BILLING CODE 3510-22-P

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; request for comments.

SUMMARY: NMFS has received a request from City of Ketchikan for authorization to take marine mammals incidental to underwater confined rock blasting in Ketchikan, Alaska. Pursuant to the Marine Mammal Protection Act (MMPA), NMFS is requesting comments on its proposal to issue an incidental harassment authorization (IHA) to incidentally take marine mammals during the specified activities. NMFS is also requesting comments on a possible one-year renewal that could be issued under certain circumstances and if all requirements are met, as described in *Request for Public Comments* at the end of this notice. NMFS will consider public comments prior to making any final decision on the issuance of the requested MMPA authorizations and agency responses will be summarized in the final notice of our decision.

DATES: Comments and information must be received no later than [*insert date 30 days after date of publication in the FEDERAL REGISTER*].

ADDRESSES: Comments should be addressed to Jolie Harrison, Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service.

Physical comments should be sent to 1315 East-West Highway, Silver Spring, MD 20910 and electronic comments should be sent to *ITP.redding@noaa.gov*.

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

FOR FURTHER INFORMATION CONTACT: 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.

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 preliminarily determined that the issuance of the proposed IHA qualifies to be categorically excluded from further NEPA review.

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

Summary of Request

On 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 Proposed Activity

Overview

The City of Ketchikan proposes 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 planned to occur from September 2019 through April 2020, and the action has the potential to affect waters in the Tongass Narrows and nearby Revillagigedo Channel, approximately 3 miles to the south.

Dates and Duration

The project is scheduled to occur from September 16, 2019 through April 30, 2020, but the blasting portion of the activities is expected to occur between November 15, 2019 and March 15, 2020. This work window will avoid periods of known salmon and eulachon spawning, minimizing impact on these species and on marine mammals who may be attracted to these prey sources. Blasting is only planned for 50 days, so it will not occur each day during that period. Blasting will occur once per day, with the blast lasting approximately one second a day, and only during daylight hours.

Specific Geographic Region

The City of Ketchikan is located in Southeast Alaska. The proposed activities will take place offshore from cruise ship Berth II in Ketchikan, Alaska, on the Tongass Narrows water-body (see Figure 1 of IHA application). Berth II is located in the southeastern portion of Ketchikan, opposite Pennock Island and near the mouth of Ketchikan Creek. The rock pinnacle to be removed sits in the channel between Pennock Island and the City of Ketchikan on Revillagigedo Island approximately 1,000 feet (ft) (305 meters (m)) west of Berth II. The immediate area is part of the Port of Ketchikan, an active marine commercial and industrial area.

The region of activity originates in the Tongass Narrows and extends southeast into the Revillagigedo Channel (approximately 3.1 miles (5 km) from Ketchikan). Impacts from all project activities are not expected to extend further than about three miles northeast of the City, where underwater noise would be impeded by landmasses.

Detailed Description of Specific Activity

Blasting

A submerged rock pinnacle sits in the channel off of Berth II, limiting vessel navigation during low tide and high wind conditions. An underwater rock pinnacle near the cruise ship

docks must be removed to allow ship traffic proper access in and out of the berths. This pinnacle, roughly 320 ft (97.5 m) by 150 ft (45.7 m), requires blasting for removal to a depth of approximately 42 ft (12.8 m) mean lower low water (MLLW).

Work includes equipment mobilization, drilling of small boreholes (less than 8 inches), rock pinnacle removal through blasting, dredging of blasted material and transport of the material to an appropriate upland stockpile or placement site, and equipment demobilization. Boreholes will be drilled through casings and from stationary barges, held on site by spuds and/or anchors. NMFS has authorized take in association with certain types of drilling in other projects, (83 FR 53217, October, 22, 2018), but those typically have much larger holes being drilled and/or other circumstances leading to an expectation of louder sound levels than are expected here. Because of the small borehole size, acoustic impacts from drilling are not expected to rise to the level of a take, and take is not proposed to be authorized for drilling activities, so its impacts are discussed minimally in this document.

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 proposed 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"). This borehole grid pattern would have a minimal spacing of four ft between each charge, but this spacing could increase to six or more

feet based on observations of how the rock is responding to blasting. For the purposes of impact modeling, four foot spacing was assumed as this minimal distance results in the most conservative impact zone estimates. Rock stemming locks the explosive material into the borehole to assure that most of the resulting energy enters the surrounding rock rather than the water column. This mitigates, or reduces, the blast energy released into the water. When the blast is detonated, each small borehole is triggered in a sequential manner to optimize rock fragmentation while minimizing underwater overpressure. This sequence is also important in reducing the amount of energy required to fracture the rock.

The use of multiple boreholes, confinement of the blast (rock stemming), and use of planned sequential delays, all help to direct the blast energy into the rock rather than the water column. Other best management practices (BMPs) include adherence to a winter in-water work window to avoid fish spawning periods (September 16, 2019 through April 30, 2020), accurate drilling, minimal blast 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. All of the proposed BMPs support the reduction of potential adverse impacts on protected species from in-water noise and overpressure.

Dredging

Dredging of the approximately 7,500 cubic yards (approximately 5734 m^3) of material freed by blasting will occur to bring the area to approximately -42 ft MLLW. Material will be removed and placed at the placement site using either a mechanical dredge or excavator deployed on a stationary barge. Material will be transported to an appropriate upland stock pile

or placement site. While dredge material is removed and placed, barges will be held stationary by spuds and/or anchors.

Dredging is considered to be a low-impact activity for marine mammals, producing non-pulsed sound and being substantially quieter in terms of acoustic energy output than sources such as seismic airguns and impact pile driving. Noise produced by dredging operations has been compared to that produced by a commercial vessel travelling at modest speed (Robinson *et al.*, 2011). Further discussion of dredging sound production may be found in the literature (e.g., Richardson *et al.*, 1995, Nedwell *et al.*, 2008, Parvin *et al.*, 2008, Ainslie *et al.*, 2009). Because dredging is expected to produce sounds similar to daily port activities, a marine mammal would not be expected to react to the sound nor subsequently be harassed. Therefore, the effects of dredging on marine mammals are not expected to rise to the level of a take. As stated, take is highly unlikely and is not proposed to be authorized for dredging activities, so its impacts are discussed minimally in this document.

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

Description of Marine Mammals in the Area of Specified Activities

Sections 3 and 4 of the application summarize available information regarding status and trends, distribution and habitat preferences, and behavior and life history, of the potentially affected species. Additional information regarding population trends and threats may be found in NMFS's Stock Assessment Reports (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 Proposed Survey Areas.

