



**BILLING CODE 3510-22-P**

**DEPARTMENT OF COMMERCE**

**National Oceanic and Atmospheric Administration**

**[RTID 0648-XA240]**

**Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to Site Characterization Surveys off the Coast of Massachusetts**

**AGENCY:** National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

**ACTION:** Notice; issuance of an incidental harassment authorization.

**SUMMARY:** In accordance with the regulations implementing the Marine Mammal Protection Act (MMPA) as amended, notification is hereby given that NMFS has issued an incidental harassment authorization (IHA) to Mayflower Wind Energy LLC (Mayflower) to incidentally harass, by Level B harassment only, marine mammals during site characterization surveys off the coast of Massachusetts in the area of the Commercial Lease of Submerged Lands for Renewable Energy Development on the Outer Continental Shelf (OCS-A 0521) and along a potential submarine cable route to landfall at Falmouth, Massachusetts.

**DATES:** This authorization is effective from July 23, 2020 to July 22, 2021.

**FOR FURTHER INFORMATION CONTACT:** Amy Fowler, Office of Protected Resources, NMFS, (301) 427-8401. Electronic copies of the application and supporting documents, as well as a list of the references cited in this document, may be obtained

online at: <https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act>. In case of problems accessing these documents, please call the contact listed above.

## **SUPPLEMENTARY INFORMATION:**

### **Background**

The MMPA prohibits the “take” of marine mammals, with certain exceptions. Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 *et seq.*) direct the Secretary of Commerce (as delegated to NMFS) to allow, upon request, the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and either regulations are issued or, if the taking is limited to harassment, a notice of a proposed incidental take authorization may be provided to the public for review.

Authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s) and will not have an unmitigable adverse impact on the availability of the species or stock(s) for taking for subsistence uses (where relevant). Further, NMFS must prescribe the permissible methods of taking and other “means of effecting the least practicable adverse impact” on the affected species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of the species or stocks for taking for certain subsistence uses (referred to in shorthand as “mitigation”); and requirements pertaining to the mitigation, monitoring and reporting of the takings are set forth.

## **Summary of Request**

On January 17, 2020, NMFS received a request from Mayflower for an IHA to take marine mammals incidental to site characterization surveys in the area of the Commercial Lease of Submerged Lands for Renewable Energy Development on the Outer Continental Shelf (OCS-A 0521; Lease Area) and a submarine export cable route connecting the Lease Area to landfall in Falmouth, Massachusetts. A revised application was received on April 9, 2020. NMFS deemed that request to be adequate and complete. Mayflower's request is for take of a small number of 14 species of marine mammals by Level B harassment only. Neither Mayflower nor NMFS expects serious injury or mortality to result from this activity and, therefore, an IHA is appropriate.

## **Description of the Specified Activity**

Mayflower plans to conduct marine site characterization surveys, including high-resolution geophysical (HRG) and geotechnical surveys, in the area of Commercial Lease of Submerged Lands for Renewable Energy Development on the Outer Continental Shelf #OCS-A 0521 (Lease Area), located approximately 60 kilometers (km) south of Martha's Vineyard, Massachusetts, and along a potential submarine cable route to landfall at Falmouth, Massachusetts.

The purpose of the planned surveys is to acquire geotechnical and HRG data on the bathymetry, seafloor morphology, subsurface geology, environmental/biological sites, seafloor obstructions, soil conditions, and locations of any man-made, historical, or archaeological resources within the Lease Area and export cable route to support development of offshore wind energy facilities. Up to three survey vessels may operate concurrently as part of the surveys, but the three vessels will spend no more than a

combined total of 215 days at sea. Surveys are expected to occur over a three-month period, beginning upon issuance of the IHA. Underwater sound resulting from Mayflower’s site characterization surveys has the potential to result in incidental take of marine mammals in the form of behavioral harassment.

The HRG survey activities planned by Mayflower are described in detail in the notice of proposed IHA (85 FR 31856; May 27, 2020). The HRG equipment planned for use is shown in Table 1.

**Table 1. Summary of HRG Survey Equipment Planned for Use by Mayflower**

<b>HRG Equipment Category</b>	<b>Specific HRG Equipment</b>	<b>Operating Frequency Range (kHz)</b>	<b>Source Level (dB rms)</b>	<b>Beamwidth (degrees)</b>	<b>Typical Pulse Duration (ms)</b>	<b>Pulse Repetition rate (Hz)</b>
Sparker	Geomarine Geo-Spark 800 J system	0.25 to 5	203	180	3.4	2
Sub-bottom profiler	Edgetech 3100 with SB-2-16S towfish	2 to 16	179	65	10	10
	Innomar SES-2000 Medium-100 Parametric	85 to 115	241	2	2	40

As described above, a detailed description of the planned HRG surveys is provided in the **Federal Register** notice for the proposed IHA (85 FR 31856; May 27, 2020). Since that time, no changes have been made to the planned HRG survey activities. Therefore, a detailed description is not provided here. Please refer to that **Federal Register** notice for the description of the specific activity. Mitigation, monitoring, and reporting measures are described in detail later in this document (please see Mitigation and Monitoring and Reporting below).

**Comments and Responses**

A notice of NMFS's proposal to issue an IHA to Mayflower was published in the **Federal Register** on May 27, 2020 (85 FR 31856). That notice described, in detail,

Mayflower's activity, the marine mammal species that may be affected by the activity, and the anticipated effects on marine mammals. During the 30-day public comment period, NMFS received comment letters from the Marine Mammal Commission (Commission) and a group of environmental non-governmental organizations (ENGOS) including the Natural Resources Defense Council, National Wildlife Foundation, Conservation Law Foundation, Whale and Dolphin Conservation North America, Defenders of Wildlife, Humane Society of the United States, Humane Society Legislative Fund, International Fund for Animal Welfare, Mass Audubon, Marine Mammal Alliance Nantucket, NY4WHALES, Surfrider Foundation, Friends of the Earth, Ocean Conservation Research, and Sanctuary Education Advisory Specialists. NMFS has posted the comments online at: [www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-other-energy-activities-renewable](http://www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-other-energy-activities-renewable). A summary of the public comments received from the Commission and ENGOS as well as NMFS' responses to those comments are below.

*Comment 1:* The Commission 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.*, echosounders, shallow-penetration sub-bottom profilers (SBPs), pingers, etc.) and (2) require action proponents to use the correct Level A harassment thresholds in all future applications. The Commission further recommends that NMFS justify why it is allowing action proponents to characterize sources in a manner inconsistent with its own acoustic guidance (NMFS 2018).

*Response:* NMFS concurs with the Commission's recommendations and will work to ensure that applicants are using the correct harassment thresholds in all future applications. As described in the notice of proposed IHA, NMFS does not agree with Mayflower's characterization of certain HRG sources as impulsive sources. However, this characterization results in more conservative modeling results and take estimates than if the Level A harassment thresholds for non-pulse sources were used and in this case, no Level A harassment is predicted or authorized.

*Comment 2:* 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 activities and all future proposed authorizations involving HRG sources.

*Response:* NMFS' interim guidance for determining Level B harassment zones from HRG sources does incorporate operating frequency and beam width. We strongly recommend that applicants employ these tools, as we believe they are generally the best methodologies that are currently available. However, applicants are free to develop additional models or use different tools if they believe they are more representative of real-world conditions. NMFS will evaluate those tools and either use them where appropriate, or recommend changes. In this case, we note that the Level B harassment zones calculated by Mayflower using JASCO's model are the same as those calculated using NMFS's interim guidance with the exception of the Innomar parametric SBP, for which JASCO's model calculates a more conservative Level B harassment zone by incorporating out-of-beam sound levels.

*Comment 3:* To maximize efficiencies and ensure best available science is being used, the Commission recommends that NMFS consult with its acoustic experts 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.

*Response:* NMFS agrees with the Commission's recommendation and is working with our acoustic experts to evaluate the appropriate methods for determining the potential for Level A harassment from HRG surveys.

*Comment 4:* The Commission recommends that NMFS and BOEM expedite efforts to develop and finalize, in the next six months, 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.

*Response:* NMFS agrees with the Commission that methodological and signal processing standards for HRG sources is warranted and is working on developing such standards. However, the effort is resource-dependent and NMFS cannot ensure such standards will be developed within the Commission's preferred time frame.

*Comment 5:* The Commission recommends that NMFS evaluate the impacts of sound sources consistently across all action proponents and deem sources *de minimis* in a consistent manner for all proposed incidental harassment authorizations and rulemakings. This has the potential to reduce burdens on both action proponents and NMFS.

*Response:* NMFS concurs with the Commission's recommendation and is currently working together with BOEM to develop a tool to assist applicants and NMFS in more quickly and efficiently identifying activities and mitigation approaches that are unlikely to result in take of marine mammals.

*Comment 6:* The Commission recommends that NMFS consider whether, in such situations involving HRG surveys, 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 exclusion zones. Specifically, the Commission states that NMFS should evaluate whether taking needs to be authorized for those sources that are not considered *de minimis*, including sparkers and boomers, and for which implementation of the various mitigation measures should be sufficient to avoid Level B harassment takes.

*Response:* NMFS has evaluated whether taking needs to be authorized for those sources that are not considered *de minimis*, including sparkers and boomers, factoring into consideration the effectiveness of mitigation and monitoring measures, and we have determined that implementation of mitigation and monitoring measures cannot ensure that all take can be avoided during all HRG survey activities under all circumstances at this time. If and when we are able to reach such a conclusion, we will re-evaluate our determination that incidental take authorization is warranted for these activities.

*Comment 7:* The Commission 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 from a vessel strike until the NMFS Office of Protected Resources and the NMFS New England/Mid-Atlantic Regional

Stranding Coordinator determine whether additional measures are necessary to minimize the potential for additional unauthorized takes.

*Response:* NMFS has imposed a suite of measures in this IHA to reduce the risk of vessel strikes and does not anticipate, and has not authorized, any takes associated with vessel strikes. Further, in the event of a ship strike Mayflower is required both to collect and report an extensive suite of information that NMFS has identified in order to evaluate the ship strike, and to notify OPR and the New England/Mid-Atlantic Regional Stranding Coordinator as soon as feasible. At that point, as the Commission suggests, NMFS would work with the applicant to determine whether there are additional mitigation measures or modifications that could further reduce the likelihood of vessel strike for the activities. However, given the existing requirements and the very low likelihood of a vessel strike occurring, the protective value of ceasing operations while NMFS and Mayflower discuss potential additional mitigations in order to avoid a second highly unlikely event during that limited period is unclear, while a requirement for project activities to cease would not be practicable for a vessel that is operating on the open water. Therefore, NMFS does not concur that the measure is warranted and we have not included this requirement in the authorization. NMFS retains authority to modify the IHA and cease all activities immediately based on a vessel strike and will exercise that authority if warranted.

*Comment 8:* The Commission recommends that NMFS specify that IHA Renewals are a one-time opportunity in all **Federal Register** notices requesting comments on the possibility of an IHA Renewal and in all associated proposed and final IHAs.

*Response:* NMFS concurs and has specified this in the final IHA for Mayflower's activities and will include this in all future **Federal Register** notices and proposed and final authorizations.

*Comment 9:* The Commission recommends that NMFS refrain from issuing renewals for any authorization and instead use its abbreviated **Federal Register** notice process as that process is similarly expeditious and fulfills NMFS's intent to maximize efficiencies.

*Response:* NMFS does not agree with the Commission and, therefore, does not adopt the Commission's recommendations. NMFS believes IHA renewals can be appropriate in certain limited circumstances, which are described in the conditions for the IHA. NMFS has previously provided responses to this recommendation in multiple notices, including 84 FR 52464 (October 02, 2019), and will provide a more detailed response within 120 days, as required by section 202(d) of the MMPA.

*Comment 10:* The ENGOs recommended a seasonal restriction on site assessment and characterization activities in the Project Areas with the potential to harass North Atlantic right whales (*Eubalaena glacialis*) between January 1 and April 30, 2021.

