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**E 3510-22-P**

**DEPARTMENT OF COMMERCE**

**National Oceanic and Atmospheric Administration**

**[RTID 0648-XE773]**

# Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to Seward Cruise Ship Passenger Dock and Terminal Facility Project in Seward, Alaska

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

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

**SUMMARY:** NMFS has received a request from Turnagain Marine Construction (TMC) for authorization to take marine mammals incidental to Seward Cruise Ship Passenger Dock and Terminal Facility project in Seward, 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-time, 1-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 authorization 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 the Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service and should be submitted via email to *ITP.Harlacher@noaa.gov*. 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 below.

*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, including all attachments, must not exceed a 25-megabyte file size. 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:** Jenna Harlacher, Office of Protected Resources, NMFS, (301) 427-8401.

**SUPPLEMENTARY INFORMATION:**

**Background**

The MMPA prohibits the “take” of marine mammals, with certain exceptions. Section 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 proposed or, if the taking is limited to harassment, a notice of a proposed IHA is provided to the public for review.

Authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s) and will not have an unmitigable adverse impact on the availability of the species or stock(s) for taking for subsistence uses (where relevant). Further, NMFS must prescribe the permissible methods of taking and other “means of effecting the least practicable adverse impact” on the affected species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of the species or stocks for taking for certain subsistence uses (referred to in shorthand as “mitigation”); and requirements pertaining to the monitoring and reporting of the takings. The definitions of all applicable MMPA statutory terms used above are included in the relevant sections below and can be found in section 3 of the MMPA (16 U.S.C. 1362) and NMFS regulations at 50 CFR 216.103.

**National Environmental Policy Act**

To comply with the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 *et seq*.) and NOAA Administrative Order (NAO) 216-6A, NMFS must review our proposed action (*i.e.*, the issuance of an IHA) with respect to potential impacts on the human environment.

This action is consistent with categories of activities identified in Categorical Exclusion B4 (IHAs with no anticipated serious injury or mortality) of the Companion Manual for NAO 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.

**Summary of Request**

On October 17, 2024, NMFS received a request from TMC for an IHA to take marine mammals incidental to Seward Cruise Ship Passenger Dock and Terminal Facility project in Seward, Alaska. Following NMFS’ review of the application, TMC submitted a revised version on April 8, 2025. The application was deemed adequate and complete on May 16, 2025. TMC's request is for take of eight species of marine mammals by Level A and Level B harassment. Neither TMC nor NMFS expect serious injury or mortality to result from this activity and, therefore, an IHA is appropriate.

**Description of Proposed Activity**

*Overview*

TMC is proposing to remove an existing passenger dock and replace it with a new passenger dock at the head of Resurrection Bay in Seward, Alaska. The existing passenger dock was constructed over 55 years ago and needs to be replaced to maintain safety and function. The proposed Seward Cruise Ship Passenger Dock and Terminal Facility Project (hereafter "project") would provide safe harbor for cruise ships and passengers during the visitor season and limited freight and utilities in the off-season.

The project would include removal of the existing passenger terminal building, passenger dock, and steel piles; dredging and offshore disposal of dredge materials; and installing new steel piles to support a new 300-foot (ft) (91.4-meters (m)) by 50-ft (15.2-m) fixed dock, a new 125-ft (38.1-m) transfer bridge, and a new 780-ft (237.7-m) by 100-ft (30.5-m) floating dock. Construction would occur on approximately 323 non-consecutive days with pile installation and removal occurring over 203 non-consecutive in-water work days over the course of 1 year. The proposed activities that have the potential to take marine mammals, by Level A and Level B harassment, include vibratory removal of existing H and steel pipe piles, vibratory installation and removal of temporary steel pipe piles, vibratory and impact installation of permanent steel pipe piles, and down-the-hole drilling (DTH) if required for installation of steel pipe piles deep into the bedrock.

*Dates and Duration*

Pile installation and removal on the Passenger Dock would require approximately 8 months beginning in fall 2025. TMC estimates a total of 203 days of in-water pile driving activity with a maximum number of 323 non-consecutive construction days. The proposed IHA would be valid for the statutory maximum of 1 year from the date of effectiveness, and will become effective upon written notification from the applicant to NMFS, but not beginning later than 1 year from the date of issuance or extending beyond 2 years from the date of issuance.

*Specific Geographic Region*

The proposed project is located in Seward, Alaska, on the Kenai Peninsula at the head of Resurrection Bay. Resurrection bay is broken into sections, the inner and outer Resurrection Bay. Outer Resurrection Bay refers to locations that occur near the mouth of the bay and the surrounding islands with Caine's Head dividing the inner and outer bay. The Passenger Dock is located approximately two kilometers (km) north of downtown Seward.

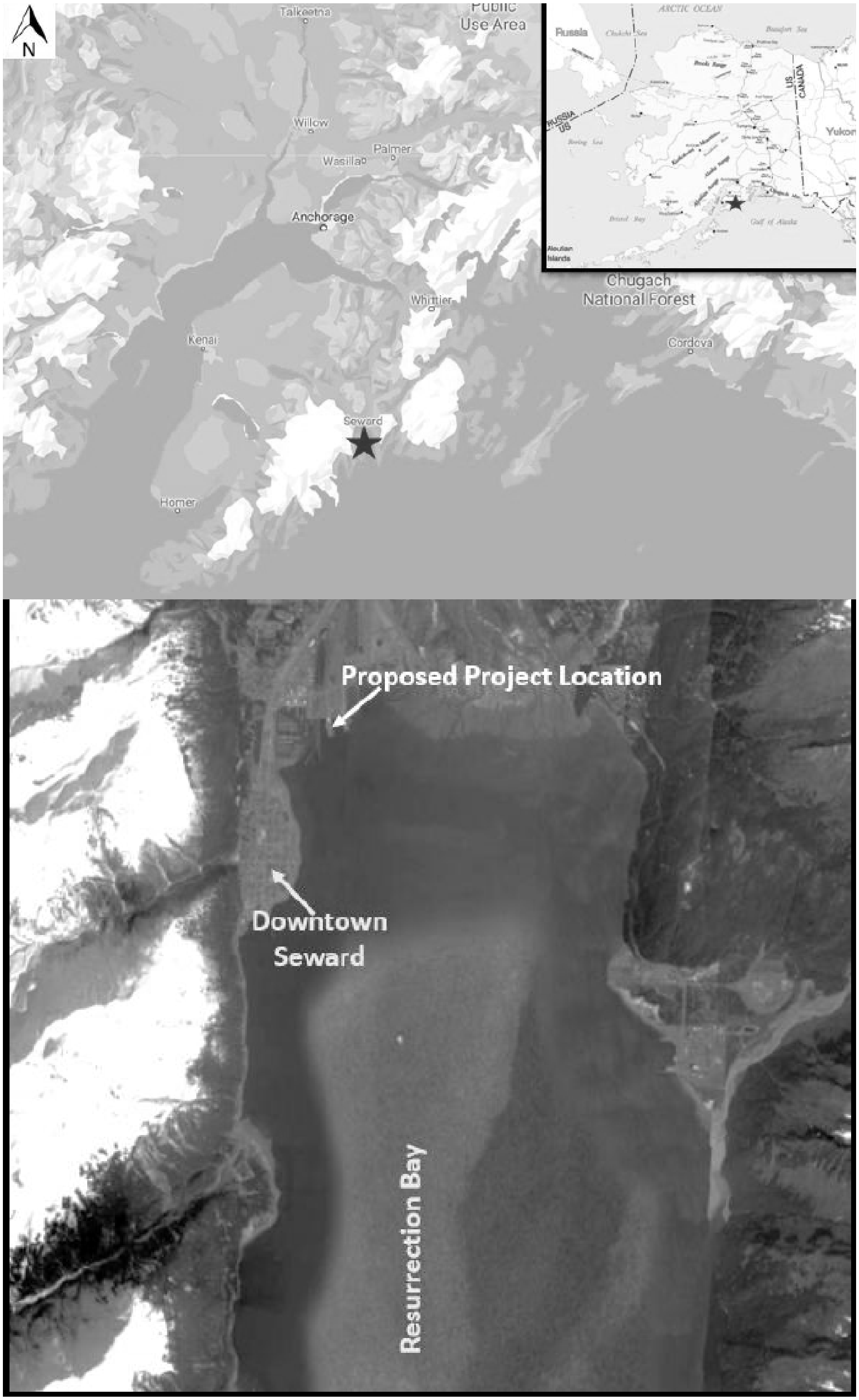


**Figure 1 – Seward Cruise Ship Passenger Dock and Terminal Facility Project Area**

*Detailed Description of the Specified Activity*

TMC proposes to remove the existing structure and construct a new cruise ship dock. This proposed project would include the removal of 1,830 existing piles via vibratory removal, the installation and removal of 100 temporary piles via vibratory driving with up to 24 piles further installed via down-the-hole drilling (DTH), and installation of 108 permanent piles via vibratory and impact pile driving, with up to 37 requiring further installation via DTH (see table 1).

The existing 14-inch (in) (35.6-centimeter (cm)) h-piles and 20-in (50.8-cm) steel piles would be removed using the deadpull method via crane or vibratory removal if needed. Pile templates would be constructed by vibrating temporary 36-in (91.4-cm) piles into position. Each section of the fixed dock requires one to three temporary piles per template. For the dolphin structure, four to six temporary piles may be needed per template. Most temporary piles would be vibrated into place, however, up to 24 may require additonal DTH in locations where the bedrock is shallow. Using the templates as guides to position the permanent piles, the permanent piles would be vibrated into dense material, then driven to tip elevation using an impact hammer.

The 76 permanent 48-in (122-cm) steel piles supporting the fixed dock and mooring dolphins would be vibrated below the midline, then impacted. Up to 24 of the 48-in piles would then be drilled into the bedrock with a DTH hammer. The 16 permanent 60-in (152-cm) and 72-in (183-cm) steel piles would be vibrated and impacted through the soil layer to the bedrock to support the mooring dolphins. If required, up to eight 60-in and up to five 72-in permanent piles would then be installed into the bedrock with DTH. All of these activities may result in incidental take of marine mammals.

**Table 1—Number and Type of Piles to Be Installed and Removed**

| Method | Pile size and type | Activity Duration (Minutes (strikes)/pile)[1] | Max piles per day | Number of piles | Estimated days of work |
|---|---|---|---|---|---|
| Vibratory Pile Driving | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Existing Pile removal | 14-in H-pile | 5 | 40 | 1,820 | 46 |
| Existing Pile removal | 20-in steel pile | 10 | 4 | 10 | 2.5 |
| Temporary Pile Installation and Removal | 36-in steel pile | 10 | 6 | 100 | 33 |
| Permanent Pile Installation | 48-in steel pile | 10 | 6 | 76 | 13 |
| Permanent Pile Installation | 60-in steel pile | 15 | 4 | 16 | 16 |
| Permanent Pile Installation | 72-in steel pile | 20 | 4 | 16 | 16 |
| Impact Pile Driving | | | | | |
| Permanent Pile Installation | 48-in steel pile | 3,000 | 4 | 76 | 19 |
| Permanent Pile Installation | 60-in steel pile | 3,000 | 3 | 16 | 16 |
| Permanent Pile Installation | 72-in steel pile | 3,000 | 3 | 16 | 16 |
| DTH | | | | | |
| Temporary Pile Installation | 36-in steel pile | 120 | 4 | 24 | 6 |
| Permanent Pile Installation | 48-in steel pile | 150 | 4 | 24 | 6 |
| Permanent Pile Installation | 60-in steel pile | 240 | 2 | 8 | 8 |
| Permanent Pile Installation | 72-in steel pile | 360 | 2 | 5 | 5 |

1 – Vibratory pile driving and DTH units are minutes per pile and Impact pile driving units are strikes per pile

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

**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. NMFS fully considered all of this information, and we refer the reader to these descriptions, instead of reprinting the information. Additional information regarding population trends and threats may be found in NMFS' Stock Assessment Reports (SARs; *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments*) and more general information about these species (*e.g.*, physical and behavioral descriptions) may be found on NMFS' website (*https://www.fisheries.noaa.gov/find-species*).

