

Annex 4: Audit reports

This Annex was updated in November 2021

Audits for stocks for which advice sheets were produced were conducted during and immediately following the WGNSSK 2021 meeting. The audits were made available to the stock assessors, who had the opportunity to adjust their reports and advice sheets if any problems were detected in the audit. The audits were also made available to the relevant advice-drafting group.

Audits for spring assessments

bll.27.3a47de (brill)

General

Brill is managed under a combined TAC with turbot. Given the lack of catch and landings data as well as survey-information brill is assessed as a Category 3 stock. This implies an advice using the 2 over 3 rule on the biomass index. This index is driven by a commercial LPUE of the Dutch large beam trawl fleet. A SPiCT model is run to determine the state of the stock in relation to reference points for brill.

For single stock summary sheet advice:

- 1) **Assessment type:** Cat 3 with annual advice
- 2) **Assessment:** trends (2 over 3 rule) using the one commercial biomass index based on the LPUE from the Dutch Beam trawl fleet.
- 3) **Forecast:** /
- 4) **Assessment model:** SPiCT is used to inform the assessor on the status of the stock in relation to reference point values.
- 5) **Data issues:** LPUE index from Dutch beam trawl fleet is used. A benchmark to improve this LPUE index is quite urgent considering the changes in the fleet related to technological creep.
- 6) **Consistency:** Consistent.
- 7) **Stock status:** F is below FMSY proxy; and SSB is above MSY Btrigger proxy (SPiCT).
- 8) **Management Plan:** No management plan

General comments

This was a well documented, well ordered and considered section. The assessment is easy to follow and interpret. Input and output data were correct.

Technical comments

Few inconsistencies were reported to the assessor and have already been fixed in both the advice sheet and report.

The assessment relies solely on a biomass index derived from a the standardized lpue from the Dutch beam-trawl fleet for vessels > 221 kW. Considering the changes in the fleet related to technological creep, a benchmark to improve this index is quite urgent.

The Dutch industry survey seems to be a promising survey that could be used in the future to assess the status of the brill stock.

Conclusions

The assessment has been performed correctly.

cod.27.47d20 (cod)

General

The stock has been benchmarked in 2021 with several changes made to the assessment and reference point calculations. Among other changes, emigration from the North Sea to area 6a is now taken into account via increased natural mortality rates for ages 3 and above. This has to be seen as a quick fix until more sophisticated spatial assessment methods become available and/or the stock definition and assessment area (including at least parts of 6a) is changed. For the reference points the ongoing low productivity of the stock is taken into account by truncating the time series used for reference point determination to the period 1998+. This led to a reduction in B_{lim} , B_{pa} and $MSY_{Btrigger}$. Although the stock status is still the same (below B_{lim} and above F_{MSY}), the position of the current SSB and F in relation to the reference points has changed to a larger extent.

For single-stock summary sheet advice

Stock Cod 27.47d20

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

- 1) Assessment type: Update (benchmarked in 2021)
- 2) Assessment: accepted
- 3) Forecast: accepted
- 4) Assessment model: SAM assessment accepted by external reviewers during and after the 2021 benchmark - tuning by two scientific surveys (IBTS q1 and IBTS q3) and one additional recruitment index derived from the IBTS q3 survey (age 0)
- 5) Consistency: 2021 benchmark, therefore not consistent with 2020 assessment.
- 6) Stock status: $B < B_{lim}$, $F > F_{MSY}$
- 7) Management plan: EU MAP accepted only by EU. Includes F_{MSY} ranges (also accepted by UK, but not by Norway). Shared stock → Headline advice based on ICES MSY approach

General comments

To have the assessment in TAF is a major improvement. However, data and scripts to derive input data like the Delta Gam indices are not yet in TAF. This could be added in the future.

The report is well written. It mentions the most important changes made in the benchmark and it describes the main issues with the assessment. It gives an overview over the most important results and issues relevant for management.

Technical comments

Information on values used for years prior to the start of the time series is missing for M and maturity in the stock annex

M values for 2020 (values from 2019) were not in accordance with the stock annex (three year average 2017 – 2019). It was a mistake in the stock annex according to the stock assessor and the stock annex will be updated.

Forecast results depend to some extent on the R version used. The routine to generate random seeds changed around R version 3.6. The assessment and forecast has been carried out with R version R 3.5.1. When running the forecasts with newer R versions (e.g., 4.0.2) slightly different forecast results are produced because of differences in the random seed. The R version used is now specified in the report.

According to the official (and ICES) landings, the TAC in 2020 has been overshot substantially especially in area 4. It is unclear whether this is e.g., a result of banking and borrowing or inter-area flexibilities. This needs to be mentioned and discussed in the report.

The 2020 landings and discards in table 10 (assessment summary) are different to the other tables in the advice sheet (especially the landings). A footnote could be added explaining the difference (likely SOP vs landings and discards uploaded in weight?).

The order of tables does not follow the order how the tables are mentioned in the text. This makes it difficult for the reader to follow. A reorganisation of tables and figures may be envisaged for the next year's report.

Exploitation patterns and maturities are now directly forecasted by SAM. Although this all makes sense, so far the report does not show which exploitation patterns and maturities are forecasted by SAM. Therefore, it is difficult to judge whether the SAM forecast is working as intended. If possible, a figure showing the forecasted exploitation patterns and maturities would be helpful.

