



DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

[RIN 0648-XA858]

Taking of Marine Mammals Incidental to Specific Activities; Taking of Marine Mammals Incidental to Pile Driving and Removal Activities during Construction of the Hoonah Marine Industrial Center Cargo Dock Project, Hoonah, Alaska

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

ACTION: Notice; proposed incidental harassment authorization; request for comments on proposed authorization and possible renewal.

SUMMARY: NMFS has received a request from the City of Hoonah (City) for authorization to take marine mammals incidental to pile driving and removal activities during construction upgrades of a cargo dock at the city-owned Hoonah Marine Industrial Center (HMIC) in Port Frederick Inlet on Chichagof Island in Hoonah, Alaska. Pursuant to the Marine Mammal Protection Act (MMPA), NMFS is requesting comments on its proposal to issue an incidental harassment authorization (IHA) to incidentally take marine mammals during the specified activities. NMFS is also requesting comments on a possible one-year renewal that could be issued under certain circumstances and if all requirements are met, as described in **Request for Public Comments** at the end of this notice. NMFS will consider public comments prior to making any final decision on the issuance of the requested MMPA authorizations and agency responses will be summarized in the final notice of our decision.

DATES: Comments and information must be received no later than [INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

ADDRESSES: Comments should be addressed to Jolie Harrison, Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service and should be sent by electronic mail to *ITP.Egger@noaa.gov*.

Instructions: NMFS is not responsible for comments sent by any other method, to any other address or individual, or received after the end of the comment period. Comments must not exceed a 25-megabyte file size, including all attachments. All comments received are a part of the public record and will generally be posted online at <https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act> without change. All personal identifying information (e.g., name, address) voluntarily submitted by the commenter may be publicly accessible. Do not submit confidential business information or otherwise sensitive or protected information.

FOR FURTHER INFORMATION CONTACT: Stephanie Egger, Office of Protected Resources, NMFS, (301) 427-8401. Electronic copies of the application and supporting documents, as well as a list of the references cited in this document, may be obtained online at: <https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act>. In case of problems accessing these documents, or for anyone who is unable to comment via electronic mail, please call the contact listed above.

SUPPLEMENTARY INFORMATION:

Background

The MMPA prohibits the “take” of marine mammals, with certain exceptions. Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 *et seq.*) direct the Secretary of Commerce (as delegated to NMFS) to allow, upon request, the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and either regulations are issued or, if the taking is limited to harassment, a notice of a proposed incidental take authorization may be provided to the public for review.

Authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s) and will not have an unmitigable adverse impact on the availability of the species or stock(s) for taking for subsistence uses (where relevant). Further, NMFS must prescribe the permissible methods of taking and other “means of effecting the least practicable adverse impact” on the affected species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of such species or stocks for taking for certain subsistence uses (referred to in shorthand as “mitigation”); and requirements pertaining to the mitigation, monitoring and reporting of such takings are set forth. The definitions of all applicable MMPA statutory terms cited above are included in the relevant sections below.

National Environmental Policy Act

To comply with the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 *et seq.*) and NOAA Administrative Order (NAO) 216-6A, NMFS must review our proposed action (*i.e.*, the issuance of an IHA) with respect to potential impacts on the human environment. This action is consistent with categories of activities identified in Categorical Exclusion B4 (IHAs with no anticipated serious injury or mortality) of the Companion Manual for NOAA Administrative Order 216-6A, which do not individually or cumulatively have the potential for significant impacts on the quality of the human environment and for which we have not identified any extraordinary circumstances that would preclude this categorical exclusion. Accordingly, NMFS has preliminarily determined that the issuance of the proposed IHA qualifies to be categorically excluded from further NEPA review.

We will review all comments submitted in response to this notice prior to concluding our NEPA process or making a final decision on the IHA request.

Summary of Request

On October 28, 2020 NMFS received a request from the City for an IHA to take marine mammals incidental to pile driving and removal during construction upgrades of a cargo dock at

the HMIC in Port Frederick Inlet on Chichagof Island in Hoonah, Alaska. The application was deemed adequate and complete on February 2, 2021. The applicant's request is for take of nine species of marine mammals by Level B harassment and five species by Level A harassment. Neither the City nor NMFS expects serious injury or mortality to result from this activity and, therefore, an IHA is appropriate.

Description of Proposed Activity

Overview

The purpose of this project is to make upgrades to the HMIC. Upgrades to the site include the installation of three breasting dolphins, a sheet pile bulk cargo dock, fender piles, and a catwalk. The proposed upgrades are needed to continue safely accommodating barges and other vessels delivering essential goods to the City.

The City is only accessible by air and water. Small amounts of cargo are transported into the community by plane; however, the majority is delivered weekly by barges from April through September (AML 2020). When weather permits, front load barges utilize a gravel landing located next to the existing City dock. The gravel landing provides a makeshift location to unload heavy cargo using a ramp and forklifts. During winter months, inclement weather events, and for more frequent deliveries, locals utilize the Alaska Marine Highway System (AMHS) ferries and the local ferry terminal.

The existing gravel landing at HMIC was not originally designed for barges and requires an additional ramp and favorable weather conditions to safely unload cargo. Even during favorable weather, the space and depth places the barges and crew at risk, and the landing cannot safely accommodate the fleet of barges delivering to Hoonah. With the decrease in AMHS ferry service (due to State funding cuts) it is imperative that a reliable way to receive goods in the City is available.

The HMIC cargo dock is one component of the HMIC, which is a phased approach to enhance the Hoonah waterfront and to provide infrastructure to support the cruise ship industry

and various other maritime industries (see Figure 4 of the application). The purpose of HMIC cargo dock project is to make improvements to the existing gravel landing to enable barges to land during all conditions. The project is needed because the existing facility cannot provide consistent and safe berthing for barges. Once the project is completed, the City will be able to reliably receive goods year-round and in all weather conditions. Currently, Alaska Marine Line barges offers seasonal ramp barge service into the City; however, this project will allow for year-round, weekly deliveries by ocean going barges.

Dates and Duration

The applicant is requesting an IHA to conduct pile driving and removal over 110 working days (not necessarily consecutive) beginning in spring and extending through the summer of 2021 as needed. Approximately 50 days of vibratory and 28 days of impact hammering will occur. An additional 35 days of drilling/down-the-hole (DTH) will occur to stabilize the piles. These are discussed in further detail below. The total construction duration accounts for the time required to mobilize materials and resources and construct the project. The duration also accounts for potential delays in material deliveries, equipment maintenance, inclement weather, and shutdowns that may occur to prevent impacts to marine mammals.

Specific Geographic Region

The proposed project at the HMIC is located in Port Frederick Inlet, approximately 0.8 kilometers (km) (0.5 miles) northwest of downtown Hoonah 0.24 km (0.15 miles) east of the State of Alaska Ferry Terminal in Southeast Alaska; T43S, R61E, S20, Copper River Meridian, USGS Quadrangle Juneau A5 NE; latitude 58.11549 and longitude -135.4547 (see Figure 1 below and see also Figure 1, 2, 3, and Appendix A, Sheet 1 of the application).

Port Frederick is a 24-km inlet that dips into northeast Chichagof Island from Icy Strait, leading to Neka Bay and Salt Lake Bay. The inlet varies between 4 and almost 6 km wide with a depth of up to 150 meters (m) (see Figure 6 of the application). Near the proposed project, the inlet is 12 to 28 m deep (NOAA 2018). NMFS's ShoreZone Mapper details the proposed

project site as a semi-protected/partially mobile/sediment or rock and sediment habitat class with gravel beaches environmental sensitivity index (NMFS 2020).



Figure 1. Project Location, Hoonah, Alaska.

Detailed Description of Specific Activity

The project would involve installing breasting dolphins, a solid fill sheet pile dock, and fender.

Construction of the three breasting dolphins would include:

- Installation of 10 temporary 30-inch (in) diameter steel piles as templates to guide proper installation of permanent piles (these piles would be removed prior to project completion); and
- Installation of 9 permanent 36-in diameter steel piles
 - Breasting Dolphin 1 - (1) vertical 36-in steel pile and (2) 36-in batter steel piles
 - Breasting Dolphin 2 – (1) vertical 36-in steel pile and (2) 36-in batter steel pile
 - Breasting Dolphin 3 - (1) vertical 36-in steel pile and (2) 36-in batter steel pile

Construction of the bulk cargo dock would include (see Figure 4; Appendix A: Sheets 3-4 of the application):

- Installation of 20 temporary 30-in steel piles as templates to guide proper installation of permanent H-piles (these piles would be removed prior to project completion);
- Installation of 12 permanent H-piles to guide proper installation of sheets;
- Installation of 500 permanent sheet piles (130 linear feet); and
- Filling the area within sheet piles with 9,600 cubic yards of fill

Installation of the fender piles would include (see Figure 4; Appendix A: Sheet 3 of the application):

- Installation of 20 temporary 30-in steel piles as templates to guide proper installation of permanent fender piles (these piles would be removed prior to project completion); and
- Installation of 6 permanent 20-in fender piles in front of sheet pile cargo dock

Construction Sequence

In-water construction of the HMIC cargo dock components is expected to occur via the following sequence:

1) Vibrate twenty 30-in temporary piles to use as a guide to install H-piles for the cargo dock.

2) Vibrate and impact 12 H-piles to depth to hold the sheets into place.

3) Remove the temporary piles.

4) Using the H-piles as a guide, vibrate and impact 500 sheets into place to create a barrier prior to placing fill.

5) Using an excavator place 9,600 cubic yards of fill within the newly constructed cargo dock frame.

After the completion of the cargo dock, the barge will move over to install the six fender piles at the existing city dock face using the following sequence:

1) Vibrate 20 temporary 30-in piles a minimum of ten feet into bedrock to create a template to guide installation of the permanent piles.

2) Weld a frame around the temporary piles.

3) Within the frame: vibrate, impact, and socket six permanent 20-in fender piles into place.

4) Remove the frame and temporary piles.

5) Perform this sequence at the other six fender pile locations.

The three breasting dolphins will be constructed as the barge moves off shore and will install

temporary and permanent piles as follows:

1) Vibrate 10 temporary 30-in piles a minimum of ten feet into bedrock to create a template to guide installation of the permanent piles.

2) Weld a frame around the temporary piles.

3) Within the frame: vibrate, impact, and socket one vertical and two batter 36-in pile

into place.

4) Remove the frame and temporary piles.

5) Perform this sequence at the second and third location working farther from the shoreline.

Please see Table 1 below for the specific amount of time required to install and remove piles.

Installation and Removal of Temporary (Template) Piles

Temporary 30-in steel piles would be installed and removed using a vibratory hammer (Table 1).

Installation of Permanent Piles

The permanent H-piles, 20-in, and 36-in piles would be installed through sand and gravel with a vibratory hammer until advancement stops. Then, the pile will be driven to depth with an impact hammer. If design tip elevation is still not achieved, the contractor will utilize a drill to secure the pile. (Note: this DTH method can also be referred to as DTH drilling. It is referred to as DTH throughout this document.) Pile depths are expected to be approximately 40 to 70 feet (ft) below the mudline and estimated to take approximately 1.25-10.5 hours (hrs) per pile to complete.

The permanent sheets would be installed using a vibratory hammer and impact hammer following the same criteria as above to achieve design tip elevation (Table 1). It is expected that it will take around 20 minutes to install each sheet.

Table 1--Pile driving and removal activities

	Project Component					
	Temporary Pile Installation	Temporary Pile Removal	Permanent Pile Installation			
Vibratory Hammer						
Diameter of Steel Pile (inches)	30	30	36	H-piles	Sheets	20
# of Piles	50	50	9	12	500 (130lf)	6
Max # Piles Vibrated per Day	4	4	4	4	30 sheets	3

Vibratory Time per Pile (min)	15	15	15	15	15	15
Vibratory Time per Day (min)	60	60	60	60	450 (7.5 hr)	45
Number of Days	12.5	12.5	2.25	3	17	2
Vibratory Time Total	12 hrs 30 mins	12 hrs 30 mins	2 hr 15 mins	3 hrs	292 hrs	1 hr 30 min
Impact Hammer						
Diameter of Steel Pile (inches)	-	-	36	H-piles	Sheets	20
# of Piles	-	-	9	12	500 (130lf)	6
Max # Piles Impacted per Day	-	-	2	5	5 sheets	2
Impact Time per Pile (min)	-	-	15	5	5	5
Impact Time per Day (min)	-	-	30	20	25	10
Number of Days	-	-	4.5 day	3	17 days	3
Impact Time Total	-	-	2 hr 15 mins	1 hr	1 hr 30 mins	30 min
Drilling/DTH						
Diameter of Steel Pile (inches)	-	-	36	H-Piles	-	20
Total Quantity	-	-	9	12	-	6
Anchor Diameter	-	-	33	20	-	20
Max # Piles Anchored per Day	-	-	2	2	-	2
Time per Pile	-	-	5-10 hrs	3-4 hrs	-	1 hr
Actual Time Spent Driving per Pile	-	-	60 min	60 min	-	60 min
Time per Day	-	-	12 hrs (max)	12 hrs (max)	-	12 hrs (max)
Actual Time Spent Driving per Day	-	-	72 mins (1 hr 12 mins; max)	2 hrs (max)	-	1 hr (max)
Blows per pile	-	-	27,000-54,000	20,000	-	15,000
Number of Days	-	-	15 days	17 days	-	3 days
Drilling Total Time	-	-	45-90 hours	20 hours	-	4 hours

In addition to the activities described above, the proposed action will involve other in-water construction and heavy machinery activities. Other types of in-water work including with heavy machinery will occur using standard barges, tug boats, and positioning piles on the substrate via a crane (*i.e.*, “stabbing the pile”). Workers will be transported from shore to the barge work platform by a 7.62 m (25 ft) skiff with a 125–250 horsepower motor. The travel distance will be less than 30.5 m (100 ft). There could be multiple shore-to-barge trips during the day; however, the area of travel will be relatively small and close to shore. We do not expect any of these other in-water construction and heavy machinery activities to take marine mammals.

