

Northwest Atlantic Fisheries Organization



**NAFO Joint Fisheries Commission-Scientific Council Working Group on
Risk-Based Management Strategies (WG-RBMS)**

07-09 February 2017
NEAFC Secretariat, London, UK

NAFO
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NAFO Joint Fisheries Commission-Scientific Council Working Group on Risk-Based Management Strategies (WG-RBMS)

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1. Opening

Carsten Hvingel (Norway) and Jacqueline Perry (Canada), co-Chairs of the WG, opened the meeting at 10:00 hours on 07 February 2017 at the headquarters of the North East Atlantic Fisheries Commission (NEAFC) in London, UK. Representatives from the following Contracting Parties were in attendance: Canada, Denmark (in respect of Faroe Island and Greenland), European Union, Japan, Norway and the United States of America (Annex 1).

2. Appointment of Rapporteur

Tom Blasdale and Ricardo Federizon (NAFO Secretariat) were appointed co-Rapporteurs.

3. Adoption of Agenda

The revised provisional agenda previously circulated was adopted (Annex 2).

4. Discussion on the Timeline for the Revision of the NAFO PA Framework

A review of the work completed to date as well as the elements requiring study within Precautionary Approach Framework (PAF) was tabled. With respect to timelines, it was clear that many items which were intended to be completed by this time remain outstanding. While this WG recognized the ongoing effort of the individuals that are providing contributions to the PAF review, it also recognized that competing priorities and a limit of capacity have hindered progress on some of the more substantive tasks. For example, research to inform on appropriate risk levels under the revised PAF will require dedicated study. Prior to the meeting of this WG scheduled for the summer, the chair of the PAF WG will consult with WG members on both capacity and revised timelines, and will report back to the this WG.

5. Discussion on the Work Schedule for the 3M Cod Benchmark Assessment

The work plan previously agreed to by this WG in April 2016 was modified during the Annual Meeting in September 2016. The timeline for the NAFO 3M Cod Benchmark Assessment and the NAFO 3M Cod Management Strategy Evaluation (MSE) have been delayed one year reflecting the priority attached to the Greenland halibut MSE review. The updated work schedule is presented in Annex 3.

6. Greenland halibut (GHL) Management Strategy Evaluation (MSE) Review

The management strategy in place since 2010 for Greenland halibut was reviewed. The scope of the review covered the MSE elements including the management objectives, performance statistics (PS) and harvest control rules (HCR) as well as the general performance of the management strategy, challenges and identification of areas of improvement. Based on the review, management objectives, example performance targets, as well as HCR guidelines, were developed. In addition, the 2017 timeline for the GHL MSE was updated. The MSE elements, including Exceptional Circumstances, will be further refined in the latter meetings of this WG, the Scientific Council (SC), and the Fisheries Commission (FC).

Objectives of the GHL Management plan

The long-term objective is to achieve and to maintain the Stock Biomass and the Fishing Mortality in the 'safe zone', as defined by the NAFO Precautionary Approach framework (FC Doc. 04-18) and to ensure that fisheries resources are maintained at or restored to levels capable of producing maximum sustainable yield, per the

Convention objectives (resolution NAFO/GC Doc. 08-03). These general management objectives can be refined into measurable objectives as:

1. Restore to within a *prescribed period of time* or maintain at B_{msy}
2. The risk of failure to meet the B_{msy} target and interim biomass targets within a *prescribed period of time* should be kept moderately low
3. Low risk of exceeding F_{msy}
4. Very low risk of going below an established threshold (e.g. B_{lim}^* or B_{lim} proxy)
5. Maximize yield in the short, medium and long term
6. The risk of steep decline of stock biomass should be kept moderately low
7. Keep inter annual TAC variation below established thresholds

It was noted that it will not be possible to meet all the objectives simultaneously and therefore some degree of “tradeoff” between objectives is to be expected.

The table below contains the list of objectives, and examples of what their potential corresponding Performance Targets (PT) might look like. Performance statistics (PS) will also need to be determined. These elements should be reviewed and may be revised or reconsidered to reflect the constraints of the technical execution of the MSE process and the upcoming assessment (April 2017) of the stock. The numbers (risk percentages, catch levels etc.) that appear in the table are intended to be illustrative, however agreement on specific details to allow identification of candidate HCRs will be required at the next meeting of WG-RBMS (April 2017).

Management Objectives	Performance Statistics	Example Performance Targets
Restore to within a <i>prescribed period of time</i> or maintain at B_{msy}	To be determined	To be determined
The risk of failure to meet the B_{msy} target and interim biomass targets within a <i>prescribed period of time</i> should be kept moderately low	To be determined	The probability of failure to meet a milestone within a prescribed period of time should be kept at 25% or lower
Low risk of exceeding F_{msy}	To be determined	The probability of F exceeding F_{msy} during the evaluation period should be kept at 30% or lower.
Very low risk of going below an established threshold [e.g. B_{lim} or B_{lim} proxy].	To be determined	The probability of a total/exploitable biomass under an established threshold (e.g. B_{lim}/B_{lim} proxy) at 10% or lower
Maximize yield in the short, medium and long term	To be determined	The magnitude of the average TAC in the short, medium and long term should be maximized.