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	*Eschrichtius robustus*	Eastern North Pacific	-, -, N	26,960 (0.05, 25,849, 2016)	801	138
Family Balaenidae						
Humpback whale	*Megaptera novaeangliae*	Central North Pacific	E, D,Y	10,103 (0.3; 7,890; 2006)	83	25
Minke whale	*Balaenoptera acutorostrata*	Alaska	-, N	N.A.	N.A.	N.A.
Order Cetartiodactyla – Cetacea – Superfamily Odontoceti (toothed whales, dolphins, and porpoises)						
Family Delphinidae						
Killer whale	*Orcinus orca*	Alaska Resident	-, N	2,347 (N.A.; 2,347; 2012)	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	*Lagenorhynchus obliquidens*	North Pacific	-,-; N	26,880 (N.A.; N.A.; 1990)	N.A.	0
Family Phocoenidae						
Harbor porpoise	*Phocoena phocoena*	Southeast Alaska	-, Y	975 (0.10; 896; 2012)	8.95	34
Dall's porpoise	*Phocoenoides dalli*	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	*Eumetopias jubatus*	Eastern U.S.	-,-, N	41,638 (N.A.; 41,638; 2015)	2,498	108
Family Phocidae (earless seals)						

Harbor seal	*Phoca vitulina richardii*	Clarence Strait	-, N	31,634 (N.A.; 29,093; 2011)	1,222	41

[1] - 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 proposed survey 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 proposed authorizing 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.

Harbor Seals

The Clarence Strait stock of harbor seals is not classified as a strategic stock (Muto *et al.*, 2017). Harbor seals occurring near Ketchikan belong to the Clarence Strait harbor seal stock. Harbor seals belonging to the Clarence Strait stock have maintained an increasing population over the past 5 years. The latest stock assessment analysis indicates that the Clarence Strait population trend is an increase of 921 seals per year, with a low probability (21 percent) that the stock is decreasing based on 5-year trend analysis (Muto *et al.*, 2018).

Harbor seals inhabit coastal and estuarine waters off Baja California; north along the western coasts of the United States, British Columbia, and Southeast Alaska; west through the Gulf of Alaska and Aleutian Islands; and in the Bering Sea north to Cape Newenham and the

Pribilof Islands. They haul out on rocks, reefs, beaches, and drifting glacial ice, and feed in marine, estuarine, and occasionally fresh waters (Muto *et al.*, 2017).

Harbor seals are common in the inside waters of southeastern Alaska. There are no documented long-term haulout sites for harbor seals in Tongass Narrows; seasonal foraging is known to occur at the mouth of Ketchikan Creek (See Figure 2 in IHA Application), typically during late summer/early fall pink salmon runs (See IHA Application). Harbor seals are known to occupy the Ketchikan harbor directly adjacent to the planned pinnacle removal. Daily sightings of low numbers of harbor seals in the immediate vicinity of the project are common.

Steller sea lion

The Steller sea lion is the largest of the eared seals, ranging along the North Pacific Rim from northern Japan to California, with centers of abundance and distribution in the Gulf of Alaska and Aleutian Islands. Steller sea lions were listed as threatened range-wide under the ESA on November 26, 1990 (55 FR 49204). Subsequently, NMFS published a final rule designating critical habitat for the species as a 20 nautical mile buffer around all major haulouts and rookeries, as well as associated terrestrial, air and aquatic zones, and three large offshore foraging areas (58 FR 45269; August 27, 1993). In 1997, NMFS reclassified Steller sea lions as two distinct population segments (DPS) based on genetic studies and other information (62 FR 24345; May 5, 1997). Steller sea lion populations that primarily occur west of 144° W (Cape Suckling, Alaska) comprise the western DPS (wDPS), while all others comprise the eastern DPS (eDPS); however, there is regular movement of both DPSs across this boundary (Jemison *et al.*, 2013). Due to the distance from this DPS boundary, NMFS is only considering eastern DPS Steller sea lions as present in the action area. Therefore, animals potentially affected by the project are assumed to be part of the eastern stock and the western stock is not discussed here.

Steller sea lions range along the North Pacific Rim from northern Japan to California, with centers of abundance and distribution in the Gulf of Alaska and Aleutian Islands. Large numbers of individuals disperse widely outside of the breeding season (late May to early July), thus potentially intermixing with animals from other areas, probably to access seasonally important prey resources (Muto *et al.*, 2017).

The current total population for the eastern stock is estimated at 71,562 (Johnson and Fritz 2014) with the U.S. portion of that stock totaling 41,638 and the southeast Alaska region supporting 28,594 eastern Steller sea lions (Muto *et al.*, 2018). Modeling reporting in the most recent stock assessment indicates population growth of 4.76 percent per year between 1989 and 2015.

There are several mapped and regularly monitored long-term Steller sea lion haulouts surrounding Ketchikan, such as Grindall island (approximately 20 miles from Ketchikan), West Rocks (36 miles), or Nose Point (37 miles), but none within Tongass Narrows (Fritz *et al.*, 2015). Sea lions are rarely observed in the Tongass narrows during the winter (See IHA Application). Fritz *et al.* (2015) reported adult counts at Grindall Island, located approximately 20 miles away from the project area, averaged about 190 between 2002 and 2015. No pups were recorded during this timeframe. West Rock averaged over 650 adults with 0 to 3 pups observed over the same timeframe. These long-term and seasonal haulouts are important habitat for Steller sea lions, but all are outside of the action area.

Grindall Island is approximately 20 miles outside of the portion of the action area where sound from the blasting is expected to rise to the level of take, north and west of the Tongass Narrows. Given that sea lion presence in Tongass Narrows mostly occurs during the Chinook run, outside of the in-water work window, and the nearest haulout site is outside of the action

area, it is expected that Steller sea lion exposure to pinnacle blasting will be low. This has been confirmed by local observers, who have reported one to three sea lions in the Tongass Narrows near Ketchikan during the Chinook run, and otherwise rarely observed any.

In summary, Steller sea lions are common throughout the inside waters of southeast Alaska and reside in areas nearby Tongass Narrows, however are not commonly observed in Tongass Narrows outside of the Chinook run. However due to the proximity of the Grindall Island haulout and the possibility of Steller sea lion movement around this haulout, they are potentially present year-round within the action area.

Harbor Porpoise

Because the abundance estimates are 12 years old and the frequency of incidental mortality in commercial fisheries is not known, the Southeast Alaska stock of harbor porpoise is classified as a strategic stock (Muto *et al.*, 2017).

There are three harbor porpoise stocks in Alaska including the Southeast Alaska stock, Gulf of Alaska stock, and the Bering Sea stock. Only the Southeast Alaska stock occurs in the project vicinity. A review of survey data collected from 2010 through 2012 calculated an abundance estimate of 975 harbor porpoises (Dahlheim *et al.*, 2015). This estimate was split into the northern and southern portion of the unit and only included inside waters of southeast Alaska. Harbor porpoise abundance in the southern portion, including Ketchikan, is estimated to be 577. However, this number is likely biased low due to survey methodology (Muto *et al.*, 2017).

Older abundance surveys which included both coastal and inside waters of southeast Alaska resulted in an observed abundance estimate of 3,766 porpoise (Hobbs and Waite 2010). Correction factors for observer perception bias and porpoise availability at the surface were used

to develop an estimated corrected abundance of 11,146 harbor porpoise in both the coastal and inside waters of Southeast Alaska.

