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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648-XG737

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to Confined Rock Blasting near Ketchikan, Alaska

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

ACTION: Notice; Issuance of an Incidental Harassment Authorization.

SUMMARY: In accordance with the regulations implementing the Marine Mammal Protection Act (MMPA) as amended, notification is hereby given that NMFS has issued an incidental harassment authorization (IHA) to the City of Ketchikan to incidentally harass, by Level B and Level A harassment only, marine mammals during underwater confined rock blasting activities associated with a rock pinnacle removal project in Ketchikan, Alaska.

DATES: This Authorization is effective from September 16, 2019 to September 15, 2020.

FOR FURTHER INFORMATION CONTACT: Gray Redding, Office of Protected Resources, NMFS, (301) 427-8401. Electronic copies of the application and supporting documents, as well as a list of the references cited in this document, may be obtained online at: <https://www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-construction-activities>. In case of problems accessing these documents, please call the contact listed above.

SUPPLEMENTARY INFORMATION:

Background

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

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

The definitions of all applicable MMPA statutory terms cited above are included in the relevant sections below.

Summary of Request

On December 10, 2018, NMFS received a request from the City of Ketchikan for an IHA to take marine mammals incidental to underwater confined blasting and excavation in southeastern Alaska. The application was deemed adequate and complete on February 7, 2019. City of Ketchikan’s request is for take of a small number of nine marine mammal species by

Level B harassment and three marine mammal species by Level A harassment. Neither the City of Ketchikan nor NMFS expects serious injury or mortality to result from this activity and, therefore, an IHA is appropriate.

Description of Specified Activity

Overview

The City of Ketchikan plans to conduct underwater confined blasting of a rock pinnacle in the Tongass Narrows, southeastern Alaska. Removal of the underwater pinnacle will expand the area of safe navigation depths for cruise ships that presently visit Berths I and II. Removing the pinnacle will provide a more reliable ingress and egress for ships over a much wider range of wind and water level conditions. The project is scheduled to occur from September 16, 2019 through April 30, 2020. The blasting portion of the activities is expected to occur between November 15, 2019 and March 15, 2020, but blasting is not restricted to this time period, in order to allow appropriate flexibility for the applicant to complete the project. The action has the potential to affect waters in the Tongass Narrows and nearby Revillagigedo Channel, approximately 3 miles to the south.

There will be up to 50 days of blasting (currently anticipating between 25 and 50 total blasts) limited to at most, one blast per day. A blast consists of a detonation of a series of sequential charges, delayed from one another at an interval of 8 milliseconds (ms), with the total blast typically lasting less than 1 second (one second = 1000 milliseconds). Each delayed charge in the blast will contain a maximum of 75 total lbs (34 kg) of explosive. The timing of the blast must assure that the maximum pounds per delay does not exceed 75 lbs. The planned daily blast will consist of a grid of boreholes, each containing a delayed charge (total number may vary but

typically it ranges between 30 to 60 holes), with the top section of the hole then filled in with stone (this process is referred to as “rock stemming”).

Following blasting, the material freed by blasting will be dredged. As discussed in the proposed **Federal Register** Notice, take is highly unlikely and is not authorized for dredging activities.

A detailed description of the planned rock pinnacle removal project is provided in the **Federal Register** notice for the proposed IHA (84 FR 11508; March 27, 2019). Since that time, no changes have been made to the planned confined underwater blasting activities. Therefore, a detailed description is not provided here. Please refer to that **Federal Register** notice for the description of the specific activity.

Comments and Responses

A notice of NMFS’s proposal to issue an IHA to the City of Ketchikan was published in the **Federal Register** on March 27, 2019 (84 FR 11508). The notice described, in detail, the City of Ketchikan’s 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 one comment from the Marine Mammal Commission (Commission).

Comment 1: The Commission recommended that NMFS estimate and ultimately authorize take by Level B harassment due to behavioral harassment during all activities involving explosives, including single detonation events, for this and all future IHAs. Additionally if NMFS elects not to authorize these takes, it should in the **Federal Register** Notices explain the basis for assuming no behavioral harassment occurs.

Response: NMFS believes that the best scientific evidence available indicates that it is appropriate to use a behavioral onset threshold for multiple detonations and to consider

detonations with microdelays between them as a single detonation. The blasts conducted by the City of Ketchikan are confined blasts with charge detonations separated by microdelays, constituting a single detonation event per day with blasts occurring for at most 50 days.

Comment 2: The Commission recommends that NMFS refrain from implementing its proposed renewal process and instead use abbreviated **Federal Register** notices and reference existing documents to streamline the IHA process. If NMFS adopts the proposed renewal process, the Commission recommends that NMFS provide the Commission and the public a legal analysis supporting its conclusion that the process is consistent with section 101(a)(5)(D) of the MMPA.

Response: The notice of the proposed IHA (84 FR 11508, March 27, 2019) expressly notifies the public that under certain, limited conditions an applicant could seek a renewal IHA for an additional year. The notice describes the conditions under which such a renewal request could be considered and expressly seeks public comment in the event such a renewal is sought. Additional reference to this solicitation of public comment has recently been added at the beginning of the **Federal Register** notices that consider renewals, requesting input specifically on the possible renewal itself. NMFS appreciates the streamlining achieved by the use of abbreviated **Federal Register** notices and intends to continue using them for proposed IHAs that include minor changes from previously issued IHAs, but which do not satisfy the renewal requirements. However, we believe our method for issuing renewals meets statutory requirements and maximizes efficiency. However, importantly, such renewals will be limited to circumstances where: The activities are identical or nearly identical to those analyzed in the proposed IHA; monitoring does not indicate impacts that were not previously analyzed and authorized; and, the mitigation and monitoring requirements remain the same, all of which allow

the public to comment on the appropriateness and effects of a renewal at the same time the public provides comments on the initial IHA. NMFS has, however, modified the language for future proposed IHAs to clarify that all IHAs, including renewal IHAs, are valid for no more than one year and that the agency will consider only one renewal for a project at this time. In addition, notice of issuance or denial of a renewal IHA will be published in the **Federal Register**, as they are for all IHAs. The option for issuing renewal IHAs has been in NMFS' incidental take regulations since 1996. We will provide any additional information to the Commission and consider posting a description of the renewal process on our website before any renewal is issued utilizing this process.

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 (SAR; <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 1 lists all species with expected potential for occurrence in waters near Ketchikan, Alaska and summarizes information related to the population or stock, including regulatory status under the MMPA and ESA and potential biological removal (PBR), where known. For taxonomy, we follow Committee on Taxonomy (2018). 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). All values presented in Table 1 are the most recent available at the time of publication and are available in the 2017 SARs (Muto *et al.*, 2018) and draft 2018 SARs (available online at: <https://www.fisheries.noaa.gov/national/marine-mammal-protection/draft-marine-mammal-stock-assessment-reports>).

Table 1. Marine Mammals that Could Occur in the Planned Action Area.

