Northwest Atlantic Fisheries Organization

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SCIENTIFIC COUNCIL INTERSESSIONAL MEETING

09-11 January 2024, via Webex

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Report of the Scientific Council Intersessional Meeting. January 2024.

09-11 January 2024, via Webex

Chair: Diana González Rapporteur: Tom Blasdale

1. Opening

The Scientific Council (SC) met by Webex during 9-11 January 2024, to address items in the work plans for NAFO Precautionary Approach Framework revision and the Management Strategy Evaluations (MSE) for 3LN redfish and 2+3KLMNO Greenland halibut, as agreed by the NAFO Joint Commission-Scientific Council Working Group on Risk-Based Management Strategies (WG-RBMS) in July 2023 (COM-SC Doc. 23-03).

The meeting was opened by the Chair, Diana González, at 09:00, Halifax time (UTC -4h).

Representatives attended from Canada, Denmark (in respect of Faroe Islands and Greenland), the European Union, France (in respect of St. Pierre et Miquelon), Japan, the Russian Federation, Ukraine and the United Kingdom and the United States of America. The Executive Secretary, Scientific Council Coordinator and other members of the Secretariat were in attendance.

2. Exceptional circumstances 2+3KLMNO Greenland halibut (GHL) for June 2024 (current ECs)

Commission request #2 (COM Doc. 23-09) asks SC in 2024 to:

> *…monitor the status of Greenland halibut in Subarea 2 + Div 3KLMNO annually to compute the TAC using the most recently agreed HCR and determine whether exceptional circumstances are occurring. If exceptional circumstances are occurring, the exceptional circumstances protocol will provide guidance on what steps should be taken.*

It is anticipated that a new HCR, to be developed under the current Management Strategy Evaluation (MSE, see section 3 below) will be used to compute the TAC for 2025, however, in the event that the new MSE is not completed and/or adopted by the Commission by September 2024, it may be necessary to use the HCR and exceptional circumstances protocol adopted by NAFO in 2017 for 2018 to 2023 inclusive.

Following replacement of the Canadian survey vessels, conversion factors for Greenland halibut in the Canadian fall surveys are expected to be available in time for the June 2024 SC meeting, however, no conversion factors can be derived for the Canadian spring survey, so the availability of the surveys for June 2024 will be:

	2019	2020	2021	2022	2023
Canada Fall 2J3K	✓	✓	✓	X	✓
Canada Fall 3LNO	✓	✓	X	X	✓
EU 3M 0-1400	✓	✓	✓	✓	✓
Canada Spring 3LNO	✓	X	X	X	--
EU-Spain 3NO	✓	X	✓	✓	✓

During the June 2023 meeting, SC considered that Exceptional Circumstances were occurring with respect to missing survey values. However, the applicability of the HCR was agreed:

> *Exceptional Circumstances occurring: over the last five years, there are two missing values from the highly weighted Canada Fall 3LNO series and three missing values from the relatively low weighted Canada Spring 3LNO series. There are insufficient data from the Canada Spring 3LNO to utilize it in the HCR, and only one value from the Canada Fall 3LNO series is contributing to the target based component of the HCR.*
>
> *However, a series of sensitivity tests indicate that applying the HCR informed by the available survey data serves as a reasonable option for providing TAC advice for 2024 with minimal deviation from the agreed Management Procedure (HCR output from a series of sensitivity tests did not deviate by more than 9%; SCR Doc. 23/015). Accordingly, it was recommended that the agreed formula could still be applied to calculate the TAC, with the exclusion of Canada 3LNO Spring series.*

SC considers that, in June 2024, the situation in relation to the availability of survey information will be similar to that in June 2023, so if it is necessary to calculate the 2025 TAC advice using the old HCR, exceptional circumstances will be occurring but the current HCR can be applied to derive the TAC for 2025.

Therefore, the SC **recommends** *estimating the 2025 TAC using the same approach that was used in 2023 to produce the 2024 TAC, using the current HCR.*

3. 2+3KLMNO Greenland halibut Management Strategy Evaluation

a) Testing Candidate Management Procedure (CMP) performance against established management objectives

i) Operating models (OMs)

The SC reviewed the list of OMs to be tested in each model (SCAA and SSM) in the Greenland halibut MSE. Small changes were made to those agreed during the July 2023 SC meeting (Table 1).

Table 1. OMs agreed for the GHL MSE process during the July 2023 SC meeting. These set of OMs changed slightly during the current meeting. In red, the more plausible OMs; in blue, the intermediate OMs; and in green, the more difficult OMs. The OM15 was deleted during the 2023 July RBMS meeting from the list.

