E 3510-22-P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

[RTID 0648- XB379]

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to the Office of Naval Research's Arctic Research Activities in the Beaufort and Chukchi Seas (Year 4)

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

ACTION: Notice; issuance of an incidental harassment authorization.

SUMMARY: In accordance with the regulations implementing the Marine Mammal Protection Act (MMPA) as amended, notification is hereby given that NMFS has issued an IHA to the U.S. Navy's Office of Naval Research (ONR) to incidentally harass, by Level B harassment only, marine mammals during oceanographic research activities associated with the Arctic Research Activities (Year 4) in the Beaufort and eastern Chukchi Seas. 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 (NDAA).

DATES: This Authorization is effective from October 5, 2021 through October 4, 2022.

FOR FURTHER INFORMATION CONTACT: Kelsey Potlock, Office of Protected Resources, NMFS, (301) 427-8401. Electronic copies of the application and supporting documents, as well as a list of the references cited in this document, may be obtained online at: *https://www.fisheries.noaa.gov/action/incidental-take-authorization-office-naval-research-arctic-research-activities-beaufort-1*. In case of problems accessing these documents, please call the contact listed above.

SUPPLEMENTARY INFORMATION:

Background

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

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

The NDAA (Pub. L. 108–136) removed the "small numbers" and "specified geographical region" limitations indicated above and amended the definition of "harassment" as it applies to a "military readiness activity." The activity for which incidental take of marine mammals is being requested addressed here qualifies as a military readiness activity. The definitions of all applicable MMPA statutory terms cited above are included in the relevant sections below.

Summary of Request

On June 4, 2021, NMFS received a request from the Office of Naval Research (ONR) for an IHA to take marine mammals incidental to oceanographic research activities, known as Arctic Research Activities, in the Beaufort and eastern Chukchi Seas. The application was deemed adequate and complete on August 4, 2021. ONR's request is for take of beluga whales (*Delphinapterus leucas*; two stocks) and ringed seals (*Pusa hispida hispida*) by Level B harassment only. Neither ONR nor NMFS expects serious injury or mortality to result from this activity and, therefore, an IHA is appropriate.

This IHA will cover the fourth year of a larger project for which ONR obtained prior IHAs (83 FR 48799, September 27, 2018; 84 FR 50007, September 24, 2019; 85 FR 53333, August 28, 2020) and may request take authorization for subsequent facets of the overall project. This IHA will be valid for a period of one year, October 5, 2021 to October 4, 2022. The larger project involves several scientific objectives that support the Arctic and Global Prediction Program, as well as the Ocean Acoustic Program and the Naval Research Laboratory, for which ONR is the parent command. ONR has complied with all the requirements (*e.g.*, mitigation, monitoring, and reporting) of the previous IHAs (83 FR 48799, September 27, 2018; 84 FR 50007, September 24, 2019; 85 FR 53333, August 28, 2020).

Description of Activities

Overview

ONR's Arctic Research Activities include scientific experiments to be conducted in support of the following programs: the Arctic and Global Prediction Program, the Ocean Acoustic Program, and the Naval Research Laboratory (NRL), for which ONR is the parent command. Specifically, the project includes the Arctic Mobile Observing System (AMOS), Ocean Acoustics field work, and NRL experiments in the Beaufort and Chukchi Seas. Project activities involve acoustic testing during cruises (two planned) and a multi-frequency navigation system concept test using left-behind active acoustic

sources. More specifically, these experiments involve the deployment of moored, drifting, and ice-tethered active acoustic sources as well as a towed source (see details in the proposed notice (86 FR 47065; August 23, 2021) on the Shallow Water Integrate Mapping System) from the Research Vessel (R/V) *Sikuliaq* and another vessel, most likely the U.S. Coast Guard Cutter (CGC) HEALY. Underwater sound from the acoustic sources may result in behavioral harassment of marine mammals.

A detailed description of the planned Arctic Research Activities is provided in the **Federal Register** notice of the proposed IHA (86 FR 47065; August 23, 2021). Since that time, no changes have been made to the project activities. Therefore, a detailed description is not provided here. Please refer to that **Federal Register** notice for the description of the specified activities.

Comments and Responses

A notice of NMFS's proposal to issue an IHA to ONR was published in the **Federal Register** on August 23, 2021 (86 FR 47065). That proposed notice described, in detail, ONR's activities, the marine mammal species that may be affected by the activities and the anticipated effects on marine mammals. During this period, NMFS received two non-substantive public comments that did not present relevant information and did not change our determinations or any aspects of the IHA as described in the proposed Federal Register notice (86 FR 47065; August 23, 2021).

