AECOM

APPENDIX L

UNDERWATER ACOUSTIC ASSESSMENT

Photo credit: Matt Goldsmith, Equinor

January 2024

Prepared for

Beacon Wind LLC

Beacon Wind

Acoustic and Exposure Modeling

JASCO Applied Sciences (USA) Inc.

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Executive Summary

Beacon Wind, LLC has submitted a Construction and Operations Plan to support the construction, operation, and decommissioning of the Beacon Wind Offshore Wind Farm (the Project). The Project is being proposed within the Bureau of Ocean Energy Management Renewable (BOEM) Energy Lease Area OCS-A 0520, an area of approximately 128,000 acres located 97 kilometers (km) east of Montauk Point and 32 km south of Nantucket. The Project will generate approximately 1,230 MW of offshore wind renewable energy with an export cable route to Astoria, New York and Waterford, Connecticut.

Beacon Wind proposes to develop the entire Lease Area with up to two individual wind farms, BW1 and BW2, consisting of 155 wind turbine generators (WTGs), up to 2 Offshore Substations (OSS), 2 submarine export cables, and interarray and substation interconnection cables. The WTGs within the Project Lease Area development will be supported by either tapered monopile foundations or piled or suction bucket jacket foundations. The OSS will be supported by piled jacket foundations. The tapered monopiles (monopiles) are up to 13 m diameter at the waterline. The WTG jacket foundation uses 4.5 m diameter pin piles. The OSS jacket foundation uses 3 m diameter pin piles. Hammering of the 13 m monopile, and the 4.5 and 3 m pin piles were selected for quantitative analysis as their installation represents the primary underwater noise of activities within the Project Design Envelope (PDE).

One submarine export cable route connects BW1 to Queens, New York, and another connects BW2 to either Queens, New York or to Waterford, Connecticut. Two shore entrance locations are under consideration in Queens, New York (New York Power Authority [NYPA] and Astoria Gateway for Renewable Energy [AGRE], which includes AGRE East and AGRE West) for the single proposed BW1 landfall and onshore substation facility. The Queens, New York onshore substation facility sites that are not used (NYPA, AGRE East, or AGRE West) for BW1 will remain under consideration for BW2, in addition to the Waterford, Connecticut site, for the single proposed BW2 onshore substation facility.

JASCO Applied Sciences (JASCO) conducted an underwater acoustic modeling assessment of the marine fauna effects zones for sounds produced by Beacon Wind's WTG and OSS pile driving activities. The goals of the assessment are to predict appropriate monitoring distances and exposure estimates based on defined acoustic thresholds representing potential injury and significant behavioral effects. The thresholds are defined for marine mammals, sea turtles, and fish. Sound generated during impact and vibratory pile driving for the installation of monopile and jacket foundations was predicted using specialized pile driving source models and underwater acoustic propagation models. For both impulsive sounds (impact pile driving) and non-impulsive sounds (vibratory pile driving), time-domain representations of the pressure waves generated in the water are required for calculating SPL and peak pressure level, which are then used to evaluate potential effects to marine animals. JASCO's animal movement modeling software, JASMINE, was used to integrate the computed sound fields with species-typical movement (e.g., dive patterns) to estimate the distributions of sound levels received by marine mammals and sea turtles that may occur near the construction area.

The potential acoustic exposure (exposure estimates) for marine species was estimated by finding the accumulated sound energy (SEL) and maximum SPL and PK pressure level that each simulated animal (i.e., animat) received over the course of the simulation. Exposure criteria are based on relevant regulatory-defined thresholds (Stadler and Woodbury 2009, GARFO 2020), best available science for fish and sea turtles (Popper et al. 2014), and available relevant scientific understanding for marine mammal behavioral thresholds (Wood et al. 2012). The projected number of animals exposed to sound levels above threshold values was determined by scaling the number of animats exposed to a criterion in the model to reflect local populations using the 2022 Duke University Habitat-based Cetacean Density Model estimates for each species.

Using the time history of the received levels, exposure ranges accounting for 95% of exposures above regulatory-defined injury and behavioral disruption thresholds (NMFS 2018, McCauley et al. 2000b, Finneran et al. 2017) were calculated. Fish were considered static receivers, so the acoustic distance to their regulatory thresholds (FHWG Andersson et al. 2007, Wysocki et al. 2007, 2008, Stadler and Woodbury 2009, Mueller-Blenkle et al. 2010, Purser and Radford 2011) were calculated. Exposure ranges for marine mammals and sea turtles, and acoustic ranges for fish are reported for four levels (0, 6, 10, and 15 dB) of broadband attenuation that could be obtained from the use of mitigation systems such as bubble curtains.

The use of specialized source and acoustic propagation models, combined with agent-based animal exposure models is presently considered the best approach for assessing exposures and effects zones for marine mammals, sea turtles, and fish from anticipated foundation pile driving activities. The approach inherently allows for assessing the cumulative effects of multiple activities performed simultaneously and at different times, and accounts for changing marine mammal densities through the year. It was applied here to several possible installation scenarios.

Acronyms and Abbreviations

BOEM	Bureau of Ocean Energy Management
CalTrans	California Department of Transportation
dB	decibels
DPS	Distinct Population Segment
EEZ	Exclusive Economic Zone
$ER_{95\%}$	95% exposure ranges
ESA	Endangered Species Act
ft	feet
FWRAM	Full Wave Range Dependent Acoustic Model
GARFO	Greater Atlantic Regional Fisheries Office
h	hour
HF	high frequency (cetacean hearing group)
HSD	Hydro Sound Damper
Hz	Hertz
IAC	Inter-Array Cables
in	inch
JASMINE	JASCO Animal Simulation Model Including Noise Exposure
kg	kilogram
kHz	kilohertz
kJ	kilojoule
km	kilometer
LF	low frequency (cetacean hearing group)
m	meter
m/s	meters per second
MF	mid-frequency (cetacean hearing group)
mi	mile
µPa	micro-Pascal
MMPA	Marine Mammal Protection Act
NARW	North Atlantic right whale
NAS	noise abatement system
NMFS	National Marine Fisheries Service (also known as NOAA Fisheries)
NMS	Noise Mitigation System
NOAA	National Oceanic and Atmospheric Administration
NY	New York
OCS	Outer Continental Shelf
OSS	Offshore Substation
PDE	Project Design Envelope
PDSM	Pile Driving Source Model
PK	zero-to-peak sound pressure
PPA	phocid (pinniped) in air (hearing group)
PPW	phocid (pinniped) in water (hearing group)
Project	Beacon Wind Offshore Wind Farm Project
PTS	permanent threshold shift
PW	phocid (seal) in water (hearing group)
rms	root mean square
SEL	sound exposure level
SEL_{cum}	cumulative sound exposure level
SPL	sound pressure level
TTS	temporary threshold shift
WTG	wind turbine generator

1. Introduction

1.1. Project Background and Overview of Assessed Activity

Beacon Wind LLC (Beacon Wind), a 50/50 joint venture between Equinor and BP, proposes to construct, own, and operate the Beacon Wind Project (the Project). The wind farm portion of the Project will be located on the Outer Continental Shelf (OCS) in the designated Bureau of Ocean Energy Management (BOEM) Renewable Energy Lease Area OCS-A 0520 (Lease Area). The wind turbine generators (WTGs), offshore substations (OSSs), and interarray cables (IACs) will be located in the Lease Area in Federal waters approximately 97 kilometers (km) east of Montauk Point and 32 km south of Nantucket. The WTGs, OSSs, IACs, and Export Cables (ECs) are collectively referred to as the Beacon Wind Project or the Project.

Underwater noise may be generated by several activities associated with the Project. Impacts of sound on marine fauna for most of these anthropogenic sound sources are expected to be low or very low. The primary sound sources that could be expected to have greater effects are impact (impulsive) and vibratory (non-impulsive, continuous sound) pile driving during foundation installation for the WTGs and OSS foundations. A quantitative assessment of pile driving activities is undertaken here as the primary source of noise associated with the Project.

For the quantitative acoustic analysis, the potential underwater acoustic impacts resulting from the installation of tapered monopile foundations and jacket foundations were modeled. The tapered monopiles are up to 13 m (43 feet (ft)) in diameter at the expected waterline. The WTG jacket foundation would use piles up to 4.5 m (15 feet (ft)) in diameter, while the OSS jacket foundation would use piles up to 3 m (10 feet (ft)). This underwater noise assessment considers the currently available information; the precise locations, noise sources, and schedule of the construction and operation scenarios is subject to change as the engineering design progresses.

The two primary sources of underwater sound are expected to occur during installation of monopile and jacket pile foundations in the Lease Area from impact pile driving and vibratory pile setting followed by impact pile driving. The methodology for modeling the acoustic field and estimating marine fauna exposures from these primary sources of sound is presented in Section 2, with the results presented in Section 4, and Appendix G and Appendix H. Secondary sources of underwater sound may occur during installation and are modeled using source-specific methodology.

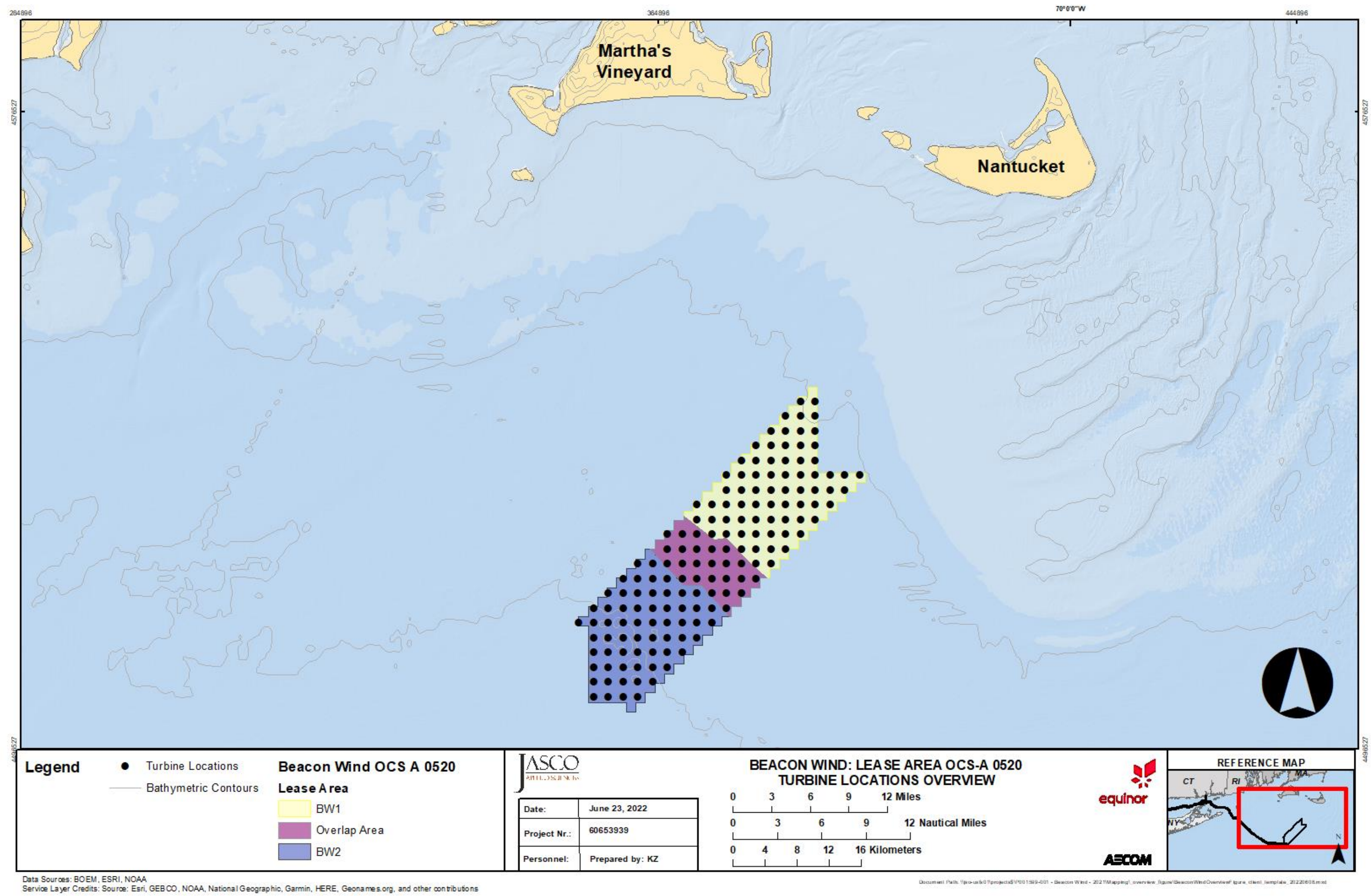

Figure 1. Location of the Beacon Wind Farm Project in relation to Martha's Vineyard and Nantucket, Massachusetts.

1.2. Modeling Scope and Assumptions

The objectives of this modeling study were to predict the acoustic ranges to regulatory-defined acoustic thresholds associated with injury and behavioral disturbance for various marine fauna, including fish, marine mammals, and sea turtles that may occur near the Project during pile driving in the construction stage of the Project. JASCO also used the results of animal movement and exposure modeling to estimate potential exposure ranges ($ER_{95\%}$) and exposure numbers for marine mammals and sea turtles.

There are several potential anthropogenic sound sources associated with the Project; however, the primary sound source is impact (impulsive) and vibratory (non-impulsive, continuous) pile driving during foundation installation in the construction stage.

Foundations may be entirely installed using only impact pile driving. Alternatively, a vibratory hammer could be used to install the monopile through surficial sediments in a controlled fashion to avoid the potential for a “pile run,” where the pile could drop quickly through the looser surficial sediments and destabilize the installation vessel. Once the pile has penetrated the surficial sediments with the vibratory hammer, an impact hammer would be used for the remainder of the installation. There is no foundation installation scenario that would entail only vibratory driving. The extent to which a vibratory hammer may be needed has been assumed for this modeling exercise and will continue to be refined as additional site-specific data are available to refine the foundation drivability analyses. The modeled scenarios represent the various potential maximum impact scenarios for pile driving, in terms of potential soil conditions, water depths, foundation diameters, hammer energy levels and number of hammer strikes.

1.2.1. Foundations

A monopile is a hollow steel cylinder that supports wind turbines in offshore wind farms. Monopiles are installed by pile driving the steel cylinders into the seabed. The modeled 13 m monopile represents the maximum potential foundation diameter in the Project Design Envelope (PDE). A jacket foundation, used for OSS or WTG, consists of a large lattice structure supported/secured by up to four pin piles for WTG jacket foundations and up to twenty-four pin piles for OSS jacket foundations. Up to four pin piles are expected to be installed per day for WTG jacket foundations. The pin piles to secure the WTG jacket structure for the Project are maximum 4.5 m diameter straight piles. For the OSS jacket foundations, pin piles are, at maximum, 3 m in diameter, and it is expected that up to 8 pin piles will be installed per day.

WTG jacket foundations are pre-piled, and OSS jacket foundations are post-piled. Pre-piling means that the jacket structure will be set on pre-installed piles. Post-piling means that the jacket structure is placed on the seafloor and piles are subsequently driven through guides at the base of each leg. These jacket foundations will also radiate sound as the piles are driven. To account for the larger radiating area including the jacket structure, the broadband sound level estimated for the jacket piles was increased by 2 dB for post-piling scenarios (Bellmann et al. 2020).

The sound generated during pile driving varies according to the type of pile driving methodology (i.e., impact or vibratory). For instance, the amount of impact hammer energy, time of vibration required to drive piles to a desired depth, and the sediment resistance encountered will affect the amount of sound produced during pile driving activities. Sediment types with greater resistance require hammers that deliver higher energy strikes and/or an increased number of strikes relative to installations in softer sediment. Vibratory pile driving is usually assumed to be used prior to impact driving for pile placement, and increasing times of vibration corresponds to increasing depths of pile penetration. Maximum sound levels usually occur during the last stage of impact pile driving where the greatest resistance is encountered (Betke 2008). To characterize the sound fields from the 3 m OSS pin piles, the 4.5 m WTG pin piles, and the 13 m WTG monopiles, the two proposed OSS locations (BB39 and BK31) and two additional representative WTG locations (AY42 and BM28) were used in the acoustic modeling. These locations are depicted in Figure 2, and their coordinates are listed in Table 1. The WTG modeling locations were selected as they represent the cutoffs for the 10th and 90th percentile water depths (i.e., 90% of depths are deeper than 42.9 m, and 90% of depths are shallower than 60.8 m). All pin piles and monopiles were assumed to be vertical for modeling purposes.

Vibratory hammering of OSS pin piles will not occur, therefore OSS pin piles were assumed to be driven by impact hammering only to a maximum expected penetration depth of 100 m (328.1 ft) at location BB39 (referred as OSS1) and 36 m (118.1 ft) at location BK31 (referred as OSS2) (Table 1). Two modalities were considered for the installation of WTG piles consisting of 1) impact hammering only (see Section 1.2.1.1 for impact modeling scenarios) and 2) vibratory followed by impact pile driving (see Section 1.2.1.2 for vibratory plus impact modeling scenarios). WTG pin piles were assumed to be driven to a maximum expected penetration depth of 70 m (246.1 ft), while WTG monopiles were assumed to be driven to maximum depths of 45 m (147.6 ft) and 55 m (180.5 ft). For the vibratory pile driving scenarios, 30- and 60-minute piling times were considered and consisted of pile penetration depths of approximately 10 and 20 m, respectively. Table 2 lists the characteristics of the different piles and other key assumptions considered in the acoustic modeling effort. Table 2 also lists the number of piles per day considered for animat modeling needed to determine the most conservative construction schedules. For example, WTG monopiles were modeled using one and two pile(s) per day installation schedules, but one pile per day was carried forward for exposure calculations. Additionally, 4 and 8 pin piles per day were modeled for OSS2, but only 4 pin piles per day scenarios were considered in exposure calculations. Additional modeling details and input parameters are shown in Appendix B.

The representative make and model of the impact hammers proposed for OSS foundations (MHU 3000S and MHU 1700S) and for WTG foundations (IHC S-5500 and IHC S-2300) and the representative hammering schedules used in the acoustic modeling effort were provided by Beacon Wind. The number of strikes at each of the hammer energy levels needed to drive the 3 m OSS pin piles, the 4.5 m WTG pin piles, and the 13 m WTG monopiles are listed in Section 1.2.1.1. The representative make and model of the vibratory hammers proposed for the WTG pin piles (TA-CV320) and WTG monopiles (QU-CV640) and the respective hammering schedules considering both vibratory and impact pile driving and used in the acoustic modeling effort were also provided by Beacon Wind. The hammer vibration duration followed by the number of strikes at each energy level needed to install the 4.5 m WTG pin piles and the 13 m WTG monopiles are listed in Section 1.2.1.2.

Table 1. Acoustic modeling locations and water depth for the OSS jacket foundations and the WTG jacket and monopile foundations.

Foundation type	Modeling location	Latitude	Longitude	Depth (m)
OSS1	BB39	40.8871° N	70.4364° W	48.75
OSS2	BK31	40.7514° N	70.6089° W	58.5
WTG	AY42	40.9380° N	70.3715° W	42.9
WTG	BM28	40.7171° N	70.6739° W	60.8

Table 2. Summary of pile properties and piling assumptions used in underwater acoustic modeling for vibratory and impact pile driving. Detailed modeling scenarios are listed in Sections 1.2.1.1 and 1.2.1.2.

Foundation type	Modeled vibratory hammer duration (min) [a]	Modeled maximum impact hammer energy (kJ)	Pile length (m)	Pile diameter (m)	Pile wall thickness (mm)	Seabed penetration (m)	Number of piles per day (acoustics)	Number of piles per day (animat modeling)
OSS1 jacket	NA	2850	118	3	85	100	8	4
OSS2 jacket	NA	1530	54	3	85	36	8	4, 8
WTG jacket	30 & 60	2200	75	4.5	53–70	70	4	4
WTG monopile 1 (MP1)	30 & 60	5225	106.3	13	100–120	45	1	1, 2
WTG monopile 2 (MP2)	30 & 60	5225	94.4	13	100–120	45	1	1, 2
WTG monopile 3 (MP3)	30 & 60	6208	104.4	13	100–120	55	1	1, 2

[a] 30-minute vibratory hammer duration is more conservative for exposure calculations, because it replaces less impact driving, but both 30- and 60-minute durations are modeled.

1.2.1.1. Impact Pile Driving

This section presents the impact pile driving scenarios considered in the acoustic modeling for each of the piles summarized in Table 2. Tables 3 and 4 present the scenarios modeled for the installation of OSS foundations and Tables 5–8 present the scenarios modeled for the installation of WTG foundations.

Table 3. Hammer energy schedule and number of strikes for 3 m pin piles for OSS1 jacket foundation with a 3000 kJ hammer.

Energy level (kJ)	Strike rate (strikes/min)	Strike count	Pile penetration depth (m)
0[a]	0	0	5
450	40	1,055	10
750	40	1,345	10
1,200	40	2,482	19
1,950	40	3,768	26
2,400	40	1,433	10
2,700	40	1,695	10
2,850	40	2,192	10
Total	**NA**	**13,970**	**100**

[a] The total penetration depth assumes a 5 m pile self-penetration.

Table 4. Hammer energy schedule and number of strikes for 3 m pin piles for OSS2 jacket foundation with a 1700 kJ hammer.

Energy level (kJ)	Strike rate (strikes/min)	Strike count	Pile penetration depth (m)
680	45	829	10
1,360	38	608	7
680	45	388	4
1,360	38	572	6
1,530	32	926	9
Total	**NA**	**3,323**	**36**

Table 5. Hammer energy schedule and number of strikes for 4.5 m pin piles for the WTG jacket foundation with a 2300 kJ hammer.

Energy level (kJ)	Strike rate (strikes/min)	Strike count	Pile penetration depth (m)
0[a]	0	0	10
250	45	614	5
450	45	1,363	9
685	38	1,725	13
1,500	38	1,844	10
2,000	38	2,526	14
2,200	38	3,593	9
Total	**NA**	**11,665**	**70**

[a] The total penetration depth assumes a 10 m pile self-penetration.

Table 6. Hammer energy schedule and number of strikes for 13 m WTG monopile (MP1) with a 5500 kJ [a] hammer.

Energy level (kJ)	Strike rate (strikes/min)	Strike count	Pile penetration depth (m)
0[b]	0	0	11
1,650	45	1,941	13
2,750	40	1,449	13
4,750	30	551	3
5,225	30	1,077	5
Total	**NA**	**5,018**	**45**

[a] Maximum hammer energy does not exceed 5,225 kJ.
[b] The total penetration depth assumes an 11 m pile self-penetration.

Table 7. Hammer energy schedule and number of strikes for 13 m WTG monopile (MP2) with a 5500 kJ [a] hammer.

Energy level (kJ)	Strike rate (strikes/min)	Strike count	Pile penetration depth (m)
0[b]	0	0	6
550	45	184	4
1,100	45	1,151	9
2,750	40	1,374	11
3,850	33	850	5
5,225	30	2,109	10
Total	**NA**	**5,668**	**45**

[a] Maximum hammer energy does not exceed 5,225 kJ.
[b] The total penetration depth assumes an 11 m pile self-penetration.

Table 8. Hammer energy schedule and number of strikes for 13 m WTG monopile (MP3) with a 5500 kJ hammer extrapolated to 6500 kJ [a]. The total penetration depth assumes a 8 m pile self-penetration.

Energy level (kJ)	Strike rate (strikes/min)	Strike count	Pile penetration depth (m)
0[b]	0	0	8
654	45	103	2
1,307	45	941	9
2,614	40	1,222	10
3,921	33	1,008	6
6,208	30	5,433	20
Total	NA	**8,707**	**55**

[a] Maximum hammer energy does not exceed 6,208 kJ.
[b] The total penetration depth assumes an 8 m pile self-penetration.

1.2.1.2. Vibratory Pile Driving

Tables 9–16 in this section presents the scenarios considered in the acoustic modeling for the installation of WTG foundations with vibratory pile setting followed by impact pile driving. WTG pile properties are summarized in Table 2.

Table 9. Installation schedule for a 4.5 m pin pile for the WTG jacket foundation using 30 min of vibratory pile setting (TA-CV320 model hammer) followed by impact hammering (2300 kJ hammer).

Hammer type	Pile penetration depth (m)	Time vibratory piling (min)	Hammer energy (kJ)	Strike count
Self-penetration	10[a]	-	-	-
Vibratory	14	30	-	-
Impact	13	-	685	1,725
Impact	10	-	1,500	1,844
Impact	14	-	2,000	2,526
Impact	9	-	2,200	3,593
Total	**70**	**30**	**-**	**9,688**

[a] The total penetration depth assumes a 10 m pile self-penetration.

Table 10. Installation schedule for a 4.5 m pin pile for the WTG jacket foundation using 60 min of vibratory pile setting (TA-CV320 model hammer) followed by impact hammering (2300 kJ hammer).

Hammer type	Pile penetration depth (m)	Time vibratory piling (min)	Hammer energy (kJ)	Strike count
Self-penetration	10[a]	-	-	-
Vibratory	27	60	-	-
Impact	10	-	1,500	1,844
Impact	14	-	2,000	2,526
Impact	9	-	2,200	3,593
Total	**70**	**60**	**-**	**7,963**

[a] The total penetration depth assumes a 10 m pile self-penetration.

Table 11. Installation schedule for a 13 m WTG monopile (MP1) using 30 min of vibratory pile setting (QU-CV640 model hammer) followed by impact hammering (5500 kJ [a] hammer).

Hammer type	Pile penetration depth (m)	Time vibratory piling (min)	Hammer energy (kJ)	Strike count
Self-penetration	11[b]	-	-	-
Vibratory	13	30	-	-
Impact	13	-	2,750	1,449
Impact	3	-	4,750	551
Impact	5	-	5,225	1,077
Total	**45**	**30**	**-**	**3,077**

[a] Maximum hammer energy does not exceed 5,225 kJ.
[b] The total penetration depth assumes an 11 m pile self-penetration.

Table 12. Installation schedule for a 13 m WTG monopile (MP1) using 60 min of vibratory pile setting (QU-CV640 model hammer) followed by impact hammering (5500 kJ [a] hammer).

Hammer type	Pile penetration depth (m)	Time vibratory piling (min)	Hammer energy (kJ)	Strike count
Self-penetration	11[b]	-	-	-
Vibratory	26	60	-	-
Impact	3	-	4,750	551
Impact	5	-	5,225	1,077
Total	**45**	**60**	**-**	**1,628**

[a] Maximum hammer energy does not exceed 5,225 kJ.
[b] The total penetration depth assumes an 11 m pile self-penetration.

Table 13. Installation schedule for a 13 m WTG monopile (MP2) using 30 min of vibratory pile setting (QU-CV640 model hammer) followed by impact hammering (5500 kJ [a] hammer).

Hammer type	Pile penetration depth (m)	Time vibratory piling (min)	Hammer energy (kJ)	Strike count
Self-penetration	6[b]	-	-	-
Vibratory	13	30	-	-
Impact	11	-	2,750	1,374
Impact	5	-	3,850	850
Impact	10	-	5,225	2,109
Total	**45**	**30**	**-**	**4,333**

[a] Maximum hammer energy does not exceed 5,225 kJ.
[b] The total penetration depth assumes a 6 m pile self-penetration.

Table 14. Installation schedule for a 13 m WTG monopile (MP2) using 60 min of vibratory pile setting (QU-CV640 model hammer) followed by impact hammering (5500 kJ [a] hammer).

Hammer type	Pile penetration depth (m)	Time vibratory piling (min)	Hammer energy (kJ)	Strike count
Self-penetration	6[b]	-	-	-
Vibratory	24	60	-	-
Impact	5	-	3,850	850
Impact	10	-	5,225	2,109
Total	**45**	**60**	**-**	**2,959**

[a] Maximum hammer energy does not exceed 5,225 kJ.
[b] The total penetration depth assumes a 6 m pile self-penetration.

Table 15. Installation schedule for a 13 m WTG monopile (MP3) using 30 min of vibratory pile setting (QU-CV640 model hammer) followed by impact hammering (5500 kJ extrapolated to 6500 kJ [a] hammer).

Hammer type	Pile penetration depth (m)	Time vibratory piling (min)	Hammer energy (kJ)	Strike count
Self-penetration	8[b]	-	-	-
Vibratory	11	30	-	-
Impact	10	-	2,614	1,222
Impact	6	-	3,921	1,008
Impact	20	-	6,208	5,433
Total	**55**	**30**	**-**	**7,663**

[a] Maximum hammer energy does not exceed 6,208 kJ.
[b] The total penetration depth assumes an 8 m pile self-penetration.

Table 16. Installation schedule for a 13 m WTG monopile (MP3) using 60 min of vibratory pile setting (QU-CV640 model hammer) followed by impact hammering (5500 kJ extrapolated to 6500 kJ [a] hammer).

Hammer type	Pile penetration depth (m)	Time vibratory piling (min)	Hammer energy (kJ)	Strike count
Self-penetration	8[b]	-	-	-
Vibratory	21	60	-	-
Impact	6	-	3,921	1,008
Impact	20	-	6,208	5,433
Total	**55**	**60**	**-**	**6,441**

[a] Maximum hammer energy does not exceed 5,225 kJ.
[b] The total penetration depth assumes an 8 m pile self-penetration.

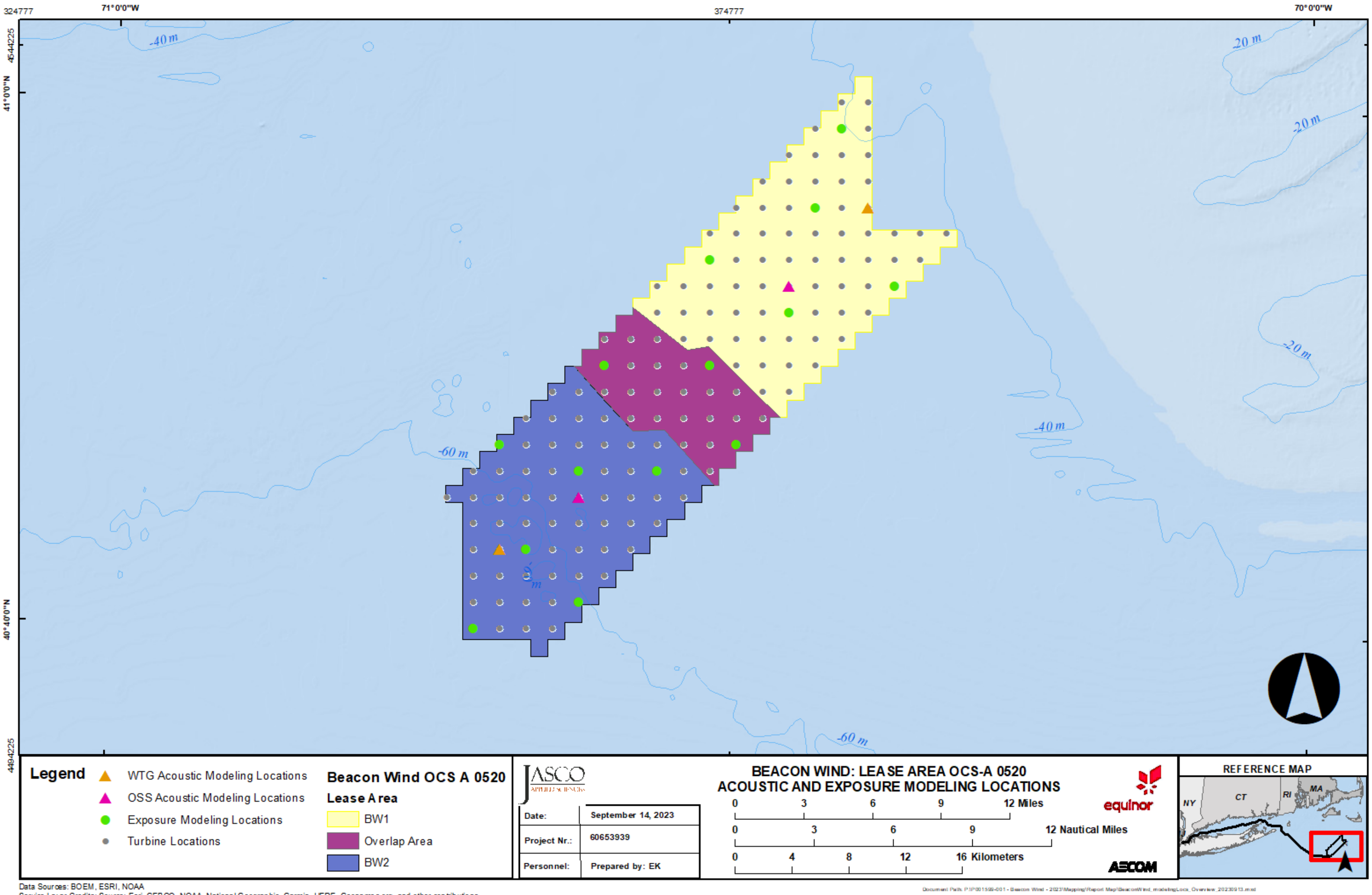

Figure 2. Beacon Wind turbine locations with acoustic propagation and exposure modeling locations.

1.2.2. Modeling Scenario and Pile Construction Schedules

Construction schedules are difficult to predict because of factors such as weather and installation variation related to drivability. Because it is hard to anticipate the construction schedule, a conservative approach was used to generate four potential installation schedules for animal exposure calculation.

The schedules described below combine two methods: the “maximum density” and the “month-specific” approach. The maximum density approach seeks to maximize the overall exposures by assuming that piling occurs in the highest density months from May through December, inclusive (e.g. highest, second, third, etc.). The month-specific approach allows for specific pile types to be installed in specific months. In some cases, the highest density months may fall on months where month-specific piling effort is already scheduled (e.g., May, June, July, or August). This overlap is taken into account and the schedules are adjusted to ensure that the number of piling days does not exceed 30 in any month.

Since each species differs in terms of presence throughout the year, the maximum schedule for each species differs. However, computing this maximum ensures that any other schedule that may occur during construction will result in lower exposures than what is predicted for the maximum case. The only foundations excluded from the maximum density approach are the OSS1 and OSS2 foundations. The 12 OSS1 pin piles are scheduled to be installed over 3 days in May, while the 24 OSS2 pin piles are spread evenly over June, July, and August. Additionally, WTG jacket foundations and all vibratory + impact pile driving scenarios follow the maximum density approach but are restricted to the months of June, July, and August. For the purposes of maximizing exposures, the 60-minute vibratory and the WTG1 monopile scenarios are excluded from the construction schedules.

Up to 90 WTG foundations may be installed in the first year and 65 WTG foundations in the second year. Exposures for WTGs are calculated assuming one monopile per day or four pin piles per day. While two monopiles per day and eight OSS2 pin piles were modeled, the one-per-day and four-per-day cases were determined to be more conservative and were therefore used to represent the maximum impact scenario.

OSS installation may occur in year 1 or year 2 of construction, however, both OSS foundations were conservatively assumed to be installed in year 1. Similarly, vibratory piling installation may occur in year 1 or year 2 of construction but was conservatively assumed to occur in year 1 for the purpose of maximizing potential exposure estimates.

For both the maximum density approach and the month-specific approach, each month may include a maximum of 30 days of piling of any type of foundation, except for May and December, which are restricted to 24 and 15 days of piling, respectively.

Each of the four construction schedules outlined in Tables 17–24 presents the number of days of piling per month for each pile diameter (3 m pin piles, 4.5 m pin piles, and 13 m monopiles) during the anticipated 2-year construction period. Year 1 tables for all four schedules include three columns describing the maximum density portion of the schedule and four additional columns describing the month-specific portion of the schedule. Note that while only the three highest density months are included, additional months may be required in cases where there is overlap with the month-specific schedules. Year 2 tables only include maximum density schedules.

The four proposed schedules are as follows:

- Construction Schedule A (Tables 17 and 18): 100% monopile foundations installed using impact pile driving only;
- Construction Schedule B (Tables 19 and 20): 80% monopile foundations, 20% WTG jacket foundations, with all foundations installed using impact pile driving only;
- Construction Schedule C (Tables 21 and 22): 100% monopile foundations with 10 vibratory + impact installations in the first year; and
- Construction Schedule D (Tables 23 and 24): 80% monopile foundations (10 vibratory + impact installations in the first year) and 20% WTG jacket foundations.

Table 17. Construction Schedule A, year 1 (all monopiles and impact only): The number of potential days of pile installation per month for each foundation type, used to estimate the total number of marine mammal and sea turtle acoustic exposures above threshold criteria. Values with column headers 'Highest', 'Second', and 'Third' use the maximum monthly density approach, while values with column headers 'May', 'June', 'July', and 'August' use the month-specific approach.

Foundation type	Highest [a]	Second [a]	Third [a]	May	June	July	August
WTG MP2	12	30	30	-	-	-	-
WTG MP3	18	0	0	-	-	-	-
OSS1	-	-	-	3	0	0	0
OSS2	-	-	-	0	2	2	2
Total # of piles	**30**	**30**	**30**	**12**	**8**	**8**	**8**
Total # of days	**30**	**30**	**30**	**3**	**2**	**2**	**2**

[a] If the highest, second, or third highest density month occurs in May or December, the maximum allowed days of piling will be reduced to 24 and 15, respectively. Pile order remains the same but gets allocated to the next highest density months.

Table 18. Construction Schedule A, year 2 (all monopiles and impact only): The number of potential days of pile installation per month for each foundation type, to estimate the total number of marine mammal and sea turtle acoustic exposures above threshold criteria. Values with column headers 'Highest', 'Second', and 'Third' use the maximum monthly density approach, while values with column headers 'May', 'June', 'July', and 'August' use the month-specific approach.

Foundation type	Highest [a]	Second [a]	Third [a]
WTG MP2	17	30	5
WTG MP3	13	0	0
Total # of piles	**30**	**30**	**5**
Total # of days	**30**	**30**	**5**

[a] If the highest, second, or third highest density month occurs in May or December, the maximum allowed days of piling will be reduced to 24 and 15, respectively. Pile order remains the same but gets allocated to the next highest density months.

Table 19. Construction Schedule B, year 1 (monopiles/ WTG jacket and impact only): The number of potential days of pile installation per month for each foundation type, used to estimate the total number of marine mammal and sea turtle acoustic exposures above threshold criteria. Values with column headers 'Highest', 'Second', and 'Third' use the maximum monthly density approach, while values with column headers 'May', 'June', 'July', and 'August' use the month-specific approach.

Foundation type	Highest [a]	Second [a]	Third [a]	May	June	July	August
WTG MP2	0	28	30	-	-	-	-
WTG MP3	12	2	0	-	-	-	-
WTG Jacket	18	0	0	-	Up to 18	Up to 18	Up to 18
OSS1	-	-	-	3	0	0	0
OSS2	-	-	-	0	2	2	2
Total # of piles	**84**	**30**	**30**	**12**	**Up to 80**	**Up to 80**	**Up to 80**
Total # of days	**30**	**30**	**30**	**3**	**Up to 20**	**Up to 20**	**Up to 20**

[a] If the highest, second, or third highest density month occurs in May or December, the maximum allowed days of piling will be reduced to 24 and 15, respectively. Pile order remains the same but gets allocated to the next highest density months.

Table 20. Construction Schedule B, year 2 (monopiles/WTG jacket and impact only) The number of potential days of pile installation per month for each foundation type, used to estimate the total number of marine mammal and sea turtle acoustic exposures above threshold criteria. Values with column headers 'Highest', 'Second', and 'Third' use the maximum monthly density approach, while values with column headers 'May', 'June', 'July', and 'August' use the month-specific approach.

Foundation type	Highest [a]	Second [a]	Third [a]	May	June	July	August
WTG MP2	7	30	5	-	-	-	-
WTG MP3	10	0	0	-	-	-	-
WTG Jacket	13	0	0	-	Up to 13	Up to 13	Up to 13
Total # of piles	**69**	**30**	**5**	**0**	**Up to 52**	**Up to 52**	**Up to 52**
Total # of days	**30**	**30**	**5**	**0**	**Up to 13**	**Up to 13**	**Up to 13**

[a] If the highest, second, or third highest density month occurs in May or December, the maximum allowed days of piling will be reduced to 24 and 15, respectively. Pile order remains the same but gets allocated to the next highest density months.

Table 21. Construction Schedule C, year 1 (all monopiles with 10 vibratory + impact installations in first year): The number of potential days of pile installation per month for each foundation type, by year and for the full buildout of Beacon Wind, used to estimate the total number of marine mammal and sea turtle acoustic exposures above threshold criteria. Values with column headers 'Highest', 'Second', and 'Third' use the maximum monthly density approach, while values with column headers 'May', 'June', 'July', and 'August' use the month-specific approach.

Foundation type	Highest [a]	Second [a]	Third [a]	May	June	July	August
WTG MP2—Impact only	4	30	30	-	-	-	-
WTG MP3—Impact only	16	0	0	-	-	-	-
WTG MP2—30 min vibe + impact	8	0	0	-	Up to 8	Up to 8	Up to 8
WTG MP3—30 min vibe + impact	2	0	0	-	Up to 2	Up to 2	Up to 2
OSS1	-	-	-	3	0	0	0
OSS2	-	-	-	0	2	2	2
Total # of piles	**30**	**30**	**30**	**12**	**Up to 18**	**Up to 18**	**Up to 18**
Tota # of days	**30**	**30**	**30**	**3**	**Up to 12**	**Up to 12**	**Up to 12**

[a] If the highest, second, or third highest density month occurs in May or December, the maximum allowed days of piling will be reduced to 24 and 15, respectively. Pile order remains the same but gets allocated to the next highest density months.

Table 22. Construction Schedule C, year 2 (all monopiles with 10 vibratory + impact installations in first year): The number of potential days of pile installation per month for each foundation type, by year and for the full buildout of Beacon Wind, used to estimate the total number of marine mammal and sea turtle acoustic exposures above threshold criteria. Values with column headers 'Highest', 'Second', and 'Third' use the maximum monthly density approach, while values with column headers 'May', 'June', 'July', and 'August' use the month-specific approach.

Foundation type	Highest [a]	Second [a]	Third [a]
WTG MP2—Impact only	17	30	5
WTG MP3—Impact only	13	0	0
Total # of piles	**30**	**30**	**5**
Total # of days	**30**	**30**	**5**

[a] If the highest, second, or third highest density month occurs in May or December, the maximum allowed days of piling will be reduced to 24 and 15, respectively. Pile order remains the same but gets allocated to the next highest density months.

Table 23. Construction Schedule D, year 1 (monopiles/ WTG jacket with 10 vibratory + impact monopile installations in first year): The number of potential days of pile installation per month for each foundation type, by year and for the full buildout of Beacon Wind, used to estimate the total number of marine mammal and sea turtle acoustic exposures above threshold criteria. Values with column headers 'Highest', 'Second', and 'Third' use the maximum monthly density approach, while values with column headers 'May', 'June', 'July', and 'August' use the month-specific approach.

Foundation type	Highest [a]	Second [a]	Third [a]	May	June	July	August
WTG MP2	0	20	30	-	-	-	-
WTG MP3	2	10	0	-	-	-	-
WTG MP2—30 min vibe + impact	8	0	0	-	Up to 8	Up to 8	Up to 8
WTG MP3—30 min vibe + impact	2	0	0	-	Up to 2	Up to 2	Up to 2
WTG Jacket	18	0	0	-	Up to 18	Up to 18	Up to 18
OSS1	-	-	-	3	-	-	-
OSS2	-	-	-	-	2	2	2
Total # of piles	**84**	**30**	**30**	**12**	**Up to 90**	**Up to 90**	**Up to 90**
Total # of days	**30**	**30**	**30**	**3**	**Up to 30**	**Up to 30**	**Up to 30**

[a] If the highest, second, or third highest density month occurs in May or December, the maximum allowed days of piling will be reduced to 24 and 15, respectively. Pile order remains the same but gets allocated to the next highest density months.

Table 24. Construction Schedule D, year 2 (monopiles/ WTG jacket with 10 vibratory + impact monopile installations in first year): The number of potential days of pile installation per month for each foundation type, by year and for the full buildout of Beacon Wind, used to estimate the total number of marine mammal and sea turtle acoustic exposures above threshold criteria. Values with column headers 'Highest', 'Second', and 'Third' use the maximum monthly density approach, while values with column headers 'May', 'June', 'July', and 'August' use the month-specific approach.

Foundation type	Highest [a]	Second [a]	Third [a]	May	June	July	August
WTG MP2	7	30	5	-	-	-	-
WTG MP3	10	0	0	-	-	-	-
WTG Jacket	13	0	0	-	Up to 13	Up to 13	Up to 13
Total # of piles	**69**	**30**	**5**	**0**	**Up to 52**	**Up to 52**	**Up to 52**
Total # of days	**30**	**30**	**5**	**0**	**Up to 13**	**Up to 13**	**Up to 13**

[a] If the highest, second, or third highest density month occurs in May or December, the maximum allowed days of piling will be reduced to 24 and 15, respectively. Pile order remains the same but gets allocated to the next highest density months.

2. Methods

The basic modeling approach is to characterize the sound produced by the source, determine how the sounds propagate within the surrounding water column, and then estimate species-specific exposure probability by combining the computed sound fields with animal movement in simulated representative scenarios.

For impact and vibratory pile driving sounds, time-domain representations of the pressure waves generated in the water are required for calculating SPL and PK, which are then used to evaluate potential impacts. The source signatures associated with installation of 3 m OSS pin piles, 4.5 m WTG pin piles, and 13 m WTG monopiles at each corresponding modeling location (Figure 2) are predicted using a finite-difference model that determines the physical vibration of the pile caused by the specific hammer used for each pile type and pile driving modality (impact and vibratory). The sound field radiating from the pile is simulated as a vertical array of point sources.

For this study, synthetic pressure waveforms were computed using a Full Waveform Range-dependent Acoustic Model (FWRAM), which is JASCO's acoustic propagation model capable of producing time-domain waveforms (Appendix F.2). The sound propagation modeling incorporated site-specific environmental data including bathymetry, sound speed in the water column, and seabed geoacoustics in the proposed construction area (Appendix F.1). Animal movement modeling integrated the estimated sound fields with species-typical behavioral parameters (e.g., dive patterns) in JASMINE to estimate received sound levels for the modeled animals (animats) that may occur in the construction area. Animats that exceed pre-defined acoustic thresholds/criteria (e.g., NMFS 2018) are identified, and the distance for the exceedances determined. The potential acoustic exposure for marine species was estimated by finding the accumulated sound energy (SEL) and maximum SPL and PK each animat received over the course of the simulation. The analysis to estimate the number of potential injurious and behavioral exposures is ongoing and will be provided in supplemental filings and permit applications.

2.1. Acoustic Environment

Beacon Wind is located in a continental shelf environment characterized by predominantly sandy seabed sediments, with some thin clay layering. Water depths in the Beacon Wind vary between approximately 39–62 m. From April to October, increased solar radiation warms the upper 25–50 m of the water column. A warmer surface layer results in a downward refracting propagation environment where propagated sound energy tends to interact with the seafloor more than in a well-mixed environment. In November, the temperature structure begins to change as solar radiation decreases and wind mixing increases near the surface. This trend intensifies and continues from December to March, resulting in a sound speed that is more uniform with depth. Average summer and winter sound speed profiles were used in the Project acoustic propagation modeling. See Appendix F for more details on the environmental parameters used in acoustic propagation and exposure modeling.

2.2. Modeling Acoustic Sources

2.2.1. Impact Pile Driving

Piles deform when driven with impact hammers, creating a bulge that travels down the pile and radiates sound into the surrounding air, water, and seabed. This sound may be received as a direct transmission from the sound source to biological receivers (such as marine mammals, sea turtles, and fish) through the water or as the result of reflected paths from the surface or re-radiated into the water from the seabed (Figure 3). Sound transmission depends on many environmental parameters, such as the sound speeds in water and substrates. It also depends on the sound production parameters of the pile and how it is driven, including the pile material, size (length, diameter, and thickness) and the make and energy of the hammer.

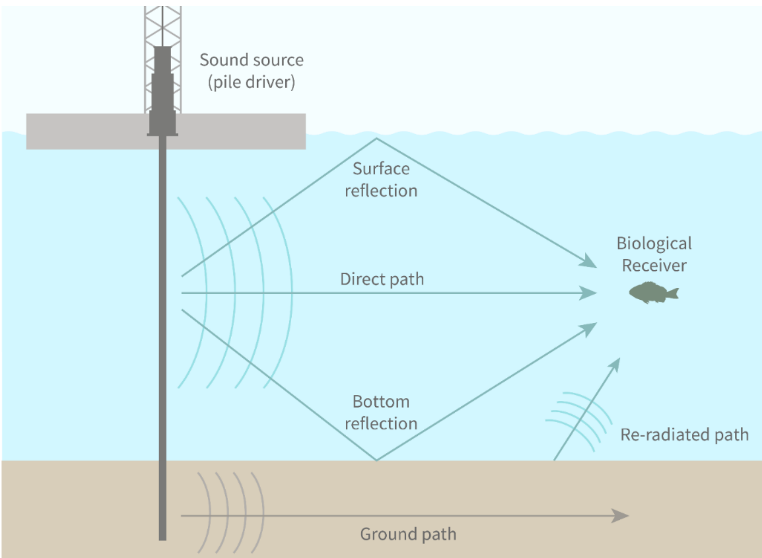

Figure 3. Sound propagation paths associated with pile driving (adapted from Buehler et al. 2015).

Forcing functions were computed for the 3 and 4.5 m pin piles, and 13 m monopile foundations using GRLWEAP 2010 (GRLWEAP, Pile Dynamics 2010). The model assumed direct contact between the representative hammers, helmets, and piles (i.e., no cushion material, providing a more conservative estimate). Forcing functions for the OSS pin piles (3 m) assumed hammers with maximum energies of 3000 and 1700 kJ. For the WTG pin pile, the maximum hammer energy assumed was 2300 kJ. The modeling of forcing functions for WTG monopiles assumed a hammer with maximum energy of 5500 kJ for which the maximum rated energy should not exceed 5225 kJ. The maximum hammer energy was scaled up to 6208 kJ for one of the scenarios by increasing the stroke height of the 5500 kJ hammer from 2.03 to 2.29 m. The forcing functions at the top of the pile are used as inputs to JASCO's Pile Driving Source Model to estimate equivalent acoustic source.

JASCO's Pile Driving Source Model (PDSM), a physical model of pile vibration and near-field sound radiation (MacGillivray 2014), was used to predict source signatures associated with impact pile driving activities. Piles are modeled assuming a vertical installation using a finite-difference structural model of pile vibration based on thin-shell theory. The sound radiating from the pile itself was simulated using a vertical array of discrete point sources. These models account for several parameters that describe the operation—pile type, material, size, and length—the pile driving equipment, and approximate pile penetration depth. See Appendix E for a more detailed description of PDSM.

2.2.2. Vibratory Pile Driving

During vibratory pile driving, piles are driven into the substrate due to longitudinal vibration motion at the hammer's operational frequency and corresponding amplitude. This causes the soil to liquefy, allowing the pile to penetrate the seabed. One second long vibratory forcing functions were computed for the 4.5 m WTG pin pile and the 13 m WTG monopile using GRLWEAP 2010 (GRLWEAP, Pile Dynamics 2010). Clamps are used to connect the vibratory hammer to the pile. The model assumed the use of 6 clamps with a total weight of 341.3 kN for the pin pile and 18 clamps with total weight of 1,253.3 kN for the monopile. No cushion between the hammer and pile was used. Non-linearities were introduced to the vibratory forcing functions based on the decay rate observed in data measured during vibratory pile driving of smaller diameter piles (Quijano et al. 2017). The resulting forcing functions serve as inputs to JASCO's pile driving source model (PDSM) used to estimate an equivalent acoustic source represented by a linear array of monopoles evenly distributed along the pile, as detailed in Appendix E.

2.3. Noise Mitigation

Noise abatement systems (NASs) are often used to decrease the sound levels in the water near a source by inserting a local impedance change that acts as a barrier to sound transmission. Attenuation by impedance change can be achieved through various technologies, including bubble curtains, evacuated sleeve systems (e.g., IHC-Noise Mitigation System (NMS)), encapsulated bubble systems (e.g., HydroSound Dampers (HSD)), or Helmholtz resonators (AdBm NMS). The effectiveness of each system is frequency dependent and may be influenced by local environmental conditions such as current and depth. For example, the size of the bubbles determines the effective frequency band of an air bubble curtain, with larger bubbles needed for lower frequencies.

Small bubble curtains (bubble curtains positioned within a small radius around the pile) have been measured to reduce sound levels from ~10 dB to more than 20 dB but are highly dependent on water depth and current and how the curtain is configured and operated (Koschinski and Lüdemann 2013, Bellmann 2014, Austin and Li 2016). Larger bubble curtains tend to perform better and more reliably, particularly when deployed with two rings (Koschinski and Lüdemann 2013, Bellmann 2014, Nehls et al. 2016). A California Department of Transportation (CalTrans) study tested several small, single, bubble-curtain systems and found that the best attenuation systems resulted in 10–15 dB of attenuation. Buehler et al. (2015) concluded that attenuation greater than 10 dB could not be reliably predicted from small, single, bubble curtains because sound transmitted through the seabed and re-radiated into the water column is the dominant source of sound in the water for bubble curtains deployed immediately around (within 32 ft [10 m] of) the pile (Buehler et al. 2015).

A recent analysis by Bellmann et al. (2020) of NASs performance measured during impact driving for wind farm foundation installation provides expected performance for common NASs configurations. Measurements with a single bubble curtain and an air supply of 0.3 m^3/min resulted in 7–11 dB of broadband attenuation for optimized systems in up to 131 ft (40 m) water depth. Increased air flow (0.5 m^3/min) may improve the attenuation levels up to 11–13 dB (M. Bellmann, personal communication, 2019). Double bubble curtains add another local impedance change and, for optimized systems, can achieve 15–16 dB of broadband attenuation (measured in up to 131.25 ft [40 m] water depth). The IHC-NMS can provide 15–17 dB of attenuation but is currently limited to piles <8 m diameter. Other NASs such as the AdBm NMS achieved 6–8 dB (M. Bellmann, personal communication, 2019), but HSDs were measured at 10–12 dB attenuation and are independent of depth (Bellmann et al. 2020). Systems may be deployed in series to achieve higher levels of attenuation.

The NAS must be chosen, tailored, and optimized for site-specific conditions. NAS performance of 10 dB broadband attenuation was chosen for this study as an achievable reduction of sound levels produced during pile driving when one NAS is in use, noting that a 10 dB decrease means the sound energy level is reduced by 90%. For exposure modeling, several levels of attenuation were included for comparison purposes.

The studies and measurements referenced above are from impact pile driving. JASCO is not aware of similar publicly available studies on the performance of NASs for vibratory pile driving. However, primary sound production of both vibratory and impact pile driving is in similar frequency bands, between ~20 to ~300 Hz. Therefore, NAS performance for vibratory pile driving is expected to be comparable to impact pile driving, and the same levels of attenuation were used for vibratory driving as impact driving.

2.4. Acoustic Effects Criteria for Marine Fauna

The following acoustic criteria, derived from the current US regulatory acoustic criteria were used for this study (further details on these criteria are in Sections 2.4.1 and 2.4.2):

1. Peak pressure levels (PK; L_{pk}) and frequency-weighted 24 h accumulated sound exposure levels (SEL; L_E) were from the US National Oceanic and Atmospheric Administration (NOAA) Technical Guidance (NMFS 2018) for marine mammal injury thresholds.
2. Sound pressure level (SPL; L_p) for marine mammal behavioral thresholds were based on the unweighted NOAA (2005) and the frequency-weighted Wood et al. (2012) criteria.
3. Injury thresholds (PK and SEL) were derived from the Fisheries Hydroacoustic Working Group (FHWG 2008) and Stadler and Woodbury (2009) for fish that are equal, greater than, or less than 2 g.
4. Injury thresholds (PK and SEL) were obtained from Popper et al. (2014) for fish without swim bladders, fish with swim bladders not involved in hearing, and fish with swim bladders involved in hearing.
5. Behavioral thresholds for fish were developed by the NOAA Fisheries Greater Atlantic Regional Fisheries Office (GARFO) (Andersson et al. 2007, Wysocki et al. 2007, Mueller-Blenkle et al. 2010, Purser and Radford 2011)
6. Peak pressure levels (PK; L_{pk}) and frequency-weighted accumulated sound exposure levels (SEL; L_E) from Finneran et al. (2017) were used for the onset of permanent threshold shift (PTS) for sea turtles.
7. Behavioral response thresholds for sea turtles were obtained from McCauley et al. (2000a), which was confirmed in Finneran et al. (2017).

2.4.1. Effects Criteria–Marine Mammals

The Marine Mammal Protection Act (MMPA) prohibits the take of marine mammals. The term "take" is defined as: to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal. MMPA regulations define harassment in two categories relevant to the Project construction and operations. These are:

- **Level A**: Any act of pursuit, torment, or annoyance that has the potential to injure a marine mammal or marine mammal stock in the wild, and
- **Level B**: Any act of pursuit, torment or annoyance which has the potential to disturb a marine mammal or marine mammal stock in the wild by causing a disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering but which does not have the potential to injure a marine mammal or marine mammal stock in the wild (16 U.S.C. 1362).

To assess the potential impacts of the underwater sound in the Project, it is necessary to first establish the acoustic exposure criteria used by United States regulators to estimate marine mammal takes. In 2016, NOAA Fisheries issued a Technical Guidance document that provides acoustic thresholds for onset of PTS in marine mammal hearing for most sound sources, which was updated in 2018 (NMFS 2016, 2018). The Technical Guidance document also recognizes two main types of sound sources: impulsive and non-impulsive. Non-impulsive sources are further broken down into continuous or intermittent categories.

NMFS also provided guidance on the use of weighting functions when applying Level A harassment criteria. The Guidance recommends the use of a dual criterion for assessing Level A exposures, including a PK (unweighted/flat) sound level metric and a cumulative SEL metric with frequency weighting. Both acoustic criteria and weighting function application are divided into functional hearing groups (low-, mid-, and high-frequency and phocid pinnipeds) that species are assigned to, based on their respective hearing sensitivities. The acoustic analysis applies the most recent sound exposure criteria utilized by NMFS to estimate acoustic harassment (NMFS 2018).

Based on observations of mysticetes (Malme et al. 1983, 1984, Richardson et al. 1986, 1990), sound levels thought to elicit disruptive behavioral response are described using the SPL metric (NMFS and NOAA 2005). NMFS currently uses a behavioral response threshold of SPL 160 dB re 1 µPa for marine mammals exposed to intermittent sounds and a threshold of 120 dB re 1 µPa for continuous sounds (NOAA 2005). Alternative thresholds used in acoustic assessments include a graded probability of response approach and take into account the frequency-dependence of animal hearing sensitivity (Wood et al. 2012). The 160 dB threshold is used in this assessment as per NOAA guidance (2019). The publication of ISO 18405 Underwater Acoustics–Terminology (ISO 2017) provided a dictionary of underwater bioacoustics (the previous standard was ANSI and ASA S1.1-2013). In the remainder of this report, we follow the definitions and conventions of ISO (2017) except where stated otherwise (Table 25).

Table 25. Summary of relevant acoustic terminology used by US regulators and in the modeling report.

Metric	NMFS (2018)	Main text [a]	Equations/tables [a]
Sound pressure level	n/a	SPL	$L_{p,w}$ [c]
Peak pressure level	PK	PK	L_{pk}
Cumulative sound exposure level	SEL_{cum} [a]	SEL	$L_{E,w,T}$ [d]

[a] Following (ISO 2017) with modifications described in the footnotes.
[b] SEL_{cum} metric used by NOAA Fisheries (NMFS) describes sound energy received by a receptor over a 24 h period. Accordingly, following the ISO standard, this will be denoted as SEL in this report, except for in tables and equations where $L_{E,w,T}$ is used.
[c] w in $L_{p,w}$ and $L_{E,w,T}$ describes frequency-weighting function, if used.
[d] T in $L_{E,w,T}$ describes the time window used to calculate SEL.

2.4.1.1. Marine Mammal Hearing Groups

Current data and predictions show that marine mammal species differ in their hearing capabilities, in absolute hearing sensitivity as well as frequency band of hearing (Richardson et al. 1995, Wartzok and Ketten 1999, Southall et al. 2007, Au and Hastings 2008). While hearing measurements are available for a small number of species based on captive animal studies, there are no direct measurements of many odontocetes or any mysticetes. As a result, hearing distances for many odontocetes are grouped with similar species, and predictions for mysticetes are based on other methods including: anatomical studies and modeling (Houser et al. 2001, Parks et al. 2007, Tubelli et al. 2012, Cranford and Krysl 2015); vocalizations (see reviews in Richardson et al. 1995, Wartzok and Ketten 1999, Au and Hastings 2008); taxonomy; and behavioral responses to sound (Dahlheim and Ljungblad 1990, see review in Reichmuth et al. 2007). In 2007, Southall et al. proposed that marine mammals be divided into hearing groups. This division was updated in 2016 and 2018 by NOAA Fisheries using more recent best available science (Table 26).

Southall et al. (2019) published an updated set of Level A sound exposure criteria (including the onset of temporary threshold shift [TTS] and permanent threshold shift [PTS] in marine mammals). While the authors propose a new nomenclature and classification for the marine mammal functional hearing groups, the proposed thresholds and weighting functions do not differ in effect from those proposed by NOAA Fisheries (2018). The new hearing groups proposed by Southall et al. (2019) have not yet been adopted by NOAA. The NOAA Fisheries (NMFS 2018) hearing groups presented in Table 26 are used in this analysis.

Table 26. Marine mammal hearing groups (Sills et al. 2014, NMFS 2018).

Hearing group	Generalized hearing distance [a]
Low-frequency (LF) cetaceans (mysticetes or baleen whales)	7 Hz to 35 kHz
Mid-frequency (MF) cetaceans (odontocetes: delphinids, beaked whales)	150 Hz to 160 kHz
High-frequency (HF) cetaceans (other odontocetes)	275 Hz to 160 kHz
Phocid pinnipeds in water (PPW)	50 Hz to 86 kHz
Phocid pinnipeds in air (PPA) [b]	50 Hz to 36 kHz

[a] The generalized hearing distance is for all species within a group. Individual hearing will vary.

[b] Sound from piling will not reach NOAA Fisheries thresholds for behavioral disturbance of seals in air (90 dB [rms] re 20 µPa for harbor seals and 100 dB [rms] re 20 µPa^2 for all other seal species) at the closest land-based sites where seals may spend time out of the water. Thus, in-air hearing is not considered further.

2.4.1.2. Marine Mammal Auditory Weighting Functions

The potential for anthropogenic sound to impact marine mammals is largely dependent on whether the sound occurs at frequencies that an animal can hear well, unless the sound pressure level is so high that it can cause physical tissue damage regardless of frequency. Auditory (frequency) weighting functions reflect an animal's ability to hear a sound (Nedwell and Turnpenny 1998, Nedwell et al. 2007). Auditory weighting functions have been proposed for marine mammals, specifically associated with PTS thresholds expressed in metrics that consider what is known about marine mammal hearing (e.g., SEL) (Southall et al. 2007, Erbe et al. 2016, Finneran 2016). Marine mammal auditory weighting functions for all hearing groups (Table 26) published by Finneran (2016) are included in the NMFS (2018) Technical Guidance for use in conjunction with corresponding permanent threshold shift (PTS [Level A]) onset acoustic criteria (Table 27; see Appendix D for a detailed description of the weighting functions).

The application of marine mammal auditory weighting functions emphasizes the importance of taking measurements and characterizing sound sources in terms of their overlap with biologically important frequencies (e.g., frequencies used for environmental awareness, communication, and the detection of predators or prey), and not only the frequencies that are relevant to achieving the objectives of the sound producing activity (i.e., context of sound source; NMFS 2018).

2.4.1.3. Marine Mammal Auditory Injury Exposure Criteria

Injury to the hearing apparatus of a marine mammal may result from a fatiguing stimulus measured in terms of SEL, which considers the sound level and duration of the exposure signal. Intense sounds may also damage hearing independent of duration, so an additional metric of peak pressure (PK) is used to assess acoustic exposure injury risk. A PTS in hearing may be considered injurious, but there are no published data on the sound levels that cause PTS in marine mammals. There are data that indicate the received sound levels at which temporary threshold shift, TTS, occurs, and PTS onset may be extrapolated from TTS onset level and an assumed growth function (Southall et al. 2007). The NMFS (2018) criteria incorporate the best available science to estimate PTS onset in marine mammals from sound energy accumulated over 24 h (SEL; L_E), or very loud, instantaneous peak sound pressure levels. These dual threshold criteria of SEL and PK are used to calculate marine mammal exposures (Table 27). If a non-impulsive sound has the potential to exceed the peak sound pressure level thresholds associated with impulsive sounds, these thresholds should also be considered.

Different types of sounds affect the ear differently. Impulsive sounds are known to be more damaging than non-impulsive sounds. For this reason, there are lower thresholds for exposure to impulsive sounds than non-impulsive sounds (Table 27). In some cases, an animal may be exposed to a combination of impulsive and non-impulsive sounds, or an impulsive sound may follow exposure to a non-impulsive sound. When concurrent sounds of different types are received, the sound energy from all sources should be summed and the threshold for impulsive sounds should be used because the resultant sound can be thought of as impulses within a background of non-impulsive sound. When impulsive sound (such as impact pile driving) follows exposure to non-impulsive sound (such as vibratory pile driving), potential effects of the non-impulsive sound (vibratory pile driving) should be evaluated first followed by the potential effects of the impulsive sound (impact pile driving). The sound energy from the exposure to non-impulsive sound (vibratory pile driving), however, should be included in the total received energy during the impulsive sound (impact pile driving) if the non-impulsive sound occurs within the time window of evaluation (24 h).

Table 27. Summary of relevant permanent threshold shift (PTS) onset acoustic thresholds for marine mammal hearing groups (NMFS 2018).

Hearing group	Impulsive signals [a] Unweighted L_{pk} (dB re 1 µPa)	Impulsive signals [a] $L_{E,w,24h}$ (dB re 1 µPa²·s)	Non-impulsive signals $L_{E,w,24h}$ (dB re 1 µPa²·s)
Low-frequency (LF) cetaceans	219	183	199
Mid-frequency (MF) cetaceans	230	185	198
High-frequency (HF) cetaceans	202	155	173
Phocid seals in water (PW)	218	185	201

[a] Dual metric acoustic thresholds for impulsive sounds: PK and SEL thresholds are defined for PTS. The larger of the two corresponding exposure distances is used to assess PTS onset zones. The PK threshold was also applied to non-impulsive sounds that had the potential for high PK levels.

2.4.1.4. Marine Mammal Behavioral Response Exposure Criteria

Numerous studies on marine mammal behavioral responses to sound exposure have not resulted in consensus in the scientific community regarding the appropriate metric for assessing behavioral reactions. It is recognized that the context in which the sound is received affects the nature and extent of responses to a stimulus (Southall et al. 2007, Ellison et al. 2012). Due to the complexity and variability of marine mammal behavioral responses to acoustic exposure, NOAA has not yet released technical guidance for determining potential behavioral responses of marine mammals exposed to sounds (NMFS 2018). NOAA's National Marine Fisheries Service (NMFS) currently uses a step function to assess behavioral impact (NOAA 2005). The step function sets an SPL of 160 dB re 1 µPa^2 as the behavioral disruption threshold for intermittent or impulsive sound sources based on the 50% response rate of collated responses from the HESS (1999) report. An SPL of 120 dB re 1 µPa^2 was set as the behavioral disruption threshold for continuous sound sources (NOAA 2005), which was based on the responses of migrating mysticete whales to airgun sounds (Malme et al. 1983, 1984). The HESS team recognized that behavioral responses to sound may occur at lower levels, but substantial responses were only likely to occur above an SPL of 140 dB re 1 µPa^2. NMFS currently uses behavioral response thresholds of SPL 160 dB re 1 µPa^2 for non-explosive impulsive sounds, such as impact pile driving, and SPL120 dB re 1 µPa^2 for continuous sounds, such as vibratory pile driving and drilling, for all marine mammal species (NMFS 2022).

An extensive review of behavioral responses to sound was undertaken by Southall et al. (2007, their Appendix B). Southall et al. (2007) found varying responses for most marine mammals between an SPL of 140 and 180 dB re 1 µPa^2, consistent with the HESS (1999) report, but lack of convergence in the data prevented them from suggesting explicit step functions. In 2012, Wood et al. proposed a graded probability of response for impulsive sounds using a frequency weighted SPL metric. Wood et al. (2012) also designated behavioral response categories for sensitive species (including harbor porpoises and beaked whales) and for migrating mysticetes. The SPL frequency weighting used by Wood et al. applies the weighting functions defined in Southall et al. (2007). For this analysis, both the unweighted NOAA (2005) and the frequency-weighted Wood et al. (2012) criteria are used to estimate Level B exposures to impulsive pile-driving sounds (Table 28).

Table 28. Wood et al. (2012)and NOAA (2005)acoustic sound pressure level (SPL) thresholds used to evaluate potential behavioral impacts to marine mammals. Probabilities are not additive.

Marine mammal group	Species	Probability of response ($L_{p,w}$ >120 dB re 1 µPa^2)	Probability of response ($L_{p,w}$ >140 dB re 1 µPa^2)	Probability of response ($L_{p,w}$ >160 dB re 1 µPa^2)	Probability of response ($L_{p,w}$ >180 dB re 1 µPa^2)	Probability of response (L_p= 160 dB re 1 µPa^2)
Sensitive odontocetes	Harbor porpoise	50%	90%	–	–	100%
Migrating mysticete whales	Minke whale Sei whale	10%	50%	90%	–	100%
-	All other species	–	10%	50%	90%	100%

2.4.2. Acoustic Thresholds for Evaluating Potential Impacts to Sea Turtles and Fish

In a cooperative effort between Federal and State transportation and resource agencies, interim criteria were developed to assess the potential for injury to fish exposed to impact pile driving sounds (Stadler and Woodbury 2009) and described by the Fisheries Hydroacoustic Working Group (FHWG 2008). Injury and behavioral response levels for fish were based on past literature for assessing the potential effects to Endangered Species Act (ESA) listed animals exposed to elevated levels of underwater sound from pile driving. Dual acoustic thresholds for physiological injury to fish included in the tool are 206 dB re 1 µPa PK and either 187 dB re 1 $\mu Pa^2 \cdot s$ SEL (>2 grams [g] fish weight) or 183 dB re 1 $\mu Pa^2 \cdot s$ SEL (<2 g fish weight) (FHWG 2008, Stadler and Woodbury 2009) (Table 29). The behavioral threshold for fish is >150 dB SPL (Andersson et al. 2007, Wysocki et al. 2007, Mueller-Blenkle et al. 2010, Purser and Radford 2011).

A technical report by an American National Standards Institute (ANSI) registered committee (Popper et al. 2014) reviewed available data and suggested metrics and methods for estimating acoustic impacts for fish. Their report includes thresholds for potential injury but does not define sound levels that may result in behavioral response, though does indicate a high likelihood of response near impact pile driving (tens of meters), moderate response at intermediate distances (hundreds of meters), and low response far (thousands of meters) from the pile (Popper et al. 2014).

Injury, impairment, and behavioral thresholds for sea turtles were developed for use by the US Navy (Finneran et al. 2017) based on exposure studies (e.g., McCauley et al. 2000b). Dual criteria (PK and SEL) have been suggested for PTS and TTS, along with auditory weighting functions published by Finneran et al. (2017) used in conjunction with SEL thresholds for PTS and TTS . The recommended behavioral threshold is an SPL of 175 dB re 1 μPa^2 (McCauley et al. 2000b, Finneran et al. 2017) (Table 29).

Table 29. Acoustic metrics and thresholds for fish and sea turtles currently used by NMFS for impact pile driving (impulsive). For vibratory (non-impulsive) pile setting, only the $L_{E,}$ 24h and behavioral thresholds apply. Best available science recommendations are below the NMFS criteria. Fish injury thresholds, from impulsive sources were used for this analysis since non-impulsive injury criteria do not exist for fish Popper et al. (2014)

Faunal group	Injury, Impulsive signals (L_{pk})	Injury, Impulsive signals ($L_{E,24h}$)	Injury, Non-impulsive signals ($L_{p,}$ $L_{E,24h}$)	Behavior (L_p)
Fish equal to or greater than 2 g [a]	206	187	-	150
Fish less than 2 g [a]	206	183	-	150
Fish without swim bladder [b]	213	216	-	-
Fish with swim bladder not involved in hearing [b]	207	203	-	-
Fish with swim bladder involved in hearing [b]	207	203	170 ($L_{p,48h}$)	-
Sea turtles [c, d]	232	204	220 ($L_{E,w,24h}$)	175

L_{pk}—peak sound pressure level (dB re 1 µPa), L_E—sound exposure level (dB re 1 µPa^2·s), L_p—root mean square sound pressure level (dB re 1 µPa^2).

A dash indicates that there are no thresholds for the specific category.

[a] NMFS recommended criteria adopted from the Fisheries Hydroacoustic Working Group (FHWG 2008).

[b] Andersson et al. (2007), Mueller-Blenkle et al. (2010), Purser and Radford (2011), Wysocki et al. (2007).

[c] Popper et al. (2014).

[d] Finneran et al. (2017).

2.5. Animal Movement Modeling and Exposure Estimation

JASMINE was used to estimate the probability of exposure of animals to sound arising from pile driving operations during construction of the Project. Sound exposure models such as JASMINE use simulated animals (animats) to sample the predicted 3-D sound fields with movement rules derived from animal observations. An overview of the exposure modeling process using JASMINE is shown in Figure 4.

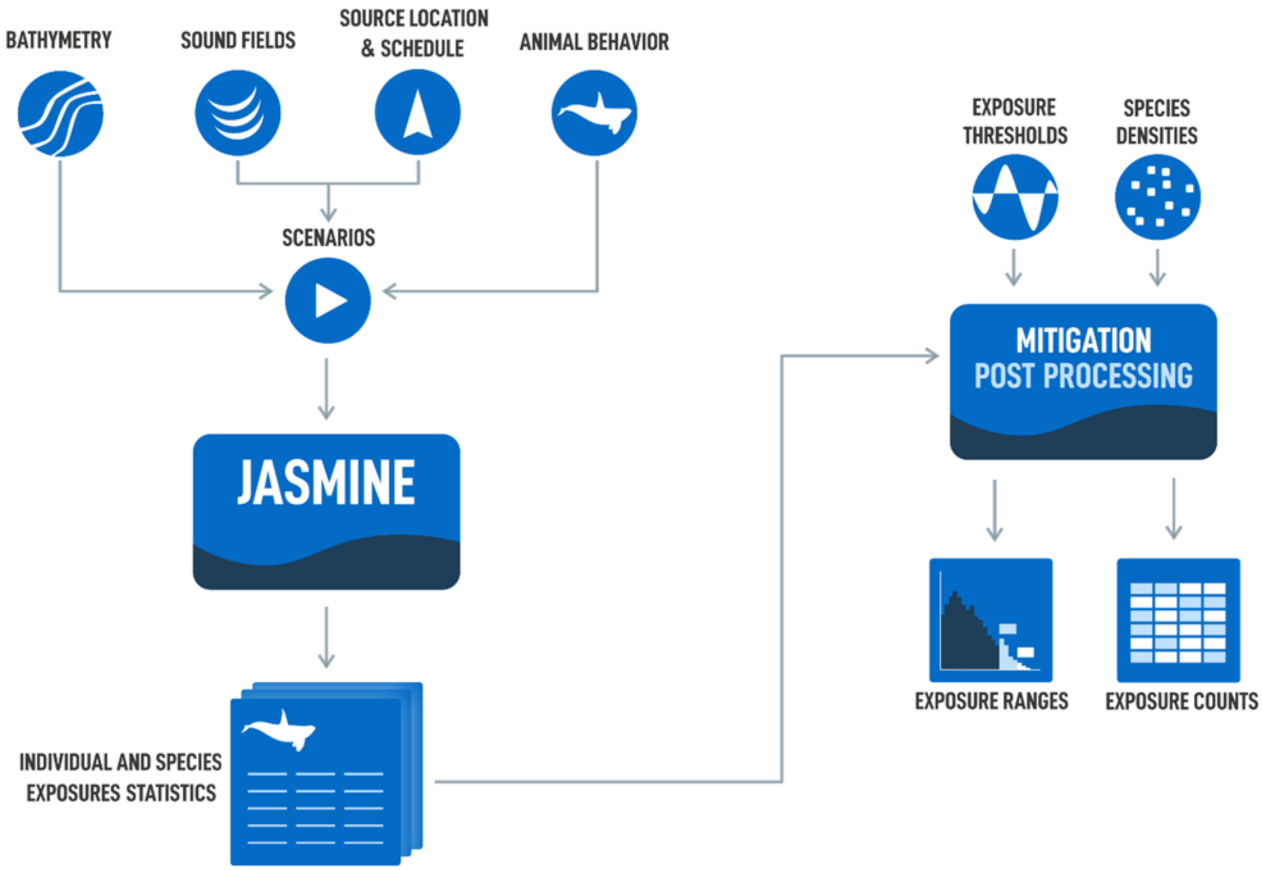

Figure 4. Exposure modeling process overview.

The parameters used for forecasting realistic behaviors (e.g., diving, foraging, and surface times) were determined and interpreted from marine species studies (e.g., tagging studies) where available, or reasonably extrapolated from related species (Appendix H.1). The predicted sound fields were sampled by the model receiver in a way that real animals are expected to by programming animats to behave like marine species that may be present near the Project. The output of the simulation is the exposure history for each animat within the simulation. An individual animat's sound exposure levels are summed over a specified duration, i.e., 24 h (Appendix H.1), to determine its total received acoustic energy (SEL) and maximum received PK and SPL. These received levels are then compared to the threshold criteria described in Section 2.4 within each analysis period. Appendix H.1 provides fuller description of animal movement modeling and the parameters used in the JASMINE simulations. Due to shifts in animal density and seasonal sound propagation effects, the number of animals predicted to be impacted by the pile driving operations is sensitive to the number of foundations installed during each month. JASMINE can be used to simulate aversive behaviors, where animals respond to sound. A subset of scenarios was run with aversion and these results are provided for demonstration purposes only (see Section 0).

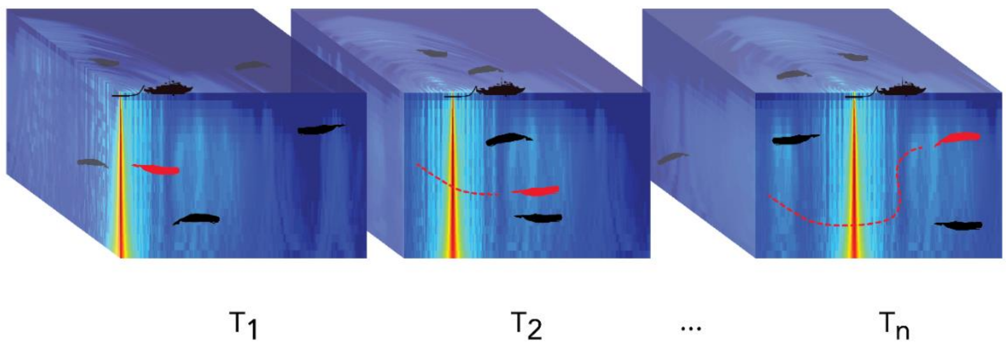

Figure 5. Depiction of animats in an environment with a moving sound field. Example animat (red) shown moving with each time step. The acoustic exposure of each animat is determined by where it is in the sound field, and its exposure history is accumulated as the simulation steps through time.

2.5.1. Implementing Pile Installation Schedules in JASMINE

Exposure modeling locations were chosen to represent expected construction activity in the Lease Area over a seven-day period. The pile installation schedules are described in Section 1.2.2.

The hammering schedule for each foundation type is determined from pile driving parameters. For a single pile, the installation time is calculated using the blow rate and blow count at each hammer energy level, along with the vibratory pile driving time if appropriate for the scenario. A pile installation schedule is created for the simulation by assigning each strike of the pile to a time in the simulation, along with the closest associated sound field for that pile type and scenario. When multiple piles are driven per day, the same hammering schedule is used for the additional piles, with a delay between piles to allow for vessel movement and set up. Figure 6 illustrates a pile installation schedule for vibratory followed by impact pile driving operations.

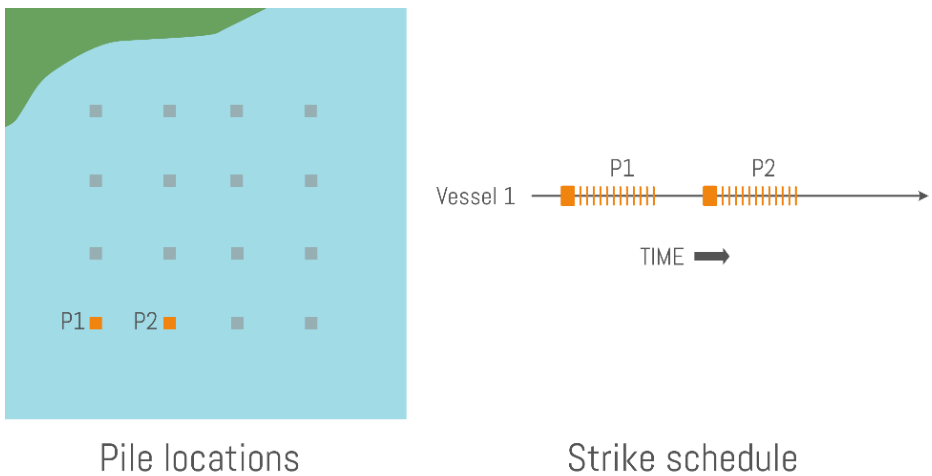

Figure 6. Pile installation schedule for vibratory pile driving followed by impact pile driving at example two locations, P1 and P2. At each location, solid orange bars indicate time periods of vibratory pile driving. These are followed by vertical orange tick marks showing conceptual representations of hammer strikes during impact pile driving.

The animal movement modeling assumed either 30 or 60 minutes of vibratory setting for 10 WTG monopile foundations per year in installation schedules C and D. For impact piling of monopile foundations, the model assumed 15 min between vibratory and impact pile driving to switch equipment. Strike rates varied with each pile type and are provided in Section 1.2.1.

For the OSS1 jacket foundation, the number of strikes required to drive each pile as provided by the Proponent is a conservative estimate, in that it is likely to be an overestimate of the actual number of strikes required. The animal movement modeling is based on exposure levels in a 24 h period to capture 24 h cumulative metrics (i.e., SEL), so pile installation is constrained to fit within 24 h. To accommodate the high number of strikes for jacket foundations within a 24 h period, a strike rate of 40 per minute was used to model cases where 4 pin piles were installed in one day. Additionally, the time between pile installation each day was decreased to 10 min.

For the OSS2 and WTG jacket foundations, the time between pile installation each day was decreased to 15 min and the time for swapping equipment for WTG jackets was reduced to 10 min.

2.6. Summing Different Source Types

When evaluating the potential for injury, the total received acoustic energy (SEL) over a given time period (24 h) is needed. Vibratory setting of piles followed by impact pile driving is being considered for the Project for the installation of both monopile and jacket foundations. Although the potential to induce hearing loss is low during vibratory driving, it does introduce sound into the water and must be considered in total. For this reason, acoustic ranges from the combined sound energy from vibratory and impact pile driving were computed and are shown in Appendix G. The PTS onset SEL thresholds are lower for impact piling than for vibratory piling (Section 2.4.1.3), so when estimating acoustic ranges and animats exposed to potentially injurious sound levels, the lower criteria were applied to the total received sound energy level from both sources.

Exposure to sound above a behavioral response threshold is a simpler, one-time exposure calculation that is done for vibratory and impact pile driving separately because these two sound sources use different thresholds and are temporally separated. The numbers of animats exposed above these thresholds are calculated individually and then these numbers are combined to get total behavioral exposures. Individual animats that are exposed above behavioral thresholds for both vibratory and impact pile driving are only counted once to avoid over-estimation of exposures.

2.7. Estimating Monitoring Zones for Mitigation

Monitoring zones for mitigation purposes have traditionally been estimated by determining the acoustic distance to injury and behavioral thresholds (see Appendix G). The traditional method assumes that all receivers (animals) in the area remain stationary for the duration of the sound event. Because where an animal is in a sound field and the pathway it takes through the sound field as it evolves over time determines the received level for each animal, treating animals as stationary may not produce realistic estimates for the monitoring zones.

Animal movement and exposure modeling can be used to account for the movement of receivers when estimating distances for monitoring zones. The distance to the closest point of approach (CPA) for each of the species-specific animats (simulated animals) during a simulation is recorded and then the CPA distance that accounts for 95 % of the animats that exceed an acoustic impact threshold is determined (Figure 7). The $ER_{95\%}$ (95 % exposure radial distance) is the horizontal distance that includes 95 % of the CPAs of animats exceeding a given impact threshold. $ER_{95\%}$ is reported for marine mammals and sea turtles. If used as an exclusion zone, keeping animals farther away from the source than the $ER_{95\%}$ will reduce exposure estimates by 95 %.

Unlike marine mammals and sea turtles for which animal movement modeling was performed, fish were considered static (not moving) receivers, so exposure ranges were not calculated. Instead, the acoustic ranges to fish impact criteria thresholds were calculated by determining the isopleth at which thresholds could be exceeded (Appendix F.3).

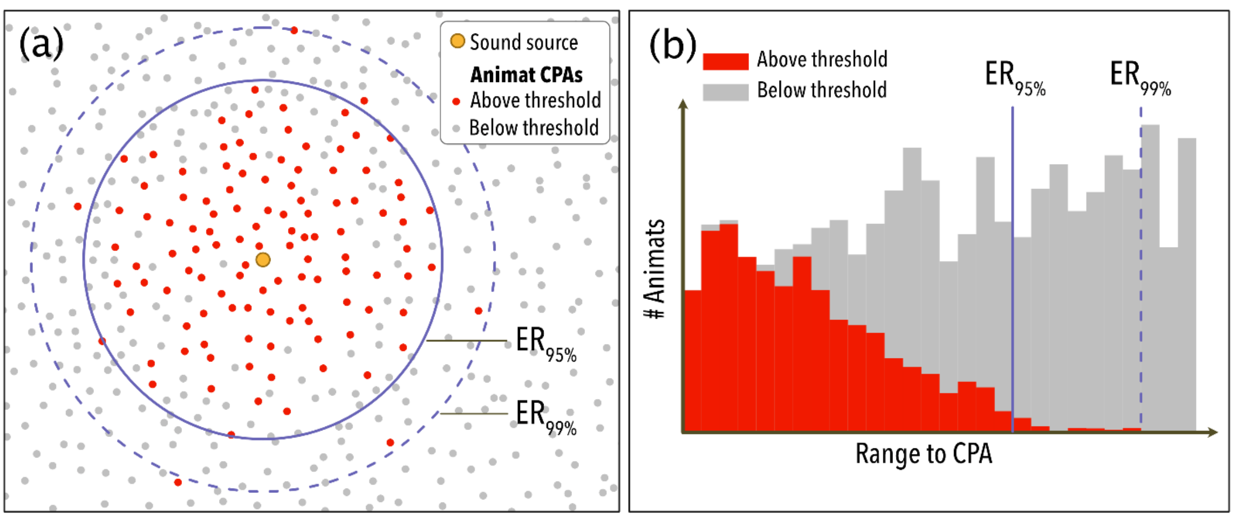

Figure 7. Example distribution of animat closest points of approach (CPAs). Panel (a) shows the horizontal distribution of animat CPAs near a sound source. Panel (b) shows the distribution of distances to animat CPAs. The 95 % and 99 % exposure ranges ($ER_{95\%}$ and $ER_{99\%}$) are indicated in both panels.

3. Marine Fauna Included in the Acoustic Assessment

Marine fauna included in the acoustic assessment are marine mammals (cetaceans and pinnipeds), sea turtles, and fish.

All marine mammal species are protected under the MMPA. Some marine mammal stocks may be designated as Strategic under the (MMPA 2015), which requires the jurisdictional agency (NMFS for the Atlantic offshore species considered in this application) to impose additional protection measures. A stock is considered Strategic if:

- Direct human-caused mortality exceeds its Potential Biological Removal (PBR) level (defined as the maximum number of animals, not including natural mortality, that can be removed from the stock while allowing the stock to reach or maintain its optimum sustainable population level);
- It is listed under the ESA;
- It is declining and likely to be listed under the ESA; or
- It is designated as depleted under the MMPA.

A depleted species or population stock is defined by the MMPA as any case in which:

- The Secretary, after consultation with the Marine Mammal Commission and the Committee of Scientific Advisors on Marine Mammals established under MMPA Title II, determines that a species or population stock is below its optimum sustainable population;
- A State, to which authority for the conservation and management of a species or population stock is transferred under Section 109 of the MMPA, determines that such species or stock is below its optimum sustainable population; or
- A species or population stock is listed as an endangered or threatened species under the ESA. Some species are further protected under the ESA (2002).

Under the ESA, a species is considered endangered if it is “in danger of extinction throughout all or a significant portion of its range.” A species is considered threatened if it “is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range” (ESA (2002)). Five marine mammal species known to occur in the Northwest Atlantic OCS region are ESA listed (Tables 30 and 31). All four species of sea turtle (Table 33) as well as four fish species (Section 3.3) occurring in the Northwest Atlantic OCS region are also ESA listed.

3.1. Marine Mammals that may Occur in the Area

Thirty-eight marine mammal species (whales, dolphins, porpoise, and seals) comprising 39 stocks have been documented as present (some year–round, some seasonally, and some as occasional visitors) in the Northwest Atlantic Outer Continental Shelf (OCS) region (CeTAP 1982, USFWS 2014, Roberts et al. 2016, Hayes et al. 2022, Hayes et al. 2023). All 38 marine mammal species identified in Table 30 are protected by the MMPA and some are also listed under the ESA. The five ESA-listed marine mammal species known to be present year-round, seasonally, or occasionally in southern New England waters are the sperm whale (*Physeter macrocephalus*), NARW (*Eubalaena glacialis)*, fin whale (*Balaenoptera physalus*), blue whale (*Balaenoptera musculus*), and sei whale (*Balaenoptera borealis*). The humpback whale (*Megaptera novaeangliae*), which may occur year-round, has been delisted as an endangered species.

Southern New England waters (including the Project Area (Figure 1)) are primarily used as opportunistic feeding areas or habitat during seasonal migratory movements that occur between the feeding areas located farther north and the breeding areas located farther south that are typically used by some of these large whale species. The modeling used in this assessment considered minke and sei whales to be migratory in the region.

The four species of phocids (true seals) that have ranges overlapping the Project Area are harbor seals (*Phoca vitulina*), gray seals (*Halichoerus grypus*), harp seals (*Pagophilus groenlandicus*), and hooded seals (*Cystophora cristata*) (Hayes et al. 2022). None of these are ESA listed but all are protected under the MMPA.

The expected occurrence of each marine mammal species in the Project Area is listed in Table 30. Many of these marine mammal species do not commonly occur in this region of the Atlantic Ocean. For this assessment, species presence was categorized as:

- Common–Occurring consistently in moderate to large numbers;
- Uncommon–Occurring in low numbers or on an irregular basis; and
- Rare–There are limited species records for some years; range includes the Offshore Development Area but due to habitat preferences and distribution information, species are generally not expected to occur in the SWDA, though rare sightings are a possibility. Records may exist for adjacent waters.

Marine mammal species considered c*ommon* and *uncommon* (Table 30) were selected for quantitative assessment by acoustic impact analysis and exposure modeling. Quantitative assessment of bottlenose dolphins (*Tursiops truncatus*) presumed all impacted individuals belong to the Western North Atlantic Offshore stock because the northern limit of the range of the coastal stock does not extend into the Offshore Development Area. Quantitative assessment of *rare* species was not conducted because impacts to those species approach zero due to their low densities. The modeled species are identified in Tables 30 and 31. The likelihood of incidental exposure for each species based on its presence, density, and overlap of proposed activities is described in Section 4.3.1.

Table 30. Marine mammals that may occur in the Project Area.

Taxonomic Suborder-Family	Species	Scientific name	Stock	Regulatory status [a]	Relative occurrence in Beacon Wind	Abundance [b]
Mysticeti - Balaenopteridae	Blue whale	*Balaenoptera musculus*	Western North Atlantic	ESA-Endangered	Rare	402
Mysticeti - Balaenopteridae	Fin whale [c]	*Balaenoptera physalus*	Western North Atlantic	ESA-Endangered	Common	6,802
Mysticeti - Balaenopteridae	Humpback whale [c]	*Megaptera novaeangliae*	Gulf of Maine	MMPA	Common	1,396
Mysticeti - Balaenopteridae	Minke whale [c]	*Balaenoptera acutorostrata*	Canadian Eastern Coastal	MMPA	Common	21,968
Mysticeti - Balaenidae	North Atlantic right whale [c]	*Eubalaena glacialis*	Western North Atlantic	ESA-Endangered	Common	338 [d]
Mysticeti - Balaenopteridae	Sei whale [c]	*Balaenoptera borealis*	Nova Scotia	ESA-Endangered	Common	6,292
Odontoceti - Physeteridae	Sperm whale [c]	*Physeter macrocephalus*	North Atlantic	ESA-Endangered	Uncommon	4,349
Odontoceti - Kogiidae	Dwarf sperm whale	*Kogia sima*	Western North Atlantic	MMPA	Rare	7,750 [e]
Odontoceti - Kogiidae	Pygmy sperm whale	*Kogia breviceps*	Western North Atlantic	MMPA	Rare	7,750 [e]
Odontoceti - Delphinidae	Atlantic spotted dolphin [c]	*Stenella frontalis*	Western North Atlantic	MMPA	Uncommon	39,921
Odontoceti - Delphinidae	Atlantic white-sided dolphin [c]	Lagenorhynchus acutus	Western North Atlantic	MMPA	Common	93,233
Odontoceti - Delphinidae	Bottlenose dolphin [c]	*Tursiops truncatus*	Western North Atlantic, offshore [f]	MMPA	Common	62,851
Odontoceti - Delphinidae	Bottlenose dolphin [c]	*Tursiops truncatus*	Western North Atlantic, Northern Migratory Coastal	MMPA-Strategic	Rare	6,639
Odontoceti - Delphinidae	Clymene dolphin	*Stenella clymene*	Western North Atlantic	MMPA	Rare	4,237
Odontoceti - Delphinidae	Common dolphin [c]	*Delphinus delphis*	Western North Atlantic	MMPA	Common	172,974
Odontoceti - Delphinidae	False killer whale	*Pseudorca crassidens*	Western North Atlantic	MMPA	Rare	1,791
Odontoceti - Delphinidae	Fraser's dolphin	*Lagenodelphis hosei*	Western North Atlantic	MMPA	Rare	Unknown
Odontoceti - Delphinidae	Killer whale	*Orcinus orca*	Western North Atlantic	MMPA	Rare	Unknown
Odontoceti - Delphinidae	Melon-headed whale	*Peponocephala electra*	Western North Atlantic	MMPA	Rare	Unknown
Odontoceti - Delphinidae	Pan-tropical spotted dolphin	*Stenella attenuata*	Western North Atlantic	MMPA	Rare	6,593
Odontoceti - Delphinidae	Pilot whale, long-finned [c]	*Globicephala melas*	Western North Atlantic	MMPA	Uncommon	39,215
Odontoceti - Delphinidae	Pilot whale, short-finned [c]	*Globicephala macrorhynchus*	Western North Atlantic	MMPA	Uncommon	28,924
Odontoceti - Delphinidae	Pygmy killer whale	*Feresa attenuata*	Western North Atlantic	MMPA	Rare	Unknown
Odontoceti - Delphinidae	Risso's dolphin [c]	*Grampus griseus*	Western North Atlantic	MMPA	Uncommon	35,215
Odontoceti - Delphinidae	Rough-toothed dolphin	*Steno bredanensis*	Western North Atlantic	MMPA	Rare	136

Odontoceti - Delphinidae	Spinner dolphin	*Stenella longirostris*	Western North Atlantic	MMPA	Rare	4,102
Odontoceti - Delphinidae	Striped dolphin	*Stenella coeruleoalba*	Western North Atlantic	MMPA	Rare	67,036
Odontoceti - Delphinidae	White-beaked dolphin	*Lagenorhynchus albirostris*	Western North Atlantic	MMPA	Rare	536,016
Odontoceti - Ziphiidae	Cuvier's beaked whale	*Ziphius cavirostris*	Western North Atlantic	MMPA	Rare	5,744
Odontoceti - Ziphiidae	Blainville's beaked whale	*Mesoplodon densirostris*	Western North Atlantic	MMPA	Rare	10,107 [g]
Odontoceti - Ziphiidae	Gervais' beaked whale	*Mesoplodon europaeus*	Western North Atlantic	MMPA	Rare	10,107 g
Odontoceti - Ziphiidae	Sowerby's beaked whale	*Mesoplodon bidens*	Western North Atlantic	MMPA	Rare	10,107 g
Odontoceti - Ziphiidae	True's beaked whale	*Mesoplodon mirus*	Western North Atlantic	MMPA	Rare	10,107 g
Odontoceti - Ziphiidae	Northern bottlenose whale	*Hyperoodon ampullatus*	Western North Atlantic	MMPA	Rare	Unknown
Odontoceti - Phocoenidae	Harbor porpoise [c]	*Phocoena phocoena*	Gulf of Maine/Bay of Fundy	MMPA	Common	95,543

[a] Denotes the highest federal regulatory classification. A strategic stock is defined as any marine mammal stock: 1) for which the level of direct human-caused mortality exceeds the potential biological removal level; 2) that is declining and likely to be listed as Threatened under the ESA; or 3) that is listed as Threatened or Endangered under the ESA or as depleted under the MMPA (Hayes et al. 2022).

[b] Best available abundance estimate is from NOAA Fisheries Stock Assessment Reports (Hayes et al. 2022).

[c] Modeled species.

[d] Best available abundance estimate is from NOAA Fisheries Stock Assessment (Hayes et al. 2023) . NARW consortium has released the 2022 report card results predicting a NARW population of 340 for 2021 (Pettis et al. 2023). However, the consortium "alters" the methods of Pace et al. (2017, 2021) to subtract additional mortality. This method is used in order to estimate all mortality, not just the observed mortality, therefore the 2022 SAR (Hayes et al. 2023) will be used to report an unaltered output of the Pace et al. (2017, 2021) model (DoC and NOAA 2020).

[e] This estimate includes both dwarf and pygmy sperm whales. Source: Hayes et al. (2022)

[f] Bottlenose dolphins occurring in the Offshore Development Area likely belong to the Western North Atlantic Offshore stock (Hayes et al. 2022).

[g] This estimate includes all undifferentiated Mesoplodon spp. Beaked whales in the Atlantic. Sources: Kenney and Vigness-Raposa (2009), Rhode Island Ocean Special Area Management Plan (2011), Waring et al. (2011, 2013, 2015), Hayes et al. (2022)

Table 31. Earless Seals (Phocidae) that may occur in the Project Area.

Species	Scientific name	Stock	Regulatory status [a]	Relative occurrence in Beacon Wind	Abundance [b]
Gray seal [c]	*Halichoerus grypus*	Western North Atlantic	MMPA	Common	27,300 [d]
Harbor seal [c]	*Phoca vitulina*	Western North Atlantic	MMPA	Common	61,336
Harp seal [c]	*Pagophilus groenlandicus*	Western North Atlantic	MMPA	Uncommon	Unknown [e]
Hooded seal	Cystophora cristata	Western North Atlantic	MMPA	Rare	Unknown

[a] Denotes the highest federal regulatory classification. A strategic stock is defined as any marine mammal stock: 1) for which the level of direct human-caused mortality exceeds the potential biological removal level; 2) that is declining and likely to be listed as Threatened under the ESA; or 3) that is listed as Threatened or Endangered under the ESA or as depleted under the MMPA (Hayes et al. 2022).

[b] Best available abundance estimate is from NOAA Fisheries Stock Assessment Reports (Hayes et al. 2022).

[c] Modeled species.

[d] Estimate of gray seal population in US waters. Data are derived from pup production estimates; (Hayes et al. 2022) notes that uncertainty about the relationship between whelping areas along with a lack of reproductive and mortality data make it difficult to reliably assess the population trend.

[e] Hayes et al. (2022) report insufficient data to estimate the population size of harp seals in US waters; the best estimate for the whole population is 7.6 million.

3.2. Mean Monthly Marine Mammal Density Estimates

Mean monthly marine mammal density estimates (animals per 100 square kilometers [animals/100 km^2]) for all species are provided in Table 32. These were obtained using the 2022 Duke University Marine Geospatial Ecology Laboratory model results (Roberts et al. 2016, 2022), which were recently updated for all species. The 2022 updated NARW model (v12) provides model predictions for three eras, 2003–2019, 2003–2009, and 2010–2019, to reflect the apparent shift in NARW distribution around 2010. The modeling reported herein used the 2010–2019 density predictions as recommended by Roberts et al. (2022). Similarly, the 2022 updated humpback whale model (v11) provides model predictions for three eras, 2002–2019, 2002–2008, and 2009–2019. The modeling reported herein used the 2009–2019 density predictions as recommended by Roberts et al. (2022).

Densities were pre-calculated within buffered polygons of various ranges around the Lease Area perimeter (see Appendix H). The following ranges were pre-selected: 10, 25, 50, 75, 100, 125, and 150 km. For each species, foundation type, and attenuation level, the most appropriate density perimeter was selected from this list. The appropriate density buffer for each species and scenario was selected in post-processing using the 95th percentile exposure range ($ER_{95\%}$) for each case, rounding up to the next highest pre-computed buffer size. For example, if the $ER_{95\%}$ was 8.5 km, the 10 km perimeter would be used. If the exposure range for any metric were to exceed the maximum pre-selected buffer range, the largest buffer would be used. For this project none of the exposure ranges exceeded this maximum.

The mean species density for each month was determined by calculating the unweighted mean of all 5 × 5 km grid cells partially or fully within the analysis polygon. This is demonstrated in Figure 8 using the 10 km buffer size as an example. Densities were computed monthly, annually, and for the May–December period to coincide with proposed pile driving activities. The density table corresponding to the 10 km buffer is provided in Table 32. All other pre-computed density tables can be found in Appendix H.

There are two cases in this study for which the MGEL/Duke models report densities for species guilds: seals and pilot whales. When calculating exposures for individual pilot whale and seal species, the guild densities provided by Roberts et al. (2016, 2022) were scaled by the relative abundances of the species in each guild, using the best available estimates of local abundance, to get species-specific density estimates surrounding the Lease Area. In estimating local abundances, all distribution data from the two pilot whale species (long-finned and short finned pilot whales) and three seal species (gray seal, harbor seal, and harp seal) were downloaded from the Ocean Biodiversity Information System (OBIS) data repository (available at https://obis.org/). After reviewing the available datasets, it was deemed that data available in OBIS in Rhode Island and Massachusetts waters are the best available for the three seals species because of their overlap with the Lease Area. For seals, OBIS reported 86 observations of gray seals, 129 observations of harbor seals, and 93 observations of harp seals. Therefore, the proportions of 0.28 (86/308), 0.42 (129/308), and 0.30 (93/308) were used to scale the seals guild densities for the three seal species, respectively. The best data available for pilot whales came from AMAPPS data in Rhode Island and Massachusetts waters. The proportions of 0.80 for long-finned and 0.20 for short-finned pilot whales were used (Palka et al. 2021).

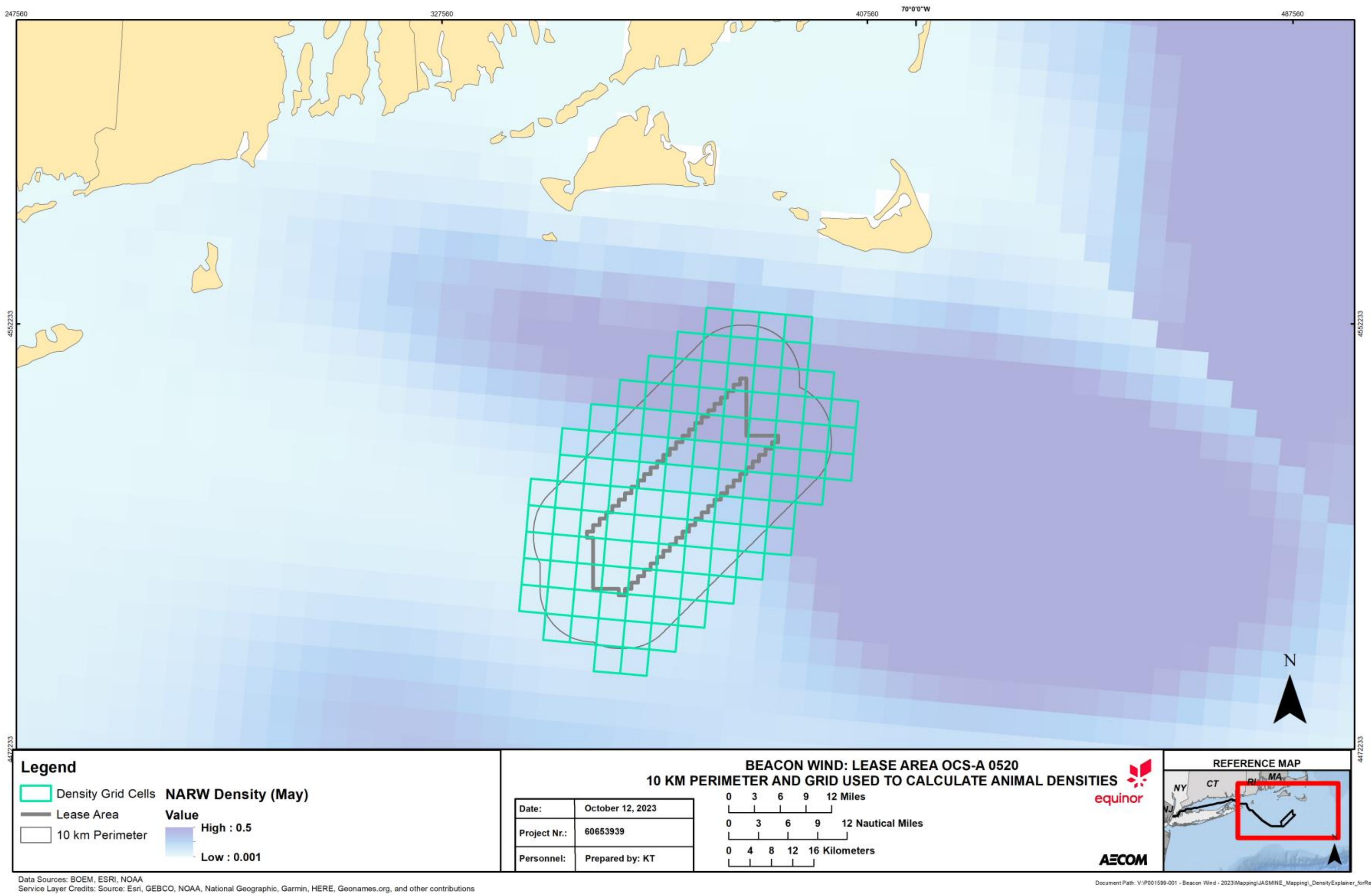

Figure 8. Marine mammal (e.g., North Atlantic right whale (NARW)) density map demonstrating how grid cells are selected for an example 10 km buffer. This subset of grid cells would then be used to extract mean monthly species densities around Lease Area OCS-A 0520 (Roberts et al. 2016, 2022). Other density buffers not shown here are: 25, 50, 75, 100, 125, and 150 km.

Table 32. Mean monthly marine mammal density estimates (animals/100 km^2)[a] for all species for the 10 km buffer around the Lease Area.

Species of interest	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual mean	May to December mean
Fin whale [b]	0.214	0.165	0.122	0.155	0.271	0.257	0.424	0.330	0.235	0.068	0.050	0.139	0.203	0.222
Minke whale	0.113	0.136	0.143	0.798	1.615	1.699	0.743	0.468	0.514	0.472	0.053	0.077	0.569	0.705
Humpback whale	0.029	0.024	0.047	0.160	0.291	0.316	0.180	0.117	0.163	0.234	0.192	0.030	0.149	0.191
North Atlantic right whale [b]	0.471	0.539	0.498	0.477	0.331	0.060	0.032	0.022	0.033	0.054	0.091	0.278	0.240	0.112
Sei whale [b]	0.038	0.023	0.047	0.115	0.188	0.057	0.014	0.011	0.018	0.037	0.083	0.066	0.058	0.059
Atlantic white sided dolphin	2.229	1.354	0.947	1.454	3.423	3.284	1.611	0.788	1.754	2.611	1.983	2.702	2.012	2.270
Atlantic spotted dolphin	0.001	<0.001	<0.001	0.004	0.026	0.039	0.039	0.064	0.335	0.529	0.167	0.017	0.102	0.152
Common dolphin	7.790	2.848	2.406	3.823	6.940	15.140	12.632	16.834	28.015	26.483	13.652	12.269	12.403	16.496
Common Bottlenose dolphin	0.479	0.112	0.065	0.181	0.864	1.440	1.541	1.764	1.651	1.506	1.372	1.149	1.010	1.411
Risso's dolphin	0.045	0.005	0.003	0.021	0.116	0.070	0.092	0.189	0.235	0.122	0.133	0.177	0.101	0.142
Long-finned pilot whale [c]	0.193	0.193	0.193	0.193	0.193	0.193	0.193	0.193	0.193	0.193	0.193	0.193	0.193	0.193
Short-finned pilot whale [c]	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048
Sperm whale [b]	0.036	0.014	0.014	0.003	0.014	0.029	0.046	0.142	0.074	0.058	0.035	0.024	0.041	0.053
Harbor porpoise	10.173	10.986	10.528	9.185	6.968	1.577	1.553	1.436	1.512	1.817	2.012	6.321	5.339	2.899
Gray seal	5.581	5.526	4.101	3.653	4.903	0.956	0.183	0.166	0.313	0.639	2.146	4.605	2.731	1.739
Harbor seal	8.371	8.289	6.152	5.480	7.355	1.434	0.274	0.249	0.470	0.959	3.219	6.907	4.097	2.608
Harp seal	5.979	5.921	4.394	3.914	5.254	1.024	0.196	0.178	0.336	0.685	2.299	4.934	2.926	1.863

[a] Density estimates are from habitat-based density modeling of the entire Atlantic Exclusive Economic Zone (EEZ) Roberts et al. (2016, 2022).
[b] Listed as Endangered under the ESA.
[c] Density adjusted by relative abundance.

3.3. Sea Turtles and Fish Species of Concern that May Occur in the Area

Four species of sea turtles may occur in the Project Area (Table 33), and all are listed as threatened or endangered: loggerhead sea turtle (Caretta caretta), Kemp's ridley sea turtle (*Lepidochelys kempii*), green sea turtle (*Chelonia mydas*), and leatherback sea turtle (*Dermochelys coriacea*). Many species of sea turtle prefer coastal waters; however, both the leatherback and loggerhead sea turtles are known to occupy deep-water habitats and are considered common during summer and fall in Southern New England waters. Kemp's Ridley sea turtles are thought to be regular visitors and green sea turtles, although uncommon, may be present during those seasons when water temperatures are highest.

There are four federally listed Threatened or Endangered fish species that may occur off the northeast Atlantic coast—the shortnose sturgeon (*Acipenser brevirostrum*), Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*), Atlantic salmon (*Salmo salar*), and giant manta ray (*Manta birostris*).

Atlantic sturgeon distribution varies by season, but they are primarily found in shallow coastal waters (bottom depth less than 20 m) during the summer months (May to September) and move to deeper waters (20–50 m) in winter and early spring (December to March) (Dunton et al. 2010). Shortnose sturgeon occur primarily in fresh and estuarine waters and occasionally enter the coastal ocean. Adults ascend rivers to spawn from February to April, and eggs are deposited over hard bottom, in shallow, fast-moving water (Dadswell et al. 1984). Because of their preference for mainland rivers and fresh and estuarine waters, shortnose sturgeon are unlikely to be found in the vicinity of the Project Area. Atlantic salmon is an anadromous species that historically ranged from northern Quebec southeast to Newfoundland and southwest to Long Island Sound. The Gulf of Maine Distinct Population Segment (DPS) of the Atlantic salmon that spawns within eight coastal watersheds within Maine is federally listed as Endangered. In 2009, the DPS was expanded to include all areas of the Gulf of Maine between the Androscoggin River and the Dennys River (NOAA Fisheries 2022). It is possible that adult Atlantic salmon may occur off the Massachusetts coast while migrating to rivers to spawn. However, only certain Gulf of Maine populations are listed as Endangered, and Gulf of Maine salmon are unlikely to be encountered south of Cape Cod (BOEM 2014).

The giant manta ray is found worldwide in tropical, subtropical, and temperate bodies of water and is commonly found offshore, in oceanic waters, and near productive coastlines. As such, giant manta rays can be found in cool water, as low as 19°C, although temperature preference appears to vary by region. For example, off the US East Coast, giant manta rays are commonly found in waters from 19 to 22°C, whereas those off the Yucatan peninsula and Indonesia are commonly found in waters between 25 to 30°C. Individuals have been observed as far north as New Jersey in the Western Atlantic basin indicating that the Offshore Development Area is located at the northern boundary of the species' range (NOAA Fisheries 2021).

Table 33. Sea turtle species potentially occurring within the regional waters of the Western North Atlantic Outer Continental Shelf (OCS) and Project Area.

Species	Scientific name	Regulatory status [a]	Relative occurrence in Beacon Wind
Leatherback sea turtle [b]	*Dermochelys coriacea*	ESA Endangered	Common
Loggerhead sea turtle [b]	*Caretta caretta*	ESA Threatened	Common
Kemp's ridley sea turtle [b]	*Lepidochelys kempii*	ESA Endangered	Uncommon
Green sea turtle [b]	*Cheloria mydas*	ESA Threatened	Uncommon

[a] Listing status as stated in NOAA Fisheries n.d., MA NHESP 2019; RI DEM 2011; NYSDEC 2020a.

[b] Modeled species.

3.4. Sea Turtle Density Estimates

Sea turtle density within the Lease Area were estimated using the East Coast sea turtle density models developed by the U.S. Naval Undersea Warfare Center (NUWC; DiMatteo et al. 2023). Leatherback sea turtle density estimates were based on version 2 of the model (DiMatteo et al. (2023)) while other species used version 1. The data are long-term monthly average estimates of density and are expressed as the number of individuals per square kilometer. Sea turtle densities used in exposure estimates are provided in Table 34.

Densities were calculated within buffered polygons of various ranges around the Lease Area perimeter (see Appendix H). The following ranges were pre-selected: 10, 25, 50, 75, 100, 125, and 150 km. For each species, foundation type, and attenuation level, the most appropriate density perimeter was selected from this list. The range was selected using the 95th percentile exposure range ($ER_{95\%}$) for each case, using the next highest range.

Table 34. Sea turtle density estimates (animals/100 km^2)[a] for all modeled species in a 10 km perimeter around the Lease Area.

Common name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual mean	May to Dec mean
Kemp's ridley sea turtle	0	0	0	0	0	0.002	0.005	0.004	0.004	0.003	<0.001	0	0.002	0.002
Leatherback sea turtle	<0.001	<0.001	<0.001	<0.001	0.002	0.042	0.104	0.170	0.244	0.146	0.025	0.002	0.061	0.092
Loggerhead sea turtle	0.002	<0.001	<0.001	0.001	0.003	0.011	0.020	0.021	0.026	0.026	0.012	0.003	0.011	0.015
Green sea turtle	0	0	0	0	0	0.021	0.095	0.091	0.088	0.015	0.002	0	0.026	0.039

[a] Density estimates are from DiMatteo et al. (2023).

4. Results

Sound fields were modeled at both OSS locations for the respective pin piles, and at two locations for WTG pin piles and monopiles, representing the range of water depths within the Project (Figure 2 and Table 1). This section summarizes the source modeling results (Section 4.1), the acoustic propagation modeling results (Section 4.2), animal movement modeling results for marine mammals and sea turtles (Sections 4.3 and 4.4), and the acoustic radial distance to thresholds for fish (Sections 4.2.1.3 and 4.2.1.4). The report tables indicate the relevant Wood step function for each marine mammal (migrating, sensitive (harbor porpoise only), or general (all others)) and the reader should refer to Table 28 for more details.

4.1. Modeled Source Characteristics

4.1.1. Impact Pile Driving

Forcing functions were computed for the 3 m OSS pin piles (Figures 9–10), the 4.5 m WTG pin pile (Figure 13), and the 13 m WTG monopiles (Figures 14–16), using GRLWEAP 2010 (GRLWEAP, Pile Dynamics 2010). The model assumed direct contact between the hammer, helmet, and pile (i.e., no cushion material), and results are independent of location. The forcing functions serve as the inputs to JASCO's pile driving source models used to estimate equivalent acoustic source characteristics detailed in Appendix D. Decidecade band levels at 10 m from each modeled pile, and for average summer and winter conditions, are shown in Figures 11 and 12 for OSS1 and OSS2, and Figures 17–24 for WTG pin pile and monopiles at modeling locations AY42 and BM38. Equivalently, decidecade band levels at 750 m from each of the modeled piles are presented in Appendix G. Computed broadband sound exposure levels at 10 and 750 m from OSS1 and OSS2 piles, for summer and winter conditions, are presented in Tables 35 and 36, respectively. Broadband sound exposure levels for the WTG jacket pile and monopiles are presented in Tables 37–41 for summer and winter conditions, and for 10 and 750 m away from the piles.

4.1.1.1. OSS Pin Piles

4.1.1.1.1. Forcing Functions

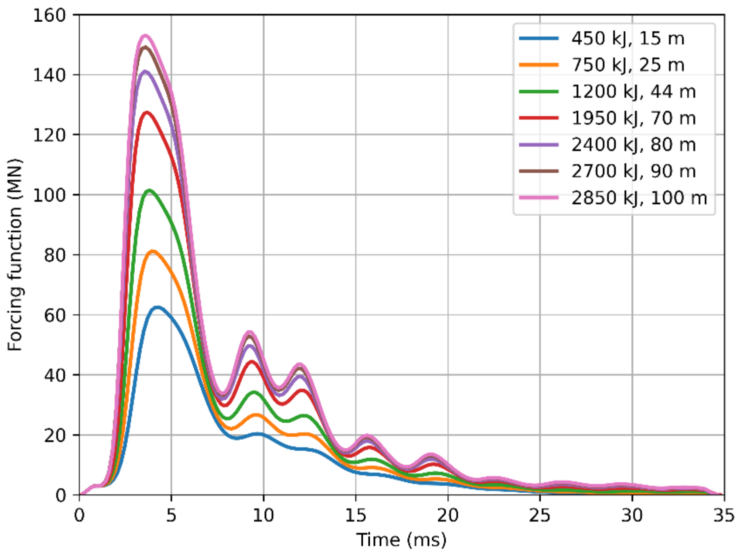

Figure 9. Modeled forcing functions versus time for 3 m diameter OSS1 pin pile, as a function of hammer energy and soil penetration depth.

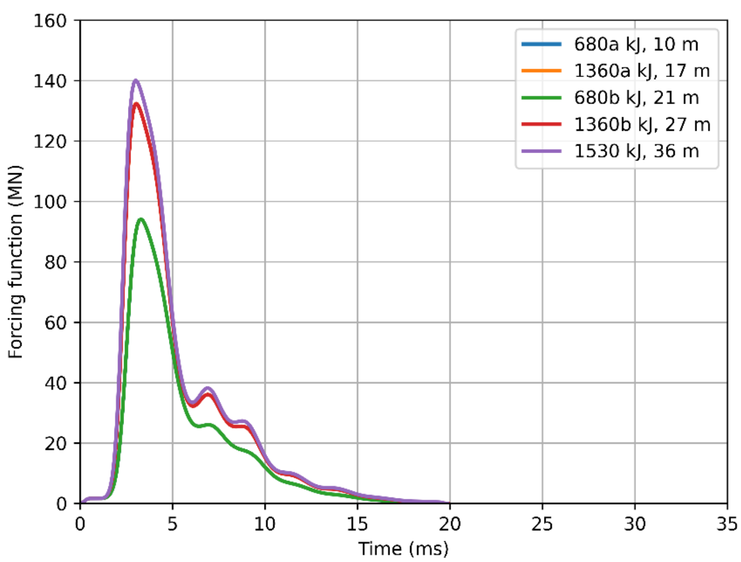

Figure 10. Modeled forcing functions versus time for 3 m diameter OSS2 pin pile, as a function of hammer energy and soil penetration depth. Letters *a* and *b* indicate order of piling for repeated energy levels.

4.1.1.1.2. Decidecade Band Plots

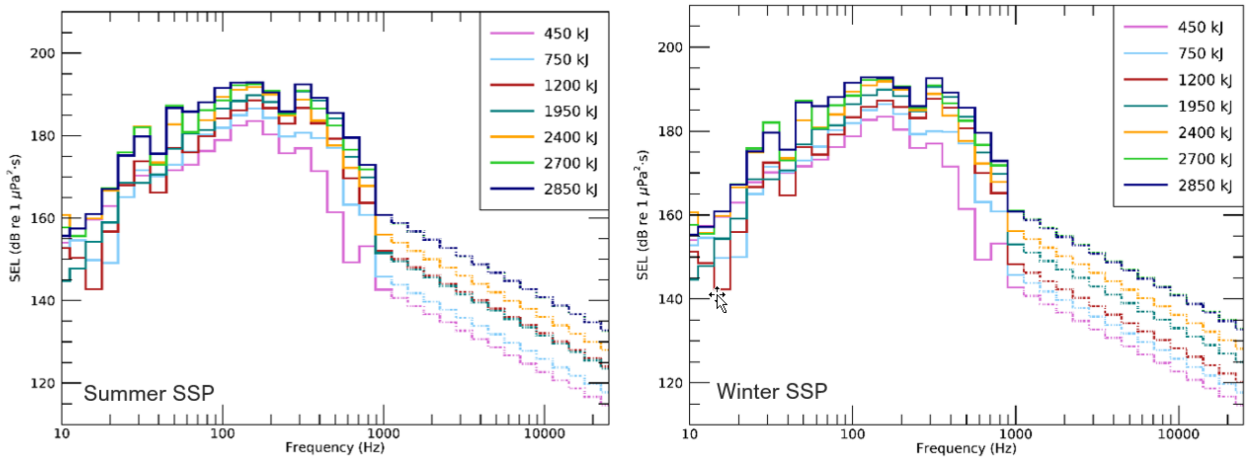

Figure 11. Per-strike decidecade band SEL at 10 m from a 3 m diameter OSS1 pin pile assuming an expected installation scenario using a 3000 kJ hammer with average summer and winter sound speed profiles. The values at higher frequencies (1–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

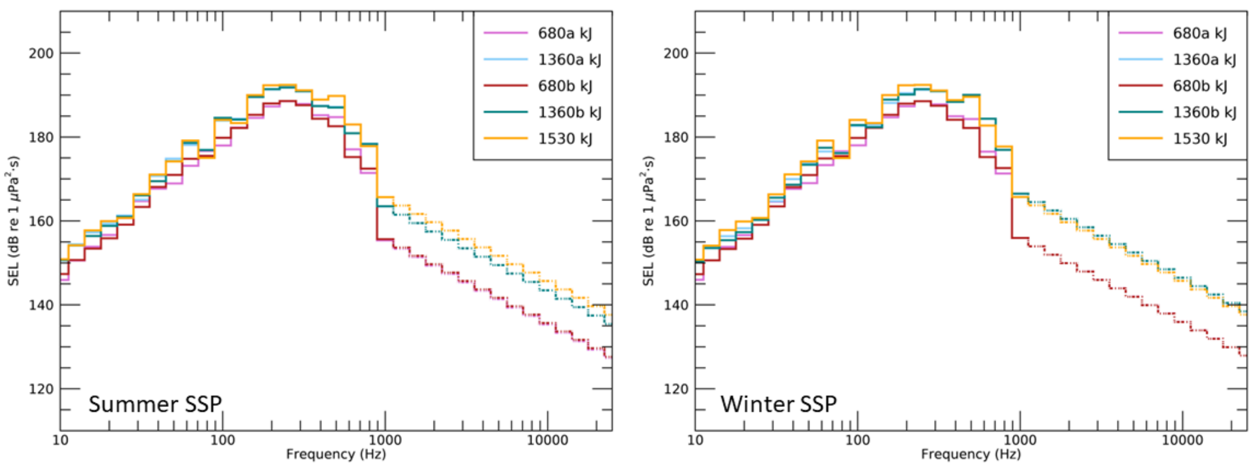

Figure 12. Per-strike decidecade band SEL at 10 m from a 3 m diameter OSS2 pin pile assuming an expected installation scenario using a 1700 kJ hammer with average summer and winter sound speed profiles. Letters *a* and *b* indicate order of piling for repeated energy levels. The values at higher frequencies (1–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

Table 35. Per-strike broadband SEL (dB re 1 µPa²·s) per modeled energy level at 10 and 750 m from a 3 m diameter OSS1 pin pile installed using a 3000 kJ hammer, for summer and winter conditions.

Energy level (kJ)	L_E @ 10 m Summer	L_E @ 10 m Winter	L_E @ 750 m Summer	L_E @ 750 m Winter
450	189.0	189.0	167.4	168.2
750	192.4	192.3	170.9	171.7
1200	194.8	194.7	173.0	173.8
1950	197.5	197.4	175.8	176.5
2400	198.3	198.3	176.0	176.6
2700	199.5	199.5	175.5	175.6
2850	200.6	200.6	173.5	173.8

Table 36. Per-strike broadband SEL (dB re 1 µPa²·s) per modeled energy level at 10 and 750 m from a 3 m diameter OSS1 pin pile installed using a 3000 kJ hammer, for summer and winter conditions.

Energy level (kJ)	L_E @ 10 m Summer	L_E @ 10 m Winter	L_E @ 750 m Summer	L_E @ 750 m Winter
450	189.0	189.0	167.4	168.2
750	192.4	192.3	170.9	171.7
1200	194.8	194.7	173.0	173.8
1950	197.5	197.4	175.8	176.5
2400	198.3	198.3	176.0	176.6
2700	199.5	199.5	175.5	175.6
2850	200.6	200.6	173.5	173.8

4.1.1.2. WTG Pin Pile and Monopiles

4.1.1.2.1. Forcing Functions

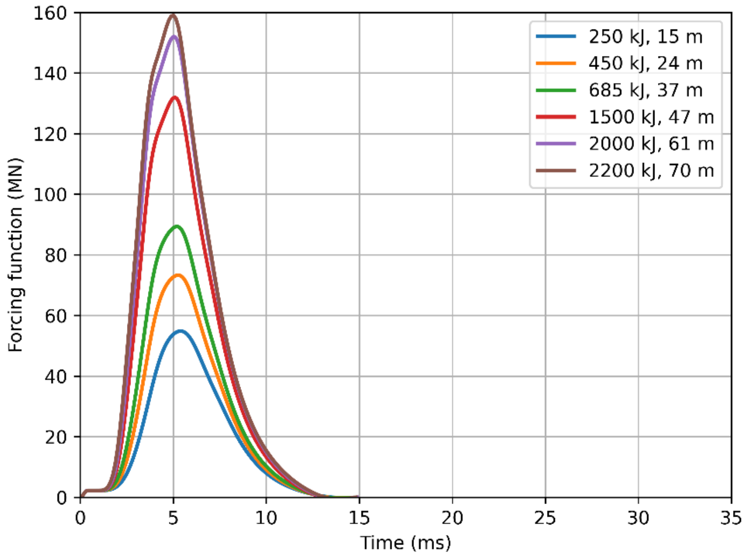

Figure 13. Modeled forcing functions versus time for WTG 4.5 m diameter pin pile, as a function of hammer energy and soil penetration depth.

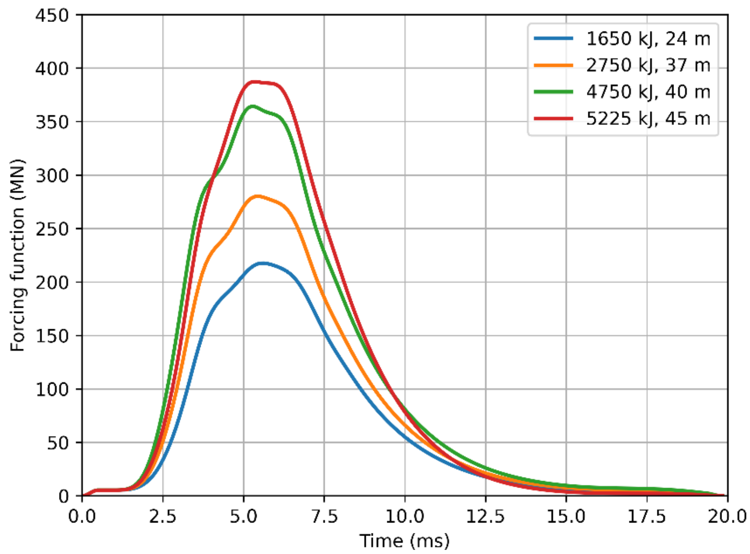

Figure 14. Modeled forcing functions versus time for WTG MP1 13 m diameter monopile, as a function of hammer energy and soil penetration depth.

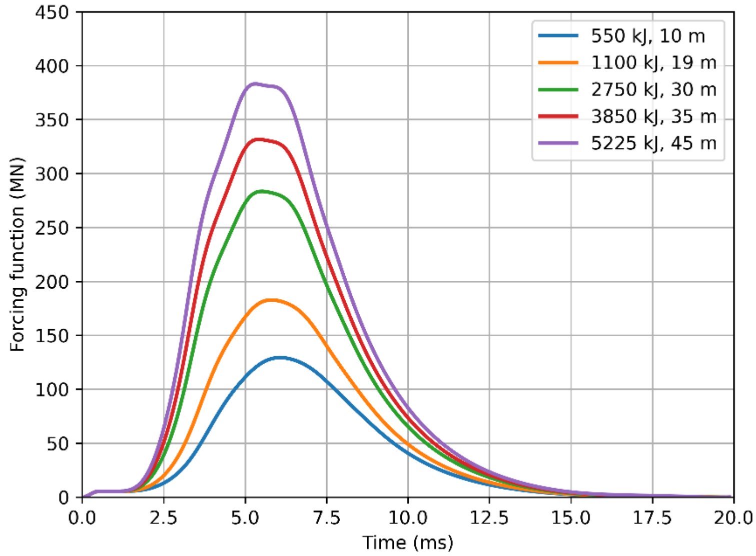

Figure 15. Modeled forcing functions versus time for WTG MP2 13 m diameter monopile, as a function of hammer energy and soil penetration depth.

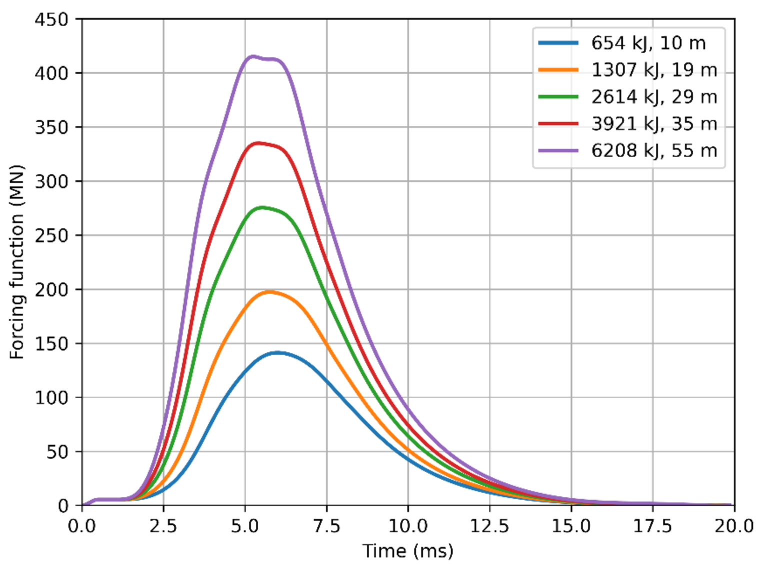

Figure 16. Modeled forcing functions versus time for WTG MP3 13 m diameter monopile, as a function of hammer energy and soil penetration depth.

4.1.1.2.2. Decidecade Band Plots

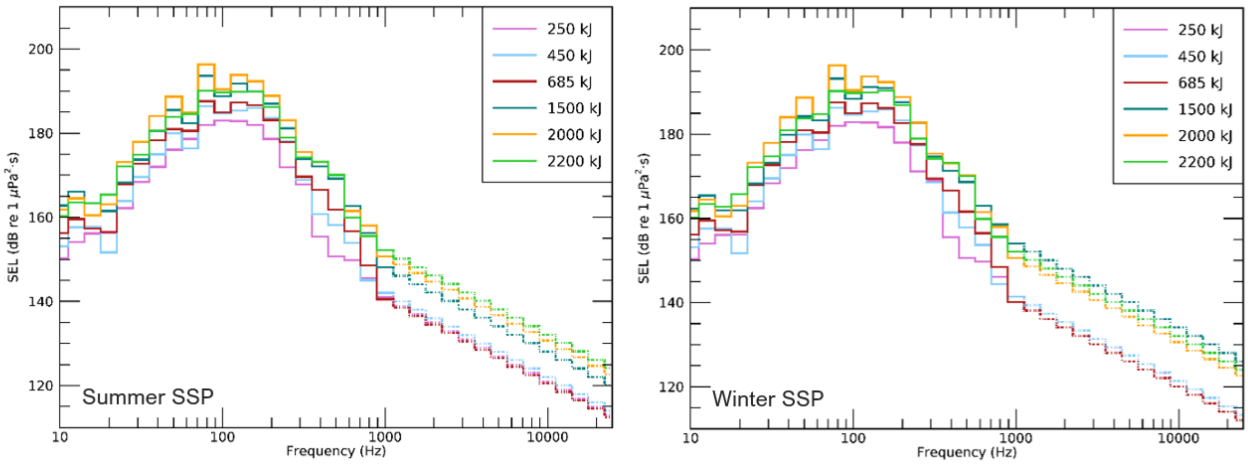

Figure 17. Location AY42: per-strike decidecade band levels at 10 m from a 4.5 m diameter WTG pin pile assuming an expected installation scenario using a 2300 kJ hammer with average summer and winter sound speed profiles. The values at higher frequencies (1–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

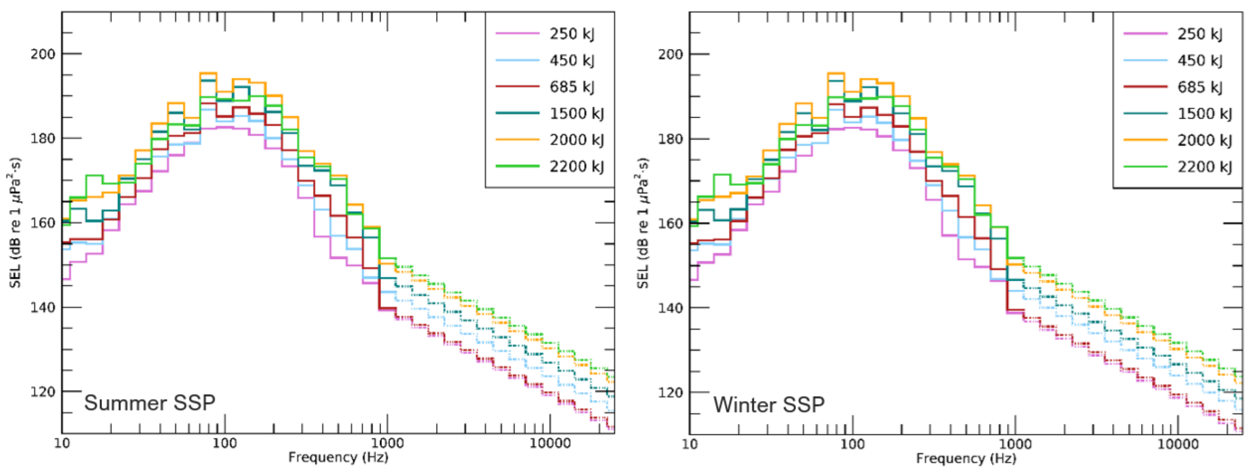

Figure 18. Location BM28: per-strike decidecade band levels at 10 m from a 4.5 m diameter WTG pin pile assuming an expected installation scenario using a 2300 kJ hammer with average summer and winter sound speed profiles. The values at higher frequencies (1–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

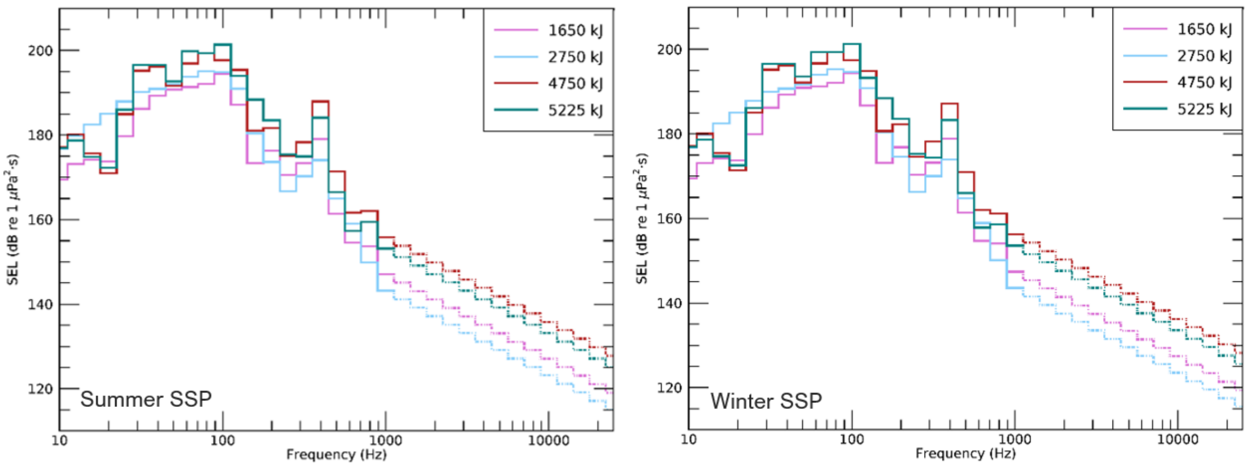

Figure 19. Location AY42: per-strike decidecade band levels at 10 m from WTG MP1 13 m diameter monopile assuming an expected installation scenario using a 5500 kJ hammer with average summer and winter sound speed profiles. The values at higher frequencies (1–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

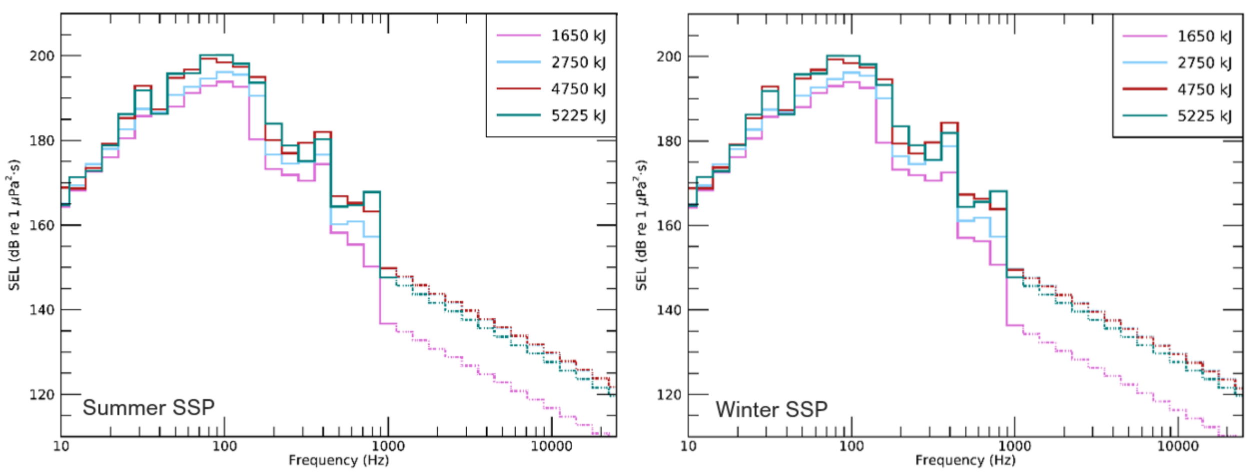

Figure 20. Location BM28: per-strike decidecade band levels at 10 m from WTG MP1 13 m diameter monopile assuming an expected installation scenario using a 5500 kJ hammer with average summer and winter sound speed profiles. The values at higher frequencies (1–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

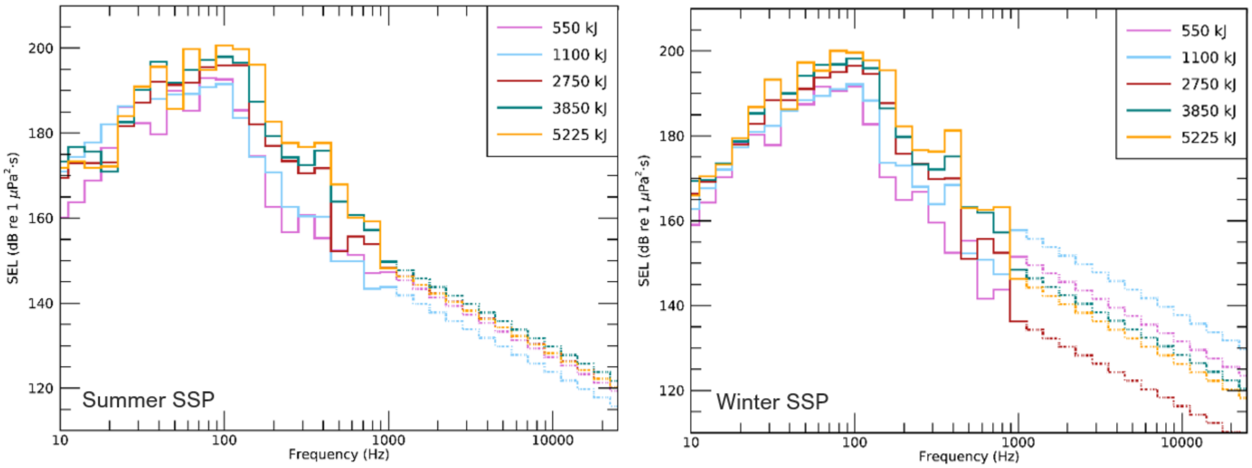

Figure 21. Location AY42: per-strike decidecade band levels at 10 m from WTG MP2 13 m diameter monopile assuming an expected installation scenario using a 5500 kJ hammer with average summer and winter sound speed profiles. The values at higher frequencies (1–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

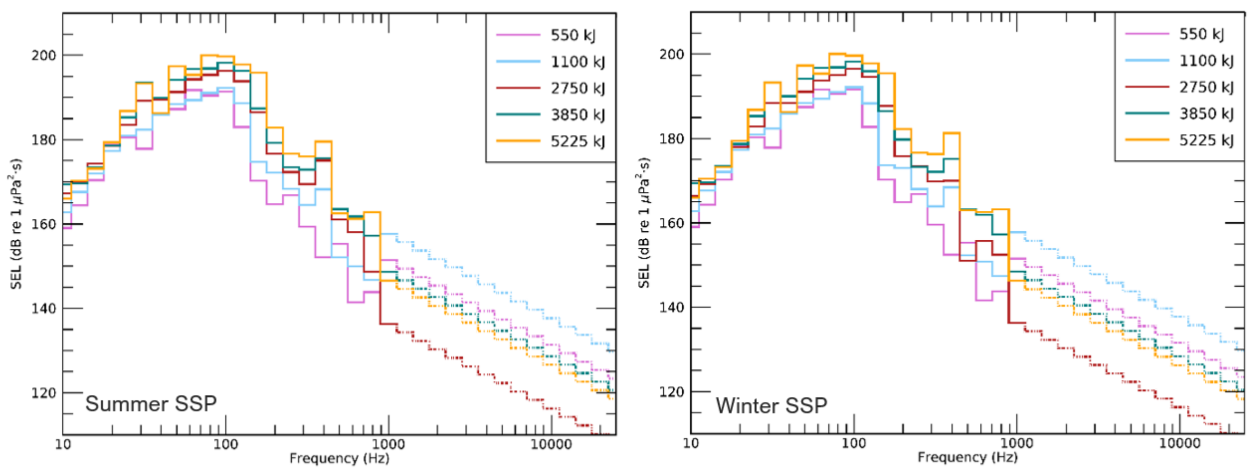

Figure 22. Location BM28: per-strike decidecade band levels at 10 m from WTG MP2 13 m diameter monopile assuming an expected installation scenario using a 5500 kJ hammer with average summer and winter sound speed profiles. The values at higher frequencies (1–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

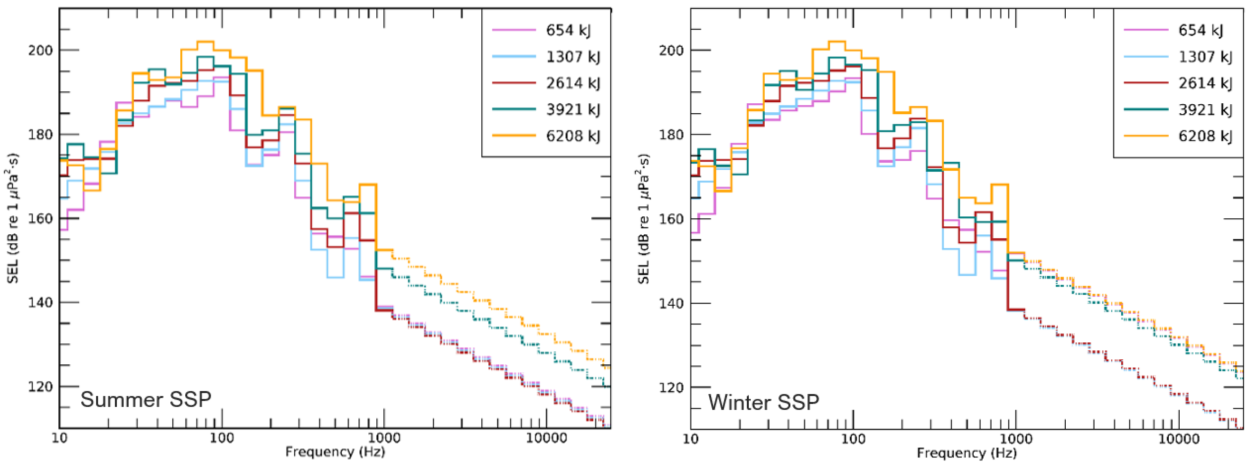

Figure 23. Location AY42: per-strike decidecade band levels at 10 m from WTG MP3 13 m diameter monopile assuming an expected installation scenario using a 5500 kJ hammer extrapolated to 6500 kJ with average summer and winter sound speed profiles. The values at higher frequencies (1–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

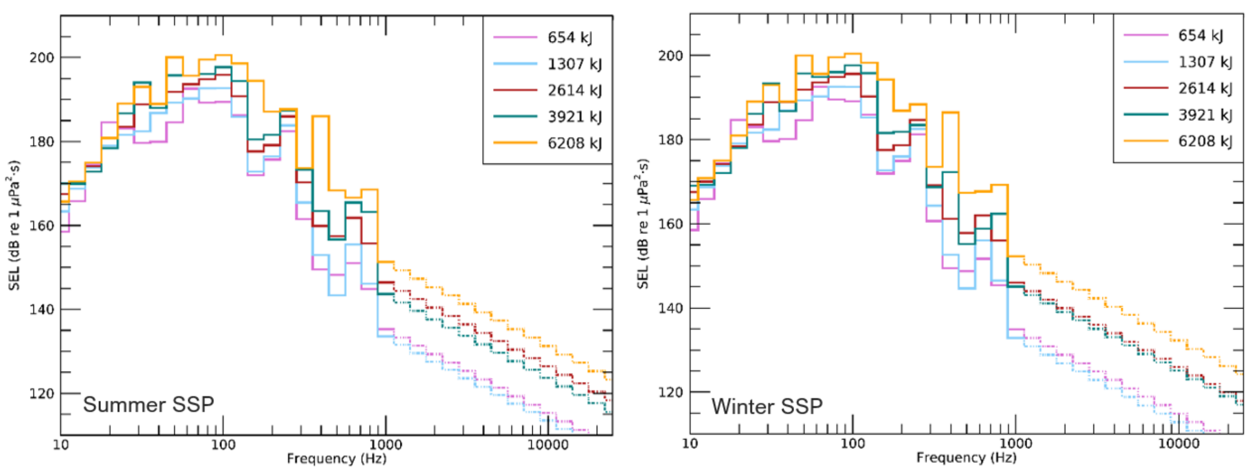

Figure 24. Location BM28: per-strike decidecade band levels at 10 m from WTG MP3 13 m diameter monopile assuming an expected installation scenario using a 5500 kJ hammer extrapolated to 6500 kJ with average summer and winter sound speed profiles. The values at higher frequencies (1–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

Table 37. Per-strike broadband SEL (dB re 1 µPa²·s) per modeled energy level at 10 and 750 m from a 4.5 m diameter WTG jacket pile installed using a 2300 kJ hammer at location AY42, for summer and winter conditions. repeated energy levels.

Energy level (kJ)	L_E @ 10 m Summer	L_E @ 10 m Winter	L_E @ 750 m Summer	L_E @ 750 m Winter
250	189.7	189.6	167.2	168.0
450	192.9	192.8	170.6	171.3
685	194.0	193.9	171.8	172.3
1500	198.4	198.3	174.7	175.2
2000	200.8	200.8	174.8	174.6
2200	197.1	197.3	172.6	172.6

Table 38. Per-strike broadband SEL (dB re 1 µPa²·s) per modeled energy level at 10 and 750 m from a 4.5 m diameter WTG jacket pile installed using a 2300 kJ hammer at location BM28, for summer and winter conditions.

Energy level (kJ)	L_E @ 10 m Summer	L_E @ 10 m Winter	L_E @ 750 m Summer	L_E @ 750 m Winter
250	189.4	189.3	165.9	165.2
450	192.2	192.1	169.5	169.9
685	194.0	193.9	169.0	169.0
1500	198.5	198.5	174.0	174.8
2000	200.8	200.8	174.2	174.3
2200	197.0	197.0	174.6	175.7

Table 39. Per-strike broadband SEL (dB re 1 µPa²·s) per modeled energy level at 10 and 750 m from a 13 m diameter WTG MP1 pile installed using a 5500 kJ [a] hammer at location AY42, for summer and winter conditions.

Energy level (kJ)	L_E @ 10 m Summer	L_E @ 10 m Winter	L_E @ 750 m Summer	L_E @ 750 m Winter
1650	199.6	199.6	176.3	176.9
2750	201.8	201.8	179.6	180.3
4750	205.2	205.1	182.4	183.0
5225	206.8	206.6	183.5	184.1

[a] Maximum hammer energy does not exceed 5,225 kJ.

Table 40. Per-strike broadband SEL (dB re 1 µPa²·s) per modeled energy level at 10 and 750 m from a 13 m diameter WTG MP1 pile installed using a 5500 kJ [a] hammer at location BM28, for summer and winter conditions.

Energy level (kJ)	L_E @ 10 m Summer	L_E @ 10 m Winter	L_E @ 750 m Summer	L_E @ 750 m Winter
1650	199.7	199.7	175.8	175.6
2750	202.1	202.1	178.3	178.2
4750	205.5	205.4	181.6	181.8
5225	206.1	206.0	182.9	182.9

[a] Maximum hammer energy does not exceed 5,225 kJ.

Table 41. Per-strike broadband SEL (dB re 1 µPa²·s) per modeled energy level at 10 and 750 m from a 13 m diameter WTG MP2 pile installed using a 5500 kJ [a] hammer at location AY42, for summer and winter conditions.

Energy level (kJ)	L_E @ 10 m Summer	L_E @ 10 m Winter	L_E @ 750 m Summer	L_E @ 750 m Winter
550	198.0	198.0	176.1	176.2
1100	198.1	198.0	175.2	175.7
2750	202.3	202.3	180.0	180.6
3850	204.4	204.3	182.3	183.1
5225	206.4	206.4	183.8	184.6

[a] Maximum hammer energy does not exceed 5,225 kJ.

Table 42. Per-strike broadband SEL (dB re 1 µPa²·s) per modeled energy level at 10 and 750 m from a 13 m diameter WTG MP2 pile installed using a 5500 kJ [a] hammer at location BM28, for summer and winter conditions.

Energy level (kJ)	L_E @ 10 m Summer	L_E @ 10 m Winter	L_E @ 750 m Summer	L_E @ 750 m Winter
550	197.3	197.4	174.1	173.8
1100	197.8	197.8	174.1	173.7
2750	202.3	202.2	178.2	177.9
3850	204.4	204.3	180.0	180.1
5225	206.2	206.1	182.7	182.9

[a] Maximum hammer energy does not exceed 5,225 kJ.

Table 43. Per-strike broadband SEL (dB re 1 µPa²·s) per modeled energy level at 10 and 750 m from a 13 m diameter WTG MP3 pile installed using a 5500 kJ [a] hammer extrapolated to 6500 kJ at location AY42, for summer and winter conditions.

Energy level (kJ)	L_E @ 10 m Summer	L_E @ 10 m Winter	L_E @ 750 m Summer	L_E @ 750 m Winter
654	197.6	197.6	175.9	176.3
1307	198.5	198.5	175.7	176.4
2614	201.7	201.6	178.6	179.4
3921	203.9	203.8	181.6	182.5
6208	207.4	207.4	185.7	186.3

[a] Maximum hammer energy does not exceed 6,208 kJ.

Table 44. Per-strike broadband SEL (dB re 1 µPa²·s) per modeled energy level at 10 and 750 m from a 13 m diameter WTG MP3 pile installed using a 5500 kJ [a] hammer extrapolated to 6500 kJ at location BM28, for summer and winter conditions.

Energy level (kJ)	L_E @ 10 m Summer	L_E @ 10 m Winter	L_E @ 750 m Summer	L_E @ 750 m Winter
654	197.2	197.1	174.0	174.2
1307	198.6	198.5	174.6	174.2
2614	201.6	201.5	177.5	177.4
3921	203.9	203.9	180.0	180.1
6208	206.9	206.9	184.1	184.0

[a] Maximum hammer energy does not exceed 6,208 kJ.

4.1.2. Vibratory Pile Driving

The WTG foundations were also assumed to be installed by vibratory and impact pile driving. In this section, the source characteristics for the vibratory pile driving stage are presented. Figures 25 and 26 show 1-second long forcing functions for the jacket and monopile under vibratory hammers calculated using GRLWEAP 2010 (GRLWEAP, Pile Dynamics 2010) with the addition of non-linearities (see Section 2.2.2). The most conservative vibratory forcing function of all monopile scenarios, i.e., the one with the highest amplitudes, was used as a representative forcing function and input to PDSM. Decidecade band levels at 10 m from the modeled piles are shown in Figures 27–-34. Observed peaks correspond to the frequency of vibration of the hammer and subsequent harmonics. Corresponding plots at 750 m from the piles are presented in Appendix G. Broadband sound exposure levels for vibratory piling for the WTG jacket pile and monopiles are presented in Tables 45–48 considering 30 and 60 min of piling, for summer and winter conditions, and for 10 and 750 m away from the piles.

4.1.2.1. WTG Pin Pile and Monopiles

4.1.2.1.1. Forcing Functions

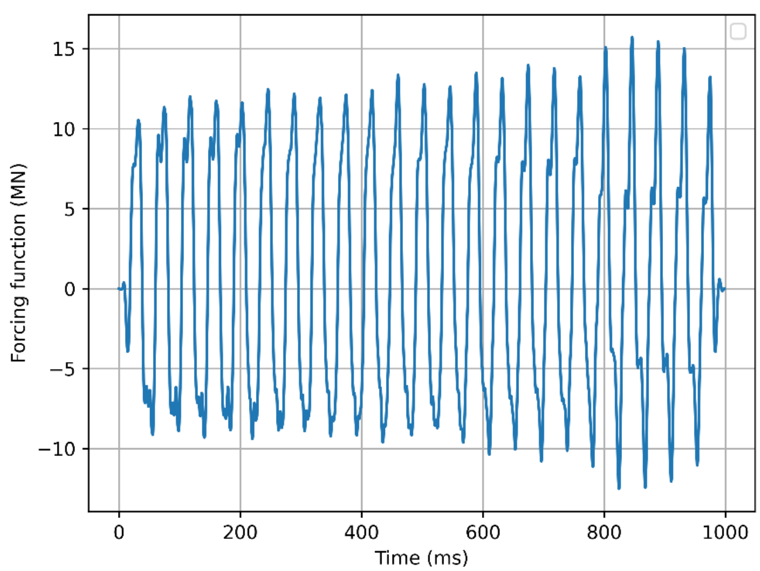

Figure 25. Modeled 1-second vibratory forcing function for a WTG 4.5 m diameter pin pile.

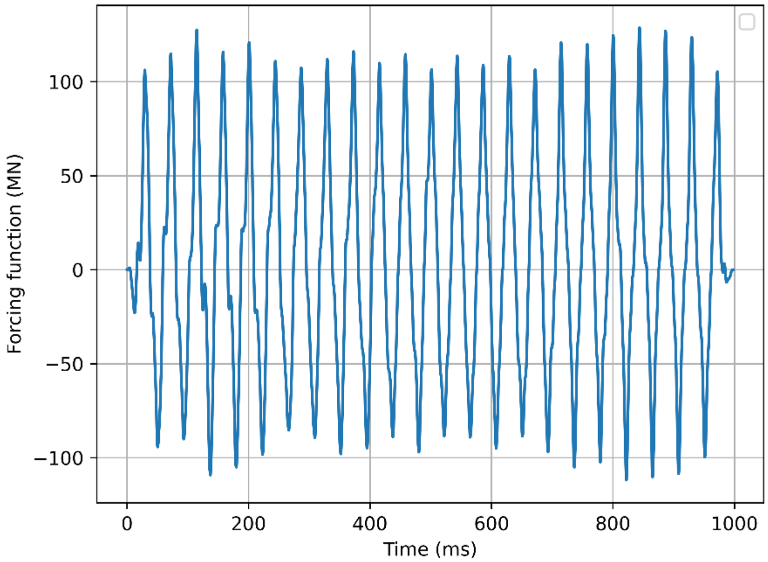

Figure 26. Modeled 1-second vibratory forcing function for a WTG 13 m diameter monopile.

