

**44th ANNUAL MEETING OF NAFO - SEPTEMBER 2022****Recommendations of the Working Group on Risk-Based Management Strategies (WG-RBMS)**

The NAFO Joint Fisheries Commission-Scientific Council Working Group on Risk-Based Management Strategies (WG-RBMS) met on 17-18 August 2022 (COM-SC Doc 22-03) and agreed on the following conclusions and recommendations:

In regard to the review of the Precautionary Approach Framework (PAF):

1. **WG-RBMS supports the conclusions reached at the PA Workshop (Annex 1).**
2. **WG-RBMS recommends that the Commission approve the updated workplan for the revision of the NAFO Precautionary Approach Framework (Annex 2).**

In regard to ongoing MSE processes for 3LN Redfish and 2+3KLMNO Greenland halibut:

3. **WG-RBMS recognizes the Scientific Council workload and the progress that has been made to date. It recommends that both processes continue to advance in parallel, to the extent possible, including approving the 2023 workplan (Annex 3).**

In regard to 3LN Redfish:

4. **WG-RBMS recommends deleting the text of NAFO CEM Article 10 bis, Redfish Conservation Plan and Harvest Control Rule, and the associated Annex I.H., noting that a new Management Strategy for this stock is currently under development.**



Annex 1. PA Framework Workshop Conclusions (COM-SC RBMS-WP 22-05)

PA Framework Conclusions (numbering does not imply priority)

1. B_{lim} should represent seriously impaired productivity (e.g., the point of impaired recruitment), derived from stock-recruitment information if possible or proxies (e.g., 30-40% B_{msy} , $B_{recover}$; depending on available information).
 - a. Management should be based on very low risk of $B < B_{lim}$ (e.g., 5-10% risk, defined by managers).
 - b. Recent and projected stock trajectory (and other information like age structure, environmental conditions, etc.) should be considered for determining appropriate management actions to achieve low risk of $B < B_{lim}$.
2. Many PA systems have implemented the UN 1995 Straddling Stocks Agreement by defining $F_{lim} = F_{msy}$, recognizing that $F_{lim} = F_{msy}$ is not directly associated with B_{lim} or impaired productivity.
3. Uncertainty and risk need to be addressed in the PA framework, and the framework needs to be implemented with the information available (e.g., buffers require defined limit reference points and estimates of uncertainties or proxies; risk evaluation requires limit reference points and projected uncertainty).
4. F_{target} can be defined using several alternatives: a fraction of F_{msy} (~80-85% F_{msy}), risk of $F > F_{lim}$, a F lower than F_{msy} that produces nearly MSY (e.g., 90-95%MSY), $F_{40\%MSP}$, or $F_{0.1}$.
 - a. F_{eco} as a target needs more development and communication with managers.
5. B_{target} is not needed in the framework, but B_{msy} is necessary as a performance statistic to meet principle b of the NAFO Convention (*"to ensure that fishery resources are maintained at or restored to levels capable of producing maximum sustainable yield"*)
6. The PA framework could benefit from an intermediate biomass reference point or multiple biomass reference points that are between B_{lim} and B_{msy} so that management actions can be implemented earlier as the stock approaches B_{lim} .
 - a. Intermediate biomass reference points can be derived from uncertainty in the assessment (e.g., B_{buf}), a multiple of B_{lim} (e.g., $B_{isr} = 2B_{lim}$ proposed for 3NO cod), a fraction of B_{msy} , or impairment of ecological role.
 - b. Management action would be based on a probability of falling below the intermediate reference points, and the risk tolerance would be greater for higher biomass reference points.
7. The PA framework requires pre-agreed management actions that are conditional on stock status and fishing status.
 - a. As examples, the current NAFO PA framework has pre-agreed management actions:

