



## Baltic Marine Environment Protection Commission

Working Group on the State of the Environment and Nature  
Conservation

STATE & CONSERVATION  
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<b>Document title</b>	Proposed approach to establish threshold values for the indicator: Distribution in time and space of loud low- and mid-frequency impulsive sounds
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<b>Submitted by</b>	EN-Noise
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### Background

GEAR 24-2021 took note of the information that some indicators for which the progress is tied to EU process (i.e. MSFD Descriptors 6, 10 and 11) are at risk of not being finalized early enough to be included in HOLAS III (i.e. based on established HOLAS III deadlines). The meeting noted that alternative approaches may need to be agreed to support progress towards HOLAS III ([presentation 4](#)), discussed these indicators and agreed that targeted contingencies need to be established for those indicators which EU process are not fully aligned with existing HOLAS III/HELCOM deadlines. The meeting discussed and agreed on the contingencies as presented in [presentation 5](#), which for impulsive noise means that the assessment will be conducted based on impulsive noise events reported to the HELCOM registry; if time allows a quantitative presentation of the information including threshold values will be provided, otherwise, a qualitative description will be included in HOLAS III ([Outcome of GEAR 24-2021](#), para. 5.25-5.26).

This document outlines the status concerning the monitoring and priority of the input of impulsive underwater noise in the HELCOM region, and summarizes the proposed evaluation methodology and threshold values for the HOLAS III assessment, following recent discussion in [EN-Noise](#). The information contained in this document is based on the proposal on the evaluation methodology for impulsive noise in HOLAS III agreed by STATE & CONSERVATION 14-2021 ([document 4J-76](#) and [Outcome of STATE & CONSERVATION 14-2021](#), para. 4J.285 -4J-290) and further guidance provided by GEAR 24-2021.

### Action requested

The Meeting is invited to consider and endorse the proposed approach to establish threshold values for use of the distribution in time and space of loud low- and mid-frequency impulsive sounds indicator in the HOLAS III assessment.

Proposed approach to establish threshold values for the indicator:  
Distribution in time and space of loud low- and mid-frequency impulsive sounds

<b>Indicator name</b>
Distribution in time and space of loud low- and mid-frequency impulsive sounds
<b>Scale of assessment for HOLAS III and rational</b>
<p>To date, a variety of marine species are known to be adversely affected by the input of impulsive anthropogenic underwater noise. Intense levels of sound exposure were documented to have the potential to cause a wide range of effects, including disturbance and injury. The monitoring programme for impulsive underwater noise implemented in the HELCOM region provides the data basis for the pressure caused by anthropogenic impulsive underwater noise and the collected data is made available in the <a href="#">HELCOM/OSPAR noise registry</a> for assessment requirements in HELCOM hosted by ICES. A Baltic Sea regional assessment for impulsive noise should be closely targeted on noise sensitive species that are adversely affected by underwater noise generating activities.</p> <p>The assessment should allow for a transparent evaluation of the pressure in terms of the spatial distribution, temporal extent, and levels of low- and mid-frequency anthropogenic impulsive noise, as well as pay special attention to the evaluation of biologically significant periods and relevant habitats. Suitable thresholds should be defined such that they may be clearly linked to values that represent levels at which species, identified as sensitive to underwater noise, are not adversely affected.</p>
<b>Spatial coverage of the indicator for HOLAS III</b>
<p>An appropriate assessment of impulsive underwater noise should be founded on a regionally harmonized monitoring, assuming that an adequate quality assurance is in place. Further, the understanding of the reporting completeness was identified as prerequisite for setting the ambition level for the assessment under HOLAS III, with a short term aim to consider an evaluation of pressures, and a longer-term aim of establishing a link with biota (<a href="#">document 10</a> to the HELCOM INDICATOR WS 2-2019). A regional <a href="#">report</a> on relevant species sensitive to underwater noise has been published recently and it provides a reference for priority areas in the HELCOM region.</p> <p>The HELCOM monitoring programme for <a href="#">impulsive noise</a> describes the relevant data basis for the HOLAS III assessment. Generally, input of impulsive noise from the following activities is currently monitored:</p> <ul style="list-style-type: none"> <li>• Explosions: <math>mTNT_{eq} &gt; 8 \text{ g}</math></li> <li>• Airgun arrays: <math>SL_{z-p} &gt; 209 \text{ dB re } 1 \mu\text{Pa m}</math></li> <li>• Impact pile driver: <math>\text{hammer energy} &gt; 0 \text{ kJ}</math></li> <li>• Sonar or acoustic deterrents: <math>SL &gt; 176\text{-}200 \text{ dB re } 1 \mu\text{Pa m}</math></li> <li>• Generic explicitly impulsive source: <math>ESL &gt; 186 \text{ dB re } 1 \mu\text{Pa}^2 \text{ m}^2 \text{ s}</math></li> </ul> <p>The minimum data basis available for the assessment provided by the monitoring includes the type of activity, the event position in different spatial resolutions (point data (lat/long), ICES statistical sub-rectangle, or German naval polygon), the date, the information about the usage of noise abatement systems, and it should include the source level (in categories on a scale from very low to very high) if possible. Monitoring of impulsive noise was implemented no later than 2015 for most</p>

