24 August 2018

Ms. Jolie Harrison, Chief
Permits and Conservation Division
Office of Protected Resources
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, MD 20910-3225

Dear Ms. Harrison:

The Marine Mammal Commission (the Commission), in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the Office of Naval Research's (ONR) application seeking authorization under section 101(a)(5)(D) of the Marine Mammal Protection Act to take marine mammals by harassment. The taking would be incidental to conducting research activities[1] in the Beaufort and Chukchi Seas in 2018 and 2019[2]. The Commission also has reviewed the National Marine Fisheries Service's (NMFS) 14 August 2018 notice (83 Fed. Reg. 40234) announcing receipt of the application and proposing to issue the authorization, subject to certain conditions.

Background

ONR plans to conduct its research activities approximately 227 km north of Alaska in the Beaufort and Chukchi Seas. The purpose is to conduct various experiments investigating (1) oceanographic and climate change processes and (2) how changing environment affects acoustic propagation and the acoustic environment. A maximum of four research cruises could last up to 30 days each, with active sources being towed up to 8 hours per day for 15 days each. Moored and drifting sources would operate intermittently for the entire year, and ice-breaking activities could occur on up to 4 days. Various active sources would be used including low- and mid-frequency sources (see the *Federal Register* notice for more details).

NMFS preliminarily has determined that, at most, the proposed activities would temporarily modify the behavior of four marine mammal[3] species or stocks. It also anticipates that any impact on the affected species and stocks would be negligible. NMFS does not anticipate any take of marine mammals by death or serious injury and believes that the potential for temporary or permanent

[1] Activities would be conducted in support the Arctic and Global Prediction Program, Ocean Acoustics Program, and the Naval Research Laboratory.
[2] Activities would occur from August through October of either year, but only during those months after the authorization is issued and only within the one-year period of the authorization.
[3] The Commission informally noted that ONR should increase its Level B harassment takes for bearded seals from one to five in case more seals are encountered than were estimated by its model. ONR agreed and NMFS plans to amend the final authorization accordingly.

hearing impairment would be at the least practicable level because of the proposed mitigation measures. The proposed mitigation, monitoring, and reporting measures include—

- implementing delay and shut-down procedures;
- implementing vessel avoidance measures;
- maintaining a separation distance[4] of 305 m from any sighted pinniped;
- using delay and shut-down procedures, if a species for which authorization has not been granted or if a species for which authorization has been granted but the authorized takes are met, approaches or is observed within the Level B harassment zone;
- deploying a moored passive acoustic monitoring device to collect data for one year and compiling those data with those obtained from 10 devices deployed in 2016 and 2017 to estimate marine mammal densities in the area;
- reporting injured and dead marine mammals to NMFS and the Alaska Regional Stranding Coordinator and suspending activities, if appropriate; and
- submitting a draft and final exercise monitoring report to NMFS.

Availability of marine mammals for subsistence

The proposed activity would occur 227 km seaward of known subsistence use areas. However, ONR did discuss its proposed research activities with the Alaska Waterways Safety Commission and the Alaska Eskimo Whaling Commission. Based on those discussions, ONR plans to establish check-in and communication procedures to minimize any impacts from its activities. Based on the location of the proposed activities, NMFS has preliminarily determined that the proposed taking would not have an unmitigable adverse impact on the availability of marine mammals for subsistence use by Alaska Natives.

The Commission concurs with NMFS's preliminary findings and therefore recommends that NMFS issue the incidental harassment authorization, subject to inclusion of the proposed mitigation, monitoring, and reporting measures.

Behavior thresholds

To further define its behavior thresholds for non-impulsive sources[5], the Navy developed multiple[6] Bayesian biphasic dose response functions[7] (Bayesian BRFs) for Phase III activities, which were used for the proposed authorization as well. The Bayesian BRFs are a generalization of the monophasic functions previously developed[8] and applied to behavioral response data[9] (see Department of the Navy 2017 for specifics). The biphasic portions of the functions are intended to describe both level- and context-based responses as proposed in Ellison et al. (2011). At higher amplitudes, a level-based response relates the received sound level to the probability of a behavioral

[4] For personnel on the ice or in aircraft.
[5] Acoustic sources (i.e., sonars and other transducers).
[6] For odontocetes, mysticetes, beaked whales, and pinnipeds.
[7] Comprising two truncated cumulative normal distribution functions with separate mean and standard deviation values, as well as upper and lower bounds. The model was fitted to data using the Markov Chain Monte Carlo algorithm.
[8] By Antunes et al. (2014) and Miller et al. (2014).
[9] From both wild and captive animals.

response; whereas, at lower amplitudes, sound can cue the presence, proximity, and approach of a sound source and stimulate a context-based response based on factors other than received sound level[10]. The Bayesian BRFs are reasonable and a much needed improvement on the Navy's two dose response functions (BRFs)[11] that it had used both for Tactical Training Theater Assessment and Planning (TAP) I and Phase II activities.