- i. in the Safe Zone, *“select and set fishing mortality from a range of F values that have a low probability of exceeding F_{lim} ...”*;
 - ii. in the Overfishing Zone, *“reduce F to below F_{buf} ”*;
 - iii. in the Cautionary Zone, *“The closer stock biomass is to B_{lim} , the lower F should be below F_{buf} to ensure that there is a very low probability that biomass will decline below B_{lim} within the foreseeable future”*;
 - iv. in the Danger Zone, *“Reduce F to below F_{buf} . The closer stock biomass is to B_{lim} , the lower F should be below F_{buf} to ensure that there is a very low probability that biomass will decline below B_{lim} within the foreseeable future”*; and
 - v. in the Collapse Zone, *“ F should be set as close to zero as possible”*.
 - b. Prescribed management actions can be qualitative (e.g., reduce F when B approaches B_{lim}) or applying a functional harvest control rule (target F a function of B)
 - c. Performance testing of the PA framework requires formulaic management actions (e.g., a function of stock biomass)
 - d. Flexibility will be needed for implementation, because a single HCR is not expected to be appropriate for all NAFO stocks.
8. PA framework should promote rebuilding of depleted stocks.
- a. Stock recovery plans may be needed when the general PA framework is not effective, but they should not be an explicit component of the framework.
9. Flexibility will be needed to implement the PA framework for short-lived stocks or stocks with sporadic recruitment.
- a. An escapement strategy could be based on B_{lim} but might require flexibility in risk tolerance.
 - b. Effective management of long-lived stocks with sporadic recruitment needs further development.
10. Participants highlighted the need for a follow-up meeting of manager and scientists to further discuss the concepts considered at the initial workshop. The objective of the meeting would to present some additional information that could help inform the development of a proposed revision of the NAFO PA Framework.

Annex 2. NAFO Precautionary Approach Framework Revision - Revised Workplan (COM-SC RBMS-WP 22-06)

- Review of and proposal for ToRs related to mapping objectives: ToRs 1a, 1c and 1g.
Deadline for results to SC: June 2021
- Present results to WG-RBMS after the June SC
- Review of and proposal for ToRs related to structural aspects and quantification of uncertainty and risk. Deadline for results to SC: ToRs 1b, 1d, 1e and 1f.
Deadline for results November 2021
- The work in the previous bullet points would need to cover the data continuum, so that the framework could be applied to all NAFO stocks (data rich and data poor).
- Consider broad associated implications for stocks managed using a Management Procedure (HCR) based on a MSE.
- Workshop - (including the group of scientists and managers and stakeholders), around March 2022, to address the entire ToR and make a proposal of revision of the NAFO PA framework (to be later reviewed by the WG-RBMS).
Note: Delayed until August 2022.
- WG-RBMS 2022, reviewed the latest SC progress report (June 2022) on the PAF, as well as, the conclusions from the 1st PAF workshop (August 2022); and, prepared a revised workplan.
- SC to prepare additional information to inform discussion at WG-RBMS in 2023.
- Time for Contracting Parties internal discussions and further work if required
- WG-RBMS July 2023, review additional information from SC and propose draft revised framework
- Provisional draft framework to be considered by the NAFO Commission in September 2023, for endorsement in advance of simulation testing.
- SC June 2024, complete simulation testing.
- WG-RBMS 2024, review the results of SC simulation testing and recommend revised PA Framework to Commission
- Sept 2024, Commission decision on adoption of revised PA Framework

Annex 3. 2023 Management Strategy Evaluation Workplan
(COM-SC RBMS-WP 22-07)

DATE	NAFO BODY	GHL MSE	3LN REDFISH
Early 2023	SC	Finalize data series to be used for the MSE	Finalize data series to be used for the MSE
April 2023	WG-RBMS (1)	Schedule finalized and proposed to the Commission; propose conceptual initial Candidate Management Procedures (CMPs); identify management objectives/performance statistics	Schedule finalized and proposed to the Commission; initiate discussion on management objectives, conceptual initial CMPs, potential OMs, and performance statistics.
June 2023	Scientific Council	Proposal and review and finalization of Operating Models (OMs) to be used; consensus required at this time; preliminary application of initial CMPs.	Proposal and review of OMs to be used
July 2023	WG-RBMS (2)	Finalize CMPs; refinement of performance statistics including risk tolerances and constraints	Continued progress on OMs, development of performance statistics; development of CMPs,
1) Timelines are notional and subject to revision based on workload, capacity and unanticipated problems.			
2) Contracting Parties are encouraged to submit proposed initial CMPs, management objectives and performance statistics for consideration in advance of the April WG-RBMS meeting.			