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SCIENTIFIC COUNCIL MEETING PARTICIPANTS SEPTEMBER 2013

Back Row (left to right): Estelle Couture, Herlé Goraguer, Konstantin Fomin, Neil Campbell, Silver Sirp, Carsten Hvingel, Bill Brodie, Ricardo Alpoim Don Stansbury, Jessica Sanders

Front Row: Joanne Morgan, Ivan Tretiakov, Mariano Koen-Alonso, Mar Sacau, Fernando Gonzalez, Diana Gonzalez-Troncoso, Monica Mandado. Daniela Diz
REPORT OF SCIENTIFIC COUNCIL MEETING

23-27 September 2012

Chair: Carsten Hvingel
Rapporteur: Neil Campbell

I. PLENARY SESSIONS

The Scientific Council met at the Westin Hotel, Halifax, NS, Canada, during 23-27 September 2013, to consider the various matters in its agenda. Representatives attended from Canada, European Union (Estonia, France, Portugal and Spain), France (with respect to St. Pierre et Miquelon), Japan, Norway and the Russian Federation. 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 0930 hours on 23 September 2013.

The Chair welcomed participants to the 35th Annual Meeting and thanked the NAFO Secretariat for hosting this event.

The provisional agenda was adopted with minor additions. The Council appointed Neil Campbell, the Scientific Council Coordinator, as rapporteur. The Chair welcomed Dalhousie University, Ecology Action Centre, FAO and the WWF as observers to this meeting.

The Council and its Standing Committees met through 23-27 September 2013 to address various items in its agenda. The Council considered and adopted the reports of the STACFIS and STACREC Standing Committees on 27 September 2013. The final session was called to order at 1030 hours on 27 September 2013. The Scientific Council then considered and adopted its report of this meeting. The meeting was adjourned at 1100 hours on 27 September 2013. As the Chair of STACFIS was unable to attend this meeting, the Vice-Chair agreed to chair this session.

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. The Scientific Council plan of action in response to the NAFO Performance Assessment is given in Annex 1.

II. REVIEW OF SCIENTIFIC COUNCIL RECOMMENDATIONS

From Scientific Council Meeting, 1-14 June 2012

X. MEETING REPORTS

1. Working Group on EAFM, December 2011

Scientific Council recommended that before design of survey sampling schemes are changed, more work be conducted in order to examine the trade-off between scientific sampling needs and potential impact on VMEs.

STATUS: No progress since 2012.
XII. OTHER MATTERS

6. Other Business

a) Quality of catch information for assessments

Scientific Council noted the concerns expressed by STACFIS regarding the quality of catch data available to perform assessments.

Contracting Parties have the responsibility to report accurate catches to NAFO via STATLANT 21 submissions, and Scientific Council has the responsibility to “compile” these catches for NAFO. Scientific Council considered that it is not its responsibility to provide the best catch figures, nevertheless Scientific Council requests clarification on which NAFO body is responsible for validating the quality of the STATLANT catch figures submitted, to enable the Scientific Council to carry out assessments in a timely manner. If it is the job of Scientific Council, Scientific Council recognizes that the availability of more information will improve the catch quality, for example inspection reports, daily catch reports and VMS data, may be required for this task.

Scientific Council recommends that General Council clarify the responsibilities of NAFO bodies and Contracting Parties with respect to determining the quality of STATLANT 21 data.

STATUS: An ad hoc Technical working group lead by the chairs of Scientific Council and Fisheries Commission has been proposed to address this issue.

There were no recommendations arising from the 2013 Scientific Council Meetings.

III. RESEARCH COORDINATION

The Council adopted the Report of the Standing Committee on Research Coordination (STACREC) as presented by the Chair, Don Stansbury. 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 Acting Chair, Don Stansbury. The full report of STACFIS is in Appendix II.

V. REQUESTS FROM THE FISHERIES COMMISSION

1. Requests deferred from the June Meeting

a) Mesh size for Redfish in Div. 3LN

Fisheries Commission requested Scientific Council to provide advice on: to examine the consequences resulting from a decrease in mesh size in the mid-water trawl fishery for redfish in Div. 3LN to 90mm or lower. (Item 5)

Scientific Council advises:

Scientific Council concluded that the reduction of mesh size from 130 mm to not less than 90 mm for the pelagic redfish fishery appears not to be harmful to the Div. 3LN redfish stock.

However, measures should be taken to ensure one source of unaccounted mortality i.e. escape mortality at the surface is not replaced by another, i.e. discarding and/or high-grading.

It was observed that beaked redfish escaping from the trawl cod-end during haul-up die as a result of barotrauma as a result of the rapid change in hydrostatic pressure, and the weight of the catch in the cod-end. These escaped fish also suffer increased predation from marine mammals and seabirds.
Previous studies in Div. 3M showed that mid water redfish fishery is a clean fishery: 95% of the hauls do not have bycatch and so its impact on other stocks is minimal. The Scientific Council also notes that the same mesh size (90 mm) for mid-water trawl as already implemented on the pelagic redfish fishery on Div. 3M and Div. 3O.

The results of the research on decreasing the mesh size in pelagic trawls directed to beaked redfish (*Sebastes mentella*) was discussed by Scientific Council.

The research on redfish mesh selectivity during Russian special experiment in 2011 was presented to Scientific Council (SCR Doc. 13/20). Scientific Council recognized that there is considerable escapement at the surface and that this represents a loss of yield to the fishery. It was suggested that a solution to avoid this escapement of dead redfish was to use a smaller mesh in the cod-end. This would have the tendency to shift the size range of the fish lost to a smaller size.

At its September 2010 meeting Scientific Council analyzed the reduction in the mesh in the mid-water trawl fishery for redfish in Div. 3M. At that time Scientific Council concluded for Div. 3M, that the fish bycatch is low when the pelagic trawls are used well above the sea bed. However, it was also noted that some of the reported fish bycatch species were typically demersal species. This indicates that the newer pelagic trawls that are capable of fishing very near bottom could have bycatch concerns. Scientific Council received a response during the September 2010 meeting from the ICES working group on Fish Technology and Fish Behavior (WGFTFB) in response to a request from Scientific Council.

At its 2013 June meeting, Scientific Council considered the work done in ICES WGFTFB during the recent years (2010-2012) and one published paper related to this matter (Herrmann *et al.*, 2012. Understanding the Size Selectivity of Redfish (*Sebastes* spp.) in North Atlantic Trawl Codends. Journal of Northwest Atlantic Fishery Science, 44: 1–13). The main conclusions were that the consequences resulting from a decrease in mesh size in the mid-water trawl fishery for redfish in Div. 3LN to 90mm will be a decrease in $L_{50}$ (length at which 50% of fish entering the cod-end are retained) from 34cm to 25cm, but the selection range ($L_{75}-L_{25}$) will decrease from 6.6 to 4.4cm.

Scientific Council acknowledges that there is some justification to reduce cod-end mesh size in redfish fisheries. However, measures should be taken to ensure one source of unaccounted mortality i.e. escape mortality at the surface is not replaced by another, i.e. discarding and/or high-grading. Scientific Council expresses its concerns about the definition of the mid-water trawl. Some newer pelagic trawls that are included in this category are capable of fishing very near bottom catching demersal fishes that usual do not happen in a common pelagic fishery and could bring bycatch concerns.

Scientific Council suggests that research efforts should concentrate on improving size selection during the towing process whilst minimizing hauling and surface escapement. In this respect Scientific Council conclude that modified sorting grids provide the best practical solution to improve size selection in redfish fisheries. In designing such grids fish behavior, construction, survival of escapees and handling considerations should be assessed. Scientific Council also recommends that the Russian studies on mesh-size and selectivity should be continued.

**b) Sargasso Sea**

*The Fisheries Commission requests the Scientific Council to comment and advise on whether the Sargasso Sea provides forage area or habitat for living marine resources that could be impacted by different types of fishing; and on whether there is a need for any management measure including a closure to protect this ecosystem. The polygon to be considered is the following:*
Scientific Council advises:

Within the portion of the Sargasso Sea defined by the polygon provided in the request, the forage areas or habitat for living marine resources that could be impacted by different types of fishing relevant to NAFO management are limited to those associated with the New England and Corner Rise Seamounts.

Therefore the Scientific Council recommends that:

1) The polygons of the closures for both the New England and Corner Rise seamounts be revised to the north, east and west in the NAFO Convention Area to include all the peaks that are shallower than 2000 metres (as shown by green dots in Fig. 3).

