

Annex 5: Audit reports

Audit of her.27.20-24

Working Group: HAWG Stock Name: her.27.20-24

Date: April 2021

Review of ICES Scientific Report, Review of ICES Scientific Report, Herring Assessment Working Group for the area south of 62N), 2021, 18-24 March 2021. Section 3.

Reviewers: Claus R. Sparrevohn and Steven Mackinson

Expert group Chair: Afra Egan, Cecilie Kvamme

Secretariat representative: Sarah Millar

*Audience to write for: **advice drafting group**,*

General

Consistent with last year and continue to be a zero-catch advice.

For single-stock summary sheet advice

Stock **her.27.20-24**

Short description of the assessment as follows (examples in grey text):

- 1) Assessment type: **update**
- 2) Assessment: **accepted**
- 3) Forecast: **accepted**
- 4) Assessment model: SAM
- 5) Consistency: Consistent with last year assessment
- 6) Stock status: SSB has been below Blim since 2007;
- 7) Management plan: No agreed MP. A MAP exist but is not approved by Norway as basis for advice.

General comments

The intermediate assumption, on transfer of catches from 3a to the NS in 2021, has changes. Normally the PELAC AC is asked to provide information on transfer and normally the assumed transfer is around 48%. This percentage has changed for 2021. This is caused by changed expectations due to Brexit. To be specific then the expectation is that there will be no possibility to fish 3a quota, transferred to NS, in UK waters. The alternative, to fish in Norwegian waters, is limited to 3000 tons. Hence the expected transfer is set to 3000 tons as a best guess provided by the PELAC.

Technical comments

- The assessment input data documented in the HAWG report was checked and matched those of the assessment data shown on stockassessment.org
- The assessment setting in the stock annex was checked and match those of the assessment data shown on stockassessment.org
- The stock annex has been updated

Conclusions

Advice is produced in consistency with the benchmark approved assessment and forecast

ICES stock advice

- Ensure the basis of the advice used is the correct one i.e Management plan; MSY approach; precautionary approach. The same as stated in the basis of advice table and history of advice table.
- The advised value of catches should be the same as presented in the catch options table.
- Check the years for which the advice is given.

Stock development over time

- Ensure all units used in the plots are correct (compare with previous year advice sheet).
- Ensure all titles of the plots are correct i.e catches; landings, recruitment age (0, 1, 2...); relative index
- Recruitment plot: if the intermediate years is an outcome of a model the value should be unshaded. *The colors on the draft advice document makes it difficult to see if it is unshaded or not.*
- Ensure the F and SSB reference points (RP) in the plots are the same as in the reference points table. Also, check the respective labels if they correspond with the RP.
- Check if the legend of the plots is consistent with what is shown in the plots.
- Check that the graphs match the data in table of stock assessment results.

Stock and exploitation status

- Compare with the previous year's advice sheet. The years in common should have the same status (symbol).
- Check if the labels for the years are correct.
- Compare the status table with the F and SSB plots they should show the same information.
- Does the stock have a management plan? If yes than the row for the management plan should be filled as well otherwise will read not applicable.

Catch options

Basis of catch options table:

For each of the rows in the table ensure that:

- The year is correct,
- The value is correct,
- The notes are correct and
- The sources are correct.

Catch options table:

- The forecast should be re-run to ensure all values are correct. *I am not able to rerun the forecast*
- Compare the input data with previous year run (previous year should be in the share point under the data folder)
- The wanted catch and SSB values should be given in tonnes (t);
- Confirm if the F values for the options F_{lim} ; F_{pa} ; are correct.
- For the options where the value of F will take SSB of the forecast year to be equal to B_{lim} ; B_{pa} ; $MSY_{Btrigger}$ confirm if the SSB value for the forecast year is equal or close to the reference points.
- For the options where a percentage is added or taken (i.e +10%; 15%, etc.) from the current TAC. Ensure that the calculated values are correct.
- For all the options given in the table calculate the percentage of change in SSB and TAC.
- In the first column (Rationale) ensure the rational of the first line is the correct basis for the advice. All other options should be under "Other options".
- Compare different catch options; higher F should result in lower SSB
- Check if SSB change is in line with F.

Basis of the advice

- Ensure the basis of the advice is correct and if the same is used in the catch option table and in the ICES stock advice section.
- Is there a management plan? If there is one it should be stated if it has been evaluated by ICES and considered precautionary or not and also if it has been sign off by the clients(EU; Norway, Faroe Islands, etc.)

Quality of the assessment

- Are the units in plots correct?
- Are the titles in the plots correct including F (age range) recruitment (age).
- The red line correspond to the year of assessment (except F which is year of assessment -1)

In the SSB and Rec. plot other colours are used.

- Each plot should have five lines.
- Ensure the reference points lines (in the SSB and F plots) are correct and match with the values in the reference point table and summary plots.

Issues relevant for the advice

- Along with the spelling and structure in the text ensure that any values referenced in the text match the values or percentages in the tables within the advice sheet.

Reference points

- ☒ Ensure all the values, technical basis and sources are correct. If new values were not calculated the table should be the same as previous year.

Basis of the assessment

- ☒ If there is no change from the previous year the table should be the same.
- ☒ Ensure there is no typos wrong acronyms for the surveys
- ☒ Assessment type- check that the standard text is used.

Information from stakeholders

- ☐ If no information is available the standard sentence should be “There is no **additional** available information”

NA

History of advice, and management

- ☒ This table should only be updated for the assessment year and forecast year except if there was revision to the previous years.
- ☒ Ensure that the forecast year “predicted landings or catch corres. to advice” column match the advice given in the ICES stock advice section (usually given in thousand tonnes).

History of catch and landings

Catch distribution by fleet table:

- ☒ Ensure the legend of the table reflects the year for the data given in the table.
- ☒ Ensure that the sum of the percentage values in each of the components (landings and discards) amount to 100%
- ☒ Ensure that the sum of the values for discards and landings are equal to the value in the catch column. However, if only landings or discards components are shown, then total catch should be unknown.

