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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648-XE271

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to the Bravo Wharf Recapitalization Project

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 U.S. Navy (Navy) for authorization to take marine mammals incidental to construction activities as part of a wharf recapitalization project. Pursuant to the Marine Mammal Protection Act (MMPA), NMFS is requesting public comment on its proposal to issue an incidental harassment authorization (IHA) to the Navy 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 this proposal 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.mccue@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 to the Internet 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: Laura McCue, Office of Protected Resources, NMFS, (301) 427-8401.

SUPPLEMENTARY INFORMATION:

Availability

An electronic copy of the Navy's application and supporting documents, as well as a list of the references cited in this document, may be obtained by visiting the Internet 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

The Navy has prepared a draft Environmental Assessment (*Wharf Bravo Recapitalization at Naval Station Mayport, Jacksonville, FL*) in accordance with the National Environmental Policy Act (NEPA) and the regulations published by the Council on Environmental Quality. It is posted at the aforementioned site. NMFS will independently evaluate the EA and determine whether or not to adopt it. We may prepare a separate NEPA analysis and incorporate relevant portions of Navy's EA by reference. Information in the Navy's application, EA, and this notice collectively provide the environmental information related to proposed issuance of this IHA for public review and comment. We will review all comments submitted in response to this notice as we complete the NEPA process, including a decision of whether to sign a Finding of No Significant Impact (FONSI), prior to a final decision on the incidental take authorization request.

Background

Sections 101(a)(5)(A) and (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 area, the incidental, but not intentional, taking of small numbers of marine mammals, providing that certain findings are made and the necessary prescriptions are established.

The incidental taking of small numbers of marine mammals may be allowed only if NMFS (through authority delegated by the Secretary) finds that the total taking by the specified activity during the specified time period will (i) have a negligible impact on the species or stock(s) and (ii) not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant). Further, the permissible methods of taking and requirements pertaining to the mitigation, monitoring and reporting of such taking must be set forth, either in specific regulations or in an authorization.

The allowance of such incidental taking under section 101(a)(5)(A), by harassment, serious injury, death, or a combination thereof, requires that regulations be established. Subsequently, a Letter of Authorization may be issued pursuant to the prescriptions established in such regulations, providing that the level of taking will be consistent with the findings made for the total taking allowable under the specific regulations. Under section 101(a)(5)(D), NMFS may authorize such incidental taking by harassment only, for periods of not more than one year, pursuant to requirements and conditions contained within an IHA. The establishment of prescriptions through either specific regulations or an authorization requires notice and opportunity for public comment.

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." 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]."

Summary of Request

On July 21, 2015, we received a request from the Navy for authorization of the taking, by Level B harassment only, of marine mammals, incidental to pile driving in association with the Bravo Wharf recapitalization project at Naval Station Mayport, Florida (NSM). That request was modified on November 4 and November 10, and a final version, which we deemed adequate and complete, was submitted on November 17. In-water work associated with the project is expected to be completed within the one-year timeframe of the proposed IHA (October 15, 2016 through September 30, 2017).

The use of both vibratory and impact pile driving is expected to produce underwater sound at levels that have the potential to result in behavioral harassment of marine mammals.

One species of marine mammal has the potential to be affected by the specified activities: bottlenose dolphin (*Tursiops truncatus truncatus*). This species may occur year-round in the action area.

Similar wharf construction and pile driving activities in Naval Station Mayport have been authorized by NMFS in the past. The first authorization was effective between September 1, 2014 through August 31, 2015, and the second authorization, which is currently ongoing, is effective from September 8, 2015 through September 7, 2016.

Description of the Specified Activity

Overview

Bravo Wharf is a medium draft, general purpose berthing wharf that was constructed in 1970 and lies at the western edge of the NSM turning basin. Bravo Wharf is approximately 2,000 ft long, 125 ft wide, and has a berthing depth of 50 ft mean lower low water. The wharf is one of two primary deep draft berths at the basin and is capable of berthing ships up to and including large amphibious ships; it is one of three primary ordnance handling berths at the basin. The wharf is a diaphragm steel sheet pile cell structure with a concrete apron, partial concrete encasement of the piling and asphalt paved deck. The wharf is currently in poor condition due to advanced deterioration of the steel sheeting and lack of corrosion protection. This structural deterioration has resulted in the institution of load restrictions within 60 ft of the wharf face. The purpose of this project is to complete necessary repairs to Bravo Wharf. Please refer to the Navy's application for a schematic of the project plan.

Dates and Duration

The total project is expected to require a maximum of 130 days of in-water pile driving. The project may require up to 24 months for completion; in-water activities are limited to a maximum of 130 days, separated into two phases. If in-water work will extend beyond the effective dates of the IHA, a second IHA application will be submitted by the Navy. There will be a maximum of 110 days for vibratory pile driving (seventy three days in phase I and thirty seven days in phase II), and a contingent 20 days of impact pile driving. The specified activities are expected to occur between October 1, 2016 and September 30, 2017.

Specific Geographic Region

NSM is located in northeastern Florida, at the mouth of the St. Johns River and adjacent to the Atlantic Ocean (see Figures 2-1 and 2-2 of the Navy's application). The St. Johns River is the longest river in Florida, with the final 35 mi flowing through the city of Jacksonville. This portion of the river is significant for commercial shipping and military use. At the mouth of the river, near the action area, the Atlantic Ocean is the dominant influence and typical salinities are above 30 ppm. Outside the river mouth, in nearshore waters, moderate oceanic currents tend to flow southward parallel to the coast. Sea surface temperatures range from around 16°C in winter to 28°C in summer.

The specific action area consists of the NSM turning basin, an area of approximately 2,000 by 3,000 ft containing ship berthing facilities at sixteen locations along wharves around the basin perimeter. The basin was constructed during the early 1940s by dredging the eastern part of Ribault Bay (at the mouth of the St. Johns River), with dredge material from the basin used to fill parts of the bay and other low-lying areas in order to elevate the land surface. The basin is currently maintained through regular dredging at a depth of 50 ft, with depths at the berths ranging from 30-50 ft. The turning basin, connected to the St. Johns River by a 500-ft-wide entrance channel, will largely contain sound produced by project activities, with the exception of sound propagating east into nearshore Atlantic waters through the entrance channel (see Figure 2-2 of the Navy's application). Bravo Wharf is located in the western corner of the Mayport turning basin.

Detailed Description of Activities

In order to rehabilitate Bravo Wharf, the Navy proposes to install a new steel sheet pile bulkhead at Bravo Wharf. The project consists of installing a total of approximately 880 single sheet piles (Phase I – berths B-2 and B-3: 590; Phase II – berth B-1: 290). The wall will be anchored at the top and fill consisting of clean gravel and flowable concrete fill will be placed behind the wall. A concrete cap will be formed along the top and outside face of the wall to tie the entire structure together and provide a berthing surface for vessels. The new bulkhead will be designed for a fifty-year service life.

All piles would be driven by vibratory hammer, although impact pile driving may be used as a contingency in cases when vibratory driving is not sufficient to reach the necessary depth. In the unlikely event that impact driving is required, either impact or vibratory driving could occur on a given day, but concurrent use of vibratory and impact drivers would not occur. The Navy estimates that a total of 130 in-water work days may be required to complete pile driving activity, which includes twenty days for contingency impact driving, if necessary.

Description of Marine Mammals in the Area of the Specified Activity

There are four marine mammal species which may inhabit or transit through the waters nearby NSM at the mouth of the St. Johns River and in nearby nearshore Atlantic waters. These include the bottlenose dolphin, Atlantic spotted dolphin (*Stenella frontalis*), North Atlantic right whale (*Eubalaena glacialis*), and humpback whale (*Megaptera novaeangliae*). Multiple additional cetacean species occur in South Atlantic waters but would not be expected to occur in shallow nearshore waters of the action area. Table 1 lists the marine mammal species with expected potential for occurrence in the vicinity of NSM during the project timeframe and summarizes key information regarding stock status and abundance. Taxonomically, we follow Committee on Taxonomy (2014). Please see NMFS' Stock Assessment Reports (SAR), available at *www.nmfs.noaa.gov/pr/sars*, for more detailed accounts of these stocks' status and abundance. Please also refer to NMFS' website (*www.nmfs.noaa.gov/pr/species/mammals*) for generalized species accounts and to the Navy's Marine Resource Assessment for the Charleston/Jacksonville Operating Area, which documents and describes the marine resources that occur in Navy operating areas of the Southeast (DoN, 2008). The document is publicly available at *www.navfac.navy.mil/products_and_services/ev/products_and_services/marine_resources/marine_resource_assessments.html* (accessed November 2, 2015).

In the species accounts provided here, 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. Multiple stocks of bottlenose dolphins may be present in the action area, either seasonally or year-round, and are described further below. We first address the three other species that may occur in the action area.

Table 1. Marine Mammals Potentially Present in the Vicinity of NSM.