Table 2 lists all species or stocks for which take is expected and proposed to be authorized for this activity and summarizes information related to the population or stock, including regulatory status under the MMPA and Endangered Species Act (ESA) and potential biological removal (PBR), where known. PBR is defined by the MMPA as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population (as described in NMFS' SARs). While no serious injury or mortality is anticipated or proposed to be authorized here, PBR and annual serious injury and mortality (M/SI) from anthropogenic sources are included here as gross indicators of the status of the species or stocks 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' 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' U.S. Alaska Marine

Mammal SARs. All values presented in table 2 are the most recent available at the time of publication (including from the draft 2024 SARs) and are available online at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments*.

**Table 2—Species[1] with Estimated Take from the Specified Activities**

| Common name | Scientific name | Stock | ESA/MMPA status; Strategic (Y/N)[2] | Stock abundance (CV, $N_{min}$, most recent abundance survey)[3] | PBR | Annual M/SI[4] |
|---|---|---|---|---|---|---|
| Order Artiodactyla – Cetacea – Mysticeti (baleen whales) | | | | | | |
| *Family Eschrichtiidae* | | | | | | |
| Gray Whale | *Eschrichtius robustus* | Eastern North Pacific | -, -, N | 26,960 (0.05, 25,849, 2016) | 801 | 131 |
| *Family Balaenopteridae (rorquals)* | | | | | | |
| Fin Whale | *Balaenoptera physalus* | Northeast Pacific | E, D, Y | 2,554 (UND, UND, 2013)[5] | UND | 0.6 |
| Humpback Whale | *Megaptera novaeangliae* | Hawai'i[6] | -, -, N | 11,278 (0.56, 7,265, 2020) | 127 | 27.09 |
| Humpback Whale | *Megaptera novaeangliae* | Mexico-North Pacific | T, D, Y | 918 (N/A, N/A, 2006)[7] | UND | 0.57 |
| Humpback Whale | *Megaptera novaeangliae* | Western North Pacific | E, D, Y | 1,084 (0.088, 1,007, 2006) | 3.4[8] | 5.82 |
| Odontoceti (toothed whales, dolphins, and porpoises) | | | | | | |
| *Family Delphinidae* | | | | | | |
| Killer Whale | *Orcinus orca* | Eastern North Pacific Alaska Resident | -, -, N | 1,920 (N/A, 1,920, 2019)[9] | 19 | 1.3 |
| Killer Whale | *Orcinus orca* | AT1 Transient | -, D, Y | 7 (N/A, 7, 2019)[10] | 0.1 | 0 |
| Killer Whale | *Orcinus orca* | Eastern North Pacific Gulf of Alaska, Aleutian Islands and Bering Sea Transient | -, -, N | 587 (N/A, 587, 2012)[11] | 5.9 | 0.8 |
| *Family Phocoenidae (porpoises)* | | | | | | |
| Dall's Porpoise | *Phocoenoides dalli* | Alaska | -, -, N | UND (UND, UND, 2015)[12] | UND | 37 |
| Harbor Porpoise | *Phocoena phocoena* | Gulf of Alaska | -, -, Y | 31,046 (0.21, N/A, 1998) | UND | 72 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Order Carnivora – Pinnipedia | | | | | | |
| *Family Otariidae (eared seals and sea lions)* | | | | | | |
| Steller Sea Lion | *Eumetopias jubatus* | Western | E, D, Y | 49,837 (N/A, 49,837, 2022)[13] | 299 | 267 |
| *Family Phocidae (earless seals)* | | | | | | |
| Harbor Seal | *Phoca vitulina* | Prince William Sound | -, -, N | 44,756 (N/A, 41,776, 2015) | 1,253 | 413 |

1- Information on the classification of marine mammal species can be found on the web page for The Society for Marine Mammalogy's Committee on Taxonomy (*https://marinemammalscience.org/science-and-publications/list-marine-mammal-species-subspecies/*; Committee on Taxonomy, 2022).

2 - 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.

3- NMFS marine mammal stock assessment reports online at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region*. CV is coefficient of variation; $N^{min}$ is the minimum estimate of stock abundance. In some cases, CV is not applicable.

4 - 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.

5 - The best available abundance estimate for this stock is not considered representative of the entire stock as surveys were limited to a small portion of the stock's range. Based upon this estimate and the $N^{min}$, the PBR value is likely negatively biased for the entire stock.

6 - New SAR in 2022 following North Pacific humpback whale stock structure changes.

7 - Abundance estimates are based upon data collected more than 8 years ago and, therefore, current estimates are considered unknown.

8 - PBR in U.S. waters = 0.2, M/SI in U.S. waters = 0.06.

9 - $N^{est}$ is based upon counts of individuals identified from photo-ID catalogs.

10 - $N^{est}$ is based upon counts of individuals identified from photo-ID catalogs. PBR has been calculated, however, a reliable estimate of the maximum net productivity rate is not available for this stock, and the default cetacean maximum theoretical net productivity rate was used for the PBR calculation.

11 - $N^{est}$ is based upon counts of individuals identified from photo-ID catalogs.

12 - The best available abundance estimate is likely an underestimate for the entire stock because it is based upon a survey that covered only a small portion of the stock's range.

13 - $N^{est}$ is best estimate of counts, which have not been corrected for animals at sea during abundance surveys. Estimates provided are for the United States only. The overall $N^{min}$ is 73,211 and overall PBR is 439.

As indicated above, all eight species (with 12 managed stocks) in table 2 temporally and spatially co-occur with the activity to the degree that take is reasonably likely to occur. While sperm whales (*Physeter macrocephalus*), eastern U.S. Steller sea lions, North Pacific right whales (*Eubalaena japonica*), minke whales (*Balaenoptera acutorostrata*), Pacific white-sided dolphin (*Lagenorhynchus obliquidens*), northern fur seal (*Callorhinus ursinus*), and northern elephant seal (*Mirounga angustirostris*) are included in the application and are found in the area, these species do not commonly occur inside Resurrection Bay. Thus, the temporal and/or spatial occurrence of these species is such that take is not expected to occur, and they are not discussed further beyond the explanation provided here.

In addition, northern sea otters (*Enhydra lutris*) may be found in Seward, Alaska. However, sea otters are managed by the U.S. Fish and Wildlife Service and are not considered further in this document.

In addition to what is included in sections 3 and 4 of the IHA application, and NMFS' website, further detail informing our analysis on the regional occurrence for select species of particular or unique vulnerability (*i.e.,* information regarding ESA listed species) is provided below.

*Fin Whale*

Fin whales are found in the Gulf of Alaska year-round. They typically inhabit deep, offshore waters, but a portion of the northeast Pacific stock (ESA-endangered) habitually utilizes inshore waters of the Kitimat Fjord System in coastal British Columbia, Canada; and fin whales have occasionally been observed in inside waters of southeast Alaska and Prince William Sound (Keen *et al.*, 2018; Ferguson *et al.*, 2015).

Local sightings from whale watching tours and Alaska Sea Life Center indicate that fin whales are frequently sighted in outer Resurrection bay. Additionally, Kenai Fjords National park staff monitor for fin whales and state that the area between the end of Resurrection Peninsula and Cheval Island and Agnes Cove (38 km from the project area) is a hot spot for fin whales (National Park Service, 2018). Although fin whales are most commonly sighted in outer Resurrection Bay, available occurrence data from the Global Biodiversity Information Facility (GBIF) show that fin whales have been observed as far into Resurrection Bay as the northern tip of Fox Island (GBIF, 2022), with reported sightings in inner Resurrection Bay in 2019, 2023, and 2024 (GBIF, 2024). There are no designated critical habitats for fin whales and there are no known biologically important areas for this species in the action area.

*Humpback Whale*

Three stocks of humpback whales could be found in the project area. These include the Hawai'i Stock (not ESA-listed), Mexico-North Pacific Stock (ESA-threatened), and the western North Pacific Stock (ESA- endangered). Although humpbacks seasonally migrate, they are observed in inner and outer Resurrection Bay regularly throughout the summer season (May through August) and may venture into the outer bay year-round (McCaslin, 2019; GBIF, 2022a). There are no designated critical habitats or biologically important areas for humpback whales in the action area.

*Killer Whale*

Three stocks of killer whales that are most likely to occur in Southcentral Alaska and the project area are the Alaska Resident stock, Gulf of Alaska/Aleutian Islands/Bering Sea Transient stock, and the AT1 Transient stock, listed as depleted under the MMPA (Muto et al. 2022). The Alaska Resident stock occurs from Southeast Alaska to the Aleutian Islands and Bering Sea. The Gulf of Alaska/Aleutian Islands/Bering Sea Transient stock range from Prince William Sound through the Aleutian Islands and Bering Sea. The AT1 Transient Stock, can be found from Prince William Sound to Kenai Fjords (Muto et al. 2022).

The AT1 Transient stock's primary habitat includes Resurrection Bay. The AT1 Transient stock experienced high mortality following the Exxon Valdez oil spill, as 11 of the original 22 individuals disappeared between 1989 and 1992. The AT1 stock currently numbers only seven individuals (Muto *et al.,* 2022).

Consultation with the Alaska SeaLife Center indicated that killer whales are commonly sighted year-round in inner and outer Resurrection Bay (Alaska SeaLife

Center 2024). Local NPS reports that both resident and transient populations are frequently observed in Kenai Fjords.

*Steller Sea Lion*

Only the western stock (ESA- endangered) of Steller sea lion is likely to occur in the action area. Womble *et al.* (2009) characterized Steller sea lion distribution in southeast Alaska in relation to seasonally available prey resources. Womble *et al*. identified four types of seasonal haulouts based on prey type and Resurrection Bay is characteristic of all four site types (ADF&G, 2022a; Brown *et al.*, 2002). The year-round availability of prey resources in Resurrection Bay (especially at the head of the bay) make it excellent foraging habitat for Steller sea lions.

It is anticipated that Steller sea lions would be present in the range of the project area year-round, with fewer individuals during the breeding season (late May through early June) when breeding females and mature males congregate at rookeries.

Reports from professional tour boat captains based in Seward indicate that at least 5 to 10 Steller sea lions can be found foraging daily throughout inner Resurrection Bay, often near Seward Harbor. Other areas where Steller sea lions are commonly observed within inner Resurrection Bay include Lowell Point, Tonsina Point, and Fourth of July Beach.

The proposed action does not overlap with Steller sea lion critical habitat or any major haulouts and rookeries; however, critical habitat occurs immediately outside of Resurrection Bay in close proximity to the ensonified area. The closest major haulouts to the action are at the mouth of Resurrection Bay, on the Resurrection Peninsula (approximately 20.95 kilometers (km) from the project site) and on Hive Island (25.72 km from the project site). The closest Steller sea lion rookery is the Chiswell Islands (approximately 54 km from the project site). Although the ensonified area extends out to

24 km from the pile driving location, due to directionality and land masses it does not overlap with any critical habitat surrounding these haulouts.

*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. 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, 2019) recommended that marine mammals be divided into hearing groups based on directly measured (behavioral or auditory evoked potential techniques) or estimated hearing ranges (behavioral response data, anatomical modeling, *etc.*). Generalized hearing ranges were chosen based on the ~65-decibel (dB) threshold from composite audiograms, previous analyses in NMFS (2018), and/or data from Southall *et al*. (2007, 2019). We note that the names of two hearing groups and the generalized hearing ranges of all marine mammal hearing groups have been recently updated (NMFS, 2024) as reflected below in table 3.

**Table 3 -- Marine Mammal Hearing Groups (NMFS, 2024)**

| Hearing Group | Generalized Hearing Range* |
|---|---|
| Low-frequency (LF) cetaceans<br>(baleen whales) | 7 Hz to 36 kHz |
| High-frequency (HF) cetaceans<br>(dolphins, toothed whales, beaked whales, bottlenose whales) | 150 Hz to 160 kHz |
| Very High-frequency (VHF) cetaceans<br>(true porpoises, *Kogia*, river dolphins, Cephalorhynchid, *Lagenorhynchus cruciger* & *L. australis*) | 200 Hz to 165 kHz |
| Phocid pinnipeds (PW) (underwater)<br>(true seals) | 40 Hz to 90 kHz |
| Otariid pinnipeds (OW) (underwater)<br>(sea lions and fur seals) | 60 Hz to 68 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 may not be as broad. Generalized hearing range chosen based on ~65 dB threshold from composite audiogram, previous analysis in NMFS (2018), and/or data from Southall *et al.* (2007, 2019). Additionally, animals are able to detect very loud sounds above and below that "generalized" hearing range. | |

For more detail concerning these groups and associated frequency ranges, please see NMFS (2024) for a review of available information.

