**BILLING CODE 3510-22-P**

**DEPARTMENT OF COMMERCE**

**National Oceanic and Atmospheric Administration**

**RIN 0648-XG106**

# Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to the Ketchikan Berth IV Expansion Project

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

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

**SUMMARY**: NMFS has received a request from the Ketchikan Dock Company (KDC) for authorization to take marine mammals incidental to the Ketchikan Berth IV expansion project in Ketchikan, 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 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. Physical comments should be sent to 1315 East-West Highway, Silver Spring, MD 20910 and electronic comments should be sent to *ITP.molineaux@noaa.gov*.

*Instructions*: NMFS is not responsible for comments sent by any other method, to any other address or individual, or received after the end of the comment period. Comments received electronically, including all attachments, must not exceed a 25-megabyte file size. Attachments to electronic comments will be accepted in Microsoft Word or Excel or Adobe PDF file formats only. All comments received are a part of the public record and will generally be posted online at *https://www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-construction-activities* 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**: Jonathan Molineaux, 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/national/marine-mammal-protection/incidental-take-authorizations-construction-activities*. In case of problems accessing these documents, please call the contact listed above.

**SUPPLEMENTARY INFORMATION**:

**Background**

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 authorization is provided to the public for review.

An authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s), will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant), and if the permissible methods of taking and requirements pertaining to the mitigation, monitoring and reporting of such takings are set forth.

NMFS has defined "negligible impact" in 50 CFR 216.103 as an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival.

The MMPA states that the term "take" means to harass, hunt, capture, kill or attempt to harass, hunt, capture, or kill any marine mammal.

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

**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 incidental harassment authorization) with respect to potential impacts on the human environment.

This action is consistent with categories of activities identified in CE B4 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 February 13, 2018, NMFS received a request from the KDC for an IHA to take marine mammals incidental to construction activities associated with the Ketchikan Berth IV Expansion Project. The IHA application was determined adequate and complete on March 28, 2018. The KDC's request is for take of eight species of marine mammals by Level B harassment and Level A harassment of a small number of harbor porpoises and harbor seals. Neither the KDC nor NMFS expect serious injury or mortality to result from this activity and, therefore, an IHA is appropriate.

**Description of Proposed Activity**

*Overview*

The KDC proposes to expand Berth IV, its dock adjacent to downtown Ketchikan, Alaska, located in East Tongass Narrows, in order to accommodate a new fleet of large cruise ships that are expected to reach Alaska in the summer of 2019.

The expansion would include the removal of some existing piles and structures and the installation of new piles and structures. All pile driving and removal would take place at the existing dock facility and is expected to occur over the course of 20 days (not necessarily consecutive). The proposed project would occur in marine waters that support several marine mammal species.  The pile driving, pile removal, and drilling activities associated with the project may result in behavioral harassment (Level B harassment and small numbers of Level A harassment) of marine mammal species.

The purpose of this project is to reconfigure Berth IV so that it can accommodate larger cruise ships. This project is needed because the existing Berth IV cannot support the modern fleet of larger cruise ships. Once the project is constructed Berth IV will be able to accommodate these large cruise ships.

*Dates and Duration*

Construction is expected to take 3-4 months beginning in Fall 2018. While construction is mostly likely to begin in October of 2018 and complete in January of 2019, depending on the start date, construction could extend into March of 2019. Regardless of start date, construction will occur within a four-month (maximum) work window.

Pile removal and installation is expected to occur for a total of approximately 36 hours over 20 days (not necessarily consecutive days). Please see Table 2 for the specific amount of time required to install and remove piles.

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 City of Ketchikan is located in Southeast Alaska. Berth IV is located adjacent to downtown Ketchikan on the shore of East Tongass Narrows (see Figures 1, 2, and 3 of IHA

Application). The berth is part of the Port of Ketchikan, an active marine commercial and industrial area.

Berth IV is located within the Ketchikan Gateway Borough on Revillagigedo Island in Southeast Alaska; T75S, R90E, S25, Copper River Meridian, USGS Quadrangle KET B5; Latitude 55 $^{o}$344' N and Longitude - 131 $^{o}$656' W. The project is located within Tongass Narrows. Major waterbodies near the area include the Clarence Strait to the north, the Revillagigedo Channel to the south, Nichols Passage to the west, and George Inlet to the east. Berth IV's expansion would take place at the existing dock facility.

*Detailed Description of Specific Activity*

The KDC proposes to expand Berth IV by replacing the existing floating barge and float with a larger pontoon dock and larger small craft float, and by expanding the existing mooring structures (see Figure 4 of IHA Application). The project would:

- Permanently remove the existing floating barge dock, float, and their associated three dolphins comprised of two 24-inch, six 30-inch, and four 36-inch diameter steel piles;
- Temporarily remove the existing transfer bridge, and then reinstall it on the new facility;
- Install sixteen temporary 30-inch diameter steel piles as templates to guide proper installation of permanent piles (these piles would be removed prior to project completion);
- Install seventeen permanent 48-inch diameter piles and one permanent 30-inch diameter pile to support a new 285 feet (ft)by 40 ft by 10 foot floating pontoon dock, its attached 220 ft by 12 ft small craft float, and mooring structures; and
- Install bull rail, floating fenders, mooring cleats, and three mast lights. (Note: these components would be installed out of the water.)

During the pile driving, pile removal and drilling activities, the following equipment will be used:

- A Vibratory Hammer: ICE 44B/12,450 pounds static weight;
- A Diesel Impact Hammer: Delmag D46/Max Energy 107,280 ft-pounds (lb);
- A Drilled shaft drill: Holte 100,000 ft-lb. top drive with down-the-hole (DTH) hammer and bit; and
- A Socket drill: Holte 100,000 ft-lb. top drive with DTH hammer and under-reamer bit.

Materials and equipment, including the dock, would be transported to the project site by barge. While work is conducted in the water, anchored barges would be used to stage construction materials and equipment. Twenty-five-ft skiffs with 250 horsepower motors would be used to support dock construction.

In-water construction would begin with the removal of existing piles followed by pile installation. Table 1 below provides the activity type and a conservative estimate of the specific amount of time required to remove and install piles.

**Table 1. Pile Driving Construction Summary.**

| **Description** | **Project Component** | | | | | |
|---|---|---|---|---|---|---|
| | **Existing Pile Removal** | **Temporary Pile Installation** | **Temporary Pile Removal** | **Permanent Pile Installation** | **Permanent Pile Installation** | **Max Installation/ Removal per Day** |
| Pile Diameter and Type | 24, 30, and 36-inch steel | 30-inch steel | 30-inch steel | 30-inch steel | 48-inch steel | -- |
| # of Piles | 2, 6, and 4 respectively; 12 total | 16 | 16 | 1 | 17 | -- |

| Vibratory Pile Driving | | | | | | |
|---|---|---|---|---|---|---|
| Max # of Piles Vibrated Per Day | 4 | 4 | 4 | 1 | 2 | 4 temporary or 2 permanent |
| Vibratory Time Per Pile | 15 minutes | 30 minutes | 10 minutes | 1 hour | 1 hour | -- |
| Vibratory Time per day | 1 hour | 2 hours | 40 minutes | 1 hour | 2 hours | 2 hours |
| Vibratory Time Total | 3 hours | 8 hours | 2 hours 40 minutes | 1 hour | 17 hours | -- |
| **Impact Pile Driving** | | | | | | |
| Max # of Piles Impacted Per Day | 0 | 0 | 0 | 0 | 3 | 3 |
| # of Strikes Per Pile | 0 | 0 | 0 | 0 | 200 strikes | 600 strikes |
| Impact Time Per Pile | 0 | 0 | 0 | 0 | 5 minutes | -- |
| Impact Time per Day | 0 | 0 | 0 | 0 | 15 minutes | 15 minutes |
| Impact Time Total | 0 | 0 | 0 | 0 | 1 hour 25 minutes | -- |
| **Socketing Pile Installation(Drilling)** | | | | | | |
| Max # of Piles Socketed per Day | 0 | 0 | 0 | 1 | 0 | 1 |
| Socket Time Per Pile | 0 | 0 | 0 | 0 | 3 hours | -- |
| Socket Time per Day | 0 | 0 | 0 | 0 | 3 hours | 3 hours |
| Socket Time Total | 0 | 0 | 0 | 0 | 3 hours | -- |

*Removal of Existing Piles*

The contractor would attempt to direct pull existing piles; if those efforts prove to be ineffective, existing piles would be removed with a vibratory hammer.

*Installation and Removal of Temporary Piles*

Temporary 30-inch diameter piles would be installed and removed with a vibratory hammer.

*Installation of Permanent Piles*

The single permanent 30-inch diameter pile would be installed through approximately 15 ft of sand and gravel with a vibratory hammer. Then the pile will be secured into underlying bedrock with conventional socketing means using a down-the-hole hammer and under-reamer bit to drill a hole into the bedrock and then socket the pile into the bedrock. Socket depths are expected to be approximately 20 ft (as determined by the geotechnical engineer) and take approximately 3 hours. (Note, this socketing method can also be referred to as down the hole drilling. We refer to it as socketing throughout this document to clarify this method from anchoring, which also uses a drill.)

Permanent 48-inch diameter piles would be driven through approximately 15 ft of sand and gravel with a vibratory hammer and impact driven into bedrock. After being driven with an impact hammer, the piles will be secured with rock anchors. To install the rock anchors, a drill will be placed inside the hallow 48-inch diameter pile and will down into the bedrock. During this anchor drilling, the 48-inch pile will not be not touched by the drill, therefore, anchoring will not generate steel-on-steel hammering noise (noise that is generated during socketing)[1]. Each anchor will take approximately 2.5 hours to complete.

**Description of Marine Mammals in the Area of Specified Activities**

Sections 3 and 4 of the KDC's IHA 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 (SAR; *www.nmfs.noaa.gov/pr/sars/*) and more general information about these species (*e.g.*, physical and behavioral descriptions) may be found on NMFS's website (*www.nmfs.noaa.gov/pr/species/mammals/*).

Table 2 lists all species with expected potential for occurrence within the vicinity of Ketchikan Berth IV and summarizes information related to the population or stock, including

[1] In rock anchoring, the DTH drill only hits the bedrock and, for this effort, the 48-inch pile will act as a casing to isolate the drill noise. The process of anchoring has been used on many projects in Alaska with 8-inch diameter anchors (including the recently permitted Haines Ferry Terminal). Due to the significant loads generated from cruise ship berthing, the Ketchikan Berth IV project will use 30-inch diameter rock anchors.

regulatory status under the MMPA and ESA and potential biological removal (PBR), where known. For taxonomy, we follow the Committee on Taxonomy (2016). 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's 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. Alaska SARs (Muto 2017a). All values presented in Table 2 are the most recent available at the time of publication and are available in the 2016 SARs (Muto 2017a), Towers *et al.*, 2015 (solely for northern resident killer whales), and draft 2017 SARs (Muto 2017b) (available online at: *www.nmfs.noaa.gov/pr/sars/draft.htm*).

