



DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RTID 0648-XF065

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to U.S. Navy Ice Exercise Activities 2026 in the Arctic Ocean

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 the U.S. Department of the Navy (hereafter Navy) for authorization to take marine mammals incidental to U.S. Navy Ice Exercise Activities 2026 (ICEX26) in the Arctic Ocean. 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. The Navy's activities are considered military readiness activities pursuant to the MMPA, as amended by the National Defense Authorization Act for Fiscal Year 2004 (2004 NDAA).

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 Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service and should be submitted via email to itp.clevenstine@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-military-readiness-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: Alyssa Clevenstine, 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.*) directs 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 (collectively referred to 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.

The 2004 NDAA (Pub. L. 108–136) removed the “small numbers” and “specified geographical region” limitations indicated above and amended the definition of “harassment” as applied to a “military readiness activity.” The activity for which incidental take of marine mammals is being requested qualifies as a military readiness activity.

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.

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

Summary of Request

On May 19, 2025, NMFS received a request from the Navy for an IHA to take marine mammals incidental to submarine training and testing activities in the Arctic Ocean. The application was deemed adequate and complete on July 10, 2025. The Navy's request is for take of ringed seal (*Pusa hispida*) by Level B harassment only. Neither the Navy nor NMFS expect serious injury or mortality to result from this activity and, therefore, an IHA is appropriate.

NMFS previously issued IHAs to the Navy for similar activities (83 FR 6522, February 14, 2018; 85 FR 6518, February 5, 2020; 87 FR 7803, February 10, 2022; 89 FR 8172, February 1, 2024). The Navy complied with all the requirements (*e.g.*, mitigation, monitoring, and reporting) of the previous IHAs, and information regarding their monitoring results may be found in the **Potential Effects of the Specified Activity on Marine Mammals and their Habitat** section.

Description of Proposed Activity

Overview

The Navy proposes to conduct submarine training and testing activities, including establishment of a tracking range and temporary ice camp, and to conduct research activities in the Arctic Ocean for approximately 6 weeks beginning in February 2026. Active acoustic transmissions may result in take by Level B harassment, including temporary hearing impairment (temporary threshold shift (TTS)) and behavioral harassment, of ringed seals.

Dates and Duration

The specified activities would occur over approximately a 6-week period between February and April 2026, including deployment and demobilization of the ice camp. The submarine training and testing activities would occur over approximately 4 weeks during the 6-week period. The proposed IHA would be effective from February 18, 2026 through April 30, 2026.

Geographic Region

The ice camp would be established approximately 185 to 370 kilometers (km) north of Prudhoe Bay, Alaska, in the same study area defined in the 2025 Draft Environmental Assessment/Overseas Environmental Assessment (EA/OEA) for Ice Exercise 2026 (hereafter 2025 Draft EA/OEA for ICEX26) (available at <https://www.nepa.navy.mil/icex/>); the exact location cannot be identified in advance, as many of the required conditions (*e.g.*, ice cover) cannot be forecasted until shortly before the exercises are expected to commence. Prior to establishment of the ice camp, reconnaissance flights would be conducted to locate suitable ice conditions required for the location of the ice camp. The reconnaissance flights would occur over an area of approximately 70,374 square km (km²), while the actual ice camp would be no more than 1.6 km in diameter, (approximately 2 km² in area). The vast majority of submarine training and testing would occur near the ice camp; however, some submarine training and testing may occur throughout the deep Arctic Ocean basin near the North Pole, within the larger Navy Activity Study Area. Figure 1 shows the locations of the Navy Activity Study Area and the Ice Camp Study Area, collectively referred to as the ICEX Study Area.

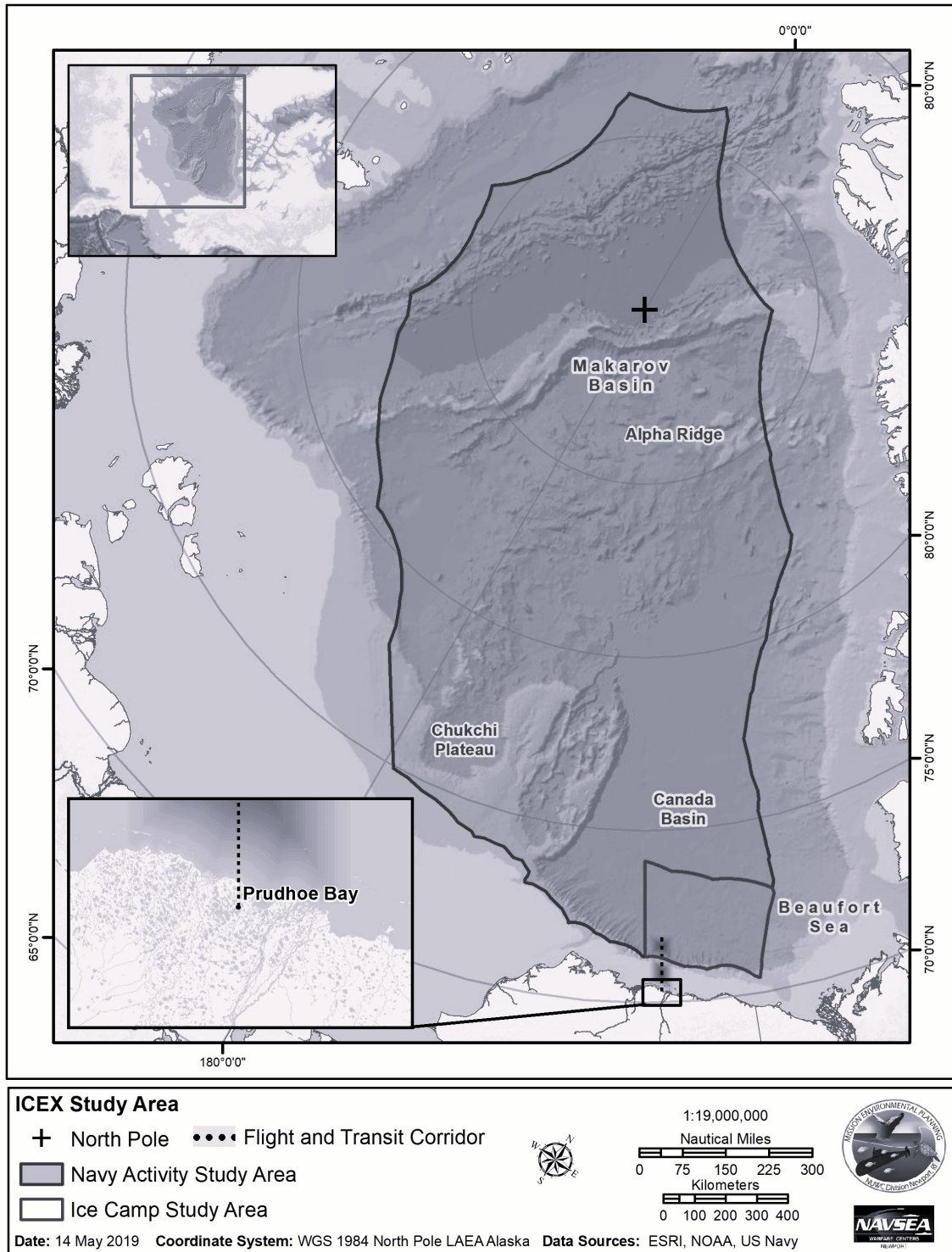


Figure 1 -- ICEX Study Area in the Arctic Ocean

Detailed Description of the Specified Activity

The Navy proposes to conduct submarine training and testing activities (*i.e.*, establishment of a portable tracking range and temporary ice camp, research activities, unmanned underwater vehicle (UUV) testing, unmanned aerial system (UAS) testing, submarine-launched non-explosive torpedo exercises) involving underwater active acoustic transmissions (active sonar), in a large area of the Arctic Ocean north of Prudhoe Bay, Alaska during a period of approximately 6 weeks beginning in February 2026. The activity proposed for 2026 and that is being evaluated for this proposed IHA — ICEX26 — is part of a regular cycle of recurring training and testing activities that the Navy proposes to conduct in the Arctic, under which submarine and tracking range activities would be conducted biennially. Some of the submarine training and testing may occur throughout the deep Arctic Ocean basin near the North Pole, within the Navy Activity Study Area (figure 1).

Additional information about the Navy's proposed training and testing activities in the Arctic is available in the 2025 Draft EA/OEA for ICEX26 (<https://www.nepa.navy.mil/icex/>). Only activities which may occur during ICEX26 are discussed in this section.

Ice Camp

ICEX26 includes deployment of a temporary camp situated on an ice floe. Prior to the set-up of the ice camp, reconnaissance flights will be conducted to locate suitable ice conditions required for the location of the ice camp. The ice camp would consist of a command hut, dining tent, sleeping quarters, an outhouse, a powerhouse, two runways (a primary and a back-up runway only for use in case of emergency), and a helipad. The number of structures and tents would range from 15 to 20, and structures typically would be 2-6 meters (m) by 6-10 m in size. Some tents may be octagon shaped and approximately 6 m in diameter. Berthing tents would contain collapsible bunk beds, a

heating unit, and a circulation fan. The completed ice camp, including runway, would be approximately 1.6 km diameter. Support equipment for the ice camp includes snowmobiles, snow blowers, gas powered augers and saws (for boring holes through the ice), two reverse osmosis units, and diesel generators. Aircraft would be used to transport personnel and equipment to and from Prudhoe Bay, Alaska, and the ice camp. All ice camp materials, fuel, and food would be transported from Prudhoe Bay, Alaska, and would either be air-dropped from military transport aircraft (*e.g.*, C-17 and C-130) or delivered via small twin-engine aircraft and military and commercial helicopters to the ice camp runway. At the completion of ICEX26, the ice camp would be demobilized and removed, and all personnel would depart.

A portable tracking range for submarine training and testing would be installed in the vicinity of the ice camp during ICEX26. Hydrophones would be deployed on the ice by drilling or melting holes in the ice and lowering the cable down into the water column, and extend to approximately 30 m below the ice. Hydrophones would be approximately 11.8 centimeters (cm) in length and have 610 m in associated cables. The hydrophones would be linked remotely to the command hut via cables. Additionally, tracking pingers would be configured aboard each submarine to continuously monitor the location of the submarines. Acoustic communications with the submarines would be used to coordinate the training and research schedule with the submarines, and an underwater telephone would be used as a backup to the acoustic communications. The Navy plans to recover the hydrophones; however, if emergency demobilization is required or the hydrophones are frozen in place and are unrecoverable, they would be left in place.

Additional information about the ICEX26 ice camp is located in the 2025 Draft EA/OEA for ICEX26. We have carefully reviewed this information and determined that activities associated with the ICEX26 ice camp, including de minimis acoustic communications, would not result in incidental take of marine mammals.

Submarine Training and Testing

Submarine activities associated with ICEX26 would generally entail safety maneuvers, active sonar use, and exercise torpedo use similar to submarine activities conducted in other undersea environments. The safety maneuvers and sonar use are similar to submarine activities conducted in other undersea environments and are being conducted in the Arctic to test their performance in a cold environment. The Navy anticipates the use of no more than 10 exercise torpedoes during ICEX26. The exercise torpedoes are inert (*i.e.*, non-explosive), and will be recovered by divers, who enter the water through melted holes, approximately 1 m wide. Submarine training and testing involves active acoustic transmissions, which have the potential to harass marine mammals. The Navy categorizes acoustic sources into “bins” based on frequency, source level, and mode of usage (U.S. Department of the Navy, 2025b). The acoustic source classification bins do not include the broadband noise produced incidental to vessel and aircraft transits and weapons firing. Noise produced from vessel, aircraft, and weapons firing activities are not carried forward because those activities were found to have de minimis or no acoustic impacts. The acoustic transmissions associated with submarine training fall within mid-frequency (MF; generally 1-10 kilohertz (kHz), source level greater than 190 decibels (dB)) and high-frequency (HF; generally 10-100 kHz, source level less than 200 dB) bins as defined in the Navy's Phase IV at-sea environmental documentation (see the 2025 AFTT Supplemental Environmental Impact Statement/Overseas Environmental Impact Statement, available at <https://www.nepa.navy.mil/afteis/>). The specifics of ICEX26 submarine acoustic sources are classified, including the parameters associated with the designated bins. Details of source use for submarine training are also classified. Any ICEX-specific acoustic sources not captured under one of the at-sea bins were modeled using source-specific parameters.

All non-acoustic components of submarine training and testing activities are fully analyzed within the 2025 Draft EA/OEA for ICEX26 (found online at <https://www.nepa.navy.mil/icex/>) and remain unchanged. We have carefully reviewed and discussed with the Navy these other aspects, such as vessel use, and determined that aspects of submarine training and testing other than active acoustic transmissions would not result in take of marine mammals. These non-acoustic components will not be discussed further, with the exception of vessel strike or exercise torpedo strike, which are discussed in the **Potential Effects of Specified Activities on Marine Mammals and their Habitat** section.