Changes from the Proposed IHA to Final IHA

NMFS notes one correction to information provided in the notice of proposed IHA (86 FR 47065; August 23, 2021). The location of the activity was described in error as being potentially as close as 110 miles from Alaska. The correct distance is 110 nautical miles (nm; 204 km).

Description of Marine Mammals in the Area of Specified Activities

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

Table 1 lists all species or stocks for which take is expected and is authorized for this action, 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. For taxonomy, we follow Committee on Taxonomy (2021). PBR is defined by the MMPA as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population (as described in NMFS's SARs). While no mortality is anticipated or authorized here, PBR and annual serious injury and mortality from anthropogenic sources are included here as gross indicators of the status of the species and other threats.

Marine mammal abundance estimates presented in this document represent the total number of individuals that make up a given stock or the total number estimated within a particular study or survey area. NMFS's stock abundance estimates for most species represent the total estimate of individuals within the geographic area, if known, that comprises that stock. For some species, this geographic area may extend beyond U.S. waters. All managed stocks in this region are assessed in NMFS's 2020 Alaska SARs (Muto *et al*., 2021). All values presented in Table 1 are the most recent available at the time of publication and are available in the 2020 SARs (Muto *et al*., 2021) and available

online at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments*.

Table 1-- Species Expected to Occur in the Project Area

Common name	Scientific name	Stock	ESA/MMPA status; Strategic (Y/N)[1]	Stock abundance (CV, N_{min}, most recent abundance survey)[2]	PBR	Annual M/SI[3]
Order Cetartiodactyla – Cetacean – Superfamily Odontoceti (toothed whales, dolphins, and porpoises)						
Family Monodontidae						
Beluga whale	*Delphinapterus leucas*	Beaufort Sea[4]	-,-; N	39,258 (0.229, N/A, 1992)	UND[4]	102
Beluga whale	*Delphinapterus leucas*	Eastern Chukchi	-,-; N	13,305 (0.51, 8,875, 2012)	178	55
Order Carnivora – Superfamily Pinnipedia						
Family Phocidae (earless seals)						
Ringed seal[5]	*Pusa hispida hispida*	Arctic	T, D; Y	171,418	5,100	6,459

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

[2] - NMFS marine mammal stock assessment reports online at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments.* CV is coefficient of variation; Nmin is the minimum estimate of stock abundance.

[3] - These values, found in NMFS's SARs, represent annual levels of human-caused mortality plus serious injury from all sources combined (*e.g.,* commercial fisheries, ship strike). Annual M/SI often cannot be determined precisely and is in some cases presented as a minimum value or range. A CV associated with estimated mortality due to commercial fisheries is presented in some cases.

[4] - The 2016 guidelines for preparing SARs state that abundance estimates older than 8 years should not be used to calculate PBR due to a decline in the reliability of an aged estimate. Therefore, the PBR for this stock is considered undetermined.

[5] – Abundance and associated values for ringed seals are for the U.S. population in the Bering Sea only.

A detailed description of the species likely to be affected by the Arctic Research Activities, including brief information regarding population trends and threats, and information regarding local occurrence, were provided in the **Federal Register** notice for

the proposed IHA (86 FR 47065; August 23, 2021). Since that time, we are not aware of any changes in the status of these species and stocks; therefore, detailed descriptions are not provided here. Please refer to that **Federal Register** notice for those descriptions. Please also refer to NMFS's website (*https://www.fisheries.noaa.gov/find-species*) for generalized species accounts.

Marine Mammal Hearing

Hearing is the most important sensory modality for marine mammals underwater, and exposure to anthropogenic sound can have deleterious effects. To appropriately assess the potential effects of exposure to sound, it is necessary to understand the frequency ranges marine mammals are able to hear. Current data indicate that not all marine mammal species have equal hearing capabilities (*e.g.*, Richardson *et al.*, 1995; Wartzok and Ketten, 1999; Au and Hastings, 2008). To reflect this, Southall *et al.* (2007) recommended that marine mammals be divided into functional hearing groups based on directly measured or estimated hearing ranges on the basis of available behavioral response data, audiograms derived using auditory evoked potential techniques, anatomical modeling, and other data. Note that no direct measurements of hearing ability have been successfully completed for mysticetes (*i.e.*, low-frequency cetaceans). Subsequently, NMFS (2018) described generalized hearing ranges for these marine mammal hearing groups. Generalized hearing ranges were chosen based on the approximately 65 decibel (dB) threshold from the normalized composite audiograms, with the exception for lower limits for low-frequency cetaceans where the lower bound was deemed to be biologically implausible and the lower bound from Southall *et al.* (2007) retained. Marine mammal hearing groups and their associated hearing ranges are provided in Table 2.

