Oct 2017

Contribution to the report “Oceans and the law of the sea”

Themes needed input on	**Activities, experiences and actions**
i) Challenges posed by anthropogenic underwater noise	For many marine organisms including most mammals, many fish, and perhaps even some invertebrates sound is important to communicate, to locate mates, to search for prey, to avoid predators and hazards, and for short- and long-range navigation. Anthropogenic sound emitted to the marine environment can potentially affect marine organisms in various ways. It can mask biologically relevant signals; it can lead to a variety of behavioural reactions; hearing organs can be affected in form of hearing loss, and at very high received levels, sound can injure or even kill marine life. Manmade sound sources of primary concern with regards to disturbance of marine life are explosions, shipping, seismic surveys, offshore construction (for example offshore wind farms or hydrocarbon production and transport facilities), and offshore industrial activities (dredging, drilling etc.), sonar of various types, and acoustic deterrent devices. Documented effects on marine life vary greatly from very subtle behavioural changes, avoidance reaction, hearing loss, injury and death in extreme cases. However, there are many uncertainties in assessing effects of noise due to the difficulties in observing individual level effects, let alone population level consequences of acoustic disturbance. From a conservation perspective, it is important to assess whether anthropogenic sound has a significant effect on populations. This is also important in assessing the impacts of noise in relation / or addition to other stressors (for example bycatch in cetaceans) either to assess cumulative impacts and / or to focus protection efforts. All factors impacting on populations are cumulative and must be assessed together by discussing the significance of effects.

ii) Actions and activities, including research activities, that have been undertaken at national, regional and global levels with regard to anthropogenic underwater noise, in particular those undertaken to address its adverse impacts	OSPAR has started to address the uncertainty around the levels of underwater noise by developing monitoring programmes for both impulsive and continuous (ambient) noise. In 2015 OSPAR establish an Impulsive Noise Register, hosted by ICES, to collect information from Contracting Parties on any sources of impulsive noise within their waters including; seismic surveys, pile driving, explosions and military sonar. The pressure from these impulsive noise sources was assessed for the first time in the OSPAR Intermediate Assessment 2017. The Impulsive Noise Registry will also be used as the basis for the development of an impact indicator for impulsive noise. The aim of which will be to assess the effect of the pressure from the impulsive noise sources on specific sensitive species. Initial discussions have taken place at the technical level on developing a methodology with the aim of adopting an OSPAR impact indicator in 2019. OSPAR also adopted, in 2015, an Ambient Noise Monitoring Strategy based on a combination of monitoring and modeling of continuous underwater noise. The first phase of this strategy is now being implemented by the Joint Monitoring Programme for Ambient Noise North Sea (JOMOPANS) Project, which is part funded by the EU. The project will start on the 1st January 2018 and will run for three years and aims to establish ambient noise monitoring programme as well as establishing standards for monitoring ambient noise and developing web based graphical interface to display monitoring information and noise maps. Other projects are also being developed to undertake ambient noise monitoring in the Celtic Seas, Bay of Biscay and Iberian Coast. Based on ongoing work within our Contracting Parties OSPAR has also developed an Inventory of measures to mitigate the emission and environmental impact of underwater noise. The purpose of this inventory is to provide OSPAR Contracting Parties an overview of effectiveness and feasibility of mitigation options to avoid or reduce emissions and impacts of underwater noise, and to support OSPAR EU Member States in establishing programmes of measures in relation to underwater noise under the MSFD by 2015. The inventory is designed to help avoid and reduce the introduction of underwater noise and/or its impacts on the marine environment through a common understanding of best mitigation options and by aiding Contracting Parties in their choice of options in the management of underwater noise sources and ultimately by the application of best available techniques (BAT) and best environmental practice (BEP), as defined in Appendix 1 to the OSPAR Convention, for activities generating impulsive and/or continuous noise underwater noise. So far two chapters on pile driving and seismic surveys have been completed and work is currently being prioritised on developing chapters on underwater noise for explosion and shipping.

iii) Any suggestions for further action to address the adverse impacts of anthropogenic underwater noise	The objective of the North East Atlantic Environment Strategy is to aim to keep the introduction of energy, including underwater noise, at levels that do not adversely affect the marine environment. However, there is a lack of direct evidence on the effects of anthropogenic sound at the population and ecosystem scale, which confounds target setting. Nevertheless, due to the growing number of studies documenting the effects of anthropogenic sound on individual marine species the potential for large-scale effects should be considered, in line with the precautionary principle. The direct observation of population and ecosystem-scale effects will require detailed long-term studies, which are able to distinguish the effects of anthropogenic sound from the effects of other anthropogenic stressors or natural factors. In the meantime, studies which examine the effects of anthropogenic sound on, for example, aspects of ecosystem functioning (nutrient cycling) or food web dynamics (predator-prey interactions) can investigate the mechanisms by which anthropogenic sound may affect marine ecosystems. A further knowledge gap is that many of the individual-based studies of the effects of anthropogenic sound have been carried out under laboratory conditions. Further studies of *in situ* responses to impulsive sound are needed, particularly for fish and marine invertebrates, as well as studies on the applicability of laboratory studies to wild populations. Some studies have shown that sound level can be a poor predictor of behavioural responses, and that other parameters (such as distance to source) may be more relevant. This issue is important for the prediction of impact, since an understanding of the mechanisms leading to disturbance is needed to make valid forecasts (i.e. when deriving dose-response relationships). Studies to further investigate the mechanisms behind behavioural responses are needed to clarify the roles of such parameters.