



BILLING CODE 3510-22-P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648-XG907

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to Ferry Berth Improvements in Tongass Narrows, Alaska

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

ACTION: Notice; Issuance of two Incidental Harassment Authorizations.

SUMMARY: In accordance with the regulations implementing the Marine Mammal Protection Act (MMPA) as amended, notification is hereby given that NMFS has issued two consecutive incidental harassment authorizations (IHA) to the Alaska Department of Transportation and Public Facilities (ADOT&PF) to incidentally harass, by Level A and Level B harassment, marine mammals during two years of activity related to ferry berth improvements and construction in Tongass Narrows, near Ketchikan, AK.

DATES: The Phase 1 Authorization is effective from March 1, 2020 to February 28, 2021. The Phase 2 Authorization is effective from March 1, 2021 to February 28, 2022.

FOR FURTHER INFORMATION CONTACT: Rob Pauline, Office of Protected Resources, NMFS, (301) 427-8401. Electronic copies of the application and supporting documents, as well as a list of the references cited in this document, may be obtained online at:

<https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act>. In case of problems accessing these documents, please call the contact listed above.

SUPPLEMENTARY INFORMATION:

Background

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

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

Summary of Request

On September 11, 2018, NMFS received a request from ADOT&PF for two consecutive IHAs to take marine mammals incidental to ferry berth improvements and construction in Tongass Narrows, near Ketchikan, Alaska. The application was deemed adequate and complete on June 11, 2019. ADOT&PF’s request was for take of a small number of eight species of

marine mammals, by Level B harassment. Of those eight species, three (harbor seal (*Phoca vitulina richardii*), harbor porpoise (*Phocoena phocoena*), and Dall's porpoise (*Phocoenoides dalli*) may also be taken by Level A harassment. Neither ADOT&PF nor NMFS expects serious injury or mortality to result from this activity and, therefore, IHAs are appropriate. The issued IHAs would each cover one year of the two-year project.

Description of Specified Activity

Overview

ADOT&PF is planning to make improvements to existing ferry berths and construct new ferry berths on Gravina Island and Revilla Island in Tongass Narrows, near Ketchikan in southeast Alaska. These ferry facilities provide the only public access between the city of Ketchikan, AK on Revillagigedo (Revilla) Island, and the Ketchikan International Airport on Gravina Island (see Figure 1-2 in application). The project's activities that have the potential to take marine mammals, by Level A harassment and Level B harassment, include vibratory and impact pile driving, drilling operations for pile installation (rock socketing), and vibratory pile removal.

Planned construction includes the installation of new ferry facilities and the renovation of existing structures. The marine construction associated with the planned activities will occur during two distinct year-long phases, and take associated with these phases would be authorized in separate, consecutive IHAs. Phase 1, which primarily includes both improvement of existing facilities and construction of new facilities on both islands, is planned to occur between March 1, 2020 to February 28, 2021, and Phase 2, which includes the improvement/refurbishing of existing facilities on both islands, is planned to occur from March 1, 2021, to February 28, 2022.

In September 2019, as the ADOT&PF progressed its plans for the 2020 construction season in Tongass Narrows, it became clear that considerations associated with the contracting strategy for the project would likely result in two or three construction sites that could be active concurrently during Phase 1. It is not anticipated that more than one construction site will be active at any time during Phase 2. When the proposed IHAs (84 FR 34134; July 17, 2019) was published, concurrent pile driving and removal activities were not expected to occur. However, on October 23, 2019, ADOT&PF submitted a memorandum to NMFS that outlined the changes to the project including concurrent pile driving and removal activities which resulted in revised monitoring zones and take estimates. All other information had been previously analyzed in the FR Notice for the two Proposed IHAs and remains unchanged. The underwater activities that may affect marine mammals, including species listed under the Endangered Species Act (ESA), still include only vibratory and impact pile installation, vibratory pile removal, and drilling of rock sockets. Pile numbers and sizes also remain consistent with the information in the proposed IHAs (84 FR 34134; July 17, 2019).

Section 101(a)(5)(D) specifies that “the Secretary shall authorize [incidental take by harassment] for periods of not more than 1 year.” In this case, the ADOT&PF knew that it would take two years to complete the entire project, and knew which activities would be conducted in each of the two years. NMFS had sufficient information to determine which species would be affected, the estimated amount and type of take that would result from the activities, and the estimated impacts to subsistence use from ADOT&PF’s activities over each of the two years of the project. Thus NMFS determined that the proposed activities met all statutory requirements and developed appropriate mitigation, monitoring, and reporting requirements for both years. It

is therefore appropriate for NMFS to issue IHAs for each of the two consecutive years of the project.

Dates and Duration

In-water construction of Phase 1 is scheduled to begin on March 1, 2020 and continue through February 28, 2021. In-water construction of Phase 2 is scheduled to begin on March 1, 2021 and continue through February 28, 2022. However, in-water pile installation/removal (including drilling) may occur simultaneously at one or more component sites during Phase 1 only. Pile installation will occur intermittently over the work period, for durations of minutes to hours at a time depending on weather, construction and mechanical delays, marine mammal shutdowns, and other potential delays and logistical constraints. There are approximately 101 days of in-water construction planned for Phase 1 assuming that two pieces of equipment are used concurrently on 30 percent of planned driving days. Use of three hammers on some days will further reduce the total number of days of pile installation. ADOT&PF anticipates that Phase 2 will require 27 days of in-water construction and will not include any concurrent pile installation or removal activities.

Specific Geographic Region

The Tongass Narrows project is located within the City of Ketchikan, Alaska. Improvements and new construction on Revilla Island will occur approximately 2.6 miles north of downtown Ketchikan. A detailed description of the area is provided in the proposed IHAs (84 FR 34134; July 17, 2019) and is not repeated here. Please see that document for more information.

Detailed Description of Specific Activity

As discussed earlier, this project is composed of two consecutive phases with take of marine mammals from each phase authorized through separate IHAs. When necessary, the description of activity is broken down by phase below, but information relevant to both phases is presented together. Planned activities with potential to take marine mammals include the noise generated by drilling of rock sockets into bedrock for steel pipe piles, vibratory removal of steel pipe piles, vibratory installation of sheet piles, and vibratory and impact installation of steel pipe piles. Each phase of the project will include different activities that are described in detail in the following sections.

ADOT&PF has revised its contracting approach and will use multiple contractors at different locations during Phase 1. While this change may result in up to three construction sites being active during the same timeframe during Phase 1, it will not change the construction phasing or the amount or extent of activity completed in either Phase 1 or Phase 2. The potential exists during Phase 1 for pile installation or removal to occur at all three locations on the same day and it is likely that two or three hammers or a combination of hammers and down-the-hole (DTH) drills will be used on the same day. When this occurs, equipment use may be staggered throughout the day, and hammer or drill use could occur at times when no other hammer or drill is being used. It is also possible that one, two, or three hammers, or a combination of up to two DTH drills and an impact or vibratory hammer, could coincidentally be in use simultaneously on the same or different project components. The likelihood of such an occurrence is anticipated to be infrequent and would be for short durations on that day. In-water pile installation is an intermittent activity, and it is common for installation to start and stop multiple times as each pile

is adjusted and its progress is measured and documented. However, the underwater activities that may affect marine mammals, including ESA-listed species, still include only vibratory and impact pile installation, vibratory pile removal, and drilling of rock sockets. Pile numbers and sizes also remain consistent with the information originally provided to NMFS.

Description of In-Water Activities (General to both Phases)

Four methods of pile installation are planned. These include use of vibratory and impact hammers, DTH drilling of rock sockets, and installation of tension anchors at some locations. Most piles will be installed vertically (plumb), but some will be installed at an angle (battered). Tension anchors will be used to secure some piles to the bedrock to withstand uplift forces. Rock sockets will be drilled at other locations where overlying sediments are too shallow to adequately secure the bottom portion of the pile. Some piles will be seated in rock sockets as well as anchored with tension anchors. A vibratory hammer will be used to install 44 temporary template piles, no greater than 20 inches in diameter, to a depth of 25 feet or less. The total duration of vibratory installation and subsequent removal of temporary piles will be approximately 22 hours spread over multiple days as shown in Table 2, and will take place within the same days as permanent pile installation. Installation and removal of temporary piles is therefore not anticipated to add to the overall estimated 101 days of pile installation and removal for Phase 1 as described in the footnote for Table 1.

The steel sheet piles for the bulkheads are of a Z-shape. Each pile is approximately 28 to 30 inches wide, and they interlock together to form a continuous wall. These sheet piles will be installed into the existing ground at elevations varying from +8 inches to +26 inches mean lower low water. Most of this work is expected to be done at lower tides so that in-water pile driving work is minimized. However, some installation work below the tidal elevations (in water) can be

expected. The ground where the sheet piles will be installed is comprised of existing rubble mound slopes. Some excavation work will be needed to temporarily remove the large rocks prior to driving the sheet piles.

Vibratory and Impact Pile-Driving Methods -- Installation of steel piles through the sediment layer will be done using vibratory or impact methods. All piles will be advanced to refusal at bedrock. Where sediments are deep and rock socketing or anchoring is not required, the final approximately 10 feet of driving will be conducted using an impact hammer so that the structural capacity of the pile embedment can be verified. Where sediments are shallow, an impact hammer will be used to seat the piles into competent bedrock before rock drilling begins. The pile installation methods used will depend on sediment depth and conditions at each pile location. The sheet pile abutment bulkheads for the new Revilla and Gravina ferry berths will be installed using vibratory hammer methods. Vibratory and impact pile driving will occur during both Phase 1 and Phase 2 of the project (Table 1 and Table 3).

As shown in Table 1, it is estimated that some piles will require 50 strikes from the impact hammer and others will require 200 strikes. In general, projects on Gravina Island will require approximately 50 strikes and projects on Revilla Island will require approximately 200 strikes. These differences are based on sediment characteristics, depth to bedrock, and the planned need for further drilling once at bedrock.

Vibratory Pile Removal -- A total of 44 temporary piles will be installed and removed during Phase 1 of the project (Table 2), while 12 piles will be installed and removed during Phase 2 (Table 4). When possible, existing piles will be extracted by directly lifting them with a crane. A vibratory hammer will be used if necessary to extract piles that cannot be directly lifted. Removal of each old pile is estimated to require no more than 15 minutes of vibratory hammer

use for the majority of the piles, but the removal of one 24-inch diameter pile may take up to 30 minutes.

Rock Socket Drilling -- Rock sockets are holes drilled into the bedrock to advance piles beyond the depth vibratory or impact driving methods are able to achieve in softer overlying sediments. The depth of the rock socket varies, but 10–15 feet is commonly required. Drilling of rock sockets through the bedrock may use both rotary and percussion drill mechanisms. Drilling breaks up the rock to allow removal of the fragments and insertion of the pile. Drill cuttings are expelled from the top of the pile using compressed air. The diameter of the drilled rock socket is slightly larger than the pile being driving, and the pile is therefore easily advanced in the rock as the hole is drilled. It is estimated that drilling rock sockets into the bedrock will take about 1–3 hours per pile. Rock sockets will be used in both Phase 1 and Phase 2 of the project (Table 1 and 3).

Tension Anchors -- Tension anchors are installed within piles that are drilled into the bedrock below the elevation of the pile tip, after the pile has been driven through the sediment layer to refusal. A 6- or 8-inch diameter steel pipe casing is inserted inside the larger diameter production pile. A rock drill is inserted into the casing, and a 6- to 8-inch-diameter hole is drilled into bedrock with rotary and percussion drilling methods. The drilling work is contained within the smaller steel pile casing and the larger steel pipe pile. The typical depth of the drilled hole varies, but 20–30 feet is common. Rock fragments will be removed through the top of the casing with compressed air. A steel rod is then grouted into the drilled hole and affixed to the top of the pile. The purpose of a rock anchor is to secure the pile to the bedrock to withstand uplift forces. Tension anchors will be utilized during both Phase 1 and Phase 2 of the project, as shown in Table 1 and Table 3.

Phase 1 Project Components

Each of the four permanent project components in Phase 1 will include installation of steel pipe piles that are 18, 24, or 30 inches in diameter. Temporary piles installed and removed during Phase 1 to support templates for permanent piles will be a maximum of 20 inches in diameter. Two of the components (Revilla and Gravina New Ferry Berths) will require the installation of steel sheet piles that will comprise the bulkhead abutments and are 27.6 or 30.3 inches in width. These sheet piles will be installed using vibratory driving at elevations varying from +8 inches to +26 inches mean lower low-water. Most of this work is expected to be done at lower tides so that in-water pile driving work is minimized. However, some installation work below the tidal elevations (in water) can be expected. The ground where the sheet piles will be installed is comprised of existing rubble mound slopes. Some excavation work will be needed to temporarily remove the large rocks prior to driving the sheet piles.

The estimated installation and removal rates for Phase 1 are 1.5 permanent pipe piles per day, 10 permanent sheet piles per day, and 4 to 6 temporary piles per day. Different types of piles may be installed or removed within a day.

Project components are briefly described below and Table 1 shows the number and size of piles broken down by the individual components of Phase 1. For additional information on how these piles will be configured, and what structures they will make up, please refer to the IHA Application.

Revilla New Ferry Berth and Upland Improvements -- The new Revilla Island airport shuttle ferry berth will be constructed immediately adjacent to the existing Revilla Island Ferry Berth (Figure 1-2 in IHA Application). It is the only Phase 1 component that will occur on Revilla Island.

New Gravina Island Shuttle Ferry Berth/Related Terminal Improvements -- The new Gravina Island airport shuttle ferry berth will be constructed immediately adjacent to the existing Gravina Island Ferry Berth (Figure 1-2 in IHA Application).

Gravina Airport Ferry Layup Facility -- Improvements to the Gravina Island Ferry layup dock facility will occur in the same location as the existing layup dock facility (Figure 1-2 in IHA Application). The current layup dock is in disrepair and needs to be replaced.

Gravina Freight Facility -- The new Gravina Island heavy freight mooring facility will be constructed in the same location as the existing barge offload facility (Figure 1-2 in IHA Application). This facility will provide improved access to Gravina Island for highway loads that cannot be accommodated by the shuttle ferry. Five breasting dolphins and one mooring dolphin will be constructed to support barge docking and will include pedestrian walkways for access by personnel. In addition, two new pile-supported mooring line structures will be constructed above the high tide line.

Table 1. Pile details and estimated effort required for pile installation during Phase 1.