Species	Stock	ESA/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
Order Cetartiodactyla – Cetacea – Superfamily Mysticeti (baleen whales)						
Family Balaenidae						

North Atlantic right whale	Western North Atlantic[5]	E/D; Y	476 (0; 476; 2013)	1	4.3	Rare inshore, regular near/offshore; Nov-Apr
Humpback whale	Gulf of Maine	E/D; Y	823 (0;823; 2008)	2.7	7.6	Rare; Fall-Spring
Superfamily Odontoceti (toothed whales, dolphins, and porpoises)						
Family Delphinidae						
Atlantic spotted dolphin	Western North Atlantic	-; N	44,715 (0.43; 31,610; 2011)	316	0	Rare; year-round
Common bottlenose dolphin	Western North Atlantic Offshore	-; N	77,532 (0.4; 56,053; 2011)	561	43.9	Rare; year-round
	Western North Atlantic Coastal, Southern Migratory	-/D; Y	9,173 (0.46; 6,326; 2010-11)	63	0-12	Possibly common[8]; Jan-Mar
	Western North Atlantic Coastal, Northern Florida	-/D; Y	1,219 (0.67; 730; 2010-11)	7	0.4	Possibly common[8]; year-round
	Jacksonville Estuarine System[6]	-; Y	412[7] (0.06; unk; 1994-97)	undet.	1.2	Possibly common[8]; year-round

[1]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, abundance estimates are actual counts of animals and there is no associated CV. 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 draft 2015 SARs (*www.nmfs.noaa.gov/pr/sars/draft.htm*).

[5]Abundance estimates (and resulting PBR values) for these stocks are new values presented in the draft 2015 SARs. This information was made available for public comment and is currently under review and therefore may be revised prior to finalizing the 2015 SARs. However, we consider this information to be the best available for use in this document.

[6]Abundance estimates for these stocks are greater than eight years old and are therefore not considered current. PBR is considered undetermined for these stocks, as there is no current minimum abundance estimate for use in calculation. We nevertheless present the most recent abundance estimates and PBR values, as these represent the best available information for use in this document.

[7]This abundance estimate is considered an overestimate because it includes non- and seasonally-resident animals.

[8]Bottlenose dolphins in general are common in the project area, but it is not possible to readily identify them to stock. Therefore, these three stocks are listed as possibly common as we have no information about which stock commonly only occurs.

Northern Right whales occur in sub-polar to temperate waters in all major ocean basins in the world with a clear migratory pattern, occurring in high latitudes in summer (feeding) and lower latitudes in winter (breeding). North Atlantic right whales exhibit extensive migratory patterns, traveling along the eastern seaboard from calving grounds off Georgia and northern Florida to northern feeding areas off of the northeast U.S. and Canada in March/April and returning in November/December. Migrations are typically within 30 nmi of the coastline and in waters less than 50 m deep. Although this migratory pattern is well known, winter distribution for most of the population – the non-calving portion – is poorly known, as many whales are not observed on the calving grounds. It is unknown where these animals spend the winter, although they may occur further offshore or may remain on foraging grounds during winter (Morano *et al*., 2012). During the winter calving period, right whales occur regularly in offshore waters of northeastern Florida. Critical habitat for right whales in the southeast (as identified under the ESA) is designated to protect calving grounds, and encompasses waters from the coast out to 15 nmi offshore from Mayport. More rarely, right whales have been observed entering the mouth of the St. Johns River for brief periods of time (Schweitzer and Zoodsma, 2011). Right whales are not present in the region outside of the winter calving season.

Humpback whales are a cosmopolitan species that migrate seasonally between warm-water (tropical or sub-tropical) breeding and calving areas in winter months and cool-water (temperate to sub-Arctic/Antarctic) feeding areas in summer months (Gendron and Urban, 1993). They tend to occupy shallow, coastal waters, although migrations are undertaken through deep, pelagic waters. In the North Atlantic, humpback whales are known to aggregate in six summer feeding areas representing relatively discrete subpopulations (Clapham and Mayo, 1987), which share common wintering grounds in the Caribbean (and to a lesser extent off of West Africa) (Winn *et al*., 1975; Mattila *et al*., 1994; Palsbøll *et al*., 1997; Smith *et al*., 1999; Stevick *et al*., 2003; Cerchio *et al*., 2010). These populations or aggregations range from the Gulf of Maine in the west to Norway in the east, and the migratory range includes the east coast of the U.S. and Canada. The only managed stock in U.S. waters is the Gulf of Maine feeding aggregation, although other stocks occur in Canadian waters (*e.g*., Gulf of St. Lawrence feeding aggregation), and it is possible that whales from other stocks could occur in U.S. waters. Significant numbers of whales do remain in mid- to high-latitude waters during the winter months (Clapham *et al*., 1993; Swingle *et al*., 1993), and there have been a number of humpback sightings in coastal waters of the southeastern U.S. during the winter (Wiley *et al*., 1995; Laerm *et al*., 1997; Waring *et al*., 2014). According to Waring *et al*. (2014), it is unclear whether the increased numbers of sightings represent a distributional change, or are simply due to an increase in sighting effort and/or whale abundance. These factors aside, the humpback whale remains relatively rare in U.S. coastal waters south of the mid-Atlantic region, and is considered rare to extralimital in the action area. Any occurrences in the region would be expected in fall, winter, and spring during migration, as whales are unlikely to occur so far south during the summer feeding season.

Neither the humpback whale nor the right whale would occur within the turning basin, and only the right whale has been observed to occur as far inshore as the mouth of the St. Johns River. Therefore, the potential for interaction with these species is unlikely. When considering frequency of occurrence, size of ensonified area (less than one square kilometer during both vibratory (approximately 0.61 km^2) and impact driving (0.51 km^2)), and duration (seventy three days in phase I, and thirty seven days in phase II), we consider the possibility for harassment of humpback and right whales to be discountable. Therefore, the humpback whale and right whale are excluded from further analysis and are not discussed further in this document.

Atlantic spotted dolphins are distributed in tropical and warm temperate waters of the western North Atlantic predominantly over the continental shelf and upper slope, from southern New England through the Gulf of Mexico (Leatherwood *et al*., 1976). Spotted dolphins in the Atlantic Ocean and Gulf of Mexico are managed as separate stocks. The Atlantic spotted dolphin occurs in two forms which may be distinct sub-species (Perrin *et al*., 1987; Rice, 1998); a larger, more heavily spotted form inhabits the continental shelf inside or near the 200-m isobath and is the only form that would be expected to occur in the action area. Although typically observed in deeper waters, spotted dolphins of the western North Atlantic stock do occur regularly in nearshore waters south of the Chesapeake Bay (Mullin and Fulling, 2003). Specific data regarding seasonal occurrence in the region of activity is lacking, but higher numbers of individuals have been reported to occur in nearshore waters of the Gulf of Mexico from November to May, suggesting seasonal migration patterns (Griffin and Griffin, 2003).

From recent observation reports from the Navy from previous construction activity at Naval Station Mayport, no spotted dolphins were observed. Similarly, dolphin research studies that have been conducted in the area also reported zero observed spotted dolphins in the project area (Gibson, pers. comm.). We consider the likelihood of Atlantic spotted dolphins being impacted by the construction activities to be discountable based on this information, combined with the zero estimated exposures (density: 0.005240 / km2). Therefore, spotted dolphins are also excluded from further analysis and are not discussed further in this document.

The following summarizes the population status and abundance of the remaining species.

Bottlenose Dolphin

Bottlenose dolphins are found worldwide in tropical to temperate waters and can be found in all depths from estuarine inshore to deep offshore waters. Temperature appears to limit the range of the species, either directly, or indirectly, for example, through distribution of prey. Off North American coasts, common bottlenose dolphins are found where surface water temperatures range from about 10º C to 32º C. In many regions, including the southeastern U.S., separate coastal and offshore populations are known. There is significant genetic, morphological, and hematological differentiation evident between the two ecotypes (*e.g.*, Walker, 1981; Duffield *et al*., 1983; Duffield, 1987; Hoelzel *et al*., 1998), which correspond to shallow, warm water and deep, cold water. Both ecotypes have been shown to inhabit the western North Atlantic (Hersh and Duffield, 1990; Mead and Potter, 1995), where the deep-water ecotype tends to be larger and darker. In addition, several lines of evidence, including photo-identification and genetic studies, support a distinction between dolphins inhabiting coastal waters near the shore and those present in the inshore waters of bays, sounds and estuaries. This complex differentiation of bottlenose dolphin populations is observed throughout the Atlantic and Gulf of Mexico coasts where bottlenose dolphins are found, although estuarine populations have not been fully defined.

