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<b>Document title</b>	Outcome of the regional expert workshop on essential fish habitats, organized by Pan Baltic Scope project and HELCOM
<b>Code</b>	5-1
<b>Category</b>	INF
<b>Agenda Item</b>	5 – Ecosystem-based approach in MSP
<b>Submission date</b>	13.3.2019
<b>Submitted by</b>	HELCOM Secretariat
<b>Reference</b>	

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## Background

In accordance with the decision of HOD 54-2018, the Regional expert workshop on essential fish habitats, organized by the Pan Baltic Scope project and HELCOM, was held in Riga, Latvia, at the premises of the Latvian Ministry of Environmental Protection and Regional Development (MoEPRD), on 12-13 December 2018.

The purpose of the Regional expert workshop on essential fish habitats was to consider existing knowledge regarding essential fish habitats at the Baltic Sea regional scale. The workshop discussed and validated existing spatial data on essential fish habitats based on proposals collated within the Pan Baltic Scope project. Based on the recommendations from the workshop, selected maps on essential fish habitats in the Baltic Sea have by now been further refined. The maps have also been presented for comments to HELCOM Fish Pro III 1-2019.

The results, including the comments from HELCOM Pan Baltic Scope EFH WS and [HELCOM Fish Pro III 1-2019](#) are to be incorporated in the work of the Pan Baltic Scope project to develop a concept of green infrastructure for supporting maritime spatial planning in the HELCOM region. The essential fish habitats maps are further going to be presented to HELCOM State and Conservation 10-2019 with a proposal for making the maps publicly available at the HELCOM Map and Data Services.

The [Outcome](#) of the regional expert workshop on essential fish habitats, organized by the Pan Baltic Scope project and HELCOM, is set out in the annex to this document.

## Action requested

The Meeting is invited to take note of the HELCOM Pan Baltic Scope EFH WS 2018 Outcome.



## Outcome of the regional expert workshop on essential fish habitats, organized by Pan Baltic Scope project and HELCOM (HELCOM Pan Baltic Scope EFH WS 2018)

### Introduction

With reference to HOD 54-2018, the Regional expert workshop on essential fish habitats, organized by the Pan Baltic Scope project and HELCOM, was held in Riga, Latvia, at the premises of Latvian Ministry of Environmental Protection and Regional Development (MoEPRD; Peldu Street 25, Riga, room 409, 4th floor), on 12-13 December 2018.

The Workshop was arranged in connection to a Pan Baltic Scope Workshop on Green Infrastructure, with shared opening and closing sessions.

The purpose of the Workshop was to consider existing knowledge regarding essential fish habitats at the Baltic Sea regional scale. The Workshop was invited to discuss and validate existing spatial data on essential fish habitats based on proposals collated within the Pan Baltic Scope project. The presented information will be further used in the Pan Baltic Scope project to develop a concept of green infrastructure for supporting maritime spatial planning in the HELCOM region.

Specifically the objective of the Workshop was to:

- consider the proposals for maps on essential fish habitats at the Baltic Sea regional scale,
- validate the proposed essential fish habitats maps, and provide recommendations for their further use in HELCOM, and
- discuss any key remaining gaps and how they could be filled.

### Joint session

The joint event of Pan Baltic Scope Workshop on Green Infrastructure (GI WS) and the HELCOM-Pan Baltic Scope Essential Fish Habitats Workshop (EFH WS) was opened by Margarita Vološina, Latvian Ministry of Environmental Protection and Regional Development, host of the event.

The event was attended by Partners of the Pan Baltic Scope project, nominated experts from Contracting Parties and invited experts on Baltic Sea essential fish habitats.

After a round of introduction of all participants, the shared opening session was started with information on the work in Pan Baltic Scope to develop a concept for green infrastructure in maritime spatial planning (Pan Baltic Scope Activity 1.2.4 'Green Infrastructure'), as presented by Anda Ruskule (**Presentation 1**). The Workshop recognized the importance of bringing environmental management and maritime spatial planning together in support of the ecosystem approach, and the potential of the green infrastructure concept to facilitate this.