Research Activities and Scientific Active Acoustic Devices

Personnel and equipment proficiency testing and multiple research and development activities would be conducted as part of ICEX26. One UUV would be deployed under the ice to test the communication and range of the vehicle and to conduct under-ice and in-water column sampling. Several other acoustic sources (*i.e.*, echosounder, transducers) would be deployed under the ice or in the water column to determine systems signal recognition capabilities. Testing involving the UUV and various acoustic/communication sources involve active acoustic transmissions, which have the potential to harass marine mammals underwater. There are no on-ice or in-air active acoustic devices proposed for use as part of ICEX26. Most acoustic transmissions that would be used in ICEX26 for research activities are considered de minimis. The Navy has defined de minimis sources as having the following parameters: low source levels, narrow beams, downward directed transmission, short pulse lengths, frequencies above (outside) known marine mammal hearing ranges, or some combination of these factors (U.S. Department of the Navy, 2025b) . Additionally, sources with operating frequencies of 200 kHz or above or source levels of 160 dB or below are considered de minimis (see the 2025 Draft EA/OEA for ICEX26 at <https://www.nepa.navy.mil/icex/>).

NMFS reviewed the Navy’s analysis and conclusions on de minimis sources and finds them complete and supportable. Parameters for scientific devices with active acoustics, including de minimis sources, are included in table 1. Additional information about ICEX26 research activities is located in table 1-1 of the Navy’s application and table 2-1 of the 2025 Draft EA/OEA for ICEX26, and elsewhere in that document. The possibility of vessel strikes caused by use of UUVs during ICEX26 is discussed in the *Potential Effects of Vessel Strike* section.

Table 1 -- Parameters for Scientific Devices with Active Acoustics

Research Institution	Source name	Frequency range (kHz)	Source level (dB)	Pulse length	Source type
University of Washington Applied Physics Laboratory	Seaglider	10	185	1 second	UUV
Naval Postgraduate School	Echosounder	38-200	221	0.5 milliseconds	Sonar
Massachusetts Institute of Technology Lincoln Lab	Echosounder	0.05-9	180	Variable	Sonar
Massachusetts Institute of Technology Lincoln Lab	SimRad Combi	38/200	219/227	Variable	Transducer

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

Description of Marine Mammals in the Area of Specified Activities

Sections 3 and 4 of the application summarize available information regarding status and trends, distribution and habitat preferences, and behavior and life history of the potentially affected species. 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 SARs (Young *et al.*, 2024). All values presented in table 2 are the most recent available at the time of publication and are available online at:

<https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments>.

Table 2 -- Species¹ 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
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Ringed seal	<i>Pusa hispida</i>	Arctic	T, D, Y	UND ^{5, 6} (UND, UND, 2013)	UND	6,459
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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 Endangered Species Act (ESA) status: Endangered (E), Threatened (T)/MMPA status: Depleted (D). 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.

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, vessel 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 A reliable population estimate for the entire stock is not available. Using a sub-sample of data collected from the U.S. portion of the Bering Sea, an abundance estimate of 171,418 ringed seals has been calculated, but this estimate does not account for availability bias due to seals in the water or in the shorefast ice zone at the time of the survey. The actual number of ringed seals in the U.S. portion of the Bering Sea is likely much higher. Using the N_{\min} based upon this negatively biased population estimate, the PBR is calculated to be 4,755 seals, although this is also a negatively biased estimate.

⁶ Boveng *et al.* (2025) estimated the abundance of ringed seals in the Chukchi Sea as 592,577 animals, which accounted for availability bias and used aerial survey and telemetry data.

As indicated in table 2, ringed seals (with one managed stock) temporally and spatially co-occur with the activity to the degree that take is reasonably likely to occur. While beluga whales (*Delphinapterus leucas*), gray whales (*Eschrichtius robustus*), bowhead whales (*Balaena mysticetus*), bearded seals (*Erignathus barbatus*), and spotted seals (*Phoca largha*) may occur in the ICEX Study Area, 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. Bowhead whales are unlikely to occur in the ICEX Study Area between February and April, as they spend winter (December to April) in the northern Bering Sea and southern Chukchi Sea, and migrate north through the Chukchi Sea and Beaufort Sea (both encompassed within the Arctic Ocean) during April and May (Young *et al.*, 2024). On their spring migration, the earliest that bowhead whales reach Point Hope in the Chukchi Sea, well south of Point Barrow, is late March to mid-April (Braham *et al.*, 1980). Although the ice camp location is not known with certainty, the distance between Point Barrow and the closest edge of the Ice

Camp Study Area is over 200 km. The distance between Point Barrow and the closest edge of the Navy Activity Study Area is over 50 km, and the distance between Point Barrow and Point Hope is an additional 525 km (straight line distance); accordingly, bowhead whales are unlikely to occur in the ICEX Study Area before ICEX26 activities conclude. Beluga whales follow a migration pattern similar to bowhead whales. They typically overwinter in the Bering Sea and migrate north during the spring to the eastern Beaufort Sea where they spend the summer and early fall months (Young *et al.*, 2023). Though the beluga whale migratory path crosses through the ICEX Study Area, they are unlikely to occur in the ICEX Study Area between February and April. Of note, the ICEX Study Area does overlap the northernmost portion of the North Bering Strait, East Chukchi, West Beaufort Sea beluga whale migratory biologically important area (BIA) (April and May) (Clarke *et al.*, 2023), though the data support for this BIA is low, the boundary certainty is low, and the importance score is moderate. Given the spring migratory direction, the northernmost portion of the BIA is likely more important later in the April and May period, and overlap with this BIA does not imply that belugas are likely to be in the ICEX Study Area during the Navy's activities.

Gray whales feed primarily in the Beaufort Sea, Chukchi Sea, and northwestern Bering Sea during the summer and fall, but migrate south to winter in Baja California lagoons (Carretta *et al.*, 2021). Typically, northward migrating gray whales do not reach the Bering Sea before May or June (Frost and Karpovich, 2008), after the ICEX26 activities would occur, and several hundred kilometers south of the ICEX Study Area. Further, gray whales are primarily bottom feeders (Swartz *et al.*, 2006) in water less than 60 m deep (Pike, 1962). Therefore, on the rare occasion that a gray whale does overwinter in the Beaufort Sea (Stafford *et al.*, 2007), we would expect an overwintering individual to remain in shallow water over the continental shelf where it could feed.

Therefore, gray whales are not expected to occur in the ICEX Study Area during the ICEX26 activity period.

Bearded seals may occur in the ICEX Study Area during the project timeframe but NMFS does not expect they would occur in the areas near the ice camp or where submarine activities involving active acoustics would occur. The Navy anticipates the ice camp would be established 185-370 km north of Prudhoe Bay in water depths of 800 m or more, and submarine training and testing activities would occur in water depths of 800 m or more. Although acoustic data indicate some bearded seals remain in the Beaufort Sea year-round (MacIntyre *et al.*, 2013; Jones *et al.*, 2014; MacIntyre *et al.*, 2015), satellite tagging data (Boveng and Cameron, 2013; Alaska Department of Fish and Game, 2021) show that large numbers of bearded seals move south in fall/winter with the advancing ice edge to spend the winter in the Bering Sea, confirming previous visual observations (Burns and Frost, 1979; Cameron and Boveng, 2009; Frost and Karpovich, 2008). The southward movement of bearded seals in the fall means that very few individuals are expected to occur along the Beaufort Sea continental shelf in February through April, the timeframe for ICEX26 activities. The northward spring migration through the Bering Strait, begins in mid-April (Burns and Frost, 1979).

In the event some bearded seals were to remain in the Beaufort Sea during the season when ICEX26 activities would occur, the most probable area in which bearded seals might occur during winter months is along the continental shelf. Bearded seals feed extensively on benthic invertebrates (*e.g.*, clams, gastropods, crabs, shrimp, bottom-dwelling fish) (Cameron *et al.*, 2010; Quakenbush *et al.*, 2011) and are typically found in water depths of 200 m or less (Burns, 1970). The Bureau of Ocean Energy Management conducted an aerial survey from July through October that covered the shallow Beaufort and Chukchi Sea shelf waters and observed bearded seals from Icy Cape to the border of Canada (Clarke *et al.*, 2017). The farthest from shore that bearded seals were observed

was the waters of the continental slope (though this study was conducted outside of the ICEX26 time frame). As mentioned previously, the Navy anticipates the ice camp would be established 185-370 km north of Prudhoe Bay in water depths of 800 m or more. The continental shelf near Prudhoe Bay is approximately 100 km wide; therefore, even if the ice camp were established at the closest estimated distance (185 km from Prudhoe Bay), it would still be approximately 83 km from habitat potentially occupied by bearded seals. Empirical evidence has not shown responses to sonar that would constitute take beyond a few kilometers from an acoustic source, and therefore, NMFS and the Navy set a distance cutoff of 5 km. Regardless of the source level at that distance, take is not estimated to occur beyond 5 km from the source. Although bearded seals occur 37-185 km offshore during spring (Bengtson *et al.*, 2005; Simpkins *et al.*, 2003), they feed heavily on benthic organisms (Fedoseev, 1965; Hamilton *et al.*, 2018; Hjelset *et al.*, 1999), and during winter bearded seals are expected to select habitats where food is abundant and easily accessible to minimize the energy required to forage and maximize energy reserves in preparation for whelping, lactation, mating, and molting. Bearded seals are not known to dive as deep as 800 m to forage, with adults typically diving no more than 100 m deep, though first year pups may dive to depths greater than 450 m (Boveng and Cameron, 2013; Cameron *et al.*, 2010; Cameron and Boveng, 2009; Gjertz *et al.*, 2000; Kovacs, 2009), and it is highly unlikely they would occur near the ice camp or where the submarine activities would be conducted. This conclusion is supported by the fact that the Navy did not visually observe or acoustically detect bearded seals during the 2020, 2022, or 2024 ice exercises.

Spotted seals may also occur in the ICEX26 Study Area during summer and fall, but they are not expected to occur in the ICEX26 Study Area during the ICEX26 timeframe (Young *et al.*, 2024).

In addition, the polar bear (*Ursus maritimus*) may be found in ICEX26 Study Area. However, polar bears are managed by the U.S. Fish and Wildlife Service and are not considered further in this document.

Ringed Seal

Ringed seals are the most common pinniped in the ICEX26 Study Area and have wide distribution in seasonally and permanently ice-covered waters of the Northern Hemisphere (North Atlantic Marine Mammal Commission, 2004), though the status of the Arctic stock of ringed seals is unknown (Young *et al.*, 2024). Throughout their range, ringed seals have an affinity for ice-covered waters and are well adapted to occupying both shore-fast and pack ice (Kelly, 1988b). Ringed seals can be found further offshore than other pinnipeds since they can maintain breathing holes in ice thickness greater than 2 m (Smith and Stirling, 1975). Breathing holes are maintained by ringed seals' sharp teeth and claws on their fore flippers. They remain in contact with ice most of the year and use it as a platform for molting in late spring to early summer, for pupping and nursing in late winter to early spring, and for resting at other times of the year (Young *et al.*, 2024).

Ringed seals have at least two distinct types of subnivean lairs: haul-out lairs and birthing lairs (Smith and Stirling, 1975). Haul-out lairs are typically single-chambered and offer protection from predators and cold weather. Birthing lairs are larger, multi-chambered areas that are used for pupping in addition to protection from predators. Ringed seals pup on both land-fast ice as well as stable pack ice. Lentfer (1972) found that ringed seals north of Barrow, Alaska (which would be west of the ice camp), build their subnivean lairs on the pack ice near pressure ridges. They are also assumed to occur within the sea ice in the proposed ice camp area. Ringed seals excavate subnivean lairs in drifts over their breathing holes in the ice, in which they rest, give birth, and nurse their pups for 5-9 weeks during late winter and spring (Chapskii, 1940; McLaren, 1958; Smith

and Stirling, 1975). Lindsay *et al.* (2021) found ringed seal counts increased after mid-May and pup counts increased after the end of April. Snow depths of at least 50-65 cm are required for functional birth lairs (Kelly, 1988a; Lydersen, 1998; Lydersen and Gjertz, 1986; Smith and Stirling, 1975), and such depths typically occur only where 20-30 cm or more of snow has accumulated on flat ice and then drifted along pressure ridges or ice hummocks (Hammill, 2008; Lydersen *et al.*, 1990; Lydersen and Ryg, 1991; Smith and Lydersen, 1991). Ringed seal birthing season typically begins in March, but the majority of births occur in early April. About a month after parturition, mating begins in late April and early May.

In Alaskan waters, during winter and early spring when sea ice is at its maximal extent, ringed seals are abundant in the northern Bering Sea, Norton and Kotzebue Sounds, and throughout the Chukchi and Beaufort Seas (Boveng *et al.*, 2025; Frost, 1985; Kelly, 1988b), including in the ICEx26 Study Area. Passive acoustic monitoring (PAM) of ringed seals from a high-frequency recording package deployed at a depth of 240 m in the Chukchi Sea, 120 km north-northwest of Barrow, Alaska, detected ringed seals in the area between mid- December and late May over a 4-year study (Jones *et al.*, 2014). With the onset of the fall freeze, ringed seal movements become increasingly restricted and seals will either move west and south with the advancing ice pack, with many seals dispersing throughout the Chukchi and Bering Seas, or remain in the Beaufort Sea (Crawford *et al.*, 2012; Frost and Lowry, 1984; Harwood *et al.*, 2012). Kelly *et al.* (2010a) tracked home ranges for ringed seals in the subnivean period (using shorefast ice); the size of the home ranges varied from less than 1 km² up to 27.9 km² (median of 0.62 km² for adult males and 0.65 km² for adult females). Most (94 percent) of the home ranges were less than 3 km² during the subnivean period (Kelly *et al.*, 2010a). Near large polynyas, ringed seals maintain ranges up to 7,000 km² during winter and 2,100 km² during spring (Born *et al.*, 2004). Some adult ringed seals return to the same small home

ranges they occupied during the previous winter (Kelly *et al.*, 2010a). The size of winter home ranges can vary by up to a factor of 10 depending on the amount of fast ice; seal movements were more restricted during winters with extensive fast ice and were much less restricted where fast ice did not form at high levels (Harwood *et al.*, 2015). Ringed seals may occur within the ICEX26 Study Area throughout the year and during the proposed specified activities.