**Table 2. Marine mammals that could occur in the project area during the specified activity.**

| Common name | Scientific name | MMPA Stock | ESA/MMPA status; Strategic (Y/N)[1] | Stock abundance Nbest, (CV, $N_{min}$, most recent abundance survey)[2] | PBR | Annual M/SI[3] |
|---|---|---|---|---|---|---|
| Order Cetartiodactyla – Cetacea – Superfamily Mysticeti (baleen whales) | | | | | | |
| Family Balaenidae | | | | | | |
| Humpback whale | *Megaptera novaeangliae* | Central North Pacific | E, D,Y | 10,103 (0.3; 7,890; 2006) | 83 | 21 |
| Minke whale | *Balaenoptera acutorostrata* | Alaska | -, N | N.A. | N.A. | N.A. |
| Order Cetartiodactyla – Cetacea – Superfamily Odontoceti (toothed whales, dolphins, and porpoises) | | | | | | |
| Family Delphinidae | | | | | | |
| Killer whale | *Orcinus orca* | Alaska Resident | -, N | 2,347 (N.A.; 2,347; 2012)[4] | 23.4 | 1 |
| | | West Coast Transient | -, N | 243 (N.A, 243, 2009)[4] | 2.4 | 1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | Northern Resident | -, N | 290 (N.A; 290; 2014)[6] | 1.96 | 0 |
| Pacific white-sided dolphin | *Lagenorhynchus obliquidens* | North Pacific | -/-; N | 26,880 (N.A.; N.A.; 1990) | N.A. | 0 |
| Family Phocoenidae | | | | | | |
| Harbor porpoise | *Phocoena phocoena* | Southeast Alaska | -, Y | 975 (0.10; 896; 2012)[5] | 8.9[5] | 34[5] |
| Dall's porpoise | *Phocoenoides dalli* | Alaska | -, N | 83,400 | N.A. | 38 |
| Order Carnivora – Superfamily Pinnipedia | | | | | | |
| Family Otariidae (eared seals and sea lions) | | | | | | |
| Steller sea lion | *Eumatopia jubatus* | Eastern U.S. | -,-, N | 41,638 (N/A; 41,638; 2015) | 2,498 | 108 |
| Family Phocidae (earless seals) | | | | | | |
| Harbor seal | *Phoca vitulina richardii* | Clarence Strait | -, N | 31,634 (N.A.; 29,093; 2011) | 1,222 | 41 |

[1] ESA status: Endangered (E), Threatened (T)/MMPA status: Depleted (D). A dash (-) indicates that the species is not listed under the ESA or designated as depleted under the MMPA. Under the MMPA, a strategic stock is one for which the level of direct human-caused mortality exceeds PBR 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; $N_{min}$ is the minimum estimate of stock abundance. In some cases, CV is not applicable (N/A).
[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).
[4]N is based on counts of individual animals identified from photo-identification catalogs.
[5]In the SAR for harbor porpoise (NMFS 2017), NMFS identified population estimates and PBR for porpoises within inland Southeast Alaska waters (these abundance estimates have not been corrected for g(0); therefore, they are likely conservative). The calculated PBR is considered unreliable for the entire stock because it is based on estimates from surveys of only a portion (the inside waters of Southeast Alaska) of the range of this stock as currently designated. The Annual M/SI is for the entire stock, including coastal waters.
[6]Abundance estimates obtained from Towers *et al.*, 2015.

All species that could potentially occur in the proposed survey areas are included in Table 2. As described below, all eight species (with ten managed stocks) temporally and spatially co-occur with the activity to the degree that take is reasonably likely to occur, and we have proposed authorizing it. In addition, northern sea otters may be found in Ketchikan. However, sea otters are managed by the U.S. Fish and Wildlife Service and are not considered further in this document.

*Pinnipeds in the Activity Area*

Steller Sea Lion

The Steller sea lion is the largest of the eared seals, ranging along the North Pacific Rim from northern Japan to California, with centers of abundance and distribution in the Gulf of

Alaska and Aleutian Islands. Steller sea lions were listed as threatened range-wide under the ESA on November 26, 1990 (55 FR 49204). Subsequently, NMFS published a final rule designating critical habitat for the species as a 20 nautical mile buffer around all major haulouts and rookeries, as well as associated terrestrial, air and aquatic zones, and three large offshore foraging areas (58 FR 45269; August 27, 1993). In 1997, NMFS reclassified Steller sea lions as two distinct population segments (DPS) based on genetic studies and other information (62 FR 24345; May 5, 1997). Steller sea lion populations that primarily occur west of 144° W (Cape Suckling, Alaska) comprise the western DPS (wDPS), while all others comprise the eastern DPS (eDPS); however, there is regular movement of both DPSs across this boundary (Jemison *et al.*, 2013). Upon this reclassification, the wDPS was listed as endangered while the eDPS remained as threatened (62 FR 24345; May 5, 1997) and in November 2013, the eDPS was delisted (78 FR 66140). Only the eDPS considered in this proposed IHA.

Steller sea lions are common in the inside waters of southeastern Alaska. They are residents of the project vicinity and are common year-round in the action area (Freitag 2017). Critical habitat has been defined in Southeast Alaska at major haulouts and major rookeries (50 CFR 226.202). The nearest rookery to action area is Forrester Island, and the nearest major haulouts are at Timbered Island and Cape Addington (NMFS 1993). All three sites are about 130 kilometers west across Klawock Island from Ketchikan. Steller sea lions are known to haul out on land, docks, buoys, and navigational markers, however, there are no established haulout sites in Tongass Narrows (HDR 2003) and other haulout sites are far beyond in-air noise disturbance threshold for hauled-out pinnipeds as described in Section 1.3 of the IHA application. Grindall Island, 12 miles west of the northern tip of Gravina Island, is a year-round sea lion haulout but not a rookery, and appears to be the haulout area nearest the project area.

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, with local movements associated with such factors as tides, weather, season, food availability, and reproduction (Muto, 2017a).

Harbor seals in Alaska are partitioned into 12 separate stocks based largely on genetic structure: (1) the Aleutian Islands stock,( 2) the Pribilof Islands stock, (3) the Bristol Bay stock, (4) the North Kodiak stock, (5) the South Kodiak stock, (6) the Prince William Sound stock, (7) the Cook Inlet/Shelikof stock, (8) the Glacier Bay/Icy Strait stock, (9) the Lynn Canal/Stephens Passage stock, (10) the Sitka/Chatham stock, (11) the Dixon/Cape Decision stock, and (12) the Clarence Strait stock. Only the Clarence Strait stock stock is considered in this proposed IHA. The range of this stock includes the east coast of Prince of Wales Island from Cape Chacon north through Clarence Strait to Point Baker and along the east coast of Mitkof and Kupreanof Islands north to Bay Point, including Ernest Sound, Behm Canal, and Pearse Cana (Muto, 2017a).

Harbor seals are common in the inside waters of southeastern Alaska. They are residents of the action area and can occur on any given day in the action area, although they tend to be more abundant in the summer. There are no known haul outs located close to the site where pile installation and removal will occur (Freitag 2017).

*Cetaceans in the Activity Area*

Humpback Whale

The humpback whale is distributed worldwide in all ocean basins. In winter, most humpback whales occur in the subtropical and tropical waters of the Northern and Southern Hemispheres, and migrate to high latitudes in the summer to feed. The historic summer feeding range of humpback whales in the North Pacific encompassed coastal and inland waters around the Pacific Rim from Point Conception, California, north to the Gulf of Alaska and the Bering Sea, and west along the Aleutian Islands to the Kamchatka Peninsula and into the Sea of Okhotsk and north of the Bering Strait (Johnson and Wolman 1984).

Under the MMPA, there are three stocks of humpback whales in the North Pacific: (1) the California/Oregon/Washington and Mexico stock, consisting of winter/spring populations in coastal Central America and coastal Mexico which migrate to the coast of California to southern British Columbia in summer/fall; (2) the central North Pacific stock, consisting of winter/spring populations of the Hawaiian Islands which migrate primarily to northern British Columbia/Southeast Alaska, the Gulf of Alaska, and the Bering Sea/Aleutian Islands; and (3) the western North Pacific stock, consisting of winter/spring populations off Asia which migrate primarily to Russia and the Bering Sea/Aleutian Islands. The central north Pacific stock is the only stock that is found near the project activities.

On September 8, 2016, NMFS published a final rule dividing the globally listed endangered species into 14 DPSs, removing the worldwide species-level listing, and in its place listing four DPSs as endangered and one DPS as threatened (81 FR 62259; effective October 11, 2016). Two DPSs (Hawaii and Mexico) are potentially present within the action area. The Hawaii DPS is not listed and the Mexico DPS is listed as threatened under the ESA. The Hawaii DPS is estimated to contain 11,398 animals where the Mexico DPS is estimated to contain 3,264 animals.

The humpback whales that forage throughout British Colombia 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.

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 (NMFS 2012).

Humpback whales may be found in and around Gravina Island in the Tongass Narrows and Revillagigedo Channel at any given time. Humpback whales are most likely to occur in the action area during periods of seasonal prey aggregations which typically occur in spring and can occur in summer and fall (Freitag 2017). Herring salmon, eulachon, and euphausiids (krill) are among the species that congregate ephemerally (HDR 2003). When humpback whales come into the Narrows to feed, they often stay in the channel for a few days at a time (Freitag 2017). 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 (Straley 2017). Given their widespread range and their opportunistic foraging strategies, humpback whales may be in the action area year-round during the proposed project activities.

Minke Whale

Minke whales are found throughout the northern hemisphere in polar, temperate, and tropical waters. In the North Pacific, minke whales occur from the Bering and Chukchi seas south to near the Equator (Leatherwood *et al.*, 1982). In Alaska, the minke whale diet consists primarily of euphausiids and walleye pollock. Minke whales are generally found in shallow, coastal waters within 200 meters of shore (Zerbini *et al.*, 2006) and are usually solitary or in small groups of 2 to 3. Rarely, loose aggregations of up to 400 animals have been associated with feeding areas in arctic latitudes. In Alaska, seasonal movements are associated with feeding areas that are generally located at the edge of the pack ice (NMFS 2014). Surveys in southeast Alaska have consistently identified individuals throughout inland waters in low numbers (Dahlheim *et al.*, 2009).

Minke whales are rare in the action area, but they could be encountered during any given day of dock construction.  Minke whales do come into Herring Cove in George Inlet, approximately 5 kilometers north of the action area, to feed (Freitag 2017). 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 2018).

Killer Whale

Killer whales have been observed in all the world's oceans, but the highest densities occur in colder and more productive waters found at high latitudes (NMFS 2016a). Killer whales occur along the entire Alaska coast, in British Columbia and Washington inland waterways, and along the outer coasts of Washington, Oregon, and California (Muto *et al.*, 2017a).