An introduction to essential fish habitats was presented by Didzis Ustups (**Presentation 2**), highlighting the importance for national and regional marine management of having a joint view on the distribution of essential habitats for fish on the Baltic Sea scale. The introduction further included a re-cap of the EFH concept, defined as those waters and substrate necessary to fish for spawning, nursery, feeding or growth to maturity. As most fish species use different habitat types for different parts of their life cycle, the full description of essential habitats for one species should include all habitat types that are critical for a species to complete its life cycle. Examples of categories that should be considered are: spawning areas, nursery areas for larvae and juveniles, adult feeding areas, migratory corridors, as well as possible specific areas to which a species may be highly restricted. In practise, the availability of data and knowledge are also decisive for what maps are possible to produce.

The purpose of the EFH Workshop was presented as to consider existing knowledge regarding essential fish habitats at the Baltic Sea regional scale, including discussion and validation of maps on essential fish habitats based on proposals collated within the Pan Baltic Scope project.

Based on the recommendations from the Workshop, essential fish habitat maps will be used in the Pan Baltic Scope project to develop a concept of green infrastructure for supporting maritime spatial planning in the HELCOM region.

With reference to HELCOM State & Conservation 9-2018 meeting (Outcome para 2J.6) it was suggested that the recommendations from HELCOM Pan Baltic Scope EFH WS will further be presented to the HELCOM State & Conservation WG with a proposal for the inclusion of new or updated maps to the HELCOM Map and Data Services.

## Essential Fish Habitats Workshop

### Opening of the EFH workshop

The dedicated Workshop on essential fish habitats was chaired by Didzis Ustups, BIOR and Latvian Ministry of Environmental Protection and Regional Development. Lena Bergström, HELCOM Project coordinator and Henri Jokinen, HELCOM Project manager, acted as secretaries of the Workshop.

The Workshop was attended by representatives from the following Contracting Parties: Denmark, Estonia, Finland, Latvia, Russia and Sweden. Consent for publication of the list of participants and the information contained therein (**Annex 1**) was received by all participants.

Didzis Ustups declared the Workshop opened and welcomed the participants to the meeting on behalf of the Pan Baltic Scope Project.

Following practical information by the Chair, the Workshop considered and adopted the Preliminary Programme as provided in Document 1.

### EFH proposals for selected species

The Workshop took note of the submitted workshop documents containing background information for the Workshop participants, including a brief to green infrastructure and its role in marine spatial planning, and more detailed information on the proposed maps on essential fish habitats (Document 2), as informed by the Chair.

The Workshop recalled that on submission of Document 2 to the Regional expert workshop on essential fish habitats, organized by the Pan Baltic Scope project and HELCOM, participants and invited experts were

invited to provide initial comments on the proposed maps by 5 December 2018. The Workshop took note that Document 2\_Add1 contains a compilation of the comments received, structured by species, and that replies were received by experts from Estonia, Latvia, Lithuania, Russia, Sweden. It was further acknowledged that Denmark and Finland provided comments already on the first draft of Document 2. The Workshop thanked for all received comments.

The further evaluation during the Workshop was carried out as follows: The proposals as contained in document 2 were presented by the assigned fish expert, together with an account of initial comments received, as contained in Document 2\_Add1. Following this general introduction, the Workshop proceeded by considering, discussing and evaluating the proposals and initial comments for as well as any key remaining gaps of the specific EFH maps, subsequently for sprat, perch, pikeperch, herring, European flounder, Baltic flounder, and cod, with the view to provide recommendations on their further use in HELCOM context.

The outcomes of the discussions are given below, separately for each species, reflecting the outcome of plenary discussions during both day 1 and day 2 of the Workshop. For the EFH of flounders and cod, and jointly for the remaining selected species, the plenary discussions were additionally supported by work in sub-groups on the morning of day 2.

