

## Annex 5: Audit Reports

### Audit of (Boarfish in subareas 6-8 boc.27.6-8)

Date: 02/09/20

Auditors: Afra Egan, Eydna í Homrum and Jens Ulleweit

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#### General

This is an update assessment with advice provided in 2019 for 2020 and 2021.

#### For single stock summary sheet advice:

- 1) **Assessment type:** update
- 2) **Assessment:** trends - Category 3 with biennial advice. No advice sheet in 2020.
- 3) **Forecast:** Not presented
- 1) **Assessment model:** Bayesian Schaefer state space surplus production model fitted using catch data, 6 delta-lognormal estimated IBTS survey indices, and 1 acoustic survey estimate. Key parameters ( $r$ ,  $K$ ,  $F_{msy}$ ,  $B_{msy}$  and  $TSB$ ) have been estimated using the exploratory Schaeffer state space surplus production model. The assessment has been run by the WinBUGS14 program.
- 2) **Data issues:** The stock assessment input data and the r-scripts used in the assessment are all available on Sharepoint in the folder "06.Data/boc.27.6-8".
- 3) **Consistency:** This updated assessment is consistent with the assessment carried out in 2019.
- 4) **Stock status:** ICES cannot assess the stock and exploitation status relative to  $MSY$  and  $PA$  reference points because the reference points are undefined.
- 5) **Management Plan:** A management strategy has been proposed by the Pelagic AC. ICES provides advice for this stock following the standard procedures which conforms to the proposed strategy from the Pelagic AC.

#### General comments

This was a well-documented, well ordered chapter and is easy to follow and interpret. There are some minor corrections outlined below.

#### Technical comments

- Correct Table 3.1.2.1 total discard figure for 2019 and correct the total catch and discards in the text section 3.1.3.
- Correct Table 3.1.2.3 discard figures for 2019.
- Table 3.2.1.2 column 2 has a mix of catch and landings. Should all be landings.
- Check values for 2016, 2019 and 2020 for the CV on the acoustic survey in Table 3.3.1.1. Values different from the assessment input file.
- Format the figures in Table 3.6.3.1.
- In table 3.2.1.6 age is missing in the leftmost column
- In table 3.2.2.1 length group is missing in the leftmost column (Total over years could probably be omitted)
- There are some unexplained abbreviations – e.g. DCMAP, MCMC – it is suggested to write in full when first mentioned.
- The first in text table in section 3.4 is a bit difficult to read because only the ages in the top row are highlighted (this may be more of a ICES-formatting issue rather than text-writing)
- Section 3.6.2 – end of first paragraph. The last sentence states that 2016 may look like an outlier. It is not easy for the reader to evaluate this until Figure 3.6.3.6 is shown. It is suggested to aid the reader with a figure already in section 3.6.2 or reference to Table 3.3.1.1).

- Section 3.6.3 – Results. Figure 3.6.3.7. In the report text and Figure caption it says TSB – but the y-axis text says SSB.
- Section 3.6.4. The table in the text has not been updated to 2019.
- Section 3.9.2. ‘F130 625 t’ – looks like there is some formatting missing
- Section 3.14 – some shift in the bullet levels (bullet 2 should probably be bullet **iv** in bullet **1** )

**Conclusions**

The assessment has been performed correctly

## Audit of Red Gurnard in subareas 3-8

Date: 03.09.2020

Auditor: Bernhard Kuehn

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### General

Information on gurnard abundance are available in DATRAS for the IBTS-Q1 survey in the North Sea, Scottish West Coast Groundfish Survey (WCGFS), Irish Groundfish Survey (IGFS) and the French EVHOE-WIBTS-Q4 survey in the Celtic Sea and Bay of Biscay and CGFS-Q4 in Division 7d. Each of these surveys covers a specific area of red gurnard distribution. Lengths at age are available from CGFS-Q4 in and IGFS-Q4.

In the North Sea, the appearance of red gurnard in the index of the IBTS Survey since 1990 is in line with an increase of the abundance in 4a. In Eastern Channel, the abundance index of the CGFS-Q4 survey has widely fluctuated, with a weak decline. The EVHOE-WIBTS-Q4 survey has slightly increased since its beginning in the 1990s.

The landings data are not species-specific in the fisheries and there are currently no technical measures specifically for managing the fishery. There is need for regular sampling of red gurnard in commercial landings and discarding to provide series of length or age compositions to conduct analytical assessment.

### For single stock summary sheet advice:

- 1) **Assessment type:** updated
- 2) **Assessment:** no analytical assessment
- 3) **Forecast:** None
- 4) **Assessment model:** None
- 5) **Data issues:** landings data are not species-specific, lack of biological sampling in commercial landings and discarding
- 6) **Consistency:** NA
- 7) **Stock status:** unknown
- 8) **Management Plan:** NA

### General comments

It is a well-structured and documented section, which gives information on the available data and perceived situation as well as outlining the known issues for the stock. There are some minor corrections listed below.