2) For seamount fisheries in areas where fishing has not historically taken place, the Exploratory Fishing protocol be expanded to include all types of fishing, specifically the current mid-water trawl gears.

3) Precautionary regulations of the mid-water trawl fishery on splendid alfonsino be put in place. The regulations can include simple measures such as limiting spatially and temporally (i.e. outside the spawning season which is reported to be in July/August (Vinnchenko, 1997)) the activity with a close monitoring (i.e. include 100% scientific observer coverage in order to collect data for these less-known areas) including prior notifications, and effort or catch limitation. These regulations would only apply to areas where fishing has taken place historically as shown in Fig. 2, and only using a mid-water trawl (i.e. bottom trawl would remain under the Exploratory Protocol). Outside these areas, the expanded Exploratory fishing protocol would apply.
Within the portion of the Sargasso Sea defined by the polygon provided in the request, the forage areas or habitat for living marine resources that could be impacted by different types of fishing relevant to NAFO management are limited to those associated with the New England and Corner Rise Seamounts. These seamounts support complex coral and sponge communities, including numerous endemic species, which provide habitat for diverse invertebrate communities that are highly dependent on them (Watling 2007, Watling et al 2007, Cho 2008, Simpson and Watling 2011, Pante and Watling 2011, ICES 2011, Shank 2010). These seamounts also host populations of deep-water fish and are important as aggregating and spawning areas for splendid alfonsino (Beryx splendens). Generally, deep-sea and seamount fish stocks are particularly vulnerable to exploitation because the fish are long lived, take longer to reach sexual maturity, and have lower fecundities (Norse et al., 2012).

A fishery on splendid alfonsino has taken place on a regular basis from 1976 to 1996 (Vinnichenko, 1997) on the Corner Rise Seamounts followed by a 9-year hiatus and again starting in 2004. Table 1 shows that catches have generally been low except for 1976, 1987 and 1995 where the catches were significantly larger (10 200 t, 2 400 t and 3500 t respectively). The splendid alfonsino is an aggregating moderately productive bathypelagic deep-sea fish that can be caught using either a bottom trawl or a mid-water trawl (Vinnichenko, 1997). It was noted that in most recent years, a directed commercial fishery using mid-water trawl had been conducted since 2005. Catches for this fishery ranged from about 50 to 1200 t and effort ranged from 4 days to 50 days. Although today this fishery is generally small (catches of 302 t in 2012), this mid-water trawl commercial fishery is not covered under Chapter II of the NCEM (i.e. Bottom Fisheries in the NAFO Regulatory Area) or any other chapter. SC noted that this gap in the NCEMs could result in an ongoing fishery that is unregulated. In 1997, Vinnichenko published a study of the alfonsino fisheries on the Corner rise seamounts and concluded: “Limited stocks of deep water fish found in the area by these studies suggest there should be concerns for these resources which are in an area where free enterprise fisheries can develop easily. These concerns demonstrate the necessity for the development of an international fishery management plan for the area of the Corner Rise and other seamounts.”

Given the long history of the splendid alfonsino fishery on the Corner Rise Seamounts, SC reviewed FC document 09-02 on the delineation of the fishing footprint and noted that the fished areas of the Corner Rise Seamount (Figure 2) had met the criteria for inclusion in the footprint but had not been included in the end due to the fact that the seamounts were closed to fishing (SCR 07-006). Nonetheless, Fig. 1 shows the areas where historical fishing of splendid alfonsino has occurred on the Corner Rise Seamounts.
Fig. 2  Distributional map of the intensity of bottom trawl effort by commercial fishing vessels for 2003–2007 in the NRA with an overlay of the candidate VME areas (FC doc 09-02). Existing bottom fishing area were defined as areas where VMS data and/or other available geo-reference data indicating bottom fishing activities have been conducted at least in two years within a reference period of 1987 to 2007 (SCS Doc. 09/21).

Scientific Council also reviewed the science advice and management measures in place for alfonsino on seamounts in other areas of the Atlantic. The 2006 ICES advice stated: “Due to their spatial distribution associated with seamounts, their life history and their aggregation behaviour, alfonsinos are easily overexploited by trawl fishing; they can only sustain low rates of exploitation. Fisheries on such species should not be allowed to expand above current levels unless it can be shown that such expansion is sustainable. To prevent wiping out entire subpopulations that have not yet been mapped and assessed the exploitation of new seamounts should not be allowed.” (ICES, 2006). Similar advice was also given in the South East Atlantic Fisheries Organisation (SEAFO). A precautionary catch limit of 200 tonnes was implemented for alfonsino in the SEAFO Convention Area until additional information becomes available to identify sustainable fishing levels (SEAFO 2008).

Historical fishing on seamounts is also known in other areas such as the South Pacific by Australia, New Zealand and other nations (fishing essentially for alfonsino and orange roughy). In the international waters of the South Pacific, before opening new regions or expanding fishing effort or catch beyond existing levels it is necessary to establish conservation and management measures to prevent significant adverse impacts on vulnerable marine ecosystems and assure the long-term sustainability of deep sea fish stocks (SPRFMO, 2007 Interim Management Measures, http://www.southpacificrfmo.org/interim-measures/).

With respect to bottom fisheries on seamounts, Scientific Council reviewed the closures and noted that the boundaries of the polygons around the Corner Rise and New England Seamounts exclude some peaks that are less than 2000m which could therefore be fishable (Fig. 3). SC notes that exploratory bottom fishing activities are regulated through the exploratory fishery protocol within the closures but that semi-pelagic fisheries (using mid-water trawl) have no measures in place.
Fig. 3. Area of closure on and around four seamounts in the NAFO Regulatory Area effective 1 January 2007 to 31 December 2010. Seamount peaks marked with green dots rise above 2000 m depth, those marked with red dots have peaks below 2000 m depth. (Map produced by Michael McKee and Peter Auster, National Undersea Research Center at The University of Connecticut, CI USA) (SCR Doc. 07/06)
Table 1. Catches of splendid alfonsino from 1976 to 2012. The shaded area shows the catches and effort of the recent commercial fishery.

<table>
<thead>
<tr>
<th>Year</th>
<th>Catch (t)</th>
<th>Effort (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1976</td>
<td>10200</td>
<td></td>
</tr>
<tr>
<td>1977</td>
<td>800</td>
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<td>152</td>
<td>9</td>
</tr>
<tr>
<td>2012</td>
<td>302</td>
<td>22</td>
</tr>
</tbody>
</table>

2. Ad hoc Requests from Current Meeting

The following requests were received during the current meeting (FC WP 13/22). Scientific Council noted that these responses are only for the clarification of the advice and do not in any way alter or change the advice published in the previous reports of the Scientific Council.

a) Sea Pens in Candidate VME Areas 13 and 14

The Fisheries Commission Working Group on Vulnerable Marine Ecosystems (WGFMS-VME) considered the scientific advice available at the time of its last meeting held in April 2013. No consensus was reached between Contracting Parties regarding specific management measures that are best suited in protecting areas 13 and 14 as reflected in Figure 2 of the Working Group report (NAFO/FC Doc. 13/3) and defined by the coordinates indicated in page 10 of that report.

New information from the EU Flemish Cap survey was expected to be available on sea pens later in 2013, which would help to clarify what type of management measures would best suit areas 13 and 14.
The Fisheries Commission requests the Scientific Council to provide the Fisheries Commission with the preliminary results or analysis, regarding occurrence of sea pens in areas towed close to areas 13 and 14 and advise if these reveal significant concentrations of VME indicators.

Scientific Council responded:

The Flemish Cap survey finished in late July 2013 and data from this survey is still preliminary. This will be examined by WGESA in November 2013, as part of their review of VME closures, and presented to Scientific Council at its next meeting. Scientific Council deferred answering this request until this analysis has been carried out.

b) Div. 3LN Redfish Catch Levels for 2014

Regarding Div. 3LN redfish, the Scientific Council recommends for 2013 and 2014 a fishing mortality "around the current level" (corresponding to a TAC of 6 346 t), which is around 1/6 of F_{msy} (TAC of 6 287 t) and a relatively low level when compared to the advice of other NAFO stocks. The Scientific Council also advised that increases should be treated with "caution". In 2012 the Fisheries Commission adopted a TAC of 6 500 t.

The Fisheries Commission requests the Scientific Council to consider the most recent survey trends and advice if an increase in TAC to 7 000 t for 2014 is sustainable.

