



Outcome of the 2th Meeting of the HELCOM Expert Network on Underwater Noise (EN-Noise 2-2019)

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Introduction

0.1 In accordance with the memo of the EN-Noise working meeting held on 24 April 2019, the 2th Meeting of the HELCOM Expert Network on Underwater Noise (EN-Noise 2-2019) was held on 18-19 June 2019 in Copenhagen, Denmark, at the premises of the Ministry of Environment and Food of Denmark.

0.2 The Meeting was attended by delegations from Denmark, Estonia, Finland, Germany, Poland and Sweden, as well as Observers from the Danish Sailing Association and ICES. The List of Participants is attached as **Annex 1**.

0.3 Ms. Lonnie Mikkelsen, welcomed the meeting participants on behalf of the Ministry of Environment and Food of Denmark.

0.4 The Meeting was Co-Chaired by Mr. Peter Sigray, Chair of the network, on Agenda Items 1, 4, 5 and 6 and Mr. Jakob Tougaard (Denmark) on Agenda Items 2 and 3. Ms. Marta Ruiz, Associate Professional Secretary, acted as secretary of the Meeting.

Agenda Item 1 Adoption of the Agenda

1.1 The Meeting adopted the Agenda as contained in **document 1-1**.

Agenda Item 2 SOM analysis for underwater noise

2.1 The Meeting recalled that HOD 55-2018 agreed to establish an ad hoc platform for analysing sufficiency of measures (SOM Platform) to support the update of the Baltic Sea Action Plan (Outcome HOD 55-2018). The aim of the SOM analyses is to evaluate whether existing policies are sufficient to achieve good environmental status (GES) in the Baltic Sea. To contribute with the required data and information for the analyses, topic teams will be established for each of the topics addressed by the SOM Platform. The topic teams will work intersessionally and report back to SOM Platform meetings and relevant Working Groups during the course of work. One of the topic teams focusses on underwater noise.

2.2 The Meeting further recalled that PRESSURE 10-2019 took note of the initial plan for the SOM analyses on underwater noise ([document DS-12](#)), noting that EN-Noise will be engaged in the work ([Outcome of PRESSURE 10-2019](#), para. DS10).

2.3 The Meeting took note of the compilation of implemented measures regarding underwater noise in Germany as contained in **document 2-1**. The Meeting took note of the clarification that strategic impact assessment refers to a group of activities or a larger regional area, whereas environmental impact assessment refers to a specific project.

2.4 The Meeting took note of the compilation of implemented measures regarding underwater noise in Denmark as contained in **document 2-2**, with the understanding that guidelines are not part of the regulatory framework in Denmark.

2.5 The Meeting took note of the proposal for further work on SOM analysis for underwater noise as contained in **document 2-3, Presentations 1 and 2**.

2.6 The Meeting took note of the proposal by Poland to divide the Baltic Sea according to ICES areas, which are in alignment with HELCOM sub-basins.

2.7 The Meeting discussed the geographical scales for (i) activity-pressure and (ii) measure-pressure for the SOM analysis on underwater noise, and agreed to use the following areas for both issues:

- Gulf of Bothnia (Bothnian Sea, the Quark and Bothnian Bay; Åland Sea and the Archipelago Sea). Justification: hydrographically well separated from the central Baltic, with low levels of shipping and extensive ice coverage in winter. Also core habitat for the Bothnian subpopulation of ringed seals, which is considered healthier than the subpopulations in the Gulf of Finland/Gulf of Riga.
- Gulf of Finland. Justification: Like the Gulf of Bothnia, these waters are shallower waters and thus separated from the deeper central Baltic. Also, these waters, together with Gulf of Bothnia, constitute the main habitat for ringed seals.
- Gulf of Riga. Justification: Because of its different shipping activity as well as wave climate and water depth compare to Central Baltic. It is also partly ice covered in winter time.
- Central Baltic (Arkona Basin, Bornholm Basin, N Baltic Proper, E+W Gotland Basin, Gulf of Gdansk). Justification: Hydrographically well-defined and dominated by deep, partly anoxic waters.
- Western Baltic (Kattegat, Great Belt, the Sound, Kiel Bay, Bay of Mecklenburg). Justification: shallow waters and narrow straits with heavy shipping. Hydrographically well separated from the Central Baltic by the southern shallows of the Sound and the Darss sill.

