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Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to the Skagway Gateway Initiative Project; Notice

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648–XE440

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to the Skagway Gateway Initiative 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 Municipality of Skagway (MOS) for authorization to take marine mammals incidental to reconstructing the existing ore dock in Skagway Harbor, Alaska, referred to as the Skagway Gateway Initiative project. The MOS requests that the IHA be valid for 1 year, from July 1, 2016 through June 30, 2017. 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 MOS to incidentally take, marine mammals for its reconstruction of the Skagway ore terminal in Skagway, AK.

DATES: Comments and information must be received no later than June 2, 2016.

ADDRESSES: Comments on the application 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 *http://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 MOS'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: *http://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 (NEPA)

We are preparing an Environmental Assessment (EA) in accordance with NEPA and the regulations published by the Council on Environmental Quality and will consider comments submitted in response to this notice as part of that process. The EA will be posted at the foregoing Web site once it is finalized.

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 Incidental Harassment Authorization (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, 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 December 2, 2015, NMFS received an application from the Municipality of Skagway (MOS) for the taking of marine mammal incidental to reconstructing the Skagway ore terminal (SOT) in Skaway Harbor, Skagway, Alaska, referred to as the Skagway Gateway Initiative project. On January 22, 2016 and March 14, 2016, and March 17, 2016 NMFS received revised applications. NMFS determined that the application was adequate and complete on April 1, 2016. MOS proposes to conduct in-water work that may incidentally harass marine mammals (*i.e.,* pile driving and removal) at the ore terminal. Take, by Level B Harassment, of individuals of six species of marine mammals is anticipated to results from the specified activity. This IHA would be valid from July 1, 2016 through June 30, 2017.

Description of the Specified Activity

Overview

The MOS is seeking an IHA for work that includes demolition of existing in-water and over-water infrastructure including in-water removal of timber, steel, and concrete piling; mechanical dredging of and upland beneficial reuse or disposal of contaminated sediments in the Skagway Ore Terminal (SOT) basin of Skagway Harbor; and construction of new infrastructure including a bulkhead wall at the northern end of the Terminal basin, a wharf structure at the western edge of the SOT, an ore loader and supporting infrastructure, seven new or refurbished moorage dolphins and associated catwalks, and a concrete floating dock and associated gangways (or an additional three moorage dolphins and catwalks, depending on funding). Development of this new infrastructure involves a combination of in-water, over-water, and upland work.

The project's timing, duration, and specific types of activities (such as pile driving and dredging) may result in the incidental taking by acoustical harassment of marine mammals protected under the MMPA. The MOS is requesting an IHA for six marine mammal species: Harbor seal (*Phoca viutlina*), Steller sea lion (*Eumetopias jubatus*), harbor porpoise (*Phocoena phocoena*), Dall's porpoise (*Phocoenoides dalli*), killer whale (*Orcinus orca*), and humpback whale (*Megaptera novaeangliae*), that may occur in the vicinity of the project.

Dates and Duration

Pile installation and extraction associated with the SOT project will begin no sooner than July 01, 2016 and will be completed no later than June 30, 2016 (1 year following IHA issuance). Pile driving activities are proposed to occur from the end of July to the beginning of October 2016 and again in March 2017 for a total of about 155 hours over the course of approximately 73 days in 2016 and 2017. Pile removal will occur in July 2016 and December 2016 to January 2017 for a total of about 117 hours over the course of approximately 39 days in 2016 and 2017. Dredging will occur from January through the beginning of March 2017, for a total of about 400 hours over 40 days in the winter of 2017.

To minimize impacts to Hooligan (*Thaleichtys pacificus*), Pacific herring (*Clupea pallasii*), capelin (*Mallotus catervarius*), and other forage fish species that are part of the prey base for many marine mammals including seals, sea lions, and baleen whales, in-water construction timing has been planned to avoid major spawning and migration times (April 1 through May 31).

Specified Geographic Region

The proposed activities will occur at the SOT located in Skagway Harbor, Alaska, on the Taiya Inlet/Lynn Canal water body. The Project is located in Section 26 and 35, T 30 S, R 59 E, Copper River Meridian; United States Geological Survey Quad Map Skagway B–1; Latitude 59.45 degrees North (N), Longitude 135.31 degrees West (W) (see Figure 1 of the MOS's application). Skagway Harbor is located at the southwestern end of the 2.5-mile-long Skagway River valley. The Skagway River empties into Taiya Inlet at the head of Lynn Canal, the northernmost fjord on the Inside Passage of the south coast of Alaska. Pullen Creek empties into the inlet on the southeast side of the valley.

Detailed Description of Activities

The proposed action for this IHA request includes demolition of existing in- and overwater infrastructure including in-water removal of timber, steel, and concrete piling; mechanical dredging of and upland beneficial reuse or disposal of contaminated sediments in the SOT basin (Terminal basin) of Skagway Harbor; and construction of new infrastructure including a bulkhead wall at the northern end of the Terminal basin, a wharf structure at the western edge of the SOT, an ore loader and supporting infrastructure, seven new or refurbished moorage dolphins and associated catwalks, and a concrete floating dock and associated gangways (or an additional three moorage dolphins and catwalks, depending on funding).

The SOT was constructed in 1968, and pier access accommodates vessels in the 35,000 DWT class (AIDEA 2008). The Port of Skagway has provided key transportation import/export capacity for the Yukon for over a century. The construction activities are designed to upgrade and enhance current shipping needs and increase the capacity and efficiency of the existing terminal for shipment and export. It will spring open new international business from cruise ships, container traffic, mining resources, and energy production, revitalizing investment in Skagway, the Port and the Region.

Existing structures to be demolished include the eastern extent of the timber pier, the ore loader and concrete and steel foundation, fuel infrastructure (timber dock and piping), the concrete Alaska Marine Lines (AML) pier, and up to five concrete and steel moorage dolphins (see sheets 1 and 2 of the MOS's application). The existing infrastructure will be demolished using heavy, land- or water-based (*i.e.,* from a barge) equipment. The contractor will be required to implement best management practices (BMPs) to minimize environmental impacts from demolition. In total, demolition actions are expected to take 39 days to complete.

Demolition of the infrastructure will generally occur as follows: Above-water infrastructure, including concrete pads, timber decking, pile caps, utilities, and piping will be removed. Timber piles will then be extracted entirely using a vibratory hammer or broken off at the mudline if extraction is not practical. The timber piles will be removed as both a source control measure (*i.e.,* through removal of creosote-treated timber piles) and as a necessary step to perform environmental dredging in this area. Table 1 shows the total number of piles to be removed during demolition.

TABLE 1—NUMBER OF PILES TO BE REMOVED VIA DEMOLITION

	Number of Creosote-treated piles to be removed	Number of steel piles to be removed
Timber Pier	400	50
Ore Loader	0	50
AML Pier	0	15
Fuel Infrastructure	0	4
Moorage Dolphins2	0	0
Total	400	119

The vertical and horizontal boundaries of the proposed dredging were designed to remove impacted sediments (*i.e.,* sediments with metals and/or polycyclic aromatic hydrocarbon (PAH) concentrations exceeding the sediment cleanup objectives [SCOs]). The SCOs were chosen to be the cleanup objective level based on discussions in the April 13, 2015, meeting between Bruce Wanstall (ADEC), Dr. Chad Gubala (MOS), and Derek Koellmann (Anchor QEA). The current estimated dredge volume (including a 1-foot over-dredge to account for equipment tolerances) is 41,000 ft^2, and the associated approximate surface area is 21,245 ft^2, pending final design and geotechnical and structural considerations, for a total surface area of 62,245 ft^2 to be removed. The estimated contaminated material planned to be removed is 17,300 cubic yards. An additional 9,000 cubic yards of uncontaminated material may be dredged for the installation of the floating dock. Pending the outcome of a treatability study, dredged sediments will either be beneficially reused in upland areas or transported to a suitable upland landfill at the discretion of ADEC.

All dredging will be performed using up-to a seven-cubic-yard clamshell bucket. Use of an environmental bucket was considered, but was deemed infeasible given the nature and composition of the sediments to be dredged. As noted in the demolitions section, specific overwater structures are planned to be demolished prior to the start of dredging. In total, dredging actions are expected to take 40 days to complete.

Construction of new in- and overwater infrastructure is proposed, including the AML bulkhead wall, wharf structure, and ore loader. In addition, either a concrete floating dock or additional moorage dolphins connected by a catwalk will be constructed. Whether the concrete floating dock or moorage dolphins and catwalk are constructed depends on available funding. All piles will be installed using a vibratory and/or impact hammer. Piles to be installed are summarized in Table 2.

TABLE 2—PILES TO BE INSTALLED

Project component	Pile size and number					Square footage of sea floor impacts
	24 in	36 in	48 in	60 in	Total	
AML Bulkhead Wall	0	0	0	0	0	0
Wharf Structure at Ore Dock	16	20	4	0	40	241.9
Ore Loader and Foundation	0	58	0	0	58	410.0
Moorage Dolphins and Catwalk	0	70	0	0	70	494.8
Fuel Infrastructure	0	17	0	0	17	120.2
Concrete Floating Dock Structure	3	14	0	7	21	245.8
Total, Concrete Floating Dock	19	179	4	7	209	1,512.7

The proposed wharf bulkhead wall will be constructed of steel sheet pile walls in the form of a rectangle of approximately 220 by 75 feet (16,500 square feet). The top of the walls will be at approximately 30 feet above MLLW, and the future bottom of the walls at a depth of –4 feet MLLW. The structure will be filled with 2,000 to 4,000 cubic yards of suitable dredged material, of which 150 to 300 cubic yards will be placed below MHHW. The ground surface where fill will be placed is primarily above MHHW. Only fill placed in the southeastern corner of the structure will be within the intertidal zone. The steel sheet pile will be installed using a vibratory and/or impact hammer.

The proposed AML pier will be a steel and concrete structure abutting the new wharf structure. The pier will be 65 by 30 feet, supported by twenty 36-inch-diameter steel piles. Finished height will be 30 feet above MLLW. Piles will be installed with a vibratory and/or impact hammer.

The proposed AML ramp will be a steel ramp of 96 by 23 feet supported by four 48-inch-diameter steel guide piles and sixteen 24-inch-diameter steel piles. Finished height will be 30 feet above MLLW. The ramp will be installed by crane.

A new ore loader is proposed in the harbor, including a loader, foundation, and access platform. The proposed ore loader foundation will be a steel and concrete structure, 50 by 50 feet and supported by fifty 36-inch-diameter steel piles. Finished height will be 30 feet above MLLW. Piles will be installed with a vibratory and/or impact hammer.

The proposed access platform will connect the ore loader to the Ore Terminal uplands. It will be a steel and concrete structure, 90 by 15 feet, and supported by twenty 36-inch-diameter steel piles. Finished height will be 30 feet above MLLW. Only the eastern 40 feet of length and eight piles will be over the intertidal or subtidal zones (the remainder will be above and tied into the uplands). Piles will be installed with a vibratory and/or impact hammer.

The concrete dock and seven moorage dolphins (see Section 2.2.4.5 of the MOS's application) or up to 10 moorage dolphins will be installed depending on funding. A concrete floating dock is proposed for the southern end of the project area, including the dock, a transfer bridge, a pile-supported pedestrian platform, and a pedestrian gangway. The proposed floating dock will be a 300-by-50-foot concrete structure supported by seven 60-inch-diameter piles and fourteen 36-inch-diameter piles. The finished height will vary with the tide; the dock will have approximately 7 feet of freeboard above the waterline. Piles will be installed with a vibratory and/or impact hammer.

The proposed transfer bridge will be a 200-by-19-foot steel structure supported by a concrete abutment founded on ten 24-inch-diameter piles placed above the intertidal zone. The top of the ramp will be 30 feet above MLLW and the bottom of the ramp will be supported by the floating dock. Only the eastern 150 feet of length will be over the intertidal or subtidal zones (the remainder will be above and tied into the uplands). The ramp will be installed by crane.

The proposed pedestrian platform will be a 25-by-55-foot concrete structure, placed adjacent to the existing timber walkway that will remain after the ore dock demolition. Finished height will be 30 feet above MLLW. The pedestrian platform will be supported on six 24-inch-diameter steel piles. Only the eastern 10 feet and three piles of this structure will be over the intertidal or subtidal zones (the remainder will be above and tied into the uplands).

The proposed pedestrian gangway will be a 150-by-8-foot steel structure that spans between the pedestrian platform and the concrete floating dock. The top of the ramp will be 30 feet above MLLW and the bottom of the ramp will be supported by the floating dock. The full length of the pedestrian gangway will be over the intertidal or subtidal zones. It will be installed by crane.

As many as 10 new moorage dolphins may be constructed, along with connecting catwalks, located as follows:

- Up to two dolphins and a catwalk 200 by 6 feet extending from the AML bulkhead wall toward the AML ramp;
- Up to five dolphins and a catwalk 400 by 6 feet extending north and south from the ore loader; and
- Up to three dolphins and a catwalk 300 by 6 feet north of the existing concrete pier, if the concrete floating dock is not constructed.

Each dolphin will consist of a 15-foot-square steel and concrete superstructure atop ten 36-inch steel piles.

Each catwalk will be a 6-foot-wide steel structure, supported by the dolphins. Finished height will be 30 feet above MLLW. Dolphins will be installed by vibratory and/or impact hammer and the catwalk will be installed by crane.

A new fuel manifold and fuel lines will be constructed on a pier extending from the ore loader platform infrastructure. The proposed fuel pier will be a steel and concrete structure. The approach pier will be 60 by 15 feet, supported by eight 36-inch-diameter steel piles. The fuel pier will be 30 by 30 feet supported by nine 36-inch-diameter steel piles. Finished height will be 30 feet above MLLW. Piles will be installed with a vibratory and/or impact hammer.

Description of Marine Mammals in the Area of the Specified Activity

Marine waters near Skagway in the Taiya inlet and the larger Lynn Canal support many species of marine mammals, including pinnipeds and cetaceans; however, the number of species that may regularly occur near the project area is 10 marine mammal species (Table 3). For the purpose of this IHA, the region of activity is defined as Taiya Inlet as acoustic impacts from the project are not anticipated to extend beyond the inlet into the adjacent Lynn Canal. Some species in this area are not expected to be impacted by the project activities, due to habitat preference including the gray whale, sperm whale, and the Pacific white-sided dolphin, and are therefore not considered further in this document after this section. Sperm whales have been observed in southeast Alaska with more frequency in recent years and have been tracked in Lynn Canal (seaswap.info). It is unknown whether they occur as far north as Taiya inlet and the action area (J. Moran personal communication, March 2016); however, there are no documented sightings in the area (seaswap.info). This species prefers deeper waters, and are unlikely to occur in the narrow inlets near Skagway. Gray whale sightings in the portion of Southeast Alaska are very rare; there have only been eight sightings since 1997, none of which were in Taiya Inlet or Lynn Canal. Pacific white-sided are also considered rare in the action area, with habitat preferences in southern waters of southeast Alaska. While minke whales may occur in the action area, our analysis and take calculation suggest that this species will not be taken for this activity (zero calculated take); therefore, no take of this species will be authorized. There are six marine mammal species documented in the waters of Taiya Inlet/Lynn Canal (Dahlheim *et al.* 2009; Allen and Angliss 2014; Muto and Angliss 2015) for which take is requested.

