Text S1. In behavioral psychophysics, various methods are used to determine detection thresholds. Two standard approaches are 1) averaging hit-to-miss transitions (Cornsweet 1962) and 2) probit analysis (Finney 1971). Thresholds derived from either method are often compared, but the validity of this direct comparison has not been evaluated. In Table S1, we provide detection thresholds calculated with both threshold determination methods using the same underlying auditory data. Hearing data were obtained from two Hawaiian monk seals in water and in air (this study, Ruscher et al. 2021, Sills et al. 2021). The two methods of threshold determination are described below. Resulting thresholds are provided for each method (Table S1).

Hit-to-miss transitions are defined as transitions between trials in which the signal was successfully detected (hit) and those in which the subject failed to respond (miss) after the signal level was lowered. Each session required a minimum of at least three hit-to-miss transitions within 6 dB of one other. Detection thresholds were calculated by averaging the signal level of 15 stable hit-to-miss transitions across 3 – 4 sessions. Testing was complete when performance stabilized across both signal-present (standard deviation < 3 dB) and signal-absent trials (false alarm rate greater than 0 and less than 0.3). The underwater and in-air hearing data reported for monk seal KP2 in the main text of this paper were calculated using this method. This change in threshold determination method from Sills et al. (2021) and Ruscher et al. (2021) was made to improve efficiency of auditory data collection with KP2.

For probit analysis, average thresholds for a session were calculated from the last five stable hit-to-miss transitions (within 6 dB of one another). Testing was considered complete when the average threshold fell within 3 dB across three sessions, and performance on signal-absent trials was considered stable (false alarm rate between 0.0 and 0.3). Final thresholds were then determined by fitting a psychometric (sigmoid) function to the proportion of correct detections at each signal level presented between the five hit-to-miss transitions in each of the three pooled sessions. An inverse prediction was applied to determine threshold as the sound pressure level corresponding to 50% correct detection (Finney 1971). Threshold criteria required 95% confidence intervals to be less than 4 dB (see e.g., Sills et al. 2014, 2015). The underwater and in-air hearing thresholds for monk seal KE18 were calculated using this method (Sills et al. 2021, Ruscher et al. 2021).

Threshold differences are reported as the absolute difference between the two methods (Table S1). To facilitate comparison, these values are provided to the nearest tenth of a dB. Detection thresholds were not consistently higher with one method versus the other. For all comparisons, absolute threshold differences were < 1 dB. As seen in Table S1, in terms of reported thresholds there is no practical difference between these two threshold determination methods. Thus, behavioral auditory data collected with either method can be compared directly. This applies specifically to these data collected for monk seals KE18 and KP2, but also more generally across behavioral hearing experiments utilizing these two threshold methods.