reporting HELCOM countries. The noise registry therefore provides a relevant data basis for the HOLAS III assessment (2016 – 2021) within the Baltic Sea basin (Figure 1).

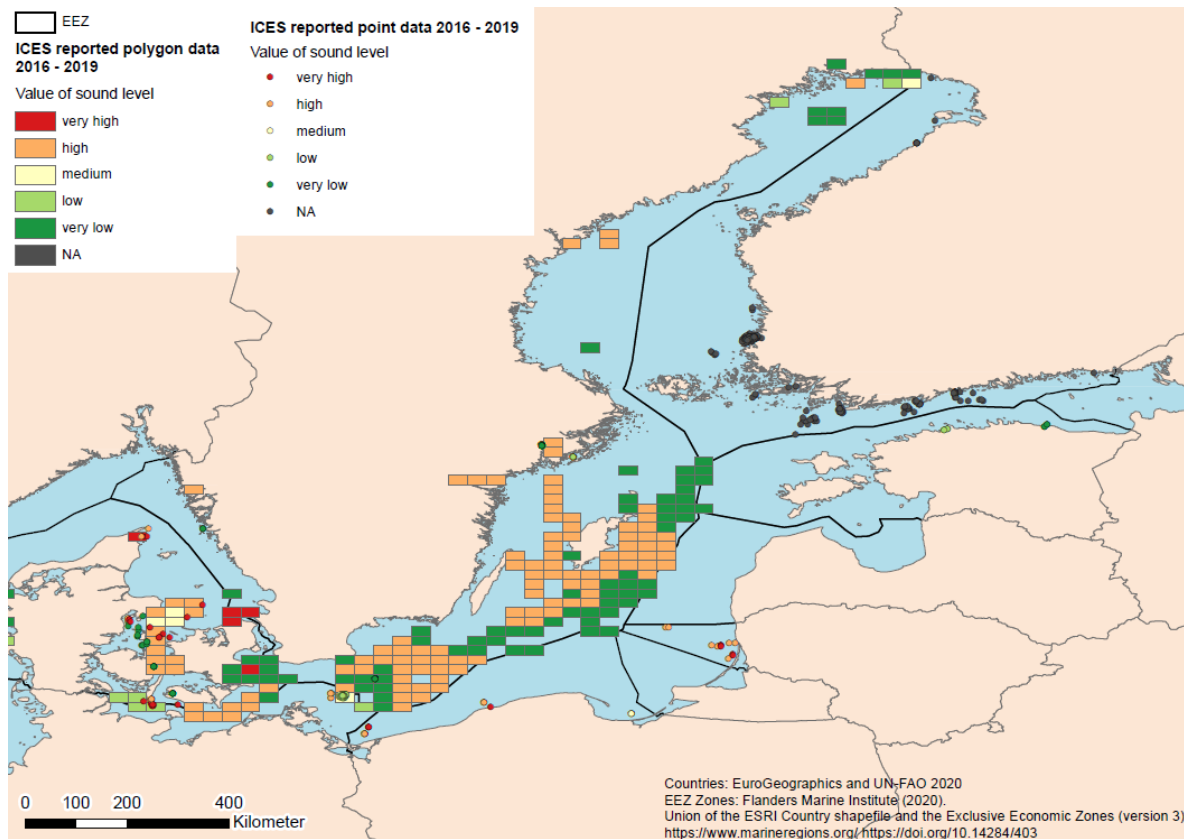


Figure 1 Reported impulsive noise events according to the intensity category within the HOLAS III assessment period from 2016 until 2019, the latest reporting cycle. The data is reported in different spatial resolutions. (Source: HARMONIZE Report A3.I2)