Critical habitat for the ringed seal was designated in May 2022 and includes marine waters within one specific area in the Bering, Chukchi, and Beaufort Seas (87 FR 19232, April 1, 2022). Essential features established by NMFS for conservation of the ringed seal are (1) snow-covered sea ice habitat suitable for the formation and maintenance of subnivean birth lairs used for sheltering pups during whelping and nursing, which is defined as waters 3 m or more in depth (relative to Mean Lower Low Water (MLLW)) containing areas of seasonal landfast (shorefast) ice or dense, stable pack ice, which have undergone deformation and contain snowdrifts of sufficient depth to form and maintain birth lairs (typically at least 54 cm deep); (2) sea ice habitat suitable as a platform for basking and molting, which is defined as areas containing sea ice of 15 percent or more concentration in waters 3 m or more in depth (relative to MLLW); and (3) primary prey resources to support Arctic ringed seals, which are defined to be small, often schooling, fishes, in particular, Arctic cod (*Boreogadus saida*), saffron cod (*Eleginus gracilis*), and rainbow smelt (*Osmerus dentex*), and small crustaceans, in particular, shrimps and amphipods.

The proposed ice camp study area was excluded from the ringed seal critical habitat because the benefits of exclusion due to national security impacts outweighed the benefits of inclusion of this area (87 FR 19232, April 1, 2022). However, as stated in NMFS' final rule for the Designation of Critical Habitat for the Arctic Subspecies of the Ringed Seal (87 FR 19232, April 1, 2022), the area proposed for exclusion contains one

or more of the essential features of the Arctic ringed seal's critical habitat, although data are limited to inform NMFS' assessment of the relative value of this area to the conservation of the species. As noted above, a portion of the ringed seal critical habitat overlaps the larger proposed ICEX26 Study Area. Notwithstanding an earlier court decision vacating NMFS' critical habitat designation for ringed seals, the underlying information regarding the importance of the area and associated features to ringed seals and their habitat remains relevant to the discussion here. However, as described later and in more detail in the **Potential Effects of Specified Activities on Marine Mammals and their Habitat** section, we do not anticipate physical impacts to any marine mammal habitat as a result of the Navy's ICEX activities, including impacts to ringed seal sea ice habitat suitable as a platform for basking and molting and impacts on prey availability. Further, this proposed IHA includes mitigation measures, as described in the **Proposed Mitigation** section, which would minimize or prevent impacts to sea ice habitat suitable for the formation and maintenance of subnivean birth lairs.

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.*, Au and Hastings, 2008; Richardson *et al.*, 1995; Wartzok and Ketten, 1999). To reflect this, Southall *et al.* (2007) and Southall *et al.* (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 dB threshold from composite audiograms, previous analyses in NMFS (2018), and/or data from Southall *et al.* (2007) and Southall *et al.*

(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 (baleen whales)	7 Hz to 36 kHz
High-frequency (HF) cetaceans (dolphins, toothed whales, beaked whales, bottlenose whales)	150 Hz to 160 kHz
Very High-frequency (VHF) cetaceans (true porpoises, <i>Kogia</i> , river dolphins, Cephalorhynchid, <i>Lagenorhynchus cruciger</i> & <i>L. australis</i>)	200 Hz to 165 kHz
Phocid pinnipeds (PW) (underwater) (true seals)	40 Hz to 90 kHz
Otariid pinnipeds (OW) (underwater) (sea lions and fur seals)	60 Hz to 68 kHz
* Represents the generalized hearing range for the entire group as a composite (<i>i.e.</i> , all species within the group), where individual species' hearing ranges may not be as broad. Generalized hearing range chosen based on approximately 65 dB threshold from composite audiogram, previous analysis in NMFS (2018), and/or data from Southall <i>et al.</i> (2007) and Southall <i>et al.</i> (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.

The Navy has requested authorization for the take of marine mammals that may occur incidental to ICEX26 activities in the ICEX Study Area. The Navy analyzed potential impacts to marine mammals from acoustic sources in the application. Acoustic effects on marine mammals during the proposed activities can occur from active sonar use. The effects of underwater noise from the Navy's proposed activities have the potential to result in take by Level B harassment of ringed seals in the ICEX Study Area.

Potential Effects of Underwater Sound on Marine Mammals

The marine soundscape is composed 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 (American National Standards Institute (ANSI), 1995). The sound level of an area is defined by the total acoustical energy being generated by known and unknown sources, which 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 10-20 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 activities may be a negligible addition to the local environment or could form a distinctive signal that may affect marine mammals.

Anthropogenic sounds cover a broad range of frequencies and sound levels and can have a range of highly variable impacts on marine life, from none or minor to potentially severe responses, depending on received levels, duration of exposure, behavioral context, and various other factors. The potential effects of underwater sound from active acoustic sources can possibly result in one or more of the following: temporary or permanent hearing impairment, other auditory injury, non-auditory physical or physiological effects, behavioral disturbance, stress, and masking (Richardson *et al.*, 1995; Gordon *et al.*, 2003; Götz *et al.*, 2009; Nowacek *et al.*, 2007; Southall *et al.*, 2007; Southall *et al.*, 2019). The degree of effect is intrinsically related to the signal characteristics, received level, distance from the source, and duration of the sound exposure. In general, sudden, high-level sounds can cause auditory injury, as can longer exposures to lower level sounds. Temporary or permanent loss of hearing can occur after exposure to noise and occurs almost exclusively for noise within an animal's hearing range.

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

which masking (*i.e.*, when a sound interferes with or masks the ability of an animal to detect a signal of interest that is above the absolute hearing threshold) may occur; the masking zone may be highly variable in size.

Underwater sounds fall into one of two general sound types: impulsive and non-impulsive (defined in the following paragraphs). The distinction between these two sound types is important because they have differing potential to cause physical effects, particularly with regard to hearing (*e.g.*, Ward (1997) in Southall *et al.* (2007)). Please see Southall *et al.* (2007) for an in-depth discussion of these concepts.

Impulsive sound sources (*e.g.*, explosions, gunshots, sonic booms, impact pile driving) produce signals that are brief (typically considered to be less than one second), broadband, atonal transients (ANSI, 1986; ANSI, 2005; Harris, 1998; ISO, 2016; NIOSH, 1998) and occur either as isolated events or repeated in some succession.

Impulsive sounds are all characterized by a relatively rapid rise from ambient pressure to a maximal pressure value followed by a rapid decay period that may include a period of diminishing, oscillating maximal and minimal pressures, and generally have an increased capacity to induce physical injury as compared with sounds that lack these features.

There are no pulsed sound sources associated with any proposed ICEX26 activities.

Non-impulsive sounds can be tonal, narrowband, or broadband, brief or prolonged, and may be either continuous or non-continuous (ANSI, 1995; NIOSH, 1998). Some of these non-impulsive sounds can be transient signals of short duration but without the essential properties of pulses (*e.g.*, rapid rise time). Examples of non-impulsive sounds include those produced by vessels, aircraft, machinery operations such as drilling or dredging, vibratory pile driving, and active sonar sources (such as those proposed for use by the Navy as part of the proposed ICEX26 activities) that intentionally direct a sound signal at a target that is reflected back in order to discern physical details about the target.

Modern sonar technology includes a variety of sonar sensor and processing systems. In concept, the simplest active sonar emits sound waves, or “pings,” sent out in multiple directions, and the sound waves then reflect off of the target object in multiple directions. The sonar source calculates the time it takes for the reflected sound waves to return; this calculation determines the distance to the target object. More sophisticated active sonar systems emit a ping and then rapidly scan or listen to the sound waves in a specific area. This provides both distance to the target and directional information. Even more advanced sonar systems use multiple receivers to listen to echoes from several directions simultaneously and provide efficient detection of both direction and distance. In general, when sonar is in use, the sonar ‘pings’ occur at intervals, referred to as a duty cycle, and the signals themselves are very short in duration. For example, sonar that emits a 1-second ping every 10 seconds has a 10 percent duty cycle. The Navy's most powerful hull-mounted mid-frequency sonar source used in ICEX activities typically emits a 1-second ping every 50 seconds representing a 2 percent duty cycle. The Navy utilizes sonar systems and other acoustic sensors in support of a variety of mission requirements.

Hearing Threshold Shift

NMFS defines a noise-induced threshold shift (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; NMFS, 2024). The amount of TS is customarily expressed in dB. A TS can be permanent or temporary. As described in NMFS (2018) and NMFS (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 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, such as the loss of cochlear neuron synapses or auditory neuropathy (Finneran, 2024; Houser, 2021). AUD INJ may or may not result in PTS, which NMFS defines 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 Ahroon *et al.*, 1996; Henderson *et al.*, 2008; Kryter *et al.*, 1966; Miller, 1974; Ward, 1960; Ward *et al.*, 1958; Ward *et al.*, 1959). AUD INJ levels for marine mammals are estimates, as with the exception of a single study unintentionally inducing PTS in a harbor seal (*Phoca vitulina*) (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 AUD INJ are not typically pursued or authorized (NMFS, 2024).

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, 2024), and is not considered an AUD INJ. Based on data from marine mammal TTS measurements (Southall *et al.*, 2007; Southall *et al.*, 2019), 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 (Finneran *et al.*, 2000; Finneran *et al.*, 2002; Schlundt *et al.*, 2000). 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.

Marine mammal hearing plays a critical role in communication with conspecifics and in interpretation of environmental cues for purposes such as predator avoidance and prey capture. Depending on the degree (elevation of threshold in dB), duration (*i.e.*, recovery time), and frequency range of TTS, and the context in which it is experienced, TTS can have effects on marine mammals ranging from discountable to serious (similar to those discussed in the Masking section). 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 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 if it were in the same frequency band as the necessary vocalizations and of a severity that impeded communication. The fact that animals exposed to high levels of sound that would be expected to result in this physiological response would also be expected to have behavioral responses of a comparatively more severe or sustained nature is potentially more significant than the simple existence of a TTS. However, it is important to note that TTS could occur due to longer exposures to sound at lower levels so that a behavioral response may not be elicited.

Depending on the degree and frequency range, the effects of AUD INJ on an animal could also range in severity, although it is considered generally more serious than TTS because it is a permanent condition (Reichmuth *et al.*, 2019). Of note, 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 some cost to the animal.

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. 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, harbor porpoise (*Phocoena phocoena*), and Yangtze finless porpoise (*Neophocoena asiaorientalis*) (Southall *et al.*, 2019). For pinnipeds in water, measurements of TTS are limited to harbor seals, elephant seals (*Mirounga angustirostris*), bearded seals, and California sea lions (*Zalophus californianus*) (Kastak *et al.*, 2007; Kastelein *et al.*, 2019a; Kastelein *et al.*, 2019c; Kastelein *et al.*, 2021; Kastelein *et al.*, 2022a; Kastelein *et al.*, 2022b; Reichmuth *et al.*, 2019; Sills *et al.*, 2020). TTS was not observed in spotted and ringed 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; Kastelein *et al.*, 2019b). 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 will be less than the TTS from a single, continuous exposure with the same SEL (Finneran *et al.*, 2010; Kastelein *et al.*, 2014; Mooney *et al.*, 2009). This means that TTS predictions based on the total, cumulative SEL will 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. Additionally,

the existing marine mammal TTS data come from a limited number of individuals within these species.

Relationships between TTS and AUD INJ 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. AUD INJ 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; Southall *et al.*, 2019)). Based on data from terrestrial mammals, a precautionary assumption is that the AUD INJ 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 AUD INJ SEL_{cum} thresholds are 15 to 20 dB higher than TTS SEL_{cum} thresholds (Southall *et al.*, 2007; Southall *et al.*, 2019). Given the higher level of sound or longer exposure duration necessary to cause AUD INJ as compared with TTS, it is considerably less likely that AUD INJ could occur.