4.1.2.1.2. Decidecade Band Plots

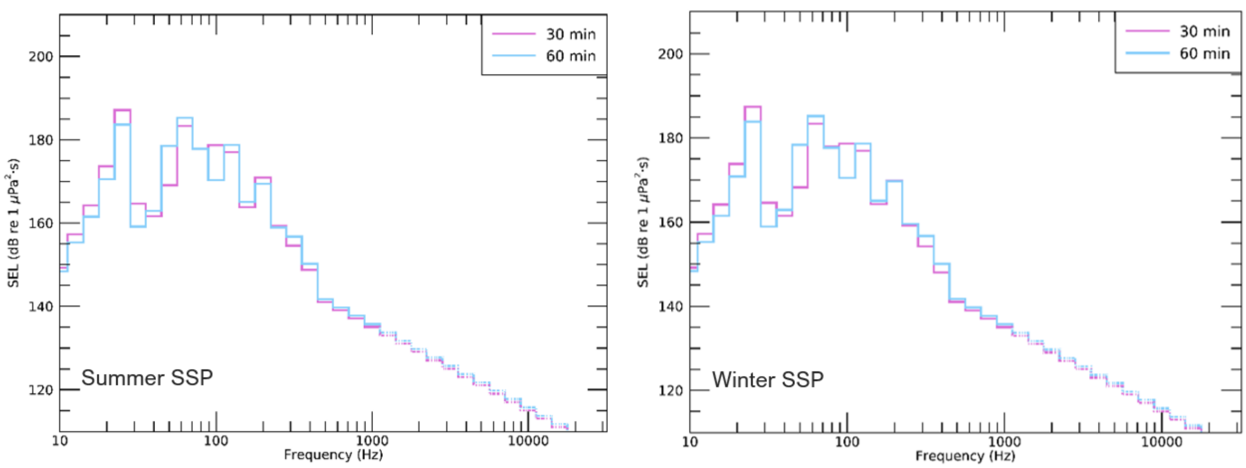

Figure 27. Location AY42: decidecade band SEL at 10 m from a 4.5 m diameter WTG pin pile assuming vibratory pile setting using a TA-CV320 hammer with average summer and winter sound speed profiles. The values at higher frequencies (1–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

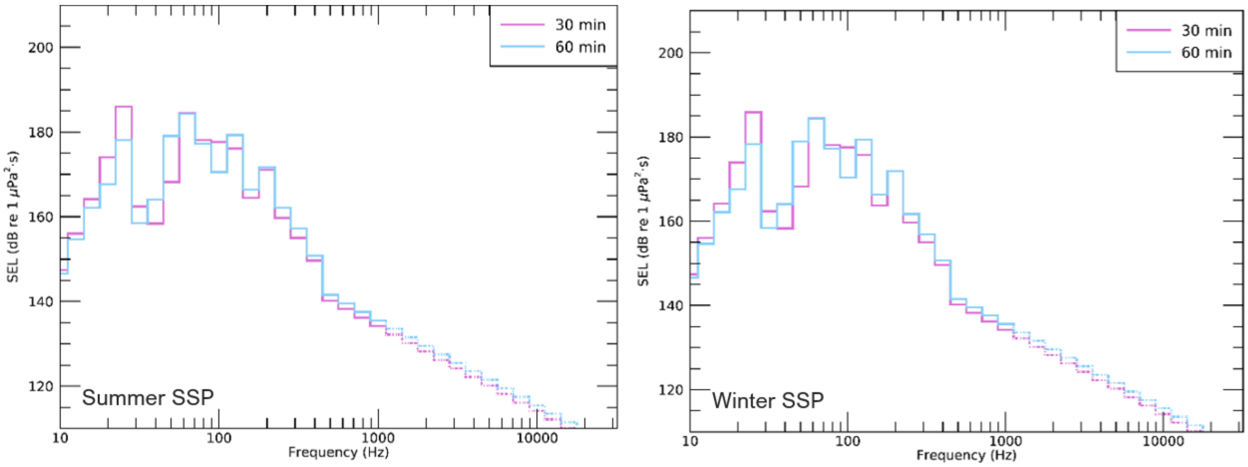

Figure 28. Location BM28: decidecade band SEL at 10 m from a 4.5 m diameter WTG pin pile assuming vibratory pile setting using a TA-CV320 hammer with average summer and winter sound speed profiles. The values at higher frequencies (1–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

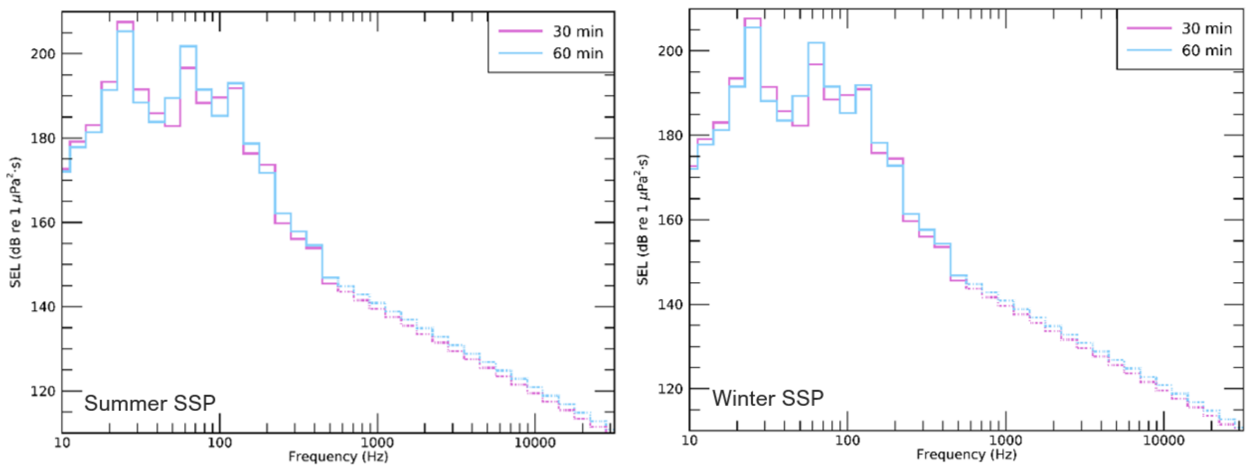

Figure 29. Location AY42: decidecade band SEL at 10 m from a WTG MP1 13 m diameter monopile assuming vibratory pile setting using a QU-CV640 hammer with average summer and winter sound speed profiles. The values at higher frequencies (0.5–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

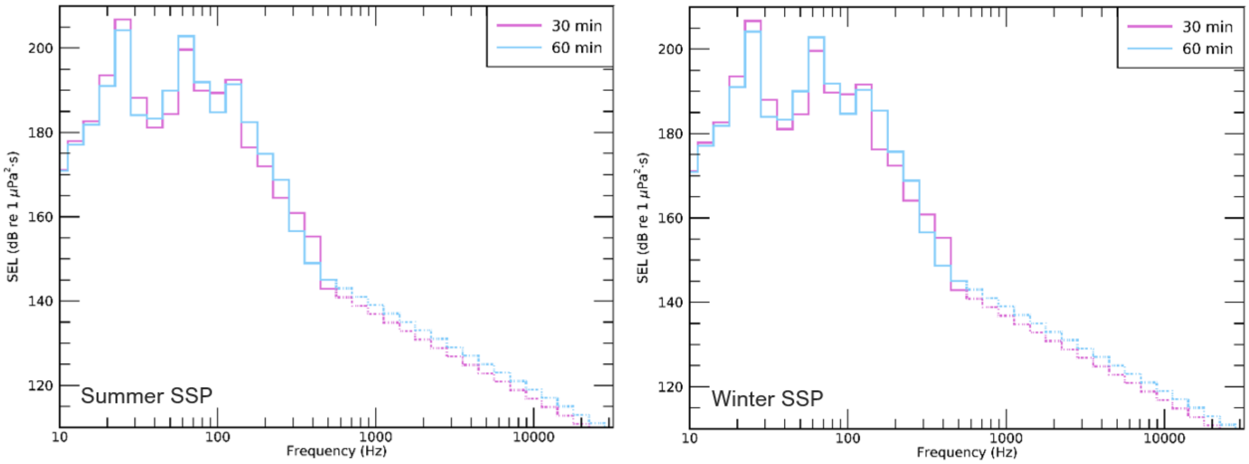

Figure 30. Location BM28: decidecade band SEL over 1 second at 10 m from a WTG MP1 13 m diameter monopile assuming vibratory pile setting using a QU-CV640 hammer with average summer and winter sound speed profiles. The values at higher frequencies (0.5–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

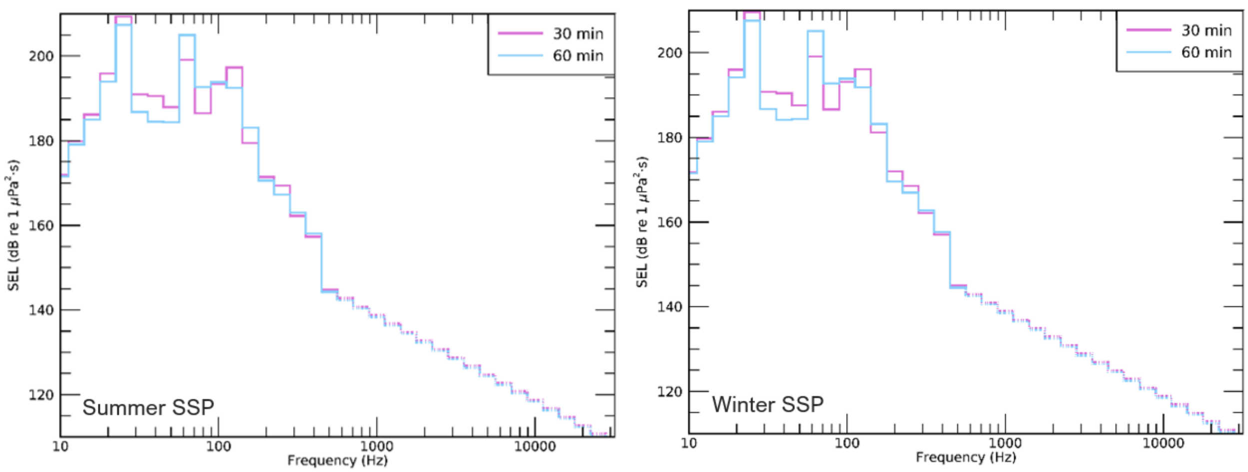

Figure 31. Location AY42: decidecade band SEL at 10 m from a WTG MP2 13 m diameter monopile assuming vibratory pile setting using a QU-CV640 hammer with average summer and winter sound speed profiles. The values at higher frequencies (0.5–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

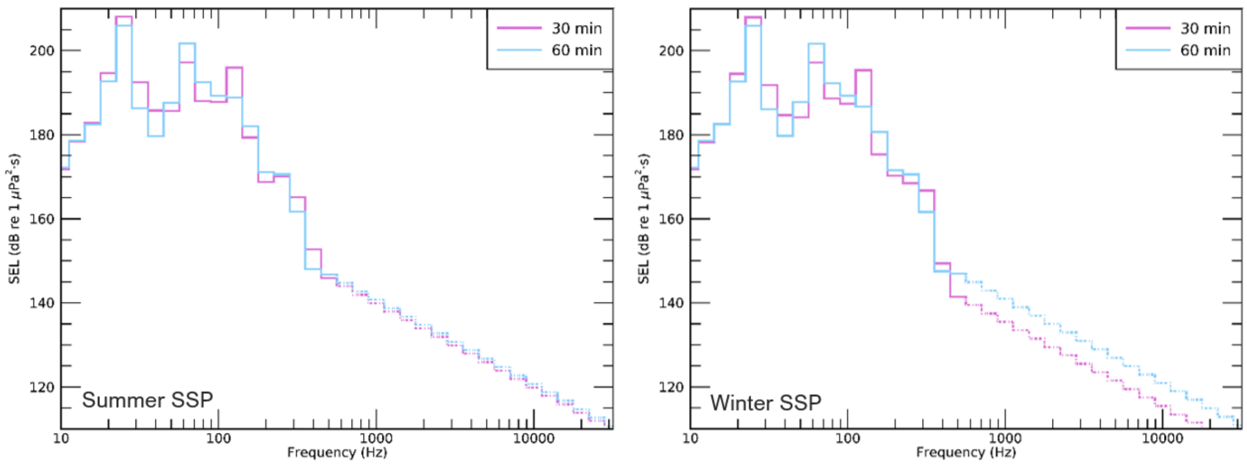

Figure 32. Location BM28: decidecade band SEL at 10 m from a WTG MP2 13 m diameter monopile assuming vibratory pile setting using a QU-CV640 hammer with average summer and winter sound speed profiles. The values at higher frequencies (0.5–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

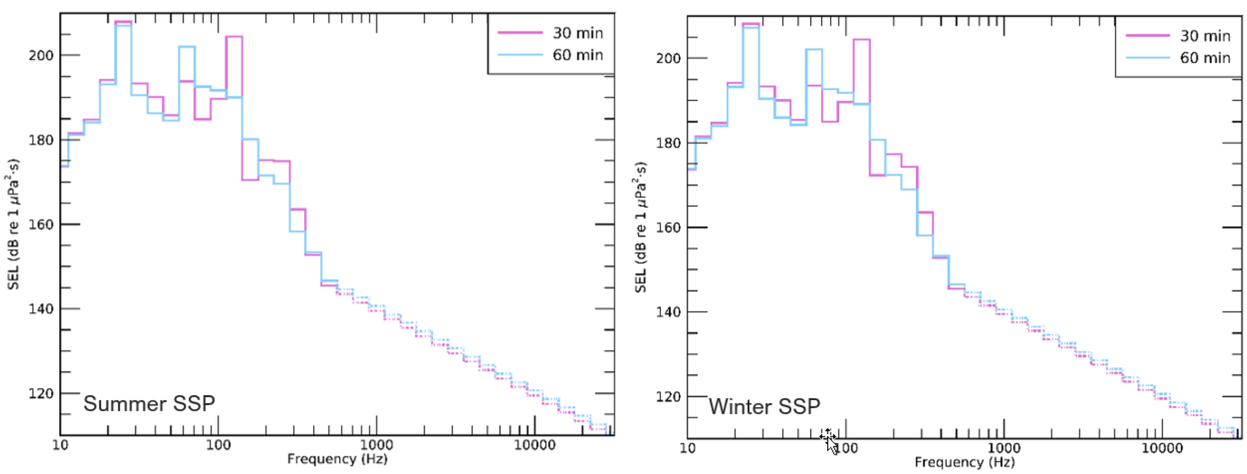

Figure 33. Location AY42: decidecade band SEL at 10 m from a WTG MP3 13 m diameter monopile assuming vibratory pile setting using a QU-CV640 hammer with average summer and winter sound speed profiles. The values at higher frequencies (0.5–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

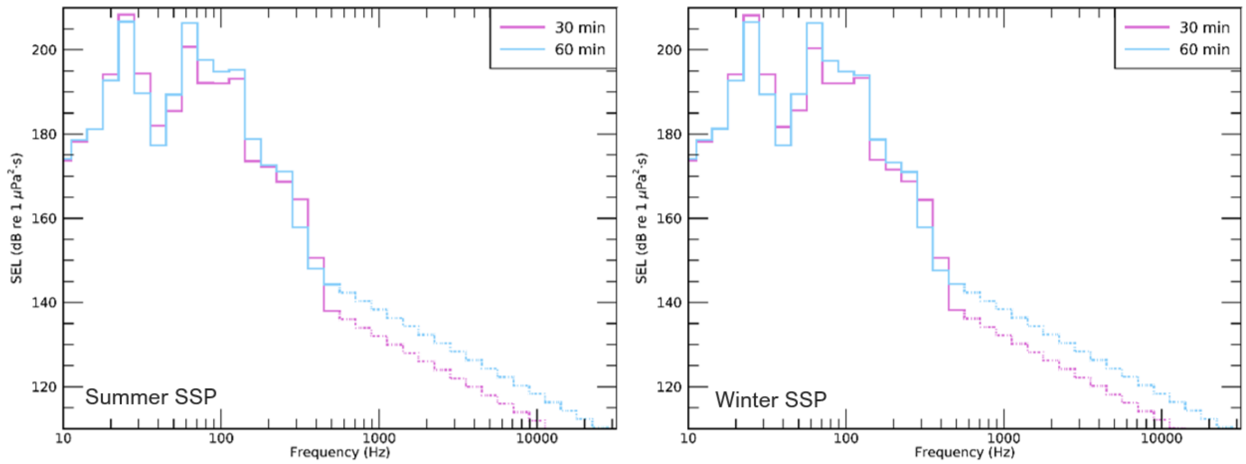

Figure 34. Location BM28: decidecade band SEL at 10 m from a WTG MP3 13 m diameter monopile assuming vibratory pile setting using a QU-CV640 hammer with average summer and winter sound speed profiles. The values at higher frequencies (0.5–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

Table 45. Broadband SEL (dB re 1 µPa^2·s) per modeled energy level at 10 and 750 m from a 4.5 m diameter WTG pin pile with installation using a TA-CV320 hammer at both locations, for summer and winter conditions.

Modeling location	Duration of Vibro-hammering (min)	L_E @ 10 m Summer	L_E @ 10 m Winter	L_E @ 750 m Summer	L_E @ 750 m Winter
AY42	30	189.9	190.0	167.1	167.3
AY42	60	189.1	189.1	166.5	166.1
BM28	30	189.5	189.4	167.5	167.4
BM28	60	187.7	187.8	168.0	167.5

Table 46. Broadband SEL (dB re 1 µPa^2·s) per modeled energy level at 10 and 750 m from a 13 m diameter WTG MP1 monopile with installation using a QU-CV640 hammer at both locations, for summer and winter conditions.

Modeling location	Duration of Vibro-hammering (min)	L_E @ 10 m Summer	L_E @ 10 m Winter	L_E @ 750 m Summer	L_E @ 750 m Winter
AY42	30	208.4	208.5	183.8	183.9
AY42	60	207.5	207.6	183.3	183.4
BM28	30	208.1	208.0	185.5	185.5
BM28	60	207.2	207.1	185.7	185.7

Table 47. Broadband SEL (dB re 1 µPa²·s) per modeled energy level at 10 and 750 m from a 13 m diameter WTG MP2 monopile with installation using a QU-CV640 hammer at both locations, for summer and winter conditions.

Modeling location	Duration of Vibro-hammering (min)	L_E @ 10 m Summer	L_E @ 10 m Winter	L_E @ 750 m Summer	L_E @ 750 m Winter
AY42	30	210.5	210.5	186.7	186.4
AY42	60	209.8	210.0	187.2	187.6
BM28	30	209.1	208.9	185.5	185.4
BM28	60	207.9	207.8	185.6	185.6

Table 48. Broadband SEL (dB re 1 µPa²·s) per modeled energy level at 10 and 750 m from a 13 m diameter WTG MP3 monopile with installation using a QU-CV640 hammer at both locations, for summer and winter conditions.

Modeling location	Duration of Vibro-hammering (min)	L_E @ 10 m Summer	L_E @ 10 m Winter	L_E @ 750 m Summer	L_E @ 750 m Winter
AY42	30	210.0	210.1	185.5	186.0
AY42	60	208.7	208.9	184.7	185.0
BM28	30	209.6	209.5	186.9	186.5
BM28	60	210.3	210.1	188.3	187.9

4.2. Modeled Sound Fields

Three dimensional (3-D) sound fields for 3 m OSS pin piles, 4 m WTG pin piles, and 13 m WTG monopiles were calculated using the source characteristics (Section 4.1 and Appendix B) at the two proposed OSS locations and at two representative locations for all WTG piles (Table 1). Environmental parameters (bathymetry, geoacoustic information, and sound speed profiles) chosen for the propagation modeling and the modeling procedures are found in Appendix F. Ranges to PK thresholds, ranges to various SPL, and SEL isopleths for single hammer strikes at the different hammer energy levels, ranges to cumulative thresholds (per pile), and ranges to vibratory and combined vibratory and impact pile driving sound fields are shown in Section 4.2.1.1.

4.2.1. Summary Acoustic Ranges

This section presents a high-level summary of the underwater acoustic modeling performed for all impact and vibratory piling scenarios considered. Installation of OSS foundations is assumed to include impact pile driving only, while installation of WTG foundations is assumed to include either impact pile driving or vibratory pile setting followed by impact pile driving. Acoustic ranges are shown for 10 dB attenuation and more detailed results are presented in Appendix G.

4.2.1.1. Acoustic Ranges to Marine Mammal and Sea Turtle Injury Thresholds

Tables 49–53 show ranges (in km) to impulsive signal thresholds for impact pile driving scenarios (OSS and WTG foundations), and vibratory pile setting followed by impact pile driving (WTG foundations). Summary ranges are shown for all modeled locations; BB39 and BK31 for OSS1 and OSS2, respectively, and AY42 (shallow) and BM28 (deep) for WTG foundations. Impact driving results are maximum ranges for summer and winter conditions. Vibratory followed by impact driving results are the maximum for 30 and 60 min of vibratory piling and the maximum for summer and winter conditions.

Table 49. Maximum acoustic ranges ($R_{95\%}$ in km) for OSS foundations (3 m diameter, 3000 kJ (OSS1) and 1700 kJ (OSS2) hammers) across summer and winter at both locations, with 10 dB attenuation (Finneran et al. 2017, NMFS 2018). Results consider the installation of 8 pin piles per day.

Hearing group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Impact piling OSS1–BB39	Impact piling OSS2–BK31
LF	183	12.9	3.58
MF	185	0.10	0.04
HF	155	1.59	0.60
PPW	185	3.35	1.14
TUW	204	2.82	1.00

Table 50. Maximum acoustic ranges ($R_{95\%}$ in km) for WTG Jacket foundation (4.5 m diameter, 2300 kJ, and TA-CV320 hammers) across summer and winter at both locations, with 10 dB attenuation (Finneran et al. 2017, NMFS 2018). Results consider the installation of 4 pin piles per day.

Hearing group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Impact piling AY42	Impact piling BM28	Vibratory + impact piling AY42	Vibratory + impact piling BM28
LF	183	7.51	5.36	7.54	5.39
MF	185	-	-	-	-
HF	155	0.24	0.17	0.25	0.17
PPW	185	0.95	0.79	0.96	0.80
TUW	204	1.37	1.26	1.40	1.27

A dash indicates that thresholds were not reached.

Table 51. Maximum acoustic ranges ($R_{95\%}$ in km) for WTG MP1 foundation (13 m diameter, 5500 kJ, and QU-CV640 hammers) across summer and winter at both locations, with 10 dB attenuation (Finneran et al. 2017, NMFS 2018).

Hearing group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Impact piling AY42	Impact piling BM28	Vibratory + impact piling AY42	Vibratory + impact piling BM28
LF	183	4.98	4.10	4.96	4.47
MF	185	-	-	-	-
HF	155	0.09	0.10	0.06	0.09
PPW	185	0.67	0.61	0.65	0.61
TUW	204	1.20	1.14	1.23	1.14

A dash indicates that thresholds were not reached.

Table 52. Maximum acoustic ranges ($R_{95\%}$ in km) for WTG MP2 foundation (13 m diameter, 5500 kJ, and QU-CV640 hammers) across summer and winter at both locations, with 10 dB attenuation (Finneran et al. 2017, NMFS 2018).

Hearing group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Impact piling AY42	Impact piling BM28	Vibratory + impact piling AY42	Vibratory + impact piling BM28
LF	183	5.50	4.24	6.41	4.64
MF	185	-	-	-	-
HF	155	0.18	0.13	0.13	0.12
PPW	185	0.81	0.61	0.93	0.64
TUW	204	1.38	1.20	1.64	1.27

A dash indicates that thresholds were not reached.

Table 53. Maximum acoustic ranges ($R_{95\%}$ in km) for WTG MP3 foundation (13 m diameter, 5500 kJ, and QU-CV640 hammers) across summer and winter at both locations, with 10 dB attenuation (Finneran et al. 2017, NMFS 2018).

Hearing group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Impact piling AY42	Impact piling BM28	Vibratory + impact piling AY42	Vibratory + impact piling BM28
LF	183	5.78	4.45	7.32	5.79
MF	185	0.00	0.00	0.00	0.00
HF	155	0.10	0.07	0.13	0.11
PPW	185	0.83	0.65	1.22	1.12
TUW	204	1.44	1.28	1.92	1.88

4.2.1.2. Acoustic Ranges: 30 and 60 Minutes of Vibratory Piling

Tables 54–57 show ranges (in km) to impulsive signal thresholds for vibratory pile setting followed by impact pile driving (WTG foundations), to compare the effects of vibratory piling duration (30 and 60 minutes). Summary ranges are shown for all modeled locations; AY42 (shallow) and BM28 (deep) for WTG foundations. Results are the maximum for summer and winter conditions.

Table 54. Comparison of maximum acoustic ranges ($R_{95\%}$ in km) for 30 and 60 min vibratory followed by impact piling for WTG jacket foundation, across summer and winter at both locations, with 10 dB attenuation (Finneran et al. 2017, NMFS 2018). Results consider the installation of 4 pin piles per day.

Hearing group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Impact piling AY42	Impact piling BM28	Vibratory + impact piling AY42	Vibratory + impact piling BM28
LF	183	7.53	5.38	7.54	5.39
MF	185	-	-	-	-
HF	155	0.24	0.17	0.25	0.17
PPW	185	0.95	0.80	0.96	0.80
TUW	204	1.39	1.27	1.40	1.27

A dash indicates that thresholds were not reached.

Table 55. Comparison of maximum acoustic ranges ($R_{95\%}$ in km) for 30 and 60 min vibratory followed by impact piling for WTG MP1 foundation, across summer and winter at both locations, with 10 dB attenuation (Finneran et al. 2017, NMFS 2018).

Hearing group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Impact piling AY42	Impact piling BM28	Vibratory + impact piling AY42	Vibratory + impact piling BM28
LF	183	4.83	4.12	4.96	4.47
MF	185	-	-	-	-
HF	155	0.06	0.09	0.06	0.09
PPW	185	0.54	0.57	0.65	0.61
TUW	204	1.06	1.05	1.23	1.14

A dash indicates that thresholds were not reached.

Table 56. Comparison of maximum acoustic ranges ($R_{95\%}$ in km) for 30 and 60 min vibratory followed by impact piling for WTG MP2 foundation, across summer and winter at both locations, with 10 dB attenuation (Finneran et al. 2017, NMFS 2018).

Hearing group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Impact piling AY42	Impact piling BM28	Vibratory + impact piling AY42	Vibratory + impact piling BM28
LF	183	5.86	4.35	6.41	4.64
MF	185	-	-	-	-
HF	155	0.13	0.12	0.13	0.12
PPW	185	0.80	0.60	0.93	0.64
TUW	204	1.43	1.18	1.64	1.27

A dash indicates that thresholds were not reached.

Table 57. Comparison of maximum acoustic ranges ($R_{95\%}$ in km) for 30 and 60 min vibratory followed by impact piling for WTG MP3 foundation, across summer and winter at both locations, with 10 dB attenuation (Finneran et al. 2017, NMFS 2018).

Hearing group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Impact piling AY42	Impact piling BM28	Vibratory + impact piling AY42	Vibratory + impact piling BM28
LF	183	7.19	5.44	7.32	5.79
MF	185	-	-	-	-
HF	155	0.13	0.11	0.13	0.11
PPW	185	1.22	1.04	1.21	1.12
TUW	204	1.89	1.68	1.92	1.88

A dash indicates that thresholds were not reached.

4.2.1.3. Acoustic Ranges to Fish Injury Thresholds

Although some fish may move away from active pile driving activities, this assessment conservatively assumed fish remained stationary over the full exposure period. Distances from the pile within which SEL exceeded fish regulatory injury thresholds were determined using a maximum-over-depth approach. The exposure distances varied azimuthally, so the distances reported here represent the radius ($R_{95\%}$) of a circle that encompasses at least 95 % of the physical locations exposed above the specified threshold level. This approach often overestimates the total area exposed above threshold but it avoids small "fingers" of higher noise propagation, in a small number of directions, that can lead to excessive exposure area estimates. See (Appendix F.3) for a more detailed description of this approach.

Tables 58–62 show ranges (in km) to impulsive signal thresholds for impact pile driving scenarios (OSS and WTG foundations), and vibratory pile setting followed by impact pile driving (WTG foundations). Summary ranges are shown for all modeled locations; BB39 and BK31 for OSS1 and OSS2, respectively, and AY42 (shallow) and BM28 (deep) for WTG foundations. Impact driving results are maximum ranges for summer and winter conditions. Vibratory followed by impact driving results are the maximum for 30 and 60 min of vibratory piling and the maximum for summer and winter conditions. More detailed tables of acoustic ranges for fish thresholds (Andersson et al. 2007, Wysocki et al. 2007, FHWG 2008, Stadler and Woodbury 2009, Mueller-Blenkle et al. 2010, Purser and Radford 2011, Popper et al. 2014) with 0, 6, 10, and 15 dB of broadband attenuation for each modeled location and season can be found in Appendix G

Table 58. Maximum acoustic ranges ($R_{95\%}$ in km) to fish injury thresholds for OSS foundations (3 m diameter, 3000 kJ (OSS1) and 1700 kJ (OSS2) hammers) across summer and winter at both locations, with 10 dB attenuation. Results consider the installation of 8 pin piles per day.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Impact piling OSS1–BB39	Impact piling OSS2–BK31
Fish ≥ 2g [a]	187	13.3	3.81
Fish < 2 g [a]	183	18.9	4.99
Fish without swim bladder [b]	216	0.85	0.37
Fish with swim bladder not involved in hearing [b]	203	3.47	1.14
Fish with swim bladder involved in hearing [b]	203	3.47	1.14

[a] NMFS recommended criteria adopted from the Fisheries Hydroacoustic Working Group (FHWG 2008).
[b] Popper et al. 2014).

Table 59. Maximum acoustic ranges ($R_{95\%}$ in km) to fish injury thresholds for WTG jacket foundation (4.5 m diameter, 2300 kJ, and TA-CV320 hammers) across summer and winter at both locations, with 10 dB attenuation. Results consider the installation of 4 pin piles per day.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Impact piling AY42	Impact piling BM28	Vibratory + impact piling AY42	Vibratory + impact piling BM28
Fish ≥ 2g [a]	187	8.84	7.72	8.88	7.83
Fish < 2 g [a]	183	13.21	10.13	13.27	10.28
Fish without swim bladder [b]	216	0.27	0.35	0.28	0.36
Fish with swim bladder not involved in hearing [b]	203	1.76	1.71	1.80	1.75
Fish with swim bladder involved in hearing [b]	203	1.76	1.71	1.80	1.75

[a] NMFS recommended criteria adopted from the Fisheries Hydroacoustic Working (FHWG 2008).
[b] Popper et al. 2014).

Table 60. Maximum acoustic ranges ($R_{95\%}$ in km) to fish injury thresholds for WTG MP1 foundation (13 m diameter, 5500 kJ, and QU-CV640 hammers) across summer and winter at both locations, with 10 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Impact piling AY42	Impact piling BM28	Vibratory + impact piling AY42	Vibratory + impact piling BM28
Fish ≥ 2g [a]	187	6.74	6.41	6.96	7.99
Fish < 2 g [a]	183	8.96	8.42	9.12	10.07
Fish without swim bladder [b]	216	0.25	0.19	0.36	0.42
Fish with swim bladder not involved in hearing [b]	203	1.72	1.56	1.91	2.03
Fish with swim bladder involved in hearing [b]	203	1.72	1.56	1.91	2.03

[a] NMFS recommended criteria adopted from the Fisheries Hydroacoustic Working Group (FHWG 2008).
[b] Popper et al. 2014).

Table 61. Maximum acoustic ranges ($R_{95\%}$ in km) to fish injury thresholds for WTG MP2 foundation (13 m diameter, 5500 kJ, and QU-CV640 hammers) across summer and winter at both locations, with 10 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Impact piling AY42	Impact piling BM28	Vibratory + impact piling AY42	Vibratory + impact piling BM28
Fish ≥ 2g [a]	187	7.27	6.68	9.07	8.54
Fish < 2 g [a]	183	9.60	8.74	12.50	10.95
Fish without swim bladder [b]	216	0.30	0.24	0.53	0.45
Fish with swim bladder not involved in hearing [b]	203	1.91	1.69	2.55	2.21
Fish with swim bladder involved in hearing [b]	203	1.91	1.69	2.55	2.21

[a] NMFS recommended criteria adopted from the Fisheries Hydroacoustic Working (FHWG 2008).
[b] Popper et al. 2014).

Table 62. Maximum acoustic ranges ($R_{95\%}$ in km) to fish injury thresholds for WTG MP3 foundation (13 m diameter, 5500 kJ, and QU-CV640 hammers) across summer and winter at both locations, with 10 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Impact piling AY42	Impact piling BM28	Vibratory + impact piling AY42	Vibratory + impact piling BM28
Fish ≥ 2g [a]	187	7.68	7.11	9.76	9.77
Fish < 2 g [a]	183	10.36	9.14	13.40	12.65
Fish without swim bladder [b]	216	0.34	0.44	0.61	0.64
Fish with swim bladder not involved in hearing [b]	203	2.01	1.83	2.81	2.93
Fish with swim bladder involved in hearing [b]	203	2.01	1.83	2.81	2.93

[a] NMFS recommended criteria adopted from the Fisheries Hydroacoustic Working Group (FHWG 2008).
[b] Popper et al. 2014).

4.2.1.4. Acoustic Ranges to Behavioral Thresholds

A summary of acoustic ranges to behavioral thresholds is given for marine mammals, sea turtles and fish. Tables 63–67 show ranges (in km) to impulsive signal thresholds for impact pile driving scenarios (OSS and WTG foundations), and to non-impulsive signal thresholds for vibratory pile setting (WTG foundations). Summary ranges are shown for all modeled locations; BB39 and BK31 for OSS1 and OSS2, respectively, and AY42 (shallow) and BM28 (deep) for WTG foundations. Impact driving results are maximum ranges for summer and winter conditions. Vibratory pile driving results are the maximum for 30 and 60 min of vibratory piling and the maximum for summer and winter conditions.

Table 63. Maximum acoustic ranges ($R_{95\%}$ in km) to behavioral thresholds for for OSS foundations (3 m diameter, 3000 kJ (OSS1) and 1700 kJ (OSS2) hammers) across summer and winter at both locations, with 10 dB attenuation.

Species	L_p Threshold (dB re 1 µPa²)	Impact piling OSS1–BB39	Impact piling OSS2–BK31
Marine mammals	160	4.40	2.34
Sea turtles	175	0.96	0.53
Fish	150	12.7	4.51

Table 64. Maximum acoustic ranges ($R_{95\%}$ in km) to behavioral thresholds for WTG jacket foundation (4.5 m diameter, 2300 kJ, and TA-CV320 hammers) across summer and winter at both locations, with 10 dB attenuation.

Species	Impact Piling L_p Thresholds	AY42	BM28	Vibratory Piling L_p Thresholds	AY42	BM28
Marine mammals	160	4.42	3.45	120	17.36	16.04
Sea turtles	175	0.65	0.60	175	0.02	0.02
Fish	150	11.05	8.11	150	1.61	1.64

L_p= unweighted sound pressure (dB re 1 µPa²).

Table 65. Maximum acoustic ranges ($R_{95\%}$ in km) to behavioral thresholds for WTG MP1 foundation (13 m diameter, 5500 kJ, and QU-CV640 hammers) across summer and winter at both locations, with 10 dB attenuation.

Species	Impact Piling L_p Thresholds	AY42	BM28	Vibratory Piling L_p Thresholds	AY42	BM28
Marine mammals	160	6.75	6.06	120	40.64	31.62
Sea turtles	175	1.91	1.74	175	0.59	0.57
Fish	150	14.14	11.61	150	7.45	9.09

L_p= unweighted sound pressure (dB re 1 µPa²).

Table 66. Maximum acoustic ranges ($R_{95\%}$ in km) to behavioral thresholds for WTG MP2 foundation (13 m diameter, 5500 kJ, and QU-CV640 hammers) across summer and winter at both locations, with 10 dB attenuation.

Species	Impact Piling L_p Thresholds	AY42	BM28	Vibratory Piling L_p Thresholds	AY42	BM28
Marine mammals	160	6.73	6.01	120	53.59	32.51
Sea turtles	175	2.03	1.72	175	0.92	0.65
Fish	150	14.34	11.55	150	9.36	9.63

L_p= unweighted sound pressure (dB re 1 µPa^2).

Table 67. Maximum acoustic ranges ($R_{95\%}$ in km) to behavioral thresholds for WTG MP3 foundation (13 m diameter, 5500 kJ, and QU-CV640 hammers) across summer and winter at both locations, with 10 dB attenuation.

Species	Impact Piling L_p Thresholds	AY42	BM28	Vibratory Piling L_p Thresholds	AY42	BM28
Marine mammals	160	7.49	6.47	120	41.46	33.54
Sea turtles	175	2.20	1.98	175	0.77	0.90
Fish	150	16.34	12.08	150	7.81	10.01

L_p= unweighted sound pressure (dB re 1 µPa^2).

4.3. Exposure Estimates

Exposure estimates were calculated for marine mammals and sea turtles using each of the proposed construction schedules (see Section 1.2.2). Each construction schedule includes a combination of foundations installed with impact pile driving, and schedules C and D include 20 total monopile installations with vibratory setting of piles followed by impact pile driving.

Sections 4.3.1 and 4.3.2 include results for each species and metric, assuming 10 dB attenuation and a summer sound speed profile. The proponent expects to implement noise abatement systems to reduce sound levels by a minimum of 10 dB but expects to achieve 12 dB or greater; higher levels of attenuation may be achieved as technology continues to evolve. For full results, including all modeled attenuation levels (0, 6, 10, and 15 dB), see Appendix H.

The hammering schedule for each foundation type was determined from pile driving parameters provided in Section 1.2.1. For vibratory and impact pile driving, the installation time was calculated using the blow rate and blow count at each hammer energy level and the time of vibratory piling was added. Both the WTG monopiles and WTG pin piles included scenarios with both vibratory and impact piling, assuming a vibratory duration of 30 min. For impact pile driving the strike rate is variable and provided in Section 1.2.1. For impact pile driving of monopiles MP2 and MP3 the total strike count is 5668 and 8707, respectively. Considering both vibratory (30 min) and impact piling, the total hours per monopile installation is ~3.93 h for MP2 and ~5.79 h for MP3.

For impact pile driving of 4 per day 4.25 m WTG pin piles, the total strike count is 11,665. Considering both vibratory and impact piling, the total hours per 4.25 m pin pile installation is ~5.17 h for 30 min vibratory and ~4.91 h for 60 min vibratory. For impact pile driving of the 4 per day 3 m OSS1 and OSS2 pin piles, the total strike count is 13970 and 3323, respectively.

4.3.1. Marine Mammals

Table 68. Construction Schedule A, Year 1 (all monopiles and impact only): Mean number of marine mammals predicted to receive sound levels above exposure criteria with 10 dB attenuation. Construction schedule assumptions are summarized in Section 1.2.2.

Hearing Group	Species	PTS ($L_{E,w,24h}$)	PTS (L_{pk})	Behavior (L_p) [a]	Behavior ($L_{p,w}$) [b]
LF	Fin whale [c]	12.40	0.03	47.92	49.92
LF	Minke whale (migrating)	58.48	0.03	236.21	860.91
LF	Humpback whale	11.74	0.08	38.83	41.10
LF	North Atlantic right whale [c]	6.74	0.05	27.41	29.84
LF	Sei whale [c] (migrating)	4.56	<0.01	19.06	95.18
MF	Atlantic white sided dolphin	0	0	704.40	256.28
MF	Atlantic spotted dolphin	0	0	27.94	7.54
MF	Common dolphin	0	0.25	6289.25	2100.69
MF	Bottlenose dolphin	0	0	299.52	105.17
MF	Risso's dolphin	0	0	43.89	16.04
MF	Long-finned pilot whale	0	0	38.05	13.74
MF	Short-finned pilot whale	0	0	0	0
MF	Sperm whale [c]	0	0	13.21	4.44
HF	Harbor porpoise (sensitive)	0	17.50	586.15	5514.34
PW	Gray seal	2.21	0	344.88	249.15
PW	Harbor seal	5.74	0.51	455.44	321.63
PW	Harp seal	4.82	0.04	494.60	337.12

[a] NOAA (2005), [b] Wood et al. (2012), [c] Listed as Endangered under the ESA. L_{pk}—peak sound pressure level (dB re 1 µPa), L_E—sound exposure level (dB re 1 µPa^2·s), L_p—root mean square sound pressure level (dB re 1 µPa^2).

Table 69. Construction Schedule A, Year 2 (all monopiles and impact only): Mean number of marine mammals predicted to receive sound levels above exposure criteria with 10 dB attenuation. Construction schedule assumptions are summarized in Section 1.2.2.

Hearing Group	Species	PTS ($L_{E,w,24h}$)	PTS (L_{pk})	Behavior (L_p) [a]	Behavior ($L_{p,w}$) [b]
LF	Fin whale [c]	7.97	0.02	35.73	37.08
LF	Minke whale (migrating)	30.84	0	169.32	655.32
LF	Humpback whale	7.17	0.05	27.78	29.52
LF	North Atlantic right whale [c]	3.32	0.04	20.46	22.50
LF	Sei whale [c] (migrating)	2.05	0	12.31	60.70
MF	Atlantic white sided dolphin	0	0	473.42	157.85
MF	Atlantic spotted dolphin	0	0	21.70	5.62
MF	Common dolphin	0	0	4607.18	1469.86
MF	Bottlenose dolphin	0	0	197.31	64.42
MF	Risso's dolphin	0	0	30.74	10.74
MF	Long-finned pilot whale	0	0	23.91	8.02
MF	Short-finned pilot whale	0	0	0	0
MF	Sperm whale [c]	0	0	10.04	3.27
HF	Harbor porpoise (sensitive)	0	8.61	422.03	2069.04
PW	Gray seal	0.15	0	295.48	204.01
PW	Harbor seal	0.30	0.30	357.29	243.99
PW	Harp seal	0.62	0	387.76	260.79

[a] NOAA (2005), [b] Wood et al. (2012), [c] Listed as Endangered under the ESA. L_{pk}—peak sound pressure level (dB re 1 µPa), L_E—sound exposure level (dB re 1 µPa^2·s), L_p—root mean square sound pressure level (dB re 1 µPa^2).

Table 70. Construction Schedule B, Year 1 (monopiles/ WTG jacket and impact only): Mean number of marine mammals predicted to receive sound levels above exposure criteria with 10 dB attenuation. Construction schedule assumptions are summarized in Section 1.2.2.

Hearing Group	Species	PTS ($L_{E,w,24h}$)	PTS (L_{pk})	Behavior (L_p) [a]	Behavior ($L_{p,w}$) [b]
LF	Fin whale [c]	14.64	0.03	45.28	48.42
LF	Minke whale (migrating)	73.58	0.03	292.17	980.57
LF	Humpback whale	14.45	0.06	40.27	42.50
LF	North Atlantic right whale [c]	6.88	0.04	27.39	29.81
LF	Sei whale [c] (migrating)	4.68	<0.01	21.21	102.55
MF	Atlantic white sided dolphin	0	0	855.86	326.86
MF	Atlantic spotted dolphin	0	0	26.84	7.39
MF	Common dolphin	0	0.25	7498.27	2629.59
MF	Bottlenose dolphin	0	0	375.86	140.49
MF	Risso's dolphin	0	0	53.27	20.21
MF	Long-finned pilot whale	0	0	44.63	16.95
MF	Short-finned pilot whale	0	0	0	0
MF	Sperm whale [c]	0	0	14.91	5.58
HF	Harbor porpoise (sensitive)	0	16.02	590.59	5404.35
PW	Gray seal	2.28	0	330.37	244.27
PW	Harbor seal	5.69	0.41	450.60	320.42
PW	Harp seal	4.78	0.04	489.11	338.18

[a] NOAA (2005), [b] Wood et al. (2012), [c] Listed as Endangered under the ESA. L_{pk}—peak sound pressure level (dB re 1 µPa), L_E—sound exposure level (dB re 1 µPa^2·s), L_p—root mean square sound pressure level (dB re 1 µPa^2).

Table 71. Construction Schedule B, Year 2 (monopiles/ WTG jacket and impact only): Mean number of marine mammals predicted to receive sound levels above exposure criteria with 10 dB attenuation. Construction schedule assumptions are summarized in Section 1.2.2.

Hearing Group	Species	PTS ($L_{E,w,24h}$)	PTS (L_{pk})	Behavior (L_p) [a]	Behavior ($L_{p,w}$) [b]
LF	Fin whale [c]	10.06	0.01	34.47	36.56
LF	Minke whale (migrating)	44.83	0	219.58	762.84
LF	Humpback whale	9.37	0.04	29.31	30.97
LF	North Atlantic right whale [c]	3.99	0.04	21.78	24.16
LF	Sei whale [c] (migrating)	2.50	<0.01	14.68	72.84
MF	Atlantic white sided dolphin	0	0	583.95	211.76
MF	Atlantic spotted dolphin	0	0	21.34	5.74
MF	Common dolphin	0	0	5384.86	1830.82
MF	Bottlenose dolphin	0	0	255.05	90.67
MF	Risso's dolphin	0	0	38.18	14.05
MF	Long-finned pilot whale	0	0	29.04	10.57
MF	Short-finned pilot whale	0	0	0	0
MF	Sperm whale [c]	0	0	11.95	4.34
HF	Harbor porpoise (sensitive)	0	9.28	460.14	4080.37
PW	Gray seal	0.21	0	279.79	201.34
PW	Harbor seal	0.23	0.24	354.80	249.84
PW	Harp seal	0.55	0	391.00	266.12

[a] NOAA (2005), [b] Wood et al. (2012), [c] Listed as Endangered under the ESA. L_{pk}—peak sound pressure level (dB re 1 µPa), L_E—sound exposure level (dB re 1 µPa^2·s), L_p—root mean square sound pressure level (dB re 1 µPa^2).

Table 72. Construction Schedule C, Year 1 (all monopiles with 10 vibratory + impact installations in first year): Mean number of marine mammals predicted to receive sound levels above exposure criteria with 10 dB attenuation. Construction schedule assumptions are summarized in Section 1.2.2.

Hearing Group	Species	PTS ($L_{E,w,24h}$)	PTS (L_{pk})	Behavior (L_p) [a]	Behavior ($L_{p,w}$) [b]
LF	Fin whale [c]	12.80	0.03	126.91	49.92
LF	Minke whale (migrating)	59.82	0.03	443.84	860.80
LF	Humpback whale	12.00	0.08	103.40	41.10
LF	North Atlantic right whale [c]	6.66	0.05	46.62	29.57
LF	Sei whale [c] (migrating)	4.52	<0.01	30.02	94.63
MF	Atlantic white sided dolphin	0	0	1439.47	256.16
MF	Atlantic spotted dolphin	0	0	48.05	7.21
MF	Common dolphin	0	0.25	10705.21	2087.86
MF	Bottlenose dolphin	0	0	591.18	105.17
MF	Risso's dolphin	0	0	223.67	15.99
MF	Long-finned pilot whale	0	0	83.28	13.74
MF	Short-finned pilot whale	0	0	0	0
MF	Sperm whale [c]	0	0	37.50	4.44
HF	Harbor porpoise (sensitive)	0	17.13	806.82	5500.80
PW	Gray seal	2.19	0	1459.26	248.18
PW	Harbor seal	5.72	0.46	872.24	319.37
PW	Harp seal	4.82	0.04	1733.56	334.99

[a] NOAA (2005), [b] Wood et al. (2012), [c] Listed as Endangered under the ESA. L_{pk}—peak sound pressure level (dB re 1 µPa), L_E—sound exposure level (dB re 1 µPa^2·s), L_p—root mean square sound pressure level (dB re 1 µPa^2).

Table 73. Construction Schedule C, Year 2 (all monopiles with 10 vibratory + impact installations in first year): Mean number of marine mammals predicted to receive sound levels above exposure criteria with 10 dB attenuation. Construction schedule assumptions are summarized in Section 1.2.2.

Hearing Group	Species	PTS ($L_{E,w,24h}$)	PTS (L_{pk})	Behavior (L_p) [a]	Behavior ($L_{p,w}$) [b]
LF	Fin whale [c]	8.38	0.02	36.29	37.57
LF	Minke whale (migrating)	33.91	0	179.11	676.79
LF	Humpback whale	7.41	0.05	28.25	29.94
LF	North Atlantic right whale [c]	3.98	0.04	22.40	24.87
LF	Sei whale [c] (migrating)	2.46	0	13.51	70.76
MF	Atlantic white sided dolphin	0	0	474.99	161.44
MF	Atlantic spotted dolphin	0	0	23.17	6.12
MF	Common dolphin	0	0	4704.07	1508.99
MF	Bottlenose dolphin	0	0	199.76	65.11
MF	Risso's dolphin	0	0	31.44	11.06
MF	Long-finned pilot whale	0	0	24.39	8.31
MF	Short-finned pilot whale	0	0	0	0
MF	Sperm whale [c]	0	0	10.61	3.48
HF	Harbor porpoise (sensitive)	0	10.45	461.64	4595.40
PW	Gray seal	0.16	0	308.40	216.81
PW	Harbor seal	0.30	0.32	381.14	265.96
PW	Harp seal	0.62	0	419.31	280.90

[a] NOAA (2005), [b] Wood et al. (2012), [c] Listed as Endangered under the ESA. L_{pk}—peak sound pressure level (dB re 1 µPa), L_E—sound exposure level (dB re 1 µPa^2·s), L_p—root mean square sound pressure level (dB re 1 µPa^2).

Table 74. Construction Schedule D, Year 1 (monopiles/ WTG jacket with 10 vibratory + impact installations in first year): Mean number of marine mammals predicted to receive sound levels above exposure criteria with 10 dB attenuation. Construction schedule assumptions are summarized in Section 1.2.2.

Hearing Group	Species	PTS ($L_{E,w,24h}$)	PTS (L_{pk})	Behavior (L_p) [a]	Behavior ($L_{p,w}$) [b]
LF	Fin whale [c]	14.83	0.03	123.99	48.18
LF	Minke whale (migrating)	74.73	0.03	499.18	980.46
LF	Humpback whale	14.65	0.06	104.74	42.41
LF	North Atlantic right whale [c]	6.78	0.04	46.39	29.26
LF	Sei whale [c] (migrating)	4.64	<0.01	32.07	100.30
MF	Atlantic white sided dolphin	0	0	1590.93	326.31
MF	Atlantic spotted dolphin	0	0	46.94	7.05
MF	Common dolphin	0	0.25	11914.22	2616.76
MF	Bottlenose dolphin	0	0	667.80	140.11
MF	Risso's dolphin	0	0	233.05	20.16
MF	Long-finned pilot whale	0	0	89.79	16.90
MF	Short-finned pilot whale	0	0	0	0
MF	Sperm whale [c]	0	0	38.88	5.46
HF	Harbor porpoise (sensitive)	0	15.62	809.23	5013.22
PW	Gray seal	2.27	0	1438.69	238.81
PW	Harbor seal	5.64	0.36	859.56	312.34
PW	Harp seal	4.77	0.04	1719.64	330.27

[a] NOAA (2005), [b] Wood et al. (2012), [c] Listed as Endangered under the ESA. L_{pk}—peak sound pressure level (dB re 1 µPa), L_E—sound exposure level (dB re 1 µPa^2·s), L_p—root mean square sound pressure level (dB re 1 µPa^2).

Table 75. Construction Schedule D, Year 2 (monopiles/ WTG jacket with 10 vibratory + impact installations in first year): Mean number of marine mammals predicted to receive sound levels above exposure criteria with 10 dB attenuation. Construction schedule assumptions are summarized in Section 1.2.2.

Hearing Group	Species	PTS ($L_{E,w,24h}$)	PTS (L_{pk})	Behavior (L_p) [a]	Behavior ($L_{p,w}$) [b]
LF	Fin whale [c]	10.06	0.01	34.47	36.56
LF	Minke whale (migrating)	44.83	0	219.58	762.84
LF	Humpback whale	9.37	0.04	29.31	30.97
LF	North Atlantic right whale [c]	3.99	0.04	21.78	24.16
LF	Sei whale [c] (migrating)	2.50	<0.01	14.68	72.84
MF	Atlantic white sided dolphin	0	0	583.95	211.76
MF	Atlantic spotted dolphin	0	0	21.34	5.74
MF	Common dolphin	0	0	5384.86	1830.82
MF	Bottlenose dolphin	0	0	255.05	90.67
MF	Risso's dolphin	0	0	38.18	14.05
MF	Long-finned pilot whale	0	0	29.04	10.57
MF	Short-finned pilot whale	0	0	0	0
MF	Sperm whale [c]	0	0	11.95	4.34
HF	Harbor porpoise (sensitive)	0	9.28	460.14	4080.37
PW	Gray seal	0.21	0	279.79	201.34
PW	Harbor seal	0.23	0.24	354.80	249.84
PW	Harp seal	0.55	0	391.00	266.12

[a] NOAA (2005), [b] Wood et al. (2012), [c] Listed as Endangered under the ESA. L_{pk}—peak sound pressure level (dB re 1 µPa), L_E—sound exposure level (dB re 1 µPa^2·s), L_p—root mean square sound pressure level (dB re 1 µPa^2).

4.3.1.1. Effect of Aversion

The mean exposure estimates reported in Section 4.3.1 do not consider animals avoiding loud sounds (aversion) or implementation of mitigation measures other than sound attenuation using NAS. Some marine mammals are well known for their aversive responses to anthropogenic sound (e.g., harbor porpoise), although it is assumed that most species will avert from noise. The Wood et al. (2012) step function includes a probability of response that is based primarily on observed aversive behavior in field studies. Additional exposure estimates with aversion based on the Wood et al. (2012) response probabilities were calculated for NARW and harbor porpoise in this study. For comparative purposes only, the results are shown with and without aversion (Table 76). Aversion was not applied to exposure estimates and only presented here for comparison.

Table 76. Construction schedule A, year 1 (all monopiles and impact only): Mean number of marine mammals predicted to receive sound levels above exposure criteria with 10 dB attenuation and with and without aversion for aversive species. Construction schedule assumptions are summarized in Section 1.2.2.

Species	PTS ($L_{E,w,24h}$) No aversion	PTS (L_{pk}) No aversion	Behavior (L_p) [a] No aversion	Behavior ($L_{p,w}$) [b] No aversion	PTS ($L_{E,w,24h}$) With aversion	PTS (L_{pk}) With aversion	Behavior (L_p) [a] With aversion	Behavior ($L_{p,w}$) [b] With aversion
North Atlantic right whale [c]	6.74	0.05	27.41	29.84	1.64	0	20.12	25.64
Harbor porpoise	0	17.50	586.15	5514.34	0	0	152.85	4519.45

[a] NOAA (2005), [b] Wood et al. (2012), [c] Listed as Endangered under the ESA. L_{pk}—peak sound pressure level (dB re 1 µPa), L_E—sound exposure level (dB re 1 µPa^2·s), L_p—root mean square sound pressure level (dB re 1 µPa^2).

4.3.2. Sea Turtles

As was done for marine mammals (see Section 4.3.1), the numbers of individual sea turtles predicted to receive sound levels above threshold criteria were determined using animal movement modeling. The construction schedules described in Section 1.2.2 were used to calculate the total number of real-world individual turtles predicted to receive sound levels above injury and behavior thresholds (Finneran et al. 2017) in the Lease Area. Tables 77–80 include results assuming broadband attenuation of 10 dB, calculated in the same way as the marine mammal exposures.

Table 77. Construction schedule A, all years (all monopiles and impact only): Mean number of sea turtles predicted to receive sound levels above exposure criteria (Finneran et al. 2017) with 10 dB attenuation. Construction schedule assumptions are summarized in Section 1.2.2.

Species	Year 1 Injury $L_{E,w,24h}$ (dB re 1 µPa²·s)	Year 1 Injury L_{pk} (dB re 1 µPa)	Year 1 Behavior L_p (dB re 1 µPa²)	Year 2 Injury $L_{E,w,24h}$ (dB re 1 µPa²·s)	Year 2 Injury L_{pk} (dB re 1 µPa)	Year 2 Behavior L_p (dB re 1 µPa²)
Kemp's ridley turtle [a]	<0.01	0	0.02	<0.01	0	0.01
Leatherback turtle [a]	0.29	0	1.79	0.18	0	1.36
Loggerhead turtle	0.02	0	0.30	0.01	0	0.22
Green turtle	0.09	0	1.27	0.06	0	0.91

[a] Listed as Endangered under the ESA.

Table 78. Construction schedule B, all years (monopiles/ WTG jacket and impact only): Mean number of sea turtles predicted to receive sound levels above exposure criteria (Finneran et al. 2017) with 10 dB attenuation. Construction schedule assumptions are summarized in Section 1.2.2.

Species	Year 1 Injury $L_{E,w,24h}$ (dB re 1 µPa²·s)	Year 1 Injury L_{pk} (dB re 1 µPa)	Year 1 Behavior L_p (dB re 1 µPa²)	Year 2 Injury $L_{E,w,24h}$ (dB re 1 µPa²·s)	Year 2 Injury L_{pk} (dB re 1 µPa)	Year 2 Behavior L_p (dB re 1 µPa²)
Kemp's ridley turtle [a]	<0.01	0	0.02	<0.01	0	0.02
Leatherback turtle [a]	0.26	0	1.48	0.19	0	1.17
Loggerhead turtle	0.02	0	0.30	0.01	0	0.21
Green turtle	0.08	0	1.37	0.06	0	0.99

[a] Listed as Endangered under the ESA.

Table 79. Construction schedule C, all years (all monopiles with 10 vibratory + impact installations in first year): Mean number of sea turtles predicted to receive sound levels above exposure criteria (Finneran et al. 2017) with 10 dB attenuation. Construction schedule assumptions are summarized in Section 1.2.2.

Species	Year 1 Injury $L_{E,w,24h}$ (dB re 1 µPa²·s)	Year 1 Injury L_{pk} (dB re 1 µPa)	Year 1 Behavior L_p (dB re 1 µPa²)	Year 2 Injury $L_{E,w,24h}$ (dB re 1 µPa²·s)	Year 2 Injury L_{pk} (dB re 1 µPa)	Year 2 Behavior L_p (dB re 1 µPa²)
Kemp's ridley turtle [a]	<0.01	0	0.02	<0.01	0	0.01
Leatherback turtle [a]	0.29	0	1.78	0.21	0	1.40
Loggerhead turtle	0.02	0	0.30	0.02	0	0.22
Green turtle	0.10	0	1.28	0.07	0	0.92

[a] Listed as Endangered under the ESA.

Table 80. Construction schedule D, all years (monopiles/ WTG jacket with 10 vibratory + impact monopile installations in first year): Mean number of sea turtles predicted to receive sound levels above exposure criteria (Finneran et al. 2017) with 10 dB attenuation. Construction schedule assumptions are summarized in Section 1.2.2.

Species	Year 1 Injury $L_{E,w,24h}$ (dB re 1 µPa²·s)	Year 1 Injury L_{pk} (dB re 1 µPa)	Year 1 Behavior L_p (dB re 1 µPa²)	Year 2 Injury $L_{E,w,24h}$ (dB re 1 µPa²·s)	Year 2 Injury L_{pk} (dB re 1 µPa)	Year 2 Behavior L_p (dB re 1 µPa²)
Kemp's ridley turtle [a]	<0.01	0	0.02	<0.01	0	0.02
Leatherback turtle [a]	0.26	0	1.48	0.19	0	1.17
Loggerhead turtle	0.02	0	0.29	0.01	0	0.21
Green turtle	0.09	0	1.37	0.06	0	0.99

[a] Listed as Endangered under the ESA.

4.4. Exposure Range Estimates

Exposure ranges, or $ER_{95\%}$, are the horizontal distances that include 95 % of the CPAs of animats exceeding a given impact threshold. These were calculated for marine mammals and sea turtles, and these results are summarized in Figure 35 for each of the foundation types and installation schedules, assuming 10 dB attenuation and a summer sound speed profile. Sections 4.4.1 and 4.4.2 provide additional detail for each species and metric. For full results, including all modeled attenuation levels and both summer and winter sound speed profiles, see Appendix G and Appendix H.

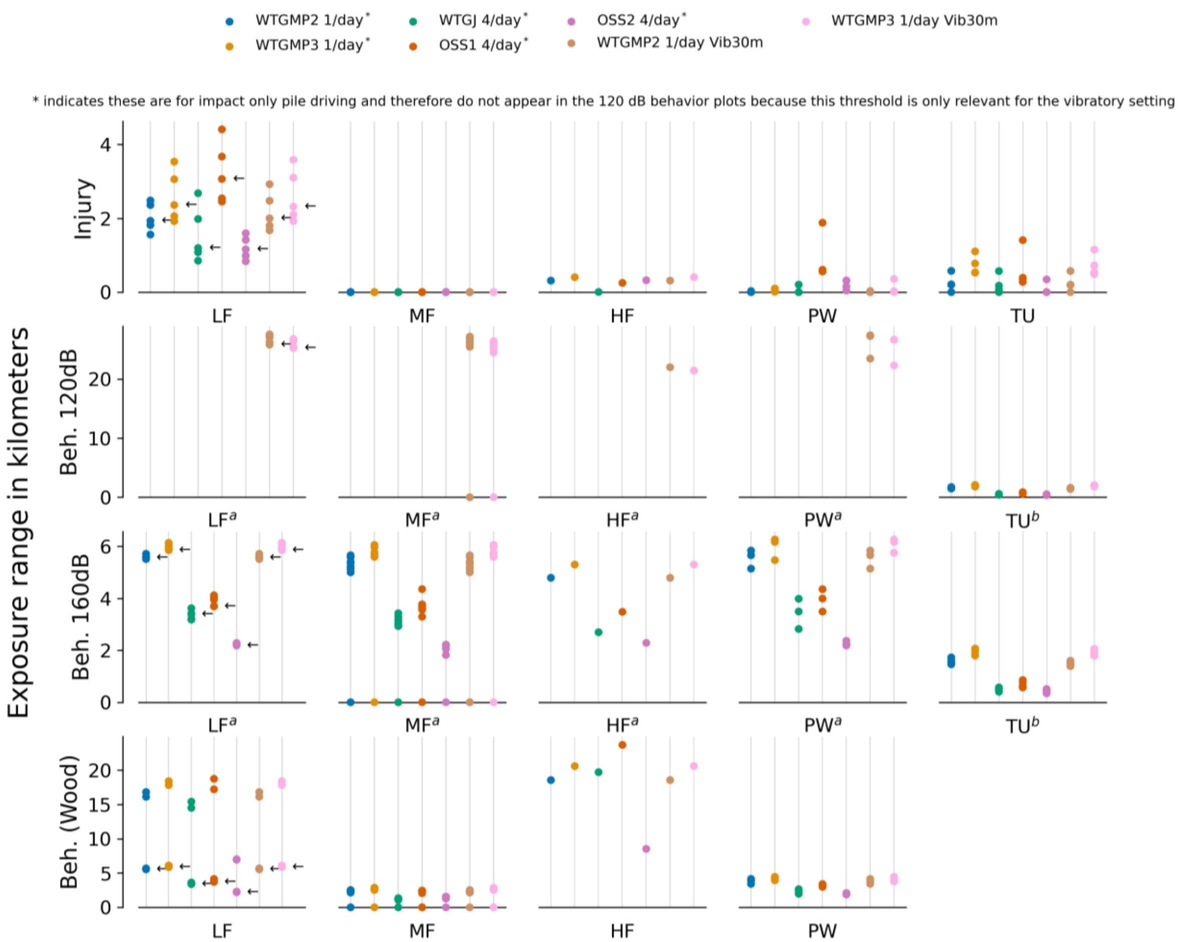

Figure 35. Exposure ranges ($ER_{95\%}$) for injury and behavior thresholds, shown for each hearing group, assuming an attenuation of 10 dB and summer sound speed profile. Each dot represents a species within the indicated hearing group (LF = low frequency cetacean, MF = mid-frequency cetacean, HF = high frequency cetacean, PW = phocid pinniped in water, and TU = turtle), and dot color represents a combination of foundation type (Jacket or Monopile [MP]) and installation schedule (number of piles installed per day). Foundation types and installation schedules used in the construction schedules were included in this figure. Note the difference in y-axis scaling between the injury and behavior plots. Arrows indicate North Atlantic right whales (NARWs). Superscript a indicates that the NOAA (2005) behavioral thresholds for marine mammals were used, and superscript b indicates that the Finneran et al. (2017) behavioral threshold for turtles was used..

4.4.1. Marine Mammals

The exposure ranges, $ER_{95\%}$, to injury and behavior thresholds are summarized in Tables 81–90 for monopile and jacket foundations, assuming 10 dB broadband attenuation and a summer acoustic propagation environment. Exposure ranges are reported for both 1 and 2 piles per day for monopile foundations, and for 4 pin piles per day for jacket foundations. Additional configurations are provided in Appendix H . Single strike ranges to various isopleths from acoustic modeling can be found in Appendix G, along with per pile SEL acoustic ranges to isopleths for the hearing groups assuming no movement of animals during pile driving.

4.4.1.1. Exposure Ranges—Impact Only

Table 81. WTGMP2 (13 m diameter, 5500 kJ, summer): Impact only exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with 10 dB attenuation.

Functional group	Species	1 pile/day PTS ($L_{E,w,24h}$)	1 pile/day PTS (L_{pk})	1 pile/day Behavior (L_p) [a]	1 pile/day Behavior ($L_{p,w}$) [b]	2 piles/day PTS ($L_{E,w,24h}$)	2 piles/day PTS (L_{pk})	2 piles/day Behavior (L_p) [a]	2 piles/day Behavior ($L_{p,w}$) [b]
LF	Fin whale [c]	2.48	0	5.71	5.68	2.77	<0.01	5.59	5.56
LF	Minke whale (migrating)	1.56	0	5.57	16.12	1.47	0	5.50	15.49
LF	Humpback whale	2.36	<0.01	5.61	5.60	2.37	0	5.46	5.44
LF	North Atlantic right whale [c]	1.93	<0.01	5.56	5.54	1.95	0	5.32	5.31
LF	Sei whale [c] (migrating)	1.82	0	5.51	16.81	1.54	0	5.48	16.58
MF	Atlantic white sided dolphin	0	0	5.41	2.38	0	0	5.36	2.33
MF	Atlantic spotted dolphin	0	0	5.13	2.20	0	0	5.06	2.16
MF	Common dolphin	0	0	5.58	2.45	0	0	5.42	2.43
MF	Bottlenose dolphin	0	0	5.00	2.15	0	0	4.96	2.06
MF	Risso's dolphin	0	0	5.21	2.41	0	0	5.19	2.35
MF	Long-finned pilot whale	0	0	5.36	2.48	0	0	5.26	2.34
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0
MF	Sperm whale [c]	0	0	5.65	2.52	0	0	5.55	2.44
HF	Harbor porpoise (sensitive)	0	0.31	4.79	18.57	0	0.41	4.74	18.13
PW	Gray seal	0	0	5.84	4.14	0	0	5.71	4.24
PW	Harbor seal	0	0	5.14	3.42	0	0	4.99	3.45
PW	Harp seal	0.03	0	5.66	3.89	<0.01	<0.01	5.62	3.89

[a] NOAA (2005), [b] Wood et al. (2012), [c] Listed as Endangered under the ESA. L_{pk}—peak sound pressure level (dB re 1 µPa), L_E—sound exposure level (dB re 1 µPa^2·s), L_p—root mean square sound pressure level (dB re 1 µPa^2).

Table 82. WTGMP3 (13 m diameter, 6500 kJ, summer): Impact only exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with 10 dB attenuation.

Functional group	Species	1 pile/day PTS ($L_{E,w,24h}$)	1 pile/day PTS (L_{pk})	1 pile/day Behavior (L_p) [a]	1 pile/day Behavior ($L_{p,w}$) [b]	2 piles/day PTS ($L_{E,w,24h}$)	2 piles/day PTS (L_{pk})	2 piles/day Behavior (L_p) [a]	2 piles/day Behavior ($L_{p,w}$) [b]
LF	Fin whale [c]	3.53	<0.01	6.13	6.08	3.55	<0.01	6.04	5.99
LF	Minke whale (migrating)	1.92	0	5.99	17.83	1.97	0	5.91	17.16
LF	Humpback whale	3.06	<0.01	6.12	6.09	3.21	0	5.93	5.91
LF	North Atlantic right whale [c]	2.36	<0.01	5.85	5.86	2.35	0	5.86	5.77
LF	Sei whale [c] (migrating)	2.06	0	5.91	18.40	2.04	<0.01	5.90	18.09
MF	Atlantic white sided dolphin	0	0	5.96	2.66	0	0	5.83	2.61
MF	Atlantic spotted dolphin	0	0	5.65	2.53	0	0	5.63	2.42
MF	Common dolphin	0	0	6.00	2.82	0	0	5.92	2.67
MF	Bottlenose dolphin	0	0	5.59	2.63	0	0	5.52	2.37
MF	Risso's dolphin	0	0	5.74	2.68	0	0	5.68	2.62
MF	Long-finned pilot whale	0	0	5.76	2.59	0	0	5.67	2.60
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0
MF	Sperm whale [c]	0	0	6.05	2.86	0	0	5.92	2.70
HF	Harbor porpoise (sensitive)	0	0.41	5.31	20.65	0	0.45	5.13	20.34
PW	Gray seal	0.10	0	6.26	4.45	0.35	0	6.09	4.38
PW	Harbor seal	<0.01	<0.01	5.47	3.94	0.06	<0.01	5.34	3.61
PW	Harp seal	0.03	0	6.17	4.24	0.06	<0.01	6.04	4.07

[a] NOAA (2005), [b] Wood et al. (2012), [c] Listed as Endangered under the ESA. L_{pk}—peak sound pressure level (dB re 1 µPa), L_E—sound exposure level (dB re 1 µPa^2·s), L_p—root mean square sound pressure level (dB re 1 µPa^2).

Table 83. WTGJ (4.5 m diameter, 2300 kJ, summer): Impact only exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with 10 dB attenuation, assuming 4 piles per day.

Functional group	Species	PTS ($L_{E,w,24h}$)	PTS (L_{pk})	Behavior (L_p) [a]	Behavior ($L_{p,w}$) [b]
LF	Fin whale [c]	2.68	0	3.62	3.62
LF	Minke whale (migrating)	0.85	0	3.21	14.50
LF	Humpback whale	1.98	0	3.41	3.44
LF	North Atlantic right whale [c]	1.19	0	3.38	3.39
LF	Sei whale [c] (migrating)	1.08	<0.01	3.18	15.41
MF	Atlantic white sided dolphin	0	0	3.15	1.23
MF	Atlantic spotted dolphin	0	0	2.94	1.14
MF	Common dolphin	0	0	3.29	1.33
MF	Bottlenose dolphin	0	0	2.93	1.08
MF	Risso's dolphin	0	0	3.15	1.33
MF	Long-finned pilot whale	0	0	3.03	1.21
MF	Short-finned pilot whale	0	0	0	0
MF	Sperm whale [c]	0	0	3.42	1.27
HF	Harbor porpoise (sensitive)	0	<0.01	2.70	19.73
PW	Gray seal	0.20	0	3.98	2.64
PW	Harbor seal	0	0	2.82	1.98
PW	Harp seal	0	0	3.49	2.38

[a] NOAA (2005), [b] (Wood et al. 2012), [c] Listed as Endangered under the ESA. L_{pk}—peak sound pressure level (dB re 1 µPa), L_E—sound exposure level (dB re 1 µPa^2·s), L_p—root mean square sound pressure level (dB re 1 µPa^2).

Table 84. OSS1 (3 m diameter, 3000 kJ, summer): Impact only exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with 10 dB attenuation, assuming 4 piles per day.

Functional group	Species	PTS ($L_{E,w,24h}$)	PTS (L_{pk})	Behavior (L_p) [a]	Behavior ($L_{p,w}$) [b]
LF	Fin whale [c]	4.41	<0.01	4.12	4.14
LF	Minke whale (migrating)	2.45	<0.01	3.70	17.21
LF	Humpback whale	3.67	<0.01	4.01	4.10
LF	North Atlantic right whale [c]	3.06	<0.01	3.69	3.70
LF	Sei whale [c] (migrating)	2.54	<0.01	3.95	18.74
MF	Atlantic white sided dolphin	0	0	3.67	2.35
MF	Atlantic spotted dolphin	0	0	4.35	0
MF	Common dolphin	0	0	3.76	2.44
MF	Bottlenose dolphin	0	0	3.29	2.06
MF	Risso's dolphin	0	0	3.63	2.34
MF	Long-finned pilot whale	0	0	3.56	2.35
MF	Short-finned pilot whale	0	0	0	0
MF	Sperm whale [c]	0	0	3.76	2.43
HF	Harbor porpoise (sensitive)	0	0.25	3.49	23.73
PW	Gray seal	1.88	0	4.35	3.39
PW	Harbor seal	0.61	<0.01	3.49	2.99
PW	Harp seal	0.56	<0.01	3.99	3.20

[a] NOAA (2005), [b] (Wood et al. 2012), [c] Listed as Endangered under the ESA. L_{pk}—peak sound pressure level (dB re 1 µPa), L_E—sound exposure level (dB re 1 µPa²·s), L_p—root mean square sound pressure level (dB re 1 µPa²).

Table 85. OSS2 (3 m diameter, 1700 kJ, summer Impact only exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with 10 dB attenuation, assuming 4 piles per day.

Functional group	Species	PTS ($L_{E,w,24h}$)	PTS (L_{pk})	Behavior (L_p) [a]	Behavior ($L_{p,w}$) [b]
LF	Fin whale [c]	1.59	0	2.28	2.30
LF	Minke whale (migrating)	0.84	0	2.24	6.94
LF	Humpback whale	1.41	0	2.24	2.24
LF	North Atlantic right whale [c]	1.16	0.01	2.18	2.19
LF	Sei whale [c] (migrating)	0.99	<0.01	2.22	7.01
MF	Atlantic white sided dolphin	0	0	2.20	1.55
MF	Atlantic spotted dolphin	0	0	2.06	1.47
MF	Common dolphin	0	<0.01	2.22	1.53
MF	Bottlenose dolphin	0	0	1.82	1.28
MF	Risso's dolphin	0	0	2.19	1.47
MF	Long-finned pilot whale	0	0	2.17	1.55
MF	Short-finned pilot whale	0	0	0	0
MF	Sperm whale [c]	0	0	2.21	1.54
HF	Harbor porpoise (sensitive)	0	0.33	2.29	8.53
PW	Gray seal	0.32	0	2.36	2.09
PW	Harbor seal	0.04	0	2.18	1.95
PW	Harp seal	0.15	0	2.24	1.88

[a] NOAA (2005), [b] (Wood et al. 2012), [c] Listed as Endangered under the ESA. L_{pk}—peak sound pressure level (dB re 1 µPa), L_E—sound exposure level (dB re 1 µPa^2·s), L_p—root mean square sound pressure level (dB re 1 µPa^2).

4.4.1.2. Exposure Ranges—Vibratory (30 min) Setting Followed by Impact Pile Driving

Table 86. WTGMP2 (13 m diameter, 5500 kJ, summer), one pile per day: Vibratory (30 min) and impact exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with 10 dB attenuation.

Functional group	Species	PTS Vibratory + impact piling ($L_{E,w,24h}$)	PTS Vibratory + impact piling (L_{pk})	Behavior Impact piling (L_p) [a]	Behavior Impact piling ($L_{p,w}$) [b]	Behavior Vibratory piling (L_p) [a]
LF	Fin whale [c]	2.92	0	5.71	5.68	27.28
LF	Minke whale (migrating)	1.67	0	5.57	16.12	26.25
LF	Humpback whale	2.47	<0.01	5.61	5.60	27.06
LF	North Atlantic right whale [c]	2.00	<0.01	5.56	5.54	25.83
LF	Sei whale [c] (migrating)	1.80	0	5.51	16.81	27.55
MF	Atlantic white sided dolphin	0	0	5.41	2.38	26.16
MF	Atlantic spotted dolphin	0	0	5.13	2.20	27.19
MF	Common dolphin	0	0	5.58	2.45	26.83
MF	Bottlenose dolphin	0	0	5.00	2.15	25.79
MF	Risso's dolphin	0	0	5.21	2.41	26.26
MF	Long-finned pilot whale	0	0	5.36	2.48	25.46
MF	Short-finned pilot whale	0	0	0	0	0
MF	Sperm whale [c]	0	0	5.65	2.52	27.08
HF	Harbor porpoise (sensitive)	0	0.31	4.79	18.57	22.06
PW	Gray seal	0	0	5.84	4.14	27.28
PW	Harbor seal	0	0	5.14	3.42	23.46
PW	Harp seal	0.03	0	5.66	3.89	27.41

[a] NOAA (2005), [b] (Wood et al. 2012), [c] Listed as Endangered under the ESA. L_{pk}—peak sound pressure level (dB re 1 µPa), L_E—sound exposure level (dB re 1 µPa^2·s), L_p—root mean square sound pressure level (dB re 1 µPa^2).

Table 87. WTGMP2 (13 m diameter, 5500 kJ, summer), two piles per day: Vibratory (30 min) and impact exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with 10 dB attenuation.

Functional group	Species	PTS Vibratory + impact piling ($L_{E,w,24h}$)	PTS Vibratory + impact piling (L_{pk})	Behavior Impact piling (L_p) [a]	Behavior Impact piling ($L_{p,w}$) [b]	Behavior Vibratory piling (L_p) [a]
LF	Fin whale [c]	3.03	<0.01	5.59	5.56	27.30
LF	Minke whale (migrating)	1.56	0	5.50	15.49	25.92
LF	Humpback whale	2.85	0	5.46	5.44	27.17
LF	North Atlantic right whale [c]	1.95	0	5.32	5.31	25.82
LF	Sei whale [c] (migrating)	1.57	0	5.48	16.58	27.44
MF	Atlantic white sided dolphin	0	0	5.36	2.33	25.64
MF	Atlantic spotted dolphin	0	0	5.06	2.16	26.71
MF	Common dolphin	0	0	5.42	2.43	26.58
MF	Bottlenose dolphin	0	0	4.96	2.06	25.83
MF	Risso's dolphin	0	0	5.19	2.35	25.49
MF	Long-finned pilot whale	0	0	5.26	2.34	24.93
MF	Short-finned pilot whale	0	0	0	0	0
MF	Sperm whale [c]	0	0	5.55	2.44	26.80
HF	Harbor porpoise (sensitive)	0	0.41	4.74	18.13	21.73
PW	Gray seal	0.23	0	5.71	4.24	26.98
PW	Harbor seal	0	0	4.99	3.45	22.99
PW	Harp seal	<0.01	<0.01	5.62	3.89	27.06

[a] NOAA (2005), [b] Wood et al. (2012) [c] Listed as Endangered under the ESA. L_{pk}—peak sound pressure level (dB re 1 µPa), L_E—sound exposure level (dB re 1 µPa^2·s), L_p—root mean square sound pressure level (dB re 1 µPa^2).

Table 88. WTGMP3 (13 m diameter, 6500 kJ, summer), one pile per day: Vibratory (30 min) and impact exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with 10 dB attenuation.

Functional group	Species	PTS Vibratory + impact piling ($L_{E,w,24h}$)	PTS Vibratory + impact piling (L_{pk})	Behavior Impact piling (L_p) [a]	Behavior Impact piling ($L_{p,w}$) [b]	Behavior Vibratory piling (L_p) [a]
LF	Fin whale [c]	3.58	<0.01	6.13	6.08	26.50
LF	Minke whale (migrating)	1.92	0	5.99	17.83	25.43
LF	Humpback whale	3.10	<0.01	6.12	6.09	26.44
LF	North Atlantic right whale [c]	2.31	<0.01	5.85	5.86	25.26
LF	Sei whale [c] (migrating)	2.10	0	5.91	18.40	26.79
MF	Atlantic white sided dolphin	0	0	5.96	2.66	25.33
MF	Atlantic spotted dolphin	0	0	5.65	2.53	26.14
MF	Common dolphin	0	0	6.00	2.82	26.03
MF	Bottlenose dolphin	0	0	5.59	2.63	25.11
MF	Risso's dolphin	0	0	5.74	2.68	25.52
MF	Long-finned pilot whale	0	0	5.76	2.59	24.49
MF	Short-finned pilot whale	0	0	0	0	0
MF	Sperm whale [c]	0	0	6.05	2.86	26.40
HF	Harbor porpoise (sensitive)	0	0.41	5.31	20.65	21.43
PW	Gray seal	0.36	0	6.26	4.45	26.66
PW	Harbor seal	0	0	5.75	3.77	22.30
PW	Harp seal	0.03	0	6.17	4.24	26.67

[a] NOAA (2005), [b] Wood et al. (2012), [c] Listed as Endangered under the ESA. L_{pk}—peak sound pressure level (dB re 1 µPa), L_E—sound exposure level (dB re 1 µPa^2·s), L_p—root mean square sound pressure level (dB re 1 µPa^2).

Table 89. WTGMP3 (13 m diameter, 6500 kJ, summer), two piles per day: Vibratory (30 min) and impact exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with 10 dB attenuation.

Functional group	Species	PTS Vibratory + impact piling ($L_{E,w,24h}$)	PTS Vibratory + impact piling (L_{pk})	Behavior Impact piling (L_p) [a]	Behavior Impact piling ($L_{p,w}$) [b]	Behavior Vibratory piling (L_p) [a]
LF	Fin whale [c]	3.57	<0.01	6.04	5.99	26.80
LF	Minke whale (migrating)	2.00	0	5.91	17.16	25.28
LF	Humpback whale	3.21	0	5.93	5.91	26.79
LF	North Atlantic right whale [c]	2.35	0	5.86	5.77	25.45
LF	Sei whale [c] (migrating)	2.05	<0.01	5.90	18.09	26.97
MF	Atlantic white sided dolphin	0	0	5.83	2.61	25.11
MF	Atlantic spotted dolphin	0	0	5.63	2.42	25.95
MF	Common dolphin	0	0	5.92	2.67	26.19
MF	Bottlenose dolphin	0	0	5.52	2.37	25.36
MF	Risso's dolphin	0	0	5.68	2.62	24.73
MF	Long-finned pilot whale	0	0	5.67	2.60	24.32
MF	Short-finned pilot whale	0	0	0	0	0
MF	Sperm whale [c]	0	0	5.92	2.70	26.37
HF	Harbor porpoise (sensitive)	0	0.45	5.13	20.34	21.35
PW	Gray seal	0.41	0	6.09	4.38	26.69
PW	Harbor seal	0.06	<0.01	5.34	3.61	22.53
PW	Harp seal	0.09	<0.01	6.04	4.07	26.64

[a] NOAA (2005), [b] Wood et al. (2012), [c] Listed as Endangered under the ESA. L_{pk}—peak sound pressure level (dB re 1 µPa), L_E—sound exposure level (dB re 1 µPa^2·s), L_p—root mean square sound pressure level (dB re 1 µPa^2).

Table 90. WTGJ (4.5 m diameter, 2300 kJ, summer) four piles per day: Vibratory (30 min) and impact exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with 10 dB attenuation.

Functional group	Species	PTS Vibratory + impact piling ($L_{E,w,24h}$)	PTS Vibratory + impact piling (L_{pk})	Behavior Impact piling (L_p) [a]	Behavior Impact piling ($L_{p,w}$) [b]	Behavior Vibratory piling (L_p) [a]
LF	Fin whale [c]	2.59	0	3.62	3.62	13.46
LF	Minke whale (migrating)	0.82	0	3.21	14.50	12.60
LF	Humpback whale	2.01	0	3.41	3.44	13.30
LF	North Atlantic right whale [c]	1.19	0	3.38	3.39	12.62
LF	Sei whale [c] (migrating)	1.10	<0.01	3.18	15.41	13.51
MF	Atlantic white sided dolphin	0	0	3.15	1.23	12.83
MF	Atlantic spotted dolphin	0	0	2.94	1.14	13.38
MF	Common dolphin	0	0	3.29	1.33	13.13
MF	Bottlenose dolphin	0	0	2.93	1.08	12.44
MF	Risso's dolphin	0	0	3.15	1.33	12.56
MF	Long-finned pilot whale	0	0	3.03	1.21	12.00
MF	Short-finned pilot whale	0	0	0	0	0
MF	Sperm whale [c]	0	0	3.42	1.27	13.20
HF	Harbor porpoise (sensitive)	0	<0.01	2.70	19.73	10.35
PW	Gray seal	0.20	0	3.98	2.64	13.49
PW	Harbor seal	0	0	2.82	1.98	11.40
PW	Harp seal	0	0	3.49	2.38	13.37

[a] NOAA (2005), [b] Wood et al. (2012), [c] Listed as Endangered under the ESA. L_{pk}—peak sound pressure level (dB re 1 µPa), L_E—sound exposure level (dB re 1 µPa^2·s), L_p—root mean square sound pressure level (dB re 1 µPa^2).

4.4.2. Sea Turtles

Similar to the results presented for marine mammals (Section 4.4.1), the exposure ranges ($ER_{95\%}$) for sea turtles are summarized in Tables 91–98 for monopile and jacket foundations, assuming 10 dB broadband attenuation and a summer acoustic propagation environment. Additional configurations are provided in Appendix H. Single strike ranges to various isopleths from acoustic modeling can be found in Appendix G, along with per-pile SEL distances to isopleths for the hearing groups assuming no movement of animals during pile driving.

4.4.2.1. Exposure Ranges—Impact Only

Table 91. WTGMP2 (13 m diameter, 5500 kJ, summer): Impact only exposure ranges ($ER_{95\%}$) in km to sea turtle threshold criteria with 10 dB attenuation.

Species	1 pile/day Injury ($L_{E,w,24h}$)	1 pile/day Injury (L_{pk})	1 pile/day Behavior (L_p)	2 piles/day Injury ($L_{E,w,24h}$)	2 piles/day Injury (L_{pk})	2 piles/day Behavior (L_p)
Kemp's ridley turtle [a]	0	0	1.51	0.08	0	1.62
Leatherback turtle [a]	0.58	0	1.60	0.62	0	1.79
Loggerhead turtle	0.21	0	1.72	0.46	0	1.58
Green turtle	0.20	0	1.46	0.36	0	1.51

[a] Listed as Endangered under the ESA.

Table 92. WTGMP3 (13 m diameter, 5500 kJ, summer): Impact only exposure ranges ($ER_{95\%}$) in km to sea turtle threshold criteria with 10 dB attenuation.

Species	1 pile/day Injury ($L_{E,w,24h}$)	1 pile/day Injury (L_{pk})	1 pile/day Behavior (L_p)	2 piles/day Injury ($L_{E,w,24h}$)	2 piles/day Injury (L_{pk})	2 piles/day Behavior (L_p)
Kemp's ridley turtle [a]	0.54	0	1.80	0.07	0	1.78
Leatherback turtle [a]	1.10	0	2.07	1.07	0	2.03
Loggerhead turtle	0.78	0	1.82	0.68	0	1.93
Green turtle	0.53	0	1.96	0.45	0	1.82

[a] Listed as Endangered under the ESA.

Table 93. WTGJ (4.5 m diameter, 2300 kJ, summer): Impact only exposure ranges ($ER_{95\%}$) in km to sea turtle threshold criteria with 10 dB attenuation, assuming four piles per day.

Species	Injury ($L_{E,w,24h}$)	Injury (L_{pk})	Behavior (L_p)
Kemp's ridley turtle [a]	0	0	0.40
Leatherback turtle [a]	0.57	0	0.57
Loggerhead turtle	0.18	0	0.50
Green turtle	0.06	0	0.51

[a] Listed as Endangered under the ESA.

Table 94. OSS1 (3 m diameter, 3000 kJ, summer): Impact only exposure ranges ($ER_{95\%}$) in km to sea turtle threshold criteria with 10 dB attenuation, assuming four piles per day.

Species	Injury ($L_{E,w,24h}$)	Injury (L_{pk})	Behavior (L_p)
Kemp's ridley turtle [a]	0.28	0	0.62
Leatherback turtle [a]	1.41	0	0.85
Loggerhead turtle	0.36	0	0.57
Green turtle	0.39	0	0.76

[a] Listed as Endangered under the ESA.

Table 95. OSS2 (3 m diameter, 1700 kJ, summer): Impact only exposure ranges ($ER_{95\%}$) in km to sea turtle threshold criteria with 10 dB attenuation, assuming four piles per day.

Species	Injury ($L_{E,w,24h}$)	Injury (L_{pk})	Behavior (L_p)
Kemp's ridley turtle [a]	0	0	0.43
Leatherback turtle [a]	0.34	0	0.34
Loggerhead turtle	0	0	0.44
Green turtle	<0.01	0	0.51

[a] Listed as Endangered under the ESA.

4.4.2.2. Exposure Ranges—Vibratory (30 min) Setting Followed by Impact Pile Driving

Table 96. WTGMP2 (13 m diameter, 5500 kJ, summer): Vibratory (30 min) and impact exposure ranges ($ER_{95\%}$) in km to sea turtle threshold criteria with 10 dB attenuation.

Species	1 pile/day Injury ($L_{E,W,24h}$)	1 pile/day Injury (L_{pk})	1 pile/day Behavior (L_p)	2 piles/day Injury ($L_{E,W,24h}$)	2 piles/day Injury (L_{pk})	2 piles/day Behavior (L_p)
Kemp's ridley turtle [a]	0	0	1.51	0.08	0	1.58
Leatherback turtle [a]	0.57	0	1.60	0.74	0	1.77
Loggerhead turtle	0.20	0	1.39	0.48	0	1.55
Green turtle	0.20	0	1.45	0.35	0	1.48

[a] Listed as Endangered under the ESA.

Table 97. WTGMP3 (13 m diameter, 6500 kJ, summer): Vibratory (30 min) and impact exposure ranges ($ER_{95\%}$) in km to sea turtle threshold criteria with 10 dB attenuation.

Species	1 pile/day Injury ($L_{E,W,24h}$)	1 pile/day Injury (L_{pk})	1 pile/day Behavior (L_p)	2 piles/day Injury ($L_{E,W,24h}$)	2 piles/day Injury (L_{pk})	2 piles/day Behavior (L_p)
Kemp's ridley turtle [a]	0.54	0	1.79	0.08	0	1.77
Leatherback turtle [a]	1.15	0	2.05	1.15	0	2.01
Loggerhead turtle	0.72	0	1.88	0.68	0	1.90
Green turtle	0.48	0	1.94	0.44	0	1.82

[a] Listed as Endangered under the ESA.

Table 98. WTGJ (4.5 m diameter, 2300 kJ, summer): Vibratory (30 min) and impact exposure ranges ($ER_{95\%}$) in km to sea turtle threshold criteria with 10 dB attenuation, assuming four piles per day.

Species	Injury ($L_{E,W,24h}$)	Injury (L_{pk})	Behavior (L_p)
Kemp's ridley turtle [a]	0	0	0.51
Leatherback turtle [a]	0.57	0	0.57
Loggerhead turtle	0.18	0	0.50
Green turtle	0.06	0	0.51

[a] Listed as Endangered under the ESA.

5. Discussion

This study predicted underwater sound levels associated with installing piles during impact piling and vibratory pile setting followed by impact pile driving. Sounds fields produced during impact pile driving for installation of 13 m monopile foundations, 3 m jacket foundations, and 4.5 m jacket foundations were found by modeling the vibration of the pile when struck with a hammer, determining a far-field representation of the pile as a sound source, and then propagating the sound from the apparent source into the environment.

Sound fields were sampled by simulating animal movement within the sound fields and determining if the levels experienced by simulated marine mammal and sea turtle animats (simulated animals) exceed regulatory thresholds. The number of animals predicted to experience levels exceeding injury or behavioral thresholds are provided in Section 4.3 and Appendix H. For those animats, the closest point of approach to the source was found and the distance accounting for 95 % of exceedances was reported as the exposure range, $ER_{95\%}$. The species-specific $ER_{95\%}$ (see tables in Section 4.4 and Appendix H) were determined with different broadband attenuation levels (0, 6, 10, and 15 dB) to account for the use of noise reduction systems, such as bubble curtains. $ER_{95\%}$ can be used for mitigation purposes, like establishing monitoring or exclusion areas. Fish were considered as static receivers, so exposure ranges were not calculated. Instead, the acoustic distance to their regulatory thresholds were determined and reported, with the different broadband attenuation levels (see tables in Sections 4.2.1.3 and 4.2.1.4).

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Literature Cited

[ANSI] American National Standards Institute and [ASA] Acoustical Society of America. S1.1-2013. *American National Standard: Acoustical Terminology*. NY, USA. https://webstore.ansi.org/Standards/ASA/ANSIASAS12013.

[ANSI] American National Standards Institute and [ASA] Acoustical Society of America. S1.13-2005 (R2010). *American National Standard: Measurement of Sound Pressure Levels in Air*. NY, USA. https://webstore.ansi.org/Standards/ASA/ANSIASAS1132005R2010.

[BOEM] Bureau of Ocean Energy Management. 2014. *Atlantic OCS Proposed Geological and Geophysical Activities: Mid-Atlantic and South Atlantic Planning Area. Final Programmatic Environmental Impact Statement*. Volume I: Chapters 1-8, Figures, Tables, and Keyword Index. OCS EIS/EA BOEM 2014-001. US Department of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region. https://www.boem.gov/sites/default/files/oil-and-gas-energy-program/GOMR/BOEM-2014-001-v1.pdf.

[CeTAP] Cetacean and Turtle Assessment Program, University of Rhode Island. 1982. *A Characterization of Marine Mammals and Turtles in the Mid- and North Atlantic Areas of the US Outer Continental Shelf, final report*. Report for US Department of the Interior, Bureau of Land Management. Contract AA551-CT8-48, Washington, DC.

[DoC] Department of Commerce (US) and [NOAA] National Oceanic and Atmospheric Administration (US). 2005. Endangered Fish and Wildlife; Notice of Intent to Prepare an Environmental Impact Statement. *Federal Register* 70(7): 1871-1875. https://www.govinfo.gov/content/pkg/FR-2005-01-11/pdf/05-525.pdf.

[ESA] Endangered Species Act of 1973 as Amended through the 108th Congress. 2002. United States Pub. L. No. 93–205, 87 Stat. 884, 16 U.S.C. 1531 (Dec 28, 1973) as amended by Pub. L. No. 107–136 (24 Jan 2002). http://www.fws.gov/endangered/esa-library/pdf/ESAall.pdf.

[FHWG] Fisheries Hydroacoustic Working Group. 2008. *Agreement in Principle for Interim Criteria for Injury to Fish from Pile Driving Activities*. 12 Jun 2008 edition. https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/ser/bio-fhwg-criteria-agree-a11y.pdf.

[GARFO] Greater Atlantic Regional Fisheries Office. 2020. *Section 7: Consultation Technical Guidance in the Greater Atlantic Region* (web page). National Marine Fisheries Service, 14 Sep 2020. https://www.greateratlantic.fisheries.noaa.gov/protected/section7/guidance/consultation/index.html.

[HESS] High Energy Seismic Survey. 1999. *High Energy Seismic Survey Review Process and Interim Operational Guidelines for Marine Surveys Offshore Southern California*. Prepared for the California State Lands Commission and the United States Minerals Management Service Pacific Outer Continental Shelf Region by the High Energy Seismic Survey Team, Camarillo, CA, USA. 98 p. https://ntrl.ntis.gov/NTRL/dashboard/searchResults/titleDetail/PB2001100103.xhtml.

[ISO] International Organization for Standardization. 2006. *ISO 80000-3:2006. Quantities and units – Part 3: Space and time*. https://www.iso.org/standard/31888.html.

[ISO] International Organization for Standardization. 2017. *ISO 18405:2017. Underwater acoustics – Terminology*. Geneva. https://www.iso.org/obp/ui/en/#!iso:std:62406:en.

Marine Mammal Protection Act of 1972 as Amended. 2015. United States Pub. L. No. 92-522, 16 U.S.C. 1361 (21 Oct 1972). http://www.nmfs.noaa.gov/pr/laws/mmpa/text.htm.

[NAVO] Naval Oceanography Office (US). 2003. *Database description for the Generalized Digital Environmental Model (GDEM-V) (U)*. Document MS 39522-5003. Oceanographic Data Bases Division, Stennis Space Center.

[NMFS] National Marine Fisheries Service (US) and [NOAA] National Oceanic and Atmospheric Administration (US). 2005. Endangered fish and wildlife: Notice of intent to prepare an environmental impact statement. *Federal Register* 70(7): 1871-1875. http://www.nmfs.noaa.gov/pr/pdfs/fr/fr70-1871.pdf.

[NMFS] National Marine Fisheries Service (US). 2016. *Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing: Underwater Acoustic Thresholds for Onset of Permanent and Temporary Threshold Shifts*. US Department of Commerce, NOAA. NOAA Technical Memorandum NMFS-OPR-55. 178 p.

[NMFS] National Marine Fisheries Service (US). 2018. *2018 Revision to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0): Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts*. US Department of Commerce, NOAA. NOAA Technical Memorandum NMFS-OPR-59. 167 p. https://media.fisheries.noaa.gov/dam-migration/tech_memo_acoustic_guidance_(20)_(pdf)_508.pdf.

[NMFS] National Marine Fisheries Service (US). 2022. *Summary of Marine Mammal Protection Act Acoustic Thresholds*. 7 p. https://media.fisheries.noaa.gov/2022-05/MM%20Acoustic%20Thresholds%20%28508%29_secure%20%28May%202022%29.pdf.

[NOAA] National Oceanic and Atmospheric Administration (U.S.). 2019. *Interim Recommendation for Sound Source Level and Propagation Analysis for High Resolution Geophysical Sources*. National Oceanic and Atmospheric Administration, US Department of Commerce. 3 p.

[USFWS] US Fish and Wildlife Service. 2014. *West Indian manatee (Trichechus manatus) Florida stock (Florida subspecies, Trichechus manatus latirostris)*. https://www.fws.gov/northflorida/manatee/SARS/20140123_FR00001606_Final_SAR_WIM_FL_Stock.pdf.

Aerts, L.A.M., M. Blees, S.B. Blackwell, C.R. Greene, Jr., K.H. Kim, D.E. Hannay, and M.E. Austin. 2008. *Marine mammal monitoring and mitigation during BP Liberty OBC seismic survey in Foggy Island Bay, Beaufort Sea, July-August 2008: 90-day report*. Document P1011-1. Report by LGL Alaska Research Associates Inc., LGL Ltd., Greeneridge Sciences Inc., and JASCO Applied Sciences for BP Exploration Alaska. 199 p. ftp://ftp.library.noaa.gov/noaa_documents.lib/NMFS/Auke%20Bay/AukeBayScans/Removable%20Disk/P1011-1.pdf.

Ainslie, M.A. 2010. *Principles of Sonar Performance Modeling*. Praxis Books. Springer, Berlin. https://doi.org/10.1007/978-3-540-87662-5.

Andersson, M.H., E. Dock-Åkerman, R. Ubral-Hedenberg, M.C. Öhman, and P. Sigray. 2007. Swimming behavior of roach (*Rutilus rutilus*) and three-spined stickleback (*Gasterosteus aculeatus*) in response to wind power noise and single-tone frequencies. *AMBIO* 36(8): 636-638. https://doi.org/10.1579/0044-7447(2007)36[636:SBORRR]2.0.CO;2.

Au, W.W.L. and M.C. Hastings. 2008. *Principles of Marine Bioacoustics*. Modern Acoustics and Signal Processing. Springer, New York. 510 p. https://doi.org/10.1007/978-0-387-78365-9.

Austin, M.E. and G.A. Warner. 2012. *Sound Source Acoustic Measurements for Apache's 2012 Cook Inlet Seismic Survey*. Version 2.0. Technical report by JASCO Applied Sciences for Fairweather LLC and Apache Corporation.

Austin, M.E. and L. Bailey. 2013. *Sound Source Verification: TGS Chukchi Sea Seismic Survey Program 2013*. Document 00706, Version 1.0. Technical report by JASCO Applied Sciences for TGS-NOPEC Geophysical Company.

Austin, M.E., A. McCrodan, C. O'Neill, Z. Li, and A.O. MacGillivray. 2013. *Marine mammal monitoring and mitigation during exploratory drilling by Shell in the Alaskan Chukchi and Beaufort Seas, July–November 2012: 90-Day Report*. *In*: Funk, D.W., C.M. Reiser, and W.R. Koski (eds.). Underwater Sound Measurements. LGL Rep. P1272D–1. Report from LGL Alaska Research Associates Inc. and JASCO Applied Sciences, for Shell Offshore Inc., National Marine Fisheries Service (US), and US Fish and Wildlife Service. 266 pp plus appendices.

Austin, M.E. 2014. Underwater noise emissions from drillships in the Arctic. *In*: Papadakis, J.S. and L. Bjørnø (eds.). *UA2014 - 2nd International Conference and Exhibition on Underwater Acoustics*. 22-27 Jun 2014, Rhodes, Greece. pp. 257-263.

Austin, M.E., H. Yurk, and R. Mills. 2015. *Acoustic Measurements and Animal Exclusion Zone Distance Verification for Furie's 2015 Kitchen Light Pile Driving Operations in Cook Inlet*. Version 2.0. Technical report by JASCO Applied Sciences for Jacobs LLC and Furie Alaska.

Austin, M.E. and Z. Li. 2016. *Marine Mammal Monitoring and Mitigation During Exploratory Drilling by Shell in the Alaskan Chukchi Sea, July–October 2015: Draft 90-day report*. *In*: Ireland, D.S. and L.N. Bisson (eds.). Underwater Sound Measurements. LGL Rep. P1363D. Report from LGL Alaska Research Associates Inc., LGL Ltd., and JASCO Applied Sciences Ltd. For Shell Gulf of Mexico Inc, National Marine Fisheries Service, and US Fish and Wildlife Service. 188 pp + appendices.

Bellmann, M.A. 2014. Overview of existing noise mitigation systems for reducing pile-driving noise. *Inter-noise2014*. Melbourne, Australia. https://www.acoustics.asn.au/conference_proceedings/INTERNOISE2014/papers/p358.pdf.

Bellmann, M.A., A. May, T. Wendt, S. Gerlach, P. Remmers, and J. Brinkmann. 2020. *Underwater noise during percussive pile driving: Influencing factors on pile-driving noise and technical possibilities to comply with noise mitigation values*. Supported by the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit (BMU)), FKZ UM16 881500. Commissioned and managed by the Federal Maritime and Hydrographic Agency (Bundesamt für Seeschifffahrt und Hydrographie (BSH)), Order No. 10036866. Edited by the itap GmbH. https://www.itap.de/media/experience_report_underwater_era-report.pdf.

Betke, K. 2008. *Measurement of Wind Turbine Construction Noise at Horns Rev II*. Report 1256-08-a-KB. Technical report by Institut für technische und angewandte Physik GmbH (ITAP) for BioConsultSH, Husun, Germany. 30 p. https://tethys.pnnl.gov/sites/default/files/publications/Betke-2008.pdf.

Buehler, D., R. Oestman, J.A. Reyff, K. Pommerenck, and B. Mitchell. 2015. *Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish*. Report CTHWANP-RT-15-306.01.01. Report by California Department of Transportation (CALTRANS), Division of Environmental Analysis. 532 p.

https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/bio-tech-guidance-hydroacoustic-effects-110215-a11y.pdf.

Collins, M.D. 1993. A split-step Padé solution for the parabolic equation method. *Journal of the Acoustical Society of America* 93(4): 1736-1742. https://doi.org/10.1121/1.406739.

Coppens, A.B. 1981. Simple equations for the speed of sound in Neptunian waters. *Journal of the Acoustical Society of America* 69(3): 862-863. https://doi.org/10.1121/1.382038.

Cranford, T.W. and P. Krysl. 2015. Fin whale sound reception mechanisms: Skull vibration enables low-frequency hearing. *PLOS ONE* 10(1). https://doi.org/10.1371/journal.pone.0116222.

Dadswell, M.J., B.D. Taubert, T.S. Squiers, D. Marchette, and J. Buckley. 1984. *Synopsis of biological data on shortnose sturgeon, Acipenser brevirostrum LeSueur 1818*. NOAA/National Marine Fisheries Service. NOAA Technical Report NMFS 14

Dahlheim, M.E. and D.K. Ljungblad. 1990. Preliminary Hearing Study on Gray Whales (*Eschrichtius Robustus*) in the Field. *In* Thomas, J.A. and R.A. Kastelein (eds.). *Sensory abilities of Cetaceans*. Volume 196. Springer Science+Business Media, Boston. pp. 335-346. https://doi.org/10.1007/978-1-4899-0858-2_22.

DiMatteo, A.D., J.J. Roberts, D. Jones, L. Garrison, K.M. Hart, R.D. Kenney, C.B. Khan, W.A. McLellan, K. Lomac-MacNair, et al. 2023. *Sea turtle density surface models along the United States Atlantic coast*. Manuscript in preparation.

Dunton, K.J., A. Jordaan, K.A. McKown, D.O. Conover, and M.G. Frisk. 2010. Abundance and distribution of Atlantic sturgeon (*Acipenser oxyrinchus*) within the Northwest Atlantic Ocean, determined from five fishery-independent surveys. *Fishery Bulletin* 108(4): 450-464. https://spo.nmfs.noaa.gov/sites/default/files/pdf-content/2010/1084/dunton.pdf.

Ellison, W.T., B.L. Southall, C.W. Clark, and A.S. Frankel. 2012. A New Context-Based Approach to Assess Marine Mammal Behavioral Responses to Anthropogenic Sounds. *Conservation Biology* 26(1): 21-28. https://doi.org/10.1111/j.1523-1739.2011.01803.x.

Erbe, C., R.D. McCauley, and A. Gavrilov. 2016. Characterizing marine soundscapes. *In* Popper, A.N. and A.D. Hawkins (eds.). *The Effects of Noise on Aquatic Life II*. Volume 875. Springer, New York. pp. 265-271. https://doi.org/10.1007/978-1-4939-2981-8_31.

Finneran, J.J. 2015. *Auditory weighting functions and TTS/PTS exposure functions for cetaceans and marine carnivores*. Technical report by SSC Pacific, San Diego, CA, USA.

Finneran, J.J. 2016. *Auditory weighting functions and TTS/PTS exposure functions for marine mammals exposed to underwater noise*. Technical Report for Space and Naval Warfare Systems Center Pacific, San Diego, CA, USA. 49 p. https://apps.dtic.mil/dtic/tr/fulltext/u2/1026445.pdf.

Finneran, J.J., E.E. Henderson, D.S. Houser, K. Jenkins, S. Kotecki, and J.L. Mulsow. 2017. *Criteria and Thresholds for U.S. Navy Acoustic and Explosive Effects Analysis (Phase III)*. Technical report by Space and Naval Warfare Systems Center Pacific (SSC Pacific). 183 p. https://nwtteis.com/portals/nwtteis/files/technical_reports/Criteria_and_Thresholds_for_U.S._Navy_Acoustic_and_Explosive_Effects_Analysis_June2017.pdf.

Funk, D.W., D.E. Hannay, D.S. Ireland, R. Rodrigues, and W.R. Koski. 2008. *Marine mammal monitoring and mitigation during open water seismic exploration by Shell Offshore Inc. in the Chukchi and Beaufort Seas, July–November 2007: 90-day report*. LGL Report P969-1. Prepared by LGL Alaska Research Associates Inc., LGL Ltd., and JASCO Research Ltd. for Shell Offshore Inc., National Marine Fisheries Service (US), and US Fish and Wildlife Service. 218 p. http://www-static.shell.com/static/usa/downloads/alaska/shell2007_90-d_final.pdf.

Hannay, D.E. and R. Racca. 2005. *Acoustic Model Validation*. Document 0000-S-90-04-T-7006-00-E, Revision 02, Version 1.3. Technical report by JASCO Research Ltd. for Sakhalin Energy Investment Company Ltd. 34 p.

Hayes, S.A., E. Josephson, K. Maze-Foley, P.E. Rosel, and J. Turek. 2022. *U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments 2021*. US Department of Commerce. NOAA Technical Memorandum NMFS-NE-288, Woods Hole, MA, USA. 380 p. https://doi.org/10.25923/6tt7-kc16.

Hayes, S.A., E.A. Josephson, K. Maze-Foley, P.E. Rosel, J.A. McCordic, and J. Wallace. 2023. *U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments 2022*. Report by US Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, and Northeast Fisheries Science Center. NOAA Technical Memorandum NMFS-NE-304, Woods Hole, MA. https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf.

Houser, D.S., D.A. Helweg, and P.W.B. Moore. 2001. A bandpass filter-bank model of auditory sensitivity in the humpback whale. *Aquatic Mammals* 27(2): 82-91. https://www.aquaticmammalsjournal.org/share/AquaticMammalsIssueArchives/2001/AquaticMammals_27-02/27-02_Houser.PDF.

Illingworth & Rodkin, Inc. 2007. Appendix I. Compendium of pile driving sound data. *In Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish*. Illingworth & Rodkin, Inc. for the California Department of Transportation, Sacramento, CA. p. 129. www.dot.ca.gov/hq/env/bio/files/pile_driving_snd_comp9_27_07.pdf.

Ireland, D.S., R. Rodrigues, D.W. Funk, W.R. Koski, and D.E. Hannay. 2009. *Marine mammal monitoring and mitigation during open water seismic exploration by Shell Offshore Inc. in the Chukchi and Beaufort Seas, July–October 2008: 90-Day Report*. Document P1049-1. 277 p.

Koschinski, S. and K. Lüdemann. 2013. *Development of Noise Mitigation Measures in Offshore Wind Farm Construction*. Commissioned by the Federal Agency for Nature Conservation (Bundesamt für Naturschutz, BfN). Original report (in German) published Jul 2011, updated Feb 2013, Nehmten and Hamburg, Germany. 97 p. https://www.bfn.de/fileadmin/MDB/documents/themen/meeresundkuestenschutz/downloads/Berichte-und-Positionspapiere/Mitigation-Measures-Underwater-Noise_2013-08-27_final.pdf.

MacGillivray, A.O. and N.R. Chapman. 2012. Modeling underwater sound propagation from an airgun array using the parabolic equation method. *Canadian Acoustics* 40(1): 19-25. https://jcaa.caa-aca.ca/index.php/jcaa/article/view/2502/2251.

MacGillivray, A.O. 2014. A model for underwater sound levels generated by marine impact pile driving. *Proceedings of Meetings on Acoustics* 20(1). https://doi.org/10.1121/2.0000030

MacGillivray, A.O. 2018. Underwater noise from pile driving of conductor casing at a deep-water oil platform. *Journal of the Acoustical Society of America* 143(1): 450-459. https://doi.org/10.1121/1.5021554.

Malme, C.I., P.R. Miles, C.W. Clark, P.L. Tyack, and J.E. Bird. 1983. *Investigations of the Potential Effects of Underwater Noise from Petroleum Industry Activities on Migrating Gray Whale Behavior. Final Report for the Period of 7 June 1982 - 31 July 1983*. Report 5366. Report by Bolt Beranek and Newman Inc. for US Department of the Interior, Minerals Management Service, Alaska OCS Office, Cambridge, MA, USA. https://www.boem.gov/sites/default/files/boem-newsroom/Library/Publications/1983/rpt5366.pdf.

Malme, C.I., P.R. Miles, C.W. Clark, P.L. Tyack, and J.E. Bird. 1984. *Investigations of the Potential Effects of Underwater Noise from Petroleum Industry Activities on Migrating Gray Whale Behavior. Phase II: January 1984 Migration*. Report 5586. Report by Bolt Beranek and Newman Inc. for the US Department of the Interior, Minerals Management Service, Cambridge, MA, USA. https://www.boem.gov/sites/default/files/boem-newsroom/Library/Publications/1983/rpt5586.pdf.

Martin, S.B., K.C. Bröker, M.-N.R. Matthews, J.T. MacDonnell, and L. Bailey. 2015. Comparison of measured and modeled air-gun array sound levels in Baffin Bay, West Greenland. *OceanNoise 2015*. 11-15 May 2015, Barcelona, Spain.

Martin, S.B. and A.N. Popper. 2016. Short- and long-term monitoring of underwater sound levels in the Hudson River (New York, USA). *Journal of the Acoustical Society of America* 139(4): 1886-1897. https://doi.org/10.1121/1.4944876.

Martin, S.B., J.T. MacDonnell, and K.C. Bröker. 2017a. Cumulative sound exposure levels—Insights from seismic survey measurements. *Journal of the Acoustical Society of America* 141(5): 3603-3603. https://doi.org/10.1121/1.4987709.

Martin, S.B., M.-N.R. Matthews, J.T. MacDonnell, and K.C. Bröker. 2017b. Characteristics of seismic survey pulses and the ambient soundscape in Baffin Bay and Melville Bay, West Greenland. *Journal of the Acoustical Society of America* 142(6): 3331-3346. https://doi.org/10.1121/1.5014049.

Matthews, M.-N.R. and A.O. MacGillivray. 2013. Comparing modeled and measured sound levels from a seismic survey in the Canadian Beaufort Sea. *Proceedings of Meetings on Acoustics* 19(1): 1-8. https://doi.org/10.1121/1.4800553.

Matuschek, R. and K. Betke. 2009. Measurements of construction noise during pile driving of offshore research platforms and wind farms. *NAG-DAGA 2009 International Conference on Acoustics*. 23-26 Mar 2009, Rotterdam, Netherlands. pp. 262-265.

McCauley, R.D., J. Fewtrell, A.J. Duncan, C. Jenner, M.-N. Jenner, J.D. Penrose, R.I.T. Prince, A. Adhitya, J. Murdoch, et al. 2000a. *Marine seismic surveys: Analysis and propagation of air-gun signals; and effects of air-gun exposure on humpback whales, sea turtles, fishes and squid*. Report R99-15. Prepared for Australian Petroleum Production Exploration Association by Centre for Maine Science and Technology, Western Australia. 198 p. https://cmst.curtin.edu.au/wp-content/uploads/sites/4/2016/05/McCauley-et-al-Seismic-effects-2000.pdf.

McCauley, R.D., J. Fewtrell, A.J. Duncan, C. Jenner, M.-N. Jenner, J.D. Penrose, R.I.T. Prince, A. Adhitya, J. Murdoch, et al. 2000b. Marine seismic surveys: A study of environmental implications. *Australian Petroleum Production Exploration Association (APPEA) Journal* 40(1): 692-708. https://doi.org/10.1071/AJ99048.

McCrodan, A., C.R. McPherson, and D.E. Hannay. 2011. *Sound Source Characterization (SSC) Measurements for Apache's 2011 Cook Inlet 2D Technology Test*. Version 3.0. Technical report by JASCO Applied Sciences for Fairweather LLC and Apache Corporation. 51 p.

McPherson, C.R. and G.A. Warner. 2012. *Sound Sources Characterization for the 2012 Simpson Lagoon OBC Seismic Survey 90-Day Report*. Document 00443, Version 2.0. Technical report by JASCO Applied Sciences for BP Exploration (Alaska) Inc.

McPherson, C.R., K. Lucke, B.J. Gaudet, S.B. Martin, and C.J. Whitt. 2018. *Pelican 3-D Seismic Survey Sound Source Characterisation*. Document 001583. Version 1.0. Technical report by JASCO Applied Sciences for RPS Energy Services Pty Ltd.

McPherson, C.R. and S.B. Martin. 2018. *Characterisation of Polarcus 2380 in^3 Airgun Array*. Document 001599, Version 1.0. Technical report by JASCO Applied Sciences for Polarcus Asia Pacific Pte Ltd.

Mueller-Blenkle, C., P.K. McGregor, A.B. Gill, M.H. Andersson, J. Metcalfe, V. Bendall, P. Sigray, D.T. Wood, and F. Thomsen. 2010. *Effects of Pile-driving Noise on the Behaviour of Marine Fish*. COWRIE Ref: Fish 06-08; Cefas Ref: C3371. 62 p. https://dspace.lib.cranfield.ac.uk/handle/1826/8235.

Nedwell, J.R. and A.W. Turnpenny. 1998. The use of a generic frequency weighting scale in estimating environmental effect. *Workshop on Seismics and Marine Mammals*. 23–25 Jun 1998, London, UK.

Nedwell, J.R., A.W. Turnpenny, J. Lovell, S.J. Parvin, R. Workman, J.A.L. Spinks, and D. Howell. 2007. *A validation of the dB$_{ht}$ as a measure of the behavioural and auditory effects of underwater noise*. Document 534R1231 Report by Subacoustech Ltd. for Chevron Ltd, TotalFinaElf Exploration UK PLC, Department of Business, Enterprise and Regulatory Reform, Shell UK Exploration and Production Ltd, The Industry Technology Facilitator, Joint Nature Conservation Committee, and The UK Ministry of Defence. 74 p. https://tethys.pnnl.gov/sites/default/files/publications/Nedwell-et-al-2007.pdf.

Nehls, G., A. Rose, A. Diederichs, M.A. Bellmann, and H. Pehlke. 2016. Noise Mitigation During Pile Driving Efficiently Reduces Disturbance of Marine Mammals. (Chapter 92) *In* Popper, A.N. and A.D. Hawkins (eds.). *The Effects of Noise on Aquatic Life II*. Volume 875. Springer, NY, USA. pp. 755-762. https://doi.org/10.1007/978-1-4939-2981-8_92.

NOAA Fisheries. 2021. *Giant Manta Ray (Manta birostris)* (web page), 29 Dec 2021. https://www.fisheries.noaa.gov/species/giant-manta-ray.

NOAA Fisheries. 2022. *Atlantic Salmon (Protected) (Salmo salar)* (web page), 25 Feb 2022. https://www.fisheries.noaa.gov/species/atlantic-salmon-protected.

O'Neill, C., D. Leary, and A. McCrodan. 2010. Sound Source Verification. (Chapter 3) *In* Blees, M.K., K.G. Hartin, D.S. Ireland, and D.E. Hannay (eds.). *Marine mammal monitoring and mitigation during open water seismic exploration by Statoil USA E&P Inc. in the Chukchi Sea, August-October 2010: 90-day report*. LGL Report P1119. Prepared by LGL Alaska Research Associates Inc., LGL Ltd., and JASCO Applied Sciences Ltd. for Statoil USA E&P Inc., National Marine Fisheries Service (US), and US Fish and Wildlife Service. pp. 1-34.

Palka, D.L., L. Aichinger Dias, E. Broughton, S. Chavez-Rosales, D.M. Cholewiak, G. Davis, A.I. DeAngelis, L.P. Garrison, H.L. Haas, et al. 2021. *Atlantic Marine Assessment Program for Protected Species: FY15 – FY19* Report by the US Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2021-051, Washington, DC. 330 p. https://espis.boem.gov/Final%20reports/BOEM_2021-051.pdf.

Parks, S.E., C.W. Clark, and P.L. Tyack. 2007. Short-and long-term changes in right whale calling behavior: The potential effects of noise on acoustic communication. *Journal of the Acoustical Society of America* 122(6): 3725-3731. https://doi.org/10.1121/1.2799904.

Pile Dynamics, Inc. 2010. GRLWEAP. https://www.pile.com/.

Popper, A.N., A.D. Hawkins, R.R. Fay, D.A. Mann, S. Bartol, T.J. Carlson, S. Coombs, W.T. Ellison, R.L. Gentry, et al. 2014. *Sound Exposure Guidelines for Fishes and Sea Turtles: A Technical Report prepared by ANSI-Accredited Standards Committee S3/SC1 and registered with ANSI*. ASA S3/SC1.4 TR-2014. SpringerBriefs in Oceanography. ASA Press and Springer. https://doi.org/10.1007/978-3-319-06659-2.

Purser, J. and A.N. Radford. 2011. Acoustic noise induces attention shifts and reduces foraging performance in three-spined sticklebacks (*Gasterosteus aculeatus*). *PLOS ONE* 6(2): e17478. https://doi.org/10.1371/journal.pone.0017478.

Quijano, J.E., M.E. Austin, and G.A. Warner. 2017. *Acoustic Modeling Study: Underwater Sound Levels from Marine Pile Driving in Southeast Alaska*. Document 01429, Version 1.0 Report 4000(135)B. Technical report by JASCO Applied Sciences for Alaska Department of Transportation & Public Facilities and Federal Highway Administration. http://www.dot.alaska.gov/stwddes/research/assets/pdf/4000-135b.pdf.

Racca, R., A.N. Rutenko, K.C. Bröker, and M.E. Austin. 2012a. A line in the water - design and enactment of a closed loop, model based sound level boundary estimation strategy for mitigation of behavioural impacts from a seismic survey. *11th European Conference on Underwater Acoustics*. Volume 34(3), Edinburgh, UK.

Racca, R., A.N. Rutenko, K.C. Bröker, and G. Gailey. 2012b. Model based sound level estimation and in-field adjustment for real-time mitigation of behavioural impacts from a seismic survey and post-event evaluation of sound exposure for individual whales. *In*: McMinn, T. (ed.). *Acoustics 2012*. Fremantle, Australia. http://www.acoustics.asn.au/conference_proceedings/AAS2012/papers/p92.pdf.

Racca, R., M.E. Austin, A.N. Rutenko, and K.C. Bröker. 2015. Monitoring the gray whale sound exposure mitigation zone and estimating acoustic transmission during a 4-D seismic survey, Sakhalin Island, Russia. *Endangered Species Research* 29(2): 131-146. https://doi.org/10.3354/esr00703.

Reichmuth, C.J., J.L. Mulsow, J.J. Finneran, D.S. Houser, and A.Y. Supin. 2007. Measurement and Response Characteristics of Auditory Brainstem Responses in Pinnipeds. *Aquatic Mammals* 33(1): 132-150. https://doi.org/10.1578/AM.33.1.2007.132.

Richardson, W.J., B. Würsig, and C.R. Greene, Jr. 1986. Reactions of bowhead whales, *Balaena mysticetus*, to seismic exploration in the Canadian Beaufort Sea. *Journal of the Acoustical Society of America* 79(4): 1117-1128. https://doi.org/10.1121/1.393384.

Richardson, W.J., B. Würsig, and C.R. Greene, Jr. 1990. Reactions of bowhead whales, *Balaena mysticetus*, to drilling and dredging noise in the Canadian Beaufort Sea. *Marine Environmental Research* 29(2): 135-160. https://doi.org/10.1016/0141-1136(90)90032-J.

Richardson, W.J., C.R. Greene, Jr., C.I. Malme, and D.H. Thomson. 1995. *Marine Mammals and Noise*. Academic Press, San Diego, CA, USA. 576 p. https://doi.org/10.1016/C2009-0-02253-3.

Roberts, J.J., B.D. Best, L. Mannocci, E. Fujioka, P.N. Halpin, D.L. Palka, L.P. Garrison, K.D. Mullin, T.V.N. Cole, et al. 2016. Habitat-based cetacean density models for the U.S. Atlantic and Gulf of Mexico. *Scientific Reports* 6. https://doi.org/10.1038/srep22615.

Roberts, J.J., T.M. Yack, and P.N. Halpin. 2022. *Habitat-based marine mammal density models for the U.S. Atlantic* (web page). https://seamap.env.duke.edu/models/Duke/EC/.

Sills, J.M., B.L. Southall, and C.J. Reichmuth. 2014. Amphibious hearing in spotted seals (*Phoca largha*): Underwater audiograms, aerial audiograms and critical ratio measurements. *Journal of Experimental Biology* 217(5): 726-734. https://doi.org/10.1242/jeb.097469.

Southall, B.L., A.E. Bowles, W.T. Ellison, J.J. Finneran, R.L. Gentry, C.R. Greene, Jr., D. Kastak, D.R. Ketten, J.H. Miller, et al. 2007. Marine Mammal Noise Exposure Criteria: Initial Scientific Recommendations. *Aquatic Mammals* 33(4): 411-521. https://doi.org/10.1578/AM.33.4.2007.411.

Southall, B.L., J.J. Finneran, C.J. Reichmuth, P.E. Nachtigall, D.R. Ketten, A.E. Bowles, W.T. Ellison, D.P. Nowacek, and P.L. Tyack. 2019. Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects. *Aquatic Mammals* 45(2): 125-232. https://doi.org/10.1578/AM.45.2.2019.125.

Stadler, J.H. and D.P. Woodbury. 2009. Assessing the effects to fishes from pile driving: Application of new hydroacoustic criteria. *Inter-Noise 2009: Innovations in Practical Noise Control*. 23-29 Aug 2009, Ottawa, Canada.

Tozer, B., D. T. Sandwell, W. H. F. Smith, C. Olson, J. R. Beale, P. Wessel. 2019. *Global bathymetry and topography at 15 arc sec: SRTM15+. Distributed by OpenTopography.* (web page).

Tubelli, A.A., A. Zosuls, D.R. Ketten, and D.C. Mountain. 2012. Prediction of a mysticete audiogram via finite element analysis of the middle ear. *In* Popper, A.N. and A.D. Hawkins (eds.). *The Effects of Noise on Aquatic Life*. Volume 730. Springer, New York. pp. 57-59. https://doi.org/10.1007/978-1-4419-7311-5_12.

Warner, G.A., C. Erbe, and D.E. Hannay. 2010. Underwater Sound Measurements. (Chapter 3) *In* Reiser, C.M., D.W. Funk, R. Rodrigues, and D.E. Hannay (eds.). *Marine Mammal Monitoring and Mitigation during Open Water Shallow Hazards and Site Clearance Surveys by Shell Offshore Inc. in the Alaskan Chukchi Sea, July-October 2009: 90-Day Report*. LGL Report P1112-1. Report by LGL Alaska Research Associates Inc. and JASCO Applied Sciences for Shell Offshore Inc., National Marine Fisheries Service (US), and Fish and Wildlife Service (US). pp. 1-54.

Warner, G.A., M.E. Austin, and A.O. MacGillivray. 2017. Hydroacoustic measurements and modeling of pile driving operations in Ketchikan, Alaska [Abstract]. *Journal of the Acoustical Society of America* 141(5): 3992. https://doi.org/10.1121/1.4989141.

Wartzok, D. and D.R. Ketten. 1999. Marine Mammal Sensory Systems. (Chapter 4) *In* Reynolds, J. and S. Rommel (eds.). *Biology of Marine Mammals*. Smithsonian Institution Press, Washington, DC. pp. 117-175.

Wood, J.D., B.L. Southall, and D.J. Tollit. 2012. *PG&E offshore 3-D Seismic Survey Project Environmental Impact Report–Marine Mammal Technical Draft Report*. Report by SMRU Ltd. 121 p. https://www.coastal.ca.gov/energy/seismic/mm-technical-report-EIR.pdf.

Wysocki, L.E., S. Amoser, and F. Ladich. 2007. Diversity in ambient noise in European freshwater habitats: Noise levels, spectral profiles, and impact on fishes. *Journal of the Acoustical Society of America* 121(5): 2559-2566. https://doi.org/10.1121/1.2713661.

Zykov, M.M. and J.T. MacDonnell. 2013. *Sound Source Characterizations for the Collaborative Baseline Survey Offshore Massachusetts Final Report: Side Scan Sonar, Sub-Bottom Profiler, and the R/V Small Research Vessel experimental*. Document 00413, Version 2.0. Technical report by JASCO Applied Sciences for Fugro GeoServices, Inc. and the (US) Bureau of Ocean Energy Management.

Appendix A. Glossary of Acoustic Terms

Unless otherwise stated in an entry, these definitions are consistent with ISO 18405 (2017).

Light blue text indicates related terms that might be in this glossary. Dark blue text indicates clickable links to related terms in this glossary.

1/3-octave

One third of an octave. A 1/3-octave is approximately equal to one decidecade (1/3 oct ≈ 1.003 ddec).

1/3-octave-band

Frequency band whose bandwidth is one 1/3 octave. The bandwidth of a 1/3-octave-band increases with increasing center frequency.

absorption

The conversion of sound energy to heat energy. Specifically, the reduction of sound pressure amplitude due to particle motion energy converting to heat in the propagation medium.

acoustic noise

Sound that interferes with an acoustic process.

agent-based modeling

A computer simulation of autonomous agents (sometimes called animats) acting in an environment, used to assess the agents' experience of the environment and/or their effect on the environment. See also animal movement modeling.

animal movement modeling

Simulation of animal movement based on behavioral rules for the purpose of predicting an animal's experience of an environment. A type of agent-based modeling.

attenuation

The gradual loss of acoustic energy from absorption and scattering as sound propagates through a medium. Attenuation depends on frequency—higher frequency sounds are attenuated faster than lower frequency sounds.

audiogram

A graph or table of hearing threshold as a function of frequency that describes the hearing sensitivity of an animal over its hearing range.

auditory frequency weighting

The process of applying an auditory frequency-weighting function. An example for marine mammals are the auditory frequency-weighting functions published by Southall et al. (2007).

auditory frequency-weighting function

Frequency-weighting function describing a compensatory approach accounting for a species' (or functional hearing group's) frequency-specific hearing sensitivity.

azimuth

A horizontal angle relative to a reference direction, which is often magnetic north or the direction of travel. In navigation, it is also called bearing.

bandwidth

A range within a continuous band of frequencies. Unit: hertz (Hz).

broadband level

The total level measured over a specified frequency range. If the frequency range is unspecified, the term refers to the entire measured frequency range.

cetacean

Member of the order Cetacea. Cetaceans are aquatic mammals and include whales, dolphins, and porpoises.

compressional wave

A mechanical vibration wave in which the direction of particle motion is parallel to the direction of propagation. Also called a longitudinal wave. In seismology/geophysics, it's called a primary wave or P-wave. Shear waves in the seabed can be converted to compressional waves in water at the water-seabed interface.

continuous sound

A sound whose sound pressure level remains above ambient sound during the observation period (ANSI and ASA S1.13-2005 (R2010)). A sound that gradually varies in intensity with time, for example, sound from a marine vessel.

decade

Logarithmic frequency interval whose upper bound is ten times larger than its lower bound (ISO 2006).

Logarithmic frequency interval whose upper bound is ten times larger than its lower bound (ISO 80000-3:2006). For example, one decade up from 1000 Hz is 10,000 Hz, and one decade down is 100 Hz.

decibel (dB)

Unit of level used to express the ratio of one value of a power quantity to another on a logarithmic scale. Especially suited to quantify variables with a large dynamic range.

decidecade

One tenth of a decade. Approximately equal to one third of an octave (1 ddec ≈ 0.3322 oct), and for this reason sometimes referred to as a 1/3 octave.

decidecade band

Frequency band whose bandwidth is one decidecade. The bandwidth of a decidecade band increases with increasing center frequency.

frequency

The rate of oscillation of a periodic function measured in cycles per unit time. The reciprocal of the period. Unit: hertz (Hz). Symbol: f. 1 Hz is equal to 1 cycle per second.

frequency weighting

The process of applying a frequency-weighting function.

frequency-weighting function

The squared magnitude of the sound pressure transfer function (ISO 18405:2017). For sound of a given frequency, the frequency-weighting function is the ratio of output power to input power of a specified filter, sometimes expressed in decibels. Examples include the following:

Auditory frequency-weighting function: compensatory frequency-weighting function accounting for a species' (or functional hearing group's) frequency-specific hearing sensitivity.

System frequency-weighting function: frequency-weighting function describing the sensitivity of an acoustic recording system, which typically consists of a hydrophone, one or more amplifiers, and an analog-to-digital converter.

functional hearing group

Category of animal species when classified according to their hearing sensitivity, hearing anatomy, and susceptibility to sound. For marine mammals, initial groupings were proposed by Southall et al. (2007), and revised groupings are developed as new research/data becomes available. Revised groupings proposed by Southall et al. (2019) include low-frequency cetaceans, high-frequency cetaceans, very high-frequency cetaceans, phocid carnivores in water, other carnivores in water, and sirenians. Example hearing groups for fish include species for which the swim bladder is involved in hearing, species for which the swim bladder is not involved in hearing, and species without a swim bladder (Popper et al. 2014). See also auditory frequency-weighting functions, which are often applied to these groups.

geoacoustic

Relating to the acoustic properties of the seabed.

hydrostatic pressure

The pressure at any given depth in a static liquid that is the result of the weight of the liquid acting on a unit area at that depth, plus any pressure acting on the surface of the liquid. Unit: pascal (Pa).

hearing threshold

For a given species or functional hearing group, the sound level for a given signal that is barely audible (i.e., that would be barely audible for a given individual in the presence of specified background noise during a specific percentage of experimental trials).

hertz (Hz)

Unit of frequency defined as one cycle per second. Often expressed in multiples such as kilohertz (1 kHz = 1000 Hz).

high-frequency (HF) cetaceans

See functional hearing group. The mid- and high-frequency cetaceans groups proposed by Southall et al. (2007) were renamed high- and very-high-frequency cetaceans, respectively, by Southall et al. (2019).

hydrostatic pressure

The pressure at any given depth in a static liquid that is the result of the weight of the liquid acting on a unit area at that depth, plus any pressure acting on the surface of the liquid. Unit: pascal (Pa).

impulsive sound

Qualitative term meaning sounds that are typically transient, brief (less than 1 s), broadband, with rapid rise time and rapid decay. They can occur in repetition or as a single event. Sources of impulsive sound include, among others, explosives, seismic airguns, and impact pile drivers.

knot (kn)

Unit of vessel speed equal to 1 nautical mile per hour.

level

A measure of a quantity expressed as the logarithm of the ratio of the quantity to a specified reference value of that quantity. For example, a value of sound pressure level with reference to 1 μPa^2 can be written in the form *x* dB re 1 μPa^2.

low-frequency (LF) cetaceans

See functional hearing group.

mid-frequency (MF) cetaceans

See functional hearing group. The mid-frequency cetaceans group proposed by Southall et al. (2007) was renamed high-frequency cetaceans by Southall et al. (2019).

octave

The interval between a sound and another sound with double or half the frequency. For example, one octave above 200 Hz is 400 Hz, and one octave below 200 Hz is 100 Hz.

parabolic equation method

A computationally efficient solution to the acoustic wave equation that is used to model propagation loss. The parabolic equation approximation omits effects of backscattered sound (which are negligible for most ocean-acoustic propagation problems), simplifying the computation of propagation loss.

peak sound pressure level (PK), zero-to-peak sound pressure level

The level (L_{pk}) of the squared maximum magnitude of the sound pressure (p^2_{pk}) in a stated frequency band and time window. Defined as $L_{pk} = 10\log_{10}(p^2_{pk}/p^2_0) = 20\log_{10}(p_{pk}/p_0)$. Unit: decibel (dB). Reference value (p^2_0) for sound in water: 1 μPa^2.

permanent threshold shift (PTS)

An irreversible loss of hearing sensitivity caused by excessive noise exposure. Considered auditory injury. Compare with temporary threshold shift.

point source

A source that radiates sound as if from a single point.

propagation loss (PL)

Difference between a source level (SL) and the level at a specified location, $\mathrm{PL}(x) = \mathrm{SL} - L(x)$.
Unit: decibel (dB).

received level

The level of a given field variable measured (or that would be measured) at a given location.

reference value

Standard value of a quantity used for calculating underwater sound level. The reference value depends on the quantity for which the level is being calculated:

Quantity	Reference value
Sound pressure	p_0^2 = 1 μPa^2 or p_0 = 1 μPa
Sound exposure	E_0 = 1 μPa^2 s

shear wave

A mechanical vibration wave in which the direction of particle motion is perpendicular to the direction of propagation. Also called a secondary wave or S-wave. Shear waves propagate only in solid media, such as sediments or rock. Shear waves in the seabed can be converted to compressional waves in water at the water-seabed interface.

sound

A time-varying disturbance in the pressure, stress, or material displacement of a medium propagated by local compression and expansion of the medium. In common meaning, a form of energy that propagates through media (e.g., water, air, ground) as pressure waves.

sound exposure

Time integral of squared sound pressure over a stated time interval in a stated frequency band. The time interval can be a specified time duration (e.g., 24 h) or from start to end of a specified event (e.g., a pile strike, an airgun pulse, a construction operation). Unit: pascal squared second (Pa^2 s). Symbol: E.

sound exposure level (SEL)

The level (L_E) of the sound exposure (E) in a stated frequency band and time window: L_E = 10log$_{10}$(E/E_0) (ISO 18405:2017). Unit: decibel (dB). Reference value (E_0) for sound in water: 1 μPa^2 s.

sound field

Region containing sound waves.

sound pressure

The contribution to total pressure caused by the action of sound (ISO 18405:2017). Unit: pascal (Pa). Symbol: p.

sound pressure level (SPL), rms sound pressure level

The level (L_p) of the time-mean-square sound pressure ($p_{\rm rms}^2$) in a stated frequency band and time window: L_p = 10log$_{10}$($p_{\rm rms}^2/p_0^2$) = 20log$_{10}$($p_{\rm rms}/p_0$), where rms is the abbreviation for root-mean-square. Unit: decibel (dB). Reference value (p_0^2) for sound in water: 1 μPa^2. SPL can also be expressed in terms of the root-mean-square (rms) with a reference value of p_0 = 1 μPa. The two definitions are equivalent.

sound speed profile

The speed of sound in the water column as a function of depth below the water surface.

source level (SL)

A property of a sound source equal to the sound pressure level measured in the far field plus the propagation loss from the acoustic center of the source to the receiver position. Unit: decibel (dB). Reference value: 1 $\mu Pa^2 m^2$.

temporary threshold shift (TTS)

Reversible loss of hearing sensitivity caused by noise exposure. Compare with permanent threshold shift.

Appendix B. Summary of Acoustic Assessment Assumption

The amount of sound generated during pile installation varies with the energy required to drive the piles to the desired depth, which depends on the sediment resistance encountered. Sediment types with greater resistance require pile drivers that deliver higher energy strikes. Maximum sound levels from pile installation usually occur during the last stage of driving (Betke 2008). The representative make and model of impact hammers, and the hammering energy schedule, were provided by Beacon Wind.

Beacon Wind is expected to construct 2 OSS jacket foundations consisting of 8 pin piles each, and WTG jacket, consisting of 4 pin piles, and/or monopile foundations consisting of single tapered piles. All models assumed piles to be vertical. For OSS jacket foundation models, pin piles are assumed to be driven to maximum penetration depths of 100 and 36 m. For WTG jacket foundation, the maximum penetration depth was 70 m. For WTG monopile foundation models, piles are assumed to be driven to maximum penetration depths of 45 (MP1 and MP2) and 55 m (MP3). While pile penetrations across the Project will vary, these values were chosen as the maximum penetration depth. The estimated numbers of strikes required to install piles to completion were obtained from Beacon Wind in consultation with potential hammer suppliers. All acoustic evaluation was performed assuming that only one pile is driven at a time. Tables B-1 through B-7 lists modeling input, assumptions, and methods. Sound from the piling ship was not included in the model.

Table B-1. Details of model inputs and assumptions, for the expected installation of OSS1 foundation jacket pin piles.

Parameter	Description
Impact hammer energy	3000 kJ
Ram weight	1647.5 kN
Helmet weight	431 kN
Strike rate (min^{-1})	40
Estimated number of strikes to drive pile	13,970
Expected maximum penetration	100 m
Modeled seabed penetration per energy level	5 (self-penetration), 10, 10, 19, 26, 10, 10, 10 m
Pile length	118 m
Pile diameter	3 m
Pile wall thickness	8.5
Number of piles per day	4
Expected time of installation	24 h

Table B-2 Details of model inputs and assumptions, for the expected installation of WTG jacket foundation pin piles.

Parameter	Description
Vibratory hammer frequency	23.3 Hz
Number of clamps	6
Weight of individual clamps	56.88 kN
Duration of vibratory piling	30 min and 60 min
Impact hammer energy	2300 kJ
Ram weight	1130.3 kN
Helmet weight	723 kN
Strike rate (min^{-1})	38–45
Estimated number of strikes to drive pile	11,665
Expected maximum penetration	70 m
Modeled seabed penetration per energy level	10 (self), 5, 9, 13, 10, 14, 9 m
Modeled seabed penetration per vibratory duration	14 m (30 min), 27 m (60 min)
Pile length	75
Pile diameter	4.5 m
Pile wall thickness	5.3–7 cm (tapered)
Number of piles per day	4
Expected time of installation	Impact only: 21 h, Vibratory(30 min)+impact: 20.7 h, Vibratory(60 min)+impact: 19.7 h

Table B-3. Details of model inputs and assumptions, for the expected installation of WTG monopile 1 (MP1) foundation.

Parameter	Description
Vibratory hammer frequency	23.3 Hz
Number of clamps	18
Weight of individual clamps	69.63 kN
Duration of vibratory piling	30 min and 60 min
Impact hammer energy	5500 kJ
Ram weight	2715 kN
Helmet weight	2256 kN
Strike rate (min^{-1})	30–45
Estimated number of strikes to drive pile	14,375
Expected maximum penetration	45 m
Modeled seabed penetration per energy level	11 (self), 13, 13, 3, 5 m
Modeled seabed penetration per vibratory duration	13 m (30 min), 26 m (60 min)
Pile length	106.3 m
Pile diameter	13 m
Pile wall thickness	10–12 cm (tapered)
Number of piles per day	1
Expected time of installation	Impact only: 3.3 h, Vibratory(30 min)+impact: 3.3 h, Vibratory(60 min)+impact: 3.2 h

Table B-4. Details of model inputs and assumptions, for the expected installation of WTG monopile 1 (MP1) foundation et pin piles.

Parameter	Description
Vibratory hammer frequency	23.3 Hz
Number of clamps	18
Weight of individual clamps	69.63 kN
Duration of vibratory piling	30 min and 60 min
Impact hammer energy	5500 kJ
Ram weight	2715 kN
Helmet weight	2256 kN
Strike rate (min^{-1})	30–45
Estimated number of strikes to drive pile	14,375
Expected maximum penetration	45 m
Modeled seabed penetration per energy level	11 (self), 13, 13, 3, 5 m
Modeled seabed penetration per vibratory duration	13 m (30 min), 26 m (60 min)
Pile length	106.3 m
Pile diameter	13 m
Pile wall thickness	10–12 cm (tapered)
Number of piles per day	1
Expected time of installation	Impact only: 3.3 h, Vibratory(30 min)+impact: 3.3 h, Vibratory(60 min)+impact: 3.2 h

Table B-5. Details of model inputs and assumptions, for the expected installation of WTG monopile 2 (MP2) foundation.

Parameter	Description
Vibratory hammer frequency	23.3 Hz
Number of clamps	18
Weight of individual clamps	69.63 kN
Duration of vibratory piling	30 min and 60 min
Impact hammer energy	5500 kJ
Ram weight	2715 kN
Helmet weight	2256 kN
Strike rate (min^{-1})	30–45
Estimated number of strikes to drive pile	5,668
Expected maximum penetration	45 m
Modeled seabed penetration per energy level	6 (self), 4, 9, 11, 5, 10 m
Modeled seabed penetration per vibratory duration	13 m (30 min), 24 m (60 min)
Pile length	AY42: 94.4 m BM28: 109.5 m
Pile diameter	13 m
Pile wall thickness	10–12 cm (tapered)
Number of piles per day	1
Expected time of installation	Impact only: 3.7 h, Vibratory(30 min)+impact: 4 h, Vibratory(60 min)+impact: 3.9 h

Table B-6. Details of model inputs and assumptions, for the expected installation of WTG monopile 3 (MP3) foundation.

Parameter	Description
Vibratory hammer frequency	23.3 Hz
Number of clamps	18
Weight of individual clamps	69.63 kN
Duration of vibratory piling	30 min and 60 min
Impact hammer energy	5500 kJ extrapolated to 6500 kJ
Ram weight	2715 kN
Helmet weight	2256 kN
Strike rate (min^{-1})	30–45
Estimated number of strikes to drive pile	14,704
Expected maximum penetration	55 m
Modeled seabed penetration per energy level	8 (self), 2, 9, 10, 6, 20 m
Modeled seabed penetration per vibratory duration	11 m (30 min), 21 m (60 min)
Pile length	AY42: 104.4 m BM28: 119.5 m
Pile diameter	13 m
Pile wall thickness	10–12 cm (tapered)
Number of piles per day	1
Expected time of installation	Impact only: 5.5 h, Vibratory(30 min)+impact: 5.8 h, Vibratory(60 min)+impact: 5.8 h

Table B-7. Details of the sound propagation model inputs and assumptions, for the expected installation of all pile types.

Parameter	Description
Sound speed profile	GDEM data averaged over region
Bathymetry	SRTM 15+ data (15 Arc Sec resolution)
Geoacoustics	Elastic seabed properties based on client-supplied description of seabed layering
Modeling method	FWRAM full-waveform parabolic equation propagation model with 22.5° azimuthal resolution
Source representation	Vertical line array
Frequency range	10–32,000 Hz
Synthetic trace length (impact driving)	OSS1 jacket pile: 500 ms, OSS2 jacket pile: 200 ms, WTG jacket: 750 ms, WTG MP1: 500 ms, WTG MP2 and WTG MP3: 400 ms
Synthetic trace length (vibratory driving)	WTG foundations: 1200 ms
Maximum modeled range	OSS jackets: 90 km, WTG foundations: 120 km (impact and vibratory piling)

Appendix C. Underwater Acoustics

This section provides a detailed description of the acoustic metrics relevant to the modeling study and the modeling methodology.

C.1. Acoustic Metrics

Underwater sound pressure amplitude is measured in decibels (dB) relative to a fixed reference pressure of p_0 = 1 μPa in water and p_0 = 20 μPa in air. Because the perceived loudness of sound, especially impulsive noise such as from seismic airguns, pile driving, and sonar, is not generally proportional to the instantaneous acoustic pressure, several sound level metrics are commonly used to evaluate noise and its effects on marine life. Here we provide specific definitions of relevant metrics used in the accompanying report. Where possible, we follow ISO standard definitions and symbols for sound metrics (e.g., ISO 2017).

The zero-to-peak sound pressure, or peak sound pressure (PK or L_{pk}; dB re 1 μPa), is the decibel level of the maximum instantaneous acoustic pressure in a stated frequency band attained by an acoustic pressure signal, $p(t)$:

$$L_{p,pk} = 10\log_{10}\frac{\max|p^2(t)|}{p_0^2} = 20\log_{10}\frac{\max|p(t)|}{p_0} \quad \text{(C-1)}$$

PK is often included as a criterion for assessing whether a sound is potentially injurious; however, because it does not account for the duration of a noise event, it is generally a poor indicator of perceived loudness.

The peak-to-peak sound pressure (PK-PK or $L_{pk\text{-}pk}$; dB re 1 μPa) is the difference between the maximum and minimum instantaneous sound pressure, possibly filtered in a stated frequency band, attained by an impulsive sound, $p(t)$:

$$L_{p,\text{pk-pk}} = 10\log_{10}\frac{[\max(p(t)) - \min(p(t))]^2}{p_0^2} \quad \text{(C-2)}$$

The sound pressure level (SPL or L_p; dB re 1 μPa) is the root-mean-square (rms) pressure level in a stated frequency band over a specified time window (T; s). It is important to note that SPL always refers to an rms pressure level and therefore not instantaneous pressure:

$$L_p = 10\log_{10}\left(\frac{1}{T}\int_T g(t)\,p^2(t)\,dt \Big/ p_0^2\right)\text{ dB} \quad \text{(C-3)}$$

where $g(t)$ is an optional time weighting function. In many cases, the start time of the integration is marched forward in small time steps to produce a time-varying L_p function. For short acoustic events, such as sonar pulses and marine mammal vocalizations, it is important to choose an appropriate time window that matches the duration of the signal. For in-air studies, when evaluating the perceived loudness of sounds with rapid amplitude variations in time, the time weighting function $g(t)$ is often set to a decaying exponential function that emphasizes more recent pressure signals. This function mimics the leaky integration nature of mammalian hearing. For example, human-based fast time-weighted L_p ($L_{p,\text{fast}}$) applies an exponential function with time constant 125 ms. A related simpler approach used in underwater acoustics sets $g(t)$ to a boxcar (unity amplitude) function of width 125 ms; the results can be referred to as

$L_{p,\text{boxcar 125ms}}$. Another approach, historically used to evaluate L_p of impulsive signals underwater, defines $g(t)$ as a boxcar function with edges set to the times corresponding to 5% and 95% of the cumulative square pressure function encompassing the duration of an impulsive acoustic event. This calculation is applied individually to each impulse signal, and the results have been referred to as 90% SPL ($L_{p,90\%}$).

The sound exposure level (SEL or L_E; dB re 1 µPa²·s) is the time-integral of the squared acoustic pressure over a duration (T):

$$L_E = 10\log_{10}\left(\int_T p^2(t)\,dt \Big/ T_0 p_0^2\right)\ \text{dB} \tag{C-4}$$

where T_0 is a reference time interval of 1 s. L_E continues to increase with time when non-zero pressure signals are present. It is a dose-type measurement, so the integration time applied must be carefully considered in terms of relevance for impact to the exposed recipients.

SEL can be calculated over a fixed duration, such as the time of a single event or a period with multiple acoustic events. When applied to impulsive sounds, SEL can be calculated by summing the SEL of the *N* individual pulses. For a fixed duration, the square pressure is integrated over the duration of interest. For multiple events, the SEL can be computed by summing (in linear units) the SEL of the *N* individual events:

$$L_{E,N} = 10\log_{10}\left(\sum_{i=1}^{N} 10^{\frac{L_{E,i}}{10}}\right)\ \text{dB} \tag{C-5}$$

C.2. Decidecade Band Analysis

The distribution of a sound's power with frequency is described by the sound's spectrum. The sound spectrum can be split into a series of adjacent frequency bands. Splitting a spectrum into 1 Hz wide bands, called passbands, yields the power spectral density of the sound. This splitting of the spectrum into passbands of a constant width of 1 Hz, however, does not represent how animals perceive sound.

Because animals perceive exponential increases in frequency rather than linear increases, analyzing a sound spectrum with passbands that increase exponentially in size better approximates real-world scenarios. In underwater acoustics, a spectrum is commonly split into decidecade bands, which are one tenth of a decade wide. A decidecade is sometimes referred to as a "1/3-octave" because one tenth of a decade is approximately equal to one third of an octave. Each decade represents a factor 10 in sound frequency. Each octave represents a factor 2 in sound frequency. The center frequency of the ith band, $f_c(i)$, is defined as:

$$f_c(i) = 10^{\frac{i}{10}}\ \text{kHz} \tag{C-6}$$

and the low (f_{lo}) and high (f_{hi}) frequency limits of the ith decade band are defined as:

$$f_{hi,i} = 10^{\frac{-1}{20}} f_c(i) \text{ and } f_{hi,i} = 10^{\frac{1}{20}} f_c(i) \tag{C-7}$$

The decidecade bands become wider with increasing frequency, and on a logarithmic scale the bands appear equally spaced (Figure C-1). The acoustic modeling spans from band −20 (f_c (−20) = 10 Hz) to band 14 (f_c (14) = 25 kHz).

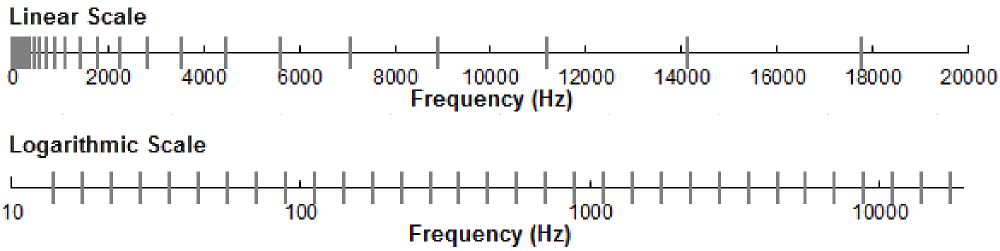

Figure C-1. Decidecade frequency bands (vertical lines) shown on a linear frequency scale and a logarithmic scale.

The sound pressure level in the *i*th band ($L_{p,i}$) is computed from the spectrum $S(f)$ between $f_{lo,i}$ and $f_{hi,i}$:

$$L_{p,i} = 10 \log_{10} \int_{f_{lo,i}}^{f_{hi,i}} S(f)\, df \; . \tag{C-8}$$

Summing the sound pressure level of all the bands yields the broadband sound pressure level:

$$\text{Broadband SPL} = 10 \log_{10} \sum_{i} 10^{\frac{L_{p,i}}{10}} \; . \tag{C-9}$$

Figure C-2 shows an example of how the decidecade band sound pressure levels compare to the sound pressure spectral density levels of an ambient noise signal. Because the decidecade bands are wider than 1 Hz, the decidecade band SPL is higher than the spectral levels at higher frequencies. Acoustic modeling of decidecade bands requires less computation time than 1 Hz bands and still resolves the frequency-dependence of the sound source and the propagation environment.

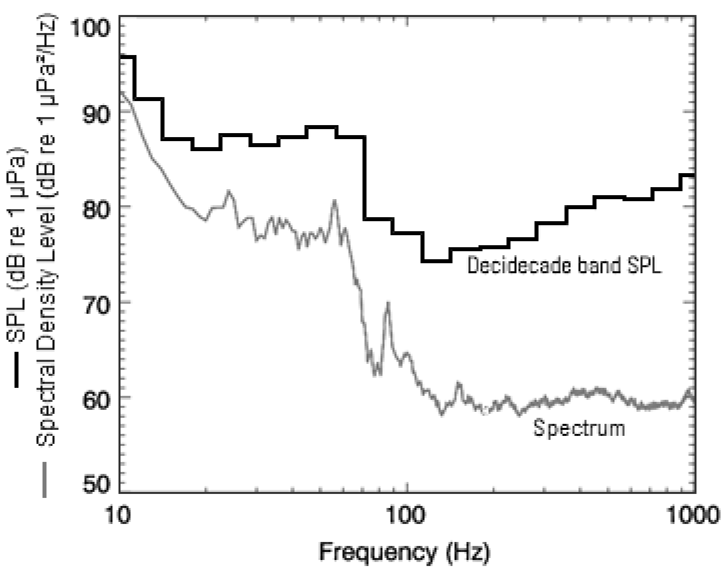

Figure C-2. Sound pressure spectral density levels and the corresponding decidecade band sound pressure levels of example ambient noise shown on a logarithmic frequency scale. Because the decidecade bands are wider with increasing frequency, the decidecade band SPL is higher than the power spectrum.

Appendix D. Auditory (Frequency) Weighting Functions

The potential for noise to affect animals of a certain species depends on how well the animals can hear it. Noises are less likely to disturb or injure an animal if they are at frequencies that the animal cannot hear well. An exception occurs when the sound pressure is so high that it can physically injure an animal by non-auditory means (i.e., barotrauma). For sound levels below such extremes, the importance of sound components at particular frequencies can be scaled by frequency weighting relevant to an animal's sensitivity to those frequencies (Nedwell and Turnpenny 1998, Nedwell et al. 2007).

D.1. Frequency Weighting Functions-Technical Guidance (NMFS 2018)

In 2015, a US Navy technical report by Finneran (2015) recommended new auditory weighting functions. The overall shape of the auditory weighting functions is similar to human A-weighting functions, which follows the sensitivity of the human ear at low sound levels. This frequency-weighting function is expressed as:

$$G(f) = K + 10\log_{10}\left[\left(\frac{(f/f_{lo})^{2a}}{\left[1+(f/f_{lo})^2\right]^a\left[1+(f/f_{hi})^2\right]^b}\right)\right]. \quad \text{(D-1)}$$

Finneran (2015) proposed five functional hearing groups for marine mammals in water: low-, mid-, and high-frequency cetaceans, phocid pinnipeds, and otariid pinnipeds. The parameters for these frequency-weighting functions were further modified the following year (Finneran 2016) and were adopted in NOAA's technical guidance that assesses noise impacts on marine mammals (NMFS 2018). Table D-1 lists the frequency-weighting parameters for each hearing group; Figure D-1 shows the resulting frequency-weighting curves.

In 2017, the Criteria and Thresholds for US Navy Acoustic and Explosive Effects Analysis (Finneran et al. 2017) updated the auditory weighting functions to include sea turtles. The sea turtle weighting curve uses the same equation used for marine mammal auditory weighting functions (Equation D-1). Parameters are provided in Table D-1.

Table D-1. Parameters for the auditory weighting functions recommended by NMFS (2018).

Hearing group	a	b	f_{lo} (Hz)	f_{hi} (-Hz)	K (dB)
Low-frequency cetaceans	1.0	2	200	19,000	0.13
Mid-frequency cetaceans	1.6	2	8,800	110,000	1.20
High-frequency cetaceans	1.8	2	12,000	140,000	1.36
Phocid pinnipeds in water	1.0	2	1,900	30,000	0.75
Otariid pinnipeds in water	2.0	2	940	25,000	0.64
Sea turtles	1.4	2	77	440	2.35

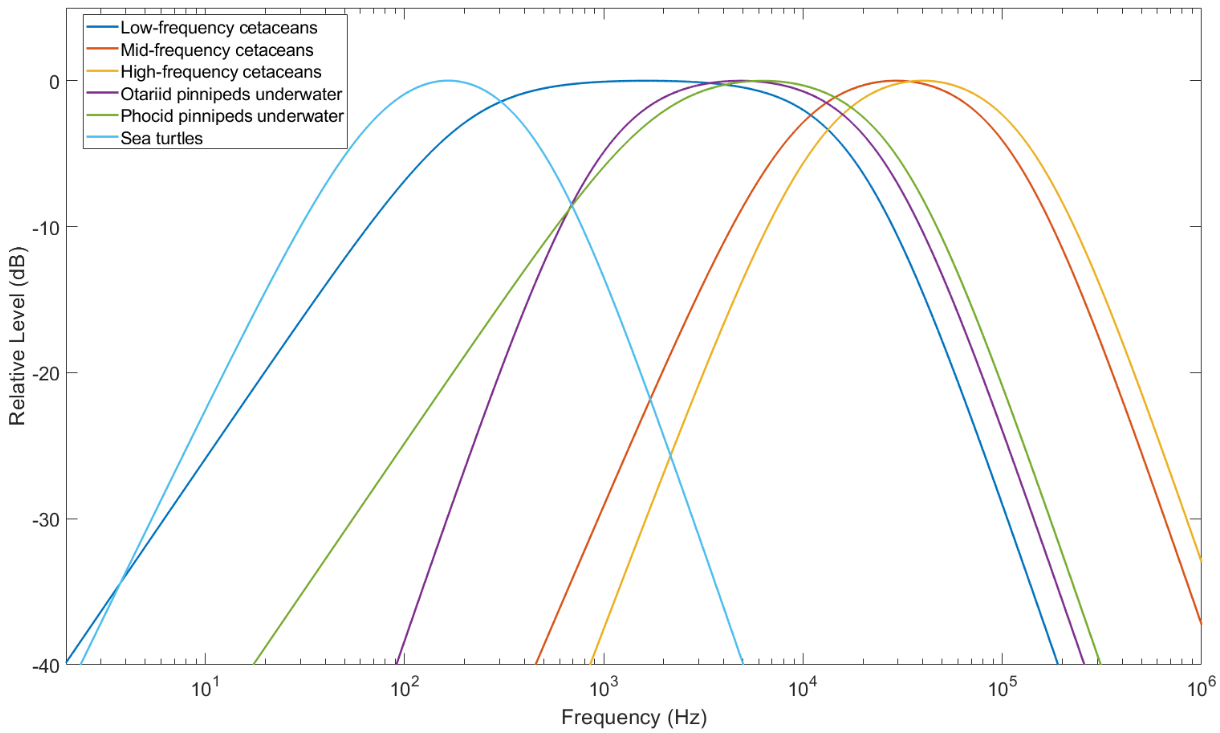

Figure D-1. Auditory weighting functions for the functional marine mammal hearing groups as recommended by NMFS (2018).

D.2. Southall et al. (2007) Frequency Weighting Functions

Auditory weighting functions for marine mammals—called M-weighting functions—were proposed by Southall et al. (2007). These M-weighting functions are applied in a similar way as A-weighting for noise level assessments for humans. Functions were defined for five hearing groups of marine mammals:

- Low-frequency (LF) cetaceans—mysticetes (baleen whales)
- Mid-frequency (MF) cetaceans—some odontocetes (toothed whales)
- High-frequency (HF) cetaceans—odontocetes specialized for using high frequencies
- Pinnipeds in water (PW)—seals, sea lions, and walrus
- Pinnipeds in air (not addressed here)

The M-weighting functions have unity gain (0 dB) through the passband and their high- and low-frequency roll-offs are approximately –12 dB per octave. The amplitude response in the frequency domain of each M-weighting function is defined by:

$$G(f) = -20\log_{10}\left[\left(1+\frac{a^2}{\mathrm{f}^2}\right)\left(1+\frac{\mathrm{f}^2}{\mathrm{b}^2}\right)\right] \quad \text{(D-2)}$$

where $G(f)$ is the weighting function amplitude (in dB) at the frequency f (in Hz), and a and b are the estimated lower and upper hearing limits, respectively, which control the roll-off and passband of the weighting function. The parameters a and b are defined uniquely for each hearing group (Table D-2). Figure D-2 shows the auditory weighting functions.

Table D-2. Parameters for the auditory weighting functions recommended by Southall et al. (2007).

Functional hearing group	*a* (Hz)	*b* (Hz)
Low-frequency cetaceans	7	22,000
Mid-frequency cetaceans	150	160,000
High-frequency cetaceans	200	180,000
Pinnipeds in water	75	75,000

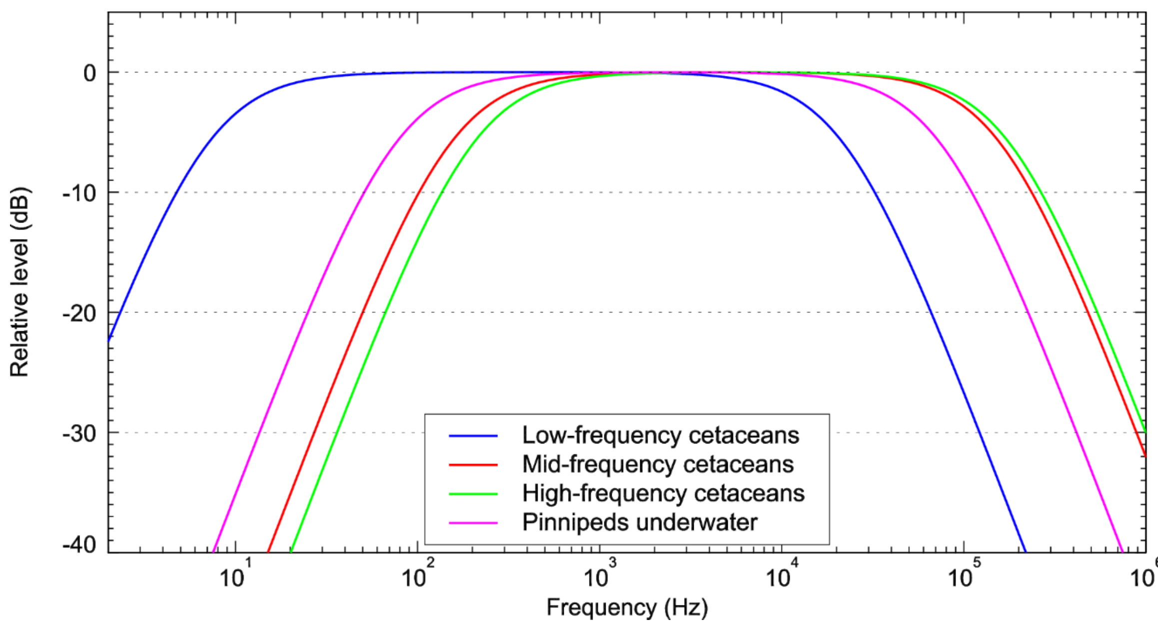

Figure D-2. Auditory weighting functions for the functional marine mammal hearing groups as recommended by Southall et al. (2007).

Appendix E. Source Models

E.1. Pile Driving Source Model (PDSM)

A physical model of pile vibration and near-field sound radiation is used to calculate source levels of piles. The physical model employed in this study computes the underwater vibration and sound radiation of a pile by solving the theoretical equations of motion for axial and radial vibrations of a cylindrical shell. These equations of motion are solved subject to boundary conditions, which describe the forcing function of the hammer at the top of the pile and the soil resistance at the base of the pile (Figure E-1). Damping of the pile vibration due to radiation loading is computed for Mach waves emanating from the pile wall. The equations of motion are discretised using the finite difference (FD) method and are solved on a discrete time and depth mesh.

To model the sound emissions from the piles, the force of the pile driving hammers also had to be modeled. The force at the top of each pile was computed using the GRLWEAP 2010 wave equation model (GRLWEAP, Pile Dynamics 2010), which includes a large database of simulated hammers—both impact and vibratory—based on the manufacturer's specifications. The forcing functions from GRLWEAP were used as inputs to the FD model to compute the resulting pile vibrations.

The sound radiating from the pile itself is simulated using a vertical array of discrete point sources. The point sources are centered on the pile axis. Their amplitudes and phases are derived using an inverse technique, such that their collective particle velocity, calculated using a near-field wave-number integration model, matches the particle velocity in the water at the pile wall. The sound field propagating away from the vertical source array is then calculated using a full-wave acoustic propagation model from which time-domain waveforms may be calculated (see Appendix F.2). MacGillivray (2014) describes the theory behind the physical model in more detail.

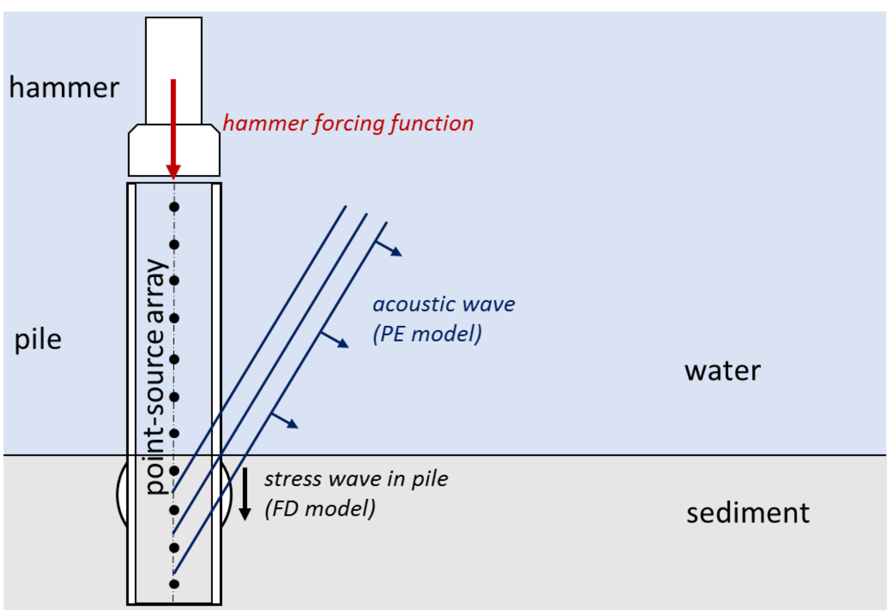

Figure E-1. Physical model geometry for impact driving of a cylindrical pile (vertical cross-section). The hammer forcing function is used with the finite difference (FD) model to compute the stress wave vibration in the pile. A vertical array of point sources is used with the parabolic equation (PE) model to compute the acoustic waves that the pile wall radiates.

Appendix F. Sound Propagation Modeling

F.1. Environmental Parameters

F.1.1. Bathymetry

A bathymetry grid around the Project area used in the acoustic propagation model was compiled based on the Shuttle Radar Topography Mission (SRTM) data referred to as SRTM-TOPO15+ (Tozer 2019). The data set is based on shipboard soundings combined with satellite-derived predicted depths, and therefore had no vertical datum associated with it. It has a resolution of 15 arc seconds or approximately 500 × 500 m pixel size at the equator. Figure F-1 shows a map of bathymetry contours generated from the bathymetry grid used in

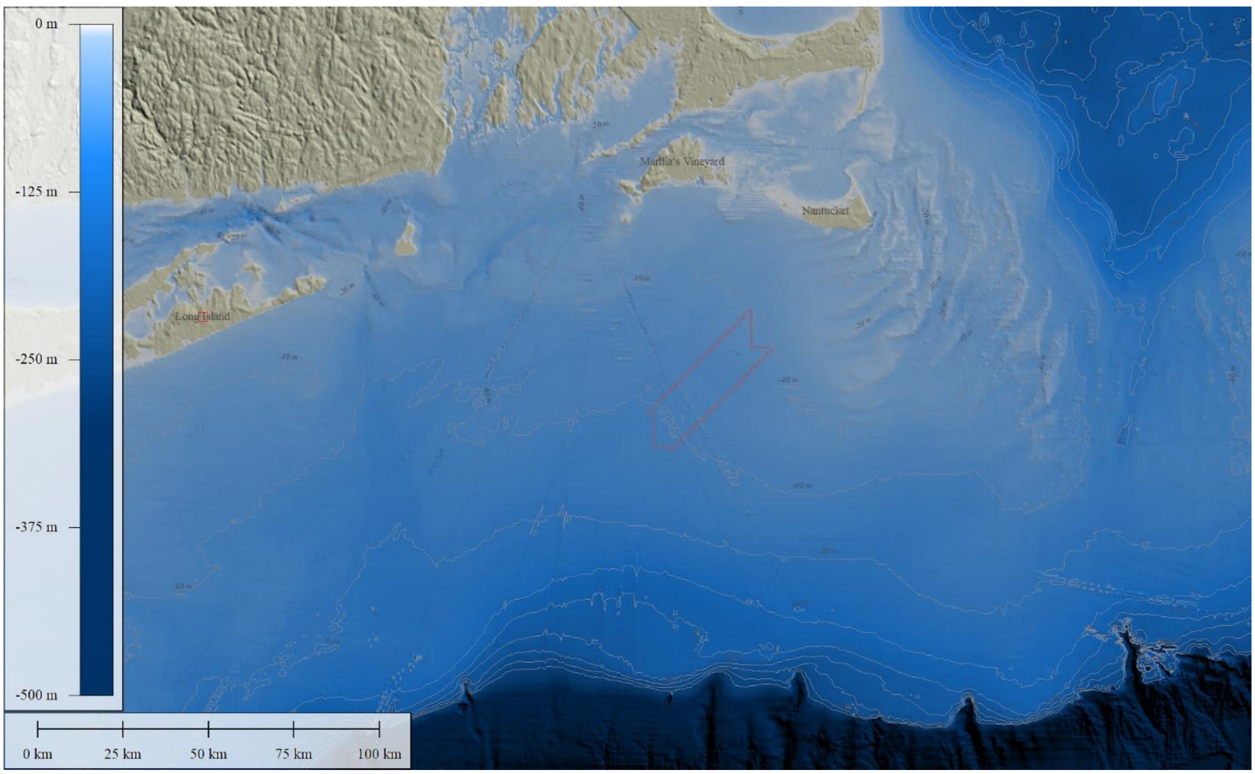

Figure F-1. Bathymetry data from SRTM-TOPO 15+ used as input to the acoustic propagation model. Isobaths are plotted in 20 m intervals up to 200 m. The Project area contour (in red) is also included for reference.

F.1.2. Geoacoustics

In shallow water environments where there is increased interaction with the seafloor, the properties of the substrate have a large influence over sound propagation. A simplified geoacoustic profile was developed from site specific seabed layering information provided by Beacon Wind. This profile consisted of a top layer of sand, a second layer of slightly denser sand, a stiff clay layer, and sand below. Tables F-1 to F-2 shows the sediment layer geoacoustic property profiles used as input to the propagation model for Locations AY42 (WTG) and BB39 (OSS), and for Locations BM28 (WTG) and BK31 (OSS), respectively, based on information provided by the Proponent and on the model presented by Ainslie (2010), which gives the geoacoustic properties by sediment type derived from measurements of geoacoustic parameters and determined empirical relationships between them.

Table F-1. Locations AY40 and BB39: Estimated geoacoustic properties used for modeling, as a function of depth. Within an indicated depth range, the parameters vary linearly.

Depth below seafloor (m)	Material	Density (g/cm^3)	Compressional wave speed (m/s)	Compressional wave attenuation (dB/λ)
0–21	Fine sand	1.990–2.018	1,710–1737	0.89–0.886
21–23	Medium/fine clay	1.370–1.398	1,485–1,488	0.100–0.101
23–38.5	Fine sand	2.021–2.041	1,739–1,759	0.885–0.881
38.5–42	Medium/fine clay	1.393–1.398	1,507–1,512	0.109–0.110
42–72	Medium/fine sand	2.116–2.155	1,796–1,833	0.869–0.859
72–200	Medium sand	2.229–2.385	1,868–2,011	0.856–0.800
200–350	Medium sand	2.385–2.546	2,011–,2154	0.800–0.725
350—500	Medium sand	2.546–2.682	2,154–2,276	0.725–0.650
>500	Medium sand	2.682	2,276	0.650

Table F-2. Location BM28 and BK31: Estimated geoacoustic properties used for modeling, as a function of depth. Within an indicated depth range, the parameters vary linearly.

Depth below seafloor (m)	Material	Density (g/cm^3)	Compressional wave speed (m/s)	Compressional wave attenuation (dB/λ)
0–21	Medium/fine clay	1.342–1.887	1,458–1,485	0.9–0.1
21–23	Very fine sand	1.888–1.890	1,677–1,680	0.928–0.916
23–38.5	Fine sand	2.021–2.041	1,739–1,759	0.885–0.881
38.5–42	Medium/fine clay	1.393–1.398	1,507–1,512	0.109–0.110
42–72	Medium/fine sand	2.116–2.155	1,796–1,833	0.869–0.859
72–200	Medium sand	2.229–2.385	1,868–2,011	0.856–0.800
200–350	Medium sand	2.385–2.546	2,011–2,154	0.800–0.725
350–500	Medium sand	2.546–2.682	2,154–2,276	0.725–0.650
>500	Medium sand	2.682	2,276	0.650

F.1.3. Sound Speed Profile

The speed of sound in sea water is a function of temperature, salinity, and pressure (depth) (Coppens 1981). Sound speed profiles were obtained from the US Navy's Generalized Digital Environmental Model (GDEM; NAVO 2003). Two representative seasons were modeled for this project, summer and winter, since these represent two distinct acoustic propagation regimes. Considering the average sound speed in the area around the proposed construction site and the deep waters beyond the lease area, the shape of the sound speed profiles is consistent within seasons. The summer average was based on the profiles for June, July, and August, while the winter average was based on the January, February, and March profiles.