Common name	Scientific name	MMPA Stock	ESA/MMPA status; Strategic (Y/N) ¹	Stock abundance N _{best} , (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.
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
		Gulf of Alaska Transient	-, N	587 (N.A.; 587; 2012)	5.87	1
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 planned action areas are included in Table 1. As described below, all 9 species (with 12 managed stocks) temporally and spatially co-occur with the activity to the degree that take is reasonably likely to occur, and we have authorized it. In addition, the northern sea otter (*Enhydra lutris*) may be found in waters near Ketchikan, Alaska. However, northern sea otters are managed by the U.S. Fish and Wildlife Service and are not considered further in this document.

A detailed description of the of the species likely to be affected by the City of Ketchikan's 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 **Federal Register** notice for the proposed IHA (84 FR 11508; March 27, 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** notice for these descriptions. Please also refer to NMFS' website (<https://www.fisheries.noaa.gov/find-species>) for generalized species accounts.

Marine Mammal Hearing

Hearing is the most important sensory modality for marine mammals underwater, and exposure to anthropogenic sound can have deleterious effects. To appropriately assess the potential effects of exposure to sound, it is necessary to understand the frequency ranges marine mammals are able to hear. Current data indicate that not all marine mammal species have equal hearing capabilities (*e.g.*, Richardson *et al.*, 1995; Wartzok and Ketten, 1999; Au and Hastings, 2008). To reflect this, Southall *et al.* (2007) recommended that marine mammals be divided into functional hearing groups based on directly measured or estimated hearing ranges on the basis of

available behavioral response data, audiograms derived using auditory evoked potential techniques, anatomical modeling, and other data. Note that no direct measurements of hearing ability have been successfully completed for mysticetes (*i.e.*, low-frequency cetaceans). Subsequently, NMFS (2018) described generalized hearing ranges for these marine mammal hearing groups. Generalized hearing ranges were chosen based on the approximately 65 (decibels) dB threshold from the normalized composite audiograms, with the exception for lower limits for low-frequency cetaceans where the lower bound was deemed to be biologically implausible and the lower bound from Southall *et al.* (2007) retained. Marine mammal hearing groups and their associated hearing ranges are provided in Table 2.

Table 2. Marine Mammal Hearing Groups (NMFS, 2018).

Hearing Group	Generalized Hearing Range*
Low-frequency (LF) cetaceans (baleen whales)	7 Hz to 35 kHz
Mid-frequency (MF) cetaceans (dolphins, toothed whales, beaked whales, bottlenose whales)	150 Hz to 160 kHz
High-frequency (HF) cetaceans (true porpoises, <i>Kogia</i> , river dolphins, cephalorhynchid, <i>Lagenorhynchus cruciger</i> & <i>L. australis</i>)	275 Hz to 160 kHz
Phocid pinnipeds (PW) (underwater) (true seals)	50 Hz to 86 kHz
Otariid pinnipeds (OW) (underwater) (sea lions and fur seals)	60 Hz to 39 kHz
* Represents the generalized hearing range for the entire group as a composite (<i>i.e.</i> , all species within the group), where individual species' hearing ranges are typically not as broad. Generalized hearing range chosen based on ~65 dB threshold from normalized composite audiogram, with the exception for lower limits for LF cetaceans (Southall <i>et al.</i> 2007) and PW pinniped (approximation).	

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

For more detail concerning these groups and associated frequency ranges, please see NMFS (2018) for a review of available information. Nine marine mammal species (seven cetacean and two pinniped (one otariid and one phocid) species) have the reasonable potential to co-occur with the planned blasting activities. Please refer to Table 1. Of the cetacean species that may be present, three are classified as low-frequency cetaceans (*i.e.*, all mysticete species), two are classified as mid-frequency cetaceans (*i.e.*, all delphinid and ziphiid species and the sperm whale), and two are classified as high-frequency cetaceans (*i.e.*, harbor porpoise and *Kogia* spp.).

Potential Effects of Specified Activities on Marine Mammals and their Habitat

The effects of underwater noise from confined underwater blasting activities for the Ketchikan pinnacle removal project have the potential to result in temporary threshold shifts (TTS) (Level B harassment) and a small degree of permanent threshold shifts (PTS) (Level A harassment) of marine mammals in the vicinity of the action area. The **Federal Register** notice for the proposed IHA (84 FR 11508; March 27, 2019) included a discussion of the effects of anthropogenic noise on marine mammals, therefore that information is not repeated here; please refer to the **Federal Register** notice (84 FR 11508; March 27, 2019) for that information.

The main impact to marine mammal habitat associated with the Ketchikan pinnacle removal project 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, because the underwater pinnacle to be removed is not prime foraging habitat. The project may have potential minor impacts to food sources such as forage fish and smaller marine mammals (transient killer whale prey), and permanent but minor impacts to the seafloor due to dredging and blasting as part of the pinnacle removal project. These potential effects are discussed in detail in the **Federal Register** notice for the proposed

IHA (84 FR 11508; March 27, 2019), therefore that information is not repeated here; please refer to that **Federal Register** notice for that information.

Estimated Take

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

After public comment and review of the proposed authorization, the following items have changed in the final authorization.

1) Estimated group sizes, which were the basis for take estimates in this project, were increased for some species, including Pacific white sided dolphin, killer whale, minke whale, and gray whale. Changes to group size were made to more conservatively account for the variability possible in group size, and these changes are outlined for each species in the "Marine Mammal Occurrence" section below.

2) The expected frequency of occurrence for minke whales was increased based on behavioral information suggested by the Commission. The details of this increase are discussed in the "Marine Mammal Occurrence" section below.

3) These changes in group size and occurrence resulting in changes to the estimated take for these species. These changes are discussed in the "Take Calculation and Estimation" section below.

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 (via TTS), as use of the explosive source (*i.e.*, blasting) for a very short period each day has the potential to result in TTS for individual marine mammals. There is also some potential for auditory injury and slight tissue damage (Level A harassment) to result, primarily for mysticetes, porpoise, and phocids because predicted auditory injury zones are larger than for mid-frequency cetaceans and otariids. The planned mitigation and monitoring measures are expected to minimize the severity of such taking to the extent practicable. The primary relevant mitigation measure is avoiding blasting when any marine mammal is observed in the PTS zone. While this measure should avoid all take by Level A harassment, NMFS is authorizing takes by Level A harassment to account for the possibility that marine mammals escape observation in the PTS zone. Additionally, while the zones for slight lung injury are large enough that a marine mammal could occur within the zone (42 meters), the mitigation and monitoring measures, such as avoiding blasting when marine mammals are observed in PTS zone, are expected to minimize the potential for such taking to the extent practicable. Therefore the potential for non-auditory physical injury is considered discountable, and all takes by Level A harassment are expected to occur due to PTS.

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 NMFS believes the best available science indicates marine mammals will incur some degree of hearing impairment; (2) the area or volume of water that will be ensonified above these levels in

a day; (3) the density or occurrence of marine mammals within these ensounded areas; and, (4) and the number of days of activities. We note that while these basic factors can contribute to a basic calculation to provide an initial prediction of takes, additional information that can qualitatively inform take estimates is also sometimes available (e.g., previous monitoring results or average group size). Below, we describe the factors considered here in more detail and present the take estimate.

