VMEs/2011/

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October 2011

منظمة الأغذية والزراعة للأمم المتحدة | 联合国粮食及农业组织 | Food and Agriculture Organization of the United Nations | Organisation des Nations Unies pour l'alimentation et l'agriculture | Продовольственная и сельскохозяйственная организация Объединенных Наций | Organización de las Naciones Unidas para la Agricultura y la Alimentación

FAO Workshop for the Development of a Global Database for Vulnerable Marine Ecosystems (VMEs)

Italy, Rome, 7 December 2011 - 9 December 2011

Review of progress on implementation of the FAO international guidelines for the management of deep-sea fisheries in the high seas- experience of RFMO/As with identifying and protecting VMEs.

by Jake Rice, DFO

Discussion paper 2

REVIEW OF PROGRESS ON IMPLEMENTATION OF THE FAO INTERNATIONAL GUIDELINES FOR THE MANAGEMENT OF DEEP-SEA FISHERIES IN THE HIGH SEAS – EXPERIENCE OF RFMO/As WITH IDENTIFYING AND PROTECTING VMEs

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The views expressed in this paper are personal to its author and do not reflect a formal position or opinion of FAO or any other organization or State.

SUMMARY

United Nations General Assembly (UNGA) Resolution 61/105 calls on States to take a number of actions directly and through regional fisheries management organizations and arrangements (RFMO/As) to ensure that ecosystem effects of fisheries are sustainable, or else not authorize fisheries to proceed. A key provision in the Resolution was to require that deep-sea fisheries are managed in ways that protected vulnerable marine ecosystems (VMEs) from serious adverse impacts (SAIs). FAO undertook to provide guidance on how States and RFMOs/As should implement the provisions of 61/105 relative to ecosystem sustainability of fisheries, and protection of VMEs in particular. This guidance was built on the results of a series of Expert Consultations. [1]. Two Technical Consultations in 2008 resulted in the International Guidelines for the Management of Deep-Sea Fisheries on the High Seas (FAO 2008; hence "the Guidelines")[2]. This report reviews the experience of RFMO/As with implementation of the paragraphs of those Guidelines addressing the identification and protection of VMEs. It highlights gaps in implementation of the Guidelines and opportunities to address gaps or increase the efficiency with which RFMOs/As are making progress.

1 INTRODUCTION

Direct contact was made with the Secretariats of several regional RFMO/As that are functioning or in the process of being established; specifically Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), Northwest Atlantic Fisheries Organization (NAFO), North East Atlantic Fisheries Commission (NEAFC), South East Atlantic Fisheries Organization (SEAFO), South Pacific Regional Fisheries Management Organisation (SPRFMO), General Fisheries Commission for the Mediterranean (GFCM), and the developing RFMO for the northwest Pacific. Each was asked to provide the documents they considered most informative of their efforts to take action on UNGA Resolution 61/105 and on the Guidelines. All RFMO/As responded positively, and the information they provided was followed up in several cases by direct reference to further documentation on the RFMO/A websites. All documents consulted in this review are listed at the end of this report.

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[1] *Expert Consultation on Deep-sea Fisheries in the High Seas (Bangkok, Thailand 21–23 Nov 2006)* – issues discussed, gaps in knowledge and capacity and focus for development of better management; *Workshop on Vulnerable Ecosystems and Destructive Fishing in Deep-sea Fisheries in the High Seas (Rome, 25–9 June 2007)* – to clarify issues of vulnerability, destructive fishing and adverse impacts ; *Expert Consultation on International Guidelines for the Management of Deep-sea Fisheries in the High Seas (Bangkok, Thailand 11–14 Sept 2007)* – initial draft guidelines developed, amended, revised and adopted; *Workshop on Knowledge and Data on Deep-sea Fisheries in the High Seas (Rome, 5–8 Nov 2007)* – to improve guidelines in relation to data issues and review the *World Wide Review of Deep-sea Fisheries* (In press); *Skippers / Fleet managers workshop on the International Guidelines (Cape Town, May 25–29, 2008)* – discussed trawl industry perspective on the international guidelines; *Technical Consultation on International Guidelines for the Management of Deep-sea Fisheries in the High Seas (Rome, February 4–8 and August 25–29, 2008)* – review and adoption of draft guidelines.

