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Report of the

# FAO WORKSHOP ON ENCOUNTER PROTOCOLS AND IMPACT ASSESSMENTS FOR DEEP-SEA FISHERIES IN AREAS BEYOND NATIONAL JURISDICTION

Arendal, Norway, 5–8 May 2015

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
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## PREPARATION OF THIS DOCUMENT

This is the report of an FAO workshop on encounter protocols and impact assessments for deep-sea fisheries in areas beyond national jurisdiction that took place in Arendal, Norway, from 5 to 8 May 2015. The workshop was organized by FAO, with support from the Norwegian Institute of Marine Research. In total, 26 participants attended the workshop in their individual capacities as regional experts on the subjects of encounter protocols and impact assessments, their development and uses. The workshop was organized as part of the FAO Deep-sea Fisheries Programme, which supports the implementation of the *International Guidelines for the Management of Deep-sea Fisheries in the High Seas*. These guidelines provide guidance to States and regional fisheries management organizations or arrangements to ensure the long-term conservation and sustainable use of deep-sea marine living resources in the high seas, including preventing significant adverse impacts on vulnerable marine ecosystems.

The workshop was financed with the support of two of the projects under the FAO Deep-sea Fisheries Programme: "Support for the implementation of the International Guidelines on the Management of Deep-sea Fisheries in the High Seas" funded by Norway, and "Fisheries Management and Marine Conservation within a Changing Ecosystem Context – deep-sea fisheries component" funded by Japan. The workshop addressed key issues identified in relation to the management of deep-sea fisheries in the high seas, and directly contributed to the goal and objectives of the Global Environment Facility-funded ABNJ Deep Seas Project: "Sustainable Fisheries Management and Biodiversity Conservation of Deep-sea Living Marine Resources and Ecosystems in the Areas Beyond National Jurisdiction".

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## ABSTRACT

The FAO workshop on encounter protocols and impact assessments in deep-sea fisheries in areas beyond national jurisdiction took place in Arendal, Norway, from 5 to 8 May 2015. The overall objectives of the workshop were to share experiences and lessons learned in i) the development and implementation of encounter protocols designed to protect vulnerable marine ecosystems from the impacts of bottom fishing activities in the areas beyond national jurisdiction , and ii) the development and use of impact assessments for deep-sea bottom fisheries. The workshop discussed regional encounter protocols and impact assessments as fisheries management tools in the context of the sustainable use of deep-sea resources and protection of vulnerable marine ecosystems. In this context, encounter protocols are used to prevent significant adverse impacts on vulnerable marine ecosystems from bottom fishing activities, while impact assessments are to assess the potential ecosystem impacts of a fishery. The need to develop encounter protocols and impact assessments have been referred to in various international *fora*, and global and regional instruments contain guidance on how to develop these tools. As such, regional fishery management organizations or arrangements (RFMO/As) have developed and adopted conservation and management measures that address encounter protocols and require impact assessments of bottom fisheries. The workshop concluded by identifying areas of challenges for the implementation and use of encounter protocols and impact assessments, and developed a suite of key messages for both concepts that will be used to inform further regional and global discussions on the use of the these tools.

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## ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| **ABNJ** | areas beyond national jurisdiction |
| **EIA** | environmental impact assessment |
| **EEZ** | exclusive economic zone |
| **GFCM** | General Fisheries Commission for the Mediterranean |
| **IEO** | Instituto Español de Oceanografía |
| **IUCN** | International Union for Conservation of Nature |
| **IUCN-FEG** | International Union for Conservation of Nature – Fisheries Expert Group |
| **NAFO** | Northwest Atlantic Fisheries Organization |
| **NEAFC** | North East Atlantic Fisheries Commission |
| **NPFC** | North Pacific Fisheries Commission |
| **PECMAS** | Permanent Committee on Management and Science |
| **RFMO/A** | Regional Fisheries Management Organization or Arrangement |
| **SAIs** | significant adverse impacts |
| **SEAFO** | South East Atlantic Fisheries Organisation |
| **SIODFA** | Southern Indian Ocean Deepsea Fishers Association (Southern Indian Ocean Deepsea Fishers Association |
| **SPRFMO** | South Pacific Regional Fisheries Management Organisation |
| **UNGA** | United Nations General Assembly |
| **VME** | vulnerable marine ecosystem |
| **VMS** | vessel monitoring system |
| **WGDEC** | Working Group on Deepwater Ecology (ICES) |

## GENERAL BACKGROUND

1. The management of bottom fisheries and the protection of ecosystems in areas beyond national jurisdiction (ABNJ) have received increased attention at the international level during the last decade. Following the World Summit on Sustainable Development in 2002, the United Nations General Assembly (UNGA) resolution 57/141 (2002) called on States to develop national, regional and international programmes to halt the loss of marine biodiversity, in particular, fragile ecosystems (para 51), to eliminate destructive fishing practices (para 52), and requested the Secretary-General to convene a meeting of the Consultative Process to discuss, among other matters, the protection of VMEs (paras 61 and 62(a)).

2. Four years later, the UNGA adopted Resolution 61/105 (2006), which called for action from states and regional fisheries management organizations or arrangements (RFMO/As) to sustainably manage fish stocks and protect VMEs, and to regulate bottom fisheries in accordance with the precautionary and ecosystem approaches (para 80). In particular, members of RFMO/As with the competence to regulate bottom fisheries should assess whether bottom fishing activities would have significant adverse impacts on VMEs (para 83a), to close those areas to bottom fishing if VMEs are known or likely to occur (para 83c), and to cease bottom fishing activities where VMEs have been encountered in the course of fishing operations (para 83d).

3. To assist states and RFMO/As in implementing this recommendation, FAO developed, through a consultative process, the *International Guidelines for the Management of Deep-Sea Fisheries in the High Seas*[1] (hereafter, Deep-sea Fisheries Guidelines), which were adopted in 2008, and contain recommendations for encounter protocols[2] and impact assessments[3].

4. Subsequently, the UNGA adopted Resolution 64/72 (2009), which builds on the assessments called for in UNGA Resolution 61/105, paragraph 83(a) (para 119(a)), and calls upon RFMO/As to establish and implement appropriate protocols for the implementation of UNGA Resolution 61/105, paragraph 83(d) on VME encounters, including definitions of what constitutes evidence of a VME encounter, threshold levels, and VME indicator species (para 119(c)).

5. At a meeting organized in Busan, Republic of Korea, in 2010[4], called for a review and of further discussions on the use and applicability of encounter protocols and impact assessments, drawing on the lessons learned from the deep-sea RFMO/As that have been working on addressing this issue. In particular, the Busan meeting participants highlighted the need to compile best practices and develop relevant guidance on the use of impacts and risk assessments, encounter protocols and related mitigation measures, in particular the move-on rule embedded in the protocols.

6. To address these needs, this workshop was formulated as an integral part of the FAO Deep-sea Fisheries Programme and the ABNJ Deep Seas Project (under the ABNJ Programme), with the overall aim of supporting States and RFMO/As with the implementation of FAO's Deep-sea Fisheries Guidelines.

## WORKSHOP ARRANGEMENTS AND OPENING SESSION

7. The workshop took place at the Thon Hotel in Arendal, Norway, from 5–8 May 2015. The 26 participants (listed in Appendix A) included regional experts attending in their personal capacities to share experiences and lessons learned on encounter protocols and impact assessments.

[1] http://www.fao.org/docrep/011/i0816t/i0816t00.htm
[2] FAO Deep-sea Fisheries Guidelines, paras 67–69
[3] FAO Deep-sea Fisheries Guidelines, paras 47–53
[4] http://www.fao.org/docrep/014/i2135e/i2135e00.pdf

8. Ms Merete Tandstad, Fishery Resources Officer with the Food and Agriculture Organization of the United Nations (FAO), opened the workshop and thanked the Norwegian Institute for Marine Research (IMR) for their assistance in planning and organizing the meeting. Mr Odd Aksel Bergstad, Principal Scientist at IMR, welcomed everyone to the meeting on behalf of his organization and noted the importance of encounter protocols and impact assessments as management measures to protect vulnerable marine ecosystems (VMEs) from bottom fishing impacts.

9. Mr Bergstad was appointed Chair for the encounter protocols session of the meeting and Mr Terje Løbach, Director at the Norwegian Directorate of Fisheries, was appointed Chair for the impact assessments session. Both appointments were unanimously agreed.

10. The agenda (Appendix B) was adopted without amendment.

**Workshop objectives and expected outputs**

11. The overall objective of the workshop was to facilitate the sharing, among regions, of experiences and lessons learned on VME encounter protocols and on impact assessments. The workshop discussed the use of VME indicator species and the setting of associated thresholds for encounter protocols as well as global experiences in conducting impact assessments for bottom fisheries. More generally, participants discussed the various management tools currently used both to ensure that fisheries are sustainable under an ecosystem approach to fisheries and for the protection of VMEs. The workshop was technical in nature and was intended to stimulate informal dialogue and exchange among regional experts involved in deep-sea fisheries.

12. A background paper on encounter protocols, providing details on the specifics of the different protocols currently in use, was circulated to participants prior to the meeting, Similarly, two background notes on impact assessments, their content and use, were also provided. The background papers were used as "baselines" for workshop discussions and were updated based on comments received. It was clarified that the upcoming FAO publication on "Vulnerable marine ecosystems: Processes and practices in the high seas" would also include sections on the regional encounter protocols.

**SESSION 1: ENCOUNTER PROTOCOLS**

**Encounter protocols — A global overview**

13. A global overview on encounter protocols was presented by Mr Trevor Kenchington, consultant with FAO. In December 2006, the UNGA called on RFMO/As to require fishing vessels that encounter VMEs to cease bottom fishing in the area where the encounter was made and report the encounter so that appropriate measures can be made (UNGA Resolution 61/105, para 83(d)). Most RFMO/As with a mandate to regulate bottom fisheries in the ABNJ have responded with some form of encounter protocol. Two distinct approaches have emerged, one originally developed by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), primarily for longlining in the Southern Ocean, and the other by the Northwest Atlantic Fishery Organization (NAFO) and the North East Atlantic Fisheries Commission (NEAFC), primarily for trawl fisheries in the North Atlantic. New Zealand has adopted a unique approach for its vessels fishing in South Pacific ABNJ, while Australia independently developed a protocol similar to the North Atlantic approach.

14. Most deep-sea fishing in the Southern Ocean is longlining for toothfish. CCAMLR has frozen the footprint of the fishery and requires assessments, 100% observer coverage, and extensive reporting. From 2008, an encounter protocol has applied in most of CCAMLR's Convention Area. To facilitate its application, fishing lines are marked in "line segments" of 1 000 hooks or 1 200 m, whichever is shorter. The *VME Taxa Classification Guide*[5] defines the VME indicator taxa and aids observers in their

[5] https://www.ccamlr.org/en/document/publications/vme-taxa-classification-guide

identification. The amount of those indicators taken on each line segment is quantified in "VME indicator units", each comprising either 1 L or 1 kg of benthos. If five or more indicator units are caught on the same line segment, the vessel is required to report the event. When CCAMLR receives five or more such reports from any one half-degree rectangle, the Secretariat notifies fishing vessels and their flag States, though all are free to continue fishing. If a single line segment takes ten or more indicator units, the vessel concerned is required to remove its gear from a one-mile radius "risk area" centred on the midpoint of the segment. On receiving a report of such a catch, CCAMLR immediately closes the risk area, notifying flag States and vessels. Risk areas remain closed to commercial fishing until reviewed. In May 2015, CCAMLR had received 156 notifications of catches exceeding five indicator units, while 64 risk areas had been closed. No reviews had yet been undertaken at the time of the workshop.

15. In response to the UNGA resolutions, NAFO and NEAFC have defined fishery footprints effectively restricting fishing to those areas, and instituted extensive closures, portions of which close parts of each footprint. Those measures are supported by an encounter protocol. As adopted in 2008, that was identical across the North Atlantic but each RFMO has since developed it in regionally specific ways. For the northwest Atlantic, NAFO currently has science-based per-set thresholds of 7 kg of sea pens, 60 kg of other live corals and 300 kg of live sponges. There is a list of VME indicator species within each of those three major taxa. Should any threshold be breached, the vessel concerned would be required to report it and to move at least two miles from the end point of the set. Only if the encounter occurred during exploratory fishing outside the footprint would the two-mile circle be closed to other vessels. In the northeast Atlantic, NEAFC has thresholds for trawling of 30 kg live coral and 400 kg live sponge, per set, each being limited to a list of taxonomic Families. Should either threshold be breached, the trawler would be required to move outside a polygon extending two miles either side of the track of the set. On receipt of a report of the encounter, NEAFC would close that polygon to all vessels, pending review. For the longline fisheries in its Regulatory Area, the Commission has recently adopted a variant of the CCAMLR approach. Without the 100% observer coverage of the Southern Ocean, however, NEAFC did not set the threshold by weight or volume but as the presence of VME organisms on 10 or more hooks per 1 000 hooks (or 1 200 m if shorter) line segment. Should that threshold be breached, the required two-mile movement would be away from the point where the encounter was judged to have occurred and the resulting circle would be closed to all, until reviewed. In practice, there have not been any reports to either NAFO or NEAFC of any breaches of their encounter protocol thresholds.

16. In the southeast Atlantic, the South East Atlantic Fisheries Organisation (SEAFO) has largely limited bottom fishing to an established footprint and instituted closures. From 2009, an encounter protocol much like NAFO's has been in place. It now applies only to trawlers and has thresholds of 60 kg of coral and 400 to 600 kg of sponges. From 2011, SEAFO adopted a CCAMLR-like protocol for longliners and pot fishing, although the list of indicator organisms is simpler.

17. Early in the process leading to the formation of the South Pacific Regional Fisheries Management Organisation (SPRFMO), the participating countries agreed to interim measures to protect VMEs, including a requirement for vessels to move 5 nm after an encounter. Development of detailed protocols was, however, left to individual flag States. More recently, SPRFMO has introduced further requirements, including assessments, restricting fishing outside of established footprints, 100% observer coverage on trawlers, and either cessation of fishing within 5 nm of an encounter with a VME or else the division of the national footprint into areas open to bottom fishing, open but subject to an encounter protocol and those closed to protect VMEs.

18. Elsewhere, while the General Fisheries Commission for the Mediterranean (GFCM) has introduced measures to protect habitats in the Mediterranean they do not include any encounter protocol.

