**DEPARTMENT OF COMMERCE**

**National Oceanic and Atmospheric Administration**

**50 CFR Part 217**

**[Docket No. 230901–0209]**

**RIN 0648–BL36**

## Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to the Ocean Wind 1 Project Offshore of New Jersey

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

**ACTION:** Final rule.

**SUMMARY:** In accordance with the regulations implementing the Marine Mammal Protection Act (MMPA), as amended, notification is hereby given that NMFS promulgates regulations to govern the incidental taking of marine mammals incidental to Ocean Wind, LLC (Ocean Wind), a subsidiary wholly owned by Orsted Wind Power North America, LLC (Orsted), construction of the Ocean Wind 1 Offshore Wind Energy Project (hereafter known as the ''Project'') in Federal and State waters off of New Jersey, specifically within the Bureau of Ocean Energy Management (BOEM) Commercial Lease of Submerged Lands for Renewable Energy Development on the Outer Continental Shelf (OCS) Lease Area OCS–A 0498 (Lease Area) and along two export cable routes to sea-to-shore transition points (collectively referred to as the ''Project Area''), over the course of 5 years (October 13, 2023 through October 12, 2028). These regulations, which allow for the issuance of a Letter of Authorization (LOA) for the incidental take of marine mammals during construction-related activities within the Project Area during the effective dates of the regulations, prescribe the permissible methods of taking and other means of effecting the least practicable adverse impact on marine mammal species or stocks and their habitat, as well as requirements pertaining to the monitoring and reporting of such taking.

**DATES:** This rulemaking and issued LOA are effective from October 13, 2023 through October 12, 2028.

**FOR FURTHER INFORMATION CONTACT:** Kelsey Potlock, Office of Protected Resources, NMFS, (301) 427–8401.

**SUPPLEMENTARY INFORMATION:**

### Availability

A copy of Ocean Wind's Incidental Take Authorization (ITA) application, supporting documents, received public comments, and the proposed rulemaking, as well as a list of the references cited in this document, may be obtained online at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-other-energy-activities-renewable.* In case of problems accessing these documents, please call the contact listed above (see **FOR FURTHER INFORMATION CONTACT**).

### Purpose and Need for Regulatory Action

This final rule, as promulgated, provides a framework under the authority of the MMPA (16 U.S.C. 1361 *et seq.*) for NMFS to authorize the take of marine mammals incidental to construction of the Project within the Project Area. NMFS received a request from Ocean Wind to incidentally take individuals of 17 species of marine mammals, comprising 18 stocks (10 stocks by Level A harassment and Level B harassment and 8 stocks by Level B harassment only), incidental to Ocean Wind's 5 years of construction activities. No mortality or serious injury was requested nor is it anticipated or authorized in this final rulemaking.

*Legal Authority for the Final Action*

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, regulations are promulgated (when applicable), and public notice and an opportunity for public comment are provided.

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). If such findings are made, NMFS must prescribe the permissible methods of taking; ''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 as ''mitigation''); and requirements pertaining to the monitoring and reporting of such takings.

As noted above, no serious injury or mortality is anticipated or authorized in this final rule. Relevant definitions of MMPA statutory and regulatory terms are included below:

- *U.S. Citizens*—individual U.S. citizens or any corporation or similar entity if it is organized under the laws of the United States or any governmental unit defined in 16 U.S.C. 1362(13) (50 CFR 216.103);
- *Take*—to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal (16 U.S.C. 1362(13); 50 CFR 216.3);
- *Incidental harassment, incidental taking, and incidental, but not intentional, taking*—an accidental taking. This does not mean that the taking is unexpected, but rather it includes those takings that are infrequent, unavoidable or accidental (see 50 CFR 216.103);
- *Serious Injury*—any injury that will likely result in mortality (50 CFR 216.3);
- *Level A harassment*—any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal or marine mammal stock in the wild (16 U.S.C. 1362(18); 50 CFR 216.3); and
- *Level B harassment*—any act of pursuit, torment, or annoyance which 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 (16 U.S.C. 1362(18); 50 CFR 216.3).

Section 101(a)(5)(A) of the MMPA and the implementing regulations at 50 CFR part 216, subpart I provide the legal basis for proposing and, if appropriate, issuing regulations and an associated LOA(s). This final rule establishes permissible methods of taking and mitigation, monitoring, and reporting requirements for Ocean Wind's construction activities.

*Summary of Major Provisions Within the Final Rule*

The major provisions of this final rule are:

- The authorized take of marine mammals by Level A harassment and/or Level B harassment;
- No authorized take of marine mammals by mortality or serious injury;
- The establishment of a seasonal moratorium on impact pile driving of foundation piles during the months of the highest presence of North Atlantic right whales (*Eubalaena glacialis*) in the Lease Area (December 1–April 30,

annually), unless prior approval from NMFS for pile driving in December;
- The establishment of a seasonal moratorium on unexploded ordnance or munitions and explosives of concern (UXOs/MECs) detonations from November 1–April 30, annually;
- A requirement for UXO/MEC detonations to only occur during hours of daylight and not during hours of darkness;
- A requirement for both visual and passive acoustic monitoring to occur by trained, NOAA Fisheries-approved Protected Species Observers (PSOs) and Passive Acoustic Monitoring (PAM; where required) operators before, during, and after select activities;
- A requirement for training for all Ocean Wind personnel to ensure marine mammal protocols and procedures are understood;
- The establishment of clearance and shutdown zones for all in-water construction activities to prevent or reduce the risk of Level A harassment and to minimize the risk of Level B harassment;
- A requirement to use sound attenuation device(s) during all foundation impact pile driving installation activities and UXO/MEC detonations to reduce noise levels to those modeled assuming 10 decibels (dB);
- A delay to the start of foundation installation and UXO/MEC detonations if a North Atlantic right whale is observed at any distance by PSOs or acoustically detected within certain distances;
- A delay to the start of foundation installation and UXO/MEC detonations if other marine mammals are observed entering or within their respective clearance zones;
- A requirement to shut down impact pile driving (if feasible) if a North Atlantic right whale is observed or if any other marine mammals are observed entering their respective shut down zones;
- A requirement to implement sound field verification during impact pile driving of foundation piles and during UXO/MEC detonations to measure *in-situ* noise levels for comparison against the modeled results;
- A requirement to implement soft-starts during impact pile driving using the least amount of hammer energy necessary for installation;
- A requirement to implement ramp-up during the use of high-resolution geophysical (HRG) marine site characterization survey equipment;
- A requirement for PSOs to continue to monitor for 30 minutes after any impact pile driving for foundation installation and after any UXO/MEC detonations;
- A requirement for the increased awareness of North Atlantic right whale presence through monitoring of the appropriate networks and Channel 16, as well as reporting any sightings to the sighting network;
- A requirement to implement various vessel strike avoidance measures;
- A requirement to implement measures during fisheries monitoring surveys, such as removing gear from the water if marine mammals are considered at-risk or are interacting with gear; and
- A requirement for frequently scheduled and situational reporting including, but not limited to, information regarding activities occurring, marine mammal observations and acoustic detections, and sound field verification monitoring results.

NMFS must withdraw or suspend an LOA issued under these regulations, after notice and opportunity for public comment, if it finds the methods of taking or the mitigation, monitoring, or reporting measures are not being substantially complied with (16 U.S.C. 1371(a)(5)(B); 50 CFR 216.206(e)). Additionally, failure to comply with the requirements of the LOA may result in civil monetary penalties and knowing violations may result in criminal penalties (16 U.S.C. 1375).

**Fixing America's Surface Transportation Act (FAST–41)**

This project is covered under Title 41 of the Fixing America's Surface Transportation Act or ''FAST–41.'' FAST–41 includes a suite of provisions designed to expedite the environmental review for covered infrastructure projects, including enhanced interagency coordination as well as milestone tracking on the public-facing Permitting Dashboard. FAST–41 also places a 2-year limitations period on any judicial claim that challenges the validity of a Federal agency decision to issue or deny an authorization for a FAST–41 covered project (42 U.S.C. 4370m–6(a)(1)(A)).

Ocean Wind's project is listed on the Permitting Dashboard, where milestones and schedules related to the environmental review and permitting for the project can be found at *https://www.permits.performance.gov/permitting-projects/ocean-wind-project.*

**Summary of Request**

On October 21, 2021, Ocean Wind submitted a request for the promulgation of regulations and issuance of an associated LOA to take marine mammals incidental to construction activities associated with the Project in the Project Area. The request was for the incidental, but not intentional, taking of a small number of 17 marine mammal species (comprising 18 stocks) by Level B harassment (all 18 stocks) and by Level A harassment (10 species or stocks). Ocean Wind did not request and NMFS neither expects nor authorizes incidental take by serious injury or mortality.

In response to our questions and comments and following extensive information exchange between Ocean Wind and NMFS, Ocean Wind submitted a final revised application on February 8, 2022. NMFS deemed it adequate and complete on February 11, 2022. This final application is available on NMFS' website at *https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act.*

On March 7, 2022, NMFS published a notice of receipt (NOR) of Ocean Wind's adequate and complete application in the **Federal Register** (87 FR 12666), requesting public comments and information on Ocean Wind's request during a 30-day public comment period. During the NOR public comment period, NMFS received comment letters from two environmental non-governmental organizations (ENGOs): Clean Ocean Action (COA) and the Natural Resource Defense Council (NRDC) on behalf of several other ENGOs.

On October 26, 2022, NMFS published a proposed rule in the **Federal Register** for the Ocean Wind 1 Project (87 FR 64868). In the proposed rule, NMFS synthesized all of the information provided by Ocean Wind, all best available scientific information and literature relevant to the proposed project, outlined, in detail, proposed mitigation designed to effect the least practicable adverse impacts on marine mammal species and stocks as well as proposed monitoring and reporting measures, and made preliminary negligible impact and small numbers determinations. The public comment period on the proposed rule was open for 45 days on *Regulations.gov* starting on October 26, 2022 and closed after December 10, 2022. Specific details on the public comments received during this 45-day period are described in the Comments and Responses section.

NMFS has previously issued three Incidental Harassment Authorizations (IHAs) to Ocean Wind for related work regarding high resolution site characterization surveys (82 FR 31562, July 7, 2017; 86 FR 26465, May 14, 2021; 87 FR 29289, May 13, 2022). To

date, Ocean Wind has complied with all the requirements (*e.g.,* mitigation, monitoring, and reporting) of the previous IHAs and information regarding their monitoring results may be found in the Estimated Take section. These monitoring reports can be found on NMFS' website: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-other-energy-activities-renewable.*

On August 1, 2022, NMFS announced proposed changes to the existing North Atlantic right whale vessel speed regulations (87 FR 46921, August 1, 2022) to further reduce the likelihood of mortalities and serious injuries to endangered right whales from vessel collisions, which are a leading cause of the species' decline and a primary factor in an ongoing Unusual Mortality Event (UME). Should a final vessel speed rule be issued and become effective during the effective period of these regulations (or any other MMPA incidental take authorization), the authorization holder will be required to comply with any and all applicable requirements contained within the final rule. Specifically, where measures in any final vessel speed rule are more protective or restrictive than those in this or any other MMPA authorization, authorization holders will be required to comply with the requirements of the vessel speed rule. Alternatively, where measures in this or any other MMPA authorization are more restrictive or protective than those in any final vessel speed rule, the measures in the MMPA authorization will remain in place. The responsibility to comply with the applicable requirements of any vessel speed rule will become effective immediately upon the effective date of any final vessel speed rule, and when notice is published on the effective date, NMFS will also notify Ocean Wind if the measures in the speed rule were to supersede any of the measures in the MMPA authorization such that they were no longer required.

## Description of the Specified Activities

*Overview*

Ocean Wind plans to construct and operate the Project, a 1,100-megawatt (MW) offshore wind farm, in the Project Area. The Project will allow the State of New Jersey to meet its renewable energy goals under the New Jersey Offshore Wind Economic Development Act. The Project will consist of several different types of permanent offshore infrastructure, including wind turbine generators (WTGs; *e.g.,* the GE Haliade-X 12 MW) and associated foundations, offshore substations (OSS), offshore substation array cables, offshore export cables, and substation interconnector cables. Overall, Ocean Wind will conduct the following specified activities: install 98 WTGs and 3 OSS on monopile foundations via impact pile driving; install and subsequently remove cofferdams and goal posts to assist in the installation of the export cable route by vibratory pile driving; several types of fishery and ecological monitoring surveys; placement of scour protection; trenching, laying, and burial activities associated with the installation of the export cable route from OSSs to shore-based converter stations and inter-array cables between turbines; HRG vessel-based site characterization surveys using active acoustic sources with frequencies of less than 180 kilohertz (kHz); the detonation of up to ten UXOs/MECs of different charge weights, as necessary; transit within the Project Area and between ports and the Lease Area to transport crew, supplies, and materials to support pile installation via vessels; and WTG operation. All offshore cables will connect to onshore export cables, substations, and grid connections, which will be located in Ocean County, New Jersey and Cape May County, New Jersey. Marine mammals exposed to elevated noise levels during impact and vibratory pile driving, detonations of UXOs/MECs, and/or site characterization surveys may be taken by Level A harassment and/or Level B harassment, depending on the specified activity.

A detailed description of the Project is provided in the proposed rule as published in the **Federal Register** (87 FR 64868, October 26, 2022). Since the proposed rule was published, Ocean Wind has modified the project start and end dates, changing them from August 2023 to July 2028 to a new effective period of October 13, 2023 to October 12, 2028. Ocean Wind has also modified its vibratory pile driving activity from vibratory pile driving of seven temporary cofferdams to vibratory pile driving of four temporary cofferdams (Barnegat Bay landfall locations) and three temporary goal posts (two at Island Beach State Park, one at BL England). This modification neither changes the nature of the specified activity (*i.e.,* vibratory pile driving), not the potential impacts to marine mammals associated with the specified activity. As described in the Estimated Take section below, this modification reduces the number of takes anticipated from vibratory pile driving. Ocean Wind has not modified any other activity from what was previously described in the proposed rule. We hereby incorporate the updated Project description, as provided by Ocean Wind, by reference; therefore, a more detailed description is not provided here. Please refer to the proposed rule and Ocean Wind's supporting information (*e.g.,* application, memos) for more information on the description of the specified activities.

*Dates and Duration*

Ocean Wind anticipates its specified activities to occur throughout all 5 years of the final rule, beginning on October 13, 2023 and continuing through October 12, 2028. Ocean Wind anticipates the following construction schedule over the 5-year period (Table 1). Ocean Wind has noted that these are the best and conservative estimates for activity durations but that the schedule may shift due to weather, mechanical, or other related delays. Additional information on dates and activity-specific durations can be found in the proposed rule and are not repeated here.

TABLE 1—CONSTRUCTION SCHEDULE

| Activity | Estimated schedule [a] |
|---|---|
| HRG Surveys | Q3 2023–Q2 2028. |
| UXO/MEC Detonation | Q4 2023–Q3 2028. |
| Landfall Cable Installation | Q4 2023–Q4 2024. |
| Offshore Export Cable Installation | Q2 2024–Q1 2025. |
| Offshore Foundation Installation (WTG and OSS) | Q2 2024–Q4 2024. |
| Inter-array Cable Installation | Q3 2024–Q2 2025. |
| WTG and OSS Installation and Commissioning | Q3 2024–Q1 2026. |

TABLE 1—CONSTRUCTION SCHEDULE—Continued

| Activity | Estimated schedule [a] |
|---|---|
| Fishery Monitoring Surveys | Q2 2022–Q4 2027. |

**Note:** "Q1, Q2, Q3, and Q4" each refer to a quarter of the year, starting in January and comprising 3 months each. Therefore, Q1 represents January through March, Q2 represents April through June, Q3 represents July through September, and Q4 represents October through December.

[a] We acknowledge that the schedule may need to shift, given unforeseeable circumstances (*e.g.,* inclement weather, mechanical difficulties) but the dates and durations presented here represent the most realistic schedule.

*Specific Geographic Region*

A detailed description of the Specific Geographic Region is provided in the proposed rule as published in the **Federal Register** (87 FR 64868, October 26, 2022). Since the proposed rule was published, no changes have been made to the Specified Geographic Region. Generally, Ocean Wind's specified activities (*i.e.,* impact pile driving of WTGs and OSS monopile foundations; vibratory pile driving (installation and removal) of temporary cofferdams and goal posts; placement of scour protection; trenching, laying, and burial activities associated with the installation of the export cable route and inter-array cables; HRG site characterization surveys; UXOs/MECs detonation; and WTG operation) are concentrated in the Project Area. A couple of Ocean Wind's specified activities (*i.e.,* fishery and ecological monitoring surveys and transport vessels) will occur in the Mid-Atlantic Bight.

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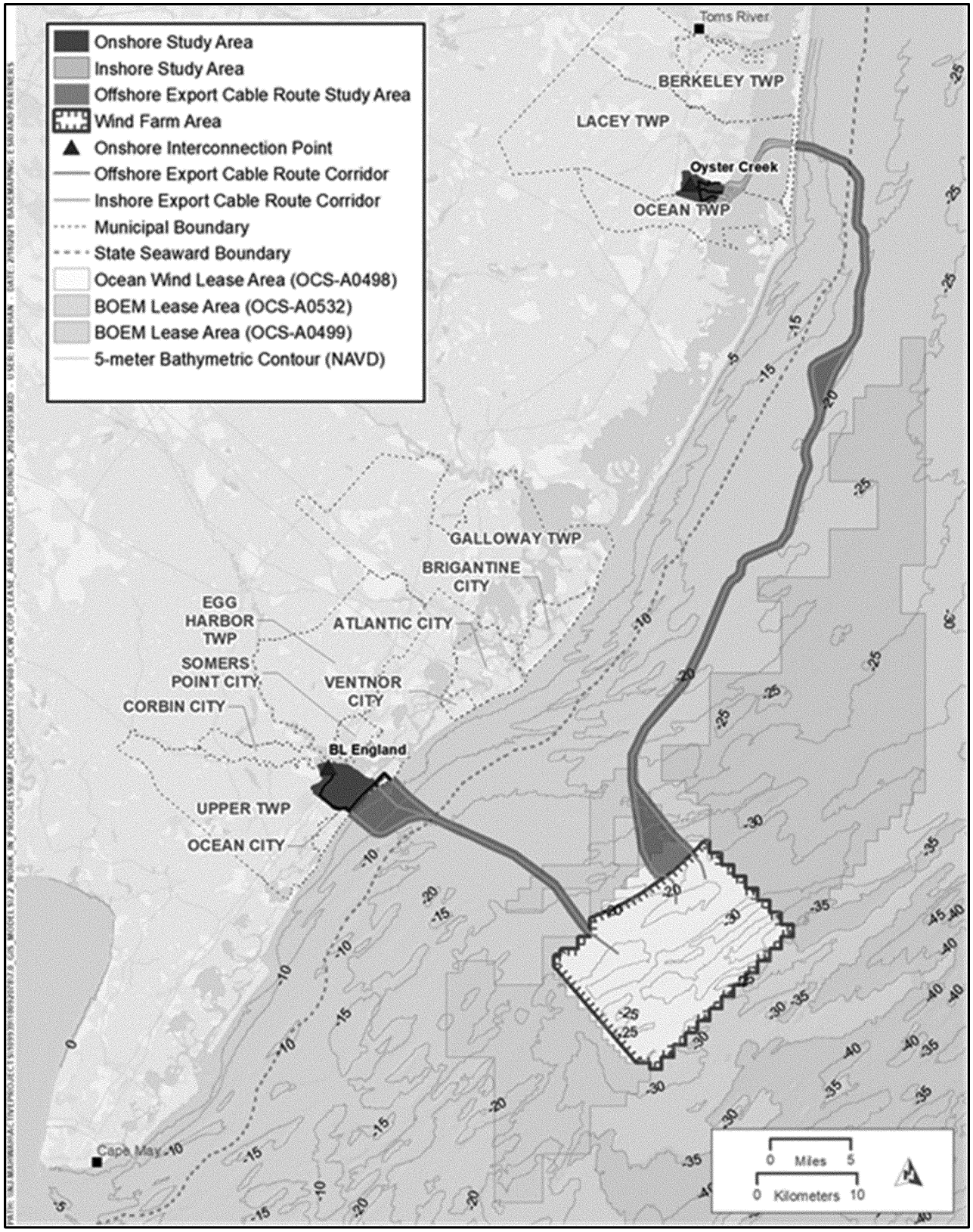


**Figure 1 – Project Area**

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**Comments and Responses**

A notice of proposed rulemaking was published in the **Federal Register** on October 26, 2022 (87 FR 64868) and a 15-day extension to the public comment period was published on November 25, 2022 (87 FR 72447). The proposed

rulemaking described, in detail, Ocean Wind's specified activities, the specific geographic region of the specified activities, the marine mammal species that may be affected by those activities, and the anticipated effects on marine mammals. In the proposed rule, we requested that interested persons submit relevant information, suggestions, and comments on Ocean Wind's request for the promulgation of regulations and issuance of an associated LOA described therein, our estimated take analyses, the preliminary determinations, and the proposed regulations. In total, the proposed rule was available for a 45-day public comment period.

In total, NMFS received 20 comment submissions, including 14 comments from private individuals. Some of these comments were out-of-scope or not applicable to this specific action (*e.g.,* general support/opposition to the Project itself; concerns for other species outside of NMFS' jurisdiction (*i.e.,* birds); maintenance of the permanent structures; Internal Revenue Service tax filing information), and are not described herein or discussed further. Four comment letters were from ENGOs, including one from COA, one from Oceana, Inc. (Oceana), and two from the NRDC, of which one was a comment letter with an attachment and the other was a request to extend the comment period an additional 15 days (hence, the extension published in the **Federal Register** on November 25, 2022 (87 FR 72447)). We also received one comment letter from a governmental organization, the Marine Mammal Commission (Commission), and one comment letter from a public organization, the Conservation Law Foundation (CLF). These five letters (excluding the NRDC request for a 15-day comment period extension on the proposed regulations) contained substantive information that NMFS considered in its estimated take analysis, final determinations, and final regulations. These comments are described below, along with NMFS' responses. All substantive comments and letters are available on NMFS' website: *https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act.* Please review the corresponding public comment link for full details regarding the comments and letters.

*Modeling and Take Estimates*

*Comment 1:* The Commission recommended that, until JASCO Applied Sciences' (hereafter, ''JASCO'') model has been validated with *in-situ* measurements from the impact installation of monopiles and pin piles in the northwest Atlantic, NMFS should require Ocean Wind and thus JASCO to re-estimate the various Level A harassment and Level B harassment zones for the final rule using source levels that are at a minimum 3 dB greater than those currently used.

*Response:* The Commission has expressed concerns about the lack of validation of JASCO's models in previous Commission letters for Orsted's other wind projects. JASCO has compared their source model predictions to an empirical model prediction by the Institute of Technical and Applied Physics (ITAP). The empirical model is based on a large data set of pile driving sounds measured at 750 m from the source collected during installation of large-diameter piles (up to 8 m) during wind farm installation in the North Sea (Bellmann, 2020). As no noise measurements exist for tapered 8/11-m monopile at this time (yet to be installed offshore), the ITAP prediction facilitates a way of validating the source levels of the numerical finite difference (FD) model. The ITAP data are averaged across different scenarios; pile sizes are grouped, which includes different hammers, water depths, depths of penetration, and environmental conditions; and the 95th percentile level is reported, whereas the aim of JASCO's modeling is to estimate the median value. While the ITAP forecast and the FD source predictions were comparable (see Appendix I of the Ocean Wind 1 Underwater Acoustic and Exposure Modeling report (Küsel *et al.,* 2022)), there is variance in the underlying ITAP data and there are parametric choices for the FD model in the different environments, so an exact match is not expected. As part of the comparison, it was found that different (but reasonable) parametric input choices in the FD modeling can result in output differences on the order of the variance in the ITAP data so it was concluded that the FD modeling approach performed as well as can be discernible given the available data. While adding 3 dB to the JASCO predictions at 750 m may bring JASCO's source predictions into line with the finite-element (FE) predictions for the portmanteau combining computation, comparison, and pile (COMPILE) scenario but it is not clear that this would be more accurate. This approach assumes that the FE models are correct but Lippert *et al.* (2016) also state ''a drawback of (the FE) approach is that it simulates the energy loss due to friction in an indirect and rather nonphysical way.'' The Commission also suggested that NMFS could have used damped cylindrical spreading model (DCSM; Lippert *et al.,* 2018) and the source levels provided by TDFD PDSM; however, for reasons described herein, NMFS has determined JASCO's model results are reliable and achievable.

Recent measurements taken during the Coastal Virginia Offshore Wind (CVOW) Pilot Project reported the range to the marine mammal Level B threshold (160 dB re 1µPa) from the 7.8-m pile installed with a double big bubble curtain to be 3,891 m (12,765.75 ft) when using a hammer operating at a maximum of 550 kJ (WaterProof, 2020). JASCO's model prediction for 11-m piles using a 4,000 kJ hammer is 4,684 m (15,367.45 ft). The Commission states that, based on the CVOW reported sound levels, JASCO's modeled predicted range should be more than double instead of only an approximate 20 percent increase because Ocean Wind's hammer has up to approximately five times more energy (550 kJ vs 4,000 kJ). NMFS disagrees. The 3,891-m distance to the Level B harassment threshold measured during the CVOW Pilot Project cited by the Commission was obtained based on the maximum measured sound pressure level (RMS SPL), which is not an ideal statistic to base estimates of Level B harassment isopleths, as it is not representative of average operating conditions and represents one hammer strike. Further, small differences in the propagation environment could account for the ranges being more comparable than expected. Importantly, as described below, NMFS is also now in receipt of measurements from the South Fork project which indicate JASCO's predicted distance to the Level B harassment threshold is realistic and attainable. Based on the expected variance between the Ocean Wind 1 and CVOW projects and measurement data from South Fork (see below), it cannot be concluded that the CVOW measured results (using the maximum RMS SPL reported) indicate that JASCO's 4,684 m modeled distance to Level B harassment threshold should be increased.

Importantly, since the proposed rule phase, NMFS has received interim sound field verification reports from the South Fork Wind project, which used JASCO's modeling. In all but one case, and out of six 7–8/9.5-m tapered piles installed, the measured distances to NMFS' Level B harassment threshold were lower than JASCO's model predicted. The distance to NMFS Level B harassment threshold was modeled as 4,684 m while *in-situ* measurements identified distances, excluding the one aforementioned pile, ranging from 1.84 kilometers (km) to 3.25 km. JASCO's modeling predicts the distances to the

Level B harassment threshold installation of Ocean Wind 1 monopiles will be approximately 3.3 km in summer, which aligns with the South Fork Wind results. South Fork Wind determined that the one pile generating noise levels above those predicted (the first pile) did so due to a malfunctioning noise attenuation system which was quickly rectified and deployed appropriately on all future piles. Further, in this final rule, we are requiring Ocean Wind's measured sound levels do not exceed those modeled, assuming 10 dB, for at least three consecutively measured monopiles. Based on all these reasons, NMFS is not requiring Ocean Wind to remodel the harassment zone sizes by adding 3 dB to the source levels and is, instead, carrying forward the modeling results as presented in the proposed rule.

Of note, NMFS has also received interim sound field reports from Vineyard Wind. However, some of the assumptions used in the modeling (*e.g.,* maximum hammer energy) do not align with the construction parameters Vineyard Wind is currently using in the field, so comparisons between the modeled and measured results are not as directly applicable and, therefore, are less useful in judging predicted alignment between modeled and measured zones.

Based on this discussion and given our consideration of the available SFV reports from other projects, we disagree with the suggestions made by the Commission. NMFS has incorporated the best available scientific information into this final rule, using recent measurements as well as estimates obtained through JASCO's modeling.

*Comment 2:* The Commission suggested that JASCO should consider revising its exposure modeling to include single-day simulations for stationary, discrete sound sources and numerous Monte Carlo simulations (*e.g.,* at least 30) for modeling reports for future rules.

*Response:* JASCO typically uses 7-day simulations to get a representative sample of the installation process (*e.g.,* impact piling every day or every other day). From those 7-day simulations, several 24-hour windows within the 7-day simulations are used to find the average exposure expected in a 24-hour period that includes impact pile driving. The average 24-hour estimates are then scaled by the number of days of impact pile driving. The use of the 7-day simulation allows for a robust probability calculation. The Commission recommends that, instead, JASCO run 30 single-day simulations to generate an average daily exposure. While NMFS makes recommendations, as appropriate, regarding the inputs, assumptions, and methods used by applicants to model and estimate marine mammal take, there is no single correct overall methodology. The Commission does not provide any information to support an assertion that the method used by JASCO is not appropriate or sufficient, and NMFS supports the use of this methodology.

Furthermore, it is unclear what the Commission means by ''stationary, discrete sound sources.'' If the sources referred to are the monopiles or pin piles, then JASCO's modeling approach does use a Monte Carlo approach for sampling the expected sound fields. With the typical modeling density of 0.5 simulated animals (animats)/km$^2$, there are usually tens of thousands of animats meaning there are tens of thousands of Monte Carlo samples. If the suggestion is to run the simulations (with tens of thousands of animats) 30 times, that is equivalent to increasing the modeling density by 30. Previous work, such as the work done by Houser (2006), has indicated that such high modeling densities are not necessary. Please refer to NMFS' related response to Comment 5.

*Comment 3:* Citing the dire situation of North Atlantic right whales, a commenter stated that NMFS should clearly describe in the regulations or LOA for wind projects that the activities cannot result in any Level A harassment, serious injury, or mortality of North Atlantic right whales.

*Response:* The proposed rule clearly states that no take of North Atlantic right whale by Level A harassment, mortality, or serious injury was requested or proposed for authorization (see the Estimated Take and Negligible Impact Analysis and Determination sections in the proposed rule), and those statements are also included in this final rule. In this final rule, for example, Tables 33 and 34 shows that only Level B harassment is authorized for North Atlantic right whales, and the North Atlantic right whale sub-section in the Negligible Impact Analysis and Determination section also states that no take of North Atlantic right whale by Level A harassment, mortality, or serious injury is anticipated or authorized and any take that is authorized is limited to Level B harassment only.

*Comment 4:* The Commission recommended that NMFS authorize Level A harassment takes for group size for minke whales and both bottlenose dolphin stocks from UXO/MEC detonations in the final rule.

*Response:* We agree that there is some small potential for these smaller species to be exposed to noise levels that may cause PTS. Therefore, in this final rule, NMFS has conservatively authorized additional takes by Level A harassment of both bottlenose dolphins stocks and minke whales from UXO/MEC detonation. Using Ocean Wind's group size information. NMFS has increased the amount of take by Level A harassment from UXO/MEC detonations from 0 in the proposed rule to 11 for each stock of bottlenose dolphins, and from 0 in the proposed rule to 2 for minke whales.

*Comment 5:* The Commission recommends that NMFS: (1) require Ocean Wind to revise its take estimates for impact installation of monopiles and pin piles based on an animat density that is greater than any species specific, real-world density and the possibility that only a single monopile is installed per day rather than two per day, and (2) increase the takes by Level A harassment of humpback whales to mean group size for OSS impact installation.

*Response:* The Commission cites two of the assumptions in the take estimate methodology that could push the take estimate in the direction of less than the maximum expected takes. However, there are multiple other assumptions in the take estimate methodology that consider conditions that would result in the maximum possible takes, or even an overestimate of possible takes. When all of these assumptions are considered together, NMFS expects the take estimate model and methodology to produce the maximum take that is expected to occur incidental to the specified activities.

While Ocean Wind has acknowledged that it may not install two piles every day, it has indicated it is capable of installing up to two piles per day with the goal to complete installation as quickly as possible. Hence, to assume only one monopile per day every day would not be consistent with what Ocean Wind, a company with offshore wind farm installation experience, has indicated is possible or is planned. The exposure estimates contained within the proposed rule are a product of modeling that assumes two piles are driven per day. There are several conservative assumptions that offset the potential to underestimate take should Ocean Wind not be able to install two piles per day every day, including, but not limited to, all piles are installed during 30 days of the highest density month and 19 days (38 piles) of the second-highest density month for each species from May to December. This is conservative because

pile driving every day within a given month is not possible due to historical weather patterns and potential technical issues that may be encountered and the highest density of every species does not occur in the same month. It is more likely that pile driving will occur over several months which have lower marine mammals species density. Additionally, for some species, group size or PSO data adjustments were made that increased the number of takes authorized compared to the modeled exposure estimates. Furthermore, the exposure estimates modeled and number of takes authorized do not consider natural avoidance of marine mammals to noise levels that could elicit PTS or the use of mitigation such as shutdown or clearance zones, which are designed to effect the least practicable adverse impact on marine mammals, including North Atlantic right whales (*e.g.,* pile driving may not commence and must shut down if a North Atlantic right whale is observed at any distance). Finally, while Ocean Wind may use monopiles for OSS foundations, NMFS has used the pin pile take estimates in the total take authorized. The exposure estimates for pin piles is greater for all species than the exposures estimated for monopiles installation.

Regarding density seeding, the Commission asserts that when a model's density seeding is lower than the real-world density and, as here, 7-day simulations are used (as opposed to using 1-day simulations that are run 30–50 times, as is the case in other models), there is a chance that the model could miss consideration of a rarer event, resulting in a lower than maximum take estimate. As noted by the Commission, for common bottlenose dolphins, the real-world density (0.51) is higher than the density seeded (0.50) in the model. The use of the 0.5 animats/km$^2$ for all species is to robustly sample (with tens of thousands of animats) the expected sound fields, providing statistically reliable results. Typically the real-world density is much lower than this modeled density and the number of real-world individual animals is found by scaling the number of animats exceeding a threshold by the ratio: real-world density/modeled density. That, rarely, the real-world density may exceed the modeled density, in this case 0.51 versus 0.50 animats/km$^2$, does not change the process or the statistical reliability of the results. While the Commission's assertion that, if this were the only factor considered, the fact that the actual density is higher than the seeded density could result in a lesser likelihood that the model would capture circumstances representing a rare event that might result in higher take may be true—in this case, the degree of difference is a real-world density of 0.51 versus a seeded density of 0.50. Additionally, as described above, there are numerous other conservative assumptions in the model such that, when considered together, support NMFS assessment that the number of takes authorized represents the maximum number of takes expected to occur incidental to the specified activities.

For these reasons, NMFS disagrees with the Commission's assessment that the take is underestimated and believes that the Commission's suggestion to double the number of takes authorized as a simplistic solution to their perceived issue would unnecessarily overestimate take. Please see NMFS related response to Comment 2.

NMFS agrees with the Commission's recommendation to increase the amount of Level A harassment of humpback whales to a group size during OSS foundation installation given the more frequent sightings of the species recently off of New Jersey. Based on the 2021–2022 monitoring report the Commission referenced, we have increased the amount of take by Level B harassment of humpback whales to 46 for OSS foundation installation. However, we emphasize that the majority of humpback whale sightings described by the Commission occurred in winter and this rulemaking includes a prohibition on foundation installation January 1 through April 30 (as impact pile driving may only occur in December with prior NMFS approval). All other foundation installation take estimates follow the approach as described in the proposed rule.

*Comment 6:* The Commission recommended that NMFS increase the Level B harassment takes for common dolphins and Atlantic white-sided dolphins incidental to cable landfall construction to a mean group size.

*Response:* Despite the nearshore location of cable landfall construction, vibratory installation and removal versus the more offshore distribution of these species, as well the short duration of vibratory pile driving, which suggests take of these species is very low, NMFS has accepted the Commission's recommendation as a conservative approach. The final rule includes 30 takes by Level B harassment of common dolphins and 12 takes by Level B harassment of Atlantic white-sided dolphins from cable landfall activities, based on group size information from AMAPPS.

*Comment 7:* The Commission recommended that NMFS determine if the Department of the Navy's (2017) group size estimates are more appropriate or reflective of the expected group size estimates for the Project than those used in the proposed rule. If so, the Commission suggests the take numbers be amended in the final rule for all Ocean Wind's activities.

*Response:* We appreciate the suggestion by the Commission to review the Department of the Navy's (2017) group size estimates to see if they are more applicable for the Project. Based on our review, we disagree that the Navy's group size estimates are the most applicable in this case. First, the Navy only provides group size estimates for odontocetes, which means we would still need to find applicable estimates for non-odontocete species found in the Atlantic Ocean. Second, the group sizes provided by Ocean Wind used information by Toth *et al.* (2011) for coastal bottlenose dolphins; Kenny and Vigness-Raposa (2010) for sei whales, minke whales, Atlantic spotted dolphins, and pilot whale *spp.;* CeTAP (1982) for humpback whales; and Barkaszi and Kelly (2019) for sperm whales and Risso's dolphin, which are derived from data gathered specifically in the mid- and north-Atlantic, where the Project will occur, whereas the group sizes in the Department of the Navy's (2017) report are based on data collected more broadly across the entire East Coast of the United States and Canada, including the Gulf of Mexico, Sargasso Sea, Labrador Sea, and Labrador Basin. Any additional takes that NMFS has opted to authorize, per recommendations by the Commission, is based on either the group size literature already provided by Ocean Wind (*e.g.,* from Toth *et al.,* 2011 for corrections to bottlenose dolphins) or based on group size information from AMAPPS, which derived data for its annual reports from specific transects undertaken in specific regions (New Jersey through Maine, per Figure 1–1 in the 2021 Annual Report, *https://repository.library.noaa.gov/view/noaa/41734*). Furthermore, AMAPPS uses more recent information, as demonstrated in the 2010–2021 annual reports found on NMFS' web page (*https://www.fisheries.noaa.gov/new-england-mid-atlantic/population-assessments/atlantic-marine-assessment-program-protected*). The Department of the Navy's (2017) group sizes are based on data from 1990 through 2013 (see Table 3–1 in the report). Lastly, based on monitoring reports received from PSOs in the field (and found on NMFS' website: *https://*

*www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-other-energy-activities-renewable#expired-authorizations*), the group sizes observed align more with estimates found in Kraus *et al.* (2016) and AMAPPS (Palka *et al.,* 2017). For these reasons, the group sizes proposed by Ocean Wind, any adjustments using AMAPPS data, and any group sizes used in the proposed and final rules are based on the best available scientific information.

*Comment 8:* The Commission recommended that NMFS include in the final rule Level B harassment takes of the coastal stock of bottlenose dolphins during impact installation of monopiles and pin piles, if any pile will be installed in 20 m of water or less or if any Level B harassment zone extends into 20 m or less of water.

*Response:* Based on the recommendation by the Commission, JASCO has seeded the coastal bottlenose dolphin stock only in shallow water (defined here as any area less than 20-m water depth). In consultation with Ocean Wind, NMFS has reallocated a conservative 10 percent of the offshore bottlenose dolphin Level B harassment take request to the coastal stock, which revises the authorized take from impact pile driving of permanent foundations to 842 takes by Level B harassment for the offshore stock and 94 takes by Level B harassment for the coastal stock.

We note that no take by Level A harassment of this coastal bottlenose dolphin stock has been authorized as, based on Figure 1 of the Underwater Acoustic and Exposure Modeling Report, all project foundations in the Lease Area will be installed beyond the 20-m isobath. The largest 10-dB attenuation exposure range for the project is approximately 3.5 km. The distance between the shallowest foundation position and shallow water is about this distance or less; thus, it is unlikely that the coastal stock would approach the piles during impact pile driving for the duration necessary to experience Level A harassment.

*Comment 9:* The Commission disagreed that non-auditory injury and mortality during UXO/MEC detonations are considered *de minimis.* It stated that although non-auditory injury and mortality could be unlikely, these outcomes are not de minimis because these assumptions were based off Bellmann *et al.* (2020) and Bellmann (2021) and their reports of bubble curtain effectiveness, which are based on information obtained from mitigating UXO/MECs in European waters using a big bubble curtain. The Commission further stated that these results from Bellmann are only potentially possible if the single or double bubble curtain was optimized for the environmental conditions and that these results are specific to European charges, which may not be representative of charges in the United States as charges in Europe have been degrading in the water for approximately 75 years, which compromises the integrity of the trinitrotoluene (TNT)-equivalent material. Additionally, the charge weights described in Bellmann (2021) are much smaller than those described for the Project (*i.e.,* 100 grams (g), 5 kilograms (kg), and 10 kg, compared to 454 kg). The Commission also added that the shockwave from the UXO/MEC detonations may displace or disrupt the bubble curtains due to the speed the shockwave travels (*i.e.,* supersonic). Because of these reasons, the Commission recommended that NMFS re-estimate the distances to threshold and the mitigation and monitoring zones for mortality, Level A harassment, and Level B harassment based on 0-dB of sound attenuation.

The Commission also stated that it does not make sense to say that behavioral harassment will not result from exposure to single detonations of UXO. The Commission also recommended that NMFS re-estimate the number of takes from UXO/MEC detonation while increasing to the relevant group sizes, when necessary. Finally, the Commission recommended that because of the reasons already explained regarding attenuating UXO/MEC detonations, NMFS should require that Ocean Wind utilize a double big bubble curtain (DBBC) during all detonations and that NMFS not allow Ocean Wind to detonate UXOs/MECs when currents are moving faster than 2 knots (kn).

*Response:* NMFS appreciates the Commission's recognition that European waters offer a different environment than the Atlantic Ocean, and then the conditions and size of explosives potentially encountered in the Ocean Wind project area. Bellmann (2021) summarized findings from Bellmann *et al.* (2021) that showed use of a single big bubble curtain during UXO/MEC detonation reduced noise levels by 11 dB for broadband sound exposure levels and up to 18 dB for peak sound pressure ($L_{pk}$). While NMFS agrees with the Commission's comment that BBCs attenuate high-frequency (HF) sound (<1 kHz) more efficiently than low-frequency (LF) sound (Bellmann *et al.,* 2020) that corresponds to most of the UXO/MEC energy, the broadband attenuation is expected to be similar, if the bubble curtain radius is large enough to avoid nearfield effects of the explosive detonations. While it is true that theoretical explosive spectra are flat at low frequencies and decay at high-frequencies, there remains significant energy at frequencies at which bubble curtains have been shown to be effective (Bellmann *et al.,* 2020). A recent study of UXO/MEC detonations in the North Sea (Robinson *et al.,* 2022) showed that measured spectra at 5.1 km had the majority of its energy between 32 and 250 Hz, in this range, the insertion loss data from Bellman (2021) has a minimum attenuation of approximately 16.8 dB in the 50-hertz (Hz) band, and is greater than 20 dB for all other bands. Further, Verfuss *et al.* (2019) summarize the effectiveness of bubble curtains on UXO/MEC detonations beyond those sizes considered in Bellman *et al.* (2021) which, while variable, provide support for the 10-dB broadband assumption when bubble curtains are deployed correctly (*i.e.,* with a sufficiently large diameter, to suppress the flow of displaced water). Therefore, the choice of 10 dB as a broadband attenuation for UXO/MEC detonations in our analysis is expected to be appropriate.

In addressing the Commission's additional comments regarding mitigating pile driving and UXO/MEC detonations and the efficacy, the physical principles of inserting an impedance change between the source and farther receivers is the same whether the source is an explosive or a pile. It is important, however, that the bubble curtain be placed outside of the region where the explosive causes nonlinear changes in the medium. While we do agree that ''the deployment'' and the ''efficacy'' are not synonymous terms, there will be a deployed bubble curtain on each of the piles driven for the project so an understanding of bubble curtain deployment strategies, maintenance, and use will be understood by the operations team. As above, the mechanism of sound attenuation, while frequency dependent, does not change for the source as long as the bubble curtain is deployed at distance where the acoustics is linear. For UXOs/MECs, the distances to thresholds for different sized charges likely to be encountered were calculated by JASCO assuming the sources were full strength and not degraded due to time. While the Commission has also accurately stated that the bubble curtain could be displaced due to the supersonic shockwave produced by the detonation event, we acknowledge that this would require the bubble curtain to be placed

in the area outside of the non-linear zone.

NMFS is requiring Ocean Wind to meet the noise levels modeled assuming 10-dB attenuation, which must be verified by SFV, and, as recommended by the Commission, is requiring Ocean Wind deploy a double big bubble curtain during all UXO/MEC detonations. Further, we are requiring that the bubble curtain be placed at a distance such that the nozzle hose remains undamaged. Given the best available science suggests 10-dB attenuation is achievable, the additional information provided above by JASCO, the requirement to meet the noise levels modeled assuming 10 dB, and the requirement to use a double big bubble curtain, as well as the extensive monitoring requirements associated with the clearance requirements (including aerial surveys if the clearance zone is greater than 5 km), NMFS has not adjusted any distances to thresholds or take estimates assuming no noise attenuation. At this time, NMFS is not requiring UXO/MEC detonation be limited to times when current speed is 2 kn or less but, as described above, is requiring Ocean Wind to meet the noise levels modeled. Should SFV identify that noise levels are not being met, NMFS will consider the current conditions during detonation and determine if such a measure is necessary to meet the noise levels modeled assuming 10-dB attenuation. Nonetheless, regarding the Commission's comment about use of the term ''*de minimis*'' to describe the likelihood of non-auditory injury or mortality, we concur that ''unlikely'' is a better descriptor and have changed it in the text where appropriate.

Regarding the Commission's comments regarding behavioral disturbance resulting from single detonations from UXO/MEC, NMFS agrees there is potential for behavioral disturbance from a single detonation per day and this impact is accounted for with the Level B harassment takes authorized from UXO/MEC detonations. NMFS acknowledges the possibility that single underwater detonations can cause a behavioral response. The current take estimate framework allows for the consideration of animals exhibiting behavioral disturbance during single explosions as they are counted as ''taken by Level B harassment'' if they are exposed above the temporary threshold shift (TTS) threshold, which is 5-dB higher than the explosive behavioral harassment threshold. The behavior threshold for underwater detonations of 5 dB less than the TTS thresholds for each functional hearing group that the Commission identifies in its comment is only applicable to multiple detonations per day. We acknowledge in our analysis that individuals exposed above the TTS threshold may also be harassed by behavioral disruption and those potential impacts are considered in the negligible impact determination. NMFS is not aware of evidence to support the assertion that animals will have behavioral responses that would qualify as take to temporally and spatially isolated explosions at received levels below the TTS threshold. However, if any such responses were to occur, they would be expected to be few and to result from exposure to the somewhat higher received levels bounded by the TTS thresholds and would thereby be accounted for in the take estimates. The derivation of the explosive injury criteria is provided in the 2017 technical report titled ''Criteria and Thresholds for U.S. Navy Acoustic and Explosive Effects Analysis (Phase III).''

In the proposed rule, we did inadvertently include UXO/MEC detonations as an example impulsive source in one location when referencing the 160-dB Level B harassment threshold, which has been removed in this final rule. We have also clarified that given Ocean Wind would be limited to detonating one UXO/MEC per day, the TTS thresholds provided in Table 5 are used to estimate the potential for Level B (behavioral) harassment. In both the proposed rule and this final rule, NMFS applied the TTS threshold to determine the received level at which Level B harassment (which includes both behavioral responses and TTS) may occur. Hence, no adjustments to take estimates is necessary.

*Mitigation*

*Comment 10:* Commenters recommended that NMFS require Ocean Wind to implement the best commercially available combined NAS technology to achieve the greatest level of noise reduction and attenuation possible for pile driving. A commenter recommended that NMFS require, at a minimum, a 10-dB reduction in SEL, but other commenters recommended that NMFS require a minimum of 15-dB or greater reductions, citing to successes described in Bellman *et al.* (2020 and 2022) and recommended ''state-of-the art'' methods using a combination of two NAS systems simultaneously. A commenter further stated that NMFS should require field measurements to be taken throughout the construction process, including on the first pile installed, to ensure compliance with noise reduction requirements. A commenter also suggested that NMFS require Ocean Wind to use HRG acoustic sources at the lowest practicable source levels needed to meet the objectives of the site characterization surveys.

*Response:* NMFS agrees with the suggestion made by the commenters that underwater noise levels should be reduced to the greatest degree practicable to reduce impacts on marine mammals. As described in both the proposed and final rule, NMFS has included requirements for sound noise attenuation methods that successfully (as evidenced by required sound field verification measurements) reduce real-world noise levels produced from impact pile driving of foundation installation to, at a minimum, the levels provided by JASCO modeled for 10-dB reduction, as analyzed in the proposed rule. Preliminary sound measurements from South Fork Wind, also an Orsted project, indicate that with multiple NAS systems, measured sound levels during impact driving foundation piles using a 4,000 kJ hammer are below those modeled assuming a 10-dB reduction and suggest, in fact, that two systems may sometimes be necessary to reach the targeted 10-dB reductions. While NMFS is requiring that Ocean Wind reduce sound levels to match the model outputs analyzed (assuming a reduction of 10 dB), we are not requiring greater reduction as it is currently unclear (based on measurements to date) whether greater reductions are consistently practicable for these activities, even if multiple NAS systems are used.

In response to the recommendation by the commenters for NMFS to confirm that a 10-dB reduction is achieved, NMFS clarifies that, because no unattenuated piles would be driven, there is no way to confirm a 10-dB reduction; rather, *in-situ* SFV measurements will be required to confirm that sound levels are at or below those modeled assuming a 10-dB reduction.

Regarding the recommendation that Ocean Wind should utilize its HRG acoustic sources at the lowest practicable source level to meet the survey objective, NMFS agrees with this suggestion and has incorporated this requirement into the final rule.

*Comment 11:* To minimize the risk of vessel strikes for all whales, and especially in recognition of the imperiled state of North Atlantic right whales, commenters recommended that NMFS require a mandatory 10-kn speed restriction for all project vessels (including PSO survey vessels) at all times, except for reasons of safety, and

in all places except in limited circumstances where the best available scientific information demonstrates that whales do not occur in the area. Other commenters made the same recommendation but suggested no exceptions. Alternatively, some suggested that project proponents could work with NMFS to develop an ''Adaptive Plan'' that modifies vessel speed restrictions if the monitoring methods are proven to be effective when vessels are traveling 10 kn or less. Commenters stated that this Adaptive Plan must follow a scientific study design. A commenter suggested that if the Adaptive Plan is scientifically proven to be equally or more effective than a 10-kn speed restriction, that the Adaptive Plan could be used as an alternative to the 10-kn speed restriction.

*Response:* NMFS agrees with the commenters that vessel strikes pose a risk to North Atlantic right whales (and all large whales broadly). Based on the density information provided by Roberts *et al.* (2023), most large whale species are less frequently found within the project area during the months when foundation installation, which requires the use of multiple vessels, would occur (*i.e.,* May through November, and December, if approved by NMFS). Specifically in the New Jersey region, there is no ESA critical habitat or areas wherein large whales are expected to congregate or remain in the area for extended periods of time (*e.g.,* no foraging biologically important areas (BIAs) are located within the project area; thereby, decreasing the time over which they are available to interact with vessels). Furthermore, while we do acknowledge that there is no time of year when North Atlantic right whales are not found within the Project area at all, NMFS, as described in the proposed rule and included in this final rule, is requiring Ocean Wind to reduce speeds to 10 kn or less in several circumstances when North Atlantic right whales are known to be present or more likely to be in the area, which include, but are not limited to, all Slow Zones (Dynamic Management Area or acoustic Slow Zone), from November 1–April 30 in the specified geographical region, and if a North Atlantic right whale is detected visually or acoustically in the project area. Additionally, aside from any requirements of this rule, Ocean Wind is required to comply with all spatial and temporal speed restrictions outlined in applicable regulations. Altogether, these speed requirements align with the commenter's recommendation.

The required mitigation measures, all of which were included in the proposed rule and are now required in the final rule, can be found in § 217.264(b) of the regulatory text. These contain speed restriction requirements, vessel actions in the event mothers and calves/pods approach the vessel (*e.g.,* shifting into neutral, *etc.*), separation distances for specific species, and actions to take in the event marine mammal(s) are sighted, among other requirements. For the final rule, NMFS has also included a requirement that all vessels be equipped with automatic identification system (AIS) to facilitate compliance checks with the speed limit requirements. Per the proposed rule, on July 19, 2023, Ocean Wind submitted a draft Vessel Strike Avoidance Plan to NMFS for review and approval. At least 180 days prior to when the Project would seek to travel above 10 knots and deploy PAM buoys (anticipated in spring 2024), Ocean Wind must submit a PAM plan to NMFS for review and approval. Without an approved PAM Plan for the transit corridor in place, Ocean Wind would not be able to travel over 10 kn.

While NMFS acknowledges that vessel strikes can result in injury or mortality of marine mammals, we have analyzed the potential for vessel strike resulting from Ocean Wind's activity and have determined that based on the required mitigation measures specific to vessel strike avoidance included in the final rule and issued LOA, which are designed to effect the least practicable adverse impact on marine mammals, the potential for vessel strike is so low as to be discountable and no vessel strikes are expected or authorized.

Additionally, based on this information, we have determined no blanket 10-kn vessel-speed restriction is necessary.

*Comment 12:* Commenters recommended that NMFS should prohibit pile driving during periods of highest risk for North Atlantic right whales, which they defined as times of the highest relative density of animals during foraging and migration, and times where cow-calf pairs, pregnant females, surface active groups (that are foraging or socializing), or aggregations of three or more whales, are not expected to be present. Citing multiple information sources, commenters further specifically recommended the seasonal restriction for pile driving be expanded to November 1 through April 30 to reflect the period of highest detections of vocal activity, sightings, and abundance estimates of North Atlantic right whales. Commenters recommended prohibiting pile driving during seasons when protected species are known to be present or migrating in the Project area, in addition to any dynamic restrictions due to the presence of North Atlantic right whale or other endangered species. Also, for UXO/MEC detonations, a commenter implied that the seasonal restrictions from January 1 through April 30, annually, are not enough to protect North Atlantic right whales but did not recommend specific times of year when pile driving and UXO/MEC detonation should not occur.

*Response:* NMFS has restricted foundation installation pile driving from January through April, which represent the times of year when North Atlantic right whales are most likely to be in the project area. We recognize that the density of whales begins to elevate in December; however, it is not until January when density greatly increases. Ocean Wind has indicated that to complete the project, pile driving in December may be required. In this final rule, NMFS has included an additional measure wherein pile driving in December must be avoided to the maximum extent practicable but may occur if necessary, provided NMFS prior approval. In any time of year when foundation installation is occurring, a sighting or acoustic detection of a North Atlantic right whale at any distance triggers a pile driving delay or shutdown. We also reiterate that Ocean Wind is required to implement a minimum visibility zone in December (2,500 m) as compared to other project months (1,650 m), reflecting the results of JASCO's underwater sound propagation modeling. With the application of these enhanced mitigation and monitoring measures in December, impacts to the North Atlantic right whale will be further reduced, if any are encountered when transiting through the Migratory Corridor.

Regarding further restrictions on pile driving in the month of November, as noted in the comments and supporting information, and acknowledged by NMFS in both the proposed and final rules, North Atlantic right whale distribution is changing due to climate change and other factors, and they are present year round in the vicinity of the project, with some detections of mothers with calves or feeding behaviors in the vicinity of the project. However, as shown in Roberts *et al.* (2023), which NMFS considers the best available scientific information regarding marine mammal densities in the Atlantic Ocean, it is not until January that densities begin to significantly increase. Further, North Atlantic right whales are not likely to be engaged in feeding behaviors in the project area, from May to November or otherwise, as the project area is primarily a migratory corridor for North Atlantic right whales and, while

some opportunistic foraging may occur, the waters off of New Jersey do not include known foraging habitat for North Atlantic right whales. As described in the Marine Mammal section, foraging habitat is located in colder, more northern waters including southern New England, the Gulf and Maine, and Canada. For these reasons, and given the inclusion of December in the seasonal impact pile driving restriction, except with NMFS prior approval, NMFS finds that further expansion of the seasonal impact pile driving restrictions (beyond December–April) is unwarranted.

Inasmuch as comments may be suggesting that NMFS prohibit pile driving when any protected species are present, it would not be practicable to implement, as there is no time of year when some species of marine mammals are not present.

Regarding a commenter's assertion that the January to April pile driving and UXO/MEC detonation moratorium is insufficient, the commenter did not propose a different time period or moratorium for NMFS to evaluate and consider for this final rule. In the proposed rule, we acknowledged that Ocean Wind had committed to not detonating UXOs/MECs from November 1 through April 30, annually, to reduce impacts to the North Atlantic right whale, and we have carried that requirement forward here in the final rule.

*Comment 13:* A commenter recommended that, for site assessment surveys, NMFS: (1) increase the size of the clearance and shutdown zones for site assessment surveys to 500 m for all large whales and 1,000 m for North Atlantic right whales, respectively; (2) require a 1,000-m acoustic clearance zone (*i.e.,* necessitating the use of PAM for HRG surveys); and (3) require that any unidentified large whale within 1,000 m of the vessel be considered a North Atlantic right whale.

*Response:* As described in the proposed and final rules, the required 500-m Shutdown Zone for North Atlantic right whales exceeds the modeled distance to the largest 160-dB Level B harassment isopleth (141 m during sparker use) by a large margin, minimizing the likelihood that they will be harassed in any manner by this activity. For other ESA-listed species (*e.g.,* fin and sei whales), the NMFS Greater Atlantic Regional Fisheries Office (GARFO) 2021 Offshore Wind Site Assessment Survey Programmatic ESA consultation (see *https://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-take-reporting-programmatics-greater-atlantic*) determined that a 100-m shutdown zone is sufficient to minimize exposure to noise that could be disturbing. Accordingly, NMFS has adopted this shutdown zone size for all baleen whale species, other than the North Atlantic right whale. Commenters do not provide additional scientific information for NMFS to consider to support their recommendation to expand the Shutdown Zone. Given that these surveys are relatively low impact and that NMFS has prescribed a precautionary North Atlantic right whale Shutdown Zone that is larger (500 m) than the largest estimated harassment zone (141 m), NMFS has determined that an increase in the size of the Shutdown Zone during HRG surveys is not warranted.

Regarding the use of acoustic monitoring to implement the shutdown zones, NMFS does not consider acoustic monitoring an effective tool for use with HRG surveys for the reasons discussed below and therefore has not required it in this final rule. As described in the Mitigation section, NMFS has determined that the prescribed mitigation requirements are sufficient to effect the least practicable adverse impact on all affected species or stocks.

The commenters do not provide additional scientific information for NMFS to consider to support their recommendation to require PAM during site assessment surveys. NMFS disagrees that this measure is warranted because it is not expected to be effective for use in detecting the species of concern. It is generally accepted that, even in the absence of additional acoustic sources, using a towed passive acoustic sensor to detect baleen whales (including North Atlantic right whales) is not typically effective because the noise from the vessel, the flow noise, and the cable noise are in the same frequency band and will mask the vast majority of baleen whale calls. Vessels produce low-frequency noise, primarily through propeller cavitation, with main energy in the 5–300 Hz frequency range. Source levels range from about 140 to 195 decibel (dB) re 1 µPa (micropascal) at 1 m (NRC, 2003; Hildebrand, 2009), depending on factors such as ship type, load, and speed, and ship hull and propeller design. Studies of vessel noise show that it appears to increase background noise levels in the 71–224 Hz range by 10–13 dB (Hatch *et al.,* 2012; McKenna *et al.,* 2012; Rolland *et al.,* 2012). PAM systems employ hydrophones towed in streamer cables approximately 500 m behind a vessel. Noise from water flow around the cables and from strumming of the cables themselves is also low frequency and typically masks signals in the same range. Experienced PAM operators (Thode *et al.,* 2017) emphasized that a PAM operation could easily report no acoustic encounters, depending on species present, simply because background noise levels rendered any acoustic detection impossible. The same report stated that a typical eight-element array towed 500 m behind a vessel could be expected to detect delphinids, sperm whales, and beaked whales at the required range, but not baleen whales, due to expected background noise levels (including seismic noise, vessel noise, and flow noise).

Further, there are several additional reasons why we disagree that use of PAM is warranted for HRG surveys, specifically. While NMFS agrees that PAM can be an important tool for augmenting detection capabilities in certain circumstances (*e.g.,* foundation installation), its utility in further reducing impacts during 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); this reflects the fact that 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, 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 for activities/sources with smaller zones. Also, 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.

Given that the effects to marine mammals from the types of HRG surveys authorized in this final rulemaking are expected to be limited to low level behavioral harassment even in the absence of mitigation, the limited additional benefit anticipated by adding this detection method (especially for North Atlantic right whales and other low frequency cetaceans, species for which PAM has limited efficacy during this activity), 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 during HRG surveys.

*Comment 14:* Commenters recommended that NMFS require pile-driving clearance and shutdown zones for large whales (other than North Atlantic right whale) that are large enough to avoid all take by Level A harassment and minimizes Level B harassment to the most practicable extent.

*Response:* The commenters do not provide additional scientific information for NMFS to consider to support their recommendation to expand clearance and shutdown zones to effect the least practicable adverse impact on marine mammals, particularly large whales, excluding the North Atlantic right whale. The required clearance zone for large whales (other than North Atlantic right whale) equates to the largest modeled distance to the largest Level A harassment threshold, plus 20 percent, for the low frequency hearing group, assuming 10 dB of sound attenuation. The shutdown zone represents the largest distance to the cumulative sound exposure level ($SEL_{cum}$) for the Level A harassment isopleth. Both of these zones are typically rounded up for PSO clarity. These requirements minimize Level B harassment and avoid almost all Level A harassment of large whales (note that for all but minke whales (n=22), all other species of large whales have 6 or fewer takes by Level A harassment across all 5 years of the rule). Further enlargement of these zones could interrupt and delay the project such that a substantially higher number of days would be needed to complete the construction activities, which would incur additional costs, but importantly also potentially increase the number of days that marine mammals are exposed to the disturbance. Accordingly, NMFS has determined that enlargement of these zones is not warranted, and that the existing required clearance and shutdown zones support a suite of measures that will effect the least practicable adverse impact on other large whales.

*Comment 15:* Commenters recommended that NMFS require clearance and shutdown zones for North Atlantic right whales specifically, including: (1) a minimum of 5,000 m for the visual clearance, acoustic clearance, and shutdown zones in all directions from the driven pile location; and (2) an acoustic shutdown zone that would extend at least 2,000 m in all directions from the driven pile location.

*Response:* The Commenters do not provide additional scientific information for NMFS to consider to support their recommendation to expand clearance and shutdown zones for impact pile driving to effect the least practicable adverse impact on North Atlantic right whales. The proposed rule and this final rule require impact pile driving to be delayed or shutdown if a North Atlantic right whale is visually or acoustically detected at any distance. Given NMFS neither anticipates nor authorizes any take by Level A harassment of North Atlantic right whales, NMFS believes that these measures will effect the least practicable adverse impact on the species. Delaying the project due to overly enlarged zone sizes would result in longer construction time frames, prolonging the time periods over which marine mammals may be exposed to construction-related stressors. Accordingly, NMFS has determined that enlargement of these zones is not warranted, and that the existing required clearance and shutdown zones support a suite of measures that will effect the least practicable adverse impact on North Atlantic right whales and other affected species.