Harbor porpoise primarily frequent coastal waters, and in the Gulf of Alaska and Southeast Alaska, they occur most frequently in waters less than 100 meters (Dahlheim *et al.*, 2009). Within the inland waters of Southeast Alaska, the harbor porpoise distribution is clumped, with greatest densities observed in the Glacier Bay/Icy Strait region, and near Zarembo and Wrangell Islands and the adjacent waters of Sumner Strait (Muto *et al.*, 2017).

Harbor porpoise are spotted sporadically from marine tour ships around Ketchikan (See IHA Application). One sighting every three weeks was reported, typically north of the Tongass Narrows in Behm Canal. The duration of these animals remaining in the area is unknown. The mean group size of harbor porpoise in Southeast Alaska is estimated at two individuals (Dahlheim *et al.*, 2009). Therefore, while less common within the Tongass Narrows than nearby areas, harbor porpoise could potentially pass through the area and/or occupy the Revillagigedo Channel year-round.

Humpback Whales

The humpback whale is distributed worldwide in all ocean basins. In winter, most humpback whales occur in the subtropical and tropical waters of the Northern and Southern Hemispheres, and migrate to high latitudes in the summer to feed (Johnson and Wolman 1984).

Under the MMPA, there are three stocks of humpback whales in the North Pacific: (1) the California/Oregon/Washington and Mexico stock, consisting of winter/spring populations in coastal Central America and coastal Mexico which migrate to the coast of California to southern British Columbia in summer/fall; (2) the central North Pacific stock, consisting of winter/spring populations of the Hawaiian Islands which migrate primarily to northern British

Columbia/Southeast Alaska, the Gulf of Alaska, and the Bering Sea/Aleutian Islands; and (3) the western North Pacific stock, consisting of winter/spring populations off Asia which migrate primarily to Russia and the Bering Sea/Aleutian Islands. The central north Pacific stock is the only stock that is found near the project activities.

On September 8, 2016, NMFS published a final rule dividing the globally listed endangered species into 14 DPSs under the ESA, removing the worldwide species-level listing, and in its place listing four DPSs as endangered and one DPS as threatened (81 FR 62259; effective October 11, 2016). Two DPSs (Hawaii and Mexico) are potentially present within the action area (Wade *et al.*, 2016). This study found a strong majority of whales present in the area belong to the delisted Hawaii DPS, while less than 10 percent of the whales expected within Southeast Alaska belong to the threatened Mexico DPS. Wade *et al.* (2016) calculated stock estimates for the newly recognized DPS's: 11,398 for Hawaii and 3,264 for Mexico. Wade *et al.* (2016) reports a distribution of 93.9 percent Hawaii DPS vs 6.1 percent Mexico DPS humpback whale observation percentage in Southeast Alaska and these relative abundance percentages are used in the analysis contained within this document.

Humpback whales are the most commonly observed baleen whale in the area and surrounding Southeast Alaska, particularly during spring and summer months. Humpback whales in Alaska, although not limited to these areas, return to specific feeding locations such as Frederick Sound, Sitka Sound, Glacier Bay, Icy Straight, Lynn Canal, and Prince William Sound, as well as other similar coastal areas (Hendrix *et al.*, 2011).

Summertime observations show humpback whales commonly transit the Tongass Narrows, particularly in late May into June (See IHA Application). Wintertime observations are reported occasionally, though not annually. Humpback whales are most likely to occur in the

action area during periods of seasonal prey aggregations which typically occur in spring and can occur in summer and fall (Freitag 2017, as cited in 83 FR 22009, May 11, 2018). Herring salmon, eulachon, and euphausiids (krill) are among the species that congregate ephemerally (HDR 2003). When humpback whales come into the Narrows to feed, they often stay in the channel for a few days at a time (Freitag 2017).

In conclusion, humpback whales could be present within the action area at any point during the year. They are most likely to occur seasonally during periods of prey aggregation, typically during the late spring and summer months.

Killer Whale

Killer whales are found throughout the North Pacific. On the west coast of North America killer whales occur along the entire Alaskan coast, in British Columbia and Washington inland waterways, and along the outer coasts of Washington, Oregon, and California (Muto *et al.*, 2017). Seasonal and year-round occurrence has been noted for killer whales throughout Alaska and in the intracoastal waterways of British Columbia and Washington State, where whales have been labeled as "resident," "transient," and "offshore" type killer whales based on aspects of morphology, ecology, genetics and behavior.

Killer whales occurring near Ketchikan could belong to one of four different stocks: Eastern North Pacific Alaska resident stock (Alaska residents); Eastern North Pacific Northern resident stock (Northern residents); Gulf of Alaska, Aleutian Islands, and Bering Sea transient stock (Gulf of Alaska transients); or West Coast transient stock (Muto *et al.*, 2017). The Northern resident stock is a transboundary stock, and includes killer whales that frequent British Columbia, Canada, and southeastern Alaska (Muto *et al.*, 2018).

In recent years, a small number of the Gulf of Alaska transients (identified by genetics and association) have been seen in southeastern Alaska; previously only West Coast transients had been seen in southeastern Alaska (Muto *et al.*, 2017). Therefore, the Gulf of Alaska transient stock occupies a range that includes southeastern Alaska. Photo-identification studies have identified 587 individual whales in this stock.

The West Coast transient stock includes animals that occur in California, Oregon, Washington, British Columbia and southeastern Alaska. Analysis of photographic data identifies 243 individual transient killer whales, however this minimum population size estimate does not include whales that belong to this stock but occur in California or the "outer coast" portion of the stock (Muto *et al.,* 2017).

Local citizens (See IHA Application) report that killer whale pods frequent the Tongass Narrows area, with a peak abundance of 20 to 30 during the Chinook salmon run, however the work window is not expected to align with major times of fish spawning. Transient killer whales are known to prey on marine mammals (Muto *et al.*, 2018), so their presence may be less dependent on fish spawning runs. Still, wintertime observations are less common, with a group of five whales reported transiting the narrows in winter 2016/2017, but none the following winter as of January 2018. Despite being rare in occurrence during the proposed time of construction (pods expected to absent more often than present), it must be acknowledged that killer whales often travel in pods and would occur as such if they were to occur at all in the project area. Typical pod sizes observed within the Tongass Narrows area range from 1 to 10 animals and the frequency of killer whales passing through the action area is estimated to be once per month (Solstice 2018, as cited in 83 FR 37473, August 1, 2018). For the purposes of this request we estimate that a group of five whales (pod) may occur near the action area occasionally. While

we are assuming a group size in the middle of the expected range, we are assuming a higher frequency of group occurrence (See "Estimated Take" section below). Due to the wide variety of life history strategies of the different killer whale populations, they could be present within the action area at any time throughout the year.

Dall's Porpoise

Dall's porpoise are widely distributed across the entire North Pacific Ocean. Throughout most of the eastern North Pacific they are present during all months of the year, although there may be seasonal onshore-offshore movements along the west coast of the continental United States and winter movements of populations out of Prince William Sound and areas in the Gulf of Alaska and Bering Sea (Muto *et al.*, 2017).