In the Mayport area, four stocks of bottlenose dolphins are currently managed, none of which are protected under the ESA. Of the four stocks – offshore, southern migratory coastal, northern Florida coastal, and Jacksonville estuarine system – only the latter three are likely to occur in the action area. Bottlenose dolphins typically occur in groups of 2-15 individuals (Shane *et al*., 1986; Kerr *et al*., 2005). Although significantly larger groups have also been reported, smaller groups are typical of shallow, confined waters. In addition, such waters typically support some degree of regional site fidelity and limited movement patterns (Shane *et al*., 1986; Wells *et al*., 1987). Observations made during marine mammal surveys conducted during 2012-2013 in the Mayport turning basin show bottlenose dolphins typically occurring individually or in pairs, or less frequently in larger groups. The maximum observed group size during these surveys is six, while the mode is one. Navy observations indicate that bottlenose dolphins rarely linger in a particular area in the turning basin, but rather appear to move purposefully through the basin and then leave, which likely reflects a lack of biological importance for these dolphins in the basin. Based on currently available information, it is not possible to determine the stock to which the dolphins occurring in the action area may belong. These stocks are described in greater detail below.

Western North Atlantic Offshore – This stock, consisting of the deep-water ecotype or offshore form of bottlenose dolphin in the western North Atlantic, is distributed primarily along the outer continental shelf and continental slope, but has been documented to occur relatively close to shore (Waring *et al*., 2014). The separation between offshore and coastal morphotypes varies depending on location and season, with the ranges overlapping to some degree south of Cape Hatteras. Based on genetic analysis, Torres *et al*. (2003) found a distributional break at 34 km from shore, with the offshore form found exclusively seaward of 34 km and in waters deeper than 34 m. Within 7.5 km of shore, all animals were of the coastal morphotype. More recently, coastwide, systematic biopsy collection surveys were conducted during the summer and winter to evaluate the degree of spatial overlap between the two morphotypes. South of Cape Hatteras, spatial overlap was found although the probability of a sampled group being from the offshore morphotype increased with increasing depth, and the closest distance for offshore animals was 7.3 km from shore, in water depths of 13 m just south of Cape Lookout (Garrison *et al*., 2003). The maximum radial distance for the largest ZOI is approximately 1.2 km (Table 3); therefore, it is unlikely that any individuals of the offshore morphotype would be affected by project activities. In terms of water depth, the affected area is generally in the range of the shallower depth reported for offshore dolphins by Garrison *et al*. (2003), but is far shallower than the depths reported by Torres *et al*. (2003). South of Cape Lookout, the zone of spatial overlap between offshore and coastal ecotypes is generally considered to occur in water depths between 20-100 m (Waring *et al*., 2014), which is generally deeper than waters in the action area. This stock is thus excluded from further analysis.

Western North Atlantic Coastal, Southern Migratory – The coastal morphotype of bottlenose dolphin is continuously distributed from the Gulf of Mexico to the Atlantic and north approximately to Long Island (Waring *et al*., 2014). On the Atlantic coast, Scott *et al*. (1988) hypothesized a single coastal stock, citing stranding patterns during a high mortality event in 1987-88 and observed density patterns. More recent studies demonstrate that there is instead a complex mosaic of stocks (Zolman, 2002; McLellan *et al*., 2002; Rosel *et al*., 2009). The coastal morphotype was managed by NMFS as a single stock until 2009, when it was split into five separate stocks, including northern and southern migratory stocks. The original, single stock of coastal dolphins recognized from 1995-2001 was listed as depleted under the MMPA as a result of a 1987-88 mortality event. That designation was retained when the single stock was split into multiple coastal stocks. Therefore, all coastal stocks of bottlenose dolphins are listed as depleted under the MMPA, and are also considered strategic stocks.

According to the Scott *et al*. (1988) hypothesis, a single stock was thought to migrate seasonally between New Jersey (summer) and central Florida (winter). Instead, it was more recently determined that a mix of resident and migratory stocks exists, with the migratory movements and spatial distribution of the southern migratory stock the most poorly understood of these. Stable isotope analysis and telemetry studies provide evidence for seasonal movements of dolphins between North Carolina and northern Florida (Knoff, 2004; Waring *et al*., 2014), and genetic analyses and tagging studies support differentiation of northern and southern migratory stocks (Rosel *et al*., 2009; Waring *et al*., 2014). Although there is significant uncertainty regarding the southern migratory stock's spatial movements, telemetry data indicates that the stock occupies waters of southern North Carolina (south of Cape Lookout) during the fall (October-December). In winter months (January-March), the stock moves as far south as northern Florida where it overlaps spatially with the northern Florida coastal and Jacksonville estuarine system stocks. In spring (April-June), the stock returns north to waters of North Carolina, and is presumed to remain north of Cape Lookout during the summer months. Therefore, the potential exists for harassment of southern migratory dolphins, most likely during the winter only.

Bottlenose dolphins are ubiquitous in coastal waters from the mid-Atlantic through the Gulf of Mexico, and therefore interact with multiple coastal fisheries, including gillnet, trawl, and trap/pot fisheries. Stock-specific total fishery-related mortality and serious injury cannot be directly estimated because of the spatial overlap among stocks of bottlenose dolphins, as well as because of unobserved fisheries. The primary known source of fishery mortality for the southern migratory stock is the mid-Atlantic gillnet fishery (Waring *et al*., 2014). Between 2004 and 2008, 588 bottlenose dolphins stranded along the Atlantic coast between Florida and Maryland that could potentially be assigned to the southern migratory stock, although the assignment of animals to a particular stock is impossible in some seasons and regions due to spatial overlap amongst stocks (Waring *et al*., 2014). Many of these animals exhibited some evidence of human interaction, such as line/net marks, gunshot wounds, or vessel strike. In addition, nearshore and estuarine habitats occupied by the coastal morphotype are adjacent to areas of high human population and some are highly industrialized. It should also be noted that stranding data underestimate the extent of fishery-related mortality and serious injury because not all of the marine mammals that die or are seriously injured in fishery interactions are discovered, reported or investigated, nor will all of those that are found necessarily show signs of entanglement or other fishery interaction. The level of technical expertise among stranding network personnel varies widely as does the ability to recognize signs of fishery interactions. Finally, multiple resident populations of bottlenose dolphins have been shown to have high concentrations of organic pollutants (*e.g*., Kuehl *et al*., 1991) and, despite little study of contaminant loads in migrating coastal dolphins, exposure to environmental pollutants and subsequent effects on population health is an area of concern and active research.

Western North Atlantic Coastal, Northern Florida – Please see above for description of the differences between coastal and offshore ecotypes and the delineation of coastal dolphins into management stocks. The northern Florida coastal stock is one of five stocks of coastal dolphins and one of three known resident stocks (other resident stocks include South Carolina/Georgia and central Florida dolphins). The spatial extent of these stocks, their potential seasonal movements, and their relationships with estuarine stocks are poorly understood. During summer months, when the migratory stocks are known to be in North Carolina waters and further north, bottlenose dolphins are still seen in coastal waters of South Carolina, Georgia and Florida, indicating the presence of additional stocks of coastal animals. Speakman *et al*. (2006) documented dolphins in coastal waters off Charleston, South Carolina, that are not known resident members of the estuarine stock, and genetic analyses indicate significant differences between coastal dolphins from northern Florida, Georgia and central South Carolina (NMFS, 2001; Rosel *et al*., 2009). The northern Florida stock is thought to be present from approximately the Georgia-Florida border south to 29.4°N (Waring *et al*., 2014).

The northern Florida coastal stock ventures into the St. Johns River in large numbers, but rarely moves past Naval Station Mayport. The mouth of the St. Johns River may serve as a foraging area for this stock and the Jacksonville estuarine stock (Gibson, pers. comm).

The northern Florida coastal stock is susceptible to interactions with similar fisheries as those described above for the southern migratory stock, including gillnet, trawl, and trap/pot fisheries. From 2004-08, 78 stranded dolphins were recovered in northern Florida waters, although it was not possible to determine whether there was evidence of human interaction for the majority of these (Waring *et al*., 2014). The same concerns discussed above regarding underestimation of mortality hold for this stock and, as for southern migratory dolphins, pollutant loading is a concern.

Jacksonville Estuarine System – Please see above for description of the differences between coastal and offshore ecotypes and the delineation of coastal dolphins into management stocks primarily inhabiting nearshore waters. The coastal morphotype of bottlenose dolphin is also resident to certain inshore estuarine waters (Caldwell, 2001; Gubbins, 2002; Zolman, 2002;

Gubbins *et al*., 2003). Multiple lines of evidence support demographic separation between coastal dolphins found in nearshore waters and those in estuarine waters, as well as between dolphins residing within estuaries along the Atlantic and Gulf coasts (*e.g*., Wells *et al*., 1987; Scott *et al*., 1990; Wells *et al*., 1996; Cortese, 2000; Zolman, 2002; Speakman, *et al*. 2006; Stolen *et al*., 2007; Balmer *et al*., 2008; Mazzoil *et al*., 2008). In particular, a study conducted near Jacksonville demonstrated significant genetic differences between coastal and estuarine dolphins (Caldwell, 2001; Rosel *et al*., 2009). Despite evidence for genetic differentiation between estuarine and nearshore populations, the degree of spatial overlap between these populations remains unclear. Photo-identification studies within estuaries demonstrate seasonal immigration and emigration and the presence of transient animals (*e.g*., Speakman *et al*., 2006). In addition, the degree of movement of resident estuarine animals into coastal waters on seasonal or shorter time scales is poorly understood (Waring *et al*., 2014).

