BILLING CODE 3510-22-P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648-XE954

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to a Breakwater Replacement Project in Eastport, Maine

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

ACTION: Notice; proposed incidental harassment authorization; request for comments.

SUMMARY: NMFS has received a request from the Maine Department of Transportation (ME DOT) for authorization to take marine mammals, by harassment, incidental to in-water construction activities from the Eastport Breakwater Replacement Project (EBRP) in Eastport, ME. Pursuant to the Marine Mammal Protection Act (MMPA), NMFS is requesting comments on its proposal to issue an incidental harassment authorization (IHA) to the ME DOT to incidentally take marine mammals, by Level B harassment only, during the specified activity.

DATES: Comments and information must be received no later than [*insert date 30 days after date of publication in the FEDERAL REGISTER*].

ADDRESSES: Comments on the applications should be addressed to Jolie Harrison, Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service. Physical comments should be sent to 1315 East-West Highway, Silver Spring, MD 20910 and electronic comments should be sent to *ITP.Egger@noaa.gov*.

Instructions: NMFS is not responsible for comments sent by any other method, to any other address or individual, or received after the end of the comment period. Comments received

electronically, including all attachments, must not exceed a 25-megabyte file size. Attachments to electronic comments will be accepted in Microsoft Word or Excel or Adobe PDF file formats only. All comments received are a part of the public record and will generally be posted online at *www.nmfs.noaa.gov/pr/permits/incidental/construction.htm* without change. All personal identifying information (*e.g.*, name, address) voluntarily submitted by the commenter may be publicly accessible. Do not submit confidential business information or otherwise sensitive or protected information.

FOR FURTHER INFORMATION CONTACT: Stephanie Egger, Office of Protected Resources, NMFS, (301) 427-8401.

SUPPLEMENTARY INFORMATION:

Availability

An electronic copy of the ME DOT's application and supporting documents, as well as a list of the references cited in this document, may be obtained online at: *www.nmfs.noaa.gov/pr/permits/incidental/construction.htm*. In case of problems accessing these documents, please call the contact listed above.

National Environmental Policy Act

NMFS is preparing an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) and will consider comments submitted in response to this notice as part of that process.

Background

Sections 101(a)(5)(D) of the MMPA (16 U.S.C. 1361 *et seq*.) direct the Secretary of Commerce to allow, upon request by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and

either regulations are issued or, if the taking is limited to harassment, a notice of a proposed authorization is provided to the public for review.

Authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s), will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant), and if the permissible methods of taking and requirements pertaining to the mitigation, monitoring and reporting of such takings are set forth. NMFS has defined "negligible impact" in 50 CFR 216.103 as "...an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival."

Section 101(a)(5)(D) of the MMPA established an expedited process by which citizens of the U.S. can apply for an authorization to incidentally take small numbers of marine mammals by harassment. Section 101(a)(5)(D) establishes a 45-day time limit for NMFS review of an application followed by a 30-day public notice and comment period on any proposed authorizations for the incidental harassment of marine mammals. Within 45 days of the close of the comment period, NMFS must either issue or deny the authorization. Except with respect to certain activities not pertinent here, the MMPA defines "harassment" as "any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B harassment)."

Summary of Request

On August 31, 2016, we received an application from the ME DOT for authorization to take marine mammals incidental to construction activities associated with the replacement and expansion of the pier and breakwater in Eastport, Maine. The project includes the removal of the original filled sheet pile structure (built in 1962), the replacement of the approach pier, expansion of the existing pier head, and the construction of a new wave attenuator. The ME DOT submitted a revised version of the application on October 21, 2016, and a final application on December 2, 2016, which we deemed adequate and complete.

The proposed activity would begin January 2017 and work may be authorized for one year, however, the pile driving activity is expected to be accomplished between January and August 2017. Harbor seal (*Phoca vitulina*), gray seal (*Halichoerus grypus*), harbor porpoise (*Phocoena phocoena*), and Atlantic white-sided dolphin (*Lagenorhynchus acutus*) are expected to be present during the proposed work. Pile driving activities are expected to produce in-water noise disturbance that has the potential to result in the behavioral harassment of marine mammals. NMFS is proposing to authorize take, by Level B Harassment, of the marine mammals, listed above, as a result of the specified activity.

On August 4, 2016, NMFS released its Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Guidance). This new guidance established new thresholds for predicting auditory injury, which equates to Level A harassment under the MMPA. The ME DOT project used this new guidance when determining the injury (Level A) zones.

Description of the Specified Activities

Overview

The Eastport Breakwater is a solid fill multi-use pier serving the local fishing community by providing a safe harbor for berthing as well as a loading and off-loading point for the fishing fleet. It also serves as a berth for larger commercial and passenger ships and a docking area for U.S. Coast Guard vessels. It is an 'L' shaped structure with one leg perpendicular to the shoreline and the outer leg parallel (see Appendix A, Project Plans, of the ME DOT IHA application). The existing pier was built in 1962 and is on the verge of being taken out of service due to public safety concerns. Recently, emergency repairs have been completed to prevent shutdown, however, these repairs are only temporary and will not keep the pier in service indefinitely. The overall replacement structure consists of an open pier supported by 151 piles, which would consist of steel pipe piles, reinforced concrete pile caps, and a precast pre-stressed plank deck with structural overlay. The approach pier would be 40 feet (ft) by 300 ft and the proposed main pier section that would be parallel to the shoreline would be 50 ft by 400 ft.

ME DOT was issued an IHA for their previous work on this project in 2014 (79 FR 59247; October 4, 2014) with a revised date for project activities in 2015 (80 FR 46565; July 20, 2015). This prosed IHA is a continuation of the work to complete the project that began in 2015.

Dates and Duration

ME DOT plans to begin in-water construction in January 2017. The potential construction schedule is presented in Table 1. In-water pile driving activities are expected by completed by August 2017. Pile driving would only occur in weather that provides adequate visibility for marine mammal monitoring activities. The proposed IHA would be valid for one year from the date of issuance.

Table 1. Construction schedule for the Eastport Breakwater Replacement Project.

Activity	Duration	Expected timeframe of activities with potential to result in harassment	Approximate hours of in-water noise producing activities with sound levels over 120 dB RMS	Pile type to be driven/activity with potential to result in harassment *
Construction of new pile supported pier	8 weeks	January 2017-August 2017	190	16”-36” steel pipe pile
Breakwater construction	32 Weeks	January 2017-August 2017	100	16”-36” steel pipe pile; sheet steel
Installation of fender piles	2 weeks	January 2017-August 2017	60	16”-36” steel pipe pile

Specified Geographic Region

The proposed activity would occur in Cobscook Bay (Washington County) in Eastport, ME. The breakwater lies near the mouth of the St. Croix River at the end of a long peninsula adjacent to Quoddy Head. Cobscook Bay has extremely strong tidal currents and notably high tides, creating an extensive intertidal habitat for marine and coastal species. Water depths at the proposed project location are between 8 and 55 ft (2.4 – 17 meter (m)). The Bay is considered a relatively intact marine system, as the area has not experienced much industrialization.

Detailed Description of Activities

The replacement pier consists of two different sections. The approach pier will be replaced in kind by placing fill inside of a sheet pile enclosure, supported by driven piles. The approach section will consist of sheet piles that are driven just outside of the existing sheet piles. The sheet piles can be installed by use of a vibratory hammer only. The main pier, fender system, and wave fence system will be pile supported with piles ranging from 16 inch to 36 inch diameter pipe

piles. These piles will be driven with a vibratory hammer to a point and must be seated with an impact hammer to ensure stability.

The vibratory hammer will drive the pile by applying a rapidly alternating force to the pile by rotating eccentric weights resulting in a downward vibratory force on the pile. The vibratory hammer will be attached to the pile head with a clamp. The vertical vibration in the pile functions by disturbing or liquefying the soil next to the pile, causing the soil particles to lose their frictional grip on the pile. The pile moves downward under its own weight, plus the weight of the hammer. It takes approximately one to three minutes to drive one pile. An impact hammer will be used to ensure the piles are embedded deep enough into the substrate to remain stable for the life of the pier. The impact hammer works by dropping a mass on top of the pile repeatedly to drive it into the substrate. Diesel combustion is used to push the mass upwards and allow it to fall onto the pile again to drive it. The breakdown of the size and amount of piles that is needed to complete the project can be found in Table 2.

Table 2. Pile types and amounts required to complete the project.

Pile size and type	Number of piles remaining to be installed
16” steel pipe pile (vibratory hammer)	37
20” steel pipe pile (impact and vibratory hammer)	25
36” steel pipe pile (impact and vibratory hammer)	2
Steel sheet pile (vibratory hammer)	80 pairs

The breakwater/ wave attenuation component of the facility consists of two portions; Section 1 will consists of sheet piles will be installed along the back of the main pier and Section 2 will be a full depth wave attenuator consisting of king piles and sheet piles. Each king pile is designed as a cantilever beam to resist lateral loads. The king piles may also be able to be used to anchor the floating docks. The wave attenuator will be placed on the inshore side of the pier structure to reduce overall length and eliminate interference with the berthing face.

Electrical and water utilities will be installed inside of the approach pier and also under the main pier. This will require a small amount of trenching under the main pier to bury portions of these lines.

At this stage of the project, the demolition of the old breakwater/pier system will take place. This is likely to be staged after a portion of the construction of the new pier is completed to help with access during demolition. The existing pier is a solid fill pier that is surrounded by sheet piles. Demolition will include removal of the fill material between the sheet piles, and cutting the sheet piles off at the mud line for removal. The fill will likely be removed with an excavator.

Standard ME DOT construction best management practices (BMPs) will also be used throughout the project. The erosion and sedimentation control BMPs can be found at *http://www.maine.gov/dep/land/erosion/escbmps/*. A spill prevention, control, and countermeasure plan will also be required for the project. This plan will ensure that all contaminants are properly stored and a cleanup plan is in place in case of any spills.

Description of Marine Mammals in the Area of the Specified Activity

The marine mammal species under NMFS jurisdiction, proposed for incidental Level B take as a result of project activities, are the harbor seal, gray seal, harbor porpoise, and Atlantic white-sided dolphin. In the species accounts provided below, we offer a brief introduction to the species and relevant stock as well as available information regarding population trends and threats, and describe any information regarding local occurrence (Table 3). Other species that may possibly occur in the vicinity of the proposed activity include North Atlantic right whale (*Eubalaena glacialis*), humpback whale (*Megaptera novaengliae*), fin whale (*Balaenoptera physalus*), minke whale (*Balaenoptera acutorostrata*), and sei whale (*Balaenoptera borealis*).

However, these five species are generally associated with open ocean habitats and occur in more offshore locations. NMFS has concluded that the specified activity will not impact these five species and they are not discussed further.

