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Northwest Atlantic Fisheries Organization

Report of the Fisheries Commission Working Group of Fishery Managers and Scientists on Vulnerable Marine Ecosystems (WGFMS-VME)

11-13 September 2012
Bergen, Norway

NAFO
Dartmouth, N.S., Canada
2012

Report of the FC Working Group of Fishery Managers and Scientists on Vulnerable Marine Ecosystems (WGFMS-VME) 11-13 September 2012 Bergen, Norway

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1. Opening of the Meeting

The Chair Bill Brodie (Canada) opened the meeting, which was held at the Norwegian Directorate of Fisheries, Bergen, at 1000hrs on Tuesday, 11 September 2012. He welcomed the participants from Canada, European Union, Norway, Russian Federation, and the USA, as well as the Scientific Council (SC) Chair (Annex 1).

2. Appointment of Rapporteur

Ricardo Federizon, (NAFO Secretariat), was appointed Rapporteur.

3. Adoption of Agenda

The provisional agenda as previously circulated was adopted (Annex 2).

4. Detailed list of VME indicator species and possibly other VME elements

Drawing on the recommendation from this WG regarding the creation of a detailed list of VME indicator species and other VME elements, the Fisheries Commission in September 2011 requested the SC to produce the list. In response, the SC at its June 2012 meeting produced the list basing it on the work of the SC WG on Ecosystem Approach to Fisheries Management (SC-WGEAFM) which met on December 2011 (see pages 37-39 of SCS Doc 12/19).

The SC Chair presented the list of VME indicator species and VME elements (Annex 3). It was noted that in the creation of the list the criteria set forth in the FAO *International Guidelines for the Management of Deep-sea Fisheries in the High Sea* was used. The black coral, although considered "iconic", did not satisfy the criteria in becoming a VME indicator species and thus it is not in the list. It was also noted that the initial intent of the list of VME elements was to inform assessments not necessarily to establish closures.

The WG agreed to forward the list of VME indicator species and other VME elements to FC with a recommendation for adoption. The list would be included as an Annex in the NAFO Conservation Measures (NCEM) and would be used in conjunction with the provisions in Chapter II of the NCEM – Bottom Fisheries in the NAFO Regulatory Area. Definition of the terms *VME indicator species* and *VME element"* in the NCEM was subsequently updated (see Annex 11).

5. GIS model for the evaluation of bycatch thresholds for sponges and other VME-defining species (e.g. corals)

As requested by FC, the SC developed the GIS model for the evaluation of bycatch thresholds for corals. The SC Chair presented the results (Annex 4; see also pages 39-43 of the SCS Doc 12/19).

The evaluation revealed that both sponges and sea pens produced similar distribution patterns between the actual and simulated fishing by catch. If a 300 kg sponge encounter threshold were in place in 2010, approximately 0.6% of the 2010 VMS-derived trawls would meet this threshold. Similarly for the sea pens, a 7 kg encounter threshold would have affected approximately 0.4% of the VMS-derived trawls.

It was emphasized that the 300- and 7-kg threshold values were used as an illustration of the probabilities of encounters that would trigger the application of move-on rules (see item 6 below).

The WG endorsed the approach of using GIS-model and highlighted the importance of providing the VMS data to the SC. The SC indicated that it would continue utilizing the GIS model in the coming year for the evaluation of bycatch thresholds for large and small gorgonians.

6. Encounter thresholds and move-on rules for groups of VME indicators including sea pens, small and large gorgonian corals, and sponge grounds

In September 2011, FC requested SC to make recommendations for encounter thresholds and move-on rules for groups of VME indicators including sea pens, small gorgonian corals, large gorgonian corals, sponge grounds and any other VME indicator species that meet the FAO Guidelines.

The SC Chair presented the response to the request (Annex 5; see also pages 43-46 of SCS Doc 12/19). SC recommends 300 kg of sponge per commercial tow (based on the median tow length of 13.8 nm as determined from the 2010 VMS) as the encounter thresholds for sponge grounds. For sea pens, the recommended threshold is 7 kg per commercial tow.

SC noted that sponge grounds are localized in narrow bands along the slope of the Grand Bank and Flemish Cap and their distribution extends to deep waters. It considers move-on rules on slope areas requiring the vessel to move to shallower areas as this will provide the highest likelihood of movement out of sponge grounds. For sea pens the potential move-on rules should include a requirement to move towards shallower waters. SC recognized that the move-on rules are complex and therefore unlikely to be put in practice.

SC noted that the encounter thresholds are a very useful tool to identify VMEs in areas where there is little survey information and the fishing activity is the main source of data. As the locations of benthic VMEs become increasingly well-defined in the NRA to support informed management though closed areas the need to implement encounter protocols gradually becomes redundant. SC considers a management through the closing of areas with significant concentrations of VMEs is the most effective measure for protecting VMEs in the NRA as it would avoid issues associated with the implementation of complex move-on rules.

The WG took note of the SC advice. It recognized practical difficulties associated with 7-kg sea pen threshold. Considering the distribution of sea pens, the WG recommends the consideration of additional area closures to protect significant concentrations of sea pends and/or introduce a 7 kg encounter threshold inside the footprint. Threshold recommendations to be forwarded to FC are presented in Annex 6.

7. Consideration of a comprehensive map of the location of VME indicator species and elements in the NRA for impact assessments

The WG produced a compilation of maps of the location of VME indicator species and elements in the NRA (Annex 7). Separate plots of the footprint and of the closed areas were included in the compilation. The maps were based on the ones that were produced by SC in response to the FC request in September 2011 (see also pp. 46-50 of the SCS Doc 12/19).

8. Workplan for the reassessments of NAFO bottom fisheries by 2016 and every 5 years thereafter

Reference was made to FC Doc 11/12 which specifies that reassessment of NAFO bottom fisheries will be reassessed in 2016 and every 5 years thereafter. FC in preparation for the reassessments requested SC to develop a workplan for completing the initial reassessment and identifying the resources and information to do so. The SC response to the request is presented in Annex 8 (see also pp. 50-52 of SCS Doc 12/19).

SC noted that many of the elements required for a fisheries assessment in the NCEM are also included in its "Roadmap for the development of an ecosystem approach to fisheries for NAFO" ("Roadmap to EAF"). It proposes the structure of fisheries assessment to be completed by 2016 to be organized in such a way that it would directly map onto the "Roadmap to EAF".

In line with the proposed framework and workplan and in recognition that the assessment of Significant Adverse Impact (SAI) is an element of EAF, the WG agreed to revise Annex I.E Part V of the NCEM (Annex 9).

The WG recognized that in the further development and consolidation of the EAF Roadmap, there is a need to modify the TOR of this WG to expand its mandate and include broader aspects of EAF. The WG agreed to forward a recommendation to this effect (Annex 10).

Also, the WG noted that the scheduled 2016 reassessment and every 5 years thereafter are not stipulated in the NCEM. It was agreed to revise Article 19.5 of the 2012 NCEM to reflect this schedule. This revision now appears as Article 20bis paragraph 2 in the draft revision of Chapter II provisions (Annex 11).

9. Interpretation of the NCEM provisions on Exploratory Fishing

Provisions in Chapter II, particularly Articles18.2 and Annex I.E Part IV of the NCEM, are ambiguous with regards to requirements for CPs and their vessels intending to engage in exploratory fisheries. It is not clear whether exploratory fisheries can proceed without prior assessment by SC and FC.

The WG noted that the intention of the Chapter II provisions is the requirement of prior assessment. In this regard relevant articles and some definition of terms were revised. The revisions are reflected in Annex 11. It was agreed that these will be forwarded to FC with a recommendation for adoption. The clarified process --- from the application of CP to engage in exploratory fisheries to the submission of the exploratory fishing report, and their assessment by FC and SC --- is illustrated in Figure 1.

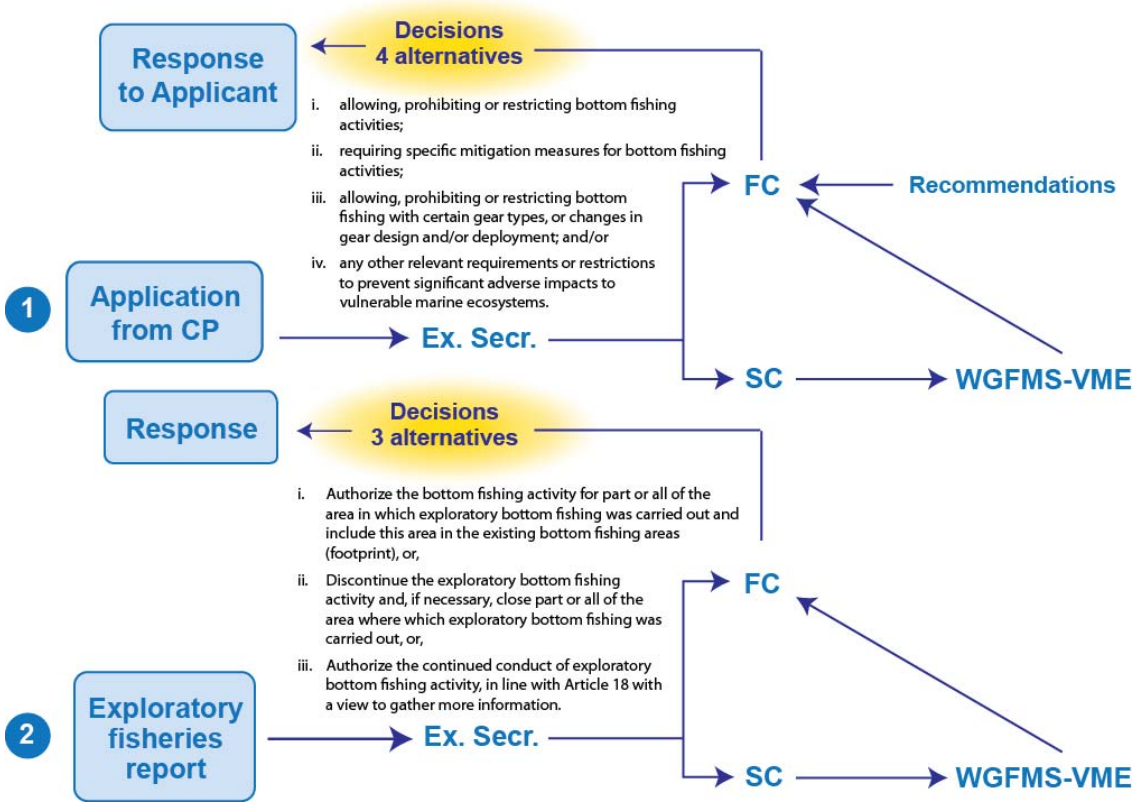

Figure 1. Flowchart describing the Exploratory Fisheries process.