*Response:* In evaluating how mitigation may or may not be appropriate to ensure the least practicable adverse impact on species or stocks and their habitat, we carefully consider two primary factors: (1) The manner in which, and the degree to which, the successful implementation of the measure(s) is expected to reduce impacts to marine mammals, marine mammal species or stocks, and their habitat; and (2) the practicability of the measures for applicant implementation, which may consider such things as relative cost and impact on operations.

NMFS is concerned about the status of the North Atlantic right whale population given that an unusual mortality event (UME) has been in effect for this species since June of 2017 and that there have been a number of recent mortalities. While the ensonified areas contemplated for any single HRG vessel are comparatively small and the anticipated resulting effects of exposure relatively lower-level, the potential impacts of multiple HRG vessels (up to three vessels are planned for use by Mayflower) operating simultaneously in areas of higher right whale density are not well-documented and warrant caution. However, Mayflower does not plan to conduct HRG survey operations during the timeframe suggested by the ENGOs, and their BOEM-approved survey plan requires surveys to end in September 2020. If Mayflower requests future authorizations that include HRG survey operations between January 1 and April 30, NMFS will consider the possibility of including seasonal restrictions.

*Comment 11:* The ENGOs recommended a prohibition on the commencement of geophysical surveys at night or during times of poor visibility. They stated that ramp up should occur during daylight hours only, to maximize the probability that North Atlantic right whales are detected and confirmed clear of the exclusion zone.

*Response:* We acknowledge the limitations inherent in detection of marine mammals at night. However, no injury is expected to result even in the absence of mitigation, given the very small estimated Level A harassment zones. Any potential impacts to marine mammals authorized for take would be limited to short-term behavioral responses. Restricting surveys in the manner suggested by the commenters may reduce marine mammal exposures by some degree in the short term, but would not result in any significant reduction in either intensity or duration of noise exposure.

Vessels would also potentially be on the water for an extended time introducing noise into the marine environment. The restrictions recommended by the commenters could result in the surveys spending increased time on the water, which may result in greater overall exposure to sound for marine mammals and increase the risk of a vessel strike; thus the commenters have not demonstrated that such a requirement would result in a net benefit. Furthermore, restricting the applicant to ramp-up only during daylight hours would have the potential to result in lengthy shutdowns of the survey equipment, which could result in the applicant failing to collect the data they have determined is necessary and, subsequently, the need to conduct additional surveys the following year. This would result in significantly increased costs incurred by the applicant. Thus, the restriction suggested by the commenters would not be practicable for the applicant to implement. In consideration of potential effectiveness of the recommended measure and its practicability for the applicant, NMFS has determined that restricting survey start-ups to daylight hours when visibility is unimpeded is not warranted or practicable in this case.

*Comment 12:* The ENGOs recommended that NMFS require monitoring an exclusion zone (EZ) for North Atlantic right whales of 1,000 meters (m), around each vessel conducting activities with noise levels that could result in injury or harassment to this species.

*Response:* Regarding the recommendation for a 1,000 m EZ specifically for North Atlantic right whales, we have determined that the 500-m EZ, as required in the IHA, is sufficiently protective. We note that the 500-m EZ exceeds the modeled distance to the largest Level B harassment isopleth distance (141 m) by a substantial margin. Thus, we are not requiring shutdown if a right whale is observed beyond 500-m.

*Comment 13:* The ENGOs recommended that a minimum of four PSOs should be required, following a two-on / two-off rotation, each responsible for scanning no more than 180° of the exclusion zone at any given time.

*Response:* NMFS does not agree with the commenters that a minimum of four PSOs should be required, following a two-on / two-off rotation, to meet the MMPA requirement that mitigation must effect the least practicable adverse impact upon the affected species or stocks and their habitat. Previous IHAs issued for HRG surveys have required that a single PSO must be stationed at the highest vantage point and engaged in general 360-degree scanning during daylight hours. The monitoring reports submitted to NMFS have demonstrated that the PSOs are able to detect marine mammals and implement appropriate mitigation measures, and project proponents have not exceeded take limits or reported unauthorized taking.

*Comment 14:* The ENGOs recommended that a combination of visual monitoring by PSOs and passive acoustic monitoring (PAM) should be used at all times that survey work is underway at noise levels that could injure or harm North Atlantic right whales.

*Response:* There are several reasons why we do not agree that use of PAM is warranted for 24-hour HRG surveys such as the one planned by Mayflower. While NMFS agrees that PAM can be an important tool for augmenting detection capabilities in certain circumstances, its utility in further reducing impact for Mayflower's planned HRG survey activities is limited. First, for this activity, the area expected to be ensonified above the Level B harassment threshold is relatively small (a maximum of 141 m as described in the *Estimated Take* section) – this reflects the fact that, to start with, the source level is comparatively low and the intensity of any resulting impacts would be

lower level and, further, it means that inasmuch as PAM will only detect a portion of any animals exposed within a zone (see below), the overall probability of PAM detecting an animal in the harassment zone is low – together these factors support the limited value of PAM for use in reducing take with smaller zones. PAM is only capable of detecting animals that are actively vocalizing, while many marine mammal species vocalize infrequently or during certain activities, which means that only a subset of the animals within the range of the PAM would be detected (and potentially have reduced impacts). Additionally, localization and range detection can be challenging under certain scenarios. For example, odontocetes are fast moving and often travel in large or dispersed groups which makes localization difficult. In addition, the ability of PAM to detect baleen whale vocalizations is further limited due to being deployed from the stern of a vessel, which puts the PAM hydrophones in proximity to propeller noise and low frequency engine noise which can mask the low frequency sounds emitted by baleen whales, including right whales.

We also note that the effects to North Atlantic right whales, and all marine mammals, from the types of surveys authorized in this IHA are expected to be limited to low level behavioral harassment even in the absence of mitigation; no injury is expected or authorized. In consideration of the limited additional benefit anticipated by adding this detection method (especially for right whales and other low frequency cetaceans, species for which PAM has limited efficacy) and the cost and impracticability of implementing a full-time PAM program, we have determined the current requirements for visual monitoring are sufficient to ensure the least practicable adverse impact on the affected species or stocks and their habitat. However, we note that Mayflower will voluntarily

implement PAM during night operations as an added precautionary measure even though this is not a NMFS requirement.

*Comment 15:* The ENGOs recommended that NMFS require developers to select SBP systems and operate those systems at power settings that achieve the lowest practicable source level for the objective.

*Response:* Mayflower has selected the equipment necessary to achieve their objectives. We have evaluated the sound produced by their equipment, and made the necessary findings to authorize taking of marine mammals incidental to Mayflower's survey activities.

*Comment 16:* The ENGOs recommended a requirement that all project vessels (regardless of size) operating within the Project Area observe a mandatory 10 knot speed restriction during the entire survey period. The commenters also recommend that if survey activities are delayed into the fall and winter, all project vessels either transiting to/from or operating within the Project Area must observe a 10 knot (18.5 kilometer (km)/hour) speed restriction between November 1, 2020 and April 30, 2021.

*Response:* NMFS has analyzed the potential for ship strike resulting from Mayflower's activity and has determined that the mitigation measures specific to ship strike avoidance are sufficient to avoid the potential for ship strike. These include: a requirement that all vessel operators comply with 10 knot (18.5 km/hour) or less speed restrictions in any established dynamic management area (DMA); a requirement that all vessel operators reduce vessel speed to 10 knots (18.5 km/hour) or less when any large whale, any mother/calf pairs, pods, or large assemblages of non-delphinoid cetaceans are observed within 100 m of an underway vessel; a requirement that all survey vessels

maintain a separation distance of 500-m or greater from any sighted North Atlantic right whale; a requirement that, if underway, vessels must steer a course away from any sighted North Atlantic right whale at 10 knots or less until the 500-m minimum separation distance has been established; and a requirement that, if a North Atlantic right whale is sighted in a vessel's path, or within 500 m of an underway vessel, the underway vessel must reduce speed and shift the engine to neutral. We have determined that the ship strike avoidance measures are sufficient to ensure the least practicable adverse impact on species or stocks and their habitat. As noted previously, occurrence of vessel strike during surveys is extremely unlikely based on the low vessel speed of approximately 3 knots (5.6 km/hour) while transiting survey lines. Furthermore, no documented vessel strikes have occurred for any HRG surveys which were issued IHAs from NMFS.

*Comment 17:* The ENGOs objected to NMFS' process to consider extending any one-year IHA with a truncated 15-day comment period as contrary to the MMPA.

*Response:* NMFS' IHA Renewal process meets all statutory requirements. All IHAs issued, whether an initial IHA or a Renewal IHA, are valid for a period of not more than one year. In addition, the public has at least 30 days to comment on all proposed IHAs, with a cumulative total of 45 days for IHA Renewals. As noted above, the *Request for Public Comments* section made clear that the agency was seeking comment on both the initial proposed IHA and the potential issuance of a Renewal for this project. Because any Renewal (as explained in the *Request for Public Comments* section) is limited to another year of identical or nearly identical activities in the same location (as described in the *Description of Proposed Activity* section) or the same activities that were not

completed within the one-year period of the initial IHA, reviewers have the information needed to effectively comment on both the immediate proposed IHA and a possible one-year Renewal, should the IHA holder choose to request one in the coming months.

While there will be additional documents submitted with a Renewal request, for a qualifying Renewal these will be limited to documentation that NMFS will make available and use to verify that the activities are identical to those in the initial IHA, are nearly identical such that the changes would have either no effect on impacts to marine mammals or decrease those impacts, or are a subset of activities already analyzed and authorized but not completed under the initial IHA. NMFS will also confirm, among other things, that the activities will occur in the same location; involve the same species and stocks; provide for continuation of the same mitigation, monitoring, and reporting requirements; and that no new information has been received that would alter the prior analysis. The Renewal request will also contain a preliminary monitoring report, but that is to verify that effects from the activities do not indicate impacts of a scale or nature not previously analyzed. The additional 15-day public comment period provides the public an opportunity to review these few documents, provide any additional pertinent information and comment on whether they think the criteria for a Renewal have been met. Between the initial 30-day comment period on these same activities and the additional 15 days, the total comment period for a Renewal is 45 days.

In addition to the IHA Renewal process being consistent with all requirements under section 101(a)(5)(D), it is also consistent with Congress' intent for issuance of IHAs to the extent reflected in statements in the legislative history of the MMPA. Through the provision for Renewals in the regulations, description of the process and

express invitation to comment on specific potential Renewals in the Request for Public Comments section of each proposed IHA, the description of the process on NMFS' website, further elaboration on the process through responses to comments such as these, posting of substantive documents on the agency's website, and provision of 30 or 45 days for public review and comment on all proposed initial IHAs and Renewals respectively, NMFS has ensured that the public “is invited and encouraged to participate fully in the agency decision-making process.”

*Comment 18:* The ENGOs suggested that it should be NMFS’ top priority to consider any initial data from state monitoring efforts, passive acoustic monitoring data, opportunistic marine mammal sightings data, satellite telemetry, and other data sources, because the models used by NMFS do not adequately capture increased use of the survey areas by right whales. Further, these commenters state that the density models NMFS uses result in an underestimate of take, and NMFS should take steps now to develop a dataset that more accurately reflects marine mammal presence so that it is in hand for future IHA authorizations and other work.

*Response:* NMFS will review any recommended data sources and will continue to use the best available information. We welcome future input from interested parties on data sources that may be of use in analyzing the potential presence and movement patterns of marine mammals, including North Atlantic right whales, in New England waters. NMFS will review any recommended data sources and will continue to use the best available information. NMFS has used the best available scientific information -- in this case the marine mammal density models developed by the Duke Marine Geospatial Ecology Lab (MGEL) (Roberts et al. 2016, 2017, 2018) -- to inform our determinations.

While the ENGOs are correct in their statement that North Atlantic right whale distribution has shifted in recent years and sightings databases, passive acoustic monitoring, and satellite telemetry data may provide additional information on right whale presence in the Project Area, no references were provided to support any change in density estimates or estimated take for North Atlantic right whales. Therefore, NMFS has not made any changes to the density information or estimated take presented in the **Federal Register** notice of proposed IHA.

*Comment 19:* The ENGOs commented that NMFS should analyze the cumulative impacts from Mayflower's survey activities, and other survey activities, on North Atlantic right whales and other protected species.