One of the species, the harbor seal, is known to consistently occur near the SOT; however the closest haul out site is six miles away. Moderate to high abundances of Steller sea lions are also known to seasonally occupy the inlet, with the closest haul out more than 22 miles away from construction activities. Several humpback whales have been observed within Taiya Inlet, sometimes close to Skagway, during non-winter months. The remaining four species (harbor porpoise, Dall's porpoise, killer whale, and minke whale) may occur in Taiya Inlet/Lynn Canal, but less frequently and farther from the SOT.

TABLE 3—MARINE MAMMAL SPECIES LIKELY TO OCCUR NEAR THE PROJECT AREA

Species name	Stock(s) abundance estimate [1]	ESA * status	MMPA ** status	Occurrence
Order Cetartiodactyla—Cetacea—Superfamily Mysticeti (baleen whales)				
Family Balaenopteridae				
Humpback whale (*Megaptera novaeangliae*)	Central North Pacific Stock: 10,252.	Endangered	Strategic, depleted	Rare.
Minke whale (*Balaenoptera acutorostrata*)	Alaska stock: N/A	Not listed	Not strategic	Unlikely.
Order Cetartiodactyla—Cetacea—Superfamily				
Family Eschrichtiidae				
Gray whale (*Eschrichtius robustus)*	Eastern North Pacific stock: 20,990.	Not listed	Not strategic, non-depleted	Unlikely.
Order Cetartiodactyla—Cetacea—Superfamily				
Family Physeteroidea				
Sperm whale (*Physeter macrocephalus*)	North Pacific stock: N/A	Endangered	Strategic, depleted	Unlikely.

TABLE 3—MARINE MAMMAL SPECIES LIKELY TO OCCUR NEAR THE PROJECT AREA—Continued

Species name	Stock(s) abundance estimate [1]	ESA * status	MMPA ** status	Occurrence
Order Cetartiodactyla—Cetacea—Superfamily				
Family Delphinidae				
Killer whale (*Orcinus orca*)	Alaska stock: 2,347 Northern resident stock: 261 Gulf of Alaska stock: 587 West coast transient stock: 243.	Not listed	Not Strategic, non-depleted	Infrequent.
Pacific white-sided dolphin (*Lagenorhynchus obliquidens*).	North Pacific stock: 26,880	Not listed	Not Strategic, non-depleted	Unlikely.
Order Cetartiodactyla—Cetacea—Superfamily				
Family Phocoenidae				
Dall's porpoise (*Phocoenoides dalli*)	Alaska stock: 83,400	Not listed	Not strategic, non-depleted	Rare.
Harbor porpoise (*Phocoena phocoena*)	Southeast AK: 11,146	Not listed	Strategic, non-depleted	Likely.
Order Carnivora—Pinnipedia				
Family Phocidae				
Harbor seal (*Phoca vitulina*)	Lynn Canal/Stephens Passage Stock: 9,478.	Not listed	Not strategic- non-depleted	Likely.
Order Carnivora—Pinnipedia				
Family Otariidae				
Steller sea lion (*Eumetopias jubatus*)	wDPS:49,497 eDPS: 60,131–74,448	Endangered	Strategic, depleted	Likely.

[1] 2015 draft marine mammal Stock Assessment Reports at *http://www.nmfs.noaa.gov/pr/sars/species.htm.*
* Endangered Species Act.
** Marine Mammal Protection Act.

Cetaceans

Humpback whale

The humpback whale is distributed worldwide in all ocean basins. In winter, most humpback whales occur in the subtropical and tropical waters of the Northern and Southern Hemispheres, and migrate to high latitudes in the summer to feed. The historic summer feeding range of humpback whales in the North Pacific encompassed coastal and inland waters around the Pacific Rim from Point Conception, California, north to the Gulf of Alaska and the Bering Sea, and west along the Aleutian Islands to the Kamchatka Peninsula and into the Sea of Okhotsk and north of the Bering Strait (Zenkovich 1954, Johnson and Wolman 1984). The winter range includes the main islands of the Hawaiian archipelago, with the greatest concentration along the west side of Maui. In Mexico, the winter range includes waters around the southern part of the Baja California peninsula, the central portions of the Pacific coast of mainland Mexico, and the Revillagigedos Islands off the mainland coast. The winter range also extends from southern Mexico into Central America, including Guatemala, El Salvador, Nicaragua, and Costa Rica (Calambokidis *et al.,* 2008).

There are three stocks of humpback whales in the North Pacific: (1) The California/Oregon/Washington and Mexico stock, consisting of winter/spring populations in coastal Central America and coastal Mexico which migrate to the coast of California to southern British Columbia in summer/fall (Calambokidis *et al.* 1989, Steiger *et al.* 1991, Calambokidis *et al.* 1993); (2) the central North Pacific stock, consisting of winter/spring populations of the Hawaiian Islands which migrate primarily to northern British Columbia/Southeast Alaska, the Gulf of Alaska, and the Bering Sea/Aleutian Islands (Perry *et al.* 1990, Calambokidis *et al.* 1997); and (3) the western North Pacific stock, consisting of winter/spring populations off Asia which migrate primarily to Russia and the Bering Sea/Aleutian Islands. Information from the SPLASH (Structure of Populations, Levels of Abundance, and Status of Humpbacks) project mostly confirms this view of humpback whale distribution and movements in the North Pacific; however, the full SPLASH results suggest the current view of population structure is incomplete. A revision of population structure in the North Pacific will be considered when the full genetic results from the SPLASH project are available. The central North Pacific stock is the only stock that is found near the project activities.

The current abundance estimate for the Central North Pacific stock is 10,252 individuals (Muto and Angliss, 2015). This stock is designated as strategic and depleted under the MMPA. Humpback whales are currently listed as endangered range-wide under the ESA. The status and population structure of humpback whales is currently under review by NMFS as part of a global status review of the species (Muto and Angliss, 2015). This stock of humpback whales is growing, with the growth rate estimated to be seven percent (Allen and Angliss, 2014). The current PBR for this stock is 173 individuals. Entanglement from fishing gear and ship strikes remain the top threats for humpback whales, with an estimated annual mortality and serious injury rate of 23 animals (Muto and Angliss, 2015).

Killer Whale

Killer whales have been observed in all oceans and seas of the world, but the highest densities occur in colder and more productive waters found at high latitudes. Killer whales are found throughout the North Pacific, and occur along the entire Alaska coast, in British Columbia and Washington inland waterways, and along the outer coasts of Washington, Oregon, and California (Allen and Angliss, 2013).

Based on data regarding association patterns, acoustics, movements, and genetic differences, eight killer whale stocks are now recognized: (1) The Alaska Resident stock; (2) the Northern Resident stock; (3) the Southern Resident stock; (4) the Gulf of Alaska, Aleutian Islands, and Bering Sea Transient stock; (5) the AT1 Transient stock; (6) the West Coast transient stock, occurring from California through southeastern Alaska; and (7) the Offshore stock, and (8) the Hawaiian stock. Only the Alaska resident; Northern resident; Gulf of Alaska, Aleutian Islands, and Bering Sea Transient (Gulf of Alaska transient); and the West coast transient stocks are considered in this application because other stocks occur outside the geographic area under consideration. Any of these four stocks could be seen in the action area; however, the Northern resident stock is most likely to occur in the area.

The Alaska resident stock is found from southeastern Alaska to the Aleutian Islands and Bering Sea. Intermixing of Alaska residents have been documented among the three areas, at least as far west as the eastern Aleutian Islands (Allen and Angliss, 2013). Combining the counts of known 'resident' whales gives a minimum number of 2,347 (Southeast Alaska + Prince William Sound + Western Alaska; 121 + 751 + 1,475) killer whales belonging to the Alaska Resident stock (Allen and Angliss 2013). At present, reliable data on trends in population abundance for the entire Alaska resident stock of killer whales are unavailable. PBR is 23.4 animals. Fishery interactions are a main threat to this stock. This stock is not designated as depleted or classified as strategic under the MMPA, and is not listed under the ESA.

The Northern resident stock occurs from Washington State through part of southeastern Alaska. The Northern Resident stock is a transboundary stock, and includes killer whales that frequent British Columbia, Canada and southeastern Alaska (Dahlheim *et al.,* 1997; Ford *et al.,* 2000). The population estimate for this stock is currently 261 whales (Allen and Angliss, 2013). This population is increasing, with an average of 2.1 percent annual increase over a 36 year time period (Ellis *et al.,* 2011). PBR for this stock is 1.96 animals. This stock is not designated as depleted or strategic under the MMPA, and is not listed as threatened or endangered under the ESA.

The Gulf of Alaska transient stock occurs mainly from Prince William Sound through the Aleutian Islands and Bering Sea. Current abundance estimate for this stock is 587 animals (Allen and Angliss, 2013). PBR is 5.87 animals per year (Allen and Angliss, 2013). Current trends for this stock are unavailable, but the stock is not designated as depleted or strategic under the MMPA and is not listed under the ESA.

The West coast transient stock includes animals that occur in California, Oregon, Washington, British Columbia and southeastern Alaska. Current abundance estimate for this stock is 243 animals, which should be considered a minimum count for this stock (Allen and Angliss, 2013). PBR is 2.4 animals per year (Allen and Angliss, 2013). No reliable estimates of population trends are available, but this stock is not designated as depleted or strategic under the MMPA, and is not listed under the ESA.

Additional information on the biology and local distribution of these species can be found in the NMFS Marine Mammal Stock Assessment Reports, which may be found at: *http://www.nmfs.noaa.gov/pr/species/.*

Dall's Porpoise

Dall's porpoise are widely distributed across the entire North Pacific Ocean. They are found over the continental shelf adjacent to the slope and over deep (2,500+ m) oceanic waters. They have been sighted throughout the North Pacific as far north as 65° N. (Buckland *et al.* 1993). Throughout most of the eastern North Pacific they are present during all months of the year, although there may be seasonal onshore-offshore movements along the west coast of the continental United States (Loeb 1972), and winter movements of populations out of Prince William Sound and areas in the Gulf of Alaska and Bering Sea (NMFS, unpubl. data, National Marine Mammal Laboratory). The stock structure of eastern North Pacific Dall's porpoise is not adequately understood at this time, but based on patterns of stock differentiation in the western North Pacific, where they have been more intensively studied, it is expected that separate stocks will emerge when data become available.

Currently one stock of Dall's porpoise is recognized in Alaskan waters, while Dall's porpoise along the west coast of the continental U.S. from California to Washington comprise a separate stock (Allen and Angliss, 2012). The current abundance estimate for the Alaska stock is 83,400 animals (Muto and Angliss, 2015). PBR for this stock is currently undetermined, and population trends are unknown; however, this stock is not designated as depleted or strategic under the MMPA, and is not listed under the ESA (Allen and Angliss, 2012).

Harbor Porpoise

The harbor porpoise inhabits temporal, subarctic, and arctic waters. In the eastern North Pacific, harbor porpoises range from Point Barrow, Alaska, to Point Conception, California. Harbor porpoise primarily frequent coastal waters and occur most frequently in waters less than 100 m deep (Hobbs and Waite 2010). They may occasionally be found in deeper offshore waters.

In Alaska, harbor porpoises are currently divided into three stocks, based primarily on geography. These are (1) the Southeast Alaska stock—occurring from the northern border of British Columbia to Cape Suckling, Alaska, (2) the Gulf of Alaska stock—occurring from Cape Suckling to Unimak Pass, and (3) the Bering Sea stock—occurring throughout the Aleutian Islands and all waters north of Unimak Pass (Allen and Angliss 2014). Only the Southeast Alaska stock is considered in this application because the other stocks are not found in the geographic area under consideration.

Harbor porpoises are neither designated as depleted under the MMPA nor listed as threatened or endangered under the ESA. Because the most recent abundance estimate is 14 years old and information on incidental harbor porpoise mortality in commercial fisheries is not well understood, the Southeast Alaska stock of harbor porpoise is classified as strategic. Population trends and status of this stock relative to optimum sustainable population size are currently unknown. The Southeast Alaska stock is currently estimated at 11,146 individuals (Muto and Angliss 2015). No reliable information is available to determine trends in abundance.

Pinnipeds

Harbor Seal

Harbor seals range from Baja California north along the west coasts of Washington, Oregon, California, British Columbia, and Southeast Alaska; west through the Gulf of Alaska, Prince William Sound, and the Aleutian Islands; and north in the Bering Sea to Cape Newenham and the Pribilof Islands. They haul out on rocks, reefs, beaches, and drifting glacial ice, and feed in marine, estuarine, and occasionally fresh waters. Harbor seals generally are nonmigratory, with local movements associated with such factors as tides, weather, season, food availability, and reproduction (Scheffer and Slipp 1944, Fisher 1952, Bigg 1969, 1981, Hastings *et al.* 2004).

In 2010, harbor seals in Alaska were partitioned into 12 separate stocks based largely on genetic structure (Allen and Angliss 2012). The 12 stocks of harbor seals identified in Alaska are (1) the Aleutian Islands stock, (2) the Pribilof Islands stock, (3) the Bristol Bay stock, (4) the North Kodiak stock, (5) the South Kodiak stock, (6) the Prince William Sound stock, (7) the Cook Inlet/Shelikof stock, (8) the Glacier Bay/Icy Strait stock, (9) the Lynn Canal/Stephens Passage stock, (10) the Sitka/Chatham stock, (11) the Dixon/Cape Decision stock, and (12) the Clarence Strait stock. Only the Lynn Canal/Stephens stock is considered for these construction activities. The range of this stock ranges north along the east and north coast of Admiralty Island from the north end of Kupreanof Island through Lynn Canal, including Taku Inlet, Tracy Arm, and Endicott Arm, and reaching as far north as Taiya, Lutak, and Chilkat Inlets (Allen and Angliss, 2012).

The current statewide abundance estimate for Alaskan harbor seals is 205,090, based on aerial survey data collected during 1998–2011 (Muto and Angliss, 2015). The abundance estimate for the Lynn Canal/Stephens Passage stock is 9,478 (Muto and Angliss 2015). The current (2007–2011) estimate of the population trend information for this stock is −176 seals per year, with a probability that the stock is decreasing (Muto and Angliss, 2015). PBR is 155 animals per year.

