

VULNERABILITY OF NORTH SEA FISH SPECIES TO UNDERWATER NOISE

Calonge, Arienne*¹

¹Flanders Marine Institute (VLIZ), Brussels, Belgium

Anthropogenic activities, such as vessel traffic, construction, and seismic surveys, are becoming more prevalent every year in the North Sea. To achieve Good Environmental Status (GES), regional threshold values of noise levels need to be defined, including the noise level at which the fitness, survival, and vital functions of individual animals are compromised (Borsani et al., 2023). Defining indicator species across different animal taxa is therefore crucial in the evaluation of the effects of underwater noise.

As part of the Interreg North Sea project DEMASK*, a trait-based scoring system to assess the vulnerability to underwater noise was developed for marine mammals, fishes, and invertebrates. The scoring system defines several factors related to the animals' hearing and sound production, reported impacts of impulsive and continuous anthropogenic noise, and the socio-ecological status of species, to compare their relative vulnerability. Based on an extensive literature review and an expert consultation survey, each species was assigned a score for each vulnerability factor. The quality of information on which the vulnerability score was based was also assessed, resulting in a data quality score for each species. With this scoring system, we highlighted species with a good evidence base of vulnerability to underwater noise, which therefore could be selected as indicator species for the North Sea.

Among the 55 North Sea fish species assessed, Atlantic cod, haddock, Atlantic herring, ling, and Atlantic salmon were those that fell within the 90th percentile of both vulnerability and data quality scores. These species have sufficient evidence of vulnerability to underwater noise and/or are commercially and ecologically important. Masking of communication signals vital for reproductive success, negative effects on foraging, and reduced heart rate related to stress were some of the reported impacts of underwater noise. As the selection is based on the most current knowledge, these species may not necessarily be the most sensitive species to underwater noise. Rather, as potential indicator species, degradation of ecosystems due to underwater noise may be assessed through known impacts of noise on their populations. Through habitat suitability maps of the selected indicator species, overlaid with noise level maps from different policy scenarios, the effects of underwater noise can be mitigated using adaptive management strategies. The scoring system presented here serves as a framework, and as more knowledge on the impacts of noise across different taxa becomes available, new indicator species are likely to be identified.

Borsani F, Andersson M, André M, et al. (2023) Setting EU threshold values for continuous underwater sound. In: Duron JN, Hanke G, Casier M (eds) MSFD Common Implementation Strategy. Publications Office of the European Union, Luxembourg, p 4. doi:10.2760/690123, JRC133476