### Technical comments

There were some inconsistencies in the landings data presented in the report (table 9.1. and 9.2) and in the data sheets from the sharepoint, most of them rounding issues. Corrections were made and reported to the chair and stock co-ordinator.

### Conclusions

The assessment has been performed correctly, but has to include some minor corrections on the landings tables.

### Checklist for audit process

#### General aspects

- Has the EG answered those TORs relevant to providing advice?
- Is the assessment according to the stock annex description?
- If a management plan is used as the basis of the advice, has been agreed to by the relevant parties and has the plan been evaluated by ICES to be precautionary?
- Have the data been used as specified in the stock annex?
- Has the assessment, recruitment and forecast model been applied as specified in the stock annex?
  
- Is there any **major** reason to deviate from the standard procedure for this stock?
- Does the update assessment give a valid basis for advice? If not, suggested what other basis should be sought for the advice?

## Audit of Striped red mullet in Subareas and Divisions 6, 7a–c, e–k, 8, and 9a

Date: 08.092020

Auditor: Laurent Dubroca

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### General

Assessment of this stock is not possible due to the short time-series of the data provided to this group : landings by country and divisions are available from 2006 to 2020, 3 survey abundances index for the species area presented from 1997 to 2017. However, it seems that fishery dependent data have been collected for several years by some countries (France since 2004) and that it would be appropriate to request them as part of a benchmark.

#### For single stock summary sheet advice:

- 1)
- 2) **Assessment type:** no assessment due to lack of age structured analytical input data provided to the WG.
- 3) **Assessment:** limited data available to evaluate stock trends.
- 4) **Forecast:** not presented
- 5) **Assessment model:** none
- 6) **Data issues:** general lack of data
- 7) **Consistency:** undefined
- 8) **Stock status:** undefined.
- 9) **Management Plan:** there is no management plan.

### General comments

Well structured and documented section pointing out the lack of data regarding this stock.

### Technical comments

Table 10.1 : The preliminary landings total for 2019 has some truncation problem : the total is 1854 tons, not 1855.

Table 10.2 : landings total for 2019 has some truncation problem: the total is 1854 tons not 1855.

### Conclusions

The absence of assessment has been performed correctly

### Checklist for audit process

#### General aspects

- Has the EG answered those TORs relevant to providing advice?
- Is the assessment according to the stock annex description?
- If a management plan is used as the basis of the advice, has been agreed to by the relevant parties and has the plan been evaluated by ICES to be precautionary?
- Have the data been used as specified in the stock annex?
- Has the assessment, recruitment and forecast model been applied as specified in the stock annex?
  
- Is there any **major** reason to deviate from the standard procedure for this stock?
- Does the update assessment give a valid basis for advice? If not, suggested what other basis should be sought for the advice?

## Audit of NEA Mackerel

Date: September 7, 2020

Auditor: Jan Arge Jacobsen, Sólvá Eliassen, Martin Pastoors

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### General

This audit focuses on the advice sheet and the WGWIDE report section on NEA Mackerel. The advice sheet is consistent with the report section.

ICES currently consider the NEA mackerel stock to consist of three spawning components: western, southern, and North Sea, although the stock structure and spawning behaviour is likely to be more dynamic. The group questioned the effect of the regulations in the North Sea, and given the new knowledge on stock structure of mackerel that is currently becoming available, a review of the appropriateness of the use of stock components and the association protection measures should be carried out (at the earliest convenience/next benchmark).

As in previous years, the assessment indicates conflicting signals between some of the data sources. The International Ecosystem Summer Survey in the Nordic Seas (IESSNS) index has remained at high levels since 2013, while the egg survey index has been at low levels since 2016. This contradictory information led to a decrease in the influence of those data sources in the assessment, and a poor fit to both data sources. As a result, the assessment mainly relies on the catch data.

### For single stock summary sheet advice:

- 6) **Assessment type:** update (inter-benchmarked in 2019)
- 7) **Assessment:** analytical
- 8) **Forecast:** presented
- 9) **Assessment model:** SAM, modified to utilise tag/recapture dataset – tuning by steel tagging data (1980–2006) and RFID tagging data (2014–2019), and three survey indices.
- 10) **Data issues:** All data available as described in stock annex and in the report text. Catch data prior to 2000 are downweighted in the assessment.
- 11) **Consistency:** The retrospective bias, where the F has consistently been overestimated and SSB underestimated, has decreased for the 2020 assessment.
- 12) **Stock status:** The fishing pressure on the stock is below FMSY; and spawning stock size is above MSY Btrigger, Bpa and Blim.
- 13) **Management Plan:** There is no management strategy agreed for the stock, therefore ICES based its advice on the MSY approach. EU, NO and FO asked ICES in 2019 to evaluate a new long term management strategy for the stock. ICES has evaluated and sent it back to the recipients in August 2020 to decide on.

### General comments

The report section is readable and all information is there, but it is rather long. The advice sheet is well documented.

### Technical comments

The assessment is done according to the stock annex.

