

# Presentation of the project results to DG Mare Brussel P5

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Final Version of 30/11/2021

Deliverable Number D.2.6.2

Event's Report



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|----------------------------|---|
| <b>Project Acronym</b>     | SOUNDSCAPE  |
| <b>Project ID Number</b>   | 10043643  |
| <b>Project Title</b>       | Soundscapes in the north Adriatic Sea and their impact on marine biological resources |
| <b>Priority Axis</b>       | 3   |
| <b>Specific Objective</b>  | 3.2   |
| <b>Work Package Number</b> | 2   |
| <b>Work Package Title</b>  | Communication activities  |
| <b>Activity Number</b>     | 2.6   |
| <b>Activity Title</b>      | Promotion of the project on the EU level  |
| <b>Partner in Charge</b>   | IOF   |
| <b>Partners Involved</b>   | IOF   |
| <b>Authors</b>             | Alice Pari (CF)   |
| <b>Status</b>              | Final   |
| <b>Distribution</b>        | Public  |

## Summary

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|---|----|
| Experts belonging to lead partner Istitute of Oceanography and Fisheries participated at 14 <sup>th</sup> Meeting of the MSFD Common Implementation Strategy - Technical Group on Underwater Noise (TG-Noise), on 15 <sup>th</sup> -16 <sup>th</sup> October 2019, in DG ENV Brussels, BELGIUM..... | 4  |
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Experts belonging to lead partner Institute of Oceanography and Fisheries participated at 14<sup>th</sup> Meeting of the MSFD Common Implementation Strategy - Technical Group on Underwater Noise (TG-Noise), on 15<sup>th</sup>-16<sup>th</sup> October 2019, in DG ENV Brussels, BELGIUM.

Dr Predrag Vukadin presented the project Soundscape's achievements at experts of TG- Noise in the afternoon session "Update of Relevant recent experiences from projects & initiatives " on October 15<sup>th</sup>

Because of Covid 19 pandemic our project coordinator Dr. Vlado Dacic couldn't present the results of Soundscape Project at DG Mare Brussel and at Open Maritime Day during the last reporting period of the project, like it was written on the Application Form.

## Agenda

**14<sup>th</sup> Meeting of the MSFD Common Implementation Strategy  
Technical Group on Underwater Noise (TG-Noise)**

**15<sup>th</sup>-16<sup>th</sup> October 2019, DG ENV Brussels, BELGIUM**

### **AGENDA**

**Venue: DG Env offices Avenue de Beaulieu 5 - 1160 Auderghem – Room A**

#### **TUESDAY, 15 OCTOBER 2019**

12.00- 13.00h Arrival

13.00-15.00h **15-1 Opening**

- Agenda and aim of the meeting
- Tour de table/all participants

**15-2 Update on the Common Implementation Strategy Work Programme**  
by Maud Casier EC DG ENV

**15-3 Feedback from WG GES on threshold values document and requirements  
from TG Noise**  
by Maud Casier EC DG ENV and René Dekeling

**15-4 Status of TG Noise Communication Report “Overview of main European-  
funded projects and other relevant initiatives”**  
by Maria Ferreira

**15-5 Update of Relevant recent experiences from projects & initiatives**

- a. QuietMed II project, by Marta Sánchez
- b. JOMOPANS project update, by Niels Kinneging
- c. Soundscape (Interreg V-A), by Predrag Vukadin
- d. ACCOBAMS initiatives update, by Alessio Maglio
- e. Recommendations from the Joint Noise Workshop of GFCM/OceanCare report, by Lindy Weilgart,

15.00-15.30h *Coffee-break*

**15.30-17.30h 15-6 Update of the TG Noise Monitoring Guidance**

Plenary discussion session on the new revised version:

- Explanation of new text by authors
- Way ahead towards finalisation of Monitoring Guidance

**17.30 – 18.00h Conclusions day 1 and planning for day 2**

**19.30h** *Group Dinner (No Host Dinner)*

**WEDNESDAY, 16 OCTOBER 2019**

**08.30-12.00h**

**16-1 Threshold values advice document**

by René Dekeling

Discussion on specific topics and decision about follow-up plan and contributors

- Assessment Framework for Impulsive noise (species and habitat approaches)
- Assessment framework for Continuous noise (principles and intermediate approach)
- Setting thresholds and consider options for reference values

**10.30-11.00h** *Coffee-break*

**12.00- 13.00h**

**16-2 TG Noise Work Programme**

- TG NOISE contribution to the CIS Work Programme 2020-2023

**16-3 Planning for the next TG Noise meeting, AoB**

**13.00h** *End of 14<sup>th</sup> TG Noise meeting*

# Minutes

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Marine Strategy Framework Directive (MSFD)  
Common Implementation Strategy

19th meeting of the **Technical Group on Underwater Noise (TG-Noise)**  
Video conference



0900-1700, Tuesday 26 October 2021

|                      |  |
|----------------------|--|
| Document:            | NOISE_19-2021 Draft Minutes  |
| Title:               | Draft Minutes of the 19 <sup>th</sup> EU TG Noise meeting                          |
| Prepared by:         | European Commission DG Environment; Support Contractors: (EUCC,) ARCADIS           |
| Date prepared:       | 29/10/2021   |
| Access to documents: | MSFD CIS : TG Noise documents on <a href="#">CIRCABC</a> and <a href="#">TEAMS</a> |

## MINUTES OF THE MEETING

### Item 1: Opening of the meeting

The meeting was chaired by the European Commission DG Environment (COM). The Head of Unit C.2 – Marine Environment and Water Industry, DG ENV of European Commission (EC) welcomed the participants that have joined this meeting online (49 participants) and introduced the rules of participation online. A list of participants is provided as an annex to this report.

The EC expressed its appreciation for the work being done within TG Noise, in view of the adoption of the assessment framework for continuous noise (deliverable 3 = DL3) at the next MSCG meeting in November. A lot of work has been done over the summer by the drafting group DG DL3 to finalise DL3, which is greatly appreciated by DG ENV. Today’s meeting and the cross-cutting discussion with the co-chair of TG SEABED on the definition of threshold values will allow to learn from each other and proceed to the next step with challenging topics ahead.

The Agenda and presentations are available at [CIRCABC](#).

### Item 2: Adoption of agenda for NOISE-19

The EC presented an update on the MSFD Common Implementation Strategy (CIS) implementation, the progress of TG Noise’s work and role, and the planning for the next meetings.

#### Key points include:

- The last meeting by TG Noise was held in May 2021 and was exceptional as it aimed at specifically discussed DL3 following up objections raised at MSCG. As such, the last plenary meeting of TG Noise took place in February 2021.

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- The report on DL3 is foreseen to be submitted to MSCG for adoption on 12<sup>th</sup> of November 2021.
- The EC wants to remind TG Noise that new requests for nomination of experts by member states and stakeholders need to be registered in the system, and any change of experts needs to be communicated to the EC.