Acoustic Thresholds

Using the best available science, NMFS has developed acoustic thresholds that identify the received level of underwater sound above which exposed marine mammals would be reasonably expected to incur TTS (equated to Level B harassment) or PTS (equated to Level A harassment) of some degree. Thresholds have also been developed to identify the pressure levels above which animals may incur different types of tissue damage from exposure to pressure waves from explosive detonation. TTS is possible and Table 3 lists TTS onset thresholds.

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

These thresholds are provided in Table 3 below. Table 3 also provides threshold for tissue damage and mortality. The references, analysis, and methodology used in the development of the thresholds are described in NMFS 2016 Technical Guidance, which may be

accessed at: <https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-acoustic-technical-guidance>.

Table 3. Explosive acoustic and pressure thresholds for marine mammals.

Group	Level B harassment		Level A harassment	Serious injury		Mortality
	Behavioral (multiple detonations)	TTS	PTS	Gastro-intestinal tract	Lung	
Low-freq cetacean	163 dB SEL	168 dB SEL or 213 dB SPL _{pk}	183 dB SEL or 219 dB SPL _{pk}	237 dB SPL	39.1M ^{1/3} (1+[D/10.081]) ^{1/2} Pa-sec where: M = mass of the animals in kg D = depth of animal in m	91.4M ^{1/3} (1+[D/10.081]) ^{1/2} Pa-sec where: M = mass of the animals in kg D = depth of animal in m
Mid-freq cetacean	165 dB SEL	170 dB SEL of 224 dB SPL _{pk}	185 dB SEL or 230 dB SPL _{pk}			
High-freq cetacean	135 dB SEL	140 dB SEL or 196 dB SPL _{pk}	155 dB SEL or 202 dB SPL _{pk}			
Phocidae	165 dB SEL	170 dB SEL or 212 dB SPL _{pk}	185 dB SEL or 218 dB SPL _{pk}			
Otariidae	183 dB SEL	188 dB SEL or 226 dB _{pk}	203 dB SEL or 232 dB SPL _{pk}			

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.

Blasting – While the NMFS Technical Guidance (2016) and associated User Spreadsheet include tools for predicting threshold shift isopleths for multiple detonations, the Marine Mammal Commission noted in response to a previous proposed IHA (83 FR 52394, October 17, 2018) that the User Spreadsheet contained some errors in methodology for single detonations.

Following a method generated through consultation with the Marine Mammal Commission, NMFS computed cumulative sound exposure impact zones from the blasting information provided by the City of Ketchikan. Peak source levels of the confined blasts were calculated based on Hempet *et al.* (2007), using a distance of 4 feet and a weight of 75 pounds for a single charge. The total charge weight is defined as the product of the single charge weight and the number of charges. In this case, the maximum number of charges is 60. Explosive energy was then computed from peak pressure of the single maximum charge, using the pressure and time relationship of a shock wave (Urick 1983). Due to time and spatial separation of each single charge by a distance of four feet, the accumulation of acoustic energy is added sequentially, assuming the transmission loss follows cylindrical spreading within the matrix of charges. The SEL from each charge at its source can then be calculated, followed by the received SEL from each charge. Since the charges will be deployed in a grid with a least 4 ft by 4 ft spacing, the received SELs from different charges to a given point will vary depending on the distance of the charges from the receiver. As stated in the “*Detailed Description of Specific Activity,*” the actual spacing between charges will be determined based on how the rock responds to the blasting. Modeling was carried out using 4 ft spacing as this closest potential spacing results in the most conservative (highest) source values and largest resulting impact zones. Without specific information regarding the layout of the charges, the modeling assumes a grid of 7 by 8 charges with an additional four charges located in peripheral locations. Among the various total SELs calculated, the largest value, SEL_{total} (max) is selected to calculate the impact range. Using the pressure versus time relationship (Urick 1983), the frequency spectrum of the explosion can be computed by taking the Fourier transform of the pressure (Weston, 1960). Frequency specific transmission loss of acoustic energy due to absorption is computed using the absorption

coefficient, α (dB/km), summarized by François and Garrison (1982a, b). Seawater properties for computing sound speed and absorption coefficient were based on Ketchikan ocean temperatures recorded from November through March (National Centers for Environmental Information, 2018) and salinity data presented in Vanderhoof and Carls (2012). Transmission loss was calculated using the sonar equation:

$$TL = SEL_{total(m)} - SEL_{threshold}$$

where $SEL_{threshold}$ is the Level A harassment and Level B harassment (TTS) threshold. The distances, R , where such transmission loss is achieved were computed numerically by combining both geometric transmission loss, and transmission loss due to frequency-specific absorption. A spreading coefficient of 20 is assumed. While this spreading coefficient would normally indicate an assumption of spherical spreading, in this instance, the higher coefficient is actually used to account for acoustic energy loss from the sediment into the water column. The outputs from this model are summarized in Table 4 below. For the dual criteria of SELcum and SPLpk shown in Table 4, distances in bold are the larger of the two isopleths, and were used in further analysis. Because the blast is composed of multiple charges arranged in a grid, these distances are measured from any individual charge, meaning that measurement begins at the outermost charges. For additional information on these calculations please refer to the “Ketchikan Detonation Modeling Concept” document which can be found at the following address: <https://www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-construction-activities>.

Table 4. Model Results of Impact Zones for Blasting in Meters (m).

Marine Mammal Hearing Group	Mortality*	Slight lung injury*	GI Tract	PTS: SELcum	PTS: SPLpk	TTS: SELcum	TTS: SPLpk
<i>Low frequency</i>	6	12	24	430**	188	2350	375

<i>cetacean</i>							
<i>Mid frequency cetacean</i>	14	31	24	90	53	430	106
<i>High frequency cetacean</i>	18	42	24	1420	1328	5000	2650
<i>Otariid</i>	12	28	24	30	42**	150	84
<i>Phocid</i>	16	37	24	210	211	1120	420

*Estimates for Mortality and Slight lung injury are based on body size of each individual species, so multiple estimates exist for some marine mammal hearing groups. The value entered into the table is the most conservative (largest isopleth) calculated for that group.

Marine Mammal Occurrence

In this section we provide the information about the presence, density, or group dynamics of marine mammals that will inform the take calculations. Expected marine mammal presence is determined by past observations and general abundance near the Ketchikan waterfront during the construction window. The take requests for this IHA were estimated using local marine mammal data sets (*e.g.*, National Marine Mammal Laboratory databases; Dahlheim *et al.*, 2009) and observations from local Ketchikan charter operators and residents. A recent IHA and associated application for nearby construction (83 FR 37473, August 1, 2018) was also reviewed to identify marine mammal group size and potential frequency of occurrence within the project vicinity.