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

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

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

For more detail concerning these groups and associated frequency ranges, please see NMFS (2018) for a review of available information. Two marine mammal species (1 cetacean and 1 pinniped (1 phocid) species) have the reasonable potential to co-occur with the survey activities. Please refer to Table 1. Beluga whales are classified as mid-frequency cetaceans.

Potential Effects of Specified Activities on Marine Mammals and their Habitat

The effects of underwater noise from the deployed acoustic sources have the potential to result in behavioral harassment of marine mammals in the vicinity of the study area. The **Federal Register** notice for the proposed IHA (86 FR 47065; August 23, 2021) included a discussion of the effects of anthropogenic noise on marine mammals and their habitat, therefore that information is not repeated here; please refer to the **Federal Register** notice (86 FR 47065; August 23, 2021) for that information.

Estimated Take

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

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 are by Level B harassment only, in the form of disruption of behavioral patterns for individual marine mammals resulting from exposure to acoustic transmissions. Based on the nature of the activity, Level A harassment is neither anticipated nor authorized.

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

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

known as the Navy Acoustic Effects Model (NAEMO) for assessing the impacts of underwater sound. Below, we describe the factors considered here in more detail and present the authorized take.

Acoustic Thresholds

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

Level B Harassment for non-explosive sources—Though significantly driven by received level, the onset of behavioral disturbance from anthropogenic noise exposure is also informed to varying degrees by other factors related to the source (*e.g.*, frequency, predictability, duty cycle), the environment (*e.g.*, bathymetry), and the receiving animals (*e.g.*, hearing, motivation, experience, demography, behavioral context) and can be difficult to predict (Southall *et al.*, 2007, Ellison *et al.*, 2012). Based on what the available science indicates and the practical need to use a threshold based on a factor that is both predictable and measurable for most activities, NMFS typically uses a generalized acoustic threshold based on received level to estimate the onset of behavioral harassment. NMFS typical generalized acoustic thresholds are received levels of 120 dB of 1 microPascal (re 1 μPa; rms) for continuous (*e.g.*, vibratory pile-driving, drilling) and above 160 dB re 1 μPa (rms) for non-explosive impulsive (*e.g.*, seismic airguns) or intermittent (*e.g.*, scientific sonar) sources. In this case, NMFS has adopted the Navy's approach to estimating incidental take by Level B harassment from the active acoustic sources for this action, which includes use of the dose response functions described below.

The Navy's dose response functions were developed to estimate take from sonar and similar transducers. Multi-year research efforts have conducted sonar exposure

studies for odontocetes and mysticetes (Miller *et al*., 2012; Sivle *et al*., 2012). Several studies with captive animals have provided data under controlled circumstances for odontocetes and pinnipeds (Houser *et al*., 2013a; Houser *et al*., 2013b). Moretti *et al*., (2014) published a beaked whale dose-response curve based on passive acoustic monitoring of beaked whales during U.S. Navy training activity at Atlantic Underwater Test and Evaluation Center during actual Anti-Submarine Warfare exercises. This new information necessitated the update of the behavioral response criteria for the U.S. Navy's environmental analyses.

Southall *et al*., (2007), and more recently Southall *et al*., (2019), synthesized data from many past behavioral studies and observations to determine the likelihood of behavioral reactions at specific sound levels. While in general, the louder the sound source the more intense the behavioral response, it was clear that the proximity of a sound source and the animal's experience, motivation, and conditioning were also critical factors influencing the response (Southall *et al*., 2007; Southall *et al*., 2019). After examining all of the available data, the authors felt that the derivation of thresholds for behavioral response based solely on exposure level was not supported because context of the animal at the time of sound exposure was an important factor in estimating response. Nonetheless, in some conditions, consistent avoidance reactions were noted at higher sound levels depending on the marine mammal species or group allowing conclusions to be drawn. Phocid seals demonstrated avoidance reactions at or below 190 dB re 1 µPa at 1m; thus, seals may actually receive levels adequate to produce TTS before avoiding the source.

Odontocete behavioral criteria for non-impulsive sources were updated based on controlled exposure studies for dolphins and sea mammals, sonar, and safety (3S) studies where odontocete behavioral responses were reported after exposure to sonar (Antunes *et al*., 2014; Houser *et a*l., 2013b); Miller *et al*., 2011; Miller *et al*., 2014; Miller *et al*.,

2012). For the 3S study, the sonar outputs included 1-2 kilohertz (kHz) up- and down-sweeps and 6-7 kHz up-sweeps; source levels were ramped up from 152-158 dB re 1 µPa to a maximum of 198-214 re 1 µPa at 1 meter (m). Sonar signals were ramped up over several pings while the vessel approached the mammals. The study did include some control passes of ships with the sonar off to discern the behavioral responses of the mammals to vessel presence alone versus active sonar.

