

Annex 5: Audit reports

Review of ICES Scientific Report, (NWWG) (2021) (22/4-6/5)

Reviewers: Petur Steingrund

Expert group Chair: Teunis Jansen

Secretariat representative: Ruth Fernandez

Audience to write for: advice drafting group, ACOM, and next year's expert group

General

The stock will be benchmarked in 2023.

For single-stock summary sheet advice

Greenland halibut in ICES subareas 5ab and 14

Short description of the assessment:

- 1) Assessment type: Stock production model (stochastic version of the logistic production model and Bayesian inference).
- 2) Assessment: accepted.
- 3) Forecast: accepted.
- 4) Assessment model: Stock production model tuned by one commercial cpue index and one (combined) survey cpue index.
- 5) Consistency: The model has been very consistent for a decade.
- 6) Stock status: $B/B_{msy} 2020 = 0.78$, $B/B_{msy} 2021 = 0.80$, $F/F_{msy} 2020 = 1.02$, $F/F_{msy} 2021 = 0.94$, productivity (% of MSY) 2020: 95%, productivity (% of MSY) 2021: 96%. Nearly the same stock size and advice for a decade.
- 7) Management plan: There is no management plan but Greenland and Iceland largely follow an agreement from 2014 which keeps the fishing mortality on a nearly sustainable level.

General comments

The assessment may not be the best one but the advice seems to have worked well for a decade.

Technical comments

There was a modification of the commercial tuning index for the year 2020 because in one area only 4 hauls were conducted in 2020.

Review of ICES Scientific Report, NWWG, 2021, 22-29 April.

Reviewers: Kristján Kristinsson

Expert group Chair: Teunis Jansen, Denmark/Greenland

Secretariat representative: Ruth Fernandez

Audience to write for: advice drafting group, ACOM, and next year's expert group

General

- Survey indices, which are used as basis for the advice, indicate that the stock is at very low level.
- The survey time series suffer from periods of no surveys and insufficient depth coverage.
- Recruitment in the area very low.
- Catches not split between the two redfish species found in East Greenland waters. Species split based on samples from the commercial fishery and from one survey.
- Recommended that the stock should be benchmarked in 2023.
 - The main goal to use underutilized data from various surveys conducted in the area.
 - Data not available to perform an analytical assessment

Stock: Beaked redfish (*Sebastes mentella*) in Division 14.b, demersal (South-east Greenland) – reb.27.14b

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

- 8) Assessment type: Category 3.2
- 9) Assessment: Survey trends, no analytical assessment.
- 10) Forecast: No forecast available.
- 11) Assessment model: Survey trend-based assessment from the Greenland Shallow Water survey (GRL-GFS).
- 12) Consistency: No survey data from the Greenland Shallow Water survey 2017-2019
- 13) Stock status: The biomass index has declined since 2010 and was in 2020 at very low levels (lowest in the time series).
- 14) Management plan: No management plan.

General comments: The assessment is based on survey trends from the Greenland Shallow Water survey (GRL-GFS). The biomass index from 2020 is below any candidate for biomass reference points. The survey was not conducted in 2017-2019 and prevents evaluation of stock development in these years. However, the German Groundfish survey in East Greenland (GER(GRL)-GFS-Q4) confirms the decreasing trend observed since 2011.

The survey's time series suffer from periods with no surveys and insufficient depth coverage of the species distribution. CPUEs from the fishery is also available but considered less reliable as biomass indicator since the species tends to have a schooling behaviour which enables the fishery to keep constant catch rates even when stock biomass is decreasing.

The absence of indications of incoming cohorts raises concerns about the future productivity of the stock. The Greenland Shallow Water survey and the German groundfish survey estimates have consistently shown very low abundance of juveniles. There are signs of improved recruitment of *Sebastes* sp. (<17 cm) observed in the Greenland Shallow Water survey in 2020. With the overall low abundance of juveniles in the past, the fishable biomass is likely not expected to increase in the coming years

Estimates of catches in 2020 are based on a species split (*S. norvegicus* and *S. mentella*) from the Greenland survey and from samples of the commercial fishery. This procedure on species allocation is expected

to continue in the future. The sharp change in this ration between 2018 and 2019 raises question of the accuracy of the split.

