Northwest Atlantic Fisheries Organization

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SCIENTIFIC COUNCIL MEETING - SEPTEMBER 2017

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REPORT OF SCIENTIFIC COUNCIL MEETING

18-22 September 2017

Chair: Katherine Sosebee Rapporteur: Tom Blasdale

I. PLENARY SESSIONS

The Scientific Council met at the Marriott Château Champlain, Montréal, Canada during 18-22 September 2017, to consider the various matters in its agenda. Representatives attended from Canada, Cuba, European Union (Estonia, European Commission, France, Portugal, Spain, and the United Kingdom), France (with respect to St. Pierre et Miquelon), Japan, Norway, the Russian Federation and the United States of America. The Scientific Council Coordinator was in attendance.

The Executive Committee met prior to the opening session of the Council to discuss the provisional agenda and plan of work.

The opening session of the Council was called to order at 09:45 hours on 18 September 2017.

The Chair welcomed participants to the 39th Annual Meeting and thanked Canada for hosting this event.

The provisional agenda was adopted without amendment. The Council appointed Tom Blasdale, the Scientific Council Coordinator, as rapporteur.

The Council and its Standing Committees met through 18-22 September 2017 to address various items in its agenda. The Council considered and adopted the reports of the STACFIS and STACREC Standing Committees on 21 September 2017. The final session was called to order at 1000 hours on 22 September 2017. The Scientific Council then considered and adopted its report of this meeting. The meeting was adjourned at 1100 hours on 22 September 2017.

The Reports of the Standing Committees as adopted by the Council are appended as follows: Appendix I - Report of Standing Committee on Research Coordination (STACREC), and Appendix II - Report of Standing Committee on Fisheries Science (STACFIS).

The Agenda, List of Research (SCR) and Summary (SCS) Documents, and the List of Representatives, Advisers and Experts, are given in Appendices III, IV, and VI, respectively.

II. REVIEW OF SCIENTIFIC COUNCIL RECOMMENDATIONS

A detailed review of recommendations was deferred to the June 2018 meeting.

III. RESEARCH COORDINATION

The Council adopted the Report of the Standing Committee on Research Coordination (STACREC) as presented by the Chair, Brian Healey. The full report of STACREC is at Appendix I.

IV. FISHERIES SCIENCE

The Council adopted the Report of the Standing Committee on Fisheries Science (STACFIS) as presented by the Chair, Joel Vigneau. The full report of STACFIS is at Appendix II.

V. REQUESTS FROM THE FISHERIES COMMISSION

1. Requests deferred from the June Meeting

Fisheries Commission requests for advice on the management of 3NO cod and **3M Golden redfish**

Advice on the management of 3NO cod and 3M Golden redfish is deferred until June 2018 and 2019 respectively.

2. Requests received from the Fisheries Commission during the annual meeting

The following requests were received during the current meeting. Scientific Council noted that these responses are only for the clarification of the advice from the June 2017 meeting.

i) On drivers for low recruitment (from the EU: COM WP 17-20)

The draft report of the June Scientific Council meeting identifies a low recruitment as one of the main drivers behind a declining abundance in some stocks. Could the Scientific Council further elaborate on what could be the reasons for such low recruitment in recent years in so many stocks and also in different NAFO divisions?

This seems to be particularly the case for Cod in Division 3M, Witch Flounder in in Division 3NO and redfish in Division 3M.

SC responded: Scientific Council has begun analysis of data on historic recruitment patterns in NAFO assessed stocks. Preliminary results seem to suggest that reduced recruitment has been occurring in recent years across many stocks including the three mentioned in the request.

In order to assess the potential importance of changes in recruitment patterns, SC will continue work after the current meeting to review the data to determine the magnitude of changes in recruitment relative to historical data for the stocks of concern. SC will also investigate whether similar patterns in recruitment have been observed in other stocks on the Flemish Cap and Grand Bank to assess whether changes are widespread.

Recruitment patterns may reflect stock-specific response to local conditions (e.g. environment, predator, indirect fishery impacts) or broader regional changes in the oceanographic regimes. A better understanding of the contribution of different factors may emerge from the continued development of an ecosystem-based approach in the NRA. In order to detect persistence in low recruitment regimes, a longer period needs to be monitored.

Consideration of recruitment patterns will be included in the terms of reference for WG-ESA and STACFEN for 2017 and beyond.

ii) On the review of the NAFO Precautionary Approach Framework. (From EU: COM WP 17-31)

The review of the NAFO Precautionary Approach Framework (PAF) remains an essential exercise for a credible scientific advice. This exercise is still to be completed and considering the limited progress achieved to date, we would appreciate an explanation on the SC capacity to address this exercise together with a revised realistic timeline.

SC responded: As a result of considerable workloads, Scientific Council was unable to make significant progress on its assessment of the PA Framework in 2017, 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.

A large contribution to the existing PAF working group is being made by retired scientists. With the current capacity available SC will not be able to complete this work.

Assuming that additional capacity is made available to this group, its priority task will be to determine the time line. A major problem is the definition of F reference points. This should be addressed in a workshop, which will require additional capacity including expertise from all the contracting parties. The working group will also reach out to experts outside NAFO with expertise in the PA. Some of the terms of reference will require input of managers, maybe through WG-RBMS on the determination of acceptable risk levels.

iii) (From the Russian Federation: COM Working Paper 17-32)

In light of the uncertainties accumulated over the recent history of 3M Cod assessments and of the severity of possible consequences for the fisheries industry resulting from reducing the TAC, the Scientific Council is requested:

1. *to review the preliminary results from the 2017 Flemish Cap survey regarding the indices of 3M cod abundance and biomass to validate the recent trends in stock dynamics;*

SC responded: The 2017 Flemish Cap survey information is not available to the Scientific Council at this time.

2. *to evaluate CPUE and utilization of the TAC for the 3M cod fishery over the recent years to determine if these parameters indicate any kind of growth or decline;*

SC responded: Scientific Council does not routinely compile commercial CPUE information for this stock as, on the basis of information for other stocks in this region, commercial nominal CPUE is not considered to be a reliable indicator of stock size. Directed effort is not reported by fishery and may be difficult to determine. SC still considers the 2017 assessment to be the best source of information on stock size and the advice given in June still applies regardless of the technical issues that will be explored in the 2018 benchmark assessment of this stock.

3. *to estimate a possible role of cod cannibalism as the reason behind the decline in 3M cod recruitment, given that under the recent assessment, the relatively high biomass is accompanied by a decline in abundance which may be indicative of the prevalence of older year-classes*.

SC responded: Cannibalism is a known phenomenon in cod and is one of a multitude of factors impacting recruitment success. However, estimating the impact of cannibalism on current recruitment levels is not possible during the current meeting. Based on work done under the GADCAP project (SCR 16/35), and considering recent decreases in recruitment of 3M redfish and low biomass of 3M shrimp, it is possible that the rate of cannibalism may have increased.

VI. MEETING REPORTS

1. Joint Commission – Scientific Council Working Group on the Ecosystem Approach Framework to Fisheries Management (WG-EAFFM)

This joint working group met at the NAFO Secretariat, Dartmouth, Nova Scotia, Canada during 14th July, 2017 and was chaired by Andrew Kenny (EU-United Kingdom). The Scientific Council was advised of progress of this group by the Chair in his presentation of the report to the joint session of Commission and Scientific Council.