Based on data regarding association patterns, acoustics, movements, and genetic differences, eight killer whale stocks are now recognized within the Pacific U.S. Exclusive Economic Zone (EEZ). This proposed IHA considers only the Alaska resident stock, northern resident and the west coast transient, all other stocks occur outside the geographic area under consideration (Muto *et al.*, 2017a).

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*. 2016). They are most common between the latitudes of 38°N and 47°N (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 (NMFS 2018a).

Pacific white-sided dolphins are rare action area, because they are pelagic and prefer more open water habitats than are found in Tongass Narrows and Revillagigedo Channel, but they could be encountered during any given day of dock construction (Freitag 2017). 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* 2016a).

Harbor porpoise

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

In Alaska, harbor porpoises are currently divided into three stocks, based primarily on geography: (1) the Southeast Alaska stock - occurring from the northern border of British Columbia to Cape Suckling, Alaska, (2) the Gulf of Alaska stock - occurring from Cape

Suckling to Unimak Pass, and (3) the Bering Sea stock - occurring throughout the Aleutian Islands and all waters north of Unimak Pass. Only the Southeast Alaska stock is considered in this proposed IHA because the other stocks are not found in the geographic area under consideration.

There are no subsistence use of this species; however, entanglement in fishing gear contributes to human-caused mortality and serious injury. Muto *et al.* (2017a) also reports harbor porpoise are vulnerable to physical modifications of nearshore habitats resulting from urban and industrial development (including waste management and nonpoint source runoff) and activities such as construction of docks and other over-water structures, filling of shallow areas, dredging, and noise (Linnenschmidt *et al.*, 2013). Near the project area, harbor porpoises are more common in open waters on the outside of Gravina Island; however, they are known to pass through Tongass Narrows and Revillagigedo Channel year-round (Freitag 2017).

Dall's porpoise

Dall's porpoise are widely distributed across the entire North Pacific Ocean. They are found over the continental shelf adjacent to the slope and over deep ($2{,}500^{+}$ meters) oceanic waters (Hall 1979). They have been sighted throughout the North Pacific as far north as 65° N (Buckland *et al.*, 1993) and as far south as 28° N in the eastern North Pacific (Leatherwood and Fielding 1974). The only apparent distribution gaps in Alaska waters are upper Cook Inlet and the shallow eastern flats of the Bering Sea. Throughout most of the eastern North Pacific they are present during all months of the year, although there may be seasonal onshore-offshore movements along the west coast of the continental United States (Loeb 1972, Leatherwood and Fielding 1974) and winter movements of populations out of areas with ice such as Prince William Sound (Hall 1979).

Dall's porpoises are seen infrequently in the action area, but they could be encountered during any given day of dock construction. In the Ketchikan vicinity, Dall's porpoises typically occur in groups of 10-15 animals, with an estimated maximum group size of 20 animals. Dall's porpoises have been observed passing through the action area 0-1 times a month (Freitag 2017).

*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 (2016) 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. The functional groups and the associated frequencies are indicated below (note that these frequency ranges correspond to the range for the composite group, with the entire range not necessarily reflecting the capabilities of every species within that group):

- Low-frequency cetaceans (mysticetes): generalized hearing is estimated to occur between approximately 7 hertz (Hz) and 35 kilohertz (kHz);
- Mid-frequency cetaceans (larger toothed whales, beaked whales, and most delphinids): generalized hearing is estimated to occur between approximately 150 Hz and 160 kHz;
- High-frequency cetaceans (porpoises, river dolphins, and members of the genera Kogia and Cephalorhynchus; including two members of the genus Lagenorhynchus, on the basis of recent echolocation data and genetic data): generalized hearing is estimated to occur between approximately 275 Hz and 160 kHz.
- Pinnipeds in water; Phocidae (true seals): generalized hearing is estimated to occur between approximately 50 Hz to 86 kHz;
- Pinnipeds in water; Otariidae (eared seals): generalized hearing is estimated to occur between 60 Hz and 39 kHz.

The pinniped functional hearing group was modified from Southall *et al*. (2007) on the basis of data indicating that phocid species have consistently demonstrated an extended frequency range of hearing compared to otariids, especially in the higher frequency range (Hemilä *et al*., 2006; Kastelein *et al*., 2009; Reichmuth and Holt, 2013).

For more detail concerning these groups and associated frequency ranges, please see NMFS (2016) for a review of available information. Eight marine mammal species (six cetacean and two pinniped (one otariid and one phocid) species) have the reasonable potential to co-occur with the proposed survey activities. Please refer to Table 2. Of the cetacean species that may be present, two are classified as low-frequency cetaceans (*i.e.*, all mysticete species), two are classified as a mid-frequency cetacean (*i.e.*, killer whale and Pacific white-sided dolphin), 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 by Incidental Harassment" 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 by Incidental Harassment" 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.

*Description of Sound*

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

Root mean square (rms) is the quadratic mean sound pressure over the duration of an impulse. Rms is calculated by squaring all of the sound amplitudes, averaging the squares, and then taking the square root of the average (Urick 1983). Rms accounts for both positive and negative values; squaring the pressures makes all values positive so that they may be accounted for in the summation of pressure levels (Hastings and Popper 2005). This measurement is often used in the context of discussing behavioral effects, in part because behavioral effects, which often result from auditory cues, may be better expressed through averaged units than by peak pressures.

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

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

- *Wind and waves*: The complex interactions between wind and water surface, including processes such as breaking waves and wave-induced bubble oscillations and cavitation, are a main source of naturally occurring ambient noise for frequencies between 200 Hz and 50 kilohertz (kHz) (Mitson 1995). In general, ambient sound levels tend to increase with increasing wind speed and wave height. Surf noise becomes important near shore, with measurements collected at a distance of 8.5 km from shore showing an increase of 10 dB in the 100 to 700 Hz band during heavy surf conditions.
- *Precipitation*: Sound from rain and hail impacting the water surface can become an important component of total noise at frequencies above 500 Hz, and possibly down to 100 Hz during quiet times.
- *Biological*: Marine mammals can contribute significantly to ambient noise levels, as can some fish and shrimp. The frequency band for biological contributions is from approximately 12 Hz to over 100 kHz.
- *Anthropogenic:* Sources of ambient noise related to human activity include transportation (surface vessels and aircraft), dredging and construction, oil and gas drilling and production, seismic surveys, sonar, explosions, and ocean acoustic studies. Shipping noise typically dominates the total ambient noise for frequencies between 20 and 300 Hz. In general, the frequencies of anthropogenic sounds are below 1 kHz and, if higher frequency sound levels

are created, they attenuate rapidly (Richardson *et al*., 1995). Sound from identifiable anthropogenic sources other than the activity of interest (*e.g*., a passing vessel) is sometimes termed background sound, as opposed to ambient sound.

The sum of the various natural and anthropogenic sound sources at any given location and time – which comprise “ambient” or “background” sound – depends not only on the source levels (as determined by current weather conditions and levels of biological and shipping activity) but also on the ability of sound to propagate through the environment. In turn, sound propagation is dependent on the spatially and temporally varying properties of the water column and sea floor, and is frequency-dependent. As a result of the dependence on a large number of varying factors, ambient sound levels can be expected to vary widely over both coarse and fine spatial and temporal scales. Sound levels at a given frequency and location can vary by 10-20 dB from day to day (Richardson *et al*., 1995). The result is that, depending on the source type and its intensity, sound from the specified activity may be a negligible addition to the local environment or could form a distinctive signal that may affect marine mammals.

*Description of Sound Sources*

In-water construction activities associated with the project would include impact pile driving, vibratory pile driving and removal, and drilling. The sounds produced by these activities fall into one of two general sound types: impulsive and non-impulsive (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.

Impulsive sound sources (*e.g*., explosions, gunshots, sonic booms, impact pile driving) produce signals that are brief (typically considered to be less than one second), broadband, atonal transients (ANSI 1986; Harris 1998; NIOSH 1998; ISO 2003; ANSI 2005) and occur either as isolated events or repeated in some succession. Impulsive 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-impulsive sounds can be tonal, narrowband, or broadband, brief or prolonged, and may be either continuous or non-continuous (ANSI 1995; NIOSH 1998). Some of these non-impulsive sounds can be transient signals of short duration but without the essential properties of impulses (*e.g.*, rapid rise time). Examples of non-impulsive 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.

Impact hammers operate by repeatedly dropping a heavy piston onto a pile to drive the pile into the substrate. Sound generated by impact hammers is characterized by rapid rise times and high peak levels, a potentially injurious combination (Hastings and Popper 2005). Vibratory hammers install piles by vibrating them and allowing the weight of the hammer to push them into the sediment. Vibratory hammers produce significantly less sound than impact hammers. Peak SPLs may be 180 dB or greater, but are generally 10 to 20 dB lower than SPLs generated during impact pile driving of the same-sized pile (Oestman *et al*., 2009). Rise time is slower, reducing the probability and severity of injury, and sound energy is distributed over a greater amount of time (Nedwell and Edwards 2002; Carlson *et al*., 2005). Drilling to insert the steel piles (not for tension anchors) will be operated by a down-hole hammer (also known as socket drilling). A down-hole hammer is a drill bit that drills through the bedrock using an impulse mechanism that functions at the bottom of the hole. This impulsive bit breaks up rock to allow removal of debris and insertion of the pile. The head extends so that the drilling takes place below the pile. The impulsive sounds produced by the hammer method are continuous and reduces sound attenuation because the noise is primarily contained within the steel pile and below ground rather than impact hammer driving methods which occur at the top of the pile (R&M 2016).

*Acoustic Impacts*

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

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

We describe the more severe effects (*i.e*., permanent hearing impairment, certain non-auditory physical or physiological effects) only briefly as we do not expect that there is a reasonable likelihood that KDC's activities may result in such effects (see below for further discussion). Marine mammals exposed to high-intensity sound, or to lower-intensity sound for prolonged periods, can experience hearing threshold shift (TS), which is the loss of hearing sensitivity at certain frequency ranges (Kastak *et al*., 1999; Schlundt *et al*., 2000; Finneran *et al*., 2002, 2005b). TS can be permanent (PTS), in which case the loss of hearing sensitivity is not fully recoverable, or temporary (TTS), in which case the animal's hearing threshold would recover over time (Southall *et al*., 2007). Repeated sound exposure that leads to TTS could cause PTS. In severe cases of PTS, there can be total or partial deafness, while in most cases the animal has an impaired ability to hear sounds in specific frequency ranges (Kryter 1985).

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

Relationships between TTS and PTS thresholds have not been studied in marine mammals – PTS data exists only for a single harbor seal (Kastak *et al*., 2008) – but are assumed to be similar to those in humans and other terrestrial mammals. PTS typically occurs at exposure levels at least several dB above a 40-dB threshold shift approximates PTS onset; *e.g*., Kryter *et al*., 1966; Miller, 1974 found 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 impulsive sounds (such as impact pile driving sounds 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 a time when communication is critical for successful mother/calf interactions could have more serious impacts.