Harbor seals are included in subsistence harvests. From 2011–2012, an average of 50 animals from this stock were harvested each year, which is higher than previous estimates of 30 animals, on average, per year from 2004–2008 (Muto and Angliss, 2015). Entanglement is the biggest contributor to their annual human-caused mortality. Lynn Canal/Stephens Passage harbor seals are not listed as depleted or strategic under the MMPA, and are not listed under the ESA.

Steller Sea Lion

The Steller sea lion is a pinniped and the largest of the eared seals. Steller sea lion populations that primarily occur west of 144° W. (Cape Suckling, Alaska) comprise the western Distinct Population Segment (wDPS), while all others comprise the eastern DPS (eDPS); however, there is regular movement of both DPSs across this boundary (Muto and Angliss, 2015). Both of these populations may occur in the action area. Steller sea lions were listed as threatened range-wide under the ESA on 26 November 1990 (55 **Federal Register** [FR] 49204). Steller sea lions were subsequently partitioned into the western and eastern DPSs in 1997 (Allen and Angliss 2010), with the wDPS being listed as endangered under the ESA and the eDPS remaining classified as threatened (62 FR 24345) until it was delisted in November 2013. In August 1993, NMFS published a final rule designating critical habitat for the Steller sea lion as a 20 nautical mile buffer around all major haul-outs and rookeries, as well as associated terrestrial, air and aquatic zones, and three large offshore foraging areas (50 CFR 226.202). There is no Steller sea lion critical habitat in the area.

The range of the Steller sea lion includes the North Pacific Ocean rim from California to northern Japan, with centers of abundance and distribution in the Gulf of Alaska and Aleutian Islands (Muto and Angliss, 2015). Steller sea lions forage in nearshore and pelagic waters where they are opportunistic predators. They feed primarily on a wide variety of fishes and cephalopods. Steller sea lions use terrestrial haulout sites to rest and take refuge. They also gather on well-defined, traditionally used rookeries to pup and breed. These habitats are typically gravel, rocky, or sand beaches; ledges; or rocky reefs (Allen and Angliss, 2013).

The current abundance estimate for the wDPS in Alaska is 49,497 sea lions, and between 60,131–74,448 animals for the eDPS (Muto and Angliss 2015). The wDPS of Steller sea lions declined approximately 75 percent from 1976 to 1990. Factors that may have contributed to this decline include (1) incidental take in fisheries, (2) legal and illegal shooting, (3) predation, (4) contaminants, (5) disease, and (6) climate change. Non-pup Steller sea lion counts at trend sites in the wDPS increased 11 percent during 2000–2004. These counts were the first region-wide increases for the wDPS since standardized surveys began in the 1970s, and were due to increased or stable counts in all regions except the western Aleutian Islands. During 2004–2008, western Alaska non-pup counts increased only 3 percent; eastern Gulf of Alaska (Prince William Sound area) counts were higher; counts from the Kenai Peninsula through Kiska Island, including Kodiak Island, were stable; and western Aleutian counts continued to decline (Allen and Angliss 2010). Current PBR for the wDPS is 297 animals, and PBR for the eDPS is currently unavailable (Muto and Angliss, 2015).

Steller sea lions are included in Alaska subsistence harvests. The mean annual take of Steller sea lions is 199 from 2004–2013 (Muto and Angliss, 2015). Entanglements in fishing gear and marine debris, and interactions with fishing gear are sources of mortality and serious injury for Steller sea lions.

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

This section includes a summary and discussion of the ways that the specified activity (*e.g.* pile driving, pile removal), including potential mitigation activities, associated with the reconstruction of the SOT may impact marine mammals and their habitat. Mitigation measures will reduce impacts to marine mammals from the project activities. Please refer to the *Proposed Mitigation* section for more information. The *Estimated Take by Incidental Harassment* section later in this document will include an analysis of the number of individuals that are expected to be taken by this activity. The *Negligible Impact Analysis* section will include the analysis of how this specific activity will impact marine mammals and will consider the content of this section, the *Estimated Take by Incidental Harassment* section, 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 pile extraction, vibratory pile driving, 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 SOT is likely to be dominated by noise from day-to-day port and vessel activities. The Port of Skagway has provided key transportation import/export capacity for the Yukon and pier access accommodates vessels in the 35,000 DWT class (AIDEA 2008). 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 harbor, it is likely that levels within the harbor 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, 1987).

High levels of vessel traffic are known to elevate background levels of noise in the marine environment. For example, continuous sounds for tugs pulling barges have been reported to range from 145 to 166 dB re 1 μPa rms at 1 meter from the source (Miles *et al.* 1987; Richardson *et al.* 1995; Simmonds *et al.* 2004). Ambient underwater noise levels in the SOT project area are both variable and relatively high, and are expected to mask some sounds of drilling, pile installation, and pile extraction.

In-water construction activities associated with the project include vibratory pile driving and removal, and impact pile driving. There are two general categories of sound types: Impulse and non-pulse (defined below). Vibratory pile driving is considered to be continuous or non-pulsed while impact pile driving is considered to be an impulse or pulsed sound type. 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 (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).

The likely or possible impacts of the proposed pile driving program at SOT on marine mammals could involve both non-acoustic and acoustic stressors. Potential non-acoustic stressors could result from the physical presence of the equipment and personnel. Any impacts to marine mammals are expected to primarily be acoustic in nature. Acoustic stressors could include effects of heavy equipment operation, pile installation and pile removal at SOT.

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 (13 species of mysticetes): Functional hearing is estimated to occur between approximately 7 Hz and 25 kHz (up to 30 kHz in some species), with best hearing estimated to be from 100 Hz to 8 kHz (Watkins, 1986; Ketten, 1998; Houser *et al.,* 2001; Au *et al.,* 2006; Lucifredi and Stein, 2007; Ketten *et al.,* 2007; Parks *et al.,* 2007a; Ketten and Mountain, 2009; Tubelli *et al.,* 2012);
- Mid-frequency cetaceans (32 species of dolphins, six species of larger toothed whales, and 19 species of beaked and bottlenose whales): Functional hearing is estimated to occur between approximately 150 Hz and 160 kHz with best hearing from 10 to less than 100 kHz (Johnson, 1967; White, 1977; Richardson *et al.,* 1995; Szymanski *et al.,* 1999; Kastelein *et al.,* 2003; Finneran *et al.,* 2005a, 2009; Nachtigall *et al.,* 2005, 2008; Yuen *et al.,* 2005; Popov *et al.,* 2007; Au and Hastings, 2008; Houser *et al.,* 2008; Pacini *et al.,* 2010, 2011; Schlundt *et al.,* 2011);
- High frequency cetaceans (eight species of true porpoises, six species of 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 (Popov and Supin, 1990a,b; Kastelein *et al.,* 2002; Popov *et al.,* 2005);
- Phocid pinnipeds in water: Functional hearing is estimated to occur between approximately 75 Hz and 100 kHz with best hearing between 1–50 kHz (Møhl, 1968; Terhune and Ronald, 1971, 1972; Richardson *et al.,* 1995; Kastak and Schusterman, 1999; Reichmuth, 2008; Kastelein *et al.,* 2009); and
- Otariid pinnipeds in water: Functional hearing is estimated to occur between approximately 100 Hz and 48 kHz, with best hearing between 2–48 kHz (Schusterman *et al.,* 1972; Moore and Schusterman, 1987; Babushina *et al.,* 1991; Richardson *et al.,* 1995; Kastak and Schusterman, 1998; Kastelein *et al.,* 2005a; Mulsow and Reichmuth, 2007; Mulsow *et al.,* 2011a, b).

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).

As mentioned previously in this document, ten marine mammal species (eight cetaceans and two pinnipeds) may occur in the project area. Of the six species likely to occur in the proposed project area for which take is requested, one is classified as a low-frequency cetacean (*i.e.* humpback whale), one is classified as a mid-frequency cetacean (*i.e.,* killer whale), and two are classified as a high-frequency cetaceans (*i.e.,* harbor porpoise and Dall's porpoise) (Southall *et al.,* 2007). Additionally, harbor seals are classified as members of the phocid pinnipeds in water functional hearing group while Stellar sea lions are grouped under the Otariid pinnipeds in water functional hearing group. A species' functional hearing group is a consideration when we analyze the effects of exposure to sound on marine mammals.

Acoustic Impacts

Please refer to the information given previously (*Description of Sound Sources*) regarding sound, characteristics of sound types, and metrics used in this document. Anthropogenic sounds cover a broad range of frequencies and sound levels and can have a range of highly variable impacts on marine life, from none or minor to potentially severe responses, depending on received levels, duration of exposure, behavioral context, and various other factors. The potential effects of underwater sound from active acoustic sources can potentially result in one or more of the following: Temporary or permanent hearing impairment, non-auditory physical or physiological effects, behavioral disturbance, stress, and masking (Richardson *et al.,* 1995; Gordon *et al.,* 2004; Nowacek *et al.,* 2007; Southall *et al.,* 2007; Gotz *et al.,* 2009). The degree of effect is intrinsically related to the signal characteristics, received level, distance from the source, and duration of the sound exposure. In general, sudden, high level sounds can cause hearing loss, as can longer exposures to lower level sounds. Temporary or permanent loss of hearing will occur almost exclusively for noise within an animal's hearing range. We first describe specific manifestations of acoustic effects before providing discussion specific to the MOS's construction activities.

Richardson *et al.* (1995) described zones of increasing intensity of effect that might be expected to occur, in relation to distance from a source and assuming that the signal is within an animal's hearing range. First is the area within which the acoustic signal would be audible (potentially perceived) to the animal, but not strong enough to elicit any overt behavioral or physiological response. The next zone corresponds with the area where the signal is audible to the animal and of sufficient intensity to elicit behavioral or physiological responsiveness. Third is a zone within which, for signals of high intensity, the received level is sufficient to potentially cause discomfort or tissue damage to auditory or other systems. Overlaying these zones to a certain extent is the area within which masking (*i.e.,* when a sound interferes with or masks the ability of an animal to detect a signal of interest that is above the absolute hearing threshold) may occur; the masking zone may be highly variable in size.

We describe the more severe effects (*i.e.,* permanent hearing impairment, certain non-auditory physical or physiological effects) only briefly as we do not expect that there is a reasonable likelihood that the MOS's activities may result in such effects (see below for further discussion). Marine mammals exposed to high-intensity sound, or to lower-intensity sound 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, 2005b). TS can be permanent (PTS), in which case the loss of hearing sensitivity is not fully recoverable, or temporary (TTS), in which case the animal's hearing threshold would recover over time (Southall *et al.,* 2007). Repeated sound exposure that leads to TTS could cause PTS. In severe cases of PTS, there can be total or partial deafness, while in most cases the animal has an impaired ability to hear sounds in specific frequency ranges (Kryter, 1985).

When PTS occurs, there is physical damage to the sound receptors in the ear (*i.e.,* tissue damage), whereas TTS represents primarily tissue fatigue and is reversible (Southall *et al.,* 2007). In addition, other investigators have suggested that TTS is within the normal bounds of physiological variability and tolerance and does not represent physical injury (*e.g.,* Ward, 1997). Therefore, NMFS does not consider TTS to constitute auditory injury.

Relationships between TTS and PTS thresholds have not been studied in marine mammals—PTS data exists only for a single harbor seal (Kastak *et al.,* 2008)—but are assumed to be similar to those in humans and other terrestrial mammals. PTS typically occurs at exposure levels at least several decibels above (a 40-dB threshold shift approximates PTS onset; *e.g.,* Kryter *et al.,* 1966; Miller, 1974) that inducing mild TTS (a 6-dB threshold shift approximates TTS onset; *e.g.,* Southall *et al.* 2007). Based on data from terrestrial mammals, a precautionary assumption is that the PTS thresholds for impulse sounds (such as impact pile driving pulses as received close to the source) are at least 6 dB higher than the TTS threshold on a peak-pressure basis and PTS cumulative sound exposure level thresholds are 15 to 20 dB higher than TTS cumulative sound exposure level thresholds (Southall *et al.,* 2007). Given the higher level of sound or longer exposure duration necessary to cause PTS as compared with TTS, it is considerably less likely that PTS could occur.

Non-auditory physiological effects or injuries that theoretically might occur in marine mammals exposed to high level underwater sound or as a secondary effect of extreme behavioral reactions (*e.g.,* change in dive profile as a result of an avoidance reaction) caused by exposure to sound include neurological effects, bubble formation, resonance effects, and other types of organ or tissue damage (Cox *et al.,* 2006; Southall *et al.,* 2007; Zimmer and Tyack, 2007). The MOS's activities do not involve the use of devices such as explosives or mid-frequency active sonar that are associated with these types of effects.

When a live or dead marine mammal swims or floats onto shore and is incapable of returning to sea, the event is termed a ''stranding'' (16 U.S.C. 1421h(3)). Marine mammals are known to strand for a variety of reasons, such as infectious agents, biotoxicosis, starvation, fishery interaction, ship strike, unusual oceanographic or weather events, sound exposure, or combinations of these stressors sustained concurrently or in series (*e.g.,* Geraci *et al.,* 1999). However, the cause or causes of most strandings are unknown (*e.g.,* Best, 1982). Combinations of dissimilar stressors may combine to kill an animal or dramatically reduce its fitness, even though one exposure without the other would not be expected to produce the same outcome (*e.g.,* Sih *et al.,* 2004). For further description of stranding events see, *e.g.,* Southall *et al.,* 2006; Jepson *et al.,* 2013; Wright *et al.,* 2013.

1. *Temporary threshold shift*—TTS is the mildest form of hearing impairment that can occur during exposure to sound (Kryter, 1985). While experiencing TTS, the hearing threshold rises, and a sound must be at a higher level in order to be heard. In terrestrial and marine mammals, TTS can last from minutes or hours to days (in cases of strong TTS). In many cases, hearing sensitivity 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 data published at the time of this writing concern TTS elicited by exposure to multiple pulses of sound.

Marine mammal hearing plays a critical role in communication with conspecifics, and interpretation of environmental cues for purposes such as predator avoidance and prey capture. Depending on the degree (elevation of threshold in dB), duration (*i.e.,* recovery time), and frequency range of TTS, and the context in which it is experienced, TTS can have effects on marine mammals ranging from discountable to serious. For example, a marine mammal may be able to readily compensate for a brief, relatively small amount of TTS in a non-critical frequency range that occurs during a time where ambient noise is lower and there are not as many competing sounds present. Alternatively, a larger amount and longer duration of TTS sustained during time when communication is critical for successful mother/calf interactions could have more serious impacts.

