



## Joint NGO guidance factsheet on Noise (Descriptor 11) on the implementation of the MSFD

April 2012

*For further information please contact:*

**Karsten Brensing**

Whale and Dolphin Conservation Society (WDCS)  
e-mail: [karsten.brensing@wdcs.org](mailto:karsten.brensing@wdcs.org)  
<http://www.wdcs.org>

**Sytske van den Akker**

Stichting De Noordzee  
e-mail: [s.vandenakker@noordzee.nl](mailto:s.vandenakker@noordzee.nl)  
<http://www.noordzee.nl>

**Thomas Vlachogianni**

Mediterranean Information Office for Environment, Culture and Sustainable Development (MIO-ECSDE)  
e-mail: [vlachogianni@mio-ecsde.org](mailto:vlachogianni@mio-ecsde.org)  
[www.mio-ecsde.org](http://www.mio-ecsde.org)

## Introduction

Sound is very important for the survival of many marine organisms like fish and marine mammals. They rely on sound for locating food, communicating, finding mates, protecting themselves, orientating and navigating underwater. The oceans are full of both natural and anthropogenic sources of sound.

Naturally generated background sound in the oceans is caused by weather (rain/hail, wind, etc.), currents and waves, geological phenomena (e.g. earthquakes, sediment movement) and animals.

However, due to the industrialization of the oceans, over the past hundred years, much attention has recently been focused on anthropogenic sources of sound in the ocean and their potentially harmful effects on marine animals. It is generally acknowledged that sources of human induced noise are becoming both more pervasive and more powerful, increasing both oceanic background sound levels and peak intensity levels. Ambient noise in the ocean has consequently increased over the past fifty years at both low frequencies and mid-frequencies.

The main human activities that contribute to underwater noise include hydrocarbons exploration and production, commercial fishing, shipping, pile-driving and dredging, the use of some oceanographic research and military technologies and more recently the construction and operation of offshore wind farms. Consequently, noise levels associated with anthropogenic activities have increased tremendously in the last decades.

Research indicates that increased background noise and specific sound sources can impact marine animals in several ways. Marine organisms that are exposed to human induced sound/noise can be adversely affected both on a short timescale (acute effect) and on a long timescale (permanent or chronic effects). Adverse effects can be subtle (e.g. temporary reduction in hearing sensitivity, displacement, behavioural effects, etc.) or severe (e.g. organ damages and in the worst case, death).

A number of factors affect the impact of sounds on marine animals. These include: the sound level, frequency and other characteristics of the sounds; the hearing sensitivity, age, sex and behavior of the animals; the environmental conditions under which the animals experience the sound.

Current knowledge about the effects of sound on marine animals is limited and much more scientific research is needed to fully understand the effects of anthropogenic sounds on marine biota. Some of the main gaps in knowledge include the impact of noise on individual marine organisms, on populations and ecosystem level; what can be considered as acceptable sound level for marine life, etc.

Although noise is nowadays a recognized form of pollution, sources of noise in the marine environment are not regulated at an international level. Recently, some progress has been made at the regional level (e.g. OSPAR, CBD, CMS, ASCOBAMS, ACCOBAMS, HELCOM, Barcelona Convention).

### 1. The Marine Strategy Framework Directive & Noise

The Marine Strategy Framework Directive (MSFD) overarching aim is to achieve Good Environmental Status (GES) in European waters by 2020. Good environmental status shall be determined on the basis of 11 qualitative descriptors. One of these descriptors, Descriptor 11 focuses on the introduction of energy, including underwater noise. GES descriptor 11 will be achieved if introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment<sup>1</sup>. Two indicators have been formulated to assess this descriptor. Guidelines on how to approach these indicators can be found in the recent publication of the MSFD Technical Subgroup on Underwater noise and other forms of energy.<sup>1</sup>

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<sup>1</sup> Van der Graaf AJ, Cools J, Ainslie MA, André M, Brensing K, Dalen J, Dekeling RPA, Robinson S, Tasker M, Thomsen F, Werner S (2012). *European Marine Strategy Framework Directive - Good Environmental Status (MSFD GES): Report of Technical Subgroup on Underwater noise and other forms of energy.*

**Descriptor 11: Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment**

**Criterion 11.1: Distribution in time and place of loud, low and mid frequency impulsive sounds**

Indicator 11.1.1: Proportion of days and their distribution within a calendar year over areas of a determined surface, as well as their spatial distribution, in which anthropogenic sound sources exceed levels that are likely to entail significant impact on marine animals measured as Sound Exposure Level (in dB re 1µPa 2 .s) or as peak sound pressure level (in dB re 1µPa peak ) at one meter, measured over the frequency band 10 Hz to 10 kHz (11.1.1)

**Criterion 11.2: Continuous low frequency sound**

Indicator 11.2.1: Trends in the ambient noise level within the 1/3 octave bands 63 and 125 Hz (centre frequency) (re 1µPa RMS; average noise level in these octave bands over a year) measured by observation stations and/or with the use of models if appropriate (11.2.1).