**Potential Effects of Specified Activities on Marine Mammals and Their Habitat**

This section provides a discussion of the ways in which components of the specified activity may impact marine mammals and their habitat. The **Estimated Take of Marine Mammals** 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 of Marine Mammals** 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 whether those impacts are reasonably expected to, or reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival.

Acoustic effects on marine mammals during the specified activity can occur from impact and vibratory pile driving. The effects of underwater noise from TMC's proposed activities have the potential to result in Level A or Level B harassment of marine mammals in the action area.

*Description of Sound Sources*

The marine soundscape is comprised of both ambient and anthropogenic sounds. Ambient sound is defined as the all-encompassing sound in a given place and is usually a composite of sound from many sources both near and far. The sound level of an area is defined by the total acoustical energy being generated by known and unknown sources. These sources may include physical (*e.g.*, waves, wind, precipitation, earthquakes, ice, atmospheric sound), biological (*e.g.*, sounds produced by marine mammals, fish, and invertebrates), and anthropogenic sound (*e.g.*, vessels, dredging, aircraft, construction).

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 to 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.

In-water construction activities associated with the project would include vibratory pile removal, impact and vibratory pile driving, and DTH. The sounds produced by these activities fall into one of two general sound types: impulsive and non-impulsive. Impulsive sounds (*e.g.*, explosions, gunshots, sonic booms, impact pile driving) are typically transient, brief (less than 1 second), broadband, and consist of high peak sound pressure with rapid rise time and rapid decay (ANSI, 1986; NIOSH, 1998; ANSI, 2005; NMFS, 2018a). Non-impulsive sounds (*e.g.*, aircraft, machinery operations such as drilling or dredging, vibratory pile driving, and active sonar systems) can be broadband, narrowband or tonal, brief or prolonged (continuous or intermittent), and typically do not have the high peak sound pressure with raid rise/decay time that impulsive sounds do (ANSI, 1995; NIOSH, 1998; NMFS, 2018a). 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).

TMC proposes to use vibratory hammers to remove steel piles, vibratory and impact pile driving to install new steel pipe piles, and DTH for a subset of installed piles to reach full depth. Impact hammers operate by repeatedly dropping a heavy piston onto a pile to drive the pile into the substrate. Sound generated by impact hammers is characterized by rapid rise times and high peak levels, a potentially injurious combination (Hastings and Popper, 2005). Vibratory hammers install piles by vibrating them and allowing the weight of the hammer to push them into the sediment. Vibratory hammers produce significantly less sound than impact hammers. Peak sound pressure levels (SPLs) may be 180 dB or greater, but are generally 10 to 20 dB lower than SPLs generated during impact pile driving of the same-sized pile (Oestman *et al.*, 2009). Rise time is slower, reducing the probability and severity of injury, and sound energy is distributed over a greater amount of time (Nedwell and Edwards, 2002; Carlson *et al.*, 2005).

A DTH hammer is essentially a drill bit that drills through the bedrock using a rotating function like a normal drill, in concert with a hammering mechanism operated by a pneumatic (or sometimes hydraulic) component integrated into the DTH hammer to increase speed of progress through the substrate (*i.e.*, it is similar to a “hammer drill” hand tool). The sounds produced by the DTH method contain both a continuous non-impulsive component from the drilling action and an impulsive component from the hammering effect. Therefore, we treat DTH systems as both impulsive and non-impulsive sound source types simultaneously.

The likely or possible impacts of TMC's proposed activity on marine mammals could involve both non-acoustic and acoustic stressors. Potential non-acoustic stressors could result from the physical presence of equipment and personnel; however, any impacts to marine mammals are expected to be primarily acoustic in nature. Acoustic stressors include effects of heavy equipment operation during pile installation and removal.

*Acoustic Effects*

The introduction of anthropogenic noise into the aquatic environment from pile driving and removal is the means by which marine mammals may be harassed from TMC's specified activity. In general, animals exposed to natural or anthropogenic sound may experience behavioral, physiological, and/or physical effects, ranging in magnitude from none to severe (Southall *et al.*, 2007, 2019). In general, exposure to pile driving noise has the potential to result in behavioral reactions (*e.g.*, avoidance, temporary cessation of foraging and vocalizing, changes in dive behavior) and, in limited cases, an auditory threshold shift (TS). Exposure to anthropogenic noise can also lead to non-observable physiological responses such an increase in stress hormones. Additional noise in a marine mammal's habitat can mask acoustic cues used by marine mammals to carry out daily functions such as communication and predator and prey detection. The effects of pile driving noise on marine mammals are dependent on several factors, including, but not limited to, sound type (*e.g.*, impulsive vs. non-impulsive), the species, age and sex class (*e.g.*, adult male vs. mom with calf), duration of exposure, the distance between the pile and the animal, received levels, behavior at time of exposure, and previous history with exposure (Wartzok *et al.*, 2004; Southall *et al.*, 2007). Here we discuss physical auditory effects (TSs) followed by behavioral effects and potential impacts on habitat.

NMFS defines a noise-induced TS as a change, usually an increase, in the threshold of audibility at a specified frequency or portion of an individual's hearing range above a previously established reference level (NMFS, 2018, 2024). The amount of TS is customarily expressed in dB. A TS can be permanent or temporary. As described in NMFS (2018, 2024), there are numerous factors to consider when examining the consequence of TS, including, but not limited to, the signal temporal pattern (*e.g.*, impulsive or non-impulsive), likelihood an individual would be exposed for a long enough duration or to a high enough level to induce a TS, the magnitude of the TS, time to recovery (seconds to minutes or hours to days), the frequency range of the exposure (*i.e.*, spectral content), the hearing and vocalization frequency range of the exposed species relative to the signal's frequency spectrum (*i.e.*, how animal uses sound within the frequency band of the signal; *e.g.*, Kastelein *et al.*, 2014), and the overlap between the animal and the source (*e.g.*, spatial, temporal, and spectral).

*Auditory Injury (AUD INJ) and Permanent Threshold Shift (PTS)*—NMFS defines AUD INJ as “damage to the inner ear that can result in destruction of tissue . . . which may or may not result in PTS” (NMFS, 2024). NMFS defines PTS as a permanent, irreversible increase in the threshold of audibility at a specified frequency or portion of an individual's hearing range above a previously established reference level (NMFS, 2024). PTS does not generally affect more than a limited frequency range, and an animal that has incurred PTS has incurred some level of hearing loss at the relevant frequencies; typically, animals with PTS are not functionally deaf (Au and Hastings, 2008; Finneran, 2016). Available data from humans and other terrestrial mammals indicate that a 40-dB threshold shift approximates PTS onset (see Ward *et al.*, 1958, 1959, 1960; Kryter *et al.*, 1966; Miller, 1974; Ahroon *et al.*, 1996; Henderson *et al.*, 2008). PTS levels for marine mammals are estimates, as with the exception of a single study unintentionally inducing PTS in a harbor seal (Kastak *et al.*, 2008), there are no empirical data measuring PTS in marine mammals largely due to the fact that, for various ethical reasons, experiments involving anthropogenic noise exposure at levels inducing PTS are not typically pursued or authorized (NMFS, 2018).

*Temporary Threshold Shift (TTS)*—TTS is a temporary, reversible increase in the threshold of audibility at a specified frequency or portion of an individual's hearing range above a previously established reference level (NMFS, 2018). Based on data from cetacean TTS measurements (Southall *et al.*, 2007), a TTS of 6 dB is considered the minimum TS clearly larger than any day-to-day or session-to-session variation in a subject's normal hearing ability (Schlundt *et al.*, 2000; Finneran *et al.*, 2000, 2002). As described in Finneran (2015), marine mammal studies have shown the amount of TTS increases with cumulative sound exposure level ($SEL_{cum}$) in an accelerating fashion: At low exposures with lower $SEL_{cum,}$ the amount of TTS is typically small and the growth curves have shallow slopes. At exposures with higher $SEL_{cum}$, the growth curves become steeper and approach linear relationships with the noise SEL.

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 (similar to those discussed in the *Masking* section, below). 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 takes place during a time when the animal is traveling through the open ocean, where ambient noise is lower and there are not as many competing sounds present. Alternatively, a larger amount and longer duration of TTS sustained during time when communication is critical for successful mother/calf interactions could have more serious impacts. We note that reduced hearing sensitivity as a simple function of aging has been observed in marine mammals, as well as humans and other taxa (Southall *et al.*, 2007), so we can infer that strategies exist for coping with this condition to some degree, though likely not without cost.

Many studies have examined noise-induced hearing loss in marine mammals (see Finneran (2015) and Southall *et al.* (2019) for summaries). TTS is the mildest form of hearing impairment that can occur during exposure to sound (Kryter, 2013). 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. For cetaceans, published data on the onset of TTS are limited to captive bottlenose dolphin (*Tursiops truncatus*), beluga whale (*Delphinapterus leucas*), harbor porpoise, and Yangtze finless porpoise (*Neophocoena asiaeorientalis*) (Southall *et al.*, 2019). For pinnipeds in water, measurements of TTS are limited to harbor seals, elephant seals, bearded seals (*Erignathus barbatus*) and California sea lions (*Zalophus californianus*) (Kastak *et al.*, 1999, 2007; Kastelein *et al.*, 2019b, 2019c, 2021, 2022a, 2022b; Reichmuth *et al.*, 2019; Sills *et al.*, 2020). TTS was not observed in spotted (*Phoca largha*) and ringed (*Pusa hispida*) seals exposed to single airgun impulse sounds at levels matching previous predictions of TTS onset (Reichmuth *et al.*, 2016). These studies examine hearing thresholds measured in marine mammals before and after exposure to intense or long-duration sound exposures. The difference between the pre-exposure and post-exposure thresholds can be used to determine the amount of threshold shift at various post-exposure times.

The amount and onset of TTS depends on the exposure frequency. Sounds at low frequencies, well below the region of best sensitivity for a species or hearing group, are less hazardous than those at higher frequencies, near the region of best sensitivity (Finneran and Schlundt, 2013). At low frequencies, onset-TTS exposure levels are higher compared to those in the region of best sensitivity (*i.e.*, a low frequency noise would need to be louder to cause TTS onset when TTS exposure level is higher), as shown for harbor porpoises and harbor seals (Kastelein *et al.*, 2019a, 2019c). Note that in general, harbor seals and harbor porpoises have a lower TTS onset than other measured pinniped or cetacean species (Finneran, 2015). In addition, TTS can accumulate across multiple exposures, but the resulting TTS would be less than the TTS from a single, continuous exposure with the same SEL (Mooney *et al.*, 2009; Finneran *et al.*, 2010; Kastelein *et al.*, 2014, 2015). This means that TTS predictions based on the total, cumulative SEL would overestimate the amount of TTS from intermittent exposures, such as sonars and impulsive sources. Nachtigall *et al.* (2018) describe measurements of hearing sensitivity of multiple odontocete species (bottlenose dolphin, harbor porpoise, beluga, and false killer whale (*Pseudorca crassidens*)) when a relatively loud sound was preceded by a warning sound. These captive animals were shown to reduce hearing sensitivity when warned of an impending intense sound. Based on these experimental observations of captive animals, the authors suggest that wild animals may dampen their hearing during prolonged exposures or if conditioned to anticipate intense sounds. Another study showed that echolocating animals (including odontocetes) might have anatomical specializations that might allow for conditioned hearing reduction and filtering of low-frequency ambient noise, including increased stiffness and control of middle ear structures and placement of inner ear structures (Ketten *et al.*, 2021). Data available on noise-induced hearing loss for mysticetes are currently lacking (NMFS, 2018). Additionally, the existing marine mammal TTS data come from a limited number of individuals within these species.

Relationships between TTS and PTS thresholds have not been studied in marine mammals, and there is no PTS data for cetaceans, but such relationships are assumed to be similar to those in humans and other terrestrial mammals. PTS typically occurs at exposure levels at least several decibels above that inducing mild TTS (*e.g.*, a 40-dB threshold shift approximates PTS onset (Kryter *et al.*, 1966; Miller, 1974), while a 6-dB threshold shift approximates TTS onset (Southall *et al.*, 2007, 2019). Based on data from terrestrial mammals, a precautionary assumption is that the PTS thresholds for impulsive sounds (such as impact pile driving pulses as received close to the source) are at least 6 dB higher than the TTS threshold on a peak-pressure basis and PTS cumulative sound exposure level thresholds are 15 to 20 dB higher than TTS cumulative sound exposure level thresholds (Southall *et al.*, 2007, 2019). 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.