Therefore, these other in-water construction and heavy machinery activities will not be discussed further.

For further details on the proposed action and project components, please refer to Section 1.2 of the application.

Proposed mitigation, monitoring, and reporting measures are described in detail later in this document (please see **Proposed Mitigation** and **Proposed Monitoring and Reporting**).

Description of Marine Mammals in the Area of Specified Activities

Sections 3 and 4 of the application summarize available information regarding status and trends, distribution and habitat preferences, and behavior and life history, of the potentially affected species. Additional information regarding population trends and threats may be found in NMFS's Stock Assessment Reports (SARs; <https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports>) and more general information about these species (e.g., physical and behavioral descriptions) may be found on NMFS's website (<https://www.fisheries.noaa.gov/find-species>).

Table 2 lists all species with expected potential for occurrence in the project area and summarizes information related to the population or stock, including regulatory status under the MMPA and ESA and potential biological removal (PBR), where known. Tagged sperm whales have been tracked within the Gulf of Alaska, and multiple whales have been tracked in Chatham Strait, in Icy Strait, and in the action area in 2014 and 2015 (<http://seaswap.info/whaletracker> Accessed 4/15/19). However, the known sperm whale habitat (these shelf-edge/slope waters of the Gulf of Alaska) are far outside of the action area. It is unlikely that sperm whales will occur in the action area where pile driving activities will occur because they are generally found in far deeper waters. Therefore, sperm whales are not being proposed for take authorization and not discussed further. For taxonomy, we follow Committee on Taxonomy (2020). PBR is defined by the MMPA as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its

optimum sustainable population (as described in NMFS’ SARs). While no mortality is anticipated or authorized here, PBR and annual serious injury and mortality from anthropogenic sources are included here as gross indicators of the status of the species and other threats.

Marine mammal abundance estimates presented in this document represent the total number of individuals that make up a given stock or the total number estimated within a particular study or survey area. NMFS’s stock abundance estimates for most species represent the total estimate of individuals within the geographic area, if known, that comprises that stock. For some species, this geographic area may extend beyond U.S. waters. All managed stocks in this region are assessed in NMFS’s U.S. Pacific and Alaska SARs (Carretta *et al.*, 2020; Muto *et al.*, 2020). All MMPA stock information presented in Table 2 is the most recent available at the time of publication and is available in the 2019 SARs (Carretta *et al.*, 2020; Muto *et al.*, 2020) and draft 2020 SARs (available online at: www.fisheries.noaa.gov/national/marine-mammal-protection/draft-marine-mammal-stock-assessment-reports).

Table 2--Marine Mammal Occurrence in the Project Area

Common name	Scientific name	Stock	ESA/MMPA status; Strategic (Y/N) ¹	Stock abundance (CV, N _{min} , most recent abundance survey) ²	PBR	Annual M/SI ³
Order Cetartiodactyla – Cetacea – Superfamily Mysticeti (baleen whales)						
Family Eschrichtiidae						
Gray Whale	<i>Eschrichtius robustus</i>	Eastern N Pacific	-, -, N	26,960 (0.05, 25,849, 2016)	801	131
Family Balaenopteridae (rorquals)						
Minke Whale	<i>Balaenoptera acutorostrata</i>	Alaska	-, -, N	N/A (see SAR, N/A, see SAR)	UND	0
Humpback Whale	<i>Megaptera novaeangliae</i>	Central N Pacific (Hawaii and Mexico DPS)	-, -, Y	10,103 (0.3, 7,891, 2006)	83	26
Superfamily Odontoceti (toothed whales, dolphins, and porpoises)						
Family Delphinidae						
Killer Whale	<i>Orcinus orca</i>	Alaska Resident	-, -, N	2,347 (N/A, 2347, 2012)	24	1
		Northern Resident	-, -, N	302 (N/A, 302, 2018)	2.2	0.2

		West Coast Transient	- , - , N	349 (na/349; 2018)	3.5	0.4
Pacific White-Sided Dolphin	<i>Lagenorhynchus obliquidens</i>	N Pacific	- , - , N	26,880 (N/A, N/A, 1990)	UND	0
Family Phocoenidae (porpoises)						
Dall's Porpoise	<i>Phocoenoides dalli</i>	AK	- , - , N	83,400 (0.097, N/A, 1991)	UND	38
Harbor Porpoise	<i>Phocoena phocoena</i>	Southeast Alaska	- , - , Y	see SAR (see SAR, see SAR, 2012)	see SAR	34
Order Carnivora – Superfamily Pinnipedia						
Family Otariidae (eared seals and sea lions)						
Steller Sea Lion	<i>Eumetopias jubatus</i>	Western DPS	E, D, Y	52,932 (see SAR, 52,932, 2019)	318	255
		Eastern DPS	T, D, Y	43,201 a (see SAR, 43,201, 2017)	2592	112
Family Phocidae (earless seals)						
Harbor Seal	<i>Phoca vitulina</i>	Glacier Bay/Icy Strait	- , - , N	7,455 (see SAR, 6,680, 2017)	120	104

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

² - NMFS marine mammal stock assessment reports online at: www.nmfs.noaa.gov/pr/sars/. CV is coefficient of variation; Nmin is the minimum estimate of stock abundance. In some cases, CV is not applicable [explain if this is the case]

³ - These values, found in NMFS's SARs, represent annual levels of human-caused mortality plus serious injury from all sources combined (e.g., commercial fisheries, ship strike). Annual M/SI often cannot be determined precisely and is in some cases presented as a minimum value or range. A CV associated with estimated mortality due to commercial fisheries is presented in some cases.

All species that could potentially occur in the proposed survey areas are included in Table

2. In addition, the Northern sea otter (*Enhydra lutris kenyoni*) may be found in the project area.

However, sea otters are managed by the U.S. Fish and Wildlife Service and are not considered further in this document.

Minke whale

In the North Pacific Ocean, minke whales occur from the Bering and Chukchi seas south to near the Equator (Leatherwood *et al.*, 1982). In the northern part of their range, minke whales are believed to be migratory, whereas, they appear to establish home ranges in the inland waters of Washington and along central California (Dorsey *et al.* 1990). Minke whales are observed in Alaska's nearshore waters during the summer months (National Park Service (NPS) 2018).

Minke whales are usually sighted individually or in small groups of 2-3, but there are reports of

loose aggregations of hundreds of animals (NMFS 2018d). Minke whales are rare in the action area, but they could be encountered. During the construction of the first Icy Strait cruise ship berth, a single minke was observed during the 135-day monitoring period (June 2015 through January 2016) (BergerABAM 2016). During Berth II construction there was also only one reported sighting of a minke whale throughout the duration of monitoring (June 2019 –October 2019; SolsticeAK 2020).

No abundance estimates have been made for the number of minke whales in the entire North Pacific. However, some information is available on the numbers of minke whales in some areas of Alaska. Line-transect surveys were conducted in shelf and nearshore waters (within 30-45 nautical miles of land) in 2001-2003 from the Kenai Fjords in the Gulf of Alaska to the central Aleutian Islands. Minke whale abundance was estimated to be 1,233 (CV = 0.34) for this area (Zerbini *et al.*, 2006). This estimate has also not been corrected for animals missed on the trackline. The majority of the sightings were in the Aleutian Islands, rather than in the Gulf of Alaska, and in water shallower than 200 m. So few minke whales were seen during three offshore Gulf of Alaska surveys for cetaceans in 2009, 2013, and 2015 that a population estimate for this species in this area could not be determined (Rone *et al.*, 2017).

Humpback whale

The humpback whale is distributed worldwide in all ocean basins and a broad geographical range from tropical to temperate waters in the Northern Hemisphere and from tropical to near-ice-edge waters in the Southern Hemisphere. The humpback whales that forage throughout British Columbia and Southeast Alaska undertake seasonal migrations from their tropical calving and breeding grounds in winter to their high-latitude feeding grounds in summer. They may be seen at any time of year in Alaska, but most animals winter in temperate or tropical waters near Hawaii. In the spring, the animals migrate back to Alaska where food is abundant. The Central North Pacific stock of humpback whales are found in the waters of Southeast Alaska

and consist of two distinct population segments (DPSs) listed under the ESA, the Hawaii DPS and the Mexico DPS.

Within Southeast Alaska, humpback whales are found throughout all major waterways and in a variety of habitats, including open-ocean entrances, open-strait environments, near-shore waters, area with strong tidal currents, and secluded bays and inlets. They tend to concentrate in several areas, including northern Southeast Alaska. Patterns of occurrence likely follow the spatial and temporal changes in prey abundance and distribution with humpback whales adjusting their foraging locations to areas of high prey density (Clapham 2000).

Humpback whales may be found in and around Chichagof Island, Icy Strait, and Port Frederick Inlet at any given time. While many humpback whales migrate to tropical calving and breeding grounds in winter, they have been observed in Southeast Alaska in all months of the year (Bettridge *et al.*, 2015). Diet for humpback whales in the Glacier Bay/Icy Strait area mainly consists of small schooling fish (capelin, juvenile walleye pollock, sand lance, and Pacific herring) rather than *euphausiids* (krill). They migrate to the northern reaches of Southeast Alaska (Glacier Bay) during spring and early summer following these fish and then move south towards Stephens Passage in early fall to feed on krill, passing the project area on the way (Krieger and Wing 1986). Over 32 years of humpback whale monitoring in the Glacier Bay/Icy Strait area reveals a substantial decline in population since 2014; a total of 164 individual whales were documented in 2016 during surveys conducted from June-August, making it the lowest count since 2008 (Neilson *et al.*, 2017)

During construction of the first Icy Strait cruise ship berth from June 2015 through January 2016, humpback whales were observed in the action area on 84 of the 135 days of monitoring; most often in September and October. Up to 18 humpback sightings were reported on a single day (October 2, 2015), and a total of 226 Level B harassments were recorded during project construction (June 2015 through January 2016) (BergerABAM 2016). Additionally, during construction of Icy Strait cruise ship Berth II in 2019, humpback whales were observed in

the action area on 45 of the 51 days of monitoring; most often in July and September. Up to 24 humpback sightings were reported on a single day (July 30, 2019) during project construction (SolsticeAK 2020). In the project vicinity, humpback whales typically occur in groups of 1-2 animals, with an estimated maximum group size of 8 animals.

On October 9, 2019, a proposed rule to designate critical habitat for humpback whales was published in the **Federal Register** (84 FR 54354). Proposed critical habitat for Mexico DPS humpback whales was divided into ten units and assigned a conservation rating based upon available data for the unit. Unit 10 encompasses Southeast Alaska, including Port Frederick and Icy Strait. The area is of medium conservation importance on a scale from very low to very high.

Gray whale

Gray whales are found exclusively in the North Pacific Ocean. The Eastern North Pacific stock of gray whales inhabit the Chukchi, Beaufort, and Bering Seas in northern Alaska in the summer and fall and California and Mexico in the winter months, with a migration route along the coastal waters of Southeast Alaska. Gray whales have also been observed feeding in waters off Southeast Alaska during the summer (NMFS 2018e).

The migration pattern of gray whales appears to follow a route along the western coast of Southeast Alaska, traveling northward from British Columbia through Hecate Strait and Dixon Entrance, passing the west coast of Chichagof Island from late March to May (Jones *et al.* 1984, Ford *et al.* 2013). Since the project area is on the east coast of Chichagof Island it is less likely there will be gray whales sighted during project construction; however, the possibility exists.

During the 2016 construction of the first cruise ship terminal at Icy Strait Point and 2019 construction of cruise ship Berth II, no gray whales were seen monitoring periods (BergerABAM 2016; SolsticeAK 2020).

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 (NMFS 2018f).

The Alaska Resident stock occurs from Southeast Alaska to the Aleutian Islands and Bering Sea. The Northern Resident stock occurs from Washington State through part of Southeast Alaska; and the West Coast Transient stock occurs from California through Southeast Alaska (Muto *et al.*, 2018) and are thought to occur frequently in Southeast Alaska (Straley 2017).

Transient killer whales can pass through the waters surrounding Chichagof Island, in Icy Strait and Glacier Bay, feeding on marine mammals. Because of their transient nature, it is difficult to predict when they will be present in the area. Whales from the Alaska Resident stock and the Northern Resident stock are thought to primarily feed on fish. Like the transient killer whales, they can pass through Icy Strait at any given time (North Gulf Oceanic Society 2018).

Killer whales were observed on 11 days during construction of the first Icy Strait cruise ship berth during the 135-day monitoring period (June 2015 through January 2016). Killer whales were observed a few times a month. Usually a singular animal was observed, but a group containing 8 individuals was seen in the action area on one occasion, for a total of 24 animals observed during in-water work (BergerABAM 2016). During construction of the second Icy Strait cruise ship Berth II in 2019 (51 days), killer whales were observed on 8 days. Usually a single animal or pairs were observed, but a group containing 5 individuals was seen in the action area on one occasion. A total of 20 animals observed during in-water work on Berth II (SolsticeAK 2020).

Pacific white-sided dolphin

Pacific white-sided dolphins are a pelagic species. They are found throughout the temperate North Pacific Ocean, north of the coasts of Japan and Baja California, Mexico (Muto *et al.*, 2018). They are most common between the latitudes of 38° North and 47° North (from

California to Washington). The distribution and abundance of Pacific white-sided dolphins may be affected by large-scale oceanographic occurrences, such as El Niño, and by underwater acoustic deterrent devices (NPS 2018a).