19. New Zealand developed an integrated system that established a footprint for the national fishery, closed areas and set an encounter protocol. The latter applies only to the trawl fishery and only in areas deemed "Moderately Fished", meaning that a 20-minute block had between three and nine New Zealand trawl sets during 2002–2006. Within the 60 such blocks open to fishing, trawlers are subject to a protocol with seven per-set thresholds. Six are weight based: 50 kg of sponges, 30 kg of scleractinians,

6 kg of hydrozoans or 1 kg each of gorgonians, antipatharians or alcyonacean soft corals. The seventh threshold is the catch of any amount of any three or more of eleven taxa (including the six for which there are weight thresholds), which is intended as a measure of biodiversity. Breaching any one of the seven thresholds obliges the trawler to move at least 5 nm and to remain outside a circle of that radius drawn around the location of the set for the duration of its current trip. There is no requirement for other vessels to avoid the area and the vessel that exceeded the threshold is free to return to the same tow on subsequent trips. Through to 2013, 185 New Zealand trawl sets were made in areas subject to that protocol, four of which breached a weight threshold and one a "biodiversity" limit.

20. For its deep-sea fisheries in the Indian and southwest Pacific oceans, Australia has adopted closures (originally instituted by the fishing industry), a restriction to the established footprint, 100% observer coverage, and an encounter protocol, with a current threshold of 50 kg of coral and sponges combined. Uniquely, dead coral skeletons are included in the weight assessed against that threshold. Should there be an encounter, the protocol would require a 5 nm movement away from all points along the trawl track or the line on which a longline was laid (much as has since been adopted by NEAFC). The resulting polygon would be closed to all Australian fishing for the duration of the vessels' permits, and the closure could be extended until reviewed.

21. The parties to the North Pacific Fisheries Commission (NPFC), the recently established RFMO with responsibility for deep-sea fishing in the ABNJ of the North Pacific, have agreed to interim measures for VME protection, including limits on fishing effort and capacity, freezing the footprint of the fishery, 100% observer coverage, exchanges of information and, for the northwest Pacific only, an outline encounter protocol. The latter requires only that a vessel encountering corals report the event and move at least 5 nm away. Three flag States have announced measures to implement that outline, although the Russian Federation and the Republic of Korea have provided little detail. Japan's protocol is modeled on NAFO's, although with a single threshold of 50 kg of live coral.

22. There is no RFMO/A with competency for deep-sea fishing in the southwest Atlantic. Three encounter protocols have, nevertheless, been announced for that region, each applicable in other deep-sea fisheries outside the jurisdiction of any RFMO/A. The Republic of Korea has implemented measures applicable to vessels flying its flag, including special licensing, vessel monitoring system (VMS), assessments, and the reporting of VME encounters, while the latter trigger a requirement to move at least one mile. Spain has undertaken the mapping of VMEs, frozen the footprint of its fishery, and established a large closure (applicable only to Spanish vessels), while it has implemented a NAFO-like encounter protocol with a threshold of 100 kg of live coral or 1 000 kg of live sponges per set. The European Union (EU) Council of Ministers has adopted measures applicable to vessels flying the flag of any member nation. Those include special fishing permits, 100% observer coverage, area closures, and a 5 nm movement by any vessel that encounters VMEs. No particular thresholds have been established.

*Discussion*

23. Following the introductory presentation on encounter protocols, the discussions noted that the only major area with no existing RFMO/A is the southwest Atlantic, but the flag States of most vessels fishing there have adopted applicable protocols. One participant reminded the group that areas not covered by either SPRFMO or NPFC remain in the Pacific, as do parts of the northern Indian Ocean not covered by SIOFA, but since there is no known bottom fishing in those areas, there likely will not be any need for measures to protect VME. Otherwise, encounter protocols are applied in all areas with an existing RFMO/A, with the exception of the Mediterranean.

24. It was further noted that at present, a similar situation exists in the Indian Ocean where there is no regulation for bottom fishing activities by an RFMO/A until the Southern Indian Ocean Fisheries

Agreement (SIOFA) develops its conservation measures[6]. Prior to the Second Meeting of Parties for SIOFA in March 2015, the EU Council Regulation N°734/2008[7] on the protection of VMEs in the high seas from the adverse impacts of bottom fishing gear would have applied to European Commission (EC) member States fishing in the region since 2008. This Council Regulation N°734/2008 also applies to the southwest Atlantic for EC vessels.

25. The question was raised as to whether there are any RFMO/A member States with more stringent measures for encounter protocols, for the protection of VMEs, than those laid out by the relevant RFMO/A. In was determined that with the exception of those areas still covered by interim measures (which typically only contain general outlines), this is not the case. Furthermore, the fishing industry has also introduced its own measures, and vessels under the Southern Indian Ocean Deepsea Fishers Association (SIODFA) vessels are required to notify their flag State of all catches of corals and sponges, which SIODFA publishes on its website.[8]

26. In general, most current encounter protocols are primarily intended for trawling and longlining. However, in most cases, the RFMO/As have used wording where essentially all fishing gear are covered by the encounter protocol.

27. There is little gillnetting in the ABNJ. NEAFC has had a temporary ban on gillnetting below 200 m since 2006 with no intention to lift the ban (Recommendation 3: 2006). In the northwest Pacific, Japan has one vessel using gillnets, for which there exist interim measures. It was agreed that an important consideration for encounter protocols is not only the different gear types, but also the variations within a gear type (e.g. fishermen in the CCAMLR Convention Area use three types of longline gear: Spanish system, autolines, and trotlines[9]).

28. It was noted that with the exception of NAFO, there has been limited scientific rationale for setting the threshold levels for encounter protocols. In NAFO, concentrations of sponges and corals that could be considered indicative of the presence of VMEs were determined and then converted to the predicted amounts a commercial trawl would take. In CCAMLR, the volume of VME indicator species that are used as thresholds were based on precautionary estimates because there is no true understanding of the density of the organisms on the seafloor.

29. The move-on distances triggered by the encounter protocols are also argued to be scientifically weak because the understanding on the patch sizes of VMEs in general is poor. In New Zealand, however, the 5 nm move-on distance was based on an assessment of the distribution of the seamounts within New Zealand's exclusive economic zone (EEZ).

30. Workshop participants noted that the initial encounter protocols adopted by RFMO/As were based on a rapid effort to comply with UNGA Resolution 61/105, para 83, before the deadline of 31 December 2008. However, as more information on VMEs and impacts from bottom fishing activities are known, there should be a move to modify the protocols and related conservation measures to reflect the best available scientific information. In this context, it was noted that new and improved technology, such as echosounders and cameras, allow scientists to map and get a better understanding of the seafloor and the VMEs that might occur there.

31. The general opinion of workshop participants was that in regions where there are comprehensive conservation and management measures for VMEs, encounter protocols should only exist as a secondary measure. However, in regions where there is no comprehensive approach, the encounter protocols could be the primary measure for the protection of VMEs from bottom fishing impacts. In either case, encounter protocols should be designed well, with simplicity and practicality in mind, and with clearer regional guidelines on what constitutes a VME (in particular for regions where there are no VME identification guides). It was noted that the process for identifying VME indicator

[6] SIOFA entered into force in June 2012. The first three Meetings of the Parties took place in 2013, 2015 and 2016. The first Scientific Committee meeting was held in March 2016. The Secretariat of SIOFA will be established in 2017 in La Réunion.

[7] http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32008R0734&from=EN

[8] http://www.siodfa.org/

[9] http://www.ccamlr.org/en/publications/fishing-gear-library

species should include both fishery-dependent and fishery-independent information, and that there is a need for a process that ensures that the VME indicators are appropriate for a given region.

**Industry experiences and challenges with the on the ground application of encounter protocols**

32. Mr Graham Patchell, Resources Manager with Sealord Group/SIODFA, gave a presentation on the industry perspective of encounter protocols. The presenter noted that since 2006, the level of scrutiny by some environmental groups and their efforts to close the high seas to fishing, in particular to bottom trawling, have increased, as has the funding invested in building a global network of marine protected areas. The course of the discussions on the development of VME protection measures, unfortunately, has also led to a generally unfavourable public opinion of the fishing industry and others who rely on high seas fisheries.

33. The different VME encounter protocols that have been put in place in various fisheries have had a major impact on fishers and have resulted in economic losses and increased costs of fishing. The fishing industry has worked with fisheries agencies since 2006 to protect livelihoods and reduce impacts. The presentation gave examples of the problems that fishers have encountered, where regions differ in habitat and impact, and why a global encounter protocol is not appropriate for all RFMO/As.

34. Major difficulties for the industry include the imbalance in the VME debate, and the challenge the industry faces to comply with strict conservation measures, while also attempting to conduct a sustainable business. From the start, the industry voiced that move-on rules would impact fishing operations. The industry also noted that fishers knew where areas of sensitive habitats were, as well as regional differences with respect to habitats and the types of fisheries that operated in each region. Fishers live on the ocean, see a different ocean than policy-makers, and a disconnect between fishers and managers was noted. One major reason for this is the lack of understanding about many aspects of deepwater trawling, especially in the Southern Hemisphere.

35. Contrary to common public belief, deepwater trawling in some areas of the ocean is a targeted fishing activity, on often limited fishing grounds and the fishing grounds rarely have a smooth flat bottom that a trawl net can be towed along. Not all fishing is on seamounts. In fact, much of the current high seas bottom trawling in the SPRFMO and SIOFA areas are on rocky banks with little elevation, or on long ridges. Some of the major fishing grounds have extremely limited trawl zones, or "highways". For example, less than 0.01% of the habitat on one 220 $km^2$ bank is fishable, with only three trawl lanes present. Even those are difficult to fish with the net being towed over large boulders.

36. The encounter protocols in force have had a major financial impact on fishers. An example was provided of an Australian fishing vessel that was target fishing orange roughy, and was working on a seamount in the Indian Ocean, where the main fishing ground was on a ridge on the south side, on which the fish aggregate for about one week each year. After several days of successful fishing, one trawl shot missed the target tow line because of current, and the trawl came up to the surface with several boulders in the codend. Ultimately, these boulders were deemed VME indicators exceeding the threshold, and the vessel was then excluded from fishing within 5 nm for the rest of the year. This took the vessel away from the fish, and away from the seamount (5 nm north to south), with a loss of at least USD 500 000 in revenue. On further analysis, it was determined that the boulders were not VME indicator species, although the national observer on board was required to make a decision based on what he/she had at hand, and the management authority made the final decision with respect to what measure to recommend.

37. The pressure that RFMOs and flag States were placed under by advocacy groups following the UNGA ruling, led to hasty and inconsistent rules and restrictions being placed on fishers. The use of predictive modelling as a sole means to identify VMEs was also questioned, highlighting an example from the SPRFMO area where further onsite investigations by the fishing industry showed that some areas previously identified as VMEs through predictive modelling, are not.

38. In the Indian Ocean, the fishing industry (through SIODFA) closed large areas (termed Benthic Protected Areas, BPAs) that were known to contain habitats sensitive to bottom and midwater trawling by its members. Several members of SIOFA (e.g. Australia and Cook Islands) now require their fishing

vessels to avoid fishing in the BPAs as part of their fishing permits, and Australia maintains a move-on rule in the SIOFA area. The two Japanese-flagged vessels in the fishery are operated by members of SIODFA, and follow the same reporting practices, while respecting the BPA closures, though these are not flag State requirements.

*Discussion*

39. During the discussion, there was mention of the complexity of the VME issue, as it includes overlapping priorities from science, the fishing industry, governments, and consumers. All of these considerations must be taken into account by managers when developing VME protection measures, which is why it may take a long time to implement any meaningful regulation.

40. The potential use of new and improved (and cheaper) technology, such as the use of cameras mounted on the headline of trawl gear, was addressed. For example, in CCAMLR, if VME indicator species are encountered, a camera has been deployed to check the fished area and determine the presence of other VME indicator species. So far, however, that practice is not required by any CCAMLR conservation measure, and has not been extended to other RFMO/As.

41. It was suggested that the lack of reported encounters in mot RFMO/A competence areas could be due to either a lack of compliance with the encounter protocol or because the thresholds are set too high. However, it was pointed out that, in some areas (e.g. the NEAFC Regulatory Area), a likely reason is that other conservation measures are functioning as expected, such that the areas open to fishing do not have any VMEs, while the areas where VMEs occur are closed to fishing, in effect at least. The procedures for approval of exploratory fishing established by some RFMO/As are complex, time-consuming, and expensive, discouraging applications and thereby effectively closing wide areas outside established fishery "footprints".

**Southern ocean experiences with encounter protocols and move-on rules**

42. Mr Mark Belchier, Science Manager with the British Antarctic Survey, presented CCAMLR experiences with the implementation of encounter protocols and move-on rules. Restrictions on the use of bottom trawls within the high seas areas of the CCAMLR Convention Area have been in place since the mid-1980s. Prohibition on the use of bottom trawls (other than for scientific research) was introduced in all high seas areas under CCAMLR management in 2006. Currently, the only bottom fisheries that are conducted in those waters are deepwater demersal longling for Patagonian and Antarctic toothfish. A subsequent prohibition on the setting of longlines at depths less than 550 m was introduced in 2009. A suite of conservation measures have also been adopted by CCAMLR in order to reduce the impact of longlines on the benthic environment and to protect VME taxa (as defined in the CCAMLR VME taxa guide) as required under UNGA 61/105.

43. CCAMLR Conservation measure (CM) 22-06 outlines the requirements of Contracting Parties wishing to undertake bottom fishing activities within the high seas regions of the convention area. It details the notification, assessment and data collection procedures required prior to the start of bottom fishing activities, which mitigate against adverse impacts on VMEs. The CM also specifies the required reporting procedures when VMEs are encountered. CM 22-07 relates to the protocols that must be undertaken when evidence of a VME encounter occurs during fishing. It defines a VME threshold based on the weight or volume of VME taxa caught on a specified length of longline (line segment). A VME unit is defined as either 1 L of VME indicator organisms that can be placed in a 10-L container; or 1 kg of those VME indicator organisms that do not fit into a 10-L container. A VME Risk Area is declared where 10 or more VME indicator units are recovered within a single line segment. A Risk Area has a radius of 1 nm from the midpoint of the line segment from which the VME indicator units are recovered. The vessel is required to immediately haul all longlines that intersect that risk area. A secondary, lower threshold of between $\geq 5$ and $< 10$ VME indicator units on a line segment triggers a requirement for the vessel to notify the secretariat of its location. If five such notifications are received within a 30 nm x 30

nm fine-scale rectangle, vessels fishing in the area are notified by the CCAMLR Secretariat that VME encounters may occur. Whilst the reporting of VME encounters is a vessel responsibility the task is facilitated by the CCAMLR requirement for at least one international scientific observer to be present on all longline vessels fishing within the convention area.