10. Update from SC on its proposed Roadmap for developing an ecosystem approach to fisheries

The SC-WGEAFM was established in 2008 with the aim of establishing plans and methods for implementing at a practical level the EAFM in the NAFO Regulatory Area. It has had 4 meetings and undertaken in collaboration with the Spanish-led NEREIDA program a considerable amount of inter-sessional assessment work. A conceptual framework has been defined which highlights the essential elements of EAF and how these relate to the fisheries assessment and management needs. From this a number of priority tasks have been identified to support the fisheries assessment needs required by 2016. This includes proposals to define areas of actual and potential fishing activity, combined with an assessment of Significant Adverse Impacts and ecosystem risk.

11. Recommendations to be forwarded to the Fisheries Commission

The following are the agreed recommendations to be forwarded to the FC:

Lists of VME indicator species and elements

1. The WG recommends that the list of VME indicator species and VME elements prepared by the Scientific Council (Annex 3) be adopted in conjunction with the proposed revisions to Article 15 of the 2012 NCEM, as contained in FCWG-VME Working Paper 12/3 Revision 4 (Annex 11). These tables should be appended as Annexes in the NCEM.

Assessment of bottom fishing activities

2.1 The WG recommends that FC request SC use the revised Annex I.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.

2.2 The WG recommends the adoption of the proposed Annex I.E.V of NCEM as contained in WG WP 12/5 Revised (Annex 9).

Exploratory Fishing

3. The WG recommends the adoption of the revised provisions relating to Exploratory Fishing in Chapter II of the NCEM, as contained in FCWG-VME Working Paper 12/3 Revision 4 (Annex 11).

Thresholds (see Annex 6; FCWG-VME Working Paper 12/7 Revised)

4.1. The WG recommends 60 kg of corals excluding sea pens, inside and outside the footprint.

4.2. The WG recommends that FC consider adopting revised encounter thresholds outside the fishing footprint of 7 kg of sea pens and 300 kg for sponges.

4.3. The WG recommends that the FC, considering the distribution of sea pens and the practical considerations associated with a value of 7 kg for a threshold, consider additional area closures to significant concentration of sea pens, and/or introduce a 7 kg threshold inside the footprint.

4.4. The WG recommends 300 kg threshold for sponges inside the fishing footprint. This measure should be reviewed if refinements to the existing closures take place.

Working Group Terms of Reference, Fisheries re-assessment (Annex 10; FCWG-VME Working Paper 12/6 Revision 2)

5. Recognizing that the Performance Review Panel has noted the usefulness of increasing communication between SC and FC, and recommended further development and consolidation of the EAF Roadmap, the WG recommends that FC modify the Terms of Reference for this WG to expand its mandate to include broader aspects of EAF as part of the future dialogue between SC and FC.

12. Other Matters

There was no other matter to discuss.

13. Adoption of Report

This report was adopted through correspondence after the meeting.

14. Adjournment

The meeting was adjourned at 1730 hrs on Thursday, 13 September 2012. The Chair thanked Norway for hosting the meeting and providing excellent facilities, the participants for their input, and the Secretariat for its excellent service.

The Chair indicated that he has been in the position since the inception of the WG in 2008 and that he is stepping down in September 2012. The participants expressed their great appreciation and noted the achievements of the WG during his leadership.

Annex 1. List of Participants

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Annex 2. Agenda

1. Opening of the Meeting
2. Appointment of Rapporteur
3. Adoption of Agenda
4. Detailed list of VME indicator species and possibly other VME elements
5. GIS model for the evaluation of bycatch thresholds for sponges and other VME-defining species (e.g. corals)
6. Encounter thresholds and move-on rules for groups of VME indicators including sea pens, small and large gorgonian corals, and sponge grounds
7. Consideration of a comprehensive map of the location of VME indicator species and elements in the NRA for impact assessments
8. Workplan for the reassessments of NAFO bottom fisheries by 2016 and every 5 years thereafter
9. Interpretation of the NCEM provisions on Exploratory Fishing
10. Update from SC on its proposed Roadmap for developing an ecosystem approach to fisheries
11. Recommendations to be forwarded to the Fisheries Commission
12. Other Matters
13. Adoption of Report
14. Adjournment

Annex 3. VME indicator species and elements

(from pages 37-39 of SCS Doc 12/19)

Table 1. List of VME Indicator Species.

Benthic Invertebrate VME Indicator Species			
Common name of taxonomic group	Known Taxon	Family	Phyllum
Large-sized sponges			Porifera
	Iophon piceum	Acarnidae	
	Stelletta normani	Ancorinidae	
	Stelletta sp.	Ancorinidae	
	Stryphnus ponderosus	Ancorinidae	
	Axinella sp.	Axinellidae	
	Phakellia sp.	Axinellidae	
	Esperiopsis villosa	Esperiopsidae	
	Geodia barretti	Geodiidae	
	Geodia macandrewii	Geodiidae	
	Geodia phlegraei	Geodiidae	
	Mycale (Mycale) lingua	Mycalidae	
	Thenea muricata	Pachastrellidae	
	Polymastia spp.	Polymastiidae	
	Weberella bursa	Polymastiidae	
	Weberella sp.	Polymastiidae	
	Asconema foliatum	Rossellidae	
	Craniella cranium	Tetillidae	
Stony corals (known seamount species may not occur in abundance in the NRA)	*Lophelia pertusa*	Caryophylliidae	Cnidaria
	Solenosmilia variabilis	Caryophylliidae	
	Enallopsammia rostrata	Dendrophylliidae	
	Madrepora oculata	Oculinidae	
Small gorgonian corals	*Anthothela grandiflora*	Anthothelidae	Cnidaria
	Chrysogorgia sp.	Chrysogorgiidae	
	Radicipes gracilis	Chrysogorgiidae	
	Metallogorgia melanotrichos	Chrysogorgiidae	
	Acanella arbuscula	Isididae	
	Acanella eburnea	Isididae	
	Swiftia sp.	Plexauridae	
	Narella laxa	Primnoidae	
Large gorgonian corals	*Acanthogorgia armata*	Acanthogorgiidae	Cnidaria
	Iridogorgia sp.	Chrysogorgiidae	
	Corallium bathyrubrum	Coralliidae	
	Corallium bayeri	Coralliidae	
	Keratoisis ornata	Isididae	
	Keratoisis sp.	Isididae	
	Lepidisis sp.	Isididae	
	Paragorgia arborea	Paragorgiidae	
	Paragorgia johnsoni	Paragorgiidae	
	Paramuricea grandis	Plexauridae	
	Paramuricea placomus	Plexauridae	
	Paramuricea spp.	Plexauridae	
	Placogorgia sp.	Plexauridae	
	Placogorgia terceira	Plexauridae	

	Calyptrophora sp.	Primnoidae	
	Parastenella atlantica	Primnoidae	
	Primnoa resedaeformis	Primnoidae	
	Thouarella grasshoffi	Primnoidae	
Sea pens	*Anthoptilum grandiflorum*	Anthoptilidae	Cnidaria
	Funiculina quadrangularis	Funiculinidae	
	Halipteris cf. *christii*	Halipteridae	
	Halipteris finmarchica	Halipteridae	
	Halipteris sp.	Halipteridae	
	Kophobelemnon stelliferum	Kophobelemnidae	
	Pennatula aculeata	Pennatulidae	
	Pennatula grandis	Pennatulidae	
	Pennatula sp.	Pennatulidae	
	Distichoptilum gracile	Protoptilidae	
	Protoptilum sp.	Protoptilidae	
	Umbellula lindahli	Umbellulidae	
	Virgularia cf. *mirabilis*	Virgulariidae	
Tube-dwelling anemones	*Pachycerianthus borealis*	Cerianthidae	Cnidaria
Erect bryozoans	*Eucratea loricata*	Eucrateidae	Bryozoa
Sea lilies (Crinoids)	*Trichometra cubensis*	Antedonidae	Echinodermata
	Conocrinus lofotensis	Bourgueticrinidae	
	Gephyrocrinus grimaldii	Hyocrinidae	
Sea squirts	*Boltenia ovifera*	Pyuridae	Chordata
	Halocynthia aurantium	Pyuridae	

Table 2. List of VME indicator elements.

Physical VME indicator elements	
Seamounts	Fogo Seamounts (Div. 3O, 4Vs) Newfoundland Seamounts (Div. 3MN) Corner Rise Seamounts (Div. 6GH) New England Seamounts (Div. 6EF)
Canyons	Shelf-indenting canyon; Tail of the Grand Bank (Div. 3N) Canyons with head > 400 m depth; South of Flemish Cap and Tail of the Grand Bank (Div. 3MN) Canyons with heads > 200 m depth; Tail of the Grand Bank (Div. 3O)
Knolls	Orphan Knoll (Div. 3K) Beothuk Knoll (Div. 3LMN)
Southeast Shoal	Tail of the Grand Bank Spawning grounds (Div. 3N)
Steep flanks > 6.4º	South and Southeast of Flemish Cap. (Div. 3LM)

Annex 4. GIS modeling of VME indicator species encounters using VMS data
(pages 39-43 of SCS Doc 12/19**)**

GIS modeling of sponge encounters using VMS data (Item 16)

Fisheries Commission requested:

Given the progress made by Scientific Council on the development of the GIS model for the evaluation of bycatch thresholds for sponges as requested by Fisheries Commission in its 2010 Annual Meeting, and mindful of the need for further refining this modeling framework, as well as exploring its potential utility for its application to other VME-defining species, Fisheries Commission requests the Executive Secretary to provide to the Scientific Council anonymous VMS data in order to further develop the current sponge model as requested by the Fisheries Commission in 2010 and to assess the feasibility of developing similar models for other VME-defining species (e.g. corals).

Scientific Council responded:

The GIS model was refined to include 2010 VMS fishing effort data to generate realistic commercial trawl by-catch estimates for sponge and sea pens. Scientific Council notes the great value that the 2010 VMS data has added to the GIS modeling work and, in particular, to the estimation of biologically-based encounter thresholds. Scientific Council requests that all VMS be made available to update the model and to apply the procedure to estimate encounter thresholds for small and large gorgonian VME indicator species (see response to Request 17 below).