No Pacific white-sided dolphins were observed during construction of the first cruise ship berth during the 135-day monitoring period (June 2015 through January 2016) (Berger ABAM 2016). However, a pod of two Pacific white-sided dolphins were observed during construction of the second cruise ship Berth II (June 2019 through October 2019) (Solstice AK 2020). They are rare in the action area, likely because they are pelagic and prefer more open water habitats than are found in Icy Strait and Port Frederick Inlet. Pacific white-sided dolphins have been observed in Alaska waters in groups ranging from 20 to 164 animals, with the sighting of 164 animals occurring in Southeast Alaska near Dixon Entrance (Muto *et al.*, 2018).

Dall's Porpoise

Dall's porpoises are widely distributed across the entire North Pacific Ocean. They show some migration patterns, inshore and offshore and north and south, based on morphology and type, geography, and seasonality (Muto *et al.*, 2018). They are common in most of the larger, deeper channels in Southeast Alaska and are rare in most narrow waterways, especially those that are relatively shallow and/or with no outlets (Jefferson *et al.*, 2019). In Southeast Alaska, abundance varies with season.

Jefferson *et al.* (2019) recently published a report with survey data spanning from 1991 to 2012 that studied Dall's porpoise density and abundance in Southeast Alaska. They found Dall's porpoise were most abundant in spring, observed with lower numbers in summer, and lowest in fall. Surveys found Dall's porpoise to be common in Icy Strait and sporadic with very low densities in Port Frederick (Jefferson *et al.*, 2019). During a 16-year survey of cetaceans in Southeast Alaska, Dall's porpoises were commonly observed during spring, summer, and fall in the nearshore waters of Icy Strait (Dahlheim *et al.*, 2009). Dall's porpoises were observed on 2 days during the 135-day monitoring period (June 2015 through January 2016) of the construction

of the first cruise ship berth (BergerABAM 2016). Both were single individuals transiting within the waters of Port Frederick in the vicinity of Halibut Island. During the second cruise ship Berth II construction a total of 21 Dall's porpoises were observed on 8 days (SolsticeAK 2020). Dall's porpoises generally occur in groups from 2-12 individuals (NMFS 2018g).

Harbor Porpoise

In the eastern North Pacific Ocean, the Bering Sea and Gulf of Alaska harbor porpoise stocks range from Point Barrow, along the Alaska coast, and the west coast of North America to Point Conception, California. The Southeast Alaska stock ranges from Cape Suckling, Alaska to the northern border of British Columbia. Within the inland waters of Southeast Alaska, harbor porpoises' distribution is clustered with greatest densities observed in the Glacier Bay/Icy Strait region and near Zarembo and Wrangell Islands and the adjacent waters of Sumner Strait (Dahlheim *et al.*, 2015). Harbor porpoises also were observed primarily between June and September during construction of the Hoonah Berth I cruise ship terminal project. Harbor porpoises were observed on 19 days during the 135-day monitoring period (June 2015 through January 2016) (BergerABAM 2016) and seen either singularly or in groups from two to four animals. During the test pile program conducted at the Berth II project site in May 2018, eight harbor porpoises were observed over a 7-hour period (SolsticeAK 2018).

There is no official stock abundance associated with the SARs for harbor porpoise. Both aerial and vessel based surveys have been conducted for this species. Aerial surveys of this stock were conducted in June and July 1997 and resulted in an observed abundance estimate of 3,766 harbor porpoise (Hobbs and Waite 2010) and the surveys included a subset of smaller bays and inlets. Correction factors for observer perception bias and porpoise availability at the surface were used to develop an estimated corrected abundance of 11,146 harbor porpoise in the coastal and inside waters of Southeast Alaska (Hobbs and Waite 2010). Vessel based spanning the 22-year study (1991-2012) found the relative abundance of harbor porpoise varied in the inland waters of Southeast Alaska. Abundance estimated in 1991-1993 (N = 1,076; percent CI = 910-

1,272) was higher than the estimate obtained for 2006-2007 (N = 604; 95 percent CI = 468-780) but comparable to the estimate for 2010-2012 (N = 975; 95 percent CI = 857-1,109; Dahlheim *et al.*, 2015). These estimates assume the probability of detection directly on the trackline to be unity ($g(0) = 1$) because estimates of $g(0)$ could not be computed for these surveys. Therefore, these abundance estimates may be biased low to an unknown degree. A range of possible $g(0)$ values for harbor porpoise vessel surveys in other regions is 0.5-0.8 (Barlow 1988, Palka 1995), suggesting that as much as 50 percent of the porpoise can be missed, even by experienced observers.

Further, other vessel based survey data (2010-2012) for the inland waters of Southeast Alaska, calculated abundance estimates for the concentrations of harbor porpoise in the northern and southern regions of the inland waters (Dahlheim *et al.* 2015). The resulting abundance estimates are 398 harbor porpoise (CV = 0.12) in the northern inland waters (including Cross Sound, Icy Strait, Glacier Bay, Lynn Canal, Stephens Passage, and Chatham Strait) and 577 harbor porpoise (CV = 0.14) in the southern inland waters (including Frederick Sound, Sumner Strait, Wrangell and Zarembo Islands, and Clarence Strait as far south as Ketchikan). Because these abundance estimates have not been corrected for $g(0)$, these estimates are likely underestimates.

The vessel based surveys are not complete coverage of harbor porpoise habitat and not corrected for bias and likely underestimate the abundance. Whereas, the aerial survey in 1997, although outdated, had better coverage of the range and is likely to be more of an accurate representation of the stock abundance (11,146 harbor porpoise) in the coastal and inside waters of Southeast Alaska.

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 are generally non-migratory and, with local movements associated with such factors as tide, weather, season, food availability and reproduction.

Distribution of the Glacier Bay/Icy Strait stock, the only stock considered in this application, ranges along the coast from Cape Fairweather and Glacier Bay south through Icy Strait to Tenakee Inlet on Chichagof Island (Muto *et al.*, 2018).

The Glacier Bay/Icy Strait stock of harbor seals are common residents of the action area and can occur on any given day in the area, although they tend to be more abundant during the fall months (Womble and Gende 2013). A total of 63 harbor seals were seen during 19 days of the 135-day monitoring period (June 2015 through January 2016) (BergerABAM 2016), while none were seen during the 2018 test pile program (SolsticeAK 2018). Harbor seals were primarily observed in summer and early fall (June to September). Harbor seals were seen singularly and in groups of two or more, but on one occasion, 22 individuals were observed hauled out on Halibut Rock, across Port Frederick approximately 2,414 m (1.5 miles) from the location of pile installation activity (BergerABAM 2016). In 2019, a total of 33 harbor seals were seen during the Berth II project (SolsticeAK 2020).

There are two known harbor seal haulouts within the project area. According to the AFSC list of harbor seal haulout locations, the closest listed haulout (id 1,349; name CF39A) is located in Port Frederick, approximately 3,400 m west of the project area (AFSC 2018). The second haulout (id: 8; name: CE79A) is approximately 10,200 meters south of the project area (AFSC 2020).

Steller Sea Lion

Steller sea lions range along the North Pacific Rim from northern Japan to California, with centers of abundance in the Gulf of Alaska and Aleutian Islands (Loughlin *et al.*, 1984).

Of the two Steller sea lion populations in Alaska, the Eastern DPS includes sea lions born on rookeries from California north through Southeast Alaska and the Western DPS includes those animals born on rookeries from Prince William Sound westward, with an eastern boundary set at 144°W (NMFS 2018h). Both WDPS and EDPS Steller sea lions are considered in this application because the WDPS are common within the geographic area under consideration (north of Summer Strait) (Fritz *et al.*, 2013, NMFS 2013).

Steller sea lions are not known to migrate annually, but individuals may widely disperse outside of the breeding season (late-May to early-July), leading to intermixing of stocks (Jemison *et al.* 2013; Allen and Angliss 2015).

Steller sea lions are common in the inside waters of Southeast Alaska. They are residents of the project vicinity and are common year-round in the action area, moving their haulouts based on seasonal concentrations of prey from exposed rookeries nearer the open Pacific Ocean during the summer to more protected sites in the winter (Alaska Department of Fish & Game (ADF&G) 2018). During the construction of the existing Icy Strait cruise ship berth a total of 180 Steller sea lions were observed on 47 days of the 135 monitoring days, amounting to an average of 1.3 sightings per day (BergerABAM 2016). Steller sea lions were frequently observed in groups of two or more individuals, but lone individuals were also observed regularly (BergerABAM 2016). During a test pile program performed at the project location by the Hoonah Cruise Ship Dock Company in May 2018, a total of 15 Steller sea lions were seen over the course of 7 hours in one day (SolsticeAK 2018). During construction of Berth II, a total of 197 Steller sea lion sightings over 42 days in 2019 were reported, amounting to an average of 4.6 sightings per day (SolsticeAK2020). They can occur in groups of 1-10 animals, but may congregate in larger groups near rookeries and haulouts (NMFS 2018h). No documented rookeries or haulouts are near the project area.

Critical habitat has been defined in Southeast Alaska at major haulouts and major rookeries (50 CFR 226.202). The nearest rookery is on the White Sisters Islands near Sitka and

the nearest major haulouts are at Benjamin Island, Cape Cross, and Graves Rocks. The White Sisters rookery is located on the west side of Chichagof Island, about 72 km southwest of the project area. Benjamin Island is about 60 km northeast of Hoonah. Cape Cross and Graves Rocks are both about 70 km west of Hoonah. Steller sea lions are known to haul out on land, docks, buoys, and navigational markers.

Marine Mammal Hearing

Hearing is the most important sensory modality for marine mammals underwater, and exposure to anthropogenic sound can have deleterious effects. To appropriately assess the potential effects of exposure to sound, 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 directly measured or estimated hearing ranges on the basis of available behavioral response data, audiograms derived using auditory evoked potential techniques, anatomical modeling, and other data. Note that no direct measurements of hearing ability have been successfully completed for mysticetes (*i.e.*, low-frequency cetaceans). Subsequently, NMFS (2018) described generalized hearing ranges for these marine mammal hearing groups. Generalized hearing ranges were chosen based on the approximately 65 decibel (dB) threshold from the normalized composite audiograms, with the exception for lower limits for low-frequency cetaceans where the lower bound was deemed to be biologically implausible and the lower bound from Southall *et al.* (2007) retained. Marine mammal hearing groups and their associated hearing ranges are provided in Table 3.

Table 3--Marine Mammal Hearing Groups (NMFS, 2018)

Hearing Group	Generalized Hearing Range*
Low-frequency (LF) cetaceans (baleen whales)	7 Hz to 35 kHz
Mid-frequency (MF) cetaceans (dolphins, toothed whales, beaked whales, bottlenose whales)	150 Hz to 160 kHz
High-frequency (HF) cetaceans (true porpoises, <i>Kogia</i> , river dolphins, cephalorhynchid, <i>Lagenorhynchus cruciger</i> & <i>L. australis</i>)	275 Hz to 160 kHz
Phocid pinnipeds (PW) (underwater) (true seals)	50 Hz to 86 kHz
Otariid pinnipeds (OW) (underwater) (sea lions and fur seals)	60 Hz to 39 kHz

* Represents the generalized hearing range for the entire group as a composite (*i.e.*, all species within the group), where individual species' hearing ranges are typically not as broad. Generalized hearing range chosen based on ~65 dB threshold from normalized composite audiogram, with the exception for lower limits for LF cetaceans (Southall *et al.* 2007) and PW pinniped (approximation).

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 and Holt, 2013).

For more detail concerning these groups and associated frequency ranges, please see NMFS (2018) for a review of available information. Nine marine mammal species (seven cetacean and two pinniped (one otariid and one phocid) species) have the reasonable potential to occur during the proposed activities. Please refer to Table 2. Of the cetacean species that may be present, three are classified as low-frequency cetaceans (*i.e.*, all mysticete species), two are classified as mid-frequency cetaceans (*i.e.*, all delphinid species), and two are classified as high-frequency cetaceans (*i.e.*, harbor porpoise and Dall's porpoise).

Potential Effects of Specified Activities on Marine Mammals and their Habitat

This section includes a summary and discussion of the ways that components of the specified activity may impact marine mammals and their habitat. The **Estimated Take** section later in this document includes a quantitative analysis of the number of individuals that are expected to be taken by this activity. The **Negligible Impact Analysis and Determination** section considers the content of this section, the **Estimated Take** section, and the **Proposed**

Mitigation section, to draw conclusions regarding the likely impacts of these activities on the reproductive success or survivorship of individuals and how those impacts on individuals are likely to impact marine mammal species or stocks.

Acoustic effects on marine mammals during the specified activity can occur from vibratory and impact pile driving as well as during DTH of the piles. The effects of underwater noise from the City's proposed activities have the potential to result in Level B behavioral harassment of marine mammals in the vicinity of the action area.

Description of Sound Sources

This section contains a brief technical background on sound, on the characteristics of certain sound types, and on metrics used in this proposal inasmuch as the information is relevant to the specified activity and to a discussion of the potential effects of the specified activity on marine mammals found later in this document. For general information on sound and its interaction with the marine environment, please see, *e.g.*, Au and Hastings (2008); Richardson *et al.* (1995); Urick (1983).

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 or corresponding points of a sound wave (length of one cycle). Higher frequency sounds have shorter wavelengths than lower frequency sounds, and typically attenuate (decrease) more rapidly, except in certain cases in shallower water. Amplitude is the height of the sound pressure wave or the "loudness" of a sound and is typically described using the relative unit of the decibel (dB). A sound pressure level (SPL) in dB is described as the ratio between a measured pressure and a reference pressure (for underwater sound, this is 1 microPascal (μPa)), and is a logarithmic unit that accounts for large variations in amplitude; therefore, a relatively small change in dB corresponds to large changes in sound pressure. The

source level (SL) represents the SPL referenced at a distance of 1 m from the source (referenced to 1 μPa), while the received level is the SPL at the listener's position (referenced to 1 μPa).