Project-level exposure estimates used sound fields based on the summer average sound speed profile from April through November and sound fields based on the winter average sound speed profile from December through March.

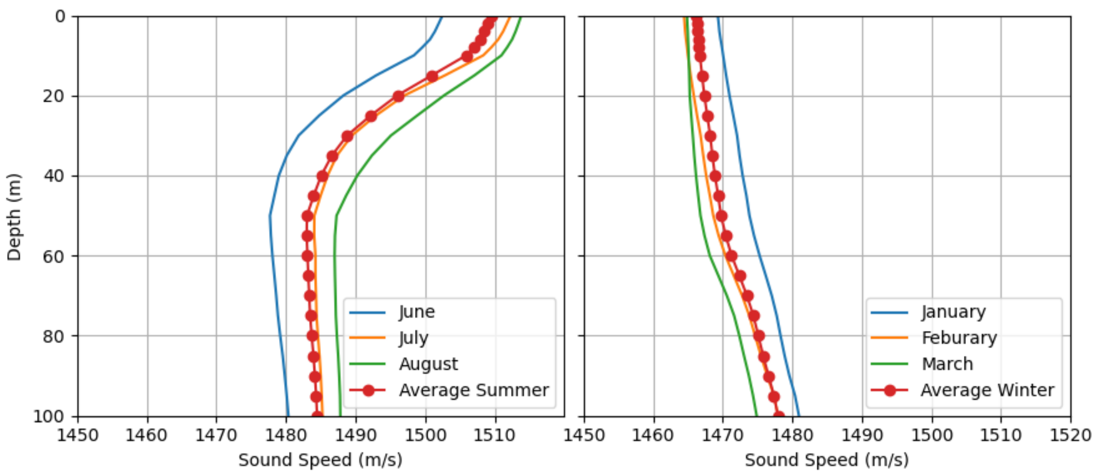

Figure F-2. Sound speed profiles up to 100 m for (left) summer and (right) winter. Seasonal averages and monthly profiles used in each of the seasonal averages are displayed.

F.2. Sound Propagation with FWRAM

For impulsive sounds from impact pile driving, time-domain representations of the pressure waves generated in the water are required for calculating SPL and peak pressure level. Furthermore, the pile must be represented as a distributed source array to accurately characterize vertical directivity effects in the near-field zone. For this study, synthetic pressure waveforms were computed using FWRAM, a full-wave acoustic propagation model based on the wide-angle parabolic equation (PE) algorithm (Collins 1993). FWRAM computes pressure waveforms as a function of range and depth via Fourier synthesis of transfer functions in closely-spaced frequency bands in range-varying marine acoustic environments. FWRAM employs an array starter method to accurately model sound propagation from a spatially distributed source (MacGillivray and Chapman 2012).

Synthetic pressure waveforms were modeled over the frequency range 10–1024 Hz, inside a 1 s window for the 3 m OSS jacket piles, the 4.5 m WTG jacket pile and the 13 m WTG monopiles.(e.g., Figure F-3). The synthetic pressure waveforms were post-processed, after applying a travel time correction, to calculate standard SPL and SEL metrics versus range and depth from the source. The acoustic field is extended to higher frequencies (up to 32,000 Hz) by applying a 20 dB/decade decay rate to match acoustic measurements of impact pile driving (Illingworth & Rodkin 2007, Matuschek and Betke 2009).

Acoustic fields in three dimensions are generated by modeling propagation loss within two-dimensional (2-D) vertical planes aligned along radials covering a 360° swath from the source, an approach commonly referred to as *N*×2-D. These vertical radial planes are separated by an angular step size of $\Delta\theta$, yielding *N* = 360°/$\Delta\theta$ planes. A total of *N* = 16 radial planes ($\Delta\theta = 22.5°$) along with a range step size Δr = 10 m and a depth step size Δd = 1 m were used in the calculations (Figure F-4).

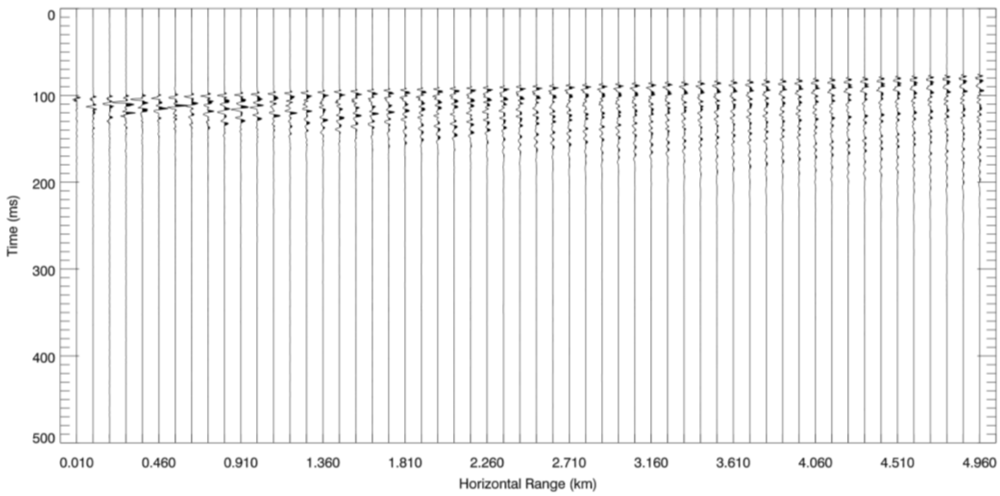

Figure F-3. Example of synthetic pressure waveforms computed by FWRAM at multiple range offsets. Receiver depth is 35 m and the amplitudes of the pressure traces have been normalised for display purposes.

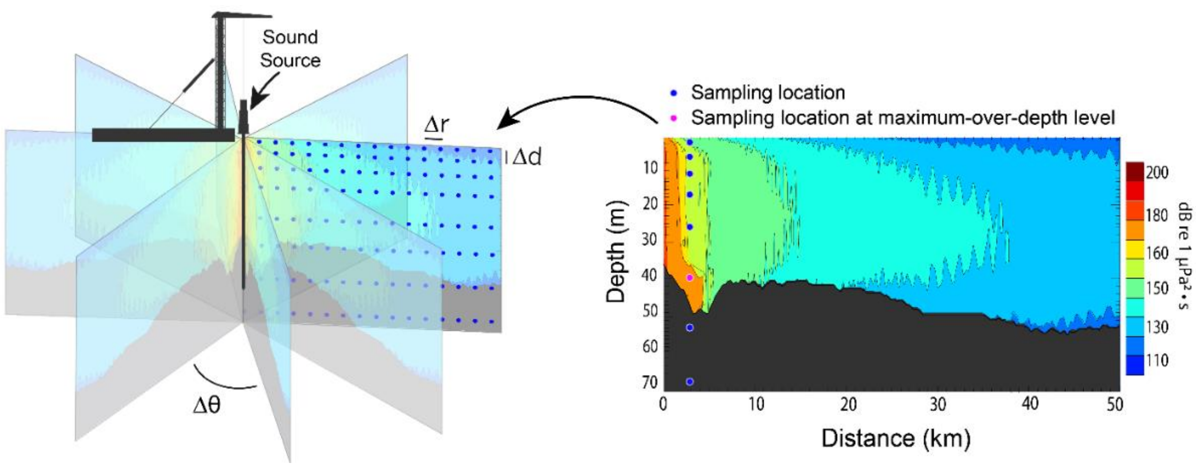

Figure F-4. Modeled three-dimensional sound field (*N*×2-D method) and maximum-over-depth modeling approach. Sampling locations are shown as blue dots on both figures. On the right panel, the pink dot represents the sampling location where the sound level is maximum over the water column. This maximum-over-depth level is used in calculating distances to sound level thresholds for some marine animals.

F.3. Estimating Acoustic Distance to Threshold Levels

A maximum-over depth approach is used to determine acoustic distances to the defined thresholds (distances to isopleths). That is, at each horizontal sampling distance, the maximum received level that occurs within the water column is used as the value at that distance. The distances to a threshold typically differ along different radii and may not be continuous because sound levels may drop below threshold at some distances and then exceed threshold at farther distances. Figure F-5 shows an example of an area with sound levels above threshold and two methods of reporting the injury or behavioral disruption distance: (1) R_{max}, the maximum distance at which the sound level was encountered in the modeled maximum-over-depth sound field, and (2) $R_{95\%}$, the maximum distance at which the sound level was encountered after the 5% farthest such points were excluded. $R_{95\%}$ is used because, regardless of the shape of the maximum-over-depth footprint, the predicted distance encompasses at least 95% of the horizontal area that would be exposed to sound at or above the specified level. The difference between R_{max} and $R_{95\%}$ depends on the source directivity and the heterogeneity of the acoustic environment. $R_{95\%}$ excludes ends of protruding areas or small isolated acoustic foci not representative of the nominal ensonification zone.

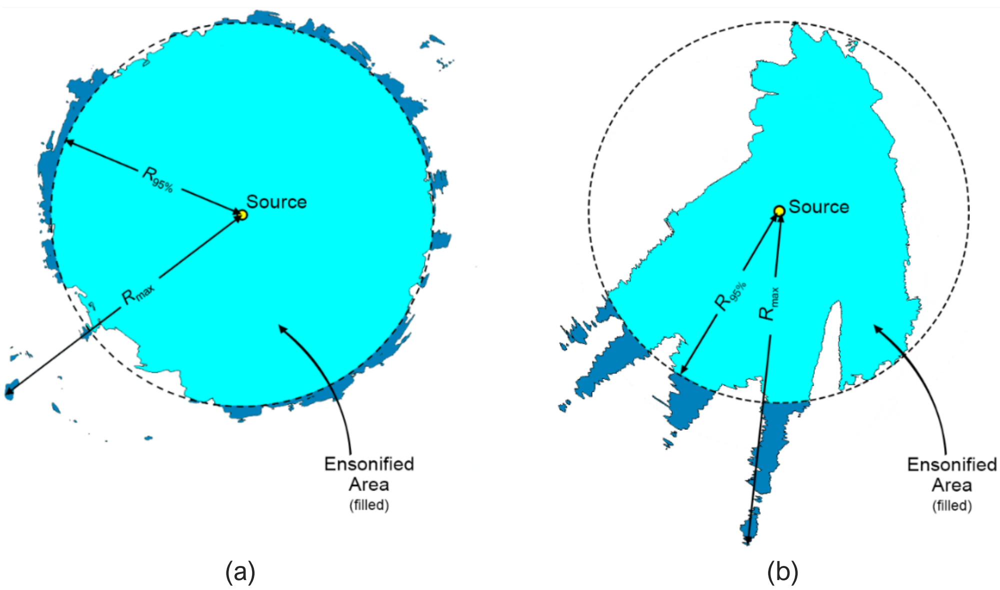

Figure F-5. Sample areas ensonified to an arbitrary sound level with R_{max} and $R_{95\%}$ distances shown for two different scenarios. (a) Largely symmetric sound level contour with small protrusions. (b) Strongly asymmetric sound level contour with long protrusions. Light blue indicates the ensonified areas bounded by $R_{95\%}$; darker blue indicates the areas outside this boundary which determine R_{max}.

F.4. Model Validation Information

Predictions from JASCO's propagation model (FWRAM) have been validated against experimental data from a number of underwater acoustic measurement programs conducted by JASCO globally, including the United States and Canadian Arctic, Canadian and southern United States waters, Greenland, Russia and Australia (Hannay and Racca 2005, Aerts et al. 2008, Funk et al. 2008, Ireland et al. 2009, O'Neill et al. 2010, Warner et al. 2010, Racca et al. 2012a, 2012b, Matthews and MacGillivray 2013, Martin et al. 2015, Racca et al. 2015, Martin et al. 2017a, 2017b, Warner et al. 2017, MacGillivray 2018, McPherson et al. 2018, McPherson and Martin 2018).

In addition, JASCO has conducted measurement programs associated with a significant number of anthropogenic activities which have included internal validation of the modeling (including McCrodan et al. 2011, Austin and Warner 2012, McPherson and Warner 2012, Austin and Bailey 2013, Austin et al. 2013, Zykov and MacDonnell 2013, Austin 2014, Austin et al. 2015, Austin and Li 2016, Martin and Popper 2016).

Appendix G. Acoustic Range Results – Impact and Vibratory plus Impact Pile Driving

This appendix provides sound levels and effects zone boundary ranges for various pile driving activities associated with the project. The result presentation is divided into sections impact pile driving and vibratory pile driving. SEL results for vibratory piling alone and for combined vibratory piling followed by impact pile driving are provided. Both OSS foundation scenarios assumed post-piling installation with impact pile driving only. A 2 dB shift was added to the sound fields for post-piling to account for vibrations potentially imparted to surrounding structures. All WTG foundations were assumed to be pre-piled and installed using either impact pile driving or vibratory pile setting followed by impact pile driving.

Acoustic modeling results presented here include decidecade band plots at 750 m from the source (Appendix G.1), tables of acoustic ranges (R_{max} and $R_{95\%}$ in km) to marine mammal (NMFS 2018), sea turtle (Finneran et al. 2017) (Appendices G.2 and G.3), and fish (FHWG 2008, Stadler and Woodbury 2009, Popper et al. 2014) (Appendix G.4) injury thresholds. The acoustic ranges to behavioral thresholds for marine mammals (NOAA 2005, Wood et al. 2012) (Appendix G.5), sea turtles (McCauley et al. 2000) (Appendix G.5), and fish (Andersson et al. 2007, Wysocki et al. 2007, Mueller-Blenkle et al. 2010, Purser and Radford 2011) (Appendix G.4) are also included. The acoustic ranges are shown for the following categories: Flat is unweighted, LF is low-frequency cetaceans, MF is mid-frequency cetaceans, HF is high-frequency cetaceans, PW is phocid pinnipeds in water, and TUW is turtles underwater. TUW weighting functions are from the US Navy (Finneran et al. 2017), the rest are from the Technical Guidance (NMFS 2018). R_{max} is the maximum distance at which the sound level was encountered in the modeled maximum-over-depth sound field and $R_{95\%}$ is the maximum distance at which the sound level was encountered after the 5% farthest such points were excluded.

G.1. Decidecade Band Plots at 750 m

G.1.1. Impact Pile Driving

Figures G-1 and G-2 in Appendix G.1.1.1 show the decidecade SEL band levels at 750 m from the source for one OSS1 pin pile, at location BB39, and one OSS2 pin pile, at location BK31. The 2 dB post-piling shift for the OSS jacket foundations was not accounted for in the plots. Appendix G.1.1.2 shows the decidecade SEL band levels at 750 m from the source for the WTG scenarios at modeling locations AY42 and BM28, and for summer and winter conditions (Figures G-3 to G-10).

G.1.1.1. OSS Pin Piles

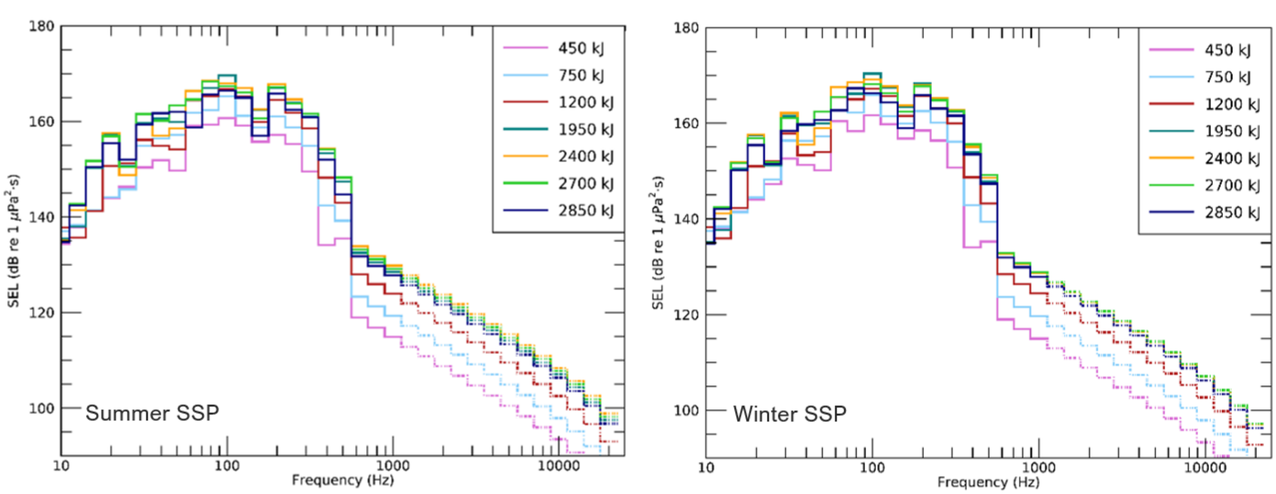

Figure G-1. Per-strike SEL band levels at 750 m from a 3 m diameter OSS1 pin pile assuming an expected installation scenario using a MHU 3000S kJ hammer with average summer and winter sound speed profiles. The values at higher frequencies (1–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

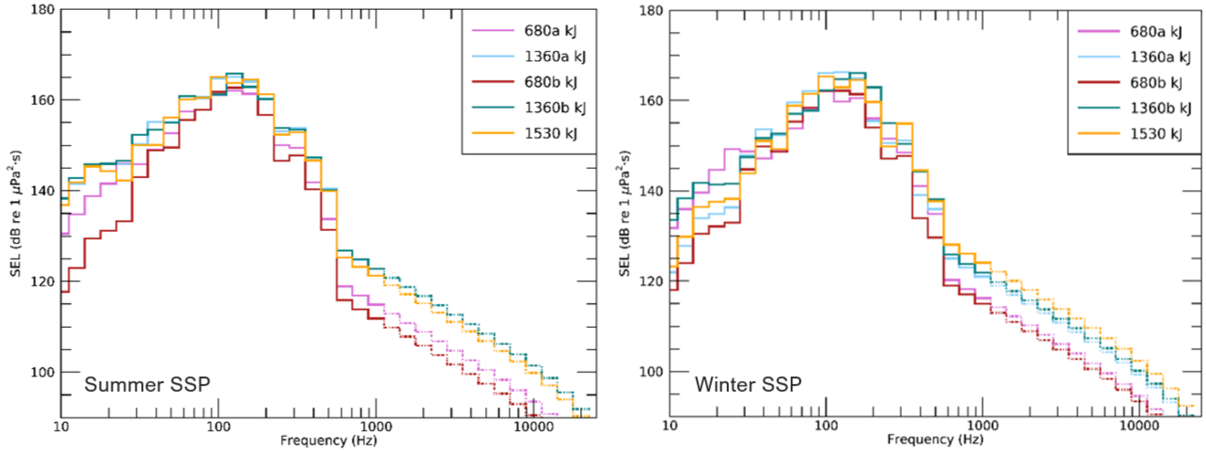

Figure G-2. Per-strike SEL band levels at 750 m from a 3 m diameter OSS2 pin pile assuming an expected installation scenario using a MHU 1700S kJ hammer with average summer and winter sound speed profiles. The values at higher frequencies (1–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

G.1.1.2. WTG Pin Pile and Monopiles

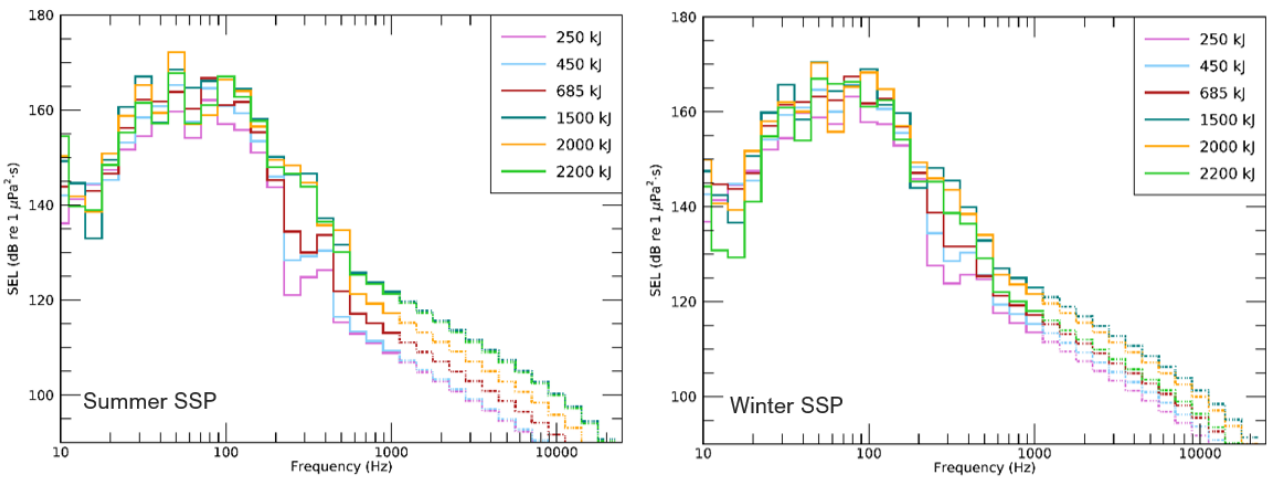

Figure G-3. Location AY42: per-strike SEL band levels at 750 m from a 4.5 m diameter WTG pin pile assuming an expected installation scenario using an IHC S-2300 kJ hammer with average summer and winter sound speed profiles. The values at higher frequencies (1–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

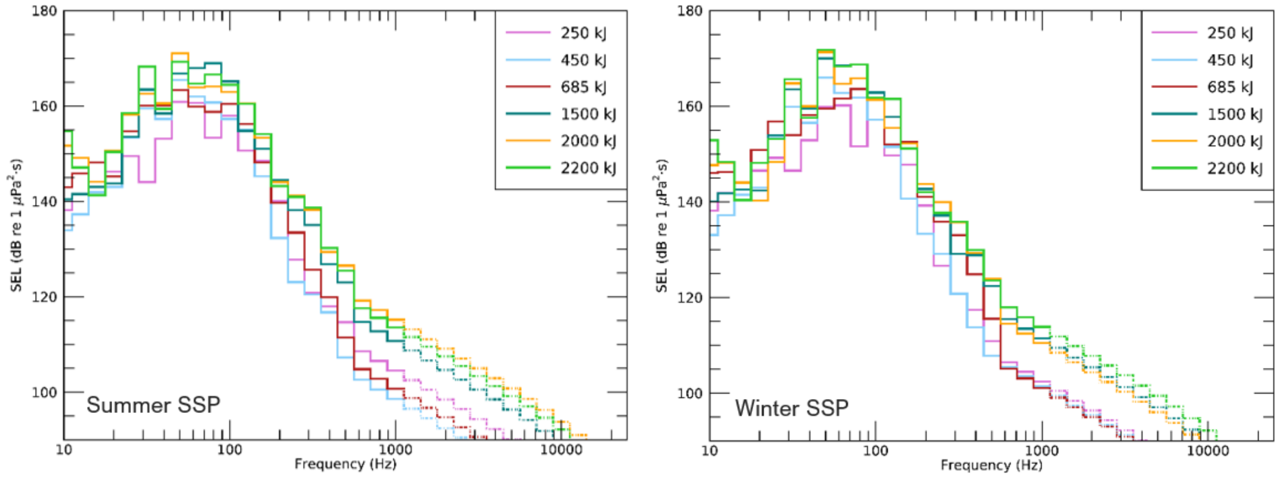

Figure G-4. Location BM28: per-strike SEL band levels at 750 m from a 4.5 m diameter WTG pin pile assuming an expected installation scenario using an IHC S-2300 kJ hammer with average summer and winter sound speed profiles. The values at higher frequencies (1–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

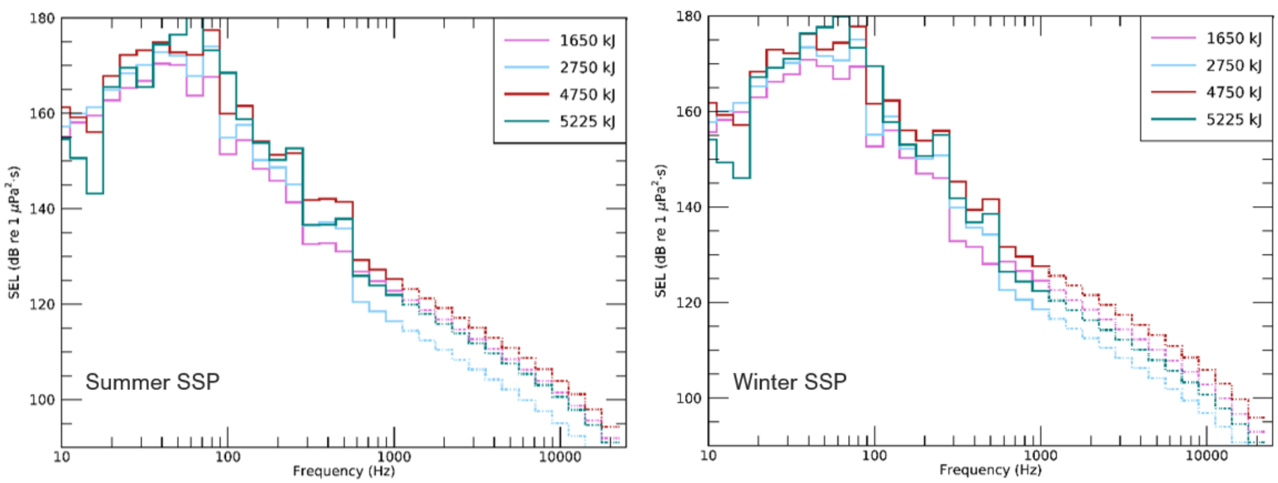

Figure G-5. Location AY42: per-strike SEL band levels at 750 m from WTG MP1 13 m diameter monopile assuming an expected installation scenario using an IHC S-5500 kJ hammer with average summer and winter sound speed profiles. The values at higher frequencies (1–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

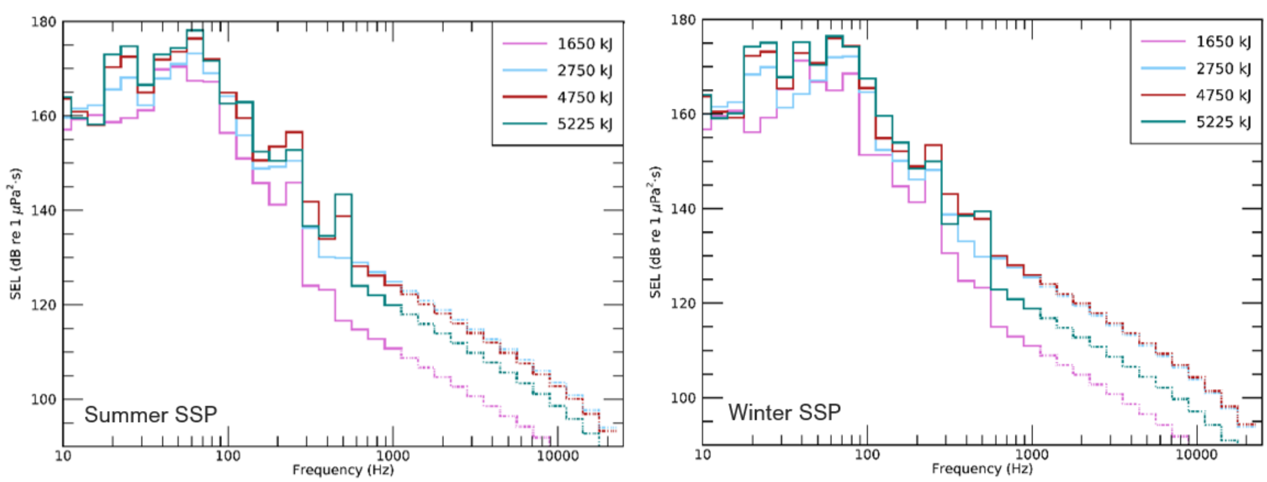

Figure G-6. Location BM28: per-strike SEL band levels at 750 m from WTG MP1 13 m diameter monopile assuming expected installation scenario using an IHC S-5500 kJ hammer with average summer and winter sound speed profiles. The values at higher frequencies (1–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

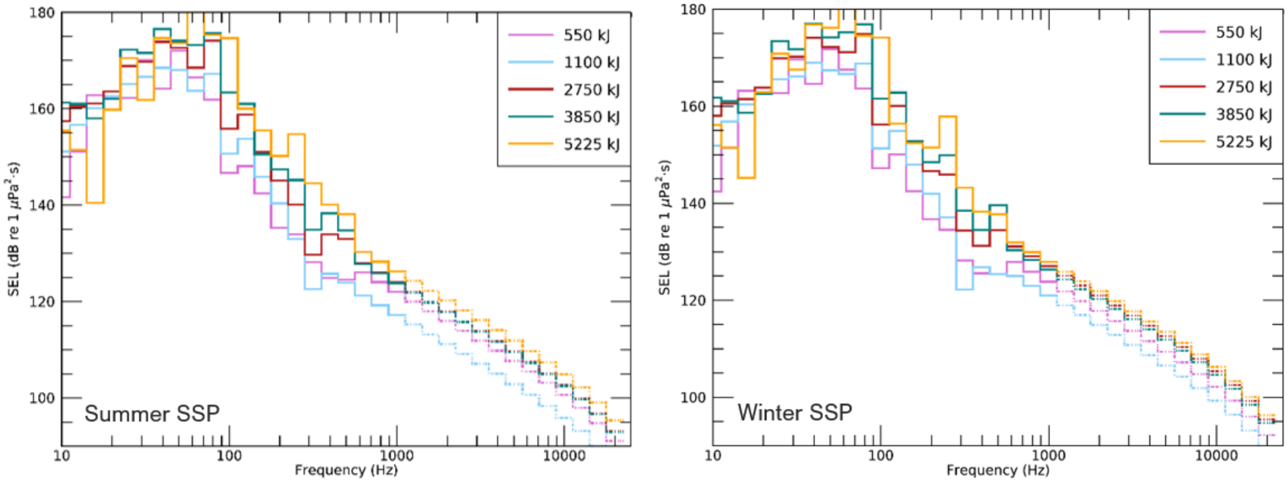

Figure G-7. Location AY42: per-strike SEL band levels at 750 m from WTG MP2 13 m diameter monopile assuming an expected installation scenario using an IHC S-5500 kJ hammer with average summer and winter sound speed profiles. The values at higher frequencies (1–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

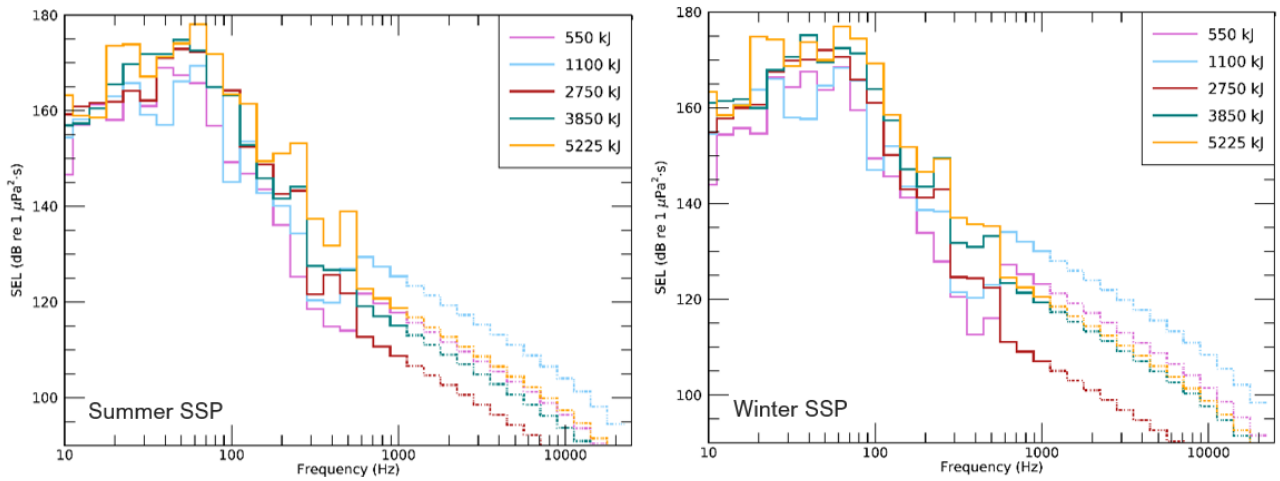

Figure G-8. Location BM28: per-strike SEL band levels at 750 m from WTG MP2 13 m diameter monopile assuming an expected installation scenario using an IHC S-5500 kJ hammer with average summer and winter sound speed profiles. The values at higher frequencies (1–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

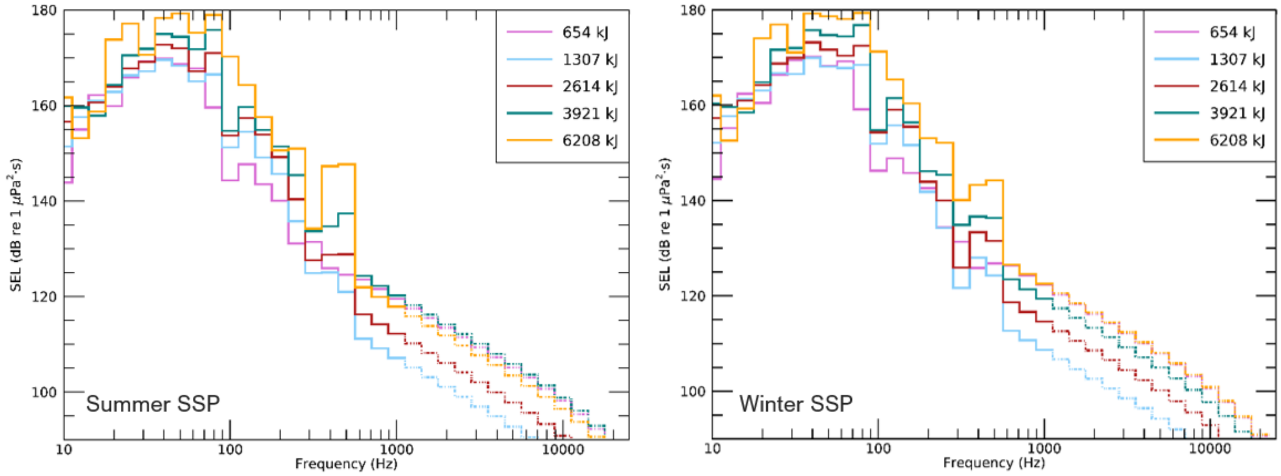

Figure G-9. Location AY42: per-strike SEL band levels at 750 m from WTG MP3 13 m diameter monopile assuming an expected installation scenario using an IHC S-5500 kJ hammer extrapolated to 6500 kJ with average summer and winter sound speed profiles. The values at higher frequencies (1–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

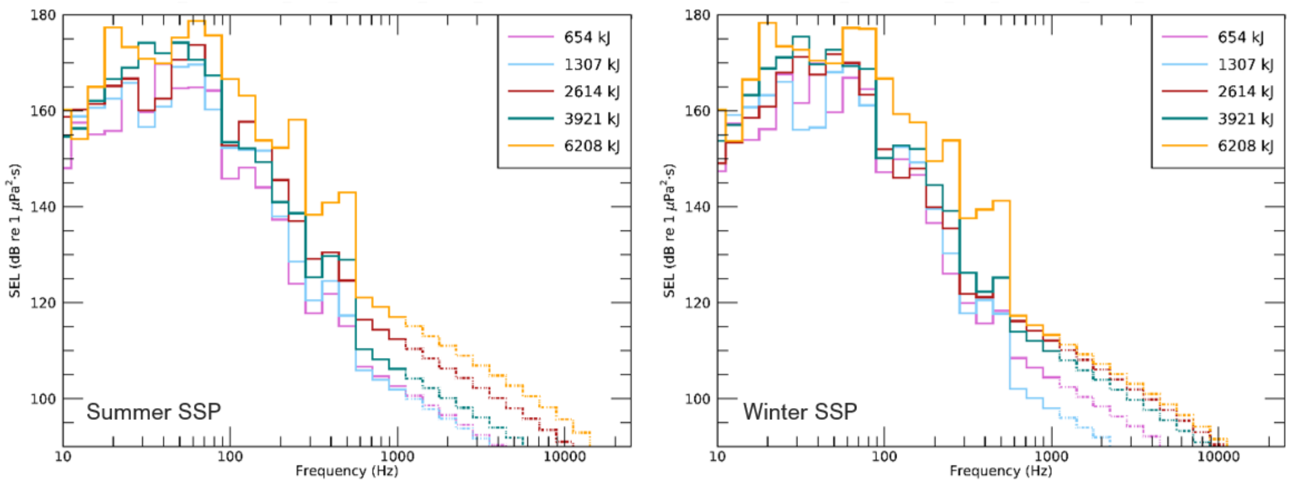

Figure G-10. Location BM28: per-strike SEL band levels at 750 m from WTG MP3 13 m diameter monopile assuming an expected installation scenario using an IHC S-5500 kJ hammer extrapolated to 6500 kJ with average summer and winter sound speed profiles. The values at higher frequencies (1–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

G.1.2. Vibratory Pile Driving

Appendix G.1.2.1 shows the decidecade band levels at 750 m from the source for the WTG vibratory piling scenarios at modeling locations AY42 and BM28, for summer and winter conditions, and assuming 30 and 60 min of vibratory piling (Figures G-11 to G-18).

G.1.2.1. WTG Pin Pile and Monopiles

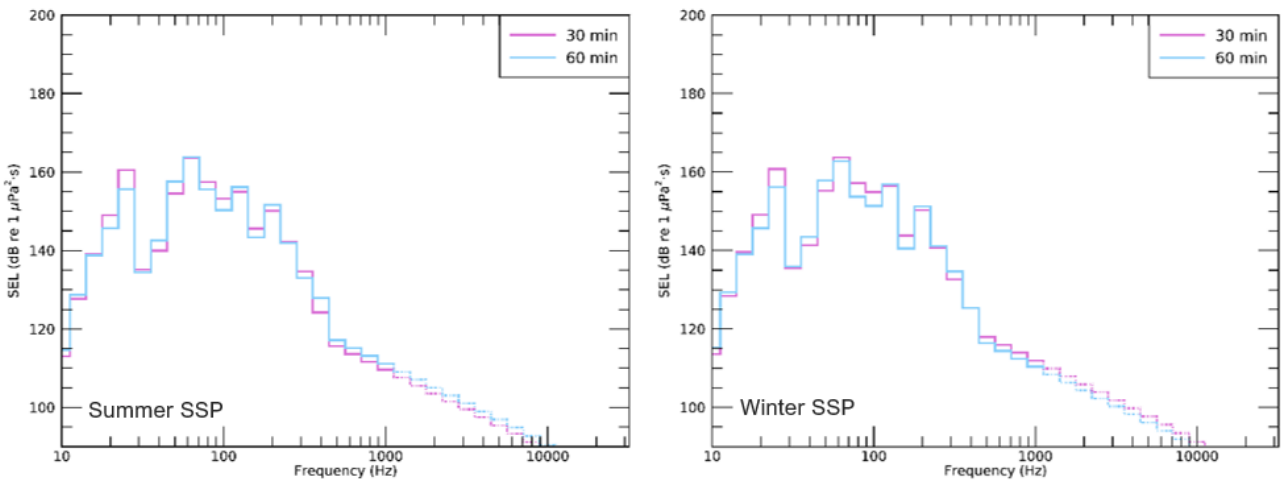

Figure G-11. Location AY42: decidecade band levels at 750 m from a 4.5 m diameter WTG pin pile assuming vibratory pile setting using an TA-CV320 hammer with average summer and winter sound speed profiles. The values at higher frequencies (1–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

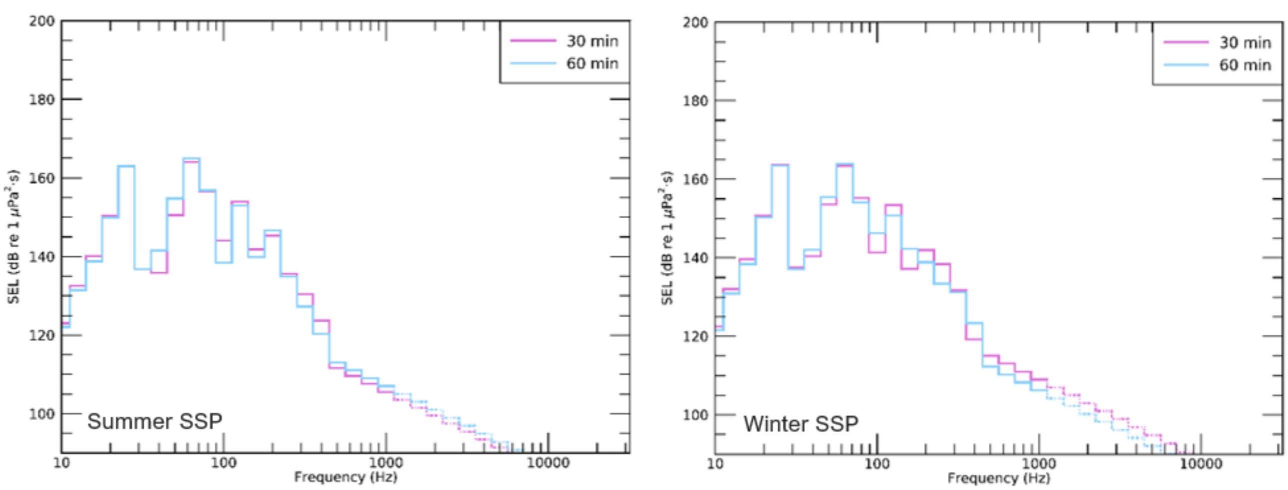

Figure G-12. Location BM28: decidecade band levels at 750 m from a 4.5 m diameter WTG pin pile assuming vibratory pile setting using an TA-CV320 hammer with average summer and winter sound speed profiles. The values at higher frequencies (1–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

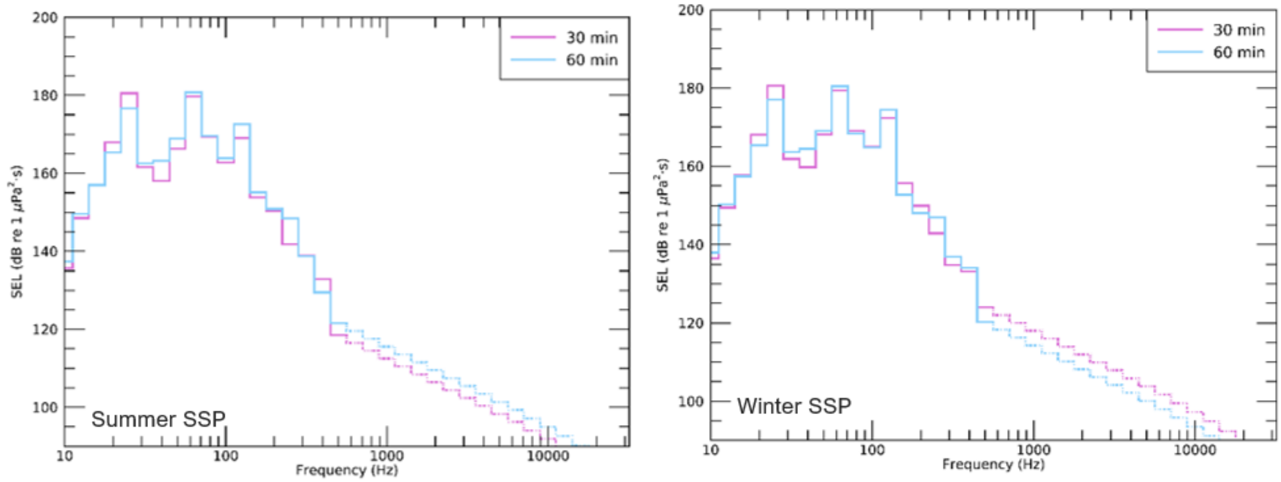

Figure G-13. Location AY42: decidecade band levels at 750 m from a WTG MP1 13 m diameter monopile assuming vibratory pile setting using an QU-CV640 hammer with average summer and winter sound speed profiles. The values at higher frequencies (0.5–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

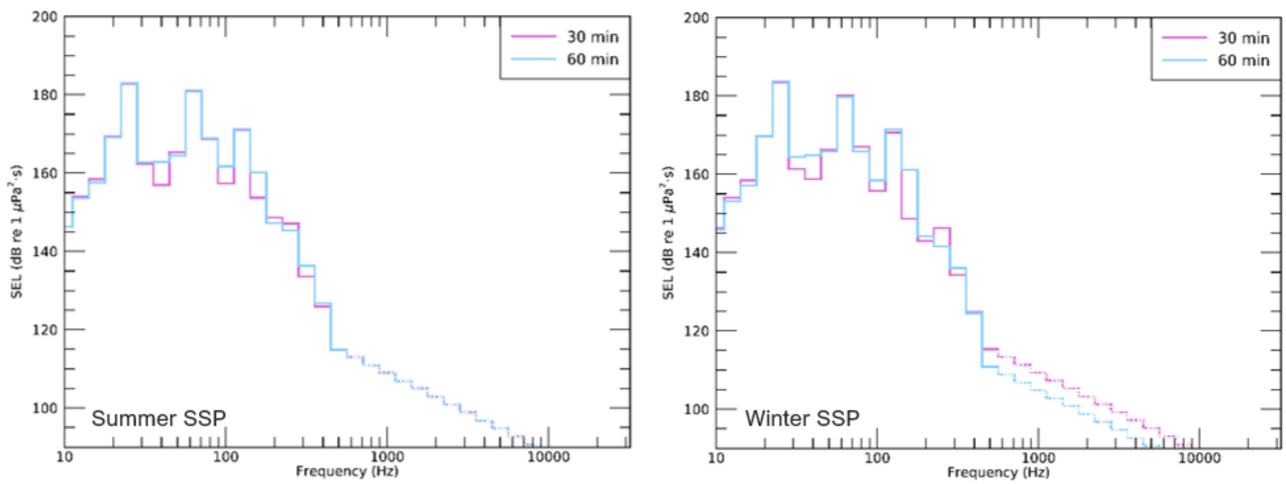

Figure G-14. Location BM28: decidecade band levels at 750 m from a WTG MP1 13 m diameter monopile assuming vibratory pile setting using an QU-CV640 hammer with average summer and winter sound speed profiles. The values at higher frequencies (0.5–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

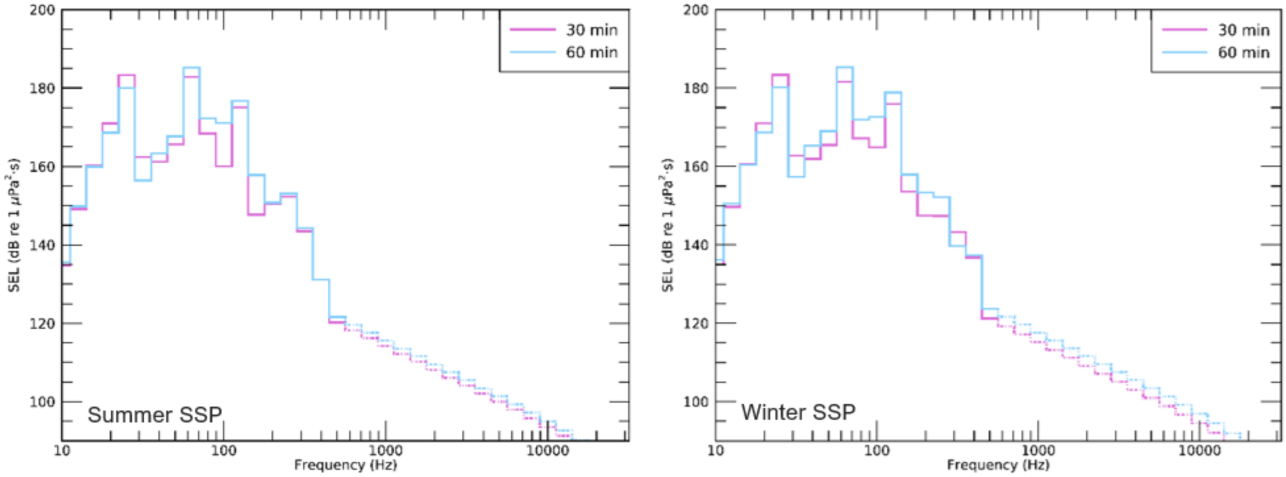

Figure G-15. Location AY42: decidecade band levels at 750 m from a WTG MP2 13 m diameter monopile assuming vibratory pile setting using a QU-CV640 hammer with average summer and winter sound speed profiles. The values at higher frequencies (0.5–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

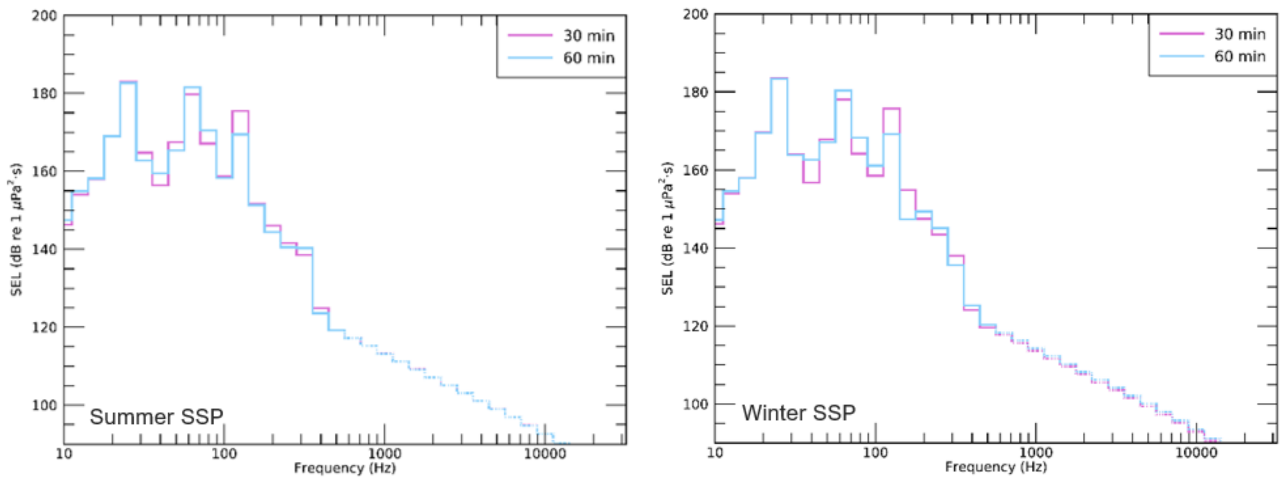

Figure G-16. Location BM28: decidecade band levels at 750 m from a WTG MP2 13 m diameter monopile assuming vibratory pile setting using an QU-CV640 hammer with average summer and winter sound speed profiles. The values at higher frequencies (0.5–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

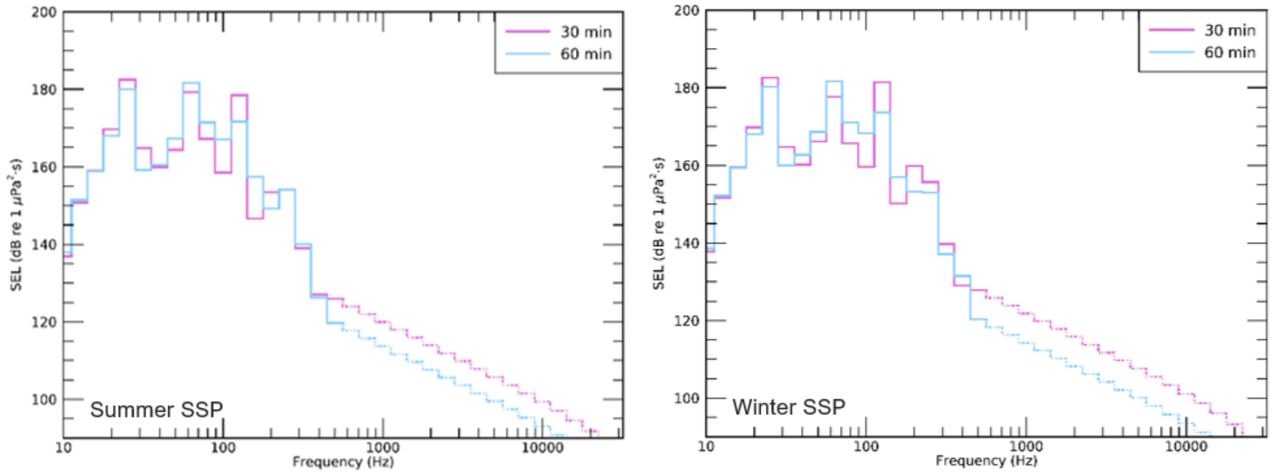

Figure G-17. Location AY42: decidecade band levels at 750 m from a WTG MP3 13 m diameter monopile assuming vibratory pile setting using an QU-CV640 hammer with average summer and winter sound speed profiles. The values at higher frequencies (0.5–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

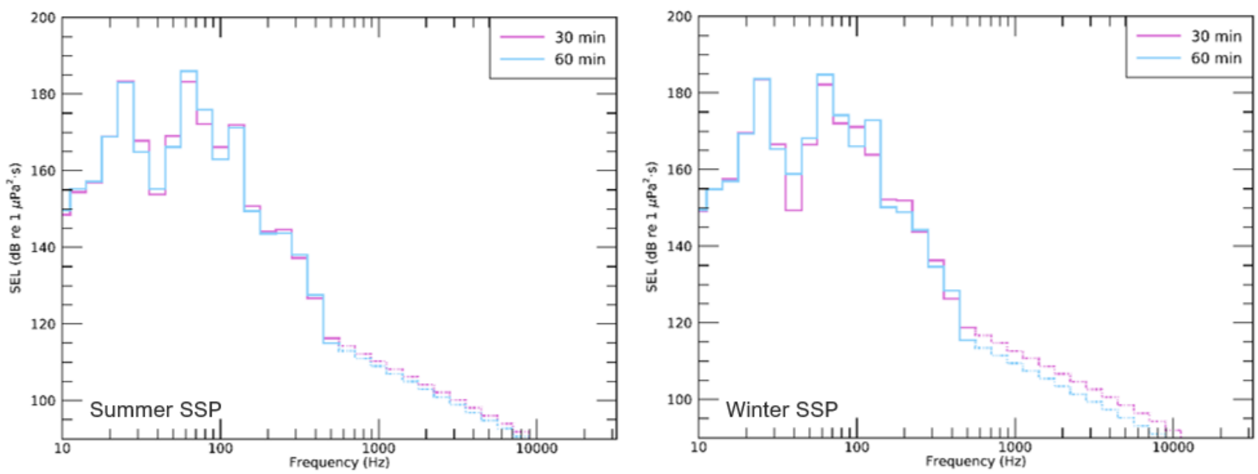

Figure G-18. Location BM28: decidecade band levels at 750 m from a WTG MP3 13 m diameter monopile assuming vibratory pile setting using an QU-CV640 hammer with average summer and winter sound speed profiles. The values at higher frequencies (0.5–32 kHz, dashed lines) have been extrapolated assuming constant decay rates.

G.2. Single-strike PK Acoustic Ranges

Acoustic ranges ($R_{95\%}$ in km) to Level A PK injury thresholds to marine mammal and sea turtles with 0, 6, 10, and 15 dB of broadband attenuation are presented in Appendix G.2.1 for impact pile driving (impulsive signal threshold) scenarios (OSS and WTG). In all tables, a dash indicates that distances could not be estimated because thresholds were not reached.

G.2.1. Impact Pile Driving

Impact pile driving results are presented in Appendix G.2.1.1 for OSS foundations and in Appendix G.2.1.2 for WTG foundations. Tables show acoustic ranges per modeling location, broadband attenuation, and season. PK ranges for OSS foundations assumed a 2 dB post-piling shift. Tables G-1 to G-8 present results for OSS1 and Tables G-9 to G-16 present results to OSS2. Tables G-17 to G-80 present results for the WTG scenarios.

G.2.1.1. OSS Pin Piles

OSS1

Table G-1. OSS1 pin pile (3 m diameter, MHU 3000S) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BB39 during Summer with different energy levels at 0 dB attenuation and 2 dB post-piling shift.

Hearing group	Threshold (L_{pk})	450 kJ	750 kJ	1200 kJ	1950 kJ	2400 kJ	2700 kJ	2800 kJ
LFC	219	-	-	0.09	0.11	0.11	0.10	0.06
MFC	230	-	-	-	-	-	-	-
HFC	202	0.28	0.42	0.58	0.80	0.81	0.75	0.57
PPW	218	-	0.02	0.09	0.12	0.12	0.10	0.07
TUW	232	-	-	-	-	-	-	-

Table G-2. OSS1 pin pile (3 m diameter, MHU 3000S) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BB39 during Winter with different energy levels at 0 dB attenuation and 2 dB post-piling shift.

Hearing group	Threshold (L_{pk})	450 kJ	750 kJ	1200 kJ	1950 kJ	2400 kJ	2700 kJ	2800 kJ
LFC	219	-	-	0.06	0.11	0.11	0.10	0.06
MFC	230	-	-	-	-	-	-	-
HFC	202	0.28	0.44	0.73	0.90	0.90	0.83	0.61
PPW	218	-	0.02	0.09	0.13	0.12	0.10	0.08
TUW	232	-	-	-	-	-	-	-

Table G-3. OSS1 pin pile (3 m diameter, MHU 3000S) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BB39 during Summer with different energy levels at 6 dB attenuation and 2 dB post-piling shift.

Hearing group	Threshold (L_{pk})	450 kJ	750 kJ	1200 kJ	1950 kJ	2400 kJ	2700 kJ	2800 kJ
LFC	219	-	-	-	-	-	0.06	0.04
MFC	230	-	-	-	-	-	-	-
HFC	202	0.13	0.15	0.27	0.44	0.44	0.42	0.35
PPW	218	-	-	-	-	0.07	0.06	0.05
TUW	232	-	-	-	-	-	-	-

Table G-4. OSS1 pin pile (3 m diameter, MHU 3000S) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BB39 during Winter with different energy levels at 6 dB attenuation and 2 dB post-piling shift.

Hearing group	Threshold (L_{pk})	450 kJ	750 kJ	1200 kJ	1950 kJ	2400 kJ	2700 kJ	2800 kJ
LFC	219	-	-	-	-	-	0.06	0.05
MFC	230	-	-	-	-	-	-	-
HFC	202	0.13	0.16	0.27	0.45	0.44	0.41	0.36
PPW	218	-	-	-	-	0.02	0.06	0.05
TUW	232	-	-	-	-	-	-	-

Table G-5. OSS1 pin pile (3 m diameter, MHU 3000S) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BB39 during Summer with different energy levels at 10 dB attenuation and 2 dB post-piling shift.

Hearing group	Threshold (L_{pk})	450 kJ	750 kJ	1200 kJ	1950 kJ	2400 kJ	2700 kJ	2800 kJ
LFC	219	-	-	-	-	-	-	-
MFC	230	-	-	-	-	-	-	-
HFC	202	0.09	0.13	0.14	0.26	0.26	0.22	0.14
PPW	218	-	-	-	-	-	-	0.03
TUW	232	-	-	-	-	-	-	-

Table G-6. OSS1 pin pile (3 m diameter, MHU 3000S) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds (R95% in km) at location BB39 during Winter with different energy levels at 10 dB attenuation and 2 dB post-piling shift

Hearing group	Threshold (L_{pk})	450 kJ	750 kJ	1200 kJ	1950 kJ	2400 kJ	2700 kJ	2800 kJ
LFC	219	-	-	-	-	-	-	-
MFC	230	-	-	-	-	-	-	-
HFC	202	0.09	0.13	0.15	0.18	0.24	0.22	0.14
PPW	218	-	-	-	-	-	-	0.03
TUW	232	-	-	-	-	-	-	-

Table G-7. OSS1 pin pile (3 m diameter, MHU 3000S) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BB39 during Summer with different energy levels at 15 dB attenuation and 2 dB post-piling shift.

Hearing group	Threshold (L_{pk})	450 kJ	750 kJ	1200 kJ	1950 kJ	2400 kJ	2700 kJ	2800 kJ
LFC	219	-	-	-	-	-	-	-
MFC	230	-	-	-	-	-	-	-
HFC	202	-	0.07	0.10	0.13	0.12	0.11	0.09
PPW	218	-	-	-	-	-	-	-
TUW	232	-	-	-	-	-	-	-

Table G-8. OSS1 pin pile (3 m diameter, MHU 3000S) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BB39 during Winter with different energy levels at 15 dB attenuation and 2 dB post-piling shift.

Hearing group	Threshold (L_{pk})	450 kJ	750 kJ	1200 kJ	1950 kJ	2400 kJ	2700 kJ	2800 kJ
LFC	219	-	-	-	-	-	-	-
MFC	230	-	-	-	-	-	-	-
HFC	202	-	0.04	0.10	0.14	0.13	0.11	0.09
PPW	218	-	-	-	-	-	-	-
TUW	232	-	-	-	-	-	-	-

OSS2

Table G-9. OSS2 pin pile (3 m diameter, MHU 1700S) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BK31 during Summer with different energy levels at 0 dB attenuation and 2 dB post-piling shift.

Hearing group	Threshold (L_{pk})	680 kJ [a]	1360 kJ [a]	680 kJ [b]	1360 kJ [b]	1530 kJ
LFC	219	0.04	0.07	0.04	0.06	0.05
MFC	230	-	-	-	-	-
HFC	202	0.50	0.60	0.48	0.57	0.55
PPW	218	0.05	0.08	0.05	0.06	0.05
TUW	232	-	-	-	-	-

Table G-10. OSS2 pin pile (3 m diameter, MHU 1700S) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BK31 during Winter with different energy levels at 0 dB attenuation and 2 dB post-piling shift.

Hearing group	Threshold (L_{pk})	680 kJ [a]	1360 kJ [a]	680 kJ [b]	1360 kJ [b]	1530 kJ
LFC	219	0.04	0.08	0.04	0.06	0.05
MFC	230	-	-	-	-	-
HFC	202	0.48	0.58	0.44	0.55	0.52
PPW	218	0.05	0.08	0.05	0.06	0.05
TUW	232	-	-	-	-	-

Table G-11. OSS2 pin pile (3 m diameter, MHU 1700S) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BK31 during Summer with different energy levels at 6 dB attenuation and 2 dB post-piling shift.

Hearing group	Threshold (L_{pk})	680 kJ [a]	1360 kJ [a]	680 kJ [b]	1360 kJ [b]	1530 kJ
LFC	219	-	0.02	-	0.02	0.03
MFC	230	-	-	-	-	-
HFC	202	0.16	0.45	0.18	0.43	0.42
PPW	218	-	0.03	-	0.03	0.03
TUW	232	-	-	-	-	-

Table G-12. OSS2 pin pile (3 m diameter, MHU 1700S) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BK31 during Winter with different energy levels at 6 dB attenuation and 2 dB post-piling shift.

Hearing group	Threshold (L_{pk})	680 kJ [a]	1360 kJ [a]	680 kJ [b]	1360 kJ [b]	1530 kJ
LFC	219	-	0.02	-	0.02	0.03
MFC	230	-	-	-	-	-
HFC	202	0.15	0.42	0.13	0.39	0.37
PPW	218	-	0.03	-	0.03	0.03
TUW	232	-	-	-	-	-

Table G-13. OSS2 pin pile (3 m diameter, MHU 1700S) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BK31 during Summer with different energy levels at 10 dB attenuation and 2 dB post-piling shift.

Hearing group	Threshold (L_{pk})	680 kJ [a]	1360 kJ [a]	680 kJ [b]	1360 kJ [b]	1530 kJ
LFC	219	-	-	-	-	-
MFC	230	-	-	-	-	-
HFC	202	0.11	0.14	0.08	0.13	0.16
PPW	218	-	-	-	-	-
TUW	232	-	-	-	-	-

Table G-14. OSS2 pin pile (3 m diameter, MHU 1700S) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BK31 during Winter with different energy levels at 10 dB attenuation and 2 dB post-piling shift.

Hearing group	Threshold (L_{pk})	680 kJ [a]	1360 kJ [a]	680 kJ [b]	1360 kJ [b]	1530 kJ
LFC	219	-	-	-	-	-
MFC	230	-	-	-	-	-
HFC	202	0.11	0.13	0.09	0.12	0.11
PPW	218	-	-	-	-	-
TUW	232	-	-	-	-	-

Table G-15. OSS2 pin pile (3 m diameter, MHU 1700S) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BK31 during Summer with different energy levels at 15 dB attenuation and 2 dB post-piling shift.

Hearing group	Threshold (L_{pk})	680 kJ [a]	1360 kJ [a]	680 kJ [b]	1360 kJ [b]	1530 kJ
LFC	219	-	-	-	-	-
MFC	230	-	-	-	-	-
HFC	202	0.06	0.09	0.06	0.06	0.05
PPW	218	-	-	-	-	-
TUW	232	-	-	-	-	-

Table G-16. OSS2 pin pile (3 m diameter, MHU 1700S) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds (R95% in km) at location BK31 during Winter with different energy levels at 15 dB attenuation and 2 dB post-piling shift.

Hearing group	Threshold (L_{pk})	680 kJ [a]	1360 kJ [a]	680 kJ [b]	1360 kJ [b]	1530 kJ
LFC	219	-	-	-	-	-
MFC	230	-	-	-	-	-
HFC	202	0.06	0.09	0.06	0.06	0.05
PPW	218	-	-	-	-	-
TUW	232	-	-	-	-	-

G.2.1.2. WTG Pin Pile and Monopiles

WTG jacket pin pile

Table G-17. WTG jacket pin pile (4.5 m diameter, IHC S2300) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location AY42 during Summer with different energy levels at 0 dB.

Hearing group	Threshold (L_{pk})	250 kJ	450 kJ	685 kJ	1500 kJ	2000 kJ	2200 kJ
LFC	219	-	-	-	0.03	0.03	-
MFC	230	-	-	-	-	-	-
HFC	202	0.19	0.26	0.30	0.36	0.28	0.22
PPW	218	-	-	-	0.05	0.03	-
TUW	232	-	-	-	-	-	-

Table G-18. WTG jacket pin pile (4.5 m diameter, IHC S2300) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location AY42 during Winter with different energy levels at 0 dB.

Hearing group	Threshold (L_{pk})	250 kJ	450 kJ	685 kJ	1500 kJ	2000 kJ	2200 kJ
LFC	219	-	-	-	0.04	0.03	-
MFC	230	-	-	-	-	-	-
HFC	202	0.19	0.26	0.30	0.36	0.28	0.22
PPW	218	-	-	-	0.05	0.04	-
TUW	232	-	-	-	-	-	-

Table G-19. WTG jacket pin pile (4.5 m diameter, IHC S2300) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BM28 during Summer with different energy levels at 0 dB.

Hearing group	Threshold (L_{pk})	250 kJ	450 kJ	685 kJ	1500 kJ	2000 kJ	2200 kJ
LFC	219	-	-	-	0.02	-	-
MFC	230	-	-	-	-	-	-
HFC	202	0.12	0.12	0.19	0.45	0.43	0.37
PPW	218	-	-	-	0.03	0.02	-
TUW	232	-	-	-	-	-	-

Table G-20. WTG jacket pin pile (4.5 m diameter, IHC S2300) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BM28 during Winter with different energy levels at 0 dB.

Hearing group	Threshold (L_{pk})	250 kJ	450 kJ	685 kJ	1500 kJ	2000 kJ	2200 kJ
LFC	219	-	-	-	0.02	-	-
MFC	230	-	-	-	-	-	-
HFC	202	0.12	0.12	0.20	0.42	0.40	0.34
PPW	218	-	-	-	0.03	0.02	-
TUW	232	-	-	-	-	-	-

Table G-21. WTG jacket pin pile (4.5 m diameter, IHC S2300) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location AY42 during Summer with different energy levels at 6 dB.

Hearing group	Threshold (L_{pk})	250 kJ	450 kJ	685 kJ	1500 kJ	2000 kJ	2200 kJ
LFC	219	-	-	-	-	-	-
MFC	230	-	-	-	-	-	-
HFC	202	0.09	0.11	0.12	0.18	0.16	0.08
PPW	218	-	-	-	-	-	-
TUW	232	-	-	-	-	-	-

Table G-22. WTG jacket pin pile (4.5 m diameter, IHC S2300) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location AY42 during Winter with different energy levels at 6 dB.

Hearing group	Threshold (L_{pk})	250 kJ	450 kJ	685 kJ	1500 kJ	2000 kJ	2200 kJ
LFC	219	-	-	-	-	-	-
MFC	230	-	-	-	-	-	-
HFC	202	0.10	0.13	0.13	0.17	0.16	0.08
PPW	218	-	-	-	-	-	-
TUW	232	-	-	-	-	-	-

Table G-23. WTG jacket pin pile (4.5 m diameter, IHC S2300) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BM28 during Summer with different energy levels at 6 dB.

Hearing group	Threshold (L_{pk})	250 kJ	450 kJ	685 kJ	1500 kJ	2000 kJ	2200 kJ
LFC	219	-	-	-	-	-	-
MFC	230	-	-	-	-	-	-
HFC	202	0.05	0.07	0.06	0.06	0.09	0.11
PPW	218	-	-	-	-	-	-
TUW	232	-	-	-	-	-	-

Table G-24. WTG jacket pin pile (4.5 m diameter, IHC S2300) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BM28 during Winter with different energy levels at 6 dB.

Hearing group	Threshold (L_{pk})	250 kJ	450 kJ	685 kJ	1500 kJ	2000 kJ	2200 kJ
LFC	219	-	-	-	-	-	-
MFC	230	-	-	-	-	-	-
HFC	202	0.04	0.07	0.06	0.07	0.09	0.11
PPW	218	-	-	-	-	-	-
TUW	232	-	-	-	-	-	-

Table G-25. WTG jacket pin pile (4.5 m diameter, IHC S2300) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location AY42 during Summer with different energy levels at 10 dB.

Hearing group	Threshold (L_{pk})	250 kJ	450 kJ	685 kJ	1500 kJ	2000 kJ	2200 kJ
LFC	219	-	-	-	-	-	-
MFC	230	-	-	-	-	-	-
HFC	202	0.02	0.08	0.09	0.10	0.08	0.04
PPW	218	-	-	-	-	-	-
TUW	232	-	-	-	-	-	-

Table G-26. WTG jacket pin pile (4.5 m diameter, IHC S2300) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location AY42 during Winter with different energy levels at 10 dB.

Hearing group	Threshold (L_{pk})	250 kJ	450 kJ	685 kJ	1500 kJ	2000 kJ	2200 kJ
LFC	219	-	-	-	-	-	-
MFC	230	-	-	-	-	-	-
HFC	202	0.02	0.09	0.09	0.10	0.08	0.05
PPW	218	-	-	-	-	-	-
TUW	232	-	-	-	-	-	-

Table G-27. WTG jacket pin pile (4.5 m diameter, IHC S2300) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BM28 during Summer with different energy levels at 10 dB.

Hearing group	Threshold (L_{pk})	250 kJ	450 kJ	685 kJ	1500 kJ	2000 kJ	2200 kJ
LFC	219	-	-	-	-	-	-
MFC	230	-	-	-	-	-	-
HFC	202	0.02	0.03	0.05	0.05	0.05	0.06
PPW	218	-	-	-	-	-	-
TUW	232	-	-	-	-	-	-

Table G-28. WTG jacket pin pile (4.5 m diameter, IHC S2300) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BM28 during Winter with different energy levels at 10 dB.

Hearing group	Threshold (L_{pk})	250 kJ	450 kJ	685 kJ	1500 kJ	2000 kJ	2200 kJ
LFC	219	-	-	-	-	-	-
MFC	230	-	-	-	-	-	-
HFC	202	-	0.03	0.05	0.05	0.05	0.06
PPW	218	-	-	-	-	-	-
TUW	232	-	-	-	-	-	-

Table G-29. WTG jacket pin pile (4.5 m diameter, IHC S2300) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location AY42 during Summer with different energy levels at 15 dB.

Hearing group	Threshold (L_{pk})	250 kJ	450 kJ	685 kJ	1500 kJ	2000 kJ	2200 kJ
LFC	219	-	-	-	-	-	-
MFC	230	-	-	-	-	-	-
HFC	202	-	-	-	0.06	0.05	0.02
PPW	218	-	-	-	-	-	-
TUW	232	-	-	-	-	-	-

Table G-30. WTG jacket pin pile (4.5 m diameter, IHC S2300) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location AY42 during Winter with different energy levels at 15 dB.

Hearing group	Threshold (L_{pk})	250 kJ	450 kJ	685 kJ	1500 kJ	2000 kJ	2200 kJ
LFC	219	-	-	-	-	-	-
MFC	230	-	-	-	-	-	-
HFC	202	-	-	-	0.06	0.05	0.02
PPW	218	-	-	-	-	-	-
TUW	232	-	-	-	-	-	-

Table G-31. WTG jacket pin pile (4.5 m diameter, IHC S2300) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BM28 during Summer with different energy levels at 15 dB.

Hearing group	Threshold (L_{pk})	250 kJ	450 kJ	685 kJ	1500 kJ	2000 kJ	2200 kJ
LFC	219	-	-	-	-	-	-
MFC	230	-	-	-	-	-	-
HFC	202	-	-	-	0.03	0.02	-
PPW	218	-	-	-	-	-	-
TUW	232	-	-	-	-	-	-

Table G-32. WTG jacket pin pile (4.5 m diameter, IHC S2300) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BM28 during Winter with different energy levels at 15 dB.

Hearing group	Threshold (L_{pk})	250 kJ	450 kJ	685 kJ	1500 kJ	2000 kJ	2200 kJ
LFC	219	-	-	-	-	-	-
MFC	230	-	-	-	-	-	-
HFC	202	-	-	-	0.03	0.02	-
PPW	218	-	-	-	-	-	-
TUW	232	-	-	-	-	-	-

WTG MP1

Table G-33. WTG MP1 foundation (13 m diameter, IHC S5500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location AY42 during Summer with different energy levels at 0 dB.

Hearing group	Threshold (L_{pk})	1650 kJ	2750 kJ	4750 kJ	5225 kJ
LFC	219	0.02	0.06	0.09	0.11
MFC	230	-	-	-	-
HFC	202	0.45	0.61	0.73	0.94
PPW	218	0.05	0.08	0.11	0.12
TUW	232	-	-	-	-

Table G-34. WTG MP1 foundation (13 m diameter, IHC S5500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location AY42 during Winter with different energy levels at 0 dB.

Hearing group	Threshold (L_{pk})	1650 kJ	2750 kJ	4750 kJ	5225 kJ
LFC	219	0.02	0.06	0.09	0.11
MFC	230	-	-	-	-
HFC	202	0.44	0.57	0.77	0.92
PPW	218	0.05	0.08	0.11	0.12
TUW	232	-	-	-	-

Table G-35. WTG MP1 foundation (13 m diameter, IHC S5500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BM28 during Summer with different energy levels at 0 dB.

Hearing group	Threshold (L_{pk})	1650 kJ	2750 kJ	4750 kJ	5225 kJ
LFC	219	0.02	0.04	0.06	0.08
MFC	230	-	-	-	-
HFC	202	0.55	0.64	1.05	1.10
PPW	218	0.03	0.05	0.08	0.09
TUW	232	-	-	-	-

Table G-36. WTG MP1 foundation (13 m diameter, IHC S5500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BM28 during Winter with different energy levels at 0 dB.

Hearing group	Threshold (L_{pk})	1650 kJ	2750 kJ	4750 kJ	5225 kJ
LFC	219	0.02	0.04	0.06	0.08
MFC	230	-	-	-	-
HFC	202	0.56	0.64	0.90	0.94
PPW	218	0.03	0.05	0.08	0.09
TUW	232	-	-	-	-

Table G-37. WTG MP1 foundation (13 m diameter, IHC S5500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location AY42 during Summer with different energy levels at 6 dB.

Hearing group	Threshold (L_{pk})	1650 kJ	2750 kJ	4750 kJ	5225 kJ
LFC	219	-	-	-	0.02
MFC	230	-	-	-	-
HFC	202	0.15	0.26	0.43	0.46
PPW	218	-	-	0.02	0.05
TUW	232	-	-	-	-

Table G-38. WTG MP1 foundation (13 m diameter, IHC S5500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location AY42 during Winter with different energy levels at 6 dB.

Hearing group	Threshold (L_{pk})	1650 kJ	2750 kJ	4750 kJ	5225 kJ
LFC	219	-	-	-	0.02
MFC	230	-	-	-	-
HFC	202	0.15	0.26	0.42	0.44
PPW	218	-	-	0.02	0.03
TUW	232	-	-	-	-

Table G-39. WTG MP1 foundation (13 m diameter, IHC S5500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BM28 during Summer with different energy levels at 6 dB.

Hearing group	Threshold (L_{pk})	1650 kJ	2750 kJ	4750 kJ	5225 kJ
LFC	219	-	-	0.02	0.02
MFC	230	-	-	-	-
HFC	202	0.13	0.47	0.54	0.56
PPW	218	-	-	0.02	0.03
TUW	232	-	-	-	-

Table G-40. WTG MP1 foundation (13 m diameter, IHC S5500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BM28 during Winter with different energy levels at 6 dB.

Hearing group	Threshold (L_{pk})	1650 kJ	2750 kJ	4750 kJ	5225 kJ
LFC	219	-	-	0.02	0.02
MFC	230	-	-	-	-
HFC	202	0.13	0.46	0.54	0.56
PPW	218	-	-	0.02	0.03
TUW	232	-	-	-	-

Table G-41. WTG MP1 foundation (13 m diameter, IHC S5500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location AY42 during Summer with different energy levels at 10 dB.

Hearing group	Threshold (L_{pk})	1650 kJ	2750 kJ	4750 kJ	5225 kJ
LFC	219	-	-	-	-
MFC	230	-	-	-	-
HFC	202	0.11	0.14	0.22	0.24
PPW	218	-	-	-	-
TUW	232	-	-	-	-

Table G-42. WTG MP1 foundation (13 m diameter, IHC S5500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location AY42 during Winter with different energy levels at 10 dB.

Hearing group	Threshold (L_{pk})	1650 kJ	2750 kJ	4750 kJ	5225 kJ
LFC	219	-	-	-	-
MFC	230	-	-	-	-
HFC	202	0.11	0.14	0.21	0.24
PPW	218	-	-	-	-
TUW	232	-	-	-	-

Table G-43. WTG MP1 foundation (13 m diameter, IHC S5500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BM28 during Summer with different energy levels at 10 dB.

Hearing group	Threshold (L_{pk})	1650 kJ	2750 kJ	4750 kJ	5225 kJ
LFC	219	-	-	-	-
MFC	230	-	-	-	-
HFC	202	0.09	0.13	0.16	0.26
PPW	218	-	-	-	-
TUW	232	-	-	-	-

Table G-44. WTG MP1 foundation (13 m diameter, IHC S5500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BM28 during Winter with different energy levels at 10 dB.

Hearing group	Threshold (L_{pk})	1650 kJ	2750 kJ	4750 kJ	5225 kJ
LFC	219	-	-	-	-
MFC	230	-	-	-	-
HFC	202	0.09	0.13	0.16	0.17
PPW	218	-	-	-	-
TUW	232	-	-	-	-

Table G-45. WTG MP1 foundation (13 m diameter, IHC S5500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location AY42 during Summer with different energy levels at 15 dB.

Hearing group	Threshold (L_{pk})	1650 kJ	2750 kJ	4750 kJ	5225 kJ
LFC	219	-	-	-	-
MFC	230	-	-	-	-
HFC	202	0.06	0.09	0.12	0.13
PPW	218	-	-	-	-
TUW	232	-	-	-	-

Table G-46. WTG MP1 foundation (13 m diameter, IHC S5500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location AY42 during Winter with different energy levels at 15 dB.

Hearing group	Threshold (L_{pk})	1650 kJ	2750 kJ	4750 kJ	5225 kJ
LFC	219	-	-	-	-
MFC	230	-	-	-	-
HFC	202	0.06	0.09	0.12	0.13
PPW	218	-	-	-	-
TUW	232	-	-	-	-

Table G-47. WTG MP1 foundation (13 m diameter, IHC S5500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BM28 during Summer with different energy levels at 15 dB.

Hearing group	Threshold (L_{pk})	1650 kJ	2750 kJ	4750 kJ	5225 kJ
LFC	219	-	-	-	-
MFC	230	-	-	-	-
HFC	202	0.03	0.06	0.09	0.10
PPW	218	-	-	-	-
TUW	232	-	-	-	-

Table G-48. WTG MP1 foundation (13 m diameter, IHC S5500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BM28 during Winter with different energy levels at 15 dB.

Hearing group	Threshold (L_{pk})	1650 kJ	2750 kJ	4750 kJ	5225 kJ
LFC	219	-	-	-	-
MFC	230	-	-	-	-
HFC	202	0.03	0.06	0.09	0.10
PPW	218	-	-	-	-
TUW	232	-	-	-	-

WTG MP2

Table G-49. WTG MP2 foundation (13 m diameter, IHC S5500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location AY42 during Summer with different energy levels at 0 dB.

Hearing group	Threshold (L_{pk})	550 kJ	1100 kJ	2750 kJ	3850 kJ	5225 kJ
LFC	219	-	-	0.07	0.09	0.12
MFC	230	-	-	-	-	-
HFC	202	0.30	0.39	0.61	0.70	1.01
PPW	218	-	0.02	0.09	0.11	0.13
TUW	232	-	-	-	-	-

Table G-50. WTG MP2 foundation (13 m diameter, IHC S5500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location AY42 during Winter with different energy levels at 0 dB.

Hearing group	Threshold (L_{pk})	550 kJ	1100 kJ	2750 kJ	3850 kJ	5225 kJ
LFC	219	-	-	0.07	0.09	0.13
MFC	230	-	-	-	-	-
HFC	202	0.33	0.38	0.57	0.77	0.98
PPW	218	-	0.02	0.09	0.11	0.13
TUW	232	-	-	-	-	-

Table G-51. WTG MP2 foundation (13 m diameter, IHC S5500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BM28 during Summer with different energy levels at 0 dB.

Hearing group	Threshold (L_{pk})	550 kJ	1100 kJ	2750 kJ	3850 kJ	5225 kJ
LFC	219	-	-	0.04	0.05	0.08
MFC	230	-	-	-	-	-
HFC	202	0.13	0.50	0.62	0.70	1.10
PPW	218	-	0.02	0.05	0.06	0.09
TUW	232	-	-	-	-	-

Table G-52. WTG MP2 foundation (13 m diameter, IHC S5500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BM28 during Winter with different energy levels at 0 dB.

Hearing group	Threshold (L_{pk})	550 kJ	1100 kJ	2750 kJ	3850 kJ	5225 kJ
LFC	219	-	-	0.04	0.05	0.07
MFC	230	-	-	-	-	-
HFC	202	0.14	0.50	0.63	0.67	0.94
PPW	218	-	0.02	0.05	0.06	0.09
TUW	232	-	-	-	-	-

Table G-53. WTG MP2 foundation (13 m diameter, IHC S5500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location AY42 during Summer with different energy levels at 6 dB.

Hearing group	Threshold (L_{pk})	550 kJ	1100 kJ	2750 kJ	3850 kJ	5225 kJ
LFC	219	-	-	-	-	0.02
MFC	230	-	-	-	-	-
HFC	202	0.10	0.13	0.27	0.41	0.50
PPW	218	-	-	-	0.02	0.06
TUW	232	-	-	-	-	-

Table G-54. WTG MP2 foundation (13 m diameter, IHC S5500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location AY42 during Winter with different energy levels at 6 dB.

Hearing group	Threshold (L_{pk})	550 kJ	1100 kJ	2750 kJ	3850 kJ	5225 kJ
LFC	219	-	-	-	-	0.02
MFC	230	-	-	-	-	-
HFC	202	0.11	0.14	0.28	0.40	0.48
PPW	218	-	-	-	0.02	0.06
TUW	232	-	-	-	-	-

Table G-55. WTG MP2 foundation (13 m diameter, IHC S5500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BM28 during Summer with different energy levels at 6 dB.

Hearing group	Threshold (L_{pk})	550 kJ	1100 kJ	2750 kJ	3850 kJ	5225 kJ
LFC	219	-	-	-	-	0.02
MFC	230	-	-	-	-	-
HFC	202	0.09	0.11	0.46	0.50	0.56
PPW	218	-	-	-	0.02	0.03
TUW	232	-	-	-	-	-

Table G-56. WTG MP2 foundation (13 m diameter, IHC S5500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BM28 during Winter with different energy levels at 6 dB.

Hearing group	Threshold (L_{pk})	550 kJ	1100 kJ	2750 kJ	3850 kJ	5225 kJ
LFC	219	-	-	-	-	0.02
MFC	230	-	-	-	-	-
HFC	202	0.09	0.11	0.44	0.50	0.56
PPW	218	-	-	-	0.02	0.03
TUW	232	-	-	-	-	-

Table G-57. WTG MP2 foundation (13 m diameter, IHC S5500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location AY42 during Summer with different energy levels at 10 dB.

Hearing group	Threshold (L_{pk})	550 kJ	1100 kJ	2750 kJ	3850 kJ	5225 kJ
LFC	219	-	-	-	-	-
MFC	230	-	-	-	-	-
HFC	202	0.06	0.09	0.14	0.17	0.26
PPW	218	-	-	-	-	-
TUW	232	-	-	-	-	-

Table G-58. WTG MP2 foundation (13 m diameter, IHC S5500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location AY42 during Winter with different energy levels at 10 dB.

Hearing group	Threshold (L_{pk})	550 kJ	1100 kJ	2750 kJ	3850 kJ	5225 kJ
LFC	219	-	-	-	-	-
MFC	230	-	-	-	-	-
HFC	202	0.06	0.09	0.15	0.17	0.26
PPW	218	-	-	-	-	-
TUW	232	-	-	-	-	-

Table G-59. WTG MP2 foundation (13 m diameter, IHC S5500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BM28 during Summer with different energy levels at 10 dB.

Hearing group	Threshold (L_{pk})	550 kJ	1100 kJ	2750 kJ	3850 kJ	5225 kJ
LFC	219	-	-	-	-	-
MFC	230	-	-	-	-	-
HFC	202	0.04	0.07	0.12	0.13	0.25
PPW	218	-	-	-	-	-
TUW	232	-	-	-	-	-

Table G-60. WTG MP2 foundation (13 m diameter, IHC S5500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BM28 during Winter with different energy levels at 10 dB.

Hearing group	Threshold (L_{pk})	550 kJ	1100 kJ	2750 kJ	3850 kJ	5225 kJ
LFC	219	-	-	-	-	-
MFC	230	-	-	-	-	-
HFC	202	0.04	0.07	0.12	0.13	0.17
PPW	218	-	-	-	-	-
TUW	232	-	-	-	-	-

Table G-61. WTG MP2 foundation (13 m diameter, IHC S5500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location AY42 during Summer with different energy levels at 15 dB.

Hearing group	Threshold (L_{pk})	550 kJ	1100 kJ	2750 kJ	3850 kJ	5225 kJ
LFC	219	-	-	-	-	-
MFC	230	-	-	-	-	-
HFC	202	0.00	0.04	0.09	0.12	0.14
PPW	218	-	-	-	-	-
TUW	232	-	-	-	-	-

Table G-62. WTG MP2 foundation (13 m diameter, IHC S5500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location AY42 during Winter with different energy levels at 15 dB.

Hearing group	Threshold (L_{pk})	550 kJ	1100 kJ	2750 kJ	3850 kJ	5225 kJ
LFC	219	-	-	-	-	-
MFC	230	-	-	-	-	-
HFC	202	0.00	0.04	0.09	0.12	0.14
PPW	218	-	-	-	-	-
TUW	232	-	-	-	-	-

Table G-63. WTG MP2 foundation (13 m diameter, IHC S5500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BM28 during Summer with different energy levels at 15 dB.

Hearing group	Threshold (L_{pk})	550 kJ	1100 kJ	2750 kJ	3850 kJ	5225 kJ
LFC	219	-	-	-	-	-
MFC	230	-	-	-	-	-
HFC	202	0.00	0.02	0.06	0.08	0.10
PPW	218	-	-	-	-	-
TUW	232	-	-	-	-	-

Table G-64. WTG MP2 foundation (13 m diameter, IHC S5500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BM28 during Winter with different energy levels at 15 dB.

Hearing group	Threshold (L_{pk})	550 kJ	1100 kJ	2750 kJ	3850 kJ	5225 kJ
LFC	219	-	-	-	-	-
MFC	230	-	-	-	-	-
HFC	202	0.00	0.02	0.06	0.08	0.10
PPW	218	-	-	-	-	-
TUW	232	-	-	-	-	-

WTG MP3

Table G-65. WTG MP3 foundation (13 m diameter, IHC S6500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location AY42 during Summer with different energy levels at 0 dB.

Hearing group	Threshold (L_{pk})	654 kJ	1307 kJ	2614 kJ	3921 kJ	6208 kJ
LFC	219	-	-	0.06	0.08	0.13
MFC	230	-	-	-	-	-
HFC	202	0.26	0.40	0.53	0.65	0.90
PPW	218	-	0.02	0.06	0.09	0.13
TUW	232	-	-	-	-	-

Table G-66. WTG MP3 foundation (13 m diameter, IHC S6500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location AY42 during Winter with different energy levels at 0 dB.

Hearing group	Threshold (L_{pk})	654 kJ	1307 kJ	2614 kJ	3921 kJ	6208 kJ
LFC	219	-	-	0.06	0.08	0.13
MFC	230	-	-	-	-	-
HFC	202	0.33	0.39	0.51	0.73	0.99
PPW	218	-	0.02	0.06	0.09	0.14
TUW	232	-	-	-	-	-

Table G-67. WTG MP3 foundation (13 m diameter, IHC S6500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BM28 during Summer with different energy levels at 0 dB.

Hearing group	Threshold (L_{pk})	654 kJ	1307 kJ	2614 kJ	3921 kJ	6208 kJ
LFC	219	-	-	0.03	0.05	0.09
MFC	230	-	-	-	-	-
HFC	202	0.14	0.51	0.60	0.68	1.15
PPW	218	-	0.02	0.04	0.06	0.09
TUW	232	-	-	-	-	-

Table G-68. WTG MP3 foundation (13 m diameter, IHC S6500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BM28 during Winter with different energy levels at 0 dB.

Hearing group	Threshold (L_{pk})	654 kJ	1307 kJ	2614 kJ	3921 kJ	6208 kJ
LFC	219	-	-	0.03	0.05	0.08
MFC	230	-	-	-	-	-
HFC	202	0.15	0.52	0.61	0.66	0.99
PPW	218	-	0.02	0.04	0.06	0.09
TUW	232	-	-	-	-	-

Table G-69. WTG MP3 foundation (13 m diameter, IHC S6500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location AY42 during Summer with different energy levels at 6 dB.

Hearing group	Threshold (L_{pk})	654 kJ	1307 kJ	2614 kJ	3921 kJ	6208 kJ
LFC	219	-	-	-	-	0.02
MFC	230	-	-	-	-	-
HFC	202	0.10	0.13	0.23	0.35	0.52
PPW	218	-	-	-	-	0.06
TUW	232	-	-	-	-	-

Table G-70. WTG MP3 foundation (13 m diameter, IHC S6500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location AY42 during Winter with different energy levels at 6 dB.

Hearing group	Threshold (L_{pk})	654 kJ	1307 kJ	2614 kJ	3921 kJ	6208 kJ
LFC	219	-	-	-	-	0.02
MFC	230	-	-	-	-	-
HFC	202	0.11	0.14	0.24	0.37	0.48
PPW	218	-	-	-	-	0.06
TUW	232	-	-	-	-	-

Table G-71. WTG MP3 foundation (13 m diameter, IHC S6500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BM28 during Summer with different energy levels at 6 dB.

Hearing group	Threshold (L_{pk})	654 kJ	1307 kJ	2614 kJ	3921 kJ	6208 kJ
LFC	219	-	-	-	-	0.02
MFC	230	-	-	-	-	-
HFC	202	0.09	0.11	0.15	0.50	0.58
PPW	218	-	-	-	-	0.03
TUW	232	-	-	-	-	-

Table G-72. WTG MP3 foundation (13 m diameter, IHC S6500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BM28 during Winter with different energy levels at 6 dB.

Hearing group	Threshold (L_{pk})	654 kJ	1307 kJ	2614 kJ	3921 kJ	6208 kJ
LFC	219	-	-	-	-	0.02
MFC	230	-	-	-	-	-
HFC	202	0.09	0.12	0.15	0.49	0.58
PPW	218	-	-	-	-	0.03
TUW	232	-	-	-	-	-

Table G-73. WTG MP3 foundation (13 m diameter, IHC S6500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location AY42 during Summer with different energy levels at 10 dB.

Hearing group	Threshold (L_{pk})	654 kJ	1307 kJ	2614 kJ	3921 kJ	6208 kJ
LFC	219	-	-	-	-	-
MFC	230	-	-	-	-	-
HFC	202	0.06	0.09	0.13	0.15	0.28
PPW	218	-	-	-	-	-
TUW	232	-	-	-	-	-

Table G-74. WTG MP3 foundation (13 m diameter, IHC S6500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location AY42 during Winter with different energy levels at 10 dB.

Hearing group	Threshold (L_{pk})	654 kJ	1307 kJ	2614 kJ	3921 kJ	6208 kJ
LFC	219	-	-	-	-	-
MFC	230	-	-	-	-	-
HFC	202	0.06	0.09	0.13	0.17	0.28
PPW	218	-	-	-	-	-
TUW	232	-	-	-	-	-

Table G-75. WTG MP3 foundation (13 m diameter, IHC S6500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BM28 during Summer with different energy levels at 10 dB.

Hearing group	Threshold (L_{pk})	654 kJ	1307 kJ	2614 kJ	3921 kJ	6208 kJ
LFC	219	-	-	-	-	-
MFC	230	-	-	-	-	-
HFC	202	0.05	0.08	0.11	0.13	0.46
PPW	218	-	-	-	-	-
TUW	232	-	-	-	-	-

Table G-76. WTG MP3 foundation (13 m diameter, IHC S6500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BM28 during Winter with different energy levels at 10 dB.

Hearing group	Threshold (L_{pk})	654 kJ	1307 kJ	2614 kJ	3921 kJ	6208 kJ
LFC	219	-	-	-	-	-
MFC	230	-	-	-	-	-
HFC	202	0.05	0.07	0.11	0.13	0.18
PPW	218	-	-	-	-	-
TUW	232	-	-	-	-	-

Table G-77. WTG MP3 foundation (13 m diameter, IHC S6500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location AY42 during Summer with different energy levels at 15 dB.

Hearing group	Threshold (L_{pk})	654 kJ	1307 kJ	2614 kJ	3921 kJ	6208 kJ
LFC	219	-	-	-	-	-
MFC	230	-	-	-	-	-
HFC	202	-	0.03	0.08	0.11	0.15
PPW	218	-	-	-	-	-
TUW	232	-	-	-	-	-

Table G-78. WTG MP3 foundation (13 m diameter, IHC S6500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location AY42 during Winter with different energy levels at 15 dB.

Hearing group	Threshold (L_{pk})	654 kJ	1307 kJ	2614 kJ	3921 kJ	6208 kJ
LFC	219	-	-	-	-	-
MFC	230	-	-	-	-	-
HFC	202	-	0.03	0.08	0.11	0.16
PPW	218	-	-	-	-	-
TUW	232	-	-	-	-	-

Table G-79. WTG MP3 foundation (13 m diameter, IHC S6500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BM28 during Summer with different energy levels at 15 dB.

Hearing group	Threshold (L_{pk})	654 kJ	1307 kJ	2614 kJ	3921 kJ	6208 kJ
LFC	219	-	-	-	-	-
MFC	230	-	-	-	-	-
HFC	202	-	0.02	0.05	0.08	0.10
PPW	218	-	-	-	-	-
TUW	232	-	-	-	-	-

Table G-80. WTG MP3 foundation (13 m diameter, IHC S6500) peak (PK) acoustic ranges to marine mammal and sea turtle injury thresholds ($R_{95\%}$ in km) at location BM28 during Winter with different energy levels at 15 dB.

Hearing group	Threshold (L_{pk})	654 kJ	1307 kJ	2614 kJ	3921 kJ	6208 kJ
LFC	219	-	-	-	-	-
MFC	230	-	-	-	-	-
HFC	202	-	0.02	0.05	0.07	0.10
PPW	218	-	-	-	-	-
TUW	232	-	-	-	-	-

G.3. Per Pile SEL Acoustic Ranges to Injury Thresholds

Acoustic ranges ($R_{95\%}$ in km) to Level A SEL injury thresholds to marine mammal and sea turtles with 0, 6, 10, and 15 dB of broadband attenuation are presented in Appendix G.3.1 for impact pile driving (impulsive signal threshold) scenarios (OSS and WTG) and Appendix G.3.2 for vibratory (non-impulsive signal thresholds) and vibratory pile setting followed by impact pile driving (impulsive signal thresholds). In all tables, a dash indicates that distances could not be estimated because thresholds were not reached.

G.3.1. Impact Pile Driving

Impact pile driving results are presented in Appendix G.3.1.1 for OSS foundations and in Appendix G.3.1.2 for WTG foundations. Tables show acoustic ranges per modeling location, broadband attenuation, and season. SEL ranges for OSS foundations assumed the installation of 8 pin piles and 2 dB of post-piling shift. SEL ranges for WTG jacket foundations assumed the installation of 4 pin piles. Tables G-81 to G-82 present results for OSS1 and OSS2, respectively. Tables G-83 to G-90 present results for the WTG scenarios.

G.3.1.1. OSS Pin Piles

Table G-81. OSS1 jacket foundation (3 m diameter, MHU 3000S) SEL acoustic ranges ($R_{95\%}$ in km) with attenuation for 8 pin piles (Finneran et al. 2017, NMFS 2018) at location BB39 for summer and winter conditions with 2 dB post-piling shift.

Hearing group	$L_{E,w,24h}$ Threshold (dB re 1 µPa^2·s)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
LF	183	17.01	12.30	9.36	6.86	39.50	19.33	12.95	8.08
MF	185	0.42	0.14	0.10	0.04	0.43	0.15	0.10	0.04
HF	155	3.64	2.26	1.56	0.94	3.86	2.37	1.59	0.92
PPW	185	6.04	4.18	3.07	2.01	6.87	4.50	3.35	2.21
TUW	204	5.84	3.81	2.67	1.67	6.57	4.13	2.82	1.77

Table G-82. OSS2 jacket foundation (3 m diameter, MHU 1700S) SEL acoustic ranges ($R_{95\%}$ in km) with attenuation for 8 pin piles (Finneran et al. 2017, NMFS 2018) at location BK31 for summer and winter conditions with 2 dB post-piling shift.

Hearing group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
LF	183	5.72	4.34	3.58	2.65	7.34	4.57	3.50	2.48
MF	185	0.12	0.06	0.04	-	0.12	0.06	0.04	-
HF	155	1.15	0.72	0.60	0.43	1.07	0.67	0.54	0.40
PPW	185	2.26	1.53	1.12	0.64	2.12	1.38	0.99	0.62
TUW	204	2.25	1.40	1.00	0.49	2.06	1.29	0.92	0.48

G.3.1.2. WTG Pin Pile and Monopiles

Table G-83. WTG jacket foundation (4.5 m diameter, IHC S2300) SEL acoustic ranges ($R_{95\%}$ in km) with attenuation for 4 pin piles (Finneran et al. 2017, NMFS 2018) at location AY42 for summer and winter conditions.

Hearing group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
LF	183	13.99	8.90	6.68	4.58	20.39	11.20	7.51	4.77
MF	185	0.03	-	-	-	0.03	-	-	-
HF	155	0.90	0.36	0.24	0.10	0.90	0.39	0.23	0.10
PPW	185	3.03	1.60	0.90	0.44	3.12	1.64	0.95	0.46
TUW	204	4.08	2.10	1.33	0.67	4.29	2.15	1.37	0.68

Table G-84. WTG jacket foundation (4.5 m diameter, IHC S2300) SEL acoustic ranges ($R_{95\%}$ in km) with attenuation for 4 pin piles (Finneran et al. 2017, NMFS 2018) at location BM28 for summer and winter conditions.

Hearing group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
LF	183	8.26	6.08	4.93	3.37	11.06	7.17	5.36	3.56
MF	185	0.02	-	-	-	0.02	-	-	-
HF	155	0.56	0.40	0.17	0.07	0.52	0.33	0.17	0.08
PPW	185	2.29	1.32	0.79	0.46	2.34	1.30	0.78	0.43
TUW	204	3.27	1.84	1.26	0.63	3.51	1.87	1.23	0.64

Table G-85. WTG MP1 foundation (13 m diameter, IHC S5500) SEL acoustic ranges ($R_{95\%}$ in km) with attenuation (Finneran et al. 2017, NMFS 2018) at location AY42 for summer and winter conditions.

Hearing group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
LF	183	8.06	5.67	4.41	2.95	10.51	6.60	4.98	3.35
MF	185	-	-	-	-	-	-	-	-
HF	155	0.42	0.14	0.08	0.03	0.43	0.16	0.09	0.03
PPW	185	1.96	1.06	0.61	0.28	2.20	1.14	0.67	0.28
TUW	204	2.91	1.71	1.13	0.57	3.29	1.86	1.20	0.63

Table G-86. WTG MP1 foundation (13 m diameter, IHC S5500) SEL acoustic ranges ($R_{95\%}$ in km) with attenuation (Finneran et al. 2017, NMFS 2018) at location BM28 for summer and winter conditions.

Hearing group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
LF	183	6.91	5.08	4.06	2.79	7.29	5.19	4.10	2.77
MF	185	-	-	-	-	-	-	-	-
HF	155	0.49	0.16	0.10	0.05	0.48	0.17	0.10	0.05
PPW	185	1.85	1.08	0.59	0.43	1.81	0.95	0.61	0.23
TUW	204	2.80	1.70	1.14	0.58	2.80	1.65	1.07	0.58

Table G-87. WTG MP2 foundation (13 m diameter, IHC S5500) SEL acoustic ranges ($R_{95\%}$ in km) with attenuation (Finneran et al. 2017, NMFS 2018) at location AY42 for summer and winter conditions.

Hearing group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
LF	183	8.72	6.15	4.82	3.37	11.99	7.35	5.50	3.80
MF	185	-	-	-	-	-	-	-	-
HF	155	0.75	0.30	0.15	0.10	0.89	0.36	0.18	0.10
PPW	185	2.30	1.24	0.74	0.34	2.53	1.37	0.81	0.39
TUW	204	3.27	1.90	1.26	0.65	3.68	2.13	1.38	0.72

Table G-88. WTG MP2 foundation (13 m diameter, IHC S5500) SEL acoustic ranges ($R_{95\%}$ in km) with attenuation (Finneran et al. 2017, NMFS 2018) at location BM28 for summer and winter conditions.

Hearing group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
LF	183	7.14	5.26	4.20	2.89	7.58	5.38	4.24	2.88
MF	185	-	-	-	-	-	-	-	-
HF	155	0.51	0.20	0.13	0.06	0.57	0.21	0.12	0.06
PPW	185	1.97	1.13	0.60	0.46	1.92	1.05	0.61	0.24
TUW	204	2.91	1.77	1.20	0.59	2.93	1.75	1.17	0.60

Table G-89. WTG MP3 foundation (13 m diameter, IHC S6500) SEL acoustic ranges ($R_{95\%}$ in km) with attenuation (Finneran et al. 2017, NMFS 2018) at location AY42 for summer and winter conditions.

Hearing group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
LF	183	9.14	6.40	4.98	3.49	13.00	7.87	5.78	3.93
MF	185	-	-	-	-	-	-	-	-
HF	155	0.39	0.14	0.10	0.03	0.40	0.16	0.09	0.03
PPW	185	2.36	1.28	0.74	0.33	2.60	1.38	0.83	0.38
TUW	204	3.39	1.94	1.32	0.71	3.82	2.16	1.44	0.77

Table G-90. WTG MP3 foundation (13 m diameter, IHC S6500) SEL acoustic ranges ($R_{95\%}$ in km) with attenuation (Finneran et al. 2017, NMFS 2018) at location BM28 for summer and winter conditions.

Hearing group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
LF	183	7.38	5.44	4.37	3.10	7.98	5.61	4.45	3.12
MF	185	-	-	-	-	-	-	-	-
HF	155	0.34	0.12	0.07	0.03	0.32	0.13	0.07	0.04
PPW	185	2.09	1.21	0.62	0.47	2.13	1.15	0.65	0.27
TUW	204	3.12	1.89	1.28	0.61	3.15	1.88	1.26	0.63

G.3.2. Vibratory Pile Driving

Vibratory pile driving results are presented in Appendix G.3.2 for WTG foundations. Tables are divided into acoustic ranges to vibratory (non-impulsive) thresholds and acoustic ranges to vibratory combined with impact pile driving, where impulsive thresholds are considered. Results are presented per modeling location, broadband attenuation, season, and duration of vibratory piling. SEL ranges for WTG jacket foundations assumed the installation of 4 pin piles. Tables G-91 to G106 show results for all WTG scenarios.

G.3.2.1. WTG Pin Pile and Monopiles

WTG jacket foundation

Table G-91. WTG jacket foundation with 4 pin piles (4.5 m diameter, TA-CV320) SEL acoustic ranges ($R_{95\%}$ in km) to acoustic threshold criteria (Finneran et al. 2017, NMFS 2018) for 30 min of vibratory piling with various levels of attenuation at location AY42 for summer and winter conditions. Ranges to impact pile driving thresholds include the acoustic energy from vibratory driving.

Hammer type	Hearing group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
Vibratory (30 min)	LF	199	0.42	0.18	0.09	0.02	0.44	0.18	0.10	0.02
Vibratory (30 min)	MF	198	-	-	-	-	-	-	-	-
Vibratory (30 min)	HF	173	-	-	-	-	-	-	-	-
Vibratory (30 min)	PW	201	-	-	-	-	-	-	-	-
Vibratory (30 min)	TUW	220	0.02	-	-	-	0.02	-	-	-
Vibratory and Impact	LF	183	14.01	8.91	6.69	4.60	20.41	11.23	7.53	4.79
Vibratory and Impact	MF	185	0.03	-	-	-	0.03	-	-	-
Vibratory and Impact	HF	155	0.90	0.37	0.24	0.10	0.91	0.40	0.23	0.10
Vibratory and Impact	PW	185	3.04	1.61	0.90	0.44	3.14	1.65	0.95	0.46
Vibratory and Impact	TUW	204	4.10	2.12	1.35	0.67	4.31	2.17	1.39	0.69

Table G-92. WTG jacket foundation with 4 pin piles (4.5 m diameter, TA-CV320) SEL acoustic ranges ($R_{95\%}$ in km) to acoustic threshold criteria (Finneran et al. 2017, NMFS 2018) for 60 min of vibratory piling with various levels of attenuation at location AY42 for summer and winter conditions. Ranges to impact pile driving thresholds include the acoustic energy from vibratory driving.

Hammer type	Hearing group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
Vibratory (30 min)	LF	199	0.65	0.24	0.11	0.06	0.70	0.23	0.11	0.06
Vibratory (30 min)	MF	198	-	-	-	-	-	-	-	-
Vibratory (30 min)	HF	173	-	-	-	-	-	-	-	-
Vibratory (30 min)	PW	201	-	-	-	-	-	-	-	-
Vibratory (30 min)	TUW	220	0.06	-	-	-	0.06		-	-
Vibratory and Impact	LF	183	14.01	8.91	6.70	4.61	20.43	11.25	7.54	4.80
Vibratory and Impact	MF	185	0.03	-	-	-	0.03	-	-	-
Vibratory and Impact	HF	155	0.91	0.37	0.25	0.10	0.91	0.40	0.23	0.10
Vibratory and Impact	PW	185	3.05	1.61	0.91	0.45	3.16	1.66	0.96	0.46
Vibratory and Impact	TUW	204	4.11	2.13	1.36	0.68	4.33	2.18	1.40	0.70

Table G-93. WTG jacket foundation with 4 pin piles (4.5 m diameter, TA-CV320) SEL acoustic ranges ($R_{95\%}$ in km) to acoustic threshold criteria (Finneran et al. 2017, NMFS 2018) for 30 min of vibratory piling with various levels of attenuation at location BM28 for summer and winter conditions. Ranges to impact pile driving thresholds include the acoustic energy from vibratory driving.

Hammer type	Hearing group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
Vibratory (30 min)	LF	199	0.41	0.09	0.06		0.34	0.09	0.06	
Vibratory (30 min)	MF	198	-	-	-	-	-	-	-	-
Vibratory (30 min)	HF	173	-	-	-	-	-	-	-	-
Vibratory (30 min)	PW	201	-	-	-	-	-	-	-	-
Vibratory (30 min)	TUW	220	-	-	-	-	-	-	-	-
Vibratory and Impact	LF	183	8.28	6.10	4.95	3.39	11.08	7.19	5.38	3.59
Vibratory and Impact	MF	185	0.02	-	-	-	0.02	-	-	-
Vibratory and Impact	HF	155	0.56	0.40	0.17	0.07	0.53	0.33	0.17	0.08
Vibratory and Impact	PW	185	2.30	1.33	0.80	0.46	2.35	1.31	0.79	0.43
Vibratory and Impact	TUW	204	3.30	1.86	1.27	0.64	3.53	1.88	1.25	0.65

Table G-94. WTG jacket foundation with 4 pin piles (4.5 m diameter, TA-CV320) SEL acoustic ranges ($R_{95\%}$ in km) to acoustic threshold criteria (Finneran et al. 2017, NMFS 2018) for 60 min of vibratory piling with various levels of attenuation at location BM28 for summer and winter conditions. Ranges to impact pile driving thresholds include the acoustic energy from vibratory driving.

Hammer type	Hearing group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
Vibratory (30 min)	LF	199	0.53	0.14	0.06	0.05	0.49	0.14	0.06	0.05
Vibratory (30 min)	MF	198	-	-	-	-	-	-	-	-
Vibratory (30 min)	HF	173	-	-	-	-	-	-	-	-
Vibratory (30 min)	PW	201	-	-	-	-	-	-	-	-
Vibratory (30 min)	TUW	220	0.04	-	-	-	0.05	-	-	-
Vibratory and Impact	LF	183	8.31	6.12	4.97	3.41	11.11	7.22	5.39	3.60
Vibratory and Impact	MF	185	0.02	-	-	-	0.02	-	-	-
Vibratory and Impact	HF	155	0.56	0.40	0.17	0.07	0.53	0.34	0.17	0.08
Vibratory and Impact	PW	185	2.31	1.34	0.80	0.46	2.36	1.32	0.79	0.43
Vibratory and Impact	TUW	204	3.32	1.86	1.27	0.64	3.55	1.89	1.26	0.66

WTG MP1

Table G-95. WTG MP1 foundation (13 m diameter, QU-CV640) SEL acoustic ranges ($R_{95\%}$ in km) to acoustic threshold criteria (Finneran et al. 2017, NMFS 2018) for 30 min of vibratory piling with various levels of attenuation at location AY42 for summer and winter conditions. Ranges to impact pile driving thresholds include the acoustic energy from vibratory driving.

Hammer type	Hearing group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
Vibratory (30 min)	LF	199	1.31	0.57	0.27	0.13	1.39	0.61	0.30	0.13
Vibratory (30 min)	MF	198	-	-	-	-	-	-	-	-
Vibratory (30 min)	HF	173	-	-	-	-	-	-	-	-
Vibratory (30 min)	PW	201	0.07	-	-	-	0.08	-	-	-
Vibratory (30 min)	TUW	220	0.13	0.06	0.02	-	0.14	0.06	0.02	-
Vibratory and Impact	LF	183	7.99	5.57	4.28	2.77	10.14	6.46	4.83	3.10
Vibratory and Impact	MF	185	-	-	-	-	-	-	-	-
Vibratory and Impact	HF	155	0.30	0.11	0.06	0.02	0.33	0.12	0.06	0.02
Vibratory and Impact	PW	185	1.77	0.90	0.51	0.25	1.92	0.96	0.54	0.24
Vibratory and Impact	TUW	204	2.79	1.58	0.98	0.47	3.11	1.70	1.06	0.51

Table G-96. WTG MP1 foundation (13 m diameter, QU-CV640) SEL acoustic ranges ($R_{95\%}$ in km) to acoustic threshold criteria (Finneran et al. 2017, NMFS 2018) for 60 min of vibratory piling with various levels of attenuation at location AY42 for summer and winter conditions. Ranges to impact pile driving thresholds include the acoustic energy from vibratory driving.

Hammer type	Hearing group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
Vibratory (30 min)	LF	199	1.86	0.95	0.59	0.27	2.08	1.03	0.63	0.27
Vibratory (30 min)	MF	198	-	-	-	-	-	-	-	-
Vibratory (30 min)	HF	173	-	-	-	-	-	-	-	-
Vibratory (30 min)	PW	201	0.11	0.05	-	-	0.11	0.05	-	-
Vibratory (30 min)	TUW	220	0.28	0.10	0.06	-	0.28	0.11	0.06	-
Vibratory and Impact	LF	183	7.95	5.65	4.45	2.95	9.79	6.45	4.96	3.37
Vibratory and Impact	MF	185	-	-	-	-	-	-	-	-
Vibratory and Impact	HF	155	0.34	0.12	0.06	0.02	0.36	0.13	0.06	0.02
Vibratory and Impact	PW	185	1.92	1.02	0.60	0.28	2.17	1.11	0.65	0.28
Vibratory and Impact	TUW	204	2.95	1.74	1.15	0.59	3.35	1.88	1.23	0.65

Table G-97. WTG MP1 foundation (13 m diameter, QU-CV640) SEL acoustic ranges ($R_{95\%}$ in km) to acoustic threshold criteria (Finneran et al. 2017, NMFS 2018) for 30 min of vibratory piling with various levels of attenuation at location BM28 for summer and winter conditions. Ranges to impact pile driving thresholds include the acoustic energy from vibratory driving.

Hammer type	Hearing group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
Vibratory (30 min)	LF	199	1.39	0.63	0.42	0.11	1.41	0.66	0.36	0.11
Vibratory (30 min)	MF	198	-	-	-	-	-	-	-	-
Vibratory (30 min)	HF	173	-	-	-	-	-	-	-	-
Vibratory (30 min)	PW	201	0.06	-	-	-	0.06	-	-	-
Vibratory (30 min)	TUW	220	0.12	0.05	0.02	-	0.12	0.05	0.02	-
Vibratory and Impact	LF	183	7.05	5.12	4.03	2.71	7.55	5.30	4.12	2.72
Vibratory and Impact	MF	185	-	-	-	-	-	-	-	-
Vibratory and Impact	HF	155	0.44	0.13	0.09	0.03	0.43	0.14	0.08	0.03
Vibratory and Impact	PW	185	1.74	0.95	0.56	0.17	1.71	0.79	0.57	0.17
Vibratory and Impact	TUW	204	2.73	1.60	1.05	0.55	2.77	1.58	0.96	0.56

Table G-98. WTG MP1 foundation (13 m diameter, QU-CV640) SEL acoustic ranges ($R_{95\%}$ in km) to acoustic threshold criteria (Finneran et al. 2017, NMFS 2018) for 60 min of vibratory piling with various levels of attenuation at location BM28 for summer and winter conditions. Ranges to impact pile driving thresholds include the acoustic energy from vibratory driving.

Hammer type	Hearing group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
Vibratory (30 min)	LF	199	1.90	0.91	0.62	0.15	1.94	0.93	0.61	0.15
Vibratory (30 min)	MF	198	-	-	-	-	-	-	-	-
Vibratory (30 min)	HF	173	-	-	-	-	-	-	-	-
Vibratory (30 min)	PW	201	0.09	0.03	-	-	0.09	0.03	-	-
Vibratory (30 min)	TUW	220	0.29	0.08	0.04	-	0.17	0.08	0.04	-
Vibratory and Impact	LF	183	7.60	5.54	4.37	2.89	8.02	5.70	4.47	2.92
Vibratory and Impact	MF	185	-	-	-	-	-	-	-	-
Vibratory and Impact	HF	155	0.45	0.13	0.09	0.04	0.44	0.14	0.09	0.03
Vibratory and Impact	PW	185	1.88	0.99	0.60	0.24	1.85	0.94	0.61	0.22
Vibratory and Impact	TUW	204	2.99	1.75	1.14	0.60	3.06	1.74	1.08	0.60

WTG MP2

Table G-99. WTG MP2 foundation (13 m diameter, QU-CV640) SEL acoustic ranges ($R_{95\%}$ in km) to acoustic threshold criteria (Finneran et al. 2017, NMFS 2018) for 30 min of vibratory piling with various levels of attenuation at location AY42 for summer and winter conditions. Ranges to impact pile driving thresholds include the acoustic energy from vibratory driving.

Hammer type	Hearing group	$L_{E,w,24h}$ Threshold (dB re 1 μPa²·s)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
Vibratory (30 min)	LF	199	2.03	0.97	0.57	0.25	2.20	1.08	0.59	0.26
Vibratory (30 min)	MF	198	-	-	-	-	-	-	-	-
Vibratory (30 min)	HF	173	-	-	-	-	-	-	-	-
Vibratory (30 min)	PW	201	0.11	0.06	-	-	0.11	0.06	-	-
Vibratory (30 min)	TUW	220	0.25	0.10	0.06	-	0.26	0.10	0.06	-
Vibratory and Impact	LF	183	9.17	6.51	5.11	3.53	12.65	7.88	5.86	4.00
Vibratory and Impact	MF	185	-	-	-	-	-	-	-	-
Vibratory and Impact	HF	155	0.71	0.27	0.13	0.08	0.82	0.34	0.13	0.08
Vibratory and Impact	PW	185	2.32	1.24	0.74	0.32	2.58	1.37	0.80	0.39
Vibratory and Impact	TUW	204	3.51	2.00	1.31	0.68	3.98	2.23	1.43	0.73

Table G-100. WTG MP2 foundation (13 m diameter, QU-CV640) SEL acoustic ranges ($R_{95\%}$ in km) to acoustic threshold criteria (Finneran et al. 2017, NMFS 2018) for 60 min of vibratory piling with various levels of attenuation at location AY42 for summer and winter conditions. Ranges to impact pile driving thresholds include the acoustic energy from vibratory driving.

Hammer type	Hearing group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
Vibratory (30 min)	LF	199	2.68	1.53	0.89	0.47	2.89	1.61	0.93	0.52
Vibratory (30 min)	MF	198	-	-	-	-	-	-	-	-
Vibratory (30 min)	HF	173	-	-	-	-	-	-	-	-
Vibratory (30 min)	PW	201	0.19	0.09	0.03	-	0.19	0.09	0.02	-
Vibratory (30 min)	TUW	220	0.48	0.19	0.10	0.06	0.54	0.19	0.11	0.06
Vibratory and Impact	LF	183	10.40	7.22	5.62	3.95	14.13	8.68	6.41	4.39
Vibratory and Impact	MF	185	-	-	-	-	-	-	-	-
Vibratory and Impact	HF	155	0.72	0.28	0.13	0.08	0.84	0.34	0.13	0.08
Vibratory and Impact	PW	185	2.55	1.45	0.87	0.43	2.78	1.56	0.93	0.45
Vibratory and Impact	TUW	204	3.98	2.30	1.54	0.85	4.42	2.52	1.64	0.90

Table G-101. WTG MP2 foundation (13 m diameter, QU-CV640) SEL acoustic ranges ($R_{95\%}$ in km) to acoustic threshold criteria (Finneran et al. 2017, NMFS 2018) for 30 min of vibratory piling with various levels of attenuation at location BM28 for summer and winter conditions. Ranges to impact pile driving thresholds include the acoustic energy from vibratory driving.

Hammer type	Hearing group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
Vibratory (30 min)	LF	199	1.43	0.61	0.46	0.12	1.46	0.65	0.43	0.13
Vibratory (30 min)	MF	198	-	-	-	-	-	-	-	-
Vibratory (30 min)	HF	173	-	-	-	-	-	-	-	-
Vibratory (30 min)	PW	201	0.06	-	-	-	0.06	-	-	-
Vibratory (30 min)	TUW	220	0.12	0.06	0.02	-	0.12	0.06	0.02	-
Vibratory and Impact	LF	183	7.43	5.37	4.24	2.85	8.04	5.60	4.35	2.88
Vibratory and Impact	MF	185	-	-	-	-	-	-	-	-
Vibratory and Impact	HF	155	0.47	0.18	0.12	0.05	0.50	0.18	0.11	0.06
Vibratory and Impact	PW	185	1.89	1.08	0.59	0.43	1.87	0.98	0.60	0.22
Vibratory and Impact	TUW	204	2.86	1.72	1.18	0.58	2.93	1.71	1.13	0.59

Table G-102. WTG MP2 foundation (13 m diameter, QU-CV640) SEL acoustic ranges ($R_{95\%}$ in km) to acoustic threshold criteria (Finneran et al. 2017, NMFS 2018) for 60 min of vibratory piling with various levels of attenuation at location BM28 for summer and winter conditions. Ranges to impact pile driving thresholds include the acoustic energy from vibratory driving.

Hammer type	Hearing group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
Vibratory (30 min)	LF	199	1.94	0.94	0.63	0.14	2.03	0.94	0.64	0.14
Vibratory (30 min)	MF	198	-	-	-	-	-	-	-	-
Vibratory (30 min)	HF	173	-	-	-	-	-	-	-	-
Vibratory (30 min)	PW	201	0.09	0.03	-	-	0.09	0.03	-	-
Vibratory (30 min)	TUW	220	0.22	0.09	0.04	-	0.15	0.09	0.04	-
Vibratory and Impact	LF	183	7.77	5.69	4.53	3.14	8.35	5.84	4.64	3.12
Vibratory and Impact	MF	185	-	-	-	-	-	-	-	-
Vibratory and Impact	HF	155	0.48	0.18	0.12	0.05	0.51	0.18	0.11	0.06
Vibratory and Impact	PW	185	2.07	1.13	0.62	0.45	2.05	1.07	0.64	0.25
Vibratory and Impact	TUW	204	3.22	1.88	1.27	0.62	3.26	1.86	1.23	0.64

WTG MP3

Table G-103. WTG MP3 foundation (13 m diameter, QU-CV640) SEL acoustic ranges ($R_{95\%}$ in km) to acoustic threshold criteria (Finneran et al. 2017, NMFS 2018) for 30 min of vibratory piling with various levels of attenuation at location AY42 for summer and winter conditions. Ranges to impact pile driving thresholds include the acoustic energy from vibratory driving.

Hammer type	Hearing group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
Vibratory (30 min)	LF	199	1.81	0.90	0.55	0.27	2.03	0.96	0.61	0.28
Vibratory (30 min)	MF	198	-	-	-	-	-	-	-	-
Vibratory (30 min)	HF	173	-	-	-	-	-	-	-	-
Vibratory (30 min)	PW	201	0.18	0.06	0.04	-	0.19	0.06	0.05	-
Vibratory (30 min)	TUW	220	0.26	0.10	0.06	0.04	0.27	0.13	0.06	0.04
Vibratory and Impact	LF	183	11.21	7.71	6.01	4.34	16.38	9.80	7.19	4.92
Vibratory and Impact	MF	185	0.02	-	-	-	0.02	-	-	-
Vibratory and Impact	HF	155	0.56	0.24	0.13	0.05	0.59	0.25	0.13	0.05
Vibratory and Impact	PW	185	2.96	1.72	1.07	0.55	3.40	1.87	1.22	0.58
Vibratory and Impact	TUW	204	4.24	2.57	1.76	0.94	4.79	2.80	1.89	1.06

Table G-104. WTG MP3 foundation (13 m diameter, QU-CV640) SEL acoustic ranges ($R_{95\%}$ in km) to acoustic threshold criteria (Finneran et al. 2017, NMFS 2018) for 60 min of vibratory piling with various levels of attenuation at location AY42 for summer and winter conditions. Ranges to impact pile driving thresholds include the acoustic energy from vibratory driving.

Hammer type	Hearing group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
Vibratory (30 min)	LF	199	1.91	0.93	0.59	0.24	2.09	0.99	0.64	0.26
Vibratory (30 min)	MF	198	-	-	-	-	-	-	-	-
Vibratory (30 min)	HF	173	-	-	-	-	-	-	-	-
Vibratory (30 min)	PW	201	0.11	0.05	-	-	0.12	0.05	-	-
Vibratory (30 min)	TUW	220	0.25	0.10	0.06	-	0.27	0.11	0.06	-
Vibratory and Impact	LF	183	11.44	7.86	6.13	4.41	16.55	10.01	7.32	5.00
Vibratory and Impact	MF	185	-	-	-	-	-	-	-	-
Vibratory and Impact	HF	155	0.55	0.23	0.12	0.05	0.58	0.24	0.13	0.04
Vibratory and Impact	PW	185	2.98	1.72	1.06	0.55	3.41	1.88	1.21	0.58
Vibratory and Impact	TUW	204	4.37	2.60	1.78	0.96	4.90	2.84	1.92	1.09

Table G-105. WTG MP3 foundation (13 m diameter, QU-CV640) SEL acoustic ranges ($R_{95\%}$ in km) to acoustic threshold criteria (Finneran et al. 2017, NMFS 2018) for 30 min of vibratory piling with various levels of attenuation at location BM28 for summer and winter conditions. Ranges to impact pile driving thresholds include the acoustic energy from vibratory driving.

Hammer type	Hearing group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
Vibratory (30 min)	LF	199	1.80	1.04	0.54	0.14	1.83	0.96	0.55	0.13
Vibratory (30 min)	MF	198	-	-	-	-	-	-	-	-
Vibratory (30 min)	HF	173	-	-	-	-	-	-	-	-
Vibratory (30 min)	PW	201	0.09	0.03	-	-	0.09	0.02	-	-
Vibratory (30 min)	TUW	220	0.20	0.09	0.05	-	0.14	0.09	0.05	-
Vibratory and Impact	LF	183	8.58	6.39	5.18	3.84	9.67	6.85	5.44	3.95
Vibratory and Impact	MF	185	-	-	-	-	-	-	-	-
Vibratory and Impact	HF	155	0.50	0.17	0.10	0.06	0.57	0.18	0.11	0.06
Vibratory and Impact	PW	185	2.63	1.53	1.04	0.56	2.67	1.48	0.86	0.57
Vibratory and Impact	TUW	204	3.90	2.44	1.68	0.98	4.01	2.46	1.68	0.82

Table G-106. WTG MP3 foundation (13 m diameter, QU-CV640) SEL acoustic ranges ($R_{95\%}$ in km) to acoustic threshold criteria (Finneran et al. 2017, NMFS 2018) for 60 min of vibratory piling with various levels of attenuation at location BM28 for summer and winter conditions. Ranges to impact pile driving thresholds include the acoustic energy from vibratory driving.

Hammer type	Hearing group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
Vibratory (30 min)	LF	199	2.73	1.63	0.91	0.54	2.77	1.65	0.91	0.56
Vibratory (30 min)	MF	198	-	-	-	-	-	-	-	-
Vibratory (30 min)	HF	173	-	-	-	-	-	-	-	-
Vibratory (30 min)	PW	201	0.12	0.06	0.02	-	0.13	0.06	0.02	-
Vibratory (30 min)	TUW	220	0.58	0.12	0.08	0.03	0.61	0.12	0.08	0.03
Vibratory and Impact	LF	183	9.00	6.79	5.57	4.20	10.24	7.27	5.79	4.27
Vibratory and Impact	MF	185	0.02	-	-	-	0.02	-	-	-
Vibratory and Impact	HF	155	0.51	0.18	0.10	0.06	0.58	0.19	0.11	0.06
Vibratory and Impact	PW	185	2.81	1.71	1.12	0.59	2.84	1.70	1.05	0.61
Vibratory and Impact	TUW	204	4.29	2.69	1.88	1.09	4.41	2.71	1.87	1.03

G.4. Fish Acoustic Ranges to Thresholds

The calculated acoustic ranges for fish to the GARFO (2020) and Popper et al. (2014) thresholds (Andersson et al. 2007, Wysocki et al. 2007, FHWG 2008, Stadler and Woodbury 2009, Mueller-Blenkle et al. 2010, Purser and Radford 2011, Popper et al. 2014) and sea turtle acoustic ranges following Finneran et al. (2017) and McCauley et al. (2000), with 0, 6, 10, and 15 dB of broadband attenuation are shown in Appendices G.4.1 and G.4.2 for scenarios that assume impact pile driving only and for scenarios that involve vibratory pile setting followed by impact pile driving, respectively.

G.4.1. Impact Pile Driving

Acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle thresholds are presented in Appendix G.4.1.1 for OSS foundations and in Appendix G.4.1.2 for WTG foundations. Results are presented per modeling location, broadband attenuation, season, and hammer energy level. SEL ranges for OSS foundations assumed the installation of 8 pin piles. SEL ranges for WTG jacket foundations assumed the installation of 4 pin piles. Tables G-107 to G-114 show results for OSS1 and Tables G-115 to G-122 show results for OSS2. Tables G-123 to G-138 show results for WTG jacket foundations. Results for WTG monopile scenarios are presented in Tables G-139 to G-154 for MP1, Tables G-155 to G-170 for MP2, and Tables G-171 to G-187 for MP3. In all tables, a dash indicates that distances could not be estimated because thresholds were not reached.

The metrics used in the tables are L_{pk} for peak sound pressure (dB re 1 μPa), L_E for sound exposure level (dB re 1 μPa^2·s), and L_p for root-mean-square sound pressure (dB re 1 μPa^2). The subscripts [a] through [e] are as follows:

- [a] NMFS recommended criteria adopted from the Fisheries Hydroacoustic Working Group (FHWG 2008).
- [b] Andersson et al. (2007), Mueller-Blenkle et al. (2010), Purser and Radford (2011), Wysocki et al. (2007).
- [c] Popper et al. (2014).
- [d] Finneran et al. (2017).
- [e] McCauley et al. (2000).

G.4.1.1. OSS Pin Piles

OSS1

Table G-107. OSS1 jacket foundation with 8 pin piles (post-piled, 3 m diameter, MHU 3000S) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BB39 for different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	Metric	Threshold	Summer 450 kJ	Summer 750 kJ	Summer 1200 kJ	Summer 1950 kJ	Summer 2400 kJ	Summer 2700 kJ	Summer 2800 kJ	Winter 450 kJ	Winter 750 kJ	Winter 1200 kJ	Winter 1950 kJ	Winter 2400 kJ	Winter 2700 kJ	Winter 2800 kJ
Fish ≥ 2g	L_{pk} [a]	206	0.14	0.27	0.39	0.52	0.51	0.46	0.40	0.15	0.26	0.39	0.48	0.47	0.45	0.40
Fish ≥ 2g	L_p [b]	150	7.01	8.36	9.30	10.67	12.39	15.56	18.46	7.93	9.64	11.37	12.68	23.55	34.12	35.28
Fish < 2 g	L_{pk} [a]	206	0.14	0.27	0.39	0.52	0.51	0.46	0.40	0.15	0.26	0.39	0.48	0.47	0.45	0.40
Fish < 2 g	L_p [b]	150	7.01	8.36	9.30	10.67	12.39	15.56	18.46	7.93	9.64	11.37	12.68	23.55	34.12	35.28
Fish without swim bladder	L_{pk} [c]	213	0.09	0.11	0.14	0.16	0.22	0.14	0.12	0.08	0.11	0.14	0.17	0.15	0.15	0.12
Fish with swim bladder	L_{pk} [c]	207	0.14	0.24	0.29	0.46	0.46	0.44	0.38	0.14	0.17	0.28	0.47	0.46	0.43	0.38
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sea turtles	L_p [e]	175	1.13	1.62	1.99	2.50	2.62	2.57	2.44	1.23	1.76	2.22	2.70	2.75	2.66	2.33

Table G-108. OSS1 jacket foundation with 8 pin piles (post-piled, 3 m diameter, MHU 3000S) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BB39 for different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	17.34	35.01
Fish < 2 g	183 [a]	21.48	56.98
Fish without swim bladder	216 [c]	2.45	2.61
Fish with swim bladder	203 [c]	6.60	7.77
Sea turtles	204 [d]	6.18	7.14

Table G-109. OSS1 jacket foundation with 8 pin piles (post-piled 3 m diameter, MHU 3000S) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BB39 for different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	Metric	Threshold	Summer 450 kJ	Summer 750 kJ	Summer 1200 kJ	Summer 1950 kJ	Summer 2400 kJ	Summer 2700 kJ	Summer 2800 kJ	Winter 450 kJ	Winter 750 kJ	Winter 1200 kJ	Winter 1950 kJ	Winter 2400 kJ	Winter 2700 kJ	Winter 2800 kJ
Fish ≥ 2g	L_{pk} [a]	206	0.09	0.13	0.14	0.26	0.26	0.22	0.14	0.09	0.13	0.15	0.18	0.24	0.22	0.14
Fish ≥ 2g	L_p [b]	150	5.09	6.05	6.79	7.62	8.96	11.27	13.35	5.57	6.67	7.67	8.54	12.88	18.17	18.77
Fish < 2 g	L_{pk} [a]	206	0.09	0.13	0.14	0.26	0.26	0.22	0.14	0.09	0.13	0.15	0.18	0.24	0.22	0.14
Fish < 2 g	L_p [b]	150	5.09	6.05	6.79	7.62	8.96	11.27	13.35	5.57	6.67	7.67	8.54	12.88	18.17	18.77
Fish without swim bladder	L_{pk} [c]	213	-	-	0.09	0.11	0.11	0.10	0.06	-	-	0.06	0.11	0.11	0.10	0.06
Fish with swim bladder	L_{pk} [c]	207	0.09	0.11	0.14	0.16	0.22	0.14	0.12	0.08	0.11	0.14	0.17	0.15	0.15	0.12
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sea turtles	L_p [e]	175	0.46	0.80	1.11	1.45	1.52	1.43	1.18	0.48	0.86	1.19	1.59	1.60	1.47	1.20

Table G-110. OSS1 jacket foundation with 8 pin piles (post-piled 3 m diameter, MHU 3000S) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BB39 for different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	12.73	18.93
Fish < 2 g	183 [a]	15.76	28.39
Fish without swim bladder	216 [c]	1.34	1.43
Fish with swim bladder	203 [c]	4.38	4.80
Sea turtles	204 [d]	4.08	4.44

Table G-111. OSS1 jacket foundation with 8 pin piles (post-piled 3 m diameter, MHU 3000S) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BB39 for different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	Metric	Threshold	Summer 450 kJ	Summer 750 kJ	Summer 1200 kJ	Summer 1950 kJ	Summer 2400 kJ	Summer 2700 kJ	Summer 2800 kJ	Winter 450 kJ	Winter 750 kJ	Winter 1200 kJ	Winter 1950 kJ	Winter 2400 kJ	Winter 2700 kJ	Winter 2800 kJ
Fish ≥ 2g	L_{pk} [a]	206	0.02	0.09	0.11	0.14	0.13	0.11	0.09	0.02	0.08	0.11	0.15	0.13	0.12	0.09
Fish ≥ 2g	L_{p} [b]	150	4.09	4.89	5.53	6.15	7.28	8.54	10.03	4.42	5.36	6.11	6.84	8.91	12.46	12.73
Fish < 2 g	L_{pk} [a]	206	0.02	0.09	0.11	0.14	0.13	0.11	0.09	0.02	0.08	0.11	0.15	0.13	0.12	0.09
Fish < 2 g	L_{p} [b]	150	4.09	4.89	5.53	6.15	7.28	8.54	10.03	4.42	5.36	6.11	6.84	8.91	12.46	12.73
Fish without swim bladder	L_{pk} [c]	213	-	-	-	0.02	0.08	0.06	0.05	-	-	-	0.02	0.08	0.06	0.05
Fish with swim bladder	L_{pk} [c]	207	-	0.07	0.10	0.13	0.12	0.11	0.09	-	0.04	0.10	0.14	0.13	0.11	0.09
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	0.28	0.45	0.65	0.89	0.91	0.88	0.69	0.27	0.46	0.71	0.96	0.96	0.90	0.71

Table G-112. OSS1 jacket foundation with 8 pin piles (post-piled 3 m diameter, MHU 3000S) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BB39 for different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	9.81	13.34
Fish < 2 g	183 [a]	12.73	18.93
Fish without swim bladder	216 [c]	0.80	0.85
Fish with swim bladder	203 [c]	3.16	3.47
Sea turtles	204 [d]	2.86	3.12

Table G-113. OSS1 jacket foundation with 8 pin piles (post-piled 3 m diameter, MHU 3000S) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BB39 for different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	Metric	Threshold	Summer 450 kJ	Summer 750 kJ	Summer 1200 kJ	Summer 1950 kJ	Summer 2400 kJ	Summer 2700 kJ	Summer 2800 kJ	Winter 450 kJ	Winter 750 kJ	Winter 1200 kJ	Winter 1950 kJ	Winter 2400 kJ	Winter 2700 kJ	Winter 2800 kJ
Fish ≥ 2g	L_{pk} [a]	206	-	-	0.02	0.10	0.09	0.07	0.06	-	-	0.02	0.10	0.09	0.07	0.06
Fish ≥ 2g	L_p [b]	150	2.83	3.67	4.22	4.78	5.43	5.94	6.64	3.12	3.98	4.59	5.24	6.11	7.25	7.13
Fish < 2 g	L_{pk} [a]	206	-	-	0.02	0.10	0.09	0.07	0.06	-	-	0.02	0.10	0.09	0.07	0.06
Fish < 2 g	L_p [b]	150	2.83	3.67	4.22	4.78	5.43	5.94	6.64	3.12	3.98	4.59	5.24	6.11	7.25	7.13
Fish without swim bladder	L_{pk} [c]	213	-	-	-	-	-	-	0.03	-	-	-	-	-	-	0.03
Fish with swim bladder	L_{pk} [c]	207	-	-	-	0.09	0.09	0.07	0.05	-	-	-	0.02	0.09	0.07	0.06
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sea turtles	L_p [e]	175	0.13	0.24	0.38	0.45	0.44	0.42	0.32	0.13	0.17	0.38	0.47	0.45	0.43	0.34

Table G-114. OSS1 jacket foundation with 8 pin piles (post-piled 3 m diameter, MHU 3000S) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BB39 for different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	7.11	8.45
Fish < 2 g	183 [a]	9.14	12.21
Fish without swim bladder	216 [c]	0.42	0.43
Fish with swim bladder	203 [c]	2.00	2.16
Sea turtles	204 [d]	1.82	1.92

OSS2

Table G-115. OSS2 jacket foundation with 8 pin piles (post-piled 3 m diameter, MHU 1700S) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BK31 for different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	Metric	Threshold	Summer 680 (a) kJ	Summer 1360 (a) kJ	Summer 680 (b) kJ	Summer 1360 (b) kJ	Summer 1530 kJ	Winter 680 (a) kJ	Winter 1360 (a) kJ	Winter 680 (b) kJ	Winter 1360 (b) kJ	Winter 1530 kJ
Fish ≥ 2g	L_{pk} [a]	206	0.43	0.48	0.41	0.46	0.46	0.39	0.45	0.37	0.42	0.40
Fish ≥ 2g	L_{p} [b]	150	6.03	6.91	6.07	7.06	7.31	6.85	9.03	6.72	8.67	9.05
Fish < 2 g	L_{pk} [a]	206	0.43	0.48	0.41	0.46	0.46	0.39	0.45	0.37	0.42	0.40
Fish < 2 g	L_{p} [b]	150	6.03	6.91	6.07	7.06	7.31	6.85	9.03	6.72	8.67	9.05
Fish without swim bladder	L_{pk} [c]	213	0.10	0.13	0.08	0.11	0.06	0.10	0.13	0.08	0.11	0.06
Fish with swim bladder	L_{pk} [c]	207	0.40	0.46	0.38	0.45	0.44	0.16	0.44	0.21	0.40	0.39
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	1.19	1.63	1.19	1.56	1.50	1.12	1.50	1.08	1.44	1.39

Table G-116. OSS2 jacket foundation with 8 pin piles (post-piled 3 m diameter, MHU 1700S) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BK31 for different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	6.43	7.57
Fish < 2 g	183 [a]	7.83	10.04
Fish without swim bladder	216 [c]	0.89	0.80
Fish with swim bladder	203 [c]	2.50	2.42
Sea turtles	204 [d]	2.33	2.22

Table G-117. OSS2 jacket foundation with 8 pin piles (post-piled 3 m diameter, MHU 1700S) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BK31 for different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	Metric	Threshold	Summer 680 (a) kJ	Summer 1360 (a) kJ	Summer 680 (b) kJ	Summer 1360 (b) kJ	Summer 1530 kJ	Winter 680 (a) kJ	Winter 1360 (a) kJ	Winter 680 (b) kJ	Winter 1360 (b) kJ	Winter 1530 kJ
Fish ≥ 2g	L_{pk} [a]	206	0.11	0.14	0.08	0.13	0.16	0.11	0.13	0.09	0.12	0.11
Fish ≥ 2g	L_{p} [b]	150	4.45	5.26	4.50	5.26	5.41	4.60	5.58	4.47	5.65	6.00
Fish < 2 g	L_{pk} [a]	206	0.11	0.14	0.08	0.13	0.16	0.11	0.13	0.09	0.12	0.11
Fish < 2 g	L_{p} [b]	150	4.45	5.26	4.50	5.26	5.41	4.60	5.58	4.47	5.65	6.00
Fish without swim bladder	L_{pk} [c]	213	0.04	0.07	0.04	0.06	0.05	0.04	0.08	0.04	0.06	0.05
Fish with swim bladder	L_{pk} [c]	207	0.10	0.13	0.08	0.11	0.06	0.10	0.13	0.08	0.11	0.06
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	0.56	0.98	0.55	0.95	0.86	0.56	0.90	0.56	0.89	0.81

Table G-118. OSS2 jacket foundation with 8 pin piles (post-piled 3 m diameter, MHU 1700S) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BK31 for different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	4.74	4.99
Fish < 2 g	183 [a]	5.84	6.53
Fish without swim bladder	216 [c]	0.45	0.42
Fish with swim bladder	203 [c]	1.60	1.49
Sea turtles	204 [d]	1.47	1.35

Table G-119. OSS2 jacket foundation with 8 pin piles (post-piled 3 m diameter, MHU 1700S) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BK31 for different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	Metric	Threshold	Summer 680 (a) kJ	Summer 1360 (a) kJ	Summer 680 (b) kJ	Summer 1360 (b) kJ	Summer 1530 kJ	Winter 680 (a) kJ	Winter 1360 (a) kJ	Winter 680 (b) kJ	Winter 1360 (b) kJ	Winter 1530 kJ
Fish ≥ 2g	L_{pk} [a]	206	0.08	0.09	0.06	0.07	0.05	0.07	0.09	0.06	0.07	0.06
Fish ≥ 2g	L_p [b]	150	3.55	4.31	3.62	4.24	4.34	3.58	4.31	3.43	4.26	4.51
Fish < 2 g	L_{pk} [a]	206	0.08	0.09	0.06	0.07	0.05	0.07	0.09	0.06	0.07	0.06
Fish < 2 g	L_p [b]	150	3.55	4.31	3.62	4.24	4.34	3.58	4.31	3.43	4.26	4.51
Fish without swim bladder	L_{pk} [c]	213	0.02	0.04	0.02	0.04	0.03	-	0.03	0.02	0.03	0.03
Fish with swim bladder	L_{pk} [c]	207	0.06	0.09	0.06	0.06	0.05	0.06	0.09	0.06	0.06	0.05
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-	-	-
Sea turtles	L_p [e]	175	0.46	0.52	0.44	0.50	0.49	0.45	0.53	0.41	0.50	0.48

Table G-120. OSS2 jacket foundation with 8 pin piles (post-piled 3 m diameter, MHU 1700S) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BK31 for different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	3.79	3.81
Fish < 2 g	183 [a]	4.74	4.99
Fish without swim bladder	216 [c]	0.37	0.17
Fish with swim bladder	203 [c]	1.14	1.02
Sea turtles	204 [d]	1.05	0.94

Table G-121. OSS2 jacket foundation with 8 pin piles (post-piled 3 m diameter, MHU 1700S) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BK31 for different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	Metric	Threshold	Summer 680 (a) kJ	Summer 1360 (a) kJ	Summer 680 (b) kJ	Summer 1360 (b) kJ	Summer 1530 kJ	Winter 680 (a) kJ	Winter 1360 (a) kJ	Winter 680 (b) kJ	Winter 1360 (b) kJ	Winter 1530 kJ
Fish ≥ 2g	L_{pk} [a]	206	0.02	0.06	0.03	0.05	0.04	0.02	0.05	0.03	0.05	0.04
Fish ≥ 2g	L_{p} [b]	150	2.54	3.17	2.57	3.04	3.13	2.49	3.04	2.43	2.91	3.06
Fish < 2 g	L_{pk} [a]	206	0.02	0.06	0.03	0.05	0.04	0.02	0.05	0.03	0.05	0.04
Fish < 2 g	L_{p} [b]	150	2.54	3.17	2.57	3.04	3.13	2.49	3.04	2.43	2.91	3.06
Fish without swim bladder	L_{pk} [c]	213	-	-	-	-	-	-	-	-	-	-
Fish with swim bladder	L_{pk} [c]	207	0.02	0.05	0.02	0.05	0.03	0.02	0.05	0.02	0.04	0.04
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	0.14	0.42	0.14	0.40	0.38	0.14	0.40	0.13	0.37	0.35

Table G-122. OSS2 jacket foundation with 8 pin piles (post-piled 3 m diameter, MHU 1700S) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BK31 for different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa^2·s)	Summer	Winter
Fish ≥ 2g	187 [a]	2.65	2.58
Fish < 2 g	183 [a]	3.54	3.54
Fish without swim bladder	216 [c]	0.07	0.07
Fish with swim bladder	203 [c]	0.60	0.58
Sea turtles	204 [d]	0.52	0.52

G.4.1.2. WTG Pin Pile and Monopiles

WTG jacket foundation

Table G-123. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, IHC S-2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	Metric	Threshold	Summer 250 kJ	Summer 450 kJ	Summer 685 kJ	Summer 1500 kJ	Summer 2000 kJ	Summer 2200 kJ	Winter 250 kJ	Winter 450 kJ	Winter 685 kJ	Winter 1500 kJ	Winter 2000 kJ	Winter 2200 kJ
Fish ≥ 2g	L_{pk} [a]	206	0.11	0.13	0.14	0.20	0.18	0.14	0.12	0.14	0.15	0.20	0.18	0.14
Fish ≥ 2g	L_{p} [b]	150	6.98	8.18	9.02	14.75	17.18	14.19	8.18	9.56	12.47	22.44	27.73	17.87
Fish < 2 g	L_{pk} [a]	206	0.11	0.13	0.14	0.20	0.18	0.14	0.12	0.14	0.15	0.20	0.18	0.14
Fish < 2 g	L_{p} [b]	150	6.98	8.18	9.02	14.75	17.18	14.19	8.18	9.56	12.47	22.44	27.73	17.87
Fish without swim bladder	L_{pk} [c]	213	0.02	0.07	0.09	0.09	0.07	0.03	0.02	0.07	0.09	0.09	0.07	0.03
Fish with swim bladder	L_{pk} [c]	207	0.10	0.12	0.13	0.20	0.17	0.13	0.11	0.13	0.14	0.19	0.17	0.13
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	0.84	1.28	1.53	2.27	2.21	1.59	0.92	1.43	1.67	2.45	2.14	1.57

Table G-124. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, IHC S-2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	14.92	21.64
Fish < 2 g	183 [a]	18.27	31.62
Fish without swim bladder	216 [c]	1.20	1.23
Fish with swim bladder	203 [c]	4.93	5.26
Sea turtles	204 [d]	4.55	4.83

Table G-125. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, IHC S-2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	Metric	Threshold	Summer 250 kJ	Summer 450 kJ	Summer 685 kJ	Summer 1500 kJ	Summer 2000 kJ	Summer 2200 kJ	Winter 250 kJ	Winter 450 kJ	Winter 685 kJ	Winter 1500 kJ	Winter 2000 kJ	Winter 2200 kJ
Fish ≥ 2g	L_{pk} [a]	206	0.02	0.08	0.09	0.10	0.08	0.04	0.02	0.09	0.09	0.10	0.08	0.05
Fish ≥ 2g	L_{p} [b]	150	5.03	5.89	6.52	10.23	12.19	9.02	5.47	6.45	7.75	14.93	16.21	9.67
Fish < 2 g	L_{pk} [a]	206	0.02	0.08	0.09	0.10	0.08	0.04	0.02	0.09	0.09	0.10	0.08	0.05
Fish < 2 g	L_{p} [b]	150	5.03	5.89	6.52	10.23	12.19	9.02	5.47	6.45	7.75	14.93	16.21	9.67
Fish without swim bladder	L_{pk} [c]	213	-	-	-	0.03	0.03	-	-	-	-	0.04	0.03	-
Fish with swim bladder	L_{pk} [c]	207	0.02	0.07	0.09	0.09	0.07	0.03	0.02	0.07	0.09	0.09	0.07	0.03
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	0.36	0.56	0.71	1.12	0.94	0.73	0.41	0.64	0.78	1.15	0.96	0.74

Table G-126. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, IHC S-2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	9.88	13.21
Fish < 2 g	183 [a]	13.37	18.52
Fish without swim bladder	216 [c]	0.52	0.52
Fish with swim bladder	203 [c]	2.71	2.78
Sea turtles	204 [d]	2.44	2.51

Table G-127. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, IHC S-2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	Metric	Threshold	Summer 250 kJ	Summer 450 kJ	Summer 685 kJ	Summer 1500 kJ	Summer 2000 kJ	Summer 2200 kJ	Winter 250 kJ	Winter 450 kJ	Winter 685 kJ	Winter 1500 kJ	Winter 2000 kJ	Winter 2200 kJ
Fish ≥ 2g	L_{pk} [a]	206	-	-	0.05	0.07	0.05	0.02	-	-	0.03	0.07	0.05	0.02
Fish ≥ 2g	L_{p} [b]	150	3.87	4.77	5.30	8.00	8.90	6.76	4.24	5.13	5.89	10.52	11.05	6.77
Fish < 2 g	L_{pk} [a]	206	-	-	0.05	0.07	0.05	0.02	-	-	0.03	0.07	0.05	0.02
Fish < 2 g	L_{p} [b]	150	3.87	4.77	5.30	8.00	8.90	6.76	4.24	5.13	5.89	10.52	11.05	6.77
Fish without swim bladder	L_{pk} [c]	213	-	-	-	-	-	-	-	-	-	-	-	-
Fish with swim bladder	L_{pk} [c]	207	-	-	-	0.06	0.05	0.02	-	-	-	0.06	0.05	0.02
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	0.20	0.30	0.39	0.65	0.57	0.44	0.20	0.32	0.41	0.64	0.56	0.43

Table G-128. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, IHC S-2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	7.62	8.84
Fish < 2 g	183 [a]	9.88	13.21
Fish without swim bladder	216 [c]	0.26	0.27
Fish with swim bladder	203 [c]	1.72	1.76
Sea turtles	204 [d]	1.57	1.59

Table G-129. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, IHC S-2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	Metric	Threshold	Summer 250 kJ	Summer 450 kJ	Summer 685 kJ	Summer 1500 kJ	Summer 2000 kJ	Summer 2200 kJ	Winter 250 kJ	Winter 450 kJ	Winter 685 kJ	Winter 1500 kJ	Winter 2000 kJ	Winter 2200 kJ
Fish ≥ 2g	L_{pk} [a]	206	-	-	-	-	-	-	-	-	-	-	-	-
Fish ≥ 2g	L_{p} [b]	150	2.52	3.29	3.87	5.76	6.21	4.59	2.73	3.63	4.25	6.86	6.71	4.40
Fish < 2 g	L_{pk} [a]	206	-	-	-	-	-	-	-	-	-	-	-	-
Fish < 2 g	L_{p} [b]	150	2.52	3.29	3.87	5.76	6.21	4.59	2.73	3.63	4.25	6.86	6.71	4.40
Fish without swim bladder	L_{pk} [c]	213	-	-	-	-	-	-	-	-	-	-	-	-
Fish with swim bladder	L_{pk} [c]	-	-	-	-	-	-	-	-	-	-	-	-	-
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	0.10	0.12	0.18	0.26	0.26	0.22	0.11	0.13	0.15	0.26	0.26	0.22

Table G-130. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, IHC S-2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	5.32	5.74
Fish < 2 g	183 [a]	7.07	8.16
Fish without swim bladder	216 [c]	0.13	0.13
Fish with swim bladder	203 [c]	0.89	0.92
Sea turtles	204 [d]	0.78	0.81

Table G-131. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, IHC S-2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	Metric	Threshold	Summer 250 kJ	Summer 450 kJ	Summer 685 kJ	Summer 1500 kJ	Summer 2000 kJ	Summer 2200 kJ	Winter 250 kJ	Winter 450 kJ	Winter 685 kJ	Winter 1500 kJ	Winter 2000 kJ	Winter 2200 kJ
Fish ≥ 2g	L_{pk} [a]	206	0.07	0.09	0.08	0.19	0.18	0.17	0.06	0.09	0.08	0.19	0.18	0.16
Fish ≥ 2g	L_p [b]	150	6.13	6.88	8.07	10.86	11.52	11.69	6.14	7.08	9.07	14.44	15.62	15.48
Fish < 2 g	L_{pk} [a]	206	0.07	0.09	0.08	0.19	0.18	0.17	0.06	0.09	0.08	0.19	0.18	0.16
Fish < 2 g	L_p [b]	150	6.13	6.88	8.07	10.86	11.52	11.69	6.14	7.08	9.07	14.44	15.62	15.48
Fish without swim bladder	L_{pk} [c]	213	-	0.02	0.03	0.05	0.03	0.06	-	0.02	0.03	0.05	0.03	0.06
Fish with swim bladder	L_{pk} [c]	-	0.06	0.09	0.07	0.18	0.16	0.14	0.06	0.09	0.07	0.10	0.16	0.16
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-	-	-	-	-
Sea turtles	L_p [e]	175	0.66	1.11	1.30	1.77	1.88	1.92	0.67	0.99	1.21	1.84	1.88	2.04

Table G-132. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, IHC S-2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	11.45	15.11
Fish < 2 g	183 [a]	13.96	18.20
Fish without swim bladder	216 [c]	1.22	1.20
Fish with swim bladder	203 [c]	4.54	4.89
Sea turtles	204 [d]	4.17	4.53

Table G-133. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, IHC S-2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	Metric	Threshold	Summer 250 kJ	Summer 450 kJ	Summer 685 kJ	Summer 1500 kJ	Summer 2000 kJ	Summer 2200 kJ	Winter 250 kJ	Winter 450 kJ	Winter 685 kJ	Winter 1500 kJ	Winter 2000 kJ	Winter 2200 kJ
Fish ≥ 2g	L_{pk} [a]	206	0.02	0.03	0.05	0.05	0.05	0.06	-	0.03	0.05	0.05	0.05	0.06
Fish ≥ 2g	L_p [b]	150	4.51	5.36	5.93	7.74	8.24	8.40	4.55	5.29	6.11	9.49	10.83	10.70
Fish < 2 g	L_{pk} [a]	206	0.02	0.03	0.05	0.05	0.05	0.06	-	0.03	0.05	0.05	0.05	0.06
Fish < 2 g	L_p [b]	150	4.51	5.36	5.93	7.74	8.24	8.40	4.55	5.29	6.11	9.49	10.83	10.70
Fish without swim bladder	L_{pk} [c]	213	-	-	-	0.02	-	-	-	-	-	0.02	-	-
Fish with swim bladder	L_{pk} [c]	-	-	0.02	0.03	0.05	0.03	0.06	-	0.02	0.03	0.05	0.03	0.06
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-	-	-	-	-
Sea turtles	L_p [e]	175	0.44	0.52	0.56	0.92	0.94	0.99	0.23	0.48	0.52	0.91	0.91	0.94

Table G-134. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, IHC S-2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 μPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	8.24	10.13
Fish < 2 g	183 [a]	10.04	13.62
Fish without swim bladder	216 [c]	0.55	0.54
Fish with swim bladder	203 [c]	2.59	2.69
Sea turtles	204 [d]	2.31	2.49

Table G-135. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, IHC S-2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	Metric	Threshold	Summer 250 kJ	Summer 450 kJ	Summer 685 kJ	Summer 1500 kJ	Summer 2000 kJ	Summer 2200 kJ	Winter 250 kJ	Winter 450 kJ	Winter 685 kJ	Winter 1500 kJ	Winter 2000 kJ	Winter 2200 kJ
Fish ≥ 2g	L_{pk} [a]	206	-	-	0.02	0.03	0.02	-	-	-	0.02	0.03	0.02	-
Fish ≥ 2g	L_{p} [b]	150	3.32	4.37	4.76	6.13	6.50	6.67	3.33	4.29	4.70	7.21	8.11	8.05
Fish < 2 g	L_{pk} [a]	206	-	-	0.02	0.03	0.02	-	-	-	0.02	0.03	0.02	-
Fish < 2 g	L_{p} [b]	150	3.32	4.37	4.76	6.13	6.50	6.67	3.33	4.29	4.70	7.21	8.11	8.05
Fish without swim bladder	L_{pk} [c]	213	-	-	-	-	-	-	-	-	-	-	-	-
Fish with swim bladder	L_{pk} [c]	207	-	-	-	0.03	0.02	-	-	-	-	0.03	0.02	-
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	0.12	0.20	0.42	0.50	0.56	0.60	0.12	0.13	0.38	0.52	0.53	0.59

Table G-136. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, IHC S-2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	6.52	7.72
Fish < 2 g	183 [a]	8.24	10.13
Fish without swim bladder	216 [c]	0.35	0.34
Fish with swim bladder	203 [c]	1.68	1.71
Sea turtles	204 [d]	1.54	1.56

Table G-137. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, IHC S-2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	Metric	Threshold	Summer 250 kJ	Summer 450 kJ	Summer 685 kJ	Summer 1500 kJ	Summer 2000 kJ	Summer 2200 kJ	Winter 250 kJ	Winter 450 kJ	Winter 685 kJ	Winter 1500 kJ	Winter 2000 kJ	Winter 2200 kJ
Fish ≥ 2g	L_{pk} [a]	206	-	-	-	-	-	-	-	-	-	-	-	-
Fish ≥ 2g	L_{p} [b]	150	2.19	2.91	3.17	4.57	4.83	4.99	2.17	2.83	3.00	4.94	5.39	5.39
Fish < 2 g	L_{pk} [a]	206	-	-	-	-	-	-	-	-	-	-	-	-
Fish < 2 g	L_{p} [b]	150	2.19	2.91	3.17	4.57	4.83	4.99	2.17	2.83	3.00	4.94	5.39	5.39
Fish without swim bladder	L_{pk} [c]	213	-	-	-	-	-	-	-	-	-	-	-	-
Fish with swim bladder	L_{pk} [c]	207	-	-	-	-	-	-	-	-	-	-	-	-
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	0.06	0.09	0.09	0.33	0.31	0.29	0.06	0.09	0.09	0.28	0.28	0.30

Table G-138. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, IHC S-2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	4.86	5.30
Fish < 2 g	183 [a]	6.17	7.13
Fish without swim bladder	216 [c]	0.10	0.10
Fish with swim bladder	203 [c]	0.92	0.91
Sea turtles	204 [d]	0.83	0.78

WTG MP1

Table G-139. WTG MP1 foundation (13 m diameter, IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) at location AY42 for different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	Metric	Threshold	Summer 1650 kJ	Summer 2750 kJ	Summer 4750 kJ	Summer 5225 kJ	Winter 1650 kJ	Winter 2750 kJ	Winter 4750 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	0.23	0.42	0.50	0.54	0.23	0.40	0.48	0.55
Fish ≥ 2g	L_{p} [b]	150	11.94	13.04	15.65	16.94	15.94	18.67	23.80	26.51
Fish < 2 g	L_{pk} [a]	206	0.23	0.42	0.50	0.54	0.23	0.40	0.48	0.55
Fish < 2 g	L_{p} [b]	150	11.94	13.04	15.65	16.94	15.94	18.67	23.80	26.51
Fish without swim bladder	L_{pk} [c]	213	0.09	0.13	0.15	0.22	0.09	0.13	0.16	0.21
Fish with swim bladder	L_{pk} [c]	207	0.20	0.34	0.47	0.50	0.20	0.36	0.45	0.48
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	2.30	2.84	3.89	4.23	2.49	3.14	4.26	4.71

Table G-140. WTG MP1 foundation (13 m diameter, IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) at location AY42 for different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	10.28	13.96
Fish < 2 g	183 [a]	12.76	18.25
Fish without swim bladder	216 [c]	1.15	1.22
Fish with swim bladder	203 [c]	3.92	4.36
Sea turtles	204 [d]	3.65	4.04

Table G-141. WTG MP1 foundation (13 m diameter, IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	Metric	Threshold	Summer 1650 kJ	Summer 2750 kJ	Summer 4750 kJ	Summer 5225 kJ	Winter 1650 kJ	Winter 2750 kJ	Winter 4750 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	0.11	0.14	0.22	0.24	0.11	0.14	0.21	0.24
Fish ≥ 2g	L_p [b]	150	8.50	9.38	11.98	12.91	10.87	12.68	16.36	18.37
Fish < 2 g	L_{pk} [a]	206	0.11	0.14	0.22	0.24	0.11	0.14	0.21	0.24
Fish < 2 g	L_p [b]	150	8.50	9.38	11.98	12.91	10.87	12.68	16.36	18.37
Fish without swim bladder	L_{pk} [c]	213	0.02	0.06	0.09	0.11	0.02	0.06	0.09	0.11
Fish with swim bladder	L_{pk} [c]	207	0.20	0.09	0.13	0.15	0.22	0.09	0.13	0.16
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-
Sea turtles	L_p [e]	175	1.22	1.67	2.38	2.60	1.32	1.81	2.55	2.78

Table G-142. WTG MP1 foundation (13 m diameter, IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	7.33	8.96
Fish < 2 g	183 [a]	9.08	12.19
Fish without swim bladder	216 [c]	0.48	0.53
Fish with swim bladder	203 [c]	2.37	2.58
Sea turtles	204 [d]	2.12	2.35

Table G-143. WTG MP1 foundation (13 m diameter, IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	Metric	Threshold	Summer 1650 kJ	Summer 2750 kJ	Summer 4750 kJ	Summer 5225 kJ	Winter 1650 kJ	Winter 2750 kJ	Winter 4750 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	0.06	0.10	0.13	0.13	0.06	0.10	0.13	0.14
Fish ≥ 2g	L_p [b]	150	6.74	7.67	9.42	10.39	8.14	9.39	12.63	14.14
Fish < 2 g	L_{pk} [a]	206	0.06	0.10	0.13	0.13	0.06	0.10	0.13	0.14
Fish < 2 g	L_p [b]	150	6.74	7.67	9.42	10.39	8.14	9.39	12.63	14.14
Fish without swim bladder	L_{pk} [c]	213	-	-	0.05	0.06	-	-	0.05	0.06
Fish with swim bladder	L_{pk} [c]	207	0.06	0.09	0.12	0.13	0.06	0.09	0.12	0.13
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-
Sea turtles	L_p [e]	175	0.71	1.09	1.60	1.78	0.78	1.18	1.73	1.91

G-144. WTG MP1 foundation (13 m diameter, IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	5.80	6.74
Fish < 2 g	183 [a]	7.33	8.96
Fish without swim bladder	216 [c]	0.25	0.25
Fish with swim bladder	203 [c]	1.58	1.72
Sea turtles	204 [d]	1.44	1.55

Table G-145. WTG MP1 foundation (13 m diameter, IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	Metric	Threshold	Summer 1650 kJ	Summer 2750 kJ	Summer 4750 kJ	Summer 5225 kJ	Winter 1650 kJ	Winter 2750 kJ	Winter 4750 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	-	0.05	0.07	0.09	-	0.04	0.07	0.09
Fish ≥ 2g	L_{p} [b]	150	4.99	5.77	7.24	7.80	5.66	6.69	8.80	9.73
Fish < 2 g	L_{pk} [a]	206	-	0.05	0.07	0.09	-	0.04	0.07	0.09
Fish < 2 g	L_{p} [b]	150	4.99	5.77	7.24	7.80	5.66	6.69	8.80	9.73
Fish without swim bladder	L_{pk} [c]	213	-	-	-	-	-	-	-	-
Fish with swim bladder	L_{pk} [c]	207	-	0.02	0.06	0.07	-	0.02	0.06	0.07
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	0.36	0.53	0.91	1.05	0.38	0.56	1.00	1.10

Table G-146. WTG MP1 foundation (13 m diameter, IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	4.21	4.70
Fish < 2 g	183 [a]	5.45	6.29
Fish without swim bladder	216 [c]	0.12	0.13
Fish with swim bladder	203 [c]	0.90	0.97
Sea turtles	204 [d]	0.73	0.80

Table G-147. WTG MP1 foundation (13 m diameter, IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	Metric	Threshold	Summer 1650 kJ	Summer 2750 kJ	Summer 4750 kJ	Summer 5225 kJ	Winter 1650 kJ	Winter 2750 kJ	Winter 4750 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	0.42	0.53	0.58	0.61	0.16	0.53	0.60	0.61
Fish ≥ 2g	L_{p} [b]	150	11.06	12.75	14.76	15.63	12.94	14.77	17.62	18.23
Fish < 2 g	L_{pk} [a]	206	0.42	0.53	0.58	0.61	0.16	0.53	0.60	0.61
Fish < 2 g	L_{p} [b]	150	11.06	12.75	14.76	15.63	12.94	14.77	17.62	18.23
Fish without swim bladder	L_{pk} [c]	213	0.09	0.11	0.14	0.16	0.09	0.11	0.14	0.16
Fish with swim bladder	L_{pk} [c]	207	0.14	0.49	0.56	0.58	0.14	0.49	0.57	0.58
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	2.42	2.85	3.70	4.03	2.43	2.87	3.83	4.21