For small issues, comments were added directly to the report

Conclusions

The assessment and forecasts have been carried out in accordance with the stock annex (apart from M in 2020 where the description in the stock annex needs to be changed).

fle.27.3a4 (flounder)

For single stock summary sheet advice:

- 9) **Assessment type:** update
- 10) **Assessment:** Survey trends-based assessment, length-based indicators
- 11) **Forecast:** no forecast
- 12) **Assessment model:** trend-based assessment based on IBTS-Q1
- 13) **Data issues:** No issues with the data.
- 14) **Consistency:** consistent with previous advice
- 15) **Stock status:** Stock status cannot be assessed based on current data availability, exploitation status is currently below the F_{MSY} proxy.
- 16) **Management Plan:** no management plan exists

General comments

This was a well documented, well ordered and considered section. It was easy to follow and interpret. Audit was based on powerpoint presentation, stock annex, advice sheet, report, and data files on the ICES sharepoint. Some minor edits necessary, see technical comments below.

Technical comments

Advice Sheet vs Report consistency

- In the advice sheet Table 1, the average discard rate is given as 29%, computed from none-rounded values, although the rounded value is what is reported in the table. Using the values given for discard rate in Table 6.6 in the report I get a value of 30.39%, i.e. rounded value 30%. There thus appears to be some inconsistency here.

The inconsistency is due to rounded numbers in table 6.6 of the report, while the calculations done for the advice sheet is based on none-rounded numbers.

- The totals given for official landings from subarea 4 in 2017 and 2018 Table 6.5 in the report does not match what is given in Table 7 in the advice sheet.

Has to be checked.

Stock annex

- In the stock annex under short term forecast it says that “since 2018 no catch advice is given any longer for North Sea flounder”. Catch advice is now once again given so this is not correct.

Stock annex updated accordingly.

- In Table 1 it is said that length at maturity is 21 mm. This should be 21 cm, shouldn't it?

Yes, 21cm. Corrected accordingly.

Report

- For the last sentence under section 6.1 starting with “This resulted in a catch advice.....”, consider adding information about the discard rate in 2018-2020 as well for reader guidance.

Information about the average discard rate added to the text.

Conclusions

The assessment has been performed correctly

had.27.46a20 (haddock)

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

- 8) Assessment type: Update
- 9) Assessment: accepted
- 10) Forecast: accepted
- 11) Assessment model: TSA, Age based analytical assessment using IBTS Q1 and Q3 surveys.
- 12) Consistency: The estimated SSB and F were consistent over last 5 years. Recruitment estimates in recent two years (2019 and 2020) are more uncertain, but it is common due to lack of data.
- 13) Stock status: Fishing pressure on the stock is below FMSY and spawning-stock size is above MSY Btrigger, Bpa, and Blim.
- 14) Management plan: EU multiannual management plan (MAP) plan for the Western Waters (EU, 2019)

General comments

The report was well written. Report and assessments covers a wide range of aspects: Impact of covid 19 in fishing efforts, sampling coverage and data quality was assessed. Changes in discards rate and biological parameters such as mean weight, maturity were well discussed. Exploratory assessments using SURBAR and SAM were conducted and the consistent result to TSA further insure the quality of the current assessment. Issues for coming benchmark were clearly addressed in the report.

Technical comments

The advice sheets are easy to read and clear. Here are few comments:

- Two ICES rounding errors in Table 2 for F (0.964 and 0.916)
- A typo in Table 7
- Overall, it is difficult for me to reproduce ICES landing/discards/catch related numbers, e.g. weights summarized in Table 6 and Table 7. These numbers are different than summarized in Youen's IC summary pdf. Maybe I am missing an extra component? Or the Youen's pdf was an old version?

There are some comments for report:

- Page 243, year typo

Conclusions

Assessment was done consistently, and report was well written

lem.27.3a47d (lemon sole)

General

Audit based on the stock annex, benchmark report, presentations, advice sheet and the report section. Overall, the presented assessment appears sound and conform to the stock annex.

For single-stock summary sheet advice

Stock lem.27.3a47d

Short description of the assessment as follows:

- 1) **Assessment type:** Updated assessment and advice according to the [2018 WKNSEA benchmark](#).
- 2) **Assessment:** accepted. Lemon sole has been defined as a category 3 species according to the ICES guidelines.
- 3) **Forecast:** No forecast.
- 4) **Assessment model:** no consistently reliable age structured data is available for commercial catches and the assessment and advice therefore follow a data limited approach:
 - Advice formulated using the data limited "2 over 3" rule, based on SSB index from a SURBAR model (using *ad-hoc* catchability corrections for age 1 and 2). The model uses age-structured GAM indices in Q1 (IBTS) and Q3 (combined IBTS+BTS).
 - Stock exploitation status evaluated using length-based indicators (LBIs), here in relation to the F_{MSY} proxy $L_{mean} = L_{F=M}$ (with assumption $M/k = 1.5$).
- 5) **Data:** data limitations such as noisiness of the survey index, partly due to low catchability of younger classes, are well documented and believed to have little influence on the advice. The Q1 index, in particular, shows a poorer internal

- consistency and seems to be given a lower weight by the SURBAR model, as suggested by larger residuals.
- 6) **Consistency:** Consistent with the benchmark. No inconsistency over time revealed; annual advice issued since 2019, every second year before.
 - 7) **Stock status:** relative SSB decreasing in the last two years, as compared to the three previous. $L_{\text{mean}} > L_{F=M}$ indicates a stock exploited below $F_{\text{MSY proxy}}$. No reference point for stock size is defined for this stock. Recruitment exhibited an upward trend over the last three years (but with high uncertainty around the estimate).
 - 8) **Management plan:** none.

General comments

Assessment and advice in line with the stock annex and benchmark decisions (with the well documented exception of the updated L_{mat} estimate for the LBI approach).