2. Joint Commission–Scientific Council Working Group on Risk-based Management Strategies (WG-RBMS)

This joint working group held four meetings in 2017: 7-9 February (FC-SC Doc. 17-02), 25-27 April (FC-SC Doc. 17-03), 11-13 July (COM-SC Doc. 17-06) and 15-17 September (COM-SC doc 17-11). All were co-chaired by Jacqueline Perry (Canada) and Carsten Hvingel (Norway) except the April meeting, where Katherine Sosebee (USA) stood in as acting Chair. The Scientific Council was advised of progress in this group by Dr. Hvingel in his presentation of the report to the joint session of Commission and Scientific Council.

3. Joint Commission–Scientific Council Working Group on Catch Reporting (WG-CR) and Catch Data Advisory Group (CDAG).

WG-CR met during 06 February 2017, and was chaired by SC Chair Katherine Sosebee (USA) (FC-SC Doc. 17-01). CDAG held follow-up meetings through video tele-conference (WebEx) on 20 April, 18 May and 24 August 2017 (Com-SC Doc. 17-08). The Scientific Council was advised of progress in this group by the Chair in her presentation of the report to the joint session of Commission and Scientific Council.

VII. SPECIAL SESSIONS

Scientific Council noted the intent to hold meetings on the review of the PA framework and the benchmark of 3M cod in 2018. This was highlighted in the presentation of the SC budget and an additional $35 000 has been added to the budget in 2018 to ensure resources are available to support participation.

VIII. REVIEW OF FUTURE MEETING ARRANGEMENTS

1. Scientific Council (in conjunction with NIPAG), 27 Sept to 4 Oct 2017,

The next Scientific Council shrimp meeting is scheduled to meet in Lysekil, Sweden during Sept 27 to Oct 4, 2017.

2. Scientific Council, 1 – 14 June 2018

Scientific Council agreed that its June meeting will be held on 1 – 14 June 2018, at St Mary's University, Halifax, Nova Scotia, Canada.

3. 3M Cod benchmark meeting, 9-13 April 2018

The 3M cod benchmark meeting will be held in IPMA, Lisbon, Portugal during 9-13 April 2018. Discussions on planning elements were held, particularly on the external invited reviewers that would be approached given the additional budget allocation to support this item. An ad-hoc planning group consisting of R. Alpoim (EU), T. Blasdale (NAFO Secretariat), F. González-Costas (EU), D. González-Troncoso (EU), and Brian Healey (Canada, incoming SC Chair) will meet by correspondence and WebEx as required to continue with planning meeting logistics.

4. Scientific Council, 17-21 September 2018,

The 2018 NAFO Annual Meeting is scheduled to take place in Tallinn, Estonia during 17-21 September 2018.

5. NAFO/ICES Joint Groups

a) WG-DEC, 5-9 March 2018.

The next meeting of the ICES–NAFO Working Group on Deepwater Ecosystems is scheduled to take place at the NAFO Secretariat, Dartmouth, Nova Scotia, Canada, during 5-9 March 2018.

b) NIPAG, 27 Sept – 4 Oct 2017

The next meeting of the NAFO/ ICES *Pandalus* Assessment Group will be held 27 Sept – 4 Oct, 2017 in Lysekil, Sweden.

6. NAFO SC Working Groups

a) WG-ESA, 7- 16 Nov, 2017

The Working Group on Ecosystem Science and Assessment (WG-ESA) will meet at the NAFO Secretariat, Dartmouth, Nova Scotia, Canada, 7-16 November, 2018.

IX. OTHER MATTERS

1. Matters raised in the Commission-SC joint sessions.

SC management advice and responses to special requests, the report of the Working Group on Risk Based Management Strategies (WG-RBMS) and that of the Working Group on the Ecosystem Approach Framework to Fisheries Management, (WG-EAFFM) were presented by the SC Chair and the co-Chair of WG-EAFFM respectively during a joint session with the Commission on 19 September. A second joint session was held on 21 September where SC Responses to feedback questions from the Commission regarding its scientific advice (COM-WP 17-33) and matters relating to the future operation of the SC and its interaction with the Commission were discussed.

The SC chair raised the issue of scientific capacity and the need for greater participation in SC, particularly in support of the ongoing review of the Precautionary Approach Framework but also in relation to the SC's work more generally. She also highlighted that several of the SC and its subsidiary bodies currently have unfilled vacancies for two key roles: the vice-Chair of SC (also serves as chair of STACREC), and the STACFEN chair. The Chair and members of SC pointed out that the SC had experienced some difficulty meeting its work commitments in 2016/17, particularly in relation to the large amount of extra work created by the Greenland halibut MSE, that a similar expanded workload is expected over the coming years, particularly if benchmark assessments become an additional annual meeting of the Council. Thus, an appropriate commitment of

resources from Contracting Parties will be required in order to meet these requirements. Additionally, the chair of WG-EAFFM further highlighted the great need for ecosystem modelling expertise to support the development of the ecosystem approach roadmap.

Canada, EU and the USA all acknowledged that the increasing complexity of the work carried out by SC and the additional matters for which advice has been requested make it important for Contracting Parties to support the SC, not just to increase the numbers of scientists but also to ensure the appropriate expertise. EU stated that they are committed to providing expertise to SC and funding part of its work and, recognizing their responsibility to provide people to act as Chairs, they hope to make a positive announcement shortly after the close of the current meeting.

Norway raised the timing of the Cod benchmark, pointing out that the benchmark meeting coincides with ICES Arctic Fisheries WG. SC members acknowledged this but stated out that it is virtually impossible to identify a time in the spring that doesn't have multiple meetings ongoing which SC members are required to prepare for, and subsequently participate in. Relatively few SC members attend the Arctic Fisheries WG compared with other ICES stock assessment groups so the timing of the 3M cod benchmark was unchanged.

2. Greenland Halibut MSE

Following the June 2017 SC meeting, issues were discovered in the computer code used to produce some of the SCAA results considered at that meeting. Consequently, SC members expressed concerns that decisions taken by the SC regarding the selection of trials to go forward may have been unsound.

Following the June meeting, the SC executive met to discuss this issue and agreed that the following questions would need to be addressed by the model developers in order to ensure the continued reliability of the SCAA-based decision making for the July RBMS meeting:

1. Are CMPs considered to be no longer required during testing in June still not required given these changes?
2. Are any of the CMPs included on the 'final list' by SC in June now no longer required? Is it possible that some of these cases have outcomes that fail on key performance statistics?
3. Related to both 1 & 2: in many cases, alpha parameter tunings in the target-based rule were chosen to have stock size at the MSY level. Presumably given the change in start point, many of these alpha parameters will now differ. Does this matter?

These questions were not fully addressed during the short time interval between the SC June meeting and the July RBMS meeting, and consequently, the July RBMS meeting agreed that any decisions made at that meeting would be considered to be conditional upon the SC receiving adequate demonstration that the coding error did not have an impact as these results formed the basis for OMs or CMP selection. SC did not subsequently have the opportunity to consider the corrected model before RBMS concluded its work and delivered its advice to the Commission in September. Several SC members considered that the SC endorsement of the advice of WG-RBMS was contingent on the coding error issue being adequately addressed and documented during the September SC meeting.

