



**MEMORANDUM OF UNDERSTANDING  
ON THE CONSERVATION AND  
MANAGEMENT OF MARINE TURTLES  
AND THEIR HABITATS OF THE INDIAN  
OCEAN AND SOUTH-EAST ASIA**

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Da Nang, Viet Nam, 21-25 October 2019

Agenda Item 11.2

**IMPACTS OF UNDERWATER NOISE**

*(Prepared by the Secretariat)*

Action requested:

- Take note of the CMS Family *Guidelines on Environmental Impact Assessments for Marine Noise-generating Activities* annexed to CMS Resolution 12.14 (see Annex 1 of this document).
- Endorse the Guidelines and disseminate them to all national departments involved in deciding on noise-generating activities.

## IMPACTS OF UNDERWATER NOISE

1. Anthropogenic ocean noise has rightly come into the spotlight as an issue of serious concern. CMS Parties first addressed this issue in 2008 through a dedicated resolution. Then the focus was still mostly on whales and dolphins, even though it was recognized that other species might also be affected. In the ten years since, scientific studies have increasingly demonstrated that impacts may be far more severe and wide-ranging than previously thought, affecting not only migratory species, but also their prey, and thereby the entire marine food web. This makes it not only an issue with respect to conservation of protected species, but one that also has direct implications for human food security and livelihoods. Furthermore, the transboundary nature of the threat, with sound travelling far and fast underwater, means that the United Nations and their specialized agencies, such as CMS, are ideally placed to address it.
2. While scientists are working hard at improving our understanding of the effects of underwater noise on marine species, applying this emerging knowledge in local and national decision-making is a challenge. Those entrusted with granting approvals and permits for activities in the marine environment need ways of assessing in advance what the impact on marine life will be. Parties to CMS have repeatedly called for noise-related considerations to be taken into account as early as the planning stages of activities, especially by making effective use of Environmental Impact Assessments (EIA). Most recently this was done in [Resolution 12.14 Adverse Impacts of Anthropogenic Noise on Cetaceans and Other Migratory Species](#) (Annex 1).
3. This Resolution endorses the *Guidelines on Environmental Impact Assessments for Marine Noise-generating Activities*, intended for use by the entire CMS Family. The Guidelines are designed to provide regulators with tailored advice presenting Best Available Techniques (BAT) and Best Environmental Practice (BEP) to apply in domestic jurisdictions. They are provided in modular format to enable regulators to apply specific information of relevance to their jurisdiction. Their overall aim is to ensure that decision-makers are presented with sufficient information to make an informed decision about impacts.
4. The Guidelines were developed at governments' request and were endorsed in October 2017 by CMS COP12. They cover the following industries or noise sources:
  - a. Military and civil high-powered sonar
  - b. Shipping and vessel traffic
  - c. Seismic surveys (air gun and alternative technologies)
  - d. Construction works
  - e. Offshore platforms
  - f. Playback and sound exposure experiments
  - g. Pingers (acoustic deterrent/harassment devices, navigation)
  - h. Other noise-generating activities (acoustic data transmission; wind, tidal and wave turbines, future technologies)
5. The Guidelines are accompanied by detailed *Technical Support Information* (CMS/COP12/Inf.11, also available here: <https://www.cms.int/en/guidelines/cms-family-guidelines-EIAs-marine-noise>, and made available as CMS/IOSEA/MOS8/Inf.11.2), which explains in terms readily understandable to policy- and decision-makers how underwater noise works, how it affects marine life, and what the specific vulnerability of different groups of species is. In this, CMS focuses not only on protected species, but also on their prey – which often is also of commercial interest.

6. The *Technical Support Information* includes in Module B *Expert Advice on Specific Species Groups* chapter B.9 *Marine Turtles*. It shows that while the ecological role of hearing has not been well studied for sea turtles, their hearing range of 50-1,200 Hz coincides with the predominant frequencies of anthropogenic noise. This means that it is likely that sea turtles might experience negative effects from noise exposure. Accordingly, this threat should be taken into account when any activities generating underwater noise are under consideration in a country, and appropriate mitigation measures should be used when projects are going ahead.
7. Two related guidance documents will be presented to CMS COP13 (links to be provided in UNEP/CMS/COP13/Doc.26.2.2) and will become available soon:
  - a. Advisory Note: Further guidance on independent, scientific modelling of noise propagation
  - b. Best Available Technology (BAT) and Best Environmental Practice (BET) for Three Noise Sources: Shipping, Seismic Airgun Surveys, and Pile Driving
8. Signatories are encouraged to endorse the *Guidelines on Environmental Impact Assessments for Marine Noise-generating Activities* and disseminate them to all national departments involved in deciding on noise-generating activities.

**Recommended Actions**

9. The Meeting of the Signatories is recommended to:
  - a) take note of the CMS Family *Guidelines on Environmental Impact Assessments for Marine Noise-generating Activities* annexed to CMS Resolution 12.14 (see Annex 1 of this document).
  - b) endorse the Guidelines and disseminate them to all national departments involved in deciding on noise-generating activities.



## CONVENTION ON MIGRATORY SPECIES

Distribution: General

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### ADVERSE IMPACTS OF ANTHROPOGENIC NOISE ON CETACEANS AND OTHER MIGRATORY SPECIES

Adopted by the Conference of the Parties at its 12<sup>th</sup> Meeting (Manila, October 2017)

*Recalling* that in Resolution 9.19 and Resolution 10.24<sup>1</sup> the CMS Parties expressed concern about possible “adverse anthropogenic marine/ocean noise impacts on cetaceans and other biota”,

*Recognizing* that anthropogenic marine noise, depending on source and intensity, is a form of pollution, composed of energy, that may degrade habitat and have adverse effects on marine life ranging from disturbance of communication or group cohesion to injury and mortality,

*Aware* that, over the last century, anthropogenic noise levels in the world’s oceans have significantly increased as a result of multiple human activities,

*Recalling* the obligations of Parties to the United Nations Convention on the Law of the Sea (UNCLOS) to protect and preserve the marine environment and to cooperate on a global and regional basis concerning marine mammals, paying special attention to highly migratory species, including cetaceans listed in Annex I of UNCLOS,

*Recalling* that the United Nations General Assembly Resolution A/RES/71/257 on *Oceans and the Law of the Sea* adopted in 2016 “[n]otes with concern that human-related threats, such as marine debris, ship strikes, underwater noise, persistent contaminants, coastal development activities, oil spills and discarded fishing gear, together may severely impact marine life, including its higher trophic levels, and calls upon States and competent international organizations to cooperate and coordinate their research efforts in this regard so as to reduce these impacts and preserve the integrity of the whole marine ecosystem while fully respecting the mandates of relevant international organizations”,

*Recalling* CMS Resolution 10.15 on *Global Programme of Work for Cetaceans*, which urges Parties and non-Parties to promote the integration of cetacean conservation into all relevant sectors by coordinating their national positions among various conventions, agreements and other international fora and instructs the Aquatic Mammals Working Group of the Scientific Council to develop advisory positions for use in Environmental Impact Assessments at the regional level and to provide support to governments and regional bodies for assessing and defining appropriate standards for noise pollution,

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<sup>1</sup> Both now consolidated as Resolution 12.14

*Recalling* that other international fora recognize anthropogenic marine noise as a potential threat to marine species conservation and welfare, and have adopted related decisions and resolutions or issued guidance, including:

- a) the Convention on Biological Diversity (CBD) through Decision X.29 concerning marine and coastal biodiversity and in particular its paragraph 12 relating to anthropogenic underwater noise and Decision XIII.10 addressing impacts of anthropogenic underwater noise on marine and coastal biodiversity and in particular paragraphs 1-2 relating to anthropogenic underwater noise,
- b) the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS) through Resolution 2.16 on *Impact Assessment of Man-Made Noise*, Resolution 3.10 on *Guidelines to Address the Impact of Anthropogenic Noise on Marine Mammals in the ACCOBAMS Area*, Resolution 4.17 on *Guidelines to address the impact of anthropogenic noise on cetaceans in the ACCOBAMS area*, Resolution 5.15 on *Addressing the Impact of Anthropogenic Noise* and Resolution 6.17 on *Anthropogenic Noise*,
- c) the Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS) through Resolution 5.4 on *Adverse Effects of Sound, Vessels and other Forms of Disturbance on Small Cetaceans*, Resolution 6.2 on *Adverse Effects of Underwater Noise on Marine Mammals during Offshore Construction Activities for Renewable Energy Production* and Resolution 8.11 on *CMS Family Guidelines on Environmental Impact Assessments for Marine Noise-generating Activities*,
- d) the International Maritime Organization (IMO), which in 2008 established in its Marine Environmental Protection Committee a high priority programme of work on minimizing the introduction of incidental noise from commercial shipping operations into the marine environment, and which in 2014 issued MEPC.1/Circ.833 *Guidelines for the Reduction of Underwater Noise from Commercial Shipping to Address Adverse Impacts on Marine Life*,
- e) the Convention for the Protection of the Marine Environment of the North-East-Atlantic (OSPAR) Guidance on environmental considerations for offshore wind farm development,
- f) the International Union for Conservation of Nature (IUCN) Resolution 3.068 concerning undersea noise pollution (World Conservation Congress at its 3<sup>rd</sup> Session in Bangkok, Thailand, 17–25 November 2004),
- g) following International Whaling Commission (IWC) Resolution 1998-6, the IWC Scientific Committee has investigated the impacts of military sonar, seismic surveys, masking and shipping noise; it has concluded that, in addition to some instances of severe acute effects (e.g. from military sonar and similar noise sources), existing levels of ocean noise can have a chronic effect, and agreed that action should be taken to reduce noise in parallel with efforts to quantify these effects; and the IWC has identified the importance of continued and increased collaboration on this issue with other organizations including ACCOBAMS, ASCOBANS, IMO and IUCN,

*Recalling* that according to Article 236 of UNCLOS, that Convention's provisions regarding the protection and preservation of the marine environment do not apply to warships, naval auxiliary and other vessels or aircraft owned or operated by a State and used, for the time being, only on governmental non-commercial service; and that each State is required to ensure, by the adoption of appropriate measures not impairing operations or operational capabilities of such vessels or aircraft owned or operated by it, that such vessels or aircraft act in a manner consistent, so far as is reasonable and practicable, with UNCLOS,

