



MARINE MAMMAL COMMISSION

14 September 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

Re: Permit Application No. 18902
(Colleen Reichmuth, Ph.D.,
University of California Santa Cruz)

Dear Ms. Harrison:

The Marine Mammal Commission (the Commission), in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the above-referenced permit amendment request with regard to the goals, policies, and requirements of the Marine Mammal Protection Act (the MMPA). Dr. Reichmuth proposes to conduct research on captive pinnipeds during a five-year period—permit 14535 authorized similar activities.

Dr. Reichmuth and co-investigators propose to conduct cognitive, hearing¹, behavioral, and temporary threshold shift (TTS) studies on up to four each of captive California sea lions, Pacific harbor seals, spotted seals, ringed seals, and bearded seals during the five-year period. She also would conduct health and physiological assessments of those animals. Activities could occur year-round at either Long Marine Laboratory or the Alaska SeaLife Center (ASLC)². The purpose of the research is to investigate learning, sensory biology, physiology, and the effects of sound³ on pinnipeds.

Dr. Reichmuth could conduct up to three 30-minute study sessions (except for TTS) each day. For the TTS studies, animals would participate in only one TTS study session per day and no other types of study sessions would be conducted on those animals. Dr. Reichmuth would use either a small-adapted sleeve airgun (up to 5 in³ and 50 psi) or the smallest commercially available conventional airgun (10 in³ and up to 1,000 psi) that emit sound below 500 Hz with sound levels ranging from 200 to 215 dB re 1 $\mu\text{Pa}_{\text{peak}}$ and 165 to 195 dB re 1 $\mu\text{Pa}^2\text{-second}$. Before each TTS study session, received sound levels, waveforms, and spectra would be measured carefully and calibrated to ensure sound levels are within the specified range. After the sound exposure level associated with

¹ Including auditory evoked potential and auditory brainstem response studies.

² The permit also would include the transport to/from ASLC, but only health and physiological assessments would occur at ASLC.

³ i.e., seismic airguns.

the onset of TTS is determined, Dr. Reichmuth would increase gradually the magnitude of the threshold shift during multiple sessions, not to exceed 15 dB and not to exceed 20 sessions per individual animal. If TTS does not occur at the maximum sound levels, testing would be discontinued.

To minimize adverse effects from TTS testing, Dr. Reichmuth's procedure would involve the gradual titration of a fatiguing sound stimulus from a level of no effect to a level of small but reliable TTS that recovers fully within 24 hours. The maximum amount of TTS to be achieved during this study, 15 dB, also is below that which normally causes a permanent threshold shift. Dr. Reichmuth would not conduct further testing until the animal's hearing has fully recovered and been stable for a 24-hour period. In addition, all measurements of the test seals are voluntary, such that they can refuse to participate or can leave the testing area at any time by swimming away from the testing apparatus or hauling out on the adjacent deck. Thus, testing can occur only when the seals voluntarily approach the trainer during a given session. Finally, Dr. Reichmuth and collaborators would monitor each individual continuously during all types of study sessions to observe any behavioral effects from those studies.

Disturbance of non-target pinnipeds that are held in adjacent pools or enclosures is not expected. However, sound levels would be carefully monitored and if received sound levels approach the behavior thresholds⁴, animals could be moved to a farther tank or held out of the water. Dr. Reichmuth requests up to two mortalities⁵ of any species during the permit duration. Dr. Reichmuth's and ASLC's Institutional Care and Use Committees have reviewed and approved the research protocols. Both facilities also currently hold appropriate licenses issued by the U.S. Department of Agriculture (USDA). Dr. Reichmuth and ASLC would abide by the requirements and regulations set forth by USDA⁶ and the International Air Transport Association when transporting animals between facilities.

The Commission believes that the proposed activities are consistent with the purposes and policies of the MMPA and recommends that NMFS issue the permit, as requested. Please contact me if you have any questions concerning the Commission's recommendation.

Sincerely,



Rebecca J. Lent, Ph.D.
Executive Director

⁴ In her application, Dr. Reichmuth indicated that the 165-dB re 1 μ Pa in-water threshold and 100-dB re 20 μ Pa in-air threshold would be used rather than the 160-dB re 1 μ Pa in-water threshold and 90 dB re 20 μ Pa in-air threshold (for harbor seals) that National Marine Fisheries Service (NMFS) currently uses. Dr. Reichmuth has since indicated that she incorrectly specified the thresholds based on Southall et al. (2007) rather than NMFS's interim sound threshold guidance and would implement the current NMFS thresholds accordingly.

⁵ By either unintentional mortality or intentional mortality (i.e., euthanasia for humaneness purposes).

⁶ She also would be required to receive approval from USDA regarding space/species housing requirements pursuant to the Animal Welfare Act before transporting animals to/from the facilities.

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Reference

Southall, B.L., A.E. Bowles, W.T. Ellison, J.J. Finneran, R.L. Gentry, C.R. Greene, Jr., D. Kastak, D.R. Ketten, J.H. Miller, P.E. Nachtigall, W.J. Richardson, J.A. Thomas, and P.L. Tyack. 2007. Marine mammal noise exposure criteria: Initial scientific recommendation. *Aquatic Mammals* 33:411–521.