The Jacksonville estuarine system (JES) stock has been defined as separate primarily by the results of photo-identification and genetic studies. The stock range is considered to be bounded in the north by the Georgia-Florida border at Cumberland Sound, extending south to approximately Jacksonville Beach, Florida. This encompasses an area defined during a photo-identification study of bottlenose dolphin residency patterns in the area (Caldwell, 2001), and the borders are subject to change upon further study of dolphin residency patterns in estuarine waters of southern Georgia and northern/central Florida. The habitat is comprised of several large brackish rivers, including the St. Johns River, as well as tidal marshes and shallow riverine systems. Three behaviorally different communities were identified during Caldwell's (2001) study: the estuarine waters north (Northern) and south (Southern) of the St. Johns River and the coastal area, all of which differed in density, habitat fidelity and social affiliation patterns. The coastal dolphins are believed to be members of a coastal stock, however (Waring *et al*., 2014). Although Northern and Southern members of the JES stock show strong site fidelity, members of both groups have been observed outside their preferred areas. Dolphins residing within estuaries south of Jacksonville Beach down to the northern boundary of the Indian River Lagoon Estuarine System (IRLES) stock are currently not included in any stock, as there are insufficient data to determine whether animals in this area exhibit affiliation to the JES stock, the IRLES stock, or are simply transient animals associated with coastal stocks. Further research is needed to establish affinities of dolphins in the area between the ranges, as currently understood, of the JES and IRLES stocks.

The JES stock is susceptible to similar fisheries interactions as those described above for coastal stocks, although only trap/pot fisheries are likely to occur in estuarine waters frequented by the stock. Only one dolphin carcass bearing evidence of fisheries interaction was recovered during 2003-07 in the JES area, and an additional sixteen stranded dolphins were recovered during this time, but no determinations regarding human interactions could be made for the majority (Waring *et al*., 2014). Nineteen bottlenose dolphins died in the St. Johns River (SJR), Florida between May 24 and November 7, 2010, all of which came from the JES stock. The cause of these deaths was undetermined. The same concerns discussed above regarding underestimation of mortality hold for this stock and, as for stocks discussed above, pollutant loading is a concern. Although no contaminant analyses have yet been conducted in this area, the JES stock inhabits areas with significant drainage from industrial and urban sources, and as such is exposed to contaminants in runoff from these. In other estuarine areas where such analyses have been conducted, exposure to anthropogenic contaminants has been found to likely have an effect (Hansen *et al*. 2004; Schwacke *et al*., 2004; Reif *et al*., 2008).

The original, single stock of coastal dolphins recognized from 1995-2001 was listed as depleted under the MMPA as a result of a 1987-88 mortality event. That designation was retained when the single stock was split into multiple coastal stocks. However, Scott *et al*. (1988) suggested that dolphins residing in the bays, sounds and estuaries adjacent to these coastal waters were not affected by the mortality event and these animals were explicitly excluded from the depleted listing (Waring *et al*., 2014). Gubbins *et al*. (2003), using data from Caldwell (2001), estimated the stock size to be 412 (CV = 0.06). However, NMFS considers abundance unknown because this estimate likely includes an unknown number of non-resident and seasonally-resident dolphins. It nevertheless represents the best available information regarding stock size. Because the stock size is likely small, and relatively few mortalities and serious injuries would exceed PBR, the stock is considered to be a strategic stock (Waring *et al*., 2014).

An unusual mortality event (UME) occurred between 2013 and 2015 spanning the Atlantic coast, which impacted all stocks of bottlenose dolphins in the area. Over 1800 dolphins stranded in this time period. The preliminary conclusion of the cause of this UME was morbillivirus. The bottlenose dolphin stocks in this area (SJR and coastal areas) may be considered vulnerable to impacts from future activities due to this recent event.

Potential Effects of the Specified Activity on Marine Mammals and their Habitat

This section includes a summary and discussion of the ways that components of the specified activity (e.g., sound produced by pile driving) may impact marine mammals and their habitat. 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 an 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 and the Proposed Mitigation 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. In the following discussion, we provide general background information on sound and marine mammal hearing before considering potential effects to marine mammals from sound produced by vibratory and impact pile driving.

Description of Sound 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. 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.

The underwater acoustic environment in the Mayport turning basin is likely to be dominated by noise from day-to-day port and vessel activities. The basin is sheltered from most wave noise, but is a high-use area for naval ships, tugboats, and security vessels. When underway, these sources can create noise between 20 Hz and 16 kHz (Lesage *et al*., 1999), with broadband noise levels up to 180 dB. While there are no current measurements of ambient noise levels in the turning basin, it is likely that levels within the basin periodically exceed the 120 dB threshold and, therefore, that the high levels of anthropogenic activity in the basin create an environment far different from quieter habitats where behavioral reactions to sounds around the 120 dB threshold have been observed (*e.g.*, Malme *et al*., 1984, 1988).

In-water construction activities associated with the project would include impact pile driving and vibratory pile driving. The sounds produced by these activities fall into one of two general sound types: pulsed and non-pulsed (defined in the following). 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.

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 (such as those used by the U.S. Navy). The duration of such sounds, as received at a distance, can be greatly extended in a highly reverberant environment.

Impact hammers operate by repeatedly dropping a heavy piston onto a pile to drive the pile into the substrate. Sound generated by impact hammers is characterized by rapid rise times and high peak levels, a potentially injurious combination (Hastings and Popper, 2005). 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 functional 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. The lower and/or upper frequencies for some of these functional hearing groups have been modified from those designated by Southall *et al*. (2007). The functional groups and the associated frequencies are indicated below (note that these frequency ranges do not necessarily correspond to the range of best hearing, which varies by species):

- Low-frequency cetaceans (mysticetes): functional hearing is estimated to occur between approximately 7 Hz and 25 kHz (extended from 22 kHz; Watkins, 1986; Au *et al*., 2006; Lucifredi and Stein, 2007; Ketten and Mountain, 2009; Tubelli *et al*., 2012);
- Mid-frequency cetaceans (larger toothed whales, beaked whales, and most delphinids): functional hearing is estimated to occur between approximately 150 Hz and 160 kHz;
- High-frequency cetaceans (porpoises, river dolphins, and members of the genera *Kogia* and *Cephalorhynchus*; now considered to include two members of the genus *Lagenorhynchus* on the basis of recent echolocation data and genetic data [May-Collado and Agnarsson, 2006; Kyhn *et al*. 2009, 2010; Tougaard *et al*. 2010]): functional hearing is estimated to occur between approximately 200 Hz and 180 kHz; and
- Pinnipeds in water: functional hearing is estimated to occur between approximately 75 Hz to 100 kHz for Phocidae (true seals) and between 100 Hz and 40 kHz for Otariidae (eared seals), with the greatest sensitivity between approximately 700 Hz and 20 kHz. The pinniped functional hearing group was modified from Southall *et al*. (2007) on the basis of data indicating that phocid species have consistently demonstrated an extended frequency range of hearing compared to otariids, especially in the higher frequency range (Hemilä *et al*., 2006; Kastelein *et al*., 2009; Reichmuth *et al*., 2013).

One cetacean species is expected to potentially be affected by the specified activity. Bottlenose dolphins are classified as mid-frequency cetaceans.

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. Potential effects from impulsive sound sources can range in severity from effects such as behavioral disturbance or tactile perception to physical discomfort, slight injury of the internal organs and the auditory system, or mortality (Yelverton *et al*., 1973).

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); thus, TTS may result in reduced fitness in survival and reproduction. However, this 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 (direct auditory tissue effects), but TTS does not (Southall *et al*., 2007). 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).

Given the available data, the received level of a single pulse (with no frequency weighting) might need to be approximately 186 dB re 1 μPa^2-s (*i.e.*, 186 dB sound exposure level [SEL] or approximately 221-226 dB p-p [peak]) in order to produce brief, mild TTS. Exposure to several strong pulses that each have received levels near 190 dB rms (175-180 dB SEL) might result in cumulative exposure of approximately 186 dB SEL and thus slight TTS in a small odontocete, assuming the TTS threshold is (to a first approximation) a function of the total received pulse energy.

The above TTS information for odontocetes is derived from studies on the bottlenose dolphin and beluga whale (*Delphinapterus leucas*). There is no published TTS information for other species of cetaceans. However, preliminary evidence from a harbor porpoise exposed to pulsed sound suggests that its TTS threshold may have been lower (Lucke *et al.*, 2009). As summarized above, data that are now available imply that TTS is unlikely to occur unless odontocetes are exposed to pile driving pulses stronger than 180 dB re 1 μPa rms.

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. Thus, for cetaceans, Southall *et al*. (2007) estimate that the PTS threshold might be an M-weighted SEL (for the sequence of received pulses) of approximately 198 dB re 1 μPa^2-s (15 dB higher than the TTS threshold for an impulse). Given the higher level of sound necessary to cause PTS as compared with TTS, it is considerably less likely that PTS could occur.