Table 3. Marine mammal information for the project area

Species	**Stock**	**ES)/MMPA status; Strategic (Y/N)[1]**	**Stock abundance (CV, N_{min}, most recent abundance survey)[2]**	**PBR[3]**	**Annual M/SI[4]**	**Relative occurrence/season of occurrence**
Harbor seal	Western North Atlantic	-; N	75,834 (0.15; 66,884; 2012)	2,006	420	Harbor seals are year-round inhabitants of the coastal waters of Maine and eastern Canada.
Gray seal	Western North Atlantic	-; N	unknown 505,00 (best estimate 2014 Canadian population DFO 2014)	unknown	5,004	Gray seals currently pup at two established colonies in Maine: Green and Seal Islands
Harbor porpoise	Gulf of Maine/ Bay of Fundy	-; N	79,883 (0.32; 61,415; 2011)	706	564	During winter (January to March), intermediate densities of harbor porpoises can be found in waters off New York to New Brunswick, Canada. In spring (April–June), harbor porpoises are widely dispersed from ME to NJ , with lower densities farther north and south.
Atlantic white-sided dolphin	Western North Atlantic	-; N	48,819 (0.61; 30,403; 2011)	304	102	During January to May, low numbers of white-sided dolphins are found from Georges Bank (separates the Gulf of Maine from the Atlantic Ocean to Jeffreys Ledge (in the Western Gulf of Maine off of New Hampshire)

[1]Endangered Species Act (ESA) status: Endangered (E), Threatened (T)/MMPA status: Depleted (D). A dash (-) indicates that the species is not listed under the ESA or designated as depleted under the MMPA. Under the MMPA, a strategic stock is one for which the level of direct human-caused mortality exceeds PBR (see footnote 3) or which is determined to be declining and likely to be listed under the ESA within the foreseeable future. Any species or stock listed under the ESA is automatically designated under the MMPA as depleted and as a strategic stock.

[2]CV is coefficient of variation; N_{min} is the minimum estimate of stock abundance. In some cases, CV is not applicable. For certain stocks of pinnipeds, abundance estimates are based upon observations of animals (often pups) ashore multiplied by some correction factor derived from knowledge of the species (or similar species) life history to arrive at a best abundance estimate; therefore, there is no associated CV. In these cases, the minimum abundance may represent actual counts of all animals ashore. The most recent abundance survey that is reflected in the abundance estimate is presented; there may be more recent surveys that have not yet been incorporated into the estimate.

[3]Potential biological removal, defined by the MMPA as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population size (OSP).

[4]These values, found in NMFS' SARs, represent annual levels of human-caused mortality plus serious injury from all sources combined (*e.g.*, commercial fisheries, subsistence hunting, ship strike). Annual M/SI often cannot be determined precisely and is in some cases presented as a minimum value. All values presented here are from the final 2015 Pacific SAR. (*http://www.nmfs.noaa.gov/pr/sars/region.htm*)

Harbor Seals

On the east coast, harbor seals range from the Canadian Arctic to southern New England, New York, and occasionally the Carolinas. Seals are year-round inhabitants of the coastal waters of Maine and eastern Canada (Katona *et al*. 1993 as cited in Waring *et al*. 2016). A northward movement from southern New England to ME and eastern Canada occurs prior to the pupping season, which takes place from mid-May through June along the ME Coast (Richardson 1976; Wilson 1978; Whitman and Payne 1990; Kenney 1994; deHart 2002 as cited in Waring *et al*. 2016). Earlier research identified no pupping areas in southern New England (Payne and Schneider 1984; Barlas 1999 as cited in Waring *et al*. 2016); however, more recent documentation suggests that some pupping is occurring at high-use haulout sites at the Isles of Shoals, ME and off Manomet, Massachusetts (MA). The overall geographic range throughout coastal New England has not changed significantly during the last century (Payne and Selzer 1989 as cited in Waring *et al*. 2016). Harbor seals can be observed year-round in Cobscook Bay. The last surveys in Cobscook Bay were conducted in 2001 where a total of 193 harbor seals were observed on the U.S. side (144 adults and 49 pups) (Gilbert *et al*. 2005). Harbor seals travel back and forth under the bridge at Lubec, ME (approximately three miles (mi) south of the project area) and Campbello Island, New Brunkswick, Canada (J. Gilbert, University of ME and S. Wood, NOAA pers. comm. 2016). During the 2001 surveys, a major haulout was observed on

Campebello Island. Harbor seals also pass through the Eastport area to their haulouts with the nearest largest site in South Bay (LuBec, ME) (J. Gilbert and S. Wood, pers. comm. 2016).

Harbor seals are typically found in temperate coastal habitats and use rocks, reefs, beaches, and drifting glacial ice as haul outs and pupping sites. Seals use terrestrial habitat "haul-out sites" throughout the year, particularly during the pupping and molting periods. In northern New England, they typically haul-out on tidal ledges. Haul-out behavior is strongly influenced by tide stage, air temperature, time of day, wind speed, and precipitation. Human disturbance can also affect haul-out behavior although harbor seals appear to acclimate to some human activity (*e.g.*, lobster boats along the coast of ME) (Weilgart 2007). Prey species for harbor seals include sandlance, silver hake, Atlantic herring, and redfish. Other species included cod, haddock, pollock, flounders, mackerel, and squid.

Pinnipeds, such as the harbor seal (and also the gray seal as discussed below) produce a wide range of social signals, most occurring at relatively low frequencies (Southall *et al*. 2007), suggesting that hearing is keenest at these frequencies. Pinnipeds communicate acoustically both on land and underwater, but have different hearing capabilities dependent upon the medium (air or water). Based on numerous studies, as summarized in Southall *et al.* (2007), pinnipeds are more sensitive to a broader range of sound frequencies underwater than in air. The generalized hearing range for pinnipeds is 50 Hz to 86 kHz (NOAA 2016). Please also refer to NMFS' website (*http://www.fisheries.noaa.gov/pr/species/mammals/seals/harbor-seal.html*) for the harbor seal account and see NMFS' Stock Assessment Reports (SAR), available at *http://www.nmfs.noaa.gov/pr/sars*, for more detailed accounts of the harbor seal stocks' status and abundance.

Gray seals

The Western North Atlantic stock of the gray seal ranges from eastern Canada to the northeastern United States. Current estimates of the total Western North Atlantic stock are not available; although, estimates of portions of the stock are available for select time periods. Gray seal abundance is likely increasing in the U.S. Atlantic U.S. Exclusive Economic Zone (EEZ), but the rate of increase is unknown. Maine coast-wide surveys conducted during the summer found 597 and 1,731 gray seals in 1993 and 2001, respectively (Gilbert *et al*. 2005 as cited in Waring *et al*. 2016). In March 1999, a maximum of 5,611gray seals were observed in the region south of ME (between Isles of Shoals, ME and Woods Hole, MA) (Barlas 1999 as cited in Waring *et al*. 2016). During the 2001 surveys (May and June), no gray seals were observed in Cobscook Bay (J. Gilbert and S. Wood pers. comm. 2016) and also none during a survey in early 2000's (January to March) (J. Gilbert pers. comm. 2016, Nelson *et al*. 2006). Given where gray seals have been observed during the harbor seal pupping flights (May and June) Cobscook Bay does not appear to be important habitat except for the gray seals on nearby Campebello Island, New Brunkswick, Canada (south of the project area) (S. Wood pers. comm. 2016).

Gray seals pup at two established colonies off the coast of ME, Green Island and Seal Island. Aerial survey data from these sites indicate that pup production is increasing with a minimum of 2,620 pups born in the U.S. in 2008 (Green Island (59 seals), Seal Island (466 seals), Muskeget Island, MA (2,095 seals)) (Wood LaFond 2009 as cited in Waring *et al*. 2016). Both colonies are tens of miles away from the proposed project area. There is no gray seal pupping in Cobscook Bay (J. Gilbert and S. Wood pers. comm. 2016). Overall there have not been many reconnaissance flight surveys for gray seal pupping so some areas of occurrence may

be unknown with the exception of gray seals pupping along the mid-coast of ME (*i.e.* Penobscot Bay) (S. Wood pers. comm. 2016).

Gray seals reside in coastal waters and also inhabit islands, sandbars, ice shelves, and icebergs. Please also refer to NMFS' website (*http://www.fisheries.noaa.gov/pr/species/mammals/seals/gray-seal.html*) for the generalized gray seal account and see NMFS' Stock Assessment Reports (SAR), available at *http://www.nmfs.noaa.gov/pr/sars*, for more detailed accounts of the gray seal stocks' status and abundance.

Harbor Porpoises

In the Western North Atlantic, the harbor porpoise stock is found in U.S. and Canadian Atlantic waters. Harbor porpoises in U.S. waters are divided into 10 stocks, based on genetics, movement patterns, and management (Waring *et al*. 2016). Any harbor porpoises encountered during the proposed project would be part of the Gulf of Maine-Bay of Fundy stock. A current trend analysis has not been conducted for this stock (Waring *et al*. 2016). During the winter months (January to March), medium densities are found in waters off of New Brunswick, Canada to NY. During the spring (April to June) and fall (October to December), harbor porpoises are widely dispersed from ME to NJ, with lower densities farther north and south (Waring *et al*. 2016). In the summer (July to September), harbor porpoises are concentrated in the northern Gulf of Maine and southern Bay of Fundy region, generally in waters less than 150 m deep (Gaskin 1977; Kraus *et al*. 1983; Palka 1995a, 1995b as cited in Waring *et al*. 2016), with a few sightings in the upper Bay of Fundy and on Georges Bank (Palka 2000 as cited in (Waring *et al*. 2016).

Harbor porpoises reside in northern temperate and subarctic coastal and offshore waters. They are commonly found in bays, estuaries, harbors, and fjords less than 200 m (650 ft) deep. Harbor porpoises are considered high-frequency cetaceans and their generalized hearing ranges from 275 Hz to 160 kHz (NOAA 2016). Please also refer to NMFS' website (*http://www.fisheries.noaa.gov/pr/species/mammals/porpoises/harbor-porpoise.html*) for the generalized harbor porpoise account and see NMFS' Stock Assessment Reports (SAR), available at *http://www.nmfs.noaa.gov/pr/sars*, for more detailed accounts of the harbor porpoise stocks' status and abundance.

Atlantic White-sided Dolphins

The Western North Atlantic stock of Atlantic white-sided dolphins ranges from Greenland to North Carolina. A current trend analysis has not been conducted for this stock (Waring *et al*. 2016). Any Atlantic white-sided dolphins encountered during the proposed project would likely be part the Gulf of Maine population and are most common in continental shelf waters from Hudson Canyon (approximately 39˚N) to Georges Bank, and in the Gulf of ME and lower Bay of Fundy (Waring *et al*. 2016). During January to May, low numbers of white-sided dolphins are found from Georges Bank to Jeffreys Ledge (off New Hampshire), with even lower numbers south of Georges Bank (Waring *et al.* 2016). From June through September, large numbers of white-sided dolphins are found from Georges Bank to the lower Bay of Fundy. From October to December, white-sided dolphins occur at intermediate densities from southern Georges Bank to southern Gulf of ME (Payne and Heinemann 1990 as cited in Waring *et al.* 2016).

Atlantic white-sided dolphins are found in temperate and sub-polar waters, primarily in continental shelf waters to the 100-m contour and exhibit seasonal movements between inshore

northern waters and southern offshore waters (Waring *et al*. 2016). They are considered mid-frequency cetaceans and their generalized hearing ranges from150 Hz to 160 kHz (NOAA 2016). Please also refer to NMFS' website (*http://www.fisheries.noaa.gov/pr/species/mammals/dolphins/atlantic-white-sided-dolphin.html*) for the generalized Atlantic white-sided dolphin account and see NMFS' Stock Assessment Reports (SAR), available at *http://www.nmfs.noaa.gov/pr/sars*, for more detailed accounts of the species status and abundance. The Atlantic white-sided dolphin is assessed in the Atlantic SAR (Waring *et al.* 2016).

