OCS EIS/EA
BOEM 2012-003

Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore New Jersey, Delaware, Maryland, and Virginia

Final Environmental Assessment

U.S. Department of the Interior
Bureau of Ocean Energy Management
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FINDING OF NO SIGNIIFCANT IMPACT

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Background

Pursuant to the National Environmental Policy Act (NEPA), 42 U.S.C. §§ 4321-4370f, and the Council on Environmental Quality (CEQ) regulations at 40 CFR 1501.3, the U.S. Department of Interior (USDOI), Bureau of Ocean Energy Management (BOEM) has prepared an environmental assessment (EA) to determine whether issuance of leases and approval of site assessment plans within the Wind Energy Areas (WEAs) offshore New Jersey, Delaware, Maryland and Virginia would have a significant effect on the environment and whether an environmental impact statement (EIS) must be prepared.

The Renewable Energy Leasing and Development Process

The Energy Policy Act of 2005, Pub. L. No. 109-58, added subsection 8(p)(1)(C) to the OCS Lands Act (OCSLA), which grants the Secretary of the Interior the authority to issue leases, easements, or rights-of-way on the OCS for the purpose of renewable energy development, including wind energy development. *See* 43 U.S.C. § 1337(p)(1)(C). The Secretary delegated this authority to the former Minerals Management Service (MMS), now BOEM. On April 22, 2009, BOEM promulgated final regulations implementing this authority at 30 CFR Part 585.

Under the renewable energy regulations, the issuance of leases and subsequent approval of wind energy development on the OCS is a staged decision-making process. BOEM's wind energy program occurs in four distinct phases: (1) planning; (2) lease issuance; (3) approval of a site assessment plan (SAP); and, (4) approval of a construction and operation plan (COP).

The first phase is to identify suitable areas for wind energy leasing consideration through collaborative, consultative, and analytical processes.

The second phase is the issuance of a commercial wind energy lease. The competitive lease issuance process is set forth at 30 CFR 585.210 – 585.225, and the noncompetitive process is set forth at 30 CFR 585.230 – 585.232. A commercial lease gives the lessee the exclusive right to subsequently seek BOEM approval for the development of the leasehold. The lease does not grant the lessee the right to construct any facilities; rather, the lease grants the right to use the leased area to develop its plans, which must be approved by BOEM before the lessee can move on to the next stage of the process. *See* 30 CFR 585.600 and 585.601. On September 6, 2011, BOEM published in the *Federal Register* the proposed commercial renewable energy lease form (76 FR 55090).

The third stage of the process is the submission of a SAP, which contains the lessee's detailed proposal for the construction of a meteorological tower and/or the installation of meteorological buoys on the leasehold. *See* 30 CFR 585.605 - 585.618. The lessee's SAP must be approved by BOEM before it conducts these "site assessment" activities on the leasehold. BOEM may approve, approve with modification, or disapprove a lessee's SAP. *See* 30 CFR 585.613.

The fourth stage of the process is the submission of a COP, a detailed plan for the construction and operation of a wind energy project on the lease. *See* 30 CFR 585.620-585.638.

BOEM approval of a COP is a precondition to the construction of any wind energy facility on the OCS. *See* 30 CFR 585.628. As with a SAP, BOEM may approve, approve with modification, or disapprove a lessee's COP. *See* 30 CFR 585.628.

The regulations also require that a lessee provide the results of surveys with its COP, including a shallow hazards survey (30 CFR 585.626 (a)(1)), geological survey (30 CFR 585.616(a)(2)), geotechnical survey (30 CFR 585.626(a)(4)), and an archaeological resource survey (30 CFR 585.626(a)(5)). BOEM refers to these surveys as "site characterization" activities. *See also* http://www.boem.gov/offshore/RenewableEnergy/PDFs/GGARCH4-11-2011.pdf.

In addition to commercial leases, BOEM has the authority to issue leases to other Federal agencies and to States for the purpose of conducting renewable energy research activities that support the future production, transportation, or transmission of renewable energy. *See* 30 CFR 585.238. The terms of these types of research leases would be negotiated by the Director of BOEM and the head of the Federal agency or the Governor of the relevant State, or their authorized representatives, on a case-by-case basis, subject to the provisions of 30 CFR Part 585, including those pertaining to public involvement.

The "Smart From the Start" Atlantic Wind Energy Initiative

On November 23, 2010, Secretary of the Interior Ken Salazar announced the "Smart from the Start" Atlantic wind energy initiative to facilitate the responsible development of wind energy on the Atlantic Outer Continental Shelf (OCS). This initiative calls for the identification of areas of the Atlantic OCS that appear most suitable for commercial wind energy activities, while presenting the fewest apparent environmental and user conflicts. These areas are known as Wind Energy Areas (WEAs). In consultation with other Federal agencies and BOEM's Intergovernmental Renewable Energy Task Forces, BOEM identified WEAs offshore New Jersey, Delaware, Maryland and Virginia. As a result of comments received on the Notice of Intent to Prepare this EA, Requests for Interest, and Calls for Information and Nominations published for these areas in the *Federal Register*, the WEAs have been further refined to arrive at the following areas that were considered for leasing in the EA (*see* Section 1.5 and Figure 1.2 of the EA):

New Jersey WEA: The area offshore New Jersey considered for leasing is approximately 43 whole OCS blocks and 26 partial blocks. The area begins 7 nm from the shore and extends roughly 23 nm seaward (or the approximate 100 ft depth contour) and extends 53 nm along the Federal/state boundary from Seaside Park south to Hereford Inlet. The entire area is approximately 418 square nm (354,408 acres; 143,424 hectares).

Delaware WEA: The area offshore Delaware considered for leasing rests between the incoming and outgoing shipping routes for Delaware Bay, and is made up of 11 whole OCS blocks and 16 partial blocks. The closest point to shore is approximately 11 miles due east from Rehoboth Beach, Delaware. The entire area is approximately 122 square nm (103,323 acres; 41,813 hectares).

Maryland WEA: The area offshore Maryland considered for leasing is defined as 9 whole OCS blocks and 11 partial blocks. The western edge of the WEA is located approximately 10 nm from the Ocean City, Maryland coast and the eastern edge is approximately 27 nm from the Ocean City, Maryland coast. The entire area is approximately 94 square nm (79,706 acres; 32,256 hectares).

Virginia WEA: The area offshore Virginia considered for leasing consists of 22 whole OCS blocks and 4 partial blocks. The western edge of the area is approximately 18 nm from Virginia Beach, and the eastern edge is approximately 37 nm from Virginia Beach. The entire area is approximately 164 square nm (138,788 acres; 56,165 hectares).

Nature of the Analysis in the EA

BOEM prepared the EA to inform decisions to issue leases in these refined WEAs, and to subsequently approve SAPs on those leases. As discussed above, BOEM does not issue permits for shallow hazards, geological, geotechnical, or archaeological resource surveys. However, since BOEM regulations require that a lessee include the results of these surveys in its application for COP approval, the EA treated the environmental consequences of these surveys as reasonably foreseeable consequences of issuing a lease.

Thus, the EA analyzes the reasonably foreseeable consequences associated with two distinct BOEM actions in the WEAs:

(1) Lease issuance (including reasonably foreseeable consequences associated with shallow hazards, geological, geotechnical, and archaeological resource surveys); and
(2) SAP approval (including reasonably foreseeable consequences associated with the installation and operation of a meteorological tower and/or meteorological buoys).

Additional analysis under NEPA will be required before any future decision is made regarding construction or operation of any wind energy facility on leases that may be issued within the WEAs. BOEM is not currently reviewing any COP, nor has any COP been submitted for the agency's consideration in the aforementioned WEAs. The purpose of conducting surveys and installing meteorological measurement devices is to assess the wind resources in the lease area and to characterize the environmental and socioeconomic resources and conditions so that a lessee can determine whether the site is suitable for commercial development and, if so, submit a COP for BOEM review.

The issuance of a lease does not mean, should a lessee submit a COP in the future, that COP would be approved, or that lease will ultimately be developed at all. Rather, the lease only grants the lessee the exclusive right to use the leasehold to gather resource and site characterization information and develop its plans, and to subsequently seek BOEM approval of its plans for the development of the leasehold (*see* the proposed renewable energy commercial lease form at 76 FR 55090). Should a lessee submit a COP, BOEM would consider its merits, perform the necessary consultations with the appropriate state, federal, local, and tribal entities, solicit input from the public and the appropriate State Task Force(s), and perform an independent site- and project- specific NEPA analysis, before determining whether to approve, approve with modifications, or disapprove a lessee's COP under 30 CFR 585.628.

Therefore, the EA considers whether (1) issuing leases and (2) approving site assessment activities in certain areas of the OCS offshore New Jersey, Delaware, Maryland, and Virginia would lead to reasonably foreseeable significant environmental impacts on the environment, and thus, whether an Environmental Impact Statement (EIS) should be prepared before leases are issued (*see* 40 CFR 1508.9). As discussed below, BOEM finds that issuing leases and approving site assessment activities within the WEAs would have no significant impact on the environment. As a result, the preparation of an EIS is not necessary for BOEM to proceed with the lease issuance process in some or all of the WEAs.

Should a particular area be leased, and should the lessee subsequently submit a SAP, BOEM would then determine whether this EA adequately considers the environmental consequences of the activities proposed in the lessee's SAP. If BOEM determines that the analysis in this EA adequately considers these consequences, then no further NEPA analysis would be required before the SAP is approved. If, on the other hand, BOEM determines that the analysis in the EA is inadequate for that purpose, BOEM would prepare an additional NEPA analysis before approving the SAP.

If and when a lessee is prepared to propose wind energy generation on its lease, it will submit a COP. If a COP is submitted, BOEM would prepare a separate site- and project-specific NEPA analysis. This may take the form of an EIS and would provide additional opportunities for public involvement pursuant to NEPA and the CEQ regulations at 40 CFR Parts 1500-1508. This NEPA process would provide the public and Federal officials with comprehensive site- and project-specific information regarding the potential environmental impacts of the specific project that the lessee is proposing. BOEM will use a site- and project-specific NEPA document to evaluate the potential environmental and socioeconomic consequences associated with the proposed project when considering whether to approve, approve with modification, or disapprove a lessee's COP pursuant to 30 CFR 585.628.

Environmental and Socioeconomic Consequences of Alternative A (Full Leasing of WEAs)

In the draft version of this EA (published for comment on July 12, 2011 (76 FR 40925)), BOEM identified Alternative A as the proposed action and the preferred alternative. However, on September 26, 2011, BOEM received information from the United States Coast Guard (USCG) indicating that, should lessees attempt to develop commercial-scale renewable energy facilities in certain areas of the WEA offshore Virginia, substantial risks to navigational safety would likely arise. Although BOEM is not currently considering approving any COPs for wind energy generation facilities in any area offshore the Mid-Atlantic States, it would make little sense to give priority to issuing leases in areas that the USCG currently believes would not be suitable for development in the future (*see also* Section 2.3 of the EA). Therefore, and for the same reasons it eliminated USCG "Category A" areas from priority leasing in the Maryland WEA during scoping, BOEM ultimately determined that Alternative A should no longer be the proposed action and the preferred alternative, and instead identified Alternative E as the proposed action and the preferred alternative (*see* Chapter 2 and Section 4.5. of the EA).

Alternative A is the alternative that contemplates the issuance of commercial and research wind energy leases within the maximum area of the WEAs offshore New Jersey, Delaware, Maryland and Virginia (*see* Figure 1.2 of this EA), and approval of site assessment activities on those leases. Alternatives B, C, and E contemplate issuing leases and approving SAPs in smaller areas offshore these states. Alternative D contemplates issuing leases in the same areas as Alternative A, but imposes seasonal restrictions on leasehold activities. Alternative A is generally anticipated to have the greatest environmental consequences of the action alternatives.

As a result, Alternative A is the focus of the environmental analysis in the EA, and is the alternative against which the generally lesser impacts of the other alternatives are compared.

Like the other alternatives, Alternative A presumes the reasonably foreseeable scenarios for leasing, site characterization, and site assessment (*see* Chapter 3 of the EA). Alternative A contemplates leasing the maximum area of each WEA, resulting in 13 total leases. Like the other action alternatives, Alternative A assumes that lessees would conduct the maximum amount of site characterization surveys (i.e., shallow hazards, geological, geotechnical, archaeological and biological surveys) in their leased areas, which, under Alternative A, would constitute the full area of each WEA. Under Alternative A, assuming that all lessees choose to install meteorological facilities, BOEM assumes that up to 12 meteorological towers, 25 meteorological buoys, or some combination would be installed within in the WEAs. These site characterization and assessment activities are projected to result in about 12,000 round-trips by vessels over a five and half year period, which would be divided between 9 major and 28 smaller ports in New Jersey, Delaware, Maryland and Virginia.

Under Alternative A, as well as the other alternatives, BOEM would require lessees to undertake activities on their leases in a particular fashion for the purpose of ensuring that potential impacts to the environment are minimized or eliminated. These requirements will be imposed as stipulations in the lease instrument and/or as conditions of approval of a SAP. Such requirements include the unanticipated finds ("chance finds") requirements described in Section 4.1.3.1.2 of the EA and the mandatory project design criteria detailed in Appendix B of the EA. The reasonably foreseeable impacts of Alternative A (full leasing of the WEAs) on environmental resources and socioeconomic conditions based on the scenario above are described in detail in Section 4.1 of the EA and summarized below:

Air Quality: Due to the low level of WEA-related vessel traffic that will be traversing any of the areas offshore or in the coastal or harbor areas of the Mid-Atlantic states at any one time over the course of five and one-half years of site assessment and characterization activities, and due to the existing air quality in these areas, the amount of human activity that emits air pollutants in these areas, and the short duration of emissions associated with Alternative A, potential impacts to onshore ambient air quality from the Alternative A would be minor, if detectable. Prevailing westerly (west to east flow) winds would prevent any substantial amount of emissions associated with Alternative A activities from making it to onshore areas from the WEAs. Emissions associated with Alternative A within port and harbor areas would be negligible, if detectable, due to the low volume of vessel activity associated with Alternative A, particularly when compared to the high volume of historic, current, and anticipated future activity in and around these areas which emit pollution, and in light of the ambient air quality in most of these areas. A non-routine event such as a diesel spill may have short-term impacts on ambient air quality in a localized area, but these effects would dissipate very quickly. Neither routine activities nor non-routine events associated with Alternative A in harbor areas, coastal waters, or in the WEAs would significantly impact onshore air quality, including the Brigantine Wilderness Area Class I Area.

Water Quality: Impacts to coastal and marine waters from vessel discharges associated with Alternative A should be of short duration and remain minimal, if detectable. Sediment disturbance resulting from anchoring and coring would be short-term, temporarily impacting local turbidity and water clarity. As a result, sediment disturbance resulting from Alternative A is not anticipated to result in any significant impact to any area within the WEAs or along any potential transmission cable route. Since collisions and allisions occur infrequently and rarely result in a spill, the risk of a spill would be small. In the unlikely event of a fuel spill, minimal impacts would result since the spill would very likely be small, and would dissipate and biodegrade within a short time. As a result, the potential impacts to water quality are not expected to be significant. Storms may disturb surface waters and cause a faster dissipation of diesel if spilled, but impacts to water quality would be negligible and of a short duration. Therefore, impacts from vessel discharges, sediment disturbance, and potential spills associated with Alternative A on harbors, ports, coastal areas, and WEAs would be minor.

Coastal Habitats: Since no expansion of existing onshore facilities is expected to occur as a result of Alternative A, impacts from routine activities would be limited to a negligible increase, if any, to wake induced erosion around the smaller, non-armored, waterways that may be used by project-related vessels. Impacts to coastal habitats from an accidental diesel fuel spill, should one occur, would likely be negligible, localized, and temporary.

Benthic Resources: The primary reasonably foreseeable impacts resulting from routine activities on benthic communities would be direct contact by anchors, driven piles, and scour protection that could cause crushing or smothering. The data collected during HRG surveys would indicate the presence of any potential benthic resources, so that sensitive habitat types, such as hard bottom and live bottom habitats, would be avoided by the lessee during sub-bottom sampling and when meteorological facility siting decisions are made. As a result, Alternative A is not anticipated to result in any significant impact to benthic communities.

Marine Mammals: Alternative A is not anticipated to result in any significant or population-level effects to marine mammals. Under all alternatives, lessees would be required to abide by the mandatory project design criteria detailed in Appendix B of the EA. *See also* discussion of NMFS Concurrence, Section 5.2.1 of the EA. The potential effects to marine mammals are expected to be very localized and temporary resulting in minimal to negligible harassment depending on the specific activity. The impacts are considered minimal due to the impact producing factor itself in certain instances (e.g., most sonar work and grab samples), and/or the limited spatial and/or temporal extent of the activity in other instances (e.g. vessel transits and pile driving activity). Specifically, harassment from sound and slight increases in the risk of vessel collisions are the primary potential impacts to marine mammals associated with Alternative A, but these impacts, if any, are anticipated to be minimal. This conclusion is supported by the NMFS, which agreed that the activities to be conducted are not likely to adversely affect listed whales when implemented according to BOEM's mandatory project design criteria detailed in Appendix B of the EA (USDOC, NOAA, NMFS 2011c).

Sea Turtles: The effects of Alternative A to sea turtles, specifically leatherback, loggerhead, Kemp's ridley, and green sea turtles, are expected to be short term and would result in minimal to negligible harassment. *See* discussion of NMFS Concurrence, Section 5.2.1 of this EA. The impacts are considered minimal due to the nature of the activity itself in some cases, and the spatial-temporal setting in which the activity associated with Alternative A would take place. Harassment from noise, minor loss/displacement from forage areas, and to a lesser degree vessel collisions, are the primary anticipated direct and indirect impacts to ESA-listed sea turtles, but these impacts are anticipated to be minimal. Thus, the consequences to sea turtles are not anticipated to be significant. This conclusion is supported by the NMFS, which agreed that the activities contemplated under Alternative A are not likely to adversely affect sea turtles when implemented according to BOEM's mandatory project design criteria detailed in Appendix B of the EA (USDOC, NOAA, NMFS, 2011c).

Birds: While birds may be affected by vessel discharges, the presence of meteorological towers and buoys, vessel discharges, and accidental fuel releases, activities and events associated with Alternative A pose no threat of significant impacts to these animals. *See* discussion of USFWS Concurrence, Section 5.2.1 of this EA. The risk of collisions with meteorological towers would be minor due to the small number of towers proposed, their size, and their distance from shore and each other. The impact of meteorological buoys on ESA-listed and non-ESA listed migratory birds (including pelagic species) is similarly expected to be negligible, because buoys are much smaller and closer to the water surface than meteorological towers, and would be similarly dispersed over a wide area.

Bats: While it is rare that bat species would be foraging or migrating through the WEAs, these mammals may on occasion be driven to the project area by prevailing winds and weather. In the event bats are present, impacts would be limited to avoidance or attraction responses. Because of the anticipated distance between the meteorological towers and buoys, there would be no additive effect of constructing all the anticipated meteorological towers or placement of buoys on bats. In fact, the anticipated data collection activities (e.g., biological surveys) may assist in future environmental analyses of impacts of OCS activities on bats. To the extent that there would be any impacts to individuals, the overall impact of Alternative A on bats would be negligible.

Fish and Essential Fish Habitat: Impacts from HRG surveys and meteorological tower construction noise on fish and essential fish habitat would be limited to behavioral reactions such as avoidance of, or flight from, the sound source. Fish that do not flee the immediate action area during pile driving procedure could be exposed to lethal sound pressure levels. However, BOEM's mandatory project design criteria, including the implementation of a "soft start" procedure, will minimize the possibility of exposure to lethal sound levels (*see* Appendix B of the EA). Impacts to fish and their habitat from the discharge of waste materials or the accidental release of fuels are expected to be minor due to the limited number of structures and vessels involved in the reasonably foreseeable leasing and site assessment scenarios. Thus, potential population-level impacts on fish resulting from Alternative A are expected to be negligible.

Archaeological Resources: Offshore New Jersey, Delaware, Maryland and Virginia to the seaward extent of the WEAs, where bottom disturbing activities associated with Alternative A would occur, has the potential to contain historic and pre-contact archaeological resources. The information generated from the lessee's initial site characterization activities, the unanticipated discoveries requirement, and existing regulatory measures would make the potential for seafloor/bottom-disturbing activities (e.g. core samples, anchorages and installation of meteorological towers and buoys) to cause damage or significant impacts to archaeological or historic resources very low. Visual impacts of meteorological facilities and project-associated vessel traffic to onshore cultural resources would be limited and temporary in nature, if noticeable, and consist predominately of vessel traffic which most likely would not be distinguishable from existing vessel traffic.

Recreational Resources: Due to the distance of the proposed lease areas from shore, the fact that no new coastal infrastructure would be necessary, and the small amount of vessel traffic associated with Alternative A that would be present in any given recreational area (particularly given the existing amount of vessel traffic currently traversing these areas), no impacts to coastal recreational resources from routine activities or potential spills are expected. While impacts could occur from marine trash and debris, it is unlikely that any additional trash that could be associated with Alternative A would be perceptible.

Demographics and Employment: Alternative A is expected to have negligible but positive impacts on the population and employment of coastal counties of Virginia, Maryland, Delaware and New Jersey that would provide support services for project-related site assessment and characterization activities.

Environmental Justice: Due to the distance from shore of the proposed lease areas and the use of existing facilities, Alternative A is not expected to have disproportionately high or adverse environmental or health effects on minority or low-income populations.

Land Use and Coastal Infrastructure: Since existing ports or industrial areas are expected to be used, and expansion of these existing facilities is not anticipated to support Alternative A, no significant impact on land use or coastal infrastructure is expected as a result of Alternative A.

Commercial and Recreational Fishing Activities: The increase in vessel traffic, and activities related to the installation/operation of the meteorological towers and buoys would not significantly impact commercial or recreational fishing activities, total catch of fish and shellfish, or navigation over any substantial period of time. Any impacts, such as localized fishing displacement and/or target species availability within the immediate area of anticipated project-related site assessment and characterization activities, would be of short duration, limited area, and temporary, and result in negligible impacts to fishing.

Other Uses of the OCS: The increase in vessel traffic, and activities associated with the installation/operation of the meteorological towers and buoys would not significantly impact current or projected future shipping or navigation. It is unlikely that vessels would collide with meteorological towers or buoys due to USCG requirements relating to marking and lighting of meteorological towers or buoys, the fact that the WEAs were identified and refined to avoid the highest traffic areas, and the fact that the few anticipated structures are small and dispersed over such a wide area of ocean. An oil spill resulting from a collision or allision between a cargo vessel/tanker and a meteorological tower/buoy is not reasonably foreseeable due to the small footprint of these facilities, the fact that they will be lit and marked on navigational charts, their distance from each other and from shore, and the strong likelihood that a meteorological tower would collapse without serious damage to an oil tanker or large ship. In addition, survey activities related to Alternative A require relatively calm seas; therefore, it is unlikely that the vessel activities associated with Alternative A would occur during periods of adverse weather when tug/towboat routes may alter course and move into or close to the New Jersey, Delaware, Maryland and Virginia WEAs.

Cumulative Effects: As discussed throughout Section 4.1 of the EA, the hallmark of the affected environment is one of past, present, and future human activities and anthropogenic impacts over an extended period of time. The incremental contribution of Alternative A to other past, present, and reasonably foreseeable actions which may also affect the affected environment would be negligible.

Throughout the EA, and in Section 4.7, BOEM considered the cumulative impacts of leasing and site assessment and characterization activities in light of other past, present, and reasonably foreseeable future actions that may also affect the affected environment, including, but not limited to, projected future increases in vessel traffic, future increases in vessel traffic resulting from the anticipated widening of the Panama canal, existing and future onshore development, existing port and waterway usage, other potential future BOEM renewable energy-related activities (e.g., Atlantic Grid Holdings' (AGH) right of way (ROW) grant application for a renewable energy transmission line, New York Power Authority's application for a commercial lease offshore New York, surveying and installing meteorological facilities on existing interim policy leases), an application for constructing a renewable energy test facility in New Jersey State waters, existing buoys and other potential obstructions offshore the Mid-Atlantic states, and existing DoD activities in and around the WEAs.

In summary, since a relatively minor amount of additional vessel traffic (12,000 round trips) would be added to already heavily used and impacted areas, the incremental impacts to coastal habitats and the economy from onshore activities associated with Alternative A would be negligible, if detectable. Offshore, the impacts of this additional vessel traffic generated by Alternative A would likely be undetectable compared to the millions of military, commercial and recreational vessel trips projected to occur during the same five and one-half year period (USDOI, MMS, 2007a).

While there are several meteorological, oceanographic, and navigational buoys installed in vicinity of the WEAs, there are currently no meteorological towers or buoys installed within the New Jersey, Delaware, Maryland and Virginia WEAs. Due to the distance between the anticipated structures and the impacts associated with installing, maintaining, and decommissioning these structures, overlapping or additive impacts are not anticipated to be significant. Since the proposed action would account for nearly all of the meteorological towers and buoys in the WEAs, the cumulative impacts of the installation, operation and decommissioning of meteorological towers and buoys would be primarily a result of approving SAPs in the WEAs and, therefore would likely be negligible to minor on all environmental resources and socioeconomic conditions, as described above. Even in light of the potential impacts associated with other offshore projects, such as AGH's proposed ROW grant, the installation of meteorological facilities on existing Interim Policy leases, New York Power Authority's application for a commercial lease offshore Long Island, and Fishermen's Energy's proposal to construct a renewable energy test project in New Jersey State waters, the cumulative impacts of issuing leases and approving SAPs in the WEAs are not anticipated to be significant.

Environmental and Socioeconomic Consequences of Alternative B (Removal of Anchorage Ground Offshore Delaware)

Under Alternative B, lease issuance and approval of site assessment activities could occur in all areas of the WEAs offshore New Jersey, Delaware, Maryland and Virginia, except for a potential anchorage ground (equivalent to about a half of an OCS block) in the Delaware WEA. Like Alternative A, the reasonably foreseeable impacts of Alternative B would not be significant, though they would differ slightly from those contemplated in alternative A within and around the

Delaware WEA, and coastal areas in Delaware, Maryland, and New Jersey. Compared to the proposed action, the slightly reduced level of survey and construction activities under Alternative B would slightly reduce the impacts on environmental resources, primarily air and water quality, within the vicinity of the Delaware WEA. Under Alternative B, on-lease survey and meteorological tower construction activities that could impact vessel traffic density and patterns would not occur in the anchorage ground. It is assumed that the risk of collisions and allisions would be greater in this area, because it has higher concentrations of vessels. By eliminating the greater risk of collisions allisions in the area, Alternative B would provide a slight reduction in the overall risk of collisions and allisions than would Alternative A. *See* Section 4.2 of the EA.

Environmental and Socioeconomic Consequences of Alternative C (Removal of Category B Areas Offshore Maryland)

Under Alternative C, lease issuance and approval of site assessment activities could occur in all areas of the WEAs offshore New Jersey, Delaware, Maryland and Virginia, except for about 82 percent of the Maryland WEA. Like Alternative A, the reasonably foreseeable impacts of Alternative C would not be significant, though they would differ within and around the Maryland WEA, and coastal areas in Maryland, Delaware, and New Jersey. Compared to Alternative A, the reduced level of survey and meteorological tower construction activities under Alternative C would reduce the impacts on environmental resources within the vicinity of the Maryland WEA, while producing slightly fewer positive impacts on the population and employment of coastal counties of Maryland, Delaware and New Jersey. Under Alternative C, survey and meteorological tower construction activities that could impact vessel traffic density and patterns would not occur in the excluded blocks. Due to the reduced level of vessel traffic and one less meteorological tower anticipated, Alternative C would provide a slightly lower risk of collisions and allisions than would Alternative A. *See* Section 4.3 of the EA.

Environmental and Socioeconomic Consequences of Alternative D (Seasonal Prohibition to protect the North Atlantic Right Whale)

Like Alternative A, under Alternative D, lease issuance and approval of site assessment activities could occur in all the areas of the WEAs offshore New Jersey, Delaware, Maryland and Virginia. However, under Alternative D, high resolution geophysical (HRG) surveys and the installation and decommissioning of meteorological facilities would not be permitted during the peak migration of right whales, which is also when other marine mammals are most likely to be present. While Alternative D would reduce the risk of vessel strikes to North Atlantic right whales and other marine mammals in and around the WEAs, as a whole, it is not anticipated that the impacts of Alternative D would be substantially different from those anticipated in connection with Alternative A. In its Concurrence letter, NMFS indicated that, should Alternative A be implemented in accordance with BOEM’s mandatory project design criteria (*see* Appendix B of the EA), it is unlikely that project-related activities would adversely affect marine mammals, including the right whale (USDOC, NOAA, NMFS, 2011c). Therefore, the degree of benefit to the right whale associated with selecting alternative D is anticipated to be marginal. Since Alternative D would be narrowing the window of time to complete meteorological tower construction and site characterization activities and could result in additional biological surveys, Alternative D may result in slightly greater overall impacts, but not significant impacts, on air and water quality than would Alternative A (*see* Section 4.4 of this EA).

Environmental and Socioeconomic Consequences of Alternative E (Removal of Inclement Weather Diversion and USCG Category A Areas Offshore Virginia) (Proposed Action - Preferred Alternative)

Under Alternative E, lease issuance and approval of site assessment activities could occur in all areas of the WEAs offshore New Jersey, Delaware, Maryland and Virginia, except for two full and five partial blocks OCS blocks in the Virginia WEA identified by the American Waterways Operators and USCG as presenting navigational safety issues, assuming leases in the areas other than the excluded blocks would be developed with commercial wind energy facilities in the future. Like Alternative A, the reasonably foreseeable impacts of Alternative E would not be significant, although they would be less than Alternative A within and around the Virginia WEA. The potential impacts of Alternative E would not be significant and would differ from the proposed action only within the Virginia WEA and in the coastal and harbor areas of Virginia. Compared with Alternative A, the reduced level of survey and construction activities under Alternative E would reduce the impacts on environmental resources within the vicinity of the Virginia WEA, while producing slightly fewer positive impacts on the population and employment of coastal counties of Virginia. Since survey and meteorological tower construction activities that could impact vessel traffic density and patterns would not occur in the excluded blocks, Alternative E would present a lower risk of collisions and allisions than would Alternative A, and would have generally lower environmental impacts than would Alternative A. *See* Section 4.5 of the EA.

Alternative E has been identified as the preferred alternative because it maximizes the potential leasing area while avoiding those areas within the WEA offshore Virginia that, should they ultimately be developed with wind generation facilities, could pose a risk to navigational safety. Although BOEM is not currently considering approving any COPs for wind energy generation facilities in any area offshore the Mid-Atlantic States that could pose such a risk, it would make little sense to give priority to issuing leases in these areas that the USCG currently believes would not be suitable for development in the future (*see also* Section 2.3 of the EA). Therefore, and for the same reasons it eliminated USCG "Category A" areas from priority leasing in the Maryland WEA during scoping, BOEM ultimately identified Alternative E as the proposed action and the preferred alternative (*see* Chapter 2 and Section 4.5. of the EA).

Environmental and Socioeconomic Consequences of Alternative F (No Action)

Under the No Action alternative, no OCS wind energy leases would be issued and no new site assessment activities would be approved within the WEAs offshore New Jersey, Delaware, Maryland and Virginia at this time. While any potential environmental and socioeconomic impacts from these activities would not occur or would be postponed, the collection of data necessary to successfully determine the feasibility of the proposed lease areas for commercial wind energy development from a dedicated data collection facility would not occur and site characterization surveys would not likely occur. However, Alternative F would not meet the purpose and need.

Supporting Documents

The following environmental documents are available upon request or at http://www.boem.gov/Renewable-Energy-Program/index.aspx:

Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore New Jersey, Delaware, Maryland, and Virginia - Final Environmental Assessment (attached)

Programmatic Environmental Impact Statement for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf, Final Environmental Impact Statement, (USDOI, MMS, 2007)

Conclusion

I have thoroughly considered the prominent issues and concerns identified in the EA and by the public and cooperating and consulting agencies in their comments, as well as the evaluation of the potential effects of the proposed action and alternatives in the attached EA. It is my determination that there are no substantial questions regarding the reasonably foreseeable impacts of the proposed action or alternatives, and that no reasonably foreseeable significant impacts are expected to occur as the result of the preferred alternative or any of the alternatives contemplated in the EA. It is therefore my determination that implementing the proposed action or any of the alternatives would not constitute a major federal action significantly affecting the quality of the human environment under Section 102(2)(C) of the National Environmental Policy Act of 1969. As a result, an EIS is not required, and I am issuing this finding of no significant impact.

Alan D. Thornhill
Chief Environmental Officer
Bureau of Ocean Energy Management

20 Jan 12
Date

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1 INTRODUCTION

1.1 Background

1.1.1 "Smart from the Start" Atlantic Wind Energy Initiative

On November 23, 2010, Secretary of the Interior Ken Salazar announced the "Smart from the Start" Atlantic wind energy initiative to facilitate the responsible development of wind energy on the Atlantic Outer Continental Shelf (OCS). This initiative calls for the identification of areas of the Atlantic OCS that appear most suitable for commercial wind energy activities, and the opening of these areas for leasing and detailed site assessment activities.

On February 9, 2011, the former Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE), now the Bureau of Ocean Energy Management (BOEM), launched the first phase of this initiative through the publication of a Notice of Intent (NOI) in the *Federal Register* (76 FR 7226). The NOI identified areas of the OCS offshore the Mid-Atlantic States – New Jersey, Delaware, Maryland, and Virginia – that appeared to provide the most suitable opportunity for wind energy development, while presenting the fewest apparent user conflicts. *See* Figure 1.1. These Wind Energy Areas (WEAs), were originally delineated in the NOI, and later refined. *See* Figure 1.2. These wind areas were developed and refined through extensive consultation with other Federal agencies and BOEM's Intergovernmental Renewable Energy Task Forces of each affected state, taking place since October 29, 2010. *See* Section 1.5 for further discussion of BOEM's Intergovernmental Renewable Energy Task Forces, and development and refinement of the WEAs. The NOI solicited public input regarding the environmental and socioeconomic issues associated with wind energy leasing in these areas (76 FR 7226).

1.1.2 BOEM Authority and Regulatory Process

The Energy Policy Act of 2005, Pub. L. No. 109-58, added subsection 8(p)(1)(C) to the OCS Lands Act (OCSLA), which grants the Secretary of the Interior the authority to issue leases, easements, or rights-of-way on the OCS for the purpose of renewable energy development, including wind energy development. *See* 43 U.S.C. § 1337(p)(1)(C). The Secretary delegated this authority to the former Minerals Management Service (MMS), now BOEM. On April 22, 2009, BOEM promulgated final regulations implementing this authority at 30 CFR Part 585.

Under the renewable energy regulations, the issuance of leases and subsequent approval of wind energy development on the OCS is a staged decision-making process. BOEM's wind energy program occurs in four distinct phases: (1) planning and analysis; (2) lease issuance; (3) approval of a site assessment plan (SAP); and, (4) approval of a construction and operation plan (COP). The first phase is to identify suitable areas for wind energy leasing consideration through collaborative, consultative, and analytical processes. The second phase is the issuance of a commercial wind energy lease. The competitive lease process is set forth at 30 CFR 585.210 – 585.225, and the noncompetitive process is set forth at 30 CFR 585.230 – 585.232. A commercial lease gives the lessee the exclusive right to subsequently seek BOEM approval for the development of the leasehold. The lease does not grant the lessee the right to construct any facilities; rather, the lease grants the right to use the leased area to develop its plans, which must be approved by BOEM before the lessee can move on to the next stage of the process. *See* 30 CFR 585.600 and 585.601. On September 6, 2011, BOEM published in the *Federal Register* the proposed form to be used to issue commercial renewable energy leases on the OCS (76 FR 55090). The third stage of the process is the submission of a SAP, which contains the lessee's detailed proposal for the construction of a meteorological tower and/or the installation of meteorological buoys on the leasehold. *See* 30 CFR 585.605 - 585.618. The lessee's SAP must be approved by BOEM before it conducts these "site assessment" activities on the leasehold. BOEM may approve, approve with modification, or disapprove a lessee's SAP. *See* 30 CFR 585.613. The fourth stage of the process is the submission of a COP, a detailed plan for the construction and operation of a wind energy project on the lease. *See* 30 CFR 585.620-585.638. BOEM approval of a COP is a precondition to the construction of any wind energy facility on the OCS. *See* 30 CFR 585.628. As with a SAP, BOEM may approve, approve with modification, or disapprove a lessee's COP. *See* 30 CFR 585.628.

The regulations also require that a lessee provide the results of surveys with its COP, including a shallow hazards survey (30 CFR 585.626 (a)(1)), geological survey (30 CFR 585.616(a)(2)), geotechnical survey (30 CFR 585.626(a)(4)), and an archaeological resource survey (30 CFR 585.626(a)(5)), though BOEM does not issue permits or approvals for these activities. BOEM refers to these surveys as "site characterization" activities. *See* also http://www.boemre.gov/offshore/RenewableEnergy/PDFs/GGARCH4-11-2011.pdf.

In addition to commercial leases, BOEM has the authority to issue leases to other Federal agencies and to States for the purpose of conducting renewable energy research activities that support the future production, transportation, or transmission of renewable energy. *See* 30 CFR 585.238. The terms of these types of research leases would be negotiated by the Director of BOEM and the head of the Federal agency or the Governor of the relevant State, or their authorized representatives, on a case-by-case basis, subject to the provisions of 30 CFR Part 585, including those pertaining to public involvement.

1.2 Purpose and Need

The purpose is to issue leases and approve site assessment plans to provide for the responsible development of wind energy resources in previously identified WEAs offshore New Jersey, Delaware, Maryland and Virginia. The need is to adequately assess wind and environmental resources of the WEAs to determine whether and which areas within the WEAs are suitable for and could support commercial-scale wind energy production.

1.3 Description of the Proposed Action

Alternative A is the issuance of commercial and research wind energy leases within the WEAs offshore New Jersey, Delaware, Maryland and Virginia as shown in Figure 1.2, and approval of site assessment activities on those leases. Of the alternatives considered in this EA, Alternative A contemplates issuing leases in the largest geographic area

In the draft version of this EA (published for comment on July 12, 2011, 76 FR 40925), BOEM identified Alternative A as the proposed action and the preferred alternative. However, on September 26, 2011, the USCG advised BOEM that issuing leases in certain areas offshore Virginia posed substantial risk to navigation, should structures be installed on those leases. Although BOEM is not currently considering approving any COPs for wind energy generation facilities in any area offshore the Mid-Atlantic States, BOEM may not want to give priority to issuing leases in areas that the USCG currently believes would not be suitable for development in the future (*see* Section 2.3 of the EA). Therefore, and for the same reasons it eliminated USCG "Category A" areas from priority leasing in the Maryland WEA during scoping, BOEM ultimately determined that Alternative A should no longer be the proposed action and the preferred alternative, and instead identified Alternative E as the proposed action and the preferred alternative.

1.4 Objective of the Environmental Assessment

Pursuant to the National Environmental Policy Act (NEPA), 42 U.S.C. §§ 4321-4370f, and the Council on Environmental Quality (CEQ) Regulations at 40 CFR 1501.3, this Environmental Assessment (EA) was prepared to assist the agency in determining which OCS areas offshore the Mid-Atlantic States should be the focus of BOEM's wind energy leasing efforts. This EA considers a number of reasonable geographic and non-geographic alternatives, and evaluates the environmental and socioeconomic consequences (including potential user conflicts) associated with issuing leases and approving site assessment plans under each alternative.

1.4.1 Information Considered

Information considered in scoping the NEPA document includes:

1. Public response to the February 9, 2011, NOI to prepare this EA;
2. BOEM research and review of current relevant scientific and socioeconomic literature;
3. Comments received in response to the Requests for Interest (RFIs) and Calls for Information and Nominations (Calls) associated with wind energy planning offshore each of the Mid-Atlantic States;
4. Ongoing consultation and coordination with the members of BOEM's Intergovernmental Renewable Energy Task Forces in each Mid-Atlantic State;
5. Consultation with potentially affected tribes in each Mid-Atlantic State;
6. Ongoing consultations with other federal agencies including the U.S. Fish and Wildlife Service (USFWS), the National Marine Fisheries Service (NMFS), the U.S. Department of Defense (DOD), and the U.S. Coast Guard (USCG); and,
7. Relevant material from the *Programmatic Environmental Impact Statement for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf, Final Environmental Impact Statement* (Programmatic EIS) (USDOI, MMS, 2007a).

1.4.2 Scope of Analysis

BOEM intends to use this EA to inform decisions to issue leases in the refined WEAs, and to subsequently approve SAPs on those leases. As discussed above, BOEM does not issue permits for shallow hazards, geological, geotechnical, or archaeological resource surveys. However, since BOEM regulations require that a lessee include the results of these surveys in its application for COP approval, this EA will treat the environmental consequences of these surveys as reasonably foreseeable consequences of issuing a lease.

Thus, this EA will analyze the reasonably foreseeable consequences associated with two distinct BOEM actions in the WEAs identified in the alternatives:

(1) Lease issuance (including reasonably foreseeable consequences associated with shallow hazards, geological, geotechnical, and archaeological resource surveys); and,
(2) SAP approval (including reasonably foreseeable consequences associated with the installation and operation of a meteorological tower and/or meteorological buoys).

Additional analysis under NEPA will be required before any future decision is made regarding construction or operation of any wind energy facility on leases that may be issued within the WEAs. BOEM is not currently reviewing any COP, nor has any COP been submitted for the agency's consideration in the aforementioned WEAs. The purpose of conducting surveys and installing meteorological measurement devices is to assess the wind resources in the lease area and to characterize the environmental and socioeconomic resources and conditions so that a lessee can determine whether the site is suitable for commercial development and, if so, submit a COP for BOEM review.

BOEM's experience with the Cape Wind Project offshore Massachusetts, as well as its understanding of the evolution of the wind industry offshore northern Europe, has demonstrated that rapidly changing technology, different wind resources and wave conditions, various seabed characteristics, different project economics, and the variety of possible project designs can affect whether, to what extent, and how a lease ultimately develops. Additionally, project design and the resulting environmental impacts are often geographically and design specific, and therefore it would be premature to analyze environmental impacts related to approval of any future COP at this time (Musial and Ram, 2010; Michel et al., 2007). Since no entity is currently in a position to submit a COP (as no entity has yet been awarded a lease or acquired the necessary leasehold information to formulate such a plan), and since the specific information contained in such a plan would be determinative of the reasonably foreseeable environmental consequences associated with the development of any lease, BOEM will not speculate in this EA as to what the consequences of the potential future development of any leasehold within in a WEA would be. While analyzing the specific environmental consequences of project construction and operation would be impossibly speculative at this stage in the leasing process, this EA considers obvious navigational issues that could be presented by wind energy development on the OCS, when considering what areas should be leased. *See* Chapter 2, Alternatives, of this EA.

This EA considers whether issuing leases and approving site assessment activities in certain areas of the OCS offshore New Jersey, Delaware, Maryland, and Virginia would lead to reasonably foreseeable significant environmental impacts on the environment, and thus, whether an Environmental Impact Statement (EIS) should be prepared before leases are issued. *See* 40 CFR 1508.9. After BOEM either issues a Finding of No Significant Impact (FONSI) or completes an EIS process, BOEM may issue one or more wind energy leases in the WEAs. In the event that a particular lease is issued, and the lessee subsequently submits a SAP, BOEM would then determine whether this EA adequately considers the environmental consequences of the activities proposed in the lessee's SAP. If BOEM determines that the analysis in this EA adequately considers these consequences, then no further NEPA analysis would be required before the SAP is approved. If, on the other hand, BOEM determines that the analysis in this EA is inadequate for that purpose, BOEM would prepare an additional NEPA analysis before approving the SAP.

If and when a lessee is prepared to propose wind energy generation on its lease, it will submit a COP. If a COP is submitted, BOEM would prepare a separate site- and project-specific NEPA analysis. This may take the form of an EIS and would provide additional opportunities for public involvement pursuant to NEPA and the CEQ regulations at 40 CFR Parts 1500-1508. This NEPA process would provide the public and Federal officials with comprehensive site- and project-specific information regarding the potential environmental impacts of the specific project that the lessee is proposing. BOEM will use a site- and project-specific NEPA document to evaluate the potential environmental and socioeconomic consequences associated with the proposed project when considering whether to approve, approve with modification, or disapprove a lessee's COP pursuant to 30 CFR 585.628.

1.4.3 Planning Process

In 2010, BOEM began publishing in the *Federal Register* RFIs and Calls for the WEAs originally identified in the NOI pursuant to 30 CFR 585.210-585.216. See the section below for further discussion of the RFI and Call processes. The RFI and Call processes are planning notices designed to assist BOEM in acquiring environmental and socioeconomic information and determining whether competitive interest exists in acquiring a wind energy lease on the OCS. *See* 43 U.S.C. § 1337(p)(3). Anyone interested in acquiring a lease in the area identified in the RFI or Call must submit a valid expression of interest, which includes the identification of the specific block or blocks the applicant is interested in acquiring, and a general description of the applicant's objectives and the facilities that it contemplates using to achieve them. *See* 30 CFR 585.213. This information has assisted BOEM in developing some of the reasonably foreseeable scenarios on which the alternatives in this EA are based:

(1) The reasonably foreseeable leasing scenario, which was used to determine how many leases a particular WEA could reasonably support; and,
(2) The reasonably foreseeable site assessment scenario, which was used to determine how many meteorological towers or buoys, would likely be installed in a particular WEA.

The RFIs and Calls also solicited public comment and information on all issues associated with wind energy leasing in the areas identified. BOEM has received robust public input in response to the RFIs and Calls dealing with a full range of issues including environmental, socioeconomic, user conflict, and refinement of the WEAs, all of which were considered in the preparation of this EA.

1.5 Development and Refinement of Wind Energy Areas

In consultation with other Federal agencies and BOEM's Intergovernmental Task Forces, BOEM identified WEAs offshore New Jersey, Delaware, Maryland, and Virginia. As a result of comments received on the NOI, RFIs, and Calls, the WEAs were further refined to arrive at the area considered under Alternative A.

Coastal and Marine Spatial Planning (CMSP)

On July 19, 2010, the President signed Executive Order 13547: Stewardship of the Ocean, Our Coasts, and the Great Lakes establishing a national ocean policy and the National Ocean Council (75 FR 43023). The Order establishes a comprehensive, integrated national policy for the stewardship of the ocean, our coasts and the Great Lakes. Where BOEM actions affect the ocean, the Order requires BOEM to take such action as necessary to implement this policy, the stewardship principles and national priority objectives adopted by the Order, and guidance from the National Ocean Council. Following the principles of CMSP, BOEM developed and refined the WEAs by coordination with the Intergovernmental Renewable Energy Task Forces.

New Jersey WEA

The Call for Information and Nominations for Commercial Leasing for Wind Power on the OCS Offshore New Jersey, published on April 20, 2011, described how the WEA/Call area was identified through consultation with BOEM's New Jersey Intergovernmental Renewable Energy Task Force (76 FR 22130). This is the same area identified as a WEA in the February 9, 2011 NOI to prepare this EA (76 FR 7226).

The New Jersey WEA and Call area were developed using the boundary of New Jersey's Ocean/Wind Power Ecological Baseline Studies (OWPEBS), as a base. The results of the

OWPEBS (http://www.nj.gov/dep/dsr/ocean-wind/report.htm) helped to identify areas that may not be suitable for development, based on features ranging from physical obstructions and usages, to the presence and density of biological resources including avian populations and aquatic habitat. Certain areas were removed from consideration prior to the publication of the NOI for the following reasons:

- The northern portion of the OWPEBS area was removed from further consideration due to the presence of a major shipping lane and telecommunications cables, and high bird densities.
- The southernmost section of the OWPEBS area was removed from further consideration, where a large number of shoals and biological resources are concentrated (e.g., birds, marine mammals, sea turtles). The presence of these biological resources increases the area's sensitivity to development and includes Marine Protected Areas (MPAs) and Essential Fish Habitat (EFH).
- The area of the OCS from the state boundary seaward to the 7 nautical mile (nm) line was also removed from further consideration. The 7 nm line is the point at which the OWPEBS identified that avian density steeply declined (moving from inshore to offshore). BOEM has excluded the area from the state boundary to the 7 nm limit due to high avian densities, the numerous shipwrecks, reefs, and shoals that occur in this zone, as well as the high level of recreational and commercial vessel activity.

The New Jersey WEA was designed to avoid the following areas:

1. Shipping lanes, traffic separation schemes (TSS), areas in close proximity to pipelines and cables, artificial reefs and shipwrecks;
2. Shoals, since they function as feeding grounds and nurseries for various pelagic and bottom-dwelling species, as well as serve as fishing/feeding hotspots for recreational and commercial fishermen, birds, sea turtles and marine mammals;
3. High Avian Densities—Areas with high avian densities are mostly concentrated in state waters along the coast. However, some hotspots can be found offshore, usually associated with shoals or other unique bottom features and/or oceanographic dynamics.
4. Fishing Hot Spots—Although, usually associated with shoals, other natural and artificial bottom features can contribute to fisheries productivity, and should be avoided when possible.
5. Marine Mammals and Sea Turtles— As shown in the OWPEBS, marine mammal and sea turtles densities are roughly evenly distributed throughout the study area, and low in number (with the exception of dolphins). However, marine mammal and sea turtle densities are often found to be higher near underwater features such as shoals and ridges; and,
6. EFH— EFHs, although not well defined in the study area, are present for numerous fish species, and are known to use the area during all or some life stages.

The area analyzed in the OWPEBS encompassed a portion of the TSS in the approaches to New York and a traditional transit route utilized by tugs and barge operators. Based on recommendations by the USCG, and considering the lack of information currently available to assess vessel traffic types, densities and routing direction of vessels leaving the TSS, BOEM determined that OCS blocks within and directly south of the TSS were not included in the WEA. OCS blocks within one nm of an identified traditional tug and barge transit route were also removed from consideration.

DOD conducts offshore testing, training and operations on the OCS offshore New Jersey. Certain areas were excluded from the WEA based on DOD assessments of compatibility between commercial offshore wind development and DOD testing, training and operations.

No refinements have been made to the WEA since its identification in the NOI. The New Jersey WEA, under consideration in this NEPA document, begins 7 nm from the shore and extends roughly 23 nm seaward (or the approximate 100 ft depth contour) and extends 53 nm along the Federal/state boundary from Seaside Park south to Hereford Inlet. The entire area is approximately 418 square nm (354,408 acres; 143,424 hectares) and contains approximately 43 whole OCS blocks and 26 partial blocks. *See* Figures 1.1 and 1.2.

Delaware WEA

On April 26, 2010, BOEM published in the *Federal Register* a RFI for an area offshore Delaware for the purpose of determining whether interest exists in acquiring a commercial wind energy lease there (75 FR 21653). The area offshore Delaware identified in the RFI was delineated based on preliminary indications of interest from developers in response to Delmarva Power's Request for Proposals (RFP) in 2006 and through consultation with BOEM's Delaware Intergovernmental Renewable Energy Task Force. The area was situated between a TSS at the entrance of the Delaware Bay, and includes a 500-meter buffer from this TSS.

On January 26, 2011, BOEM published a new notice in the *Federal Register*, a Request for Competitive Interest (RFCI) offshore Delaware, to describe a further refined area for the purpose of determining whether competitive interest exists in acquiring a lease there (*see* 76 FR 4716; Figure 1.1). A charted explosive dumping ground located in the westernmost part of the area identified in the RFI was removed from the RFCI in response to safety concerns. In addition, several aliquots (1/16th of an OCS block) along the northern and southern edges of the area identified in the RFI that were transected by the edge of the RFI area were removed. Of the aliquots transected, eighteen partial aliquots were retained in the RFCI area, primarily due to the relatively close proximity to land and shallow water. The RFCI described five charted fishing grounds and a potential vessel anchorage area, which were raised in comments submitted in response to the RFI by NMFS and USCG, respectively. The USCG had requested excluding from consideration a potential future vessel anchorage area located partially within the RFI area; however, given that establishment of this anchorage ground is pending rulemaking with no clear timetable for completion, the anchorage ground was retained in the RFCI noting that mitigation measures may apply pending the authorization of a future vessel anchorage area. Located in between two traffic separation schemes and the charted explosives dumping ground, the RFCI area is absent of shoals and high avian densities, and known ordinance disposal areas.

The WEA offshore Delaware identified in the February 9, 2011, NOI to prepare this EA (76 FR 7226) is the same area identified in the RFCI. No refinements have been made to the WEA since the NOI was published. The Delaware WEA, under consideration in this NEPA document, constitutes the area offshore Delaware situated between the incoming and outgoing shipping routes for Delaware Bay, and is made up of 11 whole OCS blocks and 16 partial blocks. The closest point to shore is approximately 11 miles due east from Rehoboth Beach, Delaware. The entire area is approximately 122 square nm (103,323 acres; 41,813 hectares). *See* Figure 1.2.

On April 12, 2011, BOEM published in the *Federal Register* a Determination of No Competitive Interest (DNCI) for the purpose of providing notice that no competitive interest exists in the area identified in the RFCI and NOI (*see* 76 FR 20367). The DNCI discussed concerns and comments expressed during the public comment period for the RFCI, including consideration of important fishing grounds (*see* Section 4.1.2.7.1.2), exclusion of the potential USCG vessel anchorage area (*see* Sections 2.2 and 4.2) and consideration of a wider buffer between the area considered for leasing and the adjacent TSS (*see* Section 4.1.3.7.2).

Maryland WEA

The Commercial Leasing for Wind Power on the OCS Offshore Maryland—RFI, published in the *Federal Register* on November 9, 2010, discussed how the RFI area was delineated through consultation with BOEM's Maryland Intergovernmental Renewable Energy Task Force (75 FR 68824). As a result of that consultation process, BOEM removed several OCS blocks in response to concerns raised by the Maryland Department of Natural Resources regarding the existence of cold water corals, recreational and commercial fishing activities, bird concentrations, shipwrecks, artificial reefs and certain benthic habitats, including shoals. The RFI area is the same area identified as a WEA in the February 9, 2011 NOI to prepare this EA (76 FR 7226).

Since the announcement of the WEA, BOEM requested that the USCG identify those blocks that, should wind energy installations be placed on them, would present navigational safety issues. The USCG identified those OCS blocks or portions of the OCS blocks that it believes should not be developed because of existing and possible future increase in vessel traffic density. The USCG also identified OCS blocks or portions of OCS blocks that it believes require further study, including analysis of existing traffic usage and patterns, as well as projected future traffic increases. Additionally, the USCG identified blocks or portions of OCS blocks where the installation of wind energy structures appear to pose minimal or no detrimental impact on navigational safety. The USCG is studying these areas further to determine if their development would have any impact to navigational safety (USCG, communication, 2011). *See* Category C on Figure 1.3. In response to the input of the USCG, BOEM refined the Maryland WEA since the publication of the NOI to include only the latter two categories of OCS blocks.

The Maryland WEA, under consideration in this NEPA document, is defined as 9 whole OCS blocks and 11 partial blocks. The western edge of the WEA is located approximately 10 nm from the Ocean City, Maryland coast and the eastern edge is approximately 27 nm from the Ocean City, Maryland coast. The entire area is approximately 94 square nm (79,706 acres; 32,256 hectares). *See* Categories B and C on Figure 1.3.

Virginia WEA

The WEA, identified in the February 9, 2011 NOI (76 FR 7226), was delineated through consultation with BOEM's Virginia Intergovernmental Renewable Energy Task Force. No RFI or Call has yet been issued to gauge competitive interest in acquiring a lease offshore Virginia. BOEM identified this WEA to avoid sensitive ecological habitat and shoals along the coast north of the mouth of the Chesapeake Bay, as well as a number of other important use areas, such as DOD training areas, a charted dredge disposal site, areas of concern specified by the National Aeronautics and Space Administration (NASA) Goddard Space Flight Center's Wallops Flight Facility, and the traffic separation schemes. BOEM included portions of OCS Block 6109 for which the Commonwealth of Virginia, January 13, 2010, submitted an unsolicited request for a renewable energy research lease to be held by the Virginia Department of Mines, Minerals and Energy. The request contemplated placement of three wind turbine test platforms on the lease. Subsequent to BOEM's receipt of the research lease request, the USCG determined that wind energy structures in OCS Block 6109 would constitute a hazard to navigation. In addition, the

Virginia Maritime Association, in their March 3, 2011, response to the NOI, requested that OCS Block 6109 be removed from further leasing consideration, because, should wind energy structures ultimately be placed in that area, they could pose a potentially hazardous impediment to navigation. BOEM has determined that activities, such as the installation of meteorological towers and buoys on OCS Block 6109 would constitute a hazard to navigation, and therefore removed the block from the WEA after publication of the NOI. *See* Figure 1.1.

The Virginia WEA, under consideration in this NEPA document, consists of 22 whole OCS blocks and 4 partial blocks. The western edge of the area is approximately 18 nm from Virginia Beach, and the eastern edge is approximately 37 nm from Virginia Beach. The entire area is approximately 164 square nm (138,788 acres; 56,165 hectares). *See* Figure 1.2.

1.6 Existing Interim Policy Leases

It should be noted that, on November 6, 2007, the MMS issued an Interim Policy for authorizing the issuance of leases for the installation of offshore data collection and technology testing facilities on the OCS (72 FR 62673). In November 2009, the MMS issued four Interim Policy leases offshore New Jersey and Delaware for data collection facilities (meteorological tower/buoys) to assess wind resource potential in these areas. Three Interim Policy leases were issued offshore New Jersey in the following lease blocks for wind resource data collection: Wilmington NJ 18-02 Blocks 6931, 6836 and 7033. One Interim Policy lease was issued offshore Delaware in lease block Salisbury NJ 18-05 Block 6325. On July 11, 2011, Fishermen's Energy of New Jersey (FERN), LLC submitted their final project plan to BOEM for their Interim Lease on OCS Block 6931 to begin meteorological and oceanographic data collection. BOEM is in the process of reviewing FERN's final project plan. Site assessment activities authorized under the four Interim Policy leases are not analyzed, as part of the proposed action or alternatives considered in this EA. The environmental consequences of those activities are instead considered in the cumulative impacts section of this NEPA document and in the *Issuance of Leases for Wind Resource Data Collection on the Outer Continental Shelf Offshore Delaware and New Jersey Environmental Assessment* (Interim Policy EA) (USDOI, MMS, 2009a).

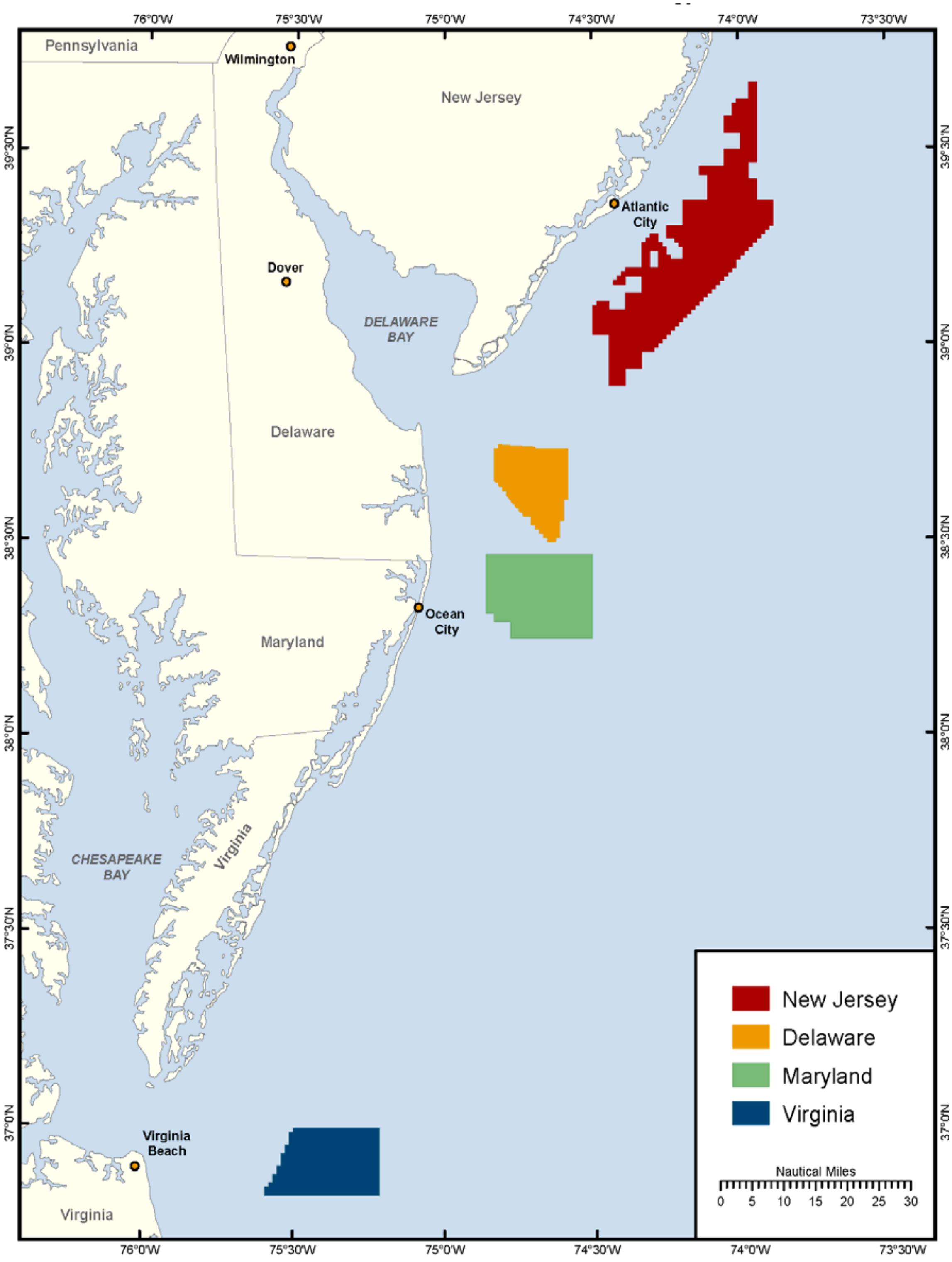

Figure 1.1. **Original WEAs offshore New Jersey, Delaware, Maryland and Virginia identified in the Notice of Intent.**

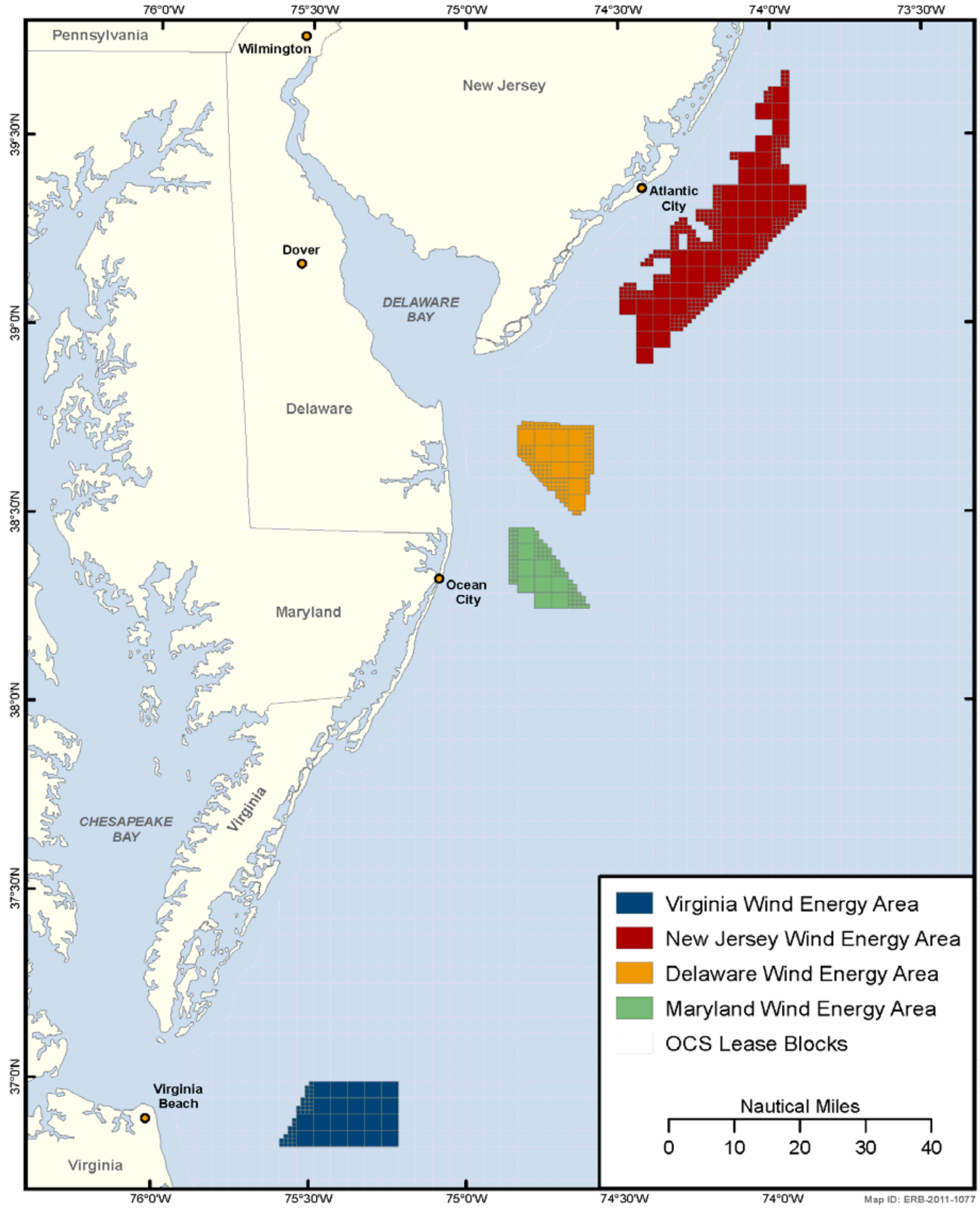

Figure 1.2. Refined Wind Energy Areas offshore New Jersey, Delaware, Maryland and Virginia.

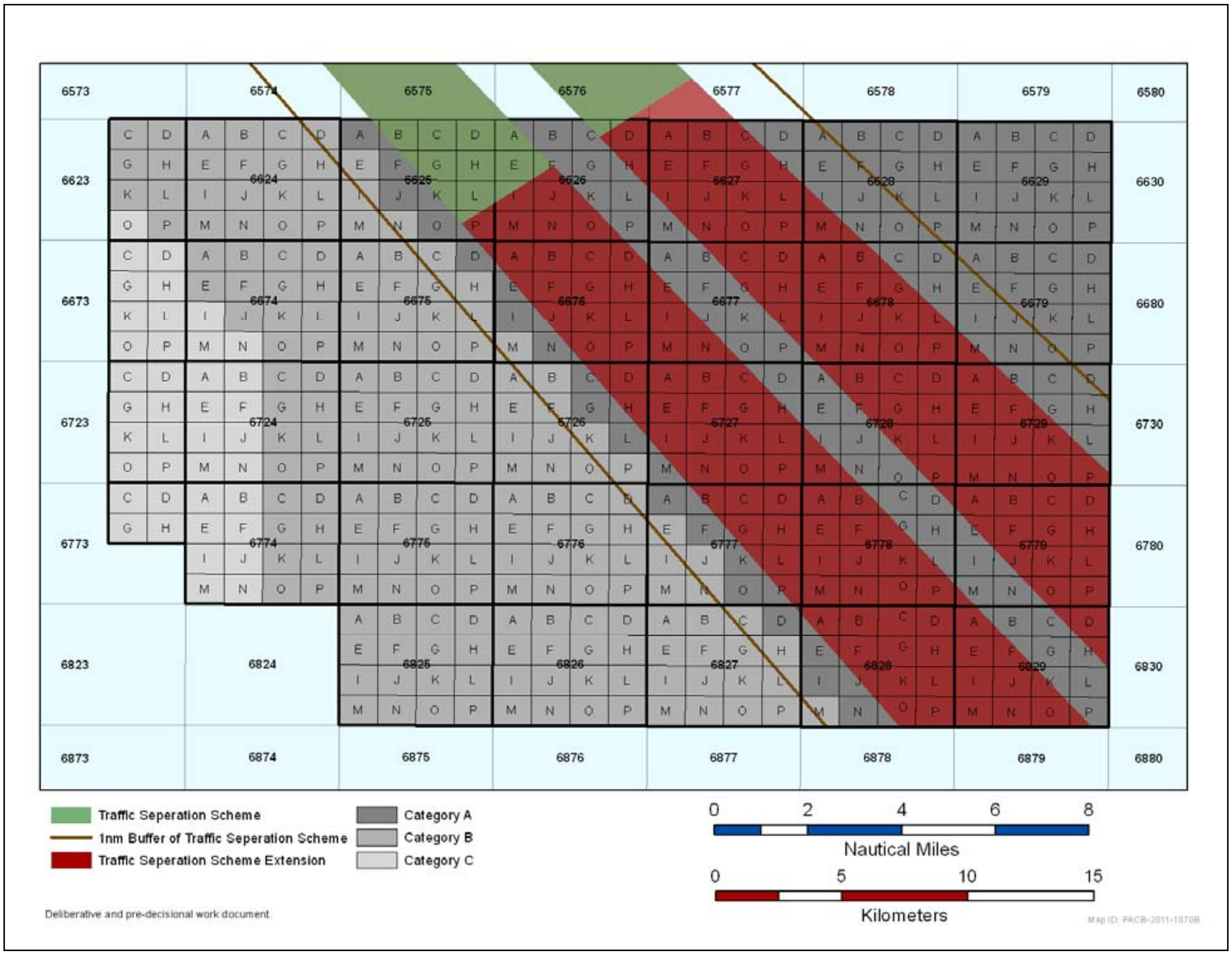

Figure 1.3. USCG-Identified Areas Offshore Maryland.

2 ALTERNATIVES

This chapter describes a number of geographic and non-geographic alternatives for lease issuance and the approval of site assessment activities within WEAs offshore New Jersey, Delaware, Maryland and Virginia. *See* Table 2.1. These alternatives were developed based on input from the following sources:

- Responses to the February 9, 2011 NOI to prepare this EA (76 FR 7226);
- Input from other Federal agencies; and
- Environmental analysis conducted for this EA.

In the Draft EA put out for public comment on July 12, 2011 (76 FR 40925) Alternative A was BOEM's proposed action and preferred alternative. On September 26, 2011, the USCG advised BOEM that issuing leases in certain areas offshore Virginia posed substantial risk to navigation, should structures be installed on those leases. Although BOEM is not currently considering approving any COPs for wind energy generation facilities in any area offshore the Mid-Atlantic States, BOEM may not want to give priority to issuing leases in areas that the USCG currently believes would not be suitable for development in the future. As a result, BOEM has modified Alternative E accordingly and has identified Alternative E as the proposed action and the preferred alternative.

Table 2.1

Alternatives Considered

Alternative	Description
Alternative A – Full Leasing for WEAs	Under Alternative A, lease issuance and approval of site assessment activities could occur in all areas of the WEAs offshore New Jersey, Delaware, Maryland and Virginia, as shown in Figure 1.2.
Alternative B – Removal of Anchorage Ground Offshore Delaware	Under Alternative B, lease issuance and approval of site assessment activities could occur in all areas of the WEAs offshore New Jersey, Delaware, Maryland and Virginia, except for an anchorage ground (equivalent to about a half of an OCS block) in the Delaware WEA.
Alternative C – Removal of Category B Areas Offshore Maryland	Under Alternative C, lease issuance and approval of site assessment activities could occur in all areas of the WEAs offshore New Jersey, Delaware, Maryland and Virginia, except for about 82% of the Maryland WEA.
Alternative D – Seasonal Prohibition to Protect the North Atlantic Right Whale	Under Alternative D, lease issuance and approval of site assessment activities could occur in all areas of the WEAs offshore New Jersey, Delaware, Maryland and Virginia, except the high resolution geological surveys, construction and decommissioning of meteorological towers and buoys would not occur during peak migration of right whales.

Alternative E (Proposed Action and Preferred Alternative) – Removal of Inclement Weather Diversion and USCG Category A Areas Offshore Virginia	Under Alternative E, lease issuance and approval of site assessment activities could occur in all areas of the WEAs offshore New Jersey, Delaware, Maryland and Virginia, except for 2 full and 5 partial OCS blocks in the Virginia WEA (or 19% of the Virginia WEA).
Alternative F – No Action	Under the No Action Alternative, no wind energy leases would be issued and no site assessment activities would be approved within the WEAs offshore New Jersey, Delaware, Maryland and Virginia at this time. Site assessment activities authorized under the four Interim Policy leases offshore New Jersey and Delaware could still occur.

2.1 Alternative A – Full Leasing of the WEAs

In consultation with other Federal agencies and BOEM's Intergovernmental Renewable Energy Task Forces, BOEM identified WEAs offshore New Jersey, Delaware, Maryland, and Virginia. As a result of comments received on the NOI, RFIs, and Calls, the WEAs have been further refined to arrive at the following areas considered under the Alternative A (Section 1.4.3 and Figures 1.1 and 1.2):

New Jersey WEA

The proposed area offshore New Jersey begins 7 nm from the shore and extends roughly 23 nm seaward (or the approximate 100 ft depth contour) and extends 53 nm along the Federal/state boundary from Seaside Park south to Hereford Inlet. The entire area is approximately 418 square nm (354,408 acres; 143,424 hectares) and contains approximately 43 whole OCS blocks and 26 partial blocks.

Delaware WEA

The proposed area offshore Delaware rests between the incoming and outgoing shipping routes for Delaware Bay, and is made up of 11 whole OCS blocks and 16 partial blocks. The closest point to shore is approximately 11 miles due east from Rehoboth Beach, Delaware. The entire area is approximately 122 square nm (103,323 acres; 41,813 hectares).

Maryland WEA

The Maryland WEA is now defined as 9 whole OCS blocks and 11 partial blocks. The western edge of the WEA is located approximately 10 nm from the Ocean City, Maryland coast and the eastern edge is approximately 27 nm from the Ocean City, Maryland coast. The entire area is approximately 94 square nm (79,706 acres; 32,256 hectares).

Virginia WEA

The Virginia WEA now consists of 22 whole OCS blocks and 4 partial blocks. The western edge of the area is approximately 18 nm from Virginia Beach, and the eastern edge is approximately 37 nm from Virginia Beach. The entire area is approximately 164 square nm (138,788 acres; 56,165 hectares).

Alternative A is the issuance of commercial and research wind energy leases within the WEAs offshore New Jersey, Delaware, Maryland and Virginia (*see* Figure 1.2), and approval of site assessment activities on those leases. This action presumes reasonably foreseeable scenarios for leasing, site characterization and site assessment as described in Chapter 3 of this document. Based on the expressions of interest in commercial wind energy leases received by BOEM, BOEM assumes that the entire area of each WEA would be leased, resulting in 13 total leaseholds. *See* Chapter 3, Reasonably Foreseeable Scenarios, of this EA. This EA also assumes that the maximum amount of site characterization surveys (i.e., shallow hazards, geological, geotechnical, archaeological and biological surveys) would be conducted in the leased areas of the WEAs. A site assessment scenario was also developed to address the range of data collection devices that may be installed under approved SAPs. BOEM assumes that, for each lease, 0-1 meteorological towers, 1-2 buoys, or a combination thereof, would be constructed or deployed. Since only one qualified company has expressed interest in the WEA offshore Delaware, and this interest was for leasing the entire WEA, only one lease is anticipated within the WEA offshore Delaware. *See* 76 FR 20367. This company already holds an Interim Policy lease authorizing the construction of a meteorological tower and/or buoy on its Interim Policy lease, so one additional meteorological buoy and no additional meteorological towers are projected in the Delaware WEA under the reasonably foreseeable scenario. As a result, up to 12 meteorological towers (should all lessees choose to propose meteorological towers on their leases) or 25 meteorological buoys (should all lessees choose to propose meteorological buoys on their leases) are projected. These site characterization and assessment activities are projected to result in about 12,000 round-trips by vessels over a five and half year period, which would be divided between 9 major and 28 smaller ports in New Jersey, Delaware, Maryland and Virginia. These leasing, site characterization and site assessment scenarios are described in detail in Chapter 3 of this EA.

Under the Alternative A as well as the other alternatives, BOEM will require lessees to undertake activities on their leaseholds in a particular fashion for the purpose of ensuring that impacts to the environment are minimized. These requirements will be imposed as stipulations in the lease instrument and/or as conditions of approval of a SAP. Such requirements include stipulations regarding the unanticipated discovery (i.e., “chance find”) of potential cultural/historic resources on the seabed (*see* Section 4.1.3.1.2, stipulations specifying processes and operating procedures designed to ensure maximum protection of endangered species and marine mammals (*see* Appendix B). Such terms and conditions are included in Chapter 4 of this EA, under the discussion of the resources they are designed to protect. These requirements are included as a part of Alternative A itself, and would be mandatory on lessees under all of the alternatives considered in this EA.

The impacts of Alternative A on environmental resources and socioeconomic conditions are described in detail in Section 4.1 of this EA.

2.2 Alternative B – Removal of Anchorage Ground Offshore Delaware

Ships frequently anchor in the vicinity of TSSs in unofficial anchorage areas, while waiting to go to port. There is such an anchorage area within the Delaware WEA offshore of Delaware Bay. *See* Figure 2.1. The USCG requested that an unofficial anchorage ground offshore Delaware, which it is considering designating officially, be excluded from consideration for leasing because, should those leases ultimately be developed with commercial wind energy generation facilities, USCG believes that those facilities would present navigational safety concerns. The anchorage ground under consideration by the USCG is bounded on its southern border by the southeast approach to Delaware Bay, on its northern border by the charted ordnance dumping ground, and on its eastern border by the 12 nm territorial sea line, and is equivalent to about half of an OCS block in size.

Alternative B differs from Alternative A in that the proposed anchorage ground (equivalent to about a half of an OCS block) would be excluded from leasing decisions under this action. An area slightly smaller (equivalent to about a half of an OCS block) than the area described under Alternative A would be considered for lease issuance and site assessment activities.

All the environmental consequences associated with selecting Alternative B would be the same as those associated with Alternative A, except for the level of impacts associated with site characterization activities. Because the proposed anchorage areas would not be leased, Alternative B would result in a slight reduction (two percent), in site characterization survey activities compared to Alternative A (reduction of about 220 nm or 50 hours of high resolution geophysical (HRG) surveys and about 6-18 bottom samples). Like Alternative A, up to one meteorological buoy is projected in the Delaware WEA (Section 3.1.3 of this EA). However, under Alternative B, that tower or buoy could not be located within the proposed anchorage ground, and therefore would pose no risk of any obstruction to navigation.

The impacts of Alternative B on environmental and socioeconomic resources are described in detail in Section 4.2 of this EA.

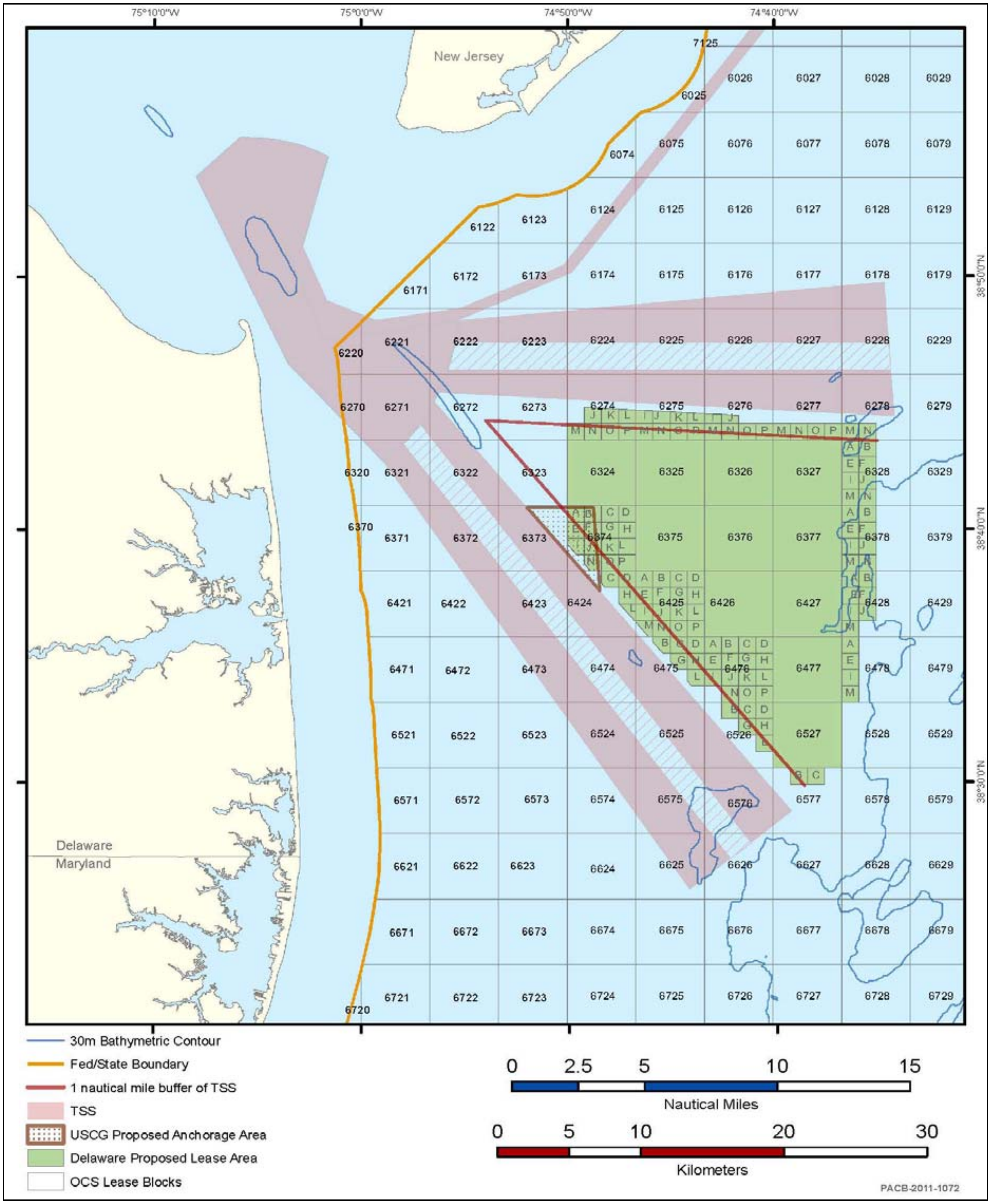

Figure 2.1 U.S. Coast Guard Proposed Anchorage Ground.

2.3 Alternative C – Removal of Category B Areas Offshore Maryland

Until its completion of the Atlantic Coast Port Access Route Study (ACPARS) in 2012 (*see* 76 FR 27788 (May 11, 2011)), the USCG has classified areas in the Maryland WEA into three categories (*see* Figure 1.3):

1. Category A – areas that USCG believes should not be leased because, should these leases be ultimately developed in the future, they would pose navigational risks due to existing and anticipated future increase in vessel traffic density (equivalent to about 18.5 OCS blocks);
2. Category B – areas which, if ultimately developed, USCG is uncertain whether navigational risks will be presented. USCG has informed BOEM that USCG needs to study these areas further before determining whether structures in these areas will pose a risk to navigational safety. (equivalent to almost 10 OCS blocks); and
3. Category C – areas in which potential future wind energy development currently appears to pose minimal or no detrimental impact on navigational safety (equivalent to about 2.5 whole OCS blocks).

The USCG's classification of these areas is based on its review of: available information including AIS data and user input; existing traffic patterns; existing literature, the consideration of opinions and advice of USCG subject matter experts on waterways management and the ACPARS Workgroup; applied concepts from the United Kingdom Maritime Guidance Note MGN 371 (guidance for determining risk levels based on proposed Offshore Renewable Energy Installations (OREI) distances from shipping routes); and opinions of senior USCG leadership.

As referenced above, the USCG is conducting an ACPARS to determine how to best route traffic on the Atlantic coast. The goal of the ACPARS (*see* 76 FR 27788 (May 11, 2011)) is to enhance navigational safety by examining existing shipping routes and waterway uses, and, to the extent practicable, reconcile the right of navigation within designated port access routes with other reasonable waterway uses such as the leasing of OCS blocks for potential construction and operation of offshore wind energy facilities.

Although BOEM is not currently considering approving any COPs for wind energy generation facilities in any area offshore the Mid-Atlantic States, BOEM may not want to give priority to issuing leases in areas that the USCG currently believes would not be suitable for development in the future. Based on the USCG's recommendation and BOEM's own preliminary analysis of vessel traffic data, BOEM has removed the Category A blocks from the Maryland WEA in all alternatives because the potential future placement of any wind energy generation facilities in these areas would pose a navigation risk to vessel traffic (*see* Section 1.5). The USCG will provide BOEM with additional navigational safety recommendations once it has completed the ACPARS.

While the USCG did not recommend that the Category B areas be removed from leasing consideration, BOEM elected to consider this as an alternative. Selection of the alternative would exclude the Category B areas from the present leasing action and allow the decision maker to make future leasing decisions for these areas after the ACPARS is complete.

Alternative C differs from Alternative A by excluding Category B Areas from leasing decisions under this action. Portions of nine OCS blocks (equivalent to about 2.5 whole OCS blocks) in the Maryland WEA would be considered for leasing and subsequent site assessment activities under Alternative C. Based simply on the reduced area, there would be about an 82% reduction in site characterization surveys offshore Maryland, and a 10% reduction to overall site characterization surveys associated with all WEAs contemplated in Alternative A. Due to the reduction in area, one less leasehold is anticipated, so it is likely one fewer meteorological tower or two fewer meteorological buoys would be constructed under Alternative C (*see* Section 3.1.3 for a reasonably foreseeable scenario for meteorological towers and buoys).

The impacts of Alternative C on environmental and socioeconomic resources are described in detail in Section 4.3 of this EA.

2.4 Alternative D – Seasonal Prohibition to Protect the North Atlantic Right Whale

The North Atlantic right whale is among the most endangered whales in the world. Current estimates of the North Atlantic right whale population are between 350-400 individuals (Waring et al., 2010). Two primary human-induced threats have been identified – collisions with vessels (ship strikes), and entanglement with fishing gear. To reduce the likelihood of ship strikes from vessels engaged in site characterization and site assessment activities, Alternative D would limit vessel activity by excluding high resolution geological surveys and the construction and decommissioning of meteorological towers and buoys during the peak migration of right whales to and from the summer feeding grounds in New England and winter calving grounds offshore Georgia and Florida. The period of exclusion would be between November and April, when the whales are present, and would apply to all four Mid-Atlantic WEAs. Vessel traffic not associated high resolution geological and geophysical surveys (e.g., vessel based and aerial avian, bat, marine mammal, sea turtle, and fish surveys), and periodic maintenance trips to install meteorological towers and buoys would not be restricted under the seasonal prohibition contemplated in this alternative.

The impacts of Alternative D on environmental and socioeconomic resources are described in detail in Section 4.4 of this EA.

2.5 Alternative E (Proposed Action and Preferred Alternative) – Removal of Inclement Weather Diversion and USCG Category A Areas Offshore Virginia

In response to the NOI, the American Waterways Operators (AWO) raised concerns regarding navigational safety in inclement weather and requested that BOEM exclude eight OCS lease blocks (6013, 6014, 6063, 6064, 6113, 6114, 6163, and 6164) within the Virginia WEA from leasing consideration (*see* Figure 2.2). The AWO states that:

> Under inclement weather conditions, vessel traffic plans require north and south bound tugboats, barge, and ATBs [articulated tug barges] to divert westward approximately 24 nm from Virginia Beach, through the proposed area of interest, between OCS leasing blocks 6013, 6014, 6063, 6064, 6113, 6114, 6163 and 6164. This area provides tugboats and barges with safer operating conditions, enough depth for tow-wires to sag 50 to 75 feet and provides ATBs with enough depth for under-keel clearance. Towing vessels would be forced to divert further west, away from the proposed area, in order to safely navigate around wind turbines. Diverting west, tugboats and barges would have to shorten their tow-wires and decrease speeds, placing crewmembers, vessels and cargo at additional risk, along with decreased maneuverability as they navigate through the shoals south of the Chesapeake Light Tower. To avoid navigating through such hostile

environments, vessels would have to be delayed while captains plot alternative bad weather diversion routes.

In response to the NOA of a draft version of this EA, AWO, after consulting with their members who are intimately familiar with the area, informed BOEM that its comments stated above were incorrectly drafted. In a letter dated August 22, 2011, AWO revised its previous comment as follows:

> AWO believes it would be preferable instead to create a channel on the most western edge of the leasing blocks by eliminating a column of parcels on the most western edge of the leasing blocks by eliminating a column of parcels on the western edge of the proposed area [full OCS blocks 6111 and 6161, and partial OCS blocks 6011, 6061, 6110, and 6160]. This change will preserve an area currently used by members during inclement weather while making a large block of undeveloped ocean available for alternative energy development.

As part of its continuing consultation with the USCG, BOEM requested that the USCG identify those OCS blocks in the Virginia WEA that, should wind energy installations be placed on them, would present navigational safety issues. On September 26, 2011, the USCG identified areas it believes would pose navigational risks should these leases be ultimately developed in the future (*see* Figure 2.2). Like it did in its analysis of the Maryland WEA, the USCG categorized these two full and five partial OCS blocks as Category A areas. The area identified by the USCG as Category A is the same as that identified as an area of concern by the AWO, except the USCG also found risk present in three additional aliquots in OCS blocks 6012.

Although BOEM is not currently considering approving any COPs for wind energy generation facilities in any area offshore the Mid-Atlantic States, BOEM may not want to give priority to issuing leases in areas that the USCG currently believes would not be suitable for development in the future (*see* Section 2.3). Based on the USCG's recommendation and BOEM's own preliminary analysis of vessel traffic data, BOEM has identified Alternative E as the preferred alternative.

BOEM revised Alternative E accordingly. Under the revised Alternative E, these areas identified by AWO and USCG would be excluded from leasing decisions under this action (*see* Figure 2.2). As a result, an area slightly less than 20 OCS blocks in the Virginia WEA would be considered for leasing and subsequent site assessment activities under Alternative E. Based simply on the reduction of the area potentially leased, there would be an 19% reduction in site characterization surveys in Virginia (about a 4% reduction in overall site characterization surveys potentially occurring in all WEAs). Due to the reduction in area, one less lease is anticipated in the Virginia WEA; therefore, one fewer meteorological tower and/or two fewer meteorological buoys would be constructed (*see* Section 3.1.3 discussing reasonably foreseeable site assessment scenarios).

Under alternative E, the scenario and impact analysis would be the same as that described under Alternative A for the WEAs offshore New Jersey, Delaware, and Maryland.

The impacts of Alternative E on environmental and socioeconomic resources are described in detail in Section 4.5 of this EA.

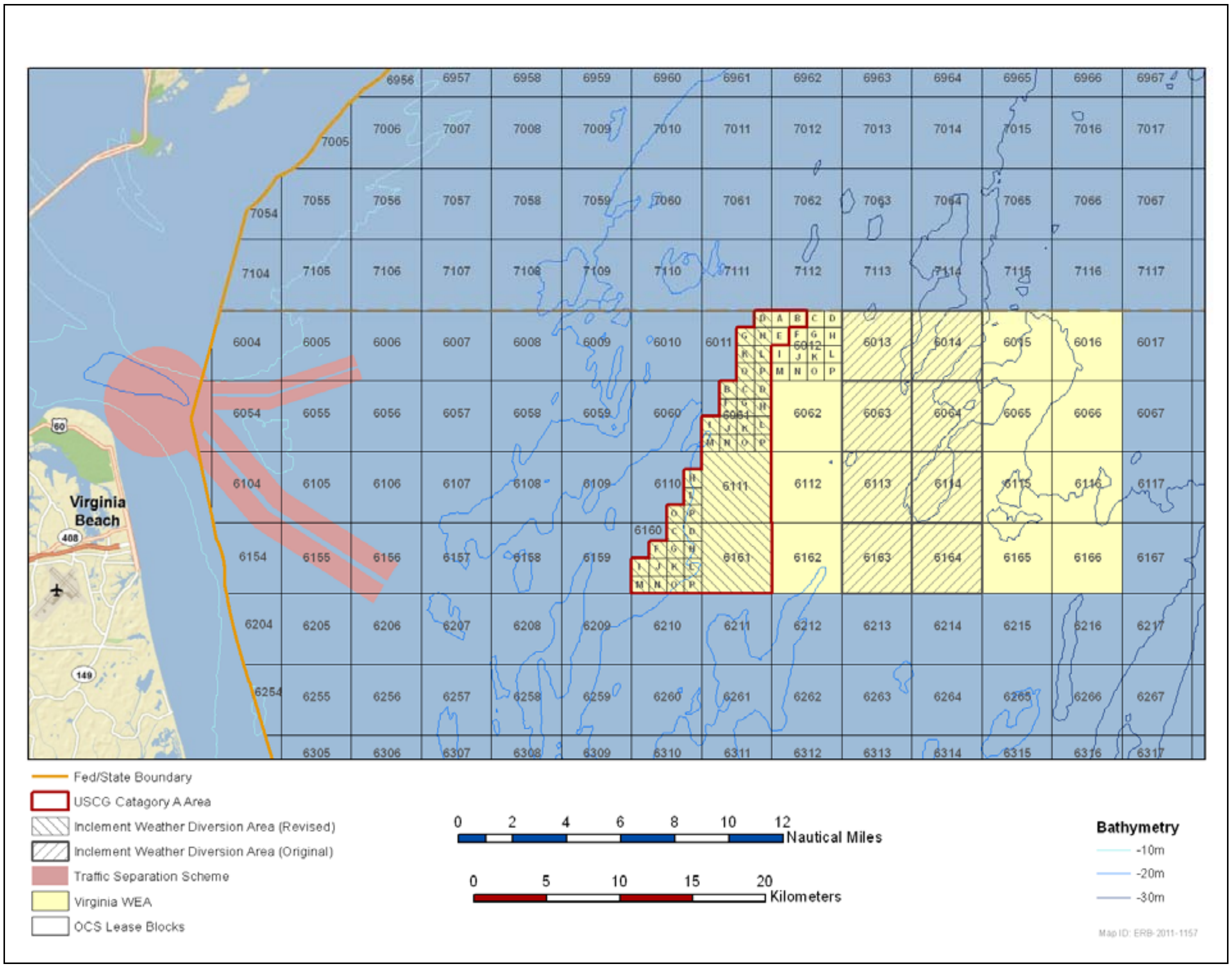

Figure 2.2 Inclement Weather Diversion and USCG Category A Areas Offshore Virginia.

2.6 Alternative F – No Action

Under the No Action Alternative, no wind energy leases would be issued and no site assessment activities would be approved within the WEAs offshore New Jersey, Delaware, Maryland and Virginia at this time. Site assessment activities authorized under the four Interim Policy leases offshore New Jersey and Delaware could still occur (*see* Section 1.6). While site characterization surveys are not under BOEM's jurisdiction and could still be conducted, due to the expense involved in conducting such surveys, it is not likely they would occur in areas that are not leased. The impacts of Alterative F (No Action) on environmental and socioeconomic resources are described in detail in Section 4.6 of this EA.

2.7 Mitigation Measures

Under the renewable energy regulations, after the lease is issued, the lessee may not commence construction of meteorological or other site assessment facilities until a SAP and the site characterization survey reports are submitted to and reviewed by BOEM (*see* 30 CFR 585.605 – 585.618). The lessee's SAP must contain a description of environmental protection features or measures that the lessee will use.

For offshore cultural resources and biologically sensitive habitats, BOEM's primary mitigation strategy has and will continue to be avoidance. For example, the exact location of meteorological towers and buoys would be adjusted to avoid adverse effects to offshore cultural resources or biologically sensitive habitats, if present. This EA also proposes several mitigation measures designed to reduce or eliminate potential environmental impacts or conflicts with existing uses. These proposed mitigation measures were developed through the analysis presented in Section 4.1, and through consultation with other Federal and State agencies. BOEM may make these proposed mitigation measures mandatory via lease stipulations and/or conditions of approval of a SAP should the specific conditions associated with a particular lease or SAP so warrant.

3 SCENARIO OF REASONABLY FORESEEABLE ACTIVITY AND IMPACT PRODUCING FACTORS

To describe the level of activity that could reasonably result from the proposed action and alternatives, BOEM developed the following scenarios for routine activities (Section 3.1 below) and non-routine events (Section 3.2 of this EA). These scenarios provide the framework for the analyses of potential environmental and socioeconomic impacts of Alternative A (Section 4.1 of this EA) and alternatives (Sections 4.2-4.6 of this EA).

3.1 Routine Activities

This section discusses the reasonably foreseeable leasing scenario, infrastructure that could be built and the activities (impact-producing factors) that could occur on those leases over the site assessment period (up to five years per lease) (*see* Table 3.1 below) subsequent to lease issuance, including site characterization surveys and the construction, operation, and decommissioning of meteorological and oceanographic data collection facilities. The routine scenario is intended to be broad enough to cover the range of reasonably foreseeable activities that would take place on a commercial or research wind lease, and structure types and activities that would be authorized under a SAP.

Table 3.1

Projected Site Characterization and Assessment Activities for Alternative A

Wind Energy Area (WEA)	Leaseholds	Site Characterization Activities		Site Assessment Activities	
		High Resolution Geophysical (HRG) Surveys (max nm/hours)	Sub-bottom Sampling (min-max)	Meteorological Towers (max)	Meteorological Buoys (max)
New Jersey	**7**	31,100/6,900	900-2,500	7	14
Delaware	1	9,300/2,100	300-700	0[1]	1[1]
Maryland	2	7,100/1,600	200-600	2	4
Virginia	3	12,600/2,800	400-1,000	3	6
Total	13	60,100/13,300	1,800-4,800	12	25

[1] Since only one qualified company has expressed interest in the WEA offshore Delaware and its interest was for the entire WEA, only one lease is anticipated for the WEA offshore Delaware. *See* 76 FR 20367. This company already holds an Interim Policy lease authorizing the construction of a meteorological tower and/or buoy on its Interim Policy lease, so one additional meteorological buoy and no additional meteorological towers are possible in the Delaware WEA under Alternative A. The environmental consequences of the meteorological tower currently authorized under the Delaware Interim Policy lease is analyzed in *Issuance of Leases for Wind Resource Data Collection on the Outer Continental Shelf Offshore Delaware and New Jersey Environmental Assessment* (Interim Policy EA) (USDOI, MMS, 2009a), and discussed in the Cumulative Impacts section of this EA.

To describe the reasonably foreseeable environmental consequences associated with lease issuance; and the approval of SAPs within the WEAs, BOEM developed the following scenarios based on the requirements of the renewable energy regulations at 30 CFR part 585, previous lease applications submitted to BOEM, proposals for data collection activities under the Interim Policy leases received from January 2008 through February 2011 (USDOI, MMS, 2009a; Fishermen's Energy, 2011; and Tetra Tech EC, Inc., 2010), and expressions of interest received in response to the numerous RFIs and Calls issued for the WEAs offshore each of the Mid-Atlantic States (Section 1.4.3 of this EA). Unless otherwise noted, assumptions in this section are based on these sources.

3.1.1 Leasing Scenario

A reasonably foreseeable leasing scenario is necessary to develop a scenario for site characterization and assessment activities. Given its nascency, there is no historical record to use to develop a leasing scenario for OCS wind energy. Instead, BOEM based its leasing scenario on the offshore wind industry's unsolicited applications for commercial leases, and responses to BOEM's renewable energy planning notices (i.e., RFIs and Calls).

In response to BOEM's renewable energy planning notices issued for WEAs offshore New Jersey, Delaware, and Maryland, the offshore wind industry submitted expressions of commercial wind energy interest that completely cover each WEA. While a RFI or Call has not been published for the Virginia WEA, BOEM believes that this trend is likely to continue in that WEA as well. Based on the expressions of commercial wind energy interest received by BOEM it is assumed that the entire area of each WEA would be leased.

Based on expressions of interest received by BOEM, proposed leases ranged from just a few OCS blocks to more than 20 blocks. The average size of a proposed wind energy lease is approximately 10 blocks. A lease size of 10 OCS blocks was used to determine the potential number of leases that may foreseeably be issued in the WEAs offshore New Jersey, Maryland, and Virginia. By dividing the total number of OCS blocks by 10, a total of 13 leases are anticipated under Alternative A. This includes 7 offshore New Jersey, 2 offshore Maryland, and 3 offshore Virginia. Since only one qualified company has expressed interest in the WEA offshore Delaware and its expressed interest in the entire WEA, only one lease is anticipated for the WEA offshore Delaware. *See* 76 FR 20367.

3.1.2 Site Characterization Surveys

BOEM regulations require that the lessee provide the results of a number of surveys with its COP, including a shallow hazards survey (30 CFR 585.626 (a)(1)), geological survey (30 CFR 585.616(a)(2)), geotechnical survey (30 CFR 585.626(a)(4)), archaeological resource survey (30 CFR 585.626(a)(5)), and biological surveys (30 CFR 585.626(a)(3)). BOEM refers to these surveys as "site characterization" activities. It is assumed that the site of a meteorological tower or buoy would be surveyed first to meet the similar data requirements for a lessee's SAP (30 CFR 585.610-585.611), and the site would not be resurveyed when the remainder of the leasehold is surveyed to meet the data requirements for a lessee's COP (30 CFR 585.626(a)). Although BOEM does not issue permits or approvals for these site characterization activities, it will not consider approving a lessee's SAP or COP if the required survey information is not included. As it is unlikely that any applicant would invest in undertaking these potentially expensive site characterizations prior to acquiring a lease (which would convey the exclusive right to apply for SAP and or COP approvals), and since the survey information must be submitted to BOEM before any SAP or COP could be approved, this EA will treat site characterization activities as actions connected to the issuance of a lease.

As described in the Programmatic EIS, to locate shallow hazards, cultural resources, and hard-bottom areas; evaluate installation feasibility; assist in the selection of appropriate foundation system designs; and determine the variability of subsurface sediments, HRG surveys and sub-bottom sampling would likely be necessary to characterize a site. On April 21, 2011, BOEM posted guidance on its website titled, *"Guidelines for Providing Geological and Geophysical, Hazards, and Archaeological Information Pursuant to 30 CFR Part 585"* (GGARCH guidelines), which details the information that would be required to satisfy 30 CFR 585.626(a) (*see* *http://www.boemre.gov/offshore/RenewableEnergy/PDFs/GGARCH4-11-2011.pdf*). In this guidance, the agency provides descriptions of survey methods that, should lessees follow them, would very likely yield information sufficient to allow the agency to consider approving a SAP or COP. For the purposes of this scenario, BOEM is assuming that all lessees would employ these methods or methods substantially similar to acquire the information required under 30 CFR585.626(a).

Lessees would only be required to submit survey information for those areas that would be disturbed or otherwise affected by future actions it proposes in a lease area. *See* GGARCH; *see also* 30 CFR 585.626. As explained further in this section, different types of site characterization surveys would be necessary to acquire the various types of information required by the regulations. Surveys with wider line spacing would likely be conducted for an entire lease area, while surveys for which narrower line spacing is recommended may be limited to the actual anticipated area of disturbance. This area of disturbance may or may not be equal to the entire lease area. However, in the absence of any specific proposal for ground-disturbing activities, this EA assumes that a lessee would survey the entire lease area at the narrower line spacing.

As a practical matter, this assumption is reasonable because acquiring survey information for the entire lease area would give the lessee the maximum flexibility to propose structures in any area of a lease. For example, if the lessee only surveyed a portion of its lease, then, under 30 CFR 585.610(b), 585.611 (SAP) and 585.626(a) (COP), it could only propose building meteorological towers or buoys or future wind energy facilities in those areas. Should those surveys reveal the presence of cultural resources or critical habitat, for example, in those areas that would preclude such development, then the lessee would need to conduct additional surveys on other portions of the lease that were not previously surveyed in order to find a location suitable for installing a facility. Doing so would incur duplicative mobilization costs (both financially and in terms of time) associated with the additional surveys. As a practical matter, comprehensive lease surveys would be far more efficient, and would allow the lessee the greatest flexibility in determining where on the leasehold to propose installing renewable energy-related structures. Comprehensive surveys would also accelerate the timeline for the lessee's proposed activities by eliminating the delay and cost associated with conducting surveys in stages.

Therefore, this EA assumes that the maximum amount of surveys would be conducted in the leased areas of the WEAs, and analyzes the environmental effects associated with maximum surveying. To the extent that lessee's survey less than 100% of their leasehold area is the same extent to which the environmental effects associated with site characterization activities would be less than what is analyzed in this EA. If the lessee opts to conduct its surveys in stages, it is assumed that the potential site of a meteorological tower or buoy would be surveyed first to meet the data requirements for a lessee's SAP (30 CFR 585.610-585.611), and that this site would not be resurveyed when the remainder of the leasehold is surveyed to meet the similar data requirements for a lessee's COP (30 CFR 585.626(a)).

As discussed in Section 3.1.2.1 below, in order to meet the information requirements of 30 CFR 585.610(b) and 585.626(a), different surveys would need to be conducted at various line spacing. *See* Section. 3.1.2.1, HRG Surveys, below. Those survey instruments that would need to be flown at the wider line spacing would very likely be attached to the same vessel surveying for a different resource at the narrower line spacing. For example, there would be no need to incur the extra time and expense in sending one vessel out to survey the lease area at 150 m line spacing for one survey, and send out another vessel to conduct a different survey of the lease area at 30m line spacing, when a single vessel could do both simultaneously. *See* GGARCH guidelines, Table 1. As a result, this EA assumes that the lessees would not conduct separate, redundant surveys based on needed line spacing, when the same vessel (or group of vessels) following the smallest line spacing could conduct all of the surveys necessary to acquire all of the relevant data in a single trip.

3.1.2.1 High-resolution Geophysical (HRG) Surveys for the Collection of Shallow Hazards, Archaeological, and Bathymetric Data

The lessee must submit the results of site characterization surveys with their SAP (30 CFR 585.610 and 585.611) and COP (30 CFR 585.626(a) and 585.627). The purpose of the HRG survey would be to acquire geophysical shallow hazards data, information pertaining to the presence or absence of archaeological resources, and to conduct bathymetric charting.

Assuming lessees would follow the GGARCH guidelines to meet the geophysical data requirements at 30 CFR 585.626(a), BOEM anticipates that the surveys would entail the following:

- For the collection of geophysical data for shallow hazards assessments, side-scan sonar/ sub-bottom profilers would be flown at 150-meter (m) line spacing over the lease area;
- For collecting geophysical data for archaeological resources assessments, magnetometers, side-scan sonar and all sub-bottom profilers would be flown at 30 meter line spacing; and,
- For bathymetric charting, lessees would use either using multi-beam technique or side-scan sonar mosaic construction that would adjust for depths encountered and provides both full-coverage of the seabed plus suitable overlap. Resolution of small discrete targets of 0.5 - 1.0 m in diameter is also necessary for the identification of potential archaeological resources.

In addition, the geophysical survey grid(s) for proposed transmission cable route(s) to shore would likely include a minimum 300 meter-wide corridor centered on the anticipated transmission cable location(s) to characterize the seabed locations where physical disturbances may occur (e.g., anchoring of vessels installing the cable or movement of the proposed cable location, if necessary). *See* GGARCH guidelines. The following likely onshore transmission grid connection points have been identified: Bethany Beach and Indian River, Delaware; Cardiff, Hudson, Larrabee, Piney Grove, and Sewaren, New Jersey; and Fentress and Norfolk, Virginia (CIER, 2010 and Atlantic Grid Operations LLC, 2010). Line spacing for surveys associated with transmission cable route surveys would follow that described above. Since it is not yet possible to predict precisely where a power substation may ultimately be installed on any given lease should it be developed in the future, or the route that any potential future transmission line would take across the seafloor to shore, this EA uses direct lines between the potential lease areas and potential interconnection points on shore to approximate the reasonably foreseeable level of surveys that may be conducted to characterize potential undersea transmission cable routes. *See* Figure 4.6. The vessel traffic associated with surveying transmission corridors off-lease has been accounted for in the vessel traffic scenarios associated with Alternative A and alternatives in this EA.

The possible types of equipment to be used during a HRG survey are summarized below and listed in Table 3.2).

Bathymetry/Depth Sounder: A depth sounder is a microprocessor-controlled, high-resolution survey-grade system that measures precise water depths in both digital and graphic formats (PAL, 2006). The system would be used in such a manner as to record with a sweep appropriate to the range of depths expected in the survey area. This EA assumes the use of multi-beam and/or single-beam bathymetry systems. The use of a multi-beam bathymetry system may be more appropriate for characterizing those lease areas containing complex topography or fragile habitats.

Magnetometer: Magnetometer surveys would be used to detect and aid in the identification of ferrous, ferric, or other objects having a distinct magnetic signature. The magnetometer sensor is typically towed as near as possible to the seafloor, which is no more than 6 meters above the seafloor.

Seafloor Imagery/Side-Scan Sonar: This survey technique is used to evaluate surface sediments, seafloor morphology, and potential surface obstructions (USDOI, MMS, 2007a). A typical side-scan sonar system consists of a top-side processor, tow cable and towfish with transducers (or 'pingers') located on the sides, which generate and record the returning sound that travels through the water column at a known speed. As explained in the GGARCH guidelines, BOEM is assuming that lessees would use a digital dual-frequency side scan sonar system with frequencies of 445 and 900 kHz and no less than 100 and 500 kHz to record continuous planimetric images of the seafloor.

