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Background

This document presents the background information towards proposal for a commercial fish assessment approach in HOLAS III. The different sections aim to inform the participants on background information, such as HOLAS III, as well as outline a proposal for the commercial fish assessment.

Based on the ToRs for ComFish WS (document 2-1), a core team, including the Chair for this workshop, was identified to plan the agenda and develop background information for the workshop. Experts from Sweden and ICES, with the support of the HELCOM Secretariat have prepared the following document.

Action requested

The Meeting is invited to:

- Take note of the information and utilize the document to support progress at the workshop,
- Discuss the proposal for commercial fish assessment,
- Agree on a proposal to STATE&CONSERVATION for the assessment of commercial fish in HOLAS III (establishment of commercial fish species, framework and indicators to be applied and used in the assessment, etc.).

Proposal for commercial fish assessment approach

Aims of the workshop

The overall aim of the workshop is to recommend an appropriate approach for regional assessment of commercial fish for the Baltic Sea region that can be implemented for HOLAS III. The workshop will focus on the appropriate commercial species and/or stocks to be evaluated, the appropriate data to be utilized in the evaluation, the appropriate way to implement a full policy and ecologically relevant assessment of commercial fish, what indicators to apply and how these should function (including threshold values). Further information is considered under the approved Terms of Reference (ToRs) for the workshop (cf. document 2.1).

This document should serve as a preparation for the first HELCOM Workshop to plan and conduct the assessment of commercial fish species in the Baltic Sea region. The content of this document should not be seen as a final suggestion for an assessment approach, but rather guide the discussion at the workshop and ensure that the outcome of the workshop could be used in the assessment of commercial fish species in HOLAS III. The workshop should foremost discuss and give advice on the following topics, based on the ToRs of the workshop and the Fish work plan for future indicators:

1. Recommend a regional species list for the assessment of commercial fish species and/or stocks in the Baltic Sea region for adoption
2. Develop and recommend the framework of the assessment, i.e. which parameters/indicators should be used
3. Recommend appropriate approaches for the integration of indicator results per species/stock and across the assessment period, respectively

HOLAS III – The third holistic assessment of the Baltic Sea

The Third Holistic Assessment of the Ecosystem Health of the Baltic Sea aims to address vital components of the Baltic Sea ecosystem as independent aspects (e.g. with specific indicators) and, by integrating or addressing these relevant components at increasing levels of aggregation, assess the overall state of the ecosystem. These holistic assessments form the benchmark from which status can be measured, improvements or deteriorations detected, and subsequently support management decision making, such as measure implementation. At HOLAS III the aim is to increase the coverage of relevant ecosystem components addressed (e.g. compared to HOLAs II) and to improve the earlier assessment made, thereby assessing status for the largest possible number of relevant ecosystem components and utilizing the most relevant and appropriate methodologies available. The assessment period for HOLAS III will cover the period of 2016-2021 and assessments carried out will directly address the BSAP objectives as well as support Contracting Parties with other commitments, for example supporting reporting under the MSFD.

The current preparatory phase for HOLAS III (till end 2021) addresses methodological development, including indicators and threshold values, with endorsement and approval required at State and Conservation and HOD (deadline of 7 September, 2021). Subsequently, the data collection phase will end by May 2022, after which the indicator evaluations will be carried out, those being due in August 2022. The indicator evaluations will then form the underlying input for the integrated assessments and lead into the relevant HOLAS III Thematic Assessments (e.g. Thematic Assessment of Biodiversity).

Background

What was done in HOLAS II

Twelve fish species were included in HOLAS II: Brill, Cod (represented by two stocks), Dab, Flounder (four stocks), Plaice (two stocks), Sole, Turbot, Herring (four stocks), Sprat, Salmon (two stocks), Sea trout and Eel (HELCOM 2018). Stocks or species which are only of minor importance to Baltic Sea fisheries were not

included, nor coastal commercially exploited species. The delineation between commercial and non-commercial fish species was not based on a regionally agreed species or stock list and was only done for the purpose of HOLAS II, mainly defined by the data availability at the time. A subset of the listed species for the assessment of commercial fish species were included in both the assessment of the ecosystem component 'fish' under the biodiversity chapter and the assessment of effect from "species removal by fishing and hunting".Cod (*Gadus morhua*), sole (*Solea solea*), plaice (*Pleuronectes platessa*), herring (*Clupea harengus*) and sprat (*Sprattus sprattus*) were included in the integrated assessment of biodiversity, as these were the ones for which assessment results in relation to both spawning stock biomass and fishing mortality were available.