The code and input data for the SAM assessment, the RCT3 analysis and the short term forecast are all available on the sharepoint data folder:

<https://community.ices.dk/ExpertGroups/WGWIDE/2020%20Meeting%20Docs/06.%20Data/mac.27.nea>. While it has been possible by the auditors to rerun the assessment, RCT3 and STF, it is noted that the documentation of the assessment procedures is rather sparse. The code would benefit from a more integrated approach between assessment, recruitment estimation and STF, e.g. with stepwise and documented code segments.

It was also noted that the code for the STF utilized a target  $F$  of 0.23 for the ICES AR option but that the correct value of 0.26 has been used to generate the values for the WG report and the ICES advice document. Likewise, the MSY Btrigger has not been updated in the code, and was still at 2.5 Mt.

The data on mackerel is presented in different levels of detail. There are 105 pages of catch data in the report, which is partly due to the formatting, but still one may wonder if this level of detail is required. On the other hand, for the survey indices, the information is perhaps a bit too scarce.

- There is no presentation of the index values generated from the recruitment analysis (only the index values in the input to the assessment; thus it is not possible to check if the appropriate transformation has been carried out).
- There is likewise no presentation of the results of the tagging analysis, only the input values to the assessment are shown.
- There appear to be mismatches between the IESSNS index values in table 8.6.3.1 and in the input to the assessment (8.7.19). A direct comparison of the values by year and age yields the following discrepancies:

COMPARE	3	4	5	6	7	8	9	10	11
2010	-0.1	-0.02	0	-0.24	-0.16	-0.02	0	-0.02	0.01
2011									
2012	-0.06	-0.27	-0.34	-0.43	-0.14	-0.09	0.04	-0.03	-0.01
2013	-0.21	-0.32	-0.16	-0.35	0.14	0.18	0.07	0.05	0.01
2014	0.77	0.24	-0.05	-0.01	-0.1	-0.22	-0.11	-0.02	-0.01
2015	-0.13	-0.64	-0.24	0.14	0.2	-0.21	-0.11	0.05	0.01
2016	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0	0	0
2020	0	0	0	0	0	0	0	0	0

Table and figure numbers and references to them in the text has been checked.

### Conclusions

The assessment has been performed correctly according to stock annex. Small discrepancies with the IESSNS values need to be checked.



## Audit of North Seas Horse mackerel stock (hom.27.3a4bc7d)

Date: September 4th , 2020

Auditor: Gersom Costas

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### General

In 2012 the North Sea horse mackerel (NSHM) was classified as a category 5 stock, based on the ICES approach to data-limited stocks (DLS). Since then, a progressive reduction of TAC was advised by ICES. In 2017, this stock was benchmarked and the North Sea International Bottom Trawl Survey (NS-IBTS) and the Channel Ground Fish Survey (CGFS) indices were modelled together. The resulting joint index was considered a proper indication of trend in abundance over time and the NSHM stock was upgraded to category 3.

This stock has a biennial advice for 2020 and 2021 therefore this is an update assessment. The advice sheet was provided in 2019 and report was well written and well documented., however the Stock Annex is rather incomplete and poorly documented.

### For single stock summary sheet advice:

- 14) **Assessment type:** update
- 15) **Assessment:** category 3 (survey based method)
- 16) **Forecast:** not presented
- 17) **Assessment model:** Hurdle model  
Formed by two sub-models
  - Modelling probability of zeroes (GLM binomial)
    - o With Year + Survey
  - Modelling count data (GLM negative binomial)
    - o With Year \* Survey
 Weighting factors (based on survey area and wingspread of gears):
  - 0.86 \* IBTS survey index estimate
  - 0.24 \* CGFS survey index estimate
- 18) **Data issues:**  
Data is available, but:
  - Catch at age data questionable due to low sampling coverage
  - discard information is considered to be incomplete
  - index area did not sufficiently cover the distribution area of the stock.
- 19) **Consistency:** it is consistent with the assessment carried out last year
- 20) **Stock status:**
  - no reference points for stock size have been defined
- 21) **Management Plan:** There is no management plan for horse mackerel in this area. ICES evaluated a proposed harvest control rule for a multi-annual plan for horse mackerel in the North Sea. None of the options were considered as being in accordance with the precautionary approach.

### General comments

The advice sheet and report was well written and well documented.

### Technical comments

The majority of the Stock Annex is missing,

### Conclusions

The assessment has been performed correctly

## Audit of North Seas Horse mackerel stock (hom.27.3a4bc7d)

Date: 01. September 2020

Auditor: Leif Nøttestad

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### General

In 2017, this stock was benchmarked and the North Sea International Bottom Trawl Survey (NS-IBTS) and the Channel Ground Fish Survey (CGFS) indices were modelled together. The resulting joint index was considered a proper indication of trend in abundance over time and the NSHM stock was upgraded to category 3. In 2018, the index remained at similar levels in 2016 and 2017. The application of the HCR resulted in an index ratio (mean index value of two most recent years (A) over mean index value of three preceding years (B); A/B ratio) of 0.39, meaning that an 80% uncertainty cap was applied. Length Based DLS methods indicated that the F in 2018 was slightly above the  $F_{MSY}$  proxy, and stock size relative to reference points was unknown. However, since the precautionary buffer was already applied to the advice in 2017, the precautionary buffer was not applied this time. This resulted in a catch advice for 2020 and 2021 of 14014 tonnes. Thus, no new catch advice will be given for NSHM for 2021.