History of commercial landings table:

- ☒ Ensure that the values for the last row are correct check against the preliminary landings (link to be added)

Summary of the assessment

- ☒ This table is an output from the standard graphs. If there was any errors picked up with any of the plots, then this table should be replaced by a new version once the errors are corrected.
- ☒ Check if the column names are correct mainly recruitment age and age range for F.
- ☒ If the stock is category 5 or 6 then it should read “There is no assessment for this stock”

Sources and references

- Ensure all references are correct.
 - In the draft advice, Table 5 refers to Management Plan (2018) with reference to ICES 2018. However, Table 4 refers to MAP (2019) with EC 2019 as reference. This is confusing.
 - In the draft advice references, both 'EU' and 'EC' are used for referencing, which is not consistent
- Ensure all references in the advice sheet are referenced in this section

Audit of Her.6a7bc

Working Group: HAWG Stock Name: her.27.6a7bc

Date: April 2021

Review of ICES Scientific Report, Review of ICES Scientific Report, Herring Assessment Working Group for the area south of 62N), 2021, 18-24 March 2021. Sections 4 and 5.

Reviewers: Mathieu Lundy

Expert group Chair: Afra Egan, Cecilie Kvamme

Secretariat representative: Sarah Millar

General

Herring in this Division is considered to consist of two stocks. At present these are not differentiated although HAWG still considers them to be discrete. They are assessed together as a meta-population. Work is ongoing to toward a new assessment model to address this issue. An annual monitoring TAC has been in place since 2016. The TAC for the current year (2021) has not been announced.

For single stock summary sheet advice:

- 1) **Assessment type:** As Interbenchmark 2019
- 2) **Assessment:** Analytical assessment
- 3) **Forecast:** not presented
- 4) **Assessment model:** Multifleet FLSAM with 3 tuning indices (one acoustic survey, two trawl surveys)
- 5) **Data issues:** The updated assessment provides the best statistical fit to the input data, but the assessment still has a strong retrospective bias. There is also a pattern of increasing catchability with age for the acoustic survey data
- 6) **Consistency:** New assessment method following inter-benchmark process.
- 7) **Stock status:** The assessment does not provide any information on the state of either constituent stock. No reference points defined. Assessment used as indicative of trends only.
- 8) **Management Plan:** No management plan in place

General comments

The model and decisions of the inter-benchmark process as presented to HAWG were used in the assessment.

Technical comments

None

Conclusions

The assessment has been performed correctly. This stock would benefit from a benchmark which addresses the methods to split stock components.

Checklist for audit process**Quality of the assessment**

- Are the units in plots correct?
- Are the titles in the plots correct including F (age range) recruitment (age). *-No. F(wr) is missing -*
- The red line correspond to the year of assessment (except F which is year of assessment -1)
 - Each plot should have five lines.
- Ensure the reference points lines (in the SSB and F plots) are correct and match with the values in the reference point table and summary plots.

Audit of her.27.6a7bc

Review of ICES Scientific Report, (HAWG) (2021) (06.04.2021)

Reviewers: Norbert Rohlf

Expert group Chair: Cecilie Cvamme, Afra Egan

Secretariat representative: Sarah Millar

General

Recommendations, general remarks for expert groups, etc. (use bullet points and subheadings if needed)

For single-stock summary sheet advice

Stock: her.27.6a7bc

Herring in this Division consists of two stocks. It is not possible yet to differentiate the two stocks and although HAWG still considers them to be discrete, they will be assessed together as a meta-population until the combined survey indices can be successfully split. A monitoring TAC is in place since 2016.

- 1) Assessment type: update assessment
- 2) Assessment: accepted
- 3) Forecast: not presented
- 4) Assessment model: Multifleet FLSAM with 3 tuning indices (one acoustic survey, two trawl surveys)
- 5) Consistency: Following Inter-benchmark procedures. As a result of the 2019 inter-benchmark, the formerly seen large retrospective pattern in the recruitment is reduced due to the inclusion of density-dependent catchability. But catchability in the acoustic surveys remains a concern.
- 6) Stock status: The assessment does not provide any information on the state of either constituent stock. No reference points defined. Assessment used as indicative of trends only.
- 7) Management plan: No agreed management plan in place for this stock.

General comments

Technical comments

None

Conclusions

The assessment has been performed correctly. This stock would benefit from a benchmark which addresses the methods to split stock components.

Audit of Her.27.irls

Working Group: HAWG Stock Name: her.27.irls

Date: 25 March 2021

Review of ICES Scientific Report, Review of ICES Scientific Report, Herring Assessment Working Group for the area south of 62N), 2021, 18-24 March 2021. Section 6.

Reviewers: Richard Nash and Cindy van Damme

Expert group Chair: Afra Egan and Cecilie Kvamme

Secretariat representative: Sarah Millar

General

The spawning-stock biomass (SSB) has decreased significantly in the last decade and is below B_{lim} since 2016. The fishing mortality (F) is above F_{msy} since 2014, above F_{pa} between 2016 and 2019, but in 2020 F is below F_{msy} . Recruitment has been below average since 2013 and is uncertain. The assessment had a substantial historical retrospective revision in the last years, but this year, SSB is very similar to last year. Applying ICES MSY approach advice is zero catch for 2022. However, in order to continue to monitor the stock development ICES advises allowing a monitoring TAC of 869 tonnes, the same as last year.

For single-stock summary sheet advice

Stock **her.27.irls**

- 1) Assessment type: update
- 2) Assessment: accepted, but considered highly uncertain, but does not affect the advice outcome
- 3) Forecast: accepted
- 4) Assessment model: Analytical assessment using ASAP tuned to a single acoustic survey using ages 2-7 (2002-2020) and catch data (1958-2020)
- 5) Consistency: Last year's and this year's assessment accepted. The assessment had a substantial historical retrospective revision as in previous years, but in this year the estimate for SSB and F are very similar to last year. The Mohns Rho is still very high, but lower than last year. Recruitment was forecasted to increase in recent years, but the retrospective pattern is of a revision downward each year with an annually decreasing trend.
- 6) Stock status: $B < B_{lim}$ since 2016, F was above F_{pa} between 2016 and 2019, but in 2020 below F_{msy} , R is uncertain, seems to be high in recent years, but in retrospective is estimated lower and decreasing
- 7) Management plan: The long-term management strategy for Celtic Sea herring that was proposed by the Pelagic AC in 2011 (Pelagic AC, 2011) was evaluated by ICES in 2018. ICES advises that the harvest control rule is no longer consistent with the precautionary approach.