Measured source levels from impact pile driving can be as high as 214 dB rms. Although no marine mammals have been shown to experience TTS or PTS as a result of being exposed to pile driving activities, captive bottlenose dolphins and beluga whales exhibited changes in behavior when exposed to strong pulsed sounds (Finneran *et al*., 2000, 2002, 2005). The animals tolerated high received levels of sound before exhibiting aversive behaviors. Experiments on a beluga whale showed that exposure to a single watergun impulse at a received level of 207 kPa (30 psi) p-p, which is equivalent to 228 dB p-p, resulted in a 7 and 6 dB TTS in the beluga whale at 0.4 and 30 kHz, respectively. Thresholds returned to within 2 dB of the pre-exposure level within four minutes of the exposure (Finneran *et al*., 2002). Although the source level of pile driving from one hammer strike is expected to be much lower than the single watergun impulse cited here, animals being exposed for a prolonged period to repeated hammer strikes could receive more sound exposure in terms of SEL than from the single watergun impulse (estimated at 188 dB re 1 μPa^2-s) in the aforementioned experiment (Finneran *et al*., 2002). However, in order for marine mammals to experience TTS or PTS, the animals have to be close enough to be exposed to high intensity sound levels for a prolonged period of time. Based on the best scientific information available, these SPLs are far below the thresholds that could cause TTS or the onset 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). Observed responses of wild marine mammals to loud pulsed sound sources (typically seismic guns or acoustic harassment devices, but also including pile driving) have been varied but often consist of avoidance behavior or other behavioral changes suggesting discomfort (Morton and Symonds, 2002; Thorson and Reyff, 2006; see also Gordon *et al*., 2003; Wartzok *et al*., 2003; Nowacek *et al*., 2007). Responses to continuous sound, such as vibratory pile installation, have not been documented as well as responses to pulsed sounds.

With both types of pile driving, it is likely that the onset of pile driving 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 (such as tail/fluke slapping or jaw clapping); 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 (such as those thought to cause beaked whale stranding due to exposure to military mid-frequency tactical sonar);
- 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 pile driving is mostly concentrated at low frequency ranges, it may have less effect on high frequency echolocation sounds made by porpoises. 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 in the proposed action are those produced by 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. Impact pile driving activity is relatively short-term, with rapid pulses occurring for approximately fifteen minutes per pile. The probability for impact pile driving resulting from this proposed action masking acoustic signals important to the behavior and survival of marine mammal species is likely to be negligible. Vibratory pile driving is also relatively short-term, with rapid oscillations occurring for approximately one and a half hours per pile. It is possible that vibratory pile driving resulting from this proposed action may mask acoustic signals important to the behavior and survival of marine mammal species, but the short-term duration and limited affected area would result in insignificant impacts from masking. Any masking event that could possibly rise to Level B harassment under the MMPA would occur concurrently within the zones of behavioral harassment already estimated for vibratory and impact pile driving, and which have already been taken into account in the exposure analysis.

Anticipated Effects on Habitat

The proposed activities at NSM would not result in permanent impacts to habitats used directly by marine mammals, but may have potential short-term impacts to food sources such as forage fish and may affect acoustic habitat (see masking discussion above). There are no known foraging hotspots or other ocean bottom structure of significant biological importance to marine mammals present in the marine waters of the project area; however the surrounding areas may be foraging habitat for the dolphins. 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) within NSM and minor impacts to the immediate substrate during installation and removal of piles during the wharf construction project.

Pile Driving Effects on Potential Prey (Fish)

Construction activities may 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) 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 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 have been known to cause injury to fish and fish mortality. The most likely impact to fish from pile driving activities at the project area would be temporary behavioral avoidance of the area. 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. In general, impacts to marine mammal prey species are expected to be minor and temporary due to the short timeframe for the project.

Pile Driving Effects on Potential Foraging Habitat

The area likely impacted by the project is relatively small compared to the available habitat in nearshore and estuarine waters in the region. 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 nearby vicinity.

In summary, given the short daily duration of sound associated with individual pile driving events and the relatively small areas being affected, pile driving 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 driving is not likely to have a permanent, adverse effect on marine mammal foraging habitat at the project area. The Mayport turning basin itself is a man-made basin with significant levels of industrial activity and regular dredging, and is unlikely to harbor significant amounts of forage fish. Thus, any impacts to marine mammal habitat are not expected to cause significant or long-term consequences for individual marine mammals or their populations.

Proposed Mitigation

In order to issue an IHA under section 101(a)(5)(D) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to 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.

Measurements from similar pile driving events were coupled with practical spreading loss to estimate zones of influence (ZOI; see Estimated Take by Incidental Harassment); these values were used to develop mitigation measures for pile driving activities at NSM. 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 Navy would conduct briefings between construction supervisors and crews, marine mammal monitoring team, and Navy staff prior to the start of all pile driving activity, and 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 Navy's mitigation through shutdown and disturbance zones:

Shutdown Zone – For all pile driving activities, the Navy will establish a shutdown zone intended to contain the area in which SPLs equal or exceed the 190 dB rms acoustic injury criteria. 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), thus preventing injury 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). Modeled radial distances for shutdown zones are shown in Table 3. However, a minimum shutdown zone of 15 m (which is larger than the maximum predicted injury zone) will be established during all pile driving activities, regardless of the estimated zone. Vibratory pile driving activities are not predicted to produce sound exceeding the 190-dB Level A harassment threshold, but these precautionary measures are intended to prevent the already unlikely possibility of physical interaction with construction equipment and to further reduce any possibility of acoustic injury. For impact driving of steel piles, if necessary, the radial distance of the shutdown would be established at 40 m.

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). Nominal radial distances for disturbance zones are shown in Table 3. Given the size of the disturbance zone for 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 stationed within the turning basin) would be observed.

In order to document observed incidents of harassment, monitors record all marine mammal observations, regardless of location. The observer's location, as well as the location of the pile being driven, 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.

Monitoring Protocols – Monitoring would be conducted before, during, and after pile driving activities. In addition, observers shall record all incidents of marine mammal occurrence, regardless of distance from activity, and shall document any behavioral reactions in concert with distance from piles being driven. Observations made outside the shutdown zone will not result in shutdown; that pile segment would be completed without cessation, unless the animal approaches or enters the shutdown zone, at which point all pile driving activities would be halted. Monitoring will take place from fifteen minutes prior to initiation through thirty minutes post-completion of pile driving activities. Pile driving activities include the time to install or remove a single pile or series of piles, as long as the time elapsed between uses of the pile driving equipment is no more than thirty minutes. Please see the Monitoring Plan (*www.nmfs.noaa.gov/pr/permits/incidental/construction.htm*), developed by the Navy in agreement with NMFS, for full details of the monitoring protocols.

The following additional measures apply to visual monitoring:

(1) Monitoring will be conducted by qualified observers, who will be placed at the best vantage point(s) practicable to monitor for marine mammals and implement shutdown/delay procedures when applicable by calling for the shutdown to the hammer operator. Qualified observers are typically trained biologists, with the following minimum qualifications:

- Visual acuity in both eyes (correction is permissible) sufficient for discernment of moving targets at the water's surface with ability to estimate target size and distance; use of binoculars may be necessary to correctly identify the target;

- 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 in-water construction activities were conducted; dates and times when in-water construction activities were suspended to avoid potential incidental injury from construction sound of marine mammals observed within a defined shutdown zone; 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.

(2) Prior to the start of pile driving activity, the shutdown zone will be monitored for fifteen minutes to ensure that it is clear of marine mammals. Pile driving will only commence once observers have declared the shutdown zone clear of marine mammals; animals will be allowed to remain in the shutdown zone (*i.e.*, must leave of their own volition) and their behavior will be monitored and documented. The shutdown zone may only be declared clear, and pile driving started, when the entire shutdown zone is visible (*i.e.*, when not obscured by dark, rain, fog, *etc*.). In addition, if such conditions should arise during impact pile driving that is already underway, the activity would be halted.

(3) If a marine mammal approaches or enters the shutdown zone during the course of pile driving operations, activity will be halted and delayed until either the animal has voluntarily left and been visually confirmed beyond the shutdown zone or fifteen minutes have passed

without re-detection of the animal. Monitoring will be conducted throughout the time required to drive a pile.

Soft Start

The use of a soft start procedure is believed to provide additional protection to marine mammals by warning or providing a chance to leave the area prior to the hammer operating at full capacity, and typically involves a requirement to initiate sound from the hammer at reduced energy followed by a waiting period. This procedure is repeated two additional times. It is difficult to specify the reduction in energy for any given hammer because of variation across drivers and, for impact hammers, the actual number of strikes at reduced energy will vary because operating the hammer at less than full power results in "bouncing" of the hammer as it strikes the pile, resulting in multiple "strikes." For impact driving, we require an initial set of three strikes from the impact hammer at reduced energy, followed by a thirty-second waiting period, then two subsequent three strike sets. Soft start will be required at the beginning of each day's impact pile driving work and at any time following a cessation of impact pile driving of thirty minutes or longer.