There are some signs of improved recruitment in some years (e.g. 2016, 2018), but the trend of the abundance index for the juvenile sub-stock is fluctuating and, when separated, the two surveys, NS-IBTS and CGFS, do not show the same trend. It remains to be seen if the weak signs of improved recruitment result in higher adult abundance, but the slight increase in the index of the exploitable sub-stock in 2019 suggests this might be the case.

Furthermore, the fisheries in the area mainly catches on horse mackerel between 15 and 25 cm. With this pattern of exploitation, mostly immature individuals are caught and exploited, which might hinder the recovery of the stock by removing an important portion of the recent year classes before they enter the spawning stock. Related to this concern and starting in the autumn of 2018, the Pelagic Freezer-trawler Association (PFA, the Netherlands) has implemented a voluntary move-away scheme to avoid the catch of small horse mackerel in 27.7.d.

The advice sheet and report is generally well written and well documented. However, the majority of the Stock Annex seem to be still missing, which make it difficult to check if the assessment is done according to this.

### For single stock summary sheet advice:

22) **Assessment type:** update. Catch advice provided for two years (2020 and 2021).

23) **Assessment:** Survey trend-based assessment (Category 3)

24) **Forecast:** Not presented

25) **Assessment model:** Hurdle model

Formed by two sub-models

- Modelling probability of zeroes (GLM binomial)
  - o With Year + Survey
- Modelling count data (GLM negative binomial)
  - o With Year \* Survey

Weighting factors (based on survey area and wingspread of gears):

- 0.86 \* IBTS survey index estimate
- 0.24 \* CGFS survey index estimate

26) **Data issues:**

Data is available, but:

- Bad catch sampling coverage
- Discard information is considered to be incomplete, and discard numbers from earlier years have not been submitted to ICES.

27) **Consistency:**

- Mistake found in the calculation of CPUE in the last assessment for 2016 and 2017, however the 2017 advice would have resulted in the same catch advice.

28) **Stock status:**

No reference points, but

- Still low abundance index with no sign of recovery
- $F/F_{msy}$  slightly above 1 in both 2019 and 2020

29) **Management Plan:** There is no management plan for horse mackerel in this area. ICES evaluated a proposed harvest control rule for a multi-annual plan for horse mackerel in the North Sea. None of the options were considered as being in accordance with the precautionary approach.

### General comments

The advice sheet and report were well written and well documented.

### Technical comments

The majority of the Stock Annex is still missing, which make it difficult to check if the assessment is done according to this.

### Conclusions

The assessment has been performed correctly. Stock advice for NSHM is biennial (2020 and 2021).

## **Audit of 6 North Sea Horse Mackerel: Divisions 27.4.a (Q1 and Q2), 27.3.a (excluding Western Skagerrak Q3 and Q4), 27.4.b, 27.4.c and 27.7.d**

Date: 4/09/20

Auditor: Pablo Carrera

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### **General**

- Stock benchmarked in 2017, category 3
  - NS-IBTS and CGFS bottom trawl surveys used as joined survey index
- Information on discards, available since 2015
- Information on non-directed fishery, available since 2017
- Danish fishery for fish-meal and oil decreased in 1980's while increased the Dutch freezer fishery for human consumption. In most recent years, highest catches are taken by the UK
  - There is an underutilization of the fishing opportunities
  - Bulk of the catches in 27.7.d

### **For single stock summary sheet advice:**

- 1) **Assessment type: update/SALY** (Catch advice provided for two years (2020 and 2021).
- 2) **Assessment:** Survey trend-based assessment (Category 3)
- 3) **Forecast:** Not presented
- 4) **Assessment model:** survey data (overdispersion and high proportion of zero values) modeled using a hurdle model with:
  - a. Year and Survey as explanatory factors (including the interaction term) in the count model (GLM-negative binomial), and Year and Survey (without the interaction) in the zero model (GLM-binomial)
  - b. Two sub-stocks are considered: juveniles (<20cm) and the exploitable stock (>20 cm) treated in sub-models
  - c. Relative contribution of each survey (NS-IBTS and CGFS) to the index, as function of both survey area and wingspread of gears (86% and 24% respectively).
- 5) **Data issues:**
  - a. Surveys not specifically designed for horse mackerel and not covering one of the main fishing grounds for the stock (7.d)
  - b. Complete discard information was not submitted to ICES, and the available information should be revised as long as may underestimate the discard proportion
  - c. Very low coverage of biological sampling (e.g. lack of data in some areas and quarters).
  - d. Only a third of the landings was sampled in most recent years,
  - e. Potential mixing of fish from the Western and Northern Sea stocks in areas 27.7d-e in winter may also confuse the cohort signals.
- 6) **Consistency:**
  - a. The index survey is considered robust, but the standard error for the intercept and the parameter  $\theta$  of the count model were not estimated for the adult sub-stock model
- 7) **Stock status:**
  - a. Survey index for adult sub-stock did not further decline in 2018, but remained at similar low levels as in 2017, compared to higher levels in 2014 to 2016.
  - b. Conflicting trends for juveniles when surveys are considered separately, but the sub-model for juvenile did not show significant trend, rather fluctuating with some years (e.g. 2018) with improved signal
  - c. Index ratio (A/B ratio or 2-over-3 ratio) for the adult sub-stock in the 2019 assessment was 0.39. Therefore, an 80% uncertainty cap was applied.
- 8) **Management Plan:**
  - a. There is no management plan, nor reference points
  - b. Length based indicator used as MSY proxy. Data source: length frequencies from the Pelagic Freezer trawler Association PFA and whole commercial data
  - c.  $F/F_{MSY}$  ratio, higher than 1.

