

## Annex 6: Audit Reports

### Audit of West Greenland inshore cod

Date: 28/04/2020

Auditor: Luis Ridao Cruz

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To the attention of the ACOM and the 2020 NWWG, this is an audit of the assessment of West Greenland inshore cod.

#### General

There is no management plan for the West Greenland inshore cod stock.

There are concerns about the mixing of stocks between the inshore and onshore areas as well as migratins to Icelandic waters.

Stock declining in recent years as a consequence of declining recruitment and/or migration to Iceland although  $F$  is quite stable since 2010

#### For single stock summary sheet advice:

1. Same procedure as last year
2. Analytical
3. Presented
4. SAM
5. Data are available, but the use of the survey indices should be revised, because they should be used as one, combined index, instead of two separated indices.
6. Fishing mortality reference points from last years assessment were not accepted and  $F_{pa}$  and  $F_{lim}$  are excluded this year.
7. Stock size is decreasing, likely due to poor recruitment and high fishing mortality values (approximately 2 times  $F_{MSY}$ ), but still above  $MSY B_{trigger}$ .
8. There is no management plan

#### General comments

The report includes all relevant data. Some editorial changes were included in the report section. There are no references to tables and figures in section 15.6 "State of the stock" but in 15.9 "Uncertainties in the assessment and forecast". This ought to be corrected. There is also a lack of reference points in figures. Recruitment figure is missing.

#### Technical comments

No comments.

#### Conclusions

The assessment has been performed according to the stock annex. Because of the difficult stock separation and mixing of stocks in the area, the assessment is very uncertain.

There is a considerable proportion of fish from the West Greenland offshore stock in inshore catches.

## Audit of Cod.2127.1f14

Date: 12/05/2020

Auditor: Einar Hjörleifsson

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To the attention of the ACOM and the 2020 NWWG,

### General

#### For single stock summary sheet advice:

- 1 **Assessment type:** Update
- 2 **Assessment:** Age-based
- 3 **Forecast:** Age-based, run internally in the model
- 4 **Assessment model:** SAM
- 5 **Data issues:** The Paamiut east (XIVb+1F) survey was not conducted in 2018 and 2019 and WH east (XIVb+1F) survey was not conducted in 2018 adding uncertainty to the assessment.
- 6 **Consistency:**
- 7 **Stock status:** Point estimates of F2019 is above Fmsy, otherwise ok.

**Management Plan:** No explicit harvest control rule

### General comments

The assessment is more uncertain in recent years because of missing surveys.

### Technical comments

The lack of surveys in 2018 means that there is no initial estimate for the 2017 year class at age 1, the resulting estimates from SAM hence based on a random walk (this was already done so last year). In the 2019 german survey the age groups 1 and 2 were zero. In SAM there is no distinction made between NULL and ZERO, both input entries are treated as missing value. Given that the random walk values are low, it was concluded to proceed with using the random walk values. Using arbitrary low survey value (instead of zero for age 1 and 2 in 2019 in this specific case) when the estimates are zero should be investigated in the next benchmark cycle.

### Conclusions

The assessment has been performed, as much as possible, according to the stock annex, although missing survey years were not anticipated at the benchmark.

## Audit of Beaked Redfish (*Sebastes mentella*), East Greenland slope (reb.27.14b)

Date: 28 April 2020

Auditor: Kristján Kristinsson

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### General

This stock was benchmarked in March 2012 and the stock has been assessed in accordance to the benchmark.

### For single stock summary sheet advice:

- 1) **Assessment type:** Category 3 (or 5)
- 2) **Assessment:** Survey trends, no analytical methods.
- 3) **Forecast:** No forecast available.
- 4) **Assessment model:** Survey trend-based assessment from the Greenland Shallow Water survey (GRL-GFS)
- 5) **Data issues:** There is no data from the Greenland Shallow Water survey (GRL-GFS) 2017-2019.
- 6) **Consistency:** No new survey data, so consistency cannot be determined.
- 7) **Stock status:** The biomass index declined from 2010 to 2016. With no new data for three years stock status cannot be determined.
- 8) **Management Plan:** None

### General comments

The assessment is based on survey trends from the Greenland Shallow Water survey (GRL-GFS). The survey was not conducted in 2017-2019 and therefore the status of the stock cannot be determined.