Behavioral Responses

Exposure to noise also has the potential to behaviorally disturb marine mammals to a level that qualifies as harassment under the MMPA. Behavioral responses to sound are highly variable and context-specific (Nowacek *et al.*, 2007; Southall *et al.*, 2007; Southall *et al.*, 2019). Many different variables can influence an animal's perception of and response to (nature and magnitude) an acoustic event. An animal's prior experience with a sound or sound source affects whether it is less likely (habituation, self-mitigation) or more likely (sensitization) to respond to certain sounds in the future (animals can also be innately predisposed to respond to certain sounds in certain ways) (Finneran, 2018; Finneran *et al.*, 2024; Nachtigall and Supin, 2013; Nachtigall and Supin, 2014; Nachtigall and Supin, 2015; Nachtigall *et al.*, 2016a; Nachtigall *et al.*, 2016b; Southall *et al.*, 2007;

Southall *et al.*, 2016). Related to the sound itself, the perceived proximity of the sound, bearing of the sound (approaching vs. retreating), the similarity of a sound to biologically relevant sounds in the animal's environment (*i.e.*, calls of predators, prey, or conspecifics), familiarity of the sound, and navigational constraints may affect the way an animal responds to the sound (DeRuiter *et al.*, 2013a; Ellison *et al.*, 2012; Southall *et al.*, 2007; Southall *et al.*, 2021; Wartzok *et al.*, 2003). Individuals (of different age, gender, reproductive status, *etc.*) among most populations will have variable hearing capabilities, and differing behavioral sensitivities to sounds that will be affected by prior conditioning, experience, and current activities of those individuals. Southall *et al.* (2007) and Southall *et al.* (2021) have developed and subsequently refined methods developed to categorize and assess the severity of acute behavioral responses, considering impacts to individuals that may consequently impact populations. Often, specific acoustic features of the sound and contextual variables (*i.e.*, proximity, duration, or recurrence of the sound or the current behavior that the marine mammal is engaged in or its prior experience), as well as entirely separate factors such as the physical presence of a nearby vessel, may be more relevant to the animal's response than the received level alone.

Studies by DeRuiter *et al.* (2013a) indicate that variability of responses to acoustic stimuli depends not only on the species receiving the sound and the sound source, but also on the social, behavioral, or environmental contexts of exposure. Another study by DeRuiter *et al.* (2013b) examined behavioral responses of goose-beaked whales to MF sonar and found that whales responded strongly at low received levels (89-127 dB re 1 μ Pa) by ceasing normal fluking and echolocation, swimming rapidly away, and extending both dive duration and subsequent non-foraging intervals when the sound source was 3.4-9.5 km away. Importantly, this study also showed that whales exposed to a similar range of received levels (78-106 dB re 1 μ Pa) from distant sonar exercises 118 km away did not elicit such responses, suggesting that context may moderate responses.

Ellison *et al.* (2012) outlined an approach to assessing the effects of sound on marine mammals that incorporates contextual-based factors. The authors recommend considering not just the received level of sound, but also the activity the animal is engaged in at the time the sound is received, the nature and novelty of the sound (*i.e.*, whether this a new sound from the animal's perspective), and the distance between the sound source and the animal. They submit that this “exposure context,” as described, greatly influences the type of behavioral response exhibited by the animal. Forney *et al.* (2017) also point out that an apparent lack of response (*e.g.*, no displacement or avoidance of a sound source) may not necessarily mean there is no cost to the individual or population, as some resources or habitats may be of such high value that animals may choose to stay, even when experiencing stress or hearing loss. Forney *et al.* (2017) recommend considering both the costs of remaining in an area of noise exposure such as TTS, PTS, or masking, which could lead to an increased risk of predation or other threats or a decreased capability to forage, and the costs of displacement, including potential increased risk of vessel strike, increased risks of predation or competition for resources, or decreased habitat suitable for foraging, resting, or socializing. This sort of contextual information is challenging to predict with accuracy for ongoing activities that occur over large spatial and temporal expanses.

Friedlaender *et al.* (2016) provided the first integration of direct measures of prey distribution and density variables incorporated into across-individual analyses of behavior responses of blue whales to sonar and demonstrated a five-fold increase in the ability to quantify variability in blue whale diving behavior. These results illustrate that responses evaluated without such measurements for foraging animals may be misleading, which again illustrates the context-dependent nature of the probability of response. Exposure of marine mammals to sound sources can result in, but is not limited to, no response or any of the following observable responses: increased alertness; orientation or

attraction to a sound source; vocal modifications; cessation of feeding; cessation of social interaction; alteration of movement or diving behavior; habitat abandonment (temporary or permanent); and, in severe cases, panic, flight, stampede, or stranding, potentially resulting in death (Southall *et al.*, 2007). A review of marine mammal responses to anthropogenic sound was first conducted by Richardson *et al.* (1995). More recent reviews (Nowacek *et al.*, 2007; DeRuiter *et al.*, 2013a; DeRuiter *et al.*, 2013b; Ellison *et al.*, 2012; Gomez *et al.*, 2016) address studies conducted since 1995 and focused on observations where the received sound level of the exposed marine mammal(s) was known or could be estimated. Gomez *et al.* (2016) conducted a review of the literature considering the contextual information of exposure in addition to received level and found that higher received levels were not always associated with more severe behavioral responses and vice versa. Southall *et al.* (2016) states that results demonstrate that some individuals of different species display clear yet varied responses, some of which have negative implications, while others appear to tolerate high levels, and that responses may not be fully predictable with simple acoustic exposure metrics (*e.g.*, received sound level). Rather, the authors state that differences among species and individuals along with contextual aspects of exposure (*e.g.*, behavioral state) appear to affect response probability (Southall *et al.*, 2019). The following parts provide examples of behavioral responses to stressors that provide an idea of the variability in responses that would be expected given the differential sensitivities of marine mammal species to sound and the wide range of potential acoustic sources to which a marine mammal may be exposed. Behavioral responses that could occur for a given sound exposure should be determined from the literature that is available for each species or extrapolated from closely related species when no information exists, along with contextual factors.

For non-impulsive sounds (*i.e.*, similar to the sources used during the proposed specified activities), data suggest that exposures of pinnipeds to received levels between

90 and 140 dB re 1 μ Pa do not elicit strong behavioral responses; no data were available for exposures at higher received levels for Southall *et al.* (2007) to include in the severity scale analysis. Reactions of harbor seals were the only available data for which the responses could be ranked on the severity scale. For reactions that were recorded, the majority (17 of 18 individuals/groups) were ranked on the severity scale as a 4 (defined as moderate change in movement, brief shift in group distribution, or moderate change in vocal behavior) or lower; the remaining response was ranked as a 6 (defined as minor or moderate avoidance of the sound source). Additional data on hooded seals (*Cystophora cristata*) indicate avoidance responses to signals above 160-170 dB re 1 μ Pa (Kvadsheim *et al.*, 2010), and data on gray seals (*Halichoerus grypus*) and harbor seals indicate avoidance response at received levels of 135-144 dB re 1 μ Pa (Götz *et al.*, 2010). In each instance where food was available, which provided the seals motivation to remain near the source, habituation to the signals occurred rapidly. In the same study, it was noted that habituation was not apparent in wild seals where no food source was available (Götz *et al.*, 2010). This implies that the motivation of the animal is necessary to consider in determining the potential for a reaction. In one study that aimed to investigate the under-ice movements and sensory cues associated with under-ice navigation of ice seals, acoustic transmitters (60-69 kHz at 159 dB re 1 μ Pa at 1 m) were attached to ringed seals (Wartzok *et al.*, 1992a; Wartzok *et al.*, 1992b). An acoustic tracking system then was installed in the ice to receive the acoustic signals and provide real-time tracking of ice seal movements. Although the frequencies used in this study are at the upper limit of ringed seal hearing, the ringed seals appeared unaffected by the acoustic transmissions, as they were able to maintain normal behaviors (*e.g.*, finding breathing holes).

Seals exposed to non-impulsive sources with a received sound pressure level within the range of calculated exposures for ICEX26 activities (142-193 dB re 1 μ Pa), have been shown to change their behavior by modifying diving activity and avoidance of

the sound source (Götz *et al.*, 2010; Kvadsheim *et al.*, 2010). Although a minor change to a behavior may occur as a result of exposure to the sources in the proposed specified activities, these changes would be within the normal range of behaviors for the animal (*e.g.*, the use of a breathing hole further from the source, rather than one closer to the source, would be within the normal range of behavior) (Kelly, 1988a).

Adult ringed seals spend up to 20 percent of the time in subnivean lairs during the winter season (Kelly *et al.*, 2010a). Ringed seal pups spend about 50 percent of their time in the lair during the nursing period (Lydersen and Hammill, 1993). During the warm season ringed seals haul out on the ice. In a study of ringed seal haulout activity by Born *et al.* (2002), ringed seals spent 25-57 percent of their time hauled out in June, which is during their molting season. Ringed seal lairs are typically used by individual seals (haulout lairs) or by a mother with a pup (birthing lairs); large lairs used by many seals for hauling out are rare (Smith and Stirling, 1975). If the non-impulsive acoustic transmissions are heard and are perceived as a threat, ringed seals within subnivean lairs could react to the sound in a similar fashion to their reaction to other threats, such as polar bears (their primary predators). Responses of ringed seals to a variety of human-induced sounds (*e.g.*, helicopter noise, snowmobiles, dogs, people, and seismic activity) have been variable; some seals entered the water and some seals remained in the lair. However, according to Kelly *et al.* (1988), in all instances in which observed seals departed lairs in response to noise disturbance, they subsequently reoccupied the lair.

Ringed seal mothers have a strong bond with their pups and may physically move their pups from the birth lair to an alternate lair to avoid predation, sometimes risking their lives to defend their pups from potential predators (Smith, 1987). If a ringed seal mother perceives the proposed acoustic sources as a threat, the network of multiple birth and haulout lairs allows the mother and pup to move to a new lair (Smith and Hammill, 1981; Smith and Stirling, 1975). The acoustic sources from these proposed specified

activities are not likely to impede a ringed seal from finding a breathing hole or lair, as captive seals have been found to primarily use vision to locate breathing holes and no effect to ringed seal vision would occur from the acoustic disturbance (Elsner *et al.*, 1989; Wartzok *et al.*, 1992a). It is anticipated that a ringed seal would be able to relocate to a different breathing hole relatively easily without impacting their normal behavior patterns.

Responses Due to Sonar and Other Transducers –

Pinniped behavioral response to sonar and other transducers is context-dependent (*e.g.*, Hastie *et al.*, 2014; Southall *et al.*, 2019). All studies on pinniped response to sonar thus far have been limited to captive animals, though, based on exposures of wild pinnipeds to vessel noise and impulsive sounds, pinnipeds may only respond strongly to military sonar that is in close proximity or approaching an animal. Kvadsheim *et al.* (2010) found that captive hooded seals exhibited avoidance response to sonar signals between 1-7 kHz (160-170 dB re 1 μ Pa RMS) by reducing diving activity, rapid surface swimming away from the source, and eventually moving to areas of least SPL. However, the authors noted a rapid adaptation in behavior (passive surface floating) during the second and subsequent exposures, indicating a level of habituation within a short amount of time. Kastelein *et al.* (2015) exposed captive harbor seals to three different sonar signals at 25 kHz with variable waveform characteristics and duty cycles and found individuals responded to a frequency modulated signal at received levels over 137 dB re 1 μ Pa by hauling out more, swimming faster, and raising their heads or jumping out of the water. However, seals did not respond to a continuous wave or combination signals at any received level (up to 156 dB re 1 μ Pa). Houser *et al.* (2013) conducted a study to determine behavioral responses of captive California sea lions to mid-frequency active sonar at various received levels (125-185 dB re 1 μ Pa). They found younger animals (less than 2 years old) were more likely to respond than older animals and responses included

increased respiration rate, increased time spent submerged, refusal to participate in a repetitive task, and hauling out. Most responses below 155 dB re 1 μ Pa were changes in respiration, while more severe responses (*i.e.*, refusing to participate, hauling out) began to occur over 170 dB re 1 μ Pa, and many of the most severe responses came from the young sea lions.

Masking

Sound can disrupt behavior through masking, or interfering with, an animal's ability to detect, recognize, interpret, or discriminate between acoustic signals of interest (*e.g.*, those used for intraspecific communication and social interactions, prey detection, predator avoidance, or navigation) (Branstetter and Sills, 2022; Clark *et al.*, 2009; Erbe and Farmer, 2000; Erbe *et al.*, 2016; Richardson *et al.*, 1995; Tyack, 2000). Masking occurs when the receipt of a sound is interfered with by another coincident sound at similar frequencies and at similar or higher intensity and may occur whether the coincident sound is natural (*e.g.*, snapping shrimp, wind, waves, precipitation) or anthropogenic (*e.g.*, shipping, sonar, seismic exploration) in origin.

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. Masking these acoustic signals can disturb the behavior of individual animals, groups of animals, or entire populations. Masking can lead to behavioral changes including vocal changes (*e.g.*, Lombard effect, increasing amplitude, or changing frequency), cessation of foraging, and leaving an area, to both signalers and receivers, in an attempt to compensate for noise levels (Erbe *et al.*, 2016).

Most research on auditory masking is focused on energetic masking, or the ability of the receiver (*i.e.*, listener) to detect a signal in noise. However, from a fitness perspective, both signal detection and signal interpretation are necessary for success. This type of masking is called informational masking and occurs when a signal is detected by an animal but the meaning of that signal has been lost. Few data exist on informational masking in marine mammals but studies have shown that some recognition of predator cues might be missed by species that are preyed upon by killer whales if killer whale vocalizations are masked (Curé *et al.*, 2015; Curé *et al.*, 2016; Deecke *et al.*, 2002; Isojunno *et al.*, 2016; Visser *et al.*, 2016). von Benda-Beckmann *et al.* (2021) modeled the effect of pulsed and continuous active sonars on sperm whale (*Physeter macrocephalus*) echolocation and found that sonar sounds could reduce the ability of sperm whales to find prey under certain conditions.

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 (*i.e.*, masking) sound is human-made, it may be considered harassment when disrupting natural behavioral patterns to the point where the behavior is abandoned or significantly altered. It is important to distinguish TTS and PTS, which persist after the sound exposure, from masking, which only 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.