As far as data were available, the stocks were assessed against fishing mortality and spawning stock biomass. The assessments were based on fisheries advice provided by the International Council for the Exploration of the Sea (ICES 2017a-f). The overall status of the stocks was evaluated against the condition that the average assessment ratio during 2011-2016 should achieve the reference values for both fishing mortality and spawning stock biomass. Size distribution of commercially exploited fish species was not assessed against a threshold value, since no indicators are yet available. In HOLAS II, the trend over time in the size structure and condition of Baltic cod was included based on data from the Baltic International Trawl Survey.

When assessed to under the section "species removal by fishing and hunting", results for stocks were not integrated into species or species groups, but summary results were presented by species groups in the form of pie charts and bar charts.

When assessed within the topic of biodiversity assessment results were presented in analogy with the above, and additionally, data were included in the BEAT integrated assessment to reflect the integrated status of fish at the level of assessment areas. Although the BEAT assessments by default are carried out over HELCOM assessment units, for open sea fish, spatial delineations according to ICES subdivisions were applied.

Eight of the assessed stocks did not show total good status, and only three showed good status, considering averages during 2011-2016. Ten stocks lacked assessment results for either fishing mortality or stock size, preventing identification of good environmental status (for good status to be identified, it was required that indicators for both fishing mortality and stock size achieved the thresholds, see also section 3 below).

Under the biodiversity section, further, the integrated status of commercial fish in the open sea, was at that time assessed as good in the Bothnian Bay, where only herring was included. In the other open sea sub-basins, the integrated results reflected a deteriorated status of cod (*Gadus morhua*), and, depending of sub-basins, also of sprat or herring (*Sprattus sprattus, Clupea harengus*). The integrated status of the group 'demersal fish' was highly influenced by cod, which did not show good status in any sub-basin where it was included. The integrated status of the group 'pelagic fish' was below good status west of Bornholm, in the Bothnian Sea and the Gulf of Riga. Red listed species like Atlantic Sturgeon, porbeagle or spurdog where included in the biodiversity section.

Policy requirements

The main purpose of HOLAS III is to provide a status assessment to plan and follow up the work within the Baltic Sea Action Plan (BSAP). In addition such assessment offer support for other commitments to which HELCOM Contracting Parties are obliged to address, for example the EU Marine Strategy Framework Directive for those Contracting Parties that are also EU Member States. At the same time, the assessment of commercial fish species must be coordinated and to some extend be based on both the principles laid down in the Common Fisheries Policy (CFP) and the Marine Strategy Framework Directive (MSFD). Coordination between the different management frameworks (CFP; MSFD) is necessary because, HELCOM Contracting Parties also member states of EU will use the HOLAS III assessment to support reporting under the MSFD in 2024, where a coordination between CFP and MSFD is compulsory. It became clear that the degree of

regional coordination of the assessment of commercial fish species should still be developed (Vasilakopoulos et al. 2021).

The current revision of the common fisheries policy was adopted in 2013 and aims to promote environmentally, economically and socially sustainable fishing, including measures to end overfishing and eliminate fish discards, for example. Currently, multi-annual plans are in place for the main part of the internationally managed fish stocks, and adjustments to fishing gear are undertaken to mitigate negative impacts on the ecosystem and fish stocks (EC 2016). The CFP is complemented by the MSFD. According to the directive EU member states should have reached Good Environmental Status by 2020 at the latest. Good Environmental status is defined for eleven different descriptors as one 'descriptor' (and its underlying criteria) targets the maintenance of healthy fish stocks, which are commercially exploited.,

MSFD Descriptor 3[1]. Three different criteria shall be assessed according to MSFD (EU 2017):

> D3C1: The Fishing mortality rate of populations commercially-exploited species is at or below levels which can produce the maximum sustainable yield (MSY).
>
> D3C2: The Spawning Stock Biomass of populations of commercially-exploited species are above biomass levels capable of producing maximum sustainable yield.
>
> D3C3: The age and size distribution of individuals in the populations of commercially-exploited species is indicative of a healthy population. This shall include a high proportion of old/large individuals and limited adverse effects of exploitation on genetic diversity.

All three criteria are mandatory to assess (i.e. primary MSFD criteria, also prioritized for development by HOLAS III: Document 4-20 to HOD 57-2019.), which means that EU members are obliged to assess these criteria for stocks which are defined as relevant. Furthermore, all three criteria must be within the criterion-specific threshold for a stock to achieve GES.

According to the MSFD, a list of stocks shall be defined based on regional or sub-regional cooperation, taking into account regulation (EU) No 1380/2013 and other relevant treaties or regulations (for details see next chapter in this document or pages 10-11 in EU COM Dec 848/2017.