The SCAA model developer (Doug Butterworth, Japan) advised the July RBMS meeting, based on results set out in a WP tabled at that meeting, that the basic behaviour of the robustness tests is pretty much unchanged. Essentially the only ones that alter performance appreciably are the TAC overrun, the large σ_R and particularly the eight years poor recruitment scenarios. As far as the tuning alpha values are concerned, they are primarily not a concern in themselves, because the CMPs need to be judged on their performance in the trials, not on their construction. Although values for specific tests have changed given the OM updates, the range of values under the corrected model is broadly similar to that for the evaluations presented at the June SC meeting. Having explored CMP control parameter space quite widely, covering the range specified in the July RBMS meeting, the model developers consider that the options presented are sufficiently broad to allow an informed selection within a wide range of potential final MPs by the RBMS, as well as to characterise CMP performance as a function of key control parameter values. The results in the WP were subsequently incorporated in a revised version of an SCR document (SCR Doc. 17-026REV: see Footnote 1 and Appendix H).

3. Awards of scientific merit

NAFO Scientific Merit Award –Mr. Don Power

Scientific Council was pleased to present a merit award to Mr. Don Power (Canada) to acknowledge and celebrate his extensive contributions to SC over his career.

Don served the SC in numerous capacities, including as a Designated Expert for multiple stocks, most notably contributing to the assessments of Redfish stocks over three decades. Don has provided exceptional leadership to SC as chair of the SC subcommittees STACREC (1996-1997) and STACFIS (2006-2007). Finally, during 2008 & 2009, Don effectively fulfilled the role of the chair of the Scientific Council.

In addition to his contributions to SC, Don has provided outstanding service to a multitude of FC-SC working groups. He has helped 'bridge the gap' between managers and scientists within NAFO, leading to a more productive working environment. One of Don's hallmark traits was to preserve the integrity and high standards of the work of Scientific Council. Another one of Don's strengths was his considerable attention to detail when drafting and debating advice from SC. His colleagues will aim to uphold Don's high standards and will miss his helpful presence. Members of the SC congratulated Don on his pending retirement, with best wishes for the future.

Award to the Outgoing Chair—Ms. Katherine Sosebee

On behalf of Scientific Council, the Vice-Chair, Brian Healey (Canada), thanked the Chair, Katherine Sosebee (USA) for her leadership as chair of STACREC and SC Vice-Chair (2014 - 2015) and Chair of Scientific Council (2016 – 2017) and for particularly representing the Council at an exceptional number of meetings during 2017. Kathy was presented with a certificate in recognition of her contributions and Council members expressed their gratitude for her guidance**.**

4. New England Seamount Chain

The 2017 meeting of WG-EAFFM recommended: *Scientific Council in its September meeting should provide advice on refined boundaries to encompass seamounts at depth less than 2000m identified in the New England seamount chain taking into account that the current proposed boundary includes large areas that do not contain seamounts* (Com-SC Doc. 17-07).

In considering the redesign of the existing New England seamount chain SC recognized the following ecological characteristics as important:

1. *Connectivity of species across seamounts*

   Differences in the connectivity of faunal populations among seamounts is almost certainly an important determinant of community composition, a potential driver of uniqueness, and a major consideration for the management of seamount ecosystems.

   Clark et al. (2010) recognized the following processes as particularly important: (1) physical ocean structure (for example hydrographic retention, large-scale and local ocean currents), (2) factors influencing larval development time and pelagic larval duration (for example temperature, food availability, predation), (3) habitat availability for larval settlement, and (4) post-settlement survival; with interactions thereof driving variations in the dispersal capabilities of fauna among seamounts.

2. *Ecological integrity and function of seamounts as whole features, not just habitat at fishable depths*

At macro-ecological scales, the fauna of individual seamounts have been found to broadly reflect the species pools present on neighboring seamounts and continental margins (Clark et al. 2010) at comparable depths. Benthic communities associated with seamounts have been shown to vary with depth (Lundsten *et al*., 2009), are linked tropically, with very deep seamount slopes being distinct from abyssal plain and the shallower slopes of seamounts (Baco, 2007).

Accordingly, the redesigned seamount closure proposed here by SC includes all seamounts at fishable depths whilst recognizing the need to include the seamount chain as a whole in sustaining the biological connectivity and function of seamount fauna at all depths. It is also noteworthy that the overall area of the proposed seamount closure is 178 535 km^2, compared to the original closure area of 275 225 km^2. Boundaries intersecting the US EEZ were adjusted to meet those of the US closure to provide continuity across the chain of seamounts (Fig. 1).

References

Clark, M.R., Rowden, A.A., Schlacher, T., *et al*. (2010). The ecology of seamounts: structure, function, and human impacts. *Annual Review of Marine Science* 2, 253–278.

Lundsten, L., Barry, J.P., Caillet, G.M., et al. (2009). Benthic invertebrate communities on three seamounts off southern and central California, USA. Marine Ecology Progress Series 374, 23–32.

Baco, A.R. (2007). Exploration for deep-sea corals on North Pacific seamounts and islands. Oceanography 20, 109–117.

Closure coordinates

	USA Canada proposal		SC Recommendation	
1	39°0’0.0 N	66° 45' 36.0" W	38°51'54.0" N	66°55'51.6"W
2	37° 12' 0.0" N	60° 48' 0.0" W	37°12'0.0" N	60°48'0.0" W
3	35° 0' 0.0" N	58° 30' 0.0" W	35'0'0.0" N	59°0'0.0" W
4	35° 0' 0.0" N	57° 0' 0.0" W	35°0'0.0" N	56°30'0.0" W
5	36° 48' 0.0" N	57° 48' 0.0" W	36°48'0.0"N	57°48'0.0" W
6	39° 0' 0.0" N	60° 0' 0.0" W	39°0'0.0" N	60°0'0.0" W
7	39° 18' 0.0" N	61° 30' 0.0" W	39°18'0.0" N	61°30'0.0" W
8	39° 51' 7.2" N	66° 0' 0.0" W	39°56'20.4" N	65°56'34.8" W