### The current status of MSFD implementation:

#### 2021:

- Reporting of monitoring programmes (art. 11) on the agenda
- Delayed assessments for articles 8 to 10 need to be done before the end of 2021
- EC assessments for art. 11
- MSFD Evaluation

#### 2022:

- Programme of Measures reporting (articles 13 – 14)
- EC assessments for articles 13 – 14

#### 2023:

- EC assessments for articles 13 – 14
- MSFD review

### Upcoming CIS tasks:

- Since 2015 implementation of GES Decision: baselines, threshold values, methodologies
- Publishing reporting guidance (under WG GES)
- Work on effectiveness of measures

### Upcoming tasks for TG Noise for 2021-2023 – linked to the CIS:

The main priority lies in the definition of threshold values for D11, first by setting up the assessment framework, followed by definition of TV. For impulsive noise, the assessment framework was adopted in May as an interim guidance but for continuous noise (DL3) work is ongoing and hopefully will be endorsed today.

Due to the focus on the work for setting up TV, the update on the monitoring guidance has been delayed. There will be an update of the communication report, to highlight the work that is being done by the members of TG Noise. Members will be contacted soon by EUCC to start the work on this.

In terms of overall EU policy initiatives, the MSFD is an essential tool for achieving the EU Green Deal objectives, adopted in 2019. The work of TG Noise has its relevance for several concrete targets and objectives being set forward in the Biodiversity strategy, the Zero Pollution action plan, but also in the Sustainable Blue Economy and Offshore renewable energy approaches. These initiatives require the definition of threshold values for underwater noise by 2022.

The MSFD implementation report (art 20 report) was adopted on June 28 2020. Based on this work, MSFD is under evaluation and could be reviewed in 2023 to come to a new directive. A public consultation on the MSFD is currently taking place, of which results will be presented on the 17<sup>th</sup> December 2021 at the MSFD stakeholder's conference. A Save-The-Date invitation has been sent, and



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the EC hereby expresses a warm welcome to members of TG Noise to join the meeting on the 17<sup>th</sup> December.

Regarding next meetings of TG Noise, following suggestions were provided:

- A new plenary meeting in the first half of 2022. Further discussion on what is needed in terms of meetings will take place with the chairs, but at least one plenary meeting is thus foreseen.
- A new scientific seminar to further support the discussions on TV and to present concrete outcomes of ongoing EU projects on underwater noise. The EC welcomes any suggestions or proposals by the group.

### Q&A – COMMENTS AND DISCUSSION

A representative from The Netherlands refers to the WG GES meeting last week (18 – 24 October) where a short update on the work by TG Noise on DL3 was presented, but no new presentation on DL3. EC clarifies that, as the mandate to revise DL3 was directly given to TG Noise by MSCG, reporting also occurs directly to MSCG.

Another point raised by The Netherlands is whether other forms of energy will be considered under D11? EC clarifies that this is internally being discussed within the Commission, but it is relevant to note that there is an interest from the MS. Also JRC is looking at TG Noise for this. The assessments of articles 8-10 will be a good basis to look at what other types of energy input might need to be considered. This should be kept in mind for next Work Programmes, so that things start to be put in motion regarding this topic. The Chair (Sweden) acknowledges that it is good to start thinking on how to approach this, as TG Noise has been caught up by the work within DG DL3 over the past months.

### Item 3: TG Noise Deliverable 3: Assessment framework for EU Threshold values for continuous noise. Update on the work of the drafting group DG DL3

The final version of DL3 is presented by the DG-leads, followed by a discussion within TG Noise for further (minor) adjustments to the document. The final draft version of DL3 has been sent around prior to the meeting and is available on [CIRCABC](#).

### BACKGROUND

First, the EC presents the background on the work being done by TG Noise and DG DL3 (established in June 2021 based on a mandate given by MSCG). There is a clear requirement within the work programme of TG Noise to establish the assessment framework of both DL1 (impulsive noise) and DL3 (continuous noise) before the actual TV can be set under DL2 and DL4 in 2022. These targets are also clearly set out in the Zero Pollution action plan, for which the revision of the MSFD by 2023 is key in further implementation. Among the key actions forced by the plan are the setting of TV by 2022. DL1 was adopted in May 2021 as an interim guidance, and will be updated to take into account outcomes of ongoing HARMONIZE project that will be available by 2022. The DG DL2 will further work with this interim guidance for setting TV for impulsive noise.

In May 2021 a special meeting on DL3 was organized to follow up on the discussions on certain concepts and definitions raised in MSCG. This led to the establishment of 3 drafting groups: DG DL2, DG DL3, DG DL4. DG DL3 started working over summer and a new version of DL3 is presented today to TG noise, after which it should be presented to MSCG in November for adoption.

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The mandate given by MSCG to DG DL3 (co-led by representatives of Sweden, Greece and Denmark) set out the need to be representative, transparent and inclusive. Four online meetings were held over summer (and several bilateral meetings among members) and an online workshop on 13 and 14 September 2021 to discuss thematic topics. Results of these discussions have been taken into account in the DL3 final draft version that is presented today. TG Noise is asked to endorse the document today so that it can be sent to MSCG before its meeting on 12 November 2021. The EC as a final point mentions the strong endeavour to keep good coordination between the different drafting groups.

### DRAFT DL3 STRUCTURE

The structure of the final draft DL3 is then presented by one of the co-leads of the DG DL3 (Denmark) who states that a lot of people have joined the discussions and meeting over summer. The focus of today will be mainly on the discussions rather than the details of the report. The overall structure of the main report remained unchanged, but substantial changes to the text occurred following discussions within DG DL3. The main focus was on aligning terminology and methodology according to 8 annexes which have also been included in the report.

Main topics for confusion and discussion among DG DL3 members were related to definitions of:

- Assessment areas, habitats and MRUs
- Assessment metrics
- Impacts on populations

Main points of the presentation/DL3 report can be summarized as follows:

- Assessment areas, habitats and MRUs:
  - o MRUs = smallest unit on which MS need to report GES by means of tools and TV but discussion on what these MRUs are -they can be national waters, EEZ, subdivisions of those, etc. but the underlying issue are habitats. However, habitats and MRUs are not the same which causes issues (some habitats occur in only 1 MRU, some habitats span more than 1 MRU, etc.).
  - o monitoring stations within habitats need to be representative for the conditions within those habitats
  - o size and depth of grid cells (each habitat = number of grid cells) used in models is point of much debate but the co-lead DK points out that the subdivision is linked to the modeling itself, which means that size and exact locations of grid cells are determined by the modeling needs and as such are not a reflection of habitat characteristics. There is also no strict requirement for regions to use the same grid for modeling.
  - o It is concluded within TG Noise that this discussion is further postponed to the work within DL4.
- Assessment metrics and assessment framework for modeling:
  - o Reference condition (RC) vs. current condition (CC): by definition, CC is always larger than RC (= only natural sources of sound; cf. modeled sound in modeling exercises), but there are practical challenges with quantifying RC. *Note that MSFD and supporting documents allow for some deviation from the RC in their definitions of GES*
  - o Both RC and CC have both a time and area component to be handled (i.e., they vary from minute to minute and from area to area), which makes it challenging to assess them.
  - o RC and CC have overlapping statistical distributions (meaning that situations exist where CC is below average RC).

