PART I: SCIENTIFIC COUNCIL MEETING, 22-26 SEPTEMBER 2014

Contents

REPORT OF SCIENTIFIC COUNCIL MEETING

22-26 September 2014

Chair: Don Stansbury Rapporteur: Neil Campbell

I. PLENARY SESSIONS

The Scientific Council met at the Palacio de Congresos Mar de Vigo, Vigo, Spain, during 22-26 September 2014, to consider the various matters in its agenda. Representatives attended from Canada, European Union (France, Portugal, Spain and the United Kingdom), France (with respect to St. Pierre et Miquelon), 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 22 September 2014.

The Chair welcomed participants to the 36th Annual Meeting and thanked the European Union, Spain and the City of Vigo Authorities 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 the Marine Stewardship Council, Ecology Action Centre, and the FAO as observers to this meeting.

The Council and its Standing Committees met through 22-26 September 2014 to address various items in its agenda. The Council considered and adopted the reports of the STACFIS and STACREC Standing Committees on 26 September 2014. The final session was called to order at 0900 hours on 26 September 2014. The Scientific Council then considered and adopted its report of this meeting. The meeting was adjourned at 1100 hours on 26 September 2014.

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

There were no recommendations arising from the 2013 or 2014 Scientific Council Meetings.

III. RESEARCH COORDINATION

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

V. REQUESTS FROM THE FISHERIES COMMISSION

1. Requests deferred from the June Meeting

a) Availability of data and progress towards quantitative assessments (Item 10)

The Scientific Council provides advice for a number of stocks based only on qualitative assessments of survey trends and catches (e.g. Div. 3NO white hake, Div. 3O redfish). For some of these stocks the advice is to lower the TAC to recent level of catches. On the other hand, there is an important effort in biological sampling, collection of fishing activity data and fishery independent surveys. There is also an important progress in providing more data to the

Scientific Council such as VMS. In spite of these efforts, no progress has been reached regarding quantitative assessments of many stocks. The Fisheries Commission requests the Scientific Council to provide an overview for all stocks on what biological and fishery information is currently available by Contracting Party and what is necessary to improve in terms of data collection in order to develop quantitative assessments and biological reference points for stocks managed by NAFO.

Scientific Council deferred this request to its June 2015 meeting.

b) Bycatch and the development of a Div. 3LN Redfish Management Strategy (requested by WG-RBMS)

The Working Group recommends Scientific Council comment on likely by-catch levels associated with the implementation of the proposed HCR for 3LN Redfish.

Preliminary information from one fleet operating in this fishery was available to Scientific Council. Bycatch rates are variable, ranging from 5 to 40%. Bycatch in the Div. 3LN redfish fishery appears to be depth dependent. Analysis of bycatch by depth in each Division would be required to fully answer this request. It was not possible to perform such an analysis at the September meeting.

2. *Ad hoc* Requests from Current Meeting

The following requests were received during the current meeting. 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.

Cod in Div. 3M

1. It is noted that the stock of cod in 3M is rebuilding following the reduction in fishing mortality and improved recruitment and that SSB is currently estimated to be well above B_{lim} with a high probability.

The EU Flemish Cap survey taking place every year in June/July is the only fishery independent information available for the assessment of cod in Division 3M since 1988. This survey is the only tuning information used in the assessment for the years 1988-2013, since no fishing fleet catch/effort is used for tuning. The assessment of cod in Division 3M is therefore highly dependent on the data quality obtained from the EU Flemish Cap survey. In 2013, the survey was impacted by activity of oil and gas prospection by [a seismic exploration vessel] (see letter of 1 July 2013 from the Head of the scientific campaign to the Scientific Council Chair) and the estimates of Div. 3M cod 1 year olds and biomass decreased substantially in relation to 2012. The increasing trend of biomass observed since 2006 and projected by last year's assessment for 2014 and 2015 was this way inverted.

The Scientific Council is requested to:

a) Provide an opinion on the possible impact that the oil and gas prospection activity might have had in the abundance index of Div. 3M cod.

b) Compare the abundance indices of different demersal stocks of the 2013 EU Flemish Cap survey in order to assess if decreases were also observed for other demersal species in Div. 3M and if there might have been a year effect in the survey of 2013, possibly consequence of the oil and gas prospection.

c) Provide any preliminary information available of the 2014 Flemish Cap survey regarding cod in order to assess if the decrease in the abundance index is confirmed also in 2014.

Scientific Council responded:

a) Scientific Council cannot evaluate at this moment the impact of the activity of the seismic vessels on the abundance index of Div. 3M cod.

b) With the exception of cod none of the declines were substantial, and in general were a continuation of recent trends. At present it is not clear whether the 2013 survey results are due to a year-effect.

c) Preliminary information indicates the abundance decline has been confirmed, however, biomass has increased. Scientific Council will fully review these survey results during the next assessment.

2) The Scientific Council reviewed document SCR Doc. 14/018 where different assumptions over the natural mortality parameter (M) are analysed. The adopted stock assessment of 3M cod assumes a constant M over age, time and gender (estimate around 0.15) while the document indicated that M variable over three age classes and

three periods of time provides estimates of around 0.2, which are more consistent with natural mortalities assumed for other cod stocks in the NAFO and ICES areas, Therefore, despite all the uncertainty around M, the constant M assumption adopted for scientific advice seems highly unlikely when considering the biology of the stock.