The controlled exposure studies included exposing the Navy's trained bottlenose dolphins to mid-frequency sonar while they were in a pen. Mid-frequency sonar was played at 6 different exposure levels from 125-185 dB re 1 µPa (rms). The behavioral response function for odontocetes resulting from the studies described above has a 50 percent probability of response at 157 dB re 1 µPa. Additionally, distance cutoffs (20 km for mid-frequency (MF) cetaceans) were applied to exclude exposures beyond which the potential of significant behavioral responses is considered to be unlikely.

The pinniped behavioral threshold was updated based on controlled exposure experiments on the following captive animals: hooded seal, gray seal (*Halichoerus grypus*), and California sea lion (Götz *et al*., 2010; Houser *et al*., 2013a; Kvadsheim *et al*., 2010). Hooded seals were exposed to increasing levels of sonar until an avoidance response was observed, while the grey seals were exposed first to a single received level multiple times, then an increasing received level. Each individual California sea lion was exposed to the same received level ten times. These exposure sessions were combined into a single response value, with an overall response assumed if an animal responded in any single session. The resulting behavioral response function for pinnipeds has a 50 percent probability of response at 166 dB re 1 µPa. Additionally, distance cutoffs (10 km for pinnipeds) were applied to exclude exposures beyond which the potential of significant behavioral responses is considered to be unlikely.

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

These thresholds are provided in Table 3 below. The references, analysis, and methodology used in the development of the thresholds are described in NMFS 2018 Technical Guidance, which may be accessed at *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-acoustic-technical-guidance*.

Table 3-- Thresholds Identifying the Onset of Permanent Threshold Shift

	PTS Onset Acoustic Thresholds* (Received Level)	
Hearing Group	Impulsive	Non-impulsive
Low-Frequency (LF) Cetaceans	*Cell 1* $L_{pk,flat}$: 219 dB $L_{E,LF,24h}$: 183 dB	*Cell 2* $L_{E,LF,24h}$: 199 dB
Mid-Frequency (MF) Cetaceans	*Cell 3* $L_{pk,flat}$: 230 dB $L_{E,MF,24h}$: 185 dB	*Cell 4* $L_{E,MF,24h}$: 198 dB
High-Frequency (HF) Cetaceans	*Cell 5* $L_{pk,flat}$: 202 dB $L_{E,HF,24h}$: 155 dB	*Cell 6* $L_{E,HF,24h}$: 173 dB
Phocid Pinnipeds (PW) (Underwater)	*Cell 7* $L_{pk,flat}$: 218 dB $L_{E,PW,24h}$: 185 dB	*Cell 8* $L_{E,PW,24h}$: 201 dB
Otariid Pinnipeds (OW) (Underwater)	*Cell 9* $L_{pk,flat}$: 232 dB $L_{E,OW,24h}$: 203 dB	*Cell 10* $L_{E,OW,24h}$: 219 dB

* Dual metric acoustic thresholds for impulsive sounds: Use whichever results in the largest isopleth for calculating PTS onset. If a non-impulsive sound has the potential of exceeding the peak sound pressure level thresholds associated with impulsive sounds, these thresholds should also be considered.

Note: Peak sound pressure (L_{pk}) has a reference value of 1 µPa, and cumulative sound exposure level (L_E) has a reference value of 1µPa^2s. In this Table, thresholds are abbreviated to reflect American National Standards Institute standards (ANSI 2013). However, peak sound pressure is defined by ANSI as incorporating frequency weighting, which is not the intent for this Technical Guidance. Hence, the subscript "flat" is being included to indicate peak sound pressure should be flat weighted or unweighted within the generalized hearing range. The subscript associated with cumulative sound exposure level thresholds indicates the designated marine mammal auditory weighting function (LF, MF, and HF cetaceans, and PW and OW pinnipeds) and that the recommended accumulation period is 24 hours. The cumulative sound exposure level thresholds could be exceeded in a multitude of ways (*i.e.*, varying exposure levels and durations, duty cycle). When possible, it is valuable for action proponents to indicate the conditions under which these acoustic thresholds will be exceeded.

Quantitative Modeling

The Navy performed a quantitative analysis to estimate the number of marine mammals that could be exposed to underwater acoustic transmissions above the previously described threshold criteria during ONR's action. Inputs to the quantitative analysis included marine mammal density estimates obtained from the Navy Marine Species Density Database, marine mammal depth occurrence distributions (U.S. Department of the Navy, 2017b), oceanographic and environmental data, marine mammal hearing data, and criteria and thresholds for levels of potential effects. The quantitative analysis consists of computer modeled estimates and a post-model analysis to determine the number of potential animal exposures. The model calculates sound energy propagation from the non-impulsive acoustic sources, the sound received by animat (virtual animal) dosimeters representing marine mammals distributed in the area around the modeled activity, and whether the sound received by animats exceeds the thresholds for effects.