Shallow & Medium (Seismic) Penetration Sub-bottom Profilers: Typically, a high-resolution Compressed High Intensity Radar Pulse (CHIRP) System sub-bottom profiler is used to generate a profile view below the bottom of the seabed, which is interpreted to develop a geologic cross section of subsurface sediment conditions under the track line surveyed. A boomer sub-bottom profiler system is capable of penetrating depth ranges of 10 to 100 m depending on frequency and bottom composition.

Table 3.2 below gives a list of typical equipment used in high-resolution site surveys and their acoustic intensity (Continental Shelf Associates, Inc., 2004). This table is representative the types of equipment that BOEM has proposed in evaluating draft project plans received under the Interim Policy leases. It should be noted that actual equipment used could have frequencies and/or sound pressure levels somewhat below or above that indicated in Table 3.2. This scenario does not include the use of any air guns that are used for deeply penetrating the seabed to determine the location, extent, and properties of oil and gas resources (such as 2D and 3D exploratory seismic surveys), as renewable energy facilities are placed meters, rather than miles, deep into the seabed.

Table 3.2

Typical Equipment to be Utilized during an HRG Survey

Survey Task	Example Equipment Model Type	Frequency (kilohertz)	Estimated Sound Pressure Levels at Source (dB re 1μPa RMS at 1m)
Singlebeam Depth Sounder	Innerspace Model 448	200 kHz	202 to 215 dB
Multibeam Depth Sounder	Reson 7101	240 kHz	207 dB
Side-Scan Sonar	Marine Sonic	300 kHz	220 dB
Shallow-Penetration Subbottom Profiler (CHIRP System)	EdgeTech CHIRP System	2-24 kHz	201 dB
Medium-Penetration Subbottom Profiler (boomer)	Applied Acoustics boomer	0.5-8 kHz	205 dB

Scenario for HRG Surveys

This EA assumes that all of the WEAs would be surveyed in their entirety, and geophysical surveys for shallow hazards (150-m line spacing) and archaeological resources (30-m line spacing) would be conducted at the same time on the same vessels conducting sweeps at the finer line spacing. This results in about 500 nm of HRG surveys per OCS block (3 statue miles by 3 statute miles), not including turns. Assuming a vessel speed of 4.5 knots (Continental Shelf Associates, Inc., 2004), and 10-hour days (daylight hours minus transit time to the site), it would take about 11 days to survey one OCS block or about 110 days to survey an average-size lease of 10 OCS blocks.

Since 13 leases are projected, 13 cable routes to shore are also projected to be surveyed. Surveying a 300 m-wide corridor along each potential cable route located outside of a lease area would result in about 5 nm or 1 hour of surveys per mile of cable. To survey all of the anticipated leases and potential cable routes to shore, HRG surveys would have to be conducted by multiple vessels and/or over multiple years. Assuming 100% coverage of the WEAs and potential cable corridors, Alternative A would result in a total of approximately 60,100 nm or 13,300 hours of HRG surveys, divided among the WEAs as follows:

- New Jersey WEA: about 31,100 nm or 6,900 hours of HRG surveys;
- Delaware WEA: about 9,300 nm or 2,100 hours of HRG surveys;
- Maryland WEA: about 7,100 nm or 1,600 hours of HRG surveys; and
- Virginia WEA: about 12,600 nm or 2,800 hours of HRG surveys.

For all vessels associated with survey activities, BOEM will require as lease stipulations, strict adherence to the project design criteria detailed in Appendix B of this EA. These requirements include exclusion zones around survey vessels, the placement of visual monitors on all survey-related vessels, compliance with NOAA Fisheries Northeast Regional Viewing Guidelines, compliance with certain reporting requirements, and mandatory ramp-up procedures. These project design criteria are more fully explained in Appendix B of this EA.

3.1.2.2 Sub-bottom Sampling

Sub-bottom sampling is required by the regulations to assess the suitability of shallow foundation soils to support a structure or transmission cable under any operational and environmental conditions that might be encountered (including extreme events), and to document soil characteristics necessary for the design and installation of structures and cables. Sub-bottom sampling also contributes to the identification of potential cultural resources by identifying relict paleolandforms that might have been suitable for human habitation. Sub-bottom sampling obtains physical and chemical data on surface sediments to provide BOEM with a detailed geotechnical evaluation of the structure's foundation(s) based on analysis of soil borings from the site (e.g., 30 CFR 585.626(4)). The results allow for a thorough investigation of the stratigraphic and geoengineering properties of the sediment that may affect the foundations or anchoring systems of project proposed renewable energy structures, which would be necessary for BOEM to consider a SAP or, later, a COP for a given lease. There should also be sufficient geological/geotechnical sampling and testing of foundation soils to thoroughly categorize engineering conditions within a proposed transmission cable corridor. Due to the cost of each sub-bottom sampling, which range from $25,000-35,000 per cone penetration test (CPT) to $500,000 per deep boring (in the renewable energy context, "deep" is anticipated to be up to 130 meters below the seabed), it is assumed the lessee would first conduct the HRG surveys and integrate the results of the HRG surveys (including analysis of archaeological, shallow hazards, and bathymetric data) in planning the geotechnical site survey and in selecting locations/depths of soil samples and in-situ tests.

Scenario for Sub-bottom Sampling

The renewable energy regulations require sediment testing at the proposed site of any proposed bottom-founded structure. *See* 30 CFR 585.610(b) (SAP) and 585.626(a) (COP). This scenario assumes that one sub-bottom sample would be taken at the foundation location for each anticipated meteorological tower and/or buoy. *See* Section 3.1.3 below for a description of the reasonably foreseeable scenario for the installation of meteorological towers/buoys associated with Alternative A. With regard to potential future COPs, the number of sub-bottom samples would depend on the number of turbines a lessee ultimately proposes (*see* 30 CFR 585.626(a)(4). As discussed in the Programmatic EIS (USDOI, MMS, 2007a), spacing between turbines is typically determined on a case-by-case basis to minimize wake effect and is based on rotor diameter associated with turbine size. In Denmark's offshore applications, for example, a spacing of seven rotor diameters between units has been used (USDOI, MMS, 2007a). Spacing of 6 x 9 rotor diameters, or 6 rotor diameters between turbines in a row and 9 rotor diameters between rows was approved for the Cape Wind project (USDOI, MMS, 2009b). In some land-based settings, turbines are separated by much greater distances, as much as 10 rotor diameters from each other (USDOI, MMS, 2007a). Based on this range in spacing for a 3.6 MW (110 m rotor diameter) turbine and a 5 MW (130 m rotor diameter) turbine, it would be possible to place anywhere from 14 – 40 turbines in one OCS block (3 statute miles by 3 statute miles). Assuming (1) a "maximum" scenario of wind development on every OCS block (which is extremely unlikely, but the lower amount of samples associated with less development would result in lower environmental impacts); (2) that a sub-bottom sample (vibracore, CPT and/or deep boring) would be conducted at every potential wind turbine location throughout the WEAs; (3) that a sub-bottom sample would be conducted every nm along each of the 13 projected transmission corridors to shore (*see* GGARCH guidelines); and (4) that a sub-bottom sample would be conducted at the foundation of each meteorological tower and/or buoy, a total of 1,800-4,800 ground penetrating surveys could occur as a result of Alternative A:

- New Jersey WEA: about 900-2,500 sub-bottom samples;
- Delaware WEA: about 300-700 sub-bottom samples;
- Maryland WEA: about 200-600 sub-bottom samples; and,
- Virginia WEA: about 400-1,000 sub-bottom samples.

Additionally, all leases issued under the proposed action and alternatives will contain an unanticipated discovery (or "chance finds") requirements, as described in Section 4.1.3.1.2 of this EA. This requirement is designed to minimize the potential of the lessee's bottom-disturbing activities to impact potential cultural resources. .

3.1.2.3 Biological Surveys

A lessee must submit the results of biological surveys with its SAP (30 CFR 585.610(b)(5)) and COP (30 CFR 585.626(3)). To assist BOEM in complying with NEPA and other relevant laws, a lessee's SAP and COP must describe biological resources, including avian resources, that could be affected by the activities proposed in its plan (30 CFR 585.611(a),(b)(5) and 585.627(a)). Once a plan is submitted, BOEM, in consultation with USFWS and NMFS, would determine whether there is sufficient information to characterize species distribution and abundance, and assess the potential impacts of the proposed activities.

These vessel and/or aerial surveys would need to characterize the biological resources of a leasehold, which can be divided into three primary categories: (1) benthic habitats; (2) avian resources; and (3) marine fauna. As part of BOEM's project design criteria (See Appendix B of this EA), all vessels and aircraft associated with Alternative A would comply with the U.S. Department of Commerce (USDOC), National Oceanic Atmospheric Administration (NOAA) Fisheries Northeast Regional Viewing Guidelines.

Benthic Habitats

The shallow hazard, and geological and geotechnical surveys described in Section 3.1.2.1 of this EA would capture all the salient features of the benthic habitat on the leasehold. These surveys would acquire information suggesting the presence or absence of exposed hard bottoms of high, moderate, or low relief; hard bottoms covered by thin, ephemeral sand layers; seagrass patches; and other algal beds, all of which are key characteristics of benthic habitat. *See* Section 4.1.2.2 (defining, describing, and discussing benthic habitat). As a result, BOEM does not anticipate that lessees would need to conduct separate surveys to characterize the benthic habitats that could be affected by their potential future leasehold activities.

Avian Resources

Under the renewable energy regulations at 30 CFR 585.626(a)(3), lessees are required to describe the state of the avian resources in its lease area in its COP submission. In some areas, such as the WEA offshore New Jersey, abundant information is available regarding the avian resources in the area (NJDEP, 2010a).

Due to the abundance of available information, BOEM does not anticipate that lessees in the WEA offshore New Jersey would need to conduct additional surveys for avian resources prior to submitting a COP. However, BOEM anticipates that lessees in an area that has not yet been surveyed for avian resources would conduct their own surveys of their lease area to meet the COP information requirement.

Avian surveys generally involve simple visual observation, either from a vessel or aircraft. Shipboard observations would generally be sufficient for the purpose of identifying the state of avian resources in the lease area, and it would be most efficient for lessees to survey for avian resources while conducting the other surveys described above. The goal of the surveys is to define the spatial distribution of avian species throughout the year in areas that a lessee ultimately proposes to develop (*see* 30 CFR 585.626). The environmental analysis in this EA assumes that lessees would conduct by monthly boat and/or aerial surveys for 2 to 3 years, during the site assessment period of a lease, prior to submitting a COP, which would capture the seasonal variation in avian numbers. Similar to guidelines developed in Germany, boat surveys would likely cover 10% of the lease (BSH, 2007). It is estimated it would take 1 to 2 days to cover 10% of an average-sized leasehold of 10 OCS blocks (but could range from 2-20 OCS blocks), which would likely be adequate for determining the presence of avian species. Surveying the same area using aerial surveys would take less than one day. Although these surveys could be conducted from vessels conducting site characterization and assessment activities in the lease area, BOEM anticipates that a lessee may undertake a maximum of 24 to 36 additional boat and/or aerial surveys for the purpose of characterizing avian resources. Should a lessee require less time to adequately characterize the avian resources of its leasehold, should vessels used for site assessment and characterization activities be used for 100% of the avian surveys, or should adequate information regarding the state of avian resources already exist (making an independent survey unnecessary), then the environmental impacts associated with conducting avian surveys would be less than that discussed in this EA. Therefore, this EA assumes that all lease areas outside of the New Jersey WEA (2 in Maryland WEA, 3 in Virginia WEA, and 1 in Delaware WEA) would be surveyed as described above. As a result, BOEM presumes that a total of 144 – 216 extra, independent surveys may be conducted to characterize avian resources under Alternative A.

Marine Fauna

Under the renewable energy regulations, a lessee would be required to describe the state of marine mammals, sea turtles, and fish resources in its lease area in its SAP submission (30 CFR 585.610(b)) and COP submission (30 CFR 585.626(a)(3)). Like with avian resources, in some areas such as the WEA offshore New Jersey, sufficient information may already be available regarding marine fauna. However, BOEM anticipates that leases in a WEA that has not yet been surveyed for marine resources would need to characterize the state of these resources to meet the COP information requirement.

Multi-year assessment periods may be necessary to capture natural seasonal and inter-annual variability of marine fauna in the area of potential effect (APE). Some data is readily available that can help inform presence or absence, and densities of marine fauna in the APE. However, these data are often incomplete or may not be available at a fine enough scale to assess the potential impacts of activities within a certain lease area. It is generally envisioned that fish, marine mammal, sea turtle, and bird aerial and shipboard surveys could be conducted simultaneously. Shipboard observations would generally be sufficient for the purpose of identifying the state of marine mammals in the lease area, and survey vessels and aircraft would have marine mammal observers on board due to standard NMFS requirements and BOEM's MMPA-related project design criteria described in Appendix B of this EA (Informal Consultation for "Non-Competitive Lease for Wind Resource Data Collection on the Northeast Outer Continental Shelf" (USDOC, NOAA, NMFS, 2009; 2010a; and 2010b)). *See also* Biological Opinion on the Cape Wind Energy Project of Nantucket Sound (USDOC, NOAA, NMFS, 2010c). Marine fauna information could also be efficiently obtained through instrumentation installed on a meteorological buoy or tower. In addition, marine fauna information from surveys can be supplemented by with publicly available information on geographic web portals that aggregate siting information from several different sources.

However, it is possible that independent marine fauna surveys would be undertaken in special circumstances or to address important data gaps. Shipboard and aerial survey information may be augmented by the deployment of passive acoustic monitors (PAMs) in such cases. As a result of the potential variability in data, the ability or inability to couple different surveys together, and the fact that it is unlikely that there would be any substantial data gaps after vessel surveys and monitoring via meteorological tower/buoy instrumentation, BOEM anticipates that very little, if any, additional vessel or aerial traffic would be associated with marine fauna surveys within the WEAs.

3.1.2.4 Timing

The timing of lease issuance, and weather and sea conditions would be the primary factors influencing timing of survey activities. Under the reasonably foreseeable site characterization scenario, BOEM would issue leases as early as late 2011 and continue through late 2012. It is assumed lessees would begin survey activities as soon as possible after receiving a lease and sea states and weather conditions permit. The most suitable sea states and weather conditions would occur from April to August (Atlantic Renewable Energy Corporation and AWS Scientific, Inc., 2004). For leases issued in late 2011, the earliest surveys would likely begin would be April 2012. Lessees have up to five years to perform site characterization activities before they must submit a COP (30 CFR 585.235(a)(2)). For leases issued in late 2012, those lessees' surveys would continue through August 2017 prior to submitting their COPs. Under Alternative A, it is projected site characterization would occur over five and one-half years from April 2012 to August 2017.

3.1.2.5 Onshore Activities

In order to conduct surveys of all of the potential leases in the WEAs and potential transmission cable routes, site characterization surveys would involve multiple vessels and would likely take place over several years. Since using vessels that could accommodate all of the necessary survey equipment and conducting as many surveys simultaneously would be most efficient, BOEM anticipates that 65 to 100 ft long vessels would be used (Irion, personal communication, 2011). Vessels must be able to accommodate a crew for several days and be large enough to mount enough cable to tow instruments. As discussed in Section 4.1.3.5, it is assumed existing ports or industrial areas in the adjacent or surrounding states would be used in support of Alternative A.

3.1.2.6 Vessel Traffic Associated with Site Characterization

Vessel traffic associated with all site characterization surveys (HRG surveys, sub-bottom sampling, and biological surveys) is projected to occur over a five and half year-period as a result of Alternative A and be divided among several existing ports in New Jersey, Delaware, Maryland, and Virginia. This section explains how the number of vessel trips was estimated.

Table 3.1 presents the amount of HRG surveys and number of sub-bottom samples that would be associated with Alternative A. For HRG surveys, this scenario assumes a vessel speed of 4.5 knots (Continental Shelf Associates, Inc. 2004) and 10-hour days (daylight hours minus transit time to and from the site). For sub-bottom sampling, this scenario assumes one sub-bottom sample (vibracore, CPT and/or deep boring) would be conducted per work day. Each work day would be associated with one round trip. In addition, BOEM presumes that 144–216 extra, independent surveys would be conducted to characterize avian resources under Alternative A. *See* Section 3.1.2.3. Based on these assumptions, approximately 3,300-6,400 vessel trips (round trips) associated with all site characterization surveys are projected to occur as a result of Alternative A over five and one-half years from April 2012 to August 2017 (Section 3.1.2.4 of this EA).

Vessel trips associated with site characterization surveys would be divided among several existing ports in New Jersey, Delaware, Maryland, and Virginia (Section 4.1.3.5 of this EA), adding traffic to already heavily-used waterways (Section 4.1.3.7 of this EA). Due to the distance of ports in New Jersey, Delaware and Maryland to the WEAs offshore those states, the ports in New Jersey, Delaware, and Maryland would support the vessel activity associated with the seven leases projected in the New Jersey WEA, the two leases projected in the Maryland WEA, and the single lease projected in the Delaware WEA. Based simply on the number of ports in New Jersey, Delaware, and Maryland, the estimated 2,500-5,000 vessel trips associated with site characterization of the New Jersey, Delaware and Maryland WEAs would be divided as follows: over half of the traffic would be supported by the 3 major and 11 smaller ports in New Jersey; and the remainder of the traffic would be split evenly between the 3 major and 8 smaller ports in Delaware and Maryland, all of which are identified in Section 4.1.3.5 of this EA. Due to the distance from ports in the other states, BOEM anticipates that the estimated 800 - 1,400 vessel trips associated with the three projected Virginia leases would be supported exclusively by the three major and nine smaller ports in Virginia identified in Section 4.1.3.5 of this EA.

More than half of the vessel traffic associated with Alternative A would be related to site characterization activities. Unlike the vessel traffic associated with site assessment activities (*see* Section 3.1.3.4 below), which would need to utilize the larger ports that would staging areas for meteorological towers and components, the vessels associated with site characterization activities could use any of the ports identified in Section 4.1.3.5 of this EA. This EA assumes that vessels associated with site assessment would strongly trend to larger ports, while vessels associated with site characterization activities would use whatever port is most convenient. As a result, this EA assumes generally that the total vessel traffic associated with Alternative A (both site characterization and site assessment) offshore would be more or less evenly distributed among large and small ports in the manner described above.

3.1.2.7 Operational Waste

Operational waste generated from all vessels associated with Alternative A 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 of greater than 15 parts per million (ppm) into the territorial sea is prohibited under 33 CFR 151.10. However, discharge is not prohibited in waters farther than 12 nm from shore if the oil concentration is less than 100 ppm. As a result, to the extent that bilge water is expelled at sea, BOEM anticipates that the discharge would be more likely to occur beyond 12 nm from shore.

Ballast water is used to maintain the 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 to ballast water as to 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 (a machine that breaks up solids) 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 (113 FR 32,869 (June 14, 2004)). BOEM assumes compliance with regulations, and therefore assumes that vessel operators would discharge trash and debris only after it has passed through a comminutor and that all other trash and debris would be returned to shore. Vessel operators are expected to abide by the USCG Ballast Water Management Program.

All vessels with toilet facilities must have a Type II or Type III marine sanitation device (MSD) that complies with 40 CFR 140 and 33 CFR 149. A Type II MSD macerates waste solids so that the discharge contains no suspended particles and has a bacteria count 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. New Jersey has no discharge zones in its rivers and the Barnegat Bay, Maryland's zones are in the Herring Bay and Northern Coastal Bays, and Virginia's no discharges zones are in the Lynnhaven River and the Broad Creek, Jackson Creek and Fishing Bay (USEPA, 2010a). Delaware does not have any discharge zones. 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 outside the State's territory and may be disposed of overboard. Gray water should not be processed through the MSD, which is specifically designed to handle sewage. BOEM assumes that vessel operators would discharge gray water overboard outside of state waters or store it onboard until they are able to dispose of it at a shoreside facility.

3.1.3 Site Assessment Activities and Data Collection Structures

A SAP describes the activities (e.g., installation of meteorological towers and buoys) a lessee plans to perform for the assessment of the wind resources and ocean conditions of its commercial lease (30 CFR 585.605). No site assessment activities could take place on a lease until BOEM has approved a lessee's SAP (30 CFR 585.600(a)). Once approved, site assessment activities would take place during the site assessment term of a commercial lease period, which is up to five years from the date of lease issuance (30 CFR 585.235(a)(2)). It is assumed that each lessee would install some type of data collection device (e.g., meteorological tower, buoy or both) on its lease to assess the wind resources and ocean conditions of the lease area. This information will allow the lessee to determine whether the lease is suitable for wind energy development, where on the lease it will propose development, and what form of development to propose in a COP.

The following scenario is addresses the reasonably foreseeable range of data collection devices that lessees may install under an approved SAP. The actual tower and foundation type and/or buoy type and anchoring system would be included in a detailed SAP submitted to BOEM, along with the results of site characterization surveys, prior to BOEM's decision to approve, approve with modification, or disapproval of a SAP. *See* 30 CFR 585.613..

BOEM assumes that, for each of the 13 leaseholds projected, 0-1 meteorological towers, 1-2 buoys, or a combination, would be constructed or deployed. Since only one qualified company has expressed interest in the WEA offshore Delaware and it is interested in acquiring a lease for the entire WEA, only one lease is anticipated for the WEA offshore Delaware. *See* 76 FR 20367. This company already holds an Interim Policy lease authorizing the construction of a meteorological tower and/or buoy in the Delaware WEA, so one additional meteorological buoy and no additional meteorological towers are projected in the Delaware WEA under Alternative A. As a result, Alternative A is projected to result in up to a total of 12 meteorological towers (should all lessees choose to propose meteorological towers on their leases) or 25 meteorological buoys (should all lessees choose to propose meteorological buoys on their leases) as presented in Table 3.3 below.

Table 3.3

Projected Number of Meteorological Towers and Buoys

Wind Energy Area (WEA)	Meteorological Towers (max)	Meteorological Buoys (max)
Delaware	0[1]	1[1]
Maryland	2	4
New Jersey	7	14
Virginia	3	6

[1] Since only one qualified company has expressed interest in the WEA offshore Delaware and its interest was for the entire WEA, only one lease is anticipated for the WEA offshore Delaware. *See* 76 FR 20367. This company already holds an Interim Policy lease authorizing the construction of a meteorological tower and/or buoy on its Interim Policy lease, so one additional meteorological buoy and no additional meteorological towers are possible in the Delaware WEA under Alternative A. The environmental consequences of the meteorological tower currently authorized under the Delaware Interim Policy lease is analyzed in *Issuance of Leases for Wind Resource Data Collection on the Outer Continental Shelf Offshore Delaware and New Jersey Environmental Assessment* (Interim Policy EA) (USDOI, MMS, 2009a), and discussed in the Cumulative Impacts section of this EA.

3.1.3.1 Meteorological Towers and Foundations

One of the traditional instruments used for characterizing wind conditions is the meteorological tower. The only meteorological tower currently installed on the OCS for the purposes of renewable energy site assessment is located on Horseshoe Shoal, in Nantucket Sound (*see* Figure 3.1). In 2002, the U.S. Army Corps of Engineers (USACE) prepared an EA for this meteorological tower (USACE, 2002). A monopole mast as shown in Figure 3.1 was used for this meteorological tower. 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 m (197 ft) above the mean lower low water datum.

Based on the Cape Wind meteorological tower, activities described in the Interim Policy EA offshore Delaware and New Jersey, and other applications received by BOEM for potential offshore leases, the meteorological tower scenario analyzed in this EA consists of a mast and data collection devices mounted on a fixed or pile-supported platform. The mast may be either a monopole (*see* Figure 3.1) or a lattice (similar to a radio tower) type (*See* Figure 3.2). A deck would be supported by a single 10-ft diameter monopole, tripod, or a steel jacket with three to four 36-inch-diameter piles. The monopole or piles would be driven anywhere from 25 to 100 feet (ft) into the seafloor. Examples of steel jacket and monopile foundations and decks are shown in Figure 3.2, and an example of a tripod foundation is shown in Figure 3.1. The final foundation type for each meteorological tower would be dependent on data collected during site characterization surveys, and its proposed design would be included in a detailed SAP submitted to BOEM for approval.

The foundation structure, and a scour control system, if required based on potential seabed scour anticipated at the site, would occupy less than two acres. Once installed, the top of a meteorological tower would be 90-100 m (295-328 ft) above mean sea level. The area of ocean bottom affected by a meteorological tower would range from about two hundred square ft, if supported by a monopole, to two thousand square ft if supported by a jacket foundation. The final foundation selection would be included in a detailed SAP submitted to BOEM along with the results of SAP-related site characterization surveys prior to BOEM consideration for approval.

Figure 3.1. Cape Wind Meteorological Tower. (Source: Cape Wind Associates, LLC).

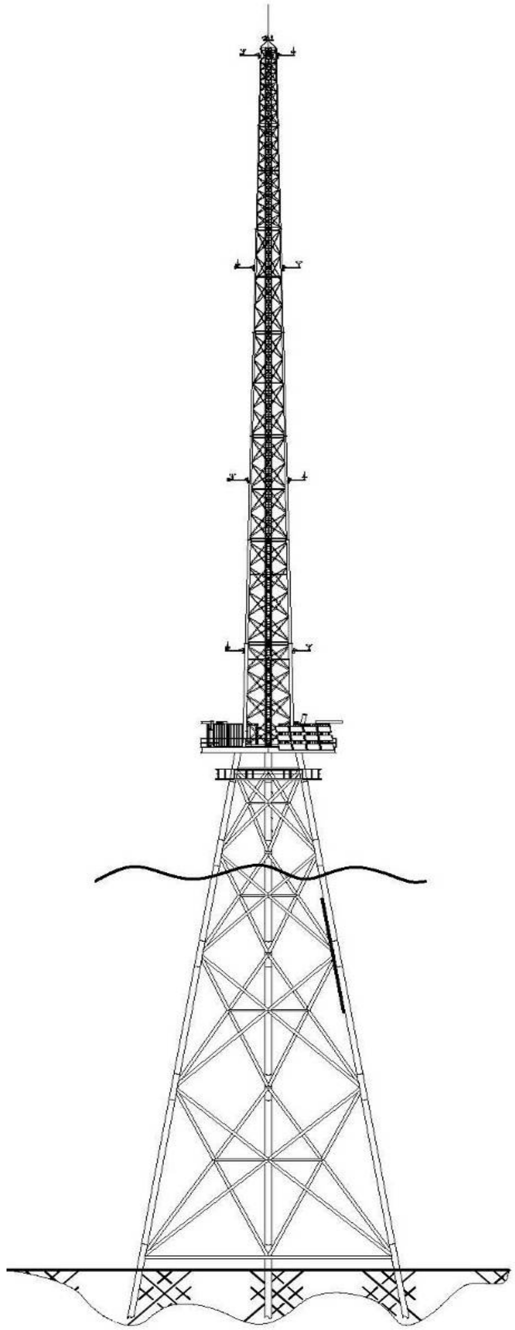

Figure 3.2(a) Example of a Lattice-type Mast Mounted on a Steel Jacket Foundation.
Source: Deepwater Wind, LLC.

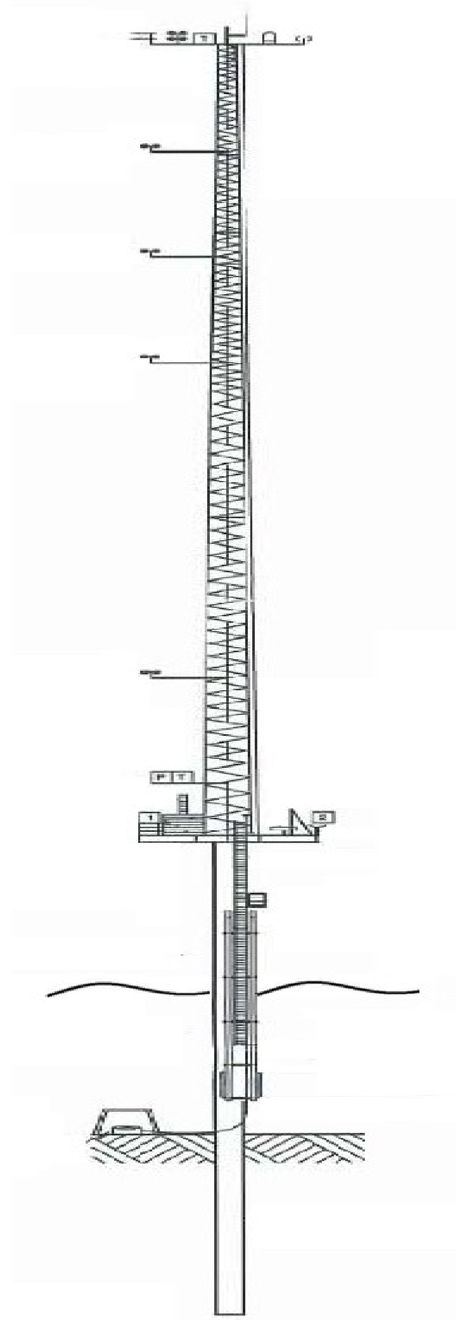

Figure 3.2(b) Example of a Lattice-type Mast Mounted on a Monopile Foundation.
Source: Fishermen's Energy of New Jersey, LLC.

Figure 3.2. Examples of Lattice Mast Meteorological Towers.

Installation

Review of the SAP

After a lease is issued and initial survey activities are conducted, the lessee may not install a meteorological tower until a SAP is submitted for review to, and approved by BOEM (30 CFR 585.614(a)). BOEM regulations (30 CFR 585.600 - 585.618) require that the SAP 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 with proposed schedules;
- 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 BOEM to ensure lessee's activities on the OCS are conducted in a safe and environmentally sound manner; and,
- Results of the geophysical and geological surveys, hazards surveys, archaeological surveys, and baseline collection studies (e.g., biological) with supporting data.

This EA considers the reasonably foreseeable environmental impacts of SAPs in certain areas of the OCS offshore New Jersey, Delaware, Maryland, and Virginia. In the event that a particular lease is issued, and the lessee subsequently submits a SAP, BOEM would then determine whether this EA adequately considers the environmental consequences of the activities proposed in the lessee's SAP. If the analysis in this EA adequately considers these consequences, then no further NEPA analysis would be required before the SAP could be approved. If, on the other hand, BOEM determines that the analysis in this EA is inadequate for that purpose, BOEM would prepare an additional NEPA analysis before approving the SAP.

The siting of meteorological towers would also be authorized by the USACE, likely under a Nationwide Permit 5 for scientific measurement devices. The USACE is a cooperating agency on this EA (*see* Section 5.2).

Timing

The timing of the issuance of a lease, and weather and sea conditions are the primary factors that would influence the timing of meteorological tower construction activities. Sea states follow annual weather patterns, with the roughest conditions occurring September through March (Atlantic Renewable Energy Corporation and AWS Scientific, Inc., 2004). Meteorological towers and buoys would likely be installed from April to August. Under Alternative A, BOEM could issue leases in late 2011. For those lessees, the first available weather season to begin construction activities would be April 2012. Lessees have up to five years to perform site assessment activities before they must submit a COP (30 CFR 585.235(a)(2)). For leases issued in late 2012, those lessees' site assessment activities would continue through August 2017 prior to submitting their COPs. Under Alternative A, it is projected site assessment would occur over five and one-half years from April 2012 to August 2017.

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 (USDOI, MMS, 2009a). Due to delays caused by weather and sea conditions, acquiring permits, and availability of vessels, workers, and tower components, it is possible that installation may not occur during the first year of a lease, and may be spread over more than one construction season. If installation occurs over two construction seasons, then it is likely that 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 (USDOI, MMS, 2009a).

Onshore Activity

A meteorological tower platform would be constructed or fabricated onshore at an existing fabrication yard. Production operations at fabrication yards would include the cutting, welding, and assembling of steel components. These 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 structures. The average bulkhead depth needed for water access to fabrications yards is 15-20 ft. Thus, platform fabrication yards must be located at deep-draft seaports or along wider and deeper of the inland channels. Section 4.1.3.5 identifies nine major ports in Delaware, New Jersey, Maryland, and Virginia that would likely support the fabrication of meteorological towers.

The meteorological tower could also be fabricated at various facilities or at inland facilities in sections, and then shipped by truck or rail to the port staging area. The meteorological tower would then be partially assembled and loaded onto a barge for transport to the offshore site. Final assembly of the tower itself would be completed offshore (USDOI, MMS, 2009a).

Because Alternative A only contemplates the installation of 12 meteorological towers, and since the fabrication facilities in the relevant major port areas are large and have high capacities, BOEM does not anticipate that the fabrication of meteorological towers associated with Alternative A would have any substantial effect on the operations of, transportation to or from, or conditions at these facilities.

Offshore Activity

During installation, a radius of approximately 1,500 ft (162 acres) around the site would be needed for the movement and anchoring of support vessels. The following sections describe the installation of a foundation structure and tower.

Several vessels would be involved with construction of a meteorological tower (*see* Table 3.4).

Table 3.4

Projected Vessel Usage and Specifications for the Construction of a Meteorological Tower

Vessel Type	Round Trips	Hours on Site	Length (ft)	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

Source: USDOI, MMS, 2009a.

Installation of the Foundation Structure and Mast

A jacket or monopole foundation and deck would be fabricated onshore then transferred to barge(s) and carried or towed to the offshore site. This equipment would typically 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 a fixed platform could range from either a single 10-ft (3-m) diameter monopile to four 3-ft (0.9-m) diameter piles (jacket). These piles would be driven anywhere from 25 to 100 ft (7.6 to 30.5 m) below the seafloor with a pile driving hammer typically used in marine construction operations.

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 overlaying soft substrate, and the impact hammer is used to finish driving the pile to its final depth (Hanson et al., 2003).

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 would be utilized to assist in the mounting of the platform decking, tower and instrumentation onto the foundation. Depending on the type of structure installed and the weather and sea conditions, the in-water construction of the foundation pilings and platform would be approximately a few days (monopole in good weather) to six weeks (jacket foundation in bad weather) (USDOI, MMS, 2009a). The mast sections would be raised using a separate barge-mounted crane; installation would likely be complete within a few weeks.

As a part of Alternative A, all lessees would be required to comply with the applicable project design standards identified in Appendix B of this EA, including “soft-start” procedures, monitoring for the presence of marine mammals and sea turtles, reporting requirements, and lighting, as well as with the unanticipated finds ("chance finds") requirements described in Section 4.1.3.1.2 of this EA, when installing a meteorological tower.

Scour Control System

Wave action, tidal circulation, and storm waves interact with sediments on the surface of the OCS, inducing sediment reworking and/or transport. Episodic sediment movement caused by ocean currents and waves can cause erosion or scour around the base of the towers. Erosion caused by scour may undermine meteorological tower structural foundations leading to potential failure.

As part of its SAP, the lessee would provide to BOEM information on the condition of the proposed site, which would include an assessment of the magnitude of potential seabed sour anticipated at the site (30 CFR 585.610(b) and 585.611(b)(1)). Based on this information, BOEM may require the installation of a scour control system as a condition of SAP approval. BOEM may also require a lessee to install a scour system after the tower is installed if substantial scour is discovered during monitoring.

There are several methods for minimizing scour around piles, such as the placement of rock armoring and mattresses of artificial (polypropylene) seagrass. A rock armor scour protection system may be used to stabilize a structure's foundation area. Rock armor and filter layer material would be placed on the seabed using a clamshell bucket or a chute. The filter layer helps prevent the loss of underlying sediments and sinking of the rock armor (ESS Group, Inc., 2006). In water depths greater than 15 ft, the median stone size would be about 50 pounds with a stone layer thickness of about 3 ft. It was estimated that the rock armor for a monopole foundation for a wind turbine would occupy 16,000 square ft (0.37 acres) of the seabed (ESS Group, Inc., 2006). While the piles of meteorological tower would be much smaller than those of a wind turbine, a meteorological tower may be supported by up to four piles. Therefore, the maximum area of the seabed impacted by rock armor for a single meteorological tower is also estimated to be 16,000 square ft (0.37 acres).

Artificial seagrass mats are made of synthetic fronds that mimic seafloor vegetation to trap sediment. The mats become buried over time and have been effective for controlling scour in both shallow and deep water (ESS Group, Inc., 2003). Monitoring of scouring at the Cape Wind meteorological tower found that, at one pile where two artificial seagrass scour mats were installed, there was a net increase of 12" of sand, and at another pile with artificial seagrass scour mats there was a net scour of 7" pilings; both occurred over a 3-yr time frame (Ocean and Coastal Consultants Inc, 2006). If used, these mats would be installed by a diver or remotely operated underwater vehicle (ROV). Each mat would be anchored at 8 to 16 locations, about one ft into the sand. It is estimated for a pile-supported platform, four mats each about 5 by 2.5 m (16.4 by 8.2 ft) would be placed around each pile. Including the extending sediment bank, a total area disturbance of about 5,200-5,900 square ft for a three-pile structure and 5,900-7,800 square ft for a four-pile structure is estimated. For a monopole, it is estimated that eight mats about 5 by 5 m (16.4 by 16.4 ft) would be used, and there would be a total area disturbance of about 3,700-4,000 square ft.

Operation and Maintenance

Under the alternatives, BOEM is assuming that lessees would install and operate a meteorological tower or meteorological buoys to assess wind resource potential during the site assessment term of a lease. A lessee must submit a COP at least six months before the end of their site assessment term of the lease if it intends to continue to the operations term of its lease (30 CFR 585.618(c)). If the COP describes continued use of existing facilities, such as a meteorological tower or buoy approved in the SAP, the lessee may keep such facilities in place on their lease during the time that BOEM reviews the COP for approval (30 CFR 585.618(a)), which may take up to two years. If following the technical and environmental review of the submitted COP, BOEM, determines that such facilities should not remain in place throughout the operations term, the lessee must initiate the decommissioning process (30 CFR 585.618(c)). Depending on how long it takes to install a meteorological tower, and depending on whether the lessee submits a COP (or the lease expires) and/or how long subsequent COP approval would take, BOEM anticipates that a meteorological tower would be present for approximately 5 years before BOEM decides whether to allow the tower to remain in place for the commercial term of a lease or whether the tower should be decommissioned immediately.

While the meteorological tower is in place, data would be collected and processed remotely; as a result, data cables to shore would not be necessary. The structure and instrumentation would be accessible by boat for routine maintenance. As indicated in previous site assessment proposals submitted to BOEM, lessees with towers powered by solar panels or small wind turbines would conduct monthly or quarterly vessel trips for operation and maintenance activity over the 5 year life of a meteorological tower (USDOI, MMS, 2009a). However, if a diesel generator is used to power the meteorological tower's 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 on the generator. Depending on the frequency of the trips, support for all of the meteorological towers in all of the WEAs would result in anywhere from of 240 quarterly to 3,120 weekly round trips. No additional or expansion of onshore facilities would be required to conduct these tasks. It is projected that crew boats 51-57 ft in length with 400-1,000 horsepower (hp) engines and 1,800 gallon fuel capacity would be used for routine maintenance, and generator refueling, if diesel generators are used. The distance from shore would make vessels more economical than helicopters, so the use of helicopters to transport personnel or supplies during operation and maintenance is not anticipated.

Lighting and Marking

All meteorological towers and buoys, regardless of height, would have lighting and marking for navigational purposes. Meteorological towers and buoys would be considered Private Aids to Navigation, which are regulated by the USCG under 33 CFR 66. A Private Aid to Navigation is a buoy, light or day beacon owned and maintained by any individual or organization other than the USCG. These aids are designed to allow individuals or organizations to mark privately owned marine obstructions or other similar hazards to navigation.

If meteorological towers are taller than 199 ft as BOEM anticipates, the lessee would also be required to file a "Notice of Proposed Construction or Alteration" with the Federal Aviation Administration (FAA) per federal aviation regulations (14 CFR 77.13). The FAA is in the process of finalizing guidance for the marking and lighting of meteorological towers less than 199 ft. tall (Edgett-Baron, personal communication, 2011). According to the FAA, specific mitigation measures, including lighting requirements, would be applied on a case-by-case basis (Edgett-Baron, personal communication, 2011). Within 12 nm of shore, any meteorological tower greater than 199 ft tall would also require an FAA obstruction evaluation analysis, to determine if the meteorological tower would pose a hazard to air traffic. Should BOEM receive a SAP for a meteorological tower outside of 12 nm from shore, BOEM would determine if the proposed meteorological tower would pose a threat to air navigation.

Visual Aesthetics

As discussed in Chapter 5.2.21.2, p. 5-120 of the Programmatic EIS, a meteorological tower in a typical seascape would introduce a vertical line that would contrast with the horizon line, and introduce a geometrical man-made element into a potentially natural landscape. Some color contrast would also be present. Weather conditions might render the top of the tower invisible or nearly so from shore, particularly for a lattice structure. While lighting on meteorological towers may be viewed from several miles away at night, the tower's lighting would be difficult to distinguish from other lighting present (e.g., vessel traffic).

The main concern related to visual impacts of meteorological towers would be that presented by the widest and most substantial portion of the tower (the deck) rather than the relatively slender (3-5 m) mast. Depending on the distance from shore, earth curvature, waves, and atmosphere could screen some or all of the deck from view. The distance (nm) that the deck of a meteorological tower would be visible by an observer at the shoreline is calculated as 1.17 times the square root of the observer's height (about 6 ft) plus 1.17 times the square root of the height of the deck (about 40 ft). Based on this formula, the decks of meteorological towers located further than 10 miles from shore would not be visible by an observer standing on the shoreline.

The Delaware, Maryland, and Virginia WEAs are all located more than 10 miles from shore. In these areas, the widest portion of meteorological towers (the decks) would be located below the visual horizon and would not be visible from shore. A small percentage of the New Jersey WEA (about 20 partial blocks) is located nearer to shore (between 7-10 miles). Only under unusually ideal conditions (e.g., high visibility and calm seas), would it be possible to see the decks of meteorological towers, should they be located in those areas of the New Jersey WEA closest to shore. While the tallest portions of the masts, up to 300 ft, would be above the visual horizon, they would be too narrow (3-5 m) to be clearly visible from shore.

Other Uses

The meteorological tower and platform could also be used to gather other information in addition to meteorological information, such as information and data regarding avian and marine mammals in the lease area. Information on other equipment that could be installed on meteorological towers is included in Section 3.1.3.3 of this EA.

Decommissioning

At the latest (*see* "Timing" section above), within a period of two years after the cancellation, expiration, relinquishment, or other termination of the lease, the lessee would be required to remove all devices, works and structures from the site and restore the leased area to its original condition before issuance of the lease (30 CFR part 585.902(a)).

It is estimated that the entire removal process of a meteorological tower would take one week or less. Decommissioning activities would begin with the removal of all meteorological instrumentation from the tower, typically a single vessel. 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 same number of vessels necessary for installation would likely be required for decommissioning. The sea bottom area beneath installed structures would be cleared of all materials that have been introduced to the area in support of the lessee's project.

Cutting and Removing

As required by BOEM, the lessee would sever bottom-founded structures and their related components at least 5 m (15 ft) below the mudline to ensure that nothing would be exposed that could interfere with future lessees and other activities in the area (30 CFR 585.910(a)). Which severing tool the operators use depends on the target size and type, water depth, economics, environmental concerns, tool availability, and weather conditions (USDOI, MMS, 2005). Due to the type and size of the piles, meteorological towers in the WEAs would most likely be removed using non-explosive severing methods. In the unlikely event that a SAP proposes the use of explosives, additional NEPA analysis and re-initiation of relevant consultations may be required.

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 tools to be employed would be an internal cutting tool, such as a high pressure water jet-cutting tool which would not require the use of divers to set up the system or jetting operations to access the required mudline (Kaiser et al., 2005). 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. As a result, 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 a decommissioning site onshore (USDOI, MMS, 2009a).

Removal of the Scour Control System

Any scour control system would also be removed during the decommissioning process. 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 the suspension of sediments that were trapped in the mats. 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 complete (USDOI, MMS, 2009a).

Disposal

Unless portions of the meteorological tower would be approved for use as artificial reefs, 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 law. Additionally, obsolete materials have been used as artificial reefs along the coastline of the United States to provide valuable habitat for numerous species of fish in areas devoid of natural hard bottom. The meteorological tower structures may also have the potential to serve as artificial reefs. However, the structure must not pose an unreasonable impediment to future development. If the lessee ultimately proposes to use the structure as an artificial reef, its plan must comply with the artificial reef permitting requirements of the USACE and the criteria in the National Artificial Reef Plan of 1985 (33 CFR 35.2103). Delaware, New Jersey, Maryland, and Virginia all have artificial reef programs. The State agency responsible for managing marine fisheries resources must accept liability for the structure before BOEM would release the Federal lessee from the obligation to decommission and remove all structures from the lease area (USDOI, MMS, 2009a).

3.1.3.2 Meteorological Buoy and Anchor System

While a meteorological tower has been the traditional device for characterizing wind conditions, several companies have expressed their interest in installing 1-2 meteorological buoys per lease instead of, or in conjunction with a meteorological tower. Meteorological buoys can be used as an alternative to or in conjunction with a meteorological tower in the offshore environment for meteorological resource data collection (i.e., wind, wave, and current). This EA assumes that, should a lessee choose to employ buoys instead of meteorological towers, it would install a maximum of two buoys per lease. These meteorological buoys would be anchored at fixed locations and regularly collect observations from many different atmospheric and oceanographic sensors.

A meteorological buoy can vary in height, hull type, and anchoring method. NOAA has successfully used discus-shaped hull buoys and boat-shaped hull buoys for weather data collection for many years. These are the buoy types that would most likely be adapted for offshore wind data collection. A large discus buoy has a circular hull ranges between 10 – 12 m diameter, and is designed for many years of service (USDOC, NOAA, National Data Buoy Center, 2011). The boat-shaped hull buoy (known as the ‘NOMAD’) is an aluminum-hulled, boat-shaped buoy with provides long-term survivability in severe seas (USDOC, NOAA, National Data Buoy Center, 2011). The largest meteorological buoys anticipated in this scenario would be similar to one proposed offshore New Jersey by Garden State Offshore Energy (GSOE) (Tetra Tech EC, Inc., 2010). GSOE proposed a 100' (30 m) long spar-type buoy weighing approximately 15 tons and just over 6 ft (2 m) in diameter.

A buoy’s specific mooring design is based on hull type, location, and water depth (USDOC, NOAA, National Data Buoy Center, 2011). Buoys can use a wide range of moorings to attach to the seabed. On the OCS, a larger discus-type or boat-shaped hull buoy may require a combination of a chain, nylon, and buoyant polypropylene materials designed for many years of ocean service. Some deep ocean moorings have operated without failure for over 10 years (USDOC, NOAA, 2011). The spar-type buoy described by GSOE would be stabilized through an on-board ballasting mechanism approximately 60 ft. below the sea surface. Approximately 30 – 40 ft. of the spar-type buoy would be above the ocean surface where meteorological and other equipment would be located.

There are several meteorological buoy manufacturers located domestically (JCOMMOPS, 2011). International meteorological buoy manufacturers and designers would likely be competitors with domestic firms. Whether the buoys originate domestically or internationally, it is likely that, for future assessment work, buoys will arrive from the manufacturers to lessee’s staging areas by truck, rail or sea, then be assembled and fitted with instrumentation and then tested before deployment via a vessel with enough deck space to accommodate a structure potentially up to 12 m as well as a crane to lower the buoy into the sea (USDOC, NOAA, 2011).

In addition to the meteorological buoys described above, a small tethered buoy (typically 3 m diameter or less) and/or other instrumentation could also be installed on or tethered to a meteorological tower to monitor oceanographic parameters and to collect baseline information on the presence of certain marine life.

Installation

Boat-shaped and discus-shaped buoys are typically towed or carried aboard a vessel to the installation location. Once at the location site, the buoy would be either lowered to the surface from the deck of the transport vessel or placed over the final location, and then the mooring anchor dropped. A boat-shaped buoy in shallower waters of the WEAs may be moored using an all-chain mooring, while a larger discus-type buoy would use a combination of chain, nylon, and buoyant polypropylene materials (USDOC, NOAA, National Data Buoy Center, 2011). Based on previous proposals, anchors for boat-shaped and discus-shaped buoys would weigh about 6,000-10,000 pounds with a footprint of about 6 square ft and an anchor sweep of about 8.75 acres. After installation, the transport vessel would remain in the area for several hours while technicians configure proper operation of all systems. Buoys would typically take one day to install. Transport and installation vessel anchoring for one day is anticipated for these types of buoys (Fishermen's Energy, 2011).

Based on the proposal offshore New Jersey by GSOE, a spar-type buoy would be towed to the installation location by a transport vessel after assembly at a land-based facility. Deployment would occur in two phases: deployment of a clump anchor to the seabed as a pre-set anchor (Phase 1) and deployment of the spar buoy and connection to the clump anchor (Phase 2). Phase 1 would take approximately one day, and include placement of the clump anchor on a barge and transporting it to the installation site. This example of rectangular clump weight anchor is 22' x 22' x 3' (approximately 6.7 m x 6.7 m x 1 m) in size and weighing approximately 100 tons, with a bottom footprint area of 484 square ft (45 m^2). Phase 2 would include towing the spar buoy to the site, deployment and connection to the clump anchor (Tetra Tech EC, Inc., 2010). Once at the final location site, it would be positioned vertically in the water column with a height from mean sea level (MSL) to main deck of 36' (11 m) and a highest mast point of approximately 52' (16 m). The monitoring buoy would be anchored to the seafloor using a clump weight anchor and mooring chain. Installation would take approximately two days. The total area of bottom disturbance associated with buoy and vessel anchors is 28' x 28' (8.5 m x 8.5 m), with a total area of 784 square ft (73 m^2). The maximum area of disturbance to benthic sediments occurs during anchor deployment and removal (e.g., sediment resettlement, sediment extrusion, etc.) for this type of buoy.

As a part of Alternative A, all lessees would be required to comply with the applicable project design standards identified in Appendix B of this EA, as well as with the unanticipated finds ("chance finds") requirements described in Section 4.1.3.1.2 of this EA.

Onshore Activity

Onshore activity (fabrication, staging, and launching of crew/cargo vessels) related to the installation of buoys is expected to utilize existing ports, which are capable of supporting this activity. Refer to Section 4.1.3.5 of this document for information pertaining to existing ports or industrial areas that would be used for meteorological buoys. No expansion of existing facilities would be necessary for the same reasons provided in the onshore activity section for meteorological towers, above.

Operation and Maintenance

Monitoring information would be transmitted to shore, including systems performance information such as battery levels and charging systems output, the operational status of navigation lighting, and buoy positions. Also, all data gathered via sensors would be fed to an on-board radio system that transmits the data string to a receiver on shore (Tetra Tech EC, Inc., 2010). Onsite inspections and preventative maintenance is expected to occur on a monthly or quarterly basis (i.e., marine fouling, wear, and lens cleaning) with periodic inspections for specialized components (i.e., buoy, hull, anchor chain, and anchor scour) occurring at separate intervals, but would likely coincide with the monthly or quarterly inspection to minimize the need for additional boat trips to the site.

BOEM anticipates that equipment placed on a buoy would be powered by small solar panels or wind turbines. In the event that the solar or wind sources are limited for an extended period, batteries would be charged by an onboard diesel generator, which would cycle on as required. The weekly or bi-weekly vessel trips that would otherwise be taken for refueling generators on meteorological towers are not expected in the context of refueling backup generators on buoys, as BOEM anticipates that onboard generator use on buoys would be intermittent and minimal.

Decommissioning

Decommissioning is basically the reverse of the installation process. Equipment recovery would be performed with support of a vessel(s) equivalent in size and capability to those used for installation (*see* section on installation, above). For small buoys, a crane lifting hook would be secured to the buoy. A water/air pump system would de-ballast the buoy into the horizontal position. The mooring chain and anchor would be recovered to the deck using a winching system. The buoy would then be towed to shore by the barge.

All buoy decommissioning is expected to be completed within one day. Buoys would be returned to shore and disassembled or reused in other applications. It is anticipated that the mooring devices and hardware would be re-used or disposed of as scrap iron for recycling (Fishermen's Energy, 2011).

3.1.3.3 Meteorological Tower and Buoy 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 buoy or on instrument support arms. In addition to conventional anemometers, Light Detection and Ranging (LIDAR), Sonic Detection and Ranging (SODAR) and Coastal Ocean Dynamic Applications Radar (CODAR) devices may be used to obtain meteorological data. LIDAR is a remote sensing technology that operates via the transmission and detection of light. SODAR is also a remote sensing technology; however it operates via the transmission and detection of sound. CODAR utilize high frequency (HF) surface wave propagation to remotely measure ocean surface waves and currents.

Ocean Monitoring Equipment

To measure the speed and direction of ocean currents, Acoustic Doppler Current Profilers (ADCP) would likely be installed on each meteorological tower or buoy. The ADCP is a remote sensing technology that transmits sound waves at a constant frequency, and measures the ricochet of the sound wave off fine particles or zooplanktons suspended in the water column.

The ADCPs may be mounted independently on the seafloor or to the legs of the platform, or attached to a buoy. A seafloor-mounted ADCP would likely be located near the meteorological tower (within approximately 500 ft) and would 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 different directions, with frequencies ranging from 300-600 kHz with a sampling rate of 1 to 60 minutes. A typical ADCP is about one to two ft tall and one to two ft wide. Its mooring, base, or cage (surrounding frame) would be several ft wider.

Other Equipment

A meteorological tower or buoy could also accommodate environmental monitoring equipment such as avian monitoring equipment (e.g., radar units, thermal imaging cameras), acoustic monitoring for marine mammals, data logging computers, power supplies, visibility sensors, water measurements (e.g., temperature, salinity), communications equipment, material hoist, and storage containers.

3.1.3.4 Vessel Traffic Associated with Site Assessment

Vessel trips would be associated with all phases of site assessment (installation, decommissioning and routine maintenance). As explained in Section 4.1.3.5, numerous existing ports or industrial areas in the adjacent states are expected to be used in support of Alternative A. These trips would be divided among nine major ports and 28 smaller ports in Delaware, New Jersey, Maryland, and Virginia, adding traffic in already heavily used waterways (*see* Section 4.1.3.7).

Based on previous site assessment proposals submitted to BOEM, up to about 40 round trips by various vessels are expected during construction of each meteorological tower. Should each potential lessee decide to install a meteorological tower on its leasehold, a total of 480 round trips are estimated from construction (40 multiplied by 12). These vessel trips may be spread over multiple construction seasons due to the various times at which lessees acquire their leases, and weather and sea state conditions, assessing suitable site(s), acquiring the necessary permits, and availability of vessels, workers, and tower components. Since decommissioning process would basically be the reverse of construction, vessel usage during decommissioning would be similar to vessel usage during construction, so another 480 round trips are estimated.

Meteorological buoys would typically take one day to install by one vessel. One round trip is assumed for the installation of each buoy and again for its decommissioning. Should each potential lessee decide to install meteorological buoys on its leasehold, a total of 50 round trips are estimated for the installation and decommissioning of the 25 anticipated meteorological buoys.

Assuming a single maintenance trip to each meteorological tower weekly to quarterly and monthly to quarterly to each buoy, Alternative A would result in an additional 148-924 vessel trips per year, or 740-4,620 vessel trips over a five and one-half year period.

The total vessel traffic estimated as a result of the installation, decommissioning, and routine maintenance of the meteorological towers/buoys that could be reasonably anticipated in connection with Alternative A is anywhere from 1,750-5,630 round trips over a five and one-half year period (Section 3.1.3.1, Operation and Maintenance).

As a part of Alternative A, all vessels associated with the activities of lessees would be required to comply with the applicable project design standards identified in Appendix B of this EA.

3.2 Non-Routine Events

Chapter 5.2.24 of the Programmatic EIS discusses in detail potential non-routine events and hazards that could occur during data collection activities. The primary events and hazards are: (1) severe storms such as hurricanes and extratropical cyclones; (2) collisions between the 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 Storms

Severe weather events have the potential to cause structural damage and injury to personnel. Data collected from National Data Buoy Center buoys located offshore of Delaware Bay (Buoys 44009 and 44012), Raritan Bay (Buoy 44025), and offshore of Virginia Beach (Buoy 44014) show wind speeds are typically lowest in June and July at 10 knots (12 mph) to 12 knots (14 mph), and highest in January ranging from 15 knots (17 mph) in the Delaware Bay area to 21 knots (24 mph) off the coast of Virginia Beach. Peak winds of up to 58 knots (67 mph) have been recorded at Buoy 44014 over the period of record (2002 – 2008) during the month of September. The highest winds are associated with tropical cyclones, but more often, high wind events are associated with extratropical cyclones in the winter season. The Atlantic Ocean hurricane season is June 1 – November 30 with a peak in September when it is most likely that hurricanes will impact the WEAs at sometime during the life of Alternative A (*see* Figure 3.3). The Atlantic basin averages about 10 storms of tropical storm strength or greater per year; about half reach hurricane level (USDOC, NOAA, 2005) and 2.5 become major hurricanes (Category 3 or higher).

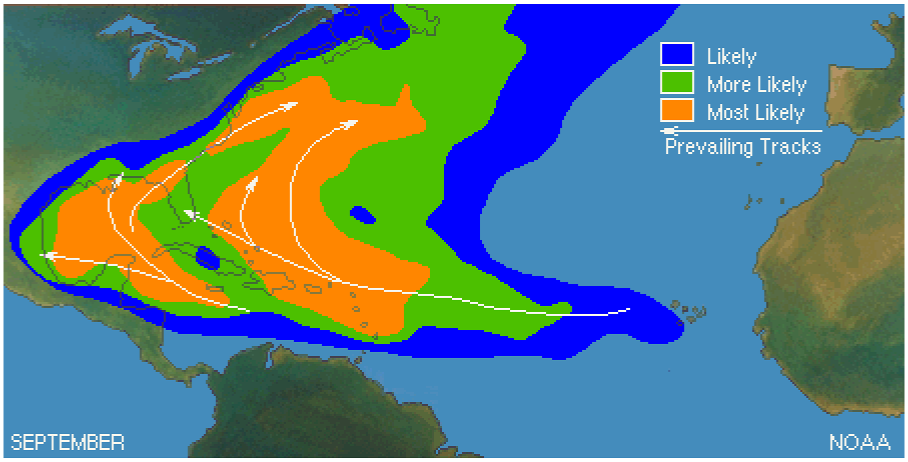

Figure 3.3. The zones of origin and tracks for the month of September during the hurricane season.
(Note: this figure only depicts average conditions. Hurricanes can originate in different locations and travel much different paths from the average; Source USDOC, NOAA, 2010)

3.2.2 Allisions and Collisions

A meteorological tower or buoy located in the WEAs could pose a risk to navigation. An allision between a ship and a meteorological structure could result in the loss of the entire facility and/or the vessel, as well as loss of life and spill of diesel fuel. When a vessel hits a buoy system, it could damage the buoy hull so the buoy loses its buoyancy and sinks, or damages the equipment or its supporting structure. Vessels associated with site characterization and assessment activities could collide with other vessels and experience accidental capsizing or result in a diesel spill.

Collisions and allisions are considered unlikely since vessel traffic is controlled by multiple routing measures, such as safety fairways, TSSs, and anchorages. These higher traffic areas were excluded from the WEAs, as described in Chapter 1 of this EA. Risk of allisions with meteorological towers and buoys would be further reduced by USCG-required marking and lighting.

Historical data supports that allisions and collisions resulting in major damage to property and equipment would be unlikely. Allision and collision incident data were reviewed for the years 1996 through 2010 (USDOI, BOEMRE, 2011a), for the Gulf of Mexico and Pacific regions, which contain many fixed structures on the OCS like the meteorological facilities that would be installed. These facilities would need operations and maintenance over the five and a half year period of site assessment just as the fixed structures in the Gulf of Mexico and Pacific regions do. Over a 15-year period with over 4,000 structures present at any one time, 236 allisions with platforms or associated OCS structures and collisions between vessels were reported in the Gulf of Mexico or Pacific regions. While only allisions and collisions that result in property or equipment damage greater than $25,000 must be reported, this number includes reports of minor damage (< $25,000). The most commonly reported causes of the allisions and collisions included human error, weather-related causes, equipment failure on the vessels, and navigational aids not working on the structures. In many cases, the allisions resulted in major damage (> $25,000) to the platforms and/or impacting vessels.

3.2.3 Spills

A diesel spill could occur as a result of collisions, accidents, or natural events. If a vessel collision occurs and if the collision leads to major hull damage a diesel spill could occur. The amount of diesel fuel that could be released by a marine vessel involved in a collision would depend on the type of vessel and severity of the collision. From 2000 to 2009, the average spill size for vessels other than tank ships and tank barges was 88.36 gallons (U.S. Department of Homeland Security, USCG, 2011), and, should Alternative A result in a spill in any given area, BOEM anticipates that the average volume would be the same.

Vessels are expected to comply with USCG requirements relating to prevention and control of oil spills. Most equipment on the meteorological towers and buoys would be powered by batteries charged by small wind turbines, solar panels.

Diesel generators may be used on some of the anticipated meteorological towers and buoys. Minor diesel fuel spills may also occur during refueling of generators. Although not required by 30 CFR Part 585, BOEM may require an Oil Spill Response Plan (OSRP) for an individual SAP, if the lessee proposes the use of a generator (30 CFR 585.610(a)(16)).

Impacts would depend greatly on the material spilled (diesel fuel in the related vessel and infrastructure types); the size and location of a spill, the meteorological conditions at the time, and the speed with which cleanup plans and equipment could be employed. 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 is a distillate of crude oil and does not contain the heavier components that contribute to crude oil's longer persistence in the environment. If a diesel spill were to occur, it would be expected to dissipate very rapidly and would then evaporate and biodegrade within a few days (USDOI, MMS, 2007b).

4 ENVIRONMENTAL AND SOCIOECONOMIC CONSEQUENCES

4.1 Alterative A – Full Leasing of the WEAs

4.1.1 Physical Resources

4.1.1.1 Air Quality

Alternative A could affect the air quality in and offshore New Jersey, Delaware, Maryland and Virginia. Survey and construction vessels would use ports in all of these states and travel through state waters to and from the WEAs. Vessels would emit pollutants in these areas. However, the volume of pollutants emitted in these areas, in light of existing vessel traffic and current ambient air quality, the heavily developed nature of many of the port and coastal areas that could be affected, and prevailing westerly winds, the reasonably foreseeable impacts of Alternative A on existing air quality would be minor, if detectible.

The ports anticipated to be used for Alternative A are the ports of Camden, Paulsboro and Trenton as well as eleven smaller ports in New Jersey; the ports of Wilmington and New Castle and two smaller ports in Delaware; the Port of Baltimore and five smaller ports in Maryland; and the ports of Hampton Roads, Hopewell and Richmond, as well as nine smaller ports within the Hampton Roads area in Virginia. More information on these ports is provided in Section 4.1.3.5 of this EA.

Chapter 4.2.2.2 of the Programmatic EIS describes air quality in the Atlantic Region, while Chapter 4.2.2.3 of the Programmatic EIS describes regulatory controls on OCS activities that would 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 waterways traversed by vessels going to and from the ports in New Jersey and Delaware had 39,666 vessel trips in 2009 (almost 20,000 roundtrips); the ports in Maryland had 5,858 vessel trips in 2009 (approximately 2,929 roundtrips); and the ports in Virginia had 35,360 vessel trips in 2009 (approximately 17,680 roundtrips) (USACE, 2009). Most of the harbors and associated coastal areas in New Jersey, Delaware, Maryland, and Virginia are heavily developed metropolitan and industrial areas and have historically been, and continue to be host to very large volumes of rail, road, vessel, and air traffic, all of which emit air pollutants.

It is anticipated that Alternative A will add over 12,000 vessel round trips in connection with site characterization and assessment activities over a five and half year period, if the entire area of each WEA would be leased and the maximum amount of site characterization surveys would be conducted in the leased areas of the WEAs (*see* Sections 3.1.2.6 and 3.1.3.4). These trips would be divided among nine major and 28 smaller existing ports in Delaware, New Jersey, Maryland, and Virginia. Due to proximity, it is assumed the majority of traffic associated with site characterization and assessment of the Virginia WEA (about 2,800 round trips) would be supported by the 3 major and 9 smaller ports in Virginia (*see* Sections 3.1.2.6 and 3.1.3.4 of this EA). If all ports are used equally, this would average about 43 round trips per year to each of the Virginia ports. Using this same methodology and based on the number of ports in each of the other states, the traffic associated with site characterization and assessment of the WEAs offshore New Jersey (about 6,400 round trips), Delaware (about 1,100 round trips) and Maryland (about 1,700 round trips) would be divided as follows: over half of the traffic supported by 3 major and 11 smaller ports in New Jersey; and the remainder of the traffic split between 3 major and 8 smaller ports in Delaware and Maryland. If all ports are used equally, this would average about 67 round trips per year to each of the ports in New Jersey, Delaware and Maryland (*see* Section 4.1.3.5 of this EA).

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 (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), ozone (O_3), particulate matter (PM_{10} and $PM_{2.5}$, particulate matter of 10 μm and 2.5 μm), and lead (Pb) (40 CFR Part 50). The primary NAAQS are set at levels to protect public health with an adequate margin of safety. The USEPA has designated secondary NAAQS 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 of a state exceed the NAAQS for any pollutant, the area is classified as "nonattainment" for that pollutant. All of the counties that may be affected by emissions associated with Alternative A meet the NAAQS for NO_2, and Pb (USEPA, 2008a). However, other NAAQS are not met for the counties containing port cities including Warren County, New Jersey, which is classified as nonattainment for SO_2. New Castle County, Delaware; six coastal New Jersey counties (Bergen, Burlington, Essex, Hudson, Monmouth, and Union Counties); three coastal Maryland counties (Anne Arundel, Baltimore City, Baltimore County); and Alexandria, Virginia are classified nonattainment for $PM_{2.5}$. The counties containing port cities including three Delaware counties (New Castle, Kent and Sussex), all New Jersey counties, four Maryland counties (Anne Arundel, Baltimore City, Baltimore, Calvert) and Alexandria, Virginia are classified as moderate for 8-hour ozone (*see* Table 4.1). All of the counties containing port cities in New Jersey (Camden, Mercer and Gloucester), Delaware (New Castle and Sussex) and Maryland (Baltimore City) are in counties classified as "moderate" for 8-hour ozone. All of the New Jersey port counties are in non attainment of $PM_{2.5}$ in addition to the above for Delaware and Maryland. 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 (NOx) emission sources (e.g., power plants) are located, and from Mid-Atlantic metropolitan areas, to the northeast, contributing to high ozone episodes.

Table 4.1
Total Number of Coastal Counties in Nonattainment of Each Criteria Pollutant per State

Criteria Pollutant	Delaware	New Jersey	Maryland	Virginia
8-hour O_3	3	9	4	1
SO_2	-	1	-	
$PM_{2.5}$	1	9	3	1

Source: USEPA, 2008a.

The USEPA General Conformity Rule (40 CFR Part 51 and 93 ensures that Federal actions comply with the national ambient air quality standards, in order to meet the Clean Air Act requirement. The Clean Air Act requires that Federal actions resulting in emissions in non-attainment areas and maintenance areas in a state conform to the federally approved State Implementation Plan (SIP). Because vessels supporting site characterization and assessment activities travel through state waters, a conformity determination would be required if emissions exceed 100 tons per year in the non-attainment areas.

Delaware's 2009 annual air quality report (DNREC, 2009a), which documents the changes and overall improvement in ambient air quality, states, "in 2009 only two pollutants, ozone and $PM_{2.5}$, exceed the national ambient air quality standards." Other pollutants monitored are well below the national standards.

In New Jersey, ozone is a significant problem in the summer months according to the 2008 annual air quality report (NJDEP, 2008a). During 2008, there were 30 days in which the new 0.075 ppm 8-hour standard for ozone was exceeded across the state of New Jersey. The mean annual average of Fine Particulate Speciation for the four fine particle monitoring sites in New Jersey was 12.6527 micrograms per cubic meter.

During the 2009 ozone season in Maryland, eleven "exceedence days were observed [,] with only one reaching the Unhealthy AQI range." From 2004 to 2008 the average number of exceedence days was 39 (MDE, 2009). Also during 2009, $PM_{2.5}$ caused air quality to exceed an Air Quality Index of 100 on a scale of 0 – 500, which means that the air was "Unhealthy for Sensitive Groups" (MDE, 2009).

Virginia's 2009 ambient air monitoring report (VADEQ, 2010a) indicated that Northern Virginia had four days that 8-hour ozone exceedence occurred. The remainder of the state had no exceedences recorded at the monitoring stations.

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 these areas, air quality-related values including visibility are protected. There is one Class I area in New Jersey that could be affected by Alternative A, the Brigantine Wilderness Area located in southern New Jersey approximately 11 miles north of Atlantic City. Class I Areas have stringent incremental limits for NO_2, SO_2 and PM_{10}. The Brigantine Wilderness Area is in a non-attainment area for ozone.

Regulatory Controls on OCS Activities That Affect Air Quality

Section 328 of the Clean Air Act Amendments of 1990 (CAAA 1990) directs the USEPA to promulgate regulations for OCS sources that may affect the air quality of any state (42 U.S.C. 7627). The regulations are found in 40 CFR Part 55. Under 40 CFR Part 55, USEPA has authority to regulate the air emissions associated with "OCS sources," which would include meteorological towers, any vessels for the purposes of constructing, servicing, or decommissioning them, and seafloor boring. *See* 40 CFR 55.2. Under the USEPA rules, for all OCS sources located within 25 nm of States' seaward boundaries, the requirements are the same as would be otherwise applicable if the source were located in the corresponding onshore area. In the States potentially affected by Alternative A, the State seaward boundaries extend three nm from the coastline.

Section 328 of the CAAA 1990 also establishes a unique treatment for vessels associated with OCS facilities. With respect to calculations of an OCS 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 nm of the source. The USEPA rules set forth in 40 CFR Part 55 replicate this treatment of vessels with respect to PTE calculations.

Any CAA permit that may be needed by EPA regulations would be issued by the appropriate USEPA Region (Region 2 for New Jersey and Region 3 for Delaware, Maryland, and Virginia) or by the appropriate state agency authorized to do so by the USEPA.

Some emissions associated with OCS sources may require compliance with the General Conformity Rule 40 CFR Part 93, Subpart B. These regulations implemented Section 176 of the 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 for activities described in a particular SAP, BOEM would conduct an applicability analysis when the SAP is received. 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 (onshore and in state waters) and only to emissions that are located within 25 nm of the state's seaward boundary.

4.1.1.1.2 Impact Analysis of Alternative A

Impacts of Routine Activities

Routine activities (*see* Section 3.1 of this EA), which include site characterization activities and the construction, servicing, maintenance, and decommissioning of meteorological towers and buoys have the potential to impact air quality locally. Potential emission sources include support vessels, survey vessels and equipment, and the possible use of diesel generators to power equipment on meteorological towers. Vessels associated with the Alternative A would emit sulfur dioxide, nitrous oxides, carbon monoxide, particulate matter, volatile organic compounds, and other chemicals categorized as air pollutants.

Emissions of Criteria Pollutants

The primary emission sources associated with site assessment activities would be from engine exhaust of vessel traffic (e.g., boat or barge) and heavy equipment (e.g., pile drivers). *See* Chapter 5.2.2.2 of the Programmatic EIS. In general, most criteria pollutant emissions would be from internal combustion engines burning diesel fuel during the installation, construction or decommissioning of a meteorological buoy or tower and would include primarily nitrogen oxides NO_x and carbon monoxide (CO), lesser amounts of volatile organic compounds (VOCs) and PM_{10} (mostly in the form of $PM_{2.5}$), and negligible amounts of sulfur oxides (SO_x).

Site Characterization Surveys

Survey vessels would emit pollutants both in state waters and in waters over the OCS while traveling to and from the WEAs and while conducting site characterization surveys within the WEAs. Impacts from pollutant emissions associated with these vessels would very likely be localized, and would not travel in between WEAs or, for example, from NJ waters to VA waters. Prevailing westerly (west to east flow) winds would prevent any substantial amount of pollutant emissions from traveling from offshore areas to onshore non-attainment areas.

In state waters, vessel traffic associated with survey vessels moving in and out of each port would reasonably be predicted to average 43 trips per year per port in Virginia and 67 trips per year per port in New Jersey, Delaware and Maryland (*see* Section 4.1.1.1.1 of this EA). These 43-67 trips per year is a very small contribution to the annual average traffic in each port, coastal, and harbor area's activity. The waterways traversed by vessels going to and from the ports in New Jersey and Delaware had 39,666 vessel trips in 2009 (almost 20,000 roundtrips); the ports in Maryland had 5,858 vessel trips in 2009 (approximately 2,929 roundtrips); and the ports in Virginia had 35,360 vessel trips in 2009 (approximately 17,680 roundtrips) (USACE, 2009). The additional pollutant emissions resulting from the vessel traffic associated with the WEAs would be negligible, if detectible, in each of the WEAs.

On the OCS, vessel traffic to conduct surveys within the WEAs would cover a maximum total of 60,100 nm and 13,300 hours of operation. Pollutant emissions from surveying a lease in a WEA offshore one state are unlikely to impact the air quality of a WEA offshore another state with the exception of survey work in the southern parts of the Delaware WEA and the northern Maryland WEA. Again, it is unlikely that these activities would impact onshore air quality in any way due to prevailing westerly winds.

Construction and Decommissioning

Alternative A is projected to result in up to 12 meteorological towers or 25 meteorological buoys within the WEAs (*see* Section 3.1.3, Table 3.3 of this EA). Potential impacts on ambient air quality within the WEAs during construction and decommissioning would be minor due to the short duration of these activities and the location of these activities offshore. Estimated emissions of criteria air pollutants from the construction and decommissioning of each anticipated meteorological tower is approximately 13.5 tons (Bluewater Wind New Jersey Energy LLC, 2009). As a result, should all of the lessees within the New Jersey WEA choose to erect meteorological towers, the total amount of all criteria pollutant emissions associated with constructing and decommissioning (including vessel traffic) all seven of the anticipated towers offshore New Jersey would be 94.5 tons, less than the de minimums permit level of 100 tons per year. The total criteria pollutant emissions for one meteorological tower and associated vessels are therefore anticipated to be well below the de minimus level. A general conformity analysis would be performed when a SAP is submitted only if the plan indicates that the site assessment activities would emit over 100 tons of a criteria pollutant per year.

Emissions associated with the construction and decommissioning of all projected meteorological towers offshore Maryland would be 27 tons (assuming two leases and hence, two towers), and offshore Virginia would be 40.5 tons (assuming three leases and hence, 3 meteorological towers). For the WEA offshore Delaware, no meteorological towers are projected in connection with Alternative A (*see* Section 4.7, Cumulative Environmental and Socioeconomic Impacts, of this EA).

Emissions associated with a buoy would be much less than those associated with a tower, because buoys are towed or carried aboard a vessel and then anchored to the seafloor. No drilling equipment would be required to install meteorological buoys. Each installation and decommissioning operation of a buoy can be completed in one day which involves one round trip. *See* Section 3.1.3.2 for more information. This is well below the number of trips required for tower installation and therefore emissions associated with construction and decommissioning projected meteorological buoys would also fall below the pollutant threshold.

Whether it be towers or buoys, emissions associated with the construction and decommissioning of the anticipated meteorological data collection facilities would be minor (less than 100 tons per leasehold). The majority of these emissions would occur within the WEAs, and would not affect onshore air quality.

Operations

As explained in Section 3.1.3.1, *Timing*, of this EA, BOEM assumes that meteorological towers and buoys would be operating concurrently or staggered within the WEAs over a five and one half year period. Equipment on the meteorological data collection facilities would be powered by batteries charged by small wind turbines, solar panels, and/or diesel generators. Diesel generators may be used as the main source of power on meteorological towers and a backup power source on meteorological buoys. While turbines and solar panels would produce no emissions, diesel generators would emit NO_x, CO, PM_{10} and SO_2. All criteria pollutant emissions are estimated to total approximately one ton (1.08 tons (Bluewater Wind New Jersey Energy LLC, 2009)) per year for each facility. Total operational emissions for all anticipated meteorological towers for the New Jersey WEA is seven tons per year; for Delaware no meteorological towers are projected in connection with Alternative A; for Maryland it is estimated to be two tons per year; and for Virginia three tons per year. Due to the distance to shore and prevailing winds, the use of diesel generators in the WEAs would not impact onshore air quality.

Support vessels traveling to and from shore and in harbor or port areas are anticipated to make approximately 12,000 round trips over 5.5 years (*see* Sections 3.1.2.6 and 3.1.3.4 of this EA). This vessel traffic has the potential to affect onshore air quality. Several major ports are suitable for supporting the fabrication and staging of meteorological towers and buoys (Section 4.1.3.5 of this EA). Support vessels traveling from these ports and offshore sites would contribute very little to pre-existing emission totals in these areas. Therefore, impacts from additional pollutant emissions, based on estimated vessel trips associated with Alternative A, in conjunction with vessel trips and associated air emissions for the already busy ports and harbors would be negligible, if detectible.

Impacts of Non-Routine Activities

The most likely impact to air emissions from non-routine activities would be caused by vapors from fuel spills resulting from either vessel collisions or allisions or from servicing or refueling generators that may be located on the metrological towers or buoys. A spill could occur from vessel collisions within or outside the WEAs, or at the sites of the 12 potential meteorological towers and 25 buoys within the WEAs (*see* Section 3.2.3 of this EA). If a vessel spill were to occur, the estimated spill size would be approximately 88 gallons based on the average spill size for vessels other than tank ships and tank barges (U.S. Department of Homeland Security, USCG, 2011). It is estimated that a buoy generator could contain 240 gallons of diesel fuel (FERN, 2011). If such a spill were to occur, it would be expected to dissipate very rapidly and then evaporate and biodegrade within a few days (USDOI, MMS, 2007b). Air emissions from a diesel spill would be minor and temporary. A diesel spill occurring in the WEAs is not projected to have any impacts on onshore air quality, because of the estimated size of a spill, prevailing atmospheric conditions over the WEAs, and distance from shore. The impacts of emissions to air quality in the vicinity of the spill within the WEAs would be minor and temporary.

In the unlikely event of vessel collision or allision, a spill could occur while en-route to and from the WEAs or while a lessee surveys potential cable routes to shore. Spills occurring in these areas, which include harbor and coastal areas, are not anticipated to have significant impacts on onshore air quality due to the estimated size and duration of the spill. If such a spill were to occur, the impacts to local air quality would be minor and temporary.

Conclusion

Due to the low level of WEA-related vessel traffic that will be traversing any of these areas at any one time over the course of five and one-half years of site assessment and characterization activities, and due to the existing air quality in these areas, the amount of human activity that emits air pollutants in these areas, and their short duration of emissions associated with Alternative A, potential impacts to onshore ambient air quality from the Alternative A would be minor, if detectable. Prevailing westerly (west to east flow) winds would prevent any substantial amount of emissions from making it to onshore areas from offshore areas and the WEAs. Emissions associated with Alternative A within ports and harbors would be negligible, if detectable, due to the low volume of vessel activity associated with Alternative A, particularly when compared to the high volume of current activity in and around these areas which emit pollution, and in light of the current ambient air quality in most of these areas. A non-routine event such as a diesel spill may have short-term impacts on ambient air quality in a localized area, but these effects would dissipate very quickly. Neither routine activities nor non-routine events in harbor areas, coastal waters, or in the WEAs would significantly impact onshore air quality, including the Brigantine Wilderness Area 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 bays and 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, burning, spills, the pollutants released into the water from vessel traffic, and anti-fouling paints containing tributyltin (the usage of anti-fouling paints containing tributyltin is not anticipated in this scenario because it is banned by the International Maritime Organization). 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 factors influencing coastal and marine environments are temperature, salinity, dissolved oxygen, nutrients, the presence of chlorophyll, 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. Contaminants, which are associated with the suspended load, may ultimately reside in the sediments rather than the water column.

The affected environment is divided into coastal and marine waters for the purposes of the following discussion. Coastal waters include all the ports/harbors, rivers, bays and estuaries that could be affected by Alternative A (e.g., traversed by vessels during site characterization and assessment activities). Marine waters include both waters offshore that are state territory (within three nm of shore) as well as those above the OCS in the WEAs and on the path to and from the WEAs from shore.

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, including the regions in which the WEAs are located. The following summarizes that information, and incorporates new and site-specific information.

Mid-Atlantic Coastal Waters and Water Quality

In the National Coastal Condition Report III, USEPA rated the quality of the nation's coastal waters on a scale of poor, fair, and good using an index based on dissolved oxygen, chlorophyll *a*, nitrogen, phosphorus, and water clarity. According to the National Coastal Condition Report III, the water quality index for the relevant portions of the Mid-Atlantic, which includes much of the New Jersey Coastline, the Delaware Coastline, Delaware Bay, the Chesapeake Bay, and coastal and harbor areas south of the Chesapeake were rated by USEPA as "poor" for water quality (*see* Figure 4.1 below).

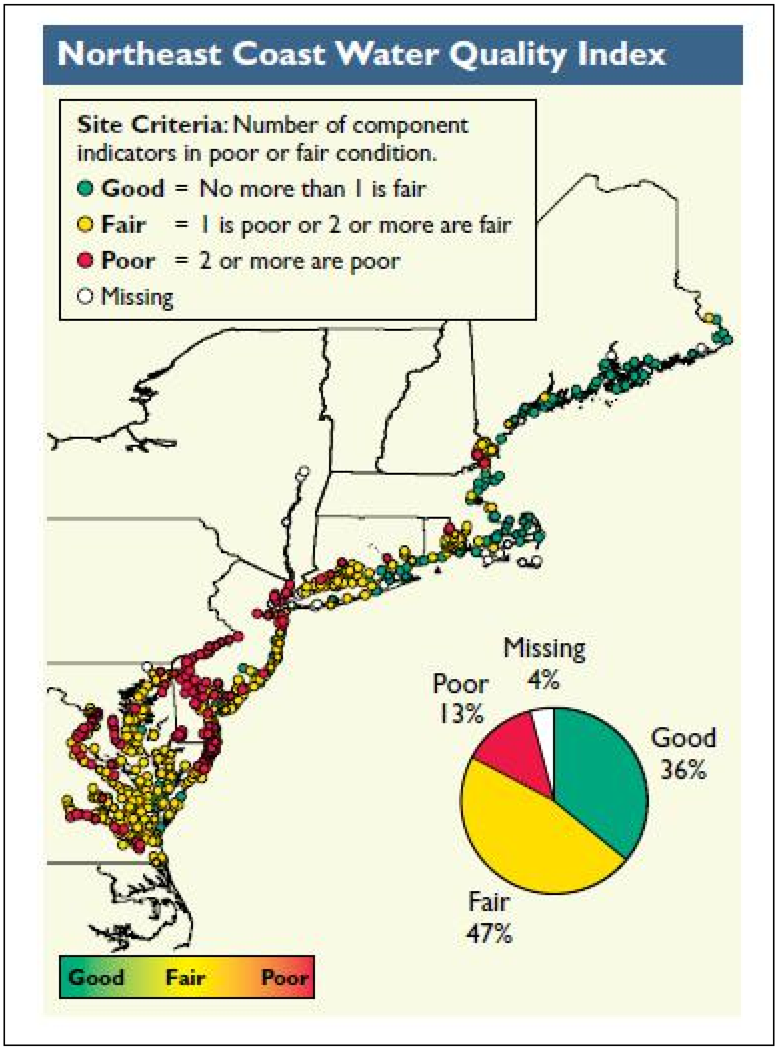

Figure 4.1. Water Quality Index for the Northeast Coast (USEPA, 2008b).

New Jersey and Delaware Coastal Waters

The ports of Camden, Paulsboro, Trenton, Wilmington, and New Castle are all located along the Delaware River. The Delaware Bay Launch is located in Milford on the Delaware Bay and the Indian River Marina is located in Rehoboth on the Indian River. The Delaware River is the longest un-dammed river in the United States east of the Mississippi. The river contains 13,539 square miles and over 15 million people (approximately five percent of the nation's population) rely on the waters for multiple uses (DRBC, 2009). Beachfront communities dot the 25-mile coast of Delaware. In the 2006 *Delaware Water Quality Assessment Report* (DNREC, 2011), Delaware's entire coastal shoreline was rated "good" for fish, aquatic life and wildlife, water supply and recreation. However, 29.5 miles of Delaware bays and estuaries that make up the Delaware River basin were reported as "impaired" due to municipal point source discharges, septic system discharges, industry, agriculture, development, runoff, vessel traffic, and natural sources, such as wildlife. In the lower Delaware Bay, the dissolved oxygen levels fall below levels adequate to provide for aerobic life forms (5.0 mg/l). Levels of the contaminants mercury, chlorinated pesticides, and PCBs are high enough in fish to require fish consumption advisories throughout the Bay.

Maryland Coastal Waters

The Port of Baltimore and Port of Annapolis are both located on the Chesapeake Bay. Almost 95% of the land in Maryland drains to the Chesapeake Bay, which then leads to the Atlantic Ocean. According to the Chesapeake & Coastal Program, "[t]he Chesapeake Bay is North America's largest and most biologically diverse estuary." (Chesapeake & Coastal Program). The Port of Baltimore, located in the upper Chesapeake Bay is a major urban, industrial, and transportation center with heavy vessel traffic and port activity. For the year 2009, the Chesapeake Bay Program rated the bay's water quality as "poor" (Chesapeake Bay Program, 2011). The bay's water quality is measured with respect to dissolved oxygen, water clarity, chlorophyll *a*, and chemical contaminants. In 2010 the bay attained 38% of its dissolved oxygen goal for the three-year period of 2008 - 2010, that is a 1% drop from the 2007 – 2009 monitoring period. Dissolved oxygen is important for the survival of aquatic animals. The levels of dissolved oxygen necessary vary by species. Water clarity is the depth to which light can penetrate into the water (Chesapeake Bay Program, 2011). Visibility to a depth ranging from 0.65 – 2.0 meters is acceptable. The bay attained 18% of its target water clarity in 2010, which is a 26% drop from 2009. Poor water clarity is impacted by suspended sediments and excess nutrients leading to algae growth. Chlorophyll *a* is an indicator of the amount of algae present. Algae is a food source, but too much of it can block sunlight and reduce dissolved oxygen levels. In 2010 the bay achieved 22% of its target, a 7% drop from 2009. Chemical contaminants are harmful to the bay's ecosystem and to human health. In 2010 the bay achieved 27.8% of its target for chemical contaminants, which is consistent with the years 2008 and 2009, but is a 6% drop from 2007.

Virginia Coastal Waters

The Virginia ports of Hampton Roads, Richmond, and Hopewell are all located along the James River which is part of the Chesapeake Bay Waterway System. The James River basin is Virginia's largest river basin. Approximately 12% of the basin is considered urban with a population of approximately 2,092,278 in 2006, concentrated in Tidewater, Greater Richmond – Petersburg, Lynchburg, and Charlottesville (VA DEQ, 2010). In the state of Virginia, the water quality standards that are in place are based upon the designated uses for the waters. There are six designated uses: aquatic life, fish consumption, public water supplies, shellfishing, swimming, and wildlife. For the designated uses of the James River basin, 902 miles of the 4,078 miles assessed for aquatic life are "impaired"; 262 miles of the 1,960 miles assessed are "impaired" for fish consumption; none of the water is "impaired" for the public water supply; 1,776 miles of the assessed 3,293 miles of water designated for recreation are "impaired"; shellfishing is not applicable in the James River basin; and 6 miles of the 3,395 miles assessed for wildlife use are "impaired." The largest sources of impairment include agricultural runoff, combined sewer overflows, discharges from municipalities separate storm sewer systems, industrial point source discharge, livestock grazing or feeding operations, municipal point source discharges, natural conditions, non-point sources, domestic wastes, waste from pets, wildlife other than waterfowl, as well as other sources impairing discrete areas of the river basin (VA DEQ, 2010).

Marine Waters

Although no data specific to the water quality of each WEA is available at this time, as the distance from shore increases, oceanic circulation and the volume of water increasingly serves to disperse, dilute, and biodegrade anthropogenic contaminants and determine water quality. Since the vast majority of pollutants and threats to marine waters originate on land, there are far fewer identified threats to marine water quality that are identified as actually originating from activities in the marine environment.

Discharges from ships and onshore wastewater treatment facilities are the most likely sources of water-borne contaminants in the WEAs themselves. Ocean-going vessels sometimes discharge bilge and ballast water and sanitary waste prior to entering state waters due to state restrictions on discharges in their waters. Presently, sewage outfalls from both the New Jersey and Delaware coasts discharge treated municipal wastewater to the Atlantic Ocean in such concentrations and volume that water quality in the corresponding WEAs could be affected. A dredge spoil location in Virginia at the mouth of the Potomac River could affect the water quality within the WEA offshore Virginia, as the project generated in excess of 450,000 m^3 of silt loam, high pH, low salt dredge spoils from 2000 to 2005 (Daniels, 2011).

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.

Sand, the predominant sediment type in the area, does not retain contaminants, thus resuspension of sediments is not a potential source of pollution. The distance of the WEAs from the shoreline bays and rivers limits the potential influence of land-based contaminants.

4.1.1.2.2 Impact Analysis of Alternative A

Routine Activities

The routine activities associated with Alternative A that would impact coastal and marine water quality include 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 summarizes that information, and incorporates new and site-specific information.

Onshore Discharges

Point-source discharges onshore and in state waters 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, such as ports and harbors. Activities associated with staging and fabrication of the meteorological towers and buoys would account for a very small amount of activity at existing port facilities during the short duration of staging. Alternative A is not anticipated to increase runoff or onshore discharge into harbors, waterways, coastal areas or the ocean environment.

Vessel Discharges

Vessel discharges associated with Alternative A may affect water quality when vessels are traveling to and from the WEAs, and during site characterization surveys and site assessment activities in the WEAs. 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. 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 nm from shore if the oil concentration is less than 100 ppm. Ballast water is less likely to contain oil but is subject to the same limits. 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). Ballast water may be subject to the USCG Ballast Water Management Program to prevent the spread of aquatic nuisance species. In coastal waters, bilge and ballast water may be discharged with an oil content of 15 ppm or less. In the *Study of Discharges Incidental to Normal Operation of Commercial Fishing Vessels and Other Non-Recreational Vessels Less than 79 Feet* (USEPA, 2010b), USEPA sampled wastewater discharges from vessels of the type associated with Alternative A: tugboats, small research vessels, and supply boats, as well as others. The samples were taken from port and coastal cities in the Mid-Atlantic and in other areas. Using the samples, USEPA modeled how these vessel types may impact water quality. It was determined that vessels discharging to a relatively large water body such as the WEAs were not likely to cause an exceedance of National Recommended Water Quality Criteria. However, there is the potential for these discharges to impact water quality locally and temporarily within the WEAs. Vessels traversing those portions of the WEAs which are outside the 12 nm boundary potentially would release bilge water and ballast water into the ocean. As discussed previously (*see* the "Marine Waters" section above), oceanic circulation and the volume of water increasingly serves to disperse, dilute, and biodegrade anthropogenic contaminants. Therefore, the discharges may affect the water quality locally and temporarily, but the potential impacts from these vessels, if any, would be minor.

The marine sanitation device (MSD) is required under 33 CFR 159 to treat sanitary waste generated on service vessels so that surrounding waters are not impacted by possible bacteria or viruses in the waste. All vessels with toilet facilities must have a MSD that complies with 40 CFR 140 and 149. Vessels complying with 33 CFR 159 are not subject to State and local MSD requirements. There are three types of MSDs. The MSD Type I macerates the sewage to no visible solids and then reduces the bacteria count to less than 1,000 per 100 millimeters using chemicals before discharge at sea. The MSD Type II device requires that solids be ground up even finer and the bacteria count must be below 200 per 100 milliliters. The discharge of treated sanitary waste would still contribute small amounts of nutrients to the water. 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. 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 outside state waters, and vessel operators may dump gray water outside state waters. Since the WEAs are all outside state waters it would be likely that vessels would discharge grey water while operating on the OCS. As discussed previously (*see* the "Marine Waters" section above), oceanic circulation and the volume of water increasingly serves to disperse, dilute, and biodegrade anthropogenic contaminants. Therefore, while the small amount of discharge associated with these vessels into such a large water body may affect the water quality locally and temporarily, the potential impacts to water quality in the open ocean, if any, would be minor.

The discharge of trash and debris is prohibited in the sea, or into the navigable waters of the United States (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. Because the discharge of trash is prohibited, BOEM concludes that no environmental effects are likely to occur as a result of trash discharge, even if some trash or debris is discharged accidentally.

Sediment Disturbance

Sediment disturbance could result from vessel and buoy anchoring, geological and geophysical (G&G) surveys, and structure installation and removal, most of which would take place within the WEAs.

<u>Anchoring</u>: The process of anchoring vessels and buoys, 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. An estimated 12,000 vessel trips are anticipated with Alternative A, if the entire area of each WEA would be leased and the maximum amount of site characterization surveys would be conducted in the leased areas of the WEAs. A portion of this vessel traffic, specifically that associated with bottom sampling, construction, and decommissioning, could result in anchorages. Anchoring and removal are short processes; therefore sediment is expected to settle within a few minutes of disturbance. Short-term impacts to turbidity and water clarity are expected to be local within discrete areas of the WEAs. These impacts are anticipated to be minor.

<u>Site Characterization Surveys</u>: The geophysical surveys within the WEAs (Described in Section 3.1.2.1) would not likely influence water quality except for vessel discharges as described above, but sediment coring would cause temporary disturbance of the seafloor, the introduction of sediment into the water column, temporary increased turbidity, and sedimentation. It is anticipated that a total of 1800 to 4800 sediment samples will be collected for all of the WEAs ranging from offshore New Jersey to offshore Virginia over a 5 1/2 – year period (*see* Sub-bottom Sampling in Section 3.1.2.2). To the extent that sediment samples are collected by drilling equipment, the disposition of the sediment core material itself could cause short-term water quality impacts, such as turbidity and a degradation of water clarity in the immediate area of disturbance. These impacts are anticipated to be temporary and minor.

<u>Installation and Decommissioning</u>: A total of twelve (12) towers (*see* Table 3.1) are anticipated to be installed and ultimately decommissioned within the WEAs from offshore New Jersey to offshore Virginia. It is not anticipated that all 12 meteorological towers will be constructed simultaneously (*see* "Timing" in Section 3.1.3.1 of this EA). Impacts to water quality resulting

from the construction and installation of meteorological towers would consist of sediment dispersal, resuspension and subsequent sedimentation from pile-driving and anchoring. 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. When the tower structure is decommissioned, sediments that had collected in any scour control system, mats or rock armor, would be temporarily disturbed. The mats and rock armor would be returned to shore for disposal (*see* Section 3.1.3.1 of this EA). Due to the short duration of installation, anticipated to be 8 days to ten weeks (*see* "Timing" in Section 3.1.3.1 of this EA), and decommissioning, anticipated at one week (*see* "Decommissioning" in Section 3.1.3.1 of this EA) impacts to water quality would be localized and temporary, and these impacts are anticipated to be minor. As a result, construction and decommissioning of the tower or installation may create temporary and localized water and sediment impacts but these impacts are anticipated to be minor.

If all lessees were to install meteorological buoys, a total of 25 buoys would be installed in an area of the OCS from offshore New Jersey to offshore Virginia. Meteorological buoy installation and decommissioning would likely take place in one (1) day for each installation and decommissioning (*see* Section 3.1.3.2 of this EA). Impacts to water quality resulting from the installation of meteorological buoys would consist of sediment dispersal, resuspension and subsequent sedimentation from anchoring. Water quality impacts would occur during decommissioning activities from material dislodged during the removal of the buoy anchor. Because the installation and removal of a buoy does not involve any pile driving or installation (or removal) of a foundation (*see* Section 3.1.3.1 of this EA), a buoy would likely have even less of an impact to local water quality than would the installation and decommissioning of a meteorological tower. However, if every lessee chose to install two buoys instead of one tower, there would be approximately twice as many buoys as towers (25) on the OCS from New Jersey to Virginia. Nevertheless, the impacts during installation and decommissioning of this number of meteorological buoys on the OCS from New Jersey to Virginia may create temporary and localized water and sediment impacts, but these impacts are anticipated to be minor (*see* Section 4.1.2.2.2 for further discussion).

Non-Routine Events

During travel to and from ports and harbors, and during site characterization and site assessment activities within the WEAs and along potential transmission cable routes, multiple sources of diesel fuel would be present on vessels, generators, and pile driving hammers. Spills could occur during refueling or as the result of an allision or collision.

A vessel allision with the meteorological structures or collision with other vessels may result in the spillage of diesel fuel. Vessels are expected to comply with USCG requirements relating to prevention and control of oil spills. Spills are not projected to have significant impacts due to the small size of a projected spill. A could occur while enroute to and from the WEAs but this is considered unlikely. If a spill were to occur, either inside or outside of a WEA, the estimated spill size would be small. From 2000 to 2009, the average spill size for vessels similar to those anticipated to be used for Alternative A was 88.36 gallons (U.S. Department of Homeland Security, USCG, 2011). Vessel allision with a meteorological buoy containing diesel powered generator may also occur. It is estimated that a buoy generator could contain 240 gallons of diesel fuel (FERN 2011). If a diesel spill of this size were to occur, it would be expected to dissipate very rapidly in the water column of the open ocean, then evaporate and biodegrade within a few days (*see* Section 3.2.3 of this EA).

The meteorological towers and buoys 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. Should this occur, the spill would similarly small, and would dissipate and biodegrade in the same manner discussed above.

Storms may also cause allisions and collisions that could result in a spill, yet the storm conditions would cause the spill to dissipate faster.

As a result, the impacts to the environment that could result from an oil spill, should one occur, associated with Alternative A are expected to be both minor and temporary.

It is also possible that larger vessels, such as tankers or container ships, could collide with meteorological structures within the WEAs. Such a collision is considered unlikely, as these structures would be sparsely placed on the OCS offshore New Jersey to Virginia, and will be lit and marked for navigational purposes (*see* Section 3.1.3.1 of this EA). If a larger vessel should collide with a meteorological facility, a large spill would be extremely unlikely (*see* Section 3.2.2 of this EA). Thus, the largest spill that could result in the unlikely event that a larger ship were to collide with a meteorological facility is on the order of 240 gallons – the estimated amount of generator fuel that could be present on the meteorological facility itself (assuming that a generator is present on the facility).

Conclusion

Impacts to coastal and marine waters from vessel discharges associated with Alternative A should be of short duration and remain minimal, if detectable. Sediment disturbance resulting from anchoring and coring would be short-term, temporarily impacting local turbidity and water clarity. As a result, sediment disturbance resulting from Alternative A is not anticipated to result in any significant impact to any area within the WEAs or along any potential transmission cable route. Since collisions and allisions occur infrequently and rarely result in a spill, the risk of a spill would be small. In the unlikely event of a fuel spill, minimal impacts would result since the spill would very likely be small, and would dissipate and biodegrade within a short time. As a result, if a spill occurred, the potential impacts to water quality are not expected to be significant. Storms may disturb surface waters and cause a faster dissipation of diesel if spilled, but impacts to water quality would be negligible and of a short duration. Therefore, impacts from vessel discharges, sediment disturbance, and potential spills associated with Alternative A on harbors, ports, coastal areas, and WEAs would be minor, if detectable.

4.1.2 Biological Resources

4.1.2.1 Coastal Habitats

4.1.2.1.1 Description of the Affected Environment

The Mid-Atlantic WEAs are located offshore of the Atlantic coastal plain. This plain is a flat stretch of land that borders the Atlantic Ocean for approximately 2,200 miles from Cape Cod through the southeast United States. 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, 2007a) and summarized in this section. The following sections include a description of the affected coastal environments for each state.

The four WEAs are located offshore Delaware, Maryland, New Jersey, and Virginia, which have a complex range of diverse coastal habitats consisting of barrier islands, sand spits, beaches, dunes, tidal and non-tidal wetlands, mudflats, and estuaries (USDOI, MMS, 2007a). Much of the Atlantic shoreline in these states has been altered to some degree, in many cases to a substantial extent, and most of the coastal habitats have been historically, and are presently impacted by human activities. Much of this alteration has been from development, agriculture, vessel and ground traffic, industry, agriculture, beach replenishment, or shore protection activities, such as jetties (USDOI, MMS, 2007a).

Delaware

Delaware has approximately 24 miles of oceanfront coastline along the Atlantic Ocean and over 380 miles bordering various estuaries, including Delaware Bay (DNREC, 2009b). Delaware is home to two large ports at New Castle and Wilmington on the Delaware side of the Bay. New Jersey has additional ports on its side (*see* Section 4.1.3.5.2 of this EA). All of these ports could potentially be used to support the activities contemplated in Alternative A.

Delaware Bay

Delaware Bay is home to several ports that would support activities in the WEAs. The Delaware Bay's 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 estuarine marsh (Adkins, 2008). Portions of the Bay consist of tidal brackish-water and salt marshes and open waters of creek, river, and bay areas (USDOC, NOAA, NERRS, 2011). The Delaware estuary wetlands, which include the Delaware Bay area, provide critical habitat for 35% of the region's threatened and endangered species (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 the world's largest spawning population of horseshoe crabs (Adkins, 2008).

Loss of essential spawning habitat due to erosion and shoreline development can threaten horseshoe crab populations (Tanacredi et al., 2009). Shoreline erosion from natural forces (wind and wave action) and human influenced forces (i.e., development activity, vessel wakes) result in erosion rate of 2 – 6 m per year, limiting the available habitat for horseshoe crab spawning areas and nesting and feeding areas for birds.

Rehoboth Bay

Although little vessel activity associated with Alternative A is likely to occur in this area, Rehoboth Bay is part of Delaware's inland bays, which includes Little Assawoman Bay and Indian River Bays. Depths in these bays are generally shallow (<6 – 7 ft below Mean Lower Low Water (MLLW) (Moffat and Nickel, 2007). Rehoboth Bay has tidal exchange with the Atlantic Ocean through Indian River Inlet, and could provide a limited exchange between ocean and bay waters in event of a diesel spill near the city of Dewey Beach.

New Jersey

New Jersey has 127 miles of coastline and 83 miles of shoreline along the Raritan and Delaware Bays, and over 300,000 acres of tidal wetlands (NJDEP, 2002 and 2008b). At the South end of the New Jersey Atlantic shore, Cape May and Atlantic Counties have short and fairly wide tide dominated barrier islands. Behind the islands, 97 square miles (253 square kilometers (km)) of marshes dominate the small open water bays (USEPA, 2009a). New Jersey is considered the most developed and densely populated shoreline in the country, with only 31 miles of shoreline between Sandy Hook in the north and Cape May Point in the south without human development between the salt marshes and the sea (Richard Stockton College, Coastal Research Center, 2011). New Jersey's coastal area is comprised of a variety of landscapes ranging from elevated headlands to wave-dominated and mixed-energy barrier islands to tidal and freshwater wetlands. Long-term biophysical and climate trends indicate that New Jersey, like other Mid-Atlantic States, will likely be subject to continued shoreline erosion, higher sea levels, and loss of natural coastal buffers (NJDEP, 2011a).

Raritan Bay

The Raritan Bay area of New Jersey (including Sandy Hook, NJ) is home to several ports that would support activities in the WEAs. 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, 2007). 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).

Maryland

The State of Maryland has several different coastal habitat types along the Atlantic Ocean and the Chesapeake Bay, with 32 miles of coastline along the Atlantic Ocean, including Assateague Island National Seashore, and numerous shallow coastal bays near Ocean City (USEPA, 2009a). The densely populated area of Ocean City occupies roughly 9 miles of coastline and is a likely area for launching survey vessels and/or vessels associated with installing, maintaining, and decommissioning meteorological towers or buoys. Counteracting shoreline erosion in developed areas may continue in the near term (USEPA, 2009a). The Maryland portion of the Chesapeake Bay houses a number of ports, including Baltimore harbor, which could be used to support activities related to Alternative A. Many of these areas are the subject of intense historic and current human development and industry. A description of the natural environs of the Maryland portion of the Chesapeake Bay can be found in the Virginia description below.

Virginia

Virginia has 5,000 miles of shoreline, with 120 miles on the Atlantic Ocean, and over one million acres of non-tidal and non-wetlands (VADEQ, 2011). There are numerous large and small ports located in the Chesapeake Bay of Virginia, especially the large ports in the Hampton Roads area, which could be used to support activities associated with Alternative A. In addition, the City of Virginia Beach south of the entrance to Chesapeake Bay could also be used to support activities associated with Alternative A due to the City's close proximity to the Virginia WEA.

Chesapeake Bay

The Chesapeake Bay is about 200 miles long, is the world's third largest estuary and includes coastlines in both the States of Maryland and Virginia. The Chesapeake supports more than 3,600 species of plants, fish and other animals, including 348 species of finfish, 173 species of shellfish, and over 2,700 plant species. The Chesapeake is a major resting ground along the Atlantic Flyway, with about one million waterfowl wintering over in the bay region, and produces more than 500 million pounds of seafood per year (USEPA, 2009b). Historic and growing commercial, industrial, recreational, agricultural, and urban activities and development have heavily impacted and continue to impact the Chesapeake and its living resources. Chemical contaminants, which are often present in sediments and are particularly high near urban areas and commercial ports, can accumulate in tissues of birds, fish, and shellfish. The Baltimore Harbor area in Maryland has been identified as a region of concern where species are likely to be affected by chemical contaminants (USEPA, 2004).

The Chesapeake is also an important commercial waterway, and both power and sail boating are major activities in the area. Sediments are a natural part of the Chesapeake ecosystem; however, accumulation of excessive amounts of sediments is undesirable because they fill in ports and waterways, and carry concentrations of toxic materials (USEPA, 2004). Sediments in the middle Bay are mostly made of silts and clays from shoreline erosion, while sediments in the lower Bay are sandier as a result of shore erosion and inputs from the ocean. Sediments can act as chemical sinks by absorbing nutrients, metals, oil, pesticides and other potentially toxic materials (USEPA, 2004). Shoreline erosion can add sediment to the Bay, and vessel traffic and loss of shoreline vegetation have accelerated natural erosion rates (USEPA, 2004).

4.1.2.1.2 Impact Analysis of Alternative A

The proposed lease areas would be located at least 7 to 18 nm from the nearest shoreline. Therefore, site characterization surveys, and the construction, operation and decommissioning activities of meteorological towers/buoys occurring within the proposed lease areas would have no direct impact on coastal habitats. However, coastal vessel traffic associated with Alternative A and the use of existing coastal and port facilities have the potential to contribute to the impacts on coastal habitats as discussed below.

Routine Activities

Several existing fabrication sites, staging areas, and ports in Delaware, New Jersey, Maryland, and Virginia would support site characterization surveys, and the construction, operation and decommissioning of meteorological towers/buoys as discussed in Section 4.1.3.5 of this EA. No expansion of these existing onshore areas is anticipated in support of Alternative A (*see* Section 4.1.3.5). Existing channels could accommodate the vessels anticipated to be used, and no additional dredging would be required to accommodate different vessel size(s) as a result of Alternative A. In addition, no cables would be installed to shore to support the meteorological towers or buoys.

Impacts from routine activities may occur from wake erosion and associated added sediment caused by vessel traffic in support of Alternative A. Over 12,000 round trips are anticipated from site characterization and assessment activities associated with Alternative A over a five and half year period, if the entire area of each WEA were to be leased and the maximum amount of site characterization surveys were to be conducted in the leased areas of the WEAs. These trips would be divided among nine major and 28 smaller existing ports in Delaware, New Jersey, Maryland, and Virginia (*see* Section 4.1.3.5 of this EA). Due to proximity, it is assumed the majority of traffic associated with site characterization and assessment of the Virginia WEA (about 2,800 round trips) would be supported by the 3 major and 9 smaller ports in Virginia (*see* Sections 3.1.2.6 and 3.1.3.4 of this EA).. If all ports are used equally, this would average about 43 round trips per year to each of the Virginia ports. Based simply on the number of ports in each state, traffic associated with site characterization and assessment of the WEAs offshore New Jersey (about 6,400 round trips), Delaware (about 1,100 round trips) and Maryland (about 1,700 round trips) would be divided as follows: over half of the traffic supported by 3 major and 11 smaller ports in New Jersey; and the remainder of the traffic split between 3 major and 8 smaller ports in Delaware and Maryland. If all ports are used equally, this would average about 67 round trips per year to each of the ports in New Jersey, Delaware and Maryland (*see* Sections 3.1.2.6 and 3.1.3.4 of this EA).

Wake erosion and sedimentation effects would be limited to approach channels and the coastal areas near the ports and bays used to conduct activities. Given the existing amount and nature of vessel traffic (including tanker ships, container ships, and other very large vessels) into and out of these ports (*see* Sections 4.1.3.5.2 and 4.1.3.7.2 of this EA), the relatively small size and number of vessels associated with Alternative A would cause a negligible increase, if any, to wake-induced erosion of associated channels. Channels in the immediate vicinity of some major ports (e.g., Trenton, Wilmington, Baltimore, and Hampton Roads) are armored, which prevents most channel erosion regardless of source.