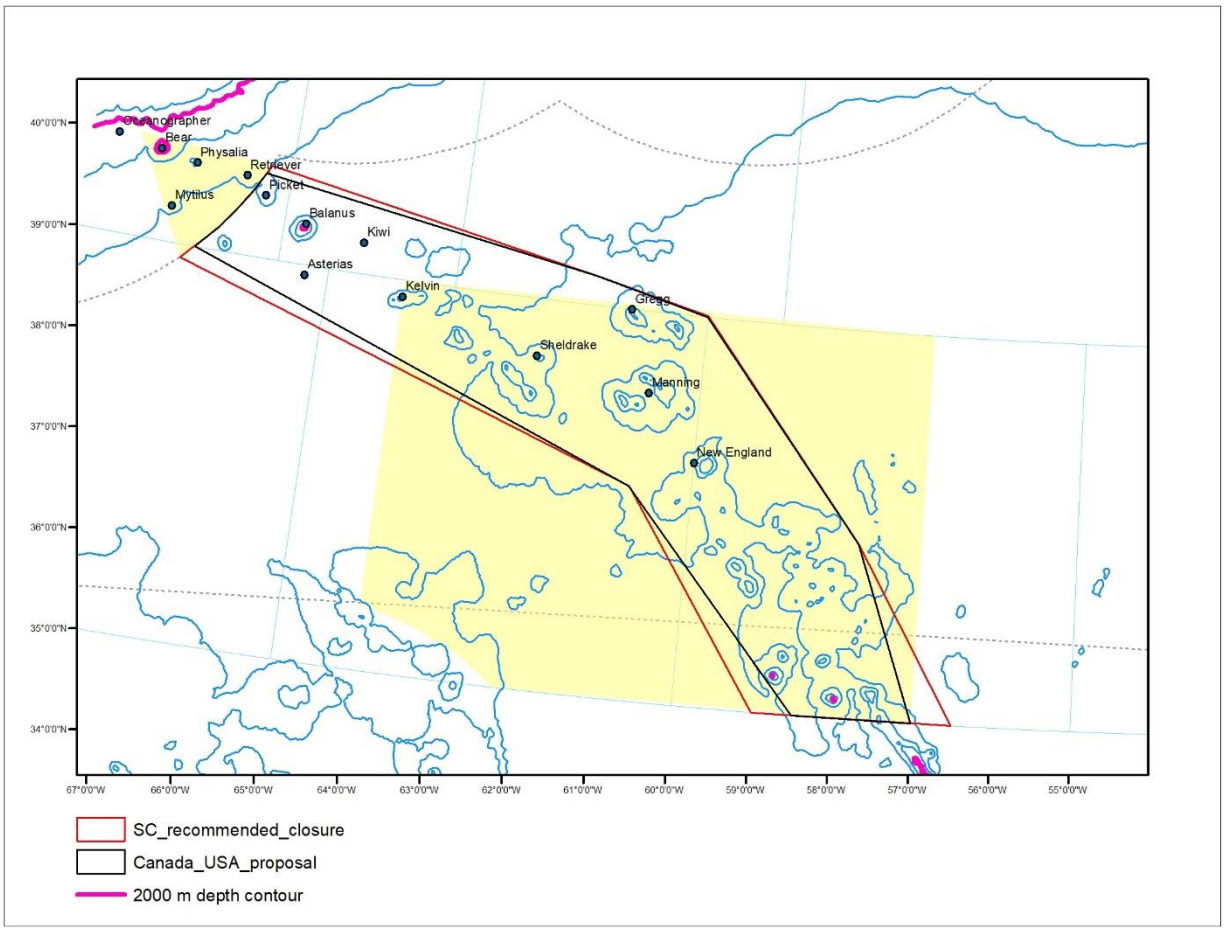

Fig. 1. SC recommendation and Canada/USA proposal for a closure to bottom fisheries to protect VMEs in the New England Seamount chain

X. ADOPTION OF REPORTS

1. Committee Reports of STACREC and STACFIS

The Council reviewed and adopted the Reports of the Standing Committees (STACREC and STACFIS).

2. Report of Scientific Council

The Council at its concluding session on 22 September 2017 considered and adopted its own report, with the usual caveat that there will be minor corrections.

XI. ADJOURNMENT

There being no other business, the meeting was adjourned at 11:00 hours on 22 September 2017. The Chair thanked the Scientific Council Coordinator for his support. The Chair thanked Canada for their hospitality in hosting the Annual Meeting. Finally, the chair thanked the members of Scientific Council for their hard work and wished everyone a safe journey home.

APPENDIX I. REPORT OF STANDING COMMITTEE ON RESEARCH COORDINATION (STACREC)

Chair: Brian Healey Rapporteur: Tom Blasdale

1. Opening

The Committee met at the Marriott Château Champlain, Montréal, Canada during 18-21 September 2017, to consider the various matters in its agenda. Representatives attended from Canada, Cuba, European Union (Estonia, European Commission, France, Portugal, Spain, and the United Kingdom), France (with respect to St. Pierre et Miquelon), Japan, Norway, the Russian Federation and the United States of America. The Scientific Council Coordinator was in attendance. The Chair opened the meeting and welcomed everyone. Tom Blasdale was appointed the Rapporteur.

2. Fisheries Statistics

a) Review of STATLANT 21

i) Submission of data

The following table updates the situation with the submission of STATLANT. There are still a few outstanding submissions but in general the submission rate is acceptable.

Table 1. Dates of receipt of STATLANT 21A and 21B reports for 2014-2016 up to September 2016

Country/component	STATLANT 21A (deadline, 1 May)			STATLANT 21B (deadline, 31 August)		
	2014	2015	2016	2014	2015	2016
CAN-CA	24 Apr 15	4 May 16	30 May 17	24 Apr 15	4 May 16	30 May 17
CAN-SF	1 Jun 15	31 May 16	28 Apr 17	31Aug 15	30 Aug 16	31 Aug 17
CAN-G	14 May 15	18 May 16	26 May 17	4 Sep 15	30 Aug 16	16 Aug 17
CAN-NL	25 May 15	21 Apr 16	26 Apr 17		29 Aug 16	31 Aug 17
CAN-Q						
CUB						
EU/BUL						
EU/EST	28 Apr-15	20 Apr 16	22 May 17	14 Aug 15	23 Aug 16	30 Aug 17
EU/DNK	21 May 15		23 May 17	4 Sep 15	15 Jun 16	7 Sep 17
EU/FRA						
EU/DEU	29 Apr 15	28 Apr 16	25 Apr 17	4 Sep 15	29 Aug 16	31 Aug 17
EU/LVA	21 Apr 15	10 Mar 16	20 Apr 17			
EU/LTU	21 May 15		9 May 17			9 May 17
EU/POL	1 Jun 15			21 Sep 15		
EU/PRT	8 May 15	26 Apr 16	19 Apr 17	3 Sep 15	23 Aug 16	28 Aug 17
EU/ESP	21 May 15	5 May 16	31 May 17	7 Sep 15	5 Aug 16	7 Sep 17
EU/GBR			25 Apr 17			6 Sep17
FRO	*	26 May 16	2 May 17	7 Jul 15	1 Jun 16	2 May 17
GRL	15 May 15	30 Apr 16	1 May 17	1 Sep 15	30 Aug 16	28 Aug 17
ISL	15 May 15					
JPN			19 Apr 17			30 Aug 17
KOR						
NOR	7 May 15	26 Apr 16	4 May 17	17 Mar 16	29 Aug 16	25 Aug 17
RUS	21 Apr 15	20 May 16	11 May 17	2 Jul 15	1 Sep 16	21 Jul 17
USA	22 May 15	19 Jul 16				
FRA-SP	20 Apr 15	25 Apr 16	25 May 17	6 Jul 15	8 Jun 16	25 May 17
UKR						

3. Research Activities

No new information on surveys was presented.

a) Surveys Planned for 2017 and early 2018

Designated Experts were requested to check and update the information contained in SCS Doc. 17/14.

4. Review of SCR and SCS Documents

There were no documents presented.

5. Review of Recommendations from Previous Meetings

a) Benchmark reviewers.

During the June 2017 meeting, STACREC proposed Terms of Reference for external review of NAFO SC Stock Assessments, and **recommended** that *SC endorse this change to existing working procedure and seek funds required (travel and/or stipend depending on review type) to allow an external review to commence in advance of the June 2017* STACREC 01 – 15 June 2017 68 *meeting. Terms of Reference for this review, as well as a list of which stocks should be reviewed and the process whereby reviewers will be selected will be considered by SC at its September 2017 meeting*.

Following the process proposed during the June 2017 meeting, SC discussed potential nominees to be external reviewers for the 3M Cod Benchmark meeting. SC has requested funding to support three external reviewers to contribute to this meeting. Final decisions on reviewers to participate will be made by the SC Chair in consultation with an ad-hoc committee planning the work for the Benchmark.

b) Online NAFO 21A extraction tool.

The SC has previously **recommended** that clarification should be added to the NAFO 21A data extraction tool webpage to note that other catch time-series are used for some stock assessments. The SC Chair will discuss the issue with the NAFO Executive Secretary and the Commission chair to request adding this note of clarification to the 21A webpage.

c) Tagging.