Scientific Council responded:

A range of catch options for this stock was provided in 2012 for 2013 and 2014. This advice was reviewed in 2013 and Scientific Council concluded that there was no basis to change this advice. As this stock is estimated to be above B_{msy}, the level of acceptable risk should be set by managers. Scientific Council does not have the capacity to fully evaluate stock management advice at the September meeting.

c) Catch Composition of Redfish in Div. 3M

The catch composition of Div. 3M redfish includes three species (Sebastes mentella, S. marinus and S. fasciatus). The assessment is focused on beaked redfish, which is a composition of only two species (S. mentella and S. fasciatus) that dominated catches and stock biomass as estimated by surveys, up to 2005. Since 2005, catches of S. marinus increased and this species is not directly accounted for by the assessment. The Fisheries Commission requests the Scientific Council to clarify how S. marinus is accounted for in the advice and if the recent change in catch composition is reflected in the recommended TAC.

Scientific Council responded:

Div. 3M Redfish advice already incorporates S. marinus. Once the advised TAC for beaked redfish is determined, it is raised using the two most recent year average proportion of S. marinus found in the redfish catches of the Spanish, Portuguese and Russian fleets.

A separate Div. 3M S. marinus assessment may be considered for the future.

d) Reference Points for Div. 3M and Div. 3NO cod

The results of the Div. 3M cod stock assessment and analysis on biological reference points for Div. 3NO cod (SCR Doc. 13/40) show that there is an apparent inconsistency between the two cod stocks regarding fishing mortality reference points. For Div. 3M cod, F_{msy} is at the level of natural mortality while for Div. 3NO cod it is F_{0.1} which is at the level of natural mortality. Both stocks are at different conservation status and Div. 3NO cod is under a moratorium. The Fisheries Commission requests the Scientific Council to analyse the apparent inconsistency between reference points of the two cod stocks, considering the selectivity patterns and if fishing mortality reference points for Div. 3M cod could be underestimated.
Scientific Council responded:

In the calculation of the $F_{\text{max}}$ for Div. 3M and 3NO cod, two different age ranges are used to estimate average fishing mortality ($F_{\text{bar}}$). Their absolute values can therefore not be directly compared. The use of a different reference age range in the $F_{\text{bar}}$ calculation of the Div. 3M cod would change the value of $F_{\text{max}}$, however result in the same yield advice.

e) Scenarios of natural mortality in Div. 3M Redfish

For Div. 3M redfish the Scientific Council recommends not to increase the current TAC of 6500 t, based on weaker incoming recruitment and uncertainty on current levels of natural mortality. Projections performed assuming current fishing mortality and natural mortality levels of 0.125 and 0.4 estimate median yields of respectively 9518 t and 5812 t for 2014. The Fisheries Commission requests advice on whether it would be reasonable to assume an intermediate scenario of natural mortality, with corresponding yield levels for 2014 and 2015 under the current fishing mortality.

Scientific Council responded:

Scientific Council reiterates its advice from June 2013. Given the uncertainty about the actual level of current natural mortality (M) (see STACFIS 2013) and its impact on short term model projections, Scientific Council decided not to use model predictions as basis for the recommendation.

f) Productivity of Div. 3NO Cod

Regarding the productivity of Div. 3NO cod and the definition of MSY reference points, the Scientific Council recommended $F_{0.1}$ or $F_{35\%\text{SPR}}$ as an interim target for fishing mortality and the level of 180 000-185 000 t of SSB as an interim $B_{\text{target}}$. The Fisheries Commission seeks clarification from the Scientific Council on the derivation of the target reference points and on the possibility to use $B_{\text{target}}$ as a proxy for $B_{\text{MSY}}$.

Scientific Council responded:

One of the difficulties with estimating reference points for this stock is the poorly defined stock recruit relationship. When there are clear fit problems of the stock recruitment relationship, one of the recommended $F_{\text{MSY}}$ or $F_{\text{lim}}$ proxies is the Yield per Recruit reference point $F_{\text{max}}$.

In 2012 Scientific Council noted that the approach used in estimation of the Div. 3NO cod maximum sustainable yield (MSY) reference points in 2011 may not be advisable due to the high uncertainty in the stock recruit relationship for this stock. Scientific Council recommended the use of proxies based on the yield per recruit (YPR) and spawner per recruit (SPR) to estimate the reference points for cod in Div. 3NO.

Using the NAFO Precautionary Approach Framework, the Scientific Council proposed $F_{0.1}$ (0.19) or $F_{35\%\text{SPR}}$ (0.20) as a possible $F_{\text{target}}$. The reason to choose these value is that a small reduction in the yield-per-recruit (YPR) gives a precautionary level of $F$ that has a very low probability to be higher than $F_{\text{lim}} = F_{\text{max}}$ (less than 5%).

Scientific Council noted that the level of biomass reference points estimated from YPR and spawners-per-recruit (SPR) depends on assumptions about the level of recruitment. Only recruits from spawning stocks larger than $B_{\text{lim}}$ were sampled because only recruitment in a fully productive stock should be taken into account when calculating MSY reference points.

The recommended $B_{\text{target}}$ and $F_{\text{target}}$ values have a very low probability of being above $F_{\text{lim}}$ or below $B_{\text{lim}}$. These interim targets are proposed until more stock recruitment and productivity regime information is available to better estimate MSY based reference points.
g) Timetable for evaluation of Div. 2J + 3KLMNO Greenland halibut management strategy

A number of Contracting Parties have expressed willingness to postpone the review of the Greenland Halibut management strategy to 2016. In view of its workload and especially of the foreseen reassessment of the impact of bottom fishing activities in 2016, the Fisheries Commission requests the advice from the Scientific Council on the feasibility to evaluate the Greenland Halibut management strategy by 2016 (or alternatively by 2017).

Scientific Council responded:

Scientific Council considers that a postponement of the review of the Greenland halibut management strategy would be appropriate. Given the current lack of catch data it would not be possible to fully review the MSE in 2014. It is suggested that such a review be carried out in 2017, to allow evaluation against performance statistics (biomass in 2016, relative to 2011) and to avoid excessive workload in light of the reassessment of bottom-fishing activities due in 2016. Scientific Council will continue to monitor primary indicators.

h) Div. 3O Redfish time series

*The 2012 TAC seems to be based on average catches over a very long period of time.* The Scientific Council has advised on TACs based on catches over a much shorter period of time. In the case of Div. 3NO white hake and Div. 3LNO skates, what is the scientific basis of setting a TAC based on a fifty-year average of catches?

Scientific Council responded:

Scientific Council lacks a quantitative assessment model on which to base predictions of annual yield potential for Div. 3O Redfish. Stock dynamics and recruitment patterns are also poorly understood.

Catches have averaged about 13 000 t since the 1960s and over the long term, catches at this level appear to have been sustainable. Scientific Council is unable to advise on a more specific TAC level.

VI. MEETING REPORTS

1. Fisheries Commission WGFMS-CPRS

This Fisheries Commission Working Group met 9 – 11 July in Saint Pierre, St. Pierre et Miquelon, and was chaired by Jean-Claude Mahé (EU-France). The Scientific Council was advised of progress in this group by the rapporteur in his presentation of the report to Fisheries Commission. Scientific Council thanked the Jean-Claude for his efforts in leading this group.

2. Fisheries Commission WGFMS-VME

This Fisheries Commission Working Group met 23 – 25 April in Halifax, Canada, and was chaired by Bill Brodie (Canada). The Scientific Council was advised of progress in this group by the Chair in his presentation of the report to Fisheries Commission. Scientific Council thanked Bill for his efforts in leading this group.

3. World Conference on Stock Assessment Methods

World Conference on Stock Assessment Methods (WCSAM) was held in Boston, MA, USA during July 15–16 (Workshop); July 17–19 (Conference). Brian Healey and Diana Gonzalez attended as on behalf of NAFO’s Scientific Council. NAFO also supported the participation of Sidney Holt as a keynote speaker.

Scientific Council deferred a full presentation on this until the June 2014 meeting.
VII. REVIEW OF FUTURE MEETING ARRANGEMENTS

1. WG on Reproductive Potential

This WG may meet in conjunction with the ICES/NAFO Symposium during 16-18 October 2013 in St. Andrews, NB, Canada.

2. WGES (formerly SC WGEAFM), November 2013

The Working Group on Ecosystem Science and Assessment (WGES) will meet at the NAFO Secretariat, Dartmouth, Canada, during 19-28 November 2013.