[2] www.fao.org/docrep/011/i0816t/i0816t00.htm

The documents were reviewed individually and material relevant to actions to identify and protect vulnerable marine ecosystems (VMEs) from significant adverse impacts (SAI) was extracted from each one. Additional associated material relevant to the approaches adopted by each agency, to related conservation actions for VMEs, such as risk assessment protocols, and further planned science or management actions was extracted as well. For each RFMO/A the information was then sorted by whether it dealt primarily with identifying VMEs, with protecting areas where VMEs were known or likely to occur, or with managing fisheries in a precautionary manner in areas where VME status was not known.

Based on this information tabulation, summaries of progress, impediments, and gaps were prepared for those paragraphs in the Guidelines relevant to identifying and protecting VMEs, and to managing fisheries when encounters with VMEs are possible. For the summary provided under the text for each paragraph, often examples are included from some of the RFMO/As. However these are presented for illustrative purposes only, and failure to list a particular RFMO/A under a particular paragraph should not be interpreted as that RFMO/A failing to take any actions on that particular issue. In a few cases the narrative summary is somewhat extended to present the evolution of action of an RFMO over a series of meetings. These cases are presented to demonstrate, via the path taken to reach a present status, either impediments that were encountered or strategies taken that facilitated progress.

UNGA Resolution 61/105, and the subsequent FAO Guidelines are important benchmarks in linking biodiversity conservation concerns to fisheries management. However, they were hardly the first moves in that direction. Many RFMO/As were taking actions consistent with conservation of biodiversity through bycatch management measures, fisheries management closures for a variety of reasons, and occasionally other measures, well before the UNGA Resolution and the FAO Technical Guidelines. In fact, the Convention of CCAMLR was built around an the concepts that underlie an ecosystem approach to fisheries management, even if that term was not being used in the early 1980s when the Convention was negotiated. The approach taken in this review, of considering specifically actions by RFMO/As after the FAO Guidelines were negotiated is a reasonable approach for determining where gaps and opportunities for progress exist relative to implementation of the Guidelines. However, it does not acknowledge any measures taken by RFMO/As before the Guidelines became available. As such, it is inappropriate to interpret failure of an RFMO/A to take action relative to a specific paragraph of the Guidelines as necessarily meaning that the RFMO/A has taken no actions relative to the intent of the paragraph. In some case previous measures implemented by an RFMO/A may have addressed the issue partially or fully. Any evaluation of performance of an RFMO relative to the FAO Guidelines and UNGA 61/105 should take account of the full suite of management measures it has in force, and not just those taken since the FAO Guidelines were negotiated.

This background paper concludes with a summary of main findings, but does not recommend any particular "best practices" or prioritize the gaps that exist in implementation. To the extent that those tasks are possible at this time, they are the prerogative of the Workshop informed by this background paper.

2 GOVERNANCE AND MANAGEMENT

General management considerations

*2.1 Identifying areas where VMEs are likely or known to occur (paragraph 21, (ii))*All RFMO/As have undertaken actions to identify areas where VMEs may occur or are likely to occur, and to map the footprint of fisheries overall, and consequently in relation to those areas and features. Progress is uneven with regard to identification of different types of VMEs. More detailed information on the types of places and features that have been the focus of the identification efforts of the RFMO/As will be provided in subsequent parts of this paper, particularly in the commentary on paragraph 42. All RFMO/As acknowledge the incomplete, and in some cases (particularly the Pacific, South Atlantic, and Mediterranean) very limited data to use in the process of identification of VMEs. Progress of the

RFMO/As in the North Atlantic may be greatest, partly because a greater body of research results was available, and partly because both of those RFMOs commenced relevant actions by the middle of the 2000s. However, CCAMLR has made substantial progress with a single well-supported workshop in 2009, and the other Pacific RFMOs are giving priority to pooling information that can be used in the identification of VMEs.

