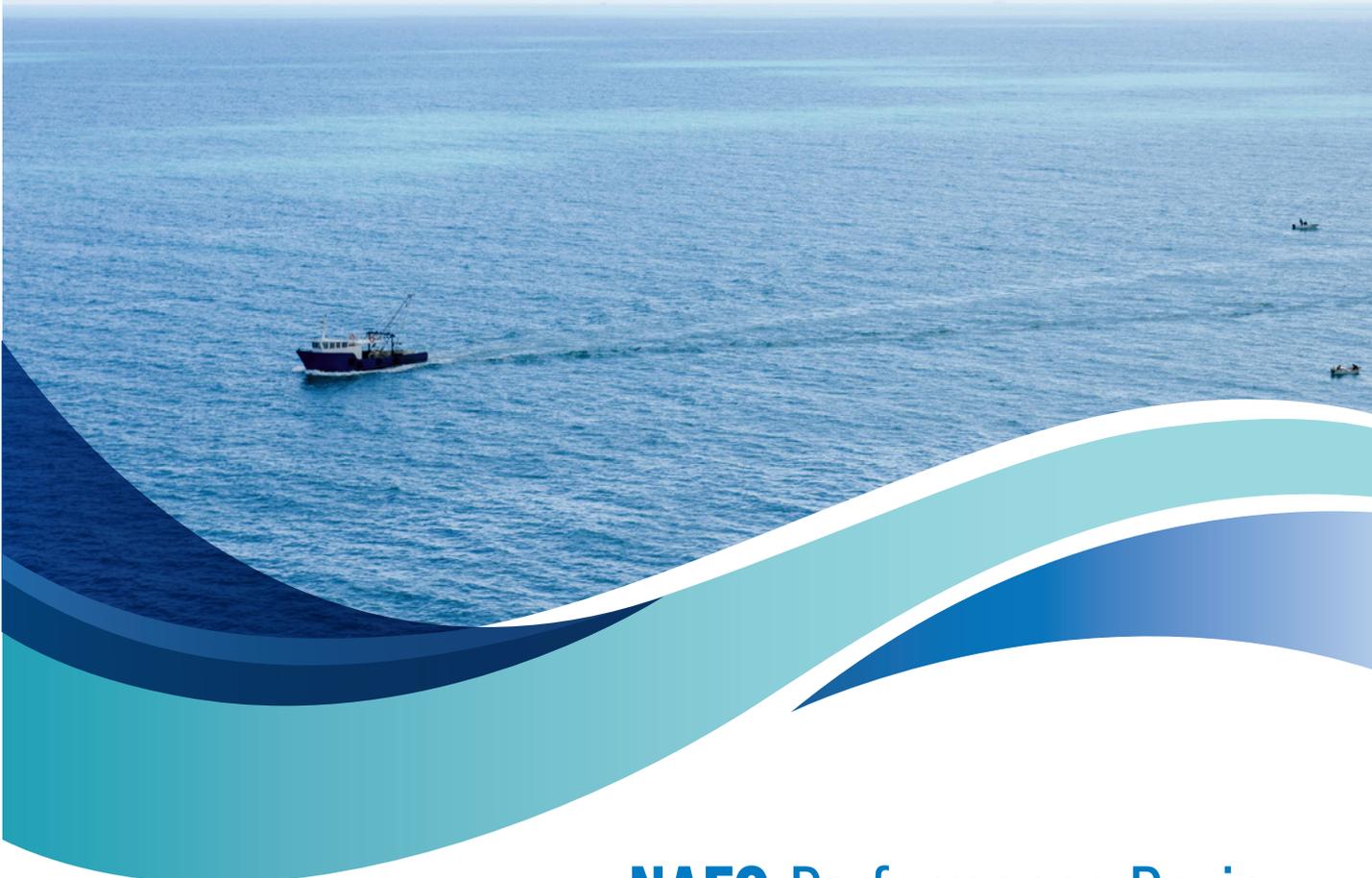




NAFO
NORTHWEST ATLANTIC
FISHERIES ORGANIZATION



NAFO Performance Review Panel Report **2018**





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NORTHWEST ATLANTIC
FISHERIES ORGANIZATION

Report of the NAFO Performance Review Panel 2018

Published in August 2018

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Table of Contents

Acronyms	iii
I. Introduction	1
Performance Review Panel	1
Mode of Operation	1
Overview	2
II. The 2011 Performance Review of NAFO	8
III. Conservation and Management	9
1. Status of living marine resources	9
a. Status of fish stocks	9
b. Status of non-target species	13
2. Ecosystem Approach and Precautionary Approach.....	13
a. Ecosystem Approach.....	13
b. Precautionary Approach.....	16
3. Data Collection and Sharing	17
4. Adoption of conservation and management measures.....	20
a. Consistency with scientific advice and the Precautionary Approach	20
b. Compatibility between measures taken by NAFO and measures taken by coastal States.....	23
c. Allocation of fishing opportunities	23
d. Previously unregulated fisheries, exploratory fisheries	24
e. Conserving biodiversity and minimizing harmful fishing impacts on marine ecosystems	24
f. Minimizing pollution, waste, discards, lost and abandoned gear and impacts on non-target species ...	26
g. Rebuilding depleted stocks.....	27
5. Capacity Management	28
6. Reporting Requirements	29
IV. Compliance and Enforcement.....	30
1. Flag State duties	30
2. Port State Measures.....	31
3. Monitoring, control and surveillance (MCS).....	31
Follow-up on infringements	32
Cooperative mechanisms to deter non-compliance	33
Market-related Measures	34
V. Governance	35
1. Decision-making	35
2. Dispute Settlement.....	35
3. Transparency	35
4. Confidentiality	36



VI. Science	37
1. Quality and provision of scientific advice	37
a. Producing the best scientific advice	37
i. Consistency with Precautionary Approach standards	37
ii. Ecosystem approach framework.....	38
iii. The development of advice including risk considerations	38
b. A standardized presentation of advice.....	39
i. Meeting user requirements	39
ii. The framework for advice	40
iii. Transparency and inclusion of uncertainty	41
c. Accessibility of advice to non-scientists and general public.....	41
i. Transparency of scientific work and processes	41
ii. Communication to managers	41
iii. Communication to the public	42
d. Scientific capacity and adequacy of resources.....	42
2. Best available science	43
VII. International Cooperation	45
1. Relationship with non-contracting parties	45
2. Cooperation with other international organizations	45
3. Special requirements of developing countries	46
VIII. Finance and Administration	47
IX. Annexes	49
Annex 1. The Terms of Reference for the 2018 Performance Review	50
Annex 2. Performance Review Panel	59
Annex 3. Developments in marine ecosystems in the NAFO Convention Area	60

Acronyms

CESAG	Joint Commission-Scientific Council Catch Estimation Strategy Advisory Group
ICES	International Council for the Exploration of the Sea
IUU fishing	Illegal, Unreported and Unregulated fishing
FAO	Food and Agriculture Organization of the United Nations
MCS	Monitoring, Control and Surveillance
NAFO	Northwest Atlantic Fisheries Organization
NCEM	NAFO Conservation and Enforcement Measures
NEAFC	North East Atlantic Fisheries Commission
PR1	NAFO 1st Performance Review Report in 2011
RFMO	Regional Fisheries Management Organization
SC	Scientific Council
STACFAD	Commission Standing Committee on Finance and Administration
STACTIC	Commission Standing Committee on International Control
STATLANT	Fishery catch statistics from national authorities
TAC	Total Allowable Catch
UN	United Nations
UNCLOS	1982 United Nations Convention on the Law of the Sea
UNFSA	1995 United Nations Fish Stocks Agreement
VME	Vulnerable Marine Ecosystem
WG	Working Group
WG-BDS	Commission Ad hoc Working Group to Reflect on the Rules Governing Bycatches, Discards and Selectivity in the NAFO Regulatory Area
WG-EAFFM	Joint Commission-Scientific Council Working Group on Ecosystem Approach Framework to Fisheries Management
WG-ESA	Scientific Council Working Group on Ecosystem Science and Assessment
WG-RBMS	Joint Commission-Scientific Council Working Group on Risk-Based Management Strategies

I. Introduction

Performance Review Panel

At its 39th Annual Meeting in 2017¹, the Northwest Atlantic Fisheries Organization (NAFO) decided to review the Organization's performance with regard to its mandate and objectives. This review assesses NAFO's performance during the period 2011-2017, with special attention to the follow-up to the recommendations stemming from the 1st Performance Assessment Report (PR1).

In accordance with the Terms of Reference of this review (Annex 1), NAFO appointed a Panel comprising six members, three external experts, none of whom should have participated in the work of NAFO, and three internal experts, nominated by a NAFO Contracting Party (Annex 2).

The appointed external experts were the following:

- Ms. Bárbara Boéchat de Almeida
- Ms. Marion Jane Willing
- Mr. Poul Degnbol

The appointed internal experts and nominating Contracting Parties were the following:

- Mr. James Baird (Canada)
- Ms. Fuensanta Candela Castillo (European Union)
- Mr. Terje Løbach (Norway)

The external Panel members agreed Ms. Willing would act as Panel coordinator.

Mode of Operation

The Panel was clear it wished to undertake an open and inclusive process and for key NAFO participants to have an opportunity to provide input and help inform the review.

The Panel has worked on the basis of documentation, feedback from Contracting Parties and registered observers and interviews with NAFO officials.

The documentation used includes NAFO documents and reports as available in the 'Library' section of the NAFO website and international legal text and documents of relevance to NAFO.

With the support of the NAFO Secretariat, the Panel held a total of five video-conferences on 15 January, 9 February, 26 February, 2 May and 13 June 2018, as well as two meetings at the NAFO headquarters in Halifax, Canada, 19–23 March and 28 May –1 June 2018.

All Contracting Parties were invited to submit views, orally or in writing, for the Panel to consider. An invitation was also sent to the ten (10) stakeholder organizations with accredited observer status in NAFO². The Panel received submissions from Canada, European Union, Japan, Norway and the United States of America (USA). No Contracting Party requested an oral presentation. Among the accredited observers, email comments were submitted by the Marine Stewardship Council and by the Sierra Club Canada. The Ecology Action Centre provided a written submission and also made an oral presentation during the Panel's first meeting.

¹ NAFO/COM Doc. 17-29 Revised (agenda item 10) – <https://archive.nafo.int/open/com/2017/comdoc17-29.pdf>

² The 10 organizations in questions are the following: Dalhousie University – EIUI, Dalhousie University – Marine & Environmental Law Institute; The Ecology Action Centre (EAC); International Coalition of Fisheries Associations; Marine Stewardship Council; Pew Trusts Org; The Shark Trust; Sierra Club Canada; World Wildlife Fund (WWF); Conseil de Bande de la Nation Innue de Nutashkuan.

The Panel met in person or via electronic means with the Chairs/vice-Chairs of the following NAFO constituent bodies, subsidiary bodies and working groups:

- The Commission
- The Scientific Council (SC)
- The Standing Committee on International Control (STACTIC)
- The Standing Committee on Finance and Administration (STACFAD)
- The Joint Commission-Scientific Council Catch Estimation Strategy Advisory Group (CESAG)
- The Joint Commission-Scientific Council Working Group on Risk Based Management Strategies (WG-RBMS)
- The Joint Commission-Scientific Council Working Group on Ecosystem Approach Framework to Fisheries Management (WG-EAFFM)
- The Scientific Council Working Group on Ecosystem Science and Assessment (WG-ESA)
- The Commission Ad Hoc Working Group on Bycatches, Discards and Selectivity (WG-BDS) in the NAFO Regulatory Area

The NAFO officials were requested to present their views and information on achievements, challenges and options for progress in relation to recommendations stemming from PR1, as well as any other issues that might have arisen since the completion of the previous exercise. The appointed external expert on fisheries science was present at the SC meeting on 2 June in order to receive further input from SC members and see SC work in practice. The Panel appreciated the opportunity to engage with the various officials and gather first-hand information of relevance to its mandate.

The Panel also wishes to thank the NAFO Secretariat. Their efficient support and constructive assistance greatly facilitated the process to develop this report.

For future Performance Review exercises, the Panel believes that NAFO should consider including an expert nominated by accredited observers as a member of the Panel.

Overview

The international community of fisheries managers and stakeholders took on board the need to assess the performance of Regional Fisheries Management Organizations (RFMOs) over a decade ago³. This reflected the increasingly important role of RFMOs as key actors in international fisheries governance. There is consensus on the need to ensure that their performance, as fora where effective decision-making and implementation takes place, is regularly assessed to respond to societal expectations and comply with the principles embodied in the international body of law that governs the shared enjoyment of the global marine commons. Most RFMOs have carried out performance assessment reviews.

In 2005, Contracting Parties agreed on the need to update the 1979 NAFO Convention in order to modernize the Organization and ensure its statutes meet the requirements of the relevant international instruments. An amended Convention text was agreed by the Contracting Parties in 2007. It entered into force on 18 May 2017, once it attained approval by three-fourths of all Contracting Parties. At the time of writing, Japan, the Republic of Korea and Ukraine are still to ratify or approve the amended Convention.

The Panel notes and commends the decision taken by Contracting Parties to give effect without delay to most of the General Principles outlined in Article III of the amended Convention, as it stems from NAFO Resolution

³ Some key step stones in the move towards RFMO Performance Reviews as an essential governance requirement:

- FAO Report of the Twenty-sixth Session of the Committee on Fisheries Rome, 7-11 March 2005, FAO Fisheries Report No. 780. Rome. FAO 2005. 88 p. paragraph 111.
- Conference on the Governance of High Seas Fisheries and the UN Fish Agreement, Moving from Words to Action, 5 May 2005. <http://waves-vagues.dfo-mpo.gc.ca/Library/320014.pdf>
- 2005 and 2006 UNGA Resolutions on Sustainable Fisheries (respectively, UNGA 60/31 and 63/112)
- Review Conference on UN Fish Stocks Agreement, New York, 22-26 May 2006.

1-08⁴ of the Commission⁵. As noted by PR1, these principles have been informing NAFO activities and decision-making since 2008, shortly after the amended Convention was adopted and open for ratification/approval.

PR1 provided an overview of NAFO's history and examined in detail the differences between the 1979 and 2007 Conventions, including the possible impact the implementation of the amended statutory provisions would have for the work of the Organization. The Panel considers significant progress has been made to modernize NAFO during the period covered by this review. This report does not assess again the Organization's overall legal framework but focuses on action taken by NAFO over the last six (6) years, its achievements and the future challenges.

The Panel notes, in particular, the following achievements:

- Increased transparency in the Organization's workings and proceedings
- A sustained commitment towards the protection of Vulnerable Marine Ecosystems (VME)
- An expansion of the Organization's use of Risk Based Management Strategies, and continuing efforts towards establishing a robust basis for the Precautionary Approach and the Ecosystem Approach to inform the conservation measures it adopts
- Improvements in the Organization's ability to collect and process reliable data for use by scientists and managers, particularly in regard to NAFO's Catch Estimation Strategy
- An improved framework for dialogue between scientists and managers, in particular through the establishment of joint Scientific Council and Commission working groups on key areas
- A generally satisfactory state of compliance in the Regulatory Area based on control measures and peer review processes that can mostly be considered robust
- Increasingly positive cooperation with other fisheries bodies, in particular the North East Atlantic Fisheries Commission (NEAFC), with which NAFO maintains regular operational exchanges of information on control efforts and management measures regarding a shared resource

The Panel sees the following external significant challenges:

- Many of the fish stocks under NAFO's responsibility are still in a precarious state. In some cases, this is largely due to ecosystems change including impacts of climate change
- Various human activities have a cumulative impact on the marine environment, beyond the mandate of NAFO, for the long-term conservation and sustainable use of the fisheries resources

Against this background the Panel believes the following areas require further attention:

- Further improving the availability and reliability of catch data
- Setting up mechanisms to promote compatibility of measures
- Ensuring sufficient resources are available to handle the increasing science workload
- Establishing a decision-making framework for the provision of scientific advice
- Addressing repeat non-compliance
- Ensuring the practical application of an Ecosystem Approach
- Revising the NAFO Conservation and Enforcement Measures (NCEM) for clarity and internal consistency
- Developing an operational plan for the NAFO Secretariat

The Panel has not addressed all the detailed criteria specified in the Terms of Reference point by point, but rather, used them as a basis for assessing progress against the general criteria. Thus, the assessment of each general criterion is a combination of the detailed criteria and progress made in relation to the recommendations made by PR1.

⁴ NAFO Resolution (1-08) – <https://www.nafo.int/Portals/0/PDFs/gc/NAFO%20Resolutions.pdf>

⁵ The amended NAFO Convention merged the role and duties of the General Council and the Fisheries Commission into one single main Body–The Commission. Up to 2017, the General Council is still referenced as the body taking all administrative and overall Organizational decisions for NAFO. For the purposes of this report, the Commission will be used throughout to indicate the Commission, Fisheries Commission and/or General Council.

The following is the full list of recommendations resulting from the assessment carried out by the Panel. Each of these points is presented in the relevant sections of this report.

In relation to the Ecosystem Approach Framework to Fisheries Management, the NAFO Performance Review Panel:

- **Recommends** the Commission, within a defined timeline, sets objectives and determines acceptable risks as outlined in the Ecosystem Approach Framework Roadmap to ensure its implementation.

In relation to the Precautionary Approach Framework, the NAFO Performance Review Panel:

- **Recommends** NAFO assigns a high priority, including a timeline, to the review of its Precautionary Approach Framework and urges NAFO to act with precaution while awaiting the completion of this review, in particular through a commitment to follow scientific advice.
- **Recommends** that NAFO includes 'data-poor' stocks in the Precautionary Approach Framework.

In relation to data collection and sharing, the NAFO Performance Review Panel:

- **Recommends** NAFO implements the applicable outcomes of the catch estimates methodology study once completed, continue the work of CESAG and utilize Scientific observer data.
- **Recommends** NAFO agrees on a means to respond to instances of non-compliance by a Contracting Party with its reporting requirements, including logbook data.
- **Recommends** NAFO implements measures to ensure that fisheries research data, including fisheries survey data used by the Scientific Council, is complete and available for peer review in accordance with established scientific publication standards.
- **Recommends** NAFO assesses whether the discard data collected on the basis of daily electronic catch reporting is sufficient in order to support a future discards policy.

In relation to the consistency of conservation and management decisions with scientific advice, the NAFO Performance Review Panel:

- **Recommends** the Commission, as a matter of high priority, follows the Scientific Council advice and implements its multi-annual management strategies and plans in a consistent manner.
- **Recommends** NAFO adopts and implements a multi-annual schedule/planning for the delivery of advice, applicable over a cycle of at least five (5) years, including timelines for the various tasks required. Requests for advice outside the agreed planning should only be accepted in exceptional circumstances.
- **Recommends** NAFO publishes annually a comparison between decisions adopted and the relevant scientific advice.

In relation to the adoption of consistent/compatible management measures, the NAFO Performance Review Panel:

- **Recommends** NAFO develops mechanisms for the application of Article VI.11 of the Convention.

In relation to the allocation of fishing opportunities, the NAFO Performance Review Panel:

- **Recommends** NAFO revisits the allocation of new fishing opportunities, should a change in circumstances justify it.

In relation to previously unregulated and exploratory fisheries, the NAFO Performance Review Panel:

- **Recommends** NAFO establishes conservation and management measures for Splendid Alfonsino in Subarea 6, at the earliest opportunity.

In relation to the conservation of marine biodiversity and the minimization of harmful fishing impacts on marine ecosystems, the NAFO Performance Review Panel:

- **Recommends** NAFO assesses means of minimizing or eliminating harmful impacts of fishing surveys on Vulnerable Marine Ecosystems within closed areas.
- **Recommends** NAFO establishes codes for Vulnerable Marine Ecosystem indicator species to facilitate reporting of encounters.
- **Recommends** NAFO reviews data available from observers reports and other possible sources that would help identify why encounters with Vulnerable Marine Ecosystems have not been reported to date.

In relation to minimizing pollution, waste, discards, lost and abandoned gear and impacts on non-target species, the NAFO Performance Review Panel:

- **Recommends** NAFO ensures the implementation of the Action Plan on discards by the stipulated target date in 2021 and establishes measures in the shorter-term to minimize or eradicate high-grading practices.
- **Urges** NAFO gives effect to Article III of the amended Convention in respect of minimizing other harmful impacts such as pollution and waste originating from fishing vessels, catch of species not subject to a directed fishery and impacts on associated or dependent species, in particular endangered species.

In relation to reporting requirements, the NAFO Performance Review Panel:

- **Recommends** NAFO develop a user-friendly data manual.

In relation to flag State duties, the NAFO Performance Review Panel:

- **Recommends** NAFO calls on all Contracting Parties to carry out self-assessments of flag State performance in accordance with the criteria set out in the FAO Voluntary Guidelines for Flag State Performance. Reports of the self-assessments should be submitted to STACTIC in order for it to present a summary report to the Commission.

- **Recommends** NAFO amends the NAFO Conservation and Enforcement Measures in order to clarify, rectify and harmonize references to the duties of the Contracting Parties as flag States.

In relation to Monitoring Control and Surveillance, the NAFO Performance Review Panel:

- **Recommends** NAFO evaluates and adopts appropriate measures to deter repeat serious non-compliance.
- **Recommends** NAFO urges Contracting Parties to become parties to the International Labour Organization (ILO) Work in Fishing Convention No. 188.

