



MARINE MAMMAL COMMISSION

26 June 2020

Ms. Jolie Harrison, Chief
Permits and Conservation Division
Office of Protected Resources
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, MD 20910-3225

Dear Ms. Harrison:

The Marine Mammal Commission (the Commission), in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the application submitted by Mayflower Wind Energy, LLC (Mayflower) under section 101(a)(5)(D) of the Marine Mammal Protection Act (the MMPA). Mayflower is seeking authorization to take small numbers of marine mammals by harassment incidental to high-resolution geophysical (HRG) surveys off Massachusetts. The Commission also has reviewed the National Marine Fisheries Service's (NMFS) 27 May 2020 notice (85 Fed. Reg. 31856) requesting comments on its proposals to issue the authorizations, subject to certain conditions.

Background

Mayflower is proposing to conduct HRG surveys to characterize a lease area¹ off Massachusetts and a submarine export cable route to a landfall location in Falmouth, Massachusetts, in support of an offshore wind development project. The surveys would occur during day and night in the lease area and the deep-water section of the cable route and during daylight hours in the shallow-water section of the cable route. The surveys would involve the use of up to three vessels, with no more than one vessel operating at a time in the same section², resulting in an estimated maximum of 215 vessel days. Sound-generating equipment proposed for use includes sub-bottom profilers (SBPs)³, ultra-short baseline and global acoustic positioning systems, multibeam echosounders, and side-scan sonars.

NMFS preliminarily has determined that the proposed activities could cause Level B harassment of small numbers of 14 marine mammal species. It also anticipates that any impact on the affected species and stocks would be negligible. NMFS does not anticipate any take of marine mammals by death or serious injury and believes that the potential for disturbance will be at the least practicable level because of the proposed mitigation measures. The proposed mitigation, monitoring, and reporting measures include—

¹ Bureau of Ocean Energy Management (BOEM) lease number OCS-A 0521.

² This requirement was not included in the draft authorization.

³ Including parametric, chirp, and sparker types.

- using at least one protected species observer to monitor the exclusion zones⁴, a 500-m monitoring zone, and a 200-m buffer zone⁵ at all times during daylight hours (30 minutes before sunrise through 30 minutes after sunset) and 30 minutes prior to and during nighttime ramp-ups of HRG survey equipment;
- using standard pre-clearance, ramp-up, delay, and shutdown procedures⁶;
- using shutdown procedures if a species for which authorization has not been granted, or a species for which authorization has been granted but the authorized number of takes is met, approaches or is observed within the Level B harassment zone;
- using passive acoustic monitoring (PAM)⁷ and night-vision equipment⁸ to detect marine mammals during night-time operations;
- using standard vessel strike avoidance procedures and monitoring⁸ the NMFS North Atlantic right whale reporting systems during all survey activities;
- reporting injured and dead marine mammals to the Office of Protected Resources and the New England/Mid-Atlantic Stranding Coordinator; and
- submitting a draft and final report to NMFS.

Appropriateness of Level A and B harassment zones

Background—The Commission has commented on the inappropriateness of Level A and B harassment zones associated with multiple HRG surveys in the past (e.g., see its [12 March 2020](#)⁹, [18 October 2019](#)¹⁰, [23 August 2019](#)¹¹, [6 July 2018](#)¹², [13 June 2018](#)¹³ letters). However, NMFS continues to allow applicants to use incorrect Level A harassment thresholds¹⁴, resulting in overestimated Level A harassment zones. NMFS also has prohibited applicants from using in-situ measurements of Level B harassment zones and required them to use Level B harassment zones calculated from source levels obtained either from Crocker and Fratantonio (2016) or manufacturer specifications, which has resulted in overestimated Level B harassment zones. NMFS recently developed and made available to applicants a revised user spreadsheet for estimating Level B harassment zones that accounts for the operating frequency and beamwidth of proposed sound sources and water depth. The Commission appreciates that NMFS has made the revised spreadsheet available. However, the spreadsheet was not used for this application and other inaccuracies persist resulting in

⁴ 500 m for North Atlantic right whales and 100 m for all other marine mammals, with the exception of small delphinids as identified herein.