*Noting* that the Convention on Biological Diversity (CBD) decision VI/20 recognized CMS as the lead partner in the conservation and sustainable use of migratory species over their entire range,

*Acknowledging* the ongoing activities in other fora to reduce underwater noise such as the activities within NATO to avoid negative effects of sonar use,

*Noting* Directive 2014/52/EU of the European Parliament and of the Council, amending Directive 2011/92/EU on the *Assessment of the Effects of Certain Public and Private Projects on the Environment*,

*Noting* the EU Marine Strategy Framework Directive and its implementing act, where Member States in European Union marine waters shall take necessary measures by 2020 to achieve or maintain their determined good environmental status, including on underwater noise, established by each of them and in coordination at Union, regional and sub-regional levels,

*Grateful* for the invitation of ACCOBAMS and ASCOBANS, accepted in 2014, that CMS participate in the Joint Noise Working Group, which provides detailed and precautionary advice to Parties, particularly on available mitigation measures, alternative technologies and standards required for achieving the conservation goals of the treaties,

*Aware* that some types of marine noise can travel faster than other forms of pollution over more than hundreds of kilometres underwater unrestricted by national boundaries and that these are ongoing and increasing,

*Taking into account* the lack of data on the distribution and migration of some populations of marine species and on the adverse human-induced impacts on CMS-listed marine species and their prey,

*Aware* that incidents of stranding and deaths of some cetacean species have coincided with and may be due to the use of high-intensity mid-frequency active sonar,

*Reaffirming* that the difficulty of proving possible negative impacts of acoustic disturbance on CMS-listed marine species and their prey necessitates a precautionary approach in cases where such an impact is likely,

*Noting* the draft research strategy developed by the European Science Foundation on "*the effects of anthropogenic sound on marine mammals*", which is based on a risk assessment framework,

*Noting* the OSPAR *Code of Conduct for Responsible Marine Research in the Deep Seas and High Seas of the OSPAR Marine Area* and the ISOM *Code of Conduct for Marine Scientific Research Vessels*, providing that marine scientific research is carried out in an environmentally friendly way using appropriate study methods reasonably available,

*Aware* of the calls on the IUCN constituency to recognize that, when there is reason to expect that harmful effects on biota may be caused by anthropogenic marine noise, lack of full scientific certainty should not be used as a reason for postponing measures to prevent or minimize such effects,

*Recognizing* with concern that cetaceans and other marine mammals, reptiles and fish species, and their prey, are vulnerable to noise disturbance and subject to a range of human impacts,

*The Conference of the Parties to the  
Convention on the Conservation of Migratory Species of Wild Animals*

1. *Reaffirms* that there is a need for ongoing and further internationally coordinated research on the impact of underwater noise (including inter alia from offshore wind farms and associated shipping) on CMS-listed marine species and their prey, their migration routes and ecological coherence, in order to give adequate protection to cetaceans and other marine migratory species;
2. *Confirms* the need for international, national and regional limitation of harmful anthropogenic marine noise through management (including, where necessary, regulation), and that this Resolution remains a key instrument in this regard;
3. *Urges* Parties and invites non-Parties that exercise jurisdiction over any part of the range of marine species listed on the appendices of CMS, or over flag vessels that are engaged within or beyond national jurisdictional limits, to take special care and, where appropriate and practical, to endeavour to control the impact of anthropogenic marine noise pollution in habitats of vulnerable species and in areas where marine species that are vulnerable to the impact of anthropogenic marine noise may be concentrated, to undertake relevant environmental assessments on the introduction of activities that may lead to noise-associated risks for CMS-listed marine species and their prey;
4. *Strongly urges* Parties to prevent adverse effects on CMS-listed marine species and their prey by restricting the emission of underwater noise; and where noise cannot be avoided, *further urges* Parties to develop an appropriate regulatory framework or implement relevant measures to ensure a reduction or mitigation of anthropogenic marine noise;
5. *Calls* on Parties and *invites* non-Parties to adopt whenever possible mitigation measures on the use of high intensity active naval sonars until a transparent assessment of their environmental impact on marine mammals, fish and other marine life has been completed and as far as possible aim to prevent impacts from the use of such sonars, especially in areas known or suspected to be important habitat to species particularly sensitive to active sonars (e.g. beaked whales) and in particular where risks to marine species cannot be excluded, taking account of existing national measures and related research in this field;
6. *Urges* Parties to ensure that Environmental Impact Assessments take full account of the effects of activities on CMS-listed marine species and their prey and consider a more holistic ecological approach at a strategic planning stage;
7. *Endorses* the “CMS Family Guidelines on Environmental Impact Assessments for Marine Noise-generating Activities” attached as Annex and *welcomes* the Technical Support Information contained in UNEP/CMS/COP12/Inf.11<sup>2</sup>;
8. *Invites* Parties to ACCOBAMS and ASCOBANS to consider adopting these Guidelines, in the elaboration of which they were fully involved, at their next Meetings of the Parties;
9. *Further invites* Signatories to relevant Memoranda of Understanding concluded under CMS to consider using these Guidelines as guiding documents;
10. *Recognizes* that the work done in relation to marine noise is rapidly evolving, and *requests* the Scientific Council, in collaboration with the Joint Noise Working Group of CMS, ACCOBAMS and ASCOBANS, to review and update these Guidelines regularly;

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<sup>2</sup> also provided online at <http://www.cms.int/guidelines/cms-family-guidelines-EIAs-marine-noise>

11. *Urges* Parties and *encourages* non-Parties to disseminate these Guidelines, where necessary translating the Guidelines into different languages for their wider dissemination and use;
12. *Invites* the private sector and other stakeholders to make full use of these Guidelines in order to assess, mitigate and minimize negative effects of anthropogenic marine noise on marine biota;
13. *Welcomes* the efforts of the private sector and other stakeholders to reduce their environmental impact and *strongly encourages* them to continue making this a priority;
14. *Recommends* that Parties, the private sector and other stakeholders apply Best Available Techniques (BAT) and Best Environmental Practice (BEP) including, where appropriate, clean technology, in their efforts to reduce or mitigate marine noise pollution;
15. *Further recommends* that Parties, the private sector and other stakeholders use, as appropriate, noise reduction techniques for offshore activities such as: air-filled coffer dams, bubble curtains or hydro-sound dampers, or different foundation types (such as floating platforms, gravity foundations or pile drilling instead of pile driving);
16. *Stresses* the need of Parties to consult with any stakeholder conducting activities known to produce anthropogenic marine noise with the potential to cause adverse effects on CMS-listed marine species and their prey, such as the oil and gas industry, shoreline developers, offshore extractors, marine renewable energy companies, other industrial activities and oceanographic and geophysical researchers recommending, how best practice of avoidance, diminution or mitigation of risk should be implemented. This also applies to military authorities to the extent that this is possible without endangering national security interests. In any case of doubt the precautionary approach should be applied;
17. *Encourages* Parties to integrate the issue of anthropogenic noise into the management plans of marine protected areas (MPAs) where appropriate, in accordance with international law, including UNCLOS;
18. *Invites* the private sector to assist in developing mitigation measures and/or alternative techniques and technologies for coastal, offshore and maritime activities in order to minimize anthropogenic noise pollution of the marine environment to the highest extent possible;
19. *Encourages* Parties to facilitate:
  - regular collaborative and coordinated temporal and geographic monitoring and assessment of local ambient noise (both of anthropogenic and biological origin);
  - further understanding of the potential for sources of noise to interfere with long-range movements and migration;
  - the compilation of a reference signature database, to be made publicly available, to assist in identifying the source of potentially damaging sounds;
  - characterization of sources of anthropogenic noise and sound propagation to enable an assessment of the potential acoustic risk for individual species in consideration of their auditory sensitivities;
  - studies on the extent and potential impact on the marine environment of high-intensity active naval sonars and seismic surveys in the marine environment; and the extent of noise inputs into the marine environment from shipping and to provide an assessment, on the basis of information to be provided by the Parties, of the impact of current practices; and
  - studies reviewing the potential benefits of “noise protection areas”, where the emission of underwater noise can be controlled and minimized for the protection of cetaceans and other biota;

whilst recognizing that some information on the extent of the use of military sonars (e.g. frequencies used) will be classified and would not be available for use in the proposed studies or databases;

20. *Recommends* that Parties that have not yet done so establish national noise registries to collect and display data on noise-generating activities in the marine area to help assess exposure levels and the likely impacts on the marine environment, and that data standards are made compatible with regional noise registries, such as the ones developed by the International Council for the Exploration of the Sea (ICES) and ACCOBAMS;
21. *Urges* all Parties to endeavour to develop provisions for the effective management of anthropogenic marine noise in CMS daughter agreements and other relevant bodies and Conventions;
22. *Invites* the Parties to strive, wherever possible, to ensure that their activities falling within the scope of this Resolution avoid harm to CMS-listed marine species and their prey;
23. *Requests* the Scientific Council, supported by the Joint Noise Working Group of CMS, ACCOBAMS and ASCOBANS, to continue monitoring new available information on the effects of underwater noise on marine species, as well as the effective assessment and management of this threat, and to make recommendations to Parties as appropriate;
24. *Requests* the Secretariat and *calls upon* Parties to contribute to the work of the IMO MEPC on noise from commercial shipping;
25. *Invites* Parties to provide the CMS Secretariat, for transmission to the Scientific Council, with copies of relevant protocols/guidelines and provisions for the effective management of anthropogenic noise, taking security needs into account, such as those of relevant CMS daughter agreements, OSPAR, IWC, IMO, NATO and other fora, thereby avoiding duplication of work; and
26. *Repeals*
  - a) Resolution 9.19, *Adverse Anthropogenic Marine/Ocean Noise Impacts on Cetaceans and Other Biota*; and
  - b) Resolution 10.24, *Further Steps to Abate Underwater Noise Pollution for the Protection of Cetaceans and Other Migratory Species*.

