



MARINE MAMMAL COMMISSION

23 February 2015

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 National Marine Fisheries Service's (NMFS) 13 February 2015 notice (80 Fed. Reg. 8166) and the letter of authorization application submitted by the Southwest Fisheries Science Center (SWFSC) seeking issuance of regulations under section 101(a)(5)(A) of the Marine Mammal Protection Act. The taking would be incidental to fisheries research activities during a five-year period. The Commission previously commented on NMFS's advanced notice of proposed rulemaking and SWFSC's application and draft environmental assessment in its 20 May 2013 letter, which reflected many of the same concerns expressed herein.

Background

SWFSC plans to conduct fisheries research surveys within the California Current ecosystem, the eastern tropical Pacific Ocean, and the Scotia Sea off Antarctica during a five-year period. The objectives are to (1) evaluate the status of exploited fishery resources and the marine environment and (2) provide scientific information regarding fisheries management to the Pacific Fishery Management Council and numerous other domestic and international fisheries management organizations. Researchers would conduct approximately 14 survey programs during the five-year period. The surveys could occur on Service-owned and -operated vessels, charter vessels, or commercial fishing vessels during daytime and nighttime hours.

SWFSC requested to take by Level A harassment, serious injury, or mortality of individuals from up to 22 species, stocks, or genera of marine mammals¹ incidental to gear interactions. The takes would occur through marine mammal interactions with fisheries survey gear. SWFSC would use pelagic trawl gear, pelagic longlines, bottom-contacted trawl gear, and other types of gear (e.g., bongo nets, manta nets, fish egg samplers) to conduct the surveys, but marine mammals are likely to interact only with pelagic trawl and longline gear based on historical data. Researchers would implement standard mitigation measures that have been used since 2009 including using a move-on rule², pingers, and/or marine mammal excluder devices in the trawl and longline surveys. In

¹ Not including unidentified pinnipeds and unidentified cetaceans.

² If one or more marine mammals are observed within 1.85 km of the planned fishing location in the 30 minutes before setting the gear, SWFSC would move to a different section of the sampling area to maintain a minimum set distance of 1.85 km from the observed marine mammals. If after moving on marine mammals remain within 1.85 km, SWFSC may decide to move again or to skip the station. Implementation of the move-on rule would not be required if five or fewer California sea lions are observed when setting longlines.

addition, SWFSC would conduct concurrent hydrographic, oceanographic, and meteorologic sampling. Researchers could use multifrequency, narrow-beam echosounders, multibeam echosounders, acoustic Doppler current profilers, narrow-beam sonar (i.e., fish-finding sonar), multibeam sonar, and net monitoring systems that operate at frequencies from 18 to 333 kHz at source levels of 205 to 224 dB re 1 μ Pa at 1 m. SWFSC has requested to take by Level B harassment individuals from numerous marine mammal species, stocks, and genera incidental to use of the acoustic sources and vessel presence. Researchers would implement various monitoring and reporting measures during the proposed activities.

Behavioral threshold for non-impulsive, acoustic sources

More than 10 years ago, NMFS categorized sound sources as either impulsive or continuous when determining thresholds for Level B harassment based on behavioral disturbance (160 vs 120 dB re 1 μ Pa, respectively; 70 Fed. Reg. 1871). Since that time, the U.S. Navy has updated the criteria and thresholds³ it uses for non-impulsive, acoustic sources (i.e., sonar and other acoustic sources) and impulsive explosive sources (i.e., underwater detonations; see Finneran and Jenkins (2012) for the Navy's current criteria and thresholds). NMFS does instruct applicants who plan to use underwater detonations during their activities to utilize the Navy's current impulsive criteria and thresholds. However, for other non-impulsive, acoustic sources, NMFS relies on its thresholds from the 2005 guidance. That guidance is outdated and not reflective of best available science. NMFS is aware of that shortcoming and is in the process of updating the criteria and thresholds for permanent threshold shift (PTS) and temporary threshold shift (TTS) but not for behavior.