*Comment 16:* For all large whale species, commenters recommended that NMFS require real-time PAM during impact pile driving to monitor the acoustic clearance and acoustic shutdown zones, and must assume a detection range of at least 10 km. They stated that this monitoring must be undertaken from a vessel other than the pile driving vessel or from a stationary unit to avoid masking of the hydrophone from the pile driving vessel or other development-related noise.

*Response:* As described in the proposed rule, NMFS is requiring the use of PAM to monitor 10-km zones around the piles, and that the systems be capable of detecting marine mammals during pile driving within this zone. However, NMFS acknowledges that this could be made clearer and has modified Table 36 to clearly describe this 10 km PAM monitoring zone. Ocean Wind is required to submit a PAM Plan to NMFS for approval at least 180 days prior to the planned impact pile driving start date. NMFS will not approve a Plan where hydrophones used for PAM would be deployed from the pile driving vessel as this would result in hydrophones inside the bubble curtains, which would clearly be ineffective for monitoring; therefore, there is no need to explicitly state in this rule that this would not be allowed. Further, Ocean Wind may launch PAM drones from shore; hence, NMFS is not requiring that Ocean Wind deploy any monitoring systems from a vessel.

*Comment 17:* Comments recommended that NMFS: (1) require all offshore personnel to be trained to identify North Atlantic right whales and other large whales, and (2) that all vessels maintain a 500-m separation distance from North Atlantic right whale, 100 m for other large whale species while also maintaining a vigilant watch for North Atlantic right whale and other large whale species. Commenter(s) also recommended that NMFS require vessels to slow down or maneuver their vessels appropriately to avoid a potential interaction with a North Atlantic right whale and other large whale species. Commenter(s) also suggested that NMFS require that vessels maintain a separation distance from North Atlantic right whales.

*Response:* NMFS notes that these requirements were included in the proposed rule (87 FR 64868, October 26, 2022) and are carried forward into this final rule.

*Comment 18:* Commenters recommended that NMFS implement diel restrictions for site assessment and characterization activities within 1.5 hours of civil sunset and in low-visibility conditions when the visual clearance zone and shutdown zone (referred to as the ''exclusion zone'' in Appendix A) cannot be visually monitored by the Lead PSO.

*Response:* NMFS acknowledges the limitations inherent in visual detection of marine mammals at night. The proposed rule and this final rule requires that visual PSOs use alternative technology (*i.e.,* infrared or thermal cameras) during periods of low visibility to monitor the clearance and shutdown zones. We note that no Level A harassment is expected to result from exposure to HRG equipment, even in the absence of mitigation, given the characteristics of the sources planned for use (supported by the very small estimated Level A harassment zones; *i.e.,* <36.5 m (119.8 feet (ft)) for all sources). Regarding Level B harassment, any potential impacts are limited to short-term behavioral responses. Given these factors combined with other mitigation measures, NMFS has determined that more restrictive mitigation requirements are not warranted.

Restricting surveys in the manner suggested by the commenters may reduce marine mammal exposures by some degree at night if, in fact, detectability is less at night and animals

do approach within the small harassment zone, but would not result in any significant reduction in either intensity or duration of noise exposure over the course of the surveys. In fact, the restrictions recommended by the commenters could result in the surveys spending increased total time (number of days) on the water introducing noise into the marine environment, which may result in greater overall impacts to marine mammals; thus, the commenters have not demonstrated that such a requirement would result in a net benefit. Furthermore, restricting the ability of the applicant to begin operations only during daylight hours, which could result in the applicant failing to collect the data they have determined is necessary within the specific timeframe and, subsequently, may necessitate the need to conduct additional surveys in the future across additional days. 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 the likely effects of the activity on marine mammals absent mitigation, potential unintended consequences of the measures as proposed by the commenters, and practicability of the recommended measures for the applicant, NMFS has determined that restricting operations as recommended is not warranted or practicable in this case.

*Comment 19:* Commenter recommended that NMFS prohibit site assessment and site characterization activities during times of highest North Atlantic right whale risk (foraging and migration, and times when mother-calf pairs, pregnant females, surface active groups, or aggregations of three or more whales, which is indicative of feeding or social behavior), using the best available science to define high-risk timeframes.

*Response:* NMFS neither anticipates, nor authorizes, take of North Atlantic right whales by Level A harassment from this activity. Furthermore, NMFS expects that the required Vessel Strike Avoidance and HRG mitigation measures will affect the least practicable adverse impact on the species from this activity. While NMFS is authorizing three total takes of three North Atlantic right whales by Level B harassment from HRG surveys over the 5-year effective period of this rulemaking, the required mitigation measures will affect the least practicable adverse impact on North Atlantic right whales. Specifically, the largest modeled Level B harassment zone size for the sparker (141 m) is already much smaller than the required separation, clearance, and shutdown distances for North Atlantic right whale (500 m) and any unidentified large whale that would be treated as if it were a North Atlantic right whale. Any Level B harassment that is not avoided is not expected to impact feeding or other behaviors in a manner that poses energetic or reproductive risks for any individuals. Given the minimal anticipated impacts of the HRG survey, NMFS disagrees that additional mitigation measures are warranted.

*Comment 20:* A commenter suggested that all acoustic and visual monitoring must begin at least 60 minutes prior to the start of or re-start of pile driving and must be conducted throughout the entire duration of the pile-driving event. They also suggested that visual monitoring must continue for 30 minutes after pile driving has ceased.

*Response:* NMFS notes that the commenter's recommended mitigation measures were included in the proposed rule and carried forward in this final rule. The proposed rule also included a requirement that Ocean Wind review PAM data at least 24 hours immediately prior to pile driving for situational awareness, which has also been included in this final rule. NMFS notes that if monitoring continues throughout any pauses in pile driving after it commences, monitoring would not have to occur for 60 minutes; however, the clearance zones measures regarding not starting pile driving until the zones are clear would become applicable.

*Comment 21:* Commenters recommended that NMFS should restrict pile driving at night and during periods of low visibility to protect all large whale species. This would include no pile driving being allowed to begin after 1.5 hours before civil sunset or during times where the visual clearance zone and shutdown zone (called the ''exclusion zone'' in the Appendix) cannot be visually monitored, as determined by the Lead PSO.

If nighttime pile driving is to be allowed, the commenters recommended that NMFS require that pile driving be initiated no later than 1.5 hours prior to civil sunset at the latest, rather than 1.5 hours after civil sunset as stated in the proposed rule, in order to maximize monitoring activities during hours of optimal visibility/daylight. Impact pile driving started at least 1.5 hours prior to civil sunset during good visibility conditions can then continue after dark, as necessary providing the best available infrared technologies are used to support visual monitoring of the clearance and exclusion zones during periods of darkness (see Attachment 1).

A commenter did caveat this recommendation by stating that NMFS should only allow pile driving to continue after dark if the activity began during daylight hours and must continue for human safety or due to installation feasibility (*i.e.,* instability or pile refusal) but only if required nighttime monitoring protocols are followed.

A commenter suggested that if pile driving must continue after dark due to safety reasons, Ocean Wind should be required to notify NMFS with these reasons and an explanation for exemption. Additionally, a commenter stated that a summary of the frequency of these exceptions must be made publicly available to ensure that these are indeed exceptions, rather than the norm, for the project.

*Response:* NMFS recognizes the need to protect marine mammals that may be exposed to pile-driving noise, as well as the challenges of detecting marine mammals in low-light conditions. However, we note that while it may be more difficult to detect marine mammals at night, there are benefits to completing the pile driving in a shorter total amount of time, and exposing marine mammals to fewer days of pile-driving noise. On July 19, 2023, Ocean Wind submitted to NMFS a final Nighttime Pile Driving Plan. This plan includes use of multiple Electro-Optical/Infra-Red (E.O./IR) cameras with cooled sensors and 32-channel hydrophone arrays to conduct PAM for marine mammal detection at night which will maximize marine mammal detection during nighttime pile driving. With the implementation of this plan, Ocean Wind may conduct pile driving at night from June 1 through October 31, annually, as this is the period, based on the Roberts *et al.* (2023) data, where North Atlantic right whale densities are the lowest. We note that Ocean Wind will not be performing nighttime pile driving for every pile, nor even every day as pile driving will not occur every day. Further, some piles will be finished before hours of darkness and some piles may necessitate completion after dark due to safety and/or stability concerns. NMFS will continue to review reports submitted by Ocean Wind and will maintain the provision to implement adaptive management, if needed. Given the requirements of the nighttime plan, which increase the likelihood of detection and the effective implementation of the required mitigation, NMFS has determined that allowing nighttime pile driving in the identified months is appropriate. For those months when nighttime pile driving is not allowed, the requirement

has been corrected to indicate that initiation of pile driving must begin 1.5 hours prior to (not after) civil sunset, as we agree with the commenter and that was the intention in the proposed rule.

Regarding a commenter's suggestion for additional and specific reporting in the event that piles must be finished after dark due to safety and/or stability concerns, we do not agree that this measure would be either beneficial or necessary. This is a blanket provision necessary for the safety of the crew and vessels and do not see what benefit tracking this available provision would be. As described in the rule, Ocean Wind only intends to install a maximum of 2 piles per day, but may only install 1 pile on many days. Because of the limited duration of pile driving predicted, we do not expect that Ocean Wind finishing pile driving after civil sunset would be a common occurrence, necessitating the need for additional restrictions or specific reporting. Regarding the reporting requirement specified by the commenter, we note that we are already requiring weekly reports during foundation installation, which would contain information that would inform on how long impact pile driving occurred and if it was necessary for this activity to occur during hours of darkness (*i.e.,* information that would document the daily start and stop of all pile-driving activities). These weekly reports would be combined into monthly and annual reports. We do not plan to make the weekly or monthly reports publicly available, due to the number or reports that would become available; however, as described in Comment 25, we do plan to make the final reports available, which would summarize all of the information contained in the weekly and monthly reports.

*Comment 22:* A commenter recommended that NMFS not allow pile driving to begin if monitoring results in either an acoustic detection within the acoustic clearance zone or a visual detection within the visual clearance zone of one or more North Atlantic right whales. They also stated that pile driving should not be initiated or must be shut down if underway (with an exception noted due to pile stability and human safety) if monitoring results in an acoustic detection within the acoustic shutdown zone or a visual detection within the visual shutdown zone of one or more North Atlantic right whales. They added that if pile driving is underway and a North Atlantic right whale is visually detected at any distance from the pile by a PSO, pile driving must be shut down. A commenter also recommended NMFS include a condition for resumption of pile driving after the Lead PSO confirms that no North Atlantic right whale or other protected species have been detected within the acoustical and visual clearance zones. Finally, a commenter acknowledged the exemption for safety from shutdown but recommends that if this exemption occurs, the project must immediately notify the NMFS with reasons and explanation for exemption and a summary of the frequency of these exceptions must be publicly available to ensure that these are the exception rather than the norm for the project. Some commenters also recommended that HRG surveys should be required to use a soft start, ramp-up procedure to encourage any nearby marine life to leave the area.

*Response:* The recommended requirement that any detection of a North Atlantic right whale (visually or acoustically in the associated clearance zone) during the clearance period would trigger a delay to the onset of pile driving was included in the proposed rule and is included in this final rule. Similarly, the recommended requirement that any detection of a North Atlantic right whale (visually or acoustically in the associated exclusion zone) while pile driving is occurring would trigger a shutdown of pile driving (with the noted safety exception) was included in the proposed rule and is included in this final rule. In this final rule, NMFS has also added the requirement that shutdown of pile driving must occur if a North Atlantic right whale is visually detected at ''any distance.'' Regarding the resumption of pile driving following a shutdown, PSOs would be required to monitor clearance zones prior to impact pile driving starting. Impact pile driving would be allowed to begin only when the Lead PSO confirms that no North Atlantic right whales or other marine mammal species have been detected in the applicable clearance zones and the PAM operator confirms no detection of North Atlantic right whales. A soft-start to pile driving or ramp-up to HRG surveys would be required, as described in the proposed rule and also included in this final rule.

Regarding a commenter's suggestion that in the event that mitigation actions are not undertaken based on specific exemptions, both the proposed and final rules require reporting weekly, monthly, and annual reports where Ocean Wind must provide reasons why mitigation actions could not occur (including for this exception). We acknowledge the importance of transparency in the reporting process and plan to make all final annual and 5-year marine mammal monitoring reports and final SFV report on our website, however, NMFS will not be making the weekly or monthly reports final given the amount of total reports that would be obtained over a 5-year period.

*Comment 23:* A commenter expressed concern regarding 8 hours of pile driving, daily, for monopile foundations as they state that there are ''no clear provisions for enforcement of these and other restrictions'' given the close proximity of other projects within the region.

*Response:* Specific to the Project, NMFS notes that this comment is unfounded, as no other projects will begin impact pile driving off New Jersey during the same period Ocean Wind would begin. However, in discussing the concern more broadly, it is not clear what the commenter means by stating that there are ''no clear provisions for enforcement of these and other restrictions.'' The MMPA has a prohibition on the take of marine mammals and if Ocean Wind does not comply with the requirements of any issued LOA and their activities result in the take of marine mammals, then they will be subject to law enforcement. Violating the regulations and LOAs can result in civil and criminal penalties. More specifically, the developer is required to submit weekly and monthly reports to NMFS for review, that would detail exactly what was installed, what parameters of the impact hammer were used, and when piling began and ceased, among other things. Additionally, the applicant would provide SFV reports for NMFS' review to allow for a clear understanding as to the effectiveness of the sound attenuation measures and if additional action (*e.g.,* modification to clearance or shutdown zones) is needed.

*Comment 24:* A commenter stated that at first, UXOs/MECs must be evaluated to see if they can be moved without detonation. If detonation must occur, the commenter stated that the mitigation measures for pile driving should be observed the same with regards to including noise abatement technology, clearance zones, and the use of PSOs. If the impact area is larger than predicted after detonation, the commenter suggests that expanded mitigation measures should be implemented.

*Response:* As described in the proposed rule and included in this final rule, Ocean Wind would use the As Low As Reasonably Practical (ALARP) approach such that detonation would be the last resort to removing a UXO/MEC. That is, Ocean Wind is required to use detonation as a means of removing

UXO/MECs only if all other options of removal have been exhausted. Also as described in the proposed rule and included in this final rule, Ocean Wind would be required to implement visual monitoring using PSOs and PAM prior to detonation. These PSOs and PAM operators would be required to clear the appropriate zones prior to Ocean Wind detonating any UXO/MEC. The proposed rule also included the measure that SFV must be conducted on every UXO/MEC, which has been carried forward in this final rule. Additionally, NMFS requires that a double big bubble curtain must be used that is positioned far enough away from the blast such that the hose nozzles are not damaged.

Furthermore, NMFS notes that we retain the ability to modify existing mitigation measures through adaptive mitigation in the event new information becomes available and if doing so creates a reasonable likelihood of more effectively accomplishing the goal(s) of the measure.

*Comment 25:* A commenter asserted that the LOA must include requirements to hold all vessels associated with site characterization surveys accountable to the ITA requirements, including vessels owned by the developer, contractors, employees, and others regardless of ownership, operator, and contract. They stated that exceptions and exemptions will create enforcement uncertainty and incentives to evade regulations through reclassification and redesignation. They recommended that NMFS simplify this by requiring all vessels to abide by the same requirements, regardless of size, ownership, function, contract or other specifics.

*Response:* NMFS notes the proposed rule and this final rule includes a general condition that extends the requirements imposed on Ocean Wind to persons it authorizes or funds to conduct activities on its behalf *e.g.,* vessel operators) while conducting the specified activities. The rule also states that Ocean Wind must ensure that the vessel operator and other relevant vessel personnel, including the PSO team, are briefed on all responsibilities, communication procedures, marine mammal monitoring protocols, operational procedures, and rule requirements prior to the start of survey activity, and when relevant new personnel join the survey operations.

*Comment 26:* A commenter stated that the LOA must include conditions for the survey and construction activities that will first avoid adverse effects on North Atlantic right whales in and around the area and then minimize and mitigate the effects that cannot be avoided. This should include a full assessment of which activities, technologies and strategies are truly necessary to achieve site characterization and construction to inform development of the offshore wind projects and which are not critical, asserting that NMFS should prescribe the most appropriate techniques that would produce the lowest impact while achieving the same goals while prohibiting those other tools/techniques that would cause more frequent, intense, or long-lasting effects.

*Response:* NMFS is required to authorize the requested incidental take if it finds such incidental take of small numbers of marine mammals by the requestor while engaging in the specified activities within the specified geographic region will have a negligible impact on such species or stock and where appropriate, will not have an unmitigable adverse impact on the availability of such species or stock for subsistence uses. As described in this notice of final rulemaking, NMFS finds that small numbers of marine mammals may be taken relative to the population size of the affected species or stocks and that the incidental take of marine mammal from all of Ocean Wind's specified activities combined will have a negligible impact on all affected marine mammal species or stocks. It is not within NMFS' authority to determine the requestor's specified activities.

The MMPA requires that we include mitigation measures that will effect the least practicable adverse impact on the affected species and stocks. In practice, NMFS agrees that the rule should include conditions for the construction activities that will first avoid adverse effects on North Atlantic right whales in and around the project area, where practicable, and then minimize the effects that cannot be avoided. NMFS has determined that this final rule meets the requirement to effect the least practicable adverse impact on the affected marine mammal stocks and their habitat. The commenter does not make any specific recommendations regarding mitigation measures.

*Monitoring, Reporting, and Adaptive Management*

*Comment 27:* Several commenters recommended that NMFS increase the frequency of information review for adaptive management to at least once a quarter and also have a mechanism in place to undertake review and adaptive management on an ad hoc basis if a serious issue is identified (*e.g.,* if unauthorized levels of Level A take of marine mammals are reported or if serious injury or mortality of an animal occurs).

*Response:* NMFS may undertake review and adaptive management actions at any time under the regulations, as written. Ocean Wind is required to submit weekly, monthly, and annual reports that NMFS will review in a timely manner and may act on pursuant to the adaptive management provisions at any time, and therefore, a separate specific quarterly review is unnecessary.

*Comment 28:* A commenter recommended that NMFS require robust monitoring protocols during pre-clearance and when site assessment and characterization activities are underway, including: (1) passive acoustic monitoring from a nearby vessel (other than the survey vessel) or a stationary unit to avoid masking; (2) visual monitoring of the clearance zone for North Atlantic right whales and other large whales by four on-duty PSOs on each survey vessel scanning 180 degrees); and (3) visual and acoustic monitoring beginning 30 minutes prior to commencement or re-initiation of survey activities through the duration of the survey.

*Response:* Regarding the recommendation to require acoustic monitoring (in any form) to support clearance and shutdown requirements for HRG surveys, please see NMFS response to Comment 13, which describes why PAM is not warranted for HRG surveys. With respect to the number of PSOs, NMFS is not requiring four on-duty PSOs given the very small harassment zone sizes associated with HRG surveys. In the proposed rule, and in this final rule, PSOs are required to commence monitoring for marine mammals 30 minutes prior to the activity before HRG surveys begin; hence, this recommendation has already been satisfied.

*Comment 29:* A commenter recommended that NMFS require infrared technology to support visual monitoring for all vessels responsible for crew transport and during any pile-driving activities that occur in periods of darkness or nighttime to supplement the visual monitoring efforts for marine mammals. They additionally included a suggestion that additional observers and monitoring approaches (*i.e.,* infrared, drones, hydrophones) must be used, as determined to be necessary, to ensure that monitoring efforts for the clearance and shutdown zones are effective during daytime, nighttime, and during periods of poor visibility.

*Response:* NMFS notes that most of the proposed recommendations were already included in the proposed rule

and have been carried forward here. Specifically, NMFS described in the proposed rule, and is requiring in the final rule, that infrared technologies and PAM hydrophone deployments be available and used before, during, and after pile driving. NMFS concurs with a suggestion by the commenter and has added a new requirement in the final rule to allow Ocean Wind to deploy drones to aid PAM efforts. Moreover, since publication of the proposed rule, Ocean Wind has submitted a nighttime pile driving plan (referred to as the Alternative Monitoring Plan) on July 19, 2023 that includes advanced technologies for monitoring marine mammals at night for both trained crew observers and PSOs. Once approved, NMFS will make the plan available on our website at *https://www.fisheries.noaa.gov/action/incidental-take-authorization-ocean-wind-lcc-construction-ocean-wind-1-wind-energy-facility*.

*Comment 30:* Some commenters recommended that additional monitoring of the visual clearance and shutdown zones must be undertaken by PSOs located on the pile-driving vessel and on an additional vessel that would circle the pile-driving site. They specified that a minimum of four PSOs must be on each vessel and must have two PSOs monitoring per shift operating on a two on, two off rotation, with the commenter suggesting that human observation be supplemented with IR technology and drones.

*Response:* In the proposed rule, NMFS proposed to require two on-duty PSOs on the pile-driving vessel and two on-duty PSOs on the secondary vessel, each covering 180 degrees, as proposed by a commenter. However, since that time, NMFS has determined that there are too few observers and is now requiring three on-duty PSOs on both platforms such that each PSO is responsible for 120-degree coverage, increasing detection effectiveness.

*Comment 31:* A commenter recommended that NMFS should require SFV during installation of WTG and OSS foundations on the first monopile installed and then on a random sample of monopiles throughout the installation process. They also noted that they do not support the installation of unmitigated piles. They added that all sound source validation reports for field measurements must be made publicly available after being evaluated by both NMFS and BOEM prior to the installation of any additional monopiles being installed.

*Response:* NMFS notes that the proposed rule and this final rule require noise abatement systems to be deployed during all impact pile driving activities to reduce noise levels to the modeled harassment isopleths, which will be validated through SFV. Additionally, the proposed rule and this final rule require SFV for the first three piles and additional piles where conditions suggest noise levels may be higher or propagate farther than those piles previously measured. Ocean Wind has the Lease Area data to identify if a pile would be more difficult to drive than the initial piles measured. Given these mitigation measures, NMFS disagrees that random sampling is necessary.

As we describe above for Comment 22, we acknowledge the importance of transparency in the reporting process and plan to make all final SFV report on our website, however, NMFS will not be making any weekly or monthly final reports available, given the amount of total reports that would be obtained over a 5-year period. The SFV reports and information gleaned would be available in these final reports.

*Comment 32:* The Commission suggested that the monitoring measures included in the proposed rule may not be sufficient in reducing the potential for Level A harassment of North Atlantic right whales, specifically indicating that visually monitoring a 3.5- to 3.8-km would prove difficult and cited literature (Oedekoven and Thomas, 2022) estimating effectiveness of marine mammal observers (MMOs) to be 54 percent for detecting rorquals at 914 m or more, 31 percent for small cetaceans in pods of more than six, and 14 percent for small cetaceans in pods of six or fewer. The Commission did not provide any recommendations to increase visual detection capabilities.

*Response:* The time of year when Ocean Wind would be conducting the majority of pile driving is when North Atlantic right whale density in the project area is very low. As provided in Table 17 and 18, one North Atlantic right whale Level A harassment exposure was estimated (0.9 from WTG installation and 0.1 from OSS foundation installation). These estimates were derived without consideration of any mitigation (except 10-dB of sound attenuation) or natural avoidance of marine mammals to avoid loud sounds. Hence, even without any monitoring or mitigation (with exception of 10-dB of sound attenuation from the modeling), the potential for PTS to occur is low. As described in response to Comment 4, the Commission cites information from a paper related to the use of trained lookouts and a team of two on-duty MMOs on moving Navy military vessels actively engaged in sonar training (Oedekoven and Thomas, 2022) to support its argument that visual monitoring would prove difficult. We note that these ''trained lookouts'' are Navy personnel who are specifically trained as lookouts in contrast to NMFS-approved PSOs who are required to have specific education backgrounds, trainings, and experience before undertaking PSO duties (see requirements found in the regulations text at Section 217.265(a)). NMFS disagrees that the statistics generated from that report are relevant to the effectiveness of monitoring for the Project. Independent, NMFS-approved PSOs are required during all impact pile driving (see requirements found in 217.265). At least three PSOs would be placed on the stationary pile driving platform and three PSOs would also be placed on each of two dedicated PSO vessels traveling at slow speeds (less than 10 kn) for a total of nine PSOs. Concurrently, real-time PAM is required to supplement visual monitoring during impact pile driving, UXO/MEC detonation, and select vessel transport. Further, Ocean Wind must monitor several times daily supplemental marine mammal detection information systems (*e.g.,* the Right Whale Sighting Advisory System) to increase situational awareness. Hence, it is reasonable to assume that the effectiveness of marine mammal monitoring during the project is much greater than the two-person MMO team reported in Oedekoven and Thomas (2022). We note that the MMO team in Oedekoven and Thomas (2022), was not always using PAM in that study, and had significantly more *Balaenoptera spp.* sightings than the lookout team (see Table 2 in Oedekoven and Thomas (2022)). Given the monitoring measures that are required for the Project in combination with the mitigation measures (*i.e.,* clearance and shutdown zones), NMFS disagrees that the monitoring measures will be insufficient to avoid Level A harassment (PTS) of North Atlantic right whales.

*Comment 33:* The Commission recommended that NMFS require Ocean Wind to have PAM operators also review acoustic data for at least 24 hours prior to UXO/MEC detonations, when available.

*Response:* We appreciate the Commission's suggestion and have incorporated it into the final rule.

*Comment 34:* The Commission recommended that NMFS include a provision that the Lead PSO must have a minimum of 90 days of at-sea experience and must have had this experience within the last 18 months.

*Response:* We appreciate the Commission's suggestion and have incorporated it into the final rule.

*Comment 35:* A commenter stated that Ocean Wind should be required to use PSOs at all times when under way. They also suggested that PSOs complement their survey efforts using additional technologies, such as infrared detection devices when in low-light conditions.

*Response:* NMFS is not requiring PSOs to be onboard every transiting vessel. However, as described in the proposed rule, as well as the final rule, Ocean Wind must have trained observers onboard all vessels. This observer may be a PSO or a crew member with no other duties if the vessel is operating above 10 kn. NMFS is also requiring Ocean Wind to provide a North Atlantic Right Whale Vessel Strike Avoidance Plan to NMFS 90 days prior to the onset of vessel use. Ocean Wind submitted that plan on July 19, 2023. Once approved, this plan will be made available on NMFS' website at *https://www.fisheries.noaa.gov/action/incidental-take-authorization-ocean-wind-lcc-construction-ocean-wind-1-wind-energy-facility.*

*Comment 36:* A commenter recommended that the LOA should require all vessels supporting site characterization to be equipped with and using Class A Automatic Identification System (AIS) devices at all times while on the water. A commenter suggested this requirement should apply to all vessels, regardless of size, associated with the survey.

*Response:* NMFS agrees that AIS should be required. This final rule includes a requirement that all vessels associated with the project be equipped with AIS.

*Comment 37:* A commenter stated that monitoring reports are not enough to evaluate impacts to marine mammals from offshore wind impacts and instead suggests that on-the-ground, independent scientists and response teams be located in the area during activities conducted under incidental take authorizations to monitor for impacts and to respond immediately or investigate if anything occurs. The commenter suggested that an organization charged specifically with responding to endangered marine mammal incidents (which NMFS notes, the commenter did not choose to define or specify further), be fully funded by the State and Federal agencies to collect the animal and conduct an independent and thorough/immediate investigation to determine the cause of death.

*Response:* NMFS disagrees with the commenter's recommendations. NMFS emphasizes that this final rule authorizes incidental take by Level A and Level B harassment from auditory injury and behavioral disturbance. Moreover, no mortality or serious injury is anticipated or authorized in this final rule. During the specified activities identified for the Project, NMFS is requiring third-party, independent visual PSOs and PAM operators be present to provide monitoring support and to instigate mitigative actions, if they are needed, such as shutdowns or delays to activities. These specific personnel are also tasked to record instances of marine mammal observations (both visually or acoustically) while also providing additional information of the distance to approach (*i.e.,* how close was the sighting/detected marine mammal to the activity), the behavior of the animal(s), and any actions determined to be necessary to be undertaken, among other requirements. While the commenter suggests an independent team be funded to monitor and respond to events if they occur, it is unclear what action(s) the commenter recommends these individual undertake if a large whale is exposed to noise levels that would cause TTS or PTS nor were any suggestions made for NMFS to consider for this final rule. To the commenter's other suggestion, we note that the MMPA established the Marine Mammal Health and Stranding Response Program (MMHSRP), a national program that coordinates emergency responses to sick, injured, distressed, or dead marine mammals. In the event Ocean Wind discovers a stranded, entangled, injured, or dead marine mammal, it must report the observation to either the NMFS Greater Atlantic Stranding Hotline or the NMFS Southeast Stranding Hotline, depending on exact location, as soon as possible but within 24 hours. We reference the commenter to the Reporting section of the regulations (217.265(g)) for more information.

*Comment 38:* The Commission recommended that NMFS require Ocean Wind to submit a PAM plan and to allow for public comments to occur prior to the issuance of the final rule. The Commission specified that this plan should include the number, type(s) (*e.g.,* moored, towed, drifting, autonomous), deployment location(s), bandwidth/sampling rate, sensitivity of the hydrophones, estimated detection range(s) for ambient conditions and during pile driving, and the detection software to be used. They also recommended that Ocean Wind and other wind developers consider whether vector sensors should be used in addition to deployed hydrophones to enhance detection capabilities, with a particular focus on ''those vocalizations that may be drowned out by the hammer strikes and resulting reverberation.''

*Response:* NMFS notes the Commission's recommendation for Ocean Wind to submit a PAM Plan to NMFS for approval is consistent with the proposed rule and this final rule. However, for the PAM Plan, this final rule requires the lead time for plan submission 180 days prior to the start of foundation installation activities. In order to meet the Commission's recommendation and the FAST–41 timeline, Ocean Wind would have had to submit a plan almost concurrently or shortly after the public comment period on the proposed rule which is not logistically feasible. Further, NMFS has identified the requirements that Ocean Wind must meet in its PAM plan in both the proposed rule, which was made available for public comment, and this final rule. Given NMFS' extensive expertise with passive acoustic monitoring and the fact that we are coordinating with BOEM's Center for Marine Acoustics (CMA), NMFS has determined that approval of the plan does not warrant public input. However, NMFS will share the plan with the Commission for review prior to approval of the plan. NMFS has included the Commission's recommendations, among other things, of what would be required in the PAM plan.

*Comment 39:* The Commission recommended that in the final rule NMFS: (1) specify which model-estimated zones (*i.e.,* acoustic ranges, exposure ranges, mitigation zones, monitoring zones) and which metrics (*i.e.,* flat maximum-over-depth ($R_{max}$), flat model-estimated acoustic ranges ($R_{95\%}$)) should be compared to the *in-situ* Level A and B harassment zones, (2) specify which type of *in-situ* Level A harassment zone (*i.e.,* acoustic or exposure ranges) should be calculated, and, (3) require that *in-situ* measurements be conducted for monopiles that are not represented by the previous three locations (*i.e.,* substrate composition, water depth) or by the hammer energies and numbers of strikes needed or number of piles installed in a given day.

*Response:* We have required, in the final rule, that the model-estimated acoustic ranges ($R_{95\%}$) be compared with the real-world sound field measurements as exposure ranges ($ER_{95\%}$) cannot be measured in the field. The acoustic ranges NMFS incorporated into the final rule are found in

Appendix H of Ocean Wind's ITA application and use the flat $R_{95\%}$ metric.

Regarding the Commission's second suggestions, the *in-situ* analysis for Level A harassment compared to acoustic range which will indicate if ERs modeled are acceptable, because if the acoustic range to the Level A harassment threshold is louder than acoustic range modeled by JASCO, one can assume the ER modeled is too small as animals move through a sound field.

Regarding the Commission's third suggestion, NMFS notes the proposed rule included language where if in the case that a monopile installation site or construction scenario was determined to be not representative of the rest of the monopile installation sites, Ocean Wind would be required to provide information on how additional sites and construction scenarios would be selected for SFV measurements, as would be described in their Foundation Installation Pile Driving SFV Plan. This plan would also be required to describe the methodology for collecting, analyzing, and preparing SFV measurement data for submission to NMFS. We acknowledge that this information is important and have carried over the same requirement into the final rule. However, we do not agree regarding the suggestion to require additional SFV based on variations in the hammer energies, number of strikes used for installation, or number of piles installed per day. NMFS applied the largest distances modeled, which represents maximum number of piles installed per day, maximum strikes predicted, and maximum hammer energies. Because of this, Ocean Wind is required to stay within the bounds of the analysis. We also note that any variation assuming less hammer strikes, less piles installed per day, or lower hammer energies would most likely result in less anticipated take per day, as the take authorized in the final rule is based on the highest bounds of the analysis. For all these reasons, we are not requiring additional SFV based on variations specific to the hammer energy, number of piles installed, or the total number of strikes.

*Comment 40:* The Commission recommended that NMFS require Ocean Wind to report on additional metrics not included in the proposed rule, including sound pressure level ($SPL_{rms}$) source levels, cumulative SEL, ranges to Level A harassment and Level B harassment thresholds, and types and locations of sound attenuation systems. The Commission also recommended the ranges to Level B harassment thresholds be based on the behavioral thresholds, not TTS thresholds. Lastly, the Commission recommended that NMFS require that Ocean Wind deploys a minimum of three hydrophones for SFV during impact pile driving and a minimum of two hydrophones and one pressure transducer for SFV during UXO/MEC detonations.

*Response:* NMFS partially concurs with the Commission's recommendations. The interim report must now include peak, SPL, and $SEL_{cum}$ metrics for all hydrophones, estimated distances to NMFS Level A harassment and Level B harassment thresholds, types and locations of sound attenuation systems. We also removed reference to the TTS thresholds. This information is also required in the final report. NMFS is not requiring source levels be estimated in interim reports given the quick turnaround time (48 hours) and amount of data needing to be analyzed in that time. The purpose of the interim reports are to determine that distances to Level A harassment and Level B harassment thresholds are not being exceeded and to determine if any mitigative action needs to be taken. Hence knowing source levels is not required at this stage. However, NMFS is requiring source levels (peak, $SEL_{cum,}$ and $SPL_{rms}$) be included in the final SFV report. Regarding the hydrophones for SFV during pile driving, NMFS is requiring Ocean Wind place two hydrophones at four locations at an azimuth of least propagation loss and two at 750 m and 90 degrees from this azimuth. This results in a total of 10 hydrophones during SFV. Additionally, we have added a requirement to deploy a pressure transducer for UXO/MEC detonations, as suggested by the Commission.

*Comment 41:* Commenters stated that the LOA must include a requirement for all phases of the Ocean Wind 1 site characterization to subscribe to the highest level of transparency, including frequent reporting to Federal agencies, requirements to report all visual and acoustic detections of North Atlantic right whales and any dead, injured, or entangled marine mammals to NMFS or the U.S. Coast Guard as soon as possible and no later than the end of the PSO shift. A commenter states that to foster stakeholder relationships and allow public engagement and oversight of the permitting, the LOA should require all reports and data to be accessible on a publicly available website. A commenter also suggested that all quarterly reports of PSO sightings must be made publically available to continue to inform marine mammal science and protection.

*Response:* NMFS notes the commenters' recommendations to report all visual and acoustic detections of North Atlantic right whales and any dead, injured, or entangled marine mammals to NMFS are consistent with the proposed rule and this final rule (see Situational Reporting). We refer the reader to 217.265(g)(13)(i)-(vi) of the regulations for more information on situational reporting.

Daily visual and acoustic detections of North Atlantic right whales and other large whale species along the Eastern Seaboard, as well as Slow Zone locations, are publicly available on WhaleMap (*https://whalemap.org/whalemap.html*). Further, recent acoustic detections of North Atlantic right whales and other large whale species are available to the public on NOAA's Passive Acoustic Cetacean Map website (*https://www.fisheries.noaa.gov/resource/data/passive-acoustic-cetacean-map*). Given the open access to the resources described above, NMFS does not concur that public access to quarterly PSO reports is warranted and we have not included this measure in the authorization. However, NMFS will post all final reports to our website. We reference the commenters to 217.265(g) for more information on reporting requirements in the regulations.

*Comment 42:* A commenter recommended that the use of quieter foundations be given full consideration when selecting a ''preferred alternative'' and that direct-drive turbines be used in lieu of gearboxes.

*Response:* The commenter refers to a ''preferred alternative'' suggests this comment is specific to the EIS BOEM developed for the project. NMFS agrees with the commenter that full consideration of various turbine foundations should be evaluated in an EIS but also recognizes that there are technological challenges and that the ultimate foundation type chosen must be practicable. Regardless, this rule evaluates the specified activities as described in Ocean Wind's MMPA application which includes installation of monopile and jacket foundations. With respect to direct-drive, NMFS agrees that the best available science indicates that these are known to be less noisy than gearboxes and we understand gearboxes are older technology. Ocean Wind has confirmed with NMFS that direct drive turbines will be used for the Ocean Wind project.

*Effects Assessment*

*Comment 43:* A commenter stated that there is a lack of basic research about the impacts of offshore wind energy development on large whales. They also asserted that the current application

does not adequately assess the impact to prey from construction and operation and suggest that any permits and authorizations (*i.e.,* any IHAs, regulations) for offshore wind development should not be issued until scientific baseline assessments for what harms may occur to whales are available. Prior to issuing any IHAs or regulations, the commenter recommended that an independent pilot project investigating the potential and real marine ecosystem impacts, including assessments for what harms may or could occur to whales, be conducted and sound science supported by planned or currently begun robust scientific baseline assessments and independent and peer-reviewed studies are complete.

*Response:* The MMPA requires NMFS to evaluate the effects of the specified activities in consideration of the best scientific evidence available and to issue the requested incidental take authorization if it makes the necessary findings. The MMPA does not allow NMFS to delay issuance of the requested authorization on the presumption that new information will become available in the future. If new information becomes available in the future, NMFS may modify the mitigation and monitoring measures in an LOA issued under these regulations through the adaptive management provisions. Furthermore, NMFS is required to withdraw or suspend an LOA if, after notice and public comment unless an emergency exists, it determines the authorized incidental take may be having more than a negligible impact on a species or stock.

NMFS has duly considered the best scientific evidence available in its effects analysis. The Potential Effects of Underwater Sound on Marine Mammals section of the proposed rule included a broad overview of the potential impacts on marine mammals from anthropogenic noise and provided summaries of several studies regarding the impacts of noise from several different types of sources (*e.g.,* airguns, Navy sonar, vessels) on large whales, including North Atlantic right whales. Offshore wind farm construction generates noise that is similar, or, in the case of vessel noise, identical, to noise sources included in these studies (*e.g.,* impact pile driving and airguns both produce impulsive, broadband sounds where the majority of energy is concentrated in low frequency ranges), and the breadth of the data from these studies helps us predict the impacts from wind activities. In addition, as described in the proposed rule, it is general scientific consensus that behavioral responses to sound are highly variable and context-specific and are impacted by multiple factors including, but not limited to, behavioral state, proximity to the source, and the nature and novelty of the sound. Overall, the ecological assessments from offshore wind farm development in Europe and peer-reviewed literature on the impacts of noise on marine mammals both in the U.S. and worldwide provides the information necessary to conduct an adequate analysis of the impacts of offshore wind construction and operation on marine mammals in the Atlantic OCS. NMFS acknowledges that studies in Europe typically focus on smaller porpoise and pinniped species, as those are more prevalent in the North Sea and other areas where offshore wind farms have been constructed, and notes that the commenter did not provide additional scientific information for NMFS to consider.

With respect to adequately assessing impacts to prey from construction and operation, NMFS considered the information in Ocean Wind's application but greatly expanded on the analysis in the proposed rule. Hence, it is not relevant that Ocean Wind's application did not fully address potential impacts to prey, as NMFS conducted its own analysis for the proposed rule, which is incorporated by reference into this final rulemaking, based on the best scientific information available. Further, the Biological Opinion provides a robust analysis on the impacts on ESA-listed marine mammal prey, many of which (*e.g.,* fish, invertebrates) serve as prey for all marine mammals that we have summarized in this final rule. NMFS notes that the commenter did not provide additional scientific information on impacts on prey for NMFS to consider.

Furthermore, a commenter specifically points out a lack of baseline data available on harbor seals in the New Jersey area. NMFS points the commenter towards two sources of information for marine mammal baseline information: The Ocean/Wind Power Ecological Baseline Studies, January 2008–December 2009, completed by the New Jersey Department of Environmental Protection in July 2010 (*https://tethys.pnnl.gov/sites/default/files/publications/Ocean-Wind-Power-Baseline-Volume1.pdf*) and AMAPPS (*https://www.fisheries.noaa.gov/new-england-mid-atlantic/population-assessments/atlantic-marine-assessment-program-protected*) with annual reports available from 2010 to 2020 that cover the areas across the Atlantic Ocean.

*Comment 44:* Some commenters questioned whether NMFS met its requirement to utilize the best available science in its analysis. A commenter stated that NMFS must use the more recent and best available science in evaluating impacts to North Atlantic right whales, including updated population estimates, recent habitat usage patterns for the project area, and a revised discussion of the acute and cumulative stress on whales in the region. A commenter identified that the North Atlantic right whale population abundance is less than that cited in the proposed rule. A commenter stated that NMFS did not use the best available science for the proposed rule (NMFS originally used n = 368) for the population estimate of North Atlantic right whales when NMFS' website stated that ''there are fewer than 350 remaining'' and that the North Atlantic right whale Consortium stated that 336 individuals remained in their 2021 Annual Report Card. A commenter also objected to NMFS' determination that no change was needed in the number of takes in the Applicant's request when NMFS acknowledged a revision in the density of the North Atlantic right whale population. A commenter then cited information about North Atlantic right whale population abundance to support this claim.

*Response:* The MMPA and its implementing regulations require that incidental take regulations be established based on the best available information, which does not always mean the most recent information. NMFS generally considers the information in the most recent U.S. Atlantic and Gulf of Mexico SAR (Hayes *et al.,* 2023) to be the best available information for a particular marine mammal stock because of the MMPA's rigorous SAR procedural requirements, which includes peer review by a statutorily established Scientific Review Group.

Regarding the comment related to the North Atlantic right whale population abundance that was cited in the proposed rule, since publication of the proposed rule, NMFS has finalized the 2022 Stock Assessment Report indicating the North Atlantic right whale population abundance is estimated as 338 individuals ($N_{est}$; 95 percent confidence interval: 325–350; 88 FR 54592, August 11, 2023). NMFS has used this most recent best available scientific information in the analysis of this final rule. This new estimate, which is based off the analysis from Pace *et al.* (2017) and subsequent refinements

found in Pace (2021), is included by reference in the final 2022 SARs (*https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports*) and provides the most recent and best available estimate, including improvements to NMFS' right whale abundance model. Specifically, Pace (2021) looked at a different way of characterizing annual estimates of age-specific survival. The results from the Pace (2021) paper that informed the final 2022 SARs strengthened the case for a change in mean survival rates after 2010 through 2011, but did not significantly change other current estimates (population size, number of new animals, adult female survival) derived from the model. Furthermore, NMFS notes that the SARs are peer reviewed by other scientific review groups prior to being finalized and published and that the North Atlantic Right Whale Report Card (Pettis *et al.,* 2022) does not undertake this process. Based on this, NMFS has considered all relevant information regarding North Atlantic right whale, including the information cited by the commenters. However, NMFS has relied on the final 2022 SAR in this final rule as it reflects the best available scientific information.

We note that this change in abundance estimate does not change the estimated take of North Atlantic right whales or authorized take numbers, nor affect our ability to make the required findings under the MMPA for Ocean Wind's construction activities.

*Comment 45:* Commenters raised concerns regarding the cumulative impacts of the multiple offshore wind projects being developed throughout the range of North Atlantic right (which they state as from North Carolina to Maine), and specifically recommended that we carefully consider the take from all of these projects in combination when conducting the negligible impact analysis for Ocean Wind. Relatedly, they emphasized the total take of bottlenose dolphins by Ocean Wind across multiple years, especially in combination with multiple projects. Commenters also objected to NMFS's conclusion that the application's take limit of 14 North Atlantic right whales for construction activities in the coastal waters between off New Jersey and New York will have a ''negligible impact'' on the species, especially in light of the North Atlantic right whale's critically endangered status, the ongoing Unusual Mortality Event that this species is experiencing and, consequently, the asserted existential threat posed to the species by obstacles to even one individual's survival—and they emphasize this comment in combination with the need to consider the take from multiple projects.

*Response:* NMFS is required to authorize the requested incidental take if it finds the total incidental take of small numbers of marine mammals by U.S. citizens ''*while engaging in that (specified) activity*'' within a specified geographic region during the five-year period (or less) will have a negligible impact on such species or stock and where appropriate, will not have an unmitigable adverse impact on the availability of such species or stock for subsistence uses (16 U.S.C. 1371(a)(5)(A)). Negligible impact is defined 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 effect on annual rates of recruitment or survival'' (50 CFR 216.103). Neither the MMPA nor its implementing regulations require consideration of unrelated activities and their impacts on marine mammal populations in the negligible impact determination. Additionally, NMFS' implementing regulations require applicants to include in their request a detailed description of the specified activity or class of activities that can be expected to result in incidental taking of marine mammals (50 CFR 216.104(a)(1)). Thus, the ''specified activity'' for which incidental take coverage is being sought under section 101(a)(5)(A) is generally defined and described by the applicant. Here, Ocean Wind is the applicant, and we analyzed the impact of its specified activity described in its application and made the necessary determinations on that basis.

Consistent with the preamble of NMFS' implementing regulations (54 FR 40338, September 29, 1989), the impacts from other past and ongoing anthropogenic activities are factored into the baseline, which is used in the negligible impact analysis. Here, NMFS has factored into its negligible impact analysis 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).

The preamble of NMFS' implementing regulations also addresses cumulative effects from future, unrelated activities. Such effects are not considered in making negligible impact determination under section 101(a)(5) of the MMPA. Rather, NMFS considers: (1) cumulative effects that are reasonably foreseeable when preparing a National Environmental Policy Act (NEPA) analysis, and (2) reasonably foreseeable cumulative effects under section 7 of the ESA for ESA-listed species, as appropriate. Accordingly, NMFS has adopted BOEM's Environmental Impact Statement (EIS) and reviewed by NMFS as part of its inter-agency coordination. This EIS addresses cumulative impacts related to the Project and substantially similar activities in similar locations. Cumulative impacts regarding the promulgation of the regulations and issuance of a LOA for construction activities, such as those planned by Ocean Wind, have been adequately addressed under NEPA in the adopted EIS that supports NMFS' determination that this action has been appropriately analyzed under NEPA. Separately, the cumulative effects of the Project on ESA-listed species, including the North Atlantic right whale, was analyzed under section 7 of the ESA when NMFS engaged in formal inter-agency consultation with the NOAA Greater Atlantic Regional Fisheries Office (GARFO). The Biological Opinion for the Project determined that NMFS' promulgation of the rulemaking and issuance of a LOA for construction activities associated with leasing, individually and cumulatively, are likely to adversely affect, but not jeopardize, listed marine mammals.

NMFS disagrees that the authorized take of 14 North Atlantic right whales by Level B harassment incidental to the Project will have a non-negligible impact on the species and notes that the commenter did not provide additional scientific information for NMFS to consider to support this claim. No take by injury, serious injury, or mortality is authorized. NMFS emphasizes that the authorized incidental take is limited to Level B harassment (*i.e.,* behavioral disturbance). As described in the proposed rule and this final rule (see Negligible Impact Analysis and Determination section), NMFS has determined that the Level B harassment of North Atlantic right will not result in impacts to the population through effects on annual rates or recruitment or survival. The project area occurs offshore of New Jersey, which does not include habitat where North Atlantic right whales are known to concentrate in foraging or reproductive behaviors. The project area is a known migratory corridor. Hence, it is likely that most of the authorized takes represent an exposure to a different individual, which means that the behavioral impacts to North Atlantic right whales are limited to behavioral disturbance occurring on 1 or 2 days within a year—

an amount that would not be expected to impact reproduction or survival. Across all years, while it is possible an animal migrating through could have been exposed during a previous year, the low amount of take authorized during the 5-year period (n=14) of the rule makes this scenario unlikely. Any disturbance to North Atlantic right whales due to Ocean Wind's activities is expected to result in temporary avoidance of the immediate area of construction but not abandonment of its migratory path. Slight displacement (but not abandonment) of a migratory pathway is unlikely to result in energetic consequences that could affect reproduction or survival of any individuals. Other impacts such as masking, TTS, and temporary communication and foraging disruption may occur (again noting that North Atlantic right whales concentrate foraging far north of the project area (*e.g.,* southern New England, Gulf of Maine, and Canada)); however, these impacts would also be temporary and unlikely to lead to survival or reproduction impacts of any individual, especially when the extensive suite of mitigation, including numerous measures targeted specifically towards minimizing impacts to North Atlantic right whales, are considered.

*Comment 46:* Commenters asserted that: (1) NMFS' reliance on the 160-dB (1 micropascal squared seconds (re 1 $\mu Pa^2s$)) threshold for behavioral harassment is not supported by the best available scientific information and grossly underestimates takes by Level B harassment; and (2) the monitoring protocols prescribed for the clearance zones are under-protective.

*Response:* Regarding the appropriateness of the 160-dB behavioral harassment threshold, NMFS notes that the potential for behavioral response to an anthropogenic source is highly variable and context-specific and acknowledges the potential for Level B harassment at exposures to received levels below 160 dB rms. Alternatively, NMFS acknowledges the potential that not every animal exposed to received levels above 160 dB rms will respond in ways constituting behavioral harassment. There are a variety of studies indicating that contextual variables play a very important role in response to anthropogenic noise, and the severity of effects are not necessarily linear when compared to a received level (RL). Several studies (*e.g.,* Nowacek *et al.,* 2004; Kastelein *et al.,* 2012 and 2015) showed there were behavioral responses to sources below the 160-dB threshold, but also acknowledged the importance of context in these responses. For example, Nowacek *et al.* (2004) reported the behavior of five out of six North Atlantic right whales was disrupted at RLs of only 133–148 dB re 1 μPa (returning to normal behavior within minutes) when exposed to an alert signal. However, the authors also reported that none of the whales responded to noise from transiting vessels or playbacks of ship noise even though the RLs were at least as strong, and contained similar frequencies, to those of the alert signal. The authors state that a possible explanation for whales responding to the alert signal and not responding to vessel noise is due to the whales having been habituated to vessel noise, while the alert signal was a novel sound. In addition, the authors noted differences between the characteristics of the vessel noise and alert signal which may also have played a part in the differences in responses to the two noise types. Therefore, it was concluded that the signal itself, as opposed to the RL, was responsible for the response. DeRuiter *et al.* (2012) also indicate that variability of responses to acoustic stimuli depends not only on the species receiving the sound and the sound source, but also on the social, behavioral, or environmental contexts of exposure. Finally, Gong *et al.* (2014) highlighted that behavioral responses depend on many contextual factors, including range to source, RL above background noise, novelty of the signal, and differences in behavioral state. Similarly, Kastelein *et al.* (2015) examined behavioral responses of a harbor porpoise to sonar signals in a quiet pool, but stated behavioral responses of harbor porpoises at sea would vary with context such as social situation, sound propagation, and background noise levels.

NMFS uses 160 dB (rms) as the exposure level for estimating Level B harassment takes and is currently considered the best available science, while acknowledging that the 160-dB rms step-function approach is a simplistic approach. However, there appears to be a misconception regarding the concept of the 160-dB threshold. While it is correct that in practice it works as a step-function, *i.e.,* animals exposed to received levels above the threshold are considered to be ''taken'' and those exposed to levels below the threshold are not, it is in fact intended as a sort of mid-point of likely behavioral responses (which are extremely complex depending on many factors including species, noise source, individual experience, and behavioral context). What this means is that, conceptually, the function recognizes that some animals exposed to levels below the threshold will in fact react in ways that appropriately considered take, while others that are exposed to levels above the threshold will not. Use of the 160-dB threshold allows for a simplistic quantitative estimate of take, while we can qualitatively address the variation in responses across different received levels in our discussion and analysis.

Overall, we reiterate the lack of scientific consensus regarding appropriate criteria. Defining sound levels that disrupt behavioral patterns is difficult because responses depend on the context in which the animal receives the sound, including an animal's behavioral mode when it hears sounds (*e.g.,* feeding, resting, or migrating), prior experience, and biological factors (*e.g.,* age and sex). Other contextual factors, such as signal characteristics, distance from the source, and signal to noise ratio, may also help determine response to a given received level of sound. Therefore, levels at which responses occur are not necessarily consistent and can be difficult to predict (Southall *et al.,* 2007; Ellison *et al.,* 2012; Southall *et al.,* 2021).

There is currently no concurrence on these complex issues, and NMFS followed its practice at the time of submission and review of this application in assessing the likelihood of disruption of behavioral patterns by using the 160-dB threshold. This threshold has remained in use in part because of the practical need to use a relatively simple threshold based on available information that is both predictable and measurable for most activities. We note that the seminal reviews presented by Southall *et al.* (2007), Gomez *et a*l. (2016), and Southall *et al.* (2021) did not suggest any specific new criteria due to lack of convergence in the data. NMFS is currently evaluating available information towards development of updated guidance for assessing the effects of anthropogenic sound on marine mammal behavior. However, undertaking a process to derive defensible exposure-response relationships is complex. A recent systematic review by Gomez *et al.* (2016) was unable to derive criteria expressing these types of exposure-response relationships based on currently available data.

NMFS acknowledges that there may be methods of assessing likely behavioral responses to acoustic stimuli that better capture the variation and context-dependency of those responses than the simple 160 dB step-function used here; there is no agreement on what that method should be or how

more complicated methods may be implemented by applicants. NMFS is committed to continuing its work in developing updated guidance with regard to acoustic thresholds, but pending additional consideration and process is reliant upon an established threshold that is reasonably reflective of available science. We also note the commenters did not provide additional information for NMFS to consider to support their claim that the 160 dB behavioral harassment threshold is not the best available scientific information.

Regarding the assertion that monitoring protocols prescribed for the clearance and shutdown zones (called ''exclusion zones'' in the comment letter) are under-protective, please refer to Comments 12, 14, 15, 16, and 18.

*Comment 47:* In general, a commenter expressed concern that noise pollution from offshore wind activities would interfere with North Atlantic right whale's social communication and prey detection. They are concerned with the low-frequency noise from large vessels involved in the construction activities overlapping North Atlantic right whale communication.

*Response:* As discussed in the Negligible Impact Analysis and Determination section (specifically the *Auditory Masking or Communication Impairment* sections) of both the proposed and final rule, the level of masking that could occur from Ocean Wind's activities will have a negligible impact on marine mammals, including North Atlantic right whales. Inherent in the concept of masking is the fact that the potential for the effect is only present during the times that the animal and the sound source are in close enough proximity for the effect to occur (and further this time period would need to coincide with a time that the animal was utilizing sounds at the masked frequency) and, as our analysis (both quantitative and qualitative components) indicates, because of the relative movement of whales and vessels, as well as the stationary nature of a majority of the activities, we do not expect these exposures with the potential for masking to be of a long duration within a given day. Further, because of the relatively low density of mysticetes during months where most of Ocean Wind's activities would be occurring (May through November in most cases), and relatively large area over which the vessels will travel and where the activities will occur, we do not expect any individual North Atlantic right whales to be exposed to potentially masking levels from these surveys for more than a few days in a year. Furthermore, as many of the activities are occurring in clusters and specific areas rather than sporadically dispersed in the project area (*i.e.,* foundation installation all occurs in the same general area, nearshore cable installation activities occur in relatively similar and nearby areas), animals are likely to temporarily avoid these locations during periods where activities are occurring but are expected to return once activities have ceased.

As noted above, any masking effects of Ocean Wind's activities are expected to be limited in duration, if present. For HRG surveys, given the likelihood of significantly reduced received levels beyond short distances from the transiting survey vessel, the short duration of potential exposure, the lower likelihood of extensive additional contributors to background noise offshore and within these short exposure periods, and the fact that the frequency of HRG signals are primarily above those used in social communication or for detection of other important clues, we believe that the incremental addition of the survey vessel is unlikely to result in more than minor and short-term masking effects. Masking is not a concern for UXO/MEC detonations, given the instantaneous nature of the signal. For pile driving, and especially foundation installation, masking effects are more likely given the larger zones and longer durations, and animals that approach the source could experience temporary masking of some lower frequency cues. However, any such effects would be localized to the areas around these stationary activities, which means that whales transiting through the area could adjust their transit away from the construction location and return once the activity has completed. For the activity as a whole, any masking that might potentially occur would be expected to likely be incurred by the same animals predicted to be exposed above the behavioral harassment threshold, and thereby accounted for in the Level B harassment numbers. NMFS notes that the commenter did not provide additional scientific information for NMFS to consider to support its concern.

*Comment 48:* A commenter was concerned that limiting construction to occur during summer and fall months (due to the seasonal moratorium for foundation installation), construction activities would be concentrated into months where other marine mammal species (*i.e.,* dolphins and whales) are using the region for foraging, birthing, nursing, migrating, etc. A commenter recommended that NMFS fully account for the consequences of any other proposed North Atlantic right whale seasonal restriction on other protected species and evaluate alternative risk reduction strategies that would protect multiple species.

*Response:* In order to promulgate a rulemaking under section 101(a)(5)(A) of the MMPA, NMFS must set forth, among other requirements, means of effecting the least practicable adverse impact on affected species or stock and its habitat. In the proposed rule and in this final rule, NMFS has determined the mitigation measures will effect the least practicable adverse impact on all of the affected species or stocks and their habitat. NMFS acknowledges that the seasonal restriction for impact pile driving is to effect the least practicable adverse impact on North Atlantic right whales; however, NMFS notes that this seasonal restriction provides additional protections to many other large whale species that tend to concentrate off of New Jersey during winter months. For example, humpback whales are located in higher numbers nearshore in the project area from October through February, with a clear offshore shift starting in March (Roberts *et al.,* 2023). Harbor porpoises, as another example, are also likely to be more present when foundation installation and UXO/MEC detonation would not be occurring. As described in this final rule, there is no habitat of significance in the specified geographic region other than the seasonal migratory BIA for North Atlantic right whales.

*Comment 49:* A commenter stated that some of the specified activities will increase the number of vessels in the ocean in the project area, which will lead to an increased threat of harm by vessel strikes to marine mammals, specifically North Atlantic right whales.

*Response:* NMFS acknowledges that vessel strikes can result in injury or mortality of marine mammals. We analyzed the potential for vessel strike resulting from Ocean Wind's activities and determined that based on the nature of the activity and the required mitigation measures specific to vessel strike avoidance included in this rulemaking, the potential for vessel strike is so low as to be discountable. The required mitigation measures, all of which were included in the proposed rulemaking and are now required in the final regulations, include: a requirement that all vessel operators comply with 10 kn (18.5 km/hour) or less speed restrictions in any SMA, DMA, or Slow Zone while underway, and check daily for information regarding the establishment of mandatory or voluntary vessel strike avoidance areas (SMAs, DMAs, Slow Zones) and information regarding North Atlantic

right whale sighting locations; a requirement that all vessels, regardless of size, operating from November 1 through April 30 operate at speeds of 10 kn (18.5 km/hour) or less; a requirement that all vessel operators reduce vessel speed to 10 kn (18.5 km/hour) or less when any large whale, any mother/calf pairs, pods, or large assemblages of non-delphinid cetaceans are observed near the vessel; a requirement that all project vessels maintain a separation distance of 500 m or greater from North Atlantic right whales; a requirement that, if underway, vessels must steer a course away from any sighted North Atlantic right whale at 10 kn or less until the 500-m minimum separation distance has been established; 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; and, a requirement that all vessels underway must maintain a minimum separation distance of 100 m or 50 m from all other marine mammals (species-dependent and excluding North Atlantic right whales), with an understanding that at times this may not be possible (*e.g.,* for animals that approach the vessel). Based on these, we have determined that the vessel strike avoidance measures in the rulemaking are sufficient to ensure the least practicable adverse impact on species or stocks and their habitat.

Separately, NMFS notes that the commenter's comment appears to conflate vessel strike risks and impacts to marine mammals due to noise from construction vessels.

*Comment 50:* A commenter stated that the vessel strike avoidance measures in the proposed rule are insufficient and clearly are directed at vessels specifically engaging in the construction activities for the applicant. They stated that the application never accounted for vessel strikes from non-project-related vessels if North Atlantic right whales are displaced outside of the project area.

*Response:* Under the MMPA, NMFS must prescribe regulations setting forth other means of effecting the least practicable adverse impact of the requestor's specified activities on species or stocks and its habitat. NMFS cannot require non-project related vessels to implement mitigation through this rulemaking. NMFS acknowledges that North Atlantic right whales may temporarily avoid the area where the specified activities occur. However, NMFS does not anticipate that North Atlantic right whales will be permanently displaced or displaced for extended periods, and the commenter does not provide evidence that this effect should be a reasonably anticipated outcome of the specified activity.

Furthermore, as described in the Biological Opinion issued by GARFO on April 3, 2023, NMFS does not expect that ESA-listed whales would experience a higher risk of vessel strike due to avoidance of pile driving. Any whale that would be exposed to vibratory pile driving noise from landfall activities (*i.e.,* temporary cofferdams, temporary goal posts) would already be located in the part of the Wind Development Area with the heaviest amount of vessel traffic due to the nearshore coastal transit routes used by vessels that would move north and south along the coast and from vessels moving from port-to-port. Similarly, if pile-driving noise causes the whale to move further offshore, given the concentration of nearshore vessel activity, we expect that the whale would actually experience lower levels of vessel traffic. During impact pile driving we expect that any whales disturbed would only need to shift their position between 1.72–3.35 km to avoid pile-driving noise above the threshold for Level B harassment. This temporary avoidance/displacement would still mean that the whale is far from the heaviest vessel traffic routes, which are located approximately 10 nautical miles (nmi; 18.5 km) away from the Lease Area.

NMFS takes the risk of vessel strike seriously and has prescribed measures sufficient to avoid the potential for vessel strike to the extent practicable. NMFS has required these measures despite a very low likelihood of vessel strike; vessels associated with the construction activities will add a discountable amount of vessel traffic to the specific geographic region and furthermore, vessels towing survey gear travel at very slow speeds (*e.g.,* roughly 4–5 kn (7.4–9.3 km/hour)) and any vessels engaged in construction activities would be primarily stationary during the pile-driving event.

*Other*

*Comment 51:* Commenters encouraged NMFS to issue LOAs on an annual basis, rather than a single 5-year LOA, to allow for the continuous incorporation of the best available scientific and commercial information and to modify mitigation and monitoring measures as necessary and in a timely manner. Commenters also stated that due to the precarious nature of the North Atlantic right whale, this annual approach is necessary to implement flexible protections.

*Response:* While NMFS understands the reasoning behind the commenters' suggestion, we do not think this is necessary as: (1) the final rule includes requirements for annual reports (in addition to weekly and monthly requirements) to support frequent evaluation of the activities and monitoring results; and (2) the final rule includes an Adaptive Management provision that allows NMFS to make modifications and adjustments to the measures found in the issued LOA if and when new information that supports necessary modifications becomes available. Because of this, NMFS will issue a single 5-year LOA and modify it, if and when necessary, at any point during the lifetime of the regulations.