# CMS Family Guidelines on Environmental Impact Assessment for Marine Noise-generating Activities

These **CMS Family Guidelines on Environmental Impact Assessment for Marine Noise-generating Activities** have been developed to present the Best Available Techniques (BAT) and Best Environmental Practice (BEP), as called for in CMS Resolutions 9.19, 10.24 and 10.15, ACCOBAMS Resolution 5.15 and ASCOBANS Resolutions 6.2 and 8.11. In addition to the parent convention, CMS, these guidelines are relevant to:

- Agreement on the Conservation of Cetaceans of the Black Seas Mediterranean Seas and Contiguous Atlantic Area (ACCOBAMS)
- Agreement on the Conservation of Seals in the Wadden Sea (Wadden Sea Seals)
- Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS)
- MOU Concerning Conservation Measures for the Eastern Atlantic Populations of the Mediterranean Monk Seal (*Monachus monachus*) (Atlantic Monk Seals)
- MOU Concerning Conservation Measures for Marine Turtles of the Atlantic Coast of Africa (Atlantic Marine Turtles)
- MOU Concerning the Conservation of the Manatee and Small Cetaceans of Western Africa and Macaronesia (Western African Aquatic Mammals)
- MOU for the Conservation of Cetaceans and their Habitats in the Pacific Islands Region (Pacific Islands Cetaceans)
- MOU on the Conservation and Management of Dugongs (*Dugong dugon*) and their Habitats throughout their Range (Dugong)
- MOU on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia (IOSEA)
- MOU on the Conservation of Migratory Sharks (Sharks)

## Contents

I.	Introduction.....	8
II.	Technical Support Information to the CMS Family Guidelines on Environmental Impact Assessment for Marine Noise-generating Activities.....	9
III.	Technical Advisory Notes.....	10
III.1.	Ambient Sound .....	10
III.2.	Sound Intensity .....	11
III.3.	Exclusion Zones .....	11
III.4.	Independent, Scientific Modelling of Noise Propagation .....	11
III.5.	Sound Exposure Level cumulative (SEL <sub>cum</sub> ).....	11
III.6.	Particle Motion/Displacement .....	12
IV.	EIA Guideline for Military and Civil High-powered Sonar .....	12
V.	EIA Guideline for Shipping and Vessels Traffic .....	15
VI.	EIA Guideline for Seismic Surveys (Air Gun and Alternative Technologies).....	17
VII.	EIA Guideline for Construction Works.....	20
VIII.	EIA Guideline for Offshore Platforms .....	22
IX.	EIA Guideline for Playback and Sound Exposure Experiments .....	25
X.	EIA Guideline for Pingers (Acoustic Deterrent/Harassment Devices, Navigation) .....	28
XI.	EIA Guideline for Other Noise-generating Activities (Acoustic Data Transmission, Wind, Tidal and Wave Turbines and Future Technologies).....	30
XII.	References .....	32

## I. Introduction

1. These **CMS Family Guidelines on Environmental Impact Assessment for Marine Noise-generating Activities** are designed to provide regulators with tailored advice to apply in domestic jurisdictions, as appropriate, to create EIA standards between jurisdictions seeking to manage marine noise-generating activities. The requirements within each of the modules are designed to ensure that the information being provided by proponents will provide decision-makers with sufficient information to make an informed decision about impacts. The modules should be read in tandem with the **Technical Support Information to the CMS Family Guidelines on Environmental Impact Assessments for Marine Noise-generating Activities** (available at [www.cms.int/guidelines/cms-family-guidelines-EIAs-marine-noise](http://www.cms.int/guidelines/cms-family-guidelines-EIAs-marine-noise)). They are structured to stand as one complete unit or to be used as discrete modules, tailored for national and agreement approaches.
2. The sea is the interconnected system of all the Earth's oceanic waters, including the five named 'oceans' - the Atlantic, Pacific, Indian, Southern and Arctic Oceans - a continuous body of salty water that covers over 70 per cent of the Earth's surface. This vast aquatic environment is home to a wider range of higher animal taxa than exists on land. Many marine species have yet to be discovered and the number known to science is expanding annually.
3. The sea also provides people with food—mainly fish, shellfish and seaweed—as well as other marine resources. It is a shared resource for us all.
4. Marine wildlife relies on sound for vital life functions, including communication, prey and predator detection, orientation and for sensing surroundings. The ocean environment is filled with natural sound (ambient noise) from biological (marine animals) and physical processes (earthquakes, wind, ice and rain) (Urick, 1983). Species living in this environment are adapted to these sounds.
5. Over the past century many anthropogenic marine activities have increased levels of noise (Hildebrand 2009; André et.al. 2010; Miksis-Olds and Nichols 2016) These modern anthropogenic noises have the potential for physical, physiological and behavioural impacts (Southall et.al. 2007).
6. Parties to CMS, ACCOBAMS and ASCOBANS have in several resolutions recognized underwater noise as a major threat to many marine species. These resolutions also call for noise-related considerations to be taken into account as early as the planning stages of activities, especially by making effective use of Environmental Impact Assessments (EIAs). The Convention on Biological Diversity Decision XII/23 also encourages governments to require EIAs for noise-generating offshore activities, and to combine acoustic mapping with habitat mapping to identify areas where these species may be exposed to noise impacts. (Prideaux, 2017b)
7. Wildlife exposed to elevated or prolonged anthropogenic noise can suffer direct injury and/or temporary or permanent auditory threshold shifts. Noise can mask important natural sounds, such as the call of a mate, or the sound made by prey or predator. Anthropogenic noise can also displace wildlife from important habitats. These impacts are experienced by a wide range of species including fish, crustaceans, cephalopods, pinnipeds (seals, sea lions and walrus), sirenians (dugong and manatee), sea turtles, the polar bear, marine otters and cetaceans (whales, dolphins and porpoises) (Southall et.al. 2007; Aguilar de Soto, 2017a; 2017b; Castellote, 2017a; 2017b; Frey, 2017; Hooker, 2017; McCauley, 2017; Marsh, 2017; Notarbartolo di Sciara, 2017a; 2017b; 2017c; Parks, 2017; Truda Palazzo, 2017; Vongraven, 2017). Where there is risk, full assessment of impact should be conducted.

8. The propagation of sound in water is complex and requires many variables to be carefully considered before it can be known if a noise-generating activity is appropriate or not. It is inappropriate to generalize sound transmission without fully investigating propagation (Prideaux, 2017a). Often, statements are made in Environmental Impact Assessments that a noise-generating activity is 'X' distance from 'Y' species or habitat and therefore, will have no impact. In these cases, distance is used as a basic proxy for impact but is rarely backed with scientifically modelled information. (Wright et.al. 2013; Prideaux and Prideaux 2015)

9. To present a defensible Environmental Impact Assessment for any noise-generating activity proposal, proponents need to have expertly modelled the noise of the proposed activity in the region and under the conditions they plan to operate. Regulators should have an understanding of the ambient or natural sound in the proposed area. This might require CMS Parties or jurisdictions to develop a metric or method for defining this, by drawing on the range of resources available worldwide. (Prideaux, 2017a)

10. All EIAs should include operational procedures to mitigate impact effectively during activities, and there should be proof of the mitigation's efficacy. These are the operational mitigation procedures that should be detailed in the national or regional regulations of the jurisdictions where the activity is proposed. Operational monitoring and mitigation procedures differ around the world, and may include industry/company best practices. Monitoring often includes, *inter alia*:

- a. periods of visual and other observation before a noise-generating activity commences
- b. passive acoustic monitoring
- c. marine mammal observers
- d. aerial surveys

Primary mitigation often includes, *inter alia*:

- e. delay to start, soft start and shut-down procedures
- f. sound dampers, including bubble curtains and cofferdams; sheathing and jacket tubes
- g. alternative low-noise or noise-free options (such as compiled in the OSPAR inventory of measures to mitigate the emission and environmental impact of underwater noise)

Secondary mitigation, where the aim is to prevent encounters of marine life with noise sources, includes *inter alia*:

- h. spatial & temporal exclusion of activities

11. Approaches to mitigate the impact of particle motion (e.g. reducing substrate or sea ice vibration) should also be investigated. Assessment of the appropriateness and efficacy of all operational procedures should be the responsibility of the government agency assessing Environmental Impact Assessments (EIA).

## II. Technical Support Information to the CMS Family Guidelines on Environmental Impact Assessment for Marine Noise-generating Activities

12. **Technical Support Information to the CMS Family Guidelines on Environmental Impact Assessments for Marine Noise-generating Activities** is provided as a full document and as stand-alone modules at: [www.cms.int/guidelines/cms-family-guidelines-EIAs-marine-noise](http://www.cms.int/guidelines/cms-family-guidelines-EIAs-marine-noise).

13. This **Technical Support Information** has been specifically designed to provide clarity and certainty for regulators, when deciding to approve or restrict proposed activities. The document provides detailed information about species' vulnerabilities, habitat considerations, impact of exposure levels and proposed assessment criteria for all of the CMS-listed species groups and their prey.

14. The document is structured to cover specific areas, as follows:
- ‘Module A: Sound in Water is Complex’ provides an insight into the characteristics of sound propagation and dispersal. This module is designed to provide decision-makers with necessary foundation knowledge to interpret the other modules in these guidelines and any impact assessments that are presented to them for consideration.
  - ‘Module B: Expert Advice on Specific Species Groups’ presents twelve separate detailed sub-modules covering each of the CMS species groups, focusing on species’ vulnerabilities, habitat considerations, impact of exposure levels and assessment criteria.
  - ‘Module C: Decompression Stress’ provides important information on bubble formation in marine mammals, source of decompression stress, source frequency, level and duration, and assessment criteria.
  - ‘Module D: Exposure Levels’ presents a summary of the current state of knowledge about general exposure levels.
  - ‘Module E: Marine Noise-generating Activities’ provides a brief summary of military sonar, seismic surveys, civil high-powered sonar, coastal and offshore construction works, offshore platforms, playback and sound exposure experiments, shipping and vessel traffic, pingers and other noise-generating activities. Each section presents current knowledge about sound intensity level, frequency range and the activities’ general characteristics. The information is summarized in a table within the module.
  - ‘Module F: Related Intergovernmental or Regional Economic Organization Decisions’ presents the series of intergovernmental decisions that have determined the direction for regulation of anthropogenic marine noise.
  - ‘Module G: Principles of EIAs’ establishes basic principles including strategic environmental assessments, transparency, natural justice, independent peer review, consultation and burden of proof.
  - ‘Module H: CMS-Listed Species Potentially Impacted by Anthropogenic Marine Noise’

15. The evidence presented in the **Technical Support Information** Modules B, C and D establishes that the effective use of EIA for all marine noise-generating activities is in line with CMS Resolutions 9.19, 10.24 and 10.15, ACCOBAMS Resolution 5.15 and ASCOBANS Resolutions 6.2 and 8.11.