OMs for GHL MSE from SC July meeting
1. Base Case
2. Hockey-stick stock-recruit relationship
3. Assume allometric natural mortality
4. Include future random error in natural mortality
5a. Assume PROVISIONAL conversion factors are biased (10%) 5b. Assume the 3LNO conversion factor is biased (10%)
6. Increase the variance in natural mortality for younger ages
7. Zero selectivity on plus-group
8. Decrease the doming in the commercial selectivities
9. Decrease starting values N(2022, a) by 10% for all ages a
10. 8 years with recruitment halved
11. Assume senescence
12. 8 years with increased natural mortality
13. Catch = 110% TAC
14. 8 years with limited survey data from 3LNO
~~15. EU only data~~

OM15, in which only the EU survey data was taken, was deleted by the July 2023 RBMS meeting as it is considered implausible that no Canadian surveys will be carried out in the future.

Because the final conversion factors from the Canadian Fall 2J3K survey will not be available until April 2024 and there are some uncertainties in the estimation of the conversion factors from the Canadian Fall 3LNO survey, the SC decided to implement OM 5 separated in a and b in order to cover these uncertainties and to be able to present the provisional results of the MSE at the April 2024 RBMS meeting for discussion. In June 2024, the results will be presented with the final values of the conversion factor of the Canadian 2J3K survey.

The agreed set of OMs, with a brief description of each of them, are in Table 2. The results of these OMs are going to be presented during the 2024 April RBMS meeting.

Table 2. OMs agreed for the GHL MSE process during this meeting.

Number	Name	Description	Plausibility	SSM	SCAA
1	Base Case	The projection model follows the same structure as the SCAA or SSM.	High	YES	YES
2	Hockey-stick stock-recruit relationship	For the future, include a hockey-stick S/R relationship, where the recruitment drops linearly to the origin from the lowest value of Bsp (SSB) in the assessment and mean recruitment (which applies at still higher Bsp values too). This is an SSM only robustness scenario, as recruitment is assumed to be random and independent from spawning stock biomass for the base case SSM OM (note that the SCAA includes a stock-recruitment relationship). In the case of the SCAA, a smooth HS S/R is going to be used to avoid convergence problems with the Beverton and Holt S/R used in this model.	High	YES	YES
3	Assume allometric natural mortality	Assume that M follows an allometric shape (i.e., Lorenzen M), where Ma = 0.12 * WAA ^ -0.305. (Note that this requires reconditioning – of the base case OM only; unless this model resolves the unusual survey selectivity patterns in the Canadian Autumn 2J3K index, it may be redundant given other OMs).	High	YES	YES
4	Include future random error in natural mortality	Include future random error in M(y,a) with variance of the error as indicated by the SSM, which has a process error variance estimate of 0.16. (Note: This is an SCAA specific OM, as variation in M is already part of the process errors carried forward in the SSM projections).	High	NO	YES
5a	Assume provisional conversion factors are biased	Assume that a biased conversion factor is applied to the future Canadian 2J3K and 3LNO indices. Specifically, increase the true conversion factor by 10%. The intent here is to test the potential consequence of getting the conversion factor wrong before being final.	High	YES	YES
5b	Assume the 3LNO Fall survey conversion factor is biased	Assume the 3LNO Fall survey conversion factor is biased (10%): The conversion factor for the 3LNO Fall survey is mainly based on data from the 2J3K Fall survey Comparative Fishing program, as the one for 3LNO Fall survey was incomplete and there is no chance to finish it. This bias is for taking into account the differences that could be between the conversion factors of 3LNO and 2J3K.	High	YES	YES
6	Increase the variance in natural mortality for younger ages	Increase the variance of M(y,a) for age groups 1 to 10 by multiplicative amounts that decrease linearly with age from 2 for age 1 to 1 for age 10. Keep the variance at 0.16 for still higher ages. This is intended to account for the possibility that variability in M may be greater at younger ages.	Intermediate	NO	YES
7	Zero selectivity on plus-group	The plus group for the stock (age 10+), which also acts as the mature/spawning portion of the stock, is not fished, and selectivity for age-10+ fish for all years is fixed at 0. This tests the ability of the CMP to pass fisheries-related performance statistics assuming the 10+ group is inaccessible.	Intermediate	YES	YES
8	Decrease the doming in the commercial selectivities	Decrease the doming in the commercial selectivities, by fixing the parameter values for the right side (higher age) half-normal to double their values for the base case OM, so that commercial selectivity decreases at higher ages at half its previous rate. For the SSM, this would involve coupling the F process estimates across ages 9+;	Intermediate	NO	YES