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

Sound exposure level (SEL; represented as dB re 1 $\mu\text{Pa}^2\text{-s}$) represents the total energy in a stated frequency band over a stated time interval or event, and considers both intensity and duration of exposure. The per-pulse SEL is calculated over the time window containing the entire pulse (*i.e.*, 100 percent of the acoustic energy). SEL is a cumulative metric; it can be accumulated over a single pulse, or calculated over periods containing multiple pulses.

Cumulative SEL represents the total energy accumulated by a receiver over a defined time window or during an event. Peak sound pressure (also referred to as zero-to-peak sound pressure or 0-pk) is the maximum instantaneous sound pressure measurable in the water at a specified distance from the source, and is represented in the same units as the rms sound pressure.

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 a manner similar to ripples on the surface of a pond and may be either directed in a beam or beams or may radiate in all directions (omnidirectional sources), as is the case for sound produced by the pile driving activity considered here. 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, which is defined as environmental background sound levels lacking a single source or point (Richardson *et al.*, 1995). 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.*, wind and waves, earthquakes, ice, atmospheric sound), biological (*e.g.*, sounds produced by marine mammals, fish, and invertebrates), and anthropogenic (*e.g.*, vessels, dredging, construction) sound. A number of sources contribute to ambient sound, including wind and waves, which are a main source of naturally occurring ambient sound for frequencies between 200 Hz and 50 kilohertz (kHz) (Mitson, 1995). In general, ambient sound levels tend to increase with increasing wind speed and wave height. Precipitation can become an important component of total sound at frequencies above 500 Hz, and possibly down to 100 Hz during quiet times. Marine mammals can contribute significantly to ambient sound levels, as can some fish and snapping shrimp. The frequency band for biological contributions is from approximately 12 Hz to over 100 kHz. Sources of ambient sound related to human activity include transportation (surface vessels), dredging and construction, oil and gas drilling and production, geophysical surveys, sonar, and explosions. Vessel noise typically dominates the total ambient sound 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.

The sum of the various natural and anthropogenic sound sources that comprise ambient sound at any given location and time depends not only on the source levels (as determined by current weather conditions and levels of biological and human 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 decibels (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.

Sounds are often considered to fall into one of two general types: pulsed and non-pulsed (defined in the following). The distinction between these two sound types is important because they have differing potential to cause physical effects, particularly with regard to hearing (*e.g.*, Ward, 1997 in Southall *et al.*, 2007). Please see Southall *et al.* (2007) for an in-depth discussion of these concepts. The distinction between these two sound types is not always obvious, as certain signals share properties of both pulsed and non-pulsed sounds. A signal near a source could be categorized as a pulse, but due to propagation effects as it moves farther from the source, the signal duration becomes longer (*e.g.*, Greene and Richardson, 1988).

Pulsed sound sources (*e.g.*, airguns, 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, 2005; Harris, 1998; NIOSH, 1998; ISO, 2003) 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 intermittent (ANSI, 1995; NIOSH, 1998). Some of these non-pulsed sounds can be transient signals of short duration but without the essential properties of pulses (*e.g.*, rapid rise time). Examples of non-pulsed sounds include those produced by vessels, aircraft, machinery operations such as drilling or dredging, vibratory pile driving, and active

sonar systems. The duration of such sounds, as received at a distance, can be greatly extended in a highly reverberant environment.

The impulsive sound generated by impact hammers is characterized by rapid rise times and high peak levels. Vibratory hammers produce non-impulsive, continuous noise at levels significantly lower than those produced by impact hammers. Rise time is slower, reducing the probability and severity of injury, and sound energy is distributed over a greater amount of time (*e.g.*, Nedwell and Edwards, 2002; Carlson *et al.*, 2005). DTH is believed to produce sound with both impulsive and continuous characteristics (*e.g.*, Denes *et al.*, 2016).

Acoustic Effects on Marine Mammals

We previously provided general background information on marine mammal hearing (see **Description of Marine Mammals in the Area of Specified Activities**). Here, we discuss the potential effects of sound on marine mammals.

Note that, in the following discussion, we refer in many cases to a review article concerning studies of noise-induced hearing loss conducted from 1996-2015 (*i.e.*, Finneran, 2015). For study-specific citations, please see that work. 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; Götz *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 pile driving and removal 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.*, certain non-auditory physical or physiological effects) only briefly as we do not expect that there is a reasonable likelihood that pile driving may result in such effects (see below for further discussion). Potential effects from explosive impulsive sound sources can range in severity from effects such as behavioral disturbance or tactile perception to physical discomfort, slight injury of the internal organs and the auditory system, or mortality (Yelverton *et al.*, 1973). 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; Tal *et al.*, 2015). The construction activities considered here do not involve the use of devices such as explosives or mid-frequency tactical sonar that are associated with these types of effects.

Threshold Shift – 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 (Finneran, 2015). TS can be permanent (permanent threshold shift (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, and there is no PTS data for cetaceans, but such relationships 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.

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.

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 (Finneran, 2015). TTS was not observed in trained spotted (*Phoca largha*) and ringed (*Pusa hispida*) seals exposed to impulsive noise at levels matching previous predictions of TTS onset (Reichmuth *et al.*, 2016). In general, harbor seals and harbor porpoises have a lower TTS onset than other measured pinniped or cetacean species (Finneran, 2015). 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), Finneran and Jenkins (2012), Finneran (2015), and NMFS (2018).

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 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). However, many delphinids approach low-frequency airgun source vessels with no apparent discomfort or obvious behavioral change (*e.g.*, Barkaszi *et al.*, 2012), indicating the importance of frequency output in relation to the species' hearing sensitivity.

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, 2013b). 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, 2005, 2006; Gailey *et al.*, 2007; Gailey *et al.*, 2016).

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.*, 2007). 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 airgun 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.

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).

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; Erbe *et al.*, 2016). 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.*, 2007; 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 the City's Activity – As described previously, the City proposes to conduct pile driving, including impact and vibratory driving (inclusive of DTH). The effects of pile driving on marine mammals are dependent on several factors, including the size, type, and depth of the animal; the depth, intensity, and duration of the pile driving sound; the depth of the water column; the substrate of the habitat; the standoff distance between the pile and the animal; and the sound propagation properties of the environment. With both types, it is likely that the

pile driving could result in temporary, short term changes in an animal's typical behavioral patterns 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.

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 lead to effects on growth, survival, or reproduction, such as drastic changes in diving/surfacing patterns or significant habitat abandonment are extremely unlikely in this area (*i.e.*, shallow waters in modified industrial areas).

Whether impact or vibratory driving, sound sources would be active for relatively short durations, with relation to potential for masking. The frequencies output by pile driving activity are lower than those used by most species expected to be regularly present for communication or foraging. We expect insignificant impacts from masking, and any masking event that could possibly rise to Level B harassment under the MMPA would occur concurrently within the zones of behavioral harassment already estimated for vibratory and impact pile driving, and which have already been taken into account in the exposure analysis.

Anticipated Effects on Marine Mammal Habitat

The proposed activities would not result in permanent impacts to habitats used directly by marine mammals. The project location is within an area that is currently used by large shipping vessels and in between two existing, heavily-traveled docks, and within an active marine commercial and tourist area.

The proposed activities may have potential short-term impacts to food sources such as forage fish. The proposed activities could also affect acoustic habitat (see masking discussion above), but meaningful impacts are unlikely. There are no known foraging hotspots, or other ocean bottom structures of significant biological importance to marine mammals present in the marine waters in the vicinity of the project area. Therefore, the main impact issue associated with the proposed activity would be temporarily elevated sound levels and the associated direct effects on marine mammals, as discussed previously. The most likely impact to marine mammal habitat occurs from pile driving effects on likely marine mammal prey (*i.e.*, fish) near where the piles are installed. Impacts to the immediate substrate during installation and removal of piles are anticipated, but these would be limited to minor, temporary suspension of sediments, which could impact water quality and visibility for a short amount of time, but which would not be expected to have any effects on individual marine mammals. Impacts to substrate are therefore not discussed further.

Effects to Prey – Sound may affect marine mammals through impacts on the abundance, behavior, or distribution of prey species (*e.g.*, crustaceans, cephalopods, fish, zooplankton). Marine mammal prey varies by species, season, and location and, for some, is not well documented. Here, we describe studies regarding the effects of noise on known marine mammal prey.

Fish utilize the soundscape and components of sound in their environment to perform important functions such as foraging, predator avoidance, mating, and spawning (*e.g.*, Zelik *et al.*, 1999; Fay, 2009). Depending on their hearing anatomy and peripheral sensory structures, which vary among species, fishes hear sounds using pressure and particle motion sensitivity capabilities and detect the motion of surrounding water (Fay *et al.*, 2008). The potential effects of noise on fishes depends on the overlapping frequency range, distance from the sound source, water depth of exposure, and species-specific hearing sensitivity, anatomy, and physiology. Key

impacts to fishes may include behavioral responses, hearing damage, barotrauma (pressure-related injuries), and mortality.

Fish react to sounds which are especially strong and/or intermittent low-frequency sounds, and behavioral responses such as flight or avoidance are the most likely effects. Short duration, sharp sounds can cause overt or subtle changes in fish behavior and local distribution. The reaction of fish to noise depends on the physiological state of the fish, past exposures, motivation (*e.g.*, feeding, spawning, migration), and other environmental factors. 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). Several studies have demonstrated that impulse sounds might affect the distribution and behavior of some fishes, potentially impacting foraging opportunities or increasing energetic costs (*e.g.*, Fewtrell and McCauley, 2012; Pearson *et al.*, 1992; Skalski *et al.*, 1992; Santulli *et al.*, 1999; Paxton *et al.*, 2017). However, some studies have shown no or slight reaction to impulse sounds (*e.g.*, Pena *et al.*, 2013; Wardle *et al.*, 2001; Jorgenson and Gyselman, 2009; Cott *et al.*, 2012). More commonly, though, the impacts of noise on fish are temporary.

SPLs of sufficient strength have been known to cause injury to fish and fish mortality. However, in most fish species, hair cells in the ear continuously regenerate and loss of auditory function likely is restored when damaged cells are replaced with new cells. Halvorsen *et al.* (2012a) showed that a TTS of 4-6 dB was recoverable within 24 hours for one species. Impacts would be most severe when the individual fish is close to the source and when the duration of exposure is long. Injury caused by barotrauma can range from slight to severe and can cause death, and is most likely for fish with swim bladders. Barotrauma injuries have been documented during controlled exposure to impact pile driving (Halvorsen *et al.*, 2012b; Casper *et al.*, 2013).

The action area supports marine habitat for prey species including large populations of anadromous fish including Pacific salmon (five species), Cutthroat (*Oncorhynchus clarkia*) and Steelhead Trout (*O. mykiss irideus*), and Dolly Varden and other species of marine fish such as halibut, Northern Rock Sole (*Lepidopsetta polyxystra*), sculpins, Pacific Cod (*Gadus macrocephalus*), herring, and Eulachon (*Thaleichthys pacificus*) (NMFS 2020i). The most likely impact to fish from pile driving activities at the project areas would be temporary behavioral avoidance of the area. The duration of fish avoidance of an 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 expected short daily duration of individual pile driving events and the relatively small areas being affected.

The following essential fish habitat (EFH) species may occur in the project area during at least one phase of their lifestage: Chum Salmon (*Oncorhynchus keta*), Pink Salmon (*O. gorbuscha*), Coho Salmon (*O. kisutch*), Sockeye Salmon (*O. nerka*), and Chinook Salmon (*O. tshawytscha*). No habitat areas of particular concern or EFH areas protected from fishing are identified near the project area (NMFS 2020h). The closest documented anadromous fish streams to the project area are Halibut Creek (AWC: 114-34-10200) approximately 5,100 m north west of the proposed project site and Humpback Creek (AWC: 114-34-10100) is approximately 7,600 m southwest of the proposed project site (ADF&G 2020a).

The area impacted by the project is relatively small compared to the available habitat in Port Frederick Inlet and does not include habitat of particular importance relative to available habitat overall. Any behavioral avoidance by fish of the disturbed area would still leave significantly large areas of fish and marine mammal foraging habitat in the nearby vicinity. As described in the preceding, the potential for the City's construction to affect the availability of prey to marine mammals or to meaningfully impact the quality of physical or acoustic habitat is considered to be insignificant. Effects to habitat will not be discussed further in this document.

Estimated Take

This section provides an estimate of the number of incidental takes proposed for authorization through this IHA, which will inform both NMFS' consideration of "small numbers" and the negligible impact determination.

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).

Take of marine mammals incidental to the City's pile driving and removal activities (as well as during DTH) could occur as a result of Level A and Level B harassment. Below we describe how the potential take is estimated. As described previously, no mortality is anticipated or proposed to be authorized for this activity. Below we describe how the take is estimated.

Generally speaking, we estimate take by considering: (1) acoustic thresholds above which NMFS believes the best available science indicates marine mammals will be behaviorally harassed or incur some degree of permanent hearing impairment; (2) the area or volume of water that will be ensonified above these levels in a day; (3) the density or occurrence of marine mammals within these ensonified areas; and, (4) and the number of days of activities. We note that while these basic factors can contribute to a basic calculation to provide an initial prediction of takes, additional information that can qualitatively inform take estimates is also sometimes available (*e.g.*, previous monitoring results or average group size). Below, we describe the factors considered here in more detail and present the proposed take estimate.

Acoustic Thresholds

Using the best available science, NMFS has developed acoustic thresholds that identify the received level of underwater sound above which exposed marine mammals would be

reasonably expected to be behaviorally harassed (equated to Level B harassment) or to incur PTS of some degree (equated to Level A harassment).