General comments

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

Technical comments

No comments

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

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?

Management plan was reviewed in 2018 and the harvest control rule was no longer considered to be consistent with the precautionary approach.

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 is useful to print previous year advice sheet for comparison purposes it will make it easier to find potential errors and or inconsistencies. **Done**

Along with the spelling and structure of the text ensure that any values referenced in the text match the values or percentages shown in the tables. **Done**

All the values presented in the advice sheet should not be rounded at the WG. All rounded will be done at the ADG. **OK**

The check list below is given by section and it results from a compilation of the most frequent errors but by no means is it a complete list.

ICES stock advice

- Ensure the basis of the advice used is the correct one i.e Management plan; MSY approach; precautionary approach. The same as stated in the basis of advice table and history of advice table.
- The advised value of catches should be the same as presented in the catch options table.
- Check the years for which the advice is given.

Stock development over time

- Ensure all units used in the plots are correct (compare with previous year advice sheet).
- Ensure all titles of the plots are correct i.e catches; landings, recruitment age (0, 1, 2...); relative index
- Recruitment plot: if the intermediate years is an outcome of a model the value should be unshaded.
- Ensure the F and SSB reference points (RP) in the plots are the same as in the reference points table. Also, check the respective labels if they correspond with the RP.
- Check if the legend of the plots is consistent with what is shown in the plots.
- Check that the graphs match the data in table of stock assessment results.

Catch options

Basis of catch options table:

For each of the rows in the table ensure that:

- The year is correct,
- The value is correct,
- The notes are correct and
- The sources are correct.

Catch options table:

- The forecast should be re-run to ensure all values are correct.
- Compare the input data with previous year run (previous year should be in the share point under the data folder)
- The wanted catch and SSB values should be given in tonnes (t);
- Confirm if the F values for the options F_{lim} ; F_{pa} ; are correct.
- For the options where the value of F will take SSB of the forecast year to be equal to B_{lim} ; B_{pa} ; $MSY_{Btrigger}$ confirm if the SSB value for the forecast year is equal or close to the reference points.
- For the options where a percentage is added or taken (i.e +10%; 15%, etc.) from the current TAC. Ensure that the calculated values are correct.
- For all the options given in the table calculate the percentage of change in SSB and TAC.
- In the first column (Rationale) ensure the rational of the first line is the correct basis for the advice. All other options should be under "Other options".
- Compare different catch options; higher F should result in lower SSB
- Check if SSB change is in line with F.

Basis of the advice

- Ensure the basis of the advice is correct and if the same is used in the catch option table and in the ICES stock advice section.
- Is there a management plan? If there is one it should be stated if it has been evaluated by ICES and considered precautionary or not and also if it has been sign off by the clients(EU; Norway, Faroe Islands, etc.)

Quality of the assessment

- Are the units in plots correct?
- Are the titles in the plots correct including F (age range) recruitment (age).
- The coloured line correspond to the year of assessment (except F which is year of assessment -1)
- Each plot should have five lines.
- Ensure the reference points lines (in the SSB and F plots) are correct and match with the values in the reference point table and summary plots.

Issues relevant for the advice

- Along with the spelling and structure in the text ensure that any values referenced in the text match the values or percentages in the tables within the advice sheet.

Reference points

- Ensure all the values, technical basis and sources are correct. If new values were not calculated the table should be the same as previous year.

Basis of the assessment

- If there is no change from the previous year the table should be the same.
- Ensure there is no typos wrong acronyms for the surveys.
- Assessment type- check that the standard text is used.

History of advice, and management

- This table should only be updated for the assessment year and forecast year except if there was revision to the previous years.
- Ensure that the forecast year “predicted landings or catch corres. to advice” column match the advice given in the ICES stock advice section (usually given in thousand tonnes).

History of catch and landings

Catch distribution by fleet table:

- Ensure the legend of the table reflects the year for the data given in the table.
- Ensure that the sum of the percentage values in each of the components (landings and discards) amount to 100%
- Ensure that the sum of the values for discards and landings are equal to the value in the catch column. However, if only landings or discards components are shown, then total catch should be unknown.

History of commercial landings table:

- Ensure that the values for the last row are correct check against the preliminary landings (link to be added)

Summary of the assessment

- This table is an output from the standard graphs. If there was any errors picked up with any of the plots, then this table should be replaced by a new version once the errors are corrected.
- Check if the column names are correct mainly recruitment age and age range for F.
- If the stock is category 5 or 6 then it should read “There is no assessment for this stock”

Sources and references

- Ensure all references are correct.
- Ensure all references in the advice sheet are referenced in this section **ICES.2109 can be removed and subsequently was removed.**

Audit of Her.27.nirls

Working Group: HAWG Stock Name: her.27.nirls

Review of ICES Scientific Report, Herring Assessment Working Group for the area south of 62N), 2021, 18-24 March 2021, **Section 7: Herring in Division 7.a North (Irish Sea)**

Reviewers: Martin Pastoors (mpastoors@pelagicfish.eu), Kirsten Birch Håkansson <kih@aqua.dtu.dk>

Expert group Chair: Afra Egan, Cecilie Kvamme

Secretariat representative: Sarah Millar

General

The report section is a straight update from the report section of the 2020 report, using track changes, so that all changes are easy to follow. The assessment procedure is highly standardized, using R-codes that require very few modifications during the assessment working group.