		alternatively, consider fixing selectivity at age 10+ half way between its terminal estimate and 1. (Note that this change also requires reconditioning). This OM is going to be tested only with SCAA as reducing doming is technically difficult, and perhaps not possible, in the SSM given its non-parametric approach to estimating F.			
9	Decrease starting values N(2022, a) by 10% for all ages a	To allow for a possible decrease in abundance while some surveys could not take place.	Intermediate	YES	YES
10	8 years with recruitment halved	Recruitment for the first eight years of the projection are half of the mean log-recruitment estimate from the SSM; afterwards, recruitment returns to its base value. This tests the ability of the CMP to recover the stock following a series of years of poor recruitment.	Low	YES	YES
11	Assume senescence	M increases from 0.12 for age 9 to 0.5 for ages 10+. (Note that this requires reconditioning – of the base case OM only.) Though the values chosen are biologically extreme, this scenario aims primarily to partially address concerns over cryptic biomass.	Low	YES	YES
12	8 years with increased natural mortality	Assume that M increases from 0.12 to 0.2 in the first 8 years of the projections (similar structure to the low recruitment OM). This scenario is intended to assess the ability of the CMP to recover the stock following a sequence of years with heightened values of M.	Low	YES	YES
13	Catch = 110% TAC	TAC for each year of the projection is increased by 10% from the value returned by the CMP to account for implementation error. This simulates behavior assuming TAC overruns are be a chronic issue in the future.	Low	YES	YES
14	8 years with limited survey data from 3LNO	Repeat baseline OM but, at the start of the projections, exclude the EU-Spain 3L series and Canada Autumn 3LNO surveys for 8 years from 2022 to 2029.	Low	YES	YES

The OMs are ranked according to their plausibility, from high to low. The current version of the updated MP generally shows better resource risk behaviour for the SSM than for the SCAA OMs; this is not surprising, as the former does not reduce expected recruitment if spawning biomass is greatly reduced. For the robustness tests, nearly all of which have been initially conducted to date, only qualitative comments are possible thus far. This is because performance will degrade to a certain extent as OMs are modified from the Base Case, with the MP having been tuned to the SCAA Base Case, but specific thresholds for the extent of degradation that is acceptable have not yet been specified. Broadly speaking, the less plausible the robustness OM is considered to be, the greater the extent of degradation in performance that would be acceptable. For the current tests, those involving decreased recruitment or increased natural mortality for all of the next eight years are the most difficult but also amongst the group of robustness OMs considered the least plausible. Given that performance for these two seems nevertheless to still be acceptable (after initial declines the MP reduces TACs so that by the end of the management period the resource is increasing again and the TAC reductions are starting to be reversed). Given what seems to be acceptable performances for these - the most difficult robustness tests – there does not seem to be any immediate need to specify detailed plausibility-specific performance thresholds.

ii) Candidate Management Procedure (CMP)

The CMP that is being tested during this MSE process is the current one.

During the 2023 July RBMS meeting, an alternative conceptual candidate management procedure was presented for consideration, noting the general steps of the probability-based rule are to calculate the probability that the stock is above target levels, calculate the probability that the stock is growing, and use both probabilities to adjust the TAC each year. The RBMS Working Group agreed to move forward with testing the

alternative CMP starting with the SSM assessment model. Once the results of initial testing are reviewed, testing may continue with the SCAA model.

Some progress has been made in developing this alternative "probability-based" MP. However, time constraints are such that this will not be advanced to the stage where the performance of this alternative can be meaningfully compared to that of the update of the current MP to be put forward by the time of the RBMS meeting in the second half of this year. Work will nevertheless continue on this alternative into following years to the stage where such quantitative performance comparison becomes possible. If then this alternative MP appears to perform better than then current MP, this will be reported to the RBMS so that this alternative could potentially be fast-tracked to replace the current MP before the end of the customary six-year review period.

A Working Paper has been shared to the group for its review and the CMP will be presented in detail during the 2024 June SC meeting.

b) Exceptional Circumstances (ECs)

The proposed Exceptional Circumstances Protocol for this MSE was drafted. The proposed new protocol is the same as of the current one with the exception of point 1. In the new MSE, the surveys to be included in the proposed HCR were changed, removing the Canadian 3LNO Spring and adding the EU 3L survey. As a result, the weights of the surveys in the HCR changed such that they are all roughly at the same level, and thus there is no a base for having "high" and "low" weighted surveys. Consequently, all the surveys are at the same level in the HCR and the proposed new Exceptional Circumstances protocol treats all surveys equally.