The Navy developed a set of software tools and compiled data for estimating acoustic effects on marine mammals without consideration of behavioral avoidance or mitigation. These tools and data sets serve as integral components of NAEMO. In NAEMO, animats are distributed non-uniformly based on species-specific density, depth distribution, and group size information and animats record energy received at their

location in the water column. A fully three-dimensional environment is used for calculating sound propagation and animat exposure in NAEMO. Site-specific bathymetry, sound speed profiles, wind speed, and bottom properties are incorporated into the propagation modeling process. NAEMO calculates the likely propagation for various levels of energy (sound or pressure) resulting from each source used during the training event.

NAEMO then records the energy received by each animat within the energy footprint of the event and calculates the number of animats having received levels of energy exposures that fall within defined impact thresholds. Predicted effects on the animats within a scenario are then tallied and the highest order effect (based on severity of criteria; *e.g.*, PTS over TTS) predicted for a given animat is assumed. Each scenario, or each 24-hour period for scenarios lasting greater than 24 hours is independent of all others, and therefore, the same individual marine mammal (as represented by an animat in the model environment) could be impacted during each independent scenario or 24-hour period. In few instances, although the activities themselves all occur within the study location, sound may propagate beyond the boundary of the study area. Any exposures occurring outside the boundary of the study area are counted as if they occurred within the study area boundary. NAEMO provides the initial estimated impacts on marine species with a static horizontal distribution (*i.e.*, animats in the model environment do not move horizontally).

There are limitations to the data used in the acoustic effects model, and the results must be interpreted within this context. While the best available data and appropriate input assumptions have been used in the modeling, when there is a lack of definitive data to support an aspect of the modeling, conservative modeling assumptions have been chosen (*i.e.,* assumptions that may result in an overestimate of acoustic exposures):

- Animats are modeled as being underwater, stationary, and facing the source and therefore always predicted to receive the maximum potential sound level at a given location (*i.e.*, no porpoising or pinnipeds' heads above water);
- Animats do not move horizontally (but change their position vertically within the water column), which may overestimate physiological effects such as hearing loss, especially for slow moving or stationary sound sources in the model;
- Animats are stationary horizontally and therefore do not avoid the sound source, unlike in the wild where animals would most often avoid exposures at higher sound levels, especially those exposures that may result in PTS;
- Multiple exposures within any 24-hour period are considered one continuous exposure for the purposes of calculating potential threshold shift, because there are not sufficient data to estimate a hearing recovery function for the time between exposures; and
- Mitigation measures were not considered in the model. In reality, sound-producing activities would be reduced, stopped, or delayed if marine mammals are detected by visual monitoring.

Because of these inherent model limitations and simplifications, model-estimated results should be further analyzed, considering such factors as the range to specific effects, avoidance, and the likelihood of successfully implementing mitigation measures. This analysis uses a number of factors in addition to the acoustic model results to predict acoustic effects on marine mammals.

For the other non-impulsive sources, NAEMO calculates the SPL and SEL for each active emission during an event. This is done by taking the following factors into account over the propagation paths: bathymetric relief and bottom types, sound speed, and attenuation contributors such as absorption, bottom loss, and surface loss. Platforms such as a ship using one or more sound sources are modeled in accordance with relevant

vehicle dynamics and time durations by moving them across an area whose size is representative of the testing event's operational area.

Table 4 provides range to effects for noise produced through use of the acoustic sources to mid-frequency cetacean and pinniped-specific criteria. Range to effects is important information in predicting non-impulsive acoustic impacts. Therefore, the ranges in Table 4 provide realistic maximum distances over which the specific effects from the use of non-impulsive sources during ONR's action will be possible.

Table 4-- Range to PTS, TTS, and Behavioral Effects in the Project Area based on Cutoff Distances for Non-Impulsive Acoustic Sources

Source Type	Range to Behavioral Effects (meters)		Range to TTS Effects (meters)[c]		Range to PTS Effects (meters)[c]	
	MF Cetacean	*Pinniped*	*MF Cetacean*	*Pinniped*	*MF Cetacean*	*Pinniped*
On-site drifting sources [b]	10,000[a]	10,000[a]	0	0	0	0
Fixed sources	20,000[a]	5,000[a]	0	0	0	0

a – Cutoff distance applied (U.S. Department of the Navy, 2017a)
b – Assessed under the assumption that some of the on-site drifting sources would become closer together.
c – No effect (and therefore, no distance from source) is anticipated based on the NAEMO modeling.