In 2015, STACREC **recommended** that *the NAFO Secretariat develop a framework for communicating tagging study information to vessels from Contracting Parties and Coastal States fishing in the Convention Area (e.g., via a link to this information on the NAFO website homepage.* The Secretariat has made some progress in planning a dedicated web page, however, due to high workload, this recommendation was not addressed in June 2017,

STACREC chair held informal discussions with chair of STACTIC discussing the potential of providing information on research programs which rely on commercial (including mark-recapture studies) – and it was **recommended** that *intercessional discussion will continue to determine a suitable method to notify fishing fleets of such research activities.*

6. Other Business

STACREC discussed possibilities for combining multiple surveys in different areas and at different times of the year to produce aggregate indices. It was agreed that intersessionally and in next year's meetings, SC members will investigate combined surveys in operation elsewhere (eg. ICES International Bottom Trawl Survey (IBTS)). Joël Vigneau will investigate the possibility of an invited speaker with expertise in IBTS coming to STACFIS in 2018.

7. Adjournment

The report was reviewed and the meeting was adjourned at 14:30 on 21 September 2017.

APPENDIX II. REPORT OF STANDING COMMITTEE ON FISHERIES SCIENCE (STACFIS)

Chair: Joël Vigneau Rapporteur: Tom Blasdale

1. Opening

The Committee met at the Marriott Château Champlain, Montréal, Canada during 18-21 September 2017, to consider the various matters in its agenda. Representatives attended from Canada, Cuba, European Union (Estonia, European Commission, France, Portugal, Spain, and the United Kingdom), France (with respect to St. Pierre et Miquelon), Japan, Norway, the Russian Federation and the United States of America. The Scientific Council Coordinator was in attendance.

2. Nomination of Designated Experts

As the incoming chair of STACFIS, it will be necessary for Karen Dwyer to stand down as the designated expert for 3LNO American plaice. Participants from Canada indicated there would be another nominee provided but the new designated Expert for this stock has not yet been confirmed.

3. Matters Deferred from the June 2017 meeting

a) FIRMS Classification for NAFO Stocks

STACFIS reiterates that the Stock Classification system is not intended as a means to convey the scientific advice to the Commission, and should not be used as such. Its purpose is to respond to a request by FIRMS to provide such a classification for their purposes. The category choices do not fully describe the status of some stocks. Scientific advice to the Commission is to be found in the Scientific Council report in the summary sheet for each stock.

Stock Size (incl. structure)	Fishing Mortality			
	None–Low	Moderate	High	Unknown
Virgin–Large	3LNO Yellowtail Flounder 3LN Redfish			
Intermediate	3M Redfish[3] 3NO Witch flounder	SA0+1 Northern shrimp[1] DS Northern shrimp[1] 0&1A Offshore. & 1B–1F Greenland halibut SA2+3KLMNO Greenland halibut	3M Cod	Greenland halibut in Uummannaq[2] Greenland halibut in Upernavik[2] Greenland halibut in Disko Bay[2] SA1 American Plaice SA1 Spotted Wolffish
Small	SA3+4 Northern shortfin squid 3NOPs White hake			3LNOPs Thorny skate
Depleted	3M American plaice 3LNO American plaice 2J3KL Witch flounder 3NO Cod 3M Northern shrimp[1,3] 3LNO Northern shrimp[1,3]			SA1 Redfish SA0+1 Roundnose grenadier SA1 Atlantic Wolffish
Unknown	SA2+3 Roughhead grenadier 3NO Capelin 3O Redfish			SA2+3 Roundnose grenadier

[1] Shrimp will be re-assessed at the SC shrimp meeting in September 2017
[2] Assessed as Greenland halibut in Div. 1A inshore
[3] Fishing mortality may not be the main driver of biomass for Div. 3M Shrimp and Redfish

Greenland halibut catch advice for 2018.

Given that the MSE for Greenland halibut was agreed by RBMS and the commission, no further work was necessary on single year advice for Greenland halibut.

4. Other Matters

a) Review of SCR and SCS Documents

SCR Doc. 17-066 on medium term projections for 3M redfish was submitted by Antonio Avila de Melo (Portugal).

Benchmark assessment for 3M cod

The NAFO Joint Fisheries Commission–Scientific Council Working Group on Risk-Based Management Strategies (FC-SC WG-RBMS) 2017 February meeting developed a detailed work plan for full benchmark assessment of this stock. It was noted that the work plan was designed to interrelate the different processes related to the management of this stock:

1) the FC Request to SC to organize a full benchmark assessment,
2) Management Strategy Evaluation,
3) potential revision of the Flim value, and
4) the NAFO PA Framework revision which is currently under discussion. The tentative timeline for the NAFO 3M Cod Benchmark and the NAFO 3M Cod MSE proposed by the FC-SC WG-RBMS was endorsed by the SC.

SC notes that in order for the benchmark to proceed, CPs must contribute scientific experts in relevant fields and must participate in the benchmark process as outlined in the calendar.

NAFO 3M Cod Benchmark calendar

1) The Scientific Council (SC), in **June 2016**, approved the main assessment issues to be revised during the 3M Benchmark (NAFO SCS Doc. 16-14). Among those issues, there is the FC request to the SC (request number 8, SC SCS Doc16/01) that the SC should, in 2016, *analyse whether the current F_{lim} value for 3M cod is currently underestimated and to revise, if required, the relevant fishing mortality and biomass reference points appropriately*. Both RBMS WG and SC agree that the best forum to carry out the F_{lim} review is the benchmark process, so this task will be undertaken during that process.
2) **Before the end of 2017** all data needed for the NAFO 3M Cod assessment will be reviewed and compiled.
3) **Between June 2017 and March 2018** different teams of SC scientists will be working on the issues identified in the 2016 June SC meeting.
4) **The benchmark will be carried out in April 2018**. This may involve SC and external scientists.
5) The **June 2018** SC meeting will carry out a new assessment taking into account the Benchmark conclusions. This assessment would inform the TAC decision for 2019 because the MSE may not be finalised before September 2018 (see next section below - "NAFO 3M Cod MSE calendar").

NAFO 3M Cod MSE calendar

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

1) In June 2018 a new 3M Cod assessment will be issued, according with the benchmark outputs as well as the reference points arising from any revisions of the PAF.
2) In August 2018, during the RBMS meeting, candidate management procedures (CMP) will be developed, management objectives finalized and performance statistics developed.

3) Between September 2018 and early 2019 different CMPs will be tested in order to see if they reach the established management objectives.

4) RBMS meeting in **early 2019** will review the results of the robustness tests.

5) **By June 2019** the RBMS WG and SC may revise the 3M Cod MSE to enable the proposal of a management procedure. This management procedure may be submitted for approval to the Commission in September, 2019.

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

SC endorsed the FC-SC WG-RBMS proposed calendar for the 3M cod benchmark with minor changes and discussed a plan for the benchmark process at NAFO.

SC also discussed the main points to be revised during the benchmark:

Assessment of Input Data:

- Ageing and Age/Length Keys (ALKs): investigate inconsistencies in age readings between readers and institutes. This investigation should include an exchange of otoliths.
- Analyse the variability in the biological parameters (i.e. age at maturity, mean weights, etc.) observed in recent years.

Assessment models:

- explore the robustness of the current model
- Explore alternative assessment models including multi species models.

Model parameters:

- Explore the possibility of expanding the current plus group.
- Explore the possibility of changing the priors of the current assessment.
- Explore alternative values/priors on natural mortality

The 3M cod benchmark will take place 9 to 13 April 2018 in IPMA Lisbon (Portugal). It is proposed that three external experts should be invited (subject to availability of funding). It is expected that the meeting will be chaired by the SC chair (to be confirmed).

b) Update on stock status of Northern (NAFO Divs. 2J+3KL) Cod

The Science Response Report of Northern Cod (2017) from Fisheries and Oceans Canada was presented to Scientific Council for information. This stock was last fully assessed in 2016 and an update of key indices was prepared in 2017.