2.8 The Meeting discussed the aggregation of the list of activities/sources generating underwater noise (document 2-3) into a smaller number of groups so that SOM-modelling is feasible, and agreed on the following aggregation:

- A. Ships required to carry AIS-transmitters.
- B. Smaller boats not required to carry AIS-transmitters.
- C. Construction, dredging, towing of fishing gear etc.
- D. Stationary infrastructure (bridges, tunnels, platforms, offshore wind farms, pipelines etc.).
- E. Impulsive sources with peak energy below 10 kHz (pile driving, seismic surveys, certain military sonars, explosions, etc.).
- F. Impulsive sources with peak energy above 10 kHz (echosounders, sonars, subbottom profilers, pingers, seal scarers etc.).

2.9 The Meeting discussed how the input from activities and effect of measures should be quantified in the SOM analysis, and was of the view that:

- The existing pre-core indicator for continuous noise covers sources A-D, but current modelling of their contributions is limited to group A and to a limited degree group B (smaller vessels that voluntarily carry AIS-transmitters).
- The existing pre-core indicator for impulsive noise is intended to cover all of group E, but in previous reporting years it is acknowledged that there is a substantial underreporting of activities, which means that the indicator is insufficient to assess the relative contribution of these sources.
- The last group, F, is not covered by any existing indicator and as it consists of a multitude of sources, some of which are very abundant (echosounders), it is an open question how this group of sources can be assessed.

2.10 The Meeting discussed the activities/sources aggregation defined in §2.9 in relation to the standard SOM activity list. The Meeting identified several areas where the list did not adequately support the characteristics of underwater noise, and agreed on the following modifications to the standard SOM activity list for continuous noise:

1. All fishing activity will be combined into one activity.
2. Restructuring of seabed morphology and Extraction of minerals will be combined into one activity.

3. A new activity will be created to consider all marine and coastal infrastructures. The activity will aggregate the following standard activities:
- Transport – shipping infrastructure (harbours, ports, ship-building)
 - Tourism and leisure infrastructure (piers, marinas)
 - Offshore structures (other than for oil/gas/renewables)
 - Extraction of oil and gas, including infrastructure (e.g. pipelines)
 - Aquaculture – marine, including infrastructure
 - Renewable energy generation (wind, wave and tidal power), including infrastructure
 - Transmission of electricity and communications (cables)
 - Canalisation and other watercourse modifications (coastal dams, culverting, trenching, weirs, large-scale water deviation)
 - Coastal defence and flood protection (seawalls, flood protection)
 - Transport – land (cars and trucks, trains), including infrastructure
 - Transport – air, including infrastructure.
 - Military operations (infrastructure, munitions disposal).

2.11 The Meeting agreed to include impulsive sources with peak energy below 10 kHz (pile driving, seismic surveys, certain military sonars, explosions, etc.) in the SOM analysis.

2.12 The Meeting agreed to exclude impulsive sources with peak energy above 10 kHz (echosounders, sonars, subbottom profilers, pingers, seal scarers etc.) from the SOM analysis but consider them, due to their relevance, when proposing measures in the HELCOM Regional Action Plan on Underwater Noise under development.

2.13 The Meeting took note of the clarification that the survey activity-pressure is to be filled based on individual expertise.

2.14 The Meeting was of the view that the survey activity-pressure is to be filled in those areas defined in §2.8 where the expert is confident.

2.15 The Meeting agreed to invite countries to share available information on national activities generating underwater sources with those countries sharing the geographical areas defined in §2.8.

2.16 The Meeting agreed that the Secretariat will further elaborate the survey activity-pressure based on the input from the Meeting and circulate it to the EN-Noise for tacit approval by **15 August 2019**. The Meeting further agreed to invite the EN-Noise to fill in the survey by **6 September 2019** and inform the Secretariat (Luke.Dodd@helcom.fi) accordingly.

2.17 The Meeting took note that the outcome of the survey activity-pressure will be submitted to HELCOM Working Groups for consideration.

2.18 The Meeting discussed a procedure for assessment of contributions from activities and effectiveness of measures and recalled that PRESSURE 10-2019 took note of the proposal that the main output from the network's work in this regard is "*...expected to be a catalog of existing and suggested future measures to reduce underwater noise, including evaluation of their likely contribution towards achieving GES for the different species groups and, to the degree possible within the limits of allocated resources, include considerations of the cost of implementing the proposed measures*" ([Outcome of PRESSURE 10-2019](#), para DS.10 and [document DS-12](#)).