1. Regional list of stocks for the assessment of commercial fish species in HOLAS III

A regionally agreed list of stocks (populations) is needed to assess the status of commercial fish species both with respects to the objectives in the BSAP and criteria laid down in the MSFD. Furthermore, this list needs to clearly define how to distinguish between commercial and non-commercial fish species. The MSFD article 8 reporting in 2018 revealed a lack of consistency and the number of populations reported by subregion varied a lot, even among MS fishing in the same sub-region (Vasilakopoulos et al. 2021).

The EU commission asked ICES for advice in order to define criteria for the choice of commercial fish species and stocks (ICES 2021). The advice provides several recommendations which should be applied in the work of HOLAS III, once agreed at the workshop:

- the selection of the stocks should be based on regional rather than a member state level (in this case member states of HELCOM),
- the total landings for stocks selected for reporting should represent a very high proportion (by weight) of the landings,
- in cases where stocks represent a small proportion of the total weight of landings but generate relatively high revenues, an additional threshold, based on commercial value, should be used to select species/stocks for reporting,

[1] Populations of all commercially exploited fish and shellfish are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock.

- Identification of locally important species/stocks should be done at MS level. These stocks/species could be included in order to avoid duplicate reporting by several MS. To what extent the inclusion of any such nationally or locally important species in HOLAS III is relevant should be discussed in the workshop.

For major species, assessments should differentiate between distinct, important stocks (not solely performed at a species level). Data deficiency in relation to the assessment criteria should not be a reason for excluding stocks from the assessment, and data poor stocks should also be included if deemed relevant. Furthermore, it should be discussed how to deal with widely distributed species in the Baltic Sea are. ICES advice suggested to omit these species from the assessment, however it might still be motivated to assess certain widely distributed species in the Baltic Sea, e.g. eel, in order to reflect all important aspects of the commercial fish fauna in the Baltic Sea. Several EU MS assessed Eel as commercial species in their 2018 MSFD assessment. Salmon and sea trout was assessed as non-commercial by several EU MS.

ICES identified four different overall approaches (or variations thereof) were used by MSs to select species for the regional assessment of commercial fish species in their 2018 MSFD Article 17 reporting (Table 1). Working Group GES did not agree on one approach so far, but noted that approach one was generally favorized by the EU MS, pending a final decision during 2021.

Table 1. Approaches identified by ICES that were used by MSs to select species/stock for assessment of commercial fish species on regional level.

Characteristics	**Approach 1**	**Approach 2**	**Approach 3**	**Approach 4**
	MSs use all species/stocks referred to in *Specifications and standardised methods for monitoring and assessment* of Decision 2017/848 for the MSFD (sub)region within which the MRU* is located.	Same as **Approach 1**, but include only species/stocks caught in the MS's MRU and landed by the reporting MS.	Same as **Approach 1**, but include only species/stocks caught in the (sub)region and landed by the reporting MS.	Same as **Approach 1**, but include only species/stocks caught in the MS's MRU and landed by any MS.
Availability of CFP-derived data to select stocks at the spatial scale and alignment of the selected approach.	Data available from the JRC/STECF FDI Database are at reasonable approximation for the Atlantic, and the Baltic and Mediterranean seas.	Catch and landings data are available nationally.	Data available from the JFC/STECF FDI Database are at reasonable approximation for the Atlantic, and the Baltic and Mediterranean seas.	Catch and landings data are only available nationally. Requires that extended reporting mechanisms between MSs are established.
Potential for commercial stocks to be omitted.	Low	High – all stocks caught in the reporting MSs MRU by other MSs will be omitted.	Low – all stocks caught by other MSs in a reporting MSs MRU will be reported by the catching MS.	Low – but sufficient data only available if an inter-MS reporting mechanism is established.
Facilitates EU- and/or MRU-wide coordination (Article 6), including the implementation of the Article 13 programme of measures using the Common Fisheries Policy.	High – Comprehensive and simple to implement.	Low – stocks caught by other MSs in the reporting MS's MRU will not be reported.	Medium – MSs will report only on stocks caught by themselves and will be responsible to report on stocks they catch in the MRUs of other MSs. Requires the reporting MS to be familiar with the MRUs of all other MSs.	Low – the reporting MS relies on other MSs to provide them with data on catches and landings consistent with the reporting MS's MRUs.

* Marine reporting units (MRUs) are defined by individual MSs and can be of varying sizes, including region, subregion, EEZ, etc.

