New England Wind Offshore Wind Farm

Updates to the Application for Marine Mammal Protection Act (MMPA) Rulemaking and Letter of Authorization

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Permits and Conservation Division,
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JASCO APPLIED SCIENCES

1. Introduction

Park City Wind LLC (Park City Wind), a wholly owned subsidiary of Avangrid Renewables, LLC (Proponent), is proposing to develop offshore renewable wind energy facilities in the Bureau of Ocean Energy Management (BOEM) Lease Area OCS-A 0534 along with associated offshore and onshore cabling, onshore substations, and onshore operations and maintenance (O&M) facilities. The New England Wind Offshore Wind Farm's (New England Wind; Project) offshore renewable wind energy facilities are located immediately southwest of Vineyard Wind 1, which is located in Lease Area OCS-A 0501. New England Wind will occupy all of Lease Area OCS-A 0534 and potentially a portion of Lease Area OCS-A 0501 in the event that Vineyard Wind 1 does not develop "spare" or extra positions included in Lease Area OCS-A 0501 and Vineyard Wind 1 assigns those positions to Lease Area OCS-A 0534. For the purposes of this document, the Southern Wind Development Area (SWDA) is defined as all of Lease Area OCS-A 0534 and the southwest portion of Lease Area OCS-A 0501, as shown in Figure 1.

New England Wind will be developed in two Phases with a maximum of 130 wind turbine generator (WTG) and electrical service platform (ESP) positions. Two positions may potentially have co-located ESPs (i.e., two foundations installed at one grid position), resulting in 132 foundations. Phase 1 will be developed immediately southwest of the Vineyard Wind 1 project. The Phase 1 Envelope allows for 41 to 62 WTGs and one or two ESP(s). Depending upon the capacity of the WTGs, Phase 1 will occupy 150–231 km^2 (37,066–57,081 acres) of the SWDA. The Phase 1 Envelope includes two WTG foundation types: monopiles and piled jackets. Phase 2, also known as Commonwealth Wind, will be immediately southwest of Phase 1 and will occupy the remainder of the SWDA. The footprint and total number of WTG and ESP positions in Phase 2 depends upon the final footprint of Phase 1; Phase 2 is expected to contain 64 to 88 WTG/ESP positions (up to three positions will be occupied by ESPs) within an area ranging from 222–303 km^2 (54,857–74,873 acres). The Phase 2 Envelope includes three general WTG foundation types: monopiles, jackets (with piles or suction buckets), or bottom-frame foundations (with piles or suction buckets).

The Proponent submitted a request for rulemaking and Letter of Authorization (LOA) pursuant to Section 101(a)(5) of the Marine Mammal Protection Act (MMPA) and 50 CFR Part 216 Subpart I to allow for the incidental harassment of small numbers of marine mammals resulting from: 1) the installation of WTGs and ESPs with methods of impact pile driving, vibratory pile setting, and drilling, 2) potential detonations of unexploded ordnances (UXO), and 3) the performance of high-resolution geophysical (HRG) surveys operating at less than 180 kHz. The LOA application was deemed adequate and complete on July 20, 2022, and a Notice of Receipt of the LOA application was published in the Federal Register on August 22, 2022 (87 FR 51345).

Although the LOA application was deemed adequate and complete in July 2022, updates have been made since that time to the Duke Marine Geospatial Ecology Lab density models, Project foundation installation and potential UXO detonation schedules, vibratory setting assessment, and mitigation of drilling activity. In addition, the Proponent has advanced development of a fisheries monitoring program and associated mitigation measures. The following subsections provide a detailed description of these updates.

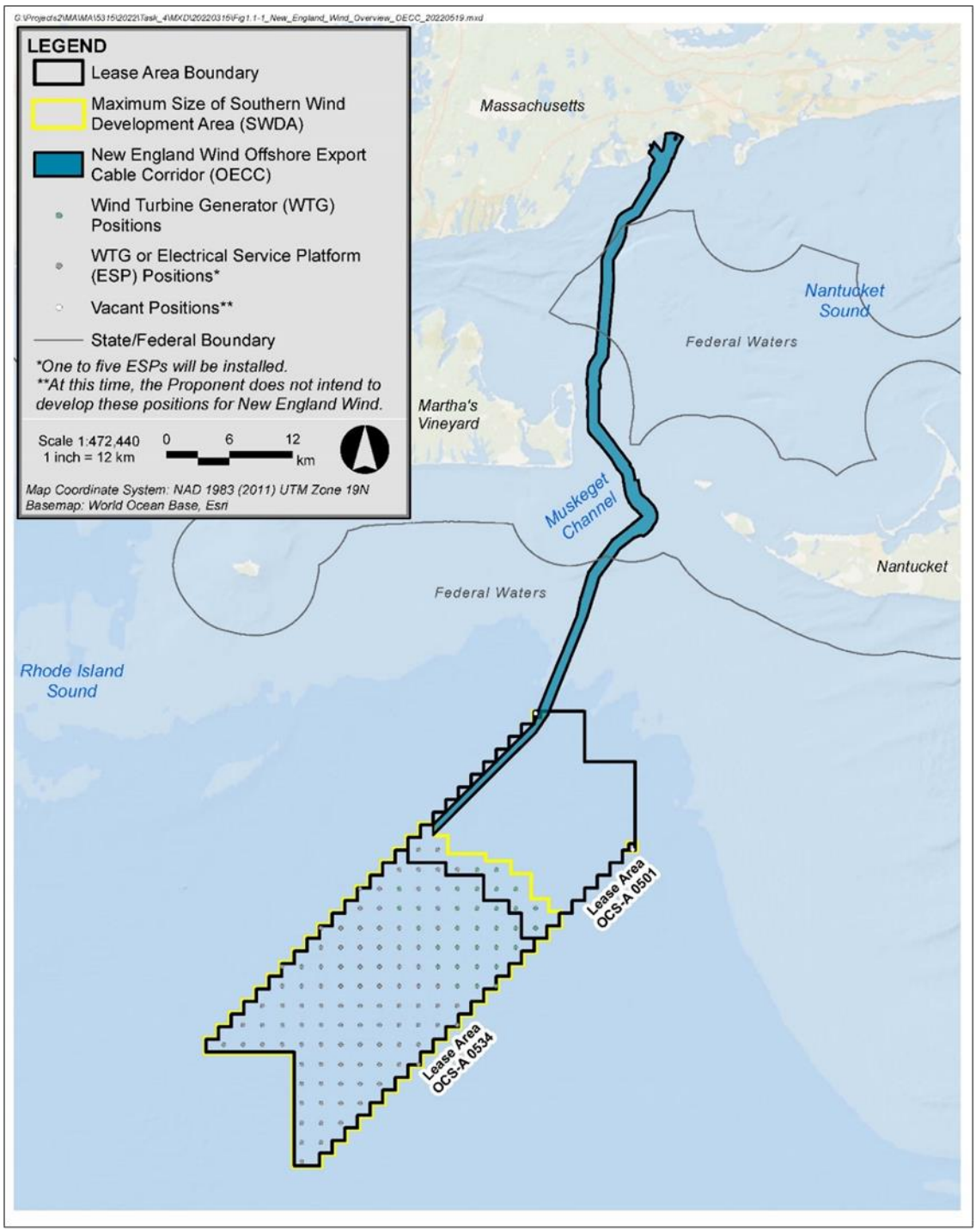

Figure 1. Location of New England Wind SWDA within Lease Area OCS-A 0534 and the SW portion of Lease Area OCS-A 0501.

1.1. Density Updates

The take request included within Section 6 of the New England Wind LOA application, submitted to NMFS in July 2022, was based primarily on a collection of Roberts et al. (2016a, 2016b, 2017, 2018, 2020, 2021a, 2021b) density estimates. On June 20, 2022, the Duke Marine Geospatial Ecology Lab released a comprehensive new set of marine mammal density models for the U.S. east coast (Roberts et al. 2022), available at https://seamap.env.duke.edu/models/Duke/EC/. The new models result in updated density estimates for all taxa for which the Proponent is requesting take and serve as a complete replacement for the Roberts et al. (2016a) models and subsequent updates. Although the Proponent's LOA application was deemed complete in July 2022, the Proponent voluntarily agreed to provide NMFS and the public with updated take estimates resulting from this update in the density models. This document includes updated exposure and take estimates calculated from the new Roberts et al. (2022) density models.

1.2. Construction Schedule Update

The New England Wind LOA application describes construction activities that would span a period of 5 years from 2025 through 2029. Year 1 is assumed to be 2025, Year 2 is assumed to be 2026, Year 3 is assumed to be 2027, Year 4 is assumed to be 2028, and Year 5 is assumed to be 2029. The application describes two possible construction schedules that could take place during these 5 years: Construction schedule A and Construction schedule B.

As described in the LOA application, Construction schedule A assumes a conservative, yet realistic two-year construction scenario whereby 54 Phase 1 WTGs are installed on monopiles, 53 Phase 2 WTGs are installed on monopiles, 23 Phase 2 WTGs are installed on jackets, and each Phase includes one ESP on a jacket foundation.[1] Construction schedule A also assumes that foundations for all of Phase 1 and a portion of Phase 2 are installed in Year 1, and that the remaining Phase 2 foundations are installed in Year 2. Overall, under this schedule, 89 monopile foundations and two jacket foundations would be installed in Year 1 and 18 monopile and 24 jacket foundations would be installed in Year 2.

As described in the LOA application, Construction schedule B assumes a conservative, yet realistic three-year construction scenario where 55 Phase 1 WTGs are installed on monopiles, 75 Phase 2 WTGs are installed on jackets, and each Phase includes one ESP on a jacket foundation.[2] Construction schedule B assumes that all ESP foundations and Phase 1 WTG foundations are installed in Year 1 and that the Phase 2 WTG foundations are installed in Years 2 and 3. Overall, under this schedule, 55 monopiles and three jacket foundations would be installed in Year 1, 53 jacket foundations would be installed in Year 2 and 22 jacket foundations would be installed in Year 3.

This document also seeks to adjust the construction schedules described above and provided in the LOA application. Specifically, the Proponent is maintaining its request for the LOA to cover the same five year period (2025 through 2029) and become effective in January 2025; however, the Proponent has determined that foundation installation activities (i.e., impact pile driving, vibratory pile setting, drilling) will occur one year later for both Construction schedule A and B. Other in-water activities (i.e., HRG survey, some UXO detonation) may occur in 2025 (Year 1), as described in the LOA application. The following

[1] Construction schedule A also includes one additional jacket foundation for a reactive compensation station (RCS), which has been eliminated from the design of New England Wind.
[2] Construction schedule B also includes one additional jacket foundation for an RCS, which has been eliminated from the design of New England Wind.

table (Table 1) summarizes the old schedule within the LOA application and compares it against the updated schedule. Detailed, updated construction schedules are provided in Table 2 and Table 3.

Table 1. A summary of the proposed Project activity and the associated year.

Activity	Year 1 (2025)	Year 2 (2026)	Year 3 (2027)	Year 4 (2028)	Year 5 (2029)
Foundation Installation (i.e., impact pile driving, vibratory pile setting, and drilling)	○	X ○	X ○	X*	
Potential UXO Detonation	X	X ○			
HRG Surveys	X ○	X ○	X ○	X ○	X ○

X = updated application schedule
o = previous LOA application schedule (July 2022 version)
* = foundation installation would only occur in this year if Construction schedule B is assumed.

Table 2. Revised Pile Installation Construction Schedule A: The number of potential days of pile installation per month under the maximum design scenario used to estimate the total number of marine mammal acoustic exposures for New England Wind.

Month	Year 2 (2026)[a]								Year 3 (2027)						Schedule A Total		
	12 m Monopile 5,000 kJ		13 m Monopile 5,000 kJ		4 m Pin pile 3,500 kJ	Year 2 total days of impact piling	Days with vibratory hammer[b]	Days with drilling[b,c]	12 m Monopile 6,000 kJ		4 m Pin Pile 3,500 kJ	Year 3 total days of impact piling	Days with vibratory hammer[b]	Days with drilling[b]	Total days of impact piling	Days with vibratory hammer[b]	Days with drilling[b]
	One per day	Two per day	One per day	Two per day	Four per day				One per day	Two per day	Four per day						
May	4	0	0	0	0	4	0	2	4	0	0	4	0	1	8	0	5
June	2	5	0	0	0	7	2	4	0	3	0	3	2	2	10	4	6
July	0	9	0	0	0	9	4	7	0	4	0	4	4	2	13	8	9
August	0	9	0	0	0	9	6	7	0	0	8	8	8	4	17	14	11
September	0	1	1	6	2	10	4	8	0	0	7	7	6	2	17	10	10
October	0	0	0	6	0	6	3	3	0	0	6	6	4	2	12	7	5
November	0	0	0	3	0	3	1	2	0	0	2	2	1	2	5	2	4
December	0	0	4	0	0	4	0	0	0	0	1	1	0	0	5	0	0
	6	**24**	**5**	**15**	**2**	**52**	**20**	**33**	**4**	**7**	**24**	**35**	**25**	**15**	**87**	**45**	**48**
Total Days	**52 days**								**35 days**						**87 days**		
Total Foundations	**89 monopiles and 2 jackets**								**18 monopiles and 24 jackets**						**133 foundations**		
Total Piles	**89 monopiles and 8 pin piles**								**18 monopiles and 96 pin piles**						**211 piles**		

[a] This LOA request is for the 5-year period 2025–2029, during which pile installation is scheduled to begin in 2026. These dates reflect the currently projected construction start year and are subject to change because exact project start dates and construction schedules are not currently available. No concurrent/simultaneous pile driving of foundations is planned.

[b] The number of days with vibratory hammering or drilling is based on a percentage of the number of days of pile installation and includes installation of a mix of monopiles at a rate of both 1 per day and 2 per day as well as installation of jacket foundations at a rate of four pin piles per day. The number of Level B takes **per day** is unaffected by the number of piles or foundations installed in that day because the SPL 120 dB metric is not cumulative. Level B take was estimated using density-based calculations that assume all animals within the area ensonified to 120 dB are taken as soon as the activity begins and cannot be taken additional times within one day. Only Level B takes are being requested for drilling and vibratory hammering.

[c] As a conservative measure, it was assumed that vibratory hammering and drilling would not occur on the same day, when possible. However, for months when the number of days with vibratory hammering plus the number of days with drilling exceeded the total number of impact piling days that month, we assumed the minimum number of days of overlap possible for these two activities. On the days with overlap between drilling and vibratory hammering, the estimated Level B takes resulting from drilling were not included to avoid double counting taken animals, because all animals within the larger vibratory hammering zone of influence were assumed to have already been taken by that activity. Level B takes for 8 days of drilling in year 2 (2026) and 9 days of drilling in year 3 (2027) shown in Schedule A were thus not included in the total take estimates.

Table 3. Revised Pile Installation Construction Schedule B: The number of potential days of pile installation per month under the maximum design scenario used to estimate the total number of marine mammal acoustic exposures for New England Wind.

Month	Year 2 (2026)[a]						Year 3 (2027)				Year 4 (2028)				Schedule B Total		
	12 m Monopile 5,000 kJ		4 m Pin pile 3,500 kJ	Year 2 total days of impact piling	Days with vibratory hammer[b]	Days with drilling[b]	4 m Pin pile 3,500 kJ	Year 3 total days of impact piling	Days with vibratory hammer[b]	Days with drilling[b,c]	4 m Pin pile 3,500 kJ	Year 4 total days of impact piling	Days with vibratory hammer[b]	Days with drilling[b]	Total days of impact piling	Days with vibratory hammer[b]	Days with drilling[b]
	One per day	Two per day	Four per day				Four per day				Four per day						
May	4	0	0	4	0	2	1	1	0	1	1	1	0	1	6	0	6
June	6	4	0	10	2	4	9	9	2	4	4	4	2	2	23	6	10
July	0	7	0	7	4	3	14	14	5	4	5	5	2	2	26	11	9
August	1	5	1	7	6	4	14	14	8	4	5	5	2	1	26	16	9
September	0	3	1	4	4	4	8	8	5	4	5	5	1	1	17	10	9
October	1	1	1	3	3	2	4	4	4	1	1	1	1	1	8	8	4
November	2	0	0	2	1	1	2	2	1	1	1	1	1	1	5	3	3
December	1	0	0	1	0	0	1	1	0	0	0	0	0	0	2	0	0
	15	**20**	**3**	**38**	**20**	**20**	**53**	**53**	**25**	**19**	**22**	**22**	**9**	**9**	**113**	**54**	**48**
Total Days	**38 days**						**53 days**				**22 days**				**113 days**		
Total Foundations	**55 monopiles and 3 jackets**						**53 jackets**				**22 jackets**				**133 foundations**		
Total Piles	**55 monopiles and 12 pin piles**						**212 pin piles**				**88 pin piles**				**367 piles**		

[a] This LOA request is for the 5-year period 2025–2029, during which pile installation is scheduled to begin in 2026. These dates reflect the currently projected construction start year and are subject to change because exact project start dates and construction schedules are not currently available. No concurrent/simultaneous pile driving of foundations is planned.

[b] The number of days with vibratory hammering or drilling is based on a percentage of the number of days of pile installation and includes installation of a mix of monopiles at a rate of both 1 per day and 2 per day as well as installation of jacket foundations at a rate of four pin piles per day. The number of Level B takes per day is unaffected by the number of piles or foundations installed in that day because the SPL 120 dB metric is not cumulative. Level B take was estimated using density-based calculations that assume all animals within the area ensonified to 120 dB are taken as soon as the activity begins and cannot be taken additional times within one day. Only Level B takes are being requested for drilling and vibratory hammering.

