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Auditory profiles of spotted (*Phoca largha*) and ringed seals (*Pusa hispida*)

J. M. Sills, Department of Ocean Sciences, University of California at Santa Cruz, Santa Cruz, CA

C. Reichmuth, Long Marine Laboratory, Institute of Marine Sciences, University of California at Santa Cruz, Santa Cruz, CA

B. L. Southall, Southall Environmental Associates, Aptos, CA

As ice retreats and industrialization increases in Arctic environments, among the many concerns for marine mammals is the potential for behavioral or auditory effects resulting from degradation of acoustic habitat. While many ice seals are known to emit underwater vocalizations, much remains to be learned about their reliance on acoustic cues for orientation, communication, and predator and prey detection in typical conditions of relative darkness. In terms of sound reception, there is limited information available for Arctic seals – some auditory data exist for harp and ringed seals but the most comprehensive data are for the more temperate-living harbor seals. Our aim in this study was to provide quantitative, species-typical auditory profiles for spotted and ringed seals tested in identical experimental conditions. Using a behavioral paradigm, we measured detection thresholds for aerial and underwater tones at frequencies spanning the range of hearing. Two individuals of each species were trained to perform the signal detection task in quiet conditions and in the presence of octave-band masking noise. The resultant audiograms for the spotted seals show acute hearing in both media, although the frequency range of best sensitivity extends two octaves higher under water than in air. The measured peak sensitivity was 51 dB re 1 μ Pa in water (12.8 kHz) and -13 dB re 20 μ Pa in air (3.2 kHz). Audiometric testing of the ringed seals is ongoing, but results thus far indicate that hearing sensitivity for the two species is similar. Signal-to-noise ratios measured for both species increased monotonically from 12 dB at 0.1 kHz to 30 dB at 25.6 kHz, suggesting that detecting sounds within background noise is important to these seals. These psychoacoustic studies thoroughly describe the amphibious hearing capabilities of Arctic seals, and inform best management practices for these vulnerable species in a rapidly changing environment.