Moreover, in the current MSE, ECs occur when one of the high weighted surveys is missed for more than one year, and when one of the low weighted surveys is missed for more than two years. For the new MSE, SC considers that it will be sufficient to specify that ECs will occur if one survey is missed for more than two years.

The list of the ECs for the new MSE is in Annex 1.

c) Traceability

For traceability, SC decided that a document will be drafted specifying exactly how the OMs (Table 2) are defined. This document will be presented during the June 2024 SC meeting.

4. 3LN redfish Management Strategy Evaluation

a) Operating models (OMs)

Two models were presented during this meeting: the survey-based age-structured catch at length model (SURBAL) and the Surplus Production Model in Continuous Time (SPiCT).

The SURBAL model had been previously presented during the 2023 June SC meeting, but it did not fit the survey data well. There appeared to be underlying processes that the models couldn't capture. To address this, SURBAL models were fitted for each NAFO division individually to get a sense of whether predicted independent trends were similar.

Independent SURBAL models (3L, 3N, 3O) provided some evidence that recruitment trends were similar across divisions and preliminary divisional model (3LNO) fit the data best when recruitment and growth model parameters were linked across divisions. Some population estimates, including biomass and recruitment, showed higher correlation between Divisions 3N and 3O than between 3L and 3N. Concerns, that were not new for SC, about the structure of the stock were raised. Genetic studies are ongoing, however results are not yet available.

Results from the SPiCT via a dashboard were presented. The dashboard is recognized as a good tool to display the results, and it will to be further developed.

After reviewing the two models presented, the SC **recommends** *continuing the work of developing the OMs in both models, prioritizing the OMs based on the SURBAL for its higher flexibility since these models allow a flexible framework for simulating sporadic recruitment.*

It is also recommended that the Base Case be based on the assumption of 3LN as a stock and that if time permits, other OMs with a different population structure be developed.

b) Performance Statistics (PSs)

No progress in this matter so far. SC **recommends** *progress in the development of the proposal for possible performance statistics for discussion at the RBMS in April 2024.*

5. Revision of the NAFO Precautionary Approach Framework (PAF)

a) Performing the testing

The PA Framework (PAF) to be tested was decided during the July 2023 RBMS meeting. In the Cautious Zone, the PAF has a leaf-shape (Figure 1).

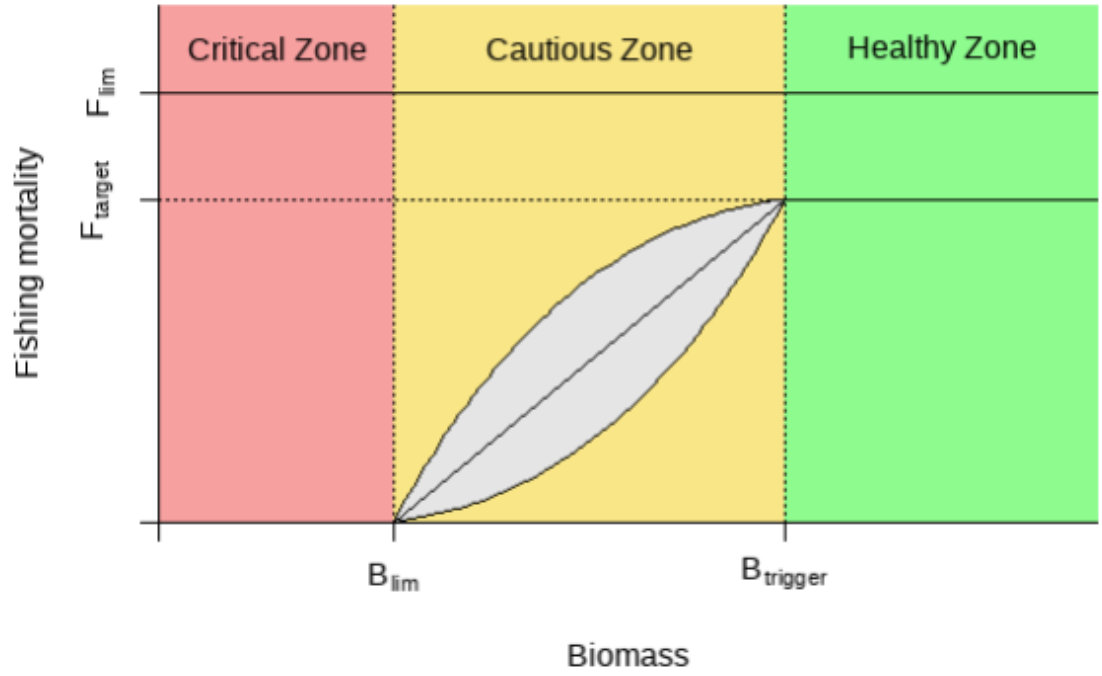

Figure 1. Provisional Draft Framework as agreed during the July 2023 RBMS.