With regard to mapping the footprint of fisheries overall, most RFMOs are receiving detailed information on trawl efforts currently and in many cases for years to decades into the past. This is proving most challenging in the Mediterranean and South Atlantic RFMO/As. In those cases large fleets of small vessels are important fishery components and detailed reporting of fishing operations from such fleets is problematic overall. The historical data are being used by Science Advisory bodies of the RFMO/As to inform analyses and modelling of possible past locations of some types of VMEs.

2.2 Adopting and implementing management measures consistent with the precautionary approach (paragraph 22)

All RFMOs are discussing at least measures to avoid areas where presence of VMEs has been confirmed, and most are considering measures to reduce the risk of SAIs in areas where VMEs are likely to be present but exact locations are uncertain. Details of the types of measures being considered will be reviewed in the commentary on subsequent Guidelines paragraphs, particularly 63-67. In all cases where RFMOs have confirmed areas where VMEs are present, they have implemented mandatory closures of at least some of these areas. In almost all cases these are areas with high densities and/or extensive stands of corals and sponges, or specific seamounts. All of these closures are for specified numbers of years, after which they will be reviewed. In the case of the North Pacific the RFMO is still in the process of being finalized, and the member States have agreed to comply with a proposed closed area, even though the RFMO does not yet have the jurisdiction to require and enforce a closure. Aside from CCAMLR, none of the RFMO/As have undertaken actions targeted at protecting VMEs other than corals and sponges or seamounts not being fished intensively at the time they were closed.

3 MANAGEMENT AND CONSERVATION STEPS

Data collection and reporting

3.1 Identification of species and collection of biological data (paragraph 36)

Several of the RFMOs are investing in developing coral and sponge identification sheets or manuals for observers on vessels fishing in the RFMO/A regulatory area, and some are offering training for observers in the use of the manuals. CCAMLR was the only RFMO that specified that training was being provided to fishers as well as observers, but that appears possibly to be the case in the Pacific RFMO/As as well. For RFMOs that chose to make modest investments in covering the costs of manual preparation and training, manuals reported to be useful and scientifically sound were consistently produced, although photographic material of corals and sponges native to various parts of the seas is unevenly available. Few of the RFMOs seem to be pursuing preparation of identification manuals for benthic invertebrates other than corals and sponges at this time. FAO has an extensive experience in preparing a wide range of technical species identification catalogues, field guides and species identification cards for commercial species and is now in the process of initiating large-scale activities to look into options for the development a range of species identification material including field guides for use on board vessels for corals, sponges and deepwater sharks.

3.2 Information for adaptive management (paragraph 38)

All RFMO/As are doing this to various extents, as a consequence of various activities to implement other provisions of these Guidelines. None of the RFMO/As are specifically devoting effort to develop rule-based adaptive management strategies for preventing SAIs on VMEs. However, such rule-based adaptive management requires the identification of a substantial portion of the VMEs in a

regulatory area, determining operational indicators of the presence of features associated with VMEs during fishing operations, setting thresholds for what constitutes evidence of a VME, and having conservation measures whose effectiveness has been tested either for uniform application where VMEs are likely, or as reactive measures in areas where encounters with VMEs are possible. None of those components of a full adaptive management system are yet in place in any RFMO/A, and until substantially more progress is made on these components, it is premature to begin to establish adaptive management rules. Status and gaps in these components of an adaptive management system are reported under paragraphs 42, 63-67, and 70-73.