16. The **Technical Support Information** was developed before the release of ISO 18405: Underwater acoustics – Terminology that provides valuable consistency to language used. The Guidelines have been slightly adapted to reflect this new ISO standard, without losing the vital connection to the **Technical Support Information**. Decision-makers should refer to both documents wherever possible.

### III. Technical Advisory Notes

17. The following advisory notes should be considered in conjunction with the individual EIA Guideline tables, as presented in Modules IV through XI.

#### III.1. Ambient Sound

18. ISO 18405 refers to ambient sound as “*sound that would be present in the absence of a specified activity*” and “*is location-specific and time-specific*”. These Guidelines more specifically define it as the average ambient (non-anthropogenic) sound levels from biological (marine animals) and physical processes (earthquakes, wind, ice and rain etc) of a given area. It should be measured (including daily and seasonal variations of frequency bands), for each component of an activity, prior to an EIA being developed and presented.

## III.2 Sound Intensity

19. ISO 18405 defines sound intensity as “the product of the sound pressure”, which is the contribution to total pressure caused by the action of sound, “and sound particle velocity”, which is the contribution to velocity of a material element caused by the action of sound.

## III.3. Exclusion Zones

20. Where exclusion zones are referred to in these Guidelines, these are areas that are designed for the protection of specific species and/or populations. Activities, and noise generated by activities, should not propagate into these areas.

## III.4. Independent, Scientific Modelling of Noise Propagation

21. The objective of noise modelling for EIAs is to predict how much noise a particular activity will generate and how it will disperse. The aim is to model the received sound levels at given distances from the noise source. The amount of sound lost at the receiver from the sound source is propagation loss.

22. The intention of EIAs is to assess the impact of proposed activities on marine species and the environment. EIAs should not only present the main output of interest to the activity proponent, but should fully disclose the full frequency bandwidth of a proposed anthropogenic noise source, the intensity/pressure/energy output within that full range, and the principal or mean/median operating frequency of the source(s). (Urlick, 1983, Etter, 2013; Prideaux, 2017a)

23. Many propagation models have been developed such as ray theory, normal modes, multipath expansion, fast field, wavenumber integration or parabolic equation. However, no single model accounts for all frequencies and environments. Factors that influence which propagation model/s should be used include the activity noise frequencies, water depth, seabed topography, temperature and salinity, and spatial variations in the environment. (Urlick, 1983, Etter, 2013; Prideaux, 2017a)

24. The accuracy (i.e. bias) of sound propagation models depends heavily on the accuracy of their input data.

25. Commonly missing in EIAs is the modelling of particle motion propagation. Invertebrates, and some fish, detect sound through particle motion to identify predator and prey. Like sound intensity, particle motion varies significantly close to noise sources and in shallow water. Excessive levels of ensonification of these animal groups may lead to injury (barotrauma). Specific modelling techniques are required to predict the impact on these species.

## III.5. Sound Exposure Level cumulative (SEL<sub>cum</sub>)

26. Sound Exposure Level (SEL) is generally referred to as dB 0 to peak or peak to peak (dB 0 to peak or dB p to p) for impulsive noise like air guns or pile driving, and dB Root Mean Squared (dB<sub>rms</sub>) for non-impulsive noise such as ship noise, dredging or a wind farm’s constant drone. Often this metric is normalized to a single sound exposure of one second (NOAA, 2016). The SEL cumulative (SEL<sub>cum</sub>) metric allows the cumulative exposure of an animal to a sound field for an extended period (often 24 hours) to be assessed against a predefined threshold for injury. (Southall, 2007; NOAA, 2016)

27. NOAA recommends a baseline accumulation period of 24 hours, but acknowledges that there may be specific exposure situations where this accumulation period requires adjustment (e.g., if activity lasts less than 24 hours or for situations where receivers are predicted to experience unusually long exposure durations). (NOAA, 2016) The limit value for pile driving in Germany is a sound exposure level of SEL<sub>05</sub> and the sound pressure level L<sub>peak</sub> at a distance of 750 metres.

### III.6. Particle Motion/Displacement

28. Sound exposure levels works well for marine mammals but not well for a number of other marine species, including crustaceans, bivalves and cephalopods, because these species are thought to mainly detect sound through particle motion. Particle motion or particle displacement is the displacement of a material element caused by the action of sound. For these Guidelines the motion concerned is the organism resonating in sympathy with the surrounding sound waves, oscillating back and forth in a particular direction, rather than through the tympanic mechanism of marine mammals or swim-bladders of some fish species. (Mooney, et.al., 2010; André, et.al., 2011; Hawkins and Popper, 2016; NOAA, 2016)

29. The detection of particle motion or particle displacement requires different types of sensors than those utilized by a conventional hydrophone. These sensors must specify the particle motion in terms of the particle displacement, or its time derivatives (particle velocity or particle acceleration).

## IV. EIA Guideline for Military and Civil High-powered Sonar

This EIA Guideline should be used in combination with the appropriate modules on species and impact from the **Technical Support Information** (B.1-12, C and D) as required for individual regional and domestic circumstances.

The EIA Guideline for Shipping and Vessels Traffic (V) should be used when the vessel is underway/making way with sonar off.

Component	Detail
Description of area	<ul style="list-style-type: none"> <li>• Detail of the spatial extent and nature of the activity – including seabed bathymetry and composition, description of known stratification characteristics and broad ecosystem descriptions – as well as the spatial area that will experience anthropogenic noise, generated by the proposed activity, above natural ambient sound levels</li> <li>• Detail of the typical weather conditions and day length for the area during the proposed activity period</li> <li>• Identification of previous and simultaneous activities, their seasons and duration in the same or adjoining areas, existence and location of any marine protected areas, and a review of activity findings and implications</li> </ul>

Component	Detail
<b>Description of the equipment and activity</b>	<ul style="list-style-type: none"> <li>• Explanation of all activity technologies available and why each proposed technology is chosen</li> <li>• Description of the activity technology including:               <ol style="list-style-type: none"> <li>a. name and description of the vessel/s to be used (except where details would risk national security)</li> <li>b. total duration of the proposed activity</li> <li>c. proposed timing of operations – season/time of day/during all weather conditions</li> <li>d. signal duration and sound intensity level (dB peak to peak) in water @ 1 metre, frequency ranges and ping rate</li> </ol> </li> <li>• Specification of the activity including anticipated nautical miles to be covered, track-lines, speed of vessels and sonar power setting changes</li> <li>• Identification of other activities having an impact in the region during and after the planned activity, if there is information, accompanied by the analysis and review of potential cumulative or synergistic impacts</li> </ul>
<b>Modelling of noise propagation loss</b>	<ul style="list-style-type: none"> <li>• Detail of independent, scientific modelling of noise propagation loss in the same season/weather conditions as the proposed activity accounting for local propagation features (depth and type of sea bottom, local propagation paths related to thermal stratification, SOFAR or natural channel characteristics) from point source out to a radius where the noise levels generated are close to natural ambient sound levels</li> <li>• Identification and mapping of proposed exclusion zones for species and description of how noise propagation into these zones will be minimized, taking into consideration the local propagation features</li> </ul>
<b>Species impact</b>	<ul style="list-style-type: none"> <li>• General:               <ol style="list-style-type: none"> <li>a. Identification and density of species likely to be present that will experience sound transmission generated by the proposed activity above natural ambient sound levels; and calculated from this, the extent of the impact zones</li> <li>b. Specification of the type of impact predicted (direct and indirect) as well as direct and indirect impacts on prey species</li> <li>c. Information on the behaviour of each species group, and the ability to detect each of the species for mitigation purposes (e.g. for marine mammals this will include diving behaviour, vocal behaviour, and conspicuousness when at the surface).</li> </ol> </li> <li>• For each species group, also detail of the following (refer to module B species summaries):               <ol style="list-style-type: none"> <li>a. Species vulnerabilities:                   <ol style="list-style-type: none"> <li>i. specific vulnerabilities to noise</li> <li>ii. lifecycle components of these vulnerabilities</li> </ol> </li> <li>b. Habitat:                   <ol style="list-style-type: none"> <li>i. specific habitat components considered</li> <li>ii. presence of critical habitat (calving, spawning, feeding grounds, resting bays etc.)</li> </ol> </li> <li>c. Scientific assessment of impact:                   <ol style="list-style-type: none"> <li>i. exposure levels</li> <li>ii. total exposure duration</li> <li>iii. determination of precautionary safe/harmful exposure levels (direct impact, indirect impact and disturbance) that account for uncertainty and avoids erroneous conclusions.</li> </ol> </li> </ol> </li> <li>• Quantification of the effectiveness of proposed mitigation methods</li> </ul>

Component	Detail
<b>Mitigation and monitoring plans</b>	<ul style="list-style-type: none"> <li>• Detail of:               <ol style="list-style-type: none"> <li>a. Scientific monitoring programmes before the survey to assess species distribution and behaviour, to facilitate the incorporation of monitoring results into the impact assessment.</li> <li>b. Scientific monitoring programmes, conducted during and after the activity, to assess impact</li> <li>c. Transparent processes for regular real-time public reporting of activity progress and all impacts encountered</li> <li>d. Most appropriate methods of species detection (e.g. visual/acoustic) and the range of available methods, and their advantages and limitations, as well their practical application during the activity.</li> <li>e. Impact mitigation proposals:                   <ol style="list-style-type: none"> <li>i. 24-hour visual or other means of detection, especially under conditions of poor visibility (including high winds, night conditions, sea spray or fog)</li> <li>ii. establishing exclusion zones to protect specific species, accompanied by scientific and precautionary justification for these zones</li> <li>iii. soft start and shut-down protocols</li> <li>iv. spatio-temporal restrictions</li> </ol> </li> </ol> </li> </ul>
<b>Reporting plans</b>	<ul style="list-style-type: none"> <li>• Detail of post operation reporting plans including verification of the effectiveness of mitigation</li> </ul>
<b>Consultation and independent review</b>	<ul style="list-style-type: none"> <li>• Description of consultation, prior to EIA submission:               <ol style="list-style-type: none"> <li>a. List of stakeholders consulted</li> <li>b. Detail of information provided to stakeholders, opportunities given for appropriate engagement and the timeframe for feedback</li> <li>c. Explanation of what amendments and changes have been made to the proposed activity in response to the comments, queries, requests and concerns</li> <li>d. Explanation of which comments, queries, requests and concerns have not been accommodated and why</li> </ol> </li> <li>• Description of independent review of draft EIA:               <ol style="list-style-type: none"> <li>a. Detail of the independent reviewers (species experts) including affiliation and qualifications</li> <li>b. Description of the comments, queries, requests and concerns received from each reviewer</li> <li>c. Explanation of what amendments and changes have been made to the proposed activity in response to the comments, queries, requests and concerns</li> <li>d. Explanation of which comments, queries, requests and concerns have not been accommodated and why</li> </ol> </li> </ul>

## V. EIA Guideline for Shipping and Vessels Traffic

This EIA Guideline should be used in combination with the appropriate modules on species and impact from the **Technical Support Information** (B.1-12, C and D) as required for individual regional and domestic circumstances.