Currently, TTS data only exist for four species of cetaceans (bottlenose dolphin [*Tursiops truncatus*], beluga whale [*Delphinapterus leucas*], harbor porpoise, and Yangtze finless porpoise [*Neophocoena asiaeorientalis*]) and three species of pinnipeds (northern elephant seal, harbor seal, and California sea lion) exposed to a limited number of sound sources (*i.e.,* mostly tones and octave-band noise) in laboratory settings (*e.g.,* Finneran *et al.,* 2002; Nachtigall *et al.,* 2004; Kastak *et al.,* 2005; Lucke *et al.,* 2009; Popov *et al.,* 2011). In general, harbor seals (Kastak *et al.,* 2005; Kastelein *et al.,* 2012a) and harbor porpoises (Lucke *et al.,* 2009; Kastelein *et al.,* 2012b) have a lower TTS onset than other measured pinniped or cetacean species. Additionally, the existing marine mammal TTS data come from a limited number of individuals within these species. There are no data available on noise-induced hearing loss for mysticetes. For summaries of data on TTS in marine mammals or for further discussion of TTS onset thresholds, please see Southall *et al.* (2007) and Finneran and Jenkins (2012).

2. *Behavioral effects*—Behavioral disturbance may include a variety of effects, including subtle changes in behavior (*e.g.,* minor or brief avoidance of an area or changes in vocalizations), more conspicuous changes in similar behavioral activities, and more sustained and/or potentially severe reactions, such as displacement from or abandonment of high-quality habitat. Behavioral responses to sound are highly variable and context-specific and any reactions depend on numerous intrinsic and extrinsic factors (*e.g.,* species, state of maturity, experience, current activity, reproductive state, auditory sensitivity, time of day), as well as the interplay between factors (*e.g.,* Richardson *et al.,* 1995; Wartzok *et al.,* 2003; Southall *et al.,* 2007; Weilgart, 2007; Archer *et al.,* 2010). Behavioral reactions can vary not only among individuals but also within an individual, depending on previous experience with a sound source, context, and numerous other factors (Ellison *et al.,* 2012), and can vary depending on characteristics associated with the sound source (*e.g.,* whether it is moving or stationary, number of sources, distance from the source). Please see Appendices B–C of Southall *et al.* (2007) for a review of studies involving marine mammal behavioral responses to sound.

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. It is important to note that habituation is appropriately considered as a ''progressive reduction in response to stimuli that are perceived as neither aversive nor beneficial,'' rather than as, more generally, moderation in response to human disturbance (Bejder *et al.,* 2009). 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. As noted, behavioral state may affect the type of response. 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 have 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 airguns or acoustic harassment devices) have been varied but often consist of avoidance behavior or other behavioral changes suggesting discomfort (Morton and Symonds, 2002; see also Richardson *et al.,* 1995; Nowacek *et al.,* 2007).

Available studies show wide variation in response to underwater sound; therefore, it is difficult to predict specifically how any given sound in a particular instance might affect marine mammals perceiving the signal. If a marine mammal does react briefly to an underwater sound by changing its behavior or moving a small distance, the impacts of the change are unlikely to be significant to the individual, let alone the stock or population. However, if a sound source displaces marine mammals from an important feeding or breeding area for a prolonged period, impacts on individuals and populations could be significant (*e.g.,* Lusseau and Bejder, 2007; Weilgart, 2007; NRC, 2005). However, there are broad categories of potential response, which we describe in greater detail here, that include alteration of dive behavior, alteration of foraging behavior, effects to breathing, interference with or alteration of vocalization, avoidance, and flight.

Changes in dive behavior can vary widely, and may consist of increased or decreased dive times and surface intervals as well as changes in the rates of ascent and descent during a dive (*e.g.,* Frankel and Clark, 2000; Costa *et al.,* 2003; Ng and Leung, 2003; Nowacek *et al.;* 2004; Goldbogen *et al.,* 2013a,b). Variations in dive behavior may reflect interruptions in biologically significant activities (*e.g.,* foraging) or they may be of little biological significance. The impact of an alteration to dive behavior resulting from an acoustic exposure depends on what the animal is doing at the time of the exposure and the type and magnitude of the response.

Disruption of feeding behavior can be difficult to correlate with anthropogenic sound exposure, so it is usually inferred by observed displacement from known foraging areas, the appearance of secondary indicators (*e.g.,* bubble nets or sediment plumes), or changes in dive behavior. As for other types of behavioral response, the frequency, duration, and temporal pattern of signal presentation, as well as differences in species sensitivity, are likely contributing factors to differences in response in any given circumstance (*e.g.,* Croll *et al.,* 2001; Nowacek *et al.;* 2004; Madsen *et al.,* 2006; Yazvenko *et al.,* 2007). A determination of whether foraging disruptions incur fitness consequences would require information on or estimates of the energetic requirements of the affected individuals and the relationship between prey availability, foraging effort and success, and the life history stage of the animal.

Variations in respiration naturally vary with different behaviors and alterations to breathing rate as a function of acoustic exposure can be expected to co-occur with other behavioral reactions, such as a flight response or an alteration in diving. However, respiration rates in and of themselves may be representative of annoyance or an acute stress response. Various studies have shown that respiration rates may either be unaffected or could increase, depending on the species and signal characteristics, again highlighting the importance in understanding species differences in the tolerance of underwater noise when determining the potential for impacts resulting from anthropogenic sound exposure (*e.g.,* Kastelein *et al.,* 2001, 2005b, 2006; Gailey *et al.,* 2007).

Marine mammals vocalize for different purposes and across multiple modes, such as whistling, echolocation click production, calling, and singing.

Changes in vocalization behavior in response to anthropogenic noise can occur for any of these modes and may result from a need to compete with an increase in background noise or may reflect increased vigilance or a startle response. For example, in the presence of potentially masking signals, humpback whales and killer whales have been observed to increase the length of their songs (Miller *et al.,* 2000; Fristrup *et al.,* 2003; Foote *et al.,* 2004), while right whales have been observed to shift the frequency content of their calls upward while reducing the rate of calling in areas of increased anthropogenic noise (Parks *et al.,* 2007b). In some cases, animals may cease sound production during production of aversive signals (Bowles *et al.,* 1994).

Avoidance is the displacement of an individual from an area or migration path as a result of the presence of a sound or other stressors, and is one of the most obvious manifestations of disturbance in marine mammals (Richardson *et al.,* 1995). For example, gray whales are known to change direction—deflecting from customary migratory paths—in order to avoid noise from seismic surveys (Malme *et al.,* 1984). Avoidance may be short-term, with animals returning to the area once the noise has ceased (*e.g.,* Bowles *et al.,* 1994; Goold, 1996; Stone *et al.,* 2000; Morton and Symonds, 2002; Gailey *et al.,* 2007). Longer-term displacement is possible, however, which may lead to changes in abundance or distribution patterns of the affected species in the affected region if habituation to the presence of the sound does not occur (*e.g.,* Blackwell *et al.,* 2004; Bejder *et al.,* 2006; Teilmann *et al.,* 2006).

A flight response is a dramatic change in normal movement to a directed and rapid movement away from the perceived location of a sound source. The flight response differs from other avoidance responses in the intensity of the response (*e.g.,* directed movement, rate of travel). Relatively little information on flight responses of marine mammals to anthropogenic signals exist, although observations of flight responses to the presence of predators have occurred (Connor and Heithaus, 1996). The result of a flight response could range from brief, temporary exertion and displacement from the area where the signal provokes flight to, in extreme cases, marine mammal strandings (Evans and England, 2001). However, it should be noted that response to a perceived predator does not necessarily invoke flight (Ford and Reeves, 2008), and whether individuals are solitary or in groups may influence the response.

Behavioral disturbance can also impact marine mammals in more subtle ways. Increased vigilance may result in costs related to diversion of focus and attention (*i.e.,* when a response consists of increased vigilance, it may come at the cost of decreased attention to other critical behaviors such as foraging or resting). These effects have generally not been demonstrated for marine mammals, but studies involving fish and terrestrial animals have shown that increased vigilance may substantially reduce feeding rates (*e.g.,* Beauchamp and Livoreil, 1997; Fritz *et al.,* 2002; Purser and Radford, 2011). In addition, chronic disturbance can cause population declines through reduction of fitness (*e.g.,* decline in body condition) and subsequent reduction in reproductive success, survival, or both (*e.g.,* Harrington and Veitch, 1992; Daan *et al.,* 1996; Bradshaw *et al.,* 1998). However, Ridgway *et al.* (2006) reported that increased vigilance in bottlenose dolphins exposed to sound over a five-day period did not cause any sleep deprivation or stress effects.

Many animals perform vital functions, such as feeding, resting, traveling, and socializing, on a diel cycle (24-hour cycle). Disruption of such functions resulting from reactions to stressors such as sound exposure are more likely to be significant if they last more than one diel cycle or recur on subsequent days (Southall *et al.,* 2007). Consequently, a behavioral response lasting less than one day and not recurring on subsequent days is not considered particularly severe unless it could directly affect reproduction or survival (Southall *et al.,* 2007). Note that there is a difference between multi-day substantive behavioral reactions and multi-day anthropogenic activities. For example, just because an activity lasts for multiple days does not necessarily mean that individual animals are either exposed to activity-related stressors for multiple days or, further, exposed in a manner resulting in sustained multi-day substantive behavioral responses.

3. *Stress responses*—An animal's perception of a threat may be sufficient to trigger stress responses consisting of some combination of behavioral responses, autonomic nervous system responses, neuroendocrine responses, or immune responses (*e.g.,* Seyle, 1950; Moberg, 2000). In many cases, an animal's first and sometimes most economical (in terms of energetic costs) response is behavioral avoidance of the potential stressor. Autonomic nervous system responses to stress typically involve changes in heart rate, blood pressure, and gastrointestinal activity. These responses have a relatively short duration and may or may not have a significant long-term effect on an animal's fitness.

Neuroendocrine stress responses often involve the hypothalamus-pituitary-adrenal system. Virtually all neuroendocrine functions that are affected by stress—including immune competence, reproduction, metabolism, and behavior—are regulated by pituitary hormones. Stress-induced changes in the secretion of pituitary hormones have been implicated in failed reproduction, altered metabolism, reduced immune competence, and behavioral disturbance (*e.g.,* Moberg, 1987; Blecha, 2000). Increases in the circulation of glucocorticoids are also equated with stress (Romano *et al.,* 2004).

The primary distinction between stress (which is adaptive and does not normally place an animal at risk) and ''distress'' is the cost of the response. During a stress response, an animal uses glycogen stores that can be quickly replenished once the stress is alleviated. In such circumstances, the cost of the stress response would not pose serious fitness consequences. However, when an animal does not have sufficient energy reserves to satisfy the energetic costs of a stress response, energy resources must be diverted from other functions. This state of distress will last until the animal replenishes its energetic reserves sufficient to restore normal function.

Relationships between these physiological mechanisms, animal behavior, and the costs of stress responses are well-studied through controlled experiments and for both laboratory and free-ranging animals (*e.g.,* Holberton *et al.,* 1996; Hood *et al.,* 1998; Jessop *et al.,* 2003; Krausman *et al.,* 2004; Lankford *et al.,* 2005). Stress responses due to exposure to anthropogenic sounds or other stressors and their effects on marine mammals have also been reviewed (Fair and Becker, 2000; Romano *et al.,* 2002b) and, more rarely, studied in wild populations (*e.g.,* Romano *et al.,* 2002a). For example, Rolland *et al.* (2012) found that noise reduction from reduced ship traffic in the Bay of Fundy was associated with decreased stress in North Atlantic right whales. These and other studies lead to a reasonable expectation that some marine mammals will experience physiological stress responses upon exposure to acoustic stressors and that it is possible that some of these would be classified as ''distress.'' In addition, any animal experiencing TTS would likely also experience stress responses (NRC, 2003).

4. *Auditory masking*—Sound can disrupt behavior through masking, or interfering with, an animal's ability to detect, recognize, or discriminate between acoustic signals of interest (*e.g.,* those used for intraspecific communication and social interactions, prey detection, predator avoidance, navigation) (Richardson *et al.,* 1995). Masking occurs when the receipt of a sound is interfered with by another coincident sound at similar frequencies and at similar or higher intensity, and may occur whether the sound is natural (*e.g.,* snapping shrimp, wind, waves, precipitation) or anthropogenic (*e.g.,* shipping, sonar, seismic exploration) in origin. The ability of a noise source to mask biologically important sounds depends on the characteristics of both the noise source and the signal of interest (*e.g.,* signal-to-noise ratio, temporal variability, direction), in relation to each other and to an animal's hearing abilities (*e.g.,* sensitivity, frequency range, critical ratios, frequency discrimination, directional discrimination, age or TTS hearing loss), and existing ambient noise and propagation conditions.

Under certain circumstances, marine mammals experiencing significant masking could also be impaired from maximizing their performance fitness in survival and reproduction. Therefore, when the coincident (masking) sound is man-made, it may be considered harassment when disrupting or altering critical behaviors. 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. For example, low-frequency signals may have less effect on high-frequency echolocation sounds produced by odontocetes but are more likely to affect detection of mysticete communication calls and other potentially important natural sounds such as those produced by surf and some prey species. The masking of communication signals by anthropogenic noise may be considered as a reduction in the communication space of animals (*e.g.,* Clark *et al.,* 2009) and may result in energetic or other costs as animals change their vocalization behavior (*e.g.,* Miller *et al.,* 2000; Foote *et al.,* 2004; Parks *et al.,* 2007b; Di Iorio and Clark, 2009; Holt *et al.,* 2009). Masking can be reduced in situations where the signal and noise come from different directions (Richardson *et al.,* 1995), through amplitude modulation of the signal, or through other compensatory behaviors (Houser and Moore, 2014). Masking can be tested directly in captive species (*e.g.,* Erbe, 2008), but in wild populations it must be either modeled or inferred from evidence of masking compensation. There are few studies addressing real-world masking sounds likely to be experienced by marine mammals in the wild (*e.g.,* Branstetter *et al.,* 2013).

Masking affects both senders and receivers of acoustic signals and can potentially have long-term chronic effects on marine mammals at the population level as well as at the individual level. 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, with most of the increase from distant commercial shipping (Hildebrand, 2009). All anthropogenic sound sources, but especially chronic and lower-frequency signals (*e.g.,* from vessel traffic), contribute to elevated ambient sound levels, thus intensifying masking.