3. WGDEC, March 2014

The ICES – NAFO Working Group on Deepwater Ecosystems (WGDEC), chaired by Odd-Aksel Bergstad, Norway, is scheduled to meet at the ICES Headquarters during 24 – 28 March 2014 to address the various items on its agenda.

4. Scientific Council, June 2014

The Scientific Council June meeting will be held on 30 May-12 June 2014. The Secretariat presented an alternative venue for this meeting. It was decided to hold the meeting at Saint Mary’s University, Halifax, NS, Canada.

5. SC/NIPAG, September 2014

An invitation to host this meeting has been extended by the Greenland Institute of Natural Resources. The meeting will be held during 10-17 September 2014.


Scientific Council noted that an invitation to host the Annual Meeting had been extended by the European Union on behalf of Spain, and the Annual Meeting will be held in Galicia, Spain 22–26 September 2014.
7. Scientific Council, June 2015
Scientific Council agreed that its June meeting will be held during 29 May - 12 June 2015 with the meeting venue being decided at the 2014 meeting.

VIII. FUTURE SPECIAL SESSIONS

1. ICES/NAFO Gadoid Symposium
NAFO Scientific Council agreed, jointly with ICES, to co-sponsor a symposium on Gadoid fisheries: the ecology and management of rebuilding, to be held in St. Andrews, New Brunswick, during 15-18 October 2013. The organizing committee is being co-convened by Ed Trippel (Canada) and Fritz Köster (Denmark), and is comprised of Jason Link (USA), Olav Kjesbu (Norway), Doug Swain (Canada), and Jonna Tomkiewicz (Denmark). At the June 2013 Scientific Council meeting it was agreed that NAFO would support the attendance of Joanne Morgan (Canada) and Kathy Sosebee (USA). Following the June meeting, the SC Executive Committee agreed to fund the attendance of one of the keynote speakers, and consequently, NAFO will also support the attendance of Peter Wright (UK).

2. ICES/Norway/NAFO Effects of Bottom Fishing Conference, Tromsø, June 2014
At its June meeting, Scientific Council received information on a conference being organized by ICES and the Institute of Marine Research, Norway, entitled “Effects of fishing on benthic fauna, habitat and ecosystem function”. This symposium will review the physical and biological effects of fishing activities to sea bottom ecosystems, look at various technical conservation measures designed to mitigate these effects and ultimately try to quantify the overall ecosystem impact. The aim is to develop tools for use in informed ecosystem-based fisheries management. Scientific Council decided to support this important symposium. The conference is being steered by Mariano Koen-Alonso (Canada), Carsten Hvingel (Norway) and Francis Neat (UK–Scotland). Scientific Council agreed to support the conference through funding participation of Mariano Koen-Alonso (Canada) and a keynote speaker.

IX. OTHER MATTERS

1. Election of Officers – STACFEN Chair
The nominating committee met to discuss the next STACFEN Chair. Estelle Couture (Canada) was nominated and approved by Scientific Council. The Council offered its congratulations to Estelle on her appointment and wished her a successful tenure.

2. Matters arising from the NAFO Performance Assessment
Scientific Council reviewed its document from the June meeting (SCS Doc. 13/17) and had no further comments to add at this time.

3. Report of the Joint FC/SC Meeting
A joint meeting of Scientific Council and Fisheries Commission was held at the Annual Meeting. In advance of this, Scientific Council met with Bruce Atkinson, Chair of the Peer Review Expert Panel to discuss the contents of their report. A number of issues were discussed with members of Fisheries Commission, including the terms of reference and chairs of future joint working groups on risk-based management strategies and on the ecosystem approach to fisheries management. Both groups will be co-chaired by a member of Scientific Council and a member of Fisheries Commission. Scientific Council were informed that Kevin Anderson and Robert Day (both Canada) had been nominated by Fisheries Commission as co-chairs of WG-RBMS and WG-EAFM respectively. A nomination committee was formed to consider nominations for the co-chairs to be drawn from Scientific Council. Carsten Hvingel (Norway) was nominated as co-chair of the WG-RBMS and Andrew Kenny (EU) as co-chair of WG-EAFM.
4. Interactions between fishery and oil/gas surveys

The presence of the seismic survey vessel RV Sanco Spirit was noted on the first days of the EU bottom-trawl survey of the Flemish Cap on board RV Vizconde de Eza in July (Fig. 4). That vessel towed an 8 mile-long cable. The vessel was accompanied by an auxiliary vessel, two miles behind, to prevent other ships from crossing over the cable.

![Map of the observed positions of the seismic survey vessel RV Sanco Spirit during the 2013 Flemish Cap European Union survey.](image)

The Vizconde de Eza was warned by the auxiliary ship to maintain a security distance of at least 4 miles to each side of the main ship, and at least 12 miles from its stern; that security area was around 90 squared nautical miles in connection with the seismic vessel. These measures forced modification of the survey plan, including the elimination from the sampling program of one CTD station.

Due to the possible disturbances that seismic survey activity could have on fish behavior and distribution, Scientific Council requests General Council to contact the CNLOPB to request information about past seismic survey activity in the NAFO Regulatory Area, as well as to be informed of plans for future surveys. This would be valuable in evaluation of fishery survey results, and to minimize interactions in the future.

4. Scientific Merit Awards

At its June meeting, Scientific Council nominated Bill Brodie (Canada) and Jean-Claude Mahé (EU – France) to receive Scientific Merit Awards. Both have provided extensive service to Scientific Council over many years, with involvement in innumerable NAFO meetings. Bill chaired the Standing Committees on Research Coordination (1989 – 91), Fisheries Science (1994 – 96), and Publications (1997 – 99) and Scientific Council (1999 – 2001), while Jean-Claude served as chair of STACFIS between 2011 and 2013. Both have also served the wider NAFO community and helped to improve cooperation between managers and scientists, with Bill chairing the Fisheries Commission Working Group on Vulnerable Marine Ecosystems (2008 – 2013) and Jean-Claude chairing the Fisheries Commission Working Group on Conservation Plans and Rebuilding Strategies (2011 –2013).

Scientific Council extended its warm thanks to them, and wished them well in their retirements.
5. Awards to outgoing chairs

On behalf of Scientific Council, the Vice-Chair, Don Stansbury (Canada), thanked the Chair, Carsten Hvingel (Norway) for his leadership as chair of STACREC and SC Vice-Chair (2009 – 2011) and Chair of Scientific Council (2011 – 2013).

6. Improved working procedures at the June meeting

Noting the increasing workload of Scientific Council, it was recommended that the chairs investigate ways of streamlining the work of the Council. Specific proposals included simplifying and standardizing interim monitoring reports and producing survey annexes.

7. Terms of reference for joint FC-SC Working Groups

Scientific Council discussed the terms of reference for the new joint working group and made a number of small adjustments. These will be discussed during the first meeting of each group. The Co-Chairs of these working groups coming from Scientific Council will discuss these further with their counterparts from Fisheries Commission. Both groups will be co-chaired by a member of Scientific Council and a member of Fisheries Commission. Scientific Council were informed that Kevin Anderson and Robert Day (both Canada) had been nominated by Fisheries Commission as co-chairs of WG-RBMS and WG-EAFM respectively. A nomination committee was formed to consider nominations for the co-chairs to be drawn from Scientific Council. Carsten Hvingel (Norway) was nominated as co-chair of the WG-RBMS and Andrew Kenny (EU) as co-chair of WG-EAFM.

8. 2nd Central Arctic Oceans Fisheries Meeting, Tromso, Norway, 28 – 31 October 2013

NAFO was amongst a number of organizations invited to participate in the second scientific meeting on fisheries in the central Arctic. The meeting is organized by coastal states of the Arctic Ocean, and will be held in Tromsø, Norway, 28 – 31 October, 2013. Scientific Council felt that participation in this initiative would be valuable, and nominated Carsten Hvingel to attend on behalf of NAFO Scientific Council.

9 Terms of reference for ad hoc Technical Group on Catch Validation

Scientific Council reviewed the proposed terms of reference for a joint ad hoc Technical Group on Catch Validation, chaired by the Scientific Council and Fisheries Commission Chairs. In addition to the SC and STACREC Chairs, Scientific Council participants should include Ricardo Alpoim (EU – Portugal), Bill Brodie (Canada) and Fernando Gonzalez (EU – Spain) and by a scientist from the Russian Federation.