Potential Effects of the Specified Activity on Marine Mammals

This section includes a summary and discussion of the ways that components of the specified activity (*e.g.*, pile driving) may impact marine mammals. This discussion includes reactions that we consider to rise to the level of a take and those that we do not consider to rise to the level of a take (for example, with acoustics, we may include a discussion of studies that showed animals not reacting at all to sound or exhibiting barely measurable avoidance). This section is intended as a background of potential effects and does not consider either the specific manner in which this activity will be carried out or the mitigation that will be implemented, and how either of those will shape the anticipated impacts from this specific activity. The Estimated Take by Incidental Harassment section later in this document will include a quantitative analysis of the number of individuals that are expected to be taken by this activity. The Negligible Impact Analysis section will include the analysis of how this specific activity will impact marine mammals and will consider the content of this section, the Estimated Take by Incidental Harassment section, the Proposed Mitigation section, and the Anticipated Potential Effects on Marine Mammal Habitat section to draw conclusions regarding the likely impacts of this activity

on the reproductive success or survivorship of individuals and from that on the affected marine mammal populations or stocks.

Description of Sound Terms and Sources

Sound travels in waves, the basic components of which are frequency, wavelength, velocity, and amplitude. Frequency is the number of pressure waves that pass by a reference point per unit of time and is measured in hertz (Hz) or cycles per second. Wavelength is the distance between two peaks of a sound wave; lower frequency sounds have longer wavelengths than higher frequency sounds and attenuate (decrease) more rapidly in shallower water. Amplitude is the height of the sound pressure wave or the 'loudness' of a sound and is typically measured using the decibel (dB) scale. A dB is the ratio between a measured pressure (with sound) and a reference pressure (sound at a constant pressure, established by scientific standards). It is a logarithmic unit that accounts for large variations in amplitude. Therefore, relatively small changes in dB ratings correspond to large changes in sound pressure. When referring to sound pressure levels (SPLs; the sound force per unit area), sound is referenced in the context of underwater sound pressure to 1 microPascal (µPa). One pascal is the pressure resulting from a force of one newton exerted over an area of one square meter (m). The source level (SL) represents the sound level at a distance of 1 m from the source (referenced to 1 µPa). The received level is the sound level at the listener's position. Note that all underwater sound levels in this document are referenced to a pressure of 1 µPa and all airborne sound levels in this document are referenced to a pressure of 20 µPa.

Root mean square (rms) is the quadratic mean sound pressure over the duration of an impulse. Rms is calculated by squaring all of the sound amplitudes, averaging the squares, and then taking the square root of the average (Urick 1983). Rms accounts for both positive and

negative values; squaring the pressures makes all values positive so that they may be accounted for in the summation of pressure levels (Hastings and Popper 2005). This measurement is often used in the context of discussing behavioral effects, in part because behavioral effects, which often result from auditory cues, may be better expressed through averaged units than by peak pressures.

When underwater objects vibrate or activity occurs, sound-pressure waves are created. These waves alternately compress and decompress the water as the sound wave travels. Underwater sound waves radiate in all directions away from the source (similar to ripples on the surface of a pond), except in cases where the source is directional. The compressions and decompressions associated with sound waves are detected as changes in pressure by aquatic life and man-made sound receptors such as hydrophones.

Even in the absence of sound from the specified activity, the underwater environment is typically loud due to ambient sound. Ambient sound is defined as environmental background sound levels lacking a single source or point (Richardson *et al*. 1995), and the sound level of a region is defined by the total acoustical energy being generated by known and unknown sources. These sources may include physical (*e.g.*, waves, earthquakes, ice, atmospheric sound), biological (*e.g.*, sounds produced by marine mammals, fish, and invertebrates), and anthropogenic sound (*e.g.*, vessels, dredging, aircraft, construction). A number of sources contribute to ambient sound, including the following (Richardson *et al*. 1995):

- Wind and waves: The complex interactions between wind and water surface, including processes such as breaking waves and wave-induced bubble oscillations and cavitation, are a main source of naturally occurring ambient noise for frequencies between 200 Hz and 50 kHz (Mitson 1995). In general, ambient sound levels tend to increase with increasing wind speed

and wave height. Surf noise becomes important near shore, with measurements collected at a distance of 8.5 km from shore showing an increase of 10 dB in the 100 to 700 Hz band during heavy surf conditions.

- Precipitation: Sound from rain and hail impacting the water surface can become an important component of total noise at frequencies above 500 Hz, and possibly down to 100 Hz during quiet times.

- Biological: Marine mammals can contribute significantly to ambient noise levels, as can some fish and shrimp. The frequency band for biological contributions is from approximately 12 Hz to over 100 kHz.

- Anthropogenic: Sources of ambient noise related to human activity include transportation (surface vessels and aircraft), dredging and construction, oil and gas drilling and production, seismic surveys, sonar, explosions, and ocean acoustic studies. Shipping noise typically dominates the total ambient noise for frequencies between 20 and 300 Hz. In general, the frequencies of anthropogenic sounds are below 1 kHz and, if higher frequency sound levels are created, they attenuate rapidly (Richardson *et al*. 1995). Sound from identifiable anthropogenic sources other than the activity of interest (*e.g.*, a passing vessel) is sometimes termed background sound, as opposed to ambient sound.

The sum of the various natural and anthropogenic sound sources at any given location and time – which comprise "ambient" or "background" sound – depends not only on the source levels (as determined by current weather conditions and levels of biological and shipping activity), but also on the ability of sound to propagate through the environment. In turn, sound propagation is dependent on the spatially and temporally varying properties of the water column and sea floor, and is frequency-dependent. As a result of the dependence on a large number of

varying factors, ambient sound levels can be expected to vary widely over both coarse and fine spatial and temporal scales. Sound levels at a given frequency and location can vary by 10-20 dB from day to day (Richardson *et al*. 1995). The result is that, depending on the source type and its intensity, sound from the specified activity may be a negligible addition to the local environment or could form a distinctive signal that may affect marine mammals.

Noise levels from the previous EBRP project were monitored in 2015/2016 (see application). The underwater acoustic environment in Eastport, ME is likely to be dominated by noise from day-to-day port and vessel activities. It is reasonable to believe that levels will generally be similar to the previous IHA for the EBRP as there is a similar type and degree of activity within the same type of environment.

In-water construction activities associated with the project include impact and vibratory pile driving. The sounds produced by these activities fall into one of two general sound types: pulsed and non-pulsed. The distinction between these two sound types is important because they have differing potential to cause physical effects, particularly with regard to hearing (*e.g.*, Ward 1997 in Southall *et al*. 2007). Please see Southall *et al*. (2007) for an in-depth discussion of these concepts.

Pulsed sound sources (*e.g.*, explosions, gunshots, sonic booms, impact pile driving) produce signals that are brief (typically considered to be less than one second), broadband, atonal transients (ANSI 1986; Harris 1998; NIOSH 1998; ISO 2003; ANSI 2005) and occur either as isolated events or repeated in some succession. Pulsed sounds are all characterized by a relatively rapid rise from ambient pressure to a maximal pressure value followed by a rapid decay period that may include a period of diminishing, oscillating maximal and minimal

pressures, and generally have an increased capacity to induce physical injury as compared with sounds that lack these features.

The sounds produced by vibratory pile driving falls into the general sound type of non-pulsed. Non-pulsed sounds can be tonal, narrowband, or broadband, brief or prolonged, and may be either continuous or non-continuous (ANSI 1995, NIOSH 1998). Some of these non-pulsed sounds can be transient signals of short duration but without the essential properties of pulses (*e.g.*, rapid rise time). Examples of non-pulsed sounds include those produced by vessels, aircraft, machinery operations such as drilling or dredging, vibratory pile driving, and active sonar systems. The duration of such sounds, as received at a distance, can be greatly extended in a highly reverberant environment.

Vibratory hammers install piles by vibrating them and allowing the weight of the hammer to push them into the sediment. Vibratory hammers produce significantly less sound than impact hammers. Peak SPLs may be 180 dB or greater, but are generally 10 to 20 dB lower than SPLs generated during impact pile driving of the same-sized pile (Oestman *et al*. 2009). Rise time is slower, reducing the probability and severity of injury, and sound energy is distributed over a greater amount of time (Nedwell and Edwards 2002; Carlson *et al*. 2005).

Marine Mammal Hearing

Hearing is the most important sensory modality for marine mammals, and exposure to sound can have deleterious effects. To appropriately assess these potential effects, it is necessary to understand the frequency ranges marine mammals are able to hear. Current data indicate that not all marine mammal species have equal hearing capabilities (*e.g.*, Richardson *et al*. 1995; Wartzok and Ketten 1999; Au and Hastings 2008). To reflect this, Southall *et al*. (2007) recommended that marine mammals be divided into hearing groups based on measured or

estimated hearing ranges on the basis of available behavioral data, audiograms derived using auditory evoked potential techniques, anatomical modeling, and other data. NMFS made modifications to the marine mammal hearing groups proposed in Southall *et al*. (2007) that is reflected in the new *Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (July 2016)* (http://www.nmfs.noaa.gov/pr/acoustics/guidelines.htm). The hearing group, pinnipeds, high frequency cetaceans (harbor porpoise) and mid-frequency cetaceans (Atlantic white-sided dolphin) which are the subject of this project, and the associated generalized hearing range is indicated in Table 4 below:

Table 4. Marine mammal hearing groups (as referenced in NOAA 2016, Technical Guidance)

Hearing Group	Generalized Hearing Range*
Phocid pinnipeds (PW) (underwater) (true seals)	50 Hz to 86 kHz
High-frequency (HF) cetaceans (true porpoises)	275 Hz to 160 kHz
Mid-frequency (MF) cetaceans (dolphins, toothed whales, beaked whales, bottlenose whales)	150 Hz to 160 kHz
***** Represents the generalized hearing range for the entire group as a composite (*i.e.*, all species within the group), where individual species' hearing ranges are typically not as broad. Generalized hearing range chosen based on ~65 dB threshold from normalized composite audiogram, with the exception for lower limits for LF cetaceans (Southall *et al*. 2007) and PW pinniped (approximation).	

Acoustic Effects, Underwater

Potential Effects of Pile Driving Sound – The effects of sounds from pile driving might result in one or more of the following: temporary or permanent hearing impairment, non-auditory physical or physiological effects, behavioral disturbance, and masking (Richardson *et al*. 1995; Gordon *et al*. 2003; Nowacek *et al*. 2007; Southall *et al*. 2007). The effects of pile driving on marine mammals are dependent on several factors, including the size, type, and depth of the animal; the depth, intensity, and duration of the pile driving sound; the depth of the water column; the substrate of the habitat; the standoff distance between the pile and the animal; and

the sound propagation properties of the environment. Impacts to marine mammals from pile driving activities are expected to result primarily from acoustic pathways. As such, the degree of effect is intrinsically related to the received level and duration of the sound exposure, which are in turn influenced by the distance between the animal and the source. The further away from the source, the less intense the exposure should be. The substrate and depth of the habitat affect the sound propagation properties of the environment. Shallow environments are typically more structurally complex, which leads to rapid sound attenuation. In addition, substrates that are soft (*e.g.*, sand) would absorb or attenuate the sound more readily than hard substrates (*e.g.*, rock) which may reflect the acoustic wave. Soft porous substrates would also likely require less time to drive the pile, and possibly less forceful equipment, which would ultimately decrease the intensity of the acoustic source.

In the absence of mitigation, impacts to marine species would be expected to result from physiological and behavioral responses to both the type and strength of the acoustic signature (Viada *et al*. 2008). The type and severity of behavioral impacts are more difficult to define due to limited studies addressing the behavioral effects of impulsive sounds on marine mammals.