In relation to follow-up on infringements, the NAFO Performance Review Panel:

- **Recommends** NAFO urges Contracting Parties to increase their efforts in ensuring timely follow-up to infringements.

In relation to transparency, the NAFO Performance Review Panel:

- **Recommends** NAFO reorganizes its website library based on the topics covered.
- **Recommends** NAFO makes all working documents publicly available, unless otherwise requested by a Contracting Party or subject to confidentiality rules.

In relation to science, the NAFO Performance Review Panel:

- **Recommends** NAFO decides the level of acceptable risk regarding the outcomes of conservation and management measures, following a dialogue between Commission and SC, to provide the latter with guidance in its advisory work.
- **Recommends** NAFO develops and publishes an advisory decision-making framework to ensure advice is linked explicitly to policy objectives, is consistent and its basis is transparent.
- **Recommends** NAFO, as a matter of high priority, develops a plan and implements steps to match the scientific resources to the workload.
- **Recommends** NAFO implements a peer review process for the science underlying the SC advice and applies it consistently to all SC science used in advice.
- **Recommends** the Secretariat conducts a survey of usage and identify further improvements to the public outreach documents relating to the state of NAFO stocks and NAFO science available on the NAFO website.

In relation to cooperation with other international organizations, the NAFO Performance Review Panel:

- **Recommends** NAFO strengthens and enhances cooperation with RFMOs and other relevant international organizations.
- **Recommends** NAFO assesses how it can contribute its expertise to international developments, in particular the completion of the Aichi Targets

and the Intergovernmental Conference on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction.

In relation to special requirements of developing countries, the NAFO Performance Review Panel:

- ***Recommends*** *NAFO participates in capacity building initiatives for developing countries.*

In relation to finance and administration, the NAFO Performance Review Panel:

- ***Recommends*** *NAFO develops an annual operational plan for the NAFO Secretariat outlining key objectives and specifying resources required to meet these objectives.*
- ***Recommends*** *NAFO initiates a process to design a new visual identity for NAFO that reflects the role and responsibilities of the Organization.*

II. The 2011 Performance Review of NAFO

PR1 was presented to the 33rd Annual Meeting in 2011⁶. A document was compiled with 63 key recommendations stemming from the report. It was decided to forward 35 to the individual NAFO bodies to which they were specifically addressed. It also established a Working Group (WG) tasked with the development of a plan of action for the implementation of the remaining 28 recommendations, involving policy issues for more than one NAFO body. The WG prepared an Action Plan⁷ which was presented and adopted at the 34th Annual Meeting in 2012, with minor amendments. The Plan prioritized follow-up recommendations as short, medium and long-term. Implementation of the proposed ways forward was entrusted to different NAFO bodies and WGs. In relation to the latter, currently three (3) joint WGs of the Commission and the SC are in operation and tasked with providing follow-up to PR1 recommendations, some of which predated the exercise but were adapted in mandate, and in name, to better cover the issues raised in the 2011 review.

These joint WGs deal with key issues and objectives, namely:

- Ensuring the reliability of data used in stock assessment, in particular regarding catch estimates (CESAG)
- Developing/improving a framework for the implementation of the Ecosystem Approach (WG-EAFFM)
- Developing/improving a framework for the implementation of the Precautionary Approach and risk-based management strategies (WG-RBMS)

From 2014 onwards, these WGs have met intersessionally and reported to the Commission, making short-term recommendations as deemed necessary. They are instrumental in facilitating dialogue between managers and scientists, which in itself was the subject of recommendations issued by PR1.

In addition, two other WGs are currently in operation which report to the SC (WG-ESA) and to the Commission (WG-BDS).

NAFO has ensured a regular review of progress implementing PR1 recommendations since its 35th Annual Meeting in 2013. At that time, Contracting Parties agreed that review and updates regarding the recommendations and their implementation would take place annually in the respective meetings of NAFO bodies⁸. In terms of substantive decisions, records show a positive response from decision-making NAFO bodies to the recommendations made by the various WGs.

The Panel is satisfied that NAFO established a comprehensive and detailed process to address key recommendations from the first review of its performance.

⁶ NAFO/GC Doc. 11-03 (agenda item 10) - <https://archive.nafo.int/open/gc/2011/gcdoc11-03.pdf>

⁷ NAFO/GC Doc. 12-01 - <https://archive.nafo.int/open/gc/2012/gcdoc12-01.pdf>

⁸ NAFO/GC Doc. 13-07 (agenda item 10) - <https://www.nafo.int/Portals/0/PDFs/gc/2013/gcdoc13-7.pdf>

III. Conservation and Management

1. Status of living marine resources

a. Status of fish stocks.

The most recent assessment of the state of stocks by May 2018 and the basis for this assessment is summarized in Table 1.

Table 1. State of stocks as assessed in 2017 (2018 for Cod in Div. 3L) and the background for this assessment⁹. B_{lim} (Biomass limit, a biomass level, below which stock productivity is likely to be seriously impaired), B_{msy} (Biomass at MSY, the biomass one would on average expect if the stock is fished at F_{msy}), CL (Confidence Limits), F (Fishing mortality), F_{lim} (A fishing mortality rate that should only have a low probability of being exceeded), F_{msy} (the fishing mortality which is expected to deliver MSY), LRP (Limit Reference Point), For further details for the use of these concepts in NAFO see NAFO/FC Doc. 04-18 and SC reports. ADAPT, NCAM, SCAA and SSM are specific models used in stock assessment.

Stock	Assessment type	Reference points	Stock Status in 2017 (SC 2017) except Cod in Div. 3L (2018)	Assessment frequency and last year of assessment
<i>Stocks on the Flemish Cap</i>				
Cod in Div. 3M	Virtual Population Analysis type Bayesian model	B_{lim} / F_{lim}	Current SSB is estimated to be well above B_{lim} . However, since 2013 recruitment has decreased, and in 2016 was at levels similar to those observed during the period 1996 to 2004. Since 2010, F has remained stable at a level around twice F_{lim} .	1 year - 2017
Redfish in Div. 3M	Extended Survivor analysis (XSA)	None	The stock currently has high biomass and spawning biomass but abundance and recruitment are declining. Year classes recruiting in 2015 and 2016 are among the lowest on record. Fishing mortality increased in 2015-2016 but is still low.	2 years - 2017
American plaice in Div. 3M	Research vessel survey Trends - XSA Illustration	None	The stock has increased slightly in recent years due to improved recruitment since 2006, and although the catches are low since 1996, it continues to be in a poor condition.	3 years - 2017
Northern Shrimp in Div. 3M	Research vessel survey Trends	B_{lim}	Following several years of low recruitment, the spawning stock has declined, and has remained below B_{lim} since 2011. The probability that SSB in 2017 is below B_{lim} is >95%. Due to continued poor recruitment there are concerns that the stock will remain at low levels.	2 years - 2017

⁹ NAFO/SCS Doc. 17-16 (Revised) – <https://www.nafo.int/Portals/0/PDFs/sc/2017/scs17-16REV.pdf>

See also NAFO/SCS Doc. 17-18 – <https://www.nafo.int/Portals/0/PDFs/sc/2017/scs17-18.pdf>

See also Assessment of the Northern Cod (*Gadus morhua*) stock in NAFO Divisions 2J3KL in 2016 – http://www.dfo-mpo.gc.ca/csas-sccs/Publications/ResDocs-DocRech/2018/2018_018-eng.pdf

Stock	Assessment type	Reference points	Stock Status in 2017 (SC 2017) except Cod in Div. 3L (2018)	Assessment frequency and last year of assessment
<i>Stocks on the Grand Bank</i>				
Cod in Div. 3L	Integrated state-space population dynamics model (NCAM)	B_{lim}	Spawning Stock Biomass (SSB) remains in the critical zone in 2018, at 37% of the Limit Reference Point (LRP) (95% CI, 27-51%), down from 52% in 2017 and returning to the level of 2015. This represents an increase from the current estimate of the 2005 level of 3% of B_{lim} . The estimated fishing mortality rate from all sources has increased from 0.014 in 2015 to 0.021 in 2016 and 0.025 in 2017 (averaged over ages 5-14).	2018. The assessment of the entire stock of Cod in Div. 2J3KL is conducted annually by Canada
Cod in Div. 3NO	ADAPT framework - Virtual Population Analysis	B_{lim} / F_{lim}	The spawning biomass has increased considerably over the past five years but the 2015 estimate of 38 454 tonnes still represents only 64% of B_{lim} (60 000 tonnes). This increase in biomass has been driven by the relatively strong 2005 and 2006-year classes and by fishing mortality values that are amongst the lowest in the time series ($F < 0.1$) and well below F_{lim} (0.3). More recent year classes do not appear as strong and hence despite the low fishing mortality, the increasing trend in SSB may not persist beyond the short term.	3 years - 2015
Redfish in Div. 3LN	Surplus production model	B_{lim} / F_{msy}	The stock is currently in in the safe zone of the NAFO Precautionary Approach Framework and is estimated to be at 1.4 x B_{msy} . There is a low to very low risk of the stock being below B_{msy} . Fishing mortality is well below F_{msy} (0.36 x F_{msy}), and the probability of being above F_{msy} is very low. Recent recruitment appears to be above average.	2 years - 2016
American plaice in Div. 3LNO	APAPT framework - Virtual Population Analysis	B_{lim} / F_{lim}	The stock remains low compared to historic levels and, although SSB is increasing, it is still estimated to be below B_{lim} . Recruitment has been low since the late 1980s, but has shown an increasing trend from 2007.	2 years - 2016
Yellowtail flounder in Div. 3LNO	Surplus production model	B_{lim} / F_{lim}	The stock size has steadily increased since 1994 and remains well above B_{msy} . There is very low risk (<1%) of the stock being below B_{msy} or F being above F_{msy} . Recent recruitment appears to be lower than average. In most years since the moratorium (1994-97) was put in place, the catch remained below the estimated surplus production levels and have been low enough to allow the stock to grow.	3 years - 2015
Witch flounder in Div. 3NO	Surplus production model	B_{lim} / F_{lim}	The stock size increased since 1999 to about 2010 and then declined after 2012 and is now at 52% B_{msy} . There is 15% risk of the stock being below B_{lim} and a 19% risk of F being above F_{lim} . Recruitment since 2013 has been decreasing with spring and fall values in 2016 approaching the lowest of the time series.	2 years - 2017

Stock	Assessment type	Reference points	Stock Status in 2017 (SC 2017) except Cod in Div. 3L (2018)	Assessment frequency and last year of assessment
Capelin in Div. 3NO	Research vessel survey trends	None	Acoustic surveys series terminated in 1994 indicated a stock at a low level. Biomass indices from bottom trawl surveys since then have not indicated a change in stock status since then.	3 years - 2015
Redfish in Div. 3O	Research vessel survey trends	None	The stock appears to have decreased from near time-series highs in 2012. Current fishing mortality is low and recent recruitment appears low.	3 years - 2016
Thorny skate in Div. 3LNOPs	Research vessel survey trends	B_{lim}	The stock is currently above B_{lim} . The probability that the current biomass is above B_{lim} is .99. Stock biomass has been increasing very slowly from low levels since the mid-1990s. Recruitment declined below average in 2014-2015. Fishing mortality is currently low.	2 years - 2016
White hake in Div. 3NOPs	Research vessel survey trends	None	The stock biomass is at a low level. No large recruitments have been observed since 2000. Recruitment was higher in 2011, but not comparable to the very high recruitment observed in 2000. Fishing mortality is low.	2 years - 2017
Northern Shrimp in Div. 3LNO	Research vessel survey trends	B_{lim}	In 2016, the risk of the stock being below B_{lim} is greater than 95%. Given prospects of poor recruitment in recent years, the stock is not expected to increase in the near future.	2 years - 2017
Splendid Alfonsino in Subarea 6	No assessment	None	Due to lack of abundance or exploitation data, no reliable stock assessment can be conducted.	No assessment
<i>Widely Distributed Stocks</i>				
Witch flounder in Div. 2]+3KL	Research vessel survey trends	B_{lim}	There was a general increase in the survey biomass index from 2003 to 2015, nevertheless, the overall stock remains below B_{lim} ($P(B_{2015} < B_{lim}) = 0.66$). In five of the most recent seven surveys, the recruitment (juvenile abundance index) has been above the long-term average. Current fishing mortality is very low.	3 years - 2016
Greenland halibut in SA2 and Div. 3KLMNO	2 Models - SCAA & SSM	B_{msy}/F_{msy}	Both models show age 5 to 9 biomass to be below B_{msy}^{5-9} and F to be below F_{msy} in 2016. The SCAA estimates 5 to 9 biomass to be 77% of B_{msy}^{5-9} and F to be 64% of F_{msy} . The SSM estimates 5 to 9 biomass to be 83 % of B_{msy}^{5-9} and F to be 53% of F_{msy} . Recent recruitment has generally increased according to both models (since 2010 in the SCAA and since 2012 in the SSM) but remains below average.	3 years - 2017
Squid <i>Illex</i> in Subareas 3 and 4	Research vessel survey & Catch trends	None	During 2015, indices of relative biomass and mean body weight, in the Div. 4VWX surveys, and relative fishing mortality indices were very low in relation to 1982-2014 low-productivity period averages. As a result, the Subareas 3 and 4 stock component of Northern shortfin squid remained in a state of low productivity during 2015.	3 years - 2016

Of these 19 stocks, the status relative to relevant fishing mortality and biomass reference points, as used in the present Precautionary Approach Framework, is available simultaneously for seven (7) stocks. The status relative to a biomass reference points is available for five (5) further stocks while no reference points have been decided for seven (7) stocks. Nine (9) are under moratoria in 2018. As discussed in the section III.4.a on “Consistency with scientific advice and the Precautionary Approach” there is little change from the situation described in PR1.

The advice given in 2017 for 2018 and the decisions made by the Commission on that basis are presented and discussed in the sections III.4.a on “Consistency with scientific advice and the Precautionary Approach” and III.4.g “Rebuilding depleted stocks”.

The overall development in stock biomass or proxies of stock biomass is presented in Figures 1 and 2¹⁰.

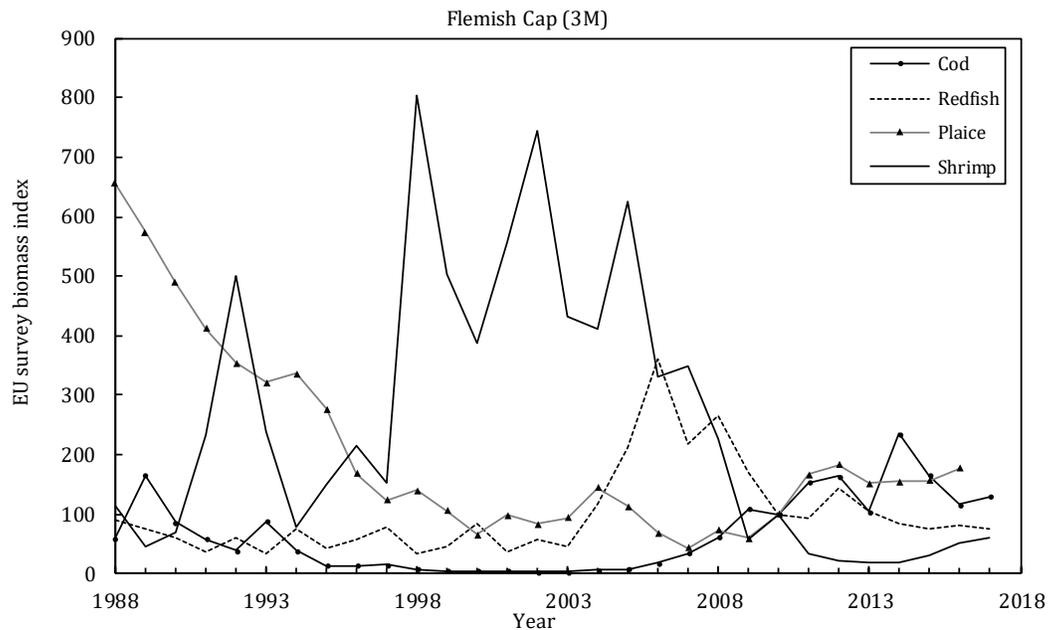


Figure 1. Trend of biomass or biomass proxies for those stocks on the Flemish Cap (Division 3M) for which such estimates are available. For scaling reasons all stocks have been normalised to 2010=100.

¹⁰ NAFO/SCS Doc. 18-19
See also NAFO/SCS Doc. 17-17- <https://archive.nafo.int/open/sc/2017/scs17-17.pdf>

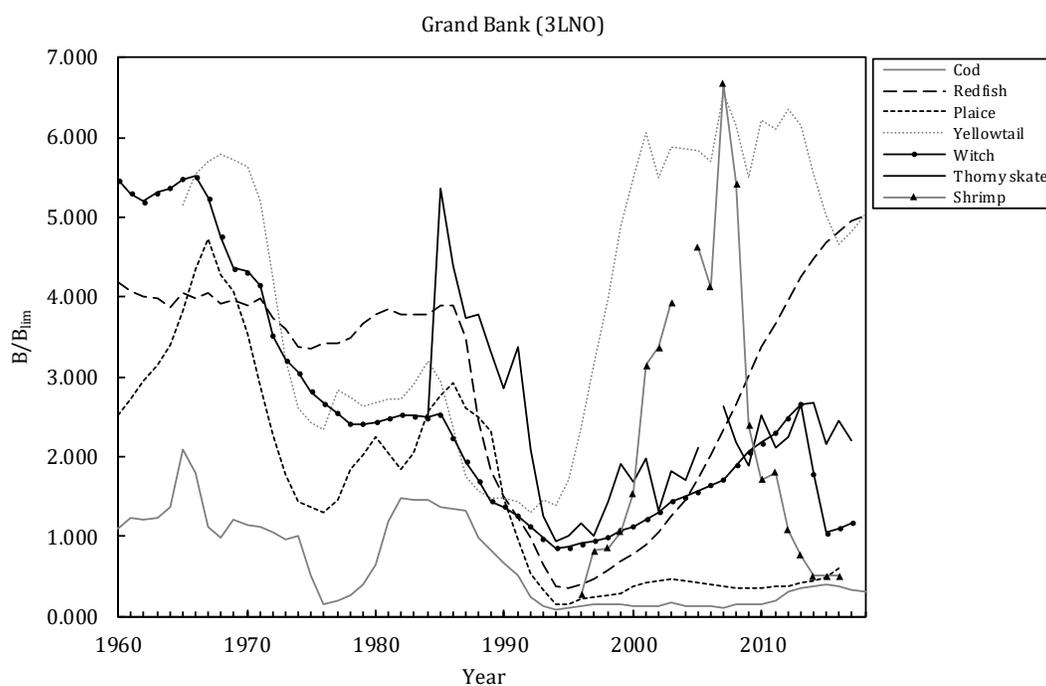


Figure 2. Biomass or survey biomass index for stocks on the Grand Bank (NAFO Divisions 3LN0) relative to their biomass limit reference points (B_{lim}) or proxies.

b. Status of non-target species

NAFO does not provide status assessments regarding non-target species. SC is developing such status assessments through the work of WG-ESA. This takes place in the context of the implementation of an Ecosystem Approach through a three-tier process¹¹. SC is also developing ecosystem summary sheets¹².

The marine ecosystems within the NAFO Convention Area have undergone large changes during the last decades. There have been shifts between the abundance of functional groups and the size compositions of populations have changed. Many fish populations, which are exploited by fishing, have not responded to reductions in fishing pressure by recovering to prior abundance and some have reduced in recent years in spite of fishing moratoria. WG-ESA has analyzed and described these changes. This is included as Annex 3.

2. Ecosystem Approach and Precautionary Approach

One of the key elements in the amended Convention is the introduction of an Ecosystem Approach to Fisheries Management that includes safeguarding the marine environment, conserving marine diversity and minimizing risk of long-term adverse effects of fishing activities on the marine ecosystem. Additionally, the amended Convention binds Contracting Parties to apply the Precautionary Approach in accordance with Article 6 of United Nations Fish Stocks Agreement (UNFSA).

a. Ecosystem Approach

PR1 made a number of recommendations, pertaining to the need to consolidate its policy to address ecosystem management considerations, implement a more ecosystem friendly management approach as well as to embrace the Precautionary Approach more widely. It encouraged NAFO to develop and consolidate its

¹¹ NAFO/SCS Doc. 17-21 (section 3.1, p. 133) – <https://archive.nafo.int/open/sc/2017/scs17-21.pdf>

¹² NAFO/SCS Doc. 17-21 (section 3.2, p. 141) – <https://archive.nafo.int/open/sc/2017/scs17-21.pdf>

Ecosystem Approach Roadmap, focusing on the sustainable use of the entire ecosystem for which it is responsible rather than just fishery-target species.

NAFO has implemented some aspects of an Ecosystem Approach. Specific measures to protect VMEs have been introduced and forage fish considerations are included in the management of capelin stocks. Beyond this, NAFO will be expected to take a more comprehensive approach where ecosystem productivity and dynamics are taken into account, not just as supplementary information but ultimately as a premise for management decisions. NAFO has started scientific and conceptual work in this latter respect through the work on the Ecosystem Approach Framework.

The NAFO work on an Ecosystem Approach Framework to Fisheries Management has been facilitated by a series of WGs, most of which have been established since PR1. At this time, the following two groups are dealing with this issue: WG-ESA and WG-EAFFM.

WG-ESA provides recommendations to the SC for use in the work of WG-EAFFM¹³.