*Response:* The MMPA grants exceptions to its broad take prohibition for a "specified activity." 16 U.S.C. 1371(a)(5)(A)(i). Cumulative impacts (also referred to as cumulative effects) is a term that appears in the context of NEPA and the ESA, but it is defined differently in those contexts. Neither the MMPA nor NMFS' codified implementing regulations address consideration of other unrelated activities and their impacts on populations. However, the preamble for NMFS' implementing regulations (54 FR 40338; September 29, 1989) states in response to comments that the impacts from other past and ongoing anthropogenic activities are to be incorporated into the negligible impact analysis via their impacts on the baseline. Accordingly, NMFS here has factored into its negligible impact analyses the impacts of other past and ongoing anthropogenic activities via their impacts on the baseline (*e.g.*, as reflected in the density/distribution and status of the species, population size and growth rate, and other relevant stressors).

#### **Changes from the Proposed IHA to Final IHA**

The estimated take in the proposed IHA was based on monthly density estimates and the expected months of survey operations (June through September). The survey timing has shifted and surveys are now expected to occur from July through September. Mayflower plans to conduct the same number of survey days, but rather than averaging the survey duration over four months, it has been averaged over three months. Estimated take has been recalculated by excluding density estimates for the month of June. By shifting the expected survey effort in June to the July-September period, the estimated takes for most species either decreased or remained the same. This is because the expected June densities of most species are higher than densities during the July-September period. However, for bottlenose dolphins (*Tursiops truncatus*) and common dolphins (*Delphinus delphis*), the densities during July-September are somewhat higher than those during June, so the take estimates for those two species increased. For bottlenose dolphins, the estimated take by Level B harassment increased from 739 to 812 and for common dolphins, the estimated take by Level B harassment increased from 278 to 318. As a conservative approach, NMFS has authorized the higher estimated take from these two calculations.

In the proposed IHA, NMFS included an exclusion zone of 100-m for all marine mammal species other than North Atlantic right whales, which required a 500-m exclusion zone, and certain genera of dolphins (*Delphinus*, *Lagenorhynchus*, and *Tursiops*) that are most likely to voluntarily approach the source vessel for purposes of interacting with the vessel (e.g., bow riding). We included this small dolphin exception because shutdown requirements for small dolphins represent practicability concerns without likely commensurate benefits for the animals in question. Small dolphins are

typically the most commonly observed marine mammals in the specific geographic region and would typically be the only marine mammals likely to intentionally approach the vessel. However, since the proposed IHA was published in the **Federal Register** on May 27, 2020 (85 FR 31856), Mayflower has been conducting geotechnical surveys in the Project Area and has reported numerous gray seals (*Halichoerus grypus*) and harbor seals (*Phoca vitulina*) voluntarily approaching the vessels, within 100 m. Mayflower expects that similar conditions may occur during the planned HRG surveys, which would result in additional shutdowns. The potential for increased shutdowns resulting from pinnipeds approaching within 100 m would require the survey vessel to revisit the missed track line to reacquire data, resulting in an overall increase in the total sound energy input to the marine environment and an increase in the total duration over which the survey is active in a given area. Removing the 100-m exclusion zone for pinnipeds would reduce the operational burden on Mayflower, and as described below in the *Estimated Take* section, even absent mitigation, NMFS does not expect that auditory injury is likely to occur to any marine mammal species. NMFS concurs that there is no meaningful benefit to retaining the 100-m exclusion zone for pinnipeds, and has changed the mitigation requirements to include pinnipeds in the shutdown exemption for animals that intentionally approach the vessel. Pinnipeds that enter the Level B harassment zone will be recorded as Level B takes. No changes have been made to the number of seals expected to be taken by Level B harassment.

### **Description of Marine Mammals in the Area of Specified Activities**

Sections 3 and 4 of the application summarize available information regarding status and trends, distribution and habitat preferences, and behavior and life history, of

the potentially affected species. Additional information regarding population trends and threats may be found in NMFS's Stock Assessment Reports (SARs;

<https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments>) and more general information about these species (e.g., physical and behavioral descriptions) may be found on NMFS's website.

(<https://www.fisheries.noaa.gov/find-species>).

Table 2 lists all species or stocks for which take is expected and authorized for this action, and summarizes information related to the population or stock, including regulatory status under the MMPA and ESA and potential biological removal (PBR), where known. For taxonomy, we follow Committee on Taxonomy (2019). PBR is defined by the MMPA as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population (as described in NMFS's SARs). While no mortality is anticipated or authorized here, PBR and annual serious injury and mortality from anthropogenic sources are included here as gross indicators of the status of the species and other threats.

Marine mammal abundance estimates presented in this document represent the total number of individuals that make up a given stock or the total number estimated within a particular study or survey area. NMFS's stock abundance estimates for most species represent the total estimate of individuals within the geographic area, if known, that comprises that stock. For some species, this geographic area may extend beyond U.S. waters. All managed stocks in this region are assessed in NMFS's U.S. Atlantic SARs. All values presented in Table 2 are the most recent available at the time of publication

and are available in the 2018 Atlantic and Gulf of Mexico Marine Mammal Stock Assessments (Hayes *et al.*, 2019a), available online at:

[www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region](http://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region) or and draft 2019 Atlantic and Gulf of Mexico Marine

Mammal Stock Assessments (Hayes *et al.* 2019b) available online at:

<https://www.fisheries.noaa.gov/national/marine-mammal-protection/draft-marine-mammal-stock-assessment-reports>.

**Table 2. Marine Mammals Known to Occur in the Project Area That May be Affected by Mayflower’s Planned Activity**

Common name	Scientific name	Stock	ESA/MMPA status; Strategic (Y/N) <sup>1</sup>	Stock abundance (CV, N <sub>min</sub> , most recent abundance survey) <sup>2</sup>	Predicted abundance <sup>3</sup>	PBR <sup>4</sup>	Annual M/SI <sup>4</sup>
Order Cetartiodactyla – Cetacea – Superfamily Mysticeti (baleen whales)							
Family Balaenidae							
North Atlantic right whale	<i>Eubalaena glacialis</i>	Western North Atlantic	E/D; Y	428 (0; 418; n/a)	535 (0.45)*	0.9	5.56
Family Balaenopteridae (rorquals)							
Humpback whale	<i>Megaptera novaeangliae</i>	Gulf of Maine	-/ -; N	1,396 (0; 1,380; See SAR)	1,637 (0.07)*	22	12.15
Fin whale	<i>Balaenoptera physalus</i>	Western North Atlantic	E/D; Y	7,418 (0.25; 6,029; See SAR)	4,633 (0.08)	12	2.35
Sei whale	<i>Balaenoptera borealis</i>	Nova Scotia	E/D; Y	6292 (1.015; 3,098; see SAR) <sup>236</sup>	717 (0.30)*	6.2	1
Minke whale	<i>Balaenoptera acutorostrata</i>	Canadian East Coast	-/-; N	24,202 (0.3; 18,902; See SAR)	2,112 (0.05)*	1189	8
Superfamily Odontoceti (toothed whales, dolphins, and porpoises)							
Family Physeteridae							
Sperm whale	<i>Physeter macrocephalus</i>	NA	E; Y	4349 (0.28;3,451; See SAR)	5,353 (0.12)	6.9	0
Family Delphinidae							
Long-finned pilot whale	<i>Globicephala melas</i>	Western North Atlantic	-/-; Y	5,636 (0.63; 3,464)	18,977 (0.11) <sup>5</sup>	35	38

Bottlenose dolphin	<i>Tursiops spp.</i>	Western North Atlantic Offshore	-/-; N	62,851 (0.23; 51,914; See SAR)	97,476 (0.06) <sup>5</sup>	591	28
Common dolphin	<i>Delphinus delphis</i>	Western North Atlantic	-/-; N	172,825 (0.21; 145,216; See SAR)	86,098 (0.12)	1,452	419
Atlantic white-sided dolphin	<i>Lagenorhynchus acutus</i>	Western North Atlantic	-/-; N	92,233 (0.71; 54,433; See SAR)	37,180 (0.07)	544	26
Risso's dolphin	<i>Grampus griseus</i>	Western North Atlantic	-/-; N	35,493 (0.19; 30,289; See SAR)	7,732 (0.09)	303	54.3
Family Phocoenidae (porpoises)							
Harbor porpoise	<i>Phocoena phocoena</i>	Gulf of Maine/Bay of Fundy	-/-; N	95,543 (0.31; 74,034; See SAR)	45,089 (0.12)*	851	217
Order Carnivora – Superfamily Pinnipedia							
Family Phocidae (earless seals)							
Gray seal <sup>6</sup>	<i>Halichoerus grypus</i>	Western North Atlantic	-/-; N	27,131 (0.19; 23,158, 2016)	N/A	1,389	5,688
Harbor seal	<i>Phoca vitulina</i>	Western North Atlantic	-/-; N	75,834 (0.15; 66,884, 2018)	N/A	345	333

1 - Endangered Species Act (ESA) status: Endangered (E), Threatened (T)/MMPA status: Depleted (D). A dash (-) indicates that the species is not listed under the ESA or designated as depleted under the MMPA. Under the MMPA, a strategic stock is one for which the level of direct human-caused mortality exceeds PBR or which is determined to be declining and likely to be listed under the ESA within the foreseeable future. Any species or stock listed under the ESA is automatically designated under the MMPA as depleted and as a strategic stock.

2 - NMFS marine mammal stock assessment reports online at: <https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region/>. CV is coefficient of variation; Nmin is the minimum estimate of stock abundance. In some cases, CV is not applicable

3 - This information represents species- or guild-specific abundance predicted by recent habitat-based cetacean density models (Roberts *et al.*, 2016, 2017, 2018). These models provide the best available scientific information regarding predicted density patterns of cetaceans in the U.S. Atlantic Ocean, and we provide the corresponding abundance predictions as a point of reference. Total abundance estimates were produced by computing the mean density of all pixels in the modeled area and multiplying by its area. For those species marked with an asterisk, the available information supported development of either two or four seasonal models; each model has an associated abundance prediction. Here, we report the maximum predicted abundance.

4 - Potential biological removal, defined by the MMPA as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population size (OSP). Annual M/SI, found in NMFS' SARs, represent annual levels of human-caused mortality plus serious injury from all sources combined (*e.g.*, commercial fisheries, subsistence hunting, ship strike). Annual M/SI values often cannot be determined precisely and is in some cases presented as a minimum value. All M/SI values are as presented in the draft 2019 SARs (Hayes *et al.*, 2019).

5 - Abundance estimates are in some cases reported for a guild or group of species when those species are difficult to differentiate at sea. Similarly, the habitat-based cetacean density models produced by Roberts *et al.* (2016, 2017, 2018) are based in part on available observational data which, in some cases, is limited to genus or guild in terms of taxonomic definition. Roberts *et al.* (2016, 2017, 2018) produced density models to genus level for *Globicephala* spp. and produced a density model for bottlenose dolphins that does not differentiate between offshore and coastal stocks.

6 - 8 NMFS stock abundance estimate applies to U.S. population only, actual stock abundance is approximately 505,000.

As indicated above, all 14 species (with 14 managed stocks) in Table 2 temporally and spatially co-occur with the activity to the degree that take is reasonably likely to

occur, and we have authorized it. All species that could potentially occur in the planned survey areas are included in Table 4 of the IHA application. However, the temporal and/or spatial occurrence of several species listed in Table 4 in the IHA application is such that take of these species is not expected to occur. The blue whale (*Balaenoptera musculus*), Cuvier's beaked whale (*Ziphius cavirostris*), four species of Mesoplodont beaked whale (*Mesoplodon* spp.), dwarf and pygmy sperm whale (*Kogia sima* and *Kogia breviceps*), and striped dolphin (*Stenella coeruleoalba*), typically occur further offshore than the Project Area, while short-finned pilot whales (*Globicephala macrorhynchus*) and Atlantic spotted dolphins (*Stenella frontalis*) are typically found further south than the Project Area (Hayes *et al.*, 2019b). There are stranding records of harp seals (*Pagophilus groenlandicus*) in Massachusetts, but the species typically occurs north of the Project Area and appearances in Massachusetts usually occur between January and May, outside of the planned survey dates (Hayes *et al.*, 2019b). As take of these species is not anticipated as a result of the planned activities, these species are not analyzed further.

