

dB-O; Underwater sound measurements appropriate to studies of Orcinus (killer whales). David Bain (University of Washington Friday Harbor Labs, Friday Harbor, WA 98250, dbain@u.washington.edu), Scott Veirs, and Val Veirs (Beam Reach Marine Science and Sustainability School, 7044 17th Ave NE, Seattle, WA, 98115, scott@beamreach.org)

In community noise studies, sound levels are usually measured under the dB-A weighting scheme, which was introduced 50 years ago in an effort to match noise measurements to the response of human listeners. Here we propose an underwater noise decibel weighting scheme matched to the hearing sensitivity of killer whales (dB-O). This scheme is based on a convolution of the spectral energy of sound with the frequency-specific hearing detection thresholds of killer whales. The biological significance of noise sources may be more readily discerned if underwater sounds are quantified dB-O weighted. Further, use of this measure would emphasize the importance of broad-band measurement of noise rather than characterizing noise sources by the frequency with the peak power-spectral density and the source level of low frequency components. We compare the measures of representative noise sources which have been recorded within the range of Southern Resident Killer Whales, including small boats, ships, airguns, and mid-frequency sonar, using both flat and dB-O weighted levels. While dB-O provides a more relevant characterization of noise than flat measurements (e.g., for predicting noise-induced stress), more detailed measurements will be required to address masking of biological signals, whose frequency structure varies with type of phonation and direction.

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