10. NEREIDA Funding

Scientific Council noted that the funding for the second phase of this project was still not available and recommended that this was addressed with the utmost urgency.

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).


The Council at its concluding session on 26 September 2013 considered and adopted its own report.

XII. ADJOURNMENT

There being no other business, the meeting was adjourned at 1230 hours on 26 September 2013.
APPENDIX I. REPORT OF STANDING COMMITTEE ON RESEARCH COORDINATION (STACREC)

Chair: Don Stansbury
Rapporteur: Barbara Marshall

The Committee met at the Westin Hotel, Halifax, NS, Canada, during 25 September 2013, to consider the various matters in its Agenda. Representatives attended from Canada, European Union (Estonia, France, Portugal and Spain), France (with respect to St. Pierre et Miquelon), Norway, Russian Federation and USA. The Scientific Council Coordinator was in attendance.

1. Opening
The Chair opened the meeting and welcomed everyone. Barbara Marshall was appointed the Rapporteur.

2. Fisheries Statistics

a) Progress Reports on Secretariat Activities
After discussions in June, historic catch date dating back to the 1800 was compiled. This will be presented on the NAFO website.

b) 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 2010-2012 up to 19 September 2013.

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<tr>
<th>Country/Component</th>
<th>STATLANT 21A (deadline, 1 May)</th>
<th></th>
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<th>STATLANT 21B (deadline 31 August)</th>
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<td>24 Apr 12</td>
<td>21 May 13</td>
<td>8 Aug 11</td>
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<td>CAN-M</td>
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<td>14 May 12</td>
<td>21 Apr 13</td>
<td>10 June 11</td>
</tr>
<tr>
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<td>29 Apr 12</td>
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<tr>
<td>E/BUL</td>
<td></td>
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<td></td>
<td>21 May 13(NF)</td>
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<tr>
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<td>17 May 12</td>
<td>2 May 13 (revised 6 Jun 13)</td>
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<td>27 Apr 12</td>
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</tr>
<tr>
<td>UKR</td>
<td>20 Jan 11 (no fishing)</td>
<td></td>
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**ii) Eurostat Meeting**

Neil Campbell had been invited to Eurostat fisheries statistics working group meeting. The meeting will be reviewing the deadline for the submission and STACREC noted that the May 1st deadline for 21A data was
necessary for the use of the data in the stock assessment process. As well the Committee agreed that the collection of 21B (effort) data was of use to the Scientific Council.

3. Research Activities

a) Surveys Planned for 2013 and Early-2014

Designated Experts were requested to check and update the information contained in SCS Doc. 13/18.

4. Other Matters

a) Review of SCR and SCS Documents

There were no documents presented.

b) Other Business

i) Use of VMS data and daily catch reports

In light of discussions on the improvement of quality and verification of catch data STACREC recommended that the Secretariat continue its exploration of VMS data and daily catch reports.

ii) NAFOTools package

SCS Doc. 18/22

Using the talents of the NAFO Intern, Thomas Reilly and NAFO Secretariat have produced an R library to assist in plotting maps of the NAFO Regulatory Area, including bathymetric data. The details of functions contained in the library are contained in the SCS document, and the library can be downloaded from the NAFO SC Sharepoint site.

iii) FAO VME database and ABNJ

Jessica Sanders, FAO, provided an overview of the project “Sustainable fisheries management and biodiversity conservation of deep-sea living resources and ecosystems in the ABNJ” which is a project currently being developed by FAO and UNEP. Ms Sanders provided suggestions on areas of the project or activities in which the members of the Scientific Council might be specifically interested. The project includes four components, of which 3 have a fisheries focus. The three components led by FAO include a focus on implementing existing legal and policy frameworks of relevance, reducing impacts on VMEs as well as reviewing work on EBSAs and implementing an Ecosystem Approach to Fisheries in interested regions.

FAO will be seeking comments from partners (which hopefully will include all relevant RFMOs and other stakeholders) over the next month and will then be finalizing the project activities and roles for partners before the end of 2013.

In addition, FAO is currently in the process of developing a database on vulnerable marine ecosystems. The beta version is now developed and the Secretariat from each RFMO will be asked have a small group of experts discuss the data for each region and provide comments on the content and functionality before the database is made public. FAO will contact the NAFO Secretariat within the following month on this issue.

5. Adjournment

The report was reviewed and the meeting was adjourned at 1045 on 27 September 2013.
APPENDIX II. REPORT OF STANDING COMMITTEE ON FISHERIES SCIENCE (STACFIS)

Chair : Don Stansbury                                           Rapporteur: Various

The Committee met at the Westin Hotel, Halifax, NS, Canada, during 23-27 September 2013, to consider the various matters in its Agenda. The Chair, Jean-Claude Mahé was unable to attend the meeting. Don Stansbury was elected as the Acting Chair for this meeting. Representatives attended from Canada, European Union (Estonia, France, Portugal, Spain), France (with respect to St. Pierre et Miquelon), Japan, Norway, Russian Federation and USA. The Scientific Council Coordinator was in attendance.

1. Opening

The Chair opened the meeting by welcoming participants. The provisional agenda was reviewed and adopted, and a plan of work developed for the meeting.

2. Nomination of Designated Experts

The current list of Designated Experts is given below and will be nominated again, save for Witch Flounder in Div. 3NO and Greenland halibut. The relevant institutes will be contacted to confirm the Designated Experts.

The nominated Designated Experts for 2014 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 (Fax: +709-772-4188)

<table>
<thead>
<tr>
<th>Species</th>
<th>Designated Expert</th>
<th>Contact Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cod in Div. 3NO</td>
<td>Rick Rideout</td>
<td>Tel: +1 709-772-4935 <a href="mailto:rick.rideout@dfo-mpo.gc.ca">rick.rideout@dfo-mpo.gc.ca</a></td>
</tr>
<tr>
<td>Redfish Div. 3O</td>
<td>Rick Rideout</td>
<td>Tel: +1 709-772-4935 <a href="mailto:rick.rideout@dfo-mpo.gc.ca">rick.rideout@dfo-mpo.gc.ca</a></td>
</tr>
<tr>
<td>American Plaice in Div. 3LNO</td>
<td>Karen Dwyer</td>
<td>Tel: +1 709-772-6975 <a href="mailto:karen.dwyer@dfo-mpo.gc.ca">karen.dwyer@dfo-mpo.gc.ca</a></td>
</tr>
<tr>
<td>Witch flounder in Div. 3NO</td>
<td>TBC</td>
<td>Tel: +1 709-772-</td>
</tr>
<tr>
<td>Witch flounder in Div. 2J+3KL</td>
<td>Dawn Maddock Parsons</td>
<td>Tel: +1 709-772-2495 <a href="mailto:dawn.parsons@dfo-mpo.gc.ca">dawn.parsons@dfo-mpo.gc.ca</a></td>
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<tr>
<td>Yellowtail flounder in Div. 3LNO</td>
<td>Dawn Maddock Parsons</td>
<td>Tel: +1 709-772-2495 <a href="mailto:dawn.parsons@dfo-mpo.gc.ca">dawn.parsons@dfo-mpo.gc.ca</a></td>
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<tr>
<td>Greenland halibut in SA 2+3KLMNO</td>
<td>TBC</td>
<td>Tel: +1 709-772-</td>
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<tr>
<td>Northern shrimp in Div. 3LNO</td>
<td>David Orr</td>
<td>Tel: +1 709-772-7343 <a href="mailto:david.orr@dfo-mpo.gc.ca">david.orr@dfo-mpo.gc.ca</a></td>
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<tr>
<td>Thorny skate in Div. 3LNO</td>
<td>Mark Simpson</td>
<td>Tel: +1 709-772-4148 <a href="mailto:mark.r.simpson@dfo-mpo.gc.ca">mark.r.simpson@dfo-mpo.gc.ca</a></td>
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<tr>
<td>White hake in Div. 3NO</td>
<td>Mark Simpson</td>
<td>Tel: +1 709-772-4148 <a href="mailto:mark.r.simpson@dfo-mpo.gc.ca">mark.r.simpson@dfo-mpo.gc.ca</a></td>
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From the Instituto Español de Oceanografía, Aptdo 1552, E-36200 Vigo (Pontevedra), Spain (Fax: +34 986 49 2351)

