Northwest Atlantic Fisheries Organization

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SCIENTIFIC COUNCIL – 2021

The Commission's Request for Scientific Advice on Management in 2022 and Beyond of Certain Stocks in Subareas 2, 3 and 4 and Other Matters

(From NAFO/COM Doc. 20-16)

Following a request from the Scientific Council, the Commission agreed that items 1, 2, 8 and 11 should be the priority for the June 2021 Scientific Council meeting subject to resources and COVID-related restrictions.

1. The Commission requests that the Scientific Council provide advice for the management of the fish stocks below according to the assessment frequency presented below. In keeping with the NAFO Precautionary Approach Framework (FC Doc. 04-18), the advice should be provided as a range of management options and a risk analysis for each option without a single TAC recommendation. The Commission will decide upon the acceptable risk level in the context of the entirety of the SC advice for each stock guided and as foreseen by the Precautionary Approach.

Yearly basis	Two-year basis	Three-year basis
Cod in Div. 3M Northern shrimp in Div. 3M	Redfish in Div. 3M Northern shrimp in Div. 3LNO Thorny skate in Div. 3LNO Witch flounder in Div. 3NO Redfish in Div. 3LN White hake in Div. 3NO	American Plaice in Div. 3LNO American Plaice in Div. 3M Capelin in Div. 3NO Northern shortfin squid in SA 3+4 Redfish in Div. 3O Yellowtail flounder in Div. 3LNO Cod in Div. 3NO

To implement this schedule of assessments, the Scientific Council is requested to conduct a full assessment of these stocks as follows:

In 2021, advice should be provided for 2022 for Cod in Div. 3M and Northern shrimp in Div. 3M. With respect to Northern shrimp in Div. 3M, SC is requested to provide its advice to the Commission prior to the 2021 Annual Meeting based on the survey data up to and including 2021.

In 2021, advice should be provided for 2022 and 2023 for: Redfish in Div. 3M, Northern shrimp in Div. 3LNO, and White hake in Div. 3NO

In 2021, advice should be provided for 2022, 2023 and 2024 for: American plaice in Div. 3LNO, Capelin in Div. 3NO, Cod in Div. 3NO, Yellowtail flounder in Div. 3LNO

Advice should be provided using the guidance provided in **Annexes A or B as appropriate**, or using the predetermined Harvest Control Rules in the cases where they exist (currently Greenland halibut 2+3KLMNO).

The Commission also requests the Scientific Council to continue to monitor the status of all other stocks annually and, should a significant change be observed in stock status (e.g. from surveys) or in bycatch in other fisheries, provide updated advice as appropriate.

2. The Commission requests the Scientific Council to monitor the status of Greenland halibut in Subarea 2+Div. 3KLMNO annually to compute the TAC using the 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.

3. The Commission requests that the Scientific Council continue its evaluation of the impact of scientific trawl surveys on VME in closed areas, and the effect of excluding surveys from these areas on stock assessments.

4. The Commission requests the Scientific Council to implement the steps of the Action plan relevant to the Scientific Council and in particular the tasks identified under section 2.2 of the Action Plan, for progression in the management and minimization of Bycatch and discards (COM Doc. 17-26).

   - Tasks outlined in Tasks 3.1 and 3.2 of the NAFO Action Plan in the Management and Minimization of Bycatch and Discards (COM Doc. 17-26).

5. The Commission requests that Scientific Council continue to refine work on the Ecosystem Road Map:

   - Continue to test the reliability of the ecosystem production potential model and other related models

   - Report on these results to WG-EAFFM and WG-RBMS to further develop how it may apply to management decisions

   - Develop options of how ecosystem advice could inform management decisions, an issue which is directly linked to the results of the foreseen EAFM roadmap workshop.

   - Continue its work to develop models that support implementation of Tier 2 of the EAFM Roadmap."

6. The Commission requests that the Scientific Council, in preparation of the re-assessment of NAFO bottom fisheries in 2021 and discussion on VME fishery closures:

   - Assess the overlap of NAFO fisheries with VME to evaluate fishery specific impacts in addition to the cumulative impacts for NRA fisheries;

   - Consider clearer objective ranking processes and options for objective weighting criteria for the overall assessment of significant adverse impacts and the risk of future adverse impacts;

   - Maintain efforts to assess all of the six FAO criteria including the three FAO functional SAI criteria which could not be evaluated in the current assessment.

   - Provide input and analysis of potential management options, with the goal of supporting meaningful and effective discussions between scientists and managers at the 2021 WG-EAFFM meeting;

   - Continue to work on the VME indicator species as listed in Annex IE, Section VI to prepare for the next assessment.