Non-Routine Events

A spill could occur within a channel or bay from WEA-related vessels on their way to or from the ports, or in the WEAs during survey activities, or installation/decommissioning/maintenance of meteorological towers/buoys. If a spill were to occur within a channel or bay and contact shore the impacts to coastal habitats would depend greatly on the type of material spilled, the size and location of the spill, the meteorological conditions at the time, and the speed with which cleanup plans and equipment could be employed. These impacts are anticipated to be minimal since average spill size is likely to be small (approximately 88 gallons) (*see* Section 3.2.3 of this EA and U.S. Department of Homeland Security, USCG, 2011), and vessels are expected to comply with USCG requirements relating to prevention and control of oil spills. Due to the distance from shore of the activities and the rapid evaporation and dissipation of diesel fuel (*see* Section 3.2.4, non-routine spills) a spill occurring within the WEAs would not likely contact shore. Collisions between vessels and allisions between vessels and meteorological towers and buoys is considered unlikely (*see* Section 3.2.2 of this EA). However in the unlikely event that a vessel allision or collision were to occur, and in the unlikely event that such a collision or allision would cause a spill, the most likely pollutant to be discharged would be diesel fuel. . If a diesel spill were to occur, it would be expected to dissipate very rapidly in the water column, then evaporate and biodegrade within a few days (*see* Section 3.2.3 of this EA), resulting in negligible, if detectable impacts to the area of the spill.

Conclusion

No direct impacts on coastal habitats would occur from routine activities in the WEAs due to the distance of the WEAs from shore. Existing ports or industrial areas in New Jersey, Delaware, Maryland and Virginia are expected to be used in support of Alternative A. In addition, no anticipated expansion of existing facilities is expected to occur as a result of Alternative A. Indirect impacts from routine activities may occur from wake erosion and associated added sediment caused by increased vessel traffic in support of the Alternative A. However; given, the volume and nature of existing vessel traffic in these areas, a negligible increase, if any, to wake induced erosion may occur around the smaller, non-armored, waterways as a result of Alternative A. Should an accidental diesel fuel spill occur as a result of Alternative A, the potential impacts to coastal habitats would be negligible, localized, and temporary.

4.1.2.2 Benthic Resources

4.1.2.2.1 Description of the Affected Environment

The Mid-Atlantic WEAs are located in the Mid-Atlantic Bight (MAB) of the Northeast Continental Shelf Large Marine Ecosystem. The following MAB characterization and Table 4.2 are adopted from *Characterization of the Fishing Practices and Marine Benthic Ecosystems of the Northeast U.S. Shelf* (NOAA Technical Memo NMFS-NE-181, 2004 cited as Johnson, 2002). The Nature Conservancy has also compiled several decades of NMFS benthic grab sample data into an informative geodatabase as part of their Northwest Atlantic Marine Ecoregional Assessment (NAM ERA). The Nature Conservancy (TNC) data is presented in Appendix A, Figures 1-3. The MAB includes the shelf and slope waters from Georges Bank south to Cape Hatteras, and east to the Gulf Stream. Like the rest of the continental shelf, the topography of the MAB was shaped largely by sea - level fluctuations caused by past ice ages. The shelf's basic morphology and sediments derive from the retreat of the last ice sheet, and the subsequent rise in sea level. Since that time, currents and waves have modified these basic structure.

Physical Features

The shelf declines gently from shore out to between 100 and 200 km offshore where it transforms to the slope (100-200 m of water depth) at the shelf break. In the Mid-Atlantic, numerous canyons incise the slope, and some cut up onto the shelf itself. The primary morphological features of the shelf include shelf valleys and channels, shoal massifs, scarps, and sand ridges and swales. The sediment type covering most of the shelf in the MAB is sand, with some relatively small, localized areas of sand-shell and sand-gravel. On the slope, silty sand, silt, and clay predominate.

Sand ridges are more modern in origin than the shelf's glaciated morphology. Their formation is not well understood; however, they appear to develop from the sediments that erode from the shore face. They maintain their shape, so it is assumed that they are in equilibrium with modern current and storm regimes. They are usually grouped, with heights of about 10 m, lengths of 10-50 km, and spacing of about 2 km. Ridges are usually oriented at a slight angle towards shore, running in length from northeast to southwest. The seaward face usually has the steepest slope. Sand ridges are often covered with smaller similar forms, such as sand waves, megaripples, and ripples. Swales occur between sand ridges. Since ridges are higher than the adjacent swales, they are exposed to more energy from water currents, and experience more sediment mobility than swales. Ridges tend to contain less fine sand, silt, and clay, while relatively sheltered swales contain more of the finer particles. Swales have greater benthic macrofaunal density, species richness, and biomass due, in part, to the increased abundance of detrital food and the physically less rigorous conditions. Sand waves are usually found in patches of 5-10 with heights of about 2 m, lengths of about 50-100 m, and spacing of about 1-2 km. Sand waves are primarily found on the inner shelf (*see* Table 4.2 for habitat types), and often observed on sides of sand ridges. Sand waves may remain intact over several seasons. Megaripples occur on sand waves or separately on the inner or central shelf. During the winter storm season, these megaripples may cover as much as 15% of the inner shelf. They tend to form in large patches and usually have lengths of about 3-5 m with heights of about 0.5-1 m. Megaripples tend to survive for less than a season. They can form during a storm and reshape the upper 50-100 cm of the sediments within a few hours. Ripples are also found everywhere on the shelf, and appear or disappear within hours or days, depending upon storms and currents. Ripples usually have lengths of about 1-150 cm and heights of a few centimeters.

Natural and artificial reefs are another important feature of the Mid-Atlantic benthic habitat. Natural reefs, although not well mapped in the Mid-Atlantic, consist largely of exposed rock outcrops or random boulders left by retreating glaciers or rafted from icebergs, or erosion of sediment-covered rock or deltaic deposits of rock, cobble, and gravel along former river channels across a retreating shoreline since the last glacial period. Steimle and Zetlin (2000) report occurrences of northern star coral (*Astrangia poculata*) and molluscan shell deposits that provide biogenic benthic structure to the environment.

Artificial reefs are localized areas of hard structure have been formed by shipwrecks, lost cargoes, disposed solid materials, shoreline jetties and groins, submerged pipelines, cables, and other materials (Steimle and Zetlin 2000). Steimle and Zetlin (2000) cite reports by commercial fishermen of cobbles and loose rock patches associated with gravelly areas in coastal areas. These areas could represent river deltaic deposits during periods of lower sea levels; but some could be ballast stones from old wooden shipwrecks. Off coastal Delaware and southward, these rocky patch are also associated with “live bottom,” i.e., the rocks are colonized by sea whips, stone coral, and other biogenic structural enhancers. While some reef structure may have been deposited specifically for use as fish habitat, most have an alternative primary purpose. However, they have all become a part of the coastal and shelf ecosystem. In general, reefs are important for attachment sites, shelter, and food for many species (Johnson, 2002). All of the features discussed above are not well mapped in the Mid-Atlantic WEAs, and it is uncertain whether they exist within the WEAs. The purpose of the site characterization activities is in part to identify the distinct features of the lease area.

The State of New Jersey has an artificial reef network of over 15 artificial reefs that it manages in cooperation with the USACE. None of these sites are within the New Jersey WEA. In fact, by design the New Jersey WEA diverts east around the Atlantic City artificial reef in order to avoid any potential impacts or conflicting uses.

Biological Features

As reported by Johnson (2002), the Mid-Atlantic shelf was divided by Boesch (1979) into seven bathymetric/morphologic subdivisions based on faunal assemblages (Table 4.2). Sediments in the region studied (Hudson Shelf Valley south to Chesapeake Bay) were dominated by sand with little finer materials. Ridges and swales are important morphological features in this area. Sediments are coarser on the ridges, and the swales have greater benthic macrofaunal density, species richness, and biomass. Faunal species composition differed between these features, and Boesch (1979) incorporated this variation in his subdivisions (Table 4.2). Much overlap of species distributions was found between depth zones, so the faunal assemblages represented more of a continuum than distinct zones.

Table 4.2

Mid-Atlantic Benthic Habitat Types[1]

Habitat Type[2]	Depth (m)	Characterization[3] (faunal zone)	Characteristic Benthic Macrofauna
Inner Shelf	0-30	Course sands with finer sands off MD and VA (sand zone)	Polychaetes: *Polygordius, Goniadella,*and *Spiophanes*
Central Shelf	30-50	(sand zone)	Polychaetes: *Goniadella,*and *Spiophanes* Amphipods: *Pseudunciola*
Central and inner shelf swales	0-50	Occurs in swales between sand ridges (sand zone)	Polychaetes: *Polygordius, Lumbrineris,*and *Spiophanes*
Outer shelf	50-100	(silty-sand zone)	Polychaetes: *Spiophanes* Amphipods: *Ampelisca vadrum* and *Erichthonius*
Outer shelf swales	50-100	Occurs in swales between sand ridges (silty-sand zone)	Amphipods: *Ampelisca agassizi, Unciola,* and *Erichthonius*
Shelf break	100-200	(silt-clay zone)	NA
Continental slope	>200	(none)	NA

[1] Johnson, 2002
[2] Boesch, 1979
[3] Pratt, 1973

In general, the Mid-Atlantic WEAs occur at depths between 20 and 40 m. According to the habitat types in Table 4.2 above, the Mid-Atlantic WEAs occur in the inner to central shelf zones. The characteristic benthic macrofauna for these zones are primarily polychaete worms. These species would be vulnerable to impacts from the installation and decommissioning of meteorological observation platforms and some site characterization activities, such as benthic grab samples and sub-bottom sampling. Where hardbottom occurs in the MAB, the area may be colonized by red algae (*Phyllophora sp*.); sponges, such as *Halichondria sp*. and *Polymastia sp*.; large anemones (*Metridium senile*, *Tealia sp*., or *Stomphia careola*); various hydroids

(*Tubularia sp*., *Obelia sp*., *Campanularis sp*.); northern stone coral, soft coral (*Alcyonaria sp*.), and sea whips (*Leptogorgia sp*.). When hardbottom features are colonized by these sessile macroinvertebrates, they become part of a "live bottom" community. Other macroinvertebrates that may be part of the livebottom communities in the MAB include barnacles; blue mussels, horse mussels *Modiolus modiolus*; the jingle shell *Anomia simplex*; bryozoans, including *Bugula sp*.; skeleton (caprellid) and tubiculous amphipods, such as *Jassa falcata*; and tubiculous polychaetes, such as *Sabellaria vulgaris* and *Hydroides dianthus* (Steimle and Zetlin 2000). It is expected that polychaete worms and other benthic macrofauna would be able to quickly repopulate disturbed areas that are not otherwise occupied by the installed structure itself as these animals are well adapted to life in the highly dynamic environment of the MAB. Although hard/live bottom communities would be avoided in the siting of meteorological observation platforms, live bottom fauna such as stone corals, soft corals, and sea whips would have recovery times on the order of several years, if they were impacted. Marine mammal, sea turtle, and fish interaction with benthic resources is presented in Sections 4.1.2.3, 4.1.2.4, and 4.1.2.7, respectively.

4.1.2.2.2 Impact Analysis of Alternative A

Routine Activities

The primary reasonably foreseeable impacts on benthic resources would be the result of site assessment activities: direct contact that could cause crushing or smothering by anchors, the scour control system, or driven piles while installing meteorological facilities. Most site characterization activities, on the other hand, involve remote sensing of the seafloor and are thus not expected to directly impact benthic resources other than fish, the impact on which are addressed in Section 4.1.2.7 of this EA. Site characterization activities that may disturb the benthic resources include grab samples, borings, vibracores, and CPTs. A total of 1,800-4,800 sub-bottom samplings could occur as a result of Alternative A on the OCS offshore New Jersey to offshore Virginia (*see* Table 3.1). Impacts from these activities are expected to be limited to the immediate area of the sample and any anchoring by vessels. In addition, the data collected during HRG surveys would indicate any potential benthic resources, so that the lessee can develop and implement appropriate avoidance measures prior to each sub-bottom sampling, avoiding the cost of unnecessary or additional sampling (*see* Section 3.1.2.2 of this EA).

It is anticipated that bottom disturbance associated with site assessment activities (the installation of meteorological towers and buoys) would impact the seafloor a maximum radius of 1,500 ft (~450 m) or 52 acres around each bottom-founded structure including all anchorages and appurtenances of the support vessels. This would result in a total of almost 1,500 acres of impacted seafloor in all the WEAs, or less than one percent of the area of all WEAs, if all 12 anticipated meteorological towers were installed and they each disturbed the maximum foreseeable area of seafloor. Should all lessees instead decide to install 2 meteorological buoys on their leases; the maximum area of disturbance would likely be approximately twice that, or 3,000 acres of impacted seafloor – a little less than 2% of the total area of the WEAs.

The area of ocean bottom affected by a meteorological tower or buoy would range from about a couple hundred square ft if supported by a monopole to 1,500 ft^2 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 seafloor by anchoring pins and would cover an area of approximately a 30-ft (9-m) radius around the piling. If 12 meteorological towers were built then the total area expected to be impacted by scour control systems or actual scour would be approximately 0.5 acres (1,500 ft^2 x 12 meteorological towers). In some areas that are not expected to be subject to scour, or where expected scouring would not compromise the integrity of the structure, scour protection may not be required. If, however, scouring does occur at a given location, the area impacted can be expected to be similar to or slightly larger than the projected area covered by a scour control system (30-ft (9-m)) radius beyond the structure, or 0.5 acres for all 12 sites). Upon decommissioning and removal, the equivalent area would be disturbed by severing the pile foundation legs at least 15 ft (4.5 m) below the mudline (30 CFR 585.910). Removing the scour control system, would disturb the same area disturbed when they were installed and would introduce a proximate cloud of turbidity over the seafloor for each leg. Re-suspended sediment would temporarily interfere with filter feeding organisms until the sediment has resettled. The time of sediment suspension would depend upon ocean currents and sediment grain size, but is anticipated to be short-lived.

The ability of soft-bottom communities to recover in number of individuals to pre-disturbance levels may take 1-3 years depending on the actual species density and diversity in the immediate area at the time of disturbance. Recovery of community composition or trophic structure that exploits all ecologic niches available may take longer (Continental Shelf Associates, Inc., 2004, p. 73). The duration of activity directly impacting benthic communities from site characterization surveys, meteorological platform installation, and removal would likely be short-term in duration (8 days to 10 weeks for construction and ≤1 week for removal) and, given the limited area of disturbance within each WEA and across all the WEAs, would cause impacts to benthic habitats that are negligible.

Non-Routine Events

Collisions between vessels and allisions between vessels and meteorological towers and buoys is considered unlikely (*see* Section 3.2.2 of this EA). However in the unlikely event that a vessel allision or collision were to occur, and in the unlikely event that such a collision or allision would cause a spill, the most likely pollutant to be discharged would be diesel fuel. If a diesel spill were to occur, it would be expected to dissipate very rapidly in the water column, then evaporate and biodegrade within a few days (*see* Section 3.2.3 of this EA), resulting in negligible, if detectable impacts to the area of the spill.

BOEM is not proposing any mitigation measures to protect sensitive benthic habitat. Rather, BOEM has a policy to avoid impacts to sensitive benthic resources. This policy is reflected in BOEM's regulations at 30 CFR 585.611(b)(5), which describes the information requirements for a SAP. The Programmatic EIS lists several best management practices for avoiding sensitive benthic resources. The survey information required under the renewable energy regulations would identify the potential for the presence of particularly sensitive benthic habitats (*see* 30 CFR 585.611(b)(5)). For instance, if surveys conducted during site characterization indicate the presence of sensitive habitats, including but not limited to 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; surfclam habitat; scallop habitat; or seagrass patches; then BOEM may require these areas be avoided for the installation of meteorological towers, buoys, or other site-disturbing activities, or may require site-specific mitigation measures. Such measures would be incorporated into a SAP as terms and conditions of approval. Additionally, BOEM would coordinate the review of a SAP with NMFS to determine if the reasonably foreseeable effects of the activities associated with Alternative A fall within impacts anticipated in the NMFS Conservation Recommendations (*see* NMFS EFH Consultation, conservation recommendation #4 in Section 4.1.2.7 of this EA).

Conclusion

Impacts of site characterization surveys, and the construction, operation, and removal of meteorological towers and buoys on benthic communities would be short-term in duration and negligible in extent. The primary reasonably foreseeable impacts resulting from routine activities on benthic communities would be direct contact by anchors, driven piles, and scour protection that could cause crushing or smothering. These impacts would be very localized, given the aerial extent of the benthic habitat types on the Atlantic continental shelf, and could only take place in 1-2% of the total area of the WEAs. If a specific area is adversely impacted, the ability of soft-bottom communities to recover in number and diversity of individuals to pre-disturbance levels may take 1-3 years. Recovery of community composition or trophic structure that exploits all ecologic niches available in that particular area may take longer (Continental Shelf Associates, Inc., 2004, p. 73). The data collected during HRG surveys would indicate the presence of any potential benthic resources, so that sensitive habitat types, such as hard bottom and live bottom habitats, could be avoided by the lessee during sub-bottom sampling and when meteorological facility siting decisions are made. Alternative A is not anticipated to result in any significant impact to benthic communities.

4.1.2.3 Marine Mammals

4.1.2.3.1 Description of the Affected Environment

The Programmatic EIS gives more detail of the life histories of the marine mammal species outlined in this section and is incorporated by reference and not repeated in its entirety herein. The area of potential effect of Alternative A is the coastal and shelf habitats offshore and in between the four WEAs and the adjacent Mid-Atlantic States and New Jersey (which is considered a part of the North Atlantic in Table 4.3. below).

Approximately 39 species of marine mammals occur in Atlantic waters above the OCS from Florida to Maine. Some species are widespread and have been reported from all Atlantic waters, while other species are generally restricted to smaller areas of the Atlantic OCS. In addition, many of these species are composed of distinct stocks that exhibit distinct distributions within overall population distributions and may be locally abundant in some waters but absent from other areas of the Atlantic OCS (Waring et al., 2007). The Atlantic Coast's marine mammals are represented by members of the taxonomic orders Cetacea, Pinnipedia, and Sirenia.

The order Cetacea includes the mysticetes (the baleen whales) and the odontocetes (the toothed whales, including the sperm whale, dolphins, and porpoises). Occurrence of cetacean species is generally widespread in Northwest Atlantic waters; many of the large whales and populations of smaller toothed whales undergo seasonal migrations along the length of the U.S. Atlantic coast. The order Sirenia is represented by the West Indian manatee, which occurs mainly in the South Atlantic, but individual animals have been documented as far north as New England. The order Pinnipedia includes four species of seal, which are mainly found in the North Atlantic. Table 4.3 lists these species, their general occurrence in the Mid-Atlantic (i.e., offshore Delaware, Maryland, and Virginia) and North Atlantic (of which the area offshore New Jersey is a part) and their typical habitat. For the purpose of interpreting Table 4.3 below, Alternative A could only affect those animals in the "coastal" and "shelf" habitats offshore these states; no activities associated with Alternative A or alternatives would take place in or affect the "Slope/Deep" habitats.

This description of the affected environment for marine mammals draws upon recent studies and literature synthesis specifically aimed at offshore areas that include the Mid-Atlantic WEAs and the areas around these WEAs that could be affected by Alternative A. These studies include the NMFS marine mammal stock assessment reports, New Jersey's *Ocean/Wind Power Ecological Baseline Studies Final Report: January 2008 – December 2009* (NJDEP, 2010a) and the Nature Conservancy's comprehensive Northwest Atlantic Marine Ecoregional Assessment (NAM ERA) report (TNC, 2010). The New Jersey survey was conducted over a 24-month period between January 2008 and December 2009 using three sampling techniques - aerial line transect surveys, shipboard line transect surveys, and passive acoustic monitoring (PAM). The source data for the NAM ERA study was primarily NMFS aerial and shipboard surveys for the period 1979-2007. Information from these sources is incorporated into this document. The NAM ERA data for marine mammal sightings is included as Appendix A of this EA. The information from the New Jersey baseline study, the Study Area encompassed approximately 97% of the New Jersey WEA, is a good representation of species presence and distribution within the other Mid-Atlantic WEAs, unless otherwise noted.

Table 4.3
Marine Mammals in the Mid and North Atlantic OCS Waters

Species	Status[b]	General Occurrence[c]		Typical Habitat		
		Mid-Atlantic[e]	North Atlantic[f]	Coastal	Shelf	Slope/Deep
Order Cetacea						
Suborder Mysticeti (baleen whales)						
Family Balaenidae						
North Atlantic right whale (*Eubalaena glacialis*)	E/D	O	UC	X	X	X
Family Balaenopteridae						
Blue whale (*Balaenoptera musculus*)	E/D	A	O		X	X
Bryde's whale (*Balaenoptera edeni*)		O	EX		X	X
Fin whale (*Balaenoptera physalus*)	E/D	UC	UC	X	X	X
Humpback whale (*Megaptera novaeangliae*)	E/D	UC	UC	X	X	X
Minke whale (*Balaenoptera acutorostrata*)		O	UC	X	X	X
Sei whale (*Balaenoptera borealis*)	E/D	O	UC		X	X
Suborder Odontoceti (toothed whales and dolphins)						
Dwarf sperm whale (*Kogia sima*)		O	UC			X
Pygmy sperm whale (*Kogia breviceps*)		UC	O			X
Sperm whale (*Physeter macrocephalus*)	E/D	UC	UC			X
Family Ziphiidae						
Blainville's beaked whale (*Mesoplodon densirostris*)		O	O			X
Cuvier's beaked whale (*Ziphius cavirostris*)		O	O			X
Gervais' beaked whale (*Mesoplodon europaeus*)		O	O			X
True's beaked whale (*Mesoplodon mirus*)		O	O			X
Sowerby's beaked whale (*Mesoplodon bidens)*		O	UC			X
Family Delphinidae						
Short-beaked common dolphin (*Delphinus delphis*)		C	C		X	X
Pantropical spotted dolphin (*Stenella attenuata*)		O	O			X
Bottlenose dolphin (*Tursiops truncatus*)	D	C	C	X	X	X
Clymene dolphin *(Stenella clymene*)		O	A			X
False killer whale (*Pseudorca crassidens*)		O	A			X
White-sided dolphin (*Lagenorhynchus acutus*)		EX	C		X	X
White-beaked dolphin (*Lagenorhynchus albirostris*		A	O		X	
Killer whale (*Orcinus orca*)		O	O		X	X
Melon-headed whale (*Peponocephala electra*)		O	A			X
Atlantic spotted dolphin *(Stenella frontalis*)		C	C			X
Short-finned pilot whale (*Globicephala macrorhynchus*)		C	O		X	X
Long-finned pilot whale *(Globicephala melas*)		UC	C		X	X
Risso's dolphin (*Grampus griseus*)		C	C			X
Spinner dolphin *(Stenella longirostris*)		O	A			X
Striped dolphin (*Stenella coeruleoalba*)		C	C			X
Harbor porpoise *(Phocoena phocoena*)		O	C	X	X	
Order Sirenia, Family Trichechidae						
West Indian manatee *(Trichechus manatus*)	E	O	O	X		
Order Carnivora, Suborder Fissipeda, Family Phocidae						
Harbor seal (*Phoca vitulina*)		UC	C	X	X	
Gray seal (*Halichoerus grypus*)		O	C	X	X	
Harp seal (*Pagophilus groenlandicus)*		EX	EX	X	X	
Hooded seal (*Cystophora cristata)*		EX	EX		X	X

Source: Waring et al. (2007).
[b] E = Endangered under the Endangered Species Act; D = Depleted under the MMPA.
[c] The indicated occurrence does not reflect the distribution and occurrence of individual stocks of marine mammals within localized geographic areas, but rather the broad distribution of the species within the larger categories of OCS waters.
[e] Mid-Atlantic includes OCS waters from the South Carolina-North Carolina border to the Delaware-New Jersey border.
[f] North Atlantic includes OCS waters from the Delaware-New Jersey border to the Maine border with Canada.
[g] A = Absent – not recorded from the area; C = Common – regularly observed throughout the year;
EX = Extralimital - known only on the basis of a few records that probably resulted from unusual wanderings of animals into the region; O = Occasional – relatively few observations throughout the year, but some species may be more frequently observed in some locations or during certain times (e.g., during migration); UC = Uncommon – infrequently observed throughout the year, but some species may be more common in some locations or during certain times of the year (e.g., during migration or when on summer calving grounds or wintering grounds).

Non ESA-Listed Marine Mammals

Most of the marine mammals, by species and by the total number of individuals, which occur in the WEAs are not listed as threatened or endangered under the Endangered Species Act (ESA). Marine mammals are, however, offered special protections under the MMPA. The Programmatic EIS provides a good overview of the known occurrence of these marine mammals, their distribution, and life histories.

Bottlenose Dolphin

The most common marine mammal in the Mid-Atlantic WEAs is the bottlenose dolphin (*Tursiops truncatues*). The western north Atlantic bottlenose dolphin is divided into two morphotypes – coastal and migratory. The coastal morphotype is subdivided into 7 stocks based largely upon spatial distribution. Generally, the offshore migratory morphotype is found exclusively seaward of 34 km (21 miles) and in waters deeper than 34 m. Within 7.5 km (4.5 miles) of shore, all animals are of the coastal morphotype (Waring et al 2010). Thus, both morphotypes are likely to be found in different portions of the Mid-Atlantic WEAs.

The New Jersey Baseline Study did not differentiate between the different stocks in their survey. The New Jersey Baseline Study found that:

> bottlenose dolphins may occur in the Study Area during any time of year. Bottlenose dolphins were the most frequently sighted species during the study period. A total of 319 bottlenose dolphin sightings were recorded; the majority of sightings (257) were on-effort. Although large groups of bottlenose dolphins were occasionally sighted (maximum group size=112), the mean group size of 15.3 animals is consistent with the typical group size of coastal bottlenose dolphins (Shane et al., 1986; Kerr et al., 2005). The presence of calves was confirmed in 24% of all sightings. The mean (16.6 m (54.5 ft)) and minimum water depth (1 m [3 ft]) for bottlenose dolphins were the most shallow of all identified cetacean species sighted during the survey and are indicative of bottlenose dolphins' primarily coastal distribution within New Jersey waters (*see* Toth et al., 2007; in press); however, a bottlenose dolphin sighting represents the deepest water depth at which a cetacean sighting was recorded during this study (34 m 112" ft), suggesting that their distribution within the Study Area is not limited to a particular depth or depth range. Bottlenose dolphin sightings ranged from 0.4 to 37.7 km (0.2 to 20.4 nm) from shore (mean=11.3 km/6.1 nm) which further supports this species' nearshore distribution in the Study Area but is also indicative of occurrence farther offshore in the Study Area. Sea surface temperatures (SSTs) for bottlenose dolphins ranged from 4.8 to 20.3°C (40.6 to 68.5°F) with a mean of 16.3°C (61.3°F). The mean and maximum SST values represent the highest temperatures for all cetacean sightings; this supports the strong seasonality associated with bottlenose dolphin occurrence in the Study Area.

Therefore, while the general assumption has been that bottlenose dolphins are limited to certain ranges by depth offshore, the New Jersey Baseline study found that these animals could be ubiquitous throughout the area that could be potentially affected by Alternative A. This is also supported by the sightings data presented in Figures B1-B4 and B21 for all WEAs. This EA assumes that both types of dolphin could occur in the area of potential effect of all four WEAs.

Minke Whale

Although minke whales are more common to the continental shelf of New England, they have been sighted in the Mid-Atlantic (Waring et al 2010; NJDEP, 2010a; TNC 2010). These sightings data indicate that minke whales occur in the vicinity of the mid-Atlantic WEAs. However, the greater occurrence is likely east of the WEAs between them and the continental shelf break (see sightings data in Appendix A). The New Jersey Baseline study found that minke whales are most likely to occur during winter, but that this species may occur year-round. Four sightings of minke whales were recorded during the survey period; two of which were on-effort and two were off-effort. All sightings were of single individuals. Sightings of minke whales occurred during the winter and spring in water depths ranging from 11 to 24 m (36 to 79 ft) with a mean depth of 18 m (59 ft). SSTs associated with the minke whale sightings ranged from 5.4 to 11.5°C (41.7 to 52.7°F) with a mean of 8.3°C (47.0°F). The winter sightings were recorded in February northeast of Barnegat Light offshore New Jersey. The two spring sightings were recorded in June southeast of Sea Isle City and northeast of Wildwood. Minke whales were sighted within 6.7 and 18.5 km (3.6 and 10.0 nm) from shore with a mean distance of 13.1 km (7.1 nm). As a result, the minke whale would occur in the nearshore areas of the New Jersey WEA and the areas that may be transited by vessels associated with Alternative A within the New Jersey WEA. These whales would likely occur more frequently in the winter than in the summer.

Short-Beaked Common Dolphin

In the Mid-Atlantic short-beaked common dolphins generally occur over the continental shelf along the 200-2000-m isobaths and over prominent underwater topography (Waring et al. 2010). This general description would place them well east of the Mid-Atlantic WEAs as they are all generally inside of the 40m isobath. However, the New Jersey Baseline Study found short-beaked common dolphins actually occur within the area of the New Jersey WEA and between the WEA and the coast. Although occurrence is more likely during the fall and winter (November through March), they may occur at any time of year. A total of 32 short-beaked common dolphin sightings were recorded during the 24-month survey period; 23 were on-effort and nine were off-effort. Total group size varied greatly with a minimum group size of one animal and a maximum of 65 animals recorded. The mean group size was 12.8 animals.

Water depth for short-beaked common dolphin sightings ranged from 10 to 31 m (33 to 102 ft). The mean water depth for sightings was 23.2 m (76.1 ft), which is the deepest mean depth for all identified cetacean sightings recorded during the survey period. This may indicate a preference for deeper waters or may be a construct of the fact that the distribution of sightings of short-beaked common dolphins during the study period was relatively far from shore. The mean distance from shore was 23.5 km (12.7 nm) although sightings ranged from 3.0 to 37.5 km (1.6 to 20.2 nm) from shore. SSTs associated with short-beaked common dolphin sightings ranged from 4.7 to 12.4°C (40.5 to 54.3°F) with a mean of 7.1°C (44.8°F). The low mean SST associated with these sightings indicates that the occurrence of these animals in the area of potential effect would be more likely in winter. In fact, short-beaked common dolphins were only sighted in fall and winter (late November through mid-March).

Therefore, while the general assumption has been that these short-beaked common dolphins are limited to certain ranges by depth offshore, the New Jersey Baseline study found that these animals could be present in the New Jersey WEA. It is well known that these dolphins have a range that includes the waters offshore all of the Mid-Atlantic States. As a result, this EA assumes that these dolphins could occur in all four of the WEAs. This EA also assumes that the occurrence of these animals would be more likely in the winter.

Harbor Porpoise

Harbor porpoise may be found in the Mid-Atlantic primarily in the fall and winter in waters around the 92m isobath (Waring et al. 2010). As with short-beaked common dolphin, this general distribution would place them east of the Mid-Atlantic WEAs. However, as was the case for short-beaked common dolphin, the New Jersey Baseline Study found that harbor porpoises occur in the nearshore waters of New Jersey, primarily during the winter (January to March). However, they may also occur during other times of the year. Harbor porpoises were the second most frequently sighted cetacean during the survey period. A total of 51 harbor porpoise sightings were recorded; 42 of these were on-effort and nine were off-effort. Total group size for the harbor porpoise was small, ranging from one to four individuals per sighting (mean group size=1.7). Sightings were recorded throughout the Study Area and ranged from 1.5 to 36.6 km (0.8 to 19.8 nm) from shore (mean=19.5 km/10.5 nm). Water depth of sightings ranged from 12 to 30 m (39 to 98 ft) with a mean value of 21.5 m (70.5 ft). SSTs for harbor porpoise ranged from 4.5 to 18.7°C (40.1 to 65.7°F) with a mean of 5.8°C (42.4°F), which is the lowest mean value for all identified cetacean species. The very low mean SST associated with these sightings indicates that their presence in the affected environment would most likely be during winter, and over 90% of harbor porpoise sightings during the study period were recorded during winter (mainly February and March). Only three sightings occurred during spring (April and May), and one sighting was recorded during summer (July). The NAM ERA sightings data (TNC 2010) also indicated harbor porpoise may be found inshore of the Virginia WEA in the winter, which supports their occurrence during the winter throughout the Mid-Atlantic WEAs and in the waters in between the WEAs and shore.

Seals

The harbor seal may be found in all nearshore waters of the Atlantic Ocean above about 30°N (approximately Jacksonville, Florida). However, along the U.S. coast they are a seasonal (September – May) inhabitant from southern New England to New Jersey, with occasional sightings into the Carolinas (Waring et al. 2010). Thus only the New Jersey WEA and the waters between the New Jersey WEA and shore will likely have common occurrences of this marine mammal. The New Jersey Baseline Study concluded that harbor seals may occur offshore New Jersey during any time of the year. However, only a single sighting of an individual harbor seal was recorded during the survey period. This seal was observed in shallow waters (18 m (59 ft)) 9.9 km (5.3 nm) east of Little Egg Inlet in June 2008. The SST associated with this sighting was 11.4°C (52.5°F). The New Jersey Baseline Study indicated that two unidentified pinnipeds recorded near Ocean City, New Jersey in April 2008 were "probably harbor seals," but this could not be confirmed. There were additional unidentified pinnipeds seen during the surveys but no supposition was made regarding their probable identification.

While the harbor seal is the pinniped most likely to occur in the mid-Atlantic, the Programmatic EIS notes that other seal species do occasionally occur in the region. The hooded seal usually occurs in New England waters between January and May, and in summer and autumn off the southeast U.S. Coast (Waring et al. 2010). While the harp seal typically inhabits waters of the North Atlantic and Arctic Oceans, the numbers of sightings and strandings have recently been increasing off the east coast from Maine to New Jersey. These extralimital sightings, which usually occur between January and May, may represent a southward shift in the winter distribution of this species (Waring et al. 2010). The gray seal occurs from New England to Labrador, with a year round breeding population present on outer Cape Cod and seasonal occurrence (September – May) to northern New Jersey (north of Atlantic City). Strandings of gray seal have been reported as far south as Cape Hatteras, North Carolina (Waring et al. 2010).

ESA-Listed Threatened and Endangered Marine Mammals

There are six cetaceans that occur in the Mid-Atlantic that are federally-listed as endangered (Table 4.3). The six whale 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*). However, of these six species, only three – right, humpback, and fin whales – are likely to occur in and around the Mid-Atlantic WEAs. Right and humpback whales are most likely to occur in and around the WEAs between November and April and fin whales are most likely to occur in the WEAs between October and January. However, acoustic monitoring data indicates that individuals may occur in the WEAs throughout the year (NJDEP, 2010a). Although sperm and sei whales occur in the Mid-Atlantic, sightings data indicate that these species are limited to areas further offshore east of the Mid-Atlantic WEAs (TNC, 2010).

Manatees are federally listed as endangered (USFWS, 2008). Individual sightings of manatees have occurred in Mid-Atlantic region in the summer months, but a regular migration/occurrence has not been established and any potential encounters with manatees would be highly unlikely.

There is no critical habitat formally identified for marine mammals in and around the Mid-Atlantic WEAs.

The New Jersey study (NJDEP, 2010a) that found the following for right, humpback and fin whales (the only ESA-listed marine mammals observed in the Study Area) during shipboard and aerial surveys and passive acoustic monitoring (PAM data was not available for humpback whales). Similar occurrences for these species may be expected for the Mid-Atlantic WEAs south of New Jersey as they align with a general north/south migration corridor (NJDEP, 2010a).

Right Whales

Observed

Right whales were seen as single animals or in pairs (mean group size=1.5). Sightings occurred in water depths ranging from 17 to 26 m (56 to 85 ft) with a mean value of 22.5 m (73.8 ft). Distances from shore ranged from 19.9 to 31.9 km (10.7 to 17.2 nm) with a mean of 23.7 km (12.8 nm). Right whales were seen in winter, spring, and fall in waters with SST ranging from 5.5 to 12.2 degrees Celsius (°C); 41.9 to 54.0 degrees Fahrenheit (°F); mean 10.0°C (50.0°F)). Three sightings were recorded during November, December, and January when right whales are known to be on the breeding/calving grounds farther south (Winn et al., 1986) or in the Gulf of Maine (Cole et al., 2009). The November 2008 sighting just south of the Study Area boundary was of an adult female who must have been migrating through the Study Area on her way to the calving grounds because she was sighted in mid-December 2008 off the coast of Florida (Zani, M., New England Aquarium, pers. comm., January 14, 2009). The sighting recorded in December 2009 near the southern boundary of the Study Area (water depth of 25 m/82 ft) was also of a female that was later sighted off the coast of Georgia in early January 2010 (Zani, M., New England Aquarium, pers. comm., January 11, 2010). Initially, two sightings of right whales were recorded close together in both time and space. Subsequent photo-identification analyses indicate that these sightings were of the same individual North Atlantic right whale. Therefore, the first sighting of this individual is considered the original sighting, and the second sighting is considered a re-sight of the individual. The January 2009 sighting was of two adult males; these whales were sighted offshore of Barnegat Light in the northernmost portion of the Study Area. The whales exhibited feeding behavior (i.e., surface skimming with mouths open) in 26 m (85 ft) of water; however, actual feeding could not be confirmed. During May 2008, a cow-calf pair was recorded in waters near the 17 m (56 ft) isobath southeast of Atlantic City. The pair was sighted in the southeast U.S. in January and February prior to the May sighting, and they were sighted in the Bay of Fundy in August (Zani, M., New England Aquarium, pers. comm., January 6, 2010).

Passive Acoustic Monitoring

Analysis of recordings captured in the Study Area during the baseline study period demonstrated North Atlantic right whale occurrence throughout the year, with a peak number of detection days in March through June (46 days in 2008, 10 in 2009 although June was not represented in 2009). North Atlantic right whales were also detected sporadically in the eastern and northern areas of the Study Area during the summer through the fall in 2008 (two days detected during July, five in August, five in September, one in October, six in November, and one in December) and in 2009 (three in August, six in September, four in October, and one in November). Nine days of detection (mid-January to mid-March 2009) resulted from the December 2008 PAM deployment even though only two of the five deployed pop-ups were recovered. During these winter months, the North Atlantic right whale calls were detected on the pop-up located 21.4 km (12 nm) from shore at a depth of 24 m (79 ft). Winter represents the time of year when North Atlantic right whale mothers and calves are found off the southeast U.S. coast (mainly off northern Florida and southern Georgia; Hamilton and Mayo, 1990; Hain et al., 1992; Knowlton et al., 1992), but it is unknown where the majority of North Atlantic right whale males and females without calves spend their time during this season. Very little data are represented from the migratory corridor (i.e., the eastern U.S. coast from New Jersey to Virginia) between the southern calving grounds and the northern feeding grounds for comparison (Mead, 1986; Knowlton et al., 1992; McLellan et al., 2002); however, these winter detection days are inconsistent with current distribution data.

Humpback Whales

Humpback whales are known to occur regularly throughout the year in the Mid-Atlantic and may occur in the Study Area year-round. Seventeen sightings of humpback whales were recorded during the study period; seven of these were off-effort and 10 were on-effort. Humpback whales were sighted during all seasons; the majority of sightings (nine) were recorded during winter. Humpback whales were sighted as single animals or in pairs (mean group size=1.2). Distance from shore ranged from 4.8 to 33.2 km (2.6 to 18.0 nm; mean=18.4 km/9.9 nm). In mid-September 2008, a mixed species aggregation of a fin whale and humpback whale was recorded south of Atlantic City. The humpback whale was observed lunge feeding in the vicinity of the fin whale; the water depth of this sighting was 15 m (49 ft). Humpback whale sightings occurred at water depths ranging from 12 to 29 m (39 to 95 ft) with a mean depth of 20.5 m (67.3 ft). This species was sighted in waters with SST ranging from 4.7°C to 19.5°C (40.5 to 67.1°F; mean 10.1°C [50.2°F]).

Fin Whales

Observed

Fin whales were the most frequently sighted large whale species during the survey period. There were a total of 37 fin whale sightings; the majority of these (27) were recorded on effort. Fin whale group size ranged from one to four animals (mean group size=1.5). Water depth for fin whale sightings ranged from 12 to 29 m (39 to 95 ft) with a mean depth of 21.5 m (70.5 ft). SSTs for these sightings ranged from 4.2 to 19.7°C (39.6 to 67.5°F) with a mean temperature of 9.6°C (49.3°F). Fin whales were sighted between 3.1 and 33.9 km (1.7 and 18.3 nm) from shore with a mean distance of 20.0 km (10.8 nm).

Fin whales were sighted during all seasons. Twenty-six sightings were recorded throughout the Study Area during the 2008 surveys. Most of these sightings were recorded during the winter and summer. One mixed-species aggregation of a fin whale and humpback whale was observed in September. While the humpback whale was lunge feeding, the fin whale surfaced multi-directionally but did not appear to be feeding. One calf was observed with an adult fin whale in August 2008. During the 2009 surveys, fin whales were again the most frequently sighted baleen whale species and were seen in every season except summer for a total of 11 sightings.

Passive Acoustic Monitoring

The fin whale was the most common marine mammal species detected acoustically during PAM of the Study Area. Fin whale pulses were primarily documented in the northern and eastern range of the Study Area where the shelf waters were deeper (>25 m [82 ft]) and distance from shore was greater than 25 km (13 nm). The consistent presence of fin whale pulses indicates that this species, or at least members of this species, can be regularly found along the New Jersey outer continental shelf. Fin whale pulses and downsweeps were documented in every month of acoustic monitoring. The 20-hertz (Hz) infrasonic pulses have duration of ~1 s (Thomson and Richardson, 1995; Charif et al., 2002). Automatic detection software facilitated an examination of all hard drives of data. Fin whales were detected on 47 days from March to May 2008, 62 days from June to September 2008, 31 days from October to December 2008, 57 days from January to March 2009, 16 days in April and May 2009, and 68 days from August to October 2009.

As mentioned previously, sightings data for marine mammals has been compiled by the Nature Conservancy for their comprehensive Northwest Atlantic Marine Ecoregional Assessment (NAM ERA). The Nature Conservancy submitted to BOEM spatial data of sightings for marine mammals as part of their comments on BOEM's NOI to prepare this EA (76 FR 7226 (Feb. 9, 2011)). All marine mammal sightings data is included in Appendix A with the exception of striped dolphin, white-sided dolphin, sperm whale, and sei whale which had little to no occurrence in the vicinity of the mid-Atlantic WEAs. The underlying data sources for these maps are the U.S. Navy's Marine Resource Assessment, which in turn, utilized NMFS survey data. The NAM ERA study does note limitations on the data, particularly with regard to the disparity in spatial scales between the data and the WEAs. The ten minute square grid cells that do not include sightings data for marine mammals may not indicate a lack of these animals, but instead may simply reflect a lack of adequate survey effort in those particular areas. However, the overall picture presented in the NAM ERA study is consistent with the predominantly winter (January – March) sightings for humpback and right whales (TNC, 2010).

Additionally, data from the Atlantic Marine Assessment Program for Protected Species (AMAPPS), the BOEM/NOAA interagency effort for the assessment of abundance and spatial distribution of mammals and turtles along the U.S. East Coast, has been evaluated. As part of the AMAPPS program, the Southeast Fisheries Science Center conducted an aerial survey of continental shelf waters along the U.S. East Coast from Cape Canaveral, Florida to Cape May, New Jersey. The survey was conducted between July 24 and August 14, 2010. A total of 7,944 km of trackline were surveyed on effort during 86 flight hours. Six species of marine mammals were identified, with the majority being bottlenose dolphins (127 groups sighted totaling 1,541 animals). The marine mammal sightings data relevant to the Mid-Atlantic WEAs is presented in Appendix A, Figure A.21. The data presented in Figure A.21 and the AMAPPS Final 2010 Annual Report, available at http://www.nefsc.noaa.gov/psb/AMAPPS/, further supports the summer distribution of marine mammals described in this EA. These data sets, in combination with the sightings data from the New Jersey study, are not assumed to be absolute delineation of marine mammal year-round occurrence in the mid-Atlantic. Rather, this data gives the best direct observational data to date for the areas where site assessment and site characterization activities may occur offshore the Mid-Atlantic States. This information will be supplemented with the data gathered through site characterization surveys.

4.1.2.3.2 Impact Analysis of Alternative A

Chapter 5.2.8.2 of the Programmatic EIS discusses the impacts of site characterization and assessment activities on marine mammals. Activities associated with site characterization and assessment that may affect marine mammals include: (1) G&G surveys; (2) construction and/or installation of meteorological observation platforms (i.e., towers and buoys); (3) vessel traffic; (4) discharges of waste materials and accidental fuel releases; and (5) meteorological observation platform decommissioning. The potential effects to marine mammals from these activities can be grouped into the following categories: (1) acoustic effects; (2) benthic habitat effects; (3) vessel collision effects; and (4) other effects (e.g., contact with waterborne pollution). It should be noted that all activities described below will be subject to evaluation by NMFS under the MMPA if and when a lessee proposes to conduct them. Accordingly, lessees would need to consult with NMFS to ensure necessary authorizations (such as Incidental Harassment Authorizations (IHAs)) are obtained when necessary.

The following analysis includes project design criteria required by BOEM, which are reflected in NMFS' programmatic concurrence which was the result of BOEM's ESA consultation regarding Alternative A (*see* Appendix B of this EA). These measures are a part of Alternative A and all action alternatives, and will be included as conditions on any leases and/or SAPs issued or approved under Alternative A.

Acoustic Effects

This section on acoustic effects summarizes what is known about noise sensitivity in marine mammals and the noise that could be produced as a result of site characterization and assessment activity in the Mid-Atlantic WEAs.

Current Understanding of Noise Sensitivity in Marine Mammals

This section is derived in large part from previous ESA consultations and biological opinions issued by NMFS for BOEM Atlantic wind energy projects.

Marine organisms rely on sound to communicate with co-specifics and derive information about their environment. There is growing concern about the effect of increasing ocean noise levels due to anthropogenic sources, particularly vessel traffic on marine mammals. Effects of noise exposure on marine organisms can be characterized by the following range of physical and behavioral responses (Richardson et al., 1995):

1. Behavioral reactions – Range from brief startle responses, to changes or interruptions in feeding, diving, or respiratory patterns, to cessation of vocalizations, to temporary or permanent displacement from habitat.
2. Masking – Reduction in ability to detect communication or other relevant sound signals due to elevated levels of background noise.
3. Temporary threshold shift (TTS) – Temporary, fully recoverable reduction in hearing sensitivity caused by exposure to sound.
4. Permanent threshold shift (PTS) – Permanent, irreversible reduction in hearing sensitivity due to damage or injury to ear structures caused by prolonged exposure to sound or temporary exposure to very intense sound.
5. Non-auditory physiological effects – Effects of sound exposure on tissues in non-auditory systems either through direct exposure or as a consequence of changes in behavior, e.g., resonance of respiratory cavities or growth of gas bubbles in body fluids.

Current thresholds established by NMFS for determining impacts to marine mammals typically center around root-mean-square (RMS) received levels of 180 dB re 1µPa for potential injury, 160 dB re 1µPa for behavioral disturbance/harassment from a non-continuous noise source, and 120 dB re 1µPa for behavioral disturbance/harassment from a continuous noise source. These thresholds are based on a limited number of experimental studies on captive odontocetes, a limited number of controlled field studies on wild marine mammals, observations of marine mammal behavior in the wild, and inferences from studies of hearing in terrestrial mammals. In addition, marine mammal responses to sound can be highly variable, depending on the individual hearing sensitivity of the animal, the behavioral or motivational state at the time of exposure, past exposure to the noise which may have caused habituation or sensitization, demographic factors, habitat characteristics, environmental factors that affect sound transmission, and non-acoustic characteristics of the sound source, such as whether it is stationary or moving (NRC 2003). Nonetheless, the threshold levels referred to above are utilized by NMFS in evaluating impacts and prescribing mitigation under the ESA and MMPA.

Marine Mammal Hearing

This section addresses the current understanding of marine mammal hearing adopted from Southall et al., 2007 (Table 4.4). In order for activities to adversely affect marine mammals through noise, the animals must be able to perceive the noises produced by the activities. If a species cannot hear a sound, or hears it poorly, then the sound is unlikely to have a significant effect (Ketten, 1998).

Table 4.4

Functional Marine Mammal Hearing Groups, Auditory Bandwidth, and Genera Represented from Each Group

Functional Hearing Group	Estimated Auditory Bandwidth	Genera Represented (number species/subspecies)
Low-frequency cetaceans	7 Hz to 22 kHz	*Balaena, Caperea, Eschrichtius, Megaptera, Balaenoptera* (13 species/subspecies)
Mid-frequency cetaceans	150 Hz to 160 kHz	*Steno, Sousa, Sotalia, Tursiops, Stenella, Delphinus, Lagenodelphis, Lagenorhynchus, Lissodelphis, Grampus, Peponocephala, Feresa, Pseudorca, Orcinus, Globicephala, Orcaella, Physeter, Delphinapterus, Monodon, Ziphius, Berardius,Tasmacetus, Hyperoodon, Mesoplodon* (57 species/subspecies)
High-frequency cetaceans	200 Hz to 180 kHz	*Phocoena, Neophocaena, Phocoenoides, Platanista, Inia, Kogia, Lipotes, Pontoporia, Cephalorhynchus* (20 species/subspecies)
Pinnipeds in water	75 Hz to 75 kHz	*Arctocephalus, Callorhinus, Zalophus, Eumetopias, Neophoca, Phocarctos, Otaria, Erignathus, Phoca, Pusa, Halichoerus, Histriophoca, Pagophilus, Cystophora, Monachus, Mirounga, Leptonychotes, Ommatophoca, Lobodon, Hydrurga, and Odobenus* (41 species/subspecies)
Pinnipeds in air	75 Hz to 30 kHz	Same species as pinnipeds in water (41 species/subspecies)

Source: Southall et al., 2007.

From what is known of marine mammal hearing and the source levels and the volume and frequencies of the meteorological tower construction noise sources (see below), it is evident that, if present in the area where the underwater noise occurs, marine mammals are capable of perceiving survey and construction related noises; and have hearing ranges that are likely to have peak sensitivities that overlap the frequencies of sub-bottom profiling survey equipment, pile driving, and vessel sound.

High Resolution Geologic Survey Acoustic Effects

HRG surveys would be employed to characterize ocean-bottom topography and subsurface geology. The HRG survey would also investigate potential benthic biological communities (or habitats) and archaeological resources. Specifically, high resolution site surveys would be used to characterize the potential site of the meteorological tower and to gather the information necessary to submit a COP in the future. HRG surveys associated with Alternative A involve shallow penetration of the seafloor. Therefore, renewable energy-related HRG surveys involve far less energy (and therefore, far less sound introduced into the environment) than do deep-penetrating oil and gas-related surveys.

Section 3.1.1.1 details a reasonably foreseeable scenario for HRG surveys. The survey would likely consist of a vessel towing an acoustic source (boomer and/or chirper) about 25m behind the ship and a 600-m streamer cable with a tail buoy. The total Mid-Atlantic WEA survey area includes the entire footprint of the WEAs. Total HRG survey time is conservatively estimated at 13,300 hours for all the Mid-Atlantic WEAs (which would involve 59,800 nm of surveys). The complete state-by-state breakdown of reasonably foreseeable HRG survey activities is presented in Section 3.1.1.1.

The sound levels at the source (i.e., the boomer, chirper survey vessel) would depend on the type of equipment used for the survey. An example of the type of equipment to be used is in Table 3.2. Acoustic energy generated by these survey instruments is directed downward and may be fanned at the seafloor and not directed horizontally. The surveys would likely use the full daylight hours available, approximately 10 hours per day. However, the time that any particular area would experience elevated sound levels would be significantly shorter as the vessel would be ensonifying a limited area along each transect. Since marine mammals would not be exposed continuously as the vessel is transiting a given area, vessel noise is not considered a continuous noise source.

The sub-bottom profilers (e.g., boomers, sparkers, and chirpers) generate sound within the hearing thresholds of most marine mammals that may occur in the action area. As noted in Table 3.2, the chirp has a sound source level of 201 dB re 1µPa rms with a typical pulse length of 32 milliseconds and a pulse repetition rate of 4 per second. A typical boomer has a sound source level of around 205 dB re 1µPa rms with the pulse duration of 150-200 microseconds and a pulse repetition rate of 3 per second. However, actual specifications may vary by manufacturer and the environment where it is to be deployed.

An acoustic evaluation conducted by Cape Wind Associates for its project on Horseshoe Shoal offshore Massachusetts indicated that HRG survey noise dissipated to 180 dB at 16 m from the source for the chirper and 27 m for the boomer. Underwater sound levels dissipated to 160 dB at 227 m from the source for the chirper, and at 386 m from the source for the boomer. However, it should be noted that this information serves as a guide and that different equipment may produce different results in different sub-marine environments. For the purposes of this EA, these zones of ensonification for acoustic harassment have been rounded up to 30 m and 400 m for the boomer at 160dB and 180dB respectively.

Effects on marine mammal behavior are generally expected to be limited due to avoidance of the immediate area around the HRG survey activities and short-term changes in behavior, falling within the MMPA definition of “Level B harassment.” Cetaceans are highly mobile and likely to quickly leave an area when disturbing noise levels are present. Baleen whales have also been found to increase call production or call frequency in the presence of noise from sub-bottom profilers and vessels (Di Iorio and Clark 2010 and Parks et al 2007). The only pinnipeds, harbor seals, are not likely to occur in the area of the survey as the only sighting in the NJ Baseline Study was well inshore of the current NJ WEA. While an HRG survey may disturb more than one individual, the surveys occurring across the WEAs at various times and locations over the course of 5-6 years and the localized and temporary nature of the sound emitted are not expected to result in any population-level effects. Individuals disturbed by HRG survey noise would likely return to normal behavioral patterns after the survey has ceased, after the survey vessel has moved out of the animal’s immediate vicinity, or after the animal has left the immediate survey area. Once an area has been surveyed, it is unlikely that it would be surveyed again. As a result, BOEM does not anticipate that any area would be precluded from use by these animals for longer than it takes for the vessel to traverse that area. Moreover, there is wide distribution of cetaceans in the proposed Mid-Atlantic WEAs. Although cetaceans may be present in a WEA during an HRG survey, the likely maximum ranges of the 180 dB and 160 dB isopleths, (estimated at maximum of 30 m and 400 m, respectively) make it unlikely that any cetaceans would be exposed to injurious or disturbing sound levels associated with the survey.

Because of the mobility of the sound source during HRG surveys, and the likelihood that marine mammals would leave the immediate vicinity of the surveys, few individuals may be expected, in most cases, to be present within the survey areas. Marine mammals that may be engaged in feeding behavior and choose not to leave the survey area may express behavioral changes, such as increased call production or frequency.

The project design criteria, including marine mammal exclusion zones monitored by trained observers, are a part of Alternative A, and will be required by BOEM in the lease instrument and/or conditions of approval for any SAP (*see* Appendix B). The NMFS concurred that the activities to be carried out as described are not likely to adversely affect listed whales when implemented according to BOEM's mandatory project design criteria (USDOC, NOAA, NMFS 2011c). In addition, the lessee's surveys would likely require an Incidental Harassment Authorization from NMFS, which would very likely require similar mitigation measures be implemented (*see* NMFS MMPA Proposed Notice of Incidental Harassment Authorization for the Cape Wind Project (76 FR 56735, September 14, 2011).

No population-level impacts on marine mammals from HRG surveys are expected as a result of this activity.

Sub-bottom Reconnaissance Acoustic Effects

The majority of sub-bottom sampling work would be accomplished via CPTs, and to a more limited extent vibracores, which does not require deep borehole drilling. However, some geologic conditions may prevent sufficient data being acquired from vibracores and CPTs and would instead necessitate obtaining a geologic profile via a borehole. Acoustic impacts from borehole drilling are expected to be below the 120 dB threshold established by NMFS for marine mammal harassment from a continuous noise source. Previous estimates submitted to BOEM for geotechnical drilling have source sound levels not exceeding 145dB at a frequency of 120Hz (USDOC, NOAA, NMFS, 2009). Previous submissions to BOEM also indicated that boring sound should attenuate to below 120 dB by the 150 m isopleth. According to project design criteria required by BOEM per the ESA consultation with NMFS, there will be a 200-m exclusion zone for marine mammals during deep hole boring activity (*see* Appendix B of this EA). The total drilling time would be dependent upon the target depth and substrate that would be drilled.

Since drilling is considered by NMFS to be a continuous noise source, the level of noise considered harassment under the MMPA is 120 dB. It is generally expected that the activity of setting up drilling equipment would deter marine mammals from entering the immediate work area. There would be nothing that would prevent animals from leaving or avoiding areas where drilling would take place. Other sub-bottom reconnaissance activity, such as the use of a CPT, is expected to only have minor acoustic impacts, primarily from vessel engines.

It is anticipated that sub-bottom reconnaissance work as a whole would have temporary effects lasting the duration of the work. These temporary effects include the displacement of marine fauna within the immediate vicinity of the work and some localized sedimentation of flora and sessile invertebrates. The acoustic impacts with this work are minor and ensonify only a small area.

Meteorological Tower Pile-Driving Noise

The type and intensity of the sounds produced by pile driving depend on a variety of factors, including the type and size of the pile, the firmness of the substrate into which the pile is driven, the depth of the water, and the type and size of the impact hammer being used. Thus, the actual sounds produced would vary from area to area. Regardless, this section attempts to capture the range of acoustic impacts from pile driving.

Pile driving is expected to generate sound levels in excess of 200 dB and have a relatively broad band of 20 Hz to >20 kHz (Madsen et al., 2006; Thomsen et al., 2006). Sound attenuation modeling done during construction at Utgrunden Wind Park in the Baltic Sea in 2000 and adopted as the model for the Cape Wind Energy Project (Report 4.1.2-1 (Noise Report)) of the FEIS) indicates that underwater noise levels may be greater than 160 dB re 1 uPa (i.e., NMFS threshold for behavioral disturbance/harassment from a non-continuous noise source) within approximately 3.4 km of the pile being driven. At distances greater than 3.4km from the pile being driven, noise levels will have dissipated to below 160 dB re 1 uPa. It should be noted that these measurements are for a 1.7 MW turbine mounted upon a monopile of approximately 5m in diameter and not for a meteorological tower. Generally, the larger the diameter of the monopole the greater the noise produced from pile driving (Nedwell, 2007). Actual measured underwater sound levels during the construction of the Cape Wind meteorological tower in 2003 were 145-167 dB at 500m with peak energy at around 500Hz.

Alternatively, modeling conducted by Bluewater Wind, LLC for proposed meteorological tower sites offshore New Jersey and Delaware under Interim Policy leases places the 160 dB isopleth at 7,230 m for Delaware and 6,600 m (USDOC, NOAA, NMFS, 2010a). This model has not been field-verified. Generally, it is anticipated that actual pile driving time would last 3-8 hours per pile driven within the Mid-Atlantic WEAs. The information from Cape Wind Associates and Bluewater Wind represent a good range of the area of ensonification at the 180 dB and 160 dB levels. This is detailed in Table 4.5 below.

Table 4.5

Modeled Areas of Ensonification from Pile Driving

Project (modeled)	Additional Info	180 dB re 1µPa (rms)	160 dB re 1µPa (rms)
Bluewater Wind (Interim Policy Lease offshore Delaware)	3.05m diameter monopole; 900kJ hammer	760m	7,230m
Bluewater Wind (Interim Policy Lease offshore New Jersey)	3.05m diameter monopole; 900kJ hammer	1,000m	6,600m
Cape Wind Energy Project (Lease in Nantucket Sound)	5.05m monopole; 1,200kJ hammer	500m	3,400m

Behavioral disturbance/harassment of marine mammals may occur when individuals are exposed to pulsed noise levels (i.e., non-continuous noise sources, such as those generated by an impact pile driver that would be used for pile installation) greater than 160 dB re 1 µPa. In order to minimize the potential effects of pile driving on listed species, BOEM proposed several mitigation measures in the Draft EA that have been incorporated into the NMFS project design criteria pursuant to the ESA consultation and are now required for pile driving activities (*see* Appendix B; (USDOC, NOAA, NMFS, 2011c).

During meteorological tower construction, marine mammals in the vicinity of the construction site may be temporarily disturbed (3-8 hours over 3 days) by noise generated during pile driving. Such noise could disturb normal behaviors (e.g., feeding, social interactions), mask calls from co specifics, 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). 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 sound generated during construction of a meteorological tower may affect more than one individual, population-level effects are not anticipated. Some species are 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 pile driving, 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 for each meteorological tower installation is anticipated to be completed within a 3-day period), or after the animal has left the survey area.

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 on the order of 100 m, and behavioral effects at ranges of the order of 20 km or more (Bailey et al., 2010). However, construction of a meteorological tower would be of relatively short duration and limited to a maximum of 10 dispersed locations throughout the Mid-Atlantic WEAs (*see* the meteorological tower/buoy action scenario in Section 3.1.2). Additionally, each of these 12 structures could be constructed at any time within an approximately 5 and one-half year period. Because marine mammals would be expected to leave the immediate vicinity of the tower during its construction, the total area of effect would be minor in relation to the environment in which these animals live, and the timing of construction would be so spatially and temporally dispersed, impacts to marine mammals in general would be of limited duration and intensity.

In the unlikely event that a whale is present within the area of potential effect when the meteorological towers are being installed, no pile driving would occur if any marine mammal is within 7 km of the pile, and BOEM would require soft-start procedures as conditions of any lease or SAP approval (*see* Appendix B for detail). Additional operating requirements may be imposed by NMFS in an IHA issued to a lessee (*see* NMFS MMPA Proposed Notice of Incidental Harassment Authorization for the Cape Wind Project (76 FR 56735 (Sept. 14, 2011))).

As exposure to harassing levels of sound (i.e., 160dB re 1uPa) is likely to only occur within 7 km of the pile being driven, and it is extremely unlikely that driving would occur if a whale were sighted within 7 km of the pile, BOEM anticipates that no whales would be exposed to sound levels greater than 160 dB and no whales would be exposed to sound levels at which injury could occur (i.e., 160dB re 1µPa). BOEM does not anticipate that these activities, due to their low number, intensity, dispersed location, and timing over a five and one-half year period, would either individually or cumulatively seriously harm or kill any of these animals. BOEM did consider the use of vibratory hammers as a measure to reduce exposure to disturbing levels of noise. BOEM does not discourage the use of vibratory hammers as their use would reduce the duration of exposure to the higher sound pressure levels associated with impact hammers. However, it should be noted that the use of vibratory hammers could result in an increase in the total installation time and thus total duration of sound exposure. Other noise reduction measures for pile driving, primarily cofferdams and foam sleeves (*see* Nehls, 2007 and USDOI, BOEMRE, 2010) have also been shown to be effective. However, the feasibility of requiring these technologies in the offshore environment needs further exploration and may be appropriate on a case-by case basis for full commercial-scale construction projects where the total duration of pile driving activities would be greater than that for a single meteorological tower.

Vessel Traffic Noise

Marine mammals may also be affected by the noise generated by surface vessels traveling to and from the WEAs. The dominant source of noise from vessels is from the propeller cavitation, and the intensity of this noise is largely related to ship size and speed. Vessel noise from vessels associated with Alternative A would generally produce low levels of noise, anticipated to be in the range of 150 to 170 dB re 1 µPa-m, at frequencies below 1,000 Hz, and would dissipate quickly with distance from the source. Exposure of marine mammals to individual construction or survey 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, and it is unlikely that such short-term effects would result in long-term population-level impacts for marine mammals. Thus, impacts from vessel noise would be negligible if detectible, and short-term.

It should be noted that the areas that could be affected by the alternatives are some of the most heavily-trafficked waters in the world and is also host to an active and large fishing industry (*see* Section 4.1.3 regarding for discussion of other ocean use). While vessel traffic associated with Alternative A may have some impact on marine mammals, that potential for impact would be exceedingly minor in light of the current potential for impact associated with current status-quo vessel activities in the area of potential effect.

Benthic Habitat Effects

Section 4.1.2.2 of this document discusses the benthic resources and the reasonably foreseeable impacts of Alternative A upon those resources. This section only discusses those impacts in relation to marine mammals. Benthic effects from Alternative A that would impact marine mammals are anticipated to be negligible due to limited utilization of the benthic environment by marine mammals and the limited impact to the benthos itself. It is expected that some benthic forage items for marine mammals may become unavailable during certain activities associated with Alternative A, as described below.

Sub-bottom Sampling

The sub-bottom sampling would result in small areas of the seafloor being disturbed (i.e., less than one ft diameter would be disturbed in the areas where cores are sampled) for no more than a few days (*see* Section 4.1.2.2 for a full discussion of the benthic resources and impacts from Alternative A). This activity could conceivably impact marine mammals by removing a small amount of forage items that would otherwise be available to these species. However, due to the small footprint of disturbance, the temporary nature of the action, and likely availability of similar benthic habitat all around the sampling location, it is expected that Alternative A would have negligible benthic effects that could impact marine mammals.

Meteorological Tower/Buoy Installation

It is expected that re-suspension of bottom sediment and the ensuing sedimentation that would occur around a recently-installed tower or buoy would have only minor temporary effects that could impact the habitat and food availability for marine mammals for the same reasons as stated above.

Meteorological Tower/Buoy Operation

The installation of a single meteorological tower (total of 12) or buoy (total of 24) within a lease block (total of 12) is not expected to result in any changes in local community assemblage and diversity or the availability of habitat and forage items for marine mammals that could occur in and around the WEAs.

Collision Effects

This section addresses potential for impacts resulting from the collision of marine mammals with structures and vessels associated with Alternative A. A collision with marine life, such as a whale, could result in injury to the animal and/or damage to the facility or vessel. In the case of fixed platforms, BOEM anticipates that marine life would simply avoid colliding with the structures.

Vessels associated with site characterization surveys, or construction, maintenance or decommissioning of the meteorological tower could collide with marine mammals during transit. According to project design criteria required by BOEM, all vessel operators must abide by "Whale-watching Guidelines," which would limit the likelihood or prevent altogether such collisions. These guidelines contain vessel approach protocols derived from the MMPA (*see* Appendix B). These guidelines identify 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), the volume of vessel traffic, and as a function of vessel speed, the number of vessel trips, and the navigational visibility.

Vessel traffic conducting surveys, and bringing equipment and personnel to meteorological tower construction sites may affect marine mammals either by direct collisions with vessels or by acoustic disturbances from vessels. 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). The majority of the vessels anticipated to be associated with the WEAs would be subject, in certain areas, to regulations limiting their speed to 10 knots or less (see below).

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), all of which are already present in the area of potential effects. Collisions with vessels greater than 80 m (260 ft) in length are usually either lethal or result in severe injuries (Laist et al., 2001), although no such vessels are anticipated to be associated with Alternative A.

Ship strikes have been recorded in U.S. waters offshore almost every coastal State. Collisions between whales and vessels have been most commonly reported along the Atlantic Coast, which is busiest in terms of vessel traffic, followed by the Pacific Coast (including Alaska and Hawaii); and the Gulf of Mexico (Jensen and Silber 2004). In addition, most ship strikes appear to occur over or near the edge of the continental shelf (Laist et al., 2001), which is shallower and provides habitat for these animals, and is also host to a greater concentration of vessel traffic than are the seas beyond the OCS. 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 North Atlantic right whale, the humpback whale, minke whale, and fin whale are considered more likely than the others to encounter vessels associated with the Mid-Atlantic WEAs.

According to project design criteria required by BOEM, vessels associated with Alternative A will be required to observe a 10 knot speed limit when mother/calf pairs, pods, or large assemblages of cetaceans are observed near an underway vessel, when safety permits (*see* Appendix B). In addition, vessels conducting activities in and around the WEAs would be subject to regulations requiring ships 19.8 m (65 ft) or longer to travel at 10 knots (11.5 mph) or less in certain areas where right whales gather (50 CFR 224.105). 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 also benefits other marine mammal species. These restrictions extend out to 37 km (20 nm) around major Mid-Atlantic ports. In addition to the mandatory speed restrictions, in Seasonal Management Areas (SMAs), vessels would also be required to check with NOAA's Sighting Advisory System when Dynamic Management Areas (DMAs) are in place. The full compliance guide can be found at: http://www.nmfs.noaa.gov/pr/pdfs/shipstrike/compliance_guide.pdf.

Considering the existing regulatory measures in place; the limited intermittent activities associated with Alternative A, which are spread out temporally, as well as geographically in and around the Mid-Atlantic WEAs, and BOEM's mandatory project design criteria (*see* Appendix B), no significant impacts due to vessel strikes are anticipated. Moreover, due to the nature and volume of existing and historic vessel traffic in the area of potential effect, it is unlikely that the vessel traffic associated with Alternative A would substantially increase the risk that marine mammals are struck within the area of potential effect. As a result, Alternative A would not lead to any substantial effects on the population of marine mammal species in these areas.

Discharge of Waste Materials and Accidental Fuel Leaks

Collisions between vessels and allisions between vessels and meteorological towers and buoys is considered unlikely (*see* Section 3.2.2 of this EA). However; in, the unlikely event that a vessel allision or collision were to occur, the most likely pollutant to be discharged would be diesel fuel. If a diesel spill were to occur, it would be expected to dissipate very rapidly in the water column, then evaporate and biodegrade within a few days (*see* Section 3.2.3 of this EA).

Marine mammals could be adversely impacted by the ingestion of, or entanglement with, solid debris. Marine 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 BOEM (30 CFR 250.300) and the USCG (MARPOL, Annex V, Public Law 100−220 (101 Stat. 1458)). Thus, the entanglement in or ingestion of project-related trash and debris by marine mammals would not be expected during normal operations.

Because of the limited amount of vessel traffic and offshore activity that would be associated with surveys and the construction/installation of meteorological towers/buoys, the release of liquid wastes would occur infrequently. The likelihood of an accident resulting in accidental discharges would be limited to the active construction/installation and decommissioning periods of the site assessment. This is because this is the time period when there would be more than one vessel on site conducting complex maneuvers in a restricted space. Survey activity is a much simpler activity usually involving one vessel moving in one continuous direction. Impacts to marine mammals from the discharge of waste materials or the accidental release of fuels are expected to be minor, if they occur at all.

Meteorological Tower and Buoy Decommissioning

The decommissioning of meteorological towers and buoys is described in Section 3.1.2. This section primarily addresses the decommissioning of a meteorological tower, as it is more extensive than decommissioning a meteorological buoy.

Upon completion of site assessment activities, the meteorological tower would be removed and transported by barge to shore. During this activity, marine mammals may be affected by sound and operational discharges as described for meteorological tower construction. 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 m (15 ft) below the mudline (30 CFR 585.910). Marine mammals could be affected by sound during pile cutting. Pile cutting techniques and associated sound levels have yet to be tested and evaluated in the Atlantic wind energy context. It is expected that only animals in the immediate vicinity of the tower (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. Disturbance of marine mammals during decommissioning is expected to be similar to that of construction with the exception that pile cutting sound is expected to be much lower than that for pile driving. Impacts from vessel activity during decommissioning are expected to be similar to that during construction, and is anticipated to be minor.

BOEM Mandatory Project Design Criteria

The following BOEM project design criteria, which are discussed in NMFS' September 20, 2011, concurrence letter, are intended to ensure that the potential for adverse impacts to marine mammals is minimized, if not eliminated (*see* Appendix B). These requirements will be included as lease stipulations and/or conditions of SAPs issued or approved under this proposed action or alternatives. A more detailed description of these requirements can be found in Appendix B.

Exclusion Zone During HRG Surveys

Effects on marine mammal behavior are generally expected to be limited to avoidance of the immediate area around the HRG survey activities and short-term changes in behavior, falling within the MMPA definition of "Level B harassment." Although cetaceans may be present in a WEA during an HRG survey, the likely maximum ranges of the 180 dB and 160 dB isopleths, (estimated at maximum of 30 m and 400 m, respectively) make it unlikely that any cetaceans would be exposed to injurious or disturbing sound levels associated with the survey. The risk of exposure would further be reduced by requiring the use of an observer, which would ensure that the survey equipment is not operated if a marine mammal or sea turtle is within 500 m of the survey vessel.

Exclusion Zone During Boring Activities

Since drilling is considered by NMFS to be a continuous noise source, the level of noise considered harassment under the MMPA is 120 dB. As a result, this requirement would require a 200 m exclusion zone for marine mammals and sea turtles during deep hole boring activity.

Pile Driving

Behavioral disturbance/harassment of marine mammals may occur when individuals are exposed to non-continuous noise sources, such as those generated by an impact pile driver that would be used for monopole installation. BOEM will require lessees to implement a "soft start" procedure, and require that no pile driving occur if any whales or sea turtles are present within 7 km of the pile to be driven. If future field-verified acoustic data indicates the 160 dB isopleths associated with pile driving is greater than 7 km, then the requirements would be modified to reflect the new data, if similar conditions/operating environment warrant the change. Regarding the shut down of pile driving operations, if pile driving stops and then resumes, it would potentially have to occur for a longer time and at increased energy levels. This would simply amplify potential impacts to any marine mammals and sea turtles present, as they would endure potentially higher sound pressure levels for longer periods of time. Thus, if a marine mammal was spotted during hammering operations, the requirements will allow the lessee to complete a pile drive segment that has been started, followed by an "all clear" period

Conclusion

Alternative A is not anticipated to result in any significant or population-level effects to marine mammals. The potential effects to marine mammals are expected to be very localized and temporary resulting in minimal to negligible harassment depending on the specific activity. The impacts are considered minimal due to the impact producing factor itself in certain instances (e.g., most sonar work and grab samples), and/or the limited spatial and/or temporal extent of the activity in other instances (e.g. vessel transits and pile driving activity). Specifically, harassment from sound and slight increases in the risk of vessel collisions are the primary potential impacts to marine mammals associated with Alternative A, but these impacts, if any, are anticipated to be minimal. *See* NMFS Concurrence, Section 5.2.1.

4.1.2.4 Sea Turtles

4.1.2.4.1 Description of the Affected Environment

Of the six species of sea turtles that can be found offshore the U.S., there are four species that potentially utilize the WEAs in the Mid-Atlantic, all of which are listed as endangered or threatened under the ESA (Table 4.6). These species include the loggerhead (*Caretta caretta*), leatherback (*Dermochelys coriacea*), green (*Chelonia mydas*), and Kemp's ridley (*Lepidochelys kempii*) sea turtles. On September 22, 2011, NMFS published a final rule to listing nine distinct population segments (DPS) of loggerhead sea turtles. The Northwest Atlantic DPS, which encompasses the action area, retained the threatened status. Of these four species only three of them, the leatherback, loggerhead, and green sea turtles, have had documented sightings within the Mid-Atlantic WEAs (TNC, 2010 and AMAPPS 2011; *see* Appendix A, Figures A.22-A.30). These four species are all highly migratory, and no individual members of any of the species are likely to be year-round residents of areas that could be affected by Alternative A. Individual animals would make migrations into nearshore waters as well as other areas of the North Atlantic Ocean, Gulf of Mexico, and the Caribbean Sea. There is no formally designated critical habitat for sea turtles in the Mid-Atlantic WEAs.

Few researchers have reported on the density of sea turtles offshore the Mid-Atlantic States. However, some useful information is available from one source (Shoop and Kenney, 1992). Shoop and Kenney (1992) used information from the University of Rhode Island's Cetacean and Turtle Assessment Program as well as other available sightings information to estimate seasonal abundances of loggerhead and leatherback sea turtles in northeastern waters, which include the waters offshore New Jersey, Delaware, Maryland, and Virginia (CETAP, 1982). The CETAP survey consisted of three years of aerial and shipboard surveys conducted between 1978 and 1982 and provided the first comprehensive assessment of the sea turtle population between Nova Scotia, Canada and Cape Hatteras, North Carolina. The authors calculated overall ranges of abundance estimates for the summer of 7,000-10,000 loggerheads and 300-600 leatherbacks present in the action area from Nova Scotia to Cape Hatteras. Using the available sightings data (2841 loggerheads, 128 leatherbacks and 491 unidentified sea turtles), the authors calculated density estimates for loggerhead and leatherback sea turtles (reported as number of turtles per square km). These calculations resulted in density estimates of 0.00164 – 0.510 loggerheads per square km and 0.00209 – 0.0216 leatherbacks per square km. It is important to note, however, that this estimate assumes that sea turtles are evenly distributed throughout the waters off the northeast, even though Shoop and Kenney report several concentration areas where loggerhead or leatherback abundance is much higher than in other areas. The Shoop and Kenney data, despite considering only the presence of loggerhead and leatherback sea turtles, likely overestimates the number of sea turtles present in the WEAs. This is due to the assumption that sea turtle abundance would be even throughout the Nova Scotia to the Cape Hatteras action area, which is an invalid assumption. Sea turtles occur in high concentrations in several areas outside of the action area, and the inclusion of these concentration areas in the density estimate skews the estimate for the action area.

This information is supported by the results of the New Jersey study (NJDEP, 2010a) that found the following for leatherback and loggerhead sea turtles (the only sea turtles observed in the vicinity of the New Jersey WEA) (NJDEP, 2010a).

Leatherback Sea Turtles

Leatherback turtles are more common in Mid-Atlantic waters during the summer and fall; however, this species may occur in the Study Area year-round. Twelve sightings of leatherback turtles were recorded during the surveys; nine of these were on-effort and three were off-effort. All leatherback turtle sightings were of single individuals; eight of the total 12 sightings were thought to be juveniles. Water depths of leatherback sightings ranged from 18 to 30 m (59 to 98 ft) with a mean depth of 24 m (79 ft). The SSTs associated with leatherback turtle sightings ranged from 18.1 to 20.3°C (64.6 to 68.5°F) with a mean of 19.0°C (66.2°F). This mean SST is the highest average value for any species or species group sighted during the survey period and is consistent with the seasonality of leatherback occurrence in the Study Area. Leatherback turtles were sighted only during the summer. The majority of sightings (seven) occurred in the far northern portion of the Study Area. Sightings were recorded from 10.3 to 36.2 km (5.6 to 19.5 NM) from shore with a mean distance of 28.6 km (15.4 NM).

Loggerhead Sea Turtles

Loggerhead turtles are more common in Mid-Atlantic waters during the summer and fall; however, this species may occur in the Study Area year-round. A total of 69 sightings of loggerhead turtles were recorded during the surveys; the vast majority of these (63) were recorded on effort. The 15 unidentified hard-shell turtle sightings recorded during spring and summer may have been loggerhead turtles; however, species identifications could not be confirmed. All loggerhead turtle sightings were of single individuals; four of the total 69 sightings were recorded as juveniles. Loggerhead sightings occurred in water depths ranging from 9 to 34 m (30 to 112 ft) with a mean depth of 23.5 m (77.1 ft). Distance from shore ranged from 1.5 to 38.4 km (0.8 to 20.7 NM; mean=24.6 km/13.3 NM). SSTs associated with these sightings ranged from 11.0 to 20.3°C (51.8 to 68.5°F) with a mean value of 18.5°C (65.3°F). This was the second highest mean SST of all sightings which is consistent with the strong seasonality of loggerhead occurrence in the Study Area. Loggerhead turtles were sighted from late spring through fall. The earliest a loggerhead was sighted was June and the latest was October. Sightings of loggerhead turtles are fairly evenly distributed although over 50% of the sightings were recorded in the eastern half of the Study Area. During the baseline study period, opportunistic sightings of sea turtles were recorded during monitoring efforts conducted in a potential wind farm site southeast of Atlantic City. Experienced observers recorded two juvenile loggerhead turtles during the geophysical surveys in August 2009 (GMI 2009b).

As previously mentioned, sightings data for sea turtles has also been compiled by the Nature Conservancy for their comprehensive Northwest Atlantic Marine Ecoregional Assessment (NAM ERA). The Nature Conservancy submitted sightings data for sea turtles as part of their comments on BOEM's NOI to prepare this EA (76 FR 7226 (Feb. 9, 2011)), which is included in Appendix A of this EA. The underlying source for these maps is the U.S. Navy's Marine Resource Assessment, which in turn utilized NMFS survey data. The NAM ERA study does note limitations on the data, especially in regards to the disparity in spatial scales between the data and the WEAs. The ten-minute square grid cells that do not include sightings data for sea turtles may not indicate a lack of these animals but instead may simply reflect a lack of adequate survey effort in those particular areas. The NAM ERA geodatabase was used by BOEM to display leatherback and loggerhead sea turtle distribution. This data, presented in Appendix A, is consistent with the distribution described in this section.

Additionally, preliminary data from the Atlantic Marine Assessment Program for Protected Species (AMAPPS), the BOEM/NOAA interagency effort for the assessment of abundance and spatial distribution of mammals and turtles along the U.S. East Coast, has been evaluated. As part of the AMAPPS program, the NMFS Southeast Fisheries Science Center conducted an aerial survey of continental shelf waters along the U.S. East Coast from Cape Canaveral, Florida to Cape May, New Jersey. The survey was conducted between July 24 and August 14, 2010. During that period, flights were conducted on 12 days with the remaining days lost due to poor weather conditions. A total of 7,944 km of trackline were surveyed on effort during 86 flight hours. Four species of sea turtles were identified within the geographic scope of this study, with the majority being loggerhead turtles (563 groups totaling 742 animals) from Cape Canaveral to Cape May. The AMAPPS Final 2010 Annual Report, available at: http://www.nefsc.noaa.gov/psb/AMAPPS/, confirms the summer distribution of sea turtles. These data sets, in combination with the sightings data from the New Jersey study, are not assumed to be absolute delineation of sea turtle year-round occurrence in the mid-Atlantic. Rather, this data gives the best direct observational data to date for the areas where site assessment and site characterization activities will occur in the mid-Atlantic. This information will be supplemented on a site-specific level with the data gathered through site characterization surveys.

Table 4.6

Sea Turtle Taxa of the Western North Atlantic

Order Testudines (turtles)	Relative Occurrence in WEAs[1]	ESA Status
Family Cheloniidae (hardshell sea turtles)		
Loggerhead sea turtle (*Caretta caretta*)	Common	Threatened
Green sea turtle (*Chelonia mydas*)	Uncommon	Threatened
Hawksbill sea turtle (*Eretmochelys imbricata*)	Rare	Endangered
Kemp's Ridley sea turtle (*Lepidochelys kempii*)	Uncommon	Endangered
Family Dermochelyidae (leatherback sea turtle)		
Leatherback sea turtle (*Dermochelys coriacea*)	Common	Endangered

[1] The occurrence category is based upon NMFS survey data as present in the TNC NAM ERA geodatabase for sightings with the Mid-Atlantic WEAs and previous endangered species consultations with NMFS.

4.1.2.4.2 Impact Analysis of Alternative A

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 and or installation of one or more meteorological observation platforms (e.g., towers, buoys, barges); (3) vessel traffic, (4) discharges of waste materials and accidental fuel releases; and 5) meteorological observation platform decommissioning. The potential effects to sea turtles from these activities can be grouped into the following categories: (1) acoustic effects; (2) benthic habitat effects; (3) vessel collision effects; and (4) other effects. It should be noted that all activities described below are subject to the evaluation under the MMPA. Lessees would need to consult with NMFS to ensure necessary authorizations (such as IHAs) are obtained prior to beginning survey or meteorological facility construction activities.

Acoustic Effects

This section on acoustic effects looks at what is known about noise sensitivity in sea turtles and the noise that could be produced as a result of site characterization and assessment activity in the Mid-Atlantic WEAs.

Current Understanding of Noise Sensitivity in Sea Turtles

This section is derived in large part from previous ESA consultations and biological opinions issued by NMFS to BOEM for Atlantic wind energy projects, and from NMFS' recent concurrence that, if Alternative A is implemented as BOEM proposes, Alternative A is unlikely to adversely affect sea turtles. *See* Appendix B. Much of the general discussion regarding sound and communication for marine organisms is presented in the marine mammal section of this document (*see* Section 4.1.2.3) and is not repeated here.

The hearing capabilities of sea turtles are not well understood. Few experimental data exist, and since sea turtles do not vocalize, inferences cannot be made from their vocalizations as is the case with baleen whales. Direct hearing measurements have been made in only a few species. An early experiment measured cochlear potential in three Pacific green turtles and suggested a best hearing sensitivity in air of 300–500 Hz and an effective hearing range of 60–1,000 Hz (Ridgway et al., 1969). Sea turtle underwater hearing is believed to be about 10 dB less sensitive than their in-air hearing (Lenhardt, 1994). Lenhardt (1994) used a behavioral "acoustic startle response" to measure the underwater hearing sensitivity of a juvenile Kemp's ridley and a juvenile loggerhead turtle to a 430-Hz tone. Their results suggest that those species have a hearing sensitivity at a frequency similar to those of the green turtles studied by Ridgway et al. (1969). Lenhardt (1994) was also able to induce startle responses in loggerhead turtles to low frequency (20–80 Hz) sounds projected into their tank. Lenhardt further suggested that sea turtles have a range of best hearing from 100–800 Hz, an upper limit of about 2,000 Hz, and serviceable hearing abilities below 80 Hz. More recently, the hearing abilities of loggerhead sea turtles were measured using auditory evoked potentials in 35 juvenile animals caught in tributaries of Chesapeake Bay (Bartol et al., 1999). Those experiments suggest that the effective hearing range of the loggerhead sea turtle is 250–750 Hz and that it's most sensitive hearing is at 250 Hz. In general, however, these experiments indicate that sea turtles generally hear best at low frequencies and that the upper frequency limit of their hearing is likely about 1 kHz. As such, sea turtles are capable of hearing in low frequency ranges that overlap with the dominant frequencies of pile driving and vessel noise, therefore, if exposed to construction-related noise these species may be affected by this exposure. Regarding sound levels, evidence suggests that levels between 110-126 dB re 1μPa are required before sea turtles detect sound (Ridgeway, 1969) and levels of 166 dB re 1μPa were required to evoke a behavioral reaction (McCauley, 2000). Acoustic harassment thresholds for sea turtles are not as established as they are for marine mammals. Thus, this section utilizes harassment thresholds for marine mammals for discussion purposes since these thresholds are limiting factors for the activities associated with Alternative A.

High Resolution Geologic Survey Acoustic Effects

As discussed in Section 3.1.1, HRG surveys would be used to characterize the potential site of the meteorological tower and possible placement of wind turbines in the future. As previously stated in Section 4.1.2.3, HRG surveys and sub-bottom profiling tools for wind turbine siting only require shallow penetration of the seafloor resulting in relatively low energy (sound) introduced into the environment than some other penetrating technology.

Sections 3.1.1 and 4.1.2.3 detail a proposed action scenario for HRG surveys, which is not repeated herein.

If the surveys occur between June and November, listed sea turtles could be exposed to acoustic effects from the HRG survey. A survey vessel would not likely travel at speeds greater than 4.5 knots while surveying. As the survey vessel travels along the transects it is expected that any sea turtles in the area that are close enough to perceive the sound would swim away from it. As noted in Section 4.1.2.3.2, potentially disturbing levels of noise (i.e., greater than 160 dB) would be experienced only within approximately 400 m of the survey equipment.

In order for a sea turtle to be exposed to injurious levels of noise, the sea turtle would need to be within 27 m of the survey equipment. Given the noise levels produced by the survey equipment and given the expected behavioral response of avoiding noise levels greater than 160 dB, it is extremely unlikely that any sea turtles would swim towards the survey vessel. As such, it is extremely unlikely that any sea turtles would be exposed to injurious levels of noise.

The available information on sea turtle behavioral responses to sound indicates that individuals are likely to actively avoid areas with disturbing levels of sound (O'Hara and Wilcox, 1990). Sea turtles whose behavior is disrupted would likely be expected to resume their behavior after the disturbance has stopped. Available information indicates that sea turtle forage items are available throughout the action area; therefore, while sea turtles may move to other areas within the action area to forage during the times when the survey is occurring, the ability of individual sea turtles to find suitable forage is not expected to be impacted. Likewise, if sea turtles were resting in a particular area they are expected to be able to find an alternate resting area within the action area. Additionally, if sea turtles are migrating through the action area, they may avoid the area with disturbing levels of sound and choose an alternate route through the action area. While the movements of individual sea turtles would be affected by the sound associated with the survey, these effects would be temporary and localized. Sea turtles are not expected to be excluded from large areas due to the activities associated with Alternative A and there would be only a minimal impact on foraging, migrating or resting sea turtles that would not result in injury or impairment in an individual's ability to complete essential behavioral functions. Major shifts in habitat use or distribution or foraging success are not expected. Changes to the individual movements of sea turtles are expected to be minor and short-term, and are therefore not likely to have population-level effects.

Sub-bottom Reconnaissance Acoustic Effects

Section 4.1.2.3.2 of the EA gives an overview of acoustic effects and is not repeated herein. It is generally expected that the activity of setting up drilling equipment would deter marine mammals, sea turtles, and fish from entering the work area. There would be nothing that would prevent animals from leaving or avoiding areas where drilling would take place. Sea turtles could be exposed to sound levels greater than 120 dB. Other sub-bottom reconnaissance activity, such as the use of a CPT, borings, and grab sampling, is expected to only have minor acoustic impacts, primarily from vessel engines.

Since leatherback, green, Kemp's ridley and loggerhead sea turtles are known to occur in the Mid-Atlantic between June and October and construction may occur during this time period, these species may be exposed to construction-related noise during the construction period. Noise from pile driving 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 energetic, 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 due to the limited area of the activity and the much larger area occupied by the population as a whole. Few individuals are expected to be exposed to construction noise, given the short-term duration of construction activities, the limited geographic area affected, and lack of presence in of turtles these areas during portions of the year.

Meteorological Tower Pile-Driving Acoustic Effects

The type and intensity of the sounds produced by pile driving depend on the type and size of the pile, the firmness of the substrate into which the pile is driven, the depth of the water, and the type and size of the impact hammer being used. Thus the actual sounds produced would vary project by project. Section 4.1.2.3.2 fully describes the range of pile driving sound and is thus not repeated here.

As mentioned above the available information on sea turtle behavioral responses to sound indicates that individuals are likely to actively avoid areas with disturbing levels of sound (O'Hara and Wilcox, 1990). Avoidance behavior may shorten the exposure period; however, the avoidance behavior could potentially disrupt normal behaviors. A reaction of individual sea turtles to the pile driving is expected to be limited to an avoidance response. Only pile driving occurring during the June – November time frame has the potential to affect sea turtles, as sea turtles are not expected to occur in the action area outside of this time of year.

As stated above, sea turtles behaviorally disrupted would be expected to resume their behavior after the pile driving has stopped. As pile driving would occur for approximately 4-8 hours a day, it is likely that sea turtles would be excluded from the area with disturbing levels of sound for at least this period each day. Available information indicates that sea turtle forage items are available throughout the action area; therefore, while sea turtles may move to other areas within the action area to forage during the times when pile driving is occurring, the ability of individual sea turtles to find suitable forage is not expected to be impacted. Likewise, if sea turtles were resting in a particular area, they are expected to be able to find an alternate resting area nearby.

Additionally, if sea turtles are migrating through the an area where activities associated with Alternative A are taking place, they may avoid the area with disturbing levels of sound and choose an alternate route. As such, while the movements of individual sea turtles will be affected by the sound associated with the pile driving, these effects would be temporary and localized. It is expected that there would be only a minimal impact on foraging, migrating or resting sea turtles that would not result in injury or impairment in an individual's ability to complete essential behavioral functions. Major shifts in habitat use or distribution or foraging success are not expected.

During pile driving, sound levels would have dissipated to below the 160 dB threshold within a distance of 7 km. Sea turtles within 7 km would be exposed to potentially injurious or harassing levels of sound. However, changes to individual's movements are expected to be minor and short-term, and are therefore not likely to have population-level effects. BOEM did consider requiring the use of vibratory hammers as a measure to reduce potential exposure to disturbing levels of noise. BOEM does not discourage the use of vibratory hammers as their use would reduce the duration of exposure to the higher sound pressure levels associated with impact hammers. However, it should be noted that the use of vibratory hammers could result in an increase in the total installation time and thus total duration of sound exposure. Other noise mitigation measures for pile driving, primarily cofferdams and foam sleeves (*see* Nehls, 2007 and USDOI, BOEMRE, 2010) have also been shown to be effective. However the feasibility of requiring these technologies in the offshore environment needs further exploration and may be appropriate on a case-by case basis for full commercial-scale construction projects where the total duration of pile driving activities would be greater than that for a single meteorological tower.

Sea Turtle Habitat Effects

Section 4.1.2.2 of this document discusses the benthic resources and impacts of Alternative A upon those resources. This section only discusses those impacts in relation to sea turtles. Impact to sea turtle habitat from Alternative A is anticipated to be negligible due to limited impact to the benthos itself. It is expected that some localized benthic forage items for sea turtles may become unavailable while activities associated with Alternative A are ongoing in specific areas.

Sub-bottom Sampling

The sub-bottom sampling would result in a negligible temporary loss of some benthic organisms (i.e., less than one ft diameter would be disturbed in the areas where cores are sampled), and a localized increase in disturbance due to vessel activity, including noise and anchor cable placement and retrieval.

Meteorological Tower/Buoy Installation

It is expected that any re-suspension of sediment and subsequent sedimentation that would occur around an installed tower or buoy would have only minor effects that could temporarily impact the habitat and food availability for sea turtles either by the activity itself causing sea turtles to not enter a forage area or the forage itself becoming unavailable due to smothering by sediment or physical structures.

Meteorological Tower/Buoy Operation

The operation of a single meteorological tower or buoy within a leasehold, or multiple towers/buoys within a WEA is not expected to result in changes in local community assemblage and diversity nor the availability of habitat and forage items for sea turtles that could occur in the action area as the footprint of the structure is expected to be less than 255 m^2 and the maintenance trips to the structure are limited.

Collision Effects

This section addresses direct impacts from the collision of sea turtles with structures and vessels described in Alternative A. A collision with a sea turtle, however unlikely, could result in injury or mortality to the animal.

Vessels associated with site characterization surveys, or construction, maintenance or decommissioning of the meteorological tower could collide with marine mammals, turtles, and other marine animals during transit. 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.

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. The likelihood of collision would vary depending upon species and life stage, the location of the vessel, and its speed and visibility. Hatchling turtles would be difficult to spot from a moving vessel because of their small size and generally cryptic coloration patterns. 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.

While the towed gear (i.e., the boomer and/or chirper) has the potential to result in interaction with sea turtles, the speed of towing (typically about 3 knots) presents very low potential for entanglement or vessel strikes during the survey as sea turtles would be able to avoid the slow moving gear and survey vessel. Because of the small amount, short duration, and slow speeds of vessel traffic that would be associated with meteorological tower/buoy construction, operation, and decommissioning, population-level impacts to sea turtles from vessel collisions are not expected.

Discharge of Waste Materials and Accidental Fuel Leaks

Collisions between vessels and allisions between vessels and meteorological towers and buoys is considered unlikely (*see* Section 3.2.2 of this EA). However; in, the unlikely event that a vessel allision or collision were to occur, and in the unlikely event that the allision or collision causes a spill, the most likely pollutant to be discharged would be diesel fuel. If a diesel spill were to occur, it would be expected to dissipate very rapidly in the water column, then evaporate and biodegrade within a few days (*see* Section 3.2.3 of this EA).

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 construction 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 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 BOEM (30 CFR 250.300) and the USCG (MARPOL, Annex V, Public Law 100–220 (101 Stat. 1458)). Assuming compliance with these regulations and laws and only accidental releases, very little exposure of sea turtles to solid debris associated with Alternative A would be anticipated.

Meteorological Tower and Buoy Decommissioning

The decommissioning of meteorological towers and buoys is described in Section 3.1.2. This section primarily addresses the decommissioning of a meteorological tower, as it is more extensive than that of a meteorological buoy in that it involves more than just the potential impacts of vessel trips, which are assessed above.

Upon completion of site characterization, the meteorological tower 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 m (15 ft) below the seabed, and sea turtles in the immediate vicinity could be disturbed by sound during the cutting of the pilings. Pile cutting techniques and associated sound levels have yet to be tested and evaluated in the Atlantic wind energy context. However, cutting sounds are less intense than those associated with pile driving, and any affected animals are expected to move away from the immediate vicinity of the site.

BOEM Mandatory Project Design Criteria

The following BOEM project design criteria, which are discussed in NMFS' September 20, 2011, concurrence letter, are intended to ensure that the potential for adverse impacts to sea turtles is minimized, if not eliminated (*see* Appendix B of this EA). These requirements will be included as lease stipulations and/or conditions of SAPs issued or approved under this proposed action or alternatives. A more detailed description of these requirements can be found in Appendix B.

Exclusion Zone During HRG Surveys

Surveys occurring between June and November could expose listed sea turtles to acoustic effects of the HRG survey. Potentially disturbing levels of noise (i.e., greater than 160 dB) would be experienced only within approximately 400 m of the survey equipment. Therefore, BOEM would require that lessees maintain a 500-m exclusion zone during any survey and that this exclusion zone be monitored for at least 30 minutes prior to ramp up of the survey equipment. The normal duration of sea turtle dives ranges from 5-40 minutes depending on species, with a maximum duration of 45-66 minutes depending on species (Spotila, 2004). As sea turtles typically surface at least every 60 minutes, it is reasonable to expect that monitoring the exclusion zone for at least 60 minutes prior to ramp up and continuing through to full operation would allow the endangered species monitors to detect any sea turtles that may be submerged in the exclusion zone.

Exclusion Zone During Boring Activity

While it is generally expected that the activity of setting up drilling equipment would deter sea turtles from entering the work area, there would be nothing that would prevent animals from leaving or avoiding areas where drilling would take place. BOEM would require a 200-m exclusion zone for sea turtles during deep hole boring activity, ensuring that no sea turtles would be exposed to sound levels greater than 120 dB (marine mammal harassment threshold from a continuous acoustic source).

Pile Driving

A 7 km exclusion zone would be monitored by trained endangered species observer for at least 30 minutes. While observers from two locations (at source and 3-4km from source) within the exclusion zone would monitor out to 7km, it is recognized that it is unlikely that sea turtles are able to be observed beyond 500 m. In order to further minimize the potential to affect sea turtles, lessees would be required to implement a "soft start" procedure. The soft start would require an initial set of three strikes from the impact hammer at 40% energy with a one minute waiting period between subsequent 3-strike sets. Regarding the shut down of pile driving operations, if pile driving stops and then resumes, it would potentially have to occur for a longer time and at increased energy levels. This would simply amplify potential impacts sea turtles, as they would endure potentially higher sound pressure levels for longer periods of time. Thus, if a sea turtle was spotted during hammering operations, the requirements will allow the lessee to complete a pile drive segment that has been started, followed by an "all clear" period.

Conclusion

The effects to sea turtles, specifically leatherback, loggerhead, Kemp's ridley, and green sea turtles, are expected to be short term and would result in minimal to negligible harassment depending on the specific activity. *See* discussion of NMFS Concurrence, Section 5.2.1 of this EA. The impacts are considered minimal due to activity itself in some cases, and the spatial-temporal setting in which the activity associated with Alternative A would take place. Specifically, harassment from noise, minor loss/displacement from forage areas, and to a lesser degree vessel collisions, are the primary anticipated direct and indirect impacts to ESA-listed sea turtles, but these impacts, if any, are anticipated to be minimal.

4.1.2.5 Birds

4.1.2.5.1 Description of the Affected Environment

The Alternative A have the potential to affect waterbirds and pelagic species of various types, as well as some shorebirds, songbirds and raptors in the waters offshore New Jersey, Delaware, Maryland, and Virginia, from the coastline (particularly in harbor areas that would be used by survey and construction vessels) out to the seaward extent of the WEAs. Birds may be affected by vessel discharges, the presence of meteorological towers and buoys, and accidental fuel releases.

A listing of all birds that can be found in and offshore 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 and offshore Delaware is available on the Delmarva Ornithological Society's website at http://www.fw.delaware.gov/NHESP/information/Pages/Endangered.aspx. A listing of all birds that can be found in and offshore Maryland is available on the Department of Natural Resources website at http://www.dnr.state.md.us/wildlife/Plants_Wildlife/rte/rteanimals.asp. A listing of all birds that can be found in and offshore Virginia is available on the Virginia Department of Game and Inland Fisheries website at http://www.dgif.virginia.gov/wildlife/.

Bird abundance generally declines in offshore environments as distance from shore increases – a pattern that has been observed in Europe (e.g., Petersen et al., 2006) and offshore Rhode Island (Paton et al., 2010). In the mid-Atlantic, this pattern was also observed in the New Jersey ecological baseline study with bird densities abundance dropping precipitously after few miles from shore (NJDEP, Vol. II, 2010). In addition, the number of bird species also declines with distance from shore. For example, of the 160 bird species that use the Atlantic flyway, a total of 55 species use offshore (5-20 km from shore) and pelagic environments and the remaining 105 species use bays, coastlines, and near shore environments (Watts, 2010).

Birds in these nearshore areas have historically been and will continue to be subject to relatively intense human stressors, such as habitat loss from onshore development, agriculture, hunting, existing vessel, ground and air traffic, and beach recreation.

Migratory Birds

Despite the level of human development and activity present, the Mid-Atlantic Coast plays an important role in the ecology of many bird species. The Atlantic Flyway, which encompasses all of the areas that could be potentially affected by Alternative A, is a major route for migratory birds, which are protected under the Migratory Bird Treaty Act of 1918 (MBTA), particularly during the spring and fall migration periods. Chapter 4.2.9.3 of the Programmatic EIS discusses the use of Atlantic Coast habitats by migratory birds.

The official list of migratory birds protected under the MBTA, and the international treaties that the MBTA implements, is found at 50 CFR 10.13. The MBTA makes it illegal to "take" migratory birds, their eggs, feathers or nests. Under the MBTA, take is "construed to mean pursue, hunt, shoot, capture, collect, kill" or an attempt to undertake such actions. Executive Order 13186 directs departments and agencies to take certain actions to further implement the MBTA. Under section 3 of the executive order, BOEM and USFWS established a Memorandum of Understanding (MOU) on June 4, 2009, which identifies specific areas in which cooperation between the agencies would substantially contribute to the conservation and management of migratory birds and their habitats. For a copy of the MOU, *see* http://www.boem.gov/Renewable-Energy-Program/MMS-FWS_MBTA_MOU_6-4-09-pdf.aspx. The purpose of the BOEM and USFWS MOU is to strengthen migratory bird conservation through enhanced collaboration between the agencies (MOU Section A). One of the underlying tenets identified in the MOU is to evaluate potential impacts to migratory birds and design or implement measures to avoid, minimize, and mitigate such impacts as appropriate (MOU Sections C, D, E(1), F(1-3, 5), G(6)).

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 trade 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 over land in Delaware and New Jersey (NJDEP, Division of Fish and Wildlife, 2009). Bald eagles have historically been associated with forests near the Delaware River and Bay, but nest throughout Delaware and New Jersey. Bald eagles are also found in Maryland and Virginia all year round. Bald eagles have been documented nesting in every county in Maryland, and most are concentrated along the Chesapeake Bay and its tributaries (MDDNR, 2011a).

Golden eagles favor more open areas in western States, and do not typically nest in Delaware and New Jersey (USFWS, 2007). The golden eagle is an occasional winter visitor to the coastal areas of Maryland, and golden eagles do winter in relevant coastal areas of Virginia. Golden eagle migration is strongly associated with the Appalachian ridgelines, and does not fly over the ocean. Bald eagles forage and nest along rivers and bays and at times fly along the shore line. Therefore, bald and golden eagles are not expected to occur in the WEAs, and with the exception of immediate bay or harbor areas, are not expected to occur any areas the where vessels associated with Alternative A would be traveling.

ESA-Listed Birds

Two species of federally endangered or threatened species of birds occur in coastal and marine waters offshore New Jersey, Delaware, Maryland, and Virginia during at least part of the year. The northeastern U.S. population of the roseate tern (*Sterna dougallii dougallii)* is listed as endangered, and the piping plover (*Charadrius melodus*) is listed as threatened. These species use coastal habitats including beaches, marshes, and intertidal wetlands. The red knot (*Calidris canutus rufa*) is identified in the Atlantic Coast States as a candidate for listing as threatened or endangered under ESA (USFWS, 2006). All three species may pass through the WEAs during migration. Finally, the pelagic Bermuda petrel (*Pterodroma cahow*) or Cahow, is federally listed as endangered (35 FR 6069) and endemic to Bermuda. Breeding season extends from late October to mid-June (Collar et al., 1992). The Cahow could potentially pass through the Virginia WEA during the non-breeding season.

Piping Plover

The piping plover (*Charadrius melodus*) is a small, stocky, sandy-colored bird resembling a sandpiper. The piping plover was listed as threatened (USFWS, 1985) in its entire range except in the Great Lakes watershed where it is listed as endangered. In 1996, the Revised Recovery Plan for the Atlantic Coast Population was completed (USFWS, 1996). 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). The summary below was derived from the USFWS species profile (USFWS, 2011a).

The Atlantic Coast Population of piping plovers nest along beaches in New Brunswick, Prince Edward Island, Nova Scotia, Quebec, southern Maine, Rhode Island, Massachusetts, Connecticut, New York, New Jersey, Delaware, Maryland, Virginia, and North Carolina. These birds winter primarily on the Atlantic Coast from North Carolina to Florida, although some migrate to the Bahamas and West Indies from mid-September to March. Although the precise route of migration is not firmly established, it is possible that these birds will fly over the WEAs during migration. Piping plovers are known to occur from March to mid-September in several counties along the Mid-Atlantic that may provide harbor for vessels associated with Alternative A (Table 4.7).

The Atlantic Coast piping plovers utilize the open, sandy beaches close to the primary dune of the barrier islands and Atlantic coastline for breeding. They prefer to nest in sparsely vegetated and open areas with sand, gravel, or cobble. They forage along the rack line where the tide washes up onto the beach.

The piping plover nearly disappeared due to excessive hunting for their feathers during the 19th century. Human disturbance often curtails breeding success. Developments near beaches also provide food that attracts increased numbers of predators, such as raccoons, skunks, and foxes, and domestic pets. Storm-tides may inundate nests.

Table 4.7

Relevant Counties Along the Mid-Atlantic Where Piping Plovers are Known to Occur

State	County
Delaware	Sussex
Maryland	Worcester
New Jersey	Atlantic
	Cape May
	Monmouth
	Ocean
Virginia	Accomack
	Hampton
	Northampton
	Portsmouth

Source: USFWS, 2011a.

Roseate Tern

The roseate tern (*Sterna dougallii dougallii)* is federally listed as endangered (USFWS, 1987), and its distribution ranges from North Carolina, up to Canada and east to Bermuda. No critical habitat has been designated for this species. The recently published 5-year review contains a comprehensive review on the roseate terns (USFWS, 2010). The summary below was derived from the USFWS species profile (USFWS, 2011b).

The roseate tern is pale, medium-sized (about 40 centimeters in length), black-capped with light-gray wings and back, and during the breeding season, the bird has a rosy tinge on the chest and belly. The roseate tern is a fast flier and a specialized plunge-diver, feeding on small marine fish in shallow water near shore.

Terns hide their nests by nesting in dense vegetation, rocks, driftwood, tires or wooden boxes. Roseate terns arrive at the breeding grounds in April and begin to lay eggs in May. The terns usually lay one or two eggs, and chicks fledge after 3-4 weeks. Roseate terns flock to specific areas in August for post-breeding dispersal and depart in mid-September for wintering grounds.

In North America, the roseate tern breeds in two discrete areas: from Nova Scotia to Long Island, NY (northeastern population) and around the Caribbean Sea (including the Florida Keys). Roseate terns are believed to winter in northern South America and along the Brazilian coast. Roseate terns are believed to occur in Mid-Atlantic during migration, primarily between March-April and September. In Virginia, Accomack, Northampton, and Virginia Beach are host to non-breeding terns, and these areas may also provide harbor for vessels associated with Alternative

A. Although occasionally seen on New Jersey beaches, the county level range for roseate terns has not been defined for New Jersey (USFWS, 2011b). In Maryland, there once were colonies of breeding roseate terns along Assateague Island in the 1930's (Stewart and Robbins, 1958). Currently, there are no roseate tern breeding colonies in Maryland or Delaware. Roseate terns are occasionally seen near or on Maryland beaches (MDOsprey, 2011) and in Delaware (Hess et al., 2000; DOS 2011). Although the precise route of migration is not firmly established, it is possible that roseate terns will fly over the WEAs during spring and fall migration.

In the late 19th century, the roseate tern suffered a drastic population decline in the U.S. due to hunting for their feathers. In addition, roseate terns have been displaced from their traditional colonies by gulls, resulting in fewer nesting colonies and reduced population size (USFWS, 1987). Given that roseate terns are ground nesters, their eggs and chicks are vulnerable to predation by red fox and Norway rat.

Red Knot

The red knot is a (*Calidris canutus rufa*) shorebird that breeds in the central Canadian arctic and winters as far south as Tierra del Fuego in South America. Each May, red knots congregate in Delaware Bay during their northward migration to feed on horseshoe crab eggs (*Limulus polyphemus*) and refuel for breeding in the Arctic.

The red knot has declined dramatically over the past twenty years from a population estimated at 100,000-150,000 to 18,000-33,000 (Niles et al., 2008). The primary threat to the red knot population is the reduced availability of horseshoe crabs eggs in Delaware Bay arising from elevated harvest of adult crabs for bait in the conch and eel fishing industries (Niles et al. 2008). Despite restrictions to the crab harvest, the 2007 horseshoe crab harvest was still greater than the 1990 harvest, and no recovery of knots was detectable (Niles et al., 2009). Although the precise migration route has not been firmly established (Niles et al., 2010), it is possible that these birds will fly over the WEAs during spring and fall migrations.

Bermuda Petrel

The Bermuda petrel, or Cahow (*Pterodroma cahow*), is pelagic bird that is endemic to Bermuda and is federally listed as endangered (35 FR 6069). From October to June, the Cahow nests in burrows among the uninhabited islets of Bermuda. However, an individual was found in a burrow in the Azores (Bried and Magalhães, 2003). Since 1960, the Cahow population has grown steadily from 18 nesting pairs to 85 in 2008 (Dobson and Madeiros, 2008). Threats to the Cahow include the flooding of nesting areas by storms, destruction of nesting areas due to collapsing cliffs and erosion, and rats (Dobson and Madeiros, 2008).

