

Monitoring Factsheet: Underwater Noise

October 2015

1. Subject: Underwater Noise

Underwater noise refers to ‘anthropogenic sound that has the potential to cause negative impacts on the marine environment, including component biota but not necessarily the whole environment’¹. Anthropogenic sounds may be of short duration or be long lasting.

‘Impulsive sound’ is an example of sounds of short duration and includes sound generated by seismic surveys, piling for wind farms and platforms, as well as explosions.

Long-lasting sounds include continuous sounds such as that generated from dredging, shipping and energy installations.

2. Monitoring Requirements

2.1. Marine Strategy Framework Directive – MSFD (2008/56/EC)

2.1.1. *Annex III characteristics/pressures/impacts*

The MSFD calls for an assessment of the environmental status based on a list of characteristics listed in Table 1 of Annex III to the Directive, and pressures and impacts listed in Table 2 of the same Annex.

Implementation of this monitoring factsheet will address ‘Underwater Noise’ as a pressure on the marine environment as listed in Table 2 of Annex III.

2.1.2. *Annex I Good Environmental Status Descriptors*

MSFD Annex I descriptors of Good Environmental Status and the associated criteria and indicators established by MSFD Commission Decision 2010/477/EU for assessment of progress towards the achievement of GES in terms underwater noise, and which will be addressed through this monitoring factsheet, are listed hereunder:

¹ Tasker, M.L.; Amundin, M.; Andre, M.; Hawkins, A.; Lang, W., Merck, T., Scholik-Schlomer, A., Teilmann, J., Thomsen, F., Werner, S. & Zakharia, M. 2010 Marine Strategy Framework Directive: Task Group 11 Underwater noise and other forms of energy. Joint Research Centre EUR 24341

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

- 11.1. Distribution in time and place of loud, low and mid frequency impulsive sounds
 - 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 1 μ Pa 2 .s) or as peak sound pressure level (in dB re 1 μ Pa peak) at one metre, measured over the frequency band 10 Hz to 10 kHz (11.1.1)

2.2. Convention on Conservation of Migratory Species of Wild Animals (Bonn Convention)

The Convention on the Conservation of Migratory Species of Wild Animals aims at the conservation of migratory species and their habitats. The Conference of the Parties of the Bonn Convention, at its Ninth Meeting in 2008 adopted Resolution 9.19 on the adverse anthropogenic marine/ocean noise impacts on cetaceans and other biota². This resolution calls on Parties to undertake, where appropriate, relevant environmental assessments on the introduction of systems which may lead to noise associated risks for marine mammals. At their tenth meeting, the Conference of Parties also adopted resolution 10.24³ which reaffirms the need for ongoing and further internationally coordinated research on the impact of underwater noise on cetaceans and other migratory species and their migratory routes. This resolution also proposes that environmental impact assessments take full account of the effects of activities on cetaceans, and to integrate the issue of anthropogenic noise in the management plans of marine protected areas, where appropriate.

2.3. Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS)

ACCOBAMS is a cooperative tool for the conservation of cetaceans in the Mediterranean, Black Seas and contiguous Atlantic zones. This agreement is mainly aimed at reducing threats to cetaceans in these areas and improving knowledge of these animals.

The Conservation Plan of ACCOBAMS, which is a full part of the Agreement, requires the Parties, amongst others to carry out impact assessments to provide a basis for regulating activities that might affect cetaceans or their habitats in the Agreement

² http://www.ascobans.org/pdf/ac16/AC16_46_CMSRes9-19_OceanNoise.pdf

³ http://www.cms.int/bodies/COP/cop10/resolutions_adopted/10_24_underwater_noise_e.pdf

area and to establish the conditions under which such activities may be conducted. Resolutions issued under the ACCOBAMS agreement [Resolution 2.16 (2004), Resolution 3.10 (2007) and Resolution 4.17 (2010)] call for mapping of the range of underwater noise to which animals are exposed and to define the exposure levels that might affect marine mammals and to consider effects of underwater noise in Environmental Impact Assessments.

3. Targets

Implementation of this monitoring factsheet will contribute towards the achievement of the targets adopted by Malta as part of the EU Marine Strategy Framework Directive, as listed hereunder.

Policy	Status to be achieved	Targets
Marine Strategy Framework Directive	Good Environmental Status: <i>Adverse effects of underwater noise on key species groups are minimised to the extent possible.</i>	To work towards building capacity in the field of underwater noise through <i>inter alia</i> knowledge gain on key species groups which may be adversely affected by this pressure and streamlining of MSFD requirements in terms of underwater noise in licensing and permitting procedures.