Part of the ongoing work of the SC and WG-EAFFM is the development and implementation of the Roadmap to the Ecosystem Approach Framework to Fisheries Management, first established in 2010 (Figure 3, left). The work on the Roadmap components has been ongoing since then. The Roadmap is a tool providing guidance and structure for decision-making by managers, not a management plan in itself. Much of the work outlined is tasked to the SC, but there are also Commission inputs required: goal setting, monitoring and decisions on acceptable risks.

Scientific work related to the Ecosystem Approach Framework to Fisheries Management has advanced during the past few years. WG-ESA has continued its work elaborating on the approach to provide inputs on how to analyze, at an Ecosystem Production Unit level, Tiers 1 (ecosystem production potential) and 2 (multispecies interactions). Tier 3 (single stock verification) is largely contained in present single stock assessments (Figure 3, right).

¹³ The work of the Scientific Council Working Group on Ecosystem Science and Assessment (WG-ESA) is divided into four themes:

- Spatial Consideration – including the review and analysis of VME protection areas
- Status, Functioning and Dynamics of NAFO Marine Ecosystems – Including the ongoing review of the EU-NEREIDA project as well as the development of guidelines for Total Catch Ceilings and Ecosystem Production Units.
- Practical Application of the Ecosystem Approach to Fisheries – including updating research related to the application of ecosystem knowledge for fisheries management in the NAFO Area, development and application of the Ecosystem Approach to Fisheries Roadmap, the development of draft summary sheets on an ecosystem level
- Specific requests made to the Working Group

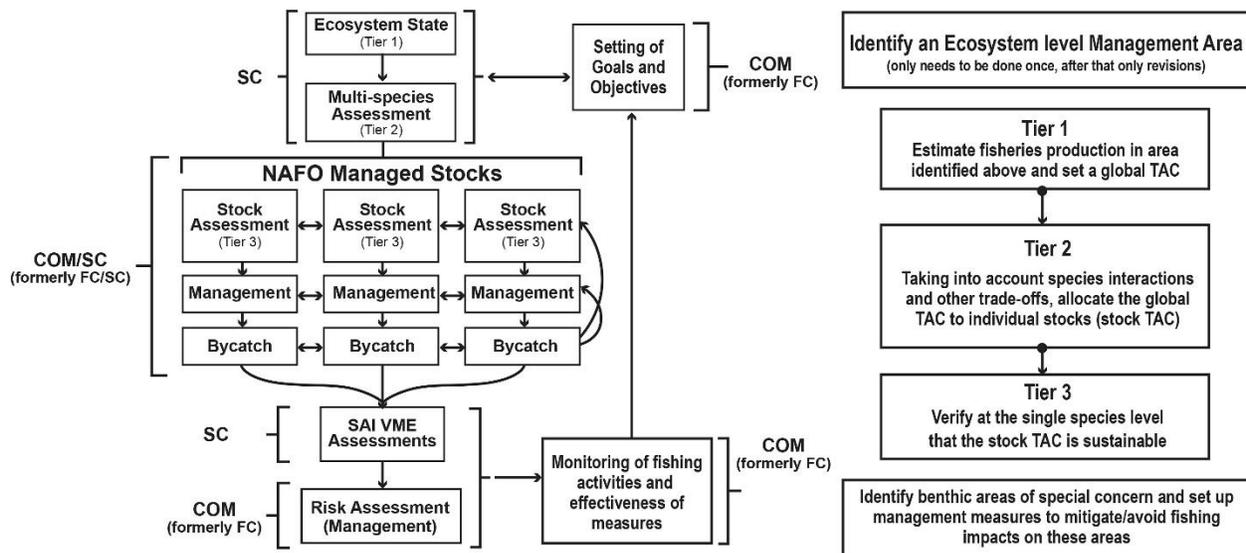


Figure 3. The NAFO Roadmap towards an Ecosystem Approach to Fisheries (left) and WG-ESAs proposal for providing science basis for an EAF (right)¹⁴. SC: Scientific Council, COM: Commission (formerly FC), SAI: Significant Adverse Impact, VME: Vulnerable Marine Ecosystem

While the NAFO Commission has implemented many measures recommended by the WG-EAFFM related to the protection of VMEs, progress on the NAFO Roadmap towards an Ecosystem Approach to Fisheries Management has been slower to develop. In 2017, the SC provided its update on progress made in implementing the Roadmap¹⁵. The SC noted that important advances included the development of Ecosystem summary sheets and further improvements to the models of Fisheries Productivity Potential and the NAFO Roadmap. It also pointed out that implementation of the Roadmap will require Contracting Parties to identify and commit additional human resources.

The Panel believes that so far there has been limited pick-up on the policy side of this more comprehensive three-tier approach. It is still premature to implement this framework directly in actual management decisions but the time may be ripe to develop a realistic timeline, which would guide further work, ensure prioritization and pick-up in management decisions.

Notwithstanding, the Panel commends NAFO for adopting and recently implementing an Action Plan for the Management and Minimization of Bycatch and Discards. This plan consists of four elements: data management, ongoing analysis and monitoring, identification of priorities and development of management options. The Action Plan, as updated¹⁶, will initially focus on stocks that are included in NAFO quota tables. Other stocks may be identified as required. The Panel notes that while collection of data and identification of priorities and options is necessary before action can be taken, this action only leads to actual changes in the fisheries if it is followed up by action as identified.

¹⁴ NAFO/SCS Doc. 17-21 (section 3.1) – <https://archive.nafo.int/open/sc/2017/scs17-21.pdf>

¹⁵ NAFO/COM-SC Doc. 17-07 (in particular agenda item 5.d) – <https://archive.nafo.int/open/com-sc/2017/com-scdoc17-07.pdf>

¹⁶ NAFO/COM Doc. 17-26 – <https://archive.nafo.int/open/com/2017/comdoc17-26.pdf>

In relation to the Ecosystem Approach Framework to Fisheries Management, the NAFO Performance Review Panel:

- *Recommends the Commission, within a defined timeline, sets objectives and determines acceptable risks as outlined in the Ecosystem Approach Framework Roadmap to ensure its implementation.*

b. Precautionary Approach

PR1 noted that the NAFO Precautionary Approach Framework¹⁷, first implemented in 2004¹⁸, is quite sophisticated and its formulation goes beyond what many other RFMOs have developed to address the provisions of Article 6 and Annex II of the UNFSA. In the meantime, PR1 also noted areas where the NAFO Precautionary Approach Framework could potentially be improved. In particular, it noted the absence of formally-defined decision rule(s) framework for its application.

The analysis, review and assessment of improvement needed for the implementation of the Precautionary Approach Framework is entrusted to the WG-RBMS¹⁹

In 2015, NAFO launched an in-depth review of the Precautionary Approach Framework. To this end, the Commission adopted the recommendation made by WG-RBMS to establish a SC Working Group on Precautionary Approach Framework²⁰:

The SC Working Group on Precautionary Approach Framework began work on the review of the NAFO Precautionary Approach Framework in 2016²¹. At that time, it was concluded that many elements of its Terms of Reference could be addressed, however the consideration of the Precautionary Approach Framework as part of the Ecosystem Approach was a large task and should be deferred until a later date.

At the 38th Annual Meeting in 2016, the Commission prioritized the Greenland Halibut Management Strategy Evaluation over the Precautionary Approach Framework Review²². The 2017 Scientific Council Report²³ states *“As a result of considerable workloads, Scientific Council was unable to make significant progress on its assessment of the PA Framework although some progress was made in the assessment of the PA Framework in the context of an ecosystem approach to management in 2016. Scientific Council will continue with its work but notes progress can only be achieved with appropriate participation of quantitative experts.”* The Panel believes this is important work and should proceed with high priority.

Stocks which have sufficient data available are generally evaluated against the Precautionary Approach Framework for the provision of scientific advice and subsequent decision making by the Commission. There are however, a number of ‘data-poor’ stocks managed by NAFO that at present do not have precautionary approach reference points determined. One of the tasks of the Precautionary Approach review is the eventual determination of relevant reference points for all stocks. When completed this should lead to the provision of advice and decision making within a Precautionary Approach Framework for most NAFO managed stocks. In the meantime, NAFO should be committed to act with precaution as a matter of principle. In particular, the Panel expresses concern that there continue to be instances where Contracting Parties cannot find consensus to follow scientific advice for certain stocks.

For stocks not assessed, the Panel notes a regular practice to roll over applicable Total Allowable Catch (TACs) from one year to the next, irrespective of actual catches. In the case of shrimp stocks, these collapsed during a time of ecosystem change and this is likely due to a combination of factors including predation, environmental conditions and fishing. Climate change, as the likely cause of this and other trends seen in stock abundance and

¹⁷ NAFO/FC Doc. 04-18 – <https://archive.nafo.int/open/fc/2004/fcdoc04-18.pdf>

¹⁸ NAFO/FC Doc. 04-17 (agenda item 12) – <https://archive.nafo.int/open/fc/2004/fcdoc04-17.pdf>

¹⁹ NAFO/FC Doc. 13-18 – <https://archive.nafo.int/open/fc/2013/fcdoc13-18.pdf>

²⁰ NAFO/FC Doc. 15-19 – <https://archive.nafo.int/open/fc/2015/fcdoc15-19.pdf>

²¹ NAFO SCS Doc. 16-15 – <https://archive.nafo.int/open/sc/2016/scs16-15.pdf>

²² NAFO/FC Doc. 16-20 (agenda item 8) – <https://archive.nafo.int/open/fc/2016/fcdoc16-20.pdf>

²³ NAFO/SCS Doc. 17-16 Revised (agenda item VII.1.c.vi, p. 28) – <https://www.nafo.int/Portals/0/PDFs/sc/2017/scs17-16REV.pdf>

distribution, should prompt NAFO to be even more precautionary in its annual decision-making, particularly where 'data-poor' stocks are concerned. This an example of how important it is to develop an operational Precautionary Approach Framework that includes those stocks which may be 'data-poor' or subject to strong drivers outside fisheries.

In relation to the Precautionary Approach Framework, the NAFO Performance Review Panel:

- **Recommends** NAFO assigns a high priority, including a timeline, to the review of its Precautionary Approach Framework and urges NAFO to act with precaution while awaiting the completion of this review, in particular through a commitment to follow scientific advice.
- **Recommends** that NAFO includes 'data-poor' stocks in the Precautionary Approach Framework.

3. Data Collection and Sharing

As PR1 noted, a fundamental requirement for stock assessment and the provision of scientific advice is that Contracting Parties collect and exchange scientific, technical and statistical data and information regarding fishing and the marine environment in an accurate and timely manner. While noting that data formats and submission specifications are in general conformity with the provisions outlined in Annex 1 of the UNFSA, PR1 conveyed concerns about the timeliness of submissions being a recurrent problem. There were also discrepancies between catch estimates stemming from the work of the SC's Standing Committee on Fisheries Science and those stemming from the catch and effort statistics collated by the Secretariat via the STATLANT System²⁴. The PR1 recommended that *"the Fisheries Commission and Scientific Council promptly resolve such discrepancies if possible, or at least provide some guidance on how they arise, including underlying assumptions made and/or consequences anticipated."* and urged Contracting Parties to ensure that every effort is made to ensure the accuracy of the data and information collected and the timeliness in the submission of such data to NAFO, recalling discussions underway in other RFMOs on the possibility of applying sanctions in case of non-compliance with reporting requirements.

PR1 described in detail the various sources of data collected by NAFO²⁵ listed below:

- STATLANT 21A provisional commercial catch data
- STATLANT 21B final catch data
- Biological Sampling Data
- Vessel Monitoring System data summary, in aggregated form
- Monthly Provisional Catch Reports submitted by the Contracting Parties²⁶

Since PR1, NAFO has started to collect and/or process data from additional sources, namely:

- Daily catch reports, transmitted electronically to the Secretariat. These reports must detail the quantity of catch retained and discarded by species for the day preceding the report²⁷
- Port Inspection reports
- NAFO observer reports
- Logbooks²⁸

²⁴ NAFO is responsible for collecting data via this system in respect of FAO Area 21, which is geographically identical to the NAFO Convention Area – <http://www.fao.org/cwp-on-fishery-statistics/handbook/introduction/data-collection-systems/en/>

²⁵ PR1 (section 4.4.1) – <https://www.nafo.int/Portals/0/PDFs/Performance/PAR-2011.pdf>

²⁶ Currently, in accordance with NCEM, Article 28.8.a – <https://www.nafo.int/Portals/0/PDFs/COM/2018/CEM-2018-web.pdf>

²⁷ 2018 NCEM, Article 28.6.c – <https://www.nafo.int/Portals/0/PDFs/COM/2018/CEM-2018-web.pdf>

²⁸ 2018 NCEM, Article 28.8.b

The Panel views this development as positive, notably since electronic daily catch reports provide NAFO with a much-needed source of data concerning discards. Without robust discarding data, NAFO would be significantly impaired to take action to assess and reduce discarding, as intended through its discards Action Plan²⁹. It should be noted that electronic daily catch reports are based on self-reporting, which may require cross checks against other data sources to assess possible bias.

The use of Port Inspection reports as an additional means for the NAFO Secretariat to complement, validate and cross-check data is also welcome. The Panel considers that availability of new sources since PR1 has enhanced NAFO's ability to cross-check the data it collects and therefore, improve the robustness of its data system.

In relation to logbook data, a reporting requirement was implemented in 2015. At the May 2018 meeting, STACTIC noted some challenges in the implementation of the provision of the logbook data with some Contracting Parties slow to report³⁰. This concern has also been raised by WG-BDS and CESAG.

Scientific observer reports are not shared by NAFO Contracting Parties whose fleets implement Scientific observer programmes. Scientific observer reports may be a useful source for cross checking against self-reporting bias³¹.

The Panel is satisfied NAFO is investing considerable effort to secure reliable catch estimates, but progress towards this objective is slow for such a key component of the Organization's conservation and management system. Several steps have been taken since PR1. In 2012, NAFO established a Peer Review Expert Panel to peer-review the SC's Standing Committee on Fisheries Science catch estimation methodology for some NAFO stocks. Further to Peer Review Expert Panel recommendations, NAFO established two further Working Groups - a Working Group on Catch Reporting in 2014 and a Catch Data Advisory Group in 2015. In 2017, the Commission decided to merge these two WGs into one, the Joint Commission-Scientific Council Catch Estimation Strategy Advisory Group (CESAG). CESAG is to provide oversight in the implementation of the catch estimation strategy and make recommendations to the Commission on ongoing refinement. The panel notes that the recommendations made by the various Working Groups, in existence since 2014, have been adopted by the Commission at successive Annual Meetings. Nevertheless, most of them are the subject of on-going work.

With the consolidation of these advisory groups into CESAG in 2017, the Commission agreed to initiate a Catch Estimates Methodology Study³². Its intended scope is to deliver "*a fully documented description of the methodologies in place by all actors involved (...), together with the development of common best practices to estimate catches.*" At the time of writing, the contract has been signed and the study is expected to be completed by the end of 2018. CESAG will review the study report ahead of the Commission's 41st Annual Meeting in 2019.

Against this background, the Panel concludes that NAFO collects a substantial amount of data from a variety of sources, and the Secretariat does a good job of processing and cross-checking data. Although steps have been taken to resolve outstanding issues, the Panel believes additional work is required to ensure robust catch estimates. Data from Scientific observer reports could be utilized to reinforce the processes in place to this end.

The Panel has also sought to identify remaining gaps in NAFO's data collection, with special attention to the issue of timeliness already highlighted in PR1. The following tables present the record of Contracting Party submissions of STATLANT data.

²⁹ See section III.2.a on "*Ecosystem Approach*", above

³⁰ NAFO/COM Doc. 18-02 (agenda item 4, p. 3) - <https://archive.nafo.int/open/com/2018/comdoc18-02.pdf>

³¹ The duties of NAFO observers are defined in Article 30 of NCEM. These include observation of compliance and data reporting. NAFO observers report according to NAFO rules. Scientific observers are employed by some Contracting Parties on some of their vessels to collect data on fishing activities to support scientific work. These observers generally do not have duties linked to compliance.

³² NAFO/COM Doc. 17-25 - <https://archive.nafo.int/open/com/2017/comdoc17-25.pdf>

Table 2. Data submitted to STATLANT for the fishing years 2010 to 2016 – STATLANT 21A (provisional commercial catch data)

	2010	2011	2012	2013	2014	2015	2016
Canada	✓	✓	✓	✓	✓	✓	✓
Cuba ¹		✓	✓				
Denmark (in respect of Faroes and Greenland)	✓	✓	✓	✓	✓	✓	✓
European Union	✓	✓	✓	✓	✓	✓	✓
France (in respect of St. Pierre et Miquelon)	✓	✓	✓	✓	✓	✓	✓
Iceland	✓	✓	✓	✓		-	-
Japan	-	-	-	-	-	-	✓
Korea	-	-	-	-	-	-	-
Norway	✓	✓	✓	✓	✓	✓	✓
Russian Federation	✓	✓	✓	✓	✓	✓	✓
Ukraine	-	-	-	-	-	-	-
USA	✓	✓	✓	✓	✓	✓	✓

¹ Did fish through chartering arrangements - No fishing

Table 3. Data submitted to STATLANT for the fishing years 2010 to 2016 – STATLANT 21B (final catch data)

	2010	2011	2012	2013	2014	2015	2016
Canada	✓	✓	✓	✓	✓	✓	✓
Cuba ¹							
Denmark (in respect of Faroes and Greenland)	✓	✓	✓	✓	✓	✓	✓
European Union	✓	✓	✓	✓	✓	✓	✓
France (in respect of St. Pierre et Miquelon)	✓	✓	✓	✓		✓	
Iceland	✓	✓				-	-
Japan	-	-	-	-	-	-	-
Korea	-	-	-	-	-	-	-
Norway	✓	✓	✓	✓	✓	✓	✓
Russian Federation	✓	✓		✓	✓	✓	✓
Ukraine	-	-	-	-	-	-	-
USA							

¹ Did fish through chartering arrangements - No fishing

The Panel is unable to assess the impact of any lack of communication of STATLANT data on NAFO's ability to estimate catches in a robust way, given the variety of sources used in catch estimation. However, it deems it appropriate to reiterate the recommendations issued by PR1 that NAFO should create means for the Organization to respond to lack of compliance by Contracting Parties with their reporting requirements.

The issue of possible catch area misreporting was raised in the course of this review. In 2014, the matter was discussed by STACTIC, at which time there were converging views on this as a potential problem but disagreement prevailed as to the means to address it. It is important to ensure catches are accurately documented in terms of their location. This issue relates to catches across division boundaries as well as to catches of the redfish stock straddling NAFO and NEAFC areas.

With regard to the sharing of fishery research data among NAFO Contracting Parties, PR1 raised concerns that research vessel information recorded by some Contracting Parties in accordance with NAFO's Manual on Groundfish Surveys in the Northwest Atlantic³³ is not reported to NAFO, even if it may be used by designated experts dealing with a stock specific assessment, and thus contribute to the work of the SC. The concerns related to the possibility that information such as gear, mesh size, mesh type, used in the surveys may not be available to the SC. The Panel is of the view that if the metadata are not readily available to the SC, this may question the robustness of the research data used by NAFO, since scientific research must be transparent and subject to peer review. This is not feasible unless the relevant data is published and accessible to data users and potential reviewers.

In relation to data collection and sharing, the NAFO Performance Review Panel:

- **Recommends** NAFO implements the applicable outcomes of the catch estimates methodology study once completed, continue the work of CESAG and utilize Scientific observer data.
- **Recommends** NAFO agrees on a means to respond to instances of non-compliance by a Contracting Party with its reporting requirements, including logbook data.
- **Recommends** NAFO implements measures to ensure that fisheries research data, including fisheries survey data used by the Scientific Council, is complete and available for peer review in accordance with established scientific publication standards.
- **Recommends** NAFO assesses whether the discard data collected on the basis of daily electronic catch reporting is sufficient in order to support a future discards policy.

4. Adoption of conservation and management measures

a. Consistency with scientific advice and the Precautionary Approach

The Panel examined the consistency of Commission decisions with scientific advice over the past six (6) years. The Panel notes that PR1 had concerns about the number of NAFO stocks under moratoria.

Since PR1, the status of moratoria stocks has not changed significantly. Of the 19 stocks included in the 2018 quota table, nine (9) are under moratoria. It should be noted that two (2) additional stocks that have come under moratorium since 2011 - Shrimp in Divisions 3LNO and Shrimp in Division 3M - were regularly managed with what amounted to low fishing mortality. It seems that the depletion of these stocks may have been due to a shifting ecosystem, possibly linked to climate change/ocean warming. Additionally, one stock that was under moratoria in 2010 - Witch flounder in Division 3NO - is now open to commercial fishing.