*Comment 52:* The Commission recommended that NMFS rectify the following omissions and errors in the final rule: (1) Section 217.260(c)(2) should also specify ''removal'' of cofferdams; (2) Section 217.264(a)(4) omitted ''UXO/MEC detonations'' in the list of specified activities; (3) The duration that PSOs must monitor the area around each foundation pile (monopiles or pin piles) after pile driving has stopped should be specified as 30 minutes in section 217.264(d)(4) or (d)(5), as noted in the preamble to the proposed rule; (4) The terms ''small odontocetes'', ''delphinids and harbor porpoises'', and ''dolphins and porpoises'' were used interchangeably throughout the various mitigation measures in section 217.264; and (5) The terms ''seals'' and ''pinnipeds'' were used interchangeably or omitted altogether from the various mitigation measures in section 217.264.

*Response:* We appreciate the Commission's specific suggestions. We have rectified the first three concerns described in the Commission's list. We have not made adjustments with respect to the final two suggestions as the intermixed use of ''seals'' versus ''pinnipeds'' and ''small odontocetes'', ''delphinids and harbor porpoises'', and ''dolphins and porpoises'' are clearly describing the species at hand. Furthermore, this variation in language does not affect the clarity or understanding of the final rule or its provisions.

*Comment 53:* A commenter recommended that NMFS deny and rescind all ITAs for offshore wind construction, including this authorization to Ocean Wind, until the Draft North Atlantic Right Whale and Offshore Wind Strategy (Draft Strategy) is finalized. Referencing the low Potential Biological Removal (PBR) for North Atlantic right whales, the

commenter also stated that all industrial full-scale construction for offshore wind energy should be paused until the Federal agencies determine how best to eliminate or avoid all impacts, Level A harassment, and Level B harassment on the North Atlantic right whale.

*Response:* As identified by a commenter, in October 2022, NMFS and BOEM released a draft joint strategy to protect and promote the recovery of North Atlantic right whales while responsibly developing offshore wind energy. The draft strategy identifies three main goals: (1) mitigation and decision-support tools; (2) research and monitoring; and (3) collaboration, communication and outreach. It focuses on improving the body of science and integrating past, present and future efforts related to North Atlantic right whales and offshore wind development.

NMFS is required to authorize the requested incidental take if it finds the total incidental take of small numbers of marine mammals by U.S. citizens while engaging in a specified activity within a specified geographic region during a five-year period (or less) will have a negligible impact on such species or stock and where appropriate, will not have an unmitigable adverse impact on the availability of such species or stock for subsistence uses (16 U.S.C. 1371(a)(5)(A)). While the incidental take authorization must be based on the best scientific information available, the MMPA does not allow NMFS to delay issuance of the requested authorization on the presumption that new information will become available in the future. NMFS has made the required findings, based on the best scientific information available and has included mitigation measures to effect the least practicable adverse impacts on North Atlantic right whales. Many of these mitigation measures are found in the Draft Strategy, as appropriate, for construction activities. While NMFS continues to work together with BOEM towards the goals identified in the Strategy, finalizing the Strategy (or similar efforts) or completing specific goals identified in the strategy are not a prerequisite for the issuance of an ITA.

While NMFS agrees that the North Atlantic right whale population abundance is alarmingly low (with entanglement in fishing gear and vessel strikes being the leading causes of North Atlantic right whale mortality), NMFS disagrees that the type of harassment authorized in this rulemaking will have a non-negligible impact (*i.e.,* adversely affect the species through effects on annual rates of recruitment or survival). NMFS emphasizes that no mortality, serious injury, or Level A harassment is anticipated or authorized for North Atlantic right whales from Ocean Wind's specified activities. Further, the impacts of Level B harassment (*i.e.,* behavioral disturbance) are expected to have a negligible impact on the North Atlantic right whale population. The magnitude of behavioral harassment authorized is very low and the severity of any behavioral responses is expected to be primarily limited to temporary displacement and avoidance of the area when some activities that have the potential to result in harassment are occurring (see the Negligible Impact Analysis and Determination section for our full analysis). No impacts to the reproductive success or survival of any individual North Atlantic right whales are expected to result from these disturbances and as such, no impacts to the population are expected to result. In its comment, the commenter conflates PBR level and Level B harassment and suggests that Level B harassment can have population level impacts. The PBR level is defined as the maximum number of animals, not including natural mortalities, that may be *removed* from a stock while allowing that stock to reach or maintain its optimum sustainable population (16 U.S.C. 1362(20)). Thus, PBR is only germane in the discussion of ''removals'' of individual North Atlantic right whales from the population and, therefore, PBR is not applicable in this discussion since no impact to reproduction or survival of any individuals is anticipated or authorized. Further, the commenter did not suggest mitigation measures to eliminate and avoid all impacts to North Atlantic right whales for NMFS to evaluate or consider.

NMFS notes that BOEM is the lead agency permitting the construction of offshore wind farms. NMFS' action authorizes take of marine mammals incidental to BOEM's permitted action (*i.e.,* offshore wind farm construction). Hence, the commenter's request is more relevant to BOEM's permitting authority. The commenter's comments regarding other offshore wind construction activities are outside the scope of this authorization.

*Comment 54:* A commenter questioned NMFS ability to consider an application wherein the applicant has not finalized design plans at the time of the proposed rule stage.

*Response:* NMFS acknowledges that at the time when the proposed rule was published in the **Federal Register**, Ocean Wind had not yet finalized its construction plan for the full buildout of permanent WTG and OSS foundations. Hence, NMFS conservatively carried forward the buildout scenario estimated to have the greater number of takes into the total estimated take analysis and small numbers and negligible impact determination. There is no requirement in the MMPA that all project design plans must be finalized prior to NMFS evaluating an ITA request. NMFS further notes that these large-scale construction projects require flexibility throughout the permitting process as supply lines are established, contractors are hired, and communications with other Federal and state agencies occur. In its comment, the commenter implies that the applicant had not ''disclosed the activity'' in its entirety, which is not accurate. Ocean Wind presented an analysis for two potential buildout scenarios assuming either a full monopile foundation buildout or a dual monopile-jacket foundation buildout.

*Comment 55:* A commenter expressed concern for the accountability, fairness, and transparency regarding how and who will determine which vessel struck a North Atlantic right whale or any other marine mammal species, if it occurs.

*Response:* NMFS directs the commenter to language found in both the proposed and final rules regarding reporting in the event of a vessel strike by one of Ocean Wind's project vessels. This reporting requirement necessitates that the strike be reported to NMFS Office of Protected Resources and GARFO within and no later than 24 hours from the time of the strike occurred. In the event of a strike, all construction activities are required to cease until NMFS Office of Protected Resources is able to review the circumstances of the strike and determine if any additional measures are necessary to ensure LOA compliance. Ocean Wind must also provide a report including provisions such as, but not limited to: the time, date, and location of the strike; the species struck; the vessel speed at the time of the strike; the vessels course and heading; what operations the vessel was engaged in; information regarding what vessel strike reduction measures were in effect to avoid a strike; information on the behavior of the animal struck; the fate of the animal; as well as photographs and/or video, as practicable. Given the precarious nature of the North Atlantic right whale, as indicated in the commenter's comment, NMFS has also required a suite of vessel strike avoidance measures that are described both in other comments and within this final rule.

It is not clear what the commenter means by ''fairness'' in determining how or which vessel struck a North Atlantic right whale or other species if it occurs,

nor has the commenter provided specific suggestions for NMFS to evaluate as means by which to conduct the actions they suggest. Ocean Wind is the responsible party for activities specifically pertaining to their action (*i.e.,* the construction of the Project). Any strike would be unlawful. In the unforeseen circumstance that a vessel strike does occur, the relevant authorities (*i.e.,* NMFS, BOEM, the Bureau of Safety and Environmental Enforcement (BSEE)) will investigate and take appropriate action.

**Changes From the Proposed to Final Rule**

Since the publication of the proposed rule in the **Federal Register** (87 FR 64868, October 26, 2022), NMFS has made changes, where appropriate, that are reflected in the final regulatory text and preamble text of this final rule. These changes are briefly identified below, with more information included in the indicated sections of the preamble to this final rule.

*Changes in Information Provided in the Preamble*

The information found in the preamble of the Proposed Rule was based on the best available information at the time of publication. Since publication of the Proposed Rule, new information has become available, which has been incorporated into this final rule as discussed below.

The following changes are reflected in the Description of Marine Mammals in the Geographic Region section of the preamble to this final rule:

Given the release of NMFS' final 2022 SARs (Hayes *et al.,* 2023), we have updated the population estimate for the North Atlantic right whale (*Eubalaena glacialis*) from 368 to 338 and the total mortality/serious injury (M/SI) amount from 8.1 to 31.2. This increase is due to the inclusion of undetected annual M/SI in the total annual serious injury/mortality.

Given the availability of new information, we have made updates to the UME summaries for multiple species.

The following changes are reflected in the Estimated Take section of the preamble to this final rule:

We have increased the amount of take authorized for humpback whales, by Level A harassment, from 1 to 2 (based on a single group size from the Atlantic Marine Assessment Program for Protected Species (AMAPPS) dataset) and the amount of take authorized, by Level B harassment, from 4 to 46, based on a recommendation by the Marine Mammal Commission to consider a previous Ocean Wind monitoring report (2021–2022) for activities offshore of New Jersey.

Based on a recommendation by the Marine Mammal Commission, NMFS has allocated takes by Level B harassment to the coastal stock of bottlenose dolphins (n = 94), which is 10 percent of the total takes for the offshore stock of bottlenose dolphins from foundation installation activities. This reduces the authorized take for the offshore stock to 90 percent of its original proposed value (n = 842).

Based on Ocean Wind replacing three cofferdams with goal posts, the take for several species (*i.e.,* fin whales (*Balaenoptera physalus*), minke whale (*Balaenoptera acutorostrata*), humpback whale (*Megaptera novaeangliae*), both stocks of bottlenose dolphins (*Tursiops truncatus*), common dolphins (*Delphinus delphis*), harbor porpoises (*Phocoena phocoena*), gray seals (*Halichoerus grypus*), and harbor seals (*Phoca vitulina*)) decreased slightly compared to what was originally proposed.

Based on a recommendation by the Marine Mammal Commission, we have increased the amount of take by Level B harassment of common dolphins and Atlantic white-sided dolphins (*Lagenorhynchus acutus*) from vibratory pile installation and removal associated with cable landfall construction from 10 to 30 and 5 to 12, respectively, based on a single group size each from the AMAPPS dataset.

Based on a recommendation by the Marine Mammal Commission, we have added additional take from UXO/MEC detonations, by Level A harassment, for minke whales (n = 1) and both stocks of bottlenose dolphins (n = 11 per stock), assuming a single group size each using information provided by Ocean Wind.

NMFS has corrected a mathematical error for sperm whales where the value presented in Table 33 was incorrectly labeled as six rather than nine during Year 2.

*Changes in the Regulatory Text*

We have made the following changes to the regulatory text, which are reflected, as appropriate, throughout this final rule and described, as appropriate, in the preamble.

For clarity and consistency, we revised two paragraphs in § 217.260 Specified activity and specified geographical region of the regulatory text to fully describe the specified activity and specified geographical region.

In § 217.261 Effective Dates, NMFS has changed the effective date from August 1, 2023 through July 31, 2028 to October 13, 2023 through October 12, 2028. The associated **SUMMARY** and **DATES** sections of this final rule reflect this change.

The following change is reflected in § 217.262 Permissible Methods of Taking: adding vibratory pile driving of goal post to the list of permissible methods of taking by Level B harassment.

The following changes are reflected in the Description of the Specified Activities section of the preamble to this final rule:

Ocean Wind has modified their vibratory pile driving activities from vibratory pile driving seven temporary cofferdams to vibratory pile driving four temporary cofferdams (Barnegat Bay landfall locations) and three temporary goal posts (two at Island Beach State Park, one at BL England). The modification from goal posts to cofferdams at three nearshore locations neither changes the nature of the specified activity (*i.e.,* vibratory pile driving), nor the potential impacts to marine mammals associated with the specified activity. This modification reduces the total amount of vibratory driving time to complete all cable landfall construction work (by approximately 90 hours total (30 hours at each of three sites)).

The following changes are reflected in § 217.264 Mitigation Requirements and the associated Mitigation section of the preamble to this final rule:

Based on a recommendation by a commenter, NMFS has added a requirement that all project vessels must utilize AIS.

This final rule indicates that Ocean Wind is required to construct the project as expeditiously as possible to avoid foundation installation in December and that NMFS must approve foundation pile driving in December in consideration of the data available should Ocean Wind request to drive piles in December.

At the time of the proposed rule, NMFS had not approved nighttime pile driving as Ocean Wind had yet to prove the efficacy of their monitoring approaches during hours of darkness. However, given additional information provided by Ocean Wind, these final regulations allow Ocean Wind to initiate impact pile driving during hours of darkness only from June 1 to October 31, annually, in accordance with their Alternative Monitoring Plan (when approved, will be available on NMFS' website at *https://www.fisheries.noaa.gov/action/incidental-take-authorization-ocean-wind-lcc-construction-ocean-wind-1-wind-energy-facility*).

NMFS has increased the size of the winter impact pile driving clearance zones for large whales (2,500 m to 3,000 m) and harbor porpoises (1,450 m to 1,750 m) and has removed the PAM clearance zone and PAM shutdown zone for North Atlantic right whales and added a single PAM monitoring zone (10 km) for all species (see Table 36) for clarity and to be consistent with the regulatory text in the proposed rule and in this final rule. Additionally, NMFS has clarified that the shutdown and clearance zones in Table 36 apply to both visual and auditory detections.

NMFS has added a requirement for a 10-m (32.8-ft) shutdown zone for all other in-water activities that are not expected to cause take of marine mammals (*e.g.,* trenching, dredging), which may be monitored by any individual on watch (approved PSO not specifically required).

NMFS has included mitigation and monitoring zones specific to the different UXO/MEC charge weights, rather than a single zone size assuming only the largest charge weight, as Orsted has since provided evidence to NMFS that they can reliably identify UXO/MEC charge weights in the field.

The following changes are reflected in § 217.265 Monitoring and Reporting Requirements and the associated Monitoring and Reporting section of the preamble of this final rule:

We have updated the process for obtaining NMFS approval for PSO and PAM Operators to be similar to requirements typically included for seismic (*e.g.,* airgun) surveys and have clarified education, training, and experience necessary to obtain NMFS' approval.

Based on a recommendation by the Marine Mammal Commission, we have added a requirement that the Lead PSO must have a minimum of 90 days of at-sea experience and must have obtained this experience within the last 18 months.

We have added a requirement to have at least three PSOs on pile driving vessels rather than two PSOs, as was originally described in the proposed rule.

Based on a recommendation by the Marine Mammal Commission, we have added a requirement that increases the time that PAM data must be reviewed prior to all UXO/MEC detonations from 1 to 24 hours (except in emergency cases where the 24-hour delay before the detonation occurred would create risk to human safety).

We have added a requirement for a double big bubble curtain placed at a distance that would avoid damage to the nozzle holes during all UXO/MEC detonations.

Based on a recommendation by the Marine Mammal Commission, we have added a requirement that a pressure transducer must be used during all UXO/MEC detonations.

We have added a requirement stating that Ocean Wind must use at least one additional noise attenuation system (NAS) in addition to a single bubble curtain and other devices for noise attenuation.

We have added requirements that SFV must be conducted on every pile until measured noise levels are at or below the modeled noise levels, assuming 10 dB, for at least three consecutive monopiles and for each UXO/MEC detonation.

We have added a requirement that Ocean Wind must deploy at least eight hydrophones at four locations (one bottom and one mid-water column at each location) along an azimuth that is likely to see lowest propagation loss and two hydrophones (one bottom and one mid-water) at 750 m, 90 degrees from the primary azimuth during installation of all piles where SFV monitoring is required and equivalent requirements during all UXO/MEC detonations.

NMFS has changed the submission date from 90 to 180 days prior to the start of pile driving or UXO/MEC detonation commencement for the Pile Driving and UXO/MEC Marine Mammal Monitoring Plan and the PAM Plan (noting the Vessel Strike Avoidance and Vibratory Pile Driving Plans retain the 90-day requirement as these activities are very nearshore).

We have removed the requirements for reviewing data on an annual and biennial basis for adaptive management and instead will make adaptive management decisions as new information warrants it.

**Description of Marine Mammals in the Specific Geographic Region**

As noted in the Changes From the Proposed to Final Rule section, since the publication of the proposed rule (87 FR 64868, October 26, 2022), updates have been made to the abundance estimate for North Atlantic right whales and the UME summaries of multiple species. These changes are described in detail in the sections below. Otherwise, the Description of Marine Mammals in the Geographic Area section has not changed since the publication of the proposed rule in the **Federal Register** (87 FR 64868, October 26, 2022).

Several marine mammal species occur within the specific geographic region. Sections 3 and 4 of Ocean Wind's ITA application summarize available information regarding status and trends, distribution and habitat preferences, and behavior and life history of the potentially affected species (Ocean Wind, 2022b). NMFS fully considered all of this information, and we refer the reader to these descriptions in the application, incorporated here by reference, instead of reprinting the information. Additional information regarding population trends and threats may be found in NMFS' 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' website (*https://www.fisheries.noaa.gov/find-species*).

Table 2 lists all species or stocks for which take is authorized under this final rule and summarizes information related to the species or stock, including regulatory status under the MMPA and Endangered Species Act (ESA) and potential biological removal (PBR), where known. PBR is defined 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' SARs; (16 U.S.C. 1362(20))). 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' 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' U.S. Atlantic and Gulf of Mexico SARs. All values presented in Table 2 are the most recent available data at the time of publication which can be found in NMFS' 2022 final SARs (Hayes *et al.,* 2023), available online at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports.*

TABLE 2—MARINE MAMMAL SPECIES [e] THAT MAY OCCUR IN THE PROJECT AREA AND BE TAKEN, BY HARASSMENT

| Common name | Scientific name | Stock | ESA/ MMPA status; strategic (Y/N) [a] | Stock abundance (CV, Nmin, most recent abundance survey) [b] | PBR | Annual M/SI [c] |
|---|---|---|---|---|---|---|
| **Order Artiodactyla—Cetacea—Superfamily Mysticeti (baleen whales)** | | | | | | |
| *Family Balaenidae:* | | | | | | |
| North Atlantic right whale | *Eubalaena glacialis* | Western Atlantic | E, D, Y | 338 (0; 332; 2020) [f] | 0.7 | [f] 31.2 |
| *Family Balaenopteridae (rorquals):* | | | | | | |
| Blue whale | *Balaenoptera musculus* | Western North Atlantic | E, D, Y | UNK (UNK; 402; 1980–2008). | 0.8 | 0 |
| Fin whale | *Balaenoptera physalus* | Western North Atlantic | E, D, Y | 6,802 (0.24; 5,573; 2016) | 11 | 1.8 |
| Humpback whale | *Megaptera novaeangliae* | Gulf of Maine | -, -, N | 1,396 (0; 1,380; 2016) | 22 | 12.15 |
| Minke whale | *Balaenoptera acutorostrata* | Canadian Eastern Coastal | -, -, N | 21,968 (0.31; 17,002; 2016). | 170 | 10.6 |
| Sei whale | *Balaenoptera borealis* | Nova Scotia | E, D, Y | 6,292 (1.02; 3,098; 2016) | 6.2 | 0.8 |
| **Superfamily Odontoceti (toothed whales, dolphins, and porpoises)** | | | | | | |
| *Family Physeteridae:* | | | | | | |
| Sperm whale | *Physeter macrocephalus* | North Atlantic | E, D, Y | 4,349 (0.28; 3,451; 2016) | 3.9 | 0 |
| *Family Delphinidae:* | | | | | | |
| Atlantic spotted dolphin | *Stenella frontalis* | Western North Atlantic | -, -, N | 39,921 (0.27; 32,032; 2016). | 320 | 0 |
| Atlantic white-sided dolphin | *Lagenorhynchus acutus* | Western North Atlantic | -, -, N | 93,233 (0.71; 54,433; 2016). | 544 | 27 |
| Bottlenose dolphin | *Tursiops truncatus* | Western North Atlantic—Offshore. | -, -, N | 62,851 (0.23; 51,914; 2016). | 519 | 28 |
| | | Northern Migratory Coastal | -, -, Y | 6,639 (0.41; 4,759; 2016) | 48 | 12.2–21.5 |
| Common dolphin | *Delphinus delphis* | Western North Atlantic | -, -, N | 172,974 (0.21; 145,216; 2016). | 1,452 | 390 |
| Long-finned pilot whale | *Globicephala melas* | Western North Atlantic | -, -, N | 39,215 (0.30; 30,627; 2016). | 306 | 9 |
| Short-finned pilot whale | *Globicephala macrorhynchus* | Western North Atlantic | -, -, N | 28,924 (0.24, 23,637, 2016). | 236 | 136 |
| Risso's dolphin | *Grampus griseus* | Western North Atlantic | -, -, N | 35,215 (0.19; 30,051; 2016). | 301 | 34 |
| *Family Phocoenidae (porpoises):* | | | | | | |
| Harbor porpoise | *Phocoena phocoena* | Gulf of Maine/Bay of Fundy | -, -, N | 95,543 (0.31; 74,034; 2016). | 851 | 164 |
| **Order Carnivora—Superfamily Pinnipedia** | | | | | | |
| *Family Phocidae (earless seals):* | | | | | | |
| Gray seal [d] | *Halichoerus grypus* | Western North Atlantic | -, -, N | 27,300 (0.22; 22,785; 2016). | 1,458 | 4,453 |
| Harbor seal | *Phoca vitulina* | Western North Atlantic | -, -, N | 61,336 (0.08; 57,637; 2018). | 1,729 | 339 |

[a] 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.

[b] NMFS' marine mammal stock assessment reports can be found online at: *www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments.* CV is the coefficient of variation; Nmin is the minimum estimate of stock abundance.

[c] These values, found in NMFS' SARs, represent annual levels of human-caused mortality plus serious injury from all sources combined (*e.g.,* commercial fisheries, vessel strike).

[d] NMFS' stock abundance estimate (and associated PBR value) applies to the U.S. population only. Total stock abundance (including animals in Canada) is approximately 451,431. The annual M/SI value given is for the total stock.

[e] Information on the classification of marine mammal species can be found on the web page for The Society for Marine Mammalogy's Committee on Taxonomy (*https://marinemammalscience.org/science-and-publications/list-marine-mammal-species-subspecies/;* Committee on Taxonomy (2023)).

[f] In the proposed rule (87 FR 64868, October 26, 2022), a population estimate of 368 was used which represented the best available science at the time of publication. However, since the publication of the proposed rule, a new estimate (n=338) was released in NMFS' draft and final 2022 SARs and has been incorporated into this final rule. In addition, the total annual average observed North Atlantic right whale mortality was updated in the final SARs from 8.1 to 31.2. Total annual average observed North Atlantic right whale mortality during the period 2016 through 2020 was 8.1 animals and annual average observed fishery mortality was 5.7 animals. Numbers presented in this table (31.2 total mortality and 22 fishery mortality) are 2015 through 2019 estimated annual means, accounting for undetected mortality and serious injury. (Hayes et al., 2023).

All 38 species that could potentially occur in the Project Area are included in Table 3–1 of the Ocean Wind's ITA application and discussed therein (Ocean Wind, 2022b). While the majority of these species have been documented or sighted off the New Jersey coast in the past, for the species and stocks not listed in Table 2, NMFS considers it unlikely that their occurrence would overlap the activity in a manner that would result in harassment, either because of their spatial occurrence (*i.e.,* more northern or southern ranges) and/or with the geomorphological characteristics of the underwater environment (*i.e.,* water depth in the development area).

A detailed description of the species likely to be affected by the Project, including brief introductions to the species and relevant stocks as well as available information regarding population trends and threats, and information regarding local occurrence, were provided in the proposed rule (87 FR 64868, October 26, 2022). Since that time, a new SAR (Hayes *et al.,* 2023) has become available for the North Atlantic right whale. Estimated abundance for

the species declined from 368 to 338 and annual M/SI increased from 8.1 to 31.2. This large increase in annual serious injury/mortality is a result of NMFS including undetected annual M/SI in the total annual serious injury/mortality. The North Atlantic right whale population remains in decline, as described in the *North Atlantic Right Whale* species section below. We are not aware of any additional changes in the status of the species and stocks listed in Table 2; therefore, detailed descriptions are not provided here. Please refer to the proposed rule for these descriptions (87 FR 64868, October 26, 2022). Please also refer to NMFS' website (*https://www.fisheries.noaa.gov/find-species*) for generalized species accounts.

Since the publication of the proposed rule, the following updates have occurred to the below species in regards to general information or their active UMEs.

*North Atlantic Right Whale*

In August 2023, NMFS released its final 2022 SARs, which updated the population estimate ($N_{best}$) of North Atlantic right whales from 368 to 338 individuals and the annual M/SI value from 8.1 to 31.2 due to the addition of estimated undetected mortality and serious injury, as described above, which had not been previously included in the SAR. The population estimate is slightly lower than the North Atlantic Right Whale Consortium's 2022 Report Card, which identifies the population estimate as 340 individuals (Pettis *et al.,* 2023). Elevated North Atlantic right whale mortalities have occurred since June 7, 2017, along the U.S. and Canadian coast, with the leading category for the cause of death for this UME determined to be ''human interaction,'' specifically from entanglements or vessel strikes. Since publication of the proposed rule, the number of animals considered part of the UME has increased. As of August 16, 2023, there have been 36 confirmed mortalities (dead, stranded, or floaters), 0 pending mortalities, and 34 seriously injured free-swimming whales for a total of 70 whales. As of October 14, 2022, the UME also considers animals (n=45) with sub-lethal injury or illness (called ''morbidity'') bringing the total number of whales in the UME to 115. More information about the North Atlantic right whale UME is available online at: *https://www.fisheries.noaa.gov/national/marine-life-distress/2017-2023-north-atlantic-right-whale-unusual-mortality-event.*

*Humpback Whale*

Since January 2016, elevated humpback whale mortalities have occurred along the Atlantic coast from Maine to Florida. This event was declared a UME in April 2017. Partial or full necropsy examinations have been conducted on approximately half of the 204 known cases (as of August 16, 2023). Of the whales examined (approximately 90), about 40 percent had evidence of human interaction, either vessel strike or entanglement (refer to *https://www.fisheries.noaa.gov/national/marine-life-distress/2016-2023-humpback-whale-unusual-mortality-event-along-atlantic-coast*). While a portion of the whales have shown evidence of pre-mortem vessel strike, this finding is not consistent across all whales examined and more research is needed. NOAA is consulting with researchers that are conducting studies on the humpback whale populations, and these efforts may provide information on changes in whale distribution and habitat use that could provide additional insight into how these vessel interactions occurred. More information is available at: *https://www.fisheries.noaa.gov/national/marine-life-distress/2016-2023-humpback-whale-unusual-mortality-event-along-atlantic-coast.*

Since December 1, 2022, the number of humpback strandings along the mid-Atlantic coast, including New Jersey, has been elevated. In some cases, the cause of death is not yet known. In others, vessel strike has been deemed the cause of death. As the humpback whale population has grown, they are seen more often in the Mid-Atlantic. These whales may be following their prey (small fish) which are reportedly close to shore in the winter. These prey also attract fish that are of interest to recreational and commercial fishermen. This increases the number of boats and fishing gear in these areas. More whales in the water in areas traveled by boats of all sizes increases the risk of vessel strikes. Vessel strikes and entanglement in fishing gear are the greatest human threats to large whales.

*Minke Whale*

Since January 2017, a UME has been declared based on elevated minke whale mortalities detected along the Atlantic coast from Maine through South Carolina. As of August 16, 2023, a total of 156 minke whales have stranded during this UME. Full or partial necropsy examinations were conducted on more than 60 percent of the whales. Preliminary findings have shown evidence of human interactions or infectious disease in several of the whales, but these findings are not consistent across all of the whales examined, so more research is needed. This UME has been declared non-active and is pending closure. More information is available at: *https://www.fisheries.noaa.gov/national/marine-life-distress/2017-2023-minke-whale-unusual-mortality-event-along-atlantic-coast.*

*Phocid Seals*

Since June 2022, elevated numbers of harbor seal and gray seal mortalities have occurred across the southern and central coast of Maine. This event was declared a UME in July 2022. Preliminary testing of samples has found some harbor and gray seals are positive for highly pathogenic avian influenza. While the UME is not occurring in the Project Area, the populations affected by the UME are the same as those potentially affected by the Project. However, due to the two states being approximately 352 km (219 mi) apart, by water (from the most northern point of New Jersey to the most southern point of Maine), NMFS does not expect that this UME would be further conflated by the activities related to the Project. Information on this UME is available online at: *https://www.fisheries.noaa.gov/2022-2023-pinniped-unusual-mortality-event-along-maine-coast.*

The above event was preceded by a different UME, occurring from 2018—2020 (closure of the 2018–2020 UME is pending). Beginning in July 2018, elevated numbers of harbor seal and gray seal mortalities occurred across Maine, New Hampshire, and Massachusetts. Additionally, stranded seals have shown clinical signs as far south as Virginia, although not in elevated numbers, therefore the UME investigation encompassed all seal strandings from Maine to Virginia. A total of 3,152 reported strandings (of all species) occurred from July 1, 2018, through March 13, 2020. Full or partial necropsy examinations have been conducted on some of the seals and samples have been collected for testing. Based on tests conducted thus far, the main pathogen found in the seals is phocine distemper virus. NMFS is performing additional testing to identify any other factors that may be involved in this UME. Information on this UME is available online at: *https://www.fisheries.noaa.gov/new-england-mid-atlantic/marine-life-distress/2018-2020-pinniped-unusual-mortality-event-along.*

*Marine Mammal Hearing*

Hearing is the most important sensory modality for marine mammals underwater, and exposure to anthropogenic sound can have deleterious effects. To appropriately assess the potential effects of exposure to sound, it is necessary to understand the frequency ranges marine mammals are able to hear. Current data indicate that not all marine mammal species have equal hearing capabilities (*e.g.,* Richardson *et al.,* 1995; Wartzok and Ketten, 1999; Au and Hastings, 2008). To reflect this, Southall *et al.* (2007) recommended that marine mammals be divided into functional hearing groups based on directly measured or estimated hearing ranges on the basis of available behavioral response data, audiograms derived using auditory evoked potential techniques, anatomical modeling, and other data. Note that no direct measurements of hearing ability have been successfully completed for mysticetes (*i.e.,* low-frequency cetaceans). Subsequently, NMFS (2018) described generalized hearing ranges for these marine mammal hearing groups. Generalized hearing ranges were chosen based on the approximately 65 dB threshold from the normalized composite audiograms, with the exception for lower limits for low-frequency cetaceans where the lower bound was deemed to be biologically implausible and the lower bound from Southall *et al.* (2007) retained. Marine mammal hearing groups and their associated hearing ranges are provided in Table 3.

TABLE 3—MARINE MAMMAL HEARING GROUPS

[NMFS, 2018]

| Hearing group | Generalized hearing range * |
|---|---|
| Low-frequency (LF) cetaceans (baleen whales) | 7 Hz to 35 kHz. |
| Mid-frequency (MF) cetaceans (dolphins, toothed whales, beaked whales, bottlenose whales) | 150 Hz to 160 kHz. |
| High-frequency (HF) cetaceans (true porpoises, Kogia, river dolphins, *cephalorhynchid, Lagenorhynchus cruciger* & *L. australis*). | 275 Hz to 160 kHz. |
| Phocid pinnipeds (PW) (underwater) (true seals) | 50 Hz to 86 kHz. |

* Represents the generalized hearing range for the entire group as a composite (*i.e.,* all species within the group), where individual species' hearing ranges are typically not as broad. Generalized hearing range chosen based on ~65 dB threshold from normalized composite audiogram, with the exception for lower limits for LF cetaceans (Southall *et al.,* 2007) and PW pinniped (approximation).

The pinniped functional hearing group was modified from Southall *et al.* (2007) on the basis of data indicating that phocid species have consistently demonstrated an extended frequency range of hearing compared to otariids, especially in the higher frequency range (Hemilä *et al.,* 2006; Kastelein *et al.,* 2009; Reichmuth and Holt, 2013). For more detail concerning these groups and associated frequency ranges, please see NMFS (2018) for a review of available information. NMFS notes that in 2019a, Southall *et al.* recommended new names for hearing groups that are widely recognized. However, this new hearing group classification does not change the weighting functions or acoustic thresholds (*i.e.,* the weighting functions and thresholds in Southall *et al.* (2019a) are identical to NMFS 2018 Revised Technical Guidance). When NMFS updates our Technical Guidance, we will be adopting the updated Southall *et al.* (2019a) hearing group classification.

**Potential Effects of Specified Activities on Marine Mammals and Their Habitat**

The effects of underwater noise from the Project's specified activities have the potential to result in the harassment of marine mammals in the specified geographic region. The proposed rule (87 FR 64868, October 26, 2022) included a discussion of the effects of anthropogenic noise on marine mammals and the potential effects of underwater noise from Ocean Wind's project activities on marine mammals and their habitat. That information and analysis is incorporated by reference into this final rule determination and is not repeated here; please refer to the notice of the proposed rule (87 FR 64868, October 26, 2022).

**Estimated Take**

As noted in the Changes From the Proposed to Final Rule section, minor changes to the estimated and authorized take for several species have been made, based on recommendations received during the public comment period and based on a mathematical error NMFS found for a single species. These changes are described in detail in the sections below and, otherwise, the methodology for, and amount of, estimated take has not changed since the proposed rule.

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

Authorized takes would primarily be by Level B harassment, as use of the acoustic sources (*i.e.,* impact and vibratory pile driving, site characterization surveys, and UXO/MEC detonations) have the potential to result in disruption of marine mammal behavioral patterns due to exposure to elevated noise levels. Impacts such as masking and TTS can contribute to behavioral disturbances. There is also some potential for auditory injury (Level A harassment) to occur in select marine mammal species incidental to the specified activities (*i.e.,* impact pile driving, vibratory pile driving, and UXO/MEC detonations). For this action, this potential is limited to mysticetes, high-frequency cetaceans, and phocids due to their hearing sensitivities and the nature of the activities. As described below, the larger distances to the PTS thresholds, when considering marine mammal weighting functions, demonstrate this potential. For mid-frequency hearing sensitivities, when thresholds and weighting and the associated PTS zone sizes are considered, the potential for PTS from the noise produced by the project is negligible. The required mitigation and monitoring measures are expected to minimize the severity of the taking to the extent practicable.

As described previously, no serious injury or mortality is anticipated or authorized for this project. Below we describe how the take was 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) and 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 estimates.

*Marine Mammal Acoustic Thresholds*

NMFS recommends the use of 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 PTS of some degree (equated to Level A harassment). Thresholds have also been developed to identify the levels above which animals may incur different types of tissue damage (non-acoustic Level A harassment or mortality) from exposure to pressure waves from explosive detonation. Thresholds have also been developed identifying the received level of in-air sound above which exposed pinnipeds would likely be behaviorally harassed. A summary of all NMFS' thresholds can be found at (*https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-acoustic-technical-guidance*).

*Level B harassment*—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 or exposure context (*e.g.,* frequency, predictability, duty cycle, duration of the exposure, signal-to-noise ratio, distance to the source), the environment (*e.g.,* other noises in the area) and the receiving animals (hearing, motivation, experience, demography, life stage, depth) and can be difficult to predict (*e.g.,* Southall *et al.,* 2007, 2021; Ellison *et al.,* 2012). Based on what the available science indicates and the practical need to use a threshold based on a metric that is both predictable and measurable for most activities, NMFS typically uses a generalized acoustic threshold based on received level to estimate the onset of behavioral harassment. NMFS generally predicts that marine mammals are likely to be behaviorally harassed in a manner considered to be Level B harassment when exposed to underwater anthropogenic noise above root-mean-squared pressure received levels (RMS SPL) of 120 dB (referenced to 1 micropascal (re 1 µPa)) for continuous (*e.g.,* vibratory pile driving, drilling) and above RMS SPL 160 dB re 1 µPa for non-explosive impulsive (*e.g.,* seismic airguns) or intermittent (*e.g.,* scientific sonar) sources (Table 4). Generally speaking, Level B harassment take estimates based on these behavioral harassment thresholds are expected to include any likely takes by TTS as, in most cases, the likelihood of TTS occurs at distances from the source less than those at which behavioral harassment is likely. TTS of a sufficient degree can manifest as behavioral harassment, as reduced hearing sensitivity and the potential reduced opportunities to detect important signals (conspecific communication, predators, prey) may result in changes in behavior patterns that would not otherwise occur.

Ocean Wind's construction activities include the use of continuous (*e.g.,* vibratory pile driving), intermittent (*e.g.,* impact pile driving, HRG acoustic sources) sources, and, therefore, the 120 and 160 dB *re* 1 µPa (rms) thresholds are applicable. NMFS notes there are separate explosive thresholds to account for Level B harassment from a single detonation per day and those are included in Table 5 below.

*Level A harassment*—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). 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). Ocean Wind's project includes the use of impulsive and non-impulsive sources.

These thresholds are provided in Table 4 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.*

TABLE 4—ONSET OF PERMANENT THRESHOLD SHIFT (PTS)

[NMFS, 2018]

| Hearing group | PTS onset thresholds * (received level) | |
|---|---|---|
| | Impulsive | Non-impulsive |
| Low-Frequency (LF) Cetaceans | *Cell 1:* $L_{p,0\text{-}pk,flat}$: 219 dB; $L_{E,p,\ LF,24h}$: 183 dB | *Cell 2:* $L_{E,p,\ LF,24h}$: 199 dB. |
| Mid-Frequency (MF) Cetaceans | *Cell 3:* $L_{p,0\text{-}pk,flat}$: 230 dB; $L_{E,p,\ MF,24h}$: 185 dB | *Cell 4:* $L_{E,p,\ MF,24h}$: 198 dB. |
| High-Frequency (HF) Cetaceans | *Cell 5:* $L_{p,0\text{-}pk,flat}$: 202 dB; $L_{E,p,HF,24h}$: 155 dB | *Cell 4:* $L_{E,p,\ HF,24h}$: 173 dB. |
| Phocid Pinnipeds (PW) (Underwater) | *Cell 7:* $L_{p,0\text{-}pk.flat}$: 218 dB; $L_{E,p,PW,24h}$: 185 dB | *Cell 8:* $L_{E,p,PW,24h}$: 201 dB. |

* Dual metric 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 are recommended for consideration.

**Note:** Peak sound pressure level ($L_{p,0\text{-}pk}$) has a reference value of 1 µPa, and weighted cumulative sound exposure level ($L_{E,p}$) has a reference value of 1µPa$^2$s. In this Table, thresholds are abbreviated to be more reflective of International Organization for Standardization standards (ISO, 2017). The subscript ''flat'' is being included to indicate peak sound pressure are flat weighted or unweighted within the generalized hearing range of marine mammals (*i.e.,* 7 Hz to 160 kHz). The subscript associated with cumulative sound exposure level thresholds indicates the designated marine mammal auditory weighting function (LF, MF, and HF cetaceans, and PW pinnipeds) and that the recommended accumulation period is 24 hours. The weighted 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 thresholds will be exceeded.

*Explosive sources*—Based on the best available science, NMFS uses the acoustic and pressure thresholds indicated in Tables 5 and 6 to predict the onset of behavioral harassment, TTS, PTS, tissue damage, and mortality

from explosive detonations. Given Ocean Wind would be limited to detonating one UXO/MEC per day, the TTS threshold is used to estimate the potential for Level B (behavioral) harassment (*i.e.,* individuals exposed above the TTS threshold may also be harassed by behavioral disruption but we do not anticipate any impacts from exposure to UXO/MEC detonation below the TTS threshold would constitute behavioral harassment).

TABLE 5—PTS ONSET, TTS ONSET, FOR UNDERWATER EXPLOSIVES

[NMFS, 2018]

| Hearing group | PTS impulsive thresholds | TTS impulsive thresholds |
|---|---|---|
| Low-Frequency (LF) Cetaceans | *Cell 1:* $L_{pk,flat}$: 219 dB; $L_{E,LF,24h}$: 183 dB | *Cell 2:* $L_{pk,flat}$: 213 dB; $L_{E,LF,24h}$: 168 dB. |
| Mid-Frequency (MF) Cetaceans | *Cell 4:* $L_{pk,flat}$: 230 dB; $L_{E,MF,24h}$: 185 dB | *Cell 5:* $L_{pk,flat}$: 224 dB; $L_{E,MF,24h}$: 170 dB. |
| High-Frequency (HF) Cetaceans | *Cell 7:* $L_{pk,flat}$: 202 dB; $L_{E,HF,24h}$: 155 dB | *Cell 8:* $L_{pk,flat}$: 196 dB; $L_{E,HF,24h}$: 140 dB. |
| Phocid Pinnipeds (PW) (Underwater) | *Cell 10:* $L_{pk,flat}$: 218 dB; $L_{E,PW,24h}$: 185 dB | *Cell 11:* $L_{pk,flat}$: 212 dB; $L_{E,PW,24h}$: 170 dB. |

* Dual metric acoustic thresholds for impulsive sounds: Use whichever results in the largest isopleth for calculating PTS/TTS onset.

**Note:** Peak sound pressure ($L_{pk}$) has a reference value of 1 µPa, and cumulative sound exposure level ($L_E$) has a reference value of 1µPa$^2$s. In this table, thresholds are abbreviated to reflect American National Standards Institute standards (ANSI, 2013). However, ANSI defines peak sound pressure 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 overall marine mammal 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 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.

Additional thresholds for the onset of non-auditory injury to lung and gastrointestinal organs from the blast shock wave and/or high peak pressures are also relevant (at relatively close ranges) (Table 6). These criteria have been developed by the U.S. Department of the Navy (DoN, 2017a) and are based on the mass of the animal (*e.g.,* lowest to highest range for each hearing group) and the depth at which it is present in the water column. Equations predicting the onset of the associated potential effects are included below (Table 6).

TABLE 6—LUNG AND GASTROINTESTINAL (G.I.) TRACT INJURY THRESHOLDS

[DoN, 2017]

| Hearing group | Mortality (severe lung injury) * | Slight lung injury * | G.I. tract injury |
|---|---|---|---|
| All Marine Mammals | *Cell 1:* Modified Goertner model; Equation 1. | *Cell 2:* Modified Goertner model; Equation 2. | *Cell 3:* $L_{pk,flat}$: 237 dB. |

* Lung injury (severe and slight) thresholds are dependent on animal mass (Recommendation: Table C.9 from DoN (2017) based on adult and/or calf/pup mass by species).

**Note:** Peak sound pressure ($L_{pk}$) has a reference value of 1 µPa. In this table, thresholds are abbreviated to reflect American National Standards Institute standards (ANSI, 2013). However, ANSI defines peak sound pressure 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 overall marine mammal generalized hearing range.

Modified Goertner Equations for severe and slight lung injury (pascal-second):

Equation 1: $103M^{1/3}(1 + D/10.1)^{1/6}$ Pa-s

Equation 2: $47.5M^{1/3}(1 + D/10.1)^{1/6}$ Pa-s

*M* animal (adult and/or calf/pup) mass (kilogram (kg)) (Table C.9 in DoN, 2017).

*D* animal depth (meters).

Below, we discuss the acoustic modeling, marine mammal density information, and take estimation for each of Ocean Wind's construction activities. NMFS has carefully considered all information and analysis presented by Ocean Wind as well as all other applicable information and, based on the best available science, concurs that Ocean Wind's estimates of the types and amounts of take for each species and stock are complete and accurate.

*Marine Mammal Densities*

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

Habitat-based density models produced by the Duke University Marine Geospatial Ecology Laboratory and the Marine-life Data and Analysis Team, based on the best available marine mammal data from 1992–2022 obtained in a collaboration between Duke University, the Northeast Regional Planning Body, the University of North Carolina Wilmington, the Virginia Aquarium and Marine Science Center, and NOAA (Roberts *et al.,* 2016a, 2016b, 2017, 2018, 2020, 2021a, 2021b, 2023), represent the best available information regarding marine mammal densities in the survey area. More recently, these data have been updated with new modeling results and include density estimates for pinnipeds (Roberts *et al.,* 2016b, 2017, 2018, 2023). Density data are subdivided into five separate raster data layers for each species, including: Abundance (density), 95 percent Confidence Interval of Abundance, 5 percent Confidence Interval of Abundance, Standard Error of Abundance, and Coefficient of Variation of Abundance.

Ocean Wind's initial densities and take estimates were included in the ITA application that was considered Adequate & Complete on February 11, 2022, in line with NMFS' standard ITA guidance (*https://www.fisheries.noaa.gov/national/marine-mammal-protection/apply-incidental-take-authorization*). However, on June 20, 2022, the Duke Marine Geospatial Ecology Laboratory released a new, and more comprehensive, set of marine mammal density models for the area along the East Coast of the United States (Roberts

*et al.,* 2023). The differences between the new density data and the older data necessitated the use of updated marine mammal densities and, subsequently, revised marine mammal take estimates. This information was provided to NMFS as a memo (referred to as the Revised Density and Take Estimate Memo) on August 29, 2022 after continued discussion between Ocean Wind and NMFS and NMFS has considered it in this analysis. The Revised Density and Take Estimate Memo was made public on NMFS' website (*https://www.fisheries.noaa.gov/action/incidental-take-authorization-ocean-wind-lcc-construction-ocean-wind-1-wind-energy-facility*) on October 26, 2022.

The densities used to estimate take from WTG and OSS foundation installation, were calculated based on average monthly densities for all grid cells within the Lease Area as well as grid cells extending an additional 5-km (3.11 miles (mi)) beyond the Lease Area, referred to as a 5 km perimeter (refer to Figure 1 of the Revised Density and Take Estimate Memo provided by Orsted). The take estimates assumed that up to 60 WTG monopiles would be installed in the highest density month for each marine mammal species (2 monopiles per day maximum × 30 days) with the remaining 38 WTG monopiles being installed in the second highest density month (2 monopiles per day maximum × 19 days). This estimation approach is conservative as it is unlikely that all piles will be installed within 2 months; however, given the uncertainty with the exact pile schedule, this approach analyzes and provides certainty that the maximum of take has been analyzed. Given the small number of jacket piles needed for OSS compared to the number of monopile WTGs, these were assumed to be installed in the highest density month only.

For cofferdam and goal post density estimates, a 10-km (6.21-mi) perimeter was applied around each of the cofferdam and goal post locations (Figure 2 of the Revised Density and Take Estimate Memo), with densities averaged among the seven cofferdam and goal post locations to result in one density table for all cofferdams and goal posts. Due to the uncertainty of the specific months that temporary cofferdam and goal post would be installed and removed via vibratory pile driving, Ocean Wind used the average density for the months of October through May, as described in the Revised Density and Take Estimate Memo. We note that in the application Ocean Wind assumed all the work would occur in the month when a species density was the highest (*e.g.,* Ocean Wind has assumed all cofferdams and goal posts would occur in December for humpback whales but in April for sei whales; Table 6–2 in the ITA application). This original approach was deemed too conservative and the revised approach, as described in the aforementioned Memo, avoids the unnecessary overestimation of marine mammal takes. While it is possible for the seven installation and removal events to occur within the same month, there is no specific expectation that the installations will occur immediately one after another across the different locations and, therefore, this approach is appropriate.

To estimate densities for the HRG surveys occurring both within the Lease Area and within the export cable routes, a 5-km (3.11-mi) perimeter was applied around the cable corridors (Figure 3 of the Revised Density and Take Estimate Memo). Given this work could occur year-round, the average annual density for each species was calculated using average monthly densities from January through December. The revised density estimates for HRG surveys were calculated for both the export cable route area and the Lease Area in the Revised Density and Take Estimate Memo in a way that aligned with the proposed schedule for HRG activities (88 survey days in Years 1, 4, and 4; 180 survey days in Years 2 and 3), as opposed to averaging the each species annual density across the entire Project Area was presented in the ITA application. Furthermore, while the original ITA application included the entire HRG area (Lease Area and export cable routes) collectively, the Memo has separated these two locations with more specific densities for the export cable route and Lease Area. These changes better account for the activity footprint and perimeter (5 km) to more accurately represent the spatial extent and resolution of the survey effort planned.

Given that UXOs/MECs have the potential to occur anywhere within the Project Area, a 15-km (9.32-mi) perimeter was applied to both the Lease Area and the export cable corridors (Figure 4 of the Revised Density and Take Estimate Memo). In cases where monthly densities were unavailable, annual densities were used instead (*i.e.,* blue whales, pilot whale *spp.,* Atlantic spotted dolphins).

NMFS notes several exceptions to the determination of the relevant densities for some marine mammal species to the method described above. These are described here in greater detail.

For several marine mammal species, Roberts *et al.* (2023) does not differentiate by stock. This is true for the bottlenose dolphins, for which take has been authorized for two stocks (coastal migratory and offshore stock). This is also true for long-finned and short-finned pilot whales (pilot whales *spp.*) and harbor and gray seals (seals), where a pooled density is the only value available from the data that is not partitioned by stock. To account for this, the coastal migratory and offshore stocks of bottlenose dolphins were adjusted based on the 20-m isobath cutoff, such that take predicted to occur in any area less than 20 m in depth was apportioned to the coastal stock only and take predicted to occur in waters of greater than 20 m of depth was apportioned to the offshore stock. The densities for the pilot whales were apportioned based on their relative abundance in the Project Area to estimate species- and stock-specific exposures. The same approach was taken for the two pinniped species (harbor and gray seals), where each species was scaled based on its relative abundance in the Project Area, as opposed the application of the same density to both, as previously described in the ITA application. Tables 7, 8, 9, and 10 below demonstrate all of the densities used in the exposure and take analyses.

TABLE 7—THE HIGHEST AND SECOND HIGHEST MONTHLY MARINE MAMMAL AND ANNUAL DENSITIES (ANIMALS PER $Km^2$) USED FOR THE MODELING OF OCEAN WIND'S WTGS AND OSSS FROM MAY THROUGH DECEMBER

| Marine mammal species | Monopile foundations | | Jacket foundations |
|---|---|---|---|
| | First highest density | Second highest density | First highest density |
| North Atlantic right whale [a] | 0.00045 (December) | 0.00012 (November) | 0.00045 (December). |
| Blue whale [a] | (c) | (c) | (c). |
| Fin whale [a] | 0.00141 (December) | 0.00080 (May) | 0.00141 (December). |

TABLE 7—THE HIGHEST AND SECOND HIGHEST MONTHLY MARINE MAMMAL AND ANNUAL DENSITIES (ANIMALS PER Km$^2$) USED FOR THE MODELING OF OCEAN WIND'S WTGS AND OSSS FROM MAY THROUGH DECEMBER—Continued

| Marine mammal species | Monopile foundations | | Jacket foundations |
|---|---|---|---|
| | First highest density | Second highest density | First highest density |
| Humpback whale | 0.00126 (December) | 0.00085 (May) | 0.00126 (December). |
| Minke whale | 0.00674 (May) | 0.00154 (June) | 0.00674 (May). |
| Sei whale [a] | 0.00042 (December) | 0.00021 (November) | 0.00042 (December). |
| Sperm whale [a] | 0.00008 (May) | 0.00004 (December) | 0.00008 (May). |
| Atlantic spotted dolphin | ([c]) | ([c]) | ([c]). |
| Atlantic white-sided dolphin | 0.00643 (May) | 0.00539 (November) | 0.00643 (May). |
| Bottlenose dolphin (offshore stock) [b] | 0.11352 (August) | 0.11146 (November) | 0.11352 (August). |
| Bottlenose dolphin (coastal stock) [b] | 0.51100 (September) | 0.47620 (August) | 0.51100 (September). |
| Common dolphin | 0.05157 (December) | 0.04682 (November) | 0.05157 (December). |
| Long-finned pilot whale [b] | 0.00015 (annual) | n/a | 0.00015 (annual). |
| Short-finned pilot whale [b] | 0.00011 (annual) | n/a | 0.00011 (annual). |
| Risso's dolphin | 0.00096 (December) | 0.00063 (November) | 0.00096 (December). |
| Harbor porpoise | 0.02456 (December) | 0.00801 (May) | 0.02456 (December). |
| Gray seal | 0.03517 (December) | 0.03017 (May) | 0.03517 (December). |
| Harbor seal | 0.09830 (December) | 0.08433 (May) | 0.09830 (December). |

[a] Listed as Endangered under the Endangered Species Act.
[b] Densities were adjusted by their relative abundance.
[c] Exposure modeling for the blue whale and Atlantic spotted dolphin was not conducted because impacts to those species approach zero due to their low predicted densities in the Project; therefore, they were excluded from all quantitative analyses and tables based on modeling results.

TABLE 8—THE MARINE MAMMAL AVERAGE AND ANNUAL DENSITIES (ANIMALS PER Km$^2$) USED FOR ANALYSIS OF OCEAN WIND'S COFFERDAM AND GOAL POST INSTALLATION AND REMOVAL FOR OCTOBER THROUGH MAY

| Marine mammal species | Period of density used | Estimated density |
|---|---|---|
| North Atlantic right whale [a] | October–May average | 0.00028 |
| Blue whale [a] | Annual Density | 0.00075 |
| Fin whale [a] | October–May average | 0.00039 |
| Humpback whale | October–May average | 0.00062 |
| Minke whale | October–May average | 0.00078 |
| Sei whale [a] | October–May average | 0.00014 |
| Sperm whale [a] | October–May average | 0.00002 |
| Atlantic spotted dolphin | ([c]) | ([c]) |
| Atlantic white-sided dolphin | October–May average | 0.00077 |
| Bottlenose dolphin (offshore stock) [b] | October–May average | 0.14866 |
| Bottlenose dolphin (coastal stock) [b] | October–May average | 0.32471 |
| Common dolphin | October–May average | 0.00409 |
| Long-finned pilot whale [b] | Annual Density | 0.00001 |
| Short-finned pilot whale [b] | Annual Density | 0.00001 |
| Risso's dolphin | October–May average | 0.00002 |
| Harbor porpoise | October–May average | 0.00854 |
| Gray seal | October–May average | 0.03602 |
| Harbor seal | October–May average | 0.10069 |

[a] Listed as Endangered under the Endangered Species Act.
[b] Densities were adjusted by their relative abundance (short-finned pilot whale = 0.00000133395 animals/km$^2$; long-finned pilot whale = 0.00000181 animals/km$^2$).
[c] No exposure modeling was performed for this species and it was added later after analysis had concluded.

TABLE 9—THE HIGHEST MONTHLY MARINE MAMMAL AND ANNUAL DENSITIES (ANIMALS PER Km$^2$) USED FOR THE MODELING OF OCEAN WIND'S UXOS/MECS FOR MAY THROUGH OCTOBER

| Marine mammal species | Density used |
|---|---|
| North Atlantic right whale [a] | 0.00008 (May). |
| Blue whale [a] | 0.00001 (Annual) |
| Fin whale [a] | 0.00068 (May). |
| Humpback whale | 0.00081 (May). |
| Minke whale | 0.00627 (May). |
| Sei whale [a] | 0.00021 (May). |
| Sperm whale [a] | 0.00008 (May). |
| Atlantic spotted dolphin | ([c]) |
| Atlantic white-sided dolphin | 0.00545 (May). |
| Bottlenose dolphin (offshore stock) [b] | 0.12615 (August). |
| Bottlenose dolphin (coastal stock) [b] | 0.71100 (September). |
| Common dolphin | 0.02407 (May). |
| Long-finned pilot whale [b] | 0.00013 (Annual). |

TABLE 9—THE HIGHEST MONTHLY MARINE MAMMAL AND ANNUAL DENSITIES (ANIMALS PER Km$^2$) USED FOR THE MODELING OF OCEAN WIND'S UXOS/MECS FOR MAY THROUGH OCTOBER—Continued

| Marine mammal species | Density used |
|---|---|
| Short-finned pilot whale [b] | 0.00010 (Annual). |
| Risso's dolphin | 0.00021 (May). |
| Harbor porpoise | 0.00789 (May). |
| Gray seal | 0.03387 (May). |
| Harbor seal | 0.09467 (May). |

[a] Listed as Endangered under the Endangered Species Act.
[b] Densities were adjusted by their relative abundance.
[c] No exposure modeling was performed for this species and it was added later after analysis had concluded.

TABLE 10—THE HIGHEST MONTHLY MARINE MAMMAL, AVERAGE, AND ANNUAL DENSITIES IN (ANIMALS PER Km$^2$) USED FOR ANALYSIS OF OCEAN WIND'S HRG SURVEY EFFORT FOR THE EXPORT CABLE ROUTE AND INTER-ARRAY CABLES FROM JANUARY THROUGH DECEMBER

| Marine mammal species | Wind farm area | Export cable route |
|---|---|---|
| North Atlantic right whale [a] | 0.00026 (Average Annual) | 0.00026 (Average Annual). |
| Blue whale [a] | 0.00001 (Annual) | 0.00001 (Annual). |
| Fin whale [a] | 0.00086 (Average Annual) | 0.00054 (Average Annual). |
| Humpback whale | 0.00069 (Average Annual) | 0.00057 (Average Annual). |
| Minke whale | 0.00171 (Average Annual) | 0.00099 (Average Annual). |
| Sei whale [a] | 0.00022 (Average Annual) | 0.00016 (Average Annual). |
| Sperm whale [a] | 0.00003 (Average Annual) | 0.00002 (Average Annual). |
| Atlantic spotted dolphin | ([c]) | ([c]). |
| Atlantic white-sided dolphin | 0.00399 (Average Annual) | 0.00130 (Average Annual). |
| Bottlenose dolphin (offshore stock) [b] | 0.06119 (Average Annual) | 0.14499 (Average Annual). |
| Bottlenose dolphin (coastal stock) [b] | 0.18073 (Average Annual) | 0.36680 (Average Annual). |
| Common dolphin | 0.02418 (Average Annual) | 0.00702 (Average Annual). |
| Long-finned pilot whale [b] | 0.00018 (Annual) | 0.00002 (Annual). |
| Short-finned pilot whale [b] | 0.00014 (Annual) | 0.00001 (Annual). |
| Risso's dolphin | 0.00029 (Average Annual) | 0.00005 (Average Annual). |
| Harbor porpoise | 0.01518 (Average Annual) | 0.00925 (Average Annual). |
| Gray seal | 0.01687 (Average Annual) | 0.02165 (Average Annual). |
| Harbor seal | 0.04715 (Average Annual) | 0.06051 (Average Annual). |

[a] Listed as Endangered under the Endangered Species Act.
[b] Densities were adjusted by their relative abundance.
[c] No exposure modeling was performed for this species and it was added later after analysis had concluded.

*Modeling and Take Estimation*

Below, we describe the three methods that were used to estimate take in consideration of the acoustic thresholds and marine mammal densities described above and the four different activities (WTG and OSS foundation installation, temporary cofferdam and goal post installation/removal, UXO/MEC detonation, and HRG surveys). The take estimates for the four different activities, as well as the combined total, are presented.

WTG and OSS Foundation Installation

As described above, Ocean Wind plans to install up to 98 WTGs and 3 OSS in the Lease Area. The proposed rule modeled and estimated take of marine mammals for two OSS construction scenarios (*i.e.,* monopile foundation and jacket foundation with pin piles) and carried the jacket foundation scenario forward into the total estimated take from all activities as it resulted in the higher estimated take number between the two scenarios. Because Ocean Wind's Construction and Operation Plan (COP) allows for the construction of either scenario, the final rule's estimated take analysis conservatively assumes the jacket foundation scenario will occur. For clarity, we have limited the estimated take analysis in this final rule to the jacket foundation scenario. For the analysis of the monopile foundation scenario, please refer to the Estimated Take section of the proposed rule.

Representative hammering schedules of increasing hammer energy with increasing penetration depth were modeled, resulting in, generally, higher intensity sound fields as the hammer energy and penetration increases (Table 11).

TABLE 11—ESTIMATED IMPACT HAMMER ENERGY SCHEDULES FOR MONOPILES AND PIN PILES

| Monopile foundations (8/11–m) | | | Jacket foundations (Pin piles; 2.44–m) | | |
|---|---|---|---|---|---|
| Hammer: IHC S–4000 | | | Hammer: IHC S–2500 | | |
| Energy level (kJ) [1] | Strike count | Pile penetration depth (m) | Energy level (kJ) | Strike count | Pile penetration depth |
| 500 | 763 | 7 | 500 | 554 | 3 |

TABLE 11—ESTIMATED IMPACT HAMMER ENERGY SCHEDULES FOR MONOPILES AND PIN PILES—Continued

| Monopile foundations (8/11–m) | | | Jacket foundations (Pin piles; 2.44–m) | | |
|---|---|---|---|---|---|
| Hammer: IHC S–4000 | | | Hammer: IHC S–2500 | | |
| Energy level (kJ) [1] | Strike count | Pile penetration depth (m) | Energy level (kJ) | Strike count | Pile penetration depth |
| 2,000 | 980 | 6 | 200 | 5,373 | 29 |
| 1,000 | 375 | 3 | 750 | 1,402 | 8 |
| 3,000 | 385 | 2 | 1,000 | 1,604 | 8 |
| 4,000 | 5,006 | 16 | 1,500 | 1,310 | 6 |
| 3,000 | 1,135 | 6 | 2,500 | 1,026 | 6 |
| 4,000 | 2,202 | 10 | 1,500 | 1,922 | 10 |
| Total | 10,846 | 50 | Total | 13,191 | 70 |

[1] Sediment types with greater resistances require hammers that deliver higher energy strikes and/or an increased number of strikes relative to installation in softer sediments. Typically the maximum sound levels usually occur during the last stage of impact pile installation where the greatest resistance is encountered (Betke, 2008).

Both monopiles and pin piles were assumed to be vertically aligned and driven to a maximum depth of 50 m for all monopiles and 70 m for all pin piles. While pile penetration depths may vary slightly, these values were chosen as reasonable penetration depths during modeling. All acoustic modeling was performed assuming that concurrent pile driving of either monopiles or pin piles would not occur. While multiple piles may be driven within any single 24-hour period, these installation activities would not occur simultaneously. Below we describe the assumptions inherent to the modeling approach and those by which Ocean Wind 1 would not exceed:

Modeling assumptions for the project are as follows:

- Up to two monopiles installed per day (4 hours per monopile; 9 hours of total with 8 hours of active pile driving time), although only one monopile may be installed on some days;
- No concurrent monopile and/or pin pile driving would occur;
- Monopiles would be 80 millimeters (mm) thick and consist of steel;
- Impact pile driving: IHC S–4000 or IHC S–2500 kJ rated energy; 1,977.151 kilonewton (kN) ram weight);
- Helmet weight: 3,776.9 kN;
- Impact hammers would have a maximum power capacity of 6,000 kilowatts (kW);
- Up to three pin piles could be installed per day;
- Pin piles would be 75 mm thick;
- Impact Pile driving: IHC S–2,500 kJ rated energy; 1,227.32 kN ram weight); and
- Helmet weight: 279 kN.