Technical comments

The range of possible estimates considered for L_{∞} , during the benchmark, appears very wide. The choice of the method is therefore expected to have a considerable impact on the estimates for L_{opt} and $L_{F=M}$, and for comparison with $L_{\text{max}5\%}$. It is moreover noticed that the option based on survey data (which was disregarded because deemed not representative of the stock size composition):

- did not include a correction for biases induced by length-stratified age sampling (which to the best of my knowledge is standard on IBTS surveys), while fitting the growth function.
- forced the t_0 of the Von Bertalanffy growth function to zero, which, by experience, may have a sizeable impact on the L_{∞} estimate.

It may therefore be advisable to reconsider the option based on survey data using an alternative method (such as the one proposed by Perreault *et al.*, 2019) in a future benchmark. Although the method chosen to estimate L_{∞} appears sound, it is based on a metanalysis, and therefore need to be considered with caution as it could provide misleading perspective on the exploitation level. A method based on data from the stock itself may provide more accurate estimates, although the issue of the representativeness of course has to be addressed.

Moreover, on Figure 9.6.6 of the report, the left vertical dashed line representing L_{max} (used to estimate L_{∞}) seems at a suspiciously low value to represent the 99th percentile, if based on the same distribution as represented on the graphic. This may need verification or clarification.

This issue is however not expected to have any influence on this year's advice as the precautionary buffer is not to be considered again until 2023 (for catches in 2024), under current guidelines.

Conclusions

The assessment has been performed correctly and reporting is adequate.

WGNSSK reiterate the advice that management should be implemented at the species level (currently managed under a combined species TAC with witch).

References

Perreault, A. M. J., Zheng, N., and Cadigan, N. G. 2019. Estimation of growth parameters based on length-stratified age samples. Canadian Journal of Fisheries and Aquatic Sciences. <http://dx.doi.org/10.1139/cjfas-2019-0129>.

ple.27.420 (plaice)

General

The stock is due to be benchmarked in 2021/2022.

For single-stock summary sheet advice

Plaice in 4 and 20

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

- 15) Assessment type: update
- 16) Assessment: accepted
- 17) Forecast: accepted
- 18) Assessment model: AAP (Aarts and Poos) – tuning with 6 survey indices (combined BTS, IBTS Q1 and IBTS Q3 all derived using delta-GAM and BTS-ISIS and SNS split into two time-series).
- 19) Consistency: Approach consistent with last years assessment. There has been a large downscaling of the 2019 recruitment.
- 20) Stock status: $B > B_{trigger}$ & B_{pa} , $F < F_{MSY}$
- 21) Management plan: Advice is based on the MSY approach. The EU management plan (MAP) is not adopted by Norway and is given only as a catch option.

General comments

Overall, well documented, and consistent with the stock annex. There are a couple places in the report which have not been updated with the latest assessment results and other parts which may now be out-dated.

The 2021 assessment is not yet in TAF. This could be added in the future to facilitate the audit process. The audit was based on the presentations to the WG, stock annex, advice sheet, report and assessment and forecast files on SharePoint.

Technical comments

There are several issues with the assessment of this stock, including:

- Conflicting information from surveys due to shifting distributions of younger and older fish.
- Annual upward revisions of ages 5+ in the IBTS Q1 delta-GAM indices that may be contributing to annual revisions of SSB.
- Residual patterns in the catches and surveys.
- An increasing and uncertain plus group.
- A mismatch in perception of the stock between the assessment and industry.
- High sensitivity of assessment results to leave-one-out analyses.

No details of the standard InterCatch raising procedure are provided in the Stock Annex. It is therefore unclear whether the same grouping strategy is used each year.

The report details changes to the May short-term forecast procedure following the ICES WKNSROP workshop in 2020. However, the decision to abandon RCT3 estimates in the May forecast has not been updated in the stock annex. The number of years to use for 'long-term' geometric mean of recruitment estimates is not specified in the stock annex but taken as 10 years. The stock annex specifies two assumptions on intermediate year F , although the decision to present only F status quo is well explained and justified in the report section.

The assessment results are highly sensitive to leave-one-out analyses. In particular, the IBTS surveys are the only surveys to sample east of Scotland and there is potential for a ghost stock. This is mentioned only briefly in the 'Issues for future benchmarks'.

F_{pa} was updated to the value of $F_{P.05}$ with advice rule following the new technical basis. This results in a new F_{pa} (0.769) that is much higher than F_{lim} (0.516).

Several minor comments have been added directly to the report section and advice sheet.

Conclusions

The assessment and forecasts have been done correctly and carried out in accordance with the stock annex (although the STF recruitment assumptions need updating in the stock annex following WKNSROP).

ple.27.7d (plaice in the eastern English Channel)

General

Audit was based on the report, PowerPoint presentations, stock annex, advice sheet, scripts and data files on the ICES SharePoint. The assessment was thoroughly discussed in the group given the change in sampling campaign of the FR GFS, historically low recruitment estimate for 2020.

All issues were addressed during the working group and the assessment was accepted and completed largely in line as described in the stock annex.

For single-stock summary sheet advice

Stock: Ple 27.7d

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

- 22) Assessment type: update
- 23) Assessment: analytical, presented and accepted
- 24) Forecast: FLR package, presented during the meeting and accepted
- 25) Assessment model: Aarts and Poos model, which is an age-based analytical assessment that uses catches in the model and forecast + 2 survey indices UK-BTS and FR-GFS.
- 26) Consistency: The assessment is largely consistent with last years assessment and forecasts. Some minor deviations are observed in the age allocation for trawlers in InterCatch, changes in the FR GFS (no UK stations) and the recruitment assumption in the Forecast.
- 27) Stock status: $B > MSYB_{trigger}$, $F < F_{msy}$, R is uncertain especially in 2020 due to the low sampling for discards given the COVID pandemic.
- 28) Management plan: MSY approach

General comments

Overall the report is well written and covers all major topics. However, the assessment of this stock encountered some issues due to the COVID-19 pandemic. The issues relate to a lack of discard sampling of the trawler fleet in most quarters of 2020 and the missing UK station in the FR GFS survey. While both issues are mentioned in the report in issues for future benchmarks, I think it would be more appropriate to state the issues in the designated sub-chapters. This will make it more transparent to the reader and provide to opportunity to elaborate by e.g. showing some results of the different runs performed to demonstrate the impact

of 1) fully removing the FR GFS, 2) removing the 2020 data point, or 3) the regular assessment. Some elaboration here is needed for future reference.