[c] As a conservative measure, it was assumed that vibratory hammering and drilling would not occur on the same day, when possible. However, for months when the number of days with vibratory hammering plus the number of days with drilling exceeded the total number of impact piling days that month, we assumed the minimum number of days of overlap possible for these two activities. On the days with overlap between drilling and vibratory hammering, the estimated Level B takes resulting from drilling were not included to avoid double counting taken animals, because all animals within the larger vibratory hammering zone of influence were assumed to have already been taken by that activity. Level B takes for 9 days of drilling in year 2 (2026), 2 days of drilling in year 3 (2027), and 2 days of drilling in year 4 (2028) shown in Schedule B were thus not included in the total take estimates.

1.3. Potential UXO Detonation Schedule Update

As described in Section 1.2.4 of the LOA application, the Proponent has commissioned a UXO desktop study in which a comprehensive historic analysis of all activities which may have contributed to potential UXO-related contamination have been considered and are summarized. As part of the study, a baseline threat assessment was conducted to assign a risk level to the different geographic areas within the New England Wind project area. The study identified moderate risk areas within the New England Wind project area and these areas are shown on Figure 2 (all other areas of New England Wind are low risk). A moderate risk is identified when evidence suggests that there is UXO present in the area (i.e., when there is a possibility of encountering UXO), activities may result in UXO detonation, and present receptors are at risk of experiencing an adverse response following detonation. Proactive UXO Mitigation is required for moderate risk (see Table 4).

Table 4. Risk level definitions.

Risk level	Definition
High	Indisputable evidence that there is a risk from this type of UXO in the area. Proactive UXO Mitigation is required.
Moderate	Evidence suggests that there is a risk from this type of UXO in the area. Proactive UXO Mitigation is required.
Low	Some evidence suggests that there is a risk from this type of UXO in the area or wider region. Reactive mitigation may be required.
Negligible	No evidence suggesting that there is a risk from this type of UXO in the area or wider region. No further mitigation is required.

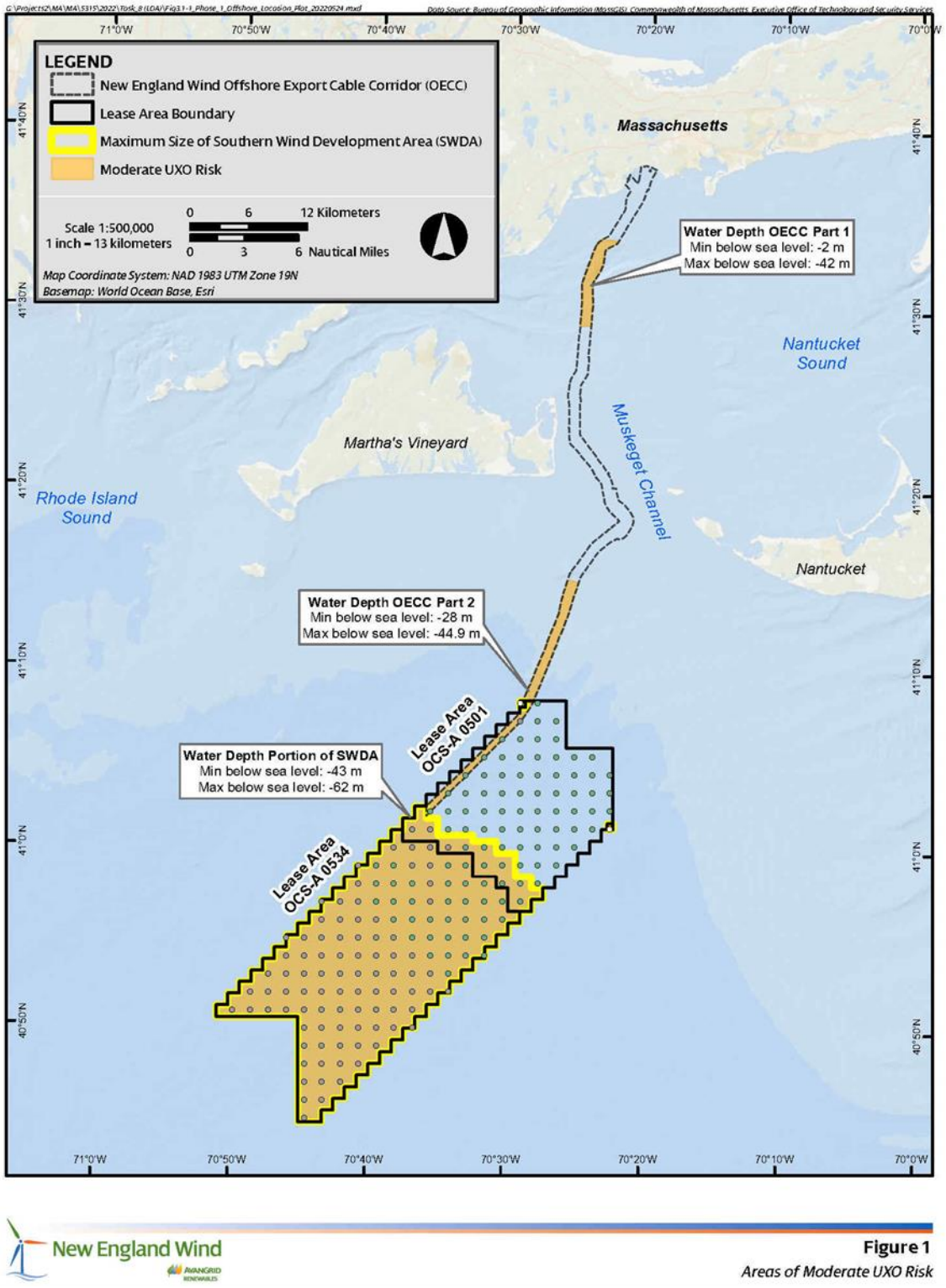

Figure 2. Potential areas of moderate risk for unexploded ordnance (UXO) presence. Source: Figure 1 of Mills (2021).

The LOA application included an analysis of up to 10 UXO detonations and potential marine mammal exposures to species' thresholds and take estimates. In order to provide a maximum yearly take estimate in the LOA application, all 10 potential UXO detonations were assumed to occur in a single year. Year 2 (2026) was chosen because it had the highest estimated pile installation takes. This method is highly conservative; however, it provides a reasonable estimate for the maximum annual take that could occur in a given calendar year. Based on ongoing development of the construction schedule, the Proponent now expects that some UXO detonation activities could occur in 2025, prior to work in the offshore export cable corridor (OECC) and/or SWDA in 2026. Accordingly, the Proponent is distributing its UXO take estimates across two potential years, Year 1 (2025) and Year 2 (2026), and no changes are being made to the number of potential UXO detonations or associated water depths. Specifically, the Proponent estimates that six detonations may occur in Year 1 and four may occur in Year 2. The UXO exposures and take estimates within this update memo assume that six detonations would occur in 2025 and four would occur in 2026 (Table 5).

Table 5. Potential UXO detonation schedule.

Potential UXO Detonation Schedule	
Year 1 (2025)	**Year 2 (2026)**
2 UXOs at 12 m	0 UXOs at 12 m
3 UXOs at 20 m	0 UXOs at 20 m
1 UXOs at 30 m	2 UXOs at 30 m
0 UXOs at 40 m	2 UXOs at 40 m
Total UXOs = **10**	

Maximum monthly UXO densities were calculated in the LOA application within the moderate UXO risk areas for each species. These areas are identified as the shallow segment of the OECC (representing the 12 m depth location) and the combined deepwater segment of the OECC and SWDA (20 m – 62 m depths). However, the attenuated SEL-based acoustic ranges extend beyond these areas (see Table 42 of the LOA application). To capture all density data within the highest possible impact area, the largest SEL-based TTS-onset acoustic ranges, assuming 10 dB of attenuation, across all hearing groups was applied to the moderate UXO risk areas (Figure 6), and these new areas are used to calculate the maximum monthly marine mammal densities in this document (Table 9).

1.4. Drilling Update

Drilling activity was also considered in the LOA application for the Project. There may be instances during construction where large sub-surface boulders or hard sediment layers are encountered, requiring drilling to pass through these barriers. The Proponent conducted a seabed drivability analysis[3] to estimate the number of foundation positions that could potentially require drilling during pile installation. The

[3] The analysis of how many foundations may require drilling considered both geophysical and geotechnical data and potential contractor means and methods. The data considered include geophysical trackline data, deep boreholes, deep downhole cone penetrometer tests (CPTs), seabed CPTs, and vibracores. The Proponent also considered information on equipment types and installation methods that is being obtained from potential contractors during the ongoing procurement process.

analysis suggested that up to 30% of foundations (~40 foundations) could require drilling[4]. The LOA application assumed 20% conservatism to this estimate (20% of 40 is ~8 additional foundations), resulting in approximately 48 total foundations (36% of all proposed foundations) that may require drilling. This is unchanged in this update.

In the LOA application, an SPL of ~140 dB re 1 µPa measured at 1 km from similar activity in the Alaskan Chukchi and Beaufort Seas (Austin et al. 2018) was used to estimate the range to the 120 dB re µPa behavioral threshold criterion (NMFS 2018). To get the range to SPL 120 dB re 1µPa, the received level at 1 km was backpropagated to 1 m using the practical spreading loss model (15 Log(range)) to obtain a sound source level of 185 dB re 1 µPa. This sound source level was then propagated out to 120 dB re µPa, also assuming practical spreading loss, to estimate the Project's Level B acoustic range for drilling activity of 21.5 km. This range was used to calculate Level B exposures and take estimates provided in the original take request. However, it has come to the Proponent's attention that a source level up to 193.3 dB re 1 µPa was estimated by Austin et al. (2018) using environmental propagation models designed for that location. It is more appropriate, and conservative, to use the SPL 193.3 dB re 1 µPa source level (based on a measured level of 141.8 dB re 1 µPa at 1 km). Then, assuming practical spreading loss, the Level B acoustic range for drilling is approximately 77 km.

The Proponent expects to employ a noise attenuation system during all drilling activity of WTG and ESP foundations. Sound produced by drilling is within the same frequency range as sound produced during impact pile driving, so the performance of a system at sufficient distance to attenuate sound entering the water from the substrate would have essentially the same performance during drilling as expected during impact pile driving. By applying 10 dB of attenuation to 193.3 dB re 1 µPa, a mitigated source level of 183.3 dB re 1 µPa is now assumed for the Project's drilling activity (attenuation was not originally applied to drilling activity in the LOA application but is applied now). Assuming practical spreading loss from an attenuated source level of 183.3 dB re 1 µPa, the Level B acoustic range for drilling is approximately 16.6 km. This final range is used to calculate the drilling Level B exposures and take estimates provided below and for the purpose of an updated take request.

Assuming (1) a mitigated sound source level of 183.3 dB re 1 µPa at 1 m for drilling (2) sound propagation by the practical spreading loss model, and (3) a maximum of 24 hours of drilling activity per day[5], the PTS ranges calculated using the NMFS online User Spreadsheet Tool (NOAA 2020, see Appendix B) are as follows:

- LF cetaceans = 174.3 m,
- MF cetaceans = 15.4 m,
- HF cetaceans = 257.7 m, and
- Phocid pinnipeds = 105.9 m.

The PTS ranges have been calculated under a conservative assumption that drilling occurs 24 hours a day, regardless of foundation or pile type. Due to the small size of the PTS ranges and the mitigation described in the LOA application, the Proponent is not requesting any Level A take of marine mammals

[4] The seabed drivability analysis estimated the number of foundation positions that would require drilling. No assumptions were made about the type of foundation installed at these positions. Because the drilling exposure analysis was completed assuming 24 hours of drilling would be conducted per day of activity, the type of foundation does not matter for the purpose of estimating marine mammal exposures. Therefore, the drilling exposure estimates are conservative.

[5] Although it is possible that each pile could require 12 hours of drilling activity, the drilling exposure analysis assumes 24 hours maximum of drilling activity per day, regardless of foundation or pile type, in order to estimate conservative exposures.

for drilling activity. The Project has committed to certain mitigation and monitoring measures which are intended to reduce the risk for Level A take. A pre-clearance and continuous monitoring program throughout pile driving and drilling is described in the LOA application. Shutdown zones identified in Table 68 of the LOA application are several times larger than the calculated PTS ranges for drilling activity. For example, a shutdown zone of 2,300 m for high-frequency cetaceans has been proposed during all drilling activity, which is intended to prohibit all Level A take of harbor porpoise during drilling. This mitigation zone is almost 9 times the estimated 257.7 m Level A zone for high-frequency cetaceans and provides a comfortable buffer, and therefore no Level A take is expected.

1.5. Vibratory Setting Update

During construction of the New England Wind project, it may be necessary to start pile installation using a vibratory hammer rather than using an impact hammer, a technique known as vibratory setting of piles. The vibratory method is particularly useful when seabed sediments are not sufficiently stiff to support the weight of the pile during the initial installation, increasing the risk of 'pile run' where a pile sinks rapidly through seabed sediments. The Proponent conducted a seabed drivability analysis to estimate the number of foundation positions that could potentially require vibratory setting of piles. The analysis suggested that up to 50% of foundations (~66 foundations) could require vibratory setting. The LOA application assumed 20% conservatism to this estimate (20% of 66 is ~13 additional foundations) resulting in approximately 79 foundations that may require vibratory setting. However, based on our current understanding of seabed sediments, the conservatism was reduced to assumes 6% conservatism (6% of 66 is ~4 additional foundations) instead of 20%, resulting in approximately 70 total foundations (53% of all proposed foundations) that may require vibratory setting. This new percentage of conservatism is used to estimate the number of days of vibratory setting shown in the revised pile installation schedules provided in this LOA application update (Tables 2 and 3).

As described in the LOA application, a SEL ~198 dB re 1 $\mu Pa^2 \cdot s$ (~188 dB re 1 $\mu Pa^2 \cdot s$ assuming a noise attenuation system [NAS] and 10 dB of attenuation) is assumed for vibratory setting activity for this project. Assuming 1) a received SEL of ~188 dB re 1 $\mu Pa^2 \cdot s$ at 10 m for 13 m monopiles using a NAS, 2) sound propagation by the practical spreading loss model (15 Log(range)), and 3) an average vibratory setting duration of 30 minutes per pile (1 hour per day assuming 2 monopiles), the PTS ranges calculated using the NMFS online User Spreadsheet Tool (NOAA 2020, see Appendix C) are as follows:

- LF cetaceans = 430.9 m,
- MF cetaceans = 38.2 m,
- HF cetaceans = 637.1 m, and
- Phocid pinnipeds = 261.9 m.

Due to the small size of the PTS ranges and the mitigation that will be applied during construction, no Level A exposures are expected, nor have they been calculated for this activity. The Project has committed to certain mitigation and monitoring measures which are intended to reduce the risk for Level A take. A pre-clearance and continuous monitoring program throughout pile driving is described in the LOA application. Shutdown zones identified in Table 68 of the LOA application are several times larger than the calculated PTS ranges for vibratory driving. For example, a shutdown zone of 2,300 m for high-frequency cetaceans has been proposed during all vibratory pile driving, which is intended to prohibit all Level A take of harbor porpoise during vibratory setting of the piles. This mitigation zone is almost 4 times the estimated 637 m Level A zone for high-frequency cetaceans and provides a comfortable buffer. Additionally, harbor porpoises are known to demonstrate behavioral avoidance and displacement in

response to pile driving (Tougaard et al. 2009, Dähne et al. 2013, Brandt et al. 2018, Graham et al. 2019). Recent research has shown that harbor porpoise response to pile driving activities diminishes over time, with initial reduction in occurrence at distances up to 7.4 km from the source (Dähne et al. 2013, Graham et al. 2019). However, even with the evidence of habituation, Graham et al. (2019) demonstrated displacement at ranges up to 1.3 km from the piling location after eight months of construction. This is greater than the 637 m distance to injurious effects estimated for New England Wind's vibratory pile setting (NOAA 2020). Although this study specifically tested the effects of impact piling rather than vibratory pile driving, Graham et al. (2017) measured overall noise levels during hours of impact pile driving and vibratory pile driving, with no meaningful difference between them. Although it is impossible to guarantee that no harbor porpoises would be within 637 m of the pile, the results of Graham et al. (2019) indicate that porpoises are unlikely to approach within 637 m once the area becomes ensonified, let alone remain there for any length of time once driving activity has begun.

1.6. Fisheries Monitoring Program

Additionally, the Proponent has advanced development of a fisheries monitoring program in accordance with the recommendations set forth in the *Guidelines for Providing Information on Fisheries for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585* (BOEM 2019). The program aims to:

- identify dominant fish species and their seasonality in the vicinity of the project area;
- establish a preconstruction baseline;
- collect additional information intended to reduce uncertainty of the baseline and interpret the results; and
- develop an approach to quantify any substantial changes to the distribution and abundance of fisheries.

The Proponent's fisheries monitoring program also outlines the general mitigation measures that will be implemented during fisheries monitoring surveys to avoid interactions with marine mammals. Details of the proposed monitoring program are provided in Appendix A.