Over the years, NAFO has taken annual decisions for certain stocks based on multi-annual recovery or management plans. At this time, such plans apply to Cod in Divisions 3NO³⁴, American plaice in Divisions 3LNO³⁵, Greenland halibut³⁶ and Redfish in Divisions 3LN³⁷. Two of these plans (American plaice and Redfish) were introduced since PR1. The Panel welcomes the progressive introduction of multi-annual management plans including decision rules. The Panel is satisfied that annual NAFO decisions have been consistent with applicable plans during the review period and welcomes decisions taken by NAFO to assess periodically the effectiveness of these plans in respect of their objectives. The recent management strategy of the Greenland

³³ NAFO Manual on Groundfish Surveys in the Northwest Atlantic – <https://archive.nafo.int/open/studies/s2/doubleday.pdf>

³⁴ 2018 NCEM, Article 7 – <https://www.nafo.int/Portals/0/PDFs/COM/2018/CEM-2018-web.pdf>

³⁵ 2018 NCEM, Article 8 – <https://www.nafo.int/Portals/0/PDFs/COM/2018/CEM-2018-web.pdf>

³⁶ 2018 NCEM, Article 10 (applies to SA 2 and Divs. 3KLMNO) – <https://www.nafo.int/Portals/0/PDFs/COM/2018/CEM-2018-web.pdf>

³⁷ 2018 NCEM, Article 10 bis – <https://www.nafo.int/Portals/0/PDFs/COM/2018/CEM-2018-web.pdf>

halibut plan is a case in point. The Panel notes the considerable resources invested in this task. The Panel also notes that a work plan has been agreed for a Management Strategy Evaluation for Cod in Division 3M, with a target for completion in 2019.

Whether stocks are under plan or not, examination of data on the scientific advice and the decisions taken by the Commission during the past three (3) years shows for the most part decisions are in line with the scientific advice, with one exception. The scientific advice from 2017 along with the management decisions for 2018 are presented in Table 4. For Cod in Division 3M, the SC recommended a quota for 2018 of 8,182 tonnes. The decision of the Commission was to establish a quota of 11 145 tonnes in 2018 and a quota of 8,182 tonnes in 2019. Decisions that deviate from scientific advice concern the Panel.

Table 4. Summary of 2017 Scientific Advice and 2018 Management Decisions

Species/Stock Area	2016 Uptake (kt)	2017 Scientific Advice	2018 Management Action
Northern Shrimp in Divs. 3LNO	0	No change in current levels	Moratorium
Northern Shrimp in Div. 3M	0	No change in current levels	No effort allocated (Moratorium)
Cod in Div. 3L			Ban on fishing in force
Cod in Divs. 3NO	0.6	No directed fishing 2016-2018	Moratorium
Cod in Div. 3M ³⁸	13.8	3/4 F_{lim} 8182 tonnes in 2018	11 145 tonnes in 2018 8182 tonnes in 2019
Redfish in 3M ³⁹	6.6	Low end of range 7000-12 000 tonnes	10 500 tonnes in 2018, 2019
Redfish in SA 2+ Div. 1F+Div. 3K			0 TAC
American Plaice in Div. 3M	0.2	No directed fishery 2018, 2019, 2020	Moratorium in 2018, 2019, 2020
Witch in Div. 3NO	1	1116 tonnes in 2018, 1175 tonnes in 2019	1116 tonnes in 2018, 1175 tonnes in 2019
White Hake in Div. 3NO ⁴⁰	0.4	No increase in catch	1000 tonnes for 2018, 2019
Greenland halibut in Divs. 2+3KLMNO ⁴¹	14.8	16 500 tonnes +/-10% (6 years)	16 500 tonnes for 2018 (12 227 tonnes in Divs. 3LMNO)
American Plaice in Divs. 3LNO	1.5	No directed fishing 2017, 2018	Moratorium in 2018

³⁸ 2017 TAC was 13 931 tonnes. Some Contracting Parties noted uncertainty with assessment with no consensus on approach for 2018. A proposal was tabled that included 11 145 tonnes for 2018 and 8,182 tonnes for 2019. Vote 8-3. This statement is included in the quota table: "For 2019, the TAC will be reduced to 8,182 t. This advice will be reviewed based on the available scientific advice for this stock."

³⁹ The 3M redfish stock contains three (3) *Sebastes* species with SC advice based on only two (*S. mentella* and *S. fasciatus*). Golden redfish (*S. marinus*) represents part of the catch but has not been assessed. SC was requested to do this in 2017, but due to lack of time this request was deferred until 2018.

⁴⁰ The range of catches from 2009 to 2016 was 100 to 500 tonnes.

⁴¹ The management of Greenland halibut is consistent with the Management Strategy Evaluation approach recommended by the WG-RBMS.

Species/Stock Area	2016 Uptake (kt)	2017 Scientific Advice	2018 Management Action
Yellowtail flounder in Divs. 3LNO	8.3	23 600 tonnes in 2017 22 000 tonnes in 2018	17 000 tonnes for 2018
Capelin in Divs. 3NO	5	No directed fishery	Moratorium for 2018
Redfish in Div. 3LN	8.5	14 200 tonnes for 2017 and 2018	14 200 tonnes for 2018
Redfish in Div. 3O	8.9	Unable to provide TAC advice	20 000 tonnes
Thorny skate in Divs. 3LNO ⁴²	4.1	No increase in catch (4,700 tonnes)	7,000 tonnes
Witch flounder in 2J+3KL	0.1	No directed fishery	Moratorium in 2018
N Short-finned squid in SA 3+4	<0.1	34 000 tonnes	34 000 tonnes
Splendid Alfonsino in Subarea 6 ⁴³	0.1	200 tonnes or 16 days on ground in res. area	No management action

In some cases, NAFO also uses risk management approaches to prevent catches exceeding the level recommended by the SC. An example of this is Thorny skate in Divisions 3LNO. The SC recommended a catch not to exceed recent harvest levels of 4,700 tonnes. This has been the advice for this stock for a number of years. For allocation reasons, the Commission decision in this regard was to set the TAC at 7,000 tonnes with the provision that should the catch in any year exceed 5,000 tonnes the additional measures would be adopted to further restrain the catches in the current year. The Panel considers this to be a workable solution as long as allocation is underutilized and the total catch is consistent with the scientific advice. The Panel refers to section III.2.b on “Precautionary Approach” and the recommendations, which are relevant also in the present context.

In relation to the consistency of conservation and management decisions with scientific advice, the NAFO Performance Review Panel:

- **Recommends** the Commission, as a matter of high priority, follows the Scientific Council advice and implements its multi-annual management strategies and plans in a consistent manner.
- **Recommends** NAFO adopts and implements a multi-annual schedule/planning for the delivery of advice, applicable over a cycle of at least five (5) years, including timelines for the various tasks required. Requests for advice outside the agreed planning should only be accepted in exceptional circumstances.
- **Recommends** NAFO publishes annually a comparison between decisions adopted and the relevant scientific advice.

⁴² Risk management approach. Should catches exceed 5,000 tonnes, additional measures would be adopted to further restrain catches in 2018.

⁴³ The Commission noted that current fishing levels are within the parameters outlined by the SC. There was no consensus reached among Contracting Parties and this issue was deferred until the 2018 Annual Meeting. Recent fishing activity (2013-2016) resulted in catches in the range of 114-127 tonnes and effort days on ground in the range of 13-17 days.

b. Compatibility between measures taken by NAFO and measures taken by coastal States

PR1 noted that while the Convention contain provisions aimed at achieving consistency and compatibility of conservation and management measures adopted by coastal States and the Commission for straddling fish stocks, these provisions are neither as obligatory nor as specific as the requirements of the UNFSA. However, PR1 also noted that a number of conservation and management measures currently in force are aligned with regulations being applied by coastal States. PR1 urged NAFO to consider adopting policy measures to bolster its commitment to ensure the compatibility of measures adopted for the conservation and management of straddling stocks within the Convention Area.

This recommendation was echoed in the PR1 Follow-up Action Plan, adopted by NAFO. The Action Plan proposed to develop mechanisms for the application of Article VI.11 of the amended Convention to ensure consistency of measures adopted for the conservation and management of straddling stocks within the Convention Area following the amended Convention's entry into force.

The Panel notes the effort made but sees a need for further work. A proposal, tabled in 2016, for coastal State Contracting Parties to notify the Executive Secretary of national measures adopted for the conservation and management of straddling stocks did not reach consensus.

In relation to the adoption of consistent/compatible management measures, the NAFO Performance Review Panel:

- *Recommends NAFO develops mechanisms for the application of Article VI.11 of the Convention.*

c. Allocation of fishing opportunities

The issue of allocation, dealt with in Article VI.12 of the Convention⁴⁴, has been particularly difficult for the newest Contracting Parties who currently have limited fishing opportunities. PR1 noted the adoption in 1999 of NAFO Resolution (1-99)⁴⁵, according to which “*New members of NAFO should be aware that presently and for the foreseeable future, stocks managed by NAFO are fully allocated, and fishing opportunities for new members are likely to be limited, for instance, to new fisheries (stocks not currently allocated by TAC/quota or effort control), and the “Others” category under the NAFO Quota Allocation Table.*”

In 2000, TAC/quota measures were introduced for Shrimp in Division 3L, although the fishery is now under moratoria. The allocation for the portion of the resource in the Regulatory Area was divided equally among all Contracting Parties. In 2005, two established fisheries came under TAC/Quota control (White hake and Thorny Skate) that were not previously subject to such measures. In both cases, the stocks had been previously fished for a number of years without TACs in place and allocation was decided based on a range of factors including catch history.

Chartering arrangements and quota transfers are additional mechanisms that can be used by Contracting Parties with limited fishing opportunities.

In addition to the issues raised above, climate change may have an impact on distribution patterns of fish stocks with subsequent challenges concerning allocation arrangements of those stocks straddling between Exclusive Economic Zones and the high seas.

⁴⁴ This Article reads: “*Measures adopted by the Commission for the allocation of fishing opportunities in the Regulatory Area shall take into account the interests of Contracting Parties whose vessels have traditionally fished within that area and the interests of the relevant coastal States. In the allocation of fishing opportunities from the Grand Bank and Flemish Cap, the Commission shall give special consideration to the Contracting Party whose coastal communities are primarily dependent on fishing activities for stocks related to these fishing banks and which has undertaken extensive efforts to ensure the conservation of such stocks through international action, in particular, by providing surveillance and inspection of international fishing activities on these banks under an International Scheme of joint enforcement.*”

⁴⁵ NAFO Resolution (1-99) – <https://www.nafo.int/Portals/0/PDFs/gc/NAFO%20Resolutions.pdf>

In relation to the allocation of fishing opportunities, the NAFO Performance Review Panel:

- *Recommends NAFO revisits the allocation of new fishing opportunities, should a change in circumstances justify it.*

d. Previously unregulated fisheries, exploratory fisheries

A number of stocks were brought under TAC and quota measures between 2000 and 2005⁴⁶. Conservation and management measures for sharks were introduced in the 2012 NCEM. Sharks are taken occasionally as bycatch in some fisheries. The Panel welcomes this development, noting in particular the requirement to retain shark onboard with fins attached.

There is currently a small fishery for Splendid Alfonsino in Subarea 6 in an area of the Corner Rise Seamounts chain utilizing mid-water fishing gear. The SC issued advice in 2017 for the management of this stock, recommending that the fishery not be allowed to expand from current levels in certain seamount areas unless it can be demonstrated that such exploitation is sustainable, and fisheries on other seamounts should not be authorized. The SC also recommended TACs based on recent catch history⁴⁷. At its 39th Annual Meeting in 2017, the Commission failed to adopt conservation measures for this stock. The Commission decided to revisit this issue in 2018⁴⁸. By this time the SC is likely to have provided an updated assessment.

In relation to exploratory fisheries, the applicable NAFO management rules are outlined in Articles 18-21 of the 2018 NCEM. The exploratory fishery measures were primarily developed with the objective of protecting VMEs in the portions of the Regulatory Area where exploratory activities could occur. The Panel notes that there appears to be few if any other potential target species occurring in the Regulatory Area that may lead to additional fisheries/stocks coming under NAFO Regulation.

In relation to previously unregulated and exploratory fisheries, the NAFO Performance Review Panel:

- *Recommends NAFO establishes conservation and management measures for Splendid Alfonsino in Subarea 6, at the earliest opportunity.*

e. Conserving biodiversity and minimizing harmful fishing impacts on marine ecosystems

PR1 commended NAFO for its progress in addressing environmental and biodiversity concerns. It highlighted that NAFO's efforts to address potential threats to biodiversity in the Convention Area were largely linked to the management of relevant fisheries and their likely impacts and that NAFO had no specific plans aimed at developing ways to conserve biodiversity. PR1 also encouraged NAFO to consider whether activities other than fishing in the Convention Area, such as oil exploration, shipping and recreational activities, may impact the stocks and fisheries as well as biodiversity in the Regulatory Area. PR1 commended NAFO for its policy and the adoption of measures in addressing the various provisions of UNGA resolution 61/105 related to bottom fishing.

The WG-EAFFM has been instrumental in developing and advancing this work since PR1. Indeed, the following measures recommended by the WG-EAFFM have been adopted by the Commission since that time:

- Establishment of three additional area closures to protect VMEs
- Revision of Article 17 of the NCEM – No exploratory fisheries on seamounts

⁴⁶ Shrimp in Div. 3LNO (2000); Redfish in Subarea 2 and 1F+3K (2001); Thorny Skate in Div. 3LNO, White hake in Div. 3NL, Shrimp in Div. 3M (2005)

⁴⁷ NAFO/SCS Doc. 17-16 Revised (Details of 2017 advice) – <https://www.nafo.int/Portals/0/PDFs/sc/2017/scs17-16REV.pdf>

⁴⁸ NAFO/COM Doc. 17-29 Revised (p. 16) – <https://archive.nafo.int/open/com/2017/comdoc17-29.pdf>

- Revision to Articles 22 and 23 of the NCEM – Re-enforcement of the provisions in case of encounter and bottom fisheries assessment

In total, NAFO has closed 21 areas for the protection of VMEs. This includes six (6) Seamount closures, the Coral closure in Division 30 and the closure of 14 areas identified as Sponge and Coral Concentration areas. The move-on thresholds in case of encounters with VME indicator species have also been reviewed and updated and are currently: 7 kg for sea pens, 60 kg for live corals and 300 kg for sponges⁴⁹.

The Panel notes the measures adopted by NAFO to protect VMEs expanded on the recommendations initially made by the United Nations (UN) General Assembly by protecting not just deep-water corals, hydrothermal vents and seamounts, but also sponges and seapens. The Panel welcomes the investment made by Contracting Parties on scientific research to identify, map and describe the ecology of VMEs⁵⁰. Increasingly improved data and information regarding VMEs occurring in the Convention Area should allow the Organization to review regularly the effectiveness of its conservation measures and consider any relevant proposals for their expansion.

The Panel notes, however, that research vessel trawl survey sets are allowed inside closed areas. Catches of VME species can be significant during such trawls⁵¹. While acknowledging the usefulness of data collected for both stock assessment and the assessment of VMEs, it is essential, if the closures are to be effective in achieving their conservation objectives, that the impact of such research activities be closely monitored and NAFO carefully assesses whether it is indispensable to carry them out in their current form. Non-destructive alternatives could be explored for future activity. The Panel is aware that one Contracting Party has decided not to undertake the existing surveys.

The Panel also notes that, although the NCEM establish rules regarding encounters with VMEs, and that these rules have been in force since 2008 (with subsequent revisions), the move-on rule that applies in case of an encounter has never been triggered. The Panel commends the creation of the recent VME identification guides⁵². No encounters have been reported, despite the fact that surveys have detected the presence of VMEs in areas open to fishing. This may be due to the absence of reporting codes for the VME species concerned, but the Panel believes it is worth identifying possible reasons for this absence of reporting.

The Panel highlights that protecting the marine environment and conserving biodiversity is a cross-sector responsibility of the various relevant authorities in order to assess the cumulative impact of different activities. For instance, the potential impact of oil and gas exploration on the effectiveness of VME closures has been of some concern to Contracting Parties over recent years. To address such concerns, NAFO and the coastal State now regularly exchange information on such activities with a view to ensure coordination and feedback.

The Panel welcomes these voluntary exchanges as well as the adoption of NAFO Resolution 1-17 in 2017 whereby: *“NAFO Contracting Parties commit to ensure that once a decision to close an area has been taken by the Commission, it is communicated, together with its scientific rationale, to all known relevant authorities of the Contracting Parties regulating industries active in the area of the closure, other than fisheries, with a view to ensuring the effectiveness of the conservation efforts in the area.”*⁵³

⁴⁹ 2018 NCEM, Article 22.1 – <https://www.nafo.int/Portals/0/PDFs/COM/2018/CEM-2018-web.pdf>

⁵⁰ e.g. NEREIDA surveys project – <https://www.nafo.int/Portals/0/PDFs/NEREIDA/diptico-neraida.pdf?ver=2016-08-09-104633-013>
See also NAFO/GC Doc. 13-02 – <https://archive.nafo.int/open/gc/2013/gcdoc13-2.pdf>

⁵¹ The Panel heard evidence of at least one (1) case where such catches amounted to 12 MT in weight.

⁵² Coral, Sponge, and Other Vulnerable Marine Ecosystem Indicator Identification Guide, NAFO Area. (2015) – <https://archive.nafo.int/open/studies/s47/s47.pdf>

Sponge Identification Guide NAFO Area (2010) – <https://archive.nafo.int/open/studies/s43/s43.pdf>

Coral Identification Guide NAFO Area (2009) – <https://archive.nafo.int/open/studies/s42/s42-final.pdf>

⁵³ NAFO Resolution 1-17 – <https://www.nafo.int/Portals/0/PDFs/gc/NAFO%20Resolutions.pdf>

In relation to the conservation of marine biodiversity and the minimization of harmful fishing impacts on marine ecosystems, the NAFO Performance Review Panel:

- ***Recommends** NAFO assesses means of minimizing or eliminating harmful impacts of fishing surveys on Vulnerable Marine Ecosystems within closed areas.*
- ***Recommends** NAFO establishes codes for Vulnerable Marine Ecosystem indicator species to facilitate reporting of encounters.*
- ***Recommends** NAFO reviews data available from observers reports and other possible sources that would help identify why encounters with Vulnerable Marine Ecosystems have not been reported to date.*

f. Minimizing pollution, waste, discards, lost and abandoned gear and impacts on non-target species

PR1 noted that the amended Convention's general principles (Article III) clearly call on NAFO to: *"Take due account of the need to minimize pollution and waste originating from fishing vessels as well as minimize discards, catch by lost or abandoned gear, catch of species not subject to a directed fishery and impacts on associated or dependent species, in particular endangered species"*.

It was further noted that a variety of measures are consistent with this principle. Most of these measures are included in the NCEM:

- Monitoring of Waste & Discards (Article 28.2)
- Reporting Discard Data (Article 28.6)
- Bycatch Requirements (Article 6)
- Shark Conservation & Management (Article 12)
- Gear Requirements (Article 13)
- Resolution to Reduce Sea Turtle Mortality in NAFO Fishing Operations⁵⁴

Gear requirements include mesh sizes, sorting grids or grates when fishing for Shrimp in Division 3L or 3M, and toggle chains with fishing for Shrimp in Division 3L. In addition, there are more recent specific provisions for using midwater gear when fishing in the vicinity of seamounts. In this case, the midwater gear shall not include discs, bobbins, or rollers on its footropes or any other attachments designed to make contact with the bottom.

Overall protection measures described above have been either maintained or improved since PR1. In addition, the NCEM now includes rules on Lost or Abandoned Gear (Article 13.10-13.12).

As mentioned in section III.2.b on *"Precautionary Approach"*, the Commission updated its Bycatch and Discards Action Plan based on the proposals made by WG-BDS in 2017⁵⁵. The Plan's final implementation deadline is set for 2021. It seeks to collect data and analyze the extent of discarding in NAFO fisheries for stocks in annexes I.A and I.B of the NCEM, and identify options for introducing fishery-specific selectivity measures and any other best practices. It should be possible, in the meantime, for NAFO to consider measures that can be envisaged for adoption in the shorter-term. A case in point could be measures to ban the practice of high-grading⁵⁶.

⁵⁴ NAFO Resolution 1-06 – <https://www.nafo.int/Portals/0/PDFs/gc/NAFO%20Resolutions.pdf>

⁵⁵ NAFO/COM Doc. 17-26 – <https://archive.nafo.int/open/com/2017/comdoc17-26.pdf>

⁵⁶ A practice of selectively retaining fish on board so that only the best quality fish are brought ashore, often involving discards of fish that comply with applicable minimum size requirements but of inferior size to other catches retained. Minimum size requirements are established in Article 14 of the NCEM for NAFO-regulated fisheries.

With regard to pollution (e.g. microplastics or plastics/other waste produced by fishing vessels, noise pollution, vessels discharges of fuel or engine fumes), the Panel notes that STACTIC will discuss garbage disposal at-sea at the 40th Annual Meeting in 2018⁵⁷.

In relation to minimizing pollution, waste, discards, lost and abandoned gear and impacts on non-target species, the NAFO Performance Review Panel:

- *Recommends NAFO ensures the implementation of the Action Plan on discards by the stipulated target date in 2021 and establishes measures in the shorter-term to minimize or eradicate high-grading practices.*
- *Urges NAFO gives effect to Article III of the amended Convention in respect of minimizing other harmful impacts such as pollution and waste originating from fishing vessels, catch of species not subject to a directed fishery and impacts on associated or dependent species, in particular endangered species.*

g. Rebuilding depleted stocks

PR1 was encouraged by NAFO developments related to conservation plans and rebuilding strategies for stocks under moratorium.

SC advice regarding stock status is presented using a “*traffic lights system*”. These traffic lights provide an immediate overview of where NAFO stands on stock status.

According to the 2017 advice from the SC, six (6) stocks regulated by the Organization show a “*red*” traffic light as to their biomass status relative to biomass reference points. These are:

- Cod in Divisions 3NO
- American plaice in Divisions 3LNO
- American plaice in Division 3M
- Witch flounder in Divisions 2J and 3KL
- All Shrimp stocks

All these stocks are under moratoria and two of them, 3NO Cod and American plaice 3LNO, are each under an interim conservation and rebuilding plan⁵⁸. In the case of American plaice, the Commission decided in 2017 to continue the moratorium at least until 2020.