2.19 The Meeting agreed that the network first attempts to quantify the relative contribution of the groups of activities in §2.10 to the pressures on the Baltic Sea. This quantification is to be made with a resolution not higher than 1/20 (i.e. grading the relative importance in fives of percent of the total) and preferring a resolution of 1/10 (i.e. grading the relative importance in tens of percent of the total).

2.20 The Meeting discussed a procedure for assessment of effectiveness of measures and agreed that a similar procedure to the one applied for activities can be used. However, the Meeting

was of the view that before such an assessment can be made, an exhaustive list of existing measures must be compiled.

2.21 The Meeting took note that the Secretariat will provide the EN-Noise with a list of existing measures following input from HELCOM countries through the SOM platform. The EN-Noise will be invited to provide support during finalisation of the list.

Agenda Item 3 HELCOM Regional Action Plan on Underwater Noise

3.1 The Meeting agreed to set up three break-up groups to discuss measures on underwater noise following the guidelines contained in **Presentation 3**.

3.2 The Meeting took note of the outcome of the three break-up groups as contained in **Annex 2**. The Meeting agreed that this is a living document to be used as inspiration in the drafting of the HELCOM Regional Action Plan (RAP) on Underwater Noise.

3.3 The Meeting took note of the Draft HELCOM RAP on Underwater Noise (**document 3-1**) which contains the feedback provided by Estonia, Germany and Russia included as footnotes for further consideration of the Meeting.

3.4 The Meeting agreed on the revised Draft HELCOM RAP on Underwater Noise as contained in **document 3-1 Rev. 1**.

3.5 The Meeting agreed to further elaborate document 3-1 Rev. 1 based on the input of the Meeting as contained in Annex 2 for consideration of the EN-Noise in the on-line meeting to be held in August aiming at the submission of an improved draft to MARITIME 19-2019 for consideration.

Agenda Item 4 HELCOM continuous noise database and soundscape planning tool

4.1 The Meeting recalled that HELCOM 40-2019 took note and considered the information on coordinated reporting and hosting of HELCOM continuous noise monitoring data (document 3-9) and decided on the proposed hosting solution (in ICES) for a HELCOM database on continuous underwater noise.

4.2 The Meeting took note of the basis for the coordinated reporting and hosting of HELCOM continuous noise monitoring data and soundscape planning tool to be used in HELCOM Assessment system as well as a section (section 4) on technical requirements as contained in **document 4-1**.

4.3 The Meeting discussed pending technicalities to sort out so that the process of setting up the continuous noise database and soundscape planning tool and agreed as follows:

- Specifics about input data:
 - Data file format:
 - a) Data reported to ICES will consist of mean sound pressure levels (dB re. 1 uPa) at regular intervals and in regularly spaced 1/3-octave bands. The averaging time is to be preferably 1 second.
 - b) The data file format to be adopted is the HDF5 format which will be provided by Germany to ICES based on the data format adopted by JOMOPANS project. Germany will kindly investigate the transfer of data from the BIAS format (ASCII format) to HDF5 format.
 - Mode of upload. Data files will be uploaded in bunches not over 2 GB. In line with the HELCOM/OSPAR impulsive noise register hosted by ICES, both automated and a web service method should be available. Notification message on the upload process will be sent to confirm whether the upload was properly done.