A detailed description of the species for which take has been authorized, including brief introductions to the relevant stocks as well as available information regarding population trends and threats, and information regarding local occurrence, were provided in the **Federal Register** notice for the proposed IHA (85 FR 31856; May 27, 2020); since that time, we are not aware of any changes in the status of these species and stocks; therefore, detailed descriptions are not provided here. Please refer to that **Federal Register** notice for these descriptions. Please also refer to NMFS' website (<https://www.fisheries.noaa.gov/find-species>) for generalized species accounts.

#### **Potential Effects of Specified Activities on Marine Mammals and their Habitat**

The effects of underwater noise from Mayflower's survey activities have the potential to result in take of marine mammals by harassment in the vicinity of the survey area. The **Federal Register** notice for the proposed IHA (85 FR 31856; May 27, 2020) included a discussion of the effects of anthropogenic noise on marine mammals and their habitat. That information and analysis is incorporated by reference into this final IHA determination and is not repeated here; please refer to the notice of proposed IHA (85 FR 31856; May 27, 2020).

### **Estimated Take**

This section provides an estimate of the number of incidental takes authorized through this IHA, which will inform both NMFS' consideration of "small numbers" and the negligible impact determination.

Harassment is the only type of take expected to result from these activities. Except with respect to certain activities not pertinent here, section 3(18) of the MMPA defines "harassment" as any act of pursuit, torment, or annoyance, which (i) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B harassment).

Authorized takes would be by Level B harassment only in the form of disruption of behavioral patterns for individual marine mammals resulting from exposure to HRG sources. Based on the nature of the activity and the anticipated effectiveness of the mitigation measures (*i.e.*, exclusion zones and shutdown measures), discussed in detail below in the *Mitigation* section, Level A harassment is neither anticipated nor authorized.

As described previously, no mortality is anticipated or authorized for this activity. Below we describe how the take is estimated.

Generally speaking, we estimate take by considering: (1) acoustic thresholds above which NMFS believes the best available science indicates marine mammals will be behaviorally harassed or incur some degree of permanent hearing impairment; (2) the area or volume of water that will be ensonified above these levels in a day; (3) the density or occurrence of marine mammals within these ensonified areas; and, (4) the number of days of activities. We note that while these basic factors can contribute to a basic calculation to provide an initial prediction of takes, additional information that can qualitatively inform take estimates is also sometimes available (e.g., previous monitoring results or average group size). Below, we describe the factors considered here in more detail and present the authorized take.

#### *Acoustic Thresholds*

Using the best available science, NMFS has developed acoustic thresholds that identify the received level of underwater sound above which exposed marine mammals would be reasonably expected to be behaviorally harassed (equated to Level B harassment) or to incur permanent threshold shift (PTS) of some degree (equated to Level A harassment).

Level B Harassment for non-explosive sources – Though significantly driven by received level, the onset of behavioral disturbance from anthropogenic noise exposure is also informed to varying degrees by other factors related to the source (e.g., frequency, predictability, duty cycle), the environment (e.g., bathymetry), and the receiving animals (hearing, motivation, experience, demography, behavioral context) and can be difficult to

predict (Southall *et al.*, 2007, Ellison *et al.*, 2012). Based on what the available science indicates and the practical need to use a threshold based on a factor that is both predictable and measurable for most activities, NMFS uses a generalized acoustic threshold based on received level to estimate the onset of behavioral harassment. NMFS predicts that marine mammals are likely to be behaviorally harassed in a manner we consider Level B harassment when exposed to underwater anthropogenic noise above received levels of 160 decibels (dB) re 1 microPascal ( $\mu\text{Pa}$ ) (root mean square (rms)) for impulsive and/or intermittent sources (*e.g.*, impact pile driving) and 120 dB rms for continuous sources (*e.g.*, vibratory driving). Mayflower's planned activity includes the use of impulsive sources (geophysical survey equipment), and therefore use of the 160 dB re 1  $\mu\text{Pa}$  (rms) threshold is applicable.

Level A harassment for non-explosive sources - NMFS' Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0) (Technical Guidance, 2018) identifies dual criteria to assess auditory injury (Level A harassment) to five different marine mammal groups (based on hearing sensitivity) as a result of exposure to noise from two different types of sources (impulsive or non-impulsive). The components of Mayflower's planned activity includes the use of impulsive sources.

Predicted distances to Level A harassment isopleths, which vary based on marine mammal functional hearing groups were calculated. The updated acoustic thresholds for impulsive sounds (such as HRG survey equipment) contained in the Technical Guidance (NMFS, 2018) were presented as dual metric acoustic thresholds using both cumulative sound exposure level ( $\text{SEL}_{\text{cum}}$ ) and peak sound pressure level metrics. As dual metrics,

NMFS considers onset of PTS (Level A harassment) to have occurred when either one of the two metrics is exceeded (*i.e.*, metric resulting in the largest isopleth). The  $SEL_{cum}$  metric considers both level and duration of exposure, as well as auditory weighting functions by marine mammal hearing group.

These thresholds are provided in Table 3 below. The references, analysis, and methodology used in the development of the thresholds are described in NMFS 2018 Technical Guidance, which may be accessed at:

[www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-acoustic-technical-guidance](http://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-acoustic-technical-guidance).

**Table 3. Thresholds identifying the onset of Permanent Threshold Shift**

	PTS Onset Acoustic Thresholds* (Received Level)	
Hearing Group	Impulsive	Non-impulsive
Low-Frequency (LF) Cetaceans	<i>Cell 1</i> $L_{pk,flat}$ : 219 dB $L_{E,LF,24h}$ : 183 dB	<i>Cell 2</i> $L_{E,LF,24h}$ : 199 dB
Mid-Frequency (MF) Cetaceans	<i>Cell 3</i> $L_{pk,flat}$ : 230 dB $L_{E,MF,24h}$ : 185 dB	<i>Cell 4</i> $L_{E,MF,24h}$ : 198 dB
High-Frequency (HF) Cetaceans	<i>Cell 5</i> $L_{pk,flat}$ : 202 dB $L_{E,HF,24h}$ : 155 dB	<i>Cell 6</i> $L_{E,HF,24h}$ : 173 dB
Phocid Pinnipeds (PW) (Underwater)	<i>Cell 7</i> $L_{pk,flat}$ : 218 dB $L_{E,PW,24h}$ : 185 dB	<i>Cell 8</i> $L_{E,PW,24h}$ : 201 dB
Otariid Pinnipeds (OW) (Underwater)	<i>Cell 9</i> $L_{pk,flat}$ : 232 dB $L_{E,OW,24h}$ : 203 dB	<i>Cell 10</i> $L_{E,OW,24h}$ : 219 dB

\* Dual metric acoustic thresholds for impulsive sounds: Use whichever results in the largest isopleth for calculating PTS onset. If a non-impulsive sound has the potential of exceeding the peak sound pressure level thresholds associated with impulsive sounds, these thresholds should also be considered.

Note: Peak sound pressure ( $L_{pk}$ ) has a reference value of 1  $\mu\text{Pa}$ , and cumulative sound exposure level ( $L_E$ ) has a reference value of 1  $\mu\text{Pa}^2\text{s}$ . In this Table, thresholds are abbreviated to reflect American National Standards Institute standards (ANSI 2013). However, peak sound pressure is defined by ANSI as incorporating frequency weighting, which is not the intent for this Technical Guidance. Hence, the subscript “flat” is being included to indicate peak sound pressure should be flat weighted or unweighted within the generalized hearing range. The subscript associated with cumulative sound exposure level thresholds indicates the designated marine mammal auditory weighting function (LF, MF, and HF cetaceans, and PW and OW pinnipeds) and that the recommended accumulation period is 24 hours. The cumulative sound exposure level thresholds could be exceeded in a multitude of ways (i.e., varying exposure levels and durations, duty cycle). When possible, it is valuable for action proponents to indicate the conditions under which these acoustic thresholds will be exceeded.

### *Ensonified Area*

Here, we describe operational and environmental parameters of the activity that will feed into identifying the area ensonified above the acoustic thresholds, which include source levels and transmission loss coefficient.

The planned survey entails the use of HRG equipment. The distance to the isopleth corresponding to the threshold for Level B harassment was calculated for all HRG equipment with the potential to result in harassment of marine mammals. NMFS has developed methodology for determining the rms sound pressure level ( $\text{SPL}_{\text{rms}}$ ) at the 160-dB isopleth for the purposes of estimating take by Level B harassment resulting from exposure to HRG survey equipment (NMFS, 2019). This methodology incorporates frequency and some directionality to refine estimated ensonified zones. Mayflower used the methods specified in the interim methodology (NMFS, 2019). The Level B harassment zone for the Innomar parametric sub-bottom profiler was calculated using this methodology, with additional modifications to account for energy emitted outside of the primary beam of the source. For sources that operate with different beam widths, the maximum beam width was used. The lowest frequency of the source was used when

calculating the absorption coefficient. The formulas used to apply the methodology are described in detail in Appendix B of the IHA application.

NMFS considers the data provided by Crocker and Fratantonio (2016) to represent the best available information on source levels associated with HRG equipment and therefore recommends that source levels provided by Crocker and Fratantonio (2016) be incorporated in the method described above to estimate isopleth distances to the Level B harassment threshold. In cases when the source level for a specific type of HRG equipment is not provided in Crocker and Fratantonio (2016), NMFS recommends that either the source levels provided by the manufacturer be used, or, in instances where source levels provided by the manufacturer are unavailable or unreliable, a proxy from Crocker and Fratantonio (2016) be used instead. Table 1 shows the HRG equipment types that may be used during the planned surveys and the sound levels associated with those HRG equipment types. Tables 2 and 4 of Appendix B in the IHA application shows the literature sources for the sound source levels that are shown in Table 1 and that were incorporated into the modeling of Level B isopleth distances to the Level B harassment threshold.

Results of modeling using the methodology described above indicated that, of the HRG survey equipment planned for use by Mayflower that has the potential to result in harassment of marine mammals, sound produced by the Geomarine Geo-Spark 400 tip sparker would propagate furthest to the Level B harassment threshold (Table 4); therefore, for the purposes of the exposure analysis, it was assumed the Geomarine Geo-Spark 400 tip sparker would be active during the entire duration of the surveys. Thus the distance to the isopleth corresponding to the threshold for Level B harassment for the

Geomarine Geo-Spark 400 tip sparker (estimated at 141 m; Table 4) was used as the basis of the take calculation for all marine mammals. Note that this results in a conservative estimate of the total ensonified area resulting from the planned activities as Mayflower may not operate the Geomarine Geo-Spark 400 tip sparker during the entire planned survey, and for any survey segments in which it is not ultimately operated, the distance to the Level B harassment threshold would be less than 141 m (Table 4). However, as Mayflower cannot predict the precise number of survey days that will require the use of the Geomarine Geo-Spark 400 tip sparker, it was assumed that it would be operated during the entire duration of the planned surveys.

**Table 4. Modeled Radial Distances from HRG Survey Equipment to Isoleths Corresponding to Level A and Level B Harassment Thresholds**

Sound Source	Radial Distance to Level A Harassment Threshold (m)*				Radial Distance to Level B Harassment Threshold (m)
	Low frequency cetaceans	Mid frequency cetaceans	High frequency cetaceans	Phocid pinnipeds (underwater)	All marine mammals
Innomar SES-2000 Medium-100 Parametric	<1	<1	60	<1	116
Edgetech 2000-DSS	<1	<1	3	<1	5
Geomarine Geo-Spark 400 tip sparker (800 Joules)	<1	<1	8	<1	141

\* Distances to the Level A harassment threshold based on the larger of the dual criteria (peak SPL and SEL<sub>cum</sub>) are shown. For all sources the SEL<sub>cum</sub> metric resulted in larger isopleth distances.