**General comments**

Report is well written and ordered. All references are included.

- In section 6.4.3.1 (Egg surveys) a reference should be included to explain why North sea mackerel is now considered an indeterminate spawner
- Reference ICES. 2018. (ICES reference points for stocks in categories 3 and 4. ICES Technical Guidelines. 13 February 2018) is missing in the text. Probably should be included in section 6.4.6.

**Technical comments**

Most of the stock annex is missing. This has to be updated, including all the available information from the 2017 benchmark.

As mentioned in the report, recent main fishing grounds match with the main spatial distribution of the juvenile (e.g. area 27.7d). The recovery of this stock would likely dependent on the fishing effort done in this area.

**Conclusions**

The assessment has been performed correctly

## Audit of Norwegian Spring Spawning Herring

Date: 04.09.2020

Auditor: Are Salthaug

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### General

The Norwegian springs-pawning herring is carried out using the XSAM model. This audit focuses on input data and assessment.

### For single stock summary sheet advice:

- 9) **Assessment type: update/SALY**
- 10) **Assessment:** analytical
- 11) **Forecast:** presented
- 12) **Assessment model:** XSAM with 3 survey fleets
- 13) **Data issues:** Input data are generally available as described in the stock annex, however, the IESNS in the Barents Sea was not carried out this year so the age 2 index from Fleet 4 does not exist for 2020.
- 14) **Consistency:** This years' assessment is consistent with last years' assessment and the WG accepted the assessment.
- 15) **Stock status:** The fishing pressure on the stock is above FMSY and FMGT, but below Fpa (and Flim). Spawning-stock size is above MSY Btrigger, Bpa, and Blim.
- 16) **Management Plan:** Agreed by the Coastal States in October 2018: the TAC shall be fixed to a fishing mortality of  $F_{mgt} = 0.14$ , with a constraint of maximum 20% reduction and 25% increase relative to the TAC in the preceding year. If SSB is forecast to be lower than MSY Btrigger in the beginning of the quota year, F decreases linearly from  $F_{mgt}$  to  $F = 0.05$  over the biomass range from  $B_{trigger}$  to  $B_{lim}$ . The long-term management strategy has been evaluated by ICES and found to be consistent with the precautionary approach.
- 17)

### General comments

The input data and assessment are documented as described in the stock annex and the report sections are well ordered.

### Technical comments

There is a rather strong upward revision of the 2016 year class in this years' assessment compared to last year's assessment.

### Conclusions

The assessment has been performed correctly

### Checklist for audit process

#### General aspects

- Has the EG answered those TORs relevant to providing advice?
- Is the assessment according to the stock annex description?
- If a management plan is used as the basis of the advice, has been agreed to by the relevant parties and has the plan been evaluated by ICES to be precautionary?
- Have the data been used as specified in the stock annex?
- Has the assessment, recruitment and forecast model been applied as specified in the stock annex?
  
- Is there any **major** reason to deviate from the standard procedure for this stock?
- Does the update assessment give a valid basis for advice? If not, suggested what other basis should be sought for the advice?

## Audit of Norwegian Spring Spawning Herring

Date: September 3, 2020

Auditors: Sondre Hølleland and Åge Høines

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### General

This audit focuses on the advice sheet and the WGWIDE report section on Norwegian spring spawning herring. The advice sheet is consistent with the report section.

### For single stock summary sheet advice:

- 1) **Assessment type:** update (last benchmark in 2016)
- 2) **Assessment:** analytical
- 3) **Forecast:** presented
- 4) **Assessment model:** XSAM – tuning by 3 surveys. TASACS is used as control in accordance with stock annex.
- 5) **Data issues:** The Barents Sea part of IESNS (“fleet 4”) is missing for 2020 due to technical issues with the Russian vessel. The recruitment index for 2020 was therefore not estimated and set to the median recruitment. A conflict in catchability between old and new observations in the Fleet 1 data was discussed during WGWIDE.
- 6) **Consistency:** The retrospective plots indicates strong consistency in both SSB and F. The estimated SSB from TASACS and XSAM are mutually consistent.
- 7) **Stock status:** The SSB point estimate, 3.315 million tonnes, is barely above the management plan, 3.184, and well above Blim of 2.5. The fishing pressure is above Fmsy and Fmgt, but below Fpa.
- 8) **Management Plan:** Agreed upon by the Coastal States in October 2018. Target  $F = 0.14$  if  $B > Bpa$ . If  $B < Bpa$ , a linear reduction of F will be applied. Advice is given according to management plan.