1.7. Summary Updates to Methodology Related to the Take Request

- The exposure estimates for all Project activities included in the LOA application have been updated in this document with the new Roberts et al. (2022) density models.
- The pile installation schedules have been updated to begin in 2026 (Year 2).
- It is now anticipated that some UXO detonation may occur in 2025, prior to start of offshore construction in the OECC and/or the SWDA. Accordingly, the potential UXO detonation schedule has been updated to assume 6 potential UXO detonations in 2025 and 4 potential UXO detonations in 2026.
- The Proponent has committed to using mitigation during all drilling activity. A new, mitigated, sound source level of 183.3 dB re 1 µPa at 1 m is assumed for the Project's drilling activity.

- For vibratory setting activity, the level of conservatism was reduced to 6% (6% of 66 is ~4 foundations), resulting in approximately 70 total foundations (53% of all proposed foundations) that may require vibratory setting prior to impact pile driving.

The following tables in this document have been updated and are intended to replace the corresponding density, exposure, and take tables included in the July 2022 LOA application. Only tables that have been updated due to the new Roberts et al. (2022) models and tables related to the updated construction plan are included herein, otherwise tables presented in the July 2022 LOA application remain valid. For additional details on the modeling and exposure calculation methodology, please refer to the July 2022 LOA application.

2. Density Estimates

The density estimates below were calculated using a perimeter around the area of activity based on the expected zone of influence for each sound-producing activity. For impact pile driving (Section 2.1), the perimeter size was selected as the largest 10 dB-attenuated exposure range for all species, scenarios, and threshold criteria, with the exception of the Wood et al. (2012) thresholds, which include a small subset of very long ranges for migrating mysticetes and harbor porpoise. Thus, the 6.2 km perimeter used for impact pile driving is the range to the 160 dB SPL behavioral threshold for fin whale, for the installation of one 12 m monopile per day with a 6,000 kJ hammer and with 10 dB attenuation. For vibratory setting of piles (Section 2.2), a 50-km perimeter was selected based on information suggesting that animals are not expected to experience a behavioral response at distances greater than 50 km (Dunlop et al. 2017a, Dunlop et al. 2017b). For drilling (Section 2.3), the perimeter uses the SPL of 141.8 dB re µPa at 1000 m (193.3 dB re μPa^2m^2 at 1 m, as measured by Austin et al. (2018)) along with practical spreading loss to obtain an estimate of 77 km to the 120 dB re µPa behavioral threshold. By applying 10 dB attenuation, the Level B acoustic range for drilling is approximately 16.6 km. For potential UXO detonation (Section 2.4), the largest SEL-based TTS-onset acoustic ranges across all hearing groups was applied to the moderate UXO risk areas, resulting in a 14.1 km perimeter for the shallow water segment of the OECC and a 13.8 km density perimeter for the deep water segment of the OECC as well as the SWDA. For HRG surveys (Section 2.5), because the range to the Level B threshold is small (<200 m), densities were calculated using the areas of interest without an additional perimeter.

For all sound sources, the densities used for long- and short-finned pilot whales are the annual pilot whale guild density scaled by their relative abundances. Similarly, the densities used for gray and harbor seals are the monthly seals guild density scaled by their relative abundances. Gray seals are used as a surrogate for harp seals because there is no density information available for this species. These scaled and surrogate densities were carried forward to the exposure and take estimates in Sections 3 and 4, respectively.

2.1. Impact Pile Driving – Densities

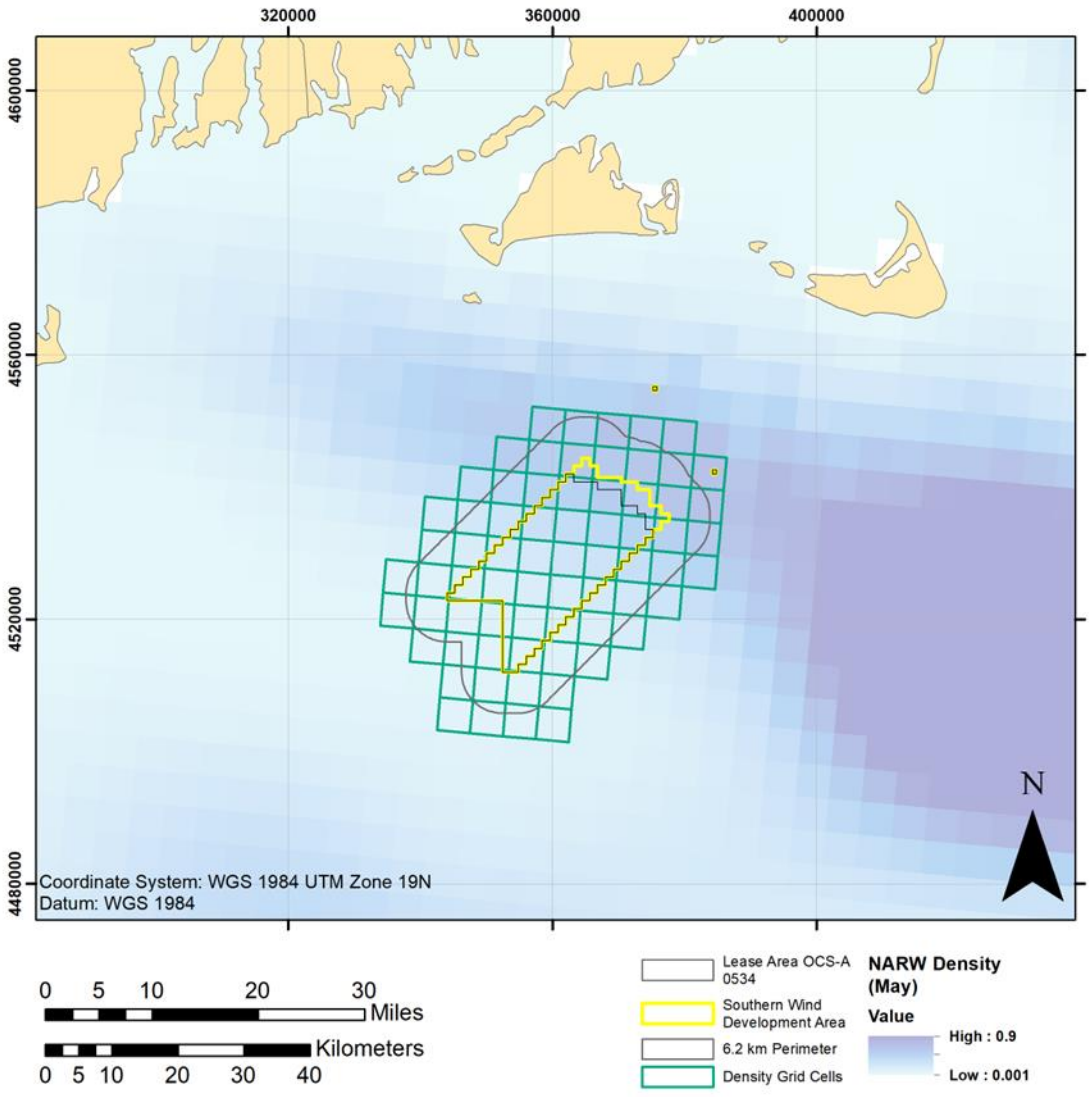

Figure 3. Marine mammal (e.g., NARW) density map (Roberts et al. 2022) showing highlighted grid cells used to calculate mean monthly species density estimates within a 6.2-km perimeter around New England Wind, based on the longest exposure range to threshold for impact pile driving. Note that the modeled densities are in units of animals/100 km^2, even when grid cells are 5 × 5 km.

Table 6. Mean monthly marine mammal density estimates for all modeled species in a 6.2-km perimeter around New England Wind, based on the longest exposure range to threshold for impact pile driving.

Species	Monthly density (animals/100 km^2)												Annual mean	May to Dec mean
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Fin whale[a]	0.212	0.168	0.106	0.163	0.270	0.249	0.443	0.370	0.234	0.057	0.050	0.138	0.205	0.226
Minke whale	0.108	0.134	0.132	0.798	1.717	1.630	0.689	0.468	0.529	0.474	0.051	0.073	0.567	0.704
Humpback whale	0.030	0.022	0.042	0.150	0.298	0.314	0.175	0.120	0.167	0.243	0.191	0.028	0.148	0.192
North Atlantic right whale[a]	0.356	0.427	0.431	0.459	0.289	0.048	0.021	0.018	0.027	0.050	0.062	0.174	0.197	0.086
Sei whale[a]	0.039	0.021	0.044	0.111	0.194	0.053	0.013	0.011	0.019	0.037	0.079	0.063	0.057	0.059
Atlantic white-sided dolphin	2.093	1.248	0.853	1.315	3.362	3.041	1.392	0.728	1.655	2.486	1.786	2.473	1.869	2.115
Atlantic spotted dolphin	0.001	0.000	0.001	0.003	0.017	0.024	0.031	0.055	0.281	0.425	0.185	0.019	0.087	0.130
Common dolphin	7.365	2.509	1.896	3.288	6.357	14.269	10.568	14.668	26.713	23.434	11.174	10.937	11.098	14.765
Bottlenose dolphin, offshore	0.515	0.113	0.060	0.158	0.832	1.390	1.510	1.702	1.511	1.360	1.278	1.141	0.964	1.341
Risso's dolphin	0.044	0.004	0.002	0.018	0.097	0.047	0.067	0.126	0.156	0.085	0.122	0.183	0.079	0.111
Long-finned pilot whale[b]	0.142	0.142	0.142	0.142	0.142	0.142	0.142	0.142	0.142	0.142	0.142	0.142	0.142	0.142
Short-finned pilot whale[b]	0.105	0.105	0.105	0.105	0.105	0.105	0.105	0.105	0.105	0.105	0.105	0.105	0.105	0.105
Sperm whale[a]	0.031	0.012	0.013	0.003	0.013	0.029	0.039	0.109	0.066	0.063	0.031	0.021	0.036	0.046
Harbor porpoise	10.065	10.857	10.353	8.936	6.826	0.895	0.804	0.776	0.919	1.225	1.373	5.683	4.893	2.313
Gray seal[c]	5.756	6.123	4.627	3.434	5.122	0.757	0.076	0.083	0.214	0.505	1.844	5.002	2.795	1.700
Harbor seal[c]	12.932	13.758	10.395	7.714	11.507	1.700	0.171	0.186	0.482	1.134	4.143	11.237	6.280	3.820
Harp seal[c]	5.756	6.123	4.627	3.434	5.122	0.757	0.076	0.083	0.214	0.505	1.844	5.002	2.795	1.700

[a] Listed as Endangered under the ESA.
[b] Long- and short-finned pilot whale densities are the annual pilot whale guild density scaled by their relative abundances.
[c] Gray and harbor seal densities are the seals guild density scaled by their relative abundances; gray seals are used as a surrogate for harp seals.

2.2. Vibratory Setting – Densities

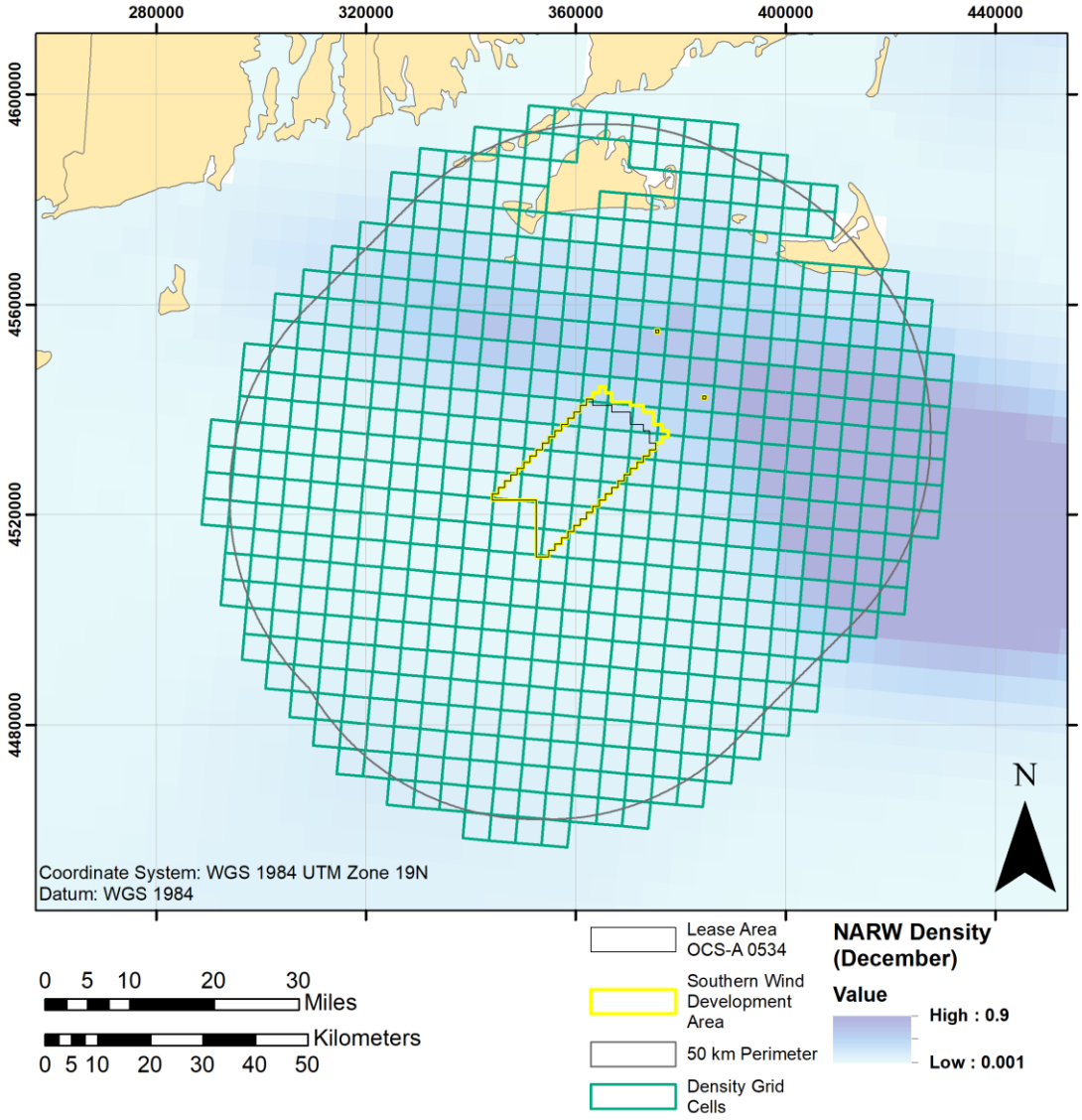

Figure 4. Marine mammal (e.g., NARW) density map (Roberts et al. 2022) showing highlighted grid cells used to calculate mean monthly species density estimates within a 50-km perimeter around New England Wind, based on the longest exposure range to threshold for impact pile driving. Note that the modeled densities are in units of animals/100 km^2, even when grid cells are 5 × 5 km.

Table 7. Mean monthly marine mammal density estimates for all modeled species in a 50-km perimeter around New England Wind, used to calculate exposures above the 120 dB SPL behavioral threshold for vibratory sounds.

Species	Monthly density (animals/100 km^2)												Annual mean	May to Dec mean
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Fin whale[a]	0.196	0.159	0.138	0.168	0.259	0.247	0.390	0.322	0.243	0.088	0.059	0.130	0.200	0.217
Minke whale	0.106	0.121	0.137	0.666	1.343	1.213	0.524	0.319	0.357	0.393	0.051	0.079	0.442	0.535
Humpback whale	0.037	0.030	0.044	0.165	0.273	0.301	0.161	0.099	0.129	0.185	0.168	0.040	0.136	0.169
North Atlantic right whale[a]	0.542	0.649	0.566	0.507	0.316	0.080	0.051	0.031	0.043	0.054	0.113	0.340	0.274	0.129
Sei whale[a]	0.031	0.023	0.044	0.121	0.181	0.058	0.016	0.009	0.015	0.034	0.076	0.059	0.056	0.056
Atlantic white-sided dolphin	2.383	1.677	1.143	1.607	3.174	3.324	1.463	0.533	1.311	2.197	1.740	2.434	1.916	2.022
Atlantic spotted dolphin	0.002	0.000	0.001	0.005	0.067	0.164	0.049	0.080	0.432	0.948	0.228	0.026	0.167	0.249
Common dolphin	9.886	4.821	3.803	5.177	8.627	17.737	12.807	14.696	22.880	29.545	17.768	14.652	13.533	17.339
Bottlenose dolphin, offshore	0.666	0.208	0.121	0.276	1.081	1.800	1.871	1.902	1.940	1.896	1.825	1.421	1.251	1.717
Risso's dolphin	0.102	0.021	0.008	0.038	0.214	0.207	0.272	0.446	0.587	0.294	0.182	0.215	0.215	0.302
Long-finned pilot whale[b]	0.165	0.165	0.165	0.165	0.165	0.165	0.165	0.165	0.165	0.165	0.165	0.165	0.165	0.165
Short-finned pilot whale[b]	0.122	0.122	0.122	0.122	0.122	0.122	0.122	0.122	0.122	0.122	0.122	0.122	0.122	0.122
Sperm whale[a]	0.031	0.018	0.017	0.004	0.014	0.029	0.039	0.111	0.054	0.040	0.029	0.027	0.035	0.043
Harbor porpoise	7.134	7.874	7.540	6.884	4.851	1.409	1.315	1.002	0.851	1.137	1.376	4.459	3.819	2.050
Gray seal[c]	5.859	5.460	4.518	4.932	7.239	5.389	1.570	1.300	1.512	2.863	3.463	5.240	4.112	3.572
Harbor seal[c]	13.164	12.268	10.150	11.081	16.265	12.108	3.528	2.921	3.397	6.432	7.781	11.773	9.239	8.026
Harp seal[c]	5.859	5.460	4.518	4.932	7.239	5.389	1.570	1.300	1.512	2.863	3.463	5.240	4.112	3.572

[a] Listed as Endangered under the ESA.
[b] Long- and short-finned pilot whale densities are the annual pilot whale guild density scaled by their relative abundances.
[c] Gray and harbor seal densities are the seals guild density scaled by their relative abundances; gray seals are used as a surrogate for harp seals.