Level B Harassment – Though significantly driven by received level, the onset of behavioral disturbance from anthropogenic noise exposure is also informed to varying degrees by other factors related to the source (*e.g.*, frequency, predictability, duty cycle), the environment (*e.g.*, bathymetry), and the receiving animals (hearing, motivation, experience, demography, behavioral context) and can be difficult to predict (Southall *et al.*, 2007, Ellison *et al.*, 2012). Based on what the available science indicates and the practical need to use a threshold based on a factor that is both predictable and measurable for most activities, NMFS uses a generalized acoustic threshold based on received level to estimate the onset of behavioral harassment. NMFS predicts that marine mammals are likely to be behaviorally harassed in a manner we consider Level B harassment when exposed to underwater anthropogenic noise above received levels of 120 dB re 1 μ Pa (rms) for continuous (*e.g.*, vibratory pile driving and DTH) and above 160 dB re 1 μ Pa (rms) for impulsive sources (*e.g.*, impact pile driving). The City’s proposed activity includes the use of continuous (vibratory pile driving, DTH) and impulsive (impact pile driving) sources, and therefore the 120 and 160 dB re 1 μ Pa (rms) are applicable.

Level A harassment - NMFS’ Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0) (Technical Guidance, 2018) identifies dual criteria to assess auditory injury (Level A harassment) to five different marine mammal groups (based on hearing sensitivity) as a result of exposure to noise. The technical guidance identifies the received levels, or thresholds, above which individual marine mammals are predicted to experience changes in their hearing sensitivity for all underwater anthropogenic sound sources, and reflects the best available science on the potential for noise to affect auditory sensitivity by:

- Dividing sound sources into two groups (*i.e.*, impulsive and non-impulsive) based on their potential to affect hearing sensitivity;

- Choosing metrics that best address the impacts of noise on hearing sensitivity, *i.e.*, sound pressure level (peak SPL) and sound exposure level (SEL) (also accounts for duration of exposure); and
- Dividing marine mammals into hearing groups and developing auditory weighting functions based on the science supporting that not all marine mammals hear and use sound in the same manner.

These thresholds were developed by compiling and synthesizing the best available science, and are provided in Table 4 below. The references, analysis, and methodology used in the development of the thresholds are described in NMFS 2018 Technical Guidance, which may be accessed at <https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-acoustic-technical-guidance>.

The City's proposed activities includes the use of continuous non-impulsive (vibratory pile driving, DTH) and impulsive (impact pile driving, DTH) sources, and therefore the 120 and 160 dB re 1 μ Pa (rms) criteria are applicable. DTH pile installation includes drilling (non-impulsive sound) and hammering (impulsive sound) to penetrate rocky substrates (Denes *et al.* 2016; Denes *et al.* 2019; Reyff and Heyvaert 2019). DTH pile installation was initially thought be a primarily non-impulsive noise source. However, Denes *et al.* (2019) concluded from a study conducted in Virginia, nearby the location for this project, that DTH should be characterized as impulsive based on Southall *et al.* (2007), who stated that signals with a >3 dB difference in sound pressure level in a 0.035-second window compared to a 1-second window can be considered impulsive. Therefore, DTH pile installation is treated as both an impulsive and non-impulsive noise source. In order to evaluate Level A harassment, DTH pile installation activities are evaluated according to the impulsive criteria and using 160 dB rms. Level B harassment isopleths are determined by applying non-impulsive criteria and using the 120 dB rms threshold which is also used for vibratory driving. This approach ensures that the largest ranges to effect for both Level A and Level B harassment are accounted for in the take estimation process.

Table 4--Thresholds identifying the onset of Permanent Threshold Shift (Auditory Injury)

Hearing Group	PTS Onset Acoustic Thresholds* (Received Level)	
	Impulsive	Non-impulsive
Low-Frequency (LF) Cetaceans	<i>Cell 1</i> $L_{pk,flat}$: 219 dB $L_{E,LF,24h}$: 183 dB	<i>Cell 2</i> $L_{E,LF,24h}$: 199 dB
Mid-Frequency (MF) Cetaceans	<i>Cell 3</i> $L_{pk,flat}$: 230 dB $L_{E,MF,24h}$: 185 dB	<i>Cell 4</i> $L_{E,MF,24h}$: 198 dB
High-Frequency (HF) Cetaceans	<i>Cell 5</i> $L_{pk,flat}$: 202 dB $L_{E,HF,24h}$: 155 dB	<i>Cell 6</i> $L_{E,HF,24h}$: 173 dB
Phocid Pinnipeds (PW) (Underwater)	<i>Cell 7</i> $L_{pk,flat}$: 218 dB $L_{E,PW,24h}$: 185 dB	<i>Cell 8</i> $L_{E,PW,24h}$: 201 dB
Otariid Pinnipeds (OW) (Underwater)	<i>Cell 9</i> $L_{pk,flat}$: 232 dB $L_{E,OW,24h}$: 203 dB	<i>Cell 10</i> $L_{E,OW,24h}$: 219 dB
<p>* Dual metric acoustic thresholds for impulsive sounds: Use whichever results in the largest isopleth for calculating PTS onset. If a non-impulsive sound has the potential of exceeding the peak sound pressure level thresholds associated with impulsive sounds, these thresholds should also be considered.</p> <p><u>Note:</u> Peak sound pressure (L_{pk}) has a reference value of 1 μPa, and cumulative sound exposure level (L_E) has a reference value of 1 μPa²s. In this Table, thresholds are abbreviated to reflect American National Standards Institute standards (ANSI 2013). However, peak sound pressure is defined by ANSI as incorporating frequency weighting, which is not the intent for this Technical Guidance. Hence, the subscript “flat” is being included to indicate peak sound pressure should be flat weighted or unweighted within the generalized hearing range. The subscript associated with cumulative sound exposure level thresholds indicates the designated marine mammal auditory weighting function (LF, MF, and HF cetaceans, and PW and OW pinnipeds) and that the recommended accumulation period is 24 hours. The cumulative sound exposure level thresholds could be exceeded in a multitude of ways (<i>i.e.</i>, varying exposure levels and durations, duty cycle). When possible, it is valuable for action proponents to indicate the conditions under which these acoustic thresholds will be exceeded.</p>		

Ensonified Area

Here, we describe operational and environmental parameters of the activity that will feed into identifying the area ensonified above the acoustic thresholds, which include source levels and transmission loss coefficient.

Sound Propagation

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:

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

B = transmission loss coefficient (assumed to be 15)

R₁ = the distance of the modeled SPL from the driven pile, and

R₂ = the distance from the driven pile of the initial measurement.

This formula neglects loss due to scattering and absorption, which is assumed to be zero here. The degree to which underwater sound propagates away from a sound source is dependent on a variety of factors, most notably the water bathymetry and presence or absence of reflective or absorptive conditions including in-water structures and sediments. Spherical spreading occurs in a perfectly unobstructed (free-field) environment not limited by depth or water surface, resulting in a 6 dB reduction in sound level for each doubling of distance from the source ($20 * \log(\text{range})$). Cylindrical spreading occurs in an environment in which sound propagation is bounded by the water surface and sea bottom, resulting in a reduction of 3 dB in sound level for each doubling of distance from the source ($10 * \log(\text{range})$). As is common practice in coastal waters, here we assume practical spreading loss (4.5 dB reduction in sound level for each doubling of distance). Practical spreading is a compromise that is often used under conditions where water depth increases as the receiver moves away from the shoreline, resulting in an expected propagation environment that would lie between spherical and cylindrical spreading loss conditions.

Sound Source Levels

The intensity of pile driving sounds is greatly influenced by factors such as the type of piles, hammers, and the physical environment in which the activity takes place. There are source level measurements available for certain pile types and sizes from the similar environments recorded from underwater pile driving projects in Alaska (*e.g.*, JASCO Reports - Denes *et al.*, 2016 and Austin *et al.*, 2016) that were evaluated and used as proxy sound source levels to

determine reasonable sound source levels likely result from the City’s pile driving and removal activities (Table 5). Many source levels used were more conservative as the values were from larger pile sizes.

Table 5--Proposed Sound Source Levels

Activity	Sound Source Level at 10 meters	Sound Source
Vibratory Pile Driving/Removal		
20-in fender pile permanent	161.9 SPL	The 20-in fender and 30-inch-diameter source level for vibratory driving are proxy from median measured source levels from pile driving of 30-inch-diameter piles to construct the Ketchikan Ferry Terminal (Denes <i>et al.</i> 2016, Table 72).
30-in steel pile temporary installation	161.9 SPL	
30-in steel pile removal	161.9 SPL	
36-in steel pile permanent	168.2 SPL	The 36-in-diameter pile source level is proxy from median measured source levels from pile driving of 48-in diameter piles for the Port of Anchorage test pile project (Austin <i>et al.</i> 2016, Table 16).
H-pile installation permanent	168 SPL	The H-pile source level is proxy from median measured source levels from vibratory pile driving of H piles for the Port of Anchorage test pile project (Yurk <i>et al.</i> 2015 as cited in Denes <i>et al.</i> 2016, Appendix H Table 2).
Sheet pile installation	160 SPL	The sheet source level is proxy from median measured source levels from vibratory pile driving of 24-in sheets for Berth 30 at the Port of Oakland, CA (Buehler <i>et al.</i> 2015; Table I.6-2).
Impact Pile Driving		
36-in steel pile permanent	186.7 SEL/ 198.6 SPL	The 36-in diameter pile source level is a proxy from median measured source level from impact hammering of 48-in piles for the Port of Anchorage test pile project (Austin <i>et al.</i> , 2016, Tables 9 and 16).
20-in fender pile installation permanent	161 SEL/ 174.8 SPL	The 20-in diameter pile source levels are proxy from median measured source levels from vibratory driving of 24-in piles for the Kodiak Ferry Terminal project (Denes <i>et al.</i> 2016)
H-pile installation permanent and Sheet pile installation	163 SEL/ 177 SPL	H-Pile and Sheets Impacting source levels are proxy from median measured source levels from pile driving H-piles and sheets for the Port of Anchorage test pile project (Yurk <i>et al.</i> 2015 as cited in Denes <i>et al.</i> 2016, Appendix H Table 1).
DTH Pile Installation		
36-in steel pile permanent	164 SEL/166 SPL	The DTH sound source proxy of 164 dB SEL is from 42-in piles, Reyff 2020 and Denes <i>et al.</i> 2019; while the 154 dB SEL is based on 24-in piles, Denes <i>et al.</i> 2016.
20-in fender pile installation temporary	154 SEL/166 SPL	
H-pile installation permanent (20-in hole)	154 SEL/166 SPL	

Level A Harassment

When the NMFS Technical Guidance (2016) was published, in recognition of the fact that ensounded area/volume could be more technically challenging to predict because of the duration component in the new thresholds, we developed a User Spreadsheet that includes tools to help predict a simple isopleth that can be used in conjunction with marine mammal density or

occurrence to help predict takes. We note that because of some of the assumptions included in the methods used for these tools, we anticipate that isopleths produced are typically going to be overestimates of some degree, which may result in some degree of overestimate of Level A harassment take. However, these tools offer the best way to predict appropriate isopleths when more sophisticated 3D modeling methods are not available, and NMFS continues to develop ways to quantitatively refine these tools, and will qualitatively address the output where appropriate. For stationary sources (such as from impact and vibratory pile driving and DTH), NMFS User Spreadsheet (2020) predicts the closest distance at which, if a marine mammal remained at that distance the whole duration of the activity, it would not incur PTS. Inputs used in the User Spreadsheet (Tables 6 and 7), and the resulting isopleths are reported below (Table 8).

Table 6--NMFS Technical Guidance (2020) User Spreadsheet Input to Calculate PTS Isopleths for Vibratory Pile Driving

USER SPREADSHEET INPUT –Vibratory Pile Driving Spreadsheet Tab A.1 Vibratory Pile Driving Used.						
	30-in piles (temporary install)	30-in piles (temporary removal)	20-in fender piles (permanent)	36-in piles (permanent)	H-piles (permanent)	Sheet piles (permanent)
Source Level (RMS SPL)	161.9	161.9	161.9	168.2	168	160
Weighting Factor Adjustment (kHz)	2.5	2.5	2.5	2.5	2.5	2.5
Number of piles within 24-hr period	4	4	4	4	4	30
Duration to drive a single pile (min)	15	15	15	15	15	15
Propagation (xLogR)	15	15	15	15	15	15
Distance of source level measurement (meters) ⁺	10	10	10	10	11	10

Table 7--NMFS Technical Guidance (2020) User Spreadsheet Input to Calculate PTS Isopleths for Impact Pile Driving

USER SPREADSHEET INPUT – Impact Pile Driving Spreadsheet Tab E.1 Impact Pile Driving Used.							
	36-in piles (permanent)	36-in pile (DTH)	20-in fender piles (permanent)	20-in fender pile (DTH)	H-pile (permanent)	H-pile (DTH)	Sheet piles (permanent)
Source Level (Single Strike/shot SEL)	186.7	164	161	154	163	154	163
Weighting Factor Adjustment (kHz)	2	2	2	2	2	2	2
Number of strikes per pile	100	-	35	-	35	-	35
Strike rate (avg. strikes per second)	-	15		15		15	
Number of piles per day	2	2	2	2	5	2	5
Propagation (xLogR)	15	15	15	15	15	15	15
Distance of source level measurement (meters) ⁺	10	10	10	10	15	10	15

Table 8--NMFS Technical Guidance (2020) User Spreadsheet Outputs to Calculate Level A Harassment PTS Isopleths

USER SPREADSHEET OUTPUT		PTS isopleths (meters)				
Activity	Sound Source Level at 10 m	Level A harassment				
		Low- Frequency Cetaceans	Mid- Frequency Cetaceans	High- Frequency Cetaceans	Phocid	Otariid
Vibratory Pile Driving/Removal						
20-in steel fender pile installation	161.9 SPL	7.8	0.7	11.6	4.8	0.3
30-in steel pile temporary installation	161.9 SPL	7.8	0.7	11.6	4.8	0.3
30-in steel pile removal	161.9 SPL	7.8	0.7	11.6	4.8	0.3
36-in steel permanent installation	168.2 SPL	20.6	1.8	30.5	12.5	0.9
H-pile installation	168 SPL	22.0	2.0	32.5	13.4	0.9

Sheet pile installation	160 SPL	22.4	2.0	33.2	13.6	1.0
Impact Pile Driving						
36-in steel permanent installation	186.7 SEL/ 198.6 SPL	602.7	21.4	717.9	322.5	23.5
20-in fender pile installation	161 SEL/ 174.8 SPL	5.8	0.2	6.9	3.1	0.21
H-pile installation	163 SEL/ 177 SPL	21.8	0.8	25.9	11.6	0.8
Sheet pile installation	163 SEL/ 177 SPL	21.8	0.8	25.9	11.6	0.8
DTH						
36-in steel permanent installation	164 SEL/ 166 SPL	1,225.6	43.6	1,459.9	655.9	47.8
20-in steel fender pile installation	154 SEL/ 166 SPL	264.1	9.4	314.5	141.3	10.3
H-pile installation	154 SEL/ 166 SPL	264.1	9.4	314.5	141.3	10.3

Level B Harassment

Utilizing the practical spreading loss model, the City determined underwater noise will fall below the behavioral effects threshold of 120 dB rms for marine mammals at the distances shown in Table 9 for vibratory pile driving/removal, and DTH. With these radial distances, and due to the occurrence of landforms (See Figure 5 and 8 of the IHA Application), the largest Level B harassment zone calculated for vibratory pile driving for 36-in steel piles and H-piles were larger than the 15,700 m from the source where land masses block sound transmission. For DTH, the largest radial distance was 11,659 m. For calculating the Level B harassment zone for impact driving, the practical spreading loss model was used with a behavioral threshold of 160 dB rms. The maximum radial distance of the Level B harassment zone for impact piling equaled 3,744 m for 36-in piles m. Table 9 below provides all Level B harassment radial distances (m) during the City’s proposed activities.