The Scientific Council is requested to:

a) Compare the estimated natural mortality value for Div. 3M cod to M values used in other cod stocks in the Atlantic and explain the rationale for a divergence and possible bias introduced due to cannibalism and other natural mortality factors.

b) Provide the value of F_{max} if M = 0.2. Please provide the Biomass, Spawning Stock Biomass and yield projections for these values of F_{max}.

c) A frequent approach to estimate F_{max} is by taking the mean of the last three years for the mean weights and exploitation pattern by age (PR). However, the SC decided to take only the values of the last year to estimate F_{max}. Explain what would have been the value of F_{max} if the mean of the last three years had been used for the mean weights and PR.

d) Estimate the projected biomass (B and SSB) and the resulting fishing mortality in 2015 and 2016 with a TAC in 2015 of 14 521 t. What is the probability of the biomass to fall below B_{lim} in 2016? Please compare with the projected biomass in 2015 and 2016 for the scenario $F_{2015} = F_{max}$.

e) Assuming that the TAC is set at 10 838 t for 2015 and is fished entirely, that the biomass evolves in accordance with the projections and F_{max} is constant, provide the foreseen yield at F_{max} (=0.145) for 2016.

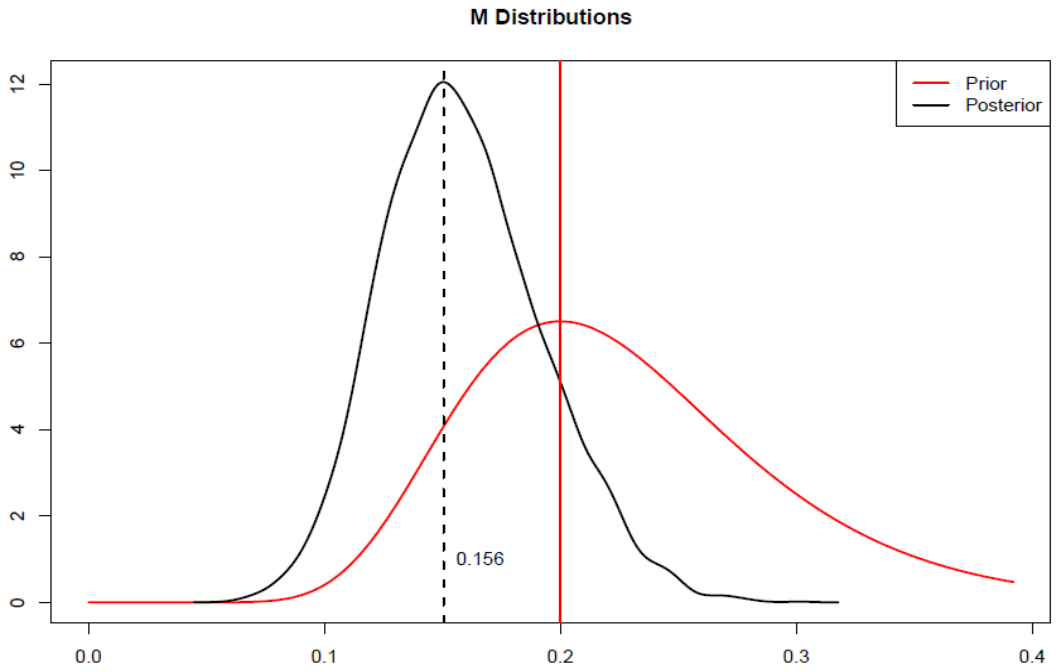
Scientific Council responded:

a) Mortality (*F* and *Z*) used in some assessments of cod are as follows:

Cod Stocks	M	*Z*
Northern Cod (Div. 2J3KL)		0.57*
Flemish Cap (Div. 3M)	0.16*	
Southern Grand Bank (Div. 3NO)	0.2	
Southern Newfoundland (Div. 3Ps)		0.44*
Gulf of St. Lawrence (Div. 3Pn4Rs)	0.2-0.4	
Southern Gulf of St. Lawrence (Div. 4TVn)	0.66*	
Eastern Scotian Shelf (Div. 4VsW)	0.36*	
Southern Scotian Shelf and the Bay of Fundy (Div. 4X5Yb)	0.76*	
Eastern Georges Bank (Div. 5Zjm)	0.8	
Gulf of Maine	0.2-0.4	
Georges Bank	0.2	
Norwegian Coastal Waters (ICES Subarea I and II (inshore))	0.2	
North-East Arctic (ICES Subareas I and II (offshore))	0.2	
Faroe Plateau (ICES Subdiv. Vb1)	0.2	

*estimated values – others are fixed

The following figure shows the input (prior) and estimated (posterior) values of M for Div. 3M cod from the 2014 assessment. The probability that M <= 0.2 is 88.1%.



Scientific Council was not able to address divergence and possible bias introduced due to cannibalism and other natural mortality factors at this meeting.

b) Scientific Council reiterates that the median value of M in Div. 3M Cod is estimated to be 0.156 in the 2014 assessment. The M=0.2 scenario constitutes a new assessment. Scientific Council thus considers these figures to be illustrative only and not a basis for management advice. If a higher value of M is assumed, yield is increased.

	F_{max} 2013 input data	
	M=0.156	M=0.2
5%	0.085	0.100
50%	0.145	0.165
95%	0.235	0.265

	M=0.156			M=0.2		
	Total Bio	SSB	Yield	Total Bio	SSB	Yield
2014	66953	44869	14521	74246	48902	14521
2015	85528	58341	10838	94311	62277	13073
2016	134970	79646		145070	81554	

c) Scientific Council took only the values for the mean weight-at-age and exploitation pattern by age in 2014 due to the strong trends seen in these values over recent years. This approach was consistent with the approach taken for mean weights in the 2013 Div. 3M cod assessment.