Predicted distances to Level A harassment isopleths, which vary based on marine mammal functional hearing groups (Table 3), were also calculated. The updated acoustic thresholds for impulsive sounds (such as HRG survey equipment) contained in the Technical Guidance (NMFS, 2018) were presented as dual metric acoustic thresholds

using both cumulative sound exposure level ( $SEL_{cum}$ ) and peak sound pressure level metrics. As dual metrics, NMFS considers onset of PTS (Level A harassment) to have occurred when either one of the two metrics is exceeded (*i.e.*, the metric resulting in the largest isopleth). The  $SEL_{cum}$  metric considers both level and duration of exposure, as well as auditory weighting functions by marine mammal hearing group.

Modeling of distances to isopleths corresponding to the Level A harassment threshold was performed for all types of HRG equipment planned for use with the potential to result in harassment of marine mammals. Mayflower used a new model developed by JASCO to calculate distances to Level A harassment isopleths based on both the peak SPL and the  $SEL_{cum}$  metric. For the peak SPL metric, the model is a series of equations that accounts for both seawater absorption and HRG equipment beam patterns (for all HRG sources with beam widths larger than  $90^\circ$ , it was assumed these sources were omnidirectional). For the  $SEL_{cum}$  metric, a model was developed that accounts for the hearing sensitivity of the marine mammal group, seawater absorption, and beam width for downwards-facing transducers. Details of the modeling methodology for both the peak SPL and  $SEL_{cum}$  metrics are provided in Appendix A of the IHA application. This model entails the following steps:

1. Weighted broadband source levels were calculated by assuming a flat spectrum between the source minimum and maximum frequency, weighted the spectrum according to the marine mammal hearing group weighting function (NMFS 2018), and summed across frequency;
2. Propagation loss was modeled as a function of oblique range;

3. Per-pulse SEL was modeled for a stationary receiver at a fixed distance off a straight survey line, using a vessel transit speed of 3.5 knots and source-specific pulse length and repetition rate. The off-line distance is referred to as the closest point of approach (CPA) and was performed for CPA distances between 1 m and 10 km. The survey line length was modeled as 10 km long (analysis showed longer survey lines increased SEL by a negligible amount). SEL is calculated as  $SPL + 10 \log_{10} T / 15$  dB, where T is the pulse duration;
4. The SEL for each survey line was calculated to produce curves of weighted SEL as a function of CPA distance; and
5. The curves from Step 4 above were used to estimate the CPA distance to the impact criteria.

We note that in the modeling methods described above and in Appendix A of the IHA application, sources that operate with a repetition rate greater than 10 Hz were assessed with the non-impulsive (intermittent) source criteria while sources with a repetition rate equal to or less than 10 Hz were assessed with the impulsive source criteria. NMFS does not necessarily agree with this step in the modeling assessment, which results in nearly all HRG sources being classified as impulsive; however, we note that the classification of the majority of HRG sources as impulsive results in more conservative modeling results. Thus, we have assessed the potential for Level A harassment to result from the planned activities based on the modeled Level A zones with the acknowledgement that these zones are likely conservative.

Modeled isopleth distances to Level A harassment thresholds for all types of HRG equipment and all marine mammal functional hearing groups are shown in Table 4. The

dual criteria (peak SPL and SEL<sub>cum</sub>) were applied to all HRG sources using the modeling methodology as described above, and the largest isopleth distances for each functional hearing group were then carried forward in the exposure analysis to be conservative. For all HRG sources, the SEL<sub>cum</sub> metric resulted in larger isopleth distances. Distances to the Level A harassment threshold based on the larger of the dual criteria (peak SPL and SEL<sub>cum</sub>) are shown in Table 4.

Modeled distances to isopleths corresponding to the Level A harassment threshold are very small (< 1 m) for three of the four marine mammal functional hearing groups that may be impacted by the planned activities (*i.e.*, low frequency and mid frequency cetaceans, and phocid pinnipeds; see Table 4). Based on the very small Level A harassment zones for these functional hearing groups, the potential for species within these functional hearing groups to be taken by Level A harassment is considered so low as to be discountable. For harbor porpoises (a high frequency specialist), the largest modeled distance to the Level A harassment threshold for the high frequency functional hearing group was 60 m (Table 4). However, as noted above, modeled distances to isopleths corresponding to the Level A harassment threshold are assumed to be conservative. Further, the Innomar source uses a very narrow beam width (two degrees) and the distances to the Level A harassment isopleths are eight meters or less for the other two sources. Level A harassment would also be more likely to occur at close approach to the sound source or as a result of longer duration exposure to the sound source, and mitigation measures – including a 100-m exclusion zone for harbor porpoises – are expected to minimize the potential for close approach or longer duration exposure to active HRG sources. In addition, harbor porpoises are a notoriously shy species which

is known to avoid vessels, and would also be expected to avoid a sound source prior to that source reaching a level that would result in injury (Level A harassment). Therefore, we have determined that the potential for take by Level A harassment of harbor porpoises is so low as to be discountable. As NMFS has determined that the likelihood of take of any marine mammals in the form of Level A harassment occurring as a result of the planned surveys is so low as to be discountable, we therefore have not authorized the take by Level A harassment of any marine mammals.

#### *Marine Mammal Occurrence*

In this section we provide the information about the presence, density, or group dynamics of marine mammals that will inform the take calculations.

The habitat-based density models produced by the Duke University Marine Geospatial Ecology Laboratory (Roberts *et al.*, 2016, 2017, 2018) represent the best available information regarding marine mammal densities in the planned survey area. The density data presented by Roberts *et al.* (2016, 2017, 2018) incorporates aerial and shipboard line-transect survey data from NMFS and other organizations and incorporates data from 8 physiographic and 16 dynamic oceanographic and biological covariates, and controls for the influence of sea state, group size, availability bias, and perception bias on the probability of making a sighting. These density models were originally developed for all cetacean taxa in the U.S. Atlantic (Roberts *et al.*, 2016). In subsequent years, certain models have been updated on the basis of additional data as well as certain methodological improvements. Our evaluation of the changes leads to a conclusion that these represent the best scientific evidence available. More information, including the model results and supplementary information for each model, is available online at

[seamap.env.duke.edu/models/Duke-EC-GOM-2015/](http://seamap.env.duke.edu/models/Duke-EC-GOM-2015/). Marine mammal density estimates in the project area (animals/km<sup>2</sup>) were obtained using these model results (Roberts *et al.*, 2016, 2017, 2018). The updated models incorporate additional sighting data, including sightings from the NOAA Atlantic Marine Assessment Program for Protected Species (AMAPPS) surveys from 2010–2014 (NEFSC & SEFSC, 2011, 2012, 2014a, 2014b, 2015, 2016).

For the exposure analysis, density data from Roberts *et al.* (2016, 2017, 2018) were mapped using a geographic information system (GIS). These data provide abundance estimates for species or species guilds within 10 km x 10 km grid cells (100 km<sup>2</sup>) on a monthly or annual basis, depending on the species. In order to select a representative sample of grid cells in and near the Project Area, a 10-km wide perimeter around the Lease Area and an 8-km wide perimeter around the cable route were created in GIS (ESRI 2017). The perimeters were then used to select grid cells near the Project Area containing the most recent monthly or annual estimates for each species in the Roberts *et al.* (2016, 2017, 2018) data. The average monthly abundance for each species in each survey area (deep-water and shallow-water) was calculated as the mean value of the grid cells within each survey portion in each month (July through September), and then converted for density (individuals/km<sup>2</sup>) by dividing by 100 km<sup>2</sup> (Tables 5 and 6).

Roberts *et al.* (2018) produced density models for all seals and did not differentiate by seal species. Because the seasonality and habitat use by gray seals roughly overlaps with that of harbor seals in the survey areas, it was assumed that modeled takes of seals could occur to either of the respective species, thus the total number of modeled takes for seals was applied to each species.

**Table 5. Average Monthly Densities for Species in the Lease Area and Deep-water Section of the Cable Route**

Species	Estimated monthly density (individuals/km <sup>2</sup> )		
	July	August	September
Fin whale	0.0033	0.0029	0.0025
Humpback whale	0.0011	0.0005	0.0011
Minke whale	0.0010	0.0007	0.0008
North Atlantic right whale	0.0000	0.0000	0.0000
Sei whale	0.0001	0.0000	0.0001
Atlantic white-sided dolphin	0.0446	0.0243	0.0246
Bottlenose dolphin	0.0516	0.0396	0.0494
Harbor porpoise	0.0125	0.0114	0.0093
Pilot whale	0.0066	0.0066	0.0066
Risso's dolphin	0.0005	0.0009	0.0007
Common dolphin	0.0614	0.1069	0.1711
Sperm whale	0.0004	0.0004	0.0002
Seals (harbor and gray)	0.0061	0.0033	0.0040

**Table 6. Average Monthly Densities for Species in the Shallow-water Section of the Cable Route**

Species	Estimated monthly density (individuals/km <sup>2</sup> )		
	July	August	September
Fin whale	0.0003	0.0003	0.0003
Humpback whale	0.0001	0.0000	0.0001
Minke whale	0.0000	0.0000	0.0000
North Atlantic right whale	0.0000	0.0000	0.0000
Sei whale	0.0000	0.0000	0.0000
Atlantic white-sided dolphin	0.0006	0.0005	0.0008
Bottlenose dolphin	0.4199	0.3211	0.3077
Harbor porpoise	0.0023	0.0037	0.0036
Pilot whale	0.0000	0.0000	0.0000
Risso's dolphin	0.0000	0.0000	0.0000
Common dolphin	0.0002	0.0006	0.0009
Sperm whale	0.0000	0.0000	0.0000
Seals (harbor and gray)	0.0281	0.0120	0.0245

*Take Calculation and Estimation*

Here we describe how the information provided above is brought together to produce a quantitative take estimate.

In order to estimate the number of marine mammals predicted to be exposed to sound levels that would result in harassment, radial distances to predicted isopleths corresponding to harassment thresholds are calculated, as described above. Those distances are then used to calculate the area(s) around the HRG survey equipment predicted to be ensonified to sound levels that exceed harassment thresholds. The area estimated to be ensonified to relevant thresholds in a single day is then calculated, based on areas predicted to be ensonified around the HRG survey equipment and the estimated trackline distance traveled per day by the survey vessel. Mayflower estimates that the survey vessel in the Lease Area and deep-water sections of the cable route will achieve a maximum daily trackline of 110 km per day and the survey vessels in the shallow-water section of the cable route will achieve a maximum of 55 km per day during planned HRG surveys. This distance accounts for survey vessels traveling at roughly 3 knots and accounts for non-active survey periods.

Based on the maximum estimated distance to the Level B harassment threshold of 141 m (Table 4) and the maximum estimated daily track line distance of 110 km, an area of 31.1 km<sup>2</sup> would be ensonified to the Level B harassment threshold each day in the Lease Area and deep-water section of the cable route during Mayflower's planned surveys. During 90 days of anticipated survey activity over the three month period (July through September), approximately 30 days of survey activity are expected each month, for an average of 933 km<sup>2</sup> ensonified to the Level B harassment threshold in the Lease Area and deep-water section of the cable route each month of survey activities.

Similarly, based on the maximum estimated distance to the Level B harassment threshold of 141 m (Table 4) and the maximum estimated daily track line distance of 55 km, an area of 15.6 km<sup>2</sup> would be ensonified to the Level B harassment threshold each day in the shallow-water section of the cable route. During 125 days of anticipated survey activity over the three month period (July through September), approximately 41.7 days of survey activity (split among two vessels) are expected each month, for an average of 650 km<sup>2</sup> ensonified to the Level B harassment threshold in the shallow-water section of the cable route each month of survey activities.

As described above, this is a conservative estimate as it assumes the HRG sources that result in the greatest isopleth distances to the Level B harassment threshold would be operated at all times during all 215 vessel days.

The estimated numbers of marine mammals that may be taken by Level B harassment were calculated by multiplying the monthly density for each species in each survey area (Tables 5 and 6) by the respective monthly ensonified area within each survey section. The results were then summed to determine the total estimated take (Table 7).