Technical comments

As mentioned above, the report needs some additional work to cover the main issues discussed during the working group.

- 1) Elaborate on the missing UK stations in the FR GFS, including a figure comparing as presented during the WG
- 2) The very low recruitment estimate in 2020 due to the lack of sampling.
- 3) The change in InterCatch procedure for the trawlers due to the lack of age samples from Q2 onwards.

Furthermore, coding issues with the FR GFS index were mentioned, i.e. some hauls with no catches were dropped from the analysis. It states a new index calculation was done solely for testing purposes and further exploration is needed before a new index can be applied. The report mentions *“issues in the calculation of the FR GFS index were reported...”*, but does not state which issues are encountered and still need to be resolved, nor are comparisons in the runs shown. I think the report would benefit by adding a figure showing the effect of the new index.

In the advice, please check the values in the Fmsy scenario. The % advice change are not in line with the STF output provided (Advice_basis_Fmsy_ple.27.7d_WGNSSK.csv). Other values appear to be ok.

Some minor comments and adjustments of the text in the report were made in track changes. Also minor changes in the advice in terms of rounding and removing a row in table 1 of the advice. All is in track changes.

Conclusions

The assessment and forecast of ple.27.7d has been performed in line as described within the Stock Annex. Minor deviations occurred but have been extensively discussed and agreed by the group. As such, I have no major concerns about the assessment and advice for this stock.

pok.27.3a46 (saithe)

General

Overall, a clear assessment presentation that follows the Stock Annex where possible. There were some changes to input data this year to account for previous errors in data submission of collation, but the WG was of the view that these were warranted to ensure an improved and robust assessment this year. The notes regarding benchmark issues are comprehensive and very helpful.

For single-stock summary sheet advice

Saithe in the North Sea (4), Skagerrak (3.a) and West of Scotland (6.a)
(pok.27.3a46a)

Short description of the assessment as follows:

- 29) Assessment type: Update
- 30) Assessment: Accepted
- 31) Forecast: Accepted
- 32) Assessment model: Update SAM assessment on TAF – tuning by one commercial biomass index and one survey index
- 33) Consistency: mostly consistent with last year, some revisions to commercial tuning index following corrections to French data. Significant impacts on assessment but stock perception very similar, and discussed further in a working document for WGNSSK. Also highlighted a mistake in the 2019 IBP reference point revisions that were corrected by WGNSSK 2021 (Flim and Fpa).
- 34) Stock status: $B > MSY$ Btrigger (just); F above F_{msy} but below F_{pa} ; recent recruitment the lowest in the time series, continuing a long-term declining trend.
- 35) Management plan: Previous EU-Norway management plan no longer in force, evaluation continuing on proposed EU-Norway-UK management plan. Baseline advice presented for the ICES MSY approach.

General comments

The text would benefit from a general proof-read – there are some grammar errors in particular that have probably built up over the years. The meaning is clear, but corrections would be a useful exercise at some point.

Technical comments

- 1) The first line of the last paragraph on page 796 suggests that all Scottish catch of saithe is discarded, whereas actually a proportion is still retained for landing as some quota is available.
- 2) Page 797, 7th paragraph: change “While Norway has a no landings obligation policy...” to “While Norway has a landings obligation policy...”
- 3) 1st paragraph of Section 16.3.2: it is noted that sampling is an “issue”. Is this a problem that means the assessment is not reliable, or was sampling in 2020 still sufficient?
- 4) In Section 16.7.2, I’m not sure it’s correct to say that the EU-Norway-UK management plan is no longer accepted. The old EU-Norway MP has been discarded because of the reference point issue, but also because of Brexit. The new EU-Norway-UK MP is still under discussion, rather than being no longer accepted.

Conclusions

As always for saithe, this is a complicated assessment but it looks to have been conducted according to the Stock Annex. There were quite a few changes to input data and reference points, but these have been accepted by the WG as necessary to correct previous errors, and are well explained in the report section.

pol.27.3a4 (pollack)

General

Last time advice for Pol.27.3a4 was requested was in 2018. The advice for this year applies to 2022-2024. Unless the stock change category, the next advice update (in 2024) will be 80% of the TAC advised this year. The stock has never been benchmarked. Apparently, an appropriate survey time-series for this stock has not been identified.

For single-stock summary sheet advice

Pol.27.3a4

Short description of the assessment as follows:

- 1) Assessment type: Category 5 assessment (i.e. assessment based solely on catches and discards)
- 2) Assessment: No assessment
- 3) Forecast: Accepted. Not a real forecast is applied. Instead, average ICES tot. catches for 2018-2020 multiplied by a precautionarity buffer (0.80) was advised for 2022-2024.
- 4) Assessment model: Category 5 assessment (i.e. assessment based solely on catches and discards)
- 5) Consistency: Last time an advice was requested was in 2018
- 6) Stock status: Not known (information to define reference points are not available)
- 7) Management plan: There is no management plan available

General comments: none (see conclusion)

Technical comments: There may be a slight inconsistency in the advice sheet. At the the top it is stated that the advice applies to 2022-2024, whereas in table 4 of the advice sheet the advised TAC is mentioned for 2021-2023. There is also “*” after the official landings for 2019 and 2020 in table 4. Should they still be there.