	F_{max}	
	SC Assessment	3-Year Average
5%	0.085	0.095
50%	0.145	0.130
95%	0.235	0.180

	SC Assessment			3-Year Average		
	Total Bio	SSB	Yield	Total Bio	SSB	Yield
2014	66953	44869	14521	76021	42770	14521
2015	85528	58341	10838	99414	61049	11962
2016	134970	79646		150535	81507	

Scientific Council considers the figures from the "3-year average" scenario to be illustrative only and not a basis for management advice.

d) *Estimate the projected biomass (B and SSB) and the resulting fishing mortality in 2015 and 2016 with a TAC in 2015 of 14 521 t. What is the probability of the biomass to fall below B_{lim} in 2016? Please compare with the projected biomass in 2015 and 2016 for the scenario $F_{2015} = F_{max}$.*

	$F=F_{max}$			Constant Catch = 14521		
	Total Bio	SSB	Yield	Total Bio	SSB	*F*
2014	66953	44869	14521	66953	44869	0.260
2015	85528	58341	10838	82450	58314	0.199
2016	134970	79646		120584	75315	

	P($B<B_{lim}$)		
	2014	2015	2016
Constant catch	<5%	<5%	<5%
Catch=F_{max}	<5%	<5%	<5%

e) Due to uncertainty in recruitment of the 2010 and 2011 years classes, Scientific Council considers that projection of management options can be provided for 2015 only. Scientific Council considers the figures for 2016 yields, SSB and biomass are illustrative only and not a basis for management advice.

	Total Bio	SSB	Yield
2014	66953	44869	14521
2015	85528	58341	10838
2016	134970	79646	18588

Redfish in Div. 3LNO

3) The Population Structure of Sebastes mentella and Sebastes fasciatus in NAFO Divisions 3LNO has been studied in the past, including the genetic markers. A conclusion is that redfish in Division 3LN and 3O are part of a same biological stock. However, at the moment, redfish in these Divisions is managed through two separated stocks. The scientific Council is therefore requested to:

a) Indicate if there is any biological reason to define two different redfish management areas in NAFO Divisions 3LNO.

b) Assess the consequence of merging the 3O and 3LN redfish stocks into a single management area with a single TAC, taking into account the possibility that the fishing effort could be more concentrated in Divisions 3LN.

a) In 2005, Scientific Council responded to a similar question from Fisheries Commission as follows:

"Regarding redfish in Divisions 3L, 3N and 3O, Scientific Council is requested to: review all available information and provide advice regarding whether the current management units (3LN and 3O) or any alternative may be the most appropriate."

In 2005, Scientific Council responded as follows:

"The Council noted that results were available from a study of redfish population structure pertinent to the long standing recommendation on the appropriateness of Div. 3LN and Div. 3O as management units (SCR Doc. 05/50). The study compared genetic and morphometric characteristics of *S. fasciatus* and *S. mentella* based on samples within Div. 3LNO and Div. 3P area. For *S. fasciatus*, the results obtained suggested no difference in the biological characters studied amongst Div. 3L, Div. 3N and Div. 3O. It further suggested that *S. fasciatus* from Div. 3LNO and from the Subdiv. 3Ps area adjacent to Div. 3O form a population that exchanges individuals with redfish in the Laurentian Channel (Div. 3P4V). Therefore Div. 3O could be influenced by migration events originating from or towards the Laurentian Channel area (Div. 3P4V). For *S. mentella*, the results suggested Div. 3L is different from the Laurentian Channel area. These results confirmed the findings of a study by Roques *et al.* (2001).

"The latter study also found no genetic difference among samples of *S. mentella* from Div. 3LN, Div. 3O and Subarea 2 + Div. 3K. The Council noted statistically non-significant genetic differences between areas could be obtained from a relatively low mixing rate between these areas.

"Most studies the Council has reviewed in the past have suggested a close connection between Div. 3LN and Div. 3O, particularly between Div. 3O and Div. 3N for both species of redfish. While many of the studies suggested a single management unit, differences observed in population dynamics between Div. 3O and Div. 3LN suggest that it would be prudent to keep Div. 3O as a separate management unit. This is also the suggestion of the 2005 study (SCR Doc. 05/50) with regard to the argument that Div. 3O may act as a buffer zone between surrounding populations."

There is no new information since 2005. SC reiterates that although there is a genetic connection between Div. 3O and Div. 3LN and other adjacent areas, differences observed in population dynamics, such as length- and age-structure of the populations, between Div. 3O and Div. 3LN suggest that it would be prudent to keep Div. 3O as a separate management unit.

b) Scientific Council responded:

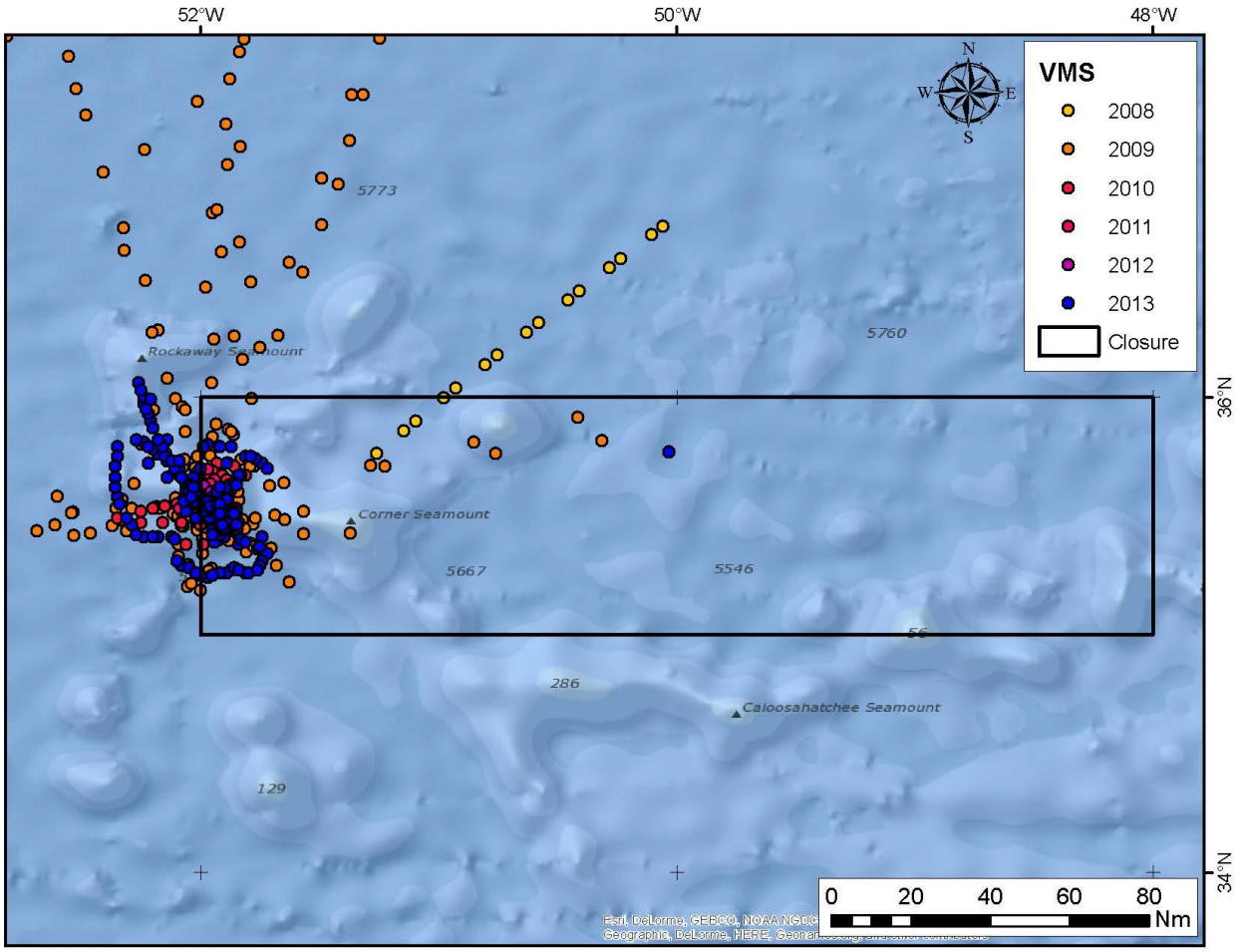
As noted in response to 3.a, the council considers that it would be prudent to keep Div. 3O as a separate management unit due to the differences observed in redfish population dynamics between the two zones and the uncertainty about the stock as a single biological unit. Given these uncertainties there would be a risk in combining the TACs from Div. 3O and Divisions 3LN. Concentrating fishing effort in Div. 3LN, with a combined TAC for Div. 3LNO, would lead to an exploitation level well above what is considered the MSY level for redfish in Div. 3LN.

Seamount Fisheries

4) The SC is requested to present records of the spatial distribution of past seamount fisheries in the NRA, including seamount fisheries with mid-water trawls, or, if appropriate, confirm that the presentation in SCS Doc. 13/20 (V.1.c)) provides a comprehensive record.

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). At the time footprint was developed there was an assumption that the seamounts were closed to bottom-trawling. The putative footprint polygons on the seamounts were therefore not included in the final footprint definition. As the exploratory protocol and management measures for seamounts evolved the perception that the seamounts were closed persisted but was not reflected in the NCEM.

Scientific Council has no reason to believe the data presented in SCS Doc. 13/20 is not comprehensive. In addition, the distribution of VMS data from 2008 – 2013 is presented below. Data from 2010 – 2013 is filtered to data at fishing speeds (0.5 – 5.0 knots).



5). The SC is requested to define the use of the term "historical" in the advice statement concerning seamount fisheries.

In this context, "historical" refers to the 20-year period used in the definition of the fishing footprint, although Scientific Council notes that the fishery for Alfonsinos on Corner Rise Seamount began earlier than this, in 1976 (Vinnichenko, 1997).

Vinnichenko, V.I., 1997. Russian investigations and deep water fishery on the Corner Rising Seamount in Subarea 6. *NAFO Scientific Council Studies*, **30,** 41–49.

Significant Adverse Impacts

6) In 2006, UNGA adopted Resolution 61/105 calling for an assessment of the risk of significant adverse impacts (SAI) of fishing activities on Vulnerable Marine Ecosystem (VME). Then FAO was invited to develop guidance to support the implementation of the Resolution and adopted international Guidelines for the Management of Deep Sea Fisheries in the High Seas in 2008 taking into account the balance between the protection of VMEs and the rational utilization of fisheries resources.

The guidelines were adopted by NAFO as measures to avoid SAI on VMEs when fishing vessels encounter VME indicator species. Article 15.10 of NCEM states that "the term "encounter" means catch of a VME indicator species above threshold levels as set out in Article 22.3." It also states that "Any encounter with a VME indicator species or merely detecting its presence is not sufficient to identify a VME."