Harbor Seals

Low numbers of harbor seals are a common observation around the Ketchikan waterfront, and likely utilize other, less developed nearshore habitats within and adjacent to the Level B harassment zone. Harbor seals can occur in the project area year-round with an estimated maximum group size of three animals (83 FR 37473, August 1, 2018, Solstice 2018), and up to three groups of three animals occurring daily in the Level B harassment (TTS) zone (1,120 meters). Additionally, harbor seals could occasionally be found in the Level A harassment (PTS) zone.

Steller Sea Lions

Known Steller sea lion haulouts are well outside of the pinnacle blasting Level B harassment zone. However, Steller sea lions are residents of the wider vicinity and could be present within the Level B harassment zone on any given day of construction. Steller sea lion observations in the project area typically include groups composed of up to 10 animals (83 FR 37473, August 1, 2018, Solstice 2018), with one group potentially present each day.

Harbor Porpoise

Based on observations of local boat charter captains and watershed stewards, harbor porpoise are infrequently encountered in the Tongass Narrows, and more frequently in the nearby larger inlets and Clarence Strait. Therefore, they could potentially transit through both the Level B harassment zone and Level A harassment zone during a blasting event. They could occupy the Ketchikan waterfront and be exposed to the Level A harassment zone during transit between preferred habitats. 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 our impact analysis, we are considering a group to consist of five animals, a value on the high end of the typical group size. The frequency of harbor porpoise occurrence in the project vicinity is estimated to be one group passing through the area per month (83 FR 37473, August 1, 2018, Solstice 2018), but, for our analysis, we conservatively consider a group of five animals could be present every five days (approximately once per week).

Humpback Whales

Based on observations of local boat charter captains and watershed stewards, humpback whales regularly utilize the surrounding waters and are occasionally observed near Ketchikan, most often on a seasonal basis. Most observations occur during the summer with sporadic

occurrences during other periods. The typical humpback whale group size in the project vicinity is between one and two animals observed at a frequency of up to three times per month (83 FR 37473, August 1, 2018, Solstice 2018), but conservatively, a group of two whales could be present every third day.

Killer Whales

Killer whales could occur within the action area year-round. Typical pod sizes observed within the project vicinity range from 1 to 10 animals and the frequency of killer whales passing through the action area is estimated to be once per month (83 FR 37473, August 1, 2018, Solstice 2018). In the **Federal Register** Notice announcing the proposed IHA, NMFS assumed a group of five whales will be present every fifth day (approximately once per week). However, in order to more conservatively account for the reported range of group sizes, the expected group size was increased to 7 killer whales expected to be present each week, which is still in the reported range of 1 to 10 animals. Note that groups could be larger, but we expect that the overall number of authorized takes is sufficient to account for this possibility given the conservative assumption that a pod would be present once per week.

Dall's Porpoise

Based on local observations and regional studies, Dall's porpoise are infrequently encountered in small numbers in the waters surrounding Ketchikan. This body of evidence 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. Tongass Narrows is not a preferred habitat, so if they are present, they would most likely be traveling between areas of preferred forage, which are not within the blasting work window. However, they could still potentially transit through the Level

B or Level A harassment zone infrequently during blasting. Typical Dall's porpoise group sizes in the project vicinity range from 10 to 15 animals observed roughly once per month (83 FR 37473, August 1, 2018, Solstice 2018). In this project, NMFS assumes a group of 10 Dall's porpoises could be present every 10th day, or approximately every other week.

Minke Whale

Based on observations of local marine mammal specialists, the possibility of minke whales occurring in the Tongass Narrows is rare. Minke whales are generally observed individually or in groups of up to three animals. This, along with scientific survey data showing that this species has not been documented within the vicinity, indicates that there is little risk of exposure to blasting. However, the accessible habitat in the Revillagigedo Channel leaves the potential that minke whale could enter the action area. In the **Federal Register** Notice announcing the proposed IHA, NMFS assumed that a group of two whales may be present every tenth day, or approximately every other week. The Commission commented that minke whales tend to be seen individually, not as members of groups. Additionally, the expected frequency of occurrence was conservatively increased from two whales every other week, to two whales each week, based on potentially increasing observations in Southeast Alaska. Therefore, in the final authorization is based on an expected occurrence of two individual whales being present every fifth day, or approximately every week.

Gray Whale

No gray whales were observed during surveys of the inland waters of southeast Alaska conducted between 1991 and 2007 (Dahlheim *et al.*, 2009). It is possible that a migrating whale may venture up Nichols Passage and enter the underwater Level B harassment zone. In the **Federal Register** Notice announcing the proposed IHA, NMFS estimated that one whale may be

present every tenth day, or approximately every two weeks. The Commission commented that gray whales tend to be observed in groups, of generally around two whales. Therefore, in the final authorization, NMFS estimates that a group of two gray whales will be present every tenth day, or approximately every two weeks.

Pacific White-Sided Dolphin

Dolphins are regularly seen within Clarence Strait but have been reported to prefer larger channel areas near open ocean. Their presence within the Tongass Narrows has not been reported. They are not expected to enter the Tongass Narrows toward their relatively small injury zone, so no take by Level A harassment is requested. Pacific white-sided dolphin group sizes generally range from between 20 and 164 animals. For the purposes of this assessment, within the proposed IHA, we assumed one group of 20 dolphins may be present within the Level B harassment zone every tenth day, or about every other week. However, NMFS has conservatively increased the expected group size to 30 dolphins, which is still within the reported group size range for the species.

Take Calculation and Estimation

Here we describe how the information provided above is brought together to produce a quantitative take estimate. Incidental take is estimated for each species by considering the likelihood of a marine mammal being present within the Level A or B harassment zone during a blasting event. Expected marine mammal presence is determined by past observations and general abundance near the Ketchikan waterfront during the construction window, as described above. The calculation for marine mammal exposures is estimated by the following two equations:

Level B harassment estimate = N (number of animals) × number of days animals are expected within Level B harassment zones for blasting.

Level A harassment estimate = N (number of animals) × number of days animals are expected to occur within the Level A harassment zone without being observed by PSOs.

For many species, the equation may also include a term to factor in the frequency a group is expected to be seen, which is explained within the paragraphs for that species.

Harbor Seals

We conservatively estimate that three groups of three harbor seals could be present within the Level B harassment zone on each day of construction and two additional harbor seals could be present within the Level A harassment zone on each day of construction. Because take estimates are based on anecdotal occurrences, including these additional individual harbor seals that could occur in the Level A harassment zone is another conservative assumption. Potential airborne disturbance would be accounted for by the Level B harassment zone, which covers a wider distance. Using these estimates the following number of harbor seals are estimated to be present through the construction period.

Level B harassment: three groups of animals x three animals per group x 50 blasting days
= 450

Level A harassment: two animals x 50 days of blasting = 100

Steller Sea lions

We conservatively estimate that a group of 10 sea lions could be present within the Level B harassment zone on any given day of blasting. No exposure within the blasting Level A harassment zone is expected based on the small size of this zone and behavior of the species in context of the planned mitigation. The Level A harassment zones can be effectively monitored during the marine mammal monitoring program and prevent take by Level A harassment. Using

these estimates the following number of Steller sea lions are estimated to be present in the Level B harassment zone:

Level B harassment: 10 animals daily over 50 blasting days = 500

No take by Level A harassment was requested or is authorized because the small Level A harassment zone can be effectively observed.