3.3 Transparency in data collection and analysis (paragraph 39)

All RFMO/As are encouraging observers to include the presence of at least corals and sponges in their reports of fisheries catches, and a few are asking for greater reporting of bycatches of benthos and non-target fish that may have life history parameters consistent with paragraph 42. Some RFMO/As are modifying catch reporting forms to allow fishers to report this information directly. Analyses of data regarding presence of and impacts on VMEs is usually assigned to whatever bodies provide scientific advice to the RFMO/A on other aspects such as fisheries and stock status. Some of these scientific advisory bodies have created either special Working Groups (e.g. the Working Group on the Biology and Assessment of Deep-Sea Fisheries Resources (WGDEEP) of the International Council for the Exploration of the Sea (ICES)) for NEAFC, the Subcommittee on Ecosystem Approach of the NAFO Scientific Council) or targeted workshops (CCAMLR) to conduct these analyses. No special measures have been taken to make the activities of these science advisory bodies display a higher degree of transparency than other activities of the advisory and management bodies. However RFMOs are being encouraged to improve transparency of all their actions, and progress is being reported regularly. NAFO has taken the unique step of creating a special Working Group of Scientists and Managers to review information and analyses and provide recommendations to the NAFO Fisheries Commission. Membership in this WG is restricted and its transparency is not considered by some external groups to be as high as other WGs of the Scientific Council.

Identifying vulnerable marine ecosystems and assessing significant impacts

3.4 Criteria for identifying VMEs (paragraph 42)

There is partial progress on this Guideline. There have been several cases where RFMO/As have used the information in The Annex directly. Seamounts are one of the types of habitats listed in The Annex as features likely to be associated with the presence of VMEs, and several RFMO/As have closed most or all of some selected seamounts to fisheries.

With regard to use of the full set of criteria, NAFO is the only RFMO/A where a scientific working group has tried to apply all the criteria to marine fish and benthic invertebrates. Results of those efforts are summarized under paragraph 46. The Working Group (WG) on Ecosystem Approach to Fisheries Management of the NAFO Scientific Council considered all the criteria to be ecologically appropriate, but expressed concerns about the limited information expected to be available for assessments using the criteria, particularly those dealing with functional significance and life history traits. A special CCAMLR WG also considered the feasibility of using each the criteria, and came to quite similar conclusions. The criteria are ecologically reasonable, but their application in assessments will pose substantial challenges to the assessment and advisory experts. Some proposals on possible approaches are reported in 3.7.

With regard to corals and sponges, several RFMO/As have tested various types of corals against the five criteria for VMEs. The science advisory bodies have consistently concluded that most types of corals and those types of sponges which may provide noteworthy three-dimensional structure do meet several of the criteria, and areas where there are “significant concentrations” are likely to be VMEs. Every single RFMO/A that has considered the use of the criteria for corals and/or sponges has commented that the absence of any objective criterion for what constitutes “presence” greatly impedes objective use of the criteria. The RFMO/As discuss the issue primarily in the context of triggers for “encounter protocols” but the scientific advisory groups conducting assessments consistently remark that absence of triggers associated with the criteria impede progress in using the criteria.

Major gap: Although science advisory bodies of the RFMO/As consider the criteria ecologically sound, they express the need for additional guidance on how they should be applied. This is particularly the case for criteria 42ii and 42iv, but triggers for use in assessments as well as encounter protocols are considered necessary for consistent and objective use of the criteria.

Opportunity: The additional guidance on how to apply the VME criteria should not be developed independently by each RFMO. This would be inefficient and risk bringing unjustified inconsistencies into practices and standards for identifying and protecting VMEs. Rather, the well-tested Expert Consultation processes of FAO, with inclusion of a representative and balanced group of experts from government, academic, and agency scientific centres, would be an appropriate model for producing the desired guidance documents. With the additional guidance, application of the criteria could continue to be done efficiently and consistently by the science advisory bodies of the individual RFMOs. See 3.8 for a more extensive discussion of this issue.

3.5 Adaptation of criteria (paragraph 43)

No RFMO/As have yet undertaken reviews intended to adapt or add criteria to those in paragraph 42 and the examples in The Annex. The reports of the RFMO/As suggest that they are finding the existing criteria taxing their capacity to deal with ecosystem issues in the contexts of reporting, assessment, or management, and are not ready to consider whether more are needed to ensure VMEs are adequately protected. They have not had sufficient experience with the existing criteria and examples to propose adaptations to them, beyond calls for greater specificity in what would constitute meeting a criterion.