Monitoring is based on the national reporting on impulsive noise events, and includes impulsive noise producing activities, which are subject to both, obligatory and voluntary reporting procedures. Further, noise from activities subject to national defence or national security are exempt from the obligation to report. Countries are encouraged to report on these activities on a voluntarily basis. Therefore, data gaps and delayed reporting of noise events have been a common challenge across the HELCOM region. A major issue within the framework of assessing impulsive underwater noise for HOLAS III relying on the HELCOM registry will be the status of data deliveries. Uncertainties related on data availability and quality should be addressed, since they will have an impact on evaluation of measures and the assessment outcome. So far, it seems crucial to have a closer look on data availability. Gaps may be related to lack of impulsive events, lack of obligation to report, national registries still being under development or delivery delays. A differentiation between these options, and the transparent communication regarding the implications on uncertainty and the assessment results should be taken forward.

A current update on the status of the reporting to the noise registry has been collected recently, with some input provided by Finland, Germany, Lithuania, and Sweden (PRESSURE 13-2020, doc. 5-3), which highlighted a need for more complete reporting practices. Moreover, a report on current activities of HELCOM EN-Noise has been submitted to PRESSURE 14-2021 encouraging national reporting of impulsive noise events for their use in the assessment in HOLAS III ([document 4-2](#)). The present data available in the noise registry therefore provides an estimate of the minimum number of impulsive noise events during the assessment period.

<b>Methodology to be applied for HOLAS III and rational</b>
<p>The assessment methodology for HOLAS III will be coordinated with and make use of experience gained through related work under EU TG Noise, OSPAR and HELCOM BLUES<sup>1</sup>, and further allow for a clear <b>linkage to biologically significant periods, relevant habitats and adverse effects such as injury and disturbance</b>, as discussed in EN-Noise previously. The assessment methodology should further provide for a robust interpretation of results, in the presence of sparse and heterogeneous data of both, underwater noise and biota.</p> <p>The temporal extent of the pressure input may significantly differ for different types of impulsive noise activities. While explosions are very short term, pile-driving and seismic survey occur on the order of hours and days. The spatial extent varies primarily with the intensity of an activity but may also vary on average between activities. Additionally, the intensity largely defines the degree of harm and area that is related to the noise input. This includes the potential for disturbance by impulsive noise events in general, and the additional potential for injury due to intense events such as explosions.</p> <p>The quantitative assessment of <b>the pressure distribution in time and space</b> due to impulsive noise should use a common, standardized resolution. An initial, robust approach for HOLAS III would be the choice of a <b>temporal resolution</b> of 24 hours (pulse block day). An initial, robust approach to consider the <b>spatial resolution</b> of the pressure is the usage of standardized effect ranges (cf. OSPAR). For <b>disturbance</b>, effect ranges may be based on empirical evidence (e.g. observed displacement) and able to acknowledge the positive effect of measures, such as the application of technical noise abatement. For <b>injury</b>, effect ranges are not easily accessible for most noise generating activities and a pragmatic approach of a constant effect size could be used to acknowledge the additional spatial extent of likely harm due to the selection of the most intense noise events without noise mitigation.</p>
<b>Threshold value setting logic and rational</b>
<p>According to its definition, impulsive noise is not persistent in the environment. However, pressure due to noise reduces the accessibility of the disturbed habitats over different time spans. Therefore, the assessment should be performed such that temporal variation of the spatial distribution of pressure is considered directly. For an initial, robust assessment threshold, applicable for HOLAS III, an acceptance limit is proposed as <b>the percentage of areal loss over time</b>, with a link to biota according to either injury or disturbance in key species (harbour porpoise, seals). This condition provides the option for defining specific assessment thresholds regarding the acceptable affected habitat area for indicator species, including a focus on key habitats, allows for adaption of the threshold during sensitive periods, and further agrees with a joint and individual focus for the different activities.</p>
<b>Threshold value(s)</b>
<p>The assessment will be conducted based on impulsive noise events reported to the HELCOM registry; if time allows a quantitative presentation of the information including threshold values will be provided, otherwise, a qualitative description will be included in HOLAS III.</p>

<sup>1</sup> HELCOM Biodiversity, Litter, Underwater noise and Effective regional measures for the Baltic Sea” (HELCOM BLUES) project is led by HELCOM and co-funded by the European Union. More information at <https://blues.helcom.fi>.

<b>Other significant issues that need to be addressed or presented to State and Conservation</b>
Nothing further
<b>Latest indicator report or (for new indicators) initially completed indicator template</b>
The latest pre-core indicator report dates back to 2016. This will be updated at a later stage.