Dahlheim *et al.* (2009) found Dall's porpoise throughout Southeast Alaska, with concentrations of animals consistently found in Lynn Canal, Stephens Passage, Icy Strait, upper Chatham Strait, Frederick Sound, and Clarence Strait. Local observers do not report specific sightings of Dall's porpoise, which typically show a strong vessel attraction (Muto *et al.*, 2017) making observations easy for a keen eye. The mean group size of Dall's porpoise in Southeast Alaska is estimated at approximately three individuals (Dahlheim *et al.*, 2009; Jefferson *et al.*, 2019), however, in the Ketchikan vicinity, Dall's porpoises are reported to typically occur in groups of 10-15 animals, with an estimated maximum group size of 20 animals (Freitag 2017, as cited in 83 FR 22009, May 11, 2018). Jefferson *et al.* (2019) presents historical survey data showing few sightings in the Ketchikan area, and based on these occurrence patterns, concludes that Dall's porpoise rarely come into narrow waterways, like Tongass Narrows. Overall, sightings of Dall's porpoise are infrequent near Ketchikan, but they could be present on any given day during the construction period.

Minke Whale

In the North Pacific minke whales occur from the Bering and Chukchi Seas south to near the Equator (Muto *et al.*, 2017). Dahlheim *et al.* (2009) observed minke whales during the spring and summer, with multiple sightings near the north end of Clarence Strait and one observation near the Dixon entrance. Observations were concentrated near the entrance to Glacier Bay, far north of the work area. Local observers do not report observations of minke whales, and that they are considered rare in waters around Ketchikan. The Alaska stock of minke whales occurs in Southeast Alaska. At this time, it is not possible to produce a reliable estimate of minimum abundance for this wide-ranging stock. No estimates have been made for the number of minke whales in the entire North Pacific. Surveys in 2001-2003 of an area ranging from Kenai Fjords in the Gulf of Alaska to the central Aleutian Islands estimate 1,233 animals (Zerbini *et al.*, 2006). 2010 surveys on the eastern Bering Sea shelf included 1,638 kilometer of effort and provide a provisional estimate of 2,020 whales (Friday *et al.*, 2013). Neither of these estimates corrected for animals missed on the trackline and only surveyed a portion of the stock's range. Due to lacking abundance estimates the current minimum population number is considered unknown. While considered rare within the vicinity, minke whales could enter the action area at any time throughout the year.

Gray Whale

The Eastern North Pacific (ENP) stock of gray whale was delisted from the ESA in 1994 (NMFS 1994). It is not listed as "depleted" under the MMPA. Crossover in range between the ESA-endangered Western North Pacific (WNP) stock is considered rare, though not unheard of. Various tagging, photo-identification, and genetic studies showed 27 to 30 whales identified in the WNP off Russia have been observed in the ENP, including the coastal waters of Canada, the

United States, and Mexico (Carretta *et al.*, 2017, Caretta *et al.*, 2019 DRAFT). These WNP gray whales are not expected to be present during the proposed activity, because the project occurs primarily during late fall to early spring. At this time, gray whales are generally in their wintering grounds, with the WNP primarily overwintering in the Western Pacific (Carretta *et al.*, 2017).

The ENP stock of gray whale primarily spends summer and autumn in Chukchi, Beaufort and northwestern Bering Seas, but some members of the group can occupy the waters between Kodiak Island down to Northern California during this time (Carretta *et al.*, 2017). Winter migration brings these animals to Baja California, Mexico. Population size is calculated based on migrating whales counted as they pass the central California coast; the most recent estimate of ENP abundance is 20,990 (Durban *et al.*, 2013). A photographic mark-recapture study (Calambokidis *et al.*, 2014) calculated an abundance estimate for the PCFG of 209 whales. The population size has been stable or increasing over the last several decades (Muto *et al.*, 2017).

A study of gray whale abundance from Northern California to British Columbia (Calambokidis *et al.*, 2014) analyzed seasonal timing and abundance of ENP gray whales over 13 years (1998 through 2010). Whales were sighted every day, however very few during December through February when most whales are in or migrating to Mexico. During this study period, 25 whales were reported in the entire Southeast Alaska region, five of which occurred in November, within the proposed construction window (November to March).

Gray whales are not generally reported by Ketchikan residents. A gray whale entering the Tongass Narrows appears highly unlikely, however a gray whale could migrate through or near the Dixon Entrance during November, and possibly travel up the Nichols Channel into the action area as it extends into the Revillagigedo Channel.

A gray whale sighting within the action area would be considered extremely rare, however they could travel up the Revillagigedo Channel during the work period.

Pacific White-Sided Dolphin

Pacific white-sided dolphin are not designated as "depleted" under the MMPA nor listed as "threatened" or "endangered" under the ESA. Because Pacific white-sided dolphin are considered common in the waters of Alaska and because the number of human-related removals is currently thought to be minimal, this stock is not a strategic stock (Muto *et al.*, 2017).

Pacific white-sided dophins (North Pacific Stock) have an estimated population size of 26,880 in the most recent stock assessments (2018). Surveys for the Alaska stock of Pacific white-sided dolphin were conducted in the late 1980s and early 1990s (Buckland *et al.*, 1993) and more recently in 2005, 2006, 2014 and 2016. The abundance estimate is based on recently published report by NMFS (James *et al.*, 2018).

Dalheim *et al.* (2009) frequently encountered Pacific white-sided dolphin in Clarence Strait with significant differences in mean group size and rare enough encounters to limit the seasonality investigation to a qualitative note that spring featured the highest number of animals observed. These observations were noted most typically in open strait environments, near the open ocean. Mean group size was over 20, with no recorded winter observations nor observations made in the Nichols Passage or Behm Canal, located on either side of the Tongass Narrows.

Though generally preferring more pelagic, open-water environments, Pacific white-sided dolphin could be present within the action area during the construction period.

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, *Kogia*, river dolphins, cephalorhynchid, *Lagenorhynchus cruciger* & *L. australis*)	275 Hz to 160 kHz
Phocid pinnipeds (PW) (underwater) (true seals)	50 Hz to 86 kHz
Otariid pinnipeds (OW) (underwater) (sea lions and fur seals)	60 Hz to 39 kHz

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

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

For more detail concerning these groups and associated frequency ranges, please see NMFS (2018) for a review of available information. Nine marine mammal species (seven cetacean and two pinniped (one otariid and one phocid) species) have the reasonable potential to co-occur with the proposed survey 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

This section includes a summary and discussion of the ways that components of the specified activity may impact marine mammals and their habitat. The *Estimated Take by*

Incidental Harassment section later in this document includes a quantitative analysis of the number of individuals that are expected to be taken by this activity. The *Negligible Impact Analysis and Determination* section considers the content of this section, the *Estimated Take by Incidental Harassment* section, and the *Proposed Mitigation* section, to draw conclusions regarding the likely impacts of these activities on the reproductive success or survivorship of individuals and how those impacts on individuals are likely to impact marine mammal species or stocks.