Richardson *et al.* (1995) argued that the maximum radius of influence of anthropogenic noise (including broadband low-frequency sound transmission) on a marine mammal is the distance from the source to the point at which the noise can barely be heard. This range is determined by either the hearing sensitivity (including critical ratios, or the lowest signal-to-noise ratio in which animals can detect a signal) of the

animal (Finneran and Branstetter, 2013; Johnson *et al.*, 1989; Southall *et al.*, 2000) or the background noise level present. Masking is most likely to affect some species' ability to detect communication calls and natural sounds (*i.e.*, surf noise, prey noise, *etc.*) (Richardson *et al.*, 1995).

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; Matthews *et al.*, 2016) and may result in energetic or other costs as animals change their vocalization behavior (*e.g.*, Di Iorio and Clark, 2010; Foote *et al.*, 2004; Holt *et al.*, 2009; Miller *et al.*, 2000; Parks *et al.*, 2007). 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 (Houser and Moore, 2014). Masking can be tested directly in captive species, 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.*, 2024; Branstetter and Sills, 2022, Cholewiak *et al.*, 2018).

High-frequency sounds may mask the echolocation calls of toothed whales. Human data indicate low-frequency sound can mask high-frequency sounds (*i.e.*, upward masking). Studies on captive odontocetes by Au *et al.* (1974), Au *et al.* (1985), and Au (1993) indicate that some species may use various processes to reduce masking effects (*e.g.*, adjustments in echolocation call intensity or frequency as a function of background

noise conditions). Odontocete hearing is highly directional at high frequencies, facilitating echolocation in masked conditions (Au and Moore, 1984). A study by Nachtigall *et al.* (2018) showed that false killer whales adjust their hearing to compensate for ambient sounds and the intensity of returning echolocation signals.

Impacts on signal detection, measured by masked detection thresholds, are not the only important factors to address when considering the potential effects of masking. As marine mammals use sound to recognize conspecifics, prey, predators, or other biologically significant sources (Branstetter *et al.*, 2016), it is also important to understand the impacts of masked recognition thresholds (*i.e.*, informational masking). Branstetter *et al.* (2016) measured masked recognition thresholds for whistle-like sounds of bottlenose dolphins and observed that they are approximately 4 dB above detection thresholds (energetic masking) for the same signals. Reduced ability to recognize a conspecific call or the acoustic signature of a predator could have severe negative impacts. Branstetter *et al.* (2016) observed that if “quality communication” is set at 90 percent recognition the output of communication space models (which are based on 50 percent detection) would likely result in a significant decrease in communication range. As marine mammals use sound to recognize predators (Allen *et al.*, 2014; Cummings and Thompson, 1971; Curé *et al.*, 2015; Fish and Vania, 1971), the presence of masking noise may also prevent marine mammals from responding to acoustic cues produced by their predators, particularly if it occurs in the same frequency band. For example, harbor seals that reside in the coastal waters of British Columbia are frequently targeted by mammal-eating killer whales. The seals acoustically discriminate between the calls of mammal-eating and fish-eating killer whales (Deecke *et al.*, 2002), a capability that should increase survivorship while reducing the energy required to identify all killer whale calls. Similarly, sperm whales (Curé *et al.*, 2016; Isojunno *et al.*, 2016), long-finned pilot whales (Visser *et al.*, 2016), and humpback whales (Curé *et al.*, 2015) changed their

behavior in response to killer whale vocalization playbacks. The potential effects of masked predator acoustic cues depend on the duration of the masking noise and the likelihood of a marine mammal encountering a predator during the time that detection and recognition of predator cues are impeded.

Redundancy and context can also facilitate detection of weak signals. These phenomena may help marine mammals detect weak sounds in the presence of natural or anthropogenic noise. Most masking studies in marine mammals present the test signal and the masking noise from the same direction. The dominant background noise may be highly directional if it comes from a particular anthropogenic source such as a vessel or industrial site. Directional hearing may significantly reduce the masking effects of these sounds by improving the effective signal-to-noise ratio.

Masking affects both senders and receivers of acoustic signals and can potentially have long-term chronic effects on marine mammals at the population level as well as at the individual level. Low-frequency ambient sound levels have increased by as much as 20 dB (more than three times in terms of SPL) in the world's ocean from pre-industrial periods, with most of the increase from distant commercial shipping (Cholewiak *et al.*, 2018; Hildebrand *et al.*, 2009). All anthropogenic sound sources, but especially chronic and lower-frequency signals (*e.g.*, from commercial vessel traffic), contribute to elevated ambient sound levels, thus intensifying masking for marine mammals.

Stress Response

Physiological stress is a natural and adaptive process that helps an animal survive changing conditions. When an animal perceives a potential threat, whether or not the stimulus actually poses a threat, a stress response is triggered (Moberg, 2000; Sapolsky, 2005; Selye, 1950). Once an animal's central nervous system perceives a threat, it mounts a biological response or defense that consists of a combination of behavioral responses, autonomic nervous system responses, neuroendocrine responses, or immune responses.

The primary distinction between stress (which is adaptive and does not normally place an animal at risk) and distress is the biotic 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 biotic functions. For example, when a stress response diverts energy away from growth in young animals, those animals may experience stunted growth. When a stress response diverts energy from a fetus, an animal's reproductive success and its fitness will suffer. In these cases, the animals will have entered a pre-pathological or pathological state which is called “distress” (Selye, 1950) or “allostatic loading” (McEwen and Wingfield, 2003). This pathological state of distress will last until the animal replenishes its energetic reserves sufficiently to restore normal function.

According to Moberg (2000), in the case of many stressors, an animal's first and sometimes most economical (in terms of biotic costs) response is behavioral avoidance of the potential stressor or avoidance of continued exposure to a stressor. An animal's second line of defense to stressors involves the sympathetic part of the autonomic nervous system and the classical “fight or flight” response, which includes the cardiovascular system, the gastrointestinal system, the exocrine glands, and the adrenal medulla to produce changes in heart rate, blood pressure, and gastrointestinal activity that humans commonly associate with “stress.” These responses have a relatively short duration and may or may not have significant long-term effect on an animal's welfare.

An animal's third line of defense to stressors involves its neuroendocrine systems or sympathetic nervous systems; the system that has received the most study has been the hypothalamus-pituitary-adrenal (HPA) system (also known as the HPA axis in mammals or the hypothalamus-pituitary-interrenal axis in fish and some reptiles). Unlike stress

responses associated with the autonomic nervous system, virtually all neuro-endocrine 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 (Moberg, 1987; Rivier and Rivest, 1991), altered metabolism (Elsasser *et al.*, 2000), reduced immune competence (Blecha, 2000), and behavioral disturbance (Blecha, 2000, Moberg, 1987). Increases in the circulation of glucocorticosteroids (cortisol, corticosterone, and aldosterone in marine mammals; see Romano *et al.* (2004)) have been equated with stress for many years.

Marine mammals naturally experience stressors within their environment and as part of their life histories. Changing weather and ocean conditions, exposure to disease and naturally occurring toxins, lack of prey availability, and interactions with predators all contribute to the stress a marine mammal experiences (Atkinson *et al.*, 2015). Breeding cycles, periods of fasting, social interactions with members of the same species, and molting (for pinnipeds) are also stressors, although they are natural components of an animal's life history. Anthropogenic activities have the potential to provide additional stressors beyond those that occur naturally (*e.g.*, fishery interactions, pollution, tourism, ocean noise) (Fair *et al.*, 2014; Meissner *et al.*, 2015; Rolland *et al.*, 2012).

Relationships between these physiological mechanisms, animal behavior, and the costs of stress responses are well-studied through controlled experiments 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; Reneerkens *et al.*, 2002; Thompson and Hamer, 2000). However, it should be noted that our understanding of the functions of various stress hormones (*e.g.*, cortisol), is based largely upon observations of the stress response in terrestrial mammals. Atkinson *et al.* (2015) note that the endocrine response of marine mammals to stress may not be the same as that of terrestrial mammals

because of the selective pressures marine mammals faced during their evolution in an ocean environment. For example, due to the necessity of breath-holding while diving and foraging at depth, the physiological role of epinephrine and norepinephrine (the catecholamines) in marine mammals might be different than in other mammals.

Relatively little information exists on the linkage between anthropogenic sound exposure and stress in marine mammals, and even less information exists on the ultimate consequences of sound-induced stress responses (either acute or chronic). Most studies to date have focused on acute responses to sound either by measuring catecholamines, a neurohormone, or heart rate as a proxy for an acute stress response.

The ability to make predictions from stress hormones about impacts on individuals and populations exposed to various forms of natural and anthropogenic stressors relies on understanding the linkages between changes in stress hormones and resulting physiological impacts. Currently, the sound characteristics that correlate with specific stress responses in marine mammals are poorly understood, as are the ultimate consequences of these changes. Several research efforts have improved the understanding of, and the ability to predict, how stressors ultimately affect marine mammal populations (*e.g.*, King *et al.*, 2015; New *et al.*, 2013; Pirota *et al.*, 2015; Pirota *et al.*, 2022). This includes determining how and to what degree various types of anthropogenic sound cause stress in marine mammals and understanding what factors may mitigate those physiological stress responses. Factors potentially affecting an animal's response to a stressor include life history, sex, age, reproductive status, overall physiological and behavioral adaptability, and whether they are naïve or experienced with the sound (*e.g.*, prior experience with a stressor may result in a reduced response due to habituation) (Finneran and Branstetter, 2013; St. Aubin and Dierauf, 2001). Because there are many unknowns regarding the occurrence of acoustically induced stress responses in marine

mammals, any physiological response (*e.g.*, hearing loss or injury) or significant behavioral response is assumed to be associated with a stress response.

Potential Effects on Marine Mammal Habitat

The Navy's proposed activities could have localized, temporary impacts on marine mammal habitat, including prey, by increasing in-water SPLs. Increased noise levels may affect acoustic habitat and adversely affect marine mammal prey within the ICEX Study Area.

Potential Effects of Sonar on Prey

Ringed seals feed on marine invertebrates and fish. Marine invertebrates occur in the world's oceans, from warm shallow waters to cold deep waters, and are the dominant animals in all habitats of the ICEX Study Area. Although most species are found within the benthic zone, marine invertebrates can be found in all zones (sympagic (within the sea ice), pelagic (open ocean), or benthic (bottom dwelling)) of the Beaufort Sea (Josefson *et al.*, 2013). The diverse range of species include oysters, crabs, worms, ghost shrimp, snails, sponges, sea fans, isopods, and stony corals (Chess, 1997; Dugan *et al.*, 2000; Proctor, 1981).

Hearing capabilities of invertebrates are largely unknown (Lovell *et al.*, 2005; Popper and Schilt, 2008). Outside of studies conducted to test the sensitivity of invertebrates to vibrations, very little is known about the effects of anthropogenic underwater noise on invertebrates (Edmonds *et al.*, 2016). While data are limited, research suggests that some of the major cephalopods and decapods may have limited hearing capabilities (Hanlon, 1987; Offutt, 1970) and may hear only low-frequency (less than 1 kHz) sources (Offutt, 1970), which is most likely within the frequency band of biological signals (Hill, 2009). In a review of crustacean sensitivity of high amplitude underwater noise by Edmonds *et al.* (2016), crustaceans may be able to hear the frequencies at which they produce sound, but it remains unclear which noises are

incidentally produced and if there are any negative effects from masking them. Acoustic signals produced by crustaceans range from low frequency rumbles (20-60 Hz) to high frequency signals (20-55 kHz) (Henninger and Watson III, 2005; Patek and Caldwell, 2006; Staaterman *et al.*, 2011). Aquatic invertebrates that can sense local water movements with ciliated cells include cnidarians, flatworms, segmented worms, urochordates (tunicates), mollusks, and arthropods (Budelmann, 1992a; Budelmann, 1992b; Popper *et al.*, 2001). Some aquatic invertebrates have specialized organs called statocysts for determination of equilibrium and, in some cases, linear or angular acceleration. Statocysts allow an animal to sense movement and may enable some species, such as cephalopods and crustaceans, to be sensitive to water particle movements associated with sound (Goodall *et al.*, 1990; Hu *et al.*, 2009; Kaifu *et al.*, 2008; Montgomery *et al.*, 2006; Popper *et al.*, 2001; Roberts and Breithaupt, 2016; Salmon, 1971). Because any acoustic sensory capabilities, if present at all, are limited to detecting water motion, and water particle motion near a sound source falls off rapidly with distance, aquatic invertebrates are probably limited to detecting nearby sound sources rather than sound caused by pressure waves from distant sources.

Studies of sound energy effects on invertebrates are few and identify only behavioral responses. Non-auditory injury, AUD INJ, TTS, and masking studies have not been conducted for invertebrates. Both behavioral and auditory brainstem response studies suggest that crustaceans may sense frequencies up to 3 kHz, but best sensitivity is likely below 200 Hz (Goodall *et al.*, 1990; Lovell *et al.*, 2005; Lovell *et al.*, 2006). Most cephalopods likely sense low-frequency sound below 1 kHz, with best sensitivities at lower frequencies (Budelmann, 2010; Mooney *et al.*, 2010; Offutt, 1970). A few cephalopods may sense higher frequencies up to 1,500 Hz (Hu *et al.*, 2009).

