

Marine Mammal Commission

4340 East-West Highway, Room 700
Bethesda, MD 20814-4447

14 March 2008

Minerals Management Service
Cape Wind Energy Project
TRC Environmental Corporation
Wannalancit Mills
650 Suffolk Street
Lowell, Massachusetts 01854

To whom it may concern:

On 18 January 2008 the Minerals Management Service published a *Federal Register* notice announcing the availability of and requesting comments on a draft environmental impact statement (DEIS) on plans to lease submerged Outer Continental Shelf lands in Nantucket Sound south of Cape Cod, Massachusetts, for the Cape Wind Energy Project. The proposed project involves constructing, operating, and decommissioning a field of 130 wind turbine generators that would provide a renewable source of electricity. The principal impact of concern for marine mammals resulting from this project is the effect of noise from pile driving to install the monopoles on which wind turbine generators will be placed. The proposed project appears to be well situated to minimize impacts on marine mammals; however, as the first offshore wind farm development in U.S. waters, it is particularly important to monitor project activities closely to verify impact assessment assumptions and detect unforeseen effects. The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the DEIS and offers the following comments and recommendations.

RECOMMENDATIONS

As a general matter, the acoustic analyses in the DEIS are largely unintelligible and in need of a thorough rewrite. Much of the acoustic information provided is unreferenced, includes inaccurate statements, and fails to include adequate information on expected sound levels associated with pile driving and the operation of wind-generating turbines. Therefore, the Marine Mammal Commission recommends that the Minerals Management Service—

- revise discussions throughout the DEIS to clarify reference units and analyses regarding sound levels, the frequencies or frequency bands involved, and their potential impact on marine species;
- immediately consult with the applicant and require that it initiate a series of studies to develop baseline information on the numbers, distribution, and habitat-use patterns of marine mammals, particularly harbor seals, gray seals, harbor porpoises, and large whales, in Nantucket Sound prior to construction activity related to the proposed project;
- expand the DEIS to provide information appropriate to impulse sound sources like pile-driving sound, including time/amplitude waveforms, the maximum source levels (peak pressure), and maximum received levels (as RMS sound pressure level and/or energy flux per unit time) as derived from the Utgrunden Project that was used to estimate sound levels expected to be generated during pile driving for the Cape Wind Energy Project;
- require, rather than recommend, that the applicant contact the National Marine Fisheries Service to determine the need for an incidental harassment authorization (IHA) pursuant to the Marine Mammal Protection Act. If the Service determines that an IHA is needed, the

Minerals Management Service should require that any authorization it may issue to proceed with offshore construction is contingent upon full compliance by the applicant with all provisions of any incidental harassment authorization issued;

- require the implementation of an environmental management system (EMS) and the approval of its provisions before any project construction activities are initiated;
- assure that any approved EMS for the project require that underwater sound levels and their attenuation rates throughout the pile-driving phase and during at least the first two years of wind turbine operation be subject to monitoring studies approved in consultation with the National Marine Fisheries Service;
- require that dedicated wildlife observers are posted at pile-driving sites in a location suitable for detecting whales, seals, turtles, and other protected marine species within the 500-meter safety zone whenever pile-driving operations are being undertaken, and that when visibility is limited by night, fog, or other circumstances, pile-driving work is either suspended or alternative means of effective wildlife detection, such as acoustic monitoring or other alternative sensing methods, is employed; and
- expand the DEIS to identify alternative methods for mitigating sound levels produced by pile driving and add a mitigation measure to require that the applicant use the best available technology for minimizing the size of the zone around pile-driving sites within which marine mammals and other marine species could be injured or otherwise affected by underwater pile-driving sound.

RATIONALE AND ADDITIONAL COMMENTS

Pages 2-7 to 2-8, Section 2.3.2.2, Installation of Monopiles: This section briefly describes the process for installing monopiles that will support the wind turbine generators. It does not, but should, indicate whether installation work will occur only during daylight hours or also at night. This is an important point given that one of the proposed mitigation measures relies on National Marine Fisheries Service-approved observers to detect marine mammals and sea turtles near installation sites, and observers are not likely to reliably detect animals at night using available technology.

The section also states that installation of the 130 monopiles proposed for this project would take eight months. Discussions of the impact associated with pile driving elsewhere in the DEIS (e.g., the first complete paragraph on page 5-126) state that “it is anticipated that 10 WTGs [wind turbine generators] would be installed per month...,” they would be installed one at a time, and installation “would occur over a two season period.” With 130 generators to be installed, the latter statement suggests that pile driving would occur over a 13-month period. The final environmental impact statement (FEIS) should be revised to clarify the length of time during which pile driving would occur and indicate whether this activity would occur year-round or seasonally. References to this period should be consistent throughout the FEIS.