Scientific Council (2014) reported that there are high concentrations of VME indicator species in the areas proposed for the establishment of closed areas.

Are there VME indicator species in the areas in excess of the threshold levels stipulated in Article 22.3? Are there any quantified criteria adopted by Fisheries Commission other than the threshold levels stipulated in Article 22.3?

Scientific Council responded:

The threshold levels indicated in Article 22.3 relate to amounts of VME indicator species expected to be observed in a typical commercial tow whose track goes over grounds that contain VME-indicator species at densities that correspond to VME habitats.

The thresholds used to delineate these VME habitats are not those of Article 22 of the CEM, but both reflect equivalent VME densities on the bottom.

Differences in threshold values are associated to their intended purposes: 1) a scientific threshold used to determine areas of significant concentrations of VME indicator species (i.e. VME habitat), and 2) the threshold used for the encounter provision during commercial operations mentioned in Article 22.3.

VME thresholds are determined quantitatively using a kernel density analysis. This analysis provides thresholds to identify "hotspots" in the biomass distribution derived from research vessel trawl survey data, by looking at natural breaks in the spatial distribution associated with changes in local density. These natural breaks allow defining of significant area polygons. The methodology was peer-reviewed and published in the primary literature (Kenchington *et al.,* in press). Current scientific thresholds from this method are:

Sponges:	75kg
Large gorgonian coral:	0.6kg
Small gorgonian coral:	0.15kg
Sea pens:	1.4kg

The by-catch thresholds for the encounter provision for sponges and seapens were calculated with a GIS model which used the VME indicator species data from research surveys and VMS fishing effort data to generate realistic commercial trawl by-catch. The thresholds generated for the purpose of the encounter provision in the NCEM are:

Sponges:	300kg
Sea pens:	7kg

The current by-catch threshold for coral was calculated by scaling up from a scientific threshold to the duration of a commercial tow (FC Doc. 09/06).

Corals:	60kg

Kenchington, E., F. J. Murillo, C. Lirette, M. Sacau, M. Koen-Alonso, A. Kenny, N. Ollerhead, V. Wareham and L. Beazley. 2014. Kernel density surface modelling as a means to identify significant concentrations of vulnerable marine ecosystem indicators. *PLOS ONE* (accepted).

Thorny Skate in Div. 3LNO

7) For Div. 3LNO Thorny skate, if you were to apply the same method of calculating the reference points as has been recently adopted for 3NO witch flounder (where the two highest points in the time series of the biomass index is used as a proxy for B_{msy}), can you comment on what the likelihood would be that thorny skate biomass index would be below B_{lim}.

Scientific Council responded:

The method applied to define reference points for witch flounder cannot be directly applied to thorny skate. The rationale to use the two highest points in the survey series as a proxy for B_{msy} for witch flounder in Div. 3NO was based upon both the survey biomass index as well as the corresponding trends in fishery landings, including those prior to the initiation of the survey. Given the shorter time-series of landings in Div. 3LNO thorny skate, it is unclear if there is justification to assume that this stock was near B_{msy} in the years when the highest survey values were observed. However, it is anticipated that reference points for thorny skate in Div. 3LNOPs may be developed during June 2015.

VI. MEETING REPORTS

1. Joint Fisheries Commission – Scientific Council – WGEAFFM

This joint working group met during 9 – 11 July 2014, and was chaired by Robert Day (Canada) and Andrew Kenny (EU-United Kingdom) (FC-SC Doc 14/03). The Scientific Council was advised of progress in this group by the Chairs in their presentation of the report to the joint session of Fisheries Commission and Scientific Council.

2. Joint Fisheries Commission – Scientific Council – WGRBMS

This joint working group met during 5 – 7 February 2014, and was co-chaired by Carsten Hvingel (Norway) and Kevin Anderson (Canada) (FC-SC Doc 14/02). The Scientific Council was advised of progress in this group by the Chairs in their presentation of the report to the joint session of Fisheries Commission and Scientific Council. Responses to the group are detailed under Other Business.

3. Joint Fisheries Commission – Scientific Council – WGCR

This joint working group met during 3 – 4 February 2014, and was chaired by SC Chair Don Stansbury (Canada) (FC-SC Doc. 14/01). The Scientific Council was advised of progress in this group by the Chair in their presentation of the report to the joint session of Fisheries Commission and Scientific Council. Scientific Council commented on the revised terms of reference for this group (FC-SC Doc. 14/04).

4. Fisheries Commission – WGBDS

This Fisheries Commission Working Group met at the NAFO Secretariat. 7 – 8 July 2014, and was chaired by FC Chair Sylvie Lapointe (Canada). The Scientific Council was advised of progress in this group by the Chair in her presentation of the report to Fisheries Commission.

VII. SPECIAL SESSIONS

There were no proposals for future special sessions. Scientific Council received a report on one symposium which NAFO recently co-sponsored.

1. ICES IMR Symposium: Effects of fishing on benthic fauna, habitat and ecosystem

NAFO was a co-sponsor of the symposium on the "Effects of fishing on benthic fauna and habitat: Change in ecosystem composition and functioning in response to fishing intensity, gear type and discard", 17 – 19 June 2014 in Tromsø, Norway, funding the attendance of Mariano Koen-Alonso (DFO-Canada), and two keynote speakers, Barry O'Neill (Marine Scotland-Science, UK) and Michael Kaiser (University of Bangor-UK). The Symposium was organized by Institute of Marine Research (IMR-Norway) and attended by more than 100 scientists from 18 countries including Europe, New Zealand, Australia and North America. The objectives of the symposium was to 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 symposium was structured around fisheries impacts on different seabed types and communities with sessions divided into the following themes:

- Soft bottom/infauna (macrobenthos) community composition
- Mixed bottom/epifauna and habitat forming megafauna
- Gear effects and development.