This EIA Guideline is directed to shipping regulators, including port and harbour authorities. Cumulative impact of shipping, identifying appropriate exclusion zones and shipping lanes should be the focus.

Component	Detail
<b>Description of area</b>	<ul style="list-style-type: none"> <li>• Detail of the spatial extent and nature of the activity – including seabed bathymetry and composition, description of known stratification characteristics and broad ecosystem descriptions – as well as the spatial area that will experience anthropogenic noise, generated by the proposed shipping, above natural ambient sound levels</li> <li>• Detail of the typical weather conditions and day length for the area during the proposed activity period</li> <li>• Existence and location of any marine protected areas</li> </ul>
<b>Description of vessels and equipment</b>	<ul style="list-style-type: none"> <li>• Description of vessel/s (tonnage, propulsion and displacement) and equipment activity</li> <li>• Detail of all activities including sound intensity levels (dB<sub>rms</sub>) @ 1 metre and frequency ranges (all frequencies to encompass, <i>inter alia</i>, propeller resonance, harmonics, cavitations, engine and hull noise)</li> <li>• Identification of other activities having an impact in the region accompanied by the analysis and review of potential cumulative or synergistic impacts</li> </ul>
<b>Modelling of noise propagation loss</b>	<ul style="list-style-type: none"> <li>• Detail of independent, scientific modelling of noise propagation loss in confined areas (harbours and channels) and accounting for local propagation features (depth and type of sea bottom, local propagation paths related to thermal stratification, SOFAR or natural channel characteristics) from point source out to a radius where the noise levels generated are close to natural ambient sound levels</li> <li>• Identification and mapping of proposed species exclusion zones and description of how noise propagation into these zones will be minimized, taking into consideration the local propagation features</li> </ul>

Component	Detail
<b>Species impact</b>	<ul style="list-style-type: none"> <li>• General:               <ol style="list-style-type: none"> <li>a. Identification and density of species likely to be present that will experience sound transmission generated by the proposed activity above natural ambient sound levels. Calculated from this, the extent of the impact zones, and the number of animals affected by the activity.</li> <li>b. Specification of the type of impact predicted (direct and indirect) as well as direct and indirect impacts on prey species</li> <li>c. Information on the behaviour of each species group, and the ability to detect each of the species for mitigation purposes (e.g. for marine mammals this will include diving behaviour, vocal behaviour, and conspicuousness when at the surface).</li> </ol> </li> <li>• For each species group, also detail of the following (refer to module B species summary):               <ol style="list-style-type: none"> <li>a. Species vulnerabilities:                   <ol style="list-style-type: none"> <li>i. specific vulnerabilities to noise</li> <li>ii. lifecycle components of these vulnerabilities</li> </ol> </li> <li>b. Habitat:                   <ol style="list-style-type: none"> <li>i. specific habitat components considered</li> <li>ii. presence of critical habitat (calving, spawning, feeding grounds, resting bays etc.)</li> </ol> </li> <li>c. Scientific assessment of impact:                   <ol style="list-style-type: none"> <li>i. exposure levels</li> <li>ii. total exposure duration</li> <li>iii. determination of precautionary safe/harmful exposure levels (direct impact, indirect impact and disturbance) that account for uncertainty and avoids erroneous conclusions</li> </ol> </li> </ol> </li> </ul>
<b>Monitoring plans</b>	<ul style="list-style-type: none"> <li>• Explanation of access to the evaluation of ongoing scientific monitoring data to assess impacts</li> <li>• Quantification of the effectiveness of proposed mitigation methods</li> <li>• Spatio-temporal restrictions</li> </ul>
<b>Consultation and independent review</b>	<ul style="list-style-type: none"> <li>• Description of consultation, prior to EIA submission:               <ol style="list-style-type: none"> <li>a. List of stakeholders consulted</li> <li>b. Detail of information provided to stakeholders, opportunities given for appropriate engagement and the timeframe for feedback</li> <li>c. Explanation of what amendments and changes have been made to the proposed activity in response to the comments, queries, requests and concerns</li> <li>d. Explanation of which comments, queries, requests and concerns have not been accommodated and why</li> </ol> </li> <li>• Description of independent review of draft EIA:               <ol style="list-style-type: none"> <li>a. Detail of the independent reviewers (species experts) including affiliation and qualifications</li> <li>b. Description of the comments, queries, requests and concerns received from each reviewer</li> <li>c. Explanation of what amendments and changes have been made to the proposed activity in response to the comments, queries, requests and concerns</li> <li>d. Explanation of which comments, queries, requests and concerns have not been accommodated and why</li> </ol> </li> </ul>

## VI. EIA Guideline for Seismic Surveys (Air Gun and Alternative Technologies)

This EIA Guideline should be used in combination with the appropriate modules on species and impact from the **Technical Support Information** (B.1-12, C and D) as required for individual regional and domestic circumstances.

Component	Detail
<b>Description of area</b>	<ul style="list-style-type: none"> <li>• Detail of the spatial extent and nature of the survey – including seabed bathymetry and composition, description of known stratification characteristics and broad ecosystem descriptions – as well as the spatial area that will experience anthropogenic noise, generated by the proposed survey, above natural ambient sound levels</li> <li>• Detail of the typical weather conditions and day length for the area during the proposed activity period</li> <li>• Identification of previous and simultaneous activities, their seasons and duration in the same or adjoining areas, existence and location of any marine protected areas, and a review of activity findings and implications</li> </ul>
<b>Description of the equipment and activity</b>	<ul style="list-style-type: none"> <li>• Explanation of all survey technologies available (including low-noise or noise-free options) and why the proposed technology has been chosen. If low-noise options have not been chosen, an explanation should be provided about why these technologies are not preferred</li> <li>• Description of the survey technology including:               <ol style="list-style-type: none"> <li>a. name and description of the vessel/s to be used</li> <li>b. total duration of the proposed survey, date, timeframe</li> <li>c. proposed timing of operations – season/time of day/during all weather conditions</li> <li>d. sound intensity level (dB peak to peak) in water @ 1 metre and all frequency ranges and discharge rate</li> <li>e. if an air gun technology is proposed:                   <ol style="list-style-type: none"> <li>i. number of arrays</li> <li>ii. number of air guns within each array</li> <li>iii. air gun charge pressure to be used</li> <li>iv. volume of each air gun in cubic inches</li> <li>v. official calibration figures supplied by the survey vessel to be charted, for noise modelling</li> <li>vi. depth the air guns to be set</li> <li>vii. number and length of streamers, distance set apart and depth the hydrophones are set</li> </ol> </li> </ol> </li> <li>• Specification of the survey including anticipated nautical miles to be covered, track-lines, speed of vessels, start-up and shut-down procedures, distance and procedures for vessel turns including any planned air gun power setting changes</li> <li>• Identification of other activities having an impact in the region during the planned survey, accompanied by the analysis and review of potential cumulative or synergistic impacts</li> </ul>

Component	Detail
<p><b>Modelling of noise propagation loss</b></p>	<ul style="list-style-type: none"> <li>• Detail of independent, scientific modelling of noise propagation loss in the same season/weather conditions as the proposed activity accounting for local propagation features (depth and type of sea bottom, local propagation paths related to thermal stratification, SOFAR or natural channel characteristics) from point source out to a radius where the noise levels generated are close to natural ambient sound levels</li> <li>• Identification and mapping of proposed species exclusion zones and description of how noise propagation into these zones will be minimized, taking into consideration the local propagation features</li> </ul>
<p><b>Species impact</b></p>	<ul style="list-style-type: none"> <li>• General:               <ol style="list-style-type: none"> <li>a. Identification and density of species likely to be present that will experience sound transmission generated by the proposed activity above natural ambient sound levels. Calculated from this, the extent of the impact zones, and the number of animals affected by the activity.</li> <li>a. Specification of the type of impact predicted (direct and indirect) as well as direct and indirect impacts to prey species</li> <li>b. Information on the behaviour of each species group, and the ability to detect each of the species for mitigation purposes (e.g. for marine mammals this will include diving behaviour, vocal behaviour, and conspicuousness when at the surface).</li> </ol> </li> <li>• For each species group, also detail of the following (refer to module B species summary):               <ol style="list-style-type: none"> <li>a. Species vulnerabilities:                   <ol style="list-style-type: none"> <li>i. specific vulnerabilities to noise</li> <li>ii. lifecycle components of these vulnerabilities</li> </ol> </li> <li>b. Habitat:                   <ol style="list-style-type: none"> <li>i. specific habitat components considered</li> <li>ii. presence of critical habitat (calving, spawning, feeding grounds, resting bays etc.)</li> </ol> </li> <li>c. Scientific assessment of impact:                   <ol style="list-style-type: none"> <li>i. exposure levels</li> <li>ii. total exposure duration</li> <li>iii. determination of precautionary safe/harmful exposure levels (direct impact, indirect impact and disturbance) that account for uncertainty and avoids erroneous conclusions</li> </ol> </li> </ol> </li> </ul>