- 2 important concepts are defined:
  - 1) LOE (Level of Onset of adverse Effects) = upper range of RC (upper 5<sup>th</sup> percentile)
  - 2) LOSE (Level of Onset of biologically Significant Effects) = used to assess deviation from the RC; probably higher than LOE and defined from empirical data
- Evaluation of grid cell status can take place by 2 methods:
  - 1) Constant level method: grid cell = significantly affected IF  $CC > LOSE$  (fixed sound level pressure)
  - 2) Excess level method: grid cell = significantly affected IF  $CC - RC > LOSE$  (instantaneous sound pressure level, e.g. used in JOMOPANS)
- Outcome = map with cells either significantly affected or not: evaluation of status of habitat depends both on tolerable duration (time component) AND tolerable area (space component) >> whether first area should be defined, then time, or vice versa is something to be dealt with within DL4.
- Overall assessment of GES = combination of LOSE, tolerable duration, tolerable area so values for all three need to be defined and TVs will be a set of all these three things. The three parameters are also interlinked: setting one value high can be counterweighted by setting another one low (e.g., allow a lot of noise in individual grid cells, but not allowing large fraction of habitat being affected). This tradeoff is again something to be discussed in DL4 (balance in parameters).
- Impacts on populations: documentation of population-level effects is required in GES definitions, but information is rarely available to make this assessment. A decision tree is shown in the presentation, which represents a certain hierarchy in assessments (starting by selecting certain key species, then questioning whether there is reliable information on habitat present; if not, replacement by MRU, etc.). There is always a tradeoff in what is known and what can be done.

#### Q&A – COMMENTS AND DISCUSSION

DG DL3 co-chairs point out that the discussion should focus on issues that can be dealt with today, to incorporate in the text of the DL3 report. The EC clarifies that there have been several occasions to address and discuss outstanding issues, and the current DL3 draft is good enough to be sent to MSCG. Only small changes are allowed before the end of the week. Other issues should be delegated to discussions and decisions within DL4.

- In general, the presentation and updated version of DL3 are well received by the MS, although it is clear that certain questions should be dealt with in DL4 which also has limited time to do all things needed.
- It is clarified that the RC can be in the past (in which case CC can be below RC), but during discussions the present RC is taken as a basis. This is relevant if climate change would be included in assessments, but this has so far not been the case.
- The topic of statistical averaging in grid cells is not being addressed (how to address multiple values in a grid cell?). As grid cells become spatial assessment windows, it should be clear what the nature and dimensions are of those grid cells (up to modeler/judgement call?) to avoid confusion. The topic of grid cell dimensions should further be discussed in DL4.
- Concerning MRU, there is still discussion on the exact definition at EU level also; the interplay between area and duration is important and allows for some flexibility for DL4. It will also depend on the indicator species, so first choose this and then the metric. FL adds that impacted area or duration of time also depends on the MRU (which affects the sound pressure), so metrics should be both species- and MRU-specific (regional discussions that need to be dealt with).

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- The presented flow chart is not in line with the outcome of the DG DL3: the four methods should be options, rather than a logical hierarchy. It also does not apply to the second definition of habitat (multispecies approach). Overall, there is quite some discussion and disagreement on the flow chart (also whether or not to include it at all, adding a caption, keeping it more general in terminology, etc.), and the EC suggests that any further issues or remarks concerning this topic should be sent to the authors by the end of the week, to be included in the revised version.
- It is noted that the DL3 report still refers to habitat as “where species live” although the annex 2 gives two options. This will be made consistent (preference for annex 2 definition by MS).
- There is the observation that making use of the combination of onset value (LOE or LOSE) and tolerable time/area brings back the need for some kind of exposure curves. This is acknowledged by the DG DL3 co-chair (DK) and is deliberately not mentioned in the DL3 text as it adds another level of complexity. In any case, there are three parameters that will define TV together. Whether or not to collapse them in 1 value is point of discussion for DL4. The co-chair (SE) points to the limited data/evidence for most species, so there should always be a dynamic/flexible component. For those indicator species where exposure curves can be drawn, this would be a good thing, but for many species there won't be enough data. These types of discussions are also to be picked up by the regions (what species do we have, how to approach, etc.).
- There is the question whether there will be a need for examples on how the assessment framework can be applied (typical sets of number) in DL4. It is put forward that setting examples of thresholds for tolerable area and duration is a regional choice and will depend on the chosen indicator species. The EC clarifies that TG Noise's role is to advice how to do it, not particularly setting these values. The co-chair (SE) agrees, as examples tend to live there own live and can be taken as recommendations while TG Noise formulates advice based on science and expert knowledge within the group. It is up to MSCG to take a decision and formulate guidance. However, examples can help to visualize and understand how the assessment framework works. The cross-cutting discussion with the co-chair of TG Seabed might give further insight on this as they experienced similar issues.
- In step 7 of the assessment framework (p. 21), it should be made clear which kind of effects are being looked at (e.g., masking, disturbance, etc.). There is the proposal to include '(disturbance & masking)' in first option, and '(masking)' in second option but the co-lead (DK) thinks both options can be used for both disturbance and masking as effects, and it should be clear from the text what is meant.
- One MS (PT) suggests not to use the terminology 'European waters' since it has a jurisdictional connotation, but instead use 'seas' (as used in other MSFD documents). The EC clarifies that this has to be looked at from a legal point of view but should not prevent TG Noise from moving forward. As feedback is needed from all legal instances, this will not be covered in the next days before sending to MSCG, but a comment will be made to MSCG.