Highlights of the symposium

The Symposium covered a wide variety of topics and approaches in 44 oral presentations (including 7 key note papers) and 28 posters. Thirty papers dealt with trawling impacts on the benthic community composition and ecological functioning and 14 papers dealt with technological innovations to mitigate the trawling impact. Four papers used a modelling approach to explore trawling impacts and 2 dealt with indicators for trawling impact. The six key note papers reviewed the session topics: effects on soft bottom communities with main focus on shallow North Sea, effects on mixed bottom communities covering VMEs (e.g. coral and sponge communities) from continental shelf to deep sea mounts, bottom impact from fishing gear and gear development. The gears covered were otter trawls targeting crustaceans and roundfish, dredges targeting scallops, beam trawls targeting flatfish, and long lines.

Trawling impact

The majority of papers reported on field studies dealt with changes in benthos that was studied along a trawling intensity gradient. The studies showed that the effect of trawling was context dependent and differed between habitats. Trawling impacts were generally less in areas of high natural disturbance. Although there are difficulties around confidentiality issues and data access for VMS data they were widely used to quantify the trawling gradients. Problems related to the use of VMS data as proxy for pressure were discussed. Depending on depth, gear and bottom type quantification of pressure on the seafloor and benthos from VMS data can be a major challenge. However, results of studies attempting to collate VMS data across large geographic areas and countries were presented and looked promising.

Recovery

Relatively few studies dealt with the recovery of the benthic ecosystem, however re-growth in a protected coral reef was presented (poster).

Ecosystem functioning

Key note papers emphasized the importance of biodiversity in the functioning and resilience of benthic ecosystems. The number of papers dealing with ecosystem functioning were relatively few, in particular experimental studies in the field. Only one paper studied the effect of bioturbation on the nutrient dynamics and the benthic-pelagic coupling. Two papers used a modelling approach to study the impact of trawling on ecosystem functioning. Most other papers tackled the problem by relating the community composition in terms of functional traits (bioturbation, biodeposition, etc) with the trawling intensity. Two papers addressed the question how trawling may influence the food of benthivorous fishes.

Tool development for ecosystem based management

Few papers dealt with the development of tools to be used in fisheries management.

Gear innovations

Five papers dealt with gear innovations and studied how these may mitigate the adverse impacts on the benthic ecosystem. Promising results were reported on reducing sea bed contact by using (semi-) pelagic otter boards. Four papers studied the effect of pulse trawls tested in the North Sea flatfish and brown shrimp fisheries, either in field experiments or in laboratory experiments.

Overall, the following observations can be made.

The trait based approach to estimate the effect of trawling on ecosystem functioning is adopted globally with great expectations; however studies on mixed bottoms and large long-lived organisms are few in Europe. There is a need for empirical studies on ecosystem functioning to test the assumptions that are inherent in traits analysis due to lack of ecological information on species level.

VMS data analysis needs further standardization and more detailed quantitative descriptions of the major fishing gears used are required to estimate trawling impact at a comparable scale across regions and across fishing gears.

There is a need to develop tools to be used in integrating the benthic ecosystem in the ecosystem approach to fisheries management. First explorations were presented at the Symposium.

The research questions addressed and the approach taken are relevant and represent the state of the art.

VIII. REVIEW OF FUTURE MEETING ARRANGEMENTS

1. Scientific Council, 29 May – 11 June 2015

Scientific Council agreed that its June meeting will be held on 29 May – 11 June 2015, at St Mary's University, Halifax.

2. Scientific Council (in conjunction with NIPAG), 9 – 16 Sep 2015

An invitation to host the meeting was given by Canada to be held in St. John's, NL, Canada. This invitation was accepted by the meeting. The agreed dates are 9 – 16 September, 2015.

3. Scientific Council, 21 – 25 September 2015

Scientific Council noted that the Annual meeting will be held 21 – 25 September in Halifax, Nova Scotia, Canada, unless an invitation to host the meeting is extended by a Contracting Party.

4. Scientific Council, 3 - 16 June 2016

Scientific Council agreed that its June meeting will be held on 3 – 16 June 2016, at St Mary's University, Halifax.

5. NAFO/ICES Joint Groups

a) WGDEC, March 2015

The next meeting of the ICES – NAFO Working Group on Deepwater Ecosystems is scheduled to take place at ICES Headquarters, Copenhagen, Denmark, during March 2015.

b) NIPAG, 9 – 16 September 2015

This meeting will be held 9 – 16 September 2015, St Johns, NL, Canada.

6. NAFO SC Working Groups

a) WGESA, 18 - 27 November, 2014

The Working Group on Ecosystem Science and Assessment will meet at the NAFO Secretariat, Dartmouth, Nova Scotia, Canada, 18 - 27 November, 2014.

b) WGHARP, 17 – 21 November 2014

The next meeting of the ICES – NAFO Working Group on Harp and Hooded Seals is scheduled to take place in Quebec City, Canada, during 17 – 21 November 2014.

IX. OTHER MATTERS

1. Election of Officers – STACFEN Chair

Scientific Council thanked Estelle Couture (Canada) for her service as chair of STACFEN. Andrew Cogswell (Canada) was elected as her replacement.