### *Sprat*

The Workshop took note of and considered the proposed map on sprat spawning areas, as presented by Didzis Ustups (**Presentation 3**). No initial comments were received by the experts ahead of the workshop.

The Workshop recognized that the map may overestimate the sprat spawning area, and that this could be justified by the precautionary principle. The map is based on information in Grauman 1980 and Voss 2012, for which full references are currently missing from the reference list in Document 2, but should be added.

The Workshop discussed the basis for selecting the choice of delineating variables, whether or not salinity should be included as a variable, or perhaps if oxygen would need to be included. In this context, information from Aro, 1989 (*A review of fish migration patterns in the Baltic. Rapports et Procès-Verbaux des Réunions du Conseil International pour l'Exploration de la Mer. 190: 72-96*) on Baltic fish distribution patterns, was suggested to be potentially relevant.

The Workshop noted that the absence of sprat spawning areas in the Gulf of Finland is in line with results from monitoring carried out in Finland and Estonia, and also that there are no indications of sprat spawning in any Estonia waters.

The Workshop discussed the possibility to apply a depth delineation in order to separate shallower areas (deeper than 30 meters) from deeper areas (deeper than 70 meters), to define areas more likely to represent areas for sprat spawning, as well as a corresponding salinity threshold.

The Workshop recognized on the general level that there is a need of better monitoring data on sprat spawning areas in the Baltic Sea.

After discussions and evaluations, the Workshop recommended to use the delineation of sprat spawning areas as presented in document 2 as a description of “potential spawning areas”, and to additionally

- define a layer denoting “high probability of spawning” as pelagic areas deeper than 70 meters and a salinity of at least 8,
- check the outcome specifically with experts from Finland, Estonia, and Sweden,
- verify what salinity data layers to use in order to best represent sprat spawning with respect to vertical distribution, and

- amend the map with a description of data quality aspects when the revised map is in place.

#### *Perch*

The Workshop took note of and considered the proposed map on perch recruitment areas, as presented by Lena Bergström (**Presentation 4**). The Workshop noted that the map represents recruitment areas, not spawning areas.

The pre-received comments from Lithuania and Russia were noted (Document 2\_Add1).

Additionally, the Workshop took note that the map on perch recruitment areas was validated against inventory data during the HOLAS II project, and that the currently presented map includes adjustments proposed by national experts in connection to that process.

The Workshop suggested to emphasize in the data description for which geographical areas the maps is likely to be the most accurate.

After discussions and evaluations, the Workshop recommended to use the map on Baltic Sea recruitment areas of perch as presented in Document 2, after the following adjustments:

- correct the map based on information from Lithuania and Russia as provided in Document 2\_Add1,
- offer Lithuania to propose detailed corrections on correspondence if relevant, and
- rename the map “Potential recruitment areas of perch”.

In addition, amendments were proposed to the description of data quality aspects in order to improve clarity and to account for the adjustments made to the map (**Annex 2**).

#### *Pikeperch*

The Workshop took note of and considered the proposed map on pikeperch recruitment areas, as presented by Lena Bergström (**Presentation 5**). The Workshop noted that national comments on the proposed map were also received and taken into account during the HOLAS II project, and that the map represents recruitment and not spawning areas.

The pre-received comments from Estonia and Lithuania were noted (Document 2\_Add1).

As a clarification, it was recalled that the presented map represents potential recruitment areas based on the environmental window approach, based on results from species distribution models.

The Workshop discussed whether the map overestimates recruitment areas by the Åland Islands, as currently only one major spawning area is known for Åland waters.

After discussions and evaluations the Workshop recommended to use the map on Baltic Sea recruitment areas of pikeperch, after the following adjustments:

- to omit all recruitment areas in Estonian waters except Matsalu and Pärnu bays,
- offer Lithuania to propose detailed corrections on correspondence if relevant, and
- rename the map “Potential recruitment areas of pikeperch”.