### Specific comments to the text that were changed during the meeting:

- Annex 1 (p. 25): “exposure as a proxy of risk” >> changed to “exposure as a proxy of impact” (risk not correct word). It is added by IT that this part had been changed in the 4<sup>th</sup> version of the report in September 2021. The MS and DG leads will check and see how to adapt.
- “Level of Onset of adverse Effect (LOE)” suggests there is some biology included in the concept, but this is not reflected in the name >> it is decided to change to “ceiling of reference condition (CRC)”
- “upper bound” to be replaced by “upper percentile” in text, since 'bound' suggests the maximum value (only 1 value)



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- In the definition of “habitat”, the work ‘geographical’ is missing and will be added throughout DL3, on p. 9 and p. 16.
- Also on p. 9 and p. 16: change “area” to “domain”.
- On p. 16: second definition of habitat is missing: “[...] or the community of species lives [...]”.
- After discussion on the flow chart on population level assessment, a caption is added, which reads “Options for assessment based on the amount and quality of information available”. There is also the suggestion to use “Population consequence types assessment/modeling/framework” instead of “PCoD” in the lower box (more general terminology, cf. remainder of DL3).
- In the accompanying text to the flow chart, the sentence “Due to current lack of empirical data [...], which is in most cases not sufficient for regulatory purposes” is changed to “[...] may not be sufficient”. Other language comments will be sent to the co-lead (DK) of the DG DL3.
- The DG DL3 leads will check for any inconsistencies throughout the remainder of the text in accordance with the suggestions above.

### CONCLUSION

#### Topics to be delegated to DL4:

- Size and depth of grid cells (+ statistical averaging)
- Balance in parameters (LOSE, tolerable duration, tolerable area) in overall GES assessment
- Order of evaluation of parameters: first time, then area or vice versa?
- Question on using exposure curves or alike: there are three parameters together that define TV, do they need to be collapsed into 1 value?

The EC concludes that TG Noise can endorse the revised document and no objection was raised by MS. A final version based on today’s modifications will be prepared by the co-chairs of DG DL3 by 29/10/2021, to be sent out to MSCG for adoption. There is agreement among the group that some issues need to be further discussed in DL4 (see list above) and those topics will need to be included in the mandate of the DG DL4.

#### **Item 4: TG Noise deliverable 2 and 4: Options for EU threshold values**

##### **a. Update on the work of drafting group DG DL2 on options for EU threshold values for impulsive noise**

TG Noise co-chair (France) provides a quick update on the work on DL2, as there have not been any tasks initiated yet within the DG for DL2. A doodle was sent on 25/10/2021 to establish a first meeting, during which the main objective will be setting a calendar with a timeline to achieve a definition of TV for impulsive noise. The discussions from today’s meeting will also feed into the discussion on TV for DL2, as well as the findings of the HELCOM project to be presented later today. The co-chair (SE) adds that the interim report from the HARMONIZE project will also present relevant findings for DL2.

##### **b. Update on the work of drafting group DG DL4 on options for EU threshold values for continuous noise**

TG noise co-chair (Italy) provides an update on the work within DG DL4, where interactions with the members have started, although the work from DL3 is needed before DG DL4 can take a start. It is mentioned that DL4 is due in early 2022, so the discussion on which baseline documents (COM DEC 17/848, staff working document of September 2021, etc.) are needed prior to starting has commenced.

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After a discussion within DG DL4 on who will take the lead in defining terminology, it was decided that the first chapter of the DL4 report will consist of terms and definitions, including those from the final DL3 version and the changes from today's TG Noise meeting. There will also be ISO 18405 and a dictionary from ADEON (with permission of the representative of The Netherlands) as supporting doc. All of these documents will be uploaded to the Teams channel as soon as DL3 is sent to MSCG to start discussing with the other TG Noise members.

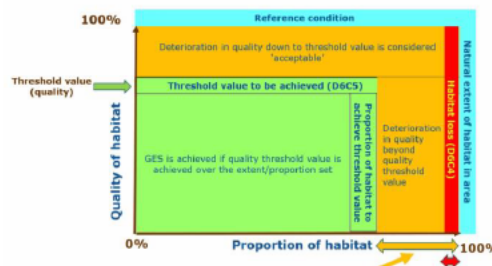
c. **Cross-cutting discussion** with co-chair of TG Seabed, on how to set up EU threshold values

Documents:

- [SEABED 7-2021-11](#) (threshold values for seabed habitats)
- [SEABED 7-2021-12](#) (Extent threshold for benthic habitats in the MSFD)

The EC welcomes the co-chair of TG Seabed, which has been invited on today's TG Noise meeting given the similarity in questions and topics to deal with in the other TG. The co-chair of TG Seabed will present a few results and findings from the work being done. It might not answer all questions, but could raise a few issues relevant to TG Noise (as discussed in advance with the Chairs of TG Noise) open for discussion after the presentation.

- Division of tasks between MS, regions/sub-regions, EU: This was tackled under the ToR in 2019 upon request by MSCG to set out in paper the way in which TG Seabed sees this relation. The three levels (EU, regional, national) are all important in the process. Individual experts bring an enormous amount of knowledge and data to the table, but what comes out at an EU level needs to be a common framework and standards, harmonized across MS and regions. Nevertheless, regional-level specificity is important to take into account and indicators need to make sense for the regions.
- How to set TV for seabed? The fact that criteria under D6 (which specifically deal with physical loss) also link to other descriptors (e.g., D2 NIS, D5 Eutrophication, etc.) adds a level of complexity for TG Seabed. Therefore, both quality and extent TV are used, depending on the criterium (e.g., D6C4: extent threshold; D6C5: quality AND extent threshold). The documents sent prior to today's meeting are based on staff working document from last year (better known as 'cross-cutting issues paper') and document setting TV for D6. In TG Seabed terminology, the RC is a pristine environment, where 100% of the quality of habitat is achieved for 100% proportion of the habitat. The relationship between those two parameters is presented in a scheme (see below), allowing for some deterioration in quality, and some loss in habitat (area):



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- The quality TV represents how much deterioration is acceptable. It is noted that a similar tradeoff applies to noise (spatial distribution + quality of sound). However the duration of noise adds an extra dimension
- TG Seabed has been going on for 3 years, and many meetings and discussions were required to get a common understanding of the starting point in the process (AF, what is 'seabed' and how to tackle?). There were orientation questions asked to the group, and two papers were published, but a better consensus was needed before setting the actual TV. One of the key pressures is seabed trawling, responsible for 95% of all physical seabed disturbance. However, the pressure is not uniform (banned from deep offshore waters, complex in coastal waters). Throughout the process, advice from e.g., ICES was used. Some of the orientation questions related to setting TV were: science vs. policy, single or multiple values, geographical scale to be applied, time period for assessment, etc. These questions generated very interesting but chaotic opinions, views, etc. while there is a need for coalescent common perspectives.
- The quality threshold is presented, which considers different interactions (biological, chemical, physical), a huge range of ecological characteristics, different ways to assess state of the habitat etc. Overall, it is a complicated picture, but there is a lot of data to help guide the process.
- How to deal with data gaps? Uncertainty vs. precaution? Lessons learned from TG Seabed are to make best use of the evidence, as there will always be a need for more data and there should be a way forward. Considering setting interim TV might help to act upon the existing evidence in a reasonable fashion.
- Models vs. empirical data? Using different indicators (e.g., OSPAR approach indicator vs. PD2/LL1 from ICES) yields different results. There is a preference for real data (monitoring), but inevitable there is a need to use models to assess large areas. The use of several indicators can help in lowering the risk for making false interpretations.
- Socio-economic side of things? Ideally, this should not come into play when setting TV, but given the scale of bottom-trawling fisheries it was necessary to consider within TG Seabed. Based on ICES data related to the scale and economic return of bottom-trawling, it was concluded that 90% of the economic value can be caught in less than 40% of the total fished area (meaning a low-economic return for ca. 60% of the fished area). Hence the question rose whether by reducing fishing effort in certain areas, less economic pain, more ecological gain could be achieved. This was applied in a cost-benefit analysis (CBA). The message is that ultimately the TV will lead to actions or measures that will affect the sectors causing the pressures. There was thus the requirement from MSCG to have some understanding of the consequences this would have on the sector as well as the environment (hence the CBA performed).