Technical comments

The report is in accordance with the stock annex.

The advice sheet is consistent with the report.

Conclusions

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

Review of ICES Scientific Report, (*expert group/workshop title*) (*year*) (*dates*)

Reviewers: Karl-Michael Werner

Expert group Chair: Teunis Jansen

Secretariat representative: Ruth Fernandez

Audience to write for: advice drafting group, ACOM, and next year's expert group

General

The stock was benchmarked in spring 2021 and is well carried out. I recommend to accept the assessment and the advice sheet. The stock assessor made the best out of the available data and carried out a careful and thorough assessment, which does, from my point of view, not leave much space for improvement.

For single-stock summary sheet advice

Iceland cod (iCod)

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

- 1) **Assessment type:** update
- 2) **Assessment:** accepted
- 3) **Forecast:** accepted
- 4) **Assessment model:** Statistical catch at age. ADCAM with a random walk on F (changes slowly through time and with ages).
- 5) **Consistency:** Stock benchmarked in spring 2021.
- 6) **Stock status:** Stock recently declining but still well above all biomass reference points.
- 7) **Management plan:** Iceland has a management plan for cod, which was evaluated by ICES and is considered precautionary. The management plan uses a catch stabilizer to limit catch fluctuations from year to year. The target harvest rate from the management plan is 0.2.

Review of ICES Scientific Report, (*expert group/workshop title*) (*year*) (*dates*)

Reviewers: Karl-Michael Werner

Expert group Chair: Teunis Jansen

Secretariat representative: Ruth Fernandez

Audience to write for: advice drafting group, ACOM, and next year's expert group

General

The fleet has historically never taken extremely high amounts of saithe due to low price and a high cost to catch it. Even when fisheries were not TAC limited, overfishing did not occur. Hence there is little fear and likely low risk of overfishing it. It seems that the stock is generally overestimated. This could be also due to changes in the fleet towards more longliners, which might also contribute to uncertainties in the assessment. The surveys do not capture the population dynamics very well, internal survey consistency of year classes is not always great. The surveys do not capture recruitment patterns well, likely because nursery grounds are shallow, where surveys don't go. The TAC has often not been caught in recent years and the harvest rate has been below the target rate of 0.2.

For single-stock summary sheet advice

Icelandic saithe

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

- 1) Assessment type: *update*
- 2) Assessment: *accepted*
- 3) Forecast: *accepted*
- 4) Assessment model: Separable statistical catch-at-age model.
- 5) Consistency: *last year's assessment accepted*
- 6) Stock status: *$B > B_{lim}$ and $B > MSYB_{trigger}$ for a while; $HR < HR_{lim}$ and $HR < HR_{msy}$; good recruitment in recent years*
- 7) Management plan: *The Icelandic ministry has a management plan on saithe in order to provide long-term maximum sustainable yield. The harvest rate according to the management plan is 0.2.*

This assessment is well carried out and from my point of view difficult to improve. The assessor used different models for comparison and carries out a careful data exploration in order to gain insights into stock dynamics. I think the stock assessor faces the difficulties and challenges and does his best to deal with them. I recommend to accept the assessment.

Review of ICES Scientific Report, (NWWG, 2021, 22-29 April).