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<tr>
<td>Roughhead grenadier in SA 2+3</td>
<td>Fernando Gonzalez-Costas</td>
<td>Tel: +34 986 49 2111 <a href="mailto:fernando.gonzalez@vi.ieo.es">fernando.gonzalez@vi.ieo.es</a></td>
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<tr>
<td>Roundnose grenadier in SA 2+3</td>
<td>Fernando Gonzalez-Costas</td>
<td>Tel: +34 986 49 2111 <a href="mailto:fernando.gonzalez@vi.ieo.es">fernando.gonzalez@vi.ieo.es</a></td>
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<tr>
<td>Cod in Div. 3M</td>
<td>Diana Gonzalez-Troncoso</td>
<td>Tel: +34 986 49 2111 <a href="mailto:diana.gonzalez@vi.ieo.es">diana.gonzalez@vi.ieo.es</a></td>
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<tr>
<td>Shrimp in Div. 3M</td>
<td>Jose Miguel Casas Sanchez</td>
<td>Tel: +34 986 49 2111 <a href="mailto:mikel.casas@vi.ieo.es">mikel.casas@vi.ieo.es</a></td>
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From the Instituto Nacional de Recursos Biológicos (INRB/IPIMAR), Av. de Brasilia, 1449-006 Lisbon, Portugal (Fax: +351 21 301 5948)

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<tr>
<td>American plaice in Div. 3M</td>
<td>Ricardo Alpoim</td>
<td>Tel: +351 21 302 7000 <a href="mailto:ralpoim@ipimar.pt">ralpoim@ipimar.pt</a></td>
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<tr>
<td>Redfish in Div. 3M</td>
<td>Antonio Avila de Melo</td>
<td>Tel: +351 21 302 7000 <a href="mailto:amelo@ipimar.pt">amelo@ipimar.pt</a></td>
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<tr>
<td>Redfish in Div. 3LN</td>
<td>Antonio Avila de Melo</td>
<td>Tel: +351 21 302 7000 <a href="mailto:amelo@ipimar.pt">amelo@ipimar.pt</a></td>
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From the Greenland Institute of Natural Resources, P. O. Box 570, DK-3900 Nuuk, Greenland (Fax: +299 36 1212)

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<tr>
<td>Redfish in SA1</td>
<td>Rasmus Nygaard</td>
<td>Tel: +299 36 1200 <a href="mailto:rany@natur.gl">rany@natur.gl</a></td>
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<tr>
<td>Other Finfish in SA1</td>
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<td>Tel: +299 36 1200 <a href="mailto:rany@natur.gl">rany@natur.gl</a></td>
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<td>Greenland halibut in Div. 1A</td>
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<td>Northern shrimp in SA 0+1</td>
<td>Michael Kingsley</td>
<td>Tel: +299 36 1200 <a href="mailto:mcsk@natur.gl">mcsk@natur.gl</a></td>
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<td>Northern shrimp in Denmark Strait</td>
<td>Nanette Hammeken</td>
<td>Tel: +299 36 1200 <a href="mailto:nanette@natur.gl">nanette@natur.gl</a></td>
</tr>
</tbody>
</table>
3. Other Matters

a) Review of SCR and SCS Documents

STACFIS reviewed one SCR document during this meeting.


The objective of this document is to test whether the current HCR for Greenland halibut under the XSA Current Assessment View OM is robust to different stock recruitment assumptions and to different measures of Reproductive Potential (RP). We tested the HCR using alternative stock recruitment functions (Segmented Regression, Ricker and Ricker) with different RP indices which vary in the level of biological complexity. The RP indices used in increasing order of biological information were: Biomass 10+, SSBcohort, FSBcohort, FSByear and TEP. Understanding the basis of uncertainty in the S/R relationships is generally the most difficult outstanding problem in fisheries assessment and management and it is a key problem in the MSE. A Ricker stock recruitment function fits the Greenland halibut stock recruitment data better than the Segmented Regression for all the RP indices. The results show that the inclusion of more biological information when estimating Reproductive Potential does not improve the stock recruitment fit in either case (Segmented Regression and Ricker). The best fits in both cases were obtained in descending order with: 10+Biomass, SSBcohort, FSBcohort, TEP and FSByear. All the OMs based on the Segmented Regression have very similar results and seem to be robust to assumptions about Reproductive Potential. In the case of the OMs based on the Ricker stock recruitment function, all of them have a very low probability, less than 1%, of achieving the exploitable biomass objective. In the case of the OMs based on the modified Ricker function, all of them have a low probability of achieving the exploitable biomass objective although the total biomass reaches maximum levels in all the OMs. The stock recruitment assumptions seem to have a big impact on the final results while the RP indices appear to have little impact. The majority of the scenarios analyzed in this document present a biomass increase in the short term (until 2016).

The Scientific Council will continue to monitor primary indicators (survey biomass indices and catches) to determine if exceptional circumstances occur, until the revision of the MSE.

b) Other Business

There being no other business Acting STACFIS Chair thanked the Designated Experts for their competence and very hard work and the Secretariat for its great support. The STACFIS Chair also thanked the Chair of Scientific Council, and the Scientific Council Coordinator for their support and help. The meeting was adjourned at 1050 on 27 September, 2013.
APPENDIX III. SCIENTIFIC COUNCIL AGENDA, SEPTEMBER 2013

I. Plenary Session
   a. Opening
   b. Appointment of Rapporteur
   c. Adoption of Agenda
   d. Plan of Work –
      i. Election of interim STACFIS chair
      ii. Joint FC-SC session
      iii. Feedback on the new advice format

II. Review of SC Recommendations

III. Research Coordination
   a. Opening
   b. Fisheries Statistics
      i. Progress Reports on Secretariat Activities
         1. Historical Catch Data
      ii. Review of STATLANT 21
      iii. EUROSTAT Working Group
   c. Research Activities
      i. Surveys planned for 2012 and early 2013
   d. Other Matters
      i. Review of SCR and SCS Documents
      ii. Review of Survey SCS Document
      iii. Other Business
         1. FAO VME Database and ABNJ Project
         2. NAFOtools Package

IV. FISHERIES SCIENCE
   a. Opening
   b. Nomination of Designated Experts
   c. Other Matters
      i. Review of SCR and SCS Documents
      ii. Other Business

V. Requests from the Fisheries Commission
   a. Requests deferred from the June meeting
      i. Mesh Size for Redfish in Div. 3LN
      ii. Sargasso Sea
   b. Ad hoc requests from the current meeting

VI. Meeting Reports
   a. Fisheries Commission WG-CPRS
   b. World Conference on Stock Assessment Methods

VII. Review of future meeting arrangements
   a. Future June meeting options

VIII. Future Special Sessions
   a. ICES/NAFO Gadoid Symposium
   b. Tromso Symposium

IX. Other Matters
   a. Election of officers – STACFEN Chair
   b. Matters arising from the NAFO Performance Assessment
c. Scientific Merit Awards
d. Awards to out-going Chairs
e. NAFO SC Representation at Central Arctic Ocean – Second Scientific Meeting, 28-31 October, Tromso, Norway
X. Adoption of Reports of STACFIS and STACREC
XI. Report of the Scientific Council
XII. Adjournment
Annex 1. Fisheries Commission’s Request for Scientific Advice on Management in 2014 and Beyond of Certain Stocks in Subareas 2, 3 and 4 and Other Matters

1. The Fisheries Commission with the concurrence of the Coastal State as regards to the stocks below which occur within its jurisdiction (“Fisheries Commission”) requests that the Scientific Council provide advice in advance of the 2013 Annual Meeting, for the management of Northern shrimp in Div. 3M, 3LNO in 2014. The advice should be provided as a range of management options and a risk analysis for each option (rather than a single TAC recommendation) in accordance to Annex A or B as appropriate.

2. 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).

<table>
<thead>
<tr>
<th>Two year basis</th>
<th>Three year basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>American plaice in Div. 3LNO</td>
<td>American plaice in Div. 3M</td>
</tr>
<tr>
<td>Capelin in Div. 3NO</td>
<td>Cod in Div. 3NO</td>
</tr>
<tr>
<td>Cod in Div. 3M</td>
<td>Northern shortfin squid in SA 3+4</td>
</tr>
<tr>
<td>Redfish in Div 3LN</td>
<td>Redfish in Div. 3O</td>
</tr>
<tr>
<td>Redfish in Div. 3M</td>
<td>Witch flounder in Div. 2J+3KL</td>
</tr>
<tr>
<td>Thorny skate in Div. 3LNO</td>
<td>Witch flounder in Div. 3NO</td>
</tr>
<tr>
<td>White hake in Div. 3NO</td>
<td></td>
</tr>
<tr>
<td>Yellowtail flounder in Div. 3LNO</td>
<td></td>
</tr>
</tbody>
</table>

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

In 2013, advice should be provided for 2014 and 2015 for Capelin in Div. 3NO, Cod in Div. 3M, Redfish in Div 3M, White hake in Div. 3NO and Yellowtail flounder in Div. 3LNO and for 2014, 2015 and 2016, Cod in Div. 3NO, Northern shortfin squid in SA 3+4, Redfish in Div. 3O and Witch Flounder in div. 2J+3KL.

