



MARINE MAMMAL COMMISSION

1 March 2013

Mr. P. Michael Payne, Chief
Permits and Conservation Division
Office of Protected Resources
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, MD 20910-3225

Dear Mr. Payne:

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the application submitted by Cape Wind Associates seeking authorization under section 101(a)(5)(D) of the Marine Mammal Protection Act to take small numbers of marine mammals by harassment. The taking would be incidental to a high-resolution geophysical survey in Nantucket Sound off Massachusetts from 1 April 2013 to 31 March 2014. The Commission also has reviewed the National Marine Fisheries Service's 1 February 2013 notice (78 Fed. Reg. 7402) announcing receipt of the application and proposing to issue the authorization, subject to certain conditions. The Commission reviewed a similar application in 2011 (see the enclosed 17 October 2011 letter) and provided a number of recommendations, some of which are reiterated here.

RECOMMENDATIONS

The Marine Mammal Commission recommends that the National Marine Fisheries Service—

- require Cape Wind Associates to use the distance to the 120-dB re 1 μ Pa threshold (i.e., 1,103 m) as the Level B harassment zone for the shallow-penetration sub-bottom profiler;
- (1) consult with experts in the field of sound propagation and marine mammal hearing to revise the acoustic criteria as necessary to specify threshold levels that would be more appropriate for a wider variety of sound sources, including the shallow-penetration sub-bottom profiler, and (2) encourage Cape Wind Associates and other entities, as appropriate, to conduct research on the impacts of such technology on marine mammals;
- require Cape Wind Associates to re-estimate the numbers of takes for gray and harbor seals based on both haul-out counts and at-sea sightings data, with appropriate corrections for availability and perception biases; and
- include proposed incidental harassment authorization language at the end of its *Federal Register* notices and ensure that the language is consistent with that referenced in the main body of the *Federal Register* notice.

RATIONALE

Cape Wind Associates proposes to conduct a high-resolution geophysical survey to identify submerged cultural resources and obtain geological data to prepare for installing 130 wind turbine generators on Horseshoe Shoal in Nantucket Sound. The survey would follow 3,432 km of track lines covering 110 km² and would occur for 109 days during daylight hours only. The operators may use multiple survey vessels, which would reduce the total number of survey days.

Cape Wind Associates would collect high-resolution geophysical data using a multibeam depth sounder, side scan sonar, magnetometer, shallow-penetration sub-bottom profiler, and medium-penetration sub-bottom profiler. The shallow-penetration sub-bottom profiler (i.e., “chirp”) is a non-impulsive, intermittent sound source (described in more detail in the next section) that operates at 2 to 16 kHz with a source level of 201 dB re 1 μ Pa at 1 m. The medium-penetration sub-bottom profiler (i.e., “boomer”) is an impulsive sound source that operates at 0.3 to 14 kHz with a source level of 205 dB re 1 μ Pa at 1 m. The multibeam depth sounder operates at 200 and 400 kHz and the side scan sonar operates at 400 and 900 kHz; the sounds from those two devices are thought to be outside the range of marine mammal hearing.

The Service preliminarily has determined that the proposed activities could result in temporary modification of the behavior of small numbers of up to five species of marine mammals, but that any impact on the affected species would be negligible. The Service does not anticipate any take of marine mammals by death or serious injury. It believes that the potential for temporary or permanent hearing impairment will be at the least practicable level because of Cape Wind Associates’ proposed mitigation and monitoring measures, which include—

- using Service-approved observers to monitor a 500-m exclusion zone for 60 minutes prior to, during, and for 60 minutes after geophysical surveys involving shallow- and medium-penetration sub-bottom profilers;
- using delay or shut-down procedures if a marine mammal is sighted within or approaching the exclusion zone and not initiating activities until the animal moves outside the exclusion zone or is not re-sighted for 60 minutes;
- using soft-start procedures at the beginning of each survey day and after a shutdown;
- conducting surveys only during daylight hours and not when the exclusion zone is obscured by fog or poor lighting conditions;
- conducting behavioral monitoring from the survey vessel for two days for every 14 days of survey activity to estimate the numbers of takes and evaluate behavioral impacts outside the 500-m exclusion zone;
- collecting data on species presence and behavior from a separate vessel before surveys begin and once a month during survey activities;
- reporting injured and dead marine mammals to the Service and the northeast regional stranding network using the Service’s phased approach and suspending activities, if appropriate; and
- submitting a final report to the Service.

Threshold for the shallow-penetration sub-bottom profiler

The Service has categorized sound sources as either impulsive or continuous to establish acoustic criteria and thresholds for Level B harassment (70 Fed. Reg. 1871; see Figure 1). Impulsive sounds are those with a rapid rise time, high peak pressure, and rapid decay. Impulsive sounds are brief (<1 second) and may be repetitive (e.g., an airgun) or singular (e.g., an explosion). Non-impulsive sounds are those that do not have these characteristics. Non-impulsive sounds can be further divided into those that are either temporally continuous or intermittent. Continuous sounds are those for which the sound pressure level is elevated consistently above the ambient level during the operation of the sound source—they are not interrupted by a silent period. Examples include sounds from drilling and vessel engines or dynamic positioning systems.