In addition, amendments were provided to the description of data quality aspects in order to improve clarity and to account for the adjustments made to the map (**Annex 2**).

### *Herring*

The Workshop took note of and considered the proposed map on herring spawning areas, as presented by Ivars Putnis (**Presentation 6**).

The pre-received comments from Finland, Lithuania and Russia were noted (Document 2\_Add1).

The Workshop considered the proposal from Russia to remove points from the Eastern Gulf of Finland, as contained in Document 2\_Add1, and the additional clarification from Russia during the Workshop regarding the physical preconditions for herring spawning close to the river Neva.

The Workshop noted that data quality aspects should be clearly stated in connection to when the map is presented, including information that the quality of the map is depending on the underlying data layers, and that herring spawning is not likely in very shallow areas.

The Workshop took note of the current state of art regarding data on actual observations of herring spawning, and regretted that the lack of mapping on herring spawning areas in general in the Baltic Sea is a current restriction to providing more detailed maps.

After discussions and evaluations, the Workshop recommended to use the map on Baltic Sea spawning areas of herring, after the following adjustments:

- omit areas in Russian waters of eastern Gulf of Finland close to the river Neva inlet,
- omit areas in the Curonian lagoon
- consider if the visual representation of spawning areas can be made more coherent, as currently some areas in Russian waters are represented as dots due to the quality of underlying data set,
- denote the currently presented areas a dark blue in the revised map, and
- include the distribution of the photic zone to represent potential spawning areas of herring (to be presented in light blue in the map), in order to also encompass areas in the southern Baltic Sea which are currently not adequately represented but are potential spawning habitats of Baltic herring.

In addition, amendments were provided to the description of data quality aspects, including a note that due to the resolution of the underlying data sets, the map encompasses areas shallower than 1 meter even though herring spawning does not usually take place in such areas (**Annex 2**).

### *European flounder*

The Workshop took note of and considered the proposed map on European flounder spawning areas, as presented by Lena Bergström (**Presentation 7**). The proposed map applies a lower limit salinity delineation of 5. The Workshop, in addition, considered an additional map provided by Sweden, where a salinity delineation 6 is used (contained in **Presentation 7**).

It was recalled that since the formal delineation between European and Baltic flounder was made only very recently, studies on physiological features formally addressing the verified two species are lacking, although some relevant information is available from earlier studies that separate flounder in two different spawning ecotypes (corresponding to the formally described distinct species).

Pre-received comments from Finland, Lithuania and Sweden were noted (Document 2\_Add1).

The Workshop noted that the area delineating potential spawning areas in the Gotland basin, according to the proposal, extends into deep areas where, due to prevailing anoxic conditions, flounder spawning has not been observed.

The Workshop noted that the area denoting “no spawning” should be extended to also including the Gulf of Bothnia and the Gulf of Finland, and that it should be represented in white colour in line with the other maps.

The Workshop additionally discussed how to include the additionally proposed data for the Kattegat, as presented Document 2, and noted that the modelled adult distribution in quarter 1 most closely corresponds to the spawning time. It was emphasized that, if the data is included, that data quality issues and the specific features of the mapping approach should be described in more detail in a background material to be referred to.

After discussions and evaluations, the Workshop recommended to rather develop the map on spawning areas of European flounder based on the additionally proposed map (**Presentation 7**), and to

- include data for the Kattegat area as presented in Document 2, figure 11 Quarter 1, with red areas identifying “high probability” areas (Quantile 95), and orange and yellow areas identifying “potential areas” (Quantiles 50 and 75),
- make sure that any areas with lack of information are clearly visualized in the map, as this may be relevant for some parts of the southwestern Baltic Sea.

### *Baltic flounder*

The Workshop took note of and considered the proposed map on Baltic flounder spawning areas, as presented by Lena Bergström (**Presentation 8**).

Pre-received comments from Estonia, Finland, Lithuania and Sweden were noted (Document 2\_Add1).