Sound fields produced during impact pile driving were modeled by first characterizing the sound signal produced during pile driving using the industry standard GRL Wave Equation Analysis Program (GRLWEAP; wave equation analysis of pile driving) model and JASCO's Pile Driving Source Model (PDSM). We provide a summary of the modelling effort below but the full JASCO modeling report can be found in Section 6 and Appendix A of Ocean Wind's ITA application (*https://www.fisheries.noaa.gov/action/incidental-take-authorization-ocean-wind-lcc-construction-ocean-wind-1-wind-energy-facility*).

Underwater sound propagation (*i.e.,* transmission loss) as a function of range from each source was modeled using JASCO's Marine Operations Noise Model (MONM) for multiple propagation radials centered at the source to yield three-dimensional (3D) transmission loss fields in the surrounding area. The MONM computes received per-pulse SEL for directional sources at specified depths. MONM uses two separate models to estimate transmission loss.

At frequencies less than 2 kHz, MONM computes acoustic propagation via a wide-angle parabolic equation (PE) solution to the acoustic wave equation based on a version of the U.S. Naval Research Laboratory's Range-dependent Acoustic Model (RAM) modified to account for an elastic seabed. MONM–RAM incorporates bathymetry, underwater sound speed as a function of depth, and a geo-acoustic profile based on seafloor composition, and accounts for source horizontal directivity. The PE method has been extensively benchmarked and is widely employed in the underwater acoustics community, and MONM–RAM's predictions have been validated against experimental data in several underwater acoustic measurement programs conducted by JASCO. At frequencies greater than 2 kHz, MONM accounts for increased sound attenuation due to volume absorption at higher frequencies with the widely used BELLHOP Gaussian beam ray-trace propagation model. This component incorporates bathymetry and underwater sound speed as a function of depth with a simplified representation of the sea bottom, as sub-bottom layers have a negligible influence on the propagation of acoustic waves with frequencies above 1 kHz. MONM–BELLHOP accounts for horizontal directivity of the source and vertical variation of the source beam pattern. Both propagation models account for full exposure from a direct acoustic wave, as well as exposure from acoustic wave reflections and refractions (*i.e.,* multi-path arrivals at the receiver).

The sound field radiating from the pile was simulated using a vertical array of point sources. Because sound itself is an oscillation (vibration) of water particles, acoustic modeling of sound in the water column is inherently an evaluation of vibration. For this study, synthetic pressure waveforms were computed using the full-wave range-dependent acoustic model (FWRAM), which is JASCO's acoustic propagation model capable of producing time-domain waveforms.

Models are more efficient at estimating SEL than $SPL_{rms}$. Therefore, conversions may be necessary to derive the corresponding $SPL_{rms}$. Propagation was modeled for a subset of sites using the FWRAM, from which broadband SEL to SPL conversion factors were calculated. The FWRAM required intensive calculation for each site, thus a representative subset of modeling sites were used to develop azimuth-, range-, and depth-dependent conversion factors. These conversion factors were

used to calculate the broadband $SPL_{rms}$ from the broadband SEL prediction.

The sound fields for the monopile and pin pile scenarios were each modeled based on one representative location in the Lease Area. For monopiles this area is G10 and for jacket foundations with pin piles this area is Z11 (see in Appendix A of the ITA application). Both modeling locations were selected as they were determined to be the most representative of the water depths in the Lease Area, as appropriate for each foundation type (*i.e.,* monopiles in shallower waters and jackets in deeper waters). All monopiles were assumed to be driven vertically and to a maximum penetration depth of 50 m (164 ft). All pin piles associated with jacket foundations were also assumed to be driven vertically to a maximum penetration depth of 70 m (230 ft).

The model also incorporated two different sound velocity profiles (related to *in-situ* measurements of temperature, salinity, and pressure within the water column) to account for variations in the acoustic propagation conditions between summer (May through November) and winter (December only). The estimated pile driving schedules (Table 16) were used to calculate the SEL sound fields at different points in time during impact pile driving.

Next, Ocean Wind modeled the sound field produced during impact pile driving by incorporating the results of the source level modeling into an acoustic propagation model. The sound propagation model incorporated site-specific environmental data that considers bathymetry, sound speed in the water column, and seabed geo-acoustics in the construction area.

Ocean Wind estimated both acoustic ranges and exposure ranges. Acoustic ranges represent the distance to a harassment threshold based on sound propagation through the environment (*i.e.,* independent of any receiver) while exposure range represents the distance at which an animal can accumulate enough energy to exceed a Level A harassment threshold in consideration of how it moves through the environment (*i.e.,* using movement modeling). In both cases, the sound level estimates are calculated from 3D sound fields and then, at each horizontal sampling range, the maximum received level that occurs within the water column is used as the received level at that range. These maximum-over-depth ($R_{max}$) values are then compared to predetermined threshold levels to determine acoustic and exposure ranges to Level A harassment and Level B harassment zone isopleths. However, the ranges to a threshold typically differ among radii from a source, and also might not be continuous along a radii because sound levels may drop below threshold at some ranges and then exceed threshold at farther ranges. To minimize the influence of these inconsistencies, 5 percent of the farthest such footprints were excluded from the model data. The resulting range, $R_{95\%}$, was chosen to identify the area over which marine mammals may be exposed above a given threshold, because, regardless of the shape of the maximum-over-depth footprint, the predicted range encompasses at least 95 percent of the horizontal area that would be exposed to sound at or above the specified threshold. The difference between $R_{max}$ and $R_{95\%}$ depends on the source directivity and the heterogeneity of the acoustic environment. $R_{95\%}$ excludes ends of protruding areas or small isolated acoustic foci not representative of the nominal ensonified zone. For purposes of calculating Level A harassment take, Ocean Wind applied $R_{95\%}$ exposure ranges, not acoustic ranges, to estimate take and determine mitigation distances for the reasons described below.

In order to best evaluate the $SEL_{cum}$ harassment thresholds for PTS, it is necessary to consider animal movement, as the results are based on how sound moves through the environment between the source and the receiver. Applying animal movement and behavior within the modeled noise fields provides the exposure range, which allows for a more realistic indication of the distances at which PTS acoustic thresholds are reached that considers the accumulation of sound over different durations (note that in all cases the distance to the peak threshold is less than the SEL-based threshold).

As described in Section 2.6 of Appendix A of Ocean Wind's ITA application, for modeled animals that have received enough acoustic energy to exceed a given Level A harassment threshold, the exposure range for each animal is defined as the closest point of approach (CPA) to the source made by that animal while it moved throughout the modeled sound field, accumulating received acoustic energy. The resulting exposure range for each species is the 95th percentile of the CPA distances for all animals that exceeded threshold levels for that species (termed the 95 percent exposure range ($ER_{95\%}$)). The $ER_{95\%}$ ranges are species-specific rather than categorized only by any functional hearing group, which allows for the incorporation of more species-specific biological parameters (*e.g.,* dive durations, swim speeds, *etc.*) for assessing the impact ranges into the model. Furthermore, because these $ER_{95\%}$ ranges are species-specific, they can be used to develop mitigation monitoring or shutdown zones.

Tables 12 and 13 below represent the $ER_{95\%}$ exposure ranges (for $SEL_{cum}$ and $SPL_{rms}$) for monopiles foundations, with Table 12 demonstrating the ranges using the summer sound speed profile and Table 13 using the winter sound speed profile. For both tables, a single monopiles and two monopiles per day are provided (the two per day ranges are shown in the parenthesis). NMFS notes that monopiles foundations constructed for Ocean Wind 1 are applicable to all WTGs and may be applicable to OSS structures, depending on the finalized buildout. Please see the Estimated Take section below, Appendix A of the Ocean Wind 1 ITA application, and Appendix R of the Ocean Wind 1 COP for further details on the acoustic modeling methodology.

Displayed in Tables 12, 13, 14, and 15 below, Ocean Wind would also employ a noise abatement system during all impact pile driving of monopiles. Noise abatement systems, such as bubble curtains, are sometimes used to decrease the sound levels radiated from a source. Additional information on sound attenuation devices is discussed in the Noise Abatement Systems section under the Mitigation section. In modeling the sound fields for Ocean Wind's proposed activities, hypothetical broadband attenuation levels of 0 dB, 6 dB, 10 dB, 15 dB, and 20 dB were modeled to gauge the effects on the ranges to thresholds given these levels of attenuation. The results for 10 dB of sound attenuation are shown below and the other attenuation levels (0 dB, 6 dB, 15 dB, and 20 dB) can be found in the ITA application.

TABLE 12—EXPOSURE RANGES ($ER_{95\%}$) TO LEVEL A HARASSMENT THRESHOLDS ($SEL_{cum}$) AND EXPOSURE RANGES ($ER_{95\%}$) AND ACOUSTIC RANGES ($R_{95\%}$) TO LEVEL B HARASSMENT THRESHOLD ($SPL_{rms}$) FOR MONOPILE FOUNDATIONS IN THE SUMMER (MAY–NOVEMBER), ASSUMING 10–dB ATTENUATION; EXPOSURE RANGES ARE FOR ONE (AND TWO) MONOPILES PER DAY

| Marine mammal species | Exposure ranges ($ER_{95\%}$) | | Acoustic range ($R_{95\%}$) |
|---|---|---|---|
| | Level A harassment (km) | Level B harassment (km) | Level B harassment (km) |
| North Atlantic right whale | 1.28 (1.37) | 2.95 (2.98) | [a] 3.253 |
| Blue whale * | ..... | ..... | |
| Fin whale | 1.58 (1.65) | 3.04 (3.13) | |
| Humpback whale | 1.14 (1.05) | 3.10 (3.09) | |
| Minke whale | 1.23 (1.26) | 3.13 (3.10) | |
| Sei whale | 1.36 (1.27) | 3.13 (3.09) | |
| Sperm whale | 0 (0) | 0 (0) | |
| Atlantic spotted dolphin * | ..... | ..... | |
| Atlantic white-sided dolphin | 0 (0) | 3.10 (3.04) | |
| Common dolphin | 0 (0) | 3.09 (3.05) | |
| Bottlenose dolphin (coastal stock) | 0 (0) | 2.80 (2.81) | |
| Bottlenose dolphin (offshore stock) | 0 (0) | 2.90 (2.81) | |
| Long-finned pilot whale | 0 (0) | 0 (0) | |
| Short-finned pilot whale | 0 (0) | 3.01 (3.08) | |
| Risso's dolphin | 0 (0) | 3.06 (3.09) | |
| Harbor porpoise | 0.84 (0.88) | 3.11 (3.07) | |
| Gray seal | 0 (0.08) | 3.21 (3.09) | |
| Harbor seal | 0 (0.06) | 3.11 (3.08) | |

* Exposure modeling for the blue whale and Atlantic spotted dolphin was not conducted because impacts on the species approach zero due to their low predicted densities in the Project Area. These species were excluded from quantitative analyses and tables. Results for these scenarios can be found in Appendix A in the ITA application.

[a] The acoustic range can be found in Table H–25 in Appendix H of Ocean Wind's ITA application. The value shown here is for 170 dB as Appendix H did not account for 10 dB of sound attenuation.

TABLE 13—EXPOSURE RANGES ($ER_{95\%}$) TO LEVEL A HARASSMENT THRESHOLDS ($SEL_{cum}$) AND EXPOSURE RANGES ($ER_{95\%}$) AND ACOUSTIC RANGES ($R_{95\%}$) TO LEVEL B HARASSMENT THRESHOLD ($SPL_{rms}$) FOR MONOPILE FOUNDATIONS IN THE WINTER (DECEMBER), ASSUMING 10-dB ATTENUATION; EXPOSURE RANGES ARE FOR ONE (AND TWO) MONOPILES PER DAY

| Marine mammal species | Exposure ranges ($ER_{95\%}$) | | Acoustic range ($R_{95\%}$) |
|---|---|---|---|
| | Level A harassment km) | Level B harassment (km) | Level B harassment (km) |
| North Atlantic right whale (migrating) | 1.85 (2.03) | 3.28 (3.35) | [a] 3.534 |
| Blue whale * | ..... | ..... | |
| Fin whale | 2.33 (2.49) | 3.48 (3.44) | |
| Humpback whale (migrating) | 1.75 (1.77) | 3.32 (3.37) | |
| Minke whale (migrating) | 1.98 (1.98) | 3.39 (3.42) | |
| Sei whale (migrating) | 1.86 (2.19) | 3.42 (3.45) | |
| Sperm whale | 0 (0) | 0 (0) | |
| Atlantic spotted dolphin * | ..... | ..... | |
| Atlantic white-sided dolphin | 0 (0) | 3.37 (3.33) | |
| Bottlenose dolphin (coastal stock) | 0 (0) | 3.12 (3.15) | |
| Bottlenose dolphin (offshore stock) | 0 (0) | 3.22 (3.18) | |
| Common dolphin | 0 (0) | 3.40 (3.36) | |
| Long-finned pilot whale | 0 (0) | 0 (0) | |
| Short-finned pilot whale | 0 (0) | 3.31 (3.41) | |
| Risso's dolphin | 0 (0) | 3.49 (3.36) | |
| Harbor porpoise | 1.06 (1.43) | 3.34 (3.37) | |
| Gray seal | 0 (0.14) | 3.44 (3.42) | |
| Harbor seal | 0.07 (0.24) | 3.47 (3.31) | |

* Exposure modeling for the blue whale and Atlantic spotted dolphin was not conducted because impacts on the species approach zero due to their low predicted densities in the Project Area. These species were excluded from quantitative analyses and tables. Results for these scenarios can be found in Appendix A in the ITA application.

[a] The acoustic range can be found in Table H–26 in Appendix H of Ocean Wind's ITA application. The value shown here is for 170 dB as Appendix H did not account for 10 dB of sound attenuation.

Tables 14 and 15 below represent the exposure ranges ($ER_{95\neq}$) for jacket foundations, with Table 14 demonstrating the ranges using the summer sound speed profile and Table 15 using the winter sound speed profile. For both tables, two pin piles and three pin piles (the three pin pile ranges are shown in the parenthesis) per day are provided. As with Tables 12 and 13 above, sound reductions of 0, 6, 10, 15, and 20 dB were modeled, but Ocean Wind would only be required to meet a minimum sound reduction level of 10 dB. The results for 10 dB of sound attenuation are shown below and the other attenuation levels (0, 6, 15, and 20 dB) can be found in the ITA application.

TABLE 14—EXPOSURE RANGES ($ER_{95\%}$) TO LEVEL A HARASSMENT THRESHOLDS ($SEL_{cum}$) AND EXPOSURE RANGES ($ER_{95\%}$) AND ACOUSTIC RANGES ($R_{95\%}$) TO LEVEL B HARASSMENT THRESHOLD ($SPL_{rms}$) FOR JACKET FOUNDATIONS (PIN PILES) IN THE SUMMER (MAY–NOVEMBER), ASSUMING 10–dB ATTENUATION; EXPOSURE RANGES ARE FOR TWO (AND THREE) PIN PILES PER DAY

| Marine mammal species | Exposure ranges ($ER_{95\%}$) | | Acoustic range ($R_{95\%}$) |
|---|---|---|---|
| | Level A harassment (km) | Level B harassment (km) | Level B harassment (km) |
| North Atlantic right whale | 0.51 (0.58) | 1.64 (1.72) | [a] 2.155 |
| Blue whale * | ..... | ..... | |
| Fin whale | 0.55 (0.59) | 1.82 (1.79) | |
| Humpback whale | 0.40 (0.42) | 1.81 (1.86) | |
| Minke whale | 0.55 (0.51) | 1.76 (1.76) | |
| Sei whale | 0.37 (0.36) | 1.81 (1.84) | |
| Sperm whale | 0 (0) | 0 (0) | |
| Atlantic spotted dolphin * | ..... | ..... | |
| Atlantic white-sided dolphin | 0 (0) | 1.55 (1.72) | |
| Bottlenose dolphin (offshore stock) | 0 (0) | 1.58 (1.60) | |
| Bottlenose dolphin (coastal stock) | 0 (0) | 1.53 (1.46) | |
| Common dolphin | 0 (0) | 1.72 (1.72) | |
| Long-finned pilot whale | 0 (0) | 0 (0) | |
| Short-finned pilot whale | 0 (0) | 0 (0) | |
| Risso's dolphin | 0 (0) | 1.61 (1.65) | |
| Harbor porpoise | 0.61 (0.61) | 1.75 (1.73) | |
| Gray seal | 0 (<0.01) | 1.75 (1.65) | |
| Harbor seal | 0 (<0.01) | 1.96 (1.91) | |

* Exposure modeling for the blue whale and Atlantic spotted dolphin was not conducted because impacts on the species approach zero due to their low predicted densities in the Project Area. These species were excluded from quantitative analyses and tables. Results for these scenarios can be found in Appendix A in the ITA application.

[a] The acoustic range can be found in Table H–41 in Appendix H of Ocean Wind's ITA application. The value shown here is for 170 dB as Appendix H did not account for 10 dB of sound attenuation.

TABLE 15—EXPOSURE RANGES ($ER_{95\%}$) TO LEVEL A HARASSMENT THRESHOLDS ($SEL_{cum}$) AND EXPOSURE RANGES ($ER_{95\%}$ AND ACOUSTIC RANGES ($R_{95\%}$) TO LEVEL B HARASSMENT THRESHOLD ($SPL_{rms}$) FOR JACKET FOUNDATIONS (PIN PILES) IN THE WINTER (DECEMBER), ASSUMING 10–dB ATTENUATION; EXPOSURE DISTANCES FOR TWO (AND THREE) PIN PILES PER DAY

| Marine mammal species | Exposure ranges ($ER_{95\%}$) | | Acoustic range ($R_{95\%}$) |
|---|---|---|---|
| | Level A harassment (km) | Level B harassment (km) | Level B harassment (km) |
| North Atlantic right whale | 0.69 (0.70) | 2.06 (2.11) | [a] 2.522 |
| Blue whale * | ..... | ..... | |
| Fin whale | 0.84 (0.74) | 2.11 (2.04) | |
| Humpback whale | 0.52 (0.51) | 2.18 (2.11) | |
| Minke whale | 0.58 (0.59) | 2.09 (2.06) | |
| Sei whale | 0.59 (0.53) | 2.13 (2.03) | |
| Sperm whale | 0 (0) | 0 (0) | |
| Atlantic spotted dolphin * | ..... | ..... | |
| Atlantic white-sided dolphin | 0 (0) | 2.12 (2.08) | |
| Bottlenose dolphin (offshore stock) | 0 (0) | 1.91 (1.85) | |
| Bottlenose dolphin (coastal stock) | 0 (0) | 1.97 (1.88) | |
| Common dolphin | 0 (0) | 2.09 (2.06) | |
| Long-finned pilot whale | 0 (0) | 0 (0) | |
| Short-finned pilot whale | 0 (0) | 0 (0) | |
| Risso's dolphin | 0 (0) | 1.93 (1.87) | |
| Harbor porpoise | 0.63 (0.70) | 2.16 (2.06) | |
| Gray seal | 0 (<0.01) | 2.33 (2.14) | |

TABLE 15—EXPOSURE RANGES ($ER_{95\%}$) TO LEVEL A HARASSMENT THRESHOLDS ($SEL_{cum}$) AND EXPOSURE RANGES ($ER_{95\%}$ AND ACOUSTIC RANGES ($R_{95\%}$) TO LEVEL B HARASSMENT THRESHOLD ($SPL_{rms}$) FOR JACKET FOUNDATIONS (PIN PILES) IN THE WINTER (DECEMBER), ASSUMING 10–dB ATTENUATION; EXPOSURE DISTANCES FOR TWO (AND THREE) PIN PILES PER DAY—Continued

| Marine mammal species | Exposure ranges ($ER_{95\%}$) | | Acoustic range ($R_{95\%}$) |
|---|---|---|---|
| | Level A harassment (km) | Level B harassment (km) | Level B harassment (km) |
| Harbor seal | 0 (<0.01) | 2.24 (2.19) | |

* Exposure modeling for the blue whale and Atlantic spotted dolphin was not conducted because impacts on the species approach zero due to their low predicted densities in the Project Area. These species were excluded from quantitative analyses and tables. Results for these scenarios can be found in Appendix A in the ITA application.

[a] The acoustic range can be found in Table H–42 in Appendix H of Ocean Wind's ITA application. The value shown here is for 170 dB as Appendix H did not account for 10 dB of sound attenuation.

JASCO's Animal Simulation Model Including Noise Exposure (JASMINE) animal movement model was used to predict the number of marine mammals exposed to impact pile driving sound above NMFS' injury and behavioral harassment thresholds. Sound exposure models like JASMINE use animats to forecast behaviors of animals in new situations and locations based on previously documented behaviors of those animals. The predicted 3D sound fields (*i.e.,* the output of the acoustic modeling process described earlier) are sampled by animats using movement rules derived from animal observations. The output of the simulation is the exposure history for each animat within the simulation.

The precise location of animats (and their pathways) are not known prior to a project, therefore a repeated random sampling technique (Monte Carlo) is used to estimate exposure probability with many animats and randomized starting positions. The probability of an animat starting out in or transitioning into a given behavioral state can be defined in terms of the animat's current behavioral state, depth, and the time of day. In addition, each travel parameter and behavioral state has a termination function that governs how long the parameter value or overall behavioral state persists in the simulation.

The output of the simulation is the exposure history for each animat within the simulation, and the combined history of all animats gives a probability density function of exposure during the project. Scaling the probability density function by the real-world density of animals results in the mean number of animats expected to be exposed to a given threshold over the duration of the project. Due to the probabilistic nature of the process, fractions of animats may be predicted to exceed threshold. If, for example, 0.1 animats are predicted to exceed threshold in the model, that is interpreted as a 10-percent chance that one animat will exceed a relevant threshold during the project, or equivalently, if the simulation were re-run 10 times, 1 of the 10 simulations would result in an animat exceeding the threshold. Similarly, a mean number prediction of 33.11 animats can be interpreted as re-running the simulation where the number of animats exceeding the threshold may differ in each simulation but the mean number of animats over all of the simulations is 33.11. A portion of an individual marine mammal cannot be taken during a project, so it is common practice to round mean number animat exposure values to integers using standard rounding methods. However, for low-probability events it is more precise to provide the actual values.

Sound fields were input into the JASMINE model, as described above, and animats were programmed based on the best available information to ''behave'' in ways that reflect the behaviors of the 17 marine mammal species (18 stocks) expected to occur in the Project Area during the proposed activity. The various parameters for forecasting realistic marine mammal behaviors (*e.g.,* diving, foraging, surface times, *etc.*) are determined based on the available literature (*e.g.,* tagging studies); when literature on these behaviors was not available for a particular species, it was extrapolated from a similar species for which behaviors would be expected to be similar to the species of interest. The parameters used in JASMINE describe animat movement in both the vertical and horizontal planes (*e.g.,* direction, travel rate, ascent and descent rates, depth, bottom following, reversals, inter-dive surface interval).

Animats were modeled to move throughout the 3D sound fields produced by each construction schedule for the entire construction period. For PTS exposures, both $SPL_{pk}$ and $SEL_{cum}$ were calculated for each species based on the corresponding acoustic criteria. Once an animat is taken within a 24-hour period, the model does not allow it to be taken a second time in that same period, but rather resets the 24-hour period on a sliding scale across 7 days of exposure. Specifically, an individual animat's accumulated energy levels ($SEL_{cum}$) are summed over that 24-hour period to determine its total received energy, and then compared to the PTS threshold. Takes by behavioral harassment are predicted when an animat enters an area ensonified by sound levels exceeding the associated behavioral harassment threshold.

It is important to note that the calculated or predicted takes represent a take instance or event within 1 day and likely overestimate the number of individuals taken for some species. Specifically, as the 24-hour evaluation window means that individuals exposed on multiple days are counted as multiple takes. For example, 10 takes may represent 10 takes of 10 different individual marine mammals occurring within 1 day each, or it may represent take of 1 individual on 10 different days; information about the species' daily and seasonal movement patterns helps to inform the interpretation of these take estimates. Also note that animal aversion was not incorporated into the JASMINE model runs that were the basis for the take estimate for any species.

To conservatively estimate the number of animals likely to be exposed above thresholds, 60 WTG monopiles (at a rate of 2 per day for 30 days) were assumed to be installed during the highest density month of each species. Additionally, 38 WTG monopiles (at a rate of 2 per day for 19 days) were also assumed to be installed during the month with the second highest species density. The scenario for the three OSS

foundations was assumed to consist of 48 pin piles (at a rate of 3 per day for a total of 16 days). The estimated construction schedule is shown below in Table 16.

TABLE 16—CONSTRUCTION SCHEDULE ASSUMPTIONS FOR WTG AND OSS FOUNDATIONS

| Foundation type | Configuration | Days of impact pile driving | |
|---|---|---|---|
| | | First highest density month | Second highest density month |
| Wind Turbine Generator (WTG) | Monopile foundation, 2 piles per day | 30 | 19 |
| Offshore Substation (OSS) | Jacket foundation, 3 pin piles per day | 16 | 0 |

**Note:**—Indicate no piling days.

In summary, exposures were estimated in the following way:

(1) The characteristics of the sound output from the proposed pile-driving activities were modeled using the GRLWEAP (wave equation analysis of pile driving) model and JASCO's PDSM;

(2) Acoustic propagation modeling was performed within the exposure model framework using JASCO's MONM and FWRAM that combined the outputs of the source model with the spatial and temporal environmental context (*e.g.,* location, oceanographic conditions, seabed type) to estimate sound fields;

(3) Animal movement modeling integrated the estimated sound fields with species-typical behavioral parameters in the JASMINE model to estimate received sound levels for the animals that may occur in the operational area for each piling scenario (*e.g.,* two monopiles per day); and

(4) The number of potential exposures above Level A harassment and Level B harassment thresholds were calculated per month and then results from all months were summed.

The results of marine mammal exposure modeling for the joint foundation approach (WTGs use monopiles; OSSs use jackets with pin piles) over 5 years assuming 10–dB attenuation only are shown in Tables 17 and 18, as these form the basis for the authorized take. These values were presented by Ocean Wind after the habitat-based density models were updated; please see the Revised Density and Take Estimate Memo available at *https://www.fisheries.noaa.gov/action/incidental-take-authorization-ocean-wind-lcc-construction-ocean-wind-1-wind-energy-facility for more information.*

TABLE 17—MODELED POTENTIAL LEVEL A HARASSMENT AND LEVEL B HARASSMENT EXPOSURES (ASSUMING 10–dB SOUND ATTENUATION) DUE TO IMPACT PILE DRIVING OF A MONOPILE FOUNDATION (ASSUMING 98 TOTAL MONOPILES FOR WTGS) OVER 5 YEARS

| Marine mammal species | Population estimate | Level A harassment ($SEL_{cum}$) | Level B harassment (160 $dB_{rms}$) |
|---|---|---|---|
| North Atlantic right whale [a] | 338 | [c] 0.9 | 3.11 |
| Blue whale [a] | [b] Unknown | [e] n/a | [e] n/a |
| Fin whale [a] | 6,802 | 3.69 | 7.05 |
| Humpback whale | 1,396 | 4.24 | 13.82 |
| Minke whale | 21,968 | 18.42 | 52.25 |
| Sei whale [a] | 6,292 | 0.89 | 2.00 |
| Sperm whale [a] | 4,349 | 0 | 0 |
| Atlantic spotted dolphin | 39,921 | [e] n/a | [e] n/a |
| Atlantic white-sided dolphin | 93,233 | 0 | 71.5 |
| Bottlenose dolphin (offshore stock) | 62,851 | 0 | 935.91 |
| Bottlenose dolphin (coastal stock) | 6,639 | 0 | 0 |
| Common dolphin | 172,974 | 0 | 1,229.37 |
| Long-finned pilot whale | 39,215 | 0 | 0 |
| Short-finned pilot whale | 28,924 | 0 | 0.04 |
| Risso's dolphin | 35,215 | 0 | 7.06 |
| Harbor porpoise [d] | 95,543 | 51.31 | 233.89 |
| Gray seal | 27,300 | 3.04 | 197.56 |
| Harbor seal | 61,336 | 12.16 | 554.22 |

*a—Listed as Endangered under the Endangered Species Act (ESA)*

*b—The minimum blue whale population is estimated at 412, although the exact value is not known. NMFS is utilizing this value for our small numbers determination, as shown in parenthesis.*

*c—Level A harassment exposures were initially estimated for this species, but due to the mitigation measures that Ocean Wind will be required to abide by, no Level A harassment take is expected, nor authorized. Instead, any exposure estimates that predicted Level A harassment were added to the authorized Level B harassment take.*

*d—The calculated Level A exposures are likely an overestimate as the modeled 10-dB sound reduction from the noise mitigation systems does not take into account that the reduction is greater at higher frequencies, which are best heard by harbor porpoises.*

*e—Exposure modeling for blue whales and Atlantic spotted dolphins was not conducted because the impacts on the species approached zero due to the low density estimates. Because of this, values for these species have been excluded from the quantitative analyses.*

TABLE 18—MODELED POTENTIAL LEVEL A HARASSMENT AND LEVEL B HARASSMENT EXPOSURES (ASSUMING 10–dB OF SOUND ATTENUATION) DUE TO IMPACT PILE DRIVING OF OSS FOUNDATIONS (ASSUMING THREE JACKETS WITH 48 PIN PILES) OVER 5 YEARS

| Marine mammal species | Population estimate | Level A harassment ($SEL_{cum}$) | Level B harassment (160 $dB_{rms}$) |
|---|---|---|---|
| North Atlantic right whale [a] | 338 | [c] 0.10 | 0.75 |
| Blue whale [a] | [b] Unknown | [e] n/a | [e] n/a |
| Fin whale [a] | 6,802 | 0.48 | 1.20 |
| Humpback whale | 1,396 | 0.54 | 3.63 |
| Minke whale | 21,968 | 2.29 | 15.81 |
| Sei whale [a] | 6,292 | 0.14 | 0.45 |
| Sperm whale [a] | 4,349 | 0 | 0 |
| Atlantic spotted dolphin | 39,921 | [e] n/a | [e] n/a |
| Atlantic white-sided dolphin | 93,233 | 0 | 16.20 |
| Bottlenose dolphin (offshore stock) | 62,851 | 0 | 168.23 |
| Bottlenose dolphin (coastal stock) | 6,639 | 0 | 0 |
| Common dolphin | 172,974 | 0 | 293.89 |
| Long-finned pilot whale | 39,215 | 0 | 0 |
| Short-finned pilot whale | 28,924 | 0 | 0 |
| Risso's dolphin | 35,215 | 0 | 1.79 |
| Harbor porpoise [d] | 95,543 | 16.60 | 70.97 |
| Gray seal | 27,300 | 0.32 | 38.59 |
| Harbor seal | 61,336 | 0.43 | 99.14 |

*a—Listed as Endangered under the Endangered Species Act (ESA)*

*b—The minimum blue whale population is estimated at 412, although the exact value is not known. NMFS is utilizing this value for our small numbers determination, as shown in parenthesis.*

*c—Level A harassment exposures were initially estimated for this species, but due to the mitigation measures that Ocean Wind will be required to abide by, no Level A harassment take is expected, nor authorized. Instead, any exposure estimates that predicted Level A harassment were added to the authorized Level B harassment take.*

*d—The calculated Level A harassment exposures are likely an overestimate as the modeled 10-dB sound reduction from the noise mitigation systems does not take into account that the reduction is greater at higher frequencies, which are best heard by harbor porpoises.*

*e—Exposure modeling for blue whales and Atlantic spotted dolphins was not conducted because the impacts on the species approached zero due to the low density estimates. Because of this, values for these species have been excluded from the quantitative analyses.*

Based on the exposure estimates for impact pile driving activities related to WTGs and OSS installation (monopile foundations and jacket foundations with pin piles), the authorized take is shown below in Tables 19 and 20. To determine the authorized take numbers, the calculated exposures were rounded to the next whole number, except where explanations have been provided to predict zero takes or to round up to average group size (see footnotes).

We note here that based on a comment from the Marine Mammal Commission, NMFS, in consultation with JASCO and Ocean Wind, has opted to allocate 10 percent of the authorized take of the offshore stock of bottlenose dolphins to the coastal stock during foundation installation. This does not change the total take numbers presented for these two stocks in Tables 33 and 34 at the end of the Estimated Take section. No takes of Level A harassment has been authorized for either of these stocks.

TABLE 19—AUTHORIZED TAKE FROM LEVEL A HARASSMENT AND LEVEL B HARASSMENT RESULTING FROM IMPACT PILE DRIVING ASSOCIATED WITH THE WTG 8/11-m MONOPILE FOUNDATIONS (ASSUMING 98 TOTAL) OVER 5 YEARS

| Marine mammal species | Population estimate | Authorized Level A harassment | Authorized Level B harassment |
|---|---|---|---|
| North Atlantic right whale [a] | 338 | [b] 0 | 4 |
| Blue whale [a] | Unknown | 0 | [c] 4 |
| Fin whale [a] | 6,802 | 4 | 8 |
| Humpback whale | 1,396 | 5 | 14 |
| Minke whale | 21,968 | 19 | 53 |
| Sei whale [a] | 6,292 | 1 | [d] 2 |
| Sperm whale [a] | 4,349 | 0 | [d] 3 |
| Atlantic spotted dolphin | 39,921 | 0 | [d] 45 |
| Atlantic white-sided dolphin | 93,233 | 0 | 72 |
| Bottlenose dolphin (offshore stock) | 62,851 | 0 | [e] 842 |
| Bottlenose dolphin (coastal stock) | 6,639 | 0 | [e] 94 |
| Common dolphin | 172,974 | 0 | 1,230 |
| Long-finned pilot whale | 39,215 | 0 | [d] 10 |
| Short-finned pilot whale | 28,924 | 0 | [d] 10 |
| Risso's dolphin | 35,215 | 0 | [d] 30 |
| Harbor porpoise | 95,543 | 52 | 234 |
| Gray seal | 27,300 | 4 | 198 |
| Harbor seal | 61,336 | 13 | 555 |

*a—Listed as Endangered under the Endangered Species Act (ESA).*

*b—JASCO's modeling estimated 0.90 Level A harassment exposures for North Atlantic right whales, but due to mitigation measures (see the Mitigation section), no Level A harassment takes are expected or authorized.*

*c—No Level B harassment exposures were estimated for blue whales, but up to four Level B harassment takes, which were not calculated through density estimates, are proposed in the event that four individuals approach the WTG foundation during installations.*

*d—The authorized take for sei whales (Kenney and Vigness-Raposa, 2010), sperm whales (Barkaszi and Kelly, 2019), Atlantic spotted dolphins (Kenney and Vigness-Raposa, 2010), both species of pilot whales (Kenney and Vigness-Raposa, 2010), and Risso's dolphins (Barkaszi and Kelly, 2019) was adjusted based on mean group size.*

*e—Based on a comment provided by the Commission, NMFS, in consultation with JASCO and Ocean Wind, have opted to allocate 10 percent of the authorized take by Level B harassment of the offshore stock of bottlenose dolphins to the coastal stock during WTG installation. No takes of Level A harassment has been authorized for either of these stocks.*

TABLE 20—AUTHORIZED LEVEL A HARASSMENT AND LEVEL B HARASSMENT TAKE RESULTING FROM IMPACT PILE DRIVING ASSOCIATED WITH OSS 2.44-m JACKET FOUNDATION USING PIN PILES (48 TOTAL PIN PILES) OVER 5 YEARS

| Marine mammal species | Population estimate | Authorized Level A harassment | Authorized Level B harassment |
|---|---|---|---|
| North Atlantic right whale [a] | 338 | 0 | 1 |
| Blue whale [a] | Unknown | 0 | 0 |
| Fin whale [a] | 6,802 | 0 | 2 |
| Humpback whale | 1,396 | [c] 2 | [c] 46 |
| Minke whale | 21,968 | 3 | 16 |
| Sei whale [a] | 6,292 | 0 | 0 |
| Sperm whale [a] | 4,349 | 0 | [b] 3 |
| Atlantic spotted dolphin | 39,921 | 0 | [b] 45 |
| Atlantic white-sided dolphin | 93,233 | 0 | 17 |
| Bottlenose dolphin (offshore stock) | 62,851 | 0 | 169 |
| Bottlenose dolphin (coastal stock) | 6,639 | 0 | 0 |
| Common dolphin | 172,974 | 0 | 294 |
| Risso's dolphin | 35,215 | 0 | [b] 30 |
| Long-finned pilot whale | 39,215 | 0 | [b] 10 |
| Short-finned pilot whale | 28,924 | 0 | [b] 10 |
| Harbor porpoise | 95,543 | 17 | 71 |
| Gray seal | 27,300 | 0 | 39 |
| Harbor seal | 61,336 | 0 | 100 |

*a—Listed as Endangered under the Endangered Species Act (ESA).*

*b—The authorized take for sei whales (Kenney and Vigness-Raposa, 2010), sperm whales (Barkaszi and Kelly, 2019), Atlantic spotted dolphins (Kenney and Vigness-Raposa, 2010), both species of pilot whales (Kenney and Vigness-Raposa, 2010), and Risso's dolphins (Barkaszi and Kelly, 2019) was adjusted based on mean group size.*

*c—Based on a comment received from the Marine Mammal Commission, NMFS has increased the authorized take by Level A harassment for OSS impact installation from one to two (representing a single group size of 1.6 animals based on AMAPPS data). For take by Level B harassment, NMFS has incorporated the Commission's suggestion of increasing the take to 46 instances, based on the group size seen in a previous monitoring report.*

Temporary Cofferdam and Goal Post Installation and Removal

Similar to the impact pile driving source level modeling, vibratory driving sound source characteristics were generated using the GRLWEAP 2010 wave equation model (Pile Dynamics, Inc., 2010). Installation and removal of the cofferdams were modeled from a single location that was deemed representative of the two potential cable routes. The radiated sound waves were modeled as discrete point sources over the full length of the pile in the water. Ocean Wind did not propose to employ noise mitigation during vibratory piling and NMFS is not requiring it in the Mitigation section; therefore, no noise abatement was applied or assumed.

To estimate the sound field to harassment isopleths generated during installation and removal of cofferdams and goal posts during vibratory pile driving, a practical spreading loss model was used. For cofferdams, a source level of 165 dB re 1 µPa was used (JASCO, 2021). A lower source level (162 dB re 1 µPa) was used for the 20-inch (50.8 centimeter (cm)) goal posts (based upon 18-inch (45.7 cm) piles from the Naval Facilities Engineering Systems Command (NAVFAC) mid-Atlantic (2019), as cited in 87 FR 78072). A transmission loss coefficient of 15logR (cylindrical spreading) was assumed for both cofferdams and goal posts. Ocean Wind did not separately analyze the removal of the cofferdams and goal posts using a vibratory extractor but has assumed that the removal would be acoustically comparable to the installation. Based on available pile-driving data presented from Caltrans (2020), this is a conservative assumption.

Given the short duration of the activity and shallow, near coast location, animat exposure modeling was not conducted for cofferdams and goal posts installation and removal to determine potential exposures from vibratory pile driving. Rather, the modeled acoustic range distances to isopleths corresponding to the relatively small Level A harassment and Level B harassment threshold values were used to calculate the area around the cofferdams and goal posts predicted to be ensonified daily to levels that exceed the thresholds, or the Ensonified Area. The Ensonified Area is calculated as the following:

$$Ensonified\ Area = \pi r^2,$$

Where $r$ is the linear acoustic range distance from the source to the isopleth to Level A harassment or Level B harassment thresholds.

The Level A harassment and Level B harassment threshold distances were mapped in a geospatial information system software (GIS) to remove any areas that overlapped land masses or areas where water was blocked by land as these areas would not be ensonified during cofferdams and goal posts installation and removal. These results are shown in Table 21.

TABLE 21—AREAS CALCULATED FOR THE MAXIMUM LEVEL A HARASSMENT AND LEVEL B HARASSMENT THRESHOLD DISTANCES FOR VIBRATORY INSTALLATION AND REMOVAL OF COFFERDAMS AND GOAL POSTS

| Cofferdam and goal post location | Area of level A harassment zone ($km^2$) | | | | Area of level B harassment zone ($km^2$) |
|---|---|---|---|---|---|
| | Low-frequency cetaceans | Mid-frequency cetaceans | High-frequency cetaceans | Phocids | |
| **Temporary Goal Posts** | | | | | |
| IBSP Atlantic HDD | <0.001 | <0.001 | <0.001 | <0.0001 | 66.18 |
| BL England HDD | <0.001 | <0.001 | <0.001 | <0.0001 | 65.05 |
| **Temporary Cofferdams** | | | | | |
| Oyster Creek HDD | 0.024 | <0.0001 | 0.052 | 0.009 | 77.01 |
| IBSP Barnegat Bay HDD | 0.024 | <0.0001 | 0.052 | 0.009 | 76.70 |

Animal movement and exposure modeling was not performed by JASCO to determine potential exposures from vibratory pile driving. Rather, the average monthly density value from October through May for each marine mammal species (refer back to Table 8) were then multiplied by the estimated Level A harassment and Level B harassment areas (in $km^2$) and the expected durations for each component of the cofferdam and goal post process (*i.e.,* installation and removal). Finally, the resulting value was multiplied by the number of activity days. It was conservatively estimated that temporary cofferdams would require 4 days to install and remove (2 days for each activity). For goal posts, it was estimated that installation and removal would occur over 6 days, assuming 3 days for installation and 3 days for removal at a rate of 1 hour daily (30 minutes for each pile at a rate of two piles per day).

As previously stated, Ocean Wind anticipates that cofferdam and goal post installation and removal would occur only during Year 1 of the construction activities, specifically from October through March, although a small number of cofferdams and goal post removals could occur in Year 2 during April or May, but it is not expected.

TABLE 22—ESTIMATED LEVEL B HARASSMENT EXPOSURES BY MONTH FROM VIBRATORY PILE INSTALLATION AND REMOVAL RELATED TO COFFERDAMS (AND GOAL POSTS IN PARENTHESIS)

| Marine mammal species | Population estimate | January | February | March | April | May | October | November | December | Average Exposures [c] |
|---|---|---|---|---|---|---|---|---|---|---|
| North Atlantic right whale [a] .. | 338 | 2.08 (1.60) | 1.71 (1.31) | 0.97 (0.74) | 0.55 (0.42) | 0.13 (0.10) | 0.09 (0.07) | 0.41 (0.31) | 1.20 (0.92) | 0.89 (0.68) |
| Blue whale [a] ..... | [b] Unknown | 0.02 (0.02) | 0.02 (0.02) | 0.02 (0.02) | 0.02 (0.02) | 0.02 (0.02) | 0.02 (0.02) | 0.02 (0.02) | 0.02 (0.02) | 0.02 (0.02) |
| Fin whale [a] ..... | 6,802 | 2.21 (1.69) | 0.65 (0.50) | 1.30 (1.00) | 1.64 (1.26) | 0.57 (0.44) | 0.54 (0.41) | 0.55 (0.42) | 2.56 (1.96) | 1.25 (0.96) |
| Humpback whale ..... | 1,396 | 2.25 (1.73) | 1.51 (1.16) | 2.28 (1.75) | 1.56 (1.20) | 0.83 (0.64) | 0.90 (0.69) | 2.13 (1.6)3 | 4.26 (3.27) | 1.96 (1.51) |
| Minke whale ..... | 21,968 | 0.42 (0.32) | 0.48 (0.37) | 0.68 (0.52) | 9.40 (7.21) | 7.42 (5.69) | 0.94 (0.72) | 0.12 (0.09) | 0.28 (0.21) | 2.47 (1.89) |
| Sei whale [a] ..... | 6,292 | 0.40 (0.31) | 0.26 (0.20) | 0.48 (0.37) | 0.61 (0.47) | 0.29 (0.22) | 0.09 (0.07) | 0.44 (0.34) | 0.91 (0.70) | 0.44 (0.33) |
| Sperm whale [a] .. | 4,349 | 0.03 (0.02) | 0.04 (0.03) | 0.02 (0.01) | 0.06 (0.04) | 0.08 (0.06) | 0.00 (0.00) | 0.15 (0.12) | 0.09 (0.07) | 0.06 (0.04) |
| Atlantic spotted dolphin ..... | 39,921 | n/a (n/a) | n/a (n/a) | n/a (n/a) | n/a (n/a) | n/a (n/a) | n/a (n/a) | n/a (n/a) | n/a (n/a) | n/a (n/a) |
| Atlantic white-sided dolphin | 93,233 | 1.49 (1.14) | 0.96 (0.73) | 1.47 (1.12) | 3.84 (2.95) | 2.11 (1.62) | 1.91 (1.47) | 4.06 (3.11) | 3.76 (2.88) | 2.45 (1.88) |
| Bottlenose dolphin (offshore stock) ..... | 62,851 | 120.06 (92.10) | 38.12 (29.24) | 60.99 (46.79) | 260.70 (199.98) | 653.27 (501.10) | 1,019.85 (782.31) | 951.596 (729.94) | 670.22 (514.11) | 471.85 (361.94) |
| Bottlenose dolphin (coastal stock) ..... | 6,639 | 161.51 (123.89) | 61.44 (47.13) | 137.20 (105.24) | 696.39 (534.19) | 1,745.23 (1,338.72) | 2,378.69 (1,824.63) | 1,988.58 (1,525.39) | 1,076.10 (825.45) | 1,030.64 (790.58) |
| Common dolphin ..... | 172,974 | 7.05 (5.41) | 3.05 (2.34) | 5.43 (4.17) | 13.05 (10.01) | 8.91 (6.84) | 6.24 (4.79) | 36.20 (27.77) | 24.03 (18.43) | 12.99 (9.97) |
| Long-finned pilot whale .... | 39,215 | 0.1 (0.0) | 0.01 (0.0) | 0.1 (0.0) | 0.1 (0.0) | 0.1 (0.0) | 0.1 (0.0) | 0.1 (0.0) | 0.1 (0.0) | 0.1 (0.0) |
| Short-finned pilot whale .... | 28,924 | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) |
| Risso's dolphin | 35,215 | 0.01 (0.01) | 0.00 (0.00) | 0.00 (0.00) | 0.03 (0.02) | 0.02 (0.02) | 0.02 (0.01) | 0.11 (0.09) | 0.21 (0.16) | 0.05 (0.04) |
| Harbor porpoise | 95,543 | 39.03 (29.94) | 34.32 (26.33) | 39.17 (30.04) | 51.95 (39.85) | 10.28 (7.89) | 0.18 (0.14) | 0.69 (0.53) | 41.18 (31.59) | 27.10 (20.79) |
| Gray seal ..... | 27,300 | 102.96 (78.98) | 73.31 (56.24) | 81.20 (62.29) | 131.83 (101.12) | 84.76 (65.02) | 126.98 (97.40) | 182.25 (139.80) | 131.44 (100.83) | 114.34 (87.71) |
| Harbor seal ..... | 61,336 | 287.77 (220.74) | 294.92 (157.19) | 226.96 (174.09) | 368.48 (282.65) | 236.92 (181.73) | 354.92 (272.25) | 509.40 (390.75) | 367.39 (281.82) | 319.59 (245.15) |

*Note: The values for goal posts are presented in parenthesis.*
*[a]—Listed as Endangered under the Endangered Species Act (ESA).*
*[b]—The minimum blue whale population is estimated at 412, although the exact value is not known. NMFS is utilizing this value for our analysis.*
*[c]—The average exposure values were calculated using the October—May columns.*

For Level A harassment from goal post installation, the monthly exposures were less than 0.01 for all species (see Table 6–9 in the Cofferdam Change Memo). For cofferdams, the Level A harassment was less than 0.01 for all species except harbor porpoise and harbor seals, which had few monthly totals that were greater than 0.01, but were always less than 0.04 (see Table 6–9 in the Revised Density and Take Estimate Memo). For the Level B harassment for cofferdams and goal posts, this yielded the exposure estimates found in Table 22. Because of this, Ocean Wind anticipates and NMFS has only authorized Level B harassment from vibratory installation and removal of the cofferdams and goal posts. However, at request of Ocean Wind, some Level A harassment takes of the coastal stock of bottlenose dolphins and both species of phocids have been authorized given the coastal location that these activities.

From the exposures calculated shown in Table 22, Ocean Wind utilized the average monthly value from October through May in their take request, which are shown in Table 23. For some species, calculated Level B harassment exposures were zero or very low, but Ocean Wind requested take of an average group size and NMFS concurred this was appropriate for authorization given the species potential occurrence in the area.

TABLE 23—AUTHORIZED LEVEL A HARASSMENT AND LEVEL B HARASSMENT TAKE RESULTING FROM VIBRATORY PILE DRIVING ASSOCIATED WITH THE INSTALLATION AND REMOVAL OF TEMPORARY COFFERDAMS AND GOAL POSTS OVER 5 YEARS

| Marine mammal species | Population estimate | Authorized level A harassment | Authorized level B harassment |
|---|---|---|---|
| North Atlantic right whale [a] | 338 | 0 | 1 |
| Blue whale [a] | Unknown | 0 | 0 |
| Fin whale [a] | 6,802 | 0 | 1 |
| Humpback whale | 1,396 | 0 | 2 |
| Minke whale | 21,968 | 0 | 2 |
| Sei whale [a] | 6,292 | 0 | 1 |
| Sperm whale [a] | 4,349 | 0 | 0 |
| Atlantic spotted dolphin | 39,921 | 0 | [b] 45 |
| Atlantic white-sided dolphin | 93,233 | 0 | [g] 12 |
| Bottlenose dolphin (offshore stock) | 62,851 | 0 | 362 |
| Bottlenose dolphin (coastal stock) [f] | 6,639 | [c] 11 | 791 |
| Common dolphin | 172,974 | 0 | [g] 30 |
| Long-finned pilot whale | 39,215 | 0 | [d] 10 |
| Short-finned pilot whale | 28,924 | 0 | [d] 10 |
| Risso's dolphin | 35,215 | 0 | [d] 30 |
| Harbor porpoise | 95,543 | 0 | 21 |
| Gray seal | 27,300 | [e] 28 | 88 |
| Harbor seal | 61,336 | [e] 28 | 246 |

*[a]—Listed as Endangered under the Endangered Species Act (ESA).*

*[b] —No Level B harassment exposures were estimated for Atlantic spotted dolphins, but NMFS has authorized a group size estimate of up to 45 Level B harassment takes.*

*[c] —No Level A harassment exposures were estimated for bottlenose dolphins of the coastal stock, but NMFS has authorized a group size estimate of up to 11 Level A harassment takes.*

*[d]—Authorized takes by Level B harassment for pilot whales (short-finned and long-finned; Kenney and Vigness-Raposa, 2010) and Risso's dolphins (Barkaszi and Kelly, 2019) were adjusted to account for an average pod size.*

*[e]—No Level A harassment exposures were estimated for gray seals and harbor seals, but 28 Level A harassment takes have been authorized in the event up to 2 animals are taken during either removal or installation of cofferdam and goal posts due to the nearshore location of the cofferdams and goal posts and seal haul outs.*

*[f]—The estimate for coastal bottlenose dolphins (bayside versus Atlantic Ocean-facing) is likely an overestimate as this stock has demonstrated a preference for coastal environments as opposed to estuarine (Toth et al., 2011).*

*[g]—Based on a comment from the Marine Mammal Commission, NMFS has increased the take of common dolphins and Atlantic white-sided dolphins by a single group size using data from AMAPPS.*

UXO/MEC Detonation

To assess the impacts from UXO/MEC detonations, JASCO conducted acoustic modeling based on previous underwater acoustic assessment work that was performed jointly between NMFS and the United States Navy. JASCO evaluated the effects thresholds (for TTS, PTS, non-auditory injury, and mortality) based on the appropriate metrics to use as indicators of disturbance and injury: (1) peak pressure level; (2) sound exposure level (SEL); and (3) acoustic impulse. Charge weights of 2.3 kg (5.1 pounds (lbs)), 9.1 kg (20.1 lbs), 45.5 kg (100.3 lbs), 227 kg (500 lbs), and 454 kg (1,000.9 lbs), which is the largest charge the Navy considers for the purposes of its analyses (see the Description of the Specified Activities section in the proposed rule), were modeled to determine the ranges to mortality, gastrointestinal injury, lung injury, PTS, and TTS thresholds. These charge weights were modeled at four different locations off Massachusetts, consisting of different depths (12 m (Site S1), 20 m (Site S2), 30 m (Site S3), and 45 m (Site S4)). The sites were deemed to be representative of both the export cable route and the Lease Area.

Here, we present distances to PTS and TTS thresholds for all UXO/MEC charge weights. In the proposed rule, we only described the distances to thresholds for the largest E12 charge weight. However, as already described, Ocean Wind will be able to identify and mitigate at the relevant distances for each specific charge weight, so we have incorporated the maximum values for each size herein. Due to the implementation of mitigation and monitoring measures, the potential for mortality and non-auditory injury is low and Ocean Wind did not request, and we are not authorizing take by mortality or non-auditory injury. For this reason we are not presenting all

modeling results here; however, they can be found in Appendix C of the application.

UXOs/MECs were modeled at the following locations, as they were determined to be representative of the environment in the Ocean Wind Project Area:

- *Shallow water ECR:* Site S1; In the channel within Narragansett Bay (12 m depth);
- *Shallow water ECR:* Site S2; Intermediate waters outside of Narragansett Bay (20 m depth);
- *Shallow water Lease Area:* Site S3; Shallower waters in the southern portion of the Hazard Zone 2 area (30 m depth);
- *Deeper water Lease Area:* Site S4; Deeper waters in northern portion of the Hazard Zone 2 area (45 m depth).

In their UXO/MEC modeling report (Appendix C of Ocean Wind's ITA application), JASCO notes that although the sample sites were located offshore of Massachusetts, the chosen sites share similar depths, sea surface, and seabed conditions as the Project Area where the Project would be developed and making it an ideal as a proxy.

Based on the depths within the ECR Area, Site S1 (12 m) was chosen as the most representative depth to assess UXO/MEC detonations within the export cable route corridor. Sites S2, S3, and S4 (20 m, 30 m, and 45 m, respectively) are applicable to the Lease Area (*i.e.,* location of the WTGs and OSSs). The SEL-based ($R_{95\neq}$) isopleths for Level A harassment (PTS) and Level B harassment (TTS) were calculated from the horizontal distances shown in Tables 24 and 25. For all species, the distance to the SEL thresholds exceeded that for the peak thresholds. Model results for all sites and all charge weights can be found in Appendix C of Ocean Wind's application. JASCO has also presented the results for both mitigated and unmitigated scenarios in the ITA application; however, Ocean Wind has committed to the use of a noise mitigation system during all detonations, and plans to use abatement systems capable of reducing noise by 10 dB. As a result, the August 2022 Revised Density and Take Estimate Memo carried forward only the mitigated UXO/MEC scenario and only the attenuated results, as presented in Tables 24 and 25, were carried forward into the exposure and take estimation. Additional information can be found in JASCO's UXO/MEC report and the Revised Density and Take Estimate Memo on NMFS' website (*https://www.fisheries.noaa.gov/action/incidental-take-authorization-ocean-wind-lcc-construction-ocean-wind-1-wind-energy-facility*).

NMFS notes that the more detailed results for the mortality and non-auditory injury analysis to marine mammals for onset gastrointestinal injury, onset lung injury, and onset of mortality can be found in Appendix C of the ITA application, which can be found on NMFS' website. NMFS concurs with Ocean Wind's analysis and does not expect or authorize any non-auditory injury, serious injury, or mortality of marine mammals from UXO/MEC detonation. The modeled distances to the mortality threshold for all UXO/MECs sizes for all animal masses are small (*i.e.,* 5–553 m; see Table 38 in Appendix C of Ocean Wind's application), as compared to the distance/area that can be effectively monitored. The modeled distances to non-auditory injury thresholds range from 5–658 m (see Tables 30 and 34 in Appendix C of the application). Ocean Wind is required to conduct extensive monitoring using both PSOs and PAM operators and clear an area of marine mammals prior to detonating any UXO/MEC. Given that Ocean Wind will be employing multiple platforms to visually monitor marine mammals as well as passive acoustic monitoring, it is reasonable to assume that marine mammals would be reliably detected within approximately 660 m of the UXO/MEC being detonated and mortality or non-auditory injury is considered not likely to occur.

TABLE 24—SEL-BASED $R_{95\%}$ PTS-ONSET RANGES, IN METERS, FROM ALL SITE MODELED DURING UXO/MEC DETONATION BY CHARGE WEIGHT, ASSUMING 10-dB SOUND ATTENUATION

| Marine mammal hearing group | 2.3 kg (5.1 lbs) | | 9.1 kg (20.1 lbs) | | 45.5 kg (100.3 lbs) | | 227 kg (500 lbs) | | 454 kg (1,000.9 lbs) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $R_{max}$ | $R_{95\%}$ | $R_{max}$ | $R_{95\%}$ | $R_{max}$ | $R_{95\%}$ | $R_{max}$ | $R_{95\%}$ | $R_{max}$ | $R_{95\%}$ |
| LFC | 632 | 552 | 1,230 | 982 | 2,010 | 1,730 | 3,370 | 2,970 | 4,270 | 3,780 |
| MFC | <50 | <50 | 79 | 75 | 175 | 156 | 419 | 337 | 535 | 461 |
| HFC | 2,100 | 1,820 | 3,020 | 2,590 | 4,400 | 3,900 | 6,130 | 5,400 | 6,960 | 6,200 |
| PP | 192 | 182 | 413 | 357 | 822 | 690 | 1,410 | 1,220 | 1,830 | 1,600 |

**Note:** *LFC = low-frequency cetaceans; MFC = mid-frequency cetaceans; HFC = high-frequency cetaceans; PP = phocid pinnipeds*

TABLE 25—SEL-BASED $R_{95\%}$ TTS-ONSET RANGES, IN METERS, FROM ALL SITE MODELED DURING UXO/MEC DETONATION BY CHARGE WEIGHT, ASSUMING 10-dB SOUND ATTENUATION

| Marine mammal hearing group | 2.3 kg (5.1 lbs) | | 9.1 kg (20.1 lbs) | | 45.5 kg (100.3 lbs) | | 227 kg (500 lbs) | | 454 kg (1,000.9 lbs) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $R_{max}$ | $R_{95\%}$ | $R_{max}$ | $R_{95\%}$ | $R_{max}$ | $R_{95\%}$ | $R_{max}$ | $R_{95\%}$ | $R_{max}$ | $R_{95\%}$ |
| LFC | 3,140 | 2,820 | 5,230 | 4,680 | 8,160 | 7,490 | 11,700 | 10,500 | 13,500 | 11,900 |
| MFC | 535 | 453 | 910 | 773 | 1,520 | 1,240 | 2,400 | 2,120 | 2,930 | 2,550 |
| HFC | 6,920 | 6,160 | 8,970 | 8,000 | 11,300 | 10,300 | 14,600 | 12,900 | 15,600 | 14,100 |
| PP | 1,730 | 1,470 | 2,710 | 2,350 | 4,340 | 3,820 | 6,640 | 5,980 | 7,820 | 7,020 |

**Note: LFC = low-frequency cetaceans; MFC = mid-frequency cetaceans; HFC = high-frequency cetaceans; PP = phocid pinnipeds**

JASCO's take estimate analysis assumed that all 10 of the UXOs/MECs would be 454 kg in weight. Although Ocean Wind does not expect that all UXOs/MECs will consist of this charge weight, they assumed as much to be conservative in estimating take. The take estimate calculations assume that the ten 454 kg charges would be split between the different depths (20 m to 45 m), as these were considered representative for the Project Area.

To calculate the potential marine mammal exposures from any UXO/MEC detonations, the horizontal distances from Tables 24 and 25 were multiplied by the highest monthly species density in the Lease Area (based on the Revised Density and Take Estimate Memo) for each of the 20-m to 45-m representative depths and by the highest monthly species density in the export cable route for the 12-m depth (see Table 9 for the densities used and Table 6–Y NEW from the Revised Density and Take Estimate Memo for all of the available densities from May through October). The resulting value from the areas multiplied by the respective species densities were then multiplied by the number of UXOs/MECs estimated at each of the depths (2 UXOs/MECs at 12 m, 3 UXOs/MECs at 20 m, 3 UXOs/MECs at 30 m, and 2 UXOs/MECs at 40 m), for a total of 10 predicted UXOs/MECs. Ocean Wind has committed not to conduct more than one UXO/MEC detonation on any given day.

Level A harassment exposures resulting from UXO/MEC detonations are considered unlikely, but possible. To reduce impacts, a noise abatement system (likely a double big bubble curtain or similar device) capable of achieving 10 dB of sound attenuation would be implemented. This level of sound reduction is considered achievable and reasonable given work being done in European waters (Bellmann *et al.,* 2020; Bellmann and Betke, 2021).

The estimated maximum PTS and TTS exposures assuming 10 dB of sound attenuation are presented in Table 26. These results are found in Appendix C, Table 29, of Ocean Wind's ITA application (Ocean Wind, 2022b). As indicated previously, where there is no more than one detonation per day, the TTS threshold is expected to also appropriately represent the level above which any behavioral disturbance might occur; so the Level B harassment exposures noted below could include TTS or behavioral disturbance.

TABLE 26—ESTIMATED POTENTIAL MAXIMUM PTS AND TTS EXPOSURES OF MARINE MAMMALS RESULTING FROM THE POSSIBLE DETONATIONS OF UP TO 10 UXOS/MECS, ASSUMING 10-DB OF SOUND ATTENUATION

| Marine mammal species | Population estimate | Level A harassment (PTS SEL) | Level B harassment (TTS SEL) |
|---|---|---|---|
| North Atlantic right whale [a] [c] | 338 | 0.03 | 0.35 |
| Blue whale [a] | [b] Unknown | <0.01 | 0.04 |
| Fin whale [a] | 6,802 | 0.28 | 2.87 |
| Humpback whale | 1,396 | 0.33 | 3.41 |
| Minke whale | 21,968 | 2.53 | 26.42 |
| Sei whale [a] | 6,292 | 0.08 | 0.87 |
| Sperm whale [a] | 4,349 | <0.01 | 0.01 |
| Atlantic spotted dolphin | 39,921 | n/a | n/a |
| Atlantic white-sided dolphin | 93,233 | 0.03 | 1.05 |
| Bottlenose dolphin (offshore stock) | 62,851 | 0.68 | 24.36 |
| Bottlenose dolphin (coastal stock) | 6,639 | 3.84 | 137.31 |
| Common dolphin | 172,974 | 0.13 | 4.65 |
| Long-finned pilot whale | 28,924 | <0.01 | 0.02 |
| Short-finned pilot whale | 39,215 | <0.01 | 0.02 |
| Risso's dolphin | 35,215 | <0.01 | 0.04 |
| Harbor porpoise | 95,543 | 9.49 | 46.50 |
| Gray seal | 27,300 | 2.28 | 50.98 |
| Harbor seal | 61,336 | 6.39 | 142.49 |

*[a]—Listed as Endangered under the Endangered Species Act (ESA).*

*[b]—The minimum blue whale population is estimated at 412, although the exact value is not known. NMFS is utilizing this value for our small numbers determination, as shown in parenthesis.*

*[c]—Level A harassment exposures were estimated for this species, but due to mitigation measures outlined in Section 11, no Level A harassment takes are expected or have been authorized. See Section 6.2.3 of the ITA application for more information.*

Table 27 presents the attenuated (10-dB) authorized take that exceeds the PTS and TTS thresholds. Although the original ITA application described and analyzed the unattenuated estimates given uncertainty with exact mitigation during UXO/MEC detonations, given the commitment by Ocean Wind to mitigate the UXO/MEC detonations, NMFS concurs that it is appropriate to carry forward the take estimates from the mitigated (10-dB sound attenuation) scenario that are found in the Revised Density and Take Estimate Memo received in August 2022 (refer to Table 6–20 in the memo).