As discussed in previous letters to NMFS regarding subbottom profilers, echosounders, and other sonars, those sources have temporal and spectral characteristics which suggest that a lower, more precautionary Level B harassment threshold of 120 dB re 1 μ Pa would be more appropriate than the 160-dB re 1 μ Pa threshold that continues to be used. Numerous researchers have observed various species of marine mammals, including the same species that could be harassed by SWFSC, responding to sound from sources (e.g., acoustic deterrent devices, acoustic harassment devices, pingers, echosounders, multibeam sonars) with characteristics similar to those used by SWFSC and at received levels below 160 dB re 1 μ Pa (Watkins and Schevill 1975, Olesiuk et al. 1995, Kastelein et al. 1997, Kastelein et al. 2000, Morton 2000, Culik et al. 2001, Johnston 2002, Morton and Symonds 2002, Kastelein et al. 2005, Barlow and Cameron 2003, Kastelein et al. 2006a and 2006b, Carretta et al. 2008, Calström et al. 2009, Brandt et al. 2012 and 2013, Götz and Janik 2013, Hastie et al. 2014, Tougaard et al. 2015). In addition, the Navy's Level B behavioral harassment thresholds for non-impulsive, acoustic sources are much lower than 160 dB re 1 μ Pa. Specifically, the Navy currently uses unweighted thresholds⁴ of 120 and 140 dB re 1 μ Pa for harbor porpoises and beaked whales, respectively. Furthermore, the terms impulsive and continuous are not dichotomous and should not be used in the mutually exclusive manner that NMFS does. As stated in NMFS's draft criteria and thresholds for PTS and TTS⁵, impulsive sources are transient, brief (less than 1 second), and broadband and typically consist of high peak pressure with rapid rise time and rapid decay (American National Standards Institute (ANSI) 1986, National Institute for Occupational Safety and

³ The Navy only uses NMFS's "old" thresholds for vibratory pile driving, impact pile driving, and airguns (120 and 160 dB re 1 μ Pa, respectively).

⁴ NMFS's old thresholds also are unweighted, step functions.

⁵ Similar definitions are given in the preamble in the *Federal Register* notice as well.

Health (NIOSH) 1998, ANSI 2005). Conversely, non-impulsive sources can be broadband, narrowband, or tonal, brief or prolonged, continuous or intermittent, and typically do not have a high peak pressure with rapid rise time (typically only small fluctuations in sound level), which is characteristic of impulsive signals (ANSI 1995, NIOSH 1998)⁶. The Commission notes, however, that regardless of whether the source has continuous or intermittent characteristics⁷, it clearly is not considered impulsive and should not be characterized as such. NMFS itself has indicated that the proposed sources are relatively high frequency, directional, and brief repeated signals—characteristics that are not reflective of impulsive sources.

All of these facts support the Commission's continued stance that NMFS should be requiring SWFSC, and other applicants utilizing similar sources, to use 120 dB re 1 μ Pa as the Level B behavioral threshold. Therefore, if NMFS intends to regulate the use of non-impulsive, acoustic sources used by SWFSC and until such time that NMFS revises its Level B behavioral thresholds for non-Navy-related acoustic sources, the Commission recommends that NMFS require SWFSC to estimate the numbers of marine mammals taken based on the 120- rather than the 160-dB re 1 μ Pa threshold when non-impulsive, acoustic sources would be used.