The Bermuda petrels are often solitary, feeding on surface prey at sea and feed on squid at night. Outside of the breeding season, it distribution is poorly known, though the species is probably widespread in the North Atlantic, following the warm waters on the western edges of the Gulf Stream. There are confirmed sightings of the Bermuda petrel offshore of North Carolina (Lee, 1987), and there are records of several incidental sightings over the last 10 years east of Cape Hatteras but no records off Virginia, Maryland, Delaware, or New Jersey (eBird, 2011). Although there is no evidence that the Cahow is present in the mid-Atlantic OCS, the Cahow may potentially be present in the southern offshore waters of the Virginia WEA.

4.1.2.5.2 Impact Analysis of Alternative A

The Programmatic EIS (Chapter 5.2.9.2) discusses the potential impacts of site characterization and assessment activities on birds. Migratory birds, including threatened and endangered species, could be affected by any of the activities contemplated under Alternative A including activities in the WEAs as well as vessel traffic to and from the WEAs.

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 G&G surveys and construction sites in the WEAs and vessels accidentally releasing solid debris. Many species of birds (such as gulls) often follow ships and forage in their wake on fish and other prey that may be 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 may be released into the open ocean (*see* Sections 3.2.3 and 4.1.1.2.2) but 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, potential 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 and 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 any of these effects could be 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 and 1988; Derraik, 2002). However, 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 Stat. 1458)). Thus, entanglement in or ingestion of OCS-related trash and debris by marine and coastal birds is not expected, and potential impacts to marine and coastal birds associated with project debris, if any, would be negligible. Because of the relatively small amount of vessel traffic and construction activity associated with the construction and operation of a meteorological tower, the placement of a meteorological buoy, or site characterization surveys over a 5 ½ year period, the potential release of wastes, debris, hazardous materials, or fuels would occur infrequently, and would occur at discrete points very large distance from each other in both space and time. Such releases, to the extent that they occur, would cease following the completion of the activity at issue, and would disperse rapidly in the open ocean.

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 (i.e., gulls, terns, shorebird, petrels, shearwaters, sea ducks, and alcids) may collide with the meteorological towers out in the open ocean and be injured or killed.

It is anticipated that the meteorological towers contemplated in this EA would be self-supported structures and not require guy wires for support and stability. Unlike the meteorological towers themselves, guy wires are invisible to birds and may not be seen until it is too late to avoid them.

Because of the small number of meteorological towers proposed and their distance from each other and distance from shore, potential impacts to marine and coastal birds populations from collisions, should any occur, would be minor. Under good weather conditions, most migratory bird species in the vicinity of the proposed lease areas (at least seven miles from shore) would be flying at an altitude higher than the anticipated meteorological towers. However, some individuals may fly lower (e.g., sea ducks, cormorants, loons, shearwaters, petrels, alcids, and gannets).

Due to the small number of anticipated structures scattered over a large area (one tower per averaged-size leasehold of 10 OCS blocks) at distances greater than seven miles from the coast, Alternative A itself is not expected to significantly affect terns or other migratory species or pelagic species. Terns may perch on tower equipment including handrails, equipment sheds, etc. Lattice-type masts (Figure 3.2.a-b) with numerous diagonal and horizontal bars are more likely to provide perching opportunities than meteorological tower with a monopole mast (Figure 3.1). Perching does not pose a threat to the birds.

Under poor visibility conditions, all migratory species in the vicinity have the potential to collide with one of the anticipated meteorological towers. Also, lighting on tall structures during periods of fog and rain can disorient birds flying at night (Huppop, et al., 2006). For instance, certain types of nighttime lighting, like steady burning lights, can confuse or attract birds when it is raining or foggy. However, red flashing lights are commonly used at land-based wind facilities without any observed increase in avian mortality compared to unlit turbine towers (Kerlinger et al., 2010). Due to the small number of structures contemplated and their distance from shore, migratory birds (including pelagic birds) colliding with the anticipated meteorological towers is possible, but would be a rare event.

Meteorological Buoys

Meteorological buoys are much closer to the water surface than meteorological towers. Most bird species would be flying above the buoy so it is unlikely that birds would collide with a buoy. However, it is possible that some individuals and species (e.g., shearwaters) may fly lower. Buoys also hold less equipment, so there would be much fewer perching opportunities although these opportunities would pose no threat to the birds. Although there could be potentially more buoys than towers (Table 3.2), the space between the buoys and between the buoys and shore would still be great. As a result, the potential impacts of buoys on birds would be negligible.

Migratory Birds

Most migratory passerines would be flying well above the buoys and towers during the spring and fall migration. Other migratory birds including marine birds, coastal shore birds, and non-ESA birds would rarely encounter these structures due to the small footprint of the structures themselves and their distance from shore and great distances between buoys and towers. Therefore, the towers and buoys, as well as vessel activities within the proposed lease areas would not likely affect these birds.

Bald and Golden Eagles

Bald and golden eagles migrate and forage over land, inland water bodies, and bays - not the open ocean. The anticipated meteorological towers and buoys would be at least seven miles offshore, thus the meteorological towers and buoys including activities within the proposed lease areas would not affect these eagles. Because Alternative A would not require expansion of existing onshore facilities and the vessel trips in coastal waters pose no threat to these animals, impacts to bald or golden eagles or their habitat would not be expected.

Endangered and Threatened Birds

The ESA-listed roseate tern and piping plover including the non-listed red knot may fly through the WEAs during spring and fall migration. Is it possible that the ESA-listed Cahow (or Bermuda Petrel) may be present in the Virginia WEA outside of the breeding season. These species would rarely encounter the small number of buoys and towers due to the small footprint of these structures and the great distances between buoys and towers. Therefore, the towers and buoys including activities within the proposed lease areas would not affect migratory birds.

Conclusion

While birds may be affected by vessel discharges, the presence of meteorological towers and buoys, vessel discharges, and accidental fuel releases pose no threat of significant impacts to these animals. The risk of collision with towers would be minor due to the small number of meteorological towers proposed, their size, and their distance from shore and each other. The impact of meteorological buoys on ESA listed and non-ESA listed migratory birds (including pelagic species) is similarly expected to be negligible, because buoys are much smaller and closer to the water surface than towers, and would be similarly dispersed over a wide area.

Proposed Mitigation Measures

The following proposed mitigation measures are intended to ensure that the potential for adverse impacts to birds is minimized, if not eliminated. This section proposes that these mitigation measures be incorporated into any future decision to issue a lease or approve a SAP:

1) To reduce the potential to attract and/or disorientate birds at night during fog and rain, the lessee shall use only red flashing strobe-like lights (not steady burning) to meet FAA requirements for meteorological towers. Navigational safety lights for towers and buoys shall be installed in compliance with USCG requirements. The lessee shall leave any additional lights (e.g., work lights) on only when necessary and hooded downward and directed when possible, to reduce upward illumination and illumination of adjacent waters. These requirements apply to lighting on the meteorological tower as well as all support vessels.
2) Meteorological towers should be designed so as to preclude the necessity for guy wires, which present the birds with something difficult to see that they could potentially collide with.

4.1.2.6 Bats

4.1.2.6.1 Description of the Affected Environment

Species of bats that currently or historically occur in New Jersey, Delaware, Maryland, and Virginia are detailed in Table 4.8. Eight of these species inhabit caves and/or mines during all or part of the year and are referred to as cave bats while the remaining six species are referred to as tree bats. Three of the bat species are federally listed as endangered, and they are the Indiana bat, gray bat and Virginia big-eared bat. None of the other bat species are candidates for listing as threatened or endangered (USFWS, 2011c). 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).

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 suggesting a preference for overland migration routes. It is also known that they fly along the coast. For instance, on the Mid-Atlantic coast, the eastern red, hoary, and silver-haired bats, use Assateague Island National Seashore, a barrier island off the coast of Maryland during migration (Johnson et al., 2011).

Bat migration over the open ocean has also been documented. For example, the hoary bat on Southeast Farallon Island, approximately 48 km west of San Francisco, migrates to the mainland in fall (Cryan and Brown, 2007) and several bat species in Europe cross the Baltic Sea in migration between southern Sweden and Denmark (Ahlén et al., 2009). However, information with regard to bat species found in the Mid-Atlantic and the associated migration routes is limited. Most information on offshore bat activity in the Mid-Atlantic comes from The New Jersey Ecological Baseline Study which includes survey results for bats over the New Jersey WEA offshore New Jersey out to 20 nm (NJDEP, 2010a, Vol. I, Appendix B). Shipboard surveys were conducted in March, April, May, June, August, September, and October 2009. No bats were detected during the 2009 March, April or June surveys, and one was detected in May. Over eight nights in August, September, and October, 53 bats were detected. Of the total 54 recordings, the eastern red bat was the most common bat detected, but they were detected in the fall offshore along the Delmarva Peninsula while only a few hoary bats and big brown/silver-haired bats were detected in spring and fall. The mean distance from shore was 5.2 nm, with the farthest distance being 10.4 nm (NJDEP, 2010a, Vol. I, Appendix B). Given that no bats were detected during the New Jersey surveys at a distance greater than 10.5 nm from shore, it is unlikely that bats will be present in the majority of the WEAs, most of which are further offshore (e.g., all of the Virginia WEA is greater than 18 nm from shore). However, it is possible that some bats may be present in the Delaware and Maryland WEAs, which are 10 nm from shore. This study suggests that bats would occur only rarely in the New Jersey WEA, which is located more than 7 nm offshore. This would likely be similar for the Delaware and Maryland WEAs, which are located 10 or more nm offshore.

Table 4.8

Occurrence ("X") of Bats by State

Common name	Scientific name	NJ[1]	DE[2]	MD[3]	VA[4]
Cave Bats					
Big brown bat	*Eptesicus fuscus*	X	X	X	X
Eastern small-footed bat	*Myotis leibii*	X		X	X
Indiana bat [E]	*Myotis sodalist*	X		X	X
Gray bat [E]	*Myotis grisescens*				X
Little brown bat	*Myotis lucifugus*	X	X	X	X
Northern long-eared bat	*Myotis septentrionalis*	X	X	X	X
Tri-colored bat	*Perimyotis subflavous*	X	X	X	X
Virginia big-eared bat [E]	*Corynorhinus townsendii virginianus*				X
Tree Bats					
Eastern red bat	*Lasiurus borealis*	X	X	X	X
Evening bat	*Nycticeius humeralis*		X[5]	X	X
Hoary bat	*Lasiurus cinereus*	X	X	X	X
Seminole bat	*Lasiurus seminolus*				X
Silver haired bat	*Lasionycteris noctivagans*	X	X	X	X
Southeastern bat	*Myotis austroriparius*				X

[E] = Federally listed as endangered.
[1] (NJDEP, 2011b)
[2] (DEDFW, 2011)
[3] (MDDNR, 2011b)
[4] (VADCR, 2011)
[5] (Kelly, personal communication, 2011)

4.1.2.6.2 Impact Analysis of Alternative A

Only the silver-haired bat, eastern red bat, and hoary bat would possibly migrate or forage through the WEAs. While their presence in the proposed lease area would likely be rare, potential impacts to these bats include avoidance or attraction responses to the structures due to noise, lighting, and the possible presence of insects.

Routine Activities

Site Assessment Activities

Bats would rarely be present in the WEAs. Thus, impacts to bats are not expected during construction, operation, or decommissioning within the WEAs, especially in the Virginia WEA. In the New Jersey, Delaware and Maryland WEAs, any impacts from tower construction noise, if any, on these species would be short-term and temporary during the eight day to ten week construction periods of the nine anticipated meteorological towers. It would take 1-2 days to install each of the meteorological buoys anticipated in the New Jersey, Delaware and Maryland WEAs. 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. Unlike large-scale wind turbines used at commercial wind facilities, the small wind turbines (with blades less than 2 m) that may be used for charging batteries on the anticipated meteorological towers and buoys are not expected to impact bats, if present over 7 miles from shore.

Because of the anticipated distance between the meteorological towers and buoys and the limited occurrence of bats on the OCS, there would be no additive effect of constructing all the meteorological towers or placement of buoys on bats.

In addition to collecting meteorological and oceanographic data, these meteorological towers and buoys would provide platforms that would assist in conducting biological studies, including monitoring for the presence of bats.

Site Characterization Activities

If bats are present, impacts from site characterization would be limited to avoidance or attraction responses to the vessels conducting surveys. Though greater than 90% of the surveys projected under Alternative A would occur within the WEAs, the presence of bats in the WEAs is unlikely during those surveys. While bats are more likely to be present during the surveying of a potential cable route to shore for each of the 13 anticipated leaseholds, less than 10% of the surveys projected under Alternative A would be associated with surveying of potential cable routes. Bats may also be present as vessels, which may trigger attraction or avoidance responses, associated with Alternative A are traversing harbor or coastal areas on their way to or from the WEAs. These potential avoidance and attraction responses, however, are not anticipated to have any effect on the bats.

Non-Routine Events

It is rare but possible that migrating bats may be driven to offshore OCS waters by a storm and subsequently into a tower. However, 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 them being blown so far out of their habitat range, and the unlikelihood that a bat so blown off course could return from the open oceans above the WEAs even if it did not strike a tower, makes the likelihood of any impact due to the presence of the towers or buoys negligible.

Conclusion

While it is rare that bat species would be foraging or migrating through the WEAs, these mammals may on occasion be driven to the project area by prevailing winds and weather. In the event bats are present, impacts would be limited to avoidance or attraction responses. Because of the anticipated distance between the meteorological towers and buoys, there would be no additive effect of constructing all the anticipated meteorological towers or placement of buoys on bats. In fact, the anticipated data collection activities (e.g., biological surveys) may assist in future environmental analyses of impacts of OCS activities on bats. To the extent that there would be any impacts to individuals, the overall impact of Alternative A on bats would be negligible.

The proposed mitigation measures for birds, Section 4.1.2.5, including lighting restrictions and prohibition on guy wires, may also reduce or eliminate any potential impacts to bats.

4.1.2.7 Fish and Essential Fish Habitat

4.1.2.7.1 Description of the Affected Environment

4.1.2.7.1.1 Fish

The Mid-Atlantic continental shelf has very diverse and abundant fishery resources due, in part, to its overlapping species ranges from New England and the south Atlantic. The New Jersey Baseline Study cites over 250 fish species in the Mid-Atlantic with 15% as temperate species and 75% as tropical-subtropical species (NJDEP, 2010a). Table 4.9 characterizes the major demersal finfish assemblages of the Mid-Atlantic Bight (MAB) which is also applicable to the Mid-Atlantic WEAs. Many of the fish species found in the Mid-Atlantic WEAs are of importance due to their value as commercial and/or recreational fisheries. However, some of the species are of special concern due to their depleted population status. All of the species present play a role in the ecosystem of the MAB as predator, prey, or in some other ecosystem function. A description of fishing activities and the economic value of fisheries is detailed in Section 4.1.3.6, Commercial and Recreational Fishing Activities, of this EA. More information regarding fish habitat can be found at on the NMFS website (http://www.nero.noaa.gov/hcd/).

Fisheries

Table 4.9 gives a general guide to the demersal finfish assemblages in the Mid-Atlantic. However, in addition to the demersal finfish; there are also important shellfish and pelagic finfish that may be found in the area of the Mid-Atlantic WEAs. Although Table 4.9 was first developed in 1984, it provides a very good overview of demersal fish assemblages in the mid-Atlantic. This conclusion is supported by the NMFS (2004), which compared the findings to broadscale studies conducted in 1998 and 1992.

Important managed shellfish on the Mid-Atlantic continental shelf include scallops, horseshoe crabs, surfclams, and ocean quahogs. Pelagic species include herring, menhaden, bluefin tuna, sandbar sharks, and scalloped hammerhead sharks. A complete list of the species present in the Mid-Atlantic WEAs that have EFH designated through the Magnuson-Stevens Fishery Conservation and Management Act is included in Section 4.1.2.7.1.2 of this EA. Additional information on mid-Atlantic fishery management plans can be found on the Mid-Atlantic Fishery Management Council website (http://www.mafmc.org/).

Species of Concern

Marine fish species of concern include the shortnose sturgeon, which is federally-listed as endangered, and can be found off the coasts of New Jersey and Delaware. It is also possible, although unlikely, that adult Atlantic salmon may occur off the Mid-Atlantic coast while migrating to New England Rivers, to spawn; certain Gulf of Maine populations of Atlantic salmon are listed as endangered. Both the shortnose sturgeon and the Atlantic salmon are anadromous, meaning they spawn in rivers and spend their adult lives in the open ocean. The shortnose sturgeon is found in nearshore estuaries and rivers, including the Delaware River and Delaware Bay. Approximate age of females at first spawning is 11 years in the Hudson and Delaware Rivers. Females generally spawn every three years, although males may spawn every year. Threats to the species have included pollution, loss of access to spawning habitats and overfishing, both directly and incidentally (USDOC, NOAA, NMFS, 2010d).

Other fish species of concern that are found in the Mid-Atlantic include one ESA candidate species, the Atlantic sturgeon (listing currently in proposed rulemaking), and several Federal

Species of Concern. The Species of Concern include three shark species: the dusky shark, the porbeagle shark, and the sand tiger shark; two herring: the alewife and blueback herring: Atlantic bluefin tuna, and the rainbow smelt (USDOC, NOAA, NMFS, 2010e). An additional fish species whose status is under review is the American eel, for which USFWS is the lead Federal agency responsible for conservation.

Regarding Atlantic sturgeon, on October 6, 2010, NMFS published two rules proposing to list 5 Distinct Population Segments (DPS) of the species (75 FR 61872). Of these 5 DPSs, four are proposed to be listed as endangered, including those which may be found in the area potentially affected by Alternative A. The Atlantic sturgeon, an anadromous species, may be found in rivers and nearshore habitats throughout the Mid-Atlantic with reproductive/spawning populations identified in the Delaware River (New Jersey and Delaware) and the James River (Virginia). Primary threats to Atlantic sturgeon include habitat degradation and loss, ship strikes, and general depletion from historical fishing. Atlantic bluefin tuna (*Thunnus thynnus*) is a highly migratory, pelagic species that is found from the Gulf of Mexico to Newfoundland in coastal and open ocean environments. Spawning is principally in the Gulf of Mexico and in the Florida Straits (USDOC, NOAA, NMFS, 2011). The dusky shark may be found in the Mid-Atlantic, occurring from the surf zone to well offshore, and from surface waters to depths of 39.6 m (1300 ft). The dusky shark is not commonly found in estuaries due to a lack of tolerance for low salinities. The species migrates northward in summer and southward in fall. Sand tiger sharks may also be found in the Mid-Atlantic. They are generally a coastal species, usually found from the surf zone to depths of about 22.9 m (75 ft). They are, however, sometimes found at depths of 182.9 m (600 ft). Porbeagle sharks are pelagic and rarely enter shallow coastal waters. They are distributed in the water column from the surface down to depths of up to 1,000 ft. On the Atlantic OCS the species range from Maine to New Jersey with the primary concentration the Gulf of Maine and Georges Bank. However, NMFS has designated EFH for porbeagle sharks on the continental shelf offshore Virginia, including the WEA offshore Virginia.

Herrings and smelts are generally found throughout the Mid-Atlantic in nearshore waters, coastal bays and estuaries up to spawning grounds in upstream riverine habitats. Their decline has generally been attributed to loss of upstream habitat due to man-made impediments (i.e., dams) and fishing pressure.

American eel (*Anguilla rostrata*) are found in fresh, brackish, and coastal waters from the southern tip of Greenland to northeastern South America. American eels begin their lives as eggs hatching in the Sargasso Sea. They take years to reach freshwater streams where they mature, and then they return to their Sargasso Sea birth waters to spawn and die. They are the only species of freshwater eels in the Western Hemisphere. Threats to American eel include habitat loss, including riverine impediments, pollution and nearshore habitat destruction; and fishing pressure (Greene et al., 2009).

Table 4.9

Major Recurrent Demersal Finfish Assemblages of the Mid-Atlantic Bight During Spring and Fall

Season	Species Assemblage				
	Boreal	**Warm Temperate**	**Inner Shelf**	**Outer Shelf**	**Slope**
Spring	Atlantic cod Little skate Sea raven Monkfish Winter flounder Longhorn sculpin Ocean pout Silver hake (Whiting) Red hake White hake Spiny dogfish	Black sea bass Summer flounder Butterfish Scup Spotted hake Northern searobin	Windowpane flounder	Fourspot flounder	Shortnose greeneye Offshore hake Blackbelly rosefish White hake
Fall	White hake Silver hake (whiting) Red hake Monkfish Longhorn sculpin Winter flounder Yellowtail flounder Witch flounder Little skate Spiny dogfish	Black sea bass Summer flounder Butterfish Scup Spotted hake Northern searobin Smooth dogfish	Windowpane flounder	Fourspot flounder Cusk eel Gulf stream flounder	Shortnose greeneye Offshore hake Blackbelly rosefish White hake Witch flounder

Source: Colvocoresses and Musick (1984).

4.1.2.7.1.2 Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) 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 Magnuson-Stevens Act requires Federal agencies to consult on activities that may adversely affect EFH designated in fishery management plans. Chapter 4.2.11.3 of the Programmatic EIS also provides a broad overview on EFH in the Atlantic.

Additionally, fishery management councils 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. None of the individual Mid-Atlantic WEAs overlaps with a designated HAPC. However, sandbar shark and summer flounder HAPCs are located inshore of the New Jersey, Delaware, and Virginia WEAs which may be transited by vessels and/or surveyed for site characterization of possible cable routes to shore. Specifically, the summer flounder HAPC overlaps with native species of macroalgae, seagrasses, and freshwater and tidal macrophytes within their defined EFH.

BOEM has determined that EFH has been designated for the following species for one or more life stages in one or more of the Mid-Atlantic WEAs:

New England Fishery Management Plan Species

Atlantic herring	Monkfish	Smooth skate
Atlantic sea scallops	Ocean pout	Thorny skate
Atlantic cod	Offshore hake	Witch flounder
Barndoor skate	Red hake	Yellowtail flounder
Clearnose skate	Rosette skate	Winter flounder
Haddock	Silver hake	Windowpane flounder
Little skate	Winter skate	

Mid-Atlantic Fishery Management Plan Species

Atlantic mackerel	Surfclam	Spiny dogfish
Black sea bass	Monkfish	Summer flounder
Bluefish	Ocean quahog	Illex squid
Butterfish	Scup	Loligo squid

South Atlantic Fishery Management Plan Species

Cobia	King mackerel	Spanish mackerel

Atlantic Highly Migratory Species Fishery Management Plan Species

Albacore tuna	Porbeagle	Caribbean sharpnose
Atlantic angel shark	Sand tiger shark	Shark
Atlantic bigeye tuna	Sandbar shark	Galapagos shark
Atlantic bluefin tuna	Scalloped hammerhead	Narrowtooth shark
Atlantic sharpnose	Shortfin mako	Sevengill shark
Atlantic skipjack	Silky shark	Sixgill shark
Atlantic swordfish	Thresher shark	Smooth hammerhead
Atlantic yellowfin tuna	Tiger shark	Shark
Basking shark	White marlin	Smalltail shark
Blue marlin	White shark	Smooth dogfish
Blue shark	Bigeye sand tiger	Longbill spearfish
Dusky shark	Shark	Blacktip shark
Longfin mako	Bigeye sixgill shark	

In a letter dated August 11, 2011, NMFS responded to the assessment of impacts to EFH contained in the Draft EA (*see* Section 5.3.2). In that letter NMFS identified four conservation recommendations that BOEM will consider applying in the future if and when a lessee submits a COP for a full scale wind energy development. *See* Appendix C of this EA..

4.1.2.7.2 Impact Analysis of Alternative A

Acoustic Effects

This section on acoustic effects is a brief summary of what is known about sound sensitivity in marine fish and the impacts of sound that could be produced as a result of site characterization and assessment activity in the Mid-Atlantic WEAs.

The auditory thresholds of marine fish that could occur in the Mid-Atlantic WEAs are not well studied. A fishes' inner ear and the lateral line overlap in the frequency range to which they respond. The lateral line appears to be most responsive to signals ranging from below one Hz to between 150 and 200 Hz (Coombs et al., 1992), while the ear responds to frequencies from about 20 Hz to several thousand Hz in some species (Popper and Fay, 1993; Popper et al., 2003). The specific frequency response characteristics of the ear and lateral line varies among different species and is probably related, at least in part, to the life styles of the particular species.

As for sound production in fish, Myrberg (1980) states that members of more than 50 fish families produce some kind of sound using special muscles or other structures that have evolved for this role, or by grinding teeth, rasping spines and fin rays, burping, expelling gas, or gulping air. Sounds are often produced by fish when they are alarmed or presented with noxious stimuli (Myrberg, 1981; Zelick et al., 1999). Some of these sounds may involve the use of the swim bladder as an underwater resonator. Sounds produced by vibrating the swim bladder may be at a higher frequency (400 Hz) than the sounds produced by moving body parts against one another. The swim bladder drumming muscles are correspondingly specialized for rapid contractions (Zelick et al., 1999).

Myrberg (1981) has identified various categories of acoustic communication that are used by fishes. These are startle or warning sounds that may help protect individuals and groups from predation; courting sounds used as part of the usual mating behaviors including advertisement; swimming sounds used in schooling and aggregation; aggressive sounds used when competing for mates; sounds used in other aggressive interactions (e.g., in territorial defense); sounds used by interceptor species to avoid predation or to locate prey; and sounds overheard and used to competitive advantage by competitors. Sounds are known to be used in reproductive behavior by a number of fish species, and the current data lead to the suggestion that males are the most active producers. Sound activity often accompanies aggressive behavior in fish, usually peaking during the reproductive season. Those benthic fish species that are territorial in nature throughout the year often produce sounds regardless of season, particularly during periods of high-level aggression (Myrberg 1981). In addition to the behaviors classified by Myrberg (1981) as communication, it is also likely that hearing is used to help form a general image of the auditory scene that may include both other fishes and abiotic sound sources and scatterers.

High Resolution Geological Survey Acoustic Effects

Sections 3.1.1 and 4.1.2.3 detail a proposed action scenario for HRG surveys, which is not repeated herein.

The impact of HRG survey noise on marine fish that could occur in the Mid-Atlantic WEAs is not well understood. Generally, noise generated by HRG surveys may have physical and/or behavioral effects on fish. Hastings et al. (1996) suggested that sounds 90 to 140 dB above a fish's hearing threshold may potentially injure the inner ear of a fish. This suggestion was supported in the findings of Enger (1981) in which injury occurred only when the stimulus was 100 to 110 dB above threshold at 200 to 250 Hz for the cod. Hastings et al. (1996) derived the values of 90 to 140 dB above threshold by examining the degree of masking and how similar the masking signal and test signal are. The data on other species are much less extensive. Chapman and Hawkins (1973) found that ambient noise at higher sea states in the ocean have masking effects in cod, haddock, and pollock. Additionally, sound could also produce generalized stress (Wysocki et al., 2006). Thus, based on limited data, it appears that for fish communication, masking and stress may occur in fish exposed to this level of sound.

Effects on fish are generally expected to be limited to avoidance of the area around the HRG survey activities and short-term changes in behavior. The region of best hearing in the majority of fish for which there are data available is from 100 to 200 Hz up to 800 Hz. Adult fish are highly mobile and may be expected to quickly leave an area when disturbed. While an HRG survey may disturb more than one individual, surveys associated with Alternative A 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.

Fish 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 fish, based on fish hearing data. Because of the limited immediate area of ensonification and duration of individual HRG surveys that may be conducted during site assessment, few fish may be expected in most cases to be present within the survey areas. Thus, potential population-level impacts on fish from HRG surveys are expected to be negligible.

Sub-bottom Reconnaissance Acoustic Effects

Acoustic impacts from borehole drilling are expected to be below 120 dB. Previous estimates submitted to BOEM for geotechnical drilling have source sound levels not exceeding 145dB at a frequency of 120Hz (USDOC, NOAA, NMFS, 2009). Previous submissions to BOEM also indicated that boring sound should attenuate to below 120 dB by the 150m isopleth. Therefore, fish are expected to able to sense the sound, but the impacts are anticipated to be negligible due to short duration, low sound levels, and the ability of the fish to leave the immediate area of the drilling.

Meteorological Tower Pile-Driving Acoustic Effects

Section 3.1.2 and 4.1.2.3 detail a proposed action scenario and acoustic effects for pile driving, which is not repeated herein.

Meteorological tower construction noise could disturb normal behaviors (e.g., feeding) of marine fish. Depending upon the several factors, including the sound source and physical oceanographic features, behavioral effects may be incurred at ranges of many miles, and hearing impairment may occur at close range (Madsen et al., 2006). As discussed in the impacts from HRG survey, behavioral reactions may include avoidance of, or flight from, the sound source and its immediate surroundings, disruption of feeding behavior, and generalized stress (Wysocki et al., 2006).

The project design criteria required by BOEM are intended to reduce or eliminate the potential for adverse impacts to marine mammals and sea turtles will also benefit fish including the implementation of a "soft start" procedure (*see* Appendix B and Section 5.3.1 of this EA). This measure will be included as a condition on any leases and/or SAPs issued or approved under this proposed action. Due to the "soft start" procedure, it is anticipated that the majority of fish would flee the area during the period of disturbance and return to normal activity in the area post-construction. Those fish that do not flee the immediate action area during the pile driving procedure could be exposed to lethal sound pressure levels. However, significant effects to fish populations are not anticipated.

Benthic Effects

Section 4.1.2.2 of this EA discusses the benthic resources and impacts from Alternative A upon those resources. This section only discusses those impacts in relation to fish and their habitat. Benthic effects from Alternative A that would impact fish and fish habitat is anticipated to be temporary and limited to the immediate area surrounding the activity. Therefore, it is not anticipated that benthic fish habitat would experience significant negative impacts that could then impact fish populations.

Sub-bottom Sampling

As stated in Section 4.1.2.2 of this EA, the sub-bottom sampling would result in a negligible temporary loss of some benthic organisms (i.e., less than one ft diameter would be disturbed in the areas where cores are sampled), and a localized increase in disturbance due to vessel activity, including noise and anchor cable placement and retrieval. This activity could impact marine fish by removing a small amount of forage items for these species. However, due to the small footprint, the temporary nature of the action, and likely availability of similar benthic habitat around the sampling location, it is expected that this activity would have negligible benthic effects that could impact federally-managed fish species that occur in the Mid-Atlantic WEAs.

Meteorological Tower/Buoy Installation

The installation of a meteorological buoy and/or the construction of a meteorological tower would have benthic effects that are temporary in nature. It is anticipated that there would be some sediment that would become suspended around deployed anchoring systems and around monopoles resulting from the installation activity. This sediment would be dispersed and settle on the surrounding seafloor. Depending upon the currents this could potentially smother some benthic organisms. However, as mentioned previously the Mid-Atlantic Bight is considered a high energy environment that sees much sediment transport in its natural state. It is expected that any sedimentation that would occur around an installed tower or buoy would have only minor temporary effects that could impact the habitat and food availability for federally-managed fish species. The loss of benthic habitat as a result of scour and/or scour control systems around foundations and moorings is discussed in Section 4.1.2.2 of this EA. Sessile marine invertebrates, including molluscan shellfish, would be lost in the footprint of the foundation/mooring and any scour control system. However, a single meteorological tower or buoy within a lease area is not expected to result in significant changes to the availability of habitat and forage items in the action area.

Meteorological Tower/Buoy Operation

It is expected that the installation of meteorological towers and large anchoring systems, that if introduced to soft sediments would introduce an artificial hard substrate that opportunistic benthic species that prefer such substrate could colonize. In addition, minor changes in species associated with softer sediments could occur due to scouring around the pilings (Hiscock et al., 2002). Certain fish species (e.g., tautog, black sea bass, Atlantic striped bass) would likely be attracted to the newly formed habitat complex, and fish population numbers in the immediate vicinity of the anchors and monopoles are likely to be higher than in surrounding waters away from the structures. However, a single meteorological tower or buoy within a lease area is not expected to result in significant changes in local community assemblage and diversity, nor the availability of habitat and forage items in the action area.

Discharge of Waste Materials and Accidental Fuel Leaks

Collisions between vessels and allisions between vessels and meteorological towers and buoys is considered unlikely (*see* Section 3.2.2 of this EA). However in the unlikely event that a vessel allision or collision were to occur, and in the unlikely event that such an allision or collision results in a discharge, the most likely pollutant to be discharged would be diesel fuel. If a diesel spill were to occur, it would be expected to dissipate very rapidly in the water column, then evaporate and biodegrade within a few days (*see* Section 3.2.3 of this EA). It is expected that pelagic fish and larval fish that can be found high in the water column would be negatively impacted by such a spill. These impacts are not expected to be significant to the populations they represent due to the temporary nature of a spill limited area over where a spill effect. Overall impacts to fish resources from diesel spills resulting from collisions, should they occur, are expected to be minimal.

Fish could be exposed to operational discharges or accidental fuel releases from construction sites and construction vessels and to accidentally released solid debris. 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, waste discharges from construction vessels would not be expected to directly affect fish or their habitat.

Fish can be adversely impacted by the ingestion of, or entanglement with, solid debris. Fish 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 BOEM (30 CFR 250.300) and the USCG (MARPOL, Annex V, Pub. L. 100–220 (101 Stat. 1458)). Thus, entanglement in or ingestion of OCS-related trash and debris by fish would not be expected during normal operations. Because of the limited duration and area of vessel traffic and construction activity that might occur with construction, operation, and decommissioning of a meteorological tower and/or met buoy, the release of liquid wastes would occur infrequently. Accidental fuel release during site characterization activities is expected to be minimal. Thus, overall impacts to fish and their habitat from the discharge of waste materials or the accidental release of fuels during site assessment and site characterization activities are expected to be minor.

Meteorological Tower and Buoy Decommissioning

The decommissioning of meteorological towers and buoys is described in Chapter 3 of this EA. Upon completion of site assessment activities, the meteorological tower would be removed and transported by barge to shore. During this activity, fish may be affected by noise and operational discharges as described for meteorological tower construction. 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 m (15 ft) below the seabed. Fish could be affected by noise produced by pile cutting equipment, although cutting produces less intense noise than pile driving. Only fish in the immediate vicinity of the 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. Disturbance of fish during decommissioning is expected to be minor resulting in negligible impacts to fish.

Natural and Unanticipated Events

A vessel allision with the meteorological structures or collision with other vessels may result in the spillage of diesel fuel. Vessels are expected to comply with USCG requirements relating to prevention and control of oil spills. Spills are not projected to have significant impacts due to the small size of a projected spill. A could occur while enroute to and from the WEAs but this is considered unlikely. If a spill were to occur, either inside or outside of a WEA, the estimated spill size would be small. From 2000 to 2009, the average spill size for vessels similar to those anticipated to be used for Alternative A was 88.36 gallons (U.S. Department of Homeland Security, USCG, 2011). Vessel allision with a meteorological buoy containing diesel powered generator may also occur. It is estimated that a buoy generator could contain 240 gallons of diesel fuel (FERN 2011). If a diesel spill of this size were to occur, it would be expected to dissipate very rapidly in the water column of the open ocean, then evaporate and biodegrade within a few days (*see* Section 3.2.3 of this EA).

The meteorological towers and buoys could also serve as attractants for fish, 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.

Storms may also cause allisions and collisions that could result in a spill, yet the storm conditions would cause the spill to dissipate faster. As a result, the impacts to fish populations that could result from an oil spill, should one occur, associated with Alternative A are expected to be both minor and temporary.

It is also possible that larger vessels, such as tankers or container ships, could collide with meteorological structures within the WEAs. Such a collision is considered unlikely, as these structures would be sparsely placed on the OCS offshore New Jersey to Virginia, and will be lit and marked for navigational purposes (*see* Section 3.1.3.1 of this EA). If a larger vessel should collide with a meteorological facility, a large spill would be extremely unlikely (*see* Section 3.2.2 of this EA). Thus, the largest spill that could result in the unlikely event that a larger ship were to collide with a meteorological facility is on the order of 240 gallons – the estimated amount of generator fuel that could be present on the meteorological facility itself (assuming that a generator is present on the facility).

Conclusion

Alternative A and the potential effects of HRG survey noise on marine fish are generally expected to be limited to avoidance around the HRG survey activities and short-term changes in behavior. Thus, potential population-level impacts, if any, on fish resulting from HRG surveys are expected to be negligible.

Meteorological tower construction noise could disturb normal behaviors. As discussed in the analysis of HRG surveys, behavioral reaction may include avoidance of, or flight from, the sound source. Fish that do not flee the immediate action area during pile driving procedure could be exposed to lethal sound pressure levels. However, the project designs criteria, including the implementation of a "soft start" procedure will minimize the possibility of exposure to lethal sound levels.

As a result of the small sub-bottom sampling footprint, it is expected this activity would have negligible benthic effects that could impact federally-managed fish species that may occur in the Mid-Atlantic WEAs. Impacts related to meteorological towers/buoys installation, operation and decommissioning is expected to be minor and not expected to result in changes in local community assemblage and diversity.

Fish could be exposed to operational discharges or accidental fuel releases from construction sites and construction vessels and to accidentally released solid debris. The entanglement in or ingestion of OCS-related trash and debris by fish would not be expected during normal operations. Impacts to fish and their habitat from the discharge of waste materials or the accidental release of fuels are expected to be minor due to the limited number of structures and vessels involved with their construction, operation, and decommissioning.

4.1.3 Socioeconomic Conditions and Impacts

4.1.3.1 Archaeological Resources

Bottom disturbing activities associated with Alternative A offshore New Jersey, Delaware, Maryland and Virginia to the seaward extent of the WEAs have the potential to affect historic and pre-contact archaeological resources on the seabed. While indistinguishable from existing traffic on the ocean, vessel traffic associated with Alternative A would be visible from coastal areas of New Jersey, Delaware, Maryland and Virginia. While indistinguishable from other lighted structures on the OCS, some meteorological towers and buoys may be visible from coastal areas of New Jersey, Delaware, Maryland and Virginia.

4.1.3.1.1 Description of the Affected Environment

A general overview of archaeological resources in the Atlantic OCS can be found in Chapter 4.2.19 of the Programmatic EIS. The WEAs and potential cable corridors offshore New Jersey, Delaware, Maryland and Virginia (*see* Figure 4.6 for an example), where bottom disturbing activities associated with Alternative A may occur, have the potential to contain both historic and pre-contact archaeological resources. Historic properties also are located on shorelines adjacent to the proposed area that may be within line-of-site of vessel traffic and some of the proposed site assessment structures.

Offshore historic period archaeological resources in these general areas include shipwrecks, which may date from as early as the 16th century to the present (Koski-Karell, 1995; USDOI, BOEMRE, 2011b). The potential for finding shipwrecks increases in areas, such as historic shipping routes, approaches to sea ports, reefs, straits, and shoals. The greatest concentration of known or reported shipwrecks per-linear mile of coastline in the Atlantic Region is found offshore the Mid-Atlantic States, based on information compiled from primary sources, secondary sources, and existing database entries (USDOI, BOEMRE, 2011b). However, many of the WEAs are in regions that have not been previously surveyed for the presence of archaeological resources. Offshore Maryland has the highest ratio of known or reported shipwrecks to miles of coastline, with over 19 shipwrecks per linear mile of coastline. Despite a relatively long coast of 112 miles, Virginia's 2,306 known or reported shipwrecks place it second with about 15 sites per mile of coastline. Offshore Delaware and New Jersey also have a very high ratio of known or reported shipwrecks per linear mile of coastline (USDOI, BOEMRE, 2011b, Section 12.6.3, Table 12-2). The distribution of shipwrecks offshore New Jersey, Delaware, Maryland and Virginia appear to closely correlate to vessel traffic, especially in the vicinity of port approaches and navigational hazards (Crothers, 2004; French, 1987; Matson, 1998; Morgan, 1989; Smith, 2003; USDOI, BOEMRE, 2011b). According to entries in the BOEM Atlantic OCS Shipwreck Database, all four Mid-Atlantic WEAs and potential cable routes to shore are characterized as having a high probability for containing shipwrecks.

Offshore archaeological resources also include submerged pre-contact sites (Nordfjord, 2006). The WEAs and potential cable corridors are located within regions of the OCS that formerly may have been exposed above sea level and available to human occupation during the last ice age (Garrison et al., 2011). Sea level data provides a guide to where drowned archaeological sites may be present on the OCS. The highest rate of sea level rise occurred during a period of known occupation along the Middle Atlantic, which archaeologists currently place at approximately 11,600–11,100 years before present day (B.P.). This period was followed by a much slower rate of sea level rise (approximately 0.8 cm per year) until ca. 7000 B.P., after which the rate of sea level rise slowed even further (0.2 cm per year or less). After 7,000 B.P., archaeological sites would have been subject to a higher frequency of erosion or destruction by the process of marine transgression (USDOI, BOEMRE, 2011b, Section 6.3).

4.1.3.1.2 Impact Analysis of Alternative A

Chapter 5.2.19 of the Programmatic EIS discusses potential impacts to potential archaeological resources that could occur from site assessment activities, construction activities, operation activities, and decommissioning of offshore structures. Impacts to potential archaeological resources offshore New Jersey, Delaware, Maryland and Virginia to the seaward extent of the WEAs that could occur from bottom disturbance and spills associated with site characterization surveys and site assessment activities (the installation of meteorological towers/buoys) associated with proposed action are discussed below.

Reasonably foreseeable viewshed impacts from vessels and potential structures associated with Alternative A also are discussed below.

Routine Activities

Site Characterization Activities

Site characterization activities; which include HRG surveys and geotechnical surveys; (core sampling/testing) are not expected to impact offshore archaeological resources. Due to the cost associated with geotechnical surveys (i.e., core sampling) of the WEAs and potential cable corridors, it is assumed that these bottom disturbing geotechnical surveys would occur after HRG surveys are conducted. The HRG surveys, which would not disturb the bottom, should be designed to identify archaeological resources and enable geotechnical surveys to avoid these resources (*see* GGARCH guidelines). The data collected during HRG surveys and interpreted by trained archaeologists and geologists would identify potential archaeological resources, so that the lessee, in coordination with BOEM, can develop and implement appropriate avoidance measures prior to each geologic sampling, avoiding the cost of unnecessary or additional sampling. Additionally, the information from HRG surveys also can lead to improved sampling strategies for the testing of potential relic paleolandforms to assist in determining whether these areas would have been suitable for human habitation when the OCS was exposed during the last ice age. *See* Section 3.1.2 of this EA.

As discussed in Chapter 3, BOEM is assuming that lessees will not undertake expensive ground-disturbing activities (i.e., core sampling) until after they have undertaken the less expensive HRG surveys to characterize the seafloor of the lease. These HRG surveys will provide indications of the potential presence and location of archaeological resources in the seabed. It is assumed that lessees would not undertake to place structures on archaeological resources (and therefore, will not invest the capital and time in sampling locations for which the HRG surveys have indicated the presence of a potential archaeological resource). However, due to the fact that little is known about the presence and location of potential archaeological resources on the Mid-Atlantic OCS, and due to the fact that the greatest concentration of known or reported shipwrecks per-linear mile of coastline in the Atlantic Region is found offshore the Mid-Atlantic States, BOEM will require that lessees observe the unanticipated finds requirements at 30 CFR 585.802 whenever engaging in ground-disturbing activities (such as core sampling). Under these lease requirements, if a lessee discovers a potential archaeological resource while conducting ground disturbing activities, it will be required to follow the process specified in 30 CFR 585.802, which is described below.

Any visual impacts of vessel traffic associated with survey activity to onshore cultural resources would be limited and temporary in nature, and would be indistinguishable from existing vessel traffic. Visual impacts of lighting of site assessment structures on coastal historic properties likewise would be indistinguishable from existing vessel traffic and other lighted structures on the OCS and would be limited and temporary in nature.

Site Assessment Activities

Archaeological resources are protected under the existing renewable energy regulations. In general, the lessee's SAP must contain information that would assist BOEM in complying with the NHPA (*see* Section 5.2.4) and other relevant laws (30 CFR 585.611(a),(b)(6)). The lessee must also describe the archaeological resources that could be affected by the activities proposed in the plan, or that could affect the activities proposed in the plan.

Meteorological towers installed under Alternative A would be virtually invisible from shore based on the narrow profile of the structure, distance from shore; earth curvature, waves, and atmosphere (*see* Section 3.1.3.1, Visual Aesthetics, of this EA). Existing ports and other onshore infrastructure are capable of supporting site assessment activities with no expansion (*see* Sections 3.1.3.1 and 3.1.3.2). Any visual impacts to onshore cultural resources would be limited and temporary in nature and would consist predominately of vessel traffic, which most likely would not be distinguishable from existing vessel traffic.

It is anticipated that bottom disturbance associated with the installation of meteorological towers and buoys would disturb the seafloor in a maximum radius of 1,500 ft (~450 m) or 162 acres around each bottom-founded structure. This includes all anchorages and appurtenances of the support vessels. This would result in almost 6,000 acres of impacted seafloor, less than one of the WEAs, if all 12 anticipated meteorological towers were constructed and 25% meteorological buoys were installed. Direct impacts to archaeological resources within 1,500 ft of each meteorological tower and buoy would be the result of direct destruction or removal of archaeological resources from their primary context. Although this would be extremely unlikely given that the bottom-disturbing surveys described above would be conducted prior to the installation of any structure (*see* e.g., 30 CFR 585.610 and 585.611), should contact between the activities associated with Alternative A and a historic or pre-contact site occur, there may be damage or loss to archaeological resources.

Should the surveys reveal the possible presence of an archaeological resource in an area that may be affected by its planned activities, the applicant would have the option to demonstrate through additional investigations that an archaeological resource either does not exist or would not be adversely affected by the seafloor/bottom-disturbing activities (30 CFR 585.802(b)).

If the lessee, while conducting activities, discovers a potential archaeological resource such as the presence of a shipwreck (e.g., a sonar image or visual confirmation of an iron, steel, or wooden hull, wooden timbers, anchors, concentrations of historic objects, piles of ballast rock), pre-contact artifacts, and/or relict landforms, etc. within the project area the lessee must:

1) Immediately halt seafloor/bottom-disturbing activities within the area of discovery;
2) Notify BOEM within 72 hours of its discovery;
3) Keep the location of the discovery confidential and take no action that may adversely affect the archaeological resource until BOEM has made an evaluation and instructs the applicant on how to proceed (30 CFR 585.802(a)(1)-(3) and 585.902(e)).

BOEM may require the lessee to conduct additional investigations to determine if the resource is eligible for listing in the National Register of Historic Places (NRHP) (30 CFR 585.802(b)). If further investigations indicate the archaeological resource is potentially eligible for the NRHP, BOEM would inform the lessee as to how to protect the resource, or how to mitigate any adverse effect to the resource.

Non-Routine Events

Diesel spills could occur due to vessel collisions or during generator refueling (*see* Section 4.1.1.2 of this EA discussing oil spills and impacts). If a diesel spill were to occur, it would be expected to dissipate very rapidly and not reach the seafloor or the coast (*see* Section 3.2.3 of this EA).

It is possible that an anchorage (from either a meteorological buoy or support vessel) may be unintentionally dragged across the seafloor in a storm event. Survey activities would not take place in periods of rough weather. Furthermore, in reviewing a SAP, BOEM would ensure that appropriately-weighted anchorages will be used for a buoy (30 CFR 585.606, 585.610 and 585.801) and that if archaeological resources are nearby, post-storm resurvey to confirm the location of anchorages would be conducted. The likelihood that archaeological resources could be impacted by a non-routine event, such as a spill or storm, is minimal. In addition, the results of HRG surveys required before SAP approvals should provide the information needed for BOEM to further assess the likelihood of damage to known sites from these unanticipated drag events. If a site is determined to have been potentially damaged, then BOEM would require the lessee to mitigate the adverse effect to the resources (30 CFR 585.802(b)).

Conclusion

Offshore New Jersey, Delaware, Maryland and Virginia to the seaward extent of the WEAs, where bottom disturbing activities associated with Alternative A would occur, has the potential to contain historic and pre-contact archaeological resources. However, the information generated from the lessee's initial site characterization activities, the unanticipated discoveries requirement, and existing regulatory measures would make the potential for seafloor/bottom-disturbing activities (e.g. core samples, anchorages and installation of meteorological towers and buoys) to cause damage or significant impacts to archaeological or historic resources very low. Visual impacts of meteorological facilities and project-associated vessel traffic to onshore cultural resources would be limited and temporary in nature, if noticeable, and consist predominately of vessel traffic which most likely would not be distinguishable from existing vessel traffic.

Proposed Mitigation Measures

The following proposed mitigation measures are intended to reduce or eliminate the potential for adverse impacts to archeological resources by ensuring sufficient survey coverage, so that these resources can be identified and avoided. This section proposes that these mitigation measures be incorporated into the terms of a lease or SAP approval:

- Compliance with the latest BOEM guidelines for geological, geophysical, hazards, and archaeological surveys. On April 21, 2011 BOEM posted *"Guidelines for Providing Geological and Geophysical, Hazards, and Archaeological Information Pursuant to 30 CFR Part 285,"* which provides recommended strategies, techniques, and elements for collecting the data necessary to readily determine the absence or presence of sites, structures, or objects of cultural or archaeological significance. *See* http://www.boemre.gov/offshore/RenewableEnergy/RegulatoryInformation.htm. This measure ensures that the data presented would be sufficient to ascertain the presence or absence of resources in the leasehold that would be affected by the activities proposed in the plan, including all seafloor/bottom-disturbing activities.
- Resurvey anchorages of semi-permanent meteorological buoys after storm events when archaeological resources are located within 150 ft. severe storm events could cause anchorages that are not appropriately weighted to be unintentionally dragged across the seafloor and therefore, could impact nearby archaeological resources. This measure would require that, in cases where archaeological resources are nearby, anchorages will be resurveyed after each severe storm event to ensure that they have remained in place. In

the unlikely event that a nearby archaeological resource had been impacted by a displaced anchor, additional mitigation measures deemed appropriate by BOEM will be communicated to and implemented by the lessee with oversight and approval by BOEM.

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 of New Jersey, Delaware, Maryland and Virginia are used for recreational activity by residents of the local areas and tourists. 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. The coastal waters of these areas would be transited by vessels associated with Alternative A. Recreational fishing is discussed in Section 4.1.3.6 of this EA.

New Jersey

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

Table 4-12 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. The USEPA reports 263 beaches in the 5 coastal counties (Atlantic, Cape May, Middlesex, Monmouth, and Ocean) in New Jersey, which is summarized in Table 4-11 (USEPA, 2008b).

Maryland

Maryland's coastline and beach recreation areas attract many local citizens, as well as out-of-state visitors. Popular recreational activities include swimming, boating, fishing and sunbathing. There are a total of 68 beaches along the coast in the following counties, which is summarized in Table 4-11 (Anne Arundel, Baltimore, Calvert, Cecil, Kent, Queen Anne's, Somerset, St Mary's and Worcester) USEPA, 2008. Table 4-12 presents employment in tourism-related industries in 2004 (National Ocean Economic Program, 2008).

Virginia

Virginia's coastline accommodates recreational activities, such as swimming, fishing, boating, jogging, camping, hiking and sunbathing. Virginia has a total of 47 beaches in the following coastal counties which is summarized in Table 4-11 (Accomack, Gloucester, Hampton, King George, Mathews, Newport News, Norfolk, Northampton, Virginia Beach and York) USEPA, 2008b. Table 4-12 presents employment in tourism-related industries in 2004 (National Ocean Economic Program, 2008).

Delaware

Sussex County is the coastal county of Delaware and is host to 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.

Delaware has 26 miles of Atlantic Ocean coastline in Sussex County. The USEPA reports 21 beaches in the coastal county of Sussex, which is summarized in Table 4-11 (USEPA, 2008b). Table 4-12 presents Delaware's ocean tourism and recreation economy by county in 2004.

Table 4.10

Number of Coastal Beaches in New Jersey, Maryland, Delaware and Virginia by County

Coastal Counties	Number
Middlesex – NJ	4
Monmouth – NJ	58
Ocean – NJ	84
Atlantic – NJ	48
Cape May – NJ	69
Sussex – DE	21
Anne Arundel – MD	27
Baltimore – MD	3
Calvert – MD	9
Cecil – MD	6
Kent – MD	8
Queen Anne’s – MD	1
Somerset – MD	2
St, Mary’s – MD	2
Worcester – MD	10
Accomack – VA	2
Gloucester – VA	1
Hampton – VA	2
King George – VA	1
Mathews – VA	1
Newport News – VA	4
Norfolk – VA	9
Northampton – VA	2
Virginia Beach – VA	24
York - VA	1
Total	399

Source: USEPA, 2008b.

Table 4.11

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
Maryland Counties	**Employment**	**Wages**
Anne Arundel	11,917	$234,873,811
Baltimore	2,415	$33,447,117
Calvert	1,327	$14,709,539
Cecil	2,009	$27,550,770
Queen Anne's	1,682	$31,417,192
Somerset	442	$4,462,424
St. Mary's	2,175	$24,267,003
Worcester	977	$12,282,840
Total	22,944	$383,010,696
Delaware Counties	**Employment**	**Wages**
Sussex	6,102	$96,770,541
Total	6,102	$96,770,541
Virginia Counties	**Employment**	**Wages**
Accomack	422	$4,814,147
Gloucester	1,061	$12,418,216
Hampton	1,425	$16,426,950
King George	270	$2,808,593
Mathews	87	$708,437
Newport News	3,615	$43,621,282
Norfolk	6,303	$89,217,010
Northampton	424	$4,285,660
Virginia Beach	12,460	$168,069,426
York	1,282	$16,355,606
Total	27,349	$358,725,327

Source: National Ocean Economic Program, 2008.

4.1.3.2.2 Impact Analysis of Alternative A

Routine Activities

Impacts on recreational resources are not anticipated in connection with Alternative A. As discussed in Section 4.1.3.5, existing ports or industrial areas are expected to be used by vessels associated with Alternative A. Expansion of these existing facilities is not anticipated. Due to the distance to shore of the WEAs, it is estimated that most of the anticipated meteorological towers would not be visible from shore (*see* Section 3.1.3, Visual Aesthetics). The few meteorological towers located nearer to shore would be virtually invisible from shore due to the anticipated widths of these structures, and to the nominal atmospheric conditions offshore of the Atlantic coast. It is most likely that vessel traffic associated with Alternative A would use established nearshore traffic lanes. Chapter 5.2.22 of the Programmatic EIS concluded that, as tourism and recreation exists in its current state in the context of existing military, commercial, and recreational water and air vessels that currently traverse these coastal areas, it is unlikely that there would be any detrimental impact on tourism and recreation from the additional vessels associated with Alternative A. No information has been presented that would tend to invalidate the analysis in the Programmatic EIS.

Non-Routine Events

The potential impacts of non-routine events on water quality are discussed in Section 4.1.1.2 of this EA. Spills could occur during refueling or as the result of a collision. Since the anticipated meteorological towers would be located 7 or more miles offshore, if a diesel spill occurred in the WEAs, it is unlikely a diesel spill would reach the shore. If a diesel spill were to occur, it would be expected to dissipate very rapidly and biodegrade within a few days. From 2000 to 2009, the average spill size for vessels other than tanker ships and tank barges was 88.36 gallons (U.S. Department of Homeland Security, USCG, 2011).

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 activities associated with Alternative A and their distance from shore, it is unlikely that recreational beaches in New Jersey, Maryland, Delaware and Virginia would be impacted by waterborne trash that may result from Alternative A. Any beached litter and debris which may result from Alternative A is unlikely to be perceptible to beach users or administrators given the amount of vessel traffic and debris currently traversing the coastal areas of these states.

Conclusion

Due to the distance of the proposed lease areas from shore, the fact that no new coastal infrastructure would be necessary, and the small amount of vessel traffic associated with Alternative A that would be present in any given recreational area (particularly given the existing amount of vessel traffic in these areas), no impacts to coastal recreational resources from routine activities or potential spills are expected. While impacts could occur from marine trash and debris, it is unlikely that any additional trash that could be associated with Alternative A would be perceptible. Potential impacts to recreational fishing are discussed in Section 4.1.3.6 of this EA.

Proposed Mitigation Measure

The following proposed mitigation measures are intended to reduce or eliminate the potential for adverse impacts to recreational resources from the accidental release of trash and debris. This section proposes that these mitigation measures be incorporated into the terms of a lease or SAP approval:

To reduce or eliminate the risk of intentional and/or accidental introduction of debris into the marine environment all vessel operators, employees and contractors actively engaged in offshore operations would be required to be briefed on marine trash and debris awareness and elimination. The lessee would also 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.

4.1.3.3 Demographics and Employment

4.1.3.3.1 Description of the Affected Environment

Chapter 4.2.18 of the Programmatic EIS describes the heterogeneity of the Atlantic region's sociocultural systems, which is reflected by a variety of demographic, employment, income, land-use, and infrastructure patterns in the coastal communities of the affected states. The Atlantic region consists of a number of contrasting types of economic areas, which include metropolitan areas and large urban areas with highly complex economic structures; urban areas that serve a smaller number of more specialized economic functions; and a large number of local and regional market areas with relatively simple economic structures and smaller, less-diversified labor markets. Population and economic data for the shore adjacent counties of New Jersey, Delaware, Maryland and Virginia that would host onshore activities associated with Alternative A is presented in Table 4.12 below.

Table 4.12

Population and Economic Data for Shore Adjacent Counties of New Jersey, Delaware, Maryland and Virginia

State	Population	Establishments	Employment	Wages
New Jersey	4,603,659	134,919	1,988,958	$106,274,699,102
Delaware	873,092	28,417	412,760	$19,651,828,841
Maryland	2,770,774	72,708	1,254,334	$59,066,786,132
Virginia	2,164,775	60,172	1,107,847	$53,526,184,202

Sources: National Ocean Economics Program, 2011a and 2011b.

4.1.3.3.2 Impact Analysis of Alternative A

Alternative A would require various support services primarily within the coastal counties of Virginia, Maryland, Delaware and New Jersey. Due to the short duration of survey, construction, and decommissioning activities, any benefit to the population and economy would be short-term. Survey, construction, and decommissioning activities are not expected to employ many workers relative to the existing employment numbers (Table 4.12 above). Little activity would be associated with the maintenance and operation of the meteorological towers and buoys.

Conclusion

Alternative A is expected to have negligible but positive impacts on the population and employment of coastal counties of Virginia, Maryland, Delaware and New Jersey that would provide support services for Alternative A.

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 (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 (USDOI, MMS, 2007a, pp. 4-114 to 4-115,).

Impact Analysis

The anticipated leases would be located seven or more nm from the nearest shoreline. Therefore, the data gathering activities or construction occurring within the proposed lease areas would not have disproportionately high or adverse environmental or health effects on minority or low-income populations. Only the use of existing coastal facilities has the potential to impact minority or low-income populations. However, existing fabrication sites, staging areas, and ports would support survey, construction, operation and decommissioning activities as discussed in Section 4.1.3.5 of this EA. No expansion of these existing onshore areas is anticipated to support Alternative A.

Conclusion

Due to the distance from shore and the use of existing facilities, Alternative A is not expected to have disproportionately high or adverse environmental or health effects on minority or low-income populations.

4.1.3.5 Land Use and Coastal Infrastructure

4.1.3.5.1 Description of the Affected Environment

As described in Sections 3.1.2 and 3.1.3 of this EA, and discussed further below, existing ports or industrial areas in New Jersey, Delaware, Maryland and Virginia are expected to be used in support of Alternative A. Existing sites would be used for fabrication, as staging areas, and crew/cargo launch sites for the installation, operation, and decommissioning of meteorological towers and buoys, and to conduct surveys. Expansion of these existing facilities is not anticipated in support of the proposed survey, construction, operation, or decommissioning activities. Based on prior site assessment proposals, proximity to the lease blocks, capacity to handle the activities associated with Alterative A, and/or established business relationships between port facilities and potential lessees would be the key determinants of where a lessee would chose to stage its operations. Of the 149 largest ports (measured by annual cargo tonnage) in the United States, 35 are located along the East Coast (ERG, 2010). Because site characterization work is generally smaller in scale, infrastructure requirements are also likely to be smaller. Due to their proximity to the WEAs, the majority of the onshore activities associated with Alternative A would take place at nine major ports and 28 smaller ports in New Jersey, Delaware, Maryland and Virginia as described in the following section.

4.1.3.5.2 Impact Analysis of Alternative A

Site Characterization Surveys

To survey the WEAs and potential cable routes, site characterization surveys would have to be conducted by multiple vessels and likely over several years per leasehold due to the number of survey miles projected. The Atlantic survey industry is not as established as the Gulf of Mexico industry, which primarily serves the oil and gas exploration and production industry. Survey ships in the Gulf of Mexico are generally 170 to 200 ft long and require a diesel refueling station. Because there is a smaller number of East Coast survey companies, lessees may be limited to where survey operations can launch from. For Atlantic surveys, vessels only 65 to 100 ft long would be necessary. Vessels must be able to accommodate a crew for several days and large enough to mount enough cable to tow survey instruments. Construction vessels may require facilities with large cranes to load and unload large pieces of equipment, which would require a commercial port (Irion, personal communication, 2011).

Vessels conducting HRG surveys and sub-bottom sampling work can either depart from one of the 35 large commercial ports or 129 smaller commercial ports (if those ports meet the requirements of the expedition) along the Eastern Seaboard. Because the research vessels that are used for HRG surveys and bottom sampling are smaller than most commercial vessels and require a smaller navigation channel depth, expeditions can depart out of most commercial ports. The proximity of a survey contractor to the lease blocks and/or established business relationships between ports and contractors would likely be the key determinants of where survey work would originate.

Site Assessment Activities

A meteorological tower 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 fabrications yards is 15-20 ft. 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 wider and deeper inland channels. The meteorological tower would likely 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. Final assembly of the tower would be completed offshore. Therefore, BOEM assumes that the staging areas for meteorological towers would be the 35 larger commercial ports in the Mid-Atlantic States.

A meteorological buoy can vary in height, breadth hull type and anchoring method. There are several meteorological buoy manufacturers located domestically with headquarters in Colorado, California and Florida (JCOMMOPS, 2011). International meteorological buoy manufacturers and designers are also likely competitors with domestic firms. Deepwater Wind, LLC is currently assembling a buoy that was manufactured in Norway and then trucked into the Rhode Island facility. Once constructed, the 15-ton buoy would be barged to a testing location (Kuffner, 2010). Whether the buoys originate domestically or internationally, it is likely that for future assessment work, buoys would arrive from manufacturers to lessee's staging areas by truck, rail or sea, then be assembled and fitted with instrumentation and tested before deployment via a vessel with enough deck space to accommodate a structure potentially up to 12 m as well as a crane to lower the buoy into the sea (USDOC, NOAA, 2007). Therefore, BOEM assumes that the staging areas for meteorological buoys would be the same 35 larger commercial ports in the Mid-Atlantic States that would accommodate staging for meteorological towers.

Currently there are four proposed OCS wind energy-related projects in various states of planning for the installation of meteorological towers and/or buoys off the coasts of New Jersey and Delaware, including Bluewater Wind New Jersey, LLC; Fishermen's Energy of New Jersey, LLC; and Deepwater Wind, LLC. Fishermen's Energy has proposed using Barney's Dock in the smaller Atlantic City Port. 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. Deepwater Wind, on the other hand demonstrates that an established relationship with a particular port or area may be a stronger determinant of where companies would centralize their operations. Deepwater has proposed using a site in Rhode Island to manufacture its 105-ft-tall floating "spar buoy" and plans on deploying the buoy by barge to Block Island, RI for testing purposes, then finally shipped to its New Jersey lease area (Kuffner, 2010).

Vessel Traffic

Over 12,000 round trips are anticipated from site characterization and assessment activities associated with Alternative A over a five and half year period, if the entire area of each WEA were to be leased and the maximum amount of site characterization surveys were to be conducted in the leased areas of the WEAs. These trips would be divided among nine major and 28 smaller existing ports in Delaware, New Jersey, Maryland, and Virginia. Due to proximity, it is assumed the majority of traffic associated with site characterization and assessment of the Virginia WEA (about 2,800 round trips) would be supported by the 3 major and 9 smaller ports in Virginia (*see* Sections 3.1.2.6 and 3.1.3.4 of this EA). If all ports are used equally, this would average about 43 round trips per year to each of the Virginia ports. Based simply on the number of ports in each state, traffic associated with site characterization and assessment of the WEAs offshore New Jersey (about 6,400 round trips), Delaware (about 1,100 round trips) and Maryland (about 1,700 round trips) would be divided as follows: over half of the traffic supported by 3 major and 11 smaller ports in New Jersey; and the remainder of the traffic split between 3 major and 8 smaller ports in Delaware and Maryland. If all ports are used equally, this would average about 67 round trips per year to each of the ports in New Jersey, Delaware and Maryland (*see* Sections 3.1.2.6 and 3.1.3.4 of this EA).

New Jersey

Of the 35 largest ports (measured by annual cargo tonnage) along the East Coast, New Jersey is home to three of these ports: Camden, Paulsboro and Trenton. With a 40-ft main channel depth, four terminals with eight berths between them, 1 multipurpose bulk/container crane with a capacity of 95 tons, and direct access to highways I-676, I-76, Rte. 130 and I-295, and rail access via Rail Connections CP Rail System, CSX, and Norfolk Southern, the Port of Camden is well-positioned to provide a link within the OCS wind supply chain (ERG, 2010). New Jersey is also home to the joint New York/New Jersey Port which maintains a 45-ft main channel depth and 0-24, 25-49, 50-100, 100+ Ton Lifts as well as fixed, mobile and floating cranes (World Port Source, 2011). Several major ports, both within the state of New Jersey and in surrounding states, exist near the WEA offshore New Jersey that are suitable to support the fabrication and staging of meteorological towers or buoys. Some of these ports include the Port of New York and industrial ports accessible via the Delaware Bay and Delaware River in Delaware and Pennsylvania (Atlantic Renewable Energy Corporation and AWS Scientific, Inc., 2004). For HRG surveys and bottom sampling, New Jersey has eleven smaller ports with varying capacities including Atlantic City that may be used (ERG, 2010).

Maryland

Of the 35 largest ports (measured by annual cargo tonnage) along the East Coast, Baltimore, Maryland is one of these ports. With 16 cargo terminals and facilities, 13 berths, a 50-ft main channel depth, as well as access to I-95, I-395, I-695, and intermodal connections to CSX Intermodal and Norfolk Southern, Baltimore is well positioned to provide a link within the OCS wind supply chain (ERG, 2010). There are several major ports in surrounding states near the WEA offshore Maryland that are suitable to support the fabrication and staging of meteorological towers or buoys. Some of these ports include the Port of New York and New Jersey and industrial ports accessibly via the Delaware Bay and Delaware River in New Jersey, Delaware, and Pennsylvania (Atlantic Renewable Energy Corporation and AWS Scientific, Inc., 2004). For HRG surveys and bottom sampling, Maryland has five smaller ports with varying capacities that includes Annapolis (World Port Source, 2011) that may be used.

Delaware

Of the 35 largest ports (measured by annual cargo tonnage) in the United States, located along the East Coast, Delaware is home to two of these ports: New Castle and Wilmington. 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 (Ro-Ro) container vessels on the Christina River, and an automobile and Ro-Ro berth on the Delaware River. The Port of Wilmington is the busiest terminal on the Delaware River handling over 400 vessels per year (Port of Wilmington, 2011). The Port of Wilmington also has truck access via I-95 and rail via CSX and Norfolk Southern (ERG, 2010). "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, 2007).

Several major ports in surrounding states exist near the WEA offshore Delaware that are suitable to support the fabrication and staging of meteorological towers or buoys. Some of these ports include the Port of New York and New Jersey and industrial ports accessibly via the

Delaware Bay and Delaware River in New Jersey and Pennsylvania (Atlantic Renewable Energy Corporation and AWS Scientific, Inc., 2004). For HRG surveys and bottom sampling, Delaware has three smaller ports that may be used.

Virginia

Of the 35 largest ports located along the East Coast, three of these ports are located in Virginia: Hampton Roads, Hopewell and Richmond. With a 50-ft main channel depth, 4 cargo terminals, 18 berths, a Ro-Ro berth, and several post-Panamax cranes, access to several interstate systems and railways, as well as an initiative to use more environmentally-friendly equipment, the Port of Virginia (which is comprised of the three marine terminals in the Hampton Roads area) is well-positioned to provide a link within OCS wind supply chain (Rondof, 2009; ERG, 2010). For HRG surveys and bottom sampling, Virginia has nine smaller ports including several located within the Hampton Roads area that may be used (World Port Source, 2011).

Conclusion

Existing ports or industrial areas are expected to be used, and expansion of these existing facilities is not anticipated to support Alternative A. No significant impact on land use or coastal infrastructure is expected.

4.1.3.6 Commercial and Recreational Fishing Activities

4.1.3.6.1 Description of the Affected Environment

The area encompassed by the Mid-Atlantic WEAs is used actively for both commercial and recreational fishing. The following section discusses these activities in the context proposed action in the WEAs. An overview of commercial and recreational fishing for the entire Atlantic region is discussed in Chapters 4.2.23.1 and 4.2.23.2 of the Programmatic EIS, respectively. Section 4.1.2.7 of this EA discusses fish and fish habitat present in the Mid-Atlantic WEAs. More information regarding fish habitat can be found at on the NMFS website (http://www.nero.noaa.gov/hcd/) and information on mid-Atlantic fishery management plans can be found on the Mid-Atlantic Fishery Management Council website (http://www.mafmc.org/).

Recreational Fishing

The Mid-Atlantic region boasts an active recreational fishing sector in coastal waters and in waters over the WEAs. Between 2008 and 2010, New Jersey, Delaware, Maryland, and Virginia averaged 550,000, 24,000, 67,500, and 54,250 recreational fishing trips in Federal waters respectively (USDOC, NOAA, NMFS, Office of Science and Technology, 2011). The top recreational fish species by weight in the Mid-Atlantic for the same time period were bluefish, black sea bass, Atlantic striped bass, and dolphin (USDOC, NOAA, NMFS Office of Science and Technology, 2011). Figures 4.3 and 4.4 below show recreational fishing effort density in and around the Mid-Atlantic WEAs; using NMFS vessel trip report data for chartered fishing vessels and recreational fishing party vessels. The data is a sum of the total days fished for the calendar year period 2004 – 2008. Spatial angling data from private fishing vessels is not available.

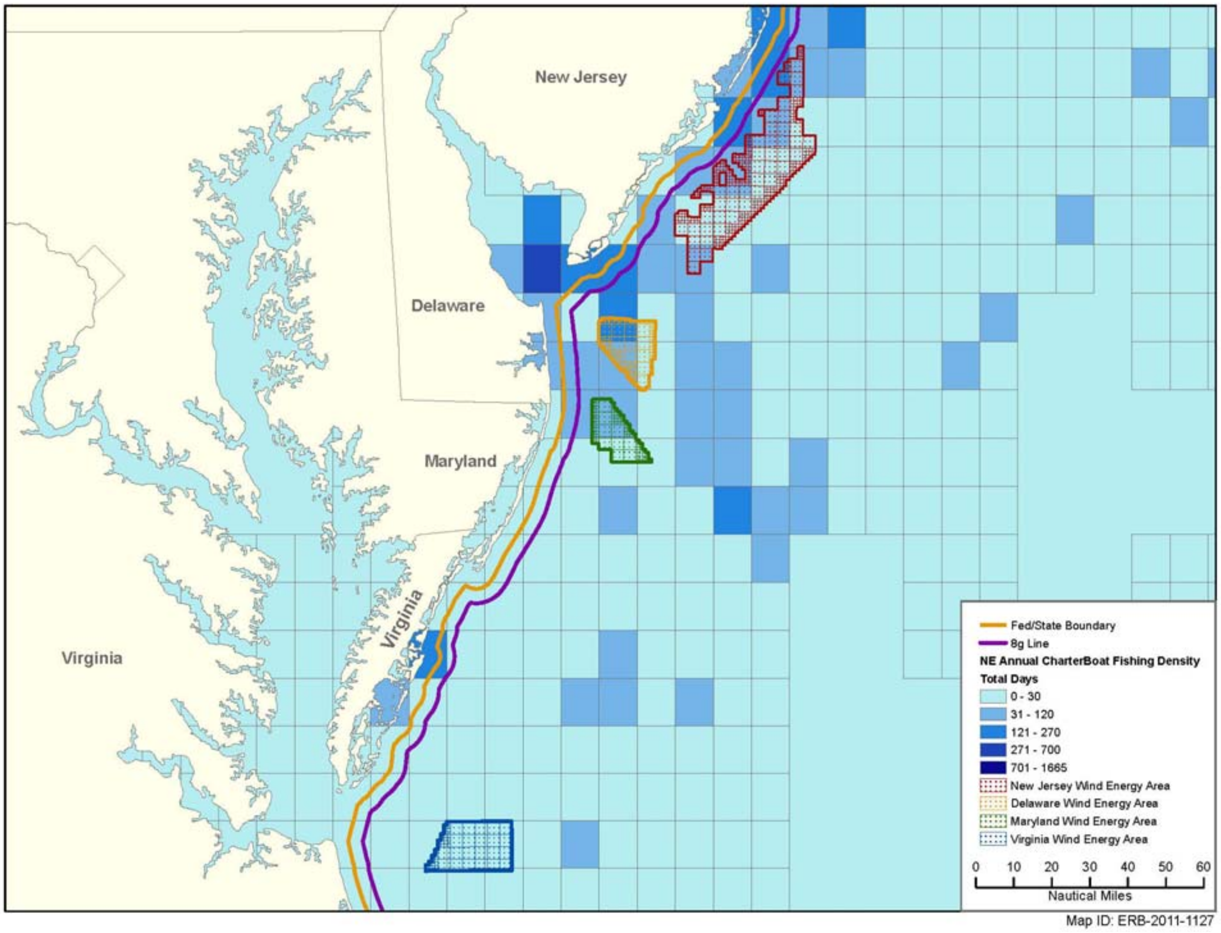

Figure 4.2. Recreational charter boat fishing effort 2004-2008.

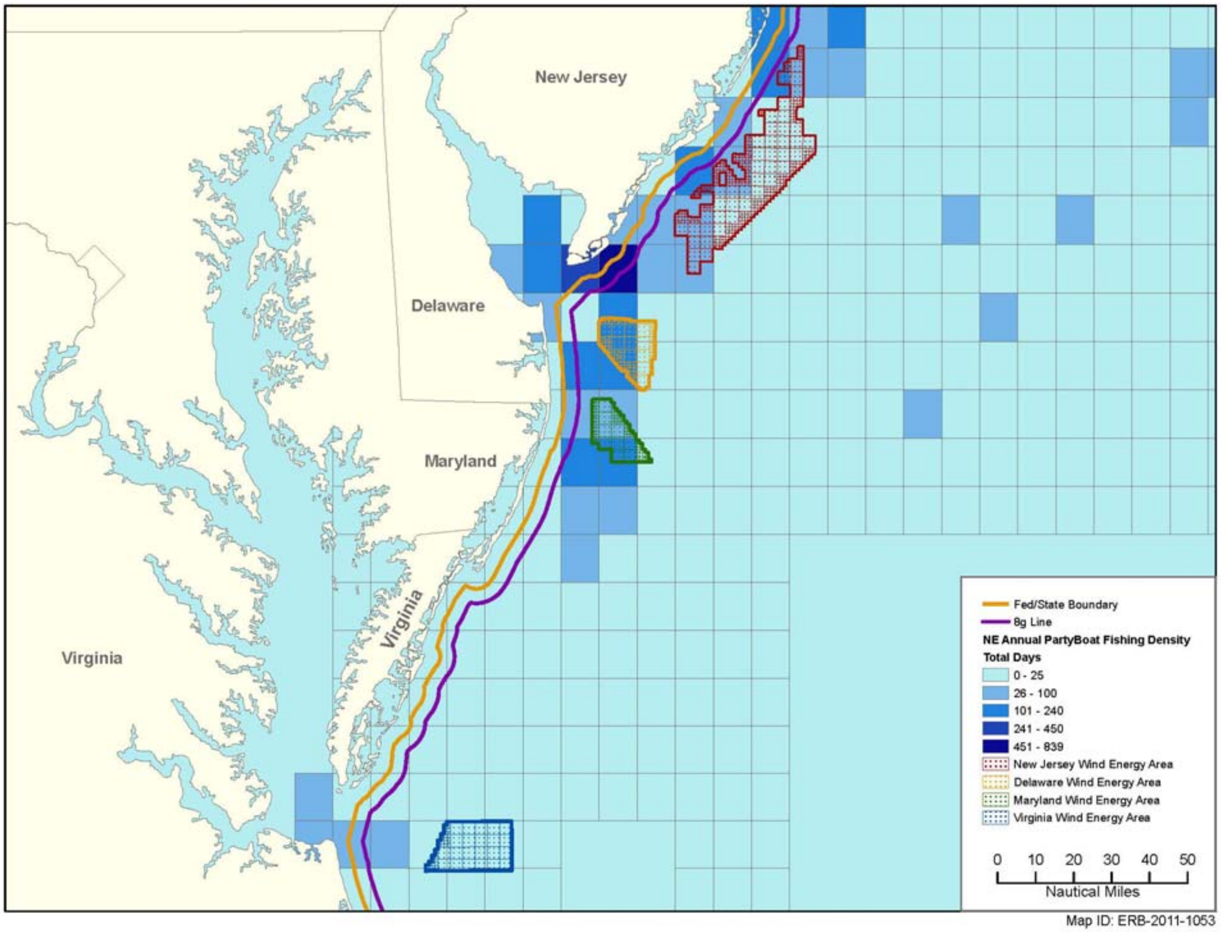

Figure 4.3. Recreational party boat fishing effort 2004-2008.

Commercial Fishing

The most important species by dollar value present in and around the Mid-Atlantic WEAs are sea scallops, surfclams, ocean quahogs, menhaden, striped bass, and blue crab (USDOC, NOAA, NMFS, Office of Science and Technology, 2011). The total landed commercial fishery weight and value for each state in 2009 is presented in Table 4.13. However, it should be noted that that state of landing may not reflect the area from which the fishery is prosecuted. For instance, Federal regulations prohibit striped bass fishing beyond 3 miles from shore (50 CFR 697.7(b)), blue crab is primarily an estuarine species, and ocean quahogs are generally harvested in deeper and/or colder waters than those directly adjacent to New Jersey where they are landed. Figure 4.4 shows commercial fishing effort for all gear types in the Mid-Atlantic WEAs. The data is a sum of the total days fished from NMFS' vessel trip reports in each 10 minute (approximately 10 nm) square block for the calendar year period, 2004 – 2008.

Table 4.13

Total Commercial Fishery Landed Weight and Value in 2009

State	Metric Tons	Pounds	$
Delaware	2,272.60	5,010,175	7,535,780
New Jersey	73,300.80	161,598,836	149,032,131
Maryland	30,986.60	68,312,955	76,057,117
Virginia	193,346.80	426,252,313	152,729,830
Total	299,906.80	661,174,279.00	385,354,858.00

Source: USDOC, NOAA, NMFS, Office of Science and Technology, 2011.

Fishing Ports

The Mid-Atlantic is home to some of the top national commercial fishing ports by value and landed weight. Table 4.14 shows the National ranking top ports by value adjacent to the Mid-Atlantic WEAs.

Table 4.14

Top Ports by National Value Rank Adjacent to WEAs

Rank	Port(s)	State	Millions of Pounds	Millions of Dollars
5	Cape May-Wildwood	NJ	63.9	73.4
6	Hampton Roads Area	VA	18	68.1
34	Reedville	VA	349.4	25.9
39	Point Pleasant	NJ	18.4	20.2

Source: USDOC, NOAA, NMFS, Office of Science and Technology, 2011.

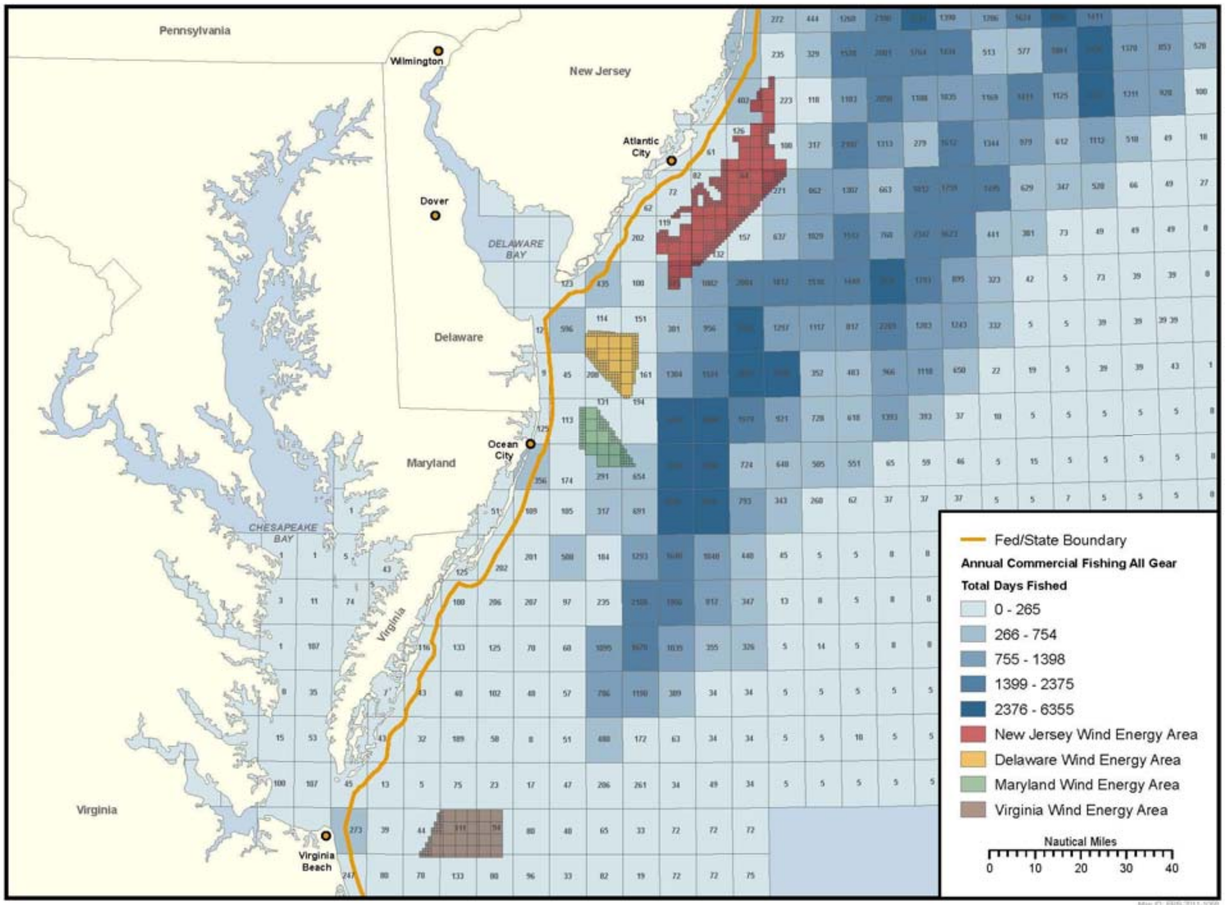

Figure 4.4. Annual Commercial Fishing – All Gear.

4.1.3.6.2 Impact Analysis of Alternative A

The following section discusses the reasonably foreseeable impacts associated with Alternative A on commercial and recreational fishing activities in the Mid-Atlantic WEAs. Alternative A has two primary activities that could impact commercial and recreational fishing activities. These activities are: Routine activities (e.g., deployment and operation of a meteorological buoy or construction of a meteorological tower, and vessel traffic from surveys); and non-routine activities (e.g., allision with structures and accidental fuel discharge). The potential effects to commercial and recreational fishing activities can be grouped into two broad categories: (1) displacement; and (2) target species availability. Chapter 5.2.23.2 of the Programmatic EIS discusses impacts of typical site characterization and assessment activities on commercial and recreational species, while Section 4.1.2.7.2 of this EA discusses impacts specific to Alternative A on fish species and their habitat.

Routine Activities

Fishing Displacement

During site characterization and the installation of meteorological buoys and towers, fishing vessels (primarily recreational party and recreational charter vessels) could be excluded from fishing grounds for short durations in order to avoid conflicts with survey vessels and/or construction vessels. It is anticipated that during installation and decommissioning of a meteorological tower or buoy, a radius of about 1,500 ft around the site would be needed for the movement and anchoring of support vessels. It is estimated to take 1 to 3 days to install a meteorological buoy and 1 to 10 weeks to install a meteorological tower (*see* Section 3.1.3 regarding meteorological tower construction scenario). Displacement during site characterization surveys is estimated to be on the order of hours versus days. Site characterization surveys, and construction and decommissioning activities would likely occur during spring and summer months, which overlaps with both recreational and commercial fishing seasons (*see* Section 3.1.2 regarding site characterization scenario).

Sections 3.1.3.1 and 3.1.3.2 describe Alternative A and the estimated footprint of a meteorological tower and buoy. The area of ocean bottom affected by a meteorological tower or buoy would range from about two hundred square ft if supported by a monopole to a couple thousand square ft if supported by a jacket foundation. Fishing activities would be precluded from the footprint of the meteorological observation platform. However, it is not anticipated that recreational and commercial fishing activities would be precluded from the immediate area outside the footprint. Since there is no electricity transmitted from met observation platforms, there are no electrical cables connecting the structures to shore or to other structures. It is likely that tying up to the structure by a vessel would be prohibited by the project developer as it is private property. If a vessel were to tie up to a meteorological buoy it could result in: (1) the movement of the buoy from its mooring location, resulting in further benthic impacts; (2) loss of some of the data if measuring or transmitting devices are damaged. Additionally, unauthorized tie-ups to buoys or towers could result in harm to the vessel and its occupants if it becomes damaged through hard impacts with the structure. The temporary displacement from project-related vessel traffic avoidance and construction activity is not anticipated to result in any measurable economic loss due to decreased fish catches or from reduced access to fishery resources.

It is very unlikely that activities associated with Alternative A would affect commercial fishing, as the majority of commercial fishing effort is outside the WEAs (*see* Figure 4.4). Although commercial fishing vessels could transit the WEAs, it is unlikely that survey activities or construction activities (projected to temporarily occupy less than one percent of the WEAs) would unreasonably interfere with access to the active fisheries beyond the WEAs.

Any of the anticipated meteorological towers would be removed to at least 5 m (15 ft) below the mudline to ensure that nothing would be exposed that could interfere with future lessees and other activities in the area (30 CFR 585.910). Once the meteorological towers are removed, the proposed sites would pose no obstacle to commercial or recreational fishing.

There are numerous port and marina locations shoreward of the Mid-Atlantic WEAs that may be utilized by commercial fishing vessels, recreational vessels, and project vessels. The projected number of vessel trips at any of these ports or marinas would be negligible (*see* Sections 3.1.2.6 and 3.1.3.4 of this EA).

Disturbances to Fish Resources

Fish resources could be temporarily affected by acoustic surveys associated with site characterization activities and by pile-driving activities associated with the installation of meteorological towers. The most substantial would be the acute acoustics associated with pile driving. It is anticipated that any fish in the immediate area of pile driving would flee upon commencement of activities. Moreover, soft-start pile driving is industry practice, and would likely be required by NMFS to ensure that marine mammals are not affected by the activity. However, if fish do not flee the area during the soft start pile driving procedure there could be limited mortality. Also during platform installation there would be increased turbidity resulting in temporary habitat loss. Post construction, it is expected that there would be both positive and negative impacts to fish habitat which would be negated in any case after decommissioning (*see* Sections 4.1.2.2 and 4.1.2.7 for a full discussion of benthic habitat and fish impacts, respectively). These impacts are not expected to have population-levels effect that would impact fisheries and the availability of fish to catch within or between fishing seasons.

Non-Routine Events

The potential impacts of non-routine events on water quality are discussed in Section 4.1.1.1.2 of this EA. During the various phases of Alternative A, multiple sources of diesel fuel would be present in vessels, generators, and pile driving hammers. Spills could occur during refueling or as the result of a collision. These would disperse, evaporate and biodegrade within a few days (*see* Section 3.2.3 of this EA). From 2000 – 2009, the average spill size for vessels other than tank ships and tank barges were 88.6 gallons (U.S. Department of Homeland Security, USCG, 2011), and, should Alternative A result in a spill in any given area, BOEM anticipates that the average volume would be the same. If such a diesel spill were to occur, it would be expected to dissipate very rapidly, and would evaporate and biodegrade within a few days, resulting in negligible impact.

Conclusion

The increase in vessel traffic, and activities related to the installation/operation of the meteorological towers and buoys would not measurably impact commercial or recreational fishing activities, total catch of fish and shellfish, or navigation over any substantial period of time. Any impacts, such as localized fishing displacement and/or target species availability within the immediate area of activities associated with Alternative A, would be of short duration, limited area, and temporary, and result in negligible, if detectible, impact to fishing.

Proposed Mitigation Measures

The following proposed mitigation measure is intended to reduce or eliminate the potential for adverse impacts to commercial and recreational fishing. This section proposes that this mitigation measure be incorporated into any future decision to issue a lease or approve a SAP:

Notification of Fishermen: To reduce potential economic impacts on commercial fishermen, lessees would be required to notify fishermen of construction and decommissioning activities via the USCG Local Notice to Mariners and daily broadcasts on Marine Channel 16. The notification would allow commercial and recreational fishermen to plan fishing trips to avoid the area where the activity would be taking place. This measure would save both time, fuel, and reduce the potential of any site use conflicts.

4.1.3.7 Other Uses of the OCS

4.1.3.7.1 Description of the Affected Environment

The vessel traffic and structures associated with Alternative A could pose a conflict with other existing and future uses of the OCS, including military activities, NASA activities, marine transportation, radar, other renewable energy activities, and the Marine Minerals Program (MMP). These activities are discussed below. Commercial and recreational fishing and recreational boating are discussed in Sections 4.1.3.6 and 4.1.3.2 of this EA, respectively.

Military Activities

Chapter 4.2.16 of the Programmatic EIS discusses the numerous military use areas off the Atlantic Coast where the U.S. Navy, Marine Corps, Air Force, and Special Operations Forces conduct various testing, training and operational missions. The WEAs are located in naval operating areas (OPAREAs), which are offshore areas where the Navy conducts training exercises, military warning areas and restricted areas. Navy fleet and Marine Corps amphibious warfare training occurs nearly every day all along the east coast in these areas, as well as open ocean areas (USDOI, MMS, 2007a). The level of activity varies from unit-level training to full-scale Carrier/Expeditionary Strike Group pre-deployment certification exercises. Military aircraft test and train within special use airspace overlying the coast and in offshore warning areas (USDOI, MMS, 2007a). The U.S. Navy, USCG, Air Force and Air National Guard are responsible for various search and rescue missions that may be conducted anywhere on the Atlantic coast, including the areas in and near the WEAs. This may include the use of low flying aircraft and helicopters offshore.

The Atlantic City OPAREA is an area used for surface, sub-surface and air warfare training exercises located off the coast of New Jersey (Global Security, 2011). Approximately 40 OCS blocks in the New Jersey WEA are located in Warning Area 107A (W-107A) and roughly 1 ½ OCS blocks are located in Warning Area 107C (W-107C). The W-107A and W-107C areas are designated special use airspace over the Atlantic City OPAREA and are used for surface-to-air gunnery exercises using conventional ordnance and exercises (Global Security, 2011). The Virginia Capes OPAREA (VACAPES) is located off the Delaware, Maryland, Virginia and North Carolina coasts (*see* Figure 4.5 of this EA). The north boundary of the VACAPES OPAREA is located 37 nm off the entrance to Delaware Bay at latitude 38º45’ N, the farthest eastern boundary is 184 nm east of Chesapeake Bay at longitude 72º41’ W, and the western boundary lies approximately 3nm off the coastline (Dept of Navy, 2008). The entire Delaware and Maryland WEAs, and approximately half of the Virginia WEA are located within the VACAPES OPAREA. Additionally, roughly half of the Delaware WEA and the entire Maryland WEA are located in Warning Area 386 (W-386). The W-386 air, surface, and sub-surface areas are utilized extensively to conduct air-to-air, air-to-surface, surface-to-air, and surface-to-surface missile exercises, gunnery exercises, and rocket exercises using conventional ordnance. Additional naval activities include supersonic flight operations, mine warfare training, and laser operations. When W-386 airspace is not in use for military activities it may be released to the FAA (U.S. Department of the Navy, 2008). The Virginia WEA also includes part of the W-387 surface transit corridor.

NASA Activities and Wallops Flight Facility

NASA Goddard Space Flight Center's Wallops Flight Facility (WFF) is located on Virginia's Eastern Shore between the Virginia and Maryland WEAs (*see* Figure 4.5 of this EA). Portions of the Maryland WEA are located within the range of a U.S. Navy radar facility located at WFF and used to track launch and flight activities conducted by NASA and its partners. The radar may be used to track air-to-air, air-to-surface, surface-to-air, and surface-to-surface missile exercises, gunnery exercises, aircraft flights and rocket launches. When the Wallops Island radar is not in use for range support activities it may be released to the FAA (U.S. Department of the Navy, 2008).

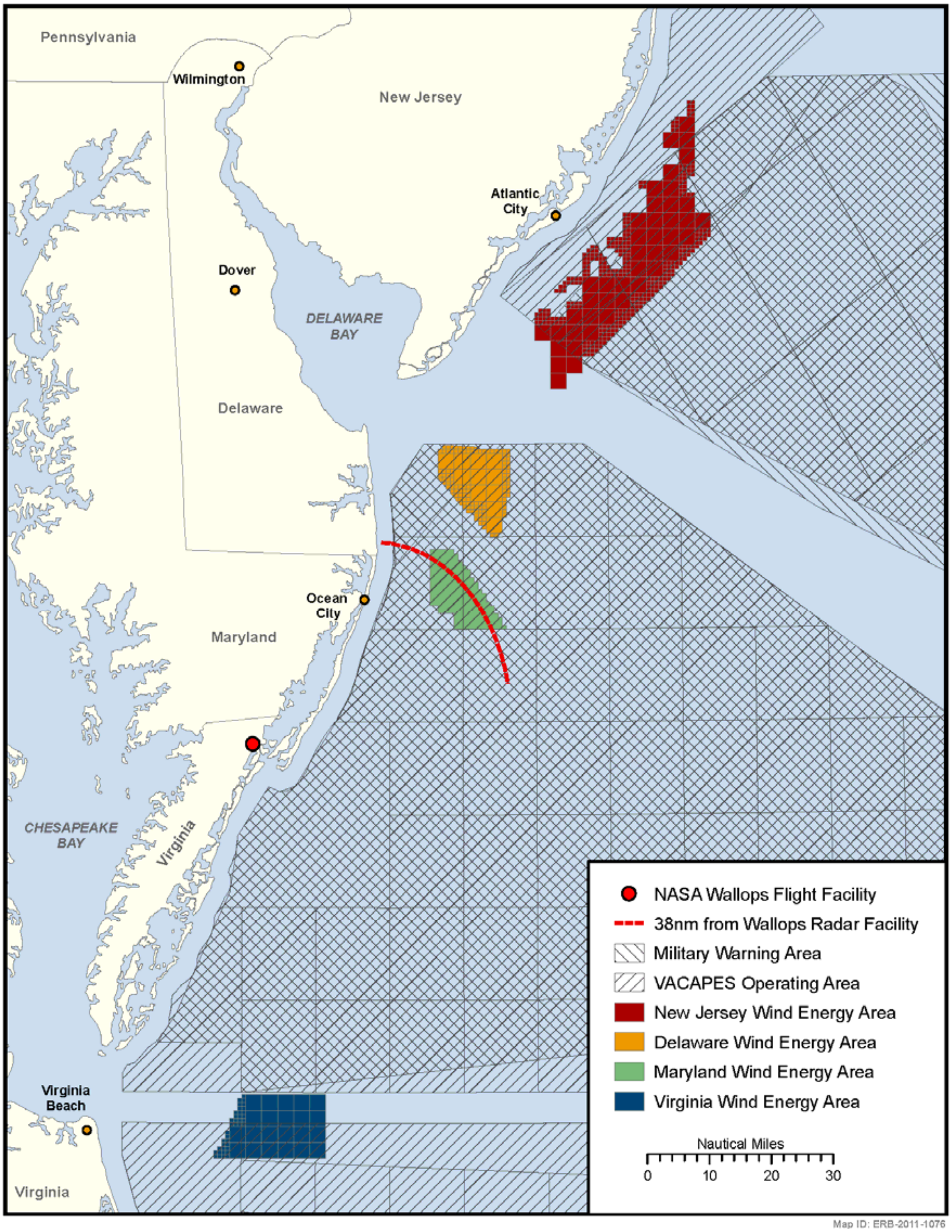

Figure 4.5. Military Activity Areas and Uses.

Marine Transportation

The general description of vessel traffic along the North Atlantic coast is incorporated here by reference and can be found in Chapter 4.2.17 of the Programmatic EIS (USDOI, MMS, 2007a). There are many major ports in the vicinity of the WEAs (*see* Section 4.1.3.5, Land Use and Coastal Ports Infrastructure of this EA). Vessels using these ports include military, commercial, recreational, and research vessels. Additionally, offshore waterways or shipping lanes are often not designated on navigational charts; and instead vessels follow routes determined by their destination, depth requirements, and weather conditions (Dept of Navy, 2008). Section 4.1.3.6 of this EA has information on recreational and commercial fishing vessel activity.

Shipping densities and vessel types vary along the Atlantic seaboard, with the highest vessel density levels associated with access routes to the major Atlantic ports. Commercial vessel traffic typically concentrates at the entrances of large bays, such as the Chesapeake and Delaware Bays. These two bays provide access to several major U.S. east coast ports, including Baltimore, Maryland; Philadelphia, Pennsylvania; Wilmington, Delaware; and the Hampton Roads area of Virginia. The Virginia WEA, near the entrance to Chesapeake Bay, has higher shipping densities and greater concentrations of commercial vessel traffic than the New Jersey WEA. Additionally, the Delaware and Maryland WEAs, adjacent to the entrance of Delaware Bay, also have similarly higher levels of shipping density and traffic concentrations than the New Jersey WEA (*see* Figure 4.6).

To facilitate organized, safe access to major ports, a non-mandatory TSS has been defined by the USCG near the mouths of both the Chesapeake and Delaware Bays. Commercial shipping in the area of major ports and bays is managed by TSSs and precautionary areas designated by 33 CFR 167 (*see* Figure 4.6). While not mandatory, insurance and ship owner requirements often mandate the use of TSS routes, due to collision avoidance and other safety issues (U.S. Department of Homeland Security, USCG, personal communication, 2011).

The Delaware Bay TSS consists of two approaches (SE and NE), a two-way traffic route, and a precautionary area located shoreward of the approaches (*see* Figure 2). Each approach consists of an inbound and outbound lane, the exact coordinates of which are defined in 33 CFR 167.170 – 167.172. A two-way traffic route is located along the north side of the TSS and is recommended by the USCG for use by tug and tow traffic entering or leaving the bay (33 CFR 167.173). A precautionary area is located on the shoreward side of the TSS (Dept of Navy, 2008). None of the Mid-Atlantic WEAs overlap with an existing TSS (*see* Figure 4.6).

The Maryland WEA is located at its nearest point approximately 1 nm from the southern approach (SE) TSS to Delaware Bay. The Delaware WEA is located adjacent to both TSS approaches (SE and NE), to Delaware Bay. At the nearest point, the Delaware WEA is 500 m from the TSS boundary line for the SE and NE approaches. *See* Figure 4.6.

The Virginia WEA is located approximately 10 nm seaward of the Chesapeake Bay TSS. *See* Figure 4.6. The Chesapeake Bay TSS consists of two approaches (southern and eastern) and a two-mile radius precautionary area located shoreward of the approaches. The southern approach also consists of an inbound and outbound lane; however, between the lanes is a deep-water route to be used by ships both inbound and outbound with drafts 42 ft. or greater in freshwater, and for naval aircraft carriers. Ships drawing less than 42 ft. may use the deep-water route when, in their master's judgment, the effect of ship characteristics, its speed and prevailing environment conditions may cause the draft of the ship to exceed or equal 42 feet (*see* Figure 4.6; International Maritime Organization (IMO) *ships' Routeing Guide, 2010* edition). The eastern approach has an inbound and an outbound lane, the exact coordinates of which are defined in 33 CFR 167.200 – 167.203, with a no-transit area between each lane designated to keep the opposing traffic lanes separate. Ships frequently anchor in the vicinity of TSSs, in unofficial anchorage areas, while waiting to go to port. This occurs particularly offshore of

Delaware Bay (U.S. Department of Homeland Security, USCG, personal communication, 2008). Authority to create official anchorage grounds in the territorial sea, out to 12 nm, was received by the USCG under the Coast Guard Authorization Act of 2010 (P.L. 111-281; U.S. Department of Homeland Security, USCG, personal communication, 2011). In June 2010 the USCG notified BOEM of its intention to establish an anchorage ground east of and adjacent to the SE approach to Delaware Bay (*see* Figure 2.1) (U.S. Department of Homeland Security, USCG, 2011). As discussed in Chapter 1 of this EA, this area has been removed from the Delaware WEA. There are currently no proposed anchorage areas in the vicinity of the Virginia WEA.

Maritime commercial shipping vessel traffic is an important component of United States commerce, and both the Delaware and Chesapeake Bays experience large amounts of maritime vessel traffic annually. In 2010, the top ten U.S. ports accounted for 58% of all oceangoing vessel calls; three of those ports are accessed through the Delaware and Chesapeake Bays. According to the U.S. Department of Transportation Maritime Administration, 7,559 oceangoing vessels made 62,747 calls at U.S. ports in 2010 (USDOT, MARAD, 2011a). Of these calls, 35% were by tankers, 31% were by containerships, 17% were by dry bulk vessels, 9% were by roll on – roll off vessels carrying vehicles for import and export, and 6% were by general cargo ships (USDOT, MARAD, 2011a). The Virginia Ports, VA, which includes all Hampton Roads area ports (e.g., Norfolk, Newport News, and Portsmouth), is ranked the third largest port in the U.S. for both dry bulk and container vessel calls; Philadelphia, PA is the sixth largest port for tanker calls; and Baltimore, Maryland is the nation's largest port for roll on – roll off vessel calls. Currently, the Virginia Ports is the fifth busiest port in the U.S with 3,021 vessel calls; and Philadelphia, Pennsylvania and Baltimore, Maryland are ranked ninth and tenth with 2,022 and 2,011 vessel calls each, respectively (USDOT, MARAD, 2011a).

The United States freight tonnage of all types, including exports, imports, and domestic shipments, is expected to grow 73% by 2035 from 2008 levels (USDOT, MARAD, 2011b). Traffic density and commercial vessel sizes are also expected to increase in the future to reflect this estimated increase in shipments. Completion of the Panama Canal widening project in 2014 will double the Canal's tonnage volume by 2025 and allow larger vessels access to the east coast ports of the United States (Panama Canal Authority, 2006). Additionally, the establishment of the U.S. Maritime Administration America's Marine Highway program in 2008 created a program to transfer commercial transportation from land routes to coastal waterways in an effort to reduce greenhouse gases and traffic congestion along the east coast (USDOT, MARAD, 2011b). In August, 2010 the Secretary of Transportation identified a Marine Highway Corridor extending from Miami, Florida to Portland, Maine (USDOT, MARAD, 2011b).

Increased vessel traffic associated with site characterization surveys, and the construction, operation, and decommissioning of meteorological towers/buoys could occur simultaneously, and possibly overlap, with these projected increases in current vessel traffic levels from both the widening of the Panama Canal and the designation of the M-95 Marine Highway Corridor.

Offshore waterways or shipping lanes are often not designated on navigational charts; instead vessels follow routes determined by their destination, depth requirements, and weather conditions (Dept of Navy, 2008). Commercial shipping traffic is often located outside USCG recommended routes and traffic schemes out in the open sea (U.S. Department of Navy, 2008). BOEM and the USCG jointly identified heavily used marine vessel traffic routes (*see* Figures 4.7(a), (b) and(c)) from known vessel routing measures and analysis of existing Automatic Information System (AIS) data for the Mid-Atlantic WEAs, concentrating on areas near the entrances to the Chesapeake and Delaware Bays. AIS is a maritime safety communications system standardized by the International Telecommunications Union and adopted by the International Maritime Organization (IMO) that provides vessel information, including, type, position, course, speed and other safety-related information authomatically to appropriately equipped shore stations, other ships, and aircraft (U.S Department of Homeland Security, USCG, Navigation Center, 2011). It is required equipment on all vessels greater than 300 gross tons. Since AIA transponders are not required on vessels < 300 gross tons, its usefulness in analysis is limited and reflects only a portion of total vessel traffic. These areas are identified in Figures 4.7(a) and (c).

Additionally, tug and towboat routes are also often not designated on navigational charts; instead tug/ towboats follow routes determined by their destination, depth requirements, and weather. These vessels are smaller than commercial shipping vessel traffic, slower than commercial vessels when towing, and often avoid areas with larger vessels for safety and navigational reasons. Unofficial tug/towboat routes were identified through discussions between BOEM and maritime stakeholders at the following meetings: Baltimore Harbor Safety and Coordination Committee meeting December 8, 2010; Mariners' Advisory Committee for the Bay and River Delaware (MAC) meeting December 9, 2010; MAC Wind Energy Working Group meeting April 27, 2011; and the Virginia Maritime Stakeholder meeting June 10, 2011. In addition, public comments received in response to the Maryland Request for Interest (November, 2010); the Delaware Call for Information (June, 2010) in the *Federal Register*; and the NOI for this EA in the *Federal Register* (February, 2011) provided information on traditional vessel usage of tug/towboat routes along the Mid-Atlantic coastline that confirmed the locations of unofficial routes previously identified in meetings between BOEM and maritime stakeholders (*see* Figures 1.2, 1.3, 2.1, and 2.3). An unofficial but heavily used tug/towboat route exists along the Mid-Atlantic coast connecting New York to Norfolk, Virginia near the coastline and adjacent to all four WEAs. This route is used to reduce vessel congestion along other navigation routes, and reduce fuel consumption, air emissions and journey time (AWO, 2010). The American Waterways Operators (AWO), a national trade association for the tugboat, towboat, and barge industry, identified two important unofficial heavily used tug/towboat routes occur near the Virginia WEA: (1) a route 6 – 8 nm offshore Virginia used by tugs/towboats when approaching or exiting the Chesapeake Bay; and (2) another route 35 nm off the Virginia shore near the Chesapeake Bay for traffic operating north and south bound connecting ports of New York to ports of Florida (AWO (b), 2011). Traffic using these routes often must alter course in periods of adverse weather or rough seas that could conflict with Alternative A. The Virginia WEA is located as near as ~10nm and as far as ~40 nm offshore Chesapeake Bay and is close to these unofficial tug/towboat routes. Another unofficial tug/towboat route exists through a portion of the Maryland WEA bisecting at roughly a 45-degree angle from the SW corner towards the NE side (Broadley, 2010).

The USCG anticipates providing BOEM with additional navigational safety recommendations upon completion of the Atlantic Coast Port Access Route Study (ACPARS) in May 2012. The goal of the ACPARS (*see* 76 FR 27788 (May 11, 2011)) is to enhance navigational safety by examining existing shipping routes and waterway uses, and, to the extent practicable, reconcile the paramount right of navigation within designated port access routes with other reasonable waterway uses, such as the leasing of OCS blocks for construction and operation of offshore renewable energy facilities. The ACPARS will focus on the coastwise shipping routes and near coastal users between Western Atlantic coastal ports, approaches to coastal ports, and future uses of those ports (including impacts of the widening of the Panama

Canal in 2012). The ACPARS will include analysis of current vessel traffic density, fishing vessel information, and agency and stakeholder experience in vessel traffic management, navigation, ship handling, and effects of weather. The data gathered during the ACPARS may result in the establishment of new vessel routing measures, modification of existing routing measures, or disestablishment of some existing routing measures of the Atlantic coast from Maine to Florida. More specifically, the ACPARS study results may recommend that the USCG modify the existing TSSs, create one or more precautionary areas, and/or identify area(s) to be avoided.

Radar

There are numerous military and civilian radar systems that provide radar coverage along the U.S. coastline. Radar can experience signal interference from tower-like structures and the radar's ability can be degraded by this interference; meteorological towers could affect nearby radar usage and abilities. BOEM consulted with the FAA on Alternative A of this EA. On April 22, 2011 the FAA responded that interference would be negligible from meteorological towers to radar systems unless the towers are situated within a quarter mile of active radar, which is not anticipated (Edgett-Baron, personal communication, 2011).

Other Renewable Energy Projects

There are other reasonably foreseeable renewable energy activities offshore the Mid-Atlantic coast that could occur in the same timeframe as Alternative A in both state waters and on the OCS. Figure 4.6 denotes the locations of these proposed projects.

State Waters

In state waters, the USACE is currently reviewing an application for a proposed project to install six wind turbine generators approximately 2.8 miles east of Atlantic City, New Jersey (ACOE, 2010).