Reviewers: Julius Nielsen

Expert group Chair: Teunis Jansen, Denmark/Greenland

Secretariat representative: Ruth Fernandez

Audience to write for: advice drafting group, ACOM, and next year's expert group

Stock: Icelandic slope *Sebastes mentella* in 5.a and 14 – reb.27.5a14

General

- The precautionary advice is based on survey indices which indicate the stock levels are relatively low with no signs of recruitment.
- Because of COVID outbreak, the advice for 2021 was not issued by ICES.
- The stock will be benchmarked in 2022
 - To apply analytical assessment model (Gadget) and move the stock from category 3 to category 1.
- The stock assessment was conducted in accordance with the Stock annex

For single-stock summary sheet advice

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

- 15) Assessment type: Category 3.2 – update assessment with addition of 1 year of data
- 16) Assessment: Survey trends, no analytical assessment
- 17) Forecast: not presented
- 18) Assessment model: Survey trend-based assessment from the Icelandic Autumn Groundfish survey (IS-SMH)
- 19) Consistency: The advice has since 2014 been based on the DLS approach (category 3.2).
- 20) Stock status: The stock status cannot be evaluated in relation to MSY or PA reference points. However, survey biomass indices show that the stock is on a relatively low level since 2002 and is fluctuating without a clear trend. The stock is considered vulnerable due to the lack of recruitment.
- 21) Management plan: no management plan for this stock.

General comments

Sebastes mentella is a slow growing and late-maturing species and is therefore considered very vulnerable to overexploitation. Since 2007, survey estimates have shown low recruitment which raises concerns about the future productivity of the stock. All stated in the report.

Technical comments

It is known that species identification beaked and golden redfish can be difficult. However, nothing about this is mentioned in the report. The report however is in accordance with the stock annex and the advice sheet is in accordance with the report.

Conclusions

The assessment has been performed correctly and in accordance with the stock annex. No major issues were observed. Therefore, the updated assessment gives a valid basis for the advice.

Review of ICES Scientific Report , NWWG, 2021, 22-29 April.

Reviewers: Tanja Buch

Expert group Chair: Teunis Jansen

Secretariat representative: Ruth Fernandez

Audience to write for: advice drafting group, ACOM, and next year's expert group

Stock **Haddock in division 5.a (Iceland ground).**

General

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

- The stock was benchmarked in 2019 as well as management strategy evaluation which resulted in new reference points.
- Because of COVID outbreak, the advice for 2020/2021 was not issued by ICES.
- There was reduced sampling effort for the commercial fisheries in 2020 due to the COVID outbreak. However, the reduced number of samples are considered sufficiently representative of the fishing operations.
- The stock assessment was conducted in accordance with the Stock annex.

For single-stock summary sheet advice

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

- 22) Assessment type: Category 1, Statistical catch-at-age model.
- 23) Assessment: accepted
- 24) Forecast: presented
- 25) Assessment model: Muppet (Statistical catch-at-age model). Using catch-at-age and 2 survey indices for tuning.
- 26) Consistency: The model from the 2019 benchmark have been used in 2019 and this year. No advice was issues in 2020 due to the COVID outbreak. The TAC set for the fishing year 2020/2021 was produced by MFRI following benchmark procedures.
- 27) Stock status: Spawning size is above MSY $B_{trigger}$, B_{PA} and B_{lim} . Fishing pressure is above both HR_{MSY} and HR_{PA} and below HR_{lim} .
- 28) Management plan: Management plan is consistent with both precautionary approach and the ICES MSY approach. The advice follow the management plan, the advice for 2021/2022 is 50429 tonnes which is an increase from the two previous years..

General comments

- The total landings are above the agreed TAC in recent years, this is due to transfer of TAC between years and between species.
- The fishing year starts at 1. September and advice TAC is for the period 1.9.2021 to 30.8.22.
- The TAC for the remainder of 2020/2021 fishing year was increased by 8000t by the Government of Iceland, this increase will be subtracted from the 2021/2022 TAC. This has not been included in the basis of the advice as it was made public during NWWG.

Technical comments

The report and advice sheet are in accordance with the stock annex.

Conclusions

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

Review of ICES Scientific Report, NWWG, 2021, 22-29 April.