For single-stock summary sheet advice**Herring in Division 7.a North (Irish Sea)**

Short description of the assessment as follows (examples in grey text):

- 1) Assessment type: update
- 2) Assessment: accepted
- 3) Forecast: accepted
- 4) Assessment model: SAM (FLSAM) - tuning by one age-based acoustic survey and one biomass acoustic survey. The age-based acoustic survey is treated as an absolute estimate of SSB (catchability set to 1).
- 5) Consistency: Consistent with last year's assessment
- 6) Stock status: $B > B_{pa}$ for a while; $F < F_{msy}$; R uncertain but seems to be high in recent years
- 7) Management plan: no management plan applicable

General comments

All input data to the assessment and forecast have been checked for consistency between the values in the report and the input files on github.

The Fpa reference point has been changed according to instructions from ACOM. That change should be documented in the reference point table, e.g. by changing the source or adding a footnote.

The last option in the forecast table is based on achieving MSY Btrigger in 2022 but in fact it is not achieving MSY Btrigger (=Bpa) but instead it is close to applying Fmsy instead.

Technical comments

The assessment uses a specific version of FLSAM that uses a control object that includes a reference to a SAM binary file. This control object is no longer useable in the recent versions of FLSAM. Running the assessment with the recent version of FLSAM, lead to hard failure in R-Studio. For that reason, the assessment and forecast could not be rerun by the auditor. It is recommended that the assessment package for the assessment is upgraded to more recent versions of FLSAM and FLAsher.

Conclusions

The assessment and forecast have been carried out using the default approach for this stock.

Audit of HAWG 2021 her.27.nirs

ICES stock advice

- Ensure the basis of the advice used is the correct one i.e Management plan; MSY approach; precautionary approach. The same as stated in the basis of advice table and history of advice table.
- The advised value of catches should be the same as presented in the catch options table.
- Check the years for which the advice is given.

Stock development over time

- Ensure all units used in the plots are correct (compare with previous year advice sheet).
- Ensure all titles of the plots are correct i.e catches; landings, recruitment age (0, 1, 2...); relative index
- Recruitment plot: if the intermediate years is an outcome of a model the value should be unshaded.
- Ensure the F and SSB reference points (RP) in the plots are the same as in the reference points table. Also, check the respective labels if they correspond with the RP.
- Check if the legend of the plots is consistent with what is shown in the plots.
- Check that the graphs match the data in table of stock assessment results.

Stock and exploitation status

- ~~Compare with the previous year's advice sheet. The years in common should have the same status (symbol).~~
- ~~Check if the labels for the years are correct.~~
- ~~Compare the status table with the F and SSB plots they should show the same information.~~
- ~~Does the stock have a management plan? If yes then the row for the management plan should be filled as well otherwise will read not applicable.~~

Catch options

Basis of catch options table:

For each of the rows in the table ensure that:

- The year is correct,
- The value is correct,
- The notes are correct and

- The sources are correct.

Catch options table:

- The forecast should be re-run to ensure all values are correct. DUE TO THE SPECIFIC VERSION OF FLSAM, THE ASSESSMENT AND FORECAST COULD NOT BE RERUN BY THE AUDITOR
- Compare the input data with previous year run (previous year should be in the share point under the data folder)
- The wanted catch and SSB values should be given in tonnes (t);
- Confirm if the F values for the options F_{lim} ; F_{pa} ; are correct.
- For the options where the value of F will take SSB of the forecast year to be equal to B_{lim} ; B_{pa} ; $MSY_{Btrigger}$ confirm if the SSB value for the forecast year is equal or close to the reference points. THE LAST OPTION IN THE FORECAST TABLE IS BASED ON ACHIEVING MSY BTRIGGER IN 2022 BUT IN FACT IT IS NOT ACHIEVING MSY BTRIGGER (=BPA) BUT INSTEAD IT IS CLOSE TO APPLYING FMSY INSTEAD.
- ~~For the options where a percentage is added or taken (i.e +10%; 15%, etc.) from the current TAC. Ensure that the calculated values are correct.~~
- For all the options given in the table calculate the percentage of change in SSB and TAC. THE COLUMN SSB CHANGE SHOULD BE AFTER THE COLUMN SSB 2023
- In the first column (Rationale) ensure the rational of the first line is the correct basis for the advice. All other options should be under "Other options".
- Compare different catch options; higher F should result in lower SSB
- Check if SSB change is in line with F.

Basis of the advice

- Ensure the basis of the advice is correct and if the same is used in the catch option table and in the ICES stock advice section.
- Is there a management plan? If there is one it should be stated if it has been evaluated by ICES and considered precautionary or not and also if it has been sign off by the clients(EU; Norway, Faroe Islands, etc.)

Quality of the assessment

- Are the units in plots correct?
- Are the titles in the plots correct including F (age range) recruitment (age). *The title for the recruitment plot should have a space before (Millions)*
- The red line correspond to the year of assessment (except F which is year of assessment -1)
- Each plot should have five lines.
- Ensure the reference points lines (in the SSB and F plots) are correct and match with the values in the reference point table and summary plots. *The legends are in a poor quality – probably an ICES problem*

Issues relevant for the advice

- Along with the spelling and structure in the text ensure that any values referenced in the text match the values or percentages in the tables within the advice sheet.

Reference points

- Ensure all the values, technical basis and sources are correct. If new values were not calculated the table should be the same as previous year. THE FPA REFERENCE POINT HAS BEEN CHANGED ACCORDING TO INSTRUCTIONS FROM ACOM. THAT CHANGE SHOULD BE DOCUMENTED IN THE REFERENCE POINT TABLE, E.G. BY CHANGING THE SOURCE OR ADDING A FOOTNOTE.

Basis of the assessment

- ~~If there is no change from the previous year the table should be the same. No similar table in the advice 2020~~
- Ensure there is no typos wrong acronyms for the surveys – *can't find the link to the new survey codes*
- Assessment type- check that the standard text is used.

Information from stakeholders

- ~~If no information is available the standard sentence should be "There is no additional available information"~~

History of advice, and management

- This table should only be updated for the assessment year and forecast year except if there was revision to the previous years. *'Official landings' missing for 2020 and 2018 and 2019 are marked as preliminary and in yellow. 'ICES estimated catch' in 2019 and 2020 do not match Table 7.1.1 in the report and table 7 and 8 in advice*
- Ensure that the forecast year "predicted landings or catch corres. to advice" column match the advice given in the ICES stock advice section (usually given in thousand tonnes).