⁵ Which encompasses the 141-m Level B harassment zone.

⁶ Shutdowns would not be required for small delphinids (*Delphinus* spp., *Tursiops* spp., and *Lagenorhynchus* spp.) that voluntarily approach the survey vessel or equipment.

⁷ This requirement was included in the preamble of the *Federal Register* notice but was not specified in the draft authorization.

⁸ This requirement was included in the draft authorization but was not specified in the preamble of the *Federal Register* notice.

⁹ For Vineyard Wind, LLC (Vineyard) and Atlantic Shores Offshore Wind, LLC's proposed HRG surveys.

¹⁰ For Skipjack Offshore Energy, LLC's (Skipjack) proposed HRG surveys.

¹¹ For Ørsted Wind Power LLC's (Ørsted) proposed HRG surveys.

¹² For Dominion Energy Virginia's (Dominion) proposed HRG surveys.

¹³ For Ørsted/Bay State Wind's (Bay State Wind) proposed HRG surveys.

¹⁴ The impulsive rather than non-impulsive thresholds were used to estimate the Level A harassment zones for the Edgetech SBP, which is a non-impulsive source.

overestimated Level A and B harassment zones once again. These and other issues are summarized herein.

Parameters, assumptions, and methods for estimating Level A and B harassment zones— JASCO Applied Sciences (USA) Inc. (JASCO) estimated the Level A and B harassment zones for Mayflower (see Appendices A and B, respectively). JASCO incorporated the operating frequency (or frequencies)¹⁵ and associated absorption coefficients and the beamwidth of each source in its estimation of Level A and B harassment zones¹⁶. The Commission concurs with incorporating those parameters but disagrees with many of the assumptions made or methods by which the Level A and B harassment zones have been estimated. The Commission conducted a thorough review of JASCO's methods in its recent [12 March 2020](#) letter that should be reviewed and considered in conjunction with this letter. In summary—

- JASCO considered beamwidth only for those sources that emitted sound at beamwidths less than or equal to 90° ¹⁷ rather than incorporating the actual beamwidth of the source. JASCO did not justify its assumption that a beamwidth greater than 90° would be considered omnidirectional and Ainslie (2010), which served as the basis for the beamwidth equation, appears not to include such an assumption.
- JASCO estimated out-of-beam source levels using various equations and assumptions (see Appendices A and B in the application) for narrow-beam sources (beamwidths $\leq 35^\circ$) rather than correctly deducing that the narrow-beam source, the Innomar SES-2000 Medium-100 (Innomar) parametric SBP, does not emit out-of-beam source levels. The Innomar parametric SBP is intended to generate narrow, nearly side-lobe-free beams of lower frequency sound¹⁸ through the interaction of high-frequency sound.
- JASCO interpolated the correction factor used to estimate out-of-beam source levels for intermediate-beam sources (beamwidths from $36-90^\circ$) based on the results from narrow-beam and broad-beam sources rather than using the beam patterns and resulting gain provided in Crocker and Fratantonio (2016)¹⁹ for the EdgeTech 3100 with SB-216 towfish (EdgeTech) chirp SBP. The correction factor would be approximately -8 dB based on Figure 1 in Appendix A of the application rather than -10 dB as depicted in Figure 61 in Crocker and Fratantonio (2016)—moreover, Table 20 in Crocker and Fratantonio (2016) notes that the gain at 90° is -31 dB, which is close to where a side lobe would be for a source with a beamwidth of 65° ²⁰.
- JASCO did not provide any of the correction factors it used for out-of-beam source levels, making it impossible to ascertain what out-of-beam source levels were actually used by JASCO and whether they were accurate. As noted, it is not appropriate to use an out-of-beam source level for the Innomar parametric SBP, as was used to determine the 116-m Level B harassment zone (see Table 3 in Appendix B of the application). JASCO also estimated the out-of-beam Level A harassment zone to be 60 m for high-frequency (HF)

¹⁵ Or the lowest operating frequency, if a range of frequencies is emitted by the source.

¹⁶ And assumed $20\log R$ propagation loss.