2. Report of the Joint FC/SC Meeting

Scientific Council and Fisheries Commission held a joint session to review the four working groups and promote good dialogue between NAFO bodies. The Scientific Council Chair raised the issue of Scientific Council workload. Some Scientific Council representatives provided examples to illustrate the problem. The amount of request items and the diversity of the requests were compounded by delayed availability of some scientific data from the flag States and Contracting Parties to the scientists. Scientific Council appealed to Fisheries Commission to be more mindful in the formulation of request for scientific advice and to Contracting Parties to send more scientists and experts to the SC meetings.

3. Review of FAO VME Database Content

Scientific Council reviewed the content of the FAO VME database. The group suggested some revisions to content, requested a number of fields be excluded from the public release and referred instead to a WebEx meeting in early February to approve. Scientific Council requested the Secretariat to contact the Project Coordinator in advance of this meeting to clarify a number of points.

4. WG-RBMS Requests and the PA Framework

Scientific Council had extensive discussions and these are the points which were agreed and thought to be helpful to the work of the Working Group.

"Discuss the relevance and implications of having F_{lim} at F_{msy}":

1. F_{lim}=F_{msy} is a requirement under the NAFO Convention (GC doc 08/3).
2. MSY can only be obtained if uncertainty in the assessments is negligible, i.e. this implies that in general fishing is carried out at a level below MSY.
3. F_{lim}=F_{msy} means that a potential F_{target} should be lower than F_{msy}: as the uncertainty in estimation of F_{msy} grows, F_{target} must be further reduced from F_{msy} .
4. By analogy (and since F_{msy} and B_{msy} are linked in equilibrium in such a way that, if F_{msy} cannot be a target, neither can B_{msy}), B_{target} should be higher than B_{msy}. As the uncertainty in estimation of B_{msy} grows, B_{target} must be further above B_{msy}.
5. Inconsistent with current management plans that specifies B_{msy} as a target.
6. Inconsistent for some stocks where NAFO TACs imply F greater than F_{lim}.
7. F_{lim} at F_{msy} is a more conservative approach than F_{msy} as a target

"Discuss the relevance and implications of having F_{msy} as a target":

1. Not in agreement with the the NAFO Convention (GC Doc. 08/3).
2. Consistent with current management plans that specifies B_{msy} as a target
3. Consistent with advice for some stocks (e.g. Div. 3M cod) that use F_{msy} proxies as targets
4. F_{msy} as a target is a less conservative approach than F_{lim} at F_{msy}

"Consider the utility of buffers (particularly B_{buf}) in the framework and in management plans and provide advice on whether the use of buffers is considered appropriate for stocks which have B_{lim}":

1. When uncertainty can be estimated $\underline{B_{buf}}$ is not needed
2. When uncertainty cannot be quantified, the buffer can be a useful qualitative measure of uncertainty with respect to limit reference points, and may be useful to delineate stock status zones.

Scientific Council further discussed:

1. Economic optimum B is slightly larger than B_{msy}
2. In multispecies scenarios MSY is often lower than that calculated in single species analysis

5. Multispecies modelling of the Flemish Cap

Alfonso Pérez Rodríguez presented the GADCAP project, an EU Marie Curie program project which deals with the development of a GADGET (Globally applicable Area Disaggregated General Ecosystem Toolbox) multispecies model for the Flemish Cap cod, redfish and shrimp. This project started in January 2014, with a duration of two years, and will be developed under the supervision of Daniel Howell, from the Institute of Marine Research in Bergen, Norway. The isolation, its relative ecological and biological simplicity, the apparent connection in the dynamic of cod, redfish and shrimp and the availability of data from commercial fleet and research surveys, make the Flemish Cap a suitable system to develop a multispecies model.

The goals of GADCAP are

1) Monospecies models for cod, redfish and shrimp;

2) Connecting these species in a Multispecies model;

3) Management strategy evaluation (depending on the positive evolution of the project).

The most important researchers from different institutions and countries, like Spain (IIM and IEO), Portugal (IPMA) and Canada (DFO), most of them members of the Scientific Council of NAFO, are collaborating in this project, both providing survey and commercial fleet information and their long experience with these databases and the stocks being modeled.

6. Timetable of assessments

Noting the increasing workload of Scientific Council, and the upcoming analysis of Significant Adverse Impacts and review of the Greenland halibut harvest control rule, Scientific Council provided feedback to Fisheries Commission on the timetable and frequency of assessments. As a result, a number of stocks were moved from biennial to triennial assessments, or vice-versa.

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 26 September 2014 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 1300 hours on 26 September 2014. The Chair thanked the Hosts of this annual meeting and the Secretariat for their usual great support. The Chair also noted that this was long-time Secretariat's member Barbara Marshall's last annual meeting and wished her well in her retirement.

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

Chair: Kathy Sosebee Rapporteur: Barbara Marshall

The Committee met at the Palacio de Congresos Mar de Vigo, Vigo, Spain, during 26 September 2014, to consider the various matters in its Agenda. Representatives attended from Canada, European Union (Estonia, France, Portugal, Spain and UK), 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

There were no activities to report on.

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 2011-2013 up to 19 September 2014.