Description of Sound

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

sound levels in this document are referenced to a pressure of 1 µPa and all airborne sound levels in this document are referenced to a pressure of 20 µPa.

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

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

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

anthropogenic sound (*e.g.*, vessels, dredging, aircraft, construction). A number of sources contribute to ambient sound, including the following (Richardson *et al.*, 1995):

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

interest (*e.g.*, a passing vessel) is sometimes termed background sound, as opposed to ambient sound.

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

Description of Sound Sources

In-water construction activities associated with the project would include dredging, borehole drilling, and blasting. Sound sources can be divided into broad categories based on various criteria or for various purposes. With regard to temporal properties, sounds are generally considered to be either continuous or transient (*i.e.*, intermittent). Continuous sounds are simply those whose sound pressure level remains above ambient sound during the observation period (ANSI, 2005). Intermittent sounds are defined as sounds with interrupted levels of low or no sound (NIOSH, 1998). Sound sources may also be categorized by spectral property. The sounds produced by the City of Ketchikan's activities fall into one of two general sound types: Impulsive and non-impulsive (defined in the following). The distinction between these two

sound types is important because they have differing potential to cause physical effects, particularly with regard to hearing (*e.g.*, Ward 1997 in Southall *et al.*, 2007). Please see Southall *et al.* (2007) for an in-depth discussion of these concepts.

Impulsive sound sources (*e.g.*, explosions, gunshots, sonic booms, impact pile driving) are by definition intermittent, and produce signals that are brief (typically considered to be less than one second), broadband, atonal transients (ANSI 1986; Harris 1998; NIOSH 1998; ISO 2003; ANSI 2005) and occur either as isolated events or repeated in some succession. Impulsive sounds are all characterized by a relatively rapid rise from ambient pressure to a maximal pressure value followed by a rapid decay period that may include a period of diminishing, oscillating maximal and minimal pressures, and generally have an increased capacity to induce physical injury as compared with sounds that lack these features.

Non-impulsive sounds can be tonal, narrowband, or broadband, brief or prolonged, and may be either continuous or intermittent (ANSI 1995; NIOSH 1998). Some of these non-impulsive sounds can be transient signals of short duration but without the essential properties of impulses (*e.g.*, rapid rise time). Examples of non-impulsive sounds include those produced by vessels, aircraft, machinery operations such as drilling or dredging, vibratory pile driving, and active sonar systems. The duration of such sounds, as received at a distance, can be greatly extended in a highly reverberant environment.

Explosives used for blasting emit an impulsive sound, which is characterized by a short duration, abrupt onset, and rapid decay. Exposure to high intensity sound may result in behavioral reactions and auditory effects such as a noise-induced threshold shift—an increase in the auditory threshold after exposure to noise (Finneran *et al.*, 2005).

The proposed project also includes the use of various low-level non-impulsive acoustic sources, including dredging and small diameter, borehole drilling, that would consistently emit noise for an extended period of time and increase vessel traffic in the Tongass Narrows. The source levels as well as impacts from dredging and fill placement activities are sources with generally lower source levels than many other sources we consider and are not thought to be dissimilar to other common industrial noise sources at a working port, such as Tongass Narrows. Because dredging is expected to produce sounds similar to daily port activities, a marine mammal would not be expected to react to the sound nor subsequently be harassed. Based on this, NMFS does not generally authorize take for dredging activities, including this project, where dredging will occur in a busy port. Additionally, while take has been authorized associated with drilling activities in other IHAs (83 FR 53217, October, 22, 2018), these have been for larger diameter drilling associated with piles. The borehole drilling associated with blasting is small diameter, and as such, are not thought to be dissimilar to other common industrial noise sources at a working port, such as Tongass Narrows. Because borehole drilling is expected to produce sounds similar to daily port activities, a marine mammal would not be expected to react to the sound and therefore would not experience harassment. Based on this, NMFS feels it is not necessary to authorize take for these drilling activities.

Acoustic Impacts

Anthropogenic sounds cover a broad range of frequencies and sound levels and can have a range of highly variable impacts on marine life, from none or minor to potentially severe responses, depending on received levels, duration of exposure, behavioral context, and various other factors. The potential effects of underwater sound from acoustic sources can potentially result in one or more of the following; temporary or permanent hearing impairment, non-auditory

physical or physiological effects, behavioral disturbance, stress, and masking (Richardson *et al.,* 1995; Gordon *et al.,* 2004; Nowacek *et al.,* 2007; Southall *et al.,* 2007; Gotz *et al.,* 2009). The degree of effect is intrinsically related to the signal characteristics, received level, distance from the source, and duration of the sound exposure. In general, sudden, high level sounds can cause hearing loss, as can longer exposures to lower level sounds. Temporary or permanent loss of hearing will occur almost exclusively for noise within an animal's hearing range. We first describe specific manifestations of acoustic effects before providing discussion specific to the City of Ketchikan's blasting activities.

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

We describe the more severe effects (*i.e.,* certain non-auditory physical or physiological effects) only briefly as we do not expect that there is a reasonable likelihood that the City of Ketchikan's activities may result in such effects (see below for further discussion). Marine mammals exposed to high-intensity sound, or to lower-intensity sound for prolonged periods, can

experience hearing threshold shift (TS), which is the loss of hearing sensitivity at certain frequency ranges (Kastak *et al.,* 1999; Schlundt *et al.,* 2000; Finneran *et al.,* 2002, 2005b). TS can be permanent (PTS), in which case the loss of hearing sensitivity is not fully recoverable, or temporary (TTS), in which case the animal's hearing threshold would recover over time (Southall *et al.,* 2007). Repeated sound exposure that leads to TTS could cause PTS. In severe cases of PTS, there can be total or partial deafness, while in most cases the animal has an impaired ability to hear sounds in specific frequency ranges (Kryter 1985).

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

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

TTS is the mildest form of hearing impairment that can occur during exposure to sound (Kryter 1985). While experiencing TTS, the hearing threshold rises, and a sound must be at a higher level in order to be heard. In terrestrial and marine mammals, TTS can last from minutes or hours to days (in cases of strong TTS). In many cases, hearing sensitivity recovers rapidly after exposure to the sound ends. Few data on sound levels and durations necessary to elicit mild TTS have been obtained for marine mammals.

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

Currently, TTS data only exist for four species of cetaceans (bottlenose dolphin (*Tursiops truncatus*), beluga whale (*Delphinapterus leucas*), harbor porpoise, and Yangtze finless porpoise (*Neophocoena asiaeorientalis*) and three species of pinnipeds (northern elephant seal (*Mirounga angustirostris*), harbor seal, and California sea lion (*Zalophus californianus*)) exposed to a limited number of sound sources (*i.e.*, mostly tones and octave-band noise) in laboratory settings (*e.g.*, Finneran *et al.*, 2002; Nachtigall *et al.*, 2004; Kastak *et al.*, 2005; Lucke *et al.*, 2009; Popov *et al.*, 2011). In general, harbor seals (Kastak *et al.*, 2005; Kastelein *et al.*, 2012a) and

harbor porpoises (Lucke *et al.,* 2009; Kastelein *et al.,*2012b) have a lower TTS onset than other measured pinniped or cetacean species. Additionally, the existing marine mammal TTS data come from a limited number of individuals within these species. We note Reichmuth *et al.* (2016) attempted to induce TTS in an additional two species of pinnipeds (ringed seal and spotted seal); however, they were unsuccessful. There are no data available on noise-induced hearing loss for mysticetes. For summaries of data on TTS in marine mammals or for further discussion of TTS onset thresholds, please see Finneran (2015).