TABLE 27—AUTHORIZED LEVEL A HARASSMENT AND LEVEL B HARASSMENT TAKES RESULTING FROM THE DETONATION OF UP TO 10 UXOS, ASSUMING 10-DB OF SOUND ATTENUATION, OVER 5 YEARS

| Marine mammal species | Population estimate | Authorized Level A harassment | Authorized Level B harassment |
|---|---|---|---|
| North Atlantic right whale [a] | 338 | 0 | 1 |
| Blue whale [a] | [d] Unknown | 0 | 0 |
| Fin whale [a] | 6,802 | 0 | 3 |

TABLE 27—AUTHORIZED LEVEL A HARASSMENT AND LEVEL B HARASSMENT TAKES RESULTING FROM THE DETONATION OF UP TO 10 UXOS, ASSUMING 10-dB OF SOUND ATTENUATION, OVER 5 YEARS—Continued

| Marine mammal species | Population estimate | Authorized Level A harassment | Authorized Level B harassment |
|---|---|---|---|
| Humpback whale | 1,396 | 0 | 4 |
| Minke whale | 21,968 | [b e] 2 | 27 |
| Sei whale [a] | 6,292 | 0 | 1 |
| Sperm whale [a] | 4,349 | 0 | [c] 3 |
| Atlantic spotted dolphin | 39,921 | 0 | [c] 45 |
| Atlantic white-sided dolphin | 93,233 | 0 | 2 |
| Bottlenose dolphin (offshore stock) | 62,851 | [b e] 11 | 25 |
| Bottlenose dolphin (coastal stock) | 6,639 | [b e] 11 | 138 |
| Common dolphin | 172,974 | 0 | 5 |
| Long-finned pilot whale | 39,215 | 0 | [c] 10 |
| Short-finned pilot whale | 28,924 | 0 | [c] 10 |
| Risso's dolphin | 35,215 | 0 | [c] 30 |
| Harbor porpoise | 95,543 | 10 | 47 |
| Gray seal | 27,300 | 3 | 51 |
| Harbor seal | 61,336 | 7 | 143 |

*[a]—Listed as Endangered under the Endangered Species Act (ESA).*

*[b]—A small amount of Level A harassment exposures were estimated based on the density calculations, but no Level A harassment take was requested for authorization due to the mitigation measures Ocean Wind would be required to implement.*

*[c]—The authorized take for the sperm whale (Barkaszi and Kelly, 2019), the Atlantic spotted dolphin (Kenny and Vigness-Raposa, 2010), both pilot whale species (Kenny and Vigness-Raposa, 2010), and the Risso's dolphins (Barkaszi and Kelly, 2019) were adjusted based on mean group size.*

*[d]—The minimum blue whale population is estimated at 412, although the exact value is not known. NMFS is utilizing this value for our small numbers determination, as shown in parenthesis.*

*[e]—Based on a comment received by the Marine Mammal Commission during the public comment period, NMFS has increased the authorized take for minke whales, based on a single group size from the AMAPPS dataset, and bottlenose dolphins (both stocks) to a single group size using a group size data from Ocean Wind.*

While there would be no more than 10 detonations of UXOs/MECs and these detonations are of very short duration (approximately 1 second), UXO/MEC detonations have a higher potential to cause mortality and injury than other Project activities and therefore have specific mitigation measures designed to minimize the likelihood of mortality and/or injury of marine mammals, including: (1) time of year/seasonal restrictions; (2) time of day restrictions; (3) use of PSOs to visually observe for North Atlantic right whales; (4) use of PAM to acoustically detect North Atlantic right whales; (5) implementation of clearance zones; (6) use of noise mitigation technology; and, (7) post-detonation monitoring visual and acoustic monitoring by PSOs and PAM operators.

Due to mitigation measures that are required to be implemented during any UXO/MEC detonations, the likelihood of Level A harassment and some Level B harassment for some species was reduced. However, there is still potential for Level A harassment for some species, such as for harbor porpoises and both harbor and gray seals.

HRG Surveys

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 ranges to the Level A harassment and Level B harassment isopleths. 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. Ocean Wind utilized the following criteria for selecting the appropriate inputs into the NMFS User Spreadsheet Tool (NMFS, 2018):

(1) For equipment that was measured in Crocker and Fratantonio (2016), the reported source level (SL) for the most likely operational parameters was selected.

(2) For equipment not measured in Crocker and Fratantonio (2016), the best available manufacturer specifications were selected. Use of manufacturer specifications represent the absolute maximum output of any source and do not adequately represent the operational source. Therefore, they should be considered an overestimate of the sound propagation range for that equipment.

(3) For equipment that was not measured in Crocker and Fratantonio (2016) and did not have sufficient manufacturer information, the closest proxy source measured in Crocker and Fratantonio (2016) was used.

The Dura-spark measurements and specifications provided in Crocker and Fratantonio (2016) were used for all sparker systems proposed for the HRG surveys. These included variants of the Dura-spark sparker system and various configurations of the GeoMarine Geo-Source sparker system. The data provided in Crocker and Fratantonio (2016) represent the most applicable data for similar sparker systems with comparable operating methods and settings when manufacturer or other reliable measurements are not available. Crocker and Fratantonio (2016) provide S-Boom measurements using two different power sources (CSP–D700 and CSP–N). The CSP–D700 power source was used in the 700-joules (J) measurements but not in the 1,000–J measurements. The CSP–N source was measured for both 700–J and 1,000–J operations but resulted in a lower source level; therefore, the single maximum source level value was used for both operational levels of the S-Boom.

Table 28 identifies all the representative survey equipment that operates below 180 kHz (*i.e.,* at frequencies that are audible and have the potential to disturb marine mammals) that may be used in support

of planned survey activities, and are likely to be detected by marine mammals given the source level, frequency, and beamwidth of the equipment. The lowest frequency of the source was used when calculating the absorption coefficient.

TABLE 28—SUMMARY OF REPRESENTATIVE HRG EQUIPMENT THAT MAY BE USED

| Equipment type | Representative HRG equipment | Operating frequency | $SL_{rms}$ (dB re 1 µPa m) | $SL_{0\text{-}pk}$ (dB re 1 µPa m) | Pulse duration (width) (millisecond) | Repetition rate (Hz) | Beamwidth (degrees) | CF = Crocker and Fratantonio (2016) MAN = manufacturer |
|---|---|---|---|---|---|---|---|---|
| **Non-parametric shallow penetration SPBs (non-impulsive)** | | | | | | | | |
| Sub-bottom Profiler. | ET 216 (2000DS or 3200 top unit) | 2–16 2–8 | 195 | - | 20 | 6 | 24 | MAN |
| | ET 424 | 4–24 | 176 | - | 3.4 | 2 | 71 | CF |
| | ET 512 | 0.7–12 | 179 | - | 9 | 8 | 80 | CF |
| | GeoPulse 5430A | 2–17 | 196 | - | 50 | 10 | 55 | MAN |
| | Teledyne Benthos Chirp III—TTV 170. | 7–2 | 197 | - | 60 | 15 | 100 | MAN |
| **Medium penetration SBPs (impulsive)** | | | | | | | | |
| Sparker | AA, Dura-spark (400 tips, 500J) [a] | 0.3–1.2 | 203 | 211 | 1.1 | 4 | Omni | CF |
| | AA, triple plate S-Boom (700–1,000J) [b]. | 0.1–5 | 205 | 211 | 0.6 | 4 | 80 | CF |

- = not applicable; ET = EdgeTech; J = joule; kHz = kilohertz; dB = decibels; SL = source level; UHD = ultra-high definition; AA = Applied Acoustics; rms = root-mean square; µPa = microPascal; re = referenced to; SPL = sound pressure level; PK = zero-to-peak pressure level; Omni = omnidirectional source.

**Notes:** All source information that was used to calculate threshold isopleths are provided in Table 1.

[a] The Dura-spark measurements and specifications provided in Crocker and Fratantonio (2016) were used for all sparker systems proposed for the survey. These include variants of the Dura-spark sparker system and various configurations of the GeoMarine Geo-Source sparker system. The data provided in Crocker and Fratantonio (2016) represent the most applicable data for similar sparker systems with comparable operating methods and settings when manufacturer or other reliable measurements are not available.

[b] Crocker and Fratantonio (2016) provide S-Boom measurements using two different power sources (CSP–D700 and CSP–N). The CSP–D700 power source was used in the 700–J measurements but not in the 1,000–J measurements. The CSP–N source was measured for both 700–J and 1,000–J operations but resulted in a lower SL; therefore, the single maximum SL value was used for both operational levels of the S-Boom.

When the NMFS Technical Guidance (2016) was published, in recognition of the fact that ensonified area/volume could be more technically challenging to predict because of the duration component in the new thresholds, we developed a User Spreadsheet that includes tools to help predict a simple isopleth that can be used in conjunction with marine mammal density or occurrence to help predict takes. We note that because of some of the assumptions included in the methods used for these tools, we anticipate that isopleths produced are typically going to be overestimates of some degree, which may result in some degree of overestimation of Level A harassment. However, these tools offer the best way to predict appropriate isopleths when more sophisticated 3D modeling methods are not available, and NMFS continues to develop ways to quantitatively refine these tools, and will qualitatively address the output where appropriate. For mobile sources (such as the active acoustic sources proposed for use during Ocean Wind's HRG surveys), the User Spreadsheet predicts the closest distance at which a stationary animal would not incur PTS if the sound source traveled by the animal in a straight line at a constant speed. JASCO modeled distances to Level A harassment isopleths for all types of HRG equipment and all marine mammal functional hearing groups using the NMFS User Spreadsheet and NMFS Technical Guidance (2018).

For HRG surveys, in order to better consider the narrower and directional beams of the sources, NMFS has developed an additional tool for determining the sound pressure level ($SPL_{rms}$) at the 160-dB isopleth for the purposes of estimating the extent of Level B harassment isopleths associated with HRG survey equipment (NMFS, 2020). This methodology incorporates frequency-dependent absorption and some directionality to refine estimated ensonified zones. Ocean Wind used NMFS' methodology with additional modifications to incorporate a seawater absorption formula and 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 (see Table 29). The lowest frequency of the source was used when calculating the absorption coefficient.

TABLE 29—DISTANCE TO WEIGHTED LEVEL A HARASSMENT AND LEVEL B HARASSMENT THRESHOLDS FOR EACH HRG SOUND SOURCE OR COMPARABLE SOUND SOURCE CATEGORY FOR EACH MARINE MAMMAL HEARING GROUP

| Equipment type | HRG sources | Distance to Level A harassment threshold (m) | | | | | Distance to Level B harassment threshold (m) |
|---|---|---|---|---|---|---|---|
| | | Low-frequency cetaceans ($SEL_{CUM}$) | Mid-frequency cetaceans ($SEL_{CUM}$) | High-frequency cetaceans ($SEL_{CUM}$) | High-frequency cetaceans ($SPL_{0\text{-}PK}$) | Phocids ($SEL_{CUM}$) | All ($SPL_{rms}$) |
| **Non-impulsive, non-parametric, shallow SBP (CHIRPs)** | | | | | | | |
| Sub-bottom Profilers (SBP; Compressed High Intensity Radiated Pulse (CHIRPs)). | EdgeTech 216 | <1 | <1 | 2.9 | n/a | 0 | 9 |
| | EdgeTech 424 | 0 | 0 | 0 | n/a | 0 | 4 |
| | EdgeTech 512i | 0 | 0 | <1 | n/a | 0 | 6 |
| | GeoPulse 5430 | <1 | <1 | 36.5 | n/a | <1 | 21 |

TABLE 29—DISTANCE TO WEIGHTED LEVEL A HARASSMENT AND LEVEL B HARASSMENT THRESHOLDS FOR EACH HRG SOUND SOURCE OR COMPARABLE SOUND SOURCE CATEGORY FOR EACH MARINE MAMMAL HEARING GROUP—Continued

| Equipment type | HRG sources | Distance to Level A harassment threshold (m) | | | | | Distance to Level B harassment threshold (m) |
|---|---|---|---|---|---|---|---|
| | | Low-frequency cetaceans ($SEL_{CUM}$) | Mid-frequency cetaceans ($SEL_{CUM}$) | High-frequency cetaceans ($SEL_{CUM}$) | High-frequency cetaceans ($SPL_{0\text{-}PK}$) | Phocids ($SEL_{CUM}$) | All ($SPL_{rms}$) |
| | Teledyn Benthos Chirp III—TTV 170. | 1.5 | <1 | 16.9 | n/a | <1 | 48 |
| **Impulsive, medium SBP (Boomers and Sparkers)** | | | | | | | |
| Boomer | AA Triple plate S-Boom (700/1,000 J). | <1 | 0 | 0 | 4.7 | <1 | 34 |
| Sparker | AA Dura-spark UHD (500 J/400 tip). | <1 | 0 | 0 | 2.8 | <1 | 141 |
| | AA Dura-spark UHD 400+400. | <1 | 0 | 0 | 2.8 | <1 | 141 |
| | GeoMarine Geo-Source dual 400 tip sparker. | <1 | 0 | 0 | 2.8 | <1 | 141 |

Potential exposures of marine mammals to acoustic impacts from HRG survey activities were estimated by assuming an active survey distance of 70 km per 24-hour period. This assumes the vessel would be traveling at a speed of 4 kn and only during periods where active acoustics were being used with frequency ranges less than 180 kHz. A vessel that would only operate during daylight hours is assumed to have an active survey distance of 35 km.

To maintain a potential for 24-hour HRG surveys, the corresponding Level A harassment and Level B harassment areas were calculated for each source based on the threshold distances, assuming a 70-km operational period (Table 30).

TABLE 30—CALCULATED AREAS (DISTANCES IN PARENTHESIS) ENCOMPASSING THE LEVEL A HARASSMENT AND LEVEL B HARASSMENT THRESHOLDS [a] FOR REPRESENTATIVE ACOUSTIC SOURCE

| Acoustic source | Level A harassment isopleth area (in $km^2$) and distance (m) [b] | | | | Level B Harassment isopleth area (in $km^2$) and distance (m) [c] |
|---|---|---|---|---|---|
| | Low-frequency cetaceans | Mid-frequency cetaceans | High-frequency cetaceans | Phocids | All Marine mammal hearing groups |
| **Non-impulsive, non-parametric, shallow SBP (CHIRPs)** | | | | | |
| ET 216 CHIRP | 0 (<1) | 0 (<1) | 0.4 (2.9) | 0 (0) | 1.3 (9) |
| ET 424 CHIRP | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0.6 (4) |
| ET 512i CHIRP | 0 (0) | 0 (0) | 0 (<1) | 0 (<1) | 0.8 (21) |
| GeoPulse 5430 | 0 (<1) | 0.1 (<1) | 5.1 (36.5) | 0 (<1) | 2.9 (21) |
| TB CHIRP III | 0.2 (1.5) | 0 (<1) | 2.4 (16.9) | 0.1 (<1) | 6.7 (48) |
| **Impulsive, medium SBP (Boomers and Sparkers)** | | | | | |
| AA Triple plate S-Boom (700–1,000 J) | 0.1 (<1) | 0 (0) | 0.7 (0) | 0 ($SEL_{CUM}$: 0; $SPL_{0\text{-}PK}$: 4.7) | 4.8 (34) |
| AA, Dura-spark UHD | 0.1 (<1) | 0 (0) | 0.4 (0) | 0 ($SEL_{CUM}$: 0; $SPL_{0\text{-}PK}$: 2.8) | 19.8 (141) |

[a] *The Level A harassment and B harassment isopleths were calculated to comprehensively assess the potential impacts of the predicted source operations as required for the ITA application (Ocean Wind, 2022b). As described in the ITA application, minimal Level A harassment takes are expected and were included.*

[b] *Based on maximum distances in Table 1–30 of the ITA application (Ocean Wind, 2022b). For consistency, the metric producing the largest distance to the Level A harassment thresholds (either cumulative sound exposure level or zero to peak sound pressure level) was used to calculate the areas for each hearing group.*

[c] *Based on maximum distances in Table 1–30 of the ITA application calculated for Level B harassment root-mean-square sound pressure level thresholds (Ocean Wind, 2022b).*

Results of modeling using the methodology described above indicated that, of the HRG survey equipment planned for use by Ocean Wind that has the potential to result in Level B harassment of marine mammals, sound produced by the Applied Acoustics Dura-spark UHD sparkers and GeoMarine Geo-Source sparker would propagate furthest to the Level B harassment threshold (141 m; Table 30). For the purposes of the exposure analysis, it was conservatively assumed that sparkers would be the dominant acoustic source for all survey days. Thus, the distances to the isopleths corresponding to the threshold for Level B harassment for sparkers (141 m) was used as the basis of the take calculation for all marine mammals.

The modeled distances to isopleths corresponding to the Level A harassment threshold were very small (<1 m (<3.3 ft)) 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 phocids). The largest distance to the Level A harassment isopleth is 36.5 m (119.8 ft), associated with use of the GeoPulse 5430A. Because this distance is small, coupled with the characteristics of sounds produced by HRG equipment in general (including the GeoPulse 5430A), neither NMFS nor Ocean Wind anticipates Level A harassment during HRG surveys, even absent mitigation.

The estimated exposures were calculated using the average density for the 12 months for each marine mammal species, or the annual density when only one value was available. These densities were multiplied by the number of annual survey days (Years 1, 4, 5 = 88 days; Years 2, 3 = 180 days) and then by the area ensonified per day (70 km multiplied by the areas found in Table 30). This approach was taken because Ocean Wind does not know which months HRG surveys would occur in. This approach produced a conservative estimate of exposures and, subsequently, take for each species.

Based on the analysis above, the modeled Level A harassment and B harassment exposures of marine mammals resulting from HRG survey activities are shown in Table 31.

TABLE 31—CALCULATED ANNUAL MAXIMUM LEVEL A HARASSMENT AND B HARASSMENT EXPOSURES OF MARINE MAMMALS RESULTING FROM ANNUAL DAYS OF HRG SURVEYS

| Marine mammal species | Population estimate | Estimated Level A harassment exposures [b] | | Estimated Level B harassment exposures | |
|---|---|---|---|---|---|
| | | Years 1, 4, and 5 (88 days) | Years 2 and 3 (180 days) | Years 1, 4, and 5 (88 days) | Years 2 and 3 (180 days) |
| North Atlantic right whale [a] | 338 | <0.01 | 0.01 | 0.46 | 0.94 |
| Blue whale [a] | Unknown | <0.01 | <0.01 | 0.02 | 0.03 |
| Fin whale [a] | 6,802 | 0.01 | 0.02 | 1.24 | 2.56 |
| Humpback whale | 1,396 | 0.01 | 0.02 | 1.10 | 2.27 |
| Minke whale | 21,968 | 0.02 | 0.04 | 2.40 | 4.98 |
| Sei whale [a] | 6,292 | <0.01 | <0.01 | 0.33 | 0.68 |
| Sperm whale [a] | 4,349 | <0.01 | <0.01 | 0.04 | 0.09 |
| Atlantic spotted dolphin | 39,921 | n/a | n/a | n/a | n/a |
| Atlantic white-sided dolphin | 93,233 | 0.03 | 0.05 | 4.79 | 10.04 |
| Bottlenose dolphin (offshore stock) | 62,851 | 1.23 | 2.46 | 173.84 | 348.37 |
| Bottlenose dolphin (coastal stock) | 6,639 | 3.28 | 6.60 | 464.18 | 933.46 |
| Common dolphin | 172,974 | 0.20 | 0.42 | 28.38 | 59.52 |
| Long-finned pilot whales | 28,924 | <0.01 | <0.01 | 0.19 | 0.40 |
| Short-finned pilot whales | 39,215 | <0.01 | <0.01 | 0.14 | 0.29 |
| Risso's dolphin | 35,215 | <0.01 | <0.01 | 0.31 | 0.65 |
| Harbor porpoise | 95,543 | 5.60 | 11.59 | 21.69 | 44.88 |
| Gray seal | 27,300 | 0.23 | 0.48 | 33.23 | 67.56 |
| Harbor seal | 61,336 | 0.66 | 1.34 | 92.88 | 188.83 |

[a] Listed as Endangered under the Endangered Species Act (ESA).
[b] Some Level A harassment exposures were estimated to occur during HRG surveys, but due to the required mitigation measures Ocean Wind would be required to undertake, no Level A harassment takes has been authorized.

NMFS reiterates that authorized takes will be by Level B harassment only, in the form of disruption of behavioral patterns for individual marine mammals resulting from exposure to noise from certain HRG acoustic sources. Based primarily on the characteristics of the signals produced by the acoustic sources planned for use and due to the small PTS zones associated with HRG equipment types planned for use, Level A harassment is neither anticipated (even absent mitigation), nor authorized. Consideration of the anticipated effectiveness of the measures (*i.e.,* exclusion zones and shutdown measures), discussed in detail below in the Mitigation section, further strengthens the conclusion that Level A harassment is not a reasonably anticipated outcome of the survey activity. Ocean Wind did not request authorization of take by Level A harassment, and no take by Level A harassment is authorized by NMFS. As described previously, no serious injury or mortality is anticipated or authorized for this activity.

The authorized take estimates presented here assumed that HRG surveys would be occurring for 24 hours each day. Adjustments based on the mean group size estimates (*i.e.,* increasing take to the mean group size if the calculated exposures were fewer) were included for the following species: sei whales (Kenney and Vigness-Raposa, 2010), minke whales (Kenney and Vigness-Raposa, 2010), humpback whales (CeTAP, 1982), sperm whales (Barkaszi and Kelly, 2019), Atlantic spotted dolphins (Kenney and Vigness-Raposa, 2010), both species of pilot whales (Kenney and Vigness-Raposa, 2010), and Risso's dolphins (Barkaszi and Kelly, 2019).

Years 1, 4, and 5 in Table 32 below represent HRG surveys occurring during the pre- and post-construction phases of the Project. Each of these years is based on an annual HRG survey effort of 88 days (264 total effort over 3 years). Years 2 and 3 would include HRG surveys occurring during the construction of other elements of the Project. Each of these years is based on an annual HRG survey effort of 180 days (360 days total over 2 years).

TABLE 32—ANNUAL AUTHORIZED LEVEL A HARASSMENT AND LEVEL B HARASSMENT TAKE RESULTING FROM HIGH-RESOLUTION (HRG) SITE CHARACTERIZATION SURVEYS OVER 5 YEARS

| Marine mammal species | Population estimate | Pre- and post-construction phases (years 1, 4, 5; 88 days annually) | | During construction phase (years 2 and 3; 180 days annually) | |
|---|---|---|---|---|---|
| | | Authorized Level B harassment | Authorized Level A harassment | Authorized Level A harassment | Authorized Level B harassment |
| North Atlantic right whale [a] | 338 | 0 | [d] 1 | 0 | [d] 2 |
| Blue whale [a] | Unknown | 0 | 0 | 0 | 0 |
| Fin whale [a] | 6,802 | 0 | 2 | 0 | 3 |
| Humpback whale | 1,396 | 0 | [b] 2 | 0 | [b] 3 |
| Minke whale | 21,968 | 0 | [b] 3 | 0 | [b] 5 |
| Sei whale [a] | 6,292 | 0 | [b] 0 | 0 | [b] 1 |
| Sperm whale [a] | 4,349 | 0 | [b] 3 | 0 | [b] 3 |
| Atlantic spotted dolphin | 39,921 | 0 | [b] 45 | 0 | [b] 45 |
| Atlantic white-sided dolphin | 93,233 | 0 | 5 | 0 | 11 |
| Bottlenose dolphin (offshore stock) | 62,851 | [c] 0 | 173 | [c] 0 | 349 |
| Bottlenose dolphin (coastal stock) | 6,639 | [c] 0 | 465 | [c] 0 | 934 |
| Common dolphin | 172,974 | 0 | 29 | 0 | 60 |
| Long-finned pilot whale | 39,215 | 0 | [b] 10 | 0 | [b] 10 |
| Short-finned pilot whale | 28,924 | 0 | [b] 10 | 0 | [b] 10 |
| Risso's dolphin | 35,215 | 0 | [b] 30 | 0 | [b] 30 |
| Harbor porpoise | 95,543 | [c] 0 | 22 | [c] 0 | 45 |
| Gray seal | 27,300 | [c] 0 | 34 | [c] 0 | 68 |
| Harbor seal | 61,336 | [c] 0 | 93 | [c] 0 | 189 |

[a] Listed as Endangered under the Endangered Species Act (ESA).

[b] The following species' requested take was a adjusted based on mean group size: Sei whale (Kenney and Vigness-Raposa, 2010), minke whale (Kenney and Vigness-Raposa, 2010), humpback whale (CeTAP, 1982), sperm whale (Barkaszi and Kelly, 2019), Atlantic spotted dolphin (Kenney and Vigness-Raposa, 2010), both species of pilot whale (Kenney and Vigness-Raposa, 2010), and Risso's dolphin (Barkaszi and Kelly, 2019).

[c] A small amount of Level A harassment exposures were estimated based on the density calculations, but no Level A harassment take was requested by Ocean Wind or authorized by NMFS due to the mitigation measures planned for use.

[d] Based on the exposure estimates, values greater than 0.5 for all other species besides North Atlantic right whale were rounded up to one. Take estimates for North Atlantic right whales from 0.45 and up were rounded up to one (to be conservative) and 0.93 was rounded to two.

Total Authorized Takes Across All Activity Types

NMFS is authorizing take by Level A harassment and Level B harassment incidental to all Project activities combined (*i.e.,* impact pile driving to install WTG and OSS monopile/pin pile foundations (assuming 10 dB of sound attenuation), vibratory pile driving to install and remove temporary cofferdams and goal posts, UXO/MEC detonations (assuming 10 dB of sound attenuation), and HRG surveys) as shown in Table 33. The annual amount of take that would occur in each year based on Ocean Wind's current schedules is provided in Table 34. The Year 1 take estimates include 88 days of HRG surveys, cofferdams and goal posts installation and removal, and mitigated UXO/MEC detonations. Year 2 includes 180 days of HRG surveys, WTG impact installation using monopile foundations, and OSS impact installation using pin piles for jacket foundations (noting that Ocean Wind will actually build out monopiles for OSS instead). Year 3 includes 180 days of HRG surveys only. And Years 4 and 5 include 88 days of HRG surveys. Although temporary cofferdam and goal post installation and removal could occur in Year 2, all of the authorized takes were allocated to Year 1 as this represents the most accurate construction scenario. All impact pile driving activities for the WTGs and OSSs could also occur outside of Year 2; however, all of the takes were allocated to Year 2 as this represents the most likely scenario.

The amount of take that NMFS authorized is considered conservative for several reasons. The authorized take numbers assume all piles are installed during 30 days of the highest density month and 19 days (38 piles) of the second-highest density month for each species from May to December. The authorized take numbers for Level A harassment do not fully account for the likelihood that marine mammals would avoid a stimulus when possible before the individual accumulates enough acoustic energy to potentially cause auditory injury; nor do these numbers fully account for the effectiveness of the required mitigation measures, with the exception for foundation installation and UXO/MEC detonations, which accounted for 10 dB of sound attenuation. Finally, while Ocean Wind may use monopiles for OSS foundations, NMFS has used the pin pile take estimates in the total take authorized. The exposure estimates for pin piles is greater for all species than the exposures estimated for monopiles installation.

If Ocean Wind decides to use suction-buckets or gravity-based foundations to install bottom-frame WTG and OSS foundations, take would not occur as noise levels would not be elevated to the degree there is a potential for take (*i.e.,* no pile driving is involved with installing suction buckets or gravity-based foundations). The authorized take from vibratory pile driving assumed temporary cofferdams using sheet piles would be installed, versus the alternative installation of a gravity-cell cofferdam, for which no take would be expected nor authorized.

NMFS also presents the percentage of each marine mammal stock estimated to be taken based on the total amount of annual take, which is presented in Table 35. Table 34 provides the total authorized take from the entire 5-year effective period of the rulemaking and issued LOA. NMFS recognizes that schedules may shift due to a number of planning and logistical constraints such that take may be redistributed

throughout the 5 years. However, the 5-year total amount of take for each species, shown in Table 33, and the maximum amount of take in any 1 year (Table 35) would not be exceeded. Additionally, to reduce impacts to marine mammals, NMFS has required several mitigation and monitoring measures, discussed in the Mitigation and Monitoring and Reporting sections, which are activity-specific and are designed to minimize acoustic exposures to marine mammal species.

TABLE 33—LEVEL A HARASSMENT AND LEVEL B HARASSMENT TAKES FOR ALL ACTIVITIES AUTHORIZED DURING THE CONSTRUCTION OF THE OCEAN WIND 1 PROJECT

| Marine mammal species | Population estimate | 2024—(Year 1) | | 2025—(Year 2) | | 2026—(Year 3) | | 2027—(Year 4) | | 2028—(Year 5) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Level A harassment | Level B harassment | Level A harassment | Level B harassment | Level A harassment | Level B harassment | Level A harassment | Level B harassment | Level A harassment | Level B harassment |
| North Atlantic right whale [a] | 338 | 0 | 3 | 0 | 7 | 0 | 2 | 0 | 1 | 0 | 1 |
| Blue whale [a] | Unknown [b] | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 |
| Fin whale [a] | 6,802 | 0 | 6 | 4 | 13 | 0 | 3 | 0 | 2 | 0 | 2 |
| Humpback whale | 1,396 | 0 | 8 | [e] 7 | [e] 66 | 0 | 3 | 0 | 2 | 0 | 2 |
| Minke whale | 21,968 | [e] 2 | 32 | 22 | 74 | 0 | 5 | 0 | 3 | 0 | 3 |
| Sei whale [a] | 6,292 | 0 | 2 | 1 | 3 | 0 | 1 | 0 | 0 | 0 | 0 |
| Sperm whale [a] | 4,349 | 0 | 6 | 0 | [d] 9 | 0 | 3 | 0 | 3 | 0 | 3 |
| Atlantic spotted dolphin | 39,921 | 0 | 135 | 0 | 135 | 0 | 45 | 0 | 45 | 0 | 45 |
| Atlantic white-sided dolphin | 93,233 | 0 | [e] 19 | 0 | 100 | 0 | 11 | 0 | 5 | 0 | 5 |
| Common dolphin | 172, 974 | 0 | [e] 64 | 0 | 1,584 | 0 | 60 | 0 | 29 | 0 | 29 |
| Bottlenose dolphin (offshore stock) | 62,851 | [e] 11 | 561 | 0 | [f] 1,360 | 0 | 349 | 0 | 174 | 0 | 174 |
| Bottlenose dolphin (coastal stock) [c] | 6,639 | [e] 22 | 1,394 | 0 | [f] 1,028 | 0 | 934 | 0 | 465 | 0 | 465 |
| Short-finned pilot whale | 39,215 | 0 | 30 | 0 | 30 | 0 | 10 | 0 | 10 | 0 | 10 |
| Long-finned pilot whale | 28,924 | 0 | 30 | 0 | 30 | 0 | 10 | 0 | 10 | 0 | 10 |
| Risso's dolphin | 35,215 | 0 | 90 | 0 | 90 | 0 | 30 | 0 | 30 | 0 | 30 |
| Harbor porpoise | 95,543 | 10 | 90 | 69 | 350 | 0 | 45 | 0 | 22 | 0 | 22 |
| Gray seal | 27,300 | 31 | 173 | 4 | 305 | 0 | 68 | 0 | 68 | 0 | 34 |
| Harbor seal | 61,336 | 35 | 482 | 13 | 844 | 0 | 189 | 0 | 93 | 0 | 93 |

[a] Listed as Endangered under the Endangered Species Act (ESA).
[b] The minimum blue whale population is estimated at 412, although the exact value is not known. NMFS is utilizing this value for our small numbers determination, as shown in parenthesis.
[c] The estimate for coastal bottlenose dolphins (bayside versus Atlantic Ocean-facing) is likely an overestimate as this stock has demonstrated a preference for coastal environments as opposed to estuarine (Toth et al., 2011).
[d] NMFS corrects a mathematical error for sperm whales where the value presented in this table was incorrectly labeled as six rather than nine for Year 2.
[e] Corrections based on group size data were made for some species, based on comments received from the Marine Mammal Commission and/or using AMAPPS/Ocean Wind's group size data, which increased some of the take when compared to the proposed rule.
[f] Based on a comment provided by the Commission, NMFS, in consultation with JASCO and Ocean Wind, have opted to allocate 10 percent of the authorized take by Level B harassment of the offshore stock of bottlenose dolphins to the coastal stock during WTG installation. No takes of Level A harassment has been authorized for either of these stocks.

TABLE 34—TOTAL 5-YEAR AUTHORIZED TAKES (LEVEL A HARASSMENT AND LEVEL B HARASSMENT) FOR ALL ACTIVITIES DURING THE CONSTRUCTION OF THE OCEAN WIND 1 PROJECT

| Marine mammal species | Population size | 5-Year Project Duration [b] | | |
|---|---|---|---|---|
| | | Level A harassment | Level B harassment | Total 5-year |
| North Atlantic right whale [a] | 338 | 0 | 14 | 14 |
| Blue whale [a] | Unknown [c] | 0 | 4 | 4 |
| Fin whale [a] | 6,802 | 4 | 26 | 30 |
| Humpback whale | 1,396 | [f] 7 | [f] 81 | 88 [f] |
| Minke whale | 21,968 | [f] 24 | 117 | [f] 141 |
| Sei whale [a] | 6,292 | 1 | 6 | 7 |
| Sperm whale [a] | 4,349 | 0 | [e] 24 | [e] 24 |
| Atlantic spotted dolphin | 39,921 | 0 | 405 | 405 |
| Atlantic white-sided dolphin | 93,233 | 0 | [f] 140 | [f] 140 |
| Bottlenose dolphin (offshore stock) | 62,851 | [f] 11 | [g] 2,618 | [g] 2,629 |
| Bottlenose dolphin (coastal stock) | 6,639 | [f] 22 | [g] 4,286 | [d f g] 4,308 |
| Common dolphin | 172,974 | 0 | [f] 1,766 | [f] 1,766 |
| Long-finned pilot whale | 39,215 | 0 | 90 | 90 |
| Short-finned pilot whale | 28,924 | 0 | 90 | 90 |
| Risso's dolphin | 35,215 | 0 | 270 | 270 |
| Harbor porpoise | 95,543 | 79 | 529 | 608 |
| Gray seal | 27,300 | 35 | 614 | 649 |
| Harbor seal | 61,336 | 48 | 1,701 | 1,749 |

[a] Listed as Endangered under the Endangered Species Act (ESA).
[b] Activities include impact pile driving of WTG and OSS foundations (assuming mitigated by 10 dB), vibratory pile driving for the installation/removal of temporary cofferdam and goal posts, HRG surveys (year-round with variable levels of effort), and up to 10 high-order UXO/MEC detonations (assuming mitigated by 10 dB).
[c] The minimum blue whale population is estimated at 412, although the exact value is not known. NMFS is utilizing this value for our small numbers determination, as shown in parenthesis.
[d] The estimate for coastal bottlenose dolphins (bayside versus Atlantic Ocean-facing) is likely an overestimate as this stock has demonstrated a preference for coastal environments as opposed to estuarine (Toth et al., 2011).
[e] NMFS corrects a mathematical error for sperm whales where the value presented in this table based on changes from Table 33.

[f] Corrections based on group size data were made for some species, based on comments received from the Marine Mammal Commission and/or using AMAPPS/Ocean Wind's group size data, which increased some of the take when compared to the proposed rule.

[g] Based on a comment provided by the Commission, NMFS, in consultation with JASCO and Ocean Wind, have opted to allocate 10 percent of the authorized take by Level B harassment of the offshore stock of bottlenose dolphins to the coastal stock during WTG installation. No takes of Level A harassment has been authorized for either of these stocks.

In making the negligible impact determination and the necessary small numbers finding, NMFS assesses the greatest number of takes of marine mammals that could occur within any one year, which in the case of this rule is based on the predicted Year 2 for all species, except the coastal stock of bottlenose dolphins, which used the calculated Level A harassment from Year 1 with the calculated Level B harassment from Year 2. In this calculation, the maximum estimated number of Level A harassment takes in any one year is summed with the maximum estimated number of Level B harassment takes in any one year for each species to yield the highest number of estimated take that could occur in any year. We recognize that certain activities could shift within the 5-year effective period of the rule; however, the rule allows for that flexibility and the takes are not expected to exceed those shown in Table 35 in any year.

TABLE 35—MAXIMUM NUMBER OF AUTHORIZED TAKES (LEVEL A HARASSMENT AND LEVEL B HARASSMENT) THAT COULD OCCUR IN ANY ONE YEAR OF THE PROJECT AND THE TOTAL PERCENT STOCK THAT WOULD BE TAKEN BASED ON THE MAXIMUM ANNUAL AUTHORIZED TAKE

| Marine mammal species | Population size | Max Level A harassment | Max Level B harassment | Max annual take (Max level A harassment + Max Level B harassment) | Total percent stock taken based on maximum annual take[b] |
|---|---|---|---|---|---|
| North Atlantic right whale[a] | 338 | 0 | 7 | 7 | 2.1 |
| Blue whale[a] | Unknown[c] | 0 | 4 | 4 | 0.97 |
| Fin whale[a] | 6,802 | 4 | 13 | 17 | 0.25 |
| Humpback whale | 1,396 | [f]8 | [f]66 | [f]74 | [f]5.3 |
| Minke whale | 21,968 | 22 | 74 | 96 | 0.44 |
| Sei whale[a] | 6,292 | 1 | 3 | 4 | 0.06 |
| Sperm whale[a] | 4,349 | 0 | [e]9 | [e]9 | [e]0.21 |
| Atlantic spotted dolphin | 39,921 | 0 | 135 | 135 | 0.34 |
| Atlantic white-sided dolphin | 93,233 | 0 | 100 | 100 | 0.11 |
| Bottlenose dolphin (offshore stock) | 62,851 | [f]11 | [g]1,360 | [g][f]1,3671 | [g][f]2.17 |
| Bottlenose dolphin (coastal stock) | 6,639 | [f]22 | 1,394 | [f]1,416 | [d][f]21.3 |
| Common dolphin | 172,974 | 0 | 1,584 | 1,584 | 0.92 |
| Long-finned pilot whale | 39,215 | 0 | 30 | 30 | 0.08 |
| Short-finned pilot whale | 28,924 | 0 | 30 | 30 | 0.10 |
| Risso's dolphin | 35,215 | 0 | 90 | 90 | 0.26 |
| Harbor porpoise | 95,543 | 69 | 350 | 419 | 0.44 |
| Gray seal | 27,300 | 31 | 305 | 336 | 1.23 |
| Harbor seal | 61,336 | 35 | 844 | 879 | 1.43 |

[a] Listed as Endangered under the Endangered Species Act (ESA).

[b] Calculations of percentage of stock taken are based on the maximum authorized Level A harassment take in any one year + the maximum authorized Level B harassment take in any one year and then compared against the best available abundance estimate as shown in Table 35. For this final rule, the best available abundance estimates are derived from the NMFS final 2022 Stock Assessment Reports.

[c] The minimum blue whale population is estimated at 412, although the exact value is not known. NMFS is utilizing this value for our small numbers determination, as shown in parenthesis.

[d] The estimate for coastal bottlenose dolphins (bayside versus Atlantic Ocean-facing) is likely an overestimate as this stock has demonstrated a preference for coastal environments as opposed to estuarine (Toth et al., 2011).

[e] NMFS corrects a mathematical error for sperm whales in Table 33 where the value presented in this table has been updated from six to nine.

[f] Corrections based on group size data were made for some species, based on comments received from the Marine Mammal Commission and/or using AMAPPS group size data, which increased some of the take when compared to the proposed rule.

[g] Based on a comment provided by the Commission, NMFS, in consultation with JASCO and Ocean Wind, have opted to allocate 10 percent of the authorized take by Level B harassment of the offshore stock of bottlenose dolphins to the coastal stock during WTG installation. No takes of Level A harassment has been authorized for either of these stocks.

## Mitigation

As noted in the Changes From the Proposed to Final Rule section, NMFS has added several new mitigation requirements and clarified a few others, has increased the winter clearance zones for large whales and harbor porpoises, and has removed the PAM clearance zone and PAM shutdown zone for North Atlantic right whales and added a single PAM monitoring zone (10 km) for all species (see Table 36) for clarity and to be consistent with the regulatory text in the proposed rule and in this final rule. Additionally, NMFS has clarified that the shutdown and clearance zones in Table 36 apply to both visual and auditory detection, and these changes are described in detail in the sections below. Other than the changes described, the required measures remain the same as those described in the proposed rule. However, NMFS has also re-organized and simplified the section to avoid full duplication of the specific requirements that are fully described in the regulatory text.

In order to promulgate a rulemaking under section 101(a)(5)(A) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to the activity, and other means of effecting the least practicable adverse 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.

The mitigation strategies described below are consistent with those required and successfully implemented under previous incidental take authorizations issued in association with in-water construction activities (*e.g.,* soft-start, establishing shutdown zones). Additional measures have also been incorporated to account for the fact that the proposed construction activities would occur offshore. Modeling was performed to estimate harassment zones, which were used to inform mitigation measures for the project's activities to minimize Level A harassment and Level B harassment to the extent practicable, while providing estimates of the areas within which Level B harassment might occur.

Generally speaking, the mitigation measures considered and required here fall into three categories: temporal (seasonal and daily) work restrictions, real-time measures (shutdown, clearance, and vessel strike avoidance), and noise attenuation/reduction measures. Seasonal work restrictions are designed to avoid or minimize operations when marine mammals are concentrated or engaged in behaviors that make them more susceptible or make impacts more likely, in order to reduce both the number and severity of potential takes, and are effective in reducing both chronic (longer-term) and acute effects. Real-time measures, such as implementation of shutdown and clearance zones, as well as vessel strike avoidance measures, are intended to reduce the probability or severity of harassment by taking steps in real time once a higher-risk scenario is identified (*e.g.,* once animals are detected within an impact zone). Noise attenuation measures, such as bubble curtains, are intended to reduce the noise at the source, which reduces both acute impacts, as well as the contribution to aggregate and cumulative noise that may result in longer-term chronic impacts.

Below, we briefly describe the required training, coordination, and vessel strike avoidance measures that apply to all activity types, and then in the following subsections we describe the measures that apply specifically to foundation installation, nearshore installation and removal activities for cable laying, HRG surveys, and UXO/MEC detonation. Details on specific requirements can be found in Part 217—Regulations Governing The Taking And Importing Of Marine Mammals at the end of this rulemaking.

*Training and Coordination*

NMFS requires all Ocean Wind employees and contractors conducting activities on the water, including, but not limited to, all vessel captains and crew are trained in marine mammal detection and identification, communication protocols, and all required measures to minimize impacts on marine mammals and support Ocean Wind's compliance with the LOA, if issued. Additionally, all relevant personnel and the marine mammal species monitoring team(s) are required to participate in joint, onboard briefings prior to the beginning of project activities. The briefing must be repeated whenever new relevant personnel (*e.g.,* new PSOs, construction contractors, relevant crew) join the project before work commences. During this training, Ocean Wind is required to instruct all project personnel regarding the authority of the marine mammal monitoring team(s). For example, the HRG acoustic equipment operator, pile driving personnel, *etc.,* is required to immediately comply with any call for a delay or shut down by the Lead PSO. Any disagreement between the Lead PSO and the project personnel must only be discussed after delay or shutdown has occurred. In particular, all captains and vessel crew must be trained in marine mammal detection and vessel strike avoidance measures to ensure marine mammals are not struck by any project or project-related vessel.

Prior to the start of in-water construction activities, vessel operators and crews would receive training about marine mammals and other protected species known or with the potential to occur in the Project Area, making observations in all weather conditions, and vessel strike avoidance measures. In addition, training would include information and resources available regarding applicable Federal laws and regulations for protected species. Ocean Wind will provide documentation of training to NMFS.

*North Atlantic Right Whale Awareness Monitoring*

Ocean Wind must use available sources of information on North Atlantic right whale presence, including daily monitoring of the Right Whale Sightings Advisory System, monitoring of U.S. Coast Guard very high frequency (VHF) Channel 16 throughout each day to receive notifications of any sightings, and information associated with any regulatory management actions (*e.g.,* establishment of a zone identifying the need to reduce vessel speeds). Maintaining daily awareness and coordination affords increased protection of North Atlantic right whales by understanding North Atlantic right whale presence in the area through ongoing visual and passive acoustic monitoring efforts and opportunities (outside of Ocean Wind's efforts), and allows for planning of construction activities, when practicable, to minimize potential impacts on North Atlantic right whales.

*Vessel Strike Avoidance Measures*

This final rule contains numerous vessel strike avoidance measures that reduce the risk that a vessel and marine mammal could collide. While the likelihood of a vessel strike is generally low, they are one of the most common ways that marine mammals are seriously injured or killed by human activities. Therefore, enhanced mitigation and monitoring measures are required to avoid vessel strikes to the extent practicable. While many of these measures are proactive intending to avoid the heavy use of vessels during

times when marine mammals of particular concern may be in the area, several are reactive and occur when a project personnel sights a marine mammal. The mitigation requirements are described generally here and in detail in the regulation text at the end of this final rule (see 50 CFR 217.264(b)). Ocean Wind will be required to comply with these measures except under circumstances when doing so would create an imminent and serious threat to a person or vessel or to the extent that a vessel is unable to maneuver and because of the inability to maneuver, the vessel cannot comply.

While underway, Ocean Wind is required to monitor for and maintain a minimum separation distance from marine mammals and operate vessels in a manner that reduces the potential for vessel strike. Regardless of the vessel's size, all vessel operators, crews, and dedicated visual observers (*i.e.,* PSO or trained crew member) must maintain a vigilant watch for all marine mammals and slow down, stop their vessel, or alter course (as appropriate) to avoid striking any marine mammal. The dedicated visual observer, equipped with suitable monitoring technology (*e.g.,* binoculars, night vision devices), must be located at an appropriate vantage point for ensuring vessels are maintaining required vessel separation distances from marine mammals (*e.g.,* 500 m from North Atlantic right whales).

All project vessels, regardless of size, must maintain the following minimum separation zones: 500 m from North Atlantic right whales; 100 m from sperm whales and non-North Atlantic right whale baleen whales; and 50 m from all delphinid cetaceans and pinnipeds (an exception is made for those species that approach the vessel (*i.e.,* bow-riding dolphins)). If any of these species are sighted within their respective minimum separation zone, the underway vessel must shift its engine to neutral and the engines must not be engaged until the animal(s) have been observed to be outside of the vessel's path and beyond the respective minimum separation zone. If a North Atlantic right whale is observed at any distance by any project personnel or acoustically detected, project vessels must reduce speeds to 10 kn. Additionally, in the event that any project-related vessel, regardless of size, observes any large whale (other than a North Atlantic right whale) within 500 m of an underway vessel, the vessel is required to immediately reduce speeds to 10 kn or less. The 10 kn speed restriction will remain in effect as outlined in 50 CFR 217.264(b).

All of the project-related vessels are required to comply with existing NMFS vessel speed restrictions for North Atlantic right whales and the measures within this rulemaking for operating vessels around North Atlantic right whales and other marine mammals. When NMFS vessel speed restrictions are not in effect and a vessel is traveling at greater than 10 kn, in addition to the required dedicated visual observer, Ocean Wind is required to monitor the crew transfer vessel transit corridor (the path crew transfer vessels take from port to any work area) in real-time with PAM prior to and during transits. To maintain awareness of North Atlantic right whale presence, vessel operators, crew members, and the marine mammal monitoring team would monitor U.S. Coast Guard VHF Channel 16, WhaleAlert, the Right Whale Sighting Advisory System (RWSAS), and the PAM system. Any marine mammal observed by project personnel must be immediately communicated to any on-duty PSOs, PAM operator(s), and all vessel captains. Any North Atlantic right whale or large whale observation or acoustic detection by PSOs or PAM operators must be conveyed to all vessel captains. All vessels would be equipped with an AIS and Ocean Wind must report all Maritime Mobile Service Identify (MMSI) numbers to NMFS Office of Protected Resources prior to initiating in-water activities. Ocean Wind would submit a NMFS-approved North Atlantic Right Whale Vessel Strike Avoidance Plan at least 90 days prior to commencement of vessel use.

Ocean Wind's compliance with these measures will reduce the likelihood of vessel strike to the extent practicable. These measures increase awareness of marine mammals in the vicinity of project vessels and require project vessels to reduce speed when marine mammals are detected (by PSOs, PAM, and/or through another source, *e.g.,* RWSAS) and maintain separation distances when marine mammals are encountered. While visual monitoring is useful, reducing vessel speed is one of the most effective, feasible options available to reduce the likelihood of and effects from a vessel strike. Numerous studies have indicated that slowing the speed of vessels reduces the risk of lethal vessel collisions, particularly in areas where right whales are abundant and vessel traffic is common and otherwise traveling at high speeds (Vanderlaan and Taggart, 2007; Conn and Silber, 2013; Van der Hoop *et al.,* 2014; Martin *et al.,* 2015; Crum *et al.,* 2019).

*Seasonal and Daily Restrictions*

Temporal restrictions in places where marine mammals are concentrated, engaged in biologically important behaviors, and/or present in sensitive life stages are effective measures for reducing the magnitude and severity of human impacts. The temporal restrictions required here are built around North Atlantic right whale protection. Based upon the best scientific information available (Roberts *et al.,* 2023), the highest densities of North Atlantic right whales in the specified geographic region are expected during the months of January through April with an increase in density starting in December. However, North Atlantic right whales may be present in the specified geographic region throughout the year.

NMFS is requiring seasonal work restrictions to minimize the risk of noise exposure to North Atlantic right whales incidental to certain specified activities to the extent practicable. These seasonal work restrictions are expected to greatly reduce the number of takes of North Atlantic right whales. These seasonal restrictions also afford protection to other marine mammals that are known to use the Project Area with greater frequency during winter months, including other baleen whales.

As described previously, no impact pile driving activities may occur January 1 through April 30. A new measure included in this final rule requires that Ocean Wind install the foundations as quickly as possible and avoid pile driving in December to the maximum extent practicable; however, pile driving may occur in December if it is unavoidable upon approval from NMFS. Ocean Wind has planned to construct the cofferdams and goal posts from October to May within the first year of the effective period of the regulations and LOA, with some potential removal occurring in April or May, if necessary. However, NMFS is not requiring any seasonal restrictions due to the relatively short duration of work and low associated impacts to marine mammals. Although North Atlantic right whales do migrate in coastal waters, they do not typically migrate very close to shore off of New Jersey and/or within New Jersey bays where work would be occurring. Given the distance to the Level B harassment isopleth is conservatively modeled at approximately 10 km, any exposure to vibratory pile driving during cofferdams and goal posts installation would be at levels closer to the 120-dB Level B harassment threshold and not at louder source levels. There is no specific time

of year that UXOs/MECs would be detonated as detonations would be considered on a case-by-case basis. However, Ocean Wind will be restricted from detonating UXO/MECs November 1 through April 30 to reduce impacts to North Atlantic right whales during peak migratory periods. NMFS is not adding seasonal restrictions to HRG surveys; however, Ocean Wind would only perform a predetermined amount of 24-hour survey days within specific years (Years 1, 4, 5 = 88 days; Years 2, 3 = 180 days).

NMFS is also requiring temporal restrictions for some activities. Within any 24-hour period, Ocean Wind would be limited to installing up to 2 monopile foundations. Ocean Wind had requested to initiate pile driving during nighttime when detection of marine mammals is visually challenging. Since the publication of the proposed rule, Ocean Wind has continued conversations with NMFS and BOEM regarding field trials they have been performing to prove the efficacy of their nighttime monitoring methods and systems. These field trials have provided information and evidence that their systems are capable of detecting marine mammals, particularly large whales, at distances necessary to ensure that the required mitigation measures are effective. On April 7, 2023, Ocean Wind submitted an Alternative Monitoring Plan for Nighttime Pile Driving outlining night time monitoring protocols and equipment. Given existing uncertainty with the novelty of the technology, in this final rule, NMFS, in agreement with BOEM, is allowing nighttime pile driving to occur from June 1 through October 31 annually, if the Alternative Monitoring Plan is approved. This period of time has been determined to be acceptable based on the Roberts *et al.* (2023) data demonstrating low North Atlantic right whale densities during these months. Nighttime pile driving outside of this period (*i.e.,* May, November–December) must not occur. From June 1 through to October 31, annually, Ocean Wind will have the ability to initiate impact pile driving at any time (day or night). Subsequent reports submitted by Ocean Wind will allow NMFS to continue to evaluate the efficacy of the technologies and methodologies and to initiate adaptive management approaches, if necessary. We also continue to encourage Ocean Wind to further investigate and test advanced technology detection systems. Any and all vibratory pile driving associated with cofferdams and goal posts installation and removal would only be able to occur during daylight hours. Any UXO/MEC detonations will be limited to daylight hours only to reduce impacts on migrating species (such as North Atlantic right whales) and to ensure that visual PSOs can confirm appropriate clearance of the site prior to detonation events occurring. Lastly, given the very small Level B harassment zone associated with HRG survey activities and no anticipated or authorized Level A harassment, NMFS is not requiring any daily restrictions for HRG surveys.

More information on activity-specific seasonal and daily restrictions can be found in the regulatory text at the end of this rulemaking.

*Noise Abatement Systems*

Ocean Wind is required to employ noise abatement systems (NAS), also known as noise attenuation systems, during all foundation installation (*i.e.,* impact pile driving) and UXO/MEC detonation activities to reduce the sound pressure levels that are transmitted through the water in an effort to reduce ranges to acoustic thresholds and minimize, to the extent practicable, any acoustic impacts resulting from these activities. Ocean Wind is required to use at least two NAS to ensure that measured sound levels do not exceed the levels modeled for a 10-dB sound level reduction for foundation installation, which is likely to include a double big bubble curtain combined with another NAS (*e.g.,* hydro-sound damper, or an AdBm Helmholz resonator), as well as the adjustment of operational protocols to minimize noise levels. For UXO/MEC detonation, a double big bubble curtain must be used and the hoses must be placed at distances to avoid damage to the bubble curtain during detonation. A single bubble curtain, alone or in combination with another NAS device, may not be used for either pile driving or UXO/MEC detonation as received SFV data reveals this approach is unlikely to attenuate sounds to the degree distances to harassment thresholds are at or smaller than those modeled assuming 10-dB of attenuation. Should the research and development phase of newer systems demonstrate effectiveness, as part of adaptive management, Ocean Wind may submit data on the effectiveness of these systems and request approval from NMFS to use them during foundation installation and UXO/MEC detonation activities.

Two categories of NAS exist: primary and secondary. A primary NAS would be used to reduce the level of noise produced by foundation installation activities at the source, typically through adjustments on to the equipment (*e.g.,* hammer strike parameters). Primary NAS are still evolving and will be considered for use during mitigation efforts when the NAS has been demonstrated as effective in commercial projects. However, as primary NAS are not fully effective at eliminating noise, a secondary NAS would be employed. The secondary NAS is a device or group of devices that would reduce noise as it was transmitted through the water away from the pile, typically through a physical barrier that would reflect or absorb sound waves and therefore, reduce the distance the higher energy sound propagates through the water column. Together, these systems must reduce noise levels to those not exceeding modeled ranges to Level A harassment and Level B harassment isopleths corresponding to those modeled assuming 10-dB sound attenuation, pending results of Sound Field Verification (SFV; see *Sound Field Verification* section below and Part 217—Regulations Governing The Taking And Importing Of Marine Mammals).

Noise abatement systems, such as bubble curtains, are used to decrease the sound levels radiated from a source. Bubbles create a local impedance change that acts as a barrier to sound transmission. The size of the bubbles determines their effective frequency band, with larger bubbles needed for lower frequencies. There are a variety of bubble curtain systems, confined or unconfined bubbles, and some with encapsulated bubbles or panels. Attenuation levels also vary by type of system, frequency band, and location. Small bubble curtains have been measured to reduce sound levels but effective attenuation is highly dependent on depth of water, current, and configuration and operation of the curtain (Austin *et al.,* 2016; Koschinski and Lüdemann, 2013). Bubble curtains vary in terms of the sizes of the bubbles and those with larger bubbles tend to perform a bit better and more reliably, particularly when deployed with two separate rings (Bellmann, 2014; Koschinski and Lüdemann, 2013; Nehls *et al.,* 2016). Encapsulated bubble systems (*i.e.,* Hydro Sound Dampers (HSDs)), can be effective within their targeted frequency ranges (*e.g.,* 100–800 Hz), and when used in conjunction with a bubble curtain appear to create the greatest attenuation. The literature presents a wide array of observed attenuation results for bubble curtains. The variability in attenuation levels is the result of variation in design as well as differences in site conditions and

difficulty in properly installing and operating in-water attenuation devices.

The literature presents a wide array of observed attenuation results for bubble curtains. The variability in attenuation levels is the result of variation in design as well as differences in site conditions and difficulty in properly installing and operating in-water attenuation devices. Dähne *et al.* (2017) found that single bubble curtains that reduce sound levels by 7 to 10 dB reduced the overall sound level by approximately 12 dB when combined as a double bubble curtain for 6-m steel monopiles in the North Sea. During installation of monopiles (consisting of approximately 8-m in diameter) for more than 150 WTGs in comparable water depths (> 25 m) and conditions in Europe indicate that attenuation of 10 dB is readily achieved (Bellmann, 2019; Bellmann *et al.,* 2020) using single BBCs for noise attenuation. When a double big bubble curtain is used (noting a single bubble curtain is not allowed), Ocean Wind is required to maintain numerous operational performance standards. These standards are defined in the regulatory text at the end of this rulemaking, and include, but are not limited to, construction contractors must train personnel in the proper balancing of airflow to the bubble ring and Ocean Wind must submit a performance test and maintenance report to NMFS within 72 hours following the performance test. Corrections to the attenuation device to meet regulatory requirements must occur prior to use during foundation installation activities and UXO/MEC detonation. In addition, a full maintenance check (*e.g.,* manually clearing holes) must occur prior to each pile being installed or any UXO/MEC detonated. If Ocean Wind uses a noise mitigation device in addition to a double big bubble curtain, similar quality control measures are required.

Ocean Wind is required to submit an SFV plan to NMFS for approval at least 180 days prior to installing foundations or detonating UXO/MECs. They are also required to submit interim and final SFV data results to NMFS and make corrections to the noise attenuation systems in the case that any SFV measurements demonstrate noise levels are above those modeled assuming 10 dB. These frequent and immediate reports allow NMFS to better understand the sound fields to which marine mammals are being exposed and require immediate corrective action should they be misaligned with anticipated noise levels within our analysis.

Noise abatement devices are not required during HRG surveys, cofferdam (sheet pile) installation and removal, and goal post (pipe pile) installation and removal. Regarding cofferdam sheet pile and goal post pipe pile installation and removal, NAS is not practicable to implement due to the physical nature of linear sheet piles and angled pipe piles, and is of low risk for impacts to marine mammals due to the short work duration and lower noise levels produced during the activities. Regarding HRG surveys, NAS cannot practicably be employed around a moving survey ship, but Ocean Wind is required to make efforts to minimize source levels by using the lowest energy settings on equipment that has the potential to result in harassment of marine mammals (*e.g.,* sparkers, boomers) and turn off equipment when not actively surveying. Overall, minimizing the amount and duration of noise in the ocean from any of the project's activities through use of all means necessary (*e.g.,* noise abatement, turning off power) will effect the least practicable adverse impact on marine mammals.

*Clearance and Shutdown Zones*

NMFS requires the establishment of both clearance and, where technically feasible, shutdown zones during project activities that have the potential to result in harassment of marine mammals. The purpose of ''clearance'' of a particular zone is to minimize potential instances of auditory injury and more severe behavioral disturbances by delaying the commencement of an activity if marine mammals are near the activity. The purpose of a shutdown is to prevent a specific acute impact, such as auditory injury or severe behavioral disturbance of sensitive species, by halting the activity.

All relevant clearance and shutdown zones during project activities would be monitored by NMFS-approved PSOs and/or PAM operators (as described in the regulatory text at the end of this rulemaking). At least one PAM operator must review data from at least 24 hours prior to foundation installation or any UXO/MEC detonations and must actively monitor hydrophones for 60 minutes prior to commencement of these activities. Any sighting or acoustic detection of a North Atlantic right whale triggers a delay to commencing pile driving and shutdown.

Prior to the start of certain specified activities (foundation installation, cofferdam install and removal, HRG surveys, UXO/MEC detonations), Ocean Wind must ensure designated areas (*i.e.,* clearance zones, Tables 36–39) are clear of marine mammals prior to commencing activities to minimize the potential for and degree of harassment. For foundation installation and UXO/MEC detonation, PSOs must visually monitor clearance zones for marine mammals for a minimum of 60 minutes, where the zone must be confirmed free of marine mammals at least 30 minutes directly prior to commencing these activities. Clearance zones represent the largest Level A harassment zone for each species group plus 20 percent or a minimum of 100 m (whichever is greater). For foundation installation, the minimum visibility zone would extend 1,650 m from the pile during summer months and 2,500 m during December (Table 36). This value corresponds to the modeled maximum $ER_{95\%}$ distances to the Level A harassment threshold for low-frequency cetaceans, assuming 10 dB of attenuation.

For cofferdam and goal post pile driving and HRG surveys, monitoring must be conducted for 30 minutes prior to initiating activities and the clearance zones must be free of marine mammals during that time.

For any other in-water construction heavy machinery activities (*e.g.,* trenching, cable laying, *etc.*), if a marine mammal is on a path towards or comes within 10 m (32.8 ft) of equipment, Ocean Wind is required to cease operations until the marine mammal has moved more than 10 m on a path away from the activity to avoid direct interaction with equipment.