The absence of indications of incoming cohorts raises concerns about the future productivity of the stock.

The split of catches between *S. mentella* and *S. norvegicus* is based on information from log-books. The sharp change in this ration between 2018 and 2019 raises question of the accuracy of the split. Figure 23.3.1.2 show little change in the depth distribution of the commercial redfish catches.

This is a category 3 stock. Since no survey data is available for three years, it should be a category 5 stock.

### 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.

## Audit of Greenland halibut

Date: 28.04.2020

Auditor: Karl-Michael Werner

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### General

- The assessment is carried out well.

- Several people from the working group and different nations provided constructive input for the assessment and although data are limited I believe the assessment is a good job and provides reasonable estimates for biomass and reference points.
- Some concerns exists about stock identification and separation in the large area covered by the assessment and it seems that genetic investigations would be useful.
- In the early 1990s, biomass dropped steeply, but median fishing mortality did not increase as strongly to justify the drop in biomass. Hence, fishing mortality might have truly been above the median but within the presented confidence intervals.

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

- 9) **Assessment type:** update
- 10) **Assessment:** stock production model
- 11) **Forecast:** presented
- 12) **Assessment model:** stochastic version of the logistic production model and Bayesian
- 13) **Data issues:** Everything looks fine, data were updated in the new report and advice sheet and also retrospectively corrected
- 14) **Consistency:** Last years assessment accepted
- 15) **Stock status:**  $B > MSYB_{trigger}$ ,  $F > F_{msy}$  ("Overfishing but not overfished"). After a steep biomass decline in the early 1990s, biomass has been stable and slightly above  $MSYB_{trigger}$ .
- 16) **Management Plan:** I cannot find indications that a management plan exists. Catches were in the most recent decade sometimes slightly below advice, but more often higher, although not dramatically (for example, 25.000 instead of 22.000 tons).

#### **General comments**

No substantial criticism for this assessment or the report. Everything appears to be in place and well structured. For future research I believe it would be useful to evaluate the impact of this fishery on benthic ecosystems, especially because in many regions this fish is caught in deep waters (800-1300 m). As long as there is little known, the ecological sustainability of the fishery remains somewhat uncertain.

#### **Technical comments**

No technical comments

#### **Conclusions**

The assessment has been performed correctly.

## Checklist for audit process

### General aspects

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

## Audit of Golden redfish (*Sebastes norvegicus*) in subareas 5, 6, 12, and 14

Date: 05. May 2020

Auditor: Helle Torp Christensen (htch@natur.gl)

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### General

The analytical assessment for the golden redfish is based on Gadget, with the main input data deriving from catches and the Icelandic spring-survey and German survey in East Greenland. This is an update assessment with one more year of data. The stock is declining because of poor recruitment (low number of recruits (<30cm) since 2009), which is evident from catches and especially surveys.

This year's advice sheet is abbreviated due to the Covid 19 disruption. Details on the assessment is still to be found in the assessment report.

### For single stock summary sheet advice:

- 1) **Assessment type:** update
- 2) **Assessment:** analytical
- 3) **Forecast:** presented
- 4) **Assessment model:** Gadget -tuning by 2 surveys
- 5) **Data issues:** NA
- 6) **Consistency:** The assessment results are consistent with last year's results, which was accepted for basis of advice.
- 7) **Stock status:** F is below Flim and Ppa but above FMSY. B is above Blim, Bpa and MGT Btrigger. Recruitment is low and decreasing.

**Management Plan:** A management plan was agreed between Iceland and Greenland for 2016-2018. The plan has not been renewed; however references points are still followed.

### General comments

The advice sheet and the report provide a good and appropriate description on the assessment and the stock status.

**Technical comments**

Paragraph 19.1 needs an update since it refers to restrictions of the cod fishery in Greenland waters that is no longer applicable. Text on the agreements regarding redfish needs update too.

**Conclusions**

This update assessment has been performed correctly and give a valid basis for advice. It differed slightly from the Stock Annex in that way that the German Survey in Greenlandic waters from 2017 was repeatedly used in 2018 due to lack of survey that year. It is not expected to have significant impact on the assessment.