Potential Effects of Pile Driving Sound—The effects of sounds from pile driving might include 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 type and depth of the animal; the pile size and type, and the intensity and duration of the pile driving sound; the depth of the water column; the substrate; 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 frequency, 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. 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 could be expected to include physiological and behavioral responses to the acoustic signature (Viada *et al.,* 2008). Potential effects from impulsive sound sources like pile driving can range in severity from effects such as behavioral disturbance to temporary or permanent hearing impairment (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 shifts. PTS constitutes injury, but TTS does not (Southall *et al.,* 2007). Based on the best scientific information available, the SPLs for the construction activities in this project are far below the thresholds that could cause TTS or the onset of PTS: 180 dB re 1 μPa rms for odontocetes and 190 dB re 1 μPa rms for pinnipeds (Table 4).

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

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);
- Longer-term habitat abandonment due to loss of desirable acoustic environment; and
- Longer-term 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. 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. 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 low. 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.

Acoustic Effects, Airborne—Pinnipeds that occur near the project site could be exposed to airborne sounds associated with pile driving that have the potential to cause behavioral harassment, depending on their distance from pile driving activities. Cetaceans are not expected to be exposed to airborne sounds that would result in harassment as defined under the MMPA.

Airborne noise will primarily be an issue for pinnipeds that are swimming or hauled out near the project site within the range of noise levels elevated above the acoustic criteria in Table 4 below. We recognize that pinnipeds in the water could be exposed to airborne sound that may result in behavioral harassment when looking with heads above water. Most likely, airborne sound would cause behavioral responses similar to those discussed above in relation to underwater sound. For instance, anthropogenic sound could cause hauled-out pinnipeds to exhibit changes in their normal behavior, such as reduction in vocalizations, or cause them to temporarily abandon the area and move further from the source. However, these animals would previously have been 'taken' as a result of exposure to underwater sound above the behavioral harassment thresholds, which are in all cases larger than those associated with airborne sound. Thus, the behavioral harassment of these animals is already accounted for in these estimates of potential take. Multiple incidents of exposure to sound above NMFS' thresholds for behavioral harassment are not believed to result in increased behavioral disturbance, in either nature or intensity of disturbance reaction. Therefore, we do not believe that authorization of incidental take resulting from airborne sound for pinnipeds is warranted, and airborne sound is not discussed further here.

Vessel Interaction

Besides being susceptible to vessel strikes, cetacean and pinniped responses to vessels may result in behavioral changes, including greater variability in the dive, surfacing, and respiration patterns; changes in vocalizations; and changes in swimming speed or direction (NRC 2003). There will be a temporary and localized increase in vessel traffic during construction.

Anticipated Effects on Marine Mammal Habitat

The proposed activities at SOT would not result in permanent negative 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. 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, as well as potential short-term effects to water and sediment quality.

The primary potential acoustic impacts to marine mammal habitat are associated with elevated sound levels produced by vibratory and impact pile driving and removal in the area. However, other potential impacts to the surrounding habitat from physical disturbance are also possible.

The proposed dredging activities were designed to remove impacted sediments (*i.e.,* sediments with metals and/or polycyclic aromatic hydrocarbon (PAH) concentrations exceeding sediment cleanup objectives. The volume of potentially contaminated material subject to dredging and treatment or disposal in an approved hazardous waste facility is estimated to be 17,300 cubic yards. The dredging activities are predicted to have a positive impact on the habitat, and any negative short term impacts (discussed below) are inconsequential in comparison to the overall benefit the environment will receive from these actions.

Sediments within the proposed dredge footprint at the Skagway Harbor have been recently sampled and tested (Anchor QEA 2014). Sediment chemistry data show levels of current sediment contamination that may cause low, chronic, long term ecological effects to benthic habitats, but would not likely cause acute, toxic effects within the water column. The dredge prism of potentially contaminated sediment occupies approximately 41,000 square feet (0.004 square kilometers), adjacent to the Ore Dock. Physical resuspension of sediments would occur during dredging and would produce localized impacts to water quality in the form of elevated turbidity plumes that would last from a few minutes to several hours. Associated contaminants are expected to be tightly bound to the sediment matrix. Because of the relatively small dredge prism, these plumes would be limited to the immediate vicinity of the Ore Dock and this portion of Skagway Harbor. There is the potential for pinnipeds to be exposed to increased turbidity during dredge operations within Skagway Harbor. However, exposure to resuspended contaminants is expected to be low since sediments would not be ingested and contaminants would be tightly bound to them. Best management practices will be instituted to limit exposure pathways in areas where dredge materials are being handled. Given the relatively small dredge footprint, which limits the size of the dredge plume; the turbidity will be limited by efforts taken to limit/prevent exposure through BMPs; the plume will be temporary and will not have a direct exposure mechanism to marine mammals; and activities will occur during the winter period when fewer pinnipeds have been observed in the area, effects on marine mammals are considered negligible.

Construction Effects on Potential Prey

Construction activities would produce continuous (*i.e.,* vibratory pile driving) sounds and pulsed (*i.e.* impact driving) sounds. Fish react to sounds that 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 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 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.

Construction activities, in the form of increased turbidity, have the potential to adversely affect forage fish and juvenile salmonid outmigratory routes in the project area. Both herring and salmon form a significant prey base for Steller sea lions, and herring is a primary prey of humpback whales. Increased turbidity is expected to occur in the immediate vicinity (on the order of 10 feet or less) of construction activities. However, suspended sediments and particulates are expected to dissipate quickly within a single tidal cycle. Given the limited area affected and high tidal dilution rates any effects on forage fish and salmon are expected to be minor or negligible. In addition, best management practices will be in effect, which will limit the extent of turbidity to the immediate project area. Finally, exposure to these contaminants from dredging is not expected to be different from the current exposure; fish and marine mammals in the Taiya Inlet/Lynn Canal region are routinely exposed to substantial levels of suspended sediment from glacial sources.

Construction Effects on Potential Foraging Habitat

Pile installation may temporarily increase turbidity resulting from suspended sediments. Any increases would be temporary, localized, and minimal. MOS must comply with state water quality standards during these operations by limiting the extent of turbidity to the immediate project area. In general, turbidity associated with pile installation is localized to about a 25-foot radius around the pile (Everitt *et al.* 1980). Cetaceans are not expected to be close enough to the project pile driving areas to experience effects of turbidity, and any pinnipeds will be transiting the area and could avoid localized areas of turbidity. Therefore, the impact from increased turbidity levels is expected to be discountable to marine mammals. Furthermore, pile driving and removal at the project site will not obstruct movements or migration of marine mammals.

Noise measurements of dredging activities are rare in the literature, but dredging is considered to be a low-impact activity for marine mammals, producing non-pulsed sound and being substantially quieter in terms of acoustic energy output than sources such as seismic airguns and impact pile driving. Noise produced by dredging operations has been compared to that produced by a commercial vessel travelling at modest speed (Robinson *et al.,* 2011). Further discussion of dredging sound production may be found in the literature (*e.g.,* Richardson *et al.,* 1995, Nedwell *et al.,* 2008, Parvin *et al.,* 2008, Ainslie *et al.,* 2009). Generally, the effects of dredging on marine mammals are not expected to rise to the level of a take. However, one study found peak sound pressure levels from clamshell dredging in Cook Inlet measured 124 decibels (re 1 μPa) at the 150 meter isopleth with the peak sound levels associated with the dredger striking the hard ocean floor (Dickerson *et al.* 2001). Therefore, to further reduce potential acoustic impacts to endangered humpback whales and Steller sea lions, there will be a 200 meter dredging shutdown zone for ESA-listed species.

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 and removal activities at SOT. The ZOIs effectively represent the mitigation zone that would be established around each pile to provide estimates of the areas within which Level B, and potential Level A, harassment might occur. In addition to the specific measures described later in this section, MOS would conduct briefings between construction supervisors and crews, marine mammal monitoring team, and other 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.

For the proposed project, MOS worked with NMFS and proposed the following mitigation measures to minimize the potential impacts to marine mammals in the project vicinity. The primary purposes of these mitigation measures are to minimize sound levels from the activities, and to monitor marine mammals within designated zones of influence corresponding to NMFS' current Level A and B harassment thresholds which are depicted in Table 4 found later in the *Estimated Take by Incidental Harassment* section.

Monitoring and Shutdown for Pile Driving

The following measures, developed by MOS and NMFS, would apply to the MOS's mitigation through shutdown and disturbance zones:

Shutdown Zone—For all pile driving activities, the MOS will establish a shutdown zone intended to contain the area in which SPLs equal or exceed the 180 dB rms acoustic injury criteria for cetaceans, and 190 dB rms for pinnipeds. 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 5 below. A minimum shutdown zone of 16 m will be established for the 190-dB zone, and 74 m for the 180 dB zone.

A 200 meter shutdown zone will be in effect for ESA-listed species for potential acoustic disturbance caused by clamshell dredging. This activity has been recorded at 124 dB peak at the 150 meter isopleth (Dickerson *et al* 2001). Peak SPLs are generally a few dB higher than rms SPLs. In this instance, we do not know exactly what the difference would be, and while this activity may exceed marine mammal acoustic thresholds at its source, we do not expect this activity to rise above background noise in this industrial area (see *Description of Sound Sources* section for more information), and therefore do not consider take for this activity. Acoustic impacts from clamshell dredging will not be considered further in this document.

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 5. 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 SOT) 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 or removed, is known from a GPS. The location of the animal is estimated as a distance from the observer, which is then compared to the location from the pile. It may then be estimated whether the animal was exposed to sound levels constituting incidental harassment on the basis of predicted distances to relevant thresholds in post-processing of observational and acoustic data, and a precise accounting of observed incidences of harassment created. This information may then be used to extrapolate observed takes to reach an approximate understanding of actual total takes.

Monitoring Protocols—Monitoring would be conducted before, during, and after pile driving and removal 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 or removed. 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 15 minutes prior to initiation through 30 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 Appendix A of the application for details on the marine mammal monitoring plan developed by the MOS with NMFS' cooperation.

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 trained biologists, with the following minimum qualifications:

(a) 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;

(b) Advanced education in biological science or related field (undergraduate degree or higher required);

(c) Experience and ability to conduct field observations and collect data according to assigned protocols (this may include academic experience);

(d) Experience or training in the field identification of marine mammals, including the identification of behaviors;

(e) Sufficient training, orientation, or experience with the construction operation to provide for personal safety during observations;

(f) 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

(g) 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 15 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 15 minutes have passed without re-detection of the animal. Monitoring will be conducted throughout the time required to drive a pile.

Ramp Up or 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.'' The project will utilize soft start techniques for all vibratory and impact pile driving. The MOS will initiate sound from vibratory hammers for fifteen seconds at reduced energy followed by a 1-minute waiting period, with the procedure repeated two additional times. For impact driving, we require an initial set of three strikes from the impact hammer at reduced energy, followed by a 1-minute waiting period, then two subsequent three strike sets. Soft start will be required at the beginning of each day's pile driving work and at any time following a cessation of pile driving of thirty minutes or longer.

If a marine mammal is present within the Level A harassment zone, ramping up will be delayed until the animal(s) leaves the Level A harassment zone. Activity will begin only after the Marine Mammal Observer (MMO) has determined, through sighting, that the animal(s) has moved outside the Level A harassment zone, or if 15 minutes have passed without resighting the animals.

In addition to the measures described later in this section, the MOS would employ the following standard mitigation measures:

(a) Conduct briefings between construction supervisors and crews, marine mammal monitoring team, and other 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.

(b) For in-water heavy machinery work other than pile driving (using, *e.g.,* standard barges, tug boats, barge-mounted excavators, or clamshell equipment used to place or remove material), if a marine mammal comes within 10 m, operations shall cease and vessels shall reduce speed to the minimum level required to maintain steerage and safe working conditions.

Time Restrictions—In-water work would occur only during daylight hours, when visual monitoring of marine mammals can be conducted. To minimize impacts to hooligan, Pacific herring, and capelin, during their spawning and migration period, all in-water pile extraction and installation will be suspended during this time (April 1 through May 31).

Sound attenuation devices—Sound levels can be greatly reduced during impact pile driving using sound attenuation devices. There are several types of sound attenuation devices including bubble curtains, cofferdams, and isolation casings (also called temporary noise attenuation piles [TNAP]), and cushion blocks. The MOS proposes to use bubble curtains and pile caps. Pile caps include a mat that rests on the piles that have been driven into soft or unstable ground to provide a suitable stable foundation, thus reducing sound levels. Bubble curtains create a column of air bubbles rising around a pile from the substrate to the water surface. The air bubbles absorb and scatter sound waves emanating from the pile, thereby reducing the sound energy.

Bubble curtains may be confined or unconfined. An unconfined bubble curtain may consist of a ring seated on the substrate and emitting air bubbles from the bottom. An unconfined bubble curtain may also consist of a stacked system, that is, a series of multiple rings placed at the bottom and at various elevations around the pile. Stacked systems may be more effective than non-stacked systems in areas with high current and deep water (Oestman *et al.,* 2009).

A confined bubble curtain contains the air bubbles within a flexible or rigid sleeve made from plastic, cloth, or pipe. Confined bubble curtains generally offer higher attenuation levels than unconfined curtains because they may physically block sound waves and they prevent air bubbles from migrating away from the pile. For this reason, the confined bubble curtain is commonly used in areas with high current velocity (Oestman *et al.,* 2009).

Both environmental conditions and the characteristics of the sound attenuation device may influence the effectiveness of the device. According to Oestman *et al.* (2009):

- In general, confined bubble curtains attain better sound attenuation levels in areas of high current than unconfined bubble curtains. If an unconfined device is used, high current velocity may sweep bubbles away from the pile, resulting in reduced levels of sound attenuation.
- Softer substrates may allow for a better seal for the device, preventing leakage of air bubbles and escape of sound waves. This increases the effectiveness of the device. Softer substrates also provide additional attenuation of sound traveling through the substrate.
- Flat bottom topography provides a better seal, enhancing effectiveness of the sound attenuation device, whereas sloped or undulating terrain reduces or eliminates its effectiveness.
- Air bubbles must be close to the pile; otherwise, sound may propagate into the water, reducing the effectiveness of the device.
- Harder substrates may transmit ground-borne sound and propagate it into the water column.

The literature presents a wide array of observed attenuation results for bubble curtains (*e.g.,* Oestman *et al.,* 2009; Coleman, 2011;). The variability in attenuation levels is due to variation in design, as well as differences in site conditions and difficulty in properly installing and operating in-water attenuation devices. As a general rule, reductions of greater than 10 dB cannot be reliably predicted. For 36-in piles the average rms reduction with use of the bubble curtain was nine dB, where the averages of all bubble-on and bubble-off data were compared. For 48-in piles, the average SPL reduction with use of a bubble curtain was seven dB for average rms values.