In 2016, a new state-space population dynamics model (Northern Cod Assessment Model, NCAM) was used to assess Northern cod (Div. 2J3KL) which integrates much of the existing information about the productivity of the stock (DFO, 2016). The model integrates information from DFO research vessel (RV) autumn trawl surveys, Sentinel surveys, inshore acoustic surveys, fishery catch age compositions, and partial fishery landings, and tagging. The 2016 assessment indicated that spawning stock biomass (SSB) has increased from 25 Kt in 2005 to 300 Kt in 2015. Recruitment (age 2) improved slightly in the last decade and the average number of age 2s from the 2011-2013 year classes corresponds to about 25% of the numbers of age 2s observed in year classes of the 1980s. Stock status is improving, increasing from 3% of B_{lim} in 2005 to 34% of B_{lim} in 2015, but SSB has been well below the critical zone since the stock collapse.

In 2017, some key metrics were updated indicating that the Canadian fall biomass index increased by 7% from 2015. Sentinel survey values indicated a decline from the high level of 2014 but still was well above the long term average. Total reported landings in 2016 were 10,164 t compared with 4,435 t in 2015 (>95% from the inshore stewardship fishery). There are no requirements to report recreational fishery landings. However, tagging data were also used to provide an estimate of the magnitude of the recreational fishery. Recreational catch based on tagging returns has been estimated at 30% of the stewardship fishery landings during 2006-

2016; therefore, total catch in 2016 was estimated at about 13, 164 t. Exploitation rate estimated from tagging was 4.4% in 2016.

A full assessment of Northern cod is planned in 2018 and results will be presented to SC during its June 2018 meeting for consideration.

SC *endorsed* the conclusions of the assessment results but given the resource status expressed concern about increases in catch from 2015 to 2016 while the fishery is under moratorium.

5. 2018 Invited Speaker

Funds are available to support the attendance of an invited speaker at the June 2018 STACFIS meeting. The STACFIS chair will endeavor to identify an appropriate speaker at the earliest opportunity to ensure their availability. It was agreed that an expert in combined surveys (eg. IBTS) should be considered.

6. Adjournment

The meeting was adjourned on 21 September 2017.

APPENDIX III. SCIENTIFIC COUNCIL AGENDA, SEPTEMBER 2017

Provisional Agenda
Scientific Council

I. Plenary Session

1. Opening
2. Appointment of Rapporteur
3. Adoption of Agenda
4. Plan of Work
   a) Joint FC – SC Session

II. Review of Scientific Council Recommendations

III. Research Coordination

1. Opening
2. Fisheries Statistics
   a) Progress Reports on Secretariat Activities
   b) Review of STATLANT21
3. Research Activities
   a) Surveys Planned for 2017 and 2018
4. Other Matters
   a) Review of SCR and SCS Documents
   b) Review of Survey SCS Document
   c) Other Business

IV. Fisheries Science

1. Opening
2. Nomination of Designated Experts
3. Other Matters
   a) Review of SCR and SCS Documents
   b) Assessments from the June meeting
   c) Other Business

V. Requests from the Fisheries Commission

1. Requests/advice deferred from the June Meeting
   a) Scientific Council budget for 2018
   b) Requests arising from Working Groups in 2017
2. *Ad hoc* Requests from Current Meeting

VI. Meeting Reports

1. Report of the NAFO *Ad Hoc* Working Group on Bycatches, Discards and Selectivity (WG-BDS), July 2017
2. Report of the NAFO Joint Commission-Scientific Council Working Group on Risk-Based Management Strategies (WG-RBMS), February, April, and July 2017
3. Report of the NAFO Joint Commission-Scientific Council Working Group on the Ecosystem Framework for Fisheries Management (WG-EAFFM), July 2017
4. Reports of the Joint Commission–Scientific Council *Ad hoc* Working Group on Catch Reporting (WG-CR) and of the Catch Data Advisory Group (CDAG), February and May 2017

VII. Review of Future Meeting Arrangements

VIII. Future Special Sessions

1. Discussion of proposed topics

IX. Other Matters

1. Timeline for the PA framework review
2. Preparations for 3M cod benchmark

3. Scheduling benchmarks

X. Adoption of Reports

1. Committee Reports of STACFIS and STACREC
2. Report of Scientific Council

XI. Adjournment

ANNEX 1. FISHERIES COMMISSION'S REQUEST FOR SCIENTIFIC ADVICE ON MANAGEMENT IN 2018 AND BEYOND OF CERTAIN STOCKS IN SUBAREAS 2, 3 AND 4 AND OTHER MATTERS

1. The Fisheries 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
Northern shrimp in Div. 3LNO	American plaice in Div. 3LNO	American plaice in Div. 3M
Cod in Div. 3M	Redfish in Div. 3M	Capelin in Div. 3NO
	Northern shrimp in Div. 3M	Cod in Div. 3NO
	Thorny skate in Div. 3LNO	Northern shortfin squid in SA 3+4
	White hake in Div. 3NO	Redfish in Div. 3O
	Witch flounder in Div. 3NO	Witch flounder in Div. 2J+3KL
		Yellowtail flounder in Div. 3LNO

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

In 2017, advice should be provided for 2018 for Northern shrimp in NAFO Div. 3LNO and Cod in Div 3M*.

In 2017, advice should be provided for 2018 and 2019 for Redfish in 3M, Witch flounder in 3NO, Shrimp in 3M, and white hake in 3NO.

In 2017, advice should be provided for 2018, 2019 and 2020 for Cod in 3NO, American plaice in Div. 3M

Advice should be provided using the guidance provided in **Annexes A or B as appropriate**, or using the predetermined Harvest Control Rules in the cases where they exist.

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

2. The Fisheries Commission requests the Scientific Council to implement the steps of the work plan relevant to the SC for progression of the Greenland halibut Management Strategy Evaluation Review (FC Working Paper 16-11 Rev. 2 adopted at the NAFO 2017 annual meeting).
3. The Fisheries Commission requests that the Scientific Council continue its risk assessment of scientific trawl surveys impact on VME in closed areas, and the effect of excluding surveys from these areas on stock assessments.
4. The Fisheries Commission requests the Scientific Council, based on analysis of the 2016 haul by haul data and patterns of fishing activity, to examine relative levels of by-catch and discards of 3M cod/redfish, and stocks under moratoria in the different circumstances (e.g. fisheries areas, season, fleets, depths, timing).
5. The stock of redfish 3M covers catches of three Sebastes species and the scientific advice is based on data of only two species (*S. mentella* and *S. fasciatus*). Golden redfish, *Sebastes marinus* (a.k.a. *S. norvegicus*), represents part of the catch but has not yet been subject to a full assessment in NAFO. The Scientific Council is requested to conduct a full assessment on 3M golden redfish in June 2017. The Scientific Council is also requested to advice on the implications for the three species in terms of catch reporting and stock management.
6. In relation to the assessment of NAFO bottom fisheries, the Fisheries Commission endorsed the next re-assessment in 2021 and that the Scientific Council should:

- Assess the overlap of NAFO fisheries with VME to evaluate fishery specific impacts in addition to the cumulative impacts;
- Consider clearer objective ranking processes and options for objective weighting criteria for the overall assessment of risk;
- Maintain efforts to assess all of the six FAO criteria (Article 18 of the FAO International Guidelines for the Management of Deep Sea Fisheries in the High Seas) including the three FAO functional SAI criteria which could not be evaluated in the current assessment (recovery potential, ecosystem function alteration, and impact relative to habitat use duration of VME indicator species).
- Continue to work on non-sponge and coral VMEs (for example bryozoan and sea squirts) to prepare for the next assessment.
- The SC further develops and compile identification guides for fishes (e.g. sharks and skates) that could be provided to observers.