7. The Commission requests that the Scientific Council review the proposed revisions to Annex I.E, Part VI as reflected in COM-SC EAFFM-WP 18-01, for consistency with the taxa list annexed to the VME guide and recommend updates as necessary.

8. The Commission requests the Scientific Council to continue progression on the review of the NAFO PA Framework in accordance to the PAF review work plan approved in 2020 (NAFO COM-SC Doc. 20-04)

9. The Commission requests that the Scientific Council Work with WG- BDS to identify areas and times where bycatch and discards of Greenland sharks have a higher rate of occurrence in time for

consideration by the Commission in 2021 to inform the development of measures to reduce bycatch in the NRA.

10. The Commission requests the Scientific Council to continue to develop a 3-5 year work plan, which reflects requests arising from the 2020 Annual Meeting, other multi-year stock assessments and other scientific inquiries already planned for the near future. The work plan should identify what resources are necessary to successfully address these issues, gaps in current resources to meet those needs and proposed prioritization by the Scientific Council of upcoming work based on those gaps.

11. The Commission requests that the Scientific Council, carry out a scoping exercise to provide guidance to the WG-RBMS on the process of conducting of a full review/evaluation of the management strategy of Div. 3LN redfish.

12. The Commission requests the Scientific Council review submitted protocols for a survey methodology to inform the assessment of Splendid Alfonsino. The Scientific Council to report on the outcome of this work at next Commission annual meeting.

13. The Commission requests that results from stock assessments and the scientific advice of Cod 2J3KL (Canada), Witch 2J3KL (Canada) and Pelagic Sebastes mentella (ICES Divisions V, XII and XIV; NAFO 1) to be presented to the Scientific Council (SC), and request the SC to prepare a summary of these assessments to be included in its annual report.

14. The Commission requests the Scientific Council, jointly with the Secretariat, to conduct ongoing analysis of the Flemish Cap cod fishery data by 2022 in order to:

    (1) monitor the consequences of the management decisions (including the analysis of the redistribution of the fishing effort along the year and its potential effects on ecosystems, the variation of the cod catch composition in lengths/ages, and the bycatch levels of other fish species, benthos in general, and VME taxa in particular), and

    (2) carry out any additional monitoring that would be required, including Div. 3M cod caught as bycatch in other fisheries during the closed period.

15. The Commission requests the Scientific Council,, in its future work, to consider whether other measures, such as depth restrictions, spatial and mesh changes, could reduce the catch of juvenile and immature cod across all fisheries in 3M.

16. The Commission requests the Scientific Council to continue to monitor and provide updates resulting from relevant research related to the potential impact of activities other than fishing in the Convention Area. Further, that the Secretariat and the Scientific Council work with other international organizations, such as the FAO and ICES, to bring in additional expertise to inform the Scientific Council's work.

17. The Commission requests the Scientific Council to provide information to the Commission at its next annual meeting on sea turtles, sea birds, and marine mammals that are present in NAFO Regulatory Area based on available data.

18. The Commission requests that the Scientific Council proceed with developing the ecosystem summary sheets for 3M and 3LNO move toward undertaking a joint Workshop with ICES (International Council for the Exploration of the Sea) as part of a peer review of North Atlantic ecosystems.

ANNEX A: Guidance for providing advice on Stocks Assessed with an Analytical Model

The Commission requests the Scientific Council to consider the following in assessing and projecting future stock levels for those stocks listed above. These evaluations should provide the information necessary for the Fisheries Commission to consider the balance between risks and yield levels, in determining its management of these stocks:

1. For stocks assessed with a production model, the advice should include updated time series of:

- Catch and TAC of recent years
- Catch to relative biomass
- Relative Biomass
- Relative Fishing mortality
- Stock trajectory against reference points
- And any information the Scientific Council deems appropriate.

Stochastic short-term projections (3 years) should be performed with the following constant fishing mortality levels as appropriate:

- For stocks opened to direct fishing: 2/3 F_{msy}, 3/4 F_{msy}, 85% F_{msy}, 90% F_{msy},95% F_{msy}, F_{msy} 0.75 X $F_{status\ quo}$, $F_{status\ qu}$,1.25 X Status quo, F=0; TAC Status quo, 85% TAC Status quo, 90% TAC Status quo, 95% TAC Status quo
- For stocks under a moratorium to direct fishing: $F_{status\ quo}$, F = 0.

The first year of the projection should assume a catch equal to the agreed TAC for that year.

Results from stochastic short-term projection should include:

- The 10%, 50% and 90% percentiles of the yield, total biomass, spawning stock biomass and exploitable biomass for each year of the projections
- The risks of stock population parameters increasing above or falling below available biomass and fishing mortality reference points. The table indicated below should guide the Scientific Council in presenting the short-term projections.