Component	Detail
<b>Mitigation and monitoring plans</b>	<ul style="list-style-type: none"> <li>• Detail of:               <ol style="list-style-type: none"> <li>a. Scientific monitoring before the survey to assess baselines, species distribution and behaviour to facilitate the incorporation of monitoring results into the impact assessment</li> <li>b. Scientific monitoring programmes, conducted during and after the survey, to assess impact, including noise monitoring stations placed at specified distances</li> <li>c. Transparent processes for regular real-time public reporting of survey progress and all impacts encountered</li> <li>d. Most appropriate methods of species detection (e.g. visual/acoustic) and the range of available methods, and their advantages and limitations, as well their practical application during the activity.</li> <li>e. Impact mitigation proposals:                   <ol style="list-style-type: none"> <li>i. 24-hour visual or other means of detection, especially under conditions of poor visibility (including high winds, night conditions, sea spray or fog)</li> <li>ii. establishing exclusion zones to protect specific species, including scientific and precautionary justification for these zones</li> <li>iii. soft start and shut-down protocols</li> <li>iv. protocols in place for consistent and detailed data recording (observer/PAM sightings and effort logs, survey tracks and operations)</li> <li>v. detailed, clear, chain of command for implementing shut-down mitigation protocols</li> <li>vi. spatio-temporal restrictions</li> </ol> </li> </ol> </li> <li>• Quantification of the effectiveness of proposed mitigation methods</li> </ul>
<b>Reporting plans</b>	<ul style="list-style-type: none"> <li>• Detail of post operation reporting plans including verification of the effectiveness of mitigation, and any shut-down procedures occurring and reasons why</li> </ul>
<b>Consultation and independent review</b>	<ul style="list-style-type: none"> <li>• Description of consultation, prior to EIA submission:               <ol style="list-style-type: none"> <li>a. List of stakeholders consulted</li> <li>b. Detail of information provided to stakeholders, opportunities given for appropriate engagement and the timeframe for feedback</li> <li>c. Explanation of what amendments and changes have been made to the proposed survey in response to the comments, queries, requests and concerns</li> <li>d. Explanation of which comments, queries, requests and concerns have not been accommodated and why</li> </ol> </li> <li>• Description of independent review of draft EIA:               <ol style="list-style-type: none"> <li>a. Detail of the independent reviewers (species experts) including affiliation and qualifications</li> <li>b. Description of the comments, queries, requests and concerns received from each reviewer</li> <li>c. Explanation of what amendments and changes have been made to the proposed survey in response to the comments, queries, requests and concerns</li> <li>d. Explanation of which comments, queries, requests and concerns have not been accommodated and why</li> </ol> </li> </ul>

## VII. EIA Guideline for Construction Works

This EIA Guideline should be used in combination with the appropriate modules on species and impact from the **Technical Support Information** (B.1-12, C and D) as required for individual regional and domestic circumstances. This guideline should be applied to all forms of marine construction, including dredging and similar vessel based activities where ships may be stationary, but under way. All commissioning and decommissioning activities should also follow these guidelines.

Component	Detail
<b>Description of area</b>	<ul style="list-style-type: none"> <li>• Detail of the spatial extent and nature of the activity – including seabed bathymetry and composition, description of known stratification characteristics and broad ecosystem descriptions – as well as the spatial area that will experience anthropogenic noise, generated by the proposed activity, above natural ambient sound levels</li> <li>• Detail of the typical weather conditions and day length for the area during the proposed activity period</li> <li>• Identification of previous and simultaneous activities, their seasons and duration in the same or adjoining areas, existence and location of any marine protected areas, and a review of activity findings and implications</li> </ul>
<b>Description of the equipment and activity</b>	<ul style="list-style-type: none"> <li>• Explanation of all activity technologies available and why each proposed technology is chosen, including consideration of noise-free installation methods</li> <li>• Specification of:               <ol style="list-style-type: none"> <li>a. total duration of the proposed activity</li> <li>b. proposed timing of operations – season/time of day/during all weather conditions</li> <li>c. sound intensity level (dB peak to peak) in water @ 1 metre and frequency ranges</li> <li>d. If explosives are proposed:                   <ol style="list-style-type: none"> <li>i. what type of explosive and what charge weight is proposed, also whether the explosive is going to be used on the seabed or subsurface</li> <li>ii. specification of sound intensity level (dB 0 to peak) in water @ 1 metre, frequency range and number of detonations and interval time</li> </ol> </li> </ol> </li> <li>• Description of noise counter measures e.g.: bubble curtains, noise dampers and cofferdams, including a description of state-of-the-art technology, Best Environmental Practice (BEP) or Best Available Technology (BAT)</li> <li>• Identification of other activities having an impact in the region during the planned activity, accompanied by the analysis and review of potential cumulative or synergistic impacts</li> </ul>
<b>Modelling of noise propagation loss</b>	<ul style="list-style-type: none"> <li>• Detail of independent, scientific modelling of noise propagation loss in the same season/weather conditions as the proposed activity accounting for local propagation features (depth and type of sea bottom, local propagation paths related to thermal stratification, SOFAR or natural channel characteristics) from point source out to a radius where the noise levels generated are close to natural ambient sound levels</li> <li>• Identification and mapping of proposed exclusion zones for species and description of how noise propagation into these zones will be minimized, taking into consideration the local propagation features</li> </ul>

Component	Detail
<b>Species impact</b>	<ul style="list-style-type: none"> <li>• General:               <ol style="list-style-type: none"> <li>a. Identification and density of species likely to be present that will experience sound transmission generated by the proposed activity above natural ambient sound levels; and calculated from this, the extent of the impact zones</li> <li>b. Specification of the type of impact predicted (direct and indirect) as well as direct and indirect impacts to prey species</li> <li>c. Information on the behaviour of each species group, and the ability to detect each of the species for mitigation purposes (e.g. for marine mammals this will include diving behaviour, vocal behaviour, and conspicuousness when at the surface).</li> </ol> </li> <li>• For each species group, also detail of the following (refer to module B species summary):               <ol style="list-style-type: none"> <li>a. Species vulnerabilities:                   <ol style="list-style-type: none"> <li>i. specific vulnerabilities to noise</li> <li>ii. lifecycle components of these vulnerabilities</li> </ol> </li> <li>b. Habitat:                   <ol style="list-style-type: none"> <li>i. specific habitat components considered</li> <li>ii. presence of critical habitat (calving, spawning, feeding grounds, resting bays etc.)</li> </ol> </li> <li>c. Scientific assessment of impact:                   <ol style="list-style-type: none"> <li>i. exposure levels</li> <li>ii. total exposure duration</li> <li>iii. determination of precautionary safe/harmful exposure levels (direct impact, indirect impact and disturbance) that account for uncertainty and avoids erroneous conclusions</li> </ol> </li> </ol> </li> </ul>
<b>Mitigation and monitoring plans</b>	<ul style="list-style-type: none"> <li>• Detail of:               <ol style="list-style-type: none"> <li>a. Scientific monitoring programmes, conducted before, during and after the activity, to assess impact, including noise monitoring stations placed at specified distances</li> <li>b. Transparent processes for regular real-time public reporting of activity progress and all impacts encountered</li> <li>c. Most appropriate methods of species detection (e.g. visual/acoustic) and the range of available methods, and their advantages and limitations, as well their practical application during the activity.</li> <li>d. Impact mitigation proposals:                   <ol style="list-style-type: none"> <li>i. 24-hour visual or other means of detection, especially under conditions of poor visibility (including high winds, night conditions, sea spray or fog)</li> <li>ii. establishing exclusion zones to protect specific species, including scientific and precautionary justification for these zones</li> <li>iii. soft start and shut-down protocols</li> <li>iv. spatio-temporal restrictions</li> </ol> </li> </ol> </li> <li>• Quantification of the effectiveness of proposed mitigation methods</li> </ul>
<b>Reporting plans</b>	<ul style="list-style-type: none"> <li>• Detail of post operation reporting plans including verification of the effectiveness of mitigation, and any shut-down procedures occurring and reasons why</li> </ul>

Component	Detail
<b>Consultation and independent review</b>	<ul style="list-style-type: none"> <li>• Description of consultation, prior to EIA submission:               <ol style="list-style-type: none"> <li>a. List of stakeholders consulted</li> <li>b. Detail of information provided to stakeholders, opportunities given for appropriate engagement and the timeframe for feedback</li> <li>c. Explanation of what amendments and changes have been made to the proposed activity in response to the comments, queries, requests and concerns</li> <li>d. Explanation of which comments, queries, requests and concerns have not been accommodated and why</li> <li>e. If it is decided that BEP or BAT is not used, this should be justified</li> </ol> </li> <li>• Description of independent review of draft EIA:               <ol style="list-style-type: none"> <li>a. Detail of the independent reviewers (species experts) including affiliation and qualifications</li> <li>b. Description of the comments, queries, requests and concerns received from each reviewer</li> <li>c. Explanation of what amendments and changes have been made to the proposed activity in response to the comments, queries, requests and concerns</li> <li>d. Explanation of which comments, queries, requests and concerns have not been accommodated and why</li> </ol> </li> </ul>

## VIII. EIA Guideline for Offshore Platforms

This EIA Guideline should be used in combination with the appropriate modules on species and impact from the **Technical Support Information** (B.1-12, C and D) as required for individual regional and domestic circumstances.

All commissioning and decommissioning activities should also follow these guidelines. Where impulsive activities, such as offshore platforms being constructed through impact driven piles, the guidelines for VII: Construction Works should also be applied.

Component	Detail
<b>Description of area</b>	<ul style="list-style-type: none"> <li>• Detail of the spatial extent and nature of the activity – including seabed bathymetry and composition, description of known stratification characteristics and broad ecosystem descriptions – as well as the spatial area that will experience anthropogenic noise, generated by the proposed activity, above natural ambient sound levels</li> <li>• Detail of the typical weather conditions and day length for the area during the proposed activity period</li> <li>• Identification of previous and simultaneous activities, their seasons and duration in the same or adjoining areas, existence and location of any marine protected areas, and a review of activity findings and implications</li> </ul>

Component	Detail
<b>Description of the equipment and activity</b>	<ul style="list-style-type: none"> <li>• Explanation of all activity technologies available and why each proposed technology is chosen, including consideration of alternatives</li> <li>• Description of the activity technology including name and description of the vessel/s and sea floor equipment to be used</li> <li>• Specification of:               <ol style="list-style-type: none"> <li>a. total duration of the proposed activity</li> <li>b. sound intensity level (dB<sub>rms</sub>) in water @ 1 metre (from noise source e.g.: platform caissons or drill ship's hull etc.) and frequency ranges</li> <li>c. sound intensity levels (peak and rms) during planned maintenance schedules</li> </ol> </li> <li>• Identification of other activities having an impact in the region during the planned activity, accompanied by the analysis and review of potential cumulative or synergistic impacts</li> </ul>
<b>Modelling of noise propagation loss</b>	<ul style="list-style-type: none"> <li>• Detail of independent, scientific modelling of noise propagation loss in the same season/weather conditions as the proposed activity accounting for local propagation features (depth and type of sea bottom, local propagation paths related to thermal stratification, SOFAR or natural channel characteristics) from point source out to a radius where the noise levels generated are close to natural ambient sound levels</li> <li>• Identification and mapping of proposed exclusion zones for species and description of how noise propagation into these zones will be minimized, taking into consideration the local propagation features</li> </ul>
<b>Species impact</b>	<ul style="list-style-type: none"> <li>• General:               <ol style="list-style-type: none"> <li>a. Identification and density of species likely to be present that will experience sound transmission generated by the proposed activity above natural ambient sound levels; and calculated from this, the extent of the impact zones</li> <li>b. Specification of the type of impact predicted (direct and indirect) as well as direct and indirect impacts to prey species</li> <li>c. Information on the behaviour of each species group, and the ability to detect each of the species for mitigation purposes (e.g. for marine mammals this will include diving behaviour, vocal behaviour, and conspicuousness when at the surface).</li> </ol> </li> <li>• For each species group, also detail of the following (refer to module B species summary):               <ol style="list-style-type: none"> <li>a. Species vulnerabilities:                   <ol style="list-style-type: none"> <li>i. specific vulnerabilities to noise</li> <li>ii. lifecycle components of these vulnerabilities</li> </ol> </li> <li>b. Habitat:                   <ol style="list-style-type: none"> <li>i. specific habitat components considered</li> <li>ii. presence of critical habitat (calving, spawning, feeding grounds, resting bays etc.)</li> </ol> </li> <li>c. Scientific assessment of impact:                   <ol style="list-style-type: none"> <li>i. exposure levels</li> <li>ii. total exposure duration:</li> <li>iii. determination of precautionary safe/harmful exposure levels (direct impact, indirect impact and disturbance) that account for uncertainty and avoids erroneous conclusions</li> </ol> </li> </ol> </li> </ul>

Component	Detail
<b>Mitigation and monitoring plans</b>	<ul style="list-style-type: none"> <li>• Detail of:               <ol style="list-style-type: none"> <li>a. Scientific monitoring programmes, conducted before, during and after the activity, to assess impact, including noise monitoring stations placed at specified distances</li> <li>b. Transparent processes for regular real-time public reporting of activity progress and all impacts encountered</li> <li>c. Most appropriate methods of species detection (e.g. visual/acoustic) and the range of available methods, and their advantages and limitations, as well their practical application during the activity.</li> <li>d. Impact mitigation proposals</li> <li>e. 24-hour visual or other means of detection, especially under conditions of poor visibility (including high winds, night conditions, sea spray or fog)</li> <li>f. Spatio-temporal restrictions</li> </ol> </li> <li>• Quantification of the effectiveness of proposed mitigation methods</li> </ul>
<b>Reporting plans</b>	<ul style="list-style-type: none"> <li>• Detail of post operation reporting plans including verification of the effectiveness of mitigation</li> </ul>
<b>Consultation and independent review</b>	<ul style="list-style-type: none"> <li>• Description of consultation, prior to EIA submission:               <ol style="list-style-type: none"> <li>a. List of stakeholders consulted</li> <li>b. Detail of information provided to stakeholders, opportunities given for appropriate engagement and the timeframe for feedback</li> <li>c. Explanation of what amendments and changes have been made to the proposed activity in response to the comments, queries, requests and concerns</li> <li>d. Explanation of which comments, queries, requests and concerns have not been accommodated and why</li> </ol> </li> <li>• Description of independent review of draft EIA:               <ol style="list-style-type: none"> <li>a. Detail of the independent reviewers (species experts) including affiliation and qualifications</li> <li>b. Description of the comments, queries, requests and concerns received from each reviewer</li> <li>c. Explanation of what amendments and changes have been made to the proposed activity in response to the comments, queries, requests and concerns</li> <li>d. Explanation of which comments, queries, requests and concerns have not been accommodated and why</li> </ol> </li> </ul>

## IX. EIA Guideline for Playback and Sound Exposure Experiments

This EIA Guideline should be used in combination with the appropriate modules on species and impact from the **Technical Support Information** (B.1-12, C and D) as required for individual regional and domestic circumstances.

Component	Detail
<b>Description of area</b>	<ul style="list-style-type: none"> <li>• Detail of the spatial extent and nature of the activity – including seabed bathymetry and composition, description of known stratification characteristics and broad ecosystem descriptions – as well as the spatial area that will experience anthropogenic noise, generated by the proposed activity, above natural ambient sound levels</li> <li>• Detail of the typical weather conditions and day length for the area during the proposed activity period</li> <li>• Identification of previous and simultaneous activities, their seasons and duration in the same or adjoining areas, existence and location of any marine protected areas, and a review of activity findings and implications</li> </ul>
<b>Description of the equipment and activity</b>	<ul style="list-style-type: none"> <li>• Noting that the scale of the noise needed to elicit a response (with respect to level and duration) may be much lower than in industry activities; and that noise can be controlled in order to affect only a small area or small number of individuals, the noise control measures of the experimental design should be described in detail.</li> <li>• Explanation of all technologies available for the activity and why each proposed technology is chosen</li> <li>• Description of the chosen technology including name and description of the vessel/s to be used</li> <li>• Specification of:             <ol style="list-style-type: none"> <li>a. lowest practicable sound intensity level required</li> <li>b. total duration of the proposed activity</li> <li>c. proposed timing of operations – season/time of day/during all weather conditions</li> <li>d. sound intensity level (dB peak to peak) in water @ 1 metre and all frequency ranges and discharge rate</li> <li>e. if an air gun technology is proposed refer to VI</li> <li>f. if explosives are proposed refer to VII</li> </ol> </li> <li>• Specification of the activity including anticipated nautical miles to be covered, track-lines, speed of vessels, start-up and shut-down procedures, distance and procedures for vessel turns including any planned air gun power setting changes</li> <li>• Identification of other activities having an impact in the region during the planned activity, accompanied by the analysis and review of potential cumulative or synergistic impacts</li> </ul>
<b>Modelling of noise propagation loss</b>	<ul style="list-style-type: none"> <li>• Detail of independent, scientific modelling of noise propagation loss in the same season/weather conditions as the proposed activity accounting for local propagation features (depth and type of sea bottom, local propagation paths related to thermal stratification, SOFAR or natural channel characteristics) from point source out to a radius where the noise levels generated are close to natural ambient sound levels</li> <li>• Identification and mapping of proposed exclusion zones for species and description of how noise propagation into these zones will be minimized, taking into consideration the local propagation features</li> </ul>

Component	Detail
<b>Species impact</b>	<ul style="list-style-type: none"> <li>• General:               <ol style="list-style-type: none"> <li>a. Identification and density of species likely to be present that will experience sound transmission generated by the proposed activity above natural ambient sound levels; and calculated from this, the extent of the impact zones</li> <li>b. Specification of the type of impact predicted (direct and indirect) as well as direct and indirect impacts to prey species</li> <li>c. Information on the behaviour of each species group, and the ability to detect each of the species for mitigation purposes (e.g. for marine mammals this will include diving behaviour, vocal behaviour, and conspicuousness when at the surface).</li> </ol> </li> <li>• For each species group, also detail of the following (refer to module B species summary):               <ol style="list-style-type: none"> <li>a. Species vulnerabilities:                   <ol style="list-style-type: none"> <li>i. specific vulnerabilities to noise</li> <li>ii. lifecycle components of these vulnerabilities</li> </ol> </li> <li>b. Habitat:                   <ol style="list-style-type: none"> <li>i. specific habitat components considered</li> <li>ii. presence of critical habitat (calving, spawning, feeding grounds, resting bays etc.)</li> </ol> </li> <li>c. Scientific assessment of impact:                   <ol style="list-style-type: none"> <li>i. exposure levels</li> <li>ii. total exposure duration</li> <li>iii. determination of precautionary safe/harmful exposure levels (direct impact, indirect impact and disturbance) that account for uncertainty and avoids erroneous conclusions</li> <li>iv. how the experiment design will monitor target and non-target species and the steps that will be taken to halt sound emission if adverse response or behavioural changes are observed</li> <li>v. how exposures that are expected to elicit particular behavioural responses (e.g. responses elicited by predator sounds, conspecific signals) will inform specific mitigation and monitoring protocols. In such cases, impact assessment should also articulate what responses may not be related to the loudness of the exposure but to the behavioural significance of the signal/noise used.</li> </ol> </li> </ol> </li> </ul>

Component	Detail
<b>Mitigation and monitoring plans</b>	<ul style="list-style-type: none"> <li>• Detail of:               <ol style="list-style-type: none"> <li>a. Scientific monitoring programmes, conducted before, during and after the activity, to assess impact</li> <li>b. Transparent processes for regular real-time public reporting of activity progress and all impacts encountered</li> <li>c. Most appropriate methods of species detection (e.g. visual/acoustic) and the range of available methods, and their advantages and limitations, as well their practical application during the activity.</li> <li>d. Impact mitigation proposals:                   <ol style="list-style-type: none"> <li>i. 24-hour visual or other means of detection, especially under conditions of poor visibility (including high winds, night conditions, sea spray or fog)</li> <li>ii. establishing exclusion zones to protect specific species, including scientific and precautionary justification for these zones</li> <li>iii. soft start and shut-down protocols</li> <li>iv. spatio-temporal restrictions</li> </ol> </li> </ol> </li> <li>• Quantification of the effectiveness of proposed mitigation methods</li> </ul>
<b>Reporting plans</b>	<ul style="list-style-type: none"> <li>• Detail of post operation reporting plans including verification of the effectiveness of mitigation</li> </ul>
<b>Consultation and independent review</b>	<ul style="list-style-type: none"> <li>• Description of consultation, prior to EIA submission:               <ol style="list-style-type: none"> <li>a. List of stakeholders consulted</li> <li>b. Detail of information provided to stakeholders, opportunities given for appropriate engagement and the timeframe for feedback</li> <li>c. Explanation of what amendments and changes have been made to the proposed activity in response to the comments, queries, requests and concerns</li> <li>d. Explanation of which comments, queries, requests and concerns have not been accommodated and why</li> </ol> </li> <li>• Description of independent review of draft EIA:               <ol style="list-style-type: none"> <li>a. Detail of the independent reviewers (species experts) including affiliation and qualifications</li> <li>b. Description of the comments, queries, requests and concerns received from each reviewer</li> <li>c. Explanation of what amendments and changes have been made to the proposed activity in response to the comments, queries, requests and concerns</li> <li>d. Explanation of which comments, queries, requests and concerns have not been accommodated and why</li> </ol> </li> </ul>

## X. EIA Guideline for Pingers (Acoustic Deterrent/Harassment Devices, Navigation)

This EIA Guideline should be used in combination with the appropriate modules on species and impact from the **Technical Support Information** (B.1-12, C and D) as required for individual regional and domestic circumstances.

Component	Detail
<b>Description of area</b>	<ul style="list-style-type: none"> <li>• Detail of the spatial extent and nature of the activity – including seabed bathymetry and composition, description of known stratification characteristics and broad ecosystem descriptions – as well as the spatial area that will experience anthropogenic noise, generated by the proposed activity, above natural ambient sound levels.</li> <li>• Detail of the typical weather conditions and day length for the area during the proposed activity period</li> <li>• Identification of previous and simultaneous activities, their seasons and duration in the same or adjoining areas, existence and location of any marine protected areas, and a review of activity findings and implications</li> </ul>
<b>Description of the equipment and activity</b>	<ul style="list-style-type: none"> <li>• Explanation of all technologies available for the activity and why the proposed technology is chosen, including the description should also contain the consideration of alternatives</li> <li>• Specification of sound intensity level (dB peak to peak) in water @ 1 metre, frequency ranges and ping rate, sound exposure level (SEL), as well as proposed spacing of pingers</li> <li>• Identification of other activities having an impact in the region accompanied by the analysis and review of potential cumulative or synergistic impacts</li> </ul>
<b>Modelling of noise propagation loss</b>	<ul style="list-style-type: none"> <li>• Detail of independent, scientific modelling of noise propagation loss in the same season/weather conditions as the proposed activity accounting for local propagation features (depth and type of sea bottom, local propagation paths related to thermal stratification, SOFAR or natural channel characteristics) from point source out to a radius where the noise levels generated are close to natural ambient sound levels</li> <li>• Identification and mapping of proposed exclusion zones for species and description of how noise propagation into these zones will be minimized, taking into consideration the local propagation features</li> </ul>

Component	Detail
<b>Species impact</b>	<ul style="list-style-type: none"> <li>• General: <ul style="list-style-type: none"> <li>a. Identification and density of species likely to be present that will experience sound transmission generated by the proposed activity above natural ambient sound levels; and calculated from this, the extent of the impact zones</li> <li>a. Specification of the type of impact predicted (direct and indirect) as well as direct and indirect impacts to prey species</li> <li>b. Information on the behaviour of each species group, and the ability to detect each of the species for mitigation purposes (e.g. for marine mammals this will include diving behaviour, vocal behaviour, and conspicuousness when at the surface).</li> </ul> </li> <li>• For each species group, also detail of the following (refer to module B species summary): <ul style="list-style-type: none"> <li>a. Species vulnerabilities: <ul style="list-style-type: none"> <li>i. specific vulnerabilities to noise</li> <li>ii. lifecycle components of these vulnerabilities</li> </ul> </li> <li>b. Habitat: <ul style="list-style-type: none"> <li>i. specific habitat components considered</li> <li>ii. presence of critical habitat (calving, spawning, feeding grounds, resting bays etc.)</li> </ul> </li> <li>c. Scientific assessment of impact: <ul style="list-style-type: none"> <li>i. exposure levels</li> <li>ii. total exposure duration</li> <li>iii. determination of precautionary safe/harmful exposure levels (direct impact, indirect impact and disturbance) that account for uncertainty and avoids erroneous conclusions</li> </ul> </li> </ul> </li> </ul>
<b>Monitoring plans</b>	<ul style="list-style-type: none"> <li>• Detail of scientific monitoring programmes, conducted before, during and after the activity, to assess impact</li> <li>• Spatio-temporal restrictions</li> <li>• Quantification of the effectiveness of proposed mitigation methods</li> </ul>
<b>Reporting plans</b>	<ul style="list-style-type: none"> <li>• Detail of post operation reporting plans including verification of the effectiveness of mitigation</li> </ul>
<b>Consultation and independent review</b>	<ul style="list-style-type: none"> <li>• Description of consultation, prior to EIA submission: <ul style="list-style-type: none"> <li>a. List of stakeholders consulted</li> <li>b. Detail of information provided to stakeholders, opportunities given for appropriate engagement and the timeframe for feedback</li> <li>c. Explanation of what amendments and changes have been made to the proposed activity in response to the comments, queries, requests and concerns</li> <li>d. Explanation of which comments, queries, requests and concerns have not been accommodated and why</li> </ul> </li> <li>• Description of independent review of draft EIA: <ul style="list-style-type: none"> <li>a. Detail of the independent reviewers (species experts) including affiliation and qualifications</li> <li>b. Description of the comments, queries, requests and concerns received from each reviewer</li> <li>c. Explanation of what amendments and changes have been made to the proposed activity in response to the comments, queries, requests and concerns</li> <li>d. Explanation of which comments, queries, requests and concerns have not been accommodated and why</li> </ul> </li> </ul>

## XI. EIA Guideline for Other Noise-generating Activities (Acoustic Data Transmission, Wind, Tidal and Wave Turbines and Future Technologies)

This EIA Guideline should be used in combination with the appropriate modules on species and impact from the **Technical Support Information** (B.1-12, C and D) as required for individual regional and domestic circumstances.

All commissioning and decommissioning activities should also follow these guidelines.

Component	Detail
<b>Description of area</b>	<ul style="list-style-type: none"> <li>• Detail of the spatial extent and nature of the activity – including seabed bathymetry and composition, description of known stratification characteristics and broad ecosystem descriptions – as well as the spatial area that will experience anthropogenic noise, generated by the proposed activity, above natural ambient sound levels</li> <li>• Detail of the typical weather conditions and day length for the area during the proposed activity period</li> <li>• Identification of previous and simultaneous activities, their seasons and duration in the same or adjoining areas, existence and location of any marine protected areas, and a review of activity findings and implications</li> </ul>
<b>Description of the equipment and activity</b>	<ul style="list-style-type: none"> <li>• Explanation of all technologies available for the activity</li> <li>• Specification of sound intensity level (dB) in water @ 1 metre, and frequency ranges. This should include dB peak to peak for acoustic data transmission for example, dB<sub>rms</sub> for wind, tidal and wave turbines and future technologies categorized accordingly</li> <li>• Identification of other activities having an impact in the region during the planned activity, accompanied by the analysis and review of potential cumulative or synergistic impacts</li> </ul>
<b>Modelling of noise propagation loss</b>	<ul style="list-style-type: none"> <li>• Detail of independent, scientific modelling of noise propagation loss in the same season/weather conditions as the proposed activity accounting for local propagation features (depth and type of sea bottom, local propagation paths related to thermal stratification, SOFAR or natural channel characteristics) from point source out to a radius where the noise levels generated are close to natural ambient sound levels</li> <li>• Identification and mapping of proposed exclusion zones for species and description of how noise propagation into these zones will be minimized, taking into consideration the local propagation features</li> </ul>

Component	Detail
<b>Species impact</b>	<ul style="list-style-type: none"> <li>• General:               <ol style="list-style-type: none"> <li>a. Identification and density of species likely to be present that will experience sound transmission generated by the proposed activity above natural ambient sound levels; and calculated from this, the extent of the impact zones</li> <li>b. Specification of the type of impact predicted (direct and indirect) as well as direct and indirect impacts to prey species</li> <li>c. Information on the behaviour of each species group, and the ability to detect each of the species for mitigation purposes (e.g. for marine mammals this will include diving behaviour, vocal behaviour, and conspicuousness when at the surface).</li> </ol> </li> <li>• For each species group, also detail of the following (refer to module B species summary):               <ol style="list-style-type: none"> <li>a. Species vulnerabilities:                   <ol style="list-style-type: none"> <li>i. specific vulnerabilities to noise</li> <li>ii. lifecycle components of these vulnerabilities</li> </ol> </li> <li>b. Habitat:                   <ol style="list-style-type: none"> <li>i. specific habitat components considered</li> <li>ii. presence of critical habitat (calving, spawning, feeding grounds, resting bays etc.)</li> </ol> </li> <li>c. Scientific assessment of impact:                   <ol style="list-style-type: none"> <li>i. exposure levels</li> <li>ii. total exposure duration</li> <li>iii. determination of precautionary safe/harmful exposure levels (direct impact, indirect impact and disturbance) that account for uncertainty and avoids erroneous conclusions</li> </ol> </li> </ol> </li> <li>• Quantification of the effectiveness of proposed mitigation methods</li> </ul>
<b>Monitoring plans</b>	<ul style="list-style-type: none"> <li>• Explanation of ongoing scientific monitoring programmes to assess impact</li> <li>• Most appropriate methods of species detection (e.g. visual/acoustic) and the range of available methods, and their advantages and limitations, as well their practical application during the activity.</li> <li>• Spatio-temporal restrictions</li> </ul>
<b>Consultation and independent review</b>	<ul style="list-style-type: none"> <li>• Description of consultation, prior to EIA submission:               <ol style="list-style-type: none"> <li>a. List of stakeholders consulted</li> <li>b. Detail of information provided to stakeholders, opportunities given for appropriate engagement and the timeframe for feedback</li> <li>c. Explanation of what amendments and changes have been made to the proposed activity in response to the comments, queries, requests and concerns</li> <li>d. Explanation of which comments, queries, requests and concerns have not been accommodated and why</li> </ol> </li> <li>• Description of independent review of draft EIA:               <ol style="list-style-type: none"> <li>a. Detail of the independent reviewers (species experts) including affiliation and qualifications</li> <li>b. Description of the comments, queries, requests and concerns received from each reviewer</li> <li>c. Explanation of what amendments and changes have been made to the proposed activity in response to the comments, queries, requests and concerns</li> <li>d. Explanation of which comments, queries, requests and concerns have not been accommodated and why</li> </ol> </li> </ul>

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Additional references are detailed in the Technical Support Information at [www.cms.int/guidelines/cms-family-guidelines-EIAs-marine-noise](http://www.cms.int/guidelines/cms-family-guidelines-EIAs-marine-noise).