Model Developments

The model was used to identify when a commercial vessel has encountered an aggregation of VME indicator species using data from research vessels and simulated commercial trawl hauls. Simulated hauls are required as the actual fishery is not conducted in VME areas; however the representativeness of the simulated effort has now been checked and improved through use of the VMS data. For both sponges (Fig. 2) and sea pens (Fig. 3) the biomass layers derived from research vessel data and simulated commercial trawls were similar and identified the same high density locations for each VME.

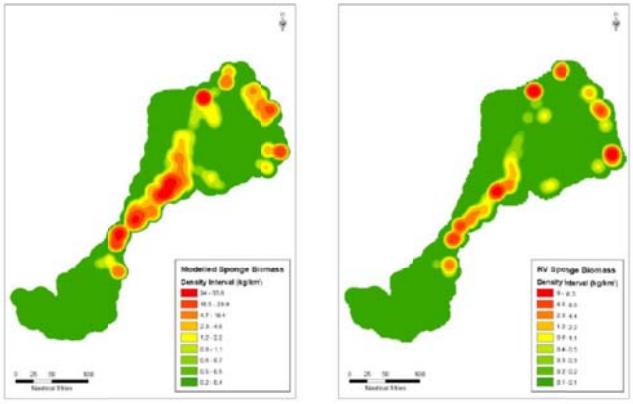


Fig. 2. Sponge biomass (kg/km^2) in the NRA estimated from simulated commercial trawls with random start locations and orientation (left) and from Spanish/EU research vessel catches (right). Note that absolute density values cannot be compared between the two areas due to the different sampling methods.

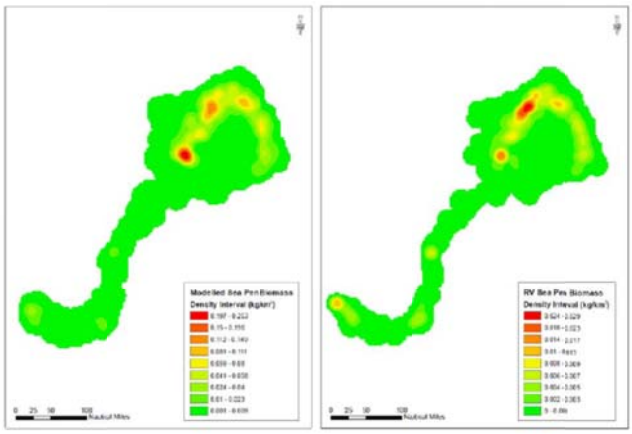
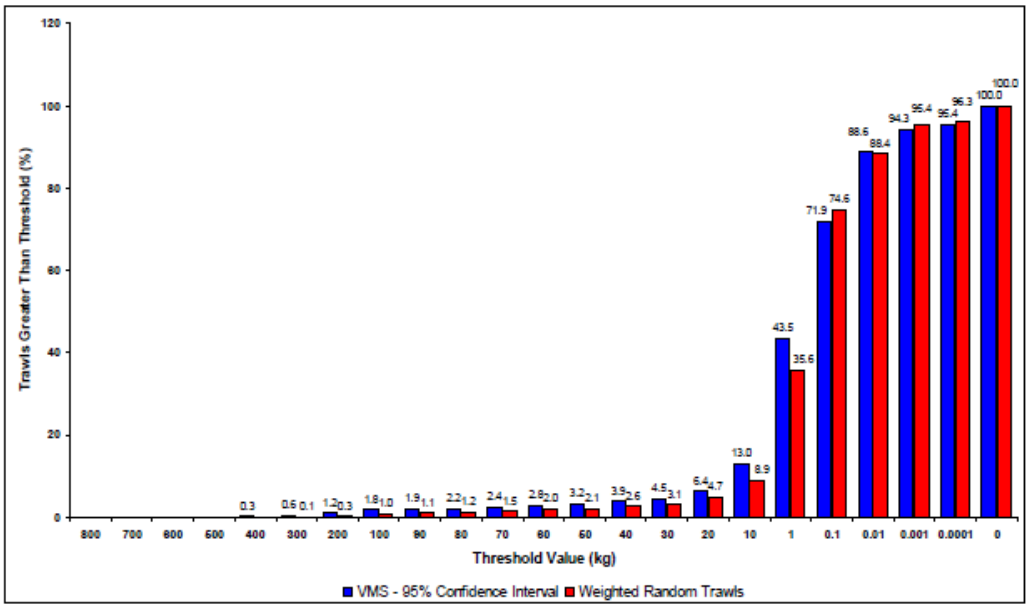


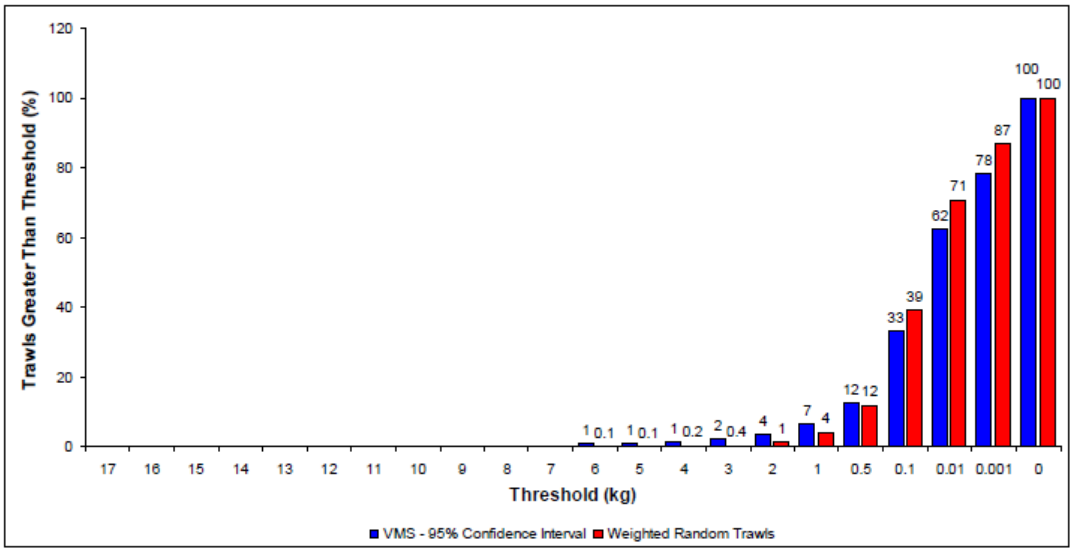
Fig. 3. Sea pen biomass (kg/km2) in the NRA estimated from simulated commercial trawls with random start locations and orientation (left) and from Spanish/EU research vessel catches (right). Note that absolute density values cannot be compared between the two areas due to the different sampling methods.

Commercial fishing tracks derived from VMS data were compared with the simulated commercial fishing tracks by randomly selecting 2000 of the former from within the 95% confidence interval of the trawl distances and comparing the catch at various thresholds with 2000 of the simulated commercial trawls (all 13.8 nm straight lines – the median of the 2010 VMS trawl distance – randomly placed and oriented in the direction of maximum effort). Both sponges (Fig. 4) and sea pens (Fig. 5) produced similar distribution patterns between the actual and simulated fishing by-catch. Figure 4 shows that if a 300 kg encounter threshold were in place in 2010 that approximately 0.6% of the 2010 VMS-derived trawls would have met this threshold. Similarly for the sea pens, a 7 kg encounter threshold would have affected approximately 0.4% of VMS-derived trawls.



	95% C.I. VMS Fishing Tracks		Weighted Random Simulation Trawls	
Threshold	Count Above Threshold	% > Threshold	Count Above Threshold	% > Threshold
800	0	0.0	0	0.0
700	0	0.0	0	0.0
600	1	0.0	0	0.0
500	0	0.0	0	0.0
400	5	0.3	0	0.0
300	11	0.6	1	0.1
200	23	1.2	5	0.3
100	35	1.8	19	1.0
90	38	1.9	22	1.1
80	44	2.2	24	1.2
70	48	2.4	29	1.5
60	55	2.8	39	2.0
50	63	3.2	41	2.1
40	78	3.9	52	2.6
30	89	4.5	62	3.1
20	127	6.4	94	4.7
10	260	13.0	178	8.9
1	869	43.5	712	35.6
0.1	1437	71.9	1492	74.6
0.01	1771	88.6	1767	88.4
0.001	1886	94.3	1908	95.4
0.0001	1907	95.4	1926	96.3
0	2000	100.0	2000	100.0

Fig. 4. Number and percentage of vessels catching sponge at various encounter threshold levels between 2000 randomly selected trawls within the 95% confidence interval of the 2010 VMS fishing track distance (blue) and 2000 simulated straight line trawls of 13. 8 nm and weighted in the direction of maximum fishing effort (red). The 300 kg encounter threshold is indicated in grey in the associated table.



Threshold	95% C.I. VMS Fishing Tracks		Weighted Random 13.8 nm Simulation Trawls	
	Count Above Threshold	% > Threshold	Count Above Threshold	% > Threshold
17	1	0	0	0.0
16	2	0.1	0	0.0
15	5	0.3	1	0.1
14	6	0.3	1	0.1
13	6	0.3	1	0.1
12	6	0.3	1	0.1
11	6	0.3	1	0.1
10	6	0.3	1	0.1
9	8	0.4	1	0.1
8	8	0.4	1	0.1
7	8	0.4	1	0.1
6	15	0.8	1	0.1
5	17	0.9	2	0.1
4	26	1.3	4	0.2
3	41	2.1	7	0.4
2	72	3.6	27	1
1	129	6.5	81	4
0.5	247	12.4	238	12
0.1	662	33.1	779	39
0.01	1245	62.3	1413	71
0.001	1560	78	1736	87
0	2000	100	2000	100

Fig. 5. Number and percentage of vessels catching sea pens at various encounter threshold levels between 2000 randomly selected trawls within the 95% confidence interval of the 2010 VMS fishing track distance (blue) and 2000 simulated straight line trawls of 13.8 nm and weighted in the direction of maximum fishing effort (red). The 7 kg encounter threshold is indicated in grey in the associated table.

The estimated area of sponge and sea pen habitat affected by trawling are illustrated in Fig. 6 and Fig. 7. The red bars mark areas of rapid change in habitat area and indicate potential thresholds for moving out of the VME habitats: ≥ 4000 kg/tow, ≥ 300kg/tow and ≥ 40 kg/tow for sponge grounds and ≥ 7 kg/tow sea pen habitats. For sponges (Fig. 2) the analyses distinguished between two types of VME sponge grounds (those dominated by *Geodia* spp. and those by *Asconema* spp.). The potential threshold of 40 kg/tow of sponge was cross referenced to physical

specimens from areas where such catches were located and shown to be produced in some cases from non-VME sponges. Therefore this threshold was not considered as a potential VME indicator level.