Conclusions:

No notable issues was raised during the presentation of the assessment, and could not find any potential mistakes when looking through the report and advice sheet, except for those mentioned under technical comments above and a few tiny comments/questions left in the report for the stock assessor to take a look at.

sol.27.4 (sole)

General

- The retrospective pattern should to be investigated. The stock assessment shows 3 of 5 peels outside the envelope and a Mohn’s $\rho > 0.2$. According to WKFORBIAS decision tree, the $SSB < B_{lim}$ in 2020 and $F_{HCR} < F_{p.05}$, allowing advice based on these results to be provided this year.

For single-stock summary sheet advice

Stock sol.27.4

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

- 36) Assessment type: update of 2020 benchmark assessment
- 37) Assessment: accepted
- 38) Forecast: accepted
- 39) Assessment model: Art and Poos statistical catch-at-age model
- 40) Consistency: the assessment of 2020 is consistent with last year's assessment.
The change in advice (-28%) is mainly due to the downward revision of the large 2018 year class.
- 41) Stock status: $SSB < B_{MSY}$ since 1999; $F_{MSY} < F < F_{pa}$
- 42) Management plan: ICES advises that when the MSY approach is applied, catches in 2022 should be no more than 15 330 tonnes.

General comments

The stock is well documented and clearly presented. The audit was based on the report, presentations and the advice sheet on the ICES sharepoint. The assessment was thoroughly discussed during the group due to strong retrospective pattern in estimated SSB (Mohn's $\rho > 0.20$ and 3 peels are outside the bounds) but, no clear explanation has been found. According to the WKFORBIAS decision tree (the stock size estimate in 2020 is below B_{lim} and F_{HCR} is well below $F_{p0.05}$), the assessment was accepted by the group to provide advice for 2021.

Technical comments

- The excel SAG file of sole.27.4 is missing in the Assessment and Forecast folder.
- The output files of the assessment and the forecast are missing in the Assessment and Forecast folder.
- There are several differences between the values of table 8 in the advice sheet (History of landings) and those of the table 17.2 of the report (Time-series of the official landings) from 2006.
- There is a mismatch in the period of calculation of the geometric mean of recruitment between the report (GM 1957-2019) (section 17.7 Recruitment estimates) and the advice sheet (GM 2008-2019) (the table 1).

Advice sheet:

- Footnote ^^ of table 2 need to be updated/removed since the TAC for 2021 was not yet been set.
- Minor changes in the advice in terms of rounding (Table 2).
- There are some differences between the column landings of the assessment summary (table 9) and ICES estimated landings (table 8) especially for 2012 and 2013.

Conclusions

The assessment has been performed correctly.

sol.27.7d (sole in the eastern English Channel)

General

Audit based on the report section, advice sheet, stock annex, 2021 WKNSEA benchmark report, and data available on the SharePoint. Overall, the presented assessment appears sound.

For single-stock summary sheet advice

Stock: Sole in Division 27.7.d

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, 3 survey age-structured indices (UK BTS, France YFS and UK YFS), 3 commercial tuning series (FRA-COTB, UK (E&W)-CBT and BE-CBT).
- 5) Consistency: In 2019 and 2020, category 3 advice was provided for this stock. In 2021 this stock was benchmarked during WKNSEA to address data issues. During WGNSSK 2021, the new assessment performed with SAM was accepted and category 1 advice was provided.
- 6) Stock status: ICES assesses that fishing pressure on the stock is above F_{MSY} but below F_{pa} and F_{lim} ; spawning-stock size is below $MSY B_{trigger}$ and between B_{pa} and B_{lim} .
- 7) Management plan: EU multiannual management plan (MAP) for the Western Waters.

General comments

Overall, the sol.27.7d section of the report is very well written and thoroughly documented. It is easy to follow and interpret. The steps taken for the short-term forecast, for instance, are well explained. The catch advice given in the report section matches with the values given in the advice sheet, and so do the reported landings and stock summary tables. The values in the advice sheet also match with the data available on the SharePoint. The only comment I have is that for some figures, the axis labels and legends are too small to read. I also made some very minor edits throughout the report, mainly formatting.

Technical comments

1. Two sections of the stock annex still need updated (section B.1.2.1 French data and section B.1.2.3 England data).
2. In the advice sheet, the SAG plot for recruitment is missing the 2017 and 2018 time series for comparison with the 2021 assessment and needs updated.
3. As mentioned above, I made a couple of comments in track changes.

Conclusions

The assessment of sol.27.7d has been performed correctly, and all the diagnostics are satisfactory. This stock has recently been through an extensive benchmark and a thorough review of the data input, and the assessment is now performed in SAM. As a result, for 2021 a category 1 stock advice is given for this stock, as opposed to a category 3 advice given last year. I have no concerns about the assessment of this stock.

tur.27.3a (turbot in Skagerrak and Kattegat)

General

Audit based on the report section, advice sheet, stock annex, 2021 WKNSEA benchmark report, and data available on the SharePoint. Overall, the presented assessment appears sound.

For single-stock summary sheet advice

Stock: Sole in Division 27.7.d

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, 3 survey age-structured indices (UK BTS, France YFS and UK YFS), 3 commercial tuning series (FRA-COTB, UK (E&W)-CBT and BE-CBT).
- 5) Consistency: In 2019 and 2020, category 3 advice was provided for this stock. In 2021 this stock was benchmarked during WKNSEA to address data issues. During WGNSSK 2021, the new assessment performed with SAM was accepted and category 1 advice was provided.
- 6) Stock status: ICES assesses that fishing pressure on the stock is above F_{MSY} but below F_{pa} and F_{lim} ; spawning-stock size is below $MSY B_{trigger}$ and between B_{pa} and B_{lim} .
- 7) Management plan: EU multiannual management plan (MAP) for the Western Waters.