2.3. Drilling – Densities

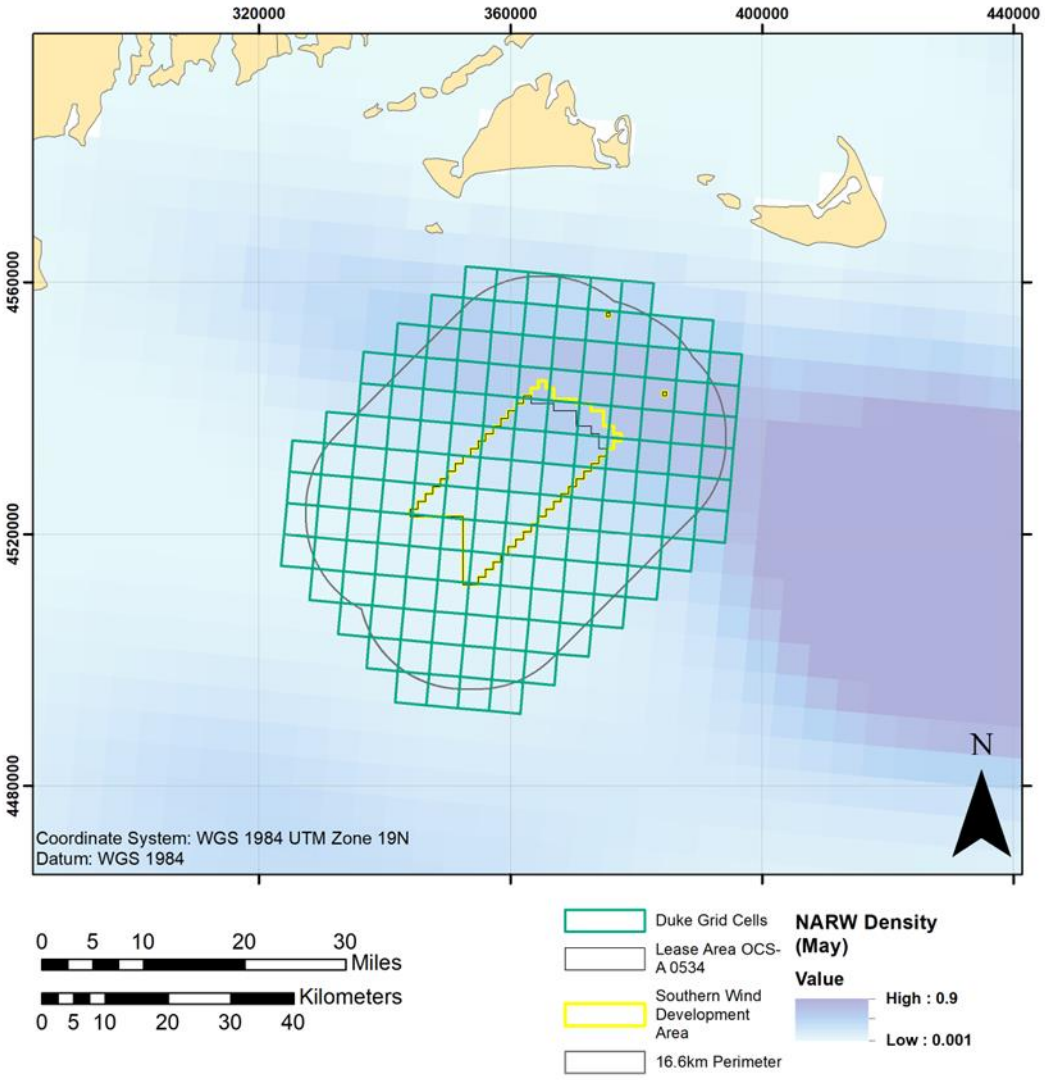

Figure 5. Marine mammal (e.g., NARW) density map (Roberts et al. 2022) showing highlighted grid cells used to calculate mean monthly species density estimates within a 16.6 km perimeter around New England Wind, used to estimate exposures to drilling sounds above the 120 dB SPL criterion. Note that the modeled densities are in units of animals/100 km^2, even when grid cells are 5 × 5 km.

Table 8. Mean monthly marine mammal density estimates for all modeled species in a 16.6-km perimeter around New England Wind, used to calculate exposures above the 120 dB SPL behavioral threshold for drilling sounds.

Species	Monthly density (animals/100 km^2)												Annual mean	May to Dec mean
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Fin whale[a]	0.216	0.164	0.111	0.164	0.274	0.260	0.421	0.342	0.222	0.060	0.053	0.142	0.203	0.222
Minke whale	0.118	0.141	0.141	0.807	1.706	1.594	0.683	0.448	0.484	0.453	0.054	0.082	0.559	0.688
Humpback whale	0.032	0.025	0.043	0.147	0.284	0.297	0.166	0.116	0.160	0.222	0.184	0.032	0.142	0.183
North Atlantic right whale[a]	0.419	0.497	0.480	0.484	0.290	0.050	0.023	0.019	0.029	0.052	0.076	0.227	0.221	0.096
Sei whale[a]	0.038	0.022	0.045	0.114	0.191	0.052	0.013	0.010	0.018	0.036	0.080	0.067	0.057	0.059
Atlantic white-sided dolphin	2.040	1.251	0.872	1.339	3.281	3.002	1.396	0.709	1.629	2.360	1.786	2.411	1.840	2.072
Atlantic spotted dolphin	0.001	0.000	0.001	0.003	0.020	0.029	0.032	0.054	0.270	0.480	0.178	0.019	0.090	0.135
Common dolphin	7.130	2.538	1.988	3.375	6.360	13.828	10.656	14.298	24.730	23.023	11.700	11.063	10.891	14.457
Bottlenose dolphin, offshore	0.480	0.112	0.061	0.161	0.813	1.356	1.470	1.633	1.488	1.353	1.268	1.076	0.939	1.307
Risso's dolphin	0.045	0.004	0.002	0.019	0.101	0.054	0.075	0.141	0.177	0.097	0.123	0.177	0.085	0.118
Long-finned pilot whale[b]	0.139	0.139	0.139	0.139	0.139	0.139	0.139	0.139	0.139	0.139	0.139	0.139	0.139	0.139
Short-finned pilot whale[b]	0.102	0.102	0.102	0.102	0.102	0.102	0.102	0.102	0.102	0.102	0.102	0.102	0.102	0.102
Sperm whale[a]	0.031	0.012	0.013	0.003	0.014	0.027	0.038	0.116	0.068	0.050	0.031	0.021	0.035	0.046
Harbor porpoise	9.722	10.500	9.999	8.702	6.457	1.041	0.988	0.950	1.043	1.274	1.435	5.798	4.826	2.373
Gray seal[c]	6.084	6.137	4.495	3.630	5.259	1.171	0.151	0.154	0.327	0.655	2.078	4.937	2.923	1.842
Harbor seal[c]	13.670	13.788	10.099	8.157	11.816	2.630	0.340	0.346	0.736	1.472	4.670	11.091	6.568	4.138
Harp seal[c]	6.084	6.137	4.495	3.630	5.259	1.171	0.151	0.154	0.327	0.655	2.078	4.937	2.923	1.842

[a] Listed as Endangered under the ESA.
[b] Long- and short-finned pilot whale densities are the annual pilot whale guild density scaled by their relative abundances.
[c] Gray and harbor seal densities are the seals guild density scaled by their relative abundances; gray seals are used as a surrogate for harp seals.

2.4. Potential UXO Detonation – Densities

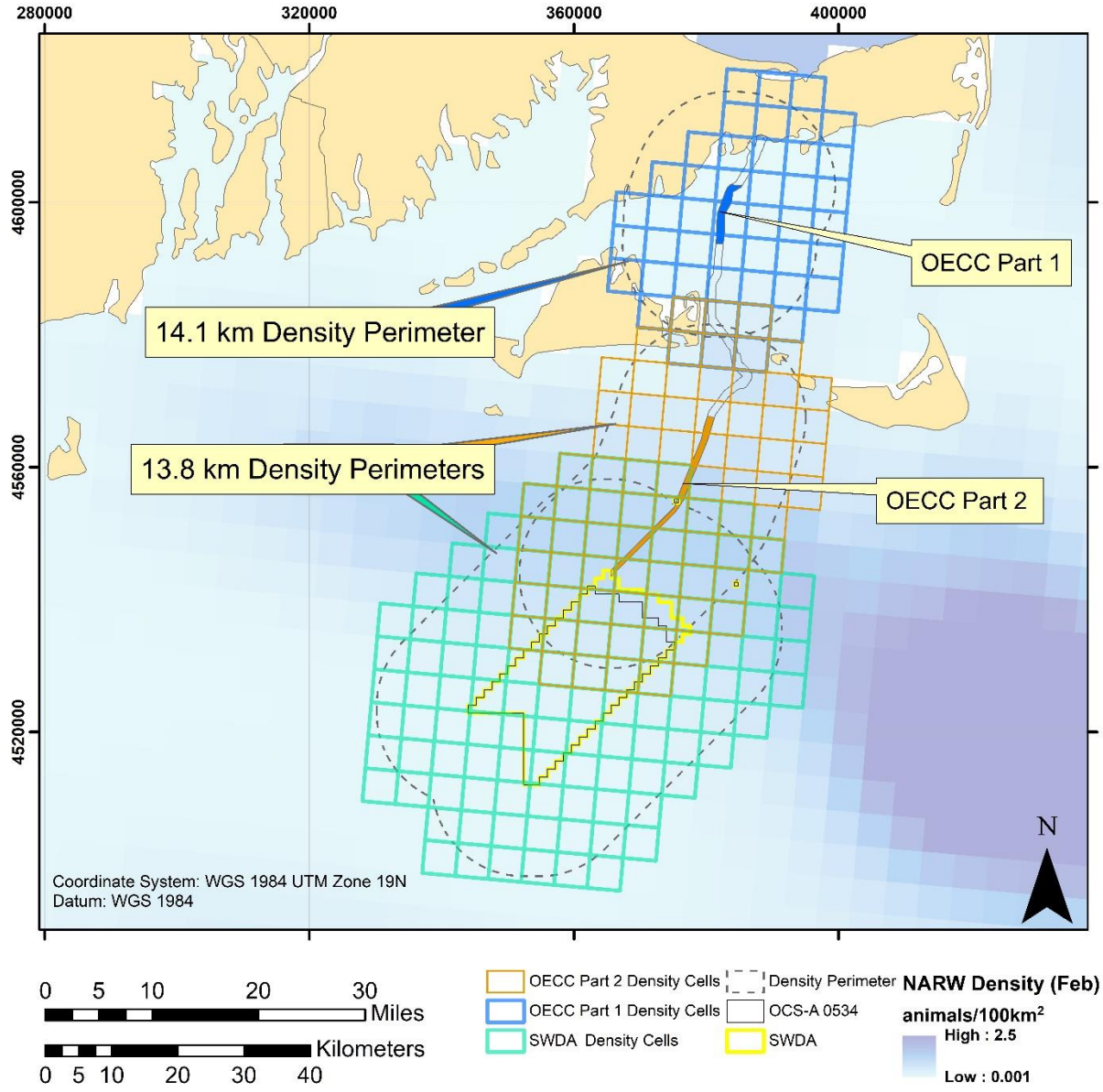

Figure 6. Marine mammal (e.g., NARW) density map (Roberts et al. 2022) showing highlighted grid cells used to calculate mean monthly species density estimates within a 13.8 km and 14.1 km perimeter around New England Wind's Offshore Export Cable Corridors (OECCs), used to estimate exposures to detonation sounds above the US Navy's TTS criterion by SEL (Finneran et al. 2017). Note that the modeled densities are in units of animals/100 km^2, even when grid cells are 5 × 5 km.

Table 9. Maximum monthly density (animals/100 km^2) at the moderate UXO risk areas used to estimate exposures during potential UXO detonations for New England Wind.

Species	Maximum Monthly Density (animals/100 km^2)	
	Shallow OECC Segment (OECC Part 1)	Deep OECC Segment (OECC Part 2) and SWDA
Fin whale[a]	0.007	0.425
Minke whale	0.129	1.720
Humpback whale	0.040	0.297
North Atlantic right whale[a,]	0.116	0.707
Sei whale[a]	0.034	0.191
Atlantic white-sided dolphin	0.051	3.278
Atlantic spotted dolphin	0.013	0.448
Common dolphin	0.350	24.845
Bottlenose dolphin, offshore	0.158	1.631
Risso's dolphin	0.010	0.176
Long-finned pilot whale[b]	0.000	0.135
Short-finned pilot whale[b]	0.000	0.100
Sperm whale[a]	0.002	0.112
Harbor porpoise	1.772	10.608
Gray seal[c]	24.506	13.647
Harbor seal[c]	55.059	30.662
Harp seal[c]	24.506	13.647

[a] Listed as Endangered under the ESA.
[b] Long- and short-finned pilot whale densities are the annual pilot whale guild density scaled by their relative abundances.
[c] Gray and harbor seal densities are the seals guild density scaled by their relative abundances; gray seals are used as a surrogate for harp seals.

2.5. HRG Surveys – Densities

Table 10. Maximum monthly density (animals/100 km^2) used to estimate exposures above acoustic thresholds during HRG surveys for New England Wind.

Species	Maximum monthly density (animals/100 km^2)
Fin whale[a]	0.436
Minke whale	1.704
Humpback whale	0.323
North Atlantic right whale[a,]	0.567
Sei whale[a]	0.193
Atlantic white-sided dolphin	3.406
Atlantic spotted dolphin	0.404
Common dolphin	28.314
Bottlenose dolphin, offshore	1.753
Risso's dolphin	0.187
Long-finned pilot whale[b]	0.149
Short-finned pilot whale[b]	0.110
Sperm whale[a]	0.111
Harbor porpoise	10.974
Gray seal[c]	27.901
Harbor seal[c]	62.687
Harp seal[c]	27.901

[a] Listed as Endangered under the ESA.
[b] Long- and short-finned pilot whale densities are the annual pilot whale guild density scaled by their relative abundances.
[c] Gray and harbor seal densities are the seals guild density scaled by their relative abundances; gray seals are used as a surrogate for harp seals.

3. Exposure Estimates

3.1. Impact Pile Driving – Exposure Estimates

Table 11. Pile Installation Construction Schedule A, All Years Summed: The mean number of marine mammals predicted to receive sound levels above exposure criteria with sound attenuation during the two years (2026–2027) of Construction Schedule A. Construction schedule assumptions are summarized in the Application.

Species		Injury						Behavior					
		L_E			L_{pk}			L_p [a]			L_p [b]		
		Attenuation (dB)						Attenuation (dB)					
		0	10	12	0	10	12	0	10	12	0	10	12
LF	Fin whale[c]	126.03	18.59	12.04	0.11	0.03	0.01	126.65	29.23	24.86	175.08	56.83	46.16
	Minke whale (migrating)[b]	347.05	68.11	44.32	0.40	0.23	0.23	519.38	187.11	167.11	2901.56	1423.27	1205.97
	Humpback whale	103.55	17.32	11.49	0.17	0.06	0.06	92.11	21.73	18.52	129.19	42.19	34.02
	North Atlantic right whale[c]	24.86	4.53	3.13	0.04	0.01	0.01	31.42	9.29	8.05	42.76	14.52	11.86
	Sei whale[c] (migrating)[b]	15.16	2.28	1.57	0.04	0.02	0.02	21.87	5.17	4.41	179.17	85.50	71.80
MF	Atlantic white sided dolphin	0.30	0.10	0.10	0.51	0.51	0.51	1477.80	552.09	492.99	1115.96	418.01	333.82
	Atlantic spotted dolphin	0	0	0	0	0	0	24.40	6.33	5.47	28.75	6.82	4.91
	Common dolphin	4.64	1.40	0	10.09	7.95	7.95	18653.57	8038.28	7310.55	13344.32	5411.36	4390.65
	Bottlenose dolphin, offshore	0.93	0.10	0	0.65	0.65	0.65	664.99	304.43	260.48	563.29	198.48	155.70
	Risso's dolphin	0.13	0.06	0.02	0.12	0.08	0.07	65.56	20.74	18.55	56.62	19.07	14.96
	Long-finned pilot whale	0.01	0.01	0	0.03	0.03	0.03	101.62	37.51	33.54	73.75	28.75	22.86
	Short-finned pilot whale	0.01	<0.01	<0.01	0.05	0.05	0.05	76.72	27.53	24.54	57.15	21.53	16.94
	Sperm whale[c]	0.02	<0.01	0	<0.01	<0.01	<0.01	28.58	8.65	7.75	25.06	8.11	6.20
HF	Harbor porpoise (sensitive)[b]	603.82	163.84	112.83	57.56	9.70	6.41	1245.84	430.59	381.05	18638.09	9310.44	7769.43
PPW	Gray seal	34.02	3.29	1.70	0.02	0.02	0.02	472.72	91.96	73.98	574.92	172.07	133.84
	Harbor seal	104.84	7.65	3.07	1.08	0.32	0.32	928.21	234.87	193.98	1181.32	362.65	282.39
	Harp seal	46.14	2.91	1.00	0.33	0	0	541.46	114.40	96.16	663.81	198.76	155.23

[a] NOAA (2005), [b] Wood et al. (2012), [c] Listed as Endangered under the ESA.