4. Competent Authorities

Policy	Competent Authority
MSFD	Office of the Prime Minister (delegation of technical implementation to the Malta Environment and Planning Authority)
Bonn Convention	Malta Environment and Planning Authority
ACCOBAMS	Malta Environment and Planning Authority

5. Spatial Extent of monitoring requirements

Policy	Extent of marine waters
MSFD	Extent of waters to be monitored depends on relevance to underwater noise generated in the marine environment.

6. Monitoring Approach

This monitoring factsheet includes one monitoring subprogramme listed hereunder:

Monitoring sub-programme	Title	Monitoring Purpose
1	Acute underwater noise – distribution, frequency and levels	Pressure

The monitoring programme addresses impulsive underwater noise in accordance with the Monitoring Guidance for Underwater Noise in European Seas – Monitoring Guidance Specifications - 2nd Report of the Technical Subgroup on Underwater Noise. Impulsive underwater noise will be monitored through compilation of a register of the occurrence of impulsive sounds generated by specific activities in the marine environment. Link with anthropogenic activities generating underwater noise is maintained through the compilation of this register.

Monitoring of ambient underwater noise is not being sought at this stage since further development of relevant monitoring processes is necessary, including the identification of monitoring stations as well as identification/development of appropriate acoustic models.

7. Assessment of status

The compilation of sound source levels or proxy of source levels in a register is to be used in the long-term to quantify pressures from impulsive underwater noise on the environment, set baselines of the current situation and inform the development of policy targets.

8. Monitoring sub-programme 1: *Acute underwater noise – distribution, frequency and levels*

8.1. Monitoring Parameters

Monitoring parameters reflect those recommended by the Monitoring Guidance for Underwater Noise in European Seas⁴:

The source level or suitable proxy of anthropogenic sound sources over the frequency band 10 Hz to 10 kHz measured in geographical locations, their spatial distribution together with the proportion of days and their distribution within a calendar year over which the underwater noise is generated.

Data to be collected in association with activities at sea generating impulsive underwater noise
Priority data
Position data (geographic position (lat/long), licensing block/area)
Date of operation
Source level or proxy of source level
Additional (if possible)
Source spectra
Duty cycle
Duration of transmissions (and actual time/time period)
Directivity
Source depth
Platform speed

8.2. Monitoring methodologies

- A register of the occurrence of impulsive sounds over the frequency band 10 Hz to 10 kHz as generated by specific activities at sea will be set up;
- Airguns, pile-driving and use of sonar working at relevant frequencies are the most important sound-sources⁵ that should be considered for inclusion in the register. Additional sources that could also be of concern include boomers, sparkers and scientific echo sounders.
- Regulators of the above-listed activities to ensure provision of data by operators, on underwater noise exceeding the thresholds stipulated in Table 1, to be compiled in the register for the activities;

⁴ Monitoring Guidance for Underwater Noise in European Seas - Monitoring Guidance Specifications. 2nd Report of the Technical Subgroup on Underwater Noise (TSG Noise). November, 2013

⁵ Noting that acoustic deterrent devices and explosives are not used in Malta.

- In the case that operators have concerns about releasing sensitive information, the option to report source level in bins rather than giving a precise figure should be provided (Table 2).
- Data as listed in Section 8.1 can be compiled in grids (e.g. based on standard licensing blocks) – size of grid to be determined on the basis of the data compiled.
- Established mechanisms as listed in Table 3 will be used to ensure that operators of relevant activities provide the information in terms of the parameters listed above.

Table 1: Activities and thresholds to determine inclusion or otherwise in noise register⁶

Activity	Threshold of source levels and proxies for inclusion in register	
	Unit	Threshold
Impact pile-drivers	No minimum threshold (all to be included)	
Explosive	Equivalent TNT mass charge (<i>m</i> TNTeq)	> 8 g
Airgun	Proxy of zero to peak source level (SLz-p)	> 209 dB re 1 μ Pa m
Other pulse sound source	Energy Source Level (SL _E)	>186 dB re 1 μ Pa ² m ² s
Low-mid frequency sonar	Generic Source Level (SL)	>176 dB re 1 μ Pa m
Low-mid frequency acoustic deterrent	Generic Source Level (SL)	>176 dB re 1 μ Pa m
Other non-pulse sound sources	Generic Source Level (SL)	>176 dB re 1 μ Pa m

Table 2: Bins to be used for registering sound levels as an alternative to exact figures