On several occasions, NMFS has determined that sound emitted from echosounders, sonars (side-scan and fish-finding), and subbottom profilers have the potential to cause Level B harassment. Similar to SWFSC sources, NMFS has issued multiple incidental harassment authorizations to Cape Wind Associates for the use of a single-beam depth sounder, multibeam depth sounder, side-scan sonar, magnetometer, shallow-penetration sub-bottom profiler, and medium-penetration sub-bottom profiler to conduct site assessment surveys for renewable energy development off Nantucket Island (76 Fed. Reg. 80891, 78 Fed. Reg. 19217, 79 Fed. Reg. 25835). In addition, NMFS is considering rulemaking to authorize Level B harassment takes for the use of only high-frequency sound sources (single-beam and multibeam echosounders and side-scan sonar) to conduct hydrographic surveys (78 Fed. Reg. 1205). However, NMFS has yet to adopt generally applicable guidance regarding when such authorizations are needed (e.g., for the National Science Foundation and associated entities, oil and gas industry, geological and geophysical survey operators and researchers, shipping industry, or the general public). The Commission believes that NMFS should provide that guidance and follow a consistent approach in assessing the potential for taking by Level B harassment from echosounders, sonars, and subbottom profilers, including whether applicants should include requests for authorizations of such taking in their applications. Therefore, the Commission recommends that NMFS develop criteria (e.g., based on source level, peak frequency, bandwidth, signal duration and duty cycle, affected species or stocks) and guidance for determining when prospective applicants should request taking by Level B harassment from the use of echosounders, sonars, and subbottom profilers.

⁶ NMFS stated that those definitions are not meant to reflect how it has previously characterized sound for behavioral thresholds. However, the Commission continues to believe that NMFS is not basing that characterization on best available science.

⁷ Which NMFS has repeatedly used as the basis for its characterization of subbottom profilers, echosounders, and other sonars as impulsive rather than continuous.

Category 1 sources

NMFS has delineated two categories of acoustic sources, Category 1 (>180 kHz) and 2 (10–180 kHz), in the *Federal Register* notice. NMFS indicated that Category 1 sources are outside the known functional hearing capability of any marine mammal, but sound emitted from those sources may be audible if sufficiently loud (e.g., Möhl 1968). NMFS further stated that Category 1 sources are highly unlikely to be of sufficient intensity to result in behavioral harassment and any individual marine mammal would be unlikely to even receive a signal that would almost certainly be inaudible. Therefore, NMFS did not expect Category 1 sources to have any effect on marine mammals and were not considered further in the proposed rule.

Recent research may raise questions regarding NMFS's assumption. Deng et al. (2014) determined that three commercially available sonars⁸ generated sound at frequencies below the center frequency (center frequency ranging from 200–260 kHz and sub-harmonic sounds ranging from 90–130 kHz) and within the hearing range of some marine mammals (e.g., mid- and high-frequency odontocetes). They indicated that those sounds were likely detectable by the animals over distances of up to several hundred meters and could potentially affect the behavior of marine mammals within fairly close proximity to the sources. In addition, Hastie et al. (2014) conducted behavioral response experiments with captive gray seals exposed to two sonars⁹. They determined that both sonars had significant effects on the seals' behavior. When the 200-kHz sonar was active, the seals spent significantly more time hauled out. Although the seals did not haul out when the 375-kHz sonar was active, they did surface at locations farther from the source than when the sonar was inactive. Hastie et al. (2014) indicated that, although peak sonar frequencies may be above marine mammal hearing ranges, high levels of sound can be produced within those hearing ranges that elicit behavioral responses—the 200- and 375-kHz sonars had source levels of 166 and 135 dB re 1 μ Pa at 1 m, respectively, at 20 kHz. Based on these examples, the Commission recommends that NMFS review the recent scientific literature on acoustic sources with frequencies above 180 kHz and incorporate those findings into its criteria and guidance for determining when prospective applicants should request authorization for taking by Level B harassment from the use of echosounders, sonars, and subbottom profilers.

The Commission hopes you find its letter useful. Please contact me if you have questions regarding its rationale or recommendations.

Sincerely,



Rebecca J. Lent, Ph.D.
Executive Director

⁸ Kongsberg SM2000 200-kHz multibeam imaging sonar, BioSonics DT-X 210-kHz split-beam scientific echosounder, and Imagenex model 965 260-kHz multibeam imaging sonar.

⁹ CodaOctopus Echoscope 2 375-kHz multibeam sonar and the BioSonics DT-X 200-kHz split-beam scientific echosounder used by Deng et al. (2014).

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