History of catch and landings

Catch distribution by fleet table:

- Ensure the legend of the table reflects the year for the data given in the table.
- Ensure that the sum of the percentage values in each of the components (landings and discards) amount to 100% - *Table 8 – is it on purpose that landings and catch don't match?*

- Ensure that the sum of the values for discards and landings are equal to the value in the catch column. However, if only landings or discards components are shown, then total catch should be unknown.

History of commercial landings table:

- Ensure that the values for the last row are correct check against the preliminary landings (link to be added) – *don't see this one, but the preliminary landings are 7952 t for all of 7.a*

Summary of the assessment

- This table is an output from the standard graphs. If there was any errors picked up with any of the plots, then this table should be replaced by a new version once the errors are corrected.
- Check if the column names are correct mainly recruitment age and age range for F.
- If the stock is category 5 or 6 then it should read "There is no assessment for this stock"

Sources and references

- Ensure all references are correct.
- Ensure all references in the advice sheet are referenced in this section

Audit of san.sa.1r

Reviewers: Espen Johnsen

Expert group Chair: Cecilie Kvamme and Afra Egan

Secretariat representative: Sarah Millar

General

- Sandeel Area 1r covers the central and southern North Sea, and the important Dogger Bank.
- The assessment was benchmarked in 2016.
- The natural mortality was updated in 2020 and used in this year's assessment.
- There is an increase in dredge survey coverage with time. The southern banks are better covered in recent years.
- After a long period of decreasing individual weight-at-age, the mean weight-at-age has increased for all age groups bringing it above the 10 years average in 2020.

For single-stock summary sheet advice

Stock: san.sa.1r

- 1) Assessment type: update
- 2) Assessment: accepted
- 3) Forecast: accepted
- 4) Assessment model: SMS 2 season model, age based, assuming a relationship between F and fishing effort – 1 fleet and 1 dredge survey
- 5) Consistency: Consistent assessment, however, retrospective is large for R.
- 6) Stock status: SSB was estimated to be below MSY $B_{\text{escapement}}$ and B_{pa} , but above B_{lim} . This is a result of a downward revision of the 2019 recruitment. No reference

points for fishing pressure have been defined for this stock. The uncertainty of the estimated SSB, F and R is low in the assessment.

- 7) Management plan: No MP for SA1r

General comments: The assessment is well documented.

Technical comments: The assessment and forecast are performed according to the information found in the stock annex.

Conclusions: The assessment has been performed correctly according to the procedure established at the last benchmark.

Audit of san.sa.1r

Reviewers: Claus R. Sparrevojn

Expert group Chair: HAWG, Cecilie Kvamme and Afra Egan

Secretariat representative: Sarah Millar

General

- Natural mortality was updated with the 2020 SMS North Sea Key Run input. The update was not considered to have any effect on the stock recruitment plot and hence would not change reference points. On basis of that it was considered appropriate to update the timeseries.
- A substantial part of SA1r catches is taking in UK EEZ, which in the future could change the spatial exploitation pattern of the stock.
- The catch advice is 5464 tons which is only marginal above the monitoring TAC of 5000 tons which has been set several times in cases of zero advice (eg. 2016 for SA1). Therefore, the group added a sentence on "ICES advises that samples should be taken from every haul, similar to a monitoring TAC"

For single-stock summary sheet advice

Stock san.sa.1r

Short description of the assessment as follows (examples in grey text):

- 1) Assessment type: update
- 2) Assessment: accepted
- 3) Forecast: accepted
- 4) Assessment model: SMS, F is scaled with effort, dredge survey index of recruitment
- 5) Consistency: Consistent assessment with some retrospective issues
- 6) Stock status: Inbetween MSYBescapement (wich is equal to Bpa) and Blim
- 7) Management plan: There is no management plan for this stock

General comments

A well-documented assessment

Technical comments

assessment performed according to stock annex.

Conclusions

Both assessment and forecast are appropriate for advice. Natural mortality was updated as it did not have any effect on the stock recruitment plot

Audit of san.sa.2r

Reviewers: Valerio Bartolino

Expert group Chair: Cecilie Kvamme and Afra Egan

Secretariat representative: Sarah Millar

General

- No remarks on the assessment which is conformed to procedures
- The retrospective pattern on R is problematic for the advice as demonstrated by the downward revision in the 2019 year class.
- The combined effect of the 2019 R revision and inter-annual flexibility in the catches (+18% of the 2020 advice) adopted by the fishery maintained the stock at low levels throughout 2020.
- The advice of a monitoring TAC is well supported

For single-stock summary sheet advice

Stock: san.sa.2r

Short description of the assessment as follows (examples in grey text):

- 1) Assessment type: update
- 2) Assessment: accepted
- 3) Forecast: accepted
- 4) Assessment model: SMS assuming a relationship between F and fishing effort – 1 fleet and 1 dredge survey
- 5) Consistency:
 - consistent with last year assessment, retrospective moderate for F and R (but remains problematic for the advice), somehow more pronounced for SSB but improved in recent years.
 - During an inter-benchmark in 2020 a power function was introduced to account for density-dependent catchability of the dredge survey. This year model estimates a parameter for the power function of 1.27 which confirms some level of density-dependency.
 - Commercial CPUEs increase in 2020 which is also corroborated by fishermen's feedback.
- 6) Stock status: SSB in 2021 is estimated just above Blim. 2020 recruitment is lower than the long-term average, and despite 2019 is confirmed as a relatively good year class, the overall perception is that the stock has been in a low productivity for >20 years. F in 2020 has a substantial jump after the 2019 record low and it's

estimated above F_{cap} which is well explained by catches exceeding the last year advice.

7) Management plan: No MP for SA2r.