### General comments

The advice sheet and report section are well-documented and well-written. It is easy to follow and interpret.

### Technical comments

The auditors have also considered the R-code used to run XSAM and find this to be executed according to the stock annex.

### Conclusions

Assessment is performed in compliance with stock annex.



## Audit of Blue whiting (*Micromesistius poutassou*) in subareas 27.1–9, 12, and 14 (Northeast Atlantic)

Date: September 4<sup>th</sup>, 2020

Auditor: Anna Olafsdottir

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### general

The WG accepted the update assessment as a basis for advice for 2021.

### For single stock summary sheet advice:

- 18) **Assessment type:** Update assessment. Benchmarked in 2012 and went through an inter benchmark in 2016.
- 19) **Assessment:** Age based analytical assessment.
- 20) **Forecast:** Presented.
- 21) **Assessment model:** SAM assessment with catch data from 1981-2020, the last year has preliminary data for quarter 1 and quarter 2, and one tuning series, the International Blue whiting spawning stock survey (IBWSS) from 2004-2019, excluding 2010. The IBWESS scheduled for spring 2020 got cancelled due to the COVID-19 pandemic.
- 22) **Data issues:** Data used in the assessment, as described in the stock annex, source code for the SAM model, and model configuration are available on ICES SharePoint and <https://www.stock-assessment.org>. Forecast was neither found online nor on sharepoint.

There was no IBWSS survey in 2020. WGWIDE decided to use the best guess of total catch in 2020, observed catch-at-age in quarter 1 and quarter 2 raised to best guess of total catch in 2020, and estimated  $F$  in the assessment. Exploratory assessment runs, using 2017 and 2018 as the last assessment year, with no survey data used for the intermediate year show “preliminary catches” gives a result closer to the “Final” results than a run with just catch data for the final survey year. Further justification for using preliminary catches for 2020 is that they have been used since the 2016 inter-benchmark, hence no need to change the assessment method and no need to make new as decisions on intermediate year assumptions except that quality of catch data in 2020 is similar to previous years.

IBWSS age segregated survey indices were recalculated recently for the whole time series using a new version of the StoX software (v2.7). This was done to correct errors in the original analysis and the preserve repeatability of the StoX analysis. The newer version of StoX could not run the older version StoX projects, hence all analyses were recalculated in the new version of StoX. Furthermore, the indices were also calculated using bootstrap estimates. Assessment test run showed that all three index versions give the same results. The meeting decided to use the recalculated index for future repeatability and the fact that switching to bootstrap index demands a benchmark according to ICES guidelines.

- 23) **Consistency:** The assessment shows the same trend as last year with a minor upward revision in recruitment.
- 24) **Stock status:**  $SBB > MSY$  Btrigger, Blim and Bpa;  $F_{msy} < F < F_{lim}$ , Fpa, R low in last four years.
- 25) **Management Plan:** A long-term management strategy was agreed in 2016. According to the plan catch is set at  $F_{MSY}$  when SSB is forecast to be above or equal to  $B_{trigger}$ .  $F$  is reduced when SSB is less than  $B_{trigger}$ , and when SSB is less than  $B_{lim}$   $F = 0.05$ . TAC constraints of 20% less or 25% more than the TAC of the preceding year apply. The strategy was evaluated by ICES and found to be precautionary. The 20% TAC constrain was applied when calculating TAC for 2021.

### General comments

This was a well-documented, well ordered, concise chapter and is easy to follow and interpret.

### Technical comments

Technical comments are provided in the advice sheet and the report text using track changes.

**Conclusions**

The assessment has been performed correctly

**Checklist for audit process****General aspects**

- Has the EG answered those TORs relevant to providing advice?
- Is the assessment according to the stock annex description?
- If a management plan is used as the basis of the advice, has been agreed to by the relevant parties and has the plan been evaluated by ICES to be precautionary?
- Have the data been used as specified in the stock annex?
- Has the assessment, recruitment and forecast model been applied as specified in the stock annex?
  
- Is there any **major** reason to deviate from the standard procedure for this stock?
- Does the update assessment give a valid basis for advice? If not, suggested what other basis should be sought for the advice?