44. VME data reported to the Secretariat are held within the CCAMLR VME registry and are uploaded onto the publically accessible web-based GIS. A report of all bottom fishing activity and VME encounters is also available through the CCAMLR website. CCAMLR has identified the need for further research to be undertaken to better assess gear-specific selectivity in order to assess the relationship between the levels of VME taxa recorded as caught by a vessel, and their abundance on the seafloor. The deployment of cameras on longlines is likely to offer the best means of achieving this. The development of habitat models for the CCAMLR region may also offer a means of reducing uncertainty regarding the risk to VME taxa from bottom longline fishing.

*Discussion*

45. During the discussion, it was noted that 100% observer coverage in CCAMLR works very well because of the way the programme is managed. The observers are monitored by an ad hoc group that exists specifically to develop methods and procedures for the observers, and monitor challenges and issues. The international observers, who are often long-term and with much experience, are nominated by the flag States to take part in the programme. The observer coverage works as bilateral agreements between nations. Reports from the observers and boat captains are reviewed and compared by the relevant groups in CCAMLR, to ensure there is no instance of an observer reporting an encounter but the vessel neglecting to take action.

**North Atlantic and ICES experiences with indicators and thresholds**

46. Mr Francis Neat, Scientist with Marine Scotland, gave a presentation on the North Atlantic and International Council for the Exploration of the Sea (ICES) experiences with indicator development and the setting of thresholds. ICES's Working Group on Deepwater Ecology (WGDEC) was formed in 2005 and soon after became a joint working group with the NAFO. Working group members are from all ICES countries bordering the North Atlantic. Its purpose is to provide scientific assessments of: i) VMEs in the deep sea; ii) the risk posed by human activities such as fishing and mining to VMEs; and iii) management options to protect VMEs. The main clients for advice are NEAFC, NAFO, Oslo/Paris convention (for the Protection of the Marine Environment of the North-East Atlantic (OSPAR), and the EC. WGDEC produces a report, parts of which are peer reviewed, which forms the basis of ICES's advice. The group collates various data and information on VMEs from across the North Atlantic (EEZs and ABNJs) and uses this to map the distribution of VMEs in relation to fishing activity. Over the years, areas of potential VMEs have been proposed and many are now closed to bottom fisheries. WGDEC also advised NEAFC on the scientific basis of the VME encounter protocols and how effective they are likely to be. The two main components of the encounter protocols, the setting of VME indicator bycatch thresholds and the adoption of a move-on rule, were reviewed by WGDEC.

47. In the NEAFC Regulatory Area, the bycatch thresholds for VME encounters were initially set to be 60 kg coral and 800 kg sponges. WGDEC could find no firm scientific basis to the setting of such thresholds and advised that they were likely to be too high given most VME indicators are fragile and break up in the net, and that catch retention was completely unknown. Furthermore, the thresholds failed to take into account variation between different VME types, biogeographical province, and differences in fishing gear types and practices (e.g. trawls and longlines). In addition, analyses based on geospatial approaches and scientific surveys suggest that the proportion of hauls with above-threshold bycatch of VME indicators was typically less than 1%, indicating that the thresholds needed to be reduced. As a result, ICES WGDEC advised NEAFC to reduce the bottom trawl thresholds by 50% (to 30 kg of coral and 400 kg of sponges). ICES also advised NEAFC to adopt a separate encounter protocol for bottom longline fisheries, with thresholds similar to those in CCAMLR's encounter protocol. NEAFC has

adopted the advice, but to date no encounters have been reported. This can be interpreted in several ways: i) that no VMEs have been encountered; ii) that thresholds are too high; iii) that there has been a failure to report; or iv) that the threshold approach is altogether inappropriate.

48. The move-on rule[10] states what action should be taken in the case that the VME indicator threshold is breached. In the NEAFC Regulatory Area, the vessel is required to move 2 nm away from the tow path, and the vessel must inform NEAFC, which will then establish a temporary closure. The intention is to reduce the likelihood of further VME encounters. WGDEC advised NEAFC that moving 2 nm away from the encounter would not necessarily decrease the likelihood of further VME encounters. In existing fishing areas that have a long history of fishing, for which a good map of the fishing footprint exists, and for which there remained only a few small patches of VMEs, the move-on rule was considered to be reasonable. However, in new or existing fishing areas that have been lightly fished and for which the footprint is not well mapped and there is, thus, much uncertainty in how much VME may be present and how they are distributed, moving 2 nm away does not necessarily mean that the risk of encountering further VMEs is reduced.

49. ICES WGDEC thus concluded that VME thresholds and move-on rules have a weak scientific basis. Spatial protection (bottom fishing closures) of VMEs has, to date, been the main management measure protecting VMEs in the northeast Atlantic.

*Discussion*

50. During the discussion it was noted that from a scientific and management perspective, priority tends to be focused on the margins of fishing areas where there is a higher risk of encountering VMEs, as opposed to heavily fished areas. Thus, a systematic, scientific way to identify those areas will be useful. As such, the use of visual surveys to determine what is on the seabed before the trawl, and comparison of that information to what ends up in the net, was mentioned as an important tool. There is also a need for standardizing trawls, in that vessels authorized to go into new fishing areas should be required to consistently tow for a period of time to reduce uncertainty.

**Concluding discussions on encounter protocols**

51. The discussions on encounter protocols culminated with an agreement on a matrix table, highlighting major points of issues and potential solutions, based on regional experiences with encounter protocols. The points are grouped under eight major headings:

I. General issues
II. Roles of encounter protocols relative to other measures for VME protection
III. Purposes of encounter protocols
IV. Indicators of encounters
V. Thresholds
VI. Move-on rules
    a. From where to move
    b. Distance to move
    c. Direction to move
VII. Post-encounter initial/temporary closures
    d. Application
    e. Geometry
    f. Duration
VIII. Where and when to apply an encounter protocol

[10] Since 2014 there has been a polygon move-on rule for the North East Atlantic Fisheries Commission (Recommendation 19:2014 as amended by Recommendation 09:2015).

Participants' observations on the major points are summarized in a matrix table (Appendix C). The table also provides summary information on the current practices of RFMO/As and flag States, relative to the issues discussed.

## SESSION 2: IMPACT ASSESSMENTS

### Introduction to impact assessments

### Convention on Biological Diversity guidance on impact assessments

52. Ms Despina Symons, Coordinator of the International Union for Conservation of Nature-Fisheries Expert Group (IUCN-FEG), on behalf of Mr Jake Rice (IUCN-FEG), introduced this topic with a presentation on obligations from international resolutions with respect to impact assessments, with a specific focus on the general guidance on impact assessments provided by the Convention on Biological Diversity (CBD). From the perspective of the CBD, there is much expert guidance available from both general and sectoral origins. Based on a recommendation by the Conference of Parties (COP), the CBD convened an expert workshop to review practices for addressing biodiversity in environmental impacts assessments (EIAs), and identify a suite of practices on the application of EIAs. The results of this workshop led to the adoption of general guidelines[11] by the CBD COP VIII (2006). Later on, CBD COP IX called for another expert workshop (2009) to review the applicability of these guidelines for marine environments in general.

53. The focus of the CBD guidelines[12] is "…how to promote and facilitate a biodiversity-inclusive EIA process in marine and coastal areas..." The CBD provides general guidance for considering biodiversity when conducting EIAs, and the general components are well-known.

- Screening
- Scoping
- Analysis and evaluation
- Reporting
- Review
- Decision-making
- Monitoring, compliance, enforcement, auditing

54. For these components there are clear roles at each stage for the industry, States (or other levels of government), experts and civil society. However, special challenges exist for each of these components (Table 1).

**Table 1**: Special challenges identified for the general components of the Convention on Biological Diversity guidelines.

| **Component** | **Challenges** |
|---|---|
| Scoping and screening | Ecological connectivity between marine areas; |
| | Complex governance structure, especially in areas beyond national jurisdiction; |
| | Identification of the "stakeholders" and appropriate stakeholder forums (what constitutes having an interest and how to access and provide *fora* for all stakeholders); and |

[11] https://www.cbd.int/doc/publications/imp---bio---eia---and---sea.pdf
[12] https://www.cbd.int/impact/guidelines.shtml

| | |
|---|---|
| | Achieving equity in the distribution of socioeconomic benefits, assessing the value of ecosystem services, allocating environmental costs, and consensus on appropriate balance of costs and benefits. |
| Assessment and evaluation of impacts | More incomplete data and knowledge (need for additional studies as part of the environmental impact assessment, both in terms of processes and spatial mapping, and the need for more incremental approvals and lessons learned); |
| | Home-bases of industries and their regulators may be far from sites of activity (this affects the costs of assessments and the follow-up of monitoring, control and surveillance); and |
| | More heterogeneity of values of participants in the evaluation is needed (to account for risk tolerances and the application of precaution). |
| Reporting, review, and decision-making | More States and interested groups want the reports (need time for review and translation issues, and does the expectation of a role in later steps create the obligation to contribute to process costs?); and |
| | For review and decision-making: Whose standards have to be met (flag State? Adjacent and/or affected States?)? Where do different standards get reconciled? |
| Management, control and surveillance | Who is accountable for costs, whose standards apply for compliance of component activities, and who has rights to information streams? |
| | Costs for all aspects are higher; and |
| | Opportunities for social engagement are very limited. |

55. The presentation also noted special biodiversity considerations.

*Focuses more on places than species:*

- Biodiversity is the recognized focus of ecologically or biologically significant areas, VMEs, Specially Protected Areas, and others;
- Species mobility (active and passive) make population-based impacts hard to document;
- There is less knowledge of spatial links to population dynamics of species, including species at risk;
- There are fewer areas of widespread degradation in ABNJs;
- Fragmentation is much less of an issue, but the three-dimensional transmission of impacts are greater; and
- The restoration and offsetting of impacts is "complex".

*Consequences of less knowledge:*

- There are great challenges in quantifying sustainable levels of impacts (true for places and populations, setting baselines and benchmarks will be hard, as well as the documentation of drivers past change);
- Greater reliance on models and extrapolation (there is less experience on how to bound extrapolations, and there is less independent data to test or validate models); and
- This makes both the contested results and need for precaution more likely (which is a complex combination for governance purposes).

*Consequences of governance complexity:*

- There are issues regarding decisions on standards and legitimacy;
- There is accountability and willingness to fill information gaps;
- The issue of consequences for poor management (who gets restitution benefits if things go bad); and

- There is the "Stable regulatory environments" concept for the future.

56. In conclusion, there are many additional challenges in conducting EIAs in marine areas compared with terrestrial, and more so in ABNJs than in EEZs (including the difficulty of systematically tracking efforts in ABNJs). To address these challenges, there is ample guidance on how to address biodiversity beyond national jurisdiction through EIAs, and the guidance is practical and explicit. Most of these practices are closely aligned with the CBD's guidelines.

**Impact assessments and the FAO Deep-sea Fisheries Guidelines and examples of implementation by RFMOs**

57. Ms Merete Tandstad (FAO) provided an overview of the relevant provisions to conduct impact assessments from bottom fisheries under the FAO Deep-sea Fisheries Guidelines, noting that para 47 of the guidelines provides detailed guidance for States and RFMO/As on impact assessments.

58. In the Deep-sea Fisheries Guidelines, the link between VMEs and the need for impact assessments is made through the definition of "vulnerability" of populations, communities and habitats, which must be assessed relative to specific threats. The guidelines call for an assessment of SAIs that might compromise ecosystem integrity in a manner that: i) impairs the ability of affected populations to replace themselves; ii) degrades long-term natural productivity of habitats; or iii) causes, on more than a temporary basis, significant loss of species richness, habitat or community types. When determining the scale and significance of the impact, the guidelines recommend that the following six factors should be considered: i) the intensity or severity of the impact; ii) the spatial extent of the impact; iii) the sensitivity or vulnerability of the ecosystem; iv) the ability of an ecosystem to recovery and the rate of recovery; v) the extent to which ecosystem functions may be altered; and vi) and the timing and duration of the impact relative to the period in which a species needs the habitat during life history stages.

59. Assessments should be conducted if deep-sea fishing activities are likely to produce SAIs in a given area. The assessments should, therefore, include (summarized): i) the types of fishing conducted or contemplated; ii) the best available scientific and technical information on the current state of fishery resources; iii) the identification, description and mapping of VMEs; iv) the data and methods used to identify, describe, and assess the impacts of the activity; v) the evaluation of the occurrence, scale, and duration of the likely impacts; vi) a risk assessment of likely impacts; and vii) proposed mitigation and management measures.