3.6 Collection and analysis of information of fisheries in relation to VMEs (paragraph 44)

All RFMO/As have commenced actions to assemble and consolidate information on the spatial distribution of fisheries under their jurisdictions. Some RFMOs have at least partial information on historical fishing effort already available as part of regular reporting, or are requesting States to bring such information forward (North Atlantic, CCAMLR). Others, including the North Pacific, have made it a priority to obtain such information retrospectively. All comment that the use of vessel monitoring systems (VMS) will improve the ability to track the spatial footprint of current and future fisheries.

All RFMOs are requiring members to file, at least, fishing plans for the coming year with varying expectations about how far into the future these plans should project distribution of effort. Reports of a couple of RFMOs discuss the complex trade-off that sound assessments of VME presence requires a lead time of at least a couple years, whereas future fishing plans are affected by a number of economic and ecological factors that are highly uncertain. The "analysis" of such information has been largely restricted to preparing maps with some form of contouring (i.e. gradation of effort by area) to reflect the recent or historical footprint of various fisheries.

Opportunity: The geo-referenced software for mapping and analyses of the spatial footprint of fisheries is being developed largely independently by all the RFMO/As. A review of practice suggests that the needs of the RFMO/As and the types of information they (could) have available are quite similar. Efficiencies could be obtained by a coordinated effort across RFMOs in developing, testing, documenting, and making available this software.

3.7 Collection of relevant information for inferring presence of VMEs (paragraph 45)

Several of the science advisory groups of RFMO/As have discussed, and in a couple of cases explored, methods for systematically using "other information that is relevant" to infer the likely presence of VMEs. This has been done in two different contexts. One has been to use relatively readily available and/or collected information on bathymetry, oceanography, etc, to develop "predictive habitat models"; that is, models which predict the probability that some type of habitat feature (usually corals and sponges) is present in an area, given data on the habitat features in the area. These models are developed, parameterized, and tested with data from some areas where presence/absence and/or quantity of various corals and/or sponges is well documented, for application in areas where the bathymetric and oceanographic data have been or could be collected, but information on corals and

sponges could only be collected at significant cost. CCAMLR, NAFO, ICES for NEAFC, and SPRFMO are all engaged in such modeling work to varying extents. The other context is to use information on life history traits of well-studies species to serve as surrogates for the life history traits of evolutionarily similar or taxonomically related deep-sea species of fish and benthic invertebrates whose biology are poorly known. The life history traits are needed for application of at least criterion 42iv, and often 42ii and sometimes other criteria as well. This work has been discussed by the science advisory groups of at least CCAMLR, NAFO, and SPRFMO, but none have carried the work to an operational stage yet.

In all cases for both contexts, the scientific advisory bodies have considered the approaches feasible, and noted a significant body of scientific literature on both "predictive habitat modeling" and "biological traits analyses/life history evolution" already exists and can be built upon. However, all have noted that assessments using such surrogates will be more uncertain that assessments using direct and site-specific information, and management based on such surrogates would have to be more risk averse than management using direct and site-specific information, to provide a comparable level of protection to VMEs.

Opportunity: Many of the scientific challenges in developing and testing "predictive habitat models" and inferring life history traits of poorly studied deep-sea species are shared among all the RFMO/As. The specific models and trait inferences will always be case specific. However, a set of scientific "best practices" for developing and especially for testing such investigations will increase efficiency of all the RFMO/As and ensure a consistently high standard of practice is achieved.