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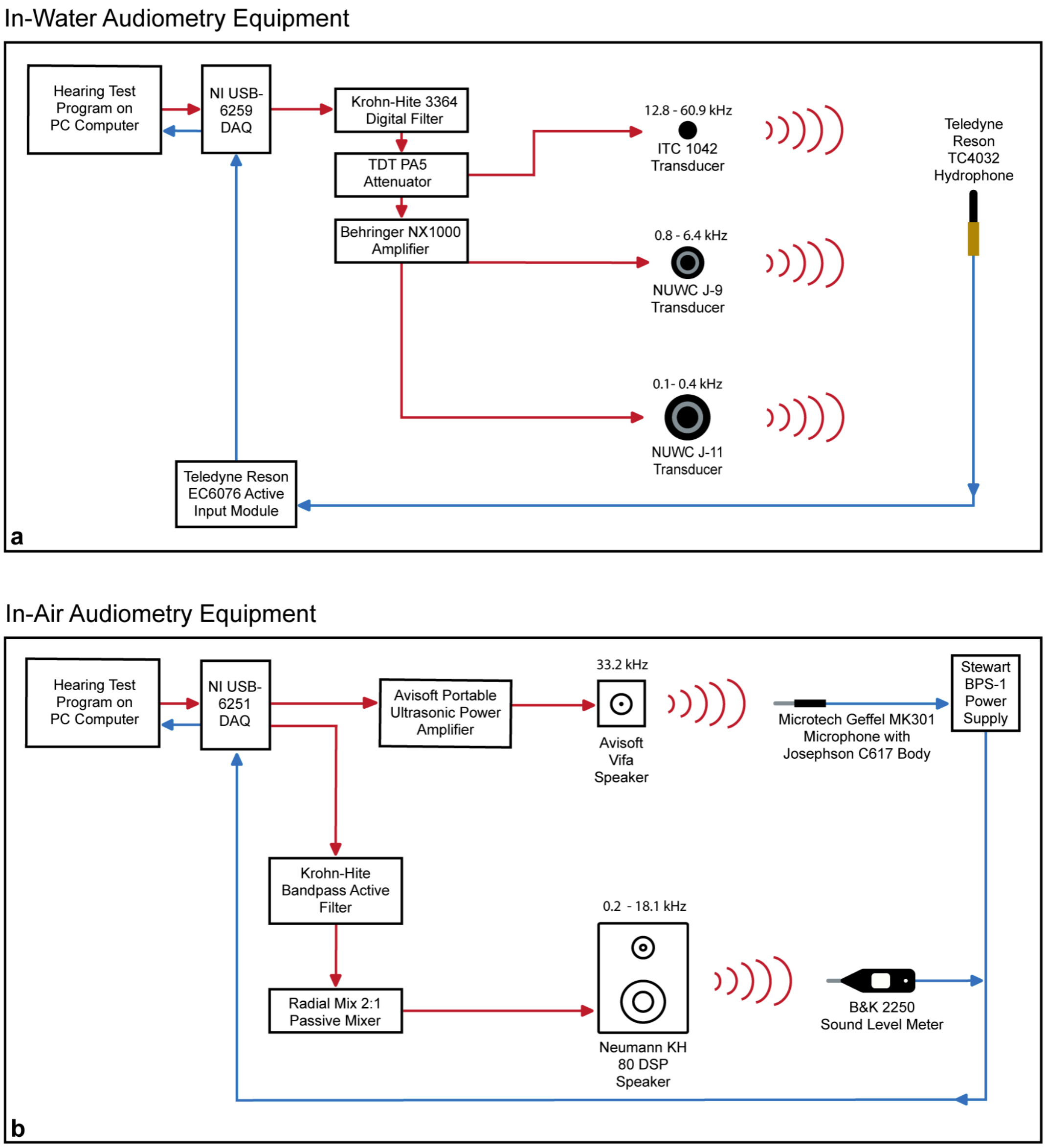
Table S1. See Text S1

	seal KP2 in water (dB re 1 µPa)			seal KE18 in water (dB re 1 µPa)			seal KE18 in air (dB re 20 µPa)		
Frequency kHz	Probit threshold	Hit-to-miss transition threshold	Threshold difference	Probit threshold	Hit-to-miss transition threshold	Threshold difference	Probit threshold	Hit-to-miss transition threshold	Threshold difference
0.1	-	-	-	106	106	0.2	62	62	0.4
0.2	-	-	-	95	95	0.1	55	55	0.1
0.4	-	-	-	89	89	0.3	51	50	0.4
0.8	79	79	0.4	74	74	0.2	40	39	0.4
1.6	80	79	0.6	73	73	0.1	45	45	0.2
3.2	78	78	0.1	76	76	0.2	40	40	0.4
6.4	80	80	0.1	83	83	0.1	59	58	0.6
12.8	77	77	0.4	79	79	0.0	51	51	0.2
18.0	72	73	0.2	74	73	0.5	-	-	-
18.1	-	-	-	-	-	-	45	45	0.3
25.6	75	75	0.2	78	78	0.1	52	52	0.2
33.2	-	-	-	-	-	-	61	61	0.3
36.2	94	94	0.2	99	99	0.1	-	-	-
43.1	130	130	0.1	125	125	0.0	-	-	-
51.2	135	136	1.0	130	130	0.1	-	-	-
60.9	142	141	0.3	137	137	0.4	-	-	-

Fig. S1. Equipment schematics are provided for the in-water (a) and in-air (b) audiometry experiments. Acoustic stimuli were generated, spatially mapped, and calibrated following the detailed methods of Sills et al. (2021) in water and Ruscher et al. (2021) or Jones et al. (2023) in air. While some of the equipment was the same as in the prior studies, specific details are provided within the main text.



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