7. The Fisheries Commission requests the SC to continue progression on the review of the NAFO PA Framework.

8. The Fisheries Commission requests the Scientific Council, by their 2018 annual meeting engage with relevant experts as needed, review the available information on the life history, population status, and current fishing mortality of Greenland sharks (*Somniosus microcephalus*), on longevity and records of Greenland shark bycatch in NAFO fisheries, and develop advice for management, in line with the precautionary approach, for consideration by the Fisheries Commission.

9. The Fisheries Commission requests the Scientific Council start working on and finalizing by SC 2018 a strategic scientific plan based on a Strength, Weaknesses, Opportunities and Threats (SWOT) analysis defining the strategy and the mid and long-term objectives and tasks in view of NAFO's amended convention objectives. The plan should define for each strategic objective goals, tasks and measurable targets.

* *3M cod Benchmark process has been delayed at the request of the Fisheries Commission in favour of the Greenland halibut MSE work plan*

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

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

1. For stocks assessed with a production model, the advice should include updated time series of:
   - Catch and TAC of recent years
   - Catch to relative biomass
   - Relative Biomass
   - Relative Fishing mortality
   - Stock trajectory against reference points
   - And any information the Scientific Council deems appropriate.

   Stochastic short-term projections (3 years) should be performed with the following constant fishing mortality levels as appropriate:
   - For stocks opened to direct fishing: 2/3 F_{msy}, 3/4 F_{msy} 85% F_{msy}, 75% F_{2016}, F_{2016}, 125% F_{2016},
   - For stocks under a moratorium to direct fishing: F_{2016}, F = 0.

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

   Results from stochastic short-term projection should include:

   - The 10%, 50% and 90% percentiles of the yield, total biomass, spawning stock biomass and exploitable biomass for each year of the projections

   - The risks of stock population parameters increasing above or falling below available biomass and fishing mortality reference points. The table indicated below should guide the Scientific Council in presenting the short-term projections.

				Limit reference points													
				$P(F>F_{lim})$			$P(B<B_{lim})$				$P(F>F_{msy})$			$P(B<B_{msy})$			$P(B2019 > B2016)$
F in 2017 and following years*	Yield 2018 (50%)	Yield 2019 (50%)	Yield 2020 (50%)	2017	2018	2019	2017	2018	2019		2017	2018	2019	2017	2018	2019	
2/3 F_{msy}	t	t	t	%	%	%	%	%	%		%	%	%	%	%	%	%
3/4 F_{msy}	t	t	t	%	%	%	%	%	%		%	%	%	%	%	%	%
85% F_{msy}	t	t	t	%	%	%	%	%	%		%	%	%	%	%	%	%
F_{msy}	t	t	t	%	%	%	%	%	%		%	%	%	%	%	%	%
0.75 X F_{2016}	t	t	t	%	%	%	%	%	%		%	%	%	%	%	%	%
F_{2015}	t	t	t	%	%	%	%	%	%		%	%	%	%	%	%	%
1.25 X F_{2016}	t	t	t	%	%	%	%	%	%		%	%	%	%	%	%	%
F=0	t	t	t	%	%	%	%	%	%		%	%	%	%	%	%	%

2. For stock assessed with an age-structured model, information should be provided on stock size, spawning stock sizes, recruitment prospects, historical fishing mortality. Graphs and/or tables should be provided for all the following for the longest time-period possible:
   - historical yield and fishing mortality;
   - spawning stock biomass and recruitment levels;
   - Stock trajectory against reference points

   And any information the Scientific Council deems appropriate
   Stochastic short-term projections (3 years) should be performed with the following constant fishing mortality levels as appropriate:

   - For stocks opened to direct fishing: $F_{0.1}$, F_{max}, 2/3 F_{max}, 3/4 F_{max}, 85% F_{max}, 75% F_{2016}, F_{2016}, 125% F_{2016},
   - For stocks under a moratorium to direct fishing: F_{2015}, F = 0.

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

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

				Limit reference points														
				P(F.>F_{lim})			P(B<B_{lim})				P(F>F0.1)			P(F>F_{max})				P(B2019 > B2016)
F in 2017 and following years*	Yield 2018	Yield 2019	Yield 2020	2017	2018	2019	2017	2018	2019		2017	2018	2019	2017	2018	2019		
F0.1	t	t	t	%	%	%	%	%	%		%	%	%	%	%	%		%
F_{max}	t	t	t	%	%	%	%	%	%		%	%	%	%	%	%		%
66% F_{max}	t	t	t	%	%	%	%	%	%		%	%	%	%	%	%		%
75% F_{max}	t	t	t	%	%	%	%	%	%		%	%	%	%	%	%		%
85% F_{max}	t	t	t	%	%	%	%	%	%		%	%	%	%	%	%		%
0.75 X F_{2016}	t	t	t	%	%	%	%	%	%		%	%	%	%	%	%		%
F_{2015}	t	t	t	%	%	%	%	%	%		%	%	%	%	%	%		%
1.25 X F_{2016}	t	t	t	%	%	%	%	%	%		%	%	%	%	%	%		%

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

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

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

a) time trends of survey abundance estimates
b) an age or size range chosen to represent the spawning population
c) an age or size-range chosen to represent the exploited population
d) recruitment proxy or index for an age or size-range chosen to represent the recruiting population.
e) fishing mortality proxy, such as the ratio of reported commercial catches to a measure of the exploited population.
f) Stock trajectory against reference points

And any information the Scientific Council deems appropriate.

ANNEX 2. DENMARK (ON BEHALF OF GREENLAND) REQUEST FOR SCIENTIFIC ADVICE ON MANAGEMENT IN 2018 OF CERTAIN STOCKS IN SUBAREAS 0 AND 1

1. **Golden redfish, demersal deep-sea redfish, Atlantic wolffish and spotted wolfish:** Advice on golden redfish (*Sebastes marinus*), demersal deep-sea redfish (*Sebastes mentella*), Atlantic wolffish (*Anarhichas lupus*) and spotted wolffish (*Anarhichas minor*) in Subarea 1 was in 2014 given for 2015-2017. Denmark (on behalf of Greenland) requests the Scientific for advice on these species.

2. **Greenland halibut, offshore: For Greenland halibut in Subareas 0 + 1 advice was in 2016 given for 2017 and 2018.** Subject to the concurrence of Canada as regards Subareas 0 and 1, the Scientific Council is requested to continue to monitor the status, and should significant changes in the stock status be observed, the Scientific Council is requested to provide updated advice for Greenland halibut as appropriate in 1) the offshore areas of NAFO Division 0A and Division 1A plus Division 1B and 2) NAFO Division 0B plus Divisions 1C-1F. The Scientific Council is also asked to advise on any other management measures it deems appropriate to ensure the sustainability of these resources.

3. **Greenland halibut, inshore:** Advice on Greenland halibut in Division 1A inshore was in 2016 given for 2017 and 2018. Denmark (on behalf of Greenland) requests Scientific Council to continue to monitor the status, and should significant changes in the stock status be observed the Scientific Council is requested to provide updated advice for Greenland halibut as appropriate.

