

## **Psychoacoustic studies of spotted and ringed seals**

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Arctic environments are changing rapidly as a result of ice retreat and industrialization related to shipping and oil and gas exploration. Among the many concerns for pagophilic seals in these regions is the potential for behavioral or auditory effects resulting from exposure to anthropogenic noise. Currently there are limited data available concerning the hearing of Arctic seals – some data exist for harp and ringed seals, while the most comprehensive audiometric data are for more temperate-living harbor seals. As the phylogenetic relationships among northern seals are not well resolved, extrapolation across species for management purposes is problematic. To this end, we are working to describe the species-typical hearing of spotted and ringed seals. Thus far, measurements of underwater hearing for the spotted seals show peak sensitivity of approximately 51 dB re 1  $\mu$ Pa at 25.6 kHz and a broad range of good auditory sensitivity extending 7 octaves. Aerial hearing thresholds for the spotted seals indicate acute sensitivity of < 10 dB re 20  $\mu$ Pa from approximately 0.5 to 11 kHz. Audiometric testing for the ringed seals is ongoing, but data collected thus far indicate that the hearing sensitivity of the two species is similar. Finally, low critical ratio measurements for both species – in air and in water – suggest that signal detection within background noise is an important capability for these seals, especially at low frequencies. These studies provide insight into how Arctic seals perceive sound, which can inform best management practices for these vulnerable species.