60. In general, most RFMOs or States include provisions for impact assessments in the context of exploratory fisheries.[13] The exploratory fisheries protocols of RFMO/As and multilateral bodies are

[13] See: South East Atlantic Fisheries Organisation: Conservation Measure 30/15 on Bottom Fishing Activities and Vulnerable Marine Ecosystems in the SEAFO Convention Area <http://www.seafo.org/Management/Conservation-Measures>; Commission on the Conservation of Antarctic Marine Living Resources Conservation Measure 22-06 (2015) Bottom fishing in the Convention Area <https://www.ccamlr.org/en/measure-22-06-2015>; North East Atlantic Fisheries Commission: Recommendation 19 2014: Recommendation on the Protection of Vulnerable Marine Ecosystems in NEAFC Regulatory Area as Amended by Recommendation 09:2015 <http://www.neafc.org/system/files/Rec_19-2014_as_amended_by_09_2015_fulltext_0.pdf> ; North Pacific Fisheries Commission: New Mechanisms for Protection of Vulnerable Marine Ecosystems and Sustainable Management of High Seas Bottom Fisheries in the Northwestern Pacific Ocean < http://npfc.r-cms.jp/files/user/interim_measures/IM-Annex2.pdf > and Science-based Standards and Criteria for Identification of VMEs and Assessment of Significant Adverse Impacts on VMEs and Marine Species < http://npfc.r-cms.jp/files/user/interim_measures/IM-Annex2.pdf >;
South Pacific Regional Fisheries Management Organisation CMM 4.03 Conservation and Management Measure for the Management of Bottom Fishing in the SPRFMO Convention Area <https://www.sprfmo.int/assets/Fisheries/Conservation-and-Management-Measures/CMM-4.03-Bottom-Fishing-2016-4Mar2016.pdf > and the Bottom Fishery Impact Assessment Standard <https://www.sprfmo.int/assets/Meetings/Meetings-before-2013/Scientific-Working-Group/SWG-06-2008/a-Miscellaneous-Documents/SPRFMO-Bottom-Fishing-Impact-Assessment-Standardagreed-Vanuatu-

applied to fishing activities outside of existing fishing areas, or activities using fishing gear not previously used in an existing fishing area, and include comprehensive impact assessment procedures outlined in the conservation and management measures. The secretariat of the RFMO/A manages these applications, and the relevant scientific bodies review the results of the assessments before recommending to the commissions to either open the area to fishing, or reject the proposal if SAIs are found or are likely to occur on VMEs. In general, exploratory fishing protocols of RFMO/As and multilateral bodies include:

- A harvesting plan that outlines types of fishing to be conducted, vessel and gear types, fishing areas, target and potential bycatch species, fishing effort levels, and duration of fishing;
- Best available scientific and technical information on the current state of fishery resources and baseline information on the ecosystems, habitats and communities in the fishing area;
- Identification, description and mapping of VMEs known or likely to occur in the fishing area;
- Identification, description and evaluation of the occurrence, character, scale and duration of likely impacts, including cumulative impacts of a proposed fishery on VMEs in a fishing area;
- Data and methods used to identify, describe and assess the impacts of the activity, the identification of the gaps in knowledge, and an evaluation of uncertainties in the information presented in the assessment;
- Risk assessment of likely impacts by the fishing operations to determine which impacts on VMEs are likely to be SAIs; and
- Mitigation and management measures to be used to prevent SAIs on VMEs and the measures to be used to monitor effects of the fishing operations.

61. Once this information is submitted to the commission, the relevant scientific body reviews the information and recommends the next steps to the Commission, which then determines if the proposed area can be opened or should remain closed. RFMO/As should also make the impact assessments publicly available, along with the existing and proposed conservation and management measures and advice and recommendations provided by the RFMO/A scientific or technical committee.

62. The guidelines also recommend that assessments be undertaken whenever there is a significant change to a fishery, or when there are significant changes to natural processes, and this is aligned with the adaptive management system of the ecosystem approach to fisheries framework.

*Discussion*

63. During the discussion, participants noted that with respect to the scale and significance of impacts, there is limited experience with addressing all six factors in practice, and that in many cases the type of information available would normally be insufficient to address the full range of factors. However, when management measures such as those for closures are implemented, some of the factors would probably be addressed indirectly. It was also noted that while the point of stakeholder participation may not be explicit in impact assessment guidelines, typically this is still included in the process. The FAO Deep-sea Fisheries Guidelines note that an appropriate body or other multilateral body should be involved, but how exactly is left to the RFMO/As to determine. While the original voluntary impact assessment guidelines from the CBD were developed in the context of terrestrial ecosystems, an expert workshop in 2009[14] noted the importance of developing impact assessment guidelines for marine environments.

64. Difficulties were noted on assessing impacts in marine environments, as compared with terrestrial environments, for EIAs and strategic environmental assessments. It was agreed that both the CBD guidelines and the FAO Deep-sea Fisheries Guidelines are in harmony with each other in terms of suggested actions by RFMO/As to conduct these assessments. While both sets of guidelines are

Fri23Sep2011-1140am.pdf> ; Northwest Atlantic Fisheries Organisation: NAFO Conservation and Enforcement Measures 2015, NAFO/FC Doc. 15/01, Chapter II (Articles 15–24).

[14] https://www.cbd.int/doc/?meeting=EWEIAMA-01

voluntary, the Deep-sea Fisheries Guidelines are used by RFMO/As to implement their conservation and management measures. In many RFMO/As, the scientific committee typically provides advice, based on impact assessments, to the commission for further decision.

**New Zealand experiences with impact assessments**

65. Mr Geoff Tingley, independent fisheries consultant with Gingerfish Ltd., gave a presentation on New Zealand's experiences with impact assessments. The approach and contents of the Bottom Fishing Impact Assessment (BFIA)[15] submitted by New Zealand to SPRFMO, as developed for existing bottom line and trawl fisheries, was presented. This approach was science-based and used considerable amounts of data from the fisheries themselves and from similar fisheries that had been operating within New Zealand's EEZ, as well as from fishery-independent research.

66. Fisheries data on VME indictor catch rates derived from observer records were used to define taxa-specific thresholds for VME indicator taxa for bottom trawl fisheries using catch curves. The thresholds used the 50$^{th}$ percentile of the catch curve for each indictor taxon. This approach does not appear to have been applied elsewhere. These thresholds were then applied in an encounter protocol and associated move-on rule.

67. The range of factors considered in the impact assessment was described, including gear type, target species and likely bycatch species. Much of the assessment was directed at benthic impacts, but the impacts on target and bycatch fish species were also covered, as were the potential impacts on seabirds.

68. The core elements of the assessment included: i) the spatial extent of fishing activity, the fishing footprint for the SPRFMO defined period 2002–2006; and ii) an analysis of evidence for VME distribution derived from fishing and research activities.

69. The factors considered included gear design and operational aspects (e.g. nets, doors, bridle length, bobbins, hook numbers and rigging); fishing depth by gear type; seasonality; effort (number of vessels, number of tows, hours/tow); vessel size and power; fishing areas and the 2002–2006 fishery footprint; catch and effort history; stock status indicators; the distribution of seamounts within and outside the declared footprint; the proportion of seamounts and other features fished; improvements in the ability of vessels to avoid impacting VMEs (e.g. navigational aids, lighter ground gear); and ongoing monitoring needs (fishery reporting, observers, VMS, analysis and reporting) to SPRFMO.

70. Existing information was used (e.g. benthic impacts of different gear types) and new analyses developed to address specific issues (e.g. defining appropriate VME indicator taxa and taxa-specific trigger thresholds). The development of taxa-specific thresholds, while seen for broad groups (e.g. sponges and corals) elsewhere, was specifically developed with thresholds for different classification orders.

71. The taxa threshold triggers for the move-on rule were supported by a biodiversity component, where a catch of three or more VME taxa, irrespective of catch quantity, also triggered the requirement to move-on. Specific consequences of triggering the move-on rule were given, including minimum distance to move and duration of closure.

72. The BFIA made it absolutely clear that the triggering of a move-on rule was not equivalent to acceptance of a VME but indicated the presence of a potential VME, with a determination of status made at a later date and using other appropriate evidence.

73. The environmental impact assessment (EIA) followed the approach described in the SPRFMO guidelines. This included the description of the impact, the spatial extent (footprint), duration, intensity, cumulative impact and overall significance level. The potential adverse impacts were assessed

[15] The New Zealand Bottom Fishing Impact Assessment can be found at: https://www.sprfmo.int/assets/Meetings/Meetings-before-2013/Scientific-Working-Group/SWG-06-2008/a-Miscellaneous-Documents/New-Zealand-Bottom-Fishery-Impact-Assessment-v1.3-2009-05-13.pdf

separately for different broadly defined gear types (trawls and lines) and specifically covered benthic VMEs, overexploitation of low-productivity deepwater species, gear loss and seabird injuries and mortality.

74. The BFIA also included a section on spatial management that boosted the protection of VMEs, with about 75% of the historic area fished closed to fishing. The SPRFMO-defined reference period of 2002–2006 left about half of the fished historic areas closed to fishing. The declared 2002–2006 footprint area was split into 20-minute grids then divided into thirds based on effort levels. The third of the 20-minute grids that were exposed to a low fishing effort were closed, based on the argument that areas where there had been little fishing were more likely to have retained more VMEs. The third of the grids with a moderate accumulated fishing effort were designated as open but subject to the move-on rule, and the third of the grids that had recorded relatively heavy fishing were declared as fully open. To ensure that the pattern of closures was representative across the area, an additional 10% of grids were closed based on bathymetry and other knowledge about the likely presence of VMEs.

75. Difficulties with this approach were encountered in a number of areas. Industry was resistant to the application of the move-on rule and the biodiversity component specifically. A review of the performance of the move-on rule and biodiversity component has shown that industry concerns were largely unfounded.

*Discussion*

76. During the discussion it was noted that in New Zealand, the assessment is based on a number of meetings specifically set up to address impact assessments. Furthermore, stakeholder engagement in New Zealand is quite good and some of the lessons learned might be applied to strengthening SPRFMO approaches. It was explained that SPRFMO's interim measures for bottom fishing impacts, among others, were quite general and much was left to flag States to determine how to implement the measures. New Zealand and Australia are the only two SPRFMO flag States that engage in bottom fisheries and each seem to have established their own practices and methodologies for impact assessments separate from one another. When comparing the measures between the two flag States, Australia generally has higher thresholds and stricter consequences if those thresholds are triggered.

77. There have been efforts in New Zealand to map fished and unfished areas, taking the biogeography of the region into account to some extent. Having this understanding of the fished and unfished areas of New Zealand allows managers to keep track of which measures apply where. For instance, in New Zealand's heavily fished areas, move-on rules are not applied but vessels are required to report any encounters with VMEs.

78. The discussion moved to address jurisdictional issues of RFMO/A member countries and those who may not have fishing activities within ABNJs, but might have responsibility over the VMEs on their continental shelves where the VMEs would be regarded as sedentary species and the rights of the coastal States, even in the high seas.

**Japanese experience with impact assessments in the southeast Atlantic**

79. Mr Tom Nishida, Vice Chair of the Scientific Committee of SEAFO, gave a presentation on the Japanese experience with impact assessments conducted for exploratory fisheries in the southeast Atlantic. Mr Nishida described the exploratory fishing undertaken by the FV *Shinsei-maru No 3*, a Japanese bottom longline vessel targeting Patagonian toothfish from 2012 to 2013 in the SEAFO's new fishing area, and the resulting impact assessment. The FV *Shinsei-maru No 3* conducted the exploratory fishing by following SEAFO's conservation measures 22/11 and 26/13. It was determined by SEAFO's Scientific Committee that the relevant conditions described in CM 26/13 and requirements for an impact assessment were satisfied. Following this, three $1^0$ x $1^0$ blocks next to the existing footprint within the SEAFO Discovery Area were opened to bottom fishing. The impact assessment concluded that the risk of SAIs was low in the assessed area.

*Discussion*

80. During the discussion, it was noted that this is an example of effectively utilizing existing efforts to conduct cost-effective impact assessments in what would otherwise be expensive circumstances: the Japanese impact assessment in the proposed exploratory fishing area took place before and after existing commercial fishing efforts in the fished areas.

81. Certain limitations in impact assessments were also noted in relation to fishing gear. There could be additional damage by gear (e.g. weights on longlines) that impacts the sea bottom but because those parts of the gear do not retain any VMEs, the potential damage is not considered in the impact assessment. Additionally, it would be difficult to determine if those non-intended impacts are also SAIs.

82. Furthermore, it was noted that there needs to be more clarification on which activities fall under existing measures. Examples were raised on the use of different gear types in an exploratory fishery, and whether each new gear type would be deemed an exploratory fishery (and, therefore, subject to the relevant rules and regulations), or whether a rating system should be used to classify the level of impact. For instance, if an exploratory fishery is conducted for trawl gear, any gear with fewer impacts than trawls (e.g. from longlines) would also be included under that assessment. It was agreed that the consideration should be for the level of impact: any gear with anticipated higher impact than those already assessed should be considered an exploratory fishery, as with any new fishing activity that impacts the bottom in a new area, regardless of the level of impact.

**Spanish experience with exploratory fishery protocols and impact assessments in NEAFC**

83. Mr Pablo Durán-Muñoz, Principal Investigator with Instituto Español de Oceanografía, (IEO) gave a presentation on the Spanish experience with exploratory fishery protocols and impact assessments in the NEAFC Regulatory Area (northeast Atlantic).

84. Exploratory fisheries are collaborative research initiatives between scientists and fishermen using commercial vessels in non-habitual fishing grounds and/or using new fishing gear and techniques. IEO's past and present experiences with the protocols and impact assessments related with such initiatives in the northeast Atlantic were presented. The objectives of the exploratory fisheries were summarized and a schematic diagram of the exploratory process was presented.

85. In the past, a seven step process was designed and developed by the IEO (technical report; scientific evaluation; selection; survey plan and coordination; exploration and mandatory observer programme and VMS; data analysis and final report to the government). In 2015, in accordance with the NEAFC Recommendation 09:2015 and the FAO Deep-sea Fisheries Guidelines, a new process was implemented. This new scheme includes the elaboration of a preliminary assessment report, the advice of the Permanent Committee on Management and Science (PECMAS) about the exploratory campaign, and the NEAFC's decision on impact mitigation measures and the authorization of the new fishing activity.

86. Two different case studies were presented: Hatton Bank (old protocol) and Central Barents Sea (new protocol). Material and methods of both cases and the main results from the Hatton Bank research were presented. Habitat mapping surveys and bottom trawl and bottom longline exploratory surveys were conducted by the IEO on the Hatton Bank. As a result of these studies, several VME areas were identified and protected.

87. With the Central Barents Sea case study, a preliminary assessment report of a proposal for exploratory bottom pot fishing to target red king crab and snow crab, to be carried out by one Spanish crab vessel in an area of the Loophole (international waters) outside the existing bottom fishing area was presented. Baseline information on ecosystems and state of the fisheries had been compiled for comparison against future changes. The report described the: i) harvesting plan, ii) mitigation plan, iii) monitoring plan (100% coverage with scientific observer and VMS), iv) VME data collection plan, and

v) results of the communication plan. A list of scientific literature was also compiled. A preliminary risk assessment of potential SAIs gave rise to the following conclusions: i) the target species are invasive and, therefore, a properly managed fishery would contribute to reducing their expansion; ii) the effects of pots on the major components of the ecosystem are initially considered to be moderate; iii) the sedimentary seabeds in the fishing area are not particularly sensitive and communities with VME indicator species are confined geographically; (v) the implementation of the measures described in the mitigation plan will avoid potential SAIs of the pot fishery on the ecosystem.