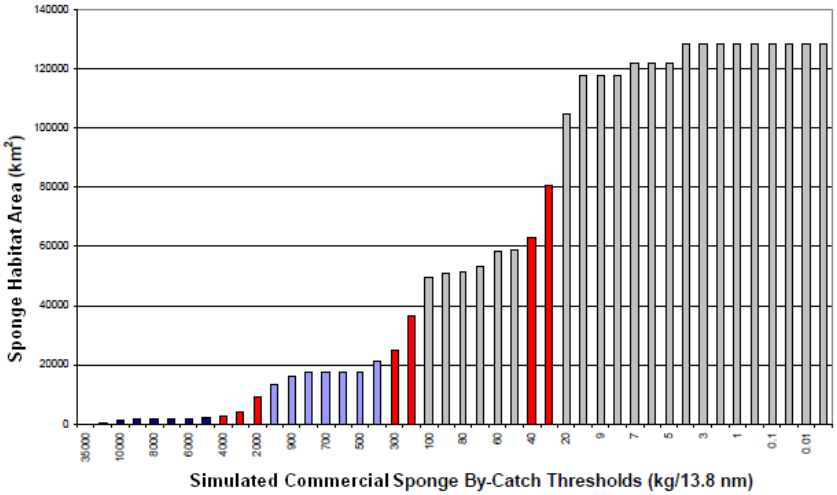


Fig. 6. Sponge habitat area occupied by successive commercial catch thresholds. Red bars indicate the levels where the greatest difference in area occupied occurred between successive catch weight values (greater than 1.3 times the area of the previous threshold). Dark blue bars correspond to the core of the *Geodia*-dominated sponge grounds. Light blue bars correspond to the VME sponge grounds for both *Geodia* -and *Asconema*-dominated habitats.

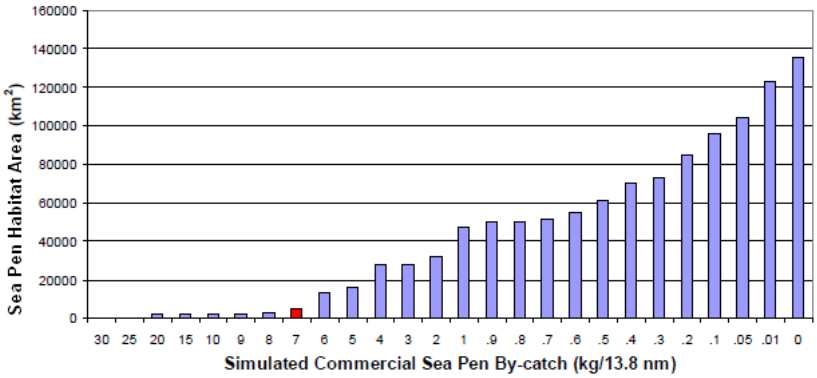


Fig. 7. Sea pen habitat area occupied by successive commercial catch thresholds. Red bars indicate the level where the greatest difference in area occupied occurred between successive catch weight values (≥ 7 kg).

Annex 5. Encounter thresholds and move-on rules

(pages 43-46 of SCS Doc 12/19)

Encounter thresholds and move on rules (Item 17)

Fisheries Commission requested:

Fisheries Commission requests the Scientific Council to make recommendations for encounter thresholds and move-on rules for groups of VME indicators including sea pens, small gorgonian corals, large gorgonian corals, sponge grounds and any other 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) the exploratory fishing area of sea mounts as applicable.

Scientific Council responded:

Candidate biologically-based encounter thresholds were established for sea pens and sponge grounds using GIS methodology applied to research vessel survey data (see response to Request 16). Similar analyses for small and large gorgonian corals and other VME indicators have not yet been performed.

Candidate move-on rules for the different groups of VME indicators were based on information on their spatial distribution. Such information was available for area 1 and parts of area 2 of the request but not for area 3. Therefore the move-on rules presented here are not applicable to the sea mounts. Scientific Council recognizes that these move-on rules are complex and unlikely to be put in practice. In the NAFO Regulatory Area fishing often takes place very close to VME areas and the proposed move-on rules in some cases could effectively remove the vessel from target species fishing ground.

Sponges

Scientific Council recommends 300 kg of sponge per commercial tow (based on the median tow length of 13.8 nm as determined from 2010 VMS data, see answer to request 16 above) as the encounter threshold for sponge grounds.

Sponge grounds are localized in narrow bands along the slope of the Grand Bank and Flemish Cap and their distribution extends to deep waters. Scientific Council therefore considers move-on rules for the slope areas that require the vessel to move to shallower areas will provide the highest likelihood of movement out of sponge grounds.

Sponge grounds occur at different depths in different areas. Different rules could therefore apply based on location (see Fig. 8 for the location of slope areas corresponding to Table 3 and following text). The move-on rule would require the vessel to move from its position to shallow water ≤ 700 m in Slope Area 1, to ≤ 1000 m in Slope Area 2, to ≤ 950 m in Slope Area 3, to ≤ 1050 m in Slope Area 4 or to ≤ 1250 m in the Sackville Spur Area 5 (Table 3). If one rule were to be implemented for all areas it would be: the vessel is required to move to shallower water ≤ 700m. The maximum move-on distance in the NRA (from 2000 m) would be 18.1 km or 9.8 nm in the shortest direction of shallower water. This would occur in Slope Area 1.

Table 3. Minimum and maximum depth ranges for sponge grounds on the continental slopes of the NRA with a maximum move-on distance based on average slope and a starting point of 2000 m, the maximum depth of the sponge grounds.

Slope Area	Shallow End of Sponge Depth Range (m)	Average Slope over Depth Range of Sponge Grounds	Estimated Maximum Distance to Move (nm)
1) Area 1	700	4.112	9.8
2) Beothuk Knoll	1000	5.011	6.2
3) SE Flemish Cap	950	4.198	7.7
4) E Flemish Cap	1050	3.861	7.6
5) Sackville Spur	1250	3.516	6.6

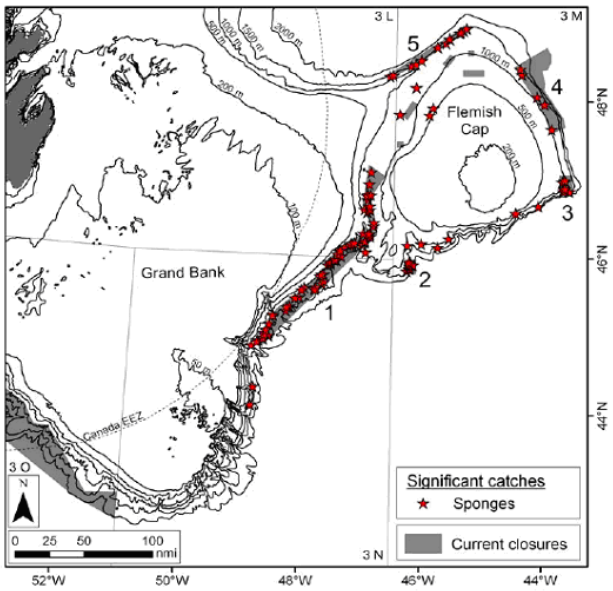


Fig. 8. Map of all significant research vessel trawl sponge catches (> 75 kg) based on Spanish/EU and Canadian bottom trawl groundfish surveys. All areas currently closed to protect significant concentrations of corals and sponges in the Divisions 3LMNO of the NRA are indicated. The numbers 1-5 indicate the areas with large sponge catches evaluated in Table 3.

Sea pens

Scientific Council recommends 7 kg of sea pens per commercial tow (based on the median tow length of 13.8 nm as determined from 2010 VMS data, see answer to request 16 above) as the encounter threshold for sea pen fields.

As for sponge grounds, Scientific Council recommends that potential move-on rules for sea pens should include the requirement to move towards shallower waters.

Scientific Council estimated that the area-specific maximum distance a vessel would have to move after an encounter (shallower direction) would range from 2.4 to 10.7 nm (Table 4). However some of the 2010 VMS fishing tracks are very close to the sea pen fields and so these move-on distances could remove vessels from fishing grounds in some cases.

Table 4. Distance from the center of each sea pen habitat area to the leading edge as illustrated Fig. 9. (note area 1 was too small for these calculations).

Polygon Number (Fig. 9)	Distance from Centre to Shallow Leading Edge (nm)
2	6.9
3	2.4
4	6.6
5	10.7
6	9.9
7	6.8

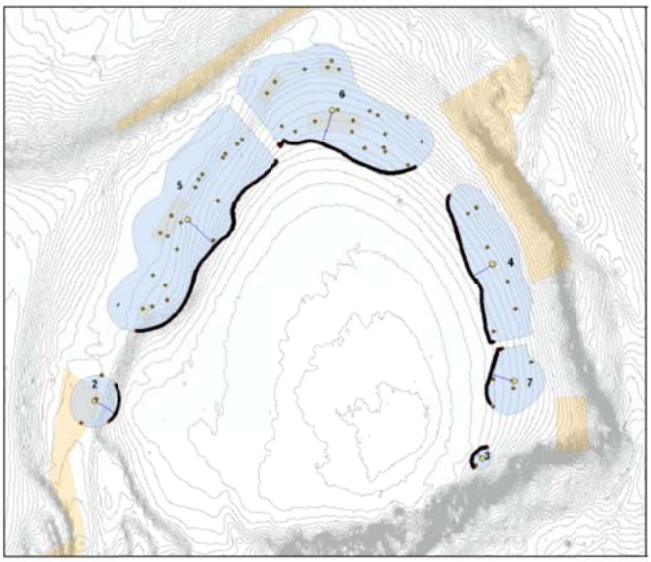


Fig. 9. Location of significant area polygons for sea pens. For each the centroid was calculated (yellow circle) and the distance to the closest edge in shallower water was determined.

Scientific Council notes that the encounter thresholds are a very useful tool to identify VMEs in areas where there is little survey information and the fishing activity is the main source of data. This applies especially to new fishing areas outside of the fishing footprint. However, as the locations of the benthic VMEs become increasingly well-defined in the NRA to support informed management through closed areas the need to implement encounter protocols gradually become redundant. Scientific Council considers a management through the closing of areas with significant concentrations of VME is the most effective measure for protecting VMEs in the NRA as it would avoid issues associated with the implementation of complex move-on rules.

