Managing the Effects of Anthropogenic Noise in the Antarctic – Steps towards the development of an underwater noise protection concept for ‘Antarctica’

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Submitted by Germany

Introduction

One of the key pollutants created by human activities in the Antarctic is underwater noise, which is primarily caused by ship traffic, but also by research activities (e.g. seismic surveys) or logistic activities. Concern about potential impacts of anthropogenic sound in the Southern Ocean was first raised at the ATCM in 2000. However, the Committee for Environmental Protection (CEP) has not discussed impacts of underwater sound in Antarctic waters since 2007 (see ATCM XXIX WP41, *SCAR Report on Marine Acoustics and the Southern Ocean* or ATCM XXX IP80, *Taking Action on Marine Noise in the Southern Ocean*), though SCAR provided Updates on Anthropogenic Sound in the Southern Ocean in 2012 (ATCM XXXV IP21) and 2019 (ATCM XLII WP 68 & BP 03). The latter has also recently been published as SCAR Bulletin 204 (2021): Anthropogenic Noise in the Southern Ocean: an Update.

The Protocol on Environmental Protection to the Antarctic Treaty (the Protocol) provides comprehensive protection for native birds and mammals (Article 3 Annex II to the Protocol) and specifies that the impacts of activities must undergo prior assessment according to Annex I of the Protocol (Article 8 para. 1 of the Protocol). New tools such as the Animal Audiogram Database[[1]](#footnote-1) can aid this assessment process (see also BP 6). Nevertheless, gaps in knowledge on the effects of underwater anthropogenic sound on Antarctic marine mammals make the assessment of such activities difficult and it is still unresolved which exposure limits and protection concepts need to be used for Antarctic marine mammals and birds in order to ensure the full level of protection pursuant to the Protocol. Furthermore, requirements and noise thresholds vary between Treaty Parties that conduct these assessments, leading to different standards.

The SCAR Antarctic and Southern Ocean Science Horizon Scan undertaken in 2014 identified "*How will organism and ecosystems respond to a changing soundscape in the Southern Ocean?*" as one of the 80 most pressing questions regarding the future of Antarctica.

In its most recent update on Anthropogenic Sound in the Southern Ocean (ATCM XLII BP03 and SCAR Bulletin 204 (2021), SCAR polled a committee of experts on the current status of underwater noise as a first-step, qualitative assessment of the state of knowledge. Based on the SCAR, experts the state of knowledge of potential impacts for cetaceans (and marine mammals in general) and the understanding of the sources and types of anthropogenic noise present in Antarctic marine waters is fair to good.

Germany hosted a workshop to determine the current state of knowledge on effects of noise on marine mammals in Antarctica in 2018 (results presented in ATCM XLII IP 31 and Erbe et al. 2019). The participating international experts on marine mammals highlighted a variety of research and management needs. The management need with the highest score was a refinement of noise exposure criteria for the Antarctic: the participating experts recommended that a series of focused international expert workshops should be held in order to develop a criteria matrix specifically for Antarctic marine mammal species and the main anthropogenic sound sources as the basis for an underwater noise protection concept for Antarctica.

To this end, Germany tendered a research project that will run from January 2020 to March 2023.

Short Project Overview

The objective of the current project is to develop a criteria matrix that specifically addresses the 24 native Antarctic marine mammal species and the three main sources of anthropogenic underwater noise: seismic airguns, hydroacoustic research equipment and vessels.

To achieve this, a series of workshops will be conducted to identify maximum sound exposure values that will prevent auditory injury and harassment by anthropogenic sound. However, the amount of species and sound sources constitute a considerable challenge, as there are still several uncertainties involved that might not be solved in the short-term. The project will therefore approach this task using the process of *Expert Knowledge Elicitation* (EKE) *or Expert Elicitation* (EE).

EE is a heuristic process typically used in situations with scarcity of empirical data but the need for conservation or management decisions (Martin et al. 2012). It should build on and use the best available research and analysis. It should be undertaken only when the state of knowledge will remain insufficient to support timely informed assessment and decision making (Morgan 2014). The outcome of EE will be a probabilistic distribution that reasonably represents the opinion of an external observer, based on the estimate and the confidence of the estimate from all experts participating in the EE. It quantifies scientific uncertainty and minimizes inadvertent bias in the elicited information.

The results of the workshops will be presented at ATCM XLIV in Berlin and in a closing conference in September 2022 also in Berlin.

The German Environment Agency (UBA) commissioned this project with funding from the Federal Ministry for Environment, Nature Conservation and Nuclear Safety (BMU). The results of the project are intended to inform the evaluation of activities within the framework of the German permitting procedures and for presentation at future ATCMs.

References

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*ATCM XXXV IP21, Anthropogenic Sound in the Southern Ocean: an Update*

*ATCM XLII WP 68, Anthropogenic Noise in the Southern Ocean: an Update*

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1. The Animal Audiogram Database (<https://animalaudiograms.museumfuernaturkunde.berlin/audiogrambase>) is a repository for consolidated storage of published underwater and in air audiogram data commissioned by Germany. [↑](#footnote-ref-1)