## Audit of Blue whiting (*Micromesistius poutassou*) in subareas 27.1–9, 12, and 14 (Northeast Atlantic) - whb.27.1-91214)

Date: 5<sup>th</sup> September 2020

Auditor: Richard D.M. Nash

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### General

#### For single stock summary sheet advice:

- 1) **Assessment type:** update assessment
- 2) **Assessment:** analytical
- 3) **Forecast:** presented
- 4) **Assessment model:** SAM, age based, normally uses one tuning series – IBWSS, however this was not available this year due to being cancelled because of the Covid-19 situation
- 5) **Data issues:** The tuning series (survey) were updated to include variance. This change did not change to perceptions in the assessment
- 6) **Consistency:** Last years assessment was accepted
- 7) **Stock status:** The fishing pressure on the stock is above  $F_{MSY}$  but below  $F_{pa}$  and  $F_{lim}$ . The spawning-stock size is above  $MSY$   $B_{trigger}$ ,  $B_{pa}$  and  $B_{lim}$ .
- 8) **Management Plan:** A long-term management strategy was agreed by the European Union, the Faroe Islands, Iceland, and Norway in 2016. This was evaluated by ICES.  
The harvest control rule (HCR) has a  $B_{lim}$  of 1.5 million t and a  $B_{pa}$  of 2.25 million t, and  $F_{MSY}$  0.32. There is a 20% TAC change limit above  $B_{pa}$ .

### General comments

This was a well documented, well ordered and considered section. It was easy to follow and interpret.

### Technical comments

The only changes from the stock annex were the use of the updated survey series data and the lack of the most recent survey data (2020 survey).

### Conclusions

The assessment has been performed correctly

## Audit of Western horse mackerel (hom.27.2a4a5b6a7a-ce-k8)

Date: 4/09/2020

Auditor: Patrícia Gonçalves

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### General

The western stock of horse mackerel is assessed with length- and age-based analytical assessment (Stock Synthesis 3 – SS3). The stock is considered in category 1.

The input data for assessment are:

- commercial catches: international catches, length and age data from catch sampling;
- three survey indices: Triennial egg survey index; IBTS recruitment index; PELACUS acoustic biomass index;
- length frequency distribution from the PELACUS survey;
- constant maturity-at-age;
- natural mortality: constant = 0.15

The stock was benchmarked in 2017.

The reference points were updated in 2019.

### For single stock summary sheet advice:

- 26) **Assessment type:** update.
- 27) **Assessment:** analytical.
- 28) **Forecast:** presented.
- 29) **Assessment model:** SS3 model; Fishery dependent data: catch-at-age and catch-at-length; Fishery independent data, survey indexes from: triennial egg surveys (1992-2019), IBTS recruitment index (2003-2019), PELACUS acoustic biomass (1992-2019).
- 30) **Data issues:** Errors on length distribution have been detected and corrected.
- 31) **Consistency:** The assessment has been accepted by the WG.
- 32) **Stock status:** F is above Fmsy, Flim and Fpa; stock size is below MSYBtrigger; the recruitment remains in a low level.
- 33) **Management Plan:** No management plan.

### General comments

The report is well written and includes a well-documented section of the results. The main subjects that have been discussed were considered and mentioned on the report.

### Technical comments

Section 5, comments on figures:

Figure 5.4.1 is mentioned in section 5.1 suggestion: (a) remove the referencing on the text from this section; or (b) keep the referencing in this section and renumbering as Figure 5.1.1.

Figures 5.3.1 and 5.3.4 are not mentioned in the text, should be added to section 5.3. Figure 5.3.4 should be renamed/renumbered as 5.3.2.

Figures 5.4.2, 5.4.3, 5.9.1 and 5.9.2 need to be updated with the 2019 data.

On figure 5.9.5 the legend is above the plot. Figure 5.9.5 should be renamed/renumbered as 5.9.3. Figure 5.9.6 should be renamed/renumbered as 5.9.4.

Section 7:

Table 7.2.4.1 the values presented in the last table in relation to all quarters must be revised.

Tables 7.2.4.4, 7.2.4.5 and 7.2.4.6 are not mentioned on the text.

Advice sheet (Section: Stock and Exploitation Status): Stock size for 2019 in relation to Bpa, Blim should be in yellow, to be in accordance with the 2019 advice sheet.

### Conclusions

The assessment has been performed correctly.

### Checklist for audit process

#### General aspects

- Has the EG answered those TORs relevant to providing advice?  
Yes.
- Is the assessment according to the stock annex description?  
The SA need to be updated.
- If a management plan is used as the basis of the advice, has been agreed to by the relevant parties and has the plan been evaluated by ICES to be precautionary?  
No management plan is available for this species.
- Have the data been used as specified in the stock annex?  
Yes.
- Has the assessment, recruitment and forecast model been applied as specified in the stock annex?  
Yes.
- Is there any **major** reason to deviate from the standard procedure for this stock?  
No.
- Does the update assessment give a valid basis for advice? If not, suggested what other basis should be sought for the advice?  
Yes, it gives.

## Audit of Western horse mackerel (hom.27.2a4a5b6a7a-ce-k8)

Date: 07/09/2020

Auditor: Claus R. Sparrevohn

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### General

The western stock of horse mackerel is Stock Synthesis 3 – SS3 assessment. The stock is considered in category 1 and SSB is just above Blim in 2020. The triannual egg-survey conducted in 2019 was not part of the 2019 assessment but is included in this 2020 assessment.