Once an activity begins, any marine mammal entering their respective shutdown zone would trigger the activity to cease. In the case of pile driving, the shutdown requirement may be waived if is not practicable due to imminent risk of injury or loss of life to an individual or risk of damage to a vessel that creates risk of injury or loss of life for individuals or the lead engineer determines there is pile refusal or pile instability. Because UXO/MEC detonations are instantaneous, no shutdown is possible; therefore, there are clearance zones but no shutdown zones for UXO/MEC detonations (Table 38). In situations when shutdown is called for during impact pile driving but Ocean Wind determines shutdown is not practicable due to aforementioned emergency reasons, reduced hammer energy must be implemented when the lead engineer determines it is practicable. Specifically, pile refusal or pile instability could result in not being able to shut down pile driving immediately. Pile refusal occurs when the pile driving sensors indicate the pile is approaching refusal, and a shut-down would lead to a stuck pile which then poses an imminent risk of injury or loss

of life to an individual, or risk of damage to a vessel that creates risk for individuals. Pile instability occurs when the pile is unstable and unable to stay standing if the piling vessel were to ''let go.'' During these periods of instability, the lead engineer may determine a shutdown is not feasible because the shutdown combined with impending weather conditions may require the piling vessel to ''let go'' which then poses an imminent risk of injury or loss of life to an individual, or risk of damage to a vessel that creates risk for individuals. Ocean Wind must document and report to NMFS all cases where the emergency exemption is taken.

After shutdown, impact pile driving may be reinitiated once all clearance zones are clear of marine mammals for the minimum species-specific periods, or, if required to maintain pile stability, at which time the lowest hammer energy must be used to maintain stability. If pile driving has been shut down due to the presence of a North Atlantic right whale, pile driving must not restart until the North Atlantic right whale has neither been visually or acoustically detected for 30 minutes. Upon re-starting pile driving, soft-start protocols must be followed if pile driving has ceased for 30 minutes or longer.

The clearance and shutdown zone sizes vary by species and are shown in Table 36, Table 37, and Table 38. Ocean Wind is allowed to request modification to these zone sizes pending results of sound field verification (see regulatory text at the end of this rulemaking). Any changes to zone size would be part of adaptive management and would require NMFS' approval.

TABLE 36—MINIMUM VISIBILITY, CLEARANCE, SHUTDOWN, AND LEVEL B HARASSMENT ZONES DURING IMPACT PILE DRIVING IN SUMMER (AND WINTER) [a]

| Monitoring zones | North atlantic right whales | Large whales | Delphinids | Harbor porpoises | Seals |
|---|---|---|---|---|---|
| Minimum Visibility Zone [b] | 1,650 m (2,500 m) | | | | |
| Clearance Zone [c d] | Any distance .. | 2,000 m (3,000 m) | 100 m | 1,100 m (1,750 m) | 100 m |
| Shutdown Zone [d] | Any distance .. | 1,800 m (2,500 m) | 100 m | 1,000 m (1,450 m) | 100 m |
| PAM Monitoring Zone | 10,000 m | | | | |
| Level B Harassment (Acoustic Range, $R_{95\%}$) | Monopiles: 3,253 m (3,534 m)<br>Pin Piles: 2,155 m (2,522 m) | | | | |

[a] Winter (*i.e.,* December) distances are presented in parentheses.
[b] The minimum visibility zone is equal to the modeled maximum $ER_{95\%}$ distances to the Level A harassment threshold for low-frequency cetaceans, assuming 10 dB of attenuation.
[c] The clearance zone is equal to the maximum Level A harassment distance for each species group (assuming 10 dB of attenuation) plus 20 percent or a minimum of 100 m (whichever is greater).
[d] This zone applies to both visual and PAM.

TABLE 37—DISTANCES TO HARASSMENT THRESHOLDS AND MITIGATION ZONES [a] DURING VIBRATORY DRIVING OF SHEET PILES AND/OR CASING PIPE PILES FOR COFFERDAMS AND GOAL POSTS [d]

| Marine mammal hearing groups | Level A harassment ($SEL_{cum}$) (m) | Level B harassment (m) | Clearance zone [b] (m) | Shutdown zone [c] (m) |
|---|---|---|---|---|
| Low-frequency cetaceans | 86.7 | 10,000 | 150 | 100 |
| Mid-frequency cetaceans | 7.7 | 10,000 | 150 | 100 |
| High-frequency cetaceans | 128.2 | 10,000 | 150 | 150 |
| Phocid Pinnipeds | 52.7 | 10,000 | 150 | 60 |

**Note:** $SEL_{cum}$ = cumulative sound exposure level; $SPL_{pk}$ = peak sound pressure level.
[a] Zone sizes are based upon a practical spreading loss model and a source level of 165.0 dB re 1 µPa (JASCO, 2021).
[b] The clearance zones for large whales, porpoises, and seals are based upon the maximum Level A harassment zone for temporary cofferdams (128.2 m; Table 37) and rounded up for PSO clarity.
[c] The shutdown zones for large whales (including North Atlantic right whale) and porpoises are based upon the maximum Level A harassment zone for each group and rounded up for PSO clarity. Shutdown zones for other dolphins and pilot whales were set using precautionary distances.
[d] Although Ocean Wind is also building temporary goal posts in some locations to aid their nearshore installation work, they have committed to using the same zones previously proposed for temporary cofferdams as they are considered more conservative and protective.

In the proposed rule, we presented zone sizes based solely on the largest charge weight due to uncertainty on how accurately these charge weights could be identified in the water. Since the proposed rule, Ocean Wind has reliably demonstrated that they can identify charge weights in the field to allow for charge weight-specific mitigative zones. Because of this, Ocean Wind is required to implement the As Low as Reasonably Practicable (ALARP) process, as described in the UXO/MEC Charge Weight Memo. This process requires Ocean Wind to undertake ''lift-and-shift'' (*i.e.,* physical removal) and then lead up to *in-situ* disposal, as necessary, which could include low-order (deflagration) to high-order (detonation) methods of removal. Another approach involves the cutting of the UXO/MEC to extract any explosive components. Implementing the ALARP approach would minimize potential impacts to marine mammals as UXOs/MECs would only be detonated as a last resort. Ocean Wind will follow a Risk Management Framework designed to align with the ALARP principle which includes historical

research/hazard profiling, communication with all relevant State and Federal Agencies, and the standards within their removal plan (see the UXO/MEC Charge Weight Memo); we believe there is a high level of certainty that charge weights and appropriate removal approaches can be implemented in the field. Furthermore, we believe that this approach will ensure the least practicable adverse impact on marine mammals by mitigating the potential for TTS for each charge weight. The UXO/MEC Charge Weight Memo is found on NMFS' website at *https://www.fisheries.noaa.gov/action/incidental-take-authorization-ocean-wind-lcc-construction-ocean-wind-1-wind-energy-facility.*

In following this charge weight-specific approach, Ocean Wind is required to clear the relevant zones as described in Table 38. These zones are based on (but not equal to) the greatest TTS threshold distances for each charge weight at any modeled site. We note that harbor porpoises and seals are difficult to detect at great distances but, due to the UXO/MEC detonation time of year restrictions, their abundance is likely to be relatively low. These zone sizes may be adjusted based on SFV and confirmation of the UXO/MEC or donor charge sizes after approval by NMFS.

No minimum visibility zone is required for UXO/MEC detonation as the entire visual clearance zone must be clear given the potential for lung and gastrointestinal tract injury.

TABLE 38—CLEARANCE, LEVEL A HARASSMENT, AND LEVEL B HARASSMENT ZONES DURING UXO/MEC DETONATIONS, BY CHARGE WEIGHT AND ASSUMING 10 dB OF SOUND ATTENUATION

| UXO/MEC charge weights | | Low-frequency cetaceans | Mid-frequency cetaceans | High-frequency cetaceans | Phocid pinnipeds |
|---|---|---|---|---|---|
| E4 (2.3 kg) | Level A harassment (m) | 552 | 50 | 1,820 | 182 |
| | Level B harassment (m) | 2,82 | 453 | 6,160 | 1,470 |
| | Clearance Zone (m) [a b] | 2,500 | 500 | 2,500 | 1,000 |
| E6 (9.1 kg) | Level A harassment (m) | 982 | 75 | 2,590 | 357 |
| | Level B harassment (m) | 4,680 | 773 | 8,000 | 2,350 |
| | Clearance Zone (m) [a b] | 4,000 | 600 | 4,000 | 1,500 |
| E8 (45.5 kg) | Level A harassment (m) | 1,730 | 156 | 3,900 | 690 |
| | Level B harassment (m) | 7,490 | 1,240 | 10,300 | 3,820 |
| | Clearance Zone (m) [a b] | 6,000 | 1,000 | 6,000 | 3,000 |
| E10 (227 kg) | Level A harassment (m) | 2,970 | 337 | 5,400 | 1,220 |
| | Level B harassment (m) | 10,500 | 2,120 | 12,900 | 5,980 |
| | Clearance Zone (m) [a b] | 9,000 | 1,500 | 9,000 | 4,000 |
| E12 (454 kg) | Level A harassment (m) | 3,780 | 461 | 6,200 | 1,600 |
| | Level B harassment (m) | 11,900 | 2,550 | 14,100 | 7,020 |
| | Clearance Zone (m) [a b] | 10,000 | 2,000 | 10,000 | 5,000 |

[a] The clearance zones presented here for the Level B harassment thresholds were derived based on an approximate proportion of the size of the Level B harassment isopleth.
[b] Some of the zones have been rounded for PSO clarity.

TABLE 39—LEVEL B HARASSMENT THRESHOLD RANGES AND MITIGATION ZONES DURING HRG SURVEYS

| Marine mammal species | Level B harassment zone (m) | | Clearance zone (m) | Shutdown zone (m) |
|---|---|---|---|---|
| | Boomer/ sparker | CHIRPs | | |
| Low-frequency cetacean (North Atlantic right whale) | 141 | 48 | 500 | 500 |
| Other low-frequency cetaceans (non-North Atlantic right whale species) | ..... | ..... | 100 | 100 |
| Mid-frequency cetaceans | 141 | 48 | 100 | [a] 100 |
| High-frequency cetaceans | 141 | 48 | 100 | [b] 100 |
| Phocid Pinnipeds | 141 | 48 | 100 | 100 |

[a] An exception is noted for bow-riding delphinids of the following genera: Delphinus, Stenella, Lagenorhynchus, and Tursiops.
[b] NMFS corrects a typo here where the shutdown zone size for high-frequency cetaceans was incorrectly labeled as 199 m. This has been corrected to 100 m.

*Soft-Start/Ramp-Up*

The use of a soft-start or ramp-up procedure is believed to provide additional protection to marine mammals by warning them, or providing them with a chance to leave the area prior to the hammer or HRG equipment operating at full capacity. Soft-start typically involves initiating hammer operation at a reduced energy level (relative to full operating capacity) followed by a waiting period. Ocean Wind must utilize a soft-start protocol for impact pile driving of monopiles by performing four to six strikes per minute at 10 to 20 percent of the maximum hammer energy, for a minimum of 20 minutes. NMFS notes that it is difficult to specify a reduction in energy for any given hammer because of variation across drivers and installation conditions. The final methodology will be developed by Ocean Wind considering final design details including site-specific soil properties and other considerations. HRG survey operators are required to ramp-up sources when the acoustic sources are used unless the equipment operates on a binary on/off switch. The ramp-up would involve starting from the smallest setting to the operating level over a period of approximately 30 minutes. Given the instantaneous nature of UXO/MEC detonations, no ramp-up/soft-start protocol is possible.

Soft-start and ramp-up will be required at the beginning of each day's activity and at any time following a cessation of activity of 30 minutes or longer. Prior to soft-start or ramp-up

beginning, the operator must receive confirmation from the PSO that the clearance zone is clear of any marine mammals.

*Fishery Monitoring Surveys*

While the likelihood of Ocean Wind's fishery monitoring surveys impacting marine mammals is minimal, NMFS requires Ocean Wind to adhere to gear and vessel mitigation measures to reduce potential impacts to the extent practicable. In addition, all crew undertaking the fishery monitoring survey activities are required to receive protected species identification training prior to activities occurring and attend the aforementioned onboarding training. The specific requirements that NMFS has set for the fishery monitoring surveys can be found in the regulatory text at the end of this rulemaking.

Based on our evaluation of the mitigation measures, as well as other measures considered by NMFS, NMFS has determined that these measures will provide the means of affecting 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.

**Monitoring and Reporting**

As noted in the Changes From the Proposed to Final Rule section, we have added, modified, or clarified a number of monitoring and reporting measures since the proposed rule. These changes are described in detail in the sections below and, otherwise, the marine mammal monitoring and reporting requirements have not changed since the proposed rule.

In order to promulgate a rulemaking for an activity, section 101(a)(5)(A) 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 proposed 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/or
- Mitigation and monitoring effectiveness.

Separately, monitoring is also regularly used to support mitigation implementation, which is referred to as mitigation monitoring, and monitoring plans typically include measures that both support mitigation implementation and increase our understanding of the impacts of the activity on marine mammals.

During the planned activities, visual monitoring by NMFS-approved PSOs would be conducted before, during, and after all impact pile driving, vibratory pile driving, UXO/MEC detonations, and HRG surveys. PAM would be also conducted during impact pile driving and UXO/MEC detonations. Visual observations and acoustic detections would be used to support the activity-specific mitigation measures (*e.g.,* clearance zones). To increase understanding of the impacts of the activity on marine mammals, PSOs must record all incidents of marine mammal occurrence at any distance from the piling locations, near the HRG acoustic sources, and during UXO/MEC detonations. PSOs would document all behaviors and behavioral changes, in concert with distance from an acoustic source. The required monitoring is described below, beginning with PSO measures that are applicable to all the aforementioned activities, followed by activity-specific monitoring requirements.

*Protected Species Observer and PAM Operator Requirements*

Ocean Wind is required to employ NMFS-approved PSOs and PAM operators. PSOs are trained professionals who are tasked with visually monitoring for marine mammals during pile driving, UXO/MEC detonation, and HRG surveys. The primary purpose of a PSO is to carry out the monitoring, collect data, and, when appropriate, call for the implementation of mitigation measures. In addition to visual observations, NMFS requires Ocean Wind to conduct PAM by PAM operators during impact pile driving, UXO/MEC detonations, and vessel transit.

The inclusion of PAM, which would be conducted by NMFS-approved PAM operators, following a standardized measurement, processing methods, reporting metrics, and metadata standards for offshore wind, alongside visual data collection is valuable to provide the most accurate record of species presence as possible and, together, these two monitoring methods are well understood to provide best results when combined together (*e.g.,* Barlow and Taylor, 2005; Clark *et al.,* 2010; Gerrodette *et al.,* 2011; Van Parijs *et al.,* 2021). Acoustic monitoring (in addition to visual monitoring) increases the likelihood of detecting marine mammals within the shutdown and clearance zones of project activities, which when applied in combination of required shutdowns helps to further reduce the risk of marine mammals being exposed to sound levels that could otherwise result in acoustic injury or more intense behavioral harassment.

The exact configuration and number of PAM systems depends on the size of the zone(s) being monitored, the amount of noise expected in the area, and the characteristics of the signals being monitored. More closely spaced hydrophones would allow for more directionality, and perhaps, range to the vocalizing marine mammals; although, this approach would add additional costs and greater levels of complexity to the project. Larger baleen cetacean species (*i.e.,* mysticetes), which produce loud and lower-frequency vocalizations, may be able to be heard with fewer hydrophones spaced at greater distances. However, smaller cetaceans (such as mid-frequency delphinids; odontocetes) may necessitate more hydrophones and to be spaced closer together given the shorter range of the shorter, mid-frequency acoustic signals (*e.g.,* whistles and echolocation clicks).

As there are no ''perfect fit'' single-optimal-array configurations, these set-ups would need to be considered on a case-by-case basis.

NMFS does not formally administer any PSO or PAM operator training program or endorse specific providers but will approve PSOs and PAM operators that have successfully completed courses that meet the curriculum and trainer requirements referenced below and further specified in the regulatory text at the end of this rulemaking.

NMFS will provide PSO and PAM operator approvals in the context of the need to ensure that PSOs and PAM operators have the necessary training and/or experience to carry out their duties competently. In order for PSOs and PAM operators to be approved, NMFS must review and approve PSO and PAM operator resumes indicating successful completion of an acceptable training course. PSOs and PAM operators must have previous experience observing marine mammals and must have the ability to work with all required and relevant software and equipment. NMFS may approve PSOs and PAM operators as conditional or unconditional. A conditional approval may be given to one who is trained but has not yet attained the requisite experience. An unconditional approval is given to one who is trained and has attained the necessary experience. The specific requirements for conditional and unconditional approval can be found in the regulatory text at the end of this rulemaking.

Conditionally-approved PSOs and PAM operators would be paired with an unconditional-approved PSO (or PAM operator, as appropriate) to ensure that the quality of marine mammal observations and data recording is kept consistent. Additionally, activities requiring PSO and/or PAM operator monitoring must have a lead on duty. The visual PSO field team, in conjunction with the PAM team (*i.e.,* marine mammal monitoring team), would have a lead member (designated as the ''Lead PSO'' or ''Lead PAM operator'') who would be required to meet the unconditional approval standard.

Although PSOs and PAM operators must be approved by NMFS, third-party observer providers and/or companies seeking PSO and PAM operator staffing should expect that those having satisfactorily completed acceptable training and with the requisite experience (if required) will be quickly approved. Ocean Wind is required to request PSO and PAM operator approvals 60 days prior to those personnel commencing work. An initial list of previously approved PSO and PAM operators must be submitted by Ocean Wind at least 30 days prior to the start of the project. Should Ocean Wind require additional PSOs or PAM operators throughout the project, Ocean Wind must submit a subsequent list of pre-approved PSOs and PAM operators to NMFS at least 15 days prior to planned use of that PSO or PAM operator. A PSO may be trained and/or experienced as both a PSO and PAM operator and may perform either duty, pursuant to scheduling requirements (and vice versa).

A minimum number of PSOs would be required to actively observe for the presence of marine mammals during certain project activities with more PSOs required as the mitigation zone sizes increase. A minimum number of PAM operators would be required to actively monitor for the presence of marine mammals during foundation installation and UXO/MEC detonation. The types of equipment required (*e.g.,* big eyes on the pile driving vessel) are also designed to increase marine mammal detection capabilities. Specifics on these types of requirements can be found in the regulations at the end of this rulemaking. In summary, at least three PSOs and one PAM operator per acoustic data stream (equivalent to the number of acoustic buoys) must be on-duty and actively monitoring per platform during foundation installation and any UXO/MEC detonation event; at least two PSOs must be on duty during cable landfall construction vibratory pile installation and removal; at least one PSO must be on-duty during HRG surveys conducted during daylight hours; and at least two PSOs must be on-duty during HRG surveys conducted during nighttime.

In addition to monitoring duties, PSOs and PAM operators are responsible for data collection. The data collected by PSO and PAM operators and subsequent analysis provide the necessary information to inform an estimate of the amount of take that occurred during the project, better understand the impacts of the project on marine mammals, address the effectiveness of monitoring and mitigation measures, and to adaptively manage activities and mitigation in the future. Data reported includes information on marine mammal sightings, activity occurring at time of sighting, monitoring conditions, and if mitigative actions were taken. Specific data collection requirements are contained within the regulations at the end of this rulemaking.

Ocean Wind is required to submit a Pile Driving and UXO/MEC Marine Mammal Monitoring Plan and a PAM Plan to NMFS 180 days in advance of foundation installation activities. The Plan must include details regarding PSO and PAM monitoring protocols and equipment proposed for us. More specifically, the PAM Plan must include a description of all proposed PAM equipment, address how the proposed passive acoustic monitoring must follow standardized measurement, processing methods, reporting metrics, and metadata standards for offshore wind as described in *NOAA and BOEM Minimum Recommendations for Use of Passive Acoustic Listening Systems in Offshore Wind Energy Development Monitoring and Mitigation Programs* (Van Parijs *et al.,* 2021). NMFS must approve the plan prior to foundation installation activities or UXO/MEC detonation commencing. Specific details on NMFS' PSO or PAM operator qualifications and requirements can be found in Part 217—Regulations Governing The Taking And Importing Of Marine Mammals at the end of this rulemaking. Additional information can be found in Ocean Wind's Protected Species Mitigation and Monitoring Plan (PSMMP) (Appendix B) found in their ITA application on NMFS' website at *https://www.fisheries.noaa.gov/action/incidental-take-authorization-ocean-wind-lcc-construction-ocean-wind-1-wind-energy-facility.*

*Sound Field Verification*

Ocean Wind must conduct SFV measurements during all UXO/MEC detonations and for all impact pile-driving activities associated with the installation of, at minimum, the first three monopile foundations. SFV measurements must continue until at least three consecutive piles demonstrate distances to thresholds are at or below those modeled assuming 10 dB of attenuation. Subsequent SFV measurements are also required should larger piles be installed or additional piles be driven that are anticipated to produce longer distances to harassment isopleths than those previously measured (*e.g.,* higher hammer energy, greater number of strikes, *etc.*). The measurements and reporting associated with SFV can be found in the regulatory text at the end of this rulemaking. The requirements are extensive to ensure monitoring is conducted appropriately and the reporting frequency is such that Ocean Wind is required to make adjustments quickly (*e.g.,* ensure bubble curtain hose maintenance, check bubble curtain air pressure supply, add additional sound attenuation, *etc.*) to

ensure marine mammals are not experiencing noise levels above those considered in this analysis. For recommended SFV protocols for impact pile driving, please consult ISO 18406 *Underwater acoustics—Measurement of radiated underwater sound from percussive pile driving* (2017).

*Reporting*

Prior to any construction activities occurring, Ocean Wind would provide a report to NMFS Office of Protected Resources that demonstrates that all required training for Ocean Wind personnel, which includes the vessel crews, vessel captains, PSOs, and PAM operators have completed all required trainings.

NMFS would require standardized and frequent reporting from Ocean Wind during the life of the regulations and LOA. All data collected relating to the Project would be recorded using industry-standard software (*e.g.,* Mysticetus or a similar software) installed on field laptops and/or tablets. Ocean Wind is required to submit weekly, monthly, annual, and situational reports. The specifics of what we require to be reported can be found in the regulatory text at the end of this final rule.

*Weekly Report*—During foundation installation activities, Ocean Wind would be required to compile and submit weekly marine mammal monitoring reports for foundation installation pile driving to NMFS Office of Protected Resources that document the daily start and stop of all pile-driving activities, the start and stop of associated observation periods by PSOs, details on the deployment of PSOs, a record of all detections of marine mammals (acoustic and visual), any mitigation actions (or if mitigation actions could not be taken, provide reasons why), and details on the noise abatement system(s) (*e.g.,* system type, distance deployed from the pile, bubble rate, *etc.*). Weekly reports will be due on Wednesday for the previous week (Sunday to Saturday). The weekly reports are also required to identify which turbines become operational and when (a map must be provided). Once all foundation pile installation is complete, weekly reports would no longer be required.

*Monthly Report*—Ocean Wind is required to compile and submit monthly reports to NMFS Office of Protected Resources that include a summary of all information in the weekly reports, including project activities carried out in the previous month, vessel transits (number, type of vessel, and route), number of piles installed, all detections of marine mammals, and any mitigative actions taken. Monthly reports would be due on the 15th of the month for the previous month. The monthly report would also identify which turbines become operational and when (a map must be provided). Once all foundation pile installation is complete, monthly reports would no longer be required.

*Annual Reporting*—Ocean Wind is required to submit an annual marine mammal monitoring (both PSO and PAM) report to NMFS Office of Protected Resources no later than 90 days following the end of a given calendar year describing, in detail, all of the information required in the monitoring section above. A final annual report must be prepared and submitted within 30 calendar days following receipt of any NMFS comments on the draft report.

*Final 5-Year Reporting*—Ocean Wind must submit its draft 5-year report(s) to NMFS Office of Protected Resources on all visual and acoustic monitoring conducted under the LOA within 90 calendar days of the completion of activities occurring under the LOA. A final 5-year report must be prepared and submitted within 60 calendar days following receipt of any NMFS comments on the draft report. Information contained within this report is described at the beginning of this section.

*Situational Reporting*—Specific situations encountered during the development of the Project requires immediate reporting. For instance, if a North Atlantic right whale is observed at any time by PSOs or project personnel, the sighting must be immediately (if not feasible, as soon as possible and no longer than 24 hours after the sighting) reported to NMFS. If a North Atlantic right whale is acoustically detected at any time via a project-related PAM system, the detection must be reported as soon as possible and no longer than 24 hours after the detection to NMFS via the 24-hour North Atlantic right whale Detection Template (*https://www.fisheries.noaa.gov/resource/document/passive-acoustic-reporting-system-templates*). Calling the hotline is not necessary when reporting PAM detections via the template.

If a sighting of a stranded, entangled, injured, or dead marine mammal occurs, the sighting would be reported to NMFS Office of Protected Resources, the NMFS Greater Atlantic Stranding Coordinator for the New England/Mid-Atlantic area (866–755–6622), and the U.S. Coast Guard within 24 hours. If the injury or death was caused by a project activity, Ocean Wind must immediately cease all activities until NMFS Office of Protected Resources is able to review the circumstances of the incident and determine what, if any, additional measures are appropriate to ensure compliance with the terms of the LOA. NMFS Office of Protected Resources may impose additional measures to minimize the likelihood of further prohibited take and ensure MMPA compliance. Ocean Wind may not resume their activities until notified by NMFS Office of Protected Resources.

In the event of a vessel strike of a marine mammal by any vessel associated with the Project, Ocean Wind must immediately report the strike incident. If the strike occurs in the Greater Atlantic Region (Maine to Virginia), Ocean Wind must call the NMFS Greater Atlantic Stranding Hotline. Separately, Ocean Wind must also and immediately report the incident to NMFS Office of Protected Resources and GARFO. Ocean Wind must immediately cease all on-water activities until NMFS Office of Protected Resources is able to review the circumstances of the incident and determine what, if any, additional measures are appropriate to ensure compliance with the terms of the LOA. NMFS Office of Protected Resources may impose additional measures to minimize the likelihood of further prohibited take and ensure MMPA compliance. Ocean Wind may not resume their activities until notified by NMFS.

In the event of any lost gear associated with the fishery surveys, Ocean Wind must report to the GARFO as soon as possible or within 24 hours of the documented time of missing or lost gear. This report must include information on any markings on the gear and any efforts undertaken or planned to recover the gear.

The specifics of what NMFS Office of Protected Resources requires to be reported is listed at the end of this rulemaking in the regulatory text.

*Sound Field Verification*—Ocean Wind is required to submit interim SFV reports after each foundation installation and UXO/MEC detonation monitored as soon as possible but within 48 hours. A final SFV report for all monopile foundation installation and UXO/MEC detonations would be required within 90 days following completion of acoustic monitoring.

**Adaptive Management**

The regulations governing the take of marine mammals incidental to Ocean Wind's construction activities contain an adaptive management component. Our understanding of the effects of

offshore wind construction activities (*e.g.,* acoustic and explosive stressors) on marine mammals continues to evolve, which makes the inclusion of an adaptive management component both valuable and necessary within the context of 5-year regulations.

The monitoring and reporting requirements in this final rule provide NMFS with information that helps us to better understand the impacts of the project's activities on marine mammals and informs our consideration of whether any changes to mitigation and monitoring are appropriate. The use of adaptive management allows NMFS to consider new information and modify mitigation, monitoring, or reporting requirements, as appropriate, with input from Ocean Wind regarding practicability, if such modifications will have a reasonable likelihood of more effectively accomplishing the goal of the measures.

The following are some of the possible sources of new information to be considered through the adaptive management process: (1) results from monitoring reports, including the weekly, monthly, situational, and annual reports required; (2) results from marine mammal and sound research; and (3) any information which reveals that marine mammals may have been taken in a manner, extent, or number not authorized by these regulations or subsequent LOA. During the course of the rule, Ocean Wind (and other LOA Holders conducting offshore wind development activities) are required to participate in one or more adaptive management meetings convened by NMFS and/or BOEM, in which the above information will be summarized and discussed in the context of potential changes to the mitigation or monitoring measures.

**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'' by mortality, serious injury, Level A harassment and Level B harassment, we consider other factors, such as the likely nature of any behavioral responses (*e.g.,* intensity, duration), the context of any such responses (*e.g.,* critical reproductive time or location, migration), as well as effects on habitat, and the likely effectiveness of 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' 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).

In the Estimated Take section to this preamble, we discuss the estimated maximum number of takes by Level A harassment and Level B harassment that could occur from Ocean Wind's specified activities based on the methods described. The impact that any given take would have is dependent on many case-specific factors that need to be considered in the negligible impact analysis (*e.g.,* the context of behavioral exposures such as duration or intensity of a disturbance, the health of impacted animals, the status of a species that incurs fitness-level impacts to individuals, *etc.*). In this final rule, we evaluate the likely impacts of the enumerated harassment takes that are authorized in the context of the specific circumstances surrounding these predicted takes. We also collectively evaluate this information, as well as other more taxa-specific information and mitigation measure effectiveness, in group-specific discussions that support our negligible impact conclusions for each stock. As described above, no serious injury or mortality is expected or authorized for any species or stock.

The Description of the Specified Activities section of this preamble describes Ocean Wind's specified activities that may result in take of marine mammals and an estimated schedule for conducting those activities. Ocean Wind has provided a realistic construction schedule although we recognize schedules may shift for a variety of reasons (*e.g.,* weather or supply delays). However, the total amount of take would not exceed the 5-year totals and maximum annual total in any given year indicated in Tables 34 and 35, respectively.

We base our analysis and negligible impact determination on the maximum number of takes that could occur and are authorized annually and across the effective period of these regulations and extensive qualitative consideration of other contextual factors that influence the degree of impact of the takes on the affected individuals and the number and context of the individuals affected. As stated before, the number of takes, both maximum annual and 5-year total, alone are only a part of the analysis.

To avoid repetition, we provide some general analysis in this Negligible Impact Analysis and Determination section that applies to all the species listed in Table 2, given that some of the anticipated effects of Ocean Wind's construction activities on marine mammals are expected to be relatively similar in nature. Then, we subdivide into more detailed discussions for mysticetes, odontocetes, and pinnipeds which have broad life-history traits that support an overarching discussion of some factors considered within the analysis for those groups (*e.g.,* habitat-use patterns, high-level differences in feeding strategies).

Last, we provide a negligible impact determination for each species or stock, providing species or stock-specific information or analysis, where appropriate, for example, for North Atlantic right whales given their population status. Organizing our analysis by grouping species or stocks that share common traits or that would respond similarly to effects of Ocean Wind's activities, and then providing species- or stock-specific information allows us to avoid duplication while ensuring that we have analyzed the effects of the specified activities on each affected species or stock. It is important to note that in the group or species sections, we base our negligible impact analysis on the maximum annual take that is predicted under the 5-year rule; however, the majority of the impacts are associated with WTG foundation and OSS foundation installation, which would occur largely within the first 2 to 3 years (2023 through 2024 or 2025). The estimated take in the other years is expected to be notably less, which is reflected in the total take that would be allowable under the rule (see Tables 33, 34, and 35).

As described previously, no serious injury or mortality is anticipated or authorized in this rule. Any Level A harassment authorized would be in the form of auditory injury (*i.e.,* PTS) and not non-auditory injury (*e.g.,* lung injury or gastrointestinal injury from UXO/MEC detonation). The amount of harassment Ocean Wind has requested, and NMFS is authorizing, is based on exposure models that consider the outputs of acoustic source and

propagation models and other data such as frequency of occurrence or group sizes. Several conservative parameters and assumptions are ingrained into these models, such as assuming forcing functions that consider direct contact with piles (*i.e.,* no cushion allowances) and application of the average summer sound speed profile to all months within a given season. The exposure model results do not reflect any mitigation measures (other than 10 dB sound attenuation) or avoidance response. The amount of take requested and authorized also reflects careful consideration of other data (*e.g.,* group size data) and for Level A harassment potential of some large whales, the consideration of mitigation measures. For all species, the amount of take authorized represents the maximum amount of Level A harassment and Level B harassment that could occur.

*Behavioral Disturbance*

In general, NMFS anticipates that impacts on an individual that has been harassed are likely to be more intense when exposed to higher received levels and for a longer duration (though this is in no way a strictly linear relationship for behavioral effects across species, individuals, or circumstances) and less severe impacts result when exposed to lower received levels and for a brief duration. However, there is also growing evidence of the importance of contextual factors such as distance from a source in predicting marine mammal behavioral response to sound—*i.e.,* sounds of a similar level emanating from a more distant source have been shown to be less likely to evoke a response of equal magnitude (DeRuiter and Doukara, 2012; Falcone *et al.,* 2017). As described in the Potential Effects to Marine Mammals and their Habitat section of the proposed rule, the intensity and duration of any impact resulting from exposure to Ocean Wind's activities is dependent upon a number of contextual factors including, but not limited to, sound source frequencies, whether the sound source is moving towards the animal, hearing ranges of marine mammals, behavioral state at time of exposure, status of individual exposed (*e.g.,* reproductive status, age class, health) and an individual's experience with similar sound sources. Southall *et al.* (2021), Ellison *et al.* (2012) and Moore and Barlow (2013), among others, emphasize the importance of context (*e.g.,* behavioral state of the animals, distance from the sound source) in evaluating behavioral responses of marine mammals to acoustic sources. Harassment of marine mammals may result in behavioral modifications (*e.g.,* avoidance, temporary cessation of foraging or communicating, changes in respiration or group dynamics, masking) or may result in auditory impacts such as hearing loss. In addition, some of the lower level physiological stress responses (*e.g.,* change in respiration, change in heart rate) discussed previously would likely co-occur with the behavioral modifications, although these physiological responses are more difficult to detect and fewer data exist relating these responses to specific received levels of sound. Takes by Level B harassment, then, may have a stress-related physiological component as well; however, we would not expect Ocean Wind's activities to produce conditions of long-term and continuous exposure to noise leading to long-term physiological stress responses in marine mammals that could affect reproduction or survival.

In the range of behavioral effects that might be expected to be part of a response that qualifies as an instance of Level B harassment by behavioral disturbance (which by nature of the way it is modeled/counted, occurs within 1 day), the less severe end might include exposure to comparatively lower levels of a sound, at a greater distance from the animal, for a few or several minutes. A less severe exposure of this nature could result in a behavioral response such as avoiding an area that an animal would otherwise have chosen to move through or feed in for some amount of time, or breaking off one or a few feeding bouts. More severe effects could occur if an animal gets close enough to the source to receive a comparatively higher level, is exposed continuously to one source for a longer time, or is exposed intermittently to different sources throughout a day. Such effects might result in an animal having a more severe flight response and leaving a larger area for a day or more or potentially losing feeding opportunities for a day. However, such severe behavioral effects are expected to occur infrequently.

Many species perform vital functions, such as feeding, resting, traveling, and socializing on a diel cycle (24-hour cycle). Behavioral reactions to noise exposure, when taking place in a biologically important context, such as disruption of critical life functions, displacement, or avoidance of important habitat, are more likely to be significant if they last more than 1 day or recur on subsequent days (Southall *et al.,* 2007) due to diel and lunar patterns in diving and foraging behaviors observed in many cetaceans (Baird *et al.,* 2008; Barlow *et al.,* 2020; Henderson *et al.,* 2016; Schorr *et al.,* 2014). It is important to note the water depth in the Project Area is shallow (ranging up to 40 m in the ECRs and 15 to 36 m in the Lease Area) and deep diving species, such as sperm whales, are not expected to be engaging in deep foraging dives when exposed to noise above NMFS harassment thresholds during the specified activities. Therefore, we do not anticipate impacts to deep foraging behavior to be impacted by the specified activities.

It is also important to identify that the estimated number of takes does not necessarily equate to the number of individual animals Ocean Wind expects to harass (which is lower) but rather to the instances of take (*i.e.,* exposures above the Level B harassment thresholds) that may occur. These instances may represent either brief exposures of seconds for UXO/MEC detonations, seconds to minutes for HRG surveys, or, in some cases, longer durations of exposure within a day (*e.g.,* pile driving). Some individuals of a species may experience recurring instances of take over multiple days throughout the year while some members of a species or stock may experience one exposure as they move through an area, which means that the number of individuals taken is smaller than the total estimated takes. In short, for species that are more likely to be migrating through the area and/or for which only a comparatively smaller number of takes are predicted (*e.g.,* some of the mysticetes), it is more likely that each take represents a different individual whereas for non-migrating species with larger amounts of predicted take, we expect that the total anticipated takes represent exposures of a smaller number of individuals of which some would be taken across multiple days.

For Ocean Wind, impact pile driving of foundation piles is most likely to result in a higher magnitude and severity of behavioral disturbance than other activities (*i.e.,* vibratory pile driving, UXO/MEC detonations, and HRG surveys). Impact pile driving has higher source levels and longer durations (on an annual basis) than vibratory pile driving and HRG surveys. HRG survey equipment also produces much higher frequencies than pile driving, resulting in minimal sound propagation. While UXO/MEC detonations may have higher source levels, impact pile driving is planned for longer durations (*i.e.,* a maximum of 10 UXO/MEC detonations are planned, which would result in only instantaneous exposures). While impact pile driving for foundation installation is anticipated to be most impactful for these reasons, impacts are minimized

through implementation of mitigation measures, including use of a sound attenuation system, soft-starts, the implementation of clearance zones that would facilitate a delay to pile-driving commencement, and implementation of shutdown zones. For example, given sufficient notice through the use of soft-start, marine mammals are expected to move away from a sound source that is disturbing prior to becoming exposed to very loud noise levels. The requirement to couple visual monitoring and PAM before and during all foundation installation and UXO/MEC detonations will increase the overall capability to detect marine mammals compared to one method alone. Measures such as the requirement to apply sound attenuation devices and implement clearance zones also apply to UXO/MEC detonation(s), which also have the potential to elicit more severe behavioral reactions in the unlikely event that an animal is relatively close to the explosion in the instant that it occurs; hence, severity of behavioral responses are expected to be lower than would be the case without mitigation.

Occasional, milder behavioral reactions are unlikely to cause long-term consequences for individual animals or populations, and even if some smaller subset of the takes are in the form of a longer (several hours or a day) and more severe response, if they are not expected to be repeated over numerous or sequential days, impacts to individual fitness are not anticipated. Also, the effect of disturbance is strongly influenced by whether it overlaps with biologically important habitats when individuals are present—avoiding biologically important habitats will provide opportunities to compensate for reduced or lost foraging (Keen *et al.,* 2021). Nearly all studies and experts agree that infrequent exposures of a single day or less are unlikely to impact an individual's overall energy budget (Farmer *et al.,* 2018; Harris *et al.,* 2017; King *et al.,* 2015; National Academy of Science, 2017; New *et al.,* 2014; Southall *et al.,* 2007; Villegas-Amtmann *et al.,* 2015).

*Temporary Threshold Shift (TTS)*

TTS is one form of Level B harassment that marine mammals may incur through exposure to Ocean Wind's activities and, as described earlier, the takes by Level B harassment may represent takes in the form of behavioral disturbance, TTS, or both. As discussed in the Potential Effects of Specified Activities on Marine Mammals and their Habitat section of the proposed rule, in general, TTS can last from a few minutes to days, be of varying degree, and occur across different frequency bandwidths, all of which determine the severity of the impacts on the affected individual, which can range from minor to more severe. Impact and vibratory pile driving and UXO/MEC detonations are broadband noise sources but generate sounds in the lower frequency ranges (with most of the energy below 1–2 kHz, but with a small amount energy ranging up to 20 kHz); therefore, in general and all else being equal, we would anticipate the potential for TTS is higher in low-frequency cetaceans (*i.e.,* mysticetes) than other marine mammal hearing groups and would be more likely to occur in frequency bands in which they communicate. However, we would not expect the TTS to span the entire communication or hearing range of any species given that the frequencies produced by these activities do not span entire hearing ranges for any particular species. Additionally, though the frequency range of TTS that marine mammals might sustain would overlap with some of the frequency ranges of their vocalizations, the frequency range of TTS from Ocean Wind's pile driving and UXO/MEC detonation activities would not typically span the entire frequency range of one vocalization type, much less span all types of vocalizations or other critical auditory cues for any given species. The required mitigation measures further reduce the potential for TTS in mysticetes.

Generally, both the degree of TTS and the duration of TTS would be greater if the marine mammal is exposed to a higher level of energy (which would occur when the peak dB level is higher or the duration is longer). The threshold for the onset of TTS was discussed previously (see the Estimated Take section of this preamble). However, source level alone is not a predictor of TTS. An animal would have to approach closer to the source or remain in the vicinity of the sound source appreciably longer to increase the received SEL, which would be difficult considering the required mitigation and the nominal speed of the receiving animal relative to the stationary sources such as impact pile driving. The recovery time of TTS is also of importance when considering the potential impacts from TTS. In TTS laboratory studies (as discussed in the Potential Effects of the Specified Activities on Marine Mammals and their Habitat section of the proposed rule), some using exposures of almost an hour in duration or up to 217 SEL, almost all individuals recovered within 1 day (or less, often in minutes) and we note that while the pile-driving activities last for hours a day, it is unlikely that most marine mammals would stay in the close vicinity of the source long enough to incur more severe TTS. UXO/MEC detonation also has the potential to result in TTS. However, given the duration of exposure is extremely short (milliseconds), the degree of TTS (*i.e.,* the amount of dB shift) is expected to be small and TTS duration is expected to be short (minutes to hours). Overall, given the small number of times that any individual might incur TTS, the low degree of TTS and the short anticipated duration, and the unlikely scenario that any TTS overlapped the entirety of a critical hearing range, it is unlikely that TTS (of the nature expected to result from the project's activities) would result in behavioral changes or other impacts that would impact any individual's (of any hearing sensitivity) reproduction or survival.

*Permanent Threshold Shift (PTS)*

NMFS is authorizing a very small amount of take by PTS to some marine mammal individuals. The numbers of authorized annual takes by Level A harassment are relatively low for all marine mammal stocks and species (Table 33). The only activities incidental to which we anticipate PTS may occur is from exposure to impact pile driving and UXO/MEC detonation, which produces sounds that are both impulsive and primarily concentrated in the lower frequency ranges (below 1 kHz) (David, 2006; Krumpel *et al.,* 2021).

There are no PTS data on cetaceans and only one instance of PTS being induced in older harbor seals (Reichmuth *et al.,* 2019). However, available TTS data (of mid-frequency hearing specialists exposed to mid- or high-frequency sounds (Southall *et al.,* 2007; NMFS, 2018; Southall *et al.,* 2019)) suggest that most threshold shifts occur in the frequency range of the source up to one octave higher than the source. We would anticipate a similar result for PTS. Further, no more than a small degree of PTS is expected to be associated with any of the incurred Level A harassment, given it is unlikely that animals would stay in the close vicinity of a source for a duration long enough to produce more than a small degree of PTS.

PTS would consist of minor degradation of hearing capabilities occurring predominantly at frequencies one-half to one octave above the frequency of the energy produced by pile driving or instantaneous UXO/MEC detonation (*i.e.,* the low-frequency region below 2 kHz) (Cody and

Johnstone, 1981; McFadden, 1986; Finneran, 2015), not severe hearing impairment. If hearing impairment occurs from either impact pile driving or UXO/MEC detonation, it is most likely that the affected animal would lose a few decibels in its hearing sensitivity, which in most cases is not likely to meaningfully affect its ability to forage and communicate with conspecifics. Ocean Wind estimates 10 UXOs/MECs may be detonated and the exposure analysis conservatively assumes that all of the UXOs/MECs found would consist of the largest charge weight of UXO/MEC (E12; 454 kg). However, it is highly unlikely that all charges would be the maximum size; thus, the amount of Level A harassment that may occur incidental to the detonation of the UXOs/MECs is likely less than what is estimated here. In addition, during impact pile driving, given sufficient notice through use of soft-start prior to implementation of full hammer energy during impact pile driving, marine mammals are expected to move away from a sound source that is disturbing prior to it resulting in severe PTS.

*Auditory Masking or Communication Impairment*

The ultimate potential impacts of masking on an individual are similar to those discussed for TTS (*e.g.,* decreased ability to communicate, forage effectively, or detect predators), but an important difference is that masking only occurs during the time of the signal, versus TTS, which continues beyond the duration of the signal. Also, though, masking can result from the sum of exposure to multiple signals, none of which might individually cause TTS. Fundamentally, masking is referred to as a chronic effect because one of the key potential harmful components of masking is its duration—the fact that an animal would have reduced ability to hear or interpret critical cues becomes much more likely to cause a problem the longer it is occurring. Inherent in the concept of masking is the fact that the potential for the effect is only present during the times that the animal and the source are in close enough proximity for the effect to occur (and further, this time period would need to coincide with a time that the animal was utilizing sounds at the masked frequency).

As our analysis has indicated, for this project we expect that impact pile driving foundations have the greatest potential to mask marine mammal signals, and this pile driving may occur for several, albeit intermittent, hours per day, for multiple days per year. Masking is fundamentally more of a concern at lower frequencies (which are pile-driving dominant frequencies), because low frequency signals propagate significantly further than higher frequencies and because they are more likely to overlap both the narrower low frequency calls of mysticetes, as well as many non-communication cues related to fish and invertebrate prey, and geologic sounds that inform navigation. However, the area in which masking would occur for all marine mammal species and stocks (*e.g.,* predominantly in the vicinity of the foundation pile being driven) is small relative to the extent of habitat used by each species and stock. In summary, the nature of Ocean Wind's activities, paired with habitat use patterns by marine mammals, does not support the likelihood that the level of masking that could occur would have the potential to affect reproductive success or survival.

*Impacts on Habitat and Prey*

Construction activities and UXO/MEC detonation may result in fish and invertebrate mortality or injury very close to the source, and all Ocean Wind's activities may cause some fish to leave the area of disturbance. It is anticipated that any mortality or injury would be limited to a very small subset of available prey and the implementation of mitigation measures such as the use of a noise attenuation system during impact pile driving and UXO/MEC detonation would further limit the degree of impact (again noting UXO/MEC detonation would be limited to 10 events over 5 years). Behavioral changes in prey in response to construction activities could temporarily impact marine mammals' foraging opportunities in a limited portion of the foraging range but, because of the relatively small area of the habitat that may be affected at any given time (*e.g.,* around a pile being driven), the impacts to marine mammal habitat are not expected to cause significant or long-term negative consequences.

Cable presence is not anticipated to impact marine mammal habitat as these would be buried, and any electromagnetic fields emanating from the cables are not anticipated to result in consequences that would impact marine mammals' prey to the extent they would be unavailable for consumption.

The presence of wind turbines within the Lease Area could have longer-term impacts on marine mammal habitat, as the project would result in the persistence of the structures within marine mammal habitat for more than 30 years. The presence of structures such as wind turbines is, in general, likely to result in certain oceanographic effects in the marine environment, and may alter aggregations and distribution of marine mammal zooplankton prey through changing the strength of tidal currents and associated fronts, changes in stratification, primary production, the degree of mixing, and stratification in the water column (Chen *et al.,* 2021; Johnson *et al.,* 2021; Christiansen *et al.,* 2022; Dorrell *et al.,* 2022).

As discussed in the Potential Effects of the Specified Activities on Marine Mammals and their Habitat section of the proposed rule, the project would consist of no more than 101 foundations (98 WTGs and 3 OSSs) in the Lease Area, which will gradually become operational following construction completion, in around Year 3 of the rule. While there are likely to be oceanographic impacts from the presence of the Ocean Wind project, meaningful oceanographic impacts relative to stratification and mixing that would significantly affect marine mammal habitat and prey over large areas in key foraging habitats during the effective period of the regulations is not anticipated (which considers 2–3 years of turbine operation). For these reasons, if oceanographic features are affected by the project during the effective period of the regulations, the impact on marine mammal habitat and their prey is likely to be comparatively minor; therefore, we are not authorizing take due to habitat and prey impacts.

The Ocean Wind 1 Biological Opinion provided an evaluation of the presence and operation of the Project on, among other species, marine mammals and their prey. While the consultation considered the life of the project (25+ years), we considered the potential for the habitat and prey impacts to also occur within the 5-year effective time frame of this rule. Overall, the Biological Opinion concluded that impacts from loss of sandy bottom habitat (from the presence of turbines and placement of scour protection) as well as any beneficial reef effects are expected to be so small that they cannot be meaningfully measured, evaluated, or detected and are, therefore, insignificant. The Biological Opinion also concluded that the presence and operation of the wind farm may change the distribution of plankton with the wind farm, these changes are not expected to affect the oceanographic forces transporting zooplankton into the area. Therefore, the Biological Opinion concluded that the overall reduction in biomass of plankton is not an anticipated outcome of operating the

Project. Thus, because changes in the biomass of zooplankton are not anticipated, any higher trophic level impacts are also not anticipated. That is, no effects to pelagic fish or benthic invertebrates that depend on plankton as forage food are expected to occur. Zooplankton, fish and invertebrates are all considered marine mammal prey and, as fully described in the Biological Opinion, measurable, detectable or significant changes to marine mammal prey abundance and distribution from wind farm operation is not anticipated.

*Mitigation To Reduce Impacts on All Species*

This rulemaking includes a variety of mitigation measures designed to minimize impacts on all marine mammals, with a focus on North Atlantic right whales (the latter is described in more detail below). For impact pile driving of foundation piles and UXO/MEC detonations, nine overarching mitigation measures are required, which are intended to reduce both the number and intensity of marine mammal takes: (1) seasonal/time of day work restrictions; (2) use of multiple PSOs to visually observe for marine mammals (with any detection within specifically designated zones that would trigger a delay or shutdown); (3) use of PAM to acoustically detect marine mammals, with a focus on detecting baleen whales (with any detection within designated zones triggering delay or shutdown); (4) implementation of clearance zones; (5) implementation of shutdown zones; (6) use of soft-start; (7) use of noise attenuation technology; (8) maintaining situational awareness of marine mammal presence through the requirement that any marine mammal sighting(s) by Ocean Wind personnel must be reported to PSOs; (9) sound field verification monitoring; and (10) Vessel Strike Avoidance measures to reduce the risk of a collision with a marine mammal and vessel. For cofferdam and goal post installation and removal, we are requiring five overarching mitigation measures: (1) seasonal/time of day work restrictions; (2) use of multiple PSOs to visually observe for marine mammals (with any detection with specifically designated zones that would trigger a delay or shutdown); (3) implementation of clearance zones; (4) implementation of shutdown zones); and (5) maintaining situational awareness of marine mammal presence through the requirement that any marine mammal sighting(s) by Ocean Wind personnel must be reported to PSOs. Lastly, for HRG surveys, we are requiring six measures: (1) measures specifically for Vessel Strike Avoidance; (2) specific requirements during daytime and nighttime HRG surveys; (3) implementation of clearance zones; (4) implementation of shutdown zones; (5) use of ramp-up of acoustic sources; and (6) maintaining situational awareness of marine mammal presence through the requirement that any marine mammal sighting(s) by Ocean Wind personnel must be reported to PSOs.

NMFS prescribes mitigation measures based on the following rationale. For activities with large harassment isopleths, Ocean Wind is committed to reducing the noise levels generated to the lowest levels practicable and is required to ensure that they do not exceed a noise footprint above that which was modeled, assuming a 10-dB attenuation. Use of a soft-start during impact pile driving will allow animals to move away from (*i.e.,* avoid) the sound source prior to applying higher hammer energy levels needed to install the pile (Ocean Wind will not use a hammer energy greater than necessary to install piles). Similarly, ramp-up during HRG surveys would allow animals to move away and avoid the acoustic sources before they reach their maximum energy level. For all activities (with some exception for UXO/MEC detonations, which would not have a shutdown zone), clearance zone and shutdown zone implementation, which are required when marine mammals are within given distances associated with certain impact thresholds for all activities, will reduce the magnitude and severity of marine mammal take. Additionally, the use of multiple PSOs (WTG and OSS foundation installation, temporary cofferdam and goal post installation and removal, UXO/MEC detonations, HRG surveys), PAM operators (for impact foundation installation and UXO/MEC detonations), and maintaining awareness of marine mammal sightings reported in the region (WTG and OSS foundation installation, temporary cofferdam and goal post installation and removal, UXO/MEC detonations, HRG surveys) will aid in detecting marine mammals that would trigger the implementation of the mitigation measures. The reporting requirements including SFV reporting (for foundation installation, foundation operation, and UXO/MEC detonations), will assist NMFS in identifying if impacts beyond those analyzed in this final rule are occurring, potentially leading to the need to enact adaptive management measures in addition to or in place of the mitigation measures.

*Mysticetes*

Six mysticete species (comprising six stocks) of cetaceans (North Atlantic right whale, blue whale, humpback whale, fin whale, sei whale, and minke whale) may be taken by harassment. These species, to varying extents, utilize the specified geographic region, including the Project Area, for the purposes of migration, foraging, and socializing. Mysticetes are in the low-frequency hearing group.

Behavioral data on mysticete reactions to pile-driving noise are scant. Kraus *et al.* (2019) predicted that the three main impacts of offshore wind farms on marine mammals would consist of displacement, behavioral disruptions, and stress. Broadly, we can look to studies that have focused on other noise sources such as seismic surveys and military training exercises, which suggest that exposure to loud signals can result in avoidance of the sound source (or displacement if the activity continues for a longer duration in a place where individuals would otherwise have been staying, which is less likely for mysticetes in this area), disruption of foraging activities (if they are occurring in the area), local masking around the source, associated stress responses, and impacts to prey, as well as TTS or PTS in some cases.

Mysticetes encountered in the Project Area are expected to primarily be migrating and, to a lesser degree, may be engaged in foraging behavior. The extent to which an animal engages in these behaviors in the area is species-specific and varies seasonally. Many mysticetes are expected to predominantly be migrating through the Project Area towards or from feeding ground located further north (*e.g.,* southern New England region, Gulf of Maine, Canada). While we acknowledged above that mortality, hearing impairment, or displacement of mysticete prey species may result locally from impact pile driving and UXO/MEC detonations, given the very short duration of and broad availability of prey species in the area and the availability of alternative suitable foraging habitat for the mysticete species most likely to be affected, any impacts on mysticete foraging is expected to be minor. Whales temporarily displaced from the Project Area are 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 habitats found further north. In addition, any displacement of whales or interruption of foraging bouts would be expected to be relatively temporary in nature.

The potential for repeated exposures is dependent upon the residency time of whales, with migratory animals unlikely to be exposed on repeated occasions and animals remaining in the area to be more likely exposed repeatedly. For mysticetes, where relatively low amounts of species-specific take by Level B harassment are predicted (compared to the abundance of each mysticete species or stock, such as is indicated in Table 33) and movement patterns suggest that individuals would not necessarily linger in a particular area for multiple days, each predicted take likely represents an exposure of a different individual; the behavioral impacts would, therefore, be expected to occur within a single day within a year—an amount that would clearly not be expected to impact reproduction or survival. Species with longer residence time in the Project Area may be subject to repeated exposures across multiple days.

In general, for this project, the duration of exposures would not be continuous throughout any given day, and pile driving would not occur on all consecutive days within a given year due to weather delays or any number of logistical constraints Ocean Wind has identified. Species-specific analysis regarding potential for repeated exposures and impacts is provided below.

Fin, humpback, minke, and sei whales are the only mysticete species for which PTS is anticipated and authorized. As described previously, PTS for mysticetes from some project activities may overlap frequencies used for communication, navigation, or detecting prey. However, given the nature and duration of the activity, the mitigation measures, and likely avoidance behavior, any PTS is expected to be of a small degree, would be limited to frequencies where pile-driving noise is concentrated (*i.e.,* only a small subset of their expected hearing range) and would not be expected to impact reproductive success or survival.

North Atlantic Right Whale

North Atlantic right whales are listed as endangered under the ESA and as both depleted and strategic stock under the MMPA. As described in the Potential Effects to Marine Mammals and Their Habitat section of the proposed rule, North Atlantic right whales are threatened by a low population abundance, higher than average mortality rates, and lower than average reproductive rates. Recent studies have reported individuals showing high stress levels (*e.g.,* Corkeron *et al.,* 2017) and poor health, which has further implications on reproductive success and calf survival (Christiansen *et al.,* 2020; Stewart *et al.,* 2021; Stewart *et al.,* 2022). As described below, a UME has been designated for North Atlantic right whales. Given this, the status of the North Atlantic right whale population is of heightened concern and, therefore, merits additional analysis and consideration. No injury or mortality is anticipated or authorized for this species.

For North Atlantic right whales, this rule authorizes up to 14 takes, by Level B harassment only, over the 5-year period, with a maximum annual allowable take of 7 (equating to approximately 2.1 percent of the stock abundance, if each take were considered to be of a different individual), with far lower numbers than that expected in the years without foundation installation (*e.g.,* years when only HRG surveys would be occurring). The Project Area is known as a migratory corridor for North Atlantic right whales and given the nature of migratory behavior (*e.g.,* continuous path), as well as the low number of total takes, we anticipate that few, if any, of the instances of take would represent repeat takes of any individual, though it could occur if whales are engaged in opportunistic foraging behavior. Whitt *et al.* (2013) observed two juveniles potentially skim-feeding off the coast of Barnegat Bay, New Jersey in January. While opportunistic foraging may occur in the Project area, the habitat does not support prime foraging habitat.

The highest density of North Atlantic right whales in the Project Area occurs in the winter (Table 7). The Mid-Atlantic, including the Project Area, may be a stopover site for migrating North Atlantic right whales moving to or from southeastern calving grounds. Migrating North Atlantic right whales have been acoustically detected north of the Project Area in the New York Bight from February to May and August through December (Biedron *et al.,* 2009). Similarly, the waters off the coast of New Jersey, including those surrounding the Project Area in the New Jersey Wind Energy Area (NJ WEA), have documented North Atlantic right whale presence as the area is an important migratory route for the species to the northern feeding areas near the Gulf of Maine and Georges Banks and to their southern breeding and calving grounds off the southeastern U.S. (CETAP, 1982; Knowlton and Kraus, 2001; Knowlton *et al.,* 2022; Biedron *et al.,* 2009; DoC, 2016b). However, comparatively, the area is not known as an important area for feeding, breeding, or calving.

North Atlantic right whales range outside the Project Area for their main feeding, breeding, calving activities (Geo-Marine, 2010). Additional qualitative observations include animals feeding and socializing in New England waters, north of the NJ WEA (Quintana-Rizzo *et al.,* 2021). The North Atlantic right whales observed during the study period, north of the NJ WEA, were primarily concentrated in the northeastern and southeastern sections of the Massachusetts WEA (MA WEA) during the summer (June–August) and winter (December–February). North Atlantic right whale distribution did shift to the west into the Rhode Island/Massachusetts (RI/MA) WEA in the spring (March–May). Quintana-Rizzo *et al.* (2021) found that approximately 23 percent of the right whale population is present from December through May, and the mean residence time has tripled to an average of 13 days during these months. The NJ WEA is not in or near these areas important to feeding, breeding, and calving activities.

In general, North Atlantic right whales in the Project Area are expected to be engaging in migratory behavior. Given the species' migratory behavior in the Project Area, we anticipate individual whales would be typically migrating through the area during most months when foundation installation and UXO/MEC detonation would occur (given the seasonal restrictions on foundation installation and UXO/MEC detonation, rather than lingering for extended periods of time). Other work that involves either much smaller harassment zones (*e.g.,* HRG surveys) or is limited in amount (*e.g.,* cable landfall construction) may also occur during periods when North Atlantic right whales are using the habitat for migration. It is important to note the activities occurring from December through May that may impact North Atlantic right whale would be primarily HRG surveys and the nearshore cofferdam and goalpost installation and removal, which would not result in very high received levels. Across all years, if an individual were to be exposed during a subsequent year, the impact of that exposure is likely independent of the previous exposure given the duration between exposures.

As described in the Description of Marine Mammals in the Geographic Area section, North Atlantic right whales are presently experiencing an ongoing UME (beginning in June 2017). Preliminary findings support human interactions, specifically vessel strikes and entanglements, as the cause of death for the majority of North Atlantic right whales. Given the current status of

the North Atlantic right whale, the loss of even one individual could significantly impact the population. No mortality, serious injury, or injury of North Atlantic right whales as a result of the project is expected or authorized. Any disturbance to North Atlantic right whales due to Ocean Wind's activities is expected to result in temporary avoidance of the immediate area of construction. As no injury, serious injury, or mortality is expected or authorized, and Level B harassment of North Atlantic right whales will be reduced to the level of least practicable adverse impact through use of mitigation measures, the authorized number of takes of North Atlantic right whales would not exacerbate or compound the effects of the ongoing UME.

As described in the general *Mysticetes* section above, foundation installation is likely to result in the highest amount of annual take and is of greatest concern given loud source levels. This activity would likely be limited to up to 116 days over a maximum of 2 years, during times when, based on the best available scientific data, North Atlantic right whales are less frequently encountered due to their migratory behavior. The potential types, severity, and magnitude of impacts are also anticipated to mirror that described in the general *Mysticetes* section above, including avoidance (the most likely outcome), changes in foraging or vocalization behavior, masking, a small amount of TTS, and temporary physiological impacts (*e.g.,* change in respiration, change in heart rate). Importantly, the effects of the activities are expected to be sufficiently low-level and localized to specific areas as to not meaningfully impact important behaviors such as migratory behavior of North Atlantic right whales. These takes are expected to result in temporary behavioral reactions, such as slight displacement (but not abandonment) of migratory habitat or temporary cessation of feeding. Further, given these exposures are generally expected to occur to different individual right whales migrating through (*i.e.,* many individuals would not be impacted on more than 1 day in a year), with some subset potentially being exposed on no more than a few days within the year, they are unlikely to result in energetic consequences that could affect reproduction or survival of any individuals.

Overall, NMFS expects that any behavioral harassment of North Atlantic right whales incidental to the specified activities would not result in changes to their migration patterns or foraging success, as only temporary avoidance of an area during construction is expected to occur. As described previously, North Atlantic right whales migrating through the Project Area are not expected to remain in this habitat for extensive durations, and any temporarily displaced animals would be able to return to or continue to travel through and forage in these areas once activities have ceased.

Although acoustic masking may occur in the vicinity of the foundation installation activities, based on the acoustic characteristics of noise associated with pile driving (*e.g.,* frequency spectra, short duration of exposure) and construction surveys (*e.g.,* intermittent signals), NMFS expects masking effects to be minimal (*e.g.,* impact pile driving) to none (*e.g.,* HRG surveys). In addition, masking would likely only occur during the period of time that a North Atlantic right whale is in the relatively close vicinity of pile driving, which is expected to be intermittent within a day, and confined to the months in which North Atlantic right whales are at lower densities and primarily moving through the area, anticipated mitigation effectiveness, and likely avoidance behaviors. TTS is another potential form of Level B harassment that could result in brief periods of slightly reduced hearing sensitivity affecting behavioral patterns by making it more difficult to hear or interpret acoustic cues within the frequency range (and slightly above) of sound produced during impact pile driving; however, any TTS would likely be of low amount, limited duration, and limited to frequencies where most construction noise is centered (below 2 kHz). NMFS expects that right whale hearing sensitivity would return to pre-exposure levels shortly after migrating through the area or moving away from the sound source.