The Workshop considered the fact that a potential issue of too wide distribution in the southwestern Baltic could be met by including an upper salinity limit in the applied environmental window, and recognized that further input from experts on flounder in these areas would be particularly welcomed.

The Workshop noted that the map as contained in Document 2 does not give a correct representation of the situation in the inner part of the Pärnu bay, likely due to limited accuracy of the underlying salinity data layer, and proposed to amend the map with additional potential spawning areas along the Estonian coast, based on detailed information provided by Estonia. Further, some areas in the Matsalu bay inner areas should be omitted, while outer areas should be marked as potential spawning grounds.

After discussions and evaluations, the Workshop recommended to follow the approach as presented in Document 2, Figure 13, option 2, but to:

- apply a lower salinity limit of 6 rather than 5,
- correct the obtained map for Estonian waters based on information reflected in Document 2\_Add1 as additionally clarified during the Workshop, and
- offer Lithuania to propose detailed corrections on correspondence if needed.

#### *Potential additional map on flounder*

The Workshop, further, considered the possibility proposed by Sweden to develop a regional map on EFH for juvenile flounders based on monitoring data put together in the BONUS INSPIRE project (Annex 3 of Document 2\_Add1), noting that such a map would represent juvenile European flounder and Baltic flounder mixed.

The Workshop supported this proposal and offered to contribute with comments to the work in development, as applicable. Additional data to support the development of such a map may also be available from Denmark, Estonia, Finland and Lithuania.

The Workshop agreed to proceed over correspondence with investigating further the possibility to develop a map on juvenile flounders, with the aim to include it in the work of the Pan Baltic Scope project, depending on the possibility to align the time tables.

The Workshop suggested that any map on juvenile flounder areas, when developed, is also presented to State & Conservation for further consideration.

#### *Cod*

The Workshop took note of and considered the proposed map on cod spawning areas, as presented by Terje Selnes (**Presentation 9**).

The Workshop also took note of additional information on EFH for cod in the Kattegat area, as contained in Document 2 and further presented by Alexandros Kokkalis (**Presentation 10**).

The Workshop discussed differences in ecological characteristics between cod stocks in the Kattegat, western Baltic Sea and eastern Baltic Sea, respectively, and considered the importance of these differences when mapping the cod spawning areas.

After discussions and evaluations the Workshop recommended that the map on Baltic Sea spawning areas of cod should rather be developed in consideration of the different ecological properties of the Eastern and Western Baltic cod stocks, and well as include available information on the Kattegat cod.

To support this proposal, the Workshop considered how the map on cod should be further refined in more detail, and provided initial proposals for environmental variables and threshold values to represent the environmental windows for Eastern Baltic cod, Western Baltic cod, and Kattegat cod, respectively.

The Workshop agreed to further develop the map on cod spawning areas over correspondence.

#### *Potential additional map on cod*

The Workshop considered the possibility to develop a map on EFH of nursery areas for cod based on monitoring data collated in the BONUS INSPIRE project (Annex 2 of Document 2\_Add1). Additional data to support the development of such a map may also be available from Denmark. The Workshop concluded that the possibilities for developing an EFH map representing recruitment areas of cod in the Baltic Sea should be investigated by making an inventory of available and potentially suitable data at the Baltic Sea regional scale as a first step.

#### *Aggregated maps*

The Workshop considered a first version of an aggregated map, representing combined information for all EFH maps discussed during the Workshop, and discussed the basis for scoring and grading of layers in such



an aggregated map, particularly whether the maximum score would equal to the total number of layers used, or to the maximum number of overlapping layers.

Recognising that many fish species use different habitats during different seasons, the Workshop recommended that seasonality is taken into account when developing aggregated maps. The Workshop proposed that any aggregated map should be supplemented with information on the seasonal relevance of each included essential fish habitats.

Recognising that the need of seasonally explicit information (annual vs seasonal data) will vary depending on how the map is used, the Workshop recommended to produce separate aggregated maps for each quarter, accounting for differences due to seasonality, in addition to an overall aggregated map representing all essential fish habitats.