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

In addition to PTS and TTS, there is a potential for 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. These impacts can 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). KDC's activities do not involve the use of devices such as explosives or mid-frequency active sonar that are associated with these types of effects.

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

*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-impulsive sound sources (typically seismic airguns or acoustic harassment devices) have been varied but often consist of avoidance behavior or other behavioral changes suggesting discomfort (Morton and Symonds 2002; see also Richardson *et al*., 1995; Nowacek *et al*., 2007).

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

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

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

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

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

Avoidance is the displacement of an individual from an area or migration path because 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 (*Eschrictius robustus*) are known to change direction – deflecting from customary migratory paths – in order to avoid noise from seismic surveys (Malme *et al*., 1984). Avoidance may be short-term, with animals returning to the area once the noise has ceased (*e.g*., Bowles *et al*., 1994; Goold, 1996; Stone *et al*., 2000; Morton and Symonds, 2002; Gailey *et al*., 2007). Longer-term displacement is possible, however, which may lead to changes in abundance or distribution patterns of the affected species in the affected region if habituation to the presence of the sound does not occur (*e.g*., Blackwell *et al*., 2004; Bejder *et al*., 2006; Teilmann *et al*., 2006).

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

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

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

*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).

*Acoustic Effects, Underwater*

Potential Effects of DTH drilling and Pile Driving– The effects of sounds from DTH drilling and pile driving might include one or more of the following: temporary or permanent hearing impairment, non-auditory physical or physiological effects, behavioral disturbance, and masking (Richardson *et al*., 1995; Gordon *et al*., 2003; Nowacek *et al*., 2007; Southall *et al*., 2007). The effects of pile driving or drilling on marine mammals are dependent on several factors, including the type and depth of the animal; the pile size and type, and the intensity and duration of the pile driving or drilling sound; the substrate; the standoff distance between the pile and the animal; and the sound propagation properties of the environment. Impacts to marine mammals from pile driving and DTH drilling activities are expected to result primarily from acoustic pathways. As such, the degree of effect is intrinsically related to the frequency, received level, and duration of the sound exposure, which are in turn influenced by the distance between the animal and the source. The further away from the source, the less intense the exposure should be. The substrate and depth of the habitat affect the sound propagation properties of the environment. In addition, substrates that are soft (*e.g.*, sand) would absorb or attenuate the sound more readily than hard substrates (*e.g.*, rock), which may reflect the acoustic wave. Soft porous substrates would also likely require less time to drive the pile, and possibly less forceful equipment, which would ultimately decrease the intensity of the acoustic source.

In the absence of mitigation, impacts to marine species could be expected to include physiological and behavioral responses to the acoustic signature (Viada *et al*., 2008). Potential effects from impulsive sound sources like pile driving can range in severity from effects such as behavioral disturbance to temporary or permanent hearing impairment (Yelverton *et al*., 1973). Due to the nature of the pile driving sounds in the project, behavioral disturbance is the most likely effect from the proposed activity. Marine mammals exposed to high intensity sound repeatedly or for prolonged periods can experience hearing threshold shifts. PTS constitutes injury, but TTS does not (Southall *et al*., 2007). Due to the use of pile caps and shutdown procedures discussed in detail in the Proposed Mitigation Section, it is highly unlikely for PTS or TTS to occur.

*Non-auditory Physiological Effects*

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

*Disturbance Reactions*

Responses to continuous sound, such as vibratory pile installation, have not been documented as well as responses to impulsive sounds. With both types of pile driving, it is likely that the onset of pile driving could result in temporary, short-term changes in an animal's typical behavior and/or avoidance of the affected area. These behavioral changes may include (Richardson *et al.*, 1995): changing durations of surfacing and dives, number of blows per surfacing, or moving direction and/or speed; reduced/increased vocal activities; changing/cessation of certain behavioral activities (such as socializing or feeding); visible startle response or aggressive behavior (such as tail/fluke slapping or jaw clapping); avoidance of areas where sound sources are located; and/or flight responses (*e.g.*, pinnipeds flushing into water from haulouts or rookeries). Pinnipeds may increase their haul-out time, possibly to avoid in-water disturbance (Thorson and Reyff 2006). If a marine mammal responds to a stimulus by changing its behavior (*e.g.*, through relatively minor changes in locomotion direction/speed or vocalization behavior), the response may or may not constitute taking at the individual level, and is unlikely to affect the stock or the species as a whole. However, if a sound source displaces marine mammals from an important feeding or breeding area for a prolonged period, impacts on animals, and if so potentially on the stock or species, could potentially be significant (*e.g.*, Lusseau and Bejder 2007; Weilgart 2007).

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 biologically significant if the change affects growth, survival, or reproduction. Significant behavioral modifications that could potentially lead to effects on growth, survival, or reproduction include:

- Drastic changes in diving/surfacing patterns (such as those thought to cause beaked whale stranding due to exposure to military mid-frequency tactical sonar);
- Longer-term habitat abandonment due to loss of desirable acoustic environment; and
- Longer-term cessation of feeding or social interaction.

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

*Auditory Masking*

Natural and artificial sounds can disrupt behavior by masking. The frequency range of the potentially masking sound is important in determining any potential behavioral impacts. Because sound generated from in-water pile driving and removal and DTH drilling is mostly concentrated at low-frequency ranges, it may have less effect on high frequency echolocation sounds made by porpoises. The most intense underwater sounds in the proposed action are those produced by impact pile driving. Given that the energy distribution of pile driving covers a broad frequency spectrum, sound from these sources would likely be within the audible range of marine mammals present in the project area. Impact pile driving activity is relatively short-term, with rapid impulsive sounds occurring for approximately fifteen minutes per pile. The probability for impact pile driving resulting from this proposed action masking acoustic signals important to the behavior and survival of marine mammal species is low. Vibratory pile driving is also relatively short-term, with rapid oscillations occurring for approximately one and a half hours per pile. It is possible that vibratory pile driving resulting from this proposed action may mask acoustic signals important to the behavior and survival of marine mammal species, but the short-term duration and limited affected area would result in insignificant impacts from masking. Any masking event that could possibly rise to Level B harassment under the MMPA would occur concurrently within the zones of behavioral harassment already estimated for DTH drilling and vibratory and impact pile driving, and which have already been taken into account in the exposure analysis.

*Acoustic Effects, Airborne*

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

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

*Anticipated Effects on Habitat*

The proposed activities at the project area would not result in permanent negative impacts to habitats used directly by marine mammals, but may have potential short-term impacts to food sources such as forage fish and may affect acoustic habitat (see masking discussion above). There are no known foraging hotspots or other ocean bottom structure of significant biological importance to marine mammals present in the marine waters of the project area during the construction window. The project area is located in an industrial and commercial shipping marina. Therefore, the main impact issue associated with the proposed activity would be temporarily elevated sound levels and the associated direct effects on marine mammals, as discussed previously in this document. The primary potential acoustic impacts to marine mammal habitat are associated with elevated sound levels produced by vibratory and impact pile driving and removal and drilling in the area. However, other potential impacts to the surrounding habitat from physical disturbance are also possible, although this will be minimal since construction is occurring in an already industrial and commercial shipping area.

*In-water Construction Effects on Potential Prey (Fish)*

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

The most likely impact to fish from pile driving and drilling activities at the project area would be temporary behavioral avoidance of the area. The duration of fish avoidance of this area after pile driving stops is unknown, but a rapid return to normal recruitment, distribution and behavior is anticipated. In general, impacts to marine mammal prey species are expected to be minor and temporary due to the short timeframe (22 days) for the project.

*Pile Driving Effects on Potential Foraging Habitat*

The area likely impacted by the project is relatively small compared to the available habitat in Ketchikan. Avoidance by potential prey (*i.e.*, fish) of the immediate area due to the temporary loss of this foraging habitat is also possible. The duration of fish avoidance of this area after pile driving stops is unknown, but a rapid return to normal recruitment, distribution and behavior is anticipated. Any behavioral avoidance by fish of the disturbed area would still leave significantly large areas of fish and marine mammal foraging habitat in the nearby vicinity of Ketchikan's Berth IV dock.

The duration of the construction activities is relatively short. The construction window is for a maximum of 22 days and each day, construction activities would only occur for a few hours during the day. Impacts to habitat and prey are expected to be minimal based on the short duration of activities.

In summary, given the short daily duration of sound associated with individual pile driving and drilling events and the relatively small areas being affected, pile driving and drilling activities associated with the proposed action are not likely to have a permanent, adverse effect on any fish habitat, or populations of fish species. Thus, any impacts to marine mammal habitat are not expected to cause significant or long-term consequences for individual marine mammals or their populations.

**Estimated Take**

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

Harassment is the only type of take expected to result from these activities. 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).

Authorized takes would primarily be by Level B harassment, as use of impact pile driving, vibratory pile driving/removal, and drilling has the potential to result in disruption of behavioral patterns for individual marine mammals. There is also some potential for auditory injury (Level A harassment) to result, primarily for harbor seals and harbor porpoises due to larger predicted auditory injury zones. Auditory injury is unlikely to occur for other species. The proposed mitigation and monitoring measures are expected to minimize the severity of such taking to the extent practicable.

As described previously, no mortality or serious injury is anticipated or proposed to be authorized for this activity. Below we describe how the take is estimated.

Described in the most basic way, 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 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.  Below, we describe these components 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 or experience TTS (equated to Level B harassment) or to incur PTS of some degree (equated to Level A harassment).

Level B Harassment for non-explosive sources – 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*., 2011). 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 μPa rms for continuous (*e.g.* vibratory pile-driving, drilling) and above 160 dB re 1 μPa rms for non-explosive impulsive (*e.g.*, seismic airguns) or intermittent (*e.g.*, scientific sonar) sources.

KDC's proposed construction activity includes the use of continuous (vibratory pile driving and drilling) and impulsive (impact pile driving) sources, and therefore the 120 and 160 dB re 1 μPa rms thresholds for Level B behavioral harassment are applicable.

Level A harassment for non-explosive sources - NMFS' Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Technical Guidance, 2016) 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 from two different types of sources (impulsive or non-impulsive). KDC's proposed activity includes the use of impulsive (impact pile driving) and non-impulsive (vibratory pile driving and drilling) sources.

These thresholds are provided in the table below. The references, analysis, and methodology used in the development of the thresholds are described in NMFS 2016 Technical Guidance, which may be accessed at: *http://www.nmfs.noaa.gov/pr/acoustics/guidelines.htm*.