Table 12. Pile Installation Construction Schedule A, Year 2 (2026): The mean number of marine mammals predicted to receive sound levels above exposure criteria with sound attenuation during year 2 (2026) under Construction Schedule A.

Species		Injury						Behavior					
		L_E			L_{pk}			L_p [a]			L_p [b]		
		Attenuation (dB)						Attenuation (dB)					
		0	10	12	0	10	12	0	10	12	0	10	12
LF	Fin whale[c]	61.79	8.95	5.55	0.05	<0.01	<0.01	72.01	16.58	14.60	97.58	32.20	26.40
	Minke whale (migrating)[b]	168.35	30.92	20.25	0.24	0.16	0.16	262.72	94.60	85.79	1537.19	735.79	622.21
	Humpback whale	50.40	8.11	5.35	0.10	0.05	0.05	50.67	11.73	10.16	71.26	23.35	18.92
	North Atlantic right whale[c]	11.45	1.94	1.33	0.02	0.01	0.01	15.72	4.60	4.01	22.18	7.41	6.02
	Sei whale[c] (migrating)[b]	7.04	0.95	0.66	0.03	0.02	0.02	11.02	2.58	2.28	96.02	45.48	37.87
MF	Atlantic white sided dolphin	0.02	<0.01	<0.01	0.35	0.35	0.35	764.04	268.77	242.37	574.17	208.26	163.23
	Atlantic spotted dolphin	0	0	0	0	0	0	13.32	3.74	3.24	14.99	3.49	2.54
	Common dolphin	0.42	0.14	0	8.32	6.41	6.41	9214.52	3683.31	3359.34	6657.90	2598.12	2078.50
	Bottlenose dolphin, offshore	0.23	<0.01	0	0.53	0.53	0.53	341.01	144.58	124.72	294.69	97.07	75.49
	Risso's dolphin	0.06	0.04	0.01	0.10	0.07	0.06	36.65	10.66	9.47	31.44	10.28	7.95
	Long-finned pilot whale	<0.01	<0.01	0	0.03	0.03	0.03	53.01	18.23	16.35	38.67	14.59	11.40
	Short-finned pilot whale	<0.01	<0.01	0	0.04	0.04	0.04	40.32	13.10	11.82	29.90	10.92	8.44
	Sperm whale[c]	<0.01	<0.01	0	<0.01	<0.01	<0.01	15.67	4.25	3.81	13.34	4.18	3.12
HF	Harbor porpoise (sensitive)[b]	271.69	70.65	48.99	28.02	4.54	2.83	625.97	207.28	184.61	10425.35	5052.58	4180.98
PPW	Gray seal	15.51	1.09	0.44	0.02	0.02	0.02	263.63	50.45	43.49	323.31	97.23	74.69
	Harbor seal	42.71	2.51	0.49	0.20	0.18	0.18	490.03	120.17	102.08	643.84	193.51	148.79
	Harp seal	19.18	1.05	0.31	0.11	0	0	293.19	58.81	50.95	362.06	107.63	83.54

[a] NOAA (2005), [b] Wood et al. (2012), [c] Listed as Endangered under the ESA.

Table 13. Pile Installation Construction Schedule A, Year 3 (2027): The mean number of marine mammals predicted to receive sound levels above exposure criteria with sound attenuation during year 3 (2027) under Construction Schedule A.

Species		Injury						Behavior					
		L_E			L_{pk}			L_p [a]			L_p [b]		
		Attenuation (dB)						Attenuation (dB)					
		0	10	12	0	10	12	0	10	12	0	10	12
LF	Fin whale[c]	64.24	9.64	6.49	0.07	0.02	<0.01	54.65	12.65	10.26	77.50	24.64	19.76
	Minke whale (migrating)[b]	178.70	37.19	24.07	0.16	0.08	0.08	256.66	92.51	81.33	1364.36	687.48	583.75
	Humpback whale	53.15	9.22	6.14	0.07	0.01	0.01	41.45	10.00	8.36	57.92	18.84	15.11
	North Atlantic right whale[c]	13.40	2.59	1.79	0.01	<0.01	<0.01	15.71	4.69	4.04	20.58	7.12	5.84
	Sei whale[c] (migrating)[b]	8.11	1.33	0.90	0.01	<0.01	<0.01	10.86	2.59	2.13	83.15	40.01	33.93
MF	Atlantic white sided dolphin	0.27	0.09	0.09	0.17	0.17	0.17	713.77	283.32	250.62	541.79	209.75	170.59
	Atlantic spotted dolphin	0	0	0	0	0	0	11.08	2.59	2.23	13.76	3.33	2.37
	Common dolphin	4.22	1.26	0	1.76	1.54	1.54	9439.06	4354.97	3951.20	6686.42	2813.24	2312.15
	Bottlenose dolphin, offshore	0.70	0.09	0	0.13	0.13	0.13	323.98	159.85	135.76	268.60	101.41	80.21
	Risso's dolphin	0.06	0.03	0.01	0.02	<0.01	<0.01	28.91	10.08	9.08	25.18	8.78	7.01
	Long-finned pilot whale	0.01	0.01	0	<0.01	<0.01	<0.01	48.61	19.28	17.19	35.09	14.16	11.46
	Short-finned pilot whale	<0.01	<0.01	<0.01	0.01	0.01	0.01	36.40	14.42	12.72	27.25	10.62	8.49
	Sperm whale[c]	<0.01	<0.01	0	<0.01	<0.01	<0.01	12.91	4.41	3.94	11.72	3.94	3.08
HF	Harbor porpoise (sensitive)[b]	332.13	93.18	63.84	29.54	5.16	3.58	619.87	223.31	196.45	8212.74	4257.86	3588.45
PPW	Gray seal	18.51	2.20	1.26	<0.01	<0.01	<0.01	209.09	41.51	30.49	251.62	74.84	59.15
	Harbor seal	62.14	5.14	2.57	0.88	0.15	0.15	438.18	114.70	91.91	537.48	169.15	133.60
	Harp seal	26.96	1.86	0.70	0.22	0	0	248.27	55.59	45.21	301.75	91.13	71.69

[a] NOAA (2005), [b] Wood et al. (2012), [c] Listed as Endangered under the ESA.

Table 14. Pile Installation Construction Schedule B, All Years Summed: The mean number of marine mammals predicted to receive sound levels above exposure criteria with sound attenuation during the three years (2026–2028) of Construction Schedule B.

Species		Injury						Behavior					
		L_E			L_{pk}			L_p [a]			L_p [b]		
		Attenuation (dB)						Attenuation (dB)					
		0	10	12	0	10	12	0	10	12	0	10	12
LF	Fin whale[c]	230.92	34.65	23.30	0.28	0.08	0.02	145.44	38.14	34.41	214.02	71.17	58.33
	Minke whale (migrating)[b]	697.00	147.08	93.58	0.73	0.18	0.18	819.92	362.71	333.21	4376.63	2131.78	1797.81
	Humpback whale	163.43	28.28	18.88	0.20	0.03	0.03	98.33	27.40	24.72	143.96	48.35	39.16
	North Atlantic right whale[c]	32.46	6.59	4.61	0.04	<0.01	<0.01	29.80	11.13	10.06	39.57	14.43	12.03
	Sei whale[c] (migrating)[b]	20.51	3.44	2.48	0.04	0.01	0.01	18.82	5.75	5.27	167.97	76.18	63.01
MF	Atlantic white sided dolphin	0.94	0.31	0.31	0.43	0.43	0.43	1940.34	866.88	785.27	1479.72	596.37	482.93
	Atlantic spotted dolphin	0	0	0	0	0	0	21.46	5.22	4.54	26.32	6.45	4.62
	Common dolphin	9.86	3.29	0	7.91	7.10	7.10	24984.51	11840.37	10837.24	17639.23	7538.26	6171.92
	Bottlenose dolphin, offshore	1.91	0.29	0	0.44	0.44	0.44	964.43	506.27	430.16	804.99	303.60	238.90
	Risso's dolphin	0.16	0.08	0.03	0.08	0.05	0.04	71.66	26.82	24.58	62.96	22.54	17.86
	Long-finned pilot whale	0.04	0.04	0	0.03	0.03	0.03	136.59	59.21	53.87	98.26	41.29	33.23
	Short-finned pilot whale	0.02	<0.01	0	0.03	0.03	0.03	101.70	44.09	39.85	75.94	30.78	24.43
	Sperm whale[c]	0.02	0.01	0	<0.01	<0.01	<0.01	35.08	12.34	11.23	31.99	10.83	8.40
HF	Harbor porpoise (sensitive)[b]	859.84	244.28	164.95	79.40	12.40	8.89	1309.91	562.44	510.95	18051.82	8262.83	6953.16
PPW	Gray seal	39.70	4.53	2.71	0.01	0.01	0.01	279.01	60.06	54.61	358.02	111.55	85.48
	Harbor seal	141.75	11.54	4.98	2.29	0.25	0.25	654.62	220.64	191.97	829.57	276.32	217.77
	Harp seal	59.95	4.12	1.50	0.57	0	0	357.17	102.00	91.09	438.52	144.79	113.77

[a] NOAA (2005), [b] Wood et al. (2012), [c] Listed as Endangered under the ESA.

Table 15. Pile Installation Construction Schedule B, Year 2 (2026): The mean number of marine mammals predicted to receive sound levels above exposure criteria with sound attenuation during year 2 (2026) under Construction Schedule B.

Species		Injury						Behavior					
		L_E			L_{pk}			L_p [a]			L_p [b]		
		Attenuation (dB)						Attenuation (dB)					
		0	10	12	0	10	12	0	10	12	0	10	12
LF	Fin whale[c]	44.82	6.55	4.09	0.05	0.02	0.02	51.06	12.19	10.79	67.39	23.10	18.96
	Minke whale (migrating)[b]	140.04	25.74	16.77	0.28	0.18	0.18	220.22	79.82	72.29	1299.07	606.21	511.32
	Humpback whale	36.34	5.52	3.65	0.05	0.03	0.03	35.33	8.44	7.42	48.38	16.53	13.36
	North Atlantic right whale[c]	7.73	1.31	0.96	<0.01	<0.01	<0.01	10.12	3.14	2.79	13.67	4.81	3.93
	Sei whale[c] (migrating)[b]	4.90	0.66	0.44	0.01	0.01	0.01	7.66	1.94	1.74	65.41	29.79	24.33
MF	Atlantic white sided dolphin	0.03	0.01	0.01	0.43	0.43	0.43	518.47	192.18	173.95	400.78	150.79	117.71
	Atlantic spotted dolphin	0	0	0	0	0	0	5.30	1.40	1.23	6.04	1.55	1.14
	Common dolphin	0.51	0.17	0	7.91	7.10	7.10	5444.97	2310.63	2118.01	3967.78	1626.21	1307.92
	Bottlenose dolphin, offshore	0.22	0.01	0	0.44	0.44	0.44	224.10	99.98	86.00	200.50	66.26	51.05
	Risso's dolphin	0.03	0.01	<0.01	0.06	0.05	0.04	19.55	6.38	5.75	17.05	5.94	4.58
	Long-finned pilot whale	<0.01	<0.01	0	0.03	0.03	0.03	34.23	12.51	11.29	25.26	9.92	7.75
	Short-finned pilot whale	<0.01	<0.01	0	0.03	0.03	0.03	25.78	8.88	8.04	19.47	7.38	5.70
	Sperm whale[c]	<0.01	<0.01	0	<0.01	<0.01	<0.01	9.39	2.77	2.50	8.19	2.67	2.01
HF	Harbor porpoise (sensitive)[b]	181.40	48.92	34.47	19.01	3.16	2.03	379.51	135.25	120.46	6108.90	2652.64	2237.81
PPW	Gray seal	10.11	0.97	0.48	0.01	0.01	0.01	154.85	29.35	26.69	180.87	57.88	44.42
	Harbor seal	28.27	1.55	0.48	0.29	0.25	0.25	285.69	76.42	65.99	369.64	115.57	89.90
	Harp seal	11.44	1.01	0.39	0.12	0	0	166.04	37.14	32.02	195.95	63.64	49.64

[a] NOAA (2005), [b] Wood et al. (2012), [c] Listed as Endangered under the ESA.

Table 16. Pile Installation Construction Schedule B, Year 3 (2027): The mean number of marine mammals predicted to receive sound levels above exposure criteria with sound attenuation during year 3 (2027) under Construction Schedule B.

Species		Injury						Behavior					
		L_E			L_{pk}			L_p [a]			L_p [b]		
		Attenuation (dB)						Attenuation (dB)					
		0	10	12	0	10	12	0	10	12	0	10	12
LF	Fin whale[c]	132.26	19.97	13.65	0.17	0.04	0	67.08	18.44	16.79	104.21	34.17	27.98
	Minke whale (migrating)[b]	386.22	84.14	53.26	0.31	0	0	415.85	196.16	180.93	2134.09	1057.89	892.10
	Humpback whale	88.81	15.90	10.64	0.10	0	0	44.02	13.25	12.09	66.79	22.23	18.03
	North Atlantic right whale[c]	16.87	3.60	2.49	0.02	0	0	13.43	5.45	4.96	17.66	6.56	5.52
	Sei whale[c] (migrating)[b]	10.53	1.88	1.38	0.02	0	0	7.53	2.57	2.38	69.17	31.29	26.09
MF	Atlantic white sided dolphin	0.64	0.21	0.21	0	0	0	993.32	471.35	427.07	753.75	311.28	255.14
	Atlantic spotted dolphin	0	0	0	0	0	0	11.20	2.65	2.29	14.05	3.40	2.41
	Common dolphin	6.53	2.18	0	0	0	0	13647.91	6656.30	6090.17	9549.18	4129.43	3397.39
	Bottlenose dolphin, offshore	1.20	0.20	0	0	0	0	524.89	288.06	244.00	428.58	168.27	133.19
	Risso's dolphin	0.09	0.04	0.01	0.01	0	0	36.52	14.33	13.20	32.17	11.63	9.31
	Long-finned pilot whale	0.03	0.03	0	0	0	0	72.34	33.00	30.09	51.58	22.17	18.00
	Short-finned pilot whale	0.01	0	0	0	0	0	53.65	24.88	22.48	39.90	16.53	13.23
	Sperm whale[c]	<0.01	<0.01	0	0	0	0	18.31	6.82	6.22	16.96	5.82	4.55
HF	Harbor porpoise (sensitive)[b]	470.46	135.47	90.48	41.87	6.40	4.76	645.18	296.24	270.78	8281.75	3890.35	3269.84
PPW	Gray seal	20.20	2.43	1.52	0	0	0	84.74	20.96	19.06	120.91	36.64	28.03
	Harbor seal	77.45	6.82	3.07	1.36	0	0	251.80	98.43	85.98	313.91	109.71	87.28
	Harp seal	33.11	2.13	0.76	0.30	0	0	130.45	44.27	40.32	165.56	55.38	43.77

[a] NOAA (2005), [b] Wood et al. (2012), [c] Listed as Endangered under the ESA.

Table 17. Construction Schedule B, Year 4 (2028): The mean number of marine mammals predicted to receive sound levels above exposure criteria with sound attenuation during year 4 (2028) under Construction Schedule B.

Species		Injury						Behavior					
		L_E			L_{pk}			L_p [a]			L_p [b]		
		Attenuation (dB)						Attenuation (dB)					
		0	10	12	0	10	12	0	10	12	0	10	12
LF	Fin whale[c]	53.84	8.13	5.56	0.07	0.02	0	27.31	7.51	6.84	42.43	13.91	11.39
	Minke whale (migrating)[b]	170.74	37.20	23.55	0.14	0	0	183.85	86.72	79.99	943.47	467.69	394.39
	Humpback whale	38.29	6.85	4.59	0.04	0	0	18.98	5.71	5.21	28.79	9.58	7.77
	North Atlantic right whale[c]	7.87	1.68	1.16	0.01	0	0	6.26	2.54	2.31	8.24	3.06	2.57
	Sei whale[c] (migrating)[b]	5.08	0.91	0.66	<0.01	0	0	3.63	1.24	1.15	33.39	15.10	12.59
MF	Atlantic white sided dolphin	0.27	0.09	0.09	0	0	0	428.55	203.35	184.25	325.19	134.30	110.08
	Atlantic spotted dolphin	0	0	0	0	0	0	4.96	1.17	1.02	6.23	1.51	1.07
	Common dolphin	2.82	0.94	0	0	0	0	5891.64	2873.44	2629.05	4122.27	1782.63	1466.61
	Bottlenose dolphin, offshore	0.49	0.08	0	0	0	0	215.44	118.24	100.15	175.91	69.07	54.67
	Risso's dolphin	0.04	0.02	<0.01	<0.01	0	0	15.59	6.12	5.64	13.74	4.97	3.97
	Long-finned pilot whale	0.01	0.01	0	0	0	0	30.03	13.70	12.49	21.41	9.20	7.47
	Short-finned pilot whale	<0.01	0	0	0	0	0	22.27	10.33	9.33	16.56	6.86	5.49
	Sperm whale[c]	<0.01	<0.01	0	0	0	0	7.38	2.75	2.51	6.84	2.34	1.84
HF	Harbor porpoise (sensitive)[b]	207.98	59.89	40.00	18.51	2.83	2.11	285.22	130.96	119.71	3661.16	1719.83	1445.52
PPW	Gray seal	9.40	1.13	0.71	0	0	0	39.42	9.75	8.87	56.24	17.04	13.04
	Harbor seal	36.03	3.17	1.43	0.63	0	0	117.13	45.79	39.99	146.02	51.03	40.60
	Harp seal	15.40	0.99	0.35	0.14	0	0	60.68	20.59	18.75	77.01	25.76	20.36

[a] NOAA (2005), [b] Wood et al. (2012), [c] Listed as Endangered under the ESA.