Harbor Porpoise

We conservatively estimate and assume that a group of five harbor porpoise could be sighted in the Level B harassment zone every 5th day, or approximately once per week. Additionally, while the City of Ketchikan does not anticipate take by Level A harassment to occur, the cryptic nature of harbor porpoises and large Level A harassment isopleth mean the species could be in the Level A harassment zone without prior observation. Therefore, one additional group of 5 animals could be present in the Level A harassment zone every second week or 10th day, a conservative assumption because this group is in addition to those anticipated in the Level B harassment zone.

Level B harassment: five animals x 50 days of work divided by 5 (frequency of occurrence) = 50

Level A harassment: five animals x 50 days of work divided by 10 (frequency of occurrence) = 25

Humpback Whale

Based on occurrence information in the area, we conservatively estimate that a group of two humpback whales will be sighted within the Level B harassment zone every third day. The City is requesting authorization for 33 takes by Level B harassment of humpback whales. Of this number, we estimate 31 humpback whales will belong to the unlisted Hawaii DPS while three

will belong to the ESA listed Mexico DPS based on the estimated occurrence of these DPSs (Wade *et al.*, 2016). It should be noted that these estimates sum to 34, because take estimates were rounded up to avoid fractional takes of individuals in the DPSs.

Level B: two animals x 50 days of work divided by 3 (frequency of occurrence) = 33

No take by Level A harassment was requested or is authorized because these large whales can be effectively monitored and work can be shutdown when they are present.

Killer Whale

Based on information presented above (*Marine Mammal Occurrence*), including the change in group size which has occurred since proposed IHA, we conservatively estimate that a group of seven whales may be sighted within the Level B harassment zone once every fifth day, or about once per week. Using this number, the following number of killer whales are estimated to be present within the Level B harassment zone:

Level B: seven animals x 50 days of work divided by 5 (frequency of occurrence) = 70.

This number of expected takes has been increased from 50 killer whales in the proposed IHA to 70 in the final authorization.

No take by Level A harassment was requested or is authorized because the relatively small Level A harassment zone can be effectively monitored to prevent take by Level A harassment.

Dall's Porpoise

Based on information presented above (*Marine Mammal Occurrence*) we conservatively estimate and assume that a group of 10 Dall's porpoise could be sighted within the Level B harassment zone every tenth day, or about every other week. Additionally, while the City of Ketchikan does not anticipate take by Level A harassment to occur, the large Level A isopleth

mean the species could be in the Level A harassment zone without prior observation. Therefore, one additional group of 10 animals could be present in the Level A harassment zone every month, which is a conservative assumption because this group is in addition to those anticipated in the Level B harassment zone.

Using this assumption, the following number of Dall's porpoise are estimated to be present in the Level B harassment zone:

Level B harassment: 10 animals x 50 days of work divided by 10 (frequency of occurrence) = 50

Level A harassment: 10 animals x 50 days of work divided by 20 (frequency of occurrence) = 25; because this is a fraction of group, this number is rounded up to 30 to represent 3 full groups of Dall's porpoise.

Minke Whale

Based on information presented above (*Marine Mammal Occurrence*) we conservatively estimate that two minke whales may be sighted within the Level B harassment zone every fifth day, or about once every week. The frequency of occurrence has been increased from every tenth day, as stated in the proposed IHA, to every fifth day here.

Level B harassment: two individual animals x 50 days work divided by 5 (frequency of occurrence) = 20. The expected rate of occurrence has been increased, resulting in a final authorization of 20 minke whales, compared to 10 in the proposed IHA.

No take by Level A harassment was requested or is authorized because the City of Ketchikan can effectively monitor for these whales and shutdown if are present in the Level A harassment zone.

Gray Whale

Based on information presented above (*Marine Mammal Occurrence*) we conservatively estimate that a group of two whales may be sighted within the Level B harassment zone every tenth day, or about every 2 weeks. This group size has been increased from one individual gray whale as shown in the proposed IHA

Level B harassment: two animal x 50 days work divided by 10 (frequency of occurrence) = 10. The final authorized take of gray whales has increased from 5 to 10 individuals due to the change in group size.

No take by Level A harassment was requested or is authorized because the City of Ketchikan can effectively monitor for these whales and shutdown if are present in the Level A harassment zone.

Pacific White-Sided Dolphin

Based on the assumption that Pacific white-sided dolphins are not expected to enter Tongass Narrows, despite their regular occurrence in the Clarence Strait, we estimate that one group of 30 dolphins may be sighted within the Level B harassment zone every tenth day, or about every other week. As explained above in “Marine Mammal Occurrence,” the group size has been increased from 20 to 30 dolphins in the final authorization.

Level B harassment: 30 animals x 50 days of work divided by 10 (frequency of occurrence) = 150. The final authorized take of gray whales has increased from 100, in the proposed IHA, to 150 individuals due to the change in group size.

No take by Level A harassment was requested or is authorized because the relatively small Level A harassment zone can be effectively monitored in order to avoid take by Level A harassment.

Table 5. Authorized Take Estimates as a Percentage of Stock Abundance.

Species	Stock (NEST)	Level A	Level B	Percent of Stock
Humpback Whale	Hawaii DPS (11,398) ^a Mexico DPS (3,264) ^a	0	31 ^a 2	0.34
Minke Whale	Alaska (N/A)	0	20	N/A
Gray Whale	Eastern North Pacific (26,960)	0	10	0.04
Killer Whale	Alaska Resident (2,347) Northern Resident (261) West Coast Transient (243) Gulf of Alaska Transient (587)	0	70	2.98 26.82 28.81 11.93 ^c
Pacific White-Sided Dolphin	North Pacific (26,880)	0	150	0.56
Dall's Porpoise	Alaska (83,400)	30	50	0.10
Harbor Porpoise	Southeast Alaska (975) ^b	25	50	7.69
Harbor Seal	Clarence Strait (31,634)	100	450	1.74
Steller Sea Lion	Eastern U.S (41,638)	0	500	1.20

^a Total estimated stock size for Central North Pacific humpback whales is 10,103. Under the MMPA humpback whales are considered a single stock (Central North Pacific); however, we have divided them here to account for DPSs listed under the ESA. Based on calculations in Wade *et al.* (2016), 93.9 percent of the humpback whales in Southeast Alaska are expected to be from the Hawaii DPS and 6.1 percent are expected to be from the Mexico DPS.

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

^c These percentages assume all 50 takes come from each individual stock, thus the percentage are likely inflated as multiple stocks are realistically impacted.

Mitigation

In order to issue an IHA under section 101(a)(5)(D) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to such activity, and other means of effecting the least practicable impact on such species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of such species or stock for taking for certain subsistence uses (latter not applicable for this action). NMFS regulations require applicants for incidental take authorizations to include information about the availability and feasibility (economic and technological) of equipment, methods, and

manner of conducting such activity or other means of effecting the least practicable adverse impact upon the affected species or stocks and their habitat (50 CFR 216.104(a)(11)).