The EC briefly recaps the presentation by the co-chair of TG Seabed by stating that there is much food for thought, and that there is certainly a need for agreeing on concepts in order to make progress. The floor is then open for comments and questions by TG Noise.

### Q&A – COMMENTS AND DISCUSSION

- TG Noise co-chair (SE) has a procedural question on setting interim TVs, whether that is acceptable from EC point of view/perspective. It is clarified that the ultimate goal is setting TV, but knowing the actual state of science might not allow for this. A representative from ACCOBAMS adds that setting interim TV from the ACCOBAMS perspective is a possibility until better knowledge allows for setting ultimate TV. It is a natural evolution for scientists to always

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require more data, any gaps can be filled by expert judgement. GES determination can be updated every 6 years according to scientific updates.

- Some members of TG Noise are particularly intrigued by the CBA presented for TG Seabed. Some comments on this from a Noise perspective:
  - For noise there is not always a tradeoff, but sometimes rather a win-win situation (e.g. slowing ships for noise also reduces fuel consumption, emissions, etc.). Could this be addressed in the same way as done in TG Seabed? Theoretically, GES should not be influenced by the cost of achieving it, but for seabed CBA was necessary due to the scale of the fisheries problem.
  - It seems that bottom trawling is concentrated in smaller areas. Would this also mean that most protection is needed in those small areas to safeguard economic revenues from it? TG Seabed clarifies that the general perspective is that areas with less economic value can be allowed to let the system restore itself and reach GES, whereas highly productive areas are the most impacted ones.
  - On the question who has performed the CBA, TG Seabed answers that the underlying data comes from ICES (released in June), but is quite simplified in today's presentation (e.g., potential savings in terms of fuel or time, shift in fishing effort, etc. have not been taken into account).
  - TG Seabed finally adds that the first aim of the CBA was to demonstrate consequences for choosing extent thresholds in terms of socio-economic impact but it is not a management solution yet (political resistance etc. to be taken into account also).
- Regarding the chart with quality vs. proportion of habitat, one observer wonders what the cumulative effects of small deteriorations for all descriptors might be. In the end, animals do not care which descriptor it is, they only notice a deterioration in their environments. It is agreed that MSFD should take account of cumulative pressures on animals and habitats.
- Referring to the extent of the area being impacted, one MS asks whether a tradeoff can be done on a habitat basis or more on a general basis across larger areas in a seabed context? TG Seabed indicates that in principle there are 22 broad habitat types defined, but the extent of protection for each type in each area (proportion) still needs to be defined. What you want is to allow for continuous use of the seabed, but having an acceptable level of overall protection for the habitat types. This might also apply to noise (balance between current and future uses and the level of impact one wants to allow).
- The question is raised whether the differences observed between model output (OSPAR vs. ICES) can be found together with TG Seabed's considerations on the use of models/measurements in a TG Seabed document? TG Seabed will have to go back to ICES for more advice on models and indicators. At the moment, there is not one model or indicator that can be advised. It needs to be investigated how current indicators perform against the set standard for them to achieve.
- The multivalued threshold diagram could be relevant for TG Noise – can it also be a curve rather than a rectangle (tradeoff between quality and space)? In theory this should be possible, but it is noted that there is a 3<sup>rd</sup> dimension for noise adding extra complexity (envelope of characteristics). This is something to learn from for the DL4 workshop.
- It is noted that D6 links to D11 too, according to latest scientific research, as quite some species are affected by noise (e.g., seagrass, hermit crabs)



**Item 5: Update on European projects and initiatives on underwater noise**

**a. HARMONIZE project**

A BSH representative (DE) presented the HARMONIZE project and current activities, with focus on the interim report. During the scientific seminar of TG Noise there was already an update on project activities provided. The most recent activities relate to the finalization of the interim report. The main objective of HARMONIZE is to investigate the different assessment methodologies from DL1 to come to a harmonized and applicable framework for impulsive noise as well as robust interpretation of results.

Among the recent activities, the principles for harmonization were set, including regional aspects, best practices of methodologies used, the use of common criteria and boundary conditions (cf. TG Seabed presentation) and cross-regional acceptance by using harmonization criteria. All of these topics have been incorporated in the interim report. The main contents include a comparison analysis of data available in noise registries. These data are both the main source and main constraint for any further steps and objectives within TG Noise. Furthermore, the report presents an analysis of a practical stepwise approach for further data analysis, as well as a section on the choice of propagation models. As there is a huge variety available there is a strong need for tailoring to purpose, and an important step to consider. Practical workflows are provided. The interim report contains also test cases on realistic data examples in different sea regions, at the request of TG Noise members. Particular effort and attention was put into this, and the three test cases provide a source of information and a learning tool. The detailed description of analyses and conclusions from the test cases are important to consider within TG Noise. There is the plan to amend the test cases. The four criteria used in the evaluation of the various approaches for impulsive noise are described (suitability, applicability, feasibility, reproducibility), and the outcomes of the previous TG Noise scientific seminar were incorporated too. The report contains a proposal of steps for an applicable AF, based on immediate implementation and stepwise workflow advise. Finally, recommendations for valuable adjustments to noise registries are given, which can be extended throughout the remainder of the project. The interim report will be placed first on the website of BSH ([https://www.bsh.de/EN/TOPICS/Offshore/Environmental\\_assessments/Underwater\\_sound/underwater\\_sound\\_node.html](https://www.bsh.de/EN/TOPICS/Offshore/Environmental_assessments/Underwater_sound/underwater_sound_node.html)), and later also on the HARMONIZE project website.

Members of TG Noise are welcome to review the report. Requests for a direct link to the interim report can be sent to the BSH representative.