¹⁷ For sources with beamwidths greater than 90° , the source was considered omnidirectional and termed broad-beam.

¹⁸ i.e., difference-frequency signals. The source levels at those lower frequencies range from 35 to more than 50 dB less than the source levels at the primary frequency (Browning et al. 2009, Qu et al. 2018).

¹⁹ JASCO used the EdgeTech Chirp 512i included in Crocker and Fratantonio (2016) as a proxy for the EdgeTech 216.

²⁰ Corresponding to the -3 dB half-width or the main lobe.

cetaceans for the Innomar parametric SBP. That zone is in stark contrast to the in-beam Level A harassment zones previously used by NMFS for the Innomar parametric SBP. NMFS estimated that the Level A harassment zone was less than 5 m for HF cetaceans in the final authorizations for Bay State Wind, Dominion, and Avangrid Renewables, LLC (Table 3 in 83 Fed. Reg. 36550, Table 4 in 83 Fed. Reg. 39069, and Table 4 in 84 Fed. Reg. 31041, respectively)²¹, less than 2 m in the final authorization for Ørsted and Skipjack (Table 5 in 84 Fed. Reg. 52478 and Table 4 in 84 Fed. Reg. 66167, respectively), and did not exist for Dominion's recent authorization (85 Fed. Reg. 14903).

- JASCO appears to have mischaracterized how it determined whether to use in-beam or out-of-beam source levels. Contrary to its assertion that it calculated separate *sound levels* using the in-beam source level at the angle corresponding to the -3 dB half-width and the out-of-beam source level in the horizontal direction (180°) and chose the higher of the two *sound levels* to assess the harassment zones, JASCO in fact calculated *separate impact ranges* using the in-beam source level at the angle corresponding to the -3-dB half-width and the out-of-beam source level in the horizontal direction and then selected the greater of the two *ranges*. The beamwidth equation incorporates slant range²² and beamwidth, not actual *source levels*.
- JASCO's beamwidth equation did not account for water depth. The beamwidth equation is based on a simple application of the Pythagorean theorem, and the full extent of the slant range cannot be achieved when it is clipped by the seafloor, which in this case occurs at 62 m in depth. Had JASCO incorporated water depth, the Level B harassment zone would have been less than 2 m for the Innomar parametric SBP, which is much less than its unsubstantiated out-of-beam Level B harassment zone of 116 m and its in-beam zone of 14 m (Table 3 in Appendix B of the application).
- JASCO's method for estimating the Level A harassment zones is not transparent and cannot be replicated. It is unclear how the sound exposure levels (SELs) for each survey line were combined, or why they were combined, how the curves of weighted SELs were produced, and what assumption(s) determined the closest point of approach for each functional hearing group.
- JASCO erroneously assumed that sources that operate at a repetition rate greater than 10 Hz are non-impulsive and sources with a repetition rate equal to or less than 10 Hz are impulsive for Level A harassment. It based that assumption on the statement in Southall et al. (2007) that a source was considered impulsive if the *sound level* measured over a short window (35 msec) is at least 3 dB greater than the *sound level* measured over a longer window (1 sec). JASCO did not evaluate *the actual sound levels* under those two windows of time, it only considered the *repetition rate*²³ in absentia of the sound levels produced. Repetition rate is not used to characterize a sound as impulsive or non-impulsive and no such criteria were included in NMFS (2018)²⁴.

²¹ It is unclear how JASCO's Level A harassment zone for HF cetaceans that used a reduced out-of-beam source level is an order of magnitude greater than a Level A harassment zone that was based on a source level more than 38 dB higher. JASCO indicated in a previous modeling report that the out-of-beam source level for the Innomar parametric SBP was 204.7 dB re 1 $\mu\text{Pa}_{\text{rms}}$ at 1 m (Table A.2.2 in Appendix A of Vineyard's application), while the source level used for Bay State Wind was 243 dB re 1 $\mu\text{Pa}_{\text{rms}}$ at 1 m.

²² Which is based on the source level and operating frequency, or absorption coefficient.