Project Component	Number of Piles	Number of Rock Sockets	Number of Tension Anchors	Average Vibratory Duration Per Pile (minutes)	Average Drilling Duration for Rock Sockets Per Pile (minutes)	Impact Strikes Per Pile	Estimated Total Number of Hours	Average Piles per Day (Range)	Days of Installation
Pile Type									
Revilla New Ferry Berth and Upland Improvements									
24" Pile Diameter	65	0	25	30	N/A	200	65	1.5 (1-3)	43
30" Pile Diameter	18	0	14	30	N/A	200	18	1.5 (1-3)	12
AZ 14-770 Sheet Pile	55	N/A	N/A	15	N/A	N/A	14	6 (6-12)	9
New Gravina Island Shuttle Ferry Berth/Related Terminal Improvements									
24" Pile Diameter	66	52	25	15	120	50	182	1.5 (1-3)	44
30" Pile Diameter	8	4	4	15	180	50	8	1.5 (1-3)	5
AZ 19-700 Sheet Pile	66.6	N/A	N/A	15	N/A	N/A	14	6 (6-12)	12
Gravina Airport Ferry Layup Facility									
18" Pile Diameter	3	0	0	15	N/A	50	2	1.5 (1-3)	2
30" Pile Diameter	12	12	10	15	180	50	23	1.5 (1-3)	8
Gravina Freight Facility									
20" Pile Diameter	6	0	6	15	N/A	50	2	1.5 (1-3)	4
24" Pile Diameter	3	3	3	15	120	50	3	1.5 (1-3)	2
30" Pile Diameter	4	2	4	15	180	50	75	1.5 (1-3)	3
Phase 1 Total	320	73	91						144*

*This number reflects the number of days that would be required if pile driving only occurred at one location at a time. ADOT&PF expects that multiple project components may be constructed simultaneously, reducing the actual number of days of pile driving to 101.

Table 2. Numbers of Temporary Piles to be Installed and Removed for each Project Component and Structure during Phase 1.

Project Component	Number of Temporary Piles	Average Vibratory Duration Per Pile for Installation (minutes)	Average Vibratory Duration Per Pile for Removal (minutes)	Days of Installation	Days of Removal	Piles per day
Revilla New Ferry Berth and Upland Improvements	12	15	15	2 to 3	2 to 3	4 to 6
New Gravina Island Shuttle Ferry Berth/Related Terminal Improvements	12	15	15	2 to 3	2 to 3	4 to 6
Gravina Airport Ferry Layup Facility	8	15	15	1 to 2	0.75 to 2	4 to 6
Gravina Freight Facility	12	15	15	2 to 3	2 to 3	4 to 6
TOTAL	44	660 (11hours)	660 (11 hours)	7-11	7-11	

Phase 2 Project Components

The two project components in Phase 2 will include installation of steel pipe piles that are 16, 24 and 30 inches in diameter as shown in Table 3. Methods for vibratory and impact installation of temporary and permanent piles, drilling of rock sockets, and installation of tension anchors will be consistent with those described above. The estimated installation and removal rate for Phase 2 is between 1.2 to 1.5 pipe piles per day depending on pile size.

One 24-inch diameter pile will be installed at the existing Revilla ferry berth. Fifteen 24-inch diameter piles and eight 30-inch-diameter piles will be installed at the existing Gravina ferry berth. A total of 10 piles will be removed to accommodate upgrades to the existing Revilla Island and Gravina Island ferry berths. One 24-inch pile will be removed from the floating fender dolphin at the existing Revilla ferry berth. The nine 16-inch-diameter piles that support the three existing dolphins at the Gravina ferry berth will also be removed. It is anticipated that, when possible, existing piles will be extracted by directly lifting them with a crane. A vibratory hammer will be used if necessary to extract piles that cannot be directly lifted. Installation of sheet piles is not planned during Phase 2.

Revilla Refurbish Existing Ferry Berth Facility -- Improvements to the existing Revilla Island Ferry Berth will include the following: (1) replace the transfer bridge, (2) replace rubber fender elements and fender panels, (3) replace one 24-inch pile on the floating fender dolphin, (4) installation of 12 tension anchors and (5) replace the bridge float with a concrete or steel float of the same dimensions. Construction of the transfer bridge, bridge float, and fender elements will occur above water. The only in-water work will be pile installation and removal associated with construction of the dolphins. No temporary piles will be installed or removed during this component of the project.

Gravina Refurbish Existing Ferry Berth Facility -- Improvements to the existing Gravina Island Ferry Berth will include the following: (1) replace the transfer bridge, (2) remove the catwalk and dolphins, (3) replace the bridge float with a concrete or steel float of the same dimensions, (4) construct a floating fender dolphin, and (5) construct four new breasting dolphins. Construction of the transfer bridge, catwalk, and bridge float will occur above water. The only in-water work will be pile installation and removal associated with construction of the dolphins. A vibratory hammer will be used to install and remove 12 temporary template piles, no greater than 20 inches in diameter, to a depth of 25 feet or less (Table 4). The total duration of vibratory installation and subsequent removal of temporary piles will be approximately 6 hours spread over multiple days, and will take place within the same days as permanent pile installation. Installation and removal of temporary piles is therefore not anticipated to add to the overall estimated 27 days of pile installation and removal for Phase 2.

Table 3. Pile details and estimated effort required for pile installation and removal during Phase 2.

Project Component	Number of Piles	Number of Rock Sockets	Number of Tension Anchors	Average Vibratory Duration Per Pile (minutes)	Average Drilling Duration for Rock Sockets Per Pile (minutes)	Impact Strikes Per Pile	Estimated Total Number of Hours	Average Piles per Day (Range)	Days of Installation and removal
Pile Type									
Revilla Refurbish Existing Ferry Berth Facility									
24" Pile Diameter	1			30		50	1	1	1
24" Pile Diameter (Removal)	1			30		N/A	1	1	1
Gravina Refurbish Existing Ferry Berth Facility									
24" Pile Diameter	15	0		15		50	11	1.5 (1-3)	10
30" Pile Diameter	8	3	12	15	180	50	6	1.2 (1-3)	7
16" Pile Diameter (Removal)	12			15			2	1.5 (1-3)	8
Phase 2 Total	24 (+13 Removal)	3							27

Table 4. Number of temporary piles to be installed and removed for each Project Component and Structure during Phase 2

Project Component	Number of Temporary Piles	Average Vibratory Duration Per Pile for Installation (minutes)	Average Vibratory Duration Per Pile for Removal (minutes)	Days of Installation	Days of Removal	Piles per day
Revilla Refurbish Existing Ferry Berth Facility	0	0	0	0	0	0

Gravina Refurbish Existing Ferry Berth Facility	12	15	15	2 to 3	2 to 3	4 to 6
TOTAL	12	180 (3 hours)	180 (3 hours)	2 to 3	2 to 3	--

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

Comments and Responses

A notice of NMFS's proposal to issue an IHA to ADOT&PF was published in the **Federal Register** on July 17, 2019 (84 FR 34134). That notice described, in detail, ADOT&PF's planned activity, the marine mammal species that may be affected by the activity, and the anticipated effects on marine mammals. During the 30-day public comment period, NMFS received the following comments from the Marine Mammal Commission:

Comment 1: The Commission indicated that NMFS had not included tension anchoring when estimating take of marine mammals and also used a source level for rock socket drilling that was low compared to a report featuring hydroacoustic data collected during anchor installation and rock socket drilling for the White Pass Yukon Route authorization (Reyff and Heyvaert 2019).

Response: There is limited data available regarding sound source levels associated with tension anchoring (also known as rock anchor drilling) and down-the-hole (DTH) drilling (also known as rock socket drilling). Much of the available data are highly variable and feature limited sample sizes. The sources also demonstrate characteristics of both impulsive and continuous noise sources. These factors influence our determination of appropriate Level A harassment and Level B harassment isopleths as well as estimated take levels. NMFS' approach to assessing potential impacts from tension anchoring or rock socket drilling has changed over time as new information becomes available regarding potential impacts from tension anchoring or rock socket drilling.

NMFS had assumed that impacts from tension anchoring were discountable because the anchoring process does not generate steel-on-steel drilling noise and because the anchoring noise occurs in isolation from the water column. In one instance, NMFS did use JASCO sound source verification data from DTH drilling at Kodiak Pier 1. NMFS used this to establish a proxy source level of 167.7 dB RMS for rock anchor drilling (cited as both Warner and Austin 2016; and Denes *et al.* 2016) for the Ketchikan Berth IV Expansion Project IHA (83 FR 37473; August 8, 2019). However, rock anchor drilling is different from rock socket drilling in that much smaller holes are drilled in the bedrock that is well below where rock sockets are drilled. The bedrock is overlain with sediments, and will likely attenuate noise production from drilling and reduce noise propagation into the water column. Additionally, the casing used during drilling is inside the larger diameter pile, meaning that there is no steel-on-steel contact, which should further reduce noise levels.

A recent report by Reyff and Heyvaert (2019) recorded a level of 157 dB RMS for rock anchor drilling near Skagway, AK. The authors noted that this report represents a small amount of data, which was highly variable, and the conditions at testing sites need to be considered before applying the findings to projects at other locations. The authors treated rock anchor drilling as a continuous noise and calculated that the Level B harassment isopleth was 205 meters. By comparison, the calculated distance to the 120 dB rms threshold for continuous noise using a source level of 166 dB rms (Denes *et al.* 2016) and $15\log R$ resulted in a Level B harassment zone isopleth of 12,023 meters. Given the very small Level B harassment zone (205 m) associated with measured source level that is 9 dB greater (166 dB vs. 157 dB) NMFS has determined that take from rock anchor drilling is discountable.

The Commission further commented that the source value of 166 dB RMS used by NMFS for DTH/rock socketing was too low considering that Reyff and Heyvaert (2019) reported a value of 179 dB RMS. The value used by NMFS was adopted from DTH drilling at Kodiak and represents the median from Denes *et al.* (2016) compared to the average from that study (167.7 dB RMS) used for the Ketchikan Berth IV Expansion Project noted previously. Additionally, measurements at Kodiak were collected from a sample of 8 piles, which constitutes a robust data set while only three driving events with highly variable measurements were recorded for rock socket drilling by Reyff and Heyvaert (2019). As noted above, the calculated distance to the 120 dB rms threshold for continuous noise using a source level of 166 dB rms and $15\log R$ resulted in a Level B harassment zone isopleth of 12,023 meters for Tongass Narrows. In comparison, JASCO calculated the transmission loss coefficient at Kodiak as 18.9 with distances of 5,049 meters to the mean and 6,846 meters to the 90th percentile for the 120 dB threshold. Therefore, the sound source level of 166 dB RMS and associated Level B harassment isopleth calculated for the Tongass Narrows IHA can be considered conservative.

There is also some uncertainty about whether these sound sources should be classified as impulsive or continuous noise sources, since they often contain characteristics of both. The classification selected would have a significant effect on the size of the resulting Level A harassment and Level B harassment zones. Here DTH/rock socketing is treated as a continuous noise source because it does not demonstrate rapid rise times and decay of sound pressure level that is typical of impulsive noises

For these particular IHAs, NMFS has determined that the potential impacts to marine mammals from tension anchoring are discountable. NMFS also determined it is appropriate to adopt 166 dB RMS as a proxy for DTH/rock socket drilling. NMFS will continue to investigate

noise characteristics associated with these relatively new pile driving technologies. We will also work on the development of guidance that could be used by future applicants when submitting applications for incidental take authorizations that utilize these methods.

Comment 2: The Commission recommended that NMFS authorize additional take of harbor seals by Level A harassment. Based on Table 1 of the proposed IHAs, impact pile driving would occur on up to 60 days during Phase I and on those days the Level A harassment zones exceed 100-m shut down zone. Although ADOT&PF would shut down its activities if a harbor seal approaches the Level A harassment zones, harbor seals could pop up undetected in Level A harassment zones larger than 100 m.

Response: While seals may appear or enter into the Level A harassment zone specified for a given activity, there is only a small likelihood that any of those animals would likely remain in the zone long enough such that their cumulative exposure could result in permanent threshold shift (PTS). Additionally, the anticipated effectiveness of the required monitoring and mitigation measures would limit the number of seals that experience auditory injury. However, NMFS concluded that while take of seals by Level A harassment is unlikely, it could occur in limited numbers and, therefore, authorized take at a level that reflects this assessment.

Comment 3: The Commission noted that the Level B harassment takes for humpback whales were vastly underestimated based on the method NMFS used for other cetaceans for ADOT's proposed authorizations. NMFS used the number of months (12) that a species could occur in the area and the frequency of occurrence to estimate the numbers of takes for all species other than humpback whales. For humpback whales, NMFS divided the number of days (144 in the proposed IHA) by the frequency of occurrence, which resulted in 82 rather than 204 Level B harassment takes of humpback whales for Phase I.

Response: NMFS frequently calculates authorized take numbers of assorted species in different ways. In this case, local anecdotal information regarding the presence of humpback whales was presented to NMFS in the format of a weekly rate. Take of other species was tabulated based on monthly rates. NMFS determined that both methods are acceptable and were used appropriately.

Comment 4: The Commission warned that potential one-year renewals of these two authorizations could have unintended consequences. For example, if ADOT&PF is unable to complete Phase I activities by March 2021 and a renewal is necessary, the renewal authorization would overlap with the Phase II activities that are to begin in March 2021. The Commission asked whether the Phase II authorization would be reissued for March 2022 to March 2023 to eliminate overlap of activities or whether the unfinished Phase I activities would occur along with all of the Phase II activities as of March 2021. The Commission further recommended that NMFS issue a one-year renewal for Phase I activities only if the Phase II authorization is delayed until 2022.

Response: ADOT&PF is planning to employ concurrent driving which will decrease the number of driving days from 144 to 101 and expedite the completion of Phase 1, reducing the likelihood that a Phase 1 renewal would be needed.

The Commission's comment likely reflects concern regarding the potential for cumulative impacts or cumulative effects to occur. NMFS has determined that the concurrent operation of up to three driving devices would result in a negligible impact to affected species. The required mitigation and monitoring measures in combination with the short duration of any overlapping activities (27 days at most, but likely much fewer), would result in potential impacts to marine mammals that are both temporary and relatively minor. Further, NMFS does not

expect that cumulative impacts to marine mammals associated with the potential overlap of two IHAs would affect the reproduction or survival of any individual marine mammals, let alone annual rates of recruitment or survival, either alone or in combination with other past, present, or ongoing activities. Additionally, we note two important facts: 1) The MMC appears to suggest that if the activities authorized in Phase 1 overlapped with the activities of Phase 2, then the impacts would necessarily be greater – but this is not a justified assumption. While some individual(s) could potentially be temporarily exposed to higher sound levels in a slightly larger area across a day or several, if that happened it would mean that the pile driving would take fewer days to complete overall, which could potentially reduce the overall impact to the exposed animals; and 2) while it is important to consider cumulative impacts in the context of NEPA (which we have), as with any two independent IHAs, the small numbers and negligible impact determinations are made in the context of the impacts of each of the specified activities considered in each of the separate IHAs.