**Table 3. Thresholds identifying the onset of Permanent Threshold Shift.**

| | **PTS Onset Acoustic Thresholds*** **(Received Level)** | |
|---|---|---|
| **Hearing Group** | **Impulsive** | **Non-impulsive** |
| **Low-Frequency (LF) Cetaceans** | *Cell 1* $L_{pk,flat}$: 219 dB $L_{E,LF,24h}$: 183 dB | *Cell 2* $L_{E,LF,24h}$: 199 dB |
| **Mid-Frequency (MF) Cetaceans** | *Cell 3* $L_{pk,flat}$: 230 dB $L_{E,MF,24h}$: 185 dB | *Cell 4* $L_{E,MF,24h}$: 198 dB |
| **High-Frequency (HF) Cetaceans** | *Cell 5* $L_{pk,flat}$: 202 dB $L_{E,HF,24h}$: 155 dB | *Cell 6* $L_{E,HF,24h}$: 173 dB |
| **Phocid Pinnipeds (PW) (Underwater)** | *Cell 7* $L_{pk,flat}$: 218 dB $L_{E,PW,24h}$: 185 dB | *Cell 8* $L_{E,PW,24h}$: 201 dB |
| **Otariid Pinnipeds (OW) (Underwater)** | *Cell 9* $L_{pk,flat}$: 232 dB $L_{E,OW,24h}$: 203 dB | *Cell 10* $L_{E,OW,24h}$: 219 dB |

* 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.

Note: Peak sound pressure ($L_{pk}$) has a reference value of 1 μPa, and cumulative sound exposure level ($L_E$) has a reference value of 1μPa²s. 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.e., 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.

*Ensonified Area*

Here, we describe operational and environmental parameters of the activity that will feed into identifying the area ensonified above the acoustic thresholds.

Reference sound levels used by KDC for all vibratory and impact piling activities were derived from source level data from construction projects at the Port of Anchorage (Austin *et al*., 2016) and Ketchikan Ferry Terminal (Denes *et al*., 2016). To determine the ensonfied areas for both the Level A and Level B zones for vibratory piling of 48-inch and 36-inch steel piles, KDC used Sound Pressure Levels (SPLs) of 168.2 dB re 1 μPa rms and 161.9 dB dB re 1 μPa rms, respectively. These were derived from vibratory pile driving data (of the same pile sizes) during the Port of Anchorage test pile project (Austin *et al*., 2016, Tables 9 and 16).

For impact pile driving, KDC used both SPLs and Sound Exposure Levels (SEL) derived from SSV studies conducted on 48-inch steel piles during the Port of Anchorage test pile project. To determine Level A ensonified zones from impact piling, KDC utilized an SEL of 186.7 dB. When determining Level A zones, SELs are more accurate than SPLs, as they incorporate the pulse duration explicitly rather than assuming a proxy pulse duration and they provide a more refined estimation of impacts. However, to determine the Level B zone for impact piling, an SPL of 198.6 dB re 1 μPa rms was used. In addition, for drilling, KDC used a reference sound level of 167.7 dB re 1 μPa rms from SSV studies conducted during drilling activities at the Kodiak Ferry Terminal to calculate both the Level A and Level B ensonified zones for the Berth IV Expansion project. More information on the source levels used are presented in Table 4 below.

**Table 4. Project Source Levels.**

| Activity | Source Level at 10 meters (dB) |
|---|---|
| **Vibratory Pile Driving/Removal** | |
| 24-inch steel removal<br>(2 piles) (~1 hour on 1 day)[1] | 161.9 SPL[2] |
| 30-inch steel removal<br>(6 piles) (~1 hour per day on 2 days) | 161.9 SPL[2] |
| 36-inch steel removal<br>(4 piles) (~1 hour on 1 day) | 168.2 SPL[2] |

| | |
|---|---|
| 30-inch steel temporary installation (16 piles) (~2 hours per day on 4 days) | 161.9 SPL[2] |
| 30-inch steel permanent installation (1 pile) (~2 hours on 1 day) | 161.9 SPL[2] |
| 48-inch steel permanent installation (17 piles) (~2 hours per day on 9 days) | 168.2 SPL[2] |
| **Impact Pile Driving** | |
| 48-inch steel permanent installation (17 piles)<br>(~15 minutes per day on 6 days) | 186.7 SEL/<br>198.6 SPL[3] |
| **Socketing Pile Installation(Drilling)** | |
| 30-inch steel permanent installation (1 pile) (~3 hours on 1 day) | 167.7 SPL[4] |

[1] This project will only remove two 24-inch diameter steel piles total for a maximum of 30 minutes of removal in one day. However, because a maximum of 4 pile could be removed each day, we used 1 hour (the time it would take to remove four piles) of removal time instead of 30 minutes to calculate the distance threshold.

[2] The 36-inch and 48-inch diameter pile source levels are proxy from median measured source levels from pile driving of 48-inch piles for the Port of Anchorage test pile project (Austin *et al*. 2016, Tables 9 and 16). The 24-inch and 30-inch diameter source levels are proxy from median measured sources levels from pile driving of 30-inch diameter piles to construct the Ketchikan Ferry Terminal (Denes *et al*. 2016, Table 72).

[3] Sound pressure level root-mean-square (SPL rms) values were used to calculate distance to Level B harassment isopleths for impact pile driving. The source level of 186.7 SEL is the median measured from the Port of Anchorage test pile project for 48-inch piles (Austin *et al*. 2016, Table 9). We calculated the distances to Level A thresholds assuming 200 strikes in 1 hour and 15 minutes of work in 24 hours.

[4] The 30-inch diameter socketing source level is proxy from mean measured sources levels from drilling of 24-inch diameter piles to construct the Kodiak Ferry Terminal (Denes *et al*. 2016, Table 72).

*Level B Zones*

The practical spreading model was used by KDC to generate the Level B harassment zones for all piling and drilling activities. Practical Spreading, a form of transmission loss, is described in full detail below.

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

$$TL = B * \log10(R1/R2), \text{ where}$$

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[range]). Cylindrical spreading occurs in an environment in which sound propagation is bounded by the water surface and sea bottom, resulting in a reduction of 3 dB in sound level for each doubling of distance from the source (10*log[range]). A practical spreading value of 15 is often used under conditions where water increases with depth as the receiver moves away from the shoreline, resulting in an expected propagation environment that would lie between spherical and cylindrical spreading loss conditions.

Utilizing the practical spreading loss model, KDC determined underwater noise will fall below the behavioral effects threshold of 120 dB rms for marine mammals at a max radial distance of 16,343 meters and 15,136 meters for vibratory piling and drilling, respectively[2]. With these radial distances, and due to the occurrence of landforms (See Figure 5 of IHA Application), the largest Level B zone calculated for vibratory piling and drilling equaled 10.3 $km^2$. For calculating the Level B zone for impact driving, the practical spreading loss model was used with

[2] These distances represent calculated distances based on the practical spreading model; however, landforms will block sound transmission at closer distances. The farthest distance that sound will transmit from the source is 13,755 m before transmission is stopped by Annette Island.

a behavioral threshold of 160 dB rms. The maximum radial distance of the Level B ensonified zone for impact piling equaled 3,744 meters. At this radial distance, the entire Level B zone for impact piling equaled 4.9 $km^2$. Table 5 below provides all Level B radial distances and their corresponding areas for each activity during KDC's Berth IV Expansion project.

**Table 5. Level B Zones Calculated Using the Practical Spreading Model.**

| Source | Level B Zones (meters) | Level B Zone (square kilometers) |
|---|---|---|
| **Vibratory Pile Driving** | | |
| 24-inch steel removal (2 piles) (~1 hour on 1 day3) | 6,215 | 5.9 |
| 30-inch steel removal (6 piles) (~1 hour per day on 2 days) | 6,215 | 5.9 |
| 36-inch steel removal (4 piles) (~1 hour on 1 day) | 16,343* | 10.3 |
| 30-inch steel temporary installation (16 piles) (~2 hours per day on 4 days) | 6,215 | 5.9 |
| 30-inch steel permanent installation (1 pile) (~2 hours on 1 day) | 6,215 | 5.9 |
| 48-inch steel permanent installation (17 piles) (~2 hours per day on 9 days) | 16,343* | 10.3 |
| **Impact Pile Driving** | | |
| 48-inch steel (17 piles) (~15 minutes per day on 6 days) | 3,745 | 4.9 |
| **Socketing Pile Installation(Drilling)** | | |
| 30-inch steel (1 pile) (~3 hours on 1 day) | 15,136* | 10.3 |

* These distances represent calculated distances based on the practical spreading model; however, landforms will block sound transmission at closer distances. The farthest distance that sound will transmit from the source is 13,755 m before transmission is stopped by Annette Island.

*Level A Zones*

When NMFS's Technical Guidance (2016) was published, in recognition of the fact that ensonified 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 will result in some degree of overestimate of Level A 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 (*i.e.*, pile driving and drilling), NMFS's User Spreadsheet 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, and the resulting Level A isopleths are reported below.

**Table 6. NMFS's Optional User Spreadsheet Inputs.**

| **USER SPREADSHEET INPUT** | | | | |
|---|---|---|---|---|
| **Equipment Type** | **Drill** | **Vibratory Pile Driver (Removal of 30-inch and 24-inch steel piles)** | **Vibratory Pile Driver (Installation of 30-inch steel piles)** | **Impact Pile Driver** |
| Spreadsheet Tab Used | Non-impulsive, continuous | Non-impulsive, continuous | Non-impulsive, continuous | Impulsive, Non-continuous |
| Source Level | 167.7 SPL | 161.9 SPL | 161.9 SPL | 186.7 SEL |
| Weighting Factor Adjustment (kHz) | 2 | 2.5 | 2.5 | 2 |
| (a)Activity duration within 24 hours<br>(b) Number of strikes per hour | (a)3 | (a)1 | (a)2 | (b) 200 |
| Propagation (xLogR) | 15 | 15 | 15 | 15 |
| Distance of source level measurement (meters)⁺ | 10 | 10 | 10 | 10 |

**Table 7. NMFS Optional User Spreadsheet Outputs.**

| **USER SPREADSHEET OUTPUT** | | | | | |
|---|---|---|---|---|---|
| | **PTS Isopleth (meters)** | | | | |
| **Source Type** | **Low-Frequency Cetaceans** | **Mid-Frequency Cetaceans** | **High-Frequency Cetaceans** | **Phocid Pinnipeds** | **Otariid Pinnipeds** |
| **Drilling** | 40 | 2.3 | 35 | 21.4 | 1.6 |
| **Vibratory Pile Driver (Removal of 30-inch and 24-inch steel piles)** | 7.8 | 0.7 | 11.6 | 4.8 | 0.3 |
| **Vibratory Pile Driver (Installation of 30-inch steel piles)** | 12.4 | 1.1 | 18.4 | 7.6 | 0.5 |

| | | | | | |
|---|---|---|---|---|---|
| **Impact Pile Driver** | 239.2 | 8.5 | 284.9 | 128.0 | 9.3 |
| **Daily ensonified area (km$^2$)** | | | | | |
| **Drilling** | 0.003 | 0.000008 | 0.002 | 0.00078 | 0.000004 |
| **Vibratory Pile Driver (Removal of 30-inch and 24-inch steel piles)** | 0.0001 | 0.0000008 | 0.0002 | 0.00004 | 0.0000001 |
| **Vibratory Pile Driver (Installation of 30-inch steel piles)** | 0.0002 | 0.000002 | 0.0005 | 0.00009 | 0.0000004 |
| **Impact Pile Driver** | 0.09 | 0.0001 | 0.13 | 0.03 | 0.0001 |

*Marine Mammal Occurrence*

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 drilling noises for each acoustic threshold were estimated using group size estimates and local observational data. As previously stated, Level B take as well as small numbers of Level A take will be will be considered for this action. Level B and Level A take are calculated differently for some species based on monthly and daily sightings data based on Freitag (2017) and average group sizes within the action area. Below gives a description of estimated habitat use and group sizes for the eight species of marine mammals known to occur within the action area.