**b. Activities of the European Marine Board related to underwater noise**

A representative of DHI gives an overview of the actions taken by the EMB regarding underwater noise. Most of last years' time was taken up by the work performed within the EMB expert working group, representing and advisory non-governmental board, which has recently published its final report. Thirteen years after the risk assessment framework published in 2008, the new report provides a summary of the current state of knowledge. The main objective of the future science brief is to make recommendations for actions. A dream team consisting of 13 scientists from all over Europe joined forces and the science brief (counting over 50 pages) can be accessed on the EMB website (<https://www.marineboard.eu/publications/addressing-underwater-noise-europe-current-state-knowledge-and-future-priorities>). TG Noise members wishing to receive the report can download it there or ask the marine board secretary or the representative of DHI directly.

The science brief contains a lot of graphs and tables to enhance the readability for policy makers. Chapter 2 focuses on impacts and effects, while Chapter 3 deals with management and mitigation. It is a large chapter, but gives a nice review on everything that has happened during the last 30 to 40 years. The timeline included in this chapter goes from 1982 (UNCLOS) to 2021.

There are 13 priority actions identified in the report (which can be found in the presentation on [CIRCABC](#)), the first two more overarching (collaborative international standards, comprehensive monitoring). It is noted that certain areas are still understudied (e.g., Black Sea) compared to others, and that there is a need also to think from the animal perspective. Priorities 9 (combination of stressors) and 10 (PCoD) both indicate the need for multistressor studies. As pressure from noise in other, less-developed, areas can be very high, international collaborative projects are necessary. All TG Noise members are invited to read the report and provide feedback.

Finally, all members of the working group are acknowledged for their effort, especially since everything had to take place through online meetings.

**c. French guidance on recommendations to limit the impacts of manmade underwater acoustic emissions on marine wildlife**

A French representative presents the guideline on anthropogenic marine noise and the French recommendations to limit the impacts of manmade acoustic noise. Work on this guideline started in 2018, but it was published in 2020 (FR version) and 2021 (EN version). The guideline came into existence due to the need to identify activities and impacts, as well as give recommendations to the state's central and local services. The guideline is also one of the measures identified in the FR POM in 2016. The basis for information was threefold, making use of scientific literature, interviews with the maritime sector, as well as exchanges with members of the steering committee. In the report, several taxa of marine fauna are covered, but only anthropogenic noise sources related to civil activities are taken into account (no military activities). There are no recommendations on threshold levels given, as this is part of the work being done in TG Noise. The report consists of a lexicon, an introduction, a preamble (where several basic concepts are explained) and four parts. Part 1 presents the different activities generating noise underwater, while Part 2 focuses on the impact on marine wildlife. Part 3 provides an overview of the possibilities for mitigation of impacts and their effectiveness. Finally, Part 4 forms the main practical output of the report consisting of several summary sheets summarizing the information of the other three parts.

Both FR and EN versions of the report can be downloaded online at <https://www.ecologie.gouv.fr/guide-lutte-contre-bruit-sous-marin>, and the French Ministry will further promote the guide at different platforms.

**d. Lessons learned from the continuous noise pressure indicators obtained in the JONAS project**

One of the members of QuietOceans and collaborator on the JONAS project (*Joint framework for ocean noise in the Atlantic Seas*) gives an update on the project, more specifically on the work related to pressure indicators for continuous noise. The main objective of the project is to deal with underwater noise risks on a transnational basis (regional rather than national approach). Today's presentation gives an illustration of the practical implementation of the methodology and the results in various parts of the Atlantic. Six high-resolution areas are covered in the JONAS project (Irish Sea, Brittany, Bay of Biscay, Gibraltar, Azores and Canary Islands) and for each of them monthly, quarterly and annual sound maps (ship noise) have been produced in 2019. An interactive web interface helps users to define pressure

indicators that they want to assess, based on the information provided (e.g., MRU, key species, etc.) and the noise maps. Some parameters are defined by the user (e.g., thresholds and effects) – for the sake of today's exercise these were selected by the JONAS collaborators based on literature and expert knowledge. After that, also scenarios will be defined by the user, based on the species presence/habitats in the MRU. Several outcomes (disturbance indicators) are presented as examples, showing that there is good correspondence between fluctuations in the indicator distribution and changes in oceanography. It is also possible to obtain maps showing the percentage of time exceeding a certain threshold (set by user) or getting a single number ('surface-below-the-curve') rather than distribution curves as an output. The interface also nicely shows that differences in impacts among different areas are well reflected in the indicators (e.g., constant indicator for one area, while fluctuating for another area with same parameters used). Finally, different effects can be investigated, such as disturbance and masking (loss of communication), with the tool.

To conclude, the online platform provides a useful way to implement pressure indicators based on statistical sound maps. It is also flexible to adapt to local conditions (parameters such as MRU, key species, effects of concern and thresholds can be decided by the user). The web interface has successfully been tested for several MRU and types of effects and the obtained pressure indicators are sufficiently sensitive to describe different 'states' of the case studies. The tool is thus operational and can help in decision-making related to the setting of GES.

The next step within the JONAS project will be to look how the situation changes with implementation of mitigation measures.

#### e. QUIETSEAS project

The lead partner (CTN) presented the update on the project quietseas, which it coordinates, as a follow-up of the QuietMED projects. All these projects served as supporting activities for MSFD implementation for D11 (underwater noise). QuietMED started in 2017 with the objective to provide guidelines and tools for monitoring of noise at the scale of the Mediterranean. QuietMED2 was the follow-up starting in 2019 and focussing on impulsive noise (D11C1). With the newly started quietseas project (2021-2023), focus will also be on continuous noise (D11C2) and expanding from the Mediterranean to the Black Sea. Throughout this process there will be room for cooperation and recapitalization of results of the previous projects, to lead to concrete and useful results as outcome.

The general objective of the quietseas project is to support the practical development of the second implementation cycle under the MSFD for D11 (both D11C1 – impulsive and D11C2 – continuous noise covered). CTN coordinates a partnership of Mediterranean and Black Sea stakeholders and authorities, while also having a link with the RSC (ICES as a member) and non-EU countries. The advisory board has some TG Noise members and there is strong cooperation with the group. The work within the project is divided into 4 thematic blocks. Activity 3 (feasibility analysis of AF for continuous noise) within the first block (dealing with indicators and thresholds) is covered by the same team as working on DL3 within TG Noise. Results of this activity are thus expected by the end of November 2021. This also applies for Activity 4 (specificities for practical implementation of AF) and Activity 5 (risk-based methodology and establishment of thresholds), meaning that TG Noise will be asked to revise three deliverables related to these activities over the coming weeks (see presentation on [CIRCABC](#)). Other activities within the project relate to regional approach (Activity 7) or case studies (Activity 8).