To avoid loss of attenuation from design and implementation errors, the MOS has required specific bubble curtain design specifications, including testing requirements for air pressure and flow prior to initial impact hammer use, and a requirement for placement on the substrate. Bubble curtains shall be used during all impact pile driving. The device will distribute air bubbles around 100 percent of the piling perimeter for the full depth of the water column, and the lowest bubble ring shall be in contact with the mudline for the full circumference of the ring. We considered six dB as potentially the best estimate of average SPL (rms) reduction, assuming appropriate deployment and no problems with the equipment. Therefore, a six dB reduction was used in the MOS's analysis of pile driving noise in the environmental analyses.

Timing Restrictions

In the SOT, designated timing restrictions exist for pile driving activities to avoid in-water work during the hooligan run in the spring (April and May) when marine mammals arrive in huge numbers to feed. The in-water work window is between July and October, to avoid this spawning run. All in-water construction activities will occur during daylight hours (sunrise to sunset)

Contaminant Exposure Mitigation

To minimize the potential for marine mammals to be exposed to harmful or toxic contaminants in the sediment during dredging operations, mitigation measures will be employed. These measures include a partial height silt curtain and contamination sequencing. The objective when using silt curtains is to create a physical barrier around the dredge equipment by protecting against the spread of suspended sediment that is generated during dredging operations in the portion of the water column in which the silt curtain extends. Silt curtains can be effective tools to minimize or reduce potential water quality impacts during dredging, when used properly and in the right site conditions. The silt curtain will be constructed of flexible, reinforced, thermoplastic material with flotation material in the upper hem and ballast material in the lower hem. The curtain will be placed in the water surrounding the dredging operation. The specifications will require that the Contractor maintain the silt curtain(s) around either the point of dredging or the dredging area (and potentially other in-water construction areas) at the contractor's discretion, in order to reduce the potential for water quality impacts and the transport of suspended solids beyond the project dredging boundaries.

Because they are mostly impermeable, silt curtains are easily affected by tides and currents and their effectiveness can be adversely impacted by high current velocities, moderate to large wave conditions, or large tidal variation. The required height of the silt curtain will be determined during subsequent design to determine a height that balances environmental protection and the efficiency to maintain the silt curtain in place during dredging based on tidal and current velocities in the harbor. The effectiveness of the silt curtain will be monitored during construction and changes may be implemented based on the results of monitoring to either enhance the protection of the silt curtain or otherwise make modifications to the silt curtain configuration to provide for more effective dredge operations while still meeting water quality requirements.

Contamination sequencing involves prioritizing the removal of the most impacted areas (*i.e.,* the area with the highest observed concentrations of contaminants of concern) before the surrounding areas. Ultimately, the necessary phasing and sequencing of the overall project (*e.g.,* dock demolition to facilitate remedial dredging) must be taken into consideration along with the safety of the dredging contractor.

Mitigation Conclusions

NMFS has carefully evaluated the applicant's proposed mitigation measures and considered a range of other measures in the context of ensuring that NMFS prescribes the means of affecting the least practicable impact on the affected marine mammal species and stocks and their habitat. Our evaluation of potential measures included consideration of the following factors in relation to one another: (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) prescribed by NMFS should be able to accomplish, have a reasonable likelihood of accomplishing (based on current science), or contribute to the accomplishment of one or more of the general goals listed below:

(1) Avoidance or minimization of injury or death of marine mammals wherever possible (goals 2, 3, and 4 may contribute to this goal).

(2) A reduction in the numbers of marine mammals (total number or number at biologically important time or location) exposed to received levels of pile driving, or other activities expected to result in the take of marine mammals (this goal may contribute to 1, above, or to reducing harassment takes only).

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

(4) A reduction in the intensity of exposures (either total number or number at biologically important time or location to stimuli expected to result in incidental take (this goal may contribute to 1, above, or to reducing the severity of harassment takes only).

(5) Avoidance or minimization of adverse effects to marine mammal habitat, paying particular attention to the prey base, activities that block or limit passage to or from biologically important areas, permanent destruction of habitat, or temporary destruction/disturbance of habitat during a biologically important time.

(6) For monitoring directly related to mitigation—an increase in the probability of detecting marine mammals, thus allowing for more effective implementation of the mitigation.

Based on our evaluation of the applicant's proposed measures, as well as other measures considered by NMFS, NMFS has preliminarily determined that the proposed mitigation measures provide the means of effecting the least practicable impact on marine mammals species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance.

Proposed measures to ensure availability of such species or stock for taking for certain subsistence uses are discussed later in this document (see *Impact on Availability of Affected Species or Stock for Taking for Subsistence Uses* section).

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 MOS submitted a marine mammal monitoring plan as part of the IHA application for this project, which can be found at w*ww.nmfs.noaa.gov/pr/permits/incidental/construction.htm.* The plan may be modified or supplemented based on comments or new information received from the public during the public comment period.

Visual Marine Mammal Observation

The MOS 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 will be trained in marine mammal identification and behaviors and are required to have no other construction-related tasks while conducting monitoring. The MOS will monitor the shutdown zone and disturbance zone before, during, and after pile driving, with observers located at the best practicable vantage points. The Marine Mammal Observers (MMOs) and MOS authorities will meet to determine the most appropriate observation platform(s) for monitoring during pile installation and extraction.

Based on our requirements, the MOS would implement the following procedures for pile driving:

- Individuals meeting the minimum qualifications identified in the applicant's monitoring plan (Appendix A of the application) would monitor Level A and Level B harassment zones during pile driving and extraction activities.
- The area within the Level B harassment threshold for impact driving will be monitored by appropriately stationed MMOs. Any marine mammal documented within the Level B harassment zone during impact driving would constitute a Level B take (harassment), and will be recorded and reported as such.
- During impact and vibratory pile driving, a shutdown zone will be established to include all areas where the underwater SPLs are anticipated to equal or exceed the Level A (injury) criteria for marine mammals (180 dB isopleth for cetaceans; 190 dB isopleth for pinnipeds). Pile installation will not commence or will be suspended temporarily if any marine mammals are observed within or approaching the area.
- The individuals will scan the waters within each monitoring zone activity using binoculars, spotting scopes, and visual observation.
- Use a hand-held or boat-mounted GPS device or rangefinder to verify the required monitoring distance from the project site.
- If poor environmental conditions restricts the observers' ability to make observations within the marine mammal shutdown zone (*e.g.* excessive wind or fog, high beaufort state), pile installation will cease. Pile driving will not be initiated until the entire shutdown zone is visible.
- Conduct pile driving and extraction activities only during daylight hours from sunrise to sunset when it is possible to visually monitor marine mammals.
- The waters will be scanned 15 minutes prior to commencing pile driving at the beginning of each day, and prior to commencing pile driving after any stoppage of 30 minutes or greater. If marine mammals enter or are observed within the designated marine mammal shutdown zone during or 15 minutes prior to pile driving, the monitors will notify the on-site construction manager to not begin until the animal has moved outside the designated radius.
- The waters will continue to be scanned for at least 30 minutes after pile driving has completed each day, and after each stoppage of 30 minutes or greater.

Data Collection

We require that observers use approved data forms. Among other pieces of information, the MOS 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 MOS will attempt to distinguish between the number of individual animals taken and the number of incidents of take. We require that, at a minimum, the following information be collected on the sighting forms:

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

In the unanticipated event that the specified activity clearly causes the take of a marine mammal in a manner prohibited by the IHA (if issued), such as serious injury or mortality (*e.g.,* ship-strike, gear interaction, and/or entanglement), the MOS would immediately cease the specified activities and immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, and the Alaska Stranding Coordinator. The report would include the following information:

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

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

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

The report would include the same information identified in the paragraph above. Activities would be able to continue while NMFS reviews the circumstances of the incident. NMFS would work with the MOS to determine whether modifications in the activities are appropriate.

In the event that the MOS discovers an injured or dead marine mammal, and the lead MMO determines that the injury or death is not associated with or related to the activities authorized in the IHA (*e.g.,* previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), the MOS would report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, and the NMFS West Coast Stranding Hotline and/or by email to the Alaska Stranding Coordinator, within 24 hours of the discovery. The MOS would provide photographs or video footage (if available) or other documentation of the stranded animal sighting to NMFS and the Marine Mammal Stranding Network.

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 pile driving and removal. Level B harassment may result in temporary changes in behavior. Note that Level A harassment and lethal takes are not expected due to the proposed mitigation and monitoring measures that are expected to minimize the possibility of such take.

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, and if so potentially 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.

Upland work can generate airborne sound and create visual disturbance that could potentially result in disturbance to marine mammals (specifically, pinnipeds) that are hauled out or at the water's surface with heads above the water. However, because any haul-outs in close proximity to the SOT would be subsumed in the disturbance zone, incidents of incidental take resulting from airborne sound or visual disturbance would already be included in those counts.

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 incidences of take.

Sound Thresholds

We use the following 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. These thresholds (Table 4) 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 4—CURRENT ACOUSTIC EXPOSURE CRITERIA

Criterion	Criterion definition	Threshold *
Level A harassment (underwater)	PTS (injury) conservatively based on TTS **	190 dB RMS for pinnipeds, 180 dB RMS for cetaceans.
Level B harassment (underwater)	Behavioral disruption	160 dB RMS (impulsive source), 120 dB RMS (continuous source).
Level B harassment (airborne)	Behavioral disruption	90 dB (harbor seals), 100dB (other pinnipeds) (unweighted).

* All decibel levels referenced to 1 micropascal (re: 1 μPa). Note all thresholds are based off root mean square (RMS) levels.
** PTS = Permanent Threshold Shift; TTS = Temporary Threshold Shift.

Distance to Sound Thresholds

The sound field in the project area is the existing ambient noise plus additional construction noise from the proposed project. The primary components of the project expected to affect marine mammals is the sound generated by impact pile driving, vibratory pile driving, and vibratory pile removal. Dredging and direct pull and clamshell removal of old timber piles do not produce noise levels expected to result in take of marine mammals. This activity has been recorded at 124 dB peak at the 150 meter isopleth (Dickerson *et al* 2001). While this activity may exceed marine mammal acoustic thresholds at its source, we do not expect this activity to rise above background noise in this industrial area, and therefore do not consider take for this activity. Depending on conditions, removal of timber piles may require vibratory hammer removal. Impact hammering typically generates the loudest noise associated with pile driving.

The project includes vibratory removal of steel piles and creosote-treated piles, summarized in Table 1; and vibratory installation of 24-, 36-, 48-, and 60-inch diameter steel pipe piles, summarized in Table 2. The Washington State Department of Transportation (WSDOT) and California Department of Transportation have compiled acoustic monitoring data for various pile-driving projects within their respective states (WSDOT unpublished; ICF Jones & Stokes and Illingworth and Rodkin 2009, updated in 2012). Upon review of these datasets, it was determined that driving moderate-sized steel piles with a vibratory pile driver will generate sound pressure levels (SPLs) of 170 dB RMS (ICF Jones & Stokes and Illingworth and Rodkin 2009, updated in 2012). Noise levels are on the order of 150 dB rms from pile removal activities.

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:

TL = transmission loss in dB
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

A practical spreading value of fifteen is often used under conditions, such as at the Skagway ore terminal, 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.

Distances to the harassment isopleths vary by pile type and size, and by pile extraction/driving tool. These distances are summarized in Table 5. Note that the actual area ensonified by pile driving or removal activities is significantly constrained by local topography relative to the total threshold radius. The actual ensonified area was determined using a straight line-of-sight projection from the anticipated pile driving locations. Distances shown in Table 5 are estimated for free-field conditions, but areas are calculated per the actual conditions of the action area. See Figures 2–5 of the MOS'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 or removal.

TABLE 5—DISTANCES TO RELEVANT UNDERWATER SOUND THRESHOLDS AND AREAS OF ENSONIFICATION

Pile type	Pile size (in)	Distance to criterion (m)				Area (km^2)
		Level B (160 dB)	Level A cetaceans (180 dB)	Level A pinnipeds (190 dB)	Continuous (120dB)	
Impact	24	1,848	86	18		3.93, 0.072, 0.031.*
	36	1,585	74	16		3.00, 0.064, 0.029.*
	48	2,154	100	22		4.96, 0.082, 0.033.*
Vibratory	60				100,000	21.
Vibratory removal	12				1,600	3.05.

* Values are for 160 dB, 180 dB, and 190 dB, respectively.

Marine Mammal Densities

Density data are only available for harbor seals for this area of Alaska. Potential exposures to impact and vibratory pile driving noise for each threshold for all other marine mammals were estimated using published reports of group sizes and population estimates, and anecdotal observational reports from local commercial entities. It is not currently possible to identify all observed individuals to stock. All estimates are conservative and include the following assumptions:

- All pilings installed at each site would have an underwater noise disturbance equal to the piling that causes the greatest noise disturbance (*i.e.,* the piling farthest from shore) installed with the method that has the largest ZOI. The largest underwater disturbance ZOI would be produced by vibratory driving steel piles. The ZOIs for each threshold are not spherical and are truncated by land masses on either side of the channel which would dissipate sound pressure waves.
- Exposures were based on estimated work days. Numbers of days were based on an average production rate of 73 days of vibratory and impact driving and 39 days of pile removal. Note that impact driving is likely to occur only on days when vibratory driving occurs.
- 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,
- 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:

Level B exposure estimate = N (number of animals) in the ensonified area * Number of days of noise generating activities

There are a number of reasons why estimates of potential incidents of take may be overestimates of the number of individuals taken, assuming that available 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 represents the number of instances of take that may occur to a small number of individuals, with a notably smaller number of animals being exposed more than once per individual. 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, especially if each take is considered a separate individual animal, and especially for pinnipeds. See Table 6 for total estimated incidents of take.

TABLE 6—CALCULATIONS FOR INCIDENTAL TAKE ESTIMATION

Species	N (animals) in the ensonified area	Number of days of activity	Proposed authorized takes	
			Level A	Level B
Harbor Seal	44	74	0	2,272
Steller sea lion	32	74	0	1,184
Humpback whale	2	42	0	84
Killer whale	15	4	0	60
Harbor porpoise	2	84	0	168
Dall's porpoise	3	15	0	45
Minke whale	0	0	0	0
Total exposures			0	3,813

Description of Marine Mammals in the Area of the Specified Activity

Harbor Seals

There are no documented long-term haulout sites for harbor seals in Taiya Inlet; however, seasonal haulouts are present within five miles of the project area at Seal Cove and at the mouth of the Taiya River. During the spring run of hooligan in April and May, 20 to over 100 individual animals have been observed in these areas, with animals within inner Taiya Inlet actively feeding. After the spawning run, much lower numbers of harbor seals are present. Local observers have found that very few, if any; harbors seals are present during the winter (R. Ford and K. Gross, personal communications). Harbor seals within the Lynn Canal/Stephens Passage stock have maintained a steady to slightly declining population over the past five years. The latest stock assessment analysis indicates that there is a 71 percent probability that the stock has declined by 1.8 percent over this period (Muto and Angliss 2015). Using seal stock assessment data from within the Lynn Canal/Stephens Passage stock, the calculated density of this stock is 1.7 animals per square kilometer (total population divided by total area). This density was applied to the area within the behavioral impact zone for vibratory driving (21 square kilometers, which includes most of Taiya Inlet) for a total of 36 animals in the whole of Taiya Inlet. These animals are mostly on haulouts in the vicinity of Seal Cove, swimming in areas near the waterfront, and hauled out at the mouth of the Taiya River. Proposed pile driving will occur in March, and in July through October, avoiding the hooligan spawning run and the period of maximum local abundance of harbor seals.