Comment 5: The Commission recommended that NMFS require all action proponents that plan to conduct activities in areas where subsistence hunting occurs to contact the relevant Native Alaskan communities and entities well in advance of any activities commencing. Additionally, NMFS should specify in all related documents announcing proposed incidental take authorizations which communities and entities were contacted, whether any concerns were conveyed, and whether any additional mitigation measures should be implemented. The Commission also recommended that NMFS refrain from issuing the authorizations until ADOT&PF specifies which Native Alaskan communities and entities were contacted, whether any concerns were conveyed, and any additional measures that may be required to mitigate any potential conflicts with subsistence hunting

Response: NMFS requires applicants to contact Native Alaskan communities if proposed projects are located near subsistence hunting areas and likely to affect subsistence resources. However, this project does not occur in a known subsistence hunting area. The project area is largely developed and features regular marine vessel traffic. ADOT&PF plans to provide advance public notice of construction activities to reduce construction impacts on local residents, ferry travelers, adjacent businesses, and other users of Tongass Narrows and nearby areas. This will include notification to local Alaska Native communities that may have members who hunt marine mammals for subsistence. If any Alaska Native communities express concerns regarding project impacts to subsistence hunting of marine mammals, further communication with ADOT&PF will take place, including provision of any project information, and clarification of any mitigation and minimization measures that may reduce potential impacts to marine mammals. However, given that NMFS does not anticipate any effects on the availability of marine mammals for subsistence uses to result from the specified activities because project activities will take place within the industrial area of Tongass Narrows immediately adjacent to Ketchikan where subsistence activities do not generally occur, there is no need to delay issuance of the IHAs.

Comment 6: The Commission recommended that NMFS publish revised proposed authorizations due to the issues described in this *Comment* section prior to the issuance of final authorizations.

Response: NMFS has consulted with ADOT&PF regarding a number of issues brought forth by the Commission. NMFS has addressed all of the issues brought forth by the Commission and has determined that the publication of revised proposed authorizations is not warranted.

Comment 7: The Commission recommended that NMFS refrain from using the renewal process for ADOT&PF's authorization and limit the IHA renewal process to authorizations that are expected to have the lowest levels of impacts and require the least complex analysis. The Commission also recommended that if NMFS intends to use the renewal process frequently or for authorizations that require more complex analysis, it should provide the Commission and other reviewers a 30-day comment opportunity.

Response: We appreciate the Commission's input and direct the Commission and other readers to our recent response to a similar comment, which can be found at 84 FR 52464 (October 2, 2019; 84 FR 52466).

Comment 8: The Commission recommended that NMFS authorize the incidental taking of marine mammals via a rulemaking rather than individual incidental harassment authorizations and authorization renewals for activities that are scheduled to last more than one year at the outset.

Response: NMFS and prospective applicants routinely discuss how incidental take authorization can be obtained most efficiently in a manner that satisfies an applicant's authorization needs. A range of factors (*e.g.* project length, project complexity, planned start date) generally dictate whether a rulemaking or IHA would be the most appropriate path for a specific scenario. There are likely situations where the issuance of more than one IHA is more efficient and preferable to a formal rulemaking.

Comment 9: The Commission recommended that NMFS conduct a more thorough review of the applications and **Federal Register** documents to ensure not only accuracy, completeness, and consistency, but also to ensure that they are based on best available science, prior to submitting them to the **Federal Register** for public comment.

Response: NMFS thanks the Commission for its recommendation. NMFS makes every effort to review notices thoroughly prior to publication and will continue this effort to publish the best possible notice for public comment using the best available science.

Changes from the Proposed IHAs to Final IHAs

As described above, ADOT&PF realized in August 2019 that its contracting strategy for this project would likely result in two or three construction sites that could be active at one time during Phase 1, although not during Phase 2. The contracting approach does not change the construction phasing or the amount or extent of activity completed in each phase. The potential for more than one piece of equipment (vibratory hammer, impact hammer, and/or DTH drill) to operate within a day or simultaneously was not considered in the proposed IHAs published on July 17, 2019 (84 FR 34134).

The extent to which the use of more than one hammer or DTH drill could occur within a day or simultaneously is unknown and difficult to quantify. Use of more than one hammer for pile installation on the same day (whether simultaneous or not) would result in a reduction in the total number of days of pile installation by increasing the number of piles that can be installed per day. The overall number of days of pile installation would decrease with use of two or three pieces of equipment. With two pieces of equipment used on 30 percent of construction days, the anticipated project duration would be reduced from a total of 144 days as described in the proposed IHAs to 101 days as described in this document. Take estimates for all species authorized for take, except for Minke whale have been revised and all changes are noted in the *Estimated Take* section. Level B harassment monitoring zones have also been established to include concurrent driving scenarios. Some of the mitigation and monitoring requirements have also been revised as described herein and noted in the *Mitigation* and the *Monitoring and*

Reporting sections. Nonetheless, none of these changes affect our negligible impact determinations or small numbers findings for any of the affected species or stocks.

Description of Marine Mammals in the Area of Specified Activities

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

Table 5 lists all species with expected potential for occurrence in waters near Ketchikan, Alaska and summarizes information related to the species or stock, including regulatory status under the MMPA and ESA and potential biological removal (PBR), where known. For taxonomy, we follow 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 (e.g., Muto *et al.*, 2018) except for gray whale, which could occur in the project area and is assessed in the U.S. Pacific SARs (Carretta *et al.* 2018). All values presented in Table 5 are the most recent available at the time of publication and are available in the 2018 SARs (Muto *et al.*, 2019, Carretta *et al.* 2019) (available online at: <https://www.fisheries.noaa.gov/national/marine-mammal-protection/draft-marine-mammal-stock-assessment-reports>).

Table 5. Marine Mammals that Could Occur in the Project Area.

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 Eschrichtiidae						
Gray Whale	<i>Eschrichtius robustus</i>	Eastern North Pacific	-, -, N	26,960 (0.05, 25,849, 2016)	801	138
Family Balaenidae						
Humpback whale	<i>Megaptera novaeangliae</i>	Central North Pacific	E, D, Y	10,103 (0.3; 7,890; 2006)	83	25
Minke whale	<i>Balaenoptera acutorostrata</i>	Alaska	-, N	N.A.	N.A.	N.A.
Fin whale	<i>Balaenoptera physalus</i>	Northeast Pacific	E, D, Y	N.A.	5.1	0.6
Order Cetartiodactyla – Cetacea – Superfamily Odontoceti (toothed whales, dolphins, and porpoises)						
Family Delphinidae						
Killer whale	<i>Orcinus orca</i>	Alaska Resident	-, N	2,347 (N.A.; 2,347; 2012)	24	1

		West Coast Transient	-, N	243 (N.A., 243, 2009)	2.4	0
		Northern Resident	-, N	261 (N.A.; 261, 2011)	1.96	0
Pacific white-sided dolphin	<i>Lagenorhynchus obliquidens</i>	North Pacific	-,-; N	26,880 (N.A.; N.A.; 1990)	N.A.	0
Family Phocoenidae						
Harbor porpoise	<i>Phocoena phocoena</i>	Southeast Alaska	-, Y	975 (0.10; 896; 2012)	8.95	34
Dall's porpoise	<i>Phocoenoides dalli</i>	Alaska	-, N	83400 (0.097, N.A., 1993)	N.A.	38
Order Carnivora – Superfamily Pinnipedia						
Family Otariidae (eared seals and sea lions)						
Steller sea lion	<i>Eumetopias jubatus</i>	Eastern U.S.	-,-, N	41,638 (N.A.; 41,638; 2015)	2,498	108
Family Phocidae (earless seals)						
Harbor seal	<i>Phoca vitulina richardii</i>	Clarence Strait	-, N	31,634 (N.A.; 29,093; 2011)	1,222	41

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

² - NMFS marine mammal stock assessment reports online at: <https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments>. CV is coefficient of variation; Nmin 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). Annual M/SI often cannot be determined precisely and is in some cases presented as a minimum value or range. A CV associated with estimated mortality due to commercial fisheries is presented in some cases.

All species that could potentially occur in the project areas are included in Table 5.

However, the spatial occurrence of gray whale and fin whale is such that take is not expected to occur, and they are not discussed further beyond the explanation provided here. Gray whales have not been reported by any local experts or recorded in monitoring reports and it would be

extremely unlikely for a gray whale to enter Tongass Narrows or the small portions of Revillagigedo Channel this project will impact. Similarly for fin whale, sightings have not been reported and it would be unlikely for a fin whale to enter the project area as they are generally associated with deeper, offshore waters.

A detailed description of the species likely to be affected by the Tongass Narrows Ferry Terminal Modifications and Improvements project, including brief introductions to the species and relevant stocks as well as available information regarding population trends and threats, and information regarding local occurrence, were provided in the proposed IHAs (84 FR 34134; July 17, 2019). Since that time, we are not aware of any changes in the status of these species and stocks; therefore, detailed descriptions are not provided here. Please refer to that **Federal Register** document for these descriptions.

Potential Effects of Specified Activities on Marine Mammals and their Habitat

The effects of underwater noise from ADOT&PF's activities have the potential to result in behavioral harassment of marine mammals in the vicinity of the action area. The proposed IHAs (84 FR 34134; July 17, 2019) included a discussion of the effects of anthropogenic noise on marine mammals, therefore that information is not repeated here; please refer to that **Federal Register** document for additional information.

Marine Mammal Habitat Effects

The main impact associated with ADOT&PF's activities would be temporarily elevated sound levels and the associated direct effects on marine mammals. The project would not result in permanent impacts to habitats used directly by marine mammals, such as haulout sites, but may have potential short-term impacts to food sources such as forage fish, and minor impacts to the immediate substrate during installation and removal of piles during the pile driving project.

These potential effects are discussed in detail in the proposed IHAs (84 FR 34134; July 17, 2019), therefore that information is not repeated here; please refer to that **Federal Register** document for that information.

Estimated Take

This section provides an estimate of the number of incidental takes that are reasonably expected to occur and, therefore, are authorized through these IHAs, which informed both NMFS' consideration of "small numbers" and the negligible impact determinations.

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 the sources (*i.e.*, impact/vibratory pile driving and drilling) has the potential to result in disruption of behavioral patterns for individual marine mammals and some small amount of temporary threshold shift (TTS). There is also some potential for auditory injury (Level A harassment) to result, primarily for high frequency species and phocids because predicted auditory injury zones are larger than for mid-frequency species and otariids. Auditory injury is unlikely to occur for mid-frequency species and otariids. The required mitigation and monitoring measures are expected to minimize the severity of such taking to the extent practicable, and result in no take by Level A harassment for mysticetes.

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

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

Acoustic Thresholds

Using the best available science, NMFS has developed acoustic thresholds that identify the received level of underwater sound above which exposed marine mammals would be reasonably expected to be behaviorally harassed (equated to Level B harassment) or to incur PTS of some degree (equated to Level A harassment).

Level B Harassment 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., 2012). Based on what the available science indicates and the practical need to use a threshold based on a factor that is both predictable and measurable for most activities, NMFS uses a generalized acoustic threshold based on received level to estimate the onset of behavioral harassment. NMFS predicts that marine mammals are likely to be behaviorally harassed in a manner we consider Level B harassment when exposed to underwater anthropogenic noise above received levels of 120 dB re 1 μ Pa (rms) (microPascal root mean square) for continuous (*e.g.*, vibratory pile-driving, drilling) and above received levels of 160 dB re 1 μ Pa (rms) for non-explosive impulsive (*e.g.*, seismic airguns) or intermittent (*e.g.*, scientific sonar) sources. Typically, and especially in cases where PTS is predicted, NMFS anticipates that some number of individuals may incur TTS. However, it is not necessary to separately quantify those takes, as it is very unlikely that an individual marine mammal would be exposed at the levels and duration necessary to incur TTS without also being exposed to the levels associated with behavioral harassment and, therefore, we expect any potential TTS takes to be captured by the estimated takes by behavioral harassment.

Both phases of ADOT&PF's planned activity include the use of continuous (vibratory pile driving/removal and drilling) and impulsive (impact pile driving) sources and, therefore, both the 120 and 160 dB re 1 μ Pa (rms) thresholds are applicable.

Level A harassment for non-explosive sources - NMFS' Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0) (NMFS, 2018) identifies dual criteria to assess auditory injury (Level A harassment) to five different marine mammal groups (based on hearing sensitivity) as a result of exposure to noise from two different types of sources (impulsive or non-impulsive).

These thresholds are provided in Table 6 below. The references, analysis, and methodology used in the development of the thresholds are described in NMFS 2018 Technical Guidance, which may be accessed at <https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-acoustic-technical-guidance>.

Table 6. Thresholds identifying the onset of Permanent Threshold Shift.

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

Ensonified Area

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

The sound field in the project area is the existing background noise plus additional construction noise from the project. Marine mammals are expected to be affected via sound generated by the primary components of the project (*i.e.*, impact pile driving, vibratory pile driving, vibratory pile removal, and drilling).

Vibratory hammers produce constant sound when operating, and produce vibrations that liquefy the sediment surrounding the pile, allowing it to penetrate to the required seating depth. An impact hammer would then generally be used to place the pile at its intended depth. The actual durations of each installation method vary depending on the type and size of the pile. An impact hammer is a steel device that works like a piston, producing a series of independent strikes to drive the pile. Impact hammering typically generates the loudest noise associated with pile installation.

In order to calculate distances to the Level A harassment and Level B harassment sound thresholds for piles of various sizes being used in this project, NMFS used acoustic monitoring data from other locations to develop source levels (see Table 7). Note that piles of differing sizes have different sound source levels (SSLs).

Empirical data from recent ADOT&PF sound source verification (SSV) studies were used to estimate sound source levels from Ketchikan for vibratory and impact driving of 30-inch steel pipe piles and Kodiak for drilling (Denes *et al.* 2016). The source level for rock socket drilling was derived from the above mentioned ADOT&PF SSV study at Kodiak, Alaska. The

reported median source value for drilling was determined to be 166 dB rms for all pile types (Denes *et al.* 2016, Table 72).

For vibratory driving of 24-inch steel piles, data from a Navy pile driving project in the Puget Sound, WA was reviewed (Navy, 2015). From this review, ADOT&PF determined the Navy’s suggested source value of 161 dB rms was an appropriate proxy source value, and NMFS concurs. Because the source value of smaller piles of the same general type (steel in this case) are not expected to exceed a larger pile, the same 161 dB rms source value was used for 18-inch and 16-inch steel piles. This assumption conforms with source values presented in Navy (2015) for a project using 16-inch steel piles at Naval Base Kitsap in Bangor, WA.

For vibratory driving of both 27.6-inch and 30.3-inch sheet piles, ADOT&PF used a source level of 160 dB rms. These source levels were reported in Caltrans (2015) summary tables for 24-inch steel sheet piles, and NMFS concurs that this value was an acceptable proxy.

Finally, ADOT&PF used source values of 177 dB SEL and 190 dB rms for impact driving of 24-inch and 18-inch steel piles. These values were determined based on summary values presented in Caltrans (2015) for impact driving of 24-inch steel piles. NMFS concurs that the same source value was an acceptable proxy for impact driving of 18-inch steel piles.

Table 7. Estimates of mean underwater sound levels generated during vibratory and impact pile installation, drilling, and vibratory pile removal.