As described in the Potential Effects to Marine Mammals and Their Habitat section of the proposed rule, the distance of the receiver to the source influences the severity of response with greater distances typically eliciting less severe responses. NMFS recognizes North Atlantic right whales migrating could be pregnant females (in the fall) and cows with older calves (in spring) and that these animals may slightly alter their migration course in response to any foundation pile driving; however, as described in the Potential Effects to Marine Mammals and Their Habitat section of the proposed rule, we anticipate that course diversion would be of small magnitude. Hence, while some avoidance of the pile-driving activities may occur, we anticipate any avoidance behavior of migratory North Atlantic right whales would be similar to that of gray whales (Tyack *et al.,* 1983), on the order of hundreds of meters up to 1 to 2 km. This diversion from a migratory path otherwise uninterrupted by the project's activities is not expected to result in meaningful energetic costs that would impact annual rates of recruitment of survival. NMFS expects that North Atlantic right whales would be able to avoid areas during periods of active noise production while not being forced out of this portion of their habitat.

North Atlantic right whale presence in the Project Area is year-round. However, abundance during summer months is lower compared to the winter months with spring and fall serving as ''shoulder seasons'' wherein abundance waxes (fall) or wanes (spring). Given this year-round habitat usage, in recognition that where and when whales may actually occur during project activities is unknown as it depends on the annual migratory behaviors, NMFS is requiring a suite of mitigation measures designed to reduce impacts to North Atlantic right whales to the maximum extent practicable. These mitigation measures (*e.g.,* seasonal/daily work restrictions, vessel separation distances, reduced vessel speed) would not only avoid the likelihood of vessel strikes but also would minimize the severity of behavioral disruptions by minimizing impacts (*e.g.,* through sound reduction using attenuation systems and reduced temporal overlap of project activities and North Atlantic right whales). This would further ensure that the number of takes by Level B harassment that are estimated to occur are not expected to affect reproductive success or survivorship by detrimental impacts to energy intake or cow/calf interactions during migratory transit. However, even in consideration of recent habitat-use and distribution shifts, Ocean Wind would still be installing foundations when the presence of North Atlantic right whales is expected to be lower.

As described in the Description of Marine Mammals in the Geographic Area section, Ocean Wind would be constructed within the North Atlantic right whale migratory corridor BIA, which represent areas and months within which a substantial portion of a species or population is known to migrate. The Lease Area is relatively small compared with the migratory BIA area (approximately 277 $km^2$ for OCS–A 0498 versus the size of the full North Atlantic right whale migratory BIA, 269,448 $km^2$). Because of this, the overall North Atlantic right whale migration is not expected to be

impacted by the proposed activities. There are no known North Atlantic right whale feeding, breeding, or calving areas within the Project Area. Prey species are mobile (*e.g.,* calanoid copepods can initiate rapid and directed escape responses) and are broadly distributed throughout the Project Area (noting again that North Atlantic right whale prey is not particularly concentrated in the Project Area relative to nearby habitats). Therefore, any impacts to prey that may occur are also unlikely to impact marine mammals.

The most significant measure to minimize impacts to individual North Atlantic right whales is the seasonal moratorium on all foundation installation activities from January 1 through April 30, and the limitation on these activities in December (*e.g.,* only work with approval from NMFS), when North Atlantic right whale abundance in the Project Area is expected to be highest. NMFS also expects this measure to greatly reduce the potential for mother-calf pairs to be exposed to impact pile driving noise above the Level B harassment threshold during their annual spring migration through the Project Area from calving grounds to primary foraging grounds (*e.g.,* Cape Cod Bay). UXO/MEC detonations would also be restricted from November 1 through April 30, annually. NMFS expects that exposures to North Atlantic right whales would be reduced due to the additional mitigation measures that would ensure that any exposures above the Level B harassment threshold would result in only short-term effects to individuals exposed.

Pile driving and UXO/MEC detonations may only begin in the absence of North Atlantic right whales (based on visual and passive acoustic monitoring). If pile driving or UXO/MEC detonations have commenced, NMFS anticipates North Atlantic right whales would avoid the area, utilizing nearby waters to carry on pre-exposure behaviors. However, foundation installation activities must be shut down if a North Atlantic right whale is sighted at any distance unless a shutdown is not feasible due to risk of injury or loss of life. Shutdown may occur anywhere if North Atlantic right whales are seen within or beyond the Level B harassment zone, further minimizing the duration and intensity of exposure. NMFS anticipates that if North Atlantic right whales go undetected and they are exposed to foundation installation or UXO/MEC detonation noise, it is unlikely a North Atlantic right whale would approach the sound source locations to the degree that they would purposely expose themselves to very high noise levels. This is because typical observed whale behavior demonstrates likely avoidance of harassing levels of sound where possible (Richardson *et al.,* 1985). These measures are designed to avoid PTS and also reduce the severity of Level B harassment, including the potential for TTS. While some TTS could occur, given the mitigation measures (*e.g.,* delay pile driving upon a sighting or acoustic detection and shutting down upon a sighting or acoustic detection), the potential for TTS to occur is low.

The clearance and shutdown measures are most effective when detection efficiency is maximized, as the measures are triggered by a sighting or acoustic detection. To maximize detection efficiency, NMFS requires the combination of PAM and visual observers. NMFS is requiring communication protocols with other project vessels, and other heightened awareness efforts (*e.g.,* daily monitoring of North Atlantic right whale sighting databases) such that as a North Atlantic right whale approaches the source (and thereby could be exposed to higher noise energy levels), PSO detection efficacy would increase, the whale would be detected, and a delay to commencing foundation installation or shutdown (if feasible) would occur. In addition, the implementation of a soft-start for impact pile driving would provide an opportunity for whales to move away from the source if they are undetected, reducing received levels. The UXO/MEC detonations mitigation measures described above would further reduce the potential to be exposed to high received levels.

For HRG surveys, the maximum distance to the Level B harassment threshold is 141 m. The estimated take, by Level B harassment only, associated with HRG surveys is to account for any North Atlantic right whale sightings PSOs may miss when HRG acoustic sources are active. However, because of the short maximum distance to the Level B harassment threshold, the requirement that vessels maintain a distance of 500 m from any North Atlantic right whales, the fact that whales are unlikely to remain in close proximity to an HRG survey vessel for any length of time, and that the acoustic source would be shut down if a North Atlantic right whale is observed within 500 m of the source, any exposure to noise levels above the harassment threshold (if any) would be very brief. To further minimize exposures, ramp-up of sub-bottom profilers must be delayed during the clearance period if PSOs detect a North Atlantic right whale (or any other ESA-listed species) within 500 m of the acoustic source. With implementation of the mitigation requirements, take by Level A harassment is unlikely and, therefore, not authorized. Potential impacts associated with Level B harassment would include low-level, temporary behavioral modifications, most likely in the form of avoidance behavior. Given the high level of precautions taken to minimize both the amount and intensity of Level B harassment on North Atlantic right whales, it is unlikely that the anticipated low-level exposures would lead to reduced reproductive success or survival.

As described above, no serious injury or mortality, or Level A harassment, of North Atlantic right whale is anticipated or allowed. Extensive North Atlantic right whale-specific mitigation measures (beyond the robust suite required for all species) are expected to further minimize the amount and severity of Level B harassment. Given the documented habitat use within the area, the majority of the individuals predicted taken (including no more than 14 instances of take, by Level B harassment only, over the course of the 5-year rule, with an annual maximum of no more than 7) would be impacted on only 1, or maybe 2, days in a year as North Atlantic right whales utilize this area for migration and would be transiting rather than residing in the area for extended periods of time; and, further, any impacts to North Atlantic right whales are expected to be in the form of lower-level behavioral disturbance. Given the magnitude and severity of the impacts discussed above, and in consideration of the required mitigation and other information presented, Ocean Wind's activities are not expected to result in impacts on the reproduction or survival of any individuals, much less affect annual rates of recruitment or survival. For these reasons, we have determined that the take (by Level B harassment only) anticipated and authorized would have a negligible impact on the North Atlantic right whale.

Blue Whale

The blue whale is listed as Endangered under the ESA, and the western North Atlantic stock is considered Depleted and Strategic under the MMPA. There are no known areas of specific biological importance in or around the Project Area, and there is no ongoing UME. The actual abundance of the stock is likely significantly greater than what is reflected in the SAR because the most recent population estimates are primarily based on surveys conducted in U.S. waters and the stock's range

extends well beyond the U.S. exclusive economic zone (EEZ). No serious injury or mortality is anticipated or authorized for this species.

The rule authorizes up to four takes, by Level B harassment only, over the 5-year period. The maximum annual allowable take by Level B harassment, four, respectively (combined, this annual take (n=4) equates to approximately 0.97 percent of the stock abundance, if each take were considered to be of a different individual). Based on the migratory nature of blue whales and the fact that there are neither feeding nor reproductive areas documented in or near the Project Area, and in consideration of the very low number of predicted annual takes, it is unlikely that the predicted instances of takes would represent repeat takes of any individual—in other words, each take likely represents one whale exposed on 1 day within a year.

With respect to the severity of those individual takes by Level B harassment, we would anticipate impacts to be limited to low-level, temporary behavioral responses with avoidance and potential masking impacts in the vicinity of the turbine installation to be the most likely type of response. Any potential TTS would be concentrated at half or one octave above the frequency band of pile-driving noise (most sound is below 2 kHz) which does not include the full predicted hearing range of blue whales. Any hearing ability temporarily impaired from TTS is anticipated to return to pre-exposure conditions within a relatively short time period after the exposures cease. Any avoidance of the Project Area due to the activities would be expected to be temporary.

Given the magnitude and severity of the impacts discussed above and in consideration of the required mitigation and other information presented, Ocean Wind's activities are not expected to result in impacts on the reproduction or survival of any individuals, much less affect annual rates of recruitment or survival. For these reasons, we have determined that the take by Level B harassment anticipated and authorized will have a negligible impact on the western North Atlantic stock of blue whales.

Fin Whale

The fin whale is listed as Endangered under the ESA, and the western North Atlantic stock is considered both Depleted and Strategic under the MMPA. No UME has been designated for this species or stock. No serious injury or mortality is anticipated or authorized for this species.

The rule authorizes up to 30 takes, by harassment only, over the 5-year period. The maximum annual allowable take by Level A harassment and Level B harassment, would be 4 and 13, respectively (combined, this annual take (n=17) equates to approximately 0.25 percent of the stock abundance, if each take were considered to be of a different individual), with far lower numbers than that expected in the years without foundation installation (*e.g.,* years when only HRG surveys would be occurring). The Project Area does not overlap any known areas of specific biological importance to fin whales. It is likely that some subset of the individual whales exposed could be taken several times annually.

Level B harassment is expected to be in the form of behavioral disturbance, primarily resulting in avoidance of the Project Area where foundation installation is occurring, and some low-level TTS and masking that may limit the detection of acoustic cues for relatively brief periods of time. Any potential PTS would be minor (limited to a few dB) and any TTS would be of short duration and concentrated at half or one octave above the frequency band of pile-driving noise (most sound is below 2 kHz) which does not include the full predicted hearing range of fin whales.

Fin whales are present in the waters off of New Jersey year round and are one of the most frequently observed large whales and cetaceans in continental shelf waters, principally from Cape Hatteras in the Mid-Atlantic northward to Nova Scotia, Canada (Sergeant, 1977; Sutcliffe and Brodie, 1977; CETAP, 1982; Hain *et al.,* 1992; Geo-Marine, 2010; BOEM 2012; Edwards *et al.,* 2015; Hayes *et al.,* 2022). Fin whales have high relative abundance in the Mid-Atlantic and Project Area, most observations occur in the winter and summer months (Geo-Marine, 2010; Hayes *et al.,* 2022) though detections do occur in spring and fall (Watkins *et al.,* 1987; Clark and Gagnon 2002; Geo-Marine, 2010; Morano *et al.,* 2012). However, fin whales typically feed in waters off of New England and within the Gulf of Maine, areas north of the Project Area, as New England and Gulf of St. Lawrence waters represent major feeding ground for fin whales (Hayes *et al.,* 2022). Hain *et al.* (1992), based on an analysis of neonate stranding data, suggested that calving takes place during October to January in latitudes of the U.S. mid-Atlantic region; however, it is unknown where calving, mating, and wintering occur for most of the population (Hayes *et al.,* 2022).

Given the documented habitat use within the area, some of the individuals taken would likely be exposed on multiple days. However, as described the project area does not include areas where fin whales are known to concentrate for feeding or reproductive behaviors and the predicted takes are expected to be in the form of lower-level impacts. Given the magnitude and severity of the impacts discussed above (including no more than 30 takes by harassment only over the course of the 5-year rule, and a maximum annual allowable take by Level A harassment and Level B harassment, of 4 and 13, respectively), and in consideration of the required mitigation and other information presented, Ocean Wind's activities are not expected to result in impacts on the reproduction or survival of any individuals, much less affect annual rates of recruitment or survival. For these reasons, we have determined that the take by harassment anticipated and authorized will have a negligible impact on the western North Atlantic stock of fin whales.

Humpback Whale

The West Indies DPS of humpback whales is not listed as threatened or endangered under the ESA, but the Gulf of Maine stock, which includes individuals from the West Indies DPS, is considered Strategic under the MMPA. However, as described in the Description of Marine Mammals in the Geographic Area section of this preamble, humpback whales along the Atlantic Coast have been experiencing an active UME as elevated humpback whale mortalities have occurred along the Atlantic coast from Maine through Florida since January 2016. Of the cases examined, approximately 40 percent had evidence of human interaction (vessel strike or entanglement). The UME does not yet provide cause for concern regarding population-level impacts and take from vessel strike and entanglement is not authorized. Despite the UME, the relevant population of humpback whales (the West Indies breeding population, or DPS of which the Gulf of Maine stock is a part) remains stable at approximately 12,000 individuals.

The rule authorizes up to 88 takes by harassment only over the 5-year period. The maximum annual allowable take by Level A harassment and Level B harassment, would be 8 and 66, respectively (combined, this maximum annual take (n=74) equates to approximately 5.3 percent of the stock abundance, if each take were considered to be of a different individual), with far lower numbers than that expected in the

years without foundation installation (*e.g.,* years when only HRG surveys would be occurring). Given that humpback whales are known to forage off of New Jersey, it is likely that some subset of the individual whales exposed could be taken several times annually.

Among the activities analyzed, impact pile driving is likely to result in the highest amount of Level A harassment annual take (seven) of humpback whales. The maximum amount of annual take authorized, by Level B harassment, is highest for impact pile driving (n=60; WTGs plus OSS pin piles).

As described in the Description of Marine Mammals in the Geographic Area section, Humpback whales are known to occur regularly throughout the Mid-Atlantic Bight, including New Jersey waters, with strong seasonality where peak occurrences occur April to June (Barco *et al.,* 2002; Geo-Marine, 2010; Curtice *et al.,* 2019; Hayes *et al.,* 2022).

In the western North Atlantic, humpback whales feed during spring, summer, and fall over a geographic range encompassing the eastern coast of the U.S. Feeding is generally considered to be focused in areas north of the project area, including a feeding BIA in the Gulf of Maine/Stellwagen Bank/Great South Channel, 47,701, but has been documented farther south and off the coast of New Jersey. When foraging, humpback whales tend to remain in the area for extended durations to capitalize on the food sources.

Assuming humpback whales who are feeding in waters within or surrounding the Project Area behave similarly, we expect that the predicted instances of disturbance could be comprised of some individuals that may be exposed on multiple days if they are utilizing the area as foraging habitat. Also similar to other baleen whales, if migrating, such individuals would likely be exposed to noise levels from the project above the harassment thresholds only once during migration through the Project Area.

For all the reasons described in the *Mysticetes* section above, we anticipate any potential PTS and TTS would be concentrated at half or one octave above the frequency band of pile-driving noise (most sound is below 2 kHz) which does not include the full predicted hearing range of baleen whales. If TTS is incurred, hearing sensitivity would likely return to pre-exposure levels relatively shortly after exposure ends. Any masking or physiological responses would also be of low magnitude and severity for reasons described above.

Given the magnitude and severity of the impacts discussed above (including no more than 88 takes over the course of the 5-year rule, and a maximum annual allowable take by Level A harassment and Level B harassment, of 8 and 66, respectively), and in consideration of the required mitigation measures and other information presented, Ocean Wind's activities are not expected to result in impacts on the reproduction or survival of any individuals, much less affect annual rates of recruitment or survival. For these reasons, we have determined that the take by harassment anticipated and authorized will have a negligible impact on the Gulf of Maine stock of humpback whales.

Minke Whale

Minke whales are not listed under the ESA, and the Canadian East Coast stock is neither considered Depleted nor strategic under the MMPA. There are no known areas of specific biological importance in or adjacent to the Project Area. As described in the Description of Marine Mammals in the Geographic Area section, a UME has been designated for this species but is pending closure. No serious injury or mortality is anticipated or authorized for this species.

The rule authorizes up to 141 takes, by harassment only, over the 5-year period. The maximum annual allowable take by Level A harassment and Level B harassment, would be 22 and 74, respectively (combined, this annual take (n=96) equates to approximately 0.44 percent of the stock abundance, if each take were considered to be of a different individual), with far lower numbers than that expected in the years without foundation installation (*e.g.,* years when only HRG surveys would be occurring). As described in the Description of Marine Mammals in the Geographic Area section, Minke whales are common offshore the U.S. Eastern Seaboard with a strong seasonal component in the continental shelf and in deeper, off-shelf waters (CETAP, 1982; Hayes *et al.,* 2022). In the Project area, minke whales are predominantly migratory and their known feeding areas are north, including a feeding BIA in the southwestern Gulf of Maine and George's Bank. Therefore, they would be more likely to be moving through (with each take representing a separate individual), though it is possible that some subset of the individual whales exposed could be taken up to a few times annually.

As described in the Description of Marine Mammals in the Geographic Area section, there is a UME for Minke whales, along the Atlantic coast from Maine through South Carolina, with highest number of deaths in Massachusetts, Maine, and New York, and preliminary findings in several of the whales have shown evidence of human interactions or infectious diseases. However, we note that the population abundance is greater than 21,000 and the take authorized through this action is not expected to exacerbate the UME in any way.

We anticipate the impacts of this harassment to follow those described in the general *Mysticetes* section above. Any potential PTS would be minor (limited to a few dB) and any TTS would be of short duration and concentrated at half or one octave above the frequency band of pile-driving noise (most sound is below 2 kHz) which does not include the full predicted hearing range of minke whales. Level B harassment would be temporary, with primary impacts being temporary displacement of the Project Area but not abandonment of any migratory or foraging behavior.

Given the magnitude and severity of the impacts discussed above (including no more than 141 takes of the course of the 5-year rule, and a maximum annual allowable take by Level A harassment and Level B harassment, of 22 and 74, respectively), and in consideration of the required mitigation and other information presented, Ocean Wind's activities are not expected to result in impacts on the reproduction or survival of any individuals, much less affect annual rates of recruitment or survival. For these reasons, we have determined that the take by harassment anticipated and authorized will have a negligible impact on the Canadian Eastern Coastal stock of minke whales.

Sei Whale

Sei whales are listed as Endangered under the ESA, and the Nova Scotia stock is considered both Depleted and Strategic under the MMPA. There are no known areas of specific biological importance in or adjacent to the Project Area and no UME has been designated for this species or stock. No serious injury or mortality is anticipated or authorized for this species.

The rule authorizes up to seven takes, by harassment only, over the 5-year period. The maximum annual allowable take by Level A harassment and Level B harassment, would be one and three, respectively (combined, this annual take (n=4) equates to approximately 0.6 percent of the stock abundance, if each take were considered to be of a different individual). As described in the Description of Marine Mammals in the Geographic Area section, most of the sei whale distribution is concentrated in

Canadian waters and seasonally in northerly U.S. waters, though they are uncommonly observed in the waters off of New Jersey. Because sei whales are migratory and their known feeding areas are east and north of the Project Area (*e.g.,* there is a feeding BIA in the Gulf of Maine), they would be more likely to be moving through and, considering this and the very low number of total takes, it is unlikely that any individual would be exposed more than once within a given year.

With respect to the severity of those individual takes by behavioral Level B harassment, we would anticipate impacts to be limited to low-level, temporary behavioral responses with avoidance and potential masking impacts in the vicinity of the turbine installation to be the most likely type of response. Any potential PTS and TTS would likely be concentrated at half or one octave above the frequency band of pile-driving noise (most sound is below 2 kHz) which does not include the full predicted hearing range of sei whales. Moreover, any TTS would be of a small degree. Any avoidance of the Project Area due to the Project's activities would be expected to be temporary.

Given the magnitude and severity of the impacts discussed above (including no more than seven takes of the course of the 5-year rule, and a maximum annual allowable take by Level A harassment and Level B harassment, of one and three, respectively), and in consideration of the required mitigation and other information presented, Ocean Wind's activities are not expected to result in impacts on the reproduction or survival of any individuals, much less affect annual rates of recruitment or survival. For these reasons, we have determined that the take by harassment anticipated and authorized will have a negligible impact on the Nova Scotia stock of sei whales.

Odontocetes

In this section, we include information here that applies to all of the odontocete species and stocks addressed below. Odontocetes include dolphins, porpoises, and all other whales possessing teeth, and we further divide them into the following subsections: sperm whales, small whales and dolphins, and harbor porpoise. These sub-sections include more specific information, as well as conclusions for each stock represented.

All of the takes of odontocetes authorized incidental to Ocean Wind's specified activities are by pile driving, UXO/MEC detonations, and HRG surveys. No serious injury or mortality is anticipated or proposed. We anticipate that, given ranges of individuals (*i.e.,* that some individuals remain within a small area for some period of time), and non-migratory nature of some odontocetes in general (especially as compared to mysticetes), these takes are more likely to represent multiple exposures of a smaller number of individuals than is the case for mysticetes, though some takes may also represent one-time exposures to an individual. Foundation installation is likely to disturb odontocetes to the greatest extent, compared to UXO/MEC detonations and HRG surveys. While we expect animals to avoid the area during foundation installation and UXO/MEC detonations, their habitat range is extensive compared to the area ensonified during these activities. In addition, as described above, UXO/MEC detonations are instantaneous; therefore, any disturbance would be very limited in time.

As described earlier, Level B harassment may include direct disruptions in behavioral patterns (*e.g.,* avoidance, changes in vocalizations (from masking) or foraging), as well as those associated with stress responses or TTS. Odontocetes are highly mobile species and similar to mysticetes, NMFS expects any avoidance behavior to be limited to the area near the sound source. While masking could occur during foundation installation, it would only occur in the vicinity of and during the duration of the activity, and would not generally occur in a frequency range that overlaps most odontocete communication or any echolocation signals. The mitigation measures (*e.g.,* use of sound attenuation systems, implementation of clearance and shutdown zones) would also minimize received levels such that the severity of any behavioral response would be expected to be less than exposure to unmitigated noise exposure.

Any masking or TTS effects are anticipated to be of low-severity. First, the frequency range of pile driving, the most impactful activity proposed to be conducted in terms of response severity, falls within a portion of the frequency range of most odontocete vocalizations. However, odontocete vocalizations span a much wider range than the low frequency construction activities planned for the project. As described above, recent studies suggest odontocetes have a mechanism to self-mitigate (*i.e.,* reduce hearing sensitivity) the impacts of noise exposure, which could potentially reduce TTS impacts. Any masking or TTS is anticipated to be limited and would typically only interfere with communication within a portion of an odontocete's range and as discussed earlier, the effects would only be expected to be of a short duration and, for TTS, a relatively small degree.

Furthermore, odontocete echolocation occurs predominantly at frequencies significantly higher than low frequency construction activities. Therefore, there is little likelihood that threshold shift would interfere with feeding behaviors. For HRG surveys, the sources operate at higher frequencies than foundation installation activities and UXO/MEC detonations. However, sounds from these sources attenuate very quickly in the water column, as described above. Therefore, any potential for PTS and TTS and masking is very limited. Further, odontocetes (*e.g.,* common dolphins, spotted dolphins, bottlenose dolphins) have demonstrated an affinity to bow-ride actively surveying HRG surveys. Therefore, the severity of any harassment, if it does occur, is anticipated to be minimal based on the lack of avoidance previously demonstrated by these species.

The waters off the coast of New Jersey are used by several odontocete species. However, none except the sperm whale are listed under the ESA, and there are no known habitats of particular importance. In general, odontocete habitat ranges are far-reaching along the Atlantic coast of the U.S., and the waters off of New Jersey, including the Project Area, do not contain any particularly unique odontocete habitat features.

Sperm Whales

Sperm whales are listed as endangered under the ESA, and the North Atlantic stock is considered both Depleted and Strategic under the MMPA. The North Atlantic stock spans the East Coast out into oceanic waters well beyond the U.S. EEZ. Although listed as endangered, the primary threat faced by the sperm whale across its range (*i.e.,* commercial whaling) has been eliminated. Current potential threats to the species globally include vessel strikes, entanglement in fishing gear, anthropogenic noise, exposure to contaminants, climate change, and marine debris. There is no currently reported trend for the stock and, although the species is listed as endangered under the ESA, there are no specific issues with the status of the stock that cause particular concern (*e.g.,* no UMEs). There are no known areas of biological importance (*e.g.,* critical habitat or BIAs) in or near the Project Area. No mortality or serious injury is anticipated or authorized for this species.

The rule authorizes up to 24 takes, by Level B harassment only over the 5-year

period. The maximum annual allowable take by Level B harassment, would be 9, which equates to approximately 0.21 percent of the stock abundance, if each take were considered to be of a different individual), with lower numbers than that expected in the years without foundation installation (*e.g.,* years when only HRG surveys would be occurring). Given sperm whale's preference for deeper waters, especially for feeding, it is unlikely that individuals will remain in the Project Area for multiple days, and therefore, the estimated takes likely represent exposures of different individuals on 1 day annually.

If sperm whales are present in the Project Area during any Project activities, they will likely be only transient visitors and not engaging in any significant behaviors. Further, the potential for TTS is low for reasons described in the general Odontocete section, but if it does occur, any hearing shift would be small and of a short duration. Because whales are not expected to be foraging in the Project Area, any TTS is not expected to interfere with foraging behavior.

Given the magnitude and severity of the impacts discussed above (including no more than 24 takes, by Level B harassment only, over the course of the 5-year rule, and a maximum annual allowable take of 9), and in consideration of the required mitigation and other information presented, Ocean Wind's activities are not expected to result in impacts on the reproduction or survival of any individuals, much less affect annual rates of recruitment or survival. For these reasons, we have determined that the take by harassment anticipated and authorized will have a negligible impact on the North Atlantic stock of sperm whales.

Dolphins and Small Whales (Including Delphinids)

The seven species and eight stocks included in this group (which are indicated in Table 2 in the *Delphinidae* family) are not listed under the ESA; however, short-finned pilot whales are listed as Strategic under the MMPA. There are no known areas of specific biological importance in or around the Project Area for any of these species and no UMEs have been designated for any of these species. No serious injury or mortality is anticipated or authorized for these species.

The seven delphinid species with takes authorized for the Project are Atlantic spotted dolphin, Atlantic white-sided dolphin, common bottlenose dolphin, common dolphin, long-finned pilot whale, short-finned pilot whale, and Risso's dolphin. The rule would allow for the authorization of 90 to 4,308 takes (depending on species) by Level A harassment and Level B harassment, over the five-year period. The maximum annual allowable take for these species by Level A harassment and Level B harassment, would range from 0 to 11 and 30 to 1,584, respectively (this annual take equates to approximately 0.08 to 21.3 percent of the stock abundance, depending on each species, if each take were considered to be of a different individual), with far lower numbers than that expected in the years without foundation installation (*e.g.,* years when only HRG surveys would be occurring).

For the coastal stock of bottlenose dolphins, given the higher number of takes relative to the stock abundance, while some of the takes likely represent exposures of different individuals on 1 day a year, it is likely that some subset of the individuals exposed could be taken several times annually. For Atlantic spotted dolphin, Atlantic white-sided dolphin, common dolphin, the offshore stock of bottlenose dolphin, long- and short-finned pilot whale, and Risso's dolphin, given the number of takes, while many of the takes likely represent exposures of different individuals on 1 day a year, some subset of the individuals exposed could be taken up to a few times annually.

The number of takes, likely movement patterns of the affected species, and the intensity of any Level A or B harassments, combined with the availability of alternate nearby foraging habitat suggests that the likely impacts would not impact the reproduction or survival of any individuals. While delphinids may be taken on several occasions, none of these species are known to have small home ranges within the Project Area or known to be particularly sensitive to anthropogenic noise. The potential for PTS in dolphins and small whales is very low and, if PTS does occur, would occur to a limited number of individuals, be of small degree, and would be limited to the frequency ranges of the activity which does not span across most of their hearing range. Some TTS can also occur but, again, it would be limited to the frequency ranges of the activity and any loss of hearing sensitivity is anticipated to return to pre-exposure conditions shortly after the animals move away from the source or the source ceases.

Given the magnitude and severity of the impacts discussed above and in consideration of the required mitigation and other information presented, Ocean Wind's activities are not expected to result in impacts on the reproduction or survival of any individuals, much less affect annual rates of recruitment or survival. For these reasons, we have determined that the take by harassment anticipated and authorized will have a negligible impact on all of the species and stocks addressed in this section.

Harbor Porpoises

Harbor porpoises are not listed as Threatened or Endangered under the ESA, and the Gulf of Maine/Bay of Fundy stock is neither considered depleted or strategic under the MMPA. The stock is found predominantly in northern U.S. coastal waters (less than 150 m depth) and up into Canada's Bay of Fundy (between New Brunswick and Nova Scotia). Although the population trend is not known, there are no UMEs or other factors that cause particular concern for this stock. No mortality or non-auditory injury are anticipated or authorized for this stock.

The rule would allow for the authorization of up to 608 takes, by harassment only, over the 5-year period. The maximum annual allowable take by Level A harassment and Level B harassment, would be 69 and 350, respectively (combined, this annual take (n=419) equates to approximately 0.44 percent of the stock abundance, if each take were considered to be of a different individual), with far lower numbers than that expected in the years without foundation installation (*e.g.,* years when only HRG surveys would be occurring). Given the number of takes, while many of the takes likely represent exposures of different individuals on 1 day a year, some subset of the individuals exposed could be taken up to a few times annually.

Regarding the severity of takes by Level B harassment, because harbor porpoises are particularly sensitive to noise, it is likely that a fair number of the responses could be of a moderate nature, particularly to pile driving. In response to pile driving, harbor porpoises are likely to avoid the area during construction, as previously demonstrated in Tougaard *et al.* (2009) in Denmark, in Dahne *et al.* (2013) in Germany, and in Vallejo *et al.* (2017) in the United Kingdom, although a study by Graham *et al.* (2019) may indicate that the avoidance distance could decrease over time. However, foundation installation is scheduled to occur off the coast of New Jersey and, given alternative foraging areas, any avoidance of the area by individuals is not likely to impact the reproduction or survival of any individuals. Given only 1 UXO/MEC would be detonated on any given day and only up to 10 UXO/MEC could be detonated under the LOA, any

behavioral response would be brief and of a low severity.

With respect to PTS and TTS, the effects on an individual are likely relatively low given the frequency bands of pile driving (most energy below 2 kHz) compared to harbor porpoise hearing (150 Hz to 160 kHz peaking around 40 kHz). Specifically, TTS is unlikely to impact hearing ability in their more sensitive hearing ranges, or the frequencies in which they communicate and echolocate. We expect any PTS that may occur to be within the very low end of their hearing range where harbor porpoises are not particularly sensitive and any PTS would be of small magnitude. As such, any PTS would not interfere with key foraging or reproductive strategies necessary for reproduction or survival.

As discussed in Hayes *et al.* (2022), Harbor porpoises are seasonally distributed. During fall (October through December) and spring (April through June), harbor porpoises are widely dispersed from New Jersey to Maine, with lower densities farther north and south. During winter (January to March), intermediate densities of harbor porpoises can be found in waters off New Jersey to North Carolina, and lower densities are found in waters off New York to New Brunswick, Canada. In non-summer months they have been seen from the coastline to deep waters (>1,800 m; Westgate *et al.,* 1998), although the majority are found over the continental shelf. While harbor porpoises are likely to avoid the area during any of the project's construction activities, as demonstrated during European wind farm construction, the time of year in which work would occur is when harbor porpoises are not in highest abundance, and any work that does occur would not result in the species' abandonment of the waters off of New Jersey.

Given the magnitude and severity of the impacts discussed above, and in consideration of the required mitigation and other information presented, Ocean Wind's activities are not expected to result in impacts on the reproduction or survival of any individuals, much less affect annual rates of recruitment or survival. For these reasons, we have determined that the take by harassment anticipated and authorized will have a negligible impact on the Gulf of Maine/Bay of Fundy stock of harbor porpoises.

Phocids (Harbor Seals and Gray Seals)

The harbor seal and gray seal are not listed under the ESA, and neither the western North Atlantic stock of gray seal nor the western North Atlantic stock of harbor seal are considered depleted or strategic under the MMPA. There are no known areas of specific biological importance in or around the Project Area. As described in the Description of Marine Mammals in the Geographic Area section, a UME has been designated for harbor seals and gray seals and is described further below. No serious injury or mortality is anticipated or authorized for this species.

For the two seal species, the rule authorizes up to between 649 and 1,749 takes for each species by harassment only over the 5-year period. The maximum annual allowable take for these species by Level A harassment and Level B harassment, would range from 31 to 35 and 305 to 844 (combined, this annual take (n=336 to 879) equates to approximately 1.23 to 1.43 percent of the stock abundance, if each take were considered to be of a different individual), with far lower numbers than that expected in the years without foundation installation (*e.g.,* years when only HRG surveys would be occurring). Though gray seals and harbor seals are considered migratory and no specific feeding areas have been designated in the area, the higher number of takes relative to the stock abundance suggests that while some of the takes likely represent exposures of different individuals on 1 day a year, it is likely that some subset of the individuals exposed could be taken several times annually.

Harbor and gray seals occur in New Jersey waters most often from December through April, with harbor seal occurrences more common than gray seals (Reynolds, 2021). Seals are more likely to be close to shore (*e.g.,* closer to the edge of the area ensonified above NMFS' harassment threshold), such that exposure to foundation installation would be expected to be at comparatively lower levels. Known haul-outs for seals occur near the coastal cofferdam and goal post locations (Oyster Creek, Island Beach State Park in Barnegat Bay, Farm Property, and BL England). However, based on the analysis conducted in Section 1.5.4 of Ocean Wind's ITA application (Figure 1–8), neither Ocean Wind nor NMFS expect the in-air sounds produced to cause take of hauled-out pinnipeds at distances greater than 541 m from the cofferdam installation/removal location (Ocean Wind, 2022b). As all documented pinniped haul-outs are located further than 541 m from each of the cofferdam locations, NMFS does not expect any harassment to occur and has not authorized any take from in-air impacts on hauled-out seals.

As described in the Potential Effects to Marine Mammals and Their Habitat section in the proposed rule, construction of wind farms in Europe resulted in pinnipeds temporarily avoiding construction areas but returning within short time frames after construction was complete (Carroll *et al.,* 2010; Hamre *et al.,* 2011; Hastie *et al.,* 2015; Russell *et al.,* 2016; Brasseur *et al.,* 2010). Effects on pinnipeds that are taken by Level B harassment in the Project Area would likely be limited to reactions such as increased swimming speeds, increased surfacing time, or decreased foraging (if such activity were occurring). Most likely, individuals would simply move away from the sound source and be temporarily displaced from those areas (Lucke *et al.,* 2006; Edren *et al.,* 2010; Skeate *et al.,* 2012; Russell *et al.,* 2016). Given the low anticipated magnitude of impacts from any given exposure (*e.g.,* temporary avoidance), even repeated Level B harassment across a few days of some small subset of individuals, which could occur, is unlikely to result in impacts on the reproduction or survival of any individuals. Moreover, pinnipeds would benefit from the mitigation measures described in 50 CFR part 217—Regulations Governing the Taking and Importing of Marine Mammals Incidental to Specified Activities.

As described above, noise from pile driving is mainly low frequency and, while any PTS and TTS that does occur would fall within the lower end of pinniped hearing ranges (50 Hz to 86 kHz), PTS and TTS would not occur at frequencies around 5 kHz where pinniped hearing is most susceptible to noise-induced hearing loss (Kastelein *et al.,* 2018). In summary, any PTS and TTS would be of small degree and not occur across the entire, or even most sensitive, hearing range. Hence, any impacts from PTS and TTS are likely to be of low severity and not interfere with behaviors critical to reproduction or survival.

Elevated numbers of harbor seal and gray seal mortalities were first observed in July 2018 and occurred across Maine, New Hampshire, and Massachusetts until 2020. Based on tests conducted so far, the main pathogen found in the seals belonging to that UME was phocine distemper virus, although additional testing to identify other factors that may be involved in this UME are underway. Currently, the only active UME is occurring in Maine with some harbor and gray seals testing positive for highly pathogenic avian influenza (HPAI) H5N1. Although elevated strandings continue, neither UME (alone or in combination) provide cause for concern regarding population-level impacts to any of these stocks. For

harbor seals, the population abundance is over 61,000 and annual mortality/serious injury (M/SI) (n=339) is well below PBR (1,729) (Hayes *et al.,* 2020). The population abundance for gray seals in the United States is over 27,000, with an estimated overall abundance, including seals in Canada, of approximately 450,000. In addition, the abundance of gray seals is likely increasing in the U.S. Atlantic, as well as in Canada (Hayes *et al.,* 2020).

Given the magnitude and severity of the impacts discussed above, and in consideration of the required mitigation and other information presented, Ocean Wind's activities are not expected to result in impacts on the reproduction or survival of any individuals, much less affect annual rates of recruitment or survival. For these reasons, we have determined that the take by harassment anticipated and authorized will have a negligible impact on harbor and gray seals.

Negligible Impact Determination

No mortality or serious injury is anticipated to occur or authorized. As described in the analysis above, the impacts resulting from the project's activities cannot be reasonably expected to, and are not reasonably likely to, adversely affect any of the species or stocks through effects on annual rates of recruitment or survival. 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 mitigation and monitoring measures, NMFS finds that the marine mammal take from all of Ocean Wind's specified activities combined 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 estimated to be 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. When the predicted number of individuals to be taken is less than one-third of the species or stock abundance, the take is considered to be of small numbers. Additionally, other qualitative factors may be considered in the analysis, such as the temporal or spatial scale of the activities.

NMFS is authorizing incidental take by Level A harassment and/or Level B harassment of 17 species of marine mammals (with 18 managed stocks). The maximum number of instances of takes by combined Level A harassment and Level B harassment possible within any 1 year relative to the best available population abundance is less than one-third for all species and stocks potentially impacted.

For 16 stocks, less than 3 percent of the stock abundance is authorized for take by harassment; for 1 stock, less than 6 percent of the stock abundance is authorized for take by harassment; and for one stock, less than 22 percent of the stock abundance is authorized for take by harassment. Specific to the North Atlantic right whale, the maximum amount of take, which is by Level B harassment only, is seven, or 2.1 percent of the stock abundance, assuming that each instance of take represents a different individual. Please see Table 35 for information relating to this small numbers analysis.

Based on the analysis contained herein of the activities (including the required mitigation and monitoring measures) and the anticipated take of marine mammals, NMFS finds that small numbers of marine mammals would 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.

Classification

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 ensure 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 promulgation of rulemakings, NMFS consults internally whenever we propose to authorize take for endangered or threatened species, in this case with the NOAA GARFO.

The NMFS Office of Protected Resources has authorized the take of five marine mammal species, which are listed under the ESA: the North Atlantic right, sei, fin, blue, and sperm whale. The Permit and Conservation Division requested initiation of section 7 consultation on September 12, 2022 with GARFO for the promulgation of the rulemaking. NMFS issued a Biological Opinion on April 3, 2023 concluding that the promulgation of the rule and issuance of LOAs thereunder is not likely to jeopardize the continued existence of threatened and endangered species under NMFS' jurisdiction and is not likely to result in the destruction or adverse modification of designated or proposed critical habitat. The Biological Opinion is available at *https://repository.library.noaa.gov/view/noaa/49689.*

The promulgated regulations, as well as requiring the applicant to abide by the reasonable and prudent measure and terms and conditions of the Biological Opinion and Incidental Take Statement, as issued by NMFS.

National Environmental Policy Act (NEPA)

To comply with the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*) and NOAA Administrative Order (NAO) 216–6A, NMFS must evaluate our proposed action (*i.e.,* promulgation of regulation) and alternatives with respect to potential impacts on the human environment. NMFS participated as a cooperating agency on the BOEM 2023 Final Environmental Impact Statement (FEIS), which was finalized on July 3, 2023, and is available at *https://www.boem.gov/renewable-energy/state-activities/ocean-wind-1.* In accordance with 40 CFR 1506.3, NMFS independently reviewed and evaluated the 2023 Ocean Wind 1 FEIS and determined that it is adequate and sufficient to meet our responsibilities under NEPA for the promulgation of this rule and issuance of the associated LOA. NMFS, therefore, has adopted the 2023 Ocean Wind 1 FEIS through a joint Record of Decision (ROD) with BOEM. The joint ROD for adoption of the 2023 Ocean Wind 1 FEIS and promulgation of this final rule and subsequent issuance of a LOA can be found at *https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act.*

Executive Order 12866

The Office of Management and Budget has determined that this rule is not significant for purposes of Executive Order 12866.

Regulatory Flexibility Act

Pursuant to the Regulatory Flexibility Act (RFA; 5 U.S.C. 601 *et seq.*), the Chief Counsel for Regulation of the Department of Commerce certified to the Chief Counsel for Advocacy of the Small Business Administration during the proposed rule stage that this action would not have a significant economic impact on a substantial number of small entities. The factual basis for the certification was published in the proposed rule and is not repeated here. No comments were received regarding this certification. As a result, a regulatory flexibility analysis was not required and none was prepared.

Paperwork Reduction Act

Notwithstanding any other provision of law, no person is required to respond to nor shall a person be subject to a penalty for failure to comply with a collection of information subject to the requirements of the Paperwork Reduction Act (PRA) unless that collection of information displays a currently valid Office of Management and Budget (OMB) control number. These requirements have been approved by OMB under control number 0648–0151 and include applications for regulations, subsequent LOA, and reports. Send comments regarding any aspect of this data collection, including suggestions for reducing the burden, to NMFS.

Coastal Zone Management Act (CZMA)

The Coastal Zone Management Act requires that any applicant for a required federal license or permit to conduct an activity, within the coastal zone or within the geographic location descriptions (*i.e.,* areas outside the coastal zone in which an activity would have reasonably foreseeable coastal effects), affecting any land or water use or natural resource of the coastal zone be consistent with the enforceable policies of a state's federally approved coastal management program. NMFS determined that Ocean Wind's application for an incidental take regulations is an unlisted activity and, thus, is not subject to Federal consistency requirements in the absence of the receipt and prior approval of an unlisted activity review request from the state by the Director of NOAA's Office for Coastal Management. Pursuant to 15 CFR 930.54, NMFS published notice of receipt of Ocean Wind's application in the **Federal Register** on March 7, 2022 (87 FR 12666) and published notice of the proposed rule on October 26, 2022 (87 FR 65868). The state of New Jersey did not request approval from the Director of NOAA's Office for Coastal Management to review Ocean Wind's application as an unlisted activity, and the time period for making such request has expired. Therefore, NMFS has determined the incidental take authorization is not subject to Federal consistency review.

**List of Subjects in 50 CFR Part 217**

Administrative practice and procedure, Endangered and threatened species, Fish, Fisheries, Marine mammals, Penalties, Reporting and recordkeeping requirements, Wildlife.

Dated: September 1, 2023.

**Samuel D. Rauch III,**

*Deputy Assistant Administrator for Regulatory Programs, National Marine Fisheries Service.*

For reasons set forth in the preamble, NMFS amends 50 CFR part 217 to read as follows:

## PART 217—REGULATIONS GOVERNING THE TAKING AND IMPORTING OF MARINE MAMMALS INCIDENTAL TO SPECIFIED ACTIVITIES

■ 1. The authority citation for part 217 continues to read:

**Authority:** 16 U.S.C. 1361 *et seq.,* unless otherwise noted.

■ 2. Add subpart AA, consisting of §§ 217.260 through 217.269, to read as follows:

### Subpart AA—Taking Marine Mammals Incidental to Construction of the Ocean Wind 1 Project Offshore of New Jersey

Sec.



## Subpart AA—Taking Marine Mammals Incidental to Construction of the Ocean Wind 1 Project Offshore of New Jersey

### § 217.260 Specified activity and specified geographical region.

(a) Regulations in this subpart apply to activities associated with the Ocean Wind 1 project (hereafter referred to as the ''Project'') by Ocean Wind, LLC (hereafter referred to as ''LOA Holder''), and those persons it authorizes or funds to conduct activities on its behalf in the area outlined in paragraph (b) of this section. Requirements imposed on LOA Holder must be implemented by those persons it authorizes or funds to conduct activities on its behalf.

(b) The specified geographical region is the Mid-Atlantic Bight, which includes, but is not limited to, the Bureau of Ocean Energy Management (BOEM) Lease Area Outer Continental Shelf (OCS)-A 0498 Commercial Lease of Submerged Lands for Renewable Energy Development, two export cable routes, and two sea-to-shore transition points located in New Jersey at Oyster Creek, Island Beach State Park in Barnegat Bay, Farm Property, and BL England.

(c) The specified activities are impact pile driving of wind turbine generator (WTGs) and offshore substation (OSSs) foundations; vibratory pile driving (install and subsequently remove) of cofferdams and goal posts; high-resolution geophysical (HRG) site characterization surveys; unexploded ordnances or munitions and explosives of concern (UXOs/MECs) detonation; vessel transit within the specified geographical region to transport crew, supplies, and materials; WTG operation; fishery and ecological monitoring surveys; placement of scour protection; and trenching, laying, and burial activities associated with the installation of the export cable route from OSSs to shore-based converter stations and inter-array cables between turbines.

### § 217.261 Effective dates.

The regulations in this subpart are effective from October 13, 2023, through October 12, 2028.

### § 217.262 Permissible methods of taking.

Under the LOA, issued pursuant to §§ 216.106 and 217.266, LOA Holder, and those persons it authorizes or funds to conduct activities on its behalf, may incidentally, but not intentionally, take marine mammals within the vicinity of BOEM Lease Area OCS–A 0498 Commercial Lease of Submerged Lands for Renewable Energy Development, along export cable routes, and at the two sea-to-shore transition points located in New Jersey at Oyster Creek, Island Beach State Park in Barnegat Bay, Farm Property, and BL England in the following ways, provided LOA Holder is in complete compliance with all terms, conditions, and requirements of the regulations in this subpart and the appropriate LOA:

(a) By Level B harassment associated with the acoustic disturbance of marine mammals by impact pile driving (WTG and OSS foundation installation), vibratory pile driving (cofferdam and

goal post installation and removal), UXO/MEC detonations, and HRG site characterization surveys;

(b) By Level A harassment associated with the acoustic disturbance of marine mammals by impact pile driving of WTG and OSS foundations and UXO/MEC detonations;

(c) Take by mortality or serious injury of any marine mammal species is not authorized; and

(d) The incidental take of marine mammals by the activities listed in paragraphs (a) and (b) of this section is limited to the following species:

TABLE 1 TO PARAGRAPH (d)

| Marine mammal species | Scientific name | Stock |
|---|---|---|
| North Atlantic right whale | *Eubalaena glacialis* | Western Atlantic. |
| Blue whale | *Balaenoptera musculus* | Western North Atlantic. |
| Fin whale | *Balaenoptera physalus* | Western North Atlantic. |
| Humpback whale | *Megaptera novaeangliae* | Gulf of Maine. |
| Minke whale | *Balaenoptera acutorostrata* | Canadian Eastern Coastal. |
| Sei whale | *Balaenoptera borealis* | Nova Scotia. |
| Sperm whale | *Physeter macrocephalus* | North Atlantic. |
| Atlantic spotted dolphin | *Stenella frontalis* | Western North Atlantic. |
| Atlantic white-sided dolphin | *Lagenorhynchus acutus* | Western North Atlantic. |
| Bottlenose dolphin | *Tursiops truncatus* | Western North Atlantic—Offshore.<br>Northern Migratory Coastal. |
| Common dolphin | *Delphinus delphis* | Western North Atlantic. |
| Long-finned pilot whale | *Globicephala melas* | Western North Atlantic. |
| Short-finned pilot whale | *Globicephala macrorhynchus* | Western North Atlantic. |
| Risso's dolphin | *Grampus griseus* | Western North Atlantic. |
| Harbor porpoise | *Phocoena phocoena* | Gulf of Maine/Bay of Fundy. |
| Gray seal | *Halichoerus grypus* | Western North Atlantic. |
| Harbor seal | *Phoca vitulina* | Western North Atlantic. |

**§ 217.263 Prohibitions.**

Except for the takings described in § 217.262 and authorized by an LOA issued under §§ 217.266 or 217.267, it is unlawful for any person to do any of the following in connection with the activities described in this subpart:

(a) Violate, or fail to comply with, the terms, conditions, and requirements of this subpart or an LOA issued under §§ 217.266 and 217.267;

(b) Take any marine mammal not specified in § 217.262(d);

(c) Take any marine mammal specified in the LOA in any manner other than as specified in the LOA; or

(d) Take any marine mammal specified in § 217.262(d), after NMFS Office of Protected Resources determines such taking results in more than a negligible impact on the species or stocks of such marine mammals.

**§ 217.264 Mitigation requirements.**

When conducting the activities identified in § 217.260(c) within the area described in § 217.260(b), LOA Holder must implement the mitigation measures contained in this section and any LOA issued under §§ 217.266 and 217.267. These mitigation measures include, but are not limited to:

(a) *General conditions.* LOA Holder must comply with the following general measures:

(1) A copy of any issued LOA must be in the possession of LOA Holder and its designees, all vessel operators, visual protected species observers (PSOs), passive acoustic monitoring (PAM) operators, pile driver operators, and any other relevant designees operating under the authority of the issued LOA;

(2) LOA Holder must conduct training for construction, survey, and vessel personnel and the marine mammal monitoring team (PSO and PAM operators) prior to the start of all in-water construction activities in order to explain responsibilities, communication procedures, marine mammal detection and identification, mitigation, monitoring, and reporting requirements, safety and operational procedures, and authorities of the marine mammal monitoring team(s). This training must be repeated for new personnel who join the work during the project. A description of the training program must be provided to NMFS at least 60 days prior to the initial training before in-water activities begin. Confirmation of all required training must be documented on a training course log sheet and reported to NMFS Office of Protected Resources prior to initiating project activities;

(3) Prior to and when conducting any in-water activities and vessel operations, LOA Holder personnel and contractors (*e.g.,* vessel operators, PSOs) must use available sources of information on North Atlantic right whale presence in or near the Project Area including daily monitoring of the Right Whale Sightings Advisory System, and monitoring of U.S. Coast Guard VHF Channel 16 throughout the day to receive notification of any sightings and/or information associated with any Slow Zones (*i.e.,* Dynamic Management Areas (DMAs) and/or acoustically-triggered slow zones) to provide situational awareness for both vessel operators, PSO(s), and PAM operator(s); The marine mammal monitoring team must monitor these systems no less than every 4 hours. For any UXO/MEC detonation, these systems must be monitored for 24 hours and immediately prior to blasting;

(4) Any marine mammal observed by project personnel must be immediately communicated to any on-duty PSOs, PAM operator(s), and all vessel captains. Any large whale observation or acoustic detection by PSOs or PAM operators must be conveyed to all vessel captains;

(5) For North Atlantic right whales, any visual or acoustic detection must trigger a delay to the commencement of pile driving, UXO/MEC detonation, and HRG surveys.

(6) In the event that a large whale is sighted or acoustically detected that cannot be confirmed as a non-North Atlantic right whale, it must be treated as if it were a North Atlantic right whale for purposes of mitigation;

(7) If a delay to commencing an activity is called for by the Lead PSO or PAM operator, LOA Holder must take the required mitigative action. If a shutdown of an activity is called for by the Lead PSO or PAM operator, LOA Holder must take the required mitigative action unless shutdown would result in

imminent risk of injury or loss of life to an individual, pile refusal, or pile instability. Any disagreements between the Lead PSO, PAM operator, and the activity operator regarding delays or shutdowns would only be discussed after the mitigative action has occurred;

(8) If an individual from a species for which authorization has not been granted, or a species for which authorization has been granted but the authorized take number has been met, is observed entering or within the relevant Level B harassment zone prior to beginning a specified activity, the activity must be delayed. If the activity is ongoing, it must be shut down immediately, unless shutdown would result in imminent risk of injury or loss of life to an individual, pile refusal, or pile instability. The activity must not commence or resume until the animal(s) has been confirmed to have left and is on a path away from the Level B harassment zone or after 15 minutes for small odontocetes and pinnipeds, and 30 minutes for all other species with no further sightings;

(9) For in-water construction heavy machinery activities listed in § 217.260(c), if a marine mammal is on a path towards or comes within 10 meters (m) (32.8 feet) of equipment, LOA Holder must cease operations until the marine mammal has moved more than 10 m on a path away from the activity to avoid direct interaction with equipment;

(10) All vessels must be equipped with a properly installed, operational Automatic Identification System (AIS) device and LOA Holder must report all Maritime Mobile Service Identify (MMSI) numbers to NMFS Office of Protected Resources;

(11) By accepting the issued LOA, LOA Holder consents to on-site observation and inspections by Federal agency personnel (including NOAA personnel) during activities described in this subpart, for the purposes of evaluating the implementation and effectiveness of measures contained within the LOA and this subpart; and

(12) It is prohibited to assault, harm, harass (including sexually harass), oppose, impede, intimidate, impair, or in any way influence or interfere with a PSO, PAM Operator, or vessel crew member acting as an observer, or attempt the same. This prohibition includes, but is not limited to, any action that interferes with an observer's responsibilities, or that creates an intimidating, hostile, or offensive environment. Personnel may report any violations to the NMFS Office of Law Enforcement.

(b) *Vessel strike avoidance measures.* LOA Holder must comply with the following vessel strike avoidance measures, unless an emergency situation presents a threat to the health, safety, or life of a person or when a vessel, actively engaged in emergency rescue or response duties, including vessel-in-distress or environmental crisis response, requires speeds in excess of 10 kn to fulfill those responsibilities, while in the specified geographical region:

(1) Prior to the start of the Project's activities involving vessels, LOA Holder must receive a protected species training that covers, at a minimum, identification of marine mammals that have the potential to occur where vessels would be operating; detection observation methods in both good weather conditions (*i.e.,* clear visibility, low winds, low sea states) and bad weather conditions (*i.e.,* fog, high winds, high sea states, with glare); sighting communication protocols; all vessel speed and approach limit mitigation requirements (*e.g.,* vessel strike avoidance measures); and information and resources available to the project personnel regarding the applicability of Federal laws and regulations for protected species. This training must be repeated for any new vessel personnel who join the Project. Confirmation of the observers' training and understanding of the Incidental Take Authorization (ITA) requirements must be documented on a training course log sheet and reported to NMFS;

(2) LOA Holder's vessels, regardless of their vessel's size, must maintain a vigilant watch for all marine mammals and slow down, stop their vessel, or alter course to avoid striking any marine mammal;

(3) LOA Holder's underway vessels (*e.g.,* transiting, surveying) operating at any speed must have a dedicated visual observer on duty at all times to monitor for marine mammals within a 180° direction of the forward path of the vessel (90° port to 90° starboard) located at an appropriate vantage point for ensuring vessels are maintaining appropriate separation distances. Visual observers must be equipped with alternative monitoring technology (*e.g.,* night vision devices, infrared cameras) for periods of low visibility (*e.g.,* darkness, rain, fog, *etc.*). The dedicated visual observer must receive prior training on protected species detection and identification, vessel strike minimization procedures, how and when to communicate with the vessel captain, and reporting requirements in this subpart. Visual observers may be third-party observers (*i.e.,* NMFS-approved PSOs) or trained crew members, as defined in (b)(1) of this subsection.

(4) LOA Holder must continuously monitor the U.S. Coast Guard VHF Channel 16 at the onset of transiting through the duration of transiting, over which North Atlantic right whale sightings are broadcasted. At the onset of transiting and at least once every 4 hours, vessel operators and/or trained crew member(s) must also monitor the project's Situational Awareness System, WhaleAlert, and relevant NOAA information systems such as the Right Whale Sighting Advisory System (RWSAS) for the presence of North Atlantic right whales;

(5) All LOA Holder's vessels must transit at 10 kn or less within any active North Atlantic right whale Slow Zone (*i.e.,* Dynamic Management Areas (DMAs) or acoustically-triggered slow zone);

(6) All LOA Holder's vessels, regardless of size, must immediately reduce speed to 10 kn or less for at least 24 hours when a North Atlantic right whale is sighted at any distance by any project-related personnel or acoustically detected by any project-related PAM system. Each subsequent observation or acoustic detection in the Project area shall trigger an additional 24-hour period. If a North Atlantic right whale is reported via any of the monitoring systems (refer back to paragraph (b)(4) of this section) within 10 kilometers (km; 6.2 miles (mi)) of a transiting vessel(s), that vessel must operate at 10 knots (kn; 11.5 miles per hour (mph)) or less for 24 hours following the reported detection;

(7) LOA Holder's vessels, regardless of size, must immediately reduce speed to 10 kn or less when any large whale (other than a North Atlantic right whale) is observed within 500 meters (m; 1,640 feet (ft)) of an underway vessel;

(8) If LOA Holder's vessel(s) are traveling at speeds greater than 10 kn (*i.e.,* no speed restrictions are enacted) in a transit corridor from a port to the Lease Area, in addition to the required dedicated visual observer, LOA Holder must monitor the transit corridor in real-time with PAM prior to and during transits. If a North Atlantic right whale is detected via visual observation or PAM within or approaching the transit corridor, all crew transfer vessels must travel at 10 kn or less for 24 hours following the detection. Each subsequent detection shall trigger a 24-hour reset. A slowdown in the transit corridor expires when there has been no further visual or acoustic detection in the transit corridor in the past 24 hours;

(9) LOA Holder's vessels must maintain a minimum separation

distance of 500 m from North Atlantic right whales. If underway, all vessels must steer a course away from any sighted North Atlantic right whale at 10 kn or less such that the 500-m minimum separation distance requirement is not violated. If a North Atlantic right whale is sighted within 500 m of an underway vessel, that vessel must reduce speed and shift the engine to neutral. Engines must not be engaged until the whale has moved outside of the vessel's path and beyond 500 m. If a whale is observed but cannot be confirmed as a species other than a North Atlantic right whale, the vessel operator must assume that it is a North Atlantic right whale and take the vessel strike avoidance measures described in this paragraph (b)(9) of this section;

(10) LOA Holder's vessels must maintain a minimum separation distance of 100 m (328 ft) from sperm whales and non-North Atlantic right whale baleen whales. If one of these species is sighted within 100 m of a transiting vessel, LOA Holder's vessel must reduce speed and shift the engine to neutral. Engines must not be engaged until the whale has moved outside of the vessel's path and beyond 100 m;

(11) LOA Holder's vessels must maintain a minimum separation distance of 50 m (164 ft) from all delphinoid cetaceans and pinnipeds with an exception made for those that approach the vessel (*i.e.,* bow-riding dolphins). If a delphinid cetacean or pinniped is sighted within 50 m of a transiting vessel, LOA Holder's vessel must shift the engine to neutral, with an exception made for those that approach the vessel (*e.g.,* bow-riding dolphins). Engines must not be engaged until the animal(s) has moved outside of the vessel's path and beyond 50 m;

(12) When a marine mammal(s) is sighted while LOA Holder's vessel(s) is transiting, the vessel must take action as necessary to avoid violating the relevant separation distances (*e.g.,* attempt to remain parallel to the animal's course, slow down, and avoid abrupt changes in direction until the animal has left the area). This measure does not apply to any vessel towing gear or any situation where respecting the relevant separation distance would be unsafe (*i.e.,* any situation where the vessel is navigationally constrained);

(13) LOA Holder's vessels underway must not divert or alter course to approach any marine mammal. If a separation distance is triggered, any vessel underway must avoid abrupt changes in course direction and transit at 10 kn or less until the animal is outside the relevant separation distance;

(14) LOA Holder is required to abide by other speed and approach regulations. Nothing in this subpart exempts vessels from any other applicable marine mammal speed and approach regulations;

(15) LOA Holder must check, daily, for information regarding the establishment of mandatory or voluntary vessel strike avoidance areas (*i.e.,* DMAs, SMAs, Slow Zones) and any information regarding North Atlantic right whale sighting locations;

(16) LOA Holder must submit a North Atlantic Right Whale Vessel Strike Avoidance Plan to NMFS Office of Protected Resources for review and approval at least 90 days prior to the planned start of vessel activity. The plan must provide details on the vessel-based observer and PAM protocols for transiting vessels. If a plan is not submitted or approved by NMFS prior to vessel operations, all project vessels transiting, year round, must travel at speeds of 10-kn or less. LOA Holder must comply with any approved North Atlantic Right Whale Vessel Strike Avoidance Plan; and

(17) Speed over ground will be used to measure all vessel speed restrictions.