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

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

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

Between the proposed IHA and this **Federal Register** notice announcing the final IHA, NMFS has made changes to required mitigation measures. NMFS increased the post-blast monitoring from 30 minutes to 1 hour to help ensure that all effects from the blast can be effectively monitored. NMFS also added timing restrictions related to sunrise and sunset to ensure that blasting was conducted during daylight and required monitoring could be completed. NMFS also increased to time between a marine mammal observation in the shutdown zone and when the shutdown zone can be considered cleared to 30 minutes, from 15 minutes, to help ensure that take by Level A harassment is minimized.

Shutdown Zone for in-water Heavy Machinery Work

For in-water heavy machinery work (using, *e.g.*, standard barges, tug boats, barge-mounted excavators, or equipment used to place or remove material), a minimum 10 meter shutdown zone shall be implemented. If a marine mammal comes within 10 meters of such operations, operations shall cease (safely) and vessels shall reduce speed to the minimum level required to maintain steerage and safe working conditions. This type of work could include (but is not limited to) the following activities: (1) movement of blasting barge; (2) drilling of boreholes; (3) dredging of rubble; and (4) transport of dredge material. An operation that requires completion due to safety reasons (*e.g.* material actively being handled by excavator/clamshell), that singular operation will be allowed to be completed. The monitoring of this 10 m shutdown zone can be conducted by construction personal as they perform their other duties.

Additional Shutdown Zones and Monitoring Zones

For blasting, the Level B harassment zone will be monitored for a minimum of 30 minutes prior to the planned blast, and continue for 1 hour (60 minutes) after the blast. If a marine mammal with authorized take remaining is sighted within this monitoring zone, blasting can occur and take will be tallied against the authorized number of takes by Level B harassment. Data will be recorded on the location, behavior, and disposition of the mammal as long as the mammal is within this monitoring zone.

The City of Ketchikan will establish a shutdown zone for a marine mammal species that is greater than its corresponding Level A harassment zone, as measured from any charge in the blasting grid. If any cetaceans or pinnipeds are observed within the shutdown zone, the blasting contractor would be notified and no blast would be allowed to occur until the animals are

observed voluntarily leaving the shutdown zone or 30 minutes have passed without re-sighting the animal in the shutdown zone, or up until 1 hour before sunset. When weather conditions prevent accurate sighting of marine mammals, blasting activities will not occur until conditions in the shutdown zone return to acceptable levels and the entire Level A zone can be monitored and cleared.

Table 6. Blasting Shutdown and Monitoring Zones.

Marine Mammal Hearing Group	Shutdown Zone (m)	Monitoring Zone (m)
<i>Low frequency cetacean</i>	1,000*	2,500
<i>Mid frequency cetacean</i>	100	500
<i>High frequency cetacean</i>	1,500	5,000
<i>Otariid</i>	100*	200
<i>Phocid</i>	250	1,500

Note: These distances are measured from the outermost points of the grid of charges that make up a blast
 * The City of Ketchikan expressed an opinion that the PTS distances for Otariids and LF cetaceans presented in Table 4 seemed uncharacteristically small when compared to the other thresholds resulting from the model. The PTS zones were therefore doubled to 84 m for Otariids and 860 m for LF cetaceans for purposes of mitigation and monitoring, resulting in the Shutdown Zones presented here.

If blasting is delayed due to marine mammal presence, PSO’s will continue monitoring for marine mammals during the delay. If blasting is delayed for a reason other than marine mammal presence, and this delay will be greater than 30 minutes, marine mammal monitoring does not need to occur during the delay. However, if monitoring is halted, a new period of the 30 minute pre-blast monitoring must occur before the rescheduled blast.

Timing and Daylight Restrictions

In-water blasting work is expected to occur from November 15, 2019, to March 15, 2020, but will be limited to September 16, 2019, to April 30, 2020. Pinnacle blasting will be conducted

during daylight hours (sunrise to sunset) to help ensure that marine mammal observers have acceptable conditions to survey the shutdown and monitoring zones. To ensure that blasting does occur between daylight hours, and required pre- and post-blast monitoring can be conducted, blasting must be planned to occur at least 30 minutes after sunrise and 1 hour before sunset. Non-blasting activities, including but not limited to dredging and borehole drilling can occur outside of daylight hours, but the 10-meter general shutdown zone must be maintained.

Non-authorized Take Prohibited

If a marine mammal is observed within the monitoring zone and that species is either not authorized for take or its authorized takes are met, blasting must not occur. Blasting must be delayed until the animal has been confirmed to have left the area or an observation time period of 15 minutes has elapsed without seeing the marine mammal in the monitoring zone.

Blasting BMPs

The City of Ketchikan will use industry BMPs to reduce the potential adverse impacts on protected species from in-water noise and overpressure. These include the use of multiple small boreholes, confinement of the blast (rock stemming), use of planned sequential delays, and all measures designed to help direct blast energy into the rock rather than the water column.

Additional BMPs to minimize impact on marine mammals and other species include adherence to a winter in-water work window, accurate drilling, shot duration, and limiting the blasts to a maximum of one per day. The project will adhere to all Federal and state blasting regulations, which includes the development and adherence to blasting plans, monitoring, and reporting.

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

effecting the least practicable impact on the affected species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance.

Monitoring and Reporting

In order to issue an IHA for an activity, section 101(a)(5)(D) of the MMPA states that NMFS must set forth, “requirements pertaining to the monitoring and reporting of such taking.” The MMPA implementing regulations at 50 CFR 216.104 (a)(13) indicate that requests for authorizations must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present in the proposed action area. Effective reporting is critical both to compliance as well as ensuring that the most value is obtained from the required monitoring.

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

- Occurrence of marine mammal species or stocks in the area in which take is anticipated (*e.g.*, presence, abundance, distribution, density);
- Nature, scope, or context of likely marine mammal exposure to potential stressors/impacts (individual or cumulative, acute or chronic), through better understanding of: (1) action or environment (*e.g.*, source characterization, propagation, ambient noise); (2) affected species (*e.g.*, life history, dive patterns); (3) co-occurrence of marine mammal species with the action; or (4) biological or behavioral context of exposure (*e.g.*, age, calving or feeding areas);
- Individual marine mammal responses (behavioral or physiological) to acoustic stressors (acute, chronic, or cumulative), other stressors, or cumulative impacts from multiple stressors;

- How anticipated responses to stressors impact either: (1) long-term fitness and survival of individual marine mammals; or (2) populations, species, or stocks;
- Effects on marine mammal habitat (*e.g.*, marine mammal prey species, acoustic habitat, or other important physical components of marine mammal habitat); and
- Mitigation and monitoring effectiveness.