Humpback Whale

Humpback whales frequent the action area and could be encountered during any given day of dock construction. In the project vicinity, humpback whales typically occur in groups of 1-2 animals, with an estimated maximum group size of four animals. Humpback whales can pass through the action area 0-3 times a month (Freitag 2017).

Minke Whale

Minke whales are rare in the action area, but they could be encountered during any given day of dock construction. These whales are usually sighted individually or in small groups of 2-

3, but there are reports of loose aggregations of hundreds of animals (NMFS 2018). Freitag (2017) estimates that a group of three whales may occur near or within the action over the four-month period.

Killer Whales

Killer whales pass through the action area and could be encountered during any given day of dock construction. In the project vicinity, typical killer whale pod size varies from between 1-2 and 7-10 individuals, with an estimated maximum group size of 10 animals. Killer whales are estimated to pass through the action area one time a month (Freitag 2017).

Pacific White-Sided Dolphin

Pacific white-sided dolphins are rare in the action area, but they could be encountered during any given day of dock construction (Freitag 2017). Pacific-white sided dolphins have been observed in Alaska waters in groups ranging from 20 to 164 animals (Muto *et al* 2016a).

Dall's Porpoise

Dall's porpoises are seen infrequently in the action area (Freitag 2017), but they could be encountered during any given day of dock construction. In the project vicinity, Dall's porpoises typically occur in groups of 10-15 animals, with an estimated maximum group size of 20 animals. Dall's porpoises have been observed passing through the action area 0-1 times a month (Freitag 2017). Harbor Porpoise

Harbor porpoises are seen infrequently in the action area, but they could be encountered during any given day of dock construction. In the project vicinity, harbor porpoises typically occur in groups of one to five animals, with an estimated maximum group size of eight animals. Harbor porpoises have been observed passing through the action area 0-1 times a month (Freitag 2017).

Harbor Seals

Harbor seals are common in the action area and are expected to be encountered in low numbers during dock construction. In the action area harbor seals typically occur in groups of one to three animals, with an estimated maximum group size of three animals. Harbor seals can occur every day of the month in the project area (Freitag 2017).

Steller Sea Lions

Steller sea lions are common in the action area and are expected to be encountered in low numbers during dock construction. In the project vicinity Steller sea lions typically occur in groups of 1-10 animals (Freitag 2017), with an estimated maximum group size of 80 animals (HDR 2003). Steller sea lions can occur every day of the month in the project area (Freitag 2017).

*Take Calculation and Estimation*

Here we describe how the information provided above is brought together to produce a quantitative take estimate. Table 8 below shows take as a percentage of population for each of the species.

Humpback Whale

Based on observational and group data it is estimated that a group of 2 humpback whales may occur within the Level B harassment zone three times each month over the four-month construction window during active pile driving (2 animals in a group x 3 groups each month × 4 months = 24 animals). Therefore, NMFS proposed to authorize 24 Level B takes of humpback whales.

Minke Whale

Based on local sighting information (Freitag 2017), it is estimated that a group of three whales may occur within the Level B harassment zone once over the four-month construction window during active pile driving (three animals in a group x one group in four months = 3 animals). Therefore, NMFS proposed to authorize three Level B takes of minke whale.

Killer Whales

Based on observational and group data it is estimated that a group of 10 killer whales may occur within the Level B harassment zone one time each month over the four-month construction window during active pile driving (10 animals in a group × 1 group each month x 4 months = 40 animals). Therefore, NMFS proposed to authorize 40 Level B takes of killer whales. (To clarify, this request is for 40 takes from all stocks combined, not 40 takes from each stock).Pacific White-Sided Dolphin

Based on observational and group data it is estimated that a group of 92 (median between 20 and 164) Pacific-white sided dolphins may occur within the Level B harassment zone once over the four-month construction window during active pile driving (92 animals in a group x one group in four months = 92 animals). Therefore, NMFS proposed to authorize 92 Level B takes of Pacific white-sided dolphins.

Dall's Porpoise

Based on observational and group data it is estimated that a group of 15 Dall's porpoises may occur within the Level B harassment zone one time each month over the four-month construction window during active pile driving (15 animals in a group x one group each month × four months = 60 animals). Therefore, NMFS proposed to authorize 60 Level B takes of Dall's porpoise.Harbor Porpoise

Based on observational and group data it is conservatively estimated that a group of 5 harbor porpoise may occur within the Level B harassment zone once time each month over the four-month construction window during active pile driving (five animals in a group x one group each month × four months = 20 animals). In addition, NMFS proposes to authorize Level A take for one group of harbor porpoises to safeguard against the possibility of PSOs not being able detect a group of harbor porpoises within their largest corresponding shutdown (see table 9). Therefore, NMFS proposes to authorize 20 Level B takes and five Level A takes of harbor porpoises.Harbor Seals

Based on observational and group data it is conservatively estimated that two groups of three harbor seals may occur within the Level B harassment zone every day that pile driving may occur, and pile driving is estimated to occur on 20 days during the four-month long construction duration (three animals in a group x two groups per day x 20 days = 120 animals). In addition, NMFS proposes to authorize Level A take for two groups of harbor seals to safeguard against the possibility of PSOs not being able detect a group of harbor seals within their largest corresponding shutdown zone (see Table 9). Therefore, NMFS proposed to authorize 120 Level B takes and six Level A takes of harbor seals.

Steller Sea Lions

Based on observational and group data it is estimated that a group of 10 Steller sea lions may occur within the Level B harassment zone every day that pile driving may occur, and pile driving is estimated to occur on 20 days during the four-month long construction duration (10 animals in a group x 20 days = 200 animals). Therefore, NMFS proposed to authorize 200 Level B takes of Steller sea lions.

**Table 8. Proposed Take Estimates as a Percentage of Stock Abundance.**

| Species | Stock (NEST)[a] | Level A | Level B | Percent of Stock |
|---|---|---|---|---|
| Humpback Whale | Hawaii DPS (11,398)[b]<br>Mexico DPS (3,264)[b] | 0 | 22[b]<br>2 | 0.20<br>0.03 |
| Minke Whale | Alaska (N/A) | 0 | 3 | N/A |
| Killer Whale | Alaska Resident (2,347)<br>Northern Resident (261)<br>West Coast Transient (243) | 0 | 40 | 1.70<br>15.33<br>16.46[d] |
| Pacific White-Sided Dolphin | North Pacific (26,880) | 0 | 92 | 0.34 |
| Dall's Porpoise | Alaska (83,400) | 0 | 60 | 0.07 |
| Harbor Porpoise | Southeast Alaska (975)[c] | 5 | 20 | 2.56 |
| Harbor Seal | Clarence Strait (31,634) | 6 | 120 | 0.40 |
| Steller Sea Lion | Eastern U.S (49,497) | 0 | 200 | 0.40 |

[a] Stock estimate from Muto, M. M. *et al*. 2016. Appendix 2. Stock Summary Table (last revised 12.30.16).NOAA-TM-AFSC-355Muto,M.M.,*et al*. *http://www.nmfs.noaa.gov/pr/sars/pdf/ak_2016_sars_appendix_2.pdf* unless otherwise noted.

[b] 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. Based on calculations in Wade *et al*. 2016, 93.9% of the humpback whales in Southeast Alaska are expected to be from the Hawaii DPS and 6.1% are expected to be from the Mexico DPS.

[c] In the SAR for harbor porpoise (NMFS 2017), NMFS identified population estimates and PBR for porpoises within inland Southeast Alaska waters (these abundance estimates have not been corrected for g(0); therefore, they are likely conservative

[d] These percentages assume all 40 takes come from each individual stock, thus the percentage should be inflated if multiple stocks are actually impacted.

## 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.

The following mitigation measures are proposed in the IHA:

*Timing Restrictions*

All work will be conducted during daylight hours. If poor environmental conditions restrict visibility full visibility of the shutdown zone, pile installation would be delayed.

*Sound Attenuation*

To minimize noise during vibratory and impact pile driving, pile caps (pile softening material) will be used. KDC will use high-density polyethylene (HDPE) or ultra-high-molecular-weight polyethylene (UHMW) softening material on all templates to eliminate steel on steel noise generation.

*Shutdown Zone for in-water Heavy Machinery Work*

For in-water heavy machinery work (using, *e.g.*, standard barges, tug boats, barge-mounted excavators, or clamshell equipment used to place or remove material), a minimum 10 meter shutdown zone shall be implemented. If a marine mammal comes within 10 meters of such operations, operations shall cease and vessels shall reduce speed to the minimum level required to maintain steerage and safe working conditions. This type of work could include (but is not limited to) the following activities: (1) vibratory pile driving; (2) movement of the barge to the pile location; (3) positioning of the pile on the substrate via a crane (*i.e.*, stabbing the pile); or (4) removal of the pile from the water column/substrate via a crane (*i.e.*, deadpull).

*Additional Shutdown Zones*

For all pile driving/removal and drilling activities, KDC will establish a shutdown zone for a marine mammal species that is greater than its corresponding Level A zone. 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). The shutdown zones for each of the pile driving and drilling activities are listed below in Table 9.