It is expected that most marine invertebrates would not sense the frequencies of the sonar associated with the proposed specified activities. Most marine invertebrates

would not be close enough to active sonar systems to potentially experience impacts to sensory structures. Any marine invertebrate capable of sensing sound may alter its behavior if exposed to sonar. Although acoustic transmissions produced during the proposed specified activities may briefly impact individuals, intermittent exposures to sonar are not expected to impact survival, growth, recruitment, or reproduction of widespread marine invertebrate populations.

The fish species located in the ICEX Study Area include those that are closely associated with the deep ocean habitat of the Beaufort Sea. Nearly 250 marine fish species have been described in the Arctic, excluding the larger parts of the sub-Arctic Bering, Barents, and Norwegian Seas (Mecklenburg *et al.*, 2011). However, only about 30 are known to occur in the Arctic waters of the Beaufort Sea (Christiansen and Reist, 2013). Largely because of the difficulty of sampling in remote, ice-covered seas, many high-Arctic fish species are known only from rare or geographically patchy records (Mecklenburg *et al.*, 2011). Aquatic systems of the Arctic undergo extended seasonal periods of ice cover and other harsh environmental conditions. Fish inhabiting such systems must be biologically and ecologically adapted to surviving such conditions. Important environmental factors that Arctic fish must contend with include reduced light, seasonal darkness, ice cover, low biodiversity, and low seasonal productivity.

All fish have two sensory systems to detect sound in the water: the inner ear, which functions very much like the inner ear in other vertebrates, and the lateral line, which consists of a series of receptors along the fish's body (Popper and Fay, 2010; Popper *et al.*, 2014). The inner ear generally detects relatively higher-frequency sounds, while the lateral line detects water motion at low frequencies (below a few hundred Hz) (Hastings and Popper, 2005). Lateral line receptors respond to the relative motion between the body surface and surrounding water; this relative motion, however, only takes place very close to sound sources and most fish are unable to detect this motion at

more than one to two body lengths distance away (Popper *et al.*, 2014). Although hearing capability data only exist for fewer than 100 of the approximately 32,000 fish species known to exist, current data suggest that most species of fish detect sounds from 50 to 1,000 Hz, with few fish hearing sounds above 4 kHz (Popper, 2008). It is believed that most fish have their best hearing sensitivity from 100 to 400 Hz (Popper, 2003).

Permanent hearing loss has not been documented in fish. A study by Halvorsen *et al.* (2012) found that for temporary hearing loss or similar negative impacts to occur, the noise needed to be within the fish's individual hearing frequency range; external factors, such as developmental history of the fish or environmental factors, may result in differing impacts to sound exposure in fish of the same species. The sensory hair cells of the inner ear in fish can regenerate after they are damaged, unlike in mammals where sensory hair cells loss is permanent (Lombarte *et al.*, 1993; Smith *et al.*, 2006). As a consequence, any hearing loss in fish may be as temporary as the timeframe required to repair or replace the sensory cells that were damaged or destroyed (Smith *et al.*, 2006), and no permanent loss of hearing in fish would result from exposure to sound.

Fish species in the ICEX Study Area are expected to hear the low-frequency sources associated with the proposed specified activities, but most are not expected to detect the higher-frequency sounds. Only a few fish species are able to detect mid-frequency sonar above 1 kHz and could have behavioral reactions or experience auditory masking during these activities. These effects are expected to be transient, and long-term consequences for the population are not expected. Fish with hearing specializations capable of detecting high-frequency sounds are not expected to be within the ICEX Study Area. If hearing specialists were present, they would have to be in close vicinity to the source to experience effects from the acoustic transmission. Human-generated sound could alter the behavior of a fish in a manner that would affect its way of living, such as where it tries to locate food or how well it can locate a potential mate; behavioral

responses to loud noise could include a startle response, such as the fish swimming away from the source, the fish “freezing” and staying in place, or scattering (Popper, 2003). Auditory masking could also interfere with a fish’s ability to hear biologically relevant sounds, inhibiting the ability to detect both predators and prey, and impacting schooling, mating, and navigating (Popper, 2003). If an individual fish comes into contact with low-frequency acoustic transmissions and is able to perceive the transmissions, they are expected to exhibit short-term behavioral reactions, when initially exposed to acoustic transmissions, which would not significantly alter breeding, foraging, or populations. Overall effects to fish from ICEX26 active sonar sources would be localized, temporary, and infrequent.

Effects of Acoustics on Physical and Foraging Habitat

Unless the sound source is stationary and/or continuous over a long duration in one area, neither of which applies to ICEX26 activities, the effects of the introduction of sound into the environment are generally considered to have a less severe impact on marine mammal habitat compared to any physical alteration of the habitat. Acoustic exposures are not expected to result in long-term physical alteration of the water column or bottom topography as the occurrences are of limited duration and would occur intermittently. Acoustic transmissions also would have no structural impact to subnivean lairs in the ice. Furthermore, since ice dampens acoustic transmissions (Richardson *et al.*, 1995), the level of sound energy that reaches the interior of a subnivean lair would be less than that ensonifying water under surrounding ice. For these reasons, it is unlikely that the Navy’s acoustic activities in the ICEX Study Area would have any effect on marine mammal habitat.

Potential Effects of Vessel Strike

Because ICEX26 would occur only when there is ice coverage and conditions are appropriate to establish an ice camp on an ice floe, no ships or smaller boats would be

involved in the activity. Vessel use would be limited to submarines and UUVs (hereafter referred to together as “vessels” unless noted separately). The potential for vessel strike during ICEX26 would therefore only arise from the use of submarines during training and testing activities, and the use of UUVs during research activities. Depths at which vessels would operate during ICEX26 would overlap with known dive depths of ringed seals, which have been recorded to 300 m in depth (Gjertz *et al.*, 2000; Lydersen and Ryg, 1991). Few authors have specifically described the responses of pinnipeds to vessels, and most of the available information on reactions to boats concerns pinnipeds hauled out on land or ice. No information is available on potential responses to submarines or UUVs. Brueggeman *et al.* (1992) stated ringed seals hauled out on the ice showed short-term escape reactions when they were within 0.25-0.5 km from a vessel; ringed seals would likely show similar reactions to submarines and UUVs, decreasing the likelihood of vessel strike during ICEX26 activities.

The Navy has kept strike records for over 20 years and has no records of individual pinnipeds being struck by a vessel as a result of Navy activities and, further, the smaller size and maneuverability of pinnipeds make a vessel strike unlikely. Also, NMFS has never received any reports indicating that pinnipeds have been struck by vessels of any type. Review of additional sources of information in the form of worldwide vessel strike records shows little evidence of strikes of pinnipeds from the shipping sector. Further, a review of seal stranding data from Alaska found that during 2020, nine ringed seal strandings were recorded by the Alaska Marine Mammal Stranding Network. Within the Arctic region of Alaska, seven ringed seal strandings were recorded. Of the nine strandings reported in Alaska (all regions included), none were found to be caused by vessel collisions (Savage, 2021).

Vessel speed, size, and mass are all important factors in determining both the potential likelihood and impacts of a vessel strike to marine mammals (Blondin *et al.*,

2025; Conn and Silber, 2013; Garrison *et al.*, 2025; Gende *et al.*, 2011; Silber *et al.*, 2010; Vanderlaan and Taggart, 2007; Wiley *et al.*, 2016). When submerged, submarines are generally slow moving (to avoid detection) and therefore marine mammals at depth with a submarine are likely able to avoid collision with the submarine. For most of the research and training and testing activities during the specified activity, submarine and UUV speeds would not typically exceed 18.5 km/hr during the time spent within the ICEX Study Area, which would lessen the already extremely unlikely chance of collisions with marine mammals, specifically ringed seals.

Based on consideration of all this information, NMFS does not anticipate incidental take of marine mammals by vessel strike from submarines or UUVs.

Potential Effects of Exercise Torpedo Strike

As noted in the *Detailed Description of Specific Activity* section, the Navy may use inert exercise torpedoes in ICEX26. While the details of the proposed torpedo exercises are classified, given the limited potential number of exercise torpedoes deployed (maximum of 10) during the exercise window, and the low density of ringed seals in the ICEX Study Area during this time, NMFS does not anticipate incidental take of marine mammals by exercise torpedo strike.

Potential Non-Acoustic Impacts

Deployment of the ice camp could potentially affect ringed seal habitat by physically damaging or crushing subnivean lairs, which could potentially result in ringed seal injury or mortality. March 1 is generally expected to be the onset of ice seal lairing season, and ringed seals typically construct lairs near pressure ridges. As described in the **Proposed Mitigation** section, the ice camp and runway would be established on a combination of first-year ice and multi-year ice without pressure ridges, which would minimize the possibility of physical impacts to subnivean lairs and habitat suitable for lairs. Ice camp deployment would begin mid-February, and be gradual, with activity

increasing over the first 5 days. So, in addition, this schedule would discourage seals from establishing birthing lairs in or near the ice camp, and would allow ringed seals to relocate outside of the ice camp area as needed, though both scenarios are unlikely as described below in this section. Personnel on on-ice vehicles would observe for marine mammals, and would follow established routes when available, to avoid potential disturbance of lairs and habitat suitable for lairs. Personnel on foot and operating on-ice vehicles would avoid deep snow drifts near pressure ridges, also to avoid potential lairs and habitat suitable for lairs. Implementation of these measures are expected to prevent ringed seal lairs from being crushed or damaged during ICEX26 activities and are expected to minimize any other potential impacts to sea ice habitat suitable for the formation of lairs. Given the proposed mitigation requirements, we also do not anticipate ringed seal injury or mortality as a result of damage to subnivean lairs.

ICEX26 personnel would be actively conducting testing and training operations on the sea ice and would travel around the camp area, including the runway, on snowmobiles. Although the Navy does not anticipate observing any seals on the ice given the lack of observations during previous ice exercises (U.S. Department of the Navy, 2018; U.S. Department of the Navy, 2020; U.S. Department of the Navy, 2022; U.S. Department of the Navy, 2025a), as a general matter, on-ice activities could cause a seal that would have otherwise built a lair in the area of an activity to be displaced and therefore, construct a lair in a different area outside of an activity area, or a seal could choose to relocate to a different existing lair outside of an activity area. However, in the case of the ice camp associated with ICEX26, displacement of seal lair construction or relocation to existing lairs outside of the ice camp area is unlikely, given the low average density of structures (the average ringed seal ice structure density in the vicinity of Prudhoe Bay, Alaska is 1.58 structures per km² (table 4)), the relative footprint of the Navy's planned ice camp (2 km²), the lack of previous ringed seal observations on the ice

during ICEX activities, and proposed mitigation requirements that would require the Navy to construct the ice camp and runway on first-year or multiyear ice without pressure ridges and would require personnel to avoid areas of deep snow drift or pressure ridges (see the **Proposed Mitigation** section for additional information about the proposed mitigation requirements). This measure, in combination with the other mitigation measures required for operation of the ice camp are expected to avoid impacts to the construction and use of ringed seal subnivean lairs, particularly given the already low average density of lairs, as described above.

Table 4 -- Ringed Seal Ice Structure Density in the Vicinity of the Prudhoe Bay, Alaska

Year	Ice Structure Density (Structures per km ²)	Source
1982	3.6	Frost and Burns (1989)
1983	0.81	Kelly <i>et al.</i> (1986)
1999	0.71	Williams <i>et al.</i> (2001)
2000	1.2	Williams <i>et al.</i> (2001)
Average Density	1.58	

Given the required mitigation measures and the low density of ringed seals anticipated in the Ice Camp Study Area during ICEX26, we do not anticipate behavioral disturbance of ringed seals due to human presence.

The Navy’s activities would occur prior to the late spring to early summer “basking period,” which occurs between abandonment of the subnivean lairs and melting of the seasonal sea ice, and is when the seals undergo their annual molt (Kelly *et al.*, 2010b). Given that the ice camp would be demobilized prior to the basking period, and the remainder of the Navy’s activities occur below the sea ice, impacts to sea ice habitat suitable as a platform for basking and molting are not anticipated to result from the ICEX26 activities.

Our preliminary determination of potential effects to the physical environment includes minimal possible impacts to marine mammals and their habitat from camp operation or deployment activities, given the proposed mitigation and the timing of the Navy's proposed activities. In addition, given the relatively short duration of submarine testing and training activities, the relatively small area that would be affected, and the lack of impacts to physical or foraging habitat, the proposed specified activities are not likely to have an adverse effect on prey species or marine mammal habitat, other than potential localized, temporary, and infrequent effects to fish as discussed above.

Therefore, any impacts to ringed seals and their habitat, as discussed above in this section, are not expected to cause significant or long-term consequences for individual ringed seals or the population. Please see the **Negligible Impact Analysis and Determination** section for additional discussion regarding the likely impacts of the Navy's activities on ringed seals, including the reproductive success or survivorship of individual ringed seals, and how those impacts on individuals are likely to impact the species or stock.

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 the negligible impact determinations and impacts on subsistence uses.

Harassment is the only type of take expected to result from these activities. For this military readiness activity, the MMPA defines "harassment" as (i) any act that injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (ii) any act that disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or

sheltering, to a point where the behavioral patterns are abandoned or significantly altered (Level B harassment).