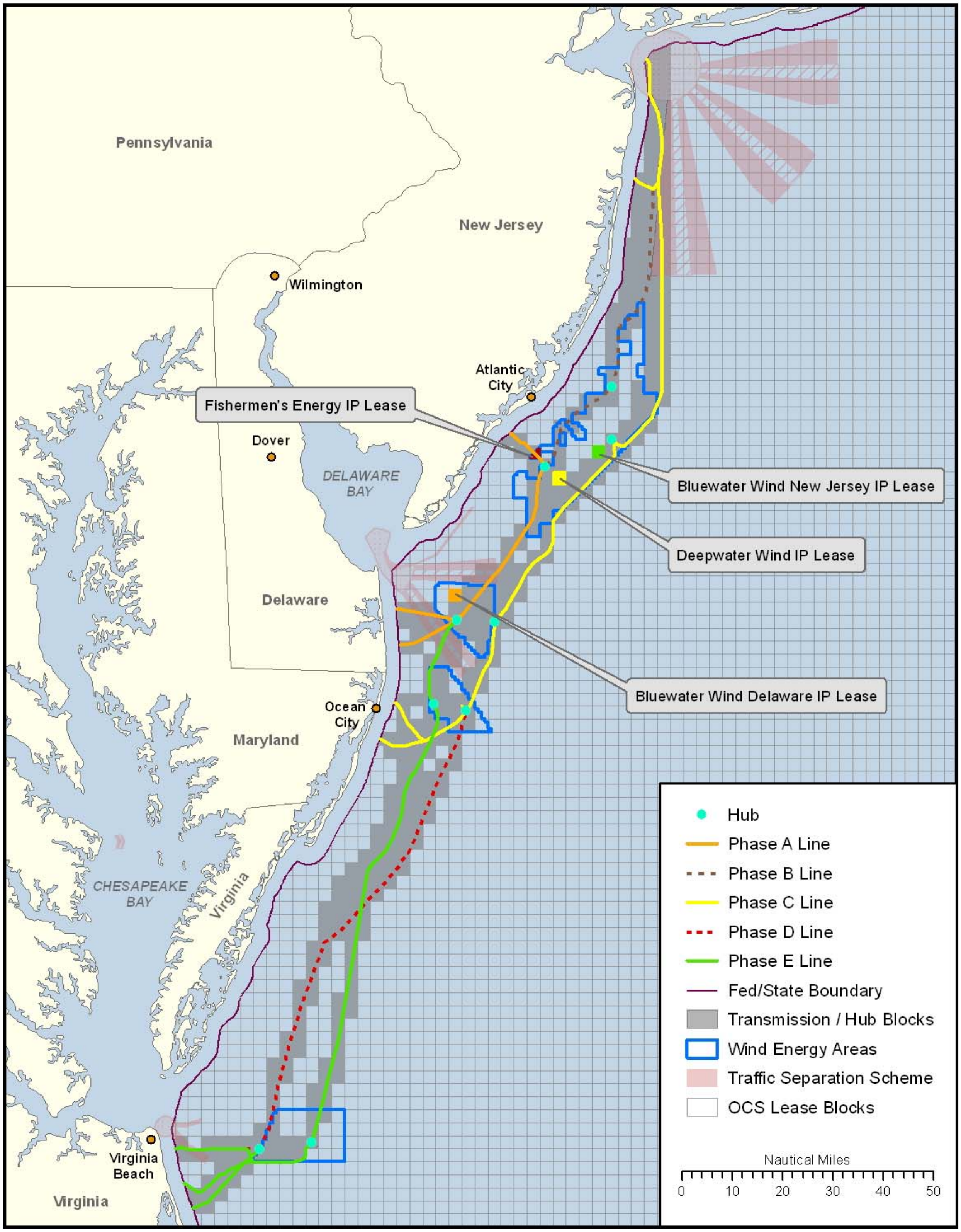

Figure 4.6. Interim Policy leases, traffic separation schemes and the proposed Atlantic Wind Connect project.

Interim Policy Leases on the OCS

BOEM issued four Interim Policy leases on the OCS offshore New Jersey and Delaware in November 2009 for wind resource data collection facilities (meteorological towers/buoys). Under these Interim Policy leases, the lessee has the right to install a meteorological tower or buoys for the purposes of assessing the wind and ocean resources on the lease. The environmental impacts associated with these leases were discussed in the Interim Policy EA. If the holder of an Interim Policy lease wishes to propose a commercial wind energy project, it must first acquire a commercial lease of an appropriate size (Interim Policy leases do not contemplate development, and are issued for single OCS blocks to support meteorological towers and buoys).

Three Interim Policy leases were issued offshore New Jersey in the following lease blocks: Wilmington NJ 18-02 Blocks 6931, 6836 and 7033. One Interim Policy lease was issued offshore Delaware in lease block Salisbury NJ 18-05 Block 6325. On July 11, 2011, Fishermen's Energy of New Jersey, LLC submitted their final project plan to BOEM for their Interim Lease on OCS block 6931 to begin meteorological and oceanographic data collection. BOEM is awaiting submittal of final meteorological tower/buoy project plans for the remaining three leases, and no construction has taken place at this point in time. Increased vessel traffic associated with construction and remaining survey activities for the four Interim Policy leases could occur simultaneously, and possibly overlap, with Alternative A.

Electrical Transmission Lines

In March 2011, BOEM received an unsolicited right-of-way (ROW) grant application from Atlantic Grid Holdings, LLC (AGH) for a subsea backbone transmission system (referred to as the Atlantic Wind Connection (AWC) project) in state waters and on the OCS offshore the states of New York, New Jersey, Delaware, Maryland and Virginia (*see* Figure 4.6). The purpose of the project is to transmit electricity generated by future offshore commercial wind facilities to onshore markets. The project would include nine offshore electrical converter platforms and 756 miles of cabling, with 650 miles on the OCS, 38 miles in state waters and 67 miles on shore (AGH, 2011). The project is proposed to be built in five distinct phases: the first phase would connect southern New Jersey and Delaware with up to 2,000 MW capacity; the second phase would connect southern New Jersey to the northern New Jersey/New York metropolitan area; the third phase would connect Maryland to New Jersey/New York metropolitan area; the fourth phase would connect Maryland to Virginia; and the final phase would connect Delaware to Virginia (AGH, 2011). The AGH estimates construction would occur over approximately 10 years and the entire system could be operational by 2021. This EA only considers increased vessel traffic associated with survey activities during site characterization for the potential cable route which could occur simultaneously, and possibly overlap, with Alternative A (*see* Section 4.6 of this EA).

Marine Minerals Program

Loss of sand from the Mid-Atlantic beaches, dunes and barrier islands is a serious problem that affects both the coastal environment and the economy. Rising sea levels due primarily to climate change are likely to accelerate beach erosion and coastal inundation, and will make storms and associated floods more intense, exacerbating erosion (NJ DEP, 2010). The artificial replacement of lost sand through renourishment cycles for beaches or coastal areas require quantities of sand that are not currently available from state sources. For example, it is estimated for the period 2014 to 2044 at least 7.6 million cubic meters of sand will be required to maintain Ocean City, Maryland beaches and new sand sources are needed outside state waters to meet increased demand (Maryland Geological Survey, 2011). Submerged shoals located offshore New Jersey, Maryland and Virginia between the WEAs and the shore have been identified as long-term sources of sand (sand burrow sites) for coastal erosion management (USDOI, MMS, 2007a); however, none of these sites are located within the boundaries of the WEAs. These offshore sites could provide compatible sand for immediate/emergency repair of beach and coastal damage from severe coastal storms (USDOI, MMS, 2007a) and are an environmentally preferred resource because they generally lie beyond the local wave base and the influence of the nearshore physical regime where long-term dredging can result in adverse changes to local wave climate and the beach (USDOI, MMS, 2007a).

4.1.3.7.2 Impact Analysis of Alternative A

Chapter 5.2.17 of the Programmatic EIS discusses the impacts that site characterization and assessment could have on marine traffic. The proposed leases would be located 7 or more miles from the nearest shoreline. Increased vessel traffic from survey activities and construction, operations and decommissioning of meteorological towers/buoys would increase vessel traffic within the WEAs and between the WEAs and shore. This increase in traffic could pose conflict with other uses of the OCS and associated activities. Therefore, site characterization surveys, and the construction, operation and decommissioning activities of meteorological towers/buoys occurring within the proposed lease areas have the potential to directly impact coastal and offshore vessel traffic and other uses of the OCS as discussed below. Non-routine activities could include collision between vessels, an allision between a vessel and a meteorological tower/buoy, and/or accidental spills of diesel or oil.

BOEM consulted with the DOD on Alternative A of this EA. On May 2, 2011, the DOD responded that the impact to the Navy's training areas and other DOD activities from site characterization surveys and installation, operation and decommissioning of meteorological towers/buoys offshore Delaware, New Jersey, Maryland, and Virginia could be mitigated given site specific stipulations in consultation with the DOD (Engle, personal communication, 2011). BOEM also consulted with NASA on Alternative A. On 21 April, 2011, NASA responded that the impact from Alternative A to the WFF facilities and other NASA activities from survey vessels and the installation, operation and decommissioning of meteorological towers/buoys offshore Maryland and Virginia would be negligible (Mitchell, personal communication, 2011).

Routine Activities

Vessel Traffic

Direct impacts from routine activities may occur as a result of increased vessel traffic in support of Alternative A. It is anticipated that additional vessel activity would occur during site characterization surveys (*see* Sections 3.1.1 and 3.1.2 this EA) and during the period that meteorological tower/buoy construction, operations, and decommissioning take place (*see* Section 3.1.3.4 of this EA). This additional vessel activity would likely occur within the WEAs, between the WEAs and shore, and in harbor and coastal areas. It is reasonably foreseeable that some vessel trips would occur through or near heavily trafficked areas, such as the entrances to the Delaware and Chesapeake Bays. These heavily trafficked areas are already expecting additional increases in traffic density and the addition of larger classes of commercial vessels associated with the completion of the Panama Canal widening in 2014 and identification of a Marine Highway Corridor extending from Miami, Florida to Portland, Maine) during the time period of Alternative A. Tug/towboat traffic associated with the marine highway corridor may occur within the WEAs and has the potential to overlap, or occur simultaneously with the vessel traffic associated with Alternative A.

Because the additional vessel activity associated with Alternative A is anticipated to be relatively small (*see* Sections 3.1.1, 3.1.2 and 3.1.3 of this EA) when compared with existing and projected future vessel traffic in the area, it is not reasonably foreseeable that the number of vessels transiting the WEAs for these activities would significantly increase vessel density levels or alter known shipping patterns.

Meteorological Towers and Buoys

The New Jersey, Delaware, Maryland and Virginia WEAs located in areas of higher vessel traffic densities where large commercial shipping vessels often transit (*see* Figure 4.7(a-c)). Although the WEA are not located within designated TSSs, meteorological towers/buoys may still pose an obstruction to navigation if placed in areas with high vessel traffic. Placement of meteorological tower/buoys in an area that did not have a stationary object prior could pose a hazard to navigation and possibly increase the likelihood of a collision or allision between a vessel and a meteorological tower/buoy or between vessels attempting to avoid a meteorological tower/buoy. The Maryland WEA is within roughly 1 nm of the heavily trafficked entrance to the Delaware SE TSS. The placement of any meteorological tower within a TSS is prohibited (*see* 33 U.S.C. Section 1223). BOEM assumes for Alternative A that lessees would comply with USCG required marking, lighting, and avoid placement of a meteorological tower/buoy within a TSS or any of the highly trafficked areas identified in the WEAs (*see* Figure 4.7(a-c)). Any placement of meteorological towers/buoys would have USCG-required marking and lighting. BOEM also assumes that any meteorological tower or buoy installed on the OCS would also be considered a Private Aid to Navigation, which are regulated by the USCG under 33 CFR Part 66. A Private Aid to Navigation is a buoy, light or day beacon owned and maintained by any individual or organization other than the USCG. These aids are designed to allow individuals or organizations to mark privately owned marine obstructions or other similar hazards to navigation.

BOEM assumes that lessees would also follow previous USCG recommendations for marking and lighting of meteorological towers and buoys including:

- Lessees would operate any visual, audible and electronic aids to navigation (such as lights, fog signal, radar beacon (RACON)) with sufficient backup power and redundancy to assure a minimum availability rate of 99.7%;
- For a meteorological tower, two lights should be installed, 180-degrees apart, at an elevation specified by the USCG at mean high water, each with an operational range of 3 nm, 90% of the nights;
- Any navigation lights located on a meteorological tower or buoy should be seen in a 360-degress arc, display a quick red characteristic and flash synchronously;
- If a structural component prevents an uninterrupted arch of visibility, then two or more lights could be installed at an elevation specified by the USCG at mean high water, each with an operational range of 3 nm, 90% of the nights. The lights would display slow flashing amber light and should flash synchronously;

- If required, a fog signal should have a range of 0.5 nm and activate whenever the visibility decreases below 3 nm; and,
- The structure would be color-coded a standard yellow, such as Munsell Chip number 2.5Y 8/12, from the water line to the base of the tower.

In addition to the above, any meteorological tower or buoy greater than 199 ft tall and within 12 nm of shore would require an Obstruction Evaluation and a Determination of Hazard/No Hazard by the FAA and each lessee would be required to file a "Notice of Proposed Construction or Alteration" with the FAA in accordance with federal aviation regulations (14 CFR 77.13). According to the FAA, specific lighting requirements or recommendations would be applied on a case by case basis (Edgett-Baron, personal communication, 2011). Additionally, the FAA published guidance in the *Federal Register* on June 24, 2011 regarding the marking and lighting of meteorological towers less than 199 ft tall that could apply to shorter meteorological towers in the portions of the WEAs located within the FAA's jurisdictional authority (76 FR 36983).

It is reasonably foreseeable that, under routine circumstances, vessels would not strike a meteorological tower or buoy that is marked and lighted as described above in accordance with USCG and FAA recommendations and requirements. As discussed previously, even should a vessel strike occur, the environmental impacts and impacts to vessel traffic in the area would be minor, if noticeable. No significant impacts are anticipated to vessel traffic in the WEAs from the installation of meteorological towers/buoys as a result of Alternative A.

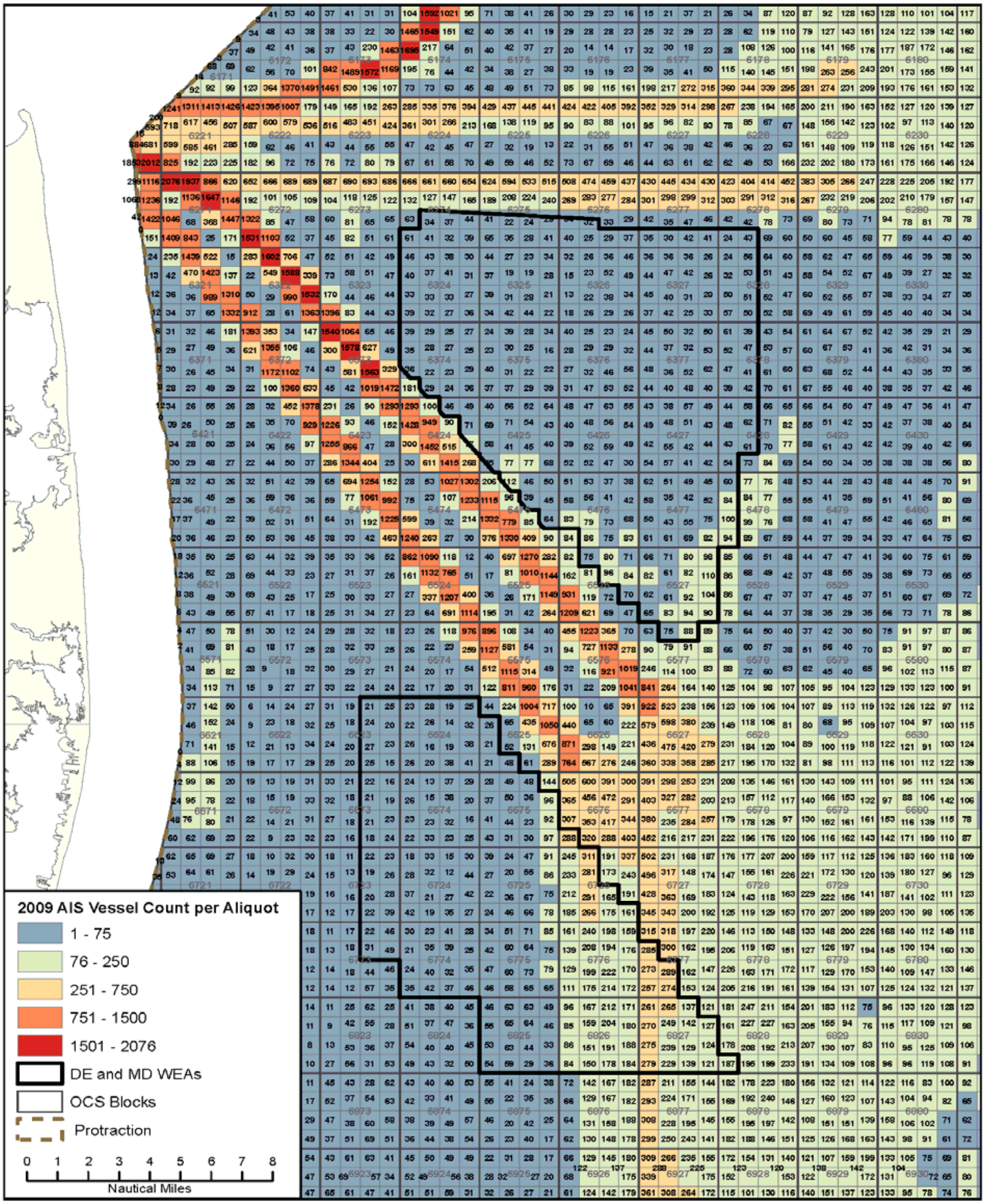

Figure 4.7a. Delaware and Maryland AIS Vessel Count Data 2009.

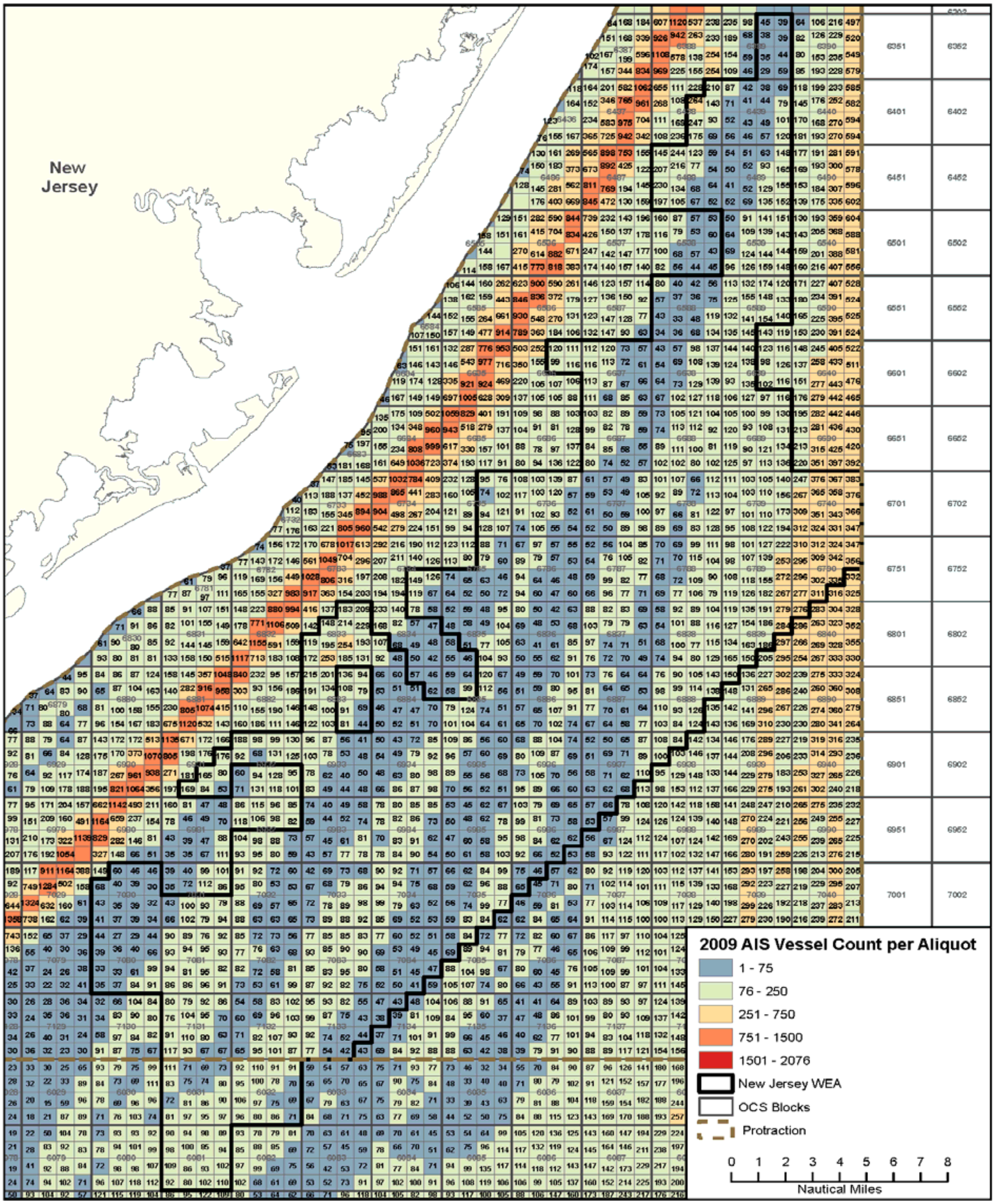

Figure 4.7b. New Jersey AIS Vessel Count Data 2009.

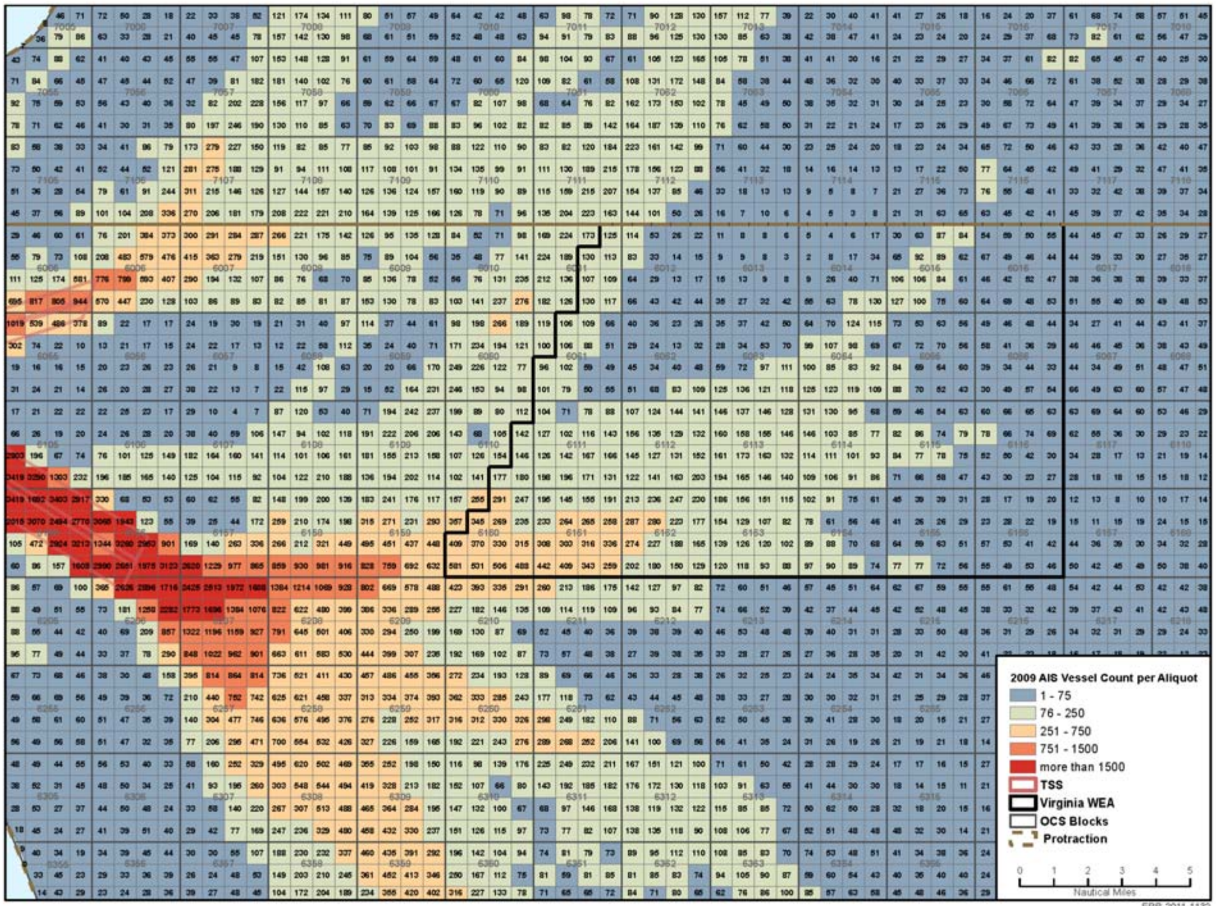

Figure 4.7c. Virginia AIS Vessel Count Data 2009.

Non-Routine Events

The vessel traffic associated with site characterization surveys, and the construction, operation and decommissioning of meteorological towers/buoys in very close proximity to the major shipping lanes and ports serving the Delaware and Chesapeake Bays would insubstantially increase the probability of a vessel collision(s) and/or allision(s).

The AIS data (*see* Figure 4.7(a-c)) indicates that the majority of large commercial vessels, which include cargo vessels, container vessels, and oil tankers, operate within and near the TSS lanes, and follow distinct patterns in order to approach/depart these lanes, often concentrating in heavily-used unofficial approach/departure areas near the entrances and exits of the TSS lanes.

The WEAs were designed to exclude TSS lanes and avoid the heavier trafficked approach/departure areas associated with those TSSs. Lessees are expected to comply with all USCG-required marking and lighting of meteorological towers/buoys and applicable FAA requirements.

When BOEM considers any individual SAP, it will further consider local vessel traffic to ensure tower placement would reduce the already small likelihood of commercial or recreational vessel collision or allision with structures associated with Alternative A.

Spills of oil or diesel could occur as a result of collisions, accidents or natural events, such as during refueling of equipment on a tower or buoy (*see* Section 3.2.3 of this EA). Vessels are expected to comply with USCG requirements relating to prevention and control of diesel fuel and oil spills. In 2010, 97% of the oil and gas tanker calls in the U.S. were by double-hulled vessels, up from 78% five years earlier (USDOT, MARAD, 2011). Double-hulled tankers are much less likely to release oil from collision and/or allision than single-hulled tankers. A multitude of government studies and independent reviews recommend double hulls as the single most effective technology to prevent future oil spills from tankers (DF Dickens Associates, Ltd., 1995).

Therefore, it is very unlikely that a collision or allision, or an oil or diesel spill resulting from such, would occur because of the presence of multiple routing measures, the fact that the WEAs avoid the highest traffic areas, the use of USCG-required marking and lighting of meteorological towers/buoys, and the increased use of double-hulled oil and gas tankers calling at U.S. ports (*see* Section 3.2.2 of this EA). The impacts to water quality if a spill would occur from these types of collisions are discussed in Section 4.1.1.2.2 of this EA.

Tug Rerouting

Tug and towboat routes may overlap portions of the Virginia WEA during periods of adverse weather conditions (AWO, 2011). These adverse weather periods would not coincide survey activities or with constructing or decommissioning meteorological towers/buoys. Survey activities require relatively calm sea conditions in order to successfully collect the necessary data and information. Similarly, the construction, installation, and decommissioning of meteorological towers/ buoys also require calm sea conditions. Therefore, it is unlikely that the vessel activities associated with Alternative A would occur during periods of adverse weather when tug/towboat routes may move into or close to the Virginia WEA. Therefore, it is not reasonably foreseeable that vessel traffic associated with Alternative A would conflict with tug/towboat vessels utilizing the areas within the Virginia WEA during adverse weather conditions.

Conclusion

The increase in vessel traffic, and activities associated with the installation/operation of the meteorological towers and buoys would not measurably impact current or projected future shipping or navigation. It is unlikely that vessels would collide with meteorological towers or buoys due to USCG requirements relating to marking and lighting of meteorological towers or buoys, the fact that the WEAs avoid the highest traffic areas, and the fact that the few anticipated structures are small and dispersed over such a wide area of ocean. An oil spill resulting from a collision or allision between a cargo vessel/tanker and a meteorological tower/buoy is not reasonably foreseeable due to the small footprint of these facilities, the fact that they will be lit and marked on navigational charts, their distance from each other and from shore, and the strong likelihood that a meteorological tower would collapse without serious damage to an oil tanker or large ship. In addition, survey activities related to Alternative A require relatively calm seas; therefore, it is unlikely that the vessel activities associated with Alternative A would occur during periods of adverse weather when tug/towboat routes may alter course and move into or close to the New Jersey, Delaware, Maryland and Virginia WEAs.

Proposed Mitigation Measures

The following proposed mitigation measures are intended to reduce or eliminate potential the impacts of site characterization surveys and the installation, operation, and decommissioning of meteorological towers/buoys on military activities, shipping, and navigational safety. This section proposes that these mitigation measures be incorporated into any future decision to issue a lease or approve a SAP.

The following proposed mitigation measures were developed in consultation with the DOD to eliminate or reduce the potential impacts of Alternative A on military activities:

- Lessees would be required to consult with the appropriate command headquarters prior to any construction or decommissioning activity, regarding the location, density, and planned periods of operation, to minimize potential conflicts with DOD activities.
- Lessees would be require to control their own electromagnetic emissions and those of its agents, employees, invitees, independent contractors, and subcontractors emanating from individual designated defense warning areas in accordance with requirements specified by the appropriate command headquarters to the degree necessary to prevent issues with DOD flight, testing, or operational activities conducted within individual designated warning areas.

The following proposed mitigation was developed in consultation with the USCG to reduce the potential impacts of Alternative A on shipping and navigational safety. This section includes USCG precautionary recommendations pending completion of the ACPARS in 2012:

Notification of Mariners: To reduce potential economic impacts on shipping and navigation, lessees would be required to notify mariners of construction and decommissioning activities via the USCG Local Notice to Mariners and daily broadcasts on Marine Channel 16. The notification would advise mariners to plan vessel routes to avoid the area where the activity would be taking place. This measure would save both time, fuel, and reduce the potential of any vessel conflicts.

Location of Meteorological Towers and Buoys: To reduce any potential conflict with existing vessel traffic and the possibility of vessel collision or allision, no meteorological towers or buoys would be located within 1 nm of any TSS boundary until further analysis and the ACPARS is completed by the USCG (U.S. Department of Homeland Security, USCG, personal communication, 2011). This would not preclude site characterization activities within 1 nm of a TSS boundary.

4.2 Alternative B – Removal of Anchorage Ground Offshore Delaware

Description of the Alternative

Ships frequently anchor in the vicinity of TSSs, in unofficial anchorage areas, while waiting to go to port. There is such an anchorage area within the Delaware WEA offshore of Delaware Bay (*see* Figure 2.1). The USCG requested that BOEM exclude from consideration an existing unofficial anchorage ground offshore Delaware, which it is considering designating officially due to navigational safety concerns. The anchorage ground under consideration by the USCG is bounded on its southern border by the southeast TSS approach to Delaware Bay, on its northern border by the charted ordnance dumping ground, and on its eastern border by the 12 nm territorial sea line, and is equivalent to about half of an OCS block in size (*see* Figure. 2.1). The USCG is scheduled to initiate rulemaking for establishing this and other anchorage grounds offshore of the Mid-Atlantic States by the end of 2011 (U.S. Department of Homeland Security, USCG, 2011).

Alternative B differs from Alternative A in that the anchorage ground (equivalent to about a half of an OCS block) would be excluded from leasing decisions under this action. An area slightly smaller (equivalent to about a half of an OCS block less) than the area described under Alternative A would be considered for lease issuance and site characterization and assessment activities.

All of the environmental consequences associated with selecting Alternative B would be the same as associated with Alternative A except for the level of impacts associated with site characterization activities. Since the anchorage ground would not be leased, Alternative B would result in a slight reduction (two percent), in site characterization surveys associated with the Delaware WEA compared to Alternative A (reduction of about 220 nm or 50 hours of HRG surveys and about 6-18 bottom samples). Like Alternative A, up to one meteorological buoy is projected in the Delaware WEA (Section 3.1.3 of this EA). However, under Alternative B, that buoy could not be located within the anchorage ground, and therefore could not conflict with use of the anchorage ground.

Table 4.15

Projected Site Characterization and Assessment Activities for Alternative B (Removal of Anchorage Ground Offshore Delaware)

Wind Energy Area (WEA)	Lease-holds	Site Characterization Activities		Site Assessment Activities	
		High Resolution Geophysical (HRG) Surveys (max nm/hours)	Sub-bottom Sampling (min-max)	Meteorological Towers (max)	Meteorological Buoys (max)
New Jersey	7	31,100/6,900	900-2,500	7	14
Delaware	1	9,100/2,000	300-700	0	1
Maryland	2	7,100/1,600	200-600	2	4
Virginia	3	12,600/2,800	400-1,000	3	6
Total	13	59,800/13,300	1,800-4,800	12	25

Effects of the Alternative

Physical Resources

<u>Air Quality</u>: Section 4.1.1.1, which describes the reasonably foreseeable impacts of Alternative A on air quality, concluded that, due to the distance from shore, and the negligible increase in emissions associated with Alternative A when compared to baseline emissions and existing air quality, neither routine activities nor non-routine events would significantly impact onshore air quality. The reduced level of survey and construction activities under Alternative B would produce slightly fewer emissions within the vicinity of the Delaware WEA than would

Alternative A. Due to the short duration and relatively low level of emissions associated with routine activities within and associated with the Delaware WEA, potential impacts on ambient air quality from either Alternative A or Alternative B would be negligible to minor.

Water Quality: Section 4.1.1.2, which describes the reasonably foreseeable impacts of Alternative A on water quality, concluded that impacts to coastal and marine waters from routine activities associated with Alternative A should be of short duration and remain minimal. Should an oil spill occur in the WEA, minimal impacts would result since a spill from the types of vessels associated with site characterization and assessment activities would be small (*see* Section 4.1.1.2). If a diesel spill were to occur, it would be expected to dissipate very rapidly in the water column, then evaporate and biodegrade within a few days (*see* Section 3.2.3 of this EA).

Moreover, collisions that could cause such a spill occur infrequently. Under Alternative B, there would be slightly less vessel traffic associated with survey activities, and hence, slightly less chance of a spill. Similarly, under Alternative B, there would be slightly fewer potential discharges of bilge or waste water or solid waste due to slightly less vessel traffic.

Since the potential impacts to water quality under Alternative A are anticipated to insignificant, the potential water quality impacts associated with Alternative B are anticipated to be marginally less so.

Biological Resources

Coastal Habitats: Section 4.1.2.1, which describes the reasonably foreseeable impacts of Alternative A on coastal habitats, concluded that no significant impacts on coastal habitats would occur from routine activities as a result of Alternative A due to the distance of the WEAs from shore, the use of existing coastal facilities, and the amount of vessel traffic currently and historically traversing coastal areas. Under Alternative B, fewer survey vessel trips would slightly reduce the potential increase of wake-induced erosion (if detectible) and risk of diesel spills, primarily in Delaware coastal waters associated with Alternative A.

Benthic Resources: Section 4.1.2.2, which describes the reasonably foreseeable impacts of Alternative A on benthic resources, concluded that the impacts of site characterization surveys, on benthic communities in and around the Delaware WEA would be short-term in duration and negligible in extent. The 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. Under Alternative B, there would be no potential for bottom-disturbing activities to impact benthic habitats located within the anchorage ground.

Marine Mammals: Section 4.1.2.3, which describes the reasonably foreseeable impacts of Alternative A on marine mammals, concluded that Alternative A would minimally or negligibly effect marine mammals and that the proposed alternative may impact marine mammals in an episodic fashion. Specifically, harassment from sound (sonar during surveys and short-duration pile driving) and slight increases in the risk of vessel collisions associated with surveys and construction are the primary activities that could impact marine mammals.

Under Alternative B, the lower level of survey activity would slightly reduce the exposure of marine mammals to noise from surveys and vessel traffic offshore Delaware. The reduced vessel traffic would also slightly lower the risk of vessel collisions with marine mammals.

Sea Turtles: Section 4.1.2.4, which describes the reasonably foreseeable impacts of Alternative A on sea turtles. These impacts are expected to be short-term and would result in minimal to negligible harassment depending on the specific activity. Specifically, harassment from noise, minor loss/displacement from forage areas, and to a lesser degree, vessel collisions are the primary anticipated impacts to ESA-listed sea turtles.

Under Alternative B, the lower level of survey activity (due to exclusion of the anchorage area) would slightly reduce the potential exposure of sea turtles to noise from surveys and vessel traffic offshore Delaware. The reduced vessel traffic would slightly lower the risk of vessel collisions with sea turtles and reduce the potential for displacement from forage areas. There would be no change in impacts associated with pile driving or construction activities because, like Alternative A, Alternative B contemplates the installation of one meteorological tower or two meteorological buoys.

Birds: Section 4.1.2.5, which describes the reasonably foreseeable impacts of Alternative A on birds, concluded that, while birds may be affected by vessel discharges and the presence of meteorological towers and buoys, 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 from shore and each other. Since one meteorological tower or two meteorological buoys are projected within the Delaware WEA under Alternatives A and B, Alternative B would not increase or decrease the potential impacts to birds resulting from these structures. Under Alternative B, the slight reduction in vessel traffic would slightly reduce the number of potential vessel discharges, which would slightly reduce potential impacts to birds in and around the Delaware WEA.

Bats: Section 4.1.2.6, which describes the reasonably foreseeable impacts of Alternative A on bats, concluded that, while it is unlikely that bat species would be foraging or migrating through the WEAs, these mammals may on occasion be driven to the project area by prevailing winds and weather. The only potential impact to bats presented by Alternative A would be the possibility that bats blown into the project area could possibly collide with a meteorological tower or buoy. Because of the anticipated distance between the anticipated meteorological towers and buoys, there would be no additive effect of constructing all the anticipated meteorological towers or placement of buoys on bats. It is not expected that Alternative A would have any measurable impact on bats. Both Alternatives A and B anticipate that one meteorological tower or two meteorological buoys would be constructed within the Delaware WEA although the current holder of the Interim Policy lease in the area could install these structures even if the No Action alternative were selected (*see* Interim Policy EA (USDOI, MMS, 2009a)). Alternative B would not increase or decrease the potential impacts to bats as described for Alternative A.

Fish and Essential Fish Habitat (EFH): Section 4.1.2.7, which describes the reasonably foreseeable impacts of Alternative A on fish and EFH, concluded that the activities associated with Alternative A and the potential effects of HRG survey noise on marine fish are generally expected to be limited to avoidance around the HRG survey activities, short-term changes in behavior, and limited and temporary loss of habitat from during the installation of meteorological towers and buoys. Thus, potential population-level impact on fish for HRG surveys is not anticipated.

Sub-bottom sampling, construction of meteorological towers, and the installation of meteorological buoys could affect local benthic habitats. The seabed disturbance footprint of sub-bottom sampling would be small; it is expected that this activity would have negligible effects on benthic habitat, and that this disturbance would have a negligible, if detectible, impact on federally-managed fish species that may occur in the Delaware WEA. Impacts related to meteorological towers/buoys installation and decommissioning is expected to be minor and not expected to result in changes in local community assemblage and diversity.

Fish could be exposed to operational discharges or accidental fuel releases from construction sites and construction vessels and to accidentally released solid debris. The entanglement in or ingestion of OCS-related trash and debris by fish would not be expected during normal operations. Impacts to fish and their habitat from the discharge of waste materials or the accidental release of fuels are expected to be minor.

Under Alternative B, the lower level of activity would slightly reduce the exposure of fish to noise from surveys and vessel traffic offshore Delaware. Under Alternative B, there would be no potential for bottom-disturbing or survey activities to impact EFH located within the anchorage ground.

Socioeconomic Conditions

<u>Offshore Archaeological Resources</u>: Section 4.1.3.1, which describes the reasonably foreseeable impacts of Alternative A on offshore archaeological resources, concluded that the information generated from the lessee's initial site characterization activities and should provide an adequate picture of the presence of significant and/or unique archaeological resources within the WEAs and along potential cable routes to shore. As a result, the potential for seafloor/bottom-disturbing activities (e.g. anchorages and installation of meteorological towers and buoys) to could cause damage to or loss of significant and/or unique archaeological information would be avoided. Under Alternative B, there would be no potential for bottom-disturbing activities to impact archeological resources located within the anchorage ground.

<u>Recreation</u>: Section 4.1.3.2, which describes the reasonably foreseeable impacts of Alternative A on recreation resources, concluded that, 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 from meteorological towers or buoys and spills are expected. Section 4.1.3.2 also concluded that the increase in vessel traffic associated with Alternative A would not significantly affect recreation in the coastal areas or oceans outside any of the potentially affected states. While impacts could occur from marine trash and debris associated with Alternative A, they would unlikely be perceptible to beach users or administrators. Due to slightly less anticipated vessel traffic, Alternative B would slightly decrease the potential impacts to recreational resources as described for Alternative A.

<u>Demographics</u>: Section 4.1.3.3, which describes the reasonably foreseeable impacts of Alternative A on demographics, concluded that, due to the magnitude, dispersed nature and short

duration of survey, construction, and decommissioning activities, any benefit to local economies or employment would be minor and short-term. Also these activities are not expected to employ many workers relative to the existing employment numbers. Since the reduction in the level of site characterization surveys associated with Alternative B would be so slight when compared with Alternative A, Alternative B is expected to produce slightly less benefit to the economies of or employment within coastal counties of Delaware, New Jersey and/ or Maryland (*see* Section 4.1.3.5.2).

Environmental Justice: Section 4.1.3.4, which describes the reasonably foreseeable impacts of Alternative A related to environmental justice issues, concluded that Alternative A would have no impacts on the environmental or health-related conditions of minority or low-income people. Only the use of coastal facilities has the potential to impact minority or low-income people. However, no expansion of these existing onshore areas is anticipated to support Alternative A or Alternative B, and significant increases in activity at these existing facilities is not anticipated as a result of either Alternative A or Alternative B. As a result, neither Alternative A nor Alternative B is expected to have disproportionately high or adverse environmental or health effects on minority or low-income people.

Land Use and Coastal Infrastructure: Section 4.1.3.5, which describes the reasonably foreseeable impacts of Alternative A on land use and coastal infrastructure, concluded that existing ports or industrial areas are expected to be used, and expansion of these existing facilities is not anticipated to support Alternative A. Since this remains true under Alternative B, no significant impact on land use or coastal infrastructure is expected.

Commercial and Recreational Fishing Activities: Section 4.1.4.6, which describes the reasonably foreseeable impacts of Alternative A on commercial and recreational fishing activities, concluded that the increase in vessel traffic, and activities from the installation/operation of the meteorological towers and buoys would not measurably impact commercial or recreational fishing activities, total catch of fish and shellfish, or navigation. Any impacts, such fishing displacement and target species availability, would be of short duration, limited area, and temporary. Under Alternative B, there would be no potential for site characterization surveys and site assessment activities to conflict with commercial and recreational fishing within the anchorage ground, although the anchorage ground is currently highly trafficked by other anchoring vessels.

Other Uses of the OCS: Section 4.1.3.7, which describes the reasonably foreseeable impacts of Alternative A on other uses of the OCS, concluded that minor direct impacts on vessel traffic density and patterns would occur from routine activities associated with Alternative A.

Under Alternative B, survey and construction activities that would impact vessel traffic density and patterns would not occur in the anchorage ground. It is assumed the risk of collisions and allisions would be greater in this area, because it already contains a relatively high concentration of vessels. Therefore, Alternative B would provide a slight reduction in the risk of collisions and allisions than would Alternative A.

Summary/Conclusion

Alternative B differs from Alternative A (Alternative A) by not offering the anchorage ground identified by the USCG located at the western tip of the Delaware WEA for lease. An area equivalent to about 18 OCS blocks in the Delaware WEA would be considered for leasing and subsequent site assessment activities under Alternative B. A slight reduction (two percent), in site characterization surveys is projected to take place in the Delaware WEA under Alternative B as compared to Alternative A.

The potential impacts of Alternative B would differ from Alternative A only within the Delaware WEA. Under Alternative B, there would be no potential for bottom-disturbing activities to impact benthic habitats or archeological resources located within the anchorage ground. While there is still the potential for some minor conflicts with other uses of the OCS, including commercial and recreational fishing. There would be no potential for site characterization surveys (although there still may be site characterization for potential subsea cable routes) and site assessment activities to conflict within the anchorage ground.

Compared to Alternative A, the reduced level of survey activities under Alternative B would slightly reduce the potential impacts on air and water quality within the vicinity of the Delaware WEA. Reduced vessel traffic would slightly reduce the risk of vessel collisions, therefore slightly reducing the risk of a diesel spill. The lower level of activity would slightly reduce the exposure of marine mammals, sea turtles, and fish to noise from surveys and vessel traffic offshore Delaware. The reduced vessel traffic would also lower the risk of vessel collisions with marine mammals and sea turtles. There would be slightly less potential for the loss or displacement of sea turtles from forage areas. While the same existing onshore facilities would likely be used in support of the site characterization surveys and site assessment activities in the remainder of the WEAs, about 20 less survey trips would slightly reduce the potential for wake-induced erosion and risk of diesel spills in coastal waters, mainly in Delaware, Maryland and/or New Jersey.

Under Alternative B, on-lease survey and construction activities that could impact vessel traffic density and patterns would not occur in the anchorage ground. It is assumed that the risk of collisions and allisions would be greater in this area, because it has higher concentrations of vessels. Therefore, Alternative B would provide a slight reduction in the risk of collisions and allisions than would result from selecting Alternative A.

4.3 Alternative C – Removal of Category B Areas Offshore Maryland

Description of the Alternative

Until its completion of the Atlantic Coast Port Access Route Study (ACPARS) in 2012 (*see* 76 FR 27788 (May 11, 2011)), the USCG has classified areas in the Maryland WEA into three categories (*see* Figure 1.3):

4. Category A – areas that USCG believes should not be leased because, should these leases be ultimately developed in the future, they would pose navigational risks due to existing and anticipated future increase in vessel traffic density (equivalent to about 18.5 OCS blocks);
5. Category B – areas which, if ultimately developed, USCG is uncertain whether navigational risks will be presented. USCG has informed BOEM that USCG needs to study these areas further before determining whether structures in these areas will pose a risk to navigational safety. (equivalent to almost 10 OCS blocks); and

6. Category C – areas in which potential future wind energy development currently appears to pose minimal or no detrimental impact on navigational safety (equivalent to about 2.5 whole OCS blocks).

The USCG's classification of these areas is based on its review of: available information including AIS data and user input; existing traffic patterns; existing literature, the consideration of opinions and advice of USCG subject matter experts on waterways management and the ACPARS Workgroup; applied concepts from the United Kingdom Maritime Guidance Note MGN 371 (guidance for determining risk levels based on proposed OREI distances from shipping routes); and opinions of senior Coast Guard leadership.

As referenced above, the USCG is conducting an ACPARS to determine how to best route traffic on the Atlantic coast. The goal of the ACPARS (*see* 76 FR 27788 (May 11, 2011)) is to enhance navigational safety by examining existing shipping routes and waterway uses, and, to the extent practicable, reconcile the right of navigation within designated port access routes with other reasonable waterway uses, such as the leasing of OCS blocks for potential construction and operation of offshore wind energy facilities.

Although BOEM is not currently considering approving any COPs for wind energy generation facilities in any area offshore the Mid-Atlantic States, BOEM may not want to give priority to issuing leases in areas that the USCG currently believes would not be suitable for development in the future. Based on the USCG's recommendation and BOEM's own preliminary analysis of vessel traffic data, BOEM has removed the Category A blocks from the Maryland WEA in all alternatives because the potential future placement of any wind energy generation facilities in these areas would pose a navigation risk to vessel traffic (*see* Section 1.5). The USCG will provide BOEM with additional navigational safety recommendations once it has completed the ACPARS. While the USCG did not recommend that the Category B areas be removed from leasing consideration, BOEM elected to consider this as an alternative. Selection of the alternative would exclude the Category B areas from the present leasing action and allow the decision maker to make future leasing decisions for these areas after the ACPARS is complete.

Alternative C differs from Alternative A (Alternative A) by excluding Category B Areas from leasing decisions under this action. Portions of nine OCS blocks (equivalent to about 2.5 whole OCS blocks) in the Maryland WEA would be considered for leasing and subsequent site assessment activities under Alternative C. Based simply on the reduced area, there would be about an 82% reduction in site characterization surveys offshore Maryland, and a 10% reduction to overall site characterization surveys associated with all WEAs contemplated in Alternative A. Due to the reduction in area, one less leasehold is anticipated, so it is likely one fewer meteorological tower or two fewer meteorological buoys would be constructed under Alternative C (*see* Section 3.1.3 for a reasonably foreseeable scenario for meteorological towers and buoys).

Table 4.16

Projected Site Characterization and Assessment Activities for Alternative C (Removal of Category B Areas Offshore Maryland)

Wind Energy Area (WEA)	Lease-holds	Site Characterization Activities		Site Assessment Activities	
		High Resolution	Sub-bottom Sampling	Meteorological Towers	Meteorological Buoys

		Geophysical (HRG) Surveys (max nm/hours)	(min-max)	(max)	(max)
New Jersey	7	31,100/6,900	900-2,500	7	14
Delaware	1	9,300/2,100	300-700	0	1
Maryland	1	1,300/300	100	1	2
Virginia	3	12,600/2,800	400-1,000	3	6
Total	12	54,200/12,100	1,600-4,400	11	23

Effects of the Alternative

Physical Resources

Air Quality: Section 4.1.1.1, which describes the reasonably foreseeable impacts of Alternative A on air quality, concluded that due to the distance from shore, neither routine activities nor non-routine events within the WEAs would impact onshore air quality. Similarly, Section 4.1.1.1, concludes that the amount of additional vessel traffic associated with Alternative A would not significantly affect onshore air quality in any of the potentially affected state. The reduced level of survey and construction activities under Alternative C would reduce emissions associated with surveys and site assessment in and around the Maryland WEA below the already negligible (if detectable) level associated with Alternative A.

Water Quality: Section 4.1.1.2, which describes the reasonably foreseeable impacts of Alternative A on water quality, concluded that impacts to coastal and marine waters from routine activities associated with Alternative A, if detectible, would be of short duration and remain minimal. If a diesel spill were to occur, it would be expected to dissipate very rapidly in the water column, then evaporate and biodegrade within a few days (*see* Section 3.2.3). Since collisions occur infrequently, the potential impacts to water quality associated with Alternative A are not expected to be significant. Under Alternative C, there would be a substantial decrease of vessel activity associated with the Maryland WEA, and as a result, there would be reduced risk of a collision or oil spill, primarily in and around Maryland, associated with surveys and site assessment activities. Similarly, discharges of bilge, wastewater, and waste from vessels associated with the Maryland WEA would be reduced.

Under Alternative C, the reduced level of bottom-disturbing activities associated with surveys and construction would reduce the reasonably foreseeable impacts to water quality within the vicinity of the Maryland WEA below that which is anticipated under Alternative A.

Biological Resources

Coastal Habitats: Section 4.1.2.1, which describes the reasonably foreseeable impacts of Alternative A on coastal habitats, concluded that no direct impacts on coastal habitats would occur from routine activities as a result of Alternative A due to the distance of the WEAs from shore and the use of heavily-trafficked vessel routes and existing port facilities. Indirect impacts from routine activities may occur from wake erosion and associated added sediment caused by increased vessel traffic in support of Alternative A, but in light of the amount of existing vessel traffic in waterways and in light of the minimal increase in traffic in any single waterway associated with Alternative A, these impacts would be negligible if detectible. Under Alternative C, fewer survey, construction, and support vessel trips would occur in and around the Maryland WEA than contemplated in Alternative A. This would reduce whatever increase of wake-induced erosion and risk of diesel spills in coastal waters, and reduce the amount of potential vessel discharge in and around the Maryland WEA. As a result, Alternative C would likely lead to fewer impacts to the Coastal habitat, primarily in Maryland, than would Alternative A.

<u>Benthic Resources</u>: Section 4.1.2.2, which describes the reasonably foreseeable impacts of Alternative A on benthic resources, concluded that impacts of site characterization, and the construction, operation, and removal of meteorological towers and buoys on benthic communities would be short-term in duration and negligible in extent. The primary potential impacts of Alternative A on benthic communities would be associated with the construction, operation, and decommissioning of meteorological towers, or the installation of meteorological buoys. Impacts would be caused by contact via anchors, driven piles, and scour protection that could cause crushing or smothering.

Potential impacts from non-routine events, such as a diesel spill, are also anticipated 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.

Under Alternative C, there would be no potential for bottom-disturbing activities within the excluded blocks, and therefore, no potential to impact benthic habitats located there.

<u>Marine Mammals</u>: Section 4.1.2.3, which describes the reasonably foreseeable impacts of Alternative A on marine mammals, concluded that Alternative A would minimally or negligibly effect marine mammals and that the proposed alternative may impact marine mammals in an episodic fashion. Specifically, harassment from sound (sonar during surveys and short-duration pile driving) and slight increases in the risk of vessel collisions associated with surveys and construction are the primary activities that could impact marine mammals.

Under Alternative C, the lower level of site characterization and site assessment activity would reduce the potential exposure of marine mammals to noise from surveys, vessel traffic, and pile driving offshore Maryland. The reduced vessel traffic would also lower the risk of vessel collisions with marine mammals to the same proportion that vessel traffic would be reduced from that anticipated in connection with Alternative A.

<u>Sea Turtles</u>: Section 4.1.2.4, which describes the reasonably foreseeable impacts of Alternative A on sea turtles. These impacts are expected to be short-term and would result in minimal to negligible harassment depending on the specific activity at issue. Specifically, harassment from noise associated with pile driving and sonar surveys, minor displacement from forage areas during construction, decommissioning, and survey activities, and to a lesser degree, vessel collisions, are the primary anticipated impacts to ESA-listed sea turtles.

Under Alternative C, the lower level of activity would substantially reduce potential exposure of sea turtles in the area of the Maryland WEA to noise from surveys, vessel traffic, and pile driving offshore Maryland. The reduced vessel traffic would lower the risk of vessel collisions with sea turtles and reduce potential displacement from forage areas.

Birds: Section 4.1.2.5, which describes the reasonably foreseeable impacts of Alternative A on birds, concludes that, while birds may be affected by vessel discharges and the presence of meteorological towers and buoys, accidental fuel release is unlikely and the risk of collision with structures would be minor due to the size of the structures, the small number of meteorological towers proposed, and their distance from shore and each other.

Since Alternative C contemplates one meteorological tower or two meteorological buoys within the WEA as opposed to the two meteorological towers or four meteorological buoys contemplated by Alternative A, Alternative C presents half the risk that birds will collide with structures within the Maryland WEA.

Bats: Section 4.1.2.6, which describes the reasonably foreseeable impacts of Alternative A on bats, concluded that, while it is unlikely that bat species would be foraging or migrating through the WEAs, these mammals may on occasion be driven to the project area by prevailing winds and weather. The only potential impact to bats presented by Alternative A would be the possibility that bats blown into the project area could possibly collide with a meteorological tower or buoy. Because of the anticipated distance between the anticipated meteorological towers and buoys, there would be no additive effect of constructing all the anticipated meteorological towers or placement of buoys on bats. It is not expected that Alternative A would have any measurable impact on bats. The current holder of the Interim Policy lease in the area could install a meteorological tower structure even if the No Action alternative were selected (*see* Interim Policy EA (USDOI, MMS, 2009a)). Since Alternative C contemplates one meteorological tower and two meteorological buoys within the WEA as opposed to the two meteorological towers and four meteorological buoys contemplated by Alternative A, Alternative C presents half the risk that birds would collide with structures within the Maryland WEA than Alternative A.

Fish and Essential Fish Habitat (EFH): Section 4.1.2.7, which describes the reasonably foreseeable impacts of Alternative A on fish and EFH, concluded that the proposed associated with Alternative A and the potential effects of HRG survey noise on marine fish are generally expected to be limited to avoidance around the HRG survey activities, short-term changes in behavior, and limited and temporary loss of habitat from during the installation of meteorological towers and buoys. Thus, potential population-level impact on fish for HRG surveys is not anticipated.

Sub-bottom sampling, construction of meteorological towers, and the installation of meteorological buoys could affect local benthic habitats. The seabed disturbance footprint of sub-bottom sampling would be small; it is expected that this activity would have negligible effects on benthic habitat, and that this disturbance would have a negligible, if detectible, impact on federally-managed fish species that may occur in the Delaware WEA. Impacts related to meteorological towers/buoys installation and decommissioning is expected to be minor and not expected to result in changes in local community assemblage and diversity.

Fish could be exposed to operational discharges or accidental fuel releases from construction sites and construction vessels and to accidentally released solid debris. The entanglement in or ingestion of OCS-related trash and debris by fish would not be expected during normal operations. Impacts to fish and their habitat from the discharge of waste materials or the accidental release of fuels are expected to be minor.

Under Alternative C, the lower level of activity would reduce the exposure of fish to noise from surveys and vessel traffic by approximately 82%. There would be no potential for bottom disturbing activities to impact EFH located within the excluded blocks under Alternative C, although the current holder of the Interim Policy lease in the area could install a meteorological tower structure even if the No Action alternative were selected (*see* Interim Policy EA (USDOI, MMS, 2009a)).

Socioeconomic Conditions

Offshore Archaeological Resources: Section 4.1.3.1, which describes the reasonably foreseeable impacts of Alternative A on offshore archaeological resources, concluded that the information generated from the lessee's initial site characterization activities and should provide an adequate picture of the presence of significant and/or unique archaeological resources within the WEAs and along potential cable routes to shore. As a result, the potential for seafloor/bottom-disturbing activities (e.g. anchorages and installation of meteorological towers and buoys) to cause damage to or loss of significant and/or unique archaeological information would be avoided. Under Alternative C, there would be no potential for bottom-disturbing activities to impact archeological resources located within the excluded blocks.

Recreational Activities: Section 4.1.3.2, which describes the reasonably foreseeable impacts of Alternative A on recreational resources, concluded that, due to the distance of the proposed lease areas from shore and the fact that that no new coastal infrastructure is proposed, no impacts to coastal recreational resources from meteorological towers or buoys and spills within the WEAs are expected. Section 4.1.3.2 also concluded that the increase in vessel traffic associated with Alternative A would not significantly affect recreation in the coastal areas or oceans outside any of the potentially affected states. While impacts could occur from marine trash and debris associated with Alternative A, they would unlikely be perceptible to beach users or administrators.

The excluded blocks under Alternative C are located so far offshore that a meteorological tower located within those blocks would not be visible from shore in any case (*see* Section 3.1.3.1, Visual Aesthetics). Not leasing in this area would present no different impact, insofar as structures are concerned, than does Alternative A on recreational resources. However, under Alternative C, vessel traffic and survey activities would be reduced by approximately 82%. As a result, assuming that vessel traffic associated with the Maryland WEA would traverse Maryland, Delaware and New Jersey coastal and harbor-related waters, Alternative C would reduce the risk that vessel traffic and discharges could impact recreational resources within Maryland, Delaware and New Jersey.

Demographics: Section 4.1.3.3, which describes the reasonably foreseeable impacts of Alternative A on demographics, concluded that, due to the magnitude, dispersed nature, and short duration of survey, construction, and decommissioning activities, any benefit to local economies or employment would be minor and short-term. Also these activities are not expected to employ many workers relative to the existing employment numbers. Due to the reduced level of site characterization surveys and site assessment activities offshore Maryland as compared with Alternative A, Alternative C is expected to produce about 82% fewer positive impacts on the population and employment of coastal counties of Maryland, Delaware and New Jersey, assuming that the activities in the Maryland WEA would be supported by facilities in those counties (*see* Section 4.1.3.5.2).

Environmental Justice: Section 4.1.3.4, which describes the reasonably foreseeable of Alternative A related to environmental justice issues, concluded that Alternative A would have no impacts on the environmental or health-related conditions of minority or low-income populations. Only the use of existing coastal facilities has the potential to impact minority or low-income populations. However, no expansion of these existing onshore areas is anticipated to support Alternative A or Alternative C, and significant increases in activity at these existing facilities is not anticipated as a result of either Alternative A or Alternative C. As a result, neither Alternative A nor Alternative C is expected to have disproportionately high or adverse environmental or health effects on minority or low-income populations.

Land Use and Coastal Infrastructure: Section 4.1.3.5.2, which describes the reasonably foreseeable impacts of Alternative A on land use and coastal infrastructure, concluded that existing ports or industrial areas are expected to be used, and that expansion of these existing facilities is not anticipated to support Alternative A. This assumption also applies to Alternative C. Assuming that Maryland, Delaware and New Jersey coastal infrastructure would be used to support activities in the WEA offshore Maryland, the selection of Alternative C would reduce the need for coastal infrastructure in those states for survey vessels by approximately 82%. As a result, Alternative C would have even less impact on land use or coastal infrastructure in Maryland, Delaware and New Jersey than would Alternative A.

Commercial and Recreational Fishing Activities: Section 4.1.4.6, which describes the reasonably foreseeable impacts of Alternative A on commercial and recreational fishing activities, concluded that the increase in vessel traffic, and activities from the installation/operation of the meteorological towers and buoys would not measurably impact commercial or recreational fishing activities, total catch of fish and shellfish, or navigation. Any impacts, such fishing displacement and target species availability, would be of short duration, limited in area, and temporary. Proposed mitigation measures (notifying fisherman of construction and decommissioning activities, and verification and evidence of site clearance) would further reduce or eliminate any potential minor impacts on fisheries.

Under Alterative C, there would be no potential for site characterization surveys and site assessment activities to conflict with commercial or recreational fishing within the excluded blocks. Compared to Alternative A, Alternative C would reduce the potential for fishing-use conflict within and around the WEA offshore Maryland by approximately 82%.

Other Uses of the OCS: Section 4.1.3.7, which describes the reasonably foreseeable impacts of Alternative A on other uses of the OCS, concluded that minor direct impacts on vessel traffic density and patterns would occur from routine activities associated with Alternative A.

Under Alternative C, survey and construction activities that would impact vessel traffic density and patterns would not occur in the anchorage ground. It is assumed the risk of collisions and allisions would be greater in this area, because it already contains a relatively high concentration of vessels. Therefore, Alternative C would provide a slight reduction in the risk of collisions and allisions than would Alternative A.

Under Alternative C, survey and construction activities that would impact vessel traffic density and patterns would not occur in the excluded blocks, which comprise approximately 82% of the WEA offshore Maryland. The reduced level of vessel traffic would proportionately reduce the risk of collisions, while one less meteorological tower would reduce the risk of allision within the Maryland WEA. Since there is not a substantial difference in vessel counts between the Category B areas proposed for exclusion under Alternative C and most of the remainder of the Maryland WEA, Alternative C would provide a slight reduction in the overall risk of collisions and allisions from that anticipated under Alternative A (*see* Figure 4.7a of this EA).

Summary/Conclusion

The potential impacts of Alternative C would only differ from Alternative A within and around the Maryland WEA. Existing and proposed mitigation measures would still reduce or eliminate potential impacts to resources located in the remainder of the Maryland WEA. There would be no potential for bottom-disturbing activities to impact benthic habitats or archeological resources located within the excluded blocks. While there is still the potential for conflicts with other uses of the OCS, including commercial and recreational fishing, there would be no potential for site characterization surveys and site assessment activities to conflict within the excluded blocks, and the reduction in overall vessel traffic (approximately 82%) associated with the Maryland WEA under Alternative C would commensurately reduce the potential for vessel-related conflicts in Maryland harbor and coastal areas.

Compared to Alternative A, the reduced level of survey and construction activities under Alternative C would similarly reduce the impacts on air and water quality in Maryland, Delaware and New Jersey port and coastal areas and within the vicinity of the Maryland WEA. Reduced vessel traffic and one less structure would reduce the risk of vessel collisions and allisions, reducing the risk of a diesel spill. The lower level of activity would reduce the exposure of marine mammals, sea turtles and fish to noise from surveys, vessel traffic, and pile driving offshore Maryland. The reduced vessel traffic would also lower the risk of vessel collisions with marine mammals and sea turtles. There would be less potential loss/displacement of sea turtles from forage areas.

Under Alternative C, one less meteorological tower is projected to be constructed than is projected in Alternative A, which would reduce the already small risk of bird or bat collisions. While the same existing onshore facilities would be used in support of the site characterization surveys and site assessment in the remainder of the WEAs, fewer survey, construction, and support vessel trips would reduce the potential for the increase of wake-induced erosion and risk of diesel spills in coastal waters in Maryland, Delaware, and New Jersey. Accordingly, Alternative C is expected to produce slightly fewer positive impacts on the population and employment of coastal counties of Maryland, Delaware, and New Jersey.

Under Alternative C, survey and construction activities that would impact vessel traffic density and patterns would not occur in the excluded blocks.

The reduced level of vessel traffic would reduce the risk of collisions, while one less meteorological tower would reduce the risk of allision within the Maryland WEA by half. Therefore, Alternative C would provide a slightly lower risk of collisions and allisions than would Alternative A.

4.4 Alternative D – Seasonal Prohibition to Protect the North Atlantic Right Whale

Description of the Alternative

The North Atlantic right whale is among the most endangered whales in the world. Current estimates of the North Atlantic right whale population are between 350-400 individuals (Waring et al., 2010). Two primary human-induced threats have been identified – collisions with vessels (ship strikes), and entanglement with fishing gear. To reduce the risk of ship strikes from vessels engaged in site characterization and site assessment activities, Alternative D would limit on-lease vessel activity by excluding HRG surveys and the construction and decommissioning of meteorological towers and buoys during peak migration periods of right whales to and from the summer feeding grounds in New England and winter calving grounds offshore Georgia and Florida. The period of exclusion would be between November and April, when the whales would be potentially present in the largest numbers, and would apply to all four Mid-Atlantic WEAs. Vessel-based and aerial biological surveys not utilizing active sonar would not be affected by the prohibition defined in this alternative.

Effects of the Alternative

Although the site characterization surveys and site assessment activities would still occur, Alternative D may slightly increase total potential impacts to air quality, water quality, coastal habitats, and benthic habitats from that described in Alternative A. Specifically, where a lessee may have previously coupled vessel-based biological surveys with some high-resolution geologic survey work, the prohibition on the sonar surveys during the winter and the need to collect winter biological data may result in additional vessel survey effort. Socioeconomic impacts would also be similar to those described in Alternative A. Migratory marine mammals other than right whales would likely benefit from an exclusion period. Impacts to other resources are discussed below.

Air Quality: Section 4.1.1.1, which describes the reasonably foreseeable impacts of Alternative A on air quality, concluded that due to the distance from shore, neither routine activities nor non-routine events within the WEAs would impact onshore air quality. Similarly, Section 4.1.1.1, concludes that the amount of additional vessel traffic associated with Alternative A would not significantly affect onshore air quality in any of the potentially affected state.

Under Alternative D, the total annual impacts to air quality would be unchanged from that described under Alternative A. However, Alternative D would be narrowing the window of time to complete construction and site characterization activities. The work window would only be restricted by a few months as normal operations under Alternative A have existing restrictions from poor working conditions that occur in the winter months and during active portions of the Atlantic hurricane season. Also, where a lessee may have previously coupled vessel-based biological surveys with some high-resolution geologic survey work, the prohibition on the sonar surveys during the winter and the need to collect winter biological data may result in additional vessel survey effort. Thus, it is anticipated Alternative D would have slightly greater impacts on air quality than would Alternative A.

Water Quality: Section 4.1.1.2, which describes the reasonably foreseeable impacts of Alternative A on water quality, concluded that impacts to coastal and marine waters from routine activities associated with Alternative A, if detectible, would be of short duration and remain minimal. Should an oil spill occur, the localized impact on water quality would be negligible, diesel is light and would become dispersed, evaporate, and biodegrade within a few days. Since collisions occur infrequently, the potential impacts to water quality associated with Alternative A are not expected to be significant. Similar to impacts to air quality, under Alternative D the total annual impacts to water quality would be unchanged from that described under Alternative A. However, Alternative D would be narrowing the window of time to complete construction and site characterization activities. The work window would only be restricted by a few months as normal operations under Alternative A have existing restrictions from poor working conditions that occur in the winter months and during active portions of the Atlantic hurricane season. Also, where a lessee may have previously coupled vessel-based biological surveys with some high-resolution geologic survey work, the prohibition on the sonar surveys during the winter and the need to collect winter biological data may result in additional vessel survey effort. Thus, it is anticipated that Alternative D would have slightly greater impacts on water quality than would Alternative A.

Coastal Habitats: Section 4.1.2.1, which describes the reasonably foreseeable impacts of Alternative A on coastal habitats, concluded that no direct impacts on coastal habitats would occur from routine activities as a result of Alternative A due to the distance of the WEAs from shore and the use of heavily-trafficked vessel routes and existing port facilities. Indirect impacts from routine activities may occur from wake erosion and associated added sediment caused by increased vessel traffic in support of Alternative A, but in light of the amount of existing vessel traffic in waterways and in light of the minimal increase in traffic in any single waterway associated with Alternative A, these impacts would be negligible, if detectible.

Under Alternative D, the total traffic to and from coastal areas (i.e. ports) would remain unchanged from that described in Alternative A. However, BOEM would be restricting the period during which certain activities would take place. In the case of coastal habitats, restricting activities to the summer could have a positive effect in that one would expect wake-effect erosion to be less in the growing season for wetland habitats near ports. However, as previously mentioned, winter activity is generally expected to be negligible due to unfavorable weather conditions. Thus, overall one could expect a slight positive to neutral difference in effects to coastal habitats when compared to Alternative A.

Marine Mammals: Alternative D would reduce the likelihood of strikes associated with vessels that are engaged in site characterization and site assessment activities during the winter. Alternative D would also reduce the likelihood that marine mammals would suffer potential acoustic disturbances from vessel operation, HRG survey activity, and meteorological tower construction during winter. It is not anticipated that this alternative would greatly impair lessee activities, as it is expected that most survey and construction activities would occur in the summer when the weather is most favorable. Other cetacean species, such as fin, minke, and humpback whales, as well as the short-beaked common dolphin and the harbor porpoise would also benefit from a winter seasonal prohibition in the Mid-Atlantic WEAs.

Although winter is when it is believed that peak migration occurs, there are occurrences of right whales in the Mid-Atlantic during the spring, summer, and fall (May-October). Sightings and acoustic monitoring data from the New Jersey Baseline Study (Section 4.1.2.3 of this EA) shows the occurrence of marine mammals in all four seasons from the passive acoustic monitoring data and sightings of marine mammals concentrated between March and June. Thus, right whales could occur in all seasons in at least the New Jersey WEA. Enough uncertainty exists regarding the spatial and temporal extent of the migratory corridor for right whales that it appears unlikely that the seasonal exclusion would fully eliminate the chances of a right whale being exposed to harassing or disturbing levels of noise and/or vessel traffic. Given BOEM's mandatory project design criteria detailed in Appendix B (particularly the exclusion zone), it is doubtful that Alternative D would present substantial marginal additional protection for whales. It is therefore unlikely that Alternative D would have substantially different consequences to right whales and marine mammals than would Alternative A.

Sea Turtles: The winter prohibition would narrow the window of activity in and around the WEAs, concentrating activities that would have been performed in the winter into spring, summer, and fall. Sea turtle occurrence in the Mid-Atlantic WEAs is greatest in the summer season. Thus sea turtles would not benefit from the winter prohibition. To the contrary, under Alternative D, the likelihood that the activities associated with Alternative D would impact sea turtles would likely increase, as whatever work would have been done in the winter would simply be added in the spring, fall, and summer. BOEM does not anticipate that much survey work would be conducted during the winter as allowed for under Alternative A. However, due to potential displacement of limited winter activities to the summer, potential for impacts to sea turtles would increase somewhat from that anticipated under the Alternative A.

Birds: It is not expected that Alternative D would significantly increase the potential impacts the piping plovers or roseate terns. They are present in the Mid-Atlantic from April to September. By early April, both species have migrated north back to their breeding grounds in the Mid-Atlantic and New England where they remain close to shore to feed and provision for their offspring. At the end of the breeding season (August-September), individuals aggregate near shore before migrating southward the South Atlantic and Caribbean by mid-September. Since these birds migrate south of the Mid-Atlantic WEAs for the winter, a winter prohibition would not benefit them. Since most their activity is restricted to nearshore waters, the concentration of activity in the summer months is not expected to increase impacts relative to Alternative A. Thus the total impacts to birds relative Alternative A is anticipated to be neutral.

Bats: Section 4.1.2.6, which describes the reasonably foreseeable impacts of Alternative A on bats, concluded that, while it is unlikely that bat species would be foraging or migrating through the WEAs, these mammals may on occasion be driven to the project area by prevailing winds and weather. The only potential impact to bats presented by Alternative A would be the possibility that bats blown into the project area could possibly collide with a meteorological tower or buoy. It is not expected that Alternative A would have any measurable impact on bats. Since bat impacts do not have a seasonal component related to construction and survey activity it is not expected to impact bats in any case, BOEM does not anticipate that that there would be any difference in the impacts to bats between Alternative D and Alternative A.

Benthic Resources: Although Alternative D would not increase or decrease the reasonably foreseeable impacts to benthic geological features, the impacts to submerged aquatic vegetation (SAV) may vary due to their seasonal life cycle. In general, SAV such as macroalgae and seagrasses are most productive during the spring and summer. In the case of macroalgae, they bloom in the spring and are persistent throughout the summer becoming dormant in the winter.

Seagrass, primarily *Zostera marina*, flower in the spring and release their seeds between May and August. The seeds germinate in the fall. Concentrating bottom-disturbing activity in late spring, summer, and fall may increase potential impacts during the reproductive phase. Additionally, these impacts are further reduced due to best management practices to avoid disturbance to seagrass beds. Some benthic invertebrates are also dormant in winter. These species may be more vulnerable to bottom disturbances during the winter, as they may be immobilized in the sediment. In the spring, summer, and fall, motile invertebrates have the capability to leave a disturbed area, thus gaining some benefit from a seasonal prohibition. Impacts to benthic invertebrates as a whole are not expected to be significantly different from those anticipated under Alternative A if activities are concentrated in the spring, summer, and fall months. As a whole, impacts to benthic resources is not expected to differ greatly from that in Alternative A even with the slightly negative effects to SAV and slightly positive effects to benthic invertebrates.

<u>Fish and Essential Fish Habitat (EFH)</u>: Section 4.1.2.7, which describes the reasonably foreseeable impacts of Alternative A on fish and EFH, concluded that the activities associated with Alternative A and the potential effects of HRG survey noise on marine fish are generally expected to be limited to avoidance around the HRG survey activities, short-term changes in behavior, and limited and temporary loss of habitat from during the installation of meteorological towers and buoys. Thus, potential population-level impact on fish for HRG surveys is not anticipated.

Sub-bottom sampling, construction of meteorological towers, and the installation of meteorological buoys could affect local benthic habitats. The seabed disturbance footprint of sub-bottom sampling would be small; it is expected that this activity would have negligible effects on benthic habitat, and that this disturbance would have a negligible, if detectible, impact on federally-managed fish species that may occur in the Delaware WEA. Impacts related to meteorological towers/buoys installation and decommissioning is expected to be minor and not expected to result in changes in local community assemblage and diversity.

Fish could be exposed to operational discharges or accidental fuel releases from construction sites and construction vessels and to accidentally released solid debris. The entanglement in or ingestion of OCS-related trash and debris by fish would not be expected during normal operations. Impacts to fish and their habitat from the discharge of waste materials or the accidental release of fuels are expected to be minor.

The impacts to fish and EFH are expected to differ from Alternative A in the case of migratory fish such as tunas, bluefish, and herrings. Impacts to the biological benthic resources are discussed in the preceding section. Migratory fish tend to be warm water migrants along the Atlantic coast. This means they will be moving into the Mid-Atlantic bight in the late spring through early summer. Thus they would not benefit from a winter prohibition on activity as they would likely be located in warmer southern waters including the Gulf of Mexico and the Caribbean during the winter prohibition period. One might expect a slightly negative impact on these migratory species, as activity would be restricted to periods when they are present in the Mid-Atlantic. However, since these species are fast swimmers they are expected to quickly flee an area that is being disturbed through site characterization surveys and construction/installation of meteorological platforms. So although the chance of exposure to disturbing impacts to migratory fish are greater under Alternative D than Alternative A, the actual impacts to these species is not expected to differ substantially from those associated with Alternative A.

Socioeconomic Conditions

Recreational Resources: Section 4.1.3.2, which describes the reasonably foreseeable impacts of Alternative A on recreational resources, concluded that, due to the distance of the proposed lease areas from shore and the fact that that no new coastal infrastructure is proposed, no impacts to coastal recreational resources from meteorological towers or buoys and spills within the WEAs are expected. Section 4.1.3.2 also concluded that the increase in vessel traffic associated with Alternative A would not significantly affect recreation in the coastal areas or oceans outside any of the potentially affected states. While impacts could occur from marine trash and debris associated with Alternative A, they would unlikely be perceptible to beach users or administrators.

Although Alternative D would restrict activity to the period when people would be recreating along the Mid-Atlantic coast, the impacts are not expected to differ from those under Alternative A. This is primarily due the fact that any noticeable increase in vessel traffic would likely be restricted to industrial port areas, where there is less recreating. Thus, the impacts to recreational resources under Alternative D are not expected to be greater or less than the impacts expected under Alternative A.

Demographics: Section 4.1.3.3, which describes the reasonably foreseeable impacts of Alternative A on demographics, concluded that, due to the magnitude, dispersed nature, and short duration of survey, construction, and decommissioning activities, any benefit to local economies or employment would be minor and short-term. Also these activities are not expected to employ many workers relative to the existing employment numbers.

There is no perceptible seasonal component to affected demographic groups from site characterization surveys and construction/installation of meteorological towers/buoys. Thus, the impacts to demographics from Alternative D do not differ from those discussed in Alternative A.

Environmental Justice: Section 4.1.3.4, which describes the reasonably foreseeable impacts of Alternative A related to environmental justice issues, concluded that Alternative A would have no impacts on the environmental or health-related conditions of minority or low-income populations. Only the use of existing coastal facilities has the potential to impact minority or low-income populations. However, no expansion of these existing onshore areas is anticipated to support Alternative A or Alternative D, and significant increases in activity at these existing facilities is not anticipated as a result of either Alternative A or Alternative D. As a result, neither Alternative A nor Alternative D is expected to have disproportionately high or adverse environmental or health effects on minority or low-income populations.

Land Use and Coastal Infrastructure: Section 4.1.3.5, which describes the reasonably foreseeable impacts of Alternative A on land use and coastal infrastructure, concluded that existing ports or industrial areas are expected to be used, and that expansion of these existing facilities is not anticipated to support Alternative A. This assumption also applies to Alternative D. It is not expected that land use and coastal infrastructure (i.e., ports) would be differentially affected by a seasonal restriction on certain activities. Although there would be a concentration if activity in the spring, summer, and fall, it is expected that the ports and other infrastructure would be able to accommodate this activity. Thus, the impacts to land use and coastal infrastructure from Alternative D do not differ from those discussed in Alternative A.

Commercial and Recreational Fishing Activities: Section 4.1.4.6, which describes the reasonably foreseeable impacts of Alternative A on commercial and recreational fishing activities, concluded that the increase in vessel traffic, and activities from the installation/operation of the meteorological towers and buoys would not measurably impact commercial or recreational fishing activities, total catch of fish and shellfish, or navigation. Any impacts, such fishing displacement and target species availability, would be of short duration, limited in area, and temporary. Proposed mitigation measures (notifying fisherman of construction and decommissioning activities, and verification and evidence of site clearance) would further reduce or eliminate any potential minor impacts on fisheries.

Although commercial and recreational fishing occur year-round, the bulk of activity occurs in the summer months. Thus, although a winter prohibition may slightly benefit some winter fisheries; most fishing activity would not accrue any benefit from Alternative D. The concentration of activity to the spring, summer, and fall may slightly increase the vessel traffic in areas fished and transited by commercial and recreational fishing vessels. However, as explained under Alternative A, these impacts are expected to be of short duration within a limited area. Thus the overall impacts from Alternative D in comparison to Alternative A are not expected to be significantly different.

Other Uses of the OCS: Section 4.1.3.7, which describes the reasonably foreseeable impacts of Alternative A on other uses of the OCS, concluded that minor direct impacts on vessel traffic density and patterns would occur from routine activities associated with Alternative A.

Under Alternative D impacts to other uses of the OCS are not expected to differ from that described in Alternative A. Military and marine transportation uses of the OCS occur year-round. Restricting site characterization surveys and construction/installation of meteorological towers/buoys to the spring, summer, and fall would not alter the impacts that are given in Alternative A as the activities are not heavily influence by seasonality and slight increases or decreases of activities therein.

Summary/Conclusion

Alternative D would appreciably reduce the risk of vessel strikes to North Atlantic right whales and other marine mammals in and around the WEAs. Other resources that have a seasonal component that might be affected by site characterization surveys and/or meteorological tower/buoy construction/installation may have slightly positive to slightly negative impacts depending on the specific resource. As a whole, it is not anticipated that the impacts are substantially different between Alternatives A and D for resources other than the North Atlantic right whale, and other cetacean species, such as fin, minke, and humpback whales, as well as the short-beaked common dolphin and the harbor porpoise. Since Alternative D would be narrowing the window of time to complete construction and site characterization activities and additional biological surveys, there would be slightly greater impacts on air and water quality than under Alternative A.

As detailed in Section 4.1.2.3 of this EA, right whales could occur in all seasons in at least the New Jersey WEA. The mandatory project design criteria detailed in Appendix B requires observers outside of the estimated peak Mid-Atlantic migration period. Enough uncertainty exists regarding the spatial and temporal extent of the migratory corridor for right whales, and the predicted impact to this species under Alternative A is sufficiently minor, that it appears unlikely that the seasonal exclusion in Alternative D would provide substantially more protection for right whales than would the selection of Alternative A.

4.5 Alternative E – Removal of Inclement Weather Diversion Area Offshore Virginia (Proposed Action and Preferred Alternative)

Description of the Alternative

In response to the NOI, the American Waterways Operators (AWO) raised concerns regarding navigational safety in inclement weather and requested that BOEM exclude eight OCS lease blocks (6013, 6014, 6063, 6064, 6113, 6114, 6163, and 6164) within the Virginia WEA from leasing consideration (*see* Figure 2.2). The AWO states that:

> Under inclement weather conditions, vessel traffic plans require north and south bound tugboats, barge, and ATBs [articulated tug barges] to divert westward approximately 24 nm from Virginia Beach, through the proposed area of interest, between OCS leasing blocks 6013, 6014, 6063, 6064, 6113, 6114, 6163 and 6164. This area provides tugboats and barges with safer operating conditions, enough depth for tow-wires to sag 50 to 75 feet and provides ATBs with enough depth for under-keel clearance. Towing vessels would be forced to divert further west, away from the proposed area, in order to safely navigate around wind turbines. Diverting west, tugboats and barges would have to shorten their tow-wires and decrease speeds, placing crewmembers, vessels and cargo at additional risk, along with decreased maneuverability as they navigate through the shoals south of the Chesapeake Light Tower. To avoid navigating through such hostile environments, vessels would have to be delayed while captains plot alternative bad weather diversion routes.

In response to the NOA of a draft version of this EA, AWO, after consulting with their members who are intimately familiar with the area, informed BOEM that its comments stated above were incorrectly drafted. In a letter dated August 22, 2011, AWO revised its previous comment as follows:

> AWO believes it would be preferable instead to create a channel on the most western edge of the leasing blocks by eliminating a column of parcels on the most western edge of the leasing blocks by eliminating a column of parcels on the western edge of the proposed area [full OCS blocks 6111 and 6161, and partial OCS blocks 6011, 6061, 6110, and 6160]. This change will preserve an area currently used by members during inclement weather while making a large block of undeveloped ocean available for alternative energy development.

As part of its continuing consultation with the USCG, BOEM requested that the USCG identify those OCS blocks in the Virginia WEA that, should wind energy installations be placed on them, would present navigational safety issues. On September 26, 2011, the USCG identified areas it believes would pose navigational risks should structures be installed on those leases (*see* Figure 2.2). Like it did in its analysis of the Maryland WEA, the USCG categorized these two full and five partial OCS blocks as Category A areas. The area identified by the USCG as Category A is the same as that identified as an area of concern by the AWO, except the USCG also found risk present in three additional aliquots in OCS blocks 6012.

Although BOEM is not currently considering approving any COPs for wind energy generation facilities in any area offshore the Mid-Atlantic States, BOEM may not want to give priority to issuing leases in areas that the USCG currently believes would not be suitable for development in the future (*see* Section 2.3). Based on the USCG's recommendation and BOEM's own preliminary analysis of vessel traffic data, BOEM has identified Alternative E as the proposed action and the preferred alternative.

BOEM revised Alternative E accordingly. Under the revised Alternative E, these areas identified by AWO and USCG would be excluded from leasing decisions under this action (*see* Figure 2.2). As a result, an area slightly less than of 20 OCS blocks in the Virginia WEA would be considered for leasing and subsequent site assessment activities under Alternative E. Based simply on the reduction of the area potentially leased, there would be an 19% reduction in site characterization surveys in Virginia (about a 4% reduction in overall site characterization surveys potentially occurring in all WEAs). Due to the reduction in area, one less lease is anticipated in the Virginia WEA; therefore, one fewer meteorological tower and/or two fewer meteorological buoys would be constructed (*see* Section 3.1.3 discussing reasonably foreseeable site assessment scenarios).

Under alternative E, the scenario and impact analysis would be the same as that described under Alternative A for the WEAs offshore New Jersey, Delaware, and Maryland.

Table 4.17

Projected Site Characterization and Assessment Activities for Alternative E (Removal of Inclement Weather Diversion and USCG Category A Areas Offshore Virginia)

Wind Energy Area (WEA)	Lease-holds	Site Characterization Activities		Site Assessment Activities	
		High Resolution Geophysical (HRG) Surveys (max nm/hours)	Sub-bottom Sampling (min-max)	Meteorological Towers (max)	Meteorological Buoys (max)
New Jersey	7	31,100/6,900	900-2,500	7	14
Delaware	1	9,300/2,100	300-700	0	1
Maryland	2	7,100/1,600	200-600	2	4
Virginia	2	10,200/2,300	300-800	2	4
Total	12	57,700/12,800	1,700-4,700	11	23

Effects of the Alternative

Physical Resources

<u>Air Quality</u>: Section 4.1.1.1, which describes the reasonably foreseeable impacts of Alternative A on air quality, concluded that due to the distance from shore, neither routine activities nor non-routine events within the WEAs would impact onshore air quality. Similarly, Section 4.1.1.1, concludes that the amount of additional vessel traffic associated with Alternative A would not significantly affect onshore air quality in any of the potentially affected state.

The reduced level of survey and construction activities under Alternative E would reduce emissions within the vicinity of Virginia and the Virginia WEA associated with site characterization and site assessment by 18%. Due to the short duration or low level of emissions from routine activities, potential impacts on ambient air quality from Alternatives A and F would remain negligible, if detectible.

Water Quality: Section 4.1.1.2, which describes the reasonably foreseeable impacts of Alternative A on water quality, concluded that impacts to coastal and marine waters from routine activities associated with Alternative A, if detectible, would be of short duration and remain minimal. Should an oil spill occur, the localized impact on water quality would be negligible, as diesel is light and would become dispersed, evaporate, and biodegrade within a few days. Since collisions occur infrequently, the potential impacts to water quality associated with Alternative A are not expected to be significant. Under Alternative E, the reduced level of bottom disturbing activities associated with surveys and construction would reduce impacts to water quality within the vicinity of the Virginia WEA. Approximately 4% fewer of total survey, construction and support vessel trips would similarly reduce the risk of diesel spills in coastal waters, mainly in Virginia, and would also reduce the amount of bilge and other vessel discharges into harbor and coastal waters, as well as the waters above the WEA offshore Virginia.

Biological Resources

Coastal Habitats: Section 4.1.2.1, which describes the reasonably foreseeable impacts of Alternative A on coastal habitats, concluded that no direct impacts on coastal habitats would occur from routine activities as a result of Alternative A due to the distance of the WEAs from shore and the use of heavily-trafficked vessel routes and existing port facilities. Indirect impacts from routine activities may occur from wake erosion and associated added sediment caused by increased vessel traffic in support of Alternative A, but in light of the amount of existing vessel traffic in waterways and in light of the minimal increase in traffic in any single waterway associated with Alternative A, these impacts would be negligible if detectible. Under Alternative E, fewer survey, construction, and support vessel trips would occur in and around the Virginia WEA than contemplated in Alternative A. This would reduce whatever increase of wake-induced erosion and risk of diesel spills in coastal waters, and reduce the amount of potential vessel discharge in and around the Virginia WEA. As a result, Alternative E would lead to fewer impacts to the Coastal habitat, primarily in Virginia, than would Alternative A.

Benthic Resources: Section 4.1.2.2, which describes the reasonably foreseeable impacts of Alternative A on benthic resources, concluded that impacts of site characterization, and the construction, operation, and removal of meteorological towers and buoys on benthic communities would be short-term in duration and negligible in extent. The primary potential impacts of Alternative A on benthic communities would be associated with the construction, operation, and decommissioning of meteorological towers, or the installation of meteorological buoys. Impacts would be caused by contact via anchors, driven piles, and scour protection that could cause crushing or smothering.

Potential impacts from non-routine events, such as a diesel spill, are also anticipated 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.

Under Alternative E, there would be no potential for bottom-disturbing activities within the excluded blocks, and therefore, no potential to impact benthic habitats located there.

Marine Mammals: Section 4.1.2.3, which describes the reasonably foreseeable impacts of Alternative A on marine mammals, concluded that Alternative A would minimally or negligibly effect marine mammals and that the proposed alternative would impact marine mammals in an episodic fashion. Specifically, harassment from sound (sonar during surveys and short-duration pile driving) and slight increases in the risk of vessel collisions associated with surveys and construction are the primary activities that could impact marine mammals.

Under Alternative E, the lower level of site characterization and site assessment activity would reduce the potential exposure of marine mammals to noise from surveys, vessel traffic, and pile driving offshore Virginia. The reduced vessel traffic would also lower the risk of vessel collisions with marine mammals to the same proportion that vessel traffic would be reduced from that anticipated in connection with Alternative A.

Sea Turtles: Section 4.1.2.4, which describes the reasonably foreseeable impacts of Alternative A on sea turtles. These impacts are expected to be short-term and would result in minimal to negligible harassment depending on the specific activity at issue. Specifically, harassment from noise associated with pile driving and sonar surveys, minor displacement from forage areas during construction, decommissioning, and survey activities, and to a lesser degree, vessel collisions, are the primary anticipated impacts to ESA-listed sea turtles.

Under Alternative E, the lower level of activity would reduce the exposure of sea turtles in the area of the Virginia WEA to noise from surveys, vessel traffic, and pile driving offshore Virginia. The reduced vessel traffic would lower the risk of vessel collisions with sea turtles and reduce the potential for displacement from forage areas offshore Virginia.

Birds: Section 4.1.2.5, which describes the reasonably foreseeable impacts of Alternative A on birds, concludes that, while birds may be affected by vessel discharges and the presence of meteorological towers and buoys, accidental fuel release is unlikely and the risk of collision with structures would be minor due to the small number of meteorological towers proposed, and their distance from shore and each other.

Under Alternative E one less meteorological tower and two fewer buoys are projected to be constructed as a result of not leasing the two full and four partial OCS blocks of the Virginia WEA, which would reduce the overall risk of bird collisions. Since Alternative E contemplates two meteorological towers and four meteorological buoys within the WEA as opposed to the three meteorological towers and six meteorological buoys contemplated by Alternative A, Alternative E presents one-third the risk that birds will collide with structures within the Virginia WEA.

Bats: Section 4.1.2.6, which describes the reasonably foreseeable impacts of Alternative A on bats, concluded that, while it is unlikely that bat species would be foraging or migrating through the WEAs, these mammals may on occasion be driven to the project area by prevailing winds and weather. The only potential impact to bats presented by Alternative A would be the possibility that bats blown into the project area could possibly collide with a meteorological tower or buoy. Because of the anticipated distance between the anticipated meteorological towers and buoys, there would be no additive effect of constructing all the anticipated meteorological towers or placement of buoys on bats. It is not expected that Alternative A would have any measurable impact on bats. The current holder of the Interim Policy lease in the area could install a meteorological tower structure even if the No Action alternative were selected (*see* Interim Policy EA (USDOI, MMS, 2009a)).

Under Alternative E one less meteorological tower and two fewer buoys are projected to be constructed as a result of not leasing the two full and four partial OCS blocks of the Virginia WEA, which would reduce the overall risk of bat collisions. Since Alternative E contemplates two meteorological towers and four meteorological buoys within the WEA as opposed to the three meteorological towers and six meteorological buoys contemplated by Alternative A, Alternative E presents one-third the risk that bats will collide with structures within the Virginia WEA.

<u>Fish and Essential Fish Habitat (EFH)</u>: Section 4.1.2.7, which describes the reasonably foreseeable impacts of Alternative A on fish and EFH, concluded that the activities associated with Alternative E and the potential effects of HRG survey noise on marine fish are generally expected to be limited to avoidance around the HRG survey activities, short-term changes in behavior, and limited and temporary loss of habitat from during the installation of meteorological towers and buoys. Thus, potential population-level impact on fish for HRG surveys is not anticipated.

Sub-bottom sampling, construction of meteorological towers, and the installation of meteorological buoys could affect local benthic habitats. The seabed disturbance footprint of sub-bottom sampling would be small; it is expected that this activity would have negligible effects on benthic habitat, and that this disturbance would have a negligible, if detectible, impact on federally-managed fish species that may occur in the Delaware WEA. Impacts related to meteorological towers/buoys installation and decommissioning is expected to be minor and not expected to result in changes in local community assemblage and diversity.

Fish could be exposed to operational discharges or accidental fuel releases from construction sites and construction vessels and to accidentally released solid debris. The entanglement in or ingestion of OCS-related trash and debris by fish would not be expected during normal operations. Impacts to fish and their habitat from the discharge of waste materials or the accidental release of fuels are expected to be minor.

Under Alternative E, the lower level of activity would reduce the exposure of fish to noise from surveys and vessel traffic and potential discharges by approximately seven percent offshore Virginia, and pile driving offshore Virginia by one-third. There would be no potential for bottom disturbing activities to impact EFH located within the excluded blocks under Alternative E.

Socioeconomic Conditions

<u>Offshore Archaeological Resources</u>: Section 4.1.3.1, which describes the reasonably foreseeable impacts of Alternative A on offshore archaeological resources, concluded that the information generated from the lessee's initial site characterization activities and should provide an adequate picture of the presence of significant and/or unique archaeological resources within the WEAs and along potential cable routes to shore. As a result, the potential for seafloor/bottom-disturbing activities (e.g., anchorages and installation of meteorological towers and buoys) to cause damage to or loss of significant and/or unique archaeological information would be

avoided. Under Alternative E, there would be no potential for bottom-disturbing activities to impact archeological resources located within the excluded blocks.

Recreational Activities: Section 4.1.3.2, which describes the reasonably foreseeable impacts of Alternative A on recreational resources, concluded that, due to the distance of the proposed lease areas from shore and the fact that that no new coastal infrastructure is proposed, no impacts to coastal recreational resources from meteorological towers or buoys and spills within the WEAs are expected. Section 4.1.3.2 also concluded that the increase in vessel traffic associated with Alternative A would not significantly affect recreation in the coastal areas or oceans outside any of the potentially affected states. While impacts could occur from marine trash and debris associated with Alternative A, they would unlikely be perceptible to beach users or administrators.

The excluded blocks under Alternative E are located so far offshore that a meteorological tower located within those blocks would not be visible from shore in any case. Not leasing in this area would present no different impact, insofar as structures are concerned, than does Alternative A on recreational resources. Under Alternative E, vessel traffic and survey activities would be reduced by approximately seven percent. As a result, assuming that vessel traffic associated with the Virginia WEA would traverse Virginia coastal and harbor-related waters, Alternative E would slightly reduce the risk that vessel traffic and discharges could impact recreational activities within Virginia.

Demographics: Section 4.1.3.3, which describes the reasonably foreseeable impacts of Alternative A on demographics, concluded that, due to the magnitude, dispersed nature, and short duration of survey, construction, and decommissioning activities, any benefit to local economies or employment would be minor and short-term. Also these activities are not expected to employ many workers relative to the existing employment numbers. Due to the reduced level of site characterization surveys and site assessment activities offshore Virginia as compared with Alternative A, Alternative E is expected to produce slightly fewer positive impacts on the population and employment of coastal counties of Virginia, assuming that the activities in the Virginia WEA would be supported by facilities in Virginia.

Environmental Justice: Section 4.1.3.4, which describes the reasonably foreseeable impacts of Alternative A related to environmental justice issues, concluded that Alternative A would have no impacts on the environmental or health-related conditions of minority or low-income populations. Only the use of existing coastal facilities has the potential to impact minority or low-income populations. However, no expansion of these existing onshore areas is anticipated to support Alternative A or Alternative E, and significant increases in activity at these existing facilities are not anticipated as a result of either Alternative A or Alternative E. As a result, neither Alternative A nor Alternative E is expected to have disproportionately high or adverse environmental or health effects on minority or low-income populations.

Land Use and Coastal Infrastructure: Section 4.1.3.5, which describes the reasonably foreseeable impacts of Alternative A on land use and coastal infrastructure, concluded that existing ports or industrial areas are expected to be used, and that expansion of these existing facilities is not anticipated to support Alternative A. This assumption also applies to Alternative E. Assuming that Virginia coastal infrastructure would be used to support activities in the WEA offshore Virginia, the selection of Alternative E would reduce the need for Virginia's coastal infrastructure for survey vessels by approximately seven percent, and for the fabrication and/or staging of towers or buoys by one-third. As a result, Alternative E would have less impact on land use or coastal infrastructure in Maryland than would Alternative A.

Commercial and Recreational Fishing Activities: Section 4.1.4.6, which describes the reasonably foreseeable impacts of Alternative A on commercial and recreational fishing activities, concluded that the increase in vessel traffic, and activities from the installation/operation of the meteorological towers and buoys would not measurably impact commercial or recreational fishing activities, total catch of fish and shellfish, or navigation. Any impacts, such fishing displacement and target species availability, would be of short duration, limited in area, and temporary. Proposed mitigation measures (notifying fisherman of construction and decommissioning activities, and verification and evidence of site clearance) would further reduce or eliminate any potential minor impacts on fisheries.

Under Alterative E, there would be no potential for site characterization surveys and site assessment activities to conflict with commercial fishing within the excluded blocks. Compared to Alternative A, Alternative E may reduce the potential for fishing-use conflict within and around the WEA offshore Virginia. However, due to the distance from shore of the excluded blocks, recreational fishing is unlikely to take place there. As a result, Alternative E would not likely benefit or otherwise affect recreational fishing in any manner other than that described in Alternative A.

Other Uses of the OCS: Section 4.1.3.7, which describes the reasonably foreseeable impacts of Alternative A on other uses of the OCS, concluded direct impacts on vessel traffic density and patterns would occur from routine activities as a result of Alternative A. Under Alternative E, survey and construction activities that would impact vessel traffic density and patterns would not occur in the excluded blocks that were identified by AWO and USCG as has having navigational safety issues. Therefore, Alternative E would provide a reduction in the overall risk of collisions and allisions than would result from selecting Alternative A. In addition, the reduction in the overall level of vessel traffic associated with the Virginia WEA, compared to Alternative A, would reduce the risk collisions, while one less meteorological tower would reduce the risk of allisions within the Virginia WEA.

Summary/Conclusion

The potential impacts of Alternative E would differ from Alternative A only within the Virginia WEA and in the coastal and harbor areas of Virginia. There would be no potential for bottom disturbing activities to impact benthic habitats or archeological resources located within the excluded blocks. While there is still the potential for conflicts with other uses of the OCS in the remaining areas in the Virginia WEA, there would be no potential for conflict within the excluded blocks.

Compared to Alternative A, the reduced level of survey and construction activities under Alternative E would reduce the impacts on air and water quality within the vicinity of the Virginia WEA. Reduced vessel traffic and fewer structures would reduce the risk of vessel collisions and allisions, reducing the risk of a diesel spill. The lower level of activity would reduce the exposure of marine mammals, sea turtles, and fish to noise from surveys, vessel traffic, and pile driving in and around the WEA. The reduced vessel traffic would also lower the risk of vessel collisions with marine mammals and sea turtles. There would be less loss/displacement of sea turtles from forage areas under Alternative E. One less meteorological tower is projected to be constructed as a result of not leasing the 2 full and 4 partial OCS blocks of the Virginia WEA, which would reduce the overall risk of bird collisions. While the same existing onshore facilities would be used in support of the site characterization surveys and site assessment in the remainder of the Virginia WEA, fewer survey, construction and support vessel trips would reduce the increase of wake induced erosion and risk of diesel spills in coastal waters and ports, mainly in Virginia. Alternative E is expected to produce slightly fewer positive impacts on the population and employment of coastal counties of Virginia.

Under Alternative E, survey and construction activities that would impact vessel traffic density and patterns would not occur in the excluded blocks that were identified by the American Waterways Operators and USCG as presenting navigational safety issues. Alternative E would provide a greater reduction in the risk of collisions and allisions than would result from simply reducing the level of activity alone.

4.7 Alternative F – No Action

Description of the Alternative

Under the No Action Alternative, no commercial or research leases to develop wind energy would be issued and there would be no approval of additional site assessment activities within the WEAs offshore New Jersey, Delaware, Maryland and Virginia at this time. Site assessment activities authorized under the four Interim Policy leases offshore New Jersey and Delaware (*see* Section 1.6 of this EA) could still occur. While site characterization surveys are not under BOEM's jurisdiction and could still be conducted, it is not likely that these activities would occur without a commercial energy lease.

Effects of the Alternative

Any potential environmental and socioeconomic impacts, described in Section 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 offshore Maryland and Virginia would also not occur or would be postponed. Opportunities for the collection of meteorological, oceanographic and biological data offshore New Jersey and Delaware would be limited to the four existing Interim Policy leases.

Summary/Conclusion

Any potential environmental and socioeconomic impacts, described in Section 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 offshore Maryland and Virginia would also not be presented to potential applicants, or would be postponed. Opportunities for the collection of meteorological, oceanographic, and biological data offshore New Jersey and Delaware would be limited to the four existing Interim Policy leases.

Under the no action alternative, the collection of data necessary to successfully determine the feasibility of all of the proposed lease areas for commercial wind energy development from a dedicated data collection facility would not occur and site characterization surveys would not likely occur.

4.8 Cumulative Impacts

Cumulative impacts are the impacts on the environment that result from the incremental impact of Alternative A when added to other past, present, and reasonably foreseeable future actions regardless of what agency, industry, or person undertakes the other actions. *See* 40 CFR 1508.7. The purpose of this EA is to issue leases and approve site assessment plans, which allows the installation of meteorological facilities. Additional analysis under NEPA will be required before any future decision is made regarding construction or operation of any wind energy facility on leases that may be issued within the WEAs. BOEM is not currently reviewing any COP, nor has any COP been submitted for the agency's consideration in the aforementioned WEAs. The purpose of conducting surveys and installing meteorological measurement devices is to assess the wind resources in the lease area and to characterize the environmental and socioeconomic resources and conditions so that a lessee can determine whether the site is suitable for commercial development and, if so, submit a COP for BOEM review.

Chapter 7.6.2 of the Programmatic EIS discusses generic cumulative impacts associated with leasing on individual environmental and socioeconomic resources. The hallmark of the affected environment for Alternative A is one of past, present, and reasonably foreseeable human-induced impacts over an extended period of time. This EA has discussed Alternative A in context of these past and present activities, and in the case of navigational safety, future increases in vessel traffic (e.g, increase in shipping in the future, widening of the Panama Canal, etc.). *See* Section 4.1.3.7. The following summarizes the cumulative impacts discussed in the EA and will focus on the incremental impact of Alternative A when added to other reasonably foreseeable future actions, which include proposed renewable energy projects in New Jersey State waters and offshore New York, existing interim policy leases, and existing meteorological facilities on the OCS.

Onshore

As discussed in Section 4.1.3.5, there are nine major ports and 28 smaller ports in New Jersey, Delaware, Maryland, and Virginia that could support Alternative A. These existing sites would be used as fabrication sites, staging areas, and crew/cargo launch sites for the installation, operations and decommission of meteorological towers and buoys, and to conduct site characterization surveys. Some of the major ports are among the busiest in the nation, and all would be accessed by already heavily used waterways.

As discussed in Section 4.1.2.1, while New Jersey, Delaware, Maryland, and Virginia have a complex range of diverse coastal habitats consisting of barrier islands, sand spits, beaches, dunes, tidal and non-tidal wetlands, mudflats, and estuaries, much of the Atlantic shoreline in these states has been altered in some degree, and most of the coastal habitats have been impacted by human activities. Much of this alteration has been from development, agriculture, maritime activities, beach replenishment, or shore protection activities, such as jetties (USDOI, MMS, 2007a).

New Jersey, Delaware and Maryland

Due to their proximity to three of the WEAs, it is anticipated that the coastal areas of New Jersey, Delaware and Maryland would host the majority of the activity associated with the WEAs offshore those states.

As discussed in Section 4.1.2.1, while New Jersey, Delaware, and Maryland have a complex range of diverse coastal habitats consisting of barrier islands, sand spits, beaches, dunes, tidal and non-tidal wetlands, mudflats, and estuaries, much of the Atlantic shoreline in these states has been altered in some degree, and most of the coastal habitats have been impacted by human activities. For example, New Jersey is considered the most developed and densely populated shoreline in the country (Richard Stockton College, Coastal Research Center, 2011).

Several of the ports that would support Alternative A would be access by the Delaware Bay and Delaware River. Delaware Bay is important ecologically and commercially to the region. The Delaware estuary wetlands, which include the Delaware Bay area, provide critical habitat for 35 percent of the region's threatened and endangered species (Adkins, 2008) (*see* Section 4.1.2.1). The Delaware Bay is also home to the world's largest freshwater port with over 3,000 commercial vessel arrivals annually (Marriott and Frantz, 2007). The Port of Wilmington is the busiest terminal, handling over 400 vessels per year, on the Delaware River, which passes through the urban and industrialized areas (Port of Wilmington, 2011) (*see* Section 4.1.3.5.2).

As discussed in Section 4.1.3.3 of this EA, New Jersey, Delaware and Maryland, like the rest of the Atlantic region, are comprised of heterogeneous sociocultural and economic systems. In 2008, the shore adjacent counties of these three states had populations of over 8 million, nearly a quarter of a million businesses, over 3.6 million jobs, and nearly $185 billion in wages.

Virginia

Due to their proximity to the Virginia WEA, it is anticipated that the coastal areas of Virginia would host the majority of the activity associated with the WEA offshore Virginia.

While the Chesapeake Bay, which includes coastlines for both Maryland and Virginia, is the world's third largest estuary, it is also an important commercial waterway and near many large commercial, industrial, and urban areas. There are numerous large and small ports located along the Chesapeake Bay in Virginia, especially the large port in the Hampton Roads area, which could be used to support activities associated with Alternative A. As discussed in Section 4.1.2.1, growing commercial, industrial, recreational and urban activities threaten the Chesapeake Bay and its living resources.

As discussed in Section 4.1.3.5 of this EA, Virginia, like the rest of the Atlantic region, is comprised of heterogeneous sociocultural and economic systems. In 2008, the counties of Virginia adjacent to the shoreline had populations of about 2.2 million, over 60,000 establishments, over 1.1 million jobs, and about $53.5 billion in wages.

Incremental Contribution of Alternative A

Over 12,000 round trips are anticipated from site characterization and assessment activities associated with Alternative A over a five and one-half year period, if the entire area of each WEA would be leased and the maximum amount of site characterization surveys would be conducted in the leased areas of the WEAs. These trips would be divided among nine major and 28 smaller existing ports in Delaware, New Jersey, Maryland, and Virginia. Due to proximity, it is assumed the majority of traffic associated with site characterization and assessment of the Virginia WEA (about 2,800 round trips) would be supported by the 3 major and 9 smaller ports in Virginia. If all ports are used equally, this would average about 45 round trips per year to each of the Virginia ports. Based simply on the number of ports in each state, traffic associated with site characterization and assessment of the WEAs offshore New Jersey (about 6,400 round trips), Delaware (about 1,200 round trips) and Maryland (about 1,700 round trips) would be divided as follows: over half of the traffic supported by 3 major and 11 smaller ports in New Jersey; and the remainder of the traffic split between 3 major and 8 smaller ports in Delaware and Maryland. If all ports are used equally, this would average about 60 round trips per year to each of the ports in New Jersey, Delaware and Maryland.

Since Alternative A would be supported by several existing sites located in already heavily impacted areas, and would add a relatively minor amount of additional vessel traffic, the incremental impacts to coastal habitats and the economy from onshore activities associated with Alternative A would be negligible, if detectable.

Offshore

Of the other activities that would occur offshore New Jersey, Delaware, Maryland and Virginia during the five and one-half year life of Alternative A, the chief impact-producing activity is vessel traffic. For example, one of the primary human-induced threats identified for the North Atlantic right whale, among the most endangered whales in the world, is collisions with vessels (ship strikes).