In the NRA there is good annual survey coverage of the area and all of the VME locations identified to date have been defined based on survey data. Scientific Council considers that the survey information is the best source of reliable information to refine the VME locations in the NRA and recommends that the Contracting Parties continue to support all of the scientific surveys which collect these data. Further, new information from the NEREIDA research project has supported the selection of those areas and has provided new information for areas not well covered by the survey, particularly in deeper waters, on rough bottoms and on steep slopes. Scientific Council considers that as the locations of the benthic VMEs become increasingly well-defined through these efforts, appropriate closed areas put in place, and reassessed through the annual surveys, then the need to implement commercial fisheries encounter protocols in the NRA diminishes.

Annex 6. Recommended Threshold values

(FCWG-VME Working Paper 12/7 Rev)

Existing measures

The VME WG notes that the 60kg threshold for corals would be retained, other than for sea pens, if the recommendations below are accepted.

Proposed Recommendation from VME WG to FC concerning Thresholds Outside the Fishing Footprint

Recognizing the advice from SC concerning sea pens and sponges, the VME WG recommends that FC consider adopting revised encounter thresholds outside the fishing footprint of 7kg for sea pens and 300 kg for sponges.

Proposed Recommendation from VME WG to FC concerning Thresholds Inside the Fishing Footprint – sea pens

The VME WG notes that the situation inside the fishing footprint is more complex, especially in light of advice for a 7kg threshold for sea pens and that two approaches are currently available and being used: closed areas or encounter protocol.

The VME WG also noted the SC observation that as locations of concentrations of benthic VME indicator species become increasingly well-defined through survey and mapping efforts, appropriate closed areas are put in place, and re-assessed through the annual surveys. Under these conditions, the encounter provisions within the footprint become redundant. The VME WG further noted that such a situation may be emerging for corals and sponges within the footprint where management decisions have been taken or are being considered to close areas. The VME WG acknowledged that UNGA Resolution 61/105 calls for encounter provisions within the suite of measures to protect VMEs. The VME WG additionally noted that SC considers that management through the closure of areas with significant concentrations of VMEs is the most effective measure for protecting VMEs in the NRA.

With the time available to the VME WG, mapping of possible refinements to the closed areas for consideration by the FC was not possible. The WG noted however that these closures could be through modifications or refinements of some of the existing closures or some additional targeted closures.

The VME WG recommends that the FC, considering the distribution of sea pens and the practical considerations associated with a value of 7 kg for a threshold, consider additional area closures to protect significant concentrations of sea pens and/or introduce a 7kg encounter threshold.

Proposed Recommendation from VME WG to FC concerning Thresholds Inside the Fishing Footprint – sponges

The VME WG noted the approach recommended for sea pens and recommends that FC consider a similar approach for sponges. The VME WG recommends 300kg as an encounter threshold for sponge. This measure should be reconsidered if refinements to the closed areas are adopted.

Annex 7. Maps of the location of VME indicator species and elements in the NRA, footprint, and closed areas

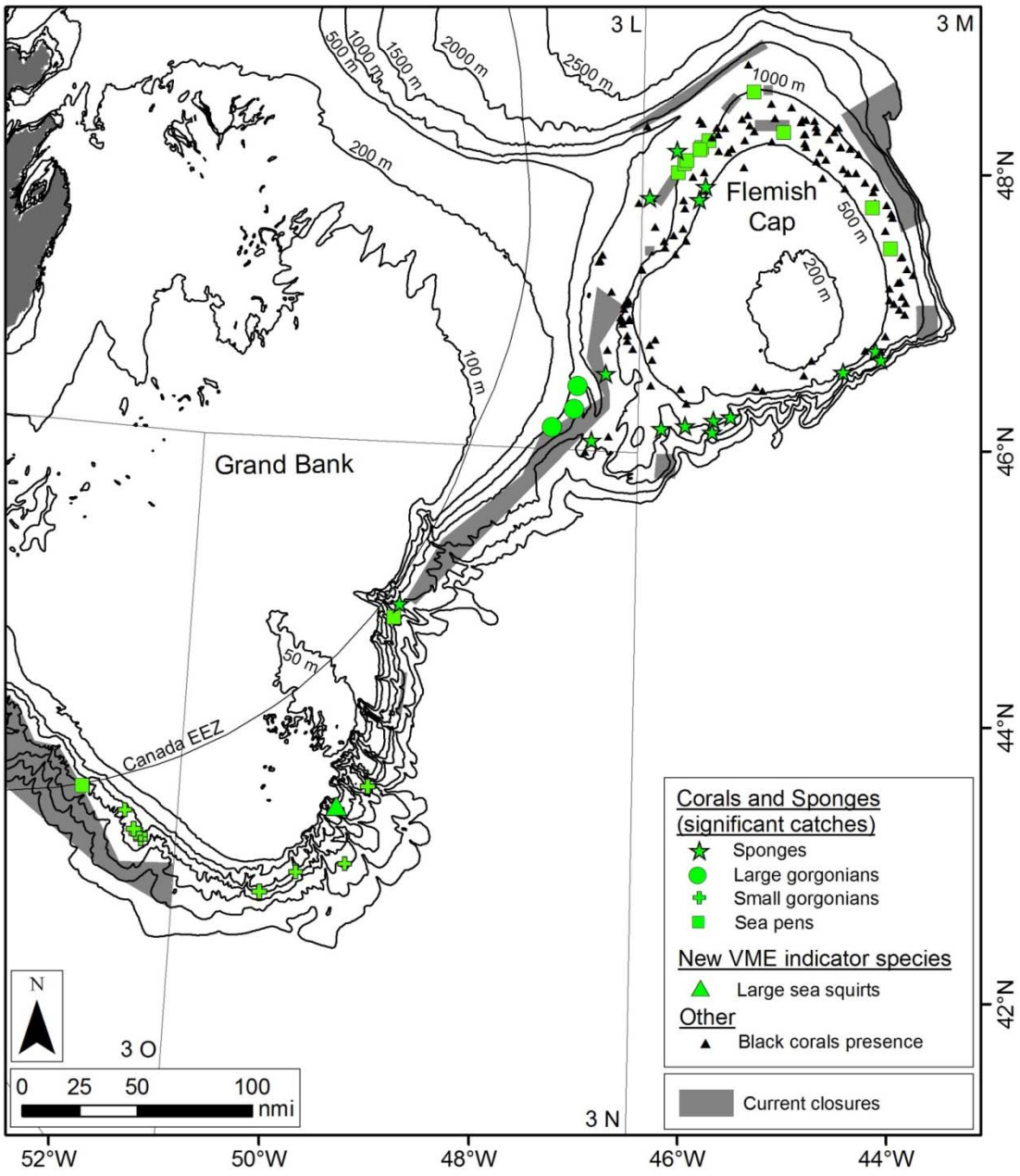


Fig. 10. Map of the location of significant research vessel trawl catches of corals and sponges and presence of black corals (Antipatharia), previously identified by the NAFO SC (NAFO 2008a, 2009) and for the period 2008-2010 and new VME indicator species (NAFO 2011), outside of the closed areas. The locations of all areas currently closed to protect significant concentrations of corals and sponges in the NRA (Divs. 3LMNO) are also indicated.

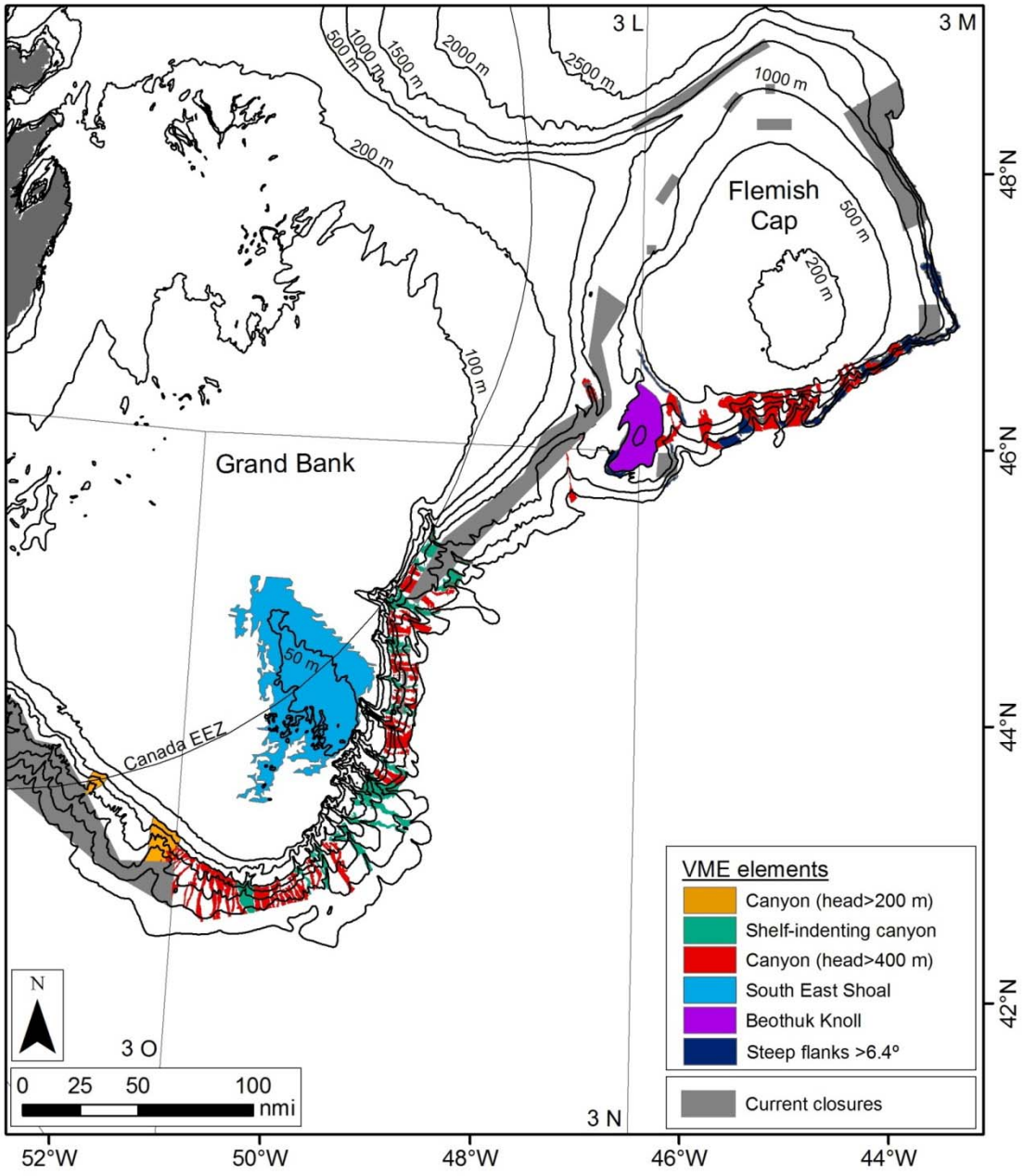


Fig. 11. Map of the VME elements previously identified by the NAFO SC (NAFO 2008b), together with the locations of the new VME elements (NAFO 2012a). The locations of all areas currently closed to protect significant concentrations of corals and sponges in the NRA (Divs. 3LMNO) are also indicated.