88. This preliminary assessment report was presented to NEAFC in April 2015. This is the first time that this type of report was presented in the NEAFC context. The process continues. In the near future, PECMAS will carry out an assessment of the information presented and will provide advice to NEAFC. Based on this advice, NEAFC will take a decision about the mitigation measures and the authorization of the exploratory fishery.

*Discussion*

89. During the discussion, it was clarified that the impact assessment is reviewed by PECMAS, which can take up to three months. PECMAS then gives advice as to whether the exploratory fishing is likely or not to have SAIs on VMEs, or if sufficient mitigation measures have been proposed to avoid such impacts. There is also a potential role for ICES in this review process. Based on the advice from PECMAS, the NEAFC Commission decides on whether the exploratory fishing can be approved.

**North Pacific experiences with encounter protocols and impact assessments**

90. Mr Loh Lee Low, International Coordinator with the United States National Marine Fisheries Service, gave a PowerPoint presentation of the North Pacific's experiences with encounter protocols, exploratory fishing protocols and fishing impact assessments. Two of his colleagues, Mr Masashi Kiyota of Japan and Mr Seok Gwan Choi of Korea provided information and support. For the North Pacific ABNJ, a new commission — the North Pacific Fisheries Commission — is becoming operational soon as its Convention is set to enter into force on 19 July 2015. The parties that negotiated this new Convention have met in more than 10 sessions over several years and have adopted two sets of Interim Measures pertinent to this FAO workshop objective.

91. The first set of Interim Measures was agreed to for the Northwest Pacific Ocean: New Mechanisms for Protection of VMEs and Sustainable Management of High Seas Bottom Fisheries in the Northwestern Pacific Ocean, adopted on 2 February 2007, and amended twice since then. The second set of Interim Measures is for the Northeast Pacific Ocean: Interim Measures for Protection of VMEs in the Northeastern Pacific Ocean, adopted on 4 March 2011.

92. The key feature of the Interim Measures for the northwest Pacific focus on controlling impacts on corals and VMEs from bottom fishing in the Emperor Seamounts area. The measures:

- Limit fishing effort to existing levels, froze the number of vessels, and limited the areas of fishing over seven seamounts;
- Prohibit fishing into new areas and no seamount fishing is allowed north of $45^0$N;
- Allow exploratory fishing in new areas and any subsequent proposed new fishing must not have SAIs that meet the determinations of the Science Working Group and the Commission;
- Require observer coverage on fishing vessels;
- Require fishing vessels to move away from their fishing location when encounters occur on any four orders of corals (Alcyonacea, Antipatharia, Gorgonacea, and Scleractinia) as well as any other indicator VME species. Japan and Korea indicated that they will adopt a 50 kg of coral per haul rule to move away by 5 nm; and
- Require collection and sharing of data, vessels have VMS, observers, among other provisions.

93. In recent years, Japan has had seven fishing vessels (1 gillnetter and 6 trawlers) and Korea has had two (both trawlers) fishing in the northwest Pacific. Russian vessels have been on the list of authorized vessels to fish, but to date, no Russian vessel has fished in this area in recent years. Additionally, no vessel has applied for exploratory fishing in the northwest Pacific.

94. In terms of impact assessments, working groups have met to assess the status of fish stocks (two on Pacific saury, and two on Pacific armourhead), and a study group has met to address encounter protocols of fishing on corals. These study groups will await the full functioning of the Science Working Group to make further impact assessments that would be required under the FAO and CBD assessment guidelines.

95. For the northeast Pacific, the set of Interim Measures that has been in place since adoption in 2011 appears to be adequate in controlling adverse impacts of fishing on corals and other VME species. There is a small longline fishery that fishes on four seamounts off of Canada's EEZ (that is under control by Canada) and no other fishing is known to take place in the Commission area (ABNJ).

96. The Interim Measure for the northeast Pacific is essentially an "exploratory fishing protocol" that will guide any future fishing in the northeast Pacific. It basically demands "no fishing" until exploratory research is conducted under the Science Working Group review, and an impact assessment for SAIs has been conducted on corals and VME species. There has been no application for such fishing thus far.

97. While encounter protocol and impact assessment issues await the full functioning the Science Working Group and the Commission, the Parties are addressing five key topics: i) implementing full observer coverage, ii) conducting research (thanks to Japan for conducting annual research cruises by its R/V *Kaiyo Maru*), iii) building a common data base system (Korea-lead), iv) planning stock assessments (Japan-lead) and v) developing encounter protocols (US-lead).

*Discussion*

98. During the discussion, it was noted that in many RFMO/As there are separate thresholds for trawls and longlines, but the VMEs caught in the trawls or sets are not identified down to a species level.

**Concluding discussions on impact assessments**

99. The session on impact assessments concluded with the development of a matrix table on the suggested guidance for impact assessments, as laid out in the FAO Deep-sea Fisheries Guidelines, para 47 (Appendix D). Furthermore, a number of challenges were identified with respect to developing, using, and implementing regional and national assessment frameworks (e.g. in relation to the different steps in the assessment process).

100. The matrix table replicated in Appendix D includes issues related to pre-assessment requirements. The commentary summarized from the discussions is highlighted in the following subsections.

***Review of the pre-assessment***

101. The workshop discussed challenges associated with this step, and it was noted that regional adaptations of the general approach would likely be needed. In NEAFC, an expert body (PECMAS) assesses the information and, if needed, there is the option to consult with ICES, after which recommendations are made to the Commission. This system works for NEAFC, but it was noted that there is limited experience in that RFMO dealing with exploratory proposals. A challenge is foreseen in the three-month limit for review of the proposal, which is done by correspondence. If the need to

consult with ICES arises, this poses a further challenge because it requires more time. However, it was acknowledged that there have been useful developments in NEAFC such as the creation of a "gear library" and the requirement of a shorter *pro forma* with specific requirements for proposals.

102. Within CCAMLR, there is a rigorous process that also includes addressing VMEs. This can take up to a week for the working group to analyse the pre-assessment. There are generally many applications and it is a challenge to have enough time to review the initial proposals and conduct an annual review of the impact assessments. To make time for this, other cases are often dropped or postponed (e.g. biology and ecology assessment work). It was acknowledged that there is a need for prioritization: research fisheries are fundamental to getting information in data-poor areas. The guidelines for assessments were initially ad hoc, but are now explicitly included in terms of reference (e.g. the one-week deadline for the review of pre-assessments and annual reviews). The comments of experts can be incorporated into the proposal before putting it forward to the Scientific Committee.

103. NAFO, NEAFC, and SEAFO have, or are, developing procedures and standards for the review of pre-assessments and what such assessments should contain. SPRFMO requires the member or Cooperating Non-Contracting Party (CNCP) to submit proposals to the Scientific Committee for evaluation, with the Scientific Committee providing feedback to the member or CNCP and advice to the Commission.

104. It was noted that the Marine Stewardship Council (MSC) also has fisheries improvement programmes for certification, and a pre-assessment programme that uses risk-based tools.

***Assessment of exploratory fisheries***

105. It was noted that after exploratory fisheries have taken place, there is an assessment on whether new fishing areas can be opened. In CCAMLR, the typical procedure is to annually review, for three years, areas where exploratory fishing has taken place. However, sometimes there are specific challenges, such as changing sea ice cover, which may have an impact on exploratory fishing plans.

***Further action***

106. In general, the relevant commission makes the decision to open an area to fishing, or to close it, and decides which gear should or should not be used. If there is approval to open the area to fishing after exploratory fishing, based on the advice made to the commission and subject to assessment by the relevant scientific body, a decision will need to be made on the footprint (and if the exploratory fisheries become incorporated into existing fishing areas); this is subject to the same rules and measures as other existing fisheries.

***Review of fishery operations (in existing fisheries)***

107. SPRFMO has requirements that all fisheries must conduct an impact assessment. Expanding fisheries gives more information and there should be a review of earlier assessments; particularly if based on information from other areas involving similar species (UNGA Res. 66/68, article 129).

***How impact assessments are made publicly available***

108. In most cases, impact assessments are made publicly available on RFMO/A websites. In CCAMLR, they are included in the reports on bottom fisheries, VMEs, and other individual fisheries, which are all made publicly available.

109. In Atlantic RFMOs, an overall impact assessment underlies the original and updated designation or "existing fishing areas" where SAIs are considered unlikely, "new fishing areas", where

SAIs are more likely to occur and where additional impact assessments of exploratory fishing activities are required, and "bottom fishing closures" where it has been determined that VMEs are likely to occur. The overall assessment, as well as the specific assessments of exploratory fishing proposals and closures, were and shall be based on best scientific advice as required in the relevant conservation measures and recommendations. All of these organizations have provisions for reviews of the overall regulation, and make amendments as appropriate based on scientific advice. Assessments are made publicly available in the sense that meeting documents and reports, including those from scientific advisory fora, are in the public domain.

***Other issues***

110. The question was raised on whether there is capacity within each RFMO/A to support the different steps in the assessment process. The answer may influence the general work of the RFMO/A, and it was acknowledged that impact assessments can be a heavy burden for new RFMO/As, such as SIOFA and SPRFMO, which may not have the capacity to address these assessments, and this comes back to the issue of prioritizing tasks.

111. NEAFC has established PECMAS, and NAFO has an ad hoc working group of scientists and managers to deal with impact assessments. Other RFMO/As go straight to the scientific committees, who review the assessments and then provide advice to the commission. Given this, the question was raised as to whether it was beneficial to have such "middle bodies", such as PECMAS or NAFO's ad hoc working group, for other RFMO/As. It was noted that in the case of PECMAS, it speeds up the process during annual meetings because the details of the proposal have been discussed during the PECMAS meetings, and the conclusions and key summaries are presented at the commission annual meetings, which generally have many topics to cover in a limited period. In the North Pacific, it was noted that an option would be to collaborate with the North Pacific Marine Science Organization in a similar manner as NEAFC and ICES.

112. In new RFMO/As, having an extra body could be complicated because of additional costs and a need to focus on having the support to existing mechanisms. Furthermore, in new commissions the burden of proof lies with individual members/CNCPs, which present the proposal to the scientific committee, which then reviews the proposal and sends advice to the commission. Therefore, RFMO/As must have the capacity to address the proposals. (Note: There have been relatively few proposals for new fisheries.)

113. There are potential costs for observer programmes. For instance, in CCAMLR, much time is spent ensuring the coordination and coherence of its observer programme, which is a cost implication.

***Consideration for developing countries***

114. The FAO Deep-sea Fisheries Guidelines acknowledge the need to include developing countries. Many developing countries and small island developing States lack the capacity to develop Notices of Intent for exploratory fisheries. This should be considered when developing new frameworks because it should be possible for all countries to participate. In the North Atlantic, only Cuba is considered a developing country, however, other RFMO/As such as SPRFMO, GFCM (General Fisheries Commission for the Mediterranean), SIOFA, and SEAFO have developing country members.

***Data-poor areas***

115. The final consideration during the plenary discussion was on data-poor areas. There is increasing reliance on data obtained from fisheries, and if there is limited research data available, data from fisheries becomes even more important (including observer data). An issue to consider in is what should be done in the absence of observers. In this case, should there be a minimum data requirement

if there is no information? A general approach could be to put more research effort into commercial platforms.

**Final observations on encounter protocols and impact assessments**

**1) Encounter protocols**

116. Eight observations on encounter protocols were agreed on by participants.

i. The role of encounter protocols varies between regions and depends on the fisheries and the management system in place.

ii. As stand-alone measures, encounter protocols are primarily useful as interim responses. However, as elements of more comprehensive measures, encounter protocols can remain useful in a fully developed and well enforced regulatory framework that satisfies the objectives described in the UNGA resolutions and in the FAO Deep-sea Fisheries Guidelines. Comprehensive measures would also include spatial management measures such as designated fishing areas, subareas only open to pre-assessed exploratory fisheries, and VME closures. A regionally tailored, risk-based approach should be considered, recognizing that when a more comprehensive framework is in place the need for encounter protocols will likely be reduced.

iii. Encounter protocols must be practical and easy to apply, but sufficiently rigorous to serve the dual purpose of minimizing encounters with VMEs and facilitating continued fishing activity.

iv. Regional adaptations of encounter protocols are required, reflecting the differing characteristics of the fisheries, the VMEs known or likely to occur in each region, and the level of knowledge and available information. Within a region, protocols may have to be most stringent for exploratory fisheries, as these are usually conducted in subareas where there is greater uncertainty about the presence and character of VMEs and potential for significant adverse impacts.

v. An ongoing challenge is the determination of suitable threshold levels for the encounter protocols (i.e. usually the quantity of VME-indicator species retained in a fishing operation, which trigger the move-on response, a temporary closure, and other follow-up actions). Due to regional differences in fisheries, the character of VMEs (e.g. determining the composition of VME taxa that are identified as indicators), and the level of development of other elements of the VME-related management framework, it is likely that thresholds will differ between regions. While scientifically validated thresholds are preferable, such thresholds are likely to be unavailable in most regions. While established based on best judgment, current thresholds remain arbitrary, to a variable degree, hence the choice of thresholds should be re-evaluated as more experience with their application is gathered.

vi. In regions where VME-indicator lists and/or associated practical identification guides are lacking, the development of such lists and guides should be given priority in order to facilitate application at-sea by vessel crew or observers. The level of identification needs to match the vulnerability of the species. The reporting level for the VME indicator species needs to be carefully considered to balance the need for specificity and operational feasibility, including the competence and tools available to those in charge of identifying VME organisms.

vii. Encounter protocols should incorporate requirements to accurately report encounter positions, and be designed to ensure that move-on distances and directions meet conservation objectives, while not placing undue burden on fishing operators. Further efforts may have to be made to derive move-on provisions better suited to specific geomorphological features, and the spatial distribution patterns of associated VMEs with different features, such as seamounts, slopes and canyons. For trawl fisheries, protocols requiring vessel movement away from the entire trawl track (rather than the endpoint of the tow, for example) would usually be the preferred option. The feasibility of using headline cameras or acoustics to monitor trawl tracks and VME indicator presence should be considered further.

viii. It is important that recording and reporting of all catches and observations of defined VME taxa in a given region, irrespective of encounter thresholds, is submitted to the relevant scientific

body in order to provide information for further analysis and assessments of VME presence in an area.

