

ACOUSTICS2008/3384
Noise-induced permanent threshold shift in a harbor seal

David Kastak, Jason Mulsow, Asila Ghouh and Colleen Reichmuth
UCSC Institute of Marine Sciences, Long Marine Lab - University of California, 100 Shaffer Road, Santa Cruz, CA 95060, USA

Investigation of auditory temporary threshold shift (TTS) in marine mammals has provided a means of predicting the harmful effects of underwater anthropogenic noise. As complete recovery of hearing is requisite in these studies, they have been considered appropriate in light of subject availability and ethical considerations. In our psychophysical studies of TTS in pinnipeds, we have employed methods designed to safely titrate from sound levels of noise inducing no TTS to levels of significant but completely recoverable hearing loss. In the present study, these methods were used with a harbor seal (*Phoca vitulina*) exposed to an underwater 4.1 kHz pure tone fatiguing stimulus. Sound levels and durations were gradually increased to a maximum received sound pressure of 184 dB re 1 μ Pa with a duration of 60 s (SEL=202 dB re 1 μ Pa²s). Upon the second exposure to this fatiguing stimulus, an initial threshold shift in excess of 50 dB was estimated at a test frequency of 5.8 kHz, a half-octave above the fatiguing tone. Recovery from this unexpectedly large shift occurred at a rate of -10 dB per log(min), with an apparently permanent threshold shift of 7 to 10 dB evident after more than two months following exposure.