Hearing Impairment and Other Physical Effects – Marine mammals exposed to high intensity sound repeatedly or for prolonged periods can experience hearing threshold shift (TS), which is the loss of hearing sensitivity at certain frequency ranges (Kastak *et al*. 1999; Schlundt *et al*. 2000; Finneran *et al*. 2002, 2005). TS can be permanent (PTS), in which case the loss of hearing sensitivity is not recoverable, or temporary (TTS), in which case the animal's hearing threshold would recover over time (Southall *et al*. 2007). Marine mammals depend on acoustic cues for vital biological functions, (*e.g.*, orientation, communication, finding prey, avoiding predators). However, the severity of the effects of TTS on an individual and likelihood of

effecting its fitness depends on the frequency and duration of TTS, as well as the biological context in which it occurs. TTS of limited duration, occurring in a frequency range that does not coincide with that used for recognition of important acoustic cues, would have little to no effect on an animal's fitness. Repeated sound exposure that leads to TTS could cause PTS. PTS constitutes injury, but TTS does not (Southall *et al.* 2007). Based on the best scientific information available, the SPLs for the EBRP may exceed the thresholds that could cause TTS or the onset of PTS based on NMFS' new acoustic guidance (NMFS 2016a, 81 FR 51694; August 4, 2016). The following subsections discuss in somewhat more detail the possibilities of TTS, PTS, and non-auditory physical effects.

Temporary Threshold Shift – TTS is the mildest form of hearing impairment that can occur during exposure to a strong sound (Kryter 1985). While experiencing TTS, the hearing threshold rises, and a sound must be stronger in order to be heard. In terrestrial mammals, TTS can last from minutes or hours to days (in cases of strong TTS). For sound exposures at or somewhat above the TTS threshold, hearing sensitivity in both terrestrial and marine mammals recovers rapidly after exposure to the sound ends. Few data on sound levels and durations necessary to elicit mild TTS have been obtained for marine mammals, and none of the published data concern TTS elicited by exposure to multiple pulses of sound. Available data on TTS in marine mammals are summarized in Southall *et al*. (2007).

Permanent Threshold Shift – When PTS occurs, there is physical damage to the sound receptors in the ear. In severe cases, there can be total or partial deafness, while in other cases the animal has an impaired ability to hear sounds in specific frequency ranges (Kryter 1985). There is no specific evidence that exposure to pulses of sound can cause PTS in any marine mammal. However, given the possibility that mammals close to a sound source might incur TTS, there has

been further speculation about the possibility that some individuals might incur PTS. Single or occasional occurrences of mild TTS are not indicative of permanent auditory damage, but repeated or (in some cases) single exposures to a level well above that causing TTS onset might elicit PTS.

Relationships between TTS and PTS thresholds have not been studied in marine mammals but are assumed to be similar to those in humans and other terrestrial mammals. PTS might occur at a received sound level at least several decibels above that inducing mild TTS if the animal were exposed to strong sound pulses with rapid rise time. Based on data from terrestrial mammals, a precautionary assumption is that the PTS threshold for impulse sounds (such as pile driving pulses as received close to the source) is at least 6 dB higher than the TTS threshold on a peak-pressure basis and probably greater than 6 dB (Southall *et al*. 2007). On an SEL basis, Southall *et al*. (2007) estimated that received levels would need to exceed the TTS threshold by at least 15 dB for there to be risk of PTS.

Non-auditory Physiological Effects – Non-auditory physiological effects or injuries that theoretically might occur in marine mammals exposed to strong underwater sound include stress, neurological effects, bubble formation, resonance effects, and other types of organ or tissue damage (Cox *et al*. 2006; Southall *et al*. 2007). Studies examining such effects are limited. In general, little is known about the potential for pile driving to cause auditory impairment or other physical effects in marine mammals. Available data suggest that such effects, if they occur at all, would presumably be limited to short distances from the sound source and to activities that extend over a prolonged period. The available data do not allow identification of a specific exposure level above which non-auditory effects can be expected (Southall *et al*. 2007) or any meaningful quantitative predictions of the numbers (if any) of marine mammals that might be

affected in those ways. Marine mammals that show behavioral avoidance of pile driving, including some odontocetes and some pinnipeds, are especially unlikely to incur auditory impairment or non-auditory physical effects.

Disturbance Reactions

Disturbance includes a variety of effects, including subtle changes in behavior, more conspicuous changes in activities, and displacement. Behavioral responses to sound are highly variable and context-specific and reactions, if any, depend on species, state of maturity, experience, current activity, reproductive state, auditory sensitivity, time of day, and many other factors (Richardson *et al*.1995; Wartzok *et al*. 2003; Southall *et al*. 2007).

Habituation can occur when an animal's response to a stimulus wanes with repeated exposure, usually in the absence of unpleasant associated events (Wartzok *et al*. 2003). Animals are most likely to habituate to sounds that are predictable and unvarying. The opposite process is sensitization, when an unpleasant experience leads to subsequent responses, often in the form of avoidance, at a lower level of exposure. Behavioral state may affect the type of response as well. For example, animals that are resting may show greater behavioral change in response to disturbing sound levels than animals that are highly motivated to remain in an area for feeding (Richardson *et al*. 1995; NRC 2003; Wartzok *et al*. 2003).

Controlled experiments with captive marine mammals showed pronounced behavioral reactions, including avoidance of loud sound sources (Ridgway *et al*. 1997; Finneran *et al*. 2003). Responses to continuous sound, such as vibratory pile installation, have not been documented as well as responses to pulsed sounds.

With pile driving it is likely that the onset of this activity could result in temporary, short term changes in an animal's typical behavior and/or avoidance of the affected area. These

behavioral changes may include (Richardson *et al*., 1995): changing durations of surfacing and dives, number of blows per surfacing, or moving direction and/or speed; reduced/increased vocal activities; changing/cessation of certain behavioral activities (such as socializing or feeding); visible startle response or aggressive behavior; avoidance of areas where sound sources are located; and/or flight responses (*e.g.*, pinnipeds flushing into water from haul-outs or rookeries). Pinnipeds may increase their haul-out time, possibly to avoid in-water disturbance (Thorson and Reyff 2006).

The biological significance of many of these behavioral disturbances is difficult to predict, especially if the detected disturbances appear minor. However, the consequences of behavioral modification could be expected to be biologically significant if the change affects growth, survival, or reproduction. Significant behavioral modifications that could potentially lead to effects on growth, survival, or reproduction include:

- Drastic changes in diving/surfacing patterns;
- Habitat abandonment due to loss of desirable acoustic environment; and
- Cessation of feeding or social interaction.

The onset of behavioral disturbance from anthropogenic sound depends on both external factors (characteristics of sound sources and their paths) and the specific characteristics of the receiving animals (hearing, motivation, experience, demography) and is difficult to predict (Southall *et al*. 2007).

Auditory Masking

Natural and artificial sounds can disrupt behavior by masking, or interfering with, a marine mammal's ability to hear other sounds. Masking occurs when the receipt of a sound is interfered with by another coincident sound at similar frequencies and at similar or higher levels.

Chronic exposure to excessive, though not high-intensity, sound could cause masking at particular frequencies for marine mammals, which utilize sound for vital biological functions. Masking can interfere with detection of acoustic signals such as communication calls, echolocation sounds, and environmental sounds important to marine mammals. Therefore, under certain circumstances, marine mammals whose acoustical sensors or environment are being severely masked could also be impaired from maximizing their performance fitness in survival and reproduction. If the coincident (masking) sound were man-made, it could be potentially harassing if it disrupted hearing-related behavior. It is important to distinguish TTS and PTS, which persist after the sound exposure, from masking, which occurs during the sound exposure. Because masking (without resulting in TS) is not associated with abnormal physiological function, it is not considered a physiological effect, but rather a potential behavioral effect.

The frequency range of the potentially masking sound is important in determining any potential behavioral impacts. Because sound generated from in-water vibratory pile driving is mostly concentrated at low frequency ranges, it may have less effect on high frequency echolocation sounds by odontocetes (toothed whales), which may hunt harbor seal. However, lower frequency man-made sounds are more likely to affect detection of communication calls and other potentially important natural sounds such as surf and prey sound. It may also affect communication signals when they occur near the sound band and thus reduce the communication space of animals (*e.g.*, Clark *et al*. 2009) and cause increased stress levels (*e.g.*, Foote *et al*. 2004; Holt *et al*. 2009).

Masking has the potential to impact species at the population or community levels as well as at individual levels. Masking affects both senders and receivers of the signals and can potentially have long-term chronic effects on marine mammal species and populations. Recent

research suggests that low frequency ambient sound levels have increased by as much as 20 dB (more than three times in terms of SPL) in the world's ocean from pre-industrial periods, and that most of these increases are from distant shipping (Hildebrand 2009). All anthropogenic sound sources, such as those from vessel traffic, pile driving, and dredging activities, contribute to the elevated ambient sound levels, thus intensifying masking.

The most intense underwater sounds by the proposed action are those produced by vibratory and impact pile driving. Given that the energy distribution of pile driving covers a broad frequency spectrum, sound from these sources would likely be within the audible range of marine mammals present in the project area.

Acoustic Effects, Airborne

Marine mammals that occur in the project area could be exposed to airborne sounds associated with pile driving activities that have the potential to cause harassment, depending on their distance from pile driving activities. Airborne sound would only be an issue for pinnipeds either hauled-out or looking with heads above water in the project area. Most likely, airborne sound would cause behavioral responses similar to those discussed above in relation to underwater sound. For instance, anthropogenic sound could cause hauled-out pinnipeds to exhibit changes in their normal behavior, such as reduction in vocalizations, or cause them to temporarily abandon their habitat and move further from the source. Studies by Blackwell *et al*. (2004) and Moulton *et al*. (2005) indicate a tolerance or lack of response to unweighted airborne sounds as high as 112 dB peak and 96 dB rms. However, there are no major haul-out sites in or near the project area, but pinnipeds can be exposed to airborne sound by looking with heads above water.

Effects on Marine Mammal Habitat

The proposed activities at the EBPR would not result in permanent impacts to habitats used directly by marine mammals, such as haul-out sites, but may have potential short-term impacts to food sources such as forage fish. There are no rookeries or major haul-out sites nearby, foraging hotspots, or other ocean bottom structure of significant biological importance to marine mammals that may be present in the marine waters in the vicinity of the project area. Therefore, the main impact issue associated with the proposed activity would be temporarily elevated sound levels and the associated direct effects on marine mammals, as discussed previously in this document. The most likely impact to marine mammal habitat occurs from pile driving effects on likely marine mammal prey (*i.e*., fish) near the pier and minor impacts to the immediate substrate during installation of piles and removal of the old structure during the breakwater replacement project.

Pile Driving Effects on Potential Prey

Construction activities would produce both pulsed (*i.e.*, impact pile driving) and continuous (*i.e.*, vibratory pile driving) sounds. Fish react to sounds which are especially strong and/or intermittent low-frequency sounds. Short duration, sharp sounds can cause overt or subtle changes in fish behavior and local distribution. Hastings and Popper (2005, 2009) identified several studies that suggest fish may relocate to avoid certain areas of sound energy. Additional studies have documented effects of pile driving (or other types of continuous sounds) on fish, although several are based on studies in support of large, multiyear bridge construction projects (*e.g.*, Scholik and Yan 2001, 2002; Popper and Hastings 2009). Sound pulses at received levels of 160 dB re 1 µPa may cause subtle changes in fish behavior. SPLs of 180 dB may cause noticeable changes in behavior (Pearson *et al*. 1992; Skalski *et al*. 1992). SPLs of sufficient

strength may cause injury to fish and fish mortality. The most likely impact to fish from pile driving at the project area would be temporary behavioral avoidance of the area. The duration of fish avoidance of this area after these activities stop is unknown, but a rapid return to normal recruitment, distribution and behavior is anticipated. In general, impacts to marine mammal prey species are expected to be minor and temporary due to the short timeframe for the pier replacement project.