²³ JASCO also considered any single pulse of short duration (less than 35 msec) to be impulsive.

²⁴ NMFS (2018) specifically defined impulsive sources as those that produce sounds that are typically transient, brief (less than 1 second), broadband, and consist of high peak sound pressure with rapid rise time and rapid decay (American

Although NMFS may contend that some of JASCO's assumptions yield more conservative results, in many instances those assumptions are just wrong and result in incorrect Level A and B harassment zones. Most concerning is the fact that NMFS continues to allow action proponents to choose arbitrarily which of the Level A harassment thresholds (impulsive or non-impulsive) to use. The blatant disregard by NMFS for its own guidance undermines the intent of the acoustic thresholds, does not represent best available science, and is precedent-setting. Given the precedent that it sets, one could question why sources such as low-, mid-, and high-frequency active sonar used by the Navy should not also be considered impulsive even though they have historically been deemed non-impulsive. Therefore, the Commission again recommends that NMFS (1) prohibit Mayflower, and other action proponents from using the impulsive Level A harassment thresholds for estimating the extents of the Level A harassment zones for non-impulsive sources (i.e., parametric and chirp SBPs, echosounders, pingers, etc.) and (2) require action proponents to use the correct Level A harassment thresholds in all future applications. If NMFS does not implement these recommendations, the Commission further recommends that NMFS justify why it is allowing action proponents to characterize sources in a manner inconsistent with its own guidance in NMFS (2018).

NMFS also must establish consistency and transparency in how it estimates Level A and B harassment zones for HRG surveys. For the Innomar parametric SBP, JASCO estimated an out-of-beam Level A harassment zone of 60 m for HF cetaceans, while the in-beam Level A harassment zones for other authorizations have been an order of magnitude less or non-existent. Similarly, for Level B harassment, JASCO estimated an out-of-beam Level B harassment zone of 116 m for the Innomar parametric SBP, whereas NMFS's revised user spreadsheet yields an in-beam Level B harassment zone of less than 2 m. NMFS noted that the various assumptions and resulting Level A and B harassment zones were conservative throughout its *Federal Register* notice. However, in this instance, the Level A and B harassment zones for the Innomar parametric SBP are not conservative, they are illogical and not based on best available science. As such, the Commission recommends that NMFS use its revised user spreadsheet, in-beam source levels, the actual beamwidth proposed to be used, and the maximum water depth in the survey area to estimate the Level B harassment zones for Mayflower's final incidental harassment authorization and all future proposed authorizations involving HRG sources. Given that the Level A harassment zones for all HRG sources have generally been less than 15 m for HF cetaceans²⁵ and much less for other functional hearing groups and NMFS consistently asserts that Level A harassment is 'so low as to be discountable' even when those zones are estimated to be 60 m²⁶ (85 Fed. Reg. 31874), the Commission questions why NMFS continues to estimate Level A harassment zones for these sources. To maximize efficiencies and ensure best available science is being used, the Commission recommends that NMFS consult with its acoustic experts²⁷ to determine how to estimate Level A harassment zones accurately, what Level A harassment zones are actually expected, and whether it is necessary to estimate Level A harassment zones for HRG surveys in general.

National Standards Institute (ANSI) 1986, National Institute for Occupational Safety and Health (NIOSH) 1998, ANSI 2005). Chirp and parametric SBPs, echosounders, and underwater positioning pingers emit (1) regularly-timed pulses that are not transient, (2) narrow-band not broad-band sound, and (3) sound that lacks a high peak pressure as well as a rapid rise time and decay.

²⁵ In final authorizations issued over the last few years, the Level A harassment zones have not exceeded 30 m for any HRG source or any functional hearing group, except for those estimated by JASCO.

²⁶ While also considering that shutdown zones of 100 m far exceed any Level A harassment zone and that HF cetaceans avoid vessels in general.

²⁷ Those personnel with expertise and formal training in underwater acoustics and bioacoustics.