- Quality control of data: all quality control of the data remains the responsibility of the data provider. ICES should thus only check received files for consistency and other issues readily identifiable as error. Other issues relating to the quality of the data, whether discovered by, or communicated to ICES, should be forwarded to the data provider and noted in the yearly report from ICES to HELCOM. Germany will provide a list of errors/inconsistencies based on their experience to ICES (carlos@ices.dk) by **16 August 2019**.
 - Organisation of data: data is naturally organised around deployments. One deployment constitutes one series of data recorded with the same instrument, on the same geographical position, with the same settings and over a specified period of time (starting with deployment and ending with recovery). Each data point should be traceable not only to station and instrument, but also to individual deployment. Data are to be structured deployment by deployment, as this will simplify the data file structure, as metadata should be the same within each deployment. A protocol for resubmission of data will be arranged at a later stage.
 - Data other than those from national monitoring programs: not to be considered at this moment since the cost estimate for the hosting of HELCOM continuous noise monitoring does not include cost of potential additional data from such other sources. It is proposed to come back to this issue once the system is established.
 - Testing files will be provided by Denmark and German by **28 June 2019**.
- Upload routines: Countries are requested to upload their quality-controlled data on a yearly basis, before **18 June** in the year following data collection. After this deadline, ICES should compile and submit a data report to HELCOM, providing information about the amount of data submitted for the previous year. This could be in the form of an online dashboard listing submissions amended to the database, as no processing of the data is required for the reporting.
 - Database structure: minimum required information for inclusion in the database is:
 - Geographical coordinates (long/lat. WGS84).
 - Sequence of sound pressure measurements (Leq) in at least one frequency band. Each value should be expressed as a sound pressure level (dB re. 1 uPa). Each data point should have an associated time stamp (UTC), appropriately corrected for clock drift, if possible.
 - Organisation, which supplied the data, for further reference.
 - Deployment details: company, serial data, type of instrument, date of calibration. ICES will provide the standard on type of instruments they are using to the Secretariat (marta.ruiz@helcom.fi) by **16 August 2019** so that countries can verify its use on the database.

Additional information about recording instrument, deployment details, data processing software etc. should be included, in accordance with the [HELCOM monitoring guidelines](#).

- Extracting data from the database: it should be possible to query the database and download parts of the data for national reporting or other uses. Such queries should return only the measurements and associated metadata, not extrapolations beyond the measurements, i.e. maps and geographical data layers. The following two schemes, where some search criteria are specified, should be possible. This could be combinations of a geographical area, a time period, and/or one or more specified recording stations:
 - In the first scheme, all available data points fulfilling the search criteria, are exported to one or more export files, which can then be downloaded. Associations between individual data points and their metadata are to be kept.

- In the second scheme, the organisation within deployments is retained. The user could be presented with a selection of deployments fulfilling the search criteria and select which deployments to download. Data from each deployment could be exported individually, each with a complete set of metadata attached.

Selection of geographical areas by country, ICES rectangles, polygons and HELCOM sub-basins should be allowed.

- Export data file format: HDF5.
- Visualization of results for managers: to be based on the statistical output and maps in the existing BIAS Soundscape planning tool. Further work on the definition of the characteristics of the soundscape planning tool is envisaged for autumn in order to have them defined by the end of 2019 (**13 December 2019**).

4.4 The Meeting agreed to postpone the discussion on further details on the soundscape planning tool in relation to the setting up of the continuous noise database.

4.5 The Meeting took note of the clarification that the soundscape planning tool will not perform any modelling; however, the tool will supply modelled data.

Agenda Item 5 Future work and any other business

5.1 The Meeting took note that underwater noise will be included in the agenda of the upcoming PRESSURE meeting (PRESSURE 11-2019) to take place on 23-25 October 2019 in Brussels, Belgium.

5.2 The Meeting emphasized the need for the EN-Noise to continue working on the definition of GES on underwater noise, and welcomed the proposal by Sweden to analyse the situation in the Baltic Sea and inform the EN-Noise in an on-line meeting to be held before the end of 2019.

5.3 The Meeting further emphasized the need to increase the knowledge on natural ambient noise in different areas of the Baltic Sea.

5.4 The Meeting recalled that HELCOM has agreed to develop a science agenda to outline existing and foreseen HELCOM regional science needs. It will serve the development of activities in HELCOM, as well as to inform external funding mechanisms on the research needs of HELCOM. The plan is to develop the HELCOM science agenda concomitantly with the update of the Baltic Sea Action Plan.

5.5 The Meeting further recalled that the EN-Noise is invited to contribute to the science agenda by responding to a survey on knowledge and research gaps by **20 September 2019**. In addition, countries are invited to provide information on the most update on-going research on underwater noise.

5.6 The Meeting welcomed the offer by Estonia to gather all experts' views and provide a document compiling the feedback provided to the next meeting of the network aiming at providing a joint EN-Noise reply to the survey.

5.7 The Meeting agreed to convene an on-line meeting of the EN-Noise in August in preparation for the upcoming PRESSURE meeting, as well as to further advance on the SOM on underwater noise (i.a. measures on noise) and the provision of a joint reply to the survey on knowledge and research gaps. For that purpose, the Secretariat will send a doodle as soon as possible.