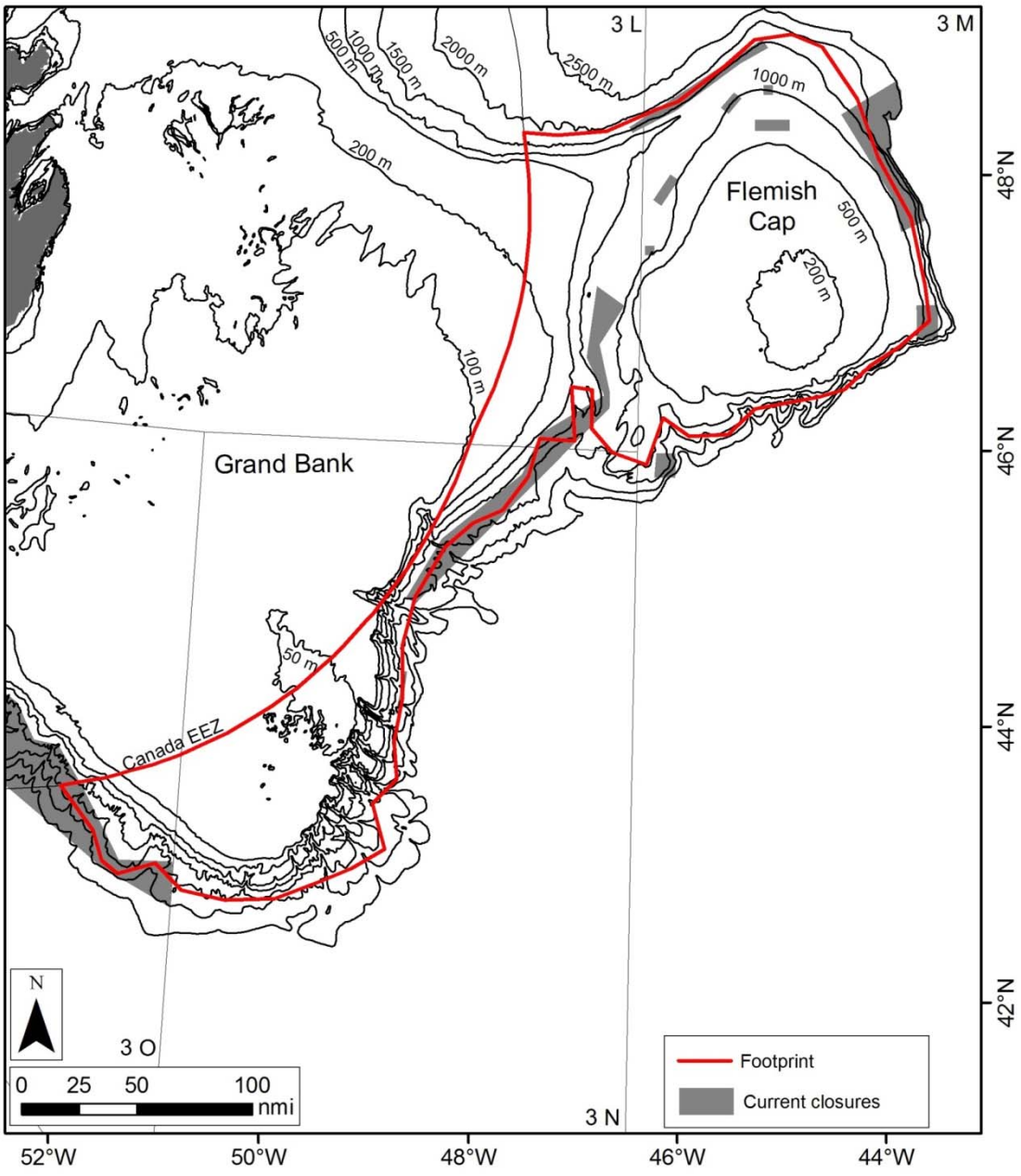


Fig. 12. Map of the footprint (NAFO, 2012b) and the locations of all areas currently closed to protect significant concentrations of corals and sponges in the NRA (Divs. 3LMNO).

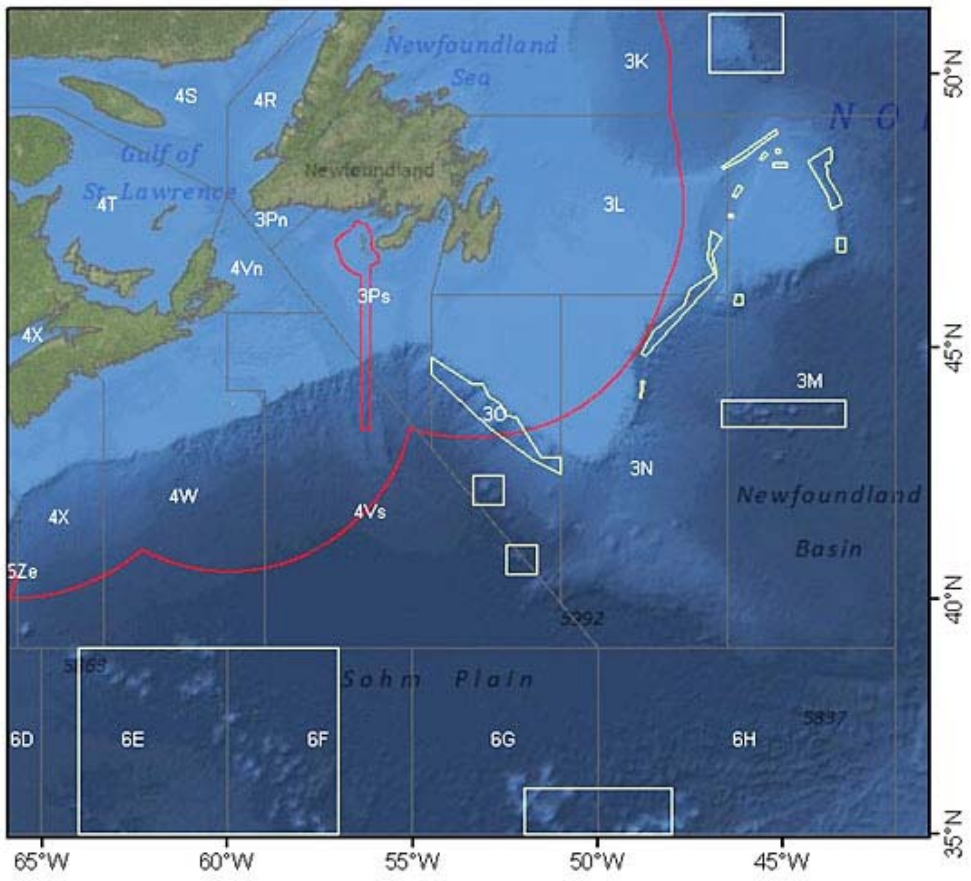


Fig.13. Map of all NAFO protection zones.

References

NAFO. 2008a. Report of the Scientific Council Meeting. 22 - 30 October 2008, Copenhagen, Denmark. Serial No. N5594, NAFO SCS Doc. 08/26, 32 pp.

NAFO. 2008b. Report of the Scientific Council Meeting. 5 - 19 June 2008, Dartmouth, Canada. Serial No. N5553, NAFO SCS Doc. 8/19, 222 pp.

NAFO. 2009. Report of the Scientific Council Meeting. 4 - 18 June 2009, Dartmouth, Canada. Serial No. N5679, NAFO SCS Doc. 9/23, 194 pp.

NAFO. 2011. Report of the NAFO SC Working Group on Ecosystem Approach to Fisheries Management (WGEAFM). 30 November - 10 December 2011, Dartmouth, Canada. Serial No. N6006, NAFO SCS Doc. 11/22, 126 pp.

NAFO. 2012a. Report of the Scientific Council Meeting. 1 - 14 June 2012, Dartmouth, Canada. Serial No. N6072, NAFO SCS Doc. 12/19, 215 pp.

NAFO. 2012b. NAFO Conservation and Enforcement Measures. Serial No. N6001. NAFO/FC Doc. 12/1, 100 pp.

Annex 8. Workplan for the reassessments of NAFO bottom fisheries
(pages 50-52 of SCS Doc 12/19)

Fisheries Commission requested:

As stated in the "Reassessment of the Impact of NAFO Managed Fisheries on known or Likely Vulnerable Marine Ecosystems" (NAFO FC WP 11/24), the Scientific Council in collaboration with the Working Group of Fishery Managers and Scientists on Vulnerable Marine Ecosystems will conduct a reassessment of NAFO bottom fisheries by 2016 and every 5 years thereafter. In preparation for reassessments, the Fisheries Commission requests the Scientific Council to develop a workplan for completing the initial reassessment and identifying the resources and information to do so.

Scientific Council responded:

Scientific Council noted that the request directs the responsibility for the fisheries assessments to Scientific Council, in collaboration with the Working Group of Fishery Managers and Scientists on Vulnerable Marine Ecosystems. The components of an assessment of bottom fishing have already been defined, based on advice from Scientific Council, and are contained in the NCEM (Chapter II, Article 19, plus Annex I.E). These requirements include not only an evaluation of fisheries impacts on VMEs, but also the management of the fisheries themselves and the assessment of their sustainability.

Scientific Council noted that many of the elements required for a fisheries assessment in the NCEM are also included in its "Roadmap for the development of an ecosystem approach to fisheries for NAFO" ("Roadmap to EAF"). Therefore, SC proposes the structure of fisheries assessment to be completed by 2016 to be organized in such a way that it would directly map onto the "Roadmap to EAF". Fig. 14 shows a schematic structure of a) how the fisheries assessments could be organized (inside rectangle in Fig. 14), and b) how it can be made into a process to make operational the "Roadmap to EAF".