Additionally to the existing indicators the MSFD GES Technical Sub-Group on Noise suggested the development of the following additional indicators and criteria related to:

1. Medium and high frequency impulsive sounds;
2. Electromagnetic fields;
3. Combined mapping of sound levels and sensitivity of marine life;
4. Further issues
  - Air-based mechanical energy and light
  - High frequency acoustic deterrent devices
  - Particle motion

## 2. How to contribute? Issues of concern and recommendations

From the aforementioned information it is clear that human induced under water sound can cause serious problems to marine life.

Within the framework of the national consultations, NGOs should try to ensure that:

- Noise related targets are ambitious, as they will drive the elaboration of the programmes of measures to achieve GES. For example the target could be realistic and may keep underwater noise not higher than the levels recorded in 2012, excluding however, levels that are harmful to marine life, which should be reduced. This should be an absolute minimum but a reduction is recommended and more ambitious targets are welcome.
- Given the fact that the levels of underwater noise have increased tremendously the past decades and that human induced sound inputs will continue to increase due to various activities (such as shipping, construction and operation of offshore wind farms, etc.), there is an imperative need for Member States to apply the precautionary principle in any case of scientific uncertainty(-ies).
- Member States should be urged to address the many noise related knowledge gaps and uncertainties already identified and undertake research activities.
- Member States should be encouraged to support the development of mitigation measures for the most important sources of noise such as seismic surveys<sup>2</sup>; shipping<sup>3</sup>; offshore installation with pile driving<sup>4</sup>.

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<sup>2</sup> Report of the Workshop on Alternative Technologies to Seismic Airgun Surveys for Oil and Gas Exploration and their Potential for Reducing Impacts on Marine Mammals. <http://www.oceanos-foundation.org/assets/Uploads/Airgun.pdf>

## 2.1. Initial Assessment

- The initial assessment has to be conducted based at least on the existing two indicators. Both impulsive and ambient noise should be addressed.
- The assessment should follow the advice of the MSFD GES Technical Sub-Group on Noise. The suggested additional indicator should be considered and preparation should be made to fulfill future demands.

## 2.2. Good environmental status

The current situation is already far away from a natural situation. Despite the many knowledge gaps, it is clear that the current situation is not close to GES! The MSFD itself states that the marine life should not be adversely affected. Therefore it is important that:

- Focus is not limited on death or injury (Permanent Threshold Shift (PTS) / Temporary Threshold Shift (TTS));
- Long term and less obvious effects are also taken into account. At a minimum, the GES should include no substantial interference with biologically important behaviours from underwater noise pollution.

## 2.3. Future steps: further development of indicators

The existing two indicators do not fulfill the demand of an ecosystem-based approach. Additional indicators should be developed as soon as possible. "Combined mapping of sound levels and sensitivity of marine life" describes an impact indicator and can be acknowledged as an ecosystem-based approach. Therefore it needs to be stressed that this indicator has to be developed and a timeframe should be given for this (preferably before 2014, so as to be in time for the monitoring programmes).

Furthermore Member States should be aware of an additional demand in relation to the suggested additional indicators and should support any scientific activities which fill out the knowledge gaps. Until this moment the use of the precautionary principle is indicated and strongly recommended.

Due to the lack of information and science-based recommendations Member States should at least agree to freeze the actual status. In relation to the two existing indicators Member States should agree on:

### Impulsive noise:

The so-called "bang days" or "pulse-blockdays" (described by the Technical Sub-Group on Noise) do not exceed the level of 2012 in 2020.

### Ambient Noise:

The trend in the ambient noise level does not exceed the level of 2012 in 2020.

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<sup>3</sup> MEPC 61-19-Noise CG Report: Report of the Correspondence Group on Noise From Commercial Shipping and Its Adverse Impacts on Marine Life

<http://www.imarest.org/Technical/TechnicalActivities/Representation/InternationalMaritimeOrganizationIMO.aspx>

<sup>4</sup> Sound Solutions – offshore wind installation techniques without underwater noise

<http://www.noordzee.nl/bibliotheek/windparkenopzee/soundsolutions/>