The stock was benchmarked in 2017.

The reference points were updated in 2019. Blim is defined as  $B_{pa}/1.4$ . Fmsy is 0.074 and based on a recruitment timeseries where the large 1083 yearclass is not included.

### For single stock summary sheet advice:

- 34) **Assessment type:** update.
- 35) **Assessment:** analytical.
- 36) **Forecast:** presented.
- 37) **Assessment model:** Stock synthesis
- 38) **Data issues:** During the meeting an error in the length distribution data was found and corrected. The effect was minor especially for the most recent years.
- 39) **Consistency:** Mohn's Rho is 0.22 for SSB and -0.155 for F. Major retrospective pattern?
- 40) **Stock status:** SSB in 2020 is estimated to be 853457 tons which is just above Blim (834480 tons). F in 2019 is estimated to be above Fmsy.
- 41) **Management Plan:** No management plan.

### General comments

Good report but I miss the information on Mohn's rho which is shown in one of the presentations.

### Technical comments

Advice sheet.

Table 2. Total TAC is used to derive the 2020 catch, but it is not explicit what "Total TAC" means.

In the forecast table an option "PELAC proposed HCR" is added.

### Conclusions

The assessment has been performed correctly, but the Mohn's rho might be of concern together with the low SSB.

## Checklist for audit process

### General aspects

- Has the EG answered those TORs relevant to providing advice?  
YES
- Is the assessment according to the stock annex description?  
YES
- If a management plan is used as the basis of the advice, has been agreed to by the relevant parties and has the plan been evaluated by ICES to be precautionary?  
NA
- Have the data been used as specified in the stock annex?  
YES
- Has the assessment, recruitment and forecast model been applied as specified in the stock annex?

YES

- Is there any **major** reason to deviate from the standard procedure for this stock?

NO.

- Does the update assessment give a valid basis for advice? If not, suggested what other basis should be sought for the advice?

YES.

## Audit of Western Horse Mackerel data and assessment

Date: 02/09/2020

Auditor: Alessandro Orio

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### General

*Western horse mackerel is assessed as a Category 1 stock. An SS3 model is run to determine the state of the stock in relation to reference points for western horse mackerel.*

### For single stock summary sheet advice:

- 9) **Assessment type:** update
- 10) **Assessment:** analytical.
- 11) **Forecast:** presented
- 12) **Assessment model:** SS3 model with commercial catches (length and age data) and three survey indices: Triennial egg survey index (1992–2019); IBTS recruitment index; PELACUS acoustic biomass.
- 13) **Data issues:** Errors in the length frequency distributions of Scotland were detected and fixed in the assessment.
- 14) **Consistency:** The view of the WG was that the assessment should be accepted. The Stock annex needs to be updated both for the initial values of the estimated parameters but especially for the new reference points obtained during the interbenchmark of 2019. Also the weight at age used in the forecast should be updated in the stock annex.
- 15) **Stock status:** Fishing pressure on the stock is above  $F_{MSY}$ ,  $F_{pa}$  and  $F_{lim}$ . Spawning stock size is below  $MSY B_{trigger}$  and between  $B_{pa}$  and  $B_{lim}$ .
- 16) **Management Plan:** No management plan

### General comments

The assessment and forecast have been available for review. Input and output data were correct.

### Technical comments

Few inconsistencies are present in the stock annex. Initial values for estimated parameters are different but these do not change the results of the assessment. The entire section on reference points needs to be updated with the new results obtained during the interbenchmark of 2019. Weight at age used in the forecast should also be updated in the stock annex since the values from SS are the ones used.

Weighting procedure of the data has been difficult during this iteration of WGIDE. Therefore, a thorough revision of the number of samples used for the different age and length frequency distributions in the assessment needs to be done. There is a need to inspect the potential problems caused by the reweighting of both age length keys and age frequency distribution of the commercial catches using the same parameter. Main recruitment deviations stops in 2013 but should be changed to the last data point available. The fishing mortality estimated by the model is weighted by the population numbers but now the unweighted  $F$  can be obtained so it would be preferable to switch to that in the future to avoid extra calculations. Forecasts run directly in SS should be also considered during the next benchmark.

### Conclusions

The assessment has been performed correctly.

### Checklist for audit process

#### General aspects

- Has the EG answered those TORs relevant to providing advice?  
Yes
- Is the assessment according to the stock annex description?  
Yes but it needs to be updated



- If a management plan is used as the basis of the advice, has been agreed to by the relevant parties and has the plan been evaluated by ICES to be precautionary?  
Yes, no management plan
- Have the data been used as specified in the stock annex?  
Yes
- Has the assessment, recruitment and forecast model been applied as specified in the stock annex?  
Yes
- Is there any **major** reason to deviate from the standard procedure for this stock?  
No
- Does the update assessment give a valid basis for advice? If not, suggested what other basis should be sought for the advice?  
Yes.