General comments

Overall, the sol.27.7d section of the report is very well written and thoroughly documented. It is easy to follow and interpret. The steps taken for the short-term forecast, for instance, are well explained. The catch advice given in the report section matches with the values given in the advice sheet, and so do the reported landings and stock summary tables. The values in the advice sheet also match with the data available on the SharePoint. The only comment I have is that for some figures, the axis labels and legends are too small to read. I also made some very minor edits throughout the report, mainly formatting.

Technical comments

1. Two sections of the stock annex still need updated (section B.1.2.1 French data and section B.1.2.3 England data).
2. In the advice sheet, the SAG plot for recruitment is missing the 2017 and 2018 time series for comparison with the 2021 assessment and needs updated.
3. As mentioned above, I made a couple of comments in track changes.

Conclusions

The assessment of sol.27.7d has been performed correctly, and all the diagnostics are satisfactory. This stock has recently been through an extensive benchmark and a thorough review of the data input, and the assessment is now performed in SAM. As a result, for 2021 a category 1 stock advice is given for this stock, as opposed to a category 3 advice given last year. I have no concerns about the assessment of this stock.

tur.27.4 (turbot)

General

Turbot in 27.4 is, since the 2018 interbenchmark, a category 1 stock assessment. The model applied uses the SAM statistical catch-at-age model. The model uses a combination of scientific surveys (BTS Q3 and SNS), and one LPUE index from the 80mm beam trawl Dutch fleet. There are currently no estimates of discards for the fleet involved in this fishery, so removals in the assessment model account only for landings.

For single-stock summary sheet advice

Stock **turbot** in Subarea 4

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

- 1) Assessment type: An update of last year's assessment model run.
- 2) Assessment: The assessment was accepted by the WG.
- 3) Forecast: The forecast was accepted by the WG.
- 4) Assessment model: SAM model with commercial landings data, two survey age-based indices (BTS-ISIS and SNS), and a commercial age-aggregated LPUE time series as input.
- 5) Consistency: The assessment for 2020 is consistent with that for 2019; Mohn's rho is low for this stock for both SSB (-9%) and F (+7%), and higher for recruitment (-15%).
- 6) Stock status: SSB in 2020 has remained stable and is well above MSYBtrigger. F is still below Fmsy. The 2018 year class was particularly strong and will make its way through their adult biomass over the next few years.
- 7) Management plan: TAC is set combined with brill. EU MAP accepted only by EU. Includes FMSY ranges. Headline advice based on ICES MSY approach

General comments

The assessment is well presented and explained. Issues that could affect the quality of results and advice are covered in detail.

Technical comments

Report

- The lack of estimates for the discards of this stock should be reflected upon. If appropriate scenarios on likely discard levels could be generated, some work could be carried out on the impact they could have on the estimated levels of productivity.
- Indices of abundance from both the SNS and BTS surveys do not appear to follow changes in abundance particularly well, given their low correlation along cohorts. This might be partly due to a single ALK being applied over the whole time series. The LPUE series is thus very influential in the model estimates. The report identifies in details these issues and proposes possible solutions to be investigated over the next benchmark.

Advice sheet

- The Quality of the assessment section, 1st paragraph, refers to uncertainty being created by the availability of data from the Dutch fleet. This needs to be explained further. Is that data availability might be biasing the selectivity estimates?

Conclusions

- Following the 2020 decision by ACOM, the value of Fpa is now based on the calculated Fp.05 with advice rule. This leads to an Fpa value of 0.86, well above the set value for Flim (0.61). This discrepancy should lead ACOM to revisit the basis for this decision, or whether it should apply to all stocks.
- The assessment has been according to the benchmark settings, as covered in the stock annex.

whg.27.47d (whiting)

For single-stock summary sheet advice

Whiting in 4 and 7d

Short description of the assessment as follows:

- 1) Assessment type: update
- 2) Assessment: accepted
- 3) Forecast: accepted
- 4) Assessment model: SAM, 2 survey tuning indices (IBTS q1 and q3). SURBAR is used for comparison to SAM. SURBAR is used to ensure consistent survey patterns between northern and southern areas, and continued justification for a single stock assessment.
- 5) Consistency: The assessment was consistent with the agreed procedure defined by the recent IBP in 2020. The main change was a revision in the assumed natural mortality rates, revised by WGSAM.
- 6) Stock status: Fishing pressure on the stock is below FMSY and spawning-stock size is above MSY Btrigger, Bpa, and Blim. Revision of assumed natural mortality values following IBPNSWHITING (2021) has shifted several reference points and, consequently, the perception of the stock. Fmsy was revised upwards, resulting in a current exploitation level significantly below Fmsy, whereas the perception of the previous year was that the stock was being fished slightly above Fmsy.
- 7) Management plan: Part of the EU plan. Shared stock with Norway → Advice based on the MSY approach.

General comments

Overall, well documented and consistent with the IBP.

Technical comments

For future consideration: Smoothing of natural mortality and maturity through time might benefit from a more standardized approach than the currently used GAM (e.g. where number of knots used is dependent on the number of data, or where a moving average with a predefined number of years is specified).

Tables 8a,b need to be revised, as there are possible errors in the catch statistics from the values updated after the advice document was reviewed during WGNSSK. Specifically, landings values for 2018 are anomalously high, resulting in a large mismatch with ICES statistics. Values for 2020 are missing, yet should be available. **[CORRECTED]**

The assessment code has been made available, but is not completely consistent with TAF. This is planned for the next year. Some changes required for TAF consistency include: 1. Documentation of all R packages in SOFTWARE.bib, removal of directory assignments, consistency of script order (e.g. bootstrap called in data.R, subfolder creation should be at the beginning of respective TAF steps: data.R, model.R, output.R, report.R).