The stocks of Witch flounder in Division 3NO and skates in Divisions 3LNO are noted as being in the “*yellow*” zone in terms of their biomass status. In the case of the former, its exploitation levels (fishing mortality) are in the “*green*” zone, whereas the latter’s fishing mortality lies in the “*yellow*” zone. TACs apply to both stocks. In the case of Witch flounder, the stock was under moratorium until 2015, when a TAC of 1,000 tonnes was agreed. This increased to over 2,000 tonnes in the two following years. For 2018, in light of decreasing observed biomass, the TAC had to be halved to 1,116 tonnes. TACs for Skates have been maintained at 7,000 tonnes since 2013 but there is a risk management strategy in place if catches exceed 5,000 tonnes.

Four (4) important stocks are in the “*green*” zone when it comes to biomass reference points. These are:

- Cod in Division 3M
- Redfish in Divisions 3LN
- Redfish in Division 3M
- Yellowtail flounder in Divisions 3LNO

⁵⁷ NAFO/COM Doc. 18-02 (agenda item 17.c, p. 12) – <https://archive.nafo.int/open/com/2018/comdoc18-02.pdf>

⁵⁸ Respectively, Articles 7.6 and 8 of the 2018 NCEM – <https://www.nafo.int/Portals/0/PDFs/COM/2018/CEM-2018-web.pdf>

Together with Greenland halibut, these stocks can be deemed to be the targets of key NAFO fisheries, particularly in economic terms.

The Panel notes NAFO's decisions to adopt the recommendation of the WG-RBMS, especially:

- The revised Management Strategy and Harvest Control Rule for Greenland Halibut (2017)
- A new Management Strategy for Redfish in Divisions 3LN (2014)
- A work plan for the completion of a benchmark assessment and the development of a Management Strategy for Cod in Division 3M

The work related to 3M Cod has been the subject of much debate at the SC, the WG-RBMS and the Commission. The development of a risk-based management strategy was first raised as a priority for NAFO in 2012⁵⁹. In 2016, a detailed work plan was developed and approved⁶⁰. In 2017, the work plan for 3M Cod was delayed one year because of the additional work required to complete the work on the Greenland halibut Management Strategy Evaluation. This delay was a cause for concern for some Contracting Parties. The 2017 advice indicates this stock is subject to fishing mortality rates higher than the currently identified fishing mortality reference point (F_{lim}). As already noted in section III.4.a on "*Consistency with scientific advice and the Precautionary Approach*", the Commission did not agree on a TAC for this stock for 2018 consistent with scientific advice.

The Commission approved a timeline for the work to be carried out regarding 3M Cod, which includes two key tasks: benchmarking the assessment and an evaluation of the management strategy for this stock. The benchmark assessment and the provision of new scientific advice for this stock took place during the April to June period in 2018 resulting in new scientific advice being available for the 40th Annual Meeting in 2018. The Management Strategy Evaluation will take a little longer and could be available for the 41st Annual Meeting in 2019.

The Panel considers NAFO is making an effort to ensure key stocks are rebuilt and maintained at levels at which they can be sustainably harvested. The Panel notes stocks not in a good status or whose status is unknown largely remain under moratoria. In the meantime, NAFO continues to review its Precautionary Approach Framework, which should provide guidance on decision-making in respect of 'data-poor' stocks or stocks for which reference points cannot be identified⁶¹.

5. Capacity Management

PR1 commended NAFO for its monitoring of vessels activity and fishing effort and considered measures to be extensive and largely effective.

The Panel notes that one of the general principles set out in Article III of the Convention is to prevent or eliminate overfishing and excess capacity and ensure that levels of fishing effort do not exceed those commensurate with the sustainable use of the fishery resources.

The annual compliance review undertaken by NAFO contains a comparison of fishing effort with the number of vessels fishing in the Regulatory Area. Deployed fishing capacity is stable since PR1. Currently, all NAFO fisheries are managed by output controls, and the trends seem to indicate that each Contracting Party manages its number of vessels and its fishing effort commensurate to the fishing opportunities available to that Contracting Party.

The Panel considers there is no urgent need to introduce additional measures addressing capacity management. Actions may be needed at a later stage, pending the results of the annual reviews.

⁵⁹ NAFO/FC Doc. 12-31 (agenda item 11, p. 8) - <https://archive.nafo.int/open/fc/2012/fcdoc12-31.pdf>

⁶⁰ NAFO FC/SC Doc. 16-01 (Annex 7, p. 18) - <https://archive.nafo.int/open/fc-sc/2016/fc-scdoc16-01.pdf>

See also NAFO/FC Doc. 16-20 (agenda item 8, p. 9) - <https://www.nafo.int/Portals/0/PDFs/fc/2016/fcdoc16-20.pdf>

⁶¹ See section III.2.b on "*Precautionary Approach*"

6. Reporting Requirements

PR1 commended NAFO on its comprehensive data holdings which appear to be in accordance with the requirements of the Convention. Nevertheless, PR1 suggested NAFO develop a user-friendly data manual to eliminate confusion and inefficiencies caused by the disparate manner in which data requirements are outlined in the NCEM.

There are numerous elements outlined in the NCEM regarding reporting requirements, which are detailed in section III.3 on “*Data Collection and Sharing*”. The Panel believes that a user manual can assist data managers both in Contracting Parties and in the Secretariat to keep track of compliance with reporting and facilitate continuity of business.

At the STACTIC meeting in September 2017, there was a discussion about the utility of the Catch and Fishing Effort monthly reporting requirements (Article 28.8)⁶², since daily catch reports can be used to automatically generate reports. This issue was discussed with input from the NAFO Secretariat on how this data is used. It was agreed that the Secretariat report back at the 2018 meeting on whether the data collected in the monthly provisional catch reports is available from other sources. It was also agreed this may be an area where redundancy may be eliminated. The users of this data and its distribution to Contracting Parties need to be included as part of this review.

The Panel believes the NAFO reporting requirements are effective in meeting the formal needs of the various NAFO bodies. This effectiveness has likely improved with the requirement to provide tow-by-tow or set-by-set data, particularly for science and enforcement needs. Given the vast array of reporting requirements there is a potential for some redundancy. NAFO has recognized this and is currently in the process of reviewing some requirements. The Panel encourages NAFO to continue with this review with the objective of eliminating redundant reporting requirements.

In relation to reporting requirements, the NAFO Performance Review Panel:

- ***Recommends NAFO develop a user-friendly data manual.***

⁶² NAFO COM Doc. 17-29 Revised (STACTIC agenda item 14.b, p. 63) – <https://archive.nafo.int/open/com/2017/comdoc17-29.pdf>

IV. Compliance and Enforcement

1. Flag State duties

PR1 recognized that constant efforts are taken by the Commission and STACTIC to improve efficiency of compliance, control and enforcement activities related to flag State obligations.

The Panel notes that, in applying the principles set out in Article III of the Convention, the Commission shall pursuant to Article VI, paragraph 8.f adopt measures to ensure adequate flag State performance. Article XI of the Convention contains provisions specifically addressing Contracting Party obligations as flag States, which reflect relevant provisions of UNCLOS, UNFSA and the 1993 FAO Compliance Agreement. Flag State duties are also incorporated in a series of the NCEM provisions. Adequate legal foundations are in place.

The mechanisms in place to ensure compliance by flag States, as well as the performance of flag States in discharging their obligations, are acceptable. In particular, the annual compliance review is important for scrutinizing whether Contracting Parties are fulfilling their duties as flag States. Such reviews date back to 2004, and show a trend of improved compliance during the following 8-10 years, remaining relatively stable since.

The Panel notes very few serious infringements are now detected annually, which may indicate that currently the system and the adherence to it by Contracting Parties functions well. There is always room for improvement, but the main task is now to keep up the good work to ensure that the current standards do not decline, and to address any future problems as they may arise.

Since PR1, the FAO has adopted Voluntary Guidelines for Flag State Performance, which contain criteria for assessing the performance of flag States ability to comply with their obligations under UNCLOS and other relevant treaties.⁶³ Furthermore the UN General Assembly in paragraph 78 of the Sustainable Fisheries Resolution of 2017, urges States, individually and collectively through RFMOs, to develop appropriate processes to assess performance of States with respect to implementing the obligations regarding fishing vessels flying their flag set out in relevant international instruments.⁶⁴

The Panel is aware that NEAFC, at its Annual Meeting in 2017, initiated a process for self-assessments by Contracting Parties in accordance with the criteria set out in the FAO guidelines. The self-assessments will be coordinated by NEAFC's compliance committee and a report will be submitted to the NEAFC Annual Meeting in 2020.

Concerning the NCEM, there is no consistent approach in describing flag State duties, as some measures are directed at Contracting Parties ("*to ensure that their vessels/masters*"), while some refer to flag State Contracting Parties. Others refer to each/every/no fishing vessel or even to masters directly in the NCEM, which probably is an omission as it is the duty of the flag State as a Contracting Party to ensure that its vessels and/or masters adhere to the regulations.

In relation to flag State duties, the NAFO Performance Review Panel:

- **Recommends** NAFO calls on all Contracting Parties to carry out self-assessments of flag State performance in accordance with the criteria set out in the FAO Voluntary Guidelines for Flag State Performance. Reports of the self-assessments should be submitted to STACTIC in order for it to present a summary report to the Commission.

⁶³ Voluntary Guidelines for Flag State Performance – <http://www.fao.org/3/a-i4577t.pdf>

⁶⁴ United Nations – General Assembly Resolution 72/72 – <http://undocs.org/en/a/res/72/72>

- *Recommends NAFO amends the NAFO Conservation and Enforcement Measures in order to clarify, rectify and harmonize references to the duties of the Contracting Parties as flag States.*

2. Port State Measures

PR1 recommended further harmonization of relevant NAFO rules with the provisions of the Port State Measures Agreement. It also suggested that work by NEAFC should be taken into account.

The Panel notes STACTIC followed up on that recommendation by establishing an ad hoc Working Group on Port State Control Alignment. Based on that work, STACTIC proposed NCEM amendments to the Commission in 2016, which were adopted. This is a welcome development.

The measures comprise designation of ports, request for entry requirements, procedures to allow port entrance and the conduct of inspections of vessels in port. In addition, the Commission has adopted specific control measures related to Greenland halibut, which contain detailed provisions on control in ports. Duties of the Contracting Parties concerning port control are also included in NAFO's non-Contracting Party scheme.

The Panel finds the amendments adopted in 2016 further clarify and strengthen the NAFO port control system aligning it with the Port State Measures Agreement.

3. Monitoring, control and surveillance (MCS)

PR1 concluded NAFO had adopted a comprehensive array of MCS Measures. A historical perspective of the Control Measures and Monitoring of Fisheries provisions in the NCEM can be found in Appendices X and XIII of PR1.

The 2017 Compliance Review⁶⁵ provides the following information on the 2016 fisheries and surveillance activities. In 2016, there were 47 fishing vessels spending a total of 4,270 days in the NAFO Regulatory Area. The total number of at-sea inspections completed on vessels with trips ending in the 2016 calendar year was 112. The number of at-sea inspections have declined from 2004 to 2015 and the inspection-rate declined from 2008 to 2015. This may be due to additional reliance on the combination of Vessel Monitoring System, observers and in-port inspections. The number of at-sea inspections completed and the inspection rate in 2016 have remained very similar to 2015.

The Panel is aware there is an interest to reflect on means to reinforce the process of the Annual Compliance Review. In 2017, STACTIC agreed on a new template for the completion of the Review that will be utilized for the 2018 exercise⁶⁶.

The NAFO observer program was launched in 1996 as part of the program for observers and Satellite Tracking⁶⁷. Since that time the program has been modified and now has a specific chapter in the NCEM. Proposals for modifications to the program are frequently tabled at STACTIC to help standardize data collection and provide clarity on the role of observers.

In 2014, the Commission established the STACTIC Observer Program Review Working Group. In 2017, the Commission revised the Terms of Reference of this WG⁶⁸ including determination of criteria for establishment of coverage levels for a "best mix" of scientific and compliance monitoring tools incorporating observer coverage and electronic monitoring. The basic change related to WG membership "All Contracting Parties are welcome and encouraged to participate in the Working Group. Scientific Council will be asked to nominate an expert to participate as a liaison between the Working Group and the Council. This liaison will attend all meetings of the Working Group."

⁶⁵ NAFO/COM Doc. 17-27 - <https://archive.nafo.int/open/com/2017/comdoc17-27.pdf>

⁶⁶ NAFO/COM Doc. 17-29 Revised (STACTIC agenda 4, p. 58) - <https://archive.nafo.int/open/com/2017/comdoc17-29.pdf>

⁶⁷ NAFO/FC Doc. 14-23 - <https://archive.nafo.int/open/fc/2014/fcdoc14-23.pdf>

⁶⁸ NAFO/COM Doc. 17-24 - <https://archive.nafo.int/open/com/2017/comdoc17-24.pdf>

The STACTIC Observer Program Review Working Group also discussed the safety and wellbeing of observers. The WG is considering measures to protect fisheries observers such as independent means of communication to report their data and to call for help if needed. The review is also addressing standards of training and equipment for observers. The Panel considers this process encouraging.

The International Labour Organization (ILO) Work in Fishing Convention No. 188 entered into force in 2017. It sets out basic standards of decent work in the fishing industry. Fishing is considered to be one of the world's most hazardous occupations. There are concerns about forced labour, human trafficking and the exploitation of migrant labour. States ratifying Convention No. 188 commit to exercising control over fishing vessels, through inspection, reporting, monitoring, complaint procedures, penalties and corrective measures⁶⁹. Given the international attention given to this issue in recent years it would be timely for Contracting Parties to become parties to this Convention. Some consideration could be given to utilizing the presence of observers on fishing vessels to have them report on the labour standards and working conditions of vessels authorized to fish in NAFO waters.

Although, as noted previously, the number of serious infringements detected annually is currently low, the Panel believes there is a need to address the issue of repeat serious non-compliance. This issue was discussed by STACTIC at the 39th Annual Meeting in 2017⁷⁰, but options proposed to deal with these issues were not adopted. There is additional work planned that will be discussed by STACTIC in 2018. There is scope to include in this work, the development of a methodology to risk profile vessels which could provide a framework to take a focused inspection approach towards vessels displaying fishing patterns consistent with misreporting of catches. Additionally, the NAFO Secretariat was asked to investigate what other RFMOs are doing to combat repeat serious non-compliance and report the results in 2018.

The Panel concludes NAFO has adopted integrated MCS Measures and these measures are effectively implemented. With respect to the observer program, NAFO is taking steps to review and refine this important MCS component. This work has been slow to date, however it is expected this review will be completed in 2018 with results presented to the Commission during the 40th Annual Meeting in 2018.

In relation to Monitoring Control and Surveillance, the NAFO Performance Review Panel:

- ***Recommends*** NAFO evaluates and adopts appropriate measures to deter repeat serious non-compliance.
- ***Recommends*** NAFO urges Contracting Parties to become parties to the International Labour Organization (ILO) Work in Fishing Convention No. 188.

Follow-up on infringements

PR1 concluded that the main requirements for the follow-up of infringements contained in internationally agreed instruments are adequately incorporated into NAFO basic texts and practices.

The most recent measures relating to identification and follow-up on infringements are contained in the NCEM, Chapter VI, Articles 37-39. During the time of PR1, the NCEM listed ten (10) serious infringements. In the 2018 NCEM, the list has increased to 17 serious infringements.

The NCEM (Article 39) outlines the obligations of a flag State Contracting Party that has been notified of an infringement. It includes taking immediate judicial or administrative action in conformity with their national legislation and ensuring that sanctions applicable in respect of infringements are adequate in severity.

⁶⁹ International Labour Organization (ILO) Work in Fishing Convention (No. 188)

⁷⁰ NAFO COM Doc. 17-29 Revised (STACTIC agenda item 5, p. 59) – <https://archive.nafo.int/open/com/2017/comdoc17-29.pdf>

Table 5 provides a summary of the status of infringement cases detected at-sea for the five-year period 2012-2016 as well as their resolution status.

Table 5. Summary of the number of infringements for the period 2012-2016. A citation is an inspection report (from at-sea) that lists one or more infringements⁷¹.

Year	Number of At-sea Inspection Reports with AI Citation/s	Number of Resolved Cases	Number of Pending Cases	% Resolved
2012	7	7	0	100%
2013	13	13	0	100%
2014	5	4	1	80%
2015	1	0	1	0%
2016	7	3*	4	43%
Total	34	27	6	79.41%

*Two of the resolutions were that the AIs were not confirmed in port.

It appears some time is required for the legal resolution of infringements. The data shows that all infringement citations in the inspection reports for 2012-2013 were eventually resolved.

The Annual Meeting in 2010 proposed to amend Article 42 with the requirement that an annual Contracting Parties' report would be required by 1 March each year on inspections and related follow-up actions taken in the previous year. This Article (now Article 40) is still included in the 2018 NCEM.

The Panel concludes that, although NAFO and its Contracting Parties appear to be following up on infringements, there appears to be some delay before infringements are fully resolved.

In relation to follow-up on infringements, the NAFO Performance Review Panel:

- **Recommends NAFO urges Contracting Parties to increase their efforts in ensuring timely follow-up to infringements.**

Cooperative mechanisms to deter non-compliance

STACTIC meets bi-annually and supports WGs dealing with specific MCS issues as part of a continuous improvement process of the integrated MCS measures outlined in the NCEM. Many of these measures are mechanisms that allow Contracting Parties to work together for their implementation⁷². For instance, Contracting Parties carry out joint inspections from time to time (e.g. Canadian inspectors working onboard European Union inspection vessels, USA inspectors working onboard Canadian inspection vessels, etc.).

NAFO maintains an illegal, unreported and unregulated (IUU) vessel list. There is cooperation between NAFO and NEAFC in this regard. The Executive Secretary transmits the IUU vessel list and any relevant information, including the reasons for listing or de-listing each vessel, to other RFMOs, including NEAFC, the South East

⁷¹ NAFO/COM Doc. 17-27 (Table 9) – <https://archive.nafo.int/open/com/2017/comdoc17-27.pdf>

⁷² NCEM, Chapter 6, "At-Sea Inspection and Surveillance Scheme" including Article 31.2 and Article 31.5.

Article 31.2: "A Contracting Party may by mutual agreement deploy inspectors it has assigned to the Scheme to an inspection platform of another Contracting Party."

Article 31.5: "Each Contracting Party participating in the Scheme shall ensure that every inspection platform entitled to fly its flag operating in the Regulatory Area maintains secure contact, daily where possible, with every other inspection platform operating in the Regulatory Area, to exchange information necessary to co-ordinate their activities."

Atlantic Fisheries Organization and the Commission for the Conservation of Antarctic Marine Living Resources⁷³. The Panel encourages NAFO to continue this cooperative work.

Market-related Measures

PR1 concluded that relevant provisions of the global instruments on trade and market-related measures have been adequately implemented in some of the NAFO basic texts. Further, the timely development and adoption, as well as effective implementation of port control and trade-related measures, which prevent port access or landing of fish products by non-compliant vessels, can be considered as having contributed to an absence of IUU fishing since 2006. Most Contracting Party port States have implemented trade-related provisions in their national legislation.

In 2012, STACTIC agreed that the existing scheme to address IUU fishing in the Regulatory Area contains the possibility of implementing trade measures (Articles 55 and 56) and noted that Contracting Parties were free to implement additional trade-related measures. STACTIC concluded it will continue to reflect on possible improvements to the NCEM related to market/trade measures⁷⁴.

In 2014, NAFO adopted revisions to Chapter VIII “*Non-Contracting Party Scheme*” of the NCEM. This was part of an ongoing effort to revise the existing NCEM to enhance the organization, structure and format of the Articles; eliminate redundancy; and clarify ambiguous or unclear measures to reflect more accurately the original intent of each measure.⁷⁵

In 2016, NAFO adopted further amendments to Chapter VII “*Port State Control*” and Chapter VIII “*Non-Contracting Party Scheme*” of the NCEM to align with the Port State Measures Agreement⁷⁶. Some key changes were introduced in the non-Contracting Party scheme including:

- *Withdraw denial of port entry only if the port State has determined there is sufficient proof that the grounds on which entry was denied were inadequate or erroneous or that such grounds no longer apply.*
- *Prohibiting entry into its ports of such vessel, and if the vessel is in port, prohibiting use of the port, except in the case of force majeure, distress, for the purposes of inspection or for taking appropriate enforcement action.*

Trade- or market-related measures are included in the NCEM, Chapter VIII “*Non-Contracting Party Scheme*”. The Panel generally agrees with the conclusions of PR1 regarding NAFO texts including relevant provisions of the global instruments on trade- and market-related measures. There has been no IUU fishing in the Regulatory Area since 2006. The Panel encourages NAFO to continue implementing measures to deter IUU fishing.

⁷³ 2018 NCEM, Article 53 – <https://www.nafo.int/Portals/0/PDFs/COM/2018/CEM-2018-web.pdf>

⁷⁴ NAFO/FC Doc. 12-31 (STACTIC agenda item 4, p. 109) – <https://archive.nafo.int/open/fc/2012/fcdoc12-31.pdf>

⁷⁵ NAFO/FC Doc. 14-14 – <https://archive.nafo.int/open/fc/2014/fcdoc14-14.pdf>

⁷⁶ NAFO/FC Doc. 16-06 – <https://archive.nafo.int/open/fc/2016/fcdoc16-06.pdf>

V. Governance

1. Decision-making

PR1 assessed the decision-making provisions of the amended Convention to be quite elaborate and represent a significant improvement on the provisions in the 1978 Convention.