Activity	Bins for reporting	
	Class	Bins
Sonar or acoustic deterrents (source level, rounded to nearest decibel)	Very Low	176-200 dB re 1 μ Pa m
	Low	201-210 dB re 1 μ Pa m
	Medium	211-220 dB re 1 μ Pa m
	High	above 220 dB re 1 μ Pa m
Generic explicitly impulsive source (energy source level, rounded to nearest decibel)	Very Low	186-210 dB re 1 μ Pa ² m ² s
	Low	211-220 dB re 1 μ Pa ² m ² s
	Medium	221-230 dB re 1 μ Pa ² m ² s
	High	above 230 dB re 1 μ Pa ² m ² s
Airgun arrays (zero to peak source level, rounded to nearest decibel):	Very Low	209-233 dB re 1 μ Pa m
	Low	234-243 dB re 1 μ Pa m
	Medium	244-253 dB re 1 μ Pa m
	High	above 253 dB re 1 μ Pa m
Explosions (equivalent TNT charge mass, rounded to nearest 10 g if less than 10 kg and to nearest 1 kg otherwise)	Very Low	8 g to 210 g
	Low	220 g to 2.1 kg
	Medium	2.11-21 kg
	High	22-210 kg
	Very High	above 210 kg
Impact pile driver (hammer energy ⁶ , rounded to nearest 10 kJ)	Very Low	less than 280 kJ
	Low	290 kJ-2.80 MJ
	Medium	2.81-28 MJ
	High	above 28 MJ

⁶ According to the Monitoring Guidance for Underwater Noise in European Seas, this list of thresholds need to be updated regularly as techniques evolve.

Table 3: Existing mechanisms used to collect the required data for relevant activities

Activity ⁷	Legislation/Mechanism	Monitoring requirements
Impact pile-drivers and other pulse and non-pulse sound sources.	The Environment and Development Planning Act regulates development and use of land and sea;	Development process to ensure the provision of data on the generation of impulsive underwater noise by relevant activities permitted in accordance with the Environment and Development Planning Act.
Airgun	Oil exploration activity is regulated by the Petroleum (Production) Act (1958), the Continental Shelf Act (2014) and the Petroleum (Production) Regulations (2001).	Exploration licenses to include provisions for submission of non-sensitive information on noise generated by seismic surveys.
Research activities using sonars		Marine scientific research permitting to include provisions for submission of non-sensitive information on noise generated by sonar devices

8.3. Monitoring area

The monitoring area depends on where the activities as listed in Table 3 occur.

8.4. Monitoring frequency

As needed.

⁷ Explosives and acoustic deterrents are not used in Malta and are hence not being included with this monitoring factsheet

9. Quality Assurance & Quality Control

With reference to the compilation of the register, standard data formats still need to be agreed at a regional scale:

- Use of a common language (English)
- Use of a common format for date in accordance with the appropriate standard (ISO 8601)
- Use of a common format for position (latitude and longitude, decimal degrees)
- Use of a common map projection (unprojected data – WGS84)
- Use of a common template (i.e. setting out the order in which information is recorded)

10. Data collection, storage and dissemination

All data should be collected and stored in accordance with the following INSPIRE Technical Specifications and/or any other relevant INSPIRE standard as identified through the Marine Pilot Project⁸:

- 'D2.8.III.16 Data Specification on Sea Regions – Technical Guidelines'⁹

Processed data to be uploaded in a geoportal.

11. Responsible organisations

Theme	Sub-themes	Responsible authorities
Impulsive underwater noise	Development at sea (including use of pile driving, dredging and drilling)	MEPA
	Seismic surveys and other surveys using sonars	Continental Shelf Department

12. Gaps and Research Needs

Gaps	Plans to address gaps
This monitoring factsheet does not cover monitoring of ambient underwater noise. Hydroacoustic monitoring stations should be selected on the basis of shipping density maps, which are currently not available at a local scale.	An ambient underwater noise monitoring regime to be developed in line with existing guidance.

⁸ <https://circabc.europa.eu/w/browse/bc33dff1-0f8c-467a-8382-7724c5f79d45>

⁹ <http://inspire.ec.europa.eu/index.cfm/pageid/2>;

13. Main Sources

- Monitoring Guidance for Underwater Noise in European Seas - Monitoring Guidance Specifications. 2nd Report of the Technical Subgroup on Underwater Noise (TSG Noise). November, 2013
- AAE Consortium (ADI Associates Ltd, Ecoserv Ltd and E Cubed Consultants). 2014. Long Term Monitoring Strategy for the Marine Environment of the Maltese Islands under the Marine Strategy Framework Directive. Service Contract for the development of a long-term monitoring strategy for the marine environment, a social and economic analysis of the use of marine waters and costs of degradation, and baseline sediment survey in inland waters (MEPA tender ref: CT3048/2012). ERDF156 - Developing national environmental monitoring infrastructure and capacity. Malta, unpublished report, 252 pp.