Method and Pile Type	Sound Source Level at 10 meters	Literature Source
Vibratory Hammer	dB rms	
30-inch steel piles	162	Denes et al 2016, Table 72
24-inch steel piles	161	Navy 2015
20-inch steel piles	161	Navy 2015
18-inch steel piles	161	Navy 2015
16-inch steel piles	161	Navy 2015
27.6-inch sheet pile	160	Caltrans 2015
30.3-inch sheet pile	160	Caltrans 2015
Drilling Rock Sockets	dB rms	

All pile diameters	166			Denes <i>et al.</i> 2016, Table 72
Impact Hammer	dB rms	dB SEL	dB peak	
30-inch steel piles	195	181	209	Denes <i>et al.</i> 2016, Table 72
24-inch steel piles	190	177	203	Caltrans 2015
18-inch steel piles	190	177	203	Caltrans 2015
Note: It is assumed that noise levels during pile installation and removal are similar. Use of an impact hammer will be limited to 5-10 minutes per pile, if necessary. It is assumed that drilling produces the same SSL regardless of DTH diameter. SEL = sound exposure level; dB peak = peak sound level; rms = root mean square				

ADOT&PF plans to employ the simultaneous use of two or more noise sources which can create overlapping sound fields that result in additive effects of sound from the different hammers under certain conditions (NMFS 2018, WSDOT 2019). The combined source levels can be calculated using rules of decibel addition described below and shown in Table 8. Overlapping sound fields created by use of more than one hammer are handled differently for impact and vibratory hammers. The use of two impact hammers simultaneously is unlikely to result in the two hammers operating in synchrony therefore, the sound pressure levels will not be adjusted regardless of the distance between the hammers. In this case, each impact hammer will be considered to have its own independent harassment zones. Sound from two or more continuous sources near the same location results in louder sound levels than from a single source. NMFS is treating DTH drilling as a continuous noise source for this project and it will be considered a similar noise to vibratory hammering. The sound levels from continuous sources cannot be added by standard addition because the decibel is measured on a logarithmic scale. For example, two sounds of equal level (plus or minus 1 dB) combine to raise the sound level by 3 dB. However, if two sounds differ by more than 10 dB, there is no combined increase in the sound level; the higher output covers any other sound. For marine mammal monitoring purposes, if the isopleth from one sound source encompasses a second sound source over a free sound field (i.e., no landmass separating the sound sources), then the continuous sources are considered close enough to be a "combined sound source" and their sound levels are added (NMFS 2018,

WSDOT 2019) to determine the sound isopleth. The resulting isopleth is centered on the "combined source," which is the geometric centroid of the polygon formed by the sound sources.

For simultaneous use of three or more hammers or DTH drills, the three pieces with the highest noise levels must be identified. The same rules for decibel addition are then applied to the two lowest source levels of the three. The resulting combined source level is then added to the third remaining source level using the same rules. For example, if two DTH hammers (166 dB rms each) are used simultaneously with vibratory installation of a 24-inch pile (161 dB rms), first the two lowest levels are added together using the rules of decibel addition: $166 - 161 = 5$, and therefore 1 dB is added to 166 dB as shown in Table 8, resulting in a combined noise level of 167 dB for the two pieces of equipment. Then 167 is added to the noise level of the third piece of equipment, 166. Since $167 - 166 = 1$, 3 dB are added to 167, resulting in a combined noise level for all equipment of 170 dB as shown in Table 8.

At this stage in project planning, it is difficult to predict when or where each of the two or three contractors or construction crews may be working, and therefore, is also difficult to predict which combinations of activities might occur simultaneously and for how long. The Phase 1 sound source levels were calculated for all possible combinations of pile installation and removal using two and three vibratory hammers and/or two DTH drills and are shown in Tables 9, 10, 11, and 12. The combined sound source levels for simultaneous vibratory hammer use, or use of a vibratory hammer and DTH drill simultaneously, range from 163 to 170 dB rms, depending on the number of piles (two or more) being installed simultaneously, pile size and type, and method of installation. These source levels were used to establish Level A harassment and Level B harassment isopleths. Simultaneous use of three DTH drills was not analyzed because it is not anticipated to occur.

Table 8. Rules for Combining Sound Levels Generated during Pile Installation and Removal.

Hammer Types	Difference in SSL	Level A Harassment Zones	Level B Harassment Zone
Vibratory, Impact	Any	Use impact zones	Use vibratory zone
Impact, Impact	Any	Use zones for each pile size and number of strikes	Use zone for each pile size
Vibratory, Vibratory	0 or 1 dB	Add 3 dB to the higher source level	Add 3 dB to the higher source level
	2 or 3 dB	Add 2 dB to the higher source level	Add 2 dB to the higher source level
	4 to 9 dB	Add 1 dB to the higher source level	Add 1 dB to the higher source level
	10 dB or more	Add 0 dB to the higher source level	Add 0 dB to the higher source level

Source: Modified from USDOT 1995, WSDOT 2018, and NMFS 2018

Note: SSL = sound source level; dB = decibels

Simultaneous in-water pile installation and removal will not occur during Phase 2 of the Tongass Narrows Project, and therefore this possibility was not analyzed. As described in the proposed IHAs, in-water pile installation and removal on the Revilla Island side of the Narrows during Phase 2 will be limited to no more than 2 hours, and, as agreed by ADOT&PF, the IHA will require that those 2 hours not coincide with in-water pile installation/removal on Gravina Island.

Table 9. Combined Sound Levels Generated during Pile Installation and Removal for Combinations of Two Pieces of Equipment: Impact Hammer, Vibratory Hammer, and DTH Drill.

Phase 1	Method			Vibratory					Drilling		Impact			
	Pile Diameter			Sheet	18	20	24	30	24	30	18/20	24	30	
	SSL			160	161	161	161	162	166	166	190	190	195	
Vibratory	Sheet	160	163	164	164	164	164	164	167	167	No Addition (Level B harassment= Vibratory, Level A harassment = Impact)			
	18	161	164	NA			164	165	167	167				
	20	161	164	NA			164	165	167	167				
	24	161	164	164	164	164	164	165	167	167				
	30	162	164	165	165	165	165	167	167	167				
Drilling	24	166	167	167	167	167	167	167	169	169				
	30	166	167	167	167	167	167	167	169	169				
Impact	18/20	190	No Addition (Level B harassment = Vibratory, Level A harassment = Impact)									No Addition		
	24	190												
	30	195												

Note: This table is applicable when two piles are installed/removed simultaneously.

Table 10. Combined Sound Levels Generated during Pile Installation and Removal for Combinations of Three Pieces of Equipment: Impact Hammer, Vibratory Hammer, and DTH Drill, when the Pile Installed at Revilla is 24 inches in Diameter.

Phase 1		New Gravina Island Shuttle Ferry Berth										
Method	Pile Diameter	SSL	Vibratory					Drilling		Impact		
			Sheet	18	20	24	30	24	30	18/20	24	30
			160	161	161	161	162	166	166	190	190	195
Vibratory	18	161	166	NA		166	166	168	168	No Addition (Level B harassment = Vibratory, Level A harassment = Impact)		
	20	161	166	NA		166	166	168	168			
	24	161	166	166	166	166	166	168	168			
	30	162	166	166	166	166	167	169	169			
Drilling	24	166	168	168	168	169	168	170	170			
	30	166	168	168	168	169	168	170	170			
Impact	18/20	190	No Addition (Level B harassment = Vibratory, Level A harassment = Impact)							No Addition		
	24	190	No Addition (Level B harassment = Vibratory, Level A harassment = Impact)									
	30	195	No Addition (Level B harassment = Vibratory, Level A harassment = Impact)									

Notes:

24-inch SSL = 161

This table is applicable when three piles are installed simultaneously, and the pile installed at Revilla is 24-in diameter.

** NA = Combinations of equipment not possible given construction plans for each component.

Table 11. Combined Sound Levels Generated during Pile Installation and Removal for Combinations of Three Pieces of Equipment: Impact Hammer, Vibratory Hammer, and DTH Drill, when the Pile Installed at Revilla is 30 Inches in Diameter.

Gravina Airport Layout and Freight	Method		Vibratory					Drilling		Impact		
	Pile Diameter		Sheet	18	20	24	30	24	30	18/20	24	30
	SSL		160	161	161	161	162	166	166	190	190	195
Vibratory	18	161	166	NA		166	167	169	169	No Addition (Level B harassment = Vibratory, Level A harassment = Impact)		
	20	161	166			166	167	169	169			
	24	161	166	166	166	166	167	169	169			
	30	162	166	167	167	167	167	169	169			
Drilling	24	166	169	169	169	169	168	170	170			
	30	166	169	169	169	169	168	170	170			
Impact	18/20	190	No Addition (Level B harassment = Vibratory, Level A harassment = Impact)						No Addition			
	24	190										
	30	195										

Notes:

30-inch SSL = 162

This table is applicable when three piles are installed simultaneously, and the pile installed at Revilla is 30-in diameter.

** NA = Combinations of equipment not possible given construction plans for each component.

Table 12. Combined Sound Levels Generated during Pile Installation and Removal for Combinations of Three Pieces of Equipment: Impact Hammer, Vibratory Hammer, and DTH Drill, when the Pile Installed at Revilla is Sheet Pile.

Phase 1		New Gravina Island Shuttle Ferry Berth											
Gravina Airport Layup and Freight	Method	Pile Diameter		Vibratory					Drilling		Impact		
		Sheet	18	20	24	30	24	30	18/20	24	30		
			SSL	160	161	161	161	162	166	166	190	190	195
Vibratory	18	161	166	NA		166	166	168	168	No Addition (Level B harassment = Vibratory, Level A harassment = Impact)			
		161	166	NA		166	166	168	168				
		161	166	166	166	166	166	168	168				
		162	166	166	166	166	166	168	168				
Drilling	24	166	168	168	168	168	168	170	170	No Addition (Level B harassment = Vibratory, Level A harassment = Impact)			
	30	166	168	168	168	168	168	170	170				
Impact	18/20	190	No Addition (Level B harassment = Vibratory, Level A harassment = Impact)										
	24	190	No Addition (Level B harassment = Vibratory, Level A harassment = Impact)										
	30	195	No Addition (Level B harassment = Vibratory, Level A harassment = Impact)										

Notes:

Sheet pile SSL = 160

This table is applicable when three piles are installed simultaneously, and sheet piles are installed at Revilla.

** NA = Combinations of equipment not possible given construction plans for each component.

Level B Harassment Zones

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:

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

TL = transmission loss in dB

B = transmission loss coefficient; for practical spreading equals 15

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

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

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

Using the practical spreading model, ADOT&PF determined underwater noise would fall below the behavioral effects threshold of 120 dB rms for marine mammals at a maximum radial distance of 12,023 m for rock socket drilling. This distance determines the maximum Level B harassment zone for the project. Other activities, including vibratory and impact pile driving, will have smaller Level B harassment zones. All Level B harassment isopleths are reported in Table 13 and Table 14 below. It should be noted that based on the geography of Tongass Narrows and the surrounding islands, sound will not reach the full distance of the Level B harassment isopleth in all directions. Generally, due to interaction with land, only a thin slice of the possible area is ensonified to the full distance of the Level B harassment isopleth.

Table 13. Calculated Distances to Level B Harassment Isopleths and Ensonified Areas During Pile Installation and Removal of a single piece of equipment.

Pile Size	Isopleth-Impact (m) (160 dB)	Impact (km ²)	Isopleth – Vibratory (m) (120 dB)	Vibratory (km ²)	Isopleth – Drilling (m) (120 dB)	Drilling (km ²)
Phase 1 Revilla side						
24-inch piles	1,000	0.780348	5,412	3.224297	--	--
30-inch piles	2,154	1.504843	6,310	3.584237	--	--
Sheet pile	--	--	4,642	2.856483	--	--
Phase 1 Gravina side						
18-inch	1,000	1.297393	5,412	9.361061	--	--
24-inch piles	1,000	1.297393	5,412	9.361061	12,023	23.618314
30-inch piles	2,154	3.077801	6,310	11.11939	12,023	23.618314
Sheet pile	--	--	4,642	7.712967	--	--
Phase 2 Revilla side						
24-inch	1,000	0.780348	5,412	3.187212	--	--
Phase 2 Gravina side						
16-inch	--	--	5,412	8.03168	--	--
24-inch piles	1,000	1.297393	5,412	8.03168	--	--
30-inch piles	2,154	3.077801	6,310	9.472484	12,023	23.618314

The Level B harassment zone distance was determined based on calculating the combination of simultaneously installed piles, and their resulting combined source level through decibel addition, as shown in Table 14. For each combined source level, the Level B harassment

is consistent, regardless of the combination of equipment. Level B harassment zones range from 7,356 meters (vibratory installation of two sheet piles or two 24-inch round piles simultaneously) to 21,544 meters (drilling for two piles and simultaneous vibratory installation of a 30-inch pile).

Table 14. Level B Harassment Zones for Combinations of Two and Three Piles of Different Sizes, Types, and Installation Methods.

Combined SSL (dB)	Distance to Level B Harassment Isoleth (meters)
163	7,356
164	8,577
165	10,000
166	11,659
167	13,594
168	15,849
169	18,478
170	21,544

These larger zones are truncated to the southeast by islands, which prevent propagation of sound in that direction beyond the confines of Tongass Narrows. To the northwest of Tongass Narrows, combined sound levels that equal or exceed 167 dB rms extend into Clarence Strait before attenuating to sound levels that are presumably below 120 dB rms. The maximum size of the ensonified area in Clarence Strait is 21.3 square kilometers (km²), which occurs only when two DTH drills are used simultaneously with a vibratory hammer. This value for area is used in calculation of exposure estimates for the two species for which we have density estimates in Clarence Strait, harbor porpoises and Dall’s porpoises. This represents the maximum area that could be ensonified when multiple pieces of equipment are used, and therefore results in a maximum estimate of exposure, because a smaller area is ensonified under most equipment combinations.

In some cases, Level B harassment zones for pile combinations are smaller than the Level B harassment zone for DTH drilling with a single drill, which is 12,023 meters (Table 14). Only the Level B harassment zones for pile combinations equal to or exceeding 167 dB rms extend past the 12,023-meter zone analyzed in the proposed IHAs. All combinations of two vibratory hammers result in Level B harassment zones that are smaller than 12,023 meters in radius (Table 9). To reach the 167 dB rms threshold with only vibratory pile installation (no DTH drilling), three vibratory hammers would have to simultaneously install 30-inch piles (Table 11). It is possible, but unlikely, that this would occur, given that the New Gravina Island Shuttle Ferry Berth/Related Terminal Improvements Project includes vibratory installation of only eight 30-inch piles for 15 minutes each, or a total of 2 hours of vibratory installation; the remaining 66 piles for this project are 24 inches in diameter.

ADOT&PF assumes that the 2 hours of simultaneous installation of 30-inch piles represents 2 days maximum when the Project's Level B harassment zone could briefly exceed 12,023 meters. All other combinations of three vibratory hammers will have Level B harassment zones that are smaller than 12,023 meters in radius and are confined within Tongass Narrows, and effects to this area were analyzed in the proposed IHAs.

Combinations of one DTH drill with a vibratory hammer, two DTH drills, and two DTH drills with a vibratory hammer also have source levels that equal or exceed 167 dB rms (Tables 9, 10, 11, and 12) and Level B harassment zones that exceed 12,023 meters (Table 14). No DTH drilling will occur during construction on Revilla Island. One or two DTH drills could be used for construction of the New Gravina Island Shuttle Ferry Berth/Related Terminal Improvements Project and the Gravina Freight Facility and Gravina Airport Ferry Layup Facility on the same day and/or simultaneously.