5.8 The Meeting took note that PRESSURE 10a-2019 (Outcome of PRESSURE 10a-2019, para. 2.22 and Annex 3) includes as one of the proposals for concretization of MM 2018 actions the organisation of a follow up meeting (following the one organised in 2017) with the OSPAR ICG Noise and in coordination with EU TG Noise to advance on the assessment of underwater noise indicators.

5.9 The Meeting was of the view that the Ocean Noise conference to be held on 25-29 May 2020 would be a good opportunity for an adjacent joint meeting. The Meeting invited Sweden and the Secretariat to further investigate this possibility.

5.10 The Meeting thanked Denmark for excellent hosting of the Meeting.

Agenda Item 6

Outcome of the Meeting

6.1 The Meeting adopted the draft outcome of the Meeting. The final Outcome of the Meeting, together with the documents and presentations considered by the Meeting are available in the [HELCOM Meeting Site](#).

Annex 1 List of Participants

Representing	Name	Organisation	Email address
Chairs			
	Mr. Peter Sigray	Swedish Defence Research Agency	peter.sigray@foi.se
	Mr. Jakob Tougaard	DCE/Aarhus University	jat@bios.au.dk
Contracting Parties			
Denmark	Ms. Nathia Brandtberg	Ministry of Environment and Food of Denmark	nathb@mfvm.dk
Denmark	Ms. Line Anker Kyhn	DCE/Aarhus University	lky@bios.au.dk
Denmark	Ms. Lonnie Mikkelsen	Ministry of Environment and Food of Denmark	lomik@mfvm.dk
Estonia	Mr. Aleksander Klauson	School of Engineering: Department of Civil Engineering and Architecture: Mechanics and Fluids and Structures Research Group	aleksander.klauson@taltech.ee
Estonia	Mr. Janek Laanearu	Tallinn University of Technology	janek.laanearu@taltech.ee
Finland	Mr. Joonas Syrjälä	Finnish Transport and Communications Agency Traficom	joonas.syrjala@traficom.fi
Germany	Ms. Carina Juretzek	Federal Maritime and Hydrographic Agency (BSH)	Carina.Juretzek@bsh.de
Germany	Mr. Sven Koschinski	Federal Agency for Nature Conservation (BfN)/ Meereszoologie	SK@meereszoologie.de
Poland	Mr. Aliaksandr Lisimenka	Institute of Oceanology of Polish Academy of Sciences, Marine Acoustics Laboratory	sasha@iopan.pl
Poland	Mr. Krzysztof Piłczyński	Chief Inspectorate for Environmental Protection	Krzysztof.Pilczynski@imgw.pl
HELCOM Observers			
ICES	Mr. Neil Holdsworth	ICES	NeilH@ices.dk
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Danish Sailing Association	Ms. Urd Kornø Rasmussen	Danish Sailing Association	urd@sejlsport.dk
HELCOM Secretariat			
HELCOM Secretariat	Mr. Luke Dodd	HELCOM Secretariat	Luke.Dodd@helcom.fi
HELCOM Secretariat	Ms. Marta Ruiz	HELCOM Secretariat	Marta.Ruiz@helcom.fi

Annex 2 Outcome of the break-up groups on measures to address underwater noise

Continuous noise	Shipping	Design/redesign
		Harbour regulation (including fees)
		Real time monitoring of shipping noise + display
		Space/time restrictions (re-routing)
		Convoys (mandatory lanes)
		Speed optimisation
		Noise categories
		Maintenance of ships
		Port electrical supply
		Optimising ship use
Small boats	Awareness	
	Regulation of ecosounders frequency	
	Engine noise standards	
	Speed limits/engine restrictions	
	AIS requirement	
Impulsive noise	Echosounders	Regulation of use
	Pile driving	Design technology
		Regulation, ramp up MMO
		BC, Cofferdam etc.
		Alternative foundation methods
	Seismic surveys	Data sharing
		Monitoring of output
		Vibroseis/ebolt as alternative methods
	Explosions	Removal/relocation
		BC
		Attenuation
		Procedure
		Guidelines
	Sub-bottom	Research
	ASW-Sonar	Training & testing
Awareness		
Seal scarers	Regulation (fishery)	
General considerations	GES – thresholds	
	Spatial planning	
	EIA cycle	