With the exception of other renewable energy activities, the past, present and reasonably foreseeable future actions discussed in this section are not unique to the Mid-Atlantic WEAs or region. Migratory species, which may be impacted by Alternative A, would also experience impacts from other actions while outside of the WEAs and Mid-Atlantic region. Sections 4.1.1.3 (Marine Mammals), 4.1.1.4 (Sea Turtles), and 4.1.1.5 (Birds) discuss cumulative impacts specific to those migratory species.

All of the WEAs are located at or near the entrances to major ports and traditional coastwise routes. Like the inland waterways that would support Alternative A, offshore waters from the shoreline to the seaward extent of the WEAs are also heavily trafficked by commercial, private, or military vessels (*see* Section 4.1.3.7). This is evident by the number of ports located in New Jersey, Delaware, Maryland and Virginia (*see* Section 4.1.3.5). Millions of military, commercial and recreational vessel trips are projected to occur during the five and one-half year life of Alternative A (USDOI, MMS, 2007a).

As discussed in Section 4.1.3.7 of this EA, BOEM received an unsolicited ROW grant application from AGH for over 700 statute mile (600 nm) subsea backbone transmission system in state and federal waters offshore New York, New Jersey, Delaware, Maryland and Virginia. Since the site characterization surveys would be the same as the surveys of potential cable routes to shore under Alternative A, the potential impacts would be similar to those described in Chapter 4.1. Using the same assumptions presented in Section 3.1.1.1, the AWC proposal could result in up to 3,000 nm of additional HRG surveys and 600 bottom samples. Based on the estimated number of surveys, BOEM anticipates the AWC proposal would add 900 vessel trips to the 12,000 vessel trips anticipated as a result of Alternative A and the millions of other unrelated vessel trips that would occur during the five and one-half year life of Alternative A. The 12,900 cumulative vessel trips associated with both Alternative A and the AWC proposal that would occur in this heavily trafficked area are not anticipated to lead to significant environmental consequences. Similarly, the discussion of sub bottom sampling contained in Chapter 4 of this EA concluded that 1,800-4,800 samples that could be taken over the life of the project would have no significant impact. This conclusion remains valid even when 600 additional samples are added to the scenario.

While there are no meteorological towers or buoys currently located within any of the WEAs, there are dozens of meteorological, oceanographic, and navigational buoys located between the WEAs and between the WEAs and shore. Chapter 3 of this EA describes the reasonably foreseeable scenario regarding the placement of meteorological buoys within the

WEAs, which is projected at a maximum of 25 from the WEA offshore Virginia to the WEA offshore New Jersey. When added to the existing buoys offshore these states, the buoys associated with Alternative A are not anticipated to result in significant environmental consequences.

There are also four existing interim leases that would allow meteorological towers and buoys to be installed in the WEAs offshore Delaware and New Jersey. As discussed in Section 3.1.3 and the Interim Policy EA: *Issuance of Leases for Wind Resource Data Collection on the Outer Continental Shelf Offshore Delaware and New Jersey Environmental Assessment* (USDOI, MMS, 2009a), the reasonably foreseeable impacts of these towers and buoys would be the same as those associated with the towers and buoys contemplated in Alternative A. *See also* Section 4.1 of this EA. While there are several meteorological, oceanographic, and navigational buoys installed in vicinity of the WEAs, there are currently no meteorological towers or buoys installed within the New Jersey, Delaware, Maryland and Virginia WEAs. A total of 14 meteorological towers are projected to be installed within the WEAs as a result of Alternative A (12) and the Interim Policy leases (2). A total of 27 meteorological buoys are projected to be installed within the WEAs as a result of Alternative A (25) and the Interim Policy leases (2). Due to the distance between structures and the impacts associated with installing, maintaining, and decommissioning these structures, overlapping or additive impacts are not anticipated to be significant. Since Alternative A would account for nearly all of the meteorological towers and buoys in the WEAs, the cumulative impacts of the installation, operation and decommissioning of meteorological towers and buoys would be primarily a result of Alternative A. The addition of two meteorological towers or 4 buoys that could be associated with these interim leases, when added to the 12 meteorological towers or 25 buoys associated with Alternative A are not anticipated to result in significant environmental consequences. The cumulative impact of the meteorological towers and buoys anticipated as a result of Alternative A when added to the impact of the same on the Interim Policy leases would likely be negligible to minor on all environmental resources and socioeconomic conditions as described in Section 4.1 of this EA.

Fishermen's Energy has proposed a demonstration scale wind project, consisting of six turbines, for an area located about 2.8 miles east of Atlantic City, New Jersey, within New Jersey State waters. (*see* Public Notice CENAP-OP-R 2008-777). On May 06, 2011, Fishermen's Energy received the State permits required to start construction.

The WTGs associated with this facility would have towers and foundations similar to those of meteorological towers discussed in this EA. Unlike the meteorological towers anticipated under Alternative A, each WTG would also be comprised of rotor (blades and blade hub) and turbine assembly (gearbox and generator enclosed by a shell or nacelle). An offshore wind energy facility would also have an electric service platform (ESP).

The Fisherman's Energy project would occupy a relatively small space on the ocean (approximately 700 acres), and would not likely, in and of itself, result in substantial impact to the resources that Alternative A could also impact. (*see* Public Notice CENAP-OP-R 2008-777). When added to the predicted impacts of the Fisherman's Energy project, the reasonably foreseeable environmental consequences associated with Alternative A are not anticipated to be significant.

The Chesapeake Light platform is located 13 nm offshore Virginia Beach, west of the Virginia WEA, and is a structure that mariners navigate around. The additional three meteorological towers or six meteorological buoys that could be installed within the Virginia

WEA under Alternative A, when added to the Chesapeake Light, are not anticipated to pose a significant obstruction to marine traffic.

While over 12,000 round trips are anticipated from site characterization and assessment activities associated with Alternative A over a five and one-half year period, this is relatively minor when compared to existing vessel traffic and considering these trips would be divided among nine major and 28 smaller existing ports in Delaware, New Jersey, Maryland, and Virginia (*see* section Sections 4.1.3.5 and 4.1.3.7 of this EA). The additional vessel traffic generated by Alternative A, and the environmental consequences associated with this vessel traffic would likely be undetectable compared to the impacts of millions of military, commercial and recreational vessel trips projected to occur during the same five and one-half year period.

The New York Power Authority (NYPA) submitted to BOEM an unsolicited application for a commercial lease for an area approximately 13 nm off the south shore of Long Island, in a south eastern direction from the Rockaway Peninsula. Were the lease issued, site characterization surveys may occur during the 5 and one-half year life of the activities contemplated under the alternatives. In addition, it is possible that NYPA may submit, and BOEM may consider and approve, a SAP for the proposed NYPA lease area. In any case, BOEM would prepare the necessary NEPA analysis prior to issuing a lease to NYPA or approving or approving with modification any SAP submitted by NYPA.

Should BOEM issue a lease to NYPA in the future, BOEM anticipates that site characterization and assessment of the lease would include approximately 1,300 vessel trips to the approximately 12,000 vessel trips that would be associated with the alternatives considered in this EA and the millions of other unrelated vessel trips that would occur during the five and one-half year time period contemplated in this EA. However, the New York Power Authority solicitation indicates that the most viable port available to support lease activities would be on Staten Island, New York, a port that vessels associated with the alternatives in this EA are not anticipated to use. Using the same assumptions presented in Chapter 3 of this EA, BOEM anticipates that, if NYPA were to obtain a lease, it would undertake 7,300 nm of HRG surveys and approximately 600 bottom surveys on the lease. These activities, would be located 44.2 nm north of the northernmost extent of the New Jersey WEA, and the vessel traffic associated with these activities are not anticipated to conflict with activities in and around the Mid-Atlantic WEAs. The discussion of sub bottom sampling found in Chapter 4 of this EA concluded that 1,800-4,800 samples that could be taken over the life of the alternatives considered in this EA would have no significant impact. This conclusion remains valid in light of the future potential for 600 additional samples to be taken offshore Long Island.

Using the same assumptions presented in Section 3.1.3, Should NYPA submit, and BOEM approve a SAP on the prospective NYPA lease, the applicant would likely install one meteorological tower or two meteorological buoys on the lease. These structures, if installed, would be located 44.2 nm north of the northernmost point of the WEA offshore New Jersey, and is not anticipated to cause conflicts with the use of the WEAs offshore the Mid-Atlantic States. The discussion of the consequences of meteorological towers and buoys found in Chapter 4 of this EA concluded that 12 towers or 25 buoys that could be installed, operated, and decommissioned in the Mid-Atlantic WEAs would not have a significant impact on the environment. The potential future addition of one tower or two buoys on a prospective lease offshore Long Island would not cumulatively lead to significant impacts.

Global Climate Change

Cumulative activities, which include Alternative A, could impact global climate change. Chapter 7.6.1.4 of the Programmatic EIS describes Global Climate Change with respect to renewable energy development. The following is a summary of that information and incorporates new information specific to Alternative A.

The temperature of the earth's atmosphere is regulated by a balance between the radiation received from the sun, the amount reflected by the earth's surface and clouds, and the amount of radiation absorbed by the earth and atmosphere. Greenhouse gases (GHG) keep the earth's surface warmer than it would be otherwise because they absorb infrared radiation from the earth and, in turn, radiate this energy back down to the surface. While these gases occur naturally in the atmosphere, there has been a rapid increase in concentrations of greenhouse gases in the earth's atmosphere from anthropogenic sources since the start of industrialization, which has caused concerns over potential changes in the global climate. The primary anthropogenic greenhouse gases are CO_2, CH_4, nitrous oxide (N_2O), and halocarbons (MMS, 2007a).

During the surveying, construction and decommissioning phases of Alternative A, GHG emissions would occur. It is currently beyond the scope of existing science to identify a specific source or discrete amount of GHG emissions and designate it as the cause of specific climate impacts at any particular location (USDOI, USGS, 2009). This is because the nature of the climate change phenomena thus far has precluded the identification of a causal relationship between discrete GHG emissions and specific environmental effects. However, the causes and effects of climate change can be summarized as follows. First, GHGs are emitted into the atmosphere, causing global warming (i.e., aggregate average increase in the temperature of the earth's atmosphere). Second, global warming induces the climate to change in disparate ways at various places around the globe, altering global precipitation regimes, decreasing the salinity of the oceans, and altering the seasons. Finally, climate change leads to direct impacts on the environment, such as changes to the structure of an ecosystem, changes to air quality, a reduced supply and increased cost of food, warming of polar regions, higher precipitation totals, sea level rise, extreme temperatures, and severe weather events (USEPA, 2011).

In general, while it can be assumed that the GHG emissions associated with Alternative A contribute to the phenomenon of climate change, these contributions are so small compared to the aggregate global emissions of GHGs that they cannot be deemed significant, if their impact could even be detected. The additional 43 – 67 vessel trips per port per year anticipated with Alternative A would have a negligible incremental contribution to existing GHG emissions, and therefore, would have an exceedingly minor effect to the environment via contributions to climate change.

Conclusion

The hallmark of the affected environment considered in this EA is one of past, present, and foreseeable human-induced impacts over an extended period of time. The incremental contribution of the proposed action and alternatives to other past, present, and reasonably foreseeable actions which may affect the environment would be negligible to minor. Indeed, the proposed action and alternatives would facilitate the collection of meteorological, oceanographic, and biological data for the environments offshore New Jersey, Delaware, Maryland and Virginia.

5 CONSULTATION AND COORDINATION

BOEM conducted early coordination with appropriate Federal and State agencies, Tribal governments, and other concerned parties to discuss and coordinate the development and refinement of WEAs under the Secretary's "Smart from the Start" initiative (*see* Sections 1.1.1 and 1.5 of this EA). Formal consultations and cooperating agency exchanges are detailed below. In addition, BOEM regularly coordinated informally, through dialogue, teleconferences, and in-person meetings, with the Federal and State agencies noted. Key agencies included NMFS, USFWS, DOD, FAA, National Aeronautics and Space Administration (NASA), USACE, USCG, USEPA, NPS, Delaware Department of Natural Resources and Environmental Control (DNREC), the New Jersey Department of Environmental Protection (NJDEP), the Commonwealth of Virginia Department of Mines, Minerals and Energy (DMME), the State Historic Preservation Offices (SHPOs) of Delaware, Maryland, New Jersey, and Virginia, and the Advisory Council on Historic Preservation (ACHP).

5.1 Public Involvement

5.1.1 Notice of Intent

On February 9, 2011, BOEM announced in the *Federal Register* the NOI to prepare this EA (76 FR 7226). The NOI solicited public input on issues and alternatives to be considered and analyzed in the EA. BOEM accepted comments until March 11, 2011. In total, 38 comments were received during the 30-day comment period. Issues identified to be analyzed included analysis of conflicts with vessel traffic; avoidance of artificial reefs; and analysis of noise impact, collision risk, and the impacts of G&G surveys. Two specific alternatives to reduce conflicts with existing vessel traffic were identified for Virginia. One was addressed by removing the block in question from the alternatives considered in the EA and the other was analyzed as an alternative. The comments can be viewed at http://www.regulations.gov by searching for docket id BOEM-2010-0077.

5.1.2 Notice of Availability

The Draft EA was available for public review and comment for 30 days following the publication of the NOA in the *Federal Register* on July 12, 2011 (76 FR 40925). The Draft EA was posted on BOEM's website at: http://www.boem.gov/Renewable-Energy-Program/Smart-from-the-Start/Index.aspx. The availability of the Draft EA was also announced in a USDOI press release (*see* http://www.doi.gov/news/pressreleases/Interior-Takes-Next-Step-toward-Holding-First-Ever-Lease-Sales-for-Commercial-Wind-in-the-Mid-Atlantic.cfm). Intergovernmental Renewable Energy Task Force members were notified by email.

The comment period ended on August 11, 2011. During this period, BOEM conducted two webinars, which provided stakeholders an overview of the EA and consultations. Attendees included applicable Intergovernmental Renewable Energy Task Force members, non-governmental organizations, and entities that responded to planning notices for the WEAs offshore New Jersey, Delaware and Maryland (*see* Section 1.4.3).

In response to the NOA, BOEM received 60 individual letters via the internet and regular mail. This included a set of 2,265 form letters submitted by the Sierra Club and a petition submitted by the National Wildlife Federation Action Fund on behalf of its supporters. Information submitted from written comments is summarized in Appendix C of this EA.

Commenters can find responses to their individual comments by locating their name, organization or document ID found just above each set of comments. All comments received were considered in the preparation of this EA and in determining whether the proposed action and alternatives would lead to significant environmental impacts. Comment letters received in response to the NOA can be viewed at http://www.regulations.gov by searching for Docket ID BOEM-2011-0053.

5.1.3 Cooperating Agencies

Section 1500.5(b) of the CEQ implementing regulations (40 CFR 1500.5(b)) encourages agency cooperation early in the NEPA process. A Federal agency can be a lead, joint lead, or cooperating agency. A lead agency manages the NEPA process and is responsible for the preparation of an EA or EIS; a joint lead Agency shares these responsibilities; and a cooperating agency is one that has jurisdiction by law or special expertise with respect to any environmental issue and which participates in the NEPA process upon the request of the lead agency. The NOI included an invitation to other Federal agencies and State, tribal, and local governments to consider becoming cooperating agencies in the preparation of this EA. Three cooperating agencies were identified and all three participated in the development and review of this EA. The agencies' jurisdiction and/or expertise are described below.

Section 4(e) of OCSLA extends the USACE's authority to prevent the obstruction to navigation in the navigable waters of the U.S. to OCS facilities. This includes the construction of meteorological towers and installation of buoys proposed by BOEM. BOEM invited the USACE in a letter dated February 18, 2011 to participate as a cooperating agency on this EA. That invitation was accepted by the USACE's North Atlantic Division in a letter to BOEM dated February 22, 2011. The USACE is also a co-consulting agency on Section 106, EFH and ESA consultations described below.

Also, on February 18, 2011 BOEM sent a letter, inviting the USCG to participate as a cooperating agency. BOEM requested USCG's assistance in the preparation of the EA, and it accepted, due to its jurisdiction and expertise with port usage vessel traffic, lighting requirements/mitigation measures for meteorological towers and buoys, and spill risk and response.

As part of the comments received on the NOI, the Commonwealth of Virginia DMME requested to participate as a cooperating agency in the preparation of this EA. Due to DMME's expertise in environmental conditions and issues associated with the areas offshore Virginia and Virginia's port usage, on March 30, 2011, BOEM invited the DMME to participate as a cooperating agency on the EA. The DMME accepted the invitation on April 1, 2011.

5.2 Consultations

5.2.1 Endangered Species Act

As required by Section 7 of the ESA, BOEM consulted with NMFS and USFWS on assessing the potential impacts of the proposed action on endangered/threatened species and designated critical habitat under their jurisdiction. In letters dated March 24, 2011, BOEM initiated informal consultations with NMFS and USFWS. The March 24, 2011 biological assessment (BA), prepared by BOEM for the consultations, concluded proposed lease issuance, associated site characterization, and subsequent site assessment activities were likely to affect but not adversely affect ESA-listed sea turtles, marine mammals, bats, birds, and fish (USDOI, BOEMRE, 2011c).

In a letter dated June 20, 2011, USFWS concurred with BOEM's determination that the proposed issuance of offshore wind energy leases and approval of site assessment activities would not adversely affect ESA-listed birds (Roseate tern and piping plover) (USFWS, 2011e). However, its determination, USFWS requested that BOEM make determinations regarding the ESA-listed cahow or Bermuda petrel (*Pterodroma cohow*) as new data indicated the possibility that the species may seasonally occur in the vicinity of the Virginia WEA. In light of this new information, BOEM has affected potential impacts to the cahow which is included in this Final EA.

The consultation with NMFS was concluded on September 20, 2011 (USDOC, NOAA, NMFS, 2011c). NMFS concluded that the proposed lease issuance, associated site characterization, and subsequent site assessment activities is not likely to adversely affect listed whales or sea turtles, when implemented according to the project design criteria and the conditions outlined in this assessment (*see* Appendix B). These requirements will be included as a condition on any leases and/or SAPs issued or approved under this decision.

5.2.2 Magnuson Fishery Conservation and Management Act

Pursuant to Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act, Federal agencies are required to consult with NMFS on any action that may result in adverse effects to EFH. The NMFS regulations implementing the EFH provisions of the Magnuson-Stevens Fisheries Conservation and Management Act can be found at 50 CFR 600. Certain OCS activities authorized by BOEM may result in adverse effects to EFH, and therefore, require EFH consultation.

Concurrent with publication of the Draft EA, BOEM initiated consultation with the NMFS, as required by the Magnuson Fishery Conservation and Management Act, on the effects of the following on fish and EFH: (1) issuing leases; (2) site characterization activities that lessees may undertake on those leases (e.g., geophysical, geotechnical, archaeological and biological surveys); and (3) the subsequent approval of site assessment activities on the leaseholds (e.g., installation and operation of meteorological towers and buoys) in the WEAs offshore New Jersey, Delaware, Maryland, and Virginia. BOEM concluded that the proposed actions may adversely impact the quality and quantity of fish, essential fish habitat and the fish that are present. Howerver, given the limited spatial extent and limited duration of the proposed actitivies, it is not likely that the impacts would be more than temporary and not substantially affect the populations of fish in the area. BOEM received the results of this consultation in a letter dated August 11, 2011. In that letter NMFS identified four conservation recommendations that BOEM will consider applying in the future if and when a lessee submits a COP for a full scale wind energy development. *See* Appendix C of this EA.

5.2.3 Coastal Zone Management Act

The Coastal Zone Management Act (CZMA) requires that Federal actions that are reasonably likely to affect any land or water use or natural resource of the coastal zone be "consistent to the maximum extent practicable" with relevant enforceable policies of the State's federally approved coastal management program (15 CFR 930 Subpart C). If an activity will have direct, indirect, or cumulative effects, the activity is subject to Federal consistency. A consistency review was performed and a Regional Consistency Determination (CD) was prepared for the affected States. Under 15 CFR 930.36(e):

> A Federal agency may provide states with CDs for Federal agency activities that are national or regional in scope and that affect any coastal use or resource of more than one State. Many States share common coastal management issues and have similar enforceable policies. The Federal agency's regional consistency determination should, at a minimum, address the common denominator of these policies and thereby addresses different States' policies with one discussion and determination.

BOEM has determined that New Jersey, Delaware, Maryland and Virginia all share common coastal management issues, and have similar enforceable policies as identified by their respective CMPs. Due to the proximity of the WEAs to each other (at least in the cases of the New Jersey, Delaware, and Maryland WEAs), the similarity of the reasonably foreseeable activities for all of the four WEAs, and similar nature of impacts on environmental and socioeconomic resources and uses within each state, BOEM has prepared a single Regional CD under 15 CFR 930.36(e) to determine whether issuing leases and approving site assessment activities (including the installation, operation and decommissioning of meteorological towers and buoys) within the WEAs offshore New Jersey, Delaware, Maryland, and Virginia is consistent to the maximum extent practicable with the provisions identified as enforceable by the Coastal Management Programs of New Jersey, Delaware, Maryland, and the Commonwealth of Virginia.

This single Regional CD was sent along with the Draft EA to New Jersey, Delaware, Maryland, and Virginia for their review. The Draft EA provided the comprehensive data and information required under 30 CFR 939.39 to support BOEM's consistency determination. BOEM has determined that the activities described in this EA are consistent to the maximum extent practicable with the enforceable policies of the CMPs of New Jersey, Delaware, Maryland, and Virginia. The affected States had 60 days to review the Regional CD and the Draft EA (which provides the supporting information required under 30 CFR 930.39(a)); the State agency had 14 days of receiving this information to identify missing information required by 930.39(a).

All four states have concurred with BOEM's conclusion described in the Draft EA Regional CD. Both the States of Maryland and Delaware Coastal Programs' requested and were granted 15-day extensions according to 15 CFR 930.41(b). The States of Delaware, Maryland and Virginia provided comments regarding the Draft EA to BOEM with their letters of concurrence. The Commonwealth of Virginia concurred in a letter to BOEM on August 10, 2011; the State of Maryland concurred in a letter to BOEM on September 23, 2011; the State of Delaware concurred in a letter to BOEM on September 27, 2011; and the State of New Jersey concurred in a letter to BOEM on October 3, 2011.

Pursuant to 30 CFR 585.611(b), if a lessee submits a SAP that shows changes in impacts from those identified in the regional CD prepared for this proposed action, BOEM may determine that the SAP is subject to a consistency certification. In that case, the lessee would submit a consistency certification under 15 CFR Part 930, Subpart E. BOEM would then submit the SAP and consistency certification to the affected States for CZMA review.

5.2.4 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA) (16 U.S.C. 470f), and the act's implementing regulations (36 CFR Part 800), require federal agencies to consider the effects of their actions on historic properties and afford the ACHP a reasonable opportunity to comment. BOEM has determined that the following activities in the WEAs constitute undertakings subject to Section 106 of NHPA:

(1) Lease issuance (including reasonably foreseeable consequences associated with shallow hazards, geological, geotechnical, and archaeological resource surveys); and,

(2) Approval of a SAP (including reasonably foreseeable consequences associated with the installation and operation of meteorological tower(s) and/or meteorological buoy(s)).

BOEM is currently working toward the execution of a Programmatic Agreement (PA) pursuant to 36 CFR 800.14(b) with its consulting parties and including the ACHP. This PA provides for Section 106 consultation to continue through both the leasing process and BOEM's decision making process regarding the approval, approval with modification, or disapproval of lessees' SAP and will also allow for a phased identification and evaluation of historic properties. Once executed and implemented, this PA will establish the process to determine and document the APE for each undertaking; to further identify historic properties located within each undertaking's APE that are listed in or eligible for listing in the National Register of Historic Places (National Register); to assess the potential adverse effects; and to avoid, reduce, or resolve any such effects through the process set forth in the agreement.

In February 9, 2011, BOEM formally notified the public through the *Federal Register* (pages 7226-7228), that it was initiating the "Smart from the Start" wind energy initiative and that it would involve Federal agencies, States, Tribes, local governments, wind power developers and the public as BOEM conducted the NEPA process and engaged in consultation. In March 2011, BOEM identified and initiated a request for NHPA Section 106 consultation through correspondence with the appropriate Mid-Atlantic SHPOs and potentially affected federally-recognized Tribes. As of the publication of this EA the SHPOs of Delaware, Maryland, New Jersey and Virginia have requested to be consulting parties. In addition, the Federally-recognized Indian tribes of the Narragansett Indian Tribe and the Shinnecock Indian Nation have formally requested to be consulting parties. BOEM has and will continue to consult with these federally-recognized tribes on a government-to-government basis, in accordance with Executive Order 13175.

BOEM has solicited local governments, potentially affected state-recognized tribes, additional federally-recognized tribes, and certain individuals and organizations with a potential interest in the undertaking (as identified through consultation with the SHPOs) to obtain further information and to learn their concerns regarding the proposed undertakings' potential effects on historic properties. These entities contacted by BOEM are listed below in Table 5.1.

BOEM has held three Section 106 consultation webinars with the consulting parties. The first was held on October 11, 2011 to present a draft of the PA and the second was held on November 9, 2011 to discuss the draft and comments received from the consulting parties. On December 15, 2011, BOEM held a third webinar to prepare a final version of the PA. As of publication of this EA, BOEM has circulated a finalized version of the PA that incorporates all of the comments and input from the consulting parties received to date. BOEM anticipates executing the PA on January 20, 2012.

On October 20, 2011, BOEM solicited public comments on the proposed undertakings as they pertain to historic properties. BOEM received three comments is response to this solicitation. These comments from Mainstream Renewable Power (UK); the Offshore Wind Development Coalition and American Wind Energy Association; and the National Trust for Historic Preservation can be viewed at regulations.gov by searching for docket id BOEM-2011-

0111. Additionally, BOEM, with the consulting parties, will continue to develop a plan to involve the public through outreach, notifications, and request for comment throughout the Section 106 consultation process for both the issuance of renewable energy leases and consideration of subsequent SAPs.

Table 5.1

Entities Solicited for Information and Concerns Regarding Historic Properties and the Proposed Undertakings

Federally-recognized Tribes	State-recognized Tribes	Local Governments	Additional Organizations
Absentee Shawnee Tribe of Oklahoma	Cheroenhaka (Nottoway) Indian Tribe	Accomack-Northampton Planning District Commission	Lower Eastern Shore Heritage Council, Inc.
Aroostook Band of Micmacs	Chickahominy Tribe	Atlantic City	Maryland Commission on Indian Affairs
Catawba Indian Nation	Eastern Chickahominy Tribe	Berlin, MD	Preservation Maryland
Delaware Nation (Anadarko)	Lenape Indian Tribe of Delaware	Board of Supervisors Accomack County	
Delaware Nation (Bartlesville)	Mattaponi Tribe	City of Chesapeake	
Delaware Nation (Emporia)	Monacan Indian Nation	City of Hampton	
Eastern Band of Cherokee Indians	Nansemond Tribe	City of Lewes	
Eastern Shawnee Tribe of Oklahoma	Nanticoke Indian Association, Inc.	City of Millville	
Houlton Band of Maliseet Indians	Nanticoke Lenni-Lenape Indians	City of Newport News	
Mashpee Wampanoag Tribe	Nottoway Indian Tribe	City of Norfolk	
Miccosukee Tribe	Pamunkey Tribe	City of Portsmouth	
Narragansett Indian Tribe	Patawomeck Indian Tribe	City of Rehoboth	
Oneida Indian Nation	Powhatan Renape Nation	City of Suffolk	
Onondaga Nation	Rampanough Mountain Indians	City of Virginia Beach	
Passamaquoddy Tribe (Indian Township)	Rappahannock Tribe	Dennis Township	
Passamaquoddy Tribe (Pleasant Point)	Upper Mattaponi Tribe	Egg Harbor City	
Penobscot Nation		Egg Harbor Township	
Saint Regis Mohawk Tribe		Hampton Roads Planning District Commission	
Seminole Tribe		James City County	
Shinnecock Indian Nation		Northampton/Accomack City	
Stockbridge-Munsee Community of Mohican Indians		Ocean City	
Tuscarora Nation		Office of Congressman Michael N. Castle	
Wampanoag Tribe of Gay Head (Acquinnah)		Ship Bottom Borough	
		Stafford Township	
		Sussex County	
		Sussex County Council	
		Town of Bethany	
		Town of Dewey Beach	
		Town of Fenwick	
		Town of Fenwick	
		Town of Ocean City	
		Town of Ocean City Council	
		Town of Ocean View	
		Town of South Bethany	
		Worcester County Commission	

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APPENDIX A

Marine Mammal, Sea Turtle, and Large Epipelagic Fish Sightings Data

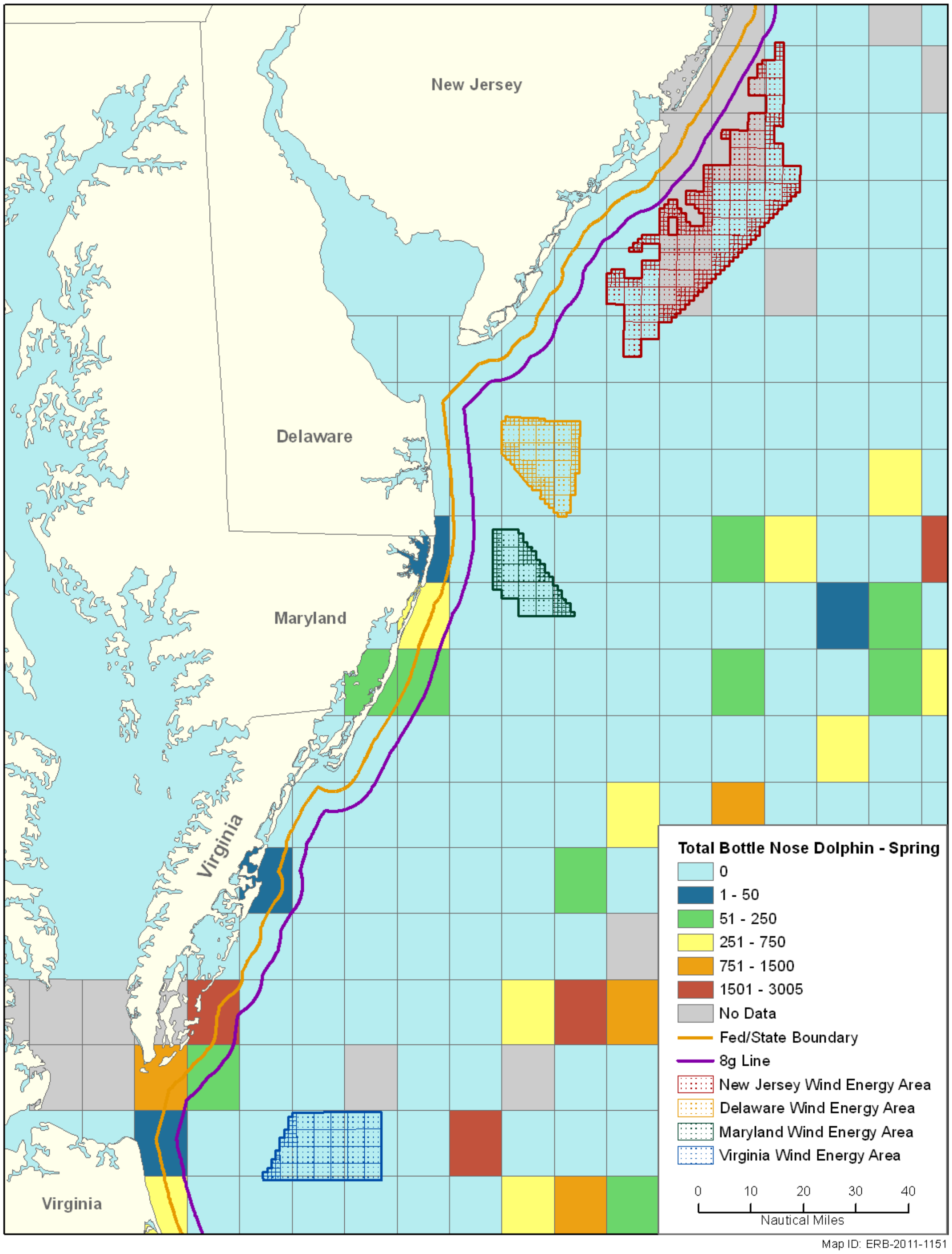

Figure A.1. Bottlenose dolphin sightings – Spring (April-June, 1979-2007). (Source: TNC, 2010).

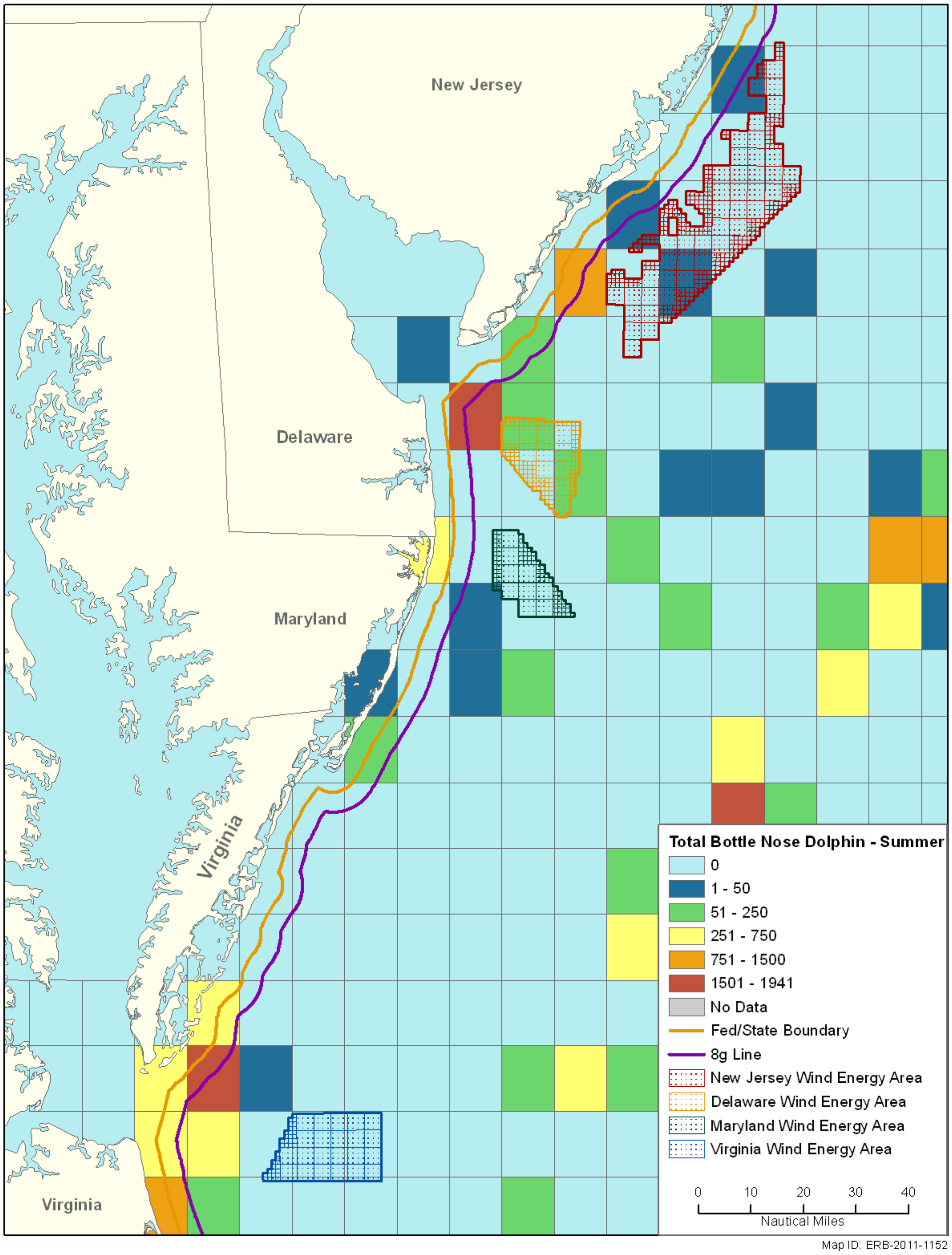

Figure A.2. Bottlenose dolphin sightings - Summer (July-August, 1979-2007).
(Source: TNC, 2010)

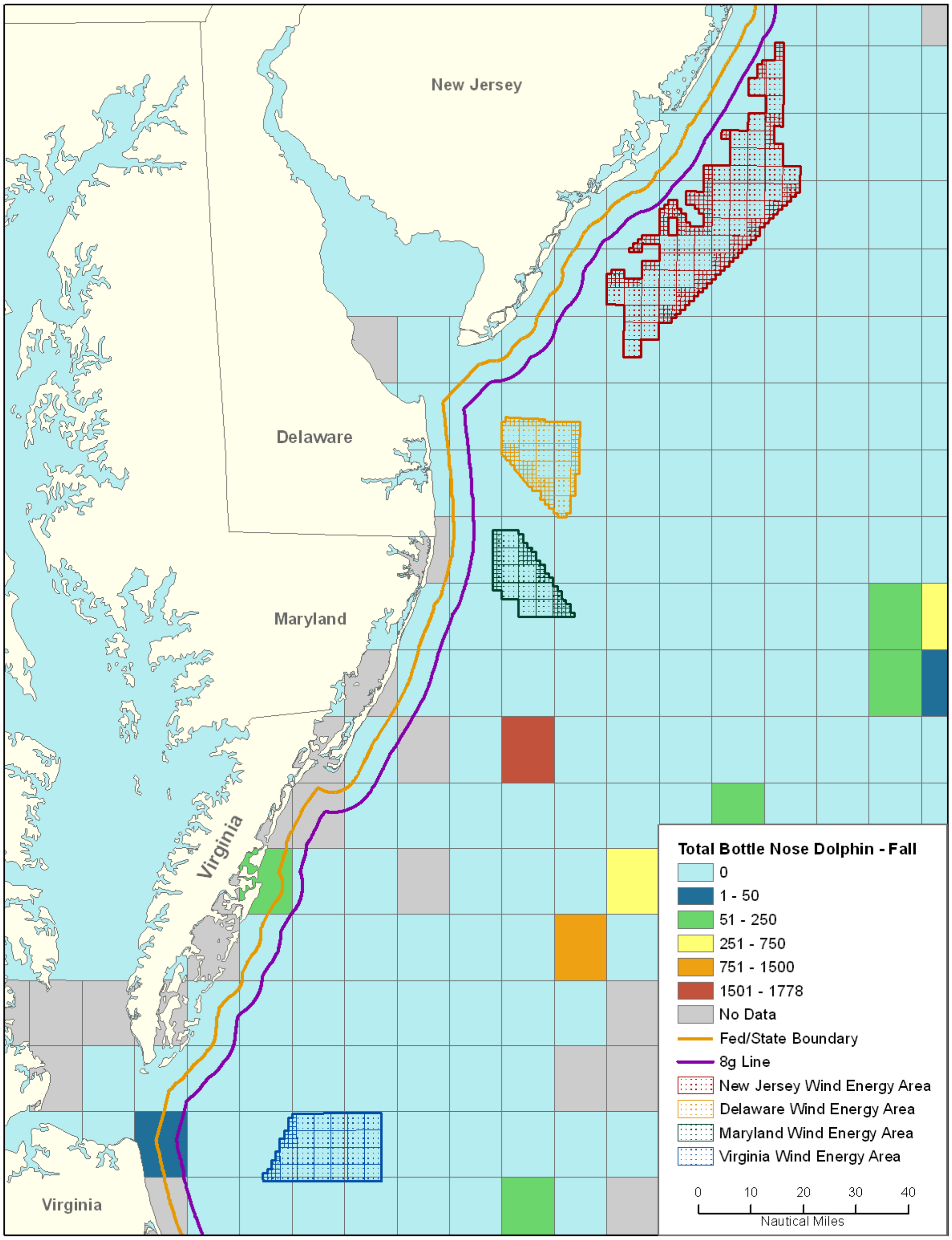

Figure A.3. Bottlenose dolphin sightings – Fall (October-December, 1979-2007).
(Source: TNC, 2010)

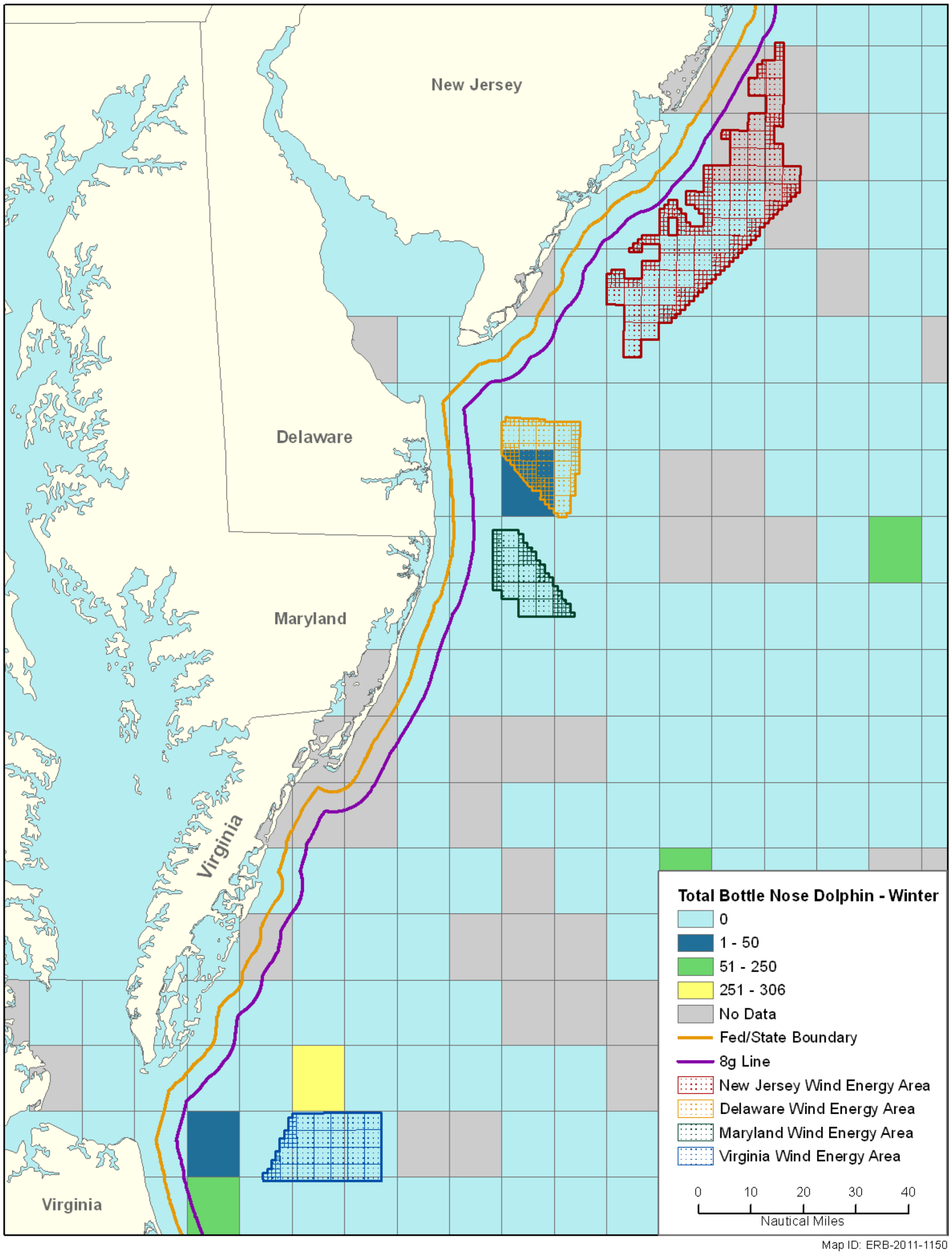

Figure A.4. Bottlenose dolphin sightings - Winter (January-March, 1979-2007).
(Source: TNC, 2010)

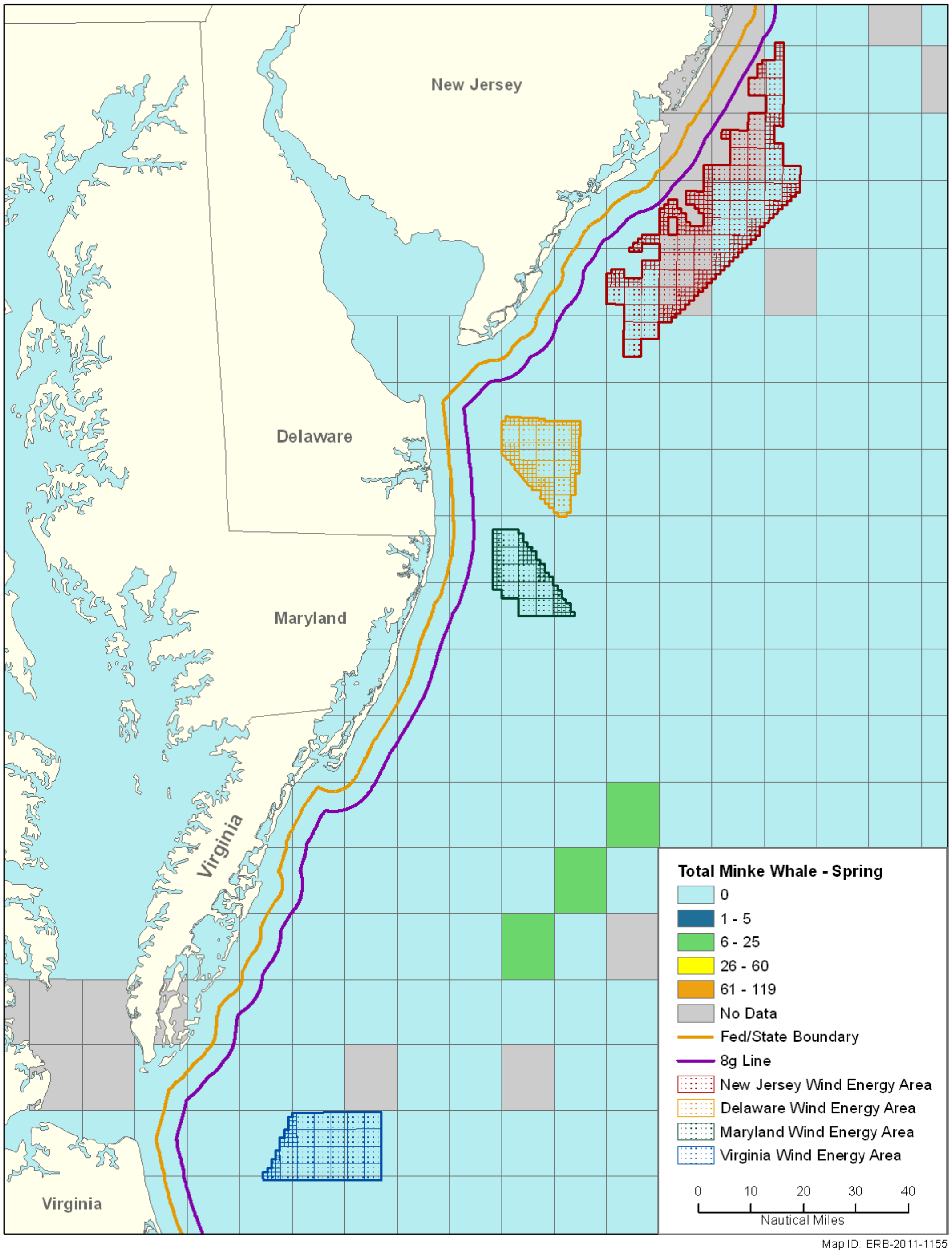

Figure A.5. Minke whale sightings – Spring (April-June) (April-June, 1979-2007).
(Source: TNC 2010)

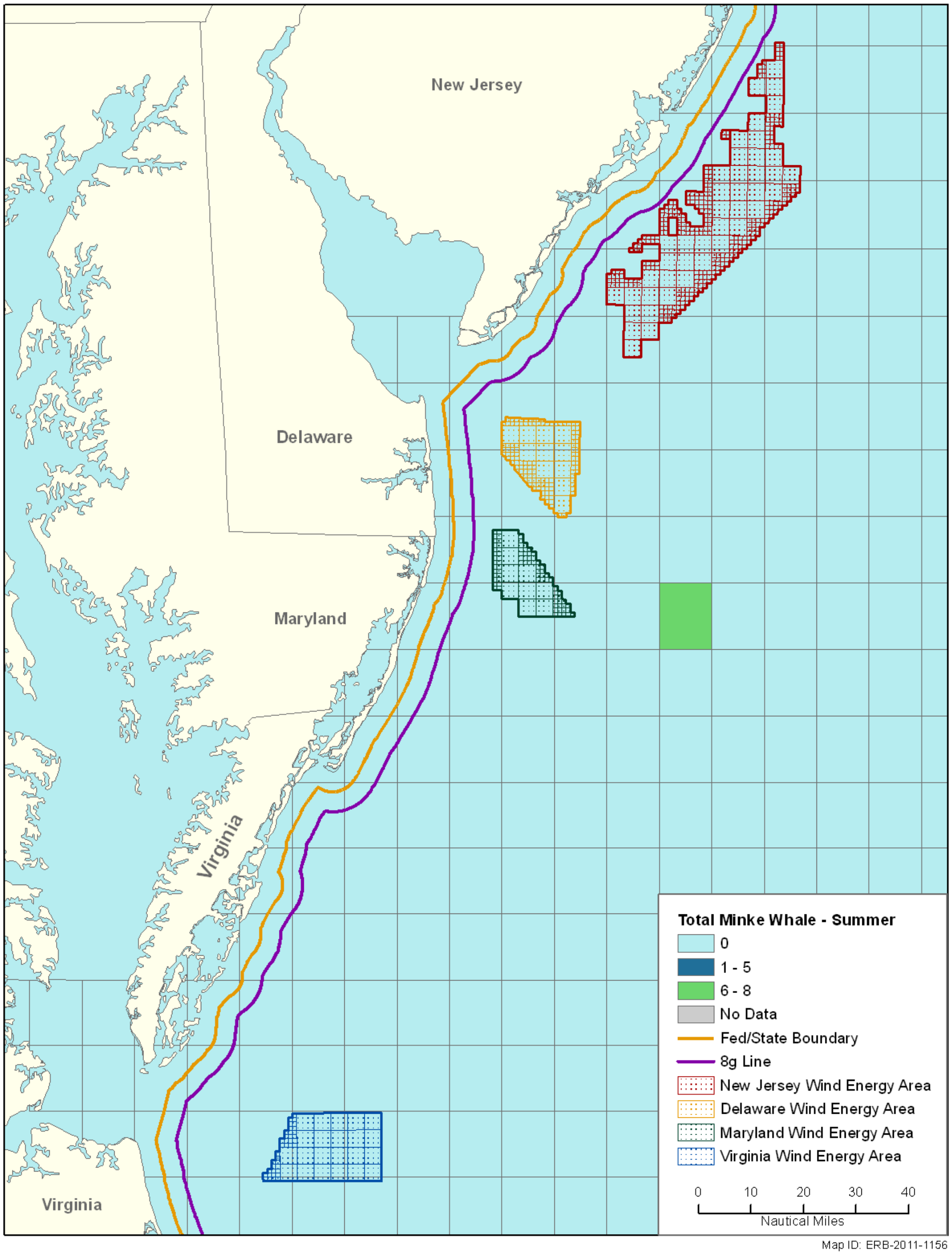

Figure A.6. Minke whale sightings – Summer (July-August, 1979-2007).
(Source: TNC, 2010)

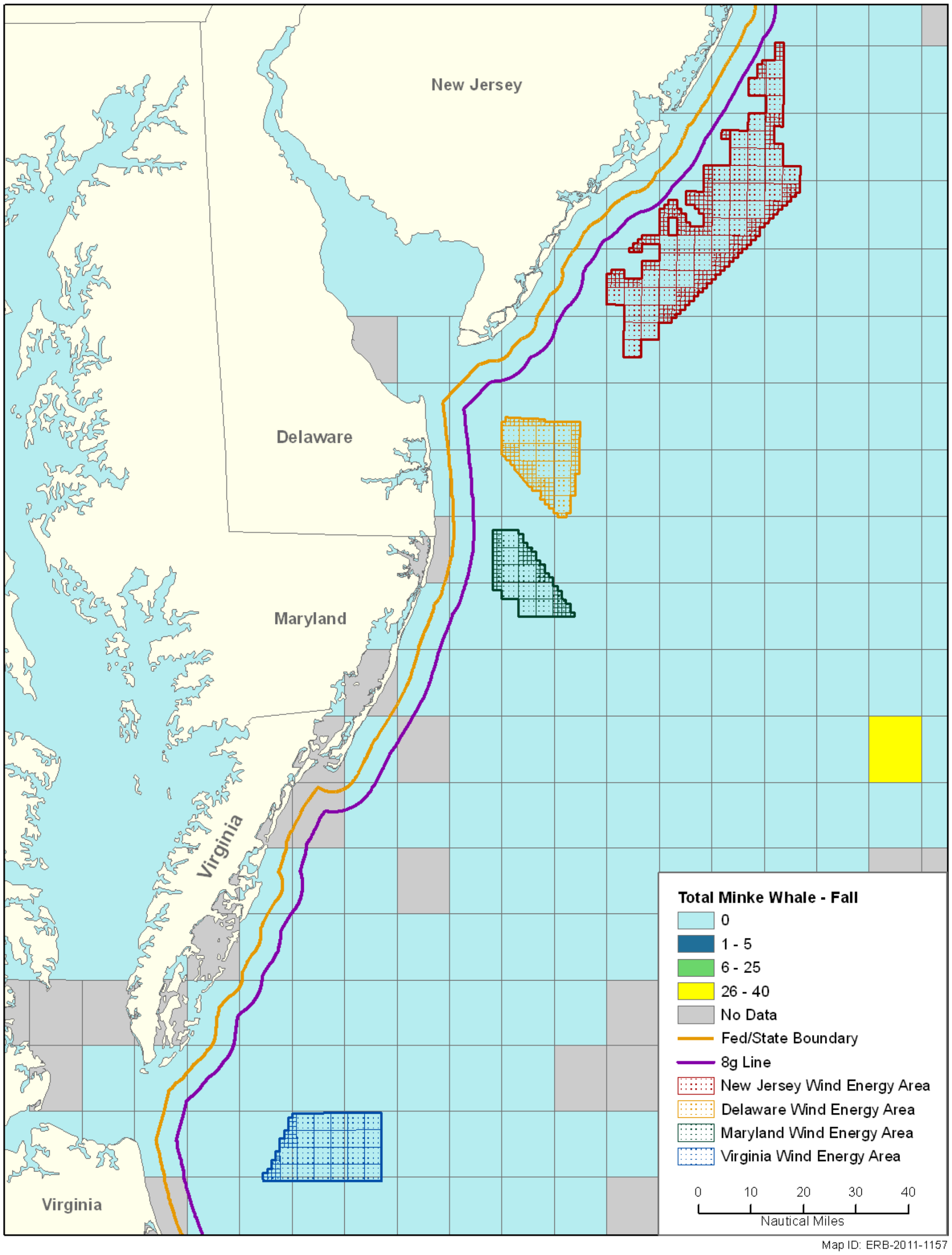

Figure A.7. Minke whale sightings – Fall (October-December, 1979-2007).
(Source: TNC, 2010)

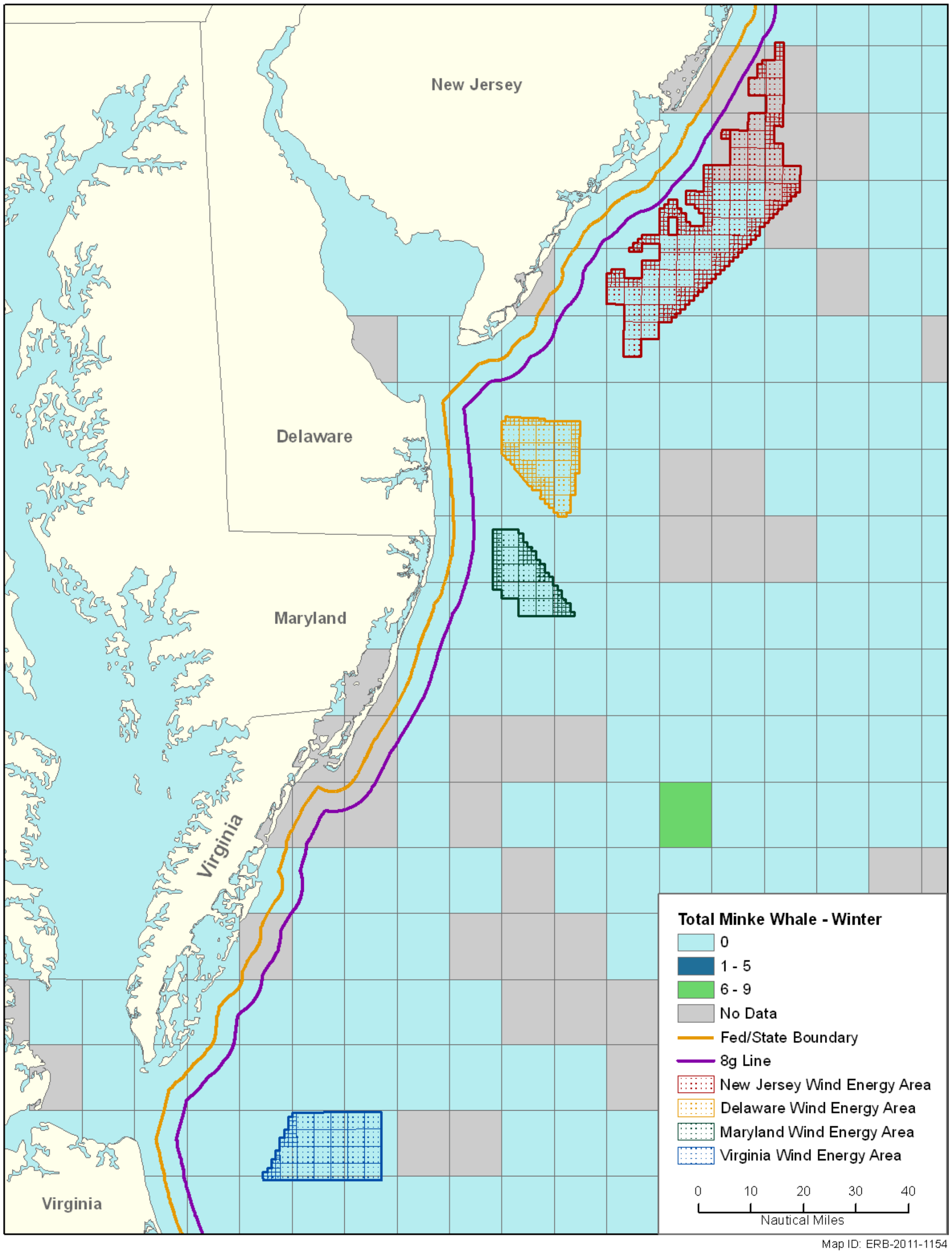

Figure A.8. Minke whale sightings – Winter (January-March, 1979-2007).
(Source: TNC, 2010)

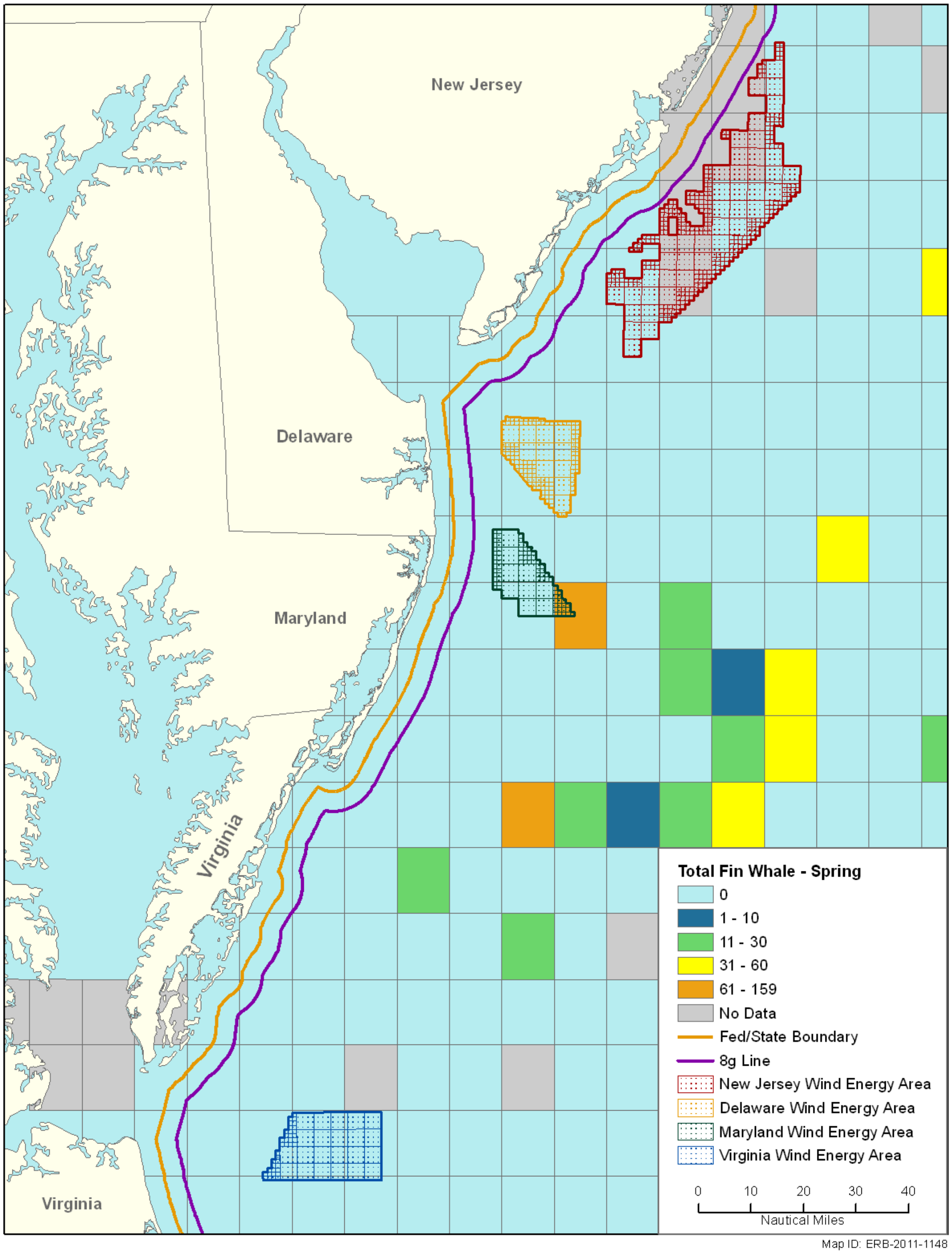

Figure A.9. Fin whale sightings – Spring (April-June, 1979-2007).
(Source: TNC, 2010)

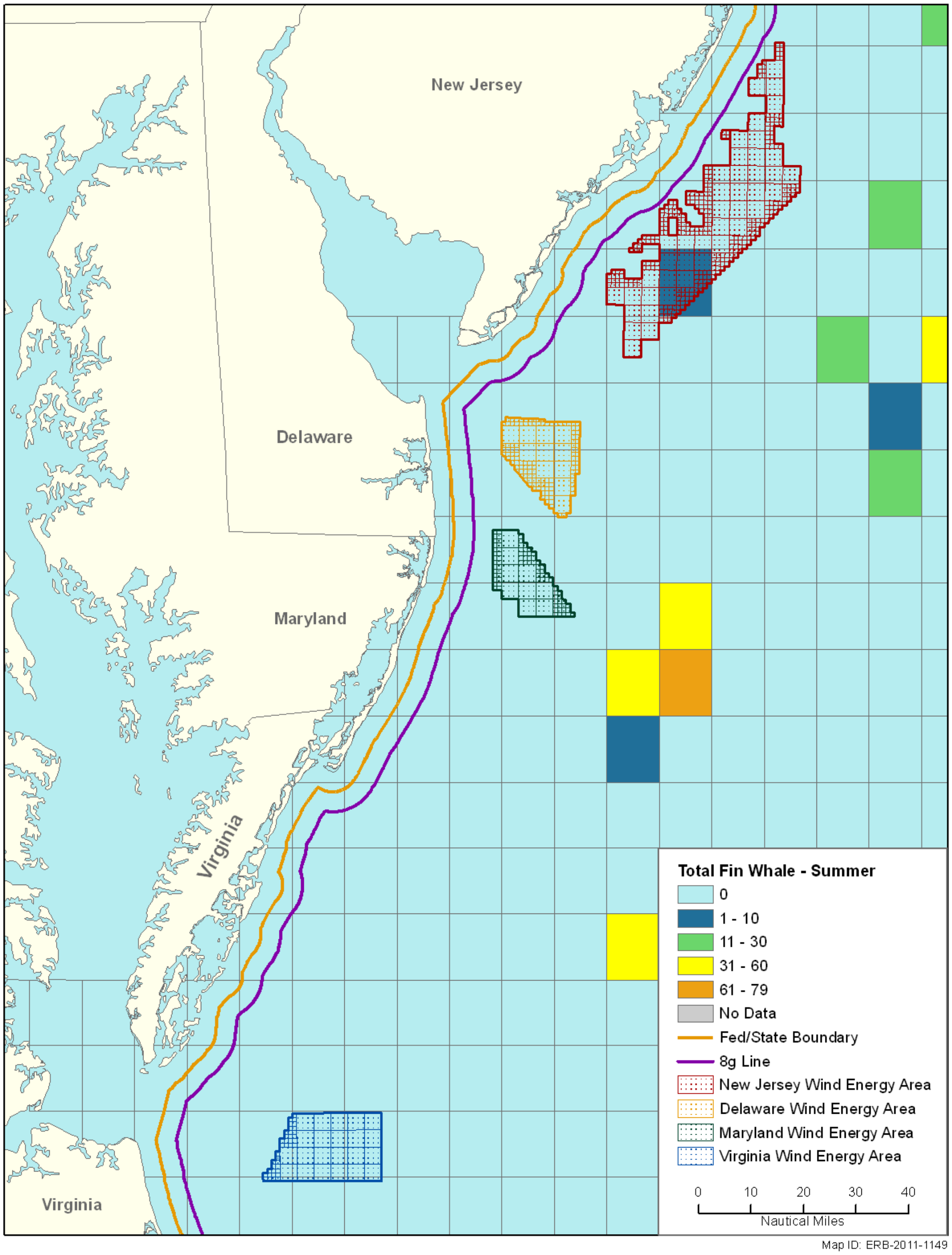

Figure A.10. Fin whale sightings – Summer (July-August, 1979-2007).
(Source: TNC, 2010)

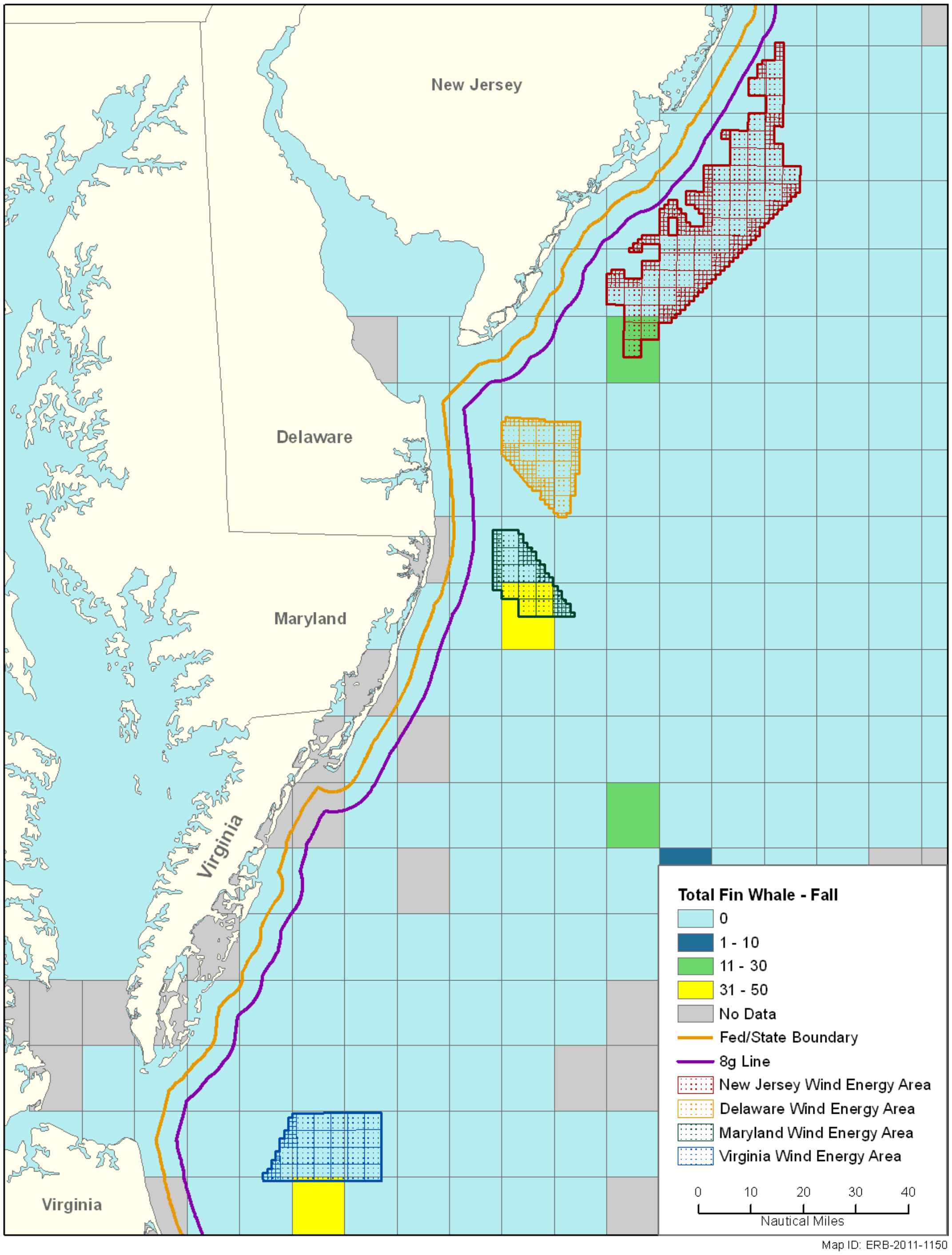

Figure A.11. Fin whale sightings – Fall (October-December, 1979-2007).
(Source: TNC, 2010)

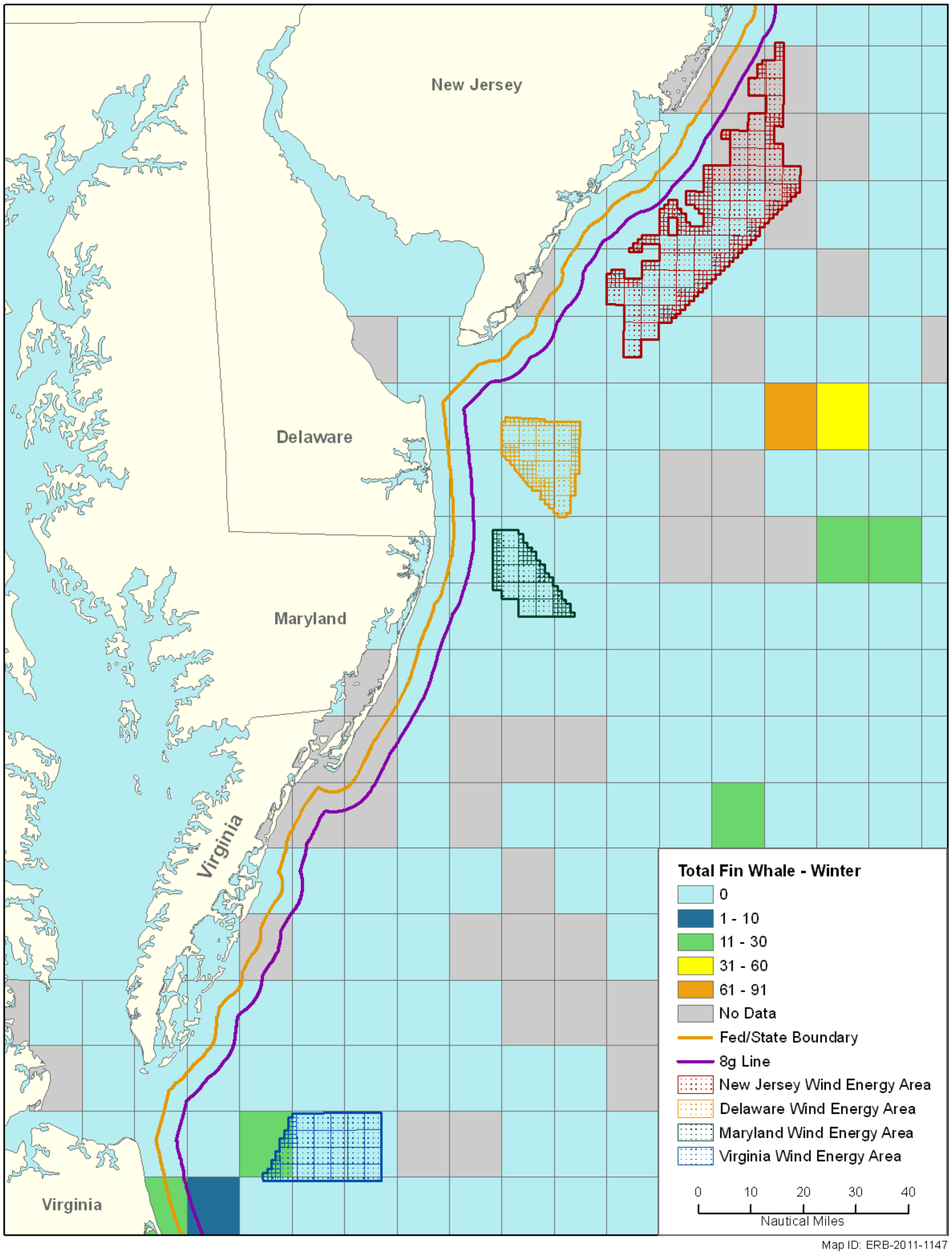

Figure A.12. Fin whale sightings – Winter (January-March, 1979-2007).
(Source: TNC 2010)

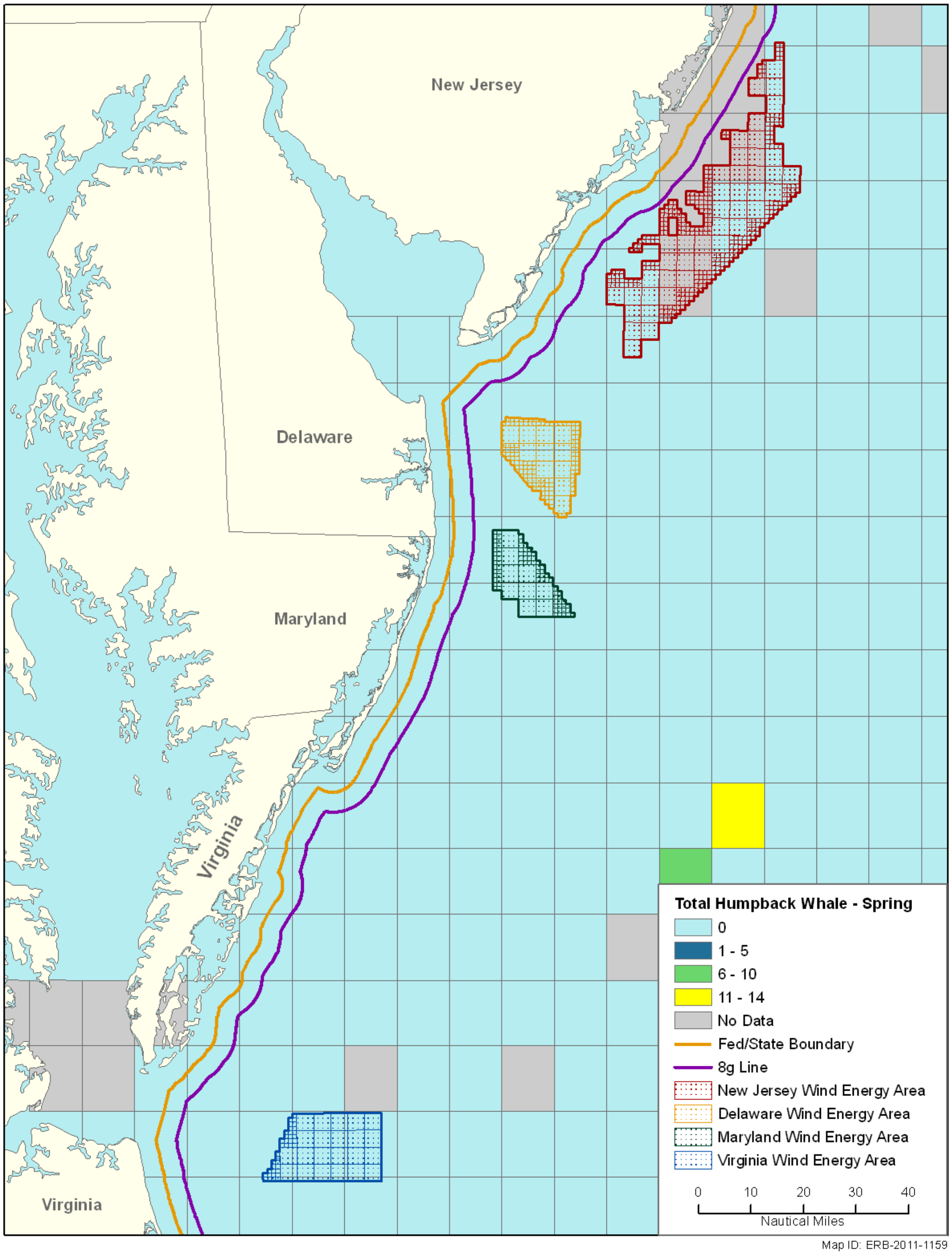

Figure A.13. Humpback whale sightings – Spring (April-June, 1979-2007).
(Source: TNC 2010)

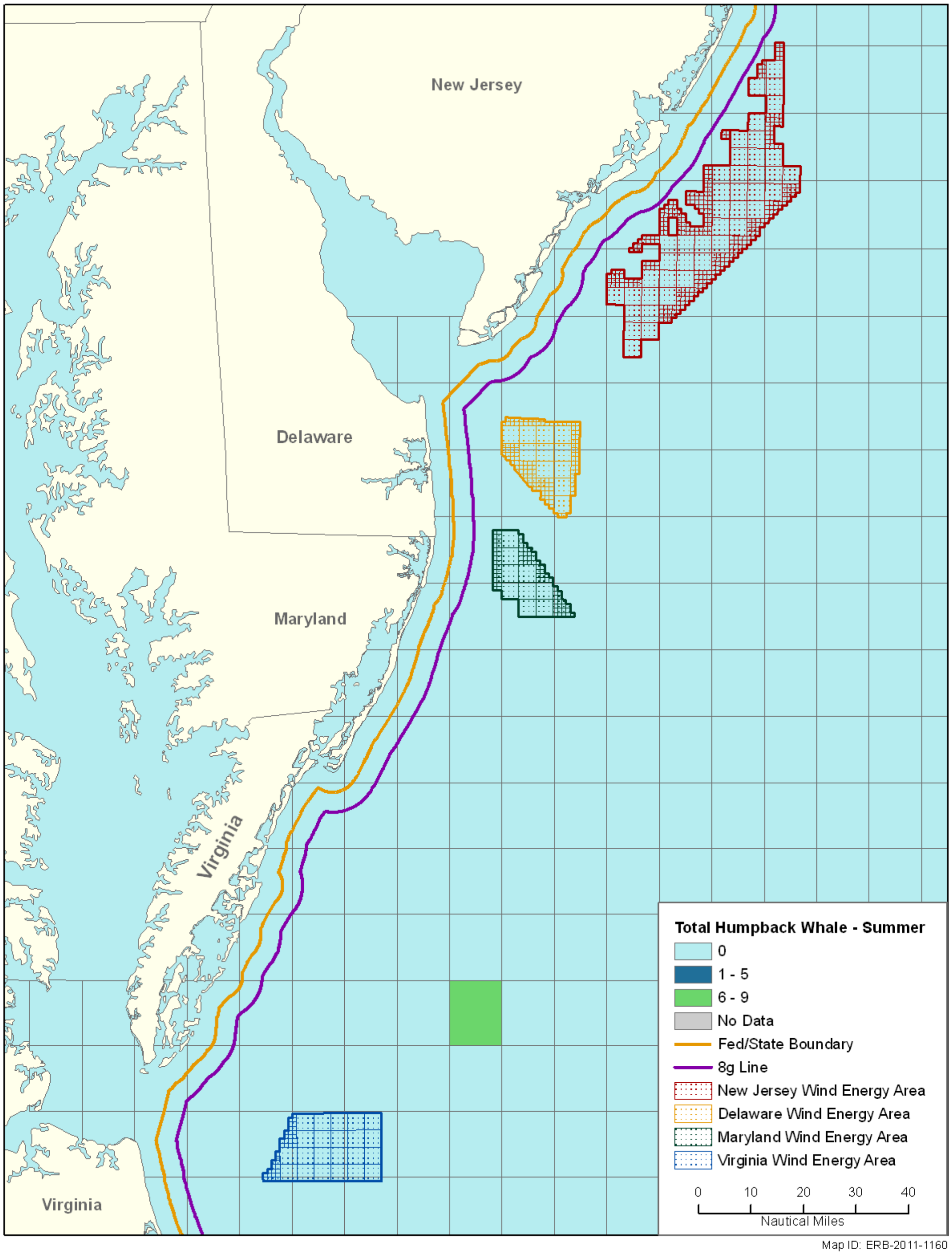

Figure A.14. Humpback whale sightings – Summer (July-August, 1979-2007).
(Source: TNC, 2010)

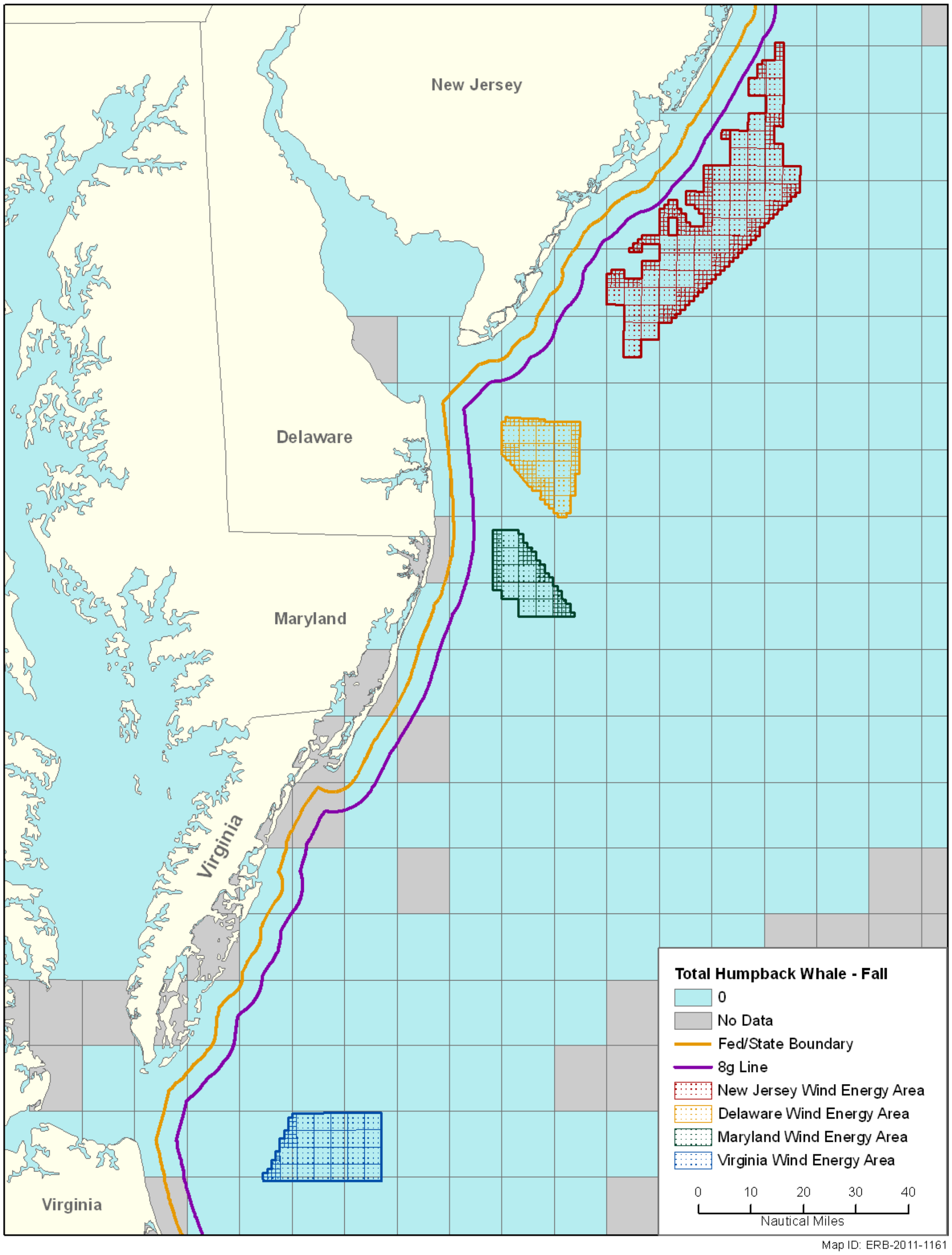

Figure A.15. Humpback whale sightings – Fall (October-December, 1979-2007).
(Source: TNC, 2010)

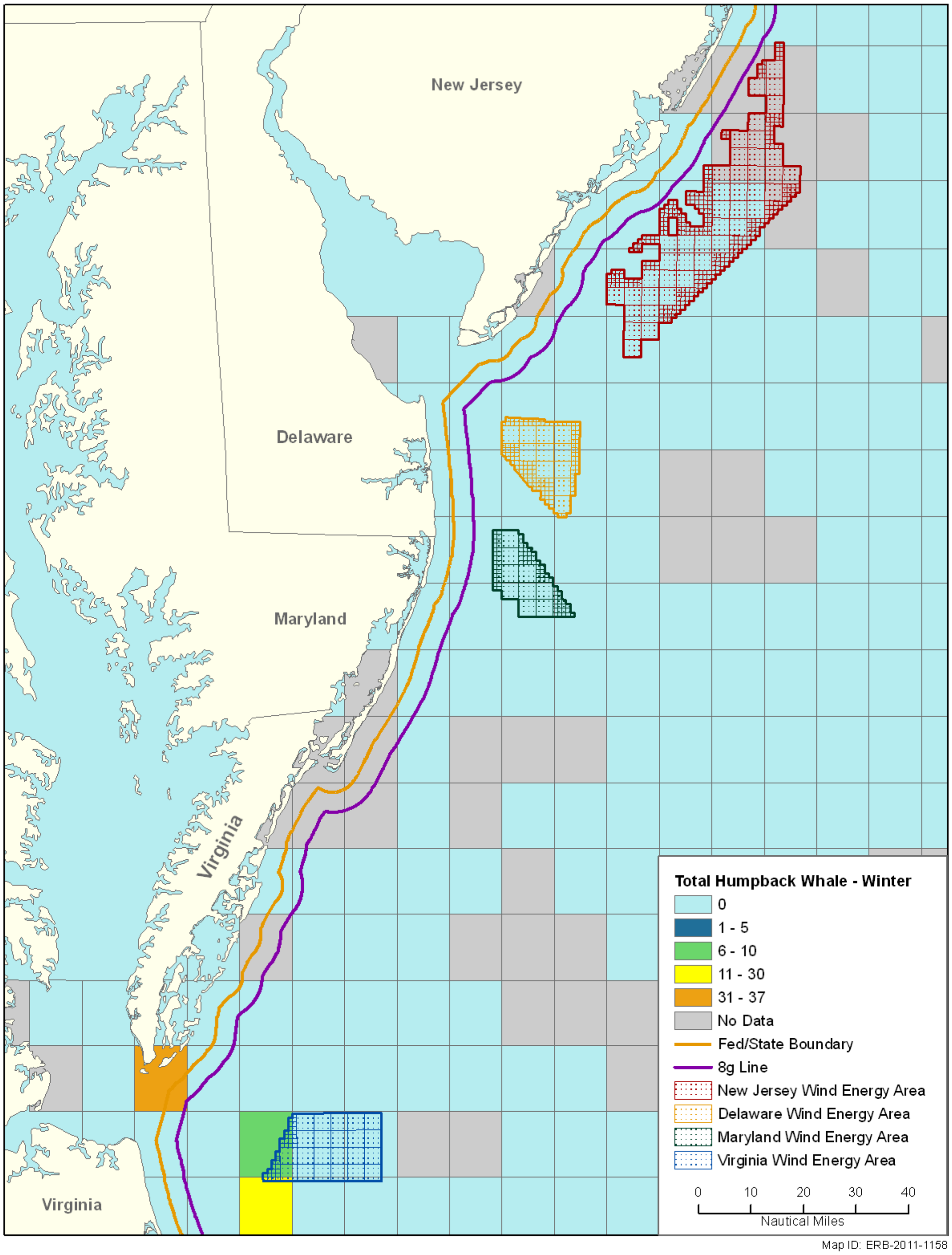

Figure A.16. Humpback whale sightings – Winter (January-March, 1979-2007).
(Source: TNC, 2010)

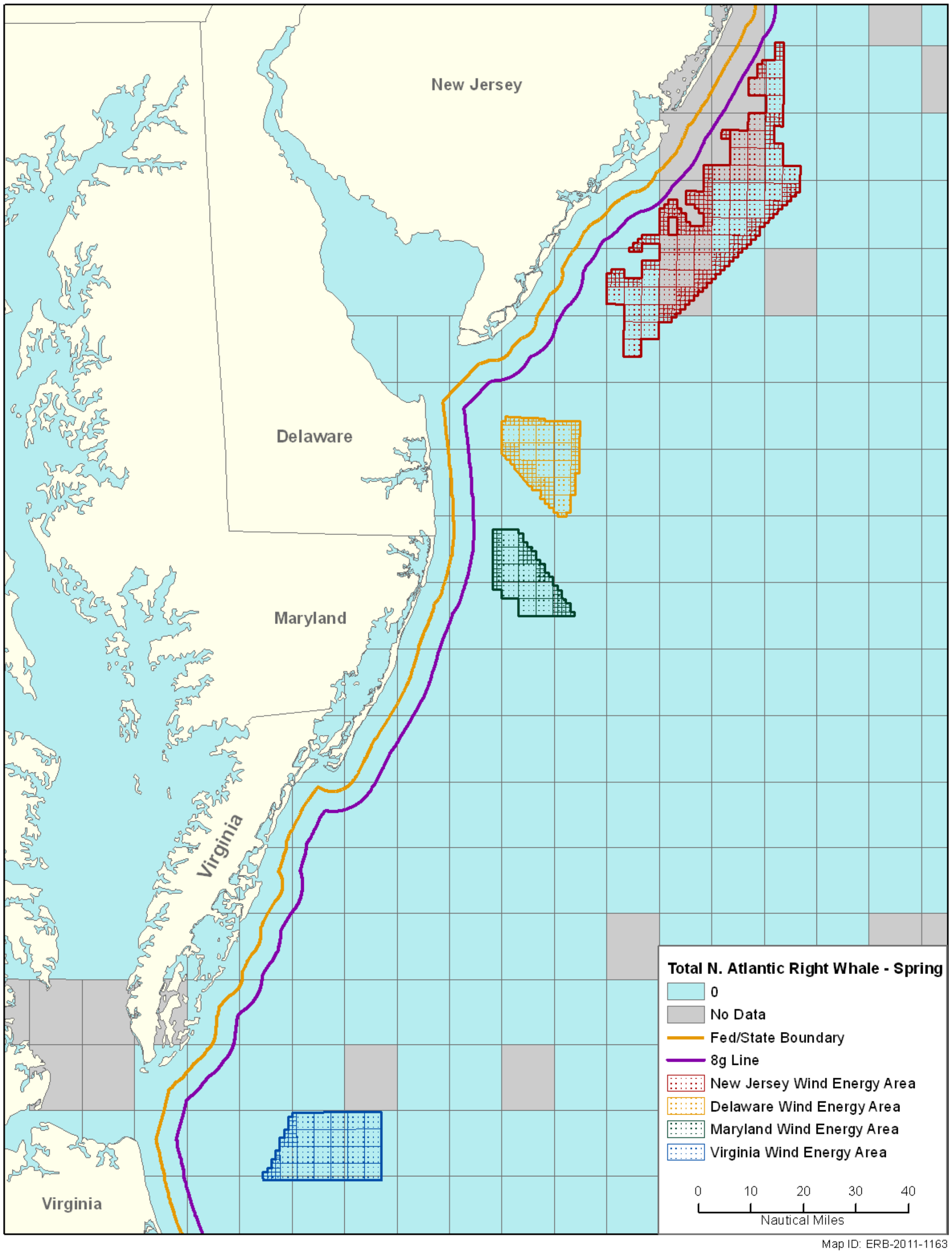

Figure A.17. North Atlantic right whale sightings – Spring (April-June, 1979-2007).
(Source: TNC, 2010)

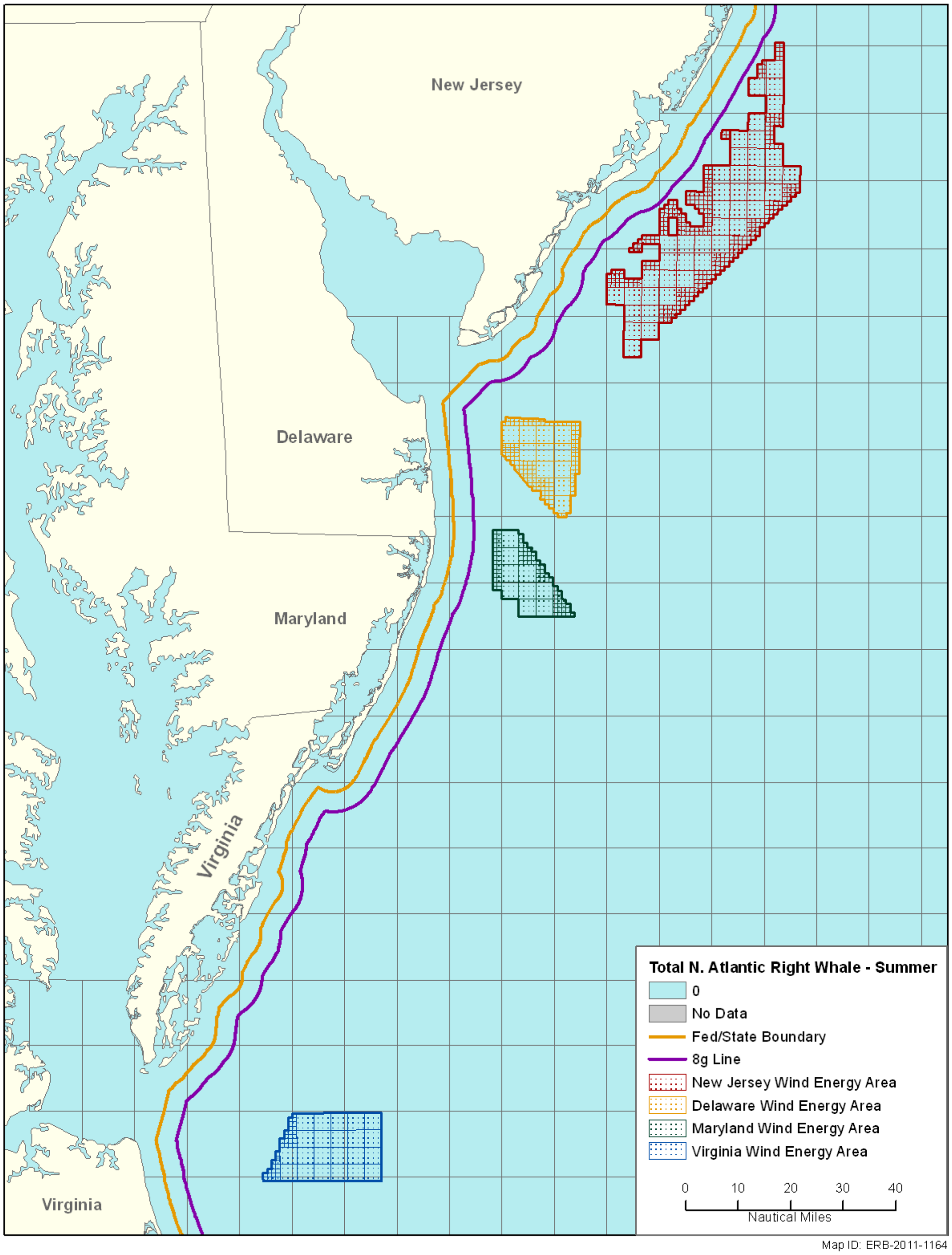

Figure A.18. North Atlantic right whale sightings – Summer (July-August, 1979-2007).
(Source: TNC, 2010)

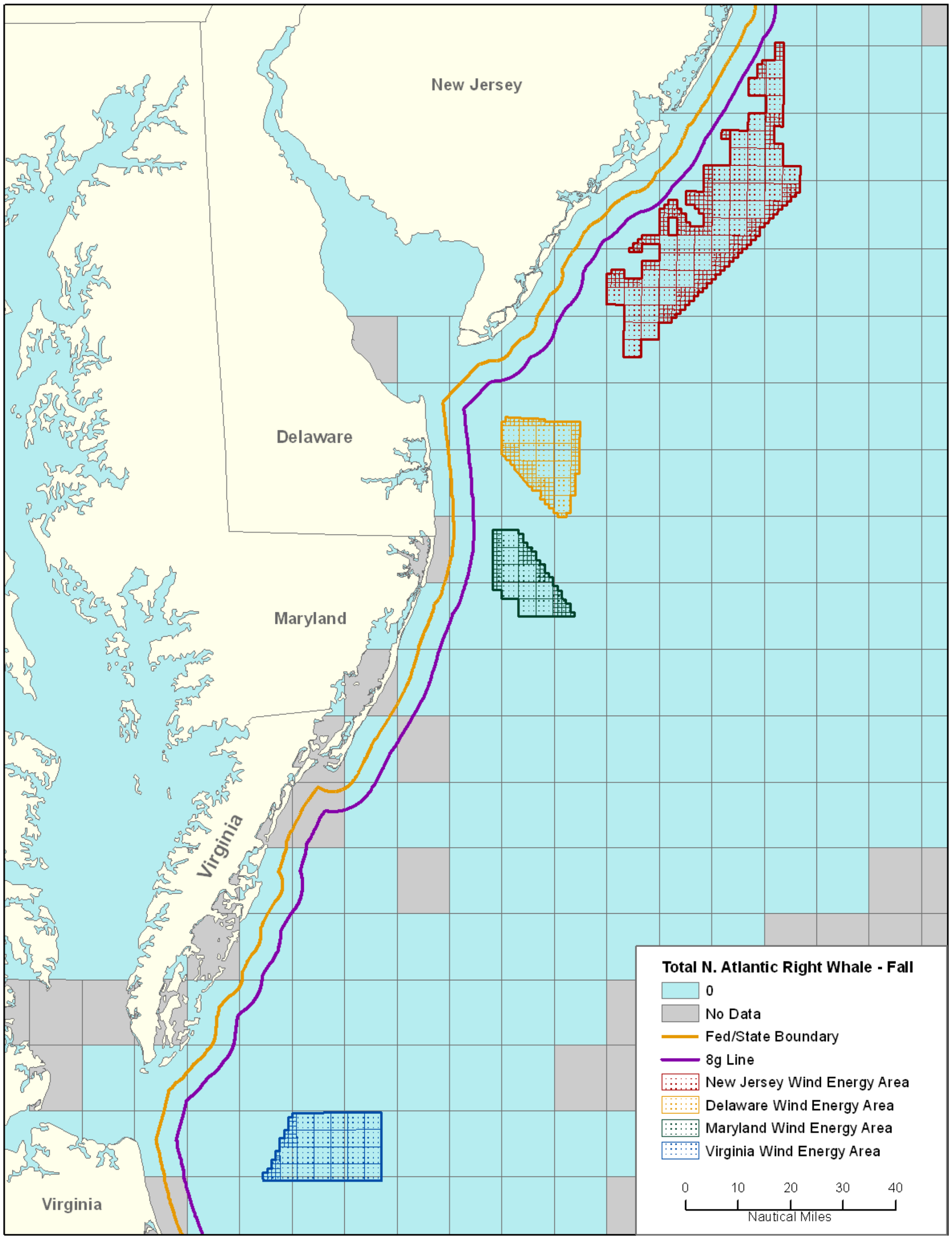

Figure A.19. North Atlantic right whale sightings – Fall (October-December, 1979-2007).
(Source: TNC, 2010)

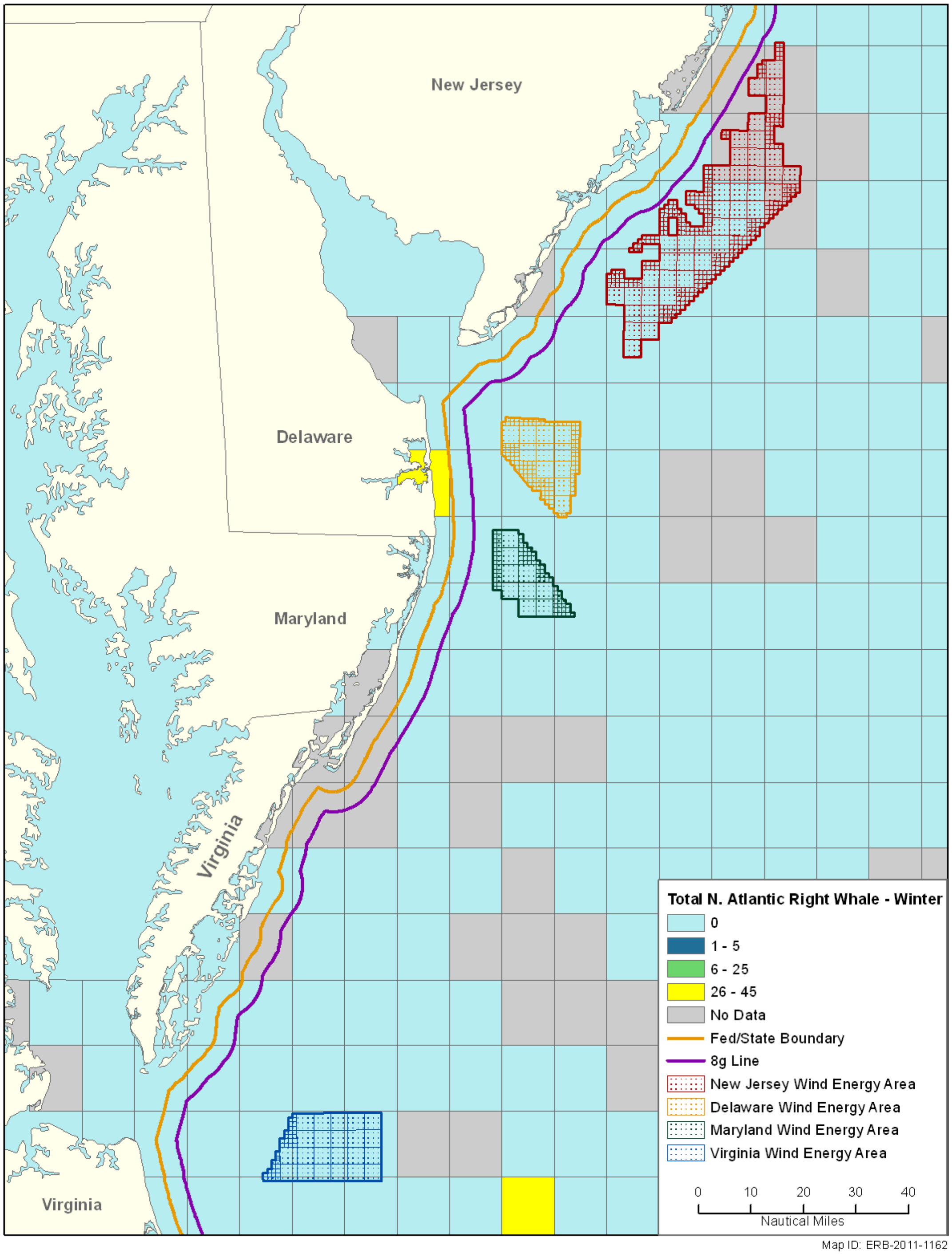

Figure A.20. North Atlantic right whale sightings – Winter (January-March, 1979-2007).
(Source: TNC, 2010)

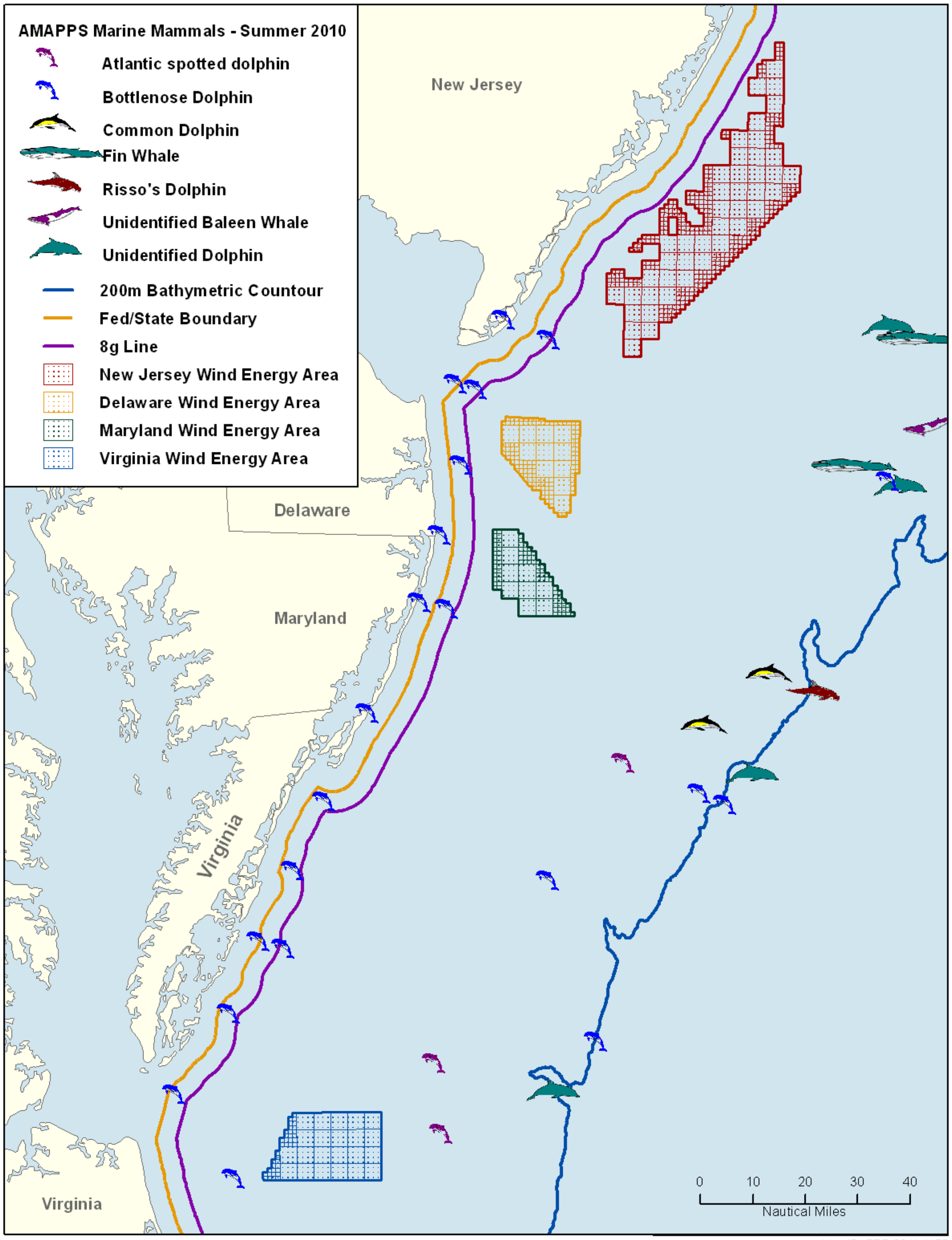

Figure A.21. Summer (July 24-August 14) 2010 Marine Mammal Aerial Sightings Data.