Table G-148. WTG MP1 foundation (13 m diameter, IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	10.23	12.08
Fish < 2 g	183 [a]	12.58	14.68
Fish without swim bladder	216 [c]	1.16	1.12
Fish with swim bladder	203 [c]	3.95	4.13
Sea turtles	204 [d]	3.66	3.81

Table G-149. WTG MP1 foundation (13 m diameter, IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	Metric	Threshold	Summer 1650 kJ	Summer 2750 kJ	Summer 4750 kJ	Summer 5225 kJ	Winter 1650 kJ	Winter 2750 kJ	Winter 4750 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	0.09	0.13	0.16	0.26	0.09	0.13	0.16	0.17
Fish ≥ 2g	L_{p} [b]	150	8.12	9.40	11.50	12.32	9.14	10.92	13.53	14.20
Fish < 2 g	L_{pk} [a]	206	0.09	0.13	0.16	0.26	0.09	0.13	0.16	0.17
Fish < 2 g	L_{p} [b]	150	8.12	9.40	11.50	12.32	9.14	10.92	13.53	14.20
Fish without swim bladder	L_{pk} [c]	213	0.02	0.04	0.06	0.08	0.02	0.04	0.06	0.08
Fish with swim bladder	L_{pk} [c]	207	0.09	0.11	0.14	0.16	0.09	0.11	0.14	0.16
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	1.33	1.71	2.32	2.53	1.33	1.71	2.33	2.56

Table G-150. WTG MP1 foundation (13 m diameter, IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	7.41	8.42
Fish < 2 g	183 [a]	9.18	10.72
Fish without swim bladder	216 [c]	0.55	0.55
Fish with swim bladder	203 [c]	2.35	2.39
Sea turtles	204 [d]	2.11	2.13

Table G-151. WTG MP1 foundation (13 m diameter, IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	Metric	Threshold	Summer 1650 kJ	Summer 2750 kJ	Summer 4750 kJ	Summer 5225 kJ	Winter 1650 kJ	Winter 2750 kJ	Winter 4750 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	0.05	0.08	0.10	0.11	0.04	0.07	0.10	0.11
Fish ≥ 2g	L_{p} [b]	150	6.45	7.72	9.18	9.84	7.17	8.57	10.84	11.61
Fish < 2 g	L_{pk} [a]	206	0.05	0.08	0.10	0.11	0.04	0.07	0.10	0.11
Fish < 2 g	L_{p} [b]	150	6.45	7.72	9.18	9.84	7.17	8.57	10.84	11.61
Fish without swim bladder	L_{pk} [c]	213	-	-	0.03	0.03	-	-	0.03	0.03
Fish with swim bladder	L_{pk} [c]	207	0.03	0.06	0.09	0.10	0.03	0.06	0.09	0.10
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	0.68	1.13	1.59	1.74	0.68	1.08	1.58	1.73

Table G-152. WTG MP1 foundation (13 m diameter, IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	5.83	6.41
Fish < 2 g	183 [a]	7.41	8.42
Fish without swim bladder	216 [c]	0.19	0.18
Fish with swim bladder	203 [c]	1.55	1.56
Sea turtles	204 [d]	1.39	1.40

Table G-153. WTG MP1 foundation (13 m diameter, IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	Metric	Threshold	Summer 1650 kJ	Summer 2750 kJ	Summer 4750 kJ	Summer 5225 kJ	Winter 1650 kJ	Winter 2750 kJ	Winter 4750 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	-	0.03	0.05	0.06	-	0.03	0.05	0.05
Fish ≥ 2g	L_{p} [b]	150	4.87	5.73	6.96	7.58	5.14	6.22	7.84	8.44
Fish < 2 g	L_{pk} [a]	206	-	0.03	0.05	0.06	-	0.03	0.05	0.05
Fish < 2 g	L_{p} [b]	150	4.87	5.73	6.96	7.58	5.14	6.22	7.84	8.44
Fish without swim bladder	L_{pk} [c]	213	-	-	-	-	-	-	-	-
Fish with swim bladder	L_{pk} [c]	207	-	0.02	0.04	0.05	-	0.02	0.04	0.05
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	0.48	0.57	0.78	1.03	0.48	0.57	0.80	0.91

Table G-154. WTG MP1 foundation (13 m diameter, IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	4.22	4.43
Fish < 2 g	183 [a]	5.51	5.99
Fish without swim bladder	216 [c]	0.09	0.09
Fish with swim bladder	203 [c]	0.77	0.77
Sea turtles	204 [d]	0.67	0.67

WTG MP2

Table G-155. WTG MP2 foundation (13 m diameter, IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	Metric	Threshold	Summer 550 kJ	Summer 1100 kJ	Summer 2750 kJ	Summer 3850 kJ	Summer 5225 kJ	Winter 550 kJ	Winter 1100 kJ	Winter 2750 kJ	Winter 3850 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	0.12	0.19	0.43	0.48	0.60	0.13	0.19	0.41	0.46	0.61
Fish ≥ 2g	L_{p} [b]	150	11.11	10.74	13.59	15.56	17.28	13.04	14.59	20.06	24.18	28.75
Fish < 2 g	L_{pk} [a]	206	0.12	0.19	0.43	0.48	0.60	0.13	0.19	0.41	0.46	0.61
Fish < 2 g	L_{p} [b]	150	11.11	10.74	13.59	15.56	17.28	13.04	14.59	20.06	24.18	28.75
Fish without swim bladder	L_{pk} [c]	213	0.06	0.09	0.13	0.16	0.24	0.06	0.09	0.14	0.16	0.23
Fish with swim bladder	L_{pk} [c]	207	0.11	0.14	0.37	0.46	0.54	0.11	0.15	0.37	0.44	0.54
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	2.25	1.97	2.92	3.63	4.30	2.39	2.18	3.28	4.02	4.76

Table G-156. WTG MP2 foundation (13 m diameter, IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	10.98	15.13
Fish < 2 g	183 [a]	13.43	19.96
Fish without swim bladder	216 [c]	1.29	1.40
Fish with swim bladder	203 [c]	4.22	4.72
Sea turtles	204 [d]	3.94	4.38

Table G-157. WTG MP2 foundation (13 m diameter, IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	Metric	Threshold	Summer 550 kJ	Summer 1100 kJ	Summer 2750 kJ	Summer 3850 kJ	Summer 5225 kJ	Winter 550 kJ	Winter 1100 kJ	Winter 2750 kJ	Winter 3850 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	0.06	0.09	0.14	0.17	0.26	0.06	0.09	0.15	0.17	0.26
Fish ≥ 2g	L_{p} [b]	150	8.11	7.67	9.86	11.70	12.94	9.10	9.43	13.61	16.45	19.18
Fish < 2 g	L_{pk} [a]	206	0.06	0.09	0.14	0.17	0.26	0.06	0.09	0.15	0.17	0.26
Fish < 2 g	L_{p} [b]	150	8.11	7.67	9.86	11.70	12.94	9.10	9.43	13.61	16.45	19.18
Fish without swim bladder	L_{pk} [c]	213	-	-	0.07	0.09	0.12	-	-	0.07	0.09	0.13
Fish with swim bladder	L_{pk} [c]	207	0.06	0.09	0.13	0.16	0.24	0.06	0.09	0.14	0.16	0.23
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	1.13	1.08	1.72	2.18	2.67	1.20	1.16	1.85	2.37	2.85

Table G-158. WTG MP2 foundation (13 m diameter, IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	7.78	9.60
Fish < 2 g	183 [a]	9.60	13.15
Fish without swim bladder	216 [c]	0.58	0.63
Fish with swim bladder	203 [c]	2.60	2.81
Sea turtles	204 [d]	2.38	2.60

Table G-159. WTG MP2 foundation (13 m diameter, IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	Metric	Threshold	Summer 550 kJ	Summer 1100 kJ	Summer 2750 kJ	Summer 3850 kJ	Summer 5225 kJ	Winter 550 kJ	Winter 1100 kJ	Winter 2750 kJ	Winter 3850 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	0.02	0.06	0.11	0.13	0.15	0.02	0.06	0.11	0.13	0.16
Fish ≥ 2g	L_{p} [b]	150	6.52	6.08	7.98	9.16	10.39	7.23	7.20	10.19	12.55	14.34
Fish < 2 g	L_{pk} [a]	206	0.02	0.06	0.11	0.13	0.15	0.02	0.06	0.11	0.13	0.16
Fish < 2 g	L_{p} [b]	150	6.52	6.08	7.98	9.16	10.39	7.23	7.20	10.19	12.55	14.34
Fish without swim bladder	L_{pk} [c]	213	-	-	-	0.03	0.07	-	-	-	0.02	0.07
Fish with swim bladder	L_{pk} [c]	207	-	0.04	0.09	0.12	0.14	-	0.04	0.09	0.12	0.14
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	0.63	0.62	1.11	1.43	1.87	0.70	0.70	1.21	1.56	2.03

Table G-160. WTG MP2 foundation (13 m diameter, IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	6.15	7.27
Fish < 2 g	183 [a]	7.78	9.60
Fish without swim bladder	216 [c]	0.28	0.30
Fish with swim bladder	203 [c]	1.78	1.91
Sea turtles	204 [d]	1.61	1.75

Table G-161. WTG MP2 foundation (13 m diameter, IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	Metric	Threshold	Summer 550 kJ	Summer 1100 kJ	Summer 2750 kJ	Summer 3850 kJ	Summer 5225 kJ	Winter 550 kJ	Winter 1100 kJ	Winter 2750 kJ	Winter 3850 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	-	-	0.05	0.07	0.09	-	-	0.04	0.07	0.10
Fish ≥ 2g	L_{p} [b]	150	4.89	4.47	5.95	6.95	7.85	5.28	5.03	7.11	8.58	9.56
Fish < 2 g	L_{pk} [a]	206	-	-	0.05	0.07	0.09	-	-	0.04	0.07	0.10
Fish < 2 g	L_{p} [b]	150	4.89	4.47	5.95	6.95	7.85	5.28	5.03	7.11	8.58	9.56
Fish without swim bladder	L_{pk} [c]	213	-	-	-	-	-	-	-	-	-	-
Fish with swim bladder	L_{pk} [c]	207	-	-	0.02	0.06	0.09	-	-	0.02	0.06	0.09
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	0.34	0.27	0.55	0.77	1.09	0.34	0.30	0.58	0.81	1.17

Table G-162. WTG MP2 foundation (13 m diameter, IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	4.51	5.07
Fish < 2 g	183 [a]	5.80	6.74
Fish without swim bladder	216 [c]	0.13	0.14
Fish with swim bladder	203 [c]	1.01	1.09
Sea turtles	204 [d]	0.89	0.95

Table G-163. WTG MP2 foundation (13 m diameter, IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	Metric	Threshold	Summer 550 kJ	Summer 1100 kJ	Summer 2750 kJ	Summer 3850 kJ	Summer 5225 kJ	Winter 550 kJ	Winter 1100 kJ	Winter 2750 kJ	Winter 3850 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	0.11	0.13	0.52	0.57	0.60	0.11	0.13	0.51	0.57	0.61
Fish ≥ 2g	L_{p} [b]	150	12.14	11.19	12.47	13.58	15.56	14.45	12.63	14.67	16.58	18.14
Fish < 2 g	L_{pk} [a]	206	0.11	0.13	0.52	0.57	0.60	0.11	0.13	0.51	0.57	0.61
Fish < 2 g	L_{p} [b]	150	12.14	11.19	12.47	13.58	15.56	14.45	12.63	14.67	16.58	18.14
Fish without swim bladder	L_{pk} [c]	213	0.03	0.05	0.10	0.13	0.16	0.03	0.05	0.11	0.13	0.16
Fish with swim bladder	L_{pk} [c]	207	0.09	0.12	0.48	0.54	0.58	0.10	0.13	0.48	0.54	0.58
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	1.95	1.95	2.86	3.31	3.97	2.06	2.00	2.89	3.36	4.16

Table G-164. WTG MP2 foundation (13 m diameter, IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	10.62	12.50
Fish < 2 g	183 [a]	12.89	15.15
Fish without swim bladder	216 [c]	1.24	1.23
Fish with swim bladder	203 [c]	4.12	4.33
Sea turtles	204 [d]	3.86	4.03

Table G-165. WTG MP2 foundation (13 m diameter, IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	Metric	Threshold	Summer 550 kJ	Summer 1100 kJ	Summer 2750 kJ	Summer 3850 kJ	Summer 5225 kJ	Winter 550 kJ	Winter 1100 kJ	Winter 2750 kJ	Winter 3850 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	0.04	0.07	0.12	0.13	0.25	0.04	0.07	0.12	0.13	0.17
Fish ≥ 2g	L_{p} [b]	150	8.88	8.17	9.20	10.22	12.26	10.36	8.92	10.78	12.50	14.13
Fish < 2 g	L_{pk} [a]	206	0.04	0.07	0.12	0.13	0.25	0.04	0.07	0.12	0.13	0.17
Fish < 2 g	L_{p} [b]	150	8.88	8.17	9.20	10.22	12.26	10.36	8.92	10.78	12.50	14.13
Fish without swim bladder	L_{pk} [c]	213	-	-	0.04	0.05	0.08	-	-	0.04	0.05	0.07
Fish with swim bladder	L_{pk} [c]	207	0.03	0.05	0.10	0.13	0.16	0.03	0.05	0.11	0.13	0.16
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	0.92	1.02	1.69	2.11	2.50	0.98	1.02	1.72	2.09	2.52

Table G-166. WTG MP2 foundation (13 m diameter, IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	7.69	8.74
Fish < 2 g	183 [a]	9.42	11.20
Fish without swim bladder	216 [c]	0.57	0.57
Fish with swim bladder	203 [c]	2.49	2.55
Sea turtles	204 [d]	2.28	2.32

Table G-167. WTG MP2 foundation (13 m diameter, IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	Metric	Threshold	Summer 550 kJ	Summer 1100 kJ	Summer 2750 kJ	Summer 3850 kJ	Summer 5225 kJ	Winter 550 kJ	Winter 1100 kJ	Winter 2750 kJ	Winter 3850 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	-	0.03	0.07	0.09	0.11	-	0.03	0.06	0.09	0.11
Fish ≥ 2g	L_p [b]	150	7.02	6.41	7.48	8.34	9.76	8.10	6.95	8.45	9.63	11.55
Fish < 2 g	L_{pk} [a]	206	-	0.03	0.07	0.09	0.11	-	0.03	0.06	0.09	0.11
Fish < 2 g	L_p [b]	150	7.02	6.41	7.48	8.34	9.76	8.10	6.95	8.45	9.63	11.55
Fish without swim bladder	L_{pk} [c]	213	-	-	-	0.02	0.03	-	-	-	0.02	0.03
Fish with swim bladder	L_{pk} [c]	207	-	0.02	0.06	0.08	0.10	-	0.02	0.06	0.08	0.10
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-	-	-
Sea turtles	L_p [e]	175	0.55	0.58	1.10	1.40	1.72	0.59	0.59	1.06	1.40	1.71

Table G-168. WTG MP2 foundation (13 m diameter, IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	6.07	6.68
Fish < 2 g	183 [a]	7.69	8.74
Fish without swim bladder	216 [c]	0.24	0.22
Fish with swim bladder	203 [c]	1.68	1.69
Sea turtles	204 [d]	1.49	1.50

Table G-169. WTG MP2 foundation (13 m diameter, IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	Metric	Threshold	Summer 550 kJ	Summer 1100 kJ	Summer 2750 kJ	Summer 3850 kJ	Summer 5225 kJ	Winter 550 kJ	Winter 1100 kJ	Winter 2750 kJ	Winter 3850 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	-	-	0.02	0.03	0.05	-	-	0.02	0.03	0.05
Fish ≥ 2g	L_{p} [b]	150	4.98	4.59	5.59	6.22	7.53	5.56	4.90	6.10	7.03	8.39
Fish < 2 g	L_{pk} [a]	206	-	-	0.02	0.03	0.05	-	-	0.02	0.03	0.05
Fish < 2 g	L_{p} [b]	150	4.98	4.59	5.59	6.22	7.53	5.56	4.90	6.10	7.03	8.39
Fish without swim bladder	L_{pk} [c]	213	-	-	-	-	-	-	-	-	-	-
Fish with swim bladder	L_{pk} [c]	207	-	-	0.02	0.03	0.05	-	-	0.02	0.03	0.04
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	0.14	0.43	0.56	0.67	1.03	0.15	0.19	0.57	0.67	0.94

Table G-170. WTG MP2 foundation (13 m diameter, IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	4.43	4.67
Fish < 2 g	183 [a]	5.71	6.26
Fish without swim bladder	216 [c]	0.09	0.09
Fish with swim bladder	203 [c]	0.94	0.84
Sea turtles	204 [d]	0.72	0.72

WTG MP3

Table G-171. WTG MP3 foundation (13 m diameter, IHC S6500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) at location AY42 for different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	Metric	Threshold	Summer 654 kJ	Summer 1307 kJ	Summer 2614 kJ	Summer 3921 kJ	Summer 6208 kJ	Winter 654 kJ	Winter 1307 kJ	Winter 2614 kJ	Winter 3921 kJ	Winter 6208 kJ
Fish ≥ 2g	L_{pk} [a]	206	0.12	0.18	0.28	0.47	0.60	0.13	0.17	0.37	0.45	0.58
Fish ≥ 2g	L_{p} [b]	150	10.95	11.16	13.18	15.09	18.82	13.18	15.56	19.12	22.47	32.86
Fish < 2 g	L_{pk} [a]	206	0.12	0.18	0.28	0.47	0.60	0.13	0.17	0.37	0.45	0.58
Fish < 2 g	L_{p} [b]	150	10.95	11.16	13.18	15.09	18.82	13.18	15.56	19.12	22.47	32.86
Fish without swim bladder	L_{pk} [c]	213	0.06	0.08	0.12	0.14	0.25	0.06	0.08	0.13	0.15	0.24
Fish with swim bladder	L_{pk} [c]	207	0.11	0.14	0.26	0.43	0.56	0.11	0.15	0.28	0.42	0.53
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	2.18	2.08	2.71	3.52	4.62	2.36	2.28	2.95	3.91	5.17

Table G-172. WTG MP3 foundation (13 m diameter, IHC S6500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	11.57	16.22
Fish < 2 g	183 [a]	14.11	21.45
Fish without swim bladder	216 [c]	1.36	1.50
Fish with swim bladder	203 [c]	4.39	4.95
Sea turtles	204 [d]	4.09	4.59

Table G-173. WTG MP3 foundation (13 m diameter, IHC S6500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	Metric	Threshold	Summer 654 kJ	Summer 1307 kJ	Summer 2614 kJ	Summer 3921 kJ	Summer 6208 kJ	Winter 654 kJ	Winter 1307 kJ	Winter 2614 kJ	Winter 3921 kJ	Winter 6208 kJ
Fish ≥ 2g	L_{pk} [a]	206	0.06	0.09	0.13	0.15	0.28	0.06	0.09	0.13	0.17	0.28
Fish ≥ 2g	L_{p} [b]	150	8.03	7.95	9.41	11.40	14.17	9.17	10.14	12.96	15.38	21.63
Fish < 2 g	L_{pk} [a]	206	0.06	0.09	0.13	0.15	0.28	0.06	0.09	0.13	0.17	0.28
Fish < 2 g	L_{p} [b]	150	8.03	7.95	9.41	11.40	14.17	9.17	10.14	12.96	15.38	21.63
Fish without swim bladder	L_{pk} [c]	213	-	-	0.06	0.08	0.13	-	-	0.06	0.08	0.13
Fish with swim bladder	L_{pk} [c]	207	0.06	0.08	0.12	0.14	0.25	0.06	0.08	0.13	0.15	0.24
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	1.14	1.13	1.56	2.04	2.87	1.22	1.21	1.69	2.27	3.19

Table G-174. WTG MP3 foundation (13 m diameter, IHC S6500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	8.13	10.36
Fish < 2 g	183 [a]	10.22	14.04
Fish without swim bladder	216 [c]	0.60	0.69
Fish with swim bladder	203 [c]	2.69	2.95
Sea turtles	204 [d]	2.50	2.70

Table G-175. WTG MP3 foundation (13 m diameter, IHC S6500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	Metric	Threshold	Summer 654 kJ	Summer 1307 kJ	Summer 2614 kJ	Summer 3921 kJ	Summer 6208 kJ	Winter 654 kJ	Winter 1307 kJ	Winter 2614 kJ	Winter 3921 kJ	Winter 6208 kJ
Fish ≥ 2g	L_{pk} [a]	206	0.02	0.05	0.09	0.11	0.16	0.02	0.05	0.09	0.12	0.17
Fish ≥ 2g	L_p [b]	150	6.47	6.27	7.62	8.96	11.52	7.27	7.64	9.55	11.87	16.34
Fish < 2 g	L_{pk} [a]	206	0.02	0.05	0.09	0.11	0.16	0.02	0.05	0.09	0.12	0.17
Fish < 2 g	L_p [b]	150	6.47	6.27	7.62	8.96	11.52	7.27	7.64	9.55	11.87	16.34
Fish without swim bladder	L_{pk} [c]	213	-	-	-	0.02	0.08	-	-	-	0.02	0.08
Fish with swim bladder	L_{pk} [c]	207	-	0.03	0.08	0.11	0.15	-	0.03	0.08	0.11	0.16
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-	-	-
Sea turtles	L_p [e]	175	0.65	0.66	0.95	1.34	2.02	0.72	0.72	1.06	1.49	2.20

Table G-176. WTG MP3 foundation (13 m diameter, IHC S6500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	6.40	7.68
Fish < 2 g	183 [a]	8.13	10.36
Fish without swim bladder	216 [c]	0.31	0.34
Fish with swim bladder	203 [c]	1.84	2.01
Sea turtles	204 [d]	1.68	1.83

Table G-177. WTG MP3 foundation (13 m diameter, IHC S6500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	Metric	Threshold	Summer 654 kJ	Summer 1307 kJ	Summer 2614 kJ	Summer 3921 kJ	Summer 6208 kJ	Winter 654 kJ	Winter 1307 kJ	Winter 2614 kJ	Winter 3921 kJ	Winter 6208 kJ
Fish ≥ 2g	L_{pk} [a]	206	-	-	0.02	0.06	0.10	-	-	0.02	0.06	0.10
Fish ≥ 2g	L_{p} [b]	150	4.87	4.60	5.66	6.77	8.49	5.29	5.27	6.69	8.23	11.14
Fish < 2 g	L_{pk} [a]	206	-	-	0.02	0.06	0.10	-	-	0.02	0.06	0.10
Fish < 2 g	L_{p} [b]	150	4.87	4.60	5.66	6.77	8.49	5.29	5.27	6.69	8.23	11.14
Fish without swim bladder	L_{pk} [c]	213	-	-	-	-	-	-	-	-	-	-
Fish with swim bladder	L_{pk} [c]	207	-	-	-	0.03	0.09	-	-	-	0.03	0.09
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	0.34	0.29	0.48	0.73	1.24	0.34	0.31	0.51	0.76	1.32

Table G-178. WTG MP3 foundation (13 m diameter, IHC S6500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa^2·s)	Summer	Winter
Fish ≥ 2g	187 [a]	4.69	5.33
Fish < 2 g	183 [a]	6.04	7.12
Fish without swim bladder	216 [c]	0.14	0.15
Fish with swim bladder	203 [c]	1.06	1.18
Sea turtles	204 [d]	0.90	0.98

Table G-179. WTG MP3 foundation (13 m diameter, IHC S6500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	Metric	Threshold	Summer 654 kJ	Summer 1307 kJ	Summer 2614 kJ	Summer 3921 kJ	Summer 6208 kJ	Winter 654 kJ	Winter 1307 kJ	Winter 2614 kJ	Winter 3921 kJ	Winter 6208 kJ
Fish ≥ 2g	L_{pk} [a]	206	0.11	0.13	0.48	0.55	0.64	0.12	0.13	0.49	0.56	0.64
Fish ≥ 2g	L_{p} [b]	150	12.12	11.66	12.21	13.50	16.32	14.46	13.18	14.30	16.59	18.33
Fish < 2 g	L_{pk} [a]	206	0.11	0.13	0.48	0.55	0.64	0.12	0.13	0.49	0.56	0.64
Fish < 2 g	L_{p} [b]	150	12.12	11.66	12.21	13.50	16.32	14.46	13.18	14.30	16.59	18.33
Fish without swim bladder	L_{pk} [c]	213	0.03	0.06	0.09	0.12	0.16	0.03	0.06	0.10	0.12	0.16
Fish with swim bladder	L_{pk} [c]	207	0.10	0.12	0.46	0.53	0.61	0.11	0.13	0.47	0.53	0.61
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	1.90	2.09	2.76	3.31	4.39	2.00	2.14	2.78	3.31	4.57

Table G-180. WTG MP3 foundation (13 m diameter, IHC S6500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	11.24	12.98
Fish < 2 g	183 [a]	13.43	15.64
Fish without swim bladder	216 [c]	1.31	1.31
Fish with swim bladder	203 [c]	4.39	4.61
Sea turtles	204 [d]	4.07	4.26

Table G-181. WTG MP3 foundation (13 m diameter, IHC S6500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	Metric	Threshold	Summer 654 kJ	Summer 1307 kJ	Summer 2614 kJ	Summer 3921 kJ	Summer 6208 kJ	Winter 654 kJ	Winter 1307 kJ	Winter 2614 kJ	Winter 3921 kJ	Winter 6208 kJ
Fish ≥ 2g	L_{pk} [a]	206	0.05	0.08	0.11	0.13	0.46	0.05	0.07	0.11	0.13	0.18
Fish ≥ 2g	L_{p} [b]	150	8.85	8.50	8.99	10.15	13.04	10.29	9.29	10.40	12.48	14.50
Fish < 2 g	L_{pk} [a]	206	0.05	0.08	0.11	0.13	0.46	0.05	0.07	0.11	0.13	0.18
Fish < 2 g	L_{p} [b]	150	8.85	8.50	8.99	10.15	13.04	10.29	9.29	10.40	12.48	14.50
Fish without swim bladder	L_{pk} [c]	213	-	-	0.03	0.05	0.09	-	-	0.03	0.05	0.08
Fish with swim bladder	L_{pk} [c]	207	0.03	0.06	0.09	0.12	0.16	0.03	0.06	0.10	0.12	0.16
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	0.93	1.11	1.58	2.04	2.74	0.99	1.12	1.60	2.04	2.76

Table G-182. WTG MP3 foundation (13 m diameter, IHC S6500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	8.12	9.14
Fish < 2 g	183 [a]	9.94	11.73
Fish without swim bladder	216 [c]	0.58	0.60
Fish with swim bladder	203 [c]	2.65	2.71
Sea turtles	204 [d]	2.45	2.49

Table G-183. WTG MP3 foundation (13 m diameter, IHC S6500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	Metric	Threshold	Summer 654 kJ	Summer 1307 kJ	Summer 2614 kJ	Summer 3921 kJ	Summer 6208 kJ	Winter 654 kJ	Winter 1307 kJ	Winter 2614 kJ	Winter 3921 kJ	Winter 6208 kJ
Fish ≥ 2g	L_{pk} [a]	206	-	0.03	0.06	0.09	0.12	-	0.03	0.06	0.09	0.12
Fish ≥ 2g	L_{p} [b]	150	7.02	6.69	7.24	8.29	10.74	8.03	7.33	8.20	9.57	12.08
Fish < 2 g	L_{pk} [a]	206	-	0.03	0.06	0.09	0.12	-	0.03	0.06	0.09	0.12
Fish < 2 g	L_{p} [b]	150	7.02	6.69	7.24	8.29	10.74	8.03	7.33	8.20	9.57	12.08
Fish without swim bladder	L_{pk} [c]	213	-	-	-	0.02	0.04	-	-	-	0.02	0.03
Fish with swim bladder	L_{pk} [c]	207	-	0.02	0.05	0.08	0.10	-	0.02	0.05	0.07	0.10
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	0.57	0.60	0.98	1.39	1.93	0.61	0.60	0.92	1.39	1.98

Table G-184. WTG MP3 foundation (13 m diameter, IHC S6500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	6.38	7.11
Fish < 2 g	183 [a]	8.12	9.14
Fish without swim bladder	216 [c]	0.44	0.27
Fish with swim bladder	203 [c]	1.80	1.83
Sea turtles	204 [d]	1.61	1.63

Table G-185. WTG MP3 foundation (13 m diameter, IHC S6500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	Metric	Threshold	Summer 654 kJ	Summer 1307 kJ	Summer 2614 kJ	Summer 3921 kJ	Summer 6208 kJ	Winter 654 kJ	Winter 1307 kJ	Winter 2614 kJ	Winter 3921 kJ	Winter 6208 kJ
Fish ≥ 2g	L_{pk} [a]	206	-	-	0.02	0.03	0.06	-	-	0.02	0.03	0.06
Fish ≥ 2g	L_{p} [b]	150	4.96	4.78	5.40	6.14	8.16	5.56	5.16	5.85	6.99	8.97
Fish < 2 g	L_{pk} [a]	206	-	-	0.02	0.03	0.06	-	-	0.02	0.03	0.06
Fish < 2 g	L_{p} [b]	150	4.96	4.78	5.40	6.14	8.16	5.56	5.16	5.85	6.99	8.97
Fish without swim bladder	L_{pk} [c]	213	-	-	-	-	-	-	-	-	-	-
Fish with swim bladder	L_{pk} [c]	207	-	-	-	0.02	0.05	-	-	-	0.02	0.05
Sea turtles	L_{pk} [d]	232	-	-	-	-	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	0.15	0.45	0.54	0.66	1.16	0.16	0.44	0.55	0.68	1.14

Table G-186. WTG MP3 foundation (13 m diameter, IHC S6500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer	Winter
Fish ≥ 2g	187 [a]	4.68	4.96
Fish < 2 g	183 [a]	6.02	6.62
Fish without swim bladder	216 [c]	0.10	0.10
Fish with swim bladder	203 [c]	1.03	0.99
Sea turtles	204 [d]	0.81	0.82

G.4.2. Vibratory Pile Driving

Acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle thresholds for vibratory pile setting followed by impact pile driving are presented in Appendix G.4.2.1 for WTG foundations. Results are presented per modeling location, duration of vibratory piling, broadband attenuation, season, and hammer energy level. SEL results were estimated from the combined vibratory and impact pile driving acoustic fields. Tables G-187 to G-218 show results for WTG jacket foundations, which assumed the installation of 4 pin piles. Results for WTG monopile scenarios are presented in Tables G-219 to G-250 for MP1, Tables G-251 to G-282 for MP2, and Tables G-283 to G-314 for MP3. In all tables, a dash indicates that distances could not be estimated because thresholds were not reached. “NA” means that the thresholds are not applicable for the specific case.

The metrics used in the tables are L_{pk} for peak sound pressure (dB re 1 μPa), L_E for sound exposure level (dB re 1 μPa^2·s), and L_p for root-mean-square sound pressure (dB re 1 μPa^2). SEL results were estimated from the combined vibratory and impact pile driving acoustic fields. The superscript [a] through [e] are as follows:

- [a] NMFS recommended criteria adopted from the Fisheries Hydroacoustic Working Group (FHWG 2008).
- [b] Andersson et al. (2007), Mueller-Blenkle et al. (2010), Purser and Radford (2011), Wysocki et al. (2007).
- [c] Popper et al. (2014).
- [d] Finneran et al. (2017).
- [e] McCauley et al. (2000).

G.4.2.1. WTG Pin Pile and Monopiles

WTG jacket pin pile

Table G-187. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, TAC V320 and IHCS2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 250 kJ	Summer 450 kJ	Summer 685 kJ	Summer 1500 kJ	Summer 2000 kJ	Summer 2200 kJ	Winter Vibr.	Winter 250 kJ	Winter 450 kJ	Winter 685 kJ	Winter 1500 kJ	Winter 2000 kJ	Winter 2200 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.11	0.13	0.14	0.20	0.18	0.14	NA	0.12	0.14	0.15	0.20	0.18	0.14
Fish ≥ 2g	L_{p} [b]	150	4.07	6.98	8.18	9.02	14.75	17.18	14.19	4.46	8.18	9.56	12.47	22.44	27.73	17.87
Fish < 2 g	L_{pk} [a]	206	NA	0.11	0.13	0.14	0.20	0.18	0.14	NA	0.12	0.14	0.15	0.20	0.18	0.14
Fish < 2 g	L_{p} [b]	150	4.07	6.98	8.18	9.02	14.75	17.18	14.19	4.46	8.18	9.56	12.47	22.44	27.73	17.87
Fish without swim bladder	L_{pk} [c]	213	NA	0.02	0.07	0.09	0.09	0.07	0.03	NA	0.02	0.07	0.09	0.09	0.07	0.03
Fish with swim bladder	L_{pk} [c]	207	NA	0.10	0.12	0.13	0.20	0.17	0.13	NA	0.11	0.13	0.14	0.19	0.17	0.13
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	0.17	0.84	1.28	1.53	2.27	2.21	1.59	0.18	0.92	1.43	1.67	2.45	2.14	1.57

Table G-188. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, TAC V320 and IHCS2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	14.96	21.67
Fish < 2 g	183 [a]	18.30	31.65
Fish without swim bladder	216 [c]	1.22	1.25
Fish with swim bladder	203 [c]	4.96	5.31
Sea turtles	204 [d]	4.59	4.87

Table G-189. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, TAC V320 and IHCS2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 250 kJ	Summer 450 kJ	Summer 685 kJ	Summer 1500 kJ	Summer 2000 kJ	Summer 2200 kJ	Winter Vibr.	Winter 250 kJ	Winter 450 kJ	Winter 685 kJ	Winter 1500 kJ	Winter 2000 kJ	Winter 2200 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.02	0.08	0.09	0.10	0.08	0.04	NA	0.02	0.09	0.09	0.10	0.08	0.05
Fish ≥ 2g	L_p [b]	150	2.32	5.03	5.89	6.52	10.23	12.19	9.02	2.50	5.47	6.45	7.75	14.93	16.21	9.67
Fish < 2 g	L_{pk} [a]	206	NA	0.02	0.08	0.09	0.10	0.08	0.04	NA	0.02	0.09	0.09	0.10	0.08	0.05
Fish < 2 g	L_p [b]	150	2.32	5.03	5.89	6.52	10.23	12.19	9.02	2.50	5.47	6.45	7.75	14.93	16.21	9.67
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	-	0.03	0.03	-	NA	-	-	-	0.04	0.03	-
Fish with swim bladder	L_{pk} [c]	207	NA	0.02	0.07	0.09	0.09	0.07	0.03	NA	0.02	0.07	0.09	0.09	0.07	0.03
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Sea turtles	L_p [e]	175	0.07	0.36	0.56	0.71	1.12	0.94	0.73	0.07	0.41	0.64	0.78	1.15	0.96	0.74

Table G-190. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, TAC V320 and IHCS2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea SEL (injury) thresholds at location AY42 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	9.93	13.27
Fish < 2 g	183 [a]	13.41	18.57
Fish without swim bladder	216 [c]	0.53	0.54
Fish with swim bladder	203 [c]	2.73	2.81
Sea turtles	204 [d]	2.48	2.54

Table G-191. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, TAC V320 and IHCS2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 250 kJ	Summer 450 kJ	Summer 685 kJ	Summer 1500 kJ	Summer 2000 kJ	Summer 2200 kJ	Winter Vibr.	Winter 250 kJ	Winter 450 kJ	Winter 685 kJ	Winter 1500 kJ	Winter 2000 kJ	Winter 2200 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	-	-	0.05	0.07	0.05	0.02	NA	-	-	0.03	0.07	0.05	0.02
Fish ≥ 2g	L_{p} [b]	150	1.54	3.87	4.77	5.30	8.00	8.90	6.76	1.61	4.24	5.13	5.89	10.52	11.05	6.77
Fish < 2 g	L_{pk} [a]	206	NA	-	-	0.05	0.07	0.05	0.02	NA	-	-	0.03	0.07	0.05	0.02
Fish < 2 g	L_{p} [b]	150	1.54	3.87	4.77	5.30	8.00	8.90	6.76	1.61	4.24	5.13	5.89	10.52	11.05	6.77
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Fish with swim bladder	L_{pk} [c]	207	NA	-	-	-	0.06	0.05	0.02	NA	-	-	-	0.06	0.05	0.02
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	0.02	0.20	0.30	0.39	0.65	0.57	0.44	0.02	0.20	0.32	0.41	0.64	0.56	0.43

Table G-192. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, TAC V320 and IHCS2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea SEL (injury) thresholds at location AY42 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	7.66	8.88
Fish < 2 g	183 [a]	9.93	13.27
Fish without swim bladder	216 [c]	0.27	0.27
Fish with swim bladder	203 [c]	1.74	1.78
Sea turtles	204 [d]	1.58	1.61

Table G-193. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, TAC V320 and IHCS2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 250 kJ	Summer 450 kJ	Summer 685 kJ	Summer 1500 kJ	Summer 2000 kJ	Summer 2200 kJ	Winter Vibr.	Winter 250 kJ	Winter 450 kJ	Winter 685 kJ	Winter 1500 kJ	Winter 2000 kJ	Winter 2200 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Fish ≥ 2g	L_{p} [b]	150	0.83	2.52	3.29	3.87	5.76	6.21	4.59	0.87	2.73	3.63	4.25	6.86	6.71	4.40
Fish < 2 g	L_{pk} [a]	206	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Fish < 2 g	L_{p} [b]	150	0.83	2.52	3.29	3.87	5.76	6.21	4.59	0.87	2.73	3.63	4.25	6.86	6.71	4.40
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Fish with swim bladder	L_{pk} [c]	207	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	-	0.10	0.12	0.18	0.26	0.26	0.22	-	0.11	0.13	0.15	0.26	0.26	0.22

Table G-194. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, TAC V320 and IHCS2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	5.35	5.79
Fish < 2 g	183 [a]	7.11	8.21
Fish without swim bladder	216 [c]	0.13	0.13
Fish with swim bladder	203 [c]	0.90	0.93
Sea turtles	204 [d]	0.80	0.82

Table G-195. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, TAC V320 and IHCS2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 250 kJ	Summer 450 kJ	Summer 685 kJ	Summer 1500 kJ	Summer 2000 kJ	Summer 2200 kJ	Winter Vibr.	Winter 250 kJ	Winter 450 kJ	Winter 685 kJ	Winter 1500 kJ	Winter 2000 kJ	Winter 2200 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.11	0.13	0.14	0.20	0.18	0.14	NA	0.12	0.14	0.15	0.20	0.18	0.14
Fish ≥ 2g	L_{p} [b]	150	3.43	6.98	8.18	9.02	14.75	17.18	14.19	3.80	8.18	9.56	12.47	22.44	27.73	17.87
Fish < 2 g	L_{pk} [a]	206	NA	0.11	0.13	0.14	0.20	0.18	0.14	NA	0.12	0.14	0.15	0.20	0.18	0.14
Fish < 2 g	L_{p} [b]	150	3.43	6.98	8.18	9.02	14.75	17.18	14.19	3.80	8.18	9.56	12.47	22.44	27.73	17.87
Fish without swim bladder	L_{pk} [c]	213	NA	0.02	0.07	0.09	0.09	0.07	0.03	NA	0.02	0.07	0.09	0.09	0.07	0.03
Fish with swim bladder	L_{pk} [c]	207	NA	0.10	0.12	0.13	0.20	0.17	0.13	NA	0.11	0.13	0.14	0.19	0.17	0.13
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	0.13	0.84	1.28	1.53	2.27	2.21	1.59	0.15	0.92	1.43	1.67	2.45	2.14	1.57

Table G-196. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, TAC V320 and IHCS2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	14.95	21.68
Fish < 2 g	183 [a]	18.30	31.68
Fish without swim bladder	216 [c]	1.24	1.28
Fish with swim bladder	203 [c]	4.97	5.31
Sea turtles	204 [d]	4.60	4.88

Table G-197. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, TAC V320 and IHCS2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 250 kJ	Summer 450 kJ	Summer 685 kJ	Summer 1500 kJ	Summer 2000 kJ	Summer 2200 kJ	Winter Vibr.	Winter 250 kJ	Winter 450 kJ	Winter 685 kJ	Winter 1500 kJ	Winter 2000 kJ	Winter 2200 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.02	0.08	0.09	0.10	0.08	0.04	NA	0.02	0.09	0.09	0.10	0.08	0.05
Fish ≥ 2g	L_{p} [b]	150	2.04	5.03	5.89	6.52	10.23	12.19	9.02	2.22	5.47	6.45	7.75	14.93	16.21	9.67
Fish < 2 g	L_{pk} [a]	206	NA	0.02	0.08	0.09	0.10	0.08	0.04	NA	0.02	0.09	0.09	0.10	0.08	0.05
Fish < 2 g	L_{p} [b]	150	2.04	5.03	5.89	6.52	10.23	12.19	9.02	2.22	5.47	6.45	7.75	14.93	16.21	9.67
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	-	0.03	0.03	-	NA	-	-	-	0.04	0.03	-
Fish with swim bladder	L_{pk} [c]	207	NA	0.02	0.07	0.09	0.09	0.07	0.03	NA	0.02	0.07	0.09	0.09	0.07	0.03
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	0.06	0.36	0.56	0.71	1.12	0.94	0.73	0.06	0.41	0.64	0.78	1.15	0.96	0.74

Table G-198. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, TAC V320 and IHCS2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	9.92	13.27
Fish < 2 g	183 [a]	13.40	18.58
Fish without swim bladder	216 [c]	0.54	0.54
Fish with swim bladder	203 [c]	2.74	2.82
Sea turtles	204 [d]	2.49	2.56

Table G-199. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, TAC V320 and IHCS2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 250 kJ	Summer 450 kJ	Summer 685 kJ	Summer 1500 kJ	Summer 2000 kJ	Summer 2200 kJ	Winter Vibr.	Winter 250 kJ	Winter 450 kJ	Winter 685 kJ	Winter 1500 kJ	Winter 2000 kJ	Winter 2200 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	-	-	0.05	0.07	0.05	0.02	NA	-	-	0.03	0.07	0.05	0.02
Fish ≥ 2g	L_{p} [b]	150	1.45	3.87	4.77	5.30	8.00	8.90	6.76	1.54	4.24	5.13	5.89	10.52	11.05	6.77
Fish < 2 g	L_{pk} [a]	206	NA	-	-	0.05	0.07	0.05	0.02	NA	-	-	0.03	0.07	0.05	0.02
Fish < 2 g	L_{p} [b]	150	1.45	3.87	4.77	5.30	8.00	8.90	6.76	1.54	4.24	5.13	5.89	10.52	11.05	6.77
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Fish with swim bladder	L_{pk} [c]	207	NA	-	-	-	0.06	0.05	0.02	NA	-	-	-	0.06	0.05	0.02
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	0.02	0.20	0.30	0.39	0.65	0.57	0.44	0.03	0.20	0.32	0.41	0.64	0.56	0.43

Table G-200. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, TAC V320 and IHCS2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa^2·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	7.65	8.88
Fish < 2 g	183 [a]	9.92	13.27
Fish without swim bladder	216 [c]	0.27	0.28
Fish with swim bladder	203 [c]	1.75	1.80
Sea turtles	204 [d]	1.60	1.63

Table G-201. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, TAC V320 and IHCS2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 250 kJ	Summer 450 kJ	Summer 685 kJ	Summer 1500 kJ	Summer 2000 kJ	Summer 2200 kJ	Winter Vibr.	Winter 250 kJ	Winter 450 kJ	Winter 685 kJ	Winter 1500 kJ	Winter 2000 kJ	Winter 2200 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Fish ≥ 2g	L_{p} [b]	150	0.75	2.52	3.29	3.87	5.76	6.21	4.59	0.83	2.73	3.63	4.25	6.86	6.71	4.40
Fish < 2 g	L_{pk} [a]	206	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Fish < 2 g	L_{p} [b]	150	0.75	2.52	3.29	3.87	5.76	6.21	4.59	0.83	2.73	3.63	4.25	6.86	6.71	4.40
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Fish with swim bladder	L_{pk} [c]	207	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	-	0.10	0.12	0.18	0.26	0.26	0.22	-	0.11	0.13	0.15	0.26	0.26	0.22

Table G-202. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, TAC V320 and IHCS2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	5.35	5.79
Fish < 2 g	183 [a]	7.10	8.21
Fish without swim bladder	216 [c]	0.14	0.13
Fish with swim bladder	203 [c]	0.91	0.94
Sea turtles	204 [d]	0.81	0.84

Table G-203. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, TAC V320 and IHCS2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 250 kJ	Summer 450 kJ	Summer 685 kJ	Summer 1500 kJ	Summer 2000 kJ	Summer 2200 kJ	Winter Vibr.	Winter 250 kJ	Winter 450 kJ	Winter 685 kJ	Winter 1500 kJ	Winter 2000 kJ	Winter 2200 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.07	0.09	0.08	0.19	0.18	0.17	NA	0.06	0.09	0.08	0.19	0.18	0.16
Fish ≥ 2g	L_p [b]	150	4.60	6.13	6.88	8.07	10.86	11.52	11.69	4.70	6.14	7.08	9.07	14.44	15.62	15.48
Fish < 2 g	L_{pk} [a]	206	NA	0.07	0.09	0.08	0.19	0.18	0.17	NA	0.06	0.09	0.08	0.19	0.18	0.16
Fish < 2 g	L_p [b]	150	4.60	6.13	6.88	8.07	10.86	11.52	11.69	4.70	6.14	7.08	9.07	14.44	15.62	15.48
Fish without swim bladder	L_{pk} [c]	213	NA	-	0.02	0.03	0.05	0.03	0.06	NA	-	0.02	0.03	0.05	0.03	0.06
Fish with swim bladder	L_{pk} [c]	207	NA	0.06	0.09	0.07	0.18	0.16	0.14	NA	0.06	0.09	0.07	0.10	0.16	0.16
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Sea turtles	L_p [e]	175	0.10	0.66	1.11	1.30	1.77	1.88	1.92	0.10	0.67	0.99	1.21	1.84	1.88	2.04

Table G-204. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, TAC V320 and IHCS2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	11.59	15.18
Fish < 2 g	183 [a]	14.08	18.26
Fish without swim bladder	216 [c]	1.23	1.23
Fish with swim bladder	203 [c]	4.59	4.94
Sea turtles	204 [d]	4.23	4.58

Table G-205. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, TAC V320 and IHCS2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 250 kJ	Summer 450 kJ	Summer 685 kJ	Summer 1500 kJ	Summer 2000 kJ	Summer 2200 kJ	Winter Vibr.	Winter 250 kJ	Winter 450 kJ	Winter 685 kJ	Winter 1500 kJ	Winter 2000 kJ	Winter 2200 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.02	0.03	0.05	0.05	0.05	0.06	NA	-	0.03	0.05	0.05	0.05	0.06
Fish ≥ 2g	L_p [b]	150	2.57	4.51	5.36	5.93	7.74	8.24	8.40	2.54	4.55	5.29	6.11	9.49	10.83	10.70
Fish < 2 g	L_{pk} [a]	206	NA	0.02	0.03	0.05	0.05	0.05	0.06	NA	-	0.03	0.05	0.05	0.05	0.06
Fish < 2 g	L_p [b]	150	2.57	4.51	5.36	5.93	7.74	8.24	8.40	2.54	4.55	5.29	6.11	9.49	10.83	10.70
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	-	0.02	-	-	NA	-	-	-	0.02	-	-
Fish with swim bladder	L_{pk} [c]	207	NA	-	0.02	0.03	0.05	0.03	0.06	NA	-	0.02	0.03	0.05	0.03	0.06
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Sea turtles	L_p [e]	175	0.05	0.44	0.52	0.56	0.92	0.94	0.99	0.05	0.23	0.48	0.52	0.91	0.91	0.94

Table G-206. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, TAC V320 and IHCS2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	8.32	10.23
Fish < 2 g	183 [a]	10.18	13.69
Fish without swim bladder	216 [c]	0.55	0.54
Fish with swim bladder	203 [c]	2.63	2.71
Sea turtles	204 [d]	2.35	2.52

Table G-207. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, TAC V320 and IHCS2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 250 kJ	Summer 450 kJ	Summer 685 kJ	Summer 1500 kJ	Summer 2000 kJ	Summer 2200 kJ	Winter Vibr.	Winter 250 kJ	Winter 450 kJ	Winter 685 kJ	Winter 1500 kJ	Winter 2000 kJ	Winter 2200 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	-	-	0.02	0.03	0.02	-	NA	-	-	0.02	0.03	0.02	-
Fish ≥ 2g	L_p [b]	150	1.64	3.32	4.37	4.76	6.13	6.50	6.67	1.64	3.33	4.29	4.70	7.21	8.11	8.05
Fish < 2 g	L_{pk} [a]	206	NA	-	-	0.02	0.03	0.02	-	NA	-	-	0.02	0.03	0.02	-
Fish < 2 g	L_p [b]	150	1.64	3.32	4.37	4.76	6.13	6.50	6.67	1.64	3.33	4.29	4.70	7.21	8.11	8.05
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Fish with swim bladder	L_{pk} [c]	207	NA	-	-	-	0.03	0.02	-	NA	-	-	-	0.03	0.02	-
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Sea turtles	L_p [e]	175	0.02	0.12	0.20	0.42	0.50	0.56	0.60	0.02	0.12	0.13	0.38	0.52	0.53	0.59

Table G-208. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, TAC V320 and IHCS2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	6.59	7.79
Fish < 2 g	183 [a]	8.32	10.23
Fish without swim bladder	216 [c]	0.36	0.34
Fish with swim bladder	203 [c]	1.71	1.73
Sea turtles	204 [d]	1.56	1.59

Table G-209. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, TAC V320 and IHCS2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 250 kJ	Summer 450 kJ	Summer 685 kJ	Summer 1500 kJ	Summer 2000 kJ	Summer 2200 kJ	Winter Vibr.	Winter 250 kJ	Winter 450 kJ	Winter 685 kJ	Winter 1500 kJ	Winter 2000 kJ	Winter 2200 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Fish ≥ 2g	L_{p} [b]	150	0.86	2.19	2.91	3.17	4.57	4.83	4.99	0.87	2.17	2.83	3.00	4.94	5.39	5.39
Fish < 2 g	L_{pk} [a]	206	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Fish < 2 g	L_{p} [b]	150	0.86	2.19	2.91	3.17	4.57	4.83	4.99	0.87	2.17	2.83	3.00	4.94	5.39	5.39
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Fish with swim bladder	L_{pk} [c]	207	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	-	0.06	0.09	0.09	0.33	0.31	0.29	-	0.06	0.09	0.09	0.28	0.28	0.30

Table G-210. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, TAC V320 and IHCS2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	4.90	5.35
Fish < 2 g	183 [a]	6.23	7.21
Fish without swim bladder	216 [c]	0.10	0.10
Fish with swim bladder	203 [c]	0.94	0.92
Sea turtles	204 [d]	0.84	0.80

Table G-211. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, TAC V320 and IHCS2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 250 kJ	Summer 450 kJ	Summer 685 kJ	Summer 1500 kJ	Summer 2000 kJ	Summer 2200 kJ	Winter Vibr.	Winter 250 kJ	Winter 450 kJ	Winter 685 kJ	Winter 1500 kJ	Winter 2000 kJ	Winter 2200 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.07	0.09	0.08	0.19	0.18	0.17	NA	0.06	0.09	0.08	0.19	0.18	0.16
Fish ≥ 2g	L_{p} [b]	150	4.06	6.13	6.88	8.07	10.86	11.52	11.69	4.16	6.14	7.08	9.07	14.44	15.62	15.48
Fish < 2 g	L_{pk} [a]	206	NA	0.07	0.09	0.08	0.19	0.18	0.17	NA	0.06	0.09	0.08	0.19	0.18	0.16
Fish < 2 g	L_{p} [b]	150	4.06	6.13	6.88	8.07	10.86	11.52	11.69	4.16	6.14	7.08	9.07	14.44	15.62	15.48
Fish without swim bladder	L_{pk} [c]	213	NA	-	0.02	0.03	0.05	0.03	0.06	NA	-	0.02	0.03	0.05	0.03	0.06
Fish with swim bladder	L_{pk} [c]	207	NA	0.06	0.09	0.07	0.18	0.16	0.14	NA	0.06	0.09	0.07	0.10	0.16	0.16
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	0.09	0.66	1.11	1.30	1.77	1.88	1.92	0.09	0.67	0.99	1.21	1.84	1.88	2.04

Table G-212. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, TAC V320 and IHCS2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	11.65	15.21
Fish < 2 g	183 [a]	14.13	18.30
Fish without swim bladder	216 [c]	1.24	1.24
Fish with swim bladder	203 [c]	4.61	4.97
Sea turtles	204 [d]	4.25	4.60

Table G-213. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, TAC V320 and IHCS2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 250 kJ	Summer 450 kJ	Summer 685 kJ	Summer 1500 kJ	Summer 2000 kJ	Summer 2200 kJ	Winter Vibr.	Winter 250 kJ	Winter 450 kJ	Winter 685 kJ	Winter 1500 kJ	Winter 2000 kJ	Winter 2200 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.02	0.03	0.05	0.05	0.05	0.06	NA	-	0.03	0.05	0.05	0.05	0.06
Fish ≥ 2g	L_p [b]	150	2.16	4.51	5.36	5.93	7.74	8.24	8.40	2.20	4.55	5.29	6.11	9.49	10.83	10.70
Fish < 2 g	L_{pk} [a]	206	NA	0.02	0.03	0.05	0.05	0.05	0.06	NA	-	0.03	0.05	0.05	0.05	0.06
Fish < 2 g	L_p [b]	150	2.16	4.51	5.36	5.93	7.74	8.24	8.40	2.20	4.55	5.29	6.11	9.49	10.83	10.70
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	-	0.02	-	-	NA	-	-	-	0.02	-	-
Fish with swim bladder	L_{pk} [c]	207	NA	-	0.02	0.03	0.05	0.03	0.06	NA	-	0.02	0.03	0.05	0.03	0.06
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Sea turtles	L_p [e]	175	0.05	0.44	0.52	0.56	0.92	0.94	0.99	0.05	0.23	0.48	0.52	0.91	0.91	0.94

Table G-214. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, TAC V320 and IHCS2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	8.35	10.28
Fish < 2 g	183 [a]	10.25	13.73
Fish without swim bladder	216 [c]	0.56	0.55
Fish with swim bladder	203 [c]	2.64	2.73
Sea turtles	204 [d]	2.37	2.53

Table G-215. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, TAC V320 and IHCS2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 250 kJ	Summer 450 kJ	Summer 685 kJ	Summer 1500 kJ	Summer 2000 kJ	Summer 2200 kJ	Winter Vibr.	Winter 250 kJ	Winter 450 kJ	Winter 685 kJ	Winter 1500 kJ	Winter 2000 kJ	Winter 2200 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	-	-	0.02	0.03	0.02	-	NA	-	-	0.02	0.03	0.02	-
Fish ≥ 2g	L_p [b]	150	1.39	3.32	4.37	4.76	6.13	6.50	6.67	1.42	3.33	4.29	4.70	7.21	8.11	8.05
Fish < 2 g	L_{pk} [a]	206	NA	-	-	0.02	0.03	0.02	-	NA	-	-	0.02	0.03	0.02	-
Fish < 2 g	L_p [b]	150	1.39	3.32	4.37	4.76	6.13	6.50	6.67	1.42	3.33	4.29	4.70	7.21	8.11	8.05
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Fish with swim bladder	L_{pk} [c]	207	-	-	-	0.03	0.02	-	NA	-	-	-	0.03	0.02	-	NA
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Sea turtles	L_p [e]	175	-	0.12	0.20	0.42	0.50	0.56	0.60	-	0.12	0.13	0.38	0.52	0.53	0.59

Table G-216. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, TAC V320 and IHCS2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	6.61	7.83
Fish < 2 g	183 [a]	8.35	10.28
Fish without swim bladder	216 [c]	0.36	0.34
Fish with swim bladder	203 [c]	1.73	1.75
Sea turtles	204 [d]	1.57	1.60

Table G-217. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, TAC V320 and IHCS2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 250 kJ	Summer 450 kJ	Summer 685 kJ	Summer 1500 kJ	Summer 2000 kJ	Summer 2200 kJ	Winter Vibr.	Winter 250 kJ	Winter 450 kJ	Winter 685 kJ	Winter 1500 kJ	Winter 2000 kJ	Winter 2200 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Fish ≥ 2g	L_{p} [b]	150	0.76	2.19	2.91	3.17	4.57	4.83	4.99	0.76	2.17	2.83	3.00	4.94	5.39	5.39
Fish < 2 g	L_{pk} [a]	206	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Fish < 2 g	L_{p} [b]	150	0.76	2.19	2.91	3.17	4.57	4.83	4.99	0.76	2.17	2.83	3.00	4.94	5.39	5.39
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Fish with swim bladder	L_{pk} [c]	207	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	-	NA	-	-	-	-	-	-
Sea turtles	L_{p} [e]	175	-	0.06	0.09	0.09	0.33	0.31	0.29	-	0.06	0.09	0.09	0.28	0.28	0.30

Table G-218. WTG jacket foundation with 4 pin piles (pre-piled 4.5 m diameter, TAC V320 and IHCS2300) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	4.92	5.38
Fish < 2 g	183 [a]	6.25	7.24
Fish without swim bladder	216 [c]	0.10	0.10
Fish with swim bladder	203 [c]	0.94	0.93
Sea turtles	204 [d]	0.85	0.81

WTG MP1

Table G-219. WTG MP1 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 1650 kJ	Summer 2750 kJ	Summer 4750 kJ	Summer 5225 kJ	Winter Vibr.	Winter 1650 kJ	Winter 2750 kJ	Winter 4750 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	NA	0.23	0.42	0.50	0.54	NA	0.23	0.40	0.48
Fish ≥ 2g	L_p [b]	150	0.76	11.57	11.94	13.04	15.65	16.94	14.78	15.94	18.67	23.80
Fish < 2 g	L_{pk} [a]	206	NA	NA	0.23	0.42	0.50	0.54	NA	0.23	0.40	0.48
Fish < 2 g	L_p [b]	150	0.76	11.57	11.94	13.04	15.65	16.94	14.78	15.94	18.67	23.80
Fish without swim bladder	L_{pk} [c]	213	NA	0.09	0.13	0.15	0.22	NA	0.09	0.13	0.16	0.21
Fish with swim bladder	L_{pk} [c]	207	NA	0.20	0.34	0.47	0.50	NA	0.20	0.36	0.45	0.48
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	NA	-	-	-	-
Sea turtles	L_p [e]	175	-	0.06	0.09	0.09	0.33	-	0.06	0.09	0.09	0.28

Table G-220. WTG MP1 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	10.71	14.18
Fish < 2 g	183 [a]	13.30	18.04
Fish without swim bladder	216 [c]	1.15	1.23
Fish with swim bladder	203 [c]	4.10	4.56
Sea turtles	204 [d]	3.80	4.20

Table G-221. WTG MP1 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 1650 kJ	Summer 2750 kJ	Summer 4750 kJ	Summer 5225 kJ	Winter Vibr.	Winter 1650 kJ	Winter 2750 kJ	Winter 4750 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.11	0.14	0.22	0.24	NA	0.11	0.14	0.21	0.24
Fish ≥ 2g	L_p [b]	150	8.09	8.50	9.38	11.98	12.91	9.64	10.87	12.68	16.36	18.37
Fish < 2 g	L_{pk} [a]	206	NA	0.11	0.14	0.22	0.24	NA	0.11	0.14	0.21	0.24
Fish < 2 g	L_p [b]	150	8.09	8.50	9.38	11.98	12.91	9.64	10.87	12.68	16.36	18.37
Fish without swim bladder	L_{pk} [c]	213	NA	0.02	0.06	0.09	0.11	NA	0.02	0.06	0.09	0.11
Fish with swim bladder	L_{pk} [c]	207	NA	0.09	0.13	0.15	0.22	NA	0.09	0.13	0.16	0.21
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	NA	-	-	-	-
Sea turtles	L_p [e]	175	0.93	1.22	1.67	2.38	2.60	0.98	1.32	1.81	2.55	2.78

Table G-222. WTG MP1 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	7.60	9.12
Fish < 2 g	183 [a]	9.34	12.46
Fish without swim bladder	216 [c]	0.52	0.55
Fish with swim bladder	203 [c]	2.45	2.64
Sea turtles	204 [d]	2.21	2.41

Table G-223. WTG MP1 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 1650 kJ	Summer 2750 kJ	Summer 4750 kJ	Summer 5225 kJ	Winter Vibr.	Winter 1650 kJ	Winter 2750 kJ	Winter 4750 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.06	0.10	0.13	0.13	NA	0.06	0.10	0.13	0.14
Fish ≥ 2g	L_p [b]	150	6.41	6.74	7.67	9.42	10.39	7.45	8.14	9.39	12.63	14.14
Fish < 2 g	L_{pk} [a]	206	NA	0.06	0.10	0.13	0.13	NA	0.06	0.10	0.13	0.14
Fish < 2 g	L_p [b]	150	6.41	6.74	7.67	9.42	10.39	7.45	8.14	9.39	12.63	14.14
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	0.05	0.06	NA	-	-	0.05	0.06
Fish with swim bladder	L_{pk} [c]	207	NA	0.06	0.09	0.12	0.13	NA	0.06	0.09	0.12	0.13
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	NA	-	-	-	-
Sea turtles	L_p [e]	175	0.57	0.71	1.09	1.60	1.78	0.59	0.78	1.18	1.73	1.91

Table G-224. WTG MP1 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	6.02	6.96
Fish < 2 g	183 [a]	7.60	9.12
Fish without swim bladder	216 [c]	0.24	0.25
Fish with swim bladder	203 [c]	1.63	1.75
Sea turtles	204 [d]	1.49	1.58

Table G-225. WTG MP1 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 1650 kJ	Summer 2750 kJ	Summer 4750 kJ	Summer 5225 kJ	Winter Vibr.	Winter 1650 kJ	Winter 2750 kJ	Winter 4750 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	-	0.05	0.07	0.09	NA	-	0.04	0.07	0.09
Fish ≥ 2g	L_{p} [b]	150	4.80	4.99	5.77	7.24	7.80	5.28	5.66	6.69	8.80	9.73
Fish < 2 g	L_{pk} [a]	206	NA	-	0.05	0.07	0.09	NA	-	0.04	0.07	0.09
Fish < 2 g	L_{p} [b]	150	4.80	4.99	5.77	7.24	7.80	5.28	5.66	6.69	8.80	9.73
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	-	-	NA	-	-	-	-
Fish with swim bladder	L_{pk} [c]	207	NA	-	0.02	0.06	0.07	NA	-	0.02	0.06	0.07
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	NA	-	-	-	-
Sea turtles	L_{p} [e]	175	0.21	0.36	0.53	0.91	1.05	0.22	0.38	0.56	1.00	1.10

Table G-226. WTG MP1 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	4.41	4.91
Fish < 2 g	183 [a]	5.68	6.48
Fish without swim bladder	216 [c]	0.12	0.12
Fish with swim bladder	203 [c]	0.90	0.95
Sea turtles	204 [d]	0.76	0.83

Table G-227. WTG MP1 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 1650 kJ	Summer 2750 kJ	Summer 4750 kJ	Summer 5225 kJ	Winter Vibr.	Winter 1650 kJ	Winter 2750 kJ	Winter 4750 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.23	0.42	0.50	0.54	NA	0.23	0.40	0.48	0.55
Fish ≥ 2g	L_p [b]	150	8.67	11.94	13.04	15.65	16.94	10.12	15.94	18.67	23.80	26.51
Fish < 2 g	L_{pk} [a]	206	NA	0.23	0.42	0.50	0.54	NA	0.23	0.40	0.48	0.55
Fish < 2 g	L_p [b]	150	8.67	11.94	13.04	15.65	16.94	10.12	15.94	18.67	23.80	26.51
Fish without swim bladder	L_{pk} [c]	213	NA	0.09	0.13	0.15	0.22	NA	0.09	0.13	0.16	0.21
Fish with swim bladder	L_{pk} [c]	207	NA	0.20	0.34	0.47	0.50	NA	0.20	0.36	0.45	0.48
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	NA	-	-	-	-
Sea turtles	L_p [e]	175	1.69	2.30	2.84	3.89	4.23	1.83	2.49	3.14	4.26	4.71

Table G-228. WTG MP1 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	10.24	13.46
Fish < 2 g	183 [a]	12.82	17.29
Fish without swim bladder	216 [c]	1.33	1.44
Fish with swim bladder	203 [c]	4.18	4.62
Sea turtles	204 [d]	3.90	4.28

Table G-229. WTG MP1 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 1650 kJ	Summer 2750 kJ	Summer 4750 kJ	Summer 5225 kJ	Winter Vibr.	Winter 1650 kJ	Winter 2750 kJ	Winter 4750 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.11	0.14	0.22	0.24	NA	0.11	0.14	0.21	0.24
Fish ≥ 2g	L_{p} [b]	150	6.41	8.50	9.38	11.98	12.91	7.08	10.87	12.68	16.36	18.37
Fish < 2 g	L_{pk} [a]	206	NA	0.11	0.14	0.22	0.24	NA	0.11	0.14	0.21	0.24
Fish < 2 g	L_{p} [b]	150	6.41	8.50	9.38	11.98	12.91	7.08	10.87	12.68	16.36	18.37
Fish without swim bladder	L_{pk} [c]	213	NA	0.02	0.06	0.09	0.11	NA	0.02	0.06	0.09	0.11
Fish with swim bladder	L_{pk} [c]	207	NA	0.09	0.13	0.15	0.22	NA	0.09	0.13	0.16	0.21
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	NA	-	-	-	-
Sea turtles	L_{p} [e]	175	0.87	1.22	1.67	2.38	2.60	0.92	1.32	1.81	2.55	2.78

Table G-230. WTG MP1 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa^2·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	7.40	8.75
Fish < 2 g	183 [a]	9.06	11.78
Fish without swim bladder	216 [c]	0.61	0.66
Fish with swim bladder	203 [c]	2.57	2.78
Sea turtles	204 [d]	2.37	2.59

Table G-231. WTG MP1 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 1650 kJ	Summer 2750 kJ	Summer 4750 kJ	Summer 5225 kJ	Winter Vibr.	Winter 1650 kJ	Winter 2750 kJ	Winter 4750 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.06	0.10	0.13	0.13	NA	0.06	0.10	0.13	0.14
Fish ≥ 2g	L_p [b]	150	5.29	6.74	7.67	9.42	10.39	5.71	8.14	9.39	12.63	14.14
Fish < 2 g	L_{pk} [a]	206	NA	0.06	0.10	0.13	0.13	NA	0.06	0.10	0.13	0.14
Fish < 2 g	L_p [b]	150	5.29	6.74	7.67	9.42	10.39	5.71	8.14	9.39	12.63	14.14
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	0.05	0.06	NA	-	-	0.05	0.06
Fish with swim bladder	L_{pk} [c]	207	NA	0.06	0.09	0.12	0.13	NA	0.06	0.09	0.12	0.13
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	NA	-	-	-	-
Sea turtles	L_p [e]	175	0.53	0.71	1.09	1.60	1.78	0.56	0.78	1.18	1.73	1.91

Table G-232. WTG MP1 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	5.94	6.71
Fish < 2 g	183 [a]	7.40	8.75
Fish without swim bladder	216 [c]	0.33	0.36
Fish with swim bladder	203 [c]	1.78	1.91
Sea turtles	204 [d]	1.61	1.74

Table G-233. WTG MP1 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 1650 kJ	Summer 2750 kJ	Summer 4750 kJ	Summer 5225 kJ	Winter Vibr.	Winter 1650 kJ	Winter 2750 kJ	Winter 4750 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	-	0.05	0.07	0.09	NA	-	0.04	0.07	0.09
Fish ≥ 2g	L_{p} [b]	150	3.97	4.99	5.77	7.24	7.80	4.31	5.66	6.69	8.80	9.73
Fish < 2 g	L_{pk} [a]	206	NA	-	0.05	0.07	0.09	NA	-	0.04	0.07	0.09
Fish < 2 g	L_{p} [b]	150	3.97	4.99	5.77	7.24	7.80	4.31	5.66	6.69	8.80	9.73
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	-	-	NA	-	-	-	-
Fish with swim bladder	L_{pk} [c]	207	NA	-	0.02	0.06	0.07	NA	-	0.02	0.06	0.07
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	NA	-	-	-	-
Sea turtles	L_{p} [e]	175	0.20	0.36	0.53	0.91	1.05	0.20	0.38	0.56	1.00	1.10

Table G-234. WTG MP1 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	4.48	4.92
Fish < 2 g	183 [a]	5.62	6.31
Fish without swim bladder	216 [c]	0.13	0.13
Fish with swim bladder	203 [c]	1.02	1.12
Sea turtles	204 [d]	0.90	0.97

Table G-235. WTG MP1 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 1650 kJ	Summer 2750 kJ	Summer 4750 kJ	Summer 5225 kJ	Winter Vibr.	Winter 1650 kJ	Winter 2750 kJ	Winter 4750 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.42	0.53	0.58	0.61	NA	0.16	0.53	0.60	0.61
Fish ≥ 2g	L_p [b]	150	14.98	11.06	12.75	14.76	15.63	15.76	12.94	14.77	17.62	18.23
Fish < 2 g	L_{pk} [a]	206	NA	0.42	0.53	0.58	0.61	NA	0.16	0.53	0.60	0.61
Fish < 2 g	L_p [b]	150	14.98	11.06	12.75	14.76	15.63	15.76	12.94	14.77	17.62	18.23
Fish without swim bladder	L_{pk} [c]	213	NA	0.09	0.11	0.14	0.16	NA	0.09	0.11	0.14	0.16
Fish with swim bladder	L_{pk} [c]	207	NA	0.14	0.49	0.56	0.58	NA	0.14	0.49	0.57	0.58
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	NA	-	-	-	-
Sea turtles	L_p [e]	175	2.49	2.42	2.85	3.70	4.03	2.52	2.43	2.87	3.83	4.21

Table G-236. WTG MP1 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	12.82	14.03
Fish < 2 g	183 [a]	15.15	16.55
Fish without swim bladder	216 [c]	1.25	1.25
Fish with swim bladder	203 [c]	4.77	4.98
Sea turtles	204 [d]	4.40	4.57

Table G-237. WTG MP1 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 1650 kJ	Summer 2750 kJ	Summer 4750 kJ	Summer 5225 kJ	Winter Vibr.	Winter 1650 kJ	Winter 2750 kJ	Winter 4750 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.09	0.13	0.16	0.26	NA	0.09	0.13	0.16	0.17
Fish ≥ 2g	L_p [b]	150	11.09	8.12	9.40	11.50	12.32	11.89	9.14	10.92	13.53	14.20
Fish < 2 g	L_{pk} [a]	206	NA	0.09	0.13	0.16	0.26	NA	0.09	0.13	0.16	0.17
Fish < 2 g	L_p [b]	150	11.09	8.12	9.40	11.50	12.32	11.89	9.14	10.92	13.53	14.20
Fish without swim bladder	L_{pk} [c]	213	NA	0.02	0.04	0.06	0.08	NA	0.02	0.04	0.06	0.08
Fish with swim bladder	L_{pk} [c]	207	NA	0.09	0.11	0.14	0.16	NA	0.09	0.11	0.14	0.16
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	NA	-	-	-	-
Sea turtles	L_p [e]	175	1.09	1.33	1.71	2.32	2.53	1.13	1.33	1.71	2.33	2.56

Table G-238. WTG MP1 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	9.02	9.70
Fish < 2 g	183 [a]	11.50	12.68
Fish without swim bladder	216 [c]	0.55	0.55
Fish with swim bladder	203 [c]	2.70	2.76
Sea turtles	204 [d]	2.48	2.52

Table G-239. WTG MP1 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 1650 kJ	Summer 2750 kJ	Summer 4750 kJ	Summer 5225 kJ	Winter Vibr.	Winter 1650 kJ	Winter 2750 kJ	Winter 4750 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.05	0.08	0.10	0.11	NA	0.04	0.07	0.10	0.11
Fish ≥ 2g	L_p [b]	150	8.70	6.45	7.72	9.18	9.84	9.09	7.17	8.57	10.84	11.61
Fish < 2 g	L_{pk} [a]	206	NA	0.05	0.08	0.10	0.11	NA	0.04	0.07	0.10	0.11
Fish < 2 g	L_p [b]	150	8.70	6.45	7.72	9.18	9.84	9.09	7.17	8.57	10.84	11.61
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	0.03	0.03	NA	-	-	0.03	0.03
Fish with swim bladder	L_{pk} [c]	207	NA	0.03	0.06	0.09	0.10	NA	0.03	0.06	0.09	0.10
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	NA	-	-	-	-
Sea turtles	L_p [e]	175	0.57	0.68	1.13	1.59	1.74	0.57	0.68	1.08	1.58	1.73

Table G-240. WTG MP1 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	7.13	7.69
Fish < 2 g	183 [a]	9.02	9.70
Fish without swim bladder	216 [c]	0.24	0.23
Fish with swim bladder	203 [c]	1.77	1.77
Sea turtles	204 [d]	1.60	1.62

Table G-241. WTG MP1 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 1650 kJ	Summer 2750 kJ	Summer 4750 kJ	Summer 5225 kJ	Winter Vibr.	Winter 1650 kJ	Winter 2750 kJ	Winter 4750 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	-	0.03	0.05	0.06	NA	-	0.03	0.05	0.05
Fish ≥ 2g	L_p [b]	150	6.29	4.87	5.73	6.96	7.58	6.54	5.14	6.22	7.84	8.44
Fish < 2 g	L_{pk} [a]	206	NA	-	0.03	0.05	0.06	NA	-	0.03	0.05	0.05
Fish < 2 g	L_p [b]	150	6.29	4.87	5.73	6.96	7.58	6.54	5.14	6.22	7.84	8.44
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	-	-	NA	-	-	-	-
Fish with swim bladder	L_{pk} [c]	207	NA	-	0.02	0.04	0.05	NA	-	0.02	0.04	0.05
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	NA	-	-	-	-
Sea turtles	L_p [e]	175	0.23	0.48	0.57	0.78	1.03	0.24	0.48	0.57	0.80	0.91

Table G-242. WTG MP1 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	5.12	5.38
Fish < 2 g	183 [a]	6.66	7.17
Fish without swim bladder	216 [c]	0.09	0.09
Fish with swim bladder	203 [c]	0.95	0.94
Sea turtles	204 [d]	0.80	0.81

Table G-243. WTG MP1 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 1650 kJ	Summer 2750 kJ	Summer 4750 kJ	Summer 5225 kJ	Winter Vibr.	Winter 1650 kJ	Winter 2750 kJ	Winter 4750 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.42	0.53	0.58	0.61	NA	0.16	0.53	0.60	0.61
Fish ≥ 2g	L_p [b]	150	13.51	11.06	12.75	14.76	15.63	14.23	12.94	14.77	17.62	18.23
Fish < 2 g	L_{pk} [a]	206	NA	0.42	0.53	0.58	0.61	NA	0.16	0.53	0.60	0.61
Fish < 2 g	L_p [b]	150	13.51	11.06	12.75	14.76	15.63	14.23	12.94	14.77	17.62	18.23
Fish without swim bladder	L_{pk} [c]	213	NA	0.09	0.11	0.14	0.16	NA	0.09	0.11	0.14	0.16
Fish with swim bladder	L_{pk} [c]	207	NA	0.14	0.49	0.56	0.58	NA	0.14	0.49	0.57	0.58
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	NA	-	-	-	-
Sea turtles	L_p [e]	175	2.01	2.42	2.85	3.70	4.03	2.21	2.43	2.87	3.83	4.21

Table G-244. WTG MP1 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	13.13	14.28
Fish < 2 g	183 [a]	15.41	16.76
Fish without swim bladder	216 [c]	1.42	1.47
Fish with swim bladder	203 [c]	4.95	5.25
Sea turtles	204 [d]	4.62	4.87

Table G-245. WTG MP1 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 1650 kJ	Summer 2750 kJ	Summer 4750 kJ	Summer 5225 kJ	Winter Vibr.	Winter 1650 kJ	Winter 2750 kJ	Winter 4750 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.09	0.13	0.16	0.26	NA	0.09	0.13	0.16	0.17
Fish ≥ 2g	L_p [b]	150	9.38	8.12	9.40	11.50	12.32	9.95	9.14	10.92	13.53	14.20
Fish < 2 g	L_{pk} [a]	206	NA	0.09	0.13	0.16	0.26	NA	0.09	0.13	0.16	0.17
Fish < 2 g	L_p [b]	150	9.38	8.12	9.40	11.50	12.32	9.95	9.14	10.92	13.53	14.20
Fish without swim bladder	L_{pk} [c]	213	NA	0.02	0.04	0.06	0.08	NA	0.02	0.04	0.06	0.08
Fish with swim bladder	L_{pk} [c]	207	NA	0.09	0.11	0.14	0.16	NA	0.09	0.11	0.14	0.16
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	NA	-	-	-	-
Sea turtles	L_p [e]	175	0.98	1.33	1.71	2.32	2.53	1.03	1.33	1.71	2.33	2.56

Table G-246. WTG MP1 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	9.24	10.07
Fish < 2 g	183 [a]	11.84	12.98
Fish without swim bladder	216 [c]	0.64	0.65
Fish with swim bladder	203 [c]	2.82	2.99
Sea turtles	204 [d]	2.61	2.71

Table G-247. WTG MP1 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 1650 kJ	Summer 2750 kJ	Summer 4750 kJ	Summer 5225 kJ	Winter Vibr.	Winter 1650 kJ	Winter 2750 kJ	Winter 4750 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.05	0.08	0.10	0.11	NA	0.04	0.07	0.10	0.11
Fish ≥ 2g	L_{p} [b]	150	7.52	6.45	7.72	9.18	9.84	7.93	7.17	8.57	10.84	11.61
Fish < 2 g	L_{pk} [a]	206	NA	0.05	0.08	0.10	0.11	NA	0.04	0.07	0.10	0.11
Fish < 2 g	L_{p} [b]	150	7.52	6.45	7.72	9.18	9.84	7.93	7.17	8.57	10.84	11.61
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	0.03	0.03	NA	-	-	0.03	0.03
Fish with swim bladder	L_{pk} [c]	207	NA	0.03	0.06	0.09	0.10	NA	0.03	0.06	0.09	0.10
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	NA	-	-	-	-
Sea turtles	L_{p} [e]	175	0.57	0.68	1.13	1.59	1.74	0.58	0.68	1.08	1.58	1.73

Table G-248. WTG MP1 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	7.39	7.99
Fish < 2 g	183 [a]	9.24	10.07
Fish without swim bladder	216 [c]	0.42	0.38
Fish with swim bladder	203 [c]	1.90	2.03
Sea turtles	204 [d]	1.76	1.80

Table G-249. WTG MP1 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 1650 kJ	Summer 2750 kJ	Summer 4750 kJ	Summer 5225 kJ	Winter Vibr.	Winter 1650 kJ	Winter 2750 kJ	Winter 4750 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	-	0.03	0.05	0.06	NA	-	0.03	0.05	0.05
Fish ≥ 2g	L_p [b]	150	5.33	4.87	5.73	6.96	7.58	5.62	5.14	6.22	7.84	8.44
Fish < 2 g	L_{pk} [a]	206	NA	-	0.03	0.05	0.06	NA	-	0.03	0.05	0.05
Fish < 2 g	L_p [b]	150	5.33	4.87	5.73	6.96	7.58	5.62	5.14	6.22	7.84	8.44
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	-	-	NA	-	-	-	-
Fish with swim bladder	L_{pk} [c]	207	NA	-	0.02	0.04	0.05	NA	-	0.02	0.04	0.05
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	NA	-	-	-	-
Sea turtles	L_p [e]	175	0.31	0.48	0.57	0.78	1.03	0.31	0.48	0.57	0.80	0.91

Table G-250. WTG MP1 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	5.32	5.65
Fish < 2 g	183 [a]	6.89	7.49
Fish without swim bladder	216 [c]	0.10	0.10
Fish with swim bladder	203 [c]	1.10	1.12
Sea turtles	204 [d]	0.97	0.99

WTG MP2

Table G-251. WTG MP2 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 550 kJ	Summer 1100 kJ	Summer 2750 kJ	Summer 3850 kJ	Summer 5225 kJ	Winter Vibr.	Winter 550 kJ	Winter 1100 kJ	Winter 2750 kJ	Winter 3850 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.12	0.19	0.43	0.48	0.60	NA	0.13	0.19	0.41	0.46	0.61
Fish ≥ 2g	L_p [b]	150	13.83	11.11	10.74	13.59	15.56	17.28	17.73	13.04	14.59	20.06	24.18	28.75
Fish < 2 g	L_{pk} [a]	206	NA	0.12	0.19	0.43	0.48	0.60	NA	0.13	0.19	0.41	0.46	0.61
Fish < 2 g	L_p [b]	150	13.83	11.11	10.74	13.59	15.56	17.28	17.73	13.04	14.59	20.06	24.18	28.75
Fish without swim bladder	L_{pk} [c]	213	NA	0.06	0.09	0.13	0.16	0.24	NA	0.06	0.09	0.14	0.16	0.23
Fish with swim bladder	L_{pk} [c]	207	NA	0.11	0.14	0.37	0.46	0.54	NA	0.11	0.15	0.37	0.44	0.54
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	NA	-	-	-	-	-
Sea turtles	L_p [e]	175	2.67	2.25	1.97	2.92	3.63	4.30	2.86	2.39	2.18	3.28	4.02	4.76

Table G-252. WTG MP2 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa^2·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	12.41	16.63
Fish < 2 g	183 [a]	14.94	20.91
Fish without swim bladder	216 [c]	1.56	1.66
Fish with swim bladder	203 [c]	4.85	5.48
Sea turtles	204 [d]	4.55	5.10

Table G-253. WTG MP2 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 550 kJ	Summer 1100 kJ	Summer 2750 kJ	Summer 3850 kJ	Summer 5225 kJ	Winter Vibr.	Winter 550 kJ	Winter 1100 kJ	Winter 2750 kJ	Winter 3850 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.06	0.09	0.14	0.17	0.26	NA	0.06	0.09	0.15	0.17	0.26
Fish ≥ 2g	L_p [b]	150	9.61	8.11	7.67	9.86	11.70	12.94	12.85	9.10	9.43	13.61	16.45	19.18
Fish < 2 g	L_{pk} [a]	206	NA	0.06	0.09	0.14	0.17	0.26	NA	0.06	0.09	0.15	0.17	0.26
Fish < 2 g	L_p [b]	150	9.61	8.11	7.67	9.86	11.70	12.94	12.85	9.10	9.43	13.61	16.45	19.18
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	0.07	0.09	0.12	NA	-	-	0.07	0.09	0.13
Fish with swim bladder	L_{pk} [c]	207	NA	0.06	0.09	0.13	0.16	0.24	NA	0.06	0.09	0.14	0.16	0.23
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	NA	-	-	-	-	-
Sea turtles	L_p [e]	175	1.49	1.13	1.08	1.72	2.18	2.67	1.58	1.20	1.16	1.85	2.37	2.85

Table G-254. WTG MP2 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	8.69	11.28
Fish < 2 g	183 [a]	11.08	14.75
Fish without swim bladder	216 [c]	0.72	0.75
Fish with swim bladder	203 [c]	2.95	3.36
Sea turtles	204 [d]	2.73	2.98

Table G-255. WTG MP2 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 550 kJ	Summer 1100 kJ	Summer 2750 kJ	Summer 3850 kJ	Summer 5225 kJ	Winter Vibr.	Winter 550 kJ	Winter 1100 kJ	Winter 2750 kJ	Winter 3850 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.02	0.06	0.11	0.13	0.15	NA	0.02	0.06	0.11	0.13	0.16
Fish ≥ 2g	L_{p} [b]	150	7.80	6.52	6.08	7.98	9.16	10.39	9.36	7.23	7.20	10.19	12.55	14.34
Fish < 2 g	L_{pk} [a]	206	NA	0.02	0.06	0.11	0.13	0.15	NA	0.02	0.06	0.11	0.13	0.16
Fish < 2 g	L_{p} [b]	150	7.80	6.52	6.08	7.98	9.16	10.39	9.36	7.23	7.20	10.19	12.55	14.34
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	-	0.03	0.07	NA	-	-	-	0.02	0.07
Fish with swim bladder	L_{pk} [c]	207	NA	-	0.04	0.09	0.12	0.14	NA	-	0.04	0.09	0.12	0.14
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	NA	-	-	-	-	-
Sea turtles	L_{p} [e]	175	0.89	0.63	0.62	1.11	1.43	1.87	0.92	0.70	0.70	1.21	1.56	2.03

Table G-256. WTG MP2 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	6.92	8.36
Fish < 2 g	183 [a]	8.69	11.28
Fish without swim bladder	216 [c]	0.40	0.43
Fish with swim bladder	203 [c]	2.07	2.28
Sea turtles	204 [d]	1.87	2.04

Table G-257. WTG MP2 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 550 kJ	Summer 1100 kJ	Summer 2750 kJ	Summer 3850 kJ	Summer 5225 kJ	Winter Vibr.	Winter 550 kJ	Winter 1100 kJ	Winter 2750 kJ	Winter 3850 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	-	-	0.05	0.07	0.09	NA	-	-	0.04	0.07	0.10
Fish ≥ 2g	L_p [b]	150	5.82	4.89	4.47	5.95	6.95	7.85	6.71	5.28	5.03	7.11	8.58	9.56
Fish < 2 g	L_{pk} [a]	206	NA	-	-	0.05	0.07	0.09	NA	-	-	0.04	0.07	0.10
Fish < 2 g	L_p [b]	150	5.82	4.89	4.47	5.95	6.95	7.85	6.71	5.28	5.03	7.11	8.58	9.56
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	-	-	-	NA	-	-	-	-	-
Fish with swim bladder	L_{pk} [c]	207	NA	-	-	0.02	0.06	0.09	NA	-	-	0.02	0.06	0.09
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	NA	-	-	-	-	-
Sea turtles	L_p [e]	175	0.45	0.34	0.27	0.55	0.77	1.09	0.46	0.34	0.30	0.58	0.81	1.17

Table G-258. WTG MP2 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	5.16	5.88
Fish < 2 g	183 [a]	6.52	7.81
Fish without swim bladder	216 [c]	0.16	0.17
Fish with swim bladder	203 [c]	1.21	1.31
Sea turtles	204 [d]	1.07	1.16

Table G-259. WTG MP2 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 550 kJ	Summer 1100 kJ	Summer 2750 kJ	Summer 3850 kJ	Summer 5225 kJ	Winter Vibr.	Winter 550 kJ	Winter 1100 kJ	Winter 2750 kJ	Winter 3850 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.12	0.19	0.43	0.48	0.60	NA	0.13	0.19	0.41	0.46	0.61
Fish ≥ 2g	L_{p} [b]	150	13.89	11.11	10.74	13.59	15.56	17.28	17.50	13.04	14.59	20.06	24.18	28.75
Fish < 2 g	L_{pk} [a]	206	NA	0.12	0.19	0.43	0.48	0.60	NA	0.13	0.19	0.41	0.46	0.61
Fish < 2 g	L_{p} [b]	150	13.89	11.11	10.74	13.59	15.56	17.28	17.50	13.04	14.59	20.06	24.18	28.75
Fish without swim bladder	L_{pk} [c]	213	NA	0.06	0.09	0.13	0.16	0.24	NA	0.06	0.09	0.14	0.16	0.23
Fish with swim bladder	L_{pk} [c]	207	NA	0.11	0.14	0.37	0.46	0.54	NA	0.11	0.15	0.37	0.44	0.54
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	NA	-	-	-	-	-
Sea turtles	L_{p} [e]	175	2.46	2.25	1.97	2.92	3.63	4.30	2.62	2.39	2.18	3.28	4.02	4.76

Table G-260. WTG MP2 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	13.72	18.10
Fish < 2 g	183 [a]	16.26	22.56
Fish without swim bladder	216 [c]	1.73	1.86
Fish with swim bladder	203 [c]	5.36	5.96
Sea turtles	204 [d]	5.03	5.55

Table G-261. WTG MP2 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 550 kJ	Summer 1100 kJ	Summer 2750 kJ	Summer 3850 kJ	Summer 5225 kJ	Winter Vibr.	Winter 550 kJ	Winter 1100 kJ	Winter 2750 kJ	Winter 3850 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.06	0.09	0.14	0.17	0.26	NA	0.06	0.09	0.15	0.17	0.26
Fish ≥ 2g	L_{p} [b]	150	9.57	8.11	7.67	9.86	11.70	12.94	12.30	9.10	9.43	13.61	16.45	19.18
Fish < 2 g	L_{pk} [a]	206	NA	0.06	0.09	0.14	0.17	0.26	NA	0.06	0.09	0.15	0.17	0.26
Fish < 2 g	L_{p} [b]	150	9.57	8.11	7.67	9.86	11.70	12.94	12.30	9.10	9.43	13.61	16.45	19.18
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	0.07	0.09	0.12	NA	-	-	0.07	0.09	0.13
Fish with swim bladder	L_{pk} [c]	207	NA	0.06	0.09	0.13	0.16	0.24	NA	0.06	0.09	0.14	0.16	0.23
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	NA	-	-	-	-	-
Sea turtles	L_{p} [e]	175	1.33	1.13	1.08	1.72	2.18	2.67	1.43	1.20	1.16	1.85	2.37	2.85

Table G-262. WTG MP2 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	9.53	12.50
Fish < 2 g	183 [a]	12.40	16.08
Fish without swim bladder	216 [c]	0.86	0.91
Fish with swim bladder	203 [c]	3.37	3.71
Sea turtles	204 [d]	3.06	3.37

Table G-263. WTG MP2 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 550 kJ	Summer 1100 kJ	Summer 2750 kJ	Summer 3850 kJ	Summer 5225 kJ	Winter Vibr.	Winter 550 kJ	Winter 1100 kJ	Winter 2750 kJ	Winter 3850 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.02	0.06	0.11	0.13	0.15	NA	0.02	0.06	0.11	0.13	0.16
Fish ≥ 2g	L_p [b]	150	7.72	6.52	6.08	7.98	9.16	10.39	8.92	7.23	7.20	10.19	12.55	14.34
Fish < 2 g	L_{pk} [a]	206	NA	0.02	0.06	0.11	0.13	0.15	NA	0.02	0.06	0.11	0.13	0.16
Fish < 2 g	L_p [b]	150	7.72	6.52	6.08	7.98	9.16	10.39	8.92	7.23	7.20	10.19	12.55	14.34
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	-	0.03	0.07	NA	-	-	-	0.02	0.07
Fish with swim bladder	L_{pk} [c]	207	NA	-	0.04	0.09	0.12	0.14	NA	-	0.04	0.09	0.12	0.14
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	NA	-	-	-	-	-
Sea turtles	L_p [e]	175	0.82	0.63	0.62	1.11	1.43	1.87	0.86	0.70	0.70	1.21	1.56	2.03

Table G-264. WTG MP2 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	7.71	9.07
Fish < 2 g	183 [a]	9.53	12.50
Fish without swim bladder	216 [c]	0.49	0.53
Fish with swim bladder	203 [c]	2.36	2.55
Sea turtles	204 [d]	2.09	2.31

Table G-265. WTG MP2 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 550 kJ	Summer 1100 kJ	Summer 2750 kJ	Summer 3850 kJ	Summer 5225 kJ	Winter Vibr.	Winter 550 kJ	Winter 1100 kJ	Winter 2750 kJ	Winter 3850 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	-	-	0.05	0.07	0.09	NA	-	-	0.04	0.07	0.10
Fish ≥ 2g	L_p [b]	150	5.68	4.89	4.47	5.95	6.95	7.85	6.28	5.28	5.03	7.11	8.58	9.56
Fish < 2 g	L_{pk} [a]	206	NA	-	-	0.05	0.07	0.09	NA	-	-	0.04	0.07	0.10
Fish < 2 g	L_p [b]	150	5.68	4.89	4.47	5.95	6.95	7.85	6.28	5.28	5.03	7.11	8.58	9.56
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	-	-	-	NA	-	-	-	-	-
Fish with swim bladder	L_{pk} [c]	207	NA	-	-	0.02	0.06	0.09	NA	-	-	0.02	0.06	0.09
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	NA	-	-	-	-	-
Sea turtles	L_p [e]	175	0.41	0.34	0.27	0.55	0.77	1.09	0.43	0.34	0.30	0.58	0.81	1.17

Table G-266. WTG MP2 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	5.70	6.39
Fish < 2 g	183 [a]	7.25	8.53
Fish without swim bladder	216 [c]	0.20	0.20
Fish with swim bladder	203 [c]	1.44	1.54
Sea turtles	204 [d]	1.22	1.34

Table G-267. WTG MP2 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 550 kJ	Summer 1100 kJ	Summer 2750 kJ	Summer 3850 kJ	Summer 5225 kJ	Winter Vibr.	Winter 550 kJ	Winter 1100 kJ	Winter 2750 kJ	Winter 3850 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.11	0.13	0.52	0.57	0.60	NA	0.11	0.13	0.51	0.57	0.61
Fish ≥ 2g	L_{p} [b]	150	15.60	12.14	11.19	12.47	13.58	15.56	16.46	14.45	12.63	14.67	16.58	18.14
Fish < 2 g	L_{pk} [a]	206	NA	0.11	0.13	0.52	0.57	0.60	NA	0.11	0.13	0.51	0.57	0.61
Fish < 2 g	L_{p} [b]	150	15.60	12.14	11.19	12.47	13.58	15.56	16.46	14.45	12.63	14.67	16.58	18.14
Fish without swim bladder	L_{pk} [c]	213	NA	0.03	0.05	0.10	0.13	0.16	NA	0.03	0.05	0.11	0.13	0.16
Fish with swim bladder	L_{pk} [c]	207	NA	0.09	0.12	0.48	0.54	0.58	NA	0.10	0.13	0.48	0.54	0.58
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	NA	-	-	-	-	-
Sea turtles	L_{p} [e]	175	2.70	1.95	1.95	2.86	3.31	3.97	2.75	2.06	2.00	2.89	3.36	4.16

Table G-268. WTG MP2 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	13.55	14.79
Fish < 2 g	183 [a]	15.81	17.34
Fish without swim bladder	216 [c]	1.40	1.41
Fish with swim bladder	203 [c]	5.16	5.43
Sea turtles	204 [d]	4.80	5.03

Table G-269. WTG MP2 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 550 kJ	Summer 1100 kJ	Summer 2750 kJ	Summer 3850 kJ	Summer 5225 kJ	Winter Vibr.	Winter 550 kJ	Winter 1100 kJ	Winter 2750 kJ	Winter 3850 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.04	0.07	0.12	0.13	0.25	NA	0.04	0.07	0.12	0.13	0.17
Fish ≥ 2g	L_p [b]	150	11.92	8.88	8.17	9.20	10.22	12.26	12.73	10.36	8.92	10.78	12.50	14.13
Fish < 2 g	L_{pk} [a]	206	NA	0.04	0.07	0.12	0.13	0.25	NA	0.04	0.07	0.12	0.13	0.17
Fish < 2 g	L_p [b]	150	11.92	8.88	8.17	9.20	10.22	12.26	12.73	10.36	8.92	10.78	12.50	14.13
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	0.04	0.05	0.08	NA	-	-	0.04	0.05	0.07
Fish with swim bladder	L_{pk} [c]	207	NA	0.03	0.05	0.10	0.13	0.16	NA	0.03	0.05	0.11	0.13	0.16
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	NA	-	-	-	-	-
Sea turtles	L_p [e]	175	1.23	0.92	1.02	1.69	2.11	2.50	1.26	0.98	1.02	1.72	2.09	2.52

Table G-270. WTG MP2 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	9.53	10.65
Fish < 2 g	183 [a]	12.30	13.51
Fish without swim bladder	216 [c]	0.60	0.60
Fish with swim bladder	203 [c]	2.95	3.08
Sea turtles	204 [d]	2.71	2.77

Table G-271. WTG MP2 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 550 kJ	Summer 1100 kJ	Summer 2750 kJ	Summer 3850 kJ	Summer 5225 kJ	Winter Vibr.	Winter 550 kJ	Winter 1100 kJ	Winter 2750 kJ	Winter 3850 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	-	0.03	0.07	0.09	0.11	NA	-	0.03	0.06	0.09	0.11
Fish ≥ 2g	L_p [b]	150	9.20	7.02	6.41	7.48	8.34	9.76	9.63	8.10	6.95	8.45	9.63	11.55
Fish < 2 g	L_{pk} [a]	206	NA	-	0.03	0.07	0.09	0.11	NA	-	0.03	0.06	0.09	0.11
Fish < 2 g	L_p [b]	150	9.20	7.02	6.41	7.48	8.34	9.76	9.63	8.10	6.95	8.45	9.63	11.55
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	-	0.02	0.03	NA	-	-	-	0.02	0.03
Fish with swim bladder	L_{pk} [c]	207	NA	-	0.02	0.06	0.08	0.10	NA	-	0.02	0.06	0.08	0.10
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	NA	-	-	-	-	-
Sea turtles	L_p [e]	175	0.65	0.55	0.58	1.10	1.40	1.72	0.65	0.59	0.59	1.06	1.40	1.71

Table G-272. WTG MP2 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	7.70	8.32
Fish < 2 g	183 [a]	9.53	10.65
Fish without swim bladder	216 [c]	0.28	0.28
Fish with swim bladder	203 [c]	1.94	1.99
Sea turtles	204 [d]	1.75	1.77

Table G-273. WTG MP2 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 550 kJ	Summer 1100 kJ	Summer 2750 kJ	Summer 3850 kJ	Summer 5225 kJ	Winter Vibr.	Winter 550 kJ	Winter 1100 kJ	Winter 2750 kJ	Winter 3850 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	-	-	0.02	0.03	0.05	NA	-	-	0.02	0.03	0.05
Fish ≥ 2g	L_p [b]	150	6.75	4.98	4.59	5.59	6.22	7.53	7.11	5.56	4.90	6.10	7.03	8.39
Fish < 2 g	L_{pk} [a]	206	NA	-	-	0.02	0.03	0.05	NA	-	-	0.02	0.03	0.05
Fish < 2 g	L_p [b]	150	6.75	4.98	4.59	5.59	6.22	7.53	7.11	5.56	4.90	6.10	7.03	8.39
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	-	-	-	NA	-	-	-	-	-
Fish with swim bladder	L_{pk} [c]	207	NA	-	-	0.02	0.03	0.05	NA	-	-	0.02	0.03	0.04
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	NA	-	-	-	-	-
Sea turtles	L_p [e]	175	0.27	0.14	0.43	0.56	0.67	1.03	0.27	0.15	0.19	0.57	0.67	0.94

Table G-274. WTG MP2 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	5.54	5.86
Fish < 2 g	183 [a]	7.21	7.80
Fish without swim bladder	216 [c]	0.10	0.10
Fish with swim bladder	203 [c]	1.09	1.07
Sea turtles	204 [d]	0.94	0.92

Table G-275. WTG MP2 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 550 kJ	Summer 1100 kJ	Summer 2750 kJ	Summer 3850 kJ	Summer 5225 kJ	Winter Vibr.	Winter 550 kJ	Winter 1100 kJ	Winter 2750 kJ	Winter 3850 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.11	0.13	0.52	0.57	0.60	NA	0.11	0.13	0.51	0.57	0.61
Fish ≥ 2g	L_p [b]	150	14.29	12.14	11.19	12.47	13.58	15.56	14.96	14.45	12.63	14.67	16.58	18.14
Fish < 2 g	L_{pk} [a]	206	NA	0.11	0.13	0.52	0.57	0.60	NA	0.11	0.13	0.51	0.57	0.61
Fish < 2 g	L_p [b]	150	14.29	12.14	11.19	12.47	13.58	15.56	14.96	14.45	12.63	14.67	16.58	18.14
Fish without swim bladder	L_{pk} [c]	213	NA	0.03	0.05	0.10	0.13	0.16	NA	0.03	0.05	0.11	0.13	0.16
Fish with swim bladder	L_{pk} [c]	207	NA	0.09	0.12	0.48	0.54	0.58	NA	0.10	0.13	0.48	0.54	0.58
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	NA	-	-	-	-	-
Sea turtles	L_p [e]	175	2.28	1.95	1.95	2.86	3.31	3.97	2.27	2.06	2.00	2.89	3.36	4.16

Table G-276. WTG MP2 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	13.86	15.02
Fish < 2 g	183 [a]	16.08	17.58
Fish without swim bladder	216 [c]	1.58	1.58
Fish with swim bladder	203 [c]	5.40	5.64
Sea turtles	204 [d]	5.04	5.23

Table G-277. WTG MP2 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 550 kJ	Summer 1100 kJ	Summer 2750 kJ	Summer 3850 kJ	Summer 5225 kJ	Winter Vibr.	Winter 550 kJ	Winter 1100 kJ	Winter 2750 kJ	Winter 3850 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.04	0.07	0.12	0.13	0.25	NA	0.04	0.07	0.12	0.13	0.17
Fish ≥ 2g	L_{p} [b]	150	10.17	8.88	8.17	9.20	10.22	12.26	10.87	10.36	8.92	10.78	12.50	14.13
Fish < 2 g	L_{pk} [a]	206	NA	0.04	0.07	0.12	0.13	0.25	NA	0.04	0.07	0.12	0.13	0.17
Fish < 2 g	L_{p} [b]	150	10.17	8.88	8.17	9.20	10.22	12.26	10.87	10.36	8.92	10.78	12.50	14.13
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	0.04	0.05	0.08	NA	-	-	0.04	0.05	0.07
Fish with swim bladder	L_{pk} [c]	207	NA	0.03	0.05	0.10	0.13	0.16	NA	0.03	0.05	0.11	0.13	0.16
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	NA	-	-	-	-	-
Sea turtles	L_{p} [e]	175	1.02	0.92	1.02	1.69	2.11	2.50	1.00	0.98	1.02	1.72	2.09	2.52

Table G-278. WTG MP2 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	9.84	10.95
Fish < 2 g	183 [a]	12.63	13.77
Fish without swim bladder	216 [c]	0.66	0.68
Fish with swim bladder	203 [c]	3.28	3.32
Sea turtles	204 [d]	2.88	2.93

Table G-279. WTG MP2 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 550 kJ	Summer 1100 kJ	Summer 2750 kJ	Summer 3850 kJ	Summer 5225 kJ	Winter Vibr.	Winter 550 kJ	Winter 1100 kJ	Winter 2750 kJ	Winter 3850 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	-	0.03	0.07	0.09	0.11	NA	-	0.03	0.06	0.09	0.11
Fish ≥ 2g	L_{p} [b]	150	8.13	7.02	6.41	7.48	8.34	9.76	8.50	8.10	6.95	8.45	9.63	11.55
Fish < 2 g	L_{pk} [a]	206	NA	-	0.03	0.07	0.09	0.11	NA	-	0.03	0.06	0.09	0.11
Fish < 2 g	L_{p} [b]	150	8.13	7.02	6.41	7.48	8.34	9.76	8.50	8.10	6.95	8.45	9.63	11.55
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	-	0.02	0.03	NA	-	-	-	0.02	0.03
Fish with swim bladder	L_{pk} [c]	207	NA	-	0.02	0.06	0.08	0.10	NA	-	0.02	0.06	0.08	0.10
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	NA	-	-	-	-	-
Sea turtles	L_{p} [e]	175	0.55	0.55	0.58	1.10	1.40	1.72	0.59	0.59	0.59	1.06	1.40	1.71

Table G-280. WTG MP2 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	7.96	8.54
Fish < 2 g	183 [a]	9.84	10.95
Fish without swim bladder	216 [c]	0.45	0.41
Fish with swim bladder	203 [c]	2.18	2.21
Sea turtles	204 [d]	1.92	1.90

Table G-281. WTG MP2 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 550 kJ	Summer 1100 kJ	Summer 2750 kJ	Summer 3850 kJ	Summer 5225 kJ	Winter Vibr.	Winter 550 kJ	Winter 1100 kJ	Winter 2750 kJ	Winter 3850 kJ	Winter 5225 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	-	-	0.02	0.03	0.05	NA	-	-	0.02	0.03	0.05
Fish ≥ 2g	L_{p} [b]	150	5.84	4.98	4.59	5.59	6.22	7.53	6.03	5.56	4.90	6.10	7.03	8.39
Fish < 2 g	L_{pk} [a]	206	NA	-	-	0.02	0.03	0.05	NA	-	-	0.02	0.03	0.05
Fish < 2 g	L_{p} [b]	150	5.84	4.98	4.59	5.59	6.22	7.53	6.03	5.56	4.90	6.10	7.03	8.39
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	-	-	-	NA	-	-	-	-	-
Fish with swim bladder	L_{pk} [c]	207	NA	-	-	0.02	0.03	0.05	NA	-	-	0.02	0.03	0.04
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	NA	-	-	-	-	-
Sea turtles	L_{p} [e]	175	0.30	0.14	0.43	0.56	0.67	1.03	0.30	0.15	0.19	0.57	0.67	0.94

Table G-282. WTG MP2 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	5.76	6.08
Fish < 2 g	183 [a]	7.49	8.03
Fish without swim bladder	216 [c]	0.11	0.11
Fish with swim bladder	203 [c]	1.22	1.19
Sea turtles	204 [d]	1.07	1.03

WTG MP3

Table G-283. WTG MP3 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 654 kJ	Summer 1307 kJ	Summer 2614 kJ	Summer 3921 kJ	Summer 6208 kJ	Winter Vibr.	Winter 654 kJ	Winter 1307 kJ	Winter 2614 kJ	Winter 3921 kJ	Winter 6208 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.12	0.18	0.28	0.47	0.60	NA	0.13	0.17	0.37	0.45	0.58
Fish ≥ 2g	L_p [b]	150	11.83	10.95	11.16	13.18	15.09	18.82	15.22	13.18	15.56	19.12	22.47	32.86
Fish < 2 g	L_{pk} [a]	206	NA	0.12	0.18	0.28	0.47	0.60	NA	0.13	0.17	0.37	0.45	0.58
Fish < 2 g	L_p [b]	150	11.83	10.95	11.16	13.18	15.09	18.82	15.22	13.18	15.56	19.12	22.47	32.86
Fish without swim bladder	L_{pk} [c]	213	NA	0.06	0.08	0.12	0.14	0.25	NA	0.06	0.08	0.13	0.15	0.24
Fish with swim bladder	L_{pk} [c]	207	NA	0.11	0.14	0.26	0.43	0.56	NA	0.11	0.15	0.28	0.42	0.53
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	NA	-	-	-	-	-
Sea turtles	L_p [e]	175	2.26	2.18	2.08	2.71	3.52	4.62	2.44	2.36	2.28	2.95	3.91	5.17

Table G-284. WTG MP3 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	13.58	19.89
Fish < 2 g	183 [a]	16.35	26.25
Fish without swim bladder	216 [c]	1.87	2.04
Fish with swim bladder	203 [c]	5.40	6.19
Sea turtles	204 [d]	5.07	5.78

Table G-285. WTG MP3 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 654 kJ	Summer 1307 kJ	Summer 2614 kJ	Summer 3921 kJ	Summer 6208 kJ	Winter Vibr.	Winter 654 kJ	Winter 1307 kJ	Winter 2614 kJ	Winter 3921 kJ	Winter 6208 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.06	0.09	0.13	0.15	0.28	NA	0.06	0.09	0.13	0.17	0.28
Fish ≥ 2g	L_{p} [b]	150	8.28	8.03	7.95	9.41	11.40	14.17	10.18	9.17	10.14	12.96	15.38	21.63
Fish < 2 g	L_{pk} [a]	206	NA	0.06	0.09	0.13	0.15	0.28	NA	0.06	0.09	0.13	0.17	0.28
Fish < 2 g	L_{p} [b]	150	8.28	8.03	7.95	9.41	11.40	14.17	10.18	9.17	10.14	12.96	15.38	21.63
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	0.06	0.08	0.13	NA	-	-	0.06	0.08	0.13
Fish with swim bladder	L_{pk} [c]	207	NA	0.06	0.08	0.12	0.14	0.25	NA	0.06	0.08	0.13	0.15	0.24
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	NA	-	-	-	-	-
Sea turtles	L_{p} [e]	175	1.23	1.14	1.13	1.56	2.04	2.87	1.34	1.22	1.21	1.69	2.27	3.19

Table G-286. WTG MP3 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	9.56	13.07
Fish < 2 g	183 [a]	12.28	17.32
Fish without swim bladder	216 [c]	0.92	1.00
Fish with swim bladder	203 [c]	3.58	3.99
Sea turtles	204 [d]	3.25	3.65

Table G-287. WTG MP3 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 654 kJ	Summer 1307 kJ	Summer 2614 kJ	Summer 3921 kJ	Summer 6208 kJ	Winter Vibr.	Winter 654 kJ	Winter 1307 kJ	Winter 2614 kJ	Winter 3921 kJ	Winter 6208 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.02	0.05	0.09	0.11	0.16	NA	0.02	0.05	0.09	0.12	0.17
Fish ≥ 2g	L_p [b]	150	6.60	6.47	6.27	7.62	8.96	11.52	7.81	7.27	7.64	9.55	11.87	16.34
Fish < 2 g	L_{pk} [a]	206	NA	0.02	0.05	0.09	0.11	0.16	NA	0.02	0.05	0.09	0.12	0.17
Fish < 2 g	L_p [b]	150	6.60	6.47	6.27	7.62	8.96	11.52	7.81	7.27	7.64	9.55	11.87	16.34
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	-	0.02	0.08	NA	-	-	-	0.02	0.08
Fish with swim bladder	L_{pk} [c]	207	NA	-	0.03	0.08	0.11	0.15	NA	-	0.03	0.08	0.11	0.16
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	NA	-	-	-	-	-
Sea turtles	L_p [e]	175	0.73	0.65	0.66	0.95	1.34	2.02	0.77	0.72	0.72	1.06	1.49	2.20

Table G-288. WTG MP3 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	7.72	9.44
Fish < 2 g	183 [a]	9.56	13.07
Fish without swim bladder	216 [c]	0.55	0.58
Fish with swim bladder	203 [c]	2.53	2.73
Sea turtles	204 [d]	2.32	2.54

Table G-289. WTG MP3 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 654 kJ	Summer 1307 kJ	Summer 2614 kJ	Summer 3921 kJ	Summer 6208 kJ	Winter Vibr.	Winter 654 kJ	Winter 1307 kJ	Winter 2614 kJ	Winter 3921 kJ	Winter 6208 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	-	-	0.02	0.06	0.10	NA	-	-	0.02	0.06	0.10
Fish ≥ 2g	L_{p} [b]	150	5.05	4.87	4.60	5.66	6.77	8.49	5.61	5.29	5.27	6.69	8.23	11.14
Fish < 2 g	L_{pk} [a]	206	NA	-	-	0.02	0.06	0.10	NA	-	-	0.02	0.06	0.10
Fish < 2 g	L_{p} [b]	150	5.05	4.87	4.60	5.66	6.77	8.49	5.61	5.29	5.27	6.69	8.23	11.14
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	-	-	-	NA	-	-	-	-	-
Fish with swim bladder	L_{pk} [c]	207	NA	-	-	-	0.03	0.09	NA	-	-	-	0.03	0.09
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	NA	-	-	-	-	-
Sea turtles	L_{p} [e]	175	0.30	0.34	0.29	0.48	0.73	1.24	0.37	0.34	0.31	0.51	0.76	1.32

Table G-290. WTG MP3 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	5.74	6.63
Fish < 2 g	183 [a]	7.27	8.84
Fish without swim bladder	216 [c]	0.24	0.24
Fish with swim bladder	203 [c]	1.56	1.67
Sea turtles	204 [d]	1.40	1.52

Table G-291. WTG MP3 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 654 kJ	Summer 1307 kJ	Summer 2614 kJ	Summer 3921 kJ	Summer 6208 kJ	Winter Vibr.	Winter 654 kJ	Winter 1307 kJ	Winter 2614 kJ	Winter 3921 kJ	Winter 6208 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.12	0.18	0.28	0.47	0.60	NA	0.13	0.17	0.37	0.45	0.58
Fish ≥ 2g	L_{p} [b]	150	11.63	10.95	11.16	13.18	15.09	18.82	14.29	13.18	15.56	19.12	22.47	32.86
Fish < 2 g	L_{pk} [a]	206	NA	0.12	0.18	0.28	0.47	0.60	NA	0.13	0.17	0.37	0.45	0.58
Fish < 2 g	L_{p} [b]	150	11.63	10.95	11.16	13.18	15.09	18.82	14.29	13.18	15.56	19.12	22.47	32.86
Fish without swim bladder	L_{pk} [c]	213	NA	0.06	0.08	0.12	0.14	0.25	NA	0.06	0.08	0.13	0.15	0.24
Fish with swim bladder	L_{pk} [c]	207	NA	0.11	0.14	0.26	0.43	0.56	NA	0.11	0.15	0.28	0.42	0.53
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	NA	-	-	-	-	-
Sea turtles	L_{p} [e]	175	1.93	2.18	2.08	2.71	3.52	4.62	2.06	2.36	2.28	2.95	3.91	5.17

Table G-292. WTG MP3 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	14.00	20.14
Fish < 2 g	183 [a]	16.75	26.50
Fish without swim bladder	216 [c]	1.92	2.11
Fish with swim bladder	203 [c]	5.61	6.38
Sea turtles	204 [d]	5.27	5.96

Table G-293. WTG MP3 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 654 kJ	Summer 1307 kJ	Summer 2614 kJ	Summer 3921 kJ	Summer 6208 kJ	Winter Vibr.	Winter 654 kJ	Winter 1307 kJ	Winter 2614 kJ	Winter 3921 kJ	Winter 6208 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.06	0.09	0.13	0.15	0.28	NA	0.06	0.09	0.13	0.17	0.28
Fish ≥ 2g	L_{p} [b]	150	8.14	8.03	7.95	9.41	11.40	14.17	9.32	9.17	10.14	12.96	15.38	21.63
Fish < 2 g	L_{pk} [a]	206	NA	0.06	0.09	0.13	0.15	0.28	NA	0.06	0.09	0.13	0.17	0.28
Fish < 2 g	L_{p} [b]	150	8.14	8.03	7.95	9.41	11.40	14.17	9.32	9.17	10.14	12.96	15.38	21.63
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	0.06	0.08	0.13	NA	-	-	0.06	0.08	0.13
Fish with swim bladder	L_{pk} [c]	207	NA	0.06	0.08	0.12	0.14	0.25	NA	0.06	0.08	0.13	0.15	0.24
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	NA	-	-	-	-	-
Sea turtles	L_{p} [e]	175	0.95	1.14	1.13	1.56	2.04	2.87	1.01	1.22	1.21	1.69	2.27	3.19

Table G-294. WTG MP3 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	10.00	13.40
Fish < 2 g	183 [a]	12.70	17.62
Fish without swim bladder	216 [c]	0.95	1.06
Fish with swim bladder	203 [c]	3.74	4.12
Sea turtles	204 [d]	3.41	3.79

Table G-295. WTG MP3 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 654 kJ	Summer 1307 kJ	Summer 2614 kJ	Summer 3921 kJ	Summer 6208 kJ	Winter Vibr.	Winter 654 kJ	Winter 1307 kJ	Winter 2614 kJ	Winter 3921 kJ	Winter 6208 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.02	0.05	0.09	0.11	0.16	NA	0.02	0.05	0.09	0.12	0.17
Fish ≥ 2g	L_{p} [b]	150	6.46	6.47	6.27	7.62	8.96	11.52	7.26	7.27	7.64	9.55	11.87	16.34
Fish < 2 g	L_{pk} [a]	206	NA	0.02	0.05	0.09	0.11	0.16	NA	0.02	0.05	0.09	0.12	0.17
Fish < 2 g	L_{p} [b]	150	6.46	6.47	6.27	7.62	8.96	11.52	7.26	7.27	7.64	9.55	11.87	16.34
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	-	0.02	0.08	NA	-	-	-	0.02	0.08
Fish with swim bladder	L_{pk} [c]	207	NA	-	0.03	0.08	0.11	0.15	NA	-	0.03	0.08	0.11	0.16
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	NA	-	-	-	-	-
Sea turtles	L_{p} [e]	175	0.60	0.65	0.66	0.95	1.34	2.02	0.62	0.72	0.72	1.06	1.49	2.20

Table G-296. WTG MP3 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	8.00	9.76
Fish < 2 g	183 [a]	10.00	13.40
Fish without swim bladder	216 [c]	0.57	0.61
Fish with swim bladder	203 [c]	2.60	2.81
Sea turtles	204 [d]	2.42	2.61

Table G-297. WTG MP3 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location AY42 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 654 kJ	Summer 1307 kJ	Summer 2614 kJ	Summer 3921 kJ	Summer 6208 kJ	Winter Vibr.	Winter 654 kJ	Winter 1307 kJ	Winter 2614 kJ	Winter 3921 kJ	Winter 6208 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	-	-	0.02	0.06	0.10	NA	-	-	0.02	0.06	0.10
Fish ≥ 2g	L_{p} [b]	150	4.82	4.87	4.60	5.66	6.77	8.49	5.19	5.29	5.27	6.69	8.23	11.14
Fish < 2 g	L_{pk} [a]	206	NA	-	-	0.02	0.06	0.10	NA	-	-	0.02	0.06	0.10
Fish < 2 g	L_{p} [b]	150	4.82	4.87	4.60	5.66	6.77	8.49	5.19	5.29	5.27	6.69	8.23	11.14
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	-	-	-	NA	-	-	-	-	-
Fish with swim bladder	L_{pk} [c]	207	NA	-	-	-	0.03	0.09	NA	-	-	-	0.03	0.09
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	NA	-	-	-	-	-
Sea turtles	L_{p} [e]	175	0.21	0.34	0.29	0.48	0.73	1.24	0.22	0.34	0.31	0.51	0.76	1.32

Table G-298. WTG MP3 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location AY42 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	5.95	6.84
Fish < 2 g	183 [a]	7.55	9.06
Fish without swim bladder	216 [c]	0.25	0.25
Fish with swim bladder	203 [c]	1.61	1.74
Sea turtles	204 [d]	1.47	1.58

Table G-299. WTG MP3 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 654 kJ	Summer 1307 kJ	Summer 2614 kJ	Summer 3921 kJ	Summer 6208 kJ	Winter Vibr.	Winter 654 kJ	Winter 1307 kJ	Winter 2614 kJ	Winter 3921 kJ	Winter 6208 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.11	0.13	0.48	0.55	0.64	NA	0.12	0.13	0.49	0.56	0.64
Fish ≥ 2g	L_{p} [b]	150	15.70	12.12	11.66	12.21	13.50	16.32	16.76	14.46	13.18	14.30	16.59	18.33
Fish < 2 g	L_{pk} [a]	206	NA	0.11	0.13	0.48	0.55	0.64	NA	0.12	0.13	0.49	0.56	0.64
Fish < 2 g	L_{p} [b]	150	15.70	12.12	11.66	12.21	13.50	16.32	16.76	14.46	13.18	14.30	16.59	18.33
Fish without swim bladder	L_{pk} [c]	213	NA	0.03	0.06	0.09	0.12	0.16	NA	0.03	0.06	0.10	0.12	0.16
Fish with swim bladder	L_{pk} [c]	207	NA	0.10	0.12	0.46	0.53	0.61	NA	0.11	0.13	0.47	0.53	0.61
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	NA	-	-	-	-	-
Sea turtles	L_{p} [e]	175	2.86	1.90	2.09	2.76	3.31	4.39	3.08	2.00	2.14	2.78	3.31	4.57

Table G-300. WTG MP3 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	14.51	16.15
Fish < 2 g	183 [a]	16.75	18.87
Fish without swim bladder	216 [c]	1.93	2.00
Fish with swim bladder	203 [c]	5.96	6.44
Sea turtles	204 [d]	5.59	6.00

Table G-301. WTG MP3 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 654 kJ	Summer 1307 kJ	Summer 2614 kJ	Summer 3921 kJ	Summer 6208 kJ	Winter Vibr.	Winter 654 kJ	Winter 1307 kJ	Winter 2614 kJ	Winter 3921 kJ	Winter 6208 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.05	0.08	0.11	0.13	0.46	NA	0.05	0.07	0.11	0.13	0.18
Fish ≥ 2g	L_p [b]	150	12.08	8.85	8.50	8.99	10.15	13.04	13.06	10.29	9.29	10.40	12.48	14.50
Fish < 2 g	L_{pk} [a]	206	NA	0.05	0.08	0.11	0.13	0.46	NA	0.05	0.07	0.11	0.13	0.18
Fish < 2 g	L_p [b]	150	12.08	8.85	8.50	8.99	10.15	13.04	13.06	10.29	9.29	10.40	12.48	14.50
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	0.03	0.05	0.09	NA	-	-	0.03	0.05	0.08
Fish with swim bladder	L_{pk} [c]	207	NA	0.03	0.06	0.09	0.12	0.16	NA	0.03	0.06	0.10	0.12	0.16
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	NA	-	-	-	-	-
Sea turtles	L_p [e]	175	1.47	0.93	1.11	1.58	2.04	2.74	1.54	0.99	1.12	1.60	2.04	2.76

Table G-302. WTG MP3 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	10.84	12.24
Fish < 2 g	183 [a]	13.36	14.85
Fish without swim bladder	216 [c]	0.94	0.93
Fish with swim bladder	203 [c]	3.85	4.05
Sea turtles	204 [d]	3.56	3.73

Table G-303. WTG MP3 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 654 kJ	Summer 1307 kJ	Summer 2614 kJ	Summer 3921 kJ	Summer 6208 kJ	Winter Vibr.	Winter 654 kJ	Winter 1307 kJ	Winter 2614 kJ	Winter 3921 kJ	Winter 6208 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	-	0.03	0.06	0.09	0.12	NA	-	0.03	0.06	0.09	0.12
Fish ≥ 2g	L_{p} [b]	150	9.31	7.02	6.69	7.24	8.29	10.74	10.01	8.03	7.33	8.20	9.57	12.08
Fish < 2 g	L_{pk} [a]	206	NA	-	0.03	0.06	0.09	0.12	NA	-	0.03	0.06	0.09	0.12
Fish < 2 g	L_{p} [b]	150	9.31	7.02	6.69	7.24	8.29	10.74	10.01	8.03	7.33	8.20	9.57	12.08
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	-	0.02	0.04	NA	-	-	-	0.02	0.03
Fish with swim bladder	L_{pk} [c]	207	NA	-	0.02	0.05	0.08	0.10	NA	-	0.02	0.05	0.07	0.10
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	NA	-	-	-	-	-
Sea turtles	L_{p} [e]	175	0.81	0.57	0.60	0.98	1.39	1.93	0.90	0.61	0.60	0.92	1.39	1.98

Table G-304. WTG MP3 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	8.63	9.41
Fish < 2 g	183 [a]	10.84	12.24
Fish without swim bladder	216 [c]	0.55	0.56
Fish with swim bladder	203 [c]	2.64	2.70
Sea turtles	204 [d]	2.42	2.47

Table G-305. WTG MP3 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 654 kJ	Summer 1307 kJ	Summer 2614 kJ	Summer 3921 kJ	Summer 6208 kJ	Winter Vibr.	Winter 654 kJ	Winter 1307 kJ	Winter 2614 kJ	Winter 3921 kJ	Winter 6208 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	-	-	0.02	0.03	0.06	NA	-	-	0.02	0.03	0.06
Fish ≥ 2g	L_p [b]	150	6.92	4.96	4.78	5.40	6.14	8.16	7.40	5.56	5.16	5.85	6.99	8.97
Fish < 2 g	L_{pk} [a]	206	NA	-	-	0.02	0.03	0.06	NA	-	-	0.02	0.03	0.06
Fish < 2 g	L_p [b]	150	6.92	4.96	4.78	5.40	6.14	8.16	7.40	5.56	5.16	5.85	6.99	8.97
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	-	-	-	NA	-	-	-	-	-
Fish with swim bladder	L_{pk} [c]	207	NA	-	-	-	0.02	0.05	NA	-	-	-	0.02	0.05
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	NA	-	-	-	-	-
Sea turtles	L_p [e]	175	0.42	0.15	0.45	0.54	0.66	1.16	0.40	0.16	0.44	0.55	0.68	1.14

Table G-306. WTG MP3 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for 30 min of vibratory piling and different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	6.34	6.89
Fish < 2 g	183 [a]	8.17	8.95
Fish without swim bladder	216 [c]	0.17	0.16
Fish with swim bladder	203 [c]	1.55	1.58
Sea turtles	204 [d]	1.37	1.38

Table G-307. WTG MP3 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 654 kJ	Summer 1307 kJ	Summer 2614 kJ	Summer 3921 kJ	Summer 6208 kJ	Winter Vibr.	Winter 654 kJ	Winter 1307 kJ	Winter 2614 kJ	Winter 3921 kJ	Winter 6208 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.11	0.13	0.48	0.55	0.64	NA	0.12	0.13	0.49	0.56	0.64
Fish ≥ 2g	L_{p} [b]	150	14.73	12.12	11.66	12.21	13.50	16.32	15.64	14.46	13.18	14.30	16.59	18.33
Fish < 2 g	L_{pk} [a]	206	NA	0.11	0.13	0.48	0.55	0.64	NA	0.12	0.13	0.49	0.56	0.64
Fish < 2 g	L_{p} [b]	150	14.73	12.12	11.66	12.21	13.50	16.32	15.64	14.46	13.18	14.30	16.59	18.33
Fish without swim bladder	L_{pk} [c]	213	NA	0.03	0.06	0.09	0.12	0.16	NA	0.03	0.06	0.10	0.12	0.16
Fish with swim bladder	L_{pk} [c]	207	NA	0.10	0.12	0.46	0.53	0.61	NA	0.11	0.13	0.47	0.53	0.61
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	NA	-	-	-	-	-
Sea turtles	L_{p} [e]	175	2.79	1.90	2.09	2.76	3.31	4.39	2.77	2.00	2.14	2.78	3.31	4.57

Table G-308. WTG MP3 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 0 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa^2·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	14.92	16.54
Fish < 2 g	183 [a]	17.15	19.26
Fish without swim bladder	216 [c]	2.21	2.29
Fish with swim bladder	203 [c]	6.32	6.72
Sea turtles	204 [d]	5.95	6.29

Table G-309. WTG MP3 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 654 kJ	Summer 1307 kJ	Summer 2614 kJ	Summer 3921 kJ	Summer 6208 kJ	Winter Vibr.	Winter 654 kJ	Winter 1307 kJ	Winter 2614 kJ	Winter 3921 kJ	Winter 6208 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	0.05	0.08	0.11	0.13	0.46	NA	0.05	0.07	0.11	0.13	0.18
Fish ≥ 2g	L_p [b]	150	10.86	8.85	8.50	8.99	10.15	13.04	11.82	10.29	9.29	10.40	12.48	14.50
Fish < 2 g	L_{pk} [a]	206	NA	0.05	0.08	0.11	0.13	0.46	NA	0.05	0.07	0.11	0.13	0.18
Fish < 2 g	L_p [b]	150	10.86	8.85	8.50	8.99	10.15	13.04	11.82	10.29	9.29	10.40	12.48	14.50
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	0.03	0.05	0.09	NA	-	-	0.03	0.05	0.08
Fish with swim bladder	L_{pk} [c]	207	NA	0.03	0.06	0.09	0.12	0.16	NA	0.03	0.06	0.10	0.12	0.16
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	NA	-	-	-	-	-
Sea turtles	L_p [e]	175	1.50	0.93	1.11	1.58	2.04	2.74	1.49	0.99	1.12	1.60	2.04	2.76

Table G-310. WTG MP3 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 6 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	11.34	12.65
Fish < 2 g	183 [a]	13.82	15.25
Fish without swim bladder	216 [c]	1.10	1.06
Fish with swim bladder	203 [c]	4.26	4.35
Sea turtles	204 [d]	3.94	4.00

Table G-311. WTG MP3 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 654 kJ	Summer 1307 kJ	Summer 2614 kJ	Summer 3921 kJ	Summer 6208 kJ	Winter Vibr.	Winter 654 kJ	Winter 1307 kJ	Winter 2614 kJ	Winter 3921 kJ	Winter 6208 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	-	0.03	0.06	0.09	0.12	NA	-	0.03	0.06	0.09	0.12
Fish ≥ 2g	L_{p} [b]	150	8.63	7.02	6.69	7.24	8.29	10.74	9.06	8.03	7.33	8.20	9.57	12.08
Fish < 2 g	L_{pk} [a]	206	NA	-	0.03	0.06	0.09	0.12	NA	-	0.03	0.06	0.09	0.12
Fish < 2 g	L_{p} [b]	150	8.63	7.02	6.69	7.24	8.29	10.74	9.06	8.03	7.33	8.20	9.57	12.08
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	-	0.02	0.04	NA	-	-	-	0.02	0.03
Fish with swim bladder	L_{pk} [c]	207	NA	-	0.02	0.05	0.08	0.10	NA	-	0.02	0.05	0.07	0.10
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	NA	-	-	-	-	-
Sea turtles	L_{p} [e]	175	1.50	0.89	0.57	0.60	0.98	1.39	1.93	0.89	0.61	0.60	0.92	1.39

Table G-312. WTG MP3 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 10 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	8.98	9.77
Fish < 2 g	183 [a]	11.34	12.65
Fish without swim bladder	216 [c]	0.62	0.64
Fish with swim bladder	203 [c]	2.89	2.93
Sea turtles	204 [d]	2.68	2.68

Table G-313. WTG MP3 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle PK (injury) and SPL (behavior) thresholds at location BM28 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	Metric	Threshold	Summer Vibr.	Summer 654 kJ	Summer 1307 kJ	Summer 2614 kJ	Summer 3921 kJ	Summer 6208 kJ	Winter Vibr.	Winter 654 kJ	Winter 1307 kJ	Winter 2614 kJ	Winter 3921 kJ	Winter 6208 kJ
Fish ≥ 2g	L_{pk} [a]	206	NA	-	-	0.02	0.03	0.06	NA	-	-	0.02	0.03	0.06
Fish ≥ 2g	L_p [b]	150	6.36	4.96	4.78	5.40	6.14	8.16	6.58	5.56	5.16	5.85	6.99	8.97
Fish < 2 g	L_{pk} [a]	206	NA	-	-	0.02	0.03	0.06	NA	-	-	0.02	0.03	0.06
Fish < 2 g	L_p [b]	150	6.36	4.96	4.78	5.40	6.14	8.16	6.58	5.56	5.16	5.85	6.99	8.97
Fish without swim bladder	L_{pk} [c]	213	NA	-	-	-	-	-	NA	-	-	-	-	-
Fish with swim bladder	L_{pk} [c]	207	NA	-	-	-	0.02	0.05	NA	-	-	-	0.02	0.05
Sea turtles	L_{pk} [d]	232	NA	-	-	-	-	-	NA	-	-	-	-	-
Sea turtles	L_p [e]	175	1.50	0.89	0.57	0.60	0.98	1.39	1.93	0.89	0.61	0.60	0.92	1.39

Table G-314. WTG MP3 foundation (13 m diameter, QUC V640 and IHC S5500) acoustic ranges ($R_{95\%}$ in km) to fish and sea turtle SEL (injury) thresholds at location BM28 for 60 min of vibratory piling and different energy levels, in summer and winter conditions with 15 dB attenuation.

Faunal group	$L_{E,w,24h}$ Threshold (dB re 1 µPa²·s)	Summer Vibratory + Impact Piling	Winter Vibratory + Impact Piling
Fish ≥ 2g	187 [a]	6.69	7.26
Fish < 2 g	183 [a]	8.53	9.23
Fish without swim bladder	216 [c]	0.27	0.27
Fish with swim bladder	203 [c]	1.78	1.75
Sea turtles	204 [d]	1.60	1.61

G.5. SPL Acoustic Ranges to Thresholds

Acoustic ranges (R_{max} and $R_{95\%}$ in km) to SPL isopleths from 120 to 200 dB, for every 10 dB interval, and for the turtle behavior threshold of 175 dB are presented in Appendix G.5.1 for impact pile driving scenarios (OSS and WTG). Acoustic ranges ($R_{95\%}$ in km) to 120 dB (marine mammals), 150 dB (fish), and 175 dB (sea turtles) SPL isopleths are presented in Appendix G.5.2 for vibratory pile driving. All results are presented for 0, 6, 10, and 15 dB of broadband attenuation.

G.5.1. Impact Pile Driving

Results for impact pile driving are presented in Appendix G.5.1.1 for OSS foundations and in Appendix G.5.1.2 for WTG foundations. Tables are presented per modeling location, energy level, season, and broadband attenuation. A dash indicates that distances could not be estimated because thresholds were not reached.

Tables G-315 to G-370 present SPL isopleth results for OSS1 and Tables G-371 to G-410 present SPL isopleth results for OSS2. A 2 dB post-piling shift was added to the OSS scenarios.

Tables G-413 to G-457 show acoustic ranges to SPL isopleths for the **WTG jacket pin pile** modeled at location AY42, considering all energy levels, summer and winter conditions, and different broadband attenuations. Tables G-458 to G-506 present similar results but modeled at location BM28. Acoustic ranges to SPL isopleths for **WTG MP1** considering all energy levels, summer and winter conditions, and different broadband attenuations are presented in Tables G-507 to G-538 for modeling location AY42 and in Tables G-539 to G-570 for modeling location BM28. Acoustic ranges to SPL isopleths for **WTG MP2** considering all energy levels, summer and winter conditions, and different broadband attenuations are presented in Tables G-571 to G-610 for modeling location AY42 and in Tables G-611 to G-650 for modeling location BM28. Acoustic ranges to SPL isopleths for **WTG MP3** considering all energy levels, summer and winter conditions, and different dB broadband attenuations are presented in Tables G-651 to G-690 for modeling location AY42 and in Tables G-691 to G-730 for modeling location BM28.

G.5.1.1. OSS Pin Piles

OSS1

Table G-315. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 450 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 0 dB attenuation (post-piled).

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.13	0.13	0.13	0.13	0.09	0.09	0.02	0.02	0.11	0.11
180	0.56	0.53	0.56	0.53	0.38	0.37	0.27	0.26	0.46	0.43
175	1.19	1.13	1.18	1.13	0.58	0.56	0.46	0.44	0.90	0.85
170	1.97	1.87	1.97	1.87	1.20	1.13	0.93	0.87	1.64	1.56
160	4.41	4.09	4.39	4.08	2.95	2.76	2.62	2.43	3.80	3.54
150	7.73	7.01	7.70	6.98	5.57	5.11	5.04	4.63	6.61	6.04
140	13.39	12.06	13.35	12.02	9.05	8.20	8.16	7.41	11.30	10.03
130	20.93	18.71	20.82	18.63	14.89	13.37	13.35	11.98	18.02	16.27
120	32.90	29.21	32.73	29.08	24.64	21.93	21.40	19.01	29.26	26.15

Table G-316. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 450 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 6 dB attenuation (post-piled).

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	-	-	-	-	-	-
180	0.26	0.26	0.26	0.26	0.13	0.13	0.11	0.11	0.15	0.14
175	0.48	0.46	0.48	0.46	0.28	0.27	0.24	0.24	0.43	0.41
170	1.02	0.97	1.01	0.97	0.52	0.50	0.44	0.42	0.80	0.75
160	2.82	2.65	2.82	2.64	1.82	1.71	1.52	1.42	2.41	2.25
150	5.59	5.09	5.57	5.08	3.99	3.73	3.51	3.25	4.84	4.47
140	9.56	8.65	9.52	8.62	6.76	6.18	6.13	5.60	8.17	7.43
130	16.12	14.52	16.07	14.47	11.20	9.94	9.73	8.79	13.78	12.37
120	25.68	23.00	25.58	22.91	17.83	16.09	15.95	14.35	21.84	19.52

Table G-317. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 450 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 10 dB attenuation (post-piled).

Level (dB re 1μPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.13	0.13	0.13	0.13	0.09	0.09	0.02	0.02	0.11	0.11
175	0.29	0.28	0.29	0.28	0.13	0.13	0.12	0.12	0.24	0.24
170	0.56	0.53	0.56	0.53	0.38	0.37	0.27	0.26	0.46	0.43
160	1.97	1.87	1.97	1.87	1.20	1.13	0.93	0.87	1.64	1.56
150	4.41	4.09	4.39	4.08	2.95	2.76	2.62	2.43	3.80	3.54
140	7.73	7.01	7.70	6.98	5.57	5.11	5.04	4.63	6.61	6.04
130	13.39	12.06	13.35	12.02	9.05	8.20	8.16	7.41	11.30	10.03
120	20.93	18.71	20.82	18.63	14.89	13.37	13.35	11.98	18.02	16.27

Table G-318. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 450 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 15 dB attenuation (post-piled).

Level (dB re 1μPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.09	0.09	0.09	0.09	-	-	-	-	0.02	0.02
175	0.13	0.13	0.13	0.13	0.09	0.09	0.02	0.02	0.11	0.11
170	0.29	0.28	0.29	0.28	0.13	0.13	0.12	0.12	0.24	0.24
160	1.19	1.13	1.18	1.13	0.58	0.56	0.46	0.44	0.90	0.85
150	3.02	2.83	3.02	2.82	1.96	1.84	1.68	1.57	2.60	2.44
140	5.89	5.37	5.87	5.36	4.22	3.95	3.77	3.51	5.13	4.71
130	10.01	9.05	9.97	9.03	7.09	6.46	6.41	5.87	8.63	7.81
120	16.86	15.18	16.80	15.13	11.85	10.54	10.21	9.16	14.41	12.94

Table G-319. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 750 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 0 dB attenuation (post-piled).

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.02	0.02	0.02	0.02	-	-	-	-	-	-
190	0.24	0.24	0.24	0.24	0.12	0.12	0.10	0.10	0.14	0.14
180	0.94	0.90	0.94	0.89	0.48	0.45	0.44	0.42	0.75	0.71
175	1.69	1.62	1.69	1.61	0.97	0.90	0.78	0.74	1.39	1.32
170	2.68	2.52	2.68	2.51	1.73	1.62	1.45	1.35	2.26	2.10
160	5.35	4.89	5.33	4.88	3.87	3.59	3.36	3.11	4.66	4.31
150	9.21	8.36	9.18	8.33	6.65	6.07	6.00	5.50	7.91	7.19
140	15.74	14.17	15.67	14.12	10.93	9.70	9.53	8.63	13.55	12.22
130	25.51	22.70	25.40	22.61	17.79	15.97	15.90	14.26	21.86	19.37
120	39.29	34.53	39.02	34.33	29.97	26.44	26.98	23.73	35.47	31.18

Table G-320. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 750 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 6 dB attenuation (post-piled).

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.10	0.10	0.10	0.10	0.02	0.02	-	-	0.09	0.09
180	0.44	0.42	0.44	0.42	0.24	0.24	0.14	0.14	0.38	0.36
175	0.84	0.80	0.84	0.79	0.46	0.43	0.42	0.40	0.59	0.57
170	1.53	1.47	1.53	1.46	0.84	0.79	0.73	0.67	1.25	1.18
160	3.68	3.41	3.68	3.40	2.49	2.30	2.10	1.93	3.05	2.84
150	6.62	6.05	6.59	6.03	4.85	4.50	4.38	4.07	5.83	5.33
140	11.71	10.50	11.65	10.45	8.09	7.34	7.27	6.62	9.70	8.77
130	18.78	16.93	18.72	16.87	13.46	12.12	12.05	10.72	16.35	14.70
120	30.35	26.86	30.19	26.74	21.86	19.28	19.12	17.16	26.96	23.98

Table G-321. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 750 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 10 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.02	0.02	0.02	0.02	-	-	-	-	-	-
180	0.24	0.24	0.24	0.24	0.12	0.12	0.10	0.10	0.14	0.14
175	0.47	0.45	0.47	0.44	0.27	0.26	0.15	0.15	0.42	0.40
170	0.94	0.90	0.94	0.90	0.48	0.45	0.44	0.42	0.75	0.71
160	2.68	2.52	2.68	2.51	1.73	1.62	1.45	1.35	2.26	2.10
150	5.35	4.89	5.33	4.88	3.87	3.59	3.36	3.11	4.66	4.31
140	9.21	8.36	9.18	8.33	6.65	6.07	6.00	5.50	7.91	7.19
130	15.74	14.17	15.67	14.12	10.93	9.70	9.53	8.63	13.55	12.22
120	25.51	22.70	25.40	22.61	17.79	15.97	15.90	14.26	21.86	19.37

Table G-322. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 750 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 15 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.11	0.11	0.11	0.11	0.02	0.02	-	-	0.10	0.10
175	0.24	0.24	0.24	0.24	0.12	0.12	0.10	0.10	0.14	0.14
170	0.47	0.45	0.47	0.44	0.27	0.26	0.15	0.15	0.42	0.40
160	1.69	1.62	1.69	1.61	0.97	0.90	0.78	0.74	1.39	1.32
150	3.95	3.67	3.94	3.66	2.68	2.49	2.31	2.14	3.34	3.09
140	6.96	6.36	6.95	6.35	5.14	4.74	4.64	4.29	6.13	5.61
130	12.42	11.18	12.38	11.13	8.47	7.68	7.67	6.95	10.20	9.16
120	19.50	17.62	19.45	17.57	14.16	12.70	12.66	11.33	17.08	15.38

Table G-323. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 1200 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 0 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.09	0.09	0.09	0.09	-	-	-	-	0.03	0.03
190	0.40	0.38	0.40	0.38	0.15	0.14	0.13	0.13	0.26	0.26
180	1.28	1.23	1.28	1.22	0.75	0.71	0.59	0.57	1.03	0.97
175	2.13	1.99	2.11	1.98	1.36	1.27	1.13	1.04	1.81	1.70
170	3.20	2.96	3.18	2.94	2.21	2.04	1.88	1.76	2.77	2.58
160	6.06	5.53	6.04	5.52	4.48	4.18	4.08	3.80	5.35	4.90
150	10.38	9.30	10.32	9.26	7.53	6.83	6.80	6.21	8.88	8.05
140	17.48	15.72	17.41	15.66	12.47	11.16	10.92	9.69	15.05	13.55
130	28.16	24.97	28.02	24.87	19.60	17.67	17.73	15.88	24.82	22.06
120	43.13	37.77	42.78	37.50	33.60	29.35	30.41	26.50	39.19	34.31

Table G-324. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 1200 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 6 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.13	0.13	0.13	0.13	0.09	0.09	0.02	0.02	0.11	0.11
180	0.53	0.51	0.53	0.51	0.40	0.38	0.28	0.27	0.46	0.44
175	1.17	1.11	1.16	1.10	0.61	0.58	0.52	0.50	0.88	0.83
170	1.93	1.83	1.93	1.82	1.23	1.14	0.97	0.91	1.62	1.53
160	4.25	3.98	4.24	3.97	2.96	2.76	2.65	2.48	3.75	3.49
150	7.48	6.79	7.45	6.77	5.57	5.12	5.07	4.67	6.57	6.00
140	13.18	11.88	13.14	11.84	9.00	8.15	8.23	7.48	11.14	9.91
130	20.87	18.59	20.76	18.50	14.92	13.44	13.39	12.06	18.13	16.31
120	33.32	29.39	33.14	29.25	25.12	22.12	21.84	19.16	29.90	26.40

Table G-325. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 1200 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 10 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	-	-	-	-	0.03	0.03
180	0.40	0.38	0.40	0.38	0.15	0.14	0.13	0.13	0.26	0.26
175	0.70	0.65	0.69	0.65	0.43	0.41	0.29	0.28	0.48	0.46
170	1.28	1.23	1.28	1.22	0.75	0.71	0.59	0.57	1.03	0.97
160	3.20	2.96	3.18	2.94	2.21	2.04	1.88	1.76	2.77	2.58
150	6.06	5.53	6.04	5.52	4.48	4.18	4.08	3.80	5.35	4.90
140	10.38	9.30	10.32	9.26	7.53	6.83	6.80	6.21	8.88	8.05
130	17.48	15.72	17.41	15.66	12.47	11.16	10.92	9.69	15.05	13.55
120	28.16	24.97	28.02	24.87	19.60	17.67	17.73	15.88	24.82	22.06

Table G-326. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 1200 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 15 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.14	0.13	0.14	0.13	0.10	0.10	0.09	0.09	0.12	0.12
175	0.40	0.38	0.40	0.38	0.15	0.14	0.13	0.13	0.26	0.26
170	0.70	0.65	0.69	0.65	0.43	0.41	0.29	0.28	0.48	0.46
160	2.13	1.99	2.11	1.98	1.36	1.27	1.13	1.04	1.81	1.70
150	4.53	4.22	4.51	4.21	3.23	2.96	2.83	2.66	3.98	3.73
140	7.91	7.18	7.88	7.16	5.87	5.38	5.34	4.90	6.91	6.29
130	13.83	12.47	13.78	12.43	9.38	8.49	8.61	7.80	11.88	10.57
120	22.16	19.64	22.03	19.54	15.67	14.07	14.07	12.62	18.92	17.05

Table G-327. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 1950 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 0 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.11	0.11	0.11	0.11	0.02	0.02	0.02	0.02	0.10	0.10
190	0.48	0.45	0.48	0.45	0.27	0.26	0.24	0.24	0.42	0.41
180	1.69	1.61	1.69	1.61	0.98	0.90	0.80	0.75	1.39	1.31
175	2.66	2.50	2.66	2.49	1.73	1.62	1.47	1.36	2.27	2.10
170	3.88	3.62	3.88	3.61	2.68	2.49	2.35	2.18	3.29	3.06
160	6.75	6.15	6.72	6.13	5.09	4.69	4.66	4.31	5.98	5.47
150	12.04	10.67	11.99	10.61	8.33	7.51	7.52	6.80	9.86	8.87
140	19.15	17.25	19.09	17.19	13.89	12.38	12.49	11.07	16.73	14.98
130	31.01	27.44	30.86	27.31	22.90	20.08	19.73	17.67	27.63	24.54
120	47.82	41.94	47.35	41.57	38.04	33.00	34.61	29.81	43.76	38.31

Table G-328. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 1950 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 6 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.15	0.15	0.15	0.15	0.11	0.11	0.10	0.10	0.14	0.13
180	0.83	0.79	0.83	0.78	0.46	0.44	0.42	0.41	0.59	0.57
175	1.52	1.45	1.52	1.44	0.84	0.80	0.74	0.70	1.24	1.17
170	2.47	2.31	2.47	2.30	1.58	1.47	1.33	1.22	2.02	1.89
160	4.88	4.53	4.87	4.52	3.59	3.32	3.10	2.90	4.31	4.03
150	8.43	7.62	8.40	7.59	6.19	5.67	5.71	5.21	7.30	6.59
140	14.58	13.10	14.52	13.05	9.90	8.91	9.07	8.16	12.66	11.25
130	23.67	21.00	23.56	20.90	16.70	14.93	14.91	13.36	19.91	17.95
120	36.88	32.42	36.66	32.24	28.16	24.81	25.51	22.23	33.25	29.27

Table G-329. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 1950 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 10 dB attenuation (post-piled).

Level (dB re 1μPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.11	0.11	0.11	0.11	0.02	0.02	0.02	0.02	0.10	0.10
180	0.48	0.45	0.48	0.45	0.27	0.26	0.24	0.24	0.42	0.41
175	0.94	0.89	0.93	0.89	0.50	0.46	0.44	0.42	0.75	0.71
170	1.69	1.61	1.69	1.61	0.98	0.90	0.80	0.75	1.39	1.31
160	3.88	3.62	3.88	3.61	2.68	2.49	2.35	2.18	3.29	3.06
150	6.75	6.15	6.72	6.13	5.09	4.69	4.66	4.31	5.98	5.47
140	12.04	10.67	11.99	10.61	8.33	7.51	7.52	6.80	9.86	8.87
130	19.15	17.25	19.09	17.19	13.89	12.38	12.49	11.08	16.73	14.98
120	31.01	27.44	30.86	27.31	22.90	20.08	19.73	17.67	27.63	24.54

Table G-330. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 1950 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 15 dB attenuation (post-piled).

Level (dB re 1μPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.02	0.02	0.02	0.02	-	-	-	-	-	-
180	0.23	0.23	0.23	0.23	0.12	0.12	0.11	0.10	0.15	0.14
175	0.48	0.45	0.48	0.45	0.27	0.26	0.24	0.24	0.42	0.41
170	0.94	0.89	0.93	0.89	0.50	0.46	0.44	0.42	0.75	0.71
160	2.66	2.50	2.66	2.49	1.73	1.62	1.47	1.36	2.27	2.10
150	5.17	4.78	5.16	4.76	3.83	3.57	3.39	3.16	4.59	4.25
140	8.91	8.02	8.88	7.99	6.48	5.94	5.99	5.45	7.69	6.95
130	15.33	13.74	15.27	13.69	10.62	9.34	9.45	8.49	13.22	11.82
120	24.92	22.14	24.81	22.04	17.51	15.67	15.70	14.02	21.20	18.83

Table G-331. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 2400 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 0 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.11	0.11	0.11	0.11	0.08	0.08	0.02	0.02	0.09	0.09
190	0.46	0.44	0.46	0.44	0.27	0.26	0.25	0.24	0.41	0.39
180	1.76	1.68	1.75	1.67	1.05	0.97	0.84	0.79	1.45	1.37
175	2.78	2.62	2.78	2.62	1.85	1.73	1.58	1.47	2.39	2.22
170	4.22	3.95	4.20	3.93	2.85	2.65	2.53	2.35	3.60	3.37
160	7.96	7.28	7.93	7.25	5.76	5.29	5.13	4.75	6.87	6.29
150	13.69	12.39	13.63	12.34	9.84	8.91	9.02	8.16	12.05	10.78
140	21.09	18.91	20.97	18.82	15.95	14.30	14.69	13.19	18.41	16.66
130	32.88	29.34	32.71	29.20	25.13	22.71	22.81	20.27	29.64	26.47
120	50.02	44.25	49.50	43.83	40.04	35.19	36.50	32.29	45.81	40.37

Table G-332. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 2400 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 6 dB

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.03	0.03	0.03	0.03	-	-	-	-	-	-
190	0.13	0.13	0.13	0.13	0.11	0.11	0.09	0.09	0.13	0.13
180	0.84	0.80	0.84	0.80	0.45	0.43	0.42	0.40	0.68	0.63
175	1.60	1.52	1.59	1.51	0.91	0.85	0.76	0.72	1.30	1.23
170	2.60	2.45	2.59	2.44	1.68	1.57	1.43	1.32	2.14	1.99
160	5.55	5.11	5.52	5.09	3.93	3.66	3.43	3.18	4.79	4.44
150	9.83	8.96	9.80	8.93	7.20	6.56	6.49	5.94	8.70	7.87
140	16.32	14.74	16.26	14.69	12.39	11.10	11.14	9.90	14.37	12.97
130	25.74	23.23	25.63	23.14	18.60	16.78	17.28	15.50	22.35	20.07
120	38.88	34.47	38.62	34.26	30.29	27.01	27.75	24.72	35.06	31.24

Table G-333. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 2400 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 10 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.11	0.11	0.11	0.11	0.08	0.08	0.02	0.02	0.09	0.09
180	0.46	0.44	0.46	0.44	0.27	0.26	0.25	0.24	0.41	0.39
175	0.96	0.91	0.95	0.91	0.52	0.50	0.44	0.42	0.77	0.73
170	1.76	1.68	1.75	1.67	1.05	0.97	0.84	0.79	1.45	1.37
160	4.22	3.95	4.20	3.93	2.85	2.65	2.53	2.35	3.60	3.37
150	7.96	7.28	7.93	7.25	5.76	5.29	5.13	4.75	6.87	6.29
140	13.69	12.39	13.63	12.34	9.84	8.91	9.02	8.16	12.05	10.78
130	21.09	18.91	20.97	18.82	15.95	14.30	14.69	13.19	18.41	16.66
120	32.88	29.34	32.71	29.20	25.13	22.71	22.81	20.27	29.64	26.47

Table G-334. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 2400 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 15 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	-	-	-	-	0.02	0.02
180	0.23	0.22	0.23	0.22	0.12	0.12	0.11	0.11	0.13	0.13
175	0.46	0.44	0.46	0.44	0.27	0.26	0.25	0.24	0.41	0.39
170	0.96	0.91	0.95	0.91	0.52	0.50	0.44	0.42	0.77	0.73
160	2.78	2.62	2.78	2.62	1.85	1.73	1.58	1.47	2.39	2.22
150	5.90	5.43	5.88	5.41	4.18	3.92	3.75	3.47	5.12	4.72
140	10.41	9.39	10.37	9.36	7.64	6.94	6.85	6.25	9.15	8.28
130	16.99	15.37	16.94	15.31	12.93	11.63	11.81	10.53	14.98	13.54
120	26.86	24.17	26.73	24.07	19.23	17.45	17.98	16.11	23.62	21.24

Table G-335. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 2700 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 0 dB attenuation (post-piled).

Level (dB re 1μPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.09	0.09	0.09	0.09	0.06	0.06	0.06	0.06	0.07	0.07
190	0.44	0.42	0.44	0.42	0.26	0.24	0.23	0.23	0.38	0.36
180	1.67	1.59	1.67	1.58	1.00	0.94	0.83	0.76	1.38	1.30
175	2.72	2.57	2.71	2.56	1.80	1.69	1.54	1.44	2.33	2.16
170	4.30	4.03	4.27	4.01	2.83	2.63	2.52	2.33	3.54	3.30
160	9.28	8.54	9.25	8.51	6.05	5.57	5.33	4.93	7.58	6.99
150	17.17	15.56	17.10	15.51	12.08	10.90	10.49	9.42	14.82	13.45
140	28.43	25.25	28.28	25.15	19.98	18.01	18.14	16.44	25.37	22.49
130	43.47	38.18	43.16	37.90	34.00	29.70	31.04	27.08	39.50	34.68
120	74.25	63.06	71.29	61.28	54.71	47.52	49.25	43.17	64.75	55.77

Table G-336. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 2700 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 6 dB attenuation (post-piled).

Level (dB re 1μPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.05	0.05	0.05	0.05	-	-	-	-	0.03	0.03
190	0.12	0.12	0.12	0.12	0.10	0.10	0.08	0.08	0.11	0.11
180	0.81	0.76	0.80	0.75	0.44	0.42	0.40	0.38	0.58	0.54
175	1.50	1.43	1.50	1.42	0.90	0.84	0.72	0.67	1.21	1.14
170	2.52	2.37	2.50	2.36	1.63	1.52	1.39	1.29	2.04	1.91
160	5.94	5.50	5.92	5.48	3.96	3.67	3.49	3.20	4.87	4.51
150	12.38	11.27	12.33	11.22	8.06	7.36	7.00	6.44	9.93	9.13
140	20.82	18.64	20.70	18.57	14.92	13.53	13.42	12.20	18.20	16.49
130	33.87	29.79	33.69	29.64	25.88	22.63	22.93	19.99	30.49	26.87
120	51.61	45.37	51.08	44.92	40.42	35.45	36.97	32.34	47.07	41.26

Table G-337. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 2700 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 10 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	0.06	0.06	0.06	0.06	0.07	0.07
180	0.44	0.42	0.44	0.42	0.26	0.24	0.23	0.23	0.38	0.36
175	0.92	0.88	0.92	0.87	0.47	0.45	0.43	0.41	0.70	0.65
170	1.67	1.59	1.67	1.58	1.00	0.94	0.83	0.76	1.38	1.30
160	4.30	4.03	4.27	4.01	2.83	2.63	2.52	2.33	3.54	3.30
150	9.28	8.54	9.25	8.51	6.05	5.57	5.33	4.93	7.58	7.00
140	17.17	15.56	17.10	15.51	12.08	10.90	10.49	9.42	14.82	13.45
130	28.43	25.25	28.28	25.15	19.98	18.01	18.15	16.44	25.37	22.49
120	43.47	38.18	43.16	37.91	34.00	29.70	31.04	27.08	39.50	34.68

Table G-338. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 2700 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 15 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	-	-	-	-	0.05	0.05
180	0.20	0.20	0.20	0.20	0.11	0.10	0.09	0.08	0.12	0.11
175	0.44	0.42	0.44	0.42	0.26	0.24	0.23	0.23	0.38	0.36
170	0.92	0.88	0.92	0.87	0.47	0.45	0.43	0.41	0.70	0.65
160	2.72	2.57	2.71	2.56	1.80	1.69	1.54	1.44	2.33	2.16
150	6.43	5.94	6.40	5.92	4.22	3.95	3.79	3.50	5.23	4.86
140	13.15	11.97	13.10	11.92	8.60	7.84	7.52	6.87	10.81	9.79
130	22.18	19.77	22.06	19.67	15.74	14.24	14.20	12.86	19.06	17.27
120	35.33	31.07	35.10	30.90	27.14	23.78	24.58	21.31	31.85	28.04

Table G-339. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 2850 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 0 dB attenuation (post-piled).

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.06	0.06
190	0.33	0.32	0.33	0.32	0.22	0.21	0.10	0.10	0.24	0.23
180	1.40	1.34	1.39	1.33	0.82	0.76	0.68	0.64	1.09	1.01
175	2.57	2.44	2.56	2.42	1.55	1.45	1.32	1.22	1.95	1.84
170	4.48	4.21	4.46	4.19	2.57	2.40	2.23	2.05	3.47	3.26
160	11.02	10.03	10.96	9.97	6.62	6.15	5.64	5.22	9.09	8.38
150	20.55	18.46	20.41	18.37	14.93	13.61	12.90	11.81	18.39	16.70
140	35.53	31.15	35.21	30.90	27.56	24.47	24.61	21.94	32.50	28.54
130	58.69	50.84	56.98	49.59	47.01	40.93	43.39	37.62	52.82	46.26
120	>90	83.79	>90	83.41	89.99	81.35	89.99	77.48	89.99	82.82

Table G-340. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 2850 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 6 dB attenuation (post-piled).

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.04	0.04	0.04	0.04	-	-	-	-	0.03	0.03
190	0.10	0.10	0.10	0.10	0.06	0.06	0.06	0.06	0.09	0.08
180	0.65	0.60	0.64	0.60	0.35	0.33	0.26	0.26	0.46	0.44
175	1.23	1.18	1.22	1.17	0.74	0.68	0.57	0.52	0.95	0.89
170	2.28	2.16	2.27	2.15	1.39	1.29	1.14	1.05	1.78	1.68
160	6.55	6.09	6.51	6.06	3.86	3.62	3.17	2.93	5.25	4.89
150	14.68	13.35	14.61	13.29	9.42	8.66	7.92	7.31	12.64	11.55
140	26.25	23.40	26.08	23.27	18.95	17.24	16.82	15.32	23.48	20.92
130	43.08	37.56	42.57	37.15	34.48	30.13	31.30	27.31	39.63	34.58
120	80.47	67.41	74.95	63.70	59.38	51.60	53.41	46.90	68.25	59.03

Table G-341. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 2850 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 10 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.06	0.06
180	0.33	0.32	0.33	0.32	0.22	0.21	0.10	0.10	0.24	0.23
175	0.74	0.69	0.73	0.69	0.40	0.38	0.34	0.32	0.57	0.52
170	1.40	1.34	1.39	1.33	0.82	0.76	0.68	0.64	1.09	1.01
160	4.48	4.21	4.46	4.19	2.57	2.40	2.23	2.05	3.47	3.26
150	11.02	10.03	10.96	9.97	6.62	6.15	5.64	5.22	9.09	8.38
140	20.55	18.46	20.41	18.37	14.93	13.61	12.90	11.81	18.39	16.70
130	35.53	31.15	35.21	30.90	27.56	24.47	24.61	21.94	32.50	28.54
120	58.69	50.84	56.98	49.59	47.01	40.93	43.39	37.62	52.82	46.26

Table G-342. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 2850 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 15 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.05	0.05	0.05	0.05	0.03	0.03	-	-	0.04	0.04
180	0.11	0.11	0.11	0.11	0.06	0.06	0.06	0.06	0.09	0.09
175	0.33	0.32	0.33	0.32	0.22	0.21	0.10	0.10	0.24	0.23
170	0.74	0.69	0.73	0.69	0.40	0.38	0.34	0.32	0.57	0.52
160	2.57	2.44	2.56	2.42	1.55	1.45	1.32	1.22	1.95	1.84
150	7.17	6.64	7.12	6.61	4.21	3.96	3.54	3.32	5.76	5.36
140	15.63	14.20	15.56	14.14	10.15	9.28	8.64	7.95	13.55	12.36
130	27.65	24.56	27.46	24.43	19.91	18.10	17.83	16.25	24.95	22.24
120	45.21	39.41	44.63	38.93	36.35	31.70	33.09	28.85	41.64	36.30

Table G-343. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 450 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 0 dB attenuation (post-piled).

Level (dB re 1μPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.13	0.13	0.13	0.13	0.05	0.05	0.02	0.02	0.11	0.11
180	0.62	0.58	0.61	0.57	0.38	0.28	0.26	0.26	0.48	0.45
175	1.28	1.23	1.28	1.22	0.58	0.56	0.48	0.46	0.98	0.93
170	2.18	2.05	2.16	2.04	1.30	1.25	1.02	0.95	1.79	1.71
160	4.82	4.42	4.81	4.41	3.34	3.06	2.86	2.66	4.16	3.87
150	8.80	7.93	8.75	7.90	6.08	5.60	5.42	5.05	7.38	6.70
140	17.17	15.47	17.06	15.37	10.72	9.47	9.38	8.44	13.83	12.39
130	37.15	33.14	36.47	32.54	21.65	19.40	18.10	16.43	29.84	26.90
120	>90	85.19	>90	84.91	79.86	68.19	56.12	49.58	>90	84.20

Table G-344. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 450 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 6 dB attenuation (post-piled).