(c) *WTG and OSS foundation installation.* The following requirements apply to impact pile driving activities associated with the installation of WTG and OSS foundations:

(1) Impact pile driving must not occur January 1 through April 30. Impact pile driving must be avoided to the maximum extent practicable in December; however, it may occur if necessary to complete the project with prior approval by NMFS;

(2) Monopiles must be no larger than 11 m in diameter, representing the larger end of the monopile design. During all monopile installation, the minimum amount of hammer energy necessary to effectively and safely install and maintain the integrity of the piles must be used. Hammer energies must not exceed 4,000 kilojoules for monopile installation. No more than two monopiles may be installed per day. Pin piles must be no larger than 5 m in diameter. During all pin pile installation, the minimum amount of hammer energy necessary to effectively and safely install and maintain the integrity of the piles must be used. Hammer energies must not exceed 2,500 kJ for pin pile installation. No more than three pin piles may be installed per day;

(3) LOA Holder may initiate impact pile driving during hours of darkness only from June 1 to October 31, annually, in accordance with a NMFS-approved Alternative Monitoring Plan for Nighttime Pile Driving;

(4) For the construction months of May and November (as well as December, if approval is granted by NMFS), impact pile driving must only be initiated during daylight hours, defined as no later than 1.5 hours prior to civil sunset and no earlier than 1 hour after civil sunrise, and would only be allowed to continue into darkness if stopping operations represents a risk to human health, safety, and/or pile stability;

(5) LOA Holder must utilize a soft-start protocol for each impact pile driving event of all foundations by performing four to six strikes per minute at 10 to 20 percent of the maximum hammer energy, for a minimum of 20 minutes;

(6) Soft-start must occur at the beginning of impact driving and at any time following a cessation of impact pile driving of 30 minutes or longer;

(7) LOA Holder must establish clearance and shutdown zones, which must be measured using the radial distance around the pile being driven. If a marine mammal is detected within or about to enter the applicable clearance zones, prior to the beginning of soft-start procedures, impact pile driving must be delayed until the animal has been visually observed exiting the clearance zone or until a specific time period has elapsed with no further sightings. The specific time periods are 15 minutes for small odontocetes and pinnipeds, and 30 minutes for all other species;

(8) For North Atlantic right whales, any visual observation or acoustic detection must trigger a delay to the commencement of pile driving. The clearance zone may only be declared clear if no North Atlantic right whale acoustic or visual detections have occurred within the clearance zone during the 60-minute monitoring period;

(9) LOA Holder must deploy at least two functional noise abatement systems that reduce noise levels to the modeled harassment isopleths, assuming 10-dB attenuation, during all impact pile driving:

(i) A single bubble curtain must not be used;

(ii) Any bubble curtain(s) must distribute air bubbles using an air flow rate of at least 0.5 $m^3$/(minute*m). The bubble curtain(s) must surround 100 percent of the piling perimeter throughout the full depth of the water column. In the unforeseen event of a single compressor malfunction, the offshore personnel operating the bubble curtain(s) must adjust the air supply and operating pressure such that the maximum possible sound attenuation

performance of the bubble curtain(s) is achieved;

(iii) The lowest bubble ring must be in contact with the seafloor for the full circumference of the ring, and the weights attached to the bottom ring must ensure 100-percent seafloor contact;

(iv) No parts of the ring or other objects may prevent full seafloor contact with a bubble curtain ring;

(v) Construction contractors must train personnel in the proper balancing of airflow to the bubble curtain ring. LOA Holder must provide NMFS Office of Protected Resources with a bubble curtain performance test and maintenance report to review within 72 hours after each pile using a bubble curtain is installed. Additionally, a full maintenance check (*e.g.,* manually clearing holes) must occur prior to each pile being installed;

(vi) Corrections to the bubble ring(s) to meet the performance standards in this paragraph (c)(9) must occur prior to impact pile driving of monopiles. If LOA Holder uses a noise mitigation device in addition to the bubble curtain, LOA Holder must maintain similar quality control measures as described in this paragraph (c)(9).

(10) LOA Holder must utilize NMFS-approved PAM systems, as described in paragraph(c)(17) of this section. The PAM system components (*i.e.,* acoustic buoys) must not be placed closer than 1 km to the pile being driven so that the activities do not mask the PAM system. LOA Holder must provide an adequate demonstration of and justification for the detection range of the system they plan to deploy while considering potential masking from concurrent pile-driving and vessel noise. The PAM system must be able to detect a vocalization of North Atlantic right whales up to 10 km (6.2 mi).

(11) LOA Holder must utilize PSO(s) and PAM operator(s), as described in § 217.265(c). At least three on-duty PSOs must be on the pile driving platform. Additionally, two dedicated-PSO vessels must be used at least 60 minutes before, during, and 30 minutes after all pile driving, and each dedicated-PSO vessel must have at least three PSOs on duty during these time periods. LOA Holder may request NMFS approval to use alternative technology (*e.g.,* drones) in lieu of one or two of the dedicated PSO vessels that provide similar marine mammal detection capabilities.

(12) If a marine mammal is detected (visually or acoustically) entering or within the respective shutdown zone after pile driving has begun, the PSO or PAM operator must call for a shutdown of pile driving and LOA Holder must stop pile driving immediately, unless shutdown is not practicable due to imminent risk of injury or loss of life to an individual or risk of damage to a vessel that creates risk of injury or loss of life for individuals, or the lead engineer determines there is pile refusal or pile instability. If pile driving is not shutdown in one of these situations, LOA Holder must reduce hammer energy to the lowest level practicable and the reason(s) for not shutting down must be documented and reported to NMFS Office of Protected Resources within the applicable monitoring reports (*e.g.,* weekly, monthly).

(13) A visual observation or acoustic detection of a North Atlantic right whale at any distance triggers shutdown requirements under paragraph (c)(12) of this section. If pile driving has been shut down due to the presence of a North Atlantic right whale, pile driving may not restart until the North Atlantic right whale has neither been visually or acoustically detected for 30 minutes;

(14) If pile driving has been shut down due to the presence of a marine mammal other than a North Atlantic right whale, pile driving must not restart until either the marine mammal(s) has voluntarily left the specific clearance zones and has been visually or acoustically confirmed beyond that clearance zone, or, when specific time periods have elapsed with no further sightings or acoustic detections have occurred. The specific time periods are 15 minutes for small odontocetes and pinnipeds, and 30 minutes for all other marine mammal species. In cases where these criteria are not met, pile driving may restart only if necessary to maintain pile stability at which time LOA Holder must use the lowest hammer energy practicable to maintain stability;

(15) LOA Holder must conduct sound field verification (SFV) measurements during pile driving activities associated with the installation of, at minimum, the first three monopile foundations. SFV measurements must continue until at least three consecutive piles demonstrate noise levels are at or below those modeled, assuming 10 decibels (dB) of attenuation. Subsequent SFV measurements are also required should larger piles be installed or if additional piles are driven that may produce louder sound fields than those previously measured (*e.g.,* higher hammer energy, greater number of strikes, *etc.*). SFV measurements must be conducted as follows:

(i) Measurements must be made at a minimum of four distances from the pile(s) being driven, along a single transect, in the direction of lowest transmission loss (*i.e.,* projected lowest transmission loss coefficient), including, but not limited to, 750 m (2,460 ft) and three additional ranges selected such that measurement of Level A harassment and Level B harassment isopleths are accurate, feasible, and avoids extrapolation. At least one additional measurement at an azimuth 90 degrees from the array at 750 m must be made. At each location, there must be a near bottom and mid-water column hydrophone (measurement systems);

(ii) The recordings must be continuous throughout the duration of all pile driving of each foundation;

(iii) The SFV measurement systems must have a sensitivity appropriate for the expected sound levels from pile driving received at the nominal ranges throughout the installation of the pile. The frequency range of SFV measurement systems must cover the range of at least 20 hertz (Hz) to 20 kilohertz (kHz). The SFV measurement systems must be designed to have omnidirectional sensitivity so that the broadband received level of all pile driving exceeds the system noise floor by at least 10 dB. The dynamic range of the SFV measurement system must be sufficient such that at each location, and the signals avoid poor signal-to-noise ratios for low amplitude signals and avoid clipping, nonlinearity, and saturation for high amplitude signals;

(iv) All hydrophones used in SFV measurements systems are required to have undergone a full system, traceable laboratory calibration conforming to International Electrotechnical Commission (IEC) 60565, or an equivalent standard procedure, from a factory or accredited source to ensure the hydrophone receives accurate sound levels, at a date not to exceed 2 years before deployment. Additional *in-situ* calibration checks using a pistonphone are required to be performed before and after each hydrophone deployment. If the measurement system employs filters via hardware or software (*e.g.,* high-pass, low-pass, *etc.*), which is not already accounted for by the calibration, the filter performance (*i.e.,* the filter's frequency response) must be known, reported, and the data corrected before analysis.

(v) LOA Holder must be prepared with additional equipment (hydrophones, recording devices, hydrophone calibrators, cables, batteries, *etc.*), which exceeds the amount of equipment necessary to perform the measurements, such that technical issues can be mitigated before measurement;

(vi) LOA Holder must submit 48-hour interim reports after each foundation is

measured (see § 217.265(g) section for interim and final reporting requirements);

(vii) LOA Holder must not exceed modeled distances to NMFS marine mammal Level A harassment and Level B harassment thresholds, assuming 10-dB attenuation, for foundation installation. If any of the interim SFV measurement reports submitted for the first three monopiles indicate the modeled distances to NMFS marine mammal Level A harassment and Level B harassment thresholds assuming 10-dB attenuation, then LOA Holder must implement additional sound attenuation measures on all subsequent foundations. LOA Holder must also increase clearance and shutdown zone sizes to those identified by NMFS until SFV measurements on at least three additional foundations demonstrate acoustic distances to harassment thresholds meet or are less than those modeled assuming 10-dB of attenuation. LOA Holder must optimize the sound attenuation systems (*e.g.,* ensure hose maintenance, pressure testing, *etc.*) to meet noise levels modeled, assuming 10-dB attenuation, within three piles or else foundation installation activities must cease until NMFS and LOA Holder can evaluate the situation and ensure future piles must not exceed noise levels modeled assuming 10-dB attenuation;

(viii) If, after additional measurements conducted pursuant to requirements of paragraph (15)(vii) of this section, acoustic measurements indicate that ranges to isopleths corresponding to the Level A harassment and Level B harassment thresholds are less than the ranges predicted by modeling (assuming 10-dB attenuation), LOA Holder may request to NMFS Office of Protected Resources a modification of the clearance and shutdown zones. For NMFS Office of Protected Resources to consider a modification request for reduced zone sizes, LOA Holder must have conducted SFV measurements on an additional three foundations and ensure that subsequent foundations would be installed under conditions that are predicted to produce smaller harassment zones than those modeled assuming 10-dB of attenuation;

(ix) LOA Holder must conduct SFV measurements upon commencement of turbine operations to estimate turbine operational source levels, in accordance with a NMFS-approved Foundation Installation Pile Driving SFV Plan. SFV must be conducted in the same manner as previously described in paragraph (c)(15) of this section, with appropriate adjustments to measurement distances, number of hydrophones, and hydrophone sensitivities being made, as necessary; and

(x) LOA Holder must submit a SFV Plan to NMFS Office of Protected Resources for review and approval at least 180 days prior to planned start of foundation installation activities and abide by the Plan if approved. At minimum, the SFV Plan must describe how LOA Holder would ensure that the first three monopile foundation installation sites selected for SFV measurements are representative of the rest of the monopile installation sites such that future pile installation events are anticipated to produce similar sound levels to those piles measured. In the case that these sites/scenarios are not determined to be representative of all other pile installation sites, LOA Holder must include information in the SFV Plan on how additional sites/scenarios would be selected for SFV measurements. The SFV Plan must also include methodology for collecting, analyzing, and preparing SFV measurement data for submission to NMFS Office of Protected Resources and describe how the effectiveness of the sound attenuation methodology would be evaluated based on the results. SFV for pile driving may not occur until NMFS approves the SFV Plan for this activity.

(16) LOA Holder must submit a Foundation Installation Pile Driving Marine Mammal Monitoring Plan to NMFS Office of Protected Resources for review and approval at least 180 days prior to planned start of pile driving and abide by the Plan if approved. LOA Holder must obtain both NMFS Office of Protected Resources and NMFS Greater Atlantic Regional Fisheries Office Protected Resources Division's concurrence with this Plan prior to the start of any pile driving. The Plan must include a description of all monitoring equipment and PAM and PSO protocols (including number and location of PSOs) for all pile driving. No foundation pile installation can occur without NMFS' approval of the Plan; and

(17) LOA Holder must submit a Passive Acoustic Monitoring Plan (PAM Plan) to NMFS Office of Protected Resources for review and approval at least 180 days prior to the planned start of foundation installation activities (impact pile driving) and abide by the Plan if approved. The PAM Plan must include a description of all proposed PAM equipment, address how the proposed passive acoustic monitoring must follow standardized measurement, processing methods, reporting metrics, and metadata standards for offshore wind. The Plan must describe all proposed PAM equipment, procedures, and protocols including proof that vocalizing North Atlantic right whales will be detected within the clearance and shutdown zones. No pile installation can occur if LOA Holder's PAM Plan does not receive approval from NMFS Office of Protected Resources and NMFS Greater Atlantic Regional Fisheries Office Protected Resources Division.

(d) *Cofferdam and goal post installation and removal.* The following requirements apply to the installation and removal of cofferdams and goal posts at the cable landfall construction sites:

(1) Installation and removal of cofferdams and goal posts must not occur during nighttime hours (defined as the hours between 1.5 hours prior to civil sunset and 1 hour after civil sunrise);

(2) All installation and removal of sheet piles for cofferdams and casing pipes for goal posts must only occur for up to 12 hours for each cofferdam and up to 1 hour daily for each goal post (within a single 24-hour period);

(3) LOA Holder must establish and implement clearance zones for the installation and removal of cofferdams and goal posts using visual monitoring. These zones must be measured using the radial distance from the cofferdam and goal post being installed and/or removed;

(4) LOA Holder must utilize PSO(s), as described in § 217.265(d). At least two on-duty PSOs must monitor for marine mammals at least 30 minutes before, during, and 30 minutes after vibratory pile driving associated with cofferdam and casing pipe installation; and

(5) If a marine mammal is observed entering or within the respective shutdown zone after vibratory pile driving has begun, the PSO must call for a shutdown of vibratory pile driving. LOA Holder must stop vibratory pile driving immediately unless shutdown is not practicable due to imminent risk of injury or loss of life to an individual or if there is a risk of damage to the vessel that would create a risk of injury or loss of life for individuals or if the lead engineer determines there is refusal or instability. In any of these situations, LOA Holder must document the reason(s) for not shutting down and report the information to NMFS Office of Protected Resources in the next available weekly report (as described in § 217.265(h)).

(e) *UXO/MEC detonations.* The following requirements apply to all Unexploded Ordnances and Munitions and Explosives of Concern (UXO/MEC) detonations:

(1) Upon encountering an UXO/MEC, LOA Holder may only resort to high-order removal (*i.e.,* detonation) if all other means of removal are impracticable;

(2) LOA Holder may detonate a maximum of 10 UXO/MECs, of varying sizes but no larger than 1,000 pounds (lbs; 454 kilograms (kg)) charge weight (*i.e.,* E12), over the effective period of this rulemaking and LOA;

(3) LOA Holder must not detonate UXO/MECs from November 1 through April 31, annually;

(4) UXO/MEC detonations must only occur during daylight hours;

(5) No more than one detonation may occur within a 24-hour period;

(6) LOA Holder must establish and implement clearance zones for UXO/MEC detonation using both visual and acoustic monitoring, as described in paragraphs (c)(7), (8), and (12) through (14) of this section. UXO/MEC clearance zones are specific to the known charge weight size of the UXO/MEC to be detonated; if charge weight is unknown or uncertain then the largest zone size must be used;

(7) LOA Holder must utilize PSO(s) and PAM operator(s), as described in § 217.265(c). At least three PSOs on each of two dedicated PSO vessels must be used for all detonations with clearance zones less than 5 km (3.1 mi). If the clearance zone is larger than 5 km, at least one dedicated PSO vessel (with at least three on-duty PSOs) and an aerial platform (with at least two on-duty PSOs) must be used. Clearance zone size is measured using the radial distance from the UXO/MEC to be detonated;

(8) LOA Holder must utilize NMFS-approved PAM systems, as described in (c)(17) of this section.

(9) LOA Holder must deploy at least a double big bubble curtain during all UXO/MEC detonations. The bubble curtain must be deployed at a distance that avoids damage to the hose nozzles:

(i) Any bubble curtain(s) must distribute air bubbles using an air flow rate of at least 0.5 $m^3$/(minute*m). The bubble curtain(s) must surround 100 percent of the piling perimeter throughout the full depth of the water column;

(ii) The lowest bubble ring must be in contact with the seafloor for the full circumference of the ring, and the weights attached to the bottom ring must ensure 100-percent seafloor contact;

(iii) No parts of the ring or other objects may prevent full seafloor contact with a bubble curtain ring;

(iv) Construction contractors must train personnel in the proper balancing of airflow to the bubble curtain ring. LOA Holder must provide NMFS Office of Protected Resources with a bubble curtain performance test and maintenance report to review within 72 hours after each UO/MEC is detonated. Additionally, a full maintenance check (*e.g.,* manually clearing holes) must occur prior to each UXO/MEC detonation;

(v) Corrections to the bubble ring(s) to meet the performance standards in this paragraph (e)(9) must occur prior to UXO/MEC detonation.

(10) LOA Holder must conduct SFV during all UXO/MEC detonations as described in paragraph (c)(15) of this section and deploy a pressure transducer;

(11) Clearance zones must be fully visible for at least 60 minutes and all marine mammal(s) must be confirmed to be outside of the clearance zone for at least 30 minutes prior to detonation. PAM must also be conducted for at least 60 minutes and the zone must be acoustically cleared during this time. If a marine mammal is observed entering or within the clearance zone prior to denotation, the activity must be delayed. Detonation may only commence if all marine mammals have been confirmed to have voluntarily left the clearance zones and been visually confirmed to be beyond the clearance zone, or when 60 minutes have elapsed without any redetections for whales (including the North Atlantic right whale) or 15 minutes have elapsed without any redetections of delphinids, harbor porpoises, or seals;

(12) For UXO/MEC detonations, LOA Holder must follow all measures described in paragraphs (c)(15) and § 217.264(c)(15)(i) through (vi), as well as the measures below:

(i) LOA Holder must not exceed modeled distances to NMFS marine mammal Level A harassment and Level B harassment thresholds, assuming 10-dB attenuation, for UXO/MEC detonations. If any of the interim SFV measurement reports submitted for any UXO/MEC detonations indicate the modeled distances to NMFS marine mammal Level A harassment and Level B harassment thresholds assuming 10-dB attenuation for future detonations will be exceeded, then LOA Holder must implement additional sound attenuation measures on all subsequent UXO/MEC detonations, including but not limited to the deployment of additional NAS to assist in achieving measurements in alignment with the modeled ranges. LOA Holder must also increase clearance zone sizes to those identified by NMFS until SFV measurements on UXO/MECs demonstrate distances to harassment thresholds will be met or will be less than those modeled assuming 10 dB of attenuation. LOA Holder must optimize the sound attenuation systems (*e.g.,* ensure hose maintenance, pressure testing, *etc.*) to meet noise levels modeled, assuming 10 dB of attenuation, for UXO/MECs of the same charge weight or else no detonation activities must occur until NMFS and LOA Holder can evaluate the situation and ensure future UXO/MEC detonations must not exceed noise levels modeled, assuming 10-dB attenuation;

(ii) LOA Holder must submit a SFV Plan for UXO/MEC detonation to NMFS Office of Protected Resources for review and approval at least 180 days prior to planned start of UXO/MEC detonation activities and abide by the Plan if approved. The SFV Plan must include methodology for collecting, analyzing, and preparing SFV measurement data for submission to NMFS Office of Protected Resources and describe how the effectiveness of the sound attenuation methodology would be evaluated based on the results. For recommended SFV protocols for UXO/MEC, please consult the National Physical Laboratory (NPL) *Protocol for In-Situ Underwater Measurement of Explosive Ordnance Disposal for UXO* (2020). SFV for UXO/MEC detonation cannot occur until NMFS approves the SFV Plan for this activity;

(iii) LOA Holder must submit a UXO/MEC Marine Mammal Monitoring Plan to NMFS Office of Protected Resources for review and approval at least 180 days prior to planned start of UXO/MEC detonation, respectively, and abide by the Plan if approved. LOA Holder must obtain both NMFS Office of Protected Resources and NMFS Greater Atlantic Regional Fisheries Office Protected Resources Division's concurrence with this Plan prior to the start of any UXO/MEC detonations. The Plan must include a description of all monitoring equipment and PAM and PSO protocols (including number and location of PSOs) for all UXO/MEC detonations. The Plan must include final UXO/MEC detonation project design (*e.g.,* number and type of UXO/MECs, removal method(s), charge weight(s), anticipated start date, *etc.*) and all information related to PAM and PSO monitoring protocols for UXO/MEC activities. The Plan must detail all plans and procedures for sound attenuation as well as for monitoring marine mammals during all UXO/MEC detonations. No UXO/MEC detonations can occur without NMFS' approval of the Plan; and

(iv) LOA Holder must submit a Passive Acoustic Monitoring Plan (PAM Plan) to NMFS Office of Protected Resources for review and approval at least 180 days prior to the planned start of UXO/MEC detonations and abide by the Plan if approved. The PAM Plan must include a description of all proposed PAM equipment, address how the proposed passive acoustic monitoring must follow standardized measurement, processing methods, reporting metrics, and metadata standards for offshore wind. The Plan must describe all proposed PAM equipment, procedures, and protocols including proof that vocalizing North Atlantic right whales will be detected within the clearance and shutdown zones. No UXO/MEC detonations can occur if LOA Holder's PAM Plan does not receive approval from NMFS Office of Protected Resources and NMFS Greater Atlantic Regional Fisheries Office Protected Resources Division.

(f) *HRG surveys.* The following requirements apply to HRG surveys operating sub-bottom profilers (SBPs) (*i.e.,* boomers, sparkers, and Compressed High Intensity Radiated Pulse (CHIRPS)):

(1) LOA Holder must establish and implement clearance and shutdown zones for HRG surveys using visual monitoring, as described in paragraph (c) of this section;

(2) LOA Holder must utilize PSO(s), as described in § 217.265(f);

(3) LOA Holder must abide by the relevant Project Design Criteria (PDCs 4, 5, and 7) of the programmatic consultation completed by NMFS' Greater Atlantic Regional Fisheries Office on June 29, 2021 (revised September 2021), pursuant to section 7 of the Endangered Species Act (ESA). To the extent that any relevant Best Management Practices (BMPs) described in these PDCs are more stringent than the requirements herein, those BMPs supersede these requirements;

(4) SBPs (hereinafter referred to as ''acoustic sources'') must be deactivated when not acquiring data or preparing to acquire data, except as necessary for testing. Acoustic sources must be used at the lowest practicable source level to meet the survey objective, when in use, and must be turned off when they are not necessary for the survey;

(5) LOA Holder is required to ramp-up acoustic sources prior to commencing full power, unless the equipment operates on a binary on/off switch, and ensure visual clearance zones are fully visible (*e.g.,* not obscured by darkness, rain, fog, *etc.*) and clear of marine mammals, as determined by the Lead PSO, for at least 30 minutes immediately prior to the initiation of survey activities using acoustic sources specified in the LOA. Ramp-up and activation must be delayed if a marine mammal(s) enters its respective shutdown zone. Ramp-up and activation may only be reinitiated if the animal(s) has been observed exiting its respective shutdown zone or until 15 minutes for small odontocetes and pinnipeds, and 30 minutes for all other species, has elapsed with no further sightings;

(6) Prior to a ramp-up procedure starting or activating acoustic sources, the acoustic source operator (operator) must notify a designated PSO of the planned start of ramp-up as agreed upon with the Lead PSO. The notification time should not be less than 60 minutes prior to the planned ramp-up or activation in order to allow the PSOs time to monitor the clearance zone(s) for 30 minutes prior to the initiation of ramp-up or activation (pre-start clearance). During this 30-minute pre-start clearance period, the entire applicable clearance zones must be visible, except as indicated in paragraph (f)(12) of this section;

(7) Ramp-ups must be scheduled so as to minimize the time spent with the source activated;

(8) A PSO conducting pre-start clearance observations must be notified again immediately prior to reinitiating ramp-up procedures and the operator must receive confirmation from the PSO to proceed;

(9) LOA Holder must implement a 30-minute clearance period of the clearance zones immediately prior to the commencing of the survey or when there is more than a 30-minute break in survey activities or PSO monitoring. A clearance period is a period when no marine mammals are detected in the relevant zone;

(10) If a marine mammal is observed within a clearance zone during the clearance period, ramp-up or acoustic surveys may not begin until the animal(s) has been observed voluntarily exiting its respective clearance zone or until a specific time period has elapsed with no further sighting. The specific time period is 15 minutes for small odontocetes and pinnipeds, and 30 minutes for all other species;

(11) In any case when the clearance process has begun in conditions with good visibility, including via the use of night vision equipment (infrared (IR)/thermal camera), and the Lead PSO has determined that the clearance zones are clear of marine mammals, survey operations would be allowed to commence (*i.e.,* no delay is required) despite periods of inclement weather and/or loss of daylight. Ramp-up may occur at times of poor visibility, including nighttime, if appropriate visual monitoring has occurred with no detections of marine mammals in the 30 minutes prior to beginning ramp-up;

(12) Once the survey has commenced, LOA Holder must shut down acoustic sources if a marine mammal enters a respective shutdown zone, except in cases when the shutdown zones become obscured for brief periods due to inclement weather, survey operations would be allowed to continue (*i.e.,* no shutdown is required) so long as no marine mammals have been detected. The shutdown requirement does not apply to small delphinids of the following genera: *Delphinus, Stenella, Lagenorhynchus,* and *Tursiops.* If there is uncertainty regarding the identification of a marine mammal species (*i.e.,* whether the observed marine mammal belongs to one of the delphinid genera for which shutdown is waived), the PSOs must use their best professional judgment in making the decision to call for a shutdown. Shutdown is required if a delphinid that belongs to a genus other than those specified in this paragraph (f)(12) of this section is detected in the shutdown zone;

(13) If an acoustic source has been shut down due to the presence of a marine mammal, the use of an acoustic source may not commence or resume until the animal(s) has been confirmed to have left the Level B harassment zone or until a full 15 minutes (for small odontocetes and seals) or 30 minutes (for all other marine mammals) have elapsed with no further sighting;

(14) LOA Holder must immediately shut down any acoustic source if a marine mammal is sighted entering or within its respective shutdown zones. If there is uncertainty regarding the identification of a marine mammal species (*i.e.,* whether the observed marine mammal belongs to one of the delphinid genera for which shutdown is waived), the PSOs must use their best professional judgment in making the decision to call for a shutdown. Shutdown is required if a delphinid that belongs to a genus other than those specified in paragraph (f)(12) of this section is detected in the shutdown zone; and

(15) If an acoustic source is shut down for a period longer than 30 minutes, all clearance and ramp-up procedures must be initiated. If an acoustic source is shut down for reasons other than mitigation (*e.g.,* mechanical difficulty) for less than 30 minutes, acoustic sources may be activated again without ramp-up only if PSOs have maintained constant

observation and no additional detections of any marine mammal occurred within the respective shutdown zones.

(g) *Fisheries monitoring surveys.* The following measures apply to fishery monitoring surveys:

(1) Survey gear must be deployed as soon as possible once the vessel arrives on station. Gear must not be deployed if there is a risk of interaction with marine mammals. Gear may be deployed after 15 minutes of no marine mammal sightings within 1 nautical mile (nmi; 1,852 m) of the sampling station;

(2) LOA Holder and/or its cooperating institutions, contracted vessels, or commercially hired captains must implement the following ''move-on'' rule: If marine mammals are sighted within 1 nmi of the planned location and 15 minutes before gear deployment, then LOA Holder and/or its cooperating institutions, contracted vessels, or commercially hired captains, as appropriate, must move the vessel away from the marine mammal to a different section of the sampling area. If, after moving on, marine mammals are still visible from the vessel, LOA Holder and its cooperating institutions, contracted vessels, or commercially hired captains must move again or skip the station;

(3) If a marine mammal is deemed to be at risk of interaction after the gear is deployed or set, all gear must be immediately removed from the water. If marine mammals are sighted before the gear is fully removed from the water, the vessel must slow its speed and maneuver the vessel away from the animals to minimize potential interactions with the observed animal;

(4) LOA Holder must maintain visual marine mammal monitoring effort during the entire period of time that gear is in the water (*i.e.,* throughout gear deployment, fishing, and retrieval);

(5) All fisheries monitoring gear must be fully cleaned and repaired (if damaged) before each use/deployment;

(6) LOA Holder's fixed gear must comply with the Atlantic Large Whale Take Reduction Plan regulations at 50 CFR 229.32 during fisheries monitoring surveys;

(7) Trawl tows must be limited to a maximum of a 20-minute trawl time at 3.0 kn;

(8) All gear must be emptied as close to the deck/sorting area and as quickly as possible after retrieval;

(9) During trawl surveys, vessel crew must open the codend of the trawl net close to the deck in order to avoid injury to animals that may be caught in the gear;

(10) Baited remote underwater video (BRUV) sampling must limit soak duration to 60 minutes or less, BRUVs must use a weighted line attached to surface and subsurface buoys that must hold a stereo-camera system in the water column and a system at the seafloor, and the vessel must remain on location with the gear while it is in use;

(11) Each chevron trap must have a vertical buoy line and must limit soak duration to 90 minutes or less;

(12) All fishery survey-related lines must include the breaking strength of all lines being less than 1,700 pounds (lbs; 771 kilograms (kg)). This may be accomplished by using whole buoy line that has a breaking strength of 1,700 lbs; or buoy line with weak inserts that result in line having an overall breaking strength of 1,700 lbs;

(13) During any survey that uses vertical lines, buoy lines must be weighted and must not float at the surface of the water and all groundlines must consist of sinking lines. All groundlines must be composed entirely of sinking lines. Buoy lines must utilize weak links. Weak links must break cleanly leaving behind the bitter end of the line. The bitter end of the line must be free of any knots when the weak link breaks. Splices are not considered to be knots. The attachment of buoys, toggles, or other floatation devices to groundlines is prohibited;

(14) All in-water survey gear, including buoys, must be properly labeled with the scientific permit number or identification as LOA Holder's research gear. All labels and markings on the gear, buoys, and buoy lines must also be compliant with the applicable regulations, and all buoy markings must comply with instructions received by the NOAA Greater Atlantic Regional Fisheries Office Protected Resources Division;

(15) All survey gear must be removed from the water whenever not in active survey use (*i.e.,* no wet storage); and

(16) All reasonable efforts, that do not compromise human safety, must be undertaken to recover gear.

**§ 217.265 Monitoring and reporting requirements.**

(a) *Protected species observer (PSO) and passive acoustic monitoring (PAM) operator qualifications.* LOA Holder must implement the following measures applicable to PSOs and PAM operators:

(1) LOA Holder must use independent, NMFS-approved PSOs and PAM operators, meaning that the PSOs and PAM operators 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 crew with regard to the presence of protected species and mitigation requirements;

(2) All PSOs and PAM operators must have successfully attained a bachelor's degree from an accredited college or university with a major in one of the natural sciences, a minimum of 30 semester hours or equivalent in the biological sciences, and at least one undergraduate course in math or statistics. The educational requirements may be waived if the PSO or PAM operator has acquired the relevant skills through a suitable amount of alternate experience. Requests for such a waiver must be submitted to NMFS Office of Protected Resources and must include written justification containing alternative experience. Alternate experience that may be considered includes, but is not limited to: previous work experience conducting academic, commercial, or government-sponsored marine mammal visual and/or acoustic surveys; or previous work experience as a PSO/PAM operator;

(3) PSOs must have visual acuity in both eyes (with correction of vision being permissible) sufficient enough to discern moving targets on the water's surface with the ability to estimate the target size and distance (binocular use is allowable); ability to conduct field observations and collect data according to the assigned protocols; sufficient training, orientation, or experience with the construction operation to provide for personal safety during observations; writing skills sufficient to document observations, including but not limited to, the number and species of marine mammals observed, the dates and times of when in-water construction activities were conducted, the dates and time when in-water construction activities were suspended to avoid potential incidental take of marine mammals from construction noise within a defined shutdown zone, and marine mammal behavior; and the ability to communicate orally, by radio, or in-person, with project personnel to provide real-time information on marine mammals observed in the area;

(4) All PSOs must be trained in northwestern Atlantic Ocean marine mammal identification and behaviors and must be able to conduct field observations and collect data according to assigned protocols. Additionally, PSOs must have the ability to work with all required and relevant software and equipment necessary during observations (as described in paragraphs (b)(6) and (b)(7) of this section);

(5) All PSOs and PAM operators must successfully complete a relevant

training course within the last 5 years, including obtaining a certificate of course completion;

(6) PSOs and PAM operators are responsible for obtaining NMFS' approval. NMFS may approve PSOs and PAM operators as conditional or unconditional. A conditionally-approved PSO or PAM operator may be one who has completed training in the last 5 years but has not yet attained the requisite field experience. An unconditionally approved PSO or PAM operator is one who has completed training within the last 5 years and attained the necessary experience (*i.e.,* demonstrate experience with monitoring for marine mammals at clearance and shutdown zone sizes similar to those produced during the respective activity). Lead PSO or PAM operators must be unconditionally approved and have a minimum of 90 days in an northwestern Atlantic Ocean offshore environment performing the role (either visual or acoustic), with the conclusion of the most recent relevant experience not more than 18 months previous. A conditionally approved PSO or PAM operator must be paired with an unconditionally approved PSO or PAM operator;

(7) PSOs for cable landfall construction (*i.e.,* vibratory pile installation and removal) and HRG surveys may be unconditionally or conditionally approved. PSOs and PAM operators for foundation installation and UXO/MEC activities must be unconditionally approved;

(8) At least one on-duty PSO and PAM operator, where applicable, for each activity (*e.g.,* impact pile driving, vibratory pile driving, UXO/MEC detonation activities, and HRG surveys) must be designated as the Lead PSO or Lead PAM operator;

(9) LOA Holder must submit NMFS previously approved PSOs and PAM operators to NMFS Office of Protected Resources for review and confirmation of their approval for specific roles at least 30 days prior to commencement of the activities requiring PSOs/PAM operators or 15 days prior to when new PSOs/PAM operators are required after activities have commenced;

(10) For prospective PSOs and PAM operators not previously approved, or for PSOs and PAM operators whose approval is not current, LOA Holder must submit resumes for approval at least 60 days prior to PSO and PAM operator use. Resumes must include information related to relevant education, experience, and training, including dates, duration, location, and description of prior PSO or PAM operator experience. Resumes must be accompanied by relevant documentation of successful completion of necessary training;

(11) PAM operators are responsible for obtaining NMFS approval. To be approved as a PAM operator, the person must meet the following qualifications: The PAM operator must demonstrate that they have prior experience with real-time acoustic detection systems and/or have completed specialized training for operating PAM systems and detecting and identifying Atlantic Ocean marine mammals sounds, in particular: North Atlantic right whale sounds, humpback whale sounds, and how to deconflict them from similar North Atlantic right whale sounds, and other co-occurring species' sounds in the area including sperm whales; must be able to distinguish between whether a marine mammal or other species sound is detected, possibly detected, not detected and similar terminology must be used across companies/projects; where localization of sounds or deriving bearings and distance are possible, the PAM operators need to have demonstrated experience in using this technique; PAM operators must be independent observers (*i.e.,* not construction personnel); PAM operators must demonstrate experience with relevant acoustic software and equipment; PAM operators must have the qualifications and relevant experience/training to safely deploy and retrieve equipment and program the software, as necessary; PAM operators must be able to test software and hardware functionality prior to operation; and PAM operators must have evaluated their acoustic detection software using the PAM Atlantic baleen whale annotated data set available at National Centers for Environmental Information (NCEI) and provide evaluation/performance metric;

(12) PAM operators must be able to review and classify acoustic detections in real-time (prioritizing North Atlantic right whales and noting detection of other cetaceans) during the real-time monitoring periods;

(13) PSOs may work as PAM operators and vice versa, pending NMFS-approval; however, they may only perform one role at any one time and must not exceed work time restrictions, which must be tallied cumulatively; and

(14) All PSOs and PAM operators must complete a Permits and Environmental Compliance Plan training and a 2-day refresher session that must be held with the PSO provider and Project compliance representative(s) prior to the start of in-water project activities (*e.g.,* HRG survey, foundation installation, cable landfall activities, UXO/MEC detonations, *etc.*).

(b) *General PSO and PAM operator requirements.* The following measures apply to PSOs and PAM operators and must be implemented by LOA Holder:

(1) PSOs must monitor for marine mammals prior to, during, and following impact pile driving, vibratory pile driving, UXO/MEC detonation activities, and HRG surveys that use sub-bottom profilers (with specific monitoring durations and needs described in paragraphs (c) through (f) of this section, respectively). Monitoring must be done while free from distractions and in a consistent, systematic, and diligent manner;

(2) For foundation installation and UXO/MEC detonation, PSOs must visually clear (*i.e.,* confirm no observations of marine mammals) the entire minimum visibility zone for a full 30 minutes immediately prior to commencing activities. For cable landfall activities (*e.g.,* cofferdams and goal posts) and HRG surveys, which do not have a minimum visibility zone, the entire clearance zone must be visually cleared and as much of the Level B harassment zone as possible;

(3) All PSOs must be located at the best vantage point(s) on any platform, as determined by the Lead PSO, in order to obtain 360-degree visual coverage of the entire clearance and shutdown zones around the activity area, and as much of the Level B harassment zone as possible. PAM operators may be located on a vessel or remotely on-shore, the PAM operator(s) must assist PSOs in ensuring full coverage of the clearance and shutdown zones. The PAM operator must monitor to and past the clearance zone for large whales;

(4) All on-duty PSOs must remain in real-time contact with the on-duty PAM operator(s), PAM operators must immediately communicate all acoustic detections of marine mammals to PSOs, including any determination regarding species identification, distance, and bearing (where relevant) relative to the pile being driven and the degree of confidence (*e.g.,* possible, probable detection) in the determination. All on-duty PSOs and PAM operator(s) must remain in contact with the on-duty construction personnel responsible for implementing mitigations (*e.g.,* delay to pile driving or UXO/MEC detonation) to ensure communication on marine mammal observations can easily, quickly, and consistently occur between all on-duty PSOs, PAM operator(s), and on-water Project personnel;

(5) The PAM operator must inform the Lead PSO(s) on duty of animal detections approaching or within

applicable ranges of interest to the activity occurring via the data collection software system (*i.e.,* Mysticetus or similar system) who must be responsible for requesting that the designated crewmember implement the necessary mitigation procedures (*i.e.,* delay);

(6) PSOs must use high magnification (25x) binoculars, standard handheld (7x) binoculars, and the naked eye to search continuously for marine mammals. During foundation installation and UXO/MEC detonations, at least two PSOs on the pile driving and detonation-dedicated PSO vessel must be equipped with functional Big Eye binoculars (*e.g.,* 25 x 150; 2.7 view angle; individual ocular focus; height control); these must be pedestal mounted on the deck at the best vantage point that provides for optimal sea surface observation and PSO safety. PAM operators must have the appropriate equipment (*i.e.,* a computer station equipped with a data collection software system available wherever they are stationed) and use a NMFS-approved PAM system to conduct monitoring. PAM systems are approved through the PAM Plan as described in § 217.264(c)(17);

(7) During periods of low visibility (*e.g.,* darkness, rain, fog, poor weather conditions, *etc.*), PSOs must use alternative technology (*i.e.,* infrared or thermal cameras) to monitor the clearance and shutdown zones as approved by NMFS; and

(8) PSOs and PAM operators must not exceed 4 consecutive watch hours on duty at any time, must have a 2-hour (minimum) break between watches, and must not exceed a combined watch schedule of more than 12 hours in a 24-hour period. If the schedule includes PSOs and PAM operators on-duty for 2-hour shifts, a minimum 1-hour break between watches must be allowed.

(c) *PSO and PAM operator requirements during WTG and OSS foundation installation and UXO/MEC detonations.* The following measures apply to PSOs and PAM operators during WTG and OSS foundation installation and UXO/MEC detonations and must be implemented by LOA Holder:

(1) PSOs and PAM operator(s), using a NMFS-approved PAM system, must monitor for marine mammals 60 minutes prior to, during, and 30 minutes following all pile-driving and UXO/MEC detonation activities. If PSOs cannot visually monitor the minimum visibility zone prior to impact pile driving or the clearance zone prior to any UXO/MEC detonation at all times using the equipment described in paragraphs (b)(6) and (7) of this section, pile-driving operations or UXO/MEC detonation must not commence or must shutdown if they are currently active;

(2) At least three on-duty PSOs must be stationed and observing from the activity platform during impact pile driving or UXO/MEC detonation and at least three on-duty PSOs must be stationed on each dedicated PSO vessel. If an aerial platform is required or used (per § 217.264(e)(7)), at least two on-duty PSOs must be actively searching for marine mammals. Concurrently, at least one PAM operator per acoustic data stream (equivalent to the number of acoustic buoys) must be actively monitoring for marine mammals 60 minutes before, during, and 30 minutes after impact pile driving or UXO/MEC detonation in accordance with a NMFS-approved PAM Plan;

(3) LOA Holder must conduct PAM for at least 24 hours immediately prior to pile driving or UXO/MEC detonation activities. The PAM operator must review all detections from the previous 24-hour period immediately prior to pile driving and UXO/MEC detonation activities.

(d) *PSO requirements during cofferdam and goal post installation and removal.* The following measures apply to PSOs during cofferdam and goal post installation and removal and must be implemented by LOA Holder:

(1) At least two PSOs must be on active duty during all activities related to the installation and removal of cofferdams and goal posts; and

(2) PSOs must monitor the clearance zone for the presence of marine mammals for 30 minutes before, throughout the installation of the sheet piles (and casing pipe, if installed), and for 30 minutes after all vibratory pile driving activities have ceased. Sheet pile or casing pipe installation must only commence when visual clearance zones are fully visible (*e.g.,* not obscured by darkness, rain, fog, *etc.*) and clear of marine mammals, as determined by the Lead PSO, for at least 30 minutes immediately prior to initiation of vibratory pile driving.

(e) *PSO requirements during HRG surveys.* The following measures apply to PSOs during HRG surveys using acoustic sources that have the potential to result in harassment and must be implemented by LOA Holder:

(1) Between four and six PSOs must be present on every 24-hour survey vessel and two to three PSOs must be present on every 12-hour survey vessel;

(2) At least one PSO must be on active duty monitoring during HRG surveys conducted during daylight (*i.e.,* from 30 minutes prior to civil sunrise through 30 minutes following civil sunset) and at least two PSOs must be on activity duty monitoring during HRG surveys conducted at night;

(3) PSOs on HRG vessels must begin monitoring 30 minutes prior to activating acoustic sources, during the use of these acoustic sources, and for 30 minutes after use of these acoustic sources has ceased;

(4) Any observations of marine mammals must be communicated to PSOs on all nearby survey vessels during concurrent HRG surveys; and

(5) During daylight hours when survey equipment is not operating, LOA Holder must ensure that visual PSOs conduct, as rotation schedules allow, observations for comparison of sighting rates and behavior with and without use of the specified acoustic sources. Off-effort PSO monitoring must be reflected in the monthly PSO monitoring reports.

(f) *Monitoring requirements during fisheries monitoring surveys.* The following measures apply during fisheries monitoring surveys and must be implemented by LOA Holder:

(1) All captains and crew conducting fishery surveys must be trained in marine mammal detection and identification; and

(2) Marine mammal monitoring must be conducted within 1 nmi from the planned survey location by the trained captain and/or a member of the scientific crew for 15 minutes prior to deploying gear, throughout gear deployment and use, and for 15 minutes after haul back.

(g) *Reporting.* LOA Holder must comply with the following reporting measures:

(1) Prior to initiation of any on-water project activities, LOA Holder must demonstrate in a report submitted to NMFS Office of Protected Resources that all required training for LOA Holder personnel (including the vessel crews, vessel captains, PSOs, and PAM operators) has been completed.

(2) LOA Holder must use a standardized reporting system during the effective period of the LOA. All data collected related to the Project must be recorded using industry-standard software that is installed on field laptops and/or tablets. Unless stated otherwise, all reports must be submitted to NMFS Office of Protected Resources (*PR.ITP.MonitoringReports@noaa.gov*), dates must be in MM/DD/YYYY format, and location information must be provided in Decimal Degrees and with the coordinate system information (*e.g.,* NAD83, WGS84, *etc.*).

(3) For all visual monitoring efforts and marine mammal sightings, the following information must be collected

and reported to NMFS Office of Protected Resources: the date and time that monitored activity begins or ends; the construction activities occurring during each observation period; the watch status (*i.e.,* sighting made by PSO on/off effort, opportunistic, crew, alternate vessel/platform); the PSO who sighted the animal; the time of sighting; the weather parameters (*e.g.,* wind speed, percent cloud cover, visibility); the water conditions (*e.g.,* Beaufort sea state, tide state, water depth); all marine mammal sightings, regardless of distance from the construction activity; species (or lowest possible taxonomic level possible); the pace of the animal(s); the estimated number of animals (minimum/maximum/high/low/best); the estimated number of animals by cohort (*e.g.,* adults, yearlings, juveniles, calves, group composition, *etc.*); the description (*i.e.,* as many distinguishing features as possible of each individual seen, including length, shape, color, pattern, scars or markings, shape and size of dorsal fin, shape of head, and blow characteristics); the description of any marine mammal behavioral observations (*e.g.,* observed behaviors such as feeding or traveling) and observed changes in behavior, including an assessment of behavioral responses thought to have resulted from the specific activity; the animal's closest distance and bearing from the pile being driven or specified HRG equipment and estimated time entered or spent within the Level A harassment and/or Level B harassment zone(s); the activity at time of sighting (*e.g.,* vibratory installation/removal, impact pile driving, construction survey), use of any noise attenuation device(s), and specific phase of activity (*e.g.,* ramp-up of HRG equipment, HRG acoustic source on/off, soft-start for pile driving, active pile driving, *etc.*); the marine mammal occurrence in Level A harassment or Level B harassment zones; the description of any mitigation-related action implemented, or mitigation-related actions called for but not implemented, in response to the sighting (*e.g.,* delay, shutdown, *etc.*) and time and location of the action; other human activity in the area, and; other applicable information, as required in any LOA issued under § 217.266.

(4) LOA Holder must compile and submit weekly reports during foundation installation to NMFS Office of Protected Resources that document the daily start and stop of all pile driving associated with the Project; the start and stop of associated observation periods by PSOs; details on the deployment of PSOs; a record of all detections of marine mammals (acoustic and visual); any mitigation actions (or if mitigation actions could not be taken, provide reasons why); and details on the noise attenuation system(s) used and its performance. Weekly reports are due on Wednesday for the previous week (Sunday to Saturday) and must include the information required under this section. The weekly report must also identify which turbines become operational and when (a map must be provided). Once all foundation pile installation is completed, weekly reports are no longer required by LOA Holder.

(5) LOA Holder must compile and submit monthly reports to NMFS Office of Protected Resources during foundation installation that include a summary of all information in the weekly reports, including project activities carried out in the previous month, vessel transits (number, type of vessel, MMIS number, and route), number of piles installed, all detections of marine mammals, and any mitigative action taken. Monthly reports are due on the 15th of the month for the previous month. The monthly report must also identify which turbines become operational and when (a map must be provided). Full PAM detection data and metadata must also be submitted monthly on the 15th of every month for the previous month via the webform on the NMFS North Atlantic Right Whale Passive Acoustic Reporting System website at *https://www.fisheries.noaa.gov/resource/document/passive-acoustic-reporting-system-templates.*

(6) LOA Holder must submit a draft annual report to NMFS Office of Protected Resources no later than 90 days following the end of a given calendar year. LOA Holder must provide a final report within 30 days following resolution of NMFS' comments on the draft report. The draft and final reports must detail the following: the total number of marine mammals of each species/stock detected and how many were within the designated Level A harassment and Level B harassment zone(s) with comparison to authorized take of marine mammals for the associated activity type; marine mammal detections and behavioral observations before, during, and after each activity; what mitigation measures were implemented (*i.e.,* number of shutdowns or clearance zone delays, *etc.*) or, if no mitigative actions was taken, why not; operational details (*i.e.,* days and duration of impact and vibratory pile driving, days and number of UXO/MEC detonations, days and amount of HRG survey effort, *etc.*); any PAM systems used; the results, effectiveness, and which noise attenuation systems were used during relevant activities (*i.e.,* impact pile driving, and UXO/MEC detonations); summarized information related to situational reporting; and any other important information relevant to the Project, including additional information that may be identified through the adaptive management process.

(7) LOA Holder must submit its draft 5-year report to NMFS Office of Protected Resources on all visual and acoustic monitoring conducted within 90 calendar days of the completion of activities occurring under the LOA. A 5-year report must be prepared and submitted within 60 calendar days following receipt of any NMFS Office of Protected Resources comments on the draft report. If no comments are received from NMFS Office of Protected Resources within 60 calendar days of NMFS Office of Protected Resources receipt of the draft report, the report shall be considered final.

(8) For those foundation piles and UXO/MEC detonations requiring SFV measurements, LOA Holder must provide the initial results of the SFV measurements to NMFS Office of Protected Resources in an interim report after each foundation installation event and each UXO/MEC detonation event as soon as they are available and prior to a subsequent detonation or foundation installation, but no later than 48 hours after each completed foundation installation event and 48 hours after a detonation. The report must include, at minimum: hammer energies/schedule used during pile driving, including, the total number of strikes and the maximum hammer energy; the model-estimated acoustic ranges ($R_{95\%}$) to compare with the real-world sound field measurements; the estimated UXO/MEC charge size (or physical size if charge size is unknown) and donor charge size in trinitrotoluene (TNT) equivalent weight for either high (donor charge used to detonate/destroy UXO/MEC) or low order (*e.g.,* deflagration where donor charge disrupts/consumes UXO/MEC) detonations and description of UXO/MEC (*e.g.,* munition type, state of submergence, approximate age); peak sound pressure level ($SPL_{pk}$), root-mean-square sound pressure level that contains 90 percent of the acoustic energy ($SPL_{rms}$), and sound exposure level (SEL, in single strike for pile driving, $SEL_{ss,}$), for each hydrophone, including at least the maximum, arithmetic mean, minimum, median (L50) and L5 (95 percent exceedance) statistics for each metric; estimated

marine mammal Level A harassment and Level B harassment acoustic isopleths, calculated using the maximum-over-depth L5 (95 percent exceedance level, maximum of both hydrophones) of the associated sound metric; comparison of modeled results assuming 10-dB attenuation against the measured marine mammal Level A harassment and Level B harassment acoustic isopleths; estimated transmission loss coefficients; pile identifier name, location of the pile and UXO/MEC and each hydrophone array in latitude/longitude; depths of each hydrophone; one-third-octave band single strike SEL spectra; if filtering is applied, full filter characteristics must be reported; and hydrophone specifications including the type, model, and sensitivity. LOA Holder must also report any immediate observations which are suspected to have a significant impact on the results including but not limited to: observed noise mitigation system issues, obstructions along the measurement transect, and technical issues with hydrophones or recording devices. If any *in-situ* calibration checks for hydrophones reveal a calibration drift greater than 0.75 dB, pistonphone calibration checks are inconclusive, or calibration checks are otherwise not effectively performed, LOA Holder must indicate full details of the calibration procedure, results, and any associated issues in the 48-hour interim reports.

(9) The final results of SFV measurements from each foundation installation and each UXO/MEC detonation must be submitted as soon as possible, but no later than 90 days following completion of each event's SFV measurements. The final reports must include all details prescribed above for the interim report as well as, at minimum, the following: the peak sound pressure level ($SPL_{pk}$), the root-mean-square sound pressure level that contains 90 percent of the acoustic energy ($SPL_{rms}$), the single strike sound exposure level ($SEL_{ss}$), the integration time for $SPL_{rms}$, the spectrum, and the 24-hour cumulative SEL extrapolated from measurements at all hydrophones. The final report must also include at least the maximum, mean, minimum, median ($L_{50}$) and $L_5$ (95 percent exceedance) statistics for each metric; the SEL and SPL power spectral density and/or one-third octave band levels (usually calculated as decidecade band levels) at the receiver locations should be reported; the sound levels reported must be in median, arithmetic mean, and $L_5$ (95 percent exceedance) (*i.e.,* average in linear space), and in dB; range of TL coefficients; the local environmental conditions, such as wind speed, transmission loss data collected on-site (or the sound velocity profile); baseline pre- and post-activity ambient sound levels (broadband and/or within frequencies of concern); a description of depth and sediment type, as documented in the Construction and Operation Plan (COP), at the recording and foundation installation and UXO/MEC detonation locations; the extents of the measured Level A harassment and Level B harassment zone(s); hammer energies required for pile installation and the number of strikes per pile; the charge weights and other relevant characteristics of UXO/MEC detonations; the hydrophone equipment and methods (*i.e.,* recording device, bandwidth/sampling rate; distance from the pile and UXO/MEC where recordings were made; the depth of recording device(s)); a description of the SFV measurement hardware and software, including software version used, calibration data, bandwidth capability and sensitivity of hydrophone(s), any filters used in hardware or software, any limitations with the equipment, and other relevant information; the spatial configuration of the noise attenuation device(s) relative to the pile and UXO/MEC charge; a description of the noise abatement system and operational parameters (*e.g.,* bubble flow rate, distance deployed from the pile and/or UXO/MEC, *etc.*), and any action taken to adjust the noise abatement system. A discussion which includes any observations which are suspected to have a significant impact on the results including but not limited to: observed noise mitigation system issues, obstructions along the measurement transect, and technical issues with hydrophones or recording devices.

(10) If at any time during the project LOA Holder becomes aware of any issue or issues which may (to any reasonable subject-matter expert, including the persons performing the measurements and analysis) call into question the validity of any measured Level A harassment or Level B harassment isopleths to a significant degree, which were previously transmitted or communicated to NMFS Office of Protected Resources, LOA Holder must inform NMFS Office of Protected Resources within 1 business day of becoming aware of this issue or before the next pile is driven (or UXO/MEC is detonated), whichever comes first.

(11) If a North Atlantic right whale is acoustic detected at any time by a project-related PAM system, LOA Holder must ensure the detection is reported as soon as possible to NMFS, but no longer than 24 hours after the detection via the *24-hour North Atlantic right whale Detection Template* (*https://www.fisheries.noaa.gov/resource/document/passive-acoustic-reporting-system-templates*). Calling the hotline is not necessary when reporting PAM detections via the template;

(12) Full detection data, metadata, and location of recorders (or GPS tracks, if applicable) from all real-time hydrophones used for monitoring during construction must be submitted within 90 calendar days following completion of activities requiring PAM for mitigation via the ISO standard metadata forms available on the NMFS Passive Acoustic Reporting System website *(https://www.fisheries.noaa.gov/resource/document/passive-acoustic-reporting-system-templates*). Submit the completed data templates to *nmfs.nec.pacmdata@noaa.gov.* The full acoustic recordings from real-time systems must also be sent to the National Centers for Environmental Information (NCEI) for archiving within 90 days following completion of activities requiring PAM for mitigation. Submission details can be found at: *https://www.ncei.noaa.gov/products/passive-acoustic-data;*

(13) LOA Holder must submit situational reports if the following circumstances occur (including all instances wherein an exemption is taken must be reported to NMFS Office of Protected Resources within 24 hours):

(i) If a North Atlantic right whale is observed at any time by PSOs or project personnel, LOA Holder must ensure the sighting is immediately (if not feasible, as soon as possible and no longer than 24 hours after the sighting) reported to NMFS and the Right Whale Sightings Advisory System (RWSAS). If in the Northeast Region (Maine to Virginia/North Carolina border) call (866–755–6622). If in the Southeast Region (North Carolina to Florida) call (877–WHALE–HELP or 877–942–5343). If calling NMFS is not possible, reports can also be made to the U.S. Coast Guard via channel 16 or through the WhaleAlert app (*http://www.whalealert.org/*). The sighting report must include the time, date, and location of the sighting, number of whales, animal description/certainty of sighting (provide photos/video if taken), Lease Area/project name, PSO/personnel name, PSO provider company (if applicable), and reporter's contact information.

(ii) If a North Atlantic right whale is observed at any time by PSOs or project personnel, LOA Holder must submit a summary report to NMFS Greater

Atlantic Regional Fisheries (GARFO; *nmfs.gar.incidental-take@noaa.gov*), NMFS Office of Protected Resources, and NMFS Northeast Fisheries Science Center (NEFSC; *ne.rw.survey@noaa.gov*) within 24 hours with the above information and the vessel/platform from which the sighting was made, activity the vessel/platform was engaged in at time of sighting, project construction and/or survey activity at the time of the sighting (*e.g.,* pile driving, cable installation, HRG survey), distance from vessel/platform to sighting at time of detection, and any mitigation actions taken in response to the sighting.

(iii) If an observation of a large whale occurs during vessel transit, LOA Holder must report the time, date, and location of the sighting; the vessel's activity, heading, and speed (knots); Beaufort sea state, water depth (meters), and visibility conditions; marine mammal species identification to the best of the observer's ability and any distinguishing characteristics; initial distance and bearing to marine mammal from vessel and closest point of approach; and any avoidance measures taken in response to the marine mammal sighting.

(iv) LOA Holder must provide NMFS Office of Protected Resources with notification of planned UXO/MEC detonation as soon as possible but at least 48 hours prior to the planned detonation, unless this 48-hour notification would create delays to the detonation that would result in imminent risk of human life or safety. This notification must include the coordinates of the planned detonation, the estimated charge size, and any other information available on the characteristics of the UXO/MEC. If an UXO/MEC detonation occurs, within 72 hours after a detonation but before the next detonation, whichever is sooner, LOA Holder must report to NMFS Office of Protected Resources the time, date, location (latitude/longitude Decimal Degrees), charge weight size, justification on why detonation was necessary and other means of removal or avoidance could not occur, all detections of marine mammals within the UXO/MEC zones, and any mitigative action taken.

(v) In the event that personnel involved in the Project discover a stranded, entangled, injured, or dead marine mammal, LOA Holder must immediately report the observation to NMFS. If in the Greater Atlantic Region (Maine to Virginia) call the NMFS Greater Atlantic Stranding Hotline (866–755–6622); if in the Southeast Region (North Carolina to Florida), call the NMFS Southeast Stranding Hotline (877–942–5343). Separately, LOA Holder must report the incident to NMFS Office of Protected Resources (*PR.ITP.MonitoringReports@noaa.gov)* and, if in the Greater Atlantic region (Maine to Virginia), NMFS Greater Atlantic Regional Fisheries Office (GARFO; *nmfs.gar.incidental-take@noaa.gov, nmfs.gar.stranding@noaa.gov*) or, if in the Southeast region (North Carolina to Florida), NMFS Southeast Regional Office (SERO; *secmammalreports@noaa.gov*) as soon as feasible. The report (via phone or email) must include contact (name, phone number, *etc.*), the time, date, and location 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.

(vi) In the event of a vessel strike of a marine mammal by any vessel associated with the Project or if project activities cause a non-auditory injury or death of a marine mammal, LOA Holder must immediately report the incident to NMFS. If in the Greater Atlantic Region (Maine to Virginia) call the NMFS Greater Atlantic Stranding Hotline (866–755–6622) and if in the Southeast Region (North Carolina to Florida) call the NMFS Southeast Stranding Hotline (877–942–5343). Separately, LOA Holder must immediately report the incident to NMFS Office of Protected Resources (*PR.ITP.MonitoringReports@noaa.gov)* and, if in the Greater Atlantic region (Maine to Virginia), NMFS GARFO (*nmfs.gar.incidental-take@noaa.gov, nmfs.gar.stranding@noaa.gov*) or, if in the Southeast region (North Carolina to Florida), NMFS SERO (*secmammalreports@noaa.gov*). The report must include the time, date, and location of the incident; species identification (if known) or description of the animal(s) involved; vessel size and motor configuration (inboard, outboard, jet propulsion); vessel's speed leading up to and during 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). LOA Holder must immediately cease all on-water activities until the NMFS Office of Protected Resources is able to review the circumstances of the incident and determine what, if any, additional measures are appropriate to ensure compliance with the terms of the LOA. NMFS Office of Protected Resources may impose additional measures to minimize the likelihood of further prohibited take and ensure MMPA compliance. LOA Holder may not resume their activities until notified by NMFS Office of Protected Resources.

(14) LOA Holder must report any lost gear associated with the fishery surveys to the NMFS GARFO Protected Resources Division (*nmfs.gar.incidental-take@noaa.gov*) as soon as possible or within 24 hours of the documented time of missing or lost gear. This report must include information on any markings on the gear and any efforts undertaken or planned to recover the gear.

**§ 217.266 Letter of Authorization.**

(a) To incidentally take marine mammals pursuant to this subpart, LOA Holder must apply for and obtain an LOA.

(b) An LOA, unless suspended or revoked, may be effective for a period of time not to exceed October 12, 2028, the expiration date of this subpart.

(c) In the event of projected changes to the activity or to mitigation and monitoring measures required by an LOA, LOA Holder must apply for and obtain a modification of the LOA as described in § 217.267.

(d) The LOA must set forth:

(1) Permissible methods of incidental taking;

(2) Means of effecting the least practicable adverse impact (*i.e.,* mitigation) on the species, its habitat, and on the availability of the species for subsistence uses; and

(3) Requirements for monitoring and reporting.

(e) Issuance of the LOA must be based on a determination that the level of taking must be consistent with the findings made for the total taking

allowable under the regulations of this subpart.

(f) Notice of issuance or denial of an LOA must be published in the **Federal Register** within 30 days of a determination.

**§ 217.267 Modifications of Letter of Authorization.**

(a) An LOA issued under §§ 217.262 and 217.266 or this section for the activity identified in § 217.260(a) shall be modified upon request by LOA Holder, provided that:

(1) The specified activity and mitigation, monitoring, and reporting measures, as well as the anticipated impacts, are the same as those described and analyzed for this subpart (excluding changes made pursuant to the adaptive management provision in paragraph (c)(1) of this section); and

(2) NMFS Office of Protected Resources determines that the mitigation, monitoring, and reporting measures required by the previous LOA under this subpart were implemented.

(b) For a LOA modification request by the applicant that includes changes to the activity or the mitigation, monitoring, or reporting (excluding changes made pursuant to the adaptive management provision in paragraph (c)(1) of this section), the LOA shall be modified, provided that:

(1) NMFS Office of Protected Resources determines that the changes to the activity or the mitigation, monitoring, or reporting do not change the findings made for the regulations in this subpart and do not result in more than a minor change in the total estimated number of takes (or distribution by species or years), and

(2) NMFS Office of Protected Resources may, if appropriate, publish a notice of proposed LOA in the **Federal Register**, including the associated analysis of the change, and solicit public comment before issuing the LOA.

(c) An LOA issued under §§ 217.262 and 217.266 or this section for the activities identified in § 217.260(a) may be modified by NMFS Office of Protected Resources under the following circumstances:

(1) Through adaptive management, NMFS Office of Protected Resources may modify (including delete, modify, or add to) the existing mitigation, monitoring, or reporting measures (after consulting with LOA Holder regarding the practicability of the modifications), if doing so creates a reasonable likelihood of more effectively accomplishing the goals of the mitigation and monitoring;

(i) Possible sources of data that could contribute to the decision to modify the mitigation, monitoring, or reporting measures in an LOA include, but are not limited to:

(A) Results from LOA Holder's monitoring(s);

(B) Results from other marine mammals and/or sound research or studies; and

(C) Any information that reveals marine mammals may have been taken in a manner, extent, or number not authorized by the regulations in this subpart or subsequent LOA.

(ii) If, through adaptive management, the modifications to the mitigation, monitoring, or reporting measures are substantial, NMFS Office of Protected Resources shall publish a notice of proposed LOA in the **Federal Register** and solicit public comment.

(2) If NMFS Office of Protected Resources determines that an emergency exists that poses a significant risk to the well-being of the species or stocks of marine mammals specified in the LOA issued pursuant to §§ 217.262 and 217.266 or this section, an LOA may be modified without prior notice or opportunity for public comment. Notice would be published in the **Federal Register** within 30 days of the action.

**§§ 217.268–217.269 [Reserved]**

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