In-situ measurements and standardized methods—The Commission again notes that in-situ measurements of the same sources conducted off the east coast of the United States during previous HRG surveys indicate that the Level B harassment zones are in fact quite small, 27 m or less (e.g., Gardline 2016), for sparkers including the Geomarine Geo-Spark 800 J (Geo-Spark). In response to the Commission’s [23 August 2019 letter](#) recommending that NMFS use in-situ measurements, NMFS indicated that discrepancies between in-situ measurements and data from Crocker and Fratantonio (2016) likely were due to the beam pattern of many HRG sources and the fact that measurements likely were taken outside the main lobe of the source (84 Fed. Reg. 52465). The Commission agrees that issue may exist for some sources, but it does not exist for sparkers that are omnidirectional.

A previously perceived issue with in-situ measurements from a sparker may have resulted from the hydrophone clipping the data in the nearfield, which was discussed by Gardline (2016). Gardline used a high sound pressure-level hydrophone to capture the nearfield measurements²⁸. Figure D.1 in Gardline (2016)²⁹ shows that the measured sound levels at approximately 140 m were approximately 140 dB re 1 μ Pa or less and were not affected by hydrophone clipping. The Level B harassment zones were estimated to be 27 m or less for the Geo-Spark by Gardline (2016), which is much less than the 141-m Level B harassment zone estimated by JASCO. The Commission is not convinced that any of the HRG sources that Mayflower plans to use would result in actual Level B harassment zones greater than 50 m, let alone the 100-m shutdown zone.

The Commission maintains that many of the in-situ measurement issues³⁰ could be minimized with proper methodological requirements and signal-processing standards, particularly for omnidirectional sources, and that those measurements should inform any incidental harassment authorization that NMFS intends to issue. To ensure that in-situ data are collected and analyzed appropriately, the Commission again recommends that NMFS and BOEM expedite efforts to develop and finalize methodological and signal-processing standards for HRG sources. Those standards should be used by action proponents that conduct HRG surveys and that either choose to conduct in-situ measurements to inform an authorization application or are required to conduct measurements to fulfill a lease condition set forth by BOEM.

HRG surveys in general

Many of the HRG sources³¹ are considered *de minimis* sources³² by NMFS in other incidental harassment authorizations and rulemakings. Thus, it is unclear why sources such as parametric and chirp SBPs, which NMFS previously determined would not have the potential to result in marine mammal harassment (85 Fed. Reg. 14903 and 30930), continue to be considered in HRG-related

²⁸ Which were used to inform the waveform and to validate the near-field digital signal processing scaling implemented by Gardline (2016; see section 2.3.2).

²⁹ Figure 3.3 in Gardline (2016) and Figure 1 in Gardline (2017) show similar results as well.

³⁰ Including contractors georeferencing the source relative to the hydrophone, the hydrophone clipping the sound, and signal-processing issues.

³¹ NMFS mischaracterized a previous recommendation made by the Commission that *all* HRG sources should be considered *de minimis* (84 Fed. Reg. 66159). Some are considered *de minimis*, while others are not. However, the impacts of those sources would be mitigated based on the implementation of shutdown requirements and lease-stipulated exclusion zones.

³² Defined as sources that have low source levels, narrow beams, downward-directed transmission, short pulse lengths, frequencies outside known marine mammal hearing ranges, or some combination of those factors (84 Fed. Reg. 37244).

authorizations. The Commission recommends that NMFS evaluate the impacts of sound sources consistently across all applications and provide notice in its guidance to applicants and to the public regarding those sources that it has determined to be *de minimis*.

Mayflower is required by BOEM to implement shutdown procedures at 500 m for North Atlantic right whales, 200 m for other cetaceans listed under the Endangered Species Act, and 100 m for other marine mammals consistent with any authorization issued by NMFS (see Addendum C of Mayflower's lease). In addition, Mayflower is required under its lease to use PAM and night-vision equipment to monitor the exclusion zones during night-time operations and low-visibility conditions. For the proposed authorizations, NMFS would require Mayflower to implement a 500-m exclusion zone for North Atlantic right whales and a 100-m exclusion zone for all other marine mammals. Those zones are greater than in-situ measured and/or re-estimated Level B harassment zones based on the recommendations included herein. As NMFS seeks to streamline and improve the efficiency of its authorization processes, the Commission again recommends that NMFS consider whether, in such situations involving HRG surveys³³, incidental harassment authorizations are necessary given the small size of the Level B harassment zones, the proposed shutdown requirements, and the added protection afforded by the lease-stipulated night-time and low-visibility monitoring requirements. Specifically, NMFS should evaluate whether taking needs to be authorized for those sources that *are not* considered *de minimis*³¹, including sparkers, *and* for which implementation of the various mitigation measures should be sufficient to avoid Level B harassment takes.