Activities for this project include impact pile driving, vibratory pile driving and vibratory removal, and DTH. There would likely be pauses in activities producing the sound during each day. Given these pauses and the fact that many marine mammals are likely moving through the project areas and not remaining for extended periods of time, the potential for TS declines.

*Behavioral Harassment*—Exposure to noise from pile driving also has the potential to behaviorally disturb marine mammals. Generally speaking, NMFS considers a behavioral disturbance that rises to the level of harassment under the MMPA a non-minor response—in other words, not every response qualifies as behavioral disturbance, and for responses that do, those of a higher level, or accrued across a longer duration, have the potential to affect foraging, reproduction, or survival. 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 may include changing durations of surfacing and dives, changing direction and/or speed;

reducing/increasing vocal activities; changing/cessation of certain behavioral activities (such as socializing or feeding); eliciting a visible startle response or aggressive behavior (such as tail/fin slapping or jaw clapping); avoidance of areas where sound sources are located. Pinnipeds may increase their haul out time, possibly to avoid in-water disturbance (Thorson and Reyff, 2006).

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.*, 2004; Southall *et al.*, 2007, 2019; 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). In general, pinnipeds seem more tolerant of, or at least habituate more quickly to, potentially disturbing underwater sound than do cetaceans, and generally seem to be less responsive to exposure to industrial sound than most cetaceans. Please see Appendices B and C of Southall *et al.* (2007) and Gomez *et al.* (2016) for reviews of studies involving marine mammal behavioral responses to sound.

Habituation can occur when an animal's response to a stimulus wanes with repeated exposure, usually in the absence of unpleasant associated events (Wartzok *et al.*, 2004). Animals are most likely to habituate to sounds that are predictable and unvarying. It is important to note that habituation is appropriately considered as a “progressive reduction in response to stimuli that are perceived as neither aversive nor beneficial,” rather than as, more generally, moderation in response to human disturbance (Bejder *et* *al.*, 2009). The opposite process is sensitization, when an unpleasant experience leads to subsequent responses, often in the form of avoidance, at a lower level of exposure.

As noted above, behavioral state may affect the type of response. For example, animals that are resting may show greater behavioral change in response to disturbing sound levels than animals that are highly motivated to remain in an area for feeding (Richardson *et al.*, 1995; Wartzok *et al.*, 2004; National Research Council (NRC), 2005). Controlled experiments with captive marine mammals have showed pronounced behavioral reactions, including avoidance of loud sound sources (Ridgway *et al.*, 1997; Finneran *et al.*, 2003). Observed responses of wild marine mammals to loud pulsed sound sources (*e.g.*, seismic airguns) have been varied but often consist of avoidance behavior or other behavioral changes (Richardson *et al.*, 1995; Morton and Symonds, 2002; Nowacek *et al.*, 2007).

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

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

Disruption of feeding behavior can be difficult to correlate with anthropogenic sound exposure, so it is usually inferred by observed displacement from known foraging areas, the appearance of secondary indicators (*e.g.*, bubble nets or sediment plumes), or changes in dive behavior. However, acoustic and movement bio-logging tools have been used in some cases, to infer responses of feeding to anthropogenic noise. For example, Blair *et al.* (2016) reported significant effects on humpback whale foraging behavior in Stellwagen Bank in response to ship noise including slower descent rates, and fewer side-rolling events per dive with increasing ship nose. In addition, Wisniewska *et al.* (2018) reported that tagged harbor porpoises demonstrated fewer prey capture attempts when encountering occasional high-noise levels resulting from vessel noise as well as more vigorous fluking, interrupted foraging, and cessation of echolocation signals observed in response to some high-noise vessel passes.

In response to playbacks of vibratory pile driving sounds, captive bottlenose dolphins showed changes in target detection and number of clicks used for a trained echolocation task (Branstetter *et al.*, 2018). Similarly, harbor porpoises trained to collect fish during playback of impact pile driving sounds also showed potential changes in behavior and task success, though individual differences were prevalent (Kastelein *et al.*, 2019d). As for other types of behavioral response, the frequency, duration, and temporal pattern of signal presentation, as well as differences in species sensitivity, are likely contributing factors to differences in response in any given circumstance (*e.g.*, Croll *et al.*, 2001; Nowacek *et al.*, 2004; Madsen *et al.*, 2006; Yazvenko *et al.*, 2007). A determination of whether foraging disruptions incur fitness consequences would require information on or estimates of the energetic requirements of the affected individuals and the relationships among prey availability, foraging effort and success, and the life history stage(s) of the animal.

Variations in respiration naturally vary with different behaviors and alterations to breathing rate as a function of acoustic exposure can be expected to co-occur with other behavioral reactions, such as a flight response or an alteration in diving. However, respiration rates in and of themselves may be representative of annoyance or an acute stress response. Various studies have shown that respiration rates may either be unaffected or could increase, depending on the species and signal characteristics, again highlighting the importance in understanding species differences in the tolerance of underwater noise when determining the potential for impacts resulting from anthropogenic sound exposure (*e.g.*, Kastelein *et al.*, 2001, 2005, 2006; Gailey *et al.*, 2007). For example, harbor porpoise respiration rate increased in response to pile driving sounds at and above a received broadband SPL of 136 dB (zero-peak SPL: 151 dB (referenced to 1 micropascal (re 1 μPa)); SEL of a single strike: 127 dB re 1 $\mu Pa^2$ -s) (Kastelein *et al.*, 2013).

Avoidance is the displacement of an individual from an area or migration path as a result of the presence of a sound or other stressors, and is one of the most obvious manifestations of disturbance in marine mammals (Richardson *et al.*, 1995). For example, gray whales are known to change direction—deflecting from customary migratory paths—in order to avoid noise from seismic surveys (Malme *et al.*, 1984). Avoidance may be short-term, with animals returning to the area once the noise has ceased (*e.g.*, Bowles *et al.*, 1994; Goold, 1996; Stone *et al.*, 2000; Morton and Symonds, 2002; Gailey *et al.*, 2007). Longer-term displacement is possible, however, which may lead to changes in abundance or distribution patterns of the affected species in the affected region if habituation to the presence of the sound does not occur (*e.g.*, Blackwell *et al.*, 2004; Bejder *et al.*, 2006; Teilmann *et al.*, 2006).

A flight response is a dramatic change in normal movement to a directed and rapid movement away from the perceived location of a sound source. The flight response differs from other avoidance responses in the intensity of the response (*e.g.*, directed movement, rate of travel). Relatively little information on flight responses of marine mammals to anthropogenic signals exist, although observations of flight responses to the presence of predators have occurred (Connor and Heithaus, 1996; Bowers *et al.*, 2018). The result of a flight response could range from brief, temporary exertion and displacement from the area where the signal provokes flight to, in extreme cases, marine mammal strandings (England *et al.*, 2001). However, it should be noted that response to a perceived predator does not necessarily invoke flight (Ford and Reeves, 2008), and whether individuals are solitary or in groups may influence the response.

Behavioral disturbance can also impact marine mammals in more subtle ways. Increased vigilance may result in costs related to diversion of focus and attention (*i.e.*, when a response consists of increased vigilance, it may come at the cost of decreased attention to other critical behaviors such as foraging or resting). These effects have generally not been demonstrated for marine mammals, but studies involving fishes and terrestrial animals have shown that increased vigilance may substantially reduce feeding rates (*e.g.*, Beauchamp and Livoreil, 1997; Fritz *et al.*, 2002; Purser and Radford, 2011). In addition, chronic disturbance can cause population declines through reduction of fitness (*e.g.*, decline in body condition) and subsequent reduction in reproductive success, survival, or both (*e.g.*, Harrington and Veitch, 1992; Daan *et al.*, 1996; Bradshaw *et al.*, 1998). However, Ridgway *et al.* (2006) reported that increased vigilance in bottlenose dolphins exposed to sound over a 5-day period did not cause any sleep deprivation or stress effects.

Many animals perform vital functions, such as feeding, resting, traveling, and socializing, on a diel cycle (24-hour cycle). Disruption of such functions resulting from reactions to stressors such as sound exposure are more likely to be significant if they last more than one diel cycle or recur on subsequent days (Southall *et al.*, 2007). Consequently, a behavioral response lasting less than 1 day and not recurring on subsequent days is not considered particularly severe unless it could directly affect reproduction or survival (Southall *et al.*, 2007). Note that there is a difference between multi-day substantive (*i.e.*, meaningful) behavioral reactions and multi-day anthropogenic activities. For example, just because an activity lasts for multiple days does not necessarily mean that individual animals are either exposed to activity-related stressors for multiple days or, further, exposed in a manner resulting in sustained multi-day substantive behavioral responses.

*Stress Responses*—An animal's perception of a threat may be sufficient to trigger stress responses consisting of some combination of behavioral responses, autonomic nervous system responses, neuroendocrine responses, or immune responses (*e.g.*, Seyle, 1950; Moberg, 2000). In many cases, an animal's first and sometimes most economical (in terms of energetic costs) response is behavioral avoidance of the potential stressor. Autonomic nervous system responses to stress typically involve changes in heart rate, blood pressure, and gastrointestinal activity. These responses have a relatively short duration and may or may not have a significant long-term effect on an animal's fitness.

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

The primary distinction between stress (which is adaptive and does not normally place an animal at risk) and "distress" is the cost of the response. During a stress response, an animal uses glycogen stores that can be quickly replenished once the stress is alleviated. In such circumstances, the cost of the stress response would not pose serious fitness consequences. However, when an animal does not have sufficient energy reserves to satisfy the energetic costs of a stress response, energy resources must be diverted from other functions. This state of distress would 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 would 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), however distress is an unlikely result of this project based on observations of marine mammals during previous, similar projects in the area.

*Auditory Masking*—Since many marine mammals rely on sound to find prey, moderate social interactions, and facilitate mating (Tyack, 2008), noise from anthropogenic sound sources can interfere with these functions, but only if the noise spectrum overlaps with the hearing sensitivity of the receiving marine mammal (Southall *et al.*, 2007; Clark *et al.*, 2009; Hatch *et al.*, 2012). Chronic exposure to excessive, though not high-intensity, noise could cause masking at particular frequencies for marine mammals that utilize sound for vital biological functions (Clark *et al.*, 2009). Acoustic masking is when other noises such as from human sources interfere with an animal's ability to detect, recognize, or discriminate between acoustic signals of interest (*e.g.*, those used for intraspecific communication and social interactions, prey detection, predator avoidance, navigation) (Richardson *et al.*, 1995; Erbe *et al.*, 2016). Therefore, under certain circumstances, marine mammals whose acoustical sensors or environment are being severely masked could also be impaired from maximizing their performance fitness in survival and reproduction. The ability of a noise source to mask biologically important sounds depends on the characteristics of both the noise source and the signal of interest (*e.g.*, signal-to-noise ratio, temporal variability, direction), in relation to each other and to an animal's hearing abilities (*e.g.*, sensitivity, frequency range, critical ratios, frequency discrimination, directional discrimination, age or TTS hearing loss), and existing ambient noise and propagation conditions (Hotchkin and Parks, 2013).

Marine mammals vocalize for different purposes and across multiple modes, such as whistling, echolocation click production, calling, and singing. Changes in vocalization behavior in response to anthropogenic noise can occur for any of these modes and may result from a need to compete with an increase in background noise or may reflect increased vigilance or a startle response. For example, in the presence of potentially masking signals, humpback whales and killer whales have been observed to increase the length of their songs (Miller *et al.*, 2000; Fristrup *et al.*, 2003) or vocalizations (Foote *et* *al.*, 2004), respectively, while North Atlantic right whales (*Eubalaena glacialis*) have been observed to shift the frequency content of their calls upward while reducing the rate of calling in areas of increased anthropogenic noise (Parks *et al.*, 2007). Fin whales have also been documented lowering the bandwidth, peak frequency, and center frequency of their vocalizations under increased levels of background noise from large vessels (Castellote *et al.*, 2012). Other alterations to communication signals have also been observed. For example, gray whales, in response to playback experiments exposing them to vessel noise, have been observed increasing their vocalization rate and producing louder signals at times of increased outboard engine noise (Dahlheim and Castellote, 2016). Alternatively, animals may cease sound production during production of aversive signals (Bowles *et al.*, 1994).