As work is ongoing, there are no results to be presented yet, but expected outcomes involve setting the definition of particularities for risk-based GES assessment in both Mediterranean and Black Sea regions, providing recommendations on acoustic propagation modelling for continuous sound assessment,

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proposing a methodology to establish TV for continuous noise (together with TG Noise work), performing an initial GES assessment for both D11C1 and D11C2 in both regions, and establishing management tools for harmonization, reporting and assessment of impulsive and continuous noise. Additionally, the project also foresees in further data gathering, as this is not easy and problems with harmonization occur (cf. HARMONIZE presentation). Currently, there is not enough data at hand. Other anticipated outcomes are quantification of effects of potential mitigation measures to reduce shipping noise, organize training sessions (both authorities and experts, from EU and non-EU) and networking activities.

A timeline for the project is presented and a delay in one of the deliverables is mentioned due to the drafting of DL3 in TG noise. Nevertheless, efforts regarding data gathering are ongoing (e.g., AIS data, biodiversity information in the Black Sea, etc.) through several data calls. A web interface (<https://quietmed2.ctnaval.com/inr-med>) developed during the previous projects provides an overview of which data has been included so far, but CTN indicates that more data will come soon. As for continuous noise, there has not yet been a specific data call given the ongoing discussion on which inventory, metadata, format, etc. has to be used.

The representative of CTN presents the further timeline for quietseas and concludes that more updates and results on the project will be shared over the coming months.

### f. Outcomes of the SOUNDS Study (Status of Underwater Noise from Shipping)

A member of the European Maritime Agency (EMSA) presents the results from the SOUNDS study (*Status of Underwater Noise from Shipping*). EMSA is a decentralised EU agency and has a double role to assist in maritime transport-related policy as well as implementation by MS. Next to that it is also an operational body which has several assets such as ships. The agency also performs maritime observational monitoring and surveillance for MS and stakeholders.

The European Green Deal has an important maritime dimension by focussing on smart and sustainable mobility. The maritime transport sector has an important impact on the environment, both atmospheric as well as marine. While the environmental focus from the sector has shifted from oil pollution to atmospheric pollution over recent years, there are also new emerging areas of concern such as underwater noise. The agency is therefore looking at how pressures are addressed and provides advice on measures to prevent or restore the impact. Last year, a tender was sent around which led to the SOUNDS study (*Study on inventory of existing policy, research and impacts of continuous underwater noise in Europe*).

There are 4 main tasks specified within the project: T#1 – addressing the contribution of the existing guidelines (incl. IMO) in reducing URN (Underwater Radiated Noise) from commercial shipping and mitigating the adverse impacts on marine life in EU waters, T#2 – Analysing the impact of URN on all trophic levels of the marine environment and in particular in EU waters through a review and a critical analysis of existing published research projects, T#3 – establishing an inventory of sources of URN from shipping (gap analysis), and T#4 – identifying the existing technological solutions that have been developed in reducing URN for new and existing ships.

The project brings together a large group of stakeholders, and uses a case study based on the Canadian ECHO project for the impact of underwater noise from shipping. Results of this project are relevant, although not based in Europe. It is clear that the main noise sources are propellers, propulsion engines, etc. Among the recent developments in the SOUNDS project are discussions on terminology and methods, shallow propagation effects, access to AIS data and study on simplification of ship-noise



measurements (e.g., by drones, onboard sensors, etc. which can be handy technologies that will improve knowledge and at a lower cost for ship owners).

EMSA mentions that in 2022 it will start a project of computational modeling for noise specifically from ships in support of DG ENV en DG MOVE. This will feed into TG Noise, as well as contribute to the work being done at international level (e.g., revision of IMO guidelines). Most existing modeling exercises and studies refer to short-term impacts on species but there is less information on longer timescales and at population level. Also source level / receipt level are usually missing from current studies. Future studies should focus on species that are easily obtained in lab environments.

There are several policies of relevance concerning noise, at international (e.g., IMO recommendations exclusively dedicated to shipping), European (MSFD for biding actions) and national level. At the national level, participation of industry representatives might be something to consider in the future. With the noise requirements in vessels being increasingly strict, there are several incentives to mitigate noise from shipping (also abroad Europe, in the USA for instance). These include technical (e.g., propeller design), operational (e.g., reduction of cavitation noise), and management support (e.g., monitoring) measures.

To conclude, engagement of the shipping industry is important to develop sustainable measures regarding underwater noise. As there is a need for combined effort from different stakeholders, terminology should be clear. The latest report from EMSA on the status of underwater noise from shipping is available for download at their website <http://emsa.europa.eu/publication/reports/item/4569-souds.html>. It is encouraging to see that it aligns well with the conclusions in the EMB report. For more information and reports on the relationship between the maritime sector and the environment members of TG Noise can visit the EMTER website (<http://emsa.europa.eu/emter.html>).

#### **g. HELCOM Blues**

A representative from TalTech (Tallinn University of Technology, EE) provides an update on Activity 4 within the HELCOM Blues project (*HELCOM biodiversity, litter, underwater noise and effective regional measures for the Baltic Sea*), which deals with support for and harmonization of regional work on D11. This relatively small project is carried out by a consortium of partners TalTech and HELCOM, and sub-contractors ICES (database manager) and QuietOceans (modeler). Underwater noise is but one of the topics being dealt with in the project.

There are a few ambitious tasks within Activity 4 of the project, both for impulsive and for continuous noise. Overall, the deliverables should lead to improved assessment (from qualitative to quantitative) of both impulsive and continuous noise with the intention of including these in the Third State of the Baltic Sea report (HOLAS III).

Concerning timing, a few important points for HOLAS III are presented:

- Any TV or methodology intended to be used as part of the HOLAS III assessment will need to be approved by the end of 2021 (HOD in December 2021) or it will not be included in the HOLAS III assessment.
- Indicator evaluation results for HOLAS III need to be ready for review and approval by 31 August 2022.
- Indicator reports for HOLAS III need to be ready for review and approval by 27 September 2022.
- Thematic reports of integrated assessments and analyses (ESA, Biodiversity, Hazardous substances, etc.) need to be ready for review and approval by 5 December 2022.

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This means that methodology needs to be ready by end this year, while next year will focus on details on how to achieve and calculate indicators. With regards to the timeline within the HELCOM Blues project, following deadlines are set for deliverables:

- Task 4.1. Continuous noise
  - o New soundscape maps (12/2021 – 02/2022)
  - o Quantitative continuous noise assessment for HOLAS III (12/2021)
  - o Improve calibration standards for monitoring of continuous noise (12/2022)
- Task 4.2. Impulsive noise
  - o Quantitative impulsive noise assessment for HOLAS III (12/2021)

Some results on the first deliverable (new soundscape maps) are presented, based on the impulsive noise inventory available on OSPAR/HELCOM (maps similar as during BIAS project). On these maps, the anthropogenic layers are now separately, as opposed to previous projects, and a static threshold level is chosen. Over 800 maps are to be produced for three regions (chosen so that all MRU/HELCOM units are integrally included in one of them, so small overlap occurs).