The Workshop recommended that the aggregated maps should recognise that the resulting aggregated maps will reflect the number of essential fish species occurring in an area and that the expected number of species varies naturally along the Baltic Sea salinity gradient

The workshop recommended that the aggregated maps should be produced and made available in such a way that it is possible to provide additional information as maps on additional aspect and species are incrementally available.

### Closing of the event

The dedicated EFH WS session was followed by a joint closing session together of Pan Baltic Scope Workshop on Green Infrastructure (GI WS).

The results of the parallel workshops, including the main points discussed, agreements reached and ways forward to be taken, were presented for the GI WS by Anda Ruskule and for EFH WS by Didzis Ustups.

With respect to essential fish habitats, the following was concluded:

- Based on the Outcome of HELCOM Pan Baltic EFH WS 1-2018, the Workshop document 2 will be further revised with the aim to incorporate the results in the work of the Pan Baltic Scope project, and to present the developed and refined maps to State & Conservation with a proposal for the inclusion of new or updated maps to the HELCOM Map and Data Services.
- With regard to the Pan Baltic Scope project timetable, it was informed that maps, scores, and draft descriptions should preferably be ready by the end January 2019. To meet this aim, a revised version of Document 2 will be circulated by to the Workshop participants by **15 January 2019**, with the possibility to review and provide comments.

The Workshop thanked Pan Baltic Scope partner Poland for investigating the possibility to provide expert comment from Poland on the revised version of Document 2, when available.

The Workshop participants thanked Latvia for generous hosting of the meeting.

### Outcome of the Workshop

The recommendations from the Workshop were discussed and agreed on during the Workshop. The final Outcome was agreed on by correspondence. The Outcome together with the documents and presentations considered by the Workshop are available on the [HELCOM PanBaltic Scope EFH WS 2018](#) meeting site.

## Annex 1. List of Participants

	Name	Organization	E-mail
<b>Chair</b>			
Latvia	Didzis Ustups	BIOR/MoEPRD	didzis.ustups@bior.lv
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## Annex 2. Revised texts on data quality

### **Revised text for “Data quality” on Perch recruitment areas**

Recruitment area here refers to essential habitats for young-of-the-year perch (based on inventory data from spawning until the end of the first summer). The map is based on information from literature and environmental variables, derived from inventory data. The species distribution modelling studies, where the thresholds values for environmental variables have been obtained, are from the northern Baltic Sea. Here, the same thresholds have been applied in the southern Baltic. Also the data layers on environmental variables are based on modelling. Due to these constraints, the perch recruitment area map should be considered as a rough estimation.

### **Revised text for “Data quality” on Pikeperch recruitment areas**

Recruitment area here refers to essential habitats for young-of-the-year pikeperch (based on inventory data from spawning until the end of the first summer). The map is based on information from literature and environmental variables, derived from inventory data. The species distribution modelling studies, where the thresholds values for environmental variables have been obtained, are from the northern Baltic Sea. Here, same thresholds have been applied in the southern Baltic. Also the data layers on environmental variables are based on modelling. Due to these constraints, the pikeperch recruitment area map should be considered as a rough estimation.

### **Revised text for “Data quality” on Herring spawning areas**

The map is based on literature information and environmental variables, not actual data on herring spawning.

The map on potential herring spawning areas is based on data layers on environmental variables (benthic and habitat-related ecosystem components), for which mapping is not exhaustive and sampling density varies between countries. Underlying data layers on vegetation (*Fucus*, *Furcellaria*, charophytes, *Zostera*) are based on inventory data and species distribution models. Information on the distribution of *Furcellaria* is lacking from Russia.

Due to constraints in the resolution of the underlying data layer, the map also identifies areas shallower than one meter as potential spawning areas of Baltic herring. However, spawning of Baltic herring does not usually occur in such shallow depth.

Due to these constraints, the map on Baltic herring spawning habitats should be considered as a rough estimation.