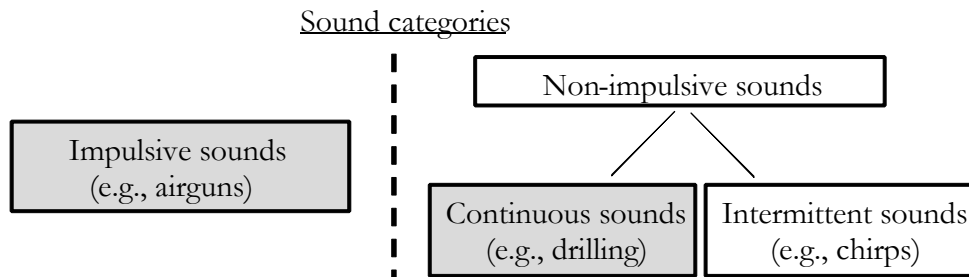


Figure 1. Sound categories – shaded boxes indicate those sounds for which the National Marine Fisheries Service has established acoustic thresholds for Level B harassment.

Relying on the results of Malme et al. (1983, 1984), the Service established a 160-dB re 1 μPa threshold to estimate the area (or zone) in which animals could be harassed by impulsive sounds and a 120-dB re 1 μPa threshold to estimate the area (or zone) in which animals could be harassed by continuous sounds. However, the Service has yet to establish or apply a consistent threshold for non-impulsive, intermittent sounds, such as those produced by the shallow-penetration sub-bottom profiler (i.e., chirp) proposed for use by Cape Wind Associates to generate high-resolution geophysical data. The shallow-penetration sub-bottom profiler emits a steady ping, ping, ping which does not exhibit the rapid rise, high peak pressure, and rapid decay used to define impulsive sounds. The intermittent nature of the sound source also does not meet the definition of a continuous sound source. Thus, the shallow-penetration sub-bottom profiler falls into a category of sounds for which the Service has yet to establish a threshold.

The Service has proposed to use the 160-dB re 1 μPa threshold for the shallow-penetration sub-bottom profiler being used by Cape Wind Associates. However, the Service has not applied the 160-dB re 1 μPa threshold consistently to all non-impulsive, intermittent sources. In a previous notice (76 Fed. Reg. 43639) the Service determined that for non-impulsive sound sources, whether continuous or intermittent, Level B harassment is presumed to begin at received levels of 120 dB re 1 μPa . Concurring with that more precautionary determination, the Commission, in its 11 October 2011 letter, recommended that the Service require Cape Wind Associates to recalculate the exclusion zone for the sub-bottom profiler based on the 120-dB re 1 μPa threshold for non-

impulsive sound sources, rather than the 160-dB re 1 μ Pa threshold used by the Service for impulsive sound sources. The Service disagreed with that recommendation.

Subsequently, the Commission inquired about the appropriate threshold to be applied to shallow-penetration sub-bottom profilers. The Service explained its reasoning for applying the 160-dB re 1 μ Pa threshold to that type of sound source as follows.

When comparing non-impulsive, intermittent sounds at distances relevant for behavioral harassment to our current criteria for impulsive and continuous sounds (and the data upon which they are based), the temporal characteristics associated with these types of sound sources are more similar to impulsive sounds (which are also intermittent) than to continuous sounds.

This may be true for some sounds, but other sounds may vary from the well-separated blasts of an airgun to the more rapid staccato of a shallow-penetration sub-bottom profiler to sounds timed so closely together that the interval between them is not discernible to the animal—that is, they are effectively continuous. How marine mammals will respond to the relatively rapid sounds associated with the shallow-penetration sub-bottom profiler is not clear. In the face of this uncertainty, the Service has chosen the least protective threshold. It then added the following to its rationale.

Furthermore, impulsive sounds lose many of the characteristics that make them potentially injurious (e.g., rise time and high peak pressure) at distances further from the source (i.e., beyond injury zone) making them even more similar to non-impulsive, intermittent sources. Thus, the 160 dB_{rms} threshold is more appropriate than the 120 dB_{rms} threshold for non-impulsive, intermittent sounds.

Although the acoustic discreteness of all sounds deteriorates with propagation, the intervals between intermittent sounds also tend to disappear with the sounds becoming more continuous in nature. Here, too, the Service has interpreted those changes in sound in the far field in the least precautionary way, seemingly ignoring contrary arguments and the associated uncertainty.