Authorized takes would be by Level B harassment only, in the form of behavioral responses and/or TTS for individual marine mammals resulting from exposure to acoustic transmissions. Based on the nature of the activity, Level A harassment is neither anticipated nor proposed to be authorized. 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 there is some reasonable potential for marine mammals to be behaviorally harassed or incur some degree of AUD INJ; (2) the area or volume of water that will be ensonified above these levels in a day; (3) the density or occurrence of marine mammals within these ensonified areas; and, (4) 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

In coordination with NMFS, the Navy developed behavioral thresholds to support environmental analyses for the Navy's training and testing activities utilizing active sonar sources; these behavioral harassment thresholds are used here to evaluate the potential effects of the active sonar components of the proposed activities. 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 (Ellison *et al.*, 2012; Southall *et al.*, 2007; Southall *et al.*, 2021).

The Navy's Phase IV pinniped behavioral criteria is based on controlled exposure experiments on the following captive animals: hooded seal, harbor seal, and California sea lion (Houser *et al.*, 2013; Kastelein *et al.*, 2015; Kvadsheim *et al.*, 2010). Overall exposure levels were 110-170 dB re 1 μ Pa for hooded seals, 107-160 dB re 1 μ Pa for harbor seals, and 125-185 dB re 1 μ Pa for California sea lions. Responses occurred at received levels ranging from 107-185 dB re 1 μ Pa. However, the mean of the response data was 154 dB re 1 μ Pa. Hooded seals were exposed to increasing levels of sonar until an avoidance response was observed. The harbor seals were exposed to a variety of contexts, frequencies, and received levels. Each individual California sea lion was exposed to the same received level 10 times; these exposure sessions were combined into a single response value, with an overall response assumed if an animal responded in any single session.

Based on the Navy's pinniped behavioral response function (see figure 6-1 of the application), there is a 50 percent probability of response at 156 dB re 1 μ Pa. To account for proximity to the active acoustic source and based on the best scientific information, a

distance of 5 km is used beyond which exposures would not qualify as take by Level B harassment under the military readiness definition.

Level A Harassment

NMFS' Updated Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 3.0) (NMFS, 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). The Navy's proposed activity includes the use of non-impulsive (active sonar) sources.

The 2024 Updated Technical Guidance criteria include both updated thresholds and updated weighting functions for each hearing group. The thresholds are provided in table 5 below for phocid pinnipeds underwater. 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 5 -- Thresholds Identifying the Onset of Auditory Injury

	AUD INJ Onset Acoustic Thresholds* (Received Level)	
Hearing Group	Impulsive	Non-impulsive
Phocid Pinnipeds (PW) (Underwater)	$L_{pk,flat}$: 223 dB $L_{E,PW,24h}$: 183 dB	$L_{E,PW,24h}$: 195 dB
<p>*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.</p> <p>Note: Peak sound pressure level ($L_{p,0-pk}$) has a reference value of 1 μPa, and weighted cumulative sound exposure level ($L_{E,p}$) has a reference value of 1 μPa²s. 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>i.e.</i>, 7 Hz to 165 kHz). The subscript associated with cumulative sound exposure level criteria indicates the designated marine mammal auditory weighting function (PW 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>i.e.</i>, 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.</p>		

For previous ICEX activities, the Navy's PTS/TTS analysis began with mathematical modeling to predict the sound transmission patterns from Navy sources, including sonar. These data were then coupled with marine species distribution and abundance data to determine the sound levels likely to be received by various marine species. These criteria and thresholds were applied to estimate specific effects that animals exposed to Navy-generated sound may experience. For weighting function derivation, the most critical data required were TTS onset exposure levels as a function of exposure frequency. These values can be estimated from published literature by examining TTS as a function of sound exposure level (SEL) for various frequencies.

Marine Mammal Occurrence

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

The Navy performed a quantitative analysis to estimate the number of mammals that could be harassed by the underwater acoustic transmissions during the specified activity. The only marine mammal susceptible to impacts from acoustic transmissions associated with the proposed activities would be ringed seals.

Ringed seal presence in the ICEX Study Area was obtained using sighting data from the Ocean Biodiversity Information System-Spatial Ecological Analysis of Megavertebrate Populations (OBIS-SEAMAP) (Halpin *et al.*, 2009). The ICEX Study Area was overlaid on the OBIS-SEAMAP ringed seal sightings map that included sightings from the years 2000-2007 and the year 2013. Sighting data were only available for the mid to late summer and fall months. To date, there have been no surveys to determine ringed seal presence in the Study Area during winter and spring months.

It is assumed that during the fall most ringed seals would migrate south and west from the Beaufort Sea to the Bering and Chukchi Seas, with some ringed seals remaining

in the Beaufort Sea. Additionally, some ringed seals would create subnivean lairs on landfast (shorefast) ice over the continental shelf during the winter and spring months, and move back into the Chukchi and Beaufort Seas during the summer and fall months (Crawford *et al.*, 2012; Frost and Lowry, 1984; Harwood *et al.*, 2012; Young *et al.*, 2024). Therefore, the average number of individual ringed seals per year was assumed to be present in the ICEX Study Area during the proposed activities, regardless of the time of year that the sighting occurred. Based on the sightings data, it is assumed that three ringed seals would be present in the ICEX Study Area.

Take Estimation

Here we describe how the information provided above is synthesized to produce a quantitative estimate of the take that is reasonably likely to occur and proposed for authorization.

When sound sources are active, exposure to increased SPLs would likely involve individuals that are moving through the area during foraging trips. Ringed seals also may be exposed en route to haul out sites or subnivean lairs. If exposure were to occur, the pinnipeds could exhibit behavioral responses, such as avoidance, increased swimming speeds, increased surfacing time, or decreased foraging. Most likely, individuals affected by acoustic transmissions resulting from the proposed activities would move away from the sound source. Ringed seals may be temporarily displaced from their subnivean lairs within the Ice Camp Study Area. Any pinniped would have to be within 5 km of the source for any behavioral reaction (*e.g.*, flushing from a lair). Any effects experienced by individual pinnipeds are anticipated to be limited to short-term disturbance of normal behavior, temporary displacement or disruption of animals that may occur near the proposed activity.

Navy estimated that three ringed seals may be taken by Level B harassment per day of activity within the ICEX Study Area. Navy anticipates conducting active acoustic

transmissions on 42 days, and therefore requested 126 takes by Level B harassment of ringed seals (3 seals per day × 42 days = 126 takes by Level B harassment) (table 6). NMFS concurs and proposes to authorize 126 takes by Level B harassment. All takes are classified as Level B harassment and not further distinguished because the method used to estimate take does not support the differentiation between behavioral harassment or TTS.

Modeling for three previous ICEXs (2018, 2020, and 2022), which employed similar acoustic sources, did not result in any estimated takes by PTS; therefore, particularly in consideration of the fact that total takes were likely overestimated for those ICEX activities given the density information used in the analyses (NMFS anticipates that the density of ringed seals is actually much lower than estimated in those analyses) and the similarity between those activities and the activities proposed for ICEX26, the Navy did not request, and NMFS is not proposing to authorize, take by Level A harassment of ringed seal.

Table 6 -- Estimated Take of Marine Mammals from the Specified Activities

Species	Level B harassment	Level A harassment	Instances of take as a percentage of population
Ringed seal	126	0	<1

During monitoring for the 2018 IHA covering similar military readiness activities in the ICEX26 Study Area, the Navy did not visually observe or acoustically detect any marine mammals (U.S. Department of the Navy, 2018). During monitoring for the 2020 IHA covering similar military readiness activities in the ICEX26 Study Area, the Navy also did not visually observe any marine mammals (U.S. Department of the Navy, 2020). Acoustic monitoring associated with the 2020 IHA did not detect any discernible marine mammal vocalizations (Henderson *et al.*, 2021). The monitoring report states that “there were a few very faint sounds that could have been (ringed seal) barks or yelps.”

However, these were likely not from ringed seals, given that ringed seal vocalizations are generally produced in series (Jones *et al.*, 2014). Henderson *et al.* (2021) expect that these sounds were likely ice-associated or perhaps anthropogenic. While the distance at which ringed seals could be acoustically detected is not definitive, Henderson *et al.* (2021) states that Expendable Mobile ASW Training Targets (EMATTs) “traveled a distance of 10 nmi (18.5 km) away and were detected the duration of the recordings; although ringed seal vocalization source levels are likely far lower than the sounds emitted by the EMATTs, this gives some idea of the potential detection radius for the cryophone. The periods when the surface anthropogenic activity is occurring in close proximity to the cryophone are dominated by those broadband noises due to the shallow hydrophone placement in ice (only 10 cm down), and any ringed seal vocalizations that were underwater could have been masked.” During monitoring for the 2022 IHA covering similar military readiness activities in the ICEX26 Study Area, the Navy also did not visually observe any marine mammals (U.S. Department of the Navy, 2022). With the exception of PAM conducted during activities for mitigation purposes (no detections), PAM did not occur in 2022 because the ice camp ice flow broke up, and therefore, Navy had to relocate camp. Given the lost time, multiple research projects were canceled, including the under-ice PAM that the Naval Postgraduate School was planning to conduct. During monitoring for the 2024 IHA covering similar military readiness activities in the ICEX26 Study Area, the Navy also did not visually observe any marine mammals (U.S. Department of the Navy, 2025a).

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. 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)). The 2004 NDAA amended the MMPA as it relates to military readiness activities and the incidental take authorization process such that “least practicable impact” shall include consideration of personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity.

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, impact on operations, and, in the case of a military readiness activity, personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity.

The mitigation requirements described in the following were proposed by the Navy or are the result of coordination between NMFS and the Navy following receipt of the application, and the Navy has agreed that all of the mitigation measures are

practicable. NMFS has fully reviewed the specified activities and the mitigation measures included in the application to determine if the mitigation measures would result in the least practicable adverse impact on marine mammals and their habitat, as required by the MMPA, and has determined the proposed measures are appropriate. NMFS describes these below as proposed mitigation requirements, and has included them in the proposed IHA.

The proposed IHA requires that appropriate personnel (including civilian personnel) involved in mitigation and training or testing activity reporting under the specified activities must complete Arctic Environmental and Safety Awareness Training. Modules include: Arctic Species Awareness and Mitigations, Environmental Considerations, Hazardous Materials Management, and General Safety.

Further, the following general mitigation measures are required to prevent incidental take of ringed seals on the ice floe associated with the ice camp (further explanation of certain mitigation measures is provided in parentheses following the measure):

- The ice camp and runway must be established on first-year and multi-year ice without pressure ridges. (This will minimize physical impacts to subnivean lairs and impacts to sea ice habitat suitable for lairs);

- Ice camp deployment must begin no later than mid-February 2026, and be gradual, with activity increasing over the first 5 days. Camp deployment must be completed by March 15, 2026. (Given that mitigation measures require that the ice camp and runway be established on first-year or multi-year ice without pressure ridges, as well as the average ringed seal lair density in the area, and the relative footprint of the Navy's planned ice camp (2 km²), it is extremely unlikely that a ringed seal would build a lair in the vicinity of the ice camp. Additionally, based on the best available science, Arctic ringed seal whelping is not expected to occur prior to mid-March, and therefore,

construction of the ice camp will be completed prior to whelping in the area of ICEX26. Further, as noted above, ringed seal lairs are not expected to occur in the ice camp study area, and therefore, NMFS does not expect ringed seals to relocate pups due to human disturbance from ice camp activities, including construction);

- Personnel on all on-ice vehicles must observe for marine and terrestrial animals;
- Snowmobiles must follow established routes, when available. On-ice vehicles must not be used to follow any animal, with the exception of actively deterring polar bears if the situation requires;

- Personnel on foot and operating on-ice vehicles must avoid areas of deep (>0.5 m) snowdrifts and pressure ridges by 0.8 km. (These areas are preferred areas for subnivean lair development);

- Personnel must maintain a 100 m avoidance distance from all observed marine mammals; and

- All material (*e.g.*, tents, unused food, excess fuel) and wastes (*e.g.*, solid waste, hazardous waste) must be removed from the ice floe upon completion of ICEX26 activities.

The following mitigation measures are required for activities involving acoustic transmissions (further explanation of certain mitigation measures is provided in parentheses following the measure):

- Personnel must begin passive acoustic monitoring (PAM) for vocalizing marine mammals 15 minutes prior to the start of activities involving active acoustic transmissions from submarines and exercise torpedoes. (This PAM would be conducted for the area around the submarine in real time by technicians on board the submarine);

- Personnel must delay active acoustic transmissions and exercise torpedo launches if a marine mammal is detected during pre-activity PAM and must shutdown

active acoustic transmissions if a marine mammal is detected during acoustic transmissions; and

- Personnel must not restart acoustic transmissions or exercise torpedo launches until 15 minutes have passed with no marine mammal detections.

Ramp up procedures for acoustic transmissions are not required as the Navy determined, and NMFS concurs, that they would result in impacts on military readiness and on the realism of training that would be impracticable.

The following mitigation measures are required for aircraft activities to prevent incidental take of marine mammals due to the presence of aircraft and associated noise.

- Fixed wing aircraft must operate at the highest altitudes practicable taking into account safety of personnel, meteorological conditions, and need to support safe operations of a drifting ice camp. Aircraft must not reduce altitude if a seal is observed on the ice. In general, cruising elevation must be 457 m or higher;

- UAS must maintain a minimum altitude of at least 15.2 m above the ice. They must not be used to track or follow marine mammals;

- Helicopter flights must use prescribed transit corridors when traveling to or from Prudhoe Bay and the ice camp. Helicopters must not hover or circle above marine mammals or within 457 m of marine mammals;

- Aircraft must maintain a minimum separation distance of 1.6 km from groups of 5 or more seals; and

- Aircraft must not land on ice within 800 m of hauled-out seals.