3.2. Vibratory Setting – Exposure Estimates

Table 18. Number of marine mammals of each species that could be exposed to sound above the 120 dB behavioral threshold criterion per day of vibratory setting based on their average monthly density within a 50 km perimeter of the SWDA and assuming a range to threshold of 50 km.

Species		May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
LF	Fin whale[a]	20.35	19.44	30.60	25.26	19.05	6.93	4.62	10.17
	Minke whale	105.49	95.28	41.16	25.02	28.02	30.84	3.99	6.24
	Humpback whale	21.44	23.66	12.62	7.75	10.10	14.53	13.18	3.12
	North Atlantic right whale[a]	24.82	6.28	4.03	2.43	3.39	4.24	8.88	26.71
	Sei whale[a]	14.22	4.55	1.25	0.71	1.15	2.68	5.97	4.61
MF	Atlantic white sided dolphin	249.31	261.07	114.89	41.83	102.93	172.59	136.69	191.17
	Atlantic spotted dolphin	5.24	12.91	3.86	6.31	33.92	74.44	17.93	2.03
	Common dolphin	677.53	1393.06	1005.84	1154.19	1797.03	2320.49	1395.49	1150.76
	Bottlenose dolphin, offshore	84.93	141.38	146.95	149.39	152.35	148.90	143.32	111.57
	Risso's dolphin	16.84	16.23	21.36	35.03	46.07	23.13	14.26	16.86
	Long-finned pilot whale	12.95	12.95	12.95	12.95	12.95	12.95	12.95	12.95
	Short-finned pilot whale	9.55	9.55	9.55	9.55	9.55	9.55	9.55	9.55
	Sperm whale[a]	1.13	2.28	3.08	8.76	4.25	3.12	2.25	2.14
HF	Harbor porpoise	381.03	110.63	103.24	78.70	66.86	89.33	108.10	350.21
PPW	Gray seal	568.59	423.26	123.34	102.10	118.73	224.84	272.01	411.56
	Harbor seal	1277.47	950.95	277.10	229.39	266.77	505.17	611.13	924.68
	Harp seal	568.59	423.26	123.34	102.10	118.73	224.84	272.01	411.56

[a] Listed as Endangered under the ESA.

Table 19. Pile Installation Construction Schedule A: Estimated number of Level B exposures from vibratory setting during pile installation by year and for the full 2-year pile installation schedule.

Species		Year 2 (2026)	Year 3 (2027)	All Years Combined
LF	Fin whale[a]	414.46	510.02	924.49
	Minke whale	713.94	850.86	1564.80
	Humpback whale	241.51	291.75	533.25
	North Atlantic right whale[a]	78.38	94.25	172.63
	Sei whale[a]	36.96	43.35	80.31
MF	Atlantic white-sided dolphin	2298.85	2760.96	5059.81
	Atlantic spotted dolphin	456.04	610.94	1066.97
	Common dolphin	29279.72	37502.65	66782.37
	Bottlenose dolphin, offshore	2966.32	3718.71	6685.03
	Risso's dolphin	596.00	781.33	1377.33
	Long-finned pilot whale	259.03	323.79	582.83
	Short-finned pilot whale	191.06	238.82	429.88
	Sperm whale[a]	98.01	127.14	225.16
HF	Harbor porpoise	1749.98	2130.44	3880.41
PPW	Gray seal	3373.95	4040.46	7414.41
	Harbor seal	7580.38	9077.87	16658.26
	Harp seal	3373.95	4040.46	7414.41

[a] Listed as Endangered under the ESA.

Table 20. Pile Installation Construction Schedule B: Estimated number of Level B exposures from vibratory setting during pile installation by year and for the full 3-year pile installation schedule.

Species		Year 2 (2026)	Year 3 (2027)	Year 4 (2028)	All Years Combined
LF	Fin whale[a]	414.46	521.57	181.20	1117.23
	Minke whale	713.94	864.00	385.79	1963.73
	Humpback whale	241.51	294.27	125.89	661.66
	North Atlantic right whale[a]	78.38	94.89	41.97	215.24
	Sei whale[a]	36.96	43.45	22.82	103.22
MF	Atlantic white-sided dolphin	2298.85	2772.92	1247.78	6319.55
	Atlantic spotted dolphin	456.04	580.87	172.44	1209.35
	Common dolphin	29279.72	36711.46	12619.19	78610.38
	Bottlenose dolphin, offshore	2966.32	3713.31	1320.01	7999.64
	Risso's dolphin	596.00	756.61	228.70	1581.32
	Long-finned pilot whale	259.03	323.79	116.57	699.39
	Short-finned pilot whale	191.06	238.82	85.98	515.86
	Sperm whale[a]	98.01	125.97	37.85	261.83
HF	Harbor porpoise	1749.98	2166.82	849.44	4766.24
PPW	Gray seal	3373.95	4045.07	1912.98	9331.99
	Harbor seal	7580.38	9088.21	4297.97	20966.56
	Harp seal	3373.95	4045.07	1912.98	9331.99

[a] Listed as Endangered under the ESA.

3.3. Drilling – Exposure Estimates

Table 21. Number of marine mammals of each species that could be exposed to sound above the 120 dB behavioral threshold criterion per day of drilling based on their average monthly density within a 16.6 km perimeter of the SWDA and assuming a range to threshold of 16.6 km.

Species		May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
LF	Fin whale[a]	2.37	2.25	3.65	2.96	1.93	0.52	0.46	1.23
	Minke whale	14.77	13.80	5.91	3.88	4.19	3.92	0.47	0.71
	Humpback whale	2.46	2.57	1.43	1.00	1.39	1.92	1.60	0.28
	North Atlantic right whale[a]	2.51	0.44	0.20	0.16	0.25	0.45	0.65	1.97
	Sei whale[a]	1.66	0.45	0.11	0.09	0.16	0.31	0.70	0.58
MF	Atlantic white sided dolphin	28.40	25.99	12.08	6.14	14.10	20.43	15.46	20.87
	Atlantic spotted dolphin	0.17	0.25	0.27	0.46	2.34	4.15	1.54	0.16
	Common dolphin	55.05	119.71	92.25	123.78	214.09	199.31	101.29	95.77
	Bottlenose dolphin, offshore	7.04	11.74	12.73	14.13	12.88	11.71	10.98	9.32
	Risso's dolphin	0.87	0.47	0.65	1.22	1.53	0.84	1.06	1.53
	Long-finned pilot whale	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
	Short-finned pilot whale	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
	Sperm whale[a]	0.12	0.23	0.33	1.01	0.59	0.43	0.27	0.18
HF	Harbor porpoise	55.90	9.01	8.55	8.22	9.03	11.03	12.42	50.19
PPW	Gray seal	45.53	10.13	1.31	1.33	2.83	5.67	17.99	42.74
	Harbor seal	102.29	22.77	2.95	3.00	6.37	12.74	40.43	96.02
	Harp seal	45.53	10.13	1.31	1.33	2.83	5.67	17.99	42.74

[a] Listed as Endangered under the ESA.

Table 22. Pile Installation Construction Schedule A: Estimated number of Level B exposures[a] from drilling during pile installation by year and for the full 2-year pile installation schedule.

Species		Year 2 (2026)	Year 3 (2027)	All Years Combined
LF	Fin whale[b]	77.88	31.81	109.69
	Minke whale	199.53	86.88	286.41
	Humpback whale	52.31	24.28	76.59
	North Atlantic right whale[b]	13.96	7.15	21.11
	Sei whale[ab]	10.13	5.48	15.61
MF	Atlantic white-sided dolphin	493.34	229.08	722.42
	Atlantic spotted dolphin	40.74	19.14	59.88
	Common dolphin	4614.33	2003.46	6617.78
	Bottlenose dolphin, offshore	409.19	183.64	592.83
	Risso's dolphin	33.59	14.86	48.45
	Long-finned pilot whale	39.63	18.01	57.64
	Short-finned pilot whale	29.23	13.28	42.51
	Sperm whale[b]	17.04	7.85	24.89
HF	Harbor porpoise	395.40	188.86	584.26
PPW	Gray seal	225.79	126.75	352.54
	Harbor seal	507.28	284.78	792.07
	Harp seal	225.79	126.75	352.54

[a] Estimated exposures are from the full drilling schedule; final take request does not include drilling exposures on days when both vibratory setting and drilling occur on the same day to avoid double counting.

[b] Listed as Endangered under the ESA.

Table 23. Pile Installation Construction Schedule B: Estimated number of Level B exposures[a] from drilling during pile installation by year and for the full 3-year pile installation schedule.

Species		Year 2 (2026)	Year 3 (2027)	Year 4 (2028)	All Years Combined
LF	Fin whale[b]	45.73	46.49	20.03	112.24
	Minke whale	143.08	130.31	66.66	340.05
	Humpback whale	34.50	31.55	16.37	82.42
	North Atlantic right whale[b]	10.57	7.81	5.30	23.69
	Sei whale[b]	7.78	5.92	4.04	17.74
MF	Atlantic white-sided dolphin	334.29	297.54	160.67	792.50
	Atlantic spotted dolphin	23.22	19.17	9.72	52.10
	Common dolphin	2717.06	2554.94	1117.43	6389.43
	Bottlenose dolphin, offshore	241.67	235.65	105.67	582.99
	Risso's dolphin	19.32	18.25	7.77	45.33
	Long-finned pilot whale	24.02	22.81	10.81	57.64
	Short-finned pilot whale	17.71	16.83	7.97	42.51
	Sperm whale[b]	9.66	9.44	3.53	22.63
HF	Harbor porpoise	276.97	218.59	131.72	627.28
PPW	Gray seal	181.54	131.65	96.25	409.44
	Harbor seal	407.87	295.78	216.25	919.90
	Harp seal	181.54	131.65	96.25	409.44

[a] Estimated exposures are from the full drilling schedule; final take request does not include drilling exposures on days when both vibratory setting and drilling occur on the same day to avoid double counting.

[b] Listed as Endangered under the ESA.

3.4. Potential UXO Detonation – Exposure Estimates

Table 24. Estimated potential maximum Level A exposures of marine mammals resulting from the possible detonations of up to 10 total UXOs occurring in 2025 and 2026, assuming no attenuation and 10 dB of attenuation.

Species		Estimated Level A Exposures (PTS SEL)			
		No Attenuation[c]		10 dB of Attenuation	
		Year 1 (2025)[d]	Year 2 (2026)[e]	Year 1 (2025)[d]	Year 2 (2026)[e]
LF	Fin whale[a]	4.08	3.85	0.75	0.70
	Minke whale	16.88	15.58	3.10	2.82
	Humpback whale	2.98	2.69	0.55	0.49
	North Atlantic right whale[a,b]	7.17	6.40	1.32	1.16
	Sei whale[a]	1.94	1.73	0.36	0.31
MF	Atlantic white-sided dolphin	0.88	0.86	0.06	0.07
	Atlantic spotted dolphin	0.12	0.12	0.01	0.01
	Common dolphin	6.69	6.52	0.49	0.53
	Bottlenose dolphin, offshore	0.46	0.43	0.03	0.03
	Risso's dolphin	0.05	0.05	0.00	0.00
	Long-finned pilot whale	0.04	0.04	0.00	0.00
	Short-finned pilot whale	0.03	0.03	0.00	0.00
	Sperm whale[a]	0.03	0.03	0.00	0.00
HF	Harbor porpoise	374.31	345.46	55.36	50.83
PPW	Gray seal[b]	63.54	34.50	7.51	3.44
	Harbor seal[b]	142.75	77.51	16.87	7.73
	Harp seal[b]	63.54	34.50	7.51	3.44

[a] Listed as Endangered under the ESA.
[b] Level A exposures were estimated for this species, but due to mitigation measures, no Level A takes are expected or requested.
[c] Although the Proponent intends to use mitigation during all potential UXO detonations, values assuming no attenuation are presented here for comparison.
[d] Year 1 (2025) exposures are calculated under the assumption that 2 UXOs would be detonated at the 12 m water depth location, 3 UXOs at 20 m, 1 UXO at 30 m, and 0 UXOs at 40 m. A total of 6 UXOs are assumed in this year.
[e] Year 2 (2026) exposures are calculated under the assumption that 0 UXOs would be detonated at the 12 m water depth location, 0 UXOs at 20 m, 2 UXOs at 30 m, and 2 UXOs at 40 m. A total of 4 UXOs are assumed in this year.

Table 25. Estimated potential maximum Level B exposures of marine mammals resulting from the possible detonations of up to 10 total UXOs occurring in 2025 and 2026, assuming no attenuation and 10 dB of attenuation.

Species		Estimated Level B Exposures (TTS SEL)			
		No Attenuation[b]		10 dB of Attenuation	
		Year 1 (2025)[c]	Year 2 (2026)[d]	Year 1 (2025)[c]	Year 2 (2026)[d]
LF	Fin whale[a]	15.82	15.75	6.75	6.56
	Minke whale	65.73	63.69	27.98	26.52
	Humpback whale	11.65	10.99	4.95	4.58
	North Atlantic right whale[a]	35.27	32.57	13.25	12.06
	Sei whale[a]	7.63	7.07	3.24	2.94
MF	Atlantic white-sided dolphin	13.31	13.12	2.41	2.46
	Atlantic spotted dolphin	1.83	1.79	0.33	0.34
	Common dolphin	100.82	99.41	18.28	18.67
	Bottlenose dolphin, offshore	6.89	6.52	1.25	1.23
	Risso's dolphin	0.73	0.70	0.13	0.13
	Long-finned pilot whale	0.54	0.54	0.10	0.10
	Short-finned pilot whale	0.40	0.40	0.07	0.07
	Sperm whale[a]	0.46	0.45	0.08	0.08
HF	Harbor porpoise	1031.91	952.37	216.13	192.18
PPW	Gray seal[b]	503.19	257.67	145.91	79.64
	Harbor seal[b]	1130.53	578.92	327.81	178.93
	Harp seal[b]	503.19	257.67	145.91	79.64

[a] Listed as Endangered under the ESA.
[b] Although the Proponent intends to use mitigation during all potential UXO detonations, values assuming no attenuation are presented here for comparison.
[c] Year 1 (2025) exposures are calculated under the assumption that 2 UXOs would be detonated at the 12 m water depth location, 3 UXOs at 20 m, 1 UXO at 30 m, and 0 UXOs at 40 m. A total of 6 UXOs are assumed in this year.
[d] Year 2 (2026) exposures are calculated under the assumption that 0 UXOs would be detonated at the 12 m water depth location, 0 UXOs at 20 m, 2 UXOs at 30 m, and 2 UXOs at 40 m. A total of 4 UXOs are assumed in this year.

3.5. HRG Surveys – Exposure Estimates

Table 26. Number of animals of each species estimated to receive sound levels above the Level B threshold annually during HRG surveys of New England Wind for the two different equipment types.

Species		Applied Acoustics AA251 boomer	GeoMarine Geo Spark 2000
LF	Fin whale[a]	3.11	2.47
	Minke whale	12.17	9.64
	Humpback whale	2.31	1.83
	North Atlantic right whale[a]	4.05	3.21
	Sei whale[a]	1.38	1.09
MF	Atlantic white-sided dolphin	24.34	19.26
	Atlantic spotted dolphin	2.88	2.28
	Common dolphin	202.30	160.13
	Bottlenose dolphin, offshore	12.53	9.92
	Risso's dolphin	1.34	1.06
	Long-finned pilot whale	1.06	0.84
	Short-finned pilot whale	0.78	0.62
	Sperm whale[a]	0.79	0.62
HF	Harbor porpoise	78.41	62.07
PPW	Gray seal	199.35	157.80
	Harbor seal	447.89	354.54
	Harp seal	199.35	157.80

[a] Listed as Endangered under the ESA.

4. Take Estimates

4.1. Impact Pile Driving – Take Estimates

Table 27. Construction Schedule A: Number of Level A and Level B takes calculated for modeled species for impact pile driving using model results with 10 or 12 dB sound attenuation for comparison.