Pile Driving Effects on Potential Foraging Habitat

Avoidance by potential prey (*i.e.*, fish) of the immediate area due to the temporary loss of this foraging habitat is also possible. The duration of fish avoidance of this area after pile driving stops is unknown, but a rapid return to normal recruitment, distribution and behavior is anticipated. Any behavioral avoidance by fish of the disturbed area would still leave significantly large areas of fish and marine mammal foraging habitat in the vicinity of Cobscook Bay.

Given the short daily duration of sound associated with individual pile driving events and the relatively small areas being affected, in-water construction activities associated with the proposed action are not likely to have a permanent, adverse effect on any fish habitat, or populations of fish species. Therefore, pile the proposed in-water construction activities are not likely to have a permanent, adverse effect on marine mammal foraging habitat at the project area.

Proposed Mitigation

In order to issue an IHA for the under section 101(a)(5)(D) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to such activity, "and other means of effecting the least practicable impact on such species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of such species or stock for taking" for certain subsistence uses. NMFS regulations require

applicants for incidental take authorizations to include information about the availability and feasibility (economic and technological) of equipment, methods, and manner of conducting such activity or other means of effecting the least practicable adverse impact upon the affected species or stocks, their habitat (50 CFR 216.104(a)(11)).

For the proposed project, ME DOT worked with NMFS and proposed the following mitigation measures to minimize the potential impacts to marine mammals in the project vicinity. The primary purposes of these mitigation measures are to minimize sound levels from the activities, and to monitor marine mammals within designated zones of influence corresponding to NMFS' current Level A and B harassment thresholds. Here we provide a description of the mitigation measures we propose to require as part of the proposed Authorization:

Zones of Influence

Direct measured data from the pile driving events of the EPBP IHA were used to calculate the zones of influence (ZOI) for Level B Harassment. These values were used to develop mitigation measures for pile driving activities at EBRP. The ZOIs effectively represent the mitigation zone that would be established around each pile to prevent Level A harassment to marine mammals, while providing estimates of the areas within which Level B harassment might occur. In addition to the specific measures described later in this section, the EBRP would conduct briefings between construction supervisors and crews, marine mammal monitoring team, and EBRP staff prior to the start of all pile driving activity, and if/when new personnel join the work, in order to explain responsibilities, communication procedures, marine mammal monitoring protocol, and operational procedures.

Monitoring and Shutdown for Pile Driving

The following measures would apply to the EBRP's mitigation through shutdown and disturbance zones:

Shutdown Zone – For all pile driving activities, EBPR will establish exclusion zones (shutdown zones). Shutdown zones are intended to contain the area in which SPLs equal or exceed acoustic injury criteria, with the purpose being to define an area within which shutdown of activity would occur upon sighting of a marine mammal (or in anticipation of an animal entering the defined area), thus preventing injury marine mammals (PTS) of marine mammals (as described previously under Potential Effects of the Specified Activity on Marine Mammals, serious injury or death are unlikely outcomes even in the absence of mitigation measures).

Using the user spreadsheet for the new acoustic guidance, injury zones were determined for the mid-frequency and high frequency cetacean and pinnipeds (phocids) as the hearing groups being analyzed for this project (see Table 5). The purpose of a shutdown zone is to define an area within which shutdown of activity would occur upon sighting of a marine mammal (or in anticipation of an animal entering the defined area). As a precautionary measure, intended to reduce the unlikely possibility of injury from direct physical interaction with construction operations, ME DOT would implement a minimum shutdown zone of 10 m radius around each pile for all construction methods for all marine mammals. The shutdown zones calculated for injury were rounded to the nearest 10 m to be more conservative or species were grouped (*e.g.*, mid and high-frequency cetaceans combined into one group) for more streamlined monitoring in the field. In both impact and vibratory pile driving, the shutdown zones were increased significantly for mid-frequency cetaceans to that which was calculated for high-frequency cetaceans in order to group all cetaceans together for monitoring.

Table 5. Injury zones and shutdown zones for hearing groups for each construction method.

Hearing Group	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds
Vibratory Pile Driving[1]			
PTS Isopleth to threshold	7.0 m	117.5 m	48.3 m
Shutdown Zone	120 m		50 m
Impact Pile Driving[2]			
PTS Isopleth to threshold	4.6 m	155.6 m	69.9 m
Shutdown Zone	160 m		70 m

[1]For vibratory driving, SL is 170, TL is15logR, weighting function is 2.5, duration is 5 hours, and distance from the source is 10 meters.
[2]For impact driving, PK SPL 202, TL is 15log R, weighting function is 2, strikes per pile is 250, number off piles per day is 3, and distance from the source is 10 meters.

Disturbance Zone – Disturbance zones are the areas in which SPLs equal or exceed 160 and 120 dB rms (for impulse and continuous sound, respectively). Disturbance zones provide utility for monitoring conducted for mitigation purposes (*i.e.*, shutdown zone monitoring) by establishing monitoring protocols for areas adjacent to the shutdown zones. Monitoring of disturbance zones enables observers to be aware of and communicate the presence of marine mammals in the project area but outside the shutdown zone and thus prepare for potential shutdowns of activity. However, the primary purpose of disturbance zone monitoring is for documenting incidents of Level B harassment; disturbance zone monitoring is discussed in greater detail later (see Proposed Monitoring and Reporting). Any marine mammal documented within the Level B harassment zone would constitute a Level B take (harassment), and will be recorded and reported as such. Nominal radial distances for disturbance zones are shown in

Table 6. Given the size of the disturbance zone for both impact and vibratory pile driving, it is impossible to guarantee that all animals would be observed or to make comprehensive observations of fine-scale behavioral reactions to sound, and only a portion of the zone (*e.g.*, what may be reasonably observed by visual observers) would be observed.

Table 6. Calculated threshold distances (m) for Level B Harassment of marine mammals

Source	Threshold distances (m)	
	160 dB	**120 dB**
Vibratory pile driving	n/a	400 m for PZC-18 Sheet Piles 665 m for PZC-26 Sheet Piles
Impact pile driving	550 m	n/a

In order to document observed incidents of harassment, monitors will record all marine mammal observations, regardless of location. The observer's location, as well as the location of the pile being driven or removed, is known from a GPS. The location of the animal is estimated as a distance from the observer, which is then compared to the location from the pile. It may then be estimated whether the animal was exposed to sound levels constituting incidental harassment on the basis of predicted distances to relevant thresholds in post-processing of observational and acoustic data, and a precise accounting of observed incidences of harassment created. This information may then be used to extrapolate observed takes to reach an approximate understanding of actual total takes.

Two Qualified Protected Species Observers (PSO) (NMFS approved biologists , monitoring responsibilities fully described in the Proposed Monitoring section) would be stationed on the pier. One PSO would be responsible for monitoring the shutdown zones, while the second observer would conduct behavioral monitoring outwards to a distance of 1 nautical mile (nmi).

Pile Driving Shut Down and Delay Procedures

If a PSO sees a marine mammal within or approaching the shutdown zones prior to start of pile driving, the observer would notify the on-site project lead (or other authorized individual) who would then be required to delay pile driving until the marine mammal has moved out of the shutdown zone (exclusion zone) from the sound source or if the animal has not been resighted within 30 minutes. If a marine mammal is sighted within or on a path toward a shutdown zone during pile driving, pile driving would cease until that animal has moved out of the shutdown zone and is on a path away from the shutdown zone or 30 minutes has lapsed since the last sighting.

Soft-start Procedures

A "soft-start" technique would be used at the beginning of each pile installation to allow any marine mammal that may be in the immediate area to leave before the pile hammer reaches full energy. For vibratory pile driving, the soft-start procedure requires contractors to initiate noise from the vibratory hammer for 15 seconds at 40-60 percent reduced energy followed by a 1-minute waiting period. The procedure would be repeated two additional times before full energy may be achieved. For impact pile driving, contractors would be required to provide an initial set of three strikes from the impact hammer at 40 percent energy, followed by a 1-minute waiting period, then two subsequent three-strike sets. Soft-start procedures would be conducted any time hammering ceases for more than 30 minutes.

Time Restrictions

Work would occur only during daylight hours, when visual monitoring of marine mammals can be conducted. To minimize impacts to Federally listed Atlantic sturgeon

(*Acipenser oxyrinchus oxyrinchus*), shortnose sturgeon (*Acipenser brevirostrum*) and Atlantic salmon (*Salmo salar*), ME DOT will follow restrictions on pile driving from April through November as directed by NMFS' Greater Atlantic Regional Office.

Mitigation Conclusions

NMFS has carefully evaluated the applicant's proposed mitigation measures and considered a range of other measures in the context of ensuring that NMFS prescribes the means of affecting the least practicable impact on the affected marine mammal species and stocks and their habitat. Our evaluation of potential measures included consideration of the following factors in relation to one another:

- The manner in which, and the degree to which, the successful implementation of the measure is expected to minimize adverse impacts to marine mammal species or stocks;
- The proven or likely efficacy of the specific measure to minimize adverse impacts as planned; and
- The practicability of the measure for applicant implementation.

Any mitigation measure(s) prescribed by NMFS should be able to accomplish, have a reasonable likelihood of accomplishing (based on current science), or contribute to the accomplishment of one or more of the general goals listed below:

1. Avoidance or minimization of injury or death of marine mammals wherever possible (goals 2, 3, and 4 may contribute to this goal).
2. A reduction in the numbers of marine mammals (total number or number at biologically important time or location) exposed to received levels of pile

driving, or other activities expected to result in the take of marine mammals (this goal may contribute to 1, above, or to reducing harassment takes only).

3. A reduction in the number of times (total number or number at biologically important time or location) individuals would be exposed to received levels of pile driving, or other activities expected to result in the take of marine mammals (this goal may contribute to 1, above, or to reducing harassment takes only).
4. A reduction in the intensity of exposures (either total number or number at biologically important time or location) to received levels of pile driving, or other activities expected to result in the take of marine mammals (this goal may contribute to a, above, or to reducing the severity of harassment takes only).
5. Avoidance or minimization of adverse effects to marine mammal habitat, paying special attention to the food base, activities that block or limit passage to or from biologically important areas, permanent destruction of habitat, or temporary destruction/disturbance of habitat during a biologically important time.
6. For monitoring directly related to mitigation – an increase in the probability of detecting marine mammals, thus allowing for more effective implementation of the mitigation.

Based on our evaluation of the applicant's proposed measures, as well as other measures considered by NMFS, NMFS has preliminarily determined that the proposed mitigation measures provide the means of effecting the least practicable impact on marine mammals species

or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance.

Proposed Monitoring and Reporting

In order to issue an IHA for an activity, section 101(a)(5)(D) of the MMPA states that NMFS must set forth "requirements pertaining to the monitoring and reporting of such taking". The MMPA implementing regulations at 50 CFR 216.104(a)(13) indicate that requests for incidental take authorizations must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present in the proposed action area.

Any monitoring requirement we prescribe should improve our understanding of one or more of the following:

- Occurrence of marine mammal species in the action area (*e.g.*, presence, abundance, distribution, density).
- Nature, scope, or context of likely marine mammal exposure to potential stressors/impacts (individual or cumulative, acute or chronic), through better understanding of: (1) Action or environment (*e.g.*, source characterization, propagation, ambient noise); (2) Affected species (*e.g.*, life history, dive patterns); (3) Co-occurrence of marine mammal species with the action; or (4) Biological or behavioral context of exposure (*e.g.*, age, calving or feeding areas).
- Individual responses to acute stressors, or impacts of chronic exposures (behavioral or physiological).
- How anticipated responses to stressors impact either: (1) long-term fitness and

survival of an individual; or (2) population, species, or stock.