Table 9--Radial Distances (meters) to Relevant Behavioral Isopleths

Activity	Received Level at 10 meters	Level B Harassment Zone (m)*
Vibratory Pile Driving/Removal		
20-in steel fender pile installation	161.9 SPL	6,215 (calculated 6,213)

30-in steel temporary installation	161.9 SPL	6,215 (calculated 6,213)
30-in steel removal	161.9 SPL	6,215 (calculated 6,213)
36-in steel permanent installation	168.2 SPL	15,700 ^a (calculated 16,343)
H-pile installation	168 SPL	15,700 ^a (calculated 17,434)
Sheet pile installation	160 SPL	4,645 (calculated 4,642)
Impact Pile Driving		
20-in fender pile installation	161 SEL/ 174.8 SPL	100 (calculated 97)
36-in steel permanent installation	186.7 SEL/ 198.6 SPL	3,745 (calculated 3,744)
H-pile and Sheet pile installation	163 SEL/ 177 SPL	205 (calculated 204)
DTH		
20-in steel fender pile installation	166 SPL	11,660 (calculated 11,659)
36-in steel temporary installation	166 SPL	11,660 (calculated 11,659)
H-pile installation	166 SPL	11,660 (calculated 11,659)

* Numbers rounded up to nearest 5 meters. These specific rounded distances are for monitoring purposes rather than take estimation.

^a Although the calculated distance to Level B harassment thresholds extends these distances, all Level B harassment zones are truncated at 15,700m from the source where land masses block sound transmission.

Marine Mammal Occurrence and Take Calculation and Estimation

In this section we provide the information about the presence, density, or group dynamics of marine mammals that will inform the take calculations. Potential exposures to impact pile driving, vibratory pile driving/removal and DTH noises for each acoustic threshold were estimated using group size estimates and local observational data. As previously stated, take by Level B harassment as well as small numbers of take by Level A harassment will be considered for this action. Take by Level B and Level A harassment are calculated differently for some species based on monthly or daily sightings data and average group sizes within the action area using the best available data. Take by Level A harassment is being proposed for three species (Dall's and harbor porpoise and harbor seal) where the Level A harassment isopleths are larger for pile driving of 36-in steel piles and DTH of 36-in piles, and is based on average group size multiplied by the number of days of impact pile driving for 36-in piles and DTH of 36-in piles.

Distances to Level A harassment thresholds for other project activities (vibratory pile driving/removal, DTH and impact driving of smaller pile sizes) are considerably smaller compared to impact pile driving of 36-in piles and DTH for 36-in piles, and mitigation is expected to avoid Level A harassment from these other activities.

Minke whales

There are no density estimates of minke whales available in the project area. These whales are usually sighted individually or in small groups of two or three, but there are reports of loose aggregations of hundreds of animals (NMFS 2018). One minke whale was sighted each year during the Hoonah cruise ship Berth I project (June 2015-January 2016; BergerABAM 2016) and during the Hoonah Berth II project (June 2019 –October 2019; SolsticeAK 2020). To be conservative based on group size, we predict that three minke whales in a group could be sighted each month over the 4-month project period for a total of 12 minke whale takes proposed for authorization by Level B harassment. No take by Level A harassment is proposed for authorization or anticipated to occur due to their rarer occurrence in the project area.

Humpback whales

There are no density estimates of humpback whales available in the project area. During the previous Hoonah Berth I project, humpback whales were observed on 84 of the 135 days of monitoring; most often in September and October (BergerABAM 2016). Additionally, during construction of the Hoonah Berth II project in 2019, humpback whales were observed in the action area on 45 of the 51 days of monitoring; most often in July and September. Up to 24 humpback sightings were reported on a single day (July 30, 2019), and a total of 108 observations were recorded in harassment zones during project construction (SolsticeAK 2020).

Based on a group size of eight animals, the general maximum group size observed in Southeast Alaska in all months of the year, NMFS estimates that 8 humpback whales could occur for each day of the project (110 days) for a total of 880 takes by Level B harassment. Under the MMPA, humpback whales are considered a single stock (Central North Pacific); however, we

have divided them here to account for DPSs listed under the ESA. Using the stock assessment from Muto *et al.* 2020 for the Central North Pacific stock (10,103 whales) and calculations in Wade *et al.* 2016; 9,487 whales are expected to be from the Hawaii DPS and 606 from the Mexico DPS. Therefore, for purposes of consultation under the ESA, we anticipate that 53 of those takes would be of individuals from the Mexico DPS (0.0601 proportion of the total takes). No take by Level A harassment is proposed for authorization or anticipated to occur due to their large size and ability to be visibly detected in the project area if an animal should approach the Level A harassment zone.

Gray whales

There are no density estimates of gray whales available in the project area. Gray whales travel alone or in small, unstable groups, although large aggregations may be seen in feeding and breeding grounds (NMFS 2018e). Observations in Glacier Bay and nearby waters recorded two gray whales documented over a 10-year period (Keller *et al.*, 2017). None were observed during Hoonah Berth I or II project monitoring (BergerABAM 2016, SolsticeAK 2020). We estimate a one gray whale x onesighting per month over the 4-month work period for a total of four gray whale takes proposed for authorization by Level B harassment. No take by Level A harassment is proposed for authorization or anticipated to occur due to their rarer occurrence in the project area, but also their large size and ability to be visibly detected in the project area if an animal should approach the Level A harassment zone.

Killer whales

There are no density estimates of killer whales available in the project area. Killer whales occur commonly in the waters of the project area, and could include members of several designated stocks that may occur in the vicinity of the proposed project area. Whales are known to use the Icy Strait corridor to enter and exit inland waters and are observed in every month of the year, with certain pods being observed inside Port Frederick passing directly in front of Hoonah. Group size of resident killer whale pods in the Icy Strait area ranges from 42 to 79 and

occur in every month of the year (Dahlheim pers. comm. to NMFS 2015). As determined during a line-transect survey by Dalheim *et al.* (2008), the greatest number of transient killer whale observed occurred in 1993 with 32 animals seen over 2 months for an average of 16 sightings per month. Killer whales were observed infrequently during construction of Hoonah Berth I project. Usually a singular animal was observed, but a group containing eight individuals was seen in the project area on one occasion. A total of 24 animals were observed during in-water work for the Hoonah Bert I project (BergerABAM 2016). During construction of the Hoonah Berth II project, killer whales were observed on 8 days. Usually a single animal or pairs were observed, but a group containing five individuals was seen in the project area on one occasion. A total of 20 animals were observed during in-water work on Hoonah Berth II project (SolsticeAK 2020). Using the largest group size for resident killer whales as discussed above, NMFS estimates that 79 killer whales (residents and transients) could occur each month during the 4-month project period for a total of 316 takes by Level B harassment. No take by Level A harassment is proposed for authorization or anticipated to occur to the ability to visibly detect these large whales and in most cases the small size of the Level A harassment zones.

Pacific white-sided dolphin

There are no density estimates of Pacific white-sided dolphins available in the project area. Pacific white-sided dolphins have been observed in Alaska waters in groups ranging from 20 to 164 animals, with the sighting of 164 animals occurring in Southeast Alaska near Dixon Entrance (Muto *et al.*, 2018). There were no Pacific white-sided dolphins observed during the 135-day monitoring period during the Hoonah Berth I project; however, a pod of two Pacific white-sided dolphins was observed during construction of the Hoonah Bert II project (SolsticeAK 2020). Using the largest group size for Pacific white-sided dolphins as discussed above, NMFS estimates 164 Pacific white-sided dolphins may be seen every other month over the 4-month project period for a total of 328 takes by Level B harassment. No take by Level A harassment is proposed or anticipated to occur as the largest Level A harassment isopleths

calculated were 43.6 m during DTH of 36-in piles and 21.4 m during impact pile driving of 36-in piles. The remaining isopleths were all under 10 m.

Dall's porpoise

Little information is available on the abundance of Dall's porpoise in the inland waters of Southeast Alaska. Dall's porpoise are most abundant in spring, observed with lower numbers in the summer, and lowest numbers in fall. Jefferson *et al.*, 2019 presents abundance estimates for Dall's porpoise in these waters and found the abundance in summer (N = 2,680, CV = 19.6 percent), and lowest in fall (N = 1,637, CV = 23.3 percent). Dall's porpoise are common in Icy Strait and sporadic with very low densities in Port Frederick (Jefferson *et al.*, 2019). Dahlheim *et al.* (2008) observed 346 Dall's porpoise in Southeast Alaska (inclusive of Icy Strait) during the summer (June/July) of 2007 for an average of 173 animals per month as part of a 17-year study period. During the previous Hoonah Berth I project, only two Dall's porpoise were observed, and were transiting within the waters of Port Frederick in the vicinity of Halibut Island. A total of 21 Dall's porpoises were observed on eight days during the Hoonah Berth II project in group sizes of 2 to 12 porpoise (SolsticeAK 2020). Therefore, NMFS' estimates 12 Dall's porpoise a week may be seen during the 4-month project period for a total of 192 takes by Level B harassment. Because the calculated Level A harassment isopleths are larger for high-frequency cetaceans during DTH of 36-in piles (1,459.9 m) and 36-in impact pile driving (717.9 m) and the applicant would have a reduced shutdown zone at 200 m, NMFS predicts that some take by Level A harassment may occur. It is estimated that two Dall's porpoise could be taken by Level A harassment every 5 days over a 20-day period (15 days of DTH of 36-in piles + 5 days of 36-in impact pile driving) for a total of 8 takes by Level A harassment.

Harbor porpoise

Dahlheim *et al.* (2015) observed 332 resident harbor porpoises occur in the Icy Strait area, and harbor porpoise are known to use the Port Frederick area as part of their core range. During the Hoonah Berth I project monitoring, a total of 32 harbor porpoise were observed over

19 days during the 4-month project. The harbor porpoises were observed in small groups with the largest group size reported was four individuals and most group sizes consisting of three or fewer animals. During the test pile program conducted at the Berth II project site in May 2018, eight harbor porpoises were observed over a 7-hour period (SolsticeAK 2018). During the Hoonah Berth II project, 120 harbor porpoises were observed June through October. The largest group size reported was eight individuals, and most group sizes consisting of four or fewer animals (SolsticeAK 2020). NMFS estimates that four harbor porpoises per day could occur in the project area over the 4-month project period (110 days) for a total of 440 takes by Level B harassment. Because the calculated Level A harassment isopleths are larger for high-frequency cetaceans during DTH of 36-in piles (1,459.9 m) and 36-in impact pile driving (717.9 m) and the applicant would have a reduced shutdown zone at 200 m, NMFS predicts that some take by Level A harassment may occur. It is estimated that four harbor porpoise could be taken by Level A harassment every 5 days over a 20-day period (15 days of DTH of 36-in piles + 5 days of 36-in impact pile driving) for a total of 16 takes by Level A harassment.

Harbor Seal

There are no density estimates of harbor seals available in the project area. Keller *et al.* (2017) observed an average of 26 harbor seal sightings each month between June and August of 2014 in Glacier Bay and Icy Strait. During the monitoring of the Hoonah Berth I project, harbor seals typically occur in groups of one to four animals and a total of 63 seals were observed during 19 days of the 135-day monitoring period. In 2019, a total of 33 harbor seals were seen during the Hoonah Berth II project. Only solo individuals were sighted during that time (SolsticeAK 2020). NMFS estimates that three harbor seals per group, and two groups a day, could occur in the project area each month during the 4-month project period (110 days) for a total of 660 takes by Level B harassment. Because the calculated Level A harassment isopleths are larger for phocids during DTH of 36-in piles (655.9 m) and 36-in impact pile driving (322.5 m), compared with the proposed shutdown zone at 200 m, NMFS predicts that some take by

Level A harassment may occur. It is estimated that one group of three harbor seals a day could be taken by Level A harassment over a 20-day period (15 days of DTH of 36-in piles + 5 days of 36-in impact pile driving) for a total of 60 takes by Level A harassment.