During the September 2023 meeting the SC decided that the PAF testing would be done in two stages, one with a more general focused approach and a second one with specific case studies.

During its September 2023 meeting, STACFAD agreed to reallocation of funds from the internship program to scientific purposes, if required. SC agreed that these funds should be used to engage a consultant to assist with the simulation testing work.

With these funds (14,000CAD), the two approaches could be done in parallel for June 2024 (or July 2024 the latest, before the August 2024 RBMS meeting) if someone is hired by January 2024.

SC agreed that a person from DFO could be tried to be hired to perform both approaches in parallel.

To start the process of engaging a consultant, Terms of Reference (ToRs) for the contract must be provided to the NAFO Secretariat. Some discussions about how generic these ToRs have to be were raised. As a conclusion, it was decided that a small group comprising the current and previous SC chairs, the PA-WG chair and members of the PA technical team will finalize drafting the ToRs to provide them to the NAFO Secretariat in order to go ahead with the contract. After receiving the ToRs, preparation of the contract by the Secretariat should take no more than a few days.

The tentative ToRs are in Annex 2.

b) Specific Approach

A tentative method for testing under the specific stock approach, and MSE-lite method, was presented. This was the method previously used by Canada for 3Ps cod. SC considered that this method may not be the best way to perform the testing that we need, as it included process error but did not include observation error. SC suggested that it is important to include observation error in the simulations. For that, SC approved to test an MSE for testing the PAF. But in this case, the specific testing can be done just with 1 or 2 stocks. The testing will start with a production model and, if time permits, with an age-structured model.

As the key element of the PAF to be tested is the leaf-shape part, SC considered that it will be better to test the specific approach with stocks that are currently in the Cautious Zone. Therefore, it was decided to use 3NO witch flounder and 3M cod as production model stock and age-structured model stock respectively. This approach will be tested in collaboration with the DEs, and members of the technical team will contact the relevant DEs to explain the nature of the help needed.

c) Generic Approach

Some progress has been made for the generic approach, but some decisions need to be taken before moving forward. Specifically, the key elements to be defined are:

1. Type of fish population: Population models (stock-production and age-structured); parameterization (i.e. life histories); type of process error (e.g. IID, AR1).
2. Harvest Control Rule: Reference points; shape of exploitation rate as a function of stock level (NAFO leaf).
3. Provide a mathematical definition for the leaf.
4. Determine that any harvest within that range achieves NAFO objectives.
5. Provide guidance on how wide the leaf can be.
6. Performance metrics: Population performance; fishery performance.

SC agreed to have process and observation errors, but no implementation error.

It was raised during the discussions that Reference Points (RPs) are required to apply the PAF, but there are several NAFO stocks, mainly those with survey indices-based assessments, that do not have RPs defined. SC agreed that, in these cases, it will be necessary to choose the most appropriate proxies.

The planned approach will be to test three options for the width of the leaf, one scenario narrow, one medium and one wide, and see how they work, and then to test how the PAF performs in the top, middle and up of the leaf. We have to be careful, as the best option for the managers would be to take always the top part of the leaf, which can cause the collapse of the stocks depending on the period of time to achieve the objectives.

It was noted that care is needed in the selection of options to test so as not to have too many, and to present the results in a way managers can understand all the implications of the PAF testing.

SC decided that the PA-WG will discuss all the details needed for performing the testing of both approaches, and circulate them to the entire SC to be approved and presented at the April 2024 WG-RBMS meeting.

6. Climate change

During the September 2023 NAFO Annual Meeting, the Commission raised a request to the SC about climate change:

> *Com Request #10. The Commission requests that the Scientific Council at its 2024 meeting: summarize the information it currently has available regarding the current and future impacts of climate change on NAFO-managed stocks, non-target species, and associated ecosystems; and identify any consequential data gaps, research needs and opportunities for productive research.*

Conversations at the 2023 Annual Meeting between SC and the FAO Deep-Sea Fisheries (DSF) Project led to the possibility that this FAO project could work with its NAFO partner on climate change in the Northwest Atlantic through a consultancy. As the consultant had to be hired as soon as possible, and the first SC meeting after the September 2023 meeting was the WG-ESA in November 2023, during that WG the ToRs to guide the setup of the consultancy by the FAO DSF Project were approved. The ToRs Drafted by WG-ESA are presented in Annex 3.