* As defined in the NAFO PA framework (FC Doc 04-18).

Management Objectives	Performance Statistics	Example Performance Targets
		The probability that the TAC is below 10,000t in any one year for the period year x to x+5 should be 25 % or lower.
The risk of steep decline of stock biomass should be kept moderately low	To be determined	The probability of a decline of 25% in terms of exploitable biomass from year x to x+5 is kept at 10% or lower.
Keep inter annual TAC variation below “an established threshold”	To be determined	<i>Either</i> This will be achieved through the constraint on the inter-annual TAC variation. At present this limit is 5% <i>or</i> a. The probability of annual TAC variations of greater than 15% be kept at 25% or lower and b. the probability of variation of more than 25% over any period of 3 years should be kept at 25% or lower.

In the April 2017 stock assessment meeting, it would be helpful if SC could consider how the risk concept should be applied e.g. should performance relative to targets be assessed at the level of individual operating models or against a (possibly weighted) average of all models? The WG-RBMS should develop consistent quantitative counterparts to the risk levels (e.g. very low, low and moderately low) taking into consideration how these terms have been defined for other NAFO stocks.

The results provided for each operating model to the April 2017 SC meeting should include at least the following, where B refers to the exploitable component of the biomass (previously considered to be ages 5-9):

- $B_{(current)}$
- B_{msy} or proxy
- F_{msy} or proxy
- Thirty year projections of exploitable biomass for the scenarios of constant catches set equal to zero, the average catch over the five most recent years; and twice that average catch. These projections should show medians, 95% probability intervals (the uncertainty arising from fluctuations in future recruitment) and five individual trajectories (“worm plots”) for each scenario.

Guidelines for the development of HCRs

Within the management strategy evaluation, the performances of a variety of candidate Management Strategies and/or HCRs should be considered. The eventual selection amongst candidates will be based on the most robust results in terms of a set of agreed performance statistics. Empirical (non-model-based) HCRs are

preferred as their outputs are more readily understood and therefore accepted by stakeholders. Nevertheless model-based HCRs will be considered provided their performance is shown to be better (time permitting).

The following guidelines are intended to assist with the development of appropriate HCRs:

General

The SC must advise what data (e.g. survey-based abundance estimates, catches) may be considered for input to management strategies/HCR i.e., as well as which metric (exploitable biomass or total biomass or abundance) to evaluate.

Restrictions to minimum/maximum changes in the TAC in terms of percentages and absolute numbers should be considered either as part of the HCR or as part of a suite of performance statistics (there is an initial preference for the former because it provides a degree of certainty for the industry). These restrictions may differ depending on the direction of the change and/or status of the stock.

Recent annual catches (and specifically their differences from the TAC intended) should also be considered as possible inputs (i.e. implementation error) bearing in mind the difficulties in estimating catches.

For empirical HCRs

Several alternative forms of empirical HCRs should be considered.

Management strategies/HCR might be refined by addition of surveys to serve as indices of recruitment in addition to others serving as indices of exploitable biomass.

The existing management strategies/HCR (based on the average of the recent trend in abundance indices from three surveys to adjust the TAC) should again be considered.

Variants of that management strategies/HCR which modify its control parameter values (e.g. lambda), constraints and number of years and weighting of surveys in the “trend calculations” should also be considered.

For Model based HCRs

Model based rules should take into consideration that which was tested in the first Greenland halibut management strategy evaluation (SCR 09-37).

Development of the timeline

WG-RBMS reviewed the timeline agreed at the Annual Meeting in 2017. Below is a revised timeline. Events after the June SC meeting will be subject to further revision depending on progress.

1. February WG-RBMS meeting
2. Intersessional:
 - WebEx meeting to agree final data sets as soon as possible and no later than the end of the 1st week of March (date to be agreed by doodle poll)
 - Initial operating models fit to data for results to be tabled at April SC meeting
3. April SC meeting:
 - Review results from available operating models
 - Discuss elements of other possible operating models to be developed prior to June SC meeting
 - Develop advice for the WG-RBMS regarding quantification of objectives/performance criteria and constraints
 - Specify Management Strategies and/or HCRs “trials”, including operating model variants to be fit, projection specifications, observation models for future generated data, and performance statistics (initial quantification of objectives)
 - Possibly give guidance for development of Candidate Management Strategies and/or HCRs