**2) Impact assessments**

117. Eight observations on impact assessments were agreed on by participants.

i. The general components of an effective impact assessment, according to the CBD, include: screening, scoping, analysis and evaluation, reporting, review, decision-making, monitoring, compliance and enforcement, and auditing. Earlier analyses have concluded that the FAO Deep-sea Fisheries Guidelines are in line with the CBD Impact Assessment Guidelines for Biodiversity.

ii. The FAO Deep-sea Fisheries Guidelines have been used to develop regional protocols relating to impact assessments for deep-sea bottom fisheries by RFMO/As and/or their members and CNCPs.

iii. During the development of current RFMO/As, VME measures assessments (although not necessarily always formally structured according to i) and ii) above) have been conducted. Most of the existing regional bodies responsible for the management of deep-sea bottom fisheries have developed protocols and processes in support of assessing the impacts of bottom fisheries for both existing and exploratory fisheries. In areas where RFMO/As are not yet fully operational or not established, some flag States have established such protocols and processes as interim unilateral arrangements.

iv. Key steps in the assessment process for exploratory fisheries include: pre-assessment by the proposing contracting party; assessment of the pre-assessment by the competent body (often the scientific body) followed by a decision by the RFMO/A to allow or not allow the exploratory fishery to proceed; and an assessment of the conducted exploratory fisheries and decision on possible action by the RFMO/A. There is limited experience with reviewing the different steps of the exploratory impact assessments, and with the exception of CCAMLR, very few proposals for exploratory fishing have been put forward.

v. While tailoring the way impact assessments are conducted to regional needs is necessary, it should be an aim to achieve higher levels of consistency across RFMO/As.

vi. There are key challenges with respect to developing, using and implementing regional and national impact assessment frameworks, and in addressing the elements of para 47 of the FAO Deep-sea Fisheries Guidelines. The challenges include: a) access to adequate information and data to explain baseline situations with regards to the status of fish resources, ecosystems, habitats and communities (against which future changes can be measured); b) mapping areas likely to contain VMEs; and c) evaluation of impacts, including the need for a transparent approach for assessing risks and incorporating uncertainty adapted to the regional situation.

vii. Experience from CCAMLR shows that with a growing number of initial proposals and reviews, there is considerable demand on existing structures to analyse pre-assessments and conduct the required reviews of the impact assessments. The additional work associated with a rigorous impact assessment process may also be a particular burden for newer RFMO/As (e.g. NPFC, SIOFA and SPRFMO), which may include a number of developing countries that may struggle with the lack of capacity to address all of the different aspects with the human and financial resources at hand.

viii. Many developing countries and small island developing States lack the capacity to develop pre-assessments. The FAO Deep-sea Fisheries Guidelines recognize the special requirements for developing countries and these should be addressed when developing new or amending existing frameworks in order to ensure the equal participation of all countries.

## Appendix A. List of participants

**FAO workshop on encounter protocols and impact assessments**
**Arendal, Norway**
**5–8 May 2015**

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## Appendix B. Workshop agenda

**FAO workshop on encounter protocols and impact assessments**
**Arendal, Norway, 5–8 May 2015**
Venue: Thon Hotel, Arendal

Draft Agenda

Day 1: Tuesday 5 May

| | |
|---|---|
| 09:00 | Arrival |
| 09:00 – 09:30 | Opening session 1<br>Welcome addresses<br>Appointment of co-Chairs and Rapporteur<br>Adoption of Agenda<br>Introductions from participants |
| 09:30 – 09:45 | Workshop objectives and expected outputs |
| 09:45 – 10:15 | Encounter protocols and impact assessments as tools in fisheries management and as elements of relevant global instruments (UNGA, DSF Guidelines)<br>Presentation<br>Discussion |
| 10:15 – 10:45 | Group photo and Coffee break |
| 10:45 – 12:30 | Session 1: Encounter protocols<br>Presentation on encounter protocols background paper – global review<br>The presentation would cover commentary on process leading up to adoption of regulations and set the scene for discussions<br>Presentation<br>Discussion on presentation and background paper |
| 12:30 – 13:30 | Lunch |
| 13:30 – 14:30 | Industry experiences with encounter protocols<br>Presentation<br>Discussion |
| 14:30 – 15:30 | Southern Ocean experiences with implementation of encounter protocols and move on rules<br>Presentation<br>Discussion |
| 15:30 – 15:45 | Coffee |
| 15:45 – 16:45 | North Atlantic and ICES experiences with developing indicators and setting thresholds<br>Presentation<br>Discussion |
| 16:45 – 17:00 | Wrapping up and day closure |

Day 2: Wednesday 6 May

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| 09:00 – 09:15 | Session 1: Encounter protocols cont.<br>Overview of day plan<br>*Goals and objectives for the day* |
| 09:15 – 10:15 | Session 1: Encounter protocols cont.<br>Concluding discussions on encounter protocols<br>Identification of major challenges and potential solutions at the global level and addressing region-specific challenges. |
| 10:15 – 10:30 | Coffee break |
| 10:30 – 12:30 | Session 1: Encounter protocols cont.<br>Concluding discussions on encounter protocols |

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| | Identification of major challenges and potential solutions at the global level and addressing region-specific challenges.<br>–Way forward<br>Agreed outcome of workshop |
| 12:30 – 13:30 | Lunch |
| 13:30 – 14:00 | Session 2: Impact assessments<br>Introduction of impact assessments component of workshop (including exploratory protocols)<br>Objectives<br>Expected outputs |
| 14:00 – 14:20 | Obligations from international resolutions and expectations in FAO guidelines - implementation by RFMOs<br>Presentation<br>General discussions |
| 14:20 – 15:20 | Specific experiences with impact assessments<br>New Zealand experience with impact assessments |
| 15:20 – 15:30 | Coffee break |
| 15:30 – 16:30 | Japan impact assessments in the context of exploratory fisheries in the South East Atlantic |
| 17:00 – 20:00 | IMR hosted boat excursion and reception |

Day 3: Thursday 7 May

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| 09:00 – 10:00 | North Atlantic and North Pacific experiences with exploratory fishery protocols and impact assessments |
| 10:00 – 10:30 | Open discussion on experiences with impact assessments |
| 10:30 – 10:45 | Coffee break |
| 10:45 – 12:30 | Continued discussions on impact assessments – experience and knowledge sharing, how have the assessments been used<br>Challenges and potential solutions |
| 12:30 – 13:30 | Lunch |
| 13:30 – 15:30 | Continued discussions on impact assessments – experience and knowledge sharing, how have the assessments been used<br>Challenges and potential solutions |
| 15:30 – 15:45 | Coffee break |
| 15:45 – 17:00 | Concluding discussions on impact<br>Identification of major challenges and potential solutions at global level and addressing region-specific challenges<br>–Way forward |
| 17:00 | Day closure |

Day 4: Friday 8 May

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| 09:00 – 10:30 | Summary and recap of encounter protocols discussions |
| 10:30 – 11:45 | Coffee break |
| 11:45 – 12:30 | Summary and recap of impact assessments discussions |
| 12:30 – 13:30 | Lunch |
| 13:30 – 14:30 | Conclusions, workshop recommendations and workshop outputs |
| 14:30 – 14:45 | Conclusion of workshop |

## Appendix C. Encounter protocols matrix table.

| General observations on encounter protocols | | |
|---|---|---|
| **Issues** | **Current approaches** | **Observations and suggestions** |
| Prior identification of VMEs | Practices vary among RFMO/As, from rather generalized in some regions to the quantitative definitions for each of three types of VME used (such as in NAFO). | The VME types likely to be present in a region (including their species compositions and the densities of those species) need to be considered and defined (as per Section 42 of the Deep-Sea Fisheries Guidelines). Until that is done, efficient and effective encounter protocols cannot be designed and impact assessments cannot be undertaken. |
| General principles | | Regional adaptations of encounter protocols are required, reflecting the differing characteristics of the fisheries, the VMEs known or likely to occur in each region, and the level of knowledge and available information.<br>Encounters are better avoided in the first place.<br><br>Encounter protocols need to be simple, since they require swift responses.<br><br>They should be designed using the best available science for a region but should be simple to apply. |
| Encounter protocols for established *versus* exploratory fisheries | Most RFMO/As and flag States use the same protocols for both established and exploratory fisheries. CCAMLR excludes some established fishing areas from the application of any protocol. New Zealand's protocol only applies in moderately-fished blocks. NAFO would only close an area following an encounter if that occurred outside the established footprint. | Within a region, protocols may have to be most stringent for exploratory fisheries that are usually conducted in subareas where there is greater uncertainty with regards to presence and character of VMEs and potential for SAIs.<br><br>The density of VME organisms in fished areas is likely to be lower than in unfished areas. Nevertheless, remnant VME in currently fished areas also requires protection.<br><br>A lower threshold in exploratory fishing is sensible, as encounters within an established footprint are likely to be with remnants of VME, whereas in a new fishing area there is greater chance of encountering |

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| | | undisturbed VMEs, while a more precautionary approach might be needed (given the lesser amount of available information). |
| Observer coverage | Requirements vary among regions. For example, CCAMLR requires 100% coverage in all deep-sea fisheries, whereas NEAFC does not. | Whether 100% coverage is needed depends on the management system and what roles observers play. If there are already very good data from a region, 100% observer coverage may be excessive.<br><br>Having observers onboard may enhance both the quality of reporting and compliance.<br><br>Almost the only reports of encounters that have yet been made have been either from CCAMLR or from New Zealand-flag vessels. Both are subject to 100% observer coverage. |
| Limited numbers of reports of encounters under most encounter protocols | CCAMLR has received 64 reports of encounters with VME (and more of encounters with VME organisms) but other RFMO/As have received few or none. | Need to look at whole system to understand why so few reports are received. Some possible reasons include:<br>• Most VME in a region is in areas closed to fishing, with little or none in the areas actively fished,<br>• The existence of an encounter protocol (together with other considerations) encourages captains to avoid areas where VME indicator species might be encountered within areas open to fishing,<br>• The thresholds are set too high, or<br>• There is a lack of compliance with the encounter protocol. |

| **Roles of encounter protocols relative to other measures for VME protection** | | |
|---|---|---|
| **Issues** | **Current approaches** | **Observations and suggestions** |
| The roles of encounter protocols relative to other measures for VME protection | Under NAFO and NEAFC, encounter protocols are explicitly secondary to closures, exploratory protocols outside the established footprint of the fishery and assessments. SEAFO and (as interim measures) NPFC have similar ranges of measures. CCAMLR | The role of encounter protocols can vary between regions and would depend on the fisheries and the management system in place.<br><br>As stand-alone measures encounter protocols are primarily useful as interim responses. |

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| | had eliminated some gear types and instituted detailed reporting before adopting an encounter protocol. New Zealand places primary emphasis on spatial controls, with an encounter protocol only applying to a minor part of the fishery. The fishing industry operating in the SIOFA area has adopted voluntary closures. | In some areas, encounter protocols may fill a primary role (e.g. when no overall management system is in place). They can function as primary tools initially and as an important first step.<br><br>As elements of more comprehensive measures, encounter protocols can remain useful in a fully developed and well enforced regulatory framework satisfying the objectives described in the UNGA resolutions and in the FAO Guidelines. Comprehensive measures would also encompass spatial management measures such as designated fishing areas, subareas only open to pre-assessed exploratory fisheries, and VME closures. A regionally tailored risk-based approach should be considered, recognizing that when a more comprehensive framework is in place the requirements for encounter protocols will likely be reduced.<br><br>Encounter protocols can be useful in data-poor circumstances.<br><br>Encounter protocols can be useful in areas with histories of light-to-moderate fishing, where there is likely to be much surviving VME but also extensive VME-free areas to move into.<br><br>Encounter protocols can be useful in exploratory fishing, in areas where the distribution of VME is not yet known and encounters are likely, despite prior surveys and assessments.<br><br>Encounter protocols can facilitate information collection, definition of precautionary areas and other measures.<br><br>Information on encounters has been used to define closures in some areas. |

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| Factors that vary among regions (or within a region) which might change the relative role of an encounter protocol | | Availability of data on VME distributions.<br><br>Availability of resources for thorough pre-fishery assessment.<br><br>Comprehensiveness of management regime in place. If there is a comprehensive system in place, an encounter protocol is less relevant. |
| Development of encounter protocols as secondary measures | | Encounter protocols must be practical and easy to apply but sufficiently rigorous to serve the dual purpose of minimizing encounters with VMEs and facilitating continued fishing activity.<br><br>Poorly designed encounter protocols can be counter-productive (e.g. by moving vessels into other VME areas) and protocols need enough development to make them effective. |

| **Purposes of encounter protocols** | | |
|---|---|---|
| **Issues** | **Current approaches** | **Observations and suggestions** |
| Procedural requirement | UNGA called on RFMO/As to require their member States to require vessels flying their flag both to report and to move away if they encounter VME. | Encounter protocols are required by UNGA resolutions but, if they are not useful in the circumstances of some fisheries, this could be highlighted and brought to the attention of UNGA. |
| To move fishing away from areas of VME | UNGA requirement, implemented in all current encounter protocols. | One purpose of encounter protocols is to limit damage from fishing activity on VMEs.<br><br>Moving fishing away from VME limits damage to that VME.<br><br>Moving away can sometimes be difficult (e.g. in CCAMLR, movements can be constrained by ice). |
| To reduce the likelihood of encounters with VME | | Encounter requirements (both movements and reporting) can create incentives to stay away from areas where encounters are likely<br>Even where there is no general expectation that a move-on rule will lead to movements, an encounter protocol can serve as a precautionary |