Human consumption fishery (HCF) catch includes BMS but not IBC. This is stated in the report, but may be added to the footnote in the advice as further clarification. One instance of % discards in the advice text incorrectly includes IBC.

I recommend that the report description regarding the procedure for IC discard raising etc. not be adjusted from year to year, but rather reflect the preferred, agreed upon, procedure, and add

text as needed to reflect deviations done for particular years (e.g. due to a lack of data on segments / quarters etc.).

Conclusions

The assessment has been done correctly. Only minor errors in some reported catch statistics were identified and these have already been partially corrected.

wit.27.3a47d (witch)

General

An assessment for wit.27.3a47d was not possible during the meeting of WGNSSK in 2021 because ICES DATRAS Center was unable to provide the survey indices, probably due to an error in the code.

Thus during the interbenchmark (IBPWITCH, 2021)

- indices were calculated using a GAM approach
- SAM model was updated
- New reference points were calculated

For single-stock summary sheet advice

Stock: **wit 3a47d**

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

- 43) Assessment type: **Update (Interbenchmark 2021)**
- 44) Assessment: **accepted**
- 45) Forecast: **accepted**
- 46) Assessment model: **SAM – proposed by WGNSSK 2021, accepted by WKNSEA 2018, modified by IBPWitch 2021– tuning by 2 age indices and 2 biomass indices**
- 47) Consistency: **Interbenchmark 2021 therefore not consistent with 2020 assessment**
- 48) Stock status: **$B < MSY B_{trigger}$; $F_{MSY} < F < F_{lim}$**
- 49) Management plan: **The EU multiannual plan (MAP) for stocks in the North Sea (EU, 2018) and adjacent waters applies to by-catches of this stock.**

General comments

- The stock annex needs a few updates to bring it into line with what has been done during the interbenchmark (see technical comments).
- All data described in the stock annex were available and used in the assessment.
- The model settings/configuration used are as described in the stock annex
- The output data from the assessment are consistent.
- The forecast settings used are as described in the report.
- The correct basis for advice has been used.
- The stock annex does not list all model setting listed in the report or on stockassessment.org

Technical comments

- Stock annex:
 - Discards rates need to be updated

Conclusions

The assessment has been performed correctly in accordance with the stock annex.

Audits for autumn update assessments (Norway pout and *Nephrops*)

nop.27.3a4 (Norway pout)

General

Assessment and forecast completed in good time (under severe pressure) and according to the specifications of the Stock Annex following the 2016 benchmark, updated with 2020 reference points.

For single stock summary sheet advice:

- 17) **Assessment type:** update assessment
- 18) **Assessment:** analytical
- 19) **Forecast:** Stochastic forecast
- 20) **Assessment model:** Quarterly SESAM model
- 21) **Data issues:** Q3 English and Scottish survey data available in time for assessment schedule. IBTS data were revised following automation of age allocation procedures, which caused a re-scaling of the assessment (SSB increase, F decrease).
- 22) **Consistency:** Update assessment, following specifications in the Stock Annex, but with revised reference points following the rescaling in the assessments.
- 23) **Stock status:** Above B_{lim} and B_{pa} , no F reference points except for F_{cap} ($F_{bar}(1-2)$);
- 24) **Management Plan:** No management plan, but ICES has evaluated long-term management strategies for Norway Pout following an EU-Norway request

General comments

Given the rapid turnaround for the audit (just a few hours), the auditor only focused on the advice sheet and the relevant inputs from the report to the advice sheet. The stock assessor is to be commended for a rapid turn-around from provision of data to completion of report and advice (just a few days).

Only minor errors detected, and some small improvements needed (rounding) as indicated below.

Technical comments (advice sheet version 7 on the advice sharepoint, as per 28/09/2021)

- Table 2 – rounding rules need to be applied, as indicated by the highlighted numbers. I have indicated what I think they should be, but needs verification by the stock assessor.
- Table 6 – EU TAC value for 2020 is not corrected. I have indicated the source for the correct value (65000 should be 72500). I have also inserted the values for 2021, with the source. An additional footnote may be needed against the EU TAC to explain that it is a combination of the EU and UK.
- Table 8 – the “Bycatch of other species” in the final table section does not add up to the values by division for 2020 and 2021 (fine for other years).

Conclusions

The assessment has been performed correctly.

nep.fu.6

General

For single stock summary sheet advice:

- 25) **Assessment type:** Category 1 with annual advice (October advice)
- 26) **Assessment:** UWTV survey
- 27) **Forecast:** An updated short-term forecast for 2022 was presented. Forecast based on latest UWTV survey (2021), mean weights (2018-2020), discard rate (22.0), discard survival (15%) and MSY harvest rates.
- 28) **Assessment model:** None
- 29) **Data issues:** No data issues
- 30) **Consistency:** This stock has been benchmarked by ICES in 2013 (WKNEPH, 2013) and the stock annex was updated.
- 31) **Stock status:**
 - The 2021 burrow abundance estimate decreased 11% in relation to 2020 but remains above the Btrigger. The harvest rate decreased in 2020 to 9.1 but remains above Fmsy.
- 32) **Management Plan:** EU multiannual plan (MAP). There is no agreement with the UK regarding the EU multiannual plan (MAP) and it is not used as the basis of the advice for this stock. The WG, ACOM and STECF have repeatedly advised that management should be at a smaller scale (FU level) than the ICES subarea level.