Level (dB re 1μPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.03	0.03	0.03	0.03	-	-	-	-	-	-
180	0.26	0.25	0.26	0.25	0.13	0.13	0.11	0.11	0.16	0.15
175	0.51	0.48	0.50	0.48	0.27	0.27	0.16	0.16	0.45	0.43
170	1.13	1.07	1.12	1.07	0.50	0.48	0.46	0.44	0.86	0.82
160	3.08	2.85	3.06	2.84	1.97	1.86	1.67	1.58	2.64	2.46
150	6.10	5.57	6.08	5.55	4.36	4.08	3.92	3.62	5.32	4.87
140	11.53	10.26	11.46	10.19	7.48	6.87	6.68	6.16	9.33	8.40
130	22.66	20.28	22.44	20.07	13.92	12.48	12.19	10.85	17.99	16.31
120	58.91	51.46	55.88	49.20	32.30	29.27	26.30	23.77	45.93	41.03

Table G-345. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 450 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 10 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.13	0.13	0.13	0.13	0.05	0.05	0.02	0.02	0.11	0.11
175	0.28	0.27	0.28	0.27	0.14	0.14	0.12	0.12	0.16	0.16
170	0.62	0.58	0.61	0.57	0.38	0.28	0.26	0.26	0.48	0.45
160	2.18	2.05	2.16	2.04	1.30	1.25	1.02	0.95	1.79	1.71
150	4.82	4.42	4.81	4.41	3.34	3.06	2.86	2.66	4.16	3.87
140	8.80	7.93	8.75	7.90	6.08	5.60	5.42	5.05	7.38	6.70
130	17.17	15.47	17.06	15.37	10.72	9.47	9.38	8.44	13.83	12.39
120	37.15	33.14	36.47	32.54	21.65	19.40	18.10	16.43	29.84	26.90

Table G-346. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 450 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 15 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.08	0.08	0.08	0.07	-	-	-	-	0.02	0.02
175	0.13	0.13	0.13	0.13	0.05	0.05	0.02	0.02	0.11	0.11
170	0.28	0.27	0.28	0.27	0.14	0.14	0.12	0.12	0.16	0.16
160	1.28	1.23	1.28	1.22	0.58	0.56	0.48	0.46	0.98	0.93
150	3.38	3.12	3.37	3.11	2.20	2.05	1.84	1.74	2.84	2.65
140	6.44	5.89	6.42	5.87	4.60	4.30	4.15	3.86	5.63	5.14
130	12.39	11.10	12.33	11.03	7.98	7.27	7.00	6.46	9.82	8.84
120	24.54	22.04	24.31	21.83	14.84	13.34	12.95	11.60	19.21	17.46

Table G-347. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 750 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 0 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.02	0.02	0.02	0.02	-	-	-	-	-	-
190	0.17	0.17	0.17	0.16	0.13	0.12	0.10	0.10	0.15	0.15
180	1.01	0.96	1.00	0.96	0.49	0.47	0.46	0.43	0.82	0.77
175	1.84	1.76	1.84	1.75	1.08	1.01	0.84	0.80	1.52	1.45
170	2.88	2.71	2.88	2.70	1.89	1.79	1.59	1.51	2.50	2.33
160	5.87	5.36	5.85	5.34	4.22	3.95	3.80	3.50	5.11	4.70
150	10.75	9.64	10.69	9.58	7.26	6.70	6.54	6.05	8.94	8.11
140	21.49	19.19	21.24	19.00	13.32	11.97	11.80	10.56	17.12	15.57
130	54.47	47.48	52.13	45.70	31.44	28.39	25.88	23.25	43.26	38.52
120	>90	85.69	>90	85.63	>90	85.03	>90	83.64	>90	85.56

Table G-348. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 750 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 6 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.10	0.10	0.10	0.10	0.02	0.02	-	-	0.08	0.07
180	0.46	0.44	0.46	0.44	0.17	0.16	0.15	0.15	0.38	0.36
175	0.90	0.86	0.90	0.86	0.47	0.44	0.43	0.41	0.70	0.67
170	1.67	1.59	1.67	1.58	0.92	0.87	0.78	0.73	1.35	1.29
160	4.05	3.74	4.03	3.73	2.73	2.54	2.37	2.19	3.44	3.17
150	7.34	6.67	7.32	6.65	5.30	4.93	4.79	4.44	6.39	5.86
140	13.91	12.64	13.82	12.56	9.12	8.27	8.09	7.44	11.63	10.40
130	30.00	27.03	29.61	26.69	17.52	15.93	14.92	13.57	24.61	21.99
120	>90	83.43	>90	82.44	50.09	44.06	39.64	35.60	80.75	68.21

Table G-349. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 750 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 10 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.02	0.02	0.02	0.02	-	-	-	-	-	-
180	0.17	0.17	0.17	0.16	0.13	0.12	0.10	0.10	0.15	0.15
175	0.48	0.46	0.48	0.46	0.26	0.26	0.16	0.16	0.44	0.41
170	1.01	0.96	1.00	0.96	0.49	0.47	0.46	0.43	0.82	0.77
160	2.88	2.71	2.88	2.70	1.89	1.79	1.59	1.51	2.50	2.33
150	5.87	5.36	5.85	5.34	4.22	3.95	3.80	3.50	5.11	4.70
140	10.75	9.64	10.69	9.58	7.26	6.70	6.54	6.05	8.94	8.11
130	21.49	19.19	21.24	19.00	13.32	11.97	11.80	10.56	17.12	15.57
120	54.47	47.48	52.13	45.70	31.44	28.39	25.88	23.25	43.26	38.52

Table G-350. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 750 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 15 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.11	0.11	0.11	0.11	0.02	0.02	-	-	0.10	0.10
175	0.17	0.17	0.17	0.16	0.13	0.12	0.10	0.10	0.15	0.15
170	0.48	0.46	0.48	0.46	0.26	0.26	0.16	0.16	0.44	0.41
160	1.84	1.76	1.84	1.75	1.08	1.01	0.84	0.80	1.52	1.45
150	4.31	3.98	4.29	3.97	2.92	2.71	2.57	2.39	3.74	3.45
140	7.80	7.09	7.77	7.06	5.61	5.20	5.05	4.68	6.73	6.17
130	14.92	13.55	14.83	13.46	9.63	8.74	8.57	7.83	12.37	11.12
120	32.67	29.40	32.19	28.97	19.00	17.24	16.07	14.64	26.75	24.07

Table G-351. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 1200 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 0 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.09	0.08	0.09	0.08	-	-	-	-	0.03	0.03
190	0.40	0.38	0.40	0.38	0.16	0.15	0.14	0.14	0.26	0.25
180	1.42	1.35	1.41	1.34	0.81	0.76	0.57	0.55	1.13	1.08
175	2.36	2.22	2.36	2.21	1.50	1.43	1.24	1.17	1.93	1.84
170	3.56	3.30	3.54	3.28	2.47	2.29	2.07	1.91	2.98	2.79
160	6.69	6.11	6.66	6.09	4.90	4.57	4.48	4.15	5.88	5.39
150	12.62	11.37	12.54	11.30	8.39	7.67	7.50	6.92	10.23	9.20
140	25.89	23.38	25.64	23.13	15.68	14.25	13.73	12.39	20.48	18.40
130	89.99	76.08	80.32	67.23	42.41	37.69	33.96	30.57	61.72	52.96
120	>90	85.84	>90	85.73	>90	85.62	>90	85.51	>90	85.70

Table G-352. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 1200 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 6 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.13	0.13	0.13	0.13	0.04	0.04	0.02	0.02	0.11	0.11
180	0.57	0.54	0.57	0.53	0.41	0.39	0.27	0.26	0.48	0.45
175	1.25	1.19	1.24	1.18	0.73	0.68	0.49	0.47	0.98	0.92
170	2.08	1.98	2.08	1.97	1.33	1.27	1.08	1.01	1.78	1.70
160	4.69	4.32	4.67	4.31	3.36	3.08	2.91	2.70	4.12	3.84
150	8.46	7.67	8.42	7.63	6.07	5.63	5.52	5.12	7.30	6.66
140	16.43	14.92	16.32	14.82	10.64	9.48	9.39	8.50	13.39	12.06
130	37.08	33.20	36.29	32.53	21.90	19.50	18.29	16.67	29.91	26.92
120	>90	85.22	>90	84.88	82.15	69.70	59.34	52.23	>90	84.17

Table G-353. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 1200 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 10 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.08	0.09	0.08	-	-	-	-	0.03	0.03
180	0.40	0.38	0.40	0.38	0.16	0.15	0.14	0.14	0.26	0.25
175	0.74	0.71	0.74	0.71	0.44	0.42	0.29	0.28	0.50	0.47
170	1.42	1.35	1.41	1.34	0.81	0.76	0.57	0.55	1.13	1.08
160	3.56	3.30	3.54	3.28	2.47	2.29	2.07	1.91	2.98	2.79
150	6.69	6.11	6.66	6.09	4.90	4.57	4.48	4.15	5.88	5.39
140	12.62	11.37	12.54	11.30	8.39	7.67	7.50	6.92	10.23	9.20
130	25.89	23.38	25.64	23.13	15.68	14.25	13.73	12.39	20.48	18.40
120	89.99	76.08	80.32	67.23	42.41	37.69	33.96	30.57	61.72	52.96

Table G-354. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 1200 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 15 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.15	0.14	0.15	0.14	0.10	0.10	0.03	0.03	0.13	0.12
175	0.40	0.38	0.40	0.38	0.16	0.15	0.14	0.14	0.26	0.25
170	0.74	0.71	0.74	0.71	0.44	0.42	0.29	0.28	0.50	0.47
160	2.36	2.22	2.36	2.21	1.50	1.43	1.24	1.17	1.93	1.84
150	5.00	4.59	4.98	4.58	3.64	3.35	3.18	2.88	4.36	4.07
140	8.97	8.14	8.92	8.10	6.40	5.93	5.78	5.38	7.74	7.03
130	17.59	15.99	17.48	15.88	11.46	10.22	9.87	8.94	14.21	12.85
120	40.91	36.57	39.91	35.73	24.43	21.83	19.69	17.93	33.14	29.82

Table G-355. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 1950 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 0 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.11	0.11	0.11	0.11	0.02	0.02	0.02	0.02	0.10	0.10
190	0.49	0.47	0.49	0.47	0.27	0.26	0.17	0.16	0.44	0.41
180	1.82	1.74	1.82	1.73	1.09	1.02	0.86	0.81	1.50	1.43
175	2.88	2.70	2.88	2.69	1.91	1.79	1.62	1.53	2.49	2.32
170	4.24	3.96	4.23	3.94	2.92	2.72	2.62	2.42	3.70	3.43
160	7.55	6.84	7.51	6.81	5.52	5.13	5.09	4.70	6.52	6.01
150	14.04	12.68	13.96	12.60	9.36	8.43	8.42	7.68	11.75	10.40
140	30.06	27.21	29.62	26.81	18.12	16.50	15.48	14.09	24.83	22.28
130	>90	84.04	>90	83.20	55.51	48.78	43.64	38.97	89.99	76.47
120	>90	85.94	>90	85.86	>90	85.74	>90	85.67	>90	85.83

Table G-356. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 1950 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 6 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.16	0.16	0.16	0.16	0.11	0.11	0.10	0.10	0.15	0.14
180	0.89	0.85	0.89	0.84	0.48	0.45	0.44	0.42	0.70	0.64
175	1.66	1.59	1.65	1.58	0.92	0.87	0.80	0.74	1.34	1.28
170	2.68	2.52	2.68	2.51	1.73	1.64	1.45	1.37	2.27	2.12
160	5.40	4.96	5.38	4.95	4.01	3.71	3.57	3.26	4.71	4.40
150	9.48	8.54	9.45	8.50	6.74	6.24	6.15	5.72	8.17	7.42
140	18.55	16.89	18.42	16.76	12.12	10.76	10.55	9.35	14.88	13.48
130	44.56	39.70	43.17	38.59	26.69	24.06	21.95	19.75	36.24	32.67
120	>90	85.62	>90	85.48	>90	84.07	88.06	76.49	>90	85.28

Table G-357. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 1950 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 10 dB attenuation (post-piled).

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.11	0.11	0.11	0.11	0.02	0.02	0.02	0.02	0.10	0.10
180	0.49	0.47	0.49	0.47	0.27	0.26	0.17	0.16	0.44	0.41
175	1.00	0.96	1.00	0.96	0.49	0.47	0.46	0.44	0.81	0.76
170	1.82	1.74	1.82	1.73	1.08	1.02	0.86	0.81	1.50	1.43
160	4.24	3.96	4.23	3.94	2.92	2.72	2.62	2.42	3.70	3.43
150	7.55	6.84	7.51	6.81	5.52	5.13	5.09	4.70	6.52	6.01
140	14.04	12.68	13.96	12.60	9.36	8.43	8.42	7.68	11.75	10.40
130	30.06	27.21	29.62	26.81	18.12	16.50	15.48	14.09	24.83	22.28
120	>90	84.04	>90	83.20	55.51	48.78	43.64	38.97	89.99	76.47

Table G-358. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 1950 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 15 dB attenuation (post-piled).

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.02	0.02	0.02	0.02	-	-	-	-	-	-
180	0.17	0.17	0.17	0.17	0.13	0.13	0.11	0.10	0.16	0.15
175	0.49	0.47	0.49	0.47	0.27	0.26	0.17	0.16	0.44	0.41
170	1.00	0.96	1.00	0.96	0.49	0.47	0.46	0.44	0.81	0.76
160	2.88	2.70	2.88	2.69	1.91	1.79	1.62	1.53	2.49	2.32
150	5.71	5.24	5.69	5.23	4.25	3.94	3.84	3.53	5.00	4.65
140	9.99	9.00	9.94	8.96	7.08	6.54	6.44	6.00	8.64	7.81
130	19.77	17.98	19.64	17.86	12.84	11.47	11.37	10.04	15.95	14.55
120	50.44	44.44	48.41	42.83	29.47	26.64	24.49	22.12	40.34	36.23

Table G-359. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 2400 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 0 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.11	0.11	0.11	0.11	0.08	0.08	0.02	0.02	0.09	0.09
190	0.47	0.45	0.47	0.45	0.26	0.25	0.22	0.22	0.42	0.40
180	1.84	1.76	1.84	1.76	1.13	1.07	0.89	0.84	1.52	1.46
175	2.92	2.75	2.90	2.74	1.94	1.83	1.69	1.58	2.52	2.36
170	4.58	4.24	4.57	4.23	2.99	2.79	2.69	2.48	3.86	3.57
160	9.74	8.91	9.70	8.86	6.25	5.75	5.47	5.05	7.99	7.34
150	26.14	23.55	25.60	23.06	15.46	14.23	12.84	11.71	20.93	19.04
140	>90	85.23	>90	84.00	70.26	62.72	57.45	51.06	89.99	81.85
130	>90	85.98	>90	85.94	>90	85.92	>90	85.91	>90	85.94
120	>90	85.99	>90	85.94	>90	85.95	>90	85.96	>90	85.94

Table G-360. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 2400 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 6 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.03	0.03	0.03	0.03	-	-	-	-	-	-
190	0.14	0.14	0.14	0.13	0.11	0.11	0.10	0.09	0.13	0.13
180	0.89	0.85	0.89	0.84	0.46	0.44	0.43	0.41	0.73	0.68
175	1.68	1.60	1.67	1.59	0.96	0.91	0.81	0.76	1.36	1.30
170	2.72	2.56	2.71	2.55	1.78	1.68	1.52	1.43	2.27	2.13
160	6.18	5.69	6.15	5.66	4.12	3.86	3.71	3.40	5.13	4.73
150	14.16	12.88	14.03	12.76	8.51	7.78	7.30	6.68	11.20	10.07
140	43.50	38.26	41.10	36.27	26.56	24.37	21.35	19.78	35.58	31.66
130	>90	85.82	>90	85.64	>90	85.47	>90	85.11	>90	85.60
120	>90	85.99	>90	85.98	>90	85.97	>90	85.96	>90	85.97

Table G-361. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 2400 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 10 dB attenuation (post-piled).

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.11	0.11	0.11	0.11	0.08	0.08	0.02	0.02	0.09	0.09
180	0.47	0.45	0.47	0.45	0.26	0.25	0.22	0.22	0.42	0.40
175	1.01	0.96	1.00	0.95	0.49	0.46	0.45	0.43	0.81	0.77
170	1.84	1.76	1.84	1.75	1.13	1.07	0.89	0.84	1.52	1.46
160	4.58	4.24	4.57	4.22	2.99	2.79	2.69	2.48	3.86	3.57
150	9.74	8.91	9.70	8.86	6.25	5.75	5.47	5.05	7.99	7.34
140	26.14	23.56	25.60	23.06	15.46	14.23	12.84	11.71	20.93	19.04
130	>90	85.23	>90	84.00	70.26	62.72	57.45	51.06	89.99	81.85
120	>90	85.98	>90	85.94	>90	85.92	>90	85.91	>90	85.94

Table G-362. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 2400 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 15 dB attenuation (post-piled).

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	-	-	-	-	0.02	0.02
180	0.20	0.20	0.20	0.20	0.12	0.12	0.11	0.11	0.13	0.13
175	0.47	0.45	0.47	0.45	0.26	0.25	0.22	0.22	0.42	0.40
170	1.01	0.96	1.00	0.95	0.49	0.46	0.45	0.43	0.81	0.77
160	2.92	2.75	2.90	2.74	1.94	1.83	1.69	1.58	2.52	2.36
150	6.63	6.11	6.61	6.08	4.40	4.12	3.96	3.67	5.53	5.08
140	15.60	14.16	15.43	14.01	9.21	8.40	7.89	7.26	12.40	11.23
130	50.33	44.30	46.77	41.20	30.93	27.99	25.21	23.30	41.07	36.39
120	>90	85.90	>90	85.72	>90	85.59	>90	85.47	>90	85.69

Table G-363. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 2700 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 0 dB attenuation (post-piled).

Level (dB re 1μPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.09	0.09	0.09	0.09	0.06	0.06	0.06	0.06	0.07	0.07
190	0.45	0.43	0.44	0.43	0.24	0.23	0.22	0.21	0.39	0.37
180	1.71	1.63	1.69	1.62	1.06	0.99	0.86	0.80	1.41	1.35
175	2.80	2.66	2.79	2.64	1.87	1.75	1.60	1.50	2.38	2.21
170	4.74	4.40	4.70	4.38	2.88	2.67	2.59	2.38	3.64	3.42
160	13.72	12.46	13.60	12.36	6.82	6.33	5.72	5.30	9.97	9.22
150	38.76	34.12	37.53	33.07	22.43	20.52	17.94	16.55	31.42	28.07
140	>90	85.65	>90	85.49	>90	84.22	83.03	74.20	>90	85.37
130	>90	86.00	>90	85.96	>90	85.95	>90	85.94	>90	85.96
120	>90	86.01	>90	85.94	>90	85.93	>90	85.94	>90	85.93

Table G-364. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 2700 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 6 dB attenuation (post-piled).

Level (dB re 1μPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.05	0.05	0.05	0.05	-	-	-	-	0.02	0.02
190	0.12	0.12	0.12	0.12	0.10	0.10	0.08	0.08	0.11	0.11
180	0.82	0.78	0.82	0.77	0.44	0.42	0.41	0.39	0.62	0.58
175	1.54	1.47	1.53	1.46	0.92	0.87	0.76	0.71	1.26	1.20
170	2.55	2.42	2.54	2.40	1.69	1.59	1.45	1.36	2.11	1.97
160	6.99	6.50	6.95	6.45	3.98	3.73	3.55	3.25	5.35	4.96
150	19.87	18.17	19.69	18.00	10.69	9.80	8.50	7.89	16.17	14.76
140	67.20	59.29	60.85	53.64	38.48	34.26	30.70	27.90	51.75	45.67
130	>90	85.94	>90	85.84	>90	85.70	>90	85.60	>90	85.81
120	>90	85.98	>90	85.99	>90	85.99	>90	85.98	>90	85.99

Table G-365. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 2700 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 10 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	0.06	0.06	0.06	0.06	0.07	0.07
180	0.45	0.43	0.44	0.43	0.24	0.23	0.22	0.21	0.39	0.37
175	0.94	0.90	0.94	0.90	0.48	0.45	0.43	0.41	0.74	0.70
170	1.71	1.63	1.69	1.62	1.06	0.99	0.86	0.80	1.41	1.35
160	4.74	4.40	4.70	4.38	2.88	2.67	2.59	2.38	3.64	3.42
150	13.72	12.46	13.60	12.36	6.82	6.33	5.72	5.30	9.97	9.22
140	38.76	34.12	37.53	33.07	22.43	20.52	17.94	16.55	31.42	28.07
130	>90	85.65	>90	85.49	>90	84.22	83.03	74.20	>90	85.37
120	>90	86.00	>90	85.96	>90	85.95	>90	85.94	>90	85.96

Table G-366. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 2700 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 15 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	-	-	-	-	0.05	0.05
180	0.19	0.19	0.19	0.19	0.11	0.10	0.10	0.09	0.12	0.12
175	0.45	0.43	0.44	0.43	0.24	0.23	0.22	0.21	0.39	0.37
170	0.94	0.90	0.94	0.90	0.48	0.45	0.43	0.41	0.74	0.70
160	2.80	2.66	2.79	2.64	1.87	1.75	1.60	1.50	2.38	2.21
150	7.84	7.25	7.77	7.19	4.35	4.04	3.85	3.54	5.88	5.45
140	22.43	20.23	22.06	19.90	12.30	11.26	9.46	8.78	17.93	16.42
130	83.48	72.85	71.53	63.16	44.24	39.32	35.75	32.09	60.25	53.21
120	>90	85.95	>90	85.90	>90	85.82	>90	85.71	>90	85.89

Table G-367. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 2850 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 0 dB attenuation (post-piled).

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.06	0.06
190	0.37	0.34	0.36	0.34	0.20	0.19	0.10	0.10	0.23	0.22
180	1.42	1.36	1.42	1.36	0.85	0.80	0.71	0.66	1.15	1.08
175	2.45	2.33	2.43	2.32	1.58	1.49	1.36	1.27	1.95	1.85
170	4.36	4.12	4.34	4.10	2.57	2.39	2.26	2.08	3.34	3.13
160	13.91	12.73	13.80	12.62	6.87	6.40	5.63	5.24	10.27	9.49
150	40.18	35.28	39.19	34.45	22.35	20.29	17.50	16.07	32.57	28.92
140	>90	85.48	>90	85.25	89.99	80.21	67.18	59.25	>90	84.87
130	>90	85.98	>90	85.95	>90	85.94	>90	85.92	>90	85.95
120	>90	85.95	>90	85.97	>90	85.97	>90	85.98	>90	85.97

Table G-368. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 2850 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 6 dB attenuation (post-piled).

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.04	0.04	0.04	0.04	-	-	-	-	0.03	0.03
190	0.10	0.10	0.10	0.10	0.06	0.06	0.06	0.06	0.09	0.09
180	0.67	0.63	0.67	0.62	0.37	0.35	0.32	0.30	0.48	0.46
175	1.26	1.20	1.26	1.20	0.74	0.70	0.60	0.55	0.99	0.94
170	2.16	2.06	2.15	2.04	1.43	1.34	1.21	1.12	1.79	1.71
160	6.80	6.37	6.74	6.33	3.75	3.51	3.15	2.89	5.16	4.85
150	20.76	18.77	20.48	18.56	10.92	10.07	8.54	7.94	16.74	15.35
140	66.71	58.74	62.42	54.90	36.70	32.49	28.58	25.72	51.59	45.27
130	>90	85.78	>90	85.70	>90	85.53	>90	85.23	>90	85.66
120	>90	85.99	>90	85.97	>90	85.97	>90	85.96	>90	85.97

Table G-369. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 2850 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 10 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.06	0.06
180	0.37	0.34	0.36	0.34	0.20	0.19	0.10	0.10	0.23	0.22
175	0.75	0.71	0.75	0.71	0.41	0.39	0.36	0.34	0.57	0.54
170	1.42	1.36	1.42	1.36	0.85	0.80	0.71	0.66	1.15	1.08
160	4.36	4.12	4.34	4.10	2.57	2.39	2.26	2.08	3.34	3.13
150	13.91	12.73	13.80	12.62	6.87	6.41	5.63	5.24	10.27	9.49
140	40.18	35.28	39.19	34.45	22.35	20.29	17.50	16.07	32.57	28.92
130	>90	85.48	>90	85.25	89.99	80.21	67.18	59.25	>90	84.87
120	>90	85.98	>90	85.95	>90	85.94	>90	85.92	>90	85.95

Table G-370. OSS1 jacket pin pile (3 m diameter, MHU 3000S, 2850 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BB39 for 15 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.05	0.05	0.05	0.05	0.03	0.03	-	-	0.04	0.04
180	0.11	0.11	0.11	0.11	0.07	0.07	0.06	0.06	0.09	0.09
175	0.37	0.34	0.36	0.34	0.20	0.19	0.10	0.10	0.23	0.22
170	0.75	0.71	0.75	0.71	0.41	0.39	0.36	0.34	0.57	0.54
160	2.45	2.33	2.43	2.32	1.58	1.49	1.36	1.27	1.95	1.85
150	7.64	7.13	7.57	7.08	4.16	3.90	3.48	3.24	5.73	5.40
140	23.48	21.13	23.15	20.85	12.54	11.53	9.50	8.83	18.61	17.04
130	83.11	71.46	74.18	64.41	41.52	36.63	32.50	29.07	59.26	52.01
120	>90	85.88	>90	85.74	>90	85.62	>90	85.50	>90	85.72

OSS2

Table G-371. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 680 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 0 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.03	0.03	0.03	0.03	-	-	-	-	0.02	0.02
190	0.15	0.14	0.15	0.14	0.10	0.10	0.09	0.09	0.13	0.13
180	0.67	0.64	0.67	0.64	0.50	0.47	0.48	0.45	0.55	0.53
175	1.26	1.19	1.26	1.19	0.95	0.91	0.64	0.61	1.13	1.06
170	1.88	1.79	1.88	1.78	1.32	1.26	1.19	1.12	1.69	1.59
160	3.77	3.55	3.75	3.54	2.66	2.52	2.39	2.25	3.15	2.96
150	6.46	6.03	6.42	6.00	4.41	4.15	4.03	3.79	5.22	4.89
140	10.12	9.41	10.00	9.33	6.46	6.03	5.80	5.42	8.12	7.54
130	15.54	14.43	15.40	14.30	9.42	8.76	8.46	7.86	12.08	11.16
120	21.54	19.63	21.27	19.38	13.56	12.57	12.28	11.35	16.24	15.03

Table G-372. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 680 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 6 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.08	0.08	0.08	0.08	0.04	0.04	0.03	0.03	0.06	0.06
180	0.46	0.44	0.46	0.44	0.16	0.16	0.14	0.13	0.44	0.42
175	0.58	0.56	0.58	0.56	0.48	0.46	0.46	0.44	0.53	0.50
170	1.17	1.10	1.17	1.10	0.86	0.79	0.56	0.53	1.04	0.98
160	2.53	2.40	2.53	2.39	1.82	1.73	1.61	1.53	2.23	2.10
150	4.74	4.45	4.71	4.43	3.31	3.11	2.90	2.75	4.00	3.77
140	7.88	7.32	7.82	7.28	5.15	4.82	4.70	4.41	6.26	5.84
130	12.46	11.63	12.34	11.50	7.58	7.04	6.72	6.26	9.40	8.74
120	17.72	16.39	17.56	16.25	11.04	10.16	9.64	8.95	13.70	12.69

Table G-373. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 680 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 10 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.03	0.03	0.03	0.03	-	-	-	-	0.02	0.02
180	0.15	0.14	0.15	0.14	0.10	0.10	0.09	0.09	0.13	0.13
175	0.48	0.46	0.48	0.45	0.41	0.40	0.15	0.15	0.46	0.44
170	0.67	0.64	0.67	0.64	0.50	0.47	0.48	0.45	0.55	0.53
160	1.88	1.79	1.88	1.78	1.32	1.26	1.19	1.12	1.69	1.59
150	3.77	3.55	3.75	3.54	2.66	2.52	2.39	2.25	3.15	2.96
140	6.46	6.03	6.42	6.00	4.41	4.15	4.03	3.79	5.22	4.89
130	10.12	9.41	10.00	9.33	6.46	6.03	5.80	5.42	8.12	7.54
120	15.54	14.43	15.40	14.30	9.42	8.76	8.46	7.86	12.08	11.16

Table G-374. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 680 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 15 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.09	0.09	0.09	0.09	0.05	0.05	0.04	0.04	0.08	0.08
175	0.15	0.14	0.15	0.14	0.10	0.10	0.09	0.09	0.13	0.13
170	0.48	0.46	0.48	0.45	0.41	0.40	0.15	0.15	0.46	0.44
160	1.26	1.19	1.26	1.19	0.95	0.91	0.64	0.61	1.13	1.06
150	2.68	2.54	2.67	2.53	1.92	1.83	1.73	1.64	2.40	2.27
140	5.00	4.69	4.98	4.67	3.53	3.32	3.04	2.87	4.18	3.94
130	8.24	7.67	8.20	7.62	5.33	4.99	4.87	4.56	6.52	6.09
120	12.96	12.10	12.84	11.98	7.90	7.34	6.96	6.49	9.72	9.04

G-375. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 1360a kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 0 dB attenuation (post-piled).

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.06	0.06	0.06	0.06	0.04	0.04	0.03	0.03	0.06	0.06
190	0.44	0.42	0.44	0.42	0.15	0.14	0.13	0.12	0.42	0.40
180	1.13	1.06	1.13	1.06	0.65	0.62	0.52	0.50	1.01	0.96
175	1.72	1.63	1.71	1.63	1.20	1.13	1.08	1.01	1.46	1.39
170	2.47	2.34	2.47	2.34	1.78	1.68	1.53	1.46	2.15	2.03
160	4.59	4.31	4.57	4.29	3.25	3.06	2.87	2.72	3.98	3.75
150	7.44	6.91	7.40	6.87	5.15	4.81	4.71	4.40	6.12	5.71
140	11.30	10.42	11.22	10.33	7.44	6.91	6.65	6.20	9.08	8.42
130	16.04	14.87	15.86	14.72	10.54	9.66	9.40	8.73	13.02	12.06
120	22.05	20.11	21.75	19.82	14.51	13.45	13.29	12.32	17.06	15.78

Table G-376. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 1360a kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 6 dB attenuation (post-piled).

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.02	0.02	0.02	0.02	-	-	-	-	-	-
190	0.11	0.10	0.11	0.10	0.08	0.08	0.06	0.06	0.09	0.09
180	0.52	0.48	0.52	0.48	0.45	0.43	0.42	0.41	0.49	0.46
175	1.04	0.98	1.04	0.98	0.57	0.54	0.50	0.47	0.95	0.91
170	1.57	1.50	1.56	1.49	1.13	1.06	1.00	0.95	1.34	1.27
160	3.10	2.92	3.09	2.92	2.33	2.20	1.97	1.87	2.78	2.64
150	5.62	5.26	5.60	5.24	4.07	3.82	3.64	3.42	4.74	4.44
140	8.82	8.20	8.78	8.16	5.93	5.53	5.43	5.06	7.20	6.69
130	13.14	12.21	13.04	12.11	8.60	7.98	7.72	7.17	10.44	9.59
120	18.14	16.76	17.94	16.60	12.32	11.37	10.88	9.99	14.56	13.48

Table G-377. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 1360a kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 10 dB attenuation (post-piled).

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	0.04	0.04	0.03	0.03	0.06	0.06
180	0.44	0.42	0.44	0.42	0.15	0.14	0.13	0.12	0.42	0.40
175	0.54	0.52	0.54	0.52	0.47	0.44	0.44	0.42	0.51	0.48
170	1.13	1.06	1.13	1.06	0.65	0.62	0.52	0.50	1.01	0.96
160	2.47	2.34	2.47	2.34	1.78	1.68	1.53	1.46	2.15	2.03
150	4.59	4.31	4.57	4.29	3.25	3.06	2.87	2.72	3.98	3.75
140	7.44	6.91	7.40	6.87	5.15	4.81	4.71	4.40	6.12	5.71
130	11.30	10.42	11.22	10.33	7.44	6.91	6.65	6.20	9.08	8.42
120	16.04	14.87	15.86	14.72	10.54	9.66	9.40	8.73	13.02	12.06

Table G-378. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 1360a kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 15 dB attenuation (post-piled).

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.02	0.02	0.02	0.02	-	-	-	-	0.02	0.02
180	0.12	0.12	0.12	0.12	0.09	0.08	0.07	0.07	0.11	0.10
175	0.44	0.42	0.44	0.42	0.15	0.14	0.13	0.12	0.42	0.40
170	0.54	0.52	0.54	0.52	0.47	0.44	0.44	0.42	0.51	0.48
160	1.72	1.63	1.71	1.63	1.20	1.13	1.08	1.01	1.46	1.39
150	3.36	3.17	3.35	3.15	2.49	2.35	2.13	2.02	2.91	2.76
140	5.91	5.52	5.88	5.49	4.23	3.97	3.84	3.61	4.94	4.62
130	9.16	8.52	9.12	8.47	6.16	5.75	5.61	5.24	7.52	6.98
120	13.58	12.63	13.48	12.52	8.88	8.25	8.00	7.43	10.92	10.03

Table G-379. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 680b kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 0 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.03	0.03	0.03	0.03	-	-	-	-	0.02	0.02
190	0.15	0.14	0.15	0.14	0.09	0.08	0.07	0.07	0.12	0.12
180	0.66	0.63	0.66	0.63	0.48	0.46	0.46	0.43	0.54	0.51
175	1.26	1.19	1.26	1.19	0.93	0.88	0.62	0.60	1.11	1.05
170	1.90	1.80	1.90	1.80	1.32	1.25	1.17	1.10	1.67	1.58
160	3.84	3.62	3.82	3.60	2.68	2.54	2.38	2.24	3.18	3.00
150	6.50	6.07	6.47	6.04	4.48	4.20	4.07	3.84	5.33	4.99
140	10.00	9.32	9.94	9.27	6.62	6.18	5.94	5.54	8.24	7.65
130	15.14	14.05	14.98	13.91	9.62	8.94	8.68	8.07	12.22	11.29
120	20.72	18.90	20.43	18.69	13.81	12.81	12.57	11.65	16.34	15.08

Table G-380. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 680b kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 6 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	0.04	0.04	0.03	0.03	0.06	0.06
180	0.45	0.42	0.45	0.42	0.34	0.34	0.12	0.12	0.42	0.40
175	0.58	0.55	0.58	0.55	0.47	0.44	0.44	0.42	0.51	0.48
170	1.17	1.09	1.16	1.09	0.83	0.76	0.54	0.51	1.00	0.95
160	2.56	2.42	2.55	2.41	1.82	1.72	1.58	1.51	2.25	2.12
150	4.81	4.50	4.78	4.48	3.34	3.15	2.92	2.77	4.06	3.82
140	7.88	7.33	7.84	7.29	5.20	4.87	4.76	4.46	6.38	5.95
130	12.22	11.33	12.12	11.23	7.80	7.24	6.90	6.42	9.52	8.85
120	17.28	15.97	17.10	15.82	11.38	10.48	9.86	9.17	13.80	12.78

Table G-381. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 680b kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 10 dB attenuation (post-piled).

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.03	0.03	0.03	0.03	-	-	-	-	0.02	0.02
180	0.15	0.14	0.15	0.14	0.09	0.08	0.07	0.07	0.12	0.12
175	0.47	0.44	0.47	0.44	0.40	0.38	0.14	0.13	0.44	0.42
170	0.66	0.63	0.66	0.63	0.48	0.46	0.46	0.43	0.54	0.51
160	1.90	1.80	1.90	1.80	1.32	1.25	1.17	1.10	1.67	1.58
150	3.84	3.62	3.82	3.60	2.68	2.54	2.38	2.24	3.18	3.00
140	6.50	6.07	6.47	6.04	4.48	4.20	4.07	3.84	5.33	4.99
130	10.00	9.32	9.94	9.27	6.62	6.18	5.94	5.54	8.24	7.65
120	15.14	14.05	14.98	13.91	9.62	8.94	8.68	8.07	12.22	11.29

Table G-382. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 680b kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 15 dB attenuation (post-piled).

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.06	0.06	0.06	0.06	0.05	0.05	0.04	0.04	0.06	0.06
175	0.15	0.14	0.15	0.14	0.09	0.08	0.07	0.07	0.12	0.12
170	0.47	0.44	0.47	0.44	0.40	0.38	0.14	0.13	0.44	0.42
160	1.26	1.19	1.26	1.19	0.93	0.88	0.62	0.60	1.11	1.05
150	2.71	2.57	2.70	2.56	1.94	1.84	1.71	1.62	2.41	2.28
140	5.07	4.74	5.04	4.72	3.55	3.36	3.09	2.90	4.23	3.98
130	8.24	7.66	8.20	7.62	5.42	5.07	4.94	4.61	6.64	6.19
120	12.68	11.80	12.60	11.69	8.10	7.52	7.18	6.68	9.84	9.14

Table G-383. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 1360b kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 0 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.06	0.06	0.06	0.06	0.04	0.04	0.03	0.03	0.05	0.05
190	0.42	0.40	0.42	0.40	0.13	0.13	0.11	0.11	0.40	0.38
180	1.10	1.04	1.10	1.03	0.62	0.59	0.51	0.48	0.97	0.93
175	1.63	1.56	1.63	1.56	1.17	1.10	1.02	0.97	1.40	1.33
170	2.39	2.25	2.38	2.24	1.74	1.64	1.44	1.38	2.06	1.94
160	4.51	4.24	4.49	4.22	3.14	2.95	2.82	2.66	3.87	3.64
150	7.58	7.06	7.52	7.01	5.09	4.76	4.62	4.32	6.24	5.83
140	11.82	10.94	11.72	10.86	7.86	7.32	6.93	6.48	9.48	8.83
130	16.38	15.15	16.28	15.04	11.70	10.82	10.21	9.46	13.85	12.84
120	22.39	20.42	22.10	20.15	15.83	14.58	14.62	13.48	18.06	16.63

Table G-384. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 1360b kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 6 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.02	0.02	0.02	0.02	-	-	-	-	-	-
190	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.06
180	0.50	0.47	0.50	0.47	0.43	0.41	0.40	0.38	0.48	0.45
175	1.00	0.95	1.00	0.95	0.55	0.52	0.48	0.46	0.89	0.83
170	1.47	1.40	1.47	1.40	1.10	1.03	0.96	0.92	1.31	1.24
160	2.97	2.82	2.97	2.82	2.25	2.11	1.94	1.83	2.71	2.57
150	5.61	5.26	5.59	5.23	3.98	3.74	3.54	3.33	4.68	4.39
140	9.06	8.44	9.00	8.39	6.06	5.67	5.42	5.07	7.48	6.96
130	13.63	12.64	13.53	12.56	9.15	8.53	8.22	7.67	11.28	10.41
120	18.37	16.98	18.21	16.82	13.38	12.39	12.21	11.29	15.49	14.32

Table G-385. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 1360b kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 10 dB attenuation (post-piled).

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	0.04	0.04	0.03	0.03	0.05	0.05
180	0.42	0.40	0.42	0.40	0.13	0.13	0.11	0.11	0.40	0.38
175	0.53	0.50	0.53	0.50	0.45	0.42	0.42	0.40	0.49	0.46
170	1.10	1.04	1.10	1.03	0.62	0.59	0.51	0.48	0.97	0.93
160	2.39	2.25	2.38	2.24	1.74	1.64	1.44	1.38	2.06	1.94
150	4.51	4.24	4.49	4.22	3.14	2.95	2.82	2.66	3.87	3.64
140	7.58	7.06	7.52	7.01	5.09	4.76	4.62	4.32	6.24	5.83
130	11.82	10.94	11.72	10.86	7.86	7.32	6.93	6.48	9.48	8.83
120	16.38	15.15	16.28	15.04	11.70	10.82	10.21	9.46	13.85	12.84

Table G-386. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 1360b kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 15 dB attenuation (post-piled).

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.02	0.02	0.02	0.02	-	-	-	-	0.02	0.02
180	0.10	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.07	0.07
175	0.42	0.40	0.42	0.40	0.13	0.13	0.11	0.11	0.40	0.38
170	0.53	0.50	0.53	0.50	0.45	0.42	0.42	0.40	0.49	0.46
160	1.63	1.56	1.63	1.56	1.17	1.10	1.02	0.97	1.40	1.33
150	3.22	3.04	3.20	3.02	2.42	2.28	2.06	1.94	2.84	2.69
140	5.91	5.53	5.88	5.51	4.13	3.89	3.74	3.52	4.91	4.61
130	9.40	8.76	9.34	8.71	6.34	5.92	5.65	5.29	7.82	7.29
120	14.07	13.04	13.97	12.96	9.46	8.82	8.54	7.96	11.78	10.89

Table G-387. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 1530 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 0 dB attenuation (post-piled).

Level (dB re 1μPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.04	0.04
190	0.40	0.38	0.40	0.38	0.12	0.11	0.06	0.06	0.37	0.35
180	1.00	0.95	1.00	0.95	0.57	0.55	0.50	0.47	0.87	0.83
175	1.58	1.50	1.58	1.50	1.13	1.07	0.97	0.92	1.40	1.33
170	2.34	2.20	2.33	2.19	1.66	1.58	1.43	1.36	2.04	1.91
160	4.64	4.34	4.60	4.31	3.08	2.90	2.79	2.64	3.87	3.65
150	7.86	7.31	7.81	7.26	5.34	4.98	4.77	4.45	6.49	6.03
140	12.30	11.36	12.22	11.29	8.41	7.80	7.53	6.96	9.88	9.17
130	16.99	15.63	16.89	15.52	12.60	11.59	11.34	10.41	14.48	13.33
120	23.17	21.16	22.93	20.94	16.80	15.34	15.63	14.29	18.86	17.25

Table G-388. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 1530 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 6 dB attenuation (post-piled).

Level (dB re 1μPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.02	0.02	0.02	0.02	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.05	0.05
180	0.49	0.47	0.49	0.46	0.41	0.39	0.38	0.37	0.47	0.44
175	0.91	0.86	0.91	0.85	0.53	0.49	0.48	0.46	0.75	0.66
170	1.46	1.39	1.46	1.38	1.01	0.96	0.87	0.82	1.30	1.23
160	3.04	2.87	3.01	2.85	2.21	2.08	1.92	1.82	2.69	2.55
150	5.80	5.41	5.77	5.38	3.96	3.72	3.49	3.29	4.83	4.51
140	9.35	8.70	9.30	8.65	6.45	5.99	5.78	5.37	7.84	7.26
130	14.13	13.04	14.03	12.96	9.73	9.02	8.88	8.22	11.94	10.99
120	18.92	17.44	18.81	17.31	14.23	13.07	13.12	12.07	16.23	14.88

Table G-389. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 1530 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 10 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.04	0.04
180	0.40	0.38	0.40	0.38	0.12	0.11	0.06	0.06	0.37	0.35
175	0.53	0.49	0.53	0.49	0.44	0.41	0.41	0.38	0.48	0.46
170	1.00	0.95	1.00	0.95	0.57	0.55	0.50	0.47	0.87	0.83
160	2.34	2.20	2.33	2.19	1.66	1.58	1.43	1.36	2.04	1.91
150	4.64	4.34	4.60	4.31	3.08	2.90	2.79	2.64	3.87	3.65
140	7.86	7.31	7.81	7.26	5.34	4.98	4.77	4.45	6.49	6.03
130	12.30	11.36	12.22	11.29	8.41	7.80	7.53	6.96	9.88	9.17
120	16.99	15.63	16.89	15.52	12.60	11.59	11.34	10.41	14.48	13.33

Table G-390. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 1530 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 15 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.02	0.02	0.02	0.02	-	-	-	-	0.02	0.02
180	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.06	0.06
175	0.40	0.38	0.40	0.38	0.12	0.11	0.06	0.06	0.37	0.35
170	0.53	0.49	0.53	0.49	0.44	0.41	0.41	0.38	0.48	0.46
160	1.58	1.50	1.58	1.50	1.13	1.07	0.97	0.92	1.40	1.33
150	3.31	3.13	3.30	3.11	2.38	2.23	2.04	1.92	2.83	2.68
140	6.10	5.69	6.07	5.66	4.18	3.92	3.70	3.49	5.09	4.75
130	9.70	9.03	9.65	8.98	6.75	6.27	6.04	5.61	8.19	7.60
120	14.59	13.46	14.48	13.37	10.10	9.32	9.21	8.53	12.40	11.43

Table G-391. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 680 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 0 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.03	0.03	0.03	0.03	-	-	-	-	0.02	0.02
190	0.15	0.14	0.15	0.14	0.10	0.10	0.10	0.09	0.13	0.13
180	0.68	0.64	0.68	0.64	0.49	0.47	0.46	0.44	0.56	0.52
175	1.18	1.12	1.18	1.12	0.84	0.78	0.64	0.60	1.04	0.98
170	1.78	1.69	1.77	1.68	1.24	1.18	1.09	1.02	1.56	1.49
160	3.79	3.58	3.76	3.56	2.52	2.39	2.22	2.10	2.95	2.80
150	7.36	6.85	7.28	6.78	4.77	4.48	4.27	4.01	5.84	5.45
140	23.68	21.45	21.44	19.33	18.21	16.56	16.39	15.02	20.09	18.18
130	>90	85.85	89.99	85.33	89.99	85.13	89.99	84.67	89.99	85.29
120	>90	86.02	>90	85.89	>90	85.88	>90	85.88	>90	85.89

Table G-392. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 680 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 6 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.08	0.08	0.08	0.08	0.04	0.04	0.03	0.03	0.06	0.06
180	0.45	0.43	0.45	0.43	0.16	0.15	0.14	0.13	0.41	0.39
175	0.60	0.56	0.60	0.56	0.48	0.45	0.44	0.42	0.52	0.49
170	1.09	1.02	1.08	1.02	0.68	0.64	0.54	0.52	0.96	0.92
160	2.45	2.32	2.44	2.31	1.71	1.62	1.43	1.37	2.06	1.95
150	4.90	4.60	4.87	4.57	3.08	2.90	2.76	2.62	3.98	3.76
140	10.01	9.27	9.87	9.14	6.77	6.29	5.98	5.58	8.24	7.65
130	57.20	52.61	44.33	40.66	38.27	35.17	34.60	31.72	42.69	39.24
120	>90	85.92	>90	85.79	>90	85.76	>90	85.74	>90	85.78

Table G-393. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 680 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 10 dB attenuation (post-piled).

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.03	0.03	0.03	0.03	-	-	-	-	0.02	0.02
180	0.15	0.14	0.15	0.14	0.10	0.10	0.10	0.09	0.13	0.13
175	0.47	0.45	0.47	0.45	0.18	0.17	0.15	0.15	0.44	0.42
170	0.68	0.64	0.68	0.64	0.49	0.47	0.46	0.44	0.56	0.52
160	1.78	1.69	1.77	1.68	1.24	1.18	1.09	1.02	1.56	1.49
150	3.79	3.58	3.76	3.56	2.52	2.39	2.22	2.10	2.95	2.80
140	7.36	6.85	7.28	6.78	4.77	4.48	4.27	4.01	5.84	5.45
130	23.68	21.45	21.44	19.33	18.21	16.56	16.39	15.02	20.09	18.18
120	>90	85.85	89.99	85.33	89.99	85.13	89.99	84.67	89.99	85.29

Table G-394. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 680 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 15 dB attenuation (post-piled).

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.09	0.09	0.09	0.09	0.05	0.05	0.04	0.04	0.08	0.07
175	0.15	0.14	0.15	0.14	0.10	0.10	0.10	0.09	0.13	0.13
170	0.47	0.45	0.47	0.45	0.18	0.17	0.15	0.15	0.44	0.42
160	1.18	1.12	1.18	1.12	0.84	0.78	0.64	0.60	1.04	0.98
150	2.62	2.49	2.61	2.48	1.82	1.73	1.58	1.50	2.24	2.12
140	5.23	4.90	5.19	4.87	3.34	3.14	2.90	2.75	4.25	4.00
130	11.33	10.40	11.04	10.13	7.73	7.17	6.76	6.28	9.21	8.49
120	71.90	66.19	52.93	48.71	45.91	42.27	41.67	38.22	51.05	46.96

Table G-395. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 1360a kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 0 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.06	0.06	0.06	0.06	0.04	0.04	0.03	0.03	0.06	0.06
190	0.42	0.40	0.42	0.40	0.14	0.14	0.13	0.13	0.38	0.37
180	0.99	0.94	0.98	0.94	0.65	0.61	0.50	0.48	0.93	0.88
175	1.57	1.50	1.57	1.50	1.09	1.01	0.96	0.91	1.33	1.28
170	2.30	2.18	2.29	2.17	1.63	1.55	1.35	1.29	1.98	1.88
160	4.58	4.31	4.55	4.29	2.97	2.82	2.68	2.54	3.79	3.59
150	9.77	9.03	9.62	8.90	6.67	6.19	5.88	5.46	8.13	7.51
140	59.25	54.51	45.47	41.78	39.40	36.23	35.53	32.65	43.86	40.30
130	>90	85.93	>90	85.79	>90	85.77	>90	85.75	>90	85.79
120	>90	86.04	>90	86.00	>90	85.99	>90	85.99	>90	86.00

Table G-396. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 1360a kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 6 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.02	0.02	0.02	0.02	-	-	-	-	-	-
190	0.11	0.11	0.11	0.11	0.08	0.08	0.06	0.06	0.09	0.09
180	0.48	0.46	0.48	0.46	0.43	0.41	0.39	0.38	0.47	0.44
175	0.94	0.90	0.94	0.90	0.58	0.54	0.48	0.45	0.86	0.81
170	1.42	1.37	1.42	1.36	0.99	0.94	0.91	0.87	1.24	1.18
160	2.97	2.82	2.95	2.81	2.14	2.02	1.85	1.75	2.56	2.43
150	5.96	5.58	5.92	5.53	4.05	3.82	3.55	3.35	4.86	4.55
140	17.00	15.36	16.04	14.54	13.16	12.00	11.51	10.51	14.97	13.54
130	89.99	85.58	89.72	82.44	78.58	72.48	71.84	66.25	86.24	79.52
120	>90	86.00	>90	85.88	>90	85.87	>90	85.86	>90	85.88

Table G-397. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 1360a kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 10 dB attenuation (post-piled).

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	0.04	0.04	0.03	0.03	0.06	0.06
180	0.42	0.40	0.42	0.40	0.14	0.14	0.13	0.13	0.38	0.37
175	0.56	0.53	0.56	0.52	0.44	0.42	0.42	0.40	0.48	0.46
170	0.99	0.94	0.98	0.94	0.65	0.61	0.50	0.48	0.93	0.88
160	2.30	2.18	2.29	2.17	1.63	1.55	1.35	1.29	1.98	1.88
150	4.58	4.31	4.55	4.29	2.97	2.82	2.68	2.54	3.79	3.59
140	9.77	9.03	9.62	8.90	6.67	6.19	5.88	5.46	8.13	7.51
130	59.25	54.51	45.47	41.78	39.40	36.23	35.53	32.65	43.86	40.30
120	>90	85.93	>90	85.79	>90	85.77	>90	85.75	>90	85.79

Table G-398. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 1360a kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 15 dB attenuation (post-piled).

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.02	0.02	0.02	0.02	-	-	-	-	0.02	0.02
180	0.12	0.12	0.12	0.12	0.09	0.08	0.08	0.08	0.11	0.10
175	0.42	0.40	0.42	0.40	0.14	0.14	0.13	0.13	0.38	0.37
170	0.56	0.53	0.56	0.52	0.44	0.42	0.42	0.40	0.48	0.46
160	1.57	1.50	1.57	1.50	1.09	1.01	0.96	0.91	1.33	1.28
150	3.22	3.04	3.20	3.02	2.29	2.16	1.97	1.88	2.70	2.58
140	6.41	5.99	6.36	5.94	4.32	4.06	3.86	3.64	5.20	4.87
130	20.06	18.11	18.67	16.88	15.76	14.31	14.07	12.81	17.75	16.03
120	89.99	85.77	89.99	85.09	89.99	84.04	84.12	77.69	89.99	84.97

Table G-399. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 680b kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 0 dB attenuation (post-piled).

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.03	0.03	0.03	0.03	-	-	-	-	0.02	0.02
190	0.13	0.13	0.13	0.13	0.09	0.08	0.08	0.08	0.12	0.11
180	0.65	0.62	0.65	0.61	0.45	0.43	0.43	0.41	0.56	0.53
175	1.15	1.08	1.15	1.08	0.82	0.78	0.61	0.58	1.00	0.95
170	1.75	1.66	1.74	1.66	1.20	1.14	1.04	0.98	1.53	1.46
160	3.63	3.43	3.60	3.40	2.47	2.34	2.13	2.01	2.89	2.75
150	7.22	6.72	7.15	6.65	4.57	4.26	4.06	3.81	5.63	5.24
140	19.05	17.05	17.99	16.18	14.68	13.16	13.05	11.84	16.70	14.95
130	89.99	85.65	89.99	84.73	85.06	78.16	77.15	70.96	89.99	84.38
120	>90	85.96	>90	85.89	>90	85.87	>90	85.85	>90	85.89

Table G-400. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 680b kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 6 dB attenuation (post-piled).

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	0.04	0.04	0.03	0.03	0.06	0.06
180	0.41	0.39	0.41	0.39	0.14	0.13	0.12	0.12	0.39	0.37
175	0.59	0.56	0.59	0.56	0.44	0.41	0.41	0.39	0.48	0.46
170	1.05	0.98	1.04	0.98	0.65	0.61	0.54	0.52	0.94	0.90
160	2.39	2.26	2.37	2.24	1.67	1.58	1.40	1.35	1.99	1.90
150	4.77	4.47	4.74	4.44	2.97	2.83	2.72	2.58	3.83	3.60
140	9.72	8.98	9.61	8.88	6.28	5.81	5.54	5.13	7.79	7.17
130	41.30	37.85	34.49	31.56	29.73	26.89	26.74	24.05	33.12	30.24
120	>90	85.92	89.99	85.74	89.99	85.64	89.99	85.55	89.99	85.71

Table G-401. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 680b kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 10 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.03	0.03	0.03	0.03	-	-	-	-	0.02	0.02
180	0.13	0.13	0.13	0.13	0.09	0.08	0.08	0.08	0.12	0.11
175	0.43	0.41	0.43	0.41	0.35	0.34	0.13	0.13	0.41	0.39
170	0.65	0.62	0.65	0.61	0.45	0.43	0.43	0.41	0.56	0.53
160	1.75	1.66	1.74	1.66	1.20	1.14	1.04	0.98	1.53	1.46
150	3.63	3.43	3.60	3.40	2.47	2.34	2.13	2.01	2.89	2.75
140	7.22	6.72	7.15	6.65	4.57	4.26	4.06	3.81	5.63	5.24
130	19.05	17.05	17.99	16.18	14.68	13.16	13.05	11.84	16.70	14.95
120	89.99	85.65	89.99	84.73	85.06	78.16	77.15	70.96	89.99	84.38

Table G-402. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 680b kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 15 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.07	0.07	0.07	0.07	0.05	0.05	0.04	0.04	0.06	0.06
175	0.13	0.13	0.13	0.13	0.09	0.08	0.08	0.08	0.12	0.11
170	0.43	0.41	0.43	0.41	0.35	0.34	0.13	0.13	0.41	0.39
160	1.15	1.08	1.15	1.08	0.82	0.78	0.61	0.58	1.00	0.95
150	2.56	2.43	2.55	2.41	1.79	1.70	1.54	1.47	2.16	2.05
140	5.11	4.78	5.07	4.75	3.18	3.01	2.84	2.70	4.09	3.84
130	10.64	9.72	10.44	9.56	6.92	6.38	6.12	5.65	8.56	7.88
120	51.83	47.57	41.52	38.06	35.34	32.41	31.99	29.07	39.74	36.53

Table G-403. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 1360b kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 0 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.06	0.06	0.06	0.06	0.04	0.04	0.03	0.03	0.05	0.05
190	0.39	0.37	0.39	0.37	0.12	0.12	0.11	0.11	0.35	0.34
180	0.98	0.93	0.98	0.93	0.60	0.57	0.48	0.47	0.91	0.87
175	1.50	1.44	1.50	1.43	1.03	0.97	0.93	0.89	1.28	1.22
170	2.18	2.06	2.16	2.05	1.57	1.50	1.29	1.23	1.90	1.80
160	4.52	4.26	4.48	4.23	2.86	2.72	2.57	2.44	3.62	3.42
150	9.38	8.67	9.26	8.58	5.75	5.35	5.11	4.75	7.25	6.70
140	27.09	23.77	24.60	21.82	20.25	18.12	18.19	16.38	23.41	20.33
130	>90	85.86	89.99	85.46	89.99	85.30	89.99	84.98	89.99	85.42
120	>90	85.97	>90	85.93	>90	85.92	>90	85.91	>90	85.93

Table G-404. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 1360b kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 6 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.02	0.02	0.02	0.02	-	-	-	-	-	-
190	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.06
180	0.46	0.44	0.46	0.44	0.40	0.38	0.36	0.35	0.43	0.41
175	0.93	0.89	0.93	0.89	0.54	0.51	0.44	0.42	0.79	0.65
170	1.35	1.28	1.34	1.28	0.97	0.92	0.88	0.84	1.19	1.13
160	2.89	2.73	2.87	2.72	2.01	1.90	1.78	1.68	2.47	2.35
150	6.02	5.65	5.96	5.60	3.80	3.58	3.27	3.08	4.71	4.41
140	12.83	11.73	12.61	11.55	8.41	7.75	7.53	6.89	10.25	9.37
130	61.95	57.00	48.04	43.81	41.25	37.83	37.11	33.85	46.24	42.28
120	>90	85.93	>90	85.85	>90	85.82	>90	85.79	>90	85.84

Table G-405. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 1360b kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 10 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	0.04	0.04	0.03	0.03	0.05	0.05
180	0.39	0.37	0.39	0.37	0.12	0.12	0.11	0.11	0.35	0.34
175	0.52	0.50	0.52	0.50	0.41	0.39	0.39	0.37	0.45	0.42
170	0.98	0.93	0.98	0.93	0.60	0.57	0.48	0.47	0.91	0.87
160	2.18	2.06	2.16	2.05	1.57	1.50	1.29	1.23	1.90	1.80
150	4.52	4.26	4.48	4.23	2.86	2.72	2.57	2.44	3.62	3.42
140	9.38	8.67	9.26	8.58	5.75	5.35	5.11	4.75	7.25	6.70
130	27.09	23.77	24.60	21.82	20.25	18.12	18.19	16.38	23.41	20.33
120	>90	85.86	89.99	85.46	89.99	85.30	89.99	84.98	89.99	85.42

Table G-406. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 1360b kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 15 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.02	0.02	0.02	0.02	-	-	-	-	0.02	0.02
180	0.08	0.08	0.08	0.08	0.06	0.06	0.06	0.06	0.07	0.07
175	0.39	0.37	0.39	0.37	0.12	0.12	0.11	0.11	0.35	0.34
170	0.52	0.50	0.52	0.50	0.41	0.39	0.39	0.37	0.45	0.42
160	1.50	1.44	1.50	1.43	1.03	0.97	0.93	0.89	1.28	1.22
150	3.08	2.91	3.06	2.89	2.18	2.05	1.88	1.79	2.60	2.48
140	6.47	6.06	6.41	6.01	4.06	3.82	3.55	3.33	5.03	4.71
130	14.01	12.75	13.77	12.53	9.52	8.59	8.32	7.67	11.45	10.38
120	78.43	71.80	56.98	52.45	49.29	45.32	44.34	40.78	54.97	50.48

Table G-407. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 1530 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 0 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.05	0.05	0.05	0.05	0.03	0.03	0.03	0.03	0.04	0.04
190	0.37	0.35	0.37	0.35	0.11	0.11	0.06	0.06	0.33	0.32
180	0.93	0.89	0.93	0.89	0.58	0.55	0.48	0.46	0.80	0.76
175	1.46	1.39	1.46	1.39	0.99	0.94	0.88	0.84	1.27	1.21
170	2.22	2.10	2.21	2.09	1.51	1.44	1.29	1.22	1.87	1.78
160	4.79	4.51	4.76	4.48	2.86	2.71	2.58	2.45	3.73	3.52
150	9.75	9.05	9.67	8.98	5.69	5.29	5.02	4.68	7.35	6.79
140	18.99	17.07	18.64	16.79	13.60	12.15	12.06	10.90	16.06	14.30
130	89.99	83.35	63.69	57.99	54.90	50.20	49.71	45.63	61.40	55.93
120	>90	85.97	>90	85.90	>90	85.88	>90	85.86	>90	85.90

Table G-408. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 1530 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 6 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.02	0.02	0.02	0.02	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.05	0.05
180	0.44	0.42	0.44	0.42	0.38	0.36	0.34	0.33	0.41	0.39
175	0.85	0.81	0.85	0.81	0.52	0.49	0.43	0.41	0.64	0.61
170	1.34	1.28	1.33	1.27	0.93	0.89	0.81	0.77	1.17	1.11
160	2.96	2.81	2.94	2.79	1.97	1.87	1.75	1.66	2.48	2.35
150	6.41	6.00	6.36	5.95	3.82	3.61	3.27	3.07	4.86	4.56
140	13.04	11.96	12.90	11.85	7.85	7.21	6.78	6.24	9.79	9.01
130	28.15	24.64	26.24	23.22	21.09	18.15	18.99	16.85	23.68	20.63
120	89.99	85.78	89.99	85.42	89.99	85.07	89.99	84.70	89.99	85.36

Table G-409. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 1530 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 10 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.05	0.05	0.05	0.05	0.03	0.03	0.03	0.03	0.04	0.04
180	0.37	0.35	0.37	0.35	0.11	0.11	0.06	0.06	0.33	0.32
175	0.50	0.48	0.50	0.48	0.40	0.37	0.37	0.35	0.43	0.41
170	0.93	0.89	0.93	0.89	0.58	0.55	0.48	0.46	0.80	0.76
160	2.22	2.10	2.21	2.09	1.51	1.44	1.29	1.22	1.87	1.78
150	4.79	4.51	4.76	4.48	2.86	2.71	2.58	2.45	3.73	3.52
140	9.75	9.05	9.67	8.98	5.69	5.29	5.02	4.68	7.35	6.79
130	18.99	17.07	18.64	16.79	13.60	12.15	12.06	10.90	16.06	14.30
120	89.99	83.35	63.69	57.99	54.90	50.20	49.71	45.63	61.40	55.93

Table G-410. OSS2 jacket pin pile (3 m diameter, MHU 1700S, 1530 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BK31 for 15 dB attenuation (post-piled).

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.03	0.03	0.03	0.03	-	-	-	-	0.02	0.02
180	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.06	0.06
175	0.37	0.35	0.37	0.35	0.11	0.11	0.06	0.06	0.33	0.32
170	0.50	0.48	0.50	0.48	0.40	0.37	0.37	0.35	0.43	0.41
160	1.46	1.39	1.46	1.39	0.99	0.94	0.88	0.84	1.27	1.21
150	3.24	3.06	3.21	3.03	2.11	1.99	1.86	1.76	2.65	2.51
140	6.88	6.42	6.82	6.37	4.08	3.84	3.54	3.33	5.19	4.86
130	13.89	12.70	13.75	12.58	8.43	7.76	7.53	6.88	10.66	9.69
120	31.71	28.15	28.80	25.69	24.58	21.49	22.15	19.24	27.06	23.77

G.5.1.2. WTG Pin Pile and Monopiles

WTG jacket pin pile

Table G-411. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 250 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.10	0.10	0.10	0.10	-	-	-	-	0.06	0.06
180	0.45	0.44	0.44	0.43	0.11	0.11	0.09	0.09	0.28	0.27
175	0.88	0.84	0.87	0.84	0.30	0.30	0.20	0.20	0.53	0.51
170	1.64	1.57	1.63	1.56	0.63	0.61	0.38	0.37	1.06	1.00
160	4.06	3.87	4.04	3.85	1.95	1.87	1.56	1.49	2.93	2.79
150	7.51	6.98	7.47	6.94	4.53	4.33	3.74	3.56	5.90	5.59
140	14.40	12.87	14.34	12.81	7.61	7.10	6.52	6.17	10.54	9.38
130	22.74	19.91	22.67	19.85	14.34	12.55	11.63	10.16	18.99	16.59
120	35.41	30.87	35.31	30.78	23.24	19.91	20.18	17.23	30.52	25.88

Table G-412. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 250 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.20	0.19	0.20	0.19	0.06	0.06	-	-	0.10	0.10
175	0.37	0.36	0.35	0.34	0.11	0.11	0.09	0.09	0.24	0.24
170	0.75	0.73	0.75	0.72	0.27	0.27	0.20	0.20	0.47	0.46
160	2.40	2.30	2.39	2.29	1.00	0.96	0.74	0.72	1.73	1.64
150	5.30	5.03	5.28	5.01	2.83	2.69	2.25	2.14	4.14	3.95
140	9.56	8.76	9.53	8.72	5.63	5.34	4.88	4.67	7.30	6.82
130	17.48	15.52	17.42	15.47	9.53	8.69	8.09	7.49	14.03	12.40
120	27.05	23.20	26.93	23.12	17.56	15.24	14.96	13.08	22.74	19.72

Table G-413. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 250 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.10	0.10	0.10	0.10	-	-	-	-	0.06	0.06
175	0.20	0.20	0.20	0.20	0.07	0.07	0.02	0.02	0.11	0.11
170	0.45	0.44	0.44	0.43	0.11	0.11	0.09	0.09	0.28	0.27
160	1.64	1.57	1.63	1.56	0.63	0.61	0.38	0.37	1.06	1.00
150	4.06	3.87	4.04	3.85	1.95	1.87	1.56	1.49	2.93	2.79
140	7.51	6.98	7.47	6.94	4.53	4.33	3.74	3.56	5.90	5.59
130	14.40	12.87	14.34	12.81	7.61	7.10	6.52	6.17	10.54	9.38
120	22.74	19.91	22.67	19.85	14.34	12.55	11.63	10.16	18.99	16.59

Table G-414. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 250 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.05	0.05	0.05	0.05	-	-	-	-	-	-
175	0.10	0.10	0.10	0.10	-	-	-	-	0.06	0.06
170	0.20	0.20	0.20	0.20	0.07	0.07	0.02	0.02	0.11	0.11
160	0.88	0.84	0.87	0.84	0.30	0.30	0.20	0.20	0.53	0.51
150	2.63	2.52	2.61	2.50	1.17	1.13	0.84	0.81	1.88	1.79
140	5.61	5.32	5.59	5.29	3.03	2.88	2.47	2.36	4.46	4.24
130	10.11	9.19	10.04	9.16	5.91	5.60	5.14	4.91	7.77	7.24
120	18.33	16.21	18.27	16.16	10.03	9.08	8.54	7.87	14.85	13.13

Table G-415. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 450 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.13	0.12	0.12	0.12	0.02	0.02	-	-	0.09	0.09
180	0.68	0.66	0.68	0.66	0.23	0.23	0.20	0.20	0.42	0.41
175	1.35	1.28	1.34	1.27	0.44	0.43	0.31	0.31	0.84	0.81
170	2.23	2.13	2.21	2.11	0.92	0.89	0.68	0.66	1.62	1.52
160	5.01	4.77	4.99	4.75	2.65	2.54	2.06	1.97	3.88	3.69
150	8.99	8.18	8.94	8.14	5.37	5.12	4.64	4.44	6.82	6.43
140	16.43	14.52	16.38	14.47	9.07	8.26	7.60	7.12	12.98	11.32
130	24.93	21.67	24.86	21.61	16.83	14.52	14.38	12.41	21.61	18.50
120	38.71	33.47	38.58	33.37	27.51	22.72	23.59	19.95	34.80	29.57

Table G-416. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 450 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.07	0.07	0.07	0.07	-	-	-	-	-	-
180	0.28	0.27	0.28	0.27	0.09	0.09	0.06	0.06	0.20	0.19
175	0.58	0.56	0.58	0.56	0.20	0.20	0.11	0.11	0.33	0.32
170	1.17	1.12	1.17	1.11	0.37	0.35	0.29	0.28	0.74	0.72
160	3.13	2.99	3.11	2.97	1.54	1.48	1.10	1.06	2.34	2.22
150	6.26	5.89	6.23	5.86	3.70	3.51	2.91	2.79	5.05	4.81
140	11.64	10.27	11.57	10.20	6.48	6.14	5.70	5.42	8.71	7.97
130	19.73	17.20	19.66	17.14	11.77	10.23	9.50	8.64	16.21	14.16
120	31.00	26.32	30.89	26.20	20.56	17.44	17.69	15.15	25.51	21.74

Table G-417. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 450 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.13	0.12	0.12	0.12	0.02	0.02	-	-	0.09	0.09
175	0.31	0.30	0.31	0.30	0.10	0.10	0.07	0.07	0.20	0.20
170	0.68	0.66	0.68	0.66	0.23	0.23	0.20	0.20	0.42	0.41
160	2.23	2.13	2.21	2.11	0.92	0.89	0.68	0.66	1.62	1.52
150	5.01	4.77	4.99	4.75	2.65	2.54	2.06	1.97	3.88	3.69
140	8.99	8.18	8.94	8.14	5.37	5.12	4.64	4.44	6.82	6.43
130	16.43	14.52	16.38	14.47	9.07	8.26	7.60	7.12	12.98	11.32
120	24.93	21.67	24.86	21.61	16.83	14.52	14.38	12.41	21.61	18.50

Table G-418. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 450 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.09	0.09	0.09	0.09	-	-	-	-	0.02	0.02
175	0.13	0.12	0.12	0.12	0.02	0.02	-	-	0.09	0.09
170	0.31	0.30	0.31	0.30	0.10	0.10	0.07	0.07	0.20	0.20
160	1.35	1.28	1.34	1.27	0.44	0.43	0.31	0.31	0.84	0.81
150	3.45	3.29	3.42	3.27	1.69	1.62	1.26	1.22	2.56	2.43
140	6.60	6.19	6.57	6.17	3.99	3.80	3.17	3.02	5.32	5.06
130	12.50	11.04	12.43	10.97	6.79	6.42	5.97	5.67	9.22	8.38
120	20.61	17.92	20.53	17.86	12.67	10.98	10.00	9.03	17.03	14.81

Table G-419. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 685 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.02	0.02	0.02	0.02	-	-	-	-	-	-
190	0.18	0.18	0.18	0.18	0.06	0.06	-	-	0.10	0.10
180	0.84	0.81	0.84	0.80	0.28	0.28	0.20	0.19	0.50	0.48
175	1.61	1.53	1.59	1.52	0.55	0.54	0.34	0.34	1.00	0.96
170	2.60	2.50	2.60	2.49	1.12	1.07	0.79	0.77	1.86	1.78
160	5.59	5.30	5.57	5.28	3.03	2.88	2.45	2.34	4.47	4.25
150	9.86	9.02	9.83	8.99	5.97	5.68	5.23	4.98	7.76	7.24
140	17.71	15.72	17.64	15.67	9.96	9.13	8.70	8.03	14.47	12.81
130	27.58	23.61	27.45	23.51	17.93	15.62	15.47	13.62	23.02	20.00
120	41.04	35.66	40.91	35.56	29.11	24.23	24.42	20.93	36.49	31.60

Table G-420. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 685 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	-	-	-	-	0.02	0.02
180	0.32	0.31	0.32	0.31	0.10	0.10	0.07	0.07	0.20	0.20
175	0.74	0.71	0.73	0.70	0.24	0.24	0.18	0.18	0.44	0.43
170	1.47	1.41	1.46	1.40	0.46	0.45	0.32	0.31	0.89	0.85
160	3.72	3.55	3.71	3.53	1.79	1.70	1.35	1.30	2.72	2.59
150	6.97	6.52	6.93	6.49	4.27	4.10	3.44	3.28	5.61	5.34
140	13.12	11.73	13.05	11.67	7.26	6.84	6.35	6.01	9.69	8.87
130	21.19	18.60	21.11	18.54	13.25	11.72	10.83	9.57	17.51	15.42
120	33.45	28.99	33.33	28.88	21.67	18.61	18.70	16.16	27.92	23.61

Table G-421. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 685 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.02	0.02	0.02	0.02	-	-	-	-	-	-
180	0.18	0.18	0.18	0.18	0.06	0.06	-	-	0.10	0.10
175	0.40	0.39	0.39	0.38	0.11	0.11	0.09	0.09	0.26	0.24
170	0.84	0.81	0.84	0.80	0.28	0.28	0.20	0.19	0.50	0.48
160	2.60	2.50	2.60	2.49	1.12	1.07	0.79	0.77	1.86	1.78
150	5.59	5.30	5.57	5.28	3.03	2.88	2.45	2.34	4.47	4.25
140	9.86	9.02	9.83	8.99	5.97	5.68	5.23	4.98	7.76	7.24
130	17.71	15.72	17.64	15.67	9.96	9.13	8.70	8.03	14.47	12.81
120	27.58	23.61	27.45	23.51	17.93	15.62	15.47	13.62	23.02	20.00

Table G-422. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 685 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.09	0.09	0.09	0.09	-	-	-	-	0.05	0.05
175	0.18	0.18	0.18	0.18	0.06	0.06	-	-	0.10	0.10
170	0.40	0.39	0.39	0.38	0.11	0.11	0.09	0.09	0.26	0.24
160	1.61	1.53	1.59	1.52	0.55	0.54	0.34	0.34	1.00	0.96
150	4.05	3.87	4.03	3.85	1.92	1.84	1.51	1.45	2.92	2.79
140	7.43	6.89	7.39	6.86	4.58	4.38	3.77	3.59	5.90	5.61
130	13.90	12.45	13.83	12.39	7.70	7.22	6.65	6.28	10.27	9.28
120	22.08	19.36	22.01	19.30	14.02	12.41	11.63	10.25	18.39	16.12

Table G-423. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 1500 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.06	0.06	0.06	0.06	-	-	-	-	0.03	0.03
190	0.26	0.26	0.26	0.26	0.09	0.09	0.06	0.06	0.18	0.18
180	1.32	1.26	1.30	1.25	0.39	0.38	0.28	0.27	0.79	0.76
175	2.36	2.27	2.35	2.25	0.83	0.80	0.57	0.55	1.60	1.52
170	4.06	3.88	4.02	3.85	1.68	1.60	1.15	1.09	2.66	2.56
160	8.66	8.00	8.63	7.96	4.49	4.28	3.45	3.28	6.41	6.05
150	16.52	14.75	16.46	14.70	8.91	8.25	7.32	6.85	13.11	11.70
140	25.88	22.45	25.77	22.38	17.20	15.13	14.60	12.98	22.26	19.35
130	39.85	34.65	39.71	34.56	28.57	23.77	24.17	20.73	35.74	30.86
120	56.47	48.05	56.12	47.81	43.70	36.97	39.23	33.32	51.12	43.43

Table G-424. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 1500 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	0.02	0.02	-	-	0.07	0.07
180	0.55	0.53	0.54	0.52	0.18	0.18	0.09	0.09	0.30	0.29
175	1.16	1.12	1.15	1.10	0.32	0.31	0.25	0.24	0.69	0.67
170	2.09	2.01	2.07	1.99	0.73	0.70	0.46	0.45	1.36	1.29
160	5.65	5.38	5.62	5.35	2.52	2.41	1.88	1.78	4.02	3.82
150	11.41	10.23	11.34	10.17	5.98	5.66	4.91	4.67	8.54	7.87
140	20.05	17.67	19.98	17.61	11.85	10.63	9.46	8.73	16.55	14.68
130	32.05	27.66	31.93	27.55	21.13	18.24	18.05	15.80	26.73	22.78
120	45.74	39.35	45.57	39.22	34.85	29.58	30.43	25.22	41.30	35.49

Table G-425. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 1500 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	-	-	-	-	0.03	0.03
180	0.26	0.26	0.26	0.26	0.09	0.09	0.06	0.06	0.18	0.18
175	0.67	0.65	0.67	0.64	0.20	0.20	0.10	0.10	0.34	0.34
170	1.32	1.26	1.30	1.25	0.39	0.38	0.28	0.27	0.79	0.76
160	4.06	3.88	4.02	3.85	1.68	1.60	1.15	1.09	2.66	2.56
150	8.66	8.00	8.63	7.96	4.49	4.28	3.45	3.28	6.41	6.05
140	16.52	14.75	16.46	14.70	8.91	8.25	7.32	6.85	13.11	11.70
130	25.88	22.45	25.77	22.38	17.20	15.13	14.60	12.98	22.26	19.35
120	39.85	34.65	39.71	34.56	28.57	23.77	24.17	20.73	35.74	30.86

Table G-426. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 1500 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.02	0.02	0.02	0.02	-	-	-	-	-	-
180	0.10	0.10	0.10	0.10	0.03	0.03	-	-	0.09	0.09
175	0.26	0.26	0.26	0.26	0.09	0.09	0.06	0.06	0.18	0.18
170	0.67	0.65	0.67	0.64	0.20	0.20	0.10	0.10	0.34	0.34
160	2.36	2.27	2.35	2.25	0.83	0.80	0.57	0.55	1.60	1.52
150	6.07	5.76	6.04	5.73	2.77	2.66	2.08	1.98	4.44	4.22
140	12.32	11.06	12.25	11.00	6.39	6.03	5.28	5.02	9.08	8.36
130	20.99	18.45	20.93	18.39	12.83	11.44	10.01	9.18	17.42	15.39
120	33.46	28.96	33.35	28.87	22.15	19.08	19.06	16.57	28.40	23.99

Table G-427. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 2000 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.05	0.05	0.05	0.05	-	-	-	-	0.03	0.03
190	0.26	0.26	0.26	0.26	0.06	0.06	0.05	0.05	0.17	0.17
180	1.19	1.14	1.17	1.12	0.32	0.31	0.23	0.22	0.68	0.66
175	2.31	2.21	2.29	2.19	0.73	0.70	0.46	0.44	1.45	1.39
170	4.21	4.02	4.18	4.00	1.52	1.47	0.95	0.92	2.75	2.64
160	9.62	8.90	9.59	8.87	5.08	4.85	3.75	3.59	7.61	7.11
150	19.30	17.18	19.23	17.12	12.21	10.98	9.55	8.76	16.60	14.87
140	32.78	28.66	32.64	28.52	23.15	20.40	20.21	17.82	28.94	25.02
130	48.78	42.43	48.45	42.19	38.95	34.17	35.19	30.80	45.09	39.27
120	76.66	67.00	75.29	65.87	60.73	52.11	54.70	46.95	70.19	60.45

Table G-428. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 2000 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	0.02	0.02	-	-	0.06	0.06
180	0.51	0.49	0.50	0.49	0.17	0.17	0.08	0.08	0.27	0.26
175	0.97	0.94	0.96	0.93	0.28	0.27	0.19	0.19	0.60	0.58
170	2.03	1.94	2.01	1.92	0.63	0.61	0.40	0.38	1.23	1.18
160	6.09	5.76	6.05	5.73	2.52	2.42	1.76	1.68	4.41	4.22
150	13.46	12.19	13.41	12.14	7.22	6.78	5.66	5.39	10.39	9.45
140	23.50	20.81	23.42	20.74	16.43	14.68	13.66	12.25	20.92	18.49
130	38.58	33.95	38.42	33.81	29.30	25.27	24.72	21.78	35.48	31.13
120	58.21	50.17	57.70	49.76	46.00	39.93	41.59	36.29	53.56	46.22

Table G-429. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 2000 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.05	0.05	0.05	0.05	-	-	-	-	0.03	0.03
180	0.26	0.26	0.26	0.26	0.06	0.06	0.05	0.05	0.17	0.17
175	0.59	0.57	0.58	0.57	0.18	0.17	0.09	0.09	0.31	0.30
170	1.19	1.14	1.17	1.12	0.32	0.31	0.23	0.22	0.68	0.66
160	4.21	4.02	4.18	4.00	1.52	1.47	0.95	0.92	2.75	2.64
150	9.62	8.90	9.59	8.87	5.08	4.85	3.75	3.59	7.61	7.11
140	19.30	17.18	19.23	17.12	12.21	10.98	9.55	8.76	16.60	14.87
130	32.78	28.66	32.64	28.52	23.15	20.40	20.21	17.82	28.94	25.02
120	48.78	42.43	48.45	42.19	38.95	34.17	35.19	30.80	45.09	39.27

Table G-430. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 2000 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.02	0.02	0.02	0.02	-	-	-	-	-	-
180	0.12	0.12	0.12	0.12	0.03	0.03	-	-	0.06	0.06
175	0.26	0.26	0.26	0.26	0.06	0.06	0.05	0.05	0.17	0.17
170	0.59	0.57	0.58	0.57	0.18	0.17	0.09	0.09	0.31	0.30
160	2.31	2.21	2.29	2.19	0.73	0.70	0.46	0.44	1.45	1.39
150	6.59	6.21	6.56	6.18	2.83	2.71	1.96	1.88	4.93	4.71
140	14.44	13.06	14.38	13.01	7.95	7.39	6.20	5.88	11.47	10.38
130	24.51	21.70	24.42	21.63	17.47	15.57	14.75	13.21	22.02	19.44
120	40.14	35.22	39.94	35.08	31.13	26.96	26.45	22.88	36.91	32.46

Table G-431. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 2200 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.03	0.03	0.03	0.03	-	-	-	-	0.02	0.02
190	0.22	0.22	0.22	0.22	0.05	0.05	0.03	0.03	0.15	0.15
180	0.86	0.82	0.84	0.81	0.27	0.27	0.20	0.20	0.55	0.53
175	1.65	1.59	1.64	1.58	0.61	0.59	0.37	0.36	0.99	0.95
170	2.84	2.72	2.83	2.71	1.11	1.07	0.78	0.76	1.95	1.87
160	7.22	6.76	7.18	6.73	3.92	3.75	2.89	2.77	5.75	5.45
150	15.74	14.19	15.68	14.14	9.49	8.84	7.86	7.36	13.38	12.09
140	27.49	23.83	27.31	23.68	20.28	18.07	17.40	15.75	24.30	21.53
130	44.00	38.51	43.76	38.28	35.47	31.48	31.62	28.05	40.86	35.92
120	70.25	60.82	68.55	59.76	55.76	48.98	50.26	44.38	64.05	55.95

Table G-432. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 2200 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	0.02	0.02	-	-	0.04	0.04
180	0.37	0.36	0.36	0.35	0.14	0.14	0.06	0.06	0.23	0.22
175	0.75	0.73	0.74	0.72	0.24	0.24	0.20	0.19	0.47	0.46
170	1.47	1.41	1.45	1.40	0.50	0.48	0.31	0.30	0.90	0.86
160	4.39	4.19	4.36	4.16	1.90	1.83	1.45	1.39	3.03	2.89
150	9.73	9.02	9.70	8.98	5.77	5.48	4.59	4.38	8.08	7.56
140	19.93	17.69	19.86	17.63	13.63	12.40	10.94	9.99	17.48	15.68
130	34.37	30.22	34.20	30.06	24.85	22.13	22.16	19.82	31.25	27.30
120	52.55	45.79	52.07	45.36	42.09	37.13	38.07	33.96	48.55	42.40

Table G-433. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 2200 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.03	0.03	0.03	0.03	-	-	-	-	0.02	0.02
180	0.22	0.22	0.22	0.22	0.05	0.05	0.03	0.03	0.15	0.15
175	0.45	0.44	0.44	0.43	0.16	0.16	0.06	0.06	0.26	0.24
170	0.86	0.82	0.84	0.81	0.27	0.27	0.20	0.20	0.55	0.53
160	2.84	2.72	2.83	2.71	1.11	1.07	0.78	0.76	1.95	1.87
150	7.22	6.76	7.18	6.73	3.92	3.75	2.89	2.77	5.75	5.45
140	15.74	14.19	15.68	14.14	9.49	8.84	7.86	7.36	13.38	12.09
130	27.49	23.83	27.31	23.68	20.28	18.07	17.40	15.75	24.30	21.53
120	44.00	38.51	43.76	38.28	35.47	31.48	31.62	28.05	40.86	35.92

Table G-434. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 2200 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.13	0.13	0.13	0.13	0.02	0.02	-	-	0.05	0.05
175	0.22	0.22	0.22	0.22	0.05	0.05	0.03	0.03	0.15	0.15
170	0.45	0.44	0.44	0.43	0.16	0.16	0.06	0.06	0.26	0.24
160	1.65	1.59	1.64	1.58	0.61	0.59	0.37	0.36	0.99	0.95
150	4.81	4.59	4.79	4.57	2.15	2.07	1.65	1.59	3.49	3.34
140	10.61	9.62	10.54	9.58	6.30	5.95	5.04	4.82	8.75	8.14
130	21.07	18.65	20.97	18.58	14.74	13.33	11.99	10.99	18.63	16.61
120	35.82	31.60	35.67	31.45	26.67	23.37	23.29	20.85	32.98	28.91

Table G-435. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 250 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.11	0.11	0.11	0.11	-	-	-	-	0.07	0.07
180	0.48	0.46	0.48	0.46	0.13	0.13	0.10	0.10	0.27	0.27
175	0.96	0.92	0.95	0.92	0.30	0.29	0.20	0.20	0.59	0.57
170	1.78	1.72	1.78	1.71	0.63	0.61	0.44	0.43	1.23	1.17
160	4.47	4.24	4.44	4.22	2.23	2.10	1.73	1.63	3.27	3.11
150	8.88	8.18	8.83	8.13	4.98	4.74	4.17	3.96	6.52	6.11
140	19.09	16.85	18.99	16.76	8.94	8.14	7.30	6.84	14.02	12.47
130	35.67	31.08	35.47	30.90	19.23	16.75	15.25	13.45	28.14	23.94
120	74.74	62.91	72.25	60.88	40.57	34.76	33.06	28.23	57.19	48.33

Table G-436. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 250 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.20	0.19	0.20	0.19	0.06	0.06	-	-	0.11	0.11
175	0.42	0.41	0.42	0.41	0.12	0.12	0.09	0.09	0.23	0.22
170	0.86	0.83	0.85	0.82	0.26	0.26	0.20	0.20	0.51	0.49
160	2.63	2.52	2.62	2.51	1.15	1.08	0.79	0.75	1.88	1.80
150	5.78	5.47	5.77	5.44	3.12	2.96	2.53	2.39	4.56	4.35
140	12.45	11.16	12.36	11.08	6.16	5.82	5.33	5.06	8.57	7.84
130	24.08	21.15	23.99	21.06	12.11	10.67	9.45	8.59	18.74	16.45
120	45.03	38.73	44.66	38.43	25.15	21.81	20.53	17.80	36.91	31.98

Table G-437. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 250 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.11	0.11	0.11	0.11	-	-	-	-	0.07	0.07
175	0.20	0.20	0.20	0.20	0.08	0.08	0.02	0.02	0.12	0.12
170	0.48	0.46	0.48	0.46	0.13	0.13	0.10	0.10	0.27	0.27
160	1.78	1.72	1.78	1.71	0.63	0.61	0.44	0.43	1.23	1.17
150	4.47	4.24	4.44	4.22	2.23	2.10	1.73	1.63	3.27	3.11
140	8.88	8.18	8.83	8.13	4.98	4.74	4.17	3.96	6.52	6.11
130	19.09	16.85	18.99	16.76	8.94	8.14	7.30	6.84	14.02	12.47
120	35.67	31.08	35.47	30.90	19.23	16.75	15.25	13.45	28.14	23.94

Table G-438. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 250 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.05	0.05	0.05	0.05	-	-	-	-	-	-
175	0.11	0.11	0.11	0.11	-	-	-	-	0.07	0.07
170	0.20	0.20	0.20	0.20	0.08	0.08	0.02	0.02	0.12	0.12
160	0.96	0.92	0.95	0.92	0.30	0.29	0.20	0.20	0.59	0.57
150	2.86	2.73	2.83	2.72	1.33	1.26	0.91	0.86	2.07	1.97
140	6.17	5.81	6.14	5.78	3.43	3.26	2.75	2.60	4.87	4.63
130	13.55	12.14	13.45	12.06	6.50	6.12	5.62	5.32	9.15	8.34
120	25.51	22.24	25.31	22.13	13.20	11.65	9.98	9.04	20.11	17.57

Table G-439. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 450 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.13	0.13	0.13	0.13	0.02	0.02	-	-	0.10	0.10
180	0.75	0.73	0.75	0.73	0.21	0.20	0.13	0.13	0.46	0.44
175	1.49	1.43	1.48	1.42	0.48	0.47	0.31	0.31	0.95	0.91
170	2.45	2.34	2.43	2.33	1.00	0.96	0.69	0.66	1.77	1.69
160	5.42	5.13	5.40	5.11	2.91	2.77	2.35	2.22	4.27	4.07
150	10.69	9.56	10.61	9.49	5.87	5.55	5.08	4.83	7.79	7.23
140	21.95	19.13	21.84	19.04	11.00	9.70	8.99	8.20	16.82	14.78
130	46.61	39.46	45.99	38.96	24.40	21.03	19.69	17.00	37.11	31.59
120	>120.00	113.04	>120.00	112.73	72.61	61.10	53.77	45.52	>120.00	109.89

Table G-440. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 450 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.07	0.07	0.07	0.07	-	-	-	-	-	-
180	0.28	0.27	0.27	0.27	0.10	0.10	0.07	0.06	0.20	0.20
175	0.66	0.64	0.65	0.63	0.20	0.20	0.12	0.12	0.41	0.39
170	1.32	1.26	1.31	1.26	0.44	0.42	0.29	0.28	0.84	0.80
160	3.47	3.31	3.45	3.29	1.71	1.61	1.25	1.17	2.57	2.46
150	6.88	6.45	6.84	6.42	4.12	3.91	3.27	3.10	5.48	5.19
140	14.93	13.30	14.85	13.23	7.30	6.81	6.23	5.89	10.17	9.18
130	28.86	24.40	28.64	24.20	15.39	13.52	12.18	10.69	22.43	19.39
120	67.46	56.82	65.56	55.36	36.74	31.21	27.75	23.25	54.16	45.67

Table G-441. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 450 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.13	0.13	0.13	0.13	0.02	0.02	-	-	0.10	0.10
175	0.33	0.32	0.31	0.30	0.11	0.11	0.09	0.09	0.20	0.20
170	0.75	0.73	0.75	0.73	0.21	0.20	0.13	0.13	0.46	0.44
160	2.45	2.34	2.43	2.33	1.00	0.96	0.69	0.66	1.77	1.69
150	5.42	5.13	5.40	5.11	2.91	2.77	2.35	2.22	4.27	4.07
140	10.69	9.56	10.61	9.49	5.87	5.55	5.08	4.83	7.79	7.23
130	21.95	19.13	21.84	19.04	11.00	9.70	8.99	8.20	16.82	14.78
120	46.61	39.46	45.99	38.96	24.40	21.03	19.69	17.00	37.11	31.59

Table G-442. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 450 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.09	0.09	0.09	0.09	-	-	-	-	0.02	0.02
175	0.13	0.13	0.13	0.13	0.02	0.02	-	-	0.10	0.10
170	0.33	0.32	0.31	0.30	0.11	0.11	0.09	0.09	0.20	0.20
160	1.49	1.43	1.48	1.42	0.48	0.47	0.31	0.31	0.95	0.91
150	3.80	3.63	3.79	3.61	1.85	1.76	1.42	1.33	2.79	2.68
140	7.37	6.88	7.33	6.84	4.43	4.20	3.60	3.40	5.78	5.47
130	15.92	14.18	15.85	14.11	7.77	7.24	6.56	6.19	11.22	9.94
120	31.34	26.65	31.08	26.41	16.59	14.52	13.24	11.63	23.90	20.67

Table G-443. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 685 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.02	0.02	0.02	0.02	-	-	-	-	-	-
190	0.15	0.15	0.15	0.15	0.06	0.06	-	-	0.11	0.11
180	0.90	0.86	0.89	0.86	0.26	0.26	0.20	0.19	0.54	0.52
175	1.73	1.67	1.72	1.66	0.58	0.56	0.39	0.38	1.15	1.09
170	2.81	2.70	2.80	2.68	1.26	1.19	0.84	0.80	1.97	1.90
160	6.26	5.89	6.22	5.86	3.38	3.23	2.66	2.54	4.91	4.67
150	13.86	12.47	13.77	12.39	6.78	6.34	5.74	5.43	9.45	8.68
140	28.65	24.70	28.41	24.48	14.89	13.27	11.24	10.05	22.47	19.67
130	68.04	57.89	65.68	55.92	36.63	31.75	28.65	24.51	53.20	45.16
120	>120.00	114.29	>120.00	114.13	>120.00	112.60	109.46	96.72	>120.00	113.95

Table G-444. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 685 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	-	-	-	-	0.02	0.02
180	0.34	0.34	0.34	0.33	0.10	0.10	0.08	0.08	0.20	0.20
175	0.81	0.78	0.80	0.77	0.21	0.20	0.13	0.13	0.46	0.45
170	1.56	1.50	1.55	1.49	0.49	0.48	0.31	0.30	0.96	0.92
160	4.12	3.92	4.10	3.90	1.91	1.83	1.48	1.41	2.93	2.80
150	8.39	7.75	8.33	7.71	4.73	4.50	3.83	3.65	6.30	5.91
140	18.72	16.58	18.61	16.49	8.88	8.17	7.33	6.81	13.77	12.32
130	38.33	33.41	37.96	33.12	21.30	18.58	16.46	14.60	31.20	26.87
120	>120.00	111.42	>120.00	109.51	57.28	48.60	42.99	36.96	93.73	81.92

Table G-445. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 685 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.02	0.02	0.02	0.02	-	-	-	-	-	-
180	0.15	0.15	0.15	0.15	0.06	0.06	-	-	0.11	0.11
175	0.42	0.41	0.42	0.41	0.12	0.12	0.09	0.09	0.23	0.22
170	0.90	0.86	0.89	0.86	0.26	0.26	0.20	0.19	0.54	0.52
160	2.81	2.70	2.80	2.68	1.26	1.19	0.84	0.80	1.97	1.90
150	6.26	5.89	6.22	5.86	3.38	3.23	2.66	2.54	4.91	4.67
140	13.86	12.47	13.77	12.39	6.78	6.34	5.74	5.43	9.45	8.68
130	28.65	24.70	28.41	24.48	14.89	13.27	11.24	10.05	22.47	19.67
120	68.04	57.89	65.68	55.92	36.63	31.75	28.65	24.51	53.20	45.16

Table G-446. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 685 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.09	0.09	0.09	0.09	-	-	-	-	0.06	0.06
175	0.15	0.15	0.15	0.15	0.06	0.06	-	-	0.11	0.11
170	0.42	0.41	0.42	0.41	0.12	0.12	0.09	0.09	0.23	0.22
160	1.73	1.67	1.72	1.66	0.58	0.56	0.39	0.38	1.15	1.09
150	4.47	4.25	4.45	4.22	2.13	2.02	1.63	1.56	3.21	3.07
140	8.98	8.29	8.94	8.25	5.02	4.78	4.16	3.97	6.70	6.26
130	20.17	17.78	20.05	17.67	9.45	8.65	7.86	7.28	15.02	13.42
120	41.34	35.81	40.87	35.46	23.05	20.14	18.05	15.90	33.90	29.33

Table G-447. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 1500 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.06	0.06	0.06	0.06	-	-	-	-	0.03	0.03
190	0.26	0.26	0.26	0.26	0.09	0.09	0.06	0.06	0.17	0.17
180	1.36	1.31	1.35	1.30	0.43	0.42	0.27	0.26	0.82	0.78
175	2.56	2.45	2.53	2.43	0.89	0.84	0.57	0.55	1.63	1.57
170	4.61	4.42	4.57	4.38	1.73	1.65	1.23	1.17	2.76	2.65
160	11.63	10.52	11.53	10.44	4.82	4.62	3.65	3.49	7.91	7.40
150	25.85	22.44	25.63	22.29	13.15	11.71	9.31	8.58	20.79	18.18
140	63.44	54.03	61.77	52.70	35.24	30.26	26.36	22.56	51.38	43.74
130	>120.00	114.11	>120.00	113.96	>120.00	110.74	90.48	79.43	>120.00	113.63
120	>120.00	114.62	>120.00	114.61	>120.00	114.58	>120.00	114.56	>120.00	114.61

Table G-448. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 1500 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	0.03	0.03	-	-	0.07	0.07
180	0.55	0.53	0.54	0.52	0.18	0.17	0.09	0.09	0.29	0.28
175	1.20	1.15	1.20	1.15	0.35	0.34	0.24	0.24	0.71	0.68
170	2.25	2.16	2.22	2.13	0.76	0.73	0.49	0.48	1.42	1.35
160	6.65	6.31	6.60	6.27	2.63	2.52	1.96	1.88	4.41	4.23
150	16.72	14.93	16.62	14.85	6.87	6.52	5.27	5.04	11.84	10.64
140	36.66	31.85	36.30	31.55	19.66	17.16	14.82	13.14	29.13	24.82
130	119.99	108.38	114.35	98.82	53.97	45.83	41.24	35.24	82.04	70.94
120	>120.00	114.61	>120.00	114.54	>120.00	114.01	>120.00	113.24	>120.00	114.43

Table G-449. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 1500 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	-	-	-	-	0.03	0.03
180	0.26	0.26	0.26	0.26	0.09	0.09	0.06	0.06	0.17	0.17
175	0.66	0.64	0.65	0.63	0.20	0.19	0.10	0.10	0.40	0.38
170	1.36	1.31	1.35	1.30	0.43	0.42	0.27	0.26	0.82	0.78
160	4.61	4.42	4.57	4.38	1.73	1.65	1.23	1.17	2.76	2.65
150	11.63	10.52	11.53	10.44	4.82	4.62	3.65	3.49	7.91	7.40
140	25.85	22.44	25.63	22.29	13.15	11.71	9.31	8.58	20.79	18.18
130	63.44	54.03	61.77	52.70	35.24	30.26	26.36	22.56	51.38	43.74
120	>120.00	114.11	>120.00	113.96	>120.00	110.74	90.48	79.43	>120.00	113.63

Table G-450. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 1500 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.02	0.02	0.02	0.02	-	-	-	-	-	-
180	0.10	0.10	0.10	0.10	0.04	0.04	-	-	0.09	0.09
175	0.26	0.26	0.26	0.26	0.09	0.09	0.06	0.06	0.17	0.17
170	0.66	0.64	0.65	0.63	0.20	0.19	0.10	0.10	0.40	0.38
160	2.56	2.45	2.53	2.43	0.89	0.84	0.57	0.55	1.63	1.57
150	7.28	6.86	7.23	6.82	2.86	2.75	2.19	2.09	4.91	4.71
140	18.07	16.05	17.96	15.96	7.64	7.17	5.78	5.51	13.24	11.87
130	39.81	34.41	39.33	34.05	21.54	18.73	16.41	14.49	32.16	27.58
120	>120.00	111.45	>120.00	110.26	60.53	51.35	46.25	39.35	97.92	86.19

Table G-451. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 2000 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.05	0.05	0.05	0.05	-	-	-	-	0.03	0.03
190	0.26	0.26	0.26	0.26	0.06	0.06	0.05	0.05	0.16	0.16
180	1.19	1.14	1.18	1.13	0.34	0.33	0.23	0.22	0.69	0.67
175	2.24	2.14	2.22	2.13	0.74	0.71	0.46	0.45	1.43	1.38
170	4.24	4.05	4.21	4.02	1.48	1.43	0.98	0.94	2.66	2.54
160	12.11	11.05	12.01	10.96	5.02	4.80	3.58	3.42	8.49	8.01
150	31.00	27.73	30.66	27.41	16.43	14.88	11.69	10.76	24.11	21.79
140	105.99	89.77	96.60	82.03	47.55	42.03	36.53	32.80	70.21	61.56
130	>120.00	114.41	>120.00	114.30	>120.00	113.62	>120.00	112.54	>120.00	114.16
120	>120.00	114.64	>120.00	114.64	>120.00	114.62	>120.00	114.61	>120.00	114.64

Table G-452. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 2000 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	0.02	0.02	-	-	0.06	0.06
180	0.51	0.49	0.50	0.49	0.16	0.16	0.08	0.08	0.28	0.27
175	0.99	0.96	0.98	0.95	0.29	0.28	0.18	0.18	0.58	0.57
170	1.95	1.87	1.93	1.85	0.63	0.61	0.41	0.40	1.22	1.18
160	6.41	6.10	6.37	6.07	2.45	2.34	1.72	1.65	4.41	4.21
150	17.99	16.21	17.88	16.11	7.88	7.49	5.70	5.45	13.67	12.43
140	44.92	39.83	44.21	39.24	24.27	21.98	18.97	17.11	36.78	33.07
130	>120.00	113.22	>120.00	112.97	81.10	70.12	57.09	50.30	>120.00	112.03
120	>120.00	114.64	>120.00	114.62	>120.00	114.37	>120.00	114.05	>120.00	114.60

Table G-453. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 2000 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.05	0.05	0.05	0.05	-	-	-	-	0.03	0.03
180	0.26	0.26	0.26	0.26	0.06	0.06	0.05	0.05	0.16	0.16
175	0.58	0.56	0.58	0.56	0.17	0.17	0.09	0.09	0.32	0.31
170	1.19	1.14	1.18	1.13	0.34	0.33	0.23	0.22	0.69	0.67
160	4.24	4.05	4.21	4.02	1.48	1.43	0.98	0.94	2.66	2.54
150	12.11	11.05	12.01	10.96	5.02	4.80	3.58	3.42	8.49	8.01
140	31.00	27.73	30.66	27.41	16.43	14.88	11.69	10.76	24.11	21.79
130	105.99	89.77	96.60	82.03	47.55	42.03	36.53	32.80	70.21	61.56
120	>120.00	114.41	>120.00	114.30	>120.00	113.62	>120.00	112.54	>120.00	114.16

Table G-454. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 2000 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.02	0.02	0.02	0.02	-	-	-	-	-	-
180	0.13	0.13	0.13	0.12	0.03	0.03	-	-	0.06	0.06
175	0.26	0.26	0.26	0.26	0.06	0.06	0.05	0.05	0.16	0.16
170	0.58	0.56	0.58	0.56	0.17	0.17	0.09	0.09	0.32	0.31
160	2.24	2.14	2.22	2.13	0.74	0.71	0.46	0.45	1.43	1.38
150	7.10	6.71	7.06	6.67	2.73	2.61	1.90	1.82	4.88	4.66
140	19.64	17.66	19.49	17.55	8.83	8.35	6.35	6.07	15.24	13.82
130	49.44	43.68	48.55	42.95	27.37	24.45	21.06	18.98	40.63	36.27
120	>120.00	113.57	>120.00	113.33	100.29	86.41	64.56	57.06	>120.00	112.76

Table G-455. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 2200 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1μPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.03	0.03	0.03	0.03	-	-	-	-	0.02	0.02
190	0.22	0.22	0.22	0.22	0.05	0.05	0.03	0.03	0.15	0.14
180	0.86	0.82	0.84	0.82	0.27	0.26	0.20	0.20	0.51	0.50
175	1.64	1.57	1.62	1.56	0.57	0.55	0.38	0.37	1.04	1.00
170	2.76	2.64	2.74	2.62	1.19	1.13	0.82	0.79	1.95	1.87
160	7.22	6.77	7.18	6.73	3.73	3.55	2.83	2.71	5.52	5.25
150	19.89	17.87	19.73	17.74	9.66	9.00	7.69	7.21	15.60	14.16
140	52.18	47.13	50.98	46.08	30.79	27.29	22.91	20.66	43.89	39.08
130	>120.00	113.99	>120.00	113.84	119.99	109.34	80.88	70.24	>120.00	113.31
120	>120.00	114.65	>120.00	114.64	>120.00	114.61	>120.00	114.49	>120.00	114.63

Table G-456. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 2200 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1μPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.12	0.12	0.12	0.12	0.02	0.02	-	-	0.04	0.04
180	0.38	0.37	0.38	0.37	0.14	0.14	0.06	0.06	0.23	0.23
175	0.76	0.74	0.75	0.73	0.24	0.24	0.17	0.17	0.46	0.44
170	1.44	1.39	1.43	1.37	0.48	0.47	0.31	0.30	0.93	0.90
160	4.24	4.03	4.20	4.00	1.92	1.84	1.46	1.40	2.97	2.84
150	10.67	9.67	10.58	9.60	5.52	5.24	4.42	4.20	8.09	7.55
140	29.50	26.02	29.10	25.67	15.66	14.26	11.60	10.60	23.28	20.92
130	105.60	89.35	95.73	81.17	46.99	42.10	36.76	32.91	70.75	61.85
120	>120.00	114.53	>120.00	114.40	>120.00	113.82	>120.00	112.80	>120.00	114.26

Table G-457. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 2200 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.03	0.03	0.03	0.03	-	-	-	-	0.02	0.02
180	0.22	0.22	0.22	0.22	0.05	0.05	0.03	0.03	0.15	0.14
175	0.44	0.43	0.43	0.42	0.16	0.16	0.06	0.06	0.26	0.25
170	0.86	0.82	0.84	0.82	0.27	0.26	0.20	0.20	0.51	0.50
160	2.76	2.64	2.74	2.62	1.19	1.13	0.82	0.79	1.95	1.87
150	7.22	6.77	7.18	6.73	3.73	3.55	2.83	2.71	5.52	5.25
140	19.89	17.87	19.73	17.74	9.66	9.00	7.69	7.21	15.60	14.16
130	52.18	47.13	50.98	46.08	30.79	27.29	22.91	20.66	43.89	39.08
120	>120.00	113.99	>120.00	113.84	119.99	109.34	80.88	70.24	>120.00	113.31

Table G-458. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 2200 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.13	0.13	0.13	0.13	0.02	0.02	-	-	0.05	0.05
175	0.22	0.22	0.22	0.22	0.05	0.05	0.03	0.03	0.15	0.14
170	0.44	0.43	0.43	0.42	0.16	0.16	0.06	0.06	0.26	0.25
160	1.64	1.57	1.62	1.56	0.57	0.55	0.38	0.37	1.04	1.00
150	4.65	4.40	4.63	4.38	2.14	2.05	1.62	1.56	3.32	3.17
140	12.06	10.94	11.96	10.85	6.08	5.75	4.78	4.54	8.90	8.29
130	32.80	29.12	32.39	28.74	17.49	15.83	13.19	12.02	25.64	22.79
120	119.99	109.37	119.28	100.77	52.04	47.02	40.96	36.61	86.23	73.61

Table G-459. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 250 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	-	-	-	-	0.03	0.03
180	0.48	0.47	0.48	0.47	0.10	0.09	0.05	0.05	0.13	0.13
175	0.68	0.66	0.68	0.66	0.14	0.14	0.12	0.12	0.54	0.53
170	1.46	1.40	1.45	1.39	0.56	0.54	0.47	0.46	0.76	0.73
160	3.48	3.32	3.45	3.29	1.59	1.53	1.26	1.22	2.46	2.36
150	6.48	6.13	6.45	6.09	3.48	3.32	2.77	2.66	4.95	4.72
140	10.20	9.56	10.08	9.45	5.86	5.57	5.15	4.91	7.74	7.22
130	16.55	15.56	16.36	15.39	8.77	8.18	7.52	7.05	11.85	10.86
120	22.60	20.95	22.38	20.76	13.27	12.20	11.23	10.25	16.46	15.43

Table G-460. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 250 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.11	0.11	0.11	0.11	0.02	0.02	-	-	0.06	0.06
175	0.45	0.44	0.45	0.44	0.08	0.08	0.04	0.04	0.13	0.13
170	0.65	0.62	0.64	0.62	0.13	0.13	0.11	0.11	0.50	0.49
160	2.03	1.95	2.01	1.93	0.68	0.66	0.59	0.57	1.47	1.42
150	4.74	4.51	4.71	4.48	2.21	2.12	1.71	1.64	3.32	3.17
140	7.92	7.41	7.86	7.36	4.53	4.33	3.72	3.55	5.93	5.61
130	12.94	12.21	12.73	12.01	6.82	6.44	5.98	5.70	9.11	8.51
120	18.88	17.65	18.68	17.47	10.01	9.36	8.85	8.25	13.93	12.90

Table G-461. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 250 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.06	0.06	0.06	0.06	-	-	-	-	0.03	0.03
175	0.12	0.12	0.12	0.12	0.03	0.03	-	-	0.09	0.09
170	0.48	0.47	0.48	0.47	0.10	0.09	0.05	0.05	0.13	0.13
160	1.46	1.40	1.45	1.39	0.56	0.54	0.47	0.46	0.76	0.73
150	3.48	3.32	3.45	3.29	1.59	1.53	1.26	1.22	2.46	2.36
140	6.48	6.13	6.45	6.09	3.48	3.32	2.77	2.66	4.95	4.72
130	10.20	9.56	10.08	9.45	5.86	5.57	5.15	4.91	7.74	7.22
120	16.55	15.56	16.36	15.39	8.77	8.18	7.52	7.05	11.85	10.86

Table G-462. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 250 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.02	0.02	0.02	0.02	-	-	-	-	-	-
175	0.06	0.06	0.06	0.06	-	-	-	-	0.03	0.03
170	0.12	0.12	0.12	0.12	0.03	0.03	-	-	0.09	0.09
160	0.68	0.66	0.68	0.66	0.14	0.14	0.12	0.12	0.54	0.53
150	2.28	2.19	2.26	2.17	0.76	0.74	0.63	0.61	1.59	1.53
140	5.04	4.78	5.01	4.75	2.41	2.31	1.86	1.78	3.60	3.44
130	8.29	7.76	8.23	7.71	4.77	4.55	3.99	3.81	6.18	5.85
120	13.62	12.85	13.41	12.65	7.10	6.68	6.21	5.90	9.43	8.82

Table G-463. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 450 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	0.02	0.02	-	-	0.05	0.05
180	0.60	0.58	0.59	0.57	0.11	0.11	0.09	0.09	0.44	0.43
175	1.15	1.11	1.15	1.10	0.46	0.45	0.20	0.13	0.66	0.64
170	1.93	1.86	1.92	1.85	0.66	0.64	0.53	0.51	1.31	1.26
160	4.57	4.37	4.54	4.35	2.01	1.93	1.61	1.55	3.16	3.02
150	7.28	6.88	7.24	6.83	4.42	4.23	3.54	3.38	5.76	5.49
140	11.00	10.25	10.90	10.15	6.65	6.33	5.91	5.64	8.49	8.01
130	16.94	15.90	16.73	15.70	9.41	8.88	8.39	7.94	12.57	11.69
120	23.05	21.32	22.81	21.09	13.86	12.95	12.04	11.17	17.18	16.07

Table G-464. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 450 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.03	0.03	0.03	0.03	-	-	-	-	-	-
180	0.13	0.13	0.12	0.12	0.05	0.05	0.02	0.02	0.09	0.09
175	0.54	0.52	0.53	0.52	0.10	0.10	0.08	0.08	0.40	0.39
170	1.03	0.99	1.02	0.98	0.43	0.42	0.12	0.12	0.60	0.58
160	2.86	2.75	2.85	2.73	1.21	1.16	0.72	0.69	1.92	1.84
150	5.62	5.36	5.59	5.33	2.89	2.77	2.22	2.13	4.34	4.15
140	8.63	8.13	8.57	8.08	5.33	5.10	4.60	4.40	6.72	6.39
130	13.46	12.69	13.26	12.48	7.71	7.30	6.77	6.45	9.67	9.11
120	19.31	17.99	19.05	17.78	10.92	10.11	9.48	8.96	14.48	13.60

Table G-465. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 450 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.09	0.09	0.09	0.09	0.02	0.02	-	-	0.05	0.05
175	0.20	0.20	0.20	0.19	0.06	0.06	0.03	0.03	0.10	0.10
170	0.60	0.58	0.59	0.57	0.11	0.11	0.09	0.09	0.44	0.43
160	1.93	1.86	1.92	1.85	0.66	0.64	0.53	0.51	1.31	1.26
150	4.57	4.37	4.54	4.35	2.01	1.93	1.61	1.55	3.16	3.02
140	7.28	6.88	7.24	6.83	4.42	4.23	3.54	3.38	5.76	5.49
130	11.00	10.25	10.90	10.15	6.65	6.33	5.91	5.64	8.49	8.01
120	16.94	15.90	16.73	15.70	9.41	8.88	8.39	7.94	12.57	11.69

Table G-466. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 450 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.03	0.03	0.03	0.03	-	-	-	-	-	-
175	0.09	0.09	0.09	0.09	0.02	0.02	-	-	0.05	0.05
170	0.20	0.20	0.20	0.19	0.06	0.06	0.03	0.03	0.10	0.10
160	1.15	1.11	1.15	1.10	0.46	0.45	0.20	0.13	0.66	0.64
150	3.04	2.91	3.02	2.89	1.33	1.28	1.00	0.96	2.05	1.97
140	5.88	5.60	5.86	5.58	3.06	2.93	2.47	2.37	4.58	4.39
130	8.95	8.44	8.91	8.39	5.54	5.30	4.84	4.62	6.96	6.62
120	14.10	13.29	13.89	13.08	7.99	7.56	6.99	6.66	9.94	9.38

Table G-467. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 685 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	0.03	0.03	-	-	0.06	0.06
180	0.64	0.62	0.63	0.61	0.10	0.10	0.09	0.09	0.48	0.46
175	1.35	1.30	1.35	1.29	0.48	0.47	0.42	0.41	0.68	0.66
170	2.08	2.00	2.06	1.98	0.70	0.68	0.57	0.55	1.51	1.45
160	4.99	4.76	4.95	4.73	2.27	2.18	1.77	1.70	3.34	3.21
150	8.53	8.07	8.47	8.02	4.58	4.38	3.85	3.68	6.34	6.02
140	14.07	13.20	13.95	13.09	7.48	7.06	6.36	6.04	9.91	9.38
130	19.98	18.60	19.81	18.44	11.72	10.93	9.73	9.18	15.45	14.55
120	27.54	25.11	27.21	24.78	16.62	15.60	15.00	14.09	20.24	18.83

Table G-468. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 685 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.05	0.05	0.05	0.05	-	-	-	-	0.02	0.02
180	0.37	0.36	0.20	0.20	0.06	0.06	0.04	0.04	0.09	0.09
175	0.58	0.56	0.58	0.56	0.09	0.09	0.07	0.07	0.45	0.44
170	1.15	1.10	1.14	1.09	0.46	0.45	0.20	0.19	0.63	0.61
160	3.00	2.87	2.97	2.85	1.40	1.35	0.98	0.94	2.08	2.00
150	6.24	5.93	6.20	5.90	3.01	2.88	2.48	2.38	4.57	4.36
140	10.14	9.56	10.03	9.49	5.66	5.38	4.78	4.58	7.72	7.28
130	16.33	15.34	16.17	15.20	8.94	8.42	7.64	7.20	12.33	11.55
120	22.57	20.88	22.38	20.71	13.93	13.07	11.87	11.06	17.26	16.18

Table G-469. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 685 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.09	0.09	0.09	0.09	0.03	0.03	-	-	0.06	0.06
175	0.43	0.42	0.43	0.42	0.06	0.06	0.05	0.05	0.09	0.09
170	0.64	0.62	0.63	0.61	0.10	0.10	0.09	0.09	0.48	0.46
160	2.08	2.00	2.06	1.98	0.70	0.68	0.57	0.55	1.51	1.45
150	4.99	4.76	4.95	4.73	2.27	2.18	1.77	1.70	3.34	3.21
140	8.53	8.07	8.47	8.02	4.58	4.38	3.85	3.68	6.34	6.02
130	14.07	13.20	13.95	13.09	7.48	7.06	6.36	6.04	9.91	9.38
120	19.98	18.60	19.81	18.44	11.72	10.93	9.73	9.18	15.45	14.55

Table G-470. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 685 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.05	0.05	0.05	0.05	-	-	-	-	0.02	0.02
175	0.09	0.09	0.09	0.09	0.03	0.03	-	-	0.06	0.06
170	0.43	0.42	0.43	0.42	0.06	0.06	0.05	0.05	0.09	0.09
160	1.35	1.30	1.35	1.29	0.48	0.47	0.42	0.41	0.68	0.66
150	3.32	3.17	3.30	3.14	1.51	1.45	1.15	1.10	2.30	2.21
140	6.58	6.25	6.53	6.21	3.27	3.11	2.69	2.58	4.87	4.63
130	10.83	10.15	10.72	10.04	5.94	5.64	5.05	4.84	8.10	7.65
120	16.91	15.87	16.75	15.72	9.29	8.76	7.98	7.53	12.93	12.12

Table G-471. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 1500 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.04	0.04	0.04	0.04	-	-	-	-	0.02	0.02
190	0.34	0.33	0.33	0.32	0.05	0.05	0.04	0.04	0.07	0.07
180	1.09	1.04	1.07	1.03	0.43	0.42	0.19	0.18	0.60	0.58
175	1.85	1.77	1.84	1.77	0.62	0.60	0.49	0.48	1.27	1.22
170	3.06	2.91	3.01	2.88	1.29	1.24	0.89	0.85	1.96	1.89
160	6.45	6.13	6.41	6.09	2.97	2.85	2.38	2.28	4.61	4.40
150	11.51	10.86	11.33	10.69	5.74	5.46	4.85	4.63	7.92	7.49
140	18.08	16.90	17.93	16.77	9.31	8.80	7.95	7.52	13.11	12.26
130	24.51	22.66	24.36	22.52	14.85	13.93	12.91	12.05	18.32	17.09
120	34.96	32.09	34.77	31.90	19.70	18.31	17.86	16.67	24.25	22.37

Table G-472. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 1500 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	0.02	0.02	-	-	0.05	0.05
180	0.48	0.46	0.48	0.46	0.07	0.07	0.06	0.06	0.37	0.36
175	0.95	0.92	0.94	0.91	0.39	0.38	0.16	0.16	0.54	0.52
170	1.71	1.65	1.70	1.64	0.57	0.54	0.47	0.45	1.09	1.04
160	4.47	4.27	4.43	4.22	1.83	1.76	1.45	1.40	2.84	2.73
150	8.16	7.74	8.08	7.65	4.05	3.87	3.17	3.03	5.80	5.51
140	14.42	13.59	14.26	13.44	6.97	6.62	5.94	5.66	9.53	9.01
130	20.64	19.17	20.47	19.03	11.36	10.60	9.49	8.98	15.29	14.37
120	28.77	26.38	28.51	26.12	16.68	15.64	15.05	14.13	20.57	19.07

Table G-473. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 1500 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.04	0.04	0.04	0.04	-	-	-	-	0.02	0.02
180	0.34	0.33	0.33	0.32	0.05	0.05	0.04	0.04	0.07	0.07
175	0.51	0.50	0.51	0.50	0.07	0.07	0.06	0.06	0.41	0.40
170	1.09	1.04	1.07	1.03	0.43	0.42	0.19	0.18	0.60	0.58
160	3.06	2.91	3.01	2.88	1.29	1.24	0.89	0.85	1.96	1.89
150	6.45	6.13	6.41	6.09	2.97	2.85	2.38	2.28	4.61	4.40
140	11.51	10.86	11.33	10.69	5.74	5.46	4.85	4.63	7.92	7.49
130	18.08	16.90	17.93	16.77	9.31	8.80	7.95	7.52	13.11	12.26
120	24.51	22.66	24.36	22.52	14.85	13.93	12.91	12.05	18.32	17.09

Table G-474. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 1500 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.06	0.06	0.06	0.06	0.02	0.02	-	-	0.05	0.05
175	0.34	0.33	0.33	0.32	0.05	0.05	0.04	0.04	0.07	0.07
170	0.51	0.50	0.51	0.50	0.07	0.07	0.06	0.06	0.41	0.40
160	1.85	1.77	1.84	1.77	0.62	0.60	0.49	0.48	1.27	1.22
150	4.81	4.57	4.77	4.53	1.95	1.88	1.58	1.52	3.02	2.89
140	8.66	8.20	8.57	8.11	4.37	4.18	3.45	3.30	6.14	5.83
130	15.05	14.19	14.90	14.05	7.40	6.99	6.25	5.95	9.93	9.38
120	21.29	19.76	21.13	19.61	12.01	11.22	9.86	9.32	15.75	14.82

Table G-475. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 2000 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.04	0.04	0.04	0.04	-	-	-	-	0.02	0.02
190	0.32	0.31	0.31	0.31	0.04	0.04	0.03	0.03	0.09	0.09
180	1.17	1.12	1.15	1.10	0.41	0.40	0.20	0.18	0.60	0.58
175	1.95	1.88	1.93	1.86	0.60	0.58	0.48	0.46	1.20	1.15
170	3.27	3.12	3.23	3.08	1.21	1.16	0.77	0.74	1.93	1.86
160	6.85	6.50	6.77	6.44	2.96	2.84	2.28	2.18	4.77	4.55
150	12.33	11.52	12.18	11.37	5.90	5.60	5.01	4.76	8.15	7.68
140	18.41	17.20	18.27	17.08	9.52	8.98	8.26	7.78	13.45	12.54
130	24.70	22.88	24.53	22.74	15.11	14.08	13.34	12.38	18.67	17.39
120	35.32	32.34	35.11	32.15	20.09	18.55	18.29	16.93	24.49	22.67

Table G-476. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 2000 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.07	0.07	0.07	0.07	0.02	0.02	-	-	0.03	0.03
180	0.48	0.46	0.47	0.46	0.08	0.08	0.05	0.05	0.35	0.34
175	0.98	0.94	0.96	0.93	0.37	0.36	0.16	0.16	0.54	0.52
170	1.79	1.72	1.78	1.70	0.55	0.53	0.45	0.44	1.01	0.97
160	4.75	4.53	4.70	4.48	1.78	1.71	1.38	1.33	2.90	2.78
150	8.71	8.24	8.63	8.15	4.17	3.97	3.15	3.00	5.93	5.64
140	14.96	14.05	14.84	13.92	7.20	6.79	6.12	5.82	9.74	9.19
130	20.87	19.43	20.73	19.29	11.71	10.86	9.76	9.18	15.57	14.60
120	29.22	26.75	28.93	26.49	16.97	15.82	15.41	14.36	20.94	19.43

Table G-477. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 2000 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.04	0.04	0.04	0.04	-	-	-	-	0.02	0.02
180	0.32	0.31	0.31	0.31	0.04	0.04	0.03	0.03	0.09	0.09
175	0.58	0.56	0.57	0.56	0.09	0.09	0.05	0.05	0.40	0.38
170	1.17	1.12	1.15	1.10	0.41	0.40	0.20	0.18	0.60	0.58
160	3.27	3.12	3.23	3.08	1.21	1.16	0.77	0.74	1.93	1.86
150	6.85	6.50	6.77	6.44	2.96	2.84	2.28	2.18	4.77	4.55
140	12.33	11.52	12.18	11.37	5.90	5.60	5.01	4.76	8.15	7.68
130	18.41	17.20	18.27	17.08	9.52	8.98	8.26	7.78	13.45	12.54
120	24.70	22.88	24.53	22.74	15.11	14.08	13.34	12.38	18.67	17.39

Table G-478. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 2000 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.08	0.08	0.08	0.08	0.02	0.02	-	-	0.05	0.05
175	0.32	0.31	0.31	0.31	0.04	0.04	0.03	0.03	0.09	0.09
170	0.58	0.56	0.57	0.56	0.09	0.09	0.05	0.05	0.40	0.38
160	1.95	1.88	1.93	1.86	0.60	0.58	0.48	0.46	1.20	1.15
150	5.06	4.83	5.01	4.78	1.89	1.82	1.52	1.46	3.12	2.97
140	9.16	8.66	9.08	8.58	4.48	4.26	3.39	3.24	6.25	5.94
130	15.51	14.58	15.39	14.46	7.55	7.11	6.39	6.07	10.14	9.50
120	21.51	20.00	21.37	19.87	12.28	11.40	10.08	9.46	16.07	15.04

Table G-479. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 2200 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.02	0.02	0.02	0.02	-	-	-	-	-	-
190	0.30	0.29	0.30	0.29	0.05	0.05	0.02	0.02	0.17	0.17
180	1.20	1.14	1.18	1.13	0.40	0.38	0.19	0.19	0.64	0.62
175	2.01	1.92	1.98	1.90	0.62	0.60	0.48	0.46	1.24	1.18
170	3.42	3.26	3.37	3.21	1.20	1.16	0.82	0.78	1.95	1.87
160	6.97	6.67	6.88	6.58	2.94	2.83	2.22	2.13	4.76	4.55
150	12.49	11.69	12.33	11.54	5.70	5.44	4.85	4.64	8.00	7.65
140	18.41	17.21	18.27	17.08	9.21	8.74	7.89	7.48	13.32	12.56
130	24.66	22.80	24.49	22.65	14.67	13.78	12.73	11.88	18.61	17.43
120	35.27	32.23	35.05	32.02	19.64	18.23	17.80	16.55	24.51	22.66

Table G-480. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 2200 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	-	-	-	-	0.03	0.03
180	0.53	0.51	0.52	0.50	0.10	0.10	0.06	0.06	0.31	0.31
175	1.04	0.99	1.02	0.97	0.34	0.33	0.18	0.18	0.54	0.53
170	1.84	1.76	1.82	1.74	0.57	0.55	0.44	0.43	1.10	1.05
160	4.91	4.69	4.86	4.64	1.73	1.66	1.31	1.26	2.93	2.81
150	8.85	8.40	8.75	8.32	4.02	3.85	3.09	2.97	5.89	5.65
140	15.03	14.13	14.91	14.00	6.90	6.59	5.88	5.62	9.65	9.19
130	20.85	19.39	20.70	19.24	11.20	10.45	9.41	8.90	15.50	14.65
120	29.14	26.59	28.85	26.32	16.64	15.54	14.90	13.97	20.89	19.45

Table G-481. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 2200 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.02	0.02	0.02	0.02	-	-	-	-	-	-
180	0.30	0.29	0.30	0.29	0.05	0.05	0.02	0.02	0.17	0.17
175	0.62	0.60	0.61	0.59	0.17	0.17	0.08	0.08	0.37	0.36
170	1.20	1.14	1.18	1.13	0.40	0.38	0.19	0.19	0.64	0.62
160	3.42	3.26	3.37	3.21	1.20	1.16	0.82	0.78	1.95	1.87
150	6.97	6.67	6.88	6.58	2.94	2.83	2.22	2.13	4.76	4.55
140	12.49	11.69	12.33	11.54	5.70	5.44	4.85	4.64	8.01	7.65
130	18.41	17.21	18.27	17.08	9.21	8.74	7.89	7.48	13.32	12.56
120	24.66	22.80	24.49	22.65	14.67	13.78	12.73	11.88	18.61	17.43

Table G-482. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 2200 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.11	0.11	0.11	0.11	-	-	-	-	0.05	0.05
175	0.30	0.29	0.30	0.29	0.05	0.05	0.02	0.02	0.17	0.17
170	0.62	0.60	0.61	0.59	0.17	0.17	0.08	0.08	0.37	0.36
160	2.01	1.92	1.98	1.90	0.62	0.60	0.48	0.46	1.24	1.18
150	5.20	4.99	5.16	4.94	1.86	1.79	1.45	1.39	3.13	3.00
140	9.25	8.80	9.16	8.70	4.36	4.18	3.34	3.20	6.23	5.96
130	15.59	14.66	15.44	14.53	7.30	6.93	6.22	5.93	10.08	9.54
120	21.48	19.95	21.33	19.80	11.80	11.00	9.73	9.20	16.05	15.09

Table G-483. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 250 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	-	-	-	-	0.02	0.02
180	0.48	0.46	0.47	0.46	0.09	0.09	0.05	0.05	0.14	0.14
175	0.69	0.67	0.69	0.67	0.15	0.15	0.12	0.12	0.54	0.52
170	1.43	1.38	1.43	1.37	0.55	0.53	0.23	0.23	0.75	0.73
160	3.48	3.33	3.45	3.30	1.56	1.50	1.16	1.11	2.41	2.31
150	6.48	6.14	6.44	6.11	3.36	3.21	2.68	2.58	4.91	4.69
140	11.87	11.12	11.64	10.92	5.77	5.50	5.06	4.83	7.58	7.14
130	19.64	18.16	19.43	17.98	8.65	8.19	7.40	6.98	12.96	12.03
120	29.88	27.08	29.56	26.79	14.98	13.87	12.22	11.31	20.54	18.84

Table G-484. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 250 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.11	0.11	0.11	0.11	0.02	0.02	-	-	0.06	0.06
175	0.23	0.23	0.23	0.23	0.07	0.07	0.04	0.04	0.13	0.13
170	0.65	0.63	0.65	0.63	0.14	0.13	0.11	0.11	0.49	0.48
160	2.02	1.94	2.00	1.92	0.69	0.67	0.59	0.57	1.43	1.38
150	4.75	4.55	4.72	4.52	2.13	2.04	1.66	1.60	3.24	3.11
140	8.11	7.76	7.98	7.65	4.44	4.25	3.57	3.42	5.87	5.58
130	15.13	14.14	14.94	13.96	6.73	6.39	5.90	5.63	9.03	8.54
120	22.84	21.04	22.65	20.87	10.44	9.72	8.79	8.31	15.86	14.72

Table G-485. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 250 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.06	0.06	0.06	0.06	-	-	-	-	0.02	0.02
175	0.12	0.12	0.12	0.12	0.03	0.03	-	-	0.08	0.08
170	0.48	0.46	0.47	0.46	0.09	0.09	0.05	0.05	0.14	0.14
160	1.43	1.38	1.43	1.37	0.55	0.53	0.23	0.23	0.75	0.73
150	3.48	3.33	3.45	3.30	1.56	1.50	1.16	1.11	2.41	2.31
140	6.48	6.14	6.44	6.11	3.36	3.21	2.68	2.58	4.91	4.69
130	11.87	11.12	11.64	10.92	5.77	5.50	5.06	4.83	7.58	7.14
120	19.64	18.16	19.43	17.98	8.65	8.19	7.40	6.98	12.96	12.03

Table G-486. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 250 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.02	0.02	0.02	0.02	-	-	-	-	-	-
175	0.06	0.06	0.06	0.06	-	-	-	-	0.02	0.02
170	0.12	0.12	0.12	0.12	0.03	0.03	-	-	0.08	0.08
160	0.69	0.67	0.69	0.67	0.15	0.15	0.12	0.12	0.54	0.52
150	2.26	2.17	2.24	2.16	0.76	0.73	0.63	0.61	1.57	1.51
140	5.05	4.81	5.02	4.79	2.33	2.24	1.78	1.72	3.52	3.37
130	8.60	8.23	8.48	8.11	4.68	4.48	3.83	3.67	6.12	5.82
120	15.85	14.79	15.66	14.62	6.97	6.61	6.12	5.83	9.44	8.93

Table G-487. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 450 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	0.02	0.02	-	-	0.05	0.05
180	0.58	0.56	0.57	0.55	0.11	0.11	0.09	0.09	0.40	0.39
175	1.03	0.99	1.02	0.99	0.43	0.42	0.14	0.13	0.64	0.62
170	1.88	1.81	1.87	1.80	0.63	0.61	0.50	0.48	1.17	1.12
160	4.47	4.29	4.44	4.26	1.92	1.84	1.53	1.47	2.98	2.86
150	7.42	7.08	7.30	6.97	4.20	4.02	3.27	3.13	5.57	5.33
140	14.49	13.44	14.31	13.26	6.42	6.13	5.66	5.40	8.81	8.32
130	22.51	20.64	22.36	20.50	11.02	10.12	8.89	8.35	16.54	15.16
120	37.43	32.78	36.76	32.32	21.05	18.74	17.99	16.00	27.65	24.22

Table G-488. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 450 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.03	0.03	0.03	0.03	-	-	-	-	-	-
180	0.12	0.12	0.12	0.12	0.05	0.05	0.02	0.02	0.09	0.09
175	0.50	0.48	0.50	0.48	0.10	0.10	0.07	0.07	0.20	0.20
170	0.95	0.92	0.94	0.91	0.22	0.21	0.13	0.13	0.58	0.56
160	2.78	2.67	2.76	2.66	1.09	1.04	0.70	0.67	1.84	1.77
150	5.53	5.29	5.50	5.26	2.74	2.63	2.04	1.97	4.13	3.96
140	9.49	9.01	9.38	8.90	5.11	4.89	4.37	4.18	6.55	6.25
130	17.67	16.29	17.49	16.13	7.67	7.26	6.56	6.25	11.43	10.54
120	26.30	23.82	26.00	23.59	14.77	13.46	11.74	10.70	20.01	18.19

Table G-489. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 450 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.09	0.09	0.09	0.09	0.02	0.02	-	-	0.05	0.05
175	0.14	0.13	0.13	0.13	0.06	0.06	0.03	0.03	0.10	0.10
170	0.58	0.56	0.57	0.55	0.11	0.11	0.09	0.09	0.40	0.39
160	1.88	1.81	1.87	1.80	0.63	0.61	0.50	0.48	1.17	1.12
150	4.47	4.29	4.44	4.26	1.92	1.84	1.53	1.47	2.98	2.86
140	7.42	7.08	7.30	6.97	4.20	4.02	3.27	3.13	5.57	5.33
130	14.49	13.44	14.31	13.26	6.42	6.13	5.66	5.40	8.81	8.32
120	22.51	20.64	22.36	20.50	11.02	10.12	8.89	8.35	16.54	15.16

Table G-490. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 450 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.03	0.03	0.03	0.03	-	-	-	-	-	-
175	0.09	0.09	0.09	0.09	0.02	0.02	-	-	0.05	0.05
170	0.14	0.13	0.13	0.13	0.06	0.06	0.03	0.03	0.10	0.10
160	1.03	0.99	1.02	0.99	0.43	0.42	0.14	0.13	0.64	0.62
150	2.95	2.83	2.93	2.82	1.20	1.15	0.82	0.78	1.94	1.87
140	5.78	5.53	5.74	5.50	2.91	2.79	2.30	2.20	4.38	4.20
130	9.99	9.46	9.88	9.36	5.32	5.09	4.58	4.39	6.82	6.49
120	18.46	17.00	18.29	16.85	8.12	7.68	6.80	6.48	12.34	11.36

Table G-491. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 685 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	0.03	0.03	-	-	0.06	0.06
180	0.62	0.60	0.61	0.59	0.10	0.10	0.09	0.09	0.45	0.44
175	1.26	1.21	1.25	1.20	0.46	0.44	0.20	0.20	0.73	0.70
170	1.97	1.89	1.95	1.88	0.73	0.70	0.52	0.50	1.41	1.36
160	4.89	4.70	4.84	4.65	2.05	1.97	1.64	1.58	3.10	2.96
150	9.60	9.07	9.49	8.97	4.36	4.17	3.46	3.32	6.12	5.85
140	18.06	16.64	17.93	16.52	7.78	7.26	6.35	6.01	11.98	10.97
130	26.97	24.27	26.70	24.06	15.93	14.37	13.21	11.87	20.80	18.81
120	90.91	81.36	78.38	69.46	40.23	34.54	29.71	25.77	62.48	55.22

Table G-492. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 685 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.05	0.05	0.05	0.05	-	-	-	-	0.02	0.02
180	0.21	0.20	0.21	0.20	0.06	0.06	0.04	0.04	0.09	0.09
175	0.54	0.52	0.54	0.52	0.09	0.09	0.08	0.08	0.42	0.41
170	1.08	1.03	1.07	1.02	0.43	0.42	0.20	0.19	0.65	0.62
160	2.86	2.75	2.84	2.73	1.27	1.23	0.89	0.85	1.94	1.87
150	6.37	6.11	6.30	6.04	2.84	2.73	2.26	2.18	4.31	4.13
140	13.20	12.22	13.02	12.05	5.49	5.23	4.57	4.37	7.83	7.42
130	21.25	19.49	21.11	19.36	10.03	9.26	8.27	7.66	15.58	14.26
120	34.66	30.53	34.18	30.18	20.13	17.91	17.36	15.46	24.94	22.39

Table G-493. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 685 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.09	0.09	0.09	0.09	0.03	0.03	-	-	0.06	0.06
175	0.40	0.38	0.40	0.38	0.06	0.06	0.05	0.05	0.10	0.09
170	0.62	0.60	0.61	0.59	0.10	0.10	0.09	0.09	0.45	0.44
160	1.97	1.89	1.95	1.88	0.73	0.70	0.52	0.50	1.41	1.36
150	4.89	4.70	4.84	4.65	2.05	1.97	1.64	1.58	3.10	2.96
140	9.60	9.07	9.49	8.97	4.36	4.17	3.46	3.32	6.12	5.85
130	18.06	16.64	17.93	16.52	7.78	7.26	6.35	6.01	11.98	10.97
120	26.97	24.27	26.70	24.06	15.93	14.37	13.21	11.87	20.80	18.81

Table G-494. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 685 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.05	0.05	0.05	0.05	-	-	-	-	0.02	0.02
175	0.09	0.09	0.09	0.09	0.03	0.03	-	-	0.06	0.06
170	0.40	0.38	0.40	0.38	0.06	0.06	0.05	0.05	0.10	0.09
160	1.26	1.21	1.25	1.20	0.46	0.44	0.20	0.20	0.73	0.70
150	3.14	3.00	3.10	2.96	1.39	1.34	1.02	0.98	2.10	2.02
140	6.79	6.50	6.72	6.42	2.99	2.87	2.48	2.38	4.61	4.42
130	14.09	13.04	13.93	12.89	5.78	5.51	4.84	4.63	8.38	7.89
120	22.02	20.20	21.89	20.08	11.04	9.99	8.86	8.18	16.41	14.99

Table G-495. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 1500 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.04	0.04	0.04	0.04	-	-	-	-	0.02	0.02
190	0.29	0.28	0.29	0.28	0.05	0.05	0.04	0.04	0.07	0.07
180	1.12	1.07	1.10	1.06	0.40	0.38	0.17	0.17	0.57	0.55
175	1.92	1.84	1.90	1.83	0.57	0.55	0.46	0.44	1.15	1.10
170	3.18	3.05	3.12	2.99	1.19	1.15	0.84	0.81	1.91	1.83
160	7.61	7.21	7.50	7.11	2.81	2.70	2.21	2.12	4.64	4.42
150	15.52	14.44	15.40	14.33	5.85	5.56	4.72	4.52	9.31	8.78
140	23.65	21.71	23.51	21.60	12.04	11.02	9.20	8.57	17.79	16.36
130	38.22	33.61	37.80	33.36	21.18	19.13	18.30	16.49	28.12	25.15
120	>120.00	113.01	>120.00	112.43	80.79	72.59	57.94	51.08	>120.00	111.16

Table G-496. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 1500 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	0.02	0.02	-	-	0.05	0.05
180	0.48	0.46	0.47	0.45	0.07	0.07	0.06	0.06	0.32	0.31
175	0.95	0.91	0.92	0.88	0.34	0.33	0.09	0.09	0.50	0.48
170	1.78	1.70	1.76	1.69	0.50	0.49	0.43	0.42	0.99	0.95
160	4.76	4.55	4.71	4.49	1.73	1.66	1.35	1.30	2.76	2.64
150	10.07	9.49	9.94	9.40	3.90	3.74	2.95	2.83	6.08	5.79
140	18.72	17.29	18.60	17.17	7.67	7.22	6.04	5.74	12.73	11.76
130	28.47	25.82	28.24	25.61	15.70	14.35	12.75	11.58	21.26	19.41
120	62.04	52.18	58.20	48.41	26.26	23.19	22.47	20.21	39.75	33.89

Table G-497. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 1500 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.04	0.04	0.04	0.04	-	-	-	-	0.02	0.02
180	0.29	0.28	0.29	0.28	0.05	0.05	0.04	0.04	0.07	0.07
175	0.54	0.52	0.53	0.51	0.07	0.07	0.06	0.06	0.38	0.37
170	1.12	1.07	1.10	1.06	0.40	0.38	0.17	0.17	0.57	0.55
160	3.18	3.05	3.12	2.99	1.19	1.15	0.84	0.81	1.91	1.83
150	7.61	7.21	7.50	7.11	2.81	2.70	2.21	2.12	4.64	4.42
140	15.52	14.44	15.40	14.33	5.85	5.56	4.72	4.52	9.31	8.78
130	23.65	21.71	23.51	21.60	12.04	11.02	9.20	8.57	17.79	16.36
120	38.22	33.61	37.80	33.36	21.18	19.13	18.30	16.49	28.12	25.15

Table G-498. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 1500 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.06	0.06	0.06	0.06	0.02	0.02	-	-	0.05	0.05
175	0.29	0.28	0.29	0.28	0.05	0.05	0.04	0.04	0.07	0.07
170	0.54	0.52	0.53	0.51	0.07	0.07	0.06	0.06	0.38	0.37
160	1.92	1.84	1.90	1.83	0.57	0.55	0.46	0.44	1.15	1.10
150	5.18	4.94	5.11	4.88	1.88	1.81	1.48	1.43	2.94	2.81
140	11.08	10.32	10.92	10.16	4.20	4.02	3.16	3.01	6.50	6.18
130	19.55	18.01	19.42	17.90	8.25	7.75	6.43	6.09	13.65	12.61
120	29.98	27.19	29.77	26.99	16.56	15.10	13.69	12.45	22.12	20.19

Table G-499. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 2000 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.04	0.04	0.04	0.04	-	-	-	-	0.02	0.02
190	0.29	0.28	0.29	0.28	0.04	0.04	0.03	0.03	0.09	0.09
180	1.13	1.08	1.10	1.06	0.38	0.37	0.18	0.17	0.57	0.55
175	1.96	1.88	1.94	1.86	0.57	0.54	0.44	0.43	1.15	1.11
170	3.44	3.29	3.38	3.23	1.13	1.09	0.78	0.74	1.93	1.86
160	8.56	8.11	8.47	8.02	2.88	2.77	2.18	2.08	5.15	4.92
150	16.87	15.62	16.76	15.52	6.76	6.42	5.20	4.97	11.40	10.55
140	25.54	23.24	25.35	23.10	14.63	13.43	11.24	10.29	20.27	18.50
130	44.90	38.22	44.40	37.91	23.54	21.36	20.42	18.47	33.80	30.03
120	>120.00	112.93	>120.00	112.79	64.84	56.11	41.50	35.44	>120.00	111.62

Table G-500. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 2000 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.07	0.07	0.07	0.07	0.02	0.02	-	-	0.03	0.03
180	0.49	0.47	0.48	0.47	0.08	0.08	0.05	0.05	0.32	0.31
175	0.95	0.91	0.93	0.90	0.34	0.33	0.15	0.15	0.50	0.49
170	1.79	1.72	1.78	1.70	0.49	0.48	0.42	0.40	1.01	0.97
160	5.15	4.92	5.09	4.87	1.70	1.64	1.30	1.25	2.85	2.74
150	11.63	10.83	11.48	10.70	4.25	4.06	3.05	2.92	7.09	6.72
140	20.22	18.56	20.11	18.47	9.24	8.67	6.99	6.63	15.13	13.98
130	32.24	29.00	32.02	28.82	18.05	16.47	15.05	13.78	23.79	21.69
120	79.12	67.28	75.26	63.59	30.44	26.92	24.25	22.00	45.84	38.41

Table G-501. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 2000 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.04	0.04	0.04	0.04	-	-	-	-	0.02	0.02
180	0.29	0.28	0.29	0.28	0.04	0.04	0.03	0.03	0.09	0.09
175	0.54	0.53	0.54	0.52	0.09	0.09	0.05	0.05	0.37	0.36
170	1.13	1.08	1.10	1.06	0.38	0.37	0.18	0.17	0.57	0.55
160	3.44	3.29	3.38	3.23	1.13	1.09	0.78	0.74	1.93	1.86
150	8.56	8.11	8.47	8.02	2.88	2.77	2.18	2.08	5.15	4.92
140	16.87	15.62	16.76	15.52	6.76	6.42	5.20	4.97	11.40	10.55
130	25.54	23.24	25.35	23.10	14.63	13.43	11.24	10.29	20.27	18.50
120	44.90	38.22	44.40	37.91	23.54	21.36	20.42	18.47	33.80	30.03

Table G-502. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 2000 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.08	0.08	0.08	0.08	0.02	0.02	-	-	0.05	0.05
175	0.29	0.28	0.29	0.28	0.04	0.04	0.03	0.03	0.09	0.09
170	0.54	0.53	0.54	0.52	0.09	0.09	0.05	0.05	0.37	0.36
160	1.96	1.88	1.94	1.86	0.57	0.54	0.44	0.43	1.15	1.11
150	5.64	5.39	5.57	5.33	1.83	1.76	1.43	1.38	3.16	3.03
140	12.60	11.73	12.47	11.61	4.62	4.44	3.40	3.26	7.75	7.32
130	21.07	19.32	20.96	19.22	9.81	9.21	7.65	7.20	15.96	14.72
120	33.88	30.43	33.69	30.26	18.95	17.24	15.92	14.55	24.67	22.51

Table G-503. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 2200 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.03	0.03	0.02	0.02	-	-	-	-	-	-
190	0.31	0.30	0.31	0.30	0.05	0.05	0.02	0.02	0.17	0.17
180	1.14	1.08	1.12	1.06	0.37	0.36	0.24	0.23	0.65	0.63
175	2.14	2.04	2.09	2.00	0.61	0.58	0.44	0.43	1.19	1.14
170	3.60	3.45	3.54	3.39	1.16	1.12	0.81	0.78	1.99	1.92
160	8.50	8.05	8.40	7.96	3.00	2.88	2.25	2.16	5.20	4.98
150	16.73	15.48	16.62	15.38	6.89	6.55	5.30	5.09	11.54	10.66
140	25.48	23.17	25.27	23.04	15.04	13.76	11.83	10.79	20.42	18.58
130	49.02	40.75	48.10	40.15	24.27	21.99	21.12	19.01	35.80	31.42
120	>120.00	113.22	>120.00	113.12	92.98	83.73	56.00	48.63	>120.00	112.84

Table G-504. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 2200 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	-	-	-	-	0.03	0.03
180	0.54	0.52	0.53	0.51	0.10	0.10	0.06	0.06	0.31	0.30
175	0.98	0.94	0.97	0.94	0.33	0.32	0.18	0.17	0.55	0.54
170	1.86	1.78	1.84	1.76	0.52	0.50	0.41	0.40	1.03	0.99
160	5.21	4.99	5.13	4.90	1.74	1.68	1.37	1.32	2.97	2.84
150	11.51	10.70	11.37	10.57	4.38	4.19	3.20	3.08	7.10	6.74
140	20.05	18.40	19.94	18.31	9.47	8.87	7.24	6.82	15.25	14.05
130	32.69	29.25	32.48	29.06	18.51	16.79	15.57	14.20	24.06	21.89
120	103.46	91.04	96.54	84.46	33.64	29.29	25.93	23.01	58.04	48.56

Table G-505. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 2200 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.03	0.03	0.02	0.02	-	-	-	-	-	-
180	0.31	0.30	0.31	0.30	0.05	0.05	0.02	0.02	0.17	0.17
175	0.61	0.59	0.60	0.58	0.17	0.17	0.09	0.09	0.35	0.34
170	1.14	1.08	1.12	1.06	0.37	0.36	0.24	0.23	0.65	0.63
160	3.60	3.45	3.54	3.39	1.16	1.12	0.81	0.78	1.99	1.92
150	8.50	8.05	8.40	7.96	3.00	2.88	2.25	2.16	5.20	4.98
140	16.73	15.48	16.62	15.38	6.89	6.55	5.30	5.09	11.54	10.66
130	25.48	23.17	25.27	23.04	15.04	13.76	11.83	10.79	20.42	18.58
120	49.02	40.75	48.10	40.15	24.27	21.99	21.12	19.01	35.80	31.42

Table G-506. WTG jacket pin pile (4.5 m diameter, IHC S-2300, 2200 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.11	0.11	0.11	0.11	-	-	-	-	0.05	0.05
175	0.31	0.30	0.31	0.30	0.05	0.05	0.02	0.02	0.17	0.17
170	0.61	0.59	0.60	0.58	0.17	0.17	0.09	0.09	0.35	0.34
160	2.14	2.04	2.09	2.00	0.61	0.58	0.44	0.43	1.19	1.14
150	5.66	5.39	5.60	5.34	1.91	1.84	1.49	1.44	3.30	3.16
140	12.47	11.60	12.35	11.48	4.75	4.55	3.54	3.39	7.80	7.37
130	20.92	19.17	20.81	19.07	10.13	9.42	7.96	7.46	16.09	14.79
120	34.48	30.78	34.25	30.61	19.41	17.59	16.45	14.96	25.05	22.76

WTG MP1

Table G-507. WTG MP1 foundation (13 m diameter, IHC S-5500, 1650 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.09	0.09	0.09	0.09	-	-	-	-	0.02	0.02
190	0.37	0.36	0.37	0.36	0.07	0.07	0.02	0.02	0.14	0.13
180	1.43	1.37	1.40	1.35	0.27	0.27	0.14	0.13	0.68	0.66
175	2.40	2.30	2.36	2.27	0.58	0.56	0.36	0.35	1.34	1.28
170	3.71	3.53	3.66	3.49	1.15	1.10	0.72	0.68	2.22	2.13
160	7.31	6.74	7.26	6.69	2.94	2.82	2.26	2.16	4.93	4.66
150	13.29	11.94	13.22	11.88	6.04	5.66	4.86	4.59	9.29	8.47
140	21.00	18.42	20.93	18.36	11.38	10.10	8.99	8.18	16.65	14.68
130	30.75	27.01	30.66	26.92	19.63	17.14	16.46	14.51	25.23	22.14
120	42.57	37.06	42.43	36.94	30.18	26.36	25.97	22.70	37.18	32.43

Table G-508. WTG MP1 foundation (13 m diameter, IHC S-5500, 1650 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.13	0.13	0.13	0.13	-	-	-	-	0.07	0.07
180	0.63	0.61	0.63	0.61	0.12	0.12	0.08	0.08	0.28	0.27
175	1.27	1.22	1.26	1.21	0.26	0.25	0.13	0.13	0.61	0.59
170	2.14	2.05	2.10	2.02	0.51	0.49	0.29	0.28	1.19	1.15
160	4.94	4.68	4.90	4.65	1.78	1.70	1.22	1.17	3.08	2.94
150	9.31	8.50	9.25	8.46	4.13	3.94	3.07	2.94	6.34	5.93
140	16.16	14.34	16.09	14.28	7.81	7.11	6.19	5.79	12.09	10.79
130	24.21	21.34	24.16	21.29	14.43	12.80	11.70	10.40	20.11	17.57
120	35.07	30.77	34.96	30.68	23.25	20.38	20.10	17.62	30.19	26.35

Table G-509. WTG MP1 foundation (13 m diameter, IHC S-5500, 1650 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	-	-	-	-	0.02	0.02
180	0.37	0.36	0.37	0.36	0.07	0.07	0.02	0.02	0.14	0.13
175	0.74	0.71	0.72	0.69	0.13	0.13	0.09	0.09	0.35	0.34
170	1.43	1.37	1.40	1.35	0.27	0.27	0.14	0.13	0.68	0.66
160	3.71	3.53	3.66	3.49	1.15	1.10	0.72	0.68	2.22	2.13
150	7.31	6.74	7.26	6.69	2.94	2.82	2.26	2.16	4.93	4.66
140	13.29	11.94	13.22	11.88	6.04	5.66	4.86	4.59	9.29	8.47
130	21.00	18.42	20.93	18.36	11.38	10.10	8.99	8.18	16.65	14.68
120	30.75	27.01	30.66	26.92	19.63	17.14	16.46	14.51	25.23	22.14

Table G-510. WTG MP1 foundation (13 m diameter, IHC S-5500, 1650 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.02	0.02	0.02	0.02	-	-	-	-	-	-
180	0.14	0.14	0.14	0.14	-	-	-	-	0.09	0.09
175	0.37	0.36	0.37	0.36	0.07	0.07	0.02	0.02	0.14	0.13
170	0.74	0.71	0.72	0.69	0.13	0.13	0.09	0.09	0.35	0.34
160	2.40	2.30	2.36	2.27	0.58	0.56	0.36	0.35	1.34	1.28
150	5.28	4.99	5.24	4.96	1.93	1.85	1.36	1.30	3.41	3.25
140	9.77	8.93	9.73	8.89	4.42	4.20	3.40	3.24	6.73	6.29
130	16.93	14.99	16.86	14.93	8.29	7.55	6.56	6.13	12.81	11.46
120	24.95	22.03	24.89	21.98	15.22	13.47	12.47	11.12	20.97	18.32

Table G-511. WTG MP1 foundation (13 m diameter, IHC S-5500, 2750 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.12	0.12	0.12	0.12	-	-	-	-	0.06	0.06
190	0.55	0.53	0.54	0.52	0.11	0.11	0.07	0.07	0.27	0.26
180	1.91	1.83	1.88	1.81	0.46	0.45	0.29	0.28	1.09	1.03
175	2.96	2.84	2.93	2.81	0.95	0.92	0.61	0.59	1.84	1.77
170	4.46	4.23	4.41	4.20	1.68	1.61	1.18	1.12	2.86	2.74
160	8.36	7.67	8.30	7.62	3.93	3.74	2.94	2.83	5.86	5.49
150	14.58	13.04	14.51	12.98	7.30	6.74	5.95	5.57	10.66	9.52
140	22.66	19.89	22.60	19.83	13.29	11.82	10.68	9.51	18.50	16.19
130	33.33	29.29	33.23	29.19	21.96	19.10	18.74	16.30	28.64	24.69
120	46.81	40.68	46.66	40.55	33.59	29.32	29.66	25.69	41.28	35.83

Table G-512. WTG MP1 foundation (13 m diameter, IHC S-5500, 2750 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.06	0.06	0.05	0.05	-	-	-	-	-	-
190	0.23	0.22	0.23	0.22	0.02	0.02	-	-	0.11	0.11
180	0.95	0.92	0.93	0.90	0.22	0.21	0.12	0.12	0.47	0.45
175	1.73	1.67	1.71	1.65	0.41	0.40	0.27	0.26	0.94	0.90
170	2.76	2.65	2.73	2.62	0.86	0.82	0.54	0.53	1.68	1.62
160	5.78	5.43	5.74	5.39	2.45	2.35	1.78	1.71	3.98	3.79
150	10.39	9.38	10.32	9.33	5.09	4.80	4.10	3.90	7.47	6.89
140	17.64	15.56	17.56	15.50	9.22	8.40	7.53	6.95	13.62	12.15
130	26.45	22.98	26.33	22.90	16.45	14.42	13.66	12.12	22.12	19.31
120	38.33	33.40	38.20	33.30	25.94	22.46	22.56	19.64	33.25	29.07

Table G-513. WTG MP1 foundation (13 m diameter, IHC S-5500, 2750 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.12	0.12	0.12	0.12	-	-	-	-	0.06	0.06
180	0.55	0.53	0.54	0.52	0.11	0.11	0.07	0.07	0.27	0.26
175	1.14	1.09	1.12	1.07	0.25	0.24	0.13	0.13	0.54	0.51
170	1.91	1.83	1.88	1.81	0.46	0.45	0.29	0.28	1.09	1.03
160	4.46	4.23	4.41	4.20	1.68	1.61	1.18	1.12	2.86	2.74
150	8.36	7.67	8.30	7.62	3.93	3.74	2.94	2.83	5.86	5.49
140	14.58	13.04	14.51	12.98	7.30	6.74	5.95	5.57	10.66	9.52
130	22.66	19.89	22.60	19.83	13.29	11.82	10.68	9.51	18.50	16.19
120	33.33	29.29	33.23	29.19	21.96	19.10	18.74	16.30	28.64	24.69

Table G-514. WTG MP1 foundation (13 m diameter, IHC S-5500, 2750 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	-	-	-	-	-	-
180	0.26	0.24	0.25	0.24	0.03	0.03	-	-	0.12	0.12
175	0.55	0.53	0.54	0.52	0.11	0.11	0.07	0.07	0.27	0.26
170	1.14	1.09	1.12	1.07	0.25	0.24	0.13	0.13	0.54	0.51
160	2.96	2.84	2.93	2.81	0.95	0.92	0.61	0.59	1.84	1.77
150	6.15	5.77	6.11	5.73	2.65	2.54	1.94	1.86	4.26	4.05
140	11.17	10.00	11.09	9.93	5.42	5.09	4.37	4.15	7.98	7.32
130	18.44	16.24	18.39	16.18	9.69	8.82	8.00	7.36	14.35	12.76
120	27.76	24.01	27.66	23.92	17.34	15.14	14.40	12.74	23.01	20.13

Table G-515. WTG MP1 foundation (13 m diameter, IHC S-5500, 4750 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.19	0.19	0.18	0.18	-	-	-	-	0.09	0.09
190	0.95	0.91	0.92	0.89	0.14	0.14	0.11	0.11	0.43	0.42
180	2.69	2.58	2.66	2.55	0.74	0.72	0.48	0.46	1.62	1.56
175	4.07	3.89	4.05	3.85	1.45	1.38	0.96	0.92	2.57	2.47
170	5.71	5.39	5.66	5.35	2.36	2.26	1.72	1.65	3.89	3.71
160	10.48	9.42	10.41	9.36	4.98	4.70	3.99	3.81	7.41	6.85
150	17.82	15.65	17.76	15.60	9.21	8.37	7.44	6.89	13.86	12.30
140	27.10	23.25	26.98	23.17	16.77	14.60	13.92	12.29	22.54	19.52
130	39.24	33.83	39.12	33.71	26.80	22.84	23.05	19.97	33.94	29.41
120	54.65	47.17	54.32	46.89	40.25	34.63	35.70	31.00	48.65	41.74

Table G-516. WTG MP1 foundation (13 m diameter, IHC S-5500, 4750 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.09	0.09	0.09	0.09	-	-	-	-	-	-
190	0.38	0.37	0.37	0.36	0.08	0.08	0.02	0.02	0.14	0.14
180	1.52	1.46	1.50	1.44	0.31	0.30	0.22	0.22	0.78	0.73
175	2.48	2.38	2.45	2.35	0.69	0.67	0.41	0.40	1.45	1.38
170	3.80	3.63	3.76	3.59	1.28	1.23	0.90	0.86	2.38	2.27
160	7.38	6.82	7.33	6.77	3.20	3.07	2.50	2.39	5.07	4.78
150	13.38	11.98	13.31	11.93	6.39	5.97	5.17	4.87	9.48	8.63
140	21.20	18.51	21.13	18.44	12.04	10.63	9.45	8.60	17.06	14.92
130	31.65	27.58	31.57	27.49	20.45	17.65	17.27	15.00	26.73	22.84
120	44.97	38.69	44.82	38.55	31.83	27.53	27.86	23.71	39.49	33.87

Table G-517. WTG MP1 foundation (13 m diameter, IHC S-5500, 4750 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.04	0.04	0.03	0.03	-	-	-	-	-	-
190	0.19	0.19	0.18	0.18	-	-	-	-	0.09	0.09
180	0.95	0.91	0.92	0.89	0.14	0.14	0.11	0.11	0.43	0.42
175	1.66	1.60	1.64	1.58	0.39	0.38	0.26	0.25	0.88	0.85
170	2.69	2.58	2.66	2.55	0.74	0.72	0.48	0.46	1.62	1.56
160	5.71	5.39	5.66	5.35	2.36	2.26	1.72	1.65	3.89	3.71
150	10.48	9.42	10.41	9.36	4.98	4.70	3.99	3.81	7.41	6.85
140	17.82	15.65	17.76	15.60	9.21	8.37	7.44	6.89	13.86	12.30
130	27.10	23.25	26.98	23.17	16.77	14.60	13.92	12.29	22.54	19.52
120	39.24	33.83	39.12	33.71	26.80	22.84	23.05	19.97	33.94	29.41

Table G-518. WTG MP1 foundation (13 m diameter, IHC S-5500, 4750 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.10	0.09	0.09	0.09	-	-	-	-	0.02	0.02
180	0.43	0.42	0.43	0.42	0.09	0.09	0.03	0.03	0.22	0.21
175	0.95	0.91	0.92	0.89	0.14	0.14	0.11	0.11	0.43	0.42
170	1.66	1.60	1.64	1.58	0.39	0.38	0.26	0.25	0.88	0.85
160	4.07	3.89	4.05	3.85	1.45	1.38	0.96	0.92	2.57	2.47
150	7.89	7.24	7.84	7.19	3.54	3.38	2.68	2.58	5.39	5.09
140	14.06	12.55	13.99	12.50	6.75	6.32	5.50	5.17	9.96	9.07
130	22.09	19.27	22.02	19.21	12.78	11.32	9.94	9.04	17.93	15.62
120	32.78	28.58	32.70	28.49	21.41	18.49	18.16	15.76	28.09	23.87

Table G-519. WTG MP1 foundation (13 m diameter, IHC S-5500, 5225 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1μPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.23	0.22	0.23	0.22	0.02	0.02	-	-	0.11	0.11
190	1.10	1.05	1.08	1.03	0.22	0.21	0.12	0.12	0.48	0.46
180	2.91	2.79	2.89	2.77	0.93	0.90	0.56	0.54	1.80	1.73
175	4.45	4.23	4.41	4.20	1.63	1.56	1.10	1.06	2.84	2.72
170	6.19	5.83	6.15	5.79	2.65	2.52	1.92	1.84	4.29	4.08
160	11.57	10.39	11.48	10.32	5.52	5.20	4.40	4.19	8.25	7.55
150	19.26	16.94	19.19	16.88	10.18	9.14	8.33	7.58	15.27	13.48
140	29.30	25.40	29.20	25.30	18.64	16.07	15.53	13.49	24.28	21.19
130	41.58	35.93	41.44	35.83	29.71	25.17	25.15	21.65	36.47	31.47
120	58.21	50.06	57.87	49.78	43.64	37.02	38.85	33.01	51.85	44.43

Table G-520. WTG MP1 foundation (13 m diameter, IHC S-5500, 5225 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1μPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.10	0.09	0.10	0.09	-	-	-	-	0.02	0.02
190	0.41	0.40	0.41	0.40	0.09	0.09	0.03	0.03	0.21	0.20
180	1.66	1.60	1.64	1.58	0.37	0.36	0.24	0.24	0.94	0.91
175	2.72	2.60	2.69	2.58	0.78	0.75	0.44	0.42	1.62	1.56
170	4.13	3.95	4.10	3.91	1.48	1.42	1.00	0.95	2.65	2.53
160	7.99	7.36	7.95	7.31	3.69	3.51	2.76	2.64	5.61	5.29
150	14.44	12.91	14.37	12.86	7.11	6.56	5.71	5.37	10.52	9.41
140	22.83	20.03	22.74	19.96	13.48	11.86	10.61	9.39	18.72	16.32
130	33.66	29.47	33.56	29.37	22.60	19.40	19.25	16.49	29.22	25.03
120	47.50	40.90	47.32	40.76	34.62	29.69	30.66	26.06	42.21	36.17

Table G-521. WTG MP1 foundation (13 m diameter, IHC S-5500, 5225 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.05	0.05	0.05	0.05	-	-	-	-	-	-
190	0.23	0.22	0.23	0.22	0.02	0.02	-	-	0.11	0.11
180	1.10	1.05	1.08	1.03	0.22	0.21	0.12	0.12	0.48	0.46
175	1.85	1.78	1.83	1.76	0.41	0.40	0.27	0.26	1.06	1.01
170	2.91	2.79	2.89	2.77	0.93	0.90	0.56	0.54	1.80	1.73
160	6.19	5.83	6.15	5.79	2.65	2.52	1.92	1.84	4.29	4.08
150	11.57	10.39	11.48	10.32	5.52	5.20	4.40	4.19	8.25	7.55
140	19.26	16.94	19.19	16.88	10.18	9.14	8.33	7.58	15.27	13.48
130	29.30	25.40	29.20	25.30	18.64	16.07	15.53	13.49	24.28	21.19
120	41.58	35.93	41.44	35.83	29.71	25.17	25.15	21.65	36.47	31.47

Table G-522. WTG MP1 foundation (13 m diameter, IHC S-5500, 5225 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.11	0.11	0.11	0.11	-	-	-	-	0.03	0.03
180	0.54	0.52	0.52	0.50	0.10	0.10	0.03	0.03	0.24	0.24
175	1.10	1.05	1.08	1.03	0.22	0.21	0.12	0.12	0.48	0.46
170	1.85	1.78	1.83	1.76	0.41	0.40	0.27	0.26	1.06	1.01
160	4.45	4.23	4.41	4.20	1.63	1.56	1.10	1.06	2.84	2.72
150	8.51	7.80	8.46	7.75	3.95	3.76	2.94	2.82	5.97	5.62
140	15.19	13.53	15.13	13.48	7.52	6.93	6.07	5.70	11.37	10.11
130	23.67	20.80	23.60	20.74	14.26	12.50	11.51	10.07	19.66	17.11
120	34.87	30.46	34.76	30.37	23.56	20.27	20.25	17.32	30.35	26.20

Table G-523. WTG MP1 foundation (13 m diameter, IHC S-5500, 1650 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.09	0.09	0.09	0.09	-	-	-	-	-	-
190	0.39	0.38	0.38	0.37	0.07	0.07	0.02	0.02	0.14	0.14
180	1.56	1.49	1.53	1.47	0.28	0.27	0.15	0.14	0.74	0.72
175	2.59	2.49	2.56	2.46	0.66	0.64	0.39	0.37	1.46	1.40
170	4.07	3.89	4.03	3.85	1.27	1.22	0.78	0.75	2.43	2.34
160	8.87	8.13	8.80	8.08	3.27	3.13	2.49	2.39	5.50	5.19
150	18.13	15.94	18.02	15.86	6.99	6.51	5.43	5.12	12.57	11.25
140	32.36	28.36	32.17	28.21	16.41	14.41	12.36	11.01	24.78	21.81
130	56.80	48.96	56.05	48.34	33.16	28.93	26.79	23.19	46.32	39.87
120	>120.00	112.69	>120.00	112.07	68.17	58.73	57.08	49.13	119.99	99.81

Table G-524. WTG MP1 foundation (13 m diameter, IHC S-5500, 1650 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.14	0.13	0.13	0.13	-	-	-	-	0.08	0.08
180	0.72	0.69	0.70	0.68	0.12	0.12	0.08	0.08	0.28	0.27
175	1.37	1.32	1.35	1.30	0.26	0.25	0.14	0.13	0.68	0.66
170	2.36	2.26	2.32	2.23	0.52	0.51	0.33	0.32	1.30	1.25
160	5.56	5.26	5.51	5.21	1.93	1.85	1.36	1.30	3.44	3.28
150	12.09	10.87	12.01	10.79	4.55	4.32	3.44	3.28	7.55	6.98
140	22.97	20.14	22.85	20.05	9.74	8.88	7.28	6.71	16.96	14.92
130	40.40	35.06	40.11	34.83	22.05	19.17	17.18	15.04	32.23	28.16
120	74.97	65.68	72.82	63.54	43.67	37.59	35.98	31.35	59.40	51.05

Table G-525. WTG MP1 foundation (13 m diameter, IHC S-5500, 1650 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	-	-	-	-	-	-
180	0.39	0.38	0.38	0.37	0.07	0.07	0.02	0.02	0.14	0.14
175	0.81	0.78	0.80	0.76	0.13	0.13	0.09	0.09	0.37	0.36
170	1.56	1.49	1.53	1.47	0.28	0.27	0.15	0.14	0.74	0.72
160	4.07	3.89	4.03	3.85	1.27	1.22	0.78	0.75	2.43	2.34
150	8.87	8.14	8.80	8.08	3.27	3.13	2.49	2.39	5.50	5.19
140	18.13	15.94	18.02	15.86	6.99	6.51	5.43	5.12	12.57	11.25
130	32.36	28.36	32.17	28.21	16.41	14.41	12.36	11.01	24.78	21.81
120	56.80	48.96	56.05	48.34	33.16	28.93	26.79	23.19	46.32	39.87

Table G-526. WTG MP1 foundation (13 m diameter, IHC S-5500, 1650 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.02	0.02	0.02	0.02	-	-	-	-	-	-
180	0.15	0.14	0.15	0.14	-	-	-	-	0.09	0.09
175	0.39	0.38	0.38	0.37	0.07	0.07	0.02	0.02	0.14	0.14
170	0.81	0.78	0.80	0.76	0.13	0.13	0.09	0.09	0.37	0.36
160	2.59	2.49	2.56	2.46	0.66	0.64	0.39	0.37	1.46	1.40
150	6.00	5.66	5.95	5.61	2.10	2.02	1.53	1.46	3.76	3.60
140	12.98	11.67	12.90	11.60	4.88	4.62	3.78	3.61	8.23	7.57
130	24.13	21.26	24.03	21.16	10.73	9.56	7.92	7.28	18.23	15.95
120	42.74	37.00	42.41	36.74	23.50	20.53	18.61	16.22	34.17	29.84

Table G-527. WTG MP1 foundation (13 m diameter, IHC S-5500, 2750 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.12	0.12	0.12	0.12	-	-	-	-	0.06	0.06
190	0.58	0.56	0.57	0.55	0.12	0.12	0.07	0.07	0.26	0.26
180	2.07	1.98	2.04	1.95	0.48	0.47	0.29	0.28	1.19	1.15
175	3.28	3.14	3.25	3.10	0.99	0.96	0.63	0.61	1.98	1.91
170	4.96	4.71	4.92	4.67	1.83	1.76	1.30	1.24	3.13	2.98
160	10.38	9.39	10.28	9.32	4.36	4.15	3.31	3.16	6.82	6.38
150	21.27	18.67	21.16	18.57	9.04	8.27	7.00	6.52	15.42	13.68
140	39.68	34.48	39.41	34.26	21.03	18.35	15.98	14.11	31.52	27.63
130	81.46	70.78	77.56	68.28	43.84	37.87	35.33	30.80	61.75	53.38
120	>120.00	114.29	>120.00	113.47	119.99	108.62	90.28	76.79	>120.00	112.51