The Panel concludes that the possibility of taking decisions to a vote, and the comprehensive and conditional objection procedure, have translated into greater commitment by Contracting Parties in implementing and complying with the measures adopted.

Notwithstanding these improvements, the Panel encourages NAFO to continue to strive for consensual decisions.

2. Dispute Settlement

PR1 noted the amended Convention contains a provision that allows for Contracting Parties to submit a dispute to an *ad hoc* panel for review. That procedure does not prevent the application of the compulsory procedure entailing binding decisions under Part XV of UNCLOS, or Part VIII of UNFSA, offering a wide array of dispute settlement means for Contracting Parties. The Panel concludes NAFO has in place adequate and up to date mechanisms for resolving disputes.

3. Transparency

The issue of transparency is two-fold – internal (i.e. whether decisions within NAFO are made in a transparent manner) and external (i.e. openness towards other organizations and civil society). In relation to decision making processes, the Panel highlights that, since PR1, significant improvements in transparency have been achieved. These improvements were facilitated by the adoption of multiannual management measures; the establishment of WGs allowing for focused discussions before decisions are taken; and by a change of mindset among delegations. Despite such improvements, the Panel is aware some delegations still feel excluded from full participation in Commission decisions. In particular, they are concerned about the possibility of block negotiation of allocation and other management decisions (“*package deal*”).

PR1 recommended deliberations should be held in plenary session. Beyond this, the Panel believes opening informal discussions to all interested delegations and updating the plenary regularly on new proposals would improve transparency. The Panel further stresses the importance of Contracting Parties continuing to strive for consensus.

In relation to other organizations and civil society access to NAFO’s work, the Panel recognizes NAFO allows representatives from other intergovernmental and non-governmental organizations to take part in its meetings, including many WG meetings. The Panel finds that the procedures for such participation are not unduly restrictive and that all interested intergovernmental and non-governmental organizations have timely access to final documents.

NAFO working documents only become publicly available once they are adopted by the relevant body. The Panel underscores that this approach does not allow for the public to track amendments made during deliberations.

As stressed by PR1, one of the most important tools to enhance NAFO transparency is its website. NAFO has completed the update of the public pages of the NAFO website (Phase I) which was launched in October 2016. As part of Phase II, the Website Re-design Ad hoc virtual Working Group has been working to develop standards and guidelines for access to documentation contained on secure portals. The Panel welcomes the decision to empower this WG to migrate information of a non-sensitive nature to the public pages of the NAFO website, or from a more limited to a broader access within the restricted section.

The Panel concludes that the NAFO public website has improved in achieving NAFO’s communication needs. The Panel finds that further improvements are required to cater to the needs of those users with a limited knowledge of the Organization’s structure.

In relation to transparency, the NAFO Performance Review Panel:

- **Recommends** NAFO reorganizes its website library based on the topics covered.
- **Recommends** NAFO makes all working documents publicly available, unless otherwise requested by a Contracting Party or subject to confidentiality rules.

4. Confidentiality

The issue of confidentiality was not addressed by PR1.

NAFO has recently taken steps to address the issue of security and confidentiality. In 2015, NAFO's IT system was subject to an external audit. Work to address its recommendations is ongoing. NAFO is in the process of setting up an information security management system (ISMS)⁷⁷.

In 2017, the Secretariat continued to reinforce the security of its internal network and data by installing, with the assistance of a grant from a Contracting Party, a second firewall and moving internet facing servers into a new more protected area created behind the firewall. The Secretariat also installed a new Vessel Monitoring System server with the latest and most secure Microsoft operating system and redundant features.

The Panel concludes NAFO is taking appropriate measures to deal with security and confidentiality, which are essential not only to guarantee the safety of data, but also to allow for cooperation and exchange of data with other organizations, such as NEAFC.

⁷⁷ An ISMS is a set of policies and procedures for systematically managing an organization's sensitive data.

VI. Science

The Scientific Council (SC) shall, according to the Article VII.8 of the Convention,

“consistent with the objective and principles of the Convention:

- a) *provide a forum for consultation and cooperation among the Contracting Parties to study and exchange scientific information and views on fishing activities and the ecosystems in which they occur, and to study and appraise the current and future status of fishery resources including environmental and ecological factors affecting them;*
- b) *promote cooperation in scientific research among Contracting Parties to fill gaps in scientific knowledge;*
- c) *compile and maintain statistics and records;*
- d) *publish or disseminate reports, information and materials pertaining to the fishing activities in the Convention Area and their ecosystems; and*
- e) *provide scientific advice to the Commission as required by the Commission.”*

The criteria for this performance review focus largely on the latter function, the provision of scientific advice as per point (e) above. In order for scientific advice to be based on best practice it must nevertheless build on the SC performing well in relation to points (a) to (d) as well. These are a prerequisite for a high standard of scientific advice. Without an open scientific process building on cooperation, a process to ensure high-quality data and transparency about scientific analysis and results, there cannot be legitimate science-based advice. These SC tasks are thus recognized as crucial. In the present review, the main focus is on SC work directly linked to advice. This is discussed in the below section VI.1 on *“Quality and provision of scientific advice”*. The quality of scientific work per se is discussed in the section VI.2 on *“Best available science”*.

1. Quality and provision of scientific advice

a. Producing the best scientific advice

NAFO needs the advice it receives to be scientifically legitimate. Advice also needs to be relevant and consistent with the Organization’s policy standards.

i. Consistency with Precautionary Approach standards

A Precautionary Approach Framework was proposed by SC in 2003 and subsequently adopted by the Commission in 2004. A new Precautionary Approach Framework is in the pipeline but work on this has not progressed due to the Commission’s decision to confer priority to management plans. This is discussed in more detail in section III.2 on *“Ecosystem Approach and Precautionary Approach”*.

This 2004 Precautionary Approach Framework⁷⁸ includes references to five ‘zones’ defined by a combination of biomass and fishing mortality relative to reference points and within which different prescribed avenues would be taken when providing advice. However, when the SC delivers advice it does not indicate in which zone the relevant stock is found. It is not clear what the role or function of the 2004 Precautionary Approach Framework is in the present advisory system.

The Precautionary Approach Framework is silent about stocks for which reference points have not been estimated or so-called ‘data-poor’ stocks, as is the case for several NAFO stocks. The Framework, according to text in the document, does not consider biological and technical stock interactions directly. The Framework does nevertheless incorporate some interaction considerations, for example that fish stocks interact through predation and competition, and it is therefore impossible to have all stocks at high biomasses simultaneously. Such considerations are incorporated by de-emphasizing B_{msy} as targets and by *“replacing the requirement that*

⁷⁸ NAFO/FC Doc. 04-18 – <https://archive.nafo.int/open/fc/2004/fcdoc04-18.pdf>

fishing mortality be zero when biomass is below B_{lim} with a requirement that fishing mortality to be as close to zero as possible in this situation”⁷⁹.

Regarding ‘data-poor’ stocks, SC does not presently have a framework for advice. There are 12 NAFO stocks which do not have estimates of reference points in one or both dimensions of biomass or fishing mortality. The advice has in several of those cases been “*there should be no directed fishery...bycatch should be kept at the lowest possible level.*” This wording is for instance used in the advice regarding American plaice in 3M, given in June 2017, a stock that according to surveys is at a low biomass and with low recruitment. In this situation, the advice is precautionary. This situation is straightforward. When the situation is more complicated, there is no guidance and an advisory framework for ‘data-poor’ stocks would be required.

A Precautionary Approach is also required prior to reopening fisheries after a moratorium. There is no advisory framework for Precautionary Approach based advice for this situation.

In some cases, management or rebuilding plans for a stock have been adopted by the Commission. In such cases, the advice is based on the plan or the basis for advice is that “*General convention objective are applied in conjunction with an Interim Conservation Plan and Rebuilding Strategy*” (Cod in Division 3NO, advice given in 2015)⁸⁰. There is no indication whether SC has found the specific plan precautionary. It is not clear whether the advice decision, in case SC has not evaluated the plan as being precautionary, would always be subject to the NAFO objective to follow a Precautionary Approach. If this is not the case, SC runs the risk of providing advice which is inconsistent with the Precautionary Approach.

Recommendations regarding prioritization of a Precautionary Approach Framework, also including ‘data-poor’ stocks, are provided in section III.2 on “*Ecosystem Approach and Precautionary Approach*”. Such a framework will, when finalized, form the basis for a decision rule for science-based advice.

ii. Ecosystem approach framework

NAFO has implemented elements of an Ecosystem Approach in its management measures. The development of a more comprehensive Ecosystem Approach is ongoing. This is discussed in section III.2 on “*Ecosystem Approach and Precautionary Approach*”, which also includes references to the science work in this process and related recommendations.

The Panel commends the work of SC and WG-ESA in this regard. This work is ground-breaking by demonstrating how an Ecosystem Approach can be operationalized in the context of international fisheries management on a meaningful scientific basis.

iii. The development of advice including risk considerations

The use of the term ‘risk’ in the NAFO context seems to relate to a probability that a specific unwanted outcome may occur.

The Commission requests SC to perform management strategy evaluations for some stocks on a risk basis. SC’s work on the science basis and the analysis of risk in this context is comprehensive.

As a general rule, the Commission also requests a range of options, each linked to a corresponding risk level. There is no indication of which probability should be the basis for the advice itself.

There is a clear requirement from management to receive advice and information which includes risk considerations. What is less clear is whether scientific advisors receive any guidance on what acceptable risks may be, to enable a consistent management response to similar risk levels.

The Panel notes that the 2004 Precautionary Approach Framework states that “*low probability might be defined as 20%, but the actual level should be specified by managers*” (in relation to F falling below F_{lim}) and that “*very low probability might be defined as 5-10%, but the actual level should be specified by managers*” (in relation to

⁷⁹ NAFO/FC Doc. 04-18 – <https://archive.nafo.int/open/fc/2004/fcdoc04-18.pdf>

⁸⁰ NAFO SCS Doc. 15-12 (Revised) – <https://www.nafo.int/Portals/0/PDFs/sc/2015/scs15-12.pdf>

biomass falling below B_{lim}). In some other jurisdictions lower probabilities are used. In the North East Atlantic for instance a 5% probability is used in the Precautionary Approach Framework regarding both fishing mortality and biomass. Using 10 or even 20% probabilities is less precautionary.

This is a policy choice; as noted in the 2004 Precautionary Approach Framework, acceptable risk levels should be identified by managers not by science advisors. There does however not appear to be any such explicit decision by the Commission. Ultimately, SC is forced to make assumptions about what risk levels are acceptable when advice is formulated. This is unfortunately commonplace in other RFMOs, and the assumption must then be that, by accepting the advice, the Commission is implicitly endorsing the risk levels used by SC as the basis for advice.

b. A standardized presentation of advice

There are two issues involved in standardization. The first is whether advice conforms to a framework which is standardized according to user requirements (in this case Commission and Contracting Party requirements). The second is whether the framework itself is in accordance with international and NAFO policies and sufficiently specific to enable advice which is both consistent and traceable to policy goals.

The advice provided by SC is, as is the case for similar bodies in other RFMOs, quantitatively dominated by the annual advice on catch/effort limits for each relevant stock.

i. Meeting user requirements

The Commission formulates its request for scientific advice annually. In recent years, the request has followed a consistent format. As an illustration, in 2017 the Commission issued the following request⁸¹:

“The Commission requests that the Scientific Council provide advice for the management of the fish stocks below according to the assessment frequency presented below. The advice should be provided as a range of management options and a risk analysis for each option (rather than a single TAC recommendation).”

Yearly Basis	Two-year basis	Three-year basis
<i>Cod in Div. 3M</i>	<i>American Plaice in Div. 3LNO Redfish in Div. 3M Northern shrimp in Div. 3M Northern shrimp in Div. 3LNO Thorny skate in Div. 3LNO White Hake in Div. 3NO Witch Flounder in Div. 3NO Redfish in Div. 3LN</i>	<i>American plaice in Div. 3M Capelin in Div. 3NO Cod in Div. 3NO Northern shortfin squid in SA 3+4 Redfish in Div. 3O Witch flounder in Div. 2J+3KL Yellowtail flounder in Div. 3LNO Greenland halibut in 2+3KLMNO Splendid alfonso in SA 6</i>

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

In 2018, advice should be provided for 2019 for Cod in Div. 3M and shrimp in Div. 3M.

In 2018, advice should be provided for 2019 and 2020 for, American Plaice in 3LNO, and Thorny Skate in 3LNO.

In 2018, advice should be provided for 2019, 2020 and 2021 for Yellowtail Flounder in 3LNO, Cod in 3NO, and Capelin in 3NO and for alfonso stocks in the NAFO Regulatory Area.”

The annual request specifies other types of advice such as evaluation of management plans, VME closures, etc.

The request for scientific advice includes guidance on the types of advice to be provided and requests SC continue monitoring the status of all other stocks annually and, should a significant change be observed in stock status or in bycatch in other fisheries, provide updated advice as appropriate.

⁸¹ NAFO/COM Doc. 17-22 – <https://archive.nafo.int/open/com/2017/comdoc17-22.pdf>

The Panel notes these requests are the result of dialogue and feedback between Commission and SC. NAFO has come a long way in improving communication and dialogue between scientists and managers, in particular thanks to the work carried out by joint SC-Commission WGs.

When it comes to the format in which the advice is delivered, recently the Commission has formulated its needs regarding TAC advice in the annexes to its annual request for advice. A specification of the contents of advice requested is also included in some, but not all, requests from coastal States. SC generally follows these specifications in the provision of advice. This means that formally SC is meeting user requirements for advice.

Regarding other types of advice, the user requirements are less specific, as requests for such advice are varied and not standardized in the same way as requests for the annual TAC advice.

ii. The framework for advice

It is difficult for the Panel to assess whether SC advice, as currently delivered, effectively helps NAFO to take decisions consistent with the Organization's policies. For stocks for which there is no rebuilding or management plan in place, SC advice refers to general Convention principles by stating that *"At this moment general convention objectives (NAFO/GC Doc. 08-03) are applied."*⁸²

The status of the stock is presented in the advice by reference to five criteria:

1. Restore to or maintain at B_{msy}
2. Eliminate overfishing
3. Apply precautionary approach
4. Minimize harmful impacts on living marine resources and ecosystems
5. Preserve marine biodiversity

Ideally one would be able to link these to the actual advice but it is not stated which – if any – of the criteria have been the ultimate basis for the advice given for a specific stock.

NAFO has not established an overall decision framework for advice.

A decision framework for science-based advice in NAFO would build on the Organization's Precautionary Approach and Ecosystem Approach Frameworks, but it would need to go further and provide technical guidance to SC about how these must be implemented.

The function of such a document is to provide guidance to science advisors about how the choices made by management in terms of policy objectives and tolerance to risk are to be interpreted in the various situations which emerge, for instance when a stock assessment and status is updated. When those choices (in the Precautionary Approach and Ecosystem Approach Framework documents) and the expected advisory response (in the advisory framework) are explicit, the science advisory process can identify which option, among those available to respond to a given stock status situation, fits best with the policy objectives adopted by the management. In the absence of a documented framework, science advisors find themselves making assumptions about what those choices should be. A documented framework also provides for a consistent approach across stocks, as well as transparency and accountability.

PR1 noted this lack of an advisory decision framework and stated *"The PRP considered that the absence of a formally defined decision rule framework may exacerbate perceived differences between the Scientific Council and Fisheries Commission. The matter is obviously one for serious consideration and review if the Organization's overall functionality and effectiveness is to be improved in the PAF's application"*. PR1 also noted some problems might be avoided if *"a procedure had been in place to guide the advice so that both precaution and scientific uncertainty could be more explicitly addressed"*⁸³.

In section III.4.a on *"Consistency with scientific advice and the Precautionary Approach"*, it is recommended the Commission follows science-based advice. Such a requirement will increase the pressure to move political

⁸² NAFO Resolution (1-08) – <https://www.nafo.int/Portals/0/PDFs/gc/NAFO%20Resolutions.pdf>

⁸³ PR1 (p.104, point 10) – <https://www.nafo.int/Portals/0/PDFs/Performance/PAR-2011.pdf>

negotiations into the science domain. In order to counteract this pressure, it is crucial that a decision framework for science-based advice is developed and implemented.

iii. Transparency and inclusion of uncertainty

The advice is delivered to the Commission through the SC report and a presentation (generally by the SC Chair) to the Commission at each Annual Meeting. The analytical background and the data used are documented in the SC reports and background documents for the SC meetings. These documents are all available through the 'Library' section on the NAFO website.

The advice is generally transparent about uncertainty, the basis for the analysis, assumptions and data weaknesses. The advice is less transparent about the rationale for the specific advice, as discussed in the previous section.

c. Accessibility of advice to non-scientists and general public

i. Transparency of scientific work and processes

NAFO implements a policy of transparency regarding science and the scientific processes followed by the Organization including:

- The SC meetings and WGs are open to registered observers with a restriction option for the chair. This has worked well.
- The SC report with the advice and the analytical background for the advice are made available to the general public, stakeholders and decision makers, prior to decision making.
- The annual stock advice is easily available on the public pages of the NAFO website in the form of a table with links. This provides a good overview and easy access.

ii. Communication to managers

The advice provided to the Commission is for recipients that are likely to be specialist readers such as decision makers and stakeholder bodies. These readers are expected to understand the advice and translate it into proposals for decisions.

For this purpose, it is a requirement that the advice includes clear reference to the data and its analytic basis. It should be traceable to the relevant NAFO policy including both the framework for sustainability and its implementation such as through management plans. It also needs to be operational by providing input which directly links to implementation options.

In general, there may be a communication gap between the science community and the recipients of the advice. This gap runs both ways. In relation to the communication of scientific advice from SC, there is a risk of viewing this advice as more certain than it actually is (the ivory tower syndrome of science being seen as objective and speaking truth to power) or alternatively as just another opinion.

An option could be, as recommended by PR1, to develop "A consolidated description of the scientific approaches, models and underlying assumptions used by the Scientific Council. This could be in the form of a users' manual outlining, with attached lay explanations, the various assessment being undertaken. Such a manual would serve to provide a record of the way in which various assessments are being carried out as well as an easily interpreted guide for the Fisheries Commission. It would also provide useful information for others with an interest in NAFO's management approach."⁸⁴.

⁸⁴ PR1 (p. 96, point 4) – <https://www.nafo.int/Portals/0/PDFs/Performance/PAR-2011.pdf>

iii. Communication to the public

The SC advice is largely unintelligible to the public because it is intended for Contracting Parties, which integrate specialists in their delegations. It is not possible to produce one document which serves both specialized readers and the public.

NAFO is taking steps to communicate to the public, for example SC's Standing Committee on Publications recommended in 2016 that the Secretariat investigate the development of public outreach web pages. These have now been produced and summaries for each species (and stocks by species) including species and fisheries descriptions and outcomes of recent assessments including status are available on the NAFO website. SC's Standing Committee on Publications is investigating in more detail who is consulting these documents. It could also be relevant to investigate whether present efforts respond to user needs. On the basis of a more detailed understanding of user needs, public outreach may be expanded to make this more directly visible on the NAFO page, to include overviews across species and stocks of status and ecosystem drivers and impacts across stocks.

d. Scientific capacity and adequacy of resources

The capacity of SC and the Secretariat to meet the needs of NAFO relates to a number of factors, including the quantity of expertise available; whether the specific expertise is available; and whether there are sufficient mechanisms in place to ensure the availability of expertise in the future.

The resources to produce scientific advice in SC have not increased in proportion to tasks. Emerging tasks, which would require science resources, include review of the Precautionary Approach Framework, management strategy evaluations and the development of an Ecosystem Approach.

The science/management interface may not work as efficiently as it could. Emerging issues have increased the need for extensive communication with other bodies within the NAFO framework. While joint WGs serve their purpose in this regard, they also increase the workload. The Panel has been informed there may be an overly formal dialogue between SC and the Commission. Progress can be slow because of the need to consult parent bodies.

This increased workload leads to delays in important work. SC has limited or no capacity left to work proactively on emerging future advisory needs and their scientific basis. For example, SC could be expected to work proactively on advice addressing impacts of climate change or how fisheries advice could link with a more comprehensive cross-sectoral advisory process.

Rationalization of the work load has occurred, including the move to multiyear advice, but this is insufficient to cover new tasks. SC not only needs more scientists but also a wider range of qualifications and expertise to match the tasks to which it is required to deliver.

The available resources could be matched to the scientific workload by:

- *Reducing the workload overall.*

This is not possible in the short term, unless NAFO chooses to give up some current initiatives. SC presently does not use resources to work on issues which are not requested by the Commission or are necessary to address policies.

In the longer term, the workload may be eased by having a framework for advice including 'data-poor' stocks which is based on readily available indices and by moving further to model-free management procedures. Ensuring that the multiyear approach to advice is not undermined by requests for intermediate advice would also contribute. It should be noted that reducing fishing mortality to sustainable levels in itself should reduce the pressure and workload regarding updates.

The efficiency of the science/management interface may be increased, and the demand on scientific resources reduced, by deformalizing the dialogue between the Commission and SC.