General comments

Technical comments

The following minor corrections are suggested:

In the report (section short term forecasts) the option for F2020 (9.1%) is missing from the catch option tables.

There is a slight mismatch in the landings and discards reported in Table 6 and Table 8 (see e.g. 2017 and 2018) in the advice sheet.

The headline advice (first sentence) in the advice sheet is slightly different from what was used for other FUs.

Conclusions

The forecast has been performed correctly with no deviations from the standard procedure for this stock.

nep.fu.7

General

For single stock summary sheet advice:

- 1) **Assessment type:** Category 1 with annual advice (October advice)
- 2) **Assessment:** UWTV survey
- 3) **Forecast:** An updated short-term forecast for 2022 was presented. Forecast based on latest UWTV survey (2021), mean weights (2018-2020), discard rate (2018-2020), discard survival (25%) and MSY harvest rates.
- 4) **Assessment model:** None
- 5) **Data issues:** No data issues
- 6) **Consistency:** Discard sampling was impacted by the Covid-19 situation, however sampling in quarters 1 and 4 was considered sufficient (coverage 55% of the landings in 2020) to be used for the discard estimates. This does not present an issue to the time series consistency.
- 7) **Stock status:** The 2021 burrow abundance estimate increased 38% in relation to 2020 returning to levels similar to previous years (2017-2019). The harvest rate decreased and is well below Fmsy.
- 8) **Management Plan:** Since 2021, ICES MSY approach; previously EU multiannual plan (MAP). There is no agreement with the UK regarding the EU MAP and it is not used as the basis of the advice for this stock. The WG, ACOM and STECF have repeatedly advised that management should be at a smaller scale (FU level) than the ICES subarea level.

General comments

Technical comments

As with every other Category 1 functional unit in the NSSK assessment area, advice for FU 7 has been impacted by the ongoing COVID-19 pandemic. However, with the resumption of UWTV surveys in 2021, the assessment could be carried out as normal, and there is no immediate need to reclassify the category of this stock.

The following minor corrections are suggested:

In the report table 11.5.1 starts in the year 1983, while the equivalent table in the advice sheet (table 8) starts at 1981.

Conclusions

The forecast has been performed correctly with no deviations from the standard procedure for this stock.

nep.fu.8

General

For single stock summary sheet advice:

- 1) **Assessment type:** Category 1
- 2) **Assessment:** UWTV survey
- 3) **Forecast:** An updated short-term forecast for 2022 was presented. Forecast based on latest UWTV survey (2021), mean weights (2018-2020), discard rate (2018-2020), discard survival (25%) and MSY harvest rates.
- 4) **Assessment model:** None
- 5) **Data issues:** No data issues
- 6) **Consistency:** In 2020, only commercial catch samples from quarter 1 were available, as a result of the COVID-19 pandemic. As observed discard rates in quarter 1 were lower than average, it was decided to calculate averages for the reference period 2017 – 2019 and scale to quarter 1 values in 2020. There was no seasonal pattern in discard rate in the past, so the approach was considered appropriate.
- 7) **Stock status:** The 2021 burrow abundance estimate decreased by 25% in relation to 2020. The harvest rate decreased and is well below Fmsy.
- 8) **Management Plan:** Since 2021, ICES MSY approach; previously EU multiannual plan (MAP). There is no agreement with the UK regarding the EU MAP and it is not used as the basis of the advice for this stock. The WG, ACOM and STECF have repeatedly advised that management should be at a smaller scale (FU level) than the ICES subarea level.

General comments**Technical comments**

As with every other Category 1 functional unit in the NSSK assessment area, advice for FU 8 has been impacted by the ongoing COVID-19 pandemic. However, with the resumption of UWTV surveys in 2021, the assessment could be carried out as normal, and there is no immediate need to reclassify the category of this stock.

Conclusions

The forecast has been performed correctly with no deviations from the standard procedure for this stock.

nep.fu.9**General**

FU 9 (Moray Firth) is one of nine Norway Lobster stock units in the North Sea (plus the area outside FUs). ICES advice is given specifically for each individual FU, however EU fishery management uses a combined stock TAC covering FUs 5, 6, 7, 8, 9, 10, 32, 33, 34, as well as regions of Subarea 4 that are outside FUs. FU 9 is a Category 1 (Nephrops) stock: the assessment uses an underwater video survey (UWTV) to estimate absolute abundance.

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

- 1) Assessment type: Category 1 (UWTV survey) with annual advice
- 2) Assessment: accepted; absolute abundance from UWTV survey
- 3) Forecast: not presented; no analytical forecast for any of the Nephrops stocks; advice for this FU is based on the most recent accepted abundance survey (2021), mean weights (2018-2020) and MSY harvest rates.
- 4) Assessment model: none
- 5) Consistency: The 2020 UWTV survey was not deemed robust enough for the assessment, because of the reduced number of stations completed due to the COVID-19 disruption on the survey schedule. As such, the stock size for 2020 is unknown. The UWTV survey was resumed in 2021 and carried out as normal. The harvest rate in 2020 was calculated using an interpolated value for abundance (average of 2019 and 2021).
- 6) Stock status: F is below the F_{MSY} proxy, and stock size is above the MSY $B_{trigger}$ proxy.
- 7) Management plan: Since 2021, ICES MSY approach; previously EU multi-annual plan

General comments

This Norway Lobster functional unit is generally well documented.

Technical comments

As with every other Category 1 functional unit in the NSSK assessment area, advice for FU 9 has been impacted by the ongoing COVID-19 pandemic. However, with the resumption of UWTV surveys in 2021, the assessment could be carried out as normal, and there is no immediate need to reclassify the category of this stock.

Conclusions

The assessment has been performed correctly in line with the stock annexe.