Physiological Effects

In addition to PTS and TTS, there is a potential for non-auditory physiological effects or injuries that theoretically might occur in marine mammals exposed to high level underwater sound or as a secondary effect of extreme behavioral reactions (*e.g.,* change in dive profile as a result of an avoidance reaction) caused by exposure to sound. These impacts can include neurological effects, bubble formation, resonance effects, and other types of organ or tissue damage (Cox *et al.,* 2006; Southall *et al.,* 2007; Zimmer and Tyack 2007). The City of Ketchikan's activities involve the use of devices such as explosives, which has been associated with these types of effects. The underwater explosion will send a shock wave and blast noise through the water, release gaseous by-products, create an oscillating bubble, and cause a plume of water to shoot up from the water surface (though this energy is reduced by as much as 60-90 percent by confining the blast as the City of Ketchikan plans to do). The shock wave and blast noise are of most concern to marine animals. The effects of an underwater explosion on a marine mammal depends on many factors, including the size, type, and depth of both the animal and the explosive charge; the depth of the water column; and the standoff distance between the charge and the animal, as well as the sound propagation properties of the environment. Potential impacts

can range from brief effects (such as behavioral disturbance), tactile perception, physical discomfort, slight injury of the internal organs and the auditory system, to death of the animal (Yelverton *et al.*, 1973; DoN, 2001). Non-lethal injury includes slight injury to internal organs and the auditory system; however, delayed lethality can be a result of individual or cumulative sublethal injuries (DoN, 2001). Immediate lethal injury would be a result of massive combined trauma to internal organs as a direct result of proximity to the point of detonation (DoN 2001). Generally, the higher the level of impulse and pressure level exposure, the more severe the impact to an individual.

Injuries resulting from a shock wave take place at boundaries between tissues of different density. Different velocities are imparted to tissues of different densities, and this can lead to their physical disruption. Blast effects are greatest at the gas-liquid interface (Landsberg 2000). Gas-containing organs, particularly the lungs and gastrointestinal (GI) tract, are especially susceptible (Goertner 1982; Hill 1978; Yelverton *et al.*, 1973). In addition, gas-containing organs including the nasal sacs, larynx, pharynx, trachea, and lungs may be damaged by compression/expansion caused by the oscillations of the blast gas bubble. Intestinal walls can bruise or rupture, with subsequent hemorrhage and escape of gut contents into the body cavity. Less severe GI tract injuries include contusions, petechiae (small red or purple spots caused by bleeding in the skin), and slight hemorrhaging (Yelverton *et al.*, 1973).

Because the ears are the most sensitive to pressure, they are the organs most sensitive to injury (Ketten 2000). Sound-related damage associated with blast noise can be theoretically distinct from injury from the shock wave, particularly farther from the explosion. If an animal is able to hear a noise, at some level it can damage its hearing by causing decreased sensitivity (Ketten 1995). Sound-related trauma can be lethal or sublethal. Lethal impacts are those that

result in immediate death or serious debilitation in or near an intense source and are not, technically, pure acoustic trauma (Ketten 1995). Sublethal impacts include hearing loss, which is caused by exposures to perceptible sounds. Severe damage (from the shock wave) to the ears includes tympanic membrane rupture, fracture of the ossicles, damage to the cochlea, hemorrhage, and cerebrospinal fluid leakage into the middle ear. Moderate injury implies partial hearing loss due to tympanic membrane rupture and blood in the middle ear. Permanent hearing loss also can occur when the hair cells are damaged by one very loud event, as well as by prolonged exposure to a loud noise or chronic exposure to noise. The level of impact from blasts depends on both an animal's location and, at outer zones, on its sensitivity to the residual noise (Ketten 1995).

The above discussion concerning underwater explosions only pertains to open water detonations in a free field. Therefore, given the low weight of the charges, confined nature of the blasts, and small size of the detonation relative to large open water detonations in conjunction with monitoring and mitigation measures discussed below, the City of Ketchikan's 25 to 50 blasting events are not likely to have severe injury or mortality effects on marine mammals in the project vicinity. Instead, NMFS considers that the City of Ketchikan's blasts are most likely to cause TTS (Level B harassment) in a few individual marine mammals, but there could be limited non-lethal injury and PTS (Level A harassment) in three species, as discussed below.

Behavioral Effects

Based on the near instantaneous nature of blasting, if only single blast is being conducted each day, NMFS does not expect behavioral disturbance to occur. The City of Ketchikan's proposed blasting is a single blast, composed of charges separated by microdelays (approximately 8 ms), and therefore behavioral disturbance is not expected to occur. As a result,

because single detonation blasting is the only proposed activity for which take is expected to occur, behavioral disturbance is only discussed briefly below.

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

Stress Response

An animal's perception of a threat may be sufficient to trigger stress responses consisting of some combination of behavioral responses, autonomic nervous system responses, neuroendocrine responses, or immune responses (*e.g.*, Seyle 1950; Moberg 2000). In many cases, an animal's first and sometimes most economical (in terms of energetic costs) response is behavioral avoidance of the potential stressor. Autonomic nervous system responses to stress typically involve changes in heart rate, blood pressure, and gastrointestinal activity. These

responses have a relatively short duration and may or may not have a significant long-term effect on an animal's fitness.

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

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

Relationships between these physiological mechanisms, animal behavior, and the costs of stress responses are well studied through controlled experiments and for both laboratory and free-ranging animals (*e.g.*, Holberton *et al.*, 1996; Hood *et al.*, 1998; Jessop *et al.*, 2003; Krausman *et al.*, 2004; Lankford *et al.*, 2005). Stress responses due to exposure to anthropogenic sounds or other stressors and their effects on marine mammals have also been reviewed (Fair and Becker 2000; Romano *et al.*, 2002b) and, more rarely, studied in wild populations

(*e.g.*,Romano *et al.*, 2002a). For example, Rolland *et al.* (2012) found that noise reduction from reduced ship traffic in the Bay of Fundy was associated with decreased stress in North Atlantic right whales. These and other studies lead to a reasonable expectation that some marine mammals will experience physiological stress responses upon exposure to acoustic stressors and that it is possible that some of these would be classified as "distress." In addition, any animal experiencing TTS would likely also experience stress responses (NRC, 2003).