SC agrees with the ToRs drafted at the WG-ESA at its November 2023 meeting to guide the DSF Project consultant in helping the SC in responding the Commission Request #10.

Some information can be available for the CPs about climate change that can be useful for the consultant (summaries, protocols…). Once the consultant is hired, SC will contact him/her to offer this documentation.

7. 3LNO American plaice full assessment in June 2024 SC meeting

The next full assessment of 3LNO American plaice was planned to be in 2024. During the June 2023 SC meeting, it was agreed that until such time the appropriate data is available and a benchmark meeting has occurred, this stock will be monitored in the future by interim monitoring reports.

During the 2023 Annual Meeting, the Commission requested that in June 2024, advice should be provided for 2025-2027 for 3LNO American plaice.

In response to this request, SC discussed data availability for this stock. Recent gaps in survey coverage, incomplete comparative fishing in the Canadian surveys, and the lack of an accepted analytical model for this stock were identified. Given these challenges and the significant workload of SC, it was agreed that this advice request will be provided through an Interim Monitoring Report in 2024. Following standard SC process, if a major change is noted through the IMR, a full assessment may be triggered. This decision will be communicated to the Commission once the report of this meeting is released.

8. STACFIS chair

At the time of this meeting, the STACFIS chair position remained vacant. A letter in this regard has been sent to all the CPs, without answer to the date. If this situation persists, SC will be unable to perform the scheduled stock assessments in June 2024. If this situation continues, this question will be raised again during the STACREC meeting in May 2024..

SC noted that, in general, the chairs of SC and its committees are always from the same two CPs: for example, the current chairs are from Canada (STAREC, STACPUB, hopefully STACFIS) and EU (SC, STACFEN, WG-ESA, PA-WG, SC co-chairs of RBMS and EAFFM). SC noted that other CPs should be encouraged to provide candidates for chairing roles. It was suggested that the chairing could be cycled around CPs. SC decided that this matter is going to be raised during the June 2024 SC meeting and during the E-WG, to inform both SC and Commission, to discuss how to proceed. Another point raised is that being chair currently has no career benefits for the individual. This is something to discuss by the CPs.

Although there are no formal rules of procedure regarding this matter, normal practice in SC has been to alternate the STACFIS Chair position between CPs on the east and west of the Atlantic respectively, with the STACFIS chair going on to the role of STACREC and SC chair. Following that convention, the next STACFIS chair would be expected to come from Europe, however, if other CPs are not willing to fill the position, Canada will try to fill the vacant position of STACFIS chair.

9. Other business

a) Documentation prior to the SC meetings

SC rules require that SCRs be submitted one week in advance of the beginning of the meeting, however SC noted that this is not always accomplished. SC considers that it would be very useful to have all documentation available prior to its presentation, in order that SC members have the opportunity to look at it and have time to digest the analyses. It is therefore necessary to establish timelines for submission of documentation (SCRs, WPs, presentations…) before they are presented to the entire group. As a general rule, SC highlighted the importance of circulating all documentation prior to the beginning of the meetings and **recommends** *a further discussion of documentation deadlines at the June meeting.*

10. Conclusions

a) Exceptional circumstances for 2+3KLMNO Greenland halibut for June 2024 (current ECs)

In 2023, the same Exceptional Circumstance occurred related to the availability of the survey information as that observed in 2022. Therefore, the SC **recommends** *estimating the 2025 TAC using the same approach that was used in 2023 to produce the 2024 TAC, using the current HCR.*

b) 2+3KLMNO Greenland halibut MSE

Conclusions about the final OMs to be run by each model.

The SC reviewed the list of Operating Models (OMs) to be tested in each model (SCAA and SSM) in the Greenland halibut MSE. Small changes were made to those agreed during the July 2023 SC meeting. The results of these OMs are going to be presented during the 2024 April RBMS meeting.

Because the final conversion factors from the Canadian Fall 2J3K survey will not be available until April 2024 and there are some uncertainties in the estimation of the conversion factors from the Canadian Fall 3LNO survey, the SC decided to implement OM 5 separated in a and b on order to cover these uncertainties and to be able to present the provisional results of the MSE at the April 2024 RBMS meeting for discussion. In June 2024, the results will be presented with the final values of the conversion factor of the Canadian 2J3K survey.

How to deal with the plausibility of the OMs?