Advice should be provided using the guidance provided in Annexes A or B as appropriate.

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 bycatches in other fisheries, provide updated advice as appropriate.

3. The Fisheries Commission adopted in 2010 an MSE approach for Greenland halibut stock in Subarea 2 + Division 3KLMNO (FC Working Paper 10/7). This approach considers a survey based harvest control rule (HCR) to set a TAC for this stock on an annual basis. The Fisheries Commission requests the Scientific Council to:
   a) Monitor and update the survey slope and to compute the TAC according to HCR adopted by the Fisheries Commission according to Annex 1 of FC Working Paper 10/7.
   b) Advise on whether or not an exceptional circumstance is occurring.

4. With respect to Northern shrimp (*Pandalus borealis*) in Div. 3LNO, noting the NAFO Framework for Precautionary Approach and recognizing the desire to demonstrate NAFO’s commitment to applying the precautionary approach, Fisheries Commission requests the Scientific Council to:
   a) identify \( F_{\text{msy}} \)
   b) identify \( B_{\text{msy}} \)
   c) provide advice on the appropriate selection of an upper reference point for biomass (e.g. \( B_{\text{buf}} \))

5. Fisheries Commission requests the Scientific Council to examine the consequences resulting from a decrease in mesh size in the mid-water trawl fishery for redfish in Div. 3LN to 90mm or lower.
6. The Fisheries Commission requests the Scientific Council to provide $B_{\text{msy}}$ and $F_{\text{msy}}$ for cod in Div. 3M.

7. Recognizing the work accomplished by the Scientific Council in 2012 on sea pens and sponges, Fisheries Commission requests the Scientific Council to complete request 17 of 2011 by making recommendations for encounter thresholds and move on rules for small gorgonian corals, large gorgonian corals, sea squirts, erect bryozoans, crinoids and cerianthid anemone which are VME indicator species that meet the FAO Guidelines for VME and SAI. Consider thresholds for 1) inside the fishing footprint and outside of the closed areas and 2) outside the fishing footprint in the NRA, and 3) for the exploratory fishing area of seamounts if applicable. In the case of sea pens and sponges make recommendations for encounter thresholds and move on rules for the exploratory fishing area of seamounts.

8. In the medium term, the Fisheries Commission requests the Scientific Council to continue research on the productivity of 3NO Cod and define MSY reference points.

9. With regards to witch flounder in Div. 3NO, the Fisheries Commission requests the Scientific Council to provide reference points or proxies, including Blim.

10. The Fisheries Commission requests the Scientific Council to use Annex 1.E.V of the NCEM to guide development of their workplan related to reassessment of fishing activity with respect to Significant Adverse Impact (SAI) on VME and would note that this assessment is a single component of the broader EAF Roadmap being developed separately by SC.

11. With regards to witch flounder in Div. 3NO, the Fisheries Commission requests the Scientific Council to provide estimates for exploitable biomass and for spawning stock biomass, or appropriate proxies, as well as smoothing, as appropriate.

12. With regards to stocks without reference points and that cannot be developed, the Fisheries Commission requests the Scientific Council to provide advice on:
   a) considerations for reopening stocks under moratorium.
   b) what would constitute a sustainable harvest rate for healthy stocks.

13. Report on the progress of the "Roadmap for developing an Ecosystem Approach to Fisheries for NAFO" regarding:
   a) The general progress of the Roadmap;
   b) Further developments on the stock interactions studies between cod, redfish and shrimp in the Flemish Cap by applying multi species models and by quantifying potential yield and biomass tradeoffs with different fishing mortalities in the multispecies context. The predation of cod over cod juveniles should be taken into account;
   c) Developments on stock interaction studies for the Grand Banks (NAFO Divisions 3KL and 3NO). The spatial overlap between these stocks should be considered.
   These developments should be considered as exploratory and be part of the progress on the "Roadmap for developing an Ecosystem Approach to Fisheries for NAFO".

14. The Scientific Advice for 3LNO shrimp is based on the assessment of fishable biomass and the trends of exploitation rates. The basic assumption is that exploitation levels are driving the dynamic of this stock. However, interactions between stocks are likely to occur and may substantially contribute to the total mortality of shrimp.

   The Fisheries Commission requests the scientific council to incorporate as much as possible information on stock interaction between these stocks in the management advice of 3LNO shrimp and to provide sustainable exploitation rates on that basis.
15. The Fisheries Commission requests the Scientific Council to comment and advise on whether the Sargasso Sea provides forage area or habitat for living marine resources that could be impacted by different types of fishing; and on whether there is a need for any management measure including a closure to protect this ecosystem. The polygon to be considered is the following:

-46.844711060999884 35.7224273930000203
-45.844178761598414 35.0
-63.272355558926961 35.512762148875188
-64.67394560231941 35.722388149068536
-66.072834561535274 35.14837148875188
-67.2114749541443 35.0
-70.697710570999789 35.847831353000117
-68.818622663999804 35.688934769000298
-66.767771029999835 37.386320105000095
-63.160524429998892 38.183166102000087
-38.528701613000123 38.512886748000025
-38.42292556400195 38.211871163000239
-37.898770146002288 37.487278540000677
-36.981801336000103 36.391153039000117

16. Assessment of risk of significant adverse impacts on VME indicator aggregations and VME elements in the NAFO RA

Fishing effort is not uniformly distributed throughout the NAFO Regulatory Area (NRA) and within the fishing footprint there is considerable variation in the intensity of fishing effort. Defining and mapping the high intensity fishing areas within the NRA would by definition represent low risk areas in terms of significant adverse impacts and therefore encounter protocols and move on rules would have little utility in these areas. Furthermore, an understanding of the relationship between the high intensity fishing areas and the environmental characteristics could be used to identify potential new low risk fishing areas. Further categories of risk should be assessed in relation to known and potential mapped VME areas and the maps of fishing intensity to support a risk based spatial management approach for all areas.

a) The Fisheries Commission requests the SC for an analysis of fishing effort (VMS data) in the NRA to define areas of different levels of fishing intensity (e.g. a map of 90%, 80%, 70%... effort) and assess these in conjunction with habitat data in order to map out areas where fishing activities would therefore have no or little significant adverse impact on VMEs and where encounter protocols and move on rules would therefore have little utility. To achieve this, high resolution data is required, (derived from the 2003-present time series of VMS records and logbook records of fishing activity provided by the secretariat and NEREIDA data). The Fisheries Commission requests therefore to the Executive Secretary to provide to the Scientific Council anonymous VMS data and logbook records of fishing activity from 2003 to present.

b) In view of the area management currently implemented and to facilitate evaluation of the need for further protective measures in response to UNGA 61/105, the SC is requested to provide an assessment of risk of significant adverse impacts on VME indicator aggregations and VME elements in the NAFO RA. This assessment should consider spatial and temporal distribution of fishing activity (derived from the 2003-present time series of VMS records and logbook records of fishing activity provided by the secretariat), and the best available knowledge on the spatial distribution of VME indicators and VME indicator elements.
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
- 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 under the following conditions:

- For stocks opened to direct fishing:
  - Projections based on constant fishing mortality at: $2/3 F_{\text{MSY}}$, $3/4 F_{\text{MSY}}$, 85% $F_{\text{MSY}}$, $F_{\text{SQ}}$ (status quo);
  - Projections based on constant yield at: Current TAC and relevant percentage above and/or below the current TAC;

- For stocks under a moratorium to direct fishing: $F_{\text{SQ}}$, $F = 0$.

Results from stochastic short term projection should include:

- The 10%, 50% and 90% percentiles of the yield and total biomass;
- 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.

The Scientific Council might consider other projection options.