Under certain circumstances, marine mammals experiencing significant masking could also be impaired from maximizing their performance fitness in survival and reproduction. Therefore, when the coincident (masking) sound is human-made, it may be considered harassment when disrupting or altering critical behaviors. It is important to distinguish TTS and PTS, which persist after the sound exposure, from masking, which occurs during the sound exposure. Because masking (without resulting in TS) is not associated with abnormal physiological function, it is not considered a physiological effect, but rather a potential behavioral effect (though not necessarily one that would be associated with harassment).

The frequency range of the potentially masking sound is important in determining any potential behavioral impacts. For example, low-frequency signals may have less effect on high-frequency echolocation sounds produced by odontocetes but are more likely to affect detection of mysticete communication calls and other potentially important natural sounds such as those produced by surf and some prey species. The masking of communication signals by anthropogenic noise may be considered as a reduction in the communication space of animals (*e.g.*, Clark *et al.*, 2009) and may result in energetic or other costs as animals change their vocalization behavior (*e.g.*, Miller *et al.*, 2000; Foote *et al.*, 2004; Parks *et al.*, 2007; Di Iorio and Clark, 2010; Holt *et al.*, 2009). Masking can be reduced in situations where the signal and noise come from different directions (Richardson *et al.*, 1995), through amplitude modulation of the signal, or through other compensatory behaviors (Hotchkin and Parks, 2013). Masking can be tested directly in captive species (*e.g.*, Erbe, 2008), but in wild populations it must be either modeled or inferred from evidence of masking compensation. There are few studies addressing real-world masking sounds likely to be experienced by marine mammals in the wild (*e.g.*, Branstetter *et al.*, 2013).

Marine mammals at or near the proposed TMC project site may be exposed to anthropogenic noise which may be a source of masking. Vocalization changes may result from a need to compete with an increase in background noise and include increasing the source level, modifying the frequency, increasing the call repetition rate of vocalizations, or ceasing to vocalize in the presence of increased noise (Hotchkin and Parks, 2013). For example, in response to loud noise, beluga whales may shift the frequency of their echolocation clicks to prevent masking by anthropogenic noise (Tyack, 2000; Eickmeier and Vallarta, 2022).

Masking occurs in the frequency band or bands that animals utilize and is more likely to occur in the presence of broadband, relatively continuous noise sources such as vibratory pile driving. Energy distribution of pile driving covers a broad frequency spectrum, and sound from pile driving would be within the audible range of pinnipeds and cetaceans present in the proposed action area. While some construction during the TMC's activities may mask some acoustic signals that are relevant to the daily behavior of marine mammals, the short-term duration and limited areas affected make it very unlikely that the fitness of individual marine mammals would be impacted.

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

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

*Marine Mammal Habitat Effects*

The project would occur near an active marine commercial and industrial area. Construction activities at the Seward Cruise Ship Passenger Dock and Terminal Facility project could have localized, temporary impacts on marine mammal habitat and their prey by increasing in-water SPLs and slightly decreasing water quality. Increased noise levels may affect acoustic habitat (see *Auditory Masking* discussion above) and adversely affect marine mammal prey in the vicinity of the project area (see discussion below). During in-water vibratory and impact pile driving and DTH, elevated levels of underwater noise would ensonify a portion of Resurrection Bay, where both fish and some mammals occur and could affect foraging success. Additionally, marine mammals may avoid the area during construction; however, displacement due to noise is expected to be temporary and is not expected to result in long-term effects to the individuals or populations.

*Water Quality*—Temporary and localized reduction in water quality would occur as a result of in-water construction activities. Most of this effect would occur during the installation and removal of piles when bottom sediments are disturbed. The installation and removal of piles would disturb bottom sediments and may cause a temporary increase in suspended sediment in the project area. During pile removal, sediment attached to the pile moves vertically through the water column until gravitational forces cause it to slough off under its own weight. The small resulting sediment plume is expected to settle out of the water column within a few hours. Studies of the effects of turbid water on fish (marine mammal prey) suggest that concentrations of suspended sediment can reach thousands of milligrams per liter before an acute toxic reaction is expected (Burton, 1993).

Effects to turbidity and sedimentation are expected to be short-term, minor, and localized. Suspended sediments in the water column should dissipate and quickly return to background levels in all construction scenarios. Turbidity within the water column has the potential to reduce the level of oxygen in the water and irritate the gills of prey fish species in the proposed project area. However, turbidity plumes associated with the project would be temporary and localized, and fish in the proposed project area would be able to move away from and avoid the areas where plumes may occur. Therefore, it is expected that the impacts on prey fish species from turbidity, and therefore on marine mammals, would be minimal and temporary. In general, the area likely impacted by the proposed construction activities is relatively small compared to the available marine mammal habitat in the Gulf of Alaska, and does not include any areas of particular importance.

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

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

Fish react to sounds which are especially strong and/or intermittent low-frequency sounds, and behavioral responses such as flight or avoidance are the most likely effects. Short duration, sharp sounds can cause overt or subtle changes in fish behavior and local distribution. The reaction of fish to noise depends on the physiological state of the fish, past exposures, motivation (*e.g.*, feeding, spawning, migration), and other environmental factors. Hastings and Popper (2005) identified several studies that suggest fish may relocate to avoid certain areas of sound energy. Additional studies have documented effects of pile driving on fish, although several are based on studies in support of large, multiyear bridge construction projects (*e.g.*, Scholik and Yan, 2001, 2002; Popper and Hastings, 2009). Several studies have demonstrated that impulse sounds might affect the distribution and behavior of some fishes, potentially impacting foraging opportunities or increasing energetic costs (*e.g.*, Fewtrell and McCauley, 2012; Pearson *et al.*, 1992; Skalski *et al.*, 1992; Santulli *et al.*, 1999; Paxton *et al.*, 2017). However, some studies have shown no or slight reaction to impulse sounds (*e.g.*, Pena *et al.*, 2013; Wardle *et al.*, 2001; Jorgenson and Gyselman, 2009; Cott *et al.*, 2012). More commonly, though, the impacts of noise on fish are temporary.

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

The greatest potential impact to fishes during construction would occur during unattenuated impact pile installation of 48, 60 and 72-in steel pipe piles, which is estimated to occur on up to 51 days for a maximum of 4 piles per day. In-water construction activities would only occur during daylight hours, allowing fish to forage and transit the project area in the evening. Vibratory pile driving would possibly elicit behavioral reactions from fishes such as temporary avoidance of the area but is unlikely to cause injuries to fishes or have persistent effects on local fish populations. Construction also would have minimal permanent and temporary impacts on benthic invertebrate species, a marine mammal prey source. In addition, it should be noted that the area in question is low-quality habitat since it is already highly developed and experiences a high level of anthropogenic noise from normal operations and other vessel traffic. In general, any negative impacts on marine mammal prey species are expected to be minor and temporary.

Fish populations in the proposed project area that serve as marine mammal prey could be temporarily affected by noise from pile installation and removal. The frequency range in which fishes generally perceive underwater sounds is 50 to 2,000 Hz, with peak sensitivities below 800 Hz (Popper and Hastings, 2009). Fish behavior or distribution may change, especially with strong and/or intermittent sounds that could harm fishes. High underwater SPLs have been documented to alter behavior, cause hearing loss, and injure or kill individual fish by causing serious internal injury (Hastings and Popper, 2005).

The most likely impact to fish from pile driving activities in the project area would be temporary behavioral avoidance of the area. The duration of fish avoidance of an area after pile driving stops is unknown, but a rapid return to normal recruitment, distribution and behavior is anticipated. In general, impacts to marine mammal prey species are expected to be minor and temporary due to the expected short daily duration of individual pile driving events.

*In-Water Construction Effects on Potential Foraging Habitat*—The area likely impacted by the project is relatively small compared to the available habitat in the Gulf of Alaska and does not include any biologically important areas (BIAs) or ESA-designated critical habitat. The total area affected by pile installation and removal and the new footprint is small compared to the vast foraging area available to marine mammals in the area. Pile driving and removal at the project site would not obstruct long-term movements or migration of marine mammals.

Avoidance by potential prey (*i.e.*, fish) of the immediate area due to the temporary loss of this foraging habitat is also possible. The duration of fish and marine mammal avoidance of this area after pile driving stops is unknown, but a rapid return to normal recruitment, distribution, and behavior is anticipated. Any behavioral avoidance by fish or marine mammals of the disturbed area would still leave significantly large areas of fish and marine mammal foraging habitat in the nearby vicinity.

In summary, given the short daily duration of sound associated with individual pile driving events and the relatively small areas being affected, pile driving activities associated with the proposed action are not likely to have a permanent adverse effect on any fish habitat, or populations of fish species. Any behavioral avoidance by fish of the disturbed area would still leave significantly large areas of fish and marine mammal foraging habitat in the nearby vicinity. Thus, we conclude that impacts of the specified activity are not likely to have more than short-term adverse effects on any prey habitat or populations of prey species. Further, any impacts to marine mammal habitat are not expected to result in significant or long-term consequences for individual marine mammals, or to contribute to adverse impacts on their populations.

**Estimated Take of Marine Mammals**

This section provides an estimate of the number of incidental takes proposed for authorization through the IHA, which will inform NMFS' consideration of "small numbers," the negligible impact determinations, and impacts on subsistence uses.

Harassment is the only type of take expected to result from these activities. Except with respect to certain activities not pertinent here, section 3(18) of the MMPA defines "harassment" as any act of pursuit, torment, or annoyance, which (i) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B harassment).

Authorized takes would primarily be by Level B harassment, as use of the acoustic source (*i.e.*, pile driving) has the potential to result in disruption of behavioral patterns for individual marine mammals. There is also some potential for AUD INJ (Level A harassment) to result, for all species because predicted AUD INJ zones are large for impact pile driving and DTH activities. The proposed mitigation and monitoring measures are expected to minimize the severity of the taking to the extent practicable.

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

For acoustic impacts, generally speaking, we estimate take by considering: (1) acoustic criteria above which NMFS believes the best available science indicates marine mammals would likely be behaviorally harassed or incur some degree of AUD INJ; (2) the area or volume of water that would be ensonified above these levels in a day; (3) the density or occurrence of marine mammals within these ensonified areas; and, (4) the number of days of activities. We note that while these factors can contribute to a basic calculation to provide an initial prediction of potential 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 estimates.

*Acoustic Criteria*

NMFS recommends the use of acoustic criteria that identify the received level of underwater sound above which exposed marine mammals would be reasonably expected to be behaviorally harassed (equated to Level B harassment) or to incur AUD INJ of some degree (equated to Level A harassment). We note that the criteria for AUD INJ, as well as the names of two hearing groups, have been recently updated (NMFS, 2024) as reflected below in the Level A Harassment section.

*Level B Harassment* – Though significantly driven by received level, the onset of behavioral disturbance from anthropogenic noise exposure is also informed to varying degrees by other factors related to the source or exposure context (*e.g.*, frequency, predictability, duty cycle, duration of the exposure, signal-to-noise ratio, distance to the source), the environment (*e.g.*, bathymetry, other noises in the area, predators in the area), and the receiving animals (hearing, motivation, experience, demography, life stage, depth) and can be difficult to predict (*e.g.*, Southall *et al.,* 2007, 2021; Ellison *et al.*, 2012). Based on what the available science indicates and the practical need to use a threshold based on a metric that is both predictable and measurable for most activities, NMFS typically uses a generalized acoustic threshold based on received level to estimate the onset of behavioral harassment. NMFS generally predicts that marine mammals are likely to be behaviorally harassed in a manner considered to be Level B harassment when exposed to underwater anthropogenic noise above root-mean-squared pressure received levels (RMS SPL) of 120 dB (referenced to 1 micropascal (re 1 μPa)) for continuous (*e.g.*, vibratory pile driving, drilling) and above RMS SPL 160 dB re 1 μPa for non-explosive impulsive (*e.g.*, seismic airguns) or intermittent (*e.g.*, scientific sonar) sources. Generally speaking, Level B harassment take estimates based on these behavioral harassment thresholds are expected to include any likely takes by TTS as, in most cases, the likelihood of TTS occurs at distances from the source less than those at which behavioral harassment is likely. TTS of a sufficient degree can manifest as behavioral harassment, as reduced hearing sensitivity and the potential reduced opportunities to detect important signals (conspecific communication, predators, prey) may result in changes in behavior patterns that would not otherwise occur.