- *Risk based prioritization.*

The Panel is aware SC had an exceptional workload in 2017. There will be gains by levelling tasks out over years. The Commission's request to the SC can evolve from one year to another, if Contracting Parties reconsider the scheduling or assessment frequency decided in the previous year for any given stock. Without prejudice to the need for flexibility in this context, a mid-to-long term priority-based workplan agreed by both the Commission and the SC would allow the latter to allocate its resources in a more efficient manner.

- *Mobilizing expertise.*

All Contracting Parties should contribute and share the burden of scientific work fairly. This is an implicit, if not formal, obligation. Some have suggested it could be supplemented by mechanisms which would link obligations to put resources at disposal to the right to make proposals in the Commission. The Panel is concerned this may lead Contracting Parties to make expertise available only for their short-term priorities and longer term and proactive work might suffer.

- *Outsourcing.*

Benefits could arise from cooperation with the International Council for the Exploration of the Sea (ICES), of which all coastal States are members. ICES is addressing the same advisory issues as the SC. The ICES scientific network is large and considerable work has already been done on management strategy evaluations, on a framework for 'data-poor' stocks, to develop formalized advice decision frameworks, and the introduction of an Ecosystem Approach including status reporting. There is already some cooperation between NAFO and ICES, including a joint working group on shrimps. In addition, individual experts participate in both SC and ICES work and Canadian and USA scientists are valuable contributors to ICES work as independent peer reviewers. The Panel believes this would be a sound basis in which to increase mutually beneficial cooperation.

2. Best available science

SC is responsible for a range of scientific tasks within NAFO as listed in Article VII.8 of the Convention.

It is not for the Panel to provide a formal review of the science under the auspices of SC. A technical review would require the Panel to include scientists with core expertise of all major areas of SC work. The Panel can assess whether SC has processes in place to ensure scientific quality. These processes should include transparency regarding data, methods and analysis used and independent expert evaluation of the work prior to publication or use.

Some of the SC work is published through NAFO's Journal of the Northwest Atlantic Fishery Science⁸⁵. The journal is peer reviewed and, importantly, is open access.

SC work not published through peer-reviewed channels is published through SC Reports, SC Research Documents (SCR) and SC Summary Documents (SCS). This material is available through the public pages of the NAFO website. Some of these documents contain scientific work which subsequently may be the basis for SC advice.

The Panel notes this work is generally transparent. One shortcoming is that survey data used in SC analyses may not be documented, as discussed in section III.3 on "*Data Collection and Sharing*". A further shortcoming relates to non-documented catch estimates and preliminary data.

SC does not have a mechanism for systematic peer review of the science underlying the advice. SC has recently endorsed a recommendation from SC's Standing Committee on Research Coordination in this respect⁸⁶. This process will begin with the 3M cod benchmark in 2018.

⁸⁵ NAFO Journal of the Northwest Atlantic Fishery Science – <http://journal.nafo.int/>

⁸⁶ NAFO/SCS Doc. 17-16 Revised (Appendix III, p. 68) – <https://www.nafo.int/Portals/0/PDFs/sc/2017/scs17-16REV.pdf>

In relation to science, the NAFO Performance Review Panel:

- **Recommends** NAFO decides the level of acceptable risk regarding the outcomes of conservation and management measures, following a dialogue between Commission and SC, to provide the latter with guidance in its advisory work.
- **Recommends** NAFO develops and publishes an advisory decision-making framework to ensure advice is linked explicitly to policy objectives, is consistent and its basis is transparent.
- **Recommends** NAFO, as a matter of high priority, develops a plan and implements steps to match the scientific resources to the workload.
- **Recommends** NAFO implements a peer review process for the science underlying the SC advice and applies it consistently to all SC science used in advice.
- **Recommends** the Secretariat conducts a survey of usage and identify further improvements to the public outreach documents relating to the state of NAFO stocks and NAFO science available on the NAFO website.

VII. International Cooperation

1. Relationship with non-contracting parties

PR1 commended NAFO for including in its amended Convention comprehensive provisions to provide a strong legal basis for cooperation with non-Contracting Parties in accordance with international law, including the taking of action against non-Contracting Parties that undermine the conservation and management measures adopted by NAFO.

The Panel assessed that non-Contracting Parties have not undertaken fishing activities in the Regulatory Area. Consequently, no action has been necessary against non-Contracting Parties undermining the objectives of the Convention.

2. Cooperation with other international organizations

PR1 concluded that the amended Convention contains comprehensive provisions concerning cooperation with RFMOs and other international organizations.

In addition to cooperative activities with the UN, FAO and NEAFC⁸⁷, NAFO continues to make efforts to maintain dialogue with relevant organizations and explore mechanisms to exchange information. Recently, the Secretariat has reached out to the International Seabed Authority and the Secretariat of the Convention on Biological Diversity. In relation to the Convention on Biological Diversity, the Secretariat has participated in meetings of the Sustainable Ocean Initiative Global Dialogue with Regional Seas Organizations and Regional Fisheries Bodies on Accelerating Progress towards the Aichi Biodiversity Targets⁸⁸.

Considering mandate restrictions and resource limitations, only through broader cooperation will NAFO succeed in achieving a true Ecosystem Approach that integrates and assesses cumulative impacts of relevant human activities on NAFO fisheries. In line with recommendations of the 2016 Review Conference on UNFSA, *“collaboration is key to achieve an understanding of the impacts of, and risks associated with, climate change with respect to fish stocks including the vulnerabilities of individual species to changes in marine ecosystems, with a view to identifying options for reducing such risk and promoting the health and resilience of marine ecosystems, sharing information and identifying and sharing best practices in this regard”*⁸⁹.

The issue of conservation of marine biodiversity and the Ecosystem Approach is at the core of important developments at international level. Among these, it is worth recalling the Aichi Biodiversity targets adopted by the Parties to the Convention on Biological Diversity⁹⁰, which aim at a 2020 deadline. The 20 targets, structured among 5 Strategic Goals, include several relating to the marine environment. The work of NAFO is already contributing to the attainment of these goals, but it is unclear to the Panel whether Contracting Parties are able to place and measure their efforts in the context of a broader, rapidly developing international context of enhanced cooperation and rapidly approaching deadlines.

The Panel believes it is important to draw attention to the process underway at UN level towards the development of an international legally binding instrument under the UNCLOS on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction. After several years of

⁸⁷ As assessed by PR1, NAFO has continued to conduct cooperative activities with the UN (e.g. providing relevant NAFO information, participating in meetings, such as the Rounds of Informal Consultations of States Parties to the United Nations Fish Stocks Agreement, the UNFSA Resumed Review Conference, Meetings of the UN Open-ended Informal Consultative Process on Oceans and Law of the Sea, the Third and Fourth session of the UN Biodiversity Beyond National Jurisdiction Preparatory Committee, etc.), with FAO (participating in meetings, such as COFI, the FAO First Meeting of the Parties to the 2009 FAO Agreement on Port State Measures, etc.), with NEAFC (including joint management of a shared stock and the establishment of a Joint Advisory Group on Data Management), among others.

⁸⁸ NAFO/COM WP 17-06

⁸⁹ UNFSA Review – A/CONF.210/2016/5 (p. 36-50) – <http://ldac.ldac.eu/attachment/142a7cd5-e3a1-4e87-b28f-4ec6909459a9>

⁹⁰ Convention on Biological Diversity – <https://www.cbd.int/sp/targets/>

preparatory work, an intergovernmental conference has been called which will hold its first session in September 2018⁹¹. These developments should lead NAFO to consider and assess its role.

In relation to cooperation with other international organizations, the NAFO Performance Review Panel:

- **Recommends** NAFO strengthens and enhances cooperation with RFMOs and other relevant international organizations.
- **Recommends** NAFO assesses how it can contribute its expertise to international developments, in particular the completion of the Aichi Targets and the Intergovernmental Conference on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction.

3. Special requirements of developing countries

PR1 noted the provisions addressed in Part VII of the UNFSA have not been taken into account in the amended Convention. PR1 also stressed that the Organization should take into account the special requirements of developing states, in accordance with the relevant international instruments addressing the conservation and management of marine living resources, including UNFSA.

The Panel believes that NEAFC's example could be followed by NAFO. Although none of NEAFC's Contracting Parties are developing countries and NEAFC's core activities do not include capacity building in developing states or other types of development cooperation, NEAFC does take part in various projects aimed at capacity building. This cooperation is undertaken through, among others, the sharing of NEAFC's knowledge and experience in fisheries management, MCS and related fields⁹².

In relation to special requirements of developing countries, the NAFO Performance Review Panel:

- **Recommends** NAFO participates in capacity building initiatives for developing countries.

⁹¹ Intergovernmental Conference on an international legally binding instrument under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction - <https://papersmart.unmeetings.org/en/ga/bbnj-intergovernmental-conference/>

⁹² Submission by NEAFC - http://www.un.org/depts/los/general_assembly/contributions_2014_2/NEAFC.pdf

VIII. Finance and Administration

PR1 made a number of suggestions and recommendations in the finance and administration area. It is clear from the actions taken over the past few years, the Contracting Parties, with support from the Secretariat, have taken these issues seriously. The Organization has adopted a range of best practice guidelines for both financial and personnel management. This positions NAFO as modern and future focused.

In particular, staff are now employed with contracts specifying position descriptions, working conditions and appraisal procedures. A set of staff rules are clearly outlined, and an open process has been developed to ensure adequate representation on the NAFO Staff Association.

The current financial situation and staffing level is stable, but it should be recognized that any additional demands, without reprioritizing existing work, would put this stability at risk. The Secretariat needs to maintain a critical mass and the necessary skills to ensure the Organization meets its obligations at a time when additional scrutiny from the international community is being applied to the operation of all RFMOs. NAFO will be under increasing pressure to broaden its scope to ensure wider environmental considerations are taken into account. The Commission should ensure the Secretariat is in a position to support this broader role.

Given the decision of the host country not to renew the current lease of the NAFO headquarters, efforts have been made to present the accommodation needs of the Secretariat to the host country. This move is planned for 2019. Security considerations and operational requirements of the Secretariat should be taken into account with any refit of existing office space.

Ongoing work is occurring with auditors to finalize procedures for future accounting processes. PR1 suggested that NAFO apply accrual accounting principles. STACFAD has explored a number of options and has determined that the use of Not-For-Profit accounting standards rather than the current International Financial Reporting Standards is the most appropriate way forward⁹³. The NAFO Financial Regulations have been modified accordingly. It is planned to complete the 2016 audit based on the modified Financial Regulations. Discussions are occurring with auditors to ensure they understand the complexities of the operation of an international organization.

Efforts have been made to lower the operating costs of the Organization. PR1 suggested that the application of cost recovery measures be considered as a way of alleviating potential financial stress on Contracting Parties. Currently fees are applied to observer attendance and a rental is charged for the use of the NAFO headquarters boardroom. Additional cost savings measures have been implemented, in particular, the increased use of video conferences and the use of the SharePoint site. It is anticipated that distribution of information and documents will increasingly be undertaken by electronic means. It may be useful to explore further opportunities to use short term contract staff to undertake discrete projects. This would need to be cost effective to ensure any increased fees are offset by reduced operating costs.

STACFAD appears to be working very efficiently. The reports from this committee are concise and coherent and positive feedback from Contracting Parties has been noted. The Panel recognizes the positive contribution STACFAD makes to the Organization and encourages a broader range of Contracting Parties to participate in the work of the Committee.

As noted, the NAFO Staff Rules 2017 have been updated and clearly specified in a user-friendly document. The Panel suggests they be regularly reviewed and updated to ensure they contain current best practice. Increasingly such documents should cover behavioral expectations such as policy responses to claims of sexual harassment and bullying. The Panel is not aware of any problems in this area but believe it would be prudent to address the issue and it may extend beyond the Secretariat. It would be useful to review and use the Government of Canada's Guidelines as a basis on such issues.

PR1 recommended timely and adequate planning to provide the Secretariat with appropriate human, financial and other resources for future work.

⁹³ NAFO 2017 Annual Report – <https://www.nafo.int/Portals/0/PDFs/ar/ar2017/AR2017.pdf>

Risks to the Organization need to be managed to ensure institutional knowledge is retained and shared amongst staff. Clear processes should be put in place for succession planning. As the Organization adapts to differing and increasing demands, the Secretariat needs to be flexible and agile. This includes reprioritizing activities and moving resources to where there are immediate demands. An ongoing issue for Contracting Parties is to ensure the Secretariat has the ability to deliver timely and modern support. Detailed planning for these operational demands may alleviate these concerns.

Currently, the Secretariat uses the NAFO schedule of meetings and fixed programme to organize its work. The amended Convention outlines the strategic and legal obligations and responsibilities. This positions the Secretariat to develop an annual operational plan outlining specific objectives and tasks to be undertaken. These objectives should indicate the resources required and the timelines for delivery. The Panel suggests a contingency objective is included to allow for unforeseen additional work requests. The process of developing an operational plan could involve a number of key staff and would provide an opportunity for employees to become familiar with the entire range of functions undertaken by the Secretariat.

In recent years, many RFMOs have undertaken a process to update their image by changing their visual identity. The Panel concluded that the current NAFO logo is outdated and confusing. It can also be difficult to reproduce in print and promotional material. Those unfamiliar with the functions of the Organization could be forgiven for assuming NAFO has responsibility for shipping matters.

The work of NAFO, like other RFMOs, has broadened to encompass wider responsibilities for sound environmental stewardship as well as managing the sustainable use of fisheries resources. The amended Convention reflects this change. The visual identity of NAFO should project this role and there is a risk NAFO will appear out of step if this issue is not addressed.

In relation to finance and administration, the NAFO Performance Review Panel:

- **Recommends** NAFO develops an annual operational plan for the NAFO Secretariat outlining key objectives and specifying resources required to meet these objectives.
- **Recommends** NAFO initiates a process to design a new visual identity for NAFO that reflects the role and responsibilities of the Organization.

IX. Annexes

Annex 1. The Terms of Reference for the 2018 Performance Review	50
Annex 2. Performance Review Panel	59
Annex 3. Developments in marine ecosystems in the NAFO Convention Area	60



Annex 1. The Terms of Reference for the 2018 Performance Review ⁹⁴

1. Scope and objectives

The scope and objectives of the work to be carried out by the Review Panel shall be:

1. To evaluate **how NAFO has responded to the outcome of 2011 NAFO Performance Review** (PR 1), taking into consideration the work and practices of NAFO's bodies, subsidiary bodies and working groups to date, and also the implementation of the action plan resulting from the recommendations of the 2011 NAFO Performance Review.
2. To identify areas where improvements are needed to strengthen the organization in order to advance the objectives of the **NAFO Convention and the subsequent 2007 amendments**.
3. To assess the functioning and efficiency of all **NAFO bodies, subsidiary bodies and working groups**, taking into account, among other:
 - a. The cooperation between Commission and Scientific Council in the context of the joint COM-SC working groups.
 - b. The findings mentioned in the Fisheries Commission's paper on "Improving Efficiency of NAFO Working Group Process" (FC Doc. 15-18).

2. Criteria

Within the scope and objectives outlined above, the review shall be performed on the basis of seven groups of criteria provided in the Annex, in no order of preference, which should be used to point both to achievements and to areas which could be improved:

- Follow-up to the 2011 NAFO Performance Review.
- Conservation and management.
- Compliance and enforcement.
- Governance including decision-making, dispute settlement, transparency and confidentiality.
- Science.
- International cooperation.
- Financial and administrative issues.

3. Review Panel composition

The Review Panel shall be composed of six (6) experts; three (3) external experts and three (3) internal experts.

a. External experts

None of the three external experts should have participated in the work of NAFO.

The external experts should cover the following qualifications and experience:

- One expert on the legal framework of international fisheries instruments and organizations.
- One expert on fisheries management.
- One expert on fisheries science.

⁹⁴ NAFO/COM Doc. 17-21 – <https://archive.nafo.int/open/com/2017/comdoc17-21.pdf>

All three (3) external experts should have an appropriate level of education and long experience relevant to the category in which they are nominated, as well as a very good command of written and spoken English.

One of the three (3) external experts shall be assigned the task of Coordinator of the Review Panel by the remaining experts, if possible by consensus of the Panel. The Coordinator will be liaising with CPs and the chairs of any relevant NAFO body or working group.

Selection of external experts:

1. All CPs will be invited to nominate three (3) external experts each: one in each of the fields mentioned above (i.e. legal issues, fisheries management and fisheries science). If possible, nominations will include some background and/or CVs.
2. The Secretariat will compile a list of candidates received from CPs, by field of expertise and attaching the background and/or CVs provided.
3. If there are not at least two qualified nominees in each category, the Secretariat may re-open the nomination process for an additional 30 days to solicit additional candidates.
4. The Secretariat will distribute the list by field, i.e. in three lists.
5. CPs will select and rank a maximum of 3 experts per field among the candidates, in order of preference.
6. The Secretariat will consolidate the ranking from the CPs. It will prepare a composite list of candidates by assigning a value to each candidate in inverse relationship to the order of each of the three lists (i.e. 3 points for candidate ranked first; 2 points for candidate ranked second and 1 point for candidate ranked third).
7. The Commission Chair will convey to CPs the results of the selection in accordance with the outcome of the ranking process.

b. Internal experts

The three (3) internal experts shall have a background in at least one of the fields mentioned in point 3 (a) above for external experts. Ideally, their main field of expertise shall not coincide. They shall be nationals of one of NAFO's CPs.

They shall be selected as follows:

1. All CPs will be invited to nominate one internal expert each, including, if possible, some background and/or CV.
2. The Secretariat will compile and distribute a list of candidates received from CPs and attaching the background and/or CV provided.
3. CPs will rank all candidates in the list, in order of preference.
4. The Secretariat will consolidate the ranking from the CPs. It will prepare a composite list of candidates by assigning each candidate a value in inverse relationship to the order of each CP ranking (i.e. if there are 10 candidates, then 10 points for candidate ranked first, 9 points for candidate ranked second, and so forth).
5. The Commission Chair will convey to CPs the results of the selection in accordance with the outcome of the ranking process.

4. Administration

Meeting(s) of the Review Panel shall be held at the NAFO Headquarters in Dartmouth, Nova Scotia, Canada or via WebEx/videoconference.

The Contracting Parties shall be invited to submit, in confidentiality, views, orally or in writing, relevant to consider by the review panel. In addition, other relevant stakeholders may be invited to submit views on relevant issues to be considered by the panel.

The travel costs of the external experts shall be reimbursed and they shall receive a per diem to cover their accommodation and subsistence costs. In addition, the experts may receive a fee for the work undertaken.

CPs whose candidates are chosen as internal experts shall pay for the participation of those experts to meeting(s) of the Panel.

The Secretariat shall provide administrative assistance to the Panel.

5. Work schedule and report of the Review Panel

The work schedule will include the following main steps:

- **October – November 2017:** Selection of Panel Review experts.
- **December 2017:** Panel Review experts are contacted by the Secretariat for availability.
- **January – June 2018:** Review Panel work, including at least two meetings face-to-face and WebEx / videoconference meetings as required.
- **1 July 2018:** Review Panel makes a provisional report available for review by the NAFO Secretariat and CPs for comments.
- **15 July 2018:** Deadline for comments by CPs to the Review Panel's provisional report.
- **15 July – 1 August 2018:** The Secretariat compiles and aggregates all CP comments to the provisional report.
- **2 August 2018:** The Secretariat circulates a final draft report to CPs, for adoption at the NAFO Annual Meeting in 2017.
- **Annual Meeting 2018:** Panel Coordinator presents the final draft report at the NAFO Annual Meeting.
- **After Annual Meeting 2018:** If adopted by the NAFO Commission, the second Performance Review report is uploaded to the public part of the NAFO website and disseminated widely by the Secretariat.

Criteria for Reviewing the Performance of NAFO

Area	General criteria	Detailed criteria
1. 1st Performance Review	<i>Follow-up to the 1st Performance Review</i>	Review of actions taken by NAFO in response to the 1 st PR recommendations and assessment of their effectiveness.
2. Conservation and management	<i>Status of living marine resources</i>	Status of fish stocks under the purview of NAFO in relation to maximum sustainable yield or other relevant biological standards.
		Trends in the status of those stocks.
		Status of species that belong to the same ecosystems as, or are associated with or dependent upon, targeted marine living resources ("non-target species").
		Trends in the status of non-target species.
	<i>Ecosystem approach and precautionary approach</i>	Extent to which NAFO decisions take account of and incorporate the ecosystem approach and the Precautionary Approach to Fisheries Management.
	<i>Data collection and sharing</i>	Extent to which NAFO has agreed formats, specifications and timeframes for data submissions, taking into account Annex 1 of the 1995 UN Fish Stocks Agreement.
		Extent to which NAFO Contracting Parties, individually or through NAFO, collect and share complete and accurate data concerning marine living resources (i.e. both fish stocks and non-target species) and other relevant data in a timely manner, including analysis of trends in fishing activities over time.
		Extent to which fishing and research data and fishing vessel and research vessel data are gathered by NAFO and shared among Contracting Parties and with other relevant international bodies.
		Extent to which NAFO is addressing any gaps in the collection and sharing of data as required.
	<i>Quality and provision of scientific advice</i>	Extent to which NAFO produces the best scientific advice relevant to the marine living resources under its purview, as well as to the effects of harvesting,

Area	General criteria	Detailed criteria
		research, conservation and associated activities on the marine ecosystem.
	<i>Adoption of conservation and management measures</i>	Extent to which NAFO has adopted measures based on the best scientific advice available to ensure the long-term conservation and sustainable use of marine living resources in the Convention Area.
		Extent to which NAFO has applied a Precautionary Approach as set forth in Article 6 of the 1995 UN Fish Stocks Agreement, including the application of precautionary reference points.
		Extent to which consistent/compatible management measures have been adopted, as set out in Article 7 of the 1995 UN Fish Stocks Agreement.
		Extent to which NAFO successfully allocates fishing opportunities consistent with the NAFO Convention and Article 11 of the 1995 UN Fish Stocks Agreement.
		Extent to which NAFO has moved toward the adoption of conservation and management measures for previously unregulated fisheries, including new and exploratory fisheries.
		Extent to which NAFO has taken due account of the need to conserve marine biological diversity and minimize harmful impacts of fishing activities and research on living marine resources and marine ecosystems.
		Extent to which NAFO has adopted measures to minimise pollution, waste, discards, catch by lost or abandoned gear, catch of non-target marine living resources, and impacts on associated or dependent species through measures including, to the extent practicable, the development and use of selective, environmentally safe and cost-effective fishing gear and techniques.
		Extent to which NAFO has adopted and is implementing effective rebuilding plans for depleted or overfished stocks including guidance for stocks under moratoria.