- Effects on marine mammal habitat and resultant impacts to marine mammals.
- Mitigation and monitoring effectiveness.

Visual Marine Mammal Observations

PSOs shall be used to detect, document, and minimize impacts to marine mammals. Monitoring would be conducted before, during, and after construction activities. In addition, PSOs shall record all incidents of marine mammal occurrence, regardless of distance from activity, and document any behavioral reactions in concert with distance from construction activities. Important qualifications for PSOs for visual monitoring include:

- Visual acuity in both eyes (correction is permissible) sufficient for discernment of marine mammals on land or in the water with ability to estimate target size and distance; use of binoculars may be necessary to correctly identify the target;
- Advanced education in biological science or related field (undergraduate degree or higher required);
- Experience and ability to conduct field observations and collect data according to assigned protocols (this may include academic experience);
- Experience or training in the field identification of marine mammals, including the identification of behaviors;
- Sufficient training, orientation, or experience with the construction operation to provide for personal safety during observations;
- Writing skills sufficient to prepare a report of observations including but not limited to the number and species of marine mammals observed; dates and times when

construction activities were conducted; dates and times when construction activities were suspended, if necessary; and marine mammal behavior; and

- Ability to communicate orally, by radio or in person, with project personnel to provide real-time information on marine mammals observed in the area as necessary.

PSOs shall also conduct mandatory biological resources awareness training for construction personnel. The awareness training shall be provided to brief construction personnel on marine mammals and the need to avoid and minimize impacts to marine mammals. If new construction personnel are added to the project, the contractor shall ensure that the personnel receive the mandatory training before starting work. The PSO would have authority to stop construction if marine mammals appear distressed (evasive maneuvers, rapid breathing, inability to flush) or in danger of injury.

The ME DOT has developed a monitoring plan based on discussions between the ME DOT and NMFS. The ME DOT will collect sighting data and behavioral responses to construction activities for marine mammal species observed in the region of activity during the period of activity. All PSOs will be trained in marine mammal identification and behaviors and are required to have no other construction-related tasks while conducting monitoring.

Data Collection

We require that PSOs use approved data forms. Among other pieces of information, the ME DOT will record detailed information about any implementation of shutdowns, including the distance of animals to the pile and description of specific actions that ensued and resulting behavior of the animal, if any. In addition, the ME DOT will attempt to distinguish between the number of individual animals taken and the number of incidents of take. We require that, at a minimum, the following information be collected on the sighting forms:

- Date and time that monitored activity begins or ends;
- Construction activities occurring during each observation period;
- Weather parameters (*e.g.*, percent cover, visibility);
- Water conditions (*e.g.*, sea state, tide state);
- Species, numbers, and, if possible, sex and age class of marine mammals;
- Description of any observable marine mammal behavior patterns, including bearing and direction of travel and distance from pile driving activity;
- Distance from pile driving activities to marine mammals and distance from the marine mammals to the observation point;
- Locations of all marine mammal observations; and
- Other human activity in the area.

Reporting

ME DOT is required to submit a draft monitoring report to NMFS within 90 days of completion of in-water construction activities. The report would include data from marine mammal sightings as described in the Data Collection section above (*i.e.*, date, time, location, species, group size, and behavior), any observed reactions to construction, distance to operating pile hammer, and construction activities occurring at time of sighting and environmental data for the period (*i.e.*, wind speed and direction, sea state, tidal state cloud cover, and visibility).

In the unanticipated event that the specified activity clearly causes the take of a marine mammal in a manner prohibited by the IHA (if issued), such as an injury (Level A harassment), serious injury, or mortality, ME DOT would immediately cease the specified activities and immediately report the incident to the Permits and Conservation Division, Office of Protected

Resources, NMFS and the Greater Atlantic Regional Fisheries Office Stranding Coordinator. The report must include the following information:

- Time, date, and location (latitude/longitude) of the incident;
- Name and type of vessel involved;
- Vessel's speed during and leading up to the incident;
- Description of the incident;
- Status of all sound source use in the 24 hrs preceding the incident;
- Water depth;
- Environmental conditions (*e.g.*, wind speed and direction, sea state, cloud cover, and visibility);
- Description of all marine mammal observations in the 24 hrs preceding the incident;
- Species identification or description of the animal(s) involved;
- Fate of the animal(s); and
- Photographs or video footage of the animal(s) (if equipment is available).

Activities would not resume until NMFS is able to review the circumstances of the prohibited take. NMFS would work with ME DOT to determine what is necessary to minimize the likelihood of further prohibited take and ensure MMPA compliance. ME DOT may not resume their activities until notified by NMFS via letter, email, or telephone.

In the event that ME DOT discovers an injured or dead marine mammal, and the lead PSO determines that the cause of the injury or death is unknown and the death is relatively recent (*i.e.*, in less than a moderate state of decomposition as described in the next paragraph), ME DOT would immediately report the incident to the Permits and Conservation Division, Office of Protected Resources, NMFS and the Greater Atlantic Regional Fisheries Office Stranding

Coordinator. The report must include the same information identified in the paragraph above. Activities may continue while NMFS reviews the circumstances of the incident. NMFS would work with ME DOT to determine whether modifications in the activities are appropriate.

In the event that ME DOT discovers an injured or dead marine mammal, and the lead PSO determines that the injury or death is not associated with or related to the activities authorized in the IHA (*e.g.*, previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), ME DOT would report the incident to the Permits and Conservation Division, Office of Protected Resources, NMFS and the NMFS Stranding Hotline and/or by email to the Greater Atlantic Regional Fisheries Office Stranding Coordinator within 24 hrs of the discovery. ME DOT would provide photographs or video footage (if available) or other documentation of the stranded animal sighting to NMFS and the Marine Mammal Stranding Network. Activities may continue while NMFS reviews the circumstances of the incident.

Estimated Take of Incidental Harassment

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

All anticipated takes would be by Level B harassment resulting from pile driving activities involving temporary changes in behavior. The proposed mitigation and monitoring

measures are expected to minimize the possibility of injurious or lethal takes such that take by Level A harassment, serious injury, or mortality is considered discountable.

If a marine mammal responds to a stimulus by changing its behavior, the response may or may not constitute taking, and is unlikely to affect the stock or the species as a whole. However, if a sound source displaces marine mammals from an important feeding or breeding area for a prolonged period, impacts on animals or on the stock or species could potentially be significant (*e.g.*, Lusseau and Bejder 2007; Weilgart 2007). Given the many uncertainties in predicting the quantity and types of impacts of sound on marine mammals, it is common practice to estimate how many animals are likely to be present within a particular distance of a given activity, or exposed to a particular level of sound. In practice, depending on the amount of information available to characterize daily and seasonal movement and distribution of affected marine mammals, it can be difficult to distinguish between the number of individuals harassed and the instances of harassment and, when duration of the activity is considered, it can result in a take estimate that overestimates the number of individuals harassed. In particular, for stationary activities, it is more likely that some smaller number of individuals may accrue a number of incidences of harassment per individual than for each incidence to accrue to a new individual, especially if those individuals display some degree of residency or site fidelity and the impetus to use the site (*e.g.*, because of foraging opportunities) is stronger than the deterrence presented by the harassing activity.

Elevated in-water sound levels from pile driving activities in the proposed project area may temporarily impact marine mammal behavior. Elevated in-air sound levels are not a concern because the nearest significant pinniped haul-out is more than six nmi away. Marine mammals are continually exposed to many sources of sound. For example, lightning, rain, sub-sea

earthquakes, and animals are natural sound sources throughout the marine environment. Marine mammals produce sounds in various contexts and use sound for various biological functions including, but not limited to, (1) social interactions; (2) foraging; (3) orientation; and (4) predator detection. Interference with producing or receiving these sounds may result in adverse impacts. Audible distance or received levels will depend on the sound source, ambient noise, and the sensitivity of the receptor (Richardson *et al.*, 1995). Marine mammal reactions to sound may depend on sound frequency, ambient sound, what the animal is doing, and the animal's distance from the sound source (Southall *et al.*, 2007).

Behavioral disturbances that could result from anthropogenic sound associated with these activities are expected to affect only a small number of individual marine mammals, although those effects could be recurring over the life of the project if the same individuals remain in the project vicinity.

The ME DOT has requested authorization for the incidental taking of small numbers of harbor seals, gray seals, harbor porpoise, and Atlantic white-sided dolphins incidental to the pile driving associated with the EBRP described previously in this document. In order to estimate the potential incidents of take that may occur incidental to the specified activity, we must first estimate the extent of the sound field that may be produced by the activity and then consider in combination with information about marine mammal density or abundance in the project area and the number of days the activity will be conducted. We first provide information on applicable sound thresholds for determining effects to marine mammals before describing the information used in estimating the sound fields, the available marine mammal density or abundance information, and the method of estimating potential incidents of take.

As discussed above, in-water pile driving activities generate loud noises that could potentially harass marine mammals in the vicinity of the ME DOT's proposed EBRP. No impacts from visual disturbance are anticipated because there are no known pinniped haul-outs within the proposed project area. The only potential disturbance anticipated to occur would be during driving operations, which may cause individual marine mammals to temporarily avoid the area.

Sound Thresholds

We use generic sound exposure thresholds to determine when an activity that produces sound might result in impacts to a marine mammal such that a take by harassment might occur. To date, no studies have been conducted that explicitly examine impacts to marine mammals from pile driving sounds or from which empirical sound thresholds have been established. These thresholds (Table 7) are used to estimate when harassment may occur (*i.e.*, when an animal is exposed to levels equal to or exceeding the relevant criterion) in specific contexts; however, useful contextual information that may inform our assessment of effects is typically lacking and we consider these thresholds as step functions. NMFS new guidance establishes new thresholds for predicting auditory injury, which equates to Level A harassment under the MMPA. The ME DOT project used this new guidance when determining the injury (Level A) zones (see Table 5).

Table 7. Current Acoustic Exposure Criteria for Level B Harassment.

Criterion	Definition	Threshold
Level B harassment (underwater)	Behavioral disruption	160 dB (impulsive source) / 120 dB (continuous source) (rms)
Level B harassment (airborne)	Behavioral disruption	90 dB (harbor seals) / 100 dB (other pinnipeds) (unweighted)

Distance to Sound Thresholds

Pile driving generates underwater noise that can potentially result in disturbance to marine mammals in the project area. Transmission loss (TL) is the decrease in acoustic intensity as an acoustic pressure wave propagates out from a source. TL parameters vary with frequency, temperature, sea conditions, current, source and receiver depth, water depth, water chemistry, and bottom composition and topography. The general formula for underwater TL is:

$TL = B * \log_{10}(R_1/R_2)$, where

R_1 = the distance of the modeled SPL from the driven pile, and

R_2 = the distance from the driven pile of the initial measurement.

This formula neglects loss due to scattering and absorption, which is assumed to be zero here. The degree to which underwater sound propagates away from a sound source is dependent on a variety of factors, most notably the water bathymetry and presence or absence of reflective or absorptive conditions including in-water structures and sediments. Spherical spreading occurs in a perfectly unobstructed (free-field) environment not limited by depth or water surface, resulting in a 6 dB reduction in sound level for each doubling of distance from the source (20*log[range]). Cylindrical spreading occurs in an environment in which sound propagation is bounded by the water surface and sea bottom, resulting in a reduction of 3 dB in sound level for each doubling of distance from the source (10*log[range]). A practical spreading value of fifteen is often used under conditions, where water increases with depth as the receiver moves away from the shoreline, resulting in an expected propagation environment that would lie between spherical and cylindrical spreading loss conditions.

