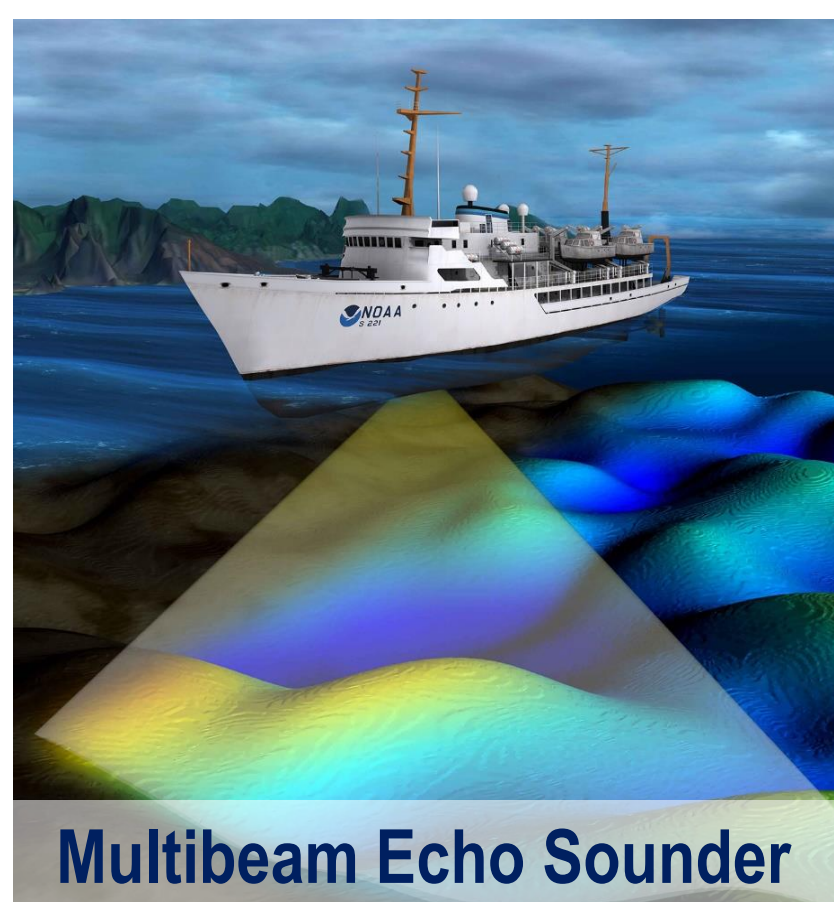


UNDERWATER SOUND AND MARINE MAMMALS








- Underwater sound from human activities adds to the ambient sound level of the ocean which includes sounds from natural biological sources such as marine life and natural physical sounds such as weather.
- NOS activities that produce underwater sound include vessel operations and use of active acoustic equipment such as echo sounders and Acoustic Doppler Current Profilers (ADCPs).



Marine mammals are sensitive to increasing sounds in the ocean because they use sound for biological functions such as communicating, navigating, searching for food, and avoiding danger.

Sound from human activities has the potential to interfere with these functions when there is an overlap between the manmade sound source and the frequencies of sound used by animals for biological functions. Masking occurs when interfering sounds reduce an animal's ability to hear sounds required for biological functions.

Approximate Underwater Hearing Range of Marine Mammals in U.S. Waters

Cetaceans	Pinnipeds	Sirenians	Fissipeds	
Whales, dolphins, and porpoises	Seals, sea lions, and walrus	Manatees	Sea otters	Polar bears
High Frequency: 275 Hz - 160 kHz Mid Frequency: 150 Hz - 160 kHz Low Frequency: 7 Hz - 35 kHz	75 Hz - 30 kHz	5 kHz - 60 kHz	< 32 kHz	< 25 kHz
				
Humpback Whales	Hawaiian Monk Seal	Manatees	Sea Otter	Polar Bears

NOS performed acoustic modeling to estimate injury (i.e., such as hearing loss) and behavioral disturbance of marine mammals exposed to sounds at frequencies below 200 kHz produced by underwater acoustic sources. Under all alternatives considered, the impact on marine mammals from active acoustic sources would be limited to minor, temporary, behavioral responses. NOS also considered the adverse impacts from other factors such as vessel and equipment sound, vessel presence, and human activity. The overall impact of the Proposed Action on marine mammals is expected to be **adverse, minor, and insignificant.**