Based on our evaluation of the applicant's proposed measures, as well as other measures considered by NMFS above, 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 will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present 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.

The Navy has coordinated with NMFS to develop an overarching program, the Integrated Comprehensive Monitoring Program (ICMP), intended to coordinate marine species monitoring efforts across all regions and to allocate the most appropriate level and type of effort for each range complex based on a set of standardized objectives, and in acknowledgement of regional expertise and resource availability. The ICMP was created in direct response to Navy requirements established in various MMPA regulations and ESA consultations. As a framework document, the ICMP applies by regulation to those activities on ranges and operating areas for which the Navy is seeking or has sought incidental take authorizations. In 2023, Navy, NMFS, the Marine Mammal Commission, and scientific experts participated in a Research and Monitoring Summit. One outcome of the summit was a refreshed strategic framework effectively replacing the ICMP, which will provide increased coordination across Navy's protected marine species investment programs.

The strategic framework is focused on Navy training and testing ranges where the majority of Navy activities occur regularly, as those areas have the greatest potential for being impacted by the Navy's activities. In comparison, ICEX is a short duration exercise that occurs approximately every other year. Due to the location and expeditionary nature of the ice camp, the number of personnel on site is extremely limited and is constrained by the requirement to be able to evacuate all personnel in a single day with small planes. As such, the Navy asserts that a dedicated monitoring project akin to those conducted in other study areas is not feasible as it would require additional personnel and equipment, and NMFS concurs.

Nonetheless, the Navy must conduct the following monitoring and reporting under the IHA. Ice camp personnel must generally monitor for marine mammals in the vicinity of the ice camp and record all observations of marine mammals, regardless of distance from the ice camp, as well as the additional data indicated below. Additionally, Navy personnel must conduct PAM during all active sonar use. Ice camp personnel must also maintain an awareness of the surrounding environment and document any observed marine mammals. When traveling away from camp, each snow machine must have a dedicated observer (not the vehicle operator) or each expeditionary team must have at least one observer. Observers must be capable of observing and recording marine mammal presence and behaviors, and accurately and completely record data. When traveling, observers will have no other primary duty than to watch for and report observations related to marine mammals and human/seal interactions. Dedicated observers can also serve as the communicator between the field party and camp.

In addition, the Navy is required to provide NMFS with a draft exercise monitoring report within 90 days of the conclusion of the specified activity. A final report must be prepared and submitted within 30 calendar days following receipt of any NMFS comments on the draft report. If no comments are received from NMFS within 30 calendar days of receipt of the draft report, the report shall be considered final. The report, at minimum, must include:

- Marine mammal monitoring effort including date, time, duration of observation efforts;
- The minimum distance between human activities and seals or seal lairs;
- Duration of time during which seals or seal lairs were known to be present within 150 m of human activities, and the behaviors exhibited by the seals during those observation periods;

- Account of the status of seal lairs located within 150 m of camps or ice trails through time;
- Ice camp activities occurring during each monitoring period (*e.g.*, construction, demobilization, safety watch, field parties);
- Number of marine mammals detected;
- Upon observation of a marine mammal, record the following information:
 - Environmental conditions when animal was observed, including relevant weather conditions such as cloud cover, snow, sun glare, and overall visibility, and estimated observable distance;
 - Lookout location and ice camp activity at time of sighting (or location and activity of personnel who made observation, if observed outside of designated monitoring periods);
 - Time and approximate location of sighting;
 - Identification of the animal(s) (*e.g.*, seal, or unidentified), also noting any identifying features;
 - Distance and location of each observed marine mammal relative to the ice camp location for each sighting;
 - Estimated number of animals (min/max/best estimate); and
 - Description of any marine mammal behavioral observations (*e.g.*, observed behaviors such as 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).

Also, all sonar usage will be collected via the Navy's Sonar Positional Reporting System database. The Navy is required to provide data regarding sonar use and the number of shutdowns during ICEX26 activities in the Atlantic Fleet Training and Testing (AFTT) Letter of Authorization 2026 annual classified report. The Navy is also required

to analyze any declassified underwater recordings collected during ICEX26 for marine mammal vocalizations and report that information to NMFS, including the types and nature of sounds heard (*e.g.*, clicks, whistles, creaks, burst pulses, continuous, sporadic, strength of signal) and the species or taxonomic group (if determinable). This information will be submitted to NMFS in an ICEX26 declassified monitoring report.

Finally, in the event that personnel discover an injured or dead marine mammal, personnel must report the incident to OPR, NMFS and to the Alaska regional stranding network as soon as feasible. The report must include the following information:

- Time, date, and location (latitude/longitude) of the first discovery (and updated location information if known and applicable);
- Species identification (if known) or description of the animal(s) involved;
- Condition of the animal(s) (including carcass condition if the animal is dead);
- Observed behaviors of the animal(s), if alive;
- If available, photographs or video footage of the animal(s); and
- General circumstances under which the animal(s) was discovered (*e.g.*, during submarine activities, observed on ice floe, or by transiting aircraft).

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).

Underwater acoustic transmissions associated with ICEX26, as outlined previously, have the potential to result in Level B harassment of ringed seals in the form of TTS and behavioral disturbance. No take by Level A harassment, serious injury, or mortality are anticipated to result from this activity. Further, at close ranges and high sound levels approaching those that could cause AUD INJ, seals would likely avoid the area immediately around the sound source.

NMFS anticipates that take of ringed seals by TTS could occur from the submarine activities. TTS is a temporary impairment of hearing and can last from minutes or hours to days (in cases of strong TTS). In many cases, however, hearing sensitivity recovers rapidly after exposure to the sound ends. This activity has the potential to result in only minor levels of TTS, and hearing sensitivity of affected animals would be expected to recover quickly. Though TTS may occur as indicated, the overall fitness of the impacted individuals is unlikely to be affected given the temporary nature of TTS and the minor levels of TTS expected from these activities. Negative impacts on the reproduction or survival of affected ring seals as well as impacts on the stock are not anticipated.

Effects on individuals that are taken by Level B harassment by behavioral disturbance could include alteration of dive behavior, alteration of foraging behavior, effects to breathing, interference with or alteration of vocalization, avoidance, and flight. More severe behavioral responses are not anticipated due to the localized, intermittent use of active acoustic sources and mitigation using PAM, which would limit exposure to active acoustic sources. Most likely, individuals would be temporarily displaced by moving away from the sound source. As described previously in the *Acoustic Impacts* section, seals exposed to non-impulsive sources with a received sound pressure level within the range of calculated exposures (142-193 dB re 1 μ Pa), have been shown to change their behavior by modifying diving activity and avoidance of the sound source (Götz *et al.*, 2010; Kvalsheim *et al.*, 2010). Although a minor change to a behavior may occur as a result of exposure to the sound sources associated with the proposed specified activity, these changes would be within the normal range of behaviors for the animal (*e.g.*, the use of a breathing hole further from the source, rather than one closer to the source). Further, given the limited number of total instances of takes and the unlikelihood that any single individuals would be taken repeatedly, multiple times over sequential days, these takes are unlikely to impact the reproduction or survival of any individuals.

The Navy's proposed activities are localized and of relatively short duration. While the total ICEX Study Area is large, the Navy expects that most activities would occur within the Ice Camp Study Area in relatively close proximity to the ice camp. The larger Navy Activity Study Area depicts the range where submarines may maneuver during the exercise. The ice camp would be in existence for up to 6 weeks with acoustic transmission occurring intermittently over approximately 4 weeks.

The project is not expected to have significant adverse effects on marine mammal habitat. The project activities are limited in time and would not modify physical marine mammal habitat. While the activities may cause some fish to leave a specific area

ensonified by acoustic transmissions, temporarily impacting marine mammals' foraging opportunities, these fish would likely return to the affected area. As such, the impacts to marine mammal habitat are not expected to cause significant or long-term negative consequences.

For on-ice activity, Level A harassment, Level B harassment, serious injury, and mortality are not anticipated, given the nature of the activities, the lack of previous ringed seal observations, and the mitigation measures NMFS has proposed to include in the IHA. The ringed seal pupping season on the ice lasts for 5-9 weeks during late winter and spring. As stated in the **Potential Effects of Specified Activities on Marine Mammals and their Habitat** section, March 1 is generally expected to be the onset of ice seal lairing season. The ice camp and runway would be established on first-year ice or multi-year ice without pressure ridges, as ringed seals tend to build their lairs near pressure ridges. Ice camp deployment will begin no later than mid-February, and be gradual, with activity increasing over the first 5 days. Ice camp deployment will be completed by March 15, before the pupping season. Displacement of seal lair construction or relocation to existing lairs outside of the ice camp area is unlikely, given the low average density of lairs (the average ringed seal lair density in the vicinity of Prudhoe Bay, Alaska, is 1.58 lairs per km² (table 4) the relative footprint of the Navy's planned ice camp (2 km²), the lack of previous ringed seal observations on the ice during ICEX activities, and mitigation requirements that require the Navy to construct the ice camp and runway on first-year or multi-year ice without pressure ridges and require personnel to avoid areas of deep snow drift or pressure ridges.

Given that mitigation measures require that the ice camp and runway be established on first-year or multi-year ice without pressure ridges, where ringed seals tend to build their lairs, it is extremely unlikely that a ringed seal would build a lair in the vicinity of the ice camp. This measure, together with the other mitigation measures

required for operation of the ice camp, are expected to avoid impacts to the construction and use of ringed seal subnivean lairs, particularly given the already low average density of lairs, as described above. Given that ringed seal lairs are not expected to occur in the ice camp study area, NMFS would not expect ringed seals to relocate pups due to human disturbance from ice camp activities.

Additional mitigation measures would also prevent damage to and disturbance of ringed seals and their lairs that could otherwise result from on-ice activities. Personnel on on-ice vehicles would observe for marine mammals, and would follow established routes when available, to avoid potential damage to or disturbance of lairs. Personnel on foot and operating on-ice vehicles would avoid deep snow drifts near pressure ridges, also to avoid potential damage to or disturbance of lairs. Further, personnel would maintain a 100 m (328 ft) distance from all observed marine mammals to avoid disturbing the animals due to the personnel's presence. Implementation of these measures would prevent ringed seal lairs from being crushed or damaged during ICEX26 activities.

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 Level A harassment, serious injury or mortality is anticipated or authorized;
- Impacts would be limited to Level B harassment, primarily in the form of behavioral disturbance that results in minor changes in behavior;
- TTS is expected to affect only a limited number of animals and is expected to be minor and short term;
- The number of takes proposed to be authorized are low relative to the estimated abundances of the affected stock, even given the extent to which abundance is significantly underestimated;

- Submarine training and testing activities would occur over only 4 weeks of the total 6-week activity period;
- There would be no loss or modification of ringed seal habitat and minimal, temporary impacts on prey;
- Physical impacts to ringed seal subnivean lairs would be avoided; and
- Mitigation requirements for ice camp activities would prevent impacts to ringed seals during the pupping season.

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

Unmitigable Adverse Impact Analysis and Determination

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

Impacts to marine mammals from the specified activity would mostly include limited, temporary behavioral disturbances of ringed seals; however, some TTS is also anticipated. No Level A harassment (auditory or non-auditory injury), serious injury, or

mortality of marine mammals is expected or proposed for authorization, and the activities are not expected to have any impacts on reproductive or survival rates of any marine mammal species.

The specified activity and associated harassment of ringed seals would not be expected to impact marine mammals in numbers or locations sufficient to reduce their availability for subsistence harvest given the short-term, temporary nature of the activities, and the distance offshore from known subsistence hunting areas. The specified activity would occur for a brief period of time outside of the primary subsistence hunting season, and though seals are harvested for subsistence uses off the North Slope of Alaska, the ICEX Study Area is seaward of known subsistence hunting areas. The Study Area boundary is approximately 50 km from shore at the closest point, though exercises will occur farther offshore.

The Navy proposes to provide advance public notice to local residents and other users of the Prudhoe Bay region of Navy activities and measures used to reduce impacts on resources. This includes notification to local Alaska Natives who hunt marine mammals for subsistence. If any Alaska Natives express concerns regarding project impacts to subsistence hunting of marine mammals, the Navy would further communicate with the concerned individuals or community. The Navy would provide project information and clarification of the mitigation measures that will reduce impacts to marine mammals.

Based on the description of the specified activity, the measures described to minimize adverse effects on the availability of marine mammals for subsistence purposes, and the proposed mitigation and monitoring measures, NMFS has preliminarily determined that there will not be an unmitigable adverse impact on subsistence uses from the Navy'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 ensures 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 NMFS' Alaska Regional Office (AKR).

NMFS Office of Protected Resources (OPR) is proposing to authorize take of ringed seals, which are listed under the ESA. OPR has requested initiation of section 7 consultation with AKR for the issuance of this IHA. The Navy has also requested a section 7 consultation with AKR for ICEX26 activities. OPR 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 the Navy for conducting submarine training and testing activities in the Arctic Ocean beginning in February 2026, 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-military-readiness-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 ICEX26 activities. 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: November 10, 2025.

Samuel D. Rauch III,

Deputy Assistant Administrator for Regulatory Programs,

National Marine Fisheries Service.

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