In this case we have measured field data available from the previous EBRP IHA at the same location and from the same type of piles/sheet piles showing at a particular point where the received level is below 120 dB, to determine the disturbance distance for the Level B ZOI. For

sheet piles PZC-18, 400m is the measured distance where the Level B ZOI is below 120 dB. For sheet piles PZC-26, the farthest measurement does not go below 120 dB so the statistical analysis of 90 percent CI was used, which pointed to 665 m for the Level B ZOI. For impact pile driving, we used the third farthest point from the measured field data, which was 550 m from the source, and measured under 160 dB.

The sound field in the project area is the existing ambient noise plus additional construction noise from the proposed project. The primary components of the project expected to affect marine mammals is the sound generated by impact and vibratory pile driving. The intensity of pile driving sounds is greatly influenced by factors such as the type of piles, hammers, and the physical environment in which the activity takes place. In order to determine the distance to the thresholds and the received levels to marine mammals that are likely to result from pile driving at EBRP, we evaluated the acoustic monitoring data (Table 8) from the previous EBRP IHA project with similar properties to the proposed activity.

Table 8. Eastport Breakwater noise monitoring data for un-attenuated pile strikes with an impact hammer and a vibratory hammer

Pile Type/Size	Relative Water Depth	Max Avg dB RMS
Impact Pile Driving		
20 ft /Steel Pipe	15 m	182
20 ft /Steel Pipe (‘Spin fin’)	15 m	186
Vibratory Pile Driving		
24 ft Steel Sheet PZC-16	15 m	170 (max dB RMS)

We consider the values presented in Table 8. to be representative of SPLs that may be produced by pile driving in the project area. Distances to the harassment isopleths vary by marine mammal type and pile extraction/driving tool. All calculated distances to and the total area encompassed by the marine mammal sound thresholds were provided in Tables 5 and 6.

In addition, we generally recognize that pinnipeds occurring within an estimated airborne harassment zone, whether in the water or hauled out (no haul outs within six nmi of the project area), could be exposed to airborne sound that may result in behavioral harassment. However, any animal exposed to airborne sound above the behavioral harassment threshold is likely to also be exposed to underwater sound above relevant thresholds (which are typically in all cases larger zones than those associated with airborne sound). Thus, the behavioral harassment of these animals is already accounted for in the estimates of potential take. Multiple incidents within a day of exposure to sound above NMFS' thresholds for behavioral harassment are not believed to result in increased behavioral disturbance, in either nature or intensity of disturbance reaction. Therefore, we do not believe that authorization of incidental take resulting from airborne sound for pinnipeds is warranted, and airborne sound is not discussed further here.

Acoustic Impacts

When considering the influence of various kinds of sound on the marine environment, it is necessary to understand that different kinds of marine life are sensitive to different frequencies of sound. Based on available behavioral data, audiograms have been derived using auditory evoked potentials, anatomical modeling, and other data. Southall *et al.* (2007) designated hearing groups for marine mammals and estimated the lower and upper frequencies of hearing of the groups. NMFS made modifications to the marine mammal hearing groups proposed in Southall *et al*. (2007) and is reflected in the new *Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (July 2016)* (*http://www.nmfs.noaa.gov/pr/acoustics/guidelines.htm*). The marine mammal hearing groups, pinnipeds, high frequency cetaceans (harbor porpoise) and mid-frequency cetaceans (Atlantic

white-sided dolphin) which are the subject of this project, and their associated generalized hearing range were previous discussed in the Marine Mammal Hearing section and also in Table 4.

As mentioned previously in this document, four marine mammal species (two cetacean and two pinniped species) are likely to occur in the area of the proposed activity. Of the two cetacean species likely to occur in the proposed project area, the Atlantic white-sided dolphin is classified as a mid-frequency cetacean and the harbor porpoise is classified as a high-frequency cetacean (NOAA 2016). A species' hearing group and its generalized hearing range is a consideration when we analyze the effects of exposure to sound on marine mammals.

ME DOT and NMFS determined that in-water construction activities involving the use of impact and vibratory pile driving during the Eastport Breakwater replacement project have the potential to result in behavioral harassment of marine mammal species and stocks in the vicinity of the proposed activity.

Description of Take Calculation

The following sections are descriptions of how take was determined for impacts to marine mammals from noise disturbance related to pile driving.

Incidental take is calculated for each species by estimating the likelihood of a marine mammal being present within the ensonified area above the threshold during pile driving activities, based on information about the presence of the animal (density estimates or the best available occurrence data) and the size of the zones of influence, which in this case is based on previous measurements from the acoustic monitoring in the previous EBRP IHA. Expected marine mammal presence is determined by past observations and general abundance during the construction window. When local abundance is the best available information, in lieu of the

density-area method, we may simply multiply some number of animals (as determined through counts of animals hauled-out) by the number of days of activity, under the assumption that all of those animals will be present within the area ensonified by the threshold and incidentally taken on each day of activity.

There are a number of reasons why estimates of potential incidents of take may be conservative, assuming that available density or abundance estimates and estimated ZOI areas are accurate. We assume, in the absence of information supporting a more refined conclusion, that the output of the calculation represents the number of individuals that may be taken by the specified activity. In fact, in the context of stationary activities such as pile driving and in areas where resident animals may be present, this number more realistically represents the number of incidents of take that may accrue to a smaller number of individuals. While pile driving can occur any day throughout the in-water work window, and the analysis is conducted on a per day basis, only a fraction of that time (typically a matter of hours on any given day) is actually spent pile driving. The potential effectiveness of mitigation measures in reducing the number of takes is typically not quantified in the take estimation process. For these reasons, these take estimates may be conservative.

For this project, the take requests were estimated using local marine mammal data sets and information from federal agencies and other experts. The best available data for marine mammals in the vicinity of the project area was derived from three sources including: three years (2007-2010) of marine mammal monitoring data from the Ocean Renewable Power Company (ORPC) tidal generator project that was located between Eastport and Lubec, ME, the 2015-2016 marine mammal monitoring data from the previous EBRP IHA, and communication with marine mammals experts from ME (Stephanie Wood, (NOAA Biologist) and Dr. James

Gilbert (Wildlife Ecologist, University of ME). Although the ORPC project was located on the other side of the peninsula from the Eastport pier, the presence of species and timing of their occurrence appears similar between the ORPC data and marine mammal monitoring data from the previous EBRP IHA.

The calculation for marine mammal exposures is estimated by:

Exposure estimate = N (number of animals in the area that is ensonified above the thresholds based on the previous sound measurements) * 160 days of pile driving activities from January to August 2017.

The estimated number of animals in the area was mostly determined based on the maximum group size of animals observed during ORPC's marine mammal observation effort (six seals (harbor and gray seals combined), six harbor porpoises, and one Atlantic white-sided dolphin) multiplied by the maximum expected number of pile/sheet installation and sheet removal days. However, during the winter and spring months we expect lower numbers of harbor porpoise in the Gulf of Maine (including the project area) and therefore take estimates were lower (Jan-May). Atlantic white-sided dolphins are not expected to frequent the project area as they are more of a pelagic species. Only two Atlantic white-sided dolphins were observed in four years of marine mammal monitoring (ORPC and EBPR IHA) and therefore, the take estimates are conservative and reflection of those observations. Harbor and gray seals were combined into one pinniped group because they cannot always be identified by species level. See Tables 9 and 10 for total estimated incidents of take.

Table 9. Marine Mammal Calculated Take for Level B Harassment.

Month	Pile Driving Days per Month	Calculated Harbor/Gray Seal Take by Level B Harassment	Calculated Harbor Porpoise Take by Level B Harassment	Calculated Atlantic White-Sided Dolphin Take by Level B Harassment
Jan	20	120	6	1
Feb	20	120	6	1
March	20	120	6	1
April	20	120	6	1
May	20	120	6	1
June	20	120	120	1
July	20	120	120	1
August	20	120	120	1
Sept				
Oct				
Nov				
Dec				
Total:	160	960	390	8

Table 10. Estimated Marine Mammal Takes by Level B Harassment.

Species	Take Authorization	Abundance	Approximate Percentage of Estimated Stock (Takes Authorized/ Population)	Population Trend
Harbor seal*	960	75,834 – Western North Atlantic stock	1.27	unknown
Gray seal		Unknown for U.S. - Western North Atlantic stock	unknown	increasing in the U.S. (EEZ), but the rate of increase is unknown.
Harbor porpoise	390	79,883 – Gulf of Maine/Bay of Fundy stock	0.48	unknown
Atlantic white-sided dolphin	8	48,819 – Western North Atlantic stock	0.016	unknown

*Note: Any pinnipeds observed/taken by Level B harassment will likely be harbor seals rather than gray seal (as gray seals do not frequent the waters of the project area as much and are found more in Canadian waters/haul out).

Analysis and Determinations

Negligible Impact

NMFS has defined "negligible impact" in 50 CFR 216.103 as "...an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival." A negligible impact finding is based on the lack of likely adverse effects on annual rates of recruitment or survival (*i.e.*, population-level effects). An estimate of the number of Level B harassment takes alone is not enough information on which to base an impact determination. In addition to considering estimates of the number of marine mammals that might be "taken" through behavioral harassment, we consider other factors, such as the likely nature of any responses (*e.g.*, intensity, duration), the context of any responses (*e.g.*, critical reproductive time or location, migration), as well as the number and nature of estimated Level A harassment takes, the number of estimated mortalities, and effects on habitat.

Pile driving activities associated with this project have the potential to disturb or displace marine mammals. Elevated noise levels are expected to be generated as a result of these activities. No serious injury or mortality would be expected at all, and with mitigation we expect to avoid any potential for Level A harassment as a result of the EBRP activities, and none are authorized by NMFS. The specified activities may result in take, in the form of Level B harassment (behavioral disturbance) only, from in-water noise from construction activities.

Effects on individuals that are taken by Level B harassment, on the basis of reports in the literature as well as monitoring from other similar activities, will likely be limited to reactions from these low intensity, localized, and short-term noise exposures that may cause brief startle reactions or short-term behavioral modifications by the animals. These reactions and behavioral

changes are expected to subside quickly when the exposures cease. Moreover, marine mammals are expected to avoid the area during in-water construction because animals generally move away from active sound sources, thereby reducing exposure and impacts. In addition, through mitigation measures including soft start, marine mammals are expected to move away from a sound source that is annoying prior to its becoming potentially injurious and detection of marine mammals by observers would enable the implementation of shutdowns to avoid injury. Repeated exposures of individuals to levels of noise disturbance that may cause Level B harassment are unlikely to result in hearing impairment or to significantly disrupt foraging behavior.

In-water construction activities would occur in relatively shallow coastal waters of Cobscook Bay. The proposed project area is not considered significant habitat for marine mammals and therefore no adverse effects on marine mammal habitat are expected. Marine mammals approaching the action area would likely be traveling or opportunistically foraging. There are no rookeries or major haul-out sites nearby, foraging hotspots, or other ocean bottom structure of significant biological importance to marine mammals that may be present in the marine waters in the vicinity of the project area. The closest significant pinniped haul out is more than six nmi away, which is well outside the project area's largest harassment zone. The proposed project area is not a prime habitat for marine mammals, nor is it considered an area frequented by marine mammals. Therefore, behavioral disturbances that could result from anthropogenic noise associated with breakwater replacement activities are expected to affect only a small number of marine mammals on an infrequent basis. Although it is possible that some individual marine mammals may be exposed to sounds from in-water construction activities more than once, the duration of these multi-exposures is expected to be low since

animals would be constantly moving in and out of the area and in-water construction activities would not occur continuously throughout the day.