TMC includes the use of continuous (vibratory pile driving and DTH) and impulsive (DTH and impact pile driving) sources, and therefore the RMS SPL thresholds of 120 and 160 dB re 1 μPa are applicable.

*Level A harassment* – NMFS' Updated Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 3.0) (Updated Technical Guidance, 2024) identifies dual criteria to assess AUD INJ (Level A harassment) to five different underwater marine mammal groups (based on hearing sensitivity) as a result of exposure to noise from two different types of sources (impulsive or non-impulsive). TMC's proposed activity includes the use of impulsive (DTH and impact pile driving) and non-impulsive (vibratory pile driving and DTH) sources.

The 2024 Updated Technical Guidance criteria include both updated thresholds and updated weighting functions for each hearing group. The thresholds are provided in the table below. The references, analysis, and methodology used in the development of the criteria are described in NMFS' 2024 Updated Technical Guidance, which may be accessed at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-acoustic-technical-guidance-other-acoustic-tools*.

**Table 4 -- Thresholds Identifying the Onset of Auditory Injury**

| | AUD INJ Onset Acoustic Thresholds* (Received Level) | |
|---|---|---|
| Hearing Group | Impulsive | Non-impulsive |
| Low-Frequency (LF) Cetaceans | *Cell 1* $L_{pk,flat}$: 222 dB $L_{E,LF,24h}$: 183 dB | *Cell 2* $L_{E,LF,24h}$: 197 dB |
| High-Frequency (HF) Cetaceans | *Cell 3* $L_{pk,flat}$: 230 dB $L_{E,HF,24h}$: 193 dB | *Cell 4* $L_{E,HF,24h}$: 201 dB |
| Very High-Frequency (VHF) Cetaceans | *Cell 5* $L_{pk,flat}$: 202 dB $L_{E,VHF,24h}$: 159 dB | *Cell 6* $L_{E,VHF,24h}$: 181 dB |
| Phocid Pinnipeds (PW) (Underwater) | *Cell 7* $L_{pk,flat}$: 223 dB $L_{E,PW,24h}$: 183 dB | *Cell 8* $L_{E,PW,24h}$: 195 dB |

| Otariid Pinnipeds (OW) (Underwater) | *Cell 9*<br>$L_{pk,flat}$: 230 dB<br>$L_{E,OW,24h}$: 185 dB | *Cell 10*<br>$L_{E,OW,24h}$: 199 dB |
|---|---|---|
| *Dual metric criteria for impulsive sounds: Use whichever criteria results in the larger isopleth for calculating AUD INJ onset. If a non-impulsive sound has the potential of exceeding the peak sound pressure level criteria associated with impulsive sounds, the PK SPL criteria are recommended for consideration for non-impulsive sources.<br><br>Note: Peak sound pressure level ($L_{p,0\text{-}pk}$) has a reference value of 1 µPa, and weighted cumulative sound exposure level ($L_{E,p}$) has a reference value of 1 µPa$^2$s. In this table, criteria are abbreviated to be more reflective of International Organization for Standardization standards (ISO 2017). The subscript "flat" is being included to indicate peak sound pressure are flat weighted or unweighted within the generalized hearing range of marine mammals underwater (*i.e.*, 7 Hz to 165 kHz). The subscript associated with cumulative sound exposure level criteria indicates the designated marine mammal auditory weighting function (LF, HF, and VHF cetaceans, and PW and OW pinnipeds) and that the recommended accumulation period is 24 hours. The weighted cumulative sound exposure level criteria could be exceeded in a multitude of ways (*i.e.*, varying exposure levels and durations, duty cycle). When possible, it is valuable for action proponents to indicate the conditions under which these criteria will be exceeded. | | |

*Ensonified Area*

Here, we describe operational and environmental parameters of the activity that are used in estimating the area ensonified above the acoustic thresholds, including source levels and transmission loss coefficient.

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

The project includes vibratory pile installation and removal, impact pile driving, and DTH. Source levels for these activities are based on reviews of measurements of the same or similar types and dimensions of piles available in the literature. Source levels for each pile size are presented in table 5. Source levels for vibratory installation and removal of piles of the same diameter are assumed to be the same.

**Table 5—Estimates of Mean Underwater Sound Levels Generated During In-water Vibratory and Impact Pile Installation and Vibratory Pile Removal**

| Method | Pile size and type | Proxy sound source levels at 10m (dB re 1 µPa) | | | Reference |
|---|---|---|---|---|---|
| | | Peak | SEL | RMS SPL | |
| No Bubble Curtain in use (Unattenuated) | | | | | |
| Vibratory removal | H-pile | - | - | 160 | NMFS, 2023 |

| | | | | | |
|---|---|---|---|---|---|
| Vibratory removal | 20-in steel pile pile | - | - | 163 | U.S. Navy, 2013 |
| Vibratory Installation and removal | 36-in steel pile (temporary) | - | - | 166 | NMFS, 2023 |
| Vibratory Installation | 48-in steel pile | - | - | 171 | U.S. Navy, 2013 |
| Impact Installation | 48-in steel pile | 213 | 179 | 195 | Caltrans, 2020 |
| DTH | 36-in steel pile (temporary) | 174 | 164 | 174 | Denes *et al.*, 2019; NMFS, 2022a; Reyff and Heyvaert, 2019; Reyff, 2020 |
| DTH | 48-in steel pile | 178 | 168 | 178 | NMFS, 2024 |
| Bubble Curtain in use (Attenuated)[1] | | | | | |
| Vibratory Installation | 48,60,72-in steel pile | - | - | 166 | U.S. Navy, 2013 |
| Impact Installation | 48-in steel pile | 208 | 174 | 190 | Caltrans, 2020 |
| Impact Installation | 60,72-in steel pile | 205 | 180 | 190 | Caltrans, 2020 |
| DTH | 48-in steel pile | 173 | 163 | 173 | NMFS, 2024 |
| DTH | 60,72-in steel pile | 169 | 176 | 169 | NOAA, 2023 |

**Note:** peak = peak sound level; rms = root mean square; SEL = sound exposure level.
1 -- Attenuated source levels with 5dB reduction due to use of a bubble curtain during these activities (Caltrans, 2015; Austin *et al.,* 2016).

*TL* is the decrease in acoustic intensity as an acoustic pressure wave propagates out from a source. *TL* parameters vary with frequency, temperature, sea conditions, current, source and receiver depth, water depth, water chemistry, and bottom composition and topography. The general formula for underwater *TL* is:

$TL = B \times \text{Log10}\ (R_1 / R_2)$,

Where:

$TL$ = transmission loss in dB

$B$ = transmission loss coefficient

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

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

Absent site-specific acoustical monitoring with differing measured *TL*, a practical spreading value of 15 is used as the *TL* coefficient in the above formula. Site-specific *TL* data for Resurrection Bay are not available; therefore, the default coefficient of 15 is used to determine the distances to the Level A harassment and Level B harassment thresholds.

The ensonified area associated with Level A harassment is more technically challenging to predict due to the need to account for a duration component. Therefore, NMFS developed an optional User Spreadsheet tool to accompany the 2024 Updated Technical Guidance that can be used to relatively simply predict an isopleth distance for use in conjunction with marine mammal density or occurrence to help predict potential takes. We note that because of some of the assumptions included in the methods underlying this optional tool, we anticipate that the resulting isopleth estimates are typically going to be overestimates of some degree, which may result in an overestimate of potential take by Level A harassment. However, this optional tool offers the best way to estimate isopleth distances when more sophisticated modeling methods are not available or practical. For stationary sources such as pile driving, the optional User Spreadsheet tool predicts the distance at which, if a marine mammal remained at that distance for the duration of the activity, it would be expected to incur auditory injury. Inputs used in the User Spreadsheet (*e.g.,* number of piles per day, duration and/or strikes per pile) The resulting estimated isopleths, are presented in table 1. The resulting estimated isopleths, are reported below (table 6).

**Table 6 – Level A and Level B Harassment Isopleths**

| Method | Pile size and type | Level A harassment zone (m) | | | | | Level B harassment zone (m) |
|---|---|---|---|---|---|---|---|
| | | LF | HF | VHF | PW | OW | |
| No Bubble Curtain in use (Unattenuated) | | | | | | | |
| Vibratory removal | H-pile | 17.7 | 6.8 | 14.4 | 22.7 | 7.6 | 4,641.6 |
| Vibratory removal | 20-in steel pile pile | 9.6 | 3.7 | 7.8 | 12.3 | 4.1 | 7,356.4 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Vibratory Installation and removal | 36-in steel pile (temporary) | 19.9 | 7.6 | 16.2 | 25.6 | 8.6 | 11,659.1 |
| Vibratory Installation | 48-in steel pile | 42.8 | 16.4 | 35 | 55.1 | 18.5 | 25,118.9[1] |
| Impact Installation | 48-in steel pile | 2,822.4 | 360.1 | 4,367.6 | 2,507.3 | 934.6 | 1,359.4 |
| DTH | 36-in steel pile (temporary) | 3,145.1 | 401.3 | 4867 | 2794 | 1,041.5 | 39,811[1] |
| DTH | 48-in steel pile | 6151 | 784.7 | 9518 | 5,463.9 | 2,036.7 | 73,564[1] |
| Bubble Curtain in use (Attenuated) | | | | | | | |
| Vibratory Installation | 48-in steel pile | 17 | 6.5 | 13.9 | 21.9 | 7.4 | 11,659.1 |
| Vibratory Installation | 60-in steel pile | 19.9 | 7.6 | 16.2 | 25.6 | 8.6 | 11,659.1 |
| Vibratory Installation | 72-in steel pile | 24.1 | 9.2 | 19.7 | 31 | 10.4 | 11,659.1 |
| Impact Installation | 48-in steel pile | 1,310 | 167 | 2,027.3 | 1,163.8 | 433.8 | 631.0 |
| Impact Installation | 60,72-in steel pile | 2,716 | 346.6 | 4,203.6 | 2,413.1 | 899.5 | 1,000 |
| DTH | 48-in steel pile | 2,854.8 | 3,64.2 | 4,417.9 | 2,536.1 | 954.4 | 34,145[1] |
| DTH | 60-in steel pile | 14,816.7 | 1,890.4 | 22,928.9 | 13,162.6 | 4,906.5 | 18,478 |
| DTH | 72-in steel pile | 19,415.4 | 2,477.2 | 30,045.4 | 1,7247.9 | 6,429.3 | 18,478 |

1 -- These harassment zones extend past than the shoreline of Resurrection Bay, so land masses would block sound transmission and distances would be truncated.

*Marine Mammal Occurrence and Take Estimation*

In this section we provide information about the occurrence of marine mammals, including density or other relevant information which will inform the take calculations.

TMC calculated occurrence estimates based on literature and communication with locals in the Seward area. They then multiplied that occurrence by the estimated days of work. After review of their occurrence estimates, NMFS believed some of the estimates to be inconsistent with the cited literature and local communications. Following careful review of the analysis and literature presented by TMC in its application, including marine mammal occurrence data and estimates, NMFS has preliminarily determined that different occurrence calculations for some species based on seasonality (peak vs off-peak), represent the best available scientific information for marine mammal abundance in the action area (table 7, see TMC application for more details). This change from what TMC originally proposed was done in consultation with the NMFS Alaska Region and other active Seward actions (see 89 FR 10409, December 20, 2024; 90 FR 21754, May 21, 2025). The revised application reflects these changes.

As described above, the estimated number of days of in-water construction is 203. There is also some potential for take by Level A harassment for all species during impact pile driving and DTH activities due to the large Level A harassment zones. In some instances, the largest zones for each species are greater than the shutdown zones either due to the cryptic nature and assumed lower detectability of some species or due to the high sound levels produced. TMC calculated take by Level A harassment by calculating the ratio of average area of the Level A harassment zones for all activities divided by the maximum area of the Level B harassment zone and multiplying this ratio by the estimated total exposure estimate. Take by Level B harassment was then calculated by subtracting the calculated take by Level A harassment from the total exposure estimate.