				Limit reference points													
				$P(F>F_{lim})$			$P(B<B_{lim})$			$P(F>F_{msy})$			$P(B<B_{msy})$				$P(B2024 > B2020)$
F in 2022 and following years*	Yield 2022 (50%)	Yield 2023 (50%)	Yield 2024 (50%)	2022	2023	2024	2022	2023	2024	2022	2023	2024	2022	2023	2024		
2/3 Fmsy	t	t	t	%	%	%	%	%	%	%	%	%	%	%	%		%
3/4 Fmsy	t	t	t	%	%	%	%	%	%	%	%	%	%	%	%		%
85% Fmsy	t	t	t	%	%	%	%	%	%	%	%	%	%	%	%		%
90% Fmsy																	
95% Fmsy																	
Fmsy	t	t	t	%	%	%	%	%	%	%	%	%	%	%	%		%
0.75 X Fstatus quo	t	t	t	%	%	%	%	%	%	%	%	%	%	%	%		%
Fstatus quo	t	t	t	%	%	%	%	%	%	%	%	%	%	%	%		%
1.25 X Status quo	t	t	t	%	%	%	%	%	%	%	%	%	%	%	%		%
F=0	t	t	t	%	%	%	%	%	%	%	%	%	%	%	%		%
TAC Status quo																	
85% TAC Status quo																	
90% TAC Status quo																	
95% TAC Status quo																	

2. For stock assessed with an age-structured model, information should be provided on stock size, spawning stock sizes, recruitment prospects, historical fishing mortality. Graphs and/or tables should be provided for all of the following for the longest time-period possible:

- historical yield and fishing mortality;
- spawning stock biomass and recruitment levels;
- Stock trajectory against reference points
- And any information the Scientific Council deems appropriate

Stochastic short-term projections (3 years) should be performed with the following constant fishing mortality levels as appropriate:

- For stocks opened to direct fishing: $F_{0.1}$, F_{max}, 2/3 F_{max}, 3/4 F_{max}, 85% F_{max}, 75% $F_{status\ quo}$, $F_{status\ quo}$, 125% $F_{status\ quo}$,
- For stocks under a moratorium to direct fishing: $F_{status\ quo}$, F = 0.

The first year of the projection should assume a catch equal to the agreed TAC for that year.

Results from stochastic short-term projection should include:

- The 10%, 50% and 90% percentiles of the yield, total biomass, spawning stock biomass and exploitable biomass for each year of the projections
- The risks of stock population parameters increasing above or falling below available biomass and fishing mortality reference points. The table indicated below should guide the Scientific Council in presenting the short-term projections.

				Limit reference points														
				$P(F.>F_{lim})$			$P(B<B_{lim})$				$P(F>F0.1)$			$P(F>F_{max})$				$P(B2024 > B2020)$
F in 2022 and following years*	Yield 2022	Yield 2023	Yield 2024	2022	2023	2024	2022	2023	2024		2022	2023	2024	2022	2023	2024		
F0.1	t	t	t	%	%	%	%	%	%		%	%	%	%	%	%		%
F_{max}	t	t	t	%	%	%	%	%	%		%	%	%	%	%	%		%
66% F_{max}	t	t	t	%	%	%	%	%	%		%	%	%	%	%	%		%
75% F_{max}	t	t	t	%	%	%	%	%	%		%	%	%	%	%	%		%
85% F_{max}	t	t	t	%	%	%	%	%	%		%	%	%	%	%	%		%
0.75 X F_{2018}	t	t	t	%	%	%	%	%	%		%	%	%	%	%	%		%
F_{2018}	t	t	t	%	%	%	%	%	%		%	%	%	%	%	%		%
1.25 X F_{2018}	t	t	t	%	%	%	%	%	%		%	%	%	%	%	%		%

ANNEX B. Guidance for providing advice on Stocks Assessed without a Population Model

For those resources for which only general biological and/or catch data are available, few standard criteria exist on which to base advice. The stock status should be evaluated in the context of management requirements for long-term sustainability and the advice provided should be consistent with the precautionary approach.

The following graphs should be presented, for one or several surveys, for the longest time-period possible:

a. time trends of survey abundance estimates
19. an age or size range chosen to represent the spawning population
20. an age or size-range chosen to represent the exploited population
21. recruitment proxy or index for an age or size-range chosen to represent the recruiting population.
22. fishing mortality proxy, such as the ratio of reported commercial catches to a measure of the exploited population.
23. Stock trajectory against reference points

And any information the Scientific Council deems appropriate.