Rather than use the Bayesian BRFs to inform its take estimates, NMFS implemented additional cut-off distances beyond which it considered the potential for significant behavioral responses to be unlikely (Table C.4 in Department of the Navy 2017). The Navy indicated it was likely that the context of the exposure is more important than the amplitude at large distances[12]. That is, the context-based response dominates the level-based response. The Commission agrees and notes that, although an important contextual factor is the distance between the animal and the sound source, those factors already have been included in the Bayesian BRFs. Including additional cut-off distances contradicts the underlying data of those functions and negates the intent of the functions themselves.

The actual cut-off distances used by the Navy also appear to be unsubstantiated. For example, the Navy indicated there are limited data on pinniped behavioral responses in general, and a total lack of data beyond 3 km from the source (Department of the Navy 2017). However, the Navy arbitrarily set the cut-off distance at 10 km for pinnipeds during ONR's proposed research activities. In response to the Commission's comments regarding those cut-off distances, the Navy indicated that pinnipeds do not exhibit strong reactions to sound pressure levels up to 140 dB re 1 μPa based on Southall et al. (2007; 83 Fed. Reg. 65230). The Commission notes, as did the Navy, that those data were limited and were based on sources that did not have characteristics similar to MFA sonar[13]. Southall et al. (2007) additionally indicated that data did not exist regarding exposures at higher received levels at that time. Luckily, data on pinniped behavioral responses now exist for both sound sources similar to MFA sonar and at higher received levels. Those data ultimately were used by the Navy to develop the Bayesian BRF for pinnipeds (see Table 3-2 in Department of the Navy 2017a for specifics), while none of the data cited in Southall et al. (2007) were used. Some of the pinnipeds did in fact exhibit 'strong' reactions based on the Southall et al. (2007) severity scale[14] to received levels less than and equal to 140 dB re 1 μPa, and those data were used to inform the context portion of the Bayesian BRF.

More concerning is the fact that, depending on the activity and species, the cut-off distances could effectively eliminate a large portion of the estimated numbers of takes. For example, for the

[10] e.g., the animal's previous experience, separation distance between sound source and animal, and behavioral state including feeding, traveling, etc.
[11] One for odontocetes and pinnipeds and one for mysticetes.
[12] For example, the Navy indicated that the range to the basement level of 120 dB re 1 μPa for the BRFs from TAP I and Phase II sometimes extended to more than 150 km during activities involving the most powerful sonar sources (e.g., AN/SQS-53; Department of the Navy 2017).
[13] Some sources emitted sound at much lower frequencies (the acoustic thermometry of the ocean climate (ATOC) sound source emitted signals at a center frequency of 75 Hz) and at a greater repetition rate than MFA sonar (Costa et al. 2003). Other sources emitted sound at higher frequencies (the Airmar™ acoustic harassment device (AHD) emitted signals at 10 kHz or higher and acoustic communication signals were emitted at 12 kHz with higher frequency harmonics) and at a greater repetition rate with shorter pulse durations (specifically the AHD) than MFA sonar (Jacobs and Terhune 2002, Kastelein et al. 2006).
[14] Equating to significant behavioral responses as specified by the Navy.

Hawaii-Southern California Fleet Training and Testing letter of authorization (LOA) application, the estimated numbers of takes would be reduced to zero for odontocetes beginning where the probability of response is 40 percent, for pinnipeds where the probability of response is 27 percent, and for beaked whales where the probability of response is 28 percent (for sonar bin MF1 in Table 6-10 in the LOA application). The cut-off distances equate to received levels greater than both thresholds currently used by the Navy and where actual context-based behavioral responses have been observed (see the Commission's 13 July 2018 letter detailing this issue). Although this level of information was not provided in ONR's proposed incidental harassment authorization application, one can only assume that the numbers of takes for beluga whales and ringed and bearded seals were reduced as well. The magnitude of those reductions are unknown. For all of these reasons, the Commission recommends that the Navy refrain from using cut-off distances in conjunction with the Bayesian BRFs and re-estimate the numbers of Level B harassment takes based solely on the Bayesian BRFs.

The Commission hopes its comments are useful. Please contact me if you have questions regarding the Commission's recommendations.

Sincerely,

Peter O. Thomas, Ph.D.,
Executive Director

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