Because harbor seal numbers decrease after the spring hooligan spawning run, we estimate that the number of local animals within the behavioral zones is estimated to be eight animals (one half of the mean range within the lower inlet). This estimate is based on the conservative assumption that about half of the animals hauled out at Seal Cove and the Taiya River mouth may be transiting through the behavioral zone for vibratory driving at any given time during the summer (14 days), for a total of 112 takes. The haulouts themselves are outside of the behavioral impact zones, approximately five miles from the project area. No exposure to the injury zone is expected because of the mitigation measures designed to prevent Level A harassment. It is expected that the marine mammal monitoring program will significantly prevent injury take in this zone. Based on calculated density estimates mentioned above, all 36 animals will be exposed to the continuous noise behavioral zone, which includes most of Taiya Inlet for all days when pile driving activities are expected to occur (60 days) for a total of 2,160 takes during this time period. Total requested harbor seal takes is 2,272.

Steller Sea Lion

There are several long-term Steller sea lion haulouts in Lynn Canal but none occur in Taiya Inlet. The nearest long-term Steller sea lion haulout is located at Gran Point, in the vicinity of Haines approximately 20 miles south of Skagway. Other year-round haulouts in Lynn Canal are present at Met Point, Benjamin Island, and Little Island, closer to Juneau (Fritz *et al.* 2015). A seasonal haulout site is located on Taiya Point rocks at the southern tip of Taiya Inlet. Estimates of 25 to 40 animals use this haulout for about three weeks during the hooligan run, during which they frequent the inlet (K. Gross, personal communication). However, most animals leave the inlet shortly after the hooligan run and are scarce after about the first week in June. Sea lions are rarely observed in the inlet during the winter. This is consistent with the National Marine Mammal Laboratory database (Fritz *et al.,* 2015), which has identified the largest number of Lynn Canal sea lions during the fall and winter months at Benjamin Island in the lower reaches of the canal.

Taiya Point Rocks are located approximately 12 miles south of Skagway and 1.3 miles outside of the continuous noise vibratory behavioral impact zone. Given that sea lion presence in Taiya Inlet occurs during the hooligan run, during which no pile driving will occur, and the nearest haulout site is outside of the behavioral impact zone, it is expected that Steller sea lion exposure to pile driving will be low. This is similar to observations from local observers, who have reported one to three sea lions in Taiya Inlet outside of the hooligan spawning run (K. Gross, personal communication). Sea lions have been observed in greater numbers in nearby Lutak Inlet in the fall during salmon runs, and at the Gran Point haulout near Haines. These observations and data suggest that it is reasonable to expect more sea lions to travel into Taiya Inlet (J. Womble, personal communication). There have been no observations of Steller sea lions in Taiya Inlet during the winter. Because Steller sea lions are sparse at times outside of the hooligan spawning run, but a portion of the hauled out seals may enter Taiya inlet during the salmon runs, we estimated that 16 Steller sea lions (half of the mean found on Taiya Rocks during the hooligan run) will be present within Taiya Inlet during any given time while pile driving and pile removal operations are occurring in the summer and fall (60 and 14 days, respectively), for a total of 1,184 total takes for Steller sea lions. Exposure to pile-driving and removal activities during the winter is not expected to occur. No Steller sea lions are expected to be exposed to the small injury zone near the facility. If any do appear, the marine mammal monitoring program would effectively prevent take.

Harbor Porpoises

Harbor porpoise primarily frequent coastal waters, and in the Gulf of Alaska and Southeast Alaska, they occur most frequently in waters less than 100 meters (Dahlheim *et al.* 2009). Within the inland waters of Southeast Alaska, the harbor porpoise distribution is clumped, with greatest densities observed in the Glacier Bay/Icy Strait region, and near Zarembo and Wrangell Islands and the adjacent waters of Sumner Strait (Allen and Angliss 2014). Dedicated research studies of harbor porpoise in this area only occur as far north in Lynn Canal as Haines during the summer (Dahlheim *et al.,* 2009; 2015); approximately 16 miles south of SOT. Group sizes were on average, between 1.37–1.59 animals (less than 2) (Dahlheim *et al.,* 2009; 2015). In Lynn Canal, observations were less frequent, primarily in lower Lynn Canal from Chatham Strait to Juneau. The species has been observed as far north as Haines during the summer (Dahlheim *et al.,* 2009, Dalheim *et al.,* 2015). Encounters of small groups of two or three animals have been reported by local vessel charters from spring through fall in Taiya Inlet. Observations have been frequent, but not on a daily basis. The mean group size of harbor porpoise in Southeast Alaska is estimated at two individuals (Dahlheim *et al.* 2009). For the purposes of this analysis it is estimated that two harbor porpoises will be present in Taiya Inlet, but because observations do not occur daily, we estimate their presence within the inlet on 75 percent of days during the pile driving period (84 days) for a total of 168 take exposures. Exposure to the behavioral disturbance zone from impact pile driving or pile removal is not likely to occur, because the species has rarely been observed in areas close to the waterfront.

Dall's Porpoise

Dall's porpoise are widely distributed across the entire North Pacific Ocean. Throughout most of the eastern North Pacific they are present during all months of the year, although there may be seasonal onshore-offshore movements along the west coast of the continental United States and winter movements of populations out of Prince William Sound and areas in the Gulf of Alaska and Bering Sea (Allen and Angliss 2014).

Dahlheim *et al.* (2009) found Dall's porpoise throughout Southeast Alaska, with concentrations of animals consistently found in Lynn Canal, Stephens Passage, Icy Strait, upper Chatham Strait, Frederick Sound, and Clarence Strait. Local observers have observed only three to six Dall's porpoises in Taiya Inlet during the early spring and late fall. Observations have been occasional to sporadic, not occurring daily. The species has not been observed near the waterfront, and no animals have been observed during the winter (K. Gross, personal communication). This is consistent with Dahlheim *et al.* (2009), who have only documented this species in Lynn Canal as far north as Haines, Alaska, about 15 miles south of Skagway and 5 miles south of the continuous noise behavioral impact zone. The mean group size of Dall's porpoise in Southeast Alaska is estimated at three individuals (Dahlheim *et al.* 2009). For the purposes of this analysis, we estimate that three animals will be present in outer Taiya Inlet for the latter half of the summer pile-driving period. Since observations during the fall have been occasional, we also assume a presence in the inlet every other day, for a total of 15 days of exposure, and 45 total takes. Exposure to the behavioral disturbance zone from impact pile driving or pile removal is not likely to occur, because the species has rarely been observed in areas close to the waterfront.

Killer Whales

Resident and transient killer whales have been documented in the middle to lower reaches of Lynn Canal, but not within the upper reaches or in Taiya Inlet (Dahlheim *et al.,* 2009). Two resident pods identified as AF and AG pods were frequently encountered throughout Icy Strait, Lynn Canal, Stephens Passage, Frederick Sound and upper Chatham Strait (Dahlheim *et al.,* 2009). The seasonality of resident killer whales could not be investigated statistically owing to low encounter rates. Mean group size of resident whales did not vary significantly among seasons and ranged from 19 to 33 individuals.

Transient killer whales were found in all major waterways, including Lynn Canal in open-strait environments, near-shore waters, protected bays and inlets, and in ice-laden waters near tidewater glaciers (Dahlheim *et al.* 2009). Dahlheim *et al.* (2009) found that transient killer whale mean group size ranged from four to six individuals in Southeast Alaska. Transient killer whale numbers were highest in summer, with lower numbers observed in spring and fall. Although this stock's range includes southeast Alaska, it has only been documented as far north as Lynn Canal; therefore, while possible, occurrence north of Lynn Canal into Taiya Inlet is rare.

Local observations indicate that resident pods occasionally enter Taiya Inlet, usually a group of 15 to 20 animals. These animals are typically observed only a few times a year (K. Gross, personal communication). In 2015 a resident pod was only observed in Taiya Inlet twice, remaining for one to four days per visit (K. Gross, personal communication). Based on these observations, we conservatively used the larger group size for all killer whale stocks (Northern residents), and the likelihood of stocks being present, to estimate a maximum of 60 killer whale takes (*e.g.* for Northern residents, at most, 15 killer whales may enter the inlet on two occasions during the summer, remaining in the inlet for two days per visit. All other stocks would likely be smaller in group size, and not occur as frequently).

Humpback Whale

Humpback whales are the most commonly observed baleen whale in the area and surrounding Southeast Alaska, particularly during spring and summer months. Humpback whales in Alaska, although not limited to these areas, return to specific feeding locations such as Frederick Sound, Chatham Strait, North Pass, Sitka Sound, Glacier Bay, Point Adolphus, and Prince William Sound, as well as other similar coastal areas (Wing and Krieger 1983). In Lynn Canal they have been observed in the spring and fall from Haines to Juneau. Scientific surveys have not documented the species within Taiya Inlet (Dahlheim *et al.,* 2009). The humpback whale population in Southeast Alaska appears to be increasing with estimates of 547 animals in the mid-1980s (Angliss and Outlaw 2005) and 961 animals in 2000 (Straley *et al.,* 2002).

Local observers have reported humpback whales in Taiya Inlet, sometimes fairly close to the Skagway waterfront. In 2015, only one whale was observed for a few weeks close to Skagway. On average, four to five individuals may occur near the town during the spring hooligan run, after which, only a few individuals are observed on and off through the summer (K. Gross, personal communication). No pile driving will occur during the spring hooligan run. For the purpose of this analysis, because humpback whale occurrence is rare and generally occurs in the spring when construction will not occur, it is estimated that two humpback whales may be present over two 3-week periods (42 days) during the summer, for a total of 84 takes. Exposure to the behavioral disturbance zone from impact pile driving or pile removal is not likely to occur, because the species has rarely been observed in areas close to the waterfront.

Analysis and Preliminary Determinations

Negligible Impact

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

To avoid repetition, the discussion of our analyses applies generally to all the species listed in Table 3, given that the anticipated effects of this pile driving project on marine mammals are expected to be relatively similar in nature. Where there are species-specific factors that have been considered, they are identified below.

Pile extraction and pile driving, activities associated with the reconstruction of the SOT, 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), from underwater sounds generated from pile driving and removal. Potential takes could occur if individuals of these species are present in the ensonified zone when pile driving and removal are under way.

The takes from Level B harassment will be due to potential behavioral disturbance and TTS. No mortality is anticipated given the nature of the activity 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 (see *Proposed Mitigation* section). Vibratory driving does not have significant potential to cause injury to marine mammals due to the relatively low source levels produced and the lack of potentially injurious source characteristics. Impact driving does have the potential to injure marine mammals; however; the marine mammal detection ability by trained observers is high under the environmental conditions described for the reconstruction of the SOT, which further enables the implementation of shutdowns to limit injury, serious injury, or mortality.

The MOS's proposed activities are localized and of relatively short duration (maximum 73 days for pile driving activities; 39 days for pile removal, and a maximum of 40 days of dredging). The entire project area is limited to the SOT area and its immediate surroundings. These localized and short-term noise exposures may cause short-term behavioral modifications in harbor seals, Steller sea lions, killer whales, harbor porpoises, Dall's porpoises, and humpback whales. Moreover, the proposed mitigation and monitoring measures, including injury shutdowns, soft start techniques, and multiple MMOs monitoring the behavioral and injury zones for marine mammal presence, are expected to reduce the likelihood of injury and behavior exposures. Additionally, no important feeding and/or reproductive areas for marine mammals are known to be within the ensonification areas of the proposed action area during the construction time frame.

The project also is not expected to have significant adverse effects on affected marine mammals' habitat. The project activities would not modify existing marine mammal habitat for a significant amount of time. The activities may cause some fish to leave the area of disturbance, thus temporarily impacting marine mammals' foraging opportunities in a limited portion of the foraging range; but, because of the short duration of the activities and the relatively small area of the habitat that may be affected, the impacts to marine mammal habitat are not expected to cause significant or long-term negative consequences.

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; Lerma, 2014). 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. Repeated exposures of individuals to levels of sound that may cause Level B harassment are unlikely to result in permanent hearing impairment or to significantly disrupt foraging behavior due to the lack of quality foraging habitat near the ore terminal. Thus, even repeated Level B harassment of some small subset of the overall stock is unlikely to result in any significant realized decrease in fitness for the affected individuals, and thus would not result in any adverse impact to the stock as a whole.

In summary, this negligible impact analysis is founded on the following factors: (1) The possibility of non-auditory injury, serious injury, or mortality may reasonably be considered discountable; (2) the anticipated instances of Level B harassment consist of, at worst, temporary modifications in behavior or potential TTS and; (3) the presumed efficacy of the proposed mitigation measures in reducing the effects of the specified activity to the level of least practicable impact. 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 reasonably expected to and is not reasonably likely to adversely affect the marine mammal species or stocks through effects on annual 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, NMFS preliminarily finds that the total marine mammal take from the MOS's reconstruction of the SOT will have a negligible impact on the affected marine mammal species or stocks.

Small Numbers Analysis

Table 7 demonstrates the number of animals that could be exposed to received noise levels that could cause Level B behavioral harassment for the proposed work at the SOT project site. The numbers of animals authorized to be taken for all species would be considered small relative to the relevant stocks or populations even if each estimated taking occurred to a new individual—an extremely unlikely scenario. The total percent of the population for which take is requested is less than one percent for humpback whales (Central North Pacific stock), and less than 2.5 percent for affected stocks of Steller sea lions (eDPS and wDPS) and harbor porpoise (Southeast Alaska stock). The most recent abundance estimate (83,400) for the affected stock of Dall's porpoise (Alaska stock) is over 20 years old (Allen and Angliss 2012); therefore, the stock size is unknown for Dall's porpoise. The total percent of the population for which take is requested is therefore also unknown; however, the 45 total take requests is a small enough number that it would be considered a small percent of this stock, which we know is fairly large based on anecdotal information. For killer whales (Alaska stock, Northern resident stock, Gulf of Alaska stock, and West Coast transient stock) and harbor seals (Lynn Canal/Stephens Passage stock), the percentage of the stock for which take is requested is less than 25 percent for all affected stocks. For pinnipeds, especially harbor seals occurring in the vicinity of the SOT, there will almost certainly be some overlap in individuals present day-to-day, and these takes are likely to occur only within some small portion of the overall regional stock.