We have carefully evaluated the Navy's proposed mitigation measures and considered their effectiveness in past implementation to preliminarily determine whether they are likely to effect 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: (1) the manner in which, and the degree to which, the successful implementation of the measure is expected to minimize adverse impacts to marine mammals, (2) the proven or likely efficacy of the specific measure to minimize adverse impacts as planned; and (3) the practicability of the measure for applicant implementation.

Any mitigation measure(s) we prescribe 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 number (total number or number at biologically important time or location) of individual marine mammals exposed to stimuli expected to result in incidental take (this goal may contribute to 1, above, or to reducing takes by behavioral harassment only).

(3) A reduction in the number (total number or number at biologically important time or location) of times any individual marine mammal would be exposed to stimuli expected to result in incidental take (this goal may contribute to 1, above, or to reducing takes by behavioral harassment only).

(4) A reduction in the intensity of exposure to stimuli expected to result in incidental take (this goal may contribute to 1, above, or to reducing the severity of behavioral harassment only).

(5) Avoidance or minimization of adverse effects to marine mammal habitat, paying particular attention to the prey base, blockage or limitation of passage to or from biologically important areas, permanent destruction of habitat, or temporary 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 Navy's proposed measures, as well as any other potential measures that may be relevant to the specified activity, we have preliminarily determined that the proposed mitigation measures provide the means of effecting the least practicable impact on marine mammal 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 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.

The Navy's proposed monitoring and reporting is also described in their Marine Mammal Monitoring Plan, on the Internet at *www.nmfs.noaa.gov/pr/permits/incidental/construction.htm*.

Visual Marine Mammal Observations

The Navy will collect sighting data and behavioral responses to construction for marine mammal species observed in the region of activity during the period of activity. All observers (MMOs) will be trained in marine mammal identification and behaviors and are required to have no other construction-related tasks while conducting monitoring. The Navy will monitor the shutdown zone and disturbance zone before, during, and after pile driving, with observers located at the best practicable vantage points. Based on our requirements, the Navy would implement the following procedures for pile driving:

- MMOs would be located at the best vantage point(s) in order to properly see the entire shutdown zone and as much of the disturbance zone as possible.

- During all observation periods, observers will use binoculars and the naked eye to search continuously for marine mammals.
- If the shutdown zones are obscured by fog or poor lighting conditions, pile driving at that location will not be initiated until that zone is visible. Should such conditions arise while impact driving is underway, the activity would be halted.
- The shutdown and disturbance zones around the pile will be monitored for the presence of marine mammals before, during, and after any pile driving or removal activity.

Individuals implementing the monitoring protocol will assess its effectiveness using an adaptive approach. The monitoring biologists will use their best professional judgment throughout implementation and seek improvements to these methods when deemed appropriate. Any modifications to protocol will be coordinated between NMFS and the Navy.

Data Collection

We require that observers use approved data forms. Among other pieces of information, the Navy 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 Navy will attempt to distinguish between the number of individual animals taken and the number of incidences 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 if possible, the correlation to SPLs;
- Distance from pile driving activities to marine mammals and distance from the marine mammals to the observation point;
- Description of implementation of mitigation measures (*e.g.*, shutdown or delay);
- Locations of all marine mammal observations; and
- Other human activity in the area.

Reporting

A draft report would be submitted to NMFS within 90 days of the completion of marine mammal monitoring, or sixty days prior to the requested date of issuance of any future IHA for projects at the same location, whichever comes first. The report will include marine mammal observations pre-activity, during-activity, and post-activity during pile driving days, and will also provide descriptions of any behavioral responses to construction activities by marine mammals and a complete description of all mitigation shutdowns and the results of those actions and an extrapolated total take estimate based on the number of marine mammals observed during the course of construction. A final report must be submitted within thirty days following resolution of comments on the draft report.

Estimated Take by 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 vibratory and impact pile driving and 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. However, it is unlikely that injurious or lethal takes would occur even in the absence of the planned mitigation and monitoring measures.

If a marine mammal responds to a stimulus by changing its behavior (*e.g.*, through relatively minor changes in locomotion direction/speed or vocalization behavior), the response may or may not constitute taking at the individual level, 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.

The turning basin is not considered important habitat for marine mammals, as it is a man-made, semi-enclosed basin with frequent industrial activity and regular maintenance dredging. The surrounding waters may be an important foraging habitat for the dolphins; however the small area of ensonification does not extend outside of the turning basin and into this foraging habitat (see Figure 6-1 in the Navy's application). Therefore, behavioral disturbances that could result from anthropogenic sound associated with these activities are expected to affect only a relatively small number of individual marine mammals that may venture near the turning basin, although those effects could be recurring over the life of the project if the same individuals remain in the project vicinity. The Navy has requested authorization for the incidental taking of small numbers of bottlenose dolphins in the Mayport turning basin that may result from pile driving during construction activities associated with the project 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. 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.

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 2) 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 is working to revise these acoustic guidelines; for more information on that process, please visit *www.nmfs.noaa.gov/pr/acoustics/guidelines.htm*.

Table 2. Current Acoustic Exposure Criteria.

Criterion	Definition	Threshold
Level A harassment (underwater)	Injury (PTS – any level above that which is known to cause TTS)	180 dB (cetaceans) / 190 dB (pinnipeds) (rms)
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

Underwater Sound Propagation Formula – 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, such as at the NSM turning basin, 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. Practical spreading loss (4.5 dB reduction in sound level for each doubling of distance) is assumed here.

Underwater Sound – 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. A number of studies, primarily on the west coast, have measured sound produced during underwater pile driving projects. However, these data are largely for impact driving of steel pipe piles and concrete piles as well as vibratory driving of steel pipe piles. Vibratory driving of steel sheet piles was monitored during the first year of construction at the nearby Wharf C-2 at Naval Station Mayport during 2015. Measurements were conducted from a small boat in the turning basin and from the construction barge itself. Details are available in DoN (2015). Source levels averaged 151 dB re 1µPa rms (DoN, 2015). No impact driving was measured at this location; therefore, proxy levels for impact driving have been calculated from other available source levels.

In order to determine reasonable SPLs and their associated effects on marine mammals that are likely to result from impact pile driving at NSM, we considered existing measurements from similar physical environments (sandy sediments and water depths greater than 15 ft) for impact and vibratory driving of 24-in steel pipe piles and for steel sheet piles. These studies, largely conducted by the Washington State Department of Transportation and the California Department of Transportation, show typical values around 160 dB for vibratory driving of 24-in pipe piles and sheet piles, and around 185-195 dB for impact driving of similar pipe piles (all measured at 10 m; *e.g.*, Laughlin, 2005a, 2005b; Illingworth and Rodkin, 2010, 2012, 2013; CalTrans, 2012). For impact driving of sheet piles a proxy source value of 189 dB (CalTrans, 2012) was selected for use in acoustic modeling based on similarity to the physical environment at NSM and because of the measurement location in mid-water column. All calculated distances to and the total area encompassed by the marine mammal sound thresholds are provided in Table 3.

Table 3. Distances to Relevant Underwater Sound Thresholds and Areas of Ensonification.

Pile type	Method	Threshold	Distance (m)[1]	Area (sq km^2)

Steel sheet piles	Vibratory	Level A harassment (180 dB)	0	0
		Level B harassment (120 dB)	1,166	0.614439
	Impact	Level A harassment (180 dB)	40	0.002
		Level B harassment (160 dB)	858	0.51

[1] Areas presented take into account attenuation and/or shadowing by land. Calculated distances to relevant thresholds cannot be reached in most directions form source piles. Please see Figures 6-1 and 6-2 in the Navy's application.

The Mayport turning basin does not represent open water, or free field, conditions. Therefore, sounds would attenuate as per the confines of the basin, and may only reach the full estimated distances to the harassment thresholds via the narrow, east-facing entrance channel. Distances shown in Table 3 are estimated for free-field conditions, but areas are calculated per the actual conditions of the action area. See Figures 6-1 and 6-2 of the Navy's application for a depiction of areas in which each underwater sound threshold is predicted to occur at the project area due to pile driving.

Marine Mammal Densities

For all species, the best scientific information available was considered for use in the marine mammal take assessment calculations. Density for bottlenose dolphins is derived from site-specific surveys conducted by the Navy (see Appendix C of the Navy's application for more information); it is not currently possible to identify observed individuals to stock. This survey effort consists of 24 half-day observation periods covering mornings and afternoons during four seasons (December 10-13, 2012, March 4-7, 2013, June 3-6, 2013, and September 9-12, 2013). During each observation period, two observers (a primary observer at an elevated observation point and a secondary observer at ground level) monitored for the presence of marine mammals in the turning basin (0.712 km^2) and an additional grid east of the basin entrance. Observers tracked marine mammal movements and behavior within the observation area, with observations recorded for five-minute intervals every half-hour. Morning sessions typically ran from 7:00-11:30 and afternoon sessions from 1:00 to 5:30.