Reviewers: Luis Ridao Cruz

Expert group Chair: Teunis Jansen, Denmark/Greenland

Secretariat representative: Ruth Fernandez

Audience to write for: advice drafting group, ACOM, and next year's expert group

General

- Stock benchmarked in 2018 using SAM as the basis for advice
- Mixing of the off-shore and in-shore components causes problems in the evaluation of the stock
- Genetic samples from the inshore survey suggest that the majority of cod in the northern area belong to the WestGreenland offshore stock component whereas further south the West-Greenland inshore stock is the dominant component.
- Steep decline in catches in the last 5 years.
- Catches comprised of relatively few year classes (5 and 6 years old individuals)

For single-stock summary sheet advice

Cod (*Gadus morhua*) in NAFO Subarea 1, inshore (West Greenland cod)

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

- 1) Assessment type: Category 1
- 2) Assessment: analytical assessment
- 3) Forecast: accepted
- 4) Assessment model: SAM – proposed by expert group, accepted by review group
2018 – tuning by two surveys
- 5) Consistency: assessment accepted for advice since benchmark in 2018. Uncertain due to stock mixing
- 6) Stock status: $SSB > MSY$ $B_{trigger}$, B_{pa} , and B_{lim} ; $F > F_{msy}$
- 7) Management plan: no management plan

General comments

The stock has increased since 2006 to historic high levels in 2016. Substantial drop in SSB in last 5 years although it is above reference points. Low recruitment since 2016 has affected the spawning stock biomass, which continues to decrease since 2016. . Fishing mortality has never been below F_{MSY} (0.27) and remains above. The mixing of cod from different stocks in the West Greenland inshore area adds uncertainty to the assessment. This is most pronounced in the poor model fit to catches, which is substantial in years with catches above 15 000 t. Management of the resource should take this issue into account when relating the ICES advice to the TAC setting.

TAC from 2016 to 2019 has only been fished in 2016. Since then, catches have decreased to 18 000 tons in 2020. TAC in 2021 is reduced to 21 000 tons.

The stock is for benchmark in 2022, where stock identities, based on new genetic data, will be the main issue.

Technical comments

The report is quite extensive. It may help to reduce size of tables (lower font, reducing cell size and so on) and figures.

Conclusions

The advice sheet is consistent with the report

The assessment has been performed in accordance with stock annex.

Reviewers: Einar Hjöleifsson

Expert group Chair: Teunis Jansen, Greenland

Secretariat representative: Ruth Fernandez

General

Areal management of the various cods found in Greenlandic waters may not be appropriate

Cod (*Gadus morhua*) in NAFO divisions 1A–1E, offshore (West Greenland)

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

- 1) Assessment type: Category 3
- 2) Assessment: Accepted
- 3) Forecast: None
- 4) Assessment model: Survey index
- 5) Consistency: Advice on this stock has been consistent
- 6) Stock status: No reference points
- 7) Management plan: No management plan

General comments

The temporal coverage of the main stock indicator (the Greenland survey) does not cover the last productivity spike of this stock. The advice sheet is augmented with German survey that started in 1982, covering the last catch productivity spike around 1990.

Technical comments

None

Conclusions

The advice is likely appropriate

Review of NWWG, Golden redfish 5,6,12, 14

Reviewers:Jesper Boje

Expert group Chair:Teunis Janssen

Secretariat representative: Ruth

General

The report is set up nicely and reads well except for some cleaning mentioned below.
The title of the stock includes subareas 5,6 and 14 while the stock acronym also contain subarea 12? (reg.27.561214) .

Section 19.8 on medium term forecast can be deleted: the section was relevant 15 yrs ago.
Likewise for 19.12 Ecosystem considerations and 19.5 Changes in the environment.

For single-stock summary sheet advice

Stock **reg.27.561214**

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

- 1) Assessment type: update
- 2) Assessment: accepted
- 3) Forecast: accepted
- 4) Assessment model: Gadget, using landings data and length distributions of catches from Iceland, Greenland, and the Faroes; survey data by length from IS-SMB (G3239) and German DTS(GFS)-Q4 (G3244), age data from Icelandic catches and IS-SMH (G4493).
- 5) Consistency: nice retro
- 6) Stock status: $F > F_{MSY}$ and $< F_{pa}$ and F_{lim} , and $SSB > MSY B_{trigger}$, B_{pa} , and B_{lim} .
- 7) Management plan:
Greenland – Iceland management plan where
 $F_{mgt} = F_{msy}$

General comments

none

Technical comments

Sampling in 5b and 14 is needed to cover entire stock.