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| | | measure (assuming that its thresholds are meaningful) and can act as a back-stop against unexpected VME presence. |
| To ensure reporting of encounters with VME | UNGA requirement, implemented in all current encounter protocols. | One purpose of encounter protocols is to gather information on encounters with VMEs and the presence of VME organisms.<br><br>In some cases, reports serve to identify new VME boundaries. |
| To enhance reporting of observations of VME organisms | Some RFMO/As and flag States (e.g. New Zealand) require reporting of all catches of VME organisms. NEAFC only receives reports of catches that exceed a threshold but all information is available to its scientific advisor, ICES.<br>CCAMLR requires enhanced reporting of catches that exceed a threshold below the threshold that triggers a vessel's movement and closure of an area. | Reports of catches of VME indicator species are needed irrespective of thresholds as all information on them can be useful. Reporting only values above thresholds leads to loss of information.<br><br>The better the existing data sets, the less need there is to gather more. Reporting of multiple catches from the same area, each smaller than the threshold that triggers a "move on", could be important for data analysis and the general management of VME protection.<br><br>A temporal trend of reducing amounts of VME organisms in fished areas is expected and is a negative signal for VME conservation. Continued reporting of sub-threshold catches in fished areas should be required by RFMO/As. |

| **Indicators of encounters** | | |
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| **Issues** | **Current approaches** | **Observations and suggestions** |
| Types of evidence available to show that a commercial fishing operation has encountered VME. | All current protocols use the catch of VME organisms by commercial gear. Some RFMO/As (e.g. CCAMLR) and flag States (e.g. New Zealand) add catches of other benthic organisms (e.g. Brisingid starfish) known to occur in VMEs. | Evidence of encounters should be differentiated from indicators of a potential encounter.<br><br>Catch of VME organisms by commercial gear (with reservations)<br>Catch, by commercial gear, of other benthic species that are known to occur in areas of VME and have been found to indicate the presence of VME. To be useful, the association between indicator species and VME needs to be quantified. |

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| | New Zealand additionally uses a "diversity" measure as an indicator of encounters with VME. | Catch in commercial gear of fish species known to be closely associated with VME. The usefulness of such an indicator would depend on finding an association between a given species and VMEs, as well as provision of adequate documentation.<br><br>Catch in scientific-type sampling gear deployed with commercial gear. (In a New Zealand research survey using commercial gear, small ring nets have been attached to the lower bridle/sweep connection and have proven effective at sampling smaller benthic fauna.)<br><br>In addition to quantities of single taxa, high species diversity and species richness of benthos in catches can be an indicator of VME.<br><br>Use of evolving technologies, such as:<br>• Imagery from gear-mounted cameras,<br>• Processed data from hull-mounted, towed or headline-mounted echosounders,<br>• Predictive modeling of seabed morphology associated with VMEs, followed by echosounder observation of the seabed on the tracks of fishing operations (e.g. drop-offs, knolls, hills and other steep topography can indicate areas where sessile filter-feeding animals may be abundant).<br><br>New technologies are required.<br><br>The feasibility of using headline cameras or acoustics to monitor trawl tracks and VME indicator presence should be considered further. |
| Types of evidence available to show that a commercial fishing operation has not encountered VME | Evidence that VME has not been encountered is not required by UNGA and has not been required by any RFMO/A. | Absence of catch of VME organisms could be an indication of the absence of VME but commercial gears are often poor at retaining VME indicator species.<br><br>Imagery from headline cameras would be useful in this context. |

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| | | VME information from research could support non-presence. |
| Level of taxonomic resolution in lists of indicator organisms | Some RFMO/As (e.g. NAFO, NEAFC, CCAMLR) have prepared detailed lists of indicator taxa and identification guides for use by observers. Their current practices range from naming particular species to naming phyla, sometimes within the same list. Other RFMO/As use informal terms like "coral". | In regions where VME-indicator lists and/or associated practical identification guides are lacking, development of such lists and guides should be given priority in order to facilitate application at sea by vessel crew or observers.<br><br>The level of identification needs to match the vulnerability of the species. The reporting level at which the VME indicator species is reported need to be carefully considered to balance the need for specificity and operational feasibility, including the competence and tools available to those in charge of identifying the VME organisms.<br><br>Overly broad categories (e.g. "sponges") can be misleading if they include species that do not indicate the presence of VME. Fishing could be moved away from areas where non-VME organisms are abundant but VME is absent.<br><br>It is useful to separate benthos in catches into five or six broad taxa, with others added as appropriate.<br><br>Even if encounter protocols use higher taxonomic levels, the data from observer identifications to low levels are needed.<br><br>Naming particular species and genera may place too great a burden on observers. It depends on the competence of those identifying the organisms, as well as the tools available to support identification of VME-indicator organisms.<br><br>There needs to be a balance between details and operational feasibility. Not all RFMO/As have access to the capacity for routine species identification of VME organisms. |

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| Factors to consider when selecting indicator organisms. | | The occurrence of selected indicator organisms should be closely linked to the presence of VME.<br><br>Indicator organisms should have reasonably high and reasonably consistent catchability in commercial gears.<br><br>The list of VME indicator species should be kept updated, according to best available scientific information. |
| Since no observable indicators are perfect, it is necessary to choose between indicators that tend to give "false positives" (i.e. triggering action even though VME is not present) and those that tend to give "false negatives". Either might be useful under some circumstances. | To date, all RFMO/As have accepted the limitations of catches of benthic organisms in commercial gear as the only indicators. | Wherever possible, encounter protocols need indicators that minimize both "false positives" and "false negatives".<br><br>When it is necessary to choose: Within established fishery footprints, encounter protocols need indicators with few "false positives", so that fishing is not moved in the absence of VME, even if that means some "false negatives".<br><br>In exploratory fishing, encounter protocols must have a low risk of "false negatives", even if many "false positives" result in temporary closures. |

| **Thresholds** | | |
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| **Issues** | **Current approaches** | **Observations and suggestions** |
| Setting thresholds | | A continued challenge is the determination of suitable threshold levels for the encounter protocols (i.e. usually the quantity of VME-indicator species retained in a fishing operation which trigger the move-on response, a temporary closure and other follow-up actions). Due to regional differences in fisheries, the character of VMEs (e.g. determining the composition of VME taxa that are appropriate as indicators), and the level of development of other elements of the VME-related management framework, it is likely that thresholds will differ between regions. While scientifically validated thresholds are preferable, such thresholds are likely to be unavailable in most regions. Since they were established based on best judgement, current thresholds remain to |

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| | | variable degrees arbitrary, hence the choice of thresholds should be evaluated as more experience with their application is gathered.<br><br>There are many issues relating to thresholds, not only the weights. The problem of setting the thresholds is the big challenge of move-on rules. |
| Multi-level thresholds | CCAMLR uses a lower threshold for reporting catches of VME-indicator organisms than for the requirement to move out of "risk areas". All other RFMO/As use only one threshold (per indicator and per gear type). | Recording and reporting to the relevant scientific body of all catches and observations, irrespective of the encounter thresholds, of the defined VME taxa in a given region is important in order to provide information for further analysis and assessments of VME presence in an area.<br><br>Reports of moderate catches of VME organisms are useful and less of a burden than reporting the benthos taken by every set, including zero catches. However, any VME record can be useful to add to the understanding of VME distributions and density. |
| Quantitative foundations of thresholds | NAFO has aimed for a quantitative link between thresholds and the definitions of each type of VME. New Zealand has used percentiles of catches of indicator organisms from historical (pre-encounter protocol) records, while Australia has used a similar, though less formal, approach. The thresholds established by other RFMO/As and flag States have had little empirical basis. | Both the NAFO and New Zealand approaches provide an expectation of how many future encounters there will be.<br><br>Analyze observer data in support of setting thresholds. |

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| Inclusion of dead remains of indicator organisms in the weights assessed against thresholds | Australia requires the inclusion of dead coral skeletal material in the weight assessed against the threshold of the national encounter protocol. Most other protocols specify that only live material should be included. | The answer varies from region to regions and each RFMO/A must look to its own set of indicator species – and likely distributional and compositional patterns as well.<br><br>Thresholds restricted to live coral alone may not be useful in all regions. Not all non-living coral skeletal material is coral rubble. Some is the dead matrix on which live coral grows. The dead matrix has an ecological function. Some taxa (e.g. scleractinian corals) are a mix of live and dead. Gorgonians are not.<br><br>Dead coral should be included if it is accompanied by live material of the same species. If all of the material (of a species) in the catch is dead, it should not be included.<br><br>Coral rubble might indicate the presence of live coral nearby.<br><br>Coral rubble is itself valuable habitat for macro-fauna but it is not a VME.<br>Observers cannot always distinguish recent coral rubble from long-dead sub-fossil coral but in some cases they can: long dead stony coral material in the South Pacific is black (from a manganese coating) whereas decades-old coral is still white-grey. |
| Responses to repeated sub-threshold catches in the same small area | CCAMLR notifies flag States and vessels of such catches but does not require any particular action. | A first catch of VME indicator organisms that is below the threshold for an encounter with VME indicators should not trigger a move. However, an area should be closed if there have been repeated sub-threshold catches there. |

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| Multiple thresholds for different species, gears, fishing methods, areas etc. within a region | Australia uses one threshold for all trawl sets. CCALMR uses one for all longline and pot gears. NAFO has three for different indicator taxa but each applied to all gears. NEAFC and SEAFO have different thresholds for trawling from those for longlining. New Zealand has seven thresholds for trawling. | Different thresholds for different gears could be feasible.<br><br>If VME specifications have been set before the encounter-protocol design process, informed judgments can be made about the relative composition of taxa likely to be encountered and their proportions (if not actual weights, because of gear selectivity). |

| **Move-on rules** | | |
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| **Issues** | **Current approaches** | **Observations and suggestions** |
| General | | Encounter protocols should incorporate requirements to enhance determination of encounter positions and be designed to ensure that the move-on distances and directions serve conservation objectives, while not placing undue burden on the fishing operators. Further efforts may have to be made to derive move-on provisions better suited to specific geomorphological features and the spatial distribution patterns of associated VMEs with different features such as seamounts, slopes, canyons etc. |
| Location to move away from, following an encounter | Following an encounter, CCAMLR, SEAFO and NEAFC require a move away from where indicator organisms were taken on longline. New Zealand requires trawlers to move a relatively long distance (at least 5 miles) from one point on a trawl track.<br>NEAFC requires movement away from everywhere on the track of a trawl set. Australia requires that for both trawl and longline gears. | For trawl fisheries protocols requiring movement away from the entire track (rather than e.g. the endpoint of the tow) would usually be preferred option.<br><br>Bottom longline gear gives a better idea of where an encounter with VME occurred than trawls do.<br><br>Where to move away from following an encounter by trawl gear need not be the same in every region and should follow scientific advice. It depends on the length of the tow, including the length of the tow relative to the move-on distance. (The point approach works if the entire tow track, plus a buffer around it, fit within the closed circle.) |

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| | NAFO requires movement away from the end point of a set. | For long trawl tows, a polygon approach is better than a point approach but it needs to be modified to the type of fishery.<br><br>In targeted trawling on seamounts, the period of bottom contact is typically short enough that the site of the encounter is known with adequate precision. On large seamounts (e.g. Louisville), the tows can be long (over an hour) and cover 3 nm to 4 nm. The contact with VME organisms will likely be on the summit or upper flanks of the seamount. Moving away from a single point is probably acceptable if the position of the gear (not that of the vessel) is used.<br><br>In some seamount trawling, the area of seabed contacted by the gear is so small and the length of the warps so great that the track of the vessel (recorded by VMS) does not accurately represent where an encounter happened. |

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| Determining the distance to move | All current encounter protocols use either 1 nm, 2 nm or 5 nm but the selection of those distances has been essentially arbitrary.<br>SPRFMO chose 5 nm after considering the size of the seamounts and other features that are fished.<br>CCAMLR chose 1 nm after considering the need to maintain data streams. | Today, it is essentially an arbitrary decision but ideally should not be.<br>It is important to document why a certain distance has been selected (e.g. science based, arbitrary etc.).<br><br>The move on distance should ideally to be based on characteristics of the regional ecosystem (e.g. VME patch sizes, distance between patches, etc.). However, the characteristics differ among (and within) regions. For many areas, data are limited. Where suitable data exist, they should be used by RFMO/As.<br><br>The selection of a distance relates back to the specification of a VME. If the VME is defined topographically (e.g. as a seamount or hydrothermal vent), then the distance needs to be enough to move the fishing off that feature and onto another. If the VME is slope and taxa based, then selecting a distance should involve analysis of existing scientific data on patch size and spacing.<br><br>Many RFMOs should have adequate information for a first attempt at that. The spreading of fishing effort that can be caused by an encounter protocol needs to be considered. Arbitrary selection of move-on distance and direction can result in a protocol that is counter-productive. A vessel encountering VME needs to move back to an area less likely to contain a VME (e.g. back to a known fishing ground). That could involve a shorter movement than the currently required distances.<br><br>The issue of untrawlable ground is important. It may be relevant if the "downstream" effects from the existing fishing tracks are small. But any sediment plume from doors and ground-gear can drift, and the likely extent of this, and smothering impact should be considered.<br><br>The move-on distance also shapes the temporary closure (if any) which follows. The effects of the distance on closure size and shape should be considered, as the closure needs to be easily implementable. |

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| | | Distance selection should be precautionary, as the area is only temporarily closed to fishing pending review. |
| Direction to move | Currently, all RFMO/As and flag States leave the direction to the sole discretion of the vessel's captain. NAFO's science advisors have discussed possible controls on directions of movement. | In established fisheries, use of the captain's knowledge and his ability to move back to known ground can be a good option. Experienced fishermen know better than anyone how to get away from patches of VME.<br><br>Relying on the captain's decision alone is not necessarily an applicable option in exploratory fisheries.<br><br>A captain should make sure that the vessel moves to a place where he will not have another encounter. That is the onus on the fleet.<br><br>The emphasis of the encounter protocol and the UNGA resolutions is to protect VME, as a priority over fishing success. However, if left top decide on the direction of a move-on, captains have little choice but to go where the fish are, even if that means staying in VME. |

| **Post-encounter initial or temporary closures** | | |
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| **Issues** | **Current approaches** | **Observations and suggestions** |
| Vessels excluded from a closure after an encounter protocol triggers a move-on | Within the established footprint of the fishery, NAFO and SEAFO require only that the vessel that had the encounter move. New Zealand also closes areas only to the one vessel. In contrast, NEAFC and CCAMLR close the area to all vessels. Australia closes to all vessels flying its flag. | Which vessels should be closed out of the area depends on regional considerations. Could be any of:<br>• Only the vessel that had the encounter,<br>• Only vessels from the flag State of the one that had the encounter,<br>• Only vessels fishing with the same gear type as involved in the encounter, or<br>• All vessels using gears that pose SAIs to VME.<br><br>Ideally, the closure should apply to all vessels, as that would prevent further contact with the VME. More definitely, all vessels using the same gear type should be excluded and a decision made about exclusion of other gear types based on the nature of the encounter. |

