

Letters to the Editor: Seismic Surveys and MPAs

Our November-December 2009 article on seismic surveys and MPAs resulted in several letters from readers (*MPA News* 11:3). The article highlighted a case involving Canada's Endeavour Hydrothermal Vents Marine Protected Area, where an academic research team sought to conduct a seismic survey to study the seabed and plate tectonics of the region. A legal challenge by conservation organizations attempted to block the study, arguing that its noise would harm marine mammals. Ultimately, the research team agreed to a government scientist's recommendation that the safety zone around the survey be expanded to 7 km, and the survey proceeded.

It is time to research and promote airgun alternatives

Dear *MPA News*:

I have been specializing in underwater noise issues since 1994, and am the author of one of the scientific papers cited at the end of your article "Seismic Surveys and MPAs". I have a few corrections/comments to your article:

1. Low-frequency active naval sonar has not been associated as much with whale strandings and deaths-at-sea as mid-frequency naval sonar has.
2. While the source levels of these naval sonars are very high, the best estimate of the levels the stranded whales received was only moderate, yet likely high enough to cause their death.
3. Mitigation measures such as safety zones, ramp-ups, etc. can be imperfect, even inadequate, in protecting whales from harm. Most are based on little to no scientific evidence, such as that whales will avoid airguns [which produce the sound waves used in seismic surveys]. If airguns stun whale prey, for instance, whales may be attracted to the survey area, even to the detriment of their hearing.
4. While I applaud the stricter mitigation measures in the case of the Endeavour Hydrothermal Vents MPA, a 7-km radius of safety zone is very difficult to monitor practically for whales.
5. Whale and fish disturbance is well documented at received levels of 130 decibels (dB) and below - in contrast to the 160-dB threshold used at Endeavour, which is 1,000 times louder.
6. While not definitive, there is highly suggestive evidence connecting whale strandings and deaths with seismic airgun noise.

It is not my position that seismic surveys should never be allowed in areas with marine mammals. Many factors enter into that decision, such as the conservation status of the species present, their sensitivity to noise, the source levels of the seismic array, and length of the survey. However, in some cases, any addition of noise may be too much. It is time to seriously research and promote more benign airgun alternatives such as, perhaps, controlled sources, passive seismic [the detection of natural low-frequency earth movements], electromagnetic surveys, etc. - especially in sensitive habitats.

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What level of sound is safe for animals in MPAs?

Dear *MPA News*:

I read with interest the recent article on ways that MPA managers might respond to seismic surveys or other noise events within or outside their boundaries. The fundamental question presented was, what level of sound is safe for animals in MPAs?

It is very clear that injuries to the auditory system, or other physiological injuries from direct exposure to sound, occur only at very close ranges to airguns, military sonars, or pile-driving - on the order of tens or at the most hundreds of meters. As Leila Hatch [of Stellwagen Bank National Marine Sanctuary] notes in the article, for MPA managers the main concern is how much behavioral disruption is acceptable for the particular species resident in an MPA. In most areas, displacement due to aversion to noise may be of minimal concern (food sources may be widely available), while in some smaller MPAs it may be more of a problem. These far less predictable patterns of behavioral disruption can be caused by relatively moderate sound from more distant noise sources - up to tens of kilometers.

The 160-dB "safe" criterion noted in the article and widely used in mitigation plans likely represents roughly the sound level at which half the population will be expected to change its behavior in noticeable ways. Unfortunately, the correlation between sound level and behavioral disruption is not at all linear. Many individuals (and some species, particularly harbor porpoises and beluga whales) respond with aversion or foraging disruptions at much lower levels, down to 120dB. There will always be a subset of a population that is more sensitive to noise. This may be of special consideration in MPAs that are addressing chronic noise intrusions or several weeks/months of airgun or construction noise. That is, are the management goals of the MPA met if a more sensitive subset of a population is being impacted repeatedly?

MPAs offer a potentially rich arena in which ocean managers can incorporate careful analysis of noise impacts on marine life. There are a slew of factors that make this a challenging task. But it is well worth the effort for MPA managers to learn more about this burgeoning field of research.

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Little if any research is truly risk-free

Dear *MPA News*:

When used for purely academic pursuits, airguns are a highly significant tool for environmental science. The sub-bottom mapping of geological structures on the ocean floor has provided, and should continue to provide, data critical to understanding the evolution and dynamics of the planet. This includes many significant concerns related to earthquakes, tsunamis, and climate change.

While academic researchers essentially use the same seismic sound source as the offshore oil/gas industry does for its seabed exploration, significant differences exist in terms of the extent the airguns are used and, above all, the intended use. Environmental concerns regarding the exploration and global overconsumption of oil should not justify halting the limited use of airguns for academic research purposes. Halting the research use of airguns would be one-sided and short-sighted - comparable to viewing X-rays only as a radiation threat rather than as a vitally important diagnostic tool for our personal health.

I fully agree that underwater noise is both a valid concern and has potential for significant negative impacts. I also agree that the use of seismic sources in MPAs should be reserved to research specifically linked to that location, as was the case for Endeavour. If a non-MPA location can serve research purposes, that site should be pursued along with minimal use of sound energy to achieve goals, and there should be preference for deeper water when possible.

However, little if any research is truly risk-free. The concept that "any possibility of harm to the ecosystem should be avoided when possible" is not something that should be applied as a selective policy tool for MPA management. An MPA's use of patrol boats, for example, represents a risk of both disturbance noise and collisions. When MPA managers and government officials are faced with statements such as "Government must ensure that potentially harmful scientific experiments are not permitted on the basis of a lack of full scientific certainty of the likelihood or magnitude of harmful impacts," the reality is that "full scientific certainty" coupled with "likelihood" is rather contradictory.

The likelihood of benefits from research using active seismic sources is perhaps greater than that of harm, particularly with mitigation and precautionary measures in use. In fact, there are risks, and potential harm, associated with not pursuing research. This needs to be balanced.

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