

Hearing profiles for the sea otter: aerial sensitivity, underwater sensitivity, and critical ratio measurements

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Sea otters (*Enhydra lutris*) have faced numerous obstacles on their path to population recovery since being hunted to near extinction in the late nineteenth century. Despite receiving protection under the U.S. Endangered Species Act in 1977, their current population size and its recent trend of decline is a cause for concern among biologists and resource managers. Human activity has been linked to disease processes, habitat degradation, food limitation, and other causes of mortality in sea otters. However, management decisions concerning the effects of human-generated noise on this species are currently made with little information about how sea otters receive and perceive sound. We designed the present study to fill this critical data gap. Our first aim was to measure the aerial and underwater auditory sensitivity of a southern sea otter to establish hearing profiles for the species. Our second aim was to determine how well sea otters detect simple signals under conditions of controlled noise. To accomplish this, an adult male sea otter was trained to respond to FM tones presented in an acoustic chamber or at a submerged underwater apparatus. Audiograms were constructed from thresholds obtained in each environment at frequencies from 0.125—38.1 kHz. Critical ratios derived from aerial masked thresholds were measured from 0.25—22.6 kHz. These results are placed in comparative and evolutionary contexts with respect to the biological significance of the auditory sense to this species. Further, we discuss the findings in consideration of the sea otter's amphibious lifestyle and in terms of current conservation efforts.