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STATEMENT OF
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BEFORE THE
SUBCOMMITTEE ON READINESS AND MANAGEMENT SUPPORT
OF THE
SENATE ARMED SERVICES COMMITTEE
ON
ENVIRONMENTAL LEGISLATIVE PROPOSALS
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Senate Armed Services Committee
Subcommittee on Readiness and Management Support
Testimony on Environmental Legislative Proposals
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This testimony is being submitted to the Committee to represent my views as an individual scientist. It does not represent those of either institution with which I am affiliated. I have arrived at my position stated below based primarily upon my experience as a researcher with over 15 years experience in the combined fields of mammalian hearing, ear disease, and head and neck trauma. My work focuses on understanding marine mammal hearing mechanisms and modeling the hearing of endangered species. My comments are also based on my experience as a member of the recent National Research Council panel on Ocean Noise and as a member of NOAA Fisheries advisory board on noise exposure.

Concomitant with man's increasing use of the oceans is an increase in the ocean's acoustic budget. As indicated in the current NRC report on Ocean Noise, noise from human related activity is increasing on average throughout the oceans at 3 dB per decade; i.e., potentially doubling every ten years. Given our ever-increasing activity in all seas and at all depths, this figure is not surprising. Anthropogenic noise is an important component of virtually every human endeavor in the oceans, whether it is shipping, transport, exploration, research, military activities, construction, or recreation. For some activities, such as military exercises and oil exploration, impulsive and explosive devices are fundamental tools that are relatively short-term but locally intense; for others, such as shipping, the source levels may on average be lower, but the sounds are constant and cumulatively dominate the noise fields in high traffic areas of the oceans.

Because there is no human activity in the oceans that does not add noise and because our activities span the globe and produce sounds over the entire audible range of most animals, it is reasonable to assume that any man-made noise in the oceans may have a significant and adverse impact on marine animals. Because marine mammals are especially dependent upon hearing and in many cases are endangered, the concern over noise impacts on these animals is particularly acute. These concerns are both logical and appropriate, but it is also important to note that at this time, there is no data that gives us a firm answer on what will be the extent of impact from any one sound source. We simply do not have sufficient data to put accurate boundaries on our concerns.

This lack of discrete knowledge on impacts of underwater sound, coupled with the relatively open wording of the original MMPA and with recent dramatic stranding events, has led to a heated, highly polarized, litigious climate. An example of broad extrapolation from one event to another, which has military relevance, is a suit brought to halt LFA use based on the fact that beaked whale mass strandings have been shown to correlate with naval exercises involving mid-range sonars. Whales that stranded in three such cases, the Bahamas, Madeira, and Canary Islands, have been found to have an unusual suite of traumas, the mechanisms for which are still

under investigation. However, there are substantial differences between LFA and mid-range tactical sonars, and, to date, there is no evidence of physical harm from LFA.

Nevertheless, this suit, which adduced as part of its concerns the Bahamian findings, was successful. Recently, other cases have been brought to halt physical oceanographic and behavioural research as well, admittedly motivated in part by very sincere but broad, undocumented concerns for the use of these unrelated sound sources. Clearly, the issue of restrictions of sound sources is not simply a military concern; decisions that are made here may impact indirectly the permitting and use of many forms of sound in our seas.

As noted above, virtually every human activity in the oceans involves sound either intentionally or as a by-product. For responsible use of the seas, it is imperative to consider to the best of our ability the probable impact of each sound we add and to determine whether that impact is worth its inherent risk. At some level, some individuals may be impacted by any sound beyond the natural, average ambient. We must consider for any effort introducing sound use in the oceans whether and to what extent the projection and repetition of the signals employed will adversely impact significantly or negligibly any species within the "acoustic reach" of the source. Realistically, because of the diversity of hearing characteristics among marine animals, it is virtually impossible to eliminate all acoustic impacts from any endeavor, therefore the key issues that must be assessed are: 1) what combination of frequencies and sound pressure levels are proposed to fit each anthropogenic task; 2) what species are present in the area the device will ensonify at levels exceeding ambient; 3) what is the probable severity of any potential impacts to the exposed animals from the combined frequency-intensity-temporal characteristics of the source.

The important point is to know whether these factors produce any biologically significant impact to a species. Of course sound operates at the individual level, but the fundamental concern is for the well being of populations. All data to date have been gathered on individual or local populations. As the NRC report on Ocean Noise and Marine Mammals emphasized, our major concern is for population level impacts and consequently a major recommendation was to structure all research on marine mammals to allow predictions of population-level consequences. Individual effects are inputs to our database, but the true metric to apply is biological significance.

The original MMPA noted a concern for impact on marine mammal populations. Yet, much of the debate and contention that we see today over the issues of sound in the oceans derives from and focuses on relatively few impacted individuals. For example, in the case of the Bahamian stranding, 7 animals died under circumstances clearly correlated with the use of military sonars. Reviews of past strandings suggest that there have been 8 to 10 similar events within the last 40 years, all involving only beaked whales. Clearly there should be concern; there is substantial reason to believe that sonars are at least a contributory cause of strandings under certain circumstances. The mechanisms involved are extremely important to determine, and there is now considerable research effort being devoted to this problem. Nonetheless, the strandings must be kept in perspective. The total mortality of suspected military related strandings in 40 years is fewer than 350, all involving two genera of beaked whales. We do not have evidence that a population level much less multi-species threat exists from those strandings. At this time we do not have any evidence to suggest that sonars in general use have a similar effect. NOAA Fisheries in a review of stranding and necropsy records for the same species did not find any

evidence of similar traumas in single beaked whale strandings nor were these traumas found in any species other than beaked whales.

Precaution is appropriate; however, currently, extraordinarily precautionary positions are holding sway in which very broad and scientifically unfounded extrapolations are being made. We are losing sight of the need for balance and for perspective. High profile events, like the dramatic strandings in the Bahamas and Canaries, are being construed as virtually global, both in terms of species and sound source types. This is a potentially hazardous position since, ironically, this type of over-interpretation is actually preventing research that could provide precisely the answers that are needed to protect and conserve marine species. In a sense, precaution, in the extreme, may lead us to stagnation, and worse, because it is a position founded on assumed rather than known effects, it may prevent us from determining the true sources of greatest potential harm.

For responsible stewardship of our oceans, it is imperative that we understand our impacts and that we proceed with a balanced and informed view. Therefore, it is equally important that views of all parties with legitimate interests be considered. Risk assessment must be a part of that debate. There is undeniably some risk to some individuals from any underwater sound, but individual risk must be balanced by potential gain to the species. The addition of significant to the proposed revisions is a conceptual step forward worthy of consideration. It implies that our focus be shifted from the impossible goal of avoiding any possible individual impact to biologically significant, population level concerns. Such a shift, implemented with caution and judicious oversight, will not only reduce litigation for military operations, but also provide opportunities for education and understanding by the public of the appropriate scope for our concerns and of the critical need for research that will provide data to finally allow us to place clear and valid limits on sound use in our seas.