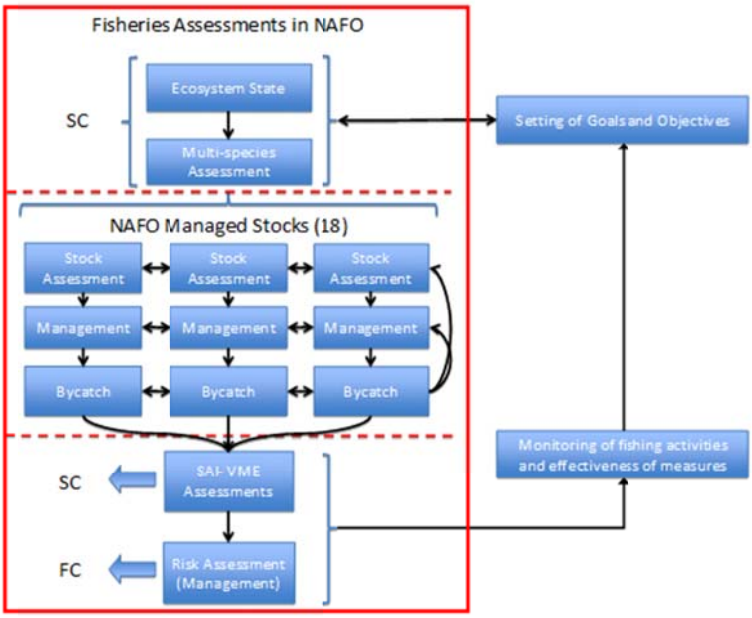


Fig. 14. Schematic representation of the structure and content of SC proposal to develop fisheries assessments. The red rectangle indicates the structure and content for the fisheries assessments themselves, while the boxes outside represent processes/mechanisms to be implemented to transform the static description of the fisheries assessment into a dynamic process to make operational the "Roadmap to EAF". (SAI – significant adverse impact; VME – vulnerable marine ecosystem).

Under this framework, there would be one assessment per ecosystem; in practice for the NRA this would likely mean one for Flemish Cap and one for the Grand Bank (with linkages to the northern NL shelf).

Scientific Council advises that a number of data sources and human resources are necessary to complete the assessments. These include:

- Contracting Parties should submit data from commercial catch, including directed species, by-catch, discards, and catches of VME indicator species, on a tow-by-tow basis.

- Accurate and ongoing maps of fishing effort in the NRA (VMS data from NAFO). This requires making VMS data available to SC in a timely fashion without an explicit FC request (i.e. change in the NCEM needed – Article 26, para. 10.d). A major improvement in data quality would be achieved if the catch information could be linked to the VMS data for the specific tow.

- Maintain or enhance research vessel information and surveys (e.g. benthic surveys, multispecies trawl surveys, oceanographic surveys). Maintaining support for programs currently providing complementary ecosystem data and analyses will also be critical.

- Human resources will also be needed to complete the work required for fisheries assessments. It is vital that CPs consider the workloads involved in the assessment process and commit to providing these resources. It is to be expected that additional resources will be needed leading to the completion of fisheries assessments in 2016 (e.g. ad hoc meetings, additional travel, contracting/hiring people, etc).

Scientific Council encourages further discussion of the proposed Scientific Council EAF framework with Fisheries Commission and/or the FC WGFMS-VME as soon as possible; noting that implementation of this approach will require considerable planning, resources, and data. This will also highlight the need for explicit and detailed objectives and goals as part of the management process.

Annex 9. Assessment of Bottom Fishing Activities
(FCWG-VME Working Paper 12/5 Rev)

Proposed Recommendation from VME WG to FC concerning Assessments

Recognizing that the current terms of reference of the WGFMS on VMEs is focused on VMEs, the WG would recommend FC consider revising Annex I E V as suggested below. This revision highlights the connections between ecosystem considerations noted by SC and the assessment of SAI on VMEs requested by FC. The WG underscores the specific nature of the assessment being considered while acknowledging how it supports broader application of EAF.

Recommends that FC request SC use the revised Annex I E V to guide development of their workplan related to reassessment of fishing activity with respect to SAI on VME and would note that this assessment is a single component of the broader EAF Roadmap being developed separately by SC.

Proposed Annex I.E. Section V. Assessment of Bottom Fisheries Activities.

V. Assessment of Bottom Fishing Activities

Assessments should consider the best available scientific and technical information on the current state of fishery resources.

Assessments should address, *inter alia*:

1. Type(s) of fishing conducted or contemplated, including vessels and gear types, fishing areas, target and potential bycatch species, fishing effort levels and duration of fishing (harvesting plan);
2. Existing baseline information on the ecosystems, habitats and communities in the fishing area, against which future changes are to be compared;
3. Identification, description and mapping of VMEs known or likely to occur in the fishing area;
4. Identification, description and evaluation of the occurrence, scale and duration of likely impacts, including cumulative impacts of activities covered by the assessment on VMEs;

4bis Consideration of VME elements known to occur in the fishing area; (New paragraph)

5. Data and methods used to identify, describe and assess the impacts of the activity, the identification of gaps in knowledge, and an evaluation of uncertainties in the information presented in the assessment;
6. Risk assessment of likely impacts by the fishing operations to determine which impacts on VMEs are likely to be significant adverse impacts; and
7. The proposed mitigation and management measures to be used to prevent significant adverse impacts on VMEs, and the measures to be used to monitor effects of the fishing operations.

Annex 10. Broadening of Working Group Terms of Reference

(FCWG-VME Working Paper 12/6, Revision 2)

Proposed recommendation from VME WG to FC

Recognizing that the Performance Review has noted the usefulness of increasing communication between SC and FC, and recommended further development and consolidation of the EAF Roadmap

The WGFMS-VME recommends that FC modify the ToR for this working group to expand its mandate to include broader aspects of EAF as part of the future dialogue between SC and FC.

Annex 11. Amendments to Chapter II of the NAFO CEM – clarification of provisions related to the exploratory bottom fishing activities – Chapter II Bottom Fisheries in the NAFO Regulatory Area
(FCWG-VME Working Paper 12/3, Revision 4)

Article 15 - Purpose and definitions

1. The purpose of this Article is to ensure the implementation by NAFO of effective measures to prevent significant adverse impacts of bottom fishing activities on vulnerable marine ecosystems known to occur or likely to occur in the Regulatory Area based on the best available scientific information. For the purposes of this Article, NAFO will take into account the guidance provided by the FAO in the framework of the Code of Conduct for Responsible Fisheries and any other internationally agreed standards, as appropriate.
2. The term 'bottom fishing activities' means bottom fishing activities where the fishing gear is likely to contact the seafloor during the normal course of fishing operations.
3. The term "existing bottom fishing areas" ("footprint") means that portion of the Regulatory Area where bottom fishing has historically occurred and is defined by the coordinates shown in Table 1 and illustrated in Figure 4.
4. The term "exploratory bottom fishing activities" means bottom fishing activities conducted in unfished bottom areas, or bottom fishing activities with significant changes to the conduct or in the technology used in the existing bottom fishing areas.
5. The term "unfished bottom areas" means other areas within the Regulatory Area which are not defined as existing bottom fishing areas.
6. The term "vulnerable marine ecosystems" has the same meaning and characteristics as those contained in paragraphs 42 and 43 of the FAO International Guidelines for the Management of Deep-Sea Fisheries in the High Seas.
7. The term "VME indicator species" refers to species of coral identified as gorgonians, *Lophelia*, and sea pen fields; crinoids; erect bryozoans; sea squirts; cerianthid anemone fields; and sponges that constitute sponge grounds or aggregations. The current list is attached as Part VI of Annex I.E.
8. The term "VME element" refers to topographical, hydrophysical or geological features which potentially support VMEs including slopes, summits and flanks of seamounts and knolls and canyons as described in the Annex of the FAO International Guidelines for the Management of Deep-Sea Fisheries in the High Seas. The current list is attached as Part VII of Annex I.E.
9. The term "significant adverse impacts" has the same meaning and characteristics as those described in paragraphs 17-20 of the FAO International Guidelines for the Management of Deep Sea Fisheries in the High Seas.
10. The term "encounter" means catch of a VME indicator species above threshold levels as set out in Article 20.3. Any encounter with a VME indicator species or merely detecting its presence is not sufficient to identify a VME. That identification should be made on a case-by-case basis through assessment by relevant bodies.

Article 16 - Seamount, Coral, and Sponge Protection Zones

1. Until December 31, 2014, no vessel shall engage in bottom fishing activities in any of the areas defined by connecting the following coordinates (in numerical order and back to coordinate 1), subject to the exception foreseen in paragraph 2.
2. A request to conduct exploratory bottom fishing activities, in any of the areas defined by paragraph 1, shall be in accordance with Article 18 and the Exploratory Protocol (Part IV of Annex I.E).
3. If a vessel fishing in any of the areas defined in paragraph 1 encounters a VME indicator species, as defined in Article 20.3, interim encounter provisions as set out in Article 20.2 will apply.
4. Until December 31, 2014, no vessel shall engage in bottom fishing activities in the following area in Division 3O defined by connecting the following coordinates (as illustrated in Figure 2).

5. Until December 31, 2014, no vessel shall engage in bottom fishing activities in the areas defined by connecting the following coordinates (as illustrated in Figure 3).

6. The measures referred to in Article 16.5 shall be reviewed in 2014 by the Fisheries Commission, taking account of the advice from the Scientific Council and the Working Group of Fishery Managers and Scientists, and a decision shall be taken on future management measures.

7. Contracting Parties are encouraged to the extent possible to record all coral and sponge catch in their annual government and/or industry research programs and to consider non-destructive means for the long-term monitoring of coral and sponges in the closed areas.

Article 17 Map of existing bottom fishing areas

Article 18 – Exploratory bottom fishing activities

1. Exploratory bottom fishing activities shall be conducted in accordance with the exploratory protocol set out in Parts I-IV of Annex I.E.
2. Contracting Parties whose vessels wish to engage in exploratory bottom fishing activities shall communicate a 'Notice of Intent to Undertake Exploratory Bottom Fishing' (Annex I.E, Parts I and IV) to the Executive Secretary together with the assessment required under Article 19(2) (i).
3. The exploratory bottom fishing activities may start only after they have been authorized in accordance with Article 19bis.
4. Contracting Parties shall ensure that vessels flying their flag and conducting exploratory bottom fishing activities have a scientific observer on board.
5. Contracting Parties shall within 3 months of the completion of the fishing trip provide an 'Exploratory Bottom Fishing Trip Report' of the results of such activities to the Executive Secretary for circulation to the Scientific Council and all Contracting Parties.