**Table 9. Shutdown Zones.**

| **Source** | **Shutdown Zones (meters)** | | | | |
|---|---|---|---|---|---|
| | Low-Frequency Cetaceans (humpback whale, minke whale) | Mid-Frequency Cetaceans (killer whale, Pacific-white sided dolphin) | High-Frequency Cetaceans (Dall's porpoise, harbor porpoise) | Phocid (harbor seal) | Otariid (sea lion) |
| **In-Water Construction Activities*** | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| In Water Heavy Construction(*i.e.*, Barge movements, pile positioning, deadpulling, and sound attenuation) | 10 | 10 | 10 | 10 | 10 |
| **Vibratory Pile Driving** | | | | | |
| 24-inch steel removal (2 piles) (~1 hour on 1 day) | 25 | 25 | 25 | 25 | 25 |
| 30-inch steel removal (6 piles) (~1 hour per day on 2 days) | 25 | 25 | 25 | 25 | 25 |
| 36-inch steel removal (4 piles) (~1 hour on 1 day) | 25 | 25 | 50 | 25 | 25 |
| 30-inch steel temporary installation (16 piles) (~2 hours per day on 4 days) | 25 | 25 | 25 | 25 | 25 |
| 30-inch steel permanent installation (1 pile) (~2 hours on 1 day) | 25 | 25 | 25 | 25 | 25 |
| 48-inch steel permanent installation (17 piles) (~2 hours per day on 9 days) | 50 | 25 | 50 | 25 | 25 |
| **Impact Pile Driving** | | | | | |
| 48-inch steel permanent installation (17 piles) (~15 minutes per day on 6 days) | 240 | 25 | 290 | 130 | 25 |
| **Socketing Pile Installation(Drilling)** | | | | | |
| 30-inch steel permanent installation (1 pile) (3 hours per day on 1 day) | 50 | 25 | 50 | 25 | 25 |

*Monitoring Zones*

KDC will establish and observe a monitoring zone. The monitoring zones for this project are areas where SPLs are equal to or exceed 120 dB rms (for vibratory pile driving and drilling) and 160 dB rms (for impact driving) These areas are equal to Level B harassment zones and are presented in Table 10 below. 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 disturbance zones enables observers to be aware of and communicate the presence of marine mammals in the project area, but outside the shutdown zone, and thus prepare for potential shutdowns of activity. However, the primary purpose of disturbance zone monitoring is for documenting instances of Level B harassment;

disturbance zone monitoring is discussed in detail later (see Proposed Monitoring and Reporting).

**Table 10. Monitoring Zones.**

| Source | Level B Zones (meters) | Level B Zone (square kilometers) |
|---|---|---|
| **Vibratory Pile Driving** | | |
| 24-inch steel removal (2 piles) (~1 hour on 1 day3) | 6,215 | 5.9 |
| 30-inch steel removal (6 piles) (~1 hour per day on 2 days) | 6,215 | 5.9 |
| 36-inch steel removal (4 piles) (~1 hour on 1 day) | 13,755 | 10.3 |
| 30-inch steel temporary installation (16 piles) (~2 hours per day on 4 days) | 6,215 | 5.9 |
| 30-inch steel permanent installation (1 pile) (~2 hours on 1 day) | 6,215 | 5.9 |
| 48-inch steel permanent installation (17 piles) (~2 hours per day on 9 days) | 13,755 | 10.3 |
| **Impact Pile Driving** | | |
| 48-inch steel (17 piles) (~15 minutes per day on 6 days) | 3,745 | 4.9 |
| **Socketing Pile Installation(Drilling)** | | |
| 30-inch steel (1 pile) (~3 hours on 1 day) | 13,755 | 10.3 |

*Non-authorized Take Prohibited*

If a species enters or approaches the Level B zone and that species is either not authorized for take or its authorized takes are met, pile driving and removal activities must shut down immediately using delay and shut-down procedures. Activities must not resume until the animal has been confirmed to have left the area or an observation time period of 15 minutes has elapsed for pinnipeds and small cetaceans and 30 minutes for large whales.

*Soft Start*

The use of a soft-start procedure are believed to provide additional protection to marine mammals by providing warning and/or giving marine mammals a chance to leave the area prior to the impact hammer operating at full capacity. For impact pile driving, contractors will be required to provide an initial set of strikes from the hammer at 40 percent energy, each strike followed by no less than a 30-second waiting period. This procedure will be conducted a total of three times before impact pile driving begins.  Soft Start is not required during vibratory pile driving and removal activities.*Pre-Activity Monitoring*

Prior to the start of daily in-water construction activity, or whenever a break in pile driving of 30 minutes or longer occurs, the observer will observe the shutdown and monitoring zones for a period of 30 minutes. The shutdown zone will be cleared when a marine mammal has not been observed within the zone for that 30-minute period. If a marine mammal is observed within the shutdown zone, a soft-start cannot proceed until the animal has left the zone or has not been observed for 15 minutes. If the Monitoring zone has been observed for 30 minutes and non-permitted species are not present within the zone, soft start procedures can commence and work can continue even if visibility becomes impaired within the Monitoring zone. When a marine mammal permitted for Level B take is present in the Monitoring zone, piling activities may begin and Level B take will be recorded. As stated above, if the entire Level B zone is not visible at the start of construction, piling or drilling activities can begin. If work ceases for more than 30 minutes, the pre-activity monitoring of both the Monitoring zone and shutdown zone will commence.

Based on our evaluation of the applicant’s proposed measures, as well as other measures considered by NMFS, NMFS has preliminarily determined that the proposed mitigation measures provide the means 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.

*Visual Monitoring*

Monitoring would be conducted 30 minutes before, during, and 30 minutes after all pile driving/removal and drilling activities. In addition, observers shall record all incidents of marine mammal occurrence, regardless of distance from activity, and shall document any behavioral reactions in concert with distance from piles being driven, removed, or pile holes being drilled. Pile driving and drilling activities include the time to install, remove, or drill a hole for a single pile or series of piles, as long as the time elapsed between uses of the pile driving equipment is no more than thirty minutes.

Monitoring will be conducted by NMFS approved Protected Species Observers (PSOs). The number of PSOs will vary from two to four, depending on the type of pile driving and size of pile, which determines the size of the harassment zones. Two land-based PSOs will monitor during all impact pile driving activity, three land-based PSOs will monitor during vibratory pile driving of 36-inch and 48-inch diameter piles, and four land-based PSOs will monitor during vibratory pile driving of 36-inch and 48-inch diameter piles.

One PSO will be stationed at Berth IV and will be able to view across Tongass Narrows south and west to Gravina Island. The second and third PSOs will be located in increments along the road systems at locations that provide the best vantage points for viewing Tongass Narrows west and east of Berth IV. These locations will vary depending on type of pile driving. The fourth PSO will be located on the road system near Mountain Point and will be able to view Tongass Narrows to the northwest and Revillagigedo Channel to the southeast.

Monitoring of pile driving shall be conducted by qualified, NMFS approved PSOs, who shall have no other assigned tasks during monitoring periods. KDC shall adhere to the following conditions when selecting observers:

- Independent PSOs shall be used (*i.e.*, not construction personnel).
- At least one PSO must have prior experience working as a marine mammal observer during construction activities.
- Other PSOs may substitute education (degree in biological science or related field) or training for experience.
- Where a team of three or more PSOs are required, a lead observer or monitoring coordinator shall be designated. The lead observer must have prior experience working as a marine mammal observer during construction.
- KDC shall submit PSO CVs for approval by NMFS.

KDC shall ensure that observers 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;
- 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.

KDC shall submit a draft report to NMFS not later than 90 days following the end of construction activities. KDC shall provide a final report within 30 days following resolution of NMFS' comments on the draft report. Reports shall contain, at minimum, the following:

- Date and time that monitored activity begins and ends for each day conducted (monitoring period);
- Construction activities occurring during each daily observation period, including how many and what type of piles driven;
- Deviation from initial proposal in pile numbers, pile types, average driving times, etc.;
- Weather parameters in each monitoring period (*e.g.*, wind speed, percent cloud cover, visibility);
- Water conditions in each monitoring period (*e.g.,* sea state, tide state);
- For each marine mammal sighting:
  - Species, numbers, and, if possible, sex and age class of marine mammals;

- Description of any observable marine mammal behavior patterns, including bearing and direction of travel and distance from pile driving activity;
- Location and distance from pile driving activities to marine mammals and distance from the marine mammals to the observation point;

- Estimated amount of time that the animals remained in the Level B zone
- Description of implementation of mitigation measures within each monitoring period (*e.g.*, shutdown or delay);
- Other human activity in the area within each monitoring period
- A summary of the following:
  - Total number of individuals of each species detected within the Level B Zone, and estimated as taken if correction factor appropriate.
  - Total number of individuals of each species detected within the Level A Zone and the average amount of time that they remained in that zone.
  - Daily average number of individuals of each species (differentiated by month as appropriate) detected within the Level B Zone, and estimated as taken, if appropriate.

**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, greater than Level A harassment zones, will be implemented. Level A take is only authorized as a precautionary measure for two species (harbor seals and harbor porpoises) in case PSOs are unable to detect them within their larger shutdown zones while impact piling 48-inch steel piles. 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 vibratory and impact pile driving, KDC 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 (HDPE) or ultra-high-molecular- weight polyethylene (UHMW) 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 any 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 and drilling operations are underway. Depending on the activity, KDC will employ the use of two to four PSOs to ensure all monitoring and shutdown zones are properly observed.

Although the expansion of Berth IV's facilities would have some permanent removal of habitat available to marine mammals, the area lost would negligible. Most of the project footprint would be within previously disturbed areas adjacent to existing Berth IV structures and within an active marine commercial and industrial area. There are no known pinniped haul outs 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 Ketchikan. The most likely impact to prey will be temporary behavioral avoidance of the immediate area. During pile driving and drilling, 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;
- The action area is located in an industrial and commercial marina;
- The absence of any rookeries, or 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 anticipated efficacy of the required mitigation measures (*i.e.* shutdown zones and pile caps) 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)(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.  Additionally, other qualitative factors may be considered in the analysis, such as the temporal or spatial scale of the activities.

Take of eight of the ten marine mammal stocks authorized for take is less than three percent of the stock abundance. For northern resident and west coast transient killer whales, we acknowledge that 15.33 percent and 16.46 percent of the stocks are proposed to be taken by Level B harassment, respectively. However, since three stocks of killer whales could occur in the action area, the 40 total killer whale takes are likely split among the three stocks. Nonetheless, since NMFS does not have a good way to predict exactly how take will be split, NMFS looked at the most conservative scenario, which is that all 40 takes could potentially occur to each of the three stocks. This is a highly unlikely scenario to occur and the percentages of each stock taken are predicted to be significantly lower than values presented in Table 8 for killer whales.

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**

There are no relevant subsistence uses of the affected marine mammal stocks or species implicated by this action.  Therefore, 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, in this case with the Alaska Regional Office (AKRO) whenever we propose to authorize take for endangered or threatened species.

NMFS is proposing to authorize take of Mexico DPS humpback whales, which are listed under the ESA. The Permit and Conservation Division has requested initiation of Section 7 consultation with the Alaska Regional Office 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 KDC for conducting pile driving, pile removal, and drilling activities for the Ketchikan Berth IV Expansion Project in Ketchikan, Alaska from October 2018 to January of 2019, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated. This section contains a draft of the IHA itself. The wording contained in this section is proposed for inclusion in the IHA (if issued).

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

2. This IHA is valid only for impact pile driving, vibratory pile driving, vibratory pile removal, and drilling activities associated with the construction of the Ketchikan Berth IV Expansion Project in Ketchikan, Alaska.