WS Tasks related request 1:

The Workhop is asked to provide recommendations to HELCOM WG State & Conservation about:

- A preferred approach for the selection of commercial species/stocks to be included in HOLAS III
- A list of commercial species/ stocks for inclusion in HOLAS III (if necessary intersessional)
- Discussion of nationally relevant stocks which could be added by each EU MS to regional list

2. Assessment approach

The assessment of commercial fish species should include both fishing mortality (F), spawning stock biomass (SSB) and if, possible size/age structure. The recommended assessment approach will be steered by the availability of data and operational indicators (ICES 2016). For both F and SSB, alternative indicators reflecting fishing mortality and stock size, such as survey indices and harvest ratios may be used if F and SSB are not available. It is unlikely that fully quantitative assessments of size and/or age distribution can be done in HOLAS III, since there are still no operational indicators (ICES 2016b). However, several countries in the Baltic Sea region reported D3C3 assessments in the 2018 reporting round of the MSFD, using qualitative thresholds (Vasilakopoulos et al. 2021).

It should be discussed in the workshop how Baltic countries report on D3C3, and if the ongoing development work within the Helcom Blues project for the assessment of size distribution of coastal fish could be applied also for commercial fish species. Alternatively, if it is possible to include other assessment of size distribution. The ICES workshop WKIND 3.3i identified three indicators, which could be used to assess size distribution and by that criterion D3C3 (ICES 2016c; ICES 2017g):

- the 95th percentile of the length–frequency distribution (L_{95}),
- the proportion of mega-spawners (P_{mega}),
- and the absolute abundance of mega-spawners ($CPUE_{mega}$)

L_{95} and "proportion of fish larger than mean size of first sexual maturation" are even recommended by the EU COM Dec 848/2017. However, besides some methodological challenges, e.g. definition of "mega-spawners" or how small individuals influence the assessment, mostly the lack of reference points with respect to sustainable exploitation made the implementation of these indicators difficult so far. Probst et al. 2021 (and references within) recommend a reference values for mega-spawners, which could be tested for relevant stocks. Furhtermore, it could be discussed whether age and size based indicators could be combined (Probst et al. 2021).

It could even be possible to include possible indicators about size/age distribution as trend indicators, if data is available and the methodological challenges could be solved (ICES 2017g). These would not necessary be used to assess if good status is reached, but could inform about the status of size distribution in relevant stocks and could be used further to define environmental goals.

WS tasks

- Give an overview of data availability through ICES for the selected stocks (could be done intersessionally) using ICES Fisheries overview or other relevant data sources[2],
- Review the available methodology for assessing size structure and evaluate if application at HOLAS III should be considered.

3. Integration

As pointed out earlier, the assessment within HOLAS III should, as far as possible, be coordinated with assessment according to EU COM DEC 848/2017 to enable EU MS to use HOLAS III as base for their national reporting according to article 8 MSFD. This would imply to use integrations rules pointed out in the decision. According to the decision one-out-all-out should be used when assessing the overall status of the stocks. Furthermore, an overall status assessment for a species/stock can only be provided if at least fishing mortality and spawning stock biomass can be assessed.

Furthermore, it is necessary to agree on a method to represent results from the annually provided ICES advice over an assessment interval of six years, as asked by both the MSFD and BSAP assessments. For HOLAS III the assessment interval is preferably be 2016-2021.

[2] https://standardgraphs.ices.dk/stockList.aspx

In HOLAS II, "good status" (at the indicator level for the assessment period) was defined as achieved if the indicator threshold value was achieved on average for all years within the assessment period (at that time 2011-2016). In practice, this was defined as the six year-average of the ratio between the annual assessment value and the annual reference value for that indicator.[3]

Results for indicators representing Fishing mortality and Spawning stock biomass were subsequently pooled using the one-out-all-out principle to provide a status assessment result of each species/stock.

Additionally, for inclusion in the BEAT tool, information of the number of years in which the threshold value was achieved was used to inform the classification of status in to four classes, as follows.

- Far from good status (BEAT value 0.125): The threshold value not achieved in any of the years
- Just below good status (BEAT value 0.375): Threshold value was not achieved for the average for all years, but achieved in at least one of the years
- Just above good status (BEAT value 0.625): Threshold value achieved for the average of all years, but not achieved in at least one of the years
- Clearly good status (BEAT value 0.825): Threshold value achieved in all years

A need for better regional coordinated integration rules is reflected by the difference in the latest MSFD article 8 reporting round. The assessment period differed greatly across MS, with five different periods reported in the Baltic Sea region (Vasilakopoulos et al. 2021). The most frequently reported assessment period was 2011-2016. Along with the variation in assessment interval a variation in integration rules between years was eminent: Integration rules and assessment intervals should be coordinated and could:

a) Only use the most recent assessment, i.e. 2021
b) OOAO within the assessment interval, i.e. in every year both criteria must be met for all stock to achieve GES
c) A certain proportion of years to be in GES in order to achieve GES over the whole assessment interval
d) Average of the assessment results for the relevant years in the assessment interval, using reference values from the latest year in the interval (as done in HOLAS III).