Page 4-12, Regulatory Requirements: This section indicates that noise impacts are a major consideration and that it is important to consider the frequency structure of sounds. However, the document consistently fails to indicate which frequencies, or frequency bands, are being discussed when referencing sound levels and impacts. This raises repeated problems throughout the DEIS. Explanations of shortcuts or assumptions when referring to decibel levels above or below certain

thresholds are not backed up with references when they first appear in the text, and clarity comes only pages or chapters later, or sometimes only through reference to one of the many reports in the appendices. The authors of the document appear to have adopted a convention of weighting some decibel values by a “standard” auditory threshold curve developed by Nedwell et al. 2004 as cited in appendix report 5.3.2-2. They then apparently “adjusted” all absolute decibel levels by subtracting the relative difference between nominal species-specific thresholds and the value in question and call this the dB_{ht} (i.e., hearing threshold). In many cases, however, dB references neglect to provide the *ht* subscript, which compounds errors and leads to confusion. As a general matter, all sound references in this report need to be clarified with regard to what units are being used, what frequencies they apply to, and from where they came.

This section also is the first to discuss ambient baseline noise levels. It notes that they are about 80 dB, with occasional higher values of around 110–120 dB (again we assume these are dB referenced to 1 microPascal and are sound pressure level [SPL] measurements). Such values are typical of the lower frequency part of the spectrum only, with sound energy coming from distant ship traffic or geophysical processes (e.g., earthquakes, tides, microseisms, etc.). Because this discussion fails to provide reference frequencies (despite assertions that it is important to consider frequency), we assume this discussion is confined to the low-frequency band (e.g., below 2 kHz). Spectrograms of baseline ambient noise data are included (e.g., figures 40 and 41), but they are generally not referenced and the curves in those figures appear to have been calculated and smoothed using some undefined procedure intended to account for the effect of noise from wind. Nevertheless, those curves indicate that ambient noise only reaches 80–90 dB SPL at ultra-low frequencies below 100 Hz, and that for frequencies of presumed marine mammal hearing (e.g., above 1 kHz), the typical baseline ambient noise level is closer to 55–65 dB SPL within the band. Moreover, wind does not contribute to noise evenly across all frequencies but tends to differentially contribute most to the frequencies between 1 and 20 kHz. This is basic knowledge and its misuse/confusion in this EIS casts the entire acoustic analysis in doubt, undermining confidence in any of the analyses and conclusions provided in the DEIS regarding sound levels and potential sound impacts on marine mammals.

Given these fundamental problems, the Marine Mammal Commission recommends that the Minerals Management Service revise discussions throughout the DEIS to clarify reference units and analyses regarding sound levels, the frequencies or frequency bands involved, and their potential impact on marine species.

Pages 4-74 to 4-81, Marine Mammals: This section describes information on marine mammals likely to occur in Nantucket Sound. For the most part, species descriptions provide no information on the abundance, distribution, or seasonality of species in the project area, and therefore provide little basis for assessing the potential impact on individual species. To the best of our knowledge, such information is limited. Additional baseline information on marine mammals in the project areas is necessary to address this situation and evaluate the potential impact of the proposed action (see below). Harbor porpoises, gray seals, and harbor seals are the species most likely to be affected. Although the project area does not appear to be important habitat for North Atlantic right whales, little information is available regarding their occurrence or the occurrence of other large whales in the project area. Given the critically endangered status of right whales, better information is important. To provide a basis for assessing the potential impact of this project, the Marine Mammal

Commission recommends that the Minerals Management Service immediately consult with the applicant and require that it initiate a series of studies to develop baseline information on the number, distribution, and habitat-use patterns of marine mammals, particularly harbor seals, gray seals, harbor porpoises, and large whales in Nantucket Sound prior to construction activity related to the proposed project.

Page 4-76, Section 4.2.6.1, Marine Mammals, Introduction: This section states that “upon consultation with NOAA Fisheries, if it is determined that an IHA is warranted, the applicant would be required to have any necessary MMPA authorizations in place before any MMS-approved activities that may impact marine mammals may take place.” The DEIS also concludes that noise associated with pile driving during construction could exceed levels assumed to cause Level B harassment as defined under the MMPA at distances of 500 meters or more from construction sites (e.g., page 5–125) and that the Minerals Management Service has recommended that the applicant contact the National Marine Fisheries Service to determine if an IHA is needed (page 5-127).

Given that both cetaceans and pinnipeds are likely to be within 500 meters of installation sites at some point during construction, the Marine Mammal Commission recommends that the Minerals Management Service require, rather than recommend, that the applicant contact the National Marine Fisheries Service to determine the need for an incidental harassment authorization pursuant to the Marine Mammal Protection Act. Given the likelihood that such an authorization will be needed, the Marine Mammal Commission further recommends that the Minerals Management Service require that any authorization it may provide for proceeding with offshore construction activities be contingent upon full compliance by the applicant with all provisions of any incidental harassment authorization.