Table G-528. WTG MP1 foundation (13 m diameter, IHC S-5500, 2750 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.06	0.06	0.05	0.05	-	-	-	-	-	-
190	0.22	0.22	0.22	0.21	0.02	0.02	-	-	0.11	0.11
180	1.06	1.02	1.02	0.99	0.16	0.16	0.12	0.12	0.48	0.47
175	1.88	1.81	1.86	1.79	0.44	0.42	0.26	0.26	0.98	0.95
170	2.97	2.85	2.94	2.82	0.91	0.87	0.56	0.54	1.82	1.75
160	6.67	6.26	6.62	6.21	2.66	2.56	1.96	1.88	4.39	4.18
150	14.16	12.68	14.07	12.61	5.85	5.48	4.58	4.34	9.31	8.53
140	27.38	23.82	27.21	23.67	12.86	11.50	9.42	8.61	20.87	18.27
130	50.73	43.97	50.23	43.56	28.45	24.64	22.26	19.42	41.04	35.54
120	>120.00	111.79	>120.00	111.06	59.57	51.45	48.15	41.71	98.72	82.80

Table G-529. WTG MP1 foundation (13 m diameter, IHC S-5500, 2750 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.12	0.12	0.12	0.12	-	-	-	-	0.06	0.06
180	0.58	0.56	0.57	0.55	0.12	0.12	0.07	0.07	0.26	0.26
175	1.22	1.18	1.21	1.17	0.24	0.24	0.13	0.13	0.56	0.54
170	2.07	1.98	2.04	1.95	0.48	0.47	0.29	0.28	1.19	1.15
160	4.96	4.71	4.92	4.67	1.83	1.76	1.30	1.24	3.13	2.98
150	10.38	9.39	10.28	9.32	4.36	4.15	3.31	3.16	6.82	6.38
140	21.27	18.67	21.16	18.57	9.04	8.27	7.00	6.52	15.42	13.68
130	39.68	34.48	39.41	34.26	21.03	18.35	15.98	14.11	31.52	27.63
120	81.46	70.78	77.56	68.28	43.84	37.87	35.33	30.80	61.75	53.38

Table G-530. WTG MP1 foundation (13 m diameter, IHC S-5500, 2750 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	-	-	-	-	-	-
180	0.26	0.24	0.25	0.24	0.03	0.03	-	-	0.13	0.13
175	0.58	0.56	0.57	0.55	0.12	0.12	0.07	0.07	0.26	0.26
170	1.22	1.18	1.21	1.17	0.24	0.24	0.13	0.13	0.56	0.54
160	3.28	3.14	3.25	3.10	0.99	0.96	0.63	0.61	1.98	1.91
150	7.21	6.69	7.16	6.64	2.87	2.75	2.16	2.07	4.74	4.49
140	15.17	13.52	15.08	13.45	6.28	5.87	4.93	4.66	9.97	9.12
130	29.30	25.59	29.13	25.43	13.97	12.45	10.13	9.21	22.42	19.62
120	54.08	46.88	53.51	46.38	30.58	26.71	23.90	21.00	43.81	37.90

Table G-531. WTG MP1 foundation (13 m diameter, IHC S-5500, 4750 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.17	0.17	0.17	0.16	-	-	-	-	0.10	0.10
190	1.04	1.00	1.01	0.98	0.15	0.15	0.11	0.11	0.44	0.43
180	2.86	2.75	2.84	2.73	0.84	0.80	0.48	0.46	1.74	1.67
175	4.48	4.26	4.42	4.22	1.59	1.52	1.10	1.04	2.76	2.65
170	6.59	6.18	6.55	6.14	2.56	2.46	1.88	1.79	4.24	4.04
160	14.00	12.63	13.92	12.56	5.64	5.30	4.39	4.18	9.26	8.50
150	27.15	23.80	26.96	23.65	12.66	11.43	9.31	8.54	20.53	18.15
140	50.12	43.91	49.63	43.47	28.16	24.64	21.89	19.35	40.45	35.38
130	>120.00	112.45	>120.00	111.87	59.98	52.53	48.10	42.06	110.10	90.32
120	>120.00	114.62	>120.00	114.53	>120.00	114.17	>120.00	112.23	>120.00	114.49

Table G-532. WTG MP1 foundation (13 m diameter, IHC S-5500, 4750 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.09	0.09	0.09	0.09	-	-	-	-	-	-
190	0.41	0.40	0.40	0.39	0.08	0.08	0.02	0.02	0.15	0.15
180	1.62	1.56	1.60	1.54	0.34	0.33	0.16	0.16	0.83	0.80
175	2.66	2.55	2.63	2.53	0.74	0.72	0.43	0.42	1.57	1.51
170	4.14	3.96	4.10	3.92	1.41	1.34	0.90	0.87	2.56	2.46
160	8.97	8.24	8.90	8.18	3.55	3.39	2.70	2.59	5.75	5.40
150	18.46	16.36	18.36	16.27	7.53	6.96	5.91	5.54	12.98	11.75
140	34.76	30.62	34.55	30.44	17.56	15.60	13.27	11.98	27.18	23.82
130	66.92	58.88	65.65	57.72	37.59	32.91	30.31	26.70	53.12	46.50
120	>120.00	113.13	>120.00	113.18	105.48	88.06	70.16	61.70	>120.00	112.72

Table G-533. WTG MP1 foundation (13 m diameter, IHC S-5500, 4750 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.04	0.04	0.03	0.03	-	-	-	-	-	-
190	0.17	0.17	0.17	0.16	-	-	-	-	0.10	0.10
180	1.04	1.00	1.01	0.98	0.15	0.15	0.11	0.11	0.44	0.43
175	1.79	1.73	1.78	1.70	0.41	0.40	0.24	0.23	0.98	0.94
170	2.86	2.75	2.84	2.73	0.84	0.80	0.48	0.46	1.74	1.67
160	6.59	6.18	6.55	6.14	2.56	2.46	1.88	1.79	4.24	4.04
150	14.00	12.63	13.92	12.56	5.64	5.30	4.39	4.18	9.26	8.50
140	27.15	23.80	26.96	23.65	12.66	11.43	9.31	8.54	20.53	18.15
130	50.12	43.91	49.63	43.47	28.16	24.64	21.89	19.35	40.45	35.38
120	>120.00	112.45	>120.00	111.87	59.98	52.53	48.10	42.06	110.10	90.32

Table G-534. WTG MP1 foundation (13 m diameter, IHC S-5500, 4750 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.10	0.10	0.10	0.09	-	-	-	-	0.02	0.02
180	0.46	0.44	0.45	0.44	0.09	0.09	0.03	0.03	0.19	0.19
175	1.04	1.00	1.01	0.98	0.15	0.15	0.11	0.11	0.44	0.43
170	1.79	1.73	1.78	1.70	0.41	0.40	0.24	0.23	0.98	0.94
160	4.48	4.26	4.42	4.22	1.59	1.52	1.10	1.04	2.76	2.65
150	9.59	8.80	9.52	8.74	3.86	3.69	2.90	2.78	6.20	5.81
140	19.74	17.46	19.63	17.37	8.19	7.55	6.36	5.94	14.02	12.64
130	36.91	32.42	36.69	32.23	19.08	16.88	14.40	12.96	29.32	25.77
120	74.10	64.94	71.51	63.06	40.38	35.28	32.61	28.76	57.22	50.11

Table G-535. WTG MP1 foundation (13 m diameter, IHC S-5500, 5225 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.23	0.22	0.22	0.22	0.02	0.02	-	-	0.11	0.11
190	1.14	1.10	1.14	1.09	0.17	0.17	0.13	0.13	0.54	0.52
180	3.20	3.06	3.15	3.02	1.00	0.95	0.60	0.58	1.93	1.86
175	4.95	4.71	4.91	4.67	1.77	1.70	1.17	1.12	3.06	2.92
170	7.24	6.75	7.17	6.70	2.83	2.71	2.09	2.00	4.77	4.53
160	15.80	14.14	15.70	14.06	6.32	5.92	4.94	4.67	10.56	9.57
150	30.07	26.51	29.93	26.36	14.47	13.00	10.51	9.52	23.11	20.46
140	54.86	47.95	54.25	47.41	30.92	27.26	24.21	21.50	43.76	38.09
130	>120.00	113.16	>120.00	113.03	66.64	58.25	51.07	44.42	119.99	110.67
120	>120.00	114.61	>120.00	114.41	>120.00	113.27	>120.00	112.83	>120.00	114.25

Table G-536. WTG MP1 foundation (13 m diameter, IHC S-5500, 5225 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.10	0.10	0.10	0.09	-	-	-	-	0.02	0.02
190	0.44	0.43	0.43	0.42	0.09	0.09	0.02	0.02	0.18	0.18
180	1.80	1.73	1.78	1.71	0.39	0.38	0.23	0.22	1.00	0.96
175	2.89	2.78	2.86	2.75	0.90	0.87	0.49	0.47	1.75	1.68
170	4.57	4.36	4.53	4.32	1.57	1.51	1.06	1.01	2.83	2.71
160	9.83	9.05	9.77	9.00	4.05	3.86	2.96	2.83	6.44	6.05
150	20.79	18.37	20.69	18.28	8.57	7.92	6.57	6.15	14.88	13.37
140	37.73	32.98	37.51	32.80	20.14	17.74	15.09	13.52	30.18	26.58
130	80.90	69.63	77.40	67.34	40.49	35.23	32.67	28.77	58.80	51.31
120	>120.00	113.65	>120.00	113.54	119.99	109.03	78.50	68.68	>120.00	113.28

Table G-537. WTG MP1 foundation (13 m diameter, IHC S-5500, 5225 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.05	0.05	0.05	0.05	-	-	-	-	-	-
190	0.23	0.22	0.22	0.22	0.02	0.02	-	-	0.11	0.11
180	1.14	1.10	1.14	1.09	0.17	0.17	0.13	0.13	0.54	0.52
175	1.98	1.91	1.97	1.89	0.43	0.42	0.26	0.26	1.10	1.06
170	3.20	3.06	3.15	3.02	1.00	0.95	0.60	0.58	1.93	1.86
160	7.24	6.75	7.17	6.70	2.83	2.71	2.09	2.00	4.77	4.53
150	15.80	14.14	15.70	14.06	6.32	5.92	4.94	4.67	10.56	9.57
140	30.07	26.50	29.93	26.36	14.47	13.00	10.51	9.52	23.11	20.46
130	54.86	47.95	54.25	47.41	30.92	27.26	24.21	21.50	43.76	38.09
120	>120.00	113.16	>120.00	113.03	66.64	58.25	51.07	44.42	119.99	110.67

Table G-538. WTG MP1 foundation (13 m diameter, IHC S-5500, 5225 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.11	0.11	0.11	0.11	-	-	-	-	0.03	0.03
180	0.59	0.57	0.58	0.56	0.10	0.10	0.03	0.03	0.23	0.23
175	1.14	1.10	1.14	1.09	0.17	0.17	0.13	0.13	0.54	0.52
170	1.98	1.91	1.97	1.89	0.43	0.42	0.26	0.26	1.10	1.06
160	4.95	4.71	4.91	4.66	1.77	1.70	1.17	1.12	3.06	2.92
150	10.78	9.73	10.69	9.66	4.36	4.16	3.27	3.11	6.92	6.49
140	22.12	19.57	22.01	19.46	9.26	8.56	7.04	6.56	16.12	14.40
130	39.94	34.87	39.71	34.66	21.65	19.10	16.48	14.66	32.02	28.25
120	100.77	83.12	94.35	78.66	43.42	37.73	35.06	30.73	64.09	56.01

Table G-539. WTG MP1 foundation (13 m diameter, IHC S-5500, 1650 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.06	0.06	0.06	0.06	-	-	-	-	0.02	0.02
190	0.49	0.48	0.49	0.48	0.05	0.05	0.02	0.02	0.13	0.13
180	1.54	1.48	1.52	1.46	0.47	0.46	0.14	0.14	0.65	0.62
175	2.52	2.42	2.50	2.40	0.60	0.58	0.51	0.49	1.45	1.40
170	3.73	3.58	3.69	3.53	1.27	1.22	0.73	0.68	2.35	2.25
160	6.76	6.45	6.62	6.29	2.97	2.85	2.32	2.24	4.58	4.37
150	11.77	11.06	11.44	10.75	5.32	5.05	4.47	4.27	7.27	6.80
140	17.45	16.25	17.15	15.97	8.09	7.57	6.87	6.47	10.86	10.07
130	23.66	21.84	23.36	21.56	11.85	11.00	9.91	9.28	15.65	14.59
120	31.85	29.18	31.50	28.85	16.22	15.10	14.31	13.37	21.37	19.67

Table G-540. WTG MP1 foundation (13 m diameter, IHC S-5500, 1650 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.11	0.11	0.11	0.11	-	-	-	-	0.05	0.05
180	0.63	0.61	0.62	0.60	0.10	0.10	0.06	0.06	0.47	0.46
175	1.37	1.33	1.36	1.31	0.43	0.42	0.13	0.13	0.61	0.59
170	2.31	2.22	2.28	2.19	0.58	0.56	0.48	0.47	1.31	1.26
160	4.84	4.60	4.77	4.55	1.87	1.79	1.33	1.28	3.10	2.96
150	8.54	8.12	8.32	7.92	3.99	3.80	3.04	2.91	5.56	5.27
140	14.03	13.14	13.75	12.88	6.31	5.95	5.37	5.11	8.61	8.07
130	19.90	18.43	19.58	18.14	9.33	8.73	8.10	7.58	12.81	12.02
120	26.73	24.46	26.22	24.02	13.50	12.65	11.82	10.96	17.75	16.51

Table G-541. WTG MP1 foundation (13 m diameter, IHC S-5500, 1650 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	-	-	-	-	0.02	0.02
180	0.49	0.48	0.49	0.48	0.05	0.05	0.02	0.02	0.13	0.13
175	0.71	0.68	0.69	0.67	0.11	0.11	0.06	0.06	0.49	0.48
170	1.54	1.48	1.52	1.46	0.47	0.46	0.14	0.14	0.65	0.62
160	3.73	3.58	3.69	3.53	1.27	1.22	0.73	0.68	2.35	2.25
150	6.76	6.45	6.62	6.29	2.97	2.85	2.32	2.24	4.58	4.37
140	11.77	11.06	11.44	10.75	5.32	5.05	4.47	4.27	7.27	6.80
130	17.45	16.25	17.15	15.97	8.09	7.57	6.87	6.47	10.86	10.07
120	23.66	21.84	23.36	21.56	11.85	11.00	9.91	9.28	15.65	14.59

Table G-542. WTG MP1 foundation (13 m diameter, IHC S-5500, 1650 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.02	0.02	0.02	0.02	-	-	-	-	-	-
180	0.13	0.13	0.13	0.13	-	-	-	-	0.06	0.06
175	0.49	0.48	0.49	0.48	0.05	0.05	0.02	0.02	0.13	0.13
170	0.71	0.68	0.69	0.67	0.11	0.11	0.06	0.06	0.49	0.48
160	2.52	2.42	2.50	2.40	0.60	0.58	0.51	0.49	1.45	1.40
150	5.12	4.87	5.06	4.81	2.04	1.94	1.47	1.42	3.37	3.22
140	8.99	8.55	8.77	8.34	4.19	4.00	3.32	3.18	5.83	5.51
130	14.58	13.64	14.30	13.38	6.58	6.20	5.60	5.32	8.95	8.38
120	20.52	18.98	20.20	18.69	9.63	9.01	8.42	7.87	13.26	12.43

Table G-543. WTG MP1 foundation (13 m diameter, IHC S-5500, 2750 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.09	0.09	0.09	0.09	-	-	-	-	0.04	0.04
190	0.58	0.57	0.58	0.57	0.09	0.09	0.05	0.05	0.43	0.42
180	1.94	1.87	1.92	1.85	0.57	0.56	0.48	0.47	1.19	1.14
175	2.98	2.85	2.96	2.83	1.08	1.04	0.62	0.60	1.90	1.83
170	4.44	4.22	4.37	4.17	1.75	1.68	1.28	1.23	2.84	2.73
160	8.12	7.72	7.92	7.52	3.73	3.57	2.90	2.78	5.26	4.98
150	13.59	12.75	13.32	12.51	6.11	5.76	5.18	4.92	8.46	7.92
140	19.51	18.08	19.24	17.82	9.28	8.67	8.00	7.46	12.73	11.91
130	26.19	24.01	25.74	23.63	13.45	12.61	11.80	10.94	17.60	16.39
120	34.66	31.54	34.29	31.23	18.09	16.80	15.98	14.93	23.73	21.84

Table G-544. WTG MP1 foundation (13 m diameter, IHC S-5500, 2750 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.03	0.03	0.03	0.03	-	-	-	-	-	-
190	0.15	0.15	0.15	0.15	0.03	0.03	-	-	0.08	0.08
180	1.00	0.95	0.98	0.94	0.16	0.15	0.10	0.09	0.57	0.55
175	1.78	1.71	1.75	1.68	0.55	0.53	0.44	0.44	1.04	1.00
170	2.79	2.67	2.76	2.65	0.77	0.74	0.59	0.57	1.74	1.67
160	5.70	5.40	5.61	5.32	2.48	2.38	1.85	1.78	3.80	3.63
150	9.90	9.40	9.72	9.22	4.63	4.41	3.85	3.67	6.39	6.02
140	15.85	14.82	15.59	14.57	7.27	6.79	6.18	5.84	9.79	9.20
130	22.06	20.36	21.76	20.09	10.83	9.99	9.29	8.67	14.48	13.58
120	29.96	27.48	29.60	27.14	15.19	14.20	13.41	12.56	20.01	18.50

Table G-545. WTG MP1 foundation (13 m diameter, IHC S-5500, 2750 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	-	-	-	-	0.04	0.04
180	0.58	0.57	0.58	0.57	0.09	0.09	0.05	0.05	0.43	0.42
175	1.17	1.13	1.16	1.11	0.18	0.17	0.11	0.11	0.59	0.57
170	1.94	1.87	1.92	1.85	0.57	0.56	0.48	0.47	1.19	1.14
160	4.44	4.22	4.37	4.17	1.75	1.68	1.28	1.23	2.84	2.73
150	8.12	7.72	7.92	7.52	3.73	3.57	2.90	2.78	5.26	4.98
140	13.59	12.75	13.32	12.51	6.11	5.76	5.18	4.92	8.46	7.92
130	19.51	18.08	19.24	17.82	9.28	8.67	8.00	7.46	12.73	11.91
120	26.19	24.01	25.74	23.63	13.45	12.61	11.80	10.94	17.60	16.39

Table G-546. WTG MP1 foundation (13 m diameter, IHC S-5500, 2750 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.03	0.03	0.03	0.03	-	-	-	-	-	-
180	0.19	0.19	0.18	0.18	0.03	0.03	0.02	0.02	0.10	0.09
175	0.58	0.57	0.58	0.57	0.09	0.09	0.05	0.05	0.43	0.42
170	1.17	1.13	1.16	1.11	0.18	0.17	0.11	0.11	0.59	0.57
160	2.98	2.85	2.96	2.83	1.08	1.04	0.62	0.60	1.90	1.83
150	6.03	5.73	5.94	5.63	2.65	2.54	1.98	1.90	4.06	3.86
140	10.55	9.90	10.21	9.62	4.87	4.62	4.07	3.89	6.72	6.31
130	16.44	15.35	16.17	15.10	7.62	7.10	6.45	6.07	10.21	9.51
120	22.72	20.95	22.42	20.68	11.33	10.48	9.59	8.96	14.98	14.01

Table G-547. WTG MP1 foundation (13 m diameter, IHC S-5500, 4750 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.13	0.13	0.13	0.13	0.02	0.02	-	-	0.07	0.07
190	0.81	0.78	0.78	0.75	0.14	0.13	0.09	0.09	0.54	0.52
180	2.63	2.52	2.60	2.49	0.65	0.63	0.57	0.56	1.58	1.52
175	3.89	3.70	3.82	3.63	1.41	1.36	1.09	1.04	2.49	2.39
170	5.37	5.10	5.30	5.01	2.26	2.18	1.74	1.67	3.49	3.35
160	9.67	9.18	9.49	8.99	4.33	4.13	3.60	3.44	6.12	5.76
150	15.82	14.76	15.54	14.52	6.96	6.53	5.88	5.55	9.62	9.04
140	22.20	20.45	21.92	20.21	10.47	9.68	9.02	8.43	14.69	13.72
130	30.12	27.63	29.81	27.34	15.29	14.22	13.25	12.39	20.70	19.07
120	38.16	34.54	37.84	34.26	20.94	19.28	18.28	16.89	27.82	25.44

Table G-548. WTG MP1 foundation (13 m diameter, IHC S-5500, 4750 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.06	0.06	0.06	0.06	-	-	-	-	0.02	0.02
190	0.50	0.48	0.49	0.48	0.06	0.06	0.03	0.03	0.13	0.13
180	1.45	1.39	1.43	1.38	0.48	0.47	0.16	0.15	0.66	0.63
175	2.40	2.32	2.38	2.28	0.63	0.61	0.55	0.53	1.39	1.34
170	3.54	3.37	3.47	3.29	1.31	1.26	0.98	0.95	2.27	2.18
160	6.89	6.55	6.76	6.39	2.96	2.83	2.41	2.32	4.41	4.21
150	12.25	11.50	11.95	11.23	5.26	4.98	4.43	4.22	7.50	7.00
140	18.34	17.00	18.06	16.75	8.34	7.79	6.99	6.57	11.58	10.80
130	24.66	22.76	24.43	22.54	12.42	11.62	10.42	9.64	16.96	15.78
120	33.19	30.31	32.87	30.07	17.39	16.11	15.15	14.09	23.23	21.35

Table G-549. WTG MP1 foundation (13 m diameter, IHC S-5500, 4750 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.02	0.02	0.02	0.02	-	-	-	-	-	-
190	0.13	0.13	0.13	0.13	0.02	0.02	-	-	0.07	0.07
180	0.81	0.78	0.78	0.75	0.14	0.13	0.09	0.09	0.54	0.52
175	1.66	1.59	1.62	1.55	0.52	0.50	0.18	0.17	0.99	0.96
170	2.63	2.52	2.60	2.49	0.65	0.63	0.57	0.56	1.58	1.52
160	5.37	5.10	5.30	5.01	2.26	2.18	1.74	1.67	3.49	3.35
150	9.67	9.18	9.49	8.99	4.33	4.13	3.60	3.44	6.12	5.76
140	15.82	14.76	15.54	14.52	6.96	6.53	5.88	5.55	9.62	9.04
130	22.20	20.45	21.92	20.21	10.47	9.68	9.02	8.43	14.69	13.72
120	30.12	27.63	29.81	27.34	15.29	14.22	13.25	12.39	20.70	19.07

Table G-550. WTG MP1 foundation (13 m diameter, IHC S-5500, 4750 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	-	-	-	-	0.02	0.02
180	0.54	0.52	0.54	0.52	0.06	0.06	0.03	0.03	0.14	0.14
175	0.81	0.78	0.78	0.75	0.14	0.13	0.09	0.09	0.54	0.52
170	1.66	1.59	1.62	1.55	0.52	0.50	0.18	0.17	0.99	0.96
160	3.89	3.70	3.82	3.63	1.41	1.36	1.09	1.04	2.49	2.39
150	7.35	6.96	7.16	6.78	3.18	3.05	2.60	2.49	4.68	4.44
140	12.83	12.07	12.57	11.82	5.52	5.22	4.65	4.42	7.89	7.37
130	18.97	17.56	18.71	17.32	8.70	8.12	7.34	6.86	12.12	11.33
120	25.44	23.35	25.00	23.07	12.89	12.06	10.92	10.11	17.56	16.32

Table G-551. WTG MP1 foundation (13 m diameter, IHC S-5500, 5225 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.15	0.15	0.15	0.14	0.02	0.02	-	-	0.07	0.07
190	1.08	1.03	1.06	1.01	0.14	0.14	0.09	0.09	0.57	0.55
180	2.80	2.69	2.78	2.66	0.73	0.70	0.59	0.57	1.73	1.66
175	4.24	4.03	4.19	3.98	1.53	1.48	1.10	1.06	2.65	2.54
170	5.88	5.56	5.80	5.48	2.42	2.33	1.78	1.71	3.76	3.61
160	10.52	9.84	10.21	9.58	4.55	4.34	3.78	3.61	6.51	6.14
150	16.81	15.63	16.53	15.39	7.28	6.83	6.14	5.81	9.91	9.34
140	23.31	21.47	23.06	21.23	10.83	10.05	9.24	8.66	15.23	14.22
130	31.55	28.89	31.24	28.62	15.69	14.60	13.56	12.69	21.43	19.73
120	40.10	36.12	39.77	35.84	21.55	19.81	18.74	17.32	28.92	26.56

Table G-552. WTG MP1 foundation (13 m diameter, IHC S-5500, 5225 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.06	0.06	0.06	0.06	-	-	-	-	0.02	0.02
190	0.54	0.52	0.53	0.51	0.06	0.06	0.03	0.03	0.13	0.13
180	1.63	1.57	1.60	1.54	0.50	0.48	0.16	0.16	0.74	0.71
175	2.64	2.53	2.62	2.51	0.65	0.63	0.57	0.55	1.54	1.49
170	3.99	3.79	3.92	3.73	1.39	1.33	0.98	0.94	2.48	2.38
160	7.51	7.11	7.31	6.91	3.12	2.99	2.52	2.42	4.75	4.52
150	13.14	12.32	12.87	12.08	5.54	5.26	4.64	4.42	7.89	7.40
140	19.39	17.92	19.12	17.68	8.63	8.08	7.30	6.86	12.09	11.31
130	26.20	23.97	25.81	23.63	12.77	11.96	10.78	9.98	17.59	16.35
120	34.77	31.62	34.47	31.35	17.85	16.54	15.50	14.44	23.92	22.03

Table G-553. WTG MP1 foundation (13 m diameter, IHC S-5500, 5225 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.02	0.02	0.02	0.02	-	-	-	-	-	-
190	0.15	0.15	0.15	0.14	0.02	0.02	-	-	0.07	0.07
180	1.08	1.03	1.06	1.01	0.14	0.14	0.09	0.09	0.57	0.55
175	1.81	1.74	1.80	1.73	0.54	0.53	0.19	0.18	1.03	0.99
170	2.80	2.69	2.78	2.66	0.73	0.70	0.59	0.57	1.73	1.66
160	5.88	5.56	5.80	5.48	2.42	2.33	1.78	1.71	3.76	3.61
150	10.52	9.84	10.21	9.58	4.55	4.34	3.78	3.61	6.51	6.14
140	16.81	15.63	16.53	15.39	7.28	6.83	6.14	5.81	9.91	9.34
130	23.31	21.47	23.06	21.23	10.83	10.05	9.24	8.66	15.23	14.22
120	31.55	28.89	31.24	28.62	15.69	14.60	13.56	12.69	21.43	19.73

Table G-554. WTG MP1 foundation (13 m diameter, IHC S-5500, 5225 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.07	0.07	0.07	0.07	-	-	-	-	0.02	0.02
180	0.58	0.56	0.57	0.55	0.06	0.06	0.03	0.03	0.16	0.16
175	1.08	1.03	1.06	1.01	0.14	0.14	0.09	0.09	0.57	0.55
170	1.81	1.74	1.80	1.73	0.54	0.53	0.19	0.18	1.03	0.99
160	4.24	4.03	4.19	3.98	1.53	1.48	1.10	1.06	2.65	2.54
150	8.01	7.58	7.79	7.38	3.38	3.25	2.68	2.58	5.01	4.76
140	13.75	12.86	13.46	12.62	5.81	5.51	4.88	4.64	8.22	7.72
130	20.02	18.50	19.76	18.26	8.94	8.39	7.64	7.16	12.62	11.81
120	27.19	24.88	26.81	24.52	13.23	12.38	11.27	10.48	18.23	16.91

Table G-555. WTG MP1 foundation (13 m diameter, IHC S-5500, 1650 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.06	0.06	0.06	0.06	-	-	-	-	0.02	0.02
190	0.49	0.48	0.48	0.47	0.05	0.05	0.02	0.02	0.13	0.13
180	1.53	1.48	1.52	1.46	0.24	0.23	0.15	0.14	0.67	0.65
175	2.53	2.43	2.50	2.41	0.63	0.60	0.50	0.49	1.44	1.39
170	3.76	3.60	3.71	3.55	1.23	1.18	0.74	0.71	2.31	2.22
160	7.50	7.17	7.30	6.97	2.91	2.80	2.28	2.19	4.54	4.33
150	13.85	12.94	13.59	12.71	5.25	4.99	4.38	4.20	7.57	7.16
140	21.34	19.61	21.09	19.38	8.62	8.14	6.99	6.63	13.44	12.50
130	31.60	28.59	31.32	28.35	14.85	13.69	12.16	11.27	21.32	19.50
120	47.68	39.95	45.96	39.30	23.65	21.53	20.22	18.37	33.10	29.58

Table G-556. WTG MP1 foundation (13 m diameter, IHC S-5500, 1650 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.12	0.12	0.11	0.11	-	-	-	-	0.05	0.05
180	0.64	0.62	0.64	0.62	0.10	0.10	0.06	0.06	0.43	0.42
175	1.38	1.33	1.36	1.31	0.20	0.20	0.13	0.13	0.63	0.61
170	2.32	2.24	2.30	2.21	0.59	0.57	0.47	0.46	1.29	1.24
160	4.99	4.79	4.87	4.68	1.81	1.74	1.30	1.25	3.03	2.90
150	9.63	9.14	9.42	8.95	3.92	3.74	2.97	2.85	5.52	5.25
140	16.70	15.47	16.44	15.24	6.28	5.98	5.30	5.04	9.43	8.90
130	24.53	22.55	24.30	22.35	10.66	9.88	8.65	8.17	16.35	15.08
120	36.34	32.41	36.02	32.16	18.01	16.47	14.94	13.75	24.84	22.70

Table G-557. WTG MP1 foundation (13 m diameter, IHC S-5500, 1650 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	-	-	-	-	0.02	0.02
180	0.49	0.48	0.48	0.47	0.05	0.05	0.02	0.02	0.13	0.13
175	0.70	0.68	0.69	0.67	0.12	0.12	0.06	0.06	0.49	0.48
170	1.53	1.48	1.52	1.46	0.24	0.23	0.15	0.14	0.67	0.65
160	3.76	3.60	3.71	3.55	1.23	1.18	0.74	0.71	2.31	2.22
150	7.50	7.17	7.30	6.97	2.91	2.80	2.28	2.19	4.54	4.33
140	13.85	12.94	13.59	12.71	5.25	4.99	4.38	4.20	7.57	7.16
130	21.34	19.61	21.09	19.38	8.62	8.14	6.99	6.63	13.44	12.50
120	31.60	28.59	31.32	28.35	14.85	13.69	12.16	11.27	21.32	19.50

Table G-558. WTG MP1 foundation (13 m diameter, IHC S-5500, 1650 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.02	0.02	0.02	0.02	-	-	-	-	-	-
180	0.13	0.13	0.13	0.13	-	-	-	-	0.06	0.06
175	0.49	0.48	0.48	0.47	0.05	0.05	0.02	0.02	0.13	0.13
170	0.70	0.68	0.69	0.67	0.12	0.12	0.06	0.06	0.49	0.48
160	2.53	2.43	2.50	2.41	0.63	0.60	0.50	0.49	1.44	1.39
150	5.35	5.14	5.20	5.00	1.98	1.91	1.44	1.39	3.31	3.17
140	10.20	9.61	9.92	9.41	4.13	3.95	3.21	3.08	5.77	5.49
130	17.43	16.13	17.18	15.90	6.60	6.28	5.54	5.26	9.89	9.32
120	25.56	23.30	25.14	23.05	11.41	10.57	9.10	8.58	17.13	15.76

Table G-559. WTG MP1 foundation (13 m diameter, IHC S-5500, 2750 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.09	0.09	0.09	0.09	-	-	-	-	0.04	0.04
190	0.59	0.57	0.59	0.57	0.09	0.09	0.05	0.05	0.19	0.19
180	1.93	1.86	1.91	1.84	0.58	0.56	0.26	0.26	1.10	1.06
175	2.98	2.87	2.96	2.84	0.96	0.92	0.63	0.61	1.85	1.78
170	4.58	4.39	4.47	4.29	1.68	1.61	1.21	1.16	2.79	2.68
160	9.02	8.57	8.81	8.39	3.64	3.49	2.83	2.71	5.23	4.97
150	15.89	14.77	15.64	14.54	6.05	5.74	5.12	4.87	8.91	8.41
140	23.68	21.79	23.46	21.58	10.13	9.45	8.39	7.90	15.58	14.38
130	34.68	31.14	34.38	30.89	18.00	16.43	15.14	13.90	24.20	22.14
120	>120.00	111.37	97.12	85.27	65.25	59.29	57.13	52.34	81.36	72.30

Table G-560. WTG MP1 foundation (13 m diameter, IHC S-5500, 2750 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.03	0.03	0.03	0.03	-	-	-	-	-	-
190	0.16	0.16	0.15	0.15	0.03	0.03	-	-	0.08	0.08
180	0.88	0.85	0.86	0.83	0.16	0.16	0.10	0.09	0.57	0.55
175	1.77	1.71	1.75	1.68	0.54	0.52	0.22	0.22	0.81	0.78
170	2.79	2.68	2.76	2.65	0.77	0.75	0.60	0.58	1.70	1.63
160	6.08	5.82	5.94	5.69	2.40	2.31	1.77	1.70	3.73	3.58
150	11.66	10.92	11.37	10.64	4.55	4.35	3.75	3.59	6.39	6.05
140	18.91	17.45	18.67	17.22	7.39	6.98	6.14	5.81	11.30	10.47
130	28.00	25.38	27.68	25.06	13.05	12.07	10.42	9.64	18.83	17.24
120	41.48	35.76	39.42	34.90	22.50	20.47	19.69	17.85	29.84	26.89

Table G-561. WTG MP1 foundation (13 m diameter, IHC S-5500, 2750 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	-	-	-	-	0.04	0.04
180	0.59	0.57	0.59	0.57	0.09	0.09	0.05	0.05	0.19	0.19
175	1.12	1.08	1.10	1.06	0.18	0.18	0.11	0.11	0.60	0.58
170	1.93	1.86	1.91	1.84	0.58	0.56	0.26	0.26	1.10	1.06
160	4.58	4.39	4.47	4.29	1.68	1.61	1.21	1.16	2.79	2.68
150	9.02	8.57	8.81	8.39	3.64	3.49	2.83	2.71	5.23	4.97
140	15.89	14.77	15.64	14.54	6.05	5.74	5.12	4.87	8.91	8.41
130	23.68	21.79	23.46	21.58	10.13	9.45	8.39	7.90	15.58	14.38
120	34.68	31.14	34.38	30.89	18.00	16.43	15.14	13.90	24.20	22.14

Table G-562. WTG MP1 foundation (13 m diameter, IHC S-5500, 2750 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.03	0.03	0.03	0.03	-	-	-	-	-	-
180	0.18	0.18	0.18	0.17	0.03	0.03	0.02	0.02	0.10	0.09
175	0.59	0.57	0.59	0.57	0.09	0.09	0.05	0.05	0.19	0.19
170	1.12	1.08	1.10	1.06	0.18	0.18	0.11	0.11	0.60	0.58
160	2.98	2.87	2.96	2.84	0.96	0.92	0.63	0.61	1.85	1.78
150	6.50	6.22	6.36	6.08	2.58	2.48	1.90	1.83	4.00	3.82
140	12.39	11.61	12.12	11.36	4.78	4.56	3.99	3.81	6.70	6.37
130	19.70	18.14	19.45	17.92	7.82	7.37	6.42	6.09	12.03	11.16
120	29.20	26.48	28.88	26.18	13.77	12.70	11.18	10.31	19.69	18.01

Table G-563. WTG MP1 foundation (13 m diameter, IHC S-5500, 4750 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.14	0.13	0.14	0.13	0.02	0.02	-	-	0.06	0.06
190	0.83	0.80	0.80	0.77	0.14	0.14	0.09	0.09	0.54	0.52
180	2.65	2.54	2.61	2.50	0.67	0.65	0.57	0.56	1.55	1.49
175	3.99	3.83	3.89	3.74	1.39	1.34	0.98	0.94	2.45	2.36
170	5.83	5.57	5.69	5.44	2.21	2.11	1.66	1.59	3.42	3.28
160	11.60	10.84	11.31	10.57	4.27	4.09	3.48	3.33	6.18	5.85
150	19.11	17.62	18.88	17.41	7.03	6.67	5.87	5.56	11.17	10.38
140	28.22	25.60	27.90	25.30	12.97	12.01	10.20	9.51	18.95	17.40
130	42.80	36.73	39.58	35.06	23.11	21.05	20.68	18.71	30.20	27.22
120	>120.00	114.24	>120.00	113.66	>120.00	112.10	115.06	105.49	>120.00	113.52

Table G-564. WTG MP1 foundation (13 m diameter, IHC S-5500, 4750 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.06	0.06	0.06	0.06	-	-	-	-	0.02	0.02
190	0.48	0.47	0.48	0.46	0.05	0.05	0.03	0.03	0.13	0.13
180	1.46	1.40	1.44	1.39	0.27	0.26	0.16	0.16	0.66	0.64
175	2.42	2.33	2.39	2.30	0.64	0.62	0.54	0.52	1.39	1.33
170	3.69	3.54	3.60	3.45	1.26	1.22	0.75	0.72	2.23	2.15
160	7.69	7.32	7.50	7.13	2.90	2.78	2.33	2.25	4.43	4.23
150	14.51	13.53	14.28	13.31	5.25	4.99	4.37	4.18	7.69	7.31
140	22.32	20.50	22.07	20.29	8.90	8.40	7.18	6.80	14.10	13.10
130	32.58	29.47	32.32	29.23	16.33	14.98	13.58	12.51	22.56	20.65
120	101.10	88.92	70.56	61.39	46.52	42.10	36.26	32.12	59.30	52.50

Table G-565. WTG MP1 foundation (13 m diameter, IHC S-5500, 4750 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.02	0.02	0.02	0.02	-	-	-	-	-	-
190	0.14	0.13	0.14	0.13	0.02	0.02	-	-	0.06	0.06
180	0.83	0.80	0.80	0.77	0.14	0.14	0.09	0.09	0.54	0.52
175	1.64	1.58	1.62	1.56	0.50	0.48	0.19	0.18	0.75	0.73
170	2.65	2.54	2.61	2.50	0.67	0.65	0.57	0.56	1.55	1.49
160	5.83	5.57	5.69	5.44	2.21	2.11	1.66	1.59	3.42	3.28
150	11.60	10.84	11.31	10.57	4.27	4.09	3.48	3.33	6.18	5.85
140	19.11	17.62	18.88	17.41	7.03	6.67	5.87	5.56	11.17	10.38
130	28.22	25.60	27.90	25.30	12.97	12.01	10.20	9.51	18.95	17.40
120	42.80	36.73	39.58	35.06	23.11	21.05	20.68	18.71	30.20	27.22

Table G-566. WTG MP1 foundation (13 m diameter, IHC S-5500, 4750 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	-	-	-	-	0.02	0.02
180	0.54	0.52	0.54	0.52	0.06	0.06	0.03	0.03	0.15	0.14
175	0.83	0.80	0.80	0.77	0.14	0.14	0.09	0.09	0.54	0.52
170	1.64	1.58	1.62	1.56	0.50	0.48	0.19	0.18	0.75	0.73
160	3.99	3.83	3.89	3.74	1.39	1.34	0.98	0.94	2.45	2.36
150	8.25	7.84	8.05	7.65	3.08	2.95	2.52	2.42	4.68	4.45
140	15.26	14.20	15.01	13.98	5.50	5.23	4.60	4.38	8.19	7.76
130	23.12	21.24	22.90	21.04	9.41	8.85	7.62	7.20	14.86	13.79
120	33.70	30.37	33.42	30.14	17.32	15.87	14.53	13.37	23.48	21.48

Table G-567. WTG MP1 foundation (13 m diameter, IHC S-5500, 5225 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.15	0.15	0.15	0.14	0.02	0.02	-	-	0.07	0.07
190	0.95	0.91	0.91	0.87	0.15	0.14	0.09	0.09	0.57	0.55
180	2.84	2.72	2.80	2.69	0.72	0.69	0.60	0.58	1.65	1.59
175	4.40	4.21	4.30	4.11	1.48	1.43	0.91	0.86	2.60	2.50
170	6.37	6.06	6.20	5.91	2.36	2.26	1.69	1.63	3.72	3.56
160	12.41	11.61	12.15	11.36	4.53	4.32	3.66	3.51	6.53	6.20
150	19.80	18.23	19.55	18.01	7.40	6.99	6.17	5.87	11.66	10.82
140	28.73	26.23	28.41	25.91	13.69	12.62	11.08	10.24	19.43	17.80
130	41.00	35.93	39.36	34.99	25.50	23.23	24.18	21.88	30.92	28.14
120	>120.00	114.20	>120.00	108.90	99.62	92.37	96.45	89.44	115.32	100.37

Table G-568. WTG MP1 foundation (13 m diameter, IHC S-5500, 5225 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.06	0.06	0.06	0.06	-	-	-	-	0.02	0.02
190	0.52	0.50	0.51	0.49	0.05	0.05	0.03	0.03	0.13	0.13
180	1.62	1.56	1.60	1.53	0.27	0.27	0.17	0.17	0.71	0.69
175	2.66	2.56	2.64	2.53	0.68	0.66	0.56	0.54	1.52	1.46
170	4.06	3.88	3.99	3.81	1.36	1.31	0.78	0.74	2.43	2.34
160	8.36	7.91	8.15	7.72	3.04	2.91	2.44	2.34	4.77	4.55
150	15.26	14.20	15.00	13.97	5.54	5.28	4.61	4.40	8.06	7.65
140	22.95	21.07	22.71	20.85	9.30	8.74	7.59	7.17	14.50	13.45
130	32.76	29.80	32.48	29.55	17.49	15.98	14.96	13.72	23.15	21.16
120	84.10	70.81	60.16	50.95	44.72	39.36	41.27	37.77	46.41	42.68

Table G-569. WTG MP1 foundation (13 m diameter, IHC S-5500, 5225 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.02	0.02	0.02	0.02	-	-	-	-	-	-
190	0.15	0.15	0.15	0.14	0.02	0.02	-	-	0.07	0.07
180	0.95	0.91	0.91	0.87	0.15	0.14	0.09	0.09	0.57	0.55
175	1.79	1.73	1.78	1.71	0.52	0.51	0.20	0.19	0.79	0.76
170	2.84	2.72	2.80	2.69	0.72	0.69	0.60	0.58	1.65	1.59
160	6.37	6.06	6.20	5.91	2.36	2.26	1.69	1.63	3.72	3.56
150	12.41	11.61	12.15	11.36	4.53	4.32	3.66	3.51	6.53	6.20
140	19.80	18.23	19.55	18.01	7.40	6.99	6.17	5.87	11.66	10.82
130	28.73	26.23	28.41	25.91	13.69	12.62	11.08	10.24	19.43	17.80
120	41.00	35.93	39.36	34.99	25.50	23.23	24.18	21.88	30.92	28.14

Table G-570. WTG MP1 foundation (13 m diameter, IHC S-5500, 5225 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.07	0.07	0.07	0.07	-	-	-	-	0.02	0.02
180	0.58	0.56	0.57	0.56	0.06	0.06	0.03	0.03	0.16	0.16
175	0.95	0.91	0.91	0.87	0.15	0.14	0.09	0.09	0.57	0.55
170	1.79	1.73	1.78	1.71	0.52	0.51	0.20	0.19	0.79	0.76
160	4.40	4.21	4.30	4.11	1.48	1.43	0.91	0.86	2.60	2.50
150	8.92	8.44	8.71	8.23	3.30	3.16	2.60	2.51	5.05	4.81
140	15.99	14.86	15.75	14.63	5.83	5.54	4.85	4.62	8.56	8.10
130	23.68	21.78	23.47	21.57	9.80	9.20	8.03	7.59	15.28	14.13
120	33.78	30.63	33.50	30.38	18.68	16.95	16.23	14.72	24.09	22.04

WTG MP2

Table G-571. WTG MP2 foundation (13 m diameter, IHC S-5500, 550 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.06	0.06	0.06	0.06	-	-	-	-	-	-
190	0.34	0.34	0.34	0.33	0.02	0.02	-	-	0.11	0.11
180	1.38	1.32	1.36	1.30	0.22	0.22	0.10	0.10	0.56	0.54
175	2.35	2.25	2.32	2.22	0.42	0.40	0.24	0.24	1.12	1.08
170	3.64	3.46	3.59	3.42	0.92	0.88	0.54	0.52	1.97	1.89
160	7.04	6.52	6.99	6.47	2.69	2.58	1.91	1.83	4.57	4.33
150	12.45	11.11	12.37	11.04	5.46	5.13	4.34	4.14	8.33	7.59
140	19.06	16.69	18.98	16.63	9.53	8.67	7.84	7.18	14.47	12.78
130	27.22	23.31	27.10	23.22	16.53	14.48	13.76	12.26	22.15	19.17
120	37.52	32.42	37.41	32.34	24.93	21.76	22.09	19.28	32.22	27.87

Table G-572. WTG MP2 foundation (13 m diameter, IHC S-5500, 550 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.11	0.11	0.11	0.11	-	-	-	-	0.04	0.04
180	0.54	0.52	0.52	0.50	0.07	0.07	0.02	0.02	0.23	0.23
175	1.18	1.13	1.14	1.09	0.19	0.19	0.09	0.09	0.48	0.47
170	2.10	2.01	2.05	1.97	0.39	0.38	0.23	0.22	0.98	0.94
160	4.85	4.59	4.80	4.55	1.50	1.43	0.96	0.92	2.84	2.73
150	8.90	8.11	8.84	8.05	3.71	3.53	2.76	2.64	5.85	5.47
140	14.91	13.25	14.85	13.18	6.82	6.36	5.54	5.21	10.28	9.22
130	22.01	19.17	21.92	19.11	12.26	10.85	9.65	8.79	17.37	15.19
120	31.25	27.17	31.14	27.08	19.86	17.22	16.87	14.81	25.43	21.99

Table G-573. WTG MP2 foundation (13 m diameter, IHC S-5500, 550 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	-	-	-	-	-	-
180	0.34	0.34	0.34	0.33	0.02	0.02	-	-	0.11	0.11
175	0.65	0.63	0.63	0.61	0.09	0.09	0.05	0.05	0.25	0.24
170	1.38	1.32	1.36	1.30	0.22	0.22	0.10	0.10	0.56	0.54
160	3.63	3.46	3.59	3.42	0.92	0.88	0.54	0.52	1.97	1.89
150	7.04	6.52	6.99	6.47	2.69	2.58	1.91	1.83	4.57	4.33
140	12.45	11.11	12.37	11.04	5.46	5.13	4.34	4.14	8.33	7.59
130	19.06	16.69	18.98	16.63	9.53	8.67	7.84	7.18	14.47	12.78
120	27.22	23.31	27.10	23.22	16.53	14.48	13.76	12.26	22.15	19.17

Table G-574. WTG MP2 foundation (13 m diameter, IHC S-5500, 550 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.12	0.12	0.12	0.12	-	-	-	-	0.05	0.05
175	0.34	0.34	0.34	0.33	0.02	0.02	-	-	0.11	0.11
170	0.65	0.63	0.63	0.61	0.09	0.09	0.05	0.05	0.25	0.24
160	2.35	2.25	2.32	2.22	0.42	0.40	0.24	0.24	1.12	1.08
150	5.17	4.89	5.13	4.84	1.69	1.62	1.08	1.02	3.08	2.94
140	9.35	8.51	9.29	8.46	3.99	3.81	2.93	2.80	6.20	5.79
130	15.57	13.79	15.49	13.73	7.26	6.70	5.87	5.50	11.06	9.76
120	22.76	19.83	22.68	19.76	12.90	11.47	10.18	9.19	18.14	15.83

Table G-575. WTG MP2 foundation (13 m diameter, IHC S-5500, 1100 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.07	0.07	0.07	0.07	-	-	-	-	-	-
190	0.27	0.27	0.27	0.26	0.05	0.05	-	-	0.13	0.13
180	1.26	1.21	1.24	1.19	0.24	0.24	0.13	0.13	0.58	0.57
175	2.05	1.97	2.01	1.93	0.47	0.46	0.28	0.28	1.15	1.11
170	3.18	3.04	3.14	3.00	0.95	0.91	0.59	0.57	1.90	1.83
160	6.50	6.08	6.45	6.03	2.66	2.54	1.93	1.85	4.36	4.14
150	11.95	10.74	11.88	10.68	5.45	5.12	4.32	4.12	8.37	7.67
140	19.52	17.18	19.45	17.12	10.14	9.17	8.17	7.48	15.33	13.62
130	29.53	25.82	29.44	25.73	18.48	16.20	15.23	13.49	24.30	21.44
120	41.63	36.35	41.52	36.25	29.22	25.39	24.61	21.68	36.42	31.85

Table G-576. WTG MP2 foundation (13 m diameter, IHC S-5500, 1100 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.12	0.12	0.12	0.12	-	-	-	-	0.06	0.06
180	0.56	0.54	0.55	0.53	0.10	0.10	0.06	0.06	0.26	0.25
175	1.12	1.08	1.10	1.05	0.22	0.21	0.12	0.12	0.50	0.48
170	1.88	1.81	1.87	1.79	0.42	0.41	0.26	0.26	1.00	0.96
160	4.40	4.19	4.36	4.15	1.53	1.47	1.00	0.96	2.72	2.61
150	8.37	7.67	8.30	7.62	3.65	3.47	2.74	2.63	5.66	5.32
140	14.67	13.13	14.60	13.07	6.97	6.48	5.58	5.24	10.71	9.58
130	23.00	20.26	22.92	20.20	13.34	11.91	10.44	9.36	18.84	16.55
120	33.88	29.87	33.80	29.79	22.33	19.55	18.89	16.54	29.27	25.50

Table G-577. WTG MP2 foundation (13 m diameter, IHC S-5500, 1100 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.07	0.07	0.07	0.07	-	-	-	-	-	-
180	0.27	0.27	0.27	0.26	0.05	0.05	-	-	0.13	0.13
175	0.65	0.62	0.63	0.61	0.11	0.11	0.07	0.07	0.27	0.27
170	1.26	1.21	1.24	1.19	0.24	0.24	0.13	0.13	0.58	0.57
160	3.18	3.04	3.14	3.00	0.95	0.91	0.59	0.57	1.90	1.83
150	6.50	6.08	6.45	6.03	2.66	2.54	1.93	1.85	4.36	4.14
140	11.95	10.74	11.88	10.68	5.45	5.12	4.32	4.12	8.37	7.67
130	19.52	17.18	19.45	17.12	10.14	9.17	8.17	7.48	15.33	13.62
120	29.53	25.82	29.44	25.73	18.48	16.20	15.23	13.49	24.30	21.44

Table G-578. WTG MP2 foundation (13 m diameter, IHC S-5500, 1100 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.13	0.13	0.13	0.13	-	-	-	-	0.07	0.07
175	0.27	0.27	0.27	0.26	0.05	0.05	-	-	0.13	0.13
170	0.65	0.62	0.63	0.61	0.11	0.11	0.07	0.07	0.27	0.27
160	2.05	1.97	2.01	1.93	0.47	0.46	0.28	0.28	1.15	1.11
150	4.72	4.47	4.67	4.43	1.70	1.63	1.19	1.13	2.91	2.79
140	8.85	8.11	8.80	8.06	3.93	3.74	2.93	2.81	6.04	5.66
130	15.42	13.75	15.34	13.69	7.47	6.88	5.94	5.57	11.51	10.31
120	23.83	21.04	23.76	20.97	14.10	12.55	11.29	10.04	19.77	17.34

Table G-579. WTG MP2 foundation (13 m diameter, IHC S-5500, 2750 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.13	0.13	0.12	0.12	-	-	-	-	0.06	0.06
190	0.57	0.55	0.57	0.55	0.12	0.12	0.07	0.07	0.27	0.27
180	1.95	1.88	1.94	1.86	0.49	0.48	0.29	0.28	1.10	1.06
175	3.06	2.92	3.01	2.88	0.98	0.95	0.63	0.61	1.92	1.84
170	4.59	4.36	4.56	4.33	1.76	1.69	1.22	1.16	2.94	2.82
160	8.73	7.98	8.67	7.93	4.08	3.89	3.08	2.93	6.07	5.69
150	15.30	13.59	15.23	13.53	7.67	7.00	6.13	5.73	11.43	10.15
140	23.62	20.71	23.55	20.64	14.16	12.45	11.47	10.09	19.66	17.06
130	34.79	30.31	34.69	30.23	23.36	20.17	20.07	17.24	30.26	26.10
120	48.95	42.22	48.79	42.07	35.65	30.60	31.41	26.96	43.54	37.37

Table G-580. WTG MP2 foundation (13 m diameter, IHC S-5500, 2750 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.06	0.06	0.06	0.06	-	-	-	-	-	-
190	0.23	0.22	0.23	0.22	0.02	0.02	-	-	0.11	0.11
180	0.96	0.92	0.94	0.91	0.22	0.21	0.12	0.12	0.49	0.48
175	1.79	1.72	1.77	1.70	0.41	0.40	0.27	0.26	0.97	0.93
170	2.83	2.72	2.80	2.69	0.84	0.82	0.52	0.51	1.76	1.70
160	5.97	5.60	5.93	5.57	2.55	2.45	1.86	1.78	4.14	3.94
150	11.06	9.86	10.97	9.80	5.27	4.97	4.22	4.03	7.88	7.20
140	18.53	16.25	18.46	16.19	9.65	8.75	7.91	7.20	14.43	12.76
130	28.02	24.10	27.92	24.01	17.64	15.25	14.54	12.74	23.31	20.27
120	39.98	34.60	39.87	34.49	28.12	23.80	23.93	20.64	35.04	30.31

Table G-581. WTG MP2 foundation (13 m diameter, IHC S-5500, 2750 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.13	0.13	0.12	0.12	-	-	-	-	0.06	0.06
180	0.57	0.55	0.57	0.55	0.12	0.12	0.07	0.07	0.27	0.27
175	1.15	1.11	1.12	1.08	0.26	0.24	0.13	0.13	0.57	0.55
170	1.95	1.88	1.94	1.86	0.49	0.48	0.29	0.28	1.10	1.06
160	4.59	4.36	4.56	4.33	1.76	1.69	1.22	1.16	2.94	2.82
150	8.73	7.98	8.67	7.93	4.08	3.89	3.08	2.93	6.07	5.69
140	15.30	13.59	15.23	13.53	7.67	7.00	6.13	5.73	11.43	10.15
130	23.62	20.71	23.55	20.64	14.16	12.45	11.47	10.09	19.66	17.06
120	34.79	30.31	34.69	30.23	23.36	20.17	20.07	17.24	30.26	26.10

Table G-582. WTG MP2 foundation (13 m diameter, IHC S-5500, 2750 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	-	-	-	-	-	-
180	0.26	0.25	0.26	0.25	0.03	0.03	-	-	0.13	0.13
175	0.57	0.55	0.57	0.55	0.12	0.12	0.07	0.07	0.27	0.27
170	1.15	1.11	1.12	1.08	0.26	0.24	0.13	0.13	0.57	0.55
160	3.06	2.92	3.01	2.88	0.98	0.95	0.63	0.61	1.92	1.84
150	6.35	5.95	6.30	5.91	2.76	2.64	1.99	1.91	4.42	4.20
140	11.81	10.56	11.74	10.50	5.61	5.26	4.50	4.28	8.37	7.64
130	19.39	16.97	19.32	16.91	10.25	9.19	8.37	7.64	15.25	13.42
120	29.22	25.24	29.12	25.16	18.58	16.03	15.40	13.41	24.17	21.08

Table G-583. WTG MP2 foundation (13 m diameter, IHC S-5500, 3850 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.15	0.14	0.14	0.14	-	-	-	-	0.09	0.09
190	0.80	0.77	0.79	0.76	0.14	0.13	0.10	0.10	0.34	0.33
180	2.49	2.39	2.46	2.37	0.71	0.68	0.44	0.43	1.45	1.39
175	3.79	3.63	3.76	3.59	1.35	1.30	0.92	0.88	2.45	2.34
170	5.42	5.12	5.38	5.08	2.29	2.18	1.63	1.56	3.68	3.51
160	10.00	9.16	9.96	9.12	4.90	4.63	3.90	3.72	7.27	6.71
150	17.57	15.56	17.48	15.50	9.24	8.42	7.44	6.86	13.66	12.25
140	26.77	23.31	26.66	23.23	16.90	14.89	13.90	12.37	22.56	19.84
130	39.03	34.05	38.91	33.94	27.04	23.35	23.21	20.33	34.11	29.90
120	54.65	47.69	54.33	47.46	40.36	34.99	35.67	31.05	48.88	42.43

Table G-584. WTG MP2 foundation (13 m diameter, IHC S-5500, 3850 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.08	0.08	0.07	0.07	-	-	-	-	-	-
190	0.29	0.28	0.28	0.28	0.07	0.07	0.02	0.02	0.13	0.13
180	1.34	1.29	1.33	1.28	0.29	0.28	0.15	0.14	0.71	0.68
175	2.26	2.18	2.24	2.15	0.60	0.58	0.34	0.33	1.33	1.28
170	3.49	3.34	3.45	3.30	1.23	1.18	0.76	0.74	2.24	2.14
160	7.01	6.54	6.97	6.50	3.11	2.96	2.43	2.32	4.91	4.64
150	12.97	11.70	12.91	11.64	6.32	5.90	5.10	4.82	9.35	8.55
140	20.99	18.52	20.93	18.46	12.05	10.72	9.48	8.65	17.00	15.05
130	31.48	27.72	31.38	27.63	20.70	18.12	17.41	15.29	26.76	23.21
120	44.83	39.02	44.69	38.90	32.05	28.02	27.95	24.10	39.60	34.42

Table G-585. WTG MP2 foundation (13 m diameter, IHC S-5500, 3850 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.02	0.02	0.02	0.02	-	-	-	-	-	-
190	0.15	0.14	0.14	0.14	-	-	-	-	0.09	0.09
180	0.80	0.77	0.79	0.76	0.14	0.13	0.10	0.10	0.34	0.33
175	1.49	1.43	1.46	1.40	0.32	0.31	0.22	0.22	0.78	0.75
170	2.49	2.39	2.46	2.37	0.71	0.68	0.44	0.43	1.45	1.39
160	5.42	5.12	5.38	5.08	2.29	2.18	1.63	1.56	3.68	3.51
150	10.00	9.16	9.96	9.12	4.90	4.63	3.90	3.72	7.27	6.71
140	17.56	15.56	17.48	15.50	9.24	8.42	7.44	6.86	13.66	12.25
130	26.77	23.31	26.66	23.23	16.90	14.89	13.90	12.37	22.56	19.84
120	39.03	34.05	38.91	33.94	27.04	23.35	23.21	20.33	34.11	29.90

Table G-586. WTG MP2 foundation (13 m diameter, IHC S-5500, 3850 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	-	-	-	-	0.02	0.02
180	0.36	0.35	0.35	0.34	0.09	0.09	0.02	0.02	0.15	0.14
175	0.80	0.77	0.79	0.76	0.14	0.13	0.10	0.10	0.34	0.33
170	1.49	1.43	1.46	1.40	0.32	0.31	0.22	0.22	0.78	0.75
160	3.79	3.63	3.76	3.59	1.35	1.30	0.92	0.88	2.45	2.34
150	7.53	6.95	7.47	6.90	3.42	3.26	2.60	2.49	5.26	4.95
140	13.66	12.29	13.59	12.23	6.72	6.26	5.43	5.11	9.84	9.00
130	21.88	19.28	21.81	19.23	12.78	11.40	9.97	9.08	17.92	15.81
120	32.64	28.72	32.54	28.64	21.65	18.96	18.36	16.09	28.13	24.34

Table G-587. WTG MP2 foundation (13 m diameter, IHC S-5500, 5225 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.26	0.25	0.26	0.24	0.03	0.03	-	-	0.13	0.13
190	1.14	1.09	1.12	1.08	0.27	0.27	0.14	0.13	0.57	0.54
180	2.97	2.85	2.94	2.82	1.06	1.02	0.69	0.66	1.94	1.86
175	4.52	4.30	4.47	4.26	1.87	1.79	1.32	1.27	2.93	2.81
170	6.26	5.89	6.21	5.84	2.84	2.73	2.19	2.08	4.42	4.22
160	11.68	10.39	11.63	10.32	5.93	5.57	4.76	4.54	8.61	7.82
150	19.91	17.28	19.84	17.23	11.44	9.87	9.15	8.22	16.15	13.98
140	30.80	26.56	30.72	26.47	20.66	17.41	17.35	14.65	26.36	22.37
130	44.63	38.02	44.46	37.88	32.82	27.70	29.08	23.92	39.88	33.73
120	64.45	54.61	63.78	54.10	49.10	41.06	44.15	36.67	58.21	48.92

Table G-588. WTG MP2 foundation (13 m diameter, IHC S-5500, 5225 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.11	0.11	0.11	0.11	-	-	-	-	0.03	0.03
190	0.48	0.47	0.48	0.46	0.11	0.11	0.04	0.04	0.26	0.25
180	1.76	1.69	1.73	1.67	0.44	0.42	0.29	0.28	1.02	0.96
175	2.79	2.67	2.77	2.65	0.96	0.92	0.57	0.55	1.74	1.67
170	4.21	4.02	4.16	3.98	1.66	1.59	1.15	1.10	2.77	2.65
160	8.12	7.42	8.06	7.37	3.96	3.78	2.98	2.86	5.80	5.46
150	14.61	12.94	14.54	12.89	7.72	7.02	6.17	5.81	11.14	9.76
140	23.65	20.56	23.59	20.49	14.71	12.66	12.09	10.42	20.07	17.17
130	35.78	30.76	35.67	30.67	24.69	21.01	21.55	18.09	31.59	26.96
120	51.17	43.60	50.95	43.41	38.65	32.39	34.14	28.77	46.33	39.09

Table G-589. WTG MP2 foundation (13 m diameter, IHC S-5500, 5225 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.06	0.06	0.06	0.06	-	-	-	-	-	-
190	0.26	0.25	0.25	0.24	0.03	0.03	-	-	0.13	0.13
180	1.14	1.09	1.12	1.08	0.27	0.27	0.14	0.13	0.57	0.54
175	1.95	1.87	1.92	1.85	0.50	0.48	0.31	0.30	1.13	1.08
170	2.97	2.85	2.94	2.82	1.06	1.02	0.69	0.66	1.94	1.86
160	6.26	5.89	6.21	5.84	2.84	2.73	2.19	2.08	4.42	4.22
150	11.68	10.39	11.63	10.32	5.93	5.57	4.76	4.54	8.61	7.82
140	19.91	17.28	19.84	17.23	11.44	9.87	9.15	8.22	16.15	13.98
130	30.80	26.56	30.72	26.47	20.66	17.41	17.35	14.65	26.36	22.37
120	44.63	38.02	44.46	37.88	32.82	27.70	29.08	23.92	39.88	33.73

Table G-590. WTG MP2 foundation (13 m diameter, IHC S-5500, 5225 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.12	0.12	0.12	0.12	-	-	-	-	0.03	0.03
180	0.57	0.56	0.57	0.55	0.12	0.12	0.08	0.08	0.28	0.27
175	1.14	1.09	1.12	1.08	0.27	0.27	0.14	0.13	0.57	0.54
170	1.95	1.87	1.92	1.85	0.50	0.48	0.31	0.30	1.13	1.08
160	4.52	4.30	4.47	4.26	1.87	1.79	1.32	1.27	2.93	2.81
150	8.60	7.85	8.56	7.81	4.24	4.05	3.32	3.17	6.16	5.80
140	15.42	13.60	15.34	13.54	8.23	7.47	6.57	6.17	11.99	10.52
130	24.51	21.38	24.45	21.32	15.60	13.36	12.90	11.12	21.04	18.02
120	37.12	31.85	37.00	31.75	26.09	21.91	22.63	19.01	32.84	28.04

Table G-591. WTG MP2 foundation (13 m diameter, IHC S-5500, 550 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.06	0.06	0.06	0.06	-	-	-	-	-	-
190	0.35	0.34	0.34	0.34	0.02	0.02	-	-	0.11	0.11
180	1.45	1.39	1.42	1.37	0.21	0.20	0.11	0.11	0.57	0.55
175	2.49	2.39	2.46	2.36	0.47	0.45	0.23	0.23	1.18	1.13
170	3.90	3.70	3.85	3.65	0.98	0.94	0.56	0.54	2.09	2.00
160	7.93	7.23	7.86	7.17	2.83	2.71	1.99	1.92	4.83	4.58
150	14.78	13.04	14.68	12.97	5.87	5.51	4.64	4.40	9.45	8.52
140	24.35	21.17	24.25	21.07	11.82	10.33	8.90	8.02	18.61	16.06
130	40.59	34.65	40.38	34.47	23.28	20.02	18.78	16.21	33.26	28.63
120	78.26	67.66	73.99	64.89	44.69	37.95	37.79	32.35	59.68	51.66

Table G-592. WTG MP2 foundation (13 m diameter, IHC S-5500, 550 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.11	0.11	0.11	0.11	-	-	-	-	0.03	0.03
180	0.57	0.56	0.55	0.54	0.08	0.08	0.02	0.02	0.23	0.22
175	1.24	1.20	1.22	1.17	0.18	0.17	0.09	0.09	0.49	0.48
170	2.25	2.15	2.21	2.11	0.39	0.38	0.22	0.21	1.04	0.99
160	5.22	4.93	5.16	4.88	1.58	1.52	1.02	0.97	2.98	2.86
150	10.07	9.10	9.97	9.04	3.96	3.77	2.90	2.77	6.29	5.89
140	18.29	15.91	18.19	15.83	7.64	6.95	5.97	5.60	12.77	11.25
130	30.41	26.19	30.28	26.06	15.71	13.66	12.19	10.68	23.35	20.10
120	49.82	42.49	49.44	42.14	30.65	26.35	24.47	21.25	41.45	35.28

Table G-593. WTG MP2 foundation (13 m diameter, IHC S-5500, 550 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	-	-	-	-	-	-
180	0.35	0.34	0.34	0.34	0.02	0.02	-	-	0.11	0.11
175	0.72	0.70	0.70	0.68	0.09	0.09	0.04	0.04	0.31	0.31
170	1.45	1.39	1.42	1.37	0.21	0.20	0.11	0.11	0.57	0.55
160	3.90	3.70	3.85	3.65	0.98	0.94	0.56	0.54	2.09	2.00
150	7.93	7.23	7.86	7.17	2.83	2.71	1.99	1.92	4.83	4.58
140	14.78	13.04	14.68	12.97	5.87	5.51	4.64	4.40	9.45	8.52
130	24.35	21.17	24.25	21.07	11.82	10.33	8.90	8.02	18.61	16.06
120	40.59	34.65	40.38	34.47	23.28	20.02	18.78	16.21	33.26	28.63

Table G-594. WTG MP2 foundation (13 m diameter, IHC S-5500, 550 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.12	0.12	0.12	0.12	-	-	-	-	0.05	0.05
175	0.35	0.34	0.34	0.34	0.02	0.02	-	-	0.11	0.11
170	0.72	0.70	0.70	0.68	0.09	0.09	0.04	0.04	0.31	0.31
160	2.49	2.39	2.46	2.36	0.47	0.45	0.23	0.23	1.18	1.13
150	5.59	5.28	5.54	5.22	1.79	1.72	1.14	1.10	3.34	3.16
140	10.93	9.67	10.83	9.58	4.25	4.05	3.17	3.01	6.70	6.25
130	19.25	16.69	19.15	16.61	8.15	7.41	6.35	5.95	13.62	11.99
120	31.85	27.53	31.72	27.41	16.83	14.58	13.10	11.54	24.52	21.26

Table G-595. WTG MP2 foundation (13 m diameter, IHC S-5500, 1100 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.08	0.08	0.08	0.08	-	-	-	-	-	-
190	0.31	0.30	0.29	0.28	0.03	0.03	-	-	0.13	0.13
180	1.35	1.29	1.32	1.28	0.24	0.24	0.13	0.13	0.67	0.64
175	2.28	2.18	2.24	2.14	0.49	0.48	0.29	0.28	1.26	1.21
170	3.56	3.39	3.51	3.35	1.02	0.99	0.69	0.67	2.07	1.97
160	7.81	7.20	7.72	7.14	2.87	2.75	2.12	2.03	4.85	4.61
150	16.43	14.59	16.35	14.51	6.30	5.93	4.81	4.58	11.10	9.96
140	31.20	27.44	31.04	27.30	14.93	13.26	10.79	9.63	23.93	21.05
130	56.46	49.03	55.95	48.59	31.41	27.46	24.49	21.53	45.47	39.26
120	>120.00	112.80	>120.00	112.55	62.48	54.04	50.32	43.40	119.99	100.94

Table G-596. WTG MP2 foundation (13 m diameter, IHC S-5500, 1100 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.12	0.12	0.12	0.12	-	-	-	-	0.06	0.06
180	0.60	0.58	0.58	0.57	0.11	0.11	0.06	0.06	0.24	0.24
175	1.20	1.16	1.19	1.14	0.19	0.19	0.13	0.13	0.53	0.51
170	2.01	1.93	1.98	1.91	0.44	0.43	0.26	0.25	1.10	1.05
160	4.91	4.66	4.85	4.61	1.68	1.61	1.13	1.08	2.94	2.82
150	10.44	9.43	10.34	9.36	4.05	3.86	2.97	2.84	6.62	6.23
140	21.60	18.97	21.48	18.87	8.81	8.07	6.48	6.09	15.50	13.77
130	39.53	34.38	39.29	34.18	20.70	18.04	15.44	13.66	31.21	27.37
120	75.76	66.58	73.84	65.15	41.13	35.49	32.81	28.66	58.52	50.64

Table G-597. WTG MP2 foundation (13 m diameter, IHC S-5500, 1100 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.08	0.08	0.08	0.08	-	-	-	-	-	-
180	0.31	0.30	0.29	0.28	0.03	0.03	-	-	0.13	0.13
175	0.72	0.70	0.71	0.68	0.12	0.12	0.08	0.08	0.28	0.27
170	1.35	1.29	1.32	1.28	0.24	0.24	0.13	0.13	0.67	0.64
160	3.56	3.39	3.51	3.35	1.02	0.99	0.69	0.67	2.07	1.97
150	7.81	7.20	7.72	7.14	2.87	2.75	2.12	2.03	4.85	4.61
140	16.43	14.59	16.35	14.51	6.30	5.93	4.81	4.58	11.10	9.96
130	31.20	27.44	31.04	27.30	14.93	13.26	10.79	9.63	23.93	21.05
120	56.46	49.03	55.95	48.59	31.41	27.46	24.49	21.53	45.47	39.26

Table G-598. WTG MP2 foundation (13 m diameter, IHC S-5500, 1100 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.13	0.13	0.13	0.13	-	-	-	-	0.07	0.07
175	0.31	0.30	0.29	0.28	0.03	0.03	-	-	0.13	0.13
170	0.72	0.70	0.71	0.68	0.12	0.12	0.08	0.08	0.28	0.27
160	2.28	2.18	2.24	2.14	0.49	0.48	0.29	0.28	1.26	1.21
150	5.31	5.03	5.26	4.98	1.86	1.79	1.30	1.25	3.21	3.07
140	11.43	10.28	11.34	10.19	4.34	4.14	3.25	3.11	7.24	6.71
130	22.97	20.20	22.87	20.10	9.52	8.71	7.01	6.53	16.79	14.82
120	41.95	36.40	41.71	36.18	22.27	19.42	16.83	14.78	33.18	29.06

Table G-599. WTG MP2 foundation (13 m diameter, IHC S-5500, 2750 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.13	0.13	0.13	0.13	-	-	-	-	0.06	0.06
190	0.60	0.58	0.58	0.57	0.12	0.12	0.07	0.07	0.26	0.26
180	2.16	2.07	2.13	2.04	0.52	0.50	0.29	0.28	1.23	1.19
175	3.44	3.28	3.40	3.25	1.06	1.02	0.64	0.62	2.10	2.01
170	5.19	4.92	5.14	4.88	1.90	1.82	1.35	1.30	3.31	3.16
160	11.34	10.19	11.24	10.11	4.55	4.33	3.48	3.33	7.34	6.79
150	22.81	20.06	22.71	19.96	9.74	8.93	7.44	6.87	16.91	14.96
140	42.99	37.47	42.68	37.20	23.04	20.18	17.64	15.52	34.10	29.97
130	119.99	99.05	114.63	92.34	48.27	41.86	38.27	33.35	70.06	61.49
120	>120.00	113.88	>120.00	113.66	>120.00	112.21	110.38	92.01	>120.00	113.38

Table G-600. WTG MP2 foundation (13 m diameter, IHC S-5500, 2750 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.06	0.06	0.06	0.06	-	-	-	-	-	-
190	0.23	0.22	0.22	0.22	0.02	0.02	-	-	0.12	0.12
180	1.04	1.00	1.02	0.98	0.17	0.17	0.13	0.13	0.52	0.50
175	1.93	1.85	1.91	1.83	0.45	0.44	0.26	0.26	1.02	0.99
170	3.08	2.95	3.04	2.91	0.92	0.88	0.56	0.54	1.90	1.82
160	7.07	6.59	7.00	6.55	2.77	2.67	2.00	1.92	4.61	4.38
150	15.26	13.61	15.16	13.53	6.11	5.74	4.74	4.50	10.01	9.17
140	29.44	25.80	29.27	25.64	14.19	12.66	10.15	9.22	22.73	19.93
130	55.93	48.72	55.35	48.22	30.86	27.13	24.04	21.18	45.06	39.16
120	>120.00	113.03	>120.00	112.86	66.47	57.91	52.54	45.58	119.99	108.76

Table G-601. WTG MP2 foundation (13 m diameter, IHC S-5500, 2750 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.13	0.13	0.13	0.13	-	-	-	-	0.06	0.06
180	0.60	0.58	0.58	0.57	0.12	0.12	0.07	0.07	0.26	0.26
175	1.26	1.21	1.23	1.19	0.24	0.24	0.14	0.13	0.59	0.57
170	2.16	2.07	2.13	2.04	0.52	0.50	0.29	0.28	1.23	1.19
160	5.19	4.92	5.14	4.88	1.90	1.82	1.35	1.30	3.31	3.16
150	11.34	10.19	11.24	10.11	4.55	4.33	3.48	3.33	7.34	6.79
140	22.81	20.06	22.71	19.96	9.74	8.93	7.44	6.87	16.91	14.96
130	42.99	37.47	42.68	37.20	23.04	20.18	17.64	15.52	34.10	29.97
120	119.99	99.05	114.63	92.34	48.27	41.86	38.27	33.35	70.06	61.49

Table G-602. WTG MP2 foundation (13 m diameter, IHC S-5500, 2750 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	-	-	-	-	-	-
180	0.26	0.25	0.26	0.25	0.03	0.03	-	-	0.13	0.13
175	0.60	0.58	0.58	0.57	0.12	0.12	0.07	0.07	0.26	0.26
170	1.26	1.21	1.23	1.19	0.24	0.24	0.14	0.13	0.59	0.57
160	3.44	3.28	3.40	3.25	1.06	1.02	0.64	0.62	2.10	2.01
150	7.69	7.11	7.62	7.05	2.97	2.85	2.26	2.18	4.97	4.71
140	16.38	14.54	16.28	14.46	6.58	6.17	5.11	4.83	11.17	10.01
130	31.18	27.51	31.00	27.37	15.46	13.71	11.34	10.13	24.11	21.27
120	60.05	52.33	59.34	51.70	33.14	29.12	25.85	22.62	48.28	41.95

Table G-603. WTG MP2 foundation (13 m diameter, IHC S-5500, 3850 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.15	0.15	0.15	0.15	-	-	-	-	0.09	0.09
190	0.84	0.81	0.83	0.80	0.15	0.14	0.11	0.11	0.40	0.38
180	2.68	2.57	2.66	2.55	0.79	0.76	0.46	0.44	1.60	1.54
175	4.21	4.02	4.17	3.99	1.46	1.40	0.95	0.92	2.63	2.53
170	6.32	5.95	6.27	5.90	2.49	2.38	1.78	1.71	4.09	3.91
160	14.00	12.55	13.92	12.48	5.59	5.27	4.34	4.14	9.26	8.50
150	27.79	24.18	27.61	24.03	13.25	11.83	9.50	8.66	21.45	18.76
140	52.50	45.37	51.99	44.95	29.57	25.72	23.02	20.09	42.77	37.02
130	>120.00	112.56	>120.00	112.16	61.73	53.14	49.55	42.64	115.88	94.44
120	>120.00	114.36	>120.00	114.15	>120.00	113.25	>120.00	112.50	>120.00	113.96

Table G-604. WTG MP2 foundation (13 m diameter, IHC S-5500, 3850 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.08	0.08	0.07	0.07	-	-	-	-	-	-
190	0.32	0.31	0.31	0.30	0.07	0.07	-	-	0.14	0.14
180	1.43	1.37	1.41	1.36	0.29	0.28	0.16	0.16	0.78	0.75
175	2.48	2.37	2.45	2.35	0.67	0.65	0.39	0.38	1.42	1.36
170	3.90	3.72	3.86	3.68	1.32	1.27	0.84	0.81	2.43	2.34
160	8.71	8.00	8.64	7.95	3.49	3.35	2.62	2.51	5.61	5.30
150	18.70	16.45	18.58	16.37	7.69	7.10	5.88	5.53	13.35	11.97
140	35.95	31.46	35.72	31.27	18.65	16.31	13.93	12.39	28.47	24.71
130	69.35	60.42	68.22	59.33	39.61	34.29	31.37	27.44	55.90	48.15
120	>120.00	113.51	>120.00	113.44	103.98	86.75	68.72	59.50	>120.00	113.00

Table G-605. WTG MP2 foundation (13 m diameter, IHC S-5500, 3850 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.02	0.02	0.02	0.02	-	-	-	-	-	-
190	0.15	0.15	0.15	0.15	-	-	-	-	0.09	0.09
180	0.84	0.81	0.83	0.80	0.15	0.14	0.11	0.11	0.40	0.38
175	1.63	1.56	1.61	1.54	0.32	0.31	0.17	0.17	0.84	0.80
170	2.68	2.57	2.66	2.55	0.79	0.76	0.46	0.44	1.60	1.54
160	6.32	5.95	6.27	5.90	2.49	2.38	1.78	1.71	4.09	3.91
150	14.00	12.55	13.92	12.48	5.59	5.27	4.34	4.14	9.26	8.50
140	27.79	24.18	27.61	24.03	13.25	11.83	9.50	8.66	21.45	18.76
130	52.50	45.37	51.99	44.95	29.57	25.72	23.02	20.09	42.77	37.02
120	>120.00	112.56	>120.00	112.16	61.73	53.14	49.55	42.64	115.88	94.44

Table G-606. WTG MP2 foundation (13 m diameter, IHC S-5500, 3850 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	-	-	-	-	0.02	0.02
180	0.40	0.39	0.39	0.38	0.09	0.09	0.02	0.02	0.16	0.15
175	0.84	0.81	0.83	0.80	0.15	0.14	0.11	0.11	0.40	0.38
170	1.63	1.56	1.61	1.54	0.32	0.31	0.17	0.17	0.84	0.80
160	4.21	4.02	4.17	3.99	1.46	1.40	0.95	0.92	2.63	2.53
150	9.35	8.58	9.28	8.53	3.84	3.66	2.83	2.73	6.08	5.73
140	20.05	17.60	19.94	17.51	8.37	7.68	6.34	5.95	14.51	12.94
130	38.34	33.42	38.07	33.20	20.25	17.64	15.20	13.46	30.49	26.69
120	75.86	66.79	73.96	65.07	42.60	36.78	33.86	29.58	60.06	51.73

Table G-607. WTG MP2 foundation (13 m diameter, IHC S-5500, 5225 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.24	0.24	0.24	0.24	0.03	0.03	-	-	0.13	0.13
190	1.22	1.17	1.20	1.15	0.26	0.26	0.15	0.15	0.63	0.60
180	3.31	3.16	3.25	3.11	1.15	1.10	0.73	0.70	2.10	2.01
175	5.02	4.76	4.97	4.72	1.97	1.90	1.45	1.40	3.25	3.10
170	7.26	6.73	7.18	6.68	3.07	2.92	2.43	2.32	4.93	4.67
160	16.07	14.34	15.97	14.26	6.80	6.36	5.42	5.11	10.95	9.88
150	32.58	28.75	32.39	28.58	16.50	14.71	12.02	10.85	25.51	22.53
140	65.41	57.42	64.18	56.34	36.83	32.38	29.61	26.07	52.52	45.81
130	>120.00	113.62	>120.00	113.50	108.70	92.08	67.29	59.34	>120.00	113.14
120	>120.00	114.61	>120.00	114.51	>120.00	114.02	>120.00	113.63	>120.00	114.36

Table G-608. WTG MP2 foundation (13 m diameter, IHC S-5500, 5225 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.11	0.11	0.11	0.11	-	-	-	-	0.03	0.03
190	0.52	0.51	0.51	0.50	0.11	0.11	0.04	0.04	0.24	0.24
180	1.90	1.82	1.88	1.80	0.46	0.44	0.29	0.28	1.10	1.04
175	2.97	2.85	2.94	2.83	1.04	0.99	0.64	0.62	1.90	1.82
170	4.65	4.43	4.61	4.39	1.82	1.75	1.26	1.20	2.96	2.83
160	9.70	8.93	9.65	8.88	4.38	4.17	3.37	3.22	6.62	6.22
150	21.77	19.18	21.65	19.07	9.26	8.55	7.28	6.72	15.95	14.25
140	42.21	36.80	41.86	36.51	23.34	20.65	17.78	15.76	34.25	30.19
130	119.99	108.51	119.99	104.22	50.21	43.73	39.91	35.00	76.41	66.81
120	>120.00	114.15	>120.00	114.07	>120.00	113.03	>120.00	110.69	>120.00	113.74

Table G-609. WTG MP2 foundation (13 m diameter, IHC S-5500, 5225 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.05	0.05	0.05	0.05	-	-	-	-	-	-
190	0.24	0.24	0.24	0.24	0.03	0.03	-	-	0.13	0.13
180	1.22	1.17	1.20	1.15	0.26	0.26	0.15	0.15	0.63	0.60
175	2.12	2.03	2.08	2.00	0.54	0.52	0.31	0.31	1.22	1.17
170	3.31	3.16	3.25	3.11	1.15	1.10	0.73	0.70	2.10	2.01
160	7.26	6.73	7.18	6.68	3.07	2.92	2.43	2.32	4.93	4.67
150	16.07	14.34	15.97	14.26	6.80	6.36	5.42	5.11	10.95	9.88
140	32.58	28.75	32.39	28.58	16.50	14.71	12.02	10.85	25.51	22.53
130	65.41	57.42	64.18	56.34	36.83	32.38	29.61	26.07	52.52	45.81
120	>120.00	113.62	>120.00	113.50	108.70	92.08	67.29	59.34	>120.00	113.14

Table G-610. WTG MP2 foundation (13 m diameter, IHC S-5500, 5225 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.12	0.12	0.12	0.12	-	-	-	-	0.03	0.03
180	0.62	0.60	0.61	0.59	0.13	0.13	0.08	0.08	0.28	0.27
175	1.22	1.17	1.20	1.15	0.26	0.26	0.15	0.15	0.63	0.60
170	2.12	2.03	2.08	2.00	0.54	0.52	0.31	0.31	1.22	1.17
160	5.02	4.76	4.97	4.72	1.97	1.90	1.45	1.40	3.25	3.10
150	10.56	9.56	10.47	9.49	4.74	4.49	3.72	3.53	7.17	6.67
140	23.25	20.55	23.14	20.44	9.96	9.17	7.82	7.24	17.48	15.50
130	45.24	39.33	44.83	38.98	24.89	22.15	19.53	17.24	36.69	32.20
120	>120.00	111.98	>120.00	111.09	54.33	47.50	43.28	37.76	93.61	79.40

Table G-611. WTG MP2 foundation (13 m diameter, IHC S-5500, 550 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.04	0.04	0.03	0.03	-	-	-	-	-	-
190	0.15	0.14	0.15	0.14	-	-	-	-	0.08	0.08
180	1.11	1.07	1.08	1.03	0.11	0.11	0.06	0.06	0.49	0.48
175	2.04	1.95	1.99	1.91	0.39	0.38	0.13	0.13	0.90	0.87
170	3.41	3.27	3.30	3.16	0.64	0.61	0.47	0.45	1.59	1.53
160	7.34	7.02	7.17	6.86	1.98	1.91	1.50	1.44	3.76	3.62
150	12.90	12.14	12.72	11.96	4.50	4.29	3.43	3.27	7.01	6.67
140	18.90	17.51	18.68	17.30	7.77	7.36	6.32	6.00	11.78	11.14
130	25.76	23.62	25.39	23.33	12.44	11.63	10.07	9.49	17.37	16.18
120	34.68	31.54	34.39	31.29	17.54	16.36	15.13	14.13	23.86	21.99

Table G-612. WTG MP2 foundation (13 m diameter, IHC S-5500, 550 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	-	-	-	-	0.02	0.02
180	0.50	0.49	0.50	0.48	0.05	0.05	-	-	0.12	0.12
175	0.96	0.92	0.92	0.88	0.10	0.09	0.06	0.06	0.44	0.43
170	1.87	1.79	1.79	1.71	0.26	0.26	0.11	0.11	0.84	0.80
160	4.83	4.62	4.72	4.52	1.06	1.00	0.71	0.68	2.29	2.17
150	9.32	8.88	9.16	8.73	2.89	2.77	2.04	1.95	4.94	4.72
140	15.18	14.19	14.98	14.01	5.68	5.40	4.53	4.31	8.71	8.31
130	21.57	19.90	21.33	19.68	9.39	8.90	7.74	7.33	13.94	13.12
120	29.77	27.26	29.48	26.98	14.31	13.39	12.35	11.53	19.92	18.42

Table G-613. WTG MP2 foundation (13 m diameter, IHC S-5500, 550 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.04	0.04	0.03	0.03	-	-	-	-	-	-
180	0.15	0.14	0.15	0.14	-	-	-	-	0.08	0.08
175	0.57	0.55	0.56	0.54	0.05	0.05	0.02	0.02	0.13	0.13
170	1.11	1.07	1.08	1.03	0.11	0.11	0.06	0.06	0.49	0.48
160	3.41	3.27	3.30	3.16	0.64	0.61	0.47	0.45	1.59	1.53
150	7.34	7.02	7.17	6.86	1.98	1.91	1.50	1.44	3.76	3.62
140	12.90	12.14	12.72	11.96	4.50	4.29	3.43	3.27	7.01	6.67
130	18.90	17.51	18.68	17.30	7.77	7.36	6.32	6.00	11.78	11.14
120	25.76	23.62	25.39	23.33	12.44	11.63	10.07	9.49	17.37	16.18

Table G-614. WTG MP2 foundation (13 m diameter, IHC S-5500, 550 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.09	0.09	0.09	0.09	-	-	-	-	0.02	0.02
175	0.15	0.14	0.15	0.14	-	-	-	-	0.08	0.08
170	0.57	0.55	0.56	0.54	0.05	0.05	0.02	0.02	0.13	0.13
160	2.04	1.95	1.99	1.91	0.39	0.38	0.13	0.13	0.90	0.87
150	5.19	4.98	5.08	4.87	1.25	1.18	0.89	0.85	2.50	2.40
140	9.77	9.29	9.62	9.16	3.17	3.02	2.35	2.24	5.26	5.01
130	15.77	14.72	15.56	14.54	6.03	5.73	4.79	4.58	9.10	8.69
120	22.27	20.52	22.01	20.30	9.77	9.22	8.16	7.76	14.48	13.61

Table G-615. WTG MP2 foundation (13 m diameter, IHC S-5500, 1100 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.04	0.04	0.04	0.04	-	-	-	-	-	-
190	0.44	0.43	0.43	0.43	0.03	0.03	-	-	0.09	0.09
180	1.22	1.18	1.21	1.16	0.16	0.16	0.10	0.09	0.58	0.57
175	2.04	1.95	1.99	1.92	0.55	0.53	0.44	0.43	1.15	1.10
170	3.30	3.14	3.23	3.07	0.81	0.79	0.58	0.57	1.88	1.81
160	6.72	6.41	6.55	6.25	2.56	2.46	1.87	1.79	4.12	3.92
150	11.94	11.19	11.67	10.93	4.85	4.60	3.96	3.77	7.00	6.58
140	17.69	16.45	17.42	16.21	7.88	7.34	6.55	6.14	10.92	10.11
130	24.00	22.17	23.75	21.93	11.88	11.00	9.86	9.22	15.73	14.72
120	32.50	29.69	32.14	29.40	16.21	15.12	14.31	13.36	21.75	20.06

Table G-616. WTG MP2 foundation (13 m diameter, IHC S-5500, 1100 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	-	-	-	-	0.03	0.03
180	0.57	0.55	0.57	0.55	0.06	0.06	0.03	0.03	0.16	0.16
175	1.07	1.02	1.05	1.00	0.14	0.13	0.09	0.09	0.56	0.54
170	1.85	1.78	1.83	1.76	0.51	0.50	0.18	0.18	0.96	0.92
160	4.53	4.30	4.46	4.23	1.46	1.40	0.98	0.95	2.65	2.55
150	8.61	8.17	8.40	7.98	3.40	3.25	2.62	2.51	5.16	4.88
140	14.20	13.28	13.94	13.06	5.94	5.59	4.91	4.65	8.50	7.96
130	20.19	18.69	19.92	18.44	9.25	8.64	7.88	7.35	12.90	12.06
120	27.44	25.09	26.98	24.67	13.55	12.66	11.82	10.94	17.99	16.76

Table G-617. WTG MP2 foundation (13 m diameter, IHC S-5500, 1100 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.04	0.04	0.04	0.04	-	-	-	-	-	-
180	0.44	0.43	0.43	0.43	0.03	0.03	-	-	0.09	0.09
175	0.60	0.58	0.60	0.58	0.08	0.08	0.04	0.04	0.41	0.40
170	1.22	1.18	1.21	1.16	0.16	0.16	0.10	0.09	0.58	0.57
160	3.30	3.14	3.23	3.07	0.81	0.79	0.58	0.57	1.88	1.81
150	6.72	6.41	6.55	6.25	2.56	2.46	1.87	1.79	4.12	3.92
140	11.94	11.19	11.67	10.93	4.85	4.60	3.96	3.77	7.00	6.58
130	17.69	16.45	17.42	16.21	7.88	7.34	6.55	6.14	10.92	10.11
120	24.00	22.17	23.75	21.93	11.88	11.00	9.86	9.22	15.73	14.72

Table G-618. WTG MP2 foundation (13 m diameter, IHC S-5500, 1100 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.10	0.10	0.10	0.10	-	-	-	-	0.04	0.04
175	0.44	0.43	0.43	0.43	0.03	0.03	-	-	0.09	0.09
170	0.60	0.58	0.60	0.58	0.08	0.08	0.04	0.04	0.41	0.40
160	2.04	1.95	1.99	1.92	0.55	0.53	0.44	0.43	1.15	1.10
150	4.84	4.59	4.75	4.52	1.59	1.53	1.14	1.10	2.83	2.72
140	9.08	8.61	8.88	8.42	3.65	3.48	2.77	2.66	5.46	5.15
130	14.76	13.79	14.50	13.57	6.22	5.86	5.15	4.89	8.87	8.30
120	20.83	19.26	20.54	19.00	9.56	8.95	8.22	7.67	13.34	12.47

Table G-619. WTG MP2 foundation (13 m diameter, IHC S-5500, 2750 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.09	0.09	0.09	0.09	-	-	-	-	0.03	0.03
190	0.58	0.56	0.58	0.56	0.07	0.07	0.04	0.04	0.18	0.18
180	1.95	1.88	1.94	1.86	0.55	0.53	0.44	0.44	1.10	1.06
175	2.98	2.86	2.96	2.84	0.91	0.87	0.59	0.57	1.85	1.78
170	4.38	4.19	4.34	4.14	1.61	1.55	1.17	1.13	2.80	2.68
160	7.86	7.48	7.65	7.29	3.61	3.46	2.79	2.68	5.18	4.91
150	13.27	12.47	12.98	12.24	5.97	5.62	5.04	4.79	8.23	7.72
140	19.14	17.73	18.84	17.47	9.04	8.45	7.74	7.22	12.46	11.68
130	25.47	23.41	24.98	23.08	13.22	12.39	11.43	10.61	17.37	16.17
120	33.97	30.99	33.64	30.69	17.89	16.61	15.80	14.74	23.41	21.54

Table G-620. WTG MP2 foundation (13 m diameter, IHC S-5500, 2750 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.03	0.03	0.02	0.02	-	-	-	-	-	-
190	0.15	0.14	0.15	0.14	0.02	0.02	-	-	0.07	0.07
180	0.95	0.92	0.94	0.90	0.14	0.13	0.09	0.09	0.55	0.53
175	1.76	1.69	1.74	1.67	0.52	0.50	0.17	0.17	0.93	0.89
170	2.80	2.68	2.77	2.65	0.70	0.65	0.57	0.55	1.64	1.58
160	5.60	5.30	5.52	5.23	2.37	2.27	1.70	1.63	3.76	3.59
150	9.67	9.20	9.48	9.01	4.53	4.31	3.71	3.55	6.28	5.91
140	15.51	14.52	15.25	14.27	7.04	6.61	6.01	5.68	9.59	9.00
130	21.63	19.97	21.32	19.70	10.47	9.66	9.05	8.45	14.30	13.38
120	29.34	26.90	28.93	26.52	14.97	14.00	13.17	12.34	19.73	18.24

Table G-621. WTG MP2 foundation (13 m diameter, IHC S-5500, 2750 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	-	-	-	-	0.03	0.03
180	0.58	0.56	0.58	0.56	0.07	0.07	0.04	0.04	0.18	0.18
175	1.15	1.10	1.12	1.08	0.16	0.16	0.10	0.10	0.58	0.56
170	1.95	1.88	1.94	1.86	0.55	0.53	0.44	0.44	1.10	1.06
160	4.38	4.19	4.34	4.14	1.61	1.55	1.17	1.13	2.80	2.68
150	7.86	7.48	7.65	7.29	3.61	3.46	2.79	2.68	5.18	4.91
140	13.27	12.47	12.98	12.24	5.97	5.62	5.04	4.79	8.23	7.72
130	19.14	17.73	18.84	17.47	9.04	8.45	7.74	7.22	12.46	11.68
120	25.47	23.41	24.98	23.08	13.22	12.39	11.43	10.61	17.37	16.17

Table G-622. WTG MP2 foundation (13 m diameter, IHC S-5500, 2750 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.03	0.03	0.03	0.03	-	-	-	-	-	-
180	0.17	0.17	0.17	0.17	0.03	0.03	-	-	0.09	0.09
175	0.58	0.56	0.58	0.56	0.07	0.07	0.04	0.04	0.18	0.18
170	1.15	1.10	1.12	1.08	0.16	0.16	0.10	0.10	0.58	0.56
160	2.98	2.86	2.96	2.84	0.91	0.87	0.59	0.57	1.85	1.78
150	5.91	5.59	5.83	5.52	2.54	2.44	1.90	1.82	4.00	3.82
140	10.14	9.59	9.89	9.40	4.75	4.52	3.96	3.77	6.56	6.17
130	16.10	15.04	15.83	14.79	7.38	6.89	6.27	5.91	9.90	9.31
120	22.27	20.55	21.96	20.28	10.95	10.14	9.35	8.74	14.79	13.82

Table G-623. WTG MP2 foundation (13 m diameter, IHC S-5500, 3850 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.12	0.12	0.11	0.11	-	-	-	-	0.06	0.06
190	0.69	0.67	0.68	0.66	0.10	0.10	0.06	0.06	0.49	0.48
180	2.39	2.29	2.36	2.26	0.62	0.60	0.51	0.50	1.39	1.34
175	3.48	3.31	3.44	3.26	1.27	1.23	0.66	0.64	2.24	2.14
170	4.91	4.65	4.85	4.59	2.01	1.92	1.43	1.37	3.21	3.05
160	8.77	8.34	8.57	8.15	4.07	3.88	3.24	3.08	5.76	5.42
150	14.49	13.58	14.24	13.34	6.63	6.22	5.56	5.25	9.16	8.59
140	20.66	19.07	20.38	18.82	9.91	9.30	8.68	8.09	13.87	12.95
130	27.98	25.64	27.60	25.27	14.61	13.61	12.76	11.94	19.44	17.96
120	36.12	32.76	35.80	32.49	19.83	18.29	17.45	16.15	25.83	23.57

Table G-624. WTG MP2 foundation (13 m diameter, IHC S-5500, 3850 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.05	0.05	0.05	0.05	-	-	-	-	-	-
190	0.45	0.44	0.44	0.44	0.03	0.03	-	-	0.10	0.10
180	1.34	1.29	1.33	1.28	0.19	0.19	0.11	0.11	0.62	0.60
175	2.21	2.11	2.18	2.08	0.59	0.57	0.48	0.47	1.29	1.24
170	3.21	3.05	3.17	3.01	1.16	1.12	0.63	0.61	2.07	1.97
160	6.19	5.88	6.11	5.77	2.75	2.64	2.09	1.99	4.20	3.99
150	10.87	10.22	10.55	9.91	4.98	4.71	4.16	3.97	6.99	6.56
140	16.89	15.73	16.61	15.48	7.98	7.43	6.68	6.26	10.81	10.04
130	23.23	21.41	22.97	21.15	11.91	11.10	9.93	9.30	15.93	14.84
120	31.33	28.71	30.98	28.45	16.56	15.36	14.51	13.53	21.95	20.18

Table G-625. WTG MP2 foundation (13 m diameter, IHC S-5500, 3850 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.02	0.02	-	-	-	-	-	-	-	-
190	0.12	0.12	0.11	0.11	-	-	-	-	0.06	0.06
180	0.69	0.67	0.68	0.66	0.10	0.10	0.06	0.06	0.49	0.48
175	1.45	1.40	1.44	1.39	0.46	0.46	0.13	0.13	0.65	0.64
170	2.39	2.29	2.36	2.26	0.62	0.60	0.51	0.50	1.39	1.34
160	4.91	4.65	4.85	4.59	2.01	1.92	1.43	1.37	3.21	3.05
150	8.77	8.34	8.57	8.15	4.07	3.88	3.24	3.08	5.76	5.42
140	14.49	13.58	14.24	13.34	6.63	6.22	5.56	5.25	9.16	8.59
130	20.66	19.07	20.38	18.82	9.91	9.30	8.68	8.09	13.87	12.95
120	27.98	25.64	27.60	25.27	14.61	13.61	12.76	11.94	19.44	17.96

Table G-626. WTG MP2 foundation (13 m diameter, IHC S-5500, 3850 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	-	-	-	-	0.02	0.02
180	0.48	0.47	0.48	0.47	0.04	0.04	0.02	0.02	0.12	0.12
175	0.69	0.67	0.68	0.66	0.10	0.10	0.06	0.06	0.49	0.48
170	1.45	1.40	1.44	1.39	0.46	0.46	0.13	0.13	0.65	0.64
160	3.48	3.31	3.44	3.26	1.27	1.23	0.66	0.64	2.24	2.14
150	6.56	6.22	6.48	6.12	2.91	2.79	2.26	2.16	4.43	4.20
140	11.53	10.86	11.24	10.57	5.22	4.94	4.37	4.17	7.35	6.86
130	17.51	16.27	17.23	16.03	8.30	7.75	6.96	6.52	11.33	10.58
120	23.83	21.98	23.57	21.74	12.36	11.56	10.42	9.62	16.46	15.34

Table G-627. WTG MP2 foundation (13 m diameter, IHC S-5500, 5225 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.15	0.15	0.15	0.14	0.02	0.02	-	-	0.08	0.08
190	1.07	1.03	1.05	1.01	0.15	0.14	0.10	0.09	0.57	0.55
180	2.77	2.66	2.74	2.63	0.95	0.93	0.59	0.57	1.72	1.65
175	4.17	3.97	4.13	3.92	1.56	1.51	1.13	1.09	2.64	2.53
170	5.81	5.50	5.71	5.41	2.44	2.34	1.78	1.72	3.73	3.58
160	10.47	9.76	10.14	9.53	4.53	4.32	3.78	3.61	6.41	6.04
150	16.71	15.56	16.44	15.32	7.20	6.75	6.11	5.78	9.84	9.26
140	23.19	21.35	22.93	21.11	10.75	9.96	9.18	8.61	15.12	14.12
130	31.33	28.70	31.00	28.45	15.60	14.53	13.49	12.66	21.26	19.59
120	39.72	35.79	39.38	35.52	21.37	19.67	18.62	17.22	28.65	26.31

Table G-628. WTG MP2 foundation (13 m diameter, IHC S-5500, 5225 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.06	0.06	0.06	0.06	-	-	-	-	0.02	0.02
190	0.53	0.51	0.52	0.51	0.06	0.06	0.03	0.03	0.14	0.13
180	1.62	1.56	1.59	1.53	0.51	0.49	0.16	0.16	0.95	0.92
175	2.60	2.50	2.57	2.47	0.64	0.62	0.57	0.55	1.55	1.49
170	3.93	3.74	3.85	3.67	1.40	1.34	1.00	0.97	2.46	2.36
160	7.47	7.05	7.26	6.85	3.10	2.98	2.54	2.44	4.68	4.45
150	13.08	12.26	12.83	12.02	5.50	5.22	4.64	4.41	7.78	7.28
140	19.28	17.83	19.00	17.59	8.54	8.01	7.24	6.80	11.99	11.21
130	25.96	23.78	25.57	23.45	12.70	11.91	10.69	9.90	17.45	16.24
120	34.51	31.40	34.18	31.13	17.74	16.44	15.44	14.39	23.76	21.89

Table G-629. WTG MP2 foundation (13 m diameter, IHC S-5500, 5225 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.03	0.03	0.03	0.03	-	-	-	-	-	-
190	0.15	0.15	0.15	0.14	0.02	0.02	-	-	0.08	0.08
180	1.07	1.03	1.05	1.01	0.15	0.14	0.10	0.09	0.57	0.55
175	1.79	1.72	1.78	1.70	0.54	0.53	0.18	0.18	1.04	1.00
170	2.77	2.66	2.74	2.63	0.95	0.93	0.59	0.57	1.72	1.65
160	5.81	5.50	5.71	5.41	2.44	2.34	1.78	1.72	3.73	3.58
150	10.47	9.76	10.14	9.53	4.53	4.32	3.78	3.61	6.41	6.04
140	16.71	15.56	16.44	15.32	7.20	6.75	6.11	5.78	9.84	9.26
130	23.19	21.35	22.93	21.11	10.75	9.96	9.18	8.61	15.12	14.12
120	31.33	28.70	31.00	28.45	15.60	14.53	13.49	12.66	21.26	19.59

Table G-630. WTG MP2 foundation (13 m diameter, IHC S-5500, 5225 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.07	0.07	0.07	0.07	-	-	-	-	0.03	0.03
180	0.57	0.55	0.57	0.55	0.07	0.07	0.04	0.04	0.16	0.16
175	1.07	1.03	1.05	1.01	0.15	0.14	0.10	0.09	0.57	0.55
170	1.79	1.72	1.78	1.70	0.54	0.53	0.18	0.18	1.04	1.00
160	4.17	3.97	4.13	3.92	1.56	1.51	1.13	1.09	2.64	2.53
150	7.98	7.53	7.75	7.32	3.40	3.26	2.70	2.60	4.94	4.69
140	13.69	12.80	13.41	12.56	5.77	5.47	4.85	4.62	8.10	7.60
130	19.92	18.41	19.66	18.16	8.87	8.31	7.57	7.09	12.53	11.72
120	26.95	24.67	26.59	24.32	13.16	12.33	11.20	10.41	18.08	16.78

Table G-631. WTG MP2 foundation (13 m diameter, IHC S-5500, 550 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.03	0.03	0.03	0.03	-	-	-	-	-	-
190	0.15	0.15	0.15	0.15	-	-	-	-	0.09	0.09
180	1.18	1.14	1.15	1.11	0.11	0.11	0.06	0.06	0.55	0.53
175	2.14	2.06	2.08	1.99	0.36	0.35	0.13	0.13	0.84	0.81
170	3.71	3.56	3.59	3.44	0.68	0.66	0.51	0.50	1.58	1.52
160	8.52	8.10	8.34	7.94	2.13	2.04	1.50	1.44	4.02	3.84
150	15.52	14.45	15.31	14.25	4.65	4.47	3.47	3.33	8.08	7.71
140	23.82	21.93	23.63	21.74	8.80	8.39	6.82	6.50	14.82	13.81
130	34.73	31.35	34.49	31.14	16.38	15.19	13.40	12.48	23.60	21.70
120	49.32	42.77	48.86	42.46	31.22	28.35	28.95	26.69	37.24	33.53

Table G-632. WTG MP2 foundation (13 m diameter, IHC S-5500, 550 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	-	-	-	-	0.02	0.02
180	0.56	0.54	0.55	0.54	0.05	0.05	-	-	0.12	0.12
175	1.02	0.98	0.99	0.95	0.10	0.10	0.06	0.06	0.49	0.48
170	1.90	1.82	1.84	1.76	0.16	0.16	0.12	0.12	0.77	0.74
160	5.32	5.10	5.19	4.98	1.13	1.09	0.72	0.69	2.36	2.27
150	11.07	10.36	10.82	10.13	2.87	2.76	2.16	2.08	5.34	5.13
140	18.78	17.33	18.55	17.13	6.08	5.82	4.64	4.45	10.22	9.62
130	28.30	25.70	28.00	25.43	11.28	10.55	8.83	8.35	18.17	16.78
120	39.52	35.29	39.22	35.06	20.74	19.03	17.54	16.29	28.61	25.98

Table G-633. WTG MP2 foundation (13 m diameter, IHC S-5500, 550 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.03	0.03	0.03	0.03	-	-	-	-	-	-
180	0.15	0.15	0.15	0.15	-	-	-	-	0.09	0.09
175	0.61	0.59	0.60	0.58	0.05	0.05	0.02	0.02	0.13	0.13
170	1.18	1.14	1.15	1.11	0.11	0.11	0.06	0.06	0.55	0.53
160	3.71	3.56	3.59	3.44	0.68	0.66	0.51	0.50	1.58	1.52
150	8.52	8.10	8.34	7.94	2.13	2.04	1.50	1.44	4.02	3.84
140	15.52	14.45	15.31	14.25	4.65	4.47	3.47	3.33	8.08	7.71
130	23.82	21.93	23.63	21.74	8.80	8.39	6.82	6.50	14.82	13.81
120	34.73	31.35	34.49	31.14	16.38	15.19	13.40	12.48	23.60	21.70

Table G-634. WTG MP2 foundation (13 m diameter, IHC S-5500, 550 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.09	0.09	0.09	0.09	-	-	-	-	0.02	0.02
175	0.15	0.15	0.15	0.15	-	-	-	-	0.09	0.09
170	0.61	0.59	0.60	0.58	0.05	0.05	0.02	0.02	0.13	0.13
160	2.14	2.06	2.08	1.99	0.36	0.35	0.13	0.13	0.84	0.81
150	5.80	5.56	5.66	5.42	1.36	1.31	0.82	0.79	2.57	2.47
140	11.85	11.09	11.63	10.88	3.12	2.99	2.39	2.29	5.78	5.54
130	19.61	18.07	19.39	17.87	6.43	6.15	4.94	4.74	11.08	10.37
120	29.47	26.79	29.19	26.54	12.11	11.34	9.42	8.90	19.05	17.57

Table G-635. WTG MP2 foundation (13 m diameter, IHC S-5500, 1100 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.04	0.04	0.04	0.04	-	-	-	-	-	-
190	0.19	0.19	0.18	0.18	0.03	0.03	-	-	0.10	0.09
180	1.23	1.19	1.22	1.17	0.16	0.16	0.10	0.10	0.60	0.58
175	2.09	2.00	2.05	1.96	0.55	0.54	0.20	0.20	1.12	1.08
170	3.34	3.20	3.28	3.14	0.79	0.77	0.60	0.58	1.88	1.81
160	7.30	6.95	7.10	6.77	2.54	2.44	1.85	1.78	4.13	3.94
150	13.49	12.63	13.25	12.41	4.87	4.62	3.96	3.78	6.99	6.64
140	20.87	19.23	20.63	19.01	8.25	7.80	6.87	6.52	12.62	11.76
130	30.60	27.86	30.36	27.67	17.16	15.91	16.08	14.52	21.80	20.05
120	82.09	74.73	62.30	57.64	59.77	53.83	59.39	52.99	61.13	55.39

Table G-636. WTG MP2 foundation (13 m diameter, IHC S-5500, 1100 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	-	-	-	-	0.03	0.03
180	0.58	0.56	0.57	0.55	0.06	0.06	0.03	0.03	0.16	0.16
175	1.06	1.02	1.03	0.99	0.14	0.14	0.09	0.09	0.57	0.55
170	1.90	1.83	1.87	1.80	0.52	0.50	0.17	0.17	0.81	0.78
160	4.74	4.54	4.61	4.42	1.45	1.40	0.83	0.80	2.66	2.56
150	9.41	8.92	9.22	8.74	3.38	3.23	2.60	2.50	5.16	4.91
140	16.30	15.14	16.04	14.92	5.94	5.61	4.94	4.68	8.81	8.34
130	24.01	22.13	23.82	21.94	10.49	9.79	8.91	8.38	15.69	14.50
120	34.90	31.45	34.66	31.45	24.38	22.60	23.97	22.20	27.80	25.43

Table G-637. WTG MP2 foundation (13 m diameter, IHC S-5500, 1100 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1μPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.04	0.04	0.04	0.04	-	-	-	-	-	-
180	0.19	0.19	0.18	0.18	0.03	0.03	-	-	0.10	0.09
175	0.61	0.59	0.60	0.58	0.07	0.07	0.04	0.04	0.17	0.17
170	1.23	1.19	1.22	1.17	0.16	0.16	0.10	0.10	0.60	0.58
160	3.34	3.20	3.28	3.14	0.79	0.77	0.60	0.58	1.88	1.81
150	7.30	6.95	7.10	6.77	2.54	2.44	1.85	1.78	4.13	3.94
140	13.49	12.63	13.25	12.41	4.87	4.62	3.96	3.78	6.99	6.64
130	20.87	19.23	20.63	19.01	8.25	7.80	6.87	6.52	12.62	11.76
120	30.60	27.86	30.36	27.67	17.16	15.91	16.08	14.52	21.80	20.05

Table G-638. WTG MP2 foundation (13 m diameter, IHC S-5500, 1100 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1μPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.11	0.11	0.10	0.10	-	-	-	-	0.03	0.03
175	0.19	0.19	0.18	0.18	0.03	0.03	-	-	0.10	0.09
170	0.61	0.59	0.60	0.58	0.07	0.07	0.04	0.04	0.17	0.17
160	2.09	2.00	2.05	1.96	0.55	0.54	0.20	0.20	1.12	1.08
150	5.11	4.90	4.98	4.78	1.58	1.52	1.10	1.06	2.84	2.73
140	9.87	9.37	9.70	9.20	3.64	3.48	2.76	2.65	5.46	5.17
130	17.04	15.80	16.79	15.57	6.24	5.92	5.20	4.93	9.29	8.78
120	24.78	22.81	24.57	22.63	11.40	10.59	9.75	9.20	16.57	15.32

Table G-639. WTG MP2 foundation (13 m diameter, IHC S-5500, 2750 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.09	0.09	0.09	0.09	-	-	-	-	0.03	0.03
190	0.59	0.57	0.58	0.57	0.07	0.07	0.04	0.04	0.17	0.17
180	1.97	1.89	1.94	1.87	0.55	0.53	0.21	0.20	1.00	0.92
175	3.03	2.89	2.98	2.86	0.78	0.75	0.60	0.58	1.83	1.76
170	4.47	4.29	4.40	4.20	1.56	1.50	1.10	1.06	2.76	2.65
160	8.89	8.45	8.68	8.27	3.52	3.37	2.73	2.63	5.18	4.92
150	15.80	14.67	15.55	14.45	5.91	5.59	4.98	4.74	8.83	8.35
140	23.70	21.79	23.48	21.58	9.85	9.25	8.12	7.65	15.50	14.33
130	35.02	31.36	34.76	31.13	17.04	15.61	14.03	12.96	23.94	21.90
120	62.36	49.86	59.44	47.24	27.20	24.31	22.85	20.77	37.40	32.93

Table G-640. WTG MP2 foundation (13 m diameter, IHC S-5500, 2750 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.03	0.03	0.02	0.02	-	-	-	-	-	-
190	0.15	0.14	0.15	0.14	0.02	0.02	-	-	0.07	0.07
180	0.86	0.83	0.84	0.81	0.14	0.14	0.08	0.08	0.55	0.53
175	1.79	1.72	1.76	1.70	0.51	0.49	0.18	0.17	0.76	0.74
170	2.81	2.70	2.77	2.67	0.71	0.68	0.57	0.55	1.62	1.56
160	5.95	5.70	5.80	5.56	2.31	2.22	1.64	1.58	3.71	3.54
150	11.51	10.78	11.23	10.51	4.46	4.24	3.61	3.46	6.28	5.96
140	18.84	17.37	18.60	17.15	7.22	6.82	5.95	5.64	11.22	10.41
130	28.18	25.47	27.84	25.16	12.65	11.72	9.87	9.27	18.71	17.14
120	40.34	35.57	40.00	35.33	20.51	18.69	17.16	15.69	29.08	26.09

Table G-641. WTG MP2 foundation (13 m diameter, IHC S-5500, 2750 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	-	-	-	-	0.03	0.03
180	0.59	0.57	0.58	0.57	0.07	0.07	0.04	0.04	0.17	0.17
175	1.10	1.06	1.08	1.03	0.16	0.16	0.10	0.10	0.58	0.57
170	1.97	1.89	1.94	1.87	0.55	0.53	0.21	0.20	1.00	0.92
160	4.47	4.29	4.40	4.20	1.56	1.50	1.10	1.06	2.76	2.65
150	8.89	8.45	8.68	8.27	3.52	3.37	2.73	2.63	5.18	4.92
140	15.80	14.67	15.55	14.45	5.91	5.59	4.98	4.74	8.83	8.35
130	23.70	21.79	23.48	21.58	9.85	9.25	8.12	7.65	15.50	14.33
120	35.02	31.36	34.76	31.13	17.04	15.61	14.03	12.96	23.94	21.90

Table G-642. WTG MP2 foundation (13 m diameter, IHC S-5500, 2750 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.03	0.03	0.03	0.03	-	-	-	-	-	-
180	0.17	0.16	0.16	0.16	0.03	0.03	-	-	0.09	0.09
175	0.59	0.57	0.58	0.57	0.07	0.07	0.04	0.04	0.17	0.17
170	1.10	1.06	1.08	1.03	0.16	0.16	0.10	0.10	0.58	0.57
160	3.03	2.89	2.98	2.86	0.78	0.75	0.60	0.58	1.83	1.76
150	6.37	6.10	6.21	5.95	2.49	2.39	1.84	1.77	3.97	3.79
140	12.26	11.49	11.99	11.23	4.68	4.46	3.88	3.70	6.62	6.29
130	19.63	18.07	19.39	17.85	7.65	7.21	6.24	5.93	11.96	11.12
120	29.38	26.58	29.08	26.29	13.31	12.33	10.55	9.74	19.54	17.90

Table G-643. WTG MP2 foundation (13 m diameter, IHC S-5500, 3850 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.12	0.12	0.12	0.12	-	-	-	-	0.05	0.05
190	0.69	0.67	0.68	0.66	0.10	0.10	0.06	0.06	0.48	0.46
180	2.39	2.29	2.36	2.26	0.63	0.60	0.49	0.48	1.36	1.31
175	3.51	3.36	3.44	3.27	1.21	1.16	0.69	0.66	2.18	2.08
170	5.18	4.96	5.05	4.84	1.93	1.85	1.39	1.33	3.14	2.99
160	10.29	9.63	9.99	9.44	3.99	3.80	3.11	2.96	5.77	5.47
150	17.95	16.58	17.74	16.37	6.63	6.29	5.50	5.22	10.33	9.61
140	27.04	24.42	26.72	24.14	11.95	11.07	9.39	8.81	18.03	16.57
130	39.20	34.70	38.90	34.46	20.12	18.34	16.82	15.39	28.30	25.41
120	113.56	99.69	92.00	79.14	36.32	32.20	33.06	29.87	57.84	48.99

Table G-644. WTG MP2 foundation (13 m diameter, IHC S-5500, 3850 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.05	0.05	0.04	0.04	-	-	-	-	-	-
190	0.22	0.22	0.20	0.20	0.03	0.03	-	-	0.10	0.10
180	1.32	1.27	1.30	1.26	0.18	0.18	0.12	0.12	0.63	0.61
175	2.18	2.09	2.15	2.06	0.59	0.57	0.44	0.44	1.25	1.20
170	3.24	3.07	3.20	3.03	1.08	1.03	0.64	0.62	1.98	1.90
160	6.85	6.55	6.71	6.40	2.69	2.58	1.98	1.90	4.16	3.97
150	13.39	12.50	13.16	12.29	4.92	4.67	4.07	3.88	7.19	6.81
140	21.24	19.52	21.02	19.32	8.34	7.85	6.71	6.36	13.35	12.40
130	31.72	28.69	31.48	28.47	14.82	13.67	12.07	11.16	21.54	19.72
120	45.72	39.68	45.34	39.39	24.30	22.18	20.98	19.07	33.60	30.07

Table G-645. WTG MP2 foundation (13 m diameter, IHC S-5500, 3850 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.02	0.02	-	-	-	-	-	-	-	-
190	0.12	0.12	0.12	0.12	-	-	-	-	0.05	0.05
180	0.69	0.67	0.68	0.66	0.10	0.10	0.06	0.06	0.48	0.46
175	1.45	1.40	1.43	1.38	0.22	0.22	0.14	0.13	0.66	0.64
170	2.39	2.29	2.36	2.26	0.63	0.60	0.49	0.48	1.36	1.31
160	5.18	4.96	5.05	4.84	1.93	1.85	1.39	1.33	3.14	2.99
150	10.29	9.63	9.99	9.44	3.99	3.80	3.11	2.96	5.77	5.47
140	17.95	16.58	17.74	16.37	6.63	6.29	5.50	5.22	10.33	9.61
130	27.04	24.42	26.72	24.14	11.95	11.07	9.39	8.81	18.03	16.57
120	39.20	34.70	38.90	34.46	20.12	18.34	16.82	15.39	28.30	25.41

Table G-646. WTG MP2 foundation (13 m diameter, IHC S-5500, 3850 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.05	0.05	-	-	-	-	0.02	0.02
180	0.48	0.47	0.48	0.46	0.04	0.04	0.02	0.02	0.12	0.12
175	0.69	0.67	0.68	0.66	0.10	0.10	0.06	0.06	0.48	0.46
170	1.45	1.40	1.43	1.38	0.22	0.22	0.14	0.13	0.66	0.64
160	3.51	3.36	3.44	3.27	1.21	1.16	0.69	0.66	2.18	2.08
150	7.37	7.03	7.17	6.84	2.84	2.73	2.18	2.08	4.38	4.19
140	14.11	13.15	13.88	12.94	5.18	4.92	4.30	4.10	7.67	7.27
130	22.09	20.29	21.87	20.09	8.81	8.30	7.07	6.68	14.05	13.04
120	32.84	29.62	32.60	29.41	15.63	14.38	12.81	11.83	22.47	20.56

Table G-647. WTG MP2 foundation (13 m diameter, IHC S-5500, 5225 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.15	0.15	0.15	0.15	0.02	0.02	-	-	0.08	0.08
190	0.98	0.94	0.96	0.92	0.15	0.15	0.09	0.09	0.57	0.55
180	2.80	2.70	2.77	2.66	0.75	0.72	0.60	0.58	1.65	1.59
175	4.34	4.16	4.24	4.05	1.50	1.44	1.02	0.98	2.58	2.48
170	6.31	6.01	6.14	5.85	2.34	2.25	1.74	1.67	3.65	3.50
160	12.35	11.55	12.07	11.29	4.48	4.28	3.65	3.50	6.39	6.07
150	19.69	18.14	19.45	17.92	7.31	6.90	6.10	5.78	11.56	10.73
140	28.62	26.08	28.30	25.77	13.15	12.17	10.39	9.64	19.11	17.53
130	39.70	35.32	39.38	35.03	22.13	20.13	19.30	17.51	29.46	26.59
120	>120.00	113.81	>120.00	110.69	88.68	79.03	78.18	70.29	114.98	101.71

Table G-648. WTG MP2 foundation (13 m diameter, IHC S-5500, 5225 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.06	0.06	0.06	0.06	-	-	-	-	0.02	0.02
190	0.52	0.51	0.51	0.50	0.06	0.06	0.03	0.03	0.14	0.14
180	1.60	1.54	1.57	1.51	0.48	0.48	0.17	0.17	0.74	0.71
175	2.62	2.52	2.59	2.49	0.67	0.65	0.57	0.55	1.51	1.45
170	4.02	3.83	3.93	3.76	1.36	1.32	0.81	0.78	2.40	2.31
160	8.30	7.85	8.09	7.65	3.01	2.88	2.45	2.35	4.67	4.45
150	15.18	14.13	14.93	13.90	5.47	5.21	4.57	4.36	8.01	7.58
140	22.81	20.96	22.58	20.74	9.14	8.61	7.43	7.01	14.39	13.35
130	32.72	29.73	32.46	29.49	16.28	14.94	13.51	12.47	22.52	20.61
120	68.48	57.65	58.50	47.94	28.04	25.14	24.49	22.34	35.12	31.28

Table G-649. WTG MP2 foundation (13 m diameter, IHC S-5500, 5225 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.03	0.03	0.02	0.02	-	-	-	-	-	-
190	0.15	0.15	0.15	0.15	0.02	0.02	-	-	0.08	0.08
180	0.98	0.94	0.96	0.92	0.15	0.15	0.09	0.09	0.57	0.55
175	1.78	1.71	1.76	1.69	0.54	0.52	0.20	0.20	0.91	0.78
170	2.80	2.70	2.77	2.66	0.75	0.72	0.60	0.58	1.65	1.59
160	6.31	6.01	6.14	5.85	2.34	2.25	1.74	1.67	3.65	3.50
150	12.35	11.55	12.07	11.29	4.48	4.28	3.65	3.50	6.39	6.07
140	19.69	18.14	19.45	17.92	7.31	6.90	6.10	5.78	11.56	10.73
130	28.62	26.08	28.30	25.77	13.15	12.17	10.39	9.64	19.11	17.53
120	39.70	35.32	39.38	35.03	22.13	20.13	19.30	17.51	29.46	26.59

Table G-650. WTG MP2 foundation (13 m diameter, IHC S-5500, 5225 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.07	0.07	0.07	0.07	-	-	-	-	0.03	0.03
180	0.57	0.56	0.57	0.55	0.07	0.07	0.04	0.04	0.16	0.16
175	0.98	0.94	0.96	0.92	0.15	0.15	0.09	0.09	0.57	0.55
170	1.78	1.71	1.76	1.69	0.54	0.52	0.20	0.20	0.91	0.78
160	4.34	4.16	4.24	4.05	1.50	1.44	1.02	0.98	2.58	2.48
150	8.88	8.39	8.66	8.19	3.27	3.13	2.62	2.52	4.95	4.72
140	15.92	14.79	15.67	14.56	5.76	5.47	4.81	4.59	8.50	8.05
130	23.56	21.66	23.34	21.46	9.61	9.05	7.86	7.42	15.14	14.01
120	33.78	30.57	33.52	30.34	17.15	15.71	14.31	13.18	23.37	21.40

WTG MP3

Table G-651. WTG MP3 foundation (13 m diameter, IHC S-6500, 654 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.06	0.06	0.06	0.06	-	-	-	-	-	-
190	0.35	0.34	0.34	0.34	0.02	0.02	-	-	0.11	0.11
180	1.34	1.29	1.32	1.27	0.22	0.22	0.11	0.11	0.55	0.53
175	2.28	2.18	2.25	2.15	0.41	0.40	0.24	0.24	1.10	1.04
170	3.60	3.44	3.55	3.40	0.91	0.88	0.54	0.52	1.95	1.87
160	6.96	6.47	6.90	6.42	2.66	2.55	1.90	1.82	4.53	4.29
150	12.26	10.95	12.19	10.88	5.42	5.11	4.32	4.13	8.22	7.50
140	18.89	16.51	18.81	16.45	9.48	8.61	7.81	7.17	14.26	12.55
130	27.20	23.19	27.07	23.09	16.65	14.45	13.97	12.33	22.18	19.07
120	37.58	32.30	37.45	32.18	25.99	22.28	22.97	19.93	32.56	27.96

Table G-652. WTG MP3 foundation (13 m diameter, IHC S-6500, 654 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.11	0.11	0.11	0.11	-	-	-	-	0.03	0.03
180	0.52	0.50	0.51	0.49	0.08	0.08	0.02	0.02	0.23	0.23
175	1.19	1.14	1.16	1.11	0.13	0.13	0.09	0.09	0.49	0.47
170	2.07	1.97	2.04	1.94	0.39	0.38	0.23	0.22	0.96	0.92
160	4.82	4.57	4.77	4.53	1.48	1.42	0.96	0.92	2.80	2.69
150	8.80	8.03	8.74	7.97	3.66	3.50	2.73	2.62	5.78	5.43
140	14.69	13.06	14.61	12.99	6.76	6.32	5.52	5.21	10.04	9.09
130	21.92	19.06	21.85	18.99	12.16	10.76	9.65	8.79	17.20	14.95
120	31.23	27.03	31.11	26.93	20.20	17.38	17.28	15.02	25.65	21.99

Table G-653. WTG MP3 foundation (13 m diameter, IHC S-6500, 654 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1μPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	-	-	-	-	-	-
180	0.35	0.34	0.34	0.34	0.02	0.02	-	-	0.11	0.11
175	0.67	0.65	0.65	0.62	0.09	0.09	0.04	0.04	0.26	0.24
170	1.34	1.29	1.32	1.27	0.22	0.22	0.11	0.11	0.55	0.53
160	3.60	3.44	3.55	3.40	0.91	0.88	0.54	0.52	1.95	1.87
150	6.96	6.47	6.90	6.42	2.66	2.55	1.90	1.82	4.53	4.29
140	12.26	10.95	12.19	10.88	5.42	5.11	4.32	4.13	8.22	7.50
130	18.89	16.51	18.81	16.45	9.48	8.61	7.81	7.17	14.26	12.55
120	27.20	23.19	27.07	23.09	16.65	14.45	13.97	12.33	22.18	19.07

Table G-654. WTG MP3 foundation (13 m diameter, IHC S-6500, 654 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1μPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.12	0.12	0.12	0.12	-	-	-	-	0.06	0.06
175	0.35	0.34	0.34	0.34	0.02	0.02	-	-	0.11	0.11
170	0.67	0.65	0.65	0.62	0.09	0.09	0.04	0.04	0.26	0.24
160	2.28	2.18	2.25	2.15	0.41	0.40	0.24	0.24	1.10	1.04
150	5.15	4.87	5.10	4.82	1.64	1.59	1.06	1.01	3.03	2.89
140	9.24	8.43	9.19	8.37	3.96	3.79	2.93	2.80	6.12	5.73
130	15.34	13.59	15.27	13.53	7.17	6.64	5.85	5.51	10.82	9.57
120	22.70	19.73	22.61	19.66	12.84	11.38	10.18	9.20	17.99	15.60

Table G-655. WTG MP3 foundation (13 m diameter, IHC S-6500, 1307 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.08	0.08	0.08	0.08	-	-	-	-	-	-
190	0.30	0.29	0.29	0.28	0.03	0.03	-	-	0.13	0.13
180	1.30	1.26	1.28	1.24	0.24	0.24	0.13	0.13	0.61	0.60
175	2.16	2.08	2.12	2.04	0.48	0.47	0.28	0.28	1.19	1.14
170	3.32	3.17	3.27	3.12	0.96	0.92	0.63	0.60	1.92	1.85
160	6.72	6.27	6.66	6.22	2.69	2.58	1.95	1.87	4.41	4.20
150	12.33	11.16	12.26	11.10	5.58	5.24	4.39	4.19	8.73	8.02
140	20.05	17.79	19.98	17.72	10.88	9.79	8.65	7.93	15.95	14.27
130	30.29	26.79	30.21	26.70	19.46	17.23	16.15	14.44	25.00	22.26
120	42.68	37.53	42.54	37.42	30.55	27.04	26.22	23.12	37.60	33.08

Table G-656. WTG MP3 foundation (13 m diameter, IHC S-6500, 1307 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.12	0.12	0.12	0.12	-	-	-	-	0.06	0.06
180	0.60	0.58	0.58	0.57	0.11	0.11	0.06	0.06	0.25	0.24
175	1.18	1.13	1.16	1.11	0.20	0.20	0.12	0.12	0.52	0.51
170	1.94	1.86	1.91	1.84	0.41	0.40	0.26	0.25	1.00	0.96
160	4.55	4.31	4.49	4.27	1.56	1.49	1.03	0.98	2.76	2.64
150	8.64	7.95	8.58	7.90	3.69	3.52	2.79	2.67	5.81	5.46
140	15.08	13.56	15.01	13.50	7.30	6.76	5.74	5.39	11.27	10.19
130	23.55	20.93	23.48	20.87	14.04	12.64	11.26	10.15	19.57	17.35
120	34.79	30.77	34.68	30.68	23.33	20.70	20.00	17.73	30.29	26.74

Table G-657. WTG MP3 foundation (13 m diameter, IHC S-6500, 1307 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.08	0.08	0.08	0.08	-	-	-	-	-	-
180	0.30	0.29	0.29	0.28	0.03	0.03	-	-	0.13	0.13
175	0.68	0.66	0.67	0.64	0.12	0.12	0.08	0.08	0.27	0.27
170	1.30	1.26	1.28	1.24	0.24	0.24	0.13	0.13	0.61	0.60
160	3.32	3.17	3.27	3.12	0.96	0.92	0.63	0.60	1.92	1.85
150	6.72	6.27	6.66	6.22	2.69	2.58	1.95	1.87	4.41	4.20
140	12.33	11.16	12.26	11.10	5.58	5.24	4.39	4.19	8.73	8.02
130	20.05	17.79	19.98	17.72	10.88	9.79	8.65	7.93	15.95	14.27
120	30.29	26.79	30.21	26.70	19.46	17.23	16.15	14.44	25.00	22.26

Table G-658. WTG MP3 foundation (13 m diameter, IHC S-6500, 1307 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.13	0.13	0.13	0.13	-	-	-	-	0.07	0.07
175	0.30	0.29	0.29	0.28	0.03	0.03	-	-	0.13	0.13
170	0.68	0.66	0.67	0.64	0.12	0.12	0.08	0.08	0.27	0.27
160	2.16	2.08	2.12	2.04	0.48	0.47	0.28	0.28	1.19	1.14
150	4.86	4.60	4.81	4.56	1.73	1.66	1.22	1.16	2.94	2.82
140	9.13	8.39	9.07	8.34	3.99	3.81	2.97	2.84	6.22	5.82
130	15.85	14.20	15.78	14.15	7.86	7.23	6.13	5.74	12.08	10.92
120	24.37	21.70	24.30	21.63	14.86	13.32	12.09	10.90	20.51	18.16

Table G-659. WTG MP3 foundation (13 m diameter, IHC S-6500, 2614 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.12	0.12	0.12	0.12	-	-	-	-	0.05	0.05
190	0.49	0.48	0.48	0.47	0.10	0.09	0.03	0.03	0.24	0.24
180	1.78	1.72	1.77	1.70	0.39	0.37	0.25	0.24	0.93	0.89
175	2.83	2.71	2.80	2.68	0.80	0.78	0.48	0.47	1.71	1.64
170	4.31	4.09	4.26	4.06	1.49	1.42	0.97	0.92	2.69	2.57
160	8.32	7.62	8.26	7.58	3.61	3.44	2.73	2.61	5.64	5.30
150	14.71	13.18	14.65	13.12	6.96	6.48	5.58	5.24	10.69	9.59
140	22.90	20.21	22.83	20.15	13.42	12.02	10.55	9.47	18.82	16.58
130	33.66	29.77	33.55	29.68	22.42	19.75	19.18	16.90	29.11	25.46
120	47.29	41.45	47.09	41.29	34.24	30.29	30.35	26.88	41.90	36.71

Table G-660. WTG MP3 foundation (13 m diameter, IHC S-6500, 2614 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.05	0.05	0.04	0.04	-	-	-	-	-	-
190	0.20	0.19	0.19	0.18	-	-	-	-	0.10	0.10
180	0.86	0.83	0.85	0.82	0.14	0.14	0.11	0.11	0.40	0.39
175	1.62	1.56	1.60	1.54	0.31	0.30	0.22	0.21	0.83	0.80
170	2.62	2.52	2.60	2.49	0.72	0.70	0.42	0.40	1.53	1.47
160	5.65	5.31	5.61	5.27	2.20	2.10	1.59	1.52	3.73	3.56
150	10.41	9.41	10.34	9.35	4.77	4.52	3.75	3.59	7.33	6.74
140	17.85	15.79	17.78	15.73	9.07	8.27	7.20	6.64	13.77	12.35
130	26.84	23.43	26.73	23.34	16.77	14.84	13.80	12.36	22.46	19.78
120	38.72	34.00	38.58	33.87	26.66	23.29	23.02	20.37	33.70	29.77

Table G-661. WTG MP3 foundation (13 m diameter, IHC S-6500, 2614 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.12	0.12	0.12	0.12	-	-	-	-	0.05	0.05
180	0.49	0.48	0.48	0.47	0.10	0.09	0.03	0.03	0.24	0.24
175	0.98	0.95	0.97	0.93	0.15	0.15	0.12	0.12	0.46	0.45
170	1.78	1.72	1.77	1.70	0.39	0.37	0.25	0.24	0.93	0.89
160	4.31	4.09	4.26	4.06	1.49	1.42	0.97	0.92	2.69	2.57
150	8.32	7.62	8.26	7.58	3.61	3.44	2.73	2.61	5.64	5.30
140	14.71	13.18	14.65	13.12	6.96	6.48	5.58	5.24	10.69	9.59
130	22.90	20.21	22.83	20.15	13.42	12.02	10.55	9.47	18.82	16.58
120	33.66	29.77	33.55	29.68	22.42	19.75	19.18	16.90	29.10	25.46

Table G-662. WTG MP3 foundation (13 m diameter, IHC S-6500, 2614 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	-	-	-	-	-	-
180	0.23	0.23	0.23	0.22	0.02	0.02	-	-	0.11	0.11
175	0.49	0.48	0.48	0.47	0.10	0.09	0.03	0.03	0.24	0.24
170	0.98	0.95	0.97	0.93	0.15	0.15	0.12	0.12	0.46	0.45
160	2.83	2.71	2.80	2.68	0.80	0.78	0.48	0.47	1.71	1.64
150	6.04	5.66	5.98	5.62	2.44	2.34	1.77	1.68	4.05	3.85
140	11.20	10.06	11.12	9.99	5.09	4.81	4.03	3.86	7.84	7.19
130	18.67	16.49	18.60	16.43	9.59	8.75	7.69	7.07	14.54	13.00
120	28.13	24.54	28.02	24.43	17.71	15.60	14.62	13.05	23.33	20.60

Table G-663. WTG MP3 foundation (13 m diameter, IHC S-6500, 3921 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1μPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.14	0.14	0.14	0.14	-	-	-	-	0.09	0.09
190	0.75	0.73	0.74	0.72	0.13	0.13	0.09	0.09	0.32	0.31
180	2.38	2.29	2.35	2.26	0.60	0.58	0.33	0.32	1.35	1.30
175	3.68	3.52	3.64	3.48	1.25	1.19	0.76	0.74	2.26	2.17
170	5.28	4.99	5.24	4.95	1.99	1.91	1.42	1.36	3.47	3.32
160	9.77	8.96	9.72	8.92	4.62	4.37	3.60	3.44	6.95	6.48
150	16.97	15.09	16.91	15.03	8.81	8.08	7.06	6.57	13.14	11.82
140	25.63	22.53	25.51	22.46	16.12	14.31	13.31	11.99	21.64	19.05
130	38.11	33.33	37.97	33.22	25.87	22.63	22.53	19.89	33.08	29.13
120	53.42	46.96	52.98	46.62	39.71	34.79	35.72	31.47	47.72	41.74

Table G-664. WTG MP3 foundation (13 m diameter, IHC S-6500, 3921 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1μPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.07	0.07	0.07	0.07	-	-	-	-	-	-
190	0.27	0.27	0.27	0.27	0.03	0.03	-	-	0.13	0.13
180	1.28	1.23	1.27	1.22	0.27	0.26	0.14	0.13	0.61	0.59
175	2.13	2.04	2.10	2.01	0.52	0.50	0.31	0.31	1.26	1.21
170	3.34	3.20	3.31	3.16	1.04	0.98	0.70	0.67	2.02	1.94
160	6.84	6.39	6.79	6.35	2.87	2.75	2.13	2.04	4.70	4.44
150	12.63	11.40	12.56	11.34	6.01	5.63	4.78	4.54	8.99	8.25
140	20.31	17.91	20.24	17.85	11.34	10.20	9.10	8.34	16.28	14.47
130	30.62	26.96	30.53	26.87	19.77	17.41	16.66	14.81	25.40	22.34
120	43.86	38.29	43.69	38.13	31.28	27.53	27.34	23.84	38.57	33.66

Table G-665. WTG MP3 foundation (13 m diameter, IHC S-6500, 3921 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.14	0.14	0.14	0.14	-	-	-	-	0.09	0.09
180	0.75	0.73	0.74	0.72	0.13	0.13	0.09	0.09	0.32	0.31
175	1.39	1.34	1.38	1.32	0.30	0.29	0.15	0.14	0.74	0.72
170	2.38	2.29	2.35	2.26	0.60	0.58	0.33	0.32	1.35	1.30
160	5.28	4.99	5.24	4.95	1.99	1.91	1.42	1.36	3.47	3.32
150	9.77	8.96	9.72	8.92	4.62	4.37	3.60	3.44	6.95	6.48
140	16.97	15.09	16.91	15.03	8.81	8.08	7.06	6.57	13.14	11.82
130	25.63	22.53	25.51	22.46	16.12	14.31	13.31	11.99	21.64	19.05
120	38.11	33.33	37.97	33.22	25.87	22.63	22.53	19.89	33.08	29.13

Table G-666. WTG MP3 foundation (13 m diameter, IHC S-6500, 3921 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	-	-	-	-	-	-
180	0.32	0.31	0.31	0.30	0.07	0.07	-	-	0.14	0.14
175	0.75	0.73	0.74	0.72	0.13	0.13	0.09	0.09	0.32	0.31
170	1.39	1.34	1.38	1.32	0.30	0.29	0.15	0.14	0.74	0.72
160	3.68	3.52	3.64	3.48	1.25	1.19	0.76	0.74	2.26	2.17
150	7.33	6.77	7.27	6.73	3.09	2.95	2.38	2.28	5.02	4.74
140	13.29	12.00	13.24	11.94	6.41	5.99	5.11	4.83	9.49	8.71
130	21.14	18.66	21.07	18.60	12.18	10.92	9.59	8.79	17.13	15.17
120	31.74	27.99	31.62	27.90	20.73	18.24	17.65	15.58	26.87	23.36

Table G-667. WTG MP3 foundation (13 m diameter, IHC S-6500, 6208 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.29	0.28	0.28	0.28	0.03	0.03	-	-	0.13	0.13
190	1.29	1.24	1.27	1.22	0.28	0.27	0.15	0.14	0.60	0.58
180	3.28	3.14	3.24	3.09	1.10	1.05	0.73	0.70	2.04	1.95
175	4.88	4.62	4.83	4.58	1.93	1.85	1.38	1.32	3.17	3.02
170	6.73	6.30	6.69	6.26	3.01	2.88	2.29	2.20	4.76	4.51
160	12.65	11.52	12.59	11.46	6.34	5.94	5.16	4.88	9.31	8.53
150	21.10	18.82	21.03	18.75	12.51	11.32	9.94	9.10	17.24	15.49
140	32.29	28.71	32.16	28.61	22.09	19.63	18.97	16.95	27.99	24.65
130	46.37	40.66	46.08	40.43	35.38	31.07	31.88	28.24	41.66	36.53
120	69.57	60.86	67.74	59.42	56.88	48.61	53.22	45.11	63.16	54.90

Table G-668. WTG MP3 foundation (13 m diameter, IHC S-6500, 6208 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.12	0.12	0.12	0.12	-	-	-	-	0.03	0.03
190	0.57	0.55	0.56	0.54	0.11	0.11	0.05	0.05	0.26	0.26
180	1.91	1.84	1.90	1.82	0.48	0.47	0.30	0.29	1.04	1.00
175	3.00	2.87	2.97	2.85	0.97	0.93	0.61	0.60	1.87	1.80
170	4.57	4.34	4.51	4.30	1.74	1.67	1.26	1.21	2.92	2.81
160	8.73	8.03	8.67	7.98	4.21	4.02	3.22	3.07	6.21	5.83
150	15.70	14.17	15.64	14.12	8.36	7.69	6.71	6.28	12.25	11.09
140	24.75	22.13	24.68	22.06	15.87	14.28	13.26	12.00	21.17	18.87
130	37.46	33.03	37.28	32.89	26.84	23.59	23.60	20.91	33.06	29.34
120	53.97	47.31	53.23	46.80	42.61	36.73	39.00	33.51	48.79	42.60

Table G-669. WTG MP3 foundation (13 m diameter, IHC S-6500, 6208 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.06	0.06	0.06	0.06	-	-	-	-	-	-
190	0.29	0.28	0.28	0.28	0.03	0.03	-	-	0.13	0.13
180	1.29	1.24	1.27	1.22	0.28	0.27	0.15	0.14	0.60	0.58
175	2.10	2.02	2.07	1.99	0.57	0.55	0.33	0.32	1.25	1.20
170	3.28	3.14	3.24	3.09	1.10	1.05	0.73	0.70	2.04	1.95
160	6.73	6.30	6.69	6.26	3.01	2.88	2.29	2.20	4.76	4.51
150	12.65	11.52	12.59	11.46	6.34	5.94	5.16	4.88	9.31	8.53
140	21.10	18.82	21.03	18.75	12.51	11.32	9.94	9.10	17.24	15.49
130	32.29	28.71	32.16	28.61	22.09	19.63	18.97	16.95	27.99	24.65
120	46.37	40.66	46.08	40.43	35.38	31.07	31.88	28.24	41.66	36.53

Table G-670. WTG MP3 foundation (13 m diameter, IHC S-6500, 6208 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.13	0.13	0.13	0.13	-	-	-	-	0.06	0.06
180	0.61	0.60	0.61	0.59	0.13	0.13	0.09	0.09	0.30	0.28
175	1.29	1.24	1.27	1.22	0.28	0.27	0.15	0.14	0.60	0.58
170	2.10	2.02	2.07	1.99	0.57	0.55	0.33	0.32	1.25	1.20
160	4.88	4.62	4.83	4.58	1.93	1.85	1.38	1.32	3.17	3.02
150	9.24	8.49	9.19	8.45	4.56	4.32	3.54	3.38	6.65	6.23
140	16.55	14.89	16.48	14.83	8.94	8.19	7.21	6.70	12.99	11.78
130	26.02	23.03	25.89	22.94	16.82	15.09	14.12	12.75	22.19	19.77
120	38.85	34.23	38.67	34.06	28.34	24.90	24.64	21.88	34.41	30.46

Table G-671. WTG MP3 foundation (13 m diameter, IHC S-6500, 654 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.06	0.06	0.06	0.06	-	-	-	-	-	-
190	0.35	0.34	0.34	0.34	0.02	0.02	-	-	0.11	0.11
180	1.42	1.36	1.40	1.34	0.21	0.20	0.11	0.11	0.56	0.54
175	2.46	2.36	2.43	2.32	0.48	0.46	0.23	0.23	1.17	1.12
170	3.90	3.72	3.86	3.68	0.96	0.93	0.57	0.55	2.12	2.04
160	7.92	7.27	7.85	7.20	2.83	2.72	2.07	1.97	4.88	4.62
150	14.74	13.18	14.64	13.10	5.94	5.57	4.73	4.47	9.49	8.68
140	25.00	22.07	24.90	21.98	12.05	10.76	9.12	8.33	19.11	16.74
130	43.30	37.44	42.94	37.15	24.72	21.67	20.20	17.52	34.72	30.34
120	119.80	95.96	105.19	86.58	51.97	44.54	42.55	36.43	71.96	62.27

Table G-672. WTG MP3 foundation (13 m diameter, IHC S-6500, 654 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.11	0.11	0.11	0.11	-	-	-	-	0.03	0.03
180	0.55	0.54	0.53	0.51	0.09	0.09	0.02	0.02	0.23	0.22
175	1.26	1.22	1.24	1.19	0.14	0.13	0.10	0.10	0.50	0.48
170	2.24	2.14	2.21	2.10	0.39	0.38	0.22	0.21	1.00	0.96
160	5.24	4.95	5.19	4.90	1.59	1.53	1.00	0.96	2.97	2.86
150	10.04	9.17	9.96	9.11	4.00	3.81	2.92	2.80	6.33	5.93
140	18.50	16.30	18.40	16.21	7.75	7.09	6.11	5.72	12.80	11.50
130	31.21	27.40	31.06	27.26	16.08	14.23	12.59	11.23	24.30	21.35
120	55.89	48.33	55.08	47.68	32.58	28.44	26.93	23.18	45.30	38.98

Table G-673. WTG MP3 foundation (13 m diameter, IHC S-6500, 654 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	-	-	-	-	-	-
180	0.35	0.34	0.34	0.34	0.02	0.02	-	-	0.11	0.11
175	0.74	0.72	0.72	0.70	0.09	0.09	0.04	0.04	0.24	0.24
170	1.42	1.36	1.40	1.34	0.21	0.20	0.11	0.11	0.56	0.54
160	3.90	3.72	3.86	3.68	0.96	0.92	0.57	0.55	2.12	2.04
150	7.92	7.27	7.85	7.20	2.83	2.72	2.07	1.97	4.88	4.62
140	14.74	13.18	14.64	13.10	5.94	5.57	4.73	4.47	9.49	8.68
130	25.00	22.07	24.90	21.98	12.05	10.76	9.12	8.33	19.11	16.74
120	43.30	37.44	42.94	37.15	24.72	21.67	20.20	17.52	34.72	30.34

Table G-674. WTG MP3 foundation (13 m diameter, IHC S-6500, 654 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.12	0.12	0.12	0.12	-	-	-	-	0.06	0.06
175	0.35	0.34	0.34	0.34	0.02	0.02	-	-	0.11	0.11
170	0.74	0.72	0.72	0.70	0.09	0.09	0.04	0.04	0.24	0.24
160	2.46	2.36	2.43	2.32	0.48	0.46	0.23	0.23	1.17	1.12
150	5.62	5.29	5.57	5.24	1.78	1.71	1.14	1.09	3.31	3.16
140	10.90	9.77	10.81	9.68	4.29	4.07	3.18	3.04	6.74	6.30
130	19.63	17.22	19.50	17.12	8.25	7.56	6.49	6.07	13.66	12.24
120	32.74	28.75	32.57	28.61	17.38	15.27	13.52	12.07	25.72	22.45

Table G-675. WTG MP3 foundation (13 m diameter, IHC S-6500, 1307 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.08	0.08	0.08	0.08	-	-	-	-	-	-
190	0.32	0.31	0.32	0.31	0.03	0.03	-	-	0.13	0.13
180	1.40	1.34	1.38	1.32	0.23	0.23	0.14	0.14	0.68	0.66
175	2.38	2.28	2.35	2.25	0.52	0.51	0.29	0.28	1.29	1.24
170	3.73	3.55	3.68	3.51	1.06	1.01	0.71	0.69	2.11	2.02
160	8.29	7.64	8.22	7.58	2.91	2.79	2.22	2.12	5.04	4.79
150	17.59	15.56	17.49	15.48	6.75	6.33	5.00	4.75	12.21	10.97
140	33.08	29.05	32.90	28.90	16.58	14.58	12.22	10.91	25.57	22.39
130	59.77	51.98	59.11	51.41	34.20	29.77	27.35	23.54	48.71	42.07
120	>120.00	113.03	>120.00	112.80	69.88	61.05	57.02	49.36	119.99	108.39

Table G-676. WTG MP3 foundation (13 m diameter, IHC S-6500, 1307 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.13	0.13	0.13	0.13	-	-	-	-	0.06	0.06
180	0.65	0.63	0.64	0.61	0.11	0.11	0.06	0.06	0.24	0.24
175	1.26	1.21	1.24	1.19	0.17	0.17	0.13	0.13	0.57	0.55
170	2.12	2.04	2.08	2.00	0.44	0.43	0.26	0.24	1.12	1.08
160	5.14	4.87	5.08	4.82	1.72	1.65	1.18	1.13	2.97	2.85
150	11.26	10.14	11.17	10.05	4.12	3.93	3.03	2.90	7.16	6.67
140	22.94	20.20	22.84	20.10	9.62	8.80	7.04	6.54	16.91	14.93
130	41.95	36.44	41.66	36.21	22.66	19.75	17.28	15.15	33.43	29.22
120	86.01	72.68	81.72	70.18	45.11	38.85	36.37	31.51	62.62	54.36

Table G-677. WTG MP3 foundation (13 m diameter, IHC S-6500, 1307 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.08	0.08	0.08	0.08	-	-	-	-	-	-
180	0.32	0.31	0.32	0.31	0.03	0.03	-	-	0.13	0.13
175	0.74	0.72	0.74	0.71	0.12	0.12	0.08	0.08	0.28	0.27
170	1.40	1.34	1.38	1.32	0.23	0.23	0.14	0.14	0.68	0.66
160	3.73	3.55	3.68	3.51	1.06	1.01	0.71	0.69	2.11	2.02
150	8.29	7.64	8.22	7.58	2.91	2.79	2.22	2.12	5.04	4.79
140	17.59	15.56	17.49	15.48	6.75	6.33	5.00	4.75	12.21	10.97
130	33.08	29.05	32.90	28.90	16.58	14.58	12.22	10.91	25.57	22.39
120	59.77	51.98	59.11	51.41	34.20	29.77	27.35	23.54	48.71	42.07

Table G-678. WTG MP3 foundation (13 m diameter, IHC S-6500, 1307 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.14	0.13	0.14	0.13	-	-	-	-	0.07	0.07
175	0.32	0.31	0.32	0.31	0.03	0.03	-	-	0.13	0.13
170	0.74	0.72	0.74	0.71	0.12	0.12	0.08	0.08	0.28	0.27
160	2.38	2.28	2.35	2.25	0.52	0.51	0.29	0.28	1.29	1.24
150	5.57	5.27	5.51	5.21	1.90	1.82	1.34	1.28	3.30	3.15
140	12.23	11.03	12.15	10.95	4.46	4.24	3.36	3.22	7.85	7.27
130	24.21	21.39	24.10	21.30	10.55	9.48	7.72	7.12	18.31	16.08
120	44.52	38.64	44.21	38.37	24.10	21.13	18.82	16.41	35.58	31.01

Table G-679. WTG MP3 foundation (13 m diameter, IHC S-6500, 2614 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.12	0.12	0.12	0.12	-	-	-	-	0.03	0.03
190	0.52	0.51	0.51	0.50	0.10	0.10	0.03	0.03	0.23	0.23
180	1.94	1.86	1.92	1.84	0.41	0.40	0.24	0.24	1.00	0.97
175	3.08	2.95	3.03	2.90	0.86	0.83	0.52	0.50	1.86	1.78
170	4.83	4.59	4.78	4.55	1.64	1.58	1.08	1.03	2.90	2.78
160	10.59	9.55	10.49	9.48	4.04	3.85	2.96	2.84	6.66	6.28
150	21.77	19.12	21.65	19.02	9.04	8.29	6.57	6.19	15.85	14.06
140	40.56	35.26	40.28	35.03	21.36	18.68	16.24	14.32	31.99	28.10
130	89.47	74.89	84.28	71.73	44.02	38.04	35.21	30.67	62.38	54.28
120	>120.00	113.46	>120.00	113.45	119.99	109.85	92.55	79.20	>120.00	113.25

Table G-680. WTG MP3 foundation (13 m diameter, IHC S-6500, 2614 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.04	0.04	0.03	0.03	-	-	-	-	-	-
190	0.17	0.16	0.17	0.16	-	-	-	-	0.11	0.11
180	0.92	0.89	0.91	0.87	0.15	0.15	0.11	0.11	0.42	0.41
175	1.76	1.69	1.73	1.67	0.36	0.35	0.17	0.17	0.89	0.86
170	2.83	2.72	2.80	2.69	0.78	0.76	0.45	0.43	1.68	1.61
160	6.61	6.23	6.56	6.18	2.45	2.34	1.76	1.68	4.16	3.97
150	14.47	12.96	14.38	12.88	5.43	5.14	4.21	4.00	9.45	8.67
140	28.06	24.41	27.89	24.26	13.10	11.73	9.36	8.58	21.37	18.73
130	51.82	45.05	51.36	44.63	28.68	24.88	22.43	19.59	41.72	36.14
120	>120.00	112.11	>120.00	111.53	59.51	51.62	48.08	41.60	105.23	86.76

Table G-681. WTG MP3 foundation (13 m diameter, IHC S-6500, 2614 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.12	0.12	0.12	0.12	-	-	-	-	0.03	0.03
180	0.52	0.51	0.51	0.50	0.10	0.10	0.03	0.03	0.23	0.23
175	1.10	1.06	1.08	1.03	0.16	0.16	0.13	0.13	0.48	0.47
170	1.94	1.86	1.92	1.84	0.41	0.40	0.24	0.24	1.00	0.97
160	4.83	4.59	4.78	4.55	1.64	1.58	1.08	1.03	2.90	2.78
150	10.59	9.55	10.49	9.48	4.04	3.85	2.96	2.84	6.66	6.28
140	21.77	19.12	21.65	19.02	9.04	8.29	6.57	6.19	15.85	14.06
130	40.56	35.26	40.28	35.03	21.36	18.68	16.24	14.32	31.99	28.10
120	89.47	74.89	84.28	71.73	44.02	38.04	35.21	30.67	62.38	54.28

Table G-682. WTG MP3 foundation (13 m diameter, IHC S-6500, 2614 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.06	0.06	0.06	0.06	-	-	-	-	-	-
180	0.23	0.23	0.23	0.22	0.02	0.02	-	-	0.12	0.12
175	0.52	0.51	0.51	0.50	0.10	0.10	0.03	0.03	0.23	0.23
170	1.10	1.06	1.08	1.03	0.16	0.16	0.13	0.13	0.48	0.47
160	3.08	2.95	3.03	2.90	0.86	0.83	0.52	0.50	1.86	1.78
150	7.18	6.69	7.11	6.64	2.66	2.54	1.93	1.85	4.49	4.28
140	15.54	13.84	15.44	13.76	5.88	5.55	4.52	4.30	10.24	9.30
130	29.90	26.20	29.74	26.05	14.26	12.71	10.17	9.24	22.88	20.07
120	55.15	48.00	54.60	47.51	30.75	26.89	24.00	21.09	44.52	38.53

Table G-683. WTG MP3 foundation (13 m diameter, IHC S-6500, 3921 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.15	0.14	0.15	0.14	-	-	-	-	0.09	0.09
190	0.80	0.76	0.79	0.76	0.14	0.13	0.09	0.09	0.33	0.32
180	2.59	2.49	2.57	2.47	0.74	0.72	0.41	0.40	1.48	1.42
175	4.09	3.91	4.05	3.87	1.32	1.28	0.83	0.79	2.50	2.40
170	6.11	5.75	6.05	5.70	2.22	2.13	1.61	1.55	3.88	3.70
160	13.17	11.87	13.10	11.80	5.25	4.96	4.03	3.85	8.60	7.92
150	25.47	22.47	25.27	22.35	11.75	10.60	8.77	8.04	19.38	17.06
140	48.11	41.97	47.67	41.57	26.39	23.11	20.68	18.21	38.92	33.92
130	119.99	109.93	119.99	107.42	57.11	49.99	47.24	41.32	86.66	73.42
120	>120.00	114.58	>120.00	114.33	>120.00	113.04	>120.00	112.42	>120.00	114.08

Table G-684. WTG MP3 foundation (13 m diameter, IHC S-6500, 3921 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.07	0.07	0.07	0.07	-	-	-	-	-	-
190	0.28	0.28	0.28	0.27	0.03	0.03	-	-	0.14	0.13
180	1.36	1.30	1.34	1.29	0.26	0.26	0.15	0.14	0.74	0.72
175	2.36	2.27	2.34	2.24	0.55	0.53	0.31	0.30	1.33	1.28
170	3.73	3.57	3.71	3.53	1.20	1.15	0.77	0.74	2.25	2.16
160	8.32	7.67	8.25	7.61	3.18	3.04	2.38	2.28	5.35	5.05
150	17.35	15.38	17.25	15.30	7.14	6.63	5.51	5.19	12.15	10.95
140	33.42	29.39	33.21	29.21	16.46	14.63	12.42	11.19	25.47	22.45
130	62.37	54.55	61.29	53.63	36.08	31.55	28.96	25.38	50.37	43.94
120	>120.00	113.36	>120.00	113.16	92.83	78.38	68.63	60.54	>120.00	111.83

Table G-685. WTG MP3 foundation (13 m diameter, IHC S-6500, 3921 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.15	0.14	0.15	0.14	-	-	-	-	0.09	0.09
180	0.80	0.76	0.79	0.76	0.14	0.13	0.09	0.09	0.33	0.32
175	1.56	1.49	1.53	1.47	0.29	0.28	0.16	0.16	0.79	0.76
170	2.59	2.49	2.57	2.47	0.74	0.72	0.41	0.40	1.48	1.42
160	6.11	5.75	6.05	5.70	2.22	2.13	1.61	1.55	3.88	3.70
150	13.17	11.87	13.10	11.80	5.25	4.96	4.03	3.85	8.60	7.92
140	25.47	22.47	25.27	22.35	11.75	10.60	8.77	8.04	19.38	17.06
130	48.11	41.97	47.67	41.57	26.39	23.11	20.68	18.21	38.92	33.92
120	119.99	109.93	119.99	107.42	57.11	49.99	47.24	41.32	86.66	73.42

Table G-686. WTG MP3 foundation (13 m diameter, IHC S-6500, 3921 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	-	-	-	-	-	-
180	0.36	0.35	0.35	0.34	0.07	0.07	-	-	0.15	0.15
175	0.80	0.76	0.79	0.76	0.14	0.13	0.09	0.09	0.33	0.32
170	1.56	1.49	1.53	1.47	0.29	0.28	0.16	0.16	0.79	0.76
160	4.09	3.91	4.05	3.87	1.32	1.28	0.83	0.79	2.50	2.40
150	8.95	8.23	8.89	8.17	3.52	3.35	2.63	2.52	5.78	5.45
140	18.58	16.42	18.47	16.33	7.74	7.14	5.95	5.59	13.17	11.86
130	35.57	31.17	35.33	30.97	17.88	15.80	13.49	12.16	27.76	24.22
120	67.09	58.85	65.72	57.59	38.92	33.91	31.40	27.64	53.85	47.04

Table G-687. WTG MP3 foundation (13 m diameter, IHC S-6500, 6208 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.29	0.28	0.29	0.28	0.03	0.03	-	-	0.14	0.14
190	1.38	1.32	1.36	1.30	0.28	0.27	0.16	0.16	0.65	0.63
180	3.68	3.51	3.62	3.46	1.24	1.19	0.81	0.78	2.21	2.11
175	5.46	5.17	5.41	5.12	2.08	1.98	1.55	1.49	3.55	3.39
170	8.10	7.49	8.03	7.43	3.35	3.21	2.56	2.46	5.36	5.08
160	18.58	16.34	18.46	16.24	7.70	7.20	5.95	5.64	13.10	11.75
150	37.89	32.86	37.53	32.57	20.35	17.69	15.16	13.60	30.29	26.27
140	99.37	84.11	89.26	76.93	48.56	41.70	38.83	33.84	67.83	58.35
130	>120.00	114.57	>120.00	113.94	>120.00	111.45	>120.00	109.25	>120.00	113.59
120	>120.00	114.60	>120.00	114.53	>120.00	114.49	>120.00	114.51	>120.00	114.52

Table G-688. WTG MP3 foundation (13 m diameter, IHC S-6500, 6208 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.13	0.13	0.13	0.13	-	-	-	-	0.03	0.03
190	0.59	0.57	0.58	0.57	0.12	0.12	0.04	0.04	0.26	0.26
180	2.08	1.98	2.05	1.96	0.52	0.50	0.30	0.29	1.18	1.14
175	3.34	3.19	3.30	3.15	1.04	0.99	0.67	0.64	2.00	1.92
170	5.04	4.79	5.00	4.75	1.92	1.84	1.34	1.29	3.23	3.08
160	11.29	10.15	11.19	10.06	4.74	4.51	3.65	3.49	7.42	6.93
150	24.52	21.63	24.41	21.52	11.14	10.04	8.48	7.85	18.88	16.52
140	51.22	44.10	50.43	43.42	28.72	24.66	22.68	19.85	41.07	35.34
130	>120.00	112.66	>120.00	112.09	72.18	62.38	57.97	50.47	119.99	106.94
120	>120.00	114.64	>120.00	114.55	>120.00	114.51	>120.00	114.48	>120.00	114.54

Table G-689. WTG MP3 foundation (13 m diameter, IHC S-6500, 6208 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.06	0.06	0.06	0.06	-	-	-	-	-	-
190	0.29	0.28	0.29	0.28	0.03	0.03	-	-	0.14	0.14
180	1.38	1.32	1.36	1.30	0.28	0.27	0.16	0.16	0.65	0.63
175	2.31	2.20	2.26	2.17	0.58	0.57	0.33	0.32	1.33	1.28
170	3.68	3.51	3.62	3.46	1.24	1.19	0.81	0.78	2.21	2.11
160	8.10	7.49	8.03	7.43	3.35	3.21	2.56	2.46	5.36	5.08
150	18.58	16.34	18.46	16.24	7.70	7.20	5.95	5.64	13.10	11.75
140	37.89	32.86	37.53	32.57	20.35	17.69	15.16	13.60	30.29	26.27
130	99.37	84.11	89.26	76.93	48.56	41.70	38.83	33.84	67.83	58.35
120	>120.00	114.57	>120.00	113.94	>120.00	111.45	>120.00	109.25	>120.00	113.59

Table G-690. WTG MP3 foundation (13 m diameter, IHC S-6500, 6208 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location AY42 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.14	0.14	0.14	0.14	-	-	-	-	0.04	0.04
180	0.69	0.67	0.66	0.64	0.13	0.13	0.09	0.09	0.30	0.29
175	1.38	1.32	1.36	1.30	0.28	0.27	0.16	0.16	0.65	0.63
170	2.31	2.20	2.26	2.17	0.58	0.57	0.33	0.32	1.33	1.28
160	5.46	5.17	5.41	5.12	2.08	1.98	1.55	1.49	3.55	3.39
150	12.39	11.14	12.30	11.06	5.11	4.84	4.00	3.82	8.12	7.55
140	26.49	23.02	26.26	22.86	12.37	11.13	9.18	8.48	20.59	17.96
130	55.18	47.60	54.22	46.77	31.11	26.99	24.51	21.57	44.60	38.23
120	>120.00	112.91	>120.00	112.67	81.88	71.85	64.74	56.18	>120.00	110.81

Table G-691. WTG MP3 foundation (13 m diameter, IHC S-6500, 654 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.03	0.03	0.03	0.03	-	-	-	-	-	-
190	0.15	0.15	0.15	0.15	0.02	0.02	-	-	0.09	0.09
180	1.12	1.08	1.09	1.04	0.12	0.12	0.08	0.08	0.52	0.51
175	1.98	1.90	1.95	1.87	0.45	0.44	0.14	0.13	0.92	0.88
170	3.41	3.27	3.31	3.17	0.74	0.72	0.52	0.50	1.64	1.57
160	7.34	7.02	7.17	6.86	2.24	2.15	1.58	1.53	3.78	3.63
150	12.89	12.12	12.69	11.94	4.57	4.37	3.54	3.38	7.05	6.70
140	19.12	17.69	18.89	17.49	7.89	7.52	6.35	6.07	11.73	11.08
130	25.98	23.79	25.64	23.50	12.45	11.70	10.15	9.57	17.47	16.28
120	34.75	31.60	34.46	31.35	17.68	16.49	15.25	14.25	23.91	22.04

Table G-692. WTG MP3 foundation (13 m diameter, IHC S-6500, 654 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	-	-	-	-	0.02	0.02
180	0.52	0.51	0.52	0.50	0.05	0.05	0.02	0.02	0.13	0.13
175	0.97	0.93	0.94	0.89	0.11	0.11	0.06	0.06	0.48	0.47
170	1.84	1.77	1.80	1.72	0.28	0.28	0.13	0.13	0.86	0.82
160	4.79	4.58	4.68	4.48	1.19	1.15	0.75	0.73	2.42	2.31
150	9.29	8.85	9.14	8.71	2.95	2.83	2.30	2.21	4.96	4.74
140	15.26	14.27	15.05	14.07	5.74	5.49	4.61	4.40	8.70	8.30
130	21.77	20.07	21.53	19.86	9.42	8.93	7.86	7.50	13.91	13.11
120	29.90	27.39	29.62	27.12	14.36	13.46	12.36	11.62	20.03	18.54

