



Document title	Outcome of the Oxygen indicator workshop
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Agenda Item	2– Eutrophication indicator development
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Background

IN-Eutrophication discussed in several meetings the need for a shallow water oxygen indicator (IN-Eutrophication 14-2019 Doc 5-3 and 16-2020 Doc 5-2) in addition to the HELCOM oxygen debt indicator.

IN-Eutrophication 18-2020 considered the need to discuss further development of the shallow water oxygen indicator in order to speed up the indicator development work to be presented in autumn 2021 for State & Conservation to be included in the HOLAS III. As a result, the Meeting agreed to organize and intersessional workshop for Contracting Parties working on the oxygen indicator. In accordance with the decision of IN-EUTROPHICATION 19-2021, the Oxygen Indicator Workshop (IN-EUTROPHICATION 19A-2020) was held online on 22 April 2021 10:00-17:00 EET.

The attachment to this document contains the outcome of the workshop, including the proposed next steps for the indicator development work.

Action requested

The Meeting is invited to consider the workshop outcomes and agree on the next steps for the work.



Outcome of the Oxygen Indicator Workshop

(IN-EUTROPHICATION 19A-2021)

Introduction

0.1 In accordance with the outcome of the 19th Meeting of HELCOM Intersessional Network on Eutrophication (IN-EUTROPHICATION 19-2021), the Oxygen Indicator Workshop (IN-EUTROPHICATION 19A-2020) was held online on 22 April 2021 10:00-17:00 EET.

0.2 The Workshop was attended by delegations from Denmark, Estonia, EU, Finland, Germany, Latvia, Poland and Sweden, as well as an observer from ICES. The List of Participants is contained as **Annex 1**.

0.3 The Workshop was chaired by Ms. Vivi Fleming, Chair of IN Eutrophication. Ms. Laura Kaikkonen, HELCOM Associate Professional Secretary, acted as secretary of the Meeting.

Agenda Item 1 Adoption of the Agenda

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

Agenda Item 2 National assessment concepts

2.1 The Workshop took note of the different national assessment concepts (documents 2-1, 2-2 rev.1, 2-3, 2-4, 2-5) and the following presentations:

- [Presentation 1](#): Joachim Kuss: "Evaluation of Oxygen data from high frequency sampling stations"
- [Presentation 2](#): Sarah Piehl: "The Baltic Sea Action Plan: Modelling of Water Quality Indicators - Supporting the HELCOM shallow-water oxygen indicator"
- [Presentation 3](#): Birgit Heyden: "Further development of oxygen test assessments in shallow waters following the German approach"
- [Presentation 4](#): Laura Hoikkala: "Finnish approach for a near-bottom oxygen indicator for shallow waters"
- [Presentation 5](#): Stella-Theresa Stoicescu, Urmas Lips: "Status of shallow water oxygen indicator development in Estonia"
- [Presentation 6](#): Stiig Markager and Jens Würgler Hansen: "Danish approach for a shallow water oxygen indicator"

2.2 The Workshop thanked all presenters for their work and welcomed the excellent overviews of the variety of approaches used by the Contracting Parties to evaluate oxygen deficiency.

Agenda item 3 Oxygen indicator development

3.1 The Workshop discussed the work plan for the oxygen indicator development in line with the timelines of the HOLAS III process and supported adopting a stepwise approach to the indicator development, first outlining what can be accomplished for HOLAS III and which parts can be further developed in the future.

3.2 The Workshop noted that based on the presented national assessment concepts and their similarities, the indicator should reflect either the maximum acceptable spatial extent of oxygen deficiency or a minimum oxygen concentration.

3.3 The Workshop discussed the biological response to oxygen deficiency at different temporal scales and noted that the number of consecutive days of hypoxia/anoxia will be an important consideration for benthic fauna. The Workshop noted that high frequency data can provide better insights to the ecologically relevant periods of oxygen deficiency and thus should be used where possible and considered in the further development of the indicator. The Workshop further acknowledged the importance of a precautionary approach in developing threshold values for acceptable levels of oxygen deficiency with regard to uncertainty to its biological effects.