Page 5-4 to 5-5, Noise, Lights, and Vibration: In one of the few instances where proper noise reference units are provided in the DEIS, this section states that the nominal source level for a typical barge of the type to be used in the proposed action is 162 dB re 1 μ Pa at 3.3 feet (1 meter) (Malme et al. 1989). However, the assertion that this sound level would not affect the behavior of marine mammals is unsupported by any references and is clearly untrue.

Page 5-10, Section 5.1.4.2, Noise and Vibration: This section is the first place in the DEIS that begins to describe the extent of pile-driving activity. It notes that 4 to 6 hours are required to drive each monopile, that the monopiles will be installed at a rate of about 10 per month within what may be two six-month “seasons,” and that there will be 2 to 36 impacts per minute for 8 to 24 hours per day. The DEIS states that any impact from noise produced by this source will be temporary and that marine mammals would quickly recover from any associated impacts. At least to us, characterizing impacts that may extend over a two-year period as temporary is inconsistent with any reasonable definition of the term.

Pages 5-14 to 5-15, Noise and Vibration: This section states that operational noise produced by generators is expected to be about 109 dB (again, we can only presume that this is a sound pressure level referenced to 1 μ Pascal). Because the DEIS indicates that the Leq ambient acoustic baseline is 107 dB re 1 μ Pascal SPL, it concludes that operating noise from the generators will not be audible to marine mammals and will have no effect. There are multiple errors in this line of thought. First, the 107 dB ambient baseline number is most likely to be 10–20 dB above actual ambient levels in the

low-frequency range of apparent concern (i.e., we assume this is the range of concern in the absence of actual frequency references). Second, wind will add mostly to the energy content of sounds above 1 kHz, not in the frequencies at which the windmills operate. Third, the 107 dB number is for the optimal operating wind speed of the windmill (i.e., about 30 knots), yet this wind speed apparently occurs only about 10 percent or less of the time in Nantucket Sound. Thus, sound levels at different wind speeds are impossible to assess. Nevertheless, it appears that generator sound will be quite a bit above ambient levels (at least 10–20 dB) most of the time and could be readily audible to marine mammals at ranges of hundreds or thousands of meters. Analyses of sound levels at specific frequency levels are needed to make discussion in this section coherent.

Page 5-39, Underwater Construction Impacts: This section states that “(underwater) sound data from the installation of similar sized piles at the Utgrunden Project were used in the acoustic modeling (see section 2.3.1 in Report 4.1.2-1)” to assess impacts from the Cape Wind Energy Project. These sound levels are not provided in the DEIS, and we were unable to find the referenced report. Thus, it is not clear what underwater sound levels were used to evaluate noise impacts on marine mammals, and it is not possible to evaluate the adequacy of underwater sound impact analyses presented later in the DEIS. The Marine Mammal Commission recommends that this section or other appropriate parts of the DEIS be revised to provide data on the maximum source levels and maximum received levels for various frequencies of underwater sound at various distances produced by pile driving at the Utgrunden Project that were used as the basis for estimating sound levels expected to be generated by pile driving during the Cape Wind Energy Project. The Minerals Management Service should recognize that pile driving is an impulsive sound source and, thus, different expressions of sound level and its biological effects may be needed than those applied to continuous tonal sources.

Pages 5-124 to 5-139, Section 5.3.2.6, Non-ESA Marine Mammals: This section discusses impacts on non-endangered and non-threatened marine mammals due to construction, operation, and decommissioning of the proposed wind farm. It is not clear whether analyses in this section of the DEIS assume that the mitigation measures identified in section 9 of the document will be implemented as part of the proposed project. This section should be revised to clarify this point.

Page 5-126, Second complete paragraph: This paragraph states that, for frequencies below 1,000 Hz, “the maximum underwater sound levels... from pile driving in the proposed action would range from 172 dB at a distance of 1,640 ft (500 m) to 170 dB at a distance of 4,002 ft (1,220 m).” Elsewhere it is noted that the thresholds for Level A harassment of marine mammals (i.e., the level at which physical injury may occur) have been set at 190 dB for pinnipeds and 180 dB for cetaceans. As noted above, the DEIS does not provide a complete description of pile-driving sound levels from the Utgrunden Project, which were assumed to be the levels likely to be produced by the Cape Wind Energy Project; however, we understand that broadband peak sound pressure levels were about 205 dB at a distance of 30 meters at the Utgrunden Project site. This level exceeds established thresholds that can cause injury to pinnipeds and cetaceans. Therefore it is not clear why the analysis concludes there would be no risk of physical injury. To provide a more accurate basis for estimating risks of physical injury, this section should indicate whether and, if so, at what range for various frequencies, underwater sound levels from pile driving might exceed either of the established injury thresholds for pinnipeds and cetaceans. Furthermore, it seems unlikely that there would only be a

decrease of only 2 dB when distance from the source is tripled. We suspect there may have been a calculation or typographic error in this statement of estimated transmission loss.