General comments

The text of the advice is in general clear and the advice monitoring TAC fully supported by evaluation of the stock status. The opening sentence on top requires revision according to ICES standards. Model settings are consistent with last year and the procedure appears in line with the stock annex.

TAC for 2020 followed the ICES advice but the realised catches exceeded the TAC of 18%. Inter-annual flexibility in the quota (bank and borrowing) is provided as explanation <https://thefish-indaily.com/featured-news/danish-fisheries-association-welcomes-10-increase-in-sandeel-quota/>.

2020 catches are dominated by age 1 fish which is consistent with the good 2019 year class.

Technical comments

Confidence bound on SSB, R and F appear unrealistically too narrow.

Retrospective patterns are moderate for F and R, but the downward revision of the 2019 year class is considerable. The 5-years average Mohn's rho for SSB is 0.49 but better in the last 3 peels (i.e., within CI).

A certain amount of catches have been reported from rectangles which are shared by SA2 and SA3. Misreporting cannot be excluded. The issue is mentioned and is expected to be given full attention at the next benchmark.

Conclusions

The assessment has been performed correctly and according to procedure. The retrospective pattern is not particularly severe on the R if compared to other sandeel stocks but the downward revision of the 2019 R and catches exceeding the advice contribute to explain the poor status of the stock.

Audit of san.sa.2r

Reviewers: Christian Kiaer and Mark R. Payne

Expert group Chair: Cecilie Kvamme and Afra Egan

Secretariat representative: Sarah Millar

General

- Assessment procedures followed.
- Short-term forecasts indicate that even with no fishing, SSB will still be below B_{pa} in 2022.
- Retrospective recruitment patterns still seen.
- Advices a monitoring TAC.

For single-stock summary sheet advice

Stock: san.sa.2r

- 1) Assessment type: update
- 2) Assessment: accepted
- 3) Forecast: accepted
- 4) Assessment model: SMS – Dredge and fleet survey
- 5) Consistency:
 - Retrospective analysis shows consistent assessment year to year.
 - Consistent results between dredge survey and model outputs.
 - The use of the power model for survey catchability, introduced to account for density dependence, seems to have improved the Mohn's rho and reduced the large overestimations of recruitment levels. AIC of models with and without the power model are similar.
 - CPUE increased in 2020 to levels similar to 2010.
- 6) Stock status: SSB is estimated to be just above Blim, up from just below Blim in 2020. The stock has been below Blim 16 out of the 20 last years. While 2019 recruitment was considered around average, the 2020 recruitment is lower. A slow increase in SSB has been seen, compared to the historical lows from 2004 to 2010.
- 7) Management plan: none

General comments

- Generally, the assessment is considered to be of good quality, although retrospective patterns are seen. Here, it is noted that the short dredge survey time series can be a factor.
- 2020 fisheries followed ICES TAC advice, but was exceeded by 18%.
- Assessment model outputs are consistent with 2020 results.
- SSB level is still just around Blim.

Technical comments

- Revisiting 2019 recruitment led to a large downward revision.
- Power model for density dependence in catchability seems to improve retrospective patterns.

Conclusions

- Assessment quality is considered good and procedures are followed correctly.
- Advices a monitoring TAC.
- SSB estimated at just above Blim, with a generally low SSB trend observed for the last 20 years. The updated lower 2019 recruitment is affecting this negatively.

Audit of San.sa.3r

Working Group: HAWG Stock Name: san.sa.3r

Review of ICES Scientific Report, (HAWG) (2021) (02.02.2021)

Reviewers: Norbert Rohlf

Expert group Chair: Cecilie Kvamme, Afra Egan

Secretariat representative: Sarah Millar

General

Recommendations, general remarks for expert groups, etc. (use bullet points and subheadings if needed)

For single-stock summary sheet advice

Stock: san.sa.3r

The stock is separated in seven management areas. Fishing takes place in five of these seven areas (sandeel area 1r-3r, 4 and 6). The stock was last benchmarked in 2016 (Inter-benchmark in 2020). Sandeel area 3r mainly consists of fishing grounds in Norwegian EEZ.

- 1) Assessment type: update
- 2) Assessment: accepted
- 3) Forecast: accepted
- 4) Assessment model: Seasonal SMS-effort model, tuned by dredge and acoustic survey index. Density-dependency in the recruitment index of the dredge survey was included to account for overestimation of large incoming year classes. Natural mortalities not updated with latest SMS runs; this would have led to substantial changes of stock's historic perception
- 5) Consistency: consistent with last year's assessment. Model was applied as per stock annex. As a result of the 2020 inter-benchmark, the formerly seen large retrospective pattern in the recruitment is reduced due to the inclusion of density-dependent catchability.
- 6) Stock status: SSB has been above B_{pa} since 2015, combined with low F. Above recruitment in period 2018 to 2020.
- 7) Management plan: There is no agreed management plan for this stock. Since 2011, the Norwegian sandeel fishery in SA3r has been managed according to an area-based management plan for the Norwegian EEZ.

General comments

The report is very concise and documents all decisions and settings made in the assessment well. The inclusion of density-dependent catchability in the dredge survey reduced the retrospective bias in the recruitment.

Technical comments

None

Conclusions

The assessment has been performed correctly and considered adequate as the basis for TAC advice. Most of the fishing grounds are in Norwegian EEZ and managed according to a Norwegian area based management plan. However, this management plan has not been evaluated by ICES.

Audit of San.sa.4

Working Group: HAWG Stock Name: san.sa 0.4

Reviewers: Espen Johnsen

Expert group Chair: Cecilie Kvamme and Afra Egan

Secretariat representative: Sarah Millar

General

Recommendations, general remarks for expert groups, etc. (use bullet points and subheadings if needed)

- The dredge survey is an important input time series for the assessment, however, the survey carried out in 2020 was of poor quality due to a low number of station and biased area coverage. Analyses showed that the areas covered in 2020 where the typically high densities areas in previous years. This skewness was adjusted, but the both the low number of stations and the adjustment of indices introduced an additional uncertainty that is not fully considered in the assessment and the prediction.
- A more standardized survey coverage is recommended for future years.
- Except from the dredge survey index adjustment, the assessment was carried out in standard manners.