Steller sea lion

There are no density estimates of Steller sea lions available in the project area. NMFS expects that Steller sea lion presence in the action area will vary due to prey resources and the spatial distribution of breeding versus non-breeding season. In April and May, Steller sea lions are likely feeding on herring spawn in the action area. Then, most Steller sea lions likely move to the rookeries along the outside coast (away from the action area) during breeding season, and would be in the action area in greater numbers in August and later months (J. Womble, NPS, pers. comm. to NMFS AK Regional Office, March 2019). However, Steller sea lions are also opportunistic predators and their presence can be hard to predict.

Steller sea lions typically occur in groups of 1-10 animals, but may congregate in larger groups near rookeries and haulouts. The previous Hoonah Berth I project observed a total of 180 Steller sea lion sightings over 135 days in 2015, amounting to an average of 1.3 sightings per day (BergerABAM 2016). During a test pile program performed at the project location by the Hoonah Cruise Ship Dock Company in May 2018, a total of 15 Steller sea lions were seen over the course of 7 hours in one day (SolsticeAK 2018). During construction of the Hoonah Berth II project, a total of 197 Steller sea lion sightings over 42 days were reported, amounting to an average of 4.6 sightings per day (SolsticeAK 2020). NMFS estimates that five Steller sea lions per day could occur in the project area each month during the 4-month project period (110 days) for a total of 550 takes by Level B harassment, with 39 of those anticipated being from the Western DPS (0.0702 proportion of the total animals (L. Jemison draft unpublished Steller sea lion data, 2019). There is some evidence of Steller sea lions remaining in areas where there is a reliable food source. Should a Steller sea lion go undetected by a Protected Species Observer (PSO) and later observed within the Level A harassment zone, the City proposes mitigation

measures (e.g., shutdowns), and it would be unlikely that an animal would accumulate enough exposure for PTS to occur. Therefore, no take by Level A harassment is proposed or anticipated to occur as the largest Level A isopleths calculated were 47.8 m during DTH of 36-in piles and 23.5 m during impact pile driving of 36-in piles. The remaining isopleths were approximately 10 m or less.

Table 10 below summarizes the proposed estimated take for all the species described above as a percentage of stock abundance.

Table 10--Proposed Take Estimates as a Percentage of Stock Abundance

Species	Stock (N _{EST})	Level A Harassment	Level B Harassment	Percent of Stock
Minke Whale	N/A	0	12	N/A
Humpback Whale	Central North Pacific	0	880	8.7
Gray Whale	Eastern North Pacific (27,000)	0	4	Less than 1 percent
Killer Whale	Alaska Resident (2,347) Northern Resident (302) West Coast Transient (243)	0	256 33 27 (Total 316)	10.9 ^a 10.9 ^a 11.1 ^a
Pacific White-Sided Dolphin	North Pacific (26,880)	0	328	Less than 1 percent
Dall's Porpoise	Alaska (83,400) ^b	8	144	Less than 1 percent
Harbor Porpoise	NA	16	440	NA
Harbor Seal	Glacier Bay/Icy Strait (7,455)	60	660	8.9
Steller Sea Lion	Eastern U.S. (43,201) Western U.S. (53,624)	0	511 39 (Total 550)	1.2 Less than 1 percent

^a Take estimates are weighted based on calculated percentages of population for each distinct stock, assuming animals present would follow same probability of presence in project area.

^b Jefferson *et al.* 2019 presents the first abundance estimates for Dall's porpoise in the waters of Southeast Alaska with highest abundance recorded in spring (N=5,381, CV= 25.4 percent), lower numbers in summer (N=2,680, CV=19.6 percent), and lowest in fall (N=1,637, CV=23.3 percent). However, NMFS currently recognizes a single

stock of Dall's porpoise in Alaskan waters and an estimate of 83,400 Dall's porpoises is used by NMFS for the entire stock (Muto *et al.*, 2020).

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 (latter not applicable for this action). NMFS regulations require applicants for incidental take authorizations to include information about the availability and feasibility (economic and technological) of equipment, methods, and manner of conducting such activity or other means of effecting the least practicable adverse impact upon the affected species or stocks and their habitat (50 CFR 216.104(a)(11)).

In evaluating how mitigation may or may not be appropriate to ensure the least practicable adverse impact on species or stocks and their habitat, as well as subsistence uses where applicable, we carefully consider two primary factors:

1) The manner in which, and the degree to which, the successful implementation of the measure(s) is expected to reduce impacts to marine mammals, marine mammal species or stocks, and their habitat. This considers the nature of the potential adverse impact being mitigated (likelihood, scope, range). It further considers the likelihood that the measure will be effective if implemented (probability of accomplishing the mitigating result if implemented as planned) the likelihood of effective implementation (probability implemented as planned); and

2) The practicability of the measures for applicant implementation, which may consider such things as cost, impact on operations, and, in the case of a military readiness activity, personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity.

General

The City would follow mitigation procedures as outlined in their Marine Mammal Monitoring Plan and as described below. In general, if poor environmental conditions restrict visibility full visibility of the shutdown zone, pile driving installation and removal as well as DTH would be delayed.

Training

The City must ensure that construction supervisors and crews, the monitoring team, and relevant City staff are trained prior to the start of construction activity subject to this IHA, so that responsibilities, communication procedures, monitoring protocols, and operational procedures are clearly understood. New personnel joining during the project must be trained prior to commencing work

Avoiding Direct Physical Interaction

The City must avoid direct physical interaction with marine mammals during construction activity. If a marine mammal comes within 10 m of such activity, operations must cease and vessels must reduce speed to the minimum level required to maintain steerage and safe working conditions, as necessary to avoid direct physical interaction.

Shutdown Zones

For all pile driving/removal and DTH activities, the City would establish a shutdown zone for a marine mammal species that is greater than its corresponding Level A harassment zone; except for a few circumstances during impact pile driving and DTH, where the shutdown zone is smaller (reduced to 200 m) than the Level A harassment zone for high frequency cetaceans and phocids due to the practicability of shutdowns on the applicant and to the potential difficulty of observing these animals in the larger Level A harassment zones. The calculated PTS isopleths were rounded up to a whole number to determine the actual shutdown zones that the applicant will operate under (Table 11). The purpose of a shutdown zone is generally to define an area within which shutdown of the activity would occur upon sighting of a marine mammal (or in anticipation of an animal entering the defined area).

Table 11--Pile Driving Shutdown Zones during Project Activities

Pile size, type, and method	Shutdown Zones				
	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid	Otariid
Vibratory Pile Driving/Removal					
20-in steel fender pile installation	10	10	15	10	10
30-in steel pile temporary installation	10	10	15	10	10
30-in steel pile removal	10	10	15	10	10
36-in steel permanent installation	25	10	35	15	10
H-pile installation	35	10	35	15	10
Sheet pile installation	25	10	35	15	10
Impact Pile Driving					
36-in steel permanent installation	625	25	200*	200*	25
20-in fender pile installation	10	10	10	10	10
H-pile installation	25	10	30	15	10
Sheet pile installation	25	10	30	15	10
DTH					
36-in steel permanent installation	1,230	45	200*	200*	50
20-in steel fender pile installation	265	10	200*	145	15
H-pile installation	265	10	200*	145	15

*Due to practicability of the applicant to shutdown and the difficulty of observing some species and low occurrence of some species in the project area, such as high frequency cetaceans or pinnipeds out to this distance, the shutdown zones were reduced and Level A harassment takes were requested during DTH and for impact pile driving of 36-in piles.

Soft Start

The City must use soft start techniques when impact pile driving. Soft start requires contractors to provide an initial set of three strikes from the hammer at reduced energy, followed by a 30-second waiting period. Then two subsequent reduced-energy strike sets would occur. A soft start must be implemented at the start of each day's impact pile driving and at any time following cessation of impact pile driving for a period of 30 minutes or longer. Soft start is not required during vibratory pile driving and removal activities.

Vessels

Vessels would adhere to the Alaska Humpback Whale Approach Regulations when transiting for project activities (see 50 CFR 216.18, 223.214, and 224.103(b)). These regulations require that all vessels:

- Not approach within 91.44 m (100 yd) of a humpback whale, or cause a vessel or other object to approach within 91.44 m (100 yd) of a humpback whale;
- Not place vessel in the path of oncoming humpback whales causing them to surface within 91.44 m (100 yd) of vessel;
- Not disrupt the normal behavior or prior activity of a whale; and
- Operate at a slow, safe speed when near a humpback whale (safe speed is defined in regulation (see 33 CFR 83.06)).

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

Proposed Monitoring and Reporting

In order to issue an IHA for an activity, Section 101(a)(5)(D) of the MMPA states that NMFS must set forth, requirements pertaining to the monitoring and reporting of such taking. The MMPA implementing regulations at 50 CFR 216.104 (a)(13) indicate that requests for 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. Effective reporting is critical both to compliance as well as ensuring that the most value is obtained from the required monitoring.

Monitoring and reporting requirements prescribed by NMFS should contribute to improved understanding of one or more of the following:

- Occurrence of marine mammal species or stocks in the area in which take is anticipated (*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 marine mammal responses (behavioral or physiological) to acoustic stressors (acute, chronic, or cumulative), other stressors, or cumulative impacts from multiple stressors.
- How anticipated responses to stressors impact either: (1) long-term fitness and survival of individual marine mammals; or (2) populations, species, or stocks.
- Effects on marine mammal habitat (*e.g.*, marine mammal prey species, acoustic habitat, or other important physical components of marine mammal habitat).
- Mitigation and monitoring effectiveness.

Monitoring Zones

The City will establish and observe monitoring zones for Level B harassment as presented in Table 9. The monitoring zones for this project are areas where SPLs are equal to or exceed 120 dB rms (for vibratory pile driving/removal and DTH) and 160 dB rms (for impact pile driving). These 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 the Level B harassment 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.

Pre-Start Clearance Monitoring

Pre-start clearance monitoring must be conducted during periods of visibility sufficient for the lead PSO to determine the shutdown zones clear of marine mammals. Pile driving and DTH may commence when the determination is made.

Visual Monitoring

Monitoring must take place from 30 minutes (min) prior to initiation of pile driving and DTH activity (*i.e.*, pre-start clearance monitoring) through 30 min post-completion of pile driving and DTH activity. If a marine mammal is observed entering or within the shutdown zones, pile driving and DTH activity must be delayed or halted. If pile driving or DTH is delayed or halted due to the presence of a marine mammal, the activity may not commence or resume until either the animal has voluntarily exited and been visually confirmed beyond the shutdown zone or 15 min have passed without re-detection of the animal. Pile driving and DTH activity must be halted upon observation of either a species for which incidental take is not authorized or a species for which incidental take has been authorized but the authorized number of takes has been met, entering or within the harassment zone.

PSO Monitoring Locations and Requirements

The City must establish monitoring locations as described in the Marine Mammal Monitoring Plan. The City must monitor the project area to the extent possible based on the required number of PSOs, required monitoring locations, and environmental conditions. Monitoring would be conducted by PSOs from on land and from a vessel. For all pile driving and DTH activities, a minimum of one observer must be assigned to each active pile driving and DTH location to monitor the shutdown zones. Three PSOs must be onsite during all in-water activities as follows: PSO 1 stationed at the pile site on the existing City Dock, PSO 2 stationed on Halibut Island facing south and PSO 3 stationed on a vessel running a transect through southern portion of the project area in Port Frederick. These observers must record all observations of marine mammals, regardless of distance from the pile being driven or during DTH.

In addition, PSOs will work in shifts lasting no longer than 4 hrs with at least a 1-hr break between shifts, and will not perform duties as a PSO for more than 12 hrs in a 24-hr period (to reduce PSO fatigue).

Monitoring of pile driving shall be conducted by qualified, NMFS-approved PSOs. The City shall adhere to the following conditions when selecting PSOs:

- PSOs must be independent (*i.e.*, not construction personnel) and have no other assigned tasks during monitoring periods.
- At least one PSO must have prior experience performing the duties of a PSO during construction activities pursuant to a NMFS-issued incidental take authorization.
- Other PSOs may substitute other relevant experience, education (degree in biological science or related field), or training.
- Where a team of three PSOs are required, a lead observer or monitoring coordinator shall be designated. The lead observer must have prior experience performing the duties of a PSO during construction activity pursuant to a NMFS-issued incidental take authorization.
- PSOs must be approved by NMFS prior to beginning any activity subject to this IHA.

The City shall ensure that the PSOs have the following additional qualifications:

- Visual acuity in both eyes (correction is permissible) sufficient for discernment of moving targets at the water's surface with ability to estimate target size and distance; use of binoculars may be necessary to correctly identify the target;
- Experience and ability to conduct field observations and collect data according to assigned protocols;
- Experience or training in the field identification of marine mammals, including the identification of behaviors;

- Sufficient training, orientation, or experience with the construction operation to provide for personal safety during observations;
- Writing skills sufficient to prepare a report of observations including but not limited to the number and species of marine mammals observed; dates and times when in-water construction activities were conducted; dates, times, and reason for implementation of mitigation (or why mitigation was not implemented when required); and marine mammal behavior;
- 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; and
- Sufficient training, orientation, or experience with the construction operations to provide for personal safety during observations.

Notification of intent to commence construction

The City shall inform NMFS OPR and the NMFS Alaska Region Protected Resources Division one week prior to commencing construction activities.

Interim monthly reports

During construction, the City will submit brief, monthly reports to the NMFS Alaska Region Protected Resources Division that summarize PSO observations and recorded takes. Monthly reporting will allow NMFS to track the amount of take (including any extrapolated takes), to allow reinitiation of consultation in a timely manner, if necessary. The monthly reports will be submitted by email to akr.section7@noaa.gov. The reporting period for each monthly PSO report will be the entire calendar month, and reports will be submitted by close of business on the 10th day of the month following the end of the reporting period.

