

Chart of Comparable Airborne and Underwater Noise Sources¹

Example: A Riveting shop (110 dB in air) would measure 171 dB underwater. A tug and barge under way (171 dB in water) would measure 110 dB in air.

Air Source or Environment	Air Sound Level and Intensity re: 20 uPa ^{2,4}	Underwater Source or Environment	Ocean Sound Level and Intensity re: 1 uPa ^{3,4}
Humans can hear their own heartbeat under water		Ambient level in a calm sea	46
Soundproof vault / Threshold of human audibility	10	Coastal bay w/ snapping shrimp ambient noise	71
Whisper or rustle of leaves / Motion picture sound stage	20	Shipping channel ambient level, "normal" shipping density.	81
Country Residence / Empty concert hall / Speaking range	30	Shipping channel ambient level, "heavy" shipping density.	91
Classroom / Auditorium / Conference room	45		106
Typical office / Hotel lobby, bank	50		111
Department store / Laboratory	55	Avoidance behavior noticed in Bowhead whales	116
Busy dining room / Very noisy office / Telephone use difficult	60	Avoidance behavior noticed in various whales and dolphins	121
Busy machine shop / Raised voice range 2 ft.	75	Avoidance behavior in 80% of migrating gray whales	136
Vehicular tunnel / Voice communication impractical	85	Maximum allowable exposure to U.S. Navy Divers	146
Superhighway / New York subway	90		151
Riveting shop or forge	110	Tug and barge underway, 18 km/hr	171
Propeller plane takeoff at 100 ft. (30 m)	120	Loudest sounds produced by blue whales	180⁵
Threshold of Pain in human hearing	125	Large tanker underway	186
	135	Icebreaker, ATOC (another Navy noise source)	196
	154	Individual LFA Sonar speaker effective source level (one of 18)	215
Ram jet at 1 meter (F-16 with after-burners at 1 meter)	160		221
Saturn Rocket at 20 ft. / 5 lbs. of TNT at 20 ft.	180	SURTASS/ LFA system effective source level	241

Notes: 1) This chart is only for a sense of approximate comparisons. As humans and airborne sounds are poorly adapted to the undersea environment, and sea creatures and underwater noise sources are poorly adapted to terrestrial sound perception and generation, comparisons on this chart are speculative in regard to impact. 2) 0dB re: 20 microPascals refers to the convention of measuring human perceived sounds relative to the threshold of human audibility. 3) 0dB re: 1 microPascals refers to the convention of measuring underwater sound relative to a known convenient reference point. 4) "Sound intensity" expresses a physical property of sound transmission relative to the density of the transmission medium. 5) 180 dB re: 1 uPa is the proposed SURTASS/LFA mitigation zone at 1 km from the ship.