Pages 5-126 to 5-127, Carryover paragraph: This paragraph states that “research has shown that marine mammal avoidance reactions occur for 50 percent of individuals at a 90dB_{ht}.” This statement is not supported by references, the species referred to are not clear, and, as noted earlier, the applicable frequencies are not described.

In addition, this paragraph states that, given noise levels expected during pile driving, “if seals are in the construction area, they are likely to temporarily avoid the zone of behavioral response (i.e. 250–1,400m) around the monopole.” If a seal is avoiding a zone, then a behavioral response clearly must be occurring beyond that zone. In addition, no references are provided to support such a conclusion, and we doubt such a broad statement would be true in all cases.

Pages 9-1 to 9-1, Environmental Management System (EMS): Sections 9.0 and 9.1 on these pages describe monitoring and mitigation measures to be carried out as part of the proposed action. The proposed project is the first of what could be many projects involving the construction of wind turbine generator fields in U.S. coastal waters. In this regard, section 9.0 states that “since neither MMS nor any other federal or state agency has past experience evaluating how projects such as the proposed action will interact with the marine environment, MMS requested and the applicant agreed to prepare and implement an EMS (Environmental Management System) tailored to the proposed action.” In part, this EMS is to include steps to monitor and measure effects resulting from the action and a review of the effectiveness of mitigation measures so as to determine whether and how mitigation measures may need to be modified.

Given the lack of experience in constructing and operating wind turbines in U.S. coastal waters, the likelihood of similar projects in other areas in the near future, and uncertainties with regard to their impacts, we strongly support this provision, and the Marine Mammal Commission recommends that the Minerals Management Service require the implementation of an EMS and the approval of its provisions before any project construction activities are allowed to be undertaken. Because of uncertainties with regard to the effects of sound produced by pile driving and operating wind-generated turbines on marine mammals, the Marine Mammal Commission also recommends that the Minerals Management Service assure that any approved EMS for the project require that underwater sound levels and their attenuation rates throughout the pile-driving phase and during at least the first two years of wind turbine operation be subject to a monitoring program approved in consultation with the National Marine Fisheries Service.

Page 9-5, Noise: This section states that “mitigation measures for underwater noise impacts include but are not limited to the use of underwater sound monitoring to confirm pile-driving noise levels and the use of soft start pile diving.” Although we agree that monitoring of sound levels from pile driving is essential, monitoring is not a mitigation measure. The DEIS provides no discussion of available technology for mitigating pile-driving sound and no explanation as to why such technology cannot or should not be used in this project. As we understand it, various types of sound barriers have been and are being developed to reduce underwater sound levels and associated impacts produced by driving piles of the size and type to be used in this project at water depths typical of the

project location. The two primary types include bubble curtains and various types of sound insulating sleeves placed around piles to be driven.

Because sound from pile driving will be one of the major sources of impact on marine mammals and other wildlife in this project, we believe the applicant should be required to utilize the best available technology for mitigating effects of pile-driving sound. Therefore, the Marine Mammal Commission recommends that the Service expand the DEIS to identify alternative methods for mitigating sound levels produced by pile driving and add a mitigation measure to require that the applicant use the best available technology for minimizing the size of the zone around pile-driving sites within which marine mammals and marine species could be injured or otherwise affected by underwater pile-driving sound and impulse pressure levels.

Page 9-10, Measures to Reduce Likelihood of Acoustic Harassment: This section states that “the applicant has proposed to utilize a marine mammal observer to insure that no marine mammals, turtles, or other protected species are within the 1,640 ft (500m) safety radius during pile driving.” Although we support this provision, we believe it should be clear that these observers need to be individuals dedicated to this task without other assigned duties and stationed in a position where detecting animals out to 500 m and beyond is possible. We also believe that more than one observer will be required to detect animals within such a large area. As noted earlier, however, it is not clear whether pile-driving operations will proceed at night and what means of detection will be used at those times or when visibility is reduced by fog or other conditions. The FEIS needs to clarify such contingencies. The Marine Mammal Commission therefore recommends that the Minerals Management Service require that dedicated wildlife observers be posted at pile-driving sites in a location suitable for detecting whales, seals, turtles, and other protected marine species within the 500-meter safety zone whenever pile-driving operations are being undertaken and that, when visibility is limited by night, fog, or other circumstances, pile-driving work is either suspended or alternative means of effective wildlife detection within that range are in place.

I hope these comments are helpful. If you or your staff has questions, please call.

Sincerely,



Timothy J. Ragen, Ph.D.
Executive Director