It should be noted, that under all options, the data source would be the same, namely the most recent available version of ICES advice for the concerned stock, with the only difference being what years out of the presented time series are considered, typically the modelled time series of the analytical assessment.

WS Tasks

- Agree on a method for integration over years to be used to describe the status of commercial fish species in the assessment interval.

Confidence

In HOLAS II, confidence in the assessment was assessed in connection to integration in the BEAT tool. Confidence was defined as scored in three different levels: high, intermediate and low for each of the four categories: confidence of classification, temporal coverage, spatial representation and methodological confidence (for details see: Development of a biodiversity assessment tool (helcom.fi).

For commercial fish, confidence was assessed as high for all species/stocks included in the integrated assessment. The integrated assessment included all stocks for which assessment results with respect to both

[3] The average of F/F-MSY in 2011-2016, and the average of MSY/MSY B-trigger in 2011-2016, respectively. For illustrations, see http://stateofthebalticsea.helcom.fi/pressures-and-their-status/species-removal-by-fishing-and-hunting/#commercially-exploited-fish and http://stateofthebalticsea.helcom.fi/biodiversity-and-its-status/fish/#commercial-fish-species-in-the-open-sea

fishing mortality and spawning stock biomass were available for the assessed years (Western Baltic cod, Eastern Baltic cod, Plaice, Sole, Herring (all stocks), Sprat).

WS Tasks

- Review the Beat confidence levels and categories and suggest changes, if needed.

Organization

What will be the required work ahead to achieve the assessment at HOLAS III, discuss and make suggestions on who will take it forward.

References

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HELCOM (2018): State of the Baltic Sea – Second HELCOM holistic assessment 2011-2016. Baltic Sea Environment Proceedings 155 (link)

ICES (2016): ICES Special Request Advice; EU request to provide guidance on the practical methodology for delivering an MSFD GES assessment on D3 for an MSFD region/subregion

ICES (2016b): ICES Special Request Advice; EU request to provide guidance on operational methods for the evaluation of the MSFD Criterion D3C3

ICES (2016c) Report of the Workshop on guidance on development of operational methods for the evaluation of the MSFD criterion D3.3 (WKIND3.3i), 14–17 March 2016

ICES (2017): (International Council for the Exploration of the Sea) 5.2 December Baltic Sea Ecoregion – Fisheries overview. http://ices.dk/sites/pub/Publication%20Reports/Advice/2017/2017/BalticSeaEcoregion_FisheriesOverviews_December.pdf

ICES (2017b): Cod (Gadus morhua) in subdivisions 24–32, eastern Baltic stock (eastern Baltic Sea). ICES Advice on fshing opportunities, catch, and efort. Baltic Sea Ecoregion Version 3: 8 June 2017

ICES (2017c): Atlantic salmon (Salmo salar) in subdivisions 22–31 (Baltic Sea, excluding the Gulf of Finland). ICES Advice on fshing opportunities, catch, and efort. Baltic Sea Ecoregion. Published 31 May 2017

ICES (2017d): Atlantic salmon (Salmo salar) in Subdivision 32 (Gulf of Finland). ICES Advice on fshing opportunities, catch, and efort. Baltic Sea Ecoregion. Published 31 May 2017.

ICES (2017e): Sea trout (Salmo trutta) in subdivisions 22–32 (Baltic Sea). ICES Advice on fshing opportunities, catch, and efort. Baltic Sea Ecoregion. Published 31 May 2017.

ICES (2017f): European eel (Anguilla anguilla) throughout its natural range. ICES Advice on fshing opportunities, catch, and efort. Ecoregions in the Northeast Atlantic Published 7 November 2017

ICES (2017g): ICES Special Request Advice; EU request to provide guidance on operational methods for the evaluation of the MSFD criterion D3C3 (second stage 2017)

ICES (2021) ICES Special Request Advice. EU request for advice on developing appropriate lists for Descriptor 3, commercially exploited fish and shellfish, for reporting by EU Member States under MSFD Article 17 in 2024.

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