A behavioral response study conducted on and around the Navy range in Southern California (SOCAL BRS) observed reactions to sonar and similar sound sources by several marine mammal species, including Risso's dolphins (*Grampus griseus*), a mid-frequency cetacean (DeRuiter *et al*., 2013; Goldbogen *et al*., 2013; Southall *et al*., 2011; Southall *et al*., 2012; Southall *et al*., 2013). In a preliminary analysis, none of the Risso's dolphins exposed to simulated or real mid-frequency sonar demonstrated any overt or obvious responses (Southall *et al*., 2012, Southall *et al*., 2013). In general, although the responses to the simulated sonar were varied across individuals and species, none of the animals exposed to real Navy sonar responded; these exposures occurred at distances

beyond 10 km, and were up to 100 km away (DeRuiter *et al*., 2013). These data suggest that most odontocetes (not including beaked whales (Family *Ziphiidae*) and harbor porpoises (*Phocoena phocoena*)) likely do not exhibit significant behavioral reactions to sonar and other transducers beyond approximately 10 km. Therefore, the Navy uses a cutoff distance for odontocetes of 10 km for moderate source level, single platform training, and testing events, and 20 km for all other events, including ONR's action (U.S. Department of the Navy, 2017a). NMFS has adopted this approach in support of this final IHA.

Southall *et al.*, (2007) reported that pinnipeds do not exhibit strong reactions to SPLs up to 140 dB re 1 µPa from non-impulsive sources. While there are limited data on pinniped behavioral responses beyond about 3 km in the water, the Navy used a distance cutoff of 2.7 nm (5 km) for moderate source level, single platform training and testing events, and 5.4 nm (10 km) for all other events, including the Arctic Research Activities (U.S. Department of the Navy, 2017a).

Regardless of the received level at the cutoff distances described above, take is not estimated to occur beyond 10 and 20 km from the source for pinnipeds and cetaceans, respectively. No instances of PTS were modeled for any species or stock; as such, no take by Level A harassment is anticipated or is authorized. Further information on cutoff distances can be found in Section 6.5.1 in ONR's 2021-2022 IHA application on NMFS' website: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-military-readiness-activities*.

The marine mammal density numbers utilized for quantitative modeling are from the Navy Marine Species Density Database (U.S. Department of the Navy, 2014). Density estimates are based on habitat-based modeling by Kaschner *et al*., (2006) and Kaschner (2004). While density estimates for the two stocks of beluga whales are equal (Kaschner *et al*., 2006; Kaschner 2004), take has been apportioned to each stock

proportional to the abundance of each stock. Table 5 shows the exposures expected for the beluga whale and ringed seal based on NAEMO modeled results.

Table 5-- Quantitative Modeling Results of Potential Exposures

Species	Density (animals/km^2)	Level B harassment (behavioral)	Level B harassment (TTS)	Total take	Percentage of stock taken[1]
Cetacean (odontocete)					
Beluga Whale (Beaufort Sea stock)[1]	0.0087	375	0	375	0.96
Beluga Whale (Chukchi Sea stock)[1]		125	0	125	0.94
Pinniped (phocid)					
Ringed Seal	0.3958	6,050	0	6,050	3.53

[1] – Acoustic exposures to beluga whales were not modeled at the stock level. Take of beluga whales in each stock was based on the proportion of each stock in relation to the total number of beluga whales. Therefore, 75 percent of the calculated take was apportioned to the Beaufort Sea stock, and 25 percent of the calculated take was apportioned to the Eastern Chukchi Sea stock.

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 NDAA for FY 2004 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, we carefully consider two primary factors:

(1) The manner in which, and the degree to which, the successful implementation of the measure(s) is expected to reduce impacts to marine mammals, marine mammal species or stocks, and their habitat, as well as subsistence uses. 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.

Mitigation for Marine Mammals and their Habitat

Ships operated by or for the Navy have personnel assigned to stand watch at all times, day and night, when moving through the water. While in transit, ships must use extreme caution and proceed at a safe speed (1-3 knots in ice; <10 knots in open ice-free waters) such that the ship can take proper and effective action to avoid a collision with any marine mammal and can be stopped within a distance appropriate to the prevailing circumstances and conditions.

While underway, the ships (including non-Navy ships operating on behalf of the Navy) utilizing active acoustics and towed in-water devices will have at least one watch

person during activities. While underway, watch personnel must be alert at all times and have access to binoculars.

During mooring or UUV deployment, visual observation will start 15 minutes prior to and continue throughout the deployment within an exclusion zone of 180 feet (ft; 55 m, roughly one ship length) around the deployed mooring. Deployment will stop if a marine mammal is visually detected within the exclusion zone. Deployment will re-commence if any one of the following conditions are met: (1) The animal is observed exiting the exclusion zone, (2) the animal is thought to have exited the exclusion zone based on its course and speed, or (3) the exclusion zone has been clear from any additional sightings for a period of 15 minutes for pinnipeds and 30 minutes for cetaceans.