4. Intersessional:
 - WG-RBMS meeting last week of April (possible venue Boston or WebEx)
 - Refinement of performance statistics including risk tolerances and constraints
 - Developers of Candidate Management Strategies and/or HCRs fit further operating models and generate performance statistics for trials for a set of initial Candidate Management Strategies and/or HCRs
5. June SC meeting:
 - Tabling of developers results
 - Review of operating model fits
 - Review of initial Candidate Management Strategies and/or HCRs results
 - Initial discussion on trial plausibility
 - Possibly add further trials and then finalize operating models and trials
 - Cull initial Candidate Management Strategies and/or HCRs to a smaller set and summarize results
6. WG-RBMS meeting (Date to be agreed after April RBMS meeting - at least two weeks after information from SC June meeting is made available and possibly linked with the WG-BDS meeting):
 - Review initial Candidate Management Strategies and/or HCRs results
 - Finalize objectives and their quantification
 - Advise direction for further Candidate Management Strategies and/or HCRs development
7. Intersessional:
 - Developers of Candidate Management Strategies and/or HCRs adjust their Candidate Management Strategies and/or HCRs towards direction advised
8. WG-RBMS (?) meeting
 - Developers of Candidate Management Strategies and/or HCRs table updated Candidate Management Strategies and/or HCRs results
 - Initial selection made of best performing Candidate Management Strategies and/or HCRs
9. Intersessional:
 - Developers of selected Management Strategies and/or HCRs finalize results for presentation to Commission
10. Commission meeting:
 - Commission adopts new Management Strategy and/or HCR.

7. Recommendations to forward to FC and SC

The WG-RBMS recommends Fisheries Commission to:

Consider and endorse the updated plan for the 3M cod benchmark (Annex 3).

On Greenland halibut:

The WG-RBMS recommends Scientific Council to:

- **Take into account the guidance on Management Objectives and the formulation of the HCRs developed by this WG.**
- **Reflect on potential updates to the Exceptional Circumstances Protocol**

The WG-RBMS commits to:

Reflect on potential updates to the Exceptional Circumstances Protocol

Further recommendations on Greenland halibut were deferred to the next meeting scheduled for April 2017.

8. Other Matters

a. NAFO Working Group on Improving Efficiency of NAFO Working Group Process

The Secretariat reported on the progress of the NAFO WG on Improving Efficiency of NAFO WG Process. Feedback was sought on the possibility of allocating two-week period for the proposed WG meetings; and on the development of a clear communication mechanism amongst NAFO's subsidiary bodies to allow improved collaboration between them intersessionally.

Concerning the first issue, the WG is open to the possibility of a two-week period allocation for WG meetings. However, the WG stressed that there would need to be flexibility to have meetings outside this period if circumstances warranted (see for example timeline in Section 6). The preparation by the Secretariat in September of a tentative meeting calendar would be very useful and help improve the efficiency of the process.

Concerning the second issue, the WG would continue to reflect on the communication mechanism. The WG can work intermittently via Share Point and when a meeting is necessary, it can be decided to have that meeting via WebEx.

9. Adoption of Report

The report was adopted by correspondence following the meeting.

10. Adjournment

The meeting was adjourned at 17:00 hours on 09 February 2017.

Annex 1. Participant List

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Annex 2. Agenda

1. Opening
2. Appointment of Rapporteur
3. Adoption of Agenda
4. Discussion on the Timeline for the Revision NAFO PA Framework
5. Discussion on the Work Schedule for the 3M Cod Benchmark Assessment
6. Greenland halibut (GHL) Management Strategy Evaluation (MSE) Review
7. Recommendations to forward to FC and SC
8. Other Matters
9. NAFO Working Group on Improving Efficiency of NAFO Working Group Process
10. Adoption of Report
11. Adjournment

Annex 3. Updated calendar of 3M Cod Benchmark Assessment and Management Strategy Evaluation

NAFO 3M Cod Benchmark calendar

1. The Scientific Council (SC), in **June 2016**, approved the main assessment issues to be revised during the 3M Benchmark (NAFO SCS Doc. 16-14). Among those issues, there is the FC request to the SC (request number 8, SC SCS Doc. 16-01) that the SC should, in 2016, *analyse whether the current F_{lim} value for 3M cod is currently underestimated and to revise, if required, the relevant fishing mortality and biomass reference points appropriately*. Both WG-RBMS and SC agree that the best forum to carry out the F_{lim} review is the benchmark process, so this task will be undertaken during that process.
2. **Before the end of 2017**, all data needed for the NAFO 3M Cod assessment will be reviewed and compiled.
3. **Between June 2017 and March 2018**, different teams of SC scientists will be working on the issues identified in the 2016 June SC meeting.
4. The benchmark will be carried out in April 2018. This may involve SC and external scientists.
5. The **June 2018** SC meeting will carry out a new assessment taking into account the Benchmark conclusions. This assessment would inform the TAC decision for 2019 because the MSE may not be finalised before September 2018 (see next section below - "NAFO 3M Cod MSE calendar")

NAFO 3M Cod MSE calendar

Little progress is expected here before June 2018: this is because the results of the 3M cod benchmark will be required prior the resumption of the MSE process. This would be the expected steps:

1. In **June 2018**, a new 3M Cod assessment would be issued, according with the benchmark outputs as well as the reference points arising from any revisions of the PAF.
2. **After September 2018**, if the FC adopts any relevant new elements of the PAF, the WG-RBMS should revise the management objectives of the 3M cod MSE accordingly.
3. **Between September 2018 and March 2019**, different HCRs could be tested in order to see if they reach the established management objectives.
4. By **June 2019**, the WG-RBMS and SC may revise the 3M Cod MSE to enable the proposal of a HCR. This HCR may be submitted for approval to FC in September, 2019.

If and as approved by the FC, this HCR will be applied to determine the TAC in 2020 and onward.