Most observations of bottlenose dolphins were of individuals or pairs, although larger groups were occasionally observed (median number of dolphins observed ranged from 1-3.5 across seasons). Densities were calculated using observational data from the primary observer supplemented with data from the secondary observer for grids not visible by the primary observer. Season-specific density was then adjusted by applying a correction factor for observer error (*i.e.*, perception bias). The seasonal densities range from 1.98603 (winter) to 4.15366 (summer) dolphins/km^2. We conservatively use the largest density value to assess take, as the Navy does not have specific information about when in-water work may occur during the proposed period of validity.

Description of Take Calculation

The following assumptions are made when estimating potential incidents of take:

- All marine mammal individuals potentially available are assumed to be present within the relevant area, and thus incidentally taken;
- An individual can only be taken once during a 24-h period; and,
- There will be110 total days of vibratory driving (seventy three days in phase I and thirty seven days in phase II) and twenty days of impact pile driving.
- Exposures to sound levels at or above the relevant thresholds equate to take, as defined by the MMPA.

The estimation of marine mammal takes typically uses the following calculation:

Exposure estimate = (n * ZOI) * days of total activity

where:

n = density estimate used for each species/season

ZOI = sound threshold ZOI area; the area encompassed by all locations where the SPLs equal or exceed the threshold being evaluated

n * ZOI produces an estimate of the abundance of animals that could be present in the area for exposure, and is rounded to the nearest whole number before multiplying by days of total activity.

The ZOI impact area is estimated using the relevant distances in Table 3, taking into consideration the possible affected area with attenuation due to the constraints of the basin. Because the basin restricts sound from propagating outward, with the exception of the east-facing entrance channel, the radial distances to thresholds are not generally reached.

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.

The quantitative exercise described above indicates that no incidents of Level A harassment would be expected, independent of the implementation of required mitigation measures. See Table 4 for total estimated incidents of take.

Table 4. Calculations for Incidental Take Estimation.

Species	n (animals/km^2)	Activity	n * ZOI[1]	Proposed authorized takes[2]
Phase I (73 days)				
Bottlenose dolphin[3]	4.15366	Vibratory driving	3	219
Phase II (37 days)				
Bottlenose dolphin[3]	4.15366	Vibratory driving	3	111
Contingency impact driving (20 days)				
Bottlenose dolphin[3]	4.15366	Impact driving	1	40
			Total exposures	370

[1]See Table 3 for relevant ZOIs. The product of this calculation is rounded to the nearest whole number.

[2]The product of n * ZOI is multiplied by the total number of activity-specific days to estimate the number of takes.

[3]It is impossible to estimate from available information which stock these takes may accrue to.

Analyses and Preliminary Determinations

Negligible Impact Analysis

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 the wharf construction project, as outlined previously, have the potential to disturb or displace marine mammals. Specifically, the specified activities may result in take, in the form of Level B harassment (behavioral disturbance) only, from underwater sounds generated from pile driving. Potential takes could occur if individuals of these species are present in the ensonified zone when pile driving is happening.

No injury, serious injury, or mortality is anticipated given the nature of the activities and measures designed to minimize the possibility of injury to marine mammals. The potential for these outcomes is minimized through the construction method and the implementation of the planned mitigation measures. Specifically, vibratory hammers will be the primary method of installation (impact driving is included only as a contingency and is not expected to be required), and this activity does not have the potential to cause injury to marine mammals due to the relatively low source levels produced (less than 180 dB) and the lack of potentially injurious source characteristics. Impact pile driving produces short, sharp pulses with higher peak levels and much sharper rise time to reach those peaks. If impact driving is necessary, implementation of soft start and shutdown zones significantly reduces any possibility of injury. Given sufficient “notice” through use of soft start (for impact driving), marine mammals are expected to move away from a sound source that is annoying prior to it becoming potentially injurious. Environmental conditions in the confined and protected Mayport turning basin mean that marine mammal detection ability by trained observers is high, enabling a high rate of success in implementation of shutdowns to avoid injury.

Effects on individuals that are taken by Level B harassment, on the basis of reports in the literature as well as monitoring from other similar activities, will likely be limited to reactions such as increased swimming speeds, increased surfacing time, or decreased foraging (if such activity were occurring) (*e.g.*, Thorson and Reyff, 2006; HDR, Inc., 2012). Most likely, individuals will simply move away from the sound source and be temporarily displaced from the areas of pile driving, although even this reaction has been observed primarily only in association with impact pile driving. The pile driving activities analyzed here are similar to, or less impactful than, numerous other construction activities conducted in San Francisco Bay and in the Puget Sound region, which have taken place with no reported injuries or mortality to marine mammals, and no known long-term adverse consequences from behavioral harassment. These activities are also nearly identical to the pile driving activities that took place at Wharf C-2 at NSM, which also reported zero injuries or mortality to marine mammals and no known long-term adverse consequences from behavioral harassment. Repeated exposures of individuals to levels of sound that may cause Level B harassment are unlikely to result in hearing impairment or to significantly disrupt foraging behavior. Thus, even repeated Level B harassment of some small subset of the overall stock is unlikely to result in any significant realized decrease in viability for the affected individuals, and thus would not result in any adverse impact to the stock as a whole.

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 turning basin 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) the absence of any significant habitat within the project area, including known areas or features of special significance for foraging or reproduction; (4) the presumed efficacy of the proposed 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, although coastal bottlenose dolphins are designated as 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 activity will have only short-term effects on individuals. The specified activity is 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 proposed monitoring and mitigation measures, we preliminarily find that the total marine mammal take from the Navy’s wharf construction activities will have a negligible impact on the affected marine mammal species or stocks.

Small Numbers Analysis

As described previously, of the 370 incidents of behavioral harassment predicted to occur for bottlenose dolphin, we have no information allowing us to parse those predicted incidents amongst the three stocks of bottlenose dolphin that may occur in the project area. Therefore, we assessed the total number of predicted incidents of take against the best abundance estimate for each stock, as though the total would occur for the stock in question. For one of the bottlenose dolphin stocks, the total predicted number of incidents of take authorized would be considered small – approximately four percent for the southern migratory stock– even if each estimated taking occurred to a new individual. This is an extremely unlikely scenario as, for bottlenose dolphins in estuarine and nearshore waters, there is likely to be some overlap in individuals present day-to-day.

The total number of authorized takes proposed for bottlenose dolphins, if assumed to accrue solely to new individuals of the JES or northern Florida coastal stocks, is higher relative to the total stock abundance, which is currently considered unknown for the JES stock and is 1,219 for the northern Florida coastal stock. However, these numbers represent the estimated incidents of take, not the number of individuals taken. That is, it is highly likely that a relatively small subset of these bottlenose dolphins would be harassed by project activities.

JES bottlenose dolphins range from Cumberland Sound at the Georgia-Florida border south to approximately Palm Coast, Florida, an area spanning over 120 linear km of coastline and including habitat consisting of complex inshore and estuarine waterways. JES dolphins, divided by Caldwell (2001) into Northern and Southern groups, show strong site fidelity and, although members of both groups have been observed outside their preferred areas, it is likely that the majority of JES dolphins would not occur within waters ensonified by project activities.

In the western North Atlantic, the Northern Florida Coastal Stock is present in coastal Atlantic waters from the Georgia/Florida border south to 29.4°N (Waring *et al.*, 2014), a span of more than 90 miles. There is no obvious boundary defining the offshore extent of this stock. They occur in waters less than 20 m deep; however, they may also occur in lower densities over the continental shelf (waters between 20 m and 100 m depth) and overlap spatially with the offshore morphotype (Waring *et al*., 2014).

In summary, JES dolphins are known to form two groups and exhibit strong site fidelity (*i.e.*, individuals do not generally range throughout the recognized overall JES stock range); and neither stock is expected to occur at all in a significant portion of the larger ZOI, which is almost entirely confined within NSM. Given that the specified activity will be stationary within an enclosed basin not recognized as an area of any special significance that would serve to attract or aggregate dolphins, we therefore believe that the estimated numbers of takes, were they to occur, likely represent repeated exposures of a much smaller number of bottlenose dolphins and that these estimated incidents of take represent small numbers of bottlenose dolphins.

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, we preliminarily find 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, we have 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 marine mammal species listed under the ESA are expected to be affected by these activities. Therefore, we have determined that section 7 consultation under the ESA is not required.