Ships will avoid approaching marine mammals head-on and will maneuver to maintain an exclusion zone of 500 yards (yd; 457 m) around observed whales, and 200 ft (183 m) around all other marine mammals, provided it is safe to do so in ice-free waters.

All personnel conducting on-ice experiments, as well as all aircraft operating in the study area, are required to maintain a separation distance of 1,000 ft (305 m) from any observed marine mammal.

These requirements do not apply if a vessel's safety is at risk, such as when a change of course would create an imminent and serious threat to safety, person, vessel, or aircraft, and to the extent that vessels are restricted in their ability to maneuver. No further action is necessary if a marine mammal other than a whale continues to approach the vessel after there has already been one maneuver and/or speed change to avoid the animal. Avoidance measures should continue for any observed whale in order to maintain an exclusion zone of 500 yd (457 m).

Based on our evaluation of the Navy’s measures, NMFS has determined that the mitigation measures provide the means effecting the least practicable impact on the

affected species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of such species or stock for subsistence uses.

Monitoring and Reporting

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

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

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

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

While underway, the ships (including non-Navy ships operating on behalf of the Navy) utilizing active acoustics will have at least one watch person during activities. Watch personnel undertake extensive training in accordance with the U.S. Navy Lookout Training Handbook or civilian equivalent, including on the job instruction and a formal Personal Qualification Standard program (or equivalent program for supporting contractors or civilians), to certify that they have demonstrated all necessary skills (such as detection and reporting of floating or partially submerged objects). Additionally, watch personnel have taken the Navy's Marine Species Awareness Training. Their duties may be performed in conjunction with other job responsibilities, such as navigating the ship or supervising other personnel. While on watch, personnel employ visual search techniques, including the use of binoculars, using a scanning method in accordance with the U.S. Navy Lookout Training Handbook or civilian equivalent. A primary duty of watch personnel is to detect and report all objects and disturbances sighted in the water that may be indicative of a threat to the ship and its crew, such as debris, or surface disturbance. Per safety requirements, watch personnel also report any marine mammals sighted that have the potential to be in the direct path of the ship as a standard collision avoidance procedure.

The U.S. Navy has coordinated with NMFS to develop an overarching program plan in which specific monitoring will occur. This plan is called the Integrated Comprehensive Monitoring Program (ICMP) (U.S. Department of the Navy, 2011). The ICMP has been developed in direct response to Navy permitting requirements established

through various environmental compliance efforts. 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. The ICMP is intended to coordinate monitoring efforts across all regions and to allocate the most appropriate level and type of effort based on a set of standardized research goals, and in acknowledgement of regional scientific value and resource availability.

The ICMP 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. ONR's Arctic Research Activities in comparison is a less intensive test with little human activity present in the Arctic. Human presence is limited to a minimal amount of days for source operations and source deployments, in contrast to the large majority (greater than 95 percent) of time that the sources will be left behind and operate autonomously. Therefore, a dedicated monitoring project is not warranted. However, ONR will record all observations of marine mammals, including the marine mammal's location (latitude and longitude), behavior, and distance from project activities.

The Navy is committed to documenting and reporting relevant aspects of research and testing activities to verify implementation of mitigation, comply with permits, and improve future environmental assessments. If any injury or death of a marine mammal is observed during the 2021-2022 Arctic Research Activities, the Navy will immediately halt the activity and report the incident to the Office of Protected Resources, NMFS, and the Alaska Regional Stranding Coordinator, NMFS. The following information must be provided:

- Time, date, and location of the discovery;
- 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.,* deployment of moored or drifting sources, during on-ice experiments, or by transiting vessel).

ONR will provide NMFS with a draft exercise monitoring report within 90 days of the conclusion of the activity. The draft exercise monitoring report will include data regarding acoustic source use and any mammal sightings or detection will be documented. The report will include the estimated number of marine mammals taken during the activity. The report will also include information on the number of shutdowns recorded. If no comments are received from NMFS within 30 days of submission of the draft final report, the draft final report will constitute the final report. If comments are received, a final report must be submitted within 30 days after receipt of comments.

Negligible Impact Analysis and Determination

NMFS has defined negligible impact as an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival (50 CFR 216.103). A negligible impact finding is based on the lack of likely adverse effects on annual rates of recruitment or survival (*i.e.*, population-level effects). An estimate of the number of takes alone is not enough information on which to base an impact determination. In addition to considering estimates of the number of marine mammals that might be "taken" through harassment, NMFS considers other factors, such as the likely nature of any responses (*e.g.*, intensity, duration), the context of any responses (*e.g.*, critical reproductive time or location, migration), as well as effects on habitat, and the likely effectiveness of the mitigation. We also assess the number, intensity, and context of estimated takes by evaluating this information relative to population status.