Species		Year 2 (2026)				Year 3 (2027)				All years combined			
		Level A		Level B		Level A		Level B		Level A		Level B	
		Attenuation (dB)				Attenuation (dB)				Attenuation (dB)			
		10	12	10	12	10	12	10	12	10	12	10	12
LF	Fin whale[a]	9	6	17	15	10	7	13	11	19	13	30	25
	Minke whale	31	21	95	86	38	25	93	82	69	45	188	168
	Humpback whale	9	6	12	11	10	7	10	9	18	12	22	19
	North Atlantic right whale[a,b]	0	0	5	5	0	0	5	5	0	0	10	9
	Sei whale[a]	1	1	3	3	2	1	3	3	3	2	6	5
MF	Atlantic white sided dolphin	1	1	269	243	1	1	284	251	1	1	553	493
	Atlantic spotted dolphin[c]	0	0	30	30	0	0	30	30	0	0	60	60
	Common dolphin	7	7	3684	3360	2	2	4355	3952	8	8	8039	7311
	Bottlenose dolphin, offshore	1	1	145	125	1	1	160	136	1	1	305	261
	Risso's dolphin	1	1	11	10	1	1	11	10	1	1	21	19
	Long-finned pilot whale	1	1	19	17	1	1	20	18	1	1	38	34
	Short-finned pilot whale	1	1	14	12	1	1	15	13	1	1	28	25
	Sperm whale[a]	1	1	5	4	1	1	5	4	1	1	9	8
HF	Harbor porpoise	71	49	208	185	94	64	224	197	164	113	431	382
PPW	Gray seal	2	1	51	44	3	2	42	31	4	2	92	74
	Harbor seal	3	1	121	103	6	3	115	92	8	4	235	194
	Harp seal	2	1	59	51	2	1	56	46	3	1	115	97

[a] Listed as Endangered under the ESA.
[b] Level A exposures were estimated for this species, but due to mitigation measures, no Level A takes are expected or requested.
[c] Annual Level B take estimate increased to one average group size, total take estimate increased to two average group sizes.

Table 28. Construction Schedule B: Number of Level A and Level B takes calculated for modeled species for impact pile driving using model results with 10 or 12 dB sound attenuation for comparison.

Species		Year 2 (2026)				Year 3 (2027)				Year 4 (2028)				All years combined			
		Level A		Level B		Level A		Level B		Level A		Level B		Level A		Level B	
		Attenuation (dB)				Attenuation (dB)				Attenuation (dB)				Attenuation (dB)			
		10	12	10	12	10	12	10	12	10	12	10	12	10	12	10	12
LF	Fin whale[a]	7	5	13	11	20	14	19	17	9	6	8	7	35	24	39	35
	Minke whale	26	17	80	73	85	54	197	181	38	24	87	80	148	94	363	334
	Humpback whale	6	4	9	8	16	11	14	13	7	5	6	6	29	19	28	25
	North Atlantic right whale[a,b]	0	0	4	3	0	0	6	5	0	0	3	3	0	0	12	11
	Sei whale[a]	1	1	2	2	2	2	3	3	1	1	2	2	4	3	6	6
MF	Atlantic white sided dolphin	1	1	193	174	1	1	472	428	1	1	204	185	1	1	867	786
	Atlantic spotted dolphin[c]	0	0	30	30	0	0	30	30	0	0	30	30	0	0	90	90
	Common dolphin	8	8	2311	2119	3	0	6657	6091	1	0	2874	2630	8	8	11841	10838
	Bottlenose dolphin, offshore	1	1	100	86	1	0	289	244	1	0	119	101	1	1	507	431
	Risso's dolphin	1	1	7	7	1	1	15	14	1	1	7	7	1	1	27	25
	Long-finned pilot whale[d]	1	1	17	17	1	0	33	31	1	0	17	17	1	1	60	54
	Short-finned pilot whale	1	1	9	9	0	0	25	23	0	0	11	10	1	1	45	40
	Sperm whale[a]	1	1	3	3	1	0	7	7	1	0	3	3	1	1	13	12
HF	Harbor porpoise	49	35	136	121	136	91	297	271	60	40	131	120	245	165	563	511
PPW	Gray seal	1	1	30	27	3	2	21	20	2	1	10	9	5	3	61	55
	Harbor seal	2	1	77	66	7	4	99	86	4	2	46	40	12	5	221	192
	Harp seal	2	1	38	33	3	1	45	41	1	1	21	19	5	2	102	92

[a] Listed as Endangered under the ESA.
[b] Level A exposures were estimated for this species, but due to mitigation measures, no Level A takes are expected or requested.
[c] Annual Level B take estimate increased to one average group size, total take estimate increased to three average group sizes.
[d] Level B take estimate increased to one average group size in year 1 and year 3.

4.2. Vibratory Setting – Take Estimates

Table 29. Construction Schedule A: Estimated number of Level B takes from vibratory setting during pile installation by year and for the full 2-year construction schedule assuming vibratory setting is used on 53% of foundation positions.

Species		Year 2 (2026)	Year 3 (2027)	All Years Combined
LF	Fin whale[a]	415	511	925
	Minke whale	714	851	1565
	Humpback whale	242	292	534
	North Atlantic right whale[a]	79	95	173
	Sei whale[a]	37	44	81
MF	Atlantic white-sided dolphin	2299	2761	5060
	Atlantic spotted dolphin	457	611	1067
	Common dolphin	29280	37503	66783
	Bottlenose dolphin, offshore	2967	3719	6686
	Risso's dolphin	597	782	1378
	Long-finned pilot whale	260	324	583
	Short-finned pilot whale	192	239	430
	Sperm whale[a]	99	128	226
HF	Harbor porpoise	1750	2131	3881
PPW	Gray seal	3374	4041	7415
	Harbor seal	7581	9078	16659
	Harp seal	3374	4041	7415

[a] Listed as Endangered under the ESA.

Table 30. Construction Schedule B: Estimated number of Level B takes from vibratory setting during pile installation by year and for the full 3-year construction schedule assuming vibratory setting is used on 53% of foundation positions.

Species		Year 2 (2026)	Year 3 (2027)	Year 4 (2028)	All Years Combined
LF	Fin whale[a]	415	522	182	1118
	Minke whale	714	865	386	1964
	Humpback whale	242	295	126	662
	North Atlantic right whale[a]	79	95	42	216
	Sei whale[a]	37	44	23	104
MF	Atlantic white-sided dolphin	2299	2773	1248	6320
	Atlantic spotted dolphin	457	581	173	1210
	Common dolphin	29280	36712	12620	78611
	Bottlenose dolphin, offshore	2967	3714	1321	8000
	Risso's dolphin	597	757	229	1582
	Long-finned pilot whale	260	324	117	700
	Short-finned pilot whale	192	239	86	516
	Sperm whale[a]	99	126	38	262
HF	Harbor porpoise	1750	2167	850	4767
PPW	Gray seal	3374	4046	1913	9332
	Harbor seal	7581	9089	4298	20967
	Harp seal	3374	4046	1913	9332

[a] Listed as Endangered under the ESA.

Table 31. Level B take calculated for vibratory setting during pile installation based on the higher of the take estimates from either Schedule A or Schedule B for each species. Used in the final take request.

Species		Level B take			
		Year 2 (2026)	Year 3 (2027)	Year 4 (2028)	3-Year total
LF	Fin whale[a]	415	522	182	1118
	Minke whale	714	865	386	1964
	Humpback whale	242	295	126	662
	North Atlantic right whale[a]	79	95	42	216
	Sei whale[a]	37	44	23	104
MF	Atlantic white-sided dolphin	2299	2773	1248	6320
	Atlantic spotted dolphin	457	611	173	1210
	Common dolphin	29280	37503	12620	78611
	Bottlenose dolphin, offshore	2967	3719	1321	8000
	Risso's dolphin	597	782	229	1582
	Long-finned pilot whale	260	324	117	700
	Short-finned pilot whale	192	239	86	516
	Sperm whale[a]	99	128	38	262
HF	Harbor porpoise	1750	2167	850	4767
PPW	Gray seal	3374	4046	1913	9332
	Harbor seal	7581	9089	4298	20967
	Harp seal	3374	4046	1913	9332

[a] Listed as Endangered under the ESA.

4.3. Drilling – Take Estimates

Table 32. Construction Schedule A: Estimated number of Level B takes[a] from drilling during pile installation by year and for the full 2-year construction schedule assuming drilling is used on 36% of foundation positions.

Species		Year 2 (2026)	Year 3 (2027)	All Years Combined
LF	Fin whale[b]	78	46	32
	Minke whale	200	144	87
	Humpback whale	53	35	25
	North Atlantic right whale[b]	14	11	8
	Sei whale[b]	11	8	6
MF	Atlantic white-sided dolphin	494	335	230
	Atlantic spotted dolphin	41	24	20
	Common dolphin	4615	2718	2004
	Bottlenose dolphin, offshore	410	242	184
	Risso's dolphin	34	20	15
	Long-finned pilot whale	40	25	19
	Short-finned pilot whale	30	18	14
	Sperm whale[b]	18	10	8
HF	Harbor porpoise	396	277	189
PPW	Gray seal	226	182	127
	Harbor seal	508	408	285
	Harp seal	226	182	127

[a] Estimated takes are from the full drilling schedule; final take request does not include drilling takes on days when both vibratory setting and drilling occur on the same day to avoid double counting.
[b] Listed as Endangered under the ESA.

Table 33. Construction Schedule B: Estimated number of Level B takes[a] from drilling during pile installation by year and for the full 3-year construction schedule assuming drilling is used on 36% of foundation positions.

Species		Year 2 (2026)	Year 3 (2027)	Year 4 (2028)	All Years Combined
LF	Fin whale[b]	46	32	47	110
	Minke whale	144	87	131	287
	Humpback whale	35	25	32	77
	North Atlantic right whale[b]	11	8	8	22
	Sei whale[b]	8	6	6	16
MF	Atlantic white-sided dolphin	335	230	298	723
	Atlantic spotted dolphin	24	20	20	60
	Common dolphin	2718	2004	2555	6618
	Bottlenose dolphin, offshore	242	184	236	593
	Risso's dolphin	20	15	19	49
	Long-finned pilot whale	25	19	23	58
	Short-finned pilot whale	18	14	17	43
	Sperm whale[b]	10	8	10	25
HF	Harbor porpoise	277	189	219	585
PPW	Gray seal	182	127	132	353
	Harbor seal	408	285	296	793
	Harp seal	182	127	132	353

[a] Estimated takes are from the full drilling schedule; final take request does not include drilling takes on days when both vibratory setting and drilling occur on the same day to avoid double counting

[b] Listed as Endangered under the ESA.

Table 34. Level B takes[a] calculated for drilling during pile installation based on the higher of the take estimates from either Schedule A or Schedule B for each species. Used in the final take request.

Species		Level B take			
		Year 2 (2026)	Year 3 (2027)	Year 4 (2028)	3-Year total
LF	Fin whale[b]	78	46	47	110
	Minke whale	200	144	131	287
	Humpback whale	53	35	32	77
	North Atlantic right whale[b]	14	11	8	22
	Sei whale[b]	11	8	6	16
MF	Atlantic white-sided dolphin	494	335	298	723
	Atlantic spotted dolphin	41	24	20	60
	Common dolphin	4615	2718	2555	6618
	Bottlenose dolphin, offshore	410	242	236	593
	Risso's dolphin	34	20	19	49
	Long-finned pilot whale	40	25	23	58
	Short-finned pilot whale	30	18	17	43
	Sperm whale[b]	18	10	10	25
HF	Harbor porpoise	396	277	219	585
PPW	Gray seal	226	182	132	353
	Harbor seal	508	408	296	793
	Harp seal	226	182	132	353

[a] Estimated takes are from the full drilling schedule; final take request does not include drilling takes on days when both vibratory setting and drilling occur on the same day to avoid double counting

[b] Listed as Endangered under the ESA.

4.4. Potential UXO Detonation – Take Estimates

Table 35. Estimated Level A and Level B takes resulting from detonation of up to 10 potential UXOs across Year 1 (2025) and Year 2 (2026), assuming no attenuation.

Species		No Attenuation[c]			
		Year 1 (2025)[d]		Year 2 (2026)[e]	
		Level A	Level B	Level A	Level B
LF	Fin whale[a]	5	16	4	16
	Minke whale	17	66	16	64
	Humpback whale	3	12	3	11
	North Atlantic right whale[a,b]	0	36	0	33
	Sei whale[a]	2	8	2	8
MF	Atlantic white-sided dolphin	1	14	1	14
	Atlantic spotted dolphin	1	2	1	2
	Common dolphin	7	101	7	100
	Bottlenose dolphin, offshore	1	7	1	7
	Risso's dolphin	1	1	1	1
	Long-finned pilot whale	1	1	1	1
	Short-finned pilot whale	1	1	1	1
	Sperm whale[a]	1	1	1	1
HF	Harbor porpoise	375	1032	346	953
PPW	Gray seal	64	504	35	258
	Harbor seal	143	1131	78	579
	Harp seal	64	504	35	258

[a] Listed as Endangered under the ESA.

[b] In consultation with BOEM and NMFS, New England Wind will identify appropriate NAS to prohibit all Level A take for North Atlantic right whale.

[c] Although the Proponent intends to use mitigation during all potential UXO detonations, values assuming no attenuation are presented here for comparison.

[d] Year 1 (2025) assumes that 2 UXOs would be detonated at the 12 m water depth location, 3 UXOs at 20 m, 1 UXO at 30 m, and 0 UXOs at 40 m. A total of 6 UXOs are assumed in this year.

[e] Year 2 (2026) assumes that 0 UXOs would be detonated at the 12 m water depth location, 0 UXOs at 20 m, 2 UXOs at 30 m, and 2 UXOs at 40 m. A total of 4 UXOs are assumed in this year.

Table 36. Estimated Level A and Level B takes resulting from detonation of up to 10 potential UXOs across Year 1 (2025) and Year 2 (2026), assuming 10 dB of attenuation.

Species		10 dB of Attenuation			
		Year 1 (2025)[c]		Year 2 (2026)[d]	
		Level A	Level B	Level A	Level B
LF	Fin whale[a]	1	7	1	7
	Minke whale	4	28	3	27
	Humpback whale	1	5	1	5
	North Atlantic right whale[a,b]	0	14	0	13
	Sei whale[a]	1	4	1	3
MF	Atlantic white-sided dolphin	1	3	1	3
	Atlantic spotted dolphin	1	1	1	1
	Common dolphin	1	19	1	19
	Bottlenose dolphin, offshore	1	2	1	2
	Risso's dolphin	1	1	1	1
	Long-finned pilot whale	1	1	1	1
	Short-finned pilot whale	1	1	1	1
	Sperm whale[a]	1	1	1	1
HF	Harbor porpoise	56	217	51	193
PPW	Gray seal	8	146	4	80
	Harbor seal	17	328	8	179
	Harp seal	8	146	4	80

[a] Listed as Endangered under the ESA.

[b] In consultation with BOEM and NMFS, New England Wind will identify appropriate NAS to prohibit all Level A take for North Atlantic right whale.

[c] Year 1 (2025) assumes that 2 UXOs would be detonated at the 12 m water depth location, 3 UXOs at 20 m, 1 UXO at 30 m, and 0 UXOs at 40 m. A total of 6 UXOs are assumed in this year.

[d] Year 2 (2026) assumes that 0 UXOs would be detonated at the 12 m water depth location, 0 UXOs at 20 m, 2 UXOs at 30 m, and 2 UXOs at 40 m. A total of 4 UXOs are assumed in this year.

4.5. HRG Surveys – Take Estimates

Table 37. Estimated Level B takes from HRG surveys for the effective period of the LOA (5-year total, 2025 - 2029).

Species		Requested yearly maximum takes	Requested 5-year total maximum takes
LF	Fin whale[a]	4	20
	Minke whale	13	65
	Humpback whale	3	15
	North Atlantic right whale[a]	5	25
	Sei whale[a]	2	10
MF	Atlantic white-sided dolphin[b]	28	140
	Atlantic spotted dolphin[b]	30	150
	Common dolphin	203	1015
	Bottlenose dolphin, offshore[b]	18	90
	Risso's dolphin[b]	7	35
	Long-finned pilot whale[b]	17	85
	Short-finned pilot whale[b]	9	45
	Sperm whale[a,b]	2	10
HF	Harbor porpoise	79	395
PPW	Gray seal	200	1000
	Harbor seal	448	2240
	Harp seal	200	1000

[a] Listed as Endangered under the ESA.
[b] Annual Level B take rounded up to one group size.

5. Number of Takes Requested – All Activities

Table 38. Requested Level A and Level B takes[a] by year for all activities for the effective period of the LOA (5-year total, 2025 – 2029).