The total authorized take for killer whales as compared to each potentially affected stock ranges from 2.7% to 24.7% of each population. In reality, it is highly unlikely that 60 individuals of any one killer whale stock will not be temporarily harassed. Instead, it is assumed that there will be a relatively short period of takes of a smaller number of the same individuals from any stock. We make this assumption because resident pods are known to occasionally frequent Taiya Inlet. It is possible that all or part of these pods will enter the disturbance zone once or twice during the course of the project. Therefore, we can conservatively estimate that, because of the gregarious nature of killer whales, a single pod of resident (15–20) killer whales may occur in the disturbance zone once or twice during the course of the project. All other stocks are rare in this area; however their range includes southeast Alaska, and therefore they may occur in the upper reaches of Lynn Canal into Taiya inlet towards Skagway, albeit infrequently. Because of this, it is assumed that the Northern resident stock is the stock most likely to be affected. However, there is a small chance that a small number of individuals of other stocks may be potentially affected. For example, transient stocks have only been observed in Lynn Canal (outside of the area of ensonification), so it likely that—if this stock were to enter the area of ensonification— the number of transients exposed would be much smaller than the take estimate for all killer whales (*e.g.* average group size of 4–6 individuals with few occurrences in the area), and would therefore be a smaller percentage of the stock abundance than what is calculated by comparing the total authorized take for all killer whales to the abundance of this stock. Therefore, we assume that the 60 takes will actually affect a smaller number of the same individuals of killer whales from any stock.

Take requests are assumed to include multiple harassments of the same individual(s), resulting in estimates of Take Request Percent of Stock that are high compared to actual take that will occur. This is the case with the harbor seal (Lynn Canal/Stephens Passage stock). As reported, a small number of harbor seals, most of which reside in Taiya Inlet year-round, will be exposed to vibratory pile driving and removal for nearly 4 months. The total population estimate in the Lynn Canal/Stephens Passage stock is 9,478 animals over 1.37 million acres of area. This is a density of 36 animals within Taiya Inlet. The largest Level B harassment Zone within the inlet occupies 21.0 square kilometers, which represents less than 0.4 percent of the total geographical area occupied by the stock. The great majority of these exposures will be to the same animals that have habituated to pile driving and pile removal activities within the inlet and the general port activities associated with the Skagway waterfront. Given that the Taiya Inlet area represents less than 0.4 percent of the total stock area, broader impacts to this stock are highly unlikely. In addition, marine mammal monitoring for the project can provide an early alert in the unlikely event that cumulative exposure of seals residing in the area is leading to adverse behavioral or physical effects.

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, which are expected to reduce the number of marine mammals potentially affected by the proposed action, NMFS finds that small numbers of marine mammals will be taken relative to the populations of the affected species or stocks.

TABLE 7—ESTIMATED NUMBERS AND PERCENTAGE OF STOCK THAT MAY BE EXPOSED TO LEVEL B HARASSMENT

Species	Proposed authorized takes	Stock(s) abundance estimate [1]	Percentage of total stock
Harbor Seal (*Phoca vitulina*)	2,272	9,478	24
Lynn Canal/Stephens Passage Stock			
Steller Sea Lion (*Eumetopias jubatus*)			
wDPS Stock	1,184	49,497	2.4
eDPS Stock		60,131	2.0
Harbor Porpoise (*Phocoena phocoena*) *Southeast Alaska Stock*	168	11,146	1.5
Dall's porpoise *(Phocoenidae dalli) Alaska Stock*	45	unknown	n/a
Killer Whale (*Orcinus orca*)			
Alaska stock		2,347	2.6
Northern resident stock	60	261	23
Gulf of Alaska stock		587	10.2
West coast transient stock		243	24.7
Humpback whale (*Megaptera novaeangliae*) *Central North Pacific Stock*	84	10,252	0.82

[1] All stock abundance estimates presented here are from the draft 2015 Alaska Stock Assessment Report.

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, which are expected to reduce the number of marine mammals potentially affected by the proposed action, NMFS preliminarily finds that small numbers of marine mammals will be taken relative to the populations of the affected species or stocks.

Impact on Availability of Affected Species for Taking for Subsistence Uses

Alaska Natives have traditionally harvested subsistence resources in Alaska for many hundreds of years, particularly Steller sea lions and harbor seals. The proposed Project will occur near but not overlap the subsistence area used by the villages of Hoonah and Angoon (Wolfe *et al.* 2013). Since all project activities will take place within the immediate vicinity of the SOT, the project will not have an adverse impact on the availability of marine mammals for subsistence use at locations farther away. No disturbance or displacement of sea lions or harbor seals from traditional hunting areas by activities associated with the SOT project is expected. No changes to availability of subsistence resources will result from SOT project activities.

Endangered Species Act (ESA)

There are two marine mammal species that are listed as endangered under the ESA with confirmed or possible occurrence in the study area: humpback whales and western DPS of Steller sea lions. Under section 7 of the ESA, the United States Army Corps of Engineers (USACE) has begun consultation with NMFS on the proposed pile driving activities. NMFS will also consult internally on the issuance of an IHA under section 101(a)(5)(D) of the MMPA for this activity. Consultation will be concluded prior to a determination on the issuance of an IHA.

National Environmental Policy Act (NEPA)

NMFS is preparing an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) and will consider comments submitted in response to this notice as part of that process. The EA will be posted at *http://www.nmfs.noaa.gov/pr/permits/incidental/construction.htm* once it is finalized. NMFS is currently conducting an analysis, pursuant to NEPA, to determine whether or not this proposed activity may have a significant effect on the human environment. This analysis will be completed prior to the issuance or denial of this proposed IHA.

Proposed Incidental Harassment Authorization

As a result of these preliminary determinations, we propose to issue an IHA to the MOS for conducting the Skagway Gateway Initiative Project, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated. The proposed IHA language 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 from July 1, 2016 through June 30, 2017.

2. This Authorization is valid only for in-water construction work associated with the Skagway Gateway Initiative Project at the Skagway Ore Terminal.

3. General Conditions.

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

(b) The species authorized for taking include humpback whale (*Megaptera navaeangliae*), killer whale (*Orcinus orca*), Steller sea lion (*Eumatopius jubatus),* harbor porpoise (*Phocoena phocoena*), Dall's porpoise (*Phocoenoides dalli*), and harbor seal (*Phoca vitulina richardii*).

(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	N (animals)	Number of days of activity	Proposed authorized takes	
			Level A	Level B
Harbor Seal	44	74	0	2,272
Steller sea lion	32	74	0	1,184
Humpback whale	2	42	0	84
Killer whale	15	4	0	60
Harbor porpoise	2	84	0	168
Dall's porpoise	3	15	0	45
Total exposures			0	3,813

(d) The taking by injury (Level A harassment), serious injury, or death of any of the species listed in condition 3(b), 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 MOS shall conduct briefings between construction supervisors and crews, marine mammal monitoring team, and staff prior to the start of all in-water pile driving, 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) Time Restriction: For all in-water pile driving activities, the MOS shall operate only during daylight hours when visual monitoring of marine mammals can be conducted. All in-water pile extraction and installation shall be completed by March 31, 2017.

(b) Establishment of Level B Harassment (ZOI)

(i) For vibratory driving, the Level B harassment area is contained within Taiya Inlet, approximately 17 km from the action area. This distance will serve as a shutdown zone for all other marine mammals not listed in 3(b). During impact driving, the Level B harassment zone shall extend to a minimum of 1,585 m for animals listed in 3(b). This 1,585-meter distance will serve as a shutdown zone for all other marine mammals not listed in 3(b).

(c) Establishment of shutdown zone.

(i) A 16-meter shutdown zone will be in effect for Steller sea lions and harbor seals. The shutdown zone for Level A injury to cetaceans would be 74 meters.

(d) The Level A and Level B harassment zones will be monitored throughout the time required to install or extract a pile. If a marine mammal is observed entering the Level B harassment zone, a Level B exposure will be recorded and behaviors documented. That pile segment will be completed without cessation, unless the animal approaches the Level A shutdown zone. Pile installation will be halted immediately before the animal enters the Level A zone.

(e) Use of Ramp Up/Soft Start.

(i) The project will utilize soft start techniques for all vibratory and impact pile driving. We require the MOS to initiate sound from vibratory hammers for fifteen seconds at reduced energy followed by a 1-minute waiting period, with the procedure repeated two additional times. For impact driving, we require an initial set of three strikes from the impact hammer at reduced energy, followed by a 1-minute waiting period, then two subsequent three strike sets.

(ii) Soft start will be required at the beginning of each day's pile driving work and at any time following a cessation of pile driving of 30 minutes or longer.

(iii) If a marine mammal is present within the shutdown zone, ramping up will be delayed until the animal(s) leaves the Level A harassment zone. Activity will begin only after the MMO has determined, through sighting, that the animal(s) has moved outside the Level A harassment zone or if 15 minutes have passed without re-sighting of the individual.

(iv) If a marine mammal is present in the Level B harassment zone, ramping up will begin and a Level B take will be documented. Ramping up will occur when these species are in the Level B harassment zone whether they entered the Level B zone from the Level A zone, or from outside the project area.

(v) If any marine mammal other than those listed in this IHA is present in the Level B harassment zone, ramping up will be delayed until the animal(s) leaves the zone. Ramping up will begin only after the MMO has determined, through sighting, that the animal(s) has moved outside the harassment zone.

(f) Sound attenuation devices—Approved sound attenuation devices shall be used during impact pile driving operations. The MOS shall implement the necessary contractual requirements to ensure that such devices are capable of achieving optimal performance, and that deployment of the device is implemented properly such that no reduction in performance may be attributable to faulty deployment.

(g) Contaminant exposure mitigation measures—A silt curtain and a contamination sequence will be used during all dredging activities.

(i) The silt curtain will be constructed of flexible, reinforced, thermoplastic material with flotation material in the upper hem and ballast material in the lower hem. The curtain will be placed in the water surrounding the dredging operation. The specifications will require that the Contractor maintain the silt curtain(s) around either the point of dredging or the dredging area at the contractor's discretion. The effectiveness of the silt curtain will be monitored during construction.

(ii) The contractor will prioritize the removal of the most impacted areas (*i.e.,* the area with the highest observed concentrations of contaminants of concern) before the surrounding areas.

(h) Standard mitigation measures.

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

(ii) For in-water heavy machinery work other than pile driving (*e.g.,* standard barges, tug boats, barge-mounted excavators, or clamshell equipment used to place or remove material), if a marine mammal comes within 10 meters, operations shall cease and vessels shall reduce speed to the minimum level required to maintain steerage and safe working conditions.

(i) The MOS shall establish monitoring locations as described below.

5. Monitoring and Reporting

The holder of this Authorization is required to report all monitoring conducted under the IHA within 90 calendar days of the completion of the marine mammal monitoring

(a) Visual Marine Mammal Monitoring and Observation

(i) At least one individual meeting the minimum qualifications identified in Appendix A of the application by the MOS will monitor the shutdown and Level B harassment zones during impact and vibratory pile driving.

(ii) During pile driving and extraction, the shutdown zone, as described in 4(b), will be monitored and maintained. Pile installation or extraction will not commence or will be suspended temporarily if any marine mammals are observed within or approaching the area of potential disturbance.

(iii) The area within the Level B harassment threshold for pile driving and extraction will be monitored by observers stationed to provide adequate view of the harassment zone. Marine mammal presence within this Level B harassment zone, if any, will be monitored. Pile driving activity will not be stopped if marine mammals are found to be present. Any marine mammal documented within the Level B harassment zone during impact driving would constitute a Level B take (harassment), and will be recorded and reported as such.

(iv) The individuals will scan the waters within each monitoring zone activity using binoculars, spotting scopes, and visual observation.

(v) If waters exceed a sea-state, or poor environmental conditions restricts the observers' ability to make observations (*e.g.* excessive wind or fog), impact pile installation will cease until conditions allow the resumption of monitoring.

(vi) The waters will be scanned 30 minutes prior to commencing pile driving or removal at the beginning of each day, and prior to commencing pile driving or removal after any stoppage of 30 minutes or greater. If marine mammals enter or are observed within the designated marine mammal shutdown zone during or 30 minutes prior to impact pile driving, the monitors will notify the on-site construction manager to not begin until the animal has moved outside the designated radius.

(vii) The waters will continue to be scanned for at least 30 minutes after pile driving has completed each day,

(b) Data Collection

(i) Observers are required to use approved data forms. Among other pieces of information, the MOS 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 MOS will attempt to distinguish between the number of individual animals taken and the number of incidents of take. At a minimum, the following information be collected on the sighting forms:

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

(c) Reporting Measures

(i) In the unanticipated event that the specified activity clearly causes the take of a marine mammal in a manner prohibited by the IHA, such as an injury (Level A harassment), serious injury or mortality (*e.g.,* ship-strike, gear interaction, and/or entanglement), the MOS would immediately cease the specified activities and immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, and the Alaska Regional Stranding Coordinators. The report would include the following information:

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

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

(iii) In the event that the MOS discovers an injured or dead marine mammal, and the lead MMO determines that the cause of the injury or death is unknown and the death is relatively recent (*i.e.,* in less than a moderate state of decomposition as described in the next paragraph), the MOS would immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, and the Alaska Stranding Hotline and/or by email to the Alaska Regional Stranding Coordinators. The report would include the same information identified in the paragraph above. Activities would be able to continue while NMFS reviews the circumstances of the incident. NMFS would work with the MOS to determine whether modifications in the activities are appropriate.

(iv) In the event that the MOS discovers an injured or dead marine mammal, and the lead MMO determines that the injury or death is not associated with or related to the activities authorized in the IHA (*e.g.,* previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), the MOS would report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, and the NMFS Alaska Stranding Hotline and/or by email to the Alaska Regional Stranding Coordinator, within 24 hours of the discovery. The DOT&PF would provide photographs or video footage (if available) or other documentation of the stranded animal sighting to NMFS and the Marine Mammal Stranding Network.

6. MOS is required to comply with the Reasonable and Prudent Measures and Terms and Conditions of the ITS corresponding to NMFS' Biological Opinion issued to both U.S. Army Corps of Engineers and NMFS' Office of Protected Resources.

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

NMFS requests comment on our analysis, the draft authorization, and any other aspect of the Notice of Proposed IHA for the Skagway Gateway Initiative Project. Please include with your comments any supporting data or literature citations to help inform our final decision on MOS's request for an MMPA authorization.

Dated: April 22, 2016.

Perry F. Gayaldo,

Deputy Director, Office of Protected Resources, National Marine Fisheries Service.

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