**Table 7—Species Occurrence Estimated**

| Species | Abundance Estimate |
|---|---|
| Gray whale | Three whales per month during spring migration in outer Resurrection Bay |
| Fin whale | Two whales every week in outer Resurrection Bay |
| Humpback whale | Peak: 1/day<br>Off-peak: 1 every other day |
| Killer whale | Peak: 7/week<br>Off-peak: 5/week |
| Dall’s porpoise | 10 every other day in outer Resurrection Bay |
| Harbor porpoise | 1/day |
| Harbor seal | 12/day |
| Steller sea lion | Peak: 8/day<br>Off-peak: 2/day |

**Table 8—Proposed Take by Stock, Harassment Type, and as a Percentage of Stock Abundance**

| Species | Stock | Proposed Authorized Take | | Proposed take as percentage of stock |
|---|---|---|---|---|
| | | Level A harassment | Level B harassment | |
| Gray whale | Eastern North Pacific | 1 | 2 | <1 |
| Fin whale | Northeast Pacific | 2 | 6 | <1[1] |
| Humpback whale[2] | Hawaii | 16 | 54 | <1 |
| | Mexico | 3 | 6 | <1[3] |
| | Western North Pacific | 0 | 1 | <1 |
| Killer whale[4] | AT1 Transient | 0 | 7[5] | NA |
| | Gulf, Aleutian, Bering Transient | 2 | 37 | 6.6 |
| | ENP Alaska Resident | 6 | 148 | 8.0 |
| Dall's porpoise | Alaska | 146 | 374 | UND[6] |
| Harbor porpoise | Gulf of Alaska | 57 | 146 | <1 |
| Harbor seal | Prince William Sound | 517 | 1,919 | 5.4 |
| Steller sea lion | Western United States | 111 | 904 | 2 |

1 – Based on 2,554 animals discussed in SARs, although it's noted that this is likely an underestimate.
2 – Based on proportion of each distinct population segment (DPS) being in resurrection bay: 89 percent Hawaii, 10 percent Mexico, and 1 percent Western North Pacific (NMFS, 2021).
3 – Based on 918 animals discussed in SARs, derived from Wade, 2021.
4 – Based on a proportion from acoustic monitoring of stocks in Resurrection Bay: 95.7 percent ENP residents, 2.7 percent Gulf/Aleutian/Bering transients, and 1.6 percent AT1 transients (Yurk *et al.*, 2010).
5 – NMFS considers any exposure of AT1 whales would likely be of a group, here assumed to consist of 7 individuals, due to the small stock size and low likelihood of individual encounters. See the **Small Numbers** section of this notice for additional discussion.
6 – NMFS does not have an official abundance estimate for this stock, and the minimum population estimate is considered to be unknown (Young *et al.*, 2023). See **Small Numbers** for additional discussion.

## 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 the activity, and other means of effecting the least practicable impact on the species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of the 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 the 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, NMFS considers 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, and impact on operations.

TMC must ensure that construction supervisors and crews, the monitoring team, and relevant TMC staff are trained prior to the start of all pile driving and DTH activity, so that responsibilities, communication procedures, monitoring protocols, and operational procedures are clearly understood. New personnel joining during the project must be trained prior to commencing work.

*Pre- and Post-Activity Monitoring*

- Monitoring must take place from 30 minutes prior to initiation of pile driving and DTH activity (*i.e.*, pre-clearance monitoring) through 30 minutes post-completion of pile driving and DTH activity; and,
- Pre-start clearance monitoring must be conducted during periods of visibility sufficient for the lead protected species observer (PSO) to determine that the

shutdown zones indicated in table 10 are clear of marine mammals. Pile driving and DTH may commence following 30 minutes of observation when the determination is made that the shutdown zones are clear of marine mammals.

*Soft Start*

TMC must use soft start techniques when impact pile driving. Soft start requires contractors to provide an initial set of three strikes at reduced energy, followed by a 30-second waiting period, then two subsequent reduced-energy strike sets. A soft start must be implemented at the start of each day's impact pile driving and at any time following cessation of impact pile driving for a period of 30 minutes or longer.

*Shutdown Zones*

TMC would establish shutdown zones for all pile driving activities. The purpose of a shutdown zone is generally to define an area within which shutdown of the activity would occur upon sighting of a marine mammal (or in anticipation of an animal entering the defined area).

If a marine mammal is observed entering or within the shutdown zones indicated in table 9, pile driving and DTH must be delayed or halted. For in-water heavy machinery activities other than pile driving, if a marine mammal comes within 10-m, work must stop and vessels must reduce speed to the minimum level required to maintain steerage and safe working conditions. A 10-m shutdown zone would also serve to protect marine mammals from physical interactions with project vessels during pile driving and other construction activities, such as barge positioning or drilling. If an activity is delayed or halted due to the presence of a marine mammal, the activity may not commence or resume until either the animal has voluntarily exited and been visually confirmed beyond the shutdown zone indicated in table 9, or 15 minutes have passed without re-detection of the animal. Construction activities must be halted upon observation of a species for which incidental take is not authorized or a species for which incidental take has been authorized but the authorized number of takes has been met entering or within the harassment zone.

All marine mammals would be monitored in the Level B harassment zones and throughout the area as far as visual monitoring can take place. If a marine mammal enters the Level B harassment zone, in-water activities would continue and the animal's presence within the estimated harassment zone would be documented.

TMC would also establish shutdown zones for all marine mammals for which take has not been authorized or for which incidental take has been authorized but the authorized number of takes has been met. These zones are equivalent to the Level B harassment zones for each activity. If a marine mammal species for which take is not authorized by this IHA enters the shutdown zone, all in-water activities would cease until the animal leaves the zone or has not been observed for at least 15 minutes, and TMC would notify NMFS about the species and precautions taken. Pile driving would proceed if the non-IHA species is observed to leave the Level B harassment zone or if 15 minutes have passed since the last observation.

If shutdown and/or clearance procedures would result in an imminent safety concern, as determined by TMC or its designated officials, the in-water activity would be allowed to continue until the safety concern has been addressed, and the animal would be continuously monitored.

**Table 9—Shutdown Zones and Level B Harassment Zones**

| Method | Pile size and type | Level A shutdown zone (m) | | | | | Level B monitoring zone (m) |
|---|---|---|---|---|---|---|---|
| | | LF | HF | VHF | PW | OW | |
| No Bubble Curtain in use | | | | | | | |
| Vibratory removal | H-pile | 20 | 10 | 15 | 25 | 10 | 4,645 |
| Vibratory removal | 20-in steel pile pile | 10 | 10 | 10 | 15 | 10 | 7,360 |
| Vibratory Installation and removal | 36-in steel pile (temporary) | 20 | 10 | 20 | 30 | 10 | 11,660 |
| Vibratory Installation | 48-in steel pile | 45 | 20 | 35 | 60 | 20 | 24,100* |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Impact Installation | 48-in steel pile | 2,000 | 365 | 300 | 300 | 300 | 1,360 |
| DTH | 36-in steel pile (temporary) | 2,000 | 405 | 300 | 300 | 300 | 24,100* |
| DTH | 48-in steel pile | 2,000 | 785 | 300 | 300 | 300 | 24,100* |
| Bubble Curtain in use | | | | | | | |
| Vibratory Installation | 48-in steel pile | 20 | 10 | 15 | 25 | 10 | 11,660 |
| Vibratory Installation | 60-in steel pile | 20 | 10 | 20 | 30 | 10 | 11,660 |
| Vibratory Installation | 72-in steel pile | 25 | 10 | 20 | 35 | 15 | 11,660 |
| Impact Installation | 48-in steel pile | 1,310 | 175 | 300 | 300 | 300 | 635 |
| Impact Installation | 60,72-in steel pile | 2,000 | 350 | 300 | 300 | 300 | 1,000 |
| DTH | 48-in steel pile | 2,000 | 365 | 300 | 300 | 300 | 24,100* |
| DTH | 60-in steel pile | 2,000 | 1,000 | 300 | 300 | 300 | 18,480 |
| DTH | 72-in steel pile | 2,000 | 2,000 | 300 | 300 | 300 | 18,480 |

*Differs from table 6 Level B harassment zone because the harassment zone extends past the shoreline of Resurrection Bay, so land masses would block sound transmission and distances would be truncated.

*Protected Species Observers*

The placement of PSOs during all construction activities (described in the **Monitoring and Reporting** section) would ensure that the entire shutdown zone is visible. Should environmental conditions deteriorate such that the entire shutdown zone would not be visible (*e.g.*, fog, heavy rain), pile driving would be delayed until the PSO is confident marine mammals within the shutdown zone could be detected.

The TMC must employ PSOs and establish monitoring locations as described in the marine mammal monitoring plan and the IHA. PSOs would monitor the full shutdown zones and the Level B harassment zones to the extent practicable. Monitoring zones provide utility for observing by establishing monitoring protocols for areas adjacent to the shutdown zones. Monitoring zones enable observers to be aware of and communicate the presence of marine mammals in the project areas outside the shutdown zones and thus prepare for a potential cessation of activity should the animal enter the shutdown zone.

*Bubble Curtain*

A bubble curtain must be employed during installation of all 60-in and 72-in piles and at least 12 of the 48-in piles (ones used in the installation of the mooring dolphins). The bubble curtain must be deployed in manner guaranteed to distribute air bubbles around 100 percent of the piling perimeter for the full depth of the water column. The lowest bubble ring must be in contact with the mudline for the full circumference of the ring. The weights attached to the bottom ring must ensure 100 percent mudline contact. No parts of the ring or other objects may prevent full mudline contact. Air flow to the bubblers must be balanced around the circumference of the pile.

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

**Proposed Monitoring and Reporting**

In order to issue an IHA for an activity, section 101(a)(5)(D) of the MMPA states that NMFS must set forth requirements pertaining to the monitoring and reporting of such taking. The MMPA implementing regulations at 50 CFR 216.104(a)(13) indicate that requests for authorizations must include the suggested means of accomplishing the necessary monitoring and reporting that would 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 while conducting the activities. 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 activity; or (4) biological or behavioral context of exposure (*e.g.*, age, calving or feeding areas);
- Individual marine mammal responses (behavioral or physiological) to acoustic stressors (acute, chronic, or cumulative), other stressors, or cumulative impacts from multiple stressors;
- How anticipated responses to stressors impact either: (1) long-term fitness and survival of individual marine mammals; or (2) populations, species, or stocks;
- Effects on marine mammal habitat (*e.g.*, marine mammal prey species, acoustic habitat, or other important physical components of marine mammal habitat); and,
- Mitigation and monitoring effectiveness.

*Visual Monitoring*

Marine mammal monitoring must be conducted in accordance with the conditions in this section and the IHA. Marine mammal monitoring during pile driving and DTH activities must be conducted by PSOs meeting the following requirements:

- PSOs must be independent of the activity contractor (for example, employed by a subcontractor) and have no other assigned tasks during monitoring periods;
- At least one PSO must have prior experience performing the duties of a PSO during construction activity pursuant to a NMFS-issued incidental take authorization;

- Other PSOs may substitute relevant experience, education (degree in biological science or related field), or training for prior experience performing the duties of a PSO during construction activity pursuant to a NMFS-issued incidental take authorization; and,
- Where a team of three or more PSOs is required, a lead observer or monitoring coordinator would be designated. The lead observer would be required to have prior experience performing the duties of a PSO during construction activities pursuant to a NMFS-issued incidental take authorization.
- PSOs must be approved by NMFS prior to beginning any activities subject to this IHA.

PSOs must 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 construction operation to provide for personal safety during observations;
- Writing skills sufficient to prepare a report of observations including but not limited to the number and species of marine mammals observed; dates and times when in-water construction activities were conducted; dates, times and reason for implementation of mitigation (or why mitigation was not implemented when required); and marine mammal behavior; and,
- Ability to communicate orally, by radio or in person, with project personnel to provide real-time information on marine mammals observed in the area as necessary.

TMC must assign a minimum of three PSOs to monitor during pile driving and DTH. One PSO must be stationed at the pile driving site, and the other PSOs must be stationed at the best practicable location for monitoring the Level A and Level B harassment zones (see Marine Mammal Monitoring Plan). All PSOs would have access to high-quality binoculars, range finders to monitor distances, and a compass to record bearing to animals as well as radios or cells phones for maintaining contact with work crews.

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

TMC shall conduct briefings between construction supervisors and crews, PSOs, TMC staff prior to the start of all pile driving activities and when new personnel join the work. These briefings must explain responsibilities, communication procedures, marine mammal monitoring protocol, and operational procedures.