The less plausible the robustness OM is considered to be, the greater the extent of degradation in performance that would be acceptable. Given what seems to be acceptable performances for even the most difficult robustness tests, there does not seem to be any immediate need to specify detailed plausibility-specific performance thresholds.

Probability CMP

Some progress has been made in developing an alternative "probability-based" MP. However, time constraints are such that this will not be advanced to the stage where the performance of this alternative can be meaningfully compared to that of the update of the current MP to be put forward by the time of the RBMS meeting in the second half of this year. Work will nevertheless continue on this alternative into following years to the stage where such quantitative performance comparison becomes possible. If then this alternative MP appears to perform better than then current MP, this will be reported to the RBMS so that this alternative could potentially be fast-tracked to replace the current MP before the end of the customary six-year review period.

A Working Paper has been shared to the group for its review and the CMP will be presented in detail during the 2024 June SC meeting.

Exceptional Circumstances (EC)

The proposed Exceptional Circumstances protocol for this MSE was drafted. The proposed new Exceptional Circumstances protocol is the same as of the current one with the exception of point 1. In the new MSE the surveys to be included in the proposed HCR were changed, removing the Canadian 3LNO Spring and adding the EU 3L survey. As a result, the weightings assigned to the surveys in the HCRs were changed such that they are now all roughly at the same level, and thus there is no a base for having "high" and "low" weighted surveys. Consequently, all the surveys are at the same level in the HCR and the proposed new Exceptional Circumstances protocol treats all surveys equally.

Moreover, in the current MSE, ECs occur when one of the high weighted surveys is missed for more than one year, and when one of the low weighted surveys is missed for more than two years. For the new MSE, SC considers that it will be sufficient to specify that ECs will occur if one survey is missed for more than two years.

Traceability

For traceability, SC decided that a document to be drafted specifying exactly how the OMs are defined. This document will be presented during the June 2024 SC meeting.

c) 3LN redfish MSE

Conclusion about the OMs

After reviewing the two models presented, the survey-based age-structured catch at length model (SURBAL) and the Surplus Production Model in Continuous Time (SPiCT), SC **recommends** *continuing the work of developing the OMs in both models, prioritizing the OMs based on the SURBAL for its higher flexibility since these models allow a flexible framework for simulating sporadic recruitment.*

It is also recommended that the Base Case be based on the assumption of 3LN as a stock and that if time permits, other OMs with a different population structure be developed.

Conclusion about the PSs

The SC **recommends** *progress in the development of the proposal for possible performance statistics for discussion at the RBMS in April 2024.*

d) Precautionary approach Framework testing

The SC agreed to carry out the testing of the precautionary approach framework approved in the July 2023 RBMS in two different ways simultaneously: one with a more general approach and another with a more specific approach focused on specific study cases.

In the case of the specific approach, it has been agreed to develop an MSE for witch flounder in 3NO and, if time permits, 3M cod.

To this end, it has been agreed to request the funds approved by STACFAD for this task to hire a consultant to help the SC technical team that will be in charge of carrying out the testing. The SC has agreed to appoint a subgroup to collaborate with the Secretary to develop the ToRs and contract this person.

Progress on testing depends on additional decisions that have yet to be decided. The SC agreed that the PA-WG will provide inputs for these decisions to be presented at the April 2024 RBMS meeting.

e) Climate change

SC agrees with the ToRs drafted at the WG-ESA at its November 2023 meeting to guide the DSF Project consultant in helping the SC in responding the Commission Request #10.

f) 3LNO American Plaice full assessments for 2024

Following a discussion about lack of data and workload issues, SC concluded that the Commission request for advice for the 3LNO American plaice will be responded by the SC via an Interim Monitoring Report, unless changes in the state of the stock arise.

This decision will be communicated to the Commission once the report of this meeting is released.

g) STACFIS chair

SC still requires a STACFIS chair.

h) Other business

As a general rule, SC highlighted the importance of circulating the documentation prior to the beginning of the meetings and **recommends** *a further discussion of documentation deadlines at the June meeting.*

ANNEX 1. EXCEPTIONAL CIRCUMSTANCES PROTOCOL OF THE OMS PROPOSED FOR THE GHL MSE PROCESS DURING THIS MEETING.

The following criteria constitute Exceptional Circumstances:

1. Missing survey data: More than two values missing, in a five-year period, from a survey used in the HCR;
2. The composite survey index used in the HCR, in a given year, is above or below the 90 percent probability envelopes projected by the base case operating models from SSM and SCAA under the MS;
3. TACs established that are not generated from the MP.