4. **Northern shrimp, West Greenland:** Subject to the concurrence of Canada as regards Subarea 0 and 1, Denmark (on behalf of Greenland) requests the Scientific Council before December 2017 to provide advice on the scientific basis for management of Northern shrimp (*Pandalus borealis*) in Subarea 0 and 1 in 2018 and for as many years ahead as data allows for.

5. **Northern shrimp, East Greenland:** Furthermore, the Scientific Council is in cooperation with ICES requested to provide advice on the scientific basis for management of Northern shrimp (*Pandalus borealis*) in Denmark Strait and adjacent waters east of southern Greenland in 2018 and for as many years ahead as data allows for.

ANNEX 3. REQUESTS FOR ADVICE FROM CANADA

1. **Greenland halibut (Subareas 0 and 1).** Advice on Greenland Halibut in Subareas 0 and 1 was provided in 2016 for 2017 and 2018. Therefore, Canada requests the Scientific Council to continue to monitor the status of this stock annually and, should a significant change be observed in stock status (e.g. from surveys) or in bycatches in other fisheries, provide updated advice as appropriate.

2. **Shrimp (Divisions 0A and Subarea 1).** Canada requests the Scientific Council to consider the following options in assessing and projecting future stock levels for Shrimp in Subareas 0 and 1:

The status of the stock should be determined and management options evaluated for catch options ranging from 30,000 t to the catch corresponding to Z_{MSY}, in 5,000-10,000 t increments (subject to the discretion of Scientific Council), with forecasts for the next 5 years if possible. These options should be evaluated in relation to the Northwest Atlantic Fisheries Organization Precautionary Approach Framework and presented in the form of risk analyses related to the limit reference points B_{lim} and Z_{MSY}.

Presentation of the results should include graphs and/or tables related to the following:

- historical and current yield, biomass relative to B_{MSY}, total mortality relative to Z_{MSY}, and recruitment (or proxy) levels for the longest time period possible;
- total mortality (Z) and fishable biomass for a range of projected catch options (as noted above) for the years 2018 to 2022 if possible. Projections should include both catch options and a range of effective cod predation biomass levels considered appropriate by the Scientific Council. Results should include risk analyses of falling below: B_{MSY}, 80% B_{MSY} and B_{lim}, and of exceeding Z_{MSY};
- total area fished for the longest time period possible; and
- any other graph or table the Scientific Council deems relevant.

ANNEX 4. DESIGNATED EXPERTS IN 2017

The nominated Designated Experts for 2017 are:

From the Science Branch, Northwest Atlantic Fisheries Centre, Department of Fisheries and Oceans, P. O. Box 5667, St. John's, NL, Canada A1C 5X1, Canada

Cod in Div. 3NO	Rick Rideout	Tel: +1 709-772-4935	rick.rideout@dfo-mpo.gc.ca
Redfish Div. 3O	Danny Ings	Tel: +1 709-772-4179	danny.ings@dfo-mpo.gc.ca
American Plaice in Div. 3LNO	Karen Dwyer	Tel: +1 709-772-6975	karen.dwyer@dfo-mpo.gc.ca
Witch flounder in Div. 3NO	Eugene lee	Tel: +1 709-772-6975	Eugene.lee@dfo-mpo.gc.ca
Witch flounder in Div. 2J+3KL	Dawn Maddock Parsons	Tel: +1 709-772-2495	dawn.parsons@dfo-mpo.gc.ca
Yellowtail flounder in Div. 3LNO	Dawn Maddock Parsons	Tel: +1 709-772-2495	dawn.parsons@dfo-mpo.gc.ca
Greenland halibut in SA 2+3KLMNO	Joanne Morgan	Tel: +1 709-772-2261	Joanne.morgan@dfo-mpo.gc.ca
Northern shrimp in Div. 3LNO	Katherine Skanes (acting DE)	Tel: +1 709-772-8437	Katherine.skanes@dfo-mpo.gc.ca
Thorny skate in Div. 3LNO	Mark Simpson	Tel: +1 709-772-4148	mark.r.simpson@dfo-mpo.gc.ca
White hake in Div. 3NO	Mark Simpson	Tel: +1 709-772-4148	mark.r.simpson@dfo-mpo.gc.ca

From the Instituto Español de Oceanografia, Aptdo 1552, E-36200 Vigo (Pontevedra), Spain (Fax: +34 986 49 2351)

Roughhead grenadier in SA 2+3	Fernando Gonzalez-Costas	Tel: +34 986 49 2111	fernando.gonzalez@ieo.es
Roundnose grenadier in SA 2+3	Fernando Gonzalez-Costas	Tel: +34 986 49 2111	fernando.gonzalez@ieo.es
Cod in Div. 3M	Diana Gonzalez-Troncoso	Tel: +34 986 49 2111	diana.gonzalez@ieo.es
Shrimp in Div. 3M	Jose Miguel Casas Sanchez	Tel: +34 986 49 2111	mikel.casas@ieo.es

From the Instituto Nacional de Recursos Biológicos (INRB/IPMA), Av. de Brasilia, 1449-006 Lisbon, Portugal

American plaice in Div. 3M	Ricardo Alpoim	Tel: +351 21 302 7000	ralpoim@ipma.pt
Golden redfish in Div. 3M	Ricardo Alpoim	Tel: +351 21 302 7000	ralpoim@ipma.pt
Redfish in Div. 3M	Antonio Avila de Melo	Tel: +351 21 302 7000	amelo@ipma.pt
Redfish in Div. 3LN	Antonio Avila de Melo	Tel: +351 21 302 7000	amelo@ipma.pt

From the Greenland Institute of Natural Resources, P. O. Box 570, DK-3900 Nuuk, Greenland (Fax: +299 36 1212)

Redfish in SA1	Rasmus Nygaard	Tel: +299 36 1200	rany@natur.gl
Other Finfish in SA1	Rasmus Nygaard	Tel: +299 36 1200	rany@natur.gl
Greenland halibut in Div. 1A	Rasmus Nygaard	Tel: +299 36 1200	rany@natur.gl
Northern shrimp in SA 0+1	AnnDorte Burmeister	Tel: +299 36 1200	anndorte@natur.gl
Northern shrimp in Denmark Strait	Nanette Hammeken	Tel: +299 36 1200	nanette@natur.gl

From the Danish Institute for Fisheries Research, Charlottenlund Slot, DK-2920, Charlottenlund, Denmark

Roundnose grenadier in SA 0+1	Ole Jørgensen	Tel: +45 33 96 33 00	olj@dfu.min.dk
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APPENDIX IV. LIST OF RESEARCH (SCR) AND SUMMARY (SCS) DOCUMENTS

Research Documents (SCR)

SCR Doc. No	Serial No.	Author	Title
SCR Doc. 17-066	N6749	A. Ávila de Melo	The Mterm projections from the 2017 assessment of beaked redfish (S. mentella and S. fasciatus) in NAFO Division 3M

Summary Documents (SCS)

SCS Doc. No	Serial No.	Author	Title
SCS Doc. 17-22	N6775	NAFO	Report of the Scientific Council, 18-22 September 2017
SCS Doc. 17-19	N6771	NAFO Secretariat	Available Data from the Commercial Fisheries Related to Stock Assessment (2016) and Inventory of Biological Surveys Conducted in the NAFO Area in 2016 and Biological Surveys Planned for 2017 and Early-2018

APPENDIX V. LIST OF REPRESENTATIVES, ADVISERS, EXPERTS AND OBSERVERS, 2017

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