3.8 Use of criteria (paragraph 46)

The assessments of VME presence by all the RFMOs have focused on the types of habitats and features listed in the Annex. Not even the full list of features in the Annex have been applied; rather seamounts, corals and sponges are the only features used directly in assessments to this point. Where RFMO/As have closed seamounts (NAFO, and some SPRFMO members in cooperation with each other and the RFMO) or areas containing parts of or multiple seamounts (NEAFC, North Pacific, CCAMLR), in all cases these were selected after some degree of review of biological information. However, in some cases little information was available and RFMOs decided to give full protection to selected seamounts until there was sufficient information and/or time for a full assessment of threats and risks (e.g NAFO, SEAFO). In other cases there was a more formal, although usually qualitative, risk assessment preceding decisions to close all or some parts of some seamounts to fishing (CCAMLR, NEAFC, North Pacific, SPRFMO).

In terms of application of the full set of criteria, the Working Group on the Ecosystem Approach to Fisheries Management of the NAFO Scientific Council was the only scientific advisory group to attempt to apply the full set of criteria during their 2007-08 activities. They produced a map of the areas where VMEs were considered likely to occur based on all five criteria. Conclusions about areas to propose as VMEs were based on an integrated view across all the criteria, but no formal weighting of information sources or criteria was applied. This map was accepted by the Scientific Council, but has not led to management actions by the Fisheries Council. Scientific advisory bodies or working groups of both CCAMLR and SPRFMO have begun discussions of the information and analyses necessary for an evaluation of fish and invertebrate species against criteria 42ii and 42iv, but have not yet commenced any such analyses.

All the RFMO/As have given high priority to review of information on various types of corals and sponges, and where rationales for this selective prioritization are given, the emphasis of corals and to a lesser extent sponges is attributed to The Annex, where different types of corals and sponges are the first two examples of species groups likely to be associated with VMEs, and listed again as a species group or community potentially supported by a topographic feature often associated with VMEs. Recalling the extensive debate during the Technical Consultations regarding if and how to include the information that eventually became The Annex, it appears that there was some foundation for the concerns of some States that including a partial list of types of areas likely to be associated with

VMEs would lead to members of those partial lists being treated as of greater importance than other types of areas that also could support VMEs. Whether this is a positive or a negative result depends on the degree to which conservation is best served by focusing first on coral and sponge areas, and only considering other types of VMEs at some unspecified time in the future.

In assessments of areas supporting "significant concentrations" of corals or sponges, all RFMOs, and usually their scientific advisory groups have stressed the absence of quantitative thresholds for what constitutes a "significant concentration' represents a significant impediment to systematic progress. This is already discussed as a Major Gap under paragraph 42 (0). Some of the science advisory bodies of RFMOs have considered approaches to determine what might serve as such a threshold. NAFO considered using various high quantiles of the cumulative frequency distribution of corals (and later sponges) from all historical survey catches, but acknowledged this approach, although objective and empirical, would equate simply being the largest stands of corals and sponges with the ecological "significance" intended in the Guidelines. Whereas the largest stands are considered highly likely to be "ecologically significant", the implicit inference that all stands other than the largest ones are not "ecologically significant" is troublesome to many participants in the assessments and advisory processes.

The scientific WGs of NAFO have continued to explore this issue, looking at various contouring algorithms for density, for choosing thresholds based on the contouring results, and beginning to consider the degree to which simply "large" and "ecologically significant" are interchangeable concepts. The science advisory bodies of other RFMOs/As are following and building variously on the work of NAFO, but none consider the issue close to the same resolution. The science advisory bodies of all the RFMO/As currently stress that existing thresholds for assessing presence of corals and sponges are to some (usually large) degree arbitrary, and likely too high to provide a high likelihood protecting all VMEs characterized by presence of corals and sponges. The management bodies of their respective RFMO/As generally acknowledge that their thresholds for inferring the presence of VMEs are somewhat arbitrary and likely too high, but all conclude that without scientific basis for changing them to some specific alternative value, they prefer to leave the thresholds where they are. The scientific advisory bodies also stress that appropriate thresholds for what constitutes "ecological significance" are going to vary among ecosystem features (such as even different types of corals or sponges) and areas, even for the same species.