<table>
<thead>
<tr>
<th>Limit reference points</th>
<th>$F &lt; F_{\text{lim}}$</th>
<th>$B &gt; B_{\text{lim}}$</th>
<th>$F &lt; F_{\text{MSY}}$</th>
<th>$B &gt; B_{\text{MSY}}$</th>
<th>$B_{y+2} &gt; B_{y-2}$**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant fishing mortality levels or yield as indicated above**</td>
<td>Yield in y* (50%)</td>
<td>Yield in y+1 (50%)</td>
<td>Yield in y+2 (50%)</td>
<td>y</td>
<td>y+1</td>
</tr>
<tr>
<td>F or Yield Options</td>
<td>t</td>
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</table>

*y = First year of the projections

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

- Catch and TAC of recent years
- 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:

- For stocks opened to direct fishing:
  - Projections based on constant fishing mortality at: $F_{0.1}$, $F_{\text{MAX}}$, $F_{\text{MSY}}$, $F_{\text{SQ}}$;
  - Projections based on constant yield at: Current TAC and relevant percentage above and/or below the current TAC;

- For stocks under a moratorium to direct fishing: $F_{\text{SQ}}$, $F = 0$.

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.

<table>
<thead>
<tr>
<th>Limit reference points</th>
<th>$F &lt; F_{\text{lim}}$</th>
<th>$B &gt; B_{\text{lim}}$</th>
<th>$F &lt; F_{0.1}$</th>
<th>$F &lt; F_{\text{max}}$</th>
<th>$B_{y+2} &gt; B_{y-2}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant fishing mortality levels or yield as indicated above*</td>
<td>Yield in $y$</td>
<td>Yield in $y+1$</td>
<td>Yield in $y+2$</td>
<td>$y$</td>
<td>$y+1$</td>
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<td>$F$ or Yield Options</td>
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</table>

* $y = \text{First year of the projections}$
** $y-2 = \text{Last year of the stock assessment}$

The Scientific Council might consider other projection options.
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 and include risk considerations as much as possible.

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. Requests for Advice from Denmark (On Behalf Of Greenland)

1. For Roundnose grenadier in Subarea 0 + 1 advice was in 2011 given for 2012-2014. Denmark (on behalf of Greenland) requests the Scientific Council to continue to monitor the status of Roundnose grenadier in Subareas 0 and 1 annually and, should significant changes in the stock status be observed (e.g. from surveys), the Scientific Council is requested to provide updated advice as appropriate.

2. Advice for golden redfish (Sebastes marinus), demersal deep-sea redfish (Sebastes mentella) American plaice (Hippoglossoides platessoides), Atlantic wolfish (Anarhichas lupus), spotted wolfish (A. minor) in Subarea 1 was in 2011 given for 2012-2014. Denmark (on behalf of Greenland) requests the Scientific Council to continue to monitor the status of these species annually, and should significant change in stock status be observed, the Scientific Council is requested to provide updated advice as appropriate.

3. Subject to the concurrence of Canada as regards Subareas 0 and 1, the Scientific Council is requested to provide advice on appropriate TAC levels for 2014 separately for Greenland halibut in 1) the offshore area 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 advice on any other management measures it deems appropriate to ensure the sustainability of these resources.

Scientific Council is also requested to provide an adaptive advice on the impact on the Greenland halibut in NAFO Division 0A and Division 1A plus Division 1B in 2014 and beyond of an increase in TAC above the 2013 TAC.

4. Advice for Greenland halibut in Division 1A inshore was in 2012 given for 2013-2014. Denmark (on behalf of Greenland), requests the Scientific Council to continue to monitor the status of Greenland halibut in Subarea 1A inshore annually, and should significant change in stock status be observed, the Scientific Council is requested to provide updated advice as appropriate.

5. Subject to the concurrence of Canada as regards Subarea 0 and 1, Denmark (on behalf of Greenland) further requests the Scientific Council before December 2013 to provide advice on the scientific basis for management of Northern shrimp (Pandalus borealis) in Subarea 0 and 1 in 2014 and for as many years ahead as data allows for.

In its advice, SC is also asked to report on whether the pending harvest control rules will be able to keep the stock at or above $B_{msy}$.

6. 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 2014 and for as many years ahead as data allows for.
Annex 3. Requests for Advice from Canada

1. **Greenland halibut (Subareas 0 and 1)**

   The Scientific Council has noted previously that there is no biological basis for conducting separate assessments for Greenland halibut throughout Subareas 0-3, but has advised that separate TACs be maintained for different areas of the distribution of Greenland halibut.

   The Scientific Council is therefore requested, subject to the concurrence of Denmark (on behalf of Greenland) as regards Subarea 1, to provide an overall assessment of status and trends in the total stock area throughout its range and to specifically advise on TAC levels for 2014, separately, for Greenland halibut in Divisions 0A+1A (offshore) and 1B, and Divisions 0B+1C-F. The Scientific Council is also asked to advise on any other management measures it deems appropriate to ensure the sustainability of these resources.

   Recognizing that only general biological advice 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 and include likely risk considerations and implications as much as possible, including risks of maintaining current TAC levels and any available details of observations that would support an increase or decrease in the TACs.

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

   - historical catches;
   - abundance and biomass indices;
   - an age or size range chosen to represent the spawning population;
   - an age or size range chosen to represent the exploited population;
   - recruitment proxy or index for an age or size-range chosen to represent the recruiting population;
   - fishing mortality proxy, such as the ratio of reported commercial catches to a measure of the exploited population;
   - stock trajectory against reference points.

   Any other information the Scientific Council feels is relevant should also be provided.

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:

   a) The status of the stock should be reviewed and management options evaluated in terms of their implications for fishable stock size, spawning stock size, recruitment prospect, catch rate and catch in both the short and long term. The implications of catch options ranging from 50,000 t to the catch corresponding to Zmsy, in 10,000 t increments, should be forecast for 2014 through 2017 if possible, and evaluated in relation to precautionary reference points of both mortality and fishable stock biomass. The present stock size and fishable stock size should be described in relation to those observed historically and those to be expected in the longer term under this range of fishing mortalities, and any other options Scientific Council feels worthy of consideration.

   b) Management options should be provided within the Northwest Atlantic Fisheries Organization Precautionary Approach Framework. Uncertainties in the assessment should be evaluated and presented in the form of risk analyses related to the limit reference points of $B_{lim}$ and $Z_{MSY}$.

   c) Presentation of the results should include the following:

   - a graph and table of historical yield and fishing mortality for the longest time period possible;
• a graph of biomass relative to \( B_{\text{msy}} \), and recruitment levels for the longest time period possible.

• a graph of the stock trajectory compared to \( B_{\text{lim}} \) and/or \( B_{\text{MSY}} \) and \( Z_{\text{MSY}} \); 

• graphs and tables of total mortality (\( Z \)) and fishable biomass for a range of projected catch options (as noted in 2a) for the years 2014 to 2017 if possible. Projections should include both catch options and a range of cod biomass levels considered appropriate by SC. Results should include risk analyses of falling below \( B_{\text{MSY}} \) and \( B_{\text{lim}} \), and of exceeding \( Z_{\text{MSY}} \); a graph of the total area fished for the longest time period possible; and any other graph or table the Scientific Council feels is relevant.
**APPENDIX IV. LISTS OF RESEARCH (SCR) AND SUMMARY (SCS) DOCUMENTS**

### Research Documents

<table>
<thead>
<tr>
<th>SCR Doc. No</th>
<th>Serial No.</th>
<th>Author</th>
<th>Title</th>
</tr>
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<tbody>
<tr>
<td>SCR 13/073</td>
<td>N6237</td>
<td>Fernando González-Costas, Diana González-Troncoso, Joanne Morgan, Hilario Murua and Dorleta García</td>
<td>Robustness of the Greenland Halibut MSE to different S/R functions and different Reproductive Potential indices</td>
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### Summary Documents

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<tr>
<td>SCS Doc. 13-18</td>
<td>N66223</td>
<td>NAFO Secretariat</td>
<td>Available Data from the Commercial Fisheries Related to Stock Assessment (2012) and Inventory of Biological Surveys Conducted in the NAFO Area in 2012 and Biological Surveys Planned for 2013 and Early-2014</td>
</tr>
<tr>
<td>SCS Doc. 13-22</td>
<td>N6268</td>
<td>T. Reilly and N. Campbell</td>
<td>NAFOTools</td>
</tr>
</tbody>
</table>
### APPENDIX VI. LIST OF REPRESENTATIVES, ADVISERS, EXPERTS AND OBSERVERS, 2013

#### CANADA

**Representatives:**
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