Use of at least one DTH drill simultaneously with a second DTH drill or one or two vibratory hammers is the most likely combination of multiple pieces of equipment that would result in Level B harassment zones that exceed 12,023 meters. It is estimated that construction of the New Gravina Island Shuttle Ferry Berth will require the most DTH drilling, with an estimated 49 days at a production rate of 1.5 piles per day (approximately 180 minutes of DTH drilling per day). On the days when DTH drilling occurs, simultaneous use of one or more vibratory hammers or a second DTH drill could also occur, resulting in a Level B harassment zone that potentially could exceed 12,023 meters for a brief period each day.

In total, the Level B harassment zone could exceed the previously analyzed 12,023 meters on up to 51 days (2 days when three 30-inch piles are likely to be installed simultaneously plus 49 days when a DTH drill could be used in combination with a second DTH drill or vibratory hammers, for 51 days total). However, use of multiple pieces of equipment, whether simultaneous or on the same day, results in an increased production rate as more piles per day are installed. This decreases the total number of days of pile installation from 144 to 101 days (duration of the project) and decreases the number of days when the Level B harassment zone size could exceed 12,023 meters.

Level A Harassment Zones

When the NMFS 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 may result in some degree of overestimate of take by Level A harassment. However, these tools offer the best way to predict appropriate isopleths when more sophisticated 3D modeling methods are not available, and NMFS continues to develop ways to quantitatively refine these tools, and will qualitatively address the output where appropriate. For stationary sources such as impact/vibratory pile driving or drilling, the NMFS 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 isopleths are reported below (Table 15).

Level A harassment thresholds for impulsive sound sources (impact pile driving) are defined for both SELcum and Peak SPL with the threshold that results in the largest modeled isopleth for each marine mammal hearing group used to establish the Level A harassment isopleth. In this project, Level A harassment isopleths based on SELcum were always larger than those based on Peak SPL. It should be noted that there is a duration component when calculating the Level A harassment isopleth based on SELcum, and this duration depends on the number of piles that will be driven in a day and strikes per pile. For some activities, ADOT&PF plans to drive variable numbers of piles per day throughout the project and determine at the beginning of each pile driving day, how many piles will be driven that day. Here, this flexibility has been accounted for by modeling multiple durations for the activity, and determining the relevant isopleths as shown in Table 17.

Equipment Type	Vibratory Pile Removal	Vibratory Pile Driver (Installation of sheet piles)	Vibratory Pile Driver (Installation of 30-inch steel piles)	Vibratory Pile Driver (Installation of 24-inch steel piles)	Vibratory Pile Driver (Installation of 20-inch steel piles)	Vibratory Pile Driver (Installation of 18-inch steel piles)	Impact Pile Driver (30-inch steel piles)	Impact Pile Driver (24-inch steel piles)	Impact Pile Driver (18-inch steel piles)	Rock Socket Drilling
Spreadsheet Tab Used	A.1) Vibratory Pile Driving	A.1) Vibratory Pile Driving	A.1) Vibratory Pile Driving	A.1) Vibratory Pile Driving	A.1) Vibratory Pile Driving	A.1) Vibratory Pile Driving	E.1) Impact Pile Driving	E.1) Impact Pile Driving	E.1) Impact Pile Driving	A.1) Vibratory Pile Driving
Source Level	161 SPL	160 SPL	162 SPL	161 SPL	161 SPL	161 SPL	181 SEL	177 SEL	177 SEL	166 SPL
Weighting Factor Adjustment (kHz)	2.5	2.5	2.5	2.5	2.5	2.5	2	2	2	2.5
(a) Activity duration (hours) within 24 hours (b) Number of strikes per pile (c) Number of piles per day	(a) 2.5 24-in pile 30 min/16-in 15 min	(a) 2.5 (15 mins * 10)	(a) 1.5 3*30 mins	(a) 1.5 3*30 mins	(a) 0.75 3*15 mins	(a) 0.75 3*15 mins	(b) 200 or 50 (c) 1 to 3	(b) 200 or 50 (c) 1 to 3	(b) 50 (c) 1 to 3	(a) 9 or 6*
Propagation (xLogR)	15	15	15	15	15	15	15	15	15	15
Distance of source level measurement (meters) ⁺	10	10	10	10	10	10	10	10	10	10

Table 15. Single Pile Driving and Drilling Activity Inputs for User Spreadsheet.

* Duration estimates for rock socket drilling are based on assumption of drilling 3 rock sockets per day. 9 hours would be the estimated duration for drilling related to 30 inch piles, and 6 hours would be the duration for drilling related to 24 and 18 inch piles.

** For specifics of what number of strikes and number of piles will be used in a given situation, please refer to Table 1 and Table 3.

Table 16. Calculated distances to Level A harassment isopleths during pile installation and removal.

Activity	Pile Diameter(s)	Minutes per Pile or Strikes per Pile	Piles Installed or Removed per day	Level A Harassment Isopleth Distance (meters)				
				Cetaceans			Pinnipeds	
				LF	MF	HF	PW	OW
Vibratory Installation	30-inch	30 Minutes	3	11	<1	15	6	<1
	24-inch, 20-inch, 18-inch	15-30 Minutes	3	9	<1	13	5	<1
	27.6-inch sheet pile, 30.3-inch sheet pile	15 Minutes	12	13	2	18	8	1
Vibratory Removal	24-inch 16-inch	30 Minutes	5	13	1	19	8	<1
Drilling Rock Sockets	30-inch	180 Minutes	3	66	6	97	40	3
	24-inch, 18-inch	120 Minutes	3	50	4	74	30	2
Impact Installation	30-inch	50 Strikes	3	208	8	247	111	9
		50 Strikes	2	159	6	189	85	7
		50 Strikes	1	100	4	119	54	4
		200 Strikes	3	523	19	623	280	21
		200 Strikes	2	399	15	476	214	16
		200 Strikes	1	252	9	300	135	10
Impact Installation	24-inch	50 Strikes	3	113	4	134	61	5
		50 Strikes	2	86	3	102	46	4
		50 Strikes	1	54	2	65	29	3
		200 Strikes	3	283	11	337	152	11
		200 Strikes	2	216	8	258	116	9
		200 Strikes	1	136	5	162	73	6
Impact Installation	18-inch	50 Strikes	3	113	4	134	61	5
		50 Strikes	2	86	3	102	46	4
		50 Strikes	1	54	2	65	29	3

Note: a 10-meter shutdown zone will be implemented for all species and activity types to prevent direct injury of marine mammals.

To keep the analysis simple, ADOT&PF and NMFS analyzed the highest source levels for the longest durations of pile installation that could occur within a day. For example, if seventeen 30-inch piles were installed with a vibratory hammer on a single day, the Level A harassment zone for all functional hearing groups would remain smaller than 50 meters. Only on the eighteenth 30-inch pile would the isopleth for high-frequency cetaceans exceed 50 meters. Similarly, the combined source level for vibratory installation of three 30-inch piles is 167 dB rms (Table 11). The Level A harassment zone for this source level is reached when the duration exceeds 155 minutes (2.6 hours). Only after 470 minutes (7.8 hours) of simultaneous installation of three 30-inch piles would the Level A harassment zone reach 100 meters, a production rate that is unlikely to be met or exceeded.

If two DTH drills operated within a day, 5 piles could be installed with 115 minutes of DTH drilling for each (575 minutes or 9.5 total hours), and the Level A harassment zone for all functional hearing groups would remain below 100 meters. Two DTH drills operating simultaneously would have a combined source level of 169 dB rms (Table 9); the Level A harassment zone for this source level is reached when the duration exceeds 148 minutes (4.9 hours) of simultaneous use of two DTH drills, a production rate that is also unlikely to be met or exceeded.

Table 17. Pile Driving and Drilling Activity Inputs for User Spreadsheet Resulting in Less than 100-m Level A Harassment Isopleth.

Equipment Type	30-inch Vibratory Maximum (non-concurrent installation)	30-inch Vibratory, 3 Piles (concurrent installation)	2 DTH Drills (concurrent installation)	DTH Drill Maximum (non-concurrent installation)
Spreadsheet Tab Used	A.1) Vibratory Pile Driving	A.1) Vibratory Pile Driving	A.1) Vibratory Pile Driving	A.1) Vibratory Pile Driving
Source Level	162	167	169 SPL	166 SPL
Weighting Factor Adjustment (kHz)	2.5	2.5	2.5	2.5

(a) Activity duration (hours) within 24 hours (b) Number of piles per day	(a) 8.5; (b) 17	(a) 7.8; (b) 3	(a) 4.9 (b) 2	(a) 9.5 (b) 5
Propagation (xLogR)	15	15	15	15
Distance of source level measurement (meters) ⁺	10	10	10	10

Table 18. Maximum Calculated distances to Level A harassment isopleths during Concurrent pile installation and removal.

Activity	Time of Installation per day (hours)	Level A Harassment Isopleth Distance (meters)				
		Cetaceans			Pinnipeds	
		LF	MF	HF	PW	OW
30-inch Vibratory Maximum (non-concurrent installation)	8.5	33	3	49	20	2
2 DTH (concurrent)	4.9 ¹	67	6.0	100	41	3
30-inch vibratory, 3 piles (concurrent)	7.8 ²	68	6	100	41	3
DTH Maximum (non-concurrent installation)	9.5 ³	64	6	98	40	3

¹Hours of simultaneous installation with 2 DTH drills*

²Hours of simultaneous installation of 3 30-inch piles**

³Hours of installation with 2 DTH drills non-concurrent installation (cannot exceed 3 piles or 10 hours per day without being concurrent)

The scenarios evaluated above and depicted in Table 17 and Table 18 represent levels of efficiency (production rates) that are unlikely to be achieved in the field, and Level A harassment zones for all functional hearing groups remained below 100 meters in all cases presented above.

Marine Mammal Occurrence and Take Calculation and Estimation

In this section we provide the information about the presence, density, or group dynamics of marine mammals that will inform the take calculations. ADOT&PF relied on a synthesis of

qualitative information from local people, including biologists and the harbormaster, because of the lack of small-scale, site-specific species density or abundance information for Tongass Narrows and nearby areas. Quantitative estimates of exposure were calculated using this qualitative information and are therefore not dependent on harassment zone sizes.

It is important to remember that Level B harassment zone sizes do not increase with use of multiple hammers or DTH drills within a day, and no additional Level B harassment exposures of marine mammals are anticipated to result from use of multiple pieces of equipment within a day. As discussed above, no additional exposures are anticipated to result from combinations of an impact hammer and a continuous noise source (vibratory hammer or DTH drill), because those zones are encompassed within the area of ensonification analyzed previously. Similarly, no additional exposures are anticipated to result due to combinations of impact hammers.

However, zones sizes that result from a combination of equipment that reaches a noise level of 167 dB rms or more (Tables 9, 10, 11, and 12) extend to the northeast of Tongass Narrows and into Clarence Strait, an area that was not considered ensonified under earlier construction scenarios analyzed in the proposed IHAs. The revised exposures estimates below are based on the simultaneous use of two or more vibratory hammers or DTH drills in combinations that exceed 167 dB rms.

ADOT&PF used 51 days as the estimated number of days when the 12,023-meter Level B harassment zone isopleth could be exceeded and exposure or take of marine mammals could occur in Clarence Strait. The total number of days of in-water pile installation and removal is now estimated at 101 days (instead of 144 days), a reduction of 43 days.

For most marine mammal species, abundance in Tongass Narrows is anticipated to be greater than abundance in Clarence Strait, and the reduction in days of ensonification in Tongass Narrows negates the increase in area in Clarence Strait. This is especially the case for species that have higher abundance in nearshore and shallow waters, and less so for species that regularly occur in deeper, more open waters. It is anticipated that the ensonified area that extends into Clarence Strait will be temporary and intermittent, lasting only for a few minutes up to a few hours per day.

Steller Sea Lion

Steller sea lion abundance in the Tongass Narrows area is not well known. No systematic studies of Steller sea lions have been conducted in or near the Tongass Narrows area. Steller sea lions are known to occur year-round and local residents report observing Steller sea lions about once or twice per week (based on communication outlined in Section 3 of the IHA application). Abundance appears to increase during herring runs (March to May) and salmon runs (July to September). Group sizes are generally 6 to 10 individuals (Freitag 2017 as cited in 83 FR 37473) but have been reported to reach 80 animals (HDR 2003). Tongass Narrows represents an area of high anthropogenic activity that sea lions would normally avoid, but at least three seafood processing plants and two fish hatcheries may be attractants to these opportunistic scavengers and predators. Sea lions are generally unafraid of humans when food sources are available. For these reasons, NMFS proposed one group of 10 Steller sea lions may be present in the project area each day, but this occurrence rate may as much as double (20 Steller sea lions per day) during periods of increased abundance associated with the herring and salmon runs (March to May and July to September).

For Phase 1, we anticipate that one large group (10 individuals) may be present in the Level B harassment zone once per day. However, as discussed above, we anticipate that exposure may be as much as twice this rate during March, April, May, July, August, and September, due to the increased presence of prey during periods of increased abundance (i.e. herring and salmon). Therefore, we expect that two large groups (20 individuals) may be present in the Level B harassment zone each day during these months (approximately half of Phase 1). We estimate a total of 1,515 potential exposures of Steller sea lions (i.e., one group of 10 sea lions per day x 50.5 days [or half of Phase 1] + two groups of 10 sea lions per day x 50.5 days = 1,515 sea lions) in Tongass Narrows.

Steller sea lions are known to swim across Clarence Strait and to use offshore areas with deeper waters, although no estimates of at-sea density or abundance in Clarence Strait are available. We estimate that a large group of 10 animals may occur in the ensonified portion of Clarence Strait each day (one group of 10 sea lions per day x 51 days = 510 individuals). Therefore, NMFS has authorized the take of 2,025 individuals (1,515 + 510 = 2,025 individuals) by Level B harassment in Tongass Narrows and Clarence Strait. This is a decrease from the 2,160 takes by Level B harassment proposed to be authorized in the proposed IHAs as concurrent driving reduced the number of anticipated driving days.

Take by Level A harassment is not expected for Steller sea lions in Phase 1, because of the small Level A harassment zones for otarrids (Table 16) and the expected effectiveness of the monitoring and mitigation measures discussed below.

During Phase 2, we anticipate Steller sea lions would be exposed at the same rate as during Phase 1. Phase 2 construction is planned to occur in the months of April, May and June. Therefore, we expect that one large group (10 individuals) may be present in the Level B

harassment zone once per day for 9 days in June, with an increase to 2 large groups per day when fish runs occur for 9 days each month in April and May. Therefore, NMFS has authorized the take of 450 Steller sea lions by Level B harassment (*i.e.*, 1 group of 10 sea lions per day x 9 days in June + 2 groups of 10 sea lions per day x 9 days per month in both April and May = 450 sea lions) which is the same number of takes estimated in the proposed IHAs.