Since the proposed IHA, there have been some changes to the monitoring and reporting measures. NMFS has added a requirement to conduct acoustic and pressure monitoring for a “production” blast in addition to the test blast, to ensure blasting isopleths in this IHA are correct. NMFS has also further specified what measurements and information the results of this blast monitoring should include to ensure the results are informative. Additionally, NMFS has added a requirement to notify the Alaska Regional Office and Alaska Stranding Network prior to, and following blasting in order to conform with previous blasting authorizations.

Visual Monitoring

Monitoring by NMFS-approved protected species observers (PSOs) will begin 30 minutes prior to a planned blast and extend through 30 minutes after the blast. This will ensure that all marine mammals in the monitoring zone are documented and that no marine mammals are present within the shutdown zone. No PSOs will be required during other activities associated with pinnacle removal including, but not limited to, bore-hole drilling and dredging. Hauled out marine mammals within the shutdown and monitoring zones will be tallied and monitored closely. PSOs will be stationed at the best vantage points possible for monitoring the monitoring zone (see Figure 3 and 4 of the IHA application); however, should the entire zone not be visible, take will be extrapolated daily, based on anticipated marine mammal occurrence and documented observations within the portion of the monitoring zone observed.

During blasting, there will be two land-based PSOs and one PSO on the barge used for blasting operations, with no duties other than monitoring. Establishing a monitoring station on the barge will provide the observer with an unobstructed view of the injury zones during blasting and direct communication with the operator.

Land based PSOs will be positioned at the best practical vantage points based on blasting activities and the locations of equipment. The land-based observers will be positioned with a clear view of the remaining of the injury zone and will monitor the shutdown zones and monitoring zones with binoculars and a spotting scope. The land-based observers will communicate via radio to the lead monitor positioned on the barge. Specific locations of the observers will be based on blasting activities and the locations of equipment. Shore-based observers will be stationed along the outer margins of the largest shutdown zone.

The monitoring position of the observers will be identified with the following characteristics:

1. Unobstructed view of blasting area;
2. Unobstructed view of all water within the shutdown zone;
3. Clear view of operator or construction foreman in the event of radio failure (lead biologist); and
4. Safe distance from activities in the construction area.

Monitoring of blasting activities must be conducted by qualified PSOs (see below), who must have no other assigned tasks during monitoring periods. The applicant must adhere to the following conditions when selecting observers:

- Independent PSOs must be used (*i.e.*, not construction personnel);

- At least one PSO must have prior experience working as a marine mammal observer during construction activities;
- Other PSOs may substitute education (degree in biological science or related field) or training for experience;
- Where a team of three or more PSOs are required, a lead observer or monitoring coordinator must be designated. The lead observer must have prior experience working as a marine mammal observer during construction; and
- The applicant must submit PSO curriculum vitae (CVs) for approval by NMFS Permits and Conservation Division.

The applicant must ensure that observers have the following additional qualifications:

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

Blast Monitoring

The City of Ketchikan will perform a minimum of one test blast to confirm underwater overpressure values. The City of Ketchikan will conduct underwater monitoring of both this test blast and at least one full scale “production” blast. During blast monitoring, overpressure will be measured during all blasting monitoring with pressure transducers and hydrophones at pre-determined locations. This work will be performed by an experienced contractor with process documents, results, and the blast reports all being approved by a blasting consultant. For monitoring of these blasts, the City of Ketchikan will be required to record the following information:

- Hydrophone equipment and methods: recording device, sampling rate, distance of recording devices from the blast where recordings were made; depth of recording devices;
- Number of charges and the weight of each charge detonated during the blast;
- Spectra and/or waveform of blasts of blasts including power spectral density reported as dB re 1 $\mu\text{Pa}^2/\text{Hz}$; and
- Mean, median, and maximum sound levels (dB re: 1 μPa) of SPLrms, SELcum, single-shot SEL, and SPLpeak.

Reporting

At least 24 hours (+/- 4 hours) prior to blasting, the City of Ketchikan will notify the Office of Protected Resources, NMFS Alaska Regional Office, and the Alaska Regional Stranding Coordinator that blasting is planned to occur, as well as notify these parties within 24 hours (+/- 4 hours) after blasting that blasting actually occurred.

A draft marine mammal monitoring report would be submitted to NMFS within 90 days after the completion of blasting activities. It will include an overall description of work

completed, a narrative regarding marine mammal sightings, and associated PSO data sheets.

Specifically, the report must include:

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

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

Additionally, the City of Ketchikan will submit the report and results of their test blast to NMFS prior to beginning production blasting. This report will include the information outlined in *Test Blast Monitoring*.

In the unanticipated event that the specified activity clearly causes the take of a marine mammal in a manner prohibited by the IHA (if issued), such as a serious injury or mortality, The City of Ketchikan would immediately cease the specified activities and report the incident to the

Office of Protected Resources, NMFS, and the Alaska Regional Stranding Coordinator. The report would include the following information:

- Description of the incident;
- Environmental conditions (*e.g.*, Beaufort sea state, visibility);
- Description of all marine mammal observations in the 24 hours preceding the incident;
- Species identification or description of the animal(s) involved;
- Fate of the animal(s); and
- Photographs or video footage of the animal(s) (if equipment is available).

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

In the event that the City of Ketchikan discovers an injured or dead marine mammal, and the lead PSO determines that the cause of the injury or death is unknown and the death is relatively recent (*e.g.*, in less than a moderate state of decomposition as described in the next paragraph), the City of Ketchikan would immediately report the incident to the Office of Protected Resources, NMFS (301-427-8401), and the Alaska Regional Stranding Coordinator (877-925-7773). The report would include the same information identified in the paragraph above. Activities would be able to continue while NMFS reviews the circumstances of the incident. NMFS would work with the City of Ketchikan to determine whether modifications in the activities are appropriate.

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

Negligible Impact Analysis and Determination

NMFS has defined negligible impact as an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival (50 CFR 216.103). A negligible impact finding is based on the lack of likely adverse effects on annual rates of recruitment or survival (*i.e.*, population-level effects). An estimate of the number of takes alone is not enough information on which to base an impact determination. In addition to considering estimates of the number of marine mammals that might be “taken” through harassment, NMFS considers other factors, such as the likely nature of any responses (*e.g.*, intensity, duration), the context of any responses (*e.g.*, critical reproductive time or location, migration), as well as effects on habitat, and the likely effectiveness of the mitigation. We also assess the number, intensity, and context of estimated takes by evaluating this information relative to population status. Consistent with the 1989 preamble for NMFS’s implementing regulations (54 FR 40338; September 29, 1989), the impacts from other past and ongoing anthropogenic activities are incorporated into this analysis via their impacts on the environmental baseline (*e.g.*, as reflected

in the regulatory status of the species, population size and growth rate where known, ongoing sources of human-caused mortality, or ambient noise levels).

To avoid repetition, our analysis applies to all species listed in Table 5, given that NMFS expects the anticipated effects of the planned blasting 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.