**Table 7. Total Numbers of Authorized Incidental Takes of Marine Mammals and Takes as a Percentage of Population**

Species	Calculated Take by Survey Region		Total Calculated Takes by Level B harassment	Authorized Takes by Level A Harassment	Authorized Takes by Level B Harassment <sup>b</sup>	Total Authorized Instances of Take as a Percentage of Population <sup>a</sup>
	Lease Area and Deep-water Cable Route	Shallow-water Cable Route				
Fin whale	8.3	0.6	8.9	0	9	0.3
Humpback whale	2.9	0.2	3.1	0	4	0.2
Minke whale	3.4	0.2	3.6	0	4	0.1
North Atlantic right whale	0.9	0	0.9	0	3 <sup>c</sup>	0.8
Sei whale	0.3	0	0.3	0	2 <sup>c</sup>	0.4

Atlantic white-sided dolphin	109.3	1.4	110.7	0	111	0.1
Bottlenose dolphin	131.0	680.4	811.5	0	812	1.0
Harbor porpoise	36.4	7	43.4	0	44	0.1
Pilot whale	18.4	0	18.4	0	19	0.1
Risso's dolphin	1.7	0	1.7	0	6 <sup>b</sup>	0.1
Common dolphin	316.5	1.1	317.6	0	318	0.3
Sperm whale	0.8	0	0.8	0	2 <sup>c</sup>	< 0.01
Seals (harbor and gray)	40.4	152.8	193.2	0	194	0.7

<sup>a</sup> Calculations of percentage of stock taken are based on the best available abundance estimate as shown in Table 2. In most cases the best available abundance estimate is provided by Roberts *et al.* (2016, 2017, 2018), when available, to maintain consistency with density estimates derived from Roberts *et al.* (2016, 2017, 2018). For bottlenose dolphins and seals, Roberts *et al.* (2016, 2017, 2018) provides only a single abundance estimate and does not provide abundance estimates at the stock or species level (respectively), so the abundance estimate used to estimate percentage of stock taken for bottlenose dolphins is derived from NMFS SARs (Hayes *et al.*, 2019). For seals, NMFS proposes to authorize 194 takes of seals as a guild by Level B harassment and assumes take could occur to either species. For the purposes of estimating percentage of stock taken, the NMFS SARs abundance estimate for gray seals was used as the abundance of gray seals is lower than that of harbor seals (Hayes *et al.*, 2019).

<sup>b</sup> Authorized take equal to calculated take rounded up to next integer, or mean group size.

<sup>c</sup> Authorized take increased to mean group size (Palka *et al.*, 2017; Kraus *et al.*, 2016).

Using the take methodology approach described above, the take estimates for Risso's dolphin, sei whale, North Atlantic right whale, and sperm whale were less than the average group sizes estimated for these species (Table 7). However, information on the social structures of these species indicates these species are likely to be encountered in groups. Therefore it is reasonable to conservatively assume that one group of each of these species will be taken during the planned survey. We have therefore authorized the take of the average group size for these species to account for the possibility that the planned survey encounters a group of either of these species (Table 7).

As described above, NMFS has determined that the likelihood of take of any marine mammals in the form of Level A harassment occurring as a result of the planned

surveys is so low as to be discountable; therefore, we have not authorized take of any marine mammals by Level A harassment.

### **Mitigation**

In order to issue an IHA under Section 101(a)(5)(D) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to the activity, and other means of effecting the least practicable impact on the species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of the species or stock for taking for certain subsistence uses (latter not applicable for this action). NMFS regulations require applicants for incidental take authorizations to include information about the availability and feasibility (economic and technological) of equipment, methods, and manner of conducting the activity or other means of effecting the least practicable adverse impact upon the affected species or stocks and their habitat (50 CFR 216.104(a)(11)).

In evaluating how mitigation may or may not be appropriate to ensure the least practicable adverse impact on species or stocks and their habitat, as well as subsistence uses where applicable, we carefully consider two primary factors:

(1) the manner in which, and the degree to which, the successful implementation of the measure(s) is expected to reduce impacts to marine mammals, marine mammal species or stocks, and their habitat. This considers the nature of the potential adverse impact being mitigated (likelihood, scope, range). It further considers the likelihood that the measure will be effective if implemented (probability of accomplishing the mitigating result if implemented as planned), the likelihood of effective implementation (probability implemented as planned); and

(2) the practicability of the measures for applicant implementation, which may consider such things as cost, impact on operations, and, in the case of a military readiness activity, personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity.

### *Mitigation Measures*

NMFS has required the following mitigation measures be implemented during Mayflower's planned marine site characterization surveys.

### *Marine Mammal Exclusion Zones, Buffer Zone and Monitoring Zone*

Marine mammal exclusion zones (EZ) must be established around the HRG survey equipment and monitored by protected species observers (PSO) during HRG surveys as follows:

- A 500-m EZ is required for North Atlantic right whales; and
- A 100-m EZ is required for all other marine mammals (with the exception of certain small dolphin species and pinnipeds specified below).

If a marine mammal is detected approaching or entering the EZs during the planned survey, the vessel operator must adhere to the shutdown procedures described below. In addition to the EZs described above, PSOs must visually monitor a 200 m Buffer Zone. During use of acoustic sources with the potential to result in marine mammal harassment (i.e., anytime the acoustic source is active, including ramp-up), occurrences of marine mammals within the Buffer Zone (but outside the EZs) must be communicated to the vessel operator to prepare for potential shutdown of the acoustic source. The Buffer Zone is not applicable when the EZ is greater than 100 meters. PSOs are also required to observe a 500-m Monitoring Zone and record the presence of all

marine mammals within this zone. In addition, any marine mammals observed within 141 m of the active HRG equipment operating at or below 180 kHz must be documented by PSOs as taken by Level B harassment. The zones described above must be based upon the radial distance from the active equipment (rather than being based on distance from the vessel itself).

### *Visual Monitoring*

A minimum of one NMFS-approved PSO must be on duty and conducting visual observations at all times during daylight hours (i.e., from 30 minutes prior to sunrise through 30 minutes following sunset) and 30 minutes prior to and during nighttime ramp-ups of HRG equipment. Visual monitoring must begin no less than 30 minutes prior to ramp-up of HRG equipment and must continue until 30 minutes after use of the acoustic source ceases or until 30 minutes past sunset. PSOs must establish and monitor the applicable EZs, Buffer Zone and Monitoring Zone as described above. Visual PSOs must coordinate to ensure 360° visual coverage around the vessel from the most appropriate observation posts, and must conduct visual observations using binoculars and the naked eye while free from distractions and in a consistent, systematic, and diligent manner. PSOs must estimate distances to marine mammals located in proximity to the vessel and/or relevant using range finders. It is the responsibility of the Lead PSO on duty to communicate the presence of marine mammals as well as to communicate and enforce the action(s) that are necessary to ensure mitigation and monitoring requirements are implemented as appropriate. Position data must be recorded using hand-held or vessel global positioning system (GPS) units for each confirmed marine mammal sighting.

### *Pre-Clearance of the Exclusion Zones*

Prior to initiating HRG survey activities, Mayflower must implement a 30-minute pre-clearance period. During pre-clearance monitoring (*i.e.*, before ramp-up of HRG equipment begins), the Buffer Zone will also act as an extension of the 100-m EZ in that observations of marine mammals within the 200-m Buffer Zone will also preclude HRG operations from beginning. During this period, PSOs must ensure that no marine mammals are observed within 200 m of the survey equipment (500 m in the case of North Atlantic right whales). HRG equipment must not start up until this 200-m zone (or, 500-m zone in the case of North Atlantic right whales) is clear of marine mammals for at least 30 minutes. The vessel operator must notify a designated PSO of the planned start of HRG survey equipment as agreed upon with the lead PSO; the notification time should not be less than 30 minutes prior to the planned initiation of HRG equipment order to allow the PSOs time to monitor the EZs and Buffer Zone for the 30 minutes of pre-clearance. A PSO conducting pre-clearance observations must be notified again immediately prior to initiating active HRG sources.

If a marine mammal were observed within the relevant EZs or Buffer Zone during the pre-clearance period, initiation of HRG survey equipment must not begin until the animal(s) has been observed exiting the respective EZ or Buffer Zone, or, until an additional time period has elapsed with no further sighting (*i.e.*, minimum 15 minutes for small odontocetes and seals, and 30 minutes for all other species). The pre-clearance requirement includes small delphinoids that approach the vessel (*e.g.*, bow ride). PSOs must also continue to monitor the zone for 30 minutes after survey equipment is shut down or survey activity has concluded.

#### *Ramp-Up of Survey Equipment*

When technically feasible, a ramp-up procedure must be used for geophysical survey equipment capable of adjusting energy levels at the start or re-start of survey activities. The ramp-up procedure must be used at the beginning of HRG survey activities in order to provide additional protection to marine mammals near the Project Area by allowing them to detect the presence of the survey and vacate the area prior to the commencement of survey equipment operation at full power. Ramp-up of the survey equipment must not begin until the relevant EZs and Buffer Zone has been cleared by the PSOs, as described above. HRG equipment must be initiated at their lowest power output and must be incrementally increased to full power. If any marine mammals are detected within the EZs or Buffer Zone prior to or during ramp-up, the HRG equipment must be shut down (as described below).

#### *Shutdown Procedures*

If an HRG source is active and a marine mammal is observed within or entering a relevant EZ (as described above) an immediate shutdown of the HRG survey equipment is required. When shutdown is called for by a PSO, the acoustic source must be immediately deactivated and any dispute resolved only following deactivation. Any PSO on duty has the authority to delay the start of survey operations or to call for shutdown of the acoustic source if a marine mammal is detected within the applicable EZ. The vessel operator must establish and maintain clear lines of communication directly between PSOs on duty and crew controlling the HRG source(s) to ensure that shutdown commands are conveyed swiftly while allowing PSOs to maintain watch. Subsequent restart of the HRG equipment must only occur after the marine mammal has either been observed exiting the relevant EZ, or, until an additional time period has elapsed with no further sighting of the

animal within the relevant EZ (*i.e.*, 15 minutes for small odontocetes and seals, and 30 minutes for large whales).

Upon implementation of shutdown, the HRG source may be reactivated after the marine mammal that triggered the shutdown has been observed exiting the applicable EZ (*i.e.*, the animal is not required to fully exit the Buffer Zone where applicable) or, following a clearance period of 15 minutes for small odontocetes and seals and 30 minutes for all other species with no further observation of the marine mammal(s) within the relevant EZ. If the HRG equipment shuts down for brief periods (*i.e.*, less than 30 minutes) for reasons other than mitigation (*e.g.*, mechanical or electronic failure) the equipment may be re-activated as soon as is practicable at full operational level, without 30 minutes of pre-clearance, only if PSOs have maintained constant visual observation during the shutdown and no visual detections of marine mammals occurred within the applicable EZs and Buffer Zone during that time. For a shutdown of 30 minutes or longer, or if visual observation was not continued diligently during the pause, pre-clearance observation is required, as described above.

The shutdown requirement is waived for certain genera of small delphinids (*i.e.*, *Delphinus*, *Lagenorhynchus*, and *Tursiops*) and pinnipeds (gray and harbor seals) under certain circumstances. If a delphinid(s) from these genera or seal(s) is visually detected approaching the vessel (*i.e.*, to bow ride) or towed survey equipment, shutdown is not required. If there is uncertainty regarding identification of a marine mammal species (*i.e.*, whether the observed marine mammal(s) belongs to one of the delphinid genera for which shutdown is waived), PSOs must use best professional judgment in making the decision to call for a shutdown.

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 have been met, approaches or is observed within the area encompassing the Level B harassment isopleth (141 m), shutdown must occur.