Table G-693. WTG MP3 foundation (13 m diameter, IHC S-6500, 654 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.03	0.03	0.03	0.03	-	-	-	-	-	-
180	0.15	0.15	0.15	0.15	0.02	0.02	-	-	0.09	0.09
175	0.59	0.57	0.58	0.57	0.06	0.06	0.03	0.03	0.14	0.13
170	1.12	1.08	1.09	1.04	0.12	0.12	0.08	0.08	0.52	0.51
160	3.41	3.27	3.31	3.17	0.74	0.72	0.52	0.50	1.64	1.57
150	7.34	7.02	7.17	6.86	2.24	2.15	1.58	1.53	3.78	3.63
140	12.89	12.12	12.69	11.94	4.57	4.37	3.54	3.38	7.05	6.70
130	19.12	17.69	18.89	17.49	7.89	7.52	6.35	6.07	11.73	11.08
120	25.98	23.79	25.64	23.50	12.45	11.70	10.15	9.57	17.47	16.28

Table G-694. WTG MP3 foundation (13 m diameter, IHC S-6500, 654 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.09	0.09	0.09	0.09	-	-	-	-	0.03	0.03
175	0.15	0.15	0.15	0.15	0.02	0.02	-	-	0.09	0.09
170	0.59	0.57	0.58	0.57	0.06	0.06	0.03	0.03	0.14	0.13
160	1.98	1.90	1.95	1.87	0.45	0.44	0.14	0.13	0.92	0.88
150	5.16	4.96	5.04	4.84	1.41	1.35	0.93	0.89	2.56	2.46
140	9.74	9.26	9.59	9.12	3.18	3.06	2.48	2.38	5.26	5.03
130	15.88	14.82	15.67	14.63	6.07	5.79	4.85	4.65	9.14	8.70
120	22.45	20.68	22.22	20.47	9.75	9.28	8.25	7.85	14.47	13.62

Table G-695. WTG MP3 foundation (13 m diameter, IHC S-6500, 1307 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.05	0.05	0.05	0.05	-	-	-	-	-	-
190	0.46	0.45	0.46	0.44	0.03	0.03	-	-	0.10	0.09
180	1.29	1.25	1.28	1.23	0.16	0.16	0.10	0.10	0.60	0.58
175	2.19	2.09	2.15	2.06	0.55	0.54	0.24	0.24	1.18	1.14
170	3.44	3.27	3.37	3.21	0.82	0.79	0.59	0.57	1.93	1.85
160	7.02	6.69	6.85	6.53	2.57	2.47	1.87	1.80	4.24	4.03
150	12.42	11.66	12.16	11.41	4.98	4.71	4.00	3.82	7.33	6.84
140	18.29	16.98	18.01	16.74	8.17	7.63	6.79	6.36	11.37	10.55
130	24.62	22.75	24.37	22.52	12.26	11.40	10.23	9.48	16.22	15.16
120	33.37	30.42	32.99	30.14	16.66	15.55	14.72	13.74	22.41	20.64

Table G-696. WTG MP3 foundation (13 m diameter, IHC S-6500, 1307 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	-	-	-	-	0.03	0.03
180	0.58	0.57	0.58	0.56	0.06	0.06	0.03	0.03	0.16	0.16
175	1.15	1.11	1.13	1.08	0.14	0.14	0.09	0.09	0.57	0.55
170	1.94	1.87	1.92	1.84	0.52	0.50	0.18	0.18	0.98	0.82
160	4.70	4.46	4.61	4.38	1.46	1.41	0.85	0.82	2.71	2.60
150	8.97	8.50	8.77	8.32	3.45	3.29	2.62	2.52	5.37	5.06
140	14.68	13.73	14.43	13.50	6.15	5.78	5.01	4.75	8.80	8.23
130	20.83	19.25	20.55	19.00	9.50	8.90	8.17	7.63	13.27	12.42
120	28.47	26.06	28.05	25.67	13.92	13.02	12.21	11.33	18.58	17.26

Table G-697. WTG MP3 foundation (13 m diameter, IHC S-6500, 1307 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.05	0.05	0.05	0.05	-	-	-	-	-	-
180	0.46	0.45	0.46	0.44	0.03	0.03	-	-	0.10	0.09
175	0.62	0.60	0.61	0.59	0.08	0.08	0.04	0.04	0.43	0.42
170	1.29	1.25	1.28	1.23	0.16	0.16	0.10	0.10	0.60	0.58
160	3.44	3.27	3.37	3.21	0.82	0.79	0.59	0.57	1.93	1.85
150	7.02	6.69	6.85	6.53	2.57	2.47	1.87	1.80	4.24	4.03
140	12.42	11.66	12.16	11.41	4.98	4.71	4.00	3.82	7.33	6.84
130	18.29	16.98	18.01	16.74	8.17	7.63	6.79	6.36	11.37	10.55
120	24.62	22.75	24.37	22.52	12.26	11.40	10.23	9.48	16.22	15.16

Table G-698. WTG MP3 foundation (13 m diameter, IHC S-6500, 1307 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.11	0.11	0.11	0.11	-	-	-	-	0.04	0.04
175	0.46	0.45	0.46	0.44	0.03	0.03	-	-	0.10	0.09
170	0.62	0.60	0.61	0.59	0.08	0.08	0.04	0.04	0.43	0.42
160	2.19	2.09	2.15	2.06	0.55	0.54	0.24	0.24	1.18	1.14
150	5.02	4.78	4.95	4.70	1.59	1.53	1.15	1.10	2.91	2.78
140	9.43	8.93	9.24	8.76	3.71	3.54	2.79	2.67	5.69	5.35
130	15.26	14.26	15.01	14.03	6.45	6.06	5.29	4.99	9.15	8.57
120	21.48	19.84	21.20	19.59	9.83	9.21	8.51	7.94	13.73	12.85

Table G-699. WTG MP3 foundation (13 m diameter, IHC S-6500, 2614 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.09	0.09	0.09	0.09	-	-	-	-	0.03	0.03
190	0.56	0.54	0.55	0.54	0.06	0.06	0.03	0.03	0.17	0.16
180	1.84	1.77	1.81	1.74	0.51	0.50	0.19	0.19	0.97	0.93
175	2.87	2.76	2.84	2.73	0.75	0.73	0.56	0.54	1.70	1.63
170	4.26	4.05	4.20	4.01	1.49	1.43	0.99	0.96	2.66	2.55
160	7.61	7.24	7.40	7.04	3.42	3.27	2.64	2.53	5.02	4.76
150	12.97	12.21	12.71	11.97	5.77	5.45	4.87	4.62	7.93	7.41
140	18.76	17.39	18.46	17.13	8.75	8.17	7.47	6.97	12.09	11.31
130	24.87	22.98	24.61	22.73	12.90	12.08	11.06	10.22	16.96	15.78
120	33.45	30.54	33.06	30.24	17.46	16.20	15.44	14.39	22.93	21.08

Table G-700. WTG MP3 foundation (13 m diameter, IHC S-6500, 2614 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.02	0.02	0.02	0.02	-	-	-	-	-	-
190	0.14	0.14	0.14	0.13	0.02	0.02	-	-	0.06	0.06
180	0.91	0.87	0.90	0.86	0.13	0.13	0.07	0.07	0.52	0.50
175	1.64	1.58	1.62	1.56	0.48	0.47	0.16	0.16	0.75	0.73
170	2.67	2.57	2.65	2.54	0.63	0.61	0.53	0.51	1.54	1.49
160	5.40	5.12	5.35	5.05	2.19	2.09	1.54	1.48	3.58	3.42
150	9.46	8.99	9.25	8.80	4.36	4.15	3.51	3.35	6.08	5.73
140	15.20	14.22	14.91	13.97	6.83	6.41	5.81	5.50	9.31	8.72
130	21.22	19.60	20.92	19.34	10.00	9.38	8.78	8.19	13.94	13.04
120	28.72	26.35	28.29	25.95	14.63	13.66	12.87	12.03	19.25	17.81

Table G-701. WTG MP3 foundation (13 m diameter, IHC S-6500, 2614 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	-	-	-	-	0.03	0.03
180	0.56	0.54	0.55	0.54	0.06	0.06	0.03	0.03	0.17	0.16
175	1.02	0.98	1.00	0.96	0.15	0.14	0.09	0.09	0.55	0.54
170	1.84	1.77	1.81	1.74	0.51	0.50	0.19	0.19	0.97	0.93
160	4.26	4.05	4.20	4.01	1.49	1.43	0.99	0.96	2.66	2.55
150	7.61	7.24	7.40	7.04	3.42	3.27	2.64	2.53	5.02	4.76
140	12.97	12.21	12.71	11.97	5.77	5.45	4.87	4.62	7.93	7.41
130	18.76	17.39	18.46	17.13	8.75	8.17	7.47	6.97	12.09	11.31
120	24.87	22.98	24.61	22.73	12.90	12.08	11.06	10.22	16.96	15.78

Table G-702. WTG MP3 foundation (13 m diameter, IHC S-6500, 2614 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.03	0.03	0.03	0.03	-	-	-	-	-	-
180	0.16	0.16	0.16	0.15	0.02	0.02	-	-	0.09	0.09
175	0.56	0.54	0.55	0.54	0.06	0.06	0.03	0.03	0.17	0.16
170	1.02	0.98	1.00	0.96	0.15	0.14	0.09	0.09	0.55	0.54
160	2.87	2.76	2.84	2.73	0.75	0.73	0.56	0.54	1.70	1.63
150	5.71	5.40	5.64	5.33	2.40	2.31	1.68	1.62	3.83	3.66
140	9.87	9.39	9.69	9.20	4.58	4.36	3.73	3.57	6.34	5.97
130	15.77	14.74	15.48	14.49	7.11	6.66	6.08	5.73	9.65	9.04
120	21.85	20.18	21.55	19.90	10.58	9.74	9.11	8.49	14.43	13.47

Table G-703. WTG MP3 foundation (13 m diameter, IHC S-6500, 3912 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.11	0.11	0.11	0.11	-	-	-	-	0.05	0.05
190	0.68	0.66	0.67	0.65	0.10	0.10	0.06	0.06	0.48	0.47
180	2.33	2.23	2.31	2.20	0.61	0.59	0.50	0.48	1.37	1.32
175	3.48	3.31	3.42	3.26	1.24	1.19	0.65	0.63	2.16	2.07
170	4.87	4.60	4.81	4.55	1.97	1.88	1.38	1.33	3.17	3.00
160	8.69	8.29	8.49	8.09	4.05	3.84	3.15	3.00	5.70	5.35
150	14.42	13.50	14.17	13.26	6.53	6.11	5.52	5.19	9.07	8.49
140	20.54	18.97	20.28	18.72	9.86	9.22	8.56	7.95	13.81	12.87
130	27.92	25.54	27.56	25.18	14.52	13.51	12.73	11.85	19.40	17.91
120	36.14	32.77	35.84	32.50	19.76	18.20	17.35	16.02	25.87	23.60

Table G-704. WTG MP3 foundation (13 m diameter, IHC S-6500, 3912 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.05	0.05	0.04	0.04	-	-	-	-	-	-
190	0.44	0.44	0.43	0.42	0.03	0.03	-	-	0.10	0.10
180	1.32	1.27	1.30	1.26	0.18	0.18	0.11	0.11	0.61	0.60
175	2.15	2.04	2.12	2.02	0.58	0.56	0.47	0.46	1.26	1.22
170	3.17	3.01	3.13	2.97	1.11	1.07	0.62	0.60	1.99	1.92
160	6.11	5.79	6.03	5.69	2.70	2.59	2.01	1.92	4.17	3.97
150	10.81	10.15	10.48	9.86	4.95	4.68	4.12	3.92	6.87	6.43
140	16.80	15.62	16.52	15.38	7.84	7.28	6.58	6.16	10.75	9.97
130	23.14	21.31	22.88	21.07	11.88	11.02	9.87	9.22	15.87	14.77
120	31.30	28.66	30.98	28.39	16.45	15.24	14.43	13.43	21.93	20.15

Table G-705. WTG MP3 foundation (13 m diameter, IHC S-6500, 3912 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.11	0.11	0.11	0.11	-	-	-	-	0.05	0.05
180	0.68	0.66	0.67	0.65	0.10	0.10	0.06	0.06	0.48	0.47
175	1.44	1.39	1.43	1.37	0.45	0.44	0.13	0.13	0.65	0.63
170	2.33	2.23	2.31	2.20	0.61	0.59	0.50	0.48	1.37	1.32
160	4.87	4.60	4.81	4.55	1.97	1.88	1.38	1.33	3.17	3.00
150	8.69	8.29	8.49	8.09	4.05	3.84	3.15	3.00	5.70	5.35
140	14.42	13.50	14.17	13.26	6.53	6.11	5.52	5.19	9.07	8.49
130	20.54	18.97	20.28	18.72	9.86	9.22	8.56	7.95	13.81	12.87
120	27.92	25.54	27.56	25.18	14.52	13.51	12.73	11.85	19.40	17.91

Table G-706. WTG MP3 foundation (13 m diameter, IHC S-6500, 3912 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.05	0.05	0.05	0.05	-	-	-	-	-	-
180	0.48	0.47	0.48	0.47	0.04	0.04	0.02	0.02	0.12	0.12
175	0.68	0.66	0.67	0.65	0.10	0.10	0.06	0.06	0.48	0.47
170	1.44	1.39	1.43	1.37	0.45	0.44	0.13	0.13	0.65	0.63
160	3.48	3.31	3.42	3.26	1.24	1.19	0.65	0.63	2.16	2.07
150	6.48	6.14	6.39	6.02	2.86	2.74	2.16	2.07	4.40	4.19
140	11.47	10.79	11.19	10.51	5.19	4.91	4.34	4.13	7.20	6.71
130	17.41	16.17	17.15	15.93	8.17	7.60	6.86	6.42	11.31	10.53
120	23.76	21.89	23.50	21.65	12.33	11.47	10.34	9.53	16.42	15.27

Table G-707. WTG MP3 foundation (13 m diameter, IHC S-6500, 6208 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.20	0.20	0.18	0.18	0.03	0.03	-	-	0.09	0.09
190	1.21	1.16	1.19	1.15	0.17	0.17	0.10	0.10	0.60	0.58
180	3.11	2.99	3.04	2.91	1.07	1.03	0.63	0.61	1.91	1.83
175	4.61	4.39	4.54	4.33	1.74	1.67	1.29	1.24	2.83	2.71
170	6.34	5.99	6.17	5.84	2.64	2.54	1.98	1.89	4.03	3.83
160	11.58	10.74	11.27	10.43	4.81	4.59	4.06	3.87	6.65	6.24
150	17.61	16.32	17.32	16.07	7.44	6.96	6.38	6.02	10.07	9.42
140	23.89	22.06	23.63	21.80	11.19	10.32	9.42	8.80	15.34	14.27
130	32.48	29.67	32.10	29.37	15.83	14.73	13.90	12.94	21.24	19.53
120	41.35	37.16	40.94	36.83	21.24	19.51	18.67	17.32	28.65	26.22

Table G-708. WTG MP3 foundation (13 m diameter, IHC S-6500, 6208 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.07	0.07	0.07	0.07	-	-	-	-	0.02	0.02
190	0.57	0.55	0.56	0.54	0.07	0.07	0.04	0.04	0.16	0.16
180	1.78	1.72	1.76	1.70	0.55	0.54	0.18	0.18	1.02	0.98
175	2.86	2.74	2.81	2.70	0.77	0.74	0.60	0.58	1.71	1.64
170	4.27	4.08	4.19	4.01	1.54	1.49	1.17	1.12	2.66	2.55
160	8.19	7.69	7.95	7.47	3.49	3.33	2.73	2.62	4.96	4.72
150	14.02	13.04	13.75	12.78	5.77	5.47	4.92	4.68	7.99	7.48
140	20.08	18.57	19.80	18.31	8.75	8.19	7.48	7.01	12.36	11.48
130	27.28	24.91	26.82	24.50	13.07	12.18	11.19	10.31	17.55	16.29
120	35.84	32.56	35.51	32.25	17.82	16.54	15.70	14.63	23.67	21.80

Table G-709. WTG MP3 foundation (13 m diameter, IHC S-6500, 6208 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.03	0.03	0.03	0.03	-	-	-	-	-	-
190	0.20	0.20	0.18	0.18	0.03	0.03	-	-	0.09	0.09
180	1.21	1.16	1.19	1.15	0.17	0.17	0.10	0.10	0.60	0.58
175	2.02	1.93	1.99	1.91	0.58	0.56	0.47	0.46	1.17	1.13
170	3.11	2.99	3.04	2.91	1.07	1.03	0.63	0.61	1.91	1.83
160	6.34	5.99	6.17	5.84	2.64	2.54	1.98	1.89	4.03	3.83
150	11.58	10.74	11.27	10.43	4.81	4.59	4.06	3.87	6.65	6.24
140	17.61	16.32	17.32	16.07	7.44	6.96	6.38	6.02	10.07	9.42
130	23.89	22.06	23.63	21.80	11.19	10.32	9.42	8.80	15.34	14.27
120	32.48	29.67	32.10	29.37	15.83	14.73	13.90	12.94	21.24	19.53

Table G-710. WTG MP3 foundation (13 m diameter, IHC S-6500, 6208 kJ energy level, summer) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	-	-	-	-	0.03	0.03
180	0.60	0.58	0.59	0.57	0.09	0.09	0.05	0.05	0.18	0.18
175	1.21	1.16	1.19	1.15	0.17	0.17	0.10	0.10	0.60	0.58
170	2.02	1.93	1.99	1.91	0.58	0.56	0.47	0.46	1.17	1.13
160	4.61	4.39	4.54	4.33	1.74	1.67	1.29	1.24	2.83	2.71
150	8.71	8.16	8.47	7.95	3.73	3.56	2.89	2.77	5.25	4.97
140	14.61	13.58	14.34	13.32	6.05	5.71	5.15	4.89	8.30	7.78
130	20.72	19.14	20.44	18.88	9.07	8.49	7.85	7.33	12.86	11.96
120	28.26	25.85	27.83	25.45	13.49	12.59	11.71	10.81	18.14	16.82

Table G-711. WTG MP3 foundation (13 m diameter, IHC S-6500, 654 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.03	0.03	0.03	0.03	-	-	-	-	-	-
190	0.16	0.16	0.16	0.15	0.02	0.02	-	-	0.09	0.09
180	1.17	1.13	1.15	1.10	0.13	0.13	0.08	0.08	0.57	0.56
175	2.09	2.00	2.02	1.94	0.48	0.46	0.14	0.14	0.85	0.82
170	3.72	3.57	3.62	3.47	0.74	0.72	0.56	0.54	1.62	1.56
160	8.45	8.03	8.29	7.88	2.33	2.25	1.57	1.51	3.99	3.83
150	15.55	14.46	15.34	14.26	4.70	4.49	3.60	3.45	8.06	7.69
140	23.52	21.62	23.33	21.43	8.73	8.32	6.84	6.53	14.75	13.73
130	33.86	30.62	33.63	30.42	15.67	14.53	12.47	11.65	23.05	21.15
120	48.48	41.64	47.98	41.32	24.28	22.23	20.70	18.93	34.16	30.67

Table G-712. WTG MP3 foundation (13 m diameter, IHC S-6500, 654 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	-	-	-	-	0.02	0.02
180	0.57	0.56	0.57	0.55	0.05	0.05	0.02	0.02	0.13	0.13
175	1.03	0.99	1.00	0.96	0.11	0.11	0.06	0.06	0.52	0.50
170	1.88	1.80	1.83	1.75	0.29	0.28	0.13	0.13	0.81	0.78
160	5.30	5.09	5.17	4.96	1.25	1.17	0.77	0.74	2.49	2.39
150	10.98	10.29	10.74	10.05	2.97	2.86	2.38	2.28	5.36	5.15
140	18.68	17.22	18.46	17.03	6.06	5.81	4.68	4.49	10.13	9.54
130	27.57	25.05	27.26	24.76	11.04	10.37	8.64	8.23	17.95	16.56
120	38.54	34.38	38.26	34.15	19.01	17.47	15.52	14.38	27.19	24.59

Table G-713. WTG MP3 foundation (13 m diameter, IHC S-6500, 654 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.03	0.03	0.03	0.03	-	-	-	-	-	-
180	0.16	0.16	0.16	0.15	0.02	0.02	-	-	0.09	0.09
175	0.63	0.61	0.62	0.60	0.06	0.06	0.03	0.03	0.14	0.14
170	1.17	1.13	1.15	1.10	0.13	0.13	0.08	0.08	0.57	0.56
160	3.72	3.57	3.62	3.47	0.74	0.72	0.56	0.54	1.62	1.56
150	8.45	8.03	8.29	7.88	2.33	2.25	1.57	1.51	3.99	3.83
140	15.55	14.46	15.34	14.26	4.70	4.49	3.60	3.45	8.06	7.69
130	23.52	21.62	23.33	21.43	8.73	8.32	6.84	6.53	14.75	13.73
120	33.86	30.62	33.63	30.42	15.67	14.53	12.47	11.65	23.05	21.15

Table G-714. WTG MP3 foundation (13 m diameter, IHC S-6500, 654 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.10	0.10	0.10	0.09	-	-	-	-	0.03	0.03
175	0.16	0.16	0.16	0.15	0.02	0.02	-	-	0.09	0.09
170	0.63	0.61	0.62	0.60	0.06	0.06	0.03	0.03	0.14	0.14
160	2.09	2.00	2.02	1.94	0.48	0.46	0.14	0.14	0.85	0.82
150	5.80	5.56	5.65	5.42	1.46	1.40	0.84	0.81	2.64	2.53
140	11.81	11.07	11.57	10.84	3.30	3.16	2.52	2.42	5.80	5.56
130	19.47	17.93	19.26	17.74	6.49	6.21	5.00	4.79	10.89	10.22
120	28.74	26.14	28.47	25.87	11.86	11.13	9.09	8.66	18.79	17.30

Table G-715. WTG MP3 foundation (13 m diameter, IHC S-6500, 1307 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.05	0.05	0.05	0.05	-	-	-	-	-	-
190	0.45	0.44	0.44	0.44	0.03	0.03	-	-	0.10	0.10
180	1.31	1.26	1.29	1.25	0.16	0.16	0.10	0.10	0.60	0.58
175	2.24	2.14	2.21	2.11	0.56	0.54	0.19	0.18	1.18	1.13
170	3.54	3.39	3.44	3.29	0.81	0.78	0.60	0.58	1.94	1.86
160	7.71	7.33	7.50	7.15	2.56	2.45	1.87	1.80	4.27	4.07
150	14.10	13.18	13.85	12.95	4.96	4.72	4.00	3.82	7.24	6.84
140	21.61	19.90	21.35	19.66	8.08	7.61	6.68	6.30	12.73	11.89
130	31.38	28.58	31.07	28.32	13.49	12.53	10.85	10.03	20.18	18.52
120	43.48	38.30	43.10	37.99	21.22	19.36	17.79	16.26	30.32	27.49

Table G-716. WTG MP3 foundation (13 m diameter, IHC S-6500, 1307 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.10	0.09	0.09	0.09	-	-	-	-	0.03	0.03
180	0.59	0.57	0.58	0.57	0.06	0.06	0.03	0.03	0.16	0.15
175	1.16	1.12	1.14	1.10	0.14	0.14	0.09	0.09	0.57	0.56
170	1.98	1.90	1.95	1.88	0.52	0.50	0.17	0.17	0.85	0.82
160	4.98	4.78	4.85	4.65	1.45	1.40	0.85	0.82	2.73	2.62
150	9.80	9.29	9.62	9.12	3.44	3.28	2.60	2.50	5.36	5.08
140	16.97	15.75	16.72	15.52	6.08	5.74	4.99	4.74	8.99	8.54
130	24.70	22.74	24.46	22.53	9.71	9.13	8.08	7.60	15.47	14.34
120	35.70	32.09	35.38	31.83	16.28	14.98	13.42	12.43	23.53	21.59

Table G-717. WTG MP3 foundation (13 m diameter, IHC S-6500, 1307 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.05	0.05	0.05	0.05	-	-	-	-	-	-
180	0.45	0.44	0.44	0.44	0.03	0.03	-	-	0.10	0.10
175	0.62	0.60	0.62	0.60	0.08	0.08	0.04	0.04	0.17	0.17
170	1.31	1.26	1.29	1.25	0.16	0.16	0.10	0.10	0.60	0.58
160	3.54	3.39	3.44	3.29	0.81	0.78	0.60	0.58	1.94	1.86
150	7.71	7.33	7.50	7.15	2.56	2.45	1.87	1.80	4.27	4.07
140	14.10	13.18	13.85	12.95	4.96	4.72	4.00	3.82	7.24	6.84
130	21.61	19.90	21.35	19.66	8.08	7.61	6.68	6.30	12.73	11.89
120	31.38	28.58	31.07	28.32	13.49	12.53	10.85	10.03	20.18	18.52

Table G-718. WTG MP3 foundation (13 m diameter, IHC S-6500, 1307 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
180	0.11	0.11	0.11	0.11	-	-	-	-	0.04	0.04
175	0.45	0.44	0.44	0.44	0.03	0.03	-	-	0.10	0.10
170	0.62	0.60	0.62	0.60	0.08	0.08	0.04	0.04	0.17	0.17
160	2.24	2.14	2.21	2.11	0.56	0.54	0.19	0.18	1.18	1.13
150	5.38	5.16	5.24	5.03	1.59	1.53	1.11	1.08	2.91	2.80
140	10.48	9.82	10.17	9.58	3.69	3.53	2.77	2.67	5.66	5.36
130	17.74	16.42	17.47	16.18	6.36	6.00	5.26	4.98	9.45	8.97
120	25.77	23.52	25.37	23.22	10.22	9.52	8.46	7.97	16.21	15.00

Table G-719. WTG MP3 foundation (13 m diameter, IHC S-6500, 2614 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.09	0.09	0.09	0.09	-	-	-	-	0.03	0.03
190	0.57	0.55	0.56	0.54	0.06	0.06	0.03	0.03	0.16	0.16
180	1.87	1.80	1.84	1.77	0.51	0.50	0.18	0.17	0.81	0.77
175	2.89	2.78	2.86	2.75	0.73	0.70	0.57	0.55	1.68	1.61
170	4.29	4.10	4.24	4.04	1.46	1.41	0.83	0.80	2.63	2.53
160	8.62	8.20	8.41	8.01	3.37	3.22	2.60	2.49	4.99	4.74
150	15.40	14.30	15.15	14.07	5.71	5.41	4.79	4.57	8.45	7.98
140	23.31	21.39	23.08	21.17	9.37	8.81	7.71	7.28	14.74	13.63
130	34.52	30.93	34.22	30.70	15.87	14.59	13.07	12.12	23.00	21.00
120	50.26	42.93	49.80	42.59	25.28	22.91	21.83	19.71	35.68	31.65

Table G-720. WTG MP3 foundation (13 m diameter, IHC S-6500, 2614 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.02	0.02	0.02	0.02	-	-	-	-	-	-
190	0.14	0.14	0.14	0.13	0.02	0.02	-	-	0.06	0.06
180	0.82	0.79	0.80	0.77	0.13	0.13	0.07	0.07	0.52	0.50
175	1.66	1.60	1.63	1.57	0.48	0.47	0.16	0.16	0.73	0.70
170	2.69	2.59	2.66	2.55	0.64	0.62	0.53	0.51	1.52	1.46
160	5.68	5.45	5.54	5.32	2.14	2.06	1.50	1.44	3.55	3.40
150	11.13	10.40	10.83	10.12	4.30	4.10	3.44	3.29	6.03	5.72
140	18.41	16.97	18.17	16.74	6.89	6.53	5.76	5.45	10.52	9.76
130	27.58	24.89	27.22	24.56	11.79	10.92	9.38	8.82	17.80	16.34
120	39.68	35.09	39.36	34.82	19.20	17.49	15.93	14.62	27.56	24.71

Table G-721. WTG MP3 foundation (13 m diameter, IHC S-6500, 2614 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	-	-	-	-	0.03	0.03
180	0.57	0.55	0.56	0.54	0.06	0.06	0.03	0.03	0.16	0.16
175	0.96	0.92	0.94	0.90	0.15	0.14	0.09	0.09	0.56	0.54
170	1.87	1.80	1.84	1.77	0.51	0.50	0.18	0.17	0.81	0.77
160	4.29	4.10	4.24	4.04	1.46	1.41	0.83	0.80	2.63	2.53
150	8.62	8.20	8.41	8.01	3.37	3.22	2.60	2.49	4.99	4.74
140	15.40	14.30	15.15	14.07	5.71	5.41	4.79	4.57	8.45	7.98
130	23.31	21.39	23.08	21.17	9.37	8.81	7.71	7.28	14.74	13.63
120	34.52	30.93	34.22	30.70	15.87	14.59	13.07	12.12	23.00	21.00

Table G-722. WTG MP3 foundation (13 m diameter, IHC S-6500, 2614 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.03	0.03	0.03	0.03	-	-	-	-	-	-
180	0.16	0.16	0.15	0.15	0.02	0.02	-	-	0.09	0.09
175	0.57	0.55	0.56	0.54	0.06	0.06	0.03	0.03	0.16	0.16
170	0.96	0.92	0.94	0.90	0.15	0.14	0.09	0.09	0.56	0.54
160	2.89	2.78	2.86	2.75	0.73	0.70	0.57	0.55	1.68	1.61
150	6.11	5.85	5.95	5.70	2.35	2.26	1.64	1.58	3.80	3.64
140	11.90	11.12	11.62	10.86	4.53	4.31	3.68	3.52	6.37	6.05
130	19.20	17.66	18.95	17.44	7.25	6.86	5.98	5.68	11.29	10.46
120	28.84	26.06	28.52	25.75	12.45	11.54	9.79	9.20	18.62	17.06

Table G-723. WTG MP3 foundation (13 m diameter, IHC S-6500, 3921 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.11	0.11	0.11	0.11	-	-	-	-	0.05	0.05
190	0.70	0.68	0.69	0.67	0.10	0.10	0.05	0.05	0.46	0.45
180	2.33	2.23	2.30	2.20	0.61	0.60	0.48	0.46	1.34	1.29
175	3.45	3.31	3.40	3.25	1.18	1.14	0.66	0.64	2.12	2.02
170	5.11	4.90	4.98	4.77	1.91	1.83	1.35	1.30	3.08	2.93
160	10.24	9.57	9.96	9.40	3.97	3.79	3.00	2.88	5.71	5.40
150	18.01	16.59	17.79	16.39	6.52	6.15	5.46	5.17	10.04	9.41
140	27.34	24.65	27.00	24.36	11.40	10.52	9.05	8.49	17.70	16.26
130	39.86	35.26	39.58	35.02	19.06	17.37	15.76	14.44	27.58	24.75
120	90.20	78.85	75.58	64.56	35.34	31.75	31.68	28.63	46.60	38.95

Table G-724. WTG MP3 foundation (13 m diameter, IHC S-6500, 3921 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.04	0.04	0.04	0.04	-	-	-	-	-	-
190	0.20	0.20	0.19	0.19	0.03	0.03	-	-	0.10	0.10
180	1.30	1.26	1.29	1.24	0.18	0.17	0.11	0.11	0.62	0.60
175	2.15	2.04	2.11	2.02	0.58	0.56	0.23	0.23	1.22	1.18
170	3.17	3.02	3.13	2.98	1.05	1.02	0.63	0.61	1.96	1.88
160	6.81	6.51	6.65	6.35	2.66	2.55	1.95	1.87	4.14	3.95
150	13.40	12.48	13.17	12.26	4.91	4.65	4.05	3.85	7.07	6.69
140	21.32	19.56	21.10	19.35	8.11	7.62	6.56	6.20	13.09	12.15
130	32.10	29.00	31.86	28.78	14.18	13.08	11.40	10.51	21.13	19.32
120	46.48	40.34	46.10	40.05	23.00	20.87	19.44	17.59	32.84	29.46

Table G-725. WTG MP3 foundation (13 m diameter, IHC S-6500, 3921 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.11	0.11	0.11	0.11	-	-	-	-	0.05	0.05
180	0.70	0.68	0.69	0.67	0.10	0.10	0.05	0.05	0.46	0.45
175	1.45	1.39	1.43	1.37	0.21	0.20	0.13	0.13	0.66	0.64
170	2.33	2.23	2.30	2.20	0.61	0.60	0.48	0.46	1.34	1.29
160	5.11	4.90	4.98	4.77	1.91	1.83	1.35	1.30	3.08	2.93
150	10.24	9.57	9.96	9.40	3.97	3.79	3.00	2.88	5.71	5.40
140	18.01	16.59	17.79	16.39	6.52	6.15	5.46	5.17	10.04	9.41
130	27.34	24.65	27.00	24.36	11.40	10.52	9.05	8.49	17.70	16.26
120	39.86	35.26	39.58	35.02	19.06	17.37	15.76	14.44	27.58	24.75

Table G-726. WTG MP3 foundation (13 m diameter, IHC S-6500, 3921 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.05	0.05	0.05	0.05	-	-	-	-	-	-
180	0.47	0.46	0.47	0.46	0.03	0.03	0.02	0.02	0.12	0.12
175	0.70	0.68	0.69	0.67	0.10	0.10	0.05	0.05	0.46	0.45
170	1.45	1.39	1.43	1.37	0.21	0.20	0.13	0.13	0.66	0.64
160	3.45	3.31	3.40	3.25	1.18	1.14	0.66	0.64	2.12	2.02
150	7.35	6.99	7.15	6.81	2.81	2.70	2.09	2.00	4.36	4.15
140	14.14	13.14	13.91	12.93	5.13	4.87	4.24	4.05	7.54	7.13
130	22.19	20.34	21.96	20.14	8.55	8.05	6.89	6.51	13.80	12.79
120	33.30	29.98	33.02	29.76	14.91	13.74	12.12	11.19	22.04	20.14

Table G-727. WTG MP3 foundation (13 m diameter, IHC S-6500, 6208 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 0 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.20	0.20	0.18	0.18	0.03	0.03	-	-	0.09	0.09
190	1.19	1.14	1.16	1.11	0.18	0.17	0.10	0.10	0.62	0.60
180	3.15	3.02	3.06	2.94	0.85	0.82	0.65	0.64	1.87	1.80
175	4.78	4.57	4.65	4.45	1.67	1.60	1.22	1.17	2.80	2.69
170	6.82	6.47	6.63	6.30	2.61	2.51	1.97	1.90	4.03	3.84
160	12.94	12.08	12.70	11.83	4.87	4.63	4.10	3.91	6.72	6.34
150	19.87	18.33	19.60	18.09	8.09	7.58	6.87	6.46	12.08	11.23
140	45.34	41.62	39.22	35.91	19.23	17.38	17.54	15.97	35.81	32.47
130	>120.00	114.77	>120.00	114.56	>120.00	114.48	>120.00	114.36	>120.00	114.61
120	>120.00	114.65	>120.00	114.63	>120.00	114.70	>120.00	114.72	>120.00	114.67

Table G-728. WTG MP3 foundation (13 m diameter, IHC S-6500, 6208 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 6 dB attenuation.

Level (dB re 1µPa²)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.07	0.07	0.07	0.07	-	-	-	-	0.02	0.02
190	0.57	0.55	0.57	0.55	0.06	0.06	0.03	0.03	0.16	0.16
180	1.82	1.75	1.78	1.71	0.55	0.54	0.20	0.20	0.82	0.79
175	2.86	2.76	2.83	2.72	0.76	0.73	0.63	0.60	1.66	1.60
170	4.44	4.26	4.33	4.14	1.49	1.43	1.04	0.99	2.62	2.52
160	8.99	8.47	8.75	8.25	3.48	3.32	2.73	2.61	4.98	4.75
150	15.61	14.50	15.36	14.26	5.91	5.60	5.08	4.81	8.51	7.99
140	22.86	21.04	22.61	20.81	10.64	9.76	8.97	8.35	14.98	13.84
130	113.00	104.62	81.99	76.02	66.44	61.94	57.22	53.41	77.52	72.08
120	>120.00	114.78	>120.00	114.73	>120.00	114.79	>120.00	114.78	>120.00	114.79

Table G-729. WTG MP3 foundation (13 m diameter, IHC S-6500, 6208 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 10 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	0.03	0.03	0.03	0.03	-	-	-	-	-	-
190	0.20	0.20	0.18	0.18	0.03	0.03	-	-	0.09	0.09
180	1.19	1.14	1.16	1.11	0.18	0.17	0.10	0.10	0.62	0.60
175	2.07	1.98	2.02	1.94	0.60	0.58	0.24	0.23	1.08	1.03
170	3.15	3.02	3.06	2.94	0.85	0.82	0.65	0.64	1.87	1.80
160	6.82	6.47	6.63	6.30	2.61	2.51	1.97	1.90	4.03	3.84
150	12.94	12.08	12.70	11.83	4.87	4.63	4.10	3.91	6.72	6.34
140	19.87	18.33	19.60	18.09	8.09	7.58	6.87	6.46	12.08	11.23
130	45.34	41.62	39.22	35.91	19.23	17.38	17.54	15.97	35.81	32.47
120	>120.00	114.77	>120.00	114.56	>120.00	114.48	>120.00	114.36	>120.00	114.61

Table G-730. WTG MP3 foundation (13 m diameter, IHC S-6500, 6208 kJ energy level, winter) acoustic ranges (R_{max} and $R_{95\%}$ in km) for each of the flat and frequency weighted SPL (Finneran et al. 2017, NMFS 2018) at location BM28 for 15 dB attenuation.

Level (dB re 1µPa^2)	FLAT R_{max}	FLAT $R_{95\%}$	LFC R_{max}	LFC $R_{95\%}$	MFC R_{max}	MFC $R_{95\%}$	HFC R_{max}	HFC $R_{95\%}$	PPW R_{max}	PPW $R_{95\%}$
200	-	-	-	-	-	-	-	-	-	-
190	0.09	0.09	0.09	0.09	-	-	-	-	0.03	0.03
180	0.61	0.59	0.61	0.58	0.09	0.09	0.05	0.05	0.18	0.18
175	1.19	1.14	1.16	1.11	0.18	0.17	0.10	0.10	0.62	0.60
170	2.07	1.98	2.02	1.94	0.60	0.58	0.24	0.23	1.08	1.03
160	4.78	4.57	4.65	4.45	1.67	1.60	1.22	1.17	2.80	2.69
150	9.52	8.97	9.31	8.77	3.73	3.56	2.88	2.76	5.26	5.00
140	16.29	15.12	16.02	14.88	6.24	5.89	5.35	5.07	9.01	8.46
130	23.57	21.71	23.34	21.49	11.84	10.87	9.70	8.98	15.85	14.60
120	>120.00	114.10	97.40	90.34	79.31	73.96	68.88	64.25	91.97	85.79

G.5.2. Vibratory Pile Driving

Results for vibratory pile driving are presented in Appendix G.5.2.1 for WTG foundations. Tables are presented per modeling location, duration of vibratory piling, season, and broadband attenuation. A dash indicates that distances could not be estimated because thresholds were not reached.

Tables G-731 and G-732 show acoustic ranges to SPL isopleths for the **WTG jacket pin pile** modeled at location AY42, assuming 30 and 60 min of vibratory piling, respectively, summer and winter conditions, and different broadband attenuations. Tables G-733 and G-734 present similar results but modeled at location BM28. Acoustic ranges to SPL isopleths for **WTG MP1** considering 30 and 60 min of vibratory piling, summer and winter conditions, and different broadband attenuations are presented in Tables G-735 to G-736 for modeling location AY42 and in Tables G-737 to G-738 for modeling location BM28. Acoustic ranges to SPL isopleths for **WTG MP2** considering 30 and 60 min of vibratory piling, summer and winter conditions, and different broadband attenuations are presented in Tables G-739 to G-740 for modeling location AY42 and in Tables G-741 to G-742 for modeling location BM28. Acoustic ranges to SPL isopleths for **WTG MP3** considering 30 and 60 min of vibratory piling, summer and winter conditions, and different dB broadband attenuations are presented in Tables G-743 to G-744 for modeling location AY42 and in Tables G-745 to G-746 for modeling location BM28.

G.5.2.1. WTG Pin Pile and Monopiles

WTG jacket pin pile

Table G-731. Jacket pin pile (4.5 m diameter, TA-CV320) SPL acoustic ranges ($R_{95\%}$ in km) to behavior acoustic threshold criteria (Finneran et al. 2017, NMFS 2018) assuming 30 min of vibratory piling at location AY42 with various levels of attenuation for summer and winter conditions.

Threshold (dB re 1µPa^2)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
120	20.30	16.31	13.90	10.42	29.64	21.05	17.36	13.22
150	4.07	2.32	1.54	0.83	4.46	2.50	1.61	0.87
175	0.17	0.07	0.02	-	0.18	0.07	0.02	-

Table G-732. Jacket pin pile (4.5 m diameter, TA-CV320) SPL acoustic ranges ($R_{95\%}$ in km) to behavior acoustic threshold criteria (Finneran et al. 2017, NMFS 2018) assuming 60 min of vibratory piling at location AY42 with various levels of attenuation for summer and winter conditions.

Threshold (dB re 1µPa^2)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
120	17.39	13.53	10.78	8.16	28.53	18.68	14.52	9.82
150	3.43	2.04	1.45	0.75	3.80	2.22	1.54	0.83
175	0.13	0.06	0.02	-	0.15	0.06	0.03	-

Table G-733. Jacket pin pile (4.5 m diameter, TA-CV320) SPL acoustic ranges ($R_{95\%}$ in km) to behavior acoustic threshold criteria (Finneran et al. 2017, NMFS 2018) assuming 30 min of vibratory piling at location BM28 with various levels of attenuation for summer and winter conditions.

Threshold (dB re 1µPa²)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
120	20.74	17.28	15.07	11.99	22.29	18.51	16.04	12.94
150	4.60	2.57	1.64	0.86	4.70	2.54	1.64	0.87
175	0.10	0.05	0.02	-	0.10	0.05	0.02	-

Table G-734. Jacket pin pile (4.5 m diameter, TA-CV320) SPL acoustic ranges ($R_{95\%}$ in km) to behavior acoustic threshold criteria (Finneran et al. 2017, NMFS 2018) assuming 60 min of vibratory piling at location BM28 with various levels of attenuation for summer and winter conditions.

Threshold (dB re 1µPa²)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
120	19.64	16.30	14.13	10.79	21.95	17.84	15.32	12.00
150	4.06	2.16	1.39	0.76	4.16	2.20	1.42	0.76
175	0.09	0.05	-	-	0.09	0.05	-	-

WTG MP1

Table G-735. WTG MP1 foundation (13 m diameter, QU-CV640) SPL acoustic ranges ($R_{95\%}$ in km) to behavior acoustic threshold criteria (Finneran et al. 2017, NMFS 2018) assuming 30 min of vibratory piling at location AY42 with various levels of attenuation for summer and winter conditions.

Threshold (dB re 1µPa²)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
120	35.77	30.38	25.91	21.20	96.76	50.57	40.64	32.36
150	11.57	8.09	6.41	4.80	14.78	9.64	7.45	5.28
175	1.91	0.93	0.57	0.21	2.05	0.98	0.59	0.22

Table G-736. WTG MP1 foundation (13 m diameter, QU-CV640) SPL acoustic ranges ($R_{95\%}$ in km) to behavior acoustic threshold criteria (Finneran et al. 2017, NMFS 2018) assuming 60 min of vibratory piling at location AY42 with various levels of attenuation for summer and winter conditions.

Threshold (dB re 1µPa²)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
120	32.11	25.26	21.33	17.90	67.36	42.24	33.54	24.68
150	8.67	6.41	5.29	3.97	10.12	7.08	5.71	4.31
175	1.69	0.87	0.53	0.20	1.83	0.92	0.56	0.20

Table G-737. WTG MP1 foundation (13 m diameter, QU-CV640) SPL acoustic ranges ($R_{95\%}$ in km) to behavior acoustic threshold criteria (Finneran et al. 2017, NMFS 2018) assuming 30 min of vibratory piling at location BM28 with various levels of attenuation for summer and winter conditions.

Threshold (dB re 1µPa²)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
120	36.69	32.48	29.01	23.77	40.48	34.95	31.62	26.38
150	14.98	11.09	8.70	6.29	15.76	11.89	9.09	6.54
175	2.49	1.09	0.57	0.23	2.52	1.13	0.57	0.24

Table G-738. WTG MP1 foundation (13 m diameter, QU-CV640) SPL acoustic ranges ($R_{95\%}$ in km) to behavior acoustic threshold criteria (Finneran et al. 2017, NMFS 2018) assuming 60 min of vibratory piling at location BM28 with various levels of attenuation for summer and winter conditions.

Threshold (dB re 1µPa²)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
120	34.72	30.22	26.27	22.06	37.88	32.83	29.06	23.43
150	13.51	9.38	7.52	5.33	14.23	9.95	7.93	5.62
175	2.01	0.98	0.57	0.31	2.21	1.03	0.58	0.31

WTG MP2

Table G-739. WTG MP2 foundation (13 m diameter, QU-CV640) SPL acoustic ranges ($R_{95\%}$ in km) to behavior acoustic threshold criteria (Finneran et al. 2017, NMFS 2018) assuming 30 min of vibratory piling at location AY42 with various levels of attenuation for summer and winter conditions.

Threshold (dB re 1µPa²)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
120	38.63	33.30	29.66	23.92	77.49	51.74	43.55	35.83
150	13.83	9.61	7.80	5.82	17.73	12.85	9.36	6.71
175	2.67	1.49	0.89	0.45	2.86	1.58	0.92	0.46

Table G-740. WTG MP2 foundation (13 m diameter, QU-CV640) SPL acoustic ranges ($R_{95\%}$ in km) to behavior acoustic threshold criteria (Finneran et al. 2017, NMFS 2018) assuming 60 min of vibratory piling at location AY42 with various levels of attenuation for summer and winter conditions.

Threshold (dB re 1µPa²)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
120	40.71	34.54	30.73	24.82	113.20	80.72	53.39	39.31
150	13.89	9.57	7.72	5.68	17.50	12.30	8.92	6.28
175	2.46	1.33	0.82	0.41	2.62	1.43	0.86	0.43

Table G-741. WTG MP2 foundation (13 m diameter, QU-CV640) SPL acoustic ranges ($R_{95\%}$ in km) to behavior acoustic threshold criteria (Finneran et al. 2017, NMFS 2018) assuming 30 min of vibratory piling at location BM28 with various levels of attenuation for summer and winter conditions.

Threshold (dB re 1µPa²)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
120	37.58	33.31	30.13	25.00	41.35	35.71	32.51	27.64
150	15.60	11.92	9.20	6.75	16.46	12.73	9.63	7.11
175	2.70	1.23	0.65	0.27	2.75	1.26	0.65	0.27

Table G-742. WTG MP2 foundation (13 m diameter, QU-CV640) SPL acoustic ranges ($R_{95\%}$ in km) to behavior acoustic threshold criteria (Finneran et al. 2017, NMFS 2018) assuming 60 min of vibratory piling at location BM28 with various levels of attenuation for summer and winter conditions.

Threshold (dB re 1µPa²)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
120	35.74	31.44	27.71	22.84	39.08	33.84	30.33	24.77
150	14.29	10.17	8.13	5.84	14.96	10.87	8.50	6.03
175	2.28	1.02	0.55	0.30	2.27	1.00	0.59	0.30

WTG MP3

Table G-743. WTG MP3 foundation (13 m diameter, QU-CV640) SPL acoustic ranges ($R_{95\%}$ in km) to behavior acoustic threshold criteria (Finneran et al. 2017, NMFS 2018) assuming 30 min of vibratory piling at location AY42 with various levels of attenuation for summer and winter conditions.

Threshold (dB re 1µPa²)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
120	36.40	30.92	26.49	21.53	104.81	51.32	41.46	33.10
150	11.83	8.28	6.60	5.05	15.22	10.18	7.81	5.61
175	2.26	1.23	0.73	0.30	2.44	1.34	0.77	0.37

Table G-744. WTG MP3 foundation (13 m diameter, QU-CV640) SPL acoustic ranges ($R_{95\%}$ in km) to behavior acoustic threshold criteria (Finneran et al. 2017, NMFS 2018) assuming 60 min of vibratory piling at location AY42 with various levels of attenuation for summer and winter conditions.

Threshold (dB re 1µPa²)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
120	35.66	30.27	25.78	21.15	75.23	46.25	38.03	30.75
150	11.63	8.14	6.46	4.82	14.29	9.32	7.26	5.19
175	1.93	0.95	0.60	0.21	2.06	1.01	0.62	0.22

Table G-745. WTG MP3 foundation (13 m diameter, QU-CV640) SPL acoustic ranges ($R_{95\%}$ in km) to behavior acoustic threshold criteria (Finneran et al. 2017, NMFS 2018) assuming 30 min of vibratory piling at location BM28 with various levels of attenuation for summer and winter conditions.

Threshold (dB re 1µPa^2)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
120	37.68	33.42	30.25	25.16	44.79	37.11	33.54	28.74
150	15.70	12.08	9.31	6.92	16.76	13.06	10.01	7.40
175	2.86	1.47	0.81	0.42	3.08	1.54	0.90	0.40

Table G-746. WTG MP3 foundation (13 m diameter, QU-CV640) SPL acoustic ranges ($R_{95\%}$ in km) to behavior acoustic threshold criteria (Finneran et al. 2017, NMFS 2018) assuming 60 min of vibratory piling at location BM28 with various levels of attenuation for summer and winter conditions.

Threshold (dB re 1µPa^2)	Summer 0 dB	Summer 6 dB	Summer 10 dB	Summer 15 dB	Winter 0 dB	Winter 6 dB	Winter 10 dB	Winter 15 dB
120	36.20	31.98	28.36	23.23	43.24	35.85	32.25	26.84
150	14.73	10.86	8.63	6.36	15.64	11.82	9.06	6.58
175	2.79	1.50	0.89	0.40	2.77	1.49	0.89	0.39

Literature Cited in This Appendix

[FHWG] Fisheries Hydroacoustic Working Group. 2008. *Agreement in Principle for Interim Criteria for Injury to Fish from Pile Driving Activities*. 12 Jun 2008 edition. https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/ser/bio-fhwg-criteria-agree-a11y.pdf.

[NMFS] National Marine Fisheries Service (US) and [NOAA] National Oceanic and Atmospheric Administration (US). 2005. Endangered fish and wildlife: Notice of intent to prepare an environmental impact statement. *Federal Register* 70(7): 1871-1875. http://www.nmfs.noaa.gov/pr/pdfs/fr/fr70-1871.pdf.

[NMFS] National Marine Fisheries Service (US). 2018. *2018 Revision to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0): Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts*. US Department of Commerce, NOAA. NOAA Technical Memorandum NMFS-OPR-59. 167 p. https://media.fisheries.noaa.gov/dam-migration/tech_memo_acoustic_guidance_(20)_(pdf)_508.pdf.

Andersson, M.H., E. Dock-Åkerman, R. Ubral-Hedenberg, M.C. Öhman, and P. Sigray. 2007. Swimming behavior of roach (*Rutilus rutilus*) and three-spined stickleback (*Gasterosteus aculeatus*) in response to wind power noise and single-tone frequencies. *AMBIO* 36(8): 636-638. https://doi.org/10.1579/0044-7447(2007)36[636:SBORRR]2.0.CO;2.

Finneran, J.J., E.E. Henderson, D.S. Houser, K. Jenkins, S. Kotecki, and J.L. Mulsow. 2017. *Criteria and Thresholds for U.S. Navy Acoustic and Explosive Effects Analysis (Phase III)*. Technical report by Space and Naval Warfare Systems Center Pacific (SSC Pacific). 183 p. https://nwtteis.com/portals/nwtteis/files/technical_reports/Criteria_and_Thresholds_for_U.S._Navy_Acoustic_and_Explosive_Effects_Analysis_June2017.pdf.

McCauley, R.D., J. Fewtrell, A.J. Duncan, C. Jenner, M.-N. Jenner, J.D. Penrose, R.I.T. Prince, A. Adhitya, J. Murdoch, and K.A. McCabe. 2000. Marine seismic surveys: A study of environmental implications. *Australian Petroleum Production Exploration Association (APPEA) Journal* 40(1): 692-708. https://doi.org/10.1071/AJ99048.

Mueller-Blenkle, C., P.K. McGregor, A.B. Gill, M.H. Andersson, J. Metcalfe, V. Bendall, P. Sigray, D.T. Wood, and F. Thomsen. 2010. *Effects of Pile-driving Noise on the Behaviour of Marine Fish*. COWRIE Ref: Fish 06-08; Cefas Ref: C3371. 62 p. https://dspace.lib.cranfield.ac.uk/handle/1826/8235.

Popper, A.N., A.D. Hawkins, R.R. Fay, D.A. Mann, S. Bartol, T.J. Carlson, S. Coombs, W.T. Ellison, R.L. Gentry, et al. 2014. *Sound Exposure Guidelines for Fishes and Sea Turtles: A Technical Report prepared by ANSI-Accredited Standards Committee S3/SC1 and registered with ANSI*. ASA S3/SC1.4 TR-2014. SpringerBriefs in Oceanography. ASA Press and Springer. https://doi.org/10.1007/978-3-319-06659-2.

Purser, J. and A.N. Radford. 2011. Acoustic noise induces attention shifts and reduces foraging performance in three-spined sticklebacks (*Gasterosteus aculeatus*). *PLOS ONE* 6(2): e17478. https://doi.org/10.1371/journal.pone.0017478.

Stadler, J.H. and D.P. Woodbury. 2009. Assessing the effects to fishes from pile driving: Application of new hydroacoustic criteria. *Inter-Noise 2009: Innovations in Practical Noise Control*. 23-29 Aug 2009, Ottawa, Canada.

Wood, J.D., B.L. Southall, and D.J. Tollit. 2012. *PG&E offshore 3-D Seismic Survey Project Environmental Impact Report–Marine Mammal Technical Draft Report*. Report by SMRU Ltd. 121 p. https://www.coastal.ca.gov/energy/seismic/mm-technical-report-EIR.pdf.

Wysocki, L.E., S. Amoser, and F. Ladich. 2007. Diversity in ambient noise in European freshwater habitats: Noise levels, spectral profiles, and impact on fishes. *Journal of the Acoustical Society of America* 121(5): 2559-2566. https://doi.org/10.1121/1.2713661.

Appendix H. Animal Movement and Exposure Modeling

H.1. Animal Movement Parameters

H.1.1. Exposure Integration Time

The time period over which acoustic exposure (L_E) should be integrated, and the time interval over which maximal exposure (SPL) should be determined to calculate a counted "take" are not well defined. Both Southall et al. (2007) and the NMFS (2018) recommend a 24 h baseline accumulation period for SEL exposure assessment but state that there may be situations where this is not appropriate (e.g., a high-level source and confined population). Resetting the integration after 24 h can lead to overestimating the number of individual animals exposed because individuals can be counted multiple times during an operation that lasts more than a day. The type of animal movement modeling engine used in this study simulates realistic movement using swimming behavior collected over relatively short periods (hours to days) and does not include large-scale movement such as migratory circulation patterns. Therefore, the simulation time should be limited to a few weeks, the approximate scale of the collected data (e.g., marine mammal tag data) (Houser 2006) and over which animal densities will remain relatively constant. For this study, one-week simulations (i.e., 7 days) were modeled.

Ideally, a simulation area is large enough to encompass the entire range of a population so that any animal that might be present in the Project Area during sound-producing activities is included. However, there are limits to the simulation area, and computational overhead increases with area. For practical reasons, the simulation area is limited in this analysis to a maximum distance of 140 km from the OCS-A 0520 Lease Area (see figures in Section 3). In the simulation, every animat that reaches and leaves a border of the simulation area is replaced by another animat entering at an opposite border—e.g., an animat departing at the northern border of the simulation area is replaced by an animat entering the simulation area at the southern border at the same longitude. When this action places the animat in an inappropriate water depth, the animat is randomly placed on the map at a depth suited to its species definition. The exposures of all animats (including those leaving the simulation and those entering) are kept for analysis. This approach maintains a consistent animat density and allows for longer integration periods with finite simulation areas.

H.1.2. Aversion

Aversion is a common response of animals to sound, particularly at relatively high sound exposure levels (Ellison et al. 2012). As received sound level generally decreases with distance from a source, this aspect of natural behavior can strongly influence the estimated maximum sound levels an animal is predicted to receive and significantly affects the probability of more pronounced direct or subsequent behavioral effects. Additionally, animals are less likely to respond to sound levels distant from a source, even when those same levels elicit response at closer distances; both proximity and received levels are important factors in aversive responses (Dunlop et al. 2017). As a supplement to this modeling study, and for comparison purposes only, parameters determining aversion at specified sound levels were implemented for the North Atlantic right whale in recognition of its Endangered status, and for harbor porpoise, a species known to have a strong aversive response to loud sounds.

Aversion is implemented in JASMINE by defining a new behavioral state that an animat may transition to when a received level is exceeded. There are very few data on which aversive behavior can be based. Because of the dearth of information and to be consistent within this report, aversion probability is based on the Wood et al. (2012) step function that was used to estimate potential behavioral disruption. Animats will be assumed to avert by changing their headings by a fixed amount away from the source, with greater deflections associated with higher received levels (Tables H-1 and H-2). Aversion thresholds for marine mammals are based on the Wood et al. (2012) step function. Animats remain in the aversive state for a specified amount of time, depending on the level of exposure that triggered aversion (Tables H-1 and H-2). During this time, travel parameters are recalculated periodically as with normal behaviors. At the end of the aversion interval, the animat model parameters are changed (see Tables H-1 and H-2), depending on the current level of exposure and the animat either begins another aversion interval or transitions to a non-aversive behavior; while if aversion begins immediately, transition to a regular behavior occurs at the end of the next surface interval, consistent with regular behavior transitions.

Table H-1. North Atlantic right whales: Aversion parameters for the animal movement simulation based on Wood et al. (2012) behavioral response criteria.

Probability of aversion (%)	Received sound level $L_{p,w}$ (dB re 1 µPa^2)	Change in course (°)	Duration of aversion (s)
10	140	10	300
50	160	20	60
90	180	30	30

Table H-2. Harbor porpoises: Aversion parameters for the animal movement simulation based on Wood et al. (2012) behavioral response criteria.

Probability of aversion (%)	Received sound level $L_{p,w}$ (dB re 1 µPa^2)	Change in course (°)	Duration of aversion (s)
50	120	20	60
90	140	30	30

H.1.3. Simulation Area: Animat Seeding

The exposure criteria for impulsive sounds were used to determine the number of animats exceeding exposure thresholds. To generate statistically reliable probability density functions, all simulations were seeded with an animat density of 0.5 animats/km^2 over the entire simulation area. Some species have depth preference restrictions, e.g., sperm whales prefer water greater than 1000 m (Aoki et al. 2007), and the simulation location contained a relatively high portion of shallow water areas.

H.2. Animal Movement Modeling Supplemental Results

H.2.1. Exposure Estimates – Based on Construction Schedules

H.2.1.1. Marine Mammals

This section contains marine mammal mean exposure estimates for each of the proposed construction schedules described in Section 1.2.2. Exposure estimates are shown in Tables H-3 to H-10, assuming 0, 6, 10, and 15 dB of broadband attenuation. Each construction schedule includes a combination of foundations installed with vibratory setting of piles followed by impact pile driving and foundations installed with impact pile driving alone. See Section 2.4 of the main acoustic report for definitions of marine mammal threshold criteria.

Table H-3. Construction Schedule A, year 1 (all monopiles and impact only, 2 year schedule): Mean number of marine mammals predicted to receive sound levels above exposure criteria with sound attenuation. Construction schedule assumptions are summarized in Section 1.2.2.

Hearing group	Species	PTS $L_{E,w,24h}$ 0 dB	PTS $L_{E,w,24h}$ 6 dB	PTS $L_{E,w,24h}$ 10 dB	PTS $L_{E,w,24h}$ 15 dB	PTS L_{PK} 0 dB	PTS L_{PK} 6 dB	PTS L_{PK} 10 dB	PTS L_{PK} 15 dB	Behavior L_p [a] 0 dB	Behavior L_p [a] 6 dB	Behavior L_p [a] 10 dB	Behavior L_p [a] 15 dB	Behavior $L_{p,w}$ [b] 0 dB	Behavior $L_{p,w}$ [b] 6 dB	Behavior $L_{p,w}$ [b] 10 dB	Behavior $L_{p,w}$ [b] 15 dB
LF	Fin whale [c]	45.51	22.70	12.40	6.25	0.50	0.06	0.03	0.03	132.27	72.83	47.92	27.79	115.61	70.23	49.92	31.66
LF	Minke whale (migrating)	156.30	88.40	58.48	25.39	0.53	0.29	0.03	0.01	548.34	336.52	236.21	147.27	1450.84	1103.77	860.91	621.57
LF	Humpback whale	35.60	18.14	11.74	6.23	0.19	0.08	0.08	0.07	107.26	58.19	38.83	22.52	92.14	57.33	41.10	26.12
LF	North Atlantic right whale [c]	21.33	11.13	6.74	3.34	0.13	0.07	0.05	<0.01	84.17	40.95	27.41	16.16	86.37	42.53	29.84	18.46
LF	Sei whale [c] (migrating)	14.26	8.00	4.56	1.61	0.07	0.01	<0.01	<0.01	48.84	27.76	19.06	12.15	167.78	120.64	95.18	68.14
MF	Atlantic white-sided dolphin	0	0	0	0	0.30	0.16	0	0	1646.36	990.51	704.40	447.68	651.18	375.06	256.28	161.64
MF	Atlantic spotted dolphin	0	0	0	0	<0.01	0	0	0	66.62	35.95	27.94	19.26	18.74	11.40	7.54	5.12
MF	Common dolphin	0	0	0	0	0.54	0.31	0.25	0	13906.14	8444.51	6289.25	4232.19	4848.28	2989.96	2100.69	1408.66
MF	Bottlenose dolphin, offshore	0	0	0	0	0	0	0	0	760.44	437.30	299.52	181.12	267.88	151.48	105.17	63.58
MF	Risso's dolphin	0	0	0	0	0.11	0.09	0	0	113.41	61.37	43.89	28.84	39.46	23.08	16.04	10.27
MF	Long-finned pilot whale	0	0	0	0	0.04	0.04	0	0	91.03	53.74	38.05	23.96	35.21	20.39	13.74	8.79
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MF	Sperm whale [c]	0	0	0	0	<0.01	<0.01	0	0	34.97	20.00	13.21	7.87	11.39	6.50	4.44	2.68
HF	Harbor porpoise (sensitive)	14.17	2.11	0	0	74.88	36.29	17.50	2.74	1320.97	833.18	586.15	371.37	8935.66	7387.33	5514.34	2563.63
PW	Gray seal	21.58	6.39	2.21	0.58	0.29	0	0	0	1359.01	574.30	344.88	172.74	763.71	388.35	249.15	138.09
PW	Harbor seal	39.78	14.27	5.74	0.51	0.95	0.58	0.51	0.29	1156.47	662.35	455.44	271.06	837.45	473.98	321.63	191.69
PW	Harp seal	41.17	11.28	4.82	0.26	1.34	0.73	0.04	0	1726.96	790.57	494.60	273.66	949.40	503.67	337.12	200.36

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

Table H-4. Construction Schedule A, year 2 (all monopiles and impact only, 2 year schedule): The mean number of marine mammals predicted to receive sound levels above exposure criteria with sound attenuation. Construction schedule assumptions are summarized in Section 1.2.2.

Hearing group	Species	PTS $L_{E,w,24h}$ 0 dB	PTS $L_{E,w,24h}$ 6 dB	PTS $L_{E,w,24h}$ 10 dB	PTS $L_{E,w,24h}$ 15 dB	PTS L_{PK} 0 dB	PTS L_{PK} 6 dB	PTS L_{PK} 10 dB	PTS L_{PK} 15 dB	Behavior L_p [a] 0 dB	Behavior L_p [a] 6 dB	Behavior L_p [a] 10 dB	Behavior L_p [a] 15 dB	Behavior $L_{p,w}$ [b] 0 dB	Behavior $L_{p,w}$ [b] 6 dB	Behavior $L_{p,w}$ [b] 10 dB	Behavior $L_{p,w}$ [b] 15 dB
LF	Fin whale [c]	31.26	15.29	7.97	3.92	0.34	0.03	0.02	0.02	97.99	54.44	35.73	20.66	85.05	52.16	37.08	23.49
LF	Minke whale (migrating)	93.09	49.56	30.84	10.70	0.25	0.22	0	0	411.25	246.83	169.32	102.48	1166.78	843.81	655.32	470.02
LF	Humpback whale	23.05	11.24	7.17	3.62	0.09	0.05	0.05	0.05	78.11	41.71	27.78	15.90	66.75	41.22	29.52	18.69
LF	North Atlantic right whale [c]	12.75	6.10	3.32	1.42	0.08	0.04	0.04	0	63.46	30.46	20.46	11.88	62.55	31.85	22.50	13.81
LF	Sei whale [c] (migrating)	7.36	3.94	2.05	0.55	0.02	<0.01	0	0	32.57	18.04	12.31	7.70	113.77	78.23	60.70	44.75
MF	Atlantic white-sided dolphin	0	0	0	0	0.10	0.10	0	0	1142.19	668.27	473.42	293.63	402.32	235.33	157.85	100.29
MF	Atlantic spotted dolphin	0	0	0	0	0	0	0	0	45.34	28.32	21.70	14.74	14.34	8.67	5.62	3.85
MF	Common dolphin	0	0	0	0	0	0	0	0	10149.02	6204.28	4607.18	3086.65	3487.68	2114.69	1469.86	985.79
MF	Bottlenose dolphin, offshore	0	0	0	0	0	0	0	0	521.93	291.28	197.31	117.86	164.47	94.13	64.42	38.40
MF	Risso's dolphin	0	0	0	0	0.08	0.07	0	0	78.65	43.54	30.74	19.97	26.15	15.58	10.74	6.79
MF	Long-finned pilot whale	0	0	0	0	0.03	0.03	0	0	60.98	33.94	23.91	14.97	20.67	12.02	8.02	5.02
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MF	Sperm whale [c]	0	0	0	0	0	0	0	0	27.29	15.33	10.04	5.83	8.56	4.80	3.27	1.96
HF	Harbor porpoise (sensitive)	0	0	0	0	44.44	22.56	8.61	1.39	986.33	613.73	422.03	265.30	5392.43	2778.45	2069.04	1310.17
PW	Gray seal	9.33	1.75	0.15	0	0.15	0	0	0	1059.00	489.67	295.48	149.51	579.63	314.48	204.01	113.07
PW	Harbor seal	10.44	1.52	0.30	0	0.45	0.30	0.30	0.15	916.13	521.97	357.29	209.35	621.16	358.29	243.99	145.01
PW	Harp seal	14.93	0.83	0.62	0	0.62	0.62	0	0	1306.84	628.54	387.76	213.02	695.18	385.64	260.79	152.22

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

Table H-5. Construction Schedule B, year 1 (monopiles/ WTG jacket and impact only, 2 year schedule): Mean number of marine mammals predicted to receive sound levels above exposure criteria with sound attenuation. Construction schedule assumptions are summarized in Section 1.2.2.

Hearing group	Species	PTS $L_{E,w,24h}$ 0 dB	PTS $L_{E,w,24h}$ 6 dB	PTS $L_{E,w,24h}$ 10 dB	PTS $L_{E,w,24h}$ 15 dB	PTS L_{PK} 0 dB	PTS L_{PK} 6 dB	PTS L_{PK} 10 dB	PTS L_{PK} 15 dB	Behavior L_p [a] 0 dB	Behavior L_p [a] 6 dB	Behavior L_p [a] 10 dB	Behavior L_p [a] 15 dB	Behavior $L_{p,w}$ [b] 0 dB	Behavior $L_{p,w}$ [b] 6 dB	Behavior $L_{p,w}$ [b] 10 dB	Behavior $L_{p,w}$ [b] 15 dB
LF	Fin whale [c]	52.64	26.22	14.64	7.20	0.47	0.09	0.03	0.02	127.35	68.85	45.28	26.09	113.97	68.33	48.42	30.51
LF	Minke whale (migrating)	223.14	123.17	73.58	26.44	0.53	0.23	0.03	0.01	654.05	408.85	292.17	188.10	1663.08	1247.46	980.57	713.05
LF	Humpback whale	44.11	22.42	14.45	7.57	0.18	0.07	0.06	0.06	109.19	60.47	40.27	23.78	94.97	59.36	42.50	27.01
LF	North Atlantic right whale [c]	22.13	11.46	6.88	3.32	0.12	0.06	0.04	<0.01	83.49	41.04	27.39	16.16	85.57	42.57	29.81	18.42
LF	Sei whale [c] (migrating)	16.17	8.62	4.68	1.55	0.08	0.02	<0.01	<0.01	53.54	30.88	21.21	13.38	184.45	130.21	102.55	73.63
MF	Atlantic white-sided dolphin	0	0	0	0	0.26	0.13	0	0	1924.12	1185.85	855.86	543.28	801.16	470.03	326.86	203.96
MF	Atlantic spotted dolphin	0	0	0	0	<0.01	0	0	0	61.71	34.73	26.84	18.38	18.27	11.09	7.39	5.00
MF	Common dolphin	0	0	0	0	2.25	0.31	0.25	0	15963.94	10009.40	7498.27	4993.75	5932.95	3699.25	2629.59	1722.92
MF	Bottlenose dolphin, offshore	0	0	0	0	0	0	0	0	937.48	552.23	375.86	222.00	353.31	203.18	140.49	84.81
MF	Risso's dolphin	0	0	0	0	0.09	0.08	0	0	127.25	73.95	53.27	35.04	48.20	28.69	20.21	12.80
MF	Long-finned pilot whale	0	0	0	0	0.03	0.03	0	0	101.65	62.25	44.63	28.74	41.31	24.47	16.95	10.71
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MF	Sperm whale [c]	0	0	0	0	<0.01	<0.01	0	0	37.56	22.00	14.91	9.05	14.03	8.10	5.58	3.35
HF	Harbor porpoise (sensitive)	14.17	2.11	0	0	76.83	34.23	16.02	2.41	1319.60	835.51	590.59	376.97	8926.28	7227.72	5404.35	2571.19
PW	Gray seal	21.69	6.34	2.28	0.58	0.28	0	0	0	1235.35	552.92	330.37	164.32	750.99	381.67	244.27	135.06
PW	Harbor seal	39.96	13.93	5.69	0.51	0.81	0.49	0.41	0.24	1145.01	656.42	450.60	268.15	833.00	472.23	320.42	191.13
PW	Harp seal	41.98	11.20	4.78	0.26	1.43	0.69	0.04	0	1599.08	780.53	489.11	271.97	946.82	505.19	338.18	201.09

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

Table H-6. Construction Schedule B, year 2 (monopiles/ WTG jacket and impact only, 2 year schedule): The mean number of marine mammals predicted to receive sound levels above exposure criteria with sound attenuation. Construction schedule assumptions are summarized in Section 1.2.2.

Hearing group	Species	PTS $L_{E,w,24h}$ 0 dB	PTS $L_{E,w,24h}$ 6 dB	PTS $L_{E,w,24h}$ 10 dB	PTS $L_{E,w,24h}$ 15 dB	PTS L_{PK} 0 dB	PTS L_{PK} 6 dB	PTS L_{PK} 10 dB	PTS L_{PK} 15 dB	Behavior L_p [a] 0 dB	Behavior L_p [a] 6 dB	Behavior L_p [a] 10 dB	Behavior L_p [a] 15 dB	Behavior $L_{p,w}$ [b] 0 dB	Behavior $L_{p,w}$ [b] 6 dB	Behavior $L_{p,w}$ [b] 10 dB	Behavior $L_{p,w}$ [b] 15 dB
LF	Fin whale [c]	37.54	18.50	10.06	4.82	0.33	0.05	0.01	0.01	95.66	52.44	34.47	19.83	84.00	51.53	36.56	23.05
LF	Minke whale (migrating)	149.93	78.95	44.83	12.96	0.25	0.15	0	0	504.07	311.62	219.58	138.90	1323.15	972.77	762.84	552.68
LF	Humpback whale	29.89	14.74	9.37	4.74	0.09	0.04	0.04	0.04	80.96	44.12	29.31	17.15	69.90	43.26	30.97	19.66
LF	North Atlantic right whale [c]	15.06	7.24	3.99	1.71	0.08	0.04	0.04	0	68.61	32.88	21.78	12.67	70.71	34.59	24.16	14.81
LF	Sei whale [c] (migrating)	9.53	4.93	2.50	0.65	0.03	<0.01	<0.01	0	37.23	21.25	14.68	9.33	129.39	92.06	72.84	52.84
MF	Atlantic white-sided dolphin	0	0	0	0	0.09	0.09	0	0	1348.22	815.80	583.95	367.31	538.97	309.54	211.76	129.88
MF	Atlantic spotted dolphin	0	0	0	0	<0.01	0	0	0	48.62	27.70	21.34	14.55	14.36	8.69	5.74	3.88
MF	Common dolphin	0	0	0	0	1.23	0	0	0	11400.82	7200.57	5384.86	3582.32	4133.18	2580.89	1830.82	1196.65
MF	Bottlenose dolphin, offshore	0	0	0	0	0	0	0	0	645.21	377.89	255.05	149.12	235.68	132.58	90.67	54.32
MF	Risso's dolphin	0	0	0	0	0.07	0.06	0	0	93.16	53.48	38.18	24.96	34.47	20.20	14.05	8.80
MF	Long-finned pilot whale	0	0	0	0	0.02	0.02	0	0	69.15	41.02	29.04	18.46	27.01	15.53	10.57	6.54
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MF	Sperm whale [c]	0	0	0	0	0	0	0	0	30.54	17.73	11.95	7.20	11.02	6.31	4.34	2.59
HF	Harbor porpoise (sensitive)	0	0	0	0	52.20	22.90	9.28	1.69	1054.77	660.04	460.14	290.12	7291.04	5528.78	4080.37	1940.59
PW	Gray seal	10.26	1.62	0.21	0	0.15	0	0	0	1010.85	467.31	279.79	139.50	615.31	314.27	201.34	111.20
PW	Harbor seal	13.06	1.81	0.23	0	0.36	0.24	0.24	0.12	919.43	520.90	354.80	208.63	662.37	371.07	249.84	147.29
PW	Harp seal	18.75	1.23	0.55	0	0.64	0.55	0	0	1275.46	631.27	391.00	214.76	753.67	399.13	266.12	156.20

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

Table H-7. Construction Schedule C, year 1 (all monopiles with 10 vibratory + impact installations in the first year, 2 year schedule): Mean number of marine mammals predicted to receive sound levels above exposure criteria with sound attenuation. Construction schedule assumptions are summarized in Section 1.2.2.

Hearing group	Species	PTS $L_{E,w,24h}$ 0 dB	PTS $L_{E,w,24h}$ 6 dB	PTS $L_{E,w,24h}$ 10 dB	PTS $L_{E,w,24h}$ 15 dB	PTS L_{PK} 0 dB	PTS L_{PK} 6 dB	PTS L_{PK} 10 dB	PTS L_{PK} 15 dB	Behavior L_p [a] 0 dB	Behavior L_p [a] 6 dB	Behavior L_p [a] 10 dB	Behavior L_p [a] 15 dB	Behavior $L_{p,w}$ [b] 0 dB	Behavior $L_{p,w}$ [b] 6 dB	Behavior $L_{p,w}$ [b] 10 dB	Behavior $L_{p,w}$ [b] 15 dB
LF	Fin whale [c]	46.41	23.21	12.80	6.43	0.50	0.06	0.03	0.03	248.40	165.98	126.91	90.85	115.61	70.23	49.92	31.66
LF	Minke whale (migrating)	160.80	90.93	59.82	25.98	0.53	0.29	0.03	0.01	849.89	580.28	443.84	351.27	1450.26	1103.64	860.80	621.49
LF	Humpback whale	36.47	18.67	12.00	6.38	0.19	0.08	0.08	0.07	202.43	134.40	103.40	69.75	92.14	57.33	41.10	26.12
LF	North Atlantic right whale [c]	21.15	11.02	6.66	3.29	0.13	0.06	0.05	<0.01	114.00	64.32	46.62	25.16	85.72	42.18	29.57	18.27
LF	Sei whale [c] (migrating)	14.24	7.97	4.52	1.60	0.07	0.01	<0.01	<0.01	65.46	40.98	30.02	19.57	166.80	119.95	94.63	67.69
MF	Atlantic white-sided dolphin	0	0	0	0	0.30	0.16	0	0	2746.37	1860.96	1439.47	925.86	650.96	374.90	256.16	161.56
MF	Atlantic spotted dolphin	0	0	0	0	<0.01	0	0	0	100.39	61.20	48.05	23.85	17.95	10.91	7.21	4.90
MF	Common dolphin	0	0	0	0	0.54	0.31	0.25	0	20442.38	13729.26	10705.21	6601.58	4824.87	2973.84	2087.86	1400.63
MF	Bottlenose dolphin, offshore	0	0	0	0	0	0	0	0	1212.47	791.44	591.18	330.91	267.88	151.48	105.17	63.58
MF	Risso's dolphin	0	0	0	0	0.11	0.09	0	0	389.92	277.18	223.67	66.54	39.38	23.02	15.99	10.24
MF	Long-finned pilot whale	0	0	0	0	0.04	0.04	0	0	163.97	111.87	83.28	49.77	35.21	20.39	13.74	8.79
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MF	Sperm whale [c]	0	0	0	0	<0.01	<0.01	0	0	70.52	48.68	37.50	26.67	11.39	6.50	4.44	2.68
HF	Harbor porpoise (sensitive)	14.17	2.11	0	0	73.40	35.79	17.13	2.64	1703.21	1100.81	806.82	540.55	8919.38	7370.66	5500.80	2554.23
PW	Gray seal	21.42	6.26	2.19	0.58	0.27	0	0	0	3037.91	1917.00	1459.26	528.01	761.71	387.09	248.18	137.56
PW	Harbor seal	39.22	14.12	5.72	0.51	0.89	0.53	0.46	0.27	2862.19	1934.31	872.24	579.73	833.46	471.30	319.37	190.32
PW	Harp seal	40.59	11.23	4.82	0.26	1.34	0.73	0.04	0	3563.53	2275.30	1733.56	664.99	944.42	500.66	334.99	198.85

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

Table H-8. Construction Schedule C, year 2 (all monopiles with 10 vibratory + impact installations in the first year, 2 year schedule): The mean number of marine mammals predicted to receive sound levels above exposure criteria with sound attenuation. Construction schedule assumptions are summarized in Section 1.2.2.

Hearing group	Species	PTS $L_{E,w,24h}$ 0 dB	PTS $L_{E,w,24h}$ 6 dB	PTS $L_{E,w,24h}$ 10 dB	PTS $L_{E,w,24h}$ 15 dB	PTS L_{PK} 0 dB	PTS L_{PK} 6 dB	PTS L_{PK} 10 dB	PTS L_{PK} 15 dB	Behavior L_p [a] 0 dB	Behavior L_p [a] 6 dB	Behavior L_p [a] 10 dB	Behavior L_p [a] 15 dB	Behavior $L_{p,w}$ [b] 0 dB	Behavior $L_{p,w}$ [b] 6 dB	Behavior $L_{p,w}$ [b] 10 dB	Behavior $L_{p,w}$ [b] 15 dB
LF	Fin whale [c]	32.25	15.87	8.38	4.11	0.35	0.03	0.02	0.02	99.07	55.21	36.29	21.01	85.07	52.81	37.57	23.84
LF	Minke whale (migrating)	101.61	53.81	33.91	12.19	0.25	0.20	0	0	427.98	259.33	179.11	109.38	1169.99	869.44	676.79	486.91
LF	Humpback whale	23.72	11.64	7.41	3.77	0.11	0.05	0.05	0.05	79.52	42.44	28.25	16.22	67.83	41.77	29.94	19.00
LF	North Atlantic right whale [c]	14.90	7.19	3.98	1.77	0.09	0.05	0.04	0	71.02	33.80	22.40	13.00	73.88	35.63	24.87	15.24
LF	Sei whale [c] (migrating)	8.39	4.60	2.46	0.71	0.03	<0.01	0	0	35.02	19.73	13.51	8.62	119.47	88.95	70.76	50.98
MF	Atlantic white-sided dolphin	0	0	0	0	0.12	0.12	0	0	1150.69	676.20	474.99	298.59	436.73	242.18	161.44	99.42
MF	Atlantic spotted dolphin	0	0	0	0	0	0	0	0	54.33	29.95	23.17	15.89	15.39	9.32	6.12	4.16
MF	Common dolphin	0	0	0	0	0	0	0	0	10372.68	6330.15	4704.07	3159.94	3507.98	2158.23	1508.99	1010.29
MF	Bottlenose dolphin, offshore	0	0	0	0	0	0	0	0	518.61	294.66	199.76	119.50	175.94	95.44	65.11	38.94
MF	Risso’s dolphin	0	0	0	0	0.08	0.07	0	0	83.31	44.44	31.44	20.51	28.50	16.21	11.06	6.99
MF	Long-finned pilot whale	0	0	0	0	0.03	0.03	0	0	61.65	35.10	24.39	15.04	23.03	12.72	8.31	5.19
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MF	Sperm whale [c]	0	0	0	0	0	0	0	0	28.46	16.13	10.61	6.27	9.03	5.10	3.48	2.09
HF	Harbor porpoise (sensitive)	0	0	0	0	51.23	24.58	10.45	1.94	1068.56	664.83	461.64	288.64	7681.87	6242.77	4595.40	2062.16
PW	Gray seal	10.78	1.75	0.16	0	0.16	0	0	0	1109.90	512.39	308.40	154.71	666.23	338.20	216.81	120.33
PW	Harbor seal	13.50	2.14	0.30	0	0.47	0.32	0.32	0.16	984.46	558.44	381.14	223.65	708.62	395.75	265.96	156.78
PW	Harp seal	19.08	1.38	0.62	0	0.62	0.62	0	0	1378.97	677.51	419.31	229.64	804.41	421.70	280.90	165.02

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

Table H-9. Construction Schedule D, year 1 (monopiles/ WTG jacket with 10 vibratory + impact monopile installations in the first year, 2 year schedule): Mean number of marine mammals predicted to receive sound levels above exposure criteria with sound attenuation. Construction schedule assumptions are summarized in Section 1.2.2.

Hearing group	Species	PTS $L_{E,w,24h}$ 0 dB	PTS $L_{E,w,24h}$ 6 dB	PTS $L_{E,w,24h}$ 10 dB	PTS $L_{E,w,24h}$ 15 dB	PTS L_{PK} 0 dB	PTS L_{PK} 6 dB	PTS L_{PK} 10 dB	PTS L_{PK} 15 dB	Behavior L_p [a] 0 dB	Behavior L_p [a] 6 dB	Behavior L_p [a] 10 dB	Behavior L_p [a] 15 dB	Behavior $L_{p,w}$ [b] 0 dB	Behavior $L_{p,w}$ [b] 6 dB	Behavior $L_{p,w}$ [b] 10 dB	Behavior $L_{p,w}$ [b] 15 dB
LF	Fin whale [c]	53.04	26.44	14.83	7.28	0.47	0.09	0.03	0.02	242.96	161.62	123.99	88.98	113.56	68.02	48.18	30.34
LF	Minke whale (migrating)	227.10	125.43	74.73	26.95	0.53	0.23	0.03	0.01	955.60	651.82	499.18	391.66	1662.49	1247.33	980.46	712.97
LF	Humpback whale	44.83	22.86	14.65	7.68	0.17	0.07	0.06	0.06	204.12	136.53	104.74	70.94	94.78	59.25	42.41	26.95
LF	North Atlantic right whale [c]	21.78	11.28	6.78	3.26	0.12	0.06	0.04	<0.01	112.43	64.00	46.39	25.06	83.33	41.72	29.26	18.07
LF	Sei whale [c] (migrating)	16.09	8.56	4.64	1.53	0.07	0.01	<0.01	<0.01	69.81	43.89	32.07	20.76	182.85	127.66	100.30	72.17
MF	Atlantic white-sided dolphin	0	0	0	0	0.26	0.13	0	0	3022.15	2055.47	1590.93	1021.46	795.87	468.98	326.31	203.88
MF	Atlantic spotted dolphin	0	0	0	0	<0.01	0	0	0	95.48	59.98	46.94	22.97	17.47	10.60	7.05	4.78
MF	Common dolphin	0	0	0	0	2.25	0.31	0.25	0	22351.02	15294.14	11914.22	7363.15	5853.85	3674.50	2616.76	1714.88
MF	Bottlenose dolphin, offshore	0	0	0	0	0	0	0	0	1389.00	906.75	667.80	371.06	351.73	203.10	140.11	84.57
MF	Risso's dolphin	0	0	0	0	0.09	0.08	0	0	403.76	289.76	233.05	72.73	47.84	28.59	20.16	12.77
MF	Long-finned pilot whale	0	0	0	0	0.03	0.03	0	0	174.49	120.20	89.79	54.54	40.95	24.37	16.90	10.68
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MF	Sperm whale [c]	0	0	0	0	<0.01	<0.01	0	0	72.49	50.22	38.88	27.60	13.77	7.93	5.46	3.28
HF	Harbor porpoise (sensitive)	14.17	2.11	0	0	75.25	33.68	15.62	2.31	1695.21	1100.42	809.23	545.25	8574.06	6691.59	5013.22	2453.74
PW	Gray seal	21.32	6.14	2.27	0.58	0.26	0	0	0	2908.66	1885.54	1438.69	516.71	728.45	372.77	238.81	131.92
PW	Harbor seal	39.22	13.76	5.64	0.51	0.74	0.44	0.36	0.22	2829.82	1916.65	859.56	572.61	808.99	459.90	312.34	186.45
PW	Harp seal	41.07	11.09	4.77	0.26	1.41	0.68	0.04	0	3429.73	2251.44	1719.64	658.64	918.25	492.72	330.27	196.14

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

Table H-10. Construction Schedule D, year 2 (monopiles/ WTG jacket with 10 vibratory + impact monopile installations in the first year, 2 year schedule): The mean number of marine mammals predicted to receive sound levels above exposure criteria with sound attenuation. Construction schedule assumptions are summarized in Section 1.2.2.

Hearing group	Species	PTS $L_{E,w,24h}$ 0 dB	PTS $L_{E,w,24h}$ 6 dB	PTS $L_{E,w,24h}$ 10 dB	PTS $L_{E,w,24h}$ 15 dB	PTS L_{PK} 0 dB	PTS L_{PK} 6 dB	PTS L_{PK} 10 dB	PTS L_{PK} 15 dB	Behavior L_p [a] 0 dB	Behavior L_p [a] 6 dB	Behavior L_p [a] 10 dB	Behavior L_p [a] 15 dB	Behavior $L_{p,w}$ [b] 0 dB	Behavior $L_{p,w}$ [b] 6 dB	Behavior $L_{p,w}$ [b] 10 dB	Behavior $L_{p,w}$ [b] 15 dB
LF	Fin whale [c]	37.54	18.50	10.06	4.82	0.33	0.05	0.01	0.01	95.66	52.44	34.47	19.83	84.00	51.53	36.56	23.05
LF	Minke whale (migrating)	149.93	78.95	44.83	12.96	0.25	0.15	0	0	504.07	311.62	219.58	138.90	1323.15	972.77	762.84	552.68
LF	Humpback whale	29.89	14.74	9.37	4.74	0.09	0.04	0.04	0.04	80.96	44.12	29.31	17.15	69.90	43.26	30.97	19.66
LF	North Atlantic right whale [c]	15.06	7.24	3.99	1.71	0.08	0.04	0.04	0	68.61	32.88	21.78	12.67	70.71	34.59	24.16	14.81
LF	Sei whale [c] (migrating)	9.53	4.93	2.50	0.65	0.03	<0.01	<0.01	0	37.23	21.25	14.68	9.33	129.39	92.06	72.84	52.84
MF	Atlantic white-sided dolphin	0	0	0	0	0.09	0.09	0	0	1348.22	815.80	583.95	367.31	538.97	309.54	211.76	129.88
MF	Atlantic spotted dolphin	0	0	0	0	<0.01	0	0	0	48.62	27.70	21.34	14.55	14.36	8.69	5.74	3.88
MF	Common dolphin	0	0	0	0	1.23	0	0	0	11400.82	7200.57	5384.86	3582.32	4133.18	2580.89	1830.82	1196.65
MF	Bottlenose dolphin, offshore	0	0	0	0	0	0	0	0	645.21	377.89	255.05	149.12	235.68	132.58	90.67	54.32
MF	Risso’s dolphin	0	0	0	0	0.07	0.06	0	0	93.16	53.48	38.18	24.96	34.47	20.20	14.05	8.80
MF	Long-finned pilot whale	0	0	0	0	0.02	0.02	0	0	69.15	41.02	29.04	18.46	27.01	15.53	10.57	6.54
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MF	Sperm whale [c]	0	0	0	0	0	0	0	0	30.54	17.73	11.95	7.20	11.02	6.31	4.34	2.59
HF	Harbor porpoise (sensitive)	0	0	0	0	52.20	22.90	9.28	1.69	1054.77	660.04	460.14	290.12	7291.04	5528.78	4080.37	1940.59
PW	Gray seal	10.26	1.62	0.21	0	0.15	0	0	0	1010.85	467.31	279.79	139.50	615.31	314.27	201.34	111.20
PW	Harbor seal	13.06	1.81	0.23	0	0.36	0.24	0.24	0.12	919.43	520.90	354.80	208.63	662.37	371.07	249.84	147.29
PW	Harp seal	18.75	1.23	0.55	0	0.64	0.55	0	0	1275.46	631.27	391.00	214.76	753.67	399.13	266.12	156.20

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

H.2.1.2. Sea Turtles

This section contains sea turtle mean exposure estimates predicted by the animal movement modeling using the proposed construction schedules described in Section 1.2.2. Exposure estimates are shown in Tables H-11 to H-18, assuming 0, 6, 10, and 15 dB of broadband attenuation. Each construction schedule includes a combination of foundations installed with vibratory setting of piles followed by impact pile driving and foundations installed with impact pile driving alone. See Section 2.4 of the main acoustic report for definitions of sea turtle threshold criteria.

Table H-11. Construction Schedule A, year 1 (all monopiles and impact only, 2 year schedule): The mean number of sea turtles predicted to receive sound levels above exposure criteria with sound attenuation. Construction schedule assumptions are summarized in Section 1.2.2.

Species	Injury $L_{E,w,24}$ 0 dB	Injury $L_{E,w,24}$ 6 dB	Injury $L_{E,w,24}$ 10 dB	Injury $L_{E,w,24}$ 15 dB	Injury L_{pk} 0 dB	Injury L_{pk} 6 dB	Injury L_{pk} 10 dB	Injury L_{pk} 15 dB	Behavior L_p 0 dB	Behavior L_p 6 dB	Behavior L_p 10 dB	Behavior L_p 15 dB
Kemp's ridley turtle [a]	0.02	<0.01	<0.01	0	0	0	0	0	0.09	0.04	0.02	<0.01
Leatherback turtle [a]	2.70	1.00	0.29	0.02	0	0	0	0	10.15	3.41	1.79	0.74
Loggerhead turtle	0.24	0.06	0.02	<0.01	<0.01	0	0	0	1.19	0.55	0.30	0.10
Green turtle	1.24	0.38	0.09	0.02	<0.01	0	0	0	5.57	2.46	1.27	0.58

[a] Listed as Endangered under the ESA.

Table H-12. Construction Schedule A, year 2 (all monopiles and impact only, 2 year schedule): The mean number of sea turtles predicted to receive sound levels above exposure criteria with sound attenuation. Construction schedule assumptions are summarized in Section 1.2.2.

Species	Injury $L_{E,w,24}$ 0 dB	Injury $L_{E,w,24}$ 6 dB	Injury $L_{E,w,24}$ 10 dB	Injury $L_{E,w,24}$ 15 dB	Injury L_{pk} 0 dB	Injury L_{pk} 6 dB	Injury L_{pk} 10 dB	Injury L_{pk} 15 dB	Behavior L_p 0 dB	Behavior L_p 6 dB	Behavior L_p 10 dB	Behavior L_p 15 dB
Kemp's ridley turtle [a]	0.01	<0.01	<0.01	0	0	0	0	0	0.06	0.03	0.01	<0.01
Leatherback turtle [a]	1.93	0.70	0.18	0.02	0	0	0	0	7.78	2.57	1.36	0.56
Loggerhead turtle	0.17	0.04	0.01	<0.01	0	0	0	0	0.87	0.40	0.22	0.07
Green turtle	0.88	0.27	0.06	0.02	0	0	0	0	4.08	1.78	0.91	0.41

[a] Listed as Endangered under the ESA.

Table H-13. Construction Schedule B, year 1 (monopiles/ WTG jacket and impact only, 2 year schedule): The mean number of sea turtles predicted to receive sound levels above exposure criteria with sound attenuation. Construction schedule assumptions are summarized in Section 1.2.2.

Species	Injury $L_{E,w,24}$ 0 dB	Injury $L_{E,w,24}$ 6 dB	Injury $L_{E,w,24}$ 10 dB	Injury $L_{E,w,24}$ 15 dB	Injury L_{pk} 0 dB	Injury L_{pk} 6 dB	Injury L_{pk} 10 dB	Injury L_{pk} 15 dB	Behavior L_p 0 dB	Behavior L_p 6 dB	Behavior L_p 10 dB	Behavior L_p 15 dB
Kemp's ridley turtle [a]	0.02	<0.01	<0.01	0	0	0	0	0	0.10	0.05	0.02	<0.01
Leatherback turtle [a]	2.77	1.03	0.26	0.03	0	0	0	0	8.73	2.98	1.48	0.61
Loggerhead turtle	0.27	0.05	0.02	<0.01	<0.01	0	0	0	1.19	0.55	0.30	0.10
Green turtle	1.53	0.47	0.08	0.02	<0.01	0	0	0	5.66	2.55	1.37	0.65

[a] Listed as Endangered under the ESA.

Table H-14. Construction Schedule B, year 2 (monopiles/ WTG jacket and impact only, 2 year schedule): The mean number of sea turtles predicted to receive sound levels above exposure criteria with sound attenuation. Construction schedule assumptions are summarized in Section 1.2.2.

Species	Injury $L_{E,w,24}$ 0 dB	Injury $L_{E,w,24}$ 6 dB	Injury $L_{E,w,24}$ 10 dB	Injury $L_{E,w,24}$ 15 dB	Injury L_{pk} 0 dB	Injury L_{pk} 6 dB	Injury L_{pk} 10 dB	Injury L_{pk} 15 dB	Behavior L_p 0 dB	Behavior L_p 6 dB	Behavior L_p 10 dB	Behavior L_p 15 dB
Kemp's ridley turtle [a]	0.02	<0.01	<0.01	0	0	0	0	0	0.07	0.03	0.02	<0.01
Leatherback turtle [a]	2.09	0.78	0.19	0.02	0	0	0	0	6.88	2.33	1.17	0.48
Loggerhead turtle	0.19	0.04	0.01	<0.01	0	0	0	0	0.86	0.40	0.21	0.07
Green turtle	1.10	0.34	0.06	0.01	0	0	0	0	4.17	1.86	0.99	0.47

[a] Listed as Endangered under the ESA.

Table H-15. Construction Schedule C, year 1 (all monopiles with 10 vibratory + impact installations in the first year, 2 year schedule): The mean number of sea turtles predicted to receive sound levels above exposure criteria with sound attenuation. Construction schedule assumptions are summarized in Section 1.2.2.

Species	Injury $L_{E,w,24}$ 0 dB	Injury $L_{E,w,24}$ 6 dB	Injury $L_{E,w,24}$ 10 dB	Injury $L_{E,w,24}$ 15 dB	Injury L_{pk} 0 dB	Injury L_{pk} 6 dB	Injury L_{pk} 10 dB	Injury L_{pk} 15 dB	Behavior L_p 0 dB	Behavior L_p 6 dB	Behavior L_p 10 dB	Behavior L_p 15 dB
Kemp's ridley turtle [a]	0.02	<0.01	<0.01	0	0	0	0	0	0.09	0.04	0.02	<0.01
Leatherback turtle [a]	2.74	1.02	0.29	0.02	0	0	0	0	10.13	3.40	1.78	0.74
Loggerhead turtle	0.24	0.06	0.02	<0.01	<0.01	0	0	0	1.19	0.55	0.30	0.10
Green turtle	1.28	0.41	0.10	0.02	<0.01	0	0	0	5.59	2.46	1.28	0.58

[a] Listed as Endangered under the ESA.

Table H-16. Construction Schedule C, year 2 (all monopiles with 10 vibratory + impact installations in the first year, 2 year schedule): The mean number of sea turtles predicted to receive sound levels above exposure criteria with sound attenuation. Construction schedule assumptions are summarized in Section 1.2.2.

Species	Injury $L_{E,w,24}$ 0 dB	Injury $L_{E,w,24}$ 6 dB	Injury $L_{E,w,24}$ 10 dB	Injury $L_{E,w,24}$ 15 dB	Injury L_{pk} 0 dB	Injury L_{pk} 6 dB	Injury L_{pk} 10 dB	Injury L_{pk} 15 dB	Behavior L_p 0 dB	Behavior L_p 6 dB	Behavior L_p 10 dB	Behavior L_p 15 dB
Kemp's ridley turtle [a]	0.01	<0.01	<0.01	0	0	0	0	0	0.06	0.03	0.01	<0.01
Leatherback turtle [a]	2.05	0.76	0.21	0.02	0	0	0	0	7.92	2.65	1.40	0.58
Loggerhead turtle	0.17	0.04	0.02	<0.01	0	0	0	0	0.88	0.40	0.22	0.07
Green turtle	0.89	0.27	0.07	0.02	0	0	0	0	4.10	1.79	0.92	0.41

[a] Listed as Endangered under the ESA.

Table H-17. Construction Schedule D, year 1 (monopiles/ WTG jacket with 10 vibratory + impact monopile installations in the first year, 2 year schedule): The mean number of sea turtles predicted to receive sound levels above exposure criteria with sound attenuation. Construction schedule assumptions are summarized in Section 1.2.2.

Species	Injury $L_{E,w,24}$ 0 dB	Injury $L_{E,w,24}$ 6 dB	Injury $L_{E,w,24}$ 10 dB	Injury $L_{E,w,24}$ 15 dB	Injury L_{pk} 0 dB	Injury L_{pk} 6 dB	Injury L_{pk} 10 dB	Injury L_{pk} 15 dB	Behavior L_p 0 dB	Behavior L_p 6 dB	Behavior L_p 10 dB	Behavior L_p 15 dB
Kemp's ridley turtle [a]	0.02	<0.01	<0.01	0	0	0	0	0	0.10	0.05	0.02	<0.01
Leatherback turtle [a]	2.81	1.05	0.26	0.03	0	0	0	0	8.71	2.97	1.48	0.61
Loggerhead turtle	0.28	0.05	0.02	<0.01	<0.01	0	0	0	1.19	0.55	0.29	0.10
Green turtle	1.56	0.49	0.09	0.02	<0.01	0	0	0	5.67	2.55	1.37	0.65

[a] Listed as Endangered under the ESA.

Table H-18. Construction Schedule D, year 2 (monopiles/ WTG jacket with 10 vibratory + impact monopile installations in the first year, 2 year schedule): The mean number of sea turtles predicted to receive sound levels above exposure criteria with sound attenuation. Construction schedule assumptions are summarized in Section 1.2.2.

Species	Injury $L_{E,w,24}$ 0 dB	Injury $L_{E,w,24}$ 6 dB	Injury $L_{E,w,24}$ 10 dB	Injury $L_{E,w,24}$ 15 dB	Injury L_{pk} 0 dB	Injury L_{pk} 6 dB	Injury L_{pk} 10 dB	Injury L_{pk} 15 dB	Behavior L_p 0 dB	Behavior L_p 6 dB	Behavior L_p 10 dB	Behavior L_p 15 dB
Kemp's ridley turtle [a]	0.02	<0.01	<0.01	0	0	0	0	0	0.07	0.03	0.02	<0.01
Leatherback turtle [a]	2.09	0.78	0.19	0.02	0	0	0	0	6.88	2.33	1.17	0.48
Loggerhead turtle	0.19	0.04	0.01	<0.01	0	0	0	0	0.86	0.40	0.21	0.07
Green turtle	1.10	0.34	0.06	0.01	0	0	0	0	4.17	1.86	0.99	0.47

[a] Listed as Endangered under the ESA.

H.2.2. Exposure Ranges – Impact Pile Driving

H.2.2.1. Marine Mammals

This section contains marine mammal exposure ranges for each of the modeled foundation types and seasons assuming 0, 6, 10, and 15 dB broadband attenuation. Exposure ranges are shown in Tables H-19 to H-32. See Section 2.4 of the main acoustic report for definitions of marine mammal threshold criteria.

Table H-19. WTGMP2 (13 m diameter, IHC S-5500, one per day, summer): Exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with sound attenuation.

Hearing group	Species	PTS $L_{E,w,24h}$ 0 dB	PTS $L_{E,w,24h}$ 6 dB	PTS $L_{E,w,24h}$ 10 dB	PTS $L_{E,w,24h}$ 15 dB	PTS L_{PK} 0 dB	PTS L_{PK} 6 dB	PTS L_{PK} 10 dB	PTS L_{PK} 15 dB	Behavior L_p [a] 0 dB	Behavior L_p [a] 6 dB	Behavior L_p [a] 10 dB	Behavior L_p [a] 15 dB	Behavior $L_{p,w}$ [b] 0 dB	Behavior $L_{p,w}$ [b] 6 dB	Behavior $L_{p,w}$ [b] 10 dB	Behavior $L_{p,w}$ [b] 15 dB
LF	Fin whale [c]	5.68	3.84	2.48	1.72	0.06	0	0	0	10.11	7.22	5.71	4.05	10.10	7.16	5.68	3.99
LF	Minke whale (migrating)	3.86	2.29	1.56	0.71	0.01	0.01	0	0	9.77	6.96	5.57	3.90	24.43	19.30	16.12	12.66
LF	Humpback whale	5.16	3.28	2.36	1.22	<0.01	<0.01	<0.01	<0.01	10.07	7.19	5.61	4.10	10.04	7.16	5.60	4.03
LF	North Atlantic right whale [c]	4.43	2.90	1.93	1.00	<0.01	<0.01	<0.01	0	9.77	6.95	5.56	4.02	9.74	6.96	5.54	3.98
LF	Sei whale [c] (migrating)	4.01	2.44	1.82	0.53	<0.01	0	0	0	10.15	7.00	5.51	3.96	25.68	20.19	16.81	13.03
MF	Atlantic white-sided dolphin	0	0	0	0	0	0	0	0	9.61	6.98	5.41	3.88	5.24	3.54	2.38	1.69
MF	Atlantic spotted dolphin	0	0	0	0	0	0	0	0	9.12	6.43	5.13	3.64	3.96	3.06	2.20	1.53
MF	Common dolphin	0	0	0	0	0	0	0	0	9.79	6.89	5.58	3.96	5.41	3.41	2.45	1.57
MF	Bottlenose dolphin, offshore	0	0	0	0	0	0	0	0	9.24	6.60	5.00	3.64	4.78	3.04	2.15	1.51
MF	Risso's dolphin	0	0	0	0	<0.01	<0.01	0	0	9.22	6.74	5.21	3.76	5.15	3.61	2.41	1.53
MF	Long-finned pilot whale	0	0	0	0	<0.01	<0.01	0	0	9.39	6.74	5.36	3.83	5.16	3.45	2.48	1.56
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MF	Sperm whale [c]	0	0	0	0	0	0	0	0	9.91	7.08	5.65	4.09	5.51	3.40	2.52	1.70
HF	Harbor porpoise (sensitive)	0	0	0	0	1.09	0.43	0.31	0.02	8.17	6.25	4.79	3.75	26.96	21.51	18.57	15.10
PW	Gray seal	0.71	0	0	0	0	0	0	0	10.39	7.40	5.84	4.22	7.76	5.52	4.14	2.81
PW	Harbor seal	0.75	0.41	0	0	0	0	0	0	9.02	6.48	5.14	3.62	6.79	4.57	3.42	2.59
PW	Harp seal	0.82	0.03	0.03	0	0.03	0.03	0	0	10.05	7.18	5.66	4.05	7.46	5.29	3.89	2.73

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

Table H-20. WTGMP2 (13 m diameter, IHC S-5500, two per day, summer): Exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with sound attenuation.

Hearing group	Species	PTS $L_{E,w,24h}$ 0 dB	PTS $L_{E,w,24h}$ 6 dB	PTS $L_{E,w,24h}$ 10 dB	PTS $L_{E,w,24h}$ 15 dB	PTS L_{PK} 0 dB	PTS L_{PK} 6 dB	PTS L_{PK} 10 dB	PTS L_{PK} 15 dB	Behavior L_p [a] 0 dB	Behavior L_p [a] 6 dB	Behavior L_p [a] 10 dB	Behavior L_p [a] 15 dB	Behavior $L_{p,w}$ [b] 0 dB	Behavior $L_{p,w}$ [b] 6 dB	Behavior $L_{p,w}$ [b] 10 dB	Behavior $L_{p,w}$ [b] 15 dB
LF	Fin whale [c]	5.52	3.64	2.77	1.43	0.07	<0.01	<0.01	<0.01	10.01	7.09	5.59	4.00	9.95	7.03	5.56	3.93
LF	Minke whale (migrating)	3.82	2.40	1.47	0.75	0.03	0.02	0	0	9.44	6.80	5.50	3.93	23.99	18.45	15.49	12.38
LF	Humpback whale	5.22	3.46	2.37	1.31	0.02	0	0	0	9.90	7.02	5.46	4.06	9.81	7.00	5.44	3.97
LF	North Atlantic right whale [c]	4.41	2.78	1.95	0.98	0.12	0	0	0	9.56	6.80	5.32	3.75	9.50	6.80	5.31	3.69
LF	Sei whale [c] (migrating)	3.93	2.48	1.54	0.84	0.08	0	0	0	9.90	6.97	5.48	3.82	25.06	19.79	16.58	12.89
MF	Atlantic white-sided dolphin	0	0	0	0	0	0	0	0	9.26	6.66	5.36	3.68	5.12	3.32	2.33	1.55
MF	Atlantic spotted dolphin	0	0	0	0	0	0	0	0	8.85	6.47	5.06	3.77	4.09	2.94	2.16	1.42
MF	Common dolphin	0	0	0	0	0	0	0	0	9.63	6.92	5.42	3.84	5.20	3.44	2.43	1.62
MF	Bottlenose dolphin, offshore	0	0	0	0	0	0	0	0	9.11	6.25	4.96	3.68	4.37	2.97	2.06	1.41
MF	Risso's dolphin	0	0	0	0	<0.01	<0.01	0	0	9.09	6.48	5.19	3.79	5.06	3.42	2.35	1.57
MF	Long-finned pilot whale	0	0	0	0	<0.01	<0.01	0	0	9.01	6.49	5.26	3.68	5.00	3.25	2.34	1.51
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MF	Sperm whale [c]	0	0	0	0	0	0	0	0	9.85	6.93	5.55	3.90	5.28	3.40	2.44	1.76
HF	Harbor porpoise (sensitive)	0	0	0	0	1.04	0.48	0.41	0	8.05	6.07	4.74	3.56	26.10	21.39	18.13	14.73
PW	Gray seal	0.66	0.41	0	0	0	0	0	0	10.24	7.15	5.71	4.24	7.61	5.27	4.24	2.83
PW	Harbor seal	0.65	0.08	0	0	0.06	0	0	0	8.66	6.15	4.99	3.53	6.40	4.42	3.45	2.44
PW	Harp seal	0.86	0.20	<0.01	0	0.08	0.02	<0.01	0	9.97	6.99	5.62	4.04	7.27	5.05	3.89	2.54

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

Table H-21. WTGMP2 (13 m diameter, IHC S-5500, one per day, winter): Exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with sound attenuation.

Hearing group	Species	PTS $L_{E,w,24h}$ 0 dB	PTS $L_{E,w,24h}$ 6 dB	PTS $L_{E,w,24h}$ 10 dB	PTS $L_{E,w,24h}$ 15 dB	PTS L_{PK} 0 dB	PTS L_{PK} 6 dB	PTS L_{PK} 10 dB	PTS L_{PK} 15 dB	Behavior L_p [a] 0 dB	Behavior L_p [a] 6 dB	Behavior L_p [a] 10 dB	Behavior L_p [a] 15 dB	Behavior $L_{p,w}$ [b] 0 dB	Behavior $L_{p,w}$ [b] 6 dB	Behavior $L_{p,w}$ [b] 10 dB	Behavior $L_{p,w}$ [b] 15 dB
LF	Fin whale [c]	6.86	4.21	3.09	1.76	0.06	0	0	0	13.91	8.71	6.53	4.51	13.72	8.68	6.52	4.52
LF	Minke whale (migrating)	4.64	2.78	1.77	0.93	0.01	0.01	0	0	13.58	8.45	6.49	4.39	55.71	35.57	27.57	19.69
LF	Humpback whale	6.44	3.97	2.49	1.29	<0.01	<0.01	<0.01	<0.01	13.62	8.61	6.47	4.44	13.54	8.62	6.48	4.44
LF	North Atlantic right whale [c]	5.34	3.23	2.09	1.14	<0.01	<0.01	<0.01	0	13.17	8.18	6.07	4.29	13.17	8.17	6.11	4.34
LF	Sei whale [c] (migrating)	4.97	2.82	2.07	0.93	<0.01	0	0	0	13.93	8.33	5.98	4.24	58.54	37.29	28.93	20.32
MF	Atlantic white-sided dolphin	0	0	0	0	0	0	0	0	13.08	8.33	6.19	4.32	5.92	3.79	2.60	1.72
MF	Atlantic spotted dolphin	0	0	0	0	0	0	0	0	13.18	6.81	5.35	3.77	3.97	3.02	2.20	1.37
MF	Common dolphin	0	0	0	0	0	0	0	0	13.30	8.30	6.37	4.21	6.07	3.75	2.76	1.72
MF	Bottlenose dolphin, offshore	0	0	0	0	0	0	0	0	12.35	7.81	5.62	4.21	5.29	3.47	2.18	1.62
MF	Risso's dolphin	0	0	0	0	<0.01	<0.01	0	0	12.95	8.10	6.00	4.28	5.97	3.74	2.68	1.74
MF	Long-finned pilot whale	0	0	0	0	<0.01	<0.01	0	0	13.17	8.21	6.16	4.19	5.96	3.62	2.69	1.55
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MF	Sperm whale [c]	0	0	0	0	0	0	0	0	13.50	8.62	6.51	4.42	6.23	4.05	2.81	1.82
HF	Harbor porpoise (sensitive)	0	0	0	0	0.83	0.47	0.19	0.04	11.41	7.41	5.66	4.10	111.86	83.05	47.85	31.36
PW	Gray seal	0.83	0	0	0	0	0	0	0	14.03	9.01	6.63	4.74	10.26	6.24	4.72	3.15
PW	Harbor seal	0.74	0.21	0	0	0	0	0	0	12.46	7.65	5.67	4.09	8.99	5.39	4.11	2.73
PW	Harp seal	0.86	0.03	0.03	0	0.03	0.03	0	0	13.70	8.72	6.53	4.63	9.84	6.07	4.61	3.08

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

Table H-22. WTGMP2 (13 m diameter, IHC S-5500, two per day, winter): Exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with sound attenuation.

Hearing group	Species	PTS $L_{E,w,24h}$ 0 dB	PTS $L_{E,w,24h}$ 6 dB	PTS $L_{E,w,24h}$ 10 dB	PTS $L_{E,w,24h}$ 15 dB	PTS L_{PK} 0 dB	PTS L_{PK} 6 dB	PTS L_{PK} 10 dB	PTS L_{PK} 15 dB	Behavior L_p [a] 0 dB	Behavior L_p [a] 6 dB	Behavior L_p [a] 10 dB	Behavior L_p [a] 15 dB	Behavior $L_{p,w}$ [b] 0 dB	Behavior $L_{p,w}$ [b] 6 dB	Behavior $L_{p,w}$ [b] 10 dB	Behavior $L_{p,w}$ [b] 15 dB
LF	Fin whale [c]	6.97	4.43	3.01	2.04	0.07	<0.01	<0.01	<0.01	13.33	8.58	6.27	4.46	13.34	8.47	6.28	4.46
LF	Minke whale (migrating)	4.61	2.72	1.64	0.75	0.03	0.02	0	0	12.78	8.24	6.07	4.19	54.69	34.43	26.58	18.82
LF	Humpback whale	6.81	4.07	2.97	1.62	0.02	0	0	0	13.22	8.41	6.47	4.38	13.21	8.41	6.45	4.39
LF	North Atlantic right whale [c]	5.56	3.35	2.02	1.11	0.12	0	0	0	12.68	7.92	5.92	4.23	12.68	7.94	5.94	4.23
LF	Sei whale [c] (migrating)	4.71	2.89	1.61	0.89	0.06	0	0	0	13.46	7.95	5.92	4.10	57.25	36.13	28.14	19.88
MF	Atlantic white-sided dolphin	0	0	0	0	0	0	0	0	12.48	7.97	5.94	4.02	5.84	3.47	2.60	1.62
MF	Atlantic spotted dolphin	0	0	0	0	0	0	0	0	12.06	6.88	5.56	3.88	4.11	2.95	2.12	1.38
MF	Common dolphin	0	0	0	0	0	0	0	0	12.46	8.02	6.08	4.11	5.88	3.61	2.66	1.85
MF	Bottlenose dolphin, offshore	0	0	0	0	0	0	0	0	11.57	7.54	5.54	3.90	5.14	3.41	2.23	1.44
MF	Risso’s dolphin	0	0	0	0	<0.01	<0.01	0	0	12.24	8.03	5.71	4.04	5.52	3.68	2.63	1.64
MF	Long-finned pilot whale	0	0	0	0	<0.01	<0.01	0	0	12.60	7.83	5.92	3.94	5.76	3.47	2.57	1.66
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MF	Sperm whale [c]	0	0	0	0	0	0	0	0	12.97	8.18	6.05	4.32	5.92	3.80	2.75	1.88
HF	Harbor porpoise (sensitive)	0	0	0	0	0.90	0.48	0.20	0	11.09	7.00	5.40	3.88	109.43	81.48	46.35	30.47
PW	Gray seal	0.99	0.24	0.22	0	0	0	0	0	13.56	8.61	6.48	4.57	9.91	5.99	4.54	3.13
PW	Harbor seal	0.64	0.08	0	0	0.06	0	0	0	11.74	7.35	5.54	3.73	8.52	5.05	3.77	2.65
PW	Harp seal	0.93	0.23	<0.01	0	0.08	0.02	<0.01	0	12.94	8.43	6.35	4.31	9.67	5.86	4.35	2.93

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

Table H-23. WTGMP3 (13 m diameter, IHC S-6500, one per day, summer): Exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with sound attenuation.

Hearing group	Species	PTS $L_{E,w,24h}$ 0 dB	PTS $L_{E,w,24h}$ 6 dB	PTS $L_{E,w,24h}$ 10 dB	PTS $L_{E,w,24h}$ 15 dB	PTS L_{PK} 0 dB	PTS L_{PK} 6 dB	PTS L_{PK} 10 dB	PTS L_{PK} 15 dB	Behavior L_p [a] 0 dB	Behavior L_p [a] 6 dB	Behavior L_p [a] 10 dB	Behavior L_p [a] 15 dB	Behavior $L_{p,w}$ [b] 0 dB	Behavior $L_{p,w}$ [b] 6 dB	Behavior $L_{p,w}$ [b] 10 dB	Behavior $L_{p,w}$ [b] 15 dB
LF	Fin whale [c]	6.90	4.84	3.53	2.36	0.05	0.03	<0.01	<0.01	10.98	7.82	6.13	4.48	11.04	7.76	6.08	4.45
LF	Minke whale (migrating)	4.67	2.84	1.92	0.88	0.01	0	0	0	10.63	7.64	5.99	4.29	26.98	21.28	17.83	14.01
LF	Humpback whale	6.48	4.20	3.06	1.86	0.11	<0.01	<0.01	<0.01	10.92	7.82	6.12	4.43	10.93	7.81	6.09	4.43
LF	North Atlantic right whale [c]	5.24	3.46	2.36	1.31	0.03	0.03	<0.01	0	10.69	7.56	5.85	4.23	10.76	7.50	5.86	4.22
LF	Sei whale [c] (migrating)	5.05	3.33	2.06	1.43	0.03	<0.01	0	0	10.76	7.71	5.91	4.34	28.71	22.33	18.40	14.61
MF	Atlantic white-sided dolphin	0	0	0	0	<0.01	<0.01	0	0	10.50	7.45	5.96	4.22	5.56	3.78	2.66	1.78
MF	Atlantic spotted dolphin	0	0	0	0	0	0	0	0	10.79	6.84	5.65	4.11	4.41	3.25	2.53	1.65
MF	Common dolphin	0	0	0	0	0	0	0	0	10.74	7.61	6.00	4.35	5.75	3.81	2.82	1.72
MF	Bottlenose dolphin, offshore	0	0	0	0	0	0	0	0	10.21	7.16	5.59	4.00	5.11	3.33	2.63	1.60
MF	Risso's dolphin	0	0	0	0	<0.01	<0.01	0	0	10.17	7.30	5.74	4.26	5.47	3.68	2.68	1.80
MF	Long-finned pilot whale	0	0	0	0	<0.01	<0.01	0	0	10.30	7.31	5.76	4.28	5.38	3.72	2.59	1.71
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MF	Sperm whale [c]	0	0	0	0	0	0	0	0	10.86	7.66	6.05	4.45	5.67	3.91	2.86	1.90
HF	Harbor porpoise (sensitive)	0	0	0	0	1.10	0.51	0.41	0.06	8.90	6.71	5.31	3.95	29.43	23.70	20.65	16.72
PW	Gray seal	1.19	0.60	0.10	0	0.10	0	0	0	11.21	7.92	6.26	4.54	8.61	5.95	4.45	2.97
PW	Harbor seal	1.26	0.45	<0.01	0	0.03	<0.01	<0.01	<0.01	9.69	6.99	5.47	4.08	7.53	5.08	3.94	2.63
PW	Harp seal	1.19	0.42	0.03	0	0.03	0.03	0	0	10.84	7.82	6.17	4.36	8.50	5.83	4.24	3.00

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

Table H-24. WTGMP3 (13 m diameter, IHC S-6500, two per day, summer): Exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with sound attenuation.

Hearing group	Species	PTS $L_{E,w,24h}$ 0 dB	PTS $L_{E,w,24h}$ 6 dB	PTS $L_{E,w,24h}$ 10 dB	PTS $L_{E,w,24h}$ 15 dB	PTS L_{PK} 0 dB	PTS L_{PK} 6 dB	PTS L_{PK} 10 dB	PTS L_{PK} 15 dB	Behavior L_p [a] 0 dB	Behavior L_p [a] 6 dB	Behavior L_p [a] 10 dB	Behavior L_p [a] 15 dB	Behavior $L_{p,w}$ [b] 0 dB	Behavior $L_{p,w}$ [b] 6 dB	Behavior $L_{p,w}$ [b] 10 dB	Behavior $L_{p,w}$ [b] 15 dB
LF	Fin whale [c]	7.11	4.76	3.55	2.45	0.09	<0.01	<0.01	<0.01	10.87	7.74	6.04	4.42	10.85	7.62	5.99	4.38
LF	Minke whale (migrating)	4.61	2.84	1.97	1.09	0.03	0.02	0	0	10.40	7.49	5.91	4.34	26.19	20.73	17.16	13.53
LF	Humpback whale	6.74	4.38	3.21	1.86	0.06	0.03	0	0	10.76	7.66	5.93	4.41	10.80	7.63	5.91	4.41
LF	North Atlantic right whale [c]	5.30	3.52	2.35	1.20	0.12	<0.01	0	0	10.46	7.38	5.86	4.29	10.46	7.39	5.77	4.31
LF	Sei whale [c] (migrating)	4.75	3.02	2.04	1.08	0.08	<0.01	<0.01	0	10.78	7.62	5.90	4.30	28.19	21.81	18.09	14.28
MF	Atlantic white-sided dolphin	0	0	0	0	0	0	0	0	10.26	7.36	5.83	4.15	5.52	3.52	2.61	1.65
MF	Atlantic spotted dolphin	0	0	0	0	0	0	0	0	10.27	6.85	5.63	4.07	4.35	3.16	2.42	1.65
MF	Common dolphin	0	0	0	0	<0.01	<0.01	0	0	10.49	7.49	5.92	4.33	5.60	3.75	2.67	1.77
MF	Bottlenose dolphin, offshore	0	0	0	0	0	0	0	0	9.90	7.09	5.52	3.95	4.74	3.17	2.37	1.59
MF	Risso's dolphin	0	0	0	0	<0.01	<0.01	0	0	10.04	7.12	5.68	4.21	5.37	3.63	2.62	1.73
MF	Long-finned pilot whale	0	0	0	0	<0.01	<0.01	0	0	9.97	7.13	5.67	4.17	5.39	3.48	2.60	1.73
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MF	Sperm whale [c]	0	0	0	0	0	0	0	0	10.63	7.62	5.92	4.33	5.72	3.84	2.70	1.85
HF	Harbor porpoise (sensitive)	<0.01	0	0	0	1.05	0.48	0.45	0.03	8.57	6.43	5.13	3.74	28.83	23.39	20.34	16.43
PW	Gray seal	1.41	0.58	0.35	0	0	0	0	0	10.93	7.77	6.09	4.50	8.29	5.71	4.38	3.05
PW	Harbor seal	1.13	0.40	0.06	0	0.06	<0.01	<0.01	<0.01	9.48	6.63	5.34	3.78	7.15	4.71	3.61	2.63
PW	Harp seal	1.05	0.35	0.06	0	0.10	0.01	<0.01	0	10.76	7.74	6.04	4.34	8.30	5.64	4.07	2.87

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

Table H-25. WTGMP3 (13 m diameter, IHC S-6500, one per day, winter): Exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with sound attenuation.

Hearing group	Species	PTS $L_{E,w,24h}$ 0 dB	PTS $L_{E,w,24h}$ 6 dB	PTS $L_{E,w,24h}$ 10 dB	PTS $L_{E,w,24h}$ 15 dB	PTS L_{PK} 0 dB	PTS L_{PK} 6 dB	PTS L_{PK} 10 dB	PTS L_{PK} 15 dB	Behavior L_p [a] 0 dB	Behavior L_p [a] 6 dB	Behavior L_p [a] 10 dB	Behavior L_p [a] 15 dB	Behavior $L_{p,w}$ [b] 0 dB	Behavior $L_{p,w}$ [b] 6 dB	Behavior $L_{p,w}$ [b] 10 dB	Behavior $L_{p,w}$ [b] 15 dB
LF	Fin whale [c]	9.47	5.94	4.17	2.59	0.05	0.03	<0.01	<0.01	16.02	10.02	7.37	4.96	16.05	10.02	7.32	4.94
LF	Minke whale (migrating)	6.33	3.58	2.13	1.05	0.13	0	0	0	15.71	9.83	7.25	4.84	79.62	42.78	31.71	22.60
LF	Humpback whale	9.00	5.38	3.62	2.10	0.11	<0.01	<0.01	<0.01	15.98	10.01	7.33	4.98	15.75	9.98	7.30	5.00
LF	North Atlantic right whale [c]	7.11	4.18	2.82	1.53	0.03	0.03	<0.01	0	15.58	9.69	7.09	4.76	15.39	9.70	7.11	4.74
LF	Sei whale [c] (migrating)	6.74	3.76	2.56	1.48	0.03	<0.01	0	0	16.30	9.80	6.75	4.60	82.35	44.24	33.41	23.90
MF	Atlantic white-sided dolphin	0	0	0	0	<0.01	<0.01	0	0	15.19	9.59	6.98	4.61	6.86	4.11	2.96	1.92
MF	Atlantic spotted dolphin	0	0	0	0	0	0	0	0	16.20	8.17	5.91	4.32	4.58	3.27	2.32	1.58
MF	Common dolphin	0	0	0	0	0	0	0	0	15.30	9.81	7.08	4.73	7.08	4.15	2.88	2.05
MF	Bottlenose dolphin, offshore	0	0	0	0	0	0	0	0	14.38	8.84	6.56	4.39	6.58	3.72	2.84	1.71
MF	Risso's dolphin	0	0	0	0	<0.01	<0.01	0	0	14.82	9.42	6.90	4.70	6.88	4.05	2.90	1.92
MF	Long-finned pilot whale	0	0	0	0	<0.01	<0.01	0	0	15.22	9.60	6.96	4.59	6.85	3.99	2.85	1.74
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MF	Sperm whale [c]	0	0	0	0	0	0	0	0	15.53	9.71	7.13	4.90	7.11	4.17	3.08	2.01
HF	Harbor porpoise (sensitive)	0	0	0	0	1.06	0.51	0.18	0.06	13.13	8.26	6.32	4.38	115.77	115.40	110.21	60.19
PW	Gray seal	1.54	0.64	0.10	0	0.10	0	0	0	16.27	10.26	7.55	5.02	11.78	6.99	5.01	3.42
PW	Harbor seal	1.26	0.45	<0.01	0	0.03	<0.01	<0.01	<0.01	14.02	9.04	6.57	4.35	10.40	6.13	4.34	2.84
PW	Harp seal	1.36	0.46	0.03	0	0.03	0.03	0	0	15.75	9.88	7.23	5.01	11.43	6.91	4.94	3.19

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

Table H-26. WTGMP3 (13 m diameter, IHC S-6500, IHC S-6500 two per day, winter): Exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with sound attenuation.

Hearing group	Species	PTS $L_{E,w,24h}$ 0 dB	PTS $L_{E,w,24h}$ 6 dB	PTS $L_{E,w,24h}$ 10 dB	PTS $L_{E,w,24h}$ 15 dB	PTS L_{PK} 0 dB	PTS L_{PK} 6 dB	PTS L_{PK} 10 dB	PTS L_{PK} 15 dB	Behavior L_p [a] 0 dB	Behavior L_p [a] 6 dB	Behavior L_p [a] 10 dB	Behavior L_p [a] 15 dB	Behavior $L_{p,w}$ [b] 0 dB	Behavior $L_{p,w}$ [b] 6 dB	Behavior $L_{p,w}$ [b] 10 dB	Behavior $L_{p,w}$ [b] 15 dB
LF	Fin whale [c]	10.33	5.91	4.35	2.66	0.07	<0.01	<0.01	<0.01	15.40	9.53	6.93	4.79	15.38	9.65	6.99	4.79
LF	Minke whale (migrating)	6.45	3.43	2.14	1.21	0.03	0.02	0	0	14.95	9.51	7.00	4.69	77.99	41.91	30.91	22.24
LF	Humpback whale	9.86	5.45	3.88	2.25	0.03	0.03	0	0	15.21	9.54	7.03	4.75	15.27	9.61	7.06	4.78
LF	North Atlantic right whale [c]	7.41	4.32	3.03	1.59	0.12	<0.01	0	0	14.66	9.24	6.66	4.58	14.81	9.32	6.73	4.56
LF	Sei whale [c] (migrating)	6.78	3.56	2.46	1.17	0.08	<0.01	<0.01	0	15.70	9.23	6.58	4.58	81.92	44.10	32.53	23.21
MF	Atlantic white-sided dolphin	0	0	0	0	0	0	0	0	14.60	9.09	6.68	4.53	6.68	3.89	2.81	1.84
MF	Atlantic spotted dolphin	0	0	0	0	0	0	0	0	15.63	7.84	5.89	4.23	4.66	3.16	2.30	1.57
MF	Common dolphin	0	0	0	0	<0.01	<0.01	0	0	14.41	9.20	6.82	4.62	6.91	4.09	2.85	2.01
MF	Bottlenose dolphin, offshore	0	0	0	0	0	0	0	0	13.45	8.49	6.18	4.22	6.10	3.66	2.49	1.63
MF	Risso's dolphin	0	0	0	0	<0.01	<0.01	0	0	14.20	9.15	6.56	4.44	6.59	3.96	2.84	1.81
MF	Long-finned pilot whale	0	0	0	0	<0.01	<0.01	0	0	14.61	8.93	6.62	4.50	6.62	3.77	2.76	1.86
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MF	Sperm whale [c]	0	0	0	0	0	0	0	0	15.03	9.54	6.86	4.73	6.87	4.13	2.98	2.02
HF	Harbor porpoise (sensitive)	<0.01	0	0	0	1.02	0.51	0.21	0.06	12.79	7.97	5.84	4.26	115.67	115.42	110.99	60.88
PW	Gray seal	1.65	0.58	0.24	0	0	0	0	0	15.82	9.82	7.26	4.99	11.50	6.88	5.03	3.29
PW	Harbor seal	1.44	0.39	0.07	0	0.06	<0.01	<0.01	<0.01	12.87	8.40	5.76	4.18	9.89	5.42	4.18	2.82
PW	Harp seal	1.30	0.37	0.08	0	0.10	0.01	<0.01	0	15.27	9.52	7.04	4.74	11.33	6.74	4.75	3.19

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

Table H-27. WTGJ (4.5 m diameter, IHC S-2300, 4 per day, summer): Exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with sound attenuation.

Hearing group	Species	PTS $L_{E,w,24h}$ 0 dB	PTS $L_{E,w,24h}$ 6 dB	PTS $L_{E,w,24h}$ 10 dB	PTS $L_{E,w,24h}$ 15 dB	PTS L_{PK} 0 dB	PTS L_{PK} 6 dB	PTS L_{PK} 10 dB	PTS L_{PK} 15 dB	Behavior L_p [a] 0 dB	Behavior L_p [a] 6 dB	Behavior L_p [a] 10 dB	Behavior L_p [a] 15 dB	Behavior $L_{p,w}$ [b] 0 dB	Behavior $L_{p,w}$ [b] 6 dB	Behavior $L_{p,w}$ [b] 10 dB	Behavior $L_{p,w}$ [b] 15 dB
LF	Fin whale [c]	6.91	4.15	2.68	1.49	0.02	<0.01	0	0	8.19	5.15	3.62	2.08	8.27	5.17	3.62	2.08
LF	Minke whale (migrating)	3.07	1.52	0.85	0.34	0.01	0	0	0	7.46	4.70	3.21	2.01	24.44	18.12	14.50	10.97
LF	Humpback whale	5.89	3.19	1.98	0.84	<0.01	0	0	0	8.02	5.04	3.41	1.99	8.13	5.10	3.44	1.99
LF	North Atlantic right whale [c]	4.35	2.08	1.19	0.49	0	0	0	0	7.47	4.70	3.38	1.90	7.61	4.83	3.39	1.88
LF	Sei whale [c] (migrating)	3.24	1.49	1.08	0.65	<0.01	<0.01	<0.01	0	7.04	4.45	3.18	2.00	25.49	19.10	15.41	10.97
MF	Atlantic white-sided dolphin	0	0	0	0	0	0	0	0	7.31	4.49	3.15	1.95	3.82	2.00	1.23	0.63
MF	Atlantic spotted dolphin	0	0	0	0	<0.01	0	0	0	5.73	3.87	2.94	1.80	2.73	1.61	1.14	0.56
MF	Common dolphin	0	0	0	0	<0.01	0	0	0	7.23	4.60	3.29	2.03	3.89	2.05	1.33	0.64
MF	Bottlenose dolphin, offshore	0	0	0	0	0	0	0	0	6.62	4.19	2.93	1.84	3.44	1.76	1.08	0.53
MF	Risso's dolphin	0	0	0	0	0	0	0	0	6.90	4.38	3.15	1.89	3.78	1.90	1.33	0.58
MF	Long-finned pilot whale	0	0	0	0	0	0	0	0	7.04	4.21	3.03	1.83	3.65	1.95	1.21	0.58
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MF	Sperm whale [c]	0	0	0	0	0	0	0	0	7.70	4.79	3.42	2.00	4.10	2.02	1.27	0.63
HF	Harbor porpoise (sensitive)	0	0	0	0	0.41	0.12	<0.01	0	6.00	3.84	2.70	1.69	29.15	23.06	19.73	15.61
PW	Gray seal	1.44	0.53	0.20	0	0.01	0	0	0	8.75	5.55	3.98	2.32	6.96	4.09	2.64	1.54
PW	Harbor seal	0.54	0.07	0	0	0	0	0	0	7.01	4.12	2.82	1.58	5.28	2.84	1.98	1.17
PW	Harp seal	0.56	0.05	0	0	0.02	0	0	0	7.97	4.98	3.49	2.01	6.56	3.65	2.38	1.26

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

Table H-28. WTGJ (4.5 m diameter, IHC S-2300, IHC S-2300, 4 per day, winter): Exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with sound attenuation.

Hearing group	Species	PTS $L_{E,w,24h}$ 0 dB	PTS $L_{E,w,24h}$ 6 dB	PTS $L_{E,w,24h}$ 10 dB	PTS $L_{E,w,24h}$ 15 dB	PTS L_{PK} 0 dB	PTS L_{PK} 6 dB	PTS L_{PK} 10 dB	PTS L_{PK} 15 dB	Behavior L_p [a] 0 dB	Behavior L_p [a] 6 dB	Behavior L_p [a] 10 dB	Behavior L_p [a] 15 dB	Behavior $L_{p,w}$ [b] 0 dB	Behavior $L_{p,w}$ [b] 6 dB	Behavior $L_{p,w}$ [b] 10 dB	Behavior $L_{p,w}$ [b] 15 dB
LF	Fin whale [c]	9.54	5.05	2.91	1.52	0.02	<0.01	0	0	10.36	5.83	3.80	2.19	10.38	5.84	3.87	2.17
LF	Minke whale (migrating)	4.30	1.86	1.02	0.36	0.01	0	0	0	9.70	5.33	3.57	2.04	82.39	36.34	24.62	15.54
LF	Humpback whale	8.40	3.98	2.32	1.08	<0.01	0	0	0	10.08	5.66	3.65	2.05	10.13	5.70	3.67	2.03
LF	North Atlantic right whale [c]	5.23	2.43	1.30	0.56	0	0	0	0	9.71	5.34	3.53	2.02	9.80	5.44	3.54	1.95
LF	Sei whale [c] (migrating)	4.14	1.78	1.19	0.76	0.04	<0.01	<0.01	0	9.38	5.12	3.47	2.04	84.97	36.50	25.78	16.22
MF	Atlantic white-sided dolphin	0	0	0	0	0	0	0	0	9.46	5.32	3.45	2.02	4.04	2.05	1.26	0.63
MF	Atlantic spotted dolphin	0	0	0	0	<0.01	0	0	0	10.79	4.38	3.25	1.90	2.94	1.60	1.11	0.56
MF	Common dolphin	0	0	0	0	<0.01	0	0	0	9.34	5.31	3.44	2.06	4.06	2.10	1.38	0.66
MF	Bottlenose dolphin, offshore	0	0	0	0	0	0	0	0	8.67	4.81	3.09	1.86	3.60	1.73	1.12	0.51
MF	Risso's dolphin	0	0	0	0	0	0	0	0	9.22	5.13	3.42	1.94	4.02	2.01	1.35	0.59
MF	Long-finned pilot whale	0	0	0	0	0	0	0	0	9.25	4.91	3.33	1.96	3.92	2.04	1.27	0.60
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MF	Sperm whale [c]	0	0	0	0	0	0	0	0	9.83	5.49	3.65	2.08	4.29	2.10	1.35	0.62
HF	Harbor porpoise (sensitive)	0	0	0	0	0.38	0.12	<0.01	0	8.44	4.59	3.07	1.79	115.32	112.80	106.34	45.20
PW	Gray seal	1.54	0.53	0.20	0	0.03	0	0	0	10.81	6.17	4.09	2.34	7.95	4.09	2.74	1.54
PW	Harbor seal	0.54	0.07	0	0	0	0	0	0	8.89	4.80	2.98	1.82	6.73	3.16	2.13	1.12
PW	Harp seal	0.59	0.06	0	0	0.02	0	0	0	10.07	5.51	3.67	2.12	7.36	3.68	2.44	1.26

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

Table H-29. OSS1 (3 m diameter, MHU 3000S, 4 per day, summer): Exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with sound attenuation.

Hearing group	Species	PTS $L_{E,w,24h}$ 0 dB	PTS $L_{E,w,24h}$ 6 dB	PTS $L_{E,w,24h}$ 10 dB	PTS $L_{E,w,24h}$ 15 dB	PTS L_{PK} 0 dB	PTS L_{PK} 6 dB	PTS L_{PK} 10 dB	PTS L_{PK} 15 dB	Behavior L_p [a] 0 dB	Behavior L_p [a] 6 dB	Behavior L_p [a] 10 dB	Behavior L_p [a] 15 dB	Behavior $L_{p,w}$ [b] 0 dB	Behavior $L_{p,w}$ [b] 6 dB	Behavior $L_{p,w}$ [b] 10 dB	Behavior $L_{p,w}$ [b] 15 dB
LF	Fin whale [c]	8.87	5.98	4.41	2.86	0.08	<0.01	<0.01	<0.01	9.73	5.97	4.12	2.51	9.78	5.98	4.14	2.56
LF	Minke whale (migrating)	5.25	3.36	2.45	1.45	0.02	0.02	<0.01	<0.01	9.04	5.34	3.70	2.36	28.47	21.24	17.21	12.80
LF	Humpback whale	7.54	4.97	3.67	2.31	0.06	0.04	<0.01	<0.01	9.56	5.64	4.01	2.43	9.64	5.69	4.10	2.46
LF	North Atlantic right whale [c]	6.24	4.14	3.06	1.88	0.06	<0.01	<0.01	<0.01	9.13	5.54	3.69	2.33	9.28	5.62	3.70	2.35
LF	Sei whale [c] (migrating)	5.69	3.52	2.54	1.57	0.08	0.04	<0.01	0	9.75	5.84	3.95	2.45	30.89	22.74	18.74	13.98
MF	Atlantic white-sided dolphin	0	0	0	0	<0.01	0	0	0	8.96	5.38	3.67	2.32	5.63	3.36	2.35	1.47
MF	Atlantic spotted dolphin	0	0	0	0	0	0	0	0	7.87	4.54	4.35	0	4.55	0	0	0
MF	Common dolphin	0	0	0	0	<0.01	<0.01	0	0	8.81	5.27	3.76	2.42	5.63	3.39	2.44	1.52
MF	Bottlenose dolphin, offshore	0	0	0	0	0	0	0	0	7.85	4.62	3.29	2.05	4.89	3.02	2.06	1.21
MF	Risso’s dolphin	0	0	0	0	<0.01	0	0	0	8.46	5.06	3.63	2.31	5.35	3.30	2.34	1.44
MF	Long-finned pilot whale	0	0	0	0	<0.01	<0.01	0	0	8.37	5.03	3.56	2.29	5.32	3.22	2.35	1.41
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MF	Sperm whale [c]	0	0	0	0	<0.01	<0.01	0	0	9.26	5.58	3.76	2.38	5.86	3.48	2.43	1.48
HF	Harbor porpoise (sensitive)	0.81	0.22	0	0	0.68	0.31	0.25	0.03	7.15	4.70	3.49	2.33	34.81	27.40	23.73	19.82
PW	Gray seal	3.93	2.57	1.88	1.13	0.03	0	0	0	10.23	6.13	4.35	2.75	8.49	4.97	3.39	2.23
PW	Harbor seal	2.21	1.13	0.61	0.24	0.01	0.01	<0.01	<0.01	8.33	4.78	3.49	2.30	6.79	4.08	2.99	2.01
PW	Harp seal	2.18	1.11	0.56	0.13	0.10	0.03	<0.01	0	9.51	5.78	3.99	2.40	8.05	4.73	3.20	2.04

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

Table H-30. OSS1 (3 m diameter, MHU 3000S, 4 per day, winter): Exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with sound attenuation.

Hearing group	Species	PTS $L_{E,w,24h}$ 0 dB	PTS $L_{E,w,24h}$ 6 dB	PTS $L_{E,w,24h}$ 10 dB	PTS $L_{E,w,24h}$ 15 dB	PTS L_{PK} 0 dB	PTS L_{PK} 6 dB	PTS L_{PK} 10 dB	PTS L_{PK} 15 dB	Behavior L_p [a] 0 dB	Behavior L_p [a] 6 dB	Behavior L_p [a] 10 dB	Behavior L_p [a] 15 dB	Behavior $L_{p,w}$ [b] 0 dB	Behavior $L_{p,w}$ [b] 6 dB	Behavior $L_{p,w}$ [b] 10 dB	Behavior $L_{p,w}$ [b] 15 dB
LF	Fin whale [c]	13.27	7.49	5.10	3.32	0.08	<0.01	<0.01	<0.01	12.42	6.44	4.18	2.63	12.29	6.44	4.18	2.62
LF	Minke whale (migrating)	7.30	4.03	2.80	1.70	0.02	0.02	<0.01	<0.01	11.68	6.02	3.81	2.42	84.69	53.75	32.83	19.77
LF	Humpback whale	12.36	6.36	4.34	2.55	0.07	0.04	<0.01	<0.01	12.29	6.19	4.12	2.51	12.24	6.21	4.15	2.53
LF	North Atlantic right whale [c]	8.37	5.00	3.46	2.23	0.06	<0.01	<0.01	<0.01	11.90	5.99	3.79	2.42	11.91	6.04	3.84	2.43
LF	Sei whale [c] (migrating)	7.46	4.11	2.87	1.75	0.10	0.04	<0.01	0	12.32	6.33	4.08	2.56	85.93	56.29	34.59	20.95
MF	Atlantic white-sided dolphin	0	0	0	0	<0.01	0	0	0	11.66	5.88	3.88	2.44	6.05	3.48	2.48	1.53
MF	Atlantic spotted dolphin	0	0	0	0	0	0	0	0	8.45	4.59	4.43	0	4.55	0	0	0
MF	Common dolphin	0	0	0	0	<0.01	<0.01	0	0	11.56	5.77	3.88	2.49	5.91	3.49	2.50	1.62
MF	Bottlenose dolphin, offshore	0	0	0	0	0	0	0	0	10.63	5.16	3.46	2.09	5.30	3.09	2.14	1.33
MF	Risso's dolphin	0	0	0	0	<0.01	0	0	0	11.39	5.74	3.80	2.37	5.89	3.42	2.42	1.52
MF	Long-finned pilot whale	0	0	0	0	<0.01	<0.01	0	0	11.53	5.65	3.77	2.31	5.90	3.30	2.38	1.39
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MF	Sperm whale [c]	0	0	0	0	<0.01	<0.01	0	0	11.97	6.07	3.94	2.45	6.18	3.53	2.49	1.61
HF	Harbor porpoise (sensitive)	0.81	0.24	0	0	0.58	0.28	0.25	0.03	10.79	5.36	3.67	2.35	87.95	86.19	85.77	84.94
PW	Gray seal	4.46	2.89	1.96	1.14	0.03	0	0	0	12.88	6.44	4.47	2.98	10.00	5.05	3.57	2.41
PW	Harbor seal	2.57	1.28	0.62	0.32	0.01	0.01	<0.01	<0.01	11.15	5.47	3.69	2.36	8.67	4.28	3.04	2.01
PW	Harp seal	2.53	1.20	0.64	0.29	0.11	0.03	<0.01	0	12.12	6.28	4.10	2.53	9.39	4.92	3.31	2.21

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

Table H-31. OSS2 (3 m diameter, MHU 1700S, 4 per day, summer): Exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with sound attenuation.

Hearing group	Species	PTS $L_{E,w,24h}$ 0 dB	PTS $L_{E,w,24h}$ 6 dB	PTS $L_{E,w,24h}$ 10 dB	PTS $L_{E,w,24h}$ 15 dB	PTS L_{PK} 0 dB	PTS L_{PK} 6 dB	PTS L_{PK} 10 dB	PTS L_{PK} 15 dB	Behavior L_p [a] 0 dB	Behavior L_p [a] 6 dB	Behavior L_p [a] 10 dB	Behavior L_p [a] 15 dB	Behavior $L_{p,w}$ [b] 0 dB	Behavior $L_{p,w}$ [b] 6 dB	Behavior $L_{p,w}$ [b] 10 dB	Behavior $L_{p,w}$ [b] 15 dB
LF	Fin whale [c]	3.33	2.28	1.59	1.05	0.07	0.03	0	0	4.21	2.94	2.28	1.55	4.22	2.97	2.30	1.55
LF	Minke whale (migrating)	2.12	1.30	0.84	0.40	0.01	0	0	0	4.12	2.85	2.24	1.45	10.68	8.24	6.94	5.47
LF	Humpback whale	2.98	2.01	1.41	0.84	0.04	0	0	0	4.08	3.00	2.24	1.50	4.11	3.00	2.24	1.49
LF	North Atlantic right whale [c]	2.40	1.68	1.16	0.74	0.01	0.01	0.01	0	3.94	2.90	2.18	1.48	3.98	2.91	2.19	1.48
LF	Sei whale [c] (migrating)	2.29	1.37	0.99	0.40	0.02	<0.01	<0.01	<0.01	4.14	2.96	2.22	1.47	11.14	8.49	7.01	5.54
MF	Atlantic white-sided dolphin	0	0	0	0	0	0	0	0	4.05	2.89	2.20	1.47	2.93	2.12	1.55	0.98
MF	Atlantic spotted dolphin	0	0	0	0	<0.01	0	0	0	3.84	2.82	2.06	1.43	2.91	2.01	1.47	1.01
MF	Common dolphin	0	0	0	0	<0.01	<0.01	<0.01	0	4.07	2.89	2.22	1.45	2.93	2.09	1.53	1.03
MF	Bottlenose dolphin, offshore	0	0	0	0	0	0	0	0	3.59	2.51	1.82	1.29	2.59	1.74	1.28	0.81
MF	Risso's dolphin	0	0	0	0	0	0	0	0	3.96	2.87	2.19	1.44	2.95	2.09	1.47	1.03
MF	Long-finned pilot whale	0	0	0	0	0	0	0	0	3.90	2.84	2.17	1.51	2.94	2.03	1.55	1.00
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MF	Sperm whale [c]	0	0	0	0	0	0	0	0	4.10	2.90	2.21	1.53	2.91	2.13	1.54	1.04
HF	Harbor porpoise (sensitive)	0.35	0.04	0	0	0.52	0.36	0.33	0	3.94	2.92	2.29	1.49	11.58	9.75	8.53	7.08
PW	Gray seal	1.42	0.85	0.32	0.33	0	0	0	0	4.31	3.09	2.36	1.56	3.72	2.64	2.09	1.44
PW	Harbor seal	0.71	0.38	0.04	0	0.02	0	0	0	3.92	2.86	2.18	1.50	3.41	2.48	1.95	1.33
PW	Harp seal	0.66	0.36	0.15	0	0.04	0	0	0	4.17	2.99	2.24	1.50	3.54	2.51	1.88	1.31

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

Table H-32. OSS2 (3 m diameter, MHU 1700S, 4 per day, winter): Exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with sound attenuation.

Hearing group	Species	PTS $L_{E,w,24h}$ 0 dB	PTS $L_{E,w,24h}$ 6 dB	PTS $L_{E,w,24h}$ 10 dB	PTS $L_{E,w,24h}$ 15 dB	PTS L_{PK} 0 dB	PTS L_{PK} 6 dB	PTS L_{PK} 10 dB	PTS L_{PK} 15 dB	Behavior L_p [a] 0 dB	Behavior L_p [a] 6 dB	Behavior L_p [a] 10 dB	Behavior L_p [a] 15 dB	Behavior $L_{p,w}$ [b] 0 dB	Behavior $L_{p,w}$ [b] 6 dB	Behavior $L_{p,w}$ [b] 10 dB	Behavior $L_{p,w}$ [b] 15 dB
LF	Fin whale [c]	3.38	2.20	1.51	1.05	0.07	0	0	0	4.41	2.78	2.10	1.32	4.41	2.77	2.10	1.33
LF	Minke whale (migrating)	2.12	1.30	0.83	0.38	0.01	0	0	0	4.24	2.64	1.99	1.34	40.60	13.54	8.72	6.06
LF	Humpback whale	2.99	2.01	1.29	0.80	0.04	0	0	0	4.23	2.77	2.05	1.39	4.26	2.81	2.06	1.39
LF	North Atlantic right whale [c]	2.44	1.68	1.15	0.74	0.01	0.01	0.01	0	4.16	2.72	1.98	1.36	4.20	2.74	1.99	1.35
LF	Sei whale [c] (migrating)	2.31	1.33	0.97	0.37	0.02	<0.01	<0.01	<0.01	4.27	2.73	2.07	1.38	41.63	14.02	8.91	6.18
MF	Atlantic white-sided dolphin	0	0	0	0	0	0	0	0	4.11	2.66	2.08	1.33	2.69	1.87	1.36	0.88
MF	Atlantic spotted dolphin	0	0	0	0	<0.01	0	0	0	3.94	2.59	1.94	1.33	2.67	1.78	1.35	0.90
MF	Common dolphin	0	0	0	0	<0.01	<0.01	<0.01	0	4.26	2.74	2.06	1.34	2.71	1.84	1.37	0.93
MF	Bottlenose dolphin, offshore	0	0	0	0	0	0	0	0	3.72	2.31	1.72	1.18	2.35	1.52	1.16	0.81
MF	Risso's dolphin	0	0	0	0	0	0	0	0	4.04	2.55	2.01	1.38	2.58	1.82	1.39	0.91
MF	Long-finned pilot whale	0	0	0	0	0	0	0	0	3.95	2.53	1.97	1.34	2.63	1.82	1.39	0.88
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MF	Sperm whale [c]	0	0	0	0	0	0	0	0	4.27	2.67	2.12	1.36	2.63	1.89	1.38	0.93
HF	Harbor porpoise (sensitive)	0.33	0.04	0	0	0.46	0.35	<0.01	0	3.81	2.57	2.00	1.36	87.24	86.67	86.25	76.19
PW	Gray seal	1.38	0.85	0.32	0.33	0	0	0	0	4.60	2.83	2.25	1.44	3.64	2.42	1.98	1.30
PW	Harbor seal	0.71	0.35	0.04	0	0.02	0	0	0	3.89	2.61	1.98	1.37	3.25	2.37	1.76	1.30
PW	Harp seal	0.66	0.36	0.15	0	0.04	0	0	0	4.38	2.74	2.10	1.37	3.51	2.36	1.81	1.19

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

H.2.2.2. Sea Turtles

This section contains sea turtle exposure ranges for each of the modeled foundation types and seasons assuming 0, 6, 10, and 15 dB broadband attenuation. Exposure ranges are shown in Tables H-33 to H-46. See Section 2.4 of the main acoustic report for definitions of sea turtle threshold criteria.

Table H-33. WTGMP2 (13 m diameter, IHC S-5500, one per day, summer): Exposure ranges ($ER_{95\%}$) in km to sea turtle threshold criteria with sound attenuation.

Species	Injury $L_{E,w,24}$ 0 dB	Injury $L_{E,w,24}$ 6 dB	Injury $L_{E,w,24}$ 10 dB	Injury $L_{E,w,24}$ 15 dB	Injury L_{pk} 0 dB	Injury L_{pk} 6 dB	Injury L_{pk} 10 dB	Injury L_{pk} 15 dB	Behavior L_p 0 dB	Behavior L_p 6 dB	Behavior L_p 10 dB	Behavior L_p 15 dB
Kemp's ridley turtle [a]	1.35	0.40	0	0	0	0	0	0	3.45	1.61	1.51	0.70
Leatherback turtle [a]	2.09	1.14	0.58	0	0	0	0	0	4.28	2.58	1.60	1.09
Loggerhead turtle	1.82	0.77	0.21	0.06	0	0	0	0	3.94	2.53	1.72	0.75
Green turtle	1.39	0.53	0.20	0.03	0	0	0	0	3.90	2.39	1.46	0.96

[a] Listed as Endangered under the ESA.

Table H-34. WTGMP2 (13 m diameter, IHC S-5500, two per day, summer): Exposure ranges ($ER_{95\%}$) in km to sea turtle threshold criteria with sound attenuation.

Species	Injury $L_{E,w,24}$ 0 dB	Injury $L_{E,w,24}$ 6 dB	Injury $L_{E,w,24}$ 10 dB	Injury $L_{E,w,24}$ 15 dB	Injury L_{pk} 0 dB	Injury L_{pk} 6 dB	Injury L_{pk} 10 dB	Injury L_{pk} 15 dB	Behavior L_p 0 dB	Behavior L_p 6 dB	Behavior L_p 10 dB	Behavior L_p 15 dB
Kemp's ridley turtle [a]	1.62	0.67	0.08	<0.01	<0.01	0	0	0	3.54	2.11	1.62	0.80
Leatherback turtle [a]	2.04	1.11	0.62	0.08	0	0	0	0	4.21	2.54	1.79	1.08
Loggerhead turtle	1.72	0.77	0.46	<0.01	<0.01	<0.01	0	0	3.87	2.37	1.58	0.98
Green turtle	1.50	0.73	0.36	0	0	0	0	0	3.89	2.38	1.51	1.06

[a] Listed as Endangered under the ESA.

Table H-35. WTGMP2 (13 m diameter, IHC S-5500, one per day, winter): Exposure ranges ($ER_{95\%}$) in km to sea turtle threshold criteria with sound attenuation.

Species	Injury $L_{E,w,24}$ 0 dB	Injury $L_{E,w,24}$ 6 dB	Injury $L_{E,w,24}$ 10 dB	Injury $L_{E,w,24}$ 15 dB	Injury L_{pk} 0 dB	Injury L_{pk} 6 dB	Injury L_{pk} 10 dB	Injury L_{pk} 15 dB	Behavior L_p 0 dB	Behavior L_p 6 dB	Behavior L_p 10 dB	Behavior L_p 15 dB
Kemp's ridley turtle [a]	1.30	0.40	0	0	0	0	0	0	4.09	1.74	1.52	0.39
Leatherback turtle [a]	2.14	1.15	0.58	0	0	0	0	0	4.73	2.85	1.71	1.15
Loggerhead turtle	1.83	0.77	0.21	0.06	0	0	0	0	4.43	2.57	1.79	0.88
Green turtle	1.66	0.53	0.20	0.03	0	0	0	0	4.40	2.48	1.61	1.03

[a] Listed as Endangered under the ESA.

Table H-36. WTGMP2 (13 m diameter, IHC S-5500, two per day, winter): Exposure ranges ($ER_{95\%}$) in km to sea turtle threshold criteria with sound attenuation.

Species	Injury $L_{E,w,24}$ 0 dB	Injury $L_{E,w,24}$ 6 dB	Injury $L_{E,w,24}$ 10 dB	Injury $L_{E,w,24}$ 15 dB	Injury L_{pk} 0 dB	Injury L_{pk} 6 dB	Injury L_{pk} 10 dB	Injury L_{pk} 15 dB	Behavior L_p 0 dB	Behavior L_p 6 dB	Behavior L_p 10 dB	Behavior L_p 15 dB
Kemp's ridley turtle [a]	1.64	0.99	0.08	<0.01	<0.01	0	0	0	4.05	2.32	1.60	0.94
Leatherback turtle [a]	2.36	1.18	0.62	0.08	0	0	0	0	4.53	2.75	1.85	1.17
Loggerhead turtle	1.84	0.85	0.48	<0.01	<0.01	<0.01	0	0	4.34	2.41	1.60	1.04
Green turtle	1.83	0.71	0.37	0	0	0	0	0	4.12	2.49	1.63	1.06

[a] Listed as Endangered under the ESA.

Table H-37. WTGMP3 (13 m diameter, IHC S-6500, IHC S-6500 one per day, summer): Exposure ranges ($ER_{95\%}$) in km to sea turtle threshold criteria with sound attenuation.

Species	Injury $L_{E,w,24}$ 0 dB	Injury $L_{E,w,24}$ 6 dB	Injury $L_{E,w,24}$ 10 dB	Injury $L_{E,w,24}$ 15 dB	Injury L_{pk} 0 dB	Injury L_{pk} 6 dB	Injury L_{pk} 10 dB	Injury L_{pk} 15 dB	Behavior L_p 0 dB	Behavior L_p 6 dB	Behavior L_p 10 dB	Behavior L_p 15 dB
Kemp's ridley turtle [a]	1.49	1.04	0.54	0	0	0	0	0	3.41	2.36	1.80	0.68
Leatherback turtle [a]	2.98	1.61	1.10	0.38	0	0	0	0	4.57	3.12	2.07	1.15
Loggerhead turtle	2.46	1.20	0.78	0.06	0	0	0	0	4.33	2.85	1.82	0.97
Green turtle	2.09	1.07	0.53	0.03	0	0	0	0	4.21	2.79	1.96	1.07

[a] Listed as Endangered under the ESA.

Table H-38. WTGMP3 (13 m diameter, IHC S-6500, two per day, summer): Exposure ranges ($ER_{95\%}$) in km to sea turtle threshold criteria with sound attenuation.

Species	Injury $L_{E,w,24}$ 0 dB	Injury $L_{E,w,24}$ 6 dB	Injury $L_{E,w,24}$ 10 dB	Injury $L_{E,w,24}$ 15 dB	Injury L_{pk} 0 dB	Injury L_{pk} 6 dB	Injury L_{pk} 10 dB	Injury L_{pk} 15 dB	Behavior L_p 0 dB	Behavior L_p 6 dB	Behavior L_p 10 dB	Behavior L_p 15 dB
Kemp's ridley turtle [a]	1.78	1.09	0.07	0.08	<0.01	0	0	0	3.68	2.36	1.78	1.05
Leatherback turtle [a]	3.10	1.68	1.07	0.42	0	0	0	0	4.51	2.98	2.03	1.21
Loggerhead turtle	2.42	1.27	0.68	0.36	<0.01	<0.01	0	0	4.20	2.84	1.93	1.07
Green turtle	2.13	1.03	0.45	0.05	0	0	0	0	4.15	2.77	1.82	1.08

[a] Listed as Endangered under the ESA.

Table H-39. WTGMP3 (13 m diameter, IHC S-6500, one per day, winter): Exposure ranges ($ER_{95\%}$) in km to sea turtle threshold criteria with sound attenuation.

Species	Injury $L_{E,w,24}$ 0 dB	Injury $L_{E,w,24}$ 6 dB	Injury $L_{E,w,24}$ 10 dB	Injury $L_{E,w,24}$ 15 dB	Injury L_{pk} 0 dB	Injury L_{pk} 6 dB	Injury L_{pk} 10 dB	Injury L_{pk} 15 dB	Behavior L_p 0 dB	Behavior L_p 6 dB	Behavior L_p 10 dB	Behavior L_p 15 dB
Kemp's ridley turtle [a]	2.36	1.01	0.54	0	0	0	0	0	4.31	2.70	1.98	0.98
Leatherback turtle [a]	3.50	1.67	1.15	0.38	0	0	0	0	5.03	3.29	2.10	1.30
Loggerhead turtle	2.99	1.41	0.90	0.06	0	0	0	0	4.85	2.97	1.85	1.09
Green turtle	2.23	1.16	0.53	0.03	0	0	0	0	4.77	2.86	1.98	1.15

[a] Listed as Endangered under the ESA.

Table H-40. WTGMP3 (13 m diameter, IHC S-6500, two per day, winter): Exposure ranges ($ER_{95\%}$) in km to sea turtle threshold criteria with sound attenuation.

Species	Injury $L_{E,w,24}$ 0 dB	Injury $L_{E,w,24}$ 6 dB	Injury $L_{E,w,24}$ 10 dB	Injury $L_{E,w,24}$ 15 dB	Injury L_{pk} 0 dB	Injury L_{pk} 6 dB	Injury L_{pk} 10 dB	Injury L_{pk} 15 dB	Behavior L_p 0 dB	Behavior L_p 6 dB	Behavior L_p 10 dB	Behavior L_p 15 dB
Kemp's ridley turtle [a]	2.34	1.29	0.07	0.08	<0.01	0	0	0	4.19	2.42	1.79	1.02
Leatherback turtle [a]	3.63	1.84	1.18	0.42	0	0	0	0	4.87	3.19	2.21	1.23
Loggerhead turtle	2.98	1.43	0.73	0.36	<0.01	<0.01	0	0	4.79	3.08	1.97	1.08
Green turtle	2.46	1.11	0.53	0.05	0	0	0	0	4.53	2.90	1.90	1.10

[a] Listed as Endangered under the ESA.

Table H-41. WTGJ (4.5 m diameter, IHC S-2300, four per day, summer): Exposure ranges ($ER_{95\%}$) in km to sea turtle threshold criteria with sound attenuation.

Species	Injury $L_{E,w,24}$ 0 dB	Injury $L_{E,w,24}$ 6 dB	Injury $L_{E,w,24}$ 10 dB	Injury $L_{E,w,24}$ 15 dB	Injury L_{pk} 0 dB	Injury L_{pk} 6 dB	Injury L_{pk} 10 dB	Injury L_{pk} 15 dB	Behavior L_p 0 dB	Behavior L_p 6 dB	Behavior L_p 10 dB	Behavior L_p 15 dB
Kemp's ridley turtle [a]	0.86	0.20	0	0	0	0	0	0	1.51	0.84	0.40	0.25
Leatherback turtle [a]	2.55	1.25	0.57	0.12	0	0	0	0	2.17	1.17	0.57	0.12
Loggerhead turtle	1.22	0.65	0.18	0	0	0	0	0	1.94	1.00	0.50	0.31
Green turtle	0.90	0.21	0.06	0	0	0	0	0	1.85	0.90	0.51	0.26

[a] Listed as Endangered under the ESA.

Table H-42. WTGJ (4.5 m diameter, IHC S-2300, four per day, winter): Exposure ranges ($ER_{95\%}$) in km to sea turtle threshold criteria with sound attenuation.

Species	Injury $L_{E,w,24}$ 0 dB	Injury $L_{E,w,24}$ 6 dB	Injury $L_{E,w,24}$ 10 dB	Injury $L_{E,w,24}$ 15 dB	Injury L_{pk} 0 dB	Injury L_{pk} 6 dB	Injury L_{pk} 10 dB	Injury L_{pk} 15 dB	Behavior L_p 0 dB	Behavior L_p 6 dB	Behavior L_p 10 dB	Behavior L_p 15 dB
Kemp's ridley turtle [a]	0.87	0.19	0	0	0	0	0	0	1.51	0.87	0.48	0.25
Leatherback turtle [a]	2.89	1.36	0.74	0.12	0	0	0	0	2.38	1.13	0.57	0.12
Loggerhead turtle	1.20	0.77	0.18	0	0	0	0	0	1.98	0.86	0.49	0.24
Green turtle	0.96	0.28	0.09	0	0	0	0	0	1.96	0.93	0.54	0.25

[a] Listed as Endangered under the ESA.

Table H-43. OSS1 (3 m diameter, MHU 3000S, four per day, summer): Exposure ranges ($ER_{95\%}$) in km to sea turtle threshold criteria with sound attenuation.

Species	Injury $L_{E,w,24}$ 0 dB	Injury $L_{E,w,24}$ 6 dB	Injury $L_{E,w,24}$ 10 dB	Injury $L_{E,w,24}$ 15 dB	Injury L_{pk} 0 dB	Injury L_{pk} 6 dB	Injury L_{pk} 10 dB	Injury L_{pk} 15 dB	Behavior L_p 0 dB	Behavior L_p 6 dB	Behavior L_p 10 dB	Behavior L_p 15 dB
Kemp's ridley turtle [a]	1.35	0.59	0.28	0	0	0	0	0	1.95	1.18	0.62	0.25
Leatherback turtle [a]	3.65	2.08	1.41	0.69	0	0	0	0	2.79	1.50	0.85	0.41
Loggerhead turtle	1.86	1.12	0.36	0.24	<0.01	0	0	0	2.38	1.28	0.57	0.31
Green turtle	1.73	0.74	0.39	0.06	<0.01	0	0	0	2.37	1.24	0.76	0.30

[a] Listed as Endangered under the ESA.

Table H-44. OSS1 (3 m diameter, MHU 3000S, four per day, winter): Exposure ranges ($ER_{95\%}$) in km to sea turtle threshold criteria with sound attenuation.

Species	Injury $L_{E,w,24}$ 0 dB	Injury $L_{E,w,24}$ 6 dB	Injury $L_{E,w,24}$ 10 dB	Injury $L_{E,w,24}$ 15 dB	Injury L_{pk} 0 dB	Injury L_{pk} 6 dB	Injury L_{pk} 10 dB	Injury L_{pk} 15 dB	Behavior L_p 0 dB	Behavior L_p 6 dB	Behavior L_p 10 dB	Behavior L_p 15 dB
Kemp's ridley turtle [a]	1.63	0.60	0.27	0	0	0	0	0	1.99	1.14	0.61	0.25
Leatherback turtle [a]	4.03	2.35	1.45	0.69	0	0	0	0	2.97	1.50	0.86	0.41
Loggerhead turtle	2.05	0.99	0.35	0.24	<0.01	0	0	0	2.52	1.36	0.61	0.31
Green turtle	2.13	0.78	0.43	0.18	<0.01	0	0	0	2.43	1.25	0.76	0.31

[a] Listed as Endangered under the ESA.

Table H-45. OSS2 (3 m diameter, MHU 1700S, four per day, summer): Exposure ranges ($ER_{95\%}$) in km to sea turtle threshold criteria with sound attenuation.

Species	Injury $L_{E,w,24}$ 0 dB	Injury $L_{E,w,24}$ 6 dB	Injury $L_{E,w,24}$ 10 dB	Injury $L_{E,w,24}$ 15 dB	Injury L_{pk} 0 dB	Injury L_{pk} 6 dB	Injury L_{pk} 10 dB	Injury L_{pk} 15 dB	Behavior L_p 0 dB	Behavior L_p 6 dB	Behavior L_p 10 dB	Behavior L_p 15 dB
Kemp's ridley turtle [a]	0.47	0.29	0	0	0	0	0	0	1.48	0.96	0.43	0.34
Leatherback turtle [a]	1.35	0.75	0.34	0	0	0	0	0	1.49	0.95	0.34	0.34
Loggerhead turtle	0.75	0.33	0	0	0	0	0	0	1.41	0.78	0.44	0.31
Green turtle	0.69	0.25	<0.01	0	<0.01	0	0	0	1.49	0.96	0.51	0.28

[a] Listed as Endangered under the ESA.