Consistent with the 1989 preamble for NMFS's implementing regulations (54 FR 40338; September 29, 1989), the impacts from other past and ongoing anthropogenic activities are incorporated into this analysis via their impacts on the environmental baseline (*e.g.*, as reflected in the regulatory status of the species, population size and growth rate where known, ongoing sources of human-caused mortality, or ambient noise levels).

Underwater acoustic transmissions associated with the Arctic Research Activities, as outlined previously, have the potential to result in Level B harassment of beluga seals and ringed seals in the form of behavioral disturbances. No serious injury, mortality, or Level A harassment are anticipated to result from these described activities.

Effects on individuals that are taken by Level B harassment could include alteration of dive behavior, alteration of foraging behavior, effects to breathing rates, 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. Most likely, individuals will simply be temporarily displaced by moving away from the acoustic source. As described previously in the behavioral effects section, seals exposed to non-impulsive sources with a received sound pressure level within the range of calculated exposures (142-193 dB re 1 μPa), 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 sound sources associated with ONR's action, these changes will 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, will be within the normal range of behavior). Thus, even repeated Level B harassment of some small subset of the overall stock is unlikely to result in any significant realized decrease in fitness for the affected individuals, and will not result in any adverse impact to the stock as a whole.

The project is not expected to have significant adverse effects on marine mammal habitat. While the activities may cause some fish to leave the area of disturbance, temporarily impacting marine mammals' foraging opportunities, this will encompass a relatively small area of habitat leaving large areas of existing fish and marine mammal foraging habitat unaffected. As such, the impacts to marine mammal habitat are not expected to cause significant or long-term negative consequences

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

- No injury, serious injury, or mortality is anticipated or authorized;
- Impacts will be limited to Level B harassment only;
- TTS is not expected or predicted to occur; only temporary behavioral modifications are expected to result from these activities; and
- There will be no permanent or significant loss or modification of marine mammal prey or habitat.

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

Unmitigable Adverse Impact Analysis and Determination

Impacts to subsistence uses of marine mammals resulting from the planned action are not anticipated (as described in greater detail in the proposed notice of the IHA (86 FR 47065; August 23, 2021)). The closest active acoustic source (fixed or drifting) within the project site that is likely to cause Level B harassment take is approximately 110 nm (204 km) from land and outside of known subsistence use areas. However, almost all

leave-behind sources that will constitute most of the Level B harassment take will be approximately 240 mi (386 km) from shore. In comparison with IHAs issued to ONR for their previous Arctic Research Activities, this project is further north; therefore, there is no spatial overlap between known subsistence harvest sites and the activities contained herein. Furthermore, and as stated above, the range to effects for non-impulsive acoustic sources in this experiment is much smaller than the distance from shore, with acoustic sources that could constitute take being located far away from known subsistence hunting areas. Lastly, the action will not remove individuals from the population.

Based on this information, NMFS has determined that there will be no unmitigable adverse impact on subsistence uses from ONR's planned activities.

Endangered Species Act

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

The AKR issued a Biological Opinion on September 29, 2021, which concluded that ONR's Arctic Research Activities and NMFS's issuance of an IHA for those activities are not likely to jeopardize the continued existence of the Arctic ringed seal or adversely modify any designated critical habitat.

National Environmental Policy Act

In compliance with the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4321 *et seq.*), as implemented by the regulations published by the Council on Environmental Quality (CEQ; 40 CFR parts 1500-1508), ONR prepared an Supplemental

Overseas Environmental Assessment (SOEA) to consider the direct, indirect, and cumulative effects to the human environment resulting from the Arctic Research Activities. NMFS made ONR's SOEA available to the public for review and comment, concurrently with the publication of the proposed IHA (86 FR 47065; August 23, 2021), on the NMFS website (*https://www.fisheries.noaa.gov/action/incidental-take-authorization-office-naval-research-arctic-research-activities-beaufort-1*), in relation to its suitability for adoption by NMFS in order to assess the impacts to the human environment of issuance of an IHA to ONR. In addition, in compliance with NEPA and the CEQ regulations, as well as NOAA Administrative Order 216-6, NMFS has reviewed ONR's SOEA and determined it to be sufficient. NMFS has subsequently adopted that EA (SOEA) and signed a Finding of No Significant Impact (FONSI) on September 23, 2021.

Authorization

As a result of these determinations, NMFS has issued an IHA to ONR for conducting oceanographic research activities in the Beaufort and eastern Chukchi Seas from October 5, 2021 through October 4, 2022, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated.

Dated: September 30, 2021.

Kimberly Damon-Randall,

Director, Office of Protected Resources,

National Marine Fisheries Service.

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