Take by Level A harassment is not expected for Steller sea lions in Phase 2, because of the small Level A harassment zones for otarrids (Table 16) and the expected effectiveness of the monitoring and mitigation measures discussed below.

Harbor Seal

Harbor seal densities in the Tongass Narrows area are not well known. No systematic studies of harbor seals have been conducted in or near Tongass Narrows. They are known to occur year-round with little seasonal variation in abundance (Freitag 2017 as cited in 83 FR 37473) and local experts estimate that there are about 1 to 3 harbor seals in Tongass Narrows every day, in addition to those that congregate near the seafood processing plants and fish hatcheries. Based on this knowledge, the expected maximum group size in Tongass Narrows is three individuals. Harbor seals are known to be curious and may approach novel activity. For these reasons we conservatively estimate that up to two groups of 3 harbor seals per group could be exposed to project-related underwater noise each day. Additionally, a smaller number of harbor seals could occasionally be present in the Level A harassment (PTS) zone and exposed to sound levels for a duration expected to result in take by Level A harassment. To account for these uncommon instances, ADOT&PF assumed and NMFS agrees that the equivalent of six groups of three individuals may be exposed in the Level A harassment zone during the whole of Phase 1, and the equivalent of three groups of three individuals may be exposed during the whole

of Phase 2. Because of the nature of take by Level A harassment (small zone size, factoring in duration of exposure) and possibility for a marine mammal group to be spread over a relatively large area compared to the Level A harassment zone, take by Level A harassment will likely not occur to an entire group at once. Despite being expected to occur on an individual basis, these group size estimates still serve as the basis for take estimation for harbor seals.

During Phase 1, ADOT&PF and NMFS anticipate that two groups of 3 individuals (6 individuals) could be present in the Level B harassment zone once per day, for a total of 606 harbor seals (i.e., 6 individuals per day x 101 days = 606 seals) exposed in Tongass Narrows.

Harbor seals are known to swim across Clarence Strait, although no estimates of at-sea density or abundance are available. It is likely that harbor seal abundance in Clarence Strait is lower than in Tongass Narrows, as harbor seals generally prefer nearshore waters. ADOT&PF and NMFS assumed that abundance of harbor seals in Clarence Strait is 5 individuals per day for a potential exposure of 255 harbor seals (5 harbor seals per day x 51 days = 255 individuals). Therefore, NMFS has authorized the take of 861 individuals by Level B harassment (606 + 255 = 861 individuals). This represents a slight increase in the number of takes estimated and proposed to be authorized in the proposed IHAs (846).

During Phase 1, it is possible, but unlikely, that harbor seals may be exposed to sound levels in the Level A harassment zone for a duration expected to result in take. As described above NMFS is authorizing take by Level A harassment for the equivalent of six groups (18 individuals) during Phase 1. This is the same number of takes estimated and proposed to be authorized in the proposed IHAs.

During Phase 2, ADOT&PF and NMFS anticipate that two groups of 3 individuals could be present in the Level B harassment zone once per day for a total of 162 takes of harbor seals by

Level B harassment (i.e., 6 individuals per day x 27 days = 162 seals). Therefore, NMFS has authorized the take of 162 individuals by Level B harassment, which is identical to the number estimated in the proposed IHAs.

During Phase 2, ADOT&PF and NMFS conservatively anticipate that the equivalent of three groups of 3 individuals may be present in the Level A harassment zone long enough to experience injury without detection by Protected Species Observers (PSOs). Therefore, NMFS is authorizing take by Level A harassment of 9 harbor seals during Phase 2. This is the same number estimated in the proposed IHAs.

Harbor Porpoise

Harbor porpoises are non-migratory; therefore, our occurrence estimates are not dependent on season. Freitag (2017 as cited in 83 FR 37473) observed harbor porpoises in Tongass Narrows zero to one time per month. Harbor porpoises observed in the project vicinity typically occur in groups of one to five animals with an estimated maximum group size of eight animals (83 FR 37473, August 1, 2018, Solstice 2018). For this take estimate, we are considering a group to consist of five animals, a value on the high end of the typical group size. Based on Freitag (2017), and supported by the reports of knowledgeable locals as described in the application, ADOT&PF and NMFS estimated that during Phase 1 two groups of 5 harbor porpoises could be exposed to project-related underwater noise above the Level B harassment threshold each month for a total of 90 harbor porpoises (i.e., two groups of 5 per month x 9 months = 90 harbor porpoises). Nine months was assumed instead of the 12 months used in the proposed IHAs to reflect the 30 percent reduction in construction duration due to concurrent installation.

Additionally, harbor porpoises may rarely enter the applicable Level A harassment zone and be exposed to sound levels for a duration expected to result in take by Level A harassment, necessitating authorized take by Level A harassment.

Harbor porpoises are known to swim across Clarence Strait and to use other areas of deep, open waters. Dahlheim et al. (2015) estimated a density of 0.02 harbor porpoises/km² in an area that encompasses Clarence Strait, resulting in an estimate of 22 harbor porpoises (0.02 harbor porpoises/km² x 21.3 km² x 51 days = 21.7 harbor porpoises, rounded up to 22 individuals) that could be potentially exposed to project noise resulting in Level B harassment in that area. This estimate is likely high, given that the entire 21.3 km² area will rarely be ensonified.

NMFS, therefore, has authorized 112 harbor porpoise takes by Level B harassment (90 + 22 = 112 individuals) during Phase 1. In the proposed IHAs we had estimated and proposed to authorize 105 takes.

During Phase 1, we anticipate that 5 individuals (the equivalent of one group) may enter the Level A harassment zone undetected, and be exposed to sound levels for a duration expected to result in take by Level A harassment, approximately once during every 4 months of construction, for a total of 15 potential takes by Level A harassment. This is the same number estimated and proposed to be authorized in the proposed IHAs.

During Phase 2, NMFS estimates that two groups of harbor porpoises may be present in the Level B harassment zone each month. Therefore, NMFS has authorized a total of 30 takes by Level B harassment (i.e., 2 groups of 5 per month x 3 months = 30 harbor porpoises) during Phase 2. This is the identical to the number estimated in the proposed IHAs.

During Phase 2, we anticipate that the equivalent of two groups of 5 individuals may enter the Level A harassment zone undetected, and be exposed to sound levels for a duration expected to result in take by Level A harassment, during the 3 months of construction. Therefore, NMFS has authorized 10 takes of harbor porpoise by Level A harassment which is also the same as the number in the proposed IHAs.

Dall's Porpoise

Dall's porpoises are expected to only occur in Tongass Narrows a few times per year. Their relative rarity is supported by Jefferson *et al.*'s (2019) presentation of historical survey data showing very few sightings in the Ketchikan area and conclusion that Dall's porpoise generally are rare in narrow waterways, like the Tongass Narrows. During Phase 1 in Tongass Narrows, we estimate that 135 Dall's porpoises could be present in the Level B harassment zone (i.e., 15 individuals per month x 9 months of construction = 135 total potential exposures).

This species is more likely to occur in the waters of Clarence Strait, however, and the estimate of exposure for this species has increased in association with ensonification of that area. Jefferson *et al.* (2019) estimated an average density of 0.19 Dall's porpoises/km² in Southeast Alaska, resulting in an estimate of 207 Dall's porpoises (0.19 Dall's porpoises/km² x 21.3 km² x 51 days = 207 Dall's porpoises) that could be potentially exposed to project noise in that area resulting in Level B harassment. NMFS has therefore authorized 342 takes (135 + 207 = 342) of Dall's porpoise by Level B harassment during Phase 1. This is an increase from the 165 takes estimated and proposed to be authorized in the proposed IHAs.

Additionally Dall's porpoises may rarely be present in the applicable Level A harassment zone and be exposed to sound levels for a duration expected to result in take by Level A harassment. To account for this rare circumstance, ADOT&PF assumed and NMFS

concluded that the equivalent of one group of 15 individuals may be exposed to sound levels in the Level A harassment zone for a duration expected to result in take during the whole of Phase 1. Therefore, NMFS has authorized 15 takes by Level A harassment, which is the same number that was estimated and proposed to be authorized in the proposed IHAs.

NMFS has authorized takes during Phase 2 that are identical to what was proposed to be authorized in the proposed IHAs. ADOT&PF estimated, and NMFS concurs, that 45 Dall's porpoises could be present in the Level B harassment zone (i.e., 15 individuals per month x 3 months of construction = 45 takes by Level B harassment). ADOT&PF also estimated that the equivalent of one group of 15 individuals may be exposed to sound levels in the Level A harassment zone for a duration expected to result in take, resulting in take by Level A harassment of 15 individual Dall's porpoises. NMFS concurs with these estimates and has authorized take of 45 porpoises by Level B harassment and 15 porpoises by Level A harassment. These estimates are the same as those found in the proposed IHAs.

Pacific White-sided Dolphin

Pacific white-sided dolphins do not generally occur in the shallow, inland waterways of Southeast Alaska. There are no records of this species occurring in Tongass Narrows, and it is uncommon for individuals to occur in the project area. However, historical sightings in nearby areas (Dahlheim and Towell 1994; Muto *et al.* 2018) and recent fluctuations in distribution and abundance mean it is possible the species could be present. To account for the possibility that this species may be present in the project area, NMFS conservatively estimated in the proposed IHAs that one large group (92 individuals) of dolphins may experience take by Level B harassment in Tongass Narrows during each phase of the activity. Pacific white-sided dolphins

are uncommon in the Clarence Strait area and have not been observed for a few years; therefore, there is no change from the original proposed numbers of Pacific white-sided dolphins takes.

NMFS has therefore authorized 92 dolphin takes by Level B harassment for both Phase 1 and Phase 2.

Take by Level A harassment is not expected for Pacific white-sided dolphins in Phase 1 or Phase 2 because of the small Level A harassment zones for mid-frequency cetaceans and the expected effectiveness of the monitoring and mitigation measures discussed below.

Killer Whale

Killer whales are observed in Tongass Narrows irregularly with peaks in abundance between May and July. A previous incidental take authorization in the Ketchikan area estimated killer whale occurrence in Tongass Narrows at one pod per month (Freitag 2017 as cited in 83 FR 37473). During Phase 1, ADOT&PF and NMFS estimate that one pod of 12 individuals may be present and exposed to project-related underwater noise at or above the Level B harassment threshold every month except between May and July, when two pods of 12 individuals may be present and exposed. This methodology was applied to both Tongass Narrows and Clarence Strait areas. It is also likely that any animals moving through Tongass Narrows would likely be the same animals that use Clarence Strait.

Therefore, NMFS has authorized 144 killer whale takes by Level B harassment (12 exposures per month x 6 months + 24 exposures per month x 3 months = 144 killer whales). The authorized number of takes is less than the 180 takes estimated and proposed to be authorized in the proposed IHAs since pile driving activities will now occur over a shorter time period.

During Phase 2, we anticipate that construction would occur in April, May, and June. Therefore, NMFS has authorized 60 takes of killer whale by Level B harassment (i.e., 12

exposures per month x 1 month (April) + 24 exposures per month x 2 months (May, June). There were 96 takes by Level B harassment estimated in the proposed IHAs. However, this figure was incorrect due to a mathematical error. The correct number should have been 60 takes.

Take by Level A harassment is not expected for killer whales in either Phase 1 or Phase 2, because of the small Level A harassment zones for mid-frequency cetaceans and the expected effectiveness of the monitoring and mitigation measures discussed below.

Humpback Whale

Humpback whales have been observed about once per week, on average, in Tongass Narrows according to local reports. Based on the estimated occurrence rate of one group of two individuals twice each week and an anticipated timeframe of pile driving to occur over the course of 144 days, NMFS proposed to authorize take of 82 humpback whales in the proposed IHAs. NMFS has used this same methodology in the final IHA to calculate that 58 (14.4 weeks x 2 groups x 2 animals/week) humpback whales could be exposed to project noise in Tongass Narrows over the anticipated 101 days of pile installation.

Local specialists agreed that about four humpback whales could pass through or near the ensonified area in Clarence Strait each day. This could result in up to 204 additional exposures of humpback whales (4 humpback whales x 51 days = 204 individuals). Therefore, NMFS has authorized take of 262 humpback whales by Level B harassment (204 + 58 = 262 humpback whales). This represents an increase of the 82 whales estimated in the proposed IHAs. Of the 262 humpback whales potentially exposed, an estimated 6.1 percent or 16 individuals (262 x 0.061 = 15.98, rounded up to 16 whales) could be from the ESA-listed Mexico Distinct Population Segment (DPS) of humpback whales based on the estimated proportion of humpback whales in

Southeast Alaska that belong to the Mexico DPS (Wade *et al.* 2016). The proposed IHAs contained an estimate of 5 animals from the Mexico DPS

For Phase 2, NMFS has authorized a total of 16 total exposures of whales in the Level B harassment zone. This is based on the estimated occurrence rate of 2 groups of 2 individuals every 7 days and an anticipated timeframe of Phase 2 pile driving to occur over the course of 27 days (27 days/ 7 days per week x 2 groups x 2 animals/group = 15.4 conservatively rounded up to 16). Based on the same estimated proportion of humpback whales in Southeast Alaska that belong to the ESA-listed Mexico DPS (Wade *et al.*, 2016), there would be an estimated take by Level B harassment of one Mexico DPS humpback whale in Phase 2 ($16 \times 0.061 = 0.97$ rounded up to 1 whale). Therefore, the remaining 15 whales taken by Level B harassment would be from the Hawaii DPS. In the proposed IHAs it was estimated that there would be 1 take from the Mexico DPS and a larger number of 16 from the Hawaii DPS due to a rounding error.

Take by Level A harassment is not expected for humpback whales in Phase 1 or Phase 2 because of the expected effectiveness of the monitoring and mitigation measures and detecting and avoiding take by Level A harassment via shutdowns of pile installation equipment.

Minke Whales

Minke whales may be present in Tongass Narrows and Clarence Strait year-round. Their abundance throughout Southeast Alaska is very low, and anecdotal reports have not included minke whales near the project area. However, minke whales are distributed throughout a wide variety of habitats and could occur near the project area. Minke whales are generally sighted as individuals (Dahlheim *et al.* 2009). Based on Freitag (2017 as cited in 83 FR 37473) it is estimated that three individual minke whales may occur in Tongass Narrows or Clarence Strait every 4 months.

Based on the estimated occurrence rate of three individuals every four months, NMFS has authorized 7 takes of minke whale by Level B harassment (3 animals in a group x 1 group every 4 months = 7 individuals in 9 months) during Phase 1. This represents a reduction from the 9 takes listed in the proposed IHAs since pile driving will occur over fewer months.

Based on the estimated occurrence rate of three individuals every 4 months, we have authorized 3 takes of minke whale by Level B harassment zone during the 3 month duration of Phase 2. This is a reduction from what was published in the proposed IHAs. Due to a mathematical error, 6 minke whale takes were initially proposed to be authorized.

Take by Level A harassment is not expected for minke whales in Phase 1 or Phase 2, because of the expected effectiveness of the monitoring and mitigation measures and detecting and avoiding take by Level A harassment via shutdowns of pile installation equipment. Additionally, minke whales are expected to be uncommon in the project area so they will likely not occur in the Level A harassment zone.