Major Gap: Little progress has been made in using criteria other than those associated with fragile, structurally complex habitat features (usually corals and some types of sponges) in identification of VMEs. De facto, for most RFMOs efforts to identify and protect VMEs have become efforts to identify and protect areas of deep-sea corals and sponges, or selected seamounts. NEAFC and CCAMLR have gone further than other RFMOs in trying to use criteria other than corals and sponges, but there is a need to use the full set of criteria in more comprehensive assessments of likelihood of VMEs.

Major Gap: Most experience has been gained with efforts to assessment presence of "significant concentrations" of corals and sponges. The absence of clear and consistent scientific and technical guidance on how to apply the concept of "significant concentration" in practice is proving a major impediment to progress.

Opportunity: Some of the scientific challenges in setting scientific standards for concluding when the various criteria for "significant concentration" have been met are common to all RFMO/As and all criteria. The specific conclusions and inferences will always be case specific. However, a set of scientific "best practices" for interpreting and applying what constitutes "significant concentration" relative to the criteria in paragraph 42 and the Annex will increase efficiency of all the RFMO/As and ensure a consistently high standard of practice is achieved. A set of "best practices" for integrating information across multiple criteria would also increase consistency and efficiency of practices among RFMOs/As.

3.9 Mechanisms for review and evaluation (paragraph 50)

NAFO has established a WG of the Scientific Council and a Working Group of the Fisheries Council to conduct and review assessments. ICES has combined several separate expert groups into a Working Group on Deep-Sea Fisheries and Ecosystems, and this group informs NEAFC and sometimes NAFO on scientific and technical matters. CCAMLR has a full scientific advisory structure and thus far has dealt with these new advisory needs either through the existing structures or targeted and well-supported workshops. SPRFMO and GFCM have been dealing with these issues through their existing science processes, without cutting off the possibility of spinning off dedicated bodies if considered necessary. To this point none of those bodies have directed scientific review and advisory efforts at the task of evaluating the effectiveness of mitigative measures that have been proposed, other than commenting on the possible boundaries of closed areas relative to known concentrations of corals and sponges.

Major Gap: The scientific advisory bodies of the RFMO/As are being tasked with assessing the presence of some features associated with the criteria for presence of VMEs. To this point they have rarely been asked to advise on alternative mitigation measures other than boundaries for closed areas. Unless closures are to be the only mitigation measure used for protection of areas where VMEs are known or likely to occur, scientific and technical effort needs to be devoted to developing the capacity and frameworks for evaluating suites and alternatives for mitigation of risks.

3.10 Repeated assessments after changes to the fishery (paragraph 53)

There has not yet been sufficient time for action to be taken (or expected) on this criterion. The need for review is acknowledged in the reports of many RFMOs, but usually in the context of future review of areas where VMEs have been suggested as likely, rather then unlikely to occur.

Management and conservation tools

3.11 Conservation and management measures (paragraph 63, (i, ii, iii))

Of the areas reviewed for this paper, only the North Pacific developing RFMO/A was included. Regular meetings among interested parties have been held and interim measures have been agreed, but no fully functioning regulatory framework is yet in place. In the North Pacific the developing RFMO has called for a reduction in effort by participating States, proposed closure of a part of one seamount where there are several lines of evidence suggesting corals that would make the area a VME are or have in the past been present, and requested participating States to refrain from expanding at least fisheries using mobile, bottom-contacting gears into new or only occasionally fished seamounts. In the South Atlantic and Mediterranean the RFMO/As may not have built the capacity to exercise their regulatory authority as fully as the RFMO/As in the North Atlantic, Southern Ocean and South Pacific, but these RFMO/As are making some progress on all of these types of measures.