Acoustic and Pressure Effects, Underwater

The effects of sounds and blasting pressure waves from the City of Ketchikan's proposed activities might include one or more of the following: Temporary or permanent hearing impairment and non-auditory physical or physiological effects, however the near instantaneous nature of blasting activity and planned single blast per day means behavioral disturbance is not likely to occur (Richardson *et al.*, 1995; Gordon *et al.*, 2003; Nowacek *et al.*, 2007; Southall *et al.*, 2007). The effects of underwater detonations on marine mammals are dependent on several factors, including the size, type, and depth of the animal; the depth, intensity, and duration of the sound; the depth of the water column; the substrate of the habitat; the standoff distance between activities and the animal; and the sound propagation properties of the environment. Thus, we expect impacts to marine mammals from the confined blasting activities to result primarily from acoustic pathways.

In the absence of mitigation, impacts to marine species could be expected to include physiological and behavioral responses to the acoustic signature (Viada *et al.*, 2008). Potential effects from impulsive sound sources like blasting can range in severity from effects such as behavioral disturbance to temporary or permanent hearing impairment (Yelverton *et al.*, 1973). Due to the nature of the sounds involved in the project and because only one blast will occur

each day, behavioral disturbance is not expected to occur and TTS is the most likely effect from the proposed activity. This short duration of elevated noise is not expected to result in meaningful behavioral disturbance that constitutes take. PTS constitutes injury, but TTS does not (Southall *et al.,* 2007). Due to the use of mitigation measures discussed in detail in the Proposed Mitigation section, it is unlikely but possible that PTS could occur from blasting. Marine mammals would need to be within a relatively small radius (size dependent on hearing group) of the blast to experience PTS.

Anticipated Effects on Marine Mammal Habitat and Prey

Blasting will permanently impact habitat directly offshore from the Ketchikan waterfront. The rock pinnacle area to be removed is roughly 320 ft by 150 ft square with an average of 4 ft in height. Appendix B of the IHA application details the configuration of this feature. Vertical benthic structure provides habitat for a variety of fish and prey species and would be removed during this portion of the project. However, the surrounding area is heavily trafficked by large and small ships and is not a significant foraging ground for marine mammals. Removal of this submerged pinnacle would not impact growth and/or survival of marine mammal populations.

Construction activities will have temporary impacts on marine mammal habitat through increases in in-water and in-air sound from underwater blasting. Construction activities that increase in-water noise, have the potential to adversely affect forage fish and juvenile salmonids in the project area. Forage fish species are part of the prey base for marine mammals. Adult salmon are a part of the prey base for Steller sea lions, harbor seals, and killer whales. Forage fish and salmonids may alter their normal behavior during pinnacle blasting and associated activities. In-water construction timing, between September 16, 2019 and April 30, 2020, has been planned to avoid major spawning and migration times. After pinnacle blasting and

associated activities are completed habitat use and function is expected to return to pre-construction levels.

The City of Ketchikan's blasting activities would produce pulsed (blasting) sounds. Fish react to sounds that are especially strong and/or intermittent low-frequency sounds. Short duration, sharp sounds can cause overt or subtle changes in fish behavior and local distribution. Hastings and Popper (2005) identified several studies that suggest fish may relocate to avoid certain areas of sound energy. Avoidance by potential prey (*i.e.*, fish, certain marine mammals) of the immediate area due to the temporary loss of this foraging habitat is also possible. The duration of fish avoidance of this area after construction activity stops is unknown, but a rapid return to normal recruitment, distribution and behavior is anticipated. Any behavioral avoidance by fish of the disturbed area would still leave sufficiently large areas of fish and marine mammal foraging habitat in waters southeast and northeast of Tongass Narrows.

Additional studies have documented effects of impulsive sounds such as pile driving on fish, although several are based on studies in support of large, multiyear bridge construction projects (*e.g.*, Scholik and Yan 2001, 2002; Popper and Hastings 2009). Sound pulses at received levels of 160 dB may cause subtle changes in fish behavior. SPLs of 180 dB may cause noticeable changes in behavior (Pearson *et al.*, 1992; Skalski *et al.*, 1992). SPLs of sufficient strength have been known to cause injury to fish and fish mortality.

While impacts from blasting to fish have the potential to be severe, including barotrauma and mortality, the blasts will last approximately one second on 25 to 50 days, making the duration of activity that could cause this impact short term. In general, impacts to marine mammal prey species are expected to be minor and the window for them to occur is temporary due to the short timeframe for the project.

Additionally, the presence of transient killer whales means some marine mammal species are also possible prey (harbor seals, harbor porpoises). The City of Ketchikan's blasting activities are expected to result in limited instances of TTS and minor PTS on these smaller marine mammals. That, as well as the fact that the City of Ketchikan is impacting a small portion of the total available marine mammal habitat means that there will be minimal impact on these marine mammals as prey.

For the most part, adverse effects on prey species during project construction will be short-term, based on the short duration of the project. Given the numbers of fish and other prey species in the vicinity, the short-term nature of effects on fish species and the mitigation measures to protect fish and marine mammals during construction, the proposed project is not expected to have measurable effects on the distribution or abundance of potential marine mammal prey species.

Other potential temporary impacts are on water quality (increases in turbidity levels) and on prey species distribution. BMPs and minimization practices used by the City of Ketchikan to minimize potential environmental effects from project activities are outlined in "Proposed Mitigation."

The most likely effects on marine mammal habitat from the proposed project will be a minor alteration of benthic habitat and temporary, short-duration noise, and water and sediment quality effects. The direct loss of habitat available to marine mammals during construction due to noise, water quality impacts, sediment quality impacts, and construction activity is expected to be minimal and return to pre-blasting conditions shortly after blasting is completed. After pinnacle blasting is completed habitat use and function in the general area are expected to return

to pre-blasting levels, despite the removal of the underwater pinnacle feature. Impacts to habitat and prey are expected to be minimal based on the short duration of activities.

Estimated Take

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

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 proposed 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 proposed to be authorized for this activity. Below we describe how the take is estimated.

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

Acoustic Thresholds

Using the best available science, NMFS has developed acoustic thresholds that identify the received level of underwater sound above which exposed marine mammals would be reasonably expected to 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 proposed 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: *http://www.nmfs.noaa.gov/pr/acoustics/guidelines.htm*.

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, SELtotal(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**
Low frequency cetacean	6	12	24	**430****	188	**2350**	375
Mid frequency cetacean	14	31	24	**90**	53	**430**	106
High frequency cetacean	18	42	24	**1420**	1328	**5000**	2650
Otariid	12	28	24	30	**42****	**150**	84
Phocid	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 this project, NMFS assumes a group of five whales will be present every fifth day (approximately once per week). Note that groups could be larger, but we expect that the overall number of takes proposed for authorization 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 10^{th} 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. NFMS assumes that a group of two whales may be present every tenth day, or approximately every other 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. NMFS estimates that one whale may 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 we assume one group of 20 dolphins may be present within the Level B harassment zone every tenth day, or about every other week.