Species		Population Size	Year 1 (2025)[b]			Year 2 (2026)			Year 3 (2027)			Year 4 (2028)			Year 5 (2029)		
			Level A	Level B	Max %	Level A	Level B	Max %	Level A	Level B	Max %	Level A	Level B	Max %	Level A	Level B	Max %
LF	Fin whale[c]	6,802	1	11	0.18	10	498	7.47	20	590	8.97	9	214	3.28	0	4	0.06
	Minke whale	21,968	4	41	0.20	34	1013	4.77	85	1198	5.84	38	549	2.67	0	13	0.06
	Humpback whale	1,396	1	8	0.64	10	305	22.56	16	341	25.57	7	148	11.10	0	3	0.21
	North Atlantic right whale[c]	368	0	19	5.16	0	115	31.25	0	114	30.98	0	55	14.95	0	5	1.36
	Sei whale[c]	6,292	1	6	0.11	2	55	0.91	2	55	0.91	1	31	0.51	0	2	0.03
MF	Atlantic white-sided dolphin	93,233	1	31	0.03	2	3016	3.24	1	3537	3.79	1	1605	1.72	0	28	0.03
	Atlantic spotted dolphin	39,921	1	31	0.08	1	552	1.39	0	684	1.71	0	238	0.60	0	30	0.08
	Common dolphin	172,974	1	222	0.13	9	36693	21.22	3	46505	26.89	1	16514	9.55	0	203	0.12
	Bottlenose dolphin, offshore	62,851	1	20	0.03	2	3434	5.47	1	4238	6.74	1	1541	2.45	0	18	0.03
	Risso's dolphin	35,215	1	8	0.03	2	641	1.83	1	820	2.33	1	249	0.71	0	7	0.02
	Long-finned pilot whale	39,215	1	18	0.05	2	328	0.84	1	395	1.01	1	160	0.41	0	17	0.04
	Short-finned pilot whale	28,924	1	10	0.04	2	239	0.83	1	289	1.00	0	113	0.39	0	9	0.03
	Sperm whale[c]	4,349	1	3	0.09	2	119	2.78	1	146	3.38	1	46	1.08	0	2	0.05
HF	Harbor porpoise	95,543	56	296	0.37	122	2558	2.81	136	2742	3.01	60	1169	1.29	0	79	0.08
PPW	Gray seal	27,300	8	346	1.30	6	3918	14.37	3	4412	16.17	2	2196	8.05	0	200	0.73
	Harbor seal	61,336	17	776	1.29	11	8806	14.37	7	9929	16.20	4	4956	8.09	0	448	0.73
	Harp seal	7,600,000	8	346	0.00	6	3926	0.05	3	4426	0.06	1	2207	0.03	0	200	0.00

[a] For days when pile installation includes both vibratory setting and drilling, only the vibratory setting Level B takes are included (because more takes are predicted for this activity) and not the drilling Level B takes to avoid double counting.

[b] For the purpose of this take request update, Year 1 is assumed to be 2025. These dates reflect the currently projected construction start year and are subject to change because exact project start dates and construction schedules are not currently available.

[c] Listed as Endangered under the ESA.

Table 39. Summary of requested Level A and Level B takes[a] for all activities for the effective period of the LOA (5-year total, 2025 – 2029).

Species		Population Size	5 Year Total		
			Level A	Level B	Max Percent
LF	Fin whale[b]	6,802	37	1283	19.41
	Minke whale	21,968	155	2739	13.17
	Humpback whale	1,396	31	779	58.02
	North Atlantic right whale[b]	368	0	300	81.52
	Sei whale[b]	6,292	6	142	2.35
MF	Atlantic white-sided dolphin	93,233	3	7940	8.52
	Atlantic spotted dolphin	39,921	2	1499	3.76
	Common dolphin	172,974	10	95901	55.45
	Bottlenose dolphin, offshore	62,851	3	9020	14.36
	Risso's dolphin	35,215	3	1676	4.77
	Long-finned pilot whale	39,215	3	890	2.28
	Short-finned pilot whale	28,924	3	639	2.22
	Sperm whale[b]	4,349	3	302	7.01
HF	Harbor porpoise	95,543	352	6636	7.31
PPW	Gray seal	27,300	17	10970	40.25
	Harbor seal	61,336	37	24723	40.37
	Harp seal	7,600,000	17	11011	0.15

[a] For days when pile installation includes both vibratory setting and drilling, only the vibratory setting Level B takes are included (because more takes are predicted for this activity) and not the drilling Level B takes to avoid double counting.

[b] Listed as Endangered under the ESA.

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Appendix A. Description of Fisheries Monitoring Program

MEMORANDUM

Date: March 8, 2023

To: Permits and Conservation Division, Office of Protected Resources, NOAA Fisheries

From: Park City Wind LLC

Subject: New England Wind LOA - Description of Fisheries Monitoring Program

In support of its Letter of Authorization (LOA) Application for the New England Wind offshore wind development, Park City Wind LLC is submitting the following description of its fisheries monitoring program.

1.0 Fisheries Monitoring

Fisheries monitoring surveys have been developed for New England Wind in accordance with the recommendations set forth in "Guidelines for Providing Information on Fisheries for Renewable Energy Development on the Atlantic Outer Continental Shelf" (BOEM 2019), which is designed to:

- Identify and confirm which dominant benthic, demersal, and pelagic species are using the project site, and when these species may be present where development is proposed;
- Establish a pre-construction baseline which may be used to assess whether detectable changes associated with proposed operations occurred in post-construction abundance and distribution of fisheries;
- Collect additional information aimed at reducing uncertainty associated with baseline estimates and/or to inform the interpretation of research results; and
- Develop an approach to quantify any substantial changes in the distribution and abundance of fisheries associated with proposed operations.

Additional documents considered include ROSA's Offshore Wind Project Monitoring Framework and Guidelines (ROSA 2021), March 2022 Draft NOAA Fisheries and BOEM Federal Survey Mitigation Implementation Strategy-Northeast U.S. Region (Hare et al. 2022), and Recommended Regional Scale Studies Related to Fisheries in the Massachusetts and Rhode Island-Massachusetts Offshore Wind Energy Areas (MADMF 2018). The Fisheries Monitoring Plan (FMP) is being developed through a collaborative process and the Proponent has met with numerous regulatory agencies and stakeholders during the development of the plan including NMFS, BOEM, Massachusetts Department of Environmental Protection, Massachusetts Office of Coastal Zone Management, and RI CRMC. The FMP follows a similar approach that was used for the Vineyard Wind 1 FMP in order to improve data applicability across the region. The Vineyard Wind 1 plan was developed through a series of workshops involving fishers,

scientists, and agencies and was reevaluated in 2021 by another stakeholder review. Fisheries monitoring surveys will be carried out by scientists from the University of Massachusetts Dartmouth School for Marine Science & Technology (SMAST), who have developed a number of fisheries monitoring survey protocols and have been conducting baseline fisheries monitoring surveys in the SWDA since 2019.[1] A summary of the fisheries monitoring surveys to be conducted are listed below in Table 1.

Table 1 Proposed Fisheries Monitoring Surveys to be conducted by New England Wind[1]

Activity	Description	Take Requested	Risk Assessment and Mitigation Measures
Demersal Otter Trawl	A seasonal trawl survey following the Northeast Area Monitoring and Assessment Program (NEAMAP) survey protocol to sample fish and invertebrates in the SWDA and control area. 200 tows per year conducted for 20 minutes at 3.0 knots.	None	Minimal risk. Marine mammal monitoring will be conducted prior to deployment, during survey, and retrieval of nets. Survey vessel will follow mitigation measures as discussed below.
Ventless Trap Survey	A ventless trap survey following a survey protocol used by MA DMF, RI DEM, and other states to sample lobster, black sea bass, and Jonah crab. Survey will be conducted twice per month from May to December in 30 stations across the SWDA and control areas (with 6 lobster traps and 1 fish pot at each station).	None	Minimal risk. Mitigation measures are discussed in section 1.2.2. Survey vessel will follow vessel mitigation measures as discussed below.
Lobster Tagging Study	A tagging study conducted twice per month from May to December in conjunction with the ventless trap survey to tag lobsters with a carapace size of 40 mm or greater.	None	Minimal risk. Survey vessel will follow vessel mitigation measures as discussed in section below.
Neuston (surface zooplankton) Net Sampling	A zooplankton sampling of 30 stations across the SWDA and control areas; each station will be sampled twice per month from May to December. This survey will consist of 10-minute tows in top 0.5 m of water column.	None	Minimal risk. Survey vessel will follow vessel mitigation measures as discussed below.
Drop Camera	An underwater camera survey to assess benthic fish and invertebrates. Conducted twice annually between April and September over 368 stations within the SWDA and control areas.	None	Minimal risk. Survey vessel will follow vessel mitigation measures as discussed below.

Notes:

1. The proposed fisheries monitoring surveys are subject to change based on agency and stakeholder feedback.

[1] A pilot video trawl survey in 2018 but the more comprehensive trawl and drop camera surveys started 2019.

1.1 General Mitigation Measures

Fisheries monitoring surveys for New England Wind will follow general vessel activity mitigation measures to protect marine mammals outlined below in addition to mitigation for the survey gear.

- Vessel operators and fisheries survey personnel working offshore will receive environmental training, including marine mammal species identification.

- Vessel operators and crew will maintain a vigilant watch for marine mammals and will adhere to legally mandated vessel speeds to reduce the risk of impact to NARWs and other marine mammals. Vessels will follow NMFS guidelines for vessel strike avoidance that are applicable at the time of the surveys by maintaining required separation distances from the animal (currently 500 m for NARW, 100 m for other whale species, and 50 m for dolphins, porpoises, and seals).

- In the event a marine mammal is sighted when a vessel is in transit, the captain will take appropriate action to maintain the required separation distances and avoid striking the marine mammal, such as remaining parallel to the animal, slowing down, shifting into neutral, or maneuvering the vessel away from the marine mammal.

- Vessel operators will check the NMFS' NARW reporting systems on a daily basis.

- Additionally, it is expected that vessel captains will monitor USCG VHF Channel 16 throughout the day to receive notifications of any sightings. This information would be used to alert the team to the presence of a NARW in the area and to implement mitigation measures as appropriate. Whenever multiple New England Wind vessels are operating, all sightings of listed species will be communicated between vessels.

- Vessel operators and crew will monitor for marine mammals prior to deployment of fishing gear (e.g., trawl net) and will continue to monitor until the gear is brought back on deck. If a marine mammal is sighted within 1 NM of the survey vessel within 15 minutes prior to the deployment of the research gear and it is considered to be at risk of interaction with the gear, the sampling station will be suspended until there are no sightings of marine mammals for at least 15 minutes within 1 NM of the sampling station. The vessel operator may also relocate the vessel away from the marine mammal to a different sampling location.

1.2 Gear-Specific Mitigation

In conjunction with the general mitigation measures applicable to all fisheries survey vessels, gear-specific measures will also be implemented to avoid interactions with marine mammal species.

1.2.1 Demersal Otter Trawl Survey

The following mitigation measures will be utilized to minimize the potential for marine mammal capture during research trawling:

- Marine mammal monitoring will be conducted by the captain and/or a survey crew member before deployment, during survey activities, and upon retrieval of fishing gear.
- Trawl tows will be limited to a 20-minute trawl time at 3.0 knots.
- If a marine mammal is observed within 1 NM of the planned sampling station in the 15 minutes prior to gear deployment, the Proponent will delay setting the trawl until the marine mammal has not been observed for 15 minutes. The Proponent may also relocate the vessel away from the marine mammal to a different sampling location. If marine mammals are still visible from the vessel after relocation, the Proponent may decide to relocate again or move on to the next sampling station.
- If marine mammals are sighted before the gear is fully removed from the water, the vessel will slow its speed and maneuver the vessel away from the animals to minimize potential interactions with the observed animal.
- The vessel crew will 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.
- Gear will be emptied immediately after retrieval within the vicinity of the deck.
- Trawl nets will be fully cleared and repaired if damaged before redeployment.

New England Wind does not anticipate and is not requesting the take of any marine mammal species incidental to fisheries research surveys. In the case of a marine mammal interaction, the Marine Mammal Stranding Network will be contacted immediately.

1.2.2 Ventless Trap Survey

The following mitigation measures will be utilized to minimize the potential for marine mammal entanglement in the vertical lines:

- To avoid entanglement with vertical lines, buoy lines will be weighted and will not float at the surface of the water and all groundlines will consist of sinking line.
- Buoy lines and linkages will be compliant with best practices. “Ropeless” gear may be tested and used. All buoys will be properly labeled with the scientific permit number and identification as research gear.
- All labels and markings on the buoys and buoy lines will be compliant with the applicable regulations, and all buoy markings will comply with instructions received by the NOAA Greater Atlantic Regional Fisheries Office Protected Resources Division.

- Survey gear will be removed outside of the sampling season (i.e., no wet storage).
- Any lost fishing gear will be immediately reported to the NOAA Greater Atlantic Regional Fisheries Office Protected Resources Division.

New England Wind does not anticipate and is not requesting the take of any marine mammal species incidental to fisheries research surveys. In the case of a marine mammal interaction, the Marine Mammal Stranding Network will be contacted immediately.

2.0 References

BOEM. 2019. Guidelines for Providing Information on Fisheries for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585. 14 p.

Hare J, Blythe B, Ford K, Hooker B, Jensen B, Lipsky A, Nachman C Pfeiffer L, Rasser M, Renshaw K. 2022. NOAA Fisheries and BOEM Federal Survey Mitigation Implementation Strategy- Northeast U.S. Region DRAFT March 2022. 35 p.

MADMF (Massachusetts Division of Marine Fisheries). 2018. Recommended regional scale studies related to fisheries in the Massachusetts and Rhode Island-Massachusetts offshore Wind Energy Areas. November 2018

ROSA. 2021. Offshore Wind Project Monitoring Framework and Guidelines. 57p.

Appendix B. NMFS Online User Spreadsheet Tool, Drilling Activity

A: STATIONARY SOURCE: Non-Impulsive, Continuous

VERSION 2.2: 2020

KEY

	Action Proponent Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isopleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	New England Wind Offshore Wind Farm
PROJECT/SOURCE INFORMATION	New England Wind Offshore Wind Farm, Updates to the Application for Marine Mammal Protection Act (MMPA) Rulemaking and Letter of Authorization Drilling Activity
Please include any assumptions	
PROJECT CONTACT	Stephanie Wilson, Director of Permitting, Offshore Avangrid Renewables

STEP 2: WEIGHTING FACTOR ADJUSTMENT

		Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value.
Weighting Factor Adjustment (kHz)¥	2.5	Default Value

¥ Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 47), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

STEP 3: SOURCE-SPECIFIC INFORMATION

Source Level (L_{rms})	183.3
Duration of Sound Production (hours) within 24-h period	24
Duration of Sound Production (seconds)	86400
10 Log (duration of sound production)	49.37
Propagation loss coefficient	15

NOTE: The User Spreadsheet tool provides a means to estimates distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS

Hearing Group	**Low-Frequency Cetaceans**	**Mid-Frequency Cetaceans**	**High-Frequency Cetaceans**	**Phocid Pinnipeds**	**Otariid Pinnipeds**
SEL_{cum} Threshold	199	198	173	201	219
PTS Isopleth to threshold (meters)	**174.3**	**15.4**	**257.7**	**105.9**	**7.4**

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	**Low-Frequency Cetaceans**	**Mid-Frequency Cetaceans**	**High-Frequency Cetaceans**	**Phocid Pinnipeds**	**Otariid Pinnipeds**
a	1	1.6	1.8	1	2
b	2	2	2	2	2
f_1	0.2	8.8	12	1.9	0.94
f_2	19	110	140	30	25
C	0.13	1.2	1.36	0.75	0.64
Adjustment (-dB)†	**-0.05**	**-16.83**	**-23.50**	**-1.29**	**-0.60**

NOTE: If user decided to override these Adjustment values, they need to make sure to download another copy to ensure the built-in calculations function properly.

$$W(f) = C + 10\log_{10}\left\{\frac{(f/f_1)^{2a}}{[1+(f/f_1)^2]^a\,[1+(f/f_2)^2]^b}\right\}$$

Appendix C. NMFS Online User Spreadsheet Tool, Vibratory Setting Activity

A.1: Vibratory Pile Driving (STATIONARY SOURCE: Non-Impulsive, Continuous)

VERSION 2.2: 2020

KEY

	Action Proponent Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isopleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	New England Wind Offshore Wind Farm
PROJECT/SOURCE INFORMATION	New England Wind Offshore Wind Farm, Updates to the Application for Marine Mammal Protection Act (MMPA) Rulemaking and Letter of Authorization Vibratory Pile Setting Activity
Please include any assumptions	
PROJECT CONTACT	Stephanie Wilson, Director of Permitting, Offshore Avangrid Renewables

STEP 2: WEIGHTING FACTOR ADJUSTMENT

		Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value
Weighting Factor Adjustment (kHz)¥	2.5	Default Value

¥ Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 48), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

STEP 3: SOURCE-SPECIFIC INFORMATION

Sound Pressure Level (L_{rms}), specified at "x" meters (Cell B30)	188
Number of piles within 24-h period	2
Duration to drive a single pile (minutes)	30
Duration of Sound Production within 24-h period (seconds)	3600
10 Log (duration of sound production)	35.56
Transmission loss coefficient	15
Distance of sound pressure level (L_{rms}) measurement (meters)	10

NOTE: The User Spreadsheet tool provides a means to estimates distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	199	198	173	201	219
PTS isopleth to threshold (meters)	**430.9**	**38.2**	**637.1**	**261.9**	**18.4**

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
a	1	1.6	1.8	1	2
b	2	2	2	2	2
f_1	0.2	8.8	12	1.9	0.94
f_2	19	110	140	30	25
C	0.13	1.2	1.36	0.75	0.64
Adjustment (-dB)†	**-0.05**	**-16.83**	**-23.50**	**-1.29**	**-0.60**

NOTE: If user decided to override these Adjustment values, they need to make sure to download another copy to ensure the built-in calculations function properly.

$$W(f) = C + 10\log_{10}\left\{\frac{(f/f_1)^{2a}}{[1+(f/f_1)^2]^a[1+(f/f_2)^2]^b}\right\}$$