For single-stock summary sheet advice

Stock: san.sa.4

Short description of the assessment as follows (examples in grey text):

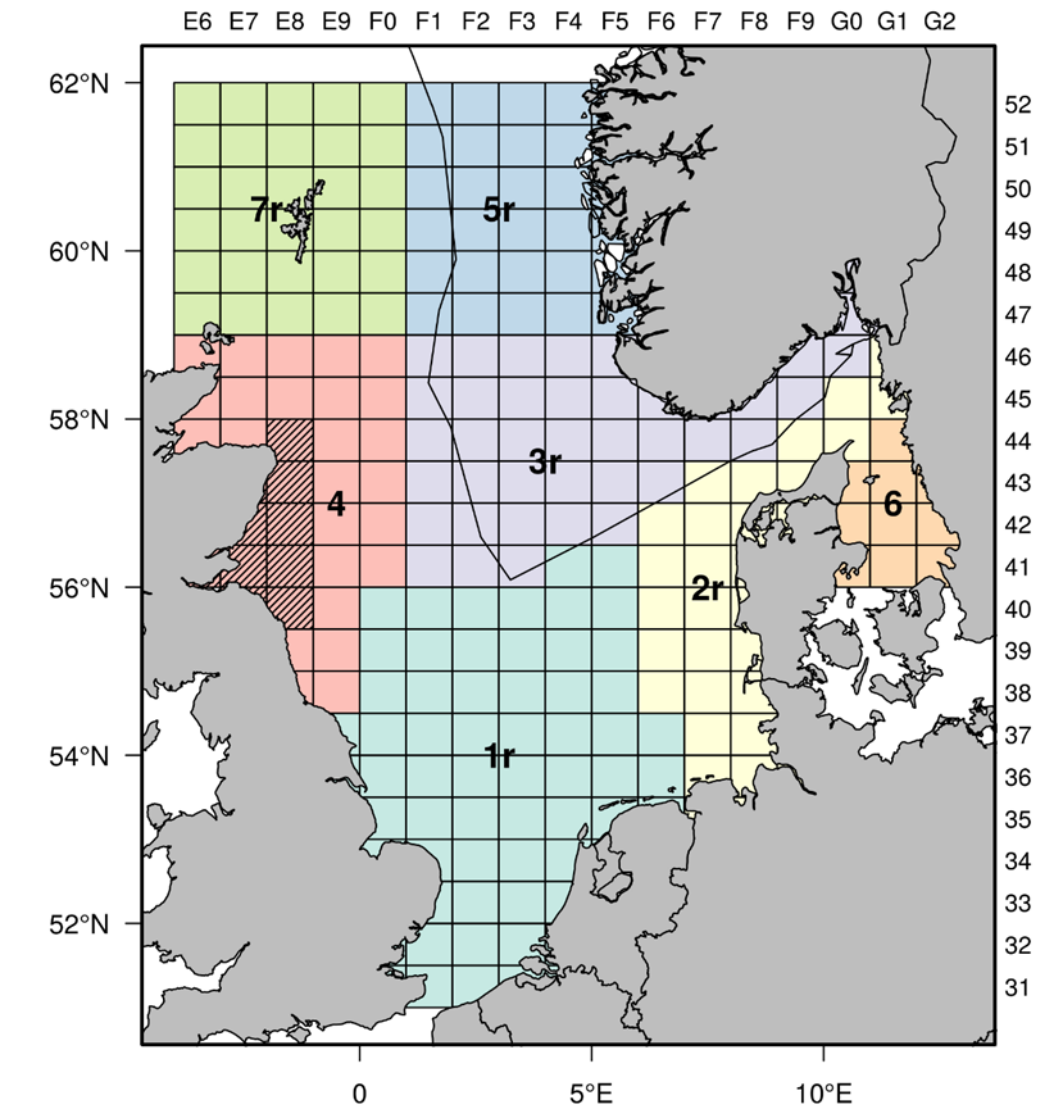
- 1) Assessment type: update
- 2) Assessment: accepted
- 3) Forecast: accepted
- 4) Assessment model: SMS 2 season model, age based, assuming a relationship between F and fishing effort – 1 fleet and 1 dredge survey
- 5) Consistency: consistent with last year assessment except that the dredge survey indices are adjusted to compensated for poor area coverage. Retrospective large for R. Low retrospective pattern for F and SSB in recent years.
- 6) Stock status: SSB is above MSY Bescapement and Bpa. No reference points for fishing pressure have been defined for this stock. The uncertainty of the estimated SSB and F is large in the assessment, resulting from a period of low commercial fishing effort (2004–2016), no data on catch age composition (2006–2011), and no survey indices (2004–2007).

Management plan: No MP for SA4, however, the Firth of Forth area (see hatched area in map below) is closed for sandeel trawling as it is important area for breeding seabirds. The advice does not consider that large part of SA4 is closed for fishing. This closure will direct the fishing effort to other areas in SA4.

General comments: It is of concern that there is a very low spatial overlap between the area covered by the dredge survey and the area covered by the commercial fishing fleet as the survey mainly cover the closed area in SA4. If there are spatial differences in recruitment in the two, the dredge survey may not represent the recruitment of the areas open for fishing. The fishing effort has been very for more than 15 years.

Technical comments: The assessment and forecast are performed according to the information found in the stock annex, however, the 2020 dredge survey indices were adjusted downwards to compensate for a skewed survey coverage that seemed to produce too high estimates for age0 and age1 indices.

Conclusions: The assessment has been performed correctly according to the procedure established at the last benchmark.



Audit of San.sa.4

Reviewers: Claus R. Sparrevohn

Expert group Chair: Cecilie Kvamme and Afra Egan

Secretariat representative: Sarah Millar

General

The dredge survey provides important information on the incoming yearclass and consequently the catch recommendation. The latest dredge survey in 2020 differed from the previously surveys since only few stations was completed resulting in an altered spatial coverage. That the coverage can influence the index is known and for SA1r and SA2r the index is calculated using a special correlation model. This is not the case for area 4. Therefore, it was found prudent to account for the skewness in spatial coverage in an ad hoc way, as described in the report.