(Source: Atlantic Marine Assessment Program for Protected Species, 2011)

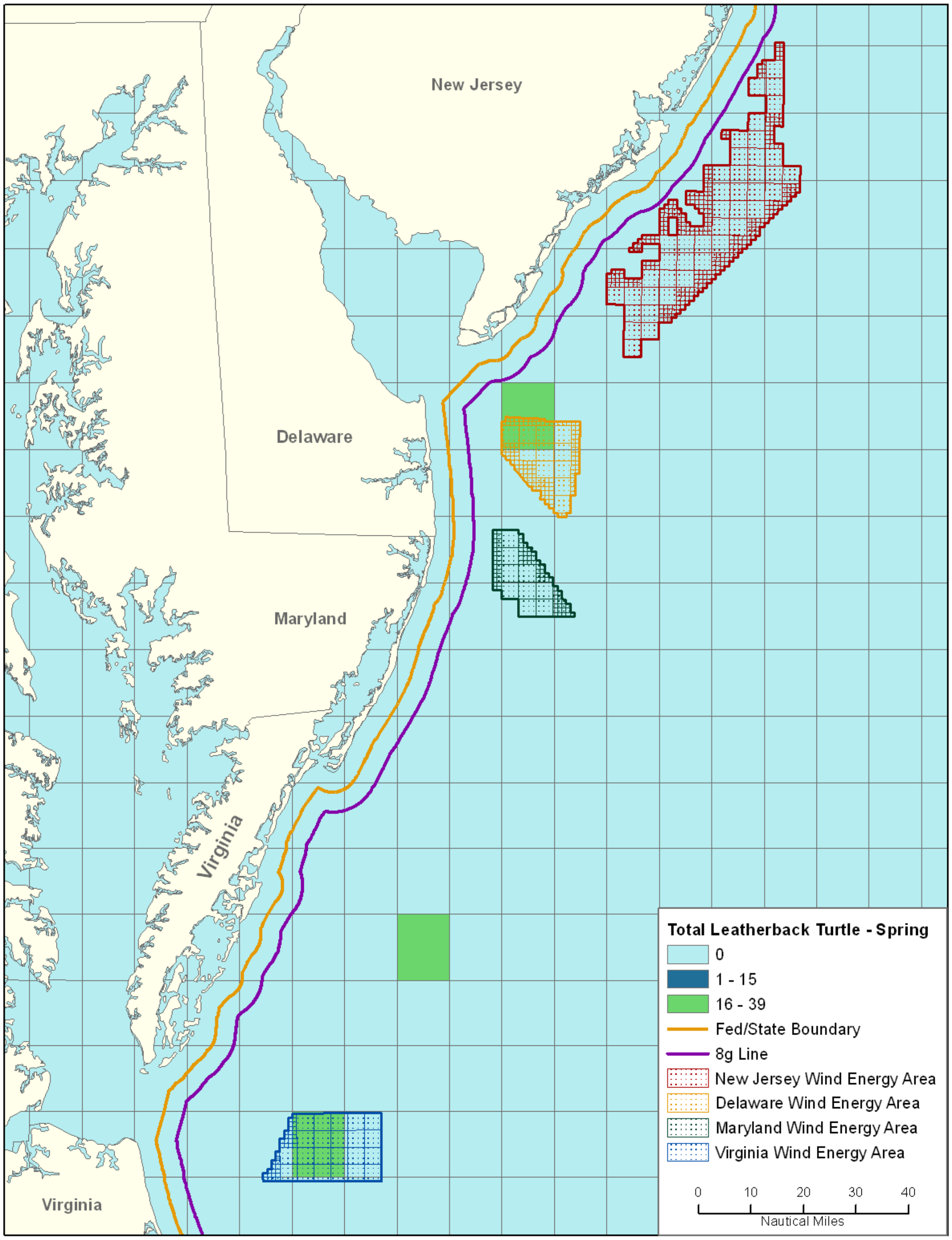

Figure A.22. Leatherback turtle sightings – Spring (April-June, 1979-2007).
(Source: TNC, 2010)

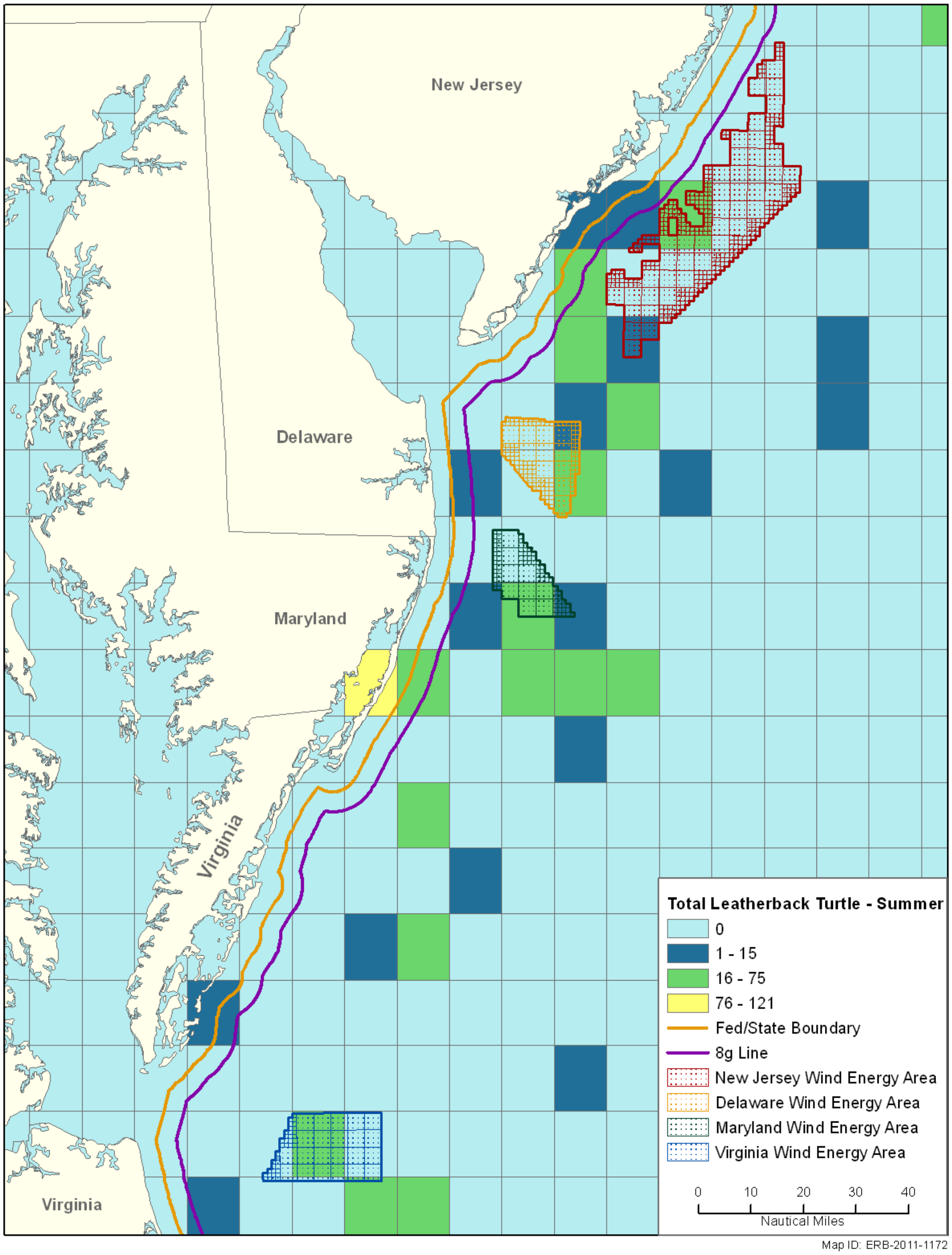

Figure A.23. Leatherback turtle sightings – Summer (July-September, 1979-2007)
(Source: TNC, 2010)

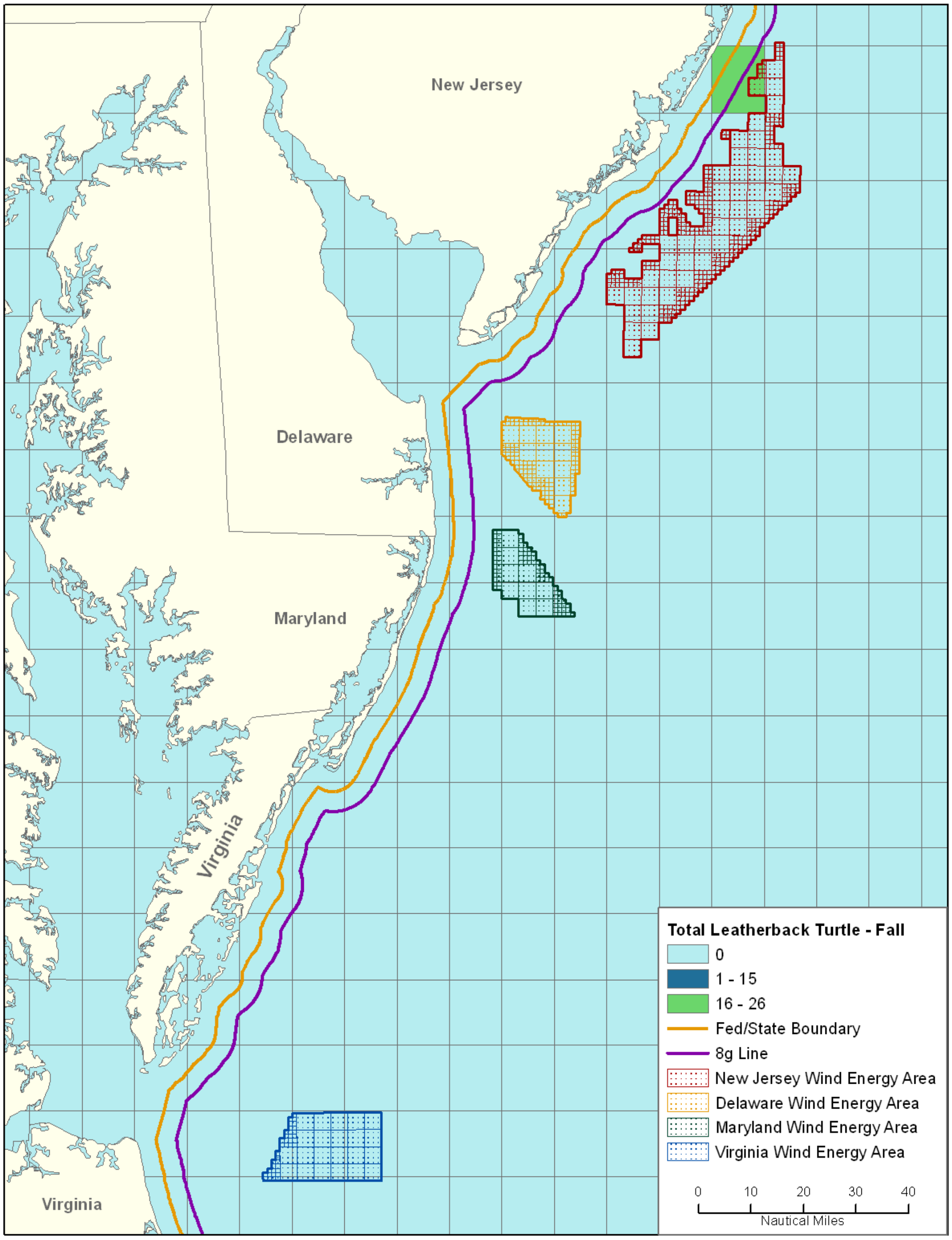

Figure A.24. Leatherback turtle sightings – Fall (October-December, 1979-2007).
(Source: TNC, 2010)

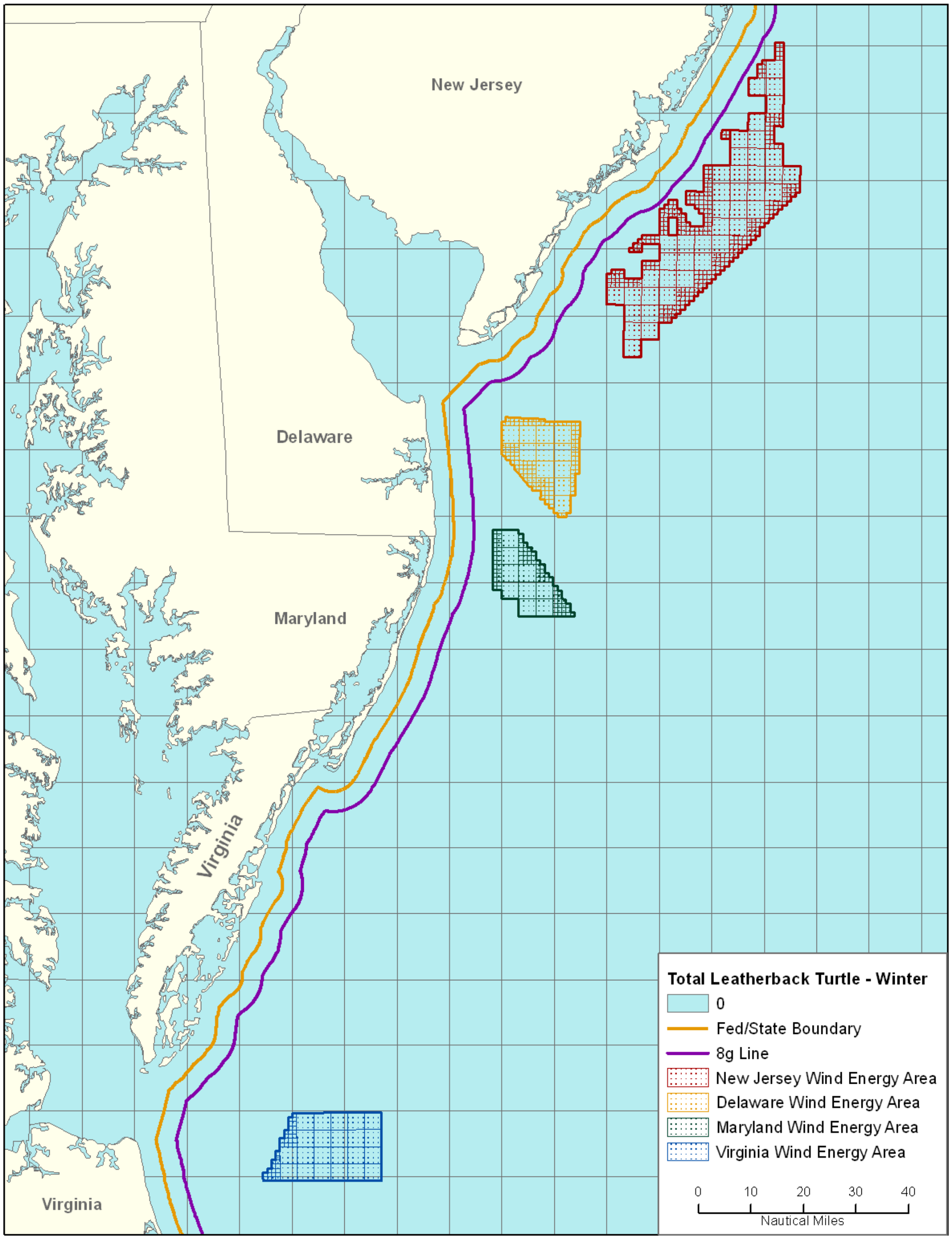

Figure A.25. Leatherback turtle sightings – Winter (January-March, 1979-2007).
(Source: TNC, 2010)

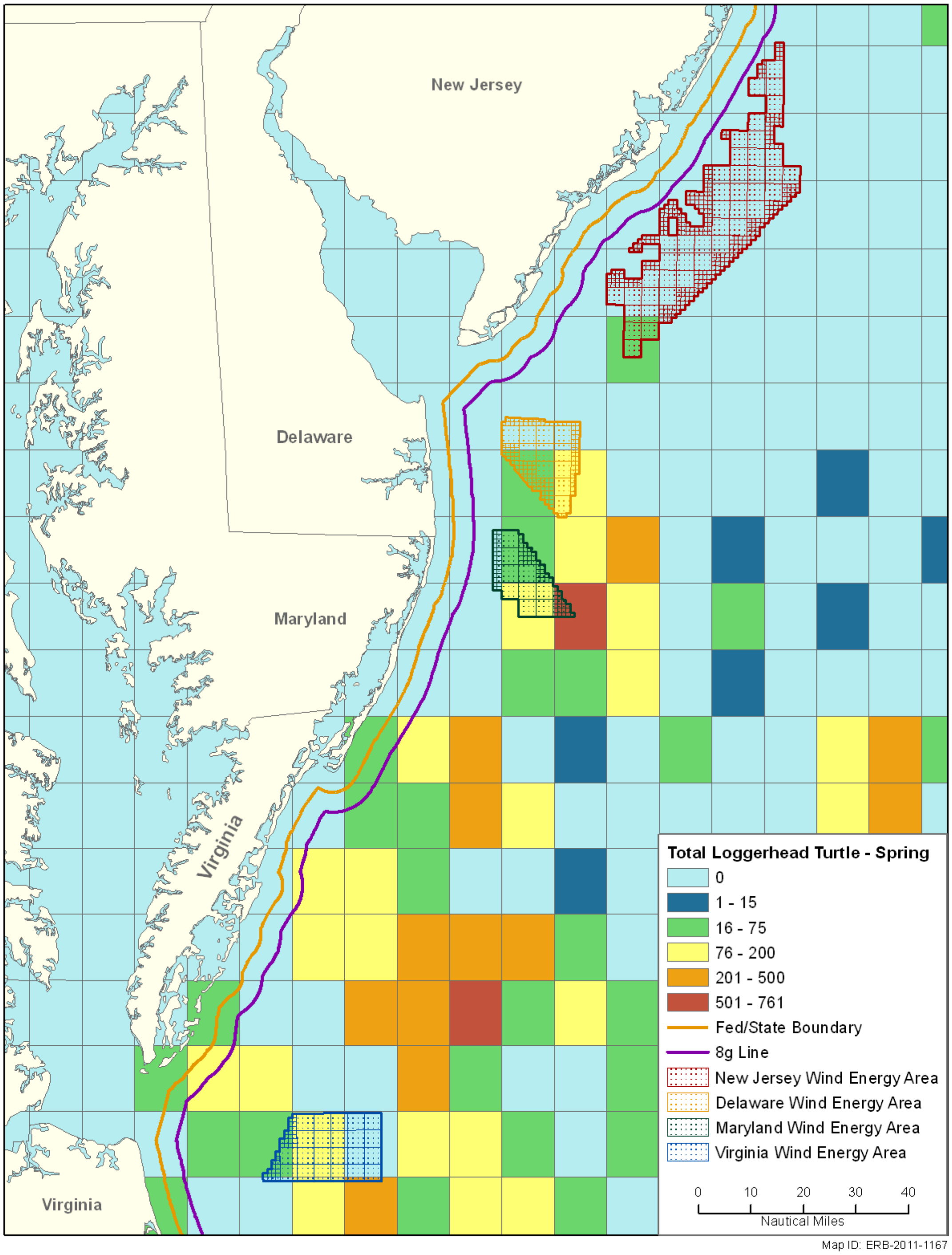

Figure A.26. Loggerhead turtle sightings – Spring (April-June, 1979-2007).
(Source: TNC, 2010)

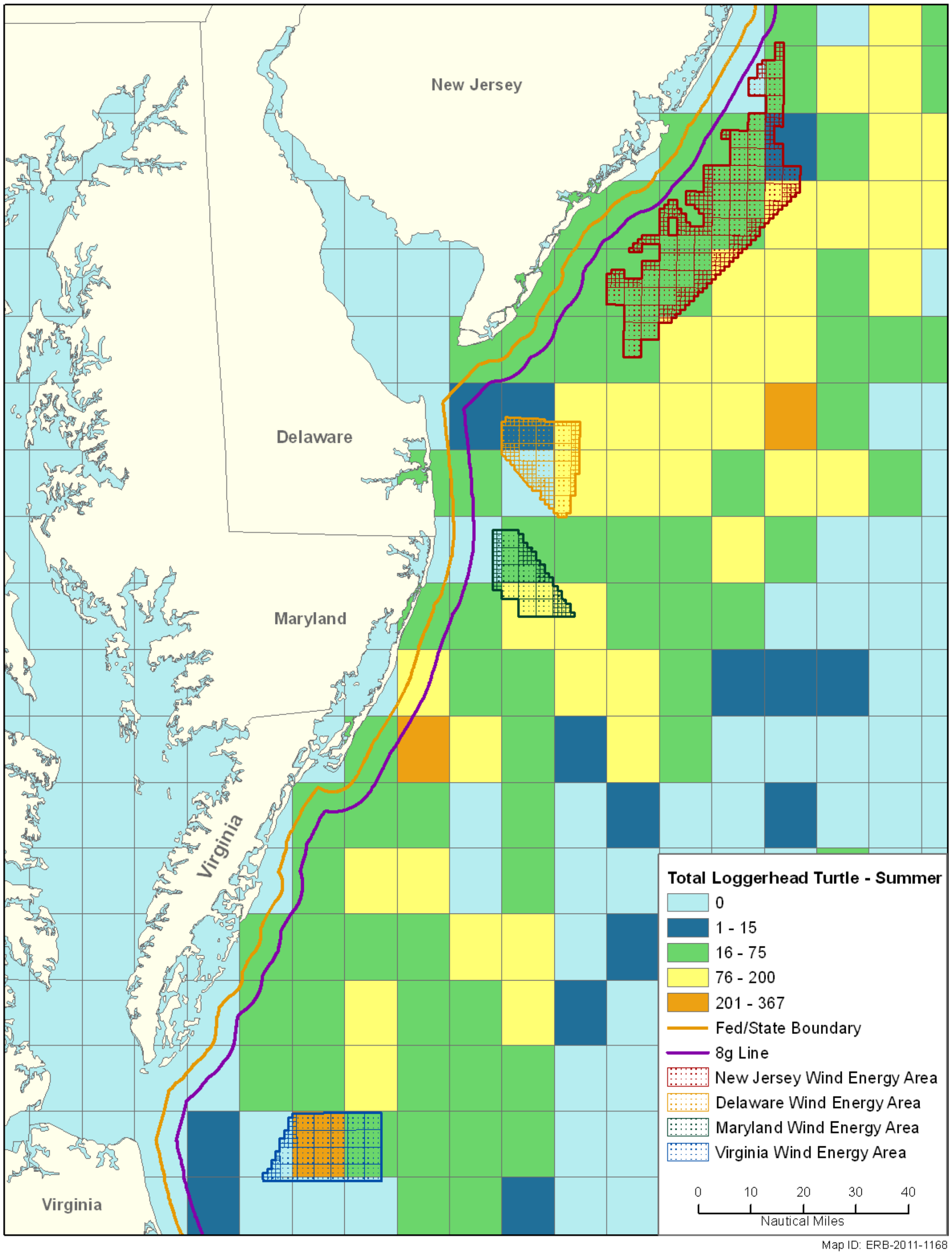

Figure A.27. Loggerhead turtle sightings – Summer (July-September, 1979-2007).
(Source: TNC, 2010)

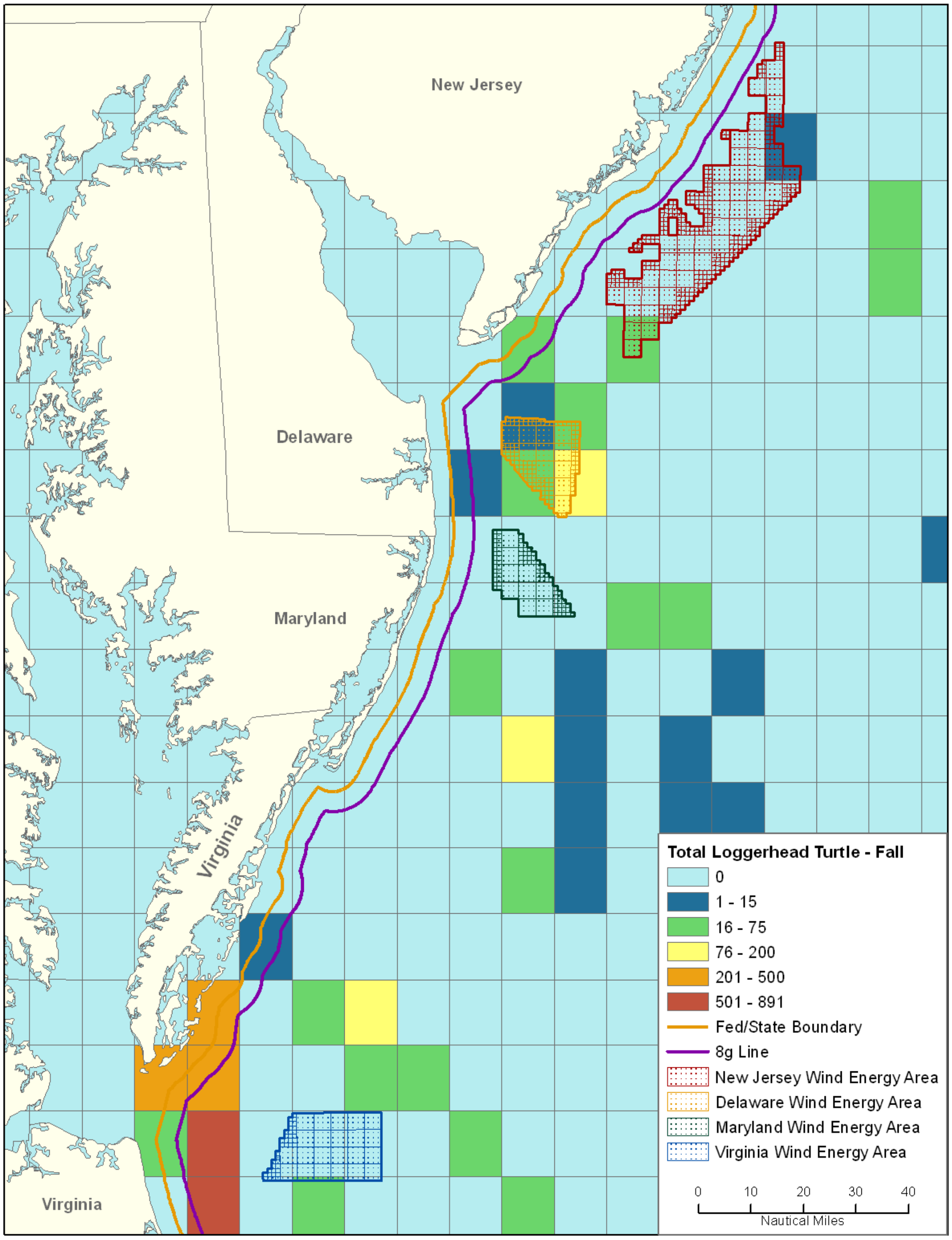

Figure A.28. Loggerhead turtle sightings – Fall (October-December, 1979-2007).
(Source: TNC,2010)

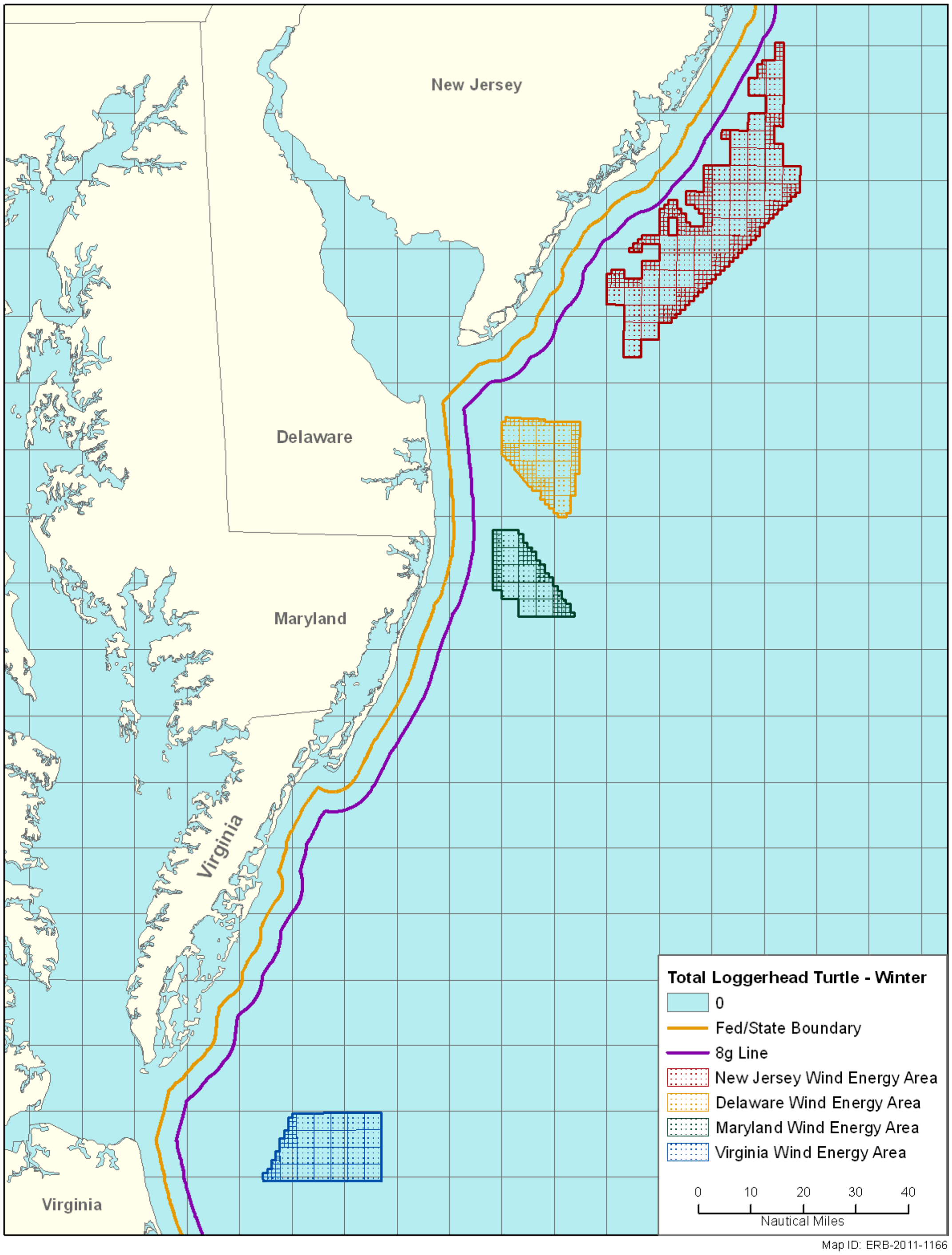

Figure A.29. Loggerhead turtle sightings – Winter (January-March, 1979-2007).
(Source: TNC, 2010)

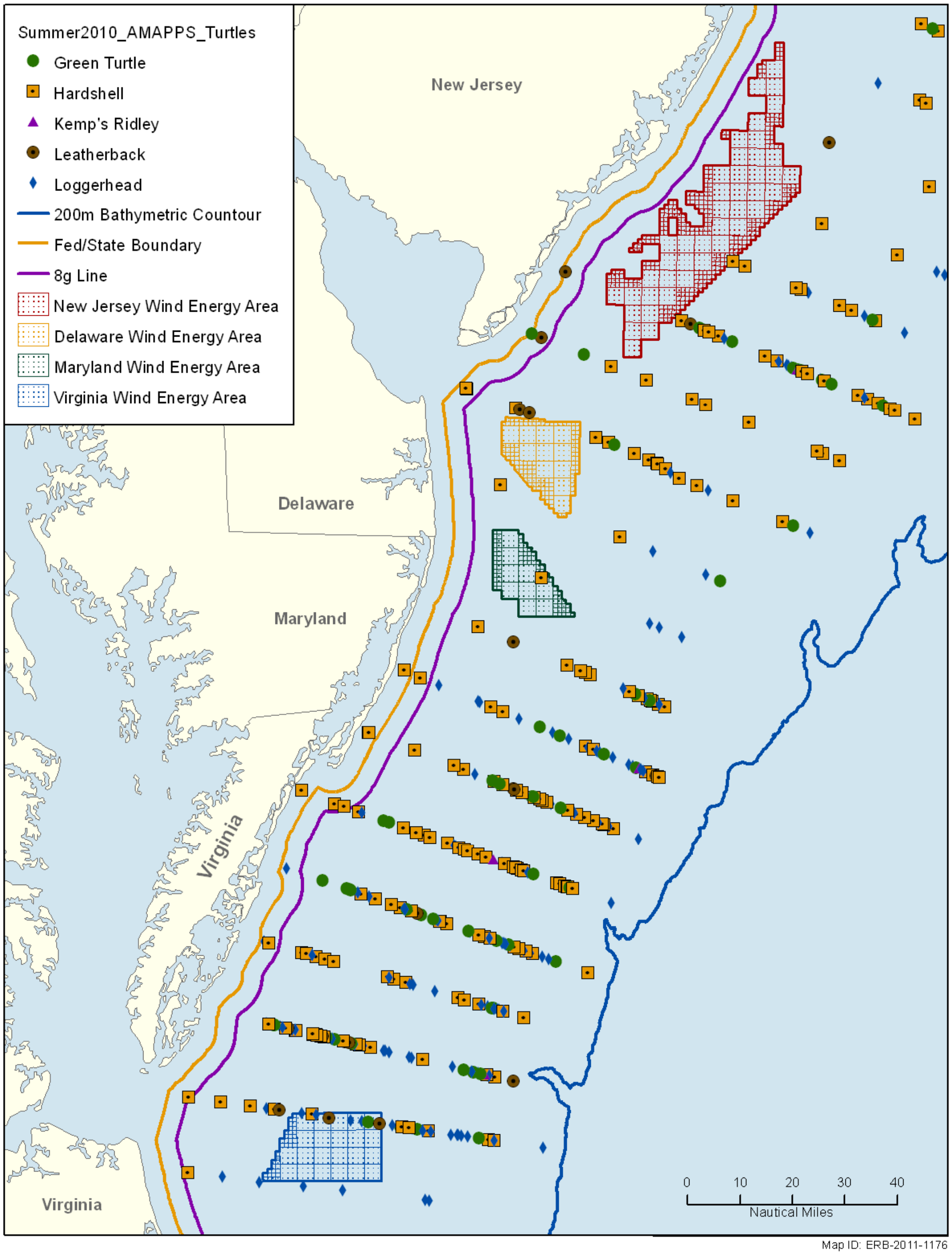

Figure A.30. Summer (July 24 – August 14) 2010 Sea Turtle Aerial Sightings Data.
(Source: Atlantic Marine Assessment Program for Protected Species, 2011)

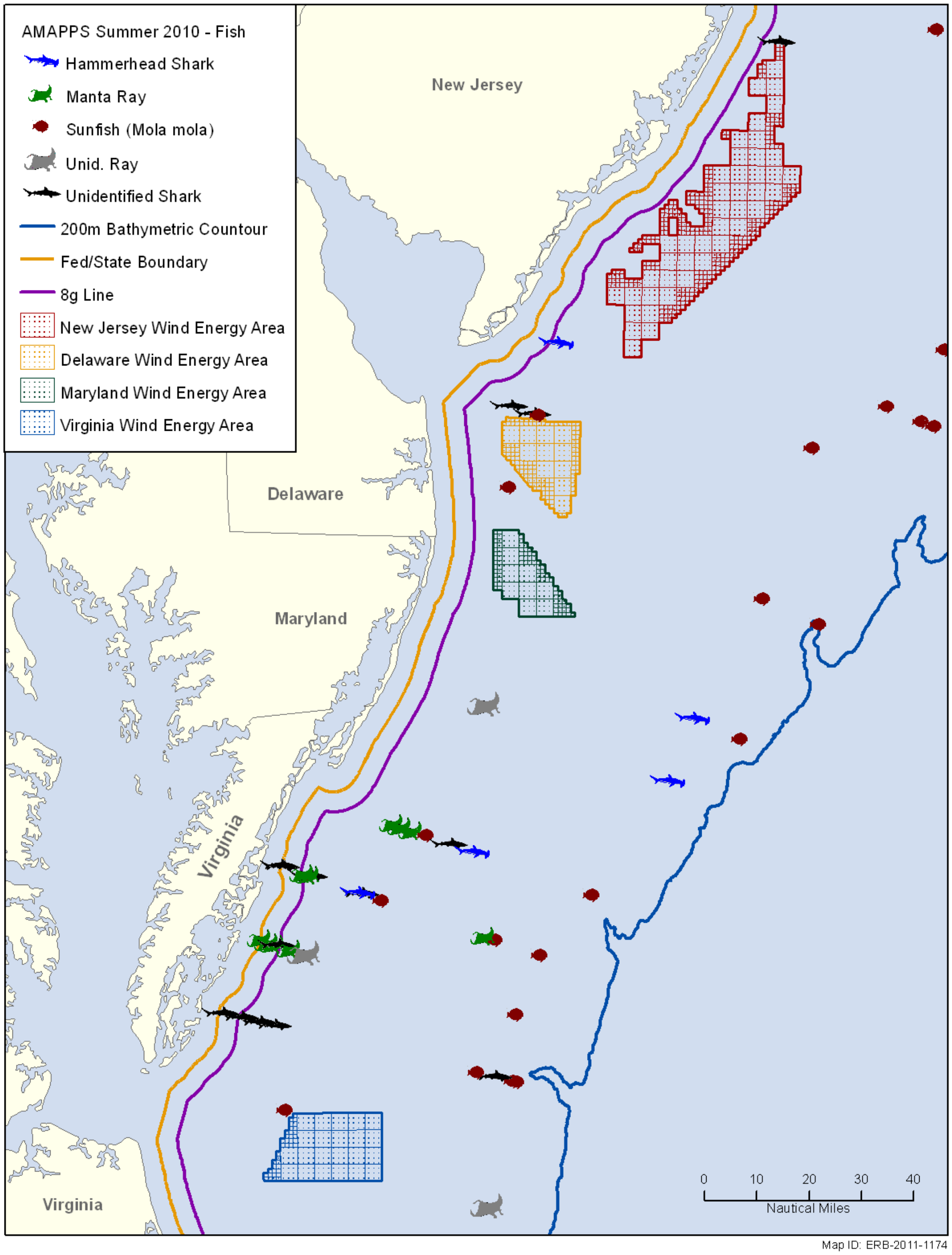

Figure A.31. Summer (July 24 – August 14) 2010 Large Epipelagic Fish Aerial Sightings Data.

(Source: Atlantic Marine Assessment Program for Protected Species 2011)

APPENDIX B

Mandatory Project Design Criteria Related to Marine Mammals and Sea Turtles

B.1. Mandatory Project Design Criteria related to Marine Mammals and Sea Turtles

This section describes the requirements BOEM will impose on lessees related to the minimization or elimination of potential impacts to ESA-listed species of whales and sea turtles. These requirements equally serve to reduce potential impacts to ESA-listed marine fish and non-ESA listed marine mammals, and marine fish. They are divided into three sections: (1) those required during all phases of site characterization and site assessment activities on a lease; (2) those required during site characterization activities; and (3) those required during construction of meteorological towers and installation of buoys. These project design criteria were shared with NMFS through the informal ESA consultation, which was completed on September 20, 2011, with NMFS concurrence that the proposed activities, implemented as described herein, would not likely adversely affect listed whales or sea turtles (USDOC, NOAA, NMFS, 2011c; Section 5.3.1 of this EA). These requirements will be included by BOEM as conditions on any leases and/or SAPs issued or approved under this decision.

B.1.1. Requirements for All Phases of Site Characterization and Site Assessment Activity on a Lease

The proposed activities would temporarily increase the number of vessels and vessel traffic within the WEAs and in the route between the WEAs and port facilities.

The following measures are meant to reduce the potential for vessel harassment or collision with listed marine mammals or sea turtles regardless of what activity that vessel is engaged in:

- All vessels and aircraft whose operations are authorized under or regulated by the terms of a BOEM-issued renewable energy lease would be required to abide by the NOAA Fisheries Northeast Regional Viewing Guidelines, as updated through the life of the project. Guidelines are available at: (http://www.nmfs.noaa.gov/pr/pdfs/education/viewing_northeast.pdf).
- Vessel operators and crews must maintain a vigilant watch for marine mammals and sea turtles and slow down or stop their vessel to avoid striking protected species.
- When whales are sighted, vessels must maintain a distance of 100 yards (91 m) or greater from the whale. If the whale is believed to be a North Atlantic right whale, the vessel must maintain a minimum distance of 500 yards (457 m) from the animal (50 CFR 2224.103).
- When sea turtles or small cetaceans are sighted, the vessels must maintain a distance of 50 yards (45 meters) or greater whenever possible.
- When cetaceans are sighted while a vessel is underway, the vessel must remain parallel to the animal's course whenever possible. The vessel must avoid excessive speed or abrupt changes in direction until the cetacean has left the area.
- Vessel speeds must be reduced to 10 knots or less when mother/calf pairs, pods, or large assemblages of cetaceans are observed near an underway vessel when safety permits. A single cetacean at the surface may indicate the presence of submerged animals in the vicinity of the vessel; therefore, precautionary measures should always be exercised.
- Whales may surface in unpredictable locations or approach slowly moving vessels. When animals are sighted in the vessel's path or in close proximity to a moving vessel,

the vessel will be required to reduce speed and shift the engine to neutral. Engines are not to be engaged until the animals are clear of the area.

- All vessel operators must comply with vessel strike reduction measures for North Atlantic right whales implemented by NMFS, including Special Management Areas (SMAs) and Dynamic Management Areas (DMAs). All vessels greater than 65 feet in length operating in a DMA must operate at speeds less than 10 knots. Compliance documents are located at: http://www.nero.noaa.gov/shipstrike/. When SMAs do not overlap with the lessee's activity area (e.g., survey, construction activity area), all vessels 65 feet in length or greater operating in the November 1 – April 30 time frame must operate at speeds less than 10 knots.
- Because of noise concerns, FAA Circular 91-36D encourages pilots making flights near noise-sensitive areas to fly at altitudes higher than minimum altitudes (http://www.fs.fed.us/r10/tongass/districts/admiralty/packcreek/AC91-36d.pdf). Project-related aircraft must avoid noise-sensitive areas, unless doing so would be impractical or unsafe. Pilots operating noise producing aircraft over noise-sensitive areas must fly not less than 2,000 ft above ground level, weather permitting, unless doing so would be impractical or unsafe. If the pilot has discretion, 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 National Marine Fisheries Service (NMFS) include provisions specifying that pilots maintain an altitude of at least 1,000 ft within sight of marine mammals.
- The lessee must ensure that vessel and aircraft (where applicable) operators are briefed to ensure they are familiar with the above requirements.
- The lessee must ensure that vessel operators, employees and contractors actively engaged in offshore operations must be briefed on marine trash and debris awareness elimination as described in the BOEM Gulf of Mexico Region's NTL No. 2007-G03 (http://www.gomr.boem.gov/homepg/regulate/regs/ntls/2007NTLs/07-g03.pdf), except that BOEM will not require the applicant to undergo formal training or post placards. The lessee must 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. The above referenced NTL provides information the applicant may use for this awareness training.
- The lessee must ensure that vessel crews report sightings of any injured or dead protected species (marine mammals and sea turtles) immediately, regardless of whether the injury or death is caused by the vessel. Sightings of injured or dead marine mammals and sea turtles must be reported to the NOAA Fisheries Northeast Region's Stranding Hotline at 800-900-3622. In addition, if the injury or death was caused by a collision with the project-related vessel, the lessee must ensure that BOEM is notified within 24 hours of the strike, as provided for in the lease. The notification should include the date and location (latitude/longitude) of the strike, the name of the vessel involved, and the species identification or a description of the animal, if possible. If the lessee's activity is responsible for the injury or death, the involved parties should remain available to assist the relevant salvage and stranding network as needed.

B.1.2. Requirements for Site Characterization Surveys

Chapters 3 and 4 of this EA describe the reasonably foreseeable HRG surveys and sub-bottom sampling the lessee would likely undertake. These field investigations would be conducted prior to the installation of a meteorological facility (*see* Section 3.1.2 of this EA).

The following requirements will apply to all project-related high-resolution geophysical survey work.

- *Establishment of Exclusion Zone*: A 500 m (1640 ft) radius exclusion zone for listed marine mammals and sea turtles shall be established around the seismic survey source vessel.
- *Visibility*: If sufficient lighting is not available, survey activity must be limited to daylight hours. Lessees will not conduct surveys at any time when lighting or weather conditions (darkness, rain, fog, sea state, etc.) prevents the monitoring of the exclusion zone. If the lessee intends to conduct seismic survey operations at night, it must consult with BOEM regarding sufficient lighting and monitoring of the 500m exclusion zone. The use of other technologies such as passive acoustic monitors (PAMs) is encouraged to supplement the visual observations. The lessee may request, and BOEM will consider in consultation with NMFS, whether to allow the use of these technologies to facilitate survey activity when visual observation may be impaired.
- *Visual Monitoring of Exclusion Zone*: The lessee must ensure that monitoring of the zones are conducted by a qualified NMFS-approved observer. Visual observations must be made using binoculars or other suitable equipment during daylight hours. Data on all observations must be recorded based on standard marine mammal observer collection data. This must include: dates and locations of construction operations; time of observation, location and weather; details of marine mammal sightings (e.g., species, numbers, behavior); and details of any observed taking (behavioral disturbances or injury/mortality). Any significant observations concerning impacts on listed marine mammals or sea turtles must be transmitted to NMFS and BOEM within 48 hours as provided in the lease. Any observed takes of listed marine mammals or sea turtles resulting in injury or mortality must be immediately (within 24 hours) reported to NMFS and BOEM.

  The lessee must ensure that visual monitoring begins no less than 60 minutes prior to the beginning of ramp-up and continue until seismic operations cease or sighting conditions do not allow observation of the sea surface (e.g., fog, rain, darkness, sea state, etc.). If a marine mammal or sea turtle is observed, the observer should note and monitor the position (including lat./long. of vessel and relative bearing and estimated distance to the animal) until the animal dives or moves out of visual range of the observer. The lessee must continue to observe for additional animals that may surface in the area, as often there are numerous animals that may surface at varying time intervals. At any time a marine mammal or sea turtle is observed within an estimated 500 m (1,640 ft) of the sound source array ("exclusion zone"), whether due to the marine mammal or sea turtle's movement, the vessel's movement, or because the marine mammal or sea turtle surfaced inside the exclusion zone, the observer will call for the immediate shut-down of the seismic operation. The vessel operator must comply immediately with such a call by an on-watch visual observer. Any disagreement or discussion should occur only after shut-down. When no marine mammals or sea turtles are sighted for at least a 60-minute period, ramp-up of the sound source may begin. Ramp-up cannot begin unless conditions allow the sea surface to be visually inspected for marine mammals and sea turtles for 60 minutes prior to commencement of ramp-up. Thus, ramp-up cannot begin after dark or in conditions that prohibit visual inspection (rain, fog, darkness, sea state, etc.) of the exclusion zone. Any shut-down due to a marine mammal or sea turtle(s) sighting within the exclusion zone must be followed by a 60-minute all-clear period and then a standard, full ramp-up. Any shut-down for other reasons, including, but not limited to, mechanical or electronic failure, resulting in the cessation of the sound source for a period greater than 20 minutes, must also be followed by full ramp-up procedures. In recognition of occasional, short periods of the cessation of survey equipment for a variety of reasons, periods of silence not exceeding 20 minutes in duration will not require ramp-up for the resumption of seismic operations if: (1) visual surveys are continued diligently throughout the silent period (requiring daylight and reasonable sighting conditions); and (2) no marine mammal or sea turtles are observed in the exclusion zone. If marine mammals or sea turtles are observed in the exclusion zone during the short silent period, resumption of seismic survey operations must be preceded by 60-minute all clear period followed by a ramp-up.

- *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).
- *Shut Down*: 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 may only occur following clearance of the exclusion zone and the implementation of ramp up procedures (if applicable).
- *Compliance with Equipment Noise Standards*: All seismic surveying equipment must comply as much as possible with applicable equipment noise standards of the USEPA.
- *Reporting for Seismic Surveys Activities*: The following report must be submitted while seismic surveys are conducted:
    - The lessee must provide BOEM and NMFS with a report within 90 days following 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 must 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.
    - The lessee must ensure that any observed injury or mortality to a listed marine mammal or sea turtle is reported to NMFS and BOEM immediately (within 24 hours). Any observations concerning impacts on listed marine mammals or sea turtles must be transmitted to NMFS and BOEM within 48 hours as provided in the lease.

Sub-bottom Sampling: The following requirements will apply to all sub-bottom sampling work.

- *Establishment of Exclusion Zone*: A 200-m radius exclusion zone for listed marine mammals and sea turtles must be established around any vessel conducting the sub-bottom sampling.
- *Visual Monitoring of Exclusion Zone*: The exclusion zone around the vessel must be monitored for the presence of listed marine mammals or sea turtles using the protocol detailed above for HRG survey work, absent the ramp-up procedures.
- *Reporting for Sub-bottom Sampling Activities*: The following reports must be submitted regarding the conduct of sub-bottom sampling activities:

  (1) A report must be provided to BOEM and NMFS within 90 days following the commencement of seismic survey activities that includes a summary of the sub-bottom sampling activities and an estimate of the number of listed marine mammals and sea turtles observed during sub-bottom sampling 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 any listed marine mammal or sea turtle takings.

  (2) The lessee must ensure that any observed injury or mortality to a listed marine mammal or sea turtle is reported to NMFS and BOEM immediately (within 24 hours). Any observations concerning impacts on listed marine mammals or sea turtles must be transmitted to NMFS and BOEM within 48 hours.

B.1.3. Requirements for the Construction of Meteorological Towers and Installation of Meteorological Buoys

Acoustic harassment from construction activities presents the potential for disturbance. The following requirements are meant to reduce or eliminate the potential for adverse impacts on listed marine mammals or sea turtles during the construction of meteorological towers and installation of meteorological buoys.

- *Requirements for Pile Driving*: BOEM will require lessees to implement the following measures during the conduct of pile driving activities related to meteorological towers:
- *Establishment of Exclusion Zone*: A preliminary 7 km radius exclusion zone for listed marine mammals and sea turtles must be established around each pile driving site in order to reduce the potential for impacts to these species. The 7 km exclusion zone is based upon the field of ensonification at the 160dB level. The 7 km exclusion zone must be monitored from two locations. One observer must be based at or near the sound source and responsible for monitoring the 180 dB field of ensonification out to 1000m from the sound source. An additional observer must be located on a separate vessel navigating approximately 4-5 km around the pile hammer monitoring 360° out to 7km from the sound source. If this method (one observer near the source and one on a vessel) is not sufficient to allow the observers to adequately monitor the exclusion zone such that any whale or sea turtle in the exclusion zone would be detected, additional observers must be used to ensure complete coverage of the exclusion zone.

- *Modification of Exclusion Zone*: If multiple piles are being driven, the field verification method may be used to modify the exclusion zone. Any new exclusion zone radius must be based on the most conservative measurement (i.e., the largest safety zone configuration) of the 160 dB zone. This zone must be used for all subsequent pile driving and be periodically re-evaluated based on the regular sound monitoring described in the Field Verification of Exclusion Zone section described below. The lessee must obtain BOEM approval of any new exclusion zone before it may be implemented.
- *Field Verification of Exclusion Zone*: The lessee must conduct field verification of the exclusion zone during pile driving of the first pile if the meteorological tower design includes multiple piles. The results of the measurements from the first pile must be used to establish a new exclusion zone which may be greater than or less than the 7 km default exclusion zone depending on the results of the field tests. The lessee must take acoustic measurements during the driving of the last half (deepest pile segment) for any given open-water pile. Two reference locations must be established at a distance of 500 m and 5 km from the pile driving. Sound measurements must be taken at the reference locations at two depths (a depth at mid-water and a depth at approximately 1m above the seafloor). Sound pressure levels must be measured and reported in the field in dB re 1 μPa rms (impulse). An infrared range finder may be used to determine distance from the pile to the reference location.

- *Visibility*: The lessee may not undertake any pile-driving at any time when lighting or weather conditions (darkness, rain, fog, sea state, etc.) prevent monitoring of the exclusion zone. The use of other technologies such as passive acoustic monitors (PAMs) is encouraged to supplement visual observations. The developer/operator may request, and BOEM will consider in consultation with NMFS, whether to allow the use of these technologies to facilitate survey activity when visual observation may be impaired.
- *Visual Monitoring of Exclusion Zone*: The lessee must ensure that monitoring of the zones is conducted by a qualified NMFS-approved observer. Visual observations must be made using binoculars or other suitable equipment during daylight hours. Data on all observations must be recorded based on standard marine mammal observer collection data. This must include: dates and locations of construction operations; time of observation, location and weather; details of marine mammal/sea turtle sightings (e.g., species, numbers, behavior); and details of any observed taking (behavioral disturbances or injury/mortality). Any observations concerning impacts on listed marine mammals or sea turtles must be transmitted to NMFS and BOEM within 48 hours. Any observed takes of listed marine mammals or sea turtles resulting in injury or mortality must be immediately (within 24 hours) reported to NMFS and BOEM as provided in the lease.

  The lessee must ensure that visual monitoring begins no less than 60 minutes prior to the beginning of soft start and continue until pile driving operations cease or sighting conditions do not allow observation of the sea surface (e.g., fog, rain, darkness, sea state, etc.). The lessee must ensure that, if a marine mammal or sea turtle is observed, the observer notes and monitors the position, relative bearing and estimated distance to the animal until the animal dives or moves out of visual range of the observer. The lessee must also ensure that the observer continues to observe for additional animals that may surface in the area, as often there are numerous animals that may surface at varying time intervals.

At any time a marine mammal or sea turtle is observed within the exclusion zone, whether due to the marine mammal or sea turtle's movement, the vessel's movement, or because the marine mammal or sea turtle surfaced inside the exclusion zone, the lessee must ensure that the observer notifies the Resident Engineer (or other mutually agreed upon individual by BOEM and the lessee). BOEM and NMFS recognize that once the pile driving of a segment begins it cannot be stopped until that segment has reached its predetermined depth. If pile driving stops and then resumes, it would potentially have to occur for a longer time and at increased energy levels. If listed marine mammals or sea turtles enter the zone after pile driving of a segment has begun, pile driving may continue and observers must monitor and record listed marine mammal and sea turtle numbers and behavior. However, 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 mutually agree upon individual) that an additional 60 minute visual and acoustic observation period will be completed, as described above, before restarting pile driving activities. In addition, pile driving may not begin during night hours or when the safety radius can not be adequately monitored (i.e., obscured by fog, sea state, inclement weather, poor lighting conditions, etc.) unless the applicant implements an alternative monitoring method that is agreed to by BOEM 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 (*see Visibility* above).

- *Implementation of Soft Start*: The lessee must ensure that a "soft start" is implemented 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 3 strikes from the impact hammer at 40-percent energy with a one minute waiting period between subsequent 3-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 mutually agreed upon individual by BOEM and the lessee) must delay pile-driving until the animal has moved outside the exclusion zone.
- *Compliance with Equipment Noise Standards*: All construction equipment must comply as much as possible with applicable equipment noise standards of the USEPA, and all construction equipment must have noise control devices no less effective than those provided on the original equipment.
- *Reporting for Construction Activities*: The following reports must be submitted during construction or installation:
    - Data on all observations must be recorded based on standard marine mammal observer collection data. This must include: dates and locations of construction operations; time of observation, location and weather; details of marine mammal sightings (e.g., species, numbers, behavior); and details of any observed taking (behavioral disturbances or injury/mortality). Any observations concerning

impacts on listed marine mammals or sea turtles must be transmitted to NMFS and BOEM within 48 hours. Any observed takes of listed marine mammals or sea turtles resulting in injury or mortality must be immediately (within 24 hours) reported to NMFS and BOEM.

- A final technical report within 120 days after completion of the pile driving and construction activities must be provided to BOEM and NMFS which 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.

APPENDIX C

Responses to Comments on the Draft Environmental Assessment

L. R. (Englewood, NJ)
(Document ID BOEM-2011-0053-0002)

Comment: Our family is a proponent of offshore wind installations. We feel this method of electricity production will add to the energy grid without adding pollutants or waste products to our burdened environment. We welcome this form of electricity production.

Response: Thank you for your comments, which have been noted and will be considered in the decision-making process.

Wayne Huebschman., Port Captain, Express Marine Inc.
(Document ID BOEM-2011-0053-0003)

Comment: Port Captain Wayne Huebschman with Express Marine Inc. submitted information on existing and future tug and barge usage in the area of Alternative A. Mr. Huebschman also commented on potential vessel routing measures.

Response: The EA discusses potential conflicts between vessels and site characterization and assessment activities, while Mr. Huesbschman's comments concern conflicts between vessels and commercial wind generation facilities. If and when a lessee is prepared to propose a wind energy facility on its lease, it will submit a COP. If a COP is submitted, BOEM would prepare a separate site- and project-specific NEPA analysis for that proposal. This may take the form of an EIS and would provide additional opportunities for public involvement pursuant to NEPA and the CEQ regulations at 40 CFR Parts 1500-1508 (Section 1.4.2).

As discussed in Section 4.1.1.7, the USCG anticipates providing BOEM with additional navigational safety recommendations upon completion of the ACPARS. The goal of the ACPARS (*see* 76 FR 27788 (May, 11, 2011)) is to enhance navigational safety by examining existing shipping routes and waterway uses, and, to the extent practicable, reconcile the paramount right of navigation within designated port access routes with other reasonable waterway uses. The data gathered during the ACPARS may result in the establishment of new vessel routing measures, modification of existing routing measures, or disestablishment of some existing routing measures of the Atlantic coast from Maine to Florida by the USCG. Mr. Huesbschman's comment letter has been provided to the USCG for consideration in the ACPARS.

Alex Pavlak
(Document ID BOEM-2011-0053-0004)

Comment: The draft views offshore wind as if it were as environmentally benign as a bridge. It ignores the fact that the whole point of wind power is to impact the environment, to reduce electric power system emissions. The emission impact is completely ignored. The usual assumption in the literature is that emissions are proportional to power, that is, if wind contributes 1% of the energy it will reduce emissions by 1%. By this method, PJM estimates Maryland offshore wind will reduce emissions by 0.17 CO_2/kWh. In reality a little wind saves natural gas, about 0.10lbs CO_2/kWh. Too much wind can cause base load coal plants to cycle and increase emissions. There simply is no data from real systems. How can you issue an environmental impact statement that ignores electric power system emissions?

Response: The purpose of this EA is to consider the reasonably foreseeable environmental consequences associated with issuing leases and approving site assessment plans in the WEAs described. If and when a lessee submits a COP, BOEM would prepare a NEPA document addressing the impacts associated with the installation and operation of the wind energy facility it proposes, which may implicate the issues raised in the comment (*see* Section 1.4.2, Scope of Analysis, of this EA).

Jason Wood, SMRU Ltd.
(Document ID BOEM-2011-0053-0005)

Comment: BOEM [sic] propose as mitigation monitoring for pile-driving (for marine mammals and turtle) to use observers on both the construction vessel and an outer observer boat circling the area. At typical observer sighting speeds (10nm/hr), coverage of the outer circumference will take > 3 hours and be limited by good sighting conditions. BOEM should consider the additional use of Passive Acoustic Monitoring (PAM) to concurrently detect both listed baleen whales and local odontocete populations. PAM could also be employed prior to operations starting. Towed PAM could be used from the support vessel or autonomous buoys (modem-linked to the construction vessel) used to cover the area in near real-time more comprehensively.

Response: The mandatory project design criteria require the monitoring of exclusion zones for both survey and pile driving activity, and do not preclude the use of PAMs to aid visual observations. The requirements detailed in Appendix B of this EA (formerly Appendix C of the Draft EA) have been updated to reflect this. If the lessee desires to conduct activity outside of times of good visibility and a calm sea state, as currently required, they may request the use of additional technologies, such as PAMs, in order to facilitate this activity. As discussed in the *2011 Final Programmatic Environmental Impact Statement/Overseas Environmental Impact Statement for Marine Seismic Research Funded by the National Science Foundation or Conducted by the U.S. Geological Survey*, available at http://www.nsf.gov/geo/oce/envcomp/usgs-nsf-marine-seismic-research/nsf-usgs-final-eis-oeis_3june2011.pdf, PAM can be effective at detecting some animals before they are detected visually. Its value can be limited, however, by bottom configuration (water depth) and other environmental factors, and in some cases towing the PAM equipment is not practicable. Because of present limitations to determine range of acoustic contacts, the value of PAM is to detect acoustic cues that alert visual observers of the presence and general direction of marine mammals (NSF, 2011). The PAMs would only detect acoustically active animals. Thus sea turtles and non-vocalizing marine mammals would not be detected. What was stated above in regards to PAMs can be said for the use of active forward-facing sonar to detect animals and discern behavior. Although active sonar would detect all animals with a reflective signature, it would only detect animals in the direction the sonar was pointing. These are additional tools that can aid shipboard endangered species observers, but are not required elements of the activities which are the subject of this assessment. Operators are encouraged to use additional tools at their disposal to aid shipboard endangered species observers in identifying endangered species and avoiding impacts to them.

Mariners' Advisory Committee for the Bay & River Delaware
(Document ID BOEM-2011-0053-0006)

Comment: Any structure can present a hazard to navigation, and a ship strike could cause the breaching of cargo and/or fuel tanks and could result in the discharge of oil into the environment. Any such spill could harm wildlife, habitat and adjacent beaches – impacting both the environment and the economy of coastal states. The MAC strongly recommends that no less than ½ nautical mile buffers be established beyond all vessel anchorage and navigation fairways and any wind energy structures; and that all structures be properly designated with navigation buoys, lights and RACONs.

Response: The MAC's recommendation for no less than a ½ nautical mile buffers is currently only applicable to the Delaware and Maryland WEAs and is addressed in Section 4.1.1.7.2.. The EA proposes that no meteorological towers /buoys could be located within a TSS or within 1 nm of any TSS boundary. In addition, Alternative B would exclude a potential anchorage ground offshore Delaware from leasing and site assessment activities at this time (*see* Sections 2.2 and 4.2). All meteorological towers and buoys, regardless of height, would have lighting and marking for navigational purposes.

Comment: MAC is also concerned about the negative environmental impacts that deviation of vessels around WEAs will have on the environment. Should WEAs be located such that exiting navigational fairways are relocated seaward, the voyage distances for ships and tows transiting around the WEAs will result in increased fuel use and increased vessel emissions.

Response: Vessels could freely traverse the WEAs, even after leases are issued. It is not anticipated that vessels would need or be required to deviate a significant distance in order to avoid a meteorological tower or buoy. Future development of commercial wind turbine facilities is not part of the proposed action or alternatives. Should a lessee subsequently submit a COP proposing a wind energy facility, the reasonably foreseeable environmental consequences of that facility, such as the potential rerouting of vessel traffic around the project area, would be addressed in a site- and project-specific NEPA analysis.

Richard Reis, Conservation Engineering
(Document ID BOEM-2011-0053-0007)

Comment: I strongly support the development of wind energy resources off of the Mid-Atlantic state.

Response: Thank you for your comment, which has been noted and will be considered in the decision-making process.

enXco Development Corporation
(Document ID BOEM-2011-0053-0008)

Comment: The enXco Development Corporation provided the following recommendations regarding each of the alternatives considered in this EA:

- Alternative A (Full Leasing for WEAs) – Recommends that BOEM select Alternative A (Full Leasing for WEAs). A FONSI should be issued because the Draft EA found that the foreseeable consequences of Alternative A would be short-term in duration and negligible in extent.
- Alternative B (Removal of Anchorage Ground Offshore Delaware) – While this change is minor and appears to have a relatively small impact on the Mid Atlantic offshore wind energy development, there is concern this may set a precedent that could allow similar concerns to eliminate larger lease areas. BOEM should not exclude the Delaware anchorage ground from the Final EA because its NEPA process provides future opportunity to exclude the anchorage ground after the ACPARS is complete and there is a formal designation of the anchorage.
- Alternative C (Removal of Category B Areas Offshore Maryland) – There is a strong objection to Alternative C which would effectively decimate the area proposed offshore Maryland WEA for wind development. The further reduction proposed in this alternative would effectively stop all offshore wind development activity in the Maryland WEA. BOEM should wait for completion of the study and urge BOEM not to choose Alternative C in the Final EA.
- Alternative D (Seasonal Prohibition to Protect the North Atlantic Right Whale) – One recognizes the importance of protecting the North Atlantic right whale. However, one questions the need for further protections beyond those already in place pursuant to the MMPA. The seasonal prohibition will increase project development time and ultimately delay the availability of renewable energy generation capacity. This will make it more difficult for Mid Atlantic States to attain their RPS goals. One opposes this alternative.
- Alternative E (Removal of Inclement Weather Diversion Areas Offshore Virginia) – Exclusion of this area will likely result in significant cost increase for wind development in Virginia by reducing the economies of scale that occur with larger projects. It would be premature to remove significant portions of the proposed WEA off Virginia at this time.
- Alternative F (No Action) – This alternative is unacceptable. It is recommended that BOEM adopt a Final EA selecting Alternative A and ultimately issue a FONSI.

Response: Thank you for your comments, which have been noted and will be considered in the decision-making process.

Under Alternatives B, C, and E, areas would be excluded from leasing decisions. Alternative E has been modified to exclude leasing and site assessment in full OCS blocks 6111 and 6161, and partial OCS blocks 6011, 6061, 6110, and 6160 on the most western edge of the Virginia WEA, rather than the eight OCS blocks identified in the draft EA (*see* Sections 2.5 and 4.5 of this EA).

Under the renewable energy regulations, the issuance of leases and subsequent approval of wind energy development on the OCS is a staged decision-making process. BOEM's wind energy leasing and development process occurs in four distinct phases: (1) planning; (2) lease issuance; (3) approval of a site assessment plan (SAP); and (4) approval of a COP. BOEM intends to use the EA to inform decisions to issue leases in the WEAs and to subsequently approve SAPs on those leases. At the fourth phase – COP phase, BOEM would prepare a separate site- and project-specific NEPA analysis which may take the form of an EIS (*see* Sections 1.1.4 and 1.4.2 of this EA.) Additional areas may be excluded during each of these phases.

University of Delaware
College of Earth, Ocean & Environment
School of Marine Science & Policy
(Document ID BOEM-2011-0053-0009)

Comment: The risk of vessel collisions with whales during peak migration time is a concern. However, a 6-month blanket prohibition on construction and survey activities is not an effective method to protect marine mammals and still allow for reasonable offshore wind site assessment and site characterization activity.

- Why would BOEM consider constraining development of wind energy projects given its significantly smaller level of impact than commercial shipping of fishing, and, unlike those activities, wind energy development may have benefits for right whales in terms of, for example, creating commercial shipping exclusion zones in which whales can migrate without risk of strike.
- It is unclear why BOEM would consider adopting a much more stringent regime for offshore wind than the expert agency, NOAA-NMFS, has with regard to the leading cause of right whale mortality-ship strikes of commercial vessels exceeding 10 knots.
- Any such blanket prohibitions should be promulgated by NOAA-NMFS pursuant to the Endangered Species Act and the Marine Mammal Protection Act, and not by BOEM, which has no expertise in regard to marine mammals, under its authority to authorize offshore wind power development.
- There is no reason for BOEM to adopt a blanket prohibition for wind energy activities during this season provided appropriate mitigation measures are in place.

Response: BOEM received several comments from four entities for and against the selection of Alternative D, as well suggestions on how the alternative might be improved. BOEM will consider these comments when evaluating whether or not to select this alternative. One suggestion by the environmental organization Oceana was to edit Alternative D to ensure that biological investigations for marine mammals be permitted during the seasonal prohibition period. Alternative D has been modified to allow biological surveys year-round.

BOEM works very closely with NMFS and other expert agencies to explore how to reduce adverse impacts to marine mammals. The alternatives developed in this EA utilize the expertise of those agencies and within BOEM to put forth a reasonable range of alternatives to be considered to reduce individual and cumulative impacts from Alternative A. At the time of the release of the Draft EA informal consultation with NMFS was not yet complete. This consultation is now complete and the results of this consultation (USDOC, NOAA, NMFS, 2011c) have been incorporated into this Final EA.

The proposed action and alternatives do not include approval of any commercial wind energy facility. If and when a lessee submits a COP, BOEM would prepare a NEPA document addressing the impacts associated with the installation and operation of the wind energy facility it proposes, which may implicate the issues raised in the comment (*see* Section 1.4.2, Scope of Analysis, of this EA).

Comment: Implementing site-specific conservation measures to protect North Atlantic right whales and other marine wildlife is a more effective means of ensuring the protection of marine mammal populations. In contrast, generic temporal exclusions will not produce desirable results.

Response: BOEM received several comments both for and against the selection of Alternative D, as well suggestions on how the alternative might be improved. BOEM has made changes to the design of Alternative D as a result of these comments, and will consider these comments when evaluating whether or not to select this alternative.

Comment: BOEM should be cautions with the suggestion of reducing mitigation measures during summer months if the action Alternative D is chosen. Such a measure would not serve to protect other marine mammals present in the mid-Atlantic from vessel strikes, acoustic impacts from construction, and other related impacts from Alternative A. It is important to consider impacts to all marine wildlife and not exclusively to North Atlantic right whales when commencing activities in the ocean.

Response: Text was added to this EA explaining that the mandatory project design criteria detailed in Appendix B is a part of the proposed action and all alternatives, including Alternative D.

Oceana

(Document ID BOEM-2011-0053-0010)

Comment: Upon the submission of the first offshore wind COP for the Mid-Atlantic OCS, it is expected that a cumulative impact and indirect effects analysis to be conducted that would consider the impact of a full build out of offshore wind projects along the Mid-Atlantic OCS.

Response: If and when a COP is submitted, BOEM would prepare a separate site- and project-specific NEPA analysis (*see* Section 1.4.2 of this EA) for the project proposed. This may take the form of an EIS which would analyze the construction and operation activities for that particular project including the cumulative impacts of the action added to other past, present and reasonably foreseeable future actions, including other renewable energy activities. Through the scoping process for such a NEPA document, BOEM will determine the geographic scope of the cumulative effects analysis.

Comment: Alternative A would best expedite offshore wind development; it does not sufficiently protect the North Atlantic right whale, even with the inclusion of mitigation measure in Appendix C of the Draft EA [now Appendix B in the Final EA]. There is great concern for the imperiled North Atlantic right whale. Therefore consider selecting Alternative D.

Alternative D seems to exclude all surveys from November to April. Doing so, would be counterproductive, in that it would prohibit crucial data from being gathered during the critical window of time. BOEM should allow biological surveys to be conducted from November to

April, while prohibiting seismic surveys. BOEM should also force these biological surveys to abide by the supplemental mitigation measures outlined below to prevent harm to marine mammals.

Response: Your suggestion to edit Alternative D to ensure that biological investigations for marine mammals be permitted during the seasonal prohibition period has been adopted.
Comment: Oceana strongly urges BOEM to mandate that site characterization and assessment activities abide by the following supplemental mitigation measures.

1. Enforce and Clarify Appendix C of the Draft EA [now Appendix B in this Final EA]

BOEME needs to enforce the mitigation measures in competitive and non-competitive leases, such as by including them as lease stipulations as was done with the Interim Policy leases. However, with respect to potential impacts to marine mammal, particularly the North Atlantic right whale, the proposed mitigation measures fall short.

The Draft EA does not state that the mitigation measures in Appendix C will be enforced, but rather say they "would likely be required by NMFS through its biological opinion an IHA permit", (pg., 87), leaving the possibility open for Appendix C to be ignored. BOEM must mandate that the mitigation measures in Appendix C be adhered to during site characterization and assessment and clarify the numerous internal inconsistencies within Appendix C.

Throughout Appendix C, BOEM states that activities that require the monitoring of an exclusion zone must be stopped when "sighting conditions do not allow observation of the sea surface (e.g., fog, rain, darkness)" (pg., 226). Nowhere in Appendix C are sea conditions explicitly acknowledge as an important factor to consider in determining whether the exclusion zone can be monitored. BOEM needs to explicitly single out sea conditions, along with fog, rain, and darkness, as a factor that should be considered in exclusion zones monitoring.

Under Section C.1.2, seismic surveys must be halted if a whale is observed within the 500 m exclusion zone. Per that same section, seismic surveys are not allowed to begin if a marine mammals or sea turtle – not just whale – is observed within the 500 m exclusion zone. Seismic surveys should be halted if any marine mammal or sea turtle is observed within the 500 m exclusion zone. This must be clarified. (Pg.. 226 -227).

Under Section C.1.2 seismic surveys are allowed to continue without a ramp-up if surveying has stopped for less than 20 minutes, unless a sea turtle or marine mammal is sited within the 500 m exclusion zone during the silent period. In that case, a ramp-up must be performed. However, in all other cases where seismic surveys must be restarted via ramp-up, the exclusion zone must be monitored for 60 minutes and ensured to be free of marine mammals and sea turtles. The exclusion zone must be free of marine mammals and sea turtles prior to ramp-up for 60 minutes, should be mandated in this case.

Under Section C.1.3, when any new exclusion zone is established during pile driving, "an additional buffer area extending out of the 160 dB zone" must be included (pg. 228). However, the exact size of the buffer is never defined. BOEM defined the size of the buffer area and state how that buffer area should be established, which would better safeguard marine species from acoustic effects during pile driving.

2. Cease Pile Driving if a Marine Mammal or Sea Turtle Enters the Exclusion Zone

Appendix C, Section C.1.3, allows pile driving to continue if a marine mammal or sea turtle is sighted within the exclusion zone after pile driving has already begun. The analysis discount the fact that wildlife may not even be in the exclusion zone, and that if they were, they would likely not be affected because the alternative would require for pile driving to stop if they entered the exclusion zone. Pile driving should be immediately stopped once a marine mammal or sea turtle enters the exclusion zone.

3. Prohibit Pile Driving at Night

Appendix C, Section C.1.3, allows pile driving to begin during night hours or when the safety radius can not be adequately monitored if "the applicant implements an alternative monitoring method that is agreed to by BOEM and NMFS" (pg., 229). Recommendation that pile driving not be allowed to start at night.

4. Prohibit Seismic Surveys at Night

Appendix C, C.1.3, allows seismic surveys to be conducted at night if "sufficient lighting is provided to monitor the 500 m exclusion zone" (pg., 227). Prohibiting seismic survey during night hours would reduce potential acoustic impacts on marine mammal and sea turtles.

5. Limited Sound Intensity during Pile Driving to 160dB

Appendix C, C.1.3, set no limits on sound intensity that can be generated during pile driving. Consequently, while the exclusion zone is established based on a sound intensity limit of 160 dB along it outer perimeter, any marine mammal or sea turtles within the exclusion zone would be subject to sound intensities much greater than 106 dB – levels which are know to cause harm to marine species. BOEM should mandate that sound pressure levels not exceed 160 dB, and when they do, be attenuated to as close to 160dB as possible.

6. Use Vibratory Hammers Wherever Applicable

A vibratory hammer should be mandated in pile driving whenever possible to reduce generated sound intensities during construction, as is the case in previously issued Interim Policy leases.

7. Establish Exclusion Zones at the 133 dB Isopleth

Appendix C, Section C.1.3, sets the sound intensity isopleth at which the exclusion zone should be established during pile driving at 160 dB, the same threshold the National Marine Fisheries Service (NMFS) uses as the onset of marine mammal behavior harassment from impulse noises. Also of concern, little data is available on the acoustic effects on North Atlantic right whales. BOEM needs to consider setting the exclusion zone during pile driving at the 133 dB isopleth.

8. Establish Exclusion Zones for Pile Driving with Site-Specific Acoustic Models

Insufficient exclusion zones, in turn, could expose marine life, such as North Atlantic right whale to harmful sounds. Site-specific modeling would avoid this potential impact by ensuring the generalize exclusion zone radius is sufficient therefore BOEM need to mandate its use prior to pile driving.

9. Use Passive Acoustic Monitoring for Live Monitoring of the Exclusion Zone

The PAM could provide invaluable assistance in ensuring the area is clear of marine mammals prior to the inception of construction and/or seismic surveys. BOEM needs to mandate that PAM be used for live monitoring of exclusion zones.

10. Limit Vessels Over 65 Feet in Length to 10 knots or less

All ships greater than or equal to 65 feet in length should be restricted to speeds of 10 knots or less year-round when on the Mid-Atlantic OCS and in transit to or from a WEA, or when moving within a WEA.

Response: In response to comments received, several edits have been made to the Mandatory Project Design Criteria in Appendix B, which incorporates the results of the ESA consultation with NMFS (USDOC, NOAA, NMFS, 2011c). These edits include speed restrictions for vessels 65 feet or greater operating between November 1 and April 30. Discussion regarding the use of noise mitigating technologies regarding pile driving has been added to Chapter 4. The mandatory project design requirements identified in Appendix B in this Final EA are based upon the best available scientific information. Although offshore pile driving is new to the U.S. Atlantic OCS, high resolution geological and geophysical surveys are not. BOEM and the Federal natural resource agencies draw upon experiences and expert knowledge from the U.S. Navy, National Science Foundation, USGS, NOAA, and BOEM's own experiences in the Pacific and Gulf of Mexico. That said, no procedure has a guaranteed effectiveness or a proven quantitative means to measure the effectiveness. Pursuant to 30 CFR 585.615, BOEM and the lessee will refine monitoring and operating procedures as necessary in response to monitoring reports received from the field.

The requirements regarding the monitoring of exclusion zones for both survey and pile driving activity does not preclude the ability to use PAMs to aid visual observations. The requirements in Appendix B of this EA (formerly Appendix C of the Draft EA) have been updated to reflect this. If the lessee desires to conduct activity outside of times of good visibility and a calm sea state, as currently required, they may request the use of additional technologies, such as PAMs, in order to facilitate this activity. As discussed in the *2011 Final Programmatic Environmental Impact Statement/Overseas Environmental Impact Statement for Marine Seismic Research Funded by the National Science Foundation or Conducted by the U.S. Geological Survey*, PAM can be effective at detecting some animals before they are detected visually. Its value can be limited, however, by bottom configuration (water depth) and other environmental factors, and in some cases towing the PAM equipment is not practicable. Because of present limitations to determine range of acoustic contacts, the value of PAM is to detect acoustic cues that alert visual observers of the presence and general direction of marine mammals (NSF, 2011). PAMs would only detect acoustically active animals. Thus sea turtles and non-vocalizing marine mammals would not be detected. What was stated above in regards to PAMs can be said for the use of active forward facing sonar to detect animals and discern behavior. Although active sonar would detect all animals with a reflective signature, it would only detect animals in the direction the sonar was pointing. These are additional tools that can aid shipboard endangered species observers, but are not seen as required elements for the activities analyzed in this assessment.

Operators are encouraged to use additional tools at their disposal to aid shipboard endangered species observers in identifying endangered species and avoiding impacts to them.

Section 3.1.3.1 discusses the installation of foundations for meteorological towers. Specifically, this discusses vibratory and impact hammering methods. Since vibratory hammers do not use force to drive the piles, the bearing capacity is not known and the piles must often be "proofed" with an impact hammer. This involves striking the pile a number of times with the impact hammer to ensure that it meets the designed bearing capacity. As a result, the requirements regarding impact hammers are still necessary. Vibratory hammers are encouraged to be used where appropriate, as their use would reduce the duration of exposure to the higher sound pressure levels associated with impact hammers. However, it should be noted that the use of vibratory hammers could result in an increase in the total installation time and thus, total duration of sound exposure. Other noise reduction measures for pile driving; primarily cofferdams and foam sleeves (*see* Nehls, 2007 and USDOI, BOEMRE, 2010) have been shown to be effective. However, the feasibility of requiring these technologies in the offshore environment needs further exploration and may be appropriate on a case-by case basis for full commercial-scale construction projects where the total duration of pile driving activities would be greater than that for a single meteorological tower.

Comment: BOEM need[s] to use adaptive management throughout the site characterization and assessment phase, in accordance with the principles put forth by the Interagency Ocean Policy Task Force in its Final Recommendation. Significant data gaps exist with respect to biological assemblage in the Mid-Atlantic region, including within the proposed WEAs, and the impacts of site characterization activities on assemblages.

Response: Given that no CMSP plan exists for the Mid-Atlantic, and following the principles outlined in the Final Recommendations of the Interagency Ocean Policy Task Force, BOEM prepared this EA with the best available information. Additionally, BOEM's ongoing regulatory authority over the activities and plans of lessees allows the agency to accommodate changing environmental conditions. Of note, much of the reason BOEM's regulations require lessees to submit the results of a number of surveys, including biological surveys, is so that BOEM has the necessary information regarding the state of the resources in the project area prior to deciding whether to approve, approve with modification, or disapprove a site assessment plan.

Comment: The Draft EA does not adequately assess the cumulative impacts of site assessment and characterization activities. Specifically, the Draft EA takes a geographically-narrow approach to it cumulative impact analysis, focusing only on the Mid-Atlantic region. While appropriate for sedentary species, migratory species experience impacts outside of the Mid-Atlantic region that must be considered in the Draft EA's cumulative impacts analysis.

Response: The EA considers the cumulative impacts of activities associated with Alterative A in light of other past, present and reasonably foreseeable future actions including: onshore development, existing port and future waterway usage, maritime traffic, expansion of the Panama Canal, and other renewable energy activities, such as the Interim Policy leases offshore New Jersey and Delaware; and proposed renewable projects in New Jersey State waters and offshore New York. Sections 4.1.1.3 (Marine Mammals), 4.1.1.4 (Sea Turtles), and 4.1.1.5 (Birds) discuss cumulative impacts specific to migratory species.

Comment: The Draft EA, in its cumulative impacts analysis section, should consider the contributions to climate change from greenhouse gas (GHG) emissions associated with site characterization and assessment. GHG emissions contribute to climate, which will impact the Mid-Atlantic OCS environment in a variety of ways. Sources of GHG emissions that the Draft EA should consider include, but not limited to, vessel trips and construction. It may not be feasible to calculate exact GHG emissions at this time, but that does not mean any analysis should be neglected; indeed, rough approximations would satisfy NEPA requirements.

Response: A climate change discussion has been added to Section 4.7 of this EA.

New England Aquarium
(Document ID BOEM-2011-0011)

Comment: The draft EA provides only the summer maps from the TNC's 2011 report, yet the activities in the Mid Atlantic WEA's will occur year-round. The EA lacks a rigorous review of the marine mammal acoustic literature, vastly underestimates the potential effects from Sub-bottom Profilers surveys and construction, and fails to address the operational questions about acoustic disturbance. Based upon lack of data and the lack of a review of existing scientific literature, the EA has little or no justification for stating that "Alternative A is not anticipated to result in any significant or population-level effects to marine mammals" (pg.,88).

Response: During the preparation of this EA, BOEM relied upon the best available scientific information to assess the potential impacts of leasing, site characterization surveys, and site assessment activities in WEAs offshore New Jersey, Delaware, Maryland and Virginia. BOEM fully acknowledges that existing data regarding impacts on the energetics of marine mammals and sea turtles from acoustic harassment is incomplete. This EA has been updated to show sightings data for all species in all seasons as well as the most recent data from the joint BOEM-NOAA Marine Assessment Program for Protected Species (AMAPPS).

Comment: The main concern is that if any Sub-bottom Profiler or pile driving activity takes place during the migratory periods, there is the possibility that such activity will create acoustic barrier to migration of either pregnant females or mothers with newborn calves, both of which could have significant population effects for this highly endangered species. The effects of both the Sub-bottom Profiler surveys and the pile driving activities are probably underestimated in the EA, suggesting a greater potential for significant acoustic disturbance than the EA suggests.

There are substantial omissions in the scientific literature on right whales and other species throughout the marine mammal section of the EA. These omissions mean that the EA does not consider the emerging body of literature that suggests significant impacts from anthropogenic noise on marine mammals, and in particular, the effects of louder low frequency noises for sub-bottom profilers and seismic exploration on large whales.

Response: Based on the best available information, BOEM believes that the section on acoustic harassment that could result from the activities associated with Alternative A is not understated. BOEM has reviewed the literature cited in your letter and updated the discussion of behavioral reaction of baleen whales acoustic disturbances in Section 4.1.1.3.2. An acoustic barrier to migration is highly unlikely given the small amount of area within each WEA that would be subject to acoustic disturbance, either pile driver or sub-bottom profiling, at any given time. If whales or sea turtles are observed in the exclusion zones the noise producing activity will cease until the animal has left the area. *See* Section 3.1.2.4 regarding the time frame in which these activities are likely to occur.

Comment: The EA underestimates the potential for ship whale collisions from the traffic expected to occur in the construction and operation of the wind farms offshore. BOEM should make 10 knots speeds a condition of the construction and operation of wind farms in the mid-Atlantic.

Response: The proposed action and alternatives do not include the consideration or approval of any commercial wind energy facility or "wind farm." The proposed action and alternatives are to issue leases and approve site assessment plans on those leases, the effects of which are the subject of this EA. If and when a lessee submits a COP, BOEM would prepare a NEPA document addressing the impacts associated with the installation and operation of the wind energy facility it proposes, which may implicate the issues raised in the comment (*see* Section 1.4.2, Scope of Analysis, of this EA).
However, the mandatory design criteria for all leasehold activities, which was the subject of consultations with NMFS, imposes speed restrictions for vessels 65 feet or greater operating between November 1 and April 30. *See Appendix B of this EA.* .

Comment: The use of the Cape Wind assessment of the effects of the Sub-bottom Profiler Surveys to estimate the sound level isopleths around the mid-Atlantic WEA's is flawed. The Cape Wind assessments were based on sandy bottom waters about 60 feet in depth. The mid-Atlantic WEA's have a variety of bottom types. Harder bottom types and deeper waters are likely to increase the range of acoustic effects of both Sub-bottom Profilers surveys and pile driving. This section of the EA needs a rigorous re-analysis and assessment of the likely acoustic propagation characteristics based upon either in-situ measurements or state of the art acoustic modeling.

Response: The draft EA stated explicitly in Section 4.1.2.3.2 that the Cape Wind information "serves as guide and that different equipment may produce different results in different sub-marine environments." In this particular case, the noise assessment from sonar equipment was based upon a spherical spreading model of the sound from the source without influences of depth or bottom type. Thus, this assessment is suitable for the general characterization of activities in the Mid-Atlantic.

Comment: The location of the WEA's and the location of the Sub-bottom Profiler surveys, as well as the pile driving activities suggest that Alternative E plus a revised mitigation strategy is a minimal requirement for attempting to mitigate effects on the right whale migration. Alternative A with the required mitigation measures described in Appendix C [now Appendix B in this EA] is wholly inadequate for marine mammal protection. A revision of the mitigation strategy is critical for permitting, construction planning, and BOEM's long term planning for alternative energy development.

Response: Although offshore pile driving is new to U.S. Atlantic waters, high resolution geological and geophysical surveys are not. BOEM and the Federal natural resource agencies draw upon experiences and expert knowledge from these experiences. In its September 20, 2011 concurrence letter, NMFS determined that the proposed lease issuance, associated site characterization, and subsequent site assessment activities, when implemented according to the mandatory project design criteria detailed in Appendix B, is not likely to adversely affect listed whales or sea turtles. *See* discussion of NMFS Concurrence, Section 5.2.1 of the EA.

Department of the Army, North Atlantic Division, Corps of Engineers
(Document ID BOEM-2011-0053-0012)

Comment: It is critical that BOEM evaluate potential hazards to navigation that may be attributed to lease blocks that effectively constrain deep draft "New Panamax" sized ships between the Dam Neck danger zone (33 CFR 334.390), the Atlantic Ocean Channel (a federal project channel), the Chesapeake Bay Traffic Separation Scheme (TSS), and natural deep water (60 feet mean lower low water) corridors used to approach to the Chesapeake Bay. While the EA notes that a TSS is "non-mandatory" in reality insurance and ship owner requirements will often mandate the use of TSS routes, in part due to collision avoidance value.

Response: As discussed in Section 4.1.3.7, it is not anticipated that site characterization and assessment activities would constrain vessel traffic; including deep draft "New Panamax" sized ships, due to the temporary nature of the surveys and the limited number and size of structures that would be associated with Alternative A. Language has been added to this section regarding the insurance company and ship owner requirements' effect on TSS usage by ships.

Comment: Alternative D, may be required to facilitate the use of Corps Nationwide Permit 5 (NWP-5) for "Scientific Measurement Devices", and 6 (NWP-6) for "Survey Activities" due in part to NWP general condition 17 (Endangered Species). If the proposed SAP activities "may affect" the North Atlantic Right Whale, then general condition 17 applies and a non-federal permittee cannot proceed with any work that may otherwise be authorized by NWP-5 or NWP-6 until notified by the Corps that we have determined that the activity will have "no effect" on the whale, or otherwise complete formal consultation with the National Marine Fisheries Service. If the National Marine Fisheries Service concurs that Alternative D results in 'no effect" to the whale, activities can proceed to use NWP-5 and NWP-6 so long as the activity otherwise complies with all other terms and conditions, and any special conditions of the nationwide permit.

Response: Comment noted. It should be noted that, in its September 20, 2011 concurrence letter, NMFS determined that Alternative A, when implemented according to the mandatory project design criteria detailed in Appendix B, is not likely to adversely affect listed whales or sea turtles. *See* discussion of NMFS Concurrence, Section 5.2.1 of the EA.

Comment: Alternative E, Removal of Inclement Weather Diversion Areas Offshore Virginia, may be required if the Corps determines that activities in the eight affected OCS blocks (6013, 6014, 6063, 6064, 6113, 6114, 6163 and 6164) constitute an adverse hazard to navigation or are contrary to the public interest regarding national security factors. Recommend that the EA include an evaluation regarding the possible substitution of eight additional blocks north, south, or east of the proposed lease area so that, in the event that permits area likely to denied, that other potential lease areas are available as replacement blocks.

Response: Alternative E has been modified to exclude leasing and site assessment in full OCS blocks 6111 and 6161, and partial OCS blocks 6011, 6061, 6110, and 6160 on the most western edge of the Virginia WEA, rather than the eight OCS blocks identified in the draft EA, per a revised the comment submitted by the American Waterways Operators and analysis conducted by the USCG. (*see* Sections 2.5 and 4.5 of this EA).

Comment: Regarding recreational fishing vessels, the EA states that, "It is likely that tying up to the structure by a vessel would be prohibited by the project developer as it is private property." However, unless actively enforced there is no way to prevent tie ups actions. Recommend that the EA (4.1.3.6) further discuss the potential effects of unauthorized tie up to meteorological tower and buoys.

Response: A brief discussion on the impacts of unauthorized tie-ups to meteorological tower and buoys has been added to Section 4.1.3.6.2 of this EA.

Commonwealth of Virginia
Department of Mines, Minerals and Energy
(Document ID BOEM-2011-0053-0013)

Concern: Alternative A was developed as the result of months of research and input from VCERC and numerous other stakeholders, including academic, government, military, and private sector maritime interests. The 22 OCS lease blocks and 4 partial blocks are the result of negotiation by all parties, and after much consolidation and ceding of many of the lease blocks originally assessed as having economically attractive wind resources. Virginia supports the designation of this area as BOEM moves forward with leasing and development off of Virginia's coast.

Response: Thank you for your comments, which have been noted and will be considered in the decision-making process.

Comment: Eliminating the eight lease blocks as proposed in Alternative E would split the Virginia WEA into two separate parcels, which would undermine the commercial value of the area by creating logistical and economic challenges for commercial developers, reducing the economies of scale necessary to attract supply chain interests, and ultimately increasing the cost of power. It believed the concerns addressed by Alternative E can be effectively accommodated in the leasing and development process.

Response: Alternative E has been modified to exclude leasing and site assessment in full OCS blocks 6111 and 6161, and partial OCS blocks 6011, 6061, 6110, and 6160 on the most western edge of the Virginia WEA, rather than the eight OCS blocks identified in the draft EA (*see* Sections 2.5 and 4.5).

Virginia Maritime Association
(Document ID BOEM-2011-0053-0014)

Comment: The Virginia Maritime Association stated that **"**there are too many unresolved issues with implications for domestic and international waterborne commerce and navigational safety" and "all alternatives proposed by the draft EA still present significant impediment for the commercial maritime industry and the Port of Hampton Roads. Therefore, a finding of "No Significant Impact" would be imprudent until necessary accommodations have been made for commercial navigation."

Response: BOEM believes that there is sufficient information to analyze the potential impacts of site characterization and assessment activities on domestic and international waterborne commerce and navigational safety. It is acknowledged that there are unresolved issues regarding domestic and international waterborne commerce and navigational safety, such as the outcome of the ACPARS, as related to commercial wind facilities, which are not being proposed and are not the subject of the analysis in this EA.

National Park Service, Northeast Region
(Document ID BOEM-2011-0053-0015)

Comment: Request at a minimum, that agency consultation is initiated with the NPS prior to BOEM approval of any SAP in this area to allow for review of the specific actions and proposed infrastructure associated with each SAP.

Response: As required by the Energy Policy Act of 2005, BOEM will continue to coordinate with affected State, local and tribal governments and relevant Federal agencies throughout its process. As an Intergovernmental Task Force member, NPS can provide input. Also under the renewable energy regulations at 30 CFR Part 585, BOEM coordinates with relevant Federal agencies (including, in particular, those agencies involved in planning activities that are undertaken to avoid conflicts among users and maximize the economic and ecological benefits of the OCS).

Comment: NPS recommends the EA be redone specifically to (1) improve the identification of avian, marine and bat distribution, densities and migration routes using more substantial and scientifically credible data, and (2) to more comprehensively address cumulative impacts on biological resources. There are large data gaps for the Mid-Atlantic ecological resources, such as marine birds, marine mammals, and sensitive benthic habitats. An adequate baseline is needed for these resources so that BOEM can adequately and confidently analyze the effects of the proposed offshore wind activities in the NEPA document. Specific comments regarding the analysis in the EA for Biological resources are provided in Attachment B, Table 1.

Response: The purpose of the description of the affected environment is to describe what resources may be impacted by the proposed action and alternatives, which is the issuance of leases and site assessment activities, including meteorological, oceanographic, and biological surveys and not the construction of a commercial wind facility. The impacts to the distribution, density, and migration routes of avian, bat, and marine fauna are not anticipated to be significant, and are discussed in Section 4.1.2 of this EA. If and when a lessee submits a COP, BOEM would prepare a NEPA document addressing the impacts associated with the installation and operation of the wind energy facility it proposes, which may implicate the issues raised in the comment (*see* Section 1.4.2, Scope of Analysis, of this EA). BOEM appreciates the review and concerns expressed by the NPS and will continue to work with the NPS, along with other constituents with an interest in offshore wind in the future.

BOEM agrees that there are site-specific data gaps regarding biological resources in the mid-Atlantic. One of the primary purposes of the regulatory requirement that lessees submit the results of biological and other surveys to BOEM with the lessees' COP is to collect site specific data regarding the state of biological and other resources. *See* 30 CFR Part 585.626(a)(3). In addition to the site specific site characterization work that would be conducted by the lessee, BOEM has an environmental studies program that has several projects collecting regional avian, bat, marine mammal, and sea turtle data (e.g., AMAPPS). BOEM has solicited input from NMFS, USFWS, and Marine Mammal Commission (MMC) regarding draft survey and monitoring guidelines for lessees. In addition to that ongoing effort, BOEM has contracted three separate studies that will be developing survey and monitoring protocols that will be incorporated into BOEM's guidelines to lessees once they become available.

Many of the specific comments in Attachment B, Table 1, of NPS's letter pertain to commercial activities. It is important to note that Alternative A does not include the consideration or approval of any commercial wind energy facility. Alternative A is the issuance of leases and approval of site assessment plans, the reasonably foreseeable effects of which are the subject of this EA.

Comment: Request that BOEM consider placing additional mitigation measures (e.g., permitting buoys in lieu of towers) on any lease areas within the Maryland WEAs to protect this unique National Seashore resource.

Response: Lessees may choose to install buoys in lieu of towers. Much of the EA is occupied with the consideration of scenarios where lessees employ buoys rather than towers on their leases.

Comment: Page 24, Section 3.1.2.1 High-resolution Geophysical (HRG) Surveys – This section describes the High-resolution Geophysical (HRG) Surveys that will be implemented within each potential lease area. This section also makes reference to identified onshore transmission grid connection points for Delaware, New Jersey and Virginia. Consider adding additional information to the draft EA to clarify if any such locations have been identified for Maryland.

Response: BOEM will include information on potential onshore transmission grid connection points for Maryland in Section 3.1.2.1 of this EA.

Comment: Page 32, Section 3.1.3 Site Assessment Activities – The draft EA does not identify who will review the SAPs and whether review of the SAPs and any determination regarding the need for subsequent NEPA analysis will involve consultation with other agencies.

Response: Review of a SAP plan will be done by BOEM in accordance with 30 CFR Part 585.605 - 613 As appropriate, BOEM will coordinate and consult with relevant Federal and State agencies, executives of relevant local governments, and affected Indian tribes on relevant nonproprietary data and information pertaining to the proposed activities.

Comment: Page 36, 3.1.3.1 Installation – When assessing adequacy of the NEPA analyses, if BOEM cannot reach a Finding of No Significant Impact (FONSI) for installation of the met towers, it should carry out subsequent analyses pursuant to NEPA.

Response: Clarification was added to Sections 1.4.2 and 3.1.3.1. After completion of this EA, BOEM will either issue a FONSI or prepare an EIS prior to issuing any leases in the WEAs. In the event that a particular lease is issued, and the lessee subsequently submits a SAP, BOEM would then determine whether this EA adequately considers the environmental consequences of the activities proposed in the lessee's SAP.

Comment: Page 39, Section 3.1.3.1 – Operation and Maintenance – There is concern about potential leaks and/or spills associated with this increased activity, and would like assurance that proper containment materials and procedures would be readily available and implemented to protect National Seashore resources should a leak or spill occur.

Response: Section 3.2.3 of this EA explains that vessels are expected to comply with USCG requirements relating to prevention and control of oil spills. Clarification was also added to that section stating "though not mandated under 30 CFR Part 585, BOEM may require an Oil Spill Response Plan (OSRP) for an individual SAP, if the lessee proposes the use of a generator." The potential impacts to coastal areas from spills are presented in Section 4.1.2.1.2, Non-Routine Events, among other places, and the impacts of a spill associated with the activities related to the proposed action, should one occur, would be small.

Comment: Page 49, Section 4.1.1.1.1 Description of Affected Environment – The number of vessel trips to and from ports in Virginia may have a greater impact on air quality in the state than determined by the draft EA. The U.S Environmental Protection Agency will be finalizing stricter national ambient air quality standards for ozone. With this in mind, the coastal communities of NJ, MD, DE and VA may be impacted and may require further reduction of ozone causing emissions, which would include emissions from marine vessels as described on pages 49-50 of the draft EA.

Response: Since the conclusion stated in Section 4.1.1.1.2 is based on the existing standards for ozone, and in any case reflect the actual impacts to air quality regardless of what the ozone standards currently are, no change to the EA is necessary. Ozone emissions associated with activities proposed in an individual SAP would be reassessed using contemporaneous standards for ozone at the time the SAP is submitted.

Comment: Page 51, Section 4.1.1.1.1 Class I areas – The discussion of Prevention of Significant Deterioration (PSD) regulations does not seem pertinent because it only applies to major new sources or major modifications to existing sources. The draft EA should explain whether there is some aspect of the wind leasing process that might require PSD permits.

Response: PSD regulations are not pertinent to the reasonably foreseeable activities associated with the proposed action or alternatives. Section 4.1.1.1.1, Class I Areas, has been edited to remove discussion of PSD permits.

Comment: Page 51 – 52, Section 4.1.1.1.1 Regulatory Controls on OCS Activities that Affect Air Quality and 4.1.1.1.2 Impact Analysis of Alternative A – It is unclear whether a general conformity analysis is required for route activities, which include site characterization activities and the construction, servicing, maintenance, and decommissioning of met towers and buoys; please clarify.

Response: Clarification has been added to Section 4.1.1.1.2 that a General Conformity analysis would be performed upon the submission of a SAP by a lessee that indicates that the SAP activities would emit over 100 tons per year of a criteria pollutant that is in non-attainment or maintenance. This analysis would pertain only to the specific criteria pollutant that is in nonattainment for maintenance areas onshore and in state waters and has the potential to exceed the 100 tons per year threshold associated with the activities proposed in that SAP.

Comment: Page 53, Section 4.1.1.1.2 Site Characterization Surveys – The total impact of 43 – 67 trips per year; per port may not be not accurate without some type of air quality analysis. It is not reasonable to conclude that emissions may be negligible without an analysis or explanation to thresholds.

Response: The thresholds set by the USEPA apply to fixed structures and associated vessels. The vessel emissions associated with meteorological towers and buoys represent a small portion of the vessel trips projected for Alternative A. These thresholds apply when performing a general conformity analysis when a SAP is submitted by a lessee which indicates that the SAP activities would emit over 100 tons per year of a criteria pollutant that is either in nonattainment or maintenance. When comparing 43 – 67 vessel trips per year per port to existing port activity to the thousands to tens of thousands vessels annually, it is reasonable to conclude that emissions associated with Alternative A would have a negligible impact. This clarification has been added to Section 4.1.1.1.2 of this EA.

Comment: Page 53, Section 4.1.1.1.2 Construction and Decommissioning – It is unclear if the total tons provide[d] by Bluewater Wind New Jersey Energy, LLC for the construction and decommissioning of met tower include marine vessel transportation to and from the site. Also, the total tons determined for offshore New Jersey at 94.5 tons is very close to the de minimus levels for determination for general conformity (100 tons). A refined analysis of air quality impact from construction and decommissioning is necessary to verify whether or not a lessee and/or BOEM would be required to conduct a general conformity analysis.

Response: The Bluewater Wind New Jersey Energy, LLC estimated emissions of criteria air pollutants from the construction and decommissioning includes vessel traffic to and from the site. The total emissions of 94.5 tons is for all criteria pollutants for all seven proposed meteorological towers projected to be installed in the New Jersey WEA as a result of Alternative A, including vessel traffic. The total criteria pollutant emissions for one meteorological tower and associated vessels is anticipated to be well below the de minimus level. A general conformity analysis would be performed when a SAP is submitted by a lessee and only for the individual criteria pollutant that exceed the 100 tons per year threshold of a pollutant in nonattainment or maintenance. It is highly unlikely for any criteria pollutant to exceed the 100 tons per year threshold for the installation of a meteorological facility and therefore a conformity determination is not likely. This clarification has been added to Section 4.1.1.1.2.

Comment: Page 54, Section 4.1.1.2 Operations – The draft EA states, "Support vessels traveling to and from shore and in harbor or port area making approximately 12,000 trips over 5.5 years have the potential to affect onshore air quality." The determinations that such support vessel travel would "…contribute slightly to emission totals…" and that"…impacts from additional pollutant emissions…would be negligible" are made without data provided or analyzed. Such statements appear contradictory to the first sentence that air quality may be impacted.

Response: Section 4.1.1.1.2 has been reworded to clarify that this statement is based on the comparison to pre-existing emissions from vessel activity and ambient air quality in these areas. There are no exact emissions totals for existing vessel traffic activity; however, by comparing additional vessel traffic to the existing, one is able to conclude that the additional emissions associated with Alternative A would have a negligible impact to existing air quality.

Comment: Page 54, Section 4.1.1.1.2 Conclusion – If BOEM is to conclude that air quality impacts are minor, it must provide some data analysis, in the form of general conformity or otherwise, especially considering the determination that marine vessel transportation to and from the New Jersey ports almost reach de minimus level (94.5 tons compared to 100 tons).

Response: The total emissions of 94.5 tons is for all criteria pollutants for all seven meteorological towers projected to be installed in the New Jersey WEA as a result of Alternative A. The total criteria pollutant emissions for one meteorological tower and associated vessels is anticipated to be well below the de minimus level. A general conformity analysis would be performed when a SAP is submitted by a lessee and only for the individual criteria pollutant that exceed the 100 tons per year threshold of a pollutant in nonattainment or maintenance. It is highly unlikely for any criteria pollutant to exceed the 100 tons per year threshold for the installation of a meteorological facility. This clarification has been added to Section 4.1.1.1.2 of this EA.

Comment: Page 116, Section 4.1.3.1 Archaeological Resources – The draft EA does not clarify whether the State Historic Preservation Officer for each of the four states has be consulted. The NPS recommends further clarification on the compliance process being utilized by BOEM under Section 106 of the National Historic Preservation Act.

Response: Section 5.3.4 (National Historic Preservation Act) of the Draft EA has been updated to reflect the current state of consultations with SHPOs, among other things. Section 5.3.4 explains that all the SHPOs have been consulted and outlines compliance process being utilized by BOEM under Section 106 of the National Historic Preservation Act.

Comment: Page 40, Section 3.1.3.1 Lighting and Marking – The draft EA does not include an analysis of lighting impact to avian species. Only impacts to marine navigation and aviation are considered. The NPS recommends including an analysis of impact to avian species.

Response: The analysis of impact to avian species is in the Section on Birds in Chapter 4.

Comment: The Maryland coastal bays adjacent to Assateague Island NS and the Town of Ocean City are notably absent for this section and the subsequent impacts analysis. These estuaries are the water bodies most likely to be affected by the proposed activities. Suggest that additional water quality data be obtained through the EPA funded Maryland Coastal Bays Program and associated analyses be appended to this section of the draft EA.

Response: The Maryland coastal bays and estuaries were not included in this analysis because BOEM does not anticipate that these waters would be traversed by vessels associated with site characterization and assessment activities.

Virginia Offshore Wind Coalition
(Document ID BOEM-2011-0053-0016)

Comment: The Virginia Offshore Wind Coalition is in support of a solution that would create a slight revision to Alternative A that provides safe and efficient commercial navigation and allows for all competing uses. One such solution would include minor modifications to the current northeast and southeast commercial vessel approaches, the DoD training areas and the WEA, Figure 1 presents an alternative that would permit safe and efficient commercial navigation into the Chesapeake Bay, sustain future growth of the Port, and allow off-shore wind energy development to proceed as proposed. Figure 1 depicts the delineation of a single "sea-lane" from the current Atlantic Ocean Channel that splits into a "North Fairway" and "South Fairway" utilizing existing deep water access and circumventing the proposed WEA. A portion of the northwest quadrant of the WEA would require relocation potentially to the west. In addition, a portion of the northeast section DoD training area could possibly relocated to the south and the southern boundary of the existing training area reconfigured and enlarged to maintain required space for military exercises and testing.

Response: BOEM has no authority to modify vessel approaches or DoD training areas. BOEM has modified Alternative E to exclude leasing and site assessment in full OCS blocks 6111 and 6161, and partial OCS blocks 6011, 6061, 6110, and 6160 on the most western edge of the Virginia WEA, rather than the eight OCS blocks identified in the draft EA (*see* Sections 2.5 and 4.5). The purpose of this EA is to consider the reasonably foreseeable environmental consequences associated with issuing leases and approving site assessment plans in the WEAs described. If and when a lessee submits a COP, BOEM will prepare a separate, site- and project-specific NEPA document addressing the impacts, including any impacts on commercial vessel approaches or USCG's modification of existing routing measures, associated with the installation and operation of a wind energy facility at that time.

Maryland Ornithological Society
(Document ID BOEM-2011-0053-0017)

Comment: An error in the EA, i.e. the statement that the federally listed Roseate Tern does not occur in the states of Maryland or Delaware. The federally endangered Roseate Tern, in fact, was a breeder in Maryland in Worcester County in the 1930s. Most recently, it has been recorded on Skimmer Island in Ocean City, MD, 21-22 June 2011: on Assateague Island 21 June 2011. This strongly suggests that the Roseate Tern occurs as a migrant.

Response: Currently, there are no known roseate tern breeding colonies in Maryland or Delaware. The EA has been updated to reflect this information.

Comment: The EA does not address other bird species. We would hope these other species would be addressed in a future EIS. The off-shore waters of all four state hosts numerous pelagic species, are the target of several pelagic birding trips every year. There is concern about the possibility of these species being attracted to navigation and hazard lights.

Response: Section 4.1.2.5.2 of this EA addresses the potential impacts of leasing, site assessment and characterization activities to ESA listed birds, candidate species, bald and golden eagles, and birds covered under the MBTA, which includes pelagic species, including potential attraction to lighting on towers and buoys.

American Bird Conservancy
(Document ID BOEM-2011-0053-0018)

Comment: Section 1.5 states that the Wind Energy Area (WEA) for New Jersey was designed to avoid shoals and areas of high avian densities, an assertion supported by the complex border of the NJ WEA. In contrast, the section's descriptions of DE, MD and VA WEAs do not indicate that shoals or areas of high avian densities were avoided, and those WEAs have, in comparison to NJ, much less complex borders (pg., 6-8). Was avoiding shoals and areas of high avian densities considered necessary for NJ but not DE, MD, or VA, and if so, why not? Please explain.

Response: Additional information on the development and refinement of the WEAs was added to Section 1.5 of this EA.

Comment: ABC recommends that clear efforts are made to identify areas where emerging environmental data would reduce or eliminate areas from each WEA to avoid environmental conflicts, and the final environmental review document should describe what these efforts have been for each WEA.

Response: The WEAs were identified using the best information currently available. Simply because an area is included in a WEA, or because an area is leased, does not necessarily mean that such an area would be the ideal location for a facility. One of the chief reasons BOEM's regulations require lessees to submit the results of a number of surveys, including biological surveys with their plans for facilities, is so that BOEM has the necessary information regarding the state of the resources in the project area prior to deciding whether to approve, approve with modification, or disapprove the facilities contemplated in the plan, which includes the location of such facilities. Plans for development (i.e., SAPs and COPs) could include conditions preventing the lessee from siting facilities in areas shown by the survey results (and all information contemporaneous with BOEM's consideration of the plan) to be particularly sensitive.

Comment: The discussion of risk from met towers needs correction (pg., 102). The EA dismisses collision risk because there will be few met towers and they will be some distance form shore. The EA does not take into account that in the dark environment with very few structures, those few structures that are lit can be expected to attract bird to them, per experience with bird collisions at rural communication towers.

Response: The following text was added to Section 4.1.1.5.2, Birds - Impact Analysis of the Alternative A, Meteorological Towers: "For instance, certain types of nighttime lighting, like steady burning lighting, can confuse or attract birds when it is raining or foggy. However, red flashing lights are commonly used at land-based wind facilities without any observed increase in avian mortality compared to unlit turbine towers (Kerlinger et al. 2010)."