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| | | In the SPRFMO area, there are so few vessels active in such a large area that moving even one away from VME helps, as an interim measure pending development of an improved encounter protocol.<br><br>In some fisheries, there are established tow lines. Those should not be closed to vessels that regularly fish without contacting VME just because a stranger makes a mistake when trying to tow down the line.<br><br>Rather than having encounters with VME trigger closures, data could be gathered and assessed annually and closures implemented after review when appropriate. That approach may be better suited to sub-threshold encounters with indicator organisms than to encounters with VME. |
| Shapes of temporarily closures | Currently, all RFMO/As and flag States use closures shaped by their move-on rules, either circles (if moving away from a point) or polygons (if moving away from a track). | A polygon around the trawl track or a circle around a move-away point would be the desired geometry in most cases. NEAFC has examined examples and concluded that polygons will be practical to apply.<br><br>In some fisheries, moving off a seabed feature is an option to be considered. |

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| Durations of temporary closures | Once a closure has been triggered by an encounter with VME, most RFMO/As and flag States maintain that closure until it has been reviewed and a decision made. On paper, Australia closes only for the duration of the present annual permit but could extend indefinitely through conditions on subsequent permits. New Zealand closes only for the duration of the present trip of the vessel that had the encounter. | Until review completed and a decision made whether the area should be a permanent closure or should be re-opened.<br><br>Temporal closures should be maintained until there is scientific evidence that bottom fishing activities would not have SAIs on the ecosystems in the areas closed.<br><br>The process for review of encounters should be time-bound, though the time may vary between RFMO/As.<br><br>Review times, and the area of the closures, need to be proportionate for industry to be responsive in the absence of observers.<br><br>None of the RFMO/As have seen many reported encounters. A year should be long enough for a review that used existing data (i.e. no new field surveys).<br>There has been little progress to date on reviews of temporary closures in those regions where there have been any (i.e. mostly CCAMLR) but it should be encouraged. |
| Reviews of temporary closures | No RFMO/A or flag State yet has specific procedures for reviewing temporary closures triggered by encounters with VME. | For the CAMLR CA, there is relevant information in other datasets, such as the general fishing database, as well as data on sub-threshold catches of VME organisms. That could be used to define the spatial extent of the VME patch, on a case-by-case basis, and so refine the design of the closure. |

**Appendix D. Impact assessments matrix table.**

Paragraph 47 of the FAO Deep-sea Fisheries Guidelines were discussed during the fourth day of the workshop, in the context of learning from current regional experiences.

| 47. Flag States and RFMO/As should conduct assessments to establish if deep-sea fishing activities are likely to produce significant adverse impacts in a given area. Such an impact assessment should address, *inter alia*: | |
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| **Text in Guidelines:** | **Discussions:** |
| i. 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); | This part of the guidelines has already been addressed in some RFMOs (e.g. through the Spanish proposal for exploratory fisheries in the NEAFC RA).<br><br>In general, with the exception of potential bycatch species, the elements listed in 47(i) have been addressed in most impact assessments. Assessments of bycatch can be a challenge to consider in a pre-assessment for an exploratory fishery and in some areas due to a lack of information. The predicted "footprint" should be included in a pre-assessment.<br><br>The need to differentiate between requirements for existing fisheries and exploratory fisheries when discussing pre-assessments was noted.<br><br>SPRFMO requires the [relevant] contracting parties to undertake impact assessment for existing fisheries. For exploratory fisheries a fishing footprint as such cannot be defined, but the relevant contracting party needs to declare the area in which the fishery will take place and provide an estimate of the fishing effort: this will be submitted for consideration as part of the impact assessment. |
| ii. best available scientific and technical information on the current state of fishery resources and baseline information on the ecosystems, habitats and communities in the fishing area, against which future changes are to be compared; | "Best available", is a key phrase. Exploratory fisheries are often initiated in areas where there are limited data available. The best available information could therefore be very little but if there is information it must be used [or inferred from other sources]. An assessment of what is not known is also important in the context of both risk management and monitoring future changes, and what will need to be collected in the exploratory phase.<br><br>For example, in CCAMLR, there is *a priori* understanding of what habitat toothfish occur in and the type of benthic organisms that may be associated with these habitats. Based on |

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| | this baseline information, it is known that there is not a great variability of habitats, which would help in assessing possible future changes.<br><br>Similarly, within SPRFMO where the main deep-sea target species is orange roughy and a lot is already known about associated habitats and communities from adjacent regions.<br><br>The objective of the assessments is to enable exploratory fisheries while managing risk to an acceptable level.<br><br>A pre-assessment tries to address acceptable risk, as stated in the Notice of Intent presented by those planning fisheries. For example, in NEAFC, there is a reference for preferred gears, etc. in the assessment procedure. |
| iii. identification, description and mapping of VMEs known or likely to occur in the fishing area; | Key issues associated with 47(iii) primarily relate to scale and accuracy: there is no clear understanding of VMEs and where they may occur. RFMOs work to evaluate the occurrence or likely occurrence of VMEs, using methods such as modelling (taking into consideration the various challenges of these methods), however, the approach to mapping of VMEs depends on the regions. The mapping would include the VME indicator species mainly, and not necessarily features.<br><br>Different regions have different levels of information available on the occurrence and distribution of VMEs: the North Atlantic has more targeted research compared with the South Pacific. This is not necessarily an issue, but it does point to the need to build risk factors and level of uncertainty into the assessment process. Some regions also have had detailed mapping of existing fisheries.<br><br>For example, SPRFMO.<br><br>NAFO has extensive fisheries independent datasets with information based on research provided from the EU and Canada. This has allowed NAFO scientists to look at the spatial patterns of biomass concentrations, which have been incorporated into models. NAFO has also benefitted from a large research programme on this topic ((NEREIDA programme). In 2014, a comprehensive assessment of VMEs in the NAFO RA was conducted.<br><br>In CCAMLR, there has been mapping of VMEs and potential VMEs and research carried out through the Antarctic surveys is a useful resource. However, caution should be used |

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| | when interpreting the results of research-derived VME distributions due to the influence of the distribution of the research sampling. Thus, research identified hotspots will likely only be a subset of all hotspots. Mathematical models on the topography and bathymetry in areas with benthic organisms have been developed. A guide to support identification of VME organisms is available.<br><br>In the Indian Ocean, significant seabed mapping is being carried out by the fishing industry, who have voluntarily closed areas with believed important concentrations of benthic organisms to their fishing vessels. Australia has conducted impact assessment in this area). Research on seamounts has also been carried out under the coordination of IUCN.<br><br>In the Southwest Atlantic mapping of VME areas were conducted by Spain, and these were later closed to Spanish vessels.<br><br>In the SPRFMO area, where there have been few scientific surveys, and the region is relatively data-poor, efforts to describe likely VME distributions have been conducted by use of habitat suitability models. A survey to ground-truth these predictions has shown that such extrapolation into far-distant regions from the location of actual sample data proven are potentially inaccurate.<br><br>The question of what constitutes mapping in this regard and the potential use of echosounders was raised, as was the need for a full mapping programme.<br><br>The possibility of using cameras on fishing vessels (headlines on trawlers or on lines with long-line fisheries) should be considered, as they are becoming less expensive and more robust, may be a more cost-effective option (although in some cases they can still be expensive) to obtain information on VMEs.<br><br>Pre-assessments need to look at all sources of information. Some chapters of the pre-assessment reports are short because of the limited information available, but in most cases there is information that could form the basis for the Notice of Intent.<br><br>It was noted that there could be datasets that RFMO/As do not know about or have direct access to, and that could be of relevance (e.g. historical information from fishing). |

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| | However it would not necessarily be the responsibility of the RFMO to coordinate access to this information. There is an obligation on the member/CNCP who puts out the letter of intent to collate and describe all potential information.<br><br>NAFO are coordinating an evidence collation effort to support their upcoming assessment of bottom fisheries in 2016, however this is distinct from the process Contracting Parties need to take for exploratory fisheries, etc.<br><br>Habitat and species distribution modelling has been applied in a number of areas to help identify the spatial extent and location of VMEs.<br><br>Over time, as more and more knowledge has been gained on the ecology of VMEs, but knowledge is not necessarily transferred to other regions (e.g. information related to depth or habitat limitations (structure of the seabed) of VME indicator species, etc.).<br><br>In practice this can be hard. For example, in SEAFO, using large-scale models does not seem to be useful because the bathymetry is mapped wrong and then the model will give the wrong information, which can become a key issue at different scales. There are similar experiences in SPRFMO, where existing SRTM bathymetry in the western and mid-Pacific is way out for some seamounts.<br><br>In the northeast Atlantic the early habitat models failed to predict *Lophelia* banks (under-prediction of occurrence). Hence it could be difficult to use large scale models for predicting events at the much smaller scale needed for fisheries (e.g. at the scale of fisheries tows).<br><br>Furthermore, the relevant member/CNCP conducting the exploratory fishing cannot be expected to map everything: so it is necessary to define what should be required in the context of an impact assessment (cannot be to too prescriptive on this point). The key issue is often one of the level of detail available in environmental data, and understanding what variables might be the main drivers of the distribution of VME taxa.<br><br>It was also noted that Proposals for Exploratory fisheries so far are only for limited geographic areas. |

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| iv. 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; | There is a need to think about what is going to be measured (and the metrics to be derived), not just about data and method. There is also a need to consider the level of uncertainty associated with a composite risk assessment ranking or scoring system (which is often indicated as a level of confidence in the assessment).<br><br>It is also important to note what the exploratory survey work will do and not do (i.e. in terms of providing information on certain aspects, but not on others). For example, maps of high-risk areas indicated uncertainties. |
| v. identification, description and evaluation of the occurrence, scale and duration of likely impacts, including cumulative impacts of activities covered by the assessment on VMEs and low- productivity fishery resources in the fishing area; | A key point is there is a need to indicate uncertainty.<br><br>47(v) and 47(vii) place high focus on VMEs and low productivity species. Typically, a full impact assessment looks at target species and other bycatch species as well (e.g. the New Zealand impact assessment considered fish and seabird bycatch).<br><br>The FAO guidelines deal with deep-sea fisheries and focus on low-productivity species (being low-productive does not, however, mean that they are not resilient (e.g. species with very many year classes may have low productivity but still be resilient to fishing). Other species are addressed by RFMOs through other means and there is an obligation also to have measures on these species. For example, New Zealand has included seabirds, as necessary in the context of bycatch from fisheries but not necessarily in a VME context.<br><br>NAFO, as part of its work plan to assess its bottom fisheries in 2016, is focusing on methodologies to assess SAIs: the approach makes the distinction between assessing risk of potential, new SAIs *versus* assessing possible historic or past SAIs in areas of VMEs outside of current closures. The approach looks at risk of current SAIs and potential past SAIs.<br><br>RFMOs should take into consideration all environment impacts (i.e. more than just low productivity and VMEs – normally such IAs would cover target, bycatch, and threatened, endangered, and protected species, habitats and communities) when considering assessments for exploratory fisheries.<br><br>It is noted that bycatch mitigation measures are different from impact assessments. In SEAFO, there are similar measures on this to CCAMLR. |

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| vi. risk assessment of likely impacts by the fishing operations to determine which impacts are likely to be significant adverse impacts, particularly impacts on VMEs and low-productivity fishery resources; and | Risk assessment approaches currently applied range from simple rankings to semi-quantitative to more quantitative methods. Most describe the likelihood of an impact occurring, and the expected consequences of that impact. Rankings are typically used from "low" to "high". National or regional bodies have received many methodologies and a compilation of these could be useful in providing further guidance on available methodology.<br><br>The level of complexity can be different depending on specific circumstances and data available (must use the highest developed methods available). When more information has been collected, more complex methods can be used beyond the method that was proposed in the process.<br><br>In all cases, it is important that this process is transparent and well documented (especially when expert opinion is used) with the results made public. |
| vii. the proposed mitigation and management measures to be used to prevent significant adverse impacts on VMEs and ensure long- term conservation and sustainable utilization of low-productivity fishery resources, and the measures to be used to monitor effects of the fishing operations. | Mitigation/management methods have to be more precautionary in data poor situations.<br><br>What are the mitigation methods available to avoid VMEs?<br><br>Must triggers (in relation to e.g. the target species themselves) be included?<br><br>What would be the review period during operations (based on the scale of operations and the time period of fishing operations, in general for fisheries resources)?<br><br>Need linkages between proposed management and mitigation measures and overall management decision processes. A decision-rule type of process can be useful, so that when a predefined threshold is reached, fishing has to stop, or move on.<br><br>How to determine an adverse impact from a significant adverse impact?<br><br>What are VMEs (regional considerations)?<br><br>The definition and specification of VMEs will dictate what mitigation measures are appropriate. Several options may be needed depending on the nature and extent of the VME/indicator taxa. |

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| | As a minimum, lists of relevant management measures that apply are needed.<br><br>**What is expected for mitigation measures in this context?**<br>Would this be technical measures with respect to gear type? Or special requirements for different gears? One mitigation measure could be a voluntary closure in an area where VME organisms were detected, or a proposal for the use of cameras to be deployed on gear by the fishing vessels.<br><br>It is important not to be too prescriptive on this: it is up to the proponent to convince the RFMO/As that the appropriate measures have been given due consideration in the assessment. Examples of possible mitigation measures should be provided (e.g. short tows, cameras). |

**This document contains the report of the FAO workshop on encounter protocols and impact assessments, held in Arendal, Norway, from 5 to 8 May 2015. The workshop was organized as part of the FAO Deep-sea Fisheries Programme, which supports the implementation of the *International Guidelines for the Management of Deep-sea Fisheries in the High Seas* (adopted in 2008). The overall workshop objective was to share experiences and lessons learned in the development and implementation of encounter protocols to protect vulnerable marine ecosystems from impacts from bottom fishing activities in the areas beyond national jurisdiction, and the development and use of impact assessments to gain information on potential impacts of deep-sea bottom fisheries on deep-sea ecosystems. The need to develop encounter protocols and impact assessments have been referred to in various international *fora*, and global and regional instruments contain guidance on how to develop these tools. As such, regional fishery management organizations or arrangements (RFMO/As) have developed and adopted conservation and management measures to address these potential impacts of bottom fisheries. The workshop concluded by identifying areas of challenges for the implementation and use of encounter protocols and impact assessments, and developed a suite of key messages for both concepts that will be used to inform further regional and global discussions on the use of the these tools.**

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