Table H-46. OSS2 (3 m diameter, MHU 1700S, four per day, winter): Exposure ranges ($ER_{95\%}$) in km to sea turtle threshold criteria with sound attenuation.

Species	Injury $L_{E,w,24}$ 0 dB	Injury $L_{E,w,24}$ 6 dB	Injury $L_{E,w,24}$ 10 dB	Injury $L_{E,w,24}$ 15 dB	Injury L_{pk} 0 dB	Injury L_{pk} 6 dB	Injury L_{pk} 10 dB	Injury L_{pk} 15 dB	Behavior L_p 0 dB	Behavior L_p 6 dB	Behavior L_p 10 dB	Behavior L_p 15 dB
Kemp's ridley turtle [a]	0.47	0.04	0	0	0	0	0	0	1.32	0.70	0.43	0.34
Leatherback turtle [a]	1.35	0.76	0.34	0	0	0	0	0	1.45	0.84	0.34	0.34
Loggerhead turtle	0.74	0.33	0	0	0	0	0	0	1.27	0.76	0.36	0.23
Green turtle	0.67	0.25	<0.01	0	<0.01	0	0	0	1.34	0.78	0.44	0.28

[a] Listed as Endangered under the ESA.

H.2.3. Exposure Ranges – 30 Min Vibratory Pile Setting Followed by Impact Pile Driving

H.2.3.1. Marine Mammals

This section contains marine mammal exposure ranges for each of the modeled foundation types and seasons assuming 0, 6, 10, and 15 dB broadband attenuation. Exposure ranges are shown in Tables H-47 to H-66. See Section 2.4 of the main acoustic report for definitions of marine mammal threshold criteria.

Table H-47. PTS: WTGMP2 (13 m diameter, IHC S-5500, one per day, summer): 30 min vibratory and impact exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with sound attenuation.

Hearing group	Species	$L_{E,w,24h}$ 0 dB	$L_{E,w,24h}$ 6 dB	$L_{E,w,24h}$ 10 dB	$L_{E,w,24h}$ 15 dB	L_{pk} 0 dB	L_{pk} 6 dB	L_{pk} 10 dB	L_{pk} 15 dB
LF	Fin whale [a]	6.19	4.19	2.92	1.74	0.06	0	0	0
LF	Minke whale (migrating)	4.03	2.33	1.67	0.80	0.01	0.01	0	0
LF	Humpback whale	5.60	3.56	2.47	1.26	<0.01	<0.01	<0.01	<0.01
LF	North Atlantic right whale [a]	4.77	2.92	2.00	0.97	<0.01	<0.01	<0.01	0
LF	Sei whale [a] (migrating)	4.24	2.51	1.80	0.70	<0.01	0	0	0
MF	Atlantic white-sided dolphin	0	0	0	0	0	0	0	0
MF	Atlantic spotted dolphin	0	0	0	0	0	0	0	0
MF	Common dolphin	0	0	0	0	0	0	0	0
MF	Bottlenose dolphin, offshore	0	0	0	0	0	0	0	0
MF	Risso's dolphin	0	0	0	0	<0.01	<0.01	0	0
MF	Long-finned pilot whale	0	0	0	0	<0.01	<0.01	0	0
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0
MF	Sperm whale [a]	0	0	0	0	0	0	0	0
HF	Harbor porpoise (sensitive)	0	0	0	0	1.09	0.43	0.31	0.02
PW	Gray seal	0.84	0.37	0	0	0	0	0	0
PW	Harbor seal	0.66	0.26	0	0	0	0	0	0
PW	Harp seal	0.85	0.03	0.03	0	0.03	0.03	0	0

[a] Listed as Endangered under the ESA

Table H-48. Behavior: WTGMP2 (13 m diameter, IHC S-5500, one per day, summer): 30 min vibratory and impact exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with sound attenuation.

Hearing group	Species	Impact piling L_p [a] 0 dB	Impact piling L_p [a] 6 dB	Impact piling L_p [a] 10 dB	Impact piling L_p [a] 15 dB	Impact piling $L_{p,w}$ [b] 0 dB	Impact piling $L_{p,w}$ [b] 6 dB	Impact piling $L_{p,w}$ [b] 10 dB	Impact piling $L_{p,w}$ [b] 15 dB	Vibratory piling L_p [a] 0 dB	Vibratory piling L_p [a] 6 dB	Vibratory piling L_p [a] 10 dB	Vibratory piling L_p [a] 15 dB
LF	Fin whale [c]	10.11	7.22	5.71	4.05	10.10	7.16	5.68	3.99	35.71	30.58	27.28	24.02
LF	Minke whale (migrating)	9.77	6.96	5.57	3.90	24.43	19.30	16.12	12.66	34.37	29.42	26.25	22.50
LF	Humpback whale	10.07	7.19	5.61	4.10	10.04	7.16	5.60	4.03	35.74	30.17	27.06	23.70
LF	North Atlantic right whale [c]	9.77	6.95	5.56	4.02	9.74	6.96	5.54	3.98	33.76	28.93	25.83	22.48
LF	Sei whale [c] (migrating)	10.15	7.00	5.51	3.96	25.68	20.19	16.81	13.03	35.92	31.04	27.55	24.00
MF	Atlantic white-sided dolphin	9.61	6.98	5.41	3.88	5.24	3.54	2.38	1.69	34.30	29.26	26.16	22.39
MF	Atlantic spotted dolphin	9.12	6.43	5.13	3.64	3.96	3.06	2.20	1.53	35.98	30.49	27.19	23.08
MF	Common dolphin	9.79	6.89	5.58	3.96	5.41	3.41	2.45	1.57	35.33	30.04	26.83	23.28
MF	Bottlenose dolphin, offshore	9.24	6.60	5.00	3.64	4.78	3.04	2.15	1.51	33.91	29.32	25.79	22.84
MF	Risso’s dolphin	9.22	6.74	5.21	3.76	5.15	3.61	2.41	1.53	34.32	29.39	26.26	22.64
MF	Long-finned pilot whale	9.39	6.74	5.36	3.83	5.16	3.45	2.48	1.56	33.36	28.51	25.46	21.84
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0	0	0	0	0
MF	Sperm whale [c]	9.91	7.08	5.65	4.09	5.51	3.40	2.52	1.70	35.23	30.29	27.08	23.54
HF	Harbor porpoise (sensitive)	8.17	6.25	4.79	3.75	26.96	21.51	18.57	15.10	28.91	24.71	22.06	18.92
PW	Gray seal	10.39	7.40	5.84	4.22	7.76	5.52	4.14	2.81	35.56	30.44	27.28	23.74
PW	Harbor seal	9.02	6.48	5.14	3.62	6.79	4.57	3.42	2.59	29.80	26.20	23.46	20.41
PW	Harp seal	10.05	7.18	5.66	4.05	7.46	5.29	3.89	2.73	35.50	30.44	27.41	23.86

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

Table H-49. PTS: WTGMP2 (13 m diameter, IHC S-5500, two per day, summer): 30 min vibratory and impact exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with sound attenuation.

Hearing group	Species	$L_{E,w,24h}$ 0 dB	$L_{E,w,24h}$ 6 dB	$L_{E,w,24h}$ 10 dB	$L_{E,w,24h}$ 15 dB	L_{pk} 0 dB	L_{pk} 6 dB	L_{pk} 10 dB	L_{pk} 15 dB
LF	Fin whale [a]	6.08	4.15	3.03	1.95	0.07	<0.01	<0.01	<0.01
LF	Minke whale (migrating)	3.96	2.47	1.56	0.72	0.03	0.02	0	0
LF	Humpback whale	5.67	3.74	2.85	1.45	0.02	0	0	0
LF	North Atlantic right whale [a]	4.68	3.01	1.95	1.00	0.12	0	0	0
LF	Sei whale [a] (migrating)	4.19	2.59	1.57	0.90	0.08	0	0	0
MF	Atlantic white-sided dolphin	0	0	0	0	0	0	0	0
MF	Atlantic spotted dolphin	0	0	0	0	0	0	0	0
MF	Common dolphin	0	0	0	0	0	0	0	0
MF	Bottlenose dolphin, offshore	0	0	0	0	0	0	0	0
MF	Risso's dolphin	0	0	0	0	<0.01	<0.01	0	0
MF	Long-finned pilot whale	0	0	0	0	<0.01	<0.01	0	0
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0
MF	Sperm whale [a]	0	0	0	0	0	0	0	0
HF	Harbor porpoise (sensitive)	0	0	0	0	1.04	0.48	0.41	0
PW	Gray seal	1.01	0.41	0.23	0	0	0	0	0
PW	Harbor seal	0.63	0.24	0	0	0.06	0	0	0
PW	Harp seal	0.87	0.20	<0.01	0	0.08	0.02	<0.01	0

[a] Listed as Endangered under the ESA.

Table H-50. Behavior: WTGMP2 (13 m diameter, IHC S-5500, two per day, summer): 30 min vibratory and impact exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with sound attenuation.

Hearing group	Species	Impact piling L_p [a] 0 dB	Impact piling L_p [a] 6 dB	Impact piling L_p [a] 10 dB	Impact piling L_p [a] 15 dB	Impact piling $L_{p,w}$ [b] 0 dB	Impact piling $L_{p,w}$ [b] 6 dB	Impact piling $L_{p,w}$ [b] 10 dB	Impact piling $L_{p,w}$ [b] 15 dB	Vibratory piling L_p [a] 0 dB	Vibratory piling L_p [a] 6 dB	Vibratory piling L_p [a] 10 dB	Vibratory piling L_p [a] 15 dB
LF	Fin whale [c]	10.01	7.09	5.59	4.00	9.95	7.03	5.56	3.93	35.28	30.40	27.30	23.77
LF	Minke whale (migrating)	9.44	6.80	5.50	3.93	23.99	18.45	15.49	12.38	33.42	28.83	25.92	22.32
LF	Humpback whale	9.90	7.02	5.46	4.06	9.81	7.00	5.44	3.97	34.98	30.10	27.17	23.51
LF	North Atlantic right whale [c]	9.56	6.80	5.32	3.75	9.50	6.80	5.31	3.69	33.32	28.61	25.82	22.31
LF	Sei whale [c] (migrating)	9.90	6.97	5.48	3.82	25.06	19.79	16.58	12.89	35.69	30.80	27.44	23.84
MF	Atlantic white-sided dolphin	9.26	6.66	5.36	3.68	5.12	3.32	2.33	1.55	33.33	28.74	25.64	22.05
MF	Atlantic spotted dolphin	8.85	6.47	5.06	3.77	4.09	2.94	2.16	1.42	34.76	29.84	26.71	23.04
MF	Common dolphin	9.63	6.92	5.42	3.84	5.20	3.44	2.43	1.62	34.47	29.56	26.58	23.16
MF	Bottlenose dolphin, offshore	9.11	6.25	4.96	3.68	4.37	2.97	2.06	1.41	33.25	28.40	25.83	22.44
MF	Risso's dolphin	9.09	6.48	5.19	3.79	5.06	3.42	2.35	1.57	33.18	28.37	25.49	22.09
MF	Long-finned pilot whale	9.01	6.49	5.26	3.68	5.00	3.25	2.34	1.51	32.53	27.81	24.93	21.48
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0	0	0	0	0
MF	Sperm whale [c]	9.85	6.93	5.55	3.90	5.28	3.40	2.44	1.76	34.84	29.77	26.80	23.51
HF	Harbor porpoise (sensitive)	8.05	6.07	4.74	3.56	26.10	21.39	18.13	14.73	28.33	24.24	21.73	18.77
PW	Gray seal	10.24	7.15	5.71	4.24	7.61	5.27	4.24	2.83	34.96	30.30	26.98	23.78
PW	Harbor seal	8.66	6.15	4.99	3.53	6.40	4.42	3.45	2.44	29.14	25.67	22.99	20.13
PW	Harp seal	9.97	6.99	5.62	4.04	7.27	5.05	3.89	2.54	34.96	30.27	27.06	23.81

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

Table H-51. PTS: WTGMP2 (13 m diameter, IHC S-5500, one per day, winter): 30 min vibratory and impact exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with sound attenuation.

Hearing group	Species	$L_{E,w,24h}$ 0 dB	$L_{E,w,24h}$ 6 dB	$L_{E,w,24h}$ 10 dB	$L_{E,w,24h}$ 15 dB	L_{pk} 0 dB	L_{pk} 6 dB	L_{pk} 10 dB	L_{pk} 15 dB
LF	Fin whale [a]	7.66	4.98	3.75	2.00	0.06	0	0	0
LF	Minke whale (migrating)	4.99	2.79	1.81	0.90	0.01	0.01	0	0
LF	Humpback whale	7.32	4.31	3.03	1.53	<0.01	<0.01	<0.01	<0.01
LF	North Atlantic right whale [a]	5.91	3.56	2.19	1.09	<0.01	<0.01	<0.01	0
LF	Sei whale [a] (migrating)	5.34	3.02	1.96	0.86	<0.01	0	0	0
MF	Atlantic white-sided dolphin	0	0	0	0	0	0	0	0
MF	Atlantic spotted dolphin	0	0	0	0	0	0	0	0
MF	Common dolphin	0	0	0	0	0	0	0	0
MF	Bottlenose dolphin, offshore	0	0	0	0	0	0	0	0
MF	Risso's dolphin	0	0	0	0	<0.01	<0.01	0	0
MF	Long-finned pilot whale	0	0	0	0	<0.01	<0.01	0	0
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0
MF	Sperm whale [a]	0	0	0	0	0	0	0	0
HF	Harbor porpoise (sensitive)	0	0	0	0	0.83	0.47	0.19	0.04
PW	Gray seal	0.84	0.53	0	0	0	0	0	0
PW	Harbor seal	0.80	0.26	0	0	0	0	0	0
PW	Harp seal	1.03	0.03	0.03	0	0.03	0.03	0	0

[a] Listed as Endangered under the ESA.

Table H-52. Behavior: WTGMP2 (13 m diameter, IHC S-5500, one per day, winter): 30 min vibratory and impact exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with sound attenuation.

Hearing group	Species	Impact piling L_p [a] 0 dB	Impact piling L_p [a] 6 dB	Impact piling L_p [a] 10 dB	Impact piling L_p [a] 15 dB	Impact piling $L_{p,w}$ [b] 0 dB	Impact piling $L_{p,w}$ [b] 6 dB	Impact piling $L_{p,w}$ [b] 10 dB	Impact piling $L_{p,w}$ [b] 15 dB	Vibratory piling L_p [a] 0 dB	Vibratory piling L_p [a] 6 dB	Vibratory piling L_p [a] 10 dB	Vibratory piling L_p [a] 15 dB
LF	Fin whale [c]	13.91	8.71	6.53	4.51	13.72	8.68	6.52	4.52	78.94	49.34	41.55	32.80
LF	Minke whale (migrating)	13.58	8.45	6.49	4.39	55.71	35.57	27.57	19.69	77.11	48.74	40.61	32.48
LF	Humpback whale	13.62	8.61	6.47	4.44	13.54	8.62	6.48	4.44	78.02	49.53	41.14	32.73
LF	North Atlantic right whale [c]	13.17	8.18	6.07	4.29	13.17	8.17	6.11	4.34	72.15	45.94	38.05	31.23
LF	Sei whale [c] (migrating)	13.93	8.33	5.98	4.24	58.54	37.29	28.93	20.32	79.13	50.34	42.41	34.07
MF	Atlantic white-sided dolphin	13.08	8.33	6.19	4.32	5.92	3.79	2.60	1.72	76.55	48.68	40.61	32.59
MF	Atlantic spotted dolphin	13.18	6.81	5.35	3.77	3.97	3.02	2.20	1.37	80.28	51.43	43.09	35.04
MF	Common dolphin	13.30	8.30	6.37	4.21	6.07	3.75	2.76	1.72	78.62	49.34	41.40	32.86
MF	Bottlenose dolphin, offshore	12.35	7.81	5.62	4.21	5.29	3.47	2.18	1.62	76.05	47.51	39.89	31.87
MF	Risso’s dolphin	12.95	8.10	6.00	4.28	5.97	3.74	2.68	1.74	75.42	48.11	40.14	32.13
MF	Long-finned pilot whale	13.17	8.21	6.16	4.19	5.96	3.62	2.69	1.55	73.21	48.29	39.93	32.22
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0	92.47	0	0	0
MF	Sperm whale [c]	13.50	8.62	6.51	4.42	6.23	4.05	2.81	1.82	78.24	49.69	40.95	32.61
HF	Harbor porpoise (sensitive)	11.41	7.41	5.66	4.10	111.86	83.05	47.85	31.36	52.60	39.50	33.21	27.23
PW	Gray seal	14.03	9.01	6.63	4.74	10.26	6.24	4.72	3.15	78.72	49.47	41.43	32.84
PW	Harbor seal	12.46	7.65	5.67	4.09	8.99	5.39	4.11	2.73	57.16	40.47	33.51	27.51
PW	Harp seal	13.70	8.72	6.53	4.63	9.84	6.07	4.61	3.08	78.73	49.13	41.20	32.78

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

Table H-53. PTS: WTGMP2 (13 m diameter, IHC S-5500, two per day, winter): 30 min vibratory and impact exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with sound attenuation.

Hearing group	Species	$L_{E,w,24h}$ 0 dB	$L_{E,w,24h}$ 6 dB	$L_{E,w,24h}$ 10 dB	$L_{E,w,24h}$ 15 dB	L_{pk} 0 dB	L_{pk} 6 dB	L_{pk} 10 dB	L_{pk} 15 dB
LF	Fin whale [a]	7.93	5.09	3.47	2.13	0.07	<0.01	<0.01	<0.01
LF	Minke whale (migrating)	5.05	2.79	1.79	0.85	0.03	0.02	0	0
LF	Humpback whale	7.75	4.61	3.21	1.87	0.02	0	0	0
LF	North Atlantic right whale [a]	6.00	3.58	2.19	1.23	0.12	0	0	0
LF	Sei whale [a] (migrating)	5.00	2.97	1.77	1.16	0.06	0	0	0
MF	Atlantic white-sided dolphin	0	0	0	0	0	0	0	0
MF	Atlantic spotted dolphin	0	0	0	0	0	0	0	0
MF	Common dolphin	0	0	0	0	0	0	0	0
MF	Bottlenose dolphin, offshore	0	0	0	0	0	0	0	0
MF	Risso's dolphin	0	0	0	0	<0.01	<0.01	0	0
MF	Long-finned pilot whale	0	0	0	0	<0.01	<0.01	0	0
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0
MF	Sperm whale [a]	0	0	0	0	0	0	0	0
HF	Harbor porpoise (sensitive)	0	0	0	0	0.90	0.48	0.20	0
PW	Gray seal	1.01	0.41	0.23	0	0	0	0	0
PW	Harbor seal	0.72	0.24	0	0	0.06	0	0	0
PW	Harp seal	0.99	0.22	<0.01	0	0.08	0.02	<0.01	0

[a] Listed as Endangered under the ESA.

Table H-54. Behavior: WTGMP2 (13 m diameter, IHC S-5500, two per day, winter): 30 min vibratory and impact exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with sound attenuation.

Hearing group	Species	Impact piling L_p [a] 0 dB	Impact piling L_p [a] 6 dB	Impact piling L_p [a] 10 dB	Impact piling L_p [a] 15 dB	Impact piling $L_{p,w}$ [b] 0 dB	Impact piling $L_{p,w}$ [b] 6 dB	Impact piling $L_{p,w}$ [b] 10 dB	Impact piling $L_{p,w}$ [b] 15 dB	Vibratory piling L_p [a] 0 dB	Vibratory piling L_p [a] 6 dB	Vibratory piling L_p [a] 10 dB	Vibratory piling L_p [a] 15 dB
LF	Fin whale [c]	13.33	8.58	6.27	4.46	13.34	8.47	6.28	4.46	76.73	47.37	39.11	31.58
LF	Minke whale (migrating)	12.78	8.24	6.07	4.19	54.69	34.43	26.58	18.82	74.76	46.68	38.54	30.82
LF	Humpback whale	13.22	8.41	6.47	4.38	13.21	8.41	6.45	4.39	75.65	47.38	38.75	31.49
LF	North Atlantic right whale [c]	12.68	7.92	5.92	4.23	12.68	7.94	5.94	4.23	71.04	45.02	37.62	29.36
LF	Sei whale [c] (migrating)	13.46	7.95	5.92	4.10	57.25	36.13	28.14	19.88	77.19	48.61	40.48	32.37
MF	Atlantic white-sided dolphin	12.48	7.97	5.94	4.02	5.84	3.47	2.60	1.62	73.61	45.95	38.28	30.78
MF	Atlantic spotted dolphin	12.06	6.88	5.56	3.88	4.11	2.95	2.12	1.38	77.73	49.88	41.96	33.50
MF	Common dolphin	12.46	8.02	6.08	4.11	5.88	3.61	2.66	1.85	74.92	46.33	39.15	30.97
MF	Bottlenose dolphin, offshore	11.57	7.54	5.54	3.90	5.14	3.41	2.23	1.44	72.09	44.39	36.59	29.13
MF	Risso's dolphin	12.24	8.03	5.71	4.04	5.52	3.68	2.63	1.64	71.32	45.33	37.74	30.29
MF	Long-finned pilot whale	12.60	7.83	5.92	3.94	5.76	3.47	2.57	1.66	71.21	46.36	38.09	30.60
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0	92.53	0	0	0
MF	Sperm whale [c]	12.97	8.18	6.05	4.32	5.92	3.80	2.75	1.88	76.02	47.20	38.98	31.13
HF	Harbor porpoise (sensitive)	11.09	7.00	5.40	3.88	109.43	81.48	46.35	30.47	50.20	37.58	31.71	25.81
PW	Gray seal	13.56	8.61	6.48	4.57	9.91	5.99	4.54	3.13	76.42	47.36	38.92	31.30
PW	Harbor seal	11.74	7.35	5.54	3.73	8.52	5.05	3.77	2.65	52.82	37.51	31.43	25.66
PW	Harp seal	12.94	8.43	6.35	4.31	9.67	5.86	4.35	2.93	75.90	46.56	39.25	31.34

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

Table H-55. PTS: WTGMP3 (13 m diameter, IHC S-6500, one per day, summer): 30 min vibratory and impact exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with sound attenuation.

Hearing group	Species	$L_{E,w,24h}$ 0 dB	$L_{E,w,24h}$ 6 dB	$L_{E,w,24h}$ 10 dB	$L_{E,w,24h}$ 15 dB	L_{pk} 0 dB	L_{pk} 6 dB	L_{pk} 10 dB	L_{pk} 15 dB
LF	Fin whale [a]	7.03	4.87	3.58	2.37	0.05	0.03	<0.01	<0.01
LF	Minke whale (migrating)	4.67	2.82	1.92	0.86	0.01	0	0	0
LF	Humpback whale	6.58	4.28	3.10	1.89	0.11	<0.01	<0.01	<0.01
LF	North Atlantic right whale [a]	5.34	3.46	2.31	1.26	0.03	0.03	<0.01	0
LF	Sei whale [a] (migrating)	4.95	3.29	2.10	1.46	0.03	<0.01	0	0
MF	Atlantic white-sided dolphin	0	0	0	0	<0.01	<0.01	0	0
MF	Atlantic spotted dolphin	0	0	0	0	0	0	0	0
MF	Common dolphin	0	0	0	0	0	0	0	0
MF	Bottlenose dolphin, offshore	0	0	0	0	0	0	0	0
MF	Risso's dolphin	0	0	0	0	<0.01	<0.01	0	0
MF	Long-finned pilot whale	0	0	0	0	<0.01	<0.01	0	0
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0
MF	Sperm whale [a]	0	0	0	0	0	0	0	0
HF	Harbor porpoise (sensitive)	0	0	0	0	1.10	0.51	0.41	0.06
PW	Gray seal	1.48	0.63	0.36	0	0.10	0	0	0
PW	Harbor seal	0.87	0.39	0	0	<0.01	0	0	0
PW	Harp seal	1.19	0.46	0.03	0	0.03	0.03	0	0

[a] Listed as Endangered under the ESA.

Table H-56. Behavior: WTGMP3 (13 m diameter, IHC S-6500, one per day, summer): 30 min vibratory and impact exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with sound attenuation.

Hearing group	Species	Impact piling L_p [a] 0 dB	Impact piling L_p [a] 6 dB	Impact piling L_p [a] 10 dB	Impact piling L_p [a] 15 dB	Impact piling $L_{p,w}$ [b] 0 dB	Impact piling $L_{p,w}$ [b] 6 dB	Impact piling $L_{p,w}$ [b] 10 dB	Impact piling $L_{p,w}$ [b] 15 dB	Vibratory piling L_p [a] 0 dB	Vibratory piling L_p [a] 6 dB	Vibratory piling L_p [a] 10 dB	Vibratory piling L_p [a] 15 dB
LF	Fin whale [c]	10.98	7.82	6.13	4.48	11.04	7.76	6.08	4.45	34.81	29.70	26.50	23.29
LF	Minke whale (migrating)	10.63	7.64	5.99	4.29	26.98	21.28	17.83	14.01	33.29	28.07	25.43	21.83
LF	Humpback whale	10.92	7.82	6.12	4.43	10.93	7.81	6.09	4.43	34.61	29.40	26.44	23.04
LF	North Atlantic right whale [c]	10.69	7.56	5.85	4.23	10.76	7.50	5.86	4.22	33.05	28.12	25.26	21.80
LF	Sei whale [c] (migrating)	10.76	7.71	5.91	4.34	28.71	22.33	18.40	14.61	35.27	30.21	26.79	23.40
MF	Atlantic white-sided dolphin	10.50	7.45	5.96	4.22	5.56	3.78	2.66	1.78	33.23	28.13	25.33	21.69
MF	Atlantic spotted dolphin	10.79	6.84	5.65	4.11	4.41	3.25	2.53	1.65	34.35	29.05	26.14	22.49
MF	Common dolphin	10.74	7.61	6.00	4.35	5.75	3.81	2.82	1.72	34.24	28.96	26.03	22.66
MF	Bottlenose dolphin, offshore	10.21	7.16	5.59	4.00	5.11	3.33	2.63	1.60	33.07	28.44	25.11	22.24
MF	Risso’s dolphin	10.17	7.30	5.74	4.26	5.47	3.68	2.68	1.80	33.32	28.20	25.52	21.92
MF	Long-finned pilot whale	10.30	7.31	5.76	4.28	5.38	3.72	2.59	1.71	32.12	27.34	24.49	20.99
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0	0	0	0	0
MF	Sperm whale [c]	10.86	7.66	6.05	4.45	5.67	3.91	2.86	1.90	34.37	29.52	26.40	22.90
HF	Harbor porpoise (sensitive)	8.90	6.71	5.31	3.95	29.43	23.70	20.65	16.72	27.95	24.12	21.43	18.41
PW	Gray seal	11.21	7.92	6.26	4.54	8.61	5.95	4.45	2.97	34.55	29.52	26.66	23.10
PW	Harbor seal	9.76	7.12	5.75	4.10	7.57	4.88	3.77	2.63	28.50	25.02	22.30	19.22
PW	Harp seal	10.84	7.82	6.17	4.36	8.50	5.83	4.24	3.00	34.45	29.68	26.67	23.18

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

Table H-57. PTS: WTGMP3 (13 m diameter, IHC S-6500, two per day, summer): 30 min vibratory and impact exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with sound attenuation.

Hearing group	Species	$L_{E,w,24h}$ 0 dB	$L_{E,w,24h}$ 6 dB	$L_{E,w,24h}$ 10 dB	$L_{E,w,24h}$ 15 dB	L_{pk} 0 dB	L_{pk} 6 dB	L_{pk} 10 dB	L_{pk} 15 dB
LF	Fin whale [a]	7.17	4.93	3.57	2.52	0.09	<0.01	<0.01	<0.01
LF	Minke whale (migrating)	4.60	2.82	2.00	1.08	0.03	0.02	0	0
LF	Humpback whale	6.87	4.40	3.21	1.85	0.06	0.03	0	0
LF	North Atlantic right whale [a]	5.30	3.52	2.35	1.39	0.12	<0.01	0	0
LF	Sei whale [a] (migrating)	4.77	2.97	2.05	1.14	0.08	<0.01	<0.01	0
MF	Atlantic white-sided dolphin	0	0	0	0	0	0	0	0
MF	Atlantic spotted dolphin	0	0	0	0	0	0	0	0
MF	Common dolphin	0	0	0	0	<0.01	<0.01	0	0
MF	Bottlenose dolphin, offshore	0	0	0	0	0	0	0	0
MF	Risso's dolphin	0	0	0	0	<0.01	<0.01	0	0
MF	Long-finned pilot whale	0	0	0	0	<0.01	<0.01	0	0
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0
MF	Sperm whale [a]	0	0	0	0	0	0	0	0
HF	Harbor porpoise (sensitive)	<0.01	0	0	0	1.05	0.48	0.45	0.03
PW	Gray seal	1.51	0.58	0.41	0	0	0	0	0
PW	Harbor seal	1.18	0.39	0.06	0	0.06	<0.01	<0.01	<0.01
PW	Harp seal	1.10	0.35	0.09	0	0.10	0.01	<0.01	0

[a] Listed as Endangered under the ESA.

Table H-58. Behavior: WTGMP3 (13 m diameter, IHC S-6500, two per day, summer): 30 min vibratory and impact exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with sound attenuation.

Hearing group	Species	Impact piling L_p [a] 0 dB	Impact piling L_p [a] 6 dB	Impact piling L_p [a] 10 dB	Impact piling L_p [a] 15 dB	Impact piling $L_{p,w}$ [b] 0 dB	Impact piling $L_{p,w}$ [b] 6 dB	Impact piling $L_{p,w}$ [b] 10 dB	Impact piling $L_{p,w}$ [b] 15 dB	Vibratory piling L_p [a] 0 dB	Vibratory piling L_p [a] 6 dB	Vibratory piling L_p [a] 10 dB	Vibratory piling L_p [a] 15 dB
LF	Fin whale [c]	10.87	7.74	6.04	4.42	10.85	7.62	5.99	4.38	34.75	29.80	26.80	23.30
LF	Minke whale (migrating)	10.40	7.49	5.91	4.34	26.19	20.73	17.16	13.53	32.81	27.98	25.28	21.80
LF	Humpback whale	10.76	7.66	5.93	4.41	10.80	7.63	5.91	4.41	34.42	29.64	26.79	23.13
LF	North Atlantic right whale [c]	10.46	7.38	5.86	4.29	10.46	7.39	5.77	4.31	32.66	28.19	25.45	21.91
LF	Sei whale [c] (migrating)	10.78	7.62	5.90	4.30	28.19	21.81	18.09	14.28	35.03	30.11	26.97	23.44
MF	Atlantic white-sided dolphin	10.26	7.36	5.83	4.15	5.52	3.52	2.61	1.65	32.68	28.01	25.11	21.60
MF	Atlantic spotted dolphin	10.27	6.85	5.63	4.07	4.35	3.16	2.42	1.65	33.80	28.83	25.95	22.53
MF	Common dolphin	10.49	7.49	5.92	4.33	5.60	3.75	2.67	1.77	33.80	28.90	26.19	22.75
MF	Bottlenose dolphin, offshore	9.90	7.09	5.52	3.95	4.74	3.17	2.37	1.59	32.68	27.95	25.36	22.11
MF	Risso's dolphin	10.04	7.12	5.68	4.21	5.37	3.63	2.62	1.73	32.31	27.82	24.73	21.64
MF	Long-finned pilot whale	9.97	7.13	5.67	4.17	5.39	3.48	2.60	1.73	31.77	27.13	24.32	20.95
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0	0	0	0	0
MF	Sperm whale [c]	10.63	7.62	5.92	4.33	5.72	3.84	2.70	1.85	34.27	29.45	26.37	23.10
HF	Harbor porpoise (sensitive)	8.57	6.43	5.13	3.74	28.83	23.39	20.34	16.43	27.88	23.94	21.35	18.42
PW	Gray seal	10.93	7.77	6.09	4.50	8.29	5.71	4.38	3.05	34.31	29.71	26.69	23.42
PW	Harbor seal	9.48	6.63	5.34	3.78	7.15	4.71	3.61	2.63	28.80	25.39	22.53	19.78
PW	Harp seal	10.76	7.74	6.04	4.34	8.30	5.64	4.07	2.87	34.42	29.76	26.64	23.40

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

Table H-59. PTS: WTGMP3 (13 m diameter, IHC S-6500, one per day, winter): 30 min vibratory and impact exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with sound attenuation.

Hearing group	Species	$L_{E,w,24h}$ 0 dB	$L_{E,w,24h}$ 6 dB	$L_{E,w,24h}$ 10 dB	$L_{E,w,24h}$ 15 dB	L_{pk} 0 dB	L_{pk} 6 dB	L_{pk} 10 dB	L_{pk} 15 dB
LF	Fin whale [a]	9.56	5.85	4.42	2.80	0.05	0.03	<0.01	<0.01
LF	Minke whale (migrating)	6.36	3.53	2.14	1.06	0.13	0	0	0
LF	Humpback whale	9.15	5.48	3.67	2.22	0.11	<0.01	<0.01	<0.01
LF	North Atlantic right whale [a]	7.12	4.17	2.79	1.54	0.03	0.03	<0.01	0
LF	Sei whale [a] (migrating)	6.70	3.70	2.51	1.43	0.03	<0.01	0	0
MF	Atlantic white-sided dolphin	0	0	0	0	<0.01	<0.01	0	0
MF	Atlantic spotted dolphin	0	0	0	0	0	0	0	0
MF	Common dolphin	0	0	0	0	0	0	0	0
MF	Bottlenose dolphin, offshore	0	0	0	0	0	0	0	0
MF	Risso’s dolphin	0	0	0	0	<0.01	<0.01	0	0
MF	Long-finned pilot whale	0	0	0	0	<0.01	<0.01	0	0
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0
MF	Sperm whale [a]	0	0	0	0	0	0	0	0
HF	Harbor porpoise (sensitive)	0	0	0	0	1.06	0.51	0.18	0.06
PW	Gray seal	1.68	0.63	0.36	0	0.10	0	0	0
PW	Harbor seal	1.25	0.43	<0.01	0	0.03	<0.01	<0.01	<0.01
PW	Harp seal	1.37	0.56	0.03	0	0.03	0.03	0	0

[a] Listed as Endangered under the ESA.

Table H-60. Behavior: WTGMP3 (13 m diameter, IHC S-6500, one per day, winter): 30 min vibratory and impact exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with sound attenuation.

Hearing group	Species	Impact piling L_p [a] 0 dB	Impact piling L_p [a] 6 dB	Impact piling L_p [a] 10 dB	Impact piling L_p [a] 15 dB	Impact piling $L_{p,w}$ [b] 0 dB	Impact piling $L_{p,w}$ [b] 6 dB	Impact piling $L_{p,w}$ [b] 10 dB	Impact piling $L_{p,w}$ [b] 15 dB	Vibratory piling L_p [a] 0 dB	Vibratory piling L_p [a] 6 dB	Vibratory piling L_p [a] 10 dB	Vibratory piling L_p [a] 15 dB
LF	Fin whale [c]	16.02	10.02	7.37	4.96	16.05	10.02	7.32	4.94	105.05	49.35	39.24	30.07
LF	Minke whale (migrating)	15.71	9.83	7.25	4.84	79.62	42.78	31.71	22.60	105.15	49.02	38.13	30.00
LF	Humpback whale	15.98	10.01	7.33	4.98	15.75	9.98	7.30	5.00	104.82	49.54	39.04	29.94
LF	North Atlantic right whale [c]	15.58	9.69	7.09	4.76	15.39	9.70	7.11	4.74	84.80	45.97	36.26	28.52
LF	Sei whale [c] (migrating)	16.30	9.80	6.75	4.60	82.35	44.24	33.41	23.90	105.97	50.34	39.82	30.61
MF	Atlantic white-sided dolphin	15.19	9.59	6.98	4.61	6.86	4.11	2.96	1.92	103.07	48.86	38.09	29.89
MF	Atlantic spotted dolphin	16.20	8.17	5.91	4.32	4.58	3.27	2.32	1.58	107.76	51.43	40.85	31.69
MF	Common dolphin	15.30	9.81	7.08	4.73	7.08	4.15	2.88	2.05	104.75	49.27	39.12	29.88
MF	Bottlenose dolphin, offshore	14.38	8.84	6.56	4.39	6.58	3.72	2.84	1.71	103.68	47.82	37.58	29.03
MF	Risso's dolphin	14.82	9.42	6.90	4.70	6.88	4.05	2.90	1.92	98.02	48.13	37.90	29.40
MF	Long-finned pilot whale	15.22	9.60	6.96	4.59	6.85	3.99	2.85	1.74	103.02	48.42	37.77	29.56
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0	118.62	0	0	0
MF	Sperm whale [c]	15.53	9.71	7.13	4.90	7.11	4.17	3.08	2.01	103.76	49.58	38.83	29.82
HF	Harbor porpoise (sensitive)	13.13	8.26	6.32	4.38	115.77	115.40	110.21	60.19	58.65	38.40	31.72	25.05
PW	Gray seal	16.27	10.26	7.55	5.02	11.78	6.99	5.01	3.42	105.07	49.56	38.84	29.92
PW	Harbor seal	14.02	9.04	6.57	4.35	10.40	6.13	4.34	2.84	60.49	41.03	32.28	25.87
PW	Harp seal	15.75	9.88	7.23	5.01	11.43	6.91	4.94	3.19	104.31	49.04	39.27	30.06

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

Table H-61. PTS: WTGMP3 (13 m diameter, IHC S-6500, two per day, winter): 30 min vibratory and impact exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with sound attenuation.

Hearing group	Species	$L_{E,w,24h}$ 0 dB	$L_{E,w,24h}$ 6 dB	$L_{E,w,24h}$ 10 dB	$L_{E,w,24h}$ 15 dB	L_{pk} 0 dB	L_{pk} 6 dB	L_{pk} 10 dB	L_{pk} 15 dB
LF	Fin whale [a]	10.58	6.06	4.39	2.71	0.07	<0.01	<0.01	<0.01
LF	Minke whale (migrating)	6.39	3.55	2.19	1.20	0.03	0.02	0	0
LF	Humpback whale	10.08	5.62	3.95	2.33	0.03	0.03	0	0
LF	North Atlantic right whale [a]	7.44	4.30	3.06	1.58	0.12	<0.01	0	0
LF	Sei whale [a] (migrating)	6.78	3.60	2.47	1.20	0.08	<0.01	<0.01	0
MF	Atlantic white-sided dolphin	0	0	0	0	0	0	0	0
MF	Atlantic spotted dolphin	0	0	0	0	0	0	0	0
MF	Common dolphin	0	0	0	0	<0.01	<0.01	0	0
MF	Bottlenose dolphin, offshore	0	0	0	0	0	0	0	0
MF	Risso's dolphin	0	0	0	0	<0.01	<0.01	0	0
MF	Long-finned pilot whale	0	0	0	0	<0.01	<0.01	0	0
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0
MF	Sperm whale [a]	0	0	0	0	0	0	0	0
HF	Harbor porpoise (sensitive)	<0.01	0	0	0	1.02	0.51	0.21	0.06
PW	Gray seal	1.69	0.59	0.41	0	0	0	0	0
PW	Harbor seal	1.36	0.38	0.07	0	0.06	<0.01	<0.01	<0.01
PW	Harp seal	1.36	0.38	0.09	0	0.10	0.01	<0.01	0

[a] Listed as Endangered under the ESA.

Table H-62. Behavior: WTGMP3 (13 m diameter, IHC S-6500, two per day, winter): 30 min vibratory and impact exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with sound attenuation.

Hearing group	Species	Impact piling L_p [a] 0 dB	Impact piling L_p [a] 6 dB	Impact piling L_p [a] 10 dB	Impact piling L_p [a] 15 dB	Impact piling $L_{p,w}$ [b] 0 dB	Impact piling $L_{p,w}$ [b] 6 dB	Impact piling $L_{p,w}$ [b] 10 dB	Impact piling $L_{p,w}$ [b] 15 dB	Vibratory piling L_p [a] 0 dB	Vibratory piling L_p [a] 6 dB	Vibratory piling L_p [a] 10 dB	Vibratory piling L_p [a] 15 dB
LF	Fin whale [c]	15.40	9.53	6.93	4.79	15.38	9.65	6.99	4.79	101.56	47.46	37.18	28.80
LF	Minke whale (migrating)	14.95	9.51	7.00	4.69	77.99	41.91	30.91	22.24	100.73	46.84	36.20	28.41
LF	Humpback whale	15.21	9.54	7.03	4.75	15.27	9.61	7.06	4.78	100.27	47.39	37.00	28.67
LF	North Atlantic right whale [c]	14.66	9.24	6.66	4.58	14.81	9.32	6.73	4.56	82.07	44.95	35.20	27.42
LF	Sei whale [c] (migrating)	15.70	9.23	6.58	4.58	81.92	44.10	32.53	23.21	105.46	48.45	38.15	29.45
MF	Atlantic white-sided dolphin	14.60	9.09	6.68	4.53	6.68	3.89	2.81	1.84	98.58	46.12	36.37	28.22
MF	Atlantic spotted dolphin	15.63	7.84	5.89	4.23	4.66	3.16	2.30	1.57	105.35	49.98	39.42	30.61
MF	Common dolphin	14.41	9.20	6.82	4.62	6.91	4.09	2.85	2.01	99.80	46.57	36.94	28.28
MF	Bottlenose dolphin, offshore	13.45	8.49	6.18	4.22	6.10	3.66	2.49	1.63	96.83	44.12	34.83	27.25
MF	Risso's dolphin	14.20	9.15	6.56	4.44	6.59	3.96	2.84	1.81	92.32	45.00	35.87	27.87
MF	Long-finned pilot whale	14.61	8.93	6.62	4.50	6.62	3.77	2.76	1.86	100.24	46.58	35.99	28.16
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0	118.23	0	0	0
MF	Sperm whale [c]	15.03	9.54	6.86	4.73	6.87	4.13	2.98	2.02	99.87	47.10	36.96	28.43
HF	Harbor porpoise (sensitive)	12.79	7.97	5.84	4.26	115.67	115.42	110.99	60.88	55.49	36.49	30.21	23.78
PW	Gray seal	15.82	9.82	7.26	4.99	11.50	6.88	5.03	3.29	100.99	47.48	37.14	28.87
PW	Harbor seal	12.87	8.40	5.76	4.18	9.89	5.42	4.18	2.82	55.28	38.06	30.16	24.57
PW	Harp seal	15.27	9.52	7.04	4.74	11.33	6.74	4.75	3.19	99.79	46.84	37.28	28.71

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

Table H-63. PTS: WTGJ (4.5 m diameter, IHC S-2300, four per day, summer): 30 min vibratory and impact exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with sound attenuation.

Hearing group	Species	$L_{E,w,24h}$ 0 dB	$L_{E,w,24h}$ 6 dB	$L_{E,w,24h}$ 10 dB	$L_{E,w,24h}$ 15 dB	L_{pk} 0 dB	L_{pk} 6 dB	L_{pk} 10 dB	L_{pk} 15 dB
LF	Fin whale [a]	6.87	4.07	2.59	1.47	0.02	<0.01	0	0
LF	Minke whale (migrating)	3.05	1.51	0.82	0.34	0.01	0	0	0
LF	Humpback whale	5.79	3.13	2.01	0.76	<0.01	0	0	0
LF	North Atlantic right whale [a]	4.30	2.08	1.19	0.48	0	0	0	0
LF	Sei whale [a] (migrating)	3.22	1.49	1.10	0.65	<0.01	<0.01	<0.01	0
MF	Atlantic white-sided dolphin	0	0	0	0	0	0	0	0
MF	Atlantic spotted dolphin	0	0	0	0	<0.01	0	0	0
MF	Common dolphin	0	0	0	0	<0.01	0	0	0
MF	Bottlenose dolphin, offshore	0	0	0	0	0	0	0	0
MF	Risso's dolphin	0	0	0	0	0	0	0	0
MF	Long-finned pilot whale	0	0	0	0	0	0	0	0
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0
MF	Sperm whale [a]	0	0	0	0	0	0	0	0
HF	Harbor porpoise (sensitive)	0	0	0	0	0.41	0.12	<0.01	0
PW	Gray seal	1.44	0.53	0.20	0	0.01	0	0	0
PW	Harbor seal	0.54	0.07	0	0	0	0	0	0
PW	Harp seal	0.55	0.05	0	0	0.02	0	0	0

[a] Listed as Endangered under the ESA.

Table H-64. Behavior: WTGJ (4.5 m diameter, IHC S-2300, four per day, summer): 30 min vibratory and impact exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with sound attenuation.

Hearing group	Species	Impact piling L_p [a] 0 dB	Impact piling L_p [a] 6 dB	Impact piling L_p [a] 10 dB	Impact piling L_p [a] 15 dB	Impact piling $L_{p,w}$ [b] 0 dB	Impact piling $L_{p,w}$ [b] 6 dB	Impact piling $L_{p,w}$ [b] 10 dB	Impact piling $L_{p,w}$ [b] 15 dB	Vibratory piling L_p [a] 0 dB	Vibratory piling L_p [a] 6 dB	Vibratory piling L_p [a] 10 dB	Vibratory piling L_p [a] 15 dB
LF	Fin whale [c]	8.19	5.15	3.62	2.08	8.27	5.17	3.62	2.08	19.53	15.87	13.46	10.80
LF	Minke whale (migrating)	7.46	4.70	3.21	2.01	24.44	18.12	14.50	10.97	18.43	14.84	12.60	9.90
LF	Humpback whale	8.02	5.04	3.41	1.99	8.13	5.10	3.44	1.99	19.56	15.60	13.30	10.50
LF	North Atlantic right whale [c]	7.47	4.70	3.38	1.90	7.61	4.83	3.39	1.88	18.40	14.88	12.62	10.18
LF	Sei whale [c] (migrating)	7.04	4.45	3.18	2.00	25.49	19.10	15.41	10.97	19.63	15.79	13.51	11.01
MF	Atlantic white-sided dolphin	7.31	4.49	3.15	1.95	3.82	2.00	1.23	0.63	18.83	15.16	12.83	10.31
MF	Atlantic spotted dolphin	5.73	3.87	2.94	1.80	2.73	1.61	1.14	0.56	19.64	15.80	13.38	10.87
MF	Common dolphin	7.23	4.60	3.29	2.03	3.89	2.05	1.33	0.64	18.88	15.38	13.13	10.45
MF	Bottlenose dolphin, offshore	6.62	4.19	2.93	1.84	3.44	1.76	1.08	0.53	18.09	14.34	12.44	9.90
MF	Risso's dolphin	6.90	4.38	3.15	1.89	3.78	1.90	1.33	0.58	18.43	14.73	12.56	9.92
MF	Long-finned pilot whale	7.04	4.21	3.03	1.83	3.65	1.95	1.21	0.58	18.03	14.32	12.00	9.47
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0	0	0	0	0
MF	Sperm whale [c]	7.70	4.79	3.42	2.00	4.10	2.02	1.27	0.63	19.48	15.57	13.20	10.60
HF	Harbor porpoise (sensitive)	6.00	3.84	2.70	1.69	29.15	23.06	19.73	15.61	15.46	12.27	10.35	8.21
PW	Gray seal	8.75	5.55	3.98	2.32	6.96	4.09	2.64	1.54	19.84	15.98	13.49	10.81
PW	Harbor seal	7.01	4.12	2.82	1.58	5.28	2.84	1.98	1.17	16.44	13.28	11.40	9.06
PW	Harp seal	7.97	4.98	3.49	2.01	6.56	3.65	2.38	1.26	19.59	15.79	13.37	10.68

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

Table H-65. PTS: WTGJ (4.5 m diameter, IHC S-2300, four per day, winter): 30 min vibratory and impact exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with sound attenuation.

Hearing group	Species	$L_{E,w,24h}$ 0 dB	$L_{E,w,24h}$ 6 dB	$L_{E,w,24h}$ 10 dB	$L_{E,w,24h}$ 15 dB	L_{pk} 0 dB	L_{pk} 6 dB	L_{pk} 10 dB	L_{pk} 15 dB
LF	Fin whale [a]	9.29	4.96	2.89	1.49	0.02	<0.01	0	0
LF	Minke whale (migrating)	4.22	1.83	1.00	0.36	0.01	0	0	0
LF	Humpback whale	8.30	3.86	2.25	1.08	<0.01	0	0	0
LF	North Atlantic right whale [a]	5.16	2.38	1.31	0.53	0	0	0	0
LF	Sei whale [a] (migrating)	4.14	1.77	1.18	0.75	0.04	<0.01	<0.01	0
MF	Atlantic white-sided dolphin	0	0	0	0	0	0	0	0
MF	Atlantic spotted dolphin	0	0	0	0	<0.01	0	0	0
MF	Common dolphin	0	0	0	0	<0.01	0	0	0
MF	Bottlenose dolphin, offshore	0	0	0	0	0	0	0	0
MF	Risso's dolphin	0	0	0	0	0	0	0	0
MF	Long-finned pilot whale	0	0	0	0	0	0	0	0
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0
MF	Sperm whale [a]	0	0	0	0	0	0	0	0
HF	Harbor porpoise (sensitive)	0	0	0	0	0.38	0.12	<0.01	0
PW	Gray seal	1.54	0.53	0.20	0	0.03	0	0	0
PW	Harbor seal	0.54	0.07	0	0	0	0	0	0
PW	Harp seal	0.58	0.06	0	0	0.02	0	0	0

[a] Listed as Endangered under the ESA.

Table H-66. Behavior: WTGJ (4.5 m diameter, IHC S-2300, four per day, winter): 30 min vibratory and impact exposure ranges ($ER_{95\%}$) in km to marine mammal threshold criteria with sound attenuation.

Hearing group	Species	Impact piling L_p [a] 0 dB	Impact piling L_p [a] 6 dB	Impact piling L_p [a] 10 dB	Impact piling L_p [a] 15 dB	Impact piling $L_{p,w}$ [b] 0 dB	Impact piling $L_{p,w}$ [b] 6 dB	Impact piling $L_{p,w}$ [b] 10 dB	Impact piling $L_{p,w}$ [b] 15 dB	Vibratory piling L_p [a] 0 dB	Vibratory piling L_p [a] 6 dB	Vibratory piling L_p [a] 10 dB	Vibratory piling L_p [a] 15 dB
LF	Fin whale [c]	10.36	5.83	3.80	2.19	10.38	5.84	3.87	2.17	26.49	19.64	16.14	12.22
LF	Minke whale (migrating)	9.70	5.33	3.57	2.04	82.39	36.34	24.62	15.54	25.63	19.12	15.47	11.67
LF	Humpback whale	10.08	5.66	3.65	2.05	10.13	5.70	3.67	2.03	26.12	19.47	15.76	12.13
LF	North Atlantic right whale [c]	9.71	5.34	3.53	2.02	9.80	5.44	3.54	1.95	24.79	18.37	15.00	11.68
LF	Sei whale [c] (migrating)	9.38	5.12	3.47	2.04	84.97	36.50	25.78	16.22	26.07	19.63	15.92	12.27
MF	Atlantic white-sided dolphin	9.46	5.32	3.45	2.02	4.04	2.05	1.26	0.63	25.66	18.83	15.36	11.81
MF	Atlantic spotted dolphin	10.79	4.38	3.25	1.90	2.94	1.60	1.11	0.56	28.73	20.21	16.66	11.99
MF	Common dolphin	9.34	5.31	3.44	2.06	4.06	2.10	1.38	0.66	25.63	18.80	15.44	11.95
MF	Bottlenose dolphin, offshore	8.67	4.81	3.09	1.86	3.60	1.73	1.12	0.51	23.91	17.62	14.52	11.32
MF	Risso's dolphin	9.22	5.13	3.42	1.94	4.02	2.01	1.35	0.59	25.24	18.56	15.19	11.48
MF	Long-finned pilot whale	9.25	4.91	3.33	1.96	3.92	2.04	1.27	0.60	25.36	19.01	15.18	11.36
MF	Short-finned pilot whale	0	0	0	0	0	0	0	0	0	0	0	0
MF	Sperm whale [c]	9.83	5.49	3.65	2.08	4.29	2.10	1.35	0.62	26.15	19.37	15.66	11.95
HF	Harbor porpoise (sensitive)	8.44	4.59	3.07	1.79	115.32	112.80	106.34	45.20	21.44	16.13	12.84	10.04
PW	Gray seal	10.81	6.17	4.09	2.34	7.95	4.09	2.74	1.54	26.77	20.07	16.04	12.33
PW	Harbor seal	8.89	4.80	2.98	1.82	6.73	3.16	2.13	1.12	21.85	16.75	13.86	10.74
PW	Harp seal	10.07	5.51	3.67	2.12	7.36	3.68	2.44	1.26	26.33	19.68	15.78	12.22

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

H.2.3.2. Sea Turtles

This section contains sea turtle exposure ranges for each of the modeled foundation types and seasons assuming 0, 6, 10, and 15 dB broadband attenuation. Exposure ranges are shown in Tables H-67 to H-76. See Section 2.4 of the main acoustic report for definitions of sea turtle threshold criteria.

Table H-67. WTGMP2 (13 m diameter, IHC S-5500, one per day, summer): 30 min vibratory and impact exposure ranges ($ER_{95\%}$) in km to sea turtle threshold criteria with sound attenuation.

Species	Injury $L_{E,w,24h}$ 0 dB	Injury $L_{E,w,24h}$ 6 dB	Injury $L_{E,w,24h}$ 10 dB	Injury $L_{E,w,24h}$ 15 dB	Injury L_{pk} 0 dB	Injury L_{pk} 6 dB	Injury L_{pk} 10 dB	Injury L_{pk} 15 dB	Behavior L_p 0 dB	Behavior L_p 6 dB	Behavior L_p 10 dB	Behavior L_p 15 dB
Kemp's ridley turtle [a]	1.30	0.40	0	0	0	0	0	0	3.45	1.61	1.51	0.70
Leatherback turtle [a]	2.33	1.30	0.57	0	0	0	0	0	4.25	2.58	1.60	1.08
Loggerhead turtle	1.81	0.73	0.20	0	0	0	0	0	3.99	2.38	1.39	0.89
Green turtle	1.61	0.70	0.20	0.03	0	0	0	0	3.81	2.36	1.45	0.90

[a] Listed as Endangered under the ESA.

Table H-68. WTGMP2 (13 m diameter, IHC S-5500, two per day, summer): 30 min vibratory and impact exposure ranges ($ER_{95\%}$) in km to sea turtle threshold criteria with sound attenuation.

Species	Injury $L_{E,w,24h}$ 0 dB	Injury $L_{E,w,24h}$ 6 dB	Injury $L_{E,w,24h}$ 10 dB	Injury $L_{E,w,24h}$ 15 dB	Injury L_{pk} 0 dB	Injury L_{pk} 6 dB	Injury L_{pk} 10 dB	Injury L_{pk} 15 dB	Behavior L_p 0 dB	Behavior L_p 6 dB	Behavior L_p 10 dB	Behavior L_p 15 dB
Kemp's ridley turtle [a]	1.60	0.72	0.08	0.08	<0.01	0	0	0	3.47	2.07	1.58	0.80
Leatherback turtle [a]	2.51	1.29	0.74	0.31	0	0	0	0	4.19	2.52	1.77	1.08
Loggerhead turtle	1.85	0.91	0.48	<0.01	<0.01	<0.01	0	0	3.80	2.29	1.55	0.98
Green turtle	1.81	0.77	0.35	0	0	0	0	0	3.86	2.36	1.48	1.04

[a] Listed as Endangered under the ESA.

Table H-69. WTGMP2 (13 m diameter, IHC S-5500, one per day, winter): 30 min vibratory and impact exposure ranges ($ER_{95\%}$) in km to sea turtle threshold criteria with sound attenuation.

Species	Injury $L_{E,w,24h}$ 0 dB	Injury $L_{E,w,24h}$ 6 dB	Injury $L_{E,w,24h}$ 10 dB	Injury $L_{E,w,24h}$ 15 dB	Injury L_{pk} 0 dB	Injury L_{pk} 6 dB	Injury L_{pk} 10 dB	Injury L_{pk} 15 dB	Behavior L_p 0 dB	Behavior L_p 6 dB	Behavior L_p 10 dB	Behavior L_p 15 dB
Kemp's ridley turtle [a]	1.63	0.82	0	0	0	0	0	0	3.59	1.74	1.52	0.39
Leatherback turtle [a]	2.73	1.47	0.76	0.36	0	0	0	0	4.72	2.85	1.71	1.15
Loggerhead turtle	2.24	1.23	0.21	0.06	0	0	0	0	4.43	2.50	1.79	0.88
Green turtle	1.81	0.93	0.43	0	0	0	0	0	4.23	2.44	1.71	0.89

[a] Listed as Endangered under the ESA.

Table H-70. WTGMP2 (13 m diameter, IHC S-5500, two per day, winter): 30 min vibratory and impact exposure ranges ($ER_{95\%}$) in km to sea turtle threshold criteria with sound attenuation.

Species	Injury $L_{E,w,24h}$ 0 dB	Injury $L_{E,w,24h}$ 6 dB	Injury $L_{E,w,24h}$ 10 dB	Injury $L_{E,w,24h}$ 15 dB	Injury L_{pk} 0 dB	Injury L_{pk} 6 dB	Injury L_{pk} 10 dB	Injury L_{pk} 15 dB	Behavior L_p 0 dB	Behavior L_p 6 dB	Behavior L_p 10 dB	Behavior L_p 15 dB
Kemp's ridley turtle [a]	1.71	0.70	0.08	0.08	<0.01	0	0	0	3.77	2.31	1.59	0.79
Leatherback turtle [a]	3.06	1.29	0.78	0.31	0	0	0	0	4.53	2.74	1.85	1.17
Loggerhead turtle	2.68	0.90	0.48	<0.01	<0.01	<0.01	0	0	4.20	2.38	1.55	1.04
Green turtle	2.10	0.85	0.36	0	0	0	0	0	4.07	2.47	1.63	1.04

[a] Listed as Endangered under the ESA.

Table H-71. WTGMP3 (13 m diameter, IHC S-6500, one per day, summer): 30 min vibratory and impact exposure ranges ($ER_{95\%}$) in km to sea turtle threshold criteria with sound attenuation.

Species	Injury $L_{E,w,24h}$ 0 dB	Injury $L_{E,w,24h}$ 6 dB	Injury $L_{E,w,24h}$ 10 dB	Injury $L_{E,w,24h}$ 15 dB	Injury L_{pk} 0 dB	Injury L_{pk} 6 dB	Injury L_{pk} 10 dB	Injury L_{pk} 15 dB	Behavior L_p 0 dB	Behavior L_p 6 dB	Behavior L_p 10 dB	Behavior L_p 15 dB
Kemp's ridley turtle [a]	1.58	1.07	0.54	0	0	0	0	0	3.41	2.35	1.79	0.68
Leatherback turtle [a]	3.17	1.74	1.15	0.35	0	0	0	0	4.57	3.12	2.05	1.15
Loggerhead turtle	2.51	1.16	0.72	0	0	0	0	0	4.38	2.79	1.88	0.95
Green turtle	2.15	1.03	0.48	0.04	0	0	0	0	4.08	2.81	1.94	0.92

[a] Listed as Endangered under the ESA.

Table H-72. WTGMP3 (13 m diameter, IHC S-6500, two per day, summer): 30 min vibratory and impact exposure ranges ($ER_{95\%}$) in km to sea turtle threshold criteria with sound attenuation.

Species	Injury $L_{E,w,24h}$ 0 dB	Injury $L_{E,w,24h}$ 6 dB	Injury $L_{E,w,24h}$ 10 dB	Injury $L_{E,w,24h}$ 15 dB	Injury L_{pk} 0 dB	Injury L_{pk} 6 dB	Injury L_{pk} 10 dB	Injury L_{pk} 15 dB	Behavior L_p 0 dB	Behavior L_p 6 dB	Behavior L_p 10 dB	Behavior L_p 15 dB
Kemp's ridley turtle [a]	2.00	0.89	0.08	0.08	<0.01	0	0	0	3.62	2.35	1.77	0.75
Leatherback turtle [a]	3.49	1.79	1.15	0.42	0	0	0	0	4.51	2.98	2.01	1.21
Loggerhead turtle	2.79	1.34	0.68	0.36	<0.01	<0.01	0	0	4.20	2.82	1.90	1.06
Green turtle	2.24	1.02	0.44	0.05	0	0	0	0	4.13	2.76	1.82	1.07

[a] Listed as Endangered under the ESA.

Table H-73. WTGMP3 (13 m diameter, IHC S-6500, one per day, winter): 30 min vibratory and impact exposure ranges ($ER_{95\%}$) in km to sea turtle threshold criteria with sound attenuation.

Species	Injury $L_{E,w,24h}$ 0 dB	Injury $L_{E,w,24h}$ 6 dB	Injury $L_{E,w,24h}$ 10 dB	Injury $L_{E,w,24h}$ 15 dB	Injury L_{pk} 0 dB	Injury L_{pk} 6 dB	Injury L_{pk} 10 dB	Injury L_{pk} 15 dB	Behavior L_p 0 dB	Behavior L_p 6 dB	Behavior L_p 10 dB	Behavior L_p 15 dB
Kemp's ridley turtle [a]	2.42	1.03	0.51	0.22	0	0	0	0	4.40	2.77	1.99	1.03
Leatherback turtle [a]	3.61	1.76	1.20	0.57	0	0	0	0	5.03	3.28	2.08	1.30
Loggerhead turtle	2.66	1.32	0.90	0.06	0	0	0	0	4.83	2.97	1.84	1.09
Green turtle	2.56	1.11	0.48	0.25	0	0	0	0	4.60	2.98	1.96	1.11

[a] Listed as Endangered under the ESA.

Table H-74. WTGMP3 (13 m diameter, IHC S-6500, two per day, winter): 30 min vibratory and impact exposure ranges ($ER_{95\%}$) in km to sea turtle threshold criteria with sound attenuation.

Species	Injury $L_{E,w,24h}$ 0 dB	Injury $L_{E,w,24h}$ 6 dB	Injury $L_{E,w,24h}$ 10 dB	Injury $L_{E,w,24h}$ 15 dB	Injury L_{pk} 0 dB	Injury L_{pk} 6 dB	Injury L_{pk} 10 dB	Injury L_{pk} 15 dB	Behavior L_p 0 dB	Behavior L_p 6 dB	Behavior L_p 10 dB	Behavior L_p 15 dB
Kemp's ridley turtle [a]	2.33	1.19	0.41	0.08	<0.01	0	0	0	4.09	2.36	1.79	0.74
Leatherback turtle [a]	3.78	1.86	1.21	0.58	0	0	0	0	4.85	3.16	2.21	1.23
Loggerhead turtle	3.17	1.44	0.94	0.36	<0.01	<0.01	0	0	4.79	2.91	1.94	1.06
Green turtle	2.53	1.19	0.57	0.10	0	0	0	0	4.46	2.89	1.89	1.08

[a] Listed as Endangered under the ESA.

Table H-75. WTGJ (4.5 m diameter, IHC S-2300, four per day, summer): 30 min vibratory and impact exposure ranges ($ER_{95\%}$) in km to sea turtle threshold criteria with sound attenuation.

Species	Injury $L_{E,w,24h}$ 0 dB	Injury $L_{E,w,24h}$ 6 dB	Injury $L_{E,w,24h}$ 10 dB	Injury $L_{E,w,24h}$ 15 dB	Injury L_{pk} 0 dB	Injury L_{pk} 6 dB	Injury L_{pk} 10 dB	Injury L_{pk} 15 dB	Behavior L_p 0 dB	Behavior L_p 6 dB	Behavior L_p 10 dB	Behavior L_p 15 dB
Kemp's ridley turtle [a]	0.62	0.21	0	0	0	0	0	0	1.70	0.75	0.51	0.22
Leatherback turtle [a]	2.55	1.25	0.57	0.10	0	0	0	0	2.17	1.16	0.57	0.10
Loggerhead turtle	1.17	0.65	0.18	0	0	0	0	0	1.90	1.00	0.50	0.30
Green turtle	0.90	0.21	0.06	0	0	0	0	0	1.81	0.90	0.51	0.26

[a] Listed as Endangered under the ESA.

Table H-76. WTGJ (4.5 m diameter, IHC S-2300, four per day, winter): 30 min vibratory and impact exposure ranges ($ER_{95\%}$) in km to sea turtle threshold criteria with sound attenuation.

Species	Injury $L_{E,w,24h}$ 0 dB	Injury $L_{E,w,24h}$ 6 dB	Injury $L_{E,w,24h}$ 10 dB	Injury $L_{E,w,24h}$ 15 dB	Injury L_{pk} 0 dB	Injury L_{pk} 6 dB	Injury L_{pk} 10 dB	Injury L_{pk} 15 dB	Behavior L_p 0 dB	Behavior L_p 6 dB	Behavior L_p 10 dB	Behavior L_p 15 dB
Kemp's ridley turtle [a]	0.87	0.19	0	0	0	0	0	0	1.51	0.87	0.48	0.25
Leatherback turtle [a]	2.93	1.39	0.73	0.10	0	0	0	0	2.38	1.13	0.57	0.10
Loggerhead turtle	1.14	0.76	0.18	0	0	0	0	0	1.97	0.86	0.49	0.23
Green turtle	0.95	0.28	0.09	0	0	0	0	0	1.96	0.93	0.54	0.25

[a] Listed as Endangered under the ESA.

H.2.4. Animal Densities

As described in Section 3.2, for vibratory setting of piles followed by impact pile driving, densities were calculated within buffered polygons around the Lease Area perimeter for the following buffer ranges: 10, 25, 50, 75, 100, 125, and 150 km. The following section contains density values for those ranges.

H.2.4.1. Marine Mammals

Table H-77. Mean monthly marine mammal density estimates for all species in a 10 km perimeter around the Lease Area.

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual mean	May to December mean
Fin whale [b]	0.214	0.165	0.122	0.155	0.271	0.257	0.424	0.330	0.235	0.068	0.050	0.139	0.203	0.222
Minke whale	0.113	0.136	0.143	0.798	1.615	1.699	0.743	0.468	0.514	0.472	0.053	0.077	0.569	0.705
Humpback whale	0.029	0.024	0.047	0.160	0.291	0.316	0.180	0.117	0.163	0.234	0.192	0.030	0.149	0.191
North Atlantic right whale [b]	0.471	0.539	0.498	0.477	0.331	0.060	0.032	0.022	0.033	0.054	0.091	0.278	0.240	0.112
Sei whale [b]	0.038	0.023	0.047	0.115	0.188	0.057	0.014	0.011	0.018	0.037	0.083	0.066	0.058	0.059
Atlantic white sided dolphin	2.229	1.354	0.947	1.454	3.423	3.284	1.611	0.788	1.754	2.611	1.983	2.702	2.012	2.270
Atlantic spotted dolphin	0.001	<0.001	<0.001	0.004	0.026	0.039	0.039	0.064	0.335	0.529	0.167	0.017	0.102	0.152
Common dolphin	7.790	2.848	2.406	3.823	6.940	15.140	12.632	16.834	28.015	26.483	13.652	12.269	12.403	16.496
Common Bottlenose dolphin	0.479	0.112	0.065	0.181	0.864	1.440	1.541	1.764	1.651	1.506	1.372	1.149	1.010	1.411
Risso's dolphin	0.045	0.005	0.003	0.021	0.116	0.070	0.092	0.189	0.235	0.122	0.133	0.177	0.101	0.142
Long-finned pilot whale [c]	0.193	0.193	0.193	0.193	0.193	0.193	0.193	0.193	0.193	0.193	0.193	0.193	0.193	0.193
Short-finned pilot whale [c]	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048
Sperm whale [b]	0.036	0.014	0.014	0.003	0.014	0.029	0.046	0.142	0.074	0.058	0.035	0.024	0.041	0.053
Harbor porpoise	10.173	10.986	10.528	9.185	6.968	1.577	1.553	1.436	1.512	1.817	2.012	6.321	5.339	2.899
Gray seal	5.581	5.526	4.101	3.653	4.903	0.956	0.183	0.166	0.313	0.639	2.146	4.605	2.731	1.739
Harbor seal	8.371	8.289	6.152	5.480	7.355	1.434	0.274	0.249	0.470	0.959	3.219	6.907	4.097	2.608
Harp seal	5.979	5.921	4.394	3.914	5.254	1.024	0.196	0.178	0.336	0.685	2.299	4.934	2.926	1.863

[a] Density estimates are from habitat-based density modeling of the entire Atlantic Exclusive Economic Zone (EEZ) (Roberts et al. 2016, 2022).
[b] Listed as Endangered under the ESA.
[c] Density adjusted by relative abundance.

Table H-78. Mean monthly marine mammal density estimates for all species in a 25 km perimeter around the Lease Area.

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual mean	May to December mean
Fin whale [b]	0.213	0.163	0.139	0.166	0.285	0.257	0.412	0.339	0.245	0.085	0.057	0.145	0.209	0.228
Minke whale	0.115	0.135	0.150	0.778	1.520	1.496	0.653	0.401	0.442	0.455	0.055	0.083	0.523	0.638
Humpback whale	0.033	0.027	0.047	0.172	0.294	0.319	0.181	0.114	0.152	0.219	0.191	0.037	0.149	0.188
North Atlantic right whale [b]	0.597	0.674	0.592	0.541	0.359	0.080	0.049	0.031	0.044	0.059	0.120	0.370	0.293	0.139
Sei whale [b]	0.035	0.024	0.048	0.121	0.190	0.060	0.016	0.010	0.017	0.038	0.084	0.066	0.059	0.060
Atlantic white sided dolphin	2.414	1.584	1.089	1.610	3.426	3.382	1.626	0.688	1.603	2.522	1.951	2.710	2.050	2.239
Atlantic spotted dolphin	0.002	<0.001	<0.001	0.005	0.047	0.095	0.047	0.071	0.392	0.772	0.196	0.021	0.137	0.205
Common dolphin	8.728	3.677	3.032	4.523	7.828	16.429	13.066	16.254	26.645	29.852	16.330	13.746	13.342	17.519
Common Bottlenose dolphin	0.502	0.131	0.080	0.214	0.947	1.571	1.669	1.817	1.786	1.668	1.543	1.192	1.093	1.524
Risso's dolphin	0.063	0.009	0.005	0.026	0.148	0.114	0.145	0.274	0.360	0.183	0.148	0.182	0.138	0.194
Long-finned pilot whale [c]	0.217	0.217	0.217	0.217	0.217	0.217	0.217	0.217	0.217	0.217	0.217	0.217	0.217	0.217
Short-finned pilot whale [c]	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054
Sperm whale [b]	0.035	0.016	0.014	0.004	0.014	0.032	0.044	0.132	0.067	0.047	0.033	0.027	0.039	0.050
Harbor porpoise	8.891	9.740	9.332	8.336	6.051	1.792	1.739	1.413	1.271	1.604	1.896	5.615	4.807	2.672
Gray seal	5.359	5.184	3.935	4.046	5.420	2.358	0.743	0.591	0.749	1.234	2.461	4.527	3.051	2.260
Harbor seal	8.038	7.776	5.903	6.069	8.130	3.537	1.115	0.886	1.123	1.851	3.692	6.790	4.576	3.391
Harp seal	5.741	5.554	4.216	4.335	5.807	2.527	0.796	0.633	0.802	1.322	2.637	4.850	3.268	2.422

[a] Density estimates are from habitat-based density modeling of the entire Atlantic Exclusive Economic Zone (EEZ) (Roberts et al. 2016, 2022).
[b] Listed as Endangered under the ESA.
[c] Density adjusted by relative abundance.

Table H-79. Mean monthly marine mammal density estimates for all species in a 50 km perimeter around the Lease Area.

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual mean	May to December mean
Fin whale [b]	0.196	0.163	0.153	0.182	0.276	0.280	0.414	0.336	0.257	0.105	0.066	0.132	0.213	0.233
Minke whale	0.112	0.127	0.148	0.649	1.252	1.215	0.559	0.328	0.347	0.400	0.054	0.087	0.440	0.530
Humpback whale	0.039	0.035	0.053	0.189	0.302	0.342	0.187	0.106	0.131	0.192	0.181	0.045	0.150	0.186
North Atlantic right whale [b]	0.717	0.850	0.730	0.634	0.435	0.127	0.083	0.045	0.061	0.072	0.161	0.470	0.365	0.182
Sei whale [b]	0.030	0.026	0.050	0.134	0.200	0.070	0.020	0.010	0.015	0.037	0.083	0.058	0.061	0.061
Atlantic white sided dolphin	2.921	2.087	1.429	1.913	3.661	4.002	1.825	0.617	1.382	2.432	2.028	2.861	2.263	2.351
Atlantic spotted dolphin	0.002	<0.001	0.001	0.007	0.093	0.260	0.069	0.122	0.559	1.208	0.261	0.029	0.218	0.325
Common dolphin	11.780	6.617	5.537	6.805	11.301	23.195	16.304	17.505	25.076	34.403	22.011	16.825	16.447	20.827
Common Bottlenose dolphin	1.012	0.363	0.224	0.453	1.558	2.609	2.604	2.578	2.790	2.797	2.658	2.036	1.807	2.454
Risso's dolphin	0.163	0.042	0.018	0.066	0.381	0.426	0.628	0.967	1.121	0.540	0.274	0.285	0.409	0.578
Long-finned pilot whale [c]	0.306	0.306	0.306	0.306	0.306	0.306	0.306	0.306	0.306	0.306	0.306	0.306	0.306	0.306
Short-finned pilot whale [c]	0.076	0.076	0.076	0.076	0.076	0.076	0.076	0.076	0.076	0.076	0.076	0.076	0.076	0.076
Sperm whale [b]	0.040	0.025	0.024	0.006	0.019	0.036	0.050	0.134	0.075	0.055	0.034	0.033	0.044	0.055
Harbor porpoise	6.774	7.547	7.380	7.035	5.136	1.945	1.886	1.452	1.167	1.504	1.764	4.393	3.998	2.406
Gray seal	5.154	4.857	4.330	5.115	6.946	5.687	1.838	1.561	1.786	3.120	3.289	4.484	4.014	3.589
Harbor seal	7.731	7.286	6.494	7.673	10.420	8.530	2.757	2.341	2.678	4.680	4.934	6.726	6.021	5.383
Harp seal	5.522	5.204	4.639	5.481	7.443	6.093	1.969	1.672	1.913	3.343	3.524	4.805	4.301	3.845

[a] Density estimates are from habitat-based density modeling of the entire Atlantic Exclusive Economic Zone (EEZ) (Roberts et al. 2016, 2022).
[b] Listed as Endangered under the ESA.
[c] Density adjusted by relative abundance.

Table H-80. Mean monthly marine mammal density estimates for all species in a 75 km perimeter around the Lease Area.

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual mean	May to December mean
Fin whale [b]	0.197	0.186	0.184	0.222	0.302	0.304	0.440	0.342	0.289	0.143	0.100	0.153	0.239	0.259
Minke whale	0.121	0.129	0.153	0.561	1.099	1.032	0.509	0.305	0.301	0.357	0.057	0.099	0.394	0.470
Humpback whale	0.048	0.050	0.072	0.195	0.319	0.353	0.190	0.109	0.129	0.178	0.170	0.057	0.156	0.188
North Atlantic right whale [b]	0.531	0.638	0.574	0.502	0.349	0.117	0.068	0.036	0.047	0.058	0.124	0.343	0.282	0.143
Sei whale [b]	0.026	0.026	0.052	0.147	0.206	0.076	0.021	0.010	0.014	0.038	0.083	0.049	0.062	0.062
Atlantic white sided dolphin	3.153	2.373	1.621	2.117	3.764	4.477	1.800	0.619	1.218	2.116	1.950	2.796	2.334	2.342
Atlantic spotted dolphin	0.007	0.005	0.006	0.011	0.099	0.268	0.082	0.155	0.572	1.171	0.264	0.033	0.223	0.330
Common dolphin	15.831	10.430	8.889	9.911	16.396	29.771	17.227	16.450	21.365	32.734	26.712	20.941	18.888	22.699
Common Bottlenose dolphin	1.763	0.858	0.617	1.021	2.616	4.211	3.851	3.541	3.940	4.159	4.008	3.044	2.802	3.671
Risso's dolphin	0.632	0.273	0.158	0.343	1.172	1.571	2.744	3.395	3.109	1.618	0.838	0.871	1.394	1.915
Long-finned pilot whale [c]	0.456	0.456	0.456	0.456	0.456	0.456	0.456	0.456	0.456	0.456	0.456	0.456	0.456	0.456
Short-finned pilot whale [c]	0.114	0.114	0.114	0.114	0.114	0.114	0.114	0.114	0.114	0.114	0.114	0.114	0.114	0.114
Sperm whale [b]	0.063	0.053	0.048	0.015	0.042	0.068	0.089	0.166	0.118	0.089	0.043	0.055	0.071	0.084
Harbor porpoise	5.307	5.920	5.987	6.136	4.732	1.953	1.832	1.467	1.113	1.387	1.505	3.553	3.408	2.193
Gray seal	4.725	4.474	4.486	5.339	6.959	6.627	1.650	1.345	1.833	3.785	3.220	3.992	4.036	3.676
Harbor seal	7.087	6.711	6.730	8.009	10.439	9.941	2.475	2.018	2.750	5.677	4.830	5.987	6.054	5.515
Harp seal	5.062	4.794	4.807	5.721	7.456	7.101	1.768	1.441	1.964	4.055	3.450	4.277	4.325	3.939

[a] Density estimates are from habitat-based density modeling of the entire Atlantic Exclusive Economic Zone (EEZ) (Roberts et al. 2016, 2022).
[b] Listed as Endangered under the ESA.
[c] Density adjusted by relative abundance.

Table H-81. Mean monthly marine mammal density estimates for all species in a 100 km perimeter around the Lease Area.

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual mean	May to December mean
Fin whale [b]	0.247	0.241	0.241	0.290	0.405	0.427	0.544	0.417	0.364	0.231	0.167	0.218	0.316	0.347
Minke whale	0.129	0.142	0.162	0.526	1.040	1.011	0.535	0.331	0.323	0.381	0.067	0.107	0.396	0.474
Humpback whale	0.056	0.060	0.093	0.247	0.480	0.498	0.318	0.247	0.271	0.279	0.220	0.074	0.237	0.298
North Atlantic right whale [b]	0.341	0.407	0.425	0.432	0.273	0.080	0.039	0.021	0.026	0.035	0.070	0.188	0.195	0.092
Sei whale [b]	0.025	0.027	0.059	0.170	0.265	0.100	0.026	0.016	0.024	0.064	0.095	0.047	0.077	0.080
Atlantic white sided dolphin	3.574	2.724	1.887	2.427	4.607	5.461	2.564	1.493	2.180	2.531	2.457	3.415	2.943	3.089
Atlantic spotted dolphin	0.168	0.166	0.167	0.172	0.250	0.393	0.248	0.343	0.725	1.214	0.400	0.193	0.370	0.471
Common dolphin	23.236	16.552	15.512	18.407	27.701	39.047	18.890	16.892	20.713	31.960	33.890	28.335	24.261	27.179
Common Bottlenose dolphin	2.715	1.635	1.368	1.983	3.890	5.532	4.761	4.181	4.742	5.241	5.374	4.117	3.795	4.730
Risso's dolphin	1.791	1.173	0.978	1.387	2.760	3.957	5.933	6.616	5.711	3.197	1.865	2.254	3.135	4.037
Long-finned pilot whale [c]	0.863	0.863	0.863	0.863	0.863	0.863	0.863	0.863	0.863	0.863	0.863	0.863	0.863	0.863
Short-finned pilot whale [c]	0.216	0.216	0.216	0.216	0.216	0.216	0.216	0.216	0.216	0.216	0.216	0.216	0.216	0.216
Sperm whale [b]	0.145	0.130	0.127	0.055	0.132	0.180	0.217	0.280	0.247	0.187	0.095	0.145	0.162	0.185
Harbor porpoise	4.617	5.083	5.315	5.587	4.714	1.646	1.528	1.283	1.069	1.292	1.310	3.283	3.061	2.016
Gray seal	4.033	3.846	3.907	4.494	5.784	5.994	1.435	1.078	1.605	3.669	2.780	3.424	3.504	3.221
Harbor seal	6.050	5.769	5.860	6.741	8.676	8.991	2.152	1.617	2.407	5.504	4.170	5.136	5.256	4.832
Harp seal	4.321	4.121	4.186	4.815	6.197	6.422	1.537	1.155	1.719	3.931	2.979	3.669	3.754	3.451

[a] Density estimates are from habitat-based density modeling of the entire Atlantic Exclusive Economic Zone (EEZ) (Roberts et al. 2016, 2022).
[b] Listed as Endangered under the ESA.
[c] Density adjusted by relative abundance.

Table H-82. Mean monthly marine mammal density estimates for all species in a 125 km perimeter around the Lease Area.

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual mean	May to December mean
Fin whale [b]	0.282	0.275	0.274	0.317	0.433	0.501	0.642	0.508	0.445	0.306	0.213	0.247	0.370	0.412
Minke whale	0.118	0.136	0.152	0.498	0.958	0.950	0.486	0.306	0.337	0.428	0.072	0.100	0.378	0.455
Humpback whale	0.059	0.060	0.093	0.259	0.492	0.530	0.352	0.262	0.290	0.295	0.223	0.087	0.250	0.316
North Atlantic right whale [b]	0.194	0.231	0.296	0.381	0.241	0.059	0.029	0.009	0.012	0.019	0.036	0.089	0.133	0.062
Sei whale [b]	0.027	0.029	0.065	0.204	0.367	0.144	0.038	0.025	0.040	0.099	0.112	0.049	0.100	0.109
Atlantic white sided dolphin	4.439	3.351	2.348	2.955	5.804	6.911	3.825	2.400	3.490	3.465	3.448	4.685	3.927	4.254
Atlantic spotted dolphin	0.444	0.442	0.442	0.447	0.525	0.668	0.538	0.642	1.042	1.550	0.677	0.471	0.657	0.764
Common dolphin	26.542	19.531	18.348	22.472	32.366	42.892	20.686	17.701	22.049	34.994	37.308	31.283	27.181	29.910
Common Bottlenose dolphin	3.197	2.057	1.824	2.511	4.421	5.919	4.924	4.290	5.007	5.704	5.966	4.624	4.204	5.107
Risso's dolphin	2.244	1.725	1.590	1.804	3.322	4.777	6.792	7.272	6.389	3.622	2.167	2.712	3.701	4.632
Long-finned pilot whale [c]	1.119	1.119	1.119	1.119	1.119	1.119	1.119	1.119	1.119	1.119	1.119	1.119	1.119	1.119
Short-finned pilot whale [c]	0.280	0.280	0.280	0.280	0.280	0.280	0.280	0.280	0.280	0.280	0.280	0.280	0.280	0.280
Sperm whale [b]	0.232	0.212	0.212	0.115	0.240	0.297	0.346	0.387	0.367	0.287	0.167	0.244	0.259	0.292
Harbor porpoise	4.493	4.976	5.195	5.272	4.478	1.166	1.021	0.883	0.796	0.974	0.985	3.057	2.775	1.670
Gray seal	3.292	3.193	3.132	3.332	4.222	4.645	1.040	0.705	1.159	2.938	2.077	2.748	2.707	2.442
Harbor seal	4.939	4.790	4.699	4.997	6.333	6.967	1.560	1.057	1.738	4.408	3.115	4.122	4.060	3.662
Harp seal	3.528	3.421	3.356	3.570	4.523	4.977	1.115	0.755	1.241	3.148	2.225	2.944	2.900	2.616

[a] Density estimates are from habitat-based density modeling of the entire Atlantic Exclusive Economic Zone (EEZ) (Roberts et al. 2016, 2022).
[b] Listed as Endangered under the ESA.
[c] Density adjusted by relative abundance.

Table H-83. Mean monthly marine mammal density estimates for all species in a 150 km perimeter around the Lease Area.

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual mean	May to December mean
Fin whale [b]	0.293	0.284	0.279	0.320	0.426	0.518	0.648	0.544	0.471	0.342	0.240	0.263	0.386	0.432
Minke whale	0.112	0.132	0.146	0.465	0.872	0.875	0.453	0.299	0.335	0.430	0.076	0.097	0.358	0.430
Humpback whale	0.058	0.059	0.092	0.255	0.483	0.525	0.359	0.278	0.306	0.303	0.219	0.089	0.252	0.320
North Atlantic right whale [b]	0.130	0.156	0.227	0.331	0.231	0.059	0.032	0.005	0.007	0.012	0.022	0.054	0.106	0.053
Sei whale [b]	0.026	0.028	0.065	0.217	0.415	0.168	0.046	0.030	0.049	0.116	0.113	0.046	0.110	0.123
Atlantic white sided dolphin	4.699	3.617	2.551	3.196	6.375	7.484	4.413	2.913	4.230	3.948	4.020	5.298	4.395	4.835
Atlantic spotted dolphin	0.683	0.680	0.681	0.685	0.753	0.875	0.771	0.867	1.208	1.650	0.888	0.709	0.871	0.965
Common dolphin	27.059	20.430	19.307	24.052	33.790	42.938	20.337	16.123	19.592	32.061	36.445	30.986	26.927	29.034
Common Bottlenose dolphin	3.636	2.473	2.216	2.976	4.908	6.321	5.129	4.409	5.201	6.084	6.419	5.049	4.568	5.440
Risso's dolphin	2.685	2.252	2.069	2.084	3.717	5.423	7.539	7.996	6.959	4.027	2.399	3.002	4.179	5.133
Long-finned pilot whale [c]	1.312	1.312	1.312	1.312	1.312	1.312	1.312	1.312	1.312	1.312	1.312	1.312	1.312	1.312
Short-finned pilot whale [c]	0.328	0.328	0.328	0.328	0.328	0.328	0.328	0.328	0.328	0.328	0.328	0.328	0.328	0.328
Sperm whale [b]	0.316	0.296	0.296	0.192	0.347	0.406	0.466	0.481	0.477	0.392	0.254	0.332	0.355	0.394
Harbor porpoise	4.163	4.665	4.922	5.097	4.449	0.902	0.772	0.667	0.644	0.800	0.825	2.924	2.569	1.498
Gray seal	2.684	2.630	2.533	2.646	3.242	3.522	0.738	0.457	0.825	2.297	1.677	2.266	2.126	1.878
Harbor seal	4.026	3.946	3.799	3.968	4.864	5.284	1.107	0.685	1.237	3.445	2.515	3.399	3.190	2.817
Harp seal	2.876	2.818	2.713	2.835	3.474	3.774	0.791	0.489	0.883	2.461	1.797	2.428	2.278	2.012

[a] Density estimates are from habitat-based density modeling of the entire Atlantic Exclusive Economic Zone (EEZ) (Roberts et al. 2016, 2022).
[b] Listed as Endangered under the ESA.
[c] Density adjusted by relative abundance.

H.2.4.2. Sea Turtles

Table H-84. Sea turtle density estimates for all modeled species in a 10 km perimeter around the Lease Area.

Common name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual mean	May to December mean
Kemp's ridley sea turtle	0	0	0	0	0	0.002	0.005	0.004	0.004	0.003	<0.001	0	0.002	0.002
Leatherback sea turtle	<0.001	<0.001	<0.001	<0.001	0.002	0.042	0.104	0.170	0.244	0.146	0.025	0.002	0.061	0.092
Loggerhead sea turtle	0.002	<0.001	<0.001	0.001	0.003	0.011	0.020	0.021	0.026	0.026	0.012	0.003	0.011	0.015
Green sea turtle	0	0	0	0	0	0.021	0.095	0.091	0.088	0.015	0.002	0	0.026	0.039

[a] Density estimates are from DiMatteo et al. (2023).

Table H-85. Sea turtle density estimates for all modeled species in a 25 km perimeter around the Lease Area.

Common name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual mean	May to December mean
Kemp's ridley sea turtle	0	0	0	0	0	0.002	0.005	0.004	0.004	0.003	<0.001	0	0.001	0.002
Leatherback sea turtle	<0.001	<0.001	<0.001	<0.001	0.002	0.039	0.100	0.160	0.223	0.132	0.022	0.002	0.057	0.085
Loggerhead sea turtle	0.002	0.001	<0.001	0.002	0.004	0.013	0.021	0.021	0.026	0.028	0.013	0.004	0.011	0.016
Green sea turtle	0	0	0	0	0	0.023	0.091	0.088	0.084	0.017	0.003	0	0.025	0.038

[a] Density estimates are from DiMatteo et al. (2023).

Table H-86. Sea turtle density estimates for all modeled species in a 50 km perimeter around the Lease Area.

Common name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual mean	May to December mean
Kemp's ridley sea turtle	0	0	0	0	0	0.002	0.004	0.003	0.003	0.002	<0.001	0	0.001	0.002
Leatherback sea turtle	<0.001	<0.001	<0.001	<0.001	0.003	0.032	0.079	0.128	0.177	0.108	0.020	0.002	0.046	0.069
Loggerhead sea turtle	0.003	0.002	0.001	0.002	0.005	0.016	0.023	0.022	0.028	0.031	0.015	0.005	0.013	0.018
Green sea turtle	0	0	0	0	0	0.024	0.086	0.085	0.077	0.019	0.003	0	0.025	0.037

[a] Density estimates are from DiMatteo et al. (2023).

Table H-87. Sea turtle density estimates for all modeled species in a 75 km perimeter around the Lease Area.

Common name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual mean	May to December mean
Kemp's ridley sea turtle	0	0	0	0	0	0.001	0.003	0.003	0.003	0.002	<0.001	0	0.001	0.002
Leatherback sea turtle	<0.001	<0.001	<0.001	<0.001	0.003	0.025	0.061	0.101	0.136	0.087	0.018	0.003	0.036	0.054
Loggerhead sea turtle	0.003	0.002	0.002	0.002	0.006	0.019	0.024	0.022	0.027	0.031	0.017	0.007	0.013	0.019
Green sea turtle	0	0	0	0	0	0.023	0.070	0.071	0.063	0.019	0.003	0	0.021	0.031

[a] Density estimates are from DiMatteo et al. (2023).

Table H-88. Sea turtle density estimates for all modeled species in a 100 km perimeter around the Lease Area.

Common name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual mean	May to December mean
Kemp's ridley sea turtle	0	0	0	0	0	0.001	0.003	0.002	0.002	0.002	<0.001	0	<0.001	0.001
Leatherback sea turtle	0.001	<0.001	<0.001	<0.001	0.003	0.022	0.050	0.083	0.110	0.073	0.017	0.003	0.030	0.045
Loggerhead sea turtle	0.003	0.003	0.002	0.002	0.007	0.021	0.025	0.022	0.027	0.032	0.019	0.008	0.014	0.020
Green sea turtle	0	0	0	0	0	0.022	0.061	0.064	0.054	0.018	0.003	0	0.019	0.028

[a] Density estimates are from DiMatteo et al. (2023).

Table H-89. Sea turtle density estimates for all modeled species in a 125 km perimeter around the Lease Area.

Common name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual mean	May to December mean
Kemp's ridley sea turtle	0	0	0	0	0	0.001	0.003	0.002	0.002	0.001	<0.001	0	<0.001	0.001
Leatherback sea turtle	0.001	<0.001	<0.001	0.001	0.004	0.021	0.044	0.075	0.098	0.069	0.018	0.004	0.028	0.042
Loggerhead sea turtle	0.004	0.003	0.002	0.003	0.008	0.024	0.025	0.022	0.027	0.034	0.021	0.009	0.015	0.021
Green sea turtle	0	0	0	0	0	0.024	0.063	0.063	0.055	0.019	0.003	0	0.019	0.028

[a] Density estimates are from DiMatteo et al. (2023).

Table H-90. Sea turtle density estimates for all modeled species in a 150 km perimeter around the Lease Area.

Common name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual mean	May to December mean
Kemp's ridley sea turtle	0	0	0	0	0	0.001	0.002	0.002	0.002	0.001	<0.001	0	<0.001	0.001
Leatherback sea turtle	0.001	0.001	0.001	0.002	0.006	0.021	0.042	0.070	0.088	0.064	0.020	0.005	0.027	0.039
Loggerhead sea turtle	0.004	0.003	0.003	0.003	0.010	0.026	0.025	0.022	0.026	0.034	0.022	0.011	0.016	0.022
Green sea turtle	0	0	0	0	0	0.024	0.055	0.055	0.050	0.018	0.003	0	0.017	0.026

[a] Density estimates are from DiMatteo et al. (2023).

H.3. Animat Seeding Areas

Exposure modeling seeding areas are set using each species' preferred depth range. The following maps show seeding areas for each species, overlaid on a density map, if available, displaying the highest density month for that species. If density surfaces are unavailable for a particular species, a surrogate may be used, and for some species, the density data source shown in the image may not coincide with the data source used in predicting exposures. Refer to Section 3.2 for a detailed description of density sources and calculations.

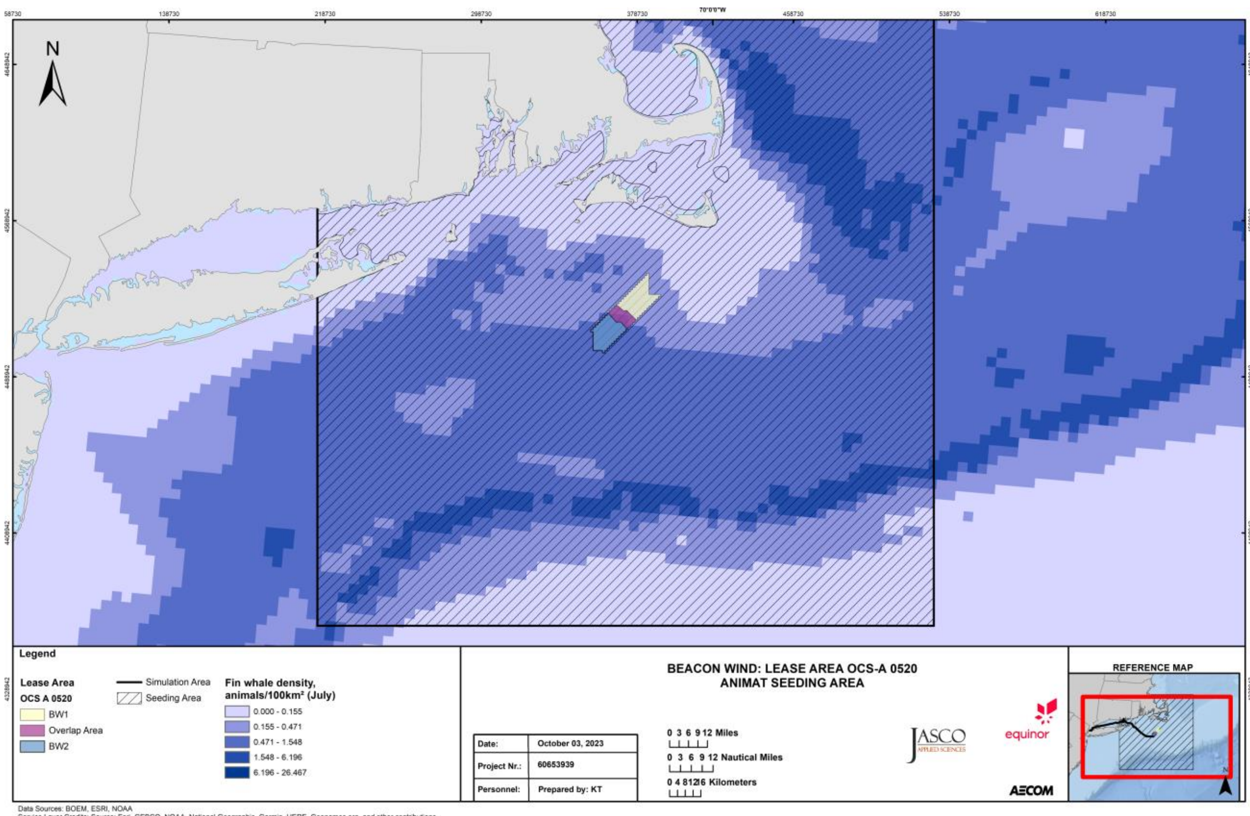

Figure H-1. Map of fin whale animat seeding area range.

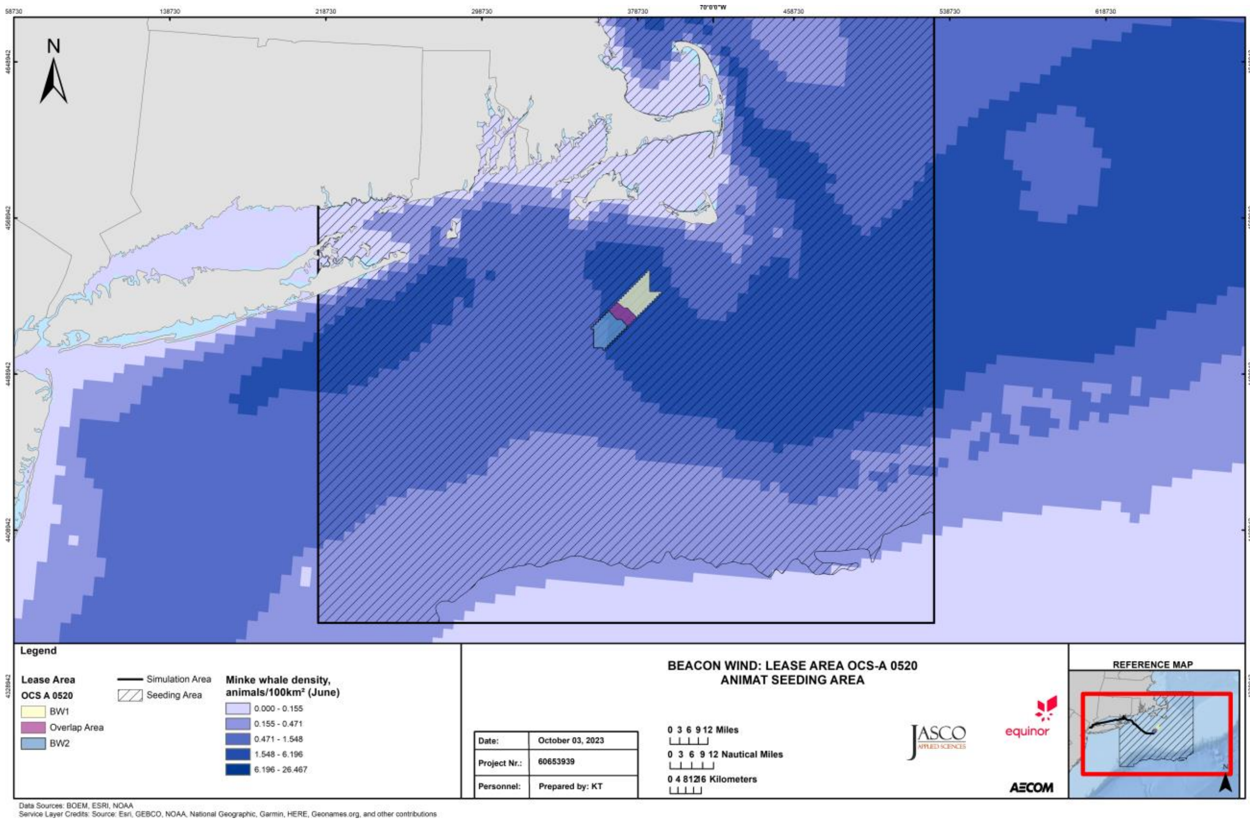

Figure H-2. Map of minke whale animat seeding area range.

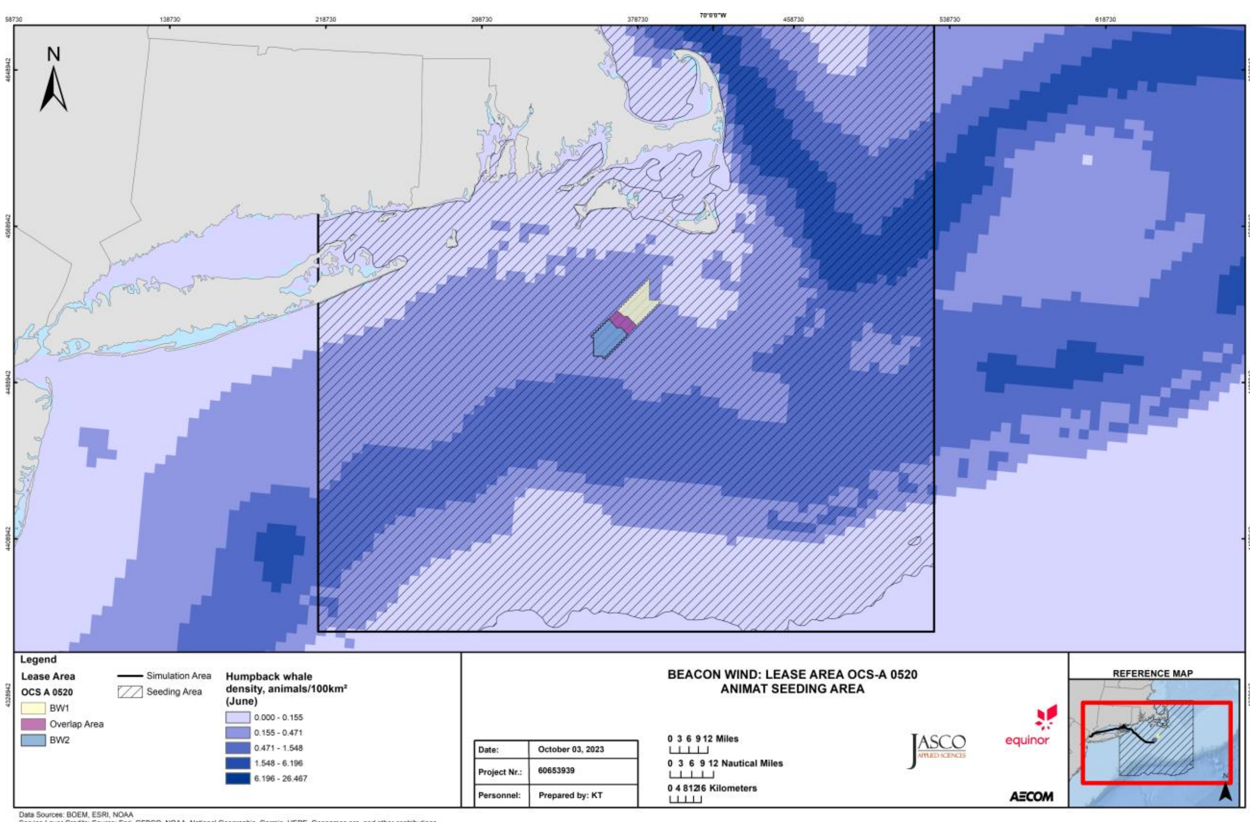

Figure H-3. Map of humpback whale animat seeding area range.

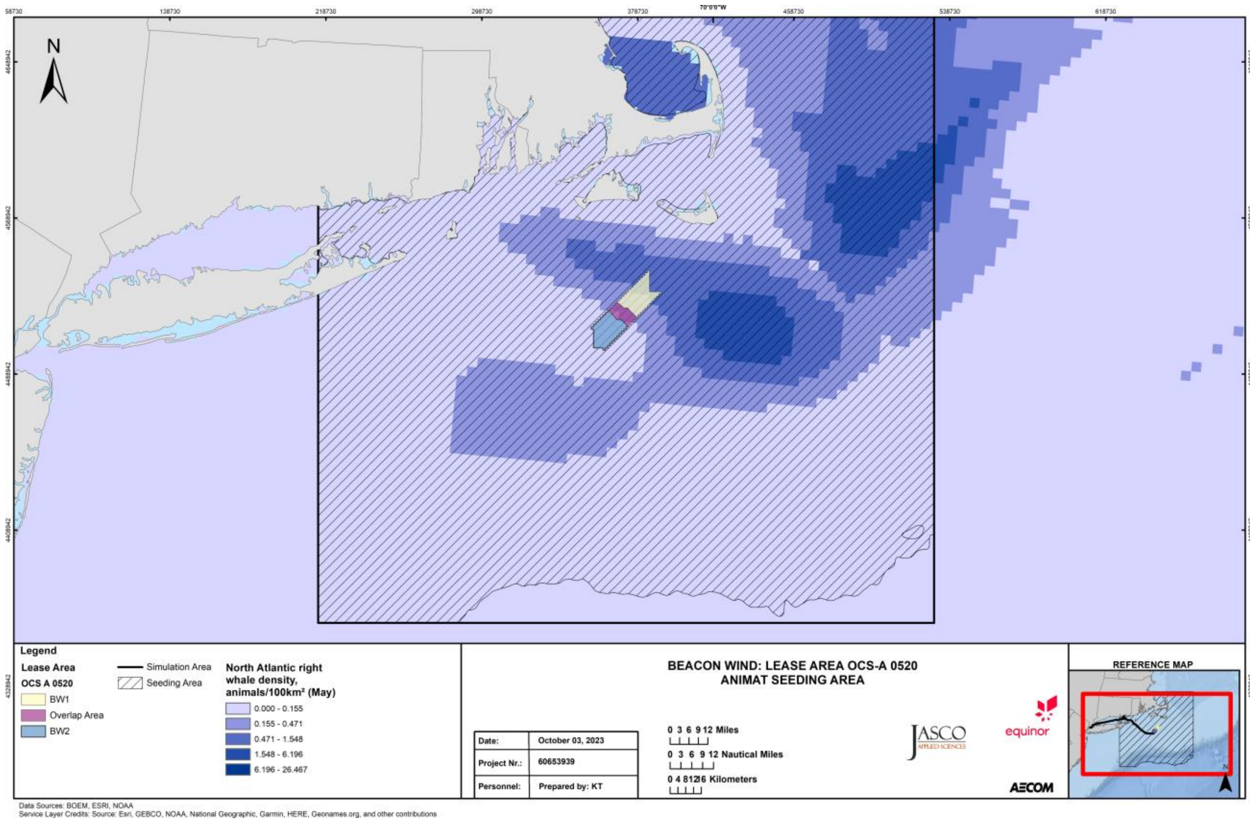

Figure H-4. Map of North Atlantic right whale animat seeding area range.

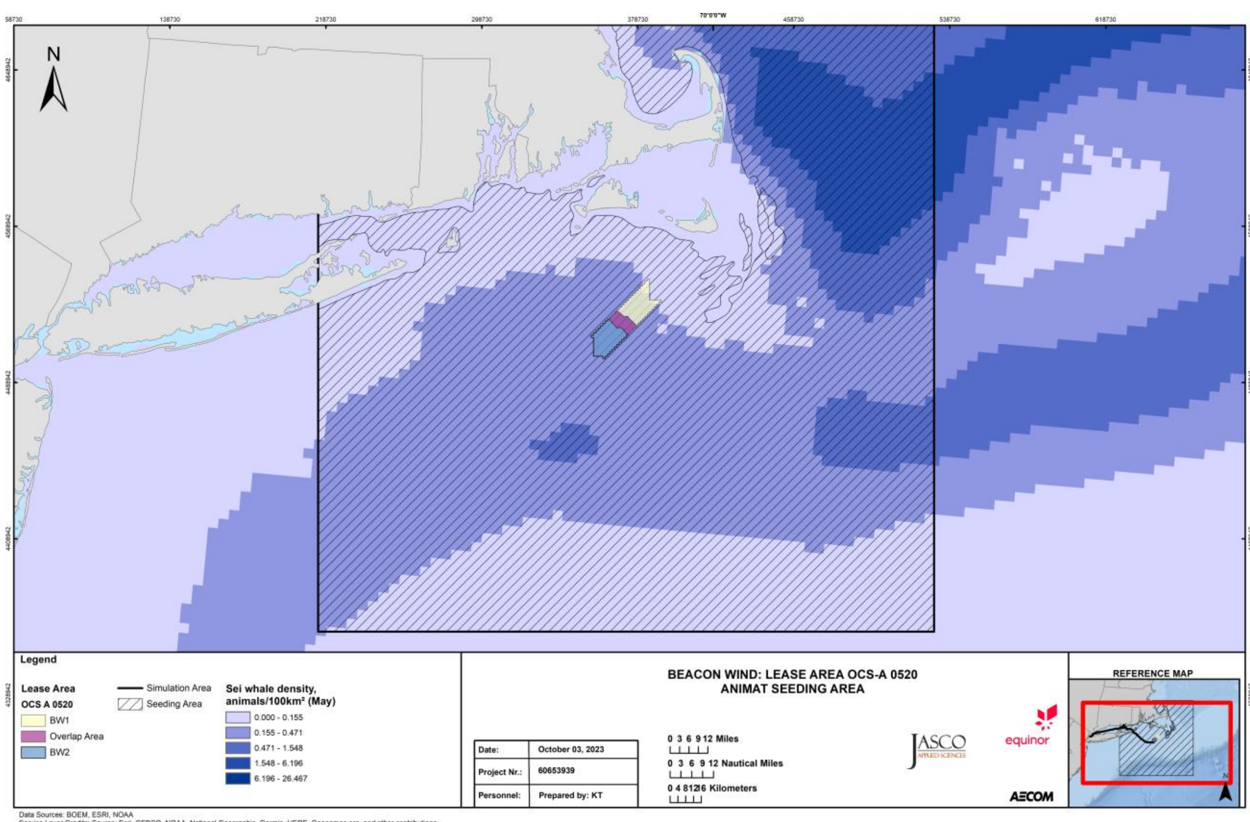

Figure H-5. Map of sei whale animat seeding area range.

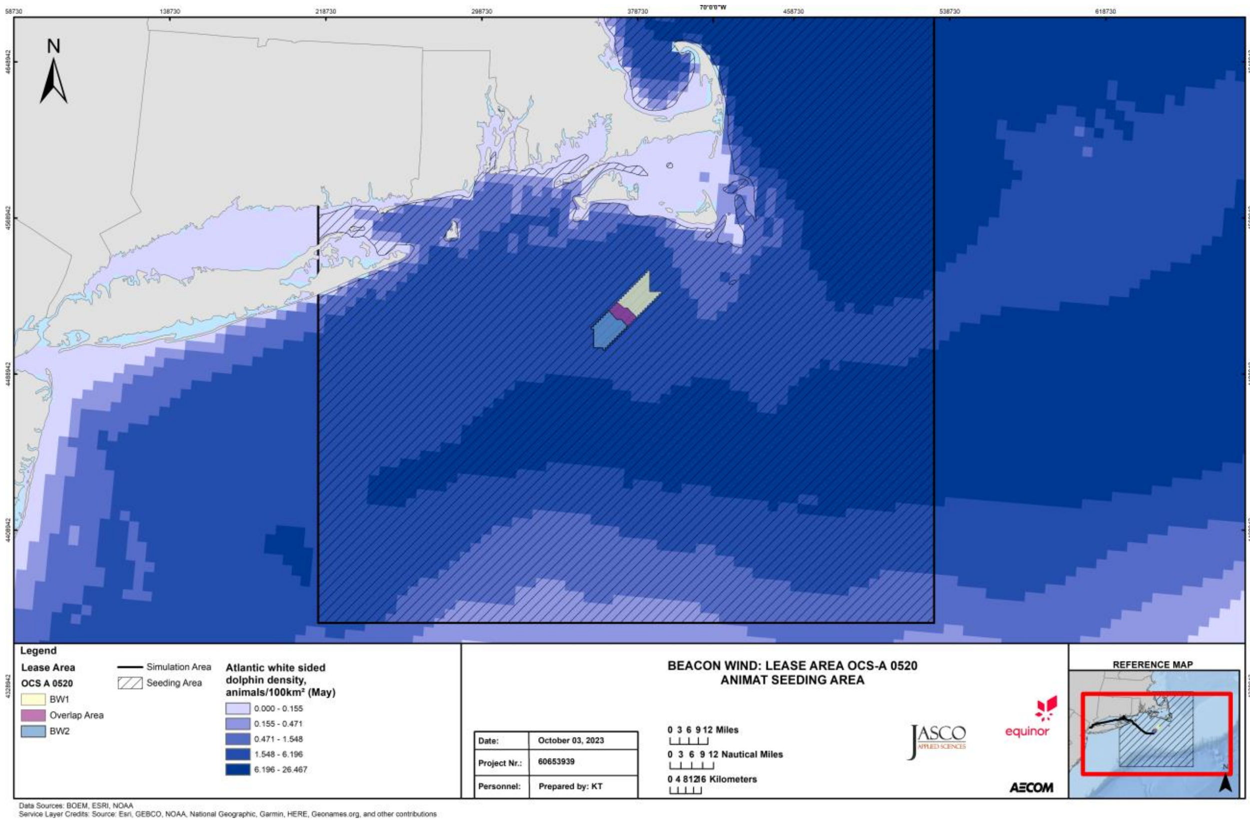

Figure H-6. Map of Atlantic white-sided dolphin animat seeding area range.

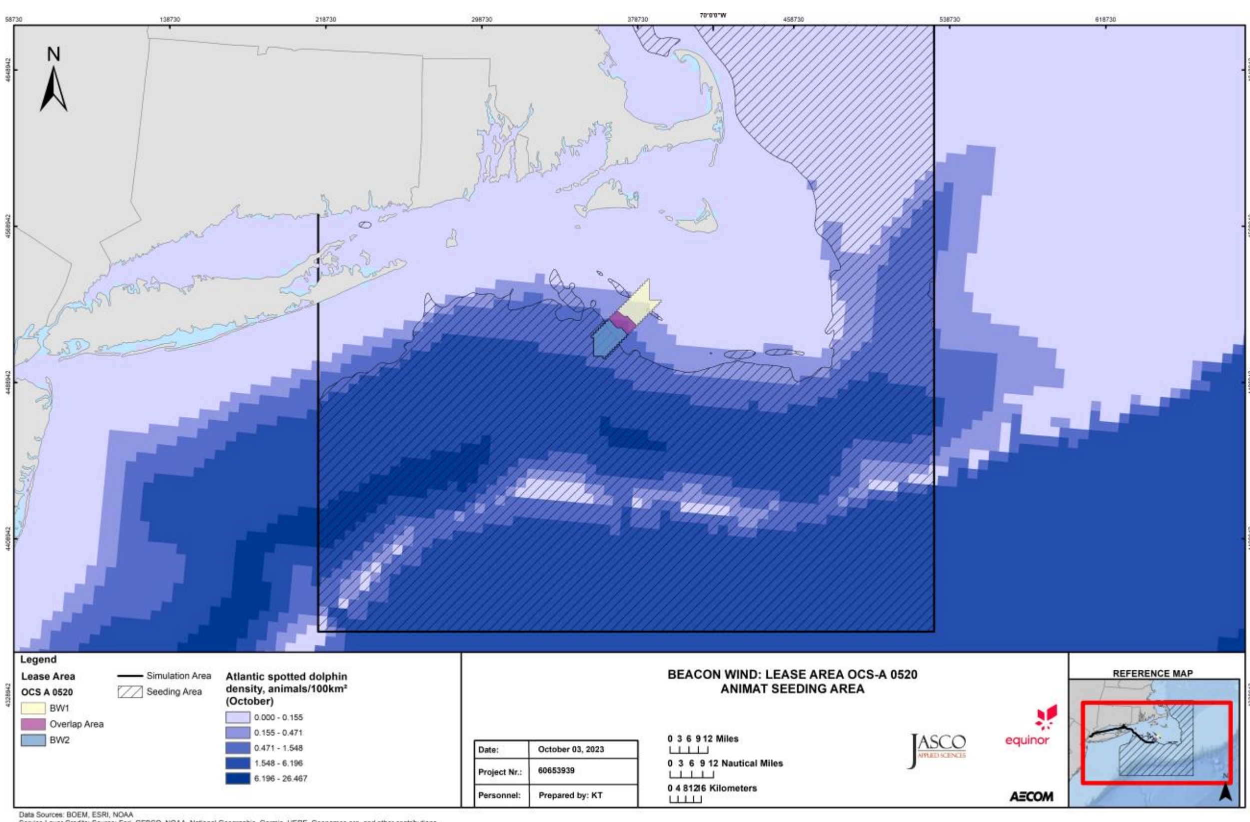

Figure H-7. Map of Atlantic spotted dolphin animat seeding area range.

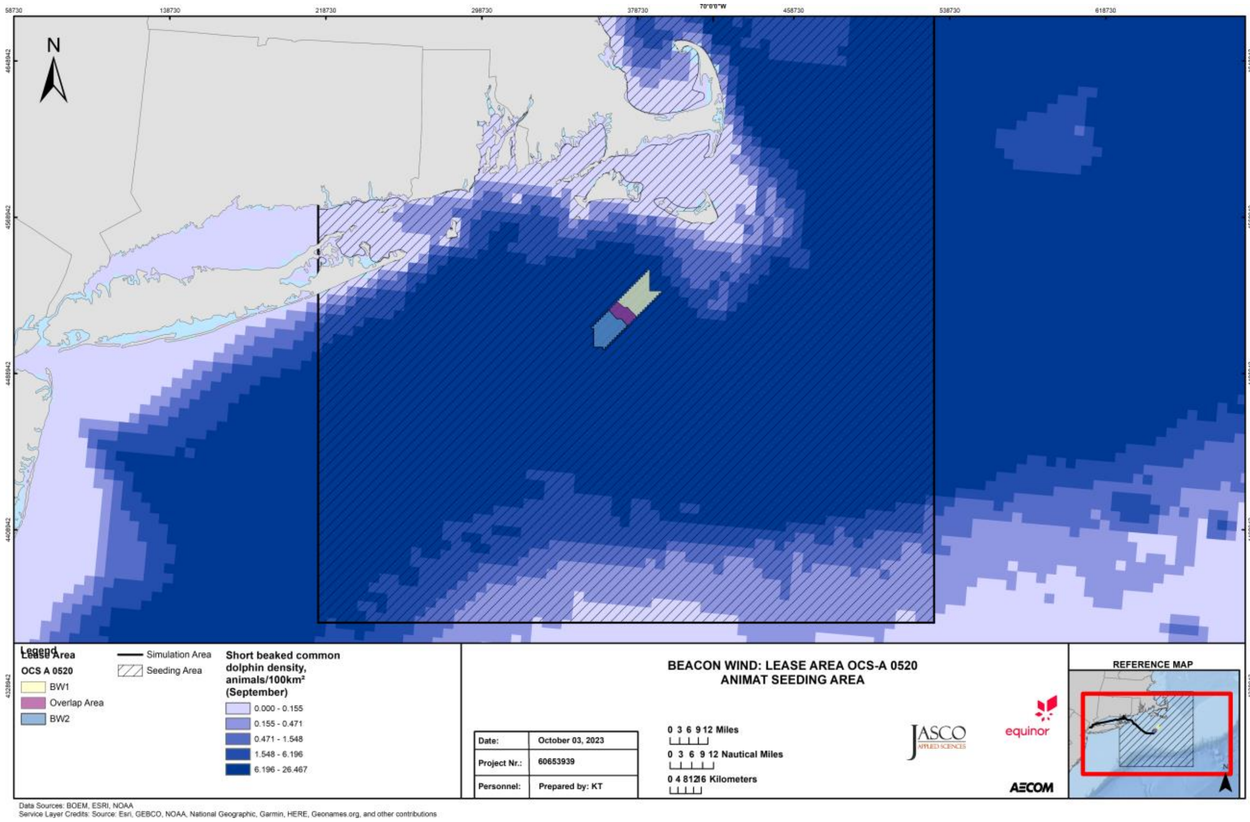

Figure H-8. Map of common dolphin animat seeding area range.

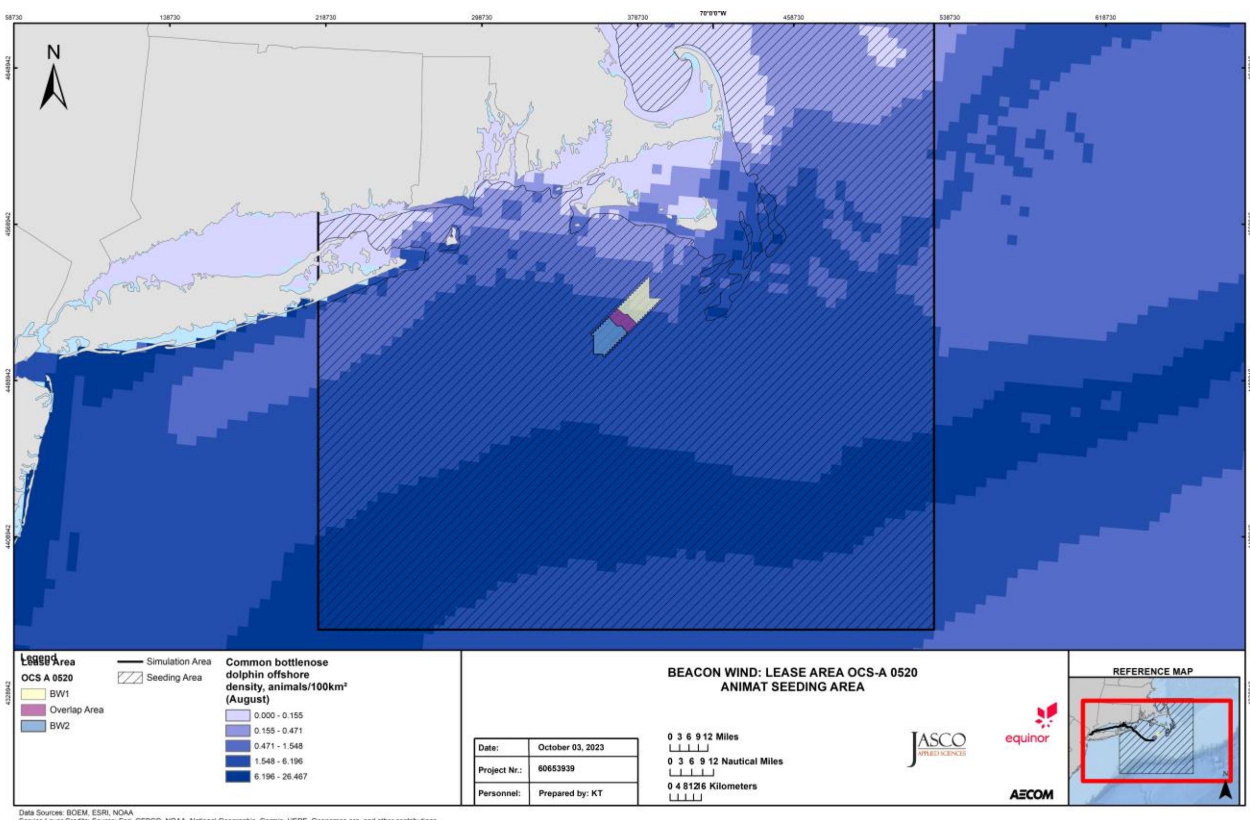

Figure H-9. Map of bottlenose dolphin (offshore) animat seeding area range.

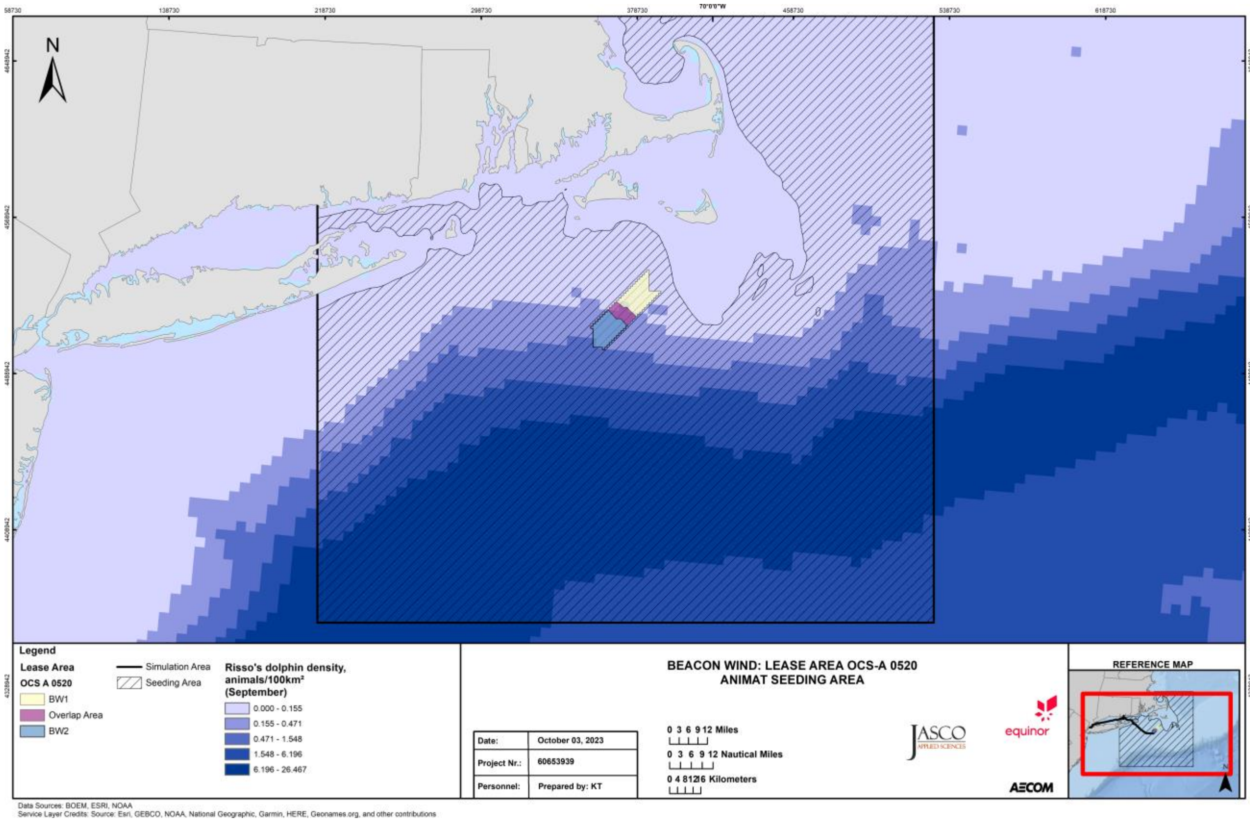

Figure H-10. Map of Risso's dolphin animat seeding area range.

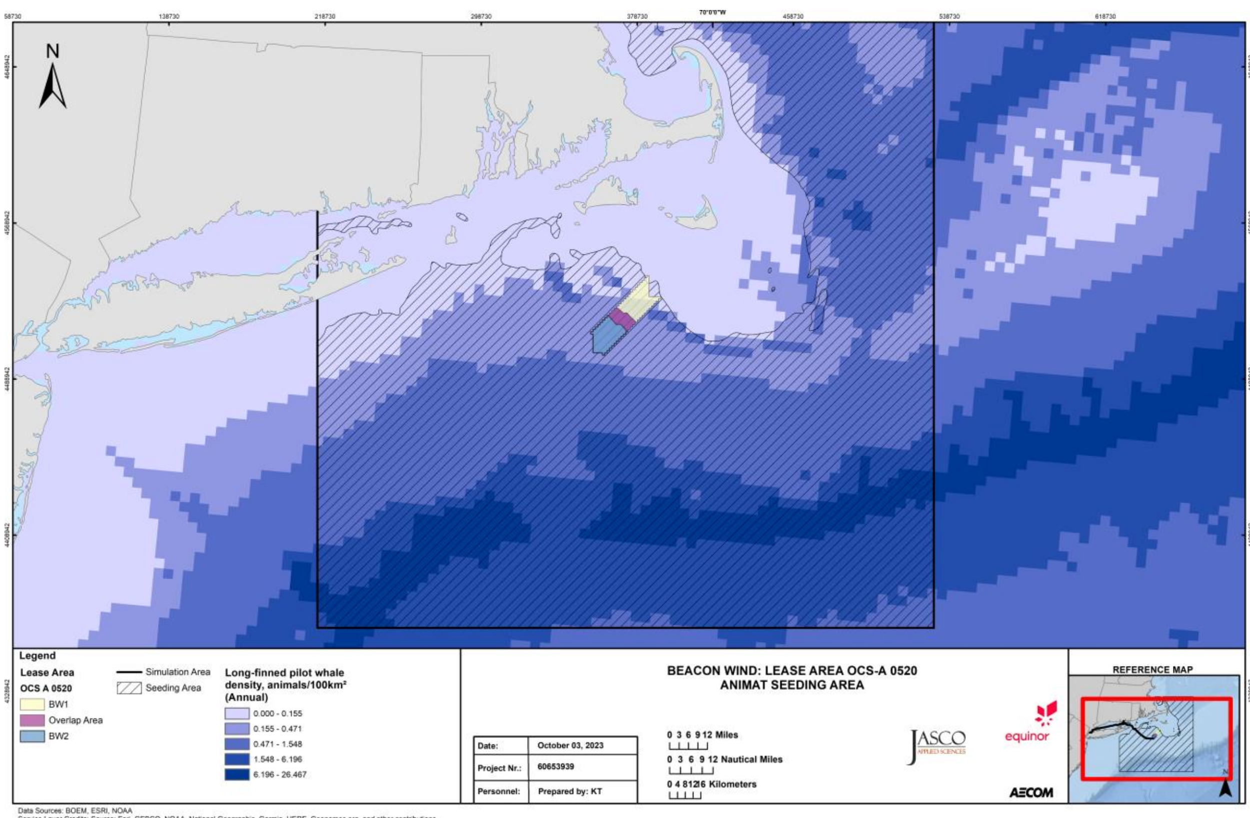

Figure H-11. Map of long-finned pilot whale animat seeding area range.

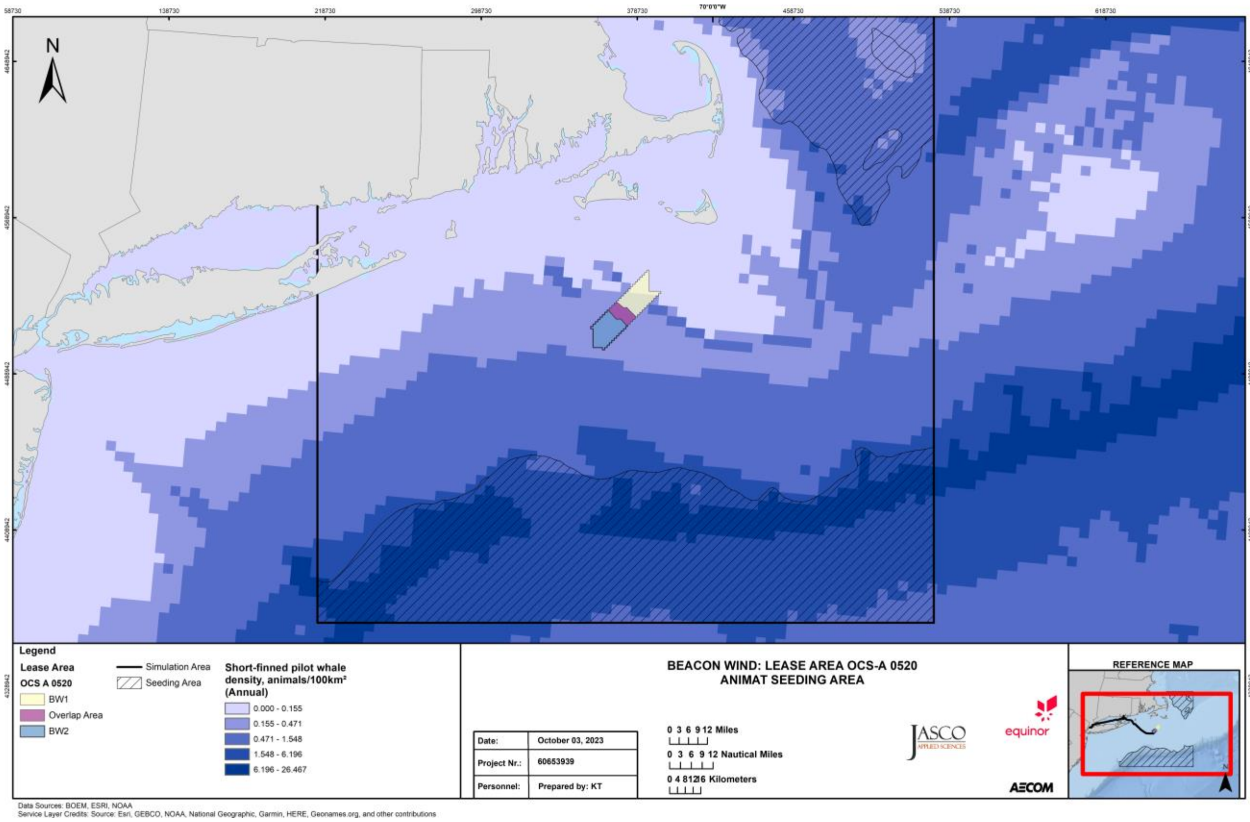

Figure H-12. Map of short-finned pilot whale animat seeding area range.

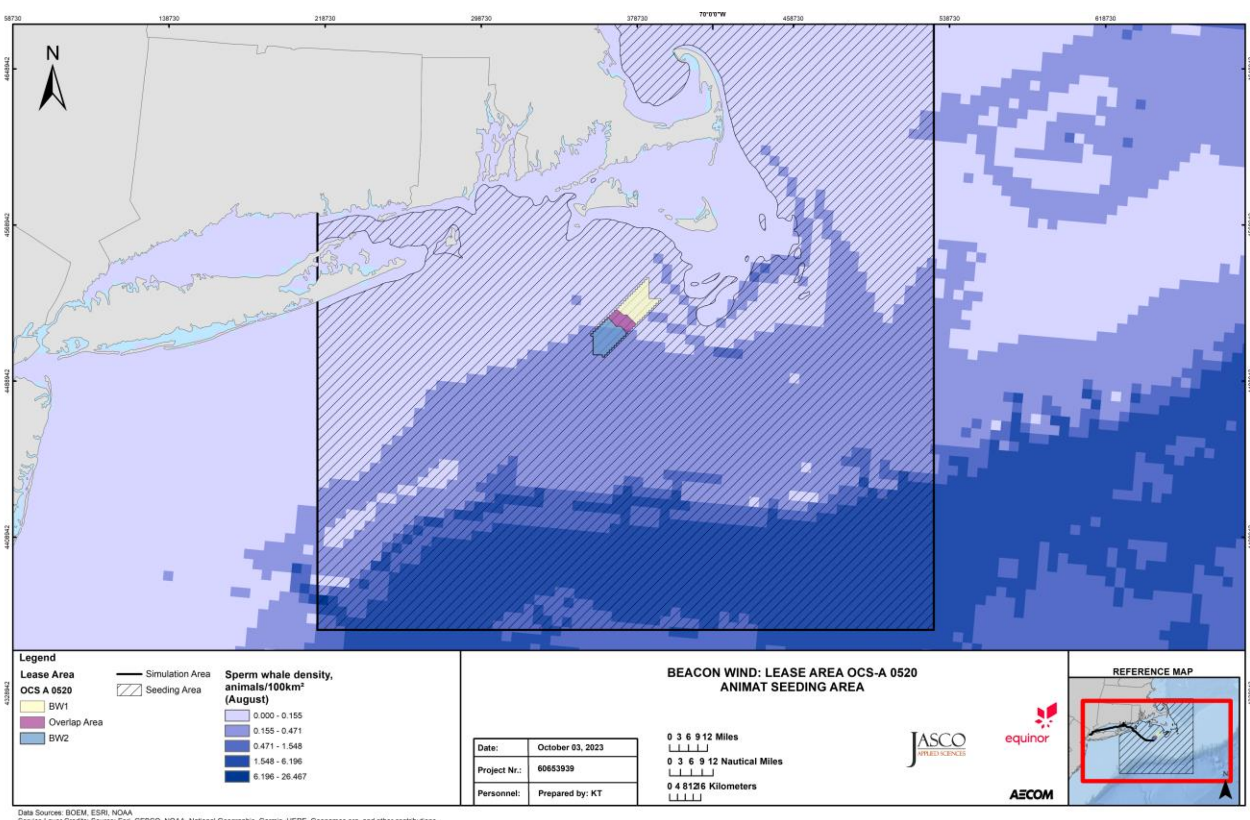

Figure H-13. Map of sperm whale animat seeding area range.

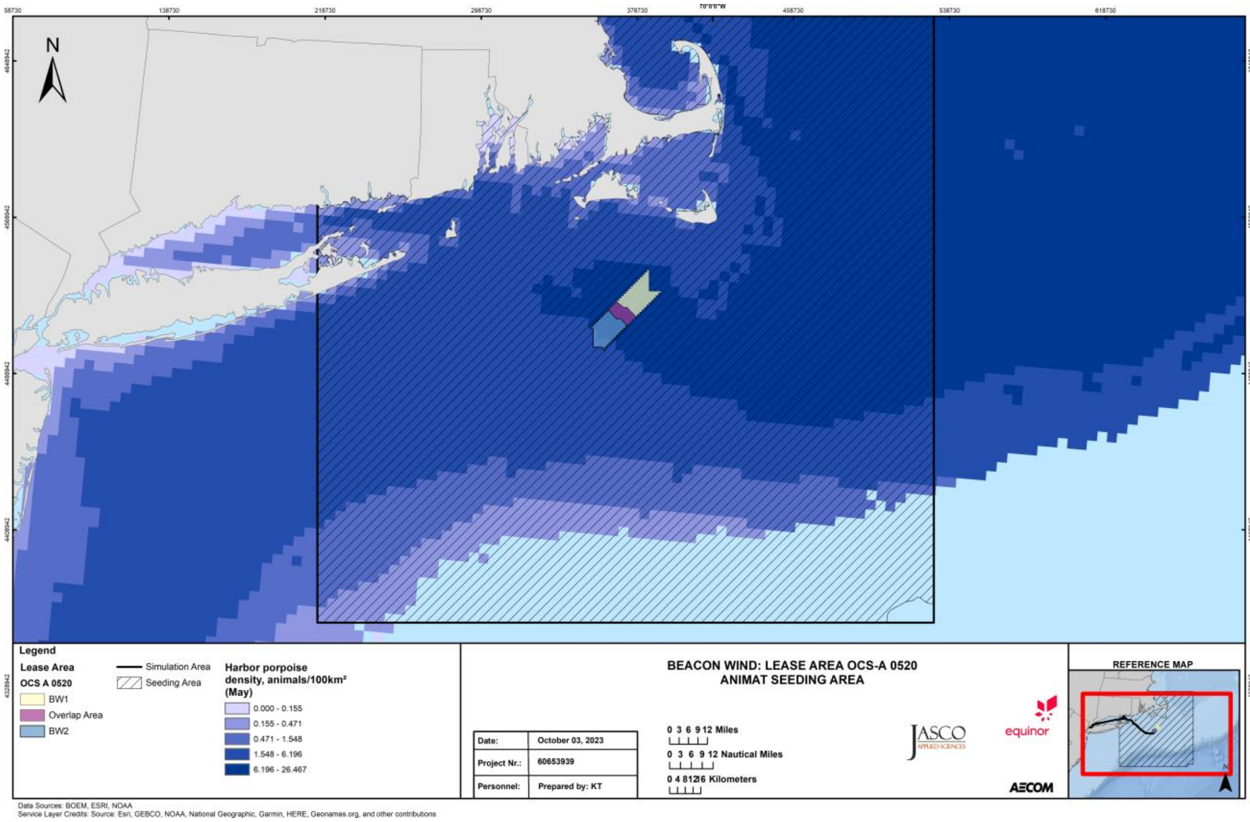

Figure H-14. Map of harbor porpoise animat seeding area range.

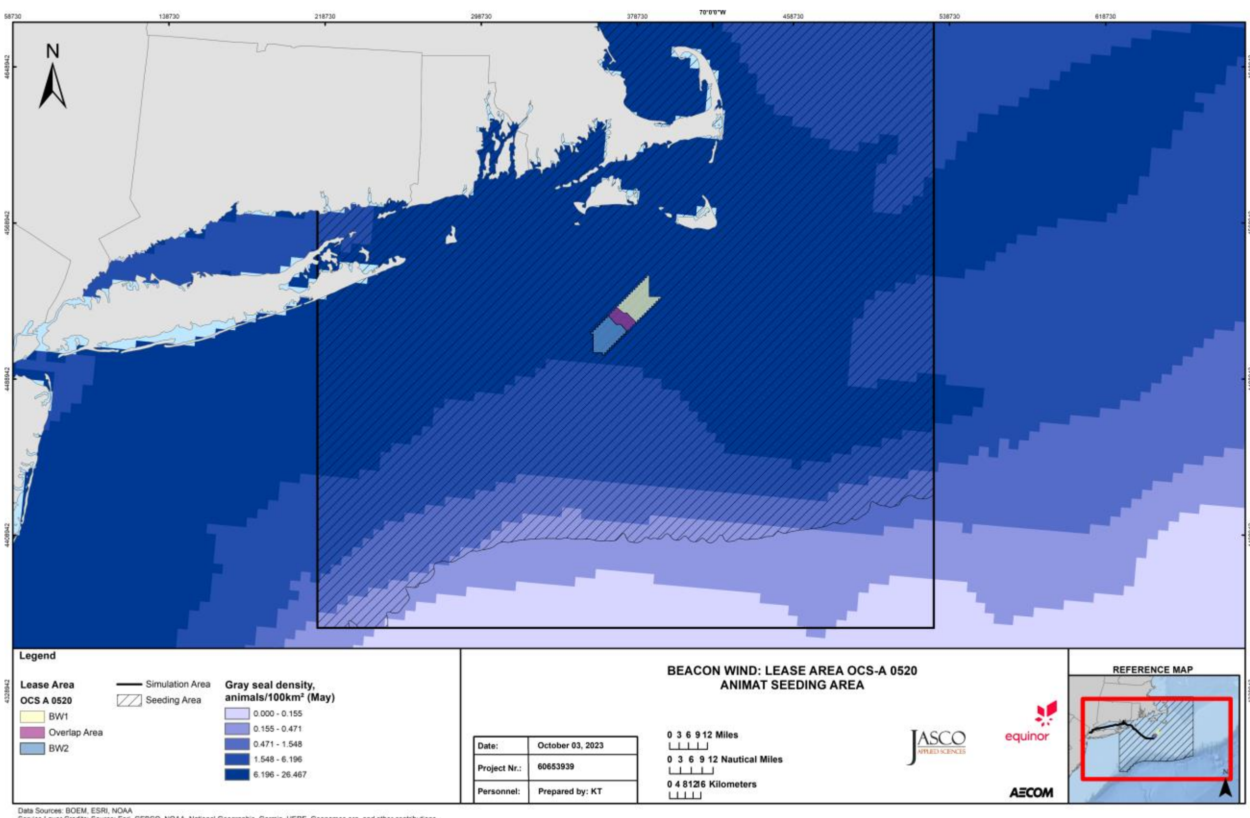

Figure H-15. Map of gray seal animat seeding area range.

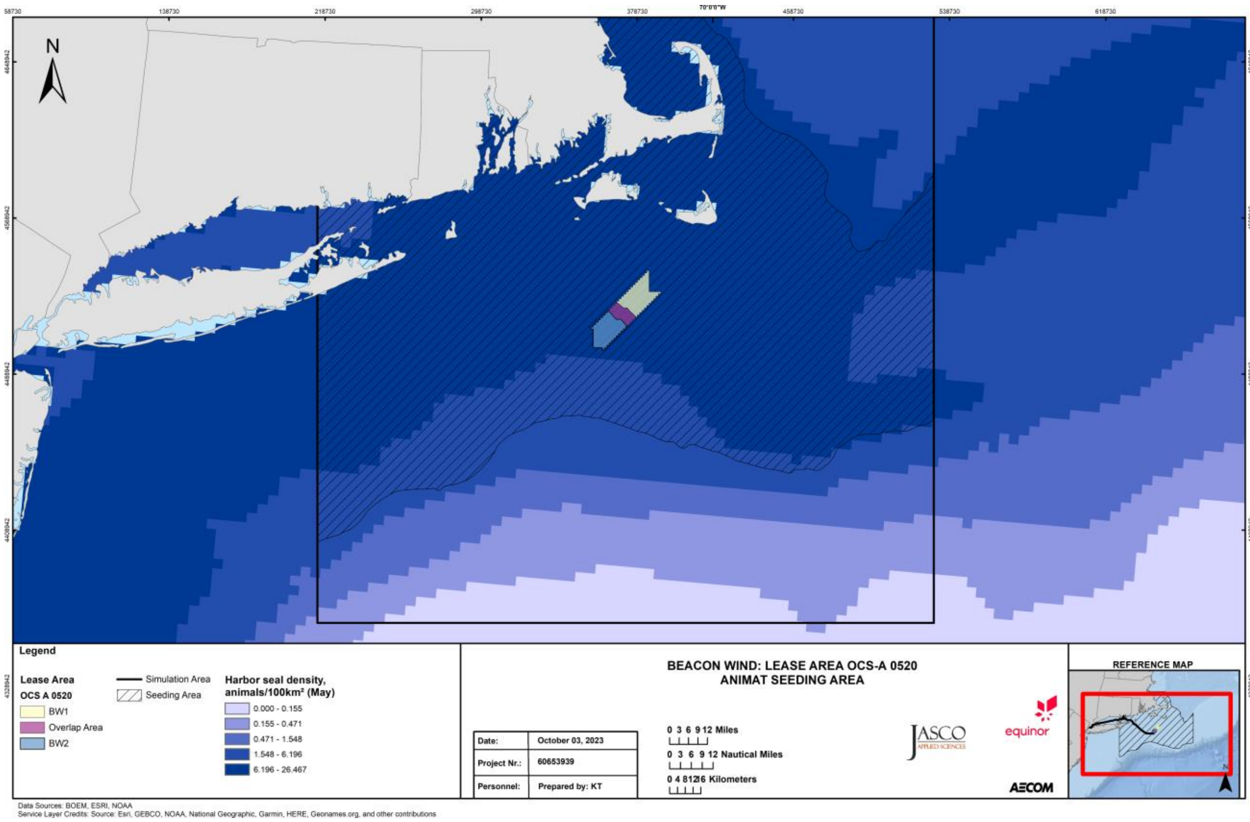

Figure H-16. Map of harbor seal animat seeding area range.

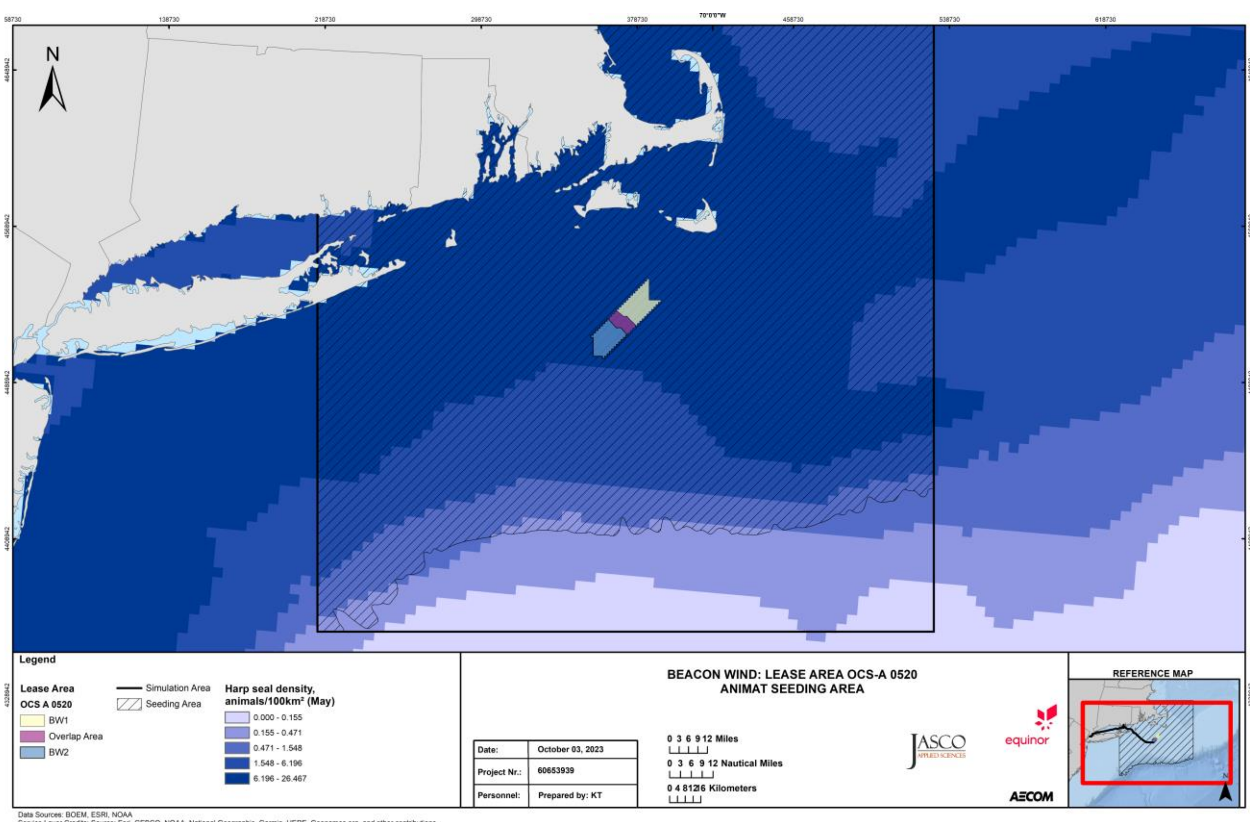

Figure H-17. Map of harp seal animat seeding area range.

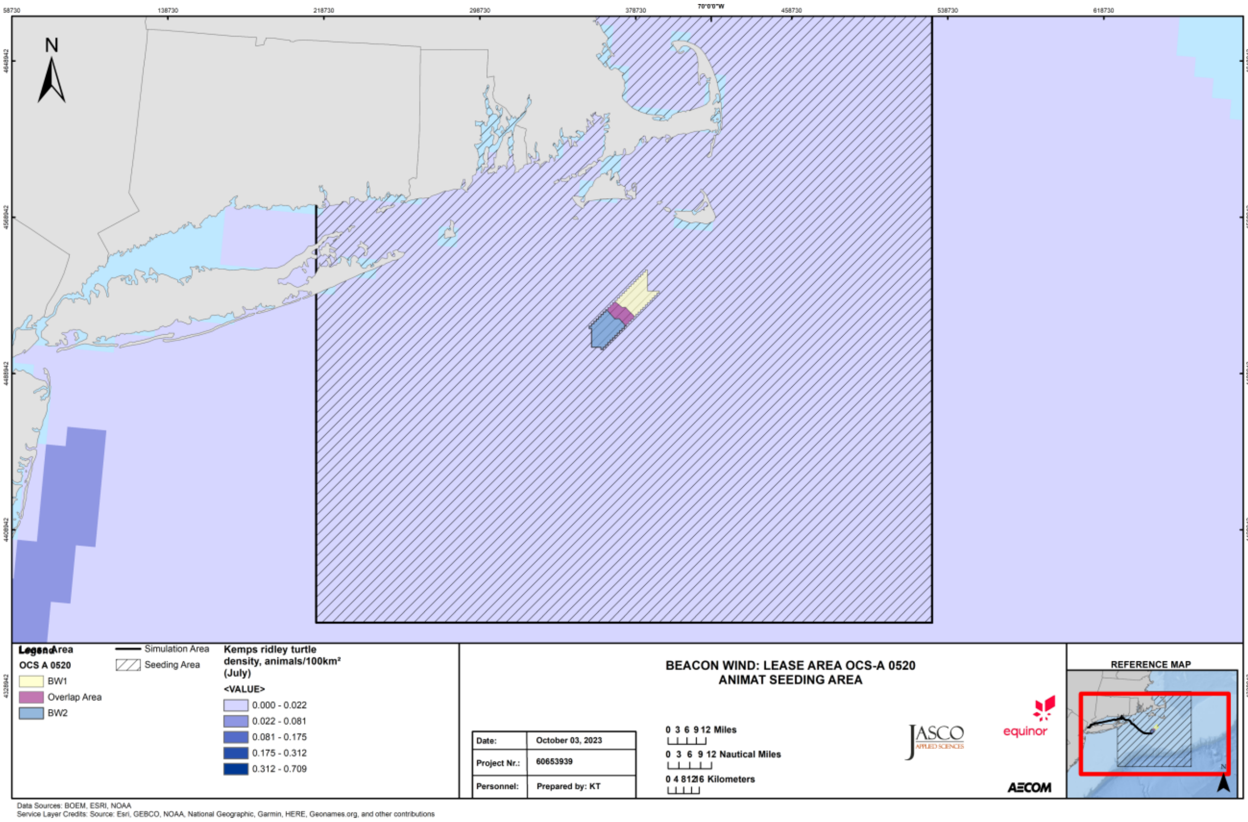

Figure H-18. Map of Kemp's ridley sea turtle animat seeding area range.

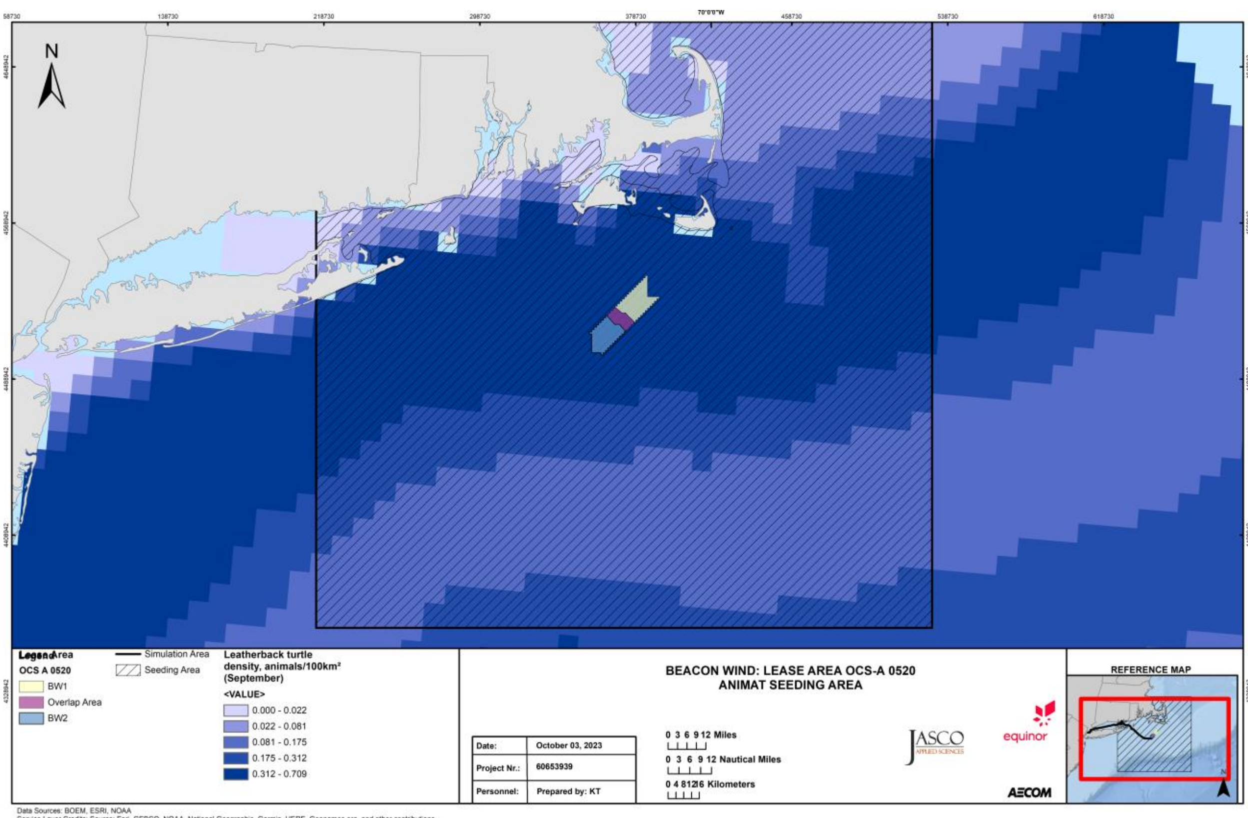

Figure H-19. Map of leatherback sea turtle animat seeding area range.

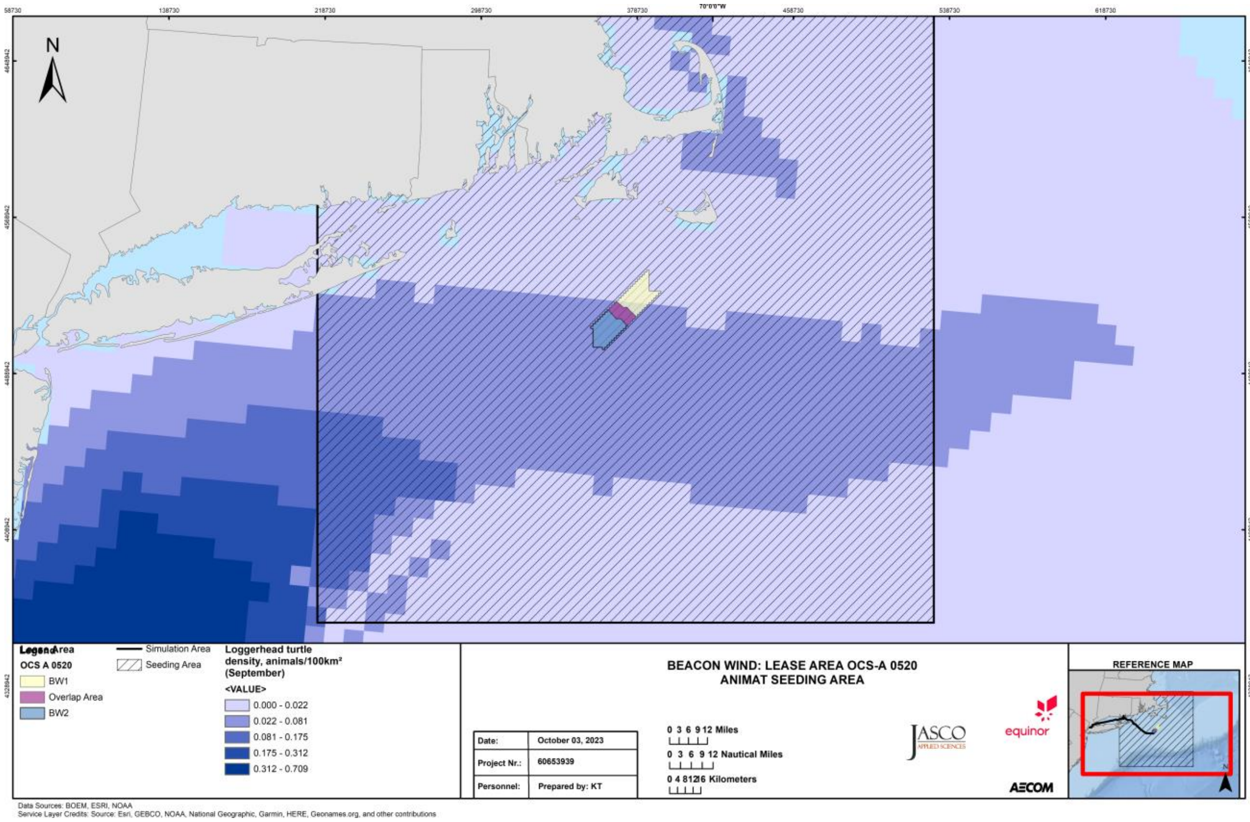

Figure H-20. Map of loggerhead sea turtle animat seeding area range.

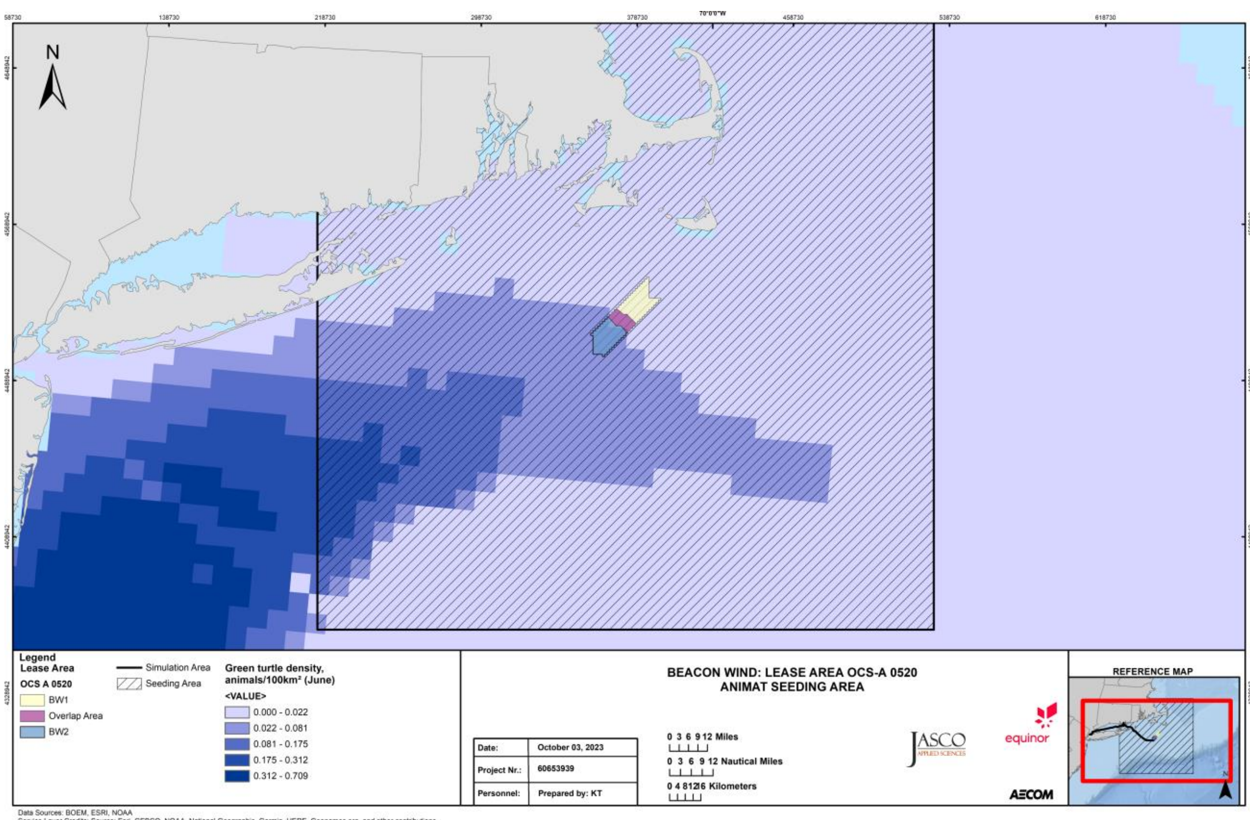

Figure H-21. Map of green sea turtle animat seeding area range.

Literature Cited in this Appendix

[DoC] Department of Commerce (US) and [NOAA] National Oceanic and Atmospheric Administration (US). 2005. 70 FR 1871: Endangered Fish and Wildlife; Notice of Intent to Prepare an Environmental Impact Statement. *Federal Register* 70(7): 1871-1875. https://www.federalregister.gov/d/05-525.

[NMFS] National Marine Fisheries Service (US). 2018. *2018 Revision to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0): Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts*. US Department of Commerce, NOAA. NOAA Technical Memorandum NMFS-OPR-59. 167 p. https://media.fisheries.noaa.gov/dam-migration/tech_memo_acoustic_guidance_(20)_(pdf)_508.pdf.

Aoki, K., M. Amano, M. Yoshioka, K. Mori, D. Tokuda, and N. Miyazaki. 2007. Diel diving behavior of sperm whales off Japan. *Marine Ecology Progress Series* 349: 277-287. https://doi.org/10.3354/meps07068.

DiMatteo, A.D., J.J. Roberts, D. Jones, L. Garrison, K.M. Hart, R.D. Kenney, C.B. Khan, W.A. McLellan, K. Lomac-MacNair, et al. 2023. *Sea turtle density surface models along the United States Atlantic coast*. Manuscript in preparation.

Dunlop, R.A., M.J. Noad, R.D. McCauley, L. Scott-Hayward, E. Kniest, R. Slade, D. Paton, and D.H. Cato. 2017. Determining the behavioural dose–response relationship of marine mammals to air gun noise and source proximity. *Journal of Experimental Biology* 220(16): 2878-2886. https://doi.org/10.1242/jeb.160192.

Ellison, W.T., B.L. Southall, C.W. Clark, and A.S. Frankel. 2012. A New Context-Based Approach to Assess Marine Mammal Behavioral Responses to Anthropogenic Sounds. *Conservation Biology* 26(1): 21-28. https://doi.org/10.1111/j.1523-1739.2011.01803.x.

Houser, D.S. 2006. A method for modeling marine mammal movement and behavior for environmental impact assessment. *IEEE Journal of Oceanic Engineering* 31(1): 76-81. https://doi.org/10.1109/JOE.2006.872204.

Roberts, J.J., B.D. Best, L. Mannocci, E. Fujioka, P.N. Halpin, D.L. Palka, L.P. Garrison, K.D. Mullin, T.V.N. Cole, et al. 2016. Habitat-based cetacean density models for the U.S. Atlantic and Gulf of Mexico. *Scientific Reports* 6. https://doi.org/10.1038/srep22615.

Roberts, J.J., T.M. Yack, and P.N. Halpin. 2022. *Habitat-based marine mammal density models for the U.S. Atlantic. Version June 20, 2022. Downloaded July 19, 2022 from https://seamap.env.duke.edu/models/Duke/EC/.*

Southall, B.L., A.E. Bowles, W.T. Ellison, J.J. Finneran, R.L. Gentry, C.R. Greene, Jr., D. Kastak, D.R. Ketten, J.H. Miller, et al. 2007. Marine Mammal Noise Exposure Criteria: Initial Scientific Recommendations. *Aquatic Mammals* 33(4): 411-521. https://doi.org/10.1578/AM.33.4.2007.411.

Wood, J.D., B.L. Southall, and D.J. Tollit. 2012. *PG&E offshore 3-D Seismic Survey Project Environmental Impact Report–Marine Mammal Technical Draft Report*. Report by SMRU Ltd. 121 p. https://www.coastal.ca.gov/energy/seismic/mm-technical-report-EIR.pdf.