Final report

The City must submit a draft report on all monitoring conducted under this IHA within 90 calendar days of the completion of monitoring or 60 calendar days prior to the requested issuance of any subsequent IHA for construction activity at the same location, whichever comes

first. A final report must be prepared and submitted within 30 days following resolution of any NMFS comments on the draft report. If no comments are received from NMFS within 30 days of receipt of the draft report, the report shall be considered final. All draft and final marine mammal monitoring reports must be submitted to *PR.ITP.MonitoringReports@noaa.gov* and *ITP.Egger@noaa.gov*. The report must contain the informational elements described in the Marine Mammal Monitoring Plan and, at minimum, must include:

- Dates and times (begin and end) of all marine mammal monitoring;
- Construction activities occurring during each daily observation period, including:
 - How many and what type of piles were driven and by what method (*e.g.*, impact, vibratory, DTH);
 - Total duration of driving time for each pile (vibratory driving) and number of strikes for each pile (impact driving); and
 - For DTH, duration of operation for both impulsive and non-pulse components.
- PSO locations during marine mammal monitoring;
- (Environmental conditions during monitoring periods (at beginning and end of PSO shift and whenever conditions change significantly), including Beaufort sea state and any other relevant weather conditions including cloud cover, fog, sun glare, and overall visibility to the horizon, and estimated observable distance;
- Upon observation of a marine mammal, the following information:
 - PSO who sighted the animal and PSO location and activity at time of sighting;
 - Time of sighting;
 - Identification of the animal (*e.g.*, genus/species, lowest possible taxonomic level, or unidentified), PSO confidence in identification, and the composition of the group if there is a mix of species;
 - Distance and bearing of each marine mammal observed to the pile being driven for each sighting (if pile driving and DTH was occurring at time of sighting);

- Estimated number of animals (min/max/best);
- Estimated number of animals by cohort (adults, juveniles, neonates, group composition etc.);
- Animal's closest point of approach and estimated time spent within the harassment zone.
- Description of any marine mammal behavioral observations (*e.g.*, observed behaviors such as feeding or traveling), including an assessment of behavioral responses to the activity (*e.g.*, no response or changes in behavioral state such as ceasing feeding, changing direction, flushing, or breaching);
- Detailed information about implementation of any mitigation (*e.g.*, shutdowns and delays), a description of specific actions that ensued, and resulting changes in behavior of the animal, if any; and
- All PSO datasheets and/or raw sightings data.

Reporting of injured or dead marine mammals

In the event that personnel involved in the construction activities discover an injured or dead marine mammal, the City must report the incident to the Office of Protected Resources (PR.ITP.MonitoringReports@noaa.gov), NMFS (301-427-8401) and to the Alaska regional stranding network (877-925-7773) as soon as feasible. If the death or injury was clearly caused by the specified activity, the City must immediately cease the specified activities until NMFS OPR is able to review the circumstances of the incident and determine what, if any, additional measures are appropriate to ensure compliance with the terms of this IHA. The City must not resume their activities until notified by NMFS. The report must include the following information:

- Time, date, and location (latitude/longitude) of the first discovery (and updated location information if known and applicable);
- Species identification (if known) or description of the animal(s) involved;

- Condition of the animal(s) (including carcass condition if the animal is dead);
- Observed behaviors of the animal(s), if alive;
- If available, photographs or video footage of the animal(s); and
- General circumstances under which the animal was discovered.

Negligible Impact Analysis and Determination

NMFS has defined negligible impact 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 (50 CFR 216.103). 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 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 harassment, NMFS considers 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 effects on habitat, and the likely effectiveness of the mitigation. We also assess the number, intensity, and context of estimated takes by evaluating this information relative to population status. Consistent with the 1989 preamble for NMFS’s implementing regulations (54 FR 40338; September 29, 1989), the impacts from other past and ongoing anthropogenic activities are incorporated into this analysis via their impacts on the environmental baseline (*e.g.*, as reflected in the regulatory status of the species, population size and growth rate where known, ongoing sources of human-caused mortality, or ambient noise levels).

As stated in the proposed mitigation section, shutdown zones that are larger than the Level A harassment zones will be implemented in the majority of construction days, which, in combination with the fact that the zones are so small to begin with, is expected to avoid the likelihood of Level A harassment for six of the nine species. For the other three species (harbor seals, Dall’s and harbor porpoises), a small amount of Level A harassment has been

conservatively proposed because the Level A harassment zones are larger than the proposed shutdown zones during impact pile driving of 36-in piles and during DTH. However, given the nature of the activities and sound source and the unlikelihood that animals would stay in the vicinity of the pile-driving for long, any PTS incurred would be expected to be of a low degree and unlikely to have any effects on individual fitness.

Exposures to elevated sound levels produced during pile driving activities may cause behavioral responses by an animal, but they are expected to be mild and temporary. 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. These reactions and behavioral changes are expected to subside quickly when the exposures cease.

To minimize noise during pile driving, the City will use pile caps (pile softening material). Much of the noise generated during pile installation comes from contact between the pile being driven and the steel template used to hold the pile in place. The contractor will use high-density polyethylene or ultra-high-molecular-weight polyethylene softening material on all templates to eliminate steel on steel noise generation.

During all impact driving, implementation of soft start procedures and monitoring of established shutdown zones will be required, significantly reducing the possibility of injury. Given sufficient notice through use of soft start (for impact driving), marine mammals are expected to move away from an irritating sound source prior to it becoming potentially injurious. In addition, PSOs will be stationed within the action area whenever pile driving/removal and

DTH activities are underway. Depending on the activity, the City will employ the use of three PSOs to ensure all monitoring and shutdown zones are properly observed.

The HMIC Cargo Dock would likely not impact any marine mammal habitat since its proposed location is within an area that is currently used by large shipping vessels and in between two existing, heavily-traveled docks, and within an active marine commercial and tourist area. There are no known pinniped haulouts or other biologically important areas for marine mammals near the action area. In addition, impacts to marine mammal prey species are expected to be minor and temporary. Overall, the area impacted by the project is very small compared to the available habitat around Hoonah. The most likely impact to prey will be temporary behavioral avoidance of the immediate area. During pile driving/removal and DTH activities, it is expected that fish and marine mammals would temporarily move to nearby locations and return to the area following cessation of in-water construction activities. Therefore, indirect effects on marine mammal prey during the construction are not expected to be substantial.

In summary and as described above, the following factors primarily support our preliminary determination that the impacts resulting from this activity are not expected to adversely affect the species or stock through effects on annual rates of recruitment or survival:

- No mortality is anticipated or authorized;
- Minimal impacts to marine mammal habitat/prey are expected;
- The action area is located and within an active marine commercial and tourist area;
- There are no rookeries, or other known areas or features of special significance for foraging or reproduction in the project area;
- Anticipated incidents of Level B harassment consist of, at worst, temporary modifications in behavior; and
- The required mitigation measures (*i.e.* shutdown zones) are expected to be effective in reducing the effects of the specified activity.

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 proposed activity will have a negligible impact on all affected marine mammal species or stocks.

Small Numbers

As noted above, only small numbers of incidental take may be authorized under Section 101(a)(5)(A) and (D) of the MMPA for specified activities other than military readiness activities. The MMPA does not define small numbers and so, in practice, where estimated numbers are available, NMFS compares the number of individuals taken to the most appropriate estimation of abundance of the relevant species or stock in our determination of whether an authorization is limited to small numbers of marine mammals. When the predicted number of individuals to be taken is fewer than one third of the species or stock abundance, the take is considered to be of small numbers. Additionally, other qualitative factors may be considered in the analysis, such as the temporal or spatial scale of the activities.

Seven of the nine marine mammal stocks proposed for take are approximately 11 percent or less of the stock abundance. There are no official stock abundances for harbor porpoise and minke whales; however, as discussed in greater detail in the **Description of Marine Mammals in the Area of Specified Activities**, we believe for the abundance information that is available, the estimated takes are likely small percentages of the stock abundance. For harbor porpoise, the abundance for the Southeast Alaska stock is likely more represented by the aerial surveys that were conducted as these surveys had better coverage and were corrected for observer bias. Based on this data, the estimated take could potentially be approximately 4 percent of the stock abundance. However, this is unlikely and the percentage of the stock taken is likely lower as the proposed take estimates are conservative and the project occurs in a small footprint compared to the available habitat in Southeast Alaska. For minke whales, in the northern part of their range

they are believed to be migratory and so few minke whales have been seen during three offshore Gulf of Alaska surveys that a population estimate could not be determined. With only twelve proposed takes for this species, the percentage of take in relation to the stock abundance is likely to be very small.

Based on the analysis contained herein of the proposed activity (including the proposed mitigation and monitoring measures) and the anticipated take of marine mammals, NMFS preliminarily finds that small numbers of marine mammals will be taken relative to the population size of the affected species or stocks.

Unmitigable Adverse Impact Analysis and Determination

In order to issue an IHA, NMFS must find that the specified activity will not have an “unmitigable adverse impact” on the subsistence uses of the affected marine mammal species or stocks by Alaskan Natives. NMFS has defined “unmitigable adverse impact” in 50 CFR 216.103 as an impact resulting from the specified activity: (1) That is likely to reduce the availability of the species to a level insufficient for a harvest to meet subsistence needs by: (i) Causing the marine mammals to abandon or avoid hunting areas; (ii) Directly displacing subsistence users; or (iii) Placing physical barriers between the marine mammals and the subsistence hunters; and (2) That cannot be sufficiently mitigated by other measures to increase the availability of marine mammals to allow subsistence needs to be met.

In September 2020, the Indigenous People’s Council for Marine Mammals (IPCoMM), the Alaska Sea Otter and Steller Sea Lion Commission, Huna Totem Corporation, and the Hoonah Indian Association (HIA) were contacted to determine potential project impacts on local subsistence activities. No comments were received from IPCoMM or the Alaska Sea Otter and Steller Sea Lion Commission. On September 14, 2020, Huna Totem Corporation expressed support for the project and indicated that they do not anticipate any marine mammal or subsistence.

The proposed project is not likely to adversely impact the availability of any marine mammal species or stocks that are commonly used for subsistence purposes or to impact subsistence harvest of marine mammals in the region because construction activities are localized and temporary; mitigation measures will be implemented to minimize disturbance of marine mammals in the project area; and the project will not result in significant changes to availability of subsistence resources.

Based on the description of the specified activity, the measures described to minimize adverse effects on the availability of marine mammals for subsistence purposes, and the proposed mitigation and monitoring measures, NMFS has preliminarily determined that there will not be an unmitigable adverse impact on subsistence uses from the City's proposed activities.

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

Endangered Species Act (ESA)

Section 7(a)(2) of the Endangered Species Act of 1973 (ESA: 16 U.S.C. 1531 *et seq.*) requires that each Federal agency insure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of designated critical habitat. To ensure ESA compliance for the issuance of IHAs, NMFS consults internally whenever we propose to authorize take for endangered or threatened species, in this case with the Alaska Regional Office (AKRO).

NMFS is proposing to authorize take of Mexico DPS humpback whales, and Western DPS Steller sea lions which are listed under the ESA. The Permit and Conservation Division has requested initiation of Section 7 consultation with the AKRO for the issuance of this IHA.

NMFS will conclude the ESA consultation prior to reaching a determination regarding the proposed issuance of the authorization.

Proposed Authorization

As a result of these preliminary determinations, NMFS proposes to issue an IHA to the City for conducting for the proposed pile driving and removal activities as well as DTH during construction of the Hoonah Marine Industrial Center Cargo Dock Project, Hoonah Alaska for one year, beginning March or April 2021, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated. A draft of the proposed IHA can be found at <https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act>.

Request for Public Comments

We request comment on our analyses, the proposed authorization, and any other aspect of this notice of proposed IHA for the proposed pile driving and removal activities as well as DTH during construction of the Hoonah Marine Industrial Center Cargo Dock Project. We also request at this time, comments on the potential for Renewal of this proposed IHA as described in the paragraph below. Please include with your comments any supporting data or literature citations to help inform decisions on the request for this IHA or a subsequent Renewal IHA.

On a case-by-case basis, NMFS may issue a one-time, 1-year Renewal IHA following notice to the public providing an additional 15 days for public comments when (1) up to another year of identical or nearly identical, or nearly identical, activities as described in the **Description of Proposed Activities** section of this notice is planned or (2) the activities as described in the **Description of Proposed Activities** section of this notice would not be completed by the time the IHA expires and a Renewal would allow for completion of the activities beyond that described in the *Dates and Duration* section of this notice, provided all of the following conditions are met:

- A request for renewal is received no later than 60 days prior to the needed Renewal IHA effective date (recognizing that the Renewal IHA expiration date cannot extend beyond one year from expiration of the initial IHA);
- The request for renewal must include the following:
 - (1) An explanation that the activities to be conducted under the requested Renewal IHA are identical to the activities analyzed under the initial IHA, are a subset of the activities, or include changes so minor (*e.g.*, reduction in pile size) that the changes do not affect the previous analyses, mitigation and monitoring requirements, or take estimates (with the exception of reducing the type or amount of take); and
 - (2) A preliminary monitoring report showing the results of the required monitoring to date and an explanation showing that the monitoring results do not indicate impacts of a scale or nature not previously analyzed or authorized.

Upon review of the request for Renewal, the status of the affected species or stocks, and any other pertinent information, NMFS determines that there are no more than minor changes in the activities, the mitigation and monitoring measures will remain the same and appropriate, and the findings in the initial IHA remain valid.

Dated: February 26, 2021.

Donna S. Wieting,

Director, Office of Protected Resources,

National Marine Fisheries Service.