Article 19 - Assessment of proposed exploratory bottom fishing activities

Assessment for proposed exploratory bottom fishing activities in the Regulatory Area shall follow the procedure below:

i. The Contracting Party proposing to participate in exploratory bottom fishing activities shall submit to the Executive Secretary information and preliminary assessment of the known and anticipated impacts of the bottom fishing activity which will be exercised by the vessels flying its flag on vulnerable marine ecosystems.

That assessment shall be sent no less than two weeks in advance of the opening of the June meeting of the Scientific Council. It shall address the elements as set forth in Part V of Annex I.E.

The Executive Secretary shall promptly forward these submissions to the Scientific Council and the Fisheries Commission.

ii. The elaboration of that assessment shall be carried out in accordance with guidance developed by the Scientific Council, or, in the absence of such guidance, to the best of the Contracting Party's ability.

iii. At the meeting of the Scientific Council immediately following the submission of the information and preliminary assessment, the Scientific Council shall undertake an assessment of the submitted documentation, according to procedures and standards it develops and, taking into account the risks of significant adverse impacts on vulnerable marine ecosystems. The Scientific Council may use in its assessment additional information available to it, including information from other fisheries in the region or similar fisheries elsewhere.

The Scientific Council shall in line with the precautionary approach, provide advice to the Fisheries Commission on possible significant adverse impacts on vulnerable marine ecosystems and on the mitigation measures to prevent them.

Article 19bis Management measures on exploratory bottom fishing activities and for the protection of Vulnerable Marine Ecosystems

1. The Working Group of Fishery Managers and Scientists on VMEs shall examine the advice of the Scientific Council delivered in accordance with Article 19(iii) and shall make recommendations to the Fisheries Commission in accordance with its mandate.

2. The Fisheries Commission shall, taking account of advice and recommendations provided by the Scientific Council and the Working Group of Fishery Managers and Scientists on VMEs concerning exploratory bottom fishing activities, including data and information arising from reports pursuant to Article 20 adopt conservation and management measures to prevent significant adverse impacts on vulnerable marine ecosystems. These may include:

i. allowing, prohibiting or restricting bottom fishing activities;

ii. requiring specific mitigation measures for bottom fishing activities;

iii. allowing, prohibiting or restricting bottom fishing with certain gear types, or changes in gear design and/or deployment; and/or

iv. any other relevant requirements or restrictions to prevent significant adverse impacts to vulnerable marine ecosystems.

Article 19ter – Evaluation of exploratory bottom fishing activities

1. At its meeting immediately following receipt of the 'Exploratory Bottom Fishing Trip Report' circulated in accordance with Article 18(5), the Scientific Council shall evaluate the exploratory bottom fishing activities. Taking into account the risks of significant adverse impacts on vulnerable marine ecosystems, the Scientific Council shall, in line with the precautionary approach, provide advice to the Fisheries Commission on the decision to be taken in accordance with Article 19ter(3).
2. The Working Group of Fishery Managers and Scientists on VMEs shall examine the advice of the Scientific Council delivered in accordance with Article 19ter(1) and shall make recommendations to the Fisheries Commission in accordance with its mandate.
3. The Fisheries Commission shall, taking account of advice and recommendations provided by the Scientific Council and the Working Group of Fishery Managers and Scientists on VMEs, either to:
    i. Authorise the bottom fishing activity for part or all of the area in which exploratory bottom fishing was carried out and include this area in the existing bottom fishing areas (footprint), or,
    ii. Discontinue the exploratory bottom fishing activity and, if necessary, close part or all of the area where which exploratory bottom fishing was carried out, or,
    iii. Authorise the continued conduct of exploratory bottom fishing activity, in line with Article 18 with a view to gather more information.

Article 20 - Interim Encounter Provision

Contracting Parties shall require that vessels flying their flag and conducting bottom fishing activities within the Regulatory Area abide by the following rules, where, in the course of fishing operations, evidence of vulnerable marine ecosystems is encountered:

1. Existing bottom fishing areas

i. Vessels shall quantify catch of VME indicator species.

ii. if the quantity of VME indicator species caught in a fishing operation (such as trawl tow or set of a gillnet or longline) is beyond the threshold defined in paragraph 3 below, the following shall apply:

- The vessel master shall report the incident to the flag State Contracting Party, which without delay shall forward the information to the Executive Secretary, including the position that is provided by the vessel, either the end point of the tow or set or another position that is closest to the exact encounter location, the VME indicator species encountered, and the quantity (kg) of VME indicator species encountered. Contracting Parties may if they so wish require their vessels to also report the incident directly to the Executive Secretary. The Executive Secretary shall archive the information and report it to all Contracting Parties. The Contracting Parties shall immediately alert all fishing vessels flying their flag.

- The vessel master shall cease fishing and move away at least 2 nautical miles from the endpoint of the tow/set in the direction least likely to result in further encounters. The captain shall use his best judgment based on all available sources of information.

- The Executive Secretary shall make an annual report on single and multiple encounters in discrete areas within existing bottom fishing areas to the Scientific Council. The Scientific Council shall evaluate and, on a case-by-case basis the information and provide advice to the Fisheries Commission on whether a VME exists. The advice shall be based on annually updated assessments of the accumulated information on encounters and the Scientific Council's advice on the need for action, using FAO guidelines as a basis. The Fisheries Commission shall consider the advice in accordance with Article 19.4.

2. Unfished bottom areas

i. Vessels shall quantify catch of VME indicator species. Observers deployed shall identify corals, sponges and other organisms to the lowest possible taxonomical level. The Exploratory Fishery Data Collection Form found in Part III of Annex I.E shall be used (templates).

ii. If the quantity of VME indicator species caught in a fishing operation (such as trawl tow or set of a gillnet or longline) is beyond the threshold defined in paragraph 3 below, the following shall apply:

- The vessel master shall report the incident without delay to its flag state Contracting Party, which shall forward the information to the Executive Secretary, including the position that is provided by the vessel, either the end point of the tow or set or another position that is closest to the exact encounter location, the VME indicator species encountered, and the quantity (kg) of VME indicator species encountered. Contracting Parties may if they so wish require their vessels to also report the incident directly to the Executive Secretary. The Executive Secretary shall archive the information and without delay transmit it to all Contracting Parties. The Contracting Parties shall issue an immediate alert to all vessels flying their flag.

- The vessel shall cease fishing and move away at least 2 nautical miles from the endpoint of the tow/set in the direction least likely to result in further encounters. The captain shall use his best judgment based on all available sources of information.

- The Executive Secretary shall at the same time request Contracting Parties to implement a temporary closure of a two mile radius around the reporting position. The reporting position is that provided by the vessel, either the endpoint of the tow/set or another position that the evidence suggests is closest to the exact encounter location.

- The Executive Secretary shall make an annual report on single and multiple encounters in discrete areas within existing bottom fishing areas to the Scientific Council. This report should also include reports from the exploratory bottom fishing activities conducted in the last year. The Scientific Council at its next meeting shall examine the temporary closure. If the Scientific Council advises that the area consists of a vulnerable marine ecosystem the Executive Secretary shall request Contracting Parties to maintain the temporary closure until such time that the Fisheries Commission has adopted conservation and management measures in accordance with Article 19bis.2. If the Scientific Council does not conclude that

the proposed area is a VME, the Executive Secretary shall inform Contracting Parties which may re-open the area to their vessels.

- The Executive Secretary shall make an annual report on archived reports from encounters in unfished bottom areas to the Scientific Council. This report shall also include reports from the exploratory bottom fishing activities that were conducted in the last year. The Scientific Council shall evaluate the information and provide advice to the Fisheries Commission on the appropriateness of temporary closures and other measures. The advice should be based on annually updated assessments of the accumulated information on encounters as well as other scientific information. The Scientific Council's advice should reflect provisions outlined in the FAO guidelines. The Fisheries Commission shall consider the advice in accordance with Article 19bis.2.

3. For both existing bottom fishing areas and unfished bottom areas, an encounter with primary VME indicator species is defined as a catch per set (e.g. trawl tow, longline set, or gillnet set) of more than 60 kg of live coral. For unfished bottom areas, an encounter with primary VME indicator species is defined as a catch per set (e.g. trawl tow, longline set, or gillnet set) of more than 400 kg of sponges. For existing bottom fishing areas (the "footprint"), an encounter with primary VME indicator species is defined as a catch per set (e.g. trawl tow, longline set, or gillnet set) of more than 600 kg of sponges. These thresholds are set on a provisional basis and may be adjusted as experience is gained in the application of this measure.

Article 20bis: Reassessment of bottom fishing activities

1. The Scientific Council, with the co-operation of Contracting Parties, shall identify, on the basis of best available scientific information, vulnerable marine ecosystems in the Regulatory Area and map sites where these vulnerable marine ecosystem are known to occur or likely to occur and provide such data and information to the Executive Secretary for circulation to all Contracting Parties.

2. Fisheries Commission will in collaboration with the Scientific Council and the Working Group of Fishery Managers and Scientists on VMEs conduct a reassessment in 2016 and every 5 years thereafter of bottom fishing activities, or when there is new scientific information indicating a VME in a given area. Following the assessment, the Fisheries Commission shall take the necessary actions to protect VMEs.

Article 21 – Review

The provisions of this Chapter shall be reviewed by the Fisheries Commission at its Annual Meeting in 2014.

Annex I.E Templates for the conduct of exploratory bottom fishing activities

IV. Exploratory Protocol

The Exploratory Protocol shall consist of:

- A harvesting plan which outlines target species, dates and areas. Area and effort restrictions should be considered to ensure fisheries occur on a gradual basis in a limited geographical area.
- A mitigation plan including measures to prevent significant adverse impact to vulnerable marine ecosystems that may be encountered during the fishery.
- A catch monitoring plan that includes recording/reporting of all species caught, 100% satellite tracking and 100% observer coverage. The recording/reporting of catch should be sufficiently detailed to conduct an assessment of activity, if required.
- A data collection plan to facilitate the identification of vulnerable marine ecosystems/species in area fished.

V. Assessment of Bottom Fishing Activities <new text of WP 12/5>

VI. List of VME indicator species <table to be inserted>

VII. List of physical VME indicator elements <table to be inserted>