Mitigation, monitoring, and reporting measures

The proposed authorizations appear to change NMFS's longstanding requirement that action proponents *immediately* report to NMFS any unauthorized injury or mortality, including a vessel strike, *and* cease operations until they have consulted with NMFS. In this case, NMFS has not specified that Mayflower must cease operations until they have consulted with NMFS. In response to previous comments by the Commission regarding this apparent change, NMFS indicated that it does not agree that a blanket requirement for project activities to cease would be practicable for a vessel that is operating on the water, and it is unclear what mitigation benefit would result from such a requirement in the event of a vessel strike (or presumably other injury; 85 Fed. Reg. 26944). In response, the Commission suggests that an evaluation of the circumstances associated with the injury would prove helpful in developing additional mitigation measures. For example, if the injury or vessel strike were to occur while the vessel was transiting at higher speeds, NMFS might require that the operator implement lower speeds during transit. If the injury or vessel strike were to involve a bow-riding dolphin, NMFS might no longer allow operators to continue operations in the presence of bow-riding delphinids. The rationale for ceasing operations until the circumstances of the unauthorized taking can be reviewed is to determine whether additional mitigation measures can be taken, as necessary, to minimize the likelihood of additional prohibited takes. The Commission therefore recommends that NMFS require Mayflower to report as soon as possible *and* cease project activities immediately in the event of an unauthorized injury or mortality of a marine mammal, including from a vessel strike, until NMFS's Office of Protected Resources and the New England/Mid-Atlantic Regional Stranding Coordinator determine whether additional measures are necessary to minimize the potential for additional unauthorized takes.

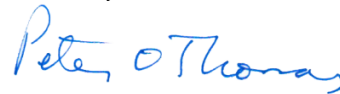
³³ And until it revises its 160-dB re 1 μ Pa threshold for intermittent, non-impulsive sources.

Proposed one-year authorization renewals

Although other recent *Federal Register* notices (85 Fed. Reg. 35292 and 85 Fed. Reg. 35919), draft authorizations (see conditions 8³⁴), and NMFS's own webpage(s) detailing the renewal process (see the revised webpages³⁵) have indicated that a renewal is a *one-time* opportunity, NMFS did not specify that in the *Federal Register* notice (85 Fed. Reg. 31882) and the draft authorization for Mayflower (see condition 8³⁶). The Commission assumes this is because the notice and draft authorization for Mayflower published before the other recent notices and authorizations. Nevertheless, the Commission must again recommend that NMFS specify that a renewal is a *one-time* opportunity in *all* of its *Federal Register* notices requesting comments on the possibility of a renewal and in *all* of the associated proposed and final incidental harassment authorizations. Regardless of whether NMFS can address this issue in a consistent manner, the Commission continues to have ongoing concerns regarding NMFS's renewal process. Those concerns can be reviewed in its [10 February 2020](#) letter. As such, the Commission again recommends that NMFS refrain from issuing renewals for any authorization and instead use its abbreviated *Federal Register* notice process, which is similarly expeditious and fulfills NMFS's intent to maximize efficiencies.

Please contact me if you have questions regarding the Commission's recommendations.

Sincerely,



Peter O. Thomas, Ph.D.,
Executive Director

cc: Stan Labak, BOEM

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³⁴ <https://www.fisheries.noaa.gov/webdam/download/107318912> and <https://www.fisheries.noaa.gov/webdam/download/107396797>.

³⁵ See <https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act> and <https://www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-harassment-authorization-renewals>.

³⁶ <https://www.fisheries.noaa.gov/webdam/download/107034512>.

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