3.4 The Workshop discussed the use of high frequency data and took note that such data can be used in the existing HEAT process. If possible, the use of high frequency data/other sources to estimate the temporal extent of hypoxia should be explored. The Workshop acknowledged that while this evaluation may not be feasible to be implemented in time for HOLAS III, the information will be useful in developing monitoring for better observing periodic hypoxia (near e.g. point sources).

3.5 The Workshop supported aiming for a data driven approach, making use of data that is most often available (e.g. CTD profile data), complemented by modelling and high frequency monitoring data. The Workshop noted that combined with bathymetry data, the CTD profile data can be used to evaluate the spatial extent of oxygen deficiency by determining the depth where the oxygen concentration falls below the threshold value.

3.6 The Workshop noted that the volume-based approach has been previously used (in the Swedish method) only in permanently anoxic areas. For a more generalized approach including also seasonally hypoxic areas, hydrographical differences between areas can be reflected in the threshold values that will be set according to ambient oxygen conditions.

3.7 The Workshop acknowledged that the Finnish approach based on historical reference values is necessary for Bothnian Bay, where the hydrographical conditions are very specific compared to other basins and assessment units.

3.8 The Workshop noted that implementing the seasonal minima approach in HEAT, making use of a combination of in situ and CTD data, is quite straightforward, as the indicator calculation for the existing oxygen debt indicator already uses both in situ bottle samples for oxygen concentration and CTD profiles to determine the depth of the halocline. CTD profiles can be used in the seasonal minima approach to evaluate predominantly stratified or well-mixed conditions at monitoring stations to support classification of station types associated with different thresholds. The Workshop took note that ICES now uses EMODnet physics map layer for bathymetry data which is very good resolution and can also be used to examine the spatial extent of the oxygen deficient layer.

3.9 The Workshop discussed the two approaches and acknowledged that the implementation of the two proposed methods should be explored in parallel, as implementing the volume-based approach is more time consuming when national threshold values for the spatial extent of oxygen deficiency must be defined.

3.10 The Workshop proposed the following way forward:

- ICES /Hjalte Parner will be implementing the two approaches, volume- and bottom-concentration-based, in the eutrophication data flow, with the help of the following contact points in IN-Eutrophication: Stiig Markager (supported by Urmas Lips) for the volume-based approach, Birgit Heyden (supported by Laura Hoikkala) for the bottom-concentration-based approach
- The Contracting Parties interested in receiving test results of the indicator in the waters surrounding their coasts make sure all relevant CTD-data is submitted to ICES; the data submission can be checked from the [ICES oceanographic data portal](#).

3.11 The Workshop took note that in order for the indicator to be accepted for HOLAS III, IN-Eutrophication will have to agree at least on the following details:

- 1) in which assessment units the indicator is relevant, and which approach will be applied;
- 2) the assessment-unit-specific thresholds for GES;

3) concerning the volume-based approach, the limit of oxygen-deficient or low-oxygen water volume. As preparation to this, the participants are requested to test alternatives in the assessment units of interest.

3.12 The Workshop proposed to evaluate the progress of the work during a second workshop to be held back-to-back with an IN-EUTROPHICATION meeting in August 2021.

3.13 The Workshop supported proposing the outlined way forward to IN-EUTROPHICATION 20-2021, which will be held as an online meeting on 26 May 2021. During the second workshop and the following IN-Eutrophication meeting the threshold values for the chosen approach for the indicator will be decided upon, in order to be submitted to STATE&CONSERVATION 15-2021.

Agenda item 4 Any other business and workshop outcome

4.1 The Workshop outcome was prepared by the Secretariat and adopted via correspondence.

Annex 1 List of participants

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