Table 19. Take Estimates as a Percentage of Stock Abundance for Phase 1.

Species	DPS/Stock	Estimated Number of Exposures to Level B Harassment	Estimated Number of Exposures to Level A Harassment	Total Estimated Exposures (Level A and Level B Harassment)	Stock Abundance	Instances of take as percentage of Population
Steller sea lion	Eastern DPS	2,025	0	2,025	41,638	4.9
Harbor seal	Clarence Strait	861	18	879	31,634	2.8
Harbor porpoise	Southeast Alaska	112	15	127	11,146	1.1
Dall's porpoise	Alaska	327	15	342	83,400	0.4
Pacific white-sided dolphin	North Pacific	92	0	92	26,880	0.3
Killer whale	AK Resident	144	0	144	2,347	6.1 ^a
	Northern Resident				261	55.2 ^a

	West Coast Transient				243	59.3 ^a
Humpback whale	Hawaii DPS	246	0	246	11,398	2.2 ^b
	Mexico DPS	16	0	16	3,264	0.5 ^b
Minke whale	Alaska	7	0	7	Unknown	N/A

Note: DPS = distinct population segment.
^a These percentages assume all takes come from the same killer whale stock, thus the percentage should be adjusted down if multiple stocks are actually affected.
^b Assumes that 6.1 percent of humpback whales exposed are members of the Mexico DPS (Wade *et al.* 2016).

Table 20. Take Estimates as a Percentage of Stock Abundance for Phase 2.

Species	DPS/Stock	Estimated Number of Exposures to Level B Harassment	Estimated Number of Exposures to Level A Harassment	Total Estimated Exposures (Level A and Level B Harassment)	Stock Abundance	Instances of Take as Percentage of Population
Steller sea lion	Eastern DPS	450	0	450	41,638	1.1
Harbor seal	Clarence Strait	162	9	171	31,634	0.5
Harbor porpoise	Southeast Alaska	30	10	40	11,146	0.4
Dall's porpoise	Alaska	45	15	60	83,400	<0.1
Pacific white-sided dolphin	North Pacific	92	0	92	26,880	0.3
Killer whale	Alaska resident				2,347	2.5 ^a
	Northern Resident	60	0	60	261	22.9 ^a
	West Coast Transient				243	24.6 ^a
Humpback whale	Hawaii DPS	15	0	15	11,398	0.1 ^b
	Mexico DPS	1	0	1	3,264	<0.1 ^b
Minke whale	Alaska	3	0	3	Unknown	N/A

Note: DPS = distinct population segment
^a These percentages assume all takes come from the same killer whale stock, thus the percentage should be adjusted down if multiple stocks are actually impacted.
^b Assumes that 6.1 percent of humpback whales exposed are members of the Mexico DPS (Wade *et al.* 2016).

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 the activity, and other means of effecting the least practicable impact on the species or stocks and their habitat, paying particular attention to

rookeries, mating grounds, and areas of similar significance, and on the availability of the species or stocks for taking for subsistence uses. NMFS regulations require applicants for incidental take authorizations to include information about the availability and feasibility (economic and technological) of equipment, methods, and manner of conducting the activity and 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.

In addition to the measures described later in this section, ADOT&PF must employ the following standard mitigation measures:

- Conduct briefings between construction supervisors and crews and the marine mammal monitoring team prior to the start of all pile driving activity, and when new personnel

join the work, to explain responsibilities, communication procedures, marine mammal monitoring protocol, and operational procedures;

- For in-water heavy machinery work other than pile driving/removal and drilling (e.g., standard barges, tug boats), if a marine mammal comes within 10 m, operations shall cease and vessels shall reduce speed to the minimum level required to maintain steerage and safe working conditions. This type of work could include the following activities: (1) movement of the barge to the pile location; or (2) positioning of the pile on the substrate via a crane (i.e., stabbing the pile);

- Work may only occur during daylight hours, when visual monitoring of marine mammals can be conducted;

- For any marine mammal species for which take by Level B harassment has not been requested or authorized, in-water pile installation/removal and drilling will shut down immediately when the animals are sighted;

- In the event that more than one contractor is working at the same time, they will maintain radio or cellular coordination in order to coordinate pile installation and removal and provide adequate monitoring by protected species observers; and

- If take by Level B harassment reaches the authorized limit for an authorized species, pile installation will be stopped as these species approach the Level B harassment zone to avoid additional take of them.

The following specific mitigation measures will also apply to ADOT&PF's in-water construction activities:

Establishment of Shutdown Zone for Level A Harassment—For all pile driving/removal and drilling activities, ADOT&PF will establish a shutdown zone. The purpose of a shutdown zone is generally to define an area within which shutdown of activity would occur upon sighting of a marine mammal (or in anticipation of an animal entering the defined area). Shutdown zones will vary based on the activity type, marine mammal hearing group, and in the case of impact pile driving, additional details about the activity including the expected number of pile strikes required, size of the pile, and number of piles to be driven during that day (See Table 21). Here, shutdown zones are generally larger than the calculated Level A harassment isopleths shown in Table 16 and Table 18. The largest shutdown zones are generally for low frequency and high frequency cetaceans as shown in Table 21. The placement of PSOs during all pile driving, pile removal, and drilling activities (described in detail in the *Monitoring and Reporting* Section) will ensure that the entire shutdown zone is visible during pile installation.

The shutdown zones shown in Table 21 apply when a single piece of equipment is in use. In addition, ADOT&PF will implement a shutdown zone of 100 meters for each vibratory hammer on days when it is anticipated that multiple vibratory hammers will be used. The ADOT&PF will also implement a shutdown zone of 100 meters for each DTH drill on days when it is anticipated that two DTH drills will be used. Since conservative Level A harassment isopleths calculated for various concurrent driving combinations (Table 18) do not exceed 100 meters, there is no take by Level A harassment associated with simultaneous use of multiple devices.

Table 21. Shutdown Zones During use of a Single Piece of Equipment.

Activity	Pile Size (inches)	Minutes per Pile or Strikes per	Piles Installed or	Level B Harassment Isopleth (m)	Shutdown Distances (m)
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		Pile	Removed per Day		LF	MF	HF	PW	OW
Vibratory Installation	30	30 min	3	6,310	50				
	24, 18	30 min	3	5,420					
	27.6 sheet pile, 30.3 sheet pile	15 min	10	4,650					
Vibratory Removal	24, 16	30 min	5	5,420					
Drilling Rock Sockets	30	180 min	3	12,030	70	50	60	50	
	24, 18	120 min	3		60	50			
Impact Installation	30	50 strikes	3	2,160	250	50	250	150	50
			2		200		200	100	
			1		100		150	100	
		200 strikes	3		550		650	300	
			2		400		500	250	
			1		300		300	150	
	24	50 strikes	3	1,000	150		150	100	
			2		100		150	50	
			1		100		100	50	
		200 strikes	3		300		350	200	
			2		250		300	150	
			1		150		200	100	
	18	50 strikes	3		150		150	100	
			2		100		150	50	
			1		100		100	50	

Establishment of Monitoring Zones for Level B Harassment—ADOT&PF will establish monitoring zones, based on the Level B harassment zones which are areas where SPLs are equal to or exceed the 160 dB rms threshold for impact driving and the 120 dB rms threshold during vibratory driving, vibratory removal, and drilling. Monitoring zones provide utility for observing marine mammals by establishing monitoring protocols for areas adjacent to the shutdown zones. Monitoring zones enable observers to be aware of and communicate the presence of marine mammals in the project area outside the shutdown zone and thus prepare for a potential cease of

activity should the animal enter the shutdown zone. The isopleths for the Level B harassment zones are depicted in Table 13 and 14. On days and at times when a single piece of pile installation or removal equipment will be used, the Level B harassment zone as shown in Table 13 for each pile will be monitored and implemented according to pile size, type, and installation method as outlined. The largest Level B harassment zone for both Phase 1 and Phase 2 extends to a radius of 12,023 meters in at least one direction up or down Tongass Narrows when a single piece of driving equipment is being utilized, making it impracticable for the PSOs to consistently view the entire harassment area. Due to this, takes by Level B harassment will be recorded and extrapolated based upon the number of observed takes and the percentage of the Level B harassment zone that was not visible.

When two or more pieces of equipment are used simultaneously, and the noise they produce is not continuous or is a combination of continuous and impulsive, Table 21 will be followed to define the Level A harassment and Level B harassment monitoring zones for each piece of equipment.

On days when multiple pieces of equipment that produce continuous noise are used simultaneously, source levels will be determined as shown in Table 9, Table 10, Table 11, and Table 12. The calculated source level will be used to determine the Level B harassment monitoring zones in accordance with values depicted in Table 14.

Soft Start - The use of a soft-start procedure provides additional protection to marine mammals by providing warning and/or giving marine mammals a chance to leave the area prior to the hammer operating at full capacity. For impact pile driving, contractors will be required to provide an initial set of strikes from the hammer at reduced 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. If a marine mammal is present within the Level A harassment zone, soft start will be delayed until the animal leaves the Level A harassment zone. Soft start will begin only after the PSO has determined, through sighting, that the animal has moved outside the Level A harassment zone. If a marine mammal is present in the Level B harassment zone, soft start may begin and a take by Level B harassment will be recorded. Soft start up may occur when these species are in the Level B harassment zone, whether they enter the Level B harassment zone from the Level A harassment zone or from outside the project area.

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 PSO 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 Level B harassment zone has been observed for 30 minutes and marine mammals are not present within the zone, soft start procedures can commence and work can continue even if visibility becomes impaired within the Level B harassment zone. When a marine mammal permitted for take by Level B harassment is present in the Level B harassment zone, piling activities may begin and take by Level B harassment will be recorded. As stated above, if the entire Level B harassment 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 Level B harassment and shutdown zone will commence.

Timing Restrictions - ADOT&PF plans to implement the Essential Fish Habitat (EFH) Conservation Recommendations developed by NMFS. These include a no in-water work timing window for three project components, Revilla New Ferry Berth and Upland Improvements, Gravina Airport Ferry Layup Facility, and Revilla Refurbish Existing Ferry Berth Facility, with no in-water work occurring between March 1 and June 15. Implementation of this timing window will likely reduce exposure/take of marine mammals to levels below what has been predicted, because some project locations will be able to install piles when other locations may not.

During Phase 2 in-water pile installation and removal on the Revilla Island side of the Narrows will be limited to no more than 2 hours that shall not coincide with in-water pile installation/removal activities on Gravina Island.

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

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 planned project

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 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 or removed. Pile driving activities include the time to install or remove a single pile or series of piles, as long as the time elapsed between uses of the pile driving equipment is no more than thirty minutes.

There will be at least one PSO present at or near each construction site during in-water pile installation and removal so that all Level A harassment zones and shutdown zones are monitored by a dedicated PSO at all times. PSOs will not perform duties for more than 12 hours in a 24-hour period. PSOs would be land-based observers, positioned at the best practical vantage points. At least one other PSO for each active worksite will begin at the central worksite and travel along the Tongass Narrows until they have reached the edges of the monitoring zones, based on the Level B harassment zones. These PSOs will then monitor the edges of the monitoring zone and as much as possible of the rest of the monitoring zone, looking for animals entering the Level B harassment zone. If waters exceed a sea state that restricts the PSO's ability to make observations within the Level A harassment zones (*e.g.*, excessive wind or fog), pile installation and removal must cease. Pile driving must not be re-initiated until the entire relevant Level A harassment zones are visible.

When combinations of one DTH drill with a vibratory hammer, two DTH drills, or two DTH drills with a vibratory hammer are used simultaneously, creating a Level B harassment zone that is greater than 12,023 meters in radius, one additional PSO (at least two total) will be stationed at the northernmost land-based location at the entrance to Tongass Narrows. One PSO will focus on Tongass Narrows, specifically watching for marine mammals that could approach or enter Tongass Narrows and the project area. The second PSO will look out into Clarence Strait, watching for marine mammals that could swim through the ensonified area. This monitoring requirement for concurrent driving scenarios was not included in the proposed IHAs.

No additional PSOs will be required at the southern-most monitoring location because the Level B harassment zones are truncated to the southeast by islands, which prevent propagation of sound in that direction beyond the confines of Tongass Narrows. Takes by Level B harassment will be recorded by PSOs and extrapolated based upon the number of observed takes and the percentage of the Level B harassment zone that was not visible.

With this configuration, PSOs can have a full view of the Level A harassment zone and awareness of as much of the Level B harassment zone as possible. This monitoring will provide information on marine mammal occurrence within Tongass Narrows and how these marine mammals are impacted by pile installation and removal.

As part of monitoring, PSOs will scan the waters using binoculars, and/or spotting scopes, and will use a handheld GPS or range-finder device to verify the distance to each sighting from the project site. All PSOs will be trained in marine mammal identification and behaviors and are required to have no other project-related tasks while conducting monitoring. In addition, monitoring will be conducted by qualified observers, who will be placed at the best vantage point(s) practicable to monitor for marine mammals and implement shutdown/delay procedures when applicable by calling for the shutdown to the hammer operator. Each construction Contractor managing an active construction site and on-going in-water pile installation or removal will provide qualified, independent PSOs for their specific contract. The ADOT&PF environmental coordinator for the project will implement coordination between or among the PSO contractors. It will be a required component of their contracts that PSOs coordinate, collaborate, and otherwise work together to ensure compliance with project permits and authorizations. Qualified observers are trained and/or experienced professionals, with the following minimum qualifications:

- Visual acuity in both eyes (correction is permissible) sufficient for discernment of moving targets at the water's surface with ability to estimate target size and distance; use of binoculars may be necessary to correctly identify the target;
- Independent observers (*i.e.*, not construction personnel);
- Observers must have their CVs/resumes submitted to and approved by NMFS;
- Advanced education in biological science or related field (*i.e.*, undergraduate degree or higher). Observers may substitute experience or training for education;
- Experience and ability to conduct field observations and collect data according to assigned protocols (this may include academic experience);
- At least one observer must have prior experience working as an observer;
- Experience or training in the field identification of marine mammals, including the identification of behaviors;
- Sufficient training, orientation, or experience with the construction operation to provide for personal safety during observations;
- Writing skills sufficient to prepare a report of observations including but not limited to the number and species of marine mammals observed; dates and times when in-water construction activities were conducted; dates and times when in-water construction activities were suspended to avoid potential incidental injury from construction sound of marine mammals observed within a defined shutdown zone; and marine mammal behavior; and
- Ability to communicate orally, by radio or in person, with project personnel to provide real-time information on marine mammals observed in the area as necessary.

Reporting

NMFS has issued two distinct and consecutive IHAs for these activities. In recognition of the value of marine mammal monitoring in understanding the impacts of ADOT&PF's activity, NMFS is requiring that ADOT&PF submit a preliminary marine mammal monitoring report for Phase 1 of the project (2020 through 2021) at least 4 months prior to the effective date of the second IHA and initiation of Phase 2. This preliminary report must contain all items that would be included in the draft final report, listed below under "Reporting". This will allow NMFS to assess the impact of the activities relative to the analysis presented here, and modify the IHA for Phase 2 if the preliminary monitoring report shows unforeseen impacts on marine mammals in the area. If needed, NMFS will publish an amended proposed IHA, describing any changes but referencing the original IHA for Phase 2, and include an opportunity for the public to comment on the amended authorization.

