



The acoustic Umwelt of bearded seals (*Erignathus barbatus*)

Sills, J. M.¹, Southall, B. L.², and Reichmuth, C.¹

¹Long Marine Laboratory, Institute of Marine Sciences, University of California at Santa Cruz, Santa Cruz, California

²Southall Environmental Associates, Inc., Aptos, California

Bearded seals (*Erignathus barbatus*) have a circumpolar Arctic distribution and are closely associated with unstable pack ice, spending nearly all of their lives in remote habitats beyond the reach of scientists and observers. As a result, their biology and behavior remain largely unknown. With respect to sensory biology, bearded seals—like other marine mammals—rely on acoustic cues to support a range of vital behaviors. Passive acoustics monitoring has revealed, for example, a rich repertoire of underwater calls associated with the breeding season. However, the ability of bearded seals to perceive sound has never been investigated. In this study, species-typical auditory profiles were obtained from two young male bearded seals trained to cooperate in a go/no-go behavioral paradigm. Detection thresholds were measured for underwater tonal sounds at frequencies ranging from 100 Hz to 61 kHz, both in quiet conditions and in the presence of octave-band masking noise. The bearded seals displayed sensitive underwater hearing, with peak sensitivity of approximately 50 dB re 1 μ Pa and a broad frequency range of best hearing extending from 350 Hz to 45 kHz. Additionally—like other phocinae seals—the two seals performed particularly well compared to other mammals when detecting target signals embedded within background noise. We can combine these hearing and auditory masking data with measurements of ocean noise from representative environments to evaluate the listening space available to free-ranging bearded seals. Such an integrated analysis can shed light on the complex acoustic world of bearded seals, about which new information is emerging but much remains to be discovered.