Next, the issue of sensitive species is presented, with the remark that there is still discussion on this topic. Indicator species would be porpoises, herring, etc.

Finally, in order to obtain more quantitative impulsive noise assessment, an improvement of the impulsive noise events registry (INER) is required (subtask 4.2.1). The problem is that some countries report accurately while others don't, leading to an irregularity of data submission. Improvement could be obtained by including a layer for seismic survey events in the Baltic, to fill the database

### h. SOUNDSCAPE project – update

A representative of the Institute for Oceanography and Fisheries IOF (HR) gives an update on the SOUNDSCAPE project (2019-2021). The project was first presented two years ago, when it was at its beginning and today an update will be given. The project is financed through Interreg Italy-Croatia and IOF has the lead of a consortium with both Croatian and Italian partners. The end of the project was originally foreseen in May 2021, but due to COVID-19 the deadline was extended to end November 2021. Most deliverable have thus been met.

The project's overall objective is to establish a cross-border technical, scientific and institutional cooperation in assessing the impact of underwater noise on the marine life, and developing a sustainable approach to marine and coastal ecosystems and resources. There are three entities each corresponding to a work package: 1) The assessment of the pressure of anthropogenic underwater noise on North Adriatic Sea marine ecosystems, 2) The assessment of sensitivity of target species and habitat suitability, and 3) Modelling and planning impact mitigation measures and scenarios.

Results of the WP3 (Soundscape assessment) are shown, which consisted of 7 actions. Over the course of 15 months, full spectrum (20 Hz – 24 kHz) continuous recording at each of 9 monitoring stations across the Northern Adriatic took place, yielding over 8000 hours of validated data, or more than 3 Terabytes to process. A processing tool (ANP) was developed and tested as one of the actions, in the form of a web application to allow parallel operations taking place on many computers. Several post-processing analyses were performed to extract as many statistics and parameters as possible.

WP 4 deals with sensitivity of targets. Two species (bottlenose dolphin and loggerhead turtle) were defined and singled out to assess habitat suitability in a case study covering a smaller part of the study

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area. The outcome are maps showing the density of occurrence or outcomes of a habitat suitability model (either Presence/Absence or encounter rate).

Finally, within WP5 (Soundscape modelling and planning impact mitigation measures and scenarios), two types of sound maps are produced:

- Whole areas - 2016 maps on 4 frequency bands
- Monthly averages

Within this WP, there is also a data integration tool on mitigation measures (Tools4MSP portal – former ADRIPLAN – see <http://data.tools4msp.eu/tools4msp/soundinfo>). This data tool also allows for combining several data layers (e.g., loggerhead turtle distribution, shipping data, etc.) into 1 map. The generated noise maps serve as an all-in-1 tool to help decision-making.

### **Item 6: Any other business**

The EC proposes to organise a new scientific seminar in spring 2022, to have more detailed discussions on the different topics. This will be discussed with the co-chairs of TG Noise.

### **Item 7: Close of meeting**

The DG ENV thanked all participants for their attendance and the speakers for their valuable contributions. Today's agenda was packed, but important discussions and suggestions have been made by the group. TG Noise co-chair (SE) thanks the participants after a long and informative day. The online meeting was closed at 17.15h on 26 October 2021.

## List of participants

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### Annex I: List of participants.

|   |                 | Organisation / Ministry  |
|---|-----------------|--|
| <b>Member States</b>                                |                 |  |
| HR  | Croatia         | Institute for Oceanography and Fisheries, Croatia (IOF)  |
| CY  | Cyprus          | Ministry of Agriculture, Natural Resources and Environment, Department of Fisheries & Marine Research (DFMR) |
| DK  | Denmark         | Aarhus University  |
| DK  | Denmark         | Institute for Bioscience   |
| EE  | Estonia         | Tallinn University of Technology (TalTech)   |
| FI  | Finland         | Finnish Environment Institute  |
| FR  | France          | SHOM (Service hydrographique et océanographique de la Marine)  |
| FR  | France          | Ministère de la transition écologique et solidaire   |
| DE  | Germany         | Muller -BBM GmbH   |
| DE  | Germany         | Federal Maritime and Hydrographic Agency (BSH)   |
| EL  | Greece          | Hellenic Center for Marine Research (HCMR)   |
| EE  | Estonia         | Taltech (Tallinn University of Technology)   |
| IE  | Ireland         | Department of housing, planning and Local Government (DHPLG)   |
| IT  | Italy           | ISPRA (Italian Institute for Marine Protection and Research)   |
| IT  | Italy           | Tethys Research Institute  |
| IT  | Italy           | Politecnico di Milano  |
| NL  | The Netherlands | JASCO Applied Sciences   |
| NL  | The Netherlands | Ministry of Infrastructure and the Environment   |
| NL  | The Netherlands | Rijkswaterstaat  |
| NO  | Norway          | Norwegian Petroleum Directorate  |
| PL  | Poland          | Maritime Institute in Gdansk (Poland)/ Marine Research Institute (Lithuania)                                 |
| PL  | Poland          | Polish Institute of Meteorology and Water Management (IMGW)  |
| PT  | Portugal        | Direção-Geral de Recursos Naturais, Segurança e Serviços Marítimos (DGRM)                                    |
| RO  | Romania         | National Institute for Marine Research and Development “Grigore Antipa” (NIMRD)                              |
| SI  | Slovenia        | Slovenian Environment Agency   |
| SI  | Slovenia        | Institute for Water of the Republic of Slovenia  |
| SE  | Sweden          | KTH Royal Institute of Technology, Sweden  |
| SE  | Sweden          | Swedish Agency for Marine and Water Management (SwAM)  |
| SE  | Sweden          | Swedish Defence Research Agency  |
| <b>International organisations and stakeholders</b> |                 |  |
| RSC   | HELCOM          | Helsinki Commission Secretariat  |
| STH   | EMB             | European Marine Board  |
| STH   | EMSA            | European Maritime Safety Agency  |
| STH   | IOGP            | International Association of Oil & Gas Producers   |
| STH   | SINAY           | SINAY maritime data solution   |
| STH   | Oceancare       | Oceancare  |
| STH   | Quiet Oceans    | Quiet Oceans   |
| STH   | IFAW            | IFAW - member of Seas At Risk  |

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|  |               |  |
|--|---------------|--|
| STH  | CTN           | CTN-Marine Technology Centre (Spain)                             |
| STH  | ACCOBAMS      | ACCOBAMS   |
| <b><i>European Commission, European Environment Agency, European Topic Centre, Consultants</i></b> |               |  |
| EC   | EC DG ENV.C.2 | European Commission, DG Environment, Unit C.2 Marine Environment |
| Consultant   | ARCADIS       | ARCADIS Belgium NV/SA  |
| Consultant   | EMODnet       | EMODnet Secretariat  |