Country/Component	STATLANT 21A (deadline, 1 May)			STALANT 21B (deadline 31 August)		
	2011	2012	2013	2011	2012	2013
CAN-CA	24 Apr 12	21 May 13	30 Apr 14	21 May 12	21 May 13	30 Apr 14
CAN-M CAN-SF CAN-G	 14 May 12 29 Apr 12	 21 Apr 13 9 May 13			 6 Sep 13 1 Sep 13	
CAN-N	30 Mar 12	30 Apr 13	30 Apr 14	6 Sep 12	9 Sep 13	29 Aug 14
CAN-Q	19 Jun 12					
CUB	4 May 12	7 May 13				
E/BUL		21 May 13(NF)			21 May 13(NF)	
E/EST	17 May 12	2 May 13 (revised 6 Jun 13)	22 May 14	2 Sep 12	1 Sep 13	29 Aug 14
E/DNK	18 May 12	17 May 13	21 Aug 14	21 Aug 12	9 Sep 13	21 Aug 14
E/FRA-M	21 May 12	4 Jun 13	22 May 14			
E/DEU	26 Apr 12	28 May 13	28 Apr 14	7 Jul 12	1 Sep 13	29 Aug 14
E/LVA	17 May 12	22 Apr 13		24 Aug 12	6 Sep 13	
E/LTU	2 May 12	27 May 13		31 Aug 12	23 Oct 13	
E/POL	26 Apr 12 (no fishing)			26 Apr 12 (no fishing)		
E/PRT	8 May 12 (revised 29 May 12)	23 Apr 13	22 May 14	14 Nov 12	4 Oct 13	29 Aug 14
E/ESP	30 May 12	28 May 13 (revised 29 May 13)	22 May 14	3 Sep 12	30 Aug 13	25 Aug 14
E/GBR	26 Apr 12	8 May 13	23 May 14		1 Sep 13	20 Aug 14
FRO	30 Apr 12	2 Jun 13		27 Aug 12	2 June 13	12 Jun 14
GRL	19 Apr 12	30 Apr 13	5 May 14	6 Sep 12	9 Sep 13	29 Aug 14
ISL	31 May 12	23 May 13 (NF)	23 May 14	20 Aug 12	23 May 13 (NF)	8 Sep 14
JPN	25 Apr 12 (no fishing)	26 Apr 13 (NF)		25 Apr 12 (no fishing)	26 Apr 13 (NF)	
KOR						
NOR	27 Apr 12	30 Apr 13	22 May 14	2 Sep 12	6 Sep 13	26 Aug 14
RUS	29 Apr 12	21 May 13	12 May 14	6 Sep 12	24 Oct 13	28 Aug 14
USA	21 May 12	21 May 13	29 May 14			
FRA-SP	14 May 12	21 May 13		24 Aug 12	9 Sep 13	30 Jul 14
UKR						

3. Research Activities

a) Surveys Planned for 2014 and Early-2015

Designated Experts were requested to check and update the information contained in SCS Doc. 14/20.

4. Other Matters

a) Review of SCR and SCS Documents

There were no documents presented.

b) Other Business

There was no other business

5. Adjournment

The report was reviewed and the meeting was adjourned at 1000 on 26 September 2014.

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

Chair : Brian Healey Rapporteur: Various

The Committee met at the Palacio de Congresos Mar de Vigo, Vigo, Spain, during 22-26 September 2014, to consider the various matters in its Agenda. Representatives attended from Canada, European Union (Estonia, France, Portugal, Spain and UK), 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 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. The relevant institutes will be contacted to confirm the Designated Experts.

The nominated Designated Experts for 2015 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)

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-	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-	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	David Orr	Tel: +1 709-772-7343	david.orr@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@vi.ieo.es
Roundnose grenadier in SA 2+3	Fernando Gonzalez-Costas	Tel: +34 986 49 2111	fernando.gonzalez@vi.ieo.es
Cod in Div. 3M	Diana Gonzalez-Troncoso	Tel: +34 986 49 2111	diana.gonzalez@vi.ieo.es
Shrimp in Div. 3M	Jose Miguel Casas Sanchez	Tel: +34 986 49 2111	mikel.casas@vi.ieo.es

From the Instituto Nacional de Recursos Biológicos (INRB/IPIMAR), Av. de Brasilia, 1449-006 Lisbon, Portugal (Fax: +351 21 301 5948)

American plaice in Div. 3M	Ricardo Alpoim	Tel: +351 21 302 7000	ralpoim@ipimar.pt
Redfish in Div. 3M	Antonio Avila de Melo	Tel: +351 21 302 7000	amelo@ipimar.pt
Redfish in Div. 3LN	Antonio Avila de Melo	Tel: +351 21 302 7000	amelo@ipimar.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	Michael Kingsley	Tel: +299 36 1200	mcsk@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 (Fax: +45 33 96 33 33)

Roundnose grenadier in SA 0+1	Ole Jørgensen	Tel: +45 33 96 33 00	olj@dfu.min.dk
Greenland halibut in SA 0+1	Ole Jørgensen	Tel: +45 33 96 33 00	olj@dfu.min.dk

From Knipovich Polar Research Institute of Marine Fisheries and Oceanography (PINRO), 6 Knipovich Street, Murmansk, 183763, Russia (Fax: +7 8152 47 3331)

Capelin in Div. 3NO	Ivan Tretiakov	Tel: +7 8152 450568	tis@pinro.ru

From National Marine Fisheries Service, NEFSC, 166 Water St., Woods Hole, MA 02543

Northern Shortfin Squid in SA 3 & 4	Lisa Hendrickson	Tel: +1 508 495-2285	lisa.hendrickson@noaa.gov

3. Other Matters

a) Review of SCR and SCS Documents

No documents were presented.

b) Other Business

There being no other business the 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 1030 hr on 26 September, 2014.