#### *Vessel Strike Avoidance*

Vessel strike avoidance measures include, but are not limited to, the following, except under circumstances when complying with these requirements would put the safety of the vessel or crew at risk:

- All vessel operators and crew will maintain vigilant watch for cetaceans and pinnipeds, and slow down or stop their vessel to avoid striking these protected species;
- All survey vessels, regardless of size, must observe a 10-knot speed restriction in DMAs designated by NMFS for the protection of North Atlantic right whales from vessel strikes. Note that this requirement includes vessels, regardless of size, to adhere to a 10 knot speed limit in DMAs, not just vessels 65 ft or greater in length;
- All vessel operators will reduce vessel speed to 10 knots (18.5 km/hr) or less when any large whale, any mother/calf pairs, large assemblages of non-delphinoid cetaceans are observed near (within 100 m (330 ft)) an underway vessel;
- All vessels will maintain a separation distance of 500 m (1,640 ft) or greater from any sighted North Atlantic right whale;
- If underway, vessels must steer a course away from any sighted North Atlantic right whale at 10 knots (18.5 km/hr) or less until the 500-m (1,640 ft) minimum

separation distance has been established. If a North Atlantic right whale is sighted in a vessel's path, or within 100 m (330 ft) to an underway vessel, the underway vessel must reduce speed and shift the engine to neutral. Engines will not be engaged until the North Atlantic right whale has moved outside of the vessel's path and beyond 100 m. If stationary, the vessel must not engage engines until the North Atlantic right whale has moved beyond 100 m;

- All vessels will maintain a separation distance of 100 m (330 ft) or greater from any sighted non-delphinoid cetacean. If sighted, the vessel underway must reduce speed and shift the engine to neutral, and must not engage the engines until the non-delphinoid cetacean has moved outside of the vessel's path and beyond 100 m. If a survey vessel is stationary, the vessel will not engage engines until the non-delphinoid cetacean has moved out of the vessel's path and beyond 100 m;
- All vessels will maintain a separation distance of 50 m (164 ft) or greater from any sighted delphinoid cetacean. Any vessel underway remain parallel to a sighted delphinoid cetacean's course whenever possible, and avoid excessive speed or abrupt changes in direction. Any vessel underway reduces vessel speed to 10 knots (18.5 km/hr) or less when pods (including mother/calf pairs) or large assemblages of delphinoid cetaceans are observed. Vessels may not adjust course and speed until the delphinoid cetaceans have moved beyond 50 m and/or the abeam of the underway vessel;
- All vessels will maintain a separation distance of 50 m (164 ft) or greater from any sighted pinniped; and

- All vessels underway will not divert or alter course in order to approach any whale, delphinoid cetacean, or pinniped. Any vessel underway will avoid excessive speed or abrupt changes in direction to avoid injury to the sighted cetacean or pinniped.

Project-specific training will be conducted for all vessel crew prior to the start of survey activities. Confirmation of the training and understanding of the requirements will be documented on a training course log sheet. Signing the log sheet will certify that the crew members understand and will comply with the necessary requirements throughout the survey activities.

#### *Passive Acoustic Monitoring*

Mayflower will also employ passive acoustic monitoring (PAM) to support monitoring during night time operations to provide for acquisition of species detections at night. While PAM is not typically required by NMFS for HRG surveys, it may provide additional benefit as a mitigation and monitoring measure to further limit potential exposure to underwater sound at levels that could result in injury or behavioral harassment.

Based on our evaluation of the applicant's planned measures, as well as other measures considered by NMFS, NMFS has determined that the required mitigation measures provide the means effecting the least practicable impact on the affected species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance.

#### **Monitoring and Reporting**

In order to issue an IHA for an activity, Section 101(a)(5)(D) of the MMPA states that NMFS must set forth requirements pertaining to the monitoring and reporting of such taking. The MMPA implementing regulations at 50 CFR 216.104 (a)(13) indicate that requests for authorizations must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present in the planned action area. Effective reporting is critical both to compliance as well as ensuring that the most value is obtained from the required monitoring.

Monitoring and reporting requirements prescribed by NMFS should contribute to improved understanding of one or more of the following:

- Occurrence of marine mammal species or stocks in the area in which take is anticipated (*e.g.*, presence, abundance, distribution, density);
- Nature, scope, or context of likely marine mammal exposure to potential stressors/impacts (individual or cumulative, acute or chronic), through better understanding of: (1) action or environment (*e.g.*, source characterization, propagation, ambient noise); (2) affected species (*e.g.*, life history, dive patterns); (3) co-occurrence of marine mammal species with the action; or (4) biological or behavioral context of exposure (*e.g.*, age, calving or feeding areas);
- Individual marine mammal responses (behavioral or physiological) to acoustic stressors (acute, chronic, or cumulative), other stressors, or cumulative impacts from multiple stressors;
- How anticipated responses to stressors impact either: (1) long-term fitness and survival of individual marine mammals; or (2) populations, species, or stocks;

- Effects on marine mammal habitat (*e.g.*, marine mammal prey species, acoustic habitat, or other important physical components of marine mammal habitat); and
- Mitigation and monitoring effectiveness.

### *Monitoring Measures*

As described above, visual monitoring must be performed by qualified and NMFS-approved PSOs. Mayflower must use independent, dedicated, trained PSOs, meaning that the PSOs must be employed by a third-party observer provider, must have no tasks other than to conduct observational effort, collect data, and communicate with and instruct relevant vessel crew with regard to the presence of marine mammals and mitigation requirements (including brief alerts regarding maritime hazards), and must have successfully completed an approved PSO training course appropriate for their designated task. Mayflower must provide resumes of all proposed PSOs (including alternates) to NMFS for review and approval prior to the start of survey operations.

During survey operations (*e.g.*, any day on which use of an HRG source is planned to occur), a minimum of one PSO must be on duty and conducting visual observations at all times on all active survey vessels during daylight hours (*i.e.*, from 30 minutes prior to sunrise through 30 minutes following sunset) and nighttime ramp-ups of HRG equipment. Visual monitoring must begin no less than 30 minutes prior to initiation of HRG survey equipment and must continue until one hour after use of the acoustic source ceases or until 30 minutes past sunset. PSOs must coordinate to ensure 360° visual coverage around the vessel from the most appropriate observation posts, and must conduct visual observations using binoculars and the naked eye while free from distractions and in a consistent, systematic, and diligent manner. PSOs may be on watch

for a maximum of four consecutive hours followed by a break of at least two hours between watches and may conduct a maximum of 12 hours of observation per 24-hour period. In cases where multiple vessels are surveying concurrently, any observations of marine mammals must be communicated to PSOs on all survey vessels.

PSOs must be equipped with binoculars and have the ability to estimate distances to marine mammals located in proximity to the vessel and/or exclusion zone using range finders. Reticulated binoculars will also be available to PSOs for use as appropriate based on conditions and visibility to support the monitoring of marine mammals. Position data must be recorded using hand-held or vessel GPS units for each sighting. Observations must take place from the highest available vantage point on the survey vessel. General 360-degree scanning must occur during the monitoring periods, and target scanning by the PSO must occur when alerted of a marine mammal presence.

During good conditions (*e.g.*, daylight hours; Beaufort sea state (BSS) 3 or less), to the maximum extent practicable, PSOs must conduct observations when the acoustic source is not operating for comparison of sighting rates and behavior with and without use of the acoustic source and between acquisition periods. Any observations of marine mammals by crew members aboard any vessel associated with the survey must be relayed to the PSO team.

Data on all PSO observations must be recorded based on standard PSO collection requirements. This includes dates, times, and locations of survey operations; dates and times of observations, location and weather; details of marine mammal sightings (*e.g.*, species, numbers, behavior); and details of any observed marine mammal take that occurs (*e.g.*, noted behavioral disturbances).

### *Reporting Measures*

Within 90 days after completion of survey activities, a final technical report must be provided to NMFS that fully documents the methods and monitoring protocols, summarizes the data recorded during monitoring, summarizes the number of marine mammals estimated to have been taken during survey activities (by species, when known), summarizes the mitigation actions taken during surveys (including what type of mitigation and the species and number of animals that prompted the mitigation action, when known), and provides an interpretation of the results and effectiveness of all mitigation and monitoring. Any recommendations made by NMFS must be addressed in the final report prior to acceptance by NMFS.

In addition to the final technical report, Mayflower must provide the reports described below as necessary during survey activities. In the unanticipated event that Mayflower's activities lead to an injury (Level A harassment) of a marine mammal, Mayflower must immediately cease the specified activities and report the incident to the NMFS Office of Protected Resources Permits and Conservation Division and the NMFS Northeast Regional Stranding Coordinator. The report must include the following information:

- Time, date, and location (latitude/longitude) of the incident;
- Name and type of vessel involved;
- Vessel's speed during and leading up to the incident;
- Description of the incident;
- Status of all sound source use in the 24 hours preceding the incident;
- Water depth;

- Environmental conditions (*e.g.*, wind speed and direction, Beaufort sea state, cloud cover, and visibility);
- Description of all marine mammal observations in the 24 hours preceding the incident;
- Species identification or description of the animal(s) involved;
- Fate of the animal(s); and
- Photographs or video footage of the animal(s) (if equipment is available).

Activities must not resume until NMFS is able to review the circumstances of the event. NMFS will work with Mayflower to minimize reoccurrence of such an event in the future. Mayflower must not resume activities until notified by NMFS.

In the event that Mayflower personnel discover an injured or dead marine mammal, Mayflower must report the incident to the OPR Permits and Conservation Division and the NMFS Northeast Regional Stranding Coordinator as soon as feasible.

The report must include the following information:

- Time, date, and location (latitude/longitude) of the first discovery (and updated location information if known and applicable);
- Species identification (if known) or description of the animal(s) involved;
- Condition of the animal(s) (including carcass condition if the animal is dead);
- Observed behaviors of the animal(s), if alive;
- If available, photographs or video footage of the animal(s); and
- General circumstances under which the animal was discovered.

In the unanticipated event of a ship strike of a marine mammal by any vessel involved in the activities covered by the IHA, Mayflower must report the incident to the NMFS OPR Permits and Conservation Division and the NMFS Northeast Regional Stranding Coordinator as soon as feasible. The report must include the following information:

- Time, date, and location (latitude/longitude) of the incident;
- Species identification (if known) or description of the animal(s) involved;
- Vessel's speed during and leading up to the incident;
- Vessel's course/heading and what operations were being conducted (if applicable);
- Status of all sound sources in use;
- Description of avoidance measures/requirements that were in place at the time of the strike and what additional measures were taken, if any, to avoid strike;
- Environmental conditions (*e.g.*, wind speed and direction, Beaufort sea state, cloud cover, visibility) immediately preceding the strike;
- Estimated size and length of animal that was struck;
- Description of the behavior of the marine mammal immediately preceding and following the strike;
- If available, description of the presence and behavior of any other marine mammals immediately preceding the strike;

- Estimated fate of the animal (*e.g.*, dead, injured but alive, injured and moving, blood or tissue observed in the water, status unknown, disappeared); and
- To the extent practicable, photographs or video footage of the animal(s).

### **Negligible Impact Analysis and Determination**

NMFS has defined negligible impact as an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival (50 CFR 216.103). A negligible impact finding is based on the lack of likely adverse effects on annual rates of recruitment or survival (*i.e.*, population-level effects). An estimate of the number of takes alone is not enough information on which to base an impact determination. In addition to considering estimates of the number of marine mammals that might be “taken” through harassment, NMFS considers other factors, such as the likely nature of any responses (*e.g.*, intensity, duration), the context of any responses (*e.g.*, critical reproductive time or location, migration), as well as effects on habitat, and the likely effectiveness of the mitigation. We also assess the number, intensity, and context of estimated takes by evaluating this information relative to population status. Consistent with the 1989 preamble for NMFS’s implementing regulations (54 FR 40338; September 29, 1989), the impacts from other past and ongoing anthropogenic activities are incorporated into this analysis via their impacts on the environmental baseline (*e.g.*, as reflected in the regulatory status of the species, population size and growth rate where known, ongoing sources of human-caused mortality, or ambient noise levels).

To avoid repetition, our analysis applies to all the species listed in Table 7, given that NMFS expects the anticipated effects of the planned survey to be similar in nature. NMFS does not anticipate that serious injury or mortality would result from HRG surveys, even in the absence of mitigation, and no serious injury or mortality is authorized. As discussed in the *Potential Effects* section of the notice of proposed IHA (85 FR 31856; May 27, 2020), non-auditory physical effects and vessel strike are not expected to occur. We expect that potential takes would be in the form of short-term Level B behavioral harassment in the form of temporary avoidance of the area or decreased foraging (if such activity were occurring), reactions that are considered to be of low severity and with no lasting biological consequences (*e.g.*, Southall *et al.*, 2007). As described above, Level A harassment is not expected to result given the nature of the operations, the anticipated size of the Level A harassment zones, the density of marine mammals in the area, and the required shutdown zones.