NMFS does not anticipate that serious injury or mortality would occur as a result of the City of Ketchikan's planned blasting. In the absence of mitigation including shutdown zones, these impacts are possible, but at very short distances from the blasts (Table 4). NMFS feels that the mitigation measures stated in "Mitigation," include adequate shutdown zones, marine mammal monitoring, and blasting BMPs sufficient to prevent serious injury or mortality. Thus, no serious injury or mortality authorized. As discussed in the *Potential Effects* section, non-auditory physical effects are not expected to occur.

The authorized number of takes by both Level A harassment and Level B harassment is given in Table 5. Take by Level A harassment is only authorized for harbor seals, harbor porpoises, and Dall's porpoises. As stated in "Mitigation" the City of Ketchikan will establish shutdown zones, greater than Level A harassment zones for blasting, and a blanket 10 m shutdown zone will be implemented for all other in-water use of heavy machinery. The authorization of take by Level A harassment is meant to account for the slight possibility that these species escape observation by the PSOs within the Level A harassment zone. Any take by Level A harassment is expected to arise from a small degree of PTS, because the isopleths

related to PTS are consistently larger than those associated with slight lung and GI tract injury (Table 4).

Blasting is only planned to occur on a maximum of 50 days, with just one blast per day, from November 15, 2019, to March 15, 2020. Because only one blast is authorized per day, and this activity would only generate noise for approximately one second, no behavioral response that could rise to the level of take is expected to occur. Therefore, all takes by Level B harassment are expected to arise from TTS, but we expect only a small degree of TTS, which is fully recoverable and not considered injury.

Although the removal of the rock pinnacle would result in the permanent alteration of habitat available for marine mammals and their prey, the affected area would be discountable. Overall, the area impacted by the project is very small compared to the available habitat around Ketchikan. The pinnacle is adjacent to an active marine commercial and industrial area, and is regularly disturbed by human activities. In addition, for all species except humpbacks, there are no known biologically important areas (BIA) near the project zone that would be impacted by the blasting activities. For humpback whales, Southeast Alaska is a seasonally important BIA from spring through late fall (Ferguson *et al.*, 2015), however, Tongass Narrows is not an important portion of this habitat due to development and human presence. Additionally, the work window is not expected to overlap with periods of peak foraging, and the action area represents a small portion of available habitat. While impacts from blasting to fish can be severe, blasting will occur for a relatively short period of 50 days, meaning the duration of impact should also be short. Any impacts on prey that would occur during that period 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. Therefore, indirect effects on marine mammal prey during the

construction are not expected to be substantial, and these insubstantial effects would therefore be unlikely to cause substantial effects on marine mammals at the individual or population level.

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

- No serious injury or mortality is anticipated or authorized;
- Blasting would not occur during fish runs, avoiding impacts during peak foraging periods;
- Only a very small portion of marine mammal habitat would be temporarily impacted;
- The City of Ketchikan would implement mitigation measures including shut down zones for all blasting and other in-water activity to minimize the potential for take by Level A harassment and the severity if it does occur; and
- TTS that will occur is expected to be of a small degree and is recoverable.

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 monitoring and mitigation measures, NMFS finds that the total marine mammal take from the planned activity will have a negligible impact on all affected marine mammal species or stocks.

Small Numbers

As noted above, only small numbers of incidental take may be authorized under 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 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 5, in the *Take Calculation and Estimation* section, presents the number of animals that could be exposed to received noise levels that may result in take by Level A harassment or Level B harassment for the planned blasting by the City of Ketchikan. Our analysis shows that at most, approximately 29 percent of the best population estimates of each affected stock could be taken, but for most species and stocks, the percentage is below 2 percent. 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 20 authorized takes by Level B harassment for the stock, comparison to the best estimate of stock abundance shows less than 2 percent of the stock is expected to be impacted. Therefore, the numbers of animals authorized to be taken for all species, including minke whale, would be considered small relative to the relevant stocks or populations even if each estimated taking occurred to a new individual—an unlikely scenario for pinnipeds, but a possibility for other marine mammals based on their described transit through Tongass Narrows. For pinnipeds, especially harbor seals and Steller sea lions, occurring in the vicinity of the project site, there will almost certainly be some overlap in individuals present day-to-day, and these takes are likely to occur only within some small portion of the overall regional stock.

Based on the analysis contained herein of the planned activity (including the mitigation and monitoring measures) and the anticipated take of marine mammals, NMFS finds that small

numbers of marine mammals will be taken relative to the population size of the affected species or stocks.

Unmitigable Adverse Impact Analysis and Determination

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

In August of 2018, the City of Ketchikan and its representatives attempted to contact the Alaska Harbor Seal Commission and contacted the Alaska Sea Otter and Steller Sea Lion Commission and the Ketchikan Indian Commission to inform them about the project and gather comment. Neither of the organizations that were successfully contacted expressed concern about the project.

In 2012, the community of Ketchikan had an estimated subsistence take of 22 harbor seals and 0 Steller sea lions (Wolf *et al.*, 2013). Hunting usually occurs in October and November (Alaska Department of Fish and Game (ADF&G) 2009), but there are also records of relatively high harvest in May (Wolfe *et al.*, 2013). 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 will not have an adverse impact on the availability

of marine mammals for subsistence use at locations farther away, where these activities are expected to take place. Some minor, short-term harassment of the harbor seals could occur, but this is not likely to have any measureable effect on subsistence harvest activities in the region. Additionally, blasting associated with the project is expected to occur from November 15 to March 15. This means that blasting, and the associated harassment of marine mammals will only overlap with a small portion of the expected period of subsistence harvest. Based on the spatial separation and partial temporal separation of blasting activities and subsistence harvest, no changes to availability of subsistence resources are expected to result from the City of Ketchikan's planned activities.

Based on the description of the specified activity, the measures described to minimize adverse effects on the availability of marine mammals for subsistence purposes, and the mitigation and monitoring measures, NMFS has determined that there will not be an unmitigable adverse impact on subsistence uses from City of Ketchikan'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 proposed action (*i.e.*, the issuance of an incidental harassment authorization) with respect to potential impacts on the human environment.

This action is consistent with categories of activities identified in 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 IHA qualifies 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 the NMFS Alaska Regional Office, whenever we propose to authorize take for endangered or threatened species.

There is one marine mammal species (Mexico DPS humpback whale) with confirmed occurrence in the project area that is listed as endangered under the ESA. The NMFS Alaska Regional Office Protected Resources Division issued a Biological Opinion on July 16, 2019 under section 7 of the ESA, on the issuance of an IHA to the City of Ketchikan under section 101(a)(5)(D) of the MMPA by the NMFS Permits and Conservation Division. The Biological Opinion concluded that the proposed action is not likely to jeopardize the continued existence of Mexico DPS humpback whale, and is not likely to destroy or adversely modify critical habitat because none exists.

Authorization

NMFS has issued an IHA to the City of Ketchikan for the potential harassment of small numbers of nine marine mammal species incidental to the rock pinnacle removal project in Tongass Narrows, near Ketchikan, Alaska, provided the previously mentioned mitigation, monitoring and reporting are incorporated.

Dated: July 25, 2019.

Donna S. Wieting,

Director, Office of Protected Resources,

National Marine Fisheries Service.

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