3. General Conditions

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

(b) The species authorized for taking are the minke whale (*Balaenoptera acutorostrata*), humpback whale (*Megaptera novaeangliae*), killer whale (*Orcinus orca*), Dall's porpoise (*Phocoenoides dalli*), harbor porpoise (*Phocoena phocoena*), Steller sea lion (*Eumetopias jubatus*), Pacific White-Sided Dolphin (*Lagenorhynchus obliquidens*), and harbor seal (*Phoca vitulina*);

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

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

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

(f) Pile driving and drilling activities authorized under this IHA may only occur during daylight hours.

4. Mitigation Measures

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

(a) For all pile driving, drilling, and in-water heavy machinery work, KDC shall implement a shutdown zone around the pile or work zone. If a marine mammal comes within or approaches the shutdown zone, such operations shall cease. See Table 2 (attached) for minimum radial distances required for shutdown zones;

(b) After a shutdown occurs, impact pile driving, vibratory piling driving/removal, and/or drilling can only begin after the animal is observed leaving the shutdown zone or has not been observed for 15 minutes;

(c) KDC shall use a softening material (*e.g.*, high-density polyethylene (HDPE) or ultra-high-molecular-weight polyethylene (UHMW)) on all templates to eliminate steel on steel noise generation.

(d) KDC will use a soft-start procedure for impact pile driving. During a soft start, KDC will be required to provide an initial set of three strikes from the impact hammer at 40 percent energy, followed by a one minute waiting period, then two subsequent 3–strike sets. This soft-start will be applied prior to beginning pile driving activities each day or when impact pile driving hammers have been idle for more than 30 minutes.

(e) KDC will drive all piles with a vibratory hammer until a desired depth is achieved or to refusal prior to using an impact hammer.

(f) KDC shall establish monitoring locations as described below.

5. Monitoring

The holder of this Authorization is required to conduct marine mammal monitoring during all pile driving/removal and drilling activities. Monitoring and reporting shall be conducted in accordance with the Monitoring Plan as described below.

(a) KDC shall monitor the Level B harassment zones (monitoring zones) and shutdown zones shown below in Tables 2 and 3 during all pile driving/removal and drilling activities

(b) If waters exceed a sea-state which restricts the observers' ability to make observations within the marine mammal shutdown zone, pile installation/removal and drilling shall cease. Pile driving and/or drilling shall not be initiated or continue until the entire largest shutdown zone for the activity is visible.

(c) Prior to the start of daily in-water construction activity, or whenever a break in pile driving/removal and/or drilling of 30 minutes or longer occurs, the PSOs shall observe the shutdown and monitoring zones for a period of 30 minutes before construction activities can begin.

(d) Monitoring shall be conducted by qualified PSOs, with minimum qualifications as described previously in the *Monitoring and Reporting* section of the proposed *Federal Notice*. PSO requirements include:

(i) Two to Four observers shall be on site to actively observe the shutdown and disturbance zones during all pile driving, removal, and drilling;

(1) Two land-based PSOs will monitor during all impact pile driving, vibratory removal, and drilling activities.

(2) Four land-based PSOs will monitor during vibratory pile driving of 36-inch and 48-inch diameter piles.

(ii) Observers shall use their naked eye with the aid of binoculars, and/or a spotting scope during all pile driving and extraction activities;

(iii) Monitoring location(s) will include the following characteristics:

(1) One PSO will be stationed at Berth IV and will be able to view across Tongass Narrows south and west to Gravina Island.

(2) A second and third PSOs will be located in increments along the road systems at locations that provide the best vantage points for viewing Tongass Narrows west and east of Berth IV. These locations will vary depending on type of pile driving.

(3) The fourth PSO will be located on the road system near Mountain Point and will be able to view Tongass Narrows to the northwest and Revillagigedo Channel to the southeast.

(4) An unobstructed view of all water within the shutdown zone and as much of the Level B harassment zone as possible for pile driving/removal and/or drilling;

(e) Marine mammal location shall be determined using a rangefinder and a GPS or compass;

(f) Post-construction monitoring shall be conducted for 30 minutes beyond the cessation of piling and drilling activities at end of day.

6. Reporting

The holder of this Authorization is required to:(a) Submit a draft report on all monitoring conducted under the IHA within 90 calendar days of the completion of marine mammal monitoring. This report shall detail the monitoring protocol, summarize the data recorded during monitoring, and estimate the number of marine mammals that may have been harassed, including the total number extrapolated from observed animals across the entirety of relevant monitoring zones A final report shall be prepared and submitted within thirty days following resolution of comments on the draft report from NMFS. This report must contain the following:

(i) Date and time a monitored activity begins or ends;

(ii) Construction activities occurring during each observation period;

(iii) Record of implementation of shutdowns, including the distance of animals to the pile and description of specific actions that ensued and resulting behavior of the animal, if any;

(iv) Deviation from initial proposal in pile numbers, pile types, average driving times, etc.;

(v) Weather parameters (*e.g.*, percent cover, visibility);

(vi) Water conditions (*e.g.*, sea state, tide state);

(vii) Species, numbers, and, if possible, sex and age class of marine mammals;

(viii) Description of any observable marine mammal behavior patterns,

(ix) Distance from pile driving activities to marine mammals and distance from the marine mammals to the observation point;

(x) Locations of all marine mammal observations; and

(xi) Other human activity in the area.

(b) Reporting injured or dead marine mammals:

(i) In the unanticipated event that the specified activity clearly causes the take of a marine mammal in a manner prohibited by this IHA, such as an injury (Level A harassment), serious injury, or mortality, KDC shall immediately cease the specified activities and report the incident to the Office of Protected Resources (301-427-8401), NMFS, and the Alaska Regional Stranding Coordinator (907-271-1332), NMFS. The report must include the following information:

1. Time and date of the incident;

2. Description of the incident;

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

4. Description of all marine mammal observations and active sound source use in the 24 hours preceding the incident;

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

6. Fate of the animal(s); and

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

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

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

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

(iii) In the event that KDC discovers an injured or dead marine mammal, and the lead observer determines that the injury or death is not associated with or related to the activities authorized in the IHA (*e.g.*, previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), KDC shall report the incident to the Office of Protected Resources, NMFS, and the Alaska Regional Stranding Coordinator, NMFS, within 24 hours of the discovery. KDC shall provide photographs or video footage or other documentation of the stranded animal sighting to NMFS;

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

**Table 1. Authorized take numbers, by species.**

| **Species** | **Stock** | **Level A** | **Level B** |
|---|---|---|---|
| Humpback Whale | Central North Pacific | 0 | 24 |
| Minke Whale | Alaska | 0 | 3 |
| Killer Whale | Alaska Resident<br>Northern Resident<br>West Coast Transient | 0 | 40<br>40<br>40 |
| Pacific White-Sided Dolphin | North Pacific | 0 | 92 |
| Dall's Porpoise | Alaska | 0 | 60 |
| Harbor Porpoise | Southeast Alaska | 5 | 20 |
| Harbor Seal | Clarence Strait | 6 | 120 |
| Steller Sea Lion | Eastern U.S | 0 | 200 |

**Table 2. Shutdown Zones.**

| Source | Shutdown Zones (meters) | | | | |
|---|---|---|---|---|---|
| | Low-Frequency Cetaceans (humpback whale, minke whale) | Mid-Frequency Cetaceans (killer whale, Pacific-white sided dolphin) | High-Frequency Cetaceans (Dall's porpoise, harbor porpoise) | Phocid (harbor seal) | Otariid (sea lion) |
| **In-Water Construction Activities*** | | | | | |
| In Water Heavy Construction(*i.e.*, Barge movements, pile positioning, deadpulling, and sound attenuation) | 10 | 10 | 10 | 10 | 10 |
| **Vibratory Pile Driving** | | | | | |
| 24-inch steel removal (2 piles) (~1 hour on 1 day) | 25 | 25 | 25 | 25 | 25 |
| 30-inch steel removal (6 piles) (~1 hour per day on 2 days) | 25 | 25 | 25 | 25 | 25 |
| 36-inch steel removal (4 piles) (~1 hour on 1 day) | 25 | 25 | 50 | 25 | 25 |
| 30-inch steel temporary installation (16 piles) (~2 hours per day on 4 days) | 25 | 25 | 25 | 25 | 25 |
| 30-inch steel permanent installation (1 pile) (~2 hours on 1 day) | 25 | 25 | 25 | 25 | 25 |
| 48-inch steel permanent installation (17 piles) (~2 hours per day on 9 days) | 50 | 25 | 50 | 25 | 25 |
| **Impact Pile Driving** | | | | | |
| 48-inch steel permanent installation (17 piles) (~15 minutes per day on 6 days) | 240 | 25 | 290 | 130 | 25 |
| **Socketing Pile Installation(Drilling)** | | | | | |
| 30-inch steel permanent installation (1 pile) (3 hours per day on 1 day) | 50 | 25 | 50 | 25 | 25 |

**Table 3. Monitoring Zones.**

| **Source** | **Level B Zones (meters)** | **Level B Zone (square kilometers)** |
|---|---|---|
| **Vibratory Pile Driving** | | |
| 24-inch steel removal (2 piles) (~1 hour on 1 day3) | 6,215 | 5.9 |
| 30-inch steel removal (6 piles) (~1 hour per day on 2 days) | 6,215 | 5.9 |
| 36-inch steel removal (4 piles) (~1 hour on 1 day) | 13,755 | 10.3 |
| 30-inch steel temporary installation (16 piles) (~2 hours per day on 4 days) | 6,215 | 5.9 |
| 30-inch steel permanent installation (1 pile) (~2 hours on 1 day) | 6,215 | 5.9 |

| | | |
|---|---|---|
| 48-inch steel permanent installation (17 piles) (~2 hours per day on 9 days) | 13,755 | 10.3 |
| **Impact Pile Driving** | | |
| 48-inch steel (17 piles) (~15 minutes per day on 6 days) | 3,745 | 4.9 |
| **Socketing Pile Installation(Drilling)** | | |
| 30-inch steel (1 pile) (~3 hours on 1 day) | 13,755 | 10.3 |

**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/removal and drilling activities. We also request comment 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 our final decision on the request for MMPA authorization.

On a case-by-case basis, NMFS may issue a second one-year IHA without additional notice when 1) another year of identical or nearly identical activities as described in the Specified Activities section is planned or 2) the activities would not be completed by the time the IHA expires and a second IHA would allow for completion of the activities beyond that described in the Dates and Duration section, provided all of the following conditions are met:

- A request for renewal is received no later than 60 days prior to expiration of the current IHA.

- The request for renewal must include the following:

(1) An explanation that the activities to be conducted beyond the initial dates either are identical to the previously analyzed activities or include changes so minor (*e.g.*, reduction in pile size) that the changes do not affect the previous analyses, take estimates, or mitigation and monitoring requirements; 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 remain the same and appropriate, and the original findings remain valid.

Dated: May 7, 2018.

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Elaine T. Saiz,

Acting Deputy Director, Office of Protected Resources,

National Marine Fisheries Service.

[FR Doc. 2018-10017 Filed: 5/10/2018 8:45 am; Publication Date: 5/11/2018]