Comment: The environmental risks of oil spills is largely dismissed in Section 3.2.3, stating that because most non-tanker spills are of small quantity and are diesel spills, rather than crude oil or bunker C. The EA's statistics are very misleading, as recreational vessels and fueling spills are included in the statistics. These spills are not related to at sea collisions following loss of steerage, and are not applicable to this discussion. Because the WEAs include shipping lanes, the EA must address the collision risks of spills from commercial ships.

Response: *See* Non-Routine Events Section 4.1.3.7.2. The WEAs were designed to avoid the shipping lanes and the heavier trafficked approach/departure areas associated with shipping lanes. In assessing the reasonably foreseeable impacts associated with Alternative A, BOEM has worked in close consultation with other expert agencies and has used the best information currently available.

APEX Wind Energy
(Document ID BOEM-2011-0053-0019)

Comment: Recommend that the EA clearly state that fewer, larger, and more widely spaced lease areas would also fall within the specific findings in the EA.

Response: As discussed in Section 3.1.1, a leasing scenario is necessary to develop a scenario for site characterization and assessment activities. The EA uses the most conservative assumption that the entire area of each WEA would be leased. By dividing the total number of OCS blocks by 10, a total of 13 leases are anticipated under Alternative A.

The WEAs were developed in close consultation with numerous federal and state agencies, renewable energy task forces from each state, and with the input of the public and myriad interested parties. Alternative A considers whether or not to issue leases within these WEAs, and in order to assess the reasonably foreseeable consequences of doing so, BOEM has analyzed a leasing scenario that is reasonably foreseeable within those areas. BOEM is not proposing fewer, larger, or more widely spaced leases within these areas (indeed some of the WEAs could only support 1-3 leases altogether), or to make fewer, larger, or more widely-spaced WEAs, as neither would achieve the purpose and need. Therefore, the EA need not analyze the consequences associated with doing so.

Comment: In Section 3.1.3.3, both LIDAR and SODAR are described as “ground-base[d]” sensing technologies. It is important to note that these technologies can and have been deployed offshore on both fixed platforms (stub towers or met towers) or floating ones (buoys).

Response: The term “ground-based” was removed from Section 3.1.3.3, Meteorological Data Collection. This section acknowledges that measurement devices could be mounted on towers or buoys.

Comment: In Section 3.1.3.3, a buoy’s location is assumed to be fixed for the duration of its field deployment. In the case where a met tower has also been commissioned, it may be desirable to first deploy the buoy adjacent to the met tower for a limited test period (1 month) in order to establish some wind measurements.

Response: This comment does not warrant further agency response, because it was included in the analysis of Alternative A. BOEM assumes a number of meteorological towers and/or buoys will be placed in the WEAs identified in Alternative A. BOEM does not, however, speculate where lessees would intend to locate the meteorological towers or buoys should they acquire a lease. It is certainly a possibility that both a meteorological tower and buoy could be located near each other (or even adjacent to each other).

Comment: The last paragraph of the Lighting and Marking section on page 40 states that if BOEM were to receive a SAP for a met mast greater than 199 feet (just taller than 60 meters) beyond the boundary of Federal Aviation Administration’s (FAA’s) jurisdiction 12 nautical miles from shore, “additional NEPA analysis and the imposition of additional mitigation measures may be necessary prior to approval.” It is not clear why additional NEPA analysis cannot be performed and the incremental, minimal impacts assessed as part of this EA.

Response: This language has been removed from Section 3.1.3.1, Lighting and Marking. As explained in Section 1.4.2, in the event that a particular lease is issued, and the lessee subsequently submits a SAP, BOEM would then determine whether this EA adequately considers the environmental consequences of the activities proposed in the lessee’s SAP. If BOEM determines, in coordination with other agencies, such as FAA if appropriate, that the analysis in this EA adequately considers these consequences, then no further NEPA analysis would be required before the SAP is approved. If, on the other hand, BOEM determines that the analysis in this EA is inadequate for that purpose, BOEM would prepare an additional NEPA analysis before approving the SAP.

Comment: On page 38 the EA assumes that scour control system will be installed on the ocean floor around the base of a met tower, but this assumption may be too broad. The EA should account for instance where a met tower is in place for a limited period of time, and in those cases incorporating scour protection would exceed the recommended design standards.

Response: Section 3.1.3.1 acknowledges that a scour control system may be required based on potential seabed scour anticipated at the site. As part of its SAP, the lessee would provide to BOEM information on the condition of the proposed site, which would include an assessment of the magnitude of potential seabed sour anticipated at the site (30 CFR 585.610(b) and 585.611(b)(1)). Based on this information, BOEM may require the installation of a scour control system as a term or condition of SAP approval. A scour system may also be required to be installed later if significant scour is discovered during monitoring. Section 3.1.3.1. has been updated accordingly.

Comment: The conclusion and proposed mitigation measures for benthic habitat on page 70 are too broad and restrictive and have the potential to exclude significant areas.

BOEM's "primary mitigation strategy" of avoiding "cultural resources and biologically sensitive habitats" (19) is unnecessarily broad and could give rise to the exclusion of large areas if surveys detect targets. The above clause could be revised as: "*Where significant adverse environmental effects on* offshore cultural resources and biologically sensitive habitats *are likely to arise,* BOEM's primary mitigation strategy has and will continue to be avoidance".

Response: As discussed in Chapter 4 of this EA, none of the alternatives are anticipated to result in significant adverse environmental effects or significant adverse effects on potential cultural or historic resources. Nevertheless, in order to minimize the potential for any adverse effect, or to minimize the effects that may occur, BOEM's primary mitigation strategy is the avoidance of sensitive areas. This policy is part of our Record of Decision in Appendix B of the PEIS and reflected in BOEM's renewable energy regulations (e.g., 30 CFR Part 585.627(a)). However, this strategy does not preclude BOEM from approving structures in areas where these resources exist, provided that the environmental impacts associated with doing so do not exceed that anticipated in a NEPA analysis.

Comment: The scope of this EA is rightly limited to "reasonably foreseeable consequences" resulting from lease issuance and SAP approval, but the potential impacts avoided by Alternatives B and C relate to project construction and operation rather than survey activities and the siting of met tower/buoys.

Response: While it is true that Alternatives B and C would likely reduce the environmental impacts associated with large-scale project construction, which is not a part of Alternative A, they would also reduce the small impacts associated with site characterization and assessment activities, which are a part of Alternative A. It is also important to note that, although BOEM is not currently considering approving any COPs for wind energy generation facilities in any area offshore the Mid-Atlantic States, it would make little sense to give priority to issuing leases in areas that would not be suitable for development in the future (hence exclusion of USCG "Category 'A'" areas from all current alternatives). The consideration of Alternatives B and C does not indicate that leasing in these areas is inadvisable. However, consultations and scoping indicated that these alternatives were reasonable and should be thoughtfully considered prior to selecting a course of action.

The Humane Society of the United States
(Document ID BOEM-2011-0053-0020)

Comment: Many of the assumptions of marine mammal habitat use are questionable, as they are based on the study conducted as part of New Jersey's analysis and a compilation of federal agency data by the Nature Conservancy (EA at 73). These sources do not necessarily reflect the best available science regarding the habitat use of the area. Appendix [A], which shows marine mammal densities based on the Nature Conservancy report, shows only summer distributions for a handful of species.

The EA states that winter acoustic detections in the area monitored with passive acoustic buoys were "inconsistent with current distribution data" (EA at 77). We must point out that there are so few data on distribution in the mid-Atlantic, that it cannot be determined that these detection were an anomalous occurrence.

Thus the EA and the FEIS appear to rely on the fact there will be displacement of animals from their normal seasonal feeding areas or migratory routes but neither can assure that this displacement will not adversely affect species at a population level. We are concern that the effect of displacement could be significant either as a result of increased energetic costs at a time when females are fasting or as a result of increased risk of entanglement or vessel-related collisions if the whales are displaced into areas where these activities are more concentrated.

Since the EA directs reviewers to the NMFS compliance document for vessel in the mid-Atlantic, and these speed restrictions do not require speed reductions for large vessels in any but a few limited port entrances, it is not clear that project vessels will be operating at slow speeds in any other transit areas or areas in which site characterization or pile driving will take place. If this is the case, then the risk of fatal collisions would be elevated in all but a few small areas.

The EA appears to count on the displacement of animals from the area as mitigation from noise-related hearing damage without a consideration for where they will be displaced or what the consequences could be (e.g., displaced into areas with more gillnet or crab fishing that may entangle them or into adjacent areas used by risk-prone shipping.

Response: The analysis in this EA is based on the best information currently available; the commenter does not present any new information for consideration in the analysis. BOEM agrees that there are some site specific data gaps regarding biological resources in the mid-Atlantic. One of the primary purposes of the site characterization activities, the impacts of which are analyzed in this document, is to collect this additional data. This requirement comes directly from the regulations at 30 CFR Part 585.626(a)(3). In addition to the site specific site characterization work that would be conducted by the lessee, BOEM has an environmental studies program that has several projects collecting regional avian, bat, marine mammal, and sea turtle data (e.g., AMAPPS). BOEM has solicited input from NMFS, USFWS, and MMC regarding draft survey and monitoring guidelines for lessees. In addition to that ongoing effort, BOEM has contracted three separate studies that will be developing survey and monitoring protocols that will be incorporated into BOEM's guidelines to lessees once they become available.

Several edits have been made to Appendix B in response to comments received and incorporates the results of the ESA consultation with the NMFS (USDOC, NOAA, NMFS 2011c). These edits include speed restrictions for vessels 65 feet or greater operating between November 1 and April 30. Discussion regarding the use of noise mitigating technologies regarding pile driving has been added to Chapter 4 and discussed elsewhere in this section. The mitigation measures identified in Appendix B are based upon the best available scientific information. The alternatives considered in this EA were developed utilizing the expertise of the natural resource agencies and within BOEM to put forth a reasonable range of alternatives to be considered to reduce individual and cumulative impacts. Pursuant to 30 CFR 585.615 BOEM and the lessee will refine monitoring and mitigation measures as necessary in response to monitoring reports received from the field.

Although BOEM concludes that there would be temporary displacement of animals as a result of animals avoiding sound sources, this displacement is anticipated to be largely localized to the area around the sound source. Migratory corridors inshore (west) and offshore (east) of the action areas which sightings data (*see* Appendix B) indicate are currently utilized corridors, would remain as they are currently which includes vessel traffic and fishing effort. For additional information on the timing of these activities *see* Section 3.1.2.4.

Deepwater Wind, LLC
(Document ID BOEM-2011-0053-0021)

Comment: We concur with the Draft EA's conclusions that no significant impacts are expected and that mitigation measures can be effectively implemented for any potential impacts associated with the leasing and site characterization/assessment activities contemplated by actions to this Notice. Accordingly, we strongly support Alternative A.

Response: Thank you for your comments, which have been noted and will be considered in the decision-making process.

U.S. Environmental Protection Agency
Office of Federal Activities
(Document ID BOEM-2011-0053-0022)

Comment: Based on our review of this draft EA, EPA has no comments.

Response: Thank you for your response.

National Wildlife Federation
(Document ID BOEM-2011-0053-0023 and
BOEM-2011-0053-0046 (replaces BOEM-2011-0053-0044))

Comment: We recommend the inclusion of strong protective measures – like those suggested in Appendix [B] and Alternative D – to first avoid; then mitigate impacts to the right whale. We believe that strong, formal consultation with the NMFS and NOAA is needed to ensure that the most effective measures are required to protect this critically endangered species throughout the year.

It is critical that the final EA require stringent measures at all times to protect whales from ship strikes and adverse impacts from undersea noise resulting from sonar and pile driving activities. The final EA must include detailed explanations of the required protective measures and their likely effectiveness, as this is lacking in Appendix [B] and Alternative D in the Draft

EA. Further, if some type of blanket exclusion of site assessment and characterization activities is determined to be necessary during the winter months, we strongly encourage BOEM to allow biological data surveys to occur during the time as it is critical that we collect as much data as possible during the time to help inform construction and operation planning.

Response: Formal consultations with states and other Federal agencies are required by statute (e.g. ESA, MSA, CZMA) and are discussed in Section 5.3 of this EA. The results of consultations with NOAA and FWS were not complete for the Draft EA but have now been completed (USDOC, NOAA, NMFS, 2011c; USFWS, 2011e) and incorporated into the document and its appendices. Appendix B contains BOEM's mandatory project design criteria; requirements that will be applied to all lessees regardless of the alternative selected. No design criteria has a guaranteed effectiveness or a proven quantitative means to measure the effectiveness. However, these requirements reduce the risks to endangered species to the point where anticipated impacts would be minimal. Pursuant to 30 CFR 585.615, BOEM and the lessee will refine monitoring and mitigation measures as necessary in response to monitoring reports received from the field. Alternative D has been modified to provide for year-round biological surveys (*see* Section 4.4 of this EA).

Comment: We believe that any area removed in the Final EA – from either Alternative A, C or E should not be permanently off the table. We support moving forward with the areas identified, but encourage BOEM to gather more information and take a closer look at all areas removed at this stage and consider them for future site assessment and characterization leasing.

Response: In Sections 2.3, 2.5, 4.2 and 4.5, additional text was added to clarify that under these alternatives areas would be excluded from this initiative; BOEM is not "closing" any area of the OCS to renewable energy leasing**.** Nothing precludes BOEM from considering an application to lease any area on the OCS.

Comment: The base language that is used for all leases should be made available for pubic comment prior to issuance. It is especially critical that the specific wildlife avoidance and mitigation measures recommended by NMFS and NOAA are fully incorporated into the lease language.

Response: On September 6, 2011, BOEM published in the *Federal Register* the proposed commercial renewable energy lease form (76 FR 55090). The *Federal Register* notice opened a 30-day comment period. BOEM is currently reviewing all submissions and will publish a final version of the form in the coming months. The mandatory project design criteria in Appendix B of this EA will be included as conditions on any leases and/or SAPs issued or approved under all of the alternatives considered in this EA.

Comment: The following comment was submitted on behalf of 11,047 National Wildlife Federation Action Fund supporters: "Thank you for taking action to advance clean energy in America. It is time to tap one of our most significant renewable resources - offshore wind in the Mid-Atlantic. Our current dependence on fossil fuels has far reaching and devastating impacts affecting our health, draining our pocketbooks, causing air and water pollution, warming the planet causing sea-levels to rise and destroying wildlife habitat. The time to transition to a clean energy economy is now."

Response: Thank you for your comments, which have been noted and will be considered in the decision-making process.

State of Delaware, Department of Natural Resources & Environmental Control
(Document ID BOEM-2011-0053-0024)

Comment: Impact pile driving has more potential to harm species sensitive to acoustic changes than vibratory pile driving because of the 'pulse.' The draft EA should discuss why vibratory pile driving is or is not suitable for installation in the WEAs.

Response: The discussion of the installation of foundations for meteorological towers in Section 3.1.3.1 has been updated. Specifically, this update discusses vibratory and impact hammering methods. Vibratory hammers are encouraged to be used where appropriate as the duration of higher sound pressure levels associated with impact hammers would be less, even though the total installation time may slightly increase.

Comment: On page 48 the EA states, "From 2000 to 2009, the average spill size of vessels other than tank ships and tank barges was 88.36 gallons (U.S. Department of Homeland Security, USCG, 2011), and, should Alternative A result in a spill in any given area, BOEM anticipated that the average volume would be the same." However, it is the threat posed by tank ships and barges that ARE of concern and any allision with either of those two types of large vessel that will result in accidents with significant consequences. The EA suggest that the vessel control process currently in place will negate the possibility of an incident while a few pages later is states, "The most commonly reported causes of the allisions and collisions include human error, weather-related cause, equipment failure on the vessel, and potential exist for such an incident to occur.

Response: BOEM believes that the vessel control procedures currently in place will negate the possibility of an incident; BOEM also acknowledges the causes of allisions and collisions as stated in Section 3.2.3, Spills. In Section 4.1.3.7.2, Non-Routine Events, it is stated that the WEAs were designed to avoid the shipping lanes and the heavier trafficked approach/departure areas associated with shipping lanes. The shipping lanes are where there is potential for an allision to occur with a tanker ship or barge. It is unlikely that vessels would collide with meteorological towers/buoys due to USCG requirements relating to marking and lighting of facilities and the fact that the WEAs avoid the highest traffic areas. An oil spill resulting from a collision or allision between a tanker ship or barge and a meteorological tower is not reasonably foreseeable because of the strong likelihood that a meteorological tower would collapse without serious damage to a tanker ship or barge. The commenter provides no new information to consider.

Comment: It should be acknowledged that for many species the current available data is insufficient in determining occurrence within the WEAs due to disparity in spatial scale (i.e., data collected by Navy in relation to WEAs), location (i.e., studies conducted in New Jersey's WEA may not be applicable to WEAs south of NJ due to different water temperature regimes) and in some cases inadequate survey methods. In addition, research effort is not equally distributed, thus applying species data collected from one WEA to another may render inaccurate conclusions.

Conclusion Page 88 – There is insufficient data for some species regarding their distribution and occurrence within the WEAs and on their population numbers. If there is a lack of data on the population, and a lack of data on the effects of Alternative A, how can a determination be made at this time that the impacts will be insignificant and have no population level effect?

Response: The analysis in the EA utilizes the best information currently available. Sections 4.1.2.3.1 and 4.1.2.4.1 of this EA discuss the affected environment for marine mammals and sea turtles as well as some of the deficiencies of that data. BOEM agrees that there are some site-specific data gaps regarding biological resources in the mid-Atlantic. One of the primary purposes of the site characterization activities, the impacts of which are analyzed in this document, is to collect this additional data. This requirement comes directly from the regulations at 30 CFR Part 585.626(a)(3).

Comment: Table 4.3, Page 72 – the stock assessment report, while including valuable information does not incorporate data collected by local entities within each State. Only two species of seal (harbor, gray) are included; however, the occurrence of harp seals and hooded seals are in Delaware is well documented (stetzar, 2000, MERR institute, pers.comm.). While this two species are not considered common, they should be included in Table 4.3.

Response: Table 4.3 has been updated to reflect the occurrence of harp and hooded seals in Delaware waters and the information regarding Atlantic sturgeon has been updated in Section 4.1.2.7.1.1.

Comment: Noise Sensitivity in Sea Turtles Page 92 – The draft EA uses what is known about marine mammal auditory threshold levels to determine noise impacts and source distance for sea turtles, which are reptiles. Given that these two animal groups are completely different taxa with specific morphology, physiology, behavior, etc., drawing definitive conclusions about the potential for impacts based on data from a different taxonomic group should be further scrutinized.

Response: Section 4.1.2.4.2 of this EA gives a full description of what is known regarding the hearing frequencies of sea turtles. The NMFS, the agency responsible for evaluating impacts to endangered and threatened sea turtles at sea, has determined that the thresholds established in BOEM's mandatory project design criteria for marine mammals is adequate to protect sea turtles. (USDOC, NOAA, NMFS, 2011c).

Comment: Section 4.1.2.5 Birds – The draft EA indicated that Roseate Terns are not known to occur in Delaware. It is inaccurate to assume, that because Delaware is not listed as one of the states in which this species occurs, it is entirely absent for the state. To the contrary, records reviewed by the Delaware Birds Records Committee (http://www.dosbirds.org/records) indicate that the species has occurred at least seven times since 1977, with six records occurring from 1997 – 2006 (http://www,dosbirds.org/sites/default/files/records/DBRCIndexDOS.1.1.2011.pdf)

In addition, at least five Roseate Tern records have been accepted by the Maryland Birds Records Committee
(http://www.mdbirds.org/mddcrc/pdf/mddatabase.pdf) for the state of Maryland.

Response: BOEM agrees that it would be inaccurate to conclude that if a species was listed as not occurring, that the species was entirely absent. BOEM appreciates the information and references provided by the state. BOEM has incorporated this information into the Section on Birds.

Comment: Meteorological Towers, Page 101-102 – This section seems to imply that most migratory birds would be flying higher than the Met tower the farther from land the tower is located. Birds expected to occur beyond 7 miles from shore are gulls, terns, shorebird, storm-petrels, shearwaters, sea ducks, and alcids. Most of the species groups represent birds that fly at relatively low altitudes and are more likely to fly lower than the height of a met tower.

Response: BOEM has incorporated this information into the EA.

Comment: Migratory Birds, Page 102-103 – The draft EA states, “Other migratory birds including marine birds, coastal shorebirds, and non-ESA birds would rarely encounter these structures due to the distance from shore, the great distance between buoys and towers and the small number of buoys and towers.” This is likely accurate for shorebirds and non-ESA birds. However, this statement is not completely accurate for some species of marine birds such as alcids, gulls, shearwaters, storm-petrels, loons and some sea ducks. These species groups are more likely to occur at least as far and farther from shore as the buoys and towers.

Response: The sentence as written is inclusive and was intended to cover all groups of birds. Distance from shore is but one of a number of factors considered, as the sentence you quote indicates.

Comment: Section 4.1.2.6 Bats – The data available is not adequate to make the assumptions stated in this section. There is no evidence that bat presence in any of the WEAs is “sporadic”. The survey work these comments are based on only included 15 nights of acoustic surveys over a single year and some non-targeted thermal imaging nights. The survey methods are not well defined but, even the data that is available (63 bat calls from at least 4 species including myotis during the fall migration period), suggests that bats do use the off-shore mid-Atlantic waters at least during the fall migration periods. Furthermore, as the draft EA mentions, offshore structures may be an attractant. Construction of the met towers will not be likely to impact bats. In fact, the construction of the met towers provides a unique opportunity to study the possibility of offshore structures attracting bats. Base-line data on bat activity at the proposed met tower site should be collected prior to installing the met towers and collected again after they are installed.

Response: The analysis in the EA is based on the best information currently available, which supports the reasonable conclusions made in the EA regarding the presence of, and potential impacts to bats. However, the collection of base-line data on bat activity will be informative, and MET towers and buoys may be used as platforms for collecting additional data on bats.

Comment: Section 4.1.2.6 – The draft EA states "Based on the above information, the lack of land mass or vegetation seven or more km offshore for bat roosting, the presence of bats in the WEAs is unlikely." Not enough data is presented to draw this conclusion. The surveys conducted so far have not been done within the WEAs but have been successful in detecting bats offshore.

Response: The analysis in the EA regarding bats is based on the best information currently available, which supports the reasonable conclusions made in the EA regarding the presence of, and potential impacts to bats. The commenter presents no new information that indicates the analysis of potential impacts to bats is unreasonable.

Comment: Conclusion, Page 106 – No data has been presented to suggest that bat presence would be unlikely at met tower locations. Although no impacts to bats are anticipated from the construction of and use of the met towers, assumptions regarding bats provided in this draft EA are misleading and should be revised to clarify the true possibilities of bats being found in the WEAs both prior to wind energy construction after construction is complete.

Response: The EA describes the reasons BOEM believes it unlikely that bats would appear at meteorological tower locations. The commenter does not provide any data or information to indicate that bat presence would be likely at meteorological towers.

Comment: Table 4.8, Page 105 – Evening bats (Nycticeius humeralis) are present in Delaware.

Response: Table 4.8 has been changed as suggested, citing Brain Kelly pers. Comm. 2011.

Comment: Section 5.3.3 – Please include in the section a brief discussion regarding the status of interstate consistency in NJ, DE, MD, and VA and the applicability in this process. Also, add a brief discussion about supplemental coordination in the event that there is new information or data that suggest that the propose activities will affect any coastal use or resource substantially different than originally described in the EA.

Response: BOEM recognizes the regional aspect of offshore wind development, and as such, prepared a regional consistency determination for all four Mid-Atlantic States listed in Alternative A. The updated status of the regional consistency determination is included in Section 5.3.3, Coastal Zone Management Act, of this EA. Pursuant to 30 585.611(b), if a lessee submits a SAP that shows changes in impacts from those identified in the regional consistency determination prepared for this action, BOEM may determine that the SAP is subject to a consistency certification. In that case, the lessee would submit a consistency certification under 15 CFR Part 930, Subpart E. BOEM would then submit the SAP and consistency certification to the affected States for CZMA review.

Mainstream Renewable Power

(Document ID BOEM-2011-0053-0025)

Comment: Mainstream believes that consideration of impacts not related to the grant of leases or the carrying out of SAP activities should be excluded from the EA.

Response: The EA does not consider impacts unrelated to the issuance of leases or approval of SAPs.

Comment: While the EA uses appropriately conservative assumptions in terms of the number and size of OCS blocks to be leased, the EA should categorically state that fewer, larger, and more generously spaced leased areas would fall within the specific findings of the EA.

Response: As discussed in Section 3.1.1, a leasing scenario is necessary to develop a scenario for site characterization and assessment activities. The EA uses the most conservative assumption that the entire area of each WEA would be leased. By dividing the total number of OCS blocks by 10, a total of 13 leases are anticipated under Alternative A.

The WEAs were developed in close consultation with numerous federal and state agencies, renewable energy task forces from each state, and with the input of the public and myriad interested parties. The proposed action and alternatives under consideration are whether or not to issue leases within these WEAs, and in order to assess the reasonably foreseeable consequences of doing so, it must analyze a leasing scenario that is reasonably foreseeable within those areas. BOEM is not proposing fewer, larger, or more widely spaced leases within these areas (indeed some of the WEAs could only support 1-3 leases altogether), or to make fewer, larger, or more widely-spaced WEAs, as neither would achieve the purpose and need. Therefore, the EA need not analyze the consequences associated with doing so.

State of New Jersey
Department of Environmental Protection
(Document ID BOEM-2011-0053-0026)

Comment: As a result of the extensive ecological work conducted to date for the New Jersey WEA, we believe that the issuance of a Finding of No Significant Impact (FONSI) for site assessment activities in New Jersey is justified at this time. In the event that an EIS for site assessment activities is determined to be necessary in other states, a FONSI would still be warranted for New Jersey due to New Jersey's advanced ecological work, which is recognized as extensive within the federal notice, and has been held out as a best practice for federal grants, conference and other offshore wind programming.

Response: Thank you for your comments, which have been noted and will be considered in the decision-making process.

Oceans Public Trust Initiative (OPTI)
(Document ID BOEM-2011-0053-0027)

Comment: It is clear from the EA that CMSP was not a significant factor in BOEM analysis. The entirety of the CMSP discussion is contained in a short paragraph on page 5. The limited approach to CMSP is not keeping with the comprehensive and inclusive nature of the President's directive.

Response: As announced by Secretary of the Interior Ken Salazar, in November 2010, BOEM is building an environmentally responsible offshore renewable energy program that is identifying Wind Energy Areas for potential leasing. The activities over the past 9 months are consistent with the tenets of this initiative, as well as the nascent CMSP effort, especially by coordinating with local, state and federal partners and public participation. The Wind Energy Area Environmental Assessments will play a crucial role in informing the CMS Plans that the Regional Planning Bodies will develop. BOEM will make best efforts to adhere to CMSP principles, as it expects other Federal and State partners will.

Comment: BOEM has provided two abbreviated opportunities for public comment, at the scoping stage, and now with the issuance of the EA. It is imperative, for purposes of complying with the principles of CMSP, that additional meaningful opportunities for public comment be provided. OPTI urge BOEM to refrain from committing large portions of the OCS to one purpose prior to the completion of the CMSP process.

Response: Comment noted.

Comment: The current NEPA process cannot adequately analyze the level of information and complex considerations necessary in order to make an informed decision of whether to offer leases in the WEAs. BOEM's reliance on an EA at this stage in the process, with the anticipated preparation of EISs at the Construction and Operation Plan (COP) stage is misplaced.

Response: Under the renewable energy regulations, the issuance of leases and subsequent approval of wind energy development on the OCS is a staged decision-making process. BOEM's wind energy program occurs in four distinct phases: (1) planning: (2) lease issuance; (3) approval of a site assessment plan (SAP); and (4) approval of a construction and operations plan (COP). BOEM intends to use the EA to inform decisions to issue leases in the WEAs and to subsequently approve SAPs on those leases. At the fourth phase – COP phase, BOEM would prepare a separate site- and project-specific NEPA analysis which may take the form of an EIS. (*see* Sections 1.1.4 and 1.4.2 of this EA.)

Comment: BOEM must, along with the NEPA process, engage in adequate consultation with other agencies for consideration of endangered species, marine mammals, and historic properties. The EA also fails to mention any measures being undertaken by BOEM to comply with the Marine Mammal Protection Act (MMPA).

Response: BOEM has convened Intergovernmental Renewable Energy Task Forces that have been established for all the states included in this assessment. Additionally, information has been received through public solicitations in BOEM's RFIs offshore Delaware and Maryland and a Call offshore New Jersey (*see* Section 1.4.3 of this EA), as well as extensive consultations with state and federal agencies and tribes. Through these meetings and submission of comments, BOEM has received valuable information from the NMFS and the Mid-Atlantic Fishery Management Council. Formal consultations that BOEM conducted with states and other Federal agencies during this NEPA process (e.g., NMFS, FWS, SHPOs) are discussed in Chapter 5 and are not repeated in this response. The lessee, not BOEM, has direct obligations under the Marine Mammal Protection Act (MMPA) pursuant to lease issuance. BOEM encourage offshore operators and lessees to apply for an Incidental Take Authorization (ITA) for activities with potential for taking marine mammals. Further, BOEM coordinates with NMFS and USFWS to ensure compliance with the MMPA and to also develop effective mitigation and monitoring requirements for an ITA. BOEM's environmental compliance on the MMPA implementing regulations can be view at http://www.boem.gov/Environmental-Stewardship/Environmental-Assessment/MMPA/index.aspx.

U.S. DOI, Fish and Wildlife Service
Division of Migratory Bird Management
(Document ID BOEM-2011-0053-0028)

Comment: On pg., 28, Avian Resources section first paragraph, the text is unclear. First, what scale is being referred to? Does this text imply that no survey work will be conducted with in WEA that has had numerous surveys (e.g., NY)? Who is responsible for determining whether a WEA has been surveyed adequately? Second, based on this text, BOEM will not require proponents to conduct surveys on smaller scales. Is this true? How will this affect micro-siting decisions within a WEA? Annual patterns of bird use can change and surveys should attempt to obtain the most current information. Relying on older surveys can mis-characterize species distributions. Please clarify text.

Response: The number of avian surveys was estimated in order to assess the impact of survey vessel traffic to environmental resources, such air and water quality. BOEM anticipates that all biological surveys would be conducted by the lessees at the scale of an individual lease. As explained in Section 3.1.1, the average size of a proposed wind energy lease is approximately 10 blocks and could range from just a few OCS blocks to more than 20.

A lessee must submit the results of biological surveys with its SAP (30 CFR 585.610(b)(5) and COP (30 CFR 585.626(3)). A lessee's SAP and COP must describe biological resources, including avian resources, that could be affected by the activities proposed in its plan (30 CFR 585.611(a),(b)(5) and 585.627(a)). Once a plan is submitted, BOEM, in consultation with USFWS, would determine whether there is sufficient information to characterize species distribution and abundance, and assess the potential impacts of the proposed activities. The information submitted with a plan may have been collected previously by another party, by the lessee after the lease is issued, or some combination of those two. Section 3.1.2.3, Biological Surveys, has been revised accordingly.

Comment: Pg., 28 – Avian Resources section: Please clarify text regarding the survey coverage of a lease proposal. It is unclear if BOEM is saying that only 10% of lease areas will be surveyed or if 1 boat survey using German guidelines covers 10% and BOEM expects multiple boat survey to effectively cover the lease area. Ocean predictors of bird distribution and abundance could be present at a variety of scales, including very small scale. Only surveying 10% of an area increases the probability of missing those smaller areas that could attract large numbers of birds. Based on the estimate of it taking 1-2 days to cover 10% of the area, it appears that it would not take much more effort to increase the accuracy and scale of the data (however, cost of surveys needs to be factored here as well).

Response: BOEM has added to the EA to clarify: "The environmental analysis in this EA assumes that lessees would conduct by monthly boat and/or aerial surveys for 2 to 3 years, during the site assessment period of a lease, prior to submitting a COP, which would capture the seasonal variation in avian numbers. Similar to guidelines developed in Germany, boat surveys would likely cover 10% of the lease (BSH, 2007). It is estimated it would take 1 to 2 days to cover 10% of an average-sized leasehold of 10 OCS blocks (but could range from 2-20 OCS blocks), which would likely be adequate for determining the presence of avian species." BOEM agrees that ocean predictors of bird distribution and abundance could operate at multiple scales and that there has to be a balance between survey cost and accuracy.

Comment: Pg., 108 – with regard to the MBTA text currently in the document, it is probably appropriate for consistency with BGEPA section below to include language that states that there is no unintentional take authorization for birds covered by the MBTA. Thus, any impact that has a negative effect on birds and their population is a violation of the Act and thus for all activities that may affect bird, avoidance and minimization measures will be developed and implemented with the goal of avoiding or minimizing unauthorized take of migratory birds.

Response: Text was added to the biological resources section to clarify the issue.

Comment: Pg., 112 – threats of Met towers. The text states that perching is not a threat in regards to the various types of tower designs. However, lattice tower designs that provide perching opportunities can "attract" birds to an area where threat occur – an attractive nuisance. Therefore, the text should be clarified the direct effect of perching is not a threat per say, but attraction of birds to perching locations can cause threats thru indirect effects.

Response: The text on attractive nuisance impacts was added to Section 4.1.2.5.2 of this EA.

Dominion
(Document ID BOEM-2011-0053-0029)

Comment: When developing the final EA/FONSI, BOEM should emphasize that even under a "worst-case" set of conditions, the issuance of leases and SAP approvals should not require any further environmental review and should proceed as expeditiously as possible.

Response: In the event that a particular lease is issued, and the lessee subsequently submits a SAP, BOEM would then determine whether this EA adequately considers the environmental consequences of the activities proposed in the lessee's SAP. If the analysis in the EA adequately considers these consequences, then no further NEPA analysis would be required before the SAP is approved. If, on the other hand, BOEM determines that the analysis in this EA is inadequate for that purpose, BOEM would prepare an additional NEPA analysis before approving the SAP.

Virginia Port Authority
(Document ID BOEM-2011-0053-0030)

Comment: With minor modifications to the current northeast and southeast approaches, the DOD training areas and the WEA outlined in Alternative A, there is a solution that would permit safe and efficient commercial navigation into Chesapeake Bay, sustain future growth of the Port, and allow off-shore wind energy development to proceed as proposed. Figure 3 depicts the delineation of a single "sealane" from the current Atlantic Ocean Channel that splits into a "North Fairway" and "South Fairway" utilizing existing deep water access and circumventing the proposed WEA. A portion of the northwest quadrant of the WEA would require relocation potentially to the west. In addition, a portion of the northeast section DOD training area could be relocated to the south and the southern boundary of the existing training area reconfigured and enlarged to maintain required space for military exercises and testing.

Response: Although BOEM has no authority to modify vessel approaches or DoD training areas, it developed the WEAs in close consultation with numerous federal and state agencies, renewable energy task forces from each state, and with the input of the public and myriad interested parties. Under the revised Alternative E, areas identified by AWO and USCG would be excluded from leasing decisions under this action (*see* Figure 2.2). As a result, an area slightly less than 20 OCS blocks in the Virginia WEA would be considered for leasing and subsequent site assessment activities under Alternative E. *See* Section 4.5 of the EA. Based simply on the reduction of the area potentially leased, there would be an 19% reduction in site characterization surveys in Virginia (about a 4% reduction in overall site characterization surveys potentially occurring in all WEAs). Due to the reduction in area, one less lease is anticipated in the Virginia WEA; therefore, one fewer meteorological tower and/or two fewer meteorological buoys would be constructed (*see* Section 3.1.3 discussing reasonably foreseeable site assessment scenarios). *See* Section 4.5 of the EA.

Comment: With the addition of the Virginia Wind Energy Area (WEA) (Figure 2), vessels approaching from the south, east and southeast and upon egress from the Bay will be forced into a narrow passage between the DOD training area and the WEA. With the opening of the expanded Panama Canal in 2014 and planned port development projects through 2052, vessel traffic is expected to increase to over 7,000 calls annually and container vessel sizes are expected to increase to 12,000 TEU's making navigation through the constricted passage (Figure 2) difficult and potentially hazardous especially during storm events and rough seas.

Response: Anticipated increases in vessel traffic from the opening of the expanded Panama Canal in 2014 are addressed in Section 4.1.3.7.1 of this EA. This EA considers the reasonably foreseeable impacts to navigation associated with issuing leases and approving site assessment plans in the WEAs in light of increased vessel traffic resulting from the anticipated expansion of the Panama Canal.

Defenders of Wildlife

(Document ID BOEM-2011-0053-0031)

Comment: Of particular concern, we note that the general lease language has not yet been released or analyzed in the EA, yet the terms of these leases will be critically important to assessing the ability of the agency to require additional environmental protections, monitoring, or mitigation as time goes on.

Response: On September 6, 2011, BOEM published in the *Federal Register* the proposed commercial renewable energy lease form (76 FR 55090). The *Federal Register* notice opened a 30-day comment period. BOEM is currently reviewing all submissions and will publish a final version of the form in the coming months. The mandatory project design criteria in Appendix B of this EA will be included as conditions on any leases and/or SAPs issued or approved under Alternative A. Additionally, lessees must still submit applications and plans for construction and operation as required by the renewable regulations at 30 CFR Part 585.

Comment: BOEM focuses on the threat of ship strikes, but not on other risks to right whales associated with Alternative A. In particular, the risk of habitat displacement resulting from high levels of sounds exposure should be carefully examined. BOEM also failed to mention that, while no critical habitat is currently designated in or near the wind EAs, several groups did petition NMFS in 2009 to designate this area as part of a migratory pathway critical habitat designation for the North Atlantic right whale.

Response: BOEM concludes that there would be temporary and localized displacement of animals as a result of animals avoiding sound sources; nothing long term, significant in area, or significant in impact. Migratory corridors inshore (west) and offshore (east) of the action areas in which sightings data (*see* Appendix B) indicate are currently utilized corridors, would remain as they are currently, which includes vessel traffic and fishing effort. For additional information on the timing of these activities and duration and extent of sound exposure *see* Section 3.1.2.

Alliance to Protect Nantucket Sound

(Document ID BOEM-2011-0053-0032)

Comment: Offshore development must also take into account the principles of Coastal and Marine Spatial Planning (CMSP). BOEM should have conducted a programmatic NEPA analysis, ultimately resulting in the production of a programmatic EIS. Only by involving stakeholders and approaching offshore energy development from a consensus-based management approach can BOEM comply with the principles of CMSP and ensure appropriate development.

Response: The activities over the past 9 months are consistent with the tenets of this initiative as well as the nascent CMSP effort, especially by coordinating with local, state and federal partners and public participation. The Wind Energy Area Environmental Assessments will play a crucial role in informing the CMS Plans that the Regional Planning Bodies will develop. BOEM will make best efforts to adhere to CMSP principles, as it expects other Federal and State partners will. BOEM conducted the *Programmatic Environmental Impact Statement for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf, Final Environmental Impact Statement* in 2007 which was incorporated by reference during the analysis of this EA.

Chesapeake Climate Action Network
(Document ID BOEM-2011-0053-0033)

Comment: We support the Bureau's Alternative A to begin renewable energy leasing in the WEAs of the Mid-Atlantic and urge BOEM to dismiss proposals that would unnecessarily reduce these area in any way.

Response: Thank you for your comments, which have been noted and will be considered in the decision-making process.

Conservation Law Foundation (CLF)
(Document ID BOEM-2011-0053-0034)

Comment: The description of Alternative A in the Final EA should make it clear that the mitigation measures (independently verified by NMFS are effective strategies) referenced in Section 4.1.2.3.2 and Appendix B are required for all site assessment and survey characterization activities conducted in the WEAs year round. The lease instruments should also be clear that the lease only authorizes approved site assessment and site characterization surveying activities that the revised mitigation strategies referenced in Section 4.1.2.3.2 and Appendix [B] of the Final EA are operational for the life of the lease.

Response: On September 6, 2011, BOEM published in the *Federal Register* the proposed commercial renewable energy lease form (76 FR 55090). The *Federal Register* notice opened a 30-day comment period. BOEM is currently reviewing all submissions and will publish a final version of the form in the coming months. The mandatory project design criteria in Appendix B of this EA will be included as conditions on any leases and/or SAPs issued or approved under Alternative A. Companies must still submit applications and plans for construction and operation as required by the renewable energy regulations at CFR Part 585, which is expressly acknowledged in the lease. Clarification has been provided in numerous places in the NEPA document.

Comment: The final EA should reference the most current and complete data sets relied upon to justify the selection of the Propose Action.

Response: During the preparation of this EA, BOEM relied upon the best available scientific information to assess the potential impacts of leasing, site characterization surveys, and site assessment activities in WEAs offshore New Jersey, Delaware, Maryland and Virginia. Chapter 6, References, is a list of literature cited throughout this EA, and the EA makes references to the many sources in the course of the discussions. This EA was prepared to analyze the reasonably foreseeable consequences of the activities associated with the proposed action and alternatives, including the no action alternative; not to justify the selection of the proposed action.

Comment: CLF supports BOEM's proposed reliance on the best management practice of "avoiding" sensitive benthic resources for installation of met towers, buoys, or other site-disturbing activities. The avoidance practice should be incorporated into the actual lease instruments issued for Site Assessment activities within WEAs. (*see* Section 4.1.2.2, Benthic Resources).

Response: Text has been added to Section 4.1.2.2, Benthic Resources, to clarify BOEM is not proposing any new specific mitigation measures to protect sensitive benthic habitat as part of this assessment. Rather, BOEM has a policy to avoid impacts to sensitive benthic resources, and to rely on the results of the site-specific surveys when considering a SAP. Furthermore, as part of the BOEM's consultation with NMFS for EFH, BOEM would coordinate the review of a SAP with NMFS to determine if potential effects of the proposed activities fall within impacts anticipated in the programmatic consultation (*see* NMFS EFH Consultation, conservation recommendation #4 in Section 4.1.1.7 of this EA).

Comment: The Final EA should explain the leasing process and specifically reference the federal regulation that will apply to the terms and conditions in the leasing instruments. For example, if the specific terms and conditions in a given lease, and the level of public review for a given lease, depend on whether the lease was issued as a result of a competitive lease sale process, BOEM should describe that process, and the regulations that apply in comparison to the process for the issuance of a non-competitive lease. Because BOEM has not developed a model lease for public review, it is not possible for stakeholders to ascertain whether DOI is taking sufficient steps to retain full authority to impose additional mitigation measures at either the Site Assessment or the Construction and Operation phases and/or to revoke a lease, without having to provide compensation to the lessee, if the data indicate that construction activities or facility operation will result in unacceptable impacts that cannot be appropriately avoided, minimized or mitigated. The base language in all lease instruments, whether issued as a result or non-competitive or competitive leasing process, should contain reasonable terms and conditions protecting the authority of DOI to modify or revoke a lease, should specifically reference applicable federal regulations authorizing such modification, and should be made available for public comment prior to lease issuance.

Response: In Section 1.1.2 of this EA, BOEM's authority and regulatory process is explained including specific references to the renewable energy regulations published in April 2009, which will apply to the terms and conditions of any lease. The specific procedures for lease issuance are provided in subpart B of the regulations. The competitive lease process is set forth at 30 CFR 585.210 – 585.225, and the noncompetitive process is set forth at 30 CFR 585.230 – 585.232 (as amended by a rulemaking effective as of June 15, 2011).

On September 6, 2011, BOEM published in the *Federal Register* the proposed commercial renewable energy lease form (76 FR 55090). The *Federal Register* notice opened a 30-day comment period. BOEM is currently reviewing all submissions and will publish a final version of the form in the coming months.

Under the regulations and the lease, lessees must submit the plans required by the regulations (i.e., SAP, COP) prior to undertaking any plan-related activities. The mandatory project design requirements in Appendix B of this EA will be included as conditions of any leases and/or SAPs issued or approved under this actionA.

Comment: In the Purpose and Need section of the EA, Section 1.2, and the final EA should identify impact associated with Climate Change – and the prospects for mitigating those impacts by garnering power from non-GHG emitting resources.

Response: The purpose of this EA is to consider the reasonably foreseeable environmental consequences associated with issuing leases and approving site assessment plans in the WEAs described; mitigating climate change is not a part of the purpose and need. The proposed action and alternatives do not include the actual commercial development of offshore wind energy resources. Rather, if and when a lessee submits a COP, BOEM would prepare a NEPA document addressing the impacts associated with the installation and operation of the wind energy facility they propose, which may implicate the issues raised in the comment (*see* Section 1.4.2, Scope of Analysis, of this EA). That said, BOEM has added a section addressing the contributions that Alternative A may make to climate change (*see* Section 4.7 of this EA).

Comment: With respect to operational waste, Section 3.1.2.7, BOEM should project the amount and type of trash and debris, and the amount of ballast and bilge water it anticipate will be generated and discharged as a result of site assessment activities associated with 12,000 vessel round trips to support its conclusion that site assessment activities will no have a significant impact.

Response: The impacts of vessel discharges to water quality are analyzed in Section 4.1.1.2.2 of this EA. As discussed in that section, the USEPA sampled wastewater discharges from vessels of the type associated with the activities with the proposed action and alternatives: tugboats, small research vessels, and supply boats, as well as others (USEPA, 2010b). It was determined that vessels discharging to a relatively large water body were not likely to cause an exceedance of National Recommended Water Quality Criteria. Rather than calculating the amount of trash, debris, ballast and bilge water that could be generated by Alternative A, BOEM compared the projected vessel traffic with the annual 140,000 vessels modeled in the USEPA study to determine whether or not significant impacts would occur. The anticipated volume of survey vessels moving in and out of each port as a result of Alternative A would potentially average 43 trips per year per port in Virginia and 67 trips per year per port in New Jersey, Delaware and Maryland (*see* Section 4.1.1.1.1 of this EA).

Atlantic Wind Connection

(Document ID BOEM-2011-0053-0035)

Comment: We concur that none of the impacts identified in the Draft EA are significant and urge the Bureau to determine a Finding of No Significant Impact. The Draft EA carefully outlines all of the potential impacts and demonstrates that, even at scale, there is no significant disturbance to the marine environment from the site characterization activities needed to move to the next step of constructing an offshore wind farm.

Response: Thank you for your comments, which have been noted and will be considered in the decision-making process.

Comment: With respect to the installation of transmission cables, on page 152 the draft EA states: a lessee could still install leasehold interconnect cables and other structures on the seabed beneath the anchorage area. While it is technically possible to install transmission cables beneath an anchorage area, it is highly unlikely that the AWC project would be installed in or near an anchorage area due to the increased possibility of anchors damaging the cable.

Response: This language has been removed from Section 4.2, Alternative B.

State of Maryland
(Document ID BOEM-2011-0053-0036)

Comment: We recommend that future environment assessments, including site-specific assessments, utilize the best available information regarding the possible effects on navigation including the findings of the USCG Port Access Route Study (PARS) currently underway.

Response: BOEM will continue to utilize the best available information regarding the possible effects on navigation, including the findings of the USCG's ACPARS if available, in future NEPA analyses.

Comment: The draft EA addresses existing conditions and considers potential effects of the leasing and site assessment activities on commercial shipping primarily in section 4.1.3.7 (Other Uses on the OCS) of the document. Given the significance of commercial navigation throughout the region, we recommend that BOEM provide this information in a standalone subheading under Section 4.1.3 (Socioeconomic Conditions and Impacts).

Response: BOEM acknowledges the importance of commercial navigation through out the region. For example, this EA considers the exclusion of areas under Alternative B, C and E due to the risk of existing vessel traffic colliding with Alternative A structures and vessels. So that readers may easily compare changes made from the draft EA to the final EA, BOEM has chosen not to implement this recommendation.

Comment: We recommend that the final EA provide additional explanation of the standards by which USCG Category classification system was developed. The standards for removal of Category B areas seems less clear; If additional vessel data is available that has been used in applying the USCG classification system in Maryland's WEA and other WEA's we urge BOEM to include it in the final EA.

Response: A summary of the basis of USCG classification was added to Sections 2.3 and 4.3 (Alternative C). BOEM takes seriously the advice and input it receives from expert federal agencies regarding subject matter squarely within their area of expertise. For more information regarding the standards by which USCG Category classification system was developed, BOEM recommends contacting the USCG directly. While the USCG did not recommend that the Category B areas be removed from leasing consideration, BOEM elected to consider this as an alternative in order to present the decision maker with a reasonable range of alternatives. Selection of Alternative C would likely postpone leasing decisions in this area until after USCG completes the ACPARS. Available vessel data was already included in Figures 4.7a – 4.7c (*see* Section 4.1.1.7.2 of this EA).

Comment: We encourage BOEM to similarly consider the foreseeable, cumulative effects of installation and operation of multiple wind energy turbines on marine traffic congestion along the entire East Coast in any future environmental analysis associated with project approval.

Response: If and when a COP is submitted, BOEM would prepare a separate site- and project-specific NEPA analysis. This may take the form of an EIS which would analyze the construction and operation activities for that particular project including the cumulative impacts of the action added to other past, present and reasonably foreseeable future actions, including other renewable energy activities. Through the scoping process for future project-specific NEPA documents, BOEM would determine the geographic scope of the cumulative effects analysis.

Comment: With regard to benthic resources, BOEM should address the following issues: mitigation measures to protect sensitive benthic habitats; the lack of data in the mid-Atlantic region describing sensitive benthic habitats, including natural reefs and "live bottom" habitats; and the assessment of cumulative impacts of potential future development activities on benthic habitats. As noted on page 67 of the draft EA, these features are not well mapped in the mid-Atlantic WEAs. Also, please provide the benthic habitat distribution and abundance data to the states and others so that we can assess the significance of the effects of offshore wind impact producing activities on the region's benthic community.

Response: BOEM's primary mitigation strategy is avoidance of sensitive benthic resources. This policy is part of our Record of Decision in Appendix B of the PEIS and reflected in BOEM's renewable energy regulations 30 CFR Part 585.627(a). However, this strategy does not preclude BOEM from siting projects in areas where these resources exist provided that

Section 4.1.2.2.1, Biological Features, of this EA has been edited to include benthic invertebrates that have been documented on live hardbottom, including natural and artificial reefs, of the mid-Atlantic.

The data used in the benthic habitat assessment is publicly available information. To request a specific data set the State of Maryland should contact their BOEM state coordinator.

Sierra Club

(Cover Letter - Document ID BOEM-2011-0053-0037;
Form Letters - Document ID BOEM-2011-0053-0041 and BOEM-2011-0053-0041-0043)

Comment: The reliance on observers to implement a 500 meter exclusion zone for North Atlantic Right Whales is questionable given the statement that "in most cases the whales were not seen beforehand or were seen too late to avoid collision." (Pg., 86). Comment that cast doubt on the reliance on observers are provided in the NOAA "Report of a Workshop to Identify and Assess Technologies to Reduce Ship Strikes of Large Whales" (NOAA Technical Memorandum NMFS-OPR-42), published in May, 2009.

Response: Appendix B.1.2, Visual Monitoring of Exclusion Zone, of this EA discusses the requirement that lessees use qualified NMFS-approved PSOs. PSOs must be able to show proper training in at-sea protected species observations and familiarity with protected species in the action area. NMFS has expertise in evaluating the credentials of PSOs and working with companies that train and employ these PSOs. The general characterization of ship strikes on page 86 of the draft EA did not take into account speed restrictions and a dedicated PSO that would be required as part of this activity. As the NMFS ship-strike technology workshop concluded (NOAA Tech Memo NMFS-OPR-42), the problem of ship strikes is a complex one; there are no easy technological "fixes"; no technology exists, or is expected to be developed in the foreseeable future that will completely ameliorate, or reduce to zero the chances of, ship strikes of large whales; and no single technology (this includes visual observations) will fit all situations.

Comment: We do not believe that the mitigation measures described in Appendix [B] are sufficient to protect highly vulnerable animals, and thus recommend the additional of provisions. Alternative D could be revised to be more focused on activities that raise the highest level of concern and whose impacts cannot be addressed in other ways, while still allowing some activity to proceed between November and April. These protections should be either incorporated into Alternative A, or adopted as a revised version of Alternative D.

BOEM should require at least one of the following methods to dampen or attenuate pile driver sound: bubble curtains, cushion blocks, cofferdams, and/or temporary noise attenuation pile ("TNAP") design. These methods have been shown individually to substantially reduce propagation levels – by as much as 26 dB in the case of cushion blocks.

Response: Thank you for your comments regarding Appendix B and Alternative D. Appendix B has been edited in response to comments and consultations received. Appendix B includes a discussion of the use of noise reducing technologies during pile driving. This and other operating requirements specified in Appendix B are based upon the best available scientific information. Noise reducing procedures for pile driving, primarily cofferdams and foam sleeves (*see* Nehls, 2007 and USDOI, BOEMRE, 2010) have been shown to be effective. However, the feasibility of requiring these technologies in the offshore environment needs further exploration and may be appropriate on a case-by case basis for full commercial-scale construction projects where the total duration of pile driving activities would be greater than that for a single meteorological tower. It should be noted that, in its September 20, 2011 concurrence letter, NMFS determined that Alternative,A when implemented according to the mandatory project design criteria detailed in Appendix B, is not likely to adversely affect listed whales or sea turtles. *See* discussion of NMFS Concurrence, Section 5.2.1 of the EA.

Comment: The EA appears to assume that platforms to be used within the WEAs will be fixed platforms, rather than floating or semi-submersible. Further, the EA states that "should BOEM receive an application for a semi-submersible or tension-leg platform, it will consider whether such a platform would lead to environmental consequences not considered in the EA." (Pg., 33). The exact wording used in the EA to discuss its assumptions regarding the likely choice of meteorological tower is confusing.

Response: Section 3.1.3.1, Meteorological Towers and Foundations, has been revised accordingly.

Comment: We recommend that BOEM apply CMSP principles to develop mitigation measures for avoidance of ship strikes related to site characterization and assessment activities as follows: Identify anticipated patterns of boat traffic, related the spatial data to information regarding estimates of the presence and abundance of NARW and require a 10 knot speed limit on all boats, including those less than 65 feet in length. The Multipurpose Marine Cadastre, jointly hosted by BOEM and NOAA, appears to lack relevant data layers. If BOEM offers CMSP tools in support of decision making, e.g. selections of blocks to be eligible for lease, it is important for those tools to contain all the relevant data layers.

Response: BOEM has done its best to acquire economic and environmental information regarding the Mid-Atlantic States, and used the best information currently available to make informed decisions about the proposed action and alternatives. In addition to supporting the ever-evolving Multipurpose Marine Cadastre, BOEM, funds ocean research to develop sound science and document relevant traditional knowledge, through the Technology Assessment and Research Program as well as the Environmental Studies Program. Past research reports, studies underway and future plans can be found on our website. BOEM also works closely with federal and state partners to share information that is relevant to the Renewable Energy Program.

Comment: There were 2,265 form letters submitted by the Sierra Club that stated offshore wind means creating local jobs and providing clean, renewable energy to power our homes, schools and businesses. A transition away from Big Coal and its heavy cost to our public health and environment; is a critical step in ensuring a better future for generations to come. When siting offshore wind projects please choose the most viable areas with special attention to environmental impacts.

Response: Thank you for your comments, which have been noted and will be considered in the decision-making process.

U.S. Coast Guard
(Document ID BOEM-2011-0053-0038)

Comment: On Page 20, first sentence: Change words “meteorological and buoys towers” to “meteorological towers and buoys”.

Response: In Section 2.7, edits were made to reflect the requested change.

Comment: On Page 138, last paragraph, third sentence: Change the wording after “draft” to read “… 42 feet or greater in fresh water and naval aircraft carriers. Ships drawing less than 42 feet may use the deep-water route when, in their master’s judgment, the effect of ship characteristics, its speed and prevailing environmental conditions may cause the draft of the ship to exceed or equal 42 feet (*see* Figure 4.6) (International Maritime Organization (IMO) *ships’ Routeing Guide, 2010* edition).”

Response: In Section 4.1.3.7, edits were made to reflect the requested change.

Comment: On Page 138, last paragraph, last sentence: Change the wording to read "Authority to create official anchorage ground in the territorial sea, out to 12 nm, was received by the USCG under the USCG Authorization Act of 2010."

Response: In Section 4.1.3.7, edits were made to reflect the requested change.

Comment: On Page 139: The last line of the first paragraph read, "There are currently no proposed anchorage areas for approaches to the Chesapeake Bay." Recommend the cited sentence be modified to read, "There are currently no proposed anchorage areas in the vicinity of the Virginia WEA."

Response: In Section 4.1.3.7, edits were made to reflect the requested changes.

Comment: On Page 145: Reference to "33 CFR Section 1223" should be changed to "33 U.S.C. 1223." Reference to "33 CFR 66" should be changed to "33 CFR Part 66."

Response: In Section 4.1.3.7.2, edits were made to reflect the requested changes.

Comment: On Page 145, sentence beginning with "meteorological towers/buoys would also be considered Private Aids…" should begin with "USCG required marking, lighting or other apparatus place on meteorological tower/buoys would also be considered Private Aids…"

Response: In Section 4.1.3.7.2, edits were made to reflect the request change.

Comment: On page 151: Recommend replacing the entire text following the fifth bullet with the following text: "Lessee would operate visual, audible and electronic aids to navigation (lights, fog signal, RACON) with sufficient backup power and redundancy to assure a minimum availability rate of 99.7%. The navigation light located on a meteorological tower or buoy should be seen in a 360-degress arc. If a structural component prevents an uninterrupted arch of visibility, then two or more lights must be installed at an elevation specified by the USCG at mean high water, each with an operational rang of 3NM, 90% of the nights. The lights shall display slow flashing amber light and shall flash synchronously. If required, the fog signal shall have a range of 0.5 NM and shall activate whenever the visibility drops below 3NM. The structure shall be color-coated yellow (i.e., Munsell Chip number 2.5Y 8/12). If a RACON is required, its characteristic will be determined by the Coast Guard. To facilitate an uninterrupted deployment, early consultation with the Coast Guard during the structure/buoy design phase is encouraged.

Response: In Section 4.1.3.7, edits were made to reflect the requested changes.

Comment: CMSP is a new national effort to gather data and decide how best to manage and utilize the ocean resources. An Atlantic Coast Port Access Route Study (PARS) is underway (estimated completion date June 2012) that would help the Coast Guard understand the impact of proposed renewable energy facilities on marine transportation route and navigational safety.

Response: Given that no CMS Plan exists for the Mid-Atlantic, and following the principles outlined in the Final Recommendations of the Interagency Ocean Policy Task Force, BOEM developed this EA with the best available information. Additionally, BOEM is adaptive and flexible to accommodate changing conditions. The information from the anticipated PARS will be helpful for future assessments (as stated in Section 2.3 of this EA), including site specific NEPA review of individual projects once leases have been issued and COPs have been submitted.

Hampton Roads Planning District Commission
(Document ID BOEM-2011-0053-0039)

Comment: We have consulted with regional local government staff regarding this project. Based on this review, the proposal appears to be consistent with local and regional plans and policies.

Response: Comment noted. Under Energy Policy Act of 2005, BOEM will continue to coordinate and consult with the Governor of any state or the executive of any local government that may be affected by a renewable energy lease, easement, or right-of-way on the OCS.

Southern Environmental Law Center
(Document ID BOEM-2011-0053-0040)

Comment: There are significant information gaps in the draft EA, and if theses gaps are not going to be filled in the final EA then they must be filled through the data-gathering process associated with site characterization and assessment activities and analyzed prior to approval of a COP.

Response: The best scientific information available was used in this EA to assess the reasonably foreseeable impacts of site characterization and assessment activities in and around the WEAs offshore New Jersey, Delaware, Maryland and Virginia. The purpose of conducting site characterization surveys and installing meteorological data collection devices is to assess the wind resources in the lease area and to characterize the conditions of the water column and seabed. BOEM regulations require that a lessee include the results of these surveys in its application for COP approval (30 CFR 585.626(a)).

Comment: The draft EA relied on the NJ Baseline study for many of the conclusions reached regarding the project's impacts on biological resources, but the study itself contained significant data gaps, especially with regard to the migratory patterns and foraging behaviors of marine mammal, sea turtles, and marine birds.

The draft EA relied on the New Jersey baseline study and the Nature Conservancy's Northwest Atlantic Marine Ecoregional Assessment (NAM ERA); these studies leave significant gaps in information regarding the presence of marine mammals in the WEAs, especially with regard to the migratory behaviors of these species.

The final EA must assess the risks of entanglement and collision resulting from displacement, especially in areas such as the Virginia WEA, which is located near large commercial ports, commercial fishing area, and military facilities. Further, BOEM must assess marine mammal response to acoustic exposure at various frequencies so that a more thorough assessment of these responses may be performed before construction and operation commences.

We urge BOEM to explain in the final EA whether sub-bottom profilers should be treated as a continuous noise source and whether additional mitigation measures should be implemented to reduce the behavioral disturbance or harassment of marine mammals at the lower 120 dB level. We urge BOEM to implement mitigation measures that prevent exposures at these lower levels, provide additional protection form vessel strikes and acoustic noise and include a 10 knot speed limit for all ships 65 feet or longer throughout all WEA at all times. We urge BOEME to include the measures identified in Appendix [B] and any additional appropriate mitigation measures as stipulations to any leases issued. In addition, BOEM needs to fully discuss and, to the degree possible given the best available science, demonstrate that the mitigation measures will be effective in protecting endangered and at risk species.

Response: BOEM used the best available information to inform the analysis in this EA. BOEM agrees that there are some site specific data gaps regarding biological resources in the mid-Atlantic. One of the purposes of the site characterization activities, the impacts of which are analyzed in this EA, is to collect site-specific data. This requirement comes directly from the regulatory requirements found at 30 CFR Part 585.626(a)(3). Appendix A has been updated with data from all seasons from the NAM ERA dataset and one season's data from AMAPPs. The available data is sufficient for BOEM to draw sound conclusions based upon the information submitted to BOEM through comments and consultations as well as review of applicable literature.

The mandatory project design criteria in Appendix B of this EA will be included as conditions of any leases and/or SAPs issued or approved under this action. It should be noted that, in its September 20, 2011 concurrence letter, NMFS determined that Alternative A, when implemented according to the mandatory project design criteria detailed in Appendix B, is not likely to adversely affect listed whales or sea turtles. *See* discussion of NMFS Concurrence, Section 5.2.1 of the EA.

Comment: BOEM must require both in the final EA and in the lease instruments themselves – that the marine mammal surveys are conducted pursuant to a single protocol to ensure that the information is comparable across agencies and amongst individual leases.

Response: With input from the NFMS and MMC, BOEM is in the process of developing survey protocols for marine fauna, such as marine mammals. These guidelines would provide recommendations for complying with the biological survey information requirements of BOEM's renewable energy regulations at 30 CFR 585.610(b)(5) for a SAP and 30 CFR 585.626(a)(3) for a COP.

Comment: The final EA and individual lease instruments must require that lessees perform bird surveys year-round, on multi-year basis, and in a comprehensive and comparable manner.

Response: With input from the USFWS and NOAA, BOEM is in the process of developing recommended survey protocols for avian resources. These guidelines would provide recommendations for complying with the biological survey information requirements of BOEM's renewable energy regulations at 30 CFR 585.610(b)(5) for a SAP and 30 CFR 585.626(a)(3) for a COP.

Comment: It is important that BOEM clarify the nature of the leases that it intends to issue for these WEAs. We urge DOI to share the basic lease form it proposes to use with the public and take comment.

Response: On September 6, 2011, BOEM published in the *Federal Register* the proposed renewable energy commercial lease form (76 FR 55090). The *Federal Register* notice opened a 30-day comment period. BOEM is currently reviewing all submissions and will publish a final version of the form in the coming months.

Comment: The draft EA included a very short section on migratory birds, citing Section 4.2.9.3 of the Programmatic EIS for the full list of migratory birds that may be impacted in the Mid-Atlantic WEAs. The final EA should assess the likelihood of migratory bird presence for species known to be present in the WEAs. Also, the draft EA fails to identify any areas of high bird concentrations in the Mid-Atlantic, and BOEM must investigate whether there are areas of high bird concentration offshore. This information must be included in the final EA so that potential impacts on bird species can be fully assessed.

Response: The EA analyzes impacts associated with leasing and site characterization activities within the mid-Atlantic WEAs. This analysis was based on the best available information. BOEM is aware that there are information gaps in the distribution and abundance of migratory birds, as well as other species and resources. Under the renewable energy regulations, lessees are required to submit the results of biological surveys (which include bird surveys) with its SAP. These survey efforts will help fill in site-specific information gaps, such as the identification of areas of high bird concentrations.

Comment: The draft EA provides no rationale for such a large exclusion (Alternative E). The AWO should work with the Coast Guard and other Virginia Task Force members to resolve this concern while minimizing its impact on the Virginia WEA. Leasing should proceed in the proposed WEA, and any necessary adjustments for barge shipping can be worked out during the site assessment phase.

Response: BOEM is not excluding or closing any area of the OCS from potential leasing. Rather, "exclusion" in this case, means exclusion from high priority leasing consideration. Applicants may apply to obtain a lease for any area of the OCS. Alternative E has been modified to exclude from priority consideration at this time full OCS blocks 6111 and 6161, and partial OCS blocks 6011, 6061, 6110, and 6160 on the most western edge of the Virginia WEA, rather than the eight OCS blocks identified in the draft EA (see Sections 2.5 and 4.5). The rationale for this exclusion is provided in the EA itself.

James and Denise Sipple
(Document ID BOEM-2011-0053-0042)

Comment: We respectfully request that, when siting offshore wind projects, you chose the most viable areas with special attention to environmental impact. Alternative A – "The Propose

Action" (pg., 14 and 49 of EA), with enhanced protection for endangered North Atlantic right whale (pg. 165 of EA, encompasses these standards (pg. 70-71 of EA).

Response: Thank you for your comments, which have been noted and will be considered in the decision-making process.

Ocean Conservancy
(Document ID BOEM-2011-0053-0045)

Comment: The EA must adhere to the CMSP principles outline in the Final Recommendations of the Interagency Ocean Policy Task Force Adopted by Executive Order 13547. The draft EA and "Smart from the Start" process as a whole must incorporate core CMSP principles.

Response: As announced by Secretary of the Interior Ken Salazar, in November 2010, BOEM is building an environmentally responsible offshore renewable energy program that is identifying Wind Energy Areas for potential leasing. The activities over the past 9 months are consistent with the tenets of this initiative as well as the nascent CMSP effort, especially by coordinating with local, state and federal partners and public participation. BOEM will make best efforts to adhere to CMSP principles, as it expects other Federal and State partners will.

Comment: BOEM sent out requests for information regarding WEAs and received a number of responses. However, the draft EA does not adequately address the input that was provided: for example, information provided by the Mid-Atlantic Regional Fisheries Management Council and NMFS. For stakeholder participation to be meaningful, it is essential that it be clear how and when information will be considered. Therefore, BOEM must clarify how the "Smart from the Start" process will solicit and respond to stakeholder and public input and how it will coordinate with other government entities.

Response: BOEM has convened Intergovernmental State-Federal Renewable Energy Task Forces that have been established for all the states affected by Alternative A. In total there have been 16 meetings to date between these states and Federal agencies to discuss issues including siting and environmental impacts. These meetings have been open to the public, and typically BOEM holds a Q&A session with the public shortly after the Task Force meeting has adjourned. Additionally, information has been received through public solicitations in BOEM's RFIs (Delaware and Maryland) and a Call offshore New Jersey. Through these meetings and submission of comments, BOEM has received valuable information from the NMFS and the Mid-Atlantic Fishery Management Council. BOEM most recently met with the Mid-Atlantic Fishery Management Council during their April 2011 meeting and will continue to work closely with the Mid-Atlantic, and other Regional Fishery Management Councils throughout this process.

Comment: BOEM must take a precautionary approach regarding potential impacts to marine life. For instance, it must consider information about movement patterns of migrating animals, prey relationships, cumulative impacts on marine mammals and other species, and the effects of scaling up offshore renewable energy operations over time. In addition, critical baseline information is needed and should be collected as soon as possible.

Response: BOEM agrees that there are some site-specific data gaps regarding biological resources in the mid-Atlantic. One of the primary purposes of the site characterization activities, the impacts of which are analyzed in this document, is to collect such data. This requirement comes directly from the regulations at 30 CFR 585.626(a)(3). In addition to the site specific site characterization work that would be conducted by the lessee, BOEM has an environmental studies program that has several projects collecting regional avian, bat, marine mammal, and sea turtle data (e.g., AMAPPS). BOEM has solicited input from NMFS, USFWS, and MMC regarding draft survey and monitoring guidelines for lessees. In addition to that ongoing effort, BOEM has contracted three separate studies that will be developing survey and monitoring protocols that will be incorporated into BOEM's guidelines to lessees once they become available.

Although BOEM concludes that there would be temporary displacement of animals as a result of animals avoiding sound sources, this displacement is anticipated to be largely localized to the area around the sound source. Migratory corridors inshore (west) and offshore (east) of the action areas, including the Virginia WEA, which sightings data (*see* Appendix B) indicate are currently utilized corridors, would remain as they are currently which includes vessel traffic and fishing effort. After review of your comments and the relevant literature, BOEM concludes given the spatial scale of impacts and timing such activity, and the mandatory project design requirements in Appendix B, that the reasonably foreseeable impact of the proposed action and the alternatives on marine mammals would not be significant. For additional information on the timing of these activities *see* Section 3.1.2.4.

Acoustic sonar work is considered a non-continuous noise source, not because of the pulse frequency, but because the sound source is in continuous motion ensonifying a different area as the vessel moves in a forward direction. This determination was made by the NMFS as part of its obligations under the MMPA and the ESA. The mandatory project design criteria included in Appendix B have been updated to reflect comments and consultations received following the release of the Draft EA. The edits to Appendix B include speed restrictions for vessels 65 feet or greater operating between November 1 and April 30. Discussion regarding the use of noise reduction technologies with respect to pile driving has been added to Chapter 4.
It should be noted that, in its September 20, 2011 concurrence letter, NMFS determined that Alternative A, when implemented according to the mandatory project design criteria detailed in Appendix B, is not likely to adversely affect listed whales or sea turtles. *See* discussion of NMFS Concurrence, Section 5.2.1 of the EA.[

Marine Mammal Commission
(Document ID BOEM-2011-0053-0047)

Comment: Monitoring of buffer zones is a standard measures for all other sources. However, it is not clear whether the lessee would be required to monitor the 7-km buffer zone for pile driving and, if so, how the lessee would do so effectively.

Recommend BOEM use exclusion zones to protect both listed and non-listed marine mammals.

Response: Several edits have been made to Appendix B to clarify that monitoring of the 7-km buffer zone is required, and to specify how such monitoring must be conducted. In its September

20, 2011 concurrence letter, NMFS determined that the proposed lease issuance, associated site characterization, and subsequent site assessment activities, , when implemented according to the mandatory project design criteria detailed in Appendix B (including monitoring of the exclusion zone), are not likely to adversely affect listed whales or sea turtles. *See* discussion of NMFS Concurrence, Section 5.2.1 of the EA.

Offshore Wind Development Coalition
(Document ID BOEM-2011-0053-0048)

Comment: In Section 3.1.3.2, buoys are described only as being an alternative to fixed met towers, but they should also be described as a potential complement. In other words, a lessee may desire to use both a tower and a buoy (or two). This possibility ought to be allowed; as currently written, it could be implied that the two are mutually exclusive.

Response: Text has been added to Section 3.1.3.2 clarifying that the EA contemplates the use of meteorological buoys in conjunction with meteorological towers.

Comment: In Section 3.1.3.3, both LIDAR and SODAR are described as "ground-based" remote sensing technologies. Of course, they can be deployed offshore too, either on fixed platforms (stub towers (steel support for windmills) or met towers) or floating ones (buoys). Curiously, the deployment of these technologies offshore is not included in the EA, even though a few companies are developing floating LIDAR systems to complement or replace fixed met towers.

Response: The term "ground-based" was removed from Section 3.1.3.3, Meteorological Data Collection. This section acknowledges that measurement devices may be mounted on towers or buoys.

Comment: 12,000 is the estimated number of vessel round-trips required for site characterization activities. While justification for this number is provided, BOEM sometimes uses it without consideration for the operations involved. For example, 12,000 vessel trips are unlikely to result in 12,000 anchoring operations. We understand this figure is a conservative upper-end estimate, but request that BOEM provide clarification that this is the case so it is not used elsewhere without this context.

Response: As explained in Section 2.1, this EA assumes that the entire area of each WEA would be leased and the maximum amount of site characterization surveys would be conducted in the leased areas of the WEAs. Thus, the conclusions in the EA represent the maximum amount of environmental effects that could be associated with the proposed action and alternatives. This clarification was added throughout Chapter 4 of this EA when discussing the 12,000 anticipated vessel trips. Rather than assuming all 12,000 vessel trips would result in an anchorage, Section 4.1.1.2.2 was revised to clarify those vessel trips associated with bottom sampling, construction and decommissioning, which would account for half of the anticipated traffic, could result in anchorages.

Comment: The last paragraph of the Lighting and Marking section on page 40 states that if BOEM were to receive a SAP for a met mast greater than 199 feet (just taller than 60 meters) beyond the boundary of Federal Aviation Administration's (FAA's) jurisdiction 12 nautical miles from shore, "additional NEPA analysis and the imposition of additional mitigation measures may be necessary prior to approval." It is not clear why the additional NEPA analysis cannot be performed and the impacts, believed to be insignificant, analyzed as part of this EA.

Response: This language has been removed from Section 3.1.3.1, Lighting and Marking. As explained in Section 1.4.2, in the event that a particular lease is issued, and the lessee subsequently submits a SAP, BOEM would then determine whether this EA, adequately considers the environmental consequences of the activities proposed in the lessee's SAP. If BOEM determines, in coordination with other agencies, such as FAA if appropriate, that the analysis in this EA adequately considers these consequences, then no further NEPA analysis would be required before the SAP is approved. If, on the other hand, BOEM determines that the analysis in this EA is inadequate for that purpose, BOEM would prepare an additional NEPA analysis before approving the SAP.

Comment: The EA assumes, on page 38, that scour control systems will be installed on the ocean floor around the base of a met tower, but this assumption may be too broad. Met towers are intended as temporary structures for the collection of data, and the installation of scour protection can add significant expense to projects. Some lessees may opt to avoid the use of scour protection systems and instead design the structure to accept the predicted scour over the expected lifetime or choose an alternative mitigation method.

Response: Section 3.1.3.1 acknowledges that a scour control system may be required based on potential seabed scour anticipated at the site. As part of its SAP, the lessee would provide to BOEM information on the condition of the proposed site, which would include an assessment of the magnitude of potential seabed sour anticipated at the site (30 CFR 585.610(b) and 585.611(b)(1)). Based on this information BOEM may require the installation of a scour control system as a condition of SAP approval. A scour system may also be required to be installed later if significant scour is discovered during monitoring. A discussion to this effect has been added to Section 3.1.3.1.

Comment: In these particular locations, we agree that a one nautical mile buffer from Traffic Separation Schemes (TSS) is an acceptable assumption for this EA, but buffers should be determined in each instance using site-specific risk analyses, and areas should not be further removed from consideration until this work is done.

Response: Thank you for your comment, which has been noted and will be considered during the decision-making process.

Comment: The AIS Vessel Count Data presented in Figure 4.7a of the EA shows that the equivalent of six lease blocks within Category B have the minimum number of vessel counts (less than 75 per aliquot) at the same level as the Category C blocks, which are not being excluded from the WEA. Therefore, there is no substantive basis for removal of over half of the Category B area. The current draft of the EA does not note the absence of vessel counts when comparing potential impacts of Alternative A and C, but should do so to show that the relative impact and risk of Alternative A is not substantial. Furthermore, the proposed extension of the current TSS illustrated in Figure 1.3 also would not add any traffic to the 10 Category B blocks. Therefore, we believe there is no current factual basis for excluding any of the Category B blocks.

Response: The comparison of vessel counts for Category B and C areas has been incorporated into the analysis of Alternative C presented in Section 4.3, Other Uses of the OCS, of this EA. In Sections 2.3, 2.5, 4.2 and 4.5, additional text was added to clarify that under these alternatives areas would be excluded from this initiative; BOEM is not "closing" any area of the OCS to renewable energy leasing. Nothing precludes BOEM from considering an application to lease any area on the OCS.

Comment: The conclusion and proposed mitigation measures for benthic habitat on page 70 are too broad and restrictive and could potentially exclude significant areas.

Response: BOEM's primary mitigation strategy is avoidance of sensitive benthic resources. This policy is part of BOEM's Record of Decision in Appendix B of the PEIS and reflected in BOEM's regulations for renewable energy at 30 CFR Part 585.627(a). However, this strategy does not preclude BOEM from siting projects in areas where these resources exist provided that the lessee's SAP demonstrates that doing so would yield environmental consequences consistent with this EA.
Regarding the impacts to the benthic environment, it is necessary to assume the largest footprint of a project in order to not underestimate the potential impacts. Section 3.1.3.1 acknowledges that a scour control system may be required based on potential seabed scour anticipated at the site. As part of its SAP, the lessee would provide to BOEM information on the condition of the proposed site, which would include an assessment of the magnitude of potential seabed sour anticipated at the site (*see* 30 CFR 585.610(b) and 585.611(b)(1)). Based on this information BOEM may require the installation of a scour control system as a condition of SAP approval. A scour system may also be required to be installed later if significant scour is discovered during monitoring. A discussion to this effect has been added to Section 3.1.3.1 of this EA.

U.S. Department of Commerce
National Oceanic and Atmospheric Administration (NOAA)
(Document ID BOEM-2011-0053-0049)

Comment: In a letter dated August 11, 2011, NMFS responded to the assessment of impacts to EFH contained in the Draft EA. As a result of that consultation, NMFS recommended implementing four conservation recommendations. The conservation recommendations and BOEM's response to the recommendations are detailed below.

1. *BOEM should remove important fishing grounds known as the "Old Grounds", "Mussel Bed", "Inside Mud Hole", "Middle Mud Hole", "Triple Wrecks", and "Outer Mud Hole" from consideration for leasing to protect key habitat for federally managed species.*

Response: BOEM shares NMFS' concern regarding impacts to fishery resources. BOEM is committed to working with NMFS and the Mid-Atlantic Fishery Management Council to better delineate these areas and evaluate a range of alternatives to accomplish the objective of conserving essential fish habitat in all WEAs, including the Delaware WEA. The results of the site characterization activities in the Delaware WEA will provide more data on the fishing grounds identified in Freeman and Walford's 1974 "Angler's Guide." BOEM requires any lessee interested in construction of offshore wind energy facilities in an area to acquire specific data on the benthic habitat and fish abundance during their site characterization activities (*see* 30 CFR 585.626(3)). The results of that site characterization work may lead to additional mitigation measures during BOEM's review of any future plans for the Delaware WEA, such as no structures being placed in the identified areas (*see* Section 4.1.2.2.2 of this EA).

2. *BOEM should undertake the proper analysis, and work with the Mid-Atlantic Fishery Management Council and NMFS to identify and preserve other areas ecologically important to production of fish resources and traditional fishing grounds throughout the geographical range covered by the proposed NEPA action.*

Response: BOEM is committed to working with NMFS and the Mid-Atlantic Fishery Management Council throughout its offshore renewable energy planning process. NMFS participates in the BOEM State-Federal Task Forces and has recently signed a Memorandum of Understanding with BOEM covering the Coordination and Collaboration Regarding Outer Continental Shelf Energy Development and Environmental Stewardship. Although members of the Regional Fishery Management Councils are not Federal entities exempt from the Federal Advisory Committee Act (FACA) and thus cannot participate in BOEM's Task Force meetings, they are invited to observe all Task Force meetings and their comments are specifically solicited for our planning documents. The information provided by NMFS, the MAFMC, and other stakeholders are taken seriously and evaluated in BOEM's planning and assessment documents.

3. *BOEM should develop a consistent approach to the SAP process, including guidance on studies and methodologies for site characterization activities. NMFS should be included in the development of this guidance to ensure NMFS trust resources are adequately characterized within the lease sites.*

Response: BOEM is in the process of developing guidance documents for site characterization and monitoring for offshore renewable energy projects. In early 2011 BOEM developed and sent out draft guidelines for review by NMFS and USFWS. BOEM has received the comments and is working on developing final guidelines. However, BOEM has two additional contracted studies, and an interagency agreement with NOAA that will also be providing recommendations on survey and monitoring protocols. Once BOEM has the opportunity to evaluate the results of those projects, the final guidelines will be released.

4. *BOEM should submit each individual SAP to NMFS for review and comment. Upon review of each SAP, additional site specific EFH conservation recommendations may be provided, as appropriate. Each SAP should include information and analysis on how fisheries resources will be characterized, including but not limited to benthic habitats, seasonal species presence, migration patterns, spawning activity, and commercial and recreational fishing activities in the*

area. Such biological surveys will provide the necessary information to ensure impacts to sensitive habitats are avoided.

Response: BOEM understands NMFS concerns regarding consultation on a programmatic document versus and actual site-specific site assessment plan. BOEM will review each SAP in the context of this, or other appropriate NEPA document, MSA and ESA consultations. BOEM will coordinate with NMFS where necessary on individual SAPs to determine if the activities in the SAP are wholly consistent with the NEPA analysis and Federal consultations (*see* Section 1.4.2 of this EA).

Comment: NOAA recommends that BOEM coordinate with NOAA's National Marine Fisheries Service (NMFS), specifically the Northeast Region's contacts prior to approval of a lessee's SAP.

Response: See response above.

The Virginia Aquarium & Marine Science Center Foundation
(Document ID BOEM-2011-0053-0050)

Comment: Recommends BOEM implement an inter-organization, ecosystem-based adaptive management plan to guide the regulatory process associated with offshore wind energy development in the mid-Atlantic region, authorized by 30 CFR Part 585.

Response: BOEM intends to use adaptive management practices to help ensure that renewable energy activities are conducted safely. Such a strategy relies on demonstrating and validating actual operating performance. To the extent possible, BOEM will require adjustments to survey and monitoring activities, as well as operational procedures for those activities on a case-by-case basis based on these operating experiences. This strategy is evident in 30 CFR 585.615, which requires lessees to submit a report following the conclusion of site assessment activities that identifies and describes any mitigation measures and monitoring methods and their effectiveness. If measures were not effective, the lessee must include recommendations for new mitigation measures or monitoring methods. These same provisions are required for construction and operations phases.

Comment: Critical gaps in biological data exist and need to be addressed prior to the site assessment plan (SAP) approval. The development management plan should incorporate a comprehensive survey program designed to close these gaps. Regional, cumulative impact analysis should be a cornerstone of the monitoring program.

Response: This EA uses the best information currently available. BOEM agrees that there are some site specific data gaps regarding biological resources in the mid-Atlantic. BOEM requires the results of site-specific surveys, including biological surveys, with the submission of a lessee's SAP (30 CFR Part 585.610(b)(5)). In addition to the site specific site characterization work that would be conducted by the lessee, BOEM has an environmental studies program that has several projects collecting regional avian, bat, marine mammal, and sea turtle data (e.g., AMAPPS). BOEM has solicited input from NMFS, USFWS, and MMC regarding draft survey and monitoring guidelines for lessees. In addition to that ongoing effort, BOEM has contracted three separate studies that will be developing survey and monitoring protocols that will be incorporated into BOEM's guidelines to lessees once they become available.

NRG Bluewater Wind

(Document ID BOEM-2011-0053-0051)

Comment: In Figure 2.1, a 1 nautical mile buffer of the Traffic Separation Scheme ("TSS") is indicated in the graphic. NRG Bluewater supports the clarification that this buffer is to illustrate the U.S. Coast Guard's precautionary recommendations pending completion of the PARS in 20112. Specifically, that no meteorological towers or buoys would be located within 1 nm of any TSS boundary until further analysis and the PARS is complete. Further, that this meteorological tower and buoy buffer would not apply to site characterization activities and would not presuppose any buffer for the lease area prior to site-specific study, beyond the existing 500 meter nearest point of the Delaware Wind Energy Area and the TSS.

Response: BOEM, in consultation with the USCG, has included the proposed mitigation measures listed in Section 4.1.3.2.7, Proposed Mitigation Measures, of this EA due to concerns raised by the USCG of locating meteorological towers and buoys close to Traffic Separation Schemes (TSSs). Initial AIS data analysis by BOEM and the USCG indicates there are high amounts of vessel traffic occurring within TSSs and the approaches to access the TSS lanes for Delaware Bay. In order to avoid potential impacts of Alternative A on navigational safety, the following proposed mitigation measure, 'No meteorological tower/buoys will be located within a TSS or within 1 nm of any TSS boundary until further analysis and the Atlantic Coast Port Access Route Study (ACPARS) is completed by the USCG,' was included in the EA for consideration by the decision-maker. Text has been added to Section 4.1.3.2.7 stating this proposed mitigation measure would not preclude site characterization activities within 1 nm of a TSS boundary, and that the adoption of this measure is not necessary to support the conclusions regarding the effects of Alternative A.

The Nature Conservancy

(Document ID BOEM-2011-0053-0052)

Comment: The Conservancy requests that BOEM include a more descriptive account of live bottom habitats that are found in the near-shore waters of the Mid-Atlantic. The current description of benthic habitats in the draft EA recognizes that natural reefs may exist, but, as presented, it perpetuates the incorrect assumption that Mid-Atlantic benthic habitats are sand dominated and inhabited primarily by polycheate worms that will recover quickly after disturbance.

In the Final EA, we request BOEM make the following additional adjustments to the use and characterization of this data. First, BOEM should either display marine mammal maps for all seasons (the draft EA only includes summer) or not the omission. Second, please also include the disclaimer that Ten Minute Squares that do not include sighting data for marine mammals or sea turtles may not indicate a lack of these animals but instead simply reflect a lack of adequate survey effort in those particular areas. Lastly, the marine mammal and sea turtles data summarized for the NAM ERA project show that many Ten Minute Squares received no survey effort for one or more species and this should be noted and symbolized on maps where relevant.

Response: BOEM appreciates the Nature Conservancy's constructive feedback and information provided throughout the offshore wind energy planning process. Section 4.1.2.2.1- Biological Features- has been edited to include benthic invertebrates that have been documented on live hardbottom, including natural and artificial reefs, of the mid-Atlantic. Throughout the document, references to the NAM ERA data have been updated to include the caveats/disclaimers to the data as requested. Lastly, Appendix B has been updated to make the sightings information more clearly understood and to include information from all species for all seasons where data is available.

Comment: Request that BOEM make clear that the final mitigation measures will be stipulations of leases and SAPs in the final EA. We ask that BOEM be more transparent regarding the basis of proposed mitigation measures for marine mammals and sea turtles in the Final EA. At a minimum, should cite its sources, whether they be a paper published in peer reviewed journal or simply an acknowledged expert's best professional judgment.

Response: The project design criteria required by BOEM (*see* Appendix B and Section 5.3.1 of this EA)are intended to reduce or eliminate the potential for adverse impacts to marine mammals (USDOC, NOAA, NMFS, 2011c). These measures will be mandatory conditions of any lease and/or SAP issued or approved under Alternative A.

The mandatory project design criteria identified in Appendix B are based upon the best available scientific information. Although offshore pile driving is new to U.S. Atlantic waters, high resolution geological and geophysical surveys are not. The alternatives considered in this EA were developed utilizing the expertise of the natural resource agencies and within BOEM to put forth a reasonable range of alternatives to be considered to ensure that the impacts associated with the proposed action and alternatives are minimized. That said, no operating procedure has a guaranteed effectiveness nor a proven quantitative means to measure the effectiveness. BOEM may refine operating procedures as necessary in response to monitoring reports received from the field.

Comment: We also request that BOEM address these issues concerning the validity of the exclusion zones in the Final EA. BOEM should both limit peak sound pressure levels to 160 dB within exclusion zones for pile driving, or require mitigation measures when this sound pressure level is exceeded. BOEM should strongly recommend the use of vibratory hammers as the preferred pile driving technique for met tower as this has been shown to significantly reduce peak sound pressure levels compared to conventional impact-pile driving techniques.

Response: Regarding the use of vibratory hammers, BOEM has updated the discussion in Section 3.1.3.1 describing the installation of foundations for met towers. Specifically, this discusses vibratory and impact hammering methods. Since vibratory hammers do not use force to drive the piles, the bearing capacity is not known and the piles must often be "proofed" with an impact hammer. This involves striking the pile a number of times with the impact hammer to ensure that it meets the designed bearing capacity. As a result of this the mitigation measures regarding impact hammers are still necessary. Vibratory hammers are encouraged to be used where appropriate as the duration of higher sound pressure levels associated with impact hammers would less, even though the total installation time may slightly increase. Other noise reduction measures for pile driving; primarily cofferdams and foam sleeves (*see* Nehls, 2007 and USDOI, BOEMRE, 2010) have been shown to be effective. However the feasibility of requiring these technologies in the offshore environment needs further exploration and may be appropriate on a case-by case basis for full commercial-scale construction projects where the total duration of pile driving activities would be greater than that for a single meteorological tower. It should be noted that in its September 20, 2011 concurrence letter, NMFS determined that Alternative A, when implemented according to the mandatory project design criteria detailed in Appendix B (including the extent of the exclusion zone), is not likely to adversely affect listed whales or sea turtles. *See* discussion of NMFS Concurrence, Section 5.2.1 of the EA.

Comment: It is imperative that BOEM, in conjunction with NMFS, develop stringent criteria for the qualifications and credentials of trained observers hired to accompany survey vessel. The draft EA does not describe the qualifications necessary to be an observer except to say monitoring of exclusion zones will be conducted by "qualified NMFS-approved observer."

Recommend that BOEM work with NMFS to develop specific criteria for marine mammal and sea turtle observers and incorporate these criteria into the endangered species mitigation measures in the Final EA.

Response: Appendix [B].1.2, Visual Monitoring of Exclusion Zone, of this EA, includes the requirement for qualified NMFS-approved PSOs. PSOs must be able to show proper training in at-sea protected species observations and familiarity with protected species in the action area. The NMFS has expertise in evaluating the credentials of PSOs and working with companies that train and employ these PSOs. For example, dredging projects along the Atlantic seaboard often require PSOs approved by NMFS, not to mention the formal observer program run by NMFS for fishery observations.

Comment: The proposed mitigation for potential vessel collisions with marine mammals in WEAs is inadequate and must be strengthened by the Final EA. BOEM assumes in the Draft EA that the risk of vessel strikes to whales will be mitigated by an existing rule passed by NMFS in December 2008 to implement speed restrictions to reduce the threat of ship collision with North Atlantic right whales (50 CR Part 224.105). The seasonal management areas (20 nautical mile buffer around major ports) do not overlap fully with the WEAs as currently delineated. The NMFS regulation has a sunset provision of December 2013. If no further action is taken, the rule will then expire. The timeframe for activities covered under the draft EA is five and a half years or until 2017. BOEM must address these shortcomings in the Final EA by mandating speeds of 10 knots or less for site assessment vessels approaching and entering WEAs from November 1 through April 30 at a minimum.

Response: BOEM's mandatory project design criteria include that "all vessels 65 feet in length or greater operating in the November 1 – April 30 time frame must operate at speeds less than 10 knots." (*see* Appendix B of this EA). In its September 20, 2011 concurrence letter, NMFS determined that Alternative A, when implemented according to the mandatory project design criteria detailed in Appendix B, is not likely to adversely affect listed whales or sea turtles. *See* discussion of NMFS Concurrence, Section 5.2.1 of the EA.

Comment: Organizations, like The Nature Conservancy, are currently engaged in projects with various partners, to collect and assess data that is relevant to the Wind Energy Areas outlined in the Draft EA. As the commenter described, these projects take into account a CMSP guiding principle of using an "ecosystem-based management approach that addresses cumulative effects to ensure the protection, integrity, maintenance, resilience and restoration" of marine ecosystems.

Response: BOEM appreciates The Nature Conservancy's effort to bring these projects to our attention and BOEM looks forward to reading the results when they become available and incorporating the results into subsequent environmental reviews, as appropriate.

Comment: Following the CMSP principle regarding "frequent and transparent broad-based, inclusive engagement of partners, the public and stakeholders," BOEM has obviously stepped up its efforts to reach out to stakeholders. However, BOEM can increase outreach to ensure renewable energy projects are compatible with other uses and conservation efforts.

Response: BOEM recognizes the value of public participation and embraces an approach which includes coordination with task forces that include federal, state, local and tribal representatives. Section 5 of the Draft EA outlines the Consultation and Coordination that BOEM undertook prior to publishing this EA. BOEM looks forward to participating in the evolving and increasing CMSP efforts through the Regional Planning Bodies as it prove informative to further WEA refinement through public participation with the Regional Planning Bodies.

OffshoreMW

(Document ID BOEM-2011-0053-0053)

Comment: An additional level of protection would be provided to marine mammals, further negating the need for a blanket seasonal prohibition of activities (per Alternative D). The protection measure referred to is called forward looking sonar, developed by a company call FarSounder. We encourage BOEM to further investigate this technology and company as part of this EA process. FarSounder's technology was developed with the support of NMFS and was originally used as a means to study whale behavior.

Response: The current mandatory project design criteria do not preclude the ability to use new technologies to aid visual observations. In fact, these requirements have been updated to reflect this if the lessee desires to conduct activity outside of times of good visibility and a calm sea state they may request the use of new technologies in order to facilitate this activity. Active sonar, such as the FarSounder, would detect all animals with a reflective signature in the direction the sonar was pointing. Additional technologies to aid shipboard endangered species observers are not seen as required elements for the activities analyzed in this assessment. Lessees are encouraged to use additional tools at their disposal to aid shipboard endangered species observers in identifying endangered species and avoiding impacts to them (*see* Appendix B of this EA).

Natural Resources Defense Council, Inc. (NRDC)
(Document ID BOEM-2011-0053-0054)

Comment: While CMSP plans are not yet in place, CMSP principles can still be brought to bear on the process.

Response: As announced by Secretary of the Interior Ken Salazar, in November 2010, BOEM is building an environmentally responsible offshore renewable energy program that is identifying WEAs for potential leasing. The activities over the past year are consistent with the tenets of this initiative as well as the nascent CMSP effort, especially by coordinating with local, state and federal partners and public participation. Data needed for ecosystem-based management and support to NOC CMSP Regional Planning Bodies (especially Mid-Atlantic) continues to be a priority in order to evaluate potential WEA leasing. Additionally, the WEA EAs will play a crucial role in informing the CMS Plans that the Regional Planning Bodies will develop. BOEM will make best efforts to adhere to CMSP principles, as it expects other Federal and State partners will.

State of New Jersey
Department of Environment Protection
Natural & Historic Resources Historic Preservation Office
(Document ID BOEM-2011-0053-0055)

Note: This letter is a response to BOEM's request for consultation with the State Historic Preservation Officers (SHPOs), as required by Section 106 of the NHPA (*see* Section 5.3.4 of this EA).

Comment: The draft EA states that sea floor disturbance related to archaeological and geophysical surveys by lessees for the installation of meteorological data collection structures will avoid or minimize impacts on historic properties. *The Historic Preservation Office (HPO) concurs with this assessment.*

Response: Comment noted.

Comment: The draft EA also states that the visual impacts of the meteorological structures will not adversely affect any historic properties, because, "Any visual impacts to onshore cultural resource would be limited and temporary in nature and would consist predominantly of vessel traffic, which most likely would not be distinguishable from existing vessel traffic." *The HPO concurs with this assessment.*

Response: Comment noted.

Narragansett Indian Tribal Historic Preservation Office
(Document ID BOEM-2011-0053-0056)

Comment: Recent archaeological evidence confirms that those ancestral relatives of the Narragansett inhabited the continental shelf and coastal lands in the proposed wind energy areas of offshore NJ, DE, MD, and VA. As BOEM moves forward with its mid-Atlantic Environmental Assessment, the Narragansett recommends that, for the purpose of gathering oral history indicators of the presence or absence of submerged settlements, BOEM form a panel of federally-recognized Tribal historic preservation advisors comprised of Atlantic coastal THPOs and augmented by state-recognized coastal Tribes. The panel would provide data to BOEM that could be incorporated into a database of likely areas that should be investigated by sub bottom profiling in search of scientific evidence of submerged settlements. The results of these surveys would provide known areas of cultural sensitivity guiding planning activities and avoidance areas for development activities.

Response: Section 4.1.3.1 of this EA discusses the potential impacts of Alternative A on potential submerged pre-contact archaeological sites. While it is impossible to determine actual impacts to archaeological resources without first having identified those resources, information generated from the lessees' initial site characterization activities would serve to identify them. Avoidance and mandatory project design criteria in this EA, as well as the consultation processes identified through consultation with parties to the Section 106 process, including the Narragansett, under the Programmatic Agreement referenced in Chapter 5 of this EA, would minimize the possibility of adverse effects to historic properties that are identified during site characterization activities.

BOEM will continue to conduct government-to-government consultations with potentially affected federally-recognized tribal nations in accordance with Section 106 of the NHPA through approval of Site Assessment Plans. Furthermore, BOEM has proposed a study to be funded in FY 2012 that will develop protocols for reconstructing submerged paleocultural landscapes and identifying ancient Native American archaeological sites in submerged environments. This study includes a large Native American participation component and is designed to develop scientifically proven, standardized, "best practices" methodologies for identifying submerged relict landscapes and pre-contact archaeological resources. The results of the study will inform standards for all future surveys.

Virginia Offshore Wind Development Authority
(Document ID BOEM-2011-0053-0057)

Comment: We understand and appreciate the interest in preserving safe inclement weather navigation for offshore barge traffic, and it is critically important that development of Virginia's offshore wind resource avoid interference with important commercial shipping interests. However, eliminating the eight lease blocks as proposed in Alternative E would split the Virginia WEA into two separate parcels, which would undermine the commercial value of the area by creating logistical and economic challenges for commercial developers, reducing the economies of scale necessary to attract supply chain interests, and ultimately increasing the cost of power that will be generated by offshore wind development. We believe the concerns addressed by Alternative E can be accommodated effectively in the leasing and development process, without the necessity of withdrawing entirely the eight identified blocks from the commercially available wind area.

Response: Alternative E has been modified to exclude leasing and site assessment in full OCS blocks 6111 and 6161, and partial OCS blocks 6011, 6061, 6110, and 6160 on the most western edge of the Virginia WEA, rather than the eight OCS blocks identified in the draft EA (*see* Sections 2.5 and 4.5).

Comment: Virginia supports and is actively pursuing an "all of the above" strategy for expanding energy production in Virginia. This includes strong support and energetic efforts to promote development of Virginia's offshore wind resources. Therefore, we urge BOEM to adopt Alternative A as described in the draft EA, and encourage every available effort to accelerate and streamline the leasing and permitting process.

Response: Thank you for your comments, which have been noted and will be considered in the decision-making process.

J. Capozzelli
(Document ID BOEM-2011-0053-0058)

Comment: I strongly support your efforts to advance offshore wind energy off the Mid-Atlantic coast in a manner that is protective of our coast and marine wildlife.

Response: Thank you for your comment, which has been noted and will be considered in the decision-making process.

Mid-Atlantic Fishery Management Council
(Document ID BOEM-2011-0053-0059)

Comment: A full EIS is necessary to address the fisheries issues associated with this type of project and other issues related to marine mammals, migratory birds, endangered species, transportation, safety, and security. Recommend an EIS be conducted at this time before any further activity is undertaken.

Response: The purpose of this EA is to determine whether or not the impacts of the proposed action and alternatives would have reasonably foreseeable significant environmental consequences. If it is determined that there are significant impacts, then an EIS will be prepared.

Comment: The value of Mid-Atlantic fishery resources (hundreds of millions of dollars) is not adequately described in this EA. The EA contains one and a half text pages (pg., 107 and 108), one table (Table 4.9), and an incomplete list of species managed by the three Atlantic Councils and the Highly Migratory Species Division of the National Marine Fisheries Service.

The reference Table 4.9 is nearly 30 years old, the information for shortnose sturgeon and Atlantic sturgeon is incorrect, and the statement referring to Habitat Area of Particular Concern (HAPC) for sandbar shark and transiting vessels also applies to summer flounder HAPC.

Response: The list of managed species in Section 4.1.2.7.1.2 is not meant to be a complete list of managed species but a list of managed species with EFH in the area that may be affected by Alternative A. This table has been updated to reflect information received from NMFS as part of the consultation on impacts to EFH. BOEM has updated Section 4.1.2.7.1.2 to reflect that summer flounder HAPC overlaps with native species of macroalgae, seagrasses, and freshwater and tidal macrophytes in any size bed, as well as loose aggregations, within adult and juvenile summer flounder EFH which was indicated by the MAFMC as being the same as sandbar shark HAPC (MAFMC 2011 and http://www.nero.noaa.gov/hcd/summerflounder.htm). The information regarding Atlantic sturgeon has been updated in Section 4.1.2.7.1.1. Although Table 4.9 was first developed in 1984, it provides a very good overview of demersal fish assemblages in the mid-Atlantic. This conclusion is supported by the NMFS (2004) which compared the findings to broadscale studies in 1998 and 1992.

Comment: The EA does not adequately describe how BOEM's processes will intersect in a cohesive and comprehensive manner with Executive Order 13547, which is the National Ocean Council to establish a comprehensive, integrated national policy for the stewardship of the Nation's ocean, coasts, and Great Lakes and provides a process for the development of ecosystem described within the recommended framework, CMSP would take a regional approach to the development of these plans, including planning for multiple existing and emerging uses, such as offshore wind energy facilities. However, BOEM's current process is being conducted on a state-by-state basis and is focused on only offshore wind facilities.

Response: BOEM has adopted many of the principles of coastal and marine spatial planning, such as comprehensive interagency coordination, and will provide information that can be referenced in future decision-making regarding wind power development. Specifically, BOEM has convened Intergovernmental Renewable Energy Task Forces that have been established for all the states affected by Alternative A. In total there have been 16 task force meetings to date between these states and Federal agencies to discuss issues including siting and environmental impacts. These meetings have been open to the public. Additionally, information has been received through public solicitations in BOEM's RFIs (Delaware and Maryland) and a Call offshore New Jersey. Through these meetings and submission of comments BOEM has received valuable information from the NMFS and the Mid-Atlantic Fishery Management Council. BOEM most recently met with the Mid-Atlantic Fishery Management Council during their April 2011 meeting and will continue to work closely with the Mid-Atlantic, and other Regional Fishery Management Councils throughout this process. Formal consultations with states and other Federal agencies required by statute (e.g. ESA, MSA, CZMA) are discussed Section 5.3 of this EA and are not repeated in this response.

Additionally, BOEM has solicited the cooperation from state and Federal agencies on the preparation of this assessment. Section 5.3 of this EA describes the agencies that have agreed to cooperate on this environmental assessment. Three agencies, the U.S. Army Corps of Engineers, the U.S. Coast Guard, and the Virginia Department of Mines, Minerals, and Energy have been consulted for their expertise in relevant subject matters and have provided feedback on previous drafts of the assessment.

Karen Guglielmo
(Document ID BOEM-2011-0053-0060)

Comment: It is important to address any concerns about the safety of our migratory birds in the flyway off our coast. Wind turbines have been responsible for bird strikes and we must be sure we continue to insure their safety.

Response: The potential impacts to migratory birds from offshore wind turbines would be addressed in a separate NEPA document, if and when a COP is submitted (*see* Section 1.4.2).

Comment: The closer the wind farm the greater affect on the view from shore.

Response: The potential impacts to viewsheds from offshore wind turbines would be addressed in a separate NEPA document, if and when a COP is submitted (*see* Section 1.4.2).

Comment: Another important issue is the overall economic impact, not only to Ocean City, but to all taxpayers in our state.

Response: In Section 4.1.3.3 of this EA, the economic data for the shore adjacent counties of New Jersey, Delaware, Maryland and Virginia that would host onshore activities associated with Alternative A is presented in Table 4.12. Alternative Ais expected to have negligible, but positive impacts on the population and employment of coastal counties of Virginia, Maryland, Delaware and New Jersey that would provide support services for Alternative A. The reasonably foreseeable economic impacts from a commercial wind facility would be addressed in a separate NEPA document, if and when a COP is submitted (*see* Section 1.4.2).

Chesapeake Audubon Society and
Maryland Conservation Council
(Document ID BOEM-2011-0053-0061)

Comment: Monitoring of exclusion zones and enforcement of related mitigation measures hinge almost entirely on the number and the skill of the observers. Request that the EA stipulate that if qualified observers are not available for any given activity, then the activity will be postponed until observers are available. In context, we suggest that "shall" be replaced by "must" to assure that if qualified observers are not available the work will not proceed.

Response: In the context of Appendix B of this EA, "shall" means "must." The ultimate binding requirements will appear as contractual language in any lease issued under Alternative A.

Commonwealth of Virginia
(Document ID BOEM-2011-0053-0062)

Comment: Reservations concerning Alternative E (Removal of Inclement Weather Diversion Areas Offshore Virginia). Eliminating the eight lease blocks as proposed in Alternative E would split the Virginia WEA into two separate parcels, which would undermine the commercial value of the area by creating logistical and economic challenges for commercial developers, reducing the economies of scale necessary to attract supply chain interests, and ultimately increasing the cost of power. The concerns addressed by Alternative E can be effectively accommodated in the leasing and development process.

Response: Alternative E has been modified to exclude leasing and site assessment in full OCS blocks 6111 and 6161, and partial OCS blocks 6011, 6061, 6110, and 6160 on the most western edge of the Virginia WEA, rather than the eight OCS blocks identified in the draft EA (*see* Sections 2.5 and 4.5).

Comment: Recommend the Final EA include (or require project-proponents provide) a detailed description of site-specific Biological Monitoring protocols and further coordination with federal and state resource agencies to develop and implement site-specific pre- and post-construction Biological Monitoring protocols.

Response: BOEM appreciates the comments suggesting additional survey and monitoring protocols. These will be considered as we develop the final guidelines for lessees. In addition to the site specific site characterization work that would be conducted by the lessees, BOEM has an environmental studies program that has several projects collecting regional avian, bat, marine mammal, and sea turtle data (e.g., AMAPPS). BOEM has solicited feedback from NMFS, FWS, and MMS regarding draft survey and monitoring guidelines for developers. In addition to that ongoing effort, BOEM has contracted three separate studies that will be developing survey and monitoring protocols that will be incorporated into BOEM's guidelines to lessees once they become available.

Comment: Recommend the Final EA include a detailed description of proposed lighting specifications for MET towers.

Response: Section 4.1.2.5.2 includes proposed mitigation measures intended to reduce or eliminate adverse impacts to birds. The first proposed mitigation measure provides a detailed description for lighting of meteorological towers.

Comment: Recommend the Final EA specify that acoustic bat monitoring devices (e.g., Anabat detectors or other comparable remote bate detection devices) be deployed on all meteorological towers.

Response: Recommendation noted.

Comment: Recommend the Final EA specify that one or more existing MET towers in areas where wind development occurs be left in place to provide post-construction monitoring data, based on site-specific monitoring protocols.

Response: Since regulations at 30 CFR Part 585.902(a) would allow a lessee up to two years following termination of a lease to decommission all structures, including meteorological towers, this recommendation could not be considered.

Comment: Recommend the Final EA specify decommissioning of a MET towers occur within 6 months (rather than within one year) after cancellation, expiration, relinquishment, or other termination of the lease and the use of a Met tower design that would result in minimal impact and be removed without explosives.

Response: *See* response above.

Comment: Recommend the Final EA include a detailed description of proposed HRG and ADCP survey equipment specifications and address potential impacts to marine Mammals.

Response: Anticipated survey equipment is described in Section 3.1.2.1 of this EA and acoustic Doppler current profilers (ADCPs) are described in Section 3.1.3.3. Impacts to marine mammals and sea turtles from the noise that could be generated by this equipment is discussed in detail in Sections 4.1.2.3.2 and 4.1.1.4.2. Section 3.1.2 discusses BOEM's guidelines for geological and geophysical surveys, including some specifications for equipment performance. Section 3.1.2 also includes an internet link to BOEM's latest guidance documents.

The American Waterways Operators
(Document ID BOEM-2011-0053-0063)

Comment: AWO supports the adoption of Alternatives B and C.

Response: Thank you for your comment, which has been noted and will be considered in the decision-making process.

Comment: Alternative E represents a modification of the Virginia coast lease blocks. This alternative was proposed by AWO in May 2011. After further review and consultation with AWO members familiar with the area, AWO believes our previous comments were incorrectly drafted and wish to revise them here as follows. AWO's previously submitted comments indicated that certain leasing blocks off the Virginia coast should be removed from wind energy projects because those areas regularly used by tugboats, barges and ATBs during inclement weather. That recommendation suggested a route that bisected the proposed developed area and placed obstructions on both sides of the vessel traffic lanes. AWO believes that it would be preferable instead to create a channel on the most western edge of the leasing blocks by eliminating a column of parcels on the western edge of the proposed area [full OCS blocks 6111 and 6161, and partial OCS blocks 6011, 6061, 6110, and 6160]. This change will preserve an area currently used by members during inclement weather while making a large block of undeveloped ocean available for alternative energy development.

Response: Alternative E has been modified to instead exclude the two full and four partial OCS blocks identified by the AWO (*see* Sections 2.5 and 4.5 of this EA).

Comment: AWO strongly recommends BOEM refrain from moving forward with leases until after the PARS study is completed, the results are analyzed by and discussed with the navigation industry, and fairways are established.

Response: Thank you for your comment, which has been noted and will be considered during the decision-making process.

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 Bureau of Ocean Energy Management Mission

As a bureau of the Department of the Interior, the Bureau of Ocean Energy Management's (BOEM's) primary responsibilities are to manage the mineral resources located on the Nation's Outer Continental Shelf (OCS).

The BOEM 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 BOEM's assistance and expertise to economic development and environmental protection.