3.12 The Precautionary approach (paragraph 65, (i, ii, iii, iv, v))

Exploratory fisheries protocols have been or are being developed for new or exploratory fisheries by RFMOs/As in the North Atlantic, Pacific, and Southern Ocean. Support for their completion and implementation seems uniformly high. In all cases the protocols include provisions to deal with 65i-65v, although particularly for 64iv, the effectiveness of the measures has not been evaluated. Commentary in the reports of several of the RFMOs express some concern about the inherent contradiction of fisheries being one of the most feasible sources of information about the presence of VMEs in areas that are poorly known, but prosecution of new fisheries may pose a threat to exactly those poorly known VMEs. The right balance between precautionary regulation of new and exploratory fisheries and opportunity to increase knowledge and provide economic benefits is neither clear nor likely to be viewed consistently by all participants in the dialogue about conservation of biodiversity and management of fisheries on the high seas.

Opportunity: Many of the management issues associated with exploratory fishery protocols that are ecologically robust but allow adequate opportunity for sustainable deep-sea fisheries to be developed are shared among all the RFMO/As. The specific provisions of such protocols will always be case specific. However, a set of "best practices" for such protocols, including for testing and demonstrating

the effectiveness of provisions for protecting poorly documented VMEs from SAIs will increase efficiency of all the RFMO/As and ensure a consistently high standard of practice is achieved.

3.13 Area closures (paragraph 66)

CCAMLR, NAFO, NEAFC, and SPRFMO have all closed at least some areas where assessments have documented the presence of VMEs to deep-sea fisheries that might cause SAIs. (In the case of SPRFMO, the closures are agreements among several Parties that have not yet been formally adopted by the RFMO.) The developing RFMO in the North Pacific has requested members to respect a closure in one area where VMEs are likely, and the member States and RFMO/As in the South Atlantic and Mediterranean are taking a variety of measures to reduce risk of SAIs while they proceed with developing the capacity for full assessments of the presence of VMEs. However, the correspondence between the areas that have been closed and the areas where science advisory groups have documented that VMEs may be likely to occur differs among RFMO/As. NEAFC and CCAMLR have closed or identified as "Risk Areas" some quite large areas, within which not all the included areas are likely to fully meet the criteria for VMEs. NAFO, on the other hand, has only closed those areas where the evidence of presence of VMEs is strong. Development of management measures to protect known VMEs in the Pacific RFMO/As are still in progress, with reports from SPRFMO suggesting that actions intermediate between those of NEAFC/CCAMLR and NAFO may occur.

3.14 Protocols for encounters with VMEs (paragraph 67)

All RFMOs are in the process of developing encounter protocols for deep-sea fisheries. All include some tentative triggers for what constitutes an "encounter", and requirements that fishing operations cease, the encounter is reported, and some form of a "move-on" provision in instituted. The RFMO/As are clearly interacting with each other in developing these protocols, and there are substantial similarities among most of them. All claim that the provisions are based on science advice, although the linkages between the science advice (particularly narrative information in the advice about uncertainties) and provisions in the encounter protocols is sometimes hard to see. This report has already summarized the substantial problems with setting ecologically sound triggers for assessing the presence of VMEs (especially in 3.4 and 3.8), and these problems loom large in developing and applying the provisions of an encounter protocol. As several RFMOs have noted in the reports on encounter protocols, fishing gears are poor samplers of many benthic features that are VMEs. Some of these reports (e.g. CCAMLR and NEAFC) note explicitly that the presence of a feature such as coral or sponge in the catch of a fishing tow can be taken as evidence of the presence of the feature in the area being fished. However, absence of the feature in the catch cannot be taken as evidence that the feature is absent in the area being fished. All the RFMOs with quantitative triggers of coral and sponge for encounter protocols also acknowledge these triggers are probably too high to provide protection to all VMEs that will be encountered. However most such acknowledgements are accompanied by comments that there is no strong scientific basis for changing to another trigger value, so they will continue to use the same quantitative trigger while asking that additional science advice be provided, should more information on which to base new science advice come available.

Similarly, the distances specified in the "move-on provisions" are generally considered large relative to the size of most stands of deep-sea corals and sponges, but small relative to the distances of individual deep sea fishing tows. Consequently some reviews of the encounter protocols being developed by RFMO/As have questioned whether such provisions actually provide effective protection to VