



## **European Marine Board Expert Working Group**

### ***Underwater Noise***

### **Terms of Reference**

***November 2019***

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## 1. Background and Rationale

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### Background

Contrary to the image of the ocean as a silent world portrayed by Jacques Cousteau in the 1950's, the ocean is now typically described as a cacophony of sounds. These sounds arise from a very wide variety of sources, both natural and human-made (anthropogenic). Natural sounds include those generated by a wide range of marine fauna, waves, rain, wind, and seabed movement, while anthropogenic sounds from human activity at sea include shipping and other marine craft, building and installations, sonar and seismic surveys.

As light does not travel far within the ocean, most marine fauna rely on sound, sound pressure and/or vibration to perceive the world around them. The presence of anthropogenic sound therefore has the potential to interfere with and impact on marine fauna.

In the context of this publication, the term underwater noise will be used to refer to noise generated, deliberately or inadvertently, by anthropogenic sources that have the potential to impact on marine fauna, and this will form the focus of this publication.

In June 2008, the Marine Board - ESF<sup>1</sup> Position Paper 13 (EMB PP 13) "The effects of anthropogenic sound on marine mammals: A draft research strategy" was published (Boyd et al., 2008). This publication recommended the use of a four-step analytical risk framework process adapted to the issue of marine mammals and anthropogenic sound to assess and identify priority research topics for reducing uncertainty. The risk framework included: (i) hazard identification; (ii) characterizing exposure to the hazard; (iii) characterizing dose-response relationships; and (iv) risk characterization, typically feeding into risk management. This risk assessment framework was illustrated by focusing on the breakdown of three of the identified high-level research questions: (i) how can we reduce the risk posed by sonar to beaked whales; (ii) what are the effects of seismic noise on individual marine mammals and populations; and (iii) what is the interaction between shipping traffic noise and baleen whales? However, the publication notes that to construct a full risk assessment, it is necessary to be able to make all the linkages between issues from sound production, through behaviour change, effects on life function, to impacts on vital rates and, by implication, the effects on populations. In particular, there was a need to improve knowledge of how effects on life function influence vital rates (Boyd et al., 2008).

More than ten years on, the research landscape has evolved and a significant body of work has been published in developing our understanding of the impacts of underwater noise on a wider range of marine species including fish and invertebrates (Weilgart, 2018).

In terms of policy, progress has also been made in this area at both a European and an International level. The EU's Marine Strategy Framework Directive<sup>2</sup> (MSFD) was adopted in June 2008, just as EMB PP13 was being published, and it recognized underwater noise as an ocean pollutant for the first time:

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<sup>1</sup> Since 1 January 2017 European Marine Board IVZW

<sup>2</sup> [https://ec.europa.eu/environment/marine/eu-coast-and-marine-policy/marine-strategy-framework-directive/index\\_en.htm](https://ec.europa.eu/environment/marine/eu-coast-and-marine-policy/marine-strategy-framework-directive/index_en.htm)

*‘pollution’ means the direct or indirect introduction into the marine environment, as a result of human activity, of substances or energy, **including human-induced marine underwater noise**, which results or is likely to result in deleterious effects such as harm to living resources and marine ecosystems...*

Underwater noise is specifically referenced in MSFD Descriptor 11 for Good Environmental Status (GES):

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

The indicators for this descriptor are based on durations of time over which sound levels are above given levels, and are not explicitly linked to any particular impact on marine species.

This meant that for the first time, EU member states were required to monitor and report on underwater noise levels in national waters. A 2018 report from the European Commission to the European Parliament and the Council assessing Member States' programmes of measures under the Marine Strategy Framework Directive<sup>3</sup> notes that in relation to this indicator, “Six Member States, mostly from the North-East Atlantic Ocean region, expect to achieve good environmental status by 2020. However, given the current knowledge gaps, most cannot estimate when it will be achieved or have not specified a date for when it is to be achieved”. It is however not clear what these knowledge gaps are, and how some Member States are able to achieve good environmental status while others cannot. Other regulatory and operational measures have also been taken internationally.

A recent development in the monitoring of ocean sound has been the approval by the Global Ocean Observing System<sup>4</sup> (GOOS) of an ocean sound Essential Ocean Variable<sup>5</sup> (EOV), initiated by the Partnership for Observation of the Global Ocean<sup>6</sup> (POGO) and the International Quiet Ocean Experiment<sup>7</sup> (IQOE), and which will be overseen by IQOE.

There has also been more public awareness of this issue, with initiatives such as the *Sounds Too Many* Lecture performance<sup>8</sup> presented at the European Maritime Day 2019, and the Ocean of Noise podcast series produced by the UK newspaper The Guardian<sup>9</sup>.

Underwater noise is expected to increase with the further development of the Blue Economy in the coming years, and we need regulations that reflect the ever-increasing combination and complexity of sounds in the ocean: the ocean soundscape.

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<sup>3</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2018:562:FIN&qid=1533034580736>

<sup>4</sup> <http://www.goosocean.org/>

<sup>5</sup> [http://www.goosocean.org/index.php?option=com\\_oa&task=viewDocumentRecord&docID=22567](http://www.goosocean.org/index.php?option=com_oa&task=viewDocumentRecord&docID=22567)

<sup>6</sup> <http://www.ocean-partners.org/>

<sup>7</sup> <https://www.iqoe.org/>

<sup>8</sup> <https://www.tba21.org/#item--soundstoomany--1961>

<sup>9</sup> <https://www.theguardian.com/science/audio/2019/may/03/oceans-of-noise-episode-one-science-weekly-podcast>

Sound generation is not necessarily negative and overall impact depends on the context in which it is being generated and radiated. For this reason, research has also been conducted into better understanding ocean soundscapes and how human activities affect these.

### **Rationale for the Working Group**

The topic of underwater noise and noise pollution has been proposed by several EMB delegates including:

- At the ExCom meeting in January 2017, Alessandro Crise suggested underwater noise, noting that a strategy is needed on how to develop the science behind observing underwater noise and its effects on marine biota;
- At the Spring Plenary meeting in 2018, Carlos Garcia Soto suggested to study the topics of noise pollution and its impacts. Jan Mees supported the idea and referred to the International Quiet Ocean Experiment;

At the Executive Committee meeting in February 2019, the ExCom members considered the existing list of proposed topics and selected underwater noise as a timely and appropriate topic to take forward.

Following this, a concept note for an activity on underwater noise was tabled at the Spring Plenary 2019 meeting, and the Board members agreed that a full Terms of Reference for the topic should be developed, noting that this as a topic of ongoing importance and was also controversial, making a publication on this appropriate and timely.

## **2. Working Group Objectives**

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An EMB activity on underwater noise would seek to provide an update on progress related to this topic since the 2008 EMB publication, to raise awareness of the current knowledge and research gaps, to broaden the scope from marine mammals to all marine organisms, and to highlight the inherent conflicts that exist relative to underwater noise and its use.

Specific objectives could include but are not limited to:

- Highlighting current understanding and existing research on the impact of different underwater noise sources on marine fauna, and the ultimate chronic and cumulative short- and long-term ecosystem impacts;
- Consider relevant updates to existing regulation e.g. to consider impacts as well as noise levels, and to consider soundscapes rather than individual noise sources;
- Explore research and policy gaps in understanding underwater noise baselines e.g. for MSFD;
- Highlight the difficulties and aspects to consider when establishing appropriate underwater noise mitigation measures;
- Identify areas in which conflict related to underwater noise can arise and trade-offs have to be considered, e.g. marine seismic research and offshore renewable energy;
- Consider current barriers to progress, including collaboration needs (between marine sciences, maritime fields and policy) and research funding limitations;
- Investigate research needs linked to the setting of international standards for measurement and experiments;

- Providing appropriate scientific input to developments linked to the ocean sound EOv; and
- Where appropriate, proposing updates to the recommendations presented in EMB PP 13.

### 3. Deliverables

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There are two possible formats for the final output of this work, which should be considered: either a shorter Future Science Brief (FSB) or a longer Position Paper (PP). These are briefly outlined below. The working group members will decide which would be most appropriate.

A FSB format document should highlighting policy-relevant recommendations and should be heavily based on existing academic publications, which already provide a comprehensive overview and review of the current state of the art. This document can be shorter (around 30-40 pages), more concise and policy focused, and will naturally be completed in a shorter timeframe. However to create a comprehensive FSB there needs to be published academic literature, reviews, etc. that could easily be taken up into the FSB. If suitable publications do not already exist on which to base this document, then an FSB cannot provide the requisite level of detail.

A PP does not need to be based on any existing publications as its wider scope allows such a document to also provide a comprehensive presentation and review of current knowledge and needs. This publication can cover a wider range of underwater noise-related topics, and can be oriented towards both the scientific and policy communities. A policy brief conveying the main policy messages would subsequently be created to support the larger document. The PP would be much longer (around 100 pages) and would take longer to produce.

For either document, a peer review process with a minimum of two external reviewers (selected from proposals by the working group members and the EMB delegates) will be organized by the European Marine Board Secretariat. In accordance with the European Marine Board procedures, the document will require approval by the European Marine Board member organizations prior to finalization and publication.

The impact of the publication will be achieved *via* a targeted dissemination strategy as described below. Working Group members will be required to make suggestions on how to reach end-user contacts and to contribute to the dissemination. Promotion of the document may include dedicated presentations at stakeholder events. Working Group members will also be asked to notify the Secretariat of any dissemination activities or observed uptake / impact for up to two years following publication, for future impact reporting.

A full outline of the decision-making procedure and system for working group operations is outlined in Annex 2.

### 4. Target Audience and Expected Impact

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Working Groups are the primary foresight and priority-setting tools of the European Marine Board. The expected outcome is that the recommendations of the resulting policy document influence future

research strategies and programmes at both national and European level. Therefore, the EMB document target audience is in the first instance those who determine and set research agendas, including research funding organisations, programme managers and science policy advisors/developers both at the national and European level.

To some extent, and depending on the subject, the expected outcome is also intended to strengthen the particular research domain by stimulating networking and developing common positions between expert scientists, potentially leading to new collaborative projects. Should a Position Paper format be selected, then the scientific community will be targeted specifically in addition to the policy community.

The recommendations and perspectives delivered through EMB policy documents can also influence and drive broader marine and maritime policies, beyond the research realm. This publication should inform European and International developments in understanding and addressing underwater noise. The key recommendations are also intended to inform the International marine and maritime community of the current state of knowledge in underwater noise and its impacts on marine wildlife and provide scientific background for future priority areas and developments in research, mitigation approaches and policy.

## **5. Working Group Composition and Operation**

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### **Working Group Chair and co-Chair**

A WG Chair will be selected by the EMB secretariat and Chair in consultation with the ExCom and a co-Chair will be selected by the Chair and with help from the Secretariat. They will represent the Working Group and take responsibility for its deliverables.

#### ***Profile***

The Working Group (WG) Chairs should be experienced marine scientists, practitioners or technologists in the field of underwater noise. It is important that the Chair and co-Chair have a big picture approach to ensure a focus and balanced view on the full spectrum of underwater noise-related topics and that they fully commit to facilitating the writing of this document.

#### ***Selection process***

The Working Group (WG) Chair and co-Chair will be selected based on a call for WG member nominations issued by the EMB Secretariat to EMB Member Organizations. A WG Chair can be directly proposed by member organization(s) or working group member(s), on the basis of her/his recognized expertise and leading role in the field, at European or international levels.

The EMB Secretariat will work together with the Chair/co-Chair to select the WG members and ensure an appropriate balance of expertise and experience within the working group. The Secretariat also endeavours to facilitate gender balance and north-south-east-west balance of the WG.

#### ***Roles and responsibilities of WG Chair***

The WG Chair and co-Chair are responsible for ensuring the scientific quality of the Working Group outputs and its timely delivery according to the WG Terms of Reference and as agreed at the kick-off meeting. The WG Chairs provide scientific leadership and motivation and drive the WG activities with the support of a dedicated European Marine Board Science Officer who acts in the capacity of WG facilitator.

The WG Chairs (lead Chair primarily and co-Chair when the lead Chair is not available):

- Chair WG meetings,
- Coordinate the scientific contributions to the document draft according to the objectives defined at the kick-off meeting,
- Maintain an overview of the content and quality of the various inputs and requests additional expertise if necessary,
- Ensure timely delivery of the WG document, and
- Enhance the document's strategic impact by promoting WG activities and the output.
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The meeting Chairs will be crucial to effectively moderate discussions and deliver meeting outputs.

### **Working Group Members**

For both a Future Science Brief and a position paper, a working group of around 12 members is proposed.

The working group experts should comprise European scientists, practitioners and technologists who are participating in leading networks and/or research groups across different research domains (e.g. underwater noise impact on and risks for marine fauna, monitoring and regulation, measurement practices, underwater noise as a component of research, underwater noise mitigation and limits). The group will be led by a Chair and co-Chair and facilitated by the EMB Secretariat.

Interaction with relevant International and European initiatives also working in this field should be explored. Specifically, POGO, SCOR, JPI Oceans and the International Quiet Ocean Experiment (IQOE) are organizations interested and active in this field and so appropriate collaboration should be sought. This could be achieved through informal interactions during the writing process, through consultation and/or workshops held during the lifetime of the activity, by engaging key people as external reviewers, or by selecting several key experts to serve as members of the working group. It is noted that the EMB has already approached POGO and IQOE to initiate discussions.

### ***Profile and selection process***

WG Members may be drawn *inter alia* from EMB member organizations, national research institutes and universities as well as relevant European projects and initiatives, industry and non-profit organizations. A call for nominations will be issued by the EMB Secretariat to EMB Member Organizations. WG Members are selected from the resulting pool of experts by the WG Chair(s), supported by the EMB Secretariat. Decisions on the composition of the Working Group are guided by achieving the correct balance of expertise required to comprehensively address the topic at hand as well as ensuring a wide geographic distribution and gender balance. Non-selection of some nominated candidates is therefore normal, and bears no relation to the scientific excellence of those candidates not selected.

***Roles and responsibilities of WG Members***

WG Members are responsible for ensuring the scientific quality of their inputs and their timely delivery according to the WG Terms of Reference.

WG Members:

- Prepare for and attend the WG meetings,
- Submit written contributions in a timely manner as agreed at the kick-off meeting,
- Guide and adhere to the high-level strategic objectives of the publication,
- Promote the resulting publication at national level and European levels, and
- Feedback information on dissemination activities and opportunities, impact and uptake to the EMB Secretariat.

**Engaging the wider community**

During the course of the WG, members may invite a selection of stakeholders or observers from the wider community including science, industry, policy makers and funders.

**EMB Facilitation of the Working Group**

The EMB Executive Director is the *ex officio* WG manager. She nominates one or two Secretariat officers to support and facilitate the Working Group.

The EMB Secretariat will coordinate this activity with the Chair and co-Chair. A dedicated EMB Science Officer will act in the capacity of facilitator and other EMB Secretariat staff may be involved depending on the specific topic for each Working Group activity.

For this WG the facilitator is: Paula Kellett, EMB Science Officer

**General Data Protection Regulation (GDPR) policy for EMB WGs**

Personal data for EMB working group members and those involved in other EMB core activities is used for internal communication with the activity as well as external communication of the EMB activity via publications, the EMB website and EMB social media outlets.

For any new EMB activities, consent is sought at the kick-off of the activity to cover all relevant use and storage of personal data. It is anticipated that the subjects would also be added to the EMB mailing list, and thus their data would continue to be stored and used beyond the end of the activity, unless consent is later withdrawn. A template consent form can be found in Annex 1. After a period of 2 years, unless requested otherwise, we will keep it in our database for future roles.

Reviewers are also contacted within the context of EMB activities. The template email they receive already clearly outlines their right to act that their input remains anonymous, in which case the reviewer would simply be listed as "Anonymous". The reviewer will be informed of how and where their personal data will be stored. The consent of the reviewer will also be specifically sought for their personal data to be used outside of any activities directly relating to their role as reviewer, using the template text included in this document.



The EMB [privacy policy contains](#) information about our compliance with GDPR (data protection law). In this document you can find how to send us a request to let you access your data that we have collected, request us to delete your data, correct any inaccuracies or restrict our processing of your data. You have the right to lodge a complaint about the way we handle your data with [Belgian Data Protection Authority](#) or you can contact us at [info@marineboard.eu](mailto:info@marineboard.eu) for more information or concerns.

## 6. Mode of Operation

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The establishment of a Working Group is for a limited duration and the group should be disbanded by the Board when it has fulfilled its mandate. European Marine Board Working Groups are facilitated by the European Marine Board Secretariat; Working Group members and Chairs are not financially supported by the European Marine Board (unless an extraordinary contribution is secured by one or more European Marine Board Member Organizations) but it is foreseen that their participation would be funded by their institutions or the member that proposed them.

The work programme for the Working Group will consist of:

- One to three meetings depending on the output selected (remote meetings via video conference may be considered);
- Writing assignments;
- Regular email interactions;
- Facilitation of the WG by the European Marine Board Secretariat;
- External peer review (normally at least 2 reviewers which includes at least one European and one International reviewer);
- Coordination of the report writing to publication standards by the WG Chair/co-Chair; and
- Final editing of the report in preparation of the publication by the European Marine Board Secretariat and WG Chair /co-Chair.

Support from the European Marine Board:

- The EMB will arrange meetings and provide organizational support for WG meetings;
- The EMB will cover the costs of all catering associated with WG meetings, including a WG dinner. Travel costs for WG participants are not covered by the EMB Secretariat, but normally covered by the nominating EMB Member Organization or by the participant's own institution (if these are different);
- The EMB will cover the costs of publication and dissemination (to relevant stakeholders) of the document;
- Members of the EMB Secretariat will attend each meeting, write and disseminate meeting minutes, and will maintain regular dialogue with the WG Chair and co-Chair to ensure timely delivery of the document.

## 7. Indicative Timetable

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The WG activities are foreseen to start in January 2020. The duration of the activities depends on which format of output is selected.

Work on a **Future Science Brief** would be expected to run for 1 year from kick-off, including 1-2 meetings (either in-person or online, as agreed by the group). The final document is foreseen to be published in December 2020, and can include a dedicated launch event (tbc) and electronic and hard copy dissemination to relevant stakeholders. The European Marine Board conduct impact reporting based on feedback from WG members and wider stakeholders for a period of up to 2 years following publication.

An indicative timetable for a Future Science Brief and order of activities is presented below.

Tasks (2019-2020)	2019		2020											
	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Approval of ToR by EMB member organizations														
Nominations and expert selection														
Appointment of WG co-Chairs														
WG member list confirmed, invitations and planning for kick-off meeting														
Kick-off meeting <ul style="list-style-type: none"> <li>discussion of ToR</li> <li>objectives and scope of the WG</li> <li>table of contents and work plan</li> <li>confirm expertise, allocate writing assignments</li> </ul> communication plan, foresight tools and brainstorming on recommendations														
Drafting of content (with remote meetings between EMB SEC, Chair and co-authors as necessary)														
WG Meeting 2 (tbc)														
Finalize (text and illustrations)														
Approval of publication by WG members and EMB delegates														
External review and revisions														
Design of the publication														
Publication and press release, followed by dissemination and uptake/impact tracking														

Work on a **Position Paper** would be expected to run for 2 years from kick-off, including 2-3 meetings (either in-person or online, as agreed by the group). The final document would be published in December 2021 and could include a dedicated launch event (tbc) and electronic and hard copy dissemination to relevant stakeholders. The European Marine Board conduct impact reporting based on feedback from WG members and wider stakeholders for a period of up to 2 years following publication.

An indicative timetable for a Position Paper and order of activities is presented below.

Tasks (2019- 2021)	2019		2020												2021											
	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Approval of ToR by EMB member organization s																										
Nomination s and expert selection																										
Appointmen t of WG co- Chairs																										
WG member list confirmed, invitations and planning for kick-off meeting																										
Kick-off meeting																										
Drafting of content																										
WG Meeting 2																										
Drafting of content																										
WG Meeting 3 (tbc)																										
Finalize (text and illustrations )																										
Approval of publication by WG members and EMB delegates																										
External review and revisions																										
Design of the publication																										
Publication and press release, followed by disseminati on and uptake/imp act tracking																										

## References

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**Annex 1: Consent form for Core Activities**

EMB holds personal data for anyone involved in core EMB activities, including Working Groups.

The following personal data may be held by the EMB Secretariat:

- Name
- Title
- Job title
- Areas of expertise and research interests
- Previously held roles
- Institute
- Country
- Institutional email address
- Institutional postal address
- Institutional telephone number
- Photographs
- Video

This information is stored in a secure spreadsheet and folder locations, and only EMB Secretariat staff have access to this.

EMB may:

- Contact you regarding the EMB activity that you are directly involved with
- Contact you regarding other EMB activities
- Add you to the EMB stakeholder mailing list
- Make your name, institution and country publically available on the EMB website, in EMB communications, e.g. presentations regarding the activity you are involved in, and in EMB publications
- Take your photograph during EMB activities and use these pictures in publications, on the EMB website and on EMB social media outlets
- Take video footage during EMB activities and use these pictures in publications, on the EMB website and on EMB social media outlets

The data held may be reviewed and revised by the subject, and consent for any or all of the above may be withdrawn at any time.

☐ Please tick this box to confirm that you understand the above, and that you give EMB permission to obtain, use and store your personal data as outlined above.

Name:

Date:

## Annex 2: Decision Making Procedure