The following elements will require application of expert judgment to determine whether Exceptional Circumstances are occurring:

1. the five survey indices relative to the 80, 90, and 95 percent probability envelopes projected by the base case operating models (SSM and SCAA) for each survey;
2. survey data at age four (age before recruitment to the fishery) compared to its series mean to monitor the status of recruitment;
3. discrepancies between catches and the TAC calculated using the MP.

ANNEX 2. TENTATIVE TERMS OF REFERENCE FOR THE CONTRACT TO HELP IN THE PRECAUTIONARY APPROACH FRAMEWORK TESTING.

1. Provide support for the development of the testing of the NAFO Precautionary Approach Framework.
2. The support will be mainly in helping with the coding of the testing.
3. The primary support will be in the specific approach with the stocks that are going to be tested (3NO witch flounder and, if time permits, 3M cod).
4. If required, support in the generic approach will be provided.
5. Deliverables: code for the testing. Is this needed?

ANNEX 3. TORS (DRAFTED BY AT THE WGESA AT ITS NOVEMBER 2023 MEETING) TO GUIDE THE DSF PROJECT CONSULTANT IN HELPING THE SC IN RESPONDING THE COMMISSION REQUEST #10.

1. Summarize the current state of knowledge on climate change projections for the Northwest Atlantic for the next 10-50 year, with emphasis on comparisons across models (e.g. type of model, resolution, level of downscaling), how the projected changes (e.g. temperature levels, heat waves, frequency of extreme events, including their level of uncertainty) may differ for different scenarios, and what are the recommended applications/standards for the use of these scenarios for ecological analyses in fisheries and marine ecology (i.e. current best practice).
2. Review the state of knowledge of the potential impacts of climate change on Northwest Atlantic fish stocks and ecosystems, discriminating the degree to which direct and indirect effects have been considered/addressed. To the extent possible, compare and rank these potential impacts in terms of a) their likely magnitude, b) their time of emergence (i.e. when they could be expected to manifest), and c) dependency of climate change scenario (i.e. how their potential impact/ranking depends on a specific scenario).
3. Review the state of knowledge on proposed approaches to incorporate climate change in stock-assessment and ecosystem-based fisheries management, with emphasis in Northwest Atlantic stocks and ecosystems. Given the results from ToRs 1 and 2, identify and rank the likely critical data and process gaps that would be required to be addressed in order to implement these approaches for NAFO stocks and ecosystems.

APPENDIX I. PROVISIONAL AGENDA

Scientific Council Intersessional Meeting

09-11 January 2024, via Webex.

Day 1: MSE, points 1, 2 and 3.

Day 2: PAF and climate change, points 4 and 5.

Day 3: If necessary to finish all the points.

1) Exceptional circumstances GHL (Paul).
   a. Are they occurring in 2023?
   b. New protocol
2) GHL MSE (Paul, Doug, Rebecca):

   Testing CMP performance against established management objectives

   There are 2 CMPs

   Initial discussions on exceptional circumstances protocol
3) RED MSE (Andrea):

   Address and review any further work on OMs, performance statistics, and CMPs stemming from RBMS
4) PAF (Mariano and Rajeev):

   SC initially identified some tasks that could be addressed in support of the simulation testing work. These tasks include (both for the generic and the specific cases):

   i) Identification/guidance on the life history scenarios range to be tested in the generic simulation testing. Prior work done by ICES and made available during the 2023 WGEAFFM meeting can provide and practical starting point for this task.
   ii) Identification/guidance on the minimum features to be included in a generic age-structure model to allow characterizing the life history combinations.
   iii) Identification/guidance on parameter combinations to use in the case of the stock-production model (e.g. combinations of r and K parameters), as well as the age-structure model (e.g. recruitment formulations, maturation, mortality ogive), to represent the life history scenarios.
   iv) Identification/guidance on of plausible ranges for the magnitudes of the process error and observation error to be used, considering that observation error is especially relevant for representing survey-based assessments.
   v) Identification/guidance on candidate cases to be tested using the specific simulation testing, with emphasis on species that would be expected not to be well captured by the generic simulation testing (e.g. redfish).
   vi) Identification/guidance on the objectives and the suite of performance metrics to be implemented, and candidate risk levels for the evaluations of these metrics. Ideally this suite of metrics should be the smallest possible set without loosing any major performance aspect. The objectives and the associated candidate risk levels would need to be discussed and agreed with managers, but working ranges are require for the implementation and debugging of the code to be developed.
5) To inform SC about the climate change ToRs and FAO contract (Mariano, Miguel, Diana).

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