Area	General criteria	Detailed criteria
	<i>Capacity management</i>	Extent to which NAFO has identified fishing capacity levels commensurate with the conservation objectives of the NAFO Convention.
		Extent to which NAFO has taken actions to prevent or eliminate excess fishing capacity and effort.
	<i>Reporting requirements</i>	Analysis of NAFO's reporting obligations to improve efficiency, avoid redundancy and reduce unnecessary burdens on CPs.
3. Compliance and enforcement	<i>Flag State duties</i>	Extent to which NAFO Contracting Parties are fulfilling their duties as flag States under the NAFO Convention, pursuant to measures adopted by NAFO, and under other international instruments, including, inter alia, the 1982 Law of the Sea Convention, 1995 UN Fish Stocks Agreement and the 1993 FAO Compliance Agreement, as applicable.
	<i>Port State measures</i>	Extent to which NAFO has adopted measures relating to the exercise of the rights and duties of its Contracting Parties as port States, as reflected in Article 23 of the 1995 UN Fish Stocks Agreement, as well as the minimum standards set out in the 2009 FAO Agreement on Port State Measures to Combat IUU Fishing.
		Extent to which these measures are effectively implemented.
	<i>Monitoring, control and surveillance (MCS)</i>	Extent to which NAFO has adopted integrated MCS measures (e.g. required use of boarding and inspection schemes, VMS, observers, catch documentation and/or trade tracking schemes, and restrictions on transshipment).
		Extent to which these measures are effectively implemented.
	<i>Follow-up on infringements</i>	Extent to which NAFO and its Contracting Parties follow up on infringements to conservation and management measures.
	<i>Cooperative mechanisms to</i>	Extent to which NAFO has established adequate cooperative mechanisms to both monitor compliance and detect and deter non-compliance (e.g. compliance

Area	General criteria	Detailed criteria
	<i>detect and deter non-compliance</i>	committees, vessel lists, sharing of information about non-compliance).
		Extent to which these mechanisms are being effectively utilised.
	<i>Market-related measures</i>	Extent to which NAFO has adopted measures relating to the exercise of the rights and duties of NAFO Contracting Parties as market States for marine living resources under the purview of NAFO.
		Extent to which these measures are being effectively implemented.
4. Governance including decision-making, dispute settlement, transparency and confidentiality.	<i>Decision-making</i>	
		Extent to which NAFO has transparent, consistent and adequate decision-making procedures that facilitate the adoption of conservation and management measures in a timely and effective manner.
		Extent to which those procedures are effectively implemented.
	<i>Dispute settlement</i>	Extent to which NAFO has established adequate mechanisms for resolving disputes.
	<i>Transparency</i>	Extent to which NAFO is operating in a transparent manner, taking into account Article 12 of the 1995 UN Fish Stocks Agreement and Article 7.1.9 of the Code of Conduct for Responsible Fisheries
		Extent to which NAFO decisions, meeting reports, scientific advice upon which decisions are made, and other relevant materials are made publicly available in a timely fashion.
		Extent to which the NAFO website caters for the online communication needs of NAFO CPs and the public in general.

Area	General criteria	Detailed criteria
	<i>Confidentiality</i>	Extent to which NAFO has set security and confidentiality standards and rules for sharing sensitive scientific and operational/compliance data.
5. Science	<i>Quality and provision of scientific advice</i>	Extent to which the Scientific Council (SC) produces the best scientific advice relevant to the living marine resources under the purview of NAFO, as well as to the effects of fishing on the marine environment.
		Extent to which scientific advice is presented in a standardised way
		Extent to which scientific advice is accessible to and understandable for non-scientists and the general public
		Extent to which the structure, processes, procedures, resources and expertise of the SC and of the Secretariat meet the needs of NAFO, in particular as regards highly demanding data and technical requirements of the most recent modelling platforms.
	<i>Best available science</i>	Extent to which best available science is used by the SC.
6. International cooperation	<i>Relationship with non-contracting parties</i>	Extent to which non-Contracting Parties have undertaken fishing activities in the NAFO Regulatory Area.
		Extent to which NAFO facilitates cooperation with non-Contracting Parties, including encouraging non-Contracting Parties to become Contracting Parties or to implement NAFO conservation and management measures voluntarily.
		Extent to which NAFO provides for action in accordance with international law against non-Contracting Parties undermining the objective of the Convention, as well as measures to deter such activities.
	<i>Cooperation with other</i>	Extent to which NAFO cooperates with Regional Fisheries Management Organizations and other

Area	General criteria	Detailed criteria
	<i>international organizations</i>	international organisations, including the network of Regional Fishery Body Secretariats.
	<i>Special requirements of developing States</i>	Extent to which NAFO recognises the special needs of developing States and cooperates with developing States, taking into account Part VII of the 1995 UN Fish Stocks Agreement.
		Extent to which NAFO Contracting Parties, individually or through the Commission, provide relevant assistance to developing States as reflected in Article 26 of UN Fish Stocks Agreement.
7. Financial and administrative issues	<i>Availability of resources for activities</i>	Extent to which financial, human and other resources are effectively forecast and made available to achieve the aims of NAFO and to implement NAFO's decisions.
	<i>Efficiency and cost-effectiveness</i>	Extent to which NAFO is efficiently and effectively managing its human and financial resources, including those of the Secretariat, in order to support NAFO's objectives and to ensure continuity of operations. This includes, among other, the establishment of clear and transparent office policies, structures, roles and responsibilities and lines of authority and effective internal and external communication.
		Extent to which the schedule and organization of the meetings could be improved.

Annex 2. Performance Review Panel

<i>External Experts</i>		
<i>Name</i>	<i>Field</i>	<i>Contact</i>
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<i>Internal Experts</i>		
<i>Name</i>	<i>Contracting Party</i>	<i>Contact</i>
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Annex 3. Developments in marine ecosystems in the NAFO Convention Area

Excerpted from the Report of the NAFO Scientific Council Working Group on Ecosystem Science and Assessment (WG-ESA)⁹⁵

WG-ESA has compiled trends in biomass information regarding functional groups from surveys. The trends are research vessel Biomass by fish functional groups from Fisheries and Oceans Canada (DFO) research vessel multispecies survey. These series include surveys with two different survey gears, initially the Engels gear and later the Campelen gear. Below are the scaled research vessel biomass series where the earlier part of the time series, when the survey used the Engels gear, has been corrected using coarse scaling factors by fish functional group. These scaling factors are only approximate. Data on commercial shellfish species only started to be consistently recorded during the Campelen period. For more explanation, see the WG-ESA report.

The Newfoundland shelf indicators are presented in Figure 1. WG-ESA considers that:

"In 2J3K, the collapse in the 1990s involved the entire fish community, and also involved a decline in fish size. After the collapse, the system was highly dominated by shellfish. The changes observed have a coherent internal structure; increases in small fish and shellfish are associated with declines in forage and large fishes. Consistent signals of rebuilding of the groundfish community appeared in the mid-late 2000s; this signal is also associated with an increase in fish size. In the 2010s the overall biomass remained relatively stable, but the dominance of groundfishes increased, and shellfish decreased. After 2014 overall biomass has shown some hints of a decline, while several functional groups are showing consistent signals of declines in abundance."

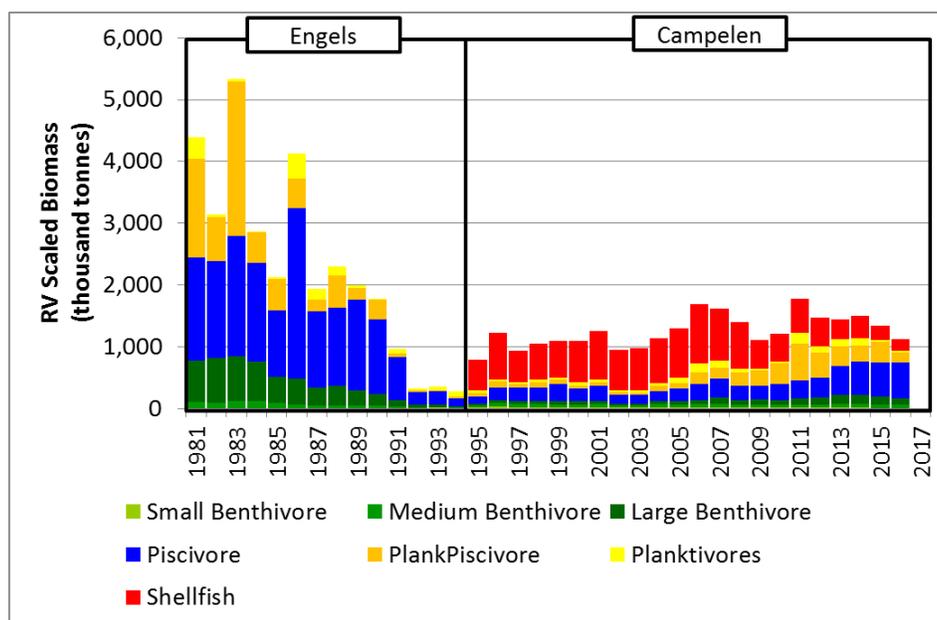


Figure 1. Research vessel Biomass by fish functional groups in the Newfoundland Shelf (NAFO Divs. 2J3K) using data from the DFO Fall multispecies survey, from WG-ESA Fig 2.4.7 (top).

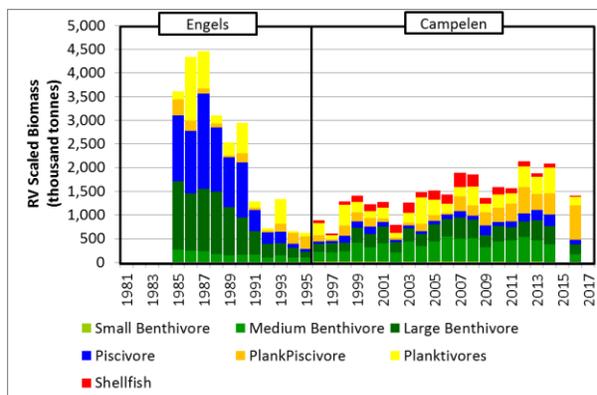
⁹⁵ NAFO/SCS Doc. 17-21 (agenda item 2.4, p. 113-132) – <https://archive.nafo.int/open/sc/2017/scs17-21.pdf>

The Grand Banks indicators are presented in Figure 2.

WG-ESA writes about the development on the Grand Banks that:

“In 3LNO the collapse in the 1990s also involved the entire fish community, and a decline in fish size. but it was not as severe as in the northern area. This EPU [Ecosystem Production Unit, the basic operational unit for the EA work in WG-ESA] shows a higher dominance of benthivores, and it was never dominated by shellfish. The groundfish community started to show signals of rebuilding around the late 2000s, but piscivores did not regain their dominant role. Overall build-up of groundfishes was initially led by medium benthivores and later by plank-piscivores. In the early 2010s the overall biomass remained relatively stable, but clear signals of decline have been observed in recent years, with total biomass in 2016-2017 showing a reduction of 30-40% from the early 2010s ... Although there was an upward trend in fish size in the late 1990s and early 2000s, fish size has declined since, and has oscillated around the post-collapse average since the late 2000s, showing low values in the most recent years. The recent declines in total biomass and reduced fish sizes is also matched by reduced abundances, with most functional groups showing negative anomalies in 2015-2016. Other change observed during this period is an increase in silver hake (warm water species) among piscivores (especially on the western portion of the Grand Bank, NAFO Div. 30), and declines in key forage species (e.g. capelin).”

Spring Survey



Fall Survey

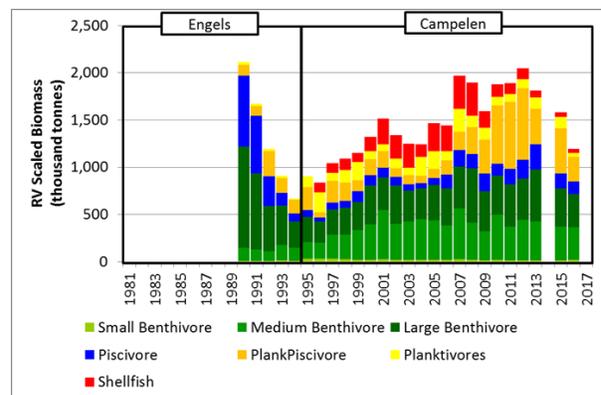


Figure 2. Research vessel Biomass by fish functional groups in the Newfoundland Shelf (NAFO Divs. 2J3K) using data from the DFO Spring and Fall multispecies surveys, from WG-ESA Fig 2.4.10 (top).

The Southern Newfoundland indicators are presented in Figure 3.

WG-ESA writes about the development in this area that:

“The decline in the 1990s also involved the entire fish community and included reductions in fish size. The overall decline seemed less severe than other ecosystem units in this bioregion. Since the mid-late 1990s, the overall biomass of the fish community has not increased significantly, but abundance did. However, both biomass and abundance after 2014 have shown reduced levels in comparison to immediately precedent years. Average fish size did not improve in the post collapse period, but showed a further decline in the mid 2000s, and still remains at that lower level. Ongoing warming trends, together with the increasing dominance of warm water species (e.g. silver hake), and the reduced fish sizes across fish functional groups suggest that this ecosystem is undergoing structural changes, and potentially experiencing reduced productivity conditions.”

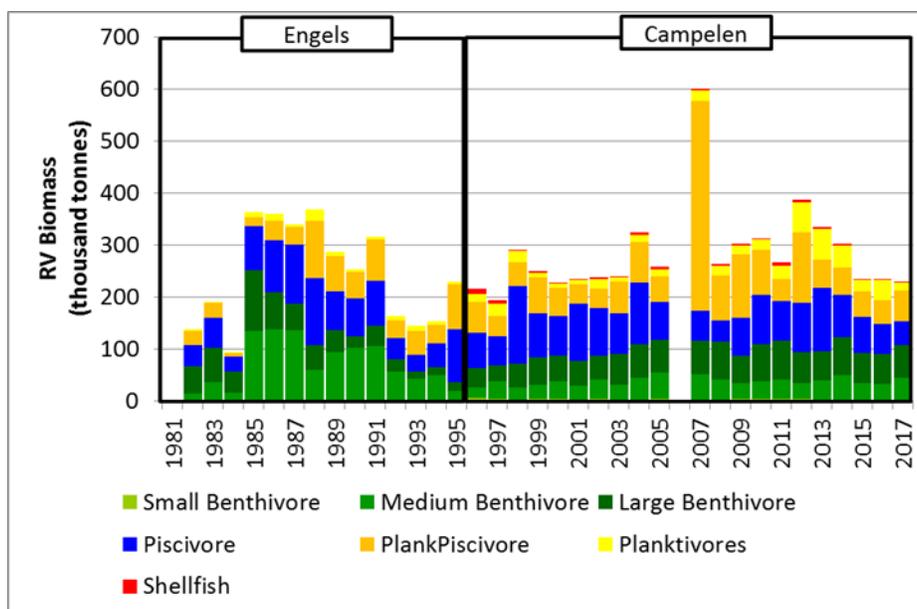


Figure 3. Research vessel Biomass by fish functional groups in the Southern Newfoundland (NAFO Sub-Div. 3Ps) using data from the DFO Spring multispecies surveys, from WG-ESA Fig 2.4.13 (top).

WG-ESA provides a synoptic overview of these developments (Figure 4) and concludes that:

“Overall, the collapses in the 1990s involved entire fish communities, and included declines in fish size across all EPU. The collapse was more severe in the north, and less in the southern Newfoundland region. These collapses were accompanied by changes in community structure. Shellfish became a dominant functional group in 2J3K after the collapse, but although increased its dominance in other ecosystems, never reached the overwhelming dominance observed in the northern region.

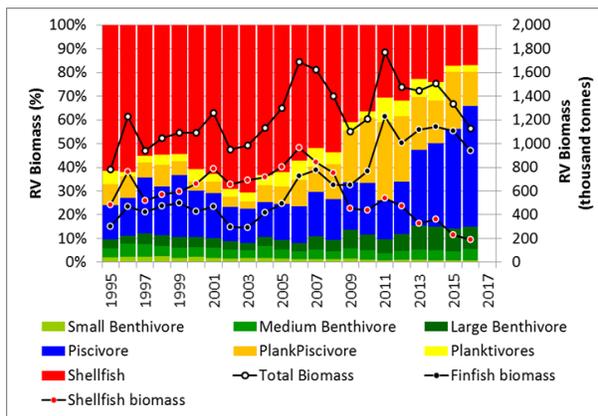
The groundfish community started to show signals of rebuilding during the mid-late 2000s, but current levels are still well below pre-collapse level. The functional groups leading the groundfish rebuilding were not the same across ecosystems; piscivores are important drivers in the northern area, but they have a lesser role in southern ecosystems.

After initial build-ups, finfish biomass was relatively stable in 2010-2014, but recent surveys are indicating a downward trend. This is clearly evident on the Grand Bank (3LNO) EPU. Overall, it appears

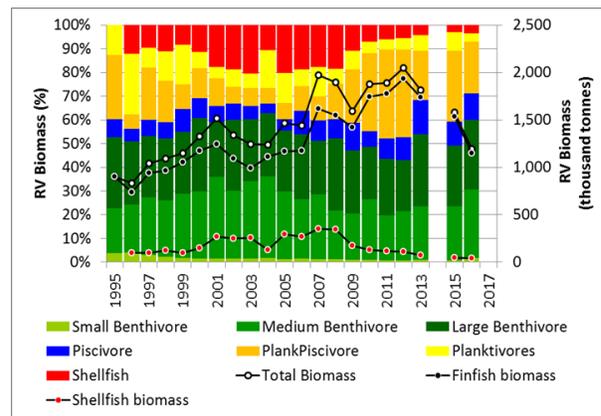
that the conditions that led to the start of a rebuilding have withered. This may be linked to the simultaneous reductions in capelin and shrimp availability, as well as other changes in ecosystem conditions (e.g. declines in zooplankton levels in recent years).

Silver hake, a warm water species, is increasing its dominance among piscivores. They have become a major component of this functional group in 3Ps and are increasing in the Grand Bank. This may hint of the changes to be expected under warming conditions; the full extent of these kinds of impacts on these ecosystems remains largely unknown.”

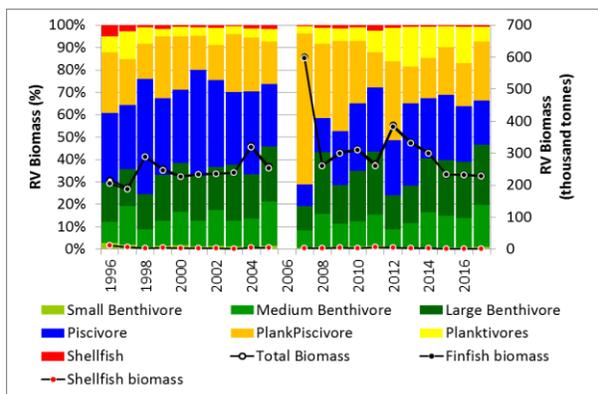
Newfoundland Shelf (2J3K) – Fall Survey



Grand Bank (3LNO) – Fall Survey



Southern Newfoundland (3Ps) – Spring Survey



Grand Bank (3LNO) – Spring Survey

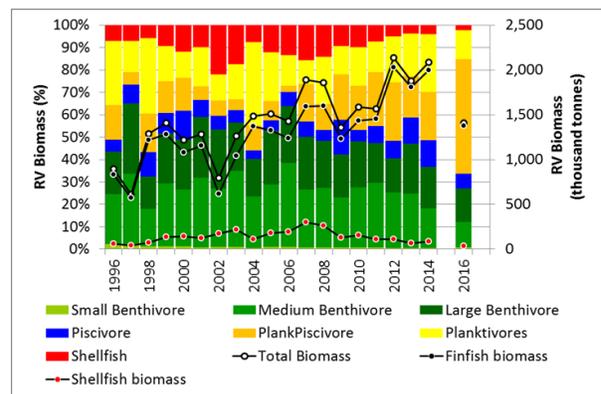


Figure 4. Synoptic comparison of the structure and trends in the fish communities during 1995-2017 among the Newfoundland Shelf (2J3K), the Grand Bank (3LNO) and Southern Newfoundland (3Ps) using data from the DFO Spring and Fall multispecies surveys, from WG-ESA Fig 2.4.16.



