

## Report on the SCAR *ad hoc* Group on Marine Acoustic Technology and the Environment Workshop, September 2001

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The Scientific Committee on Antarctic Research (SCAR) sponsored a workshop on the impact of acoustic technology on the Antarctic marine environment in Cambridge, September 2001. The participants represented a spectrum of expertise from biologists specializing in the effects of noise in the marine environment, biologists specializing in Antarctic animals to geophysicists with knowledge of underwater acoustics. The workshop focussed particularly on the Antarctic and its findings will be published as a SCAR report after review by a panel of experts.

Equipment using sound waves to investigate the sea bed and the water column are essential to the understanding of the Antarctic marine environment. At the same time, there is active research into the effects of such technology on marine animals, particularly cetaceans. The potential risks posed by equipment are a combination of source level, frequency and local effects that define the likelihood of interacting with animals. Many acoustic instruments are of sufficiently low power and high frequency as to pose a minor risk to the environment. The equipment with the highest risk potential are airgun arrays and low frequency, high power transducers with wide beam angles. Cetaceans have been observed avoiding powerful, low frequency sound sources and there is now a documented case of injury to whales from multiple, mid frequency (2.6-8.2 kHz) military echo sounders. At the same time, some whale populations co-exist with commercial seismic exploration surveys. In the case of other animals, there is some evidence for short-term displacement of some seals and fish by seismic surveys but there is little literature available.

The working group felt that the evidence available did not justify a ban on seismic surveys or scientific echo sounders in Antarctic waters, however, surveys should be examined on a case by case basis and mitigation strategies should be used to reduce the risk to Antarctic wildlife from high power, low frequency sources. Acoustic releases and similar low power, occasional source were not considered a threat to wildlife. Mitigation strategies should be investigated to evaluate their effectiveness and there should be a regular review of mitigation strategies and the progress of research in the field to ensure that new research findings will be available to the Antarctic community. Research into the hearing and reaction to noise of Antarctic animals should be encouraged as should

research into sound propagation conditions around Antarctica. Records of the locations, timing, duration, frequency, and nature of hydro-acoustic and other activities should be maintained to permit retrospective assessment of the likely causes of any future observed changes in the distributions, abundance, or productivity of the potentially affected species and populations. Some mitigation strategies in use are:

- (1) Use of the minimum source level to achieve the result.
- (2) Use of "soft starts" whereby power is increased gradually over periods of 20 minutes or more.
- (3) Care should be taken with line lay outs to avoid restricting animals' ability to avoid the source.
- (4) Equipment should be shut down if cetaceans are observed within a distance of the vessel defined by the source power, directionality and propagation characteristics.
- (5) Surveys should be planned to minimize repeated surveying of areas in consecutive years with high risk equipment.
- (6) Care should be exercised to minimize impacts in known sensitive areas and times.

Further research is needed to assess whether these measures work and to better monitor the proximity of wildlife to a vessel. The Antarctic community and permitting agencies will need to monitor research progress to ensure practices are up to date.

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