Harbor and gray seals, harbor porpoise, and Atlantic white-sided dolphins as the potentially affected marine mammal species under NMFS jurisdiction in the action area, are not listed as threatened or endangered under the ESA and are not considered strategic under the MMPA. Even after repeated Level B harassment of some small subset of the overall stocks are unlikely to result in any significant realized decrease in fitness to those individuals, and thus would not result in any adverse impact to the stocks as a whole. Level B harassment will be reduced to the level of least practicable impact through use of mitigation measures described herein and, if sound produced by project activities is sufficiently disturbing, animals are likely to simply avoid the project area while the activity is occurring.

In summary, this negligible impact analysis is founded on the following factors: (1) the possibility of injury, serious injury, or mortality may reasonably be considered discountable; (2) the anticipated incidents of Level B harassment consist of, at worst, temporary modifications in behavior; (3) there is no primary foraging and reproductive habitat in the project area and the project activities are not expected to result in the alteration of habitat important to these behaviors or substantially impact the behaviors themselves (4) there is no major haul out habitat within six nmi of the project area (5) the proposed project area is not a prime habitat for marine mammals, nor will have no adverse effect on marine mammal habitat (6) and the presumed efficacy of the mitigation measures in reducing the effects of the specified activity to the level of least practicable impact. In addition, these stocks are not listed under the ESA or considered depleted under the MMPA. In combination, we believe that these factors, as well as the available body of evidence from other similar activities, demonstrate that the potential effects of the

specified activities will have only short-term effects on individuals. The specified activities are not expected to impact rates of recruitment or survival and will therefore not result in population-level impacts.

Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the monitoring and mitigation measures, we preliminarily find that the total marine mammal take from the construction activities will have a negligible impact on the affected marine mammal species or stocks.

Small Numbers

The amount of take NMFS proposes to authorize is considered small, less than one percent relative to the estimated populations for harbor porpoises and Atlantic white-sided dolphins and 1.27 percent for harbor seals. Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the mitigation and monitoring measures, NMFS finds that small numbers of marine mammals will be taken relative to the populations of the affected species or stocks.

Impact on Availability of Affected Species for Taking for Subsistence Uses

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

Endangered Species Act (ESA)

No species listed under the ESA are expected to be affected by these activities. Therefore, NMFS has determined that a section 7 consultation under the ESA is not required.

National Environmental Policy Act (NEPA)

In compliance with the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq*.), as implemented by the regulations published by the Council on Environmental Quality (40 CFR parts 1500-1508), NMFS is preparing an EA to consider the environmental impacts of issuance of a one-year IHA.

Proposed Authorization

NMFS proposes an IHA to ME DOT for the potential harassment of small numbers of marine mammal species incidental to its EBRP, Eastport, Maine, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated. The draft IHA language is provided next.

1. This Authorization is valid for one year from issuance.

2. This Authorization is valid only for activities associated with the EBRP in Eastport, Maine.

3. General Conditions

(a) The species authorized for incidental harassment takings, Level B harassment only, are: harbor seal (*Phoca vitulina*), gray seal (*Halichoerus grypus*), harbor porpoise (*Phocoena phocoena*), and Atlantic white-sided dolphin (*Lagenorhynchus acutus*). The allowed take numbers of these species are shown in Table 11.

Table 11. Species/stocks and numbers of marine mammals allowed under this IHA.

Species	Estimated marine mammal takes
Harbor seal	960
Gray seal	
Harbor porpoise	390
Atlantic white-sided dolphin	8

(b) The authorization for taking by harassment is limited to the following acoustic sources and from the following activities:

- Impact and vibratory driving activities

(c) The taking of any marine mammal in a manner prohibited under this Authorization must be reported within 24 hours of the taking to the Greater Atlantic Region Fisheries Office (GARFO), National Marine Fisheries Service (NMFS) Permits and Conservation Division, Office of Protected Resources.

4. The holder of this Authorization must notify the NMFS' Permits and Conservation Division, Office of Protected Resources, at least 48 hours prior to the start of activities identified in 3(b) (unless constrained by the date of issuance of this Authorization in which case notification shall be made as soon as possible).

5. Prohibitions

(a) The taking, by incidental harassment only, is limited to the species listed under condition 3(a) above and by the numbers listed in Table 11. The taking by Level A harassment, injury or death of these species or the taking by harassment, injury or death of any other species of marine mammal is prohibited and may result in the modification, suspension, or revocation of this Authorization.

(b) The taking of any marine mammal is prohibited whenever the required protected species observers (PSOs), required by condition 7(a), are not present in conformance with condition 7(a) of this Authorization.

6. Mitigation

(a) Shutdown and Level B Zones

(i) ME DOT shall implement shutdown zones (exclusion zones) for Level A Harassment and zones for Level B Harassment as described in Table 12 below.

Table 12. Shutzone and Level B Zones for Marine Mammals.

Activity	Pinnipeds	Cetaceans
Impact Pile Driving (Level A)	70 m	160 m
Impact Pile Driving (Level B)	550 m	
Vibratory Pile Driving (Level A)	50 m	120 m
Vibratory Pile Driving (Level B) **PZC-18 Sheet Piles** **PZC-26 Sheet Piles**	400 m 665 m	

(b) Soft Start

(i) For vibratory pile driving, contractors shall initiate noise from the vibratory hammer for 15 seconds at 40-60 percent reduced energy, followed by a 1-minute waiting period. The procedure shall be repeated two additional times before full energy may be achieved.

(ii) For impact hammering, contractors shall provide an initial set of three strikes from the impact hammer at 40 percent energy, followed by a 1-minute waiting period, then two subsequent three-strike sets.

(iii) The soft-start procedure will be conducted prior to driving each pile if hammering ceases for more than 30 minutes.

(c) Shutdown Measures

(i) If a marine mammal is sighted within or approaching the shutdown zones (exclusion zone) prior to start of impact pile driving, the observer would notify the on-site project lead (or other authorized individual) who would then be required to delay pile driving until the animal has moved out of the shutdown zone (exclusion zone) or if the animal has not been resighted within 30 minutes.

(ii) If a marine mammal is sighted within or on a path toward the exclusion zone during pile driving, pile driving would cease until that animal has moved out of the shutdown (exclusion zone) or 30 minutes has lapsed since the last sighting.

(iii) Although it is unlikely, if a marine mammal that is not covered under the IHA is sighted in the vicinity of the project area and is about to enter the ZOI, ME DOT shall implement shutdown measures to ensure that the animal is not exposed to noise levels that could result a take.

(d) Timing Restrictions

(i) Work would occur only during daylight hours, when visual monitoring of marine mammals can be conducted. To minimize impacts to Federally listed Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*), shortnose sturgeon (*Acipenser brevirostrum*) and Atlantic salmon (*Salmo salar*), ME DOT will

follow restrictions on pile driving from April through November as directed by NMFS'GARFO.

7. Monitoring:

(a) Visual Monitoring

(i) Protected Species Observers

ME DOT shall employ two biologically-trained, NMFS-approved protected species observers (PSOs) to conduct marine mammal monitoring for its EBRP.

(ii) Visual monitoring for marine mammals in the shutdown zone (exclusion zone) shall be conducted 30 minutes before, during, and 30 minutes after all impact pile driving activities.

(iii) PSOs shall be positioned on the pier. One observer would survey inwards toward the pile driving site and the second observer would conduct behavioral monitoring outwards to a distance of 1 km during all impact pile driving.

(iv) PSOs shall provide 100 percent coverage for marine mammal exclusion zones and conduct monitoring out to the extent of the relevant Level B harassment zones for vibratory pile driving activities.

(v) PSOs shall be provided with the equipment necessary to effectively monitor for marine mammals (*e.g.*, high-quality binoculars, compass, and range-finder as well as a digital SLR camera with telephoto lens and video capability) in order to determine if animals have entered into the exclusion zone or Level B harassment isopleth and to record species, behaviors, and responses to pile driving.

8. Reporting:

(a) ME DOT shall provide NMFS with a draft monitoring report within 90 days of the conclusion of the construction work. This report shall detail the monitoring protocol, summarize the data recorded during monitoring, and estimate the number of marine mammals that may have been harassed.

(b) If comments are received from the NMFS GARFO or NMFS Office of Protected Resources on the draft report, a final report shall be submitted to NMFS within 30 days thereafter. If no comments are received from NMFS, the draft report will be considered to be the final report.

(c) In the unanticipated event that the construction activities clearly cause the take of a marine mammal in a manner prohibited by this Authorization (if issued), such as an injury, serious injury or mortality (*e.g.*, ship-strike, gear interaction, and/or entanglement), ME DOT shall immediately cease all operations and immediately report the incident to NMFS Permits and Conservation Division, Office of Protected Resources, and the GARFO Stranding Coordinators. The report must include the following information:

(i) time, date, and location (latitude/longitude) of the incident;

(ii) description of the incident;

(iii) status of all sound source use in the 24 hours preceding the incident;

(iv) environmental conditions (*e.g.*, wind speed and direction, Beaufort sea state, cloud cover, visibility, and water depth);

(v) description of marine mammal observations in the 24 hours preceding the incident;

(vi) species identification or description of the animal(s) involved;

(vii) the fate of the animal(s); and

(viii) photographs or video footage of the animal (if equipment is available).

(d) Activities shall not resume until NMFS is able to review the circumstances of the prohibited take. NMFS shall work with ME DOT to determine what is necessary to minimize the likelihood of further prohibited take and ensure MMPA compliance. ME DOT may not resume their activities until notified by NMFS via letter, email, or telephone.

(e) In the event that ME DOT discovers an injured or dead marine mammal, and the lead PSO determines that the cause of the injury or death is unknown and the death is relatively recent (i.e., in less than a moderate state of decomposition as described in the next paragraph), GARFO will immediately report the incident to NMFS Permits and Conservation Division, Office of Protected Resources, and the GARFO Stranding Coordinators. The report must include the same information identified above. Activities may continue while NMFS reviews the circumstances of the incident. NMFS will work with ME DOT to determine whether modifications in the activities are appropriate.

(f) In the event that ME DOT discovers an injured or dead marine mammal, and the lead PSO determines that the injury or death is not associated with or related to the activities proposed in the IHA (*e.g.*, previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), ME DOT shall report the incident to NMFS Permits and Conservation Division, Office of Protected Resources, and the GARFO Stranding Coordinators, within 24 hours of the discovery. ME DOT shall provide photographs or video footage (if available) or other documentation of the

stranded animal sighting to NMFS and the Marine Mammal Stranding Network. ME DOT can continue its operations under such a case.

9. This Authorization may be modified, suspended or withdrawn if the holder fails to abide by the conditions prescribed herein or if the authorized taking is having more than a negligible impact on the species or stock of affected marine mammals, or if there is an unmitigable adverse impact on the availability of such species or stocks for subsistence uses.

10. A copy of this proposed Authorization must be in the possession of each contractor who performs the EBRP in Eastport, Maine.

11. This Authorization may be modified, suspended, or withdrawn if the Holder fails to abide by the conditions prescribed herein or if the authorized taking is having more than a negligible impact on the species or stock of affected marine mammals.

Request for Public Comments

NMFS requests comments on our analysis, the draft authorization, and any other aspect of the Notice of Proposed IHA for ME DOT's construction project in Eastport, Maine. Please include with your comments any supporting data or literature citations to help inform our final decision on ME DOT's request for an MMPA authorization.

Dated: December 6, 2016.

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Donna S. Wieting,

Director, Office of Protected Resources,

National Marine Fisheries Service.

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