In addition to the preliminary monitoring report discussed above, separate draft marine mammal monitoring reports must be submitted to NMFS within 90 days after the completion of both Phase 1 and Phase 2 pile driving, pile removal, and drilling activities. These reports will include an overall description of work completed, a narrative regarding marine mammal sightings, and associated PSO data sheets. Specifically, the reports must include:

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

- Distance from pile driving activities to marine mammals and distance from the marine mammals to the observation point;
- Locations of all marine mammal observations;
- An estimate of total take based on proportion of the monitoring zone that was observed; and
- Other human activity in the area.

If no comments are received from NMFS within 30 days, that phase's draft final report will constitute the final report. If comments are received, a final report for the given phase addressing NMFS comments must be submitted within 30 days after receipt of comments.

In the event that personnel involved in the construction activities discover an injured or dead marine mammal, ADOT&PF shall report the incident to the Office of Protected Resources (OPR), NMFS and to the Alaska Regional Stranding Coordinator as soon as feasible. The report must include the following information:

- Time, date, and location (latitude/longitude) of the first discovery (and updated location information if known and applicable);
- Species identification (if known) or description of the animal(s) involved;
- Condition of the animal(s) (including carcass condition if the animal is dead);
- Observed behaviors of the animal(s), if alive;
- If available, photographs or video footage of the animal(s); and
- General circumstances under which the animal was discovered.

Negligible Impact Analyses and Determinations

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).

To avoid repetition, our analysis applies to all species listed in Table 5 for which take could occur (*i.e.*, not including gray whales and fin whales, for which take was found to be unlikely), given that NMFS expects the anticipated effects of the planned pile driving/removal and drilling to be similar in nature. Where there are meaningful differences between species or stocks, or groups of species, in anticipated individual responses to activities, impact of expected take on the population due to differences in population status, or impacts on habitat, NMFS has identified species-specific factors to inform the analysis. Additionally, the planned activity for both Phase 1 and Phase 2 is similar in nature, so the impacts are expected to be similar and are analyzed as such, unless otherwise noted.

NMFS does not anticipate that serious injury or mortality would occur as a result of ADOT&PF's planned activity. As stated in the mitigation section, shutdown zones that equal or exceed Level A harassment isopleths shown in Table 21 will be implemented. Take by Level A harassment is authorized for some species (harbor seals, harbor porpoises, and Dall's porpoises) to account for the slight possibility that these species escape observation by the PSOs within the shutdown zone. Further, any take by Level A harassment is expected to arise from, at most, a small degree of PTS because animals would need to be exposed to higher levels and/or longer duration than are expected to occur here in order to incur any more than a small degree of PTS. Additionally, and as noted previously, some subset of the individuals that are behaviorally harassed could also simultaneously incur some small degree of TTS for a short duration of time. Because of the small degree anticipated, though, any PTS or TTS potentially incurred here would not be expected to adversely impact individual fitness, let alone annual rates of recruitment or survival.

Behavioral responses of marine mammals to pile driving, pile removal, and drilling at the sites in Tongass Narrows are expected to be mild, short term, and temporary. Marine mammals within the Level B harassment zone may not show any visual cues they are disturbed by activities or they could become alert, avoid the area, leave the area, or display other mild responses that are not observable such as changes in vocalization patterns. Given that pile driving, pile removal, and drilling would occur for only a portion of the project's two years and often on nonconsecutive days (101 days in Phase 1, or 27 days in Phase 2), any harassment occurring during either phase would be temporary. Additionally, many of the species present in Tongass Narrows or Clarence Strait would only be present temporarily based on seasonal

patterns or during transit between other habitats. These temporarily present species would be exposed to even smaller periods of noise-generating activity, further decreasing the impacts.

In addition, for all species except humpback whales, there are no known Biologically Important Areas (BIAs) near the project zone that would be impacted by ADOT&PF's planned activities. For humpback whales, the whole of Southeast Alaska is a seasonal BIA from spring through late fall (Ferguson *et al.*, 2015), however, Tongass Narrows and Clarence Strait are not important portions of this habitat due to development and human presence. Tongass Narrows is also a small passageway and represents a very small portion of the total available habitat. There is no ESA-designated critical habitat for humpback whales.

More generally, there are no known calving or rookery grounds within the project area, but anecdotal evidence from local experts shows that marine mammals are more prevalent in Tongass Narrows and Clarence Strait during spring and summer associated with feeding on aggregations of fish, meaning the area may play a role in foraging. Because ADOT&PF's activities, especially in Phase 1, could occur during any season, takes may occur during important feeding times. However, the project area represents a small portion of available foraging habitat and impacts on marine mammal feeding for all species, including humpback whales, should be minimal.

Any impacts on marine mammal prey that would occur during ADOT&PF's planned activity would have at most short-term effects on foraging of individual marine mammals, and likely no effect on the populations of marine mammals as a whole. Indirect effects on marine mammal prey during the construction are expected to be minor, and these effects are unlikely to cause substantial effects on marine mammals at the individual level, with no expected effect on annual rates of recruitment or survival.

In summary and as described above, the following factors primarily support our determination that the impacts resulting from this activity, for both Phase 1 and Phase 2, are not expected to adversely affect the species or stocks through effects on annual rates of recruitment or survival:

- No serious injury or mortality is anticipated or authorized;
- ADOT&PF will implement mitigation measures including soft-starts for impact pile driving and shutdown zones that exceed Level A harassment zones for most authorized species, which will help minimize the numbers of marine mammals exposed to injurious levels of sound, and to ensure that take by Level A harassment is at most a small degree of PTS;
- Level B harassment takes are not of a duration or intensity expected to result in impacts on reproduction or survival. Also, the only known area of specific biological importance covers a broad area of southeast Alaska for humpback whales, and the project area is a very small portion of that BIA. No other known areas of particular biological importance to any of the affected species or stocks are impacted by the activity; and
- The project area represents a very small portion of the available foraging area for all marine mammal species and anticipated habitat impacts are minor.

Phase 1 - 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 required monitoring and mitigation measures, NMFS finds that the total marine mammal take from ADOT&PF's planned Phase 1 activities will have a negligible impact on all affected marine mammal species or stocks.

Phase 2 - 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 required monitoring and mitigation measures, NMFS finds that the total marine mammal take from ADOT&PF's planned Phase 2 activities will have a negligible impact on all affected marine mammal species or stocks.

Small Numbers

Only small numbers of incidental take may be authorized under Sections 101(a)(5)(A) and (D) of the MMPA for specified activities other than military readiness activities. The MMPA does not define small numbers and so, in practice, where estimated numbers are available, NMFS compares the number of individuals that may be 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.

Table 19 and Table 20, in the *Marine Mammal Occurrence and Take Calculation and Estimation* section, present the number of instances that animals could be exposed to received noise levels that may result in take by Level A harassment or Level B harassment for both Phase 1 and Phase 2 of ADOT&PF's planned activities. The percentage of stock taken by harassment and is calculated by dividing the authorized number of takes by the best available stock population estimate. Our analysis of ADOT&PF's planned Phase 1 activity shows that for all but two of the three killer whale stocks mentioned above, less than seven percent of the best population estimates of each affected stock could be taken. Analysis of Phase 2 showed authorized takes represent less than 25 percent of all stocks, which NMFS considers "small numbers." There are two stocks, Northern Resident killer whales and West Coast Transient killer whales, for which the estimated percentage of stock taken in Phase 1 appears high when compared to other stocks and species (Table 19). However, when other qualitative factors are

used to inform an assessment of the likely number of individual marine mammals taken, the resulting numbers are appropriately considered small. Initial analysis (which assumes that all takes could accrue to any of the three stocks, and is very unlikely) of the West Coast Transient stock shows that in Phase 1, when instances of take (not individuals taken) are compared to the stock abundance, 59.3 percent of the stock could experience take. For the Northern Resident stock, the initial analysis shows that when instances of take (not individuals taken) are compared to the stock abundance, 55.2 percent of the stock could experience take. While these numbers appear high, the extensive ranges of both stocks compared to ADOT&PF's project area mean that realistically there will be multiple takes of a smaller number of individuals from these stocks, resulting in no more than a third of the individuals of any of these stocks being taken. The Northern Resident stock's range stretches from Washington State into southeast Alaska and the stock is frequently observed along British Columbia, Canada (Muto *et al.* 2018). The West Coast transient stock occurs in California, Oregon, Washington, British Columbia, and southeastern Alaska. In both cases, ADOT&PF is only impacting a small portion of the total range, and this impact is intermittent.

Further, the above percentages are based on analyzing the entire estimated take of killer whales as if it would occur to a single killer whale stock, which is extremely unlikely to occur, instead of apportioned among the three stocks that could occur in the area. Realistically, the take will be spread in some way among the stocks expected to be in the area (i.e., 100 percent of the take cannot occur to each of the three stocks), further reducing the percentage of takes anticipated to come from any single stock. For example, if we assumed that the take were equally apportioned across the three stocks, the predicted percentages are both reduced to below one third of the population. When this is considered in combination with large ranges of the two

stocks noted above, it is entirely unlikely that more than one third of the Northern Resident or West Coast Transient killer whale stocks would be taken in Phase 1 of the project.

For both Phase 1 and Phase 2, there was one stock, minke whale, where the lack of an accepted stock abundance value prevented us from calculating an expected percentage of the population that would be affected. The most relevant estimate of partial stock abundance is 1,233 minke whales for a portion of the Gulf of Alaska (Zerbini *et al.*, 2006). Given the estimated 7 authorized takes by Level B harassment for the stock in Phase 1, comparison to the best estimate of stock abundance shows less than 1 percent of the stock is expected to be impacted. A similar analysis of Phase 2, with 3 takes of minke whale by Level B harassment authorized, in comparison to the best estimate of stock abundance shows less than 1 percent of the stock is expected to be impacted. Additionally, the range of the Alaska stock of minke whales is extensive, stretching from the Canadian Pacific coast to the Chukchi Sea, and ADOT&PF's project area impacts a small portion of this range. Therefore, the numbers of minke whales authorized to be taken are small relative to estimated survey abundance even if each estimated taking occurred to a new individual.

Phase 1 - Based on the analysis contained herein of the planned activity (including the required mitigation and monitoring measures) and the anticipated take of marine mammals for Phase 1 of ADOT&PF's activity, NMFS finds that small numbers of marine mammals will be taken relative to the population size of the affected species or stocks in Phase 1 of the project.

Phase 2 - Based on the analysis contained herein of the planned activity (including the mitigation and monitoring measures) and the anticipated take of marine mammals for Phase 2 of ADOT&PF's activity, NMFS finds that small numbers of marine mammals will be taken relative to the population size of the affected species or stocks in Phase 2 of the project.

Unmitigable Adverse Impact Analysis and Determination

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

Harbor seals are the marine mammal species most regularly harvested for subsistence by households in Ketchikan and Saxman (A community a few miles south of Ketchikan, on the Tongass Narrows). Eighty harbor seals were harvested by Ketchikan residents in 2007, which ranked fourth among all communities in Alaska that year for harvest of harbor seals. Thirteen harbor seals were harvested by Saxman residents in 2007. In 2008, two Steller sea lions were harvested by Ketchikan-based subsistence hunters, but this is the only record of sea lion harvest by residents of either Ketchikan or Saxman. In 2012, the community of Ketchikan had an estimated subsistence take of 22 harbor seals and 0 Steller sea lion (Wolf *et al.*, 2013). This is the most recent data available. Hunting usually occurs in October and November (ADF&G 2009), but there are also records of relatively high harvest in May (Wolfe *et al.*, 2013). The Alaska Department of Fish and Game (ADF&G) has not recorded harvest of cetaceans from either community (ADF&G 2018). All project activities will take place within the industrial area of Tongass Narrows immediately adjacent to Ketchikan where subsistence activities do not

generally occur. The project also will not have an adverse impact on the availability of marine mammals for subsistence use at locations farther away, where these construction activities are not expected to take place. Some minor, short-term harassment of the harbor seals could occur, but any effects on subsistence harvest activities in the region will be minimal, and not have an adverse impact.

Phase 1 - Based on the effects and location of the specified activity, and the mitigation and monitoring measures, NMFS has determined that there will not be an unmitigable adverse impact on subsistence uses from Phase 1 of ADOT&PF's planned activities.

Phase 2 - Based on the effects and location of the specified activity, and the mitigation and monitoring measures, NMFS has determined that there will not be an unmitigable adverse impact on subsistence uses from Phase 2 of ADOT&PF's planned activities.

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 action (*i.e.*, the issuance of incidental harassment authorizations) with respect to potential impacts on the human environment.

This action is consistent with categories of activities identified in Categorical Exclusion B4 (incidental harassment authorizations with no anticipated serious injury or mortality) of the Companion Manual for NOAA Administrative Order 216-6A, which do not individually or cumulatively have the potential for significant impacts on the quality of the human environment and for which we have not identified any extraordinary circumstances that would preclude this categorical exclusion. Accordingly, NMFS has determined that the issuance of the IHAs qualify to be categorically excluded from further NEPA review.

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' Office of Protected Resources consults internally, in this case with NMFS' Alaska Regional Office, whenever we propose to authorize take for endangered or threatened species.

NMFS is authorizing take of the Central North Pacific stock of humpback whales, of which a portion belong to the Mexico DPS of humpback whales, which are listed under the ESA. The action agency are the Federal Highway Administration (FHA) and the NMFS Office of Protected Resources Permits and Conservation Division. On February 6, 2019, NMFS completed consultation with ADOT&PF for Tongass Narrows Project and issued a Biological Opinion with the FHA as an action agency. Reinitiation of formal consultation was required to add NMFS Permits and Conservation Division as an action agency and to analyze changes to the action that were not considered in the February 2019 opinion (PCTS# AKR-2018-9806/ECO# AKRO-2018-01287). The original opinion considered the effects of only one project component being constructed at a time and did not analyze potential effects of concurrent pile driving which may cause effects to the listed species that were not considered in the original opinion; therefore, reinitiation of formal consultation was required.

NMFS' Alaska Region issued a revised Biological Opinion to NMFS' Office of Protected Resources on December 19, 2019 which concluded that issuance of IHAs to ADOT&PF is not likely to jeopardize the continued existence of Mexico DPS humpback whales.

Authorizations

NMFS has issued two separate, consecutive IHAs to ADOT&PF for incidental take resulting from pile ferry berth improvements and construction activities in Tongass Narrows, Alaska in 2020 through 2021 (Phase 1) and 2021 through 2022 (Phase 2), including the previously discussed mitigation, monitoring, and reporting requirements that have been incorporated.

Dated: December 20, 2019.

Donna S. Wieting,

Director, Office of Protected Resources,

National Marine Fisheries Service.

[FR Doc. 2020-00038 Filed: 1/6/2020 8:45 am; Publication Date: 1/7/2020]