National Environmental Policy Act (NEPA)

The Navy has prepared a Draft Environmental Assessment (EA; Environmental Assessment for the Wharf Bravo Recapitalization at Naval Station Mayport, Jacksonville, FL) in accordance with NEPA and the regulations published by the Council on Environmental Quality. We have posted it on the NMFS website (see **SUPPLEMENTARY INFORMATION**) concurrently with the publication of this proposed IHA. NMFS will independently evaluate the EA and determine whether or not to adopt it. We may prepare a separate NEPA analysis and incorporate relevant portions of the Navy's EA by reference. Information in the Navy's application, EA, and this notice collectively provide the environmental information related to proposed issuance of the IHA for public review and comment. We will review all comments submitted in response to this notice as we complete the NEPA process, including a decision of whether to sign a Finding of No Significant Impact (FONSI), prior to a final decision on the IHA request. The 2015 NEPA documents are available for review at *www.nmfs.noaa.gov/pr/permits/incidental/construction.htm*.

Proposed Authorization

As a result of these preliminary determinations, we propose to authorize the take of marine mammals incidental to the Navy's Bravo wharf recapitalization project, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated. Specific language from the proposed IHA is provided next.

This section contains a draft of the IHA. The wording contained in this section is proposed for inclusion in the IHA (if issued).

1. This Incidental Harassment Authorization (IHA) is valid for one year from the date of issuance.

2. This IHA is valid only for pile driving activities associated with the Bravo Wharf Recapitalization Project at Naval Station Mayport, Florida.

3. General Conditions

(a) A copy of this IHA must be in the possession of the Navy, its designees, and work crew personnel operating under the authority of this IHA.

(b) The species authorized for taking is the bottlenose dolphin (*Tursiops truncatus*).

(c) The taking, by Level B harassment only, is limited to the species listed in condition 3(b). See Table 1 for numbers of take authorized.

Table 1. Authorized Take Numbers.

Species	**Authorized Take**		
	Phase I	**Phase II**	**Contingency Impact driving**
Bottlenose dolphin	219	111	40

(d) The taking by injury (Level A harassment), serious injury, or death of the species listed in condition 3(b) of the Authorization or any taking of any other species of marine mammal is prohibited and may result in the modification, suspension, or revocation of this IHA.

(e) The Navy shall conduct briefings between construction supervisors and crews, marine mammal monitoring team, and Navy staff prior to the start of all pile driving activity, and when new personnel join the work, in order to explain responsibilities, communication procedures, marine mammal monitoring protocol, and operational procedures.

4. Mitigation Measures

The holder of this Authorization is required to implement the following mitigation measures:

(a) For all pile driving, the Navy shall implement a minimum shutdown zone of 15 m radius around the pile. If a marine mammal comes within or approaches the shutdown zone, such operations shall cease. For impact driving of steel piles, the minimum shutdown zone shall be of 40 m radius.

(b) The Navy shall establish monitoring locations as described below. Please also refer to the Marine Mammal Monitoring Plan (see *www.nmfs.noaa.gov/pr/permits/incidental/construction.htm).*

i. For all pile driving activities, a minimum of two observers shall be deployed, with one positioned to achieve optimal monitoring of the shutdown zone and the second positioned to achieve optimal monitoring of surrounding waters of the turning basin, the entrance to that basin, and portions of the Atlantic Ocean. If practicable, the second observer should be deployed to an elevated position, preferably opposite Bravo Wharf and with clear sight lines to the wharf and out the entrance channel.

ii. These observers shall record all observations of marine mammals, regardless of distance from the pile being driven, as well as behavior and potential behavioral reactions of the animals. Observations within the turning basin shall be distinguished from those in the entrance channel and nearshore waters of the Atlantic Ocean.

iii. All observers shall be equipped for communication of marine mammal observations amongst themselves and to other relevant personnel (*e.g.*, those necessary to effect activity delay or shutdown).

(c) Monitoring shall take place from fifteen minutes prior to initiation of pile driving activity through thirty minutes post-completion of pile driving activity. Pre-activity monitoring shall be conducted for fifteen minutes to ensure that the shutdown zone is clear of marine mammals, and pile driving may commence when observers have declared the shutdown zone clear of marine mammals. In the event of a delay or shutdown of activity resulting from marine mammals in the shutdown zone, animals shall be allowed to remain in the shutdown zone (*i.e.*, must leave of their own volition) and their behavior shall be monitored and documented. Monitoring shall occur throughout the time required to drive a pile. The shutdown zone must be determined to be clear during periods of good visibility (*i.e.*, the entire shutdown zone and surrounding waters must be visible to the naked eye).

(d) If a marine mammal approaches or enters the shutdown zone, all pile driving activities at that location shall be halted. If pile driving is halted or delayed due to the presence of a marine mammal, the activity may not commence or resume until either the animal has voluntarily left and been visually confirmed beyond the shutdown zone or fifteen minutes have passed without re-detection of the animal.

(e) Monitoring shall be conducted by qualified observers, as described in the Monitoring Plan. Trained observers shall be placed from the best vantage point(s) practicable to monitor for marine mammals and implement shutdown or delay procedures when applicable through communication with the equipment operator. Observer training must be provided prior to project start and in accordance with the monitoring plan, and shall include instruction on species identification (sufficient to distinguish the species listed in 3(b)), description and categorization of observed behaviors and interpretation of behaviors that may be construed as being reactions to the specified activity, proper completion of data forms, and other basic components of biological monitoring, including tracking of observed animals or groups of animals such that repeat sound exposures may be attributed to individuals (to the extent possible).

(f) The Navy shall use soft start techniques recommended by NMFS for impact pile driving. Soft start requires contractors to provide an initial set of strikes at reduced energy, followed by a thirty-second waiting period, then two subsequent reduced energy strike sets. Soft start shall be implemented at the start of each day's impact pile driving and at any time following cessation of impact pile driving for a period of thirty minutes or longer.

(g) Pile driving shall only be conducted during daylight hours.

5. Monitoring

The holder of this Authorization is required to conduct marine mammal monitoring during pile driving activity. Marine mammal monitoring and reporting shall be conducted in accordance with the Monitoring Plan.

(a) The Navy shall collect sighting data and behavioral responses to pile driving for marine mammal species observed in the region of activity during the period of activity. All observers shall be trained in marine mammal identification and behaviors, and shall have no other construction-related tasks while conducting monitoring.

(b) For all marine mammal monitoring, the information shall be recorded as described in the Monitoring Plan.

6. Reporting

The holder of this Authorization is required to:

(a) Submit a draft report on all monitoring conducted under the IHA within ninety days of the completion of marine mammal monitoring, or sixty days prior to the issuance of any subsequent IHA for projects at NSM, whichever comes first. A final report shall be prepared and submitted within thirty days following resolution of comments on the draft report from NMFS. This report must contain the informational elements described in the Monitoring Plan, at minimum (see *www.nmfs.noaa.gov/pr/permits/incidental/construction.htm*), and shall also include:

i. 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.

ii. Description of attempts to distinguish between the number of individual animals taken and the number of incidents of take, such as ability to track groups or individuals.

iii. An estimated total take estimate extrapolated from the number of marine mammals observed during the course of construction activities, if necessary.

(b) Reporting injured or dead marine mammals:

i. In the unanticipated event that the specified activity clearly causes the take of a marine mammal in a manner prohibited by this IHA, such as an injury (Level A harassment), serious injury, or mortality, Navy shall immediately cease the specified activities and report the incident to the Office of Protected Resources, NMFS, and the Southeast Regional Stranding Coordinator, NMFS. The report must include the following information:

A. Time and date of the incident;

B. Description of the incident;

C. Environmental conditions (*e.g.*, wind speed and direction, Beaufort sea state, cloud cover, and visibility);

D. Description of all marine mammal observations in the 24 hours preceding the incident;

E. Species identification or description of the animal(s) involved;

F. Fate of the animal(s); and

G. Photographs or video footage of the animal(s).

Activities shall not resume until NMFS is able to review the circumstances of the prohibited take. NMFS will work with Navy to determine what measures are necessary to minimize the likelihood of further prohibited take and ensure MMPA compliance. Navy may not resume their activities until notified by NMFS.

ii. In the event that Navy discovers an injured or dead marine mammal, and the lead observer determines that the cause of the injury or death is unknown and the death is relatively recent (*e.g.*, in less than a moderate state of decomposition), Navy shall immediately report the incident to the Office of Protected Resources, NMFS, and the Southeast Regional Stranding Coordinator, NMFS.

The report must include the same information identified in 6(b)(i) of this IHA. Activities may continue while NMFS reviews the circumstances of the incident. NMFS will work with Navy to determine whether additional mitigation measures or modifications to the activities are appropriate.

iii. In the event that Navy discovers an injured or dead marine mammal, and the lead observer 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, scavenger damage), Navy shall report the incident to the Office of Protected Resources, NMFS, and the Southeast Regional Stranding Coordinator, NMFS, within 24 hours of the discovery. Navy shall provide photographs or video footage or other documentation of the stranded animal sighting to NMFS.

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

Request for Public Comments

We request comment on our analyses, the draft authorization, and any other aspect of this Notice of Proposed IHAs for Navy's wharf construction activities. Please include with your comments any supporting data or literature citations to help inform our final decision on Navy's request for an MMPA authorization.

Dated: December 2, 2015.

Perry F. Gayaldo,

Deputy Director,

Office of Protected Resources,

National Marine Fisheries Service.

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