*Reporting*

A draft marine mammal monitoring report would be submitted to NMFS within 90 days after the completion of pile driving and removal activities, or 60 days prior to a requested date of issuance from any future IHAs for projects at the same location, whichever comes first. The report would include an overall description of work completed, a narrative regarding marine mammal sightings, and associated electronic PSO data sheets. Specifically, the report must include:

- Dates and times (begin and end) of all marine mammal monitoring;

- Construction activities occurring during each daily observation period, including the number and type of piles driven or removed and by what method (*i.e.*, impact) and the total equipment duration for vibratory removal for each pile or total number of strikes for each pile (impact driving);
- PSO locations during marine mammal monitoring;
- Environmental conditions during monitoring periods (at beginning and end of PSO shift and whenever conditions change significantly), including Beaufort sea state and any other relevant weather conditions including cloud cover, fog, sun glare, and overall visibility to the horizon, and estimated observable distance;
- Upon observation of a marine mammal, the following information: (1) Name of PSO who sighted the animal(s) and PSO location and activity at the time of sighting; (2) Time of sighting; (3) Identification of the animal(s) (*e.g.*, genus/species, lowest possible taxonomic level, or unidentifiable), PSO confidence in identification, and the composition of the group if there is a mix of species; (4) Distance and bearing of each marine mammal observed relative to the pile being driven for each sightings (if pile driving was occurring at time of sighting); (5) Estimated number of animals (min/max/best estimate); (6) Estimated number of animals by cohort (adults, juveniles, neonates, group composition, sex class, *etc.*); (7) Animal's closest point of approach and estimated time spent within the harassment zone; (8) Description of any marine mammal behavioral observations (*e.g.*, observed behaviors such as feeding or traveling), including an assessment of behavioral responses thought to have resulted from the activity (*e.g.*, no response or changes in behavioral state such as ceasing feeding, changing direction, flushing, or breaching);
- Number of marine mammals detected within the harassment zones and shutdown zones; by species; and,

- Detailed information about any implementation of any mitigation triggered (*e.g.*, shutdowns and delays), a description of specific actions that ensured, and resulting changes in behavior of the animal(s), if any.

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

*Reporting Injured or Dead Marine Mammals*

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

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

**Negligible Impact Analysis and Determination**

NMFS has defined negligible impact as an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival (50 CFR 216.103). A negligible impact finding is based on the lack of likely adverse effects on annual rates of recruitment or survival (*i.e.*, population-level effects). An estimate of the number of takes alone is not enough information on which to base an impact determination. In addition to considering estimates of the number of marine mammals that might be "taken" through harassment, NMFS considers other factors, such as the likely nature of any impacts or responses (*e.g.*, intensity, duration), the context of any impacts or responses (*e.g.*, critical reproductive time or location, foraging impacts affecting energetics), 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' 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 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, the discussion of our analysis applies to all species listed in table 2, given that the anticipated effects of this activity on these different marine mammal stocks are expected to be similar. There is little information about the nature or severity of the impacts, or the size, status, or structure of any of these species or stocks that would lead to a different analysis for this activity.

Pile driving and DTH activities associated with the TMC construction project has the potential to disturb or displace marine mammals. Specifically, the project activities may result in take, in the form of Level A and Level B harassment, from underwater and in-air sounds generated from pile driving and removal. Potential takes could occur if individuals are present in the ensonified zone when these activities are underway.

The takes by Level B harassment would be due to potential behavioral disturbance and TTS. Takes by Level A harassment would be due to auditory injury. No serious injury or mortality is expected, even in the absence of required mitigation measures, given the nature of the activities. The potential for harassment would be further minimized through the construction method and the implementation of the planned mitigation measures (see **Mitigation** section).

Take by Level A harassment is authorized for all species to account for the possibility that an animal could enter a Level A harassment zone prior to detection, and remain within that zone for a duration long enough to incur auditory injury before being observed and TMC shutting down pile driving activity. Given the short duration drive each pile and breaks between pile installations (to reset equipment and move piles into place), an animal would have to remain within the area estimated to be ensonified above the Level A harassment threshold for multiple hours. This is highly unlikely given marine mammal movement in the area. The number of takes by Level A harassment authorized is low for all marine mammal species. Any take by Level A harassment is expected to arise from, at most, a small degree of auditory injury, *i.e.*, minor degradation (likely only a few dB) of hearing capabilities within regions of hearing that align most completely with the energy produced by vibratory and impact pile driving (*i.e.*, the low-frequency region below 2 kHz), not severe hearing impairment or impairment within the ranges of greatest hearing sensitivity. Animals would need to be exposed to higher levels and/or longer duration than are expected to occur here in order to incur any more than a small degree of auditory injury. Due to the small degree anticipated, any auditory injury incurred would not be expected to affect the reproductive success or survival of any individuals, much less result in adverse impacts on the species or stock.

Additionally, some subset of the individuals that are behaviorally harassed could also simultaneously incur some small degree of TTS for a short duration of time. However, since the hearing sensitivity of individuals that incur TTS is expected to recover completely within minutes to hours, it is unlikely that the brief hearing impairment would affect the individual's long-term ability to forage and communicate with conspecifics, and would therefore not likely impact reproduction or survival of any individual marine mammal, let alone adversely affect rates of recruitment or survival of the species or stock.

Behavioral responses of marine mammals to pile driving and DTH in Seward are expected to be mild, short term, and temporary. Marine mammals within the Level B harassment zones may not show any visual cues they are disturbed by activities or they could become alert, avoid the area, leave the area, or display other mild responses that are not observable, such as changes in vocalization patterns. Given that pile driving and DTH would occur for only a portion of the project's duration, any harassment would be temporary. Additionally, many of the species present in region would only be present temporarily based on seasonal patterns or during transit between other habitats. These temporarily present species would be exposed to even smaller periods of noise-generating activity, further decreasing the impacts.

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

For all species and stocks, take would occur within a limited, confined area (adjacent to the project site) of the stock's range, and, there are no known BIAs near the project area that would be impacted by TMC's activities. While harbor seal is the species most likely to occur within the immediate project area, the nearest officially documented haulout is outside of the ensonified areas. There is a possible haulout site for harbor seals near project area on the sediment groin, although the only documentation of this sighting is from 1999. There are no regular haulouts in the immediate project vicinity; the next closest regular haulout is 14 km away. There are no Steller sea lion haulouts in the project area. The closest haulout is 21 km from the project area.

In addition, it is unlikely that minor noise effects in a small, localized area of habitat would have any effect on the reproduction or survival of any individuals, much less the stocks' annual rates of recruitment or survival. Specific to the AT1 stock of killer whales, which is depleted and numbers only seven individuals, no recruitment has occurred in this stock since 1984, and it is unlikely to recover (Young *et al.*, 2025). In combination, we believe that these factors, as well as the available body of evidence from other similar activities, demonstrate that the potential effects of the specified activities would have only minor, short-term effects on individuals. The specified activities are not expected to impact rates of recruitment or survival and would therefore not result in population-level impacts.

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 any of the species or stocks through effects on annual rates of recruitment or survival:

- No serious injury or mortality is anticipated or authorized;
- Take by Level A harassment is authorized for all species due to the large Level A harassment zones but would be small amounts and of a low degree;

- For all species and stocks, Seward is a very small and peripheral part of their range;
- The intensity of anticipated takes by Level B harassment is relatively low for all stocks. Level B harassment would be primarily in the form of behavioral disturbance, resulting in avoidance of the project areas around where impact or vibratory pile driving is occurring, with some low-level TTS that may limit the detection of acoustic cues for relatively brief amounts of time in relatively confined footprints of the activities;
- Effects on species that serve as prey for marine mammals from the activities are expected to be short-term and, therefore, any associated impacts on marine mammal feeding are not expected to result in significant or long-term consequences for individuals, or to accrue to adverse impacts on their populations;
- The project area does not overlap any BIAs or any other important areas for marine mammals;
- The ensonified areas are small relative to the overall habitat ranges of all species and stocks; and,
- The lack of anticipated significant or long-term negative effects to marine mammal habitat.

Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the monitoring and mitigation measures, NMFS finds that the total marine mammal take from the planned activities would have a negligible impact on all affected marine mammal species or stocks.

**Small Numbers**

As noted previously, only take of small numbers of marine mammals may be authorized under section 101(a)(5)(A) and (D) of the MMPA for specified activities other than military readiness activities. The MMPA does not define small numbers and so, in practice, where estimated numbers are available, NMFS compares the number of individuals taken to the most appropriate estimation of abundance of the relevant species or stock in our determination of whether an authorization is limited to small numbers of marine mammals. When the predicted number of individuals to be taken is fewer than one-third of the species or stock abundance, the take is considered to be of small numbers (86 FR 5322, January 19, 2021). Additionally, other qualitative factors may be considered in the analysis, such as the temporal or spatial scale of the activities.

Another circumstance in which NMFS considers it appropriate to make a small numbers finding is in the case of a species or stock that may potentially be taken but is either rarely encountered or only expected to be taken on rare occasions. In that circumstance, one or two assumed encounters with a group of animals (meaning a group that is traveling together or aggregated, and thus exposed to a stressor at the same approximate time) should reasonably be considered small numbers, regardless of consideration of the proportion of the stock (if known), as rare encounters resulting in take of one or two groups should be considered small relative to the range and distribution of any stock.

The AT1 stock of killer whales is exceptionally small, estimated to include only seven individuals. While it is possible that AT1 whales could visit Seward, passive acoustic monitoring in Resurrection Bay showed that the vast majority of killer whales detected were from the Alaska Resident stock, with AT1 whales detected only 1.6 percent of the time (Myers *et al.*, 2021). NMFS considers it reasonably likely that the AT1 stock may occur one time during the course of the project at this project site. Based on the rarity of encounters with this group expected at the project site, this represents small numbers for this stock.

For all other stocks, except for the Alaska stock of Dall's porpoises, whose abundance estimate is unknown, the proposed number of takes is less than one-third of the best available population abundance estimate (table 8). The numbers of animals proposed for authorization to be taken from these stocks would be considered small relative to the relevant stocks' abundances, even if each estimated taking occurred to a new individual—an extremely unlikely scenario.

Current abundance estimates of Dall's porpoises in the region are not available. The most recent estimate (83,400 individuals) does not include coastal or inland waters of southeast Alaska and is considered unreliable since it is based upon data collected more than 8 years ago (Young *et al.*, 2023). However, given the size of the most recent estimate, the 520 takes of this stock proposed for authorization clearly represents small numbers of this 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 would 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 would 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.

There are two species of marine mammals that traditionally have been taken as part of subsistence harvests in Resurrection Bay: Steller sea lion and harbor seal. The most recent data on subsistence-harvested marine mammals near Seward is of harbor seals in 2002, and there is no current local marine mammal subsistence harvest in Seward.

The proposed project is not likely to adversely impact the availability of any marine mammal species or stocks that are commonly used for subsistence purposes or impact subsistence harvest of marine mammals in the region. Although the proposed activities are located in a region where subsistence harvests have occurred historically, there is currently no marine mammal subsistence harvest. The project location is adjacent to heavily traveled industrialized waterways and all project activities would take place within waterfronts where subsistence activities do not generally occur. Some minor, short-term harassment of Steller sea lions and harbor seals could occur, but any effects on subsistence harvest activities in the project areas would be minimal, and not have an adverse impact.

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 would not be an unmitigable adverse impact on subsistence uses from TMC's proposed activities.

**Endangered Species Act**

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

NMFS is proposing to authorize take of fin whales (Northeast Pacific Stock), humpback whales (Mexico and western North Pacific DPS), and Steller sea lions (western DPS), which are listed under the ESA.

The Permits and Conservation Division has requested initiation of section 7 consultation with the Alaska Region for the issuance of this IHA. NMFS will conclude the ESA consultation prior to reaching a determination regarding the proposed issuance of the authorization.

**Proposed Authorization**

As a result of these preliminary determinations, NMFS proposes to issue an IHA to TMC for conducting the Seward Cruise Ship Passenger Dock and Terminal Facility Project in Seward Alaska, 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/national/marine-mammal-protection/incidental-take-authorizations-construction-activities*.

**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 construction project. We also request comment on the potential renewal of this proposed IHA as described in the paragraph below. Please include with your comments any supporting data or literature citations to help inform decisions on the request for this IHA or a subsequent renewal IHA.

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

- A request for renewal is received no later than 60 days prior to the needed renewal IHA effective date (recognizing that the renewal IHA expiration date cannot extend beyond 1 year from expiration of the initial IHA).

- The request for renewal must include the following:

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

(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: July 17, 2025.

**Shannon Bettridge**,

*Acting Director, Office of Protected Resources,*

*National Marine Fisheries Service.*

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