Diagnostics from the Gadget model is difficult to evaluate wrt acceptance/rejection of modelrun. In example the model fit to the different length classes, what is the criteria for non-acceptable?(issue on agenda for next benchmark) Guidance is required.

Conclusions

None

Review of ICES Scientific Report, NWWG, 2021, 22-29 April

Reviewers: Birkir Bardarson

Expert group Chair: Teunis Jansen

Secretariat representative: Ruth Fernandez

Audience to write for: advice drafting group, ACOM, and next year's expert group

General

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

- The stock was benchmarked in 2011 and the Stock annex has been updated since e.g. involving advancements in relation to *Ichthyophonus* infections and mortality. The NWWG dealt with the PA reference points in 2016 and revised them in accordance to the ICES Technical Guidelines. Management strategy evaluation took place in 2017.
- Because of COVID outbreak, the advice for 2020/2021 was not issued by ICES but surveys were conducted and TAC advised by MFRI according to the Stock Annex.

For single-stock summary sheet advice

Stock **Herring (*Clupea harengus*) in Division 5.a, summer-spawning herring (Iceland grounds)**

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

- 1) Assessment type: update
- 2) Assessment: accepted
- 3) Forecast: accepted
- 4) Assessment model: NFT-ADAPT (VPA/ADAPT version 3.3.0 NOAA Fisheries Toolbox) age-based model. Tuning by catch in numbers and age disaggregated indices from acoustic surveys.
- 5) Consistency: The NFT-ADAPT model has been used as the basis for the assessments since 2005 and this year a comparison with a separate model (Muppet) gave very similar results. Retrospective analyses indicate a consistency over recent years, although, changes in stock distribution in the past are likely to have caused changes in survey catchability and *Ichthyophonus* pandemic has lead to uncertainties in mortality estimates. Advice has increased as a result of the upward revision in the stock size, due to a large 2017 year-class entering the fishery at age 4 this autumn.
- 6) Stock status: Fishing pressure is at F_{MSY} , HR_{4+} is below HR_{MGT} , F_{pa} and F_{lim} . SSB above $MSY B_{trigger}$, B_{pa} and B_{lim} . The stock size was declining 2000-2018 due to a combination of *Ichthyophonus* mortality and series of below average and poor year classes entering the stock. Strong 2017 year class has appeared and will cause an upward revision from last year's assessment.
- 7) Management plan: Agreed by ICES in 2017.

The TAC for the fishing year Y/Y+1 (1 September of year Y to 31 August of year Y+1) is calculated as follows:

When SSB_Y is equal to or above $MGT B_{trigger}$: $TAC_{Y/Y+1} = HR_{MGT} \times B_{ref,Y}$

When SSB_Y is below $MGT B_{trigger}$: $TAC_{Y/Y+1} = HR_{MGT} \times \left(\frac{SSB_Y}{MGT B_{trigger}} \right) \times B_{ref,Y}$

The spawning-stock biomass trigger ($MGT B_{trigger}$) is defined as 200 000 tonnes, the reference biomass is defined as the biomass of herring of ages 4 and older, and the target harvest rate (HR_{MGT}) is set to 0.15.

General comments

The assessment of this stock has been and is likely to continue to be challenged by uncertainties in catchability due to distributional shifts (e.g. changed overwintering areas) that current survey strategy and coverage can have difficulties to observe. This uncertainty could be reduced by more extensive herring surveys. Further, there are uncertainties about M by the *Ichthyophonus* pandemic that could be improved by more accurate estimation of the infection mortality in future studies.

Technical comments

None

Conclusions

(Single tables or figures can be added in the text, longer texts should be added as annexes.)

The stock assessment was conducted in accordance with the Stock annex