The Service has acknowledged that impulsive and non-impulsive, intermittent sound sources also may vary in other characteristics (i.e., spectral characteristics). That distinction is particularly relevant in this instance because the sound emitted from the shallow-penetration sub-bottom profiler is a frequency-modulated pulse that is linearly swept along the 2 to 16 kHz frequency band, which differs considerably from an impulsive source that emits a broadband sound with a rapid rise time and decay in the lower frequency range (i.e., the medium penetration sub-bottom profiler, with energy levels of 1 kJ from 100 to 1,000 Hz).

The Commission recognizes that the Service has a limited basis for setting acoustic thresholds. However, in the face of uncertainty regarding the importance of various sound characteristics and their impacts on marine mammal behavior, the Commission believes that the Service should be taking a more precautionary approach. Such an approach is necessary for two

reasons. First, it is more protective and provides greater assurance that the impacts of the sound will, indeed, be negligible. Second, a more precautionary approach generally provides a stronger incentive for parties (e.g., agencies, industry) to support the research needed to address the uncertainty.

In the absence of the necessary research on the impacts of shallow-penetration sub-bottom profilers on marine mammal behavior, the Marine Mammal Commission recommends that the National Marine Fisheries Service require Cape Wind Associates to use the distance to the 120-dB re 1 μ Pa threshold (i.e., 1,103 m) as the Level B harassment zone for the shallow-penetration sub-bottom profiler. The Marine Mammal Commission further recommends that the Service (1) consult with experts in the field of sound propagation and marine mammal hearing to revise the acoustic criteria as necessary to specify threshold levels that would be more appropriate for a wider range of sound sources, including the shallow-penetration sub-bottom profiler, and (2) encourage Cape Wind Associates and other entities, as appropriate, to conduct research on the impacts of such technology on marine mammals.

Density and take estimates for pinnipeds

Density estimates for pinnipeds (i.e., gray and harbor seals) in the survey area were based on at-sea sightings from aerial surveys flown by Cape Wind Associates, rather than haul-out counts from nearby Monomoy, Muskeget, and Tuckernuck Islands. As noted in the Commission's previous letter, aerial at-sea surveys are known to be negatively biased because of the limited amount of time seals spend at the surface (i.e., availability bias) and difficulties in detecting them from a moving aircraft when they are at the surface (i.e., perception or detection bias). The at-sea surveys flown by Cape Wind Associates' contractor did not detect any harbor seals, although it noted that harbor seal numbers have been increasing along the New England coast and at nearby haul-out sites.

The Service responded to the Commission's recommendation to recalculate density estimates using haul-out counts by stating that it was highly improbable that all seals (i.e., those seen swimming and/or foraging, as well as those at the haul-out sites) would be in the activity area simultaneously and that using the haul-out counts to estimate the numbers of takes would misrepresent the numbers of seals potentially exposed to sounds at or above 160 dB re 1 μ Pa.

The Commission continues to disagree with the Service's approach, as it is based on an estimate that is negatively biased. Sightings from aerial surveys can provide some indication of relative density in different areas, but as noted by the applicant, seals spend up to 90 percent of their time underwater (Thompson and Fedak 1993, Beck et al. 2000), thus making detection difficult. In addition, animals that are at the surface are difficult to detect due to their low profile (usually only the head and neck are exposed). Limited information from satellite-tagged animals indicates that gray seals forage inshore, close to haul-out sites (Ampela 2010). Both seal species prey on sand lance (Payne and Selzer 2006, Ampela 2009), which occur in Nantucket Sound and surrounding areas (King et al. 2010). Unless the Service applies an approach that accounts for the well-established and widely recognized sources of negative bias in aerial survey observations of seals, it is—again—estimating potential impact in a non-precautionary manner. The Commission does not believe that approach is consistent with the Service's responsibility to ensure that the impact of the proposed activities is negligible.

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To ensure a more accurate estimate of the numbers of takes that may occur, the Marine Mammal Commission recommends that the National Marine Fisheries Service require Cape Wind Associates to re-estimate the numbers of takes for gray and harbor seals based on both haul-out counts and at-sea sightings data, with appropriate corrections for availability and perception biases.

Inclusion of draft authorization language

In other proposed authorizations, the Service has included the pertinent draft incidental harassment authorization language at the end of the *Federal Register* notice (e.g., 77 Fed. Reg. 25830, 78 Fed. Reg. 9373). The inclusion of that language clarifies the Service's proposed authorization by reducing ambiguities that may arise regarding proposed activities, take estimates, and mitigation and monitoring measures. Such clarifications are very helpful and, therefore, the Marine Mammal Commission recommends that, in the future, the National Marine Fisheries Service include proposed incidental harassment authorization language at the end of its *Federal Register* notices and ensure that the language is consistent with that referenced in the main body of the *Federal Register* notice.

Please contact me if you have questions about the Commission's recommendations or rationale.

Sincerely,



Timothy J. Ragen, Ph.D.
Executive Director

cc: Mary Colligan, National Marine Fisheries Service Northeast Regional Office

Enclosure

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