It is recommended that the index calculation is evaluated during next benchmark, potential by using similar method as on SA1r and SA2r.

This index adjustment was only divergent form the normal procedure. No changes to the natural mortality assumption were made.

For single-stock summary sheet advice

Stock *san.sa.4*

Short description of the assessment as follows (examples in grey text):

- 1) Assessment type: update
- 2) Assessment: accepted
- 3) Forecast: accepted
- 4) Assessment model: SMS, dredgesurvey+catches
- 5) Consistency: Consistent except for the dredge survey index
- 6) Stock status: SSB is above Bescapement which is set equal to Bpa.
- 7) Management plan: No management plan

General comments

Assessment and forecast well performed

Technical comments

Dredge survey adjusted to account for skewness in the spatial coverage.

Audit of spr.27.3a4

Review of ICES Scientific Report, HAWG 2021 March 16-24

Reviewers: Henrik Mosegaard and Christophe Loots

Expert group Chair: *Afra Egan, Cecilie Kvamme*

Secretariat representative: Sara Millar

General

During the the last benchmark in 2018 the stock unit was re-defined, combining division 3.a and subarea 4.

For single-stock summary sheet advice

Stock

spr27.3a4

Short description of the assessment as follows (examples in grey text):

- 1) Assessment type: analytical update
- 2) Assessment: accepted
- 3) Forecast: accepted
- 4) Assessment model: SMS in quarterly step, assessment year July-June, tuning data catches 0-3+, IBTS Q1 (age 0-3), IBTS Q3 (age 1-3), HERAS (age 1-3). 3 y average M from the 2017 WGSAM key run, according to recent guidance from ACOM LS (March 2021).
- 5) Consistency: The assessment was accepted similar to last year. There has been a large improvement in retrospective pattern after the benchmark but as 41% of the recruiting year class contributes to the SSB at the end of the year, the still high retrospective pattern in SSB (5 year mohn's rho = 0.19) is not unexpected.
- 6) Stock status: $SSB > MSY B_{escapement}$, no precautionary F-reference points are defined for the stock. F is estimated higher than F_{cap} in recent 7 years.
- 7) Management plan: No agreed precautionary management plan for sprat, advice according to MSY approach (escapement strategy with $F_{cap} = 0.69$).

General comments

Technical comments

There is no technical issue with this stock

Audit of Spr.27.7de

Working Group: HAWG Stock Name: spr.27.7de

Review of ICES Scientific Report, HAWG 2021, 16th-24th March 2021

Reviewers: *Christophe Loots, Campbell Pert*

Expert group Chair: *Afra Egan, Cecilie Kvamme*

Secretariat representative: *Sarah Louise Millar*

General

This is a category 3 stock for which the assessment is based on the trend and absolute estimate of biomass in the PELTIC acoustic index from 2013 onward. The acoustic survey covers a much wider area than the Lyme Bay area where the stock is defined and the fishery is focused.

The stock was treated inconsistently in the past (2 over 3 or 1 over 2 rule) which was not precautionary. The stock was sent to IBP to resolve implementation of the new guidance for short lived data limited species. It was decided to use a constant harvest rate of 8.57 % applied to the PELTIC survey index to calculate the biomass that can be taken.

For single-stock summary sheet advice**Sprat in the English Channel (spr.27.7de)**

Short description of the assessment as follows (examples in grey text):

- 1) Assessment type: *update*
- 2) Assessment: *accepted. Based on biomass trends from the PELTIC survey.*
- 3) Forecast: *No forecast*
- 4) Assessment model: *There is no assessment model for this stock.*
- 5) Consistency: *The stock was treated inconsistently in the past. From this year, a constant harvest rate of 8.57 %, which was shown to be precautionary, is used.*
- 6) Stock status: *No reference points, but a small decrease in the stock biomass index and harvest rate in 2020.*
- 7) Management plan: *There is no management plan for this stock.*

General comments

The draft report is well documented and easy to read. The ways the assessment is performed and the catch advice is provided are clear and well explained.

In table 1 "Constant Harvest Rate" there is an additional space between in the number "8.57%" which needs removed.

In "Issues relevant for the advice" section "Stock" is a capital and should be small "s".(?)

Technical comments

The assessment appears to be done according to the stock annex.

A constant harvest rate of 8.57% is now used to calculate the biomass that can be taken, accordingly to recommendations from IBP.

Conclusions

The assessment has apparently been performed correctly according to the Stock Annex and the advice was given following the new rule for this category 3 stock.

Audit of Spr.27.67a-c,f-k

Working Group: HAWG Stock Name: spr.27.67a-c,f-k

Date: 25/03/2021

Auditor: Eleanor MacLeod, Cormac Nolan

General

This is a category 5 'stock' with no assessment and two-year advice following the precautionary approach. A precautionary buffer was last applied in 2017 and has again been applied in 2021 for the following two years. The stock structure of sprat populations in these subareas is not clear.

For single stock summary sheet advice:

- 1) **Assessment type:** NA
- 2) **Assessment:** NA
- 3) **Forecast:** NA
- 4) **Assessment model:** NA
- 5) **Data issues:** No data issues
- 6) **Consistency:** Precautionary buffer applied. Last applied in 2017.
- 7) **Stock status:** Unknown
- 8) **Management Plan:** There is no management plan for this stock.

General comments

The draft report is well documented and easy to understand. The advice sheet for this 'stock' refers to subarea 6 and divisions 7a-c,f-k. However, the title of the report section -and some of the tables within it - refer to the whole of subareas 6 and 7. As Channel sprat in 7d,e now has its own report section, the auditors suggest working towards removing 7d,e from the Celtic Seas section.

Technical comments

Suggested edits were made directly in the draft advice sheet and report. Any queries or clarifications were directed to the author.

Conclusions

The same procedure as last year has been appropriately followed and the latest ICES guidelines for single stock advice have been met.