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 proposed 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 proposed to be 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 proposed to be 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*) we conservatively estimate that a group of five 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: five animals x 50 days of work divided by 5 (frequency of occurrence) = 50

No take by Level A harassment was requested or is proposed to be 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 tenth day, or about once every two weeks.

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

No take by Level A harassment was requested or is proposed to be 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 one whale may be sighted within the Level B harassment zone every tenth day, or about every 2 weeks.

Level B harassment: one animal x 50 days work divided by 10 (frequency of occurrence) = 5

No take by Level A harassment was requested or is proposed to be 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 20 dolphins may be sighted within the Level B harassment zone every tenth day, or about every other week.

Level B harassment: 20 animals x 50 days of work divided by 10 (frequency of occurrence) = 100

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

Table 5. Proposed 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] 3	0.34
Minke Whale	Alaska (N/A)	0	10	N/A
Gray Whale	Eastern North Pacific (26,960)	0	5	0.02
Killer Whale	Alaska Resident (2,347) Northern Resident (261) West Coast Transient (243) Gulf of Alaska Transient (587)	0	50	2.13 19.16 20.58 8.52[c]
Pacific White-Sided Dolphin	North Pacific (26,880)	0	100	0.37
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% of the humpback whales in Southeast Alaska are expected to be from the Hawaii DPS and 6.1% are expected to be from the Mexico DPS.

[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.

Proposed Mitigation

In order to issue an IHA under section 101(a)(5)(D) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to such activity, and other means of effecting the least practicable impact on such species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of such species or stock for taking for certain subsistence uses (latter not applicable for this action). NMFS regulations require applicants for incidental take authorizations to include information about the availability and feasibility (economic and technological) of equipment, methods, and manner of conducting such activity or other means of effecting the least practicable adverse impact upon the affected species or stocks and their habitat (50 CFR 216.104(a)(11)).

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

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

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

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.

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 30 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 15 minutes have passed without re-sighting the animal in the shutdown zone. When weather conditions prevent accurate sighting of marine mammals, blasting activities will not occur until conditions in the shutdown zone return to acceptable levels.

Table 6. Blasting Shutdown and Monitoring Zones

Marine Mammal Hearing Group	Shutdown Zone (m)	Monitoring Zone (m)
Low frequency ceteacean	1,000*	2,500
Mid frequency ceteacean	100	500
High frequency cetacean	1,500	5,000
Otariid	100*	200
Phocid	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. 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 proposed measures, as well as other measures considered by NMFS, NMFS has preliminarily determined that the proposed mitigation measures provide the means effecting the least practicable impact on the affected species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance.

Proposed Monitoring and Reporting

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

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

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

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

Visual Monitoring

Monitoring 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. 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.
- The applicant must submit PSO curriculum vitae (CVs) for approval by NMFS.

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.
- 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.

Test Blast Monitoring

While full hydroacoustic monitoring is not planned for this project, the City of Ketchikan will perform a minimum of one test blast to confirm underwater overpressure values. Overpressure will be measured during the test blast with hydrophones at pre-determined locations. This work will be performed by an experienced contractor with process documents, results, and the test blast report all being approved by a blasting consultant. For monitoring of this test blast, 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; and

- Mean, median, and maximum sound levels (dB re: 1µPa) of SELcum and SPLpeak.

Reporting

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, and the Alaska Regional Stranding Coordinator. The report would include the same information identified in the paragraph above. Activities would be able to

continue while NMFS reviews the circumstances of the incident. NMFS would work with the 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 proposed 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 proposed blasting. In the absence of proposed 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 "Proposed Mitigation," include adequate shutdown zones, marine mammal monitoring, and blasting BMPs sufficient to prevent serious injury or mortality. Thus, no serious injury or morality is proposed for authorization. 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 proposed to be authorized for harbor seals, harbor porpoises, and Dall's porpoises. As stated in "Proposed 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 proposed 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 proposed 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-terms 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 preliminary determination that the impacts resulting from this activity are not expected to adversely affect the species or stock through effects on annual rates of recruitment or survival:

- No 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 proposed monitoring and mitigation measures, NMFS preliminarily finds that the total marine mammal take from the proposed activity will have a negligible impact on all affected marine mammal species or stocks.

Small Numbers

As noted above, only small numbers of incidental take may be authorized under 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 proposed blasting by the City of Ketchikan. Our analysis shows that at most, approximately 20.6 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 10 authorized takes by Level B harassment for the stock, comparison to the best estimate of stock abundance shows less than 1 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 proposed activity (including the proposed mitigation and monitoring measures) and the anticipated take of marine mammals, NMFS preliminarily finds that small numbers of marine mammals will be taken relative to the population size of the affected species or stocks.

Unmitigable Adverse Impact Analysis and Determination

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

In 2012, the community of Ketchikan had an estimated subsistence take of 22 harbor seals and 0 Steller sea lion (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 proposed 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 proposed mitigation and monitoring measures, NMFS has preliminarily determined that there will not be an unmitigable adverse impact on subsistence uses from City of Ketchikan's proposed activities.

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.

NMFS is proposing to authorize take of Mexico DPS humpback whales which are listed under the ESA. The NMFS Office of Protected Resources has requested initiation of Section 7

consultation with the NMFS Alaska Regional Office for the issuance of this IHA. NMFS will conclude the ESA section 7 consultation prior to reaching a determination regarding the proposed issuance of the authorization.

Proposed Authorization

As a result of these preliminary determinations, NMFS proposes to issue an IHA to the City of Ketchikan for conducting blasting near Ketchikan, Alaska in 2019 and 2020, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated. A draft of the proposed IHA can be found at *https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act*.

Request for Public Comments

We request comment on our analyses, the proposed authorization, and any other aspect of this Notice of Proposed IHA for the proposed underwater blasting. We also request comment on the potential for renewal of this proposed IHA as described in the paragraph below. Please include with your comments any supporting data or literature citations to help inform our final decision on the request for MMPA authorization.

On a case-by-case basis, NMFS may issue a one-year IHA renewal with an expedited public comment period (15 days) when (1) another year of identical or nearly identical activities as described in the Specified Activities section is planned or (2) the activities would not be completed by the time the IHA expires and a second IHA would allow for completion of the activities beyond that described in the Dates and Duration section, provided all of the following conditions are met:

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

- The request for renewal must include the following:

(1) An explanation that the activities to be conducted under the proposed Renewal are identical to the activities analyzed under the initial IHA, are a subset of the activities, or include changes so minor (e.g., reduction in pile size) that the changes do not affect the previous analyses, mitigation and monitoring requirements, or take estimates (with the exception of reducing the type or amount of take because only a subset of the initially analyzed activities remain to be completed under the Renewal)..

(2) A preliminary monitoring report showing the results of the required monitoring to date and an explanation showing that the monitoring results do not indicate impacts of a scale or nature not previously analyzed or authorized.

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

Dated: March 21, 2019.

Donna S. Wieting,

Director, Office of Protected Resources,

National Marine Fisheries Service.

[FR Doc. 2019-05826 Filed: 3/26/2019 8:45 am; Publication Date: 3/27/2019]