Effects on individuals that are taken by Level B harassment, on the basis of reports in the literature as well as monitoring from other similar activities, will likely be limited to reactions such as increased swimming speeds, increased surfacing time, or decreased foraging (if such activity were occurring). Most likely, individuals will simply move away from the sound source and temporarily avoid the area where the survey is occurring. We expect that any avoidance of the survey area by marine mammals would be temporary in nature and that any marine mammals that avoid the survey area during the survey activities would not be permanently displaced. Even repeated Level B harassment of some small subset of an overall stock is unlikely to result in any significant

realized decrease in viability for the affected individuals, and thus would not result in any adverse impact to the stock as a whole.

Regarding impacts to marine mammal habitat, prey species are mobile, and are broadly distributed throughout the Project Area and the footprint of the activity is small; therefore, marine mammals that may be temporarily displaced during survey activities are expected to be able to resume foraging once they have moved away from areas with disturbing levels of underwater noise. Because of the availability of similar habitat and resources in the surrounding area the impacts to marine mammals and the food sources that they utilize are not expected to cause significant or long-term consequences for individual marine mammals or their populations. The HRG survey equipment itself will not result in physical habitat disturbance. Avoidance of the area around the HRG survey activities by marine mammal prey species is possible. However, any avoidance by prey species would be expected to be short term and temporary.

ESA-listed species for which takes are authorized are North Atlantic right, fin, sei, and sperm whales, and these effects are anticipated to be limited to lower level behavioral effects. The planned survey is not anticipated to affect the fitness or reproductive success of individual animals. Since impacts to individual survivorship and fecundity are unlikely, the planned survey is not expected to result in population-level effects for any ESA-listed species or alter current population trends of any ESA-listed species.

The status of the North Atlantic right whale population is of heightened concern and, therefore, merits additional analysis. NMFS has rigorously assessed potential impacts to right whales from this survey. We have established a 500-m shutdown zone

for right whales which is precautionary considering the Level B harassment isopleth for the largest source utilized (*i.e.* GeoMarine Geo-Source 400 tip sparker) is estimated to be 141 m.

The Project Area encompasses or is in close proximity to feeding biologically important areas (BIAs) for right whales (February-April), humpback whales (March-December), fin whales (March-October), and sei whales (May-November) as well as a migratory BIA for right whales (March-April and November-December. Most of these feeding BIAs are extensive and sufficiently large (705 km<sup>2</sup> and 3,149 km<sup>2</sup> for right whales; 47,701 km<sup>2</sup> for humpback whales; 2,933 km<sup>2</sup> for fin whales; and 56,609 km<sup>2</sup> for sei whales), and the acoustic footprint of the planned survey is sufficiently small, that feeding opportunities for these whales would not be reduced appreciably. Any whales temporarily displaced from the Project Area would be expected to have sufficient remaining feeding habitat available to them, and would not be prevented from feeding in other areas within the biologically important feeding habitat. In addition, any displacement of whales from the BIA or interruption of foraging bouts would be expected to be temporary in nature. Therefore, we do not expect impacts to whales within feeding BIAs to effect the fitness of any large whales.

A migratory BIA for North Atlantic right whales (effective March-April and November-December) extends from Massachusetts to Florida (LaBrecque, *et al.*, 2015). Off the south coast of Massachusetts and Rhode Island, this BIA extends from the coast to beyond the shelf break. The fact that the spatial acoustic footprint of the planned survey is very small relative to the spatial extent of the available migratory habitat means that right whale migration is not expected to be impacted by the p survey. Required

vessel strike avoidance measures will also decrease risk of ship strike during migration. NMFS is expanding the standard avoidance measures by requiring that all vessels, regardless of size, adhere to a 10 knot speed limit in any established DMAs. Additionally, limited take by Level B harassment of North Atlantic right whales has been authorized as HRG survey operations are required to shut down at 500 m to minimize the potential for behavioral harassment of this species.

There are several active unusual mortality events (UMEs) occurring in the vicinity of Mayflower's planned surveys. Elevated humpback whale mortalities have occurred along the Atlantic coast from Maine through Florida since January 2016. Of the cases examined, approximately half had evidence of human interaction (ship strike or entanglement). The UME does not yet provide cause for concern regarding population-level impacts. Despite the UME, the relevant population of humpback whales (the West Indies breeding population, or distinct population segment (DPS)) remains stable. Beginning in January 2017, elevated minke whale strandings have occurred along the Atlantic coast from Maine through South Carolina, with highest numbers in Massachusetts, Maine, and New York. This event does not provide cause for concern regarding population level impacts, as the likely population abundance is greater than 20,000 whales. Elevated North Atlantic right whale mortalities began in June 2017, primarily in Canada. Overall, preliminary findings support human interactions, specifically vessel strikes or rope entanglements, as the cause of death for the majority of the right whales. Elevated numbers of harbor seal and gray seal mortalities were first observed in July 2018 and have occurred across Maine, New Hampshire and Massachusetts. Based on tests conducted so far, the main pathogen found in the seals is

phocine distemper virus although additional testing to identify other factors that may be involved in this UME are underway. The UME does not yet provide cause for concern regarding population-level impacts to any of these stocks. For harbor seals, the population abundance is over 75,000 and annual M/SI (345) is well below PBR (2,006) (Hayes *et al.*, 2018). For gray seals, the population abundance in the United States is over 27,000, with an estimated abundance including seals in Canada of approximately 505,000, and abundance is likely increasing in the U.S. Atlantic Exclusive Economic Zone as well as in Canada (Hayes *et al.*, 2018).

Direct physical interactions (ship strikes and entanglements) appear to be responsible for many of the UME humpback and right whale mortalities recorded. The planned HRG survey will require ship strike avoidance measures which would minimize the risk of ship strikes while fishing gear and in-water lines will not be employed as part of the survey. Furthermore, the planned activities are not expected to promote the transmission of infectious disease among marine mammals. The survey is not expected to result in the deaths of any marine mammals or combine with the effects of the ongoing UMEs to result in any additional impacts not analyzed here. Accordingly, Mayflower did not request, and NMFS has not authorized, take of marine mammals by serious injury, or mortality.

The required mitigation measures are expected to reduce the number and/or severity of takes by giving animals the opportunity to move away from the sound source before HRG survey equipment reaches full energy and preventing animals from being exposed to sound levels that have the potential to cause injury (Level A harassment) and

more severe Level B harassment during HRG survey activities, even in the biologically important areas described above. No Level A harassment is anticipated or authorized.

NMFS expects that takes would be in the form of short-term Level B behavioral harassment in the form of brief startling reaction and/or temporary vacating of the area, or decreased foraging (if such activity were occurring)—reactions that (at the scale and intensity anticipated here) are considered to be of low severity and with no lasting biological consequences. Since both the source and the marine mammals are mobile, only a smaller area would be ensounded by sound levels that could result in take for only a short period. Additionally, required mitigation measures would reduce exposure to sound that could result in more severe behavioral harassment.

In summary and as described above, the following factors primarily support our determination that the impacts resulting from this activity are not expected to adversely affect the species or stock through effects on annual rates of recruitment or survival:

- No mortality or serious injury is anticipated or authorized;
- No Level A harassment (PTS) is anticipated;
- Any foraging interruptions are expected to be short term and unlikely to be cause significantly impacts;
- Impacts on marine mammal habitat and species that serve as prey species for marine mammals are expected to be minimal and the alternate areas of similar habitat value for marine mammals are readily available;
- Take is anticipated to be primarily Level B behavioral harassment consisting of brief startling reactions and/or temporary avoidance of the Project Area;

- Survey activities would occur in such a comparatively small portion of the biologically important area for north Atlantic right whale migration, that any avoidance of the Project Area due to activities would not affect migration. In addition, mitigation measures to shut down at 500 m to minimize potential for Level B behavioral harassment would limit both the number and severity of take of the species;
- Similarly, due to the relatively small footprint of the survey activities in relation to the size of a biologically important areas for right, humpback, fin, and sei whales foraging, the survey activities would not affect foraging success of this species; and
- Required mitigation measures, including visual monitoring and shutdowns, are expected to minimize the intensity of potential impacts to marine mammals.

Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the required monitoring and mitigation measures, NMFS finds that the total marine mammal take from the Mayflower's planned HRG surveys will have a negligible impact on all affected marine mammal species or stocks.

### **Small Numbers**

As noted above, only small numbers of incidental take may be authorized under sections 101(a)(5)(A) and (D) of the MMPA for specified activities other than military readiness activities. The MMPA does not define small numbers and so, in practice, where estimated numbers are available, NMFS compares the number of individuals taken to the

most appropriate estimation of abundance of the relevant species or stock in our determination of whether an authorization is limited to small numbers of marine mammals. Additionally, other qualitative factors may be considered in the analysis, such as the temporal or spatial scale of the activities.

The numbers of marine mammals that we authorize to be taken, for all species and stocks, would be considered small relative to the relevant stocks or populations (less than one third of the best available population abundance for all species and stocks) (see Table 7). In fact, the total amount of taking authorized for all species is 1 percent or less for all affected stocks.

Based on the analysis contained herein of the planned activity (including the required mitigation and monitoring measures) and the anticipated take of marine mammals, NMFS finds that small numbers of marine mammals will be taken relative to the population size of the affected species or stocks.

### **Unmitigable Adverse Impact Analysis and Determination**

There are no relevant subsistence uses of the affected marine mammal stocks or species implicated by this action. Therefore, NMFS has determined that the total taking of affected species or stocks would not have an unmitigable adverse impact on the availability of such species or stocks for taking for subsistence purposes.

### **National Environmental Policy Act**

To comply with the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 *et seq.*) and NOAA Administrative Order (NAO) 216-6A, NMFS must review our proposed action (*i.e.*, the issuance of an incidental harassment authorization) with respect to potential impacts on the human environment.

This action is consistent with categories of activities identified in Categorical Exclusion B4 (incidental harassment authorizations with no anticipated serious injury or mortality) of the Companion Manual for NOAA Administrative Order 216-6A, which do not individually or cumulatively have the potential for significant impacts on the quality of the human environment and for which we have not identified any extraordinary circumstances that would preclude this categorical exclusion. Accordingly, NMFS has determined that the issuance of the IHA qualifies to be categorically excluded from further NEPA review.

### **Endangered Species Act (ESA)**

Section 7(a)(2) of the Endangered Species Act of 1973 (16 U.S.C. 1531 *et seq.*) requires that each Federal agency insure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of designated critical habitat. To ensure ESA compliance for the issuance of IHAs, NMFS consults internally, in this case with the NMFS Greater Atlantic Regional Fisheries Office (GARFO), whenever we propose to authorize take for endangered or threatened species.

The NMFS Office of Protected Resources is authorizing the incidental take of four species of marine mammals which are listed under the ESA: fin, sei, sperm, and North Atlantic right whales. We requested initiation of consultation under section 7 of the ESA with NMFS GARFO on May 6, 2020, for the issuance of this IHA. On July 22, 2020, NMFS GARFO determined our issuance of the IHA to Mayflower was not likely to adversely affect the North Atlantic right, fin, sei, and sperm whale or the critical

habitat of any ESA-listed species or result in the take of any marine mammals in violation of the ESA.

**Authorization**

NMFS has issued an IHA to Mayflower for the potential harassment of small numbers of 14 marine mammal species incidental to the conducting marine site characterization surveys offshore of Massachusetts in the area of the Commercial Lease of Submerged Lands for Renewable Energy Development on the Outer Continental Shelf (OCS-A 0521) and along a potential submarine cable route to landfall at Falmouth, Massachusetts, provided the previously mentioned mitigation, monitoring and reporting requirements are followed.

Dated: July 23, 2020.

**Donna S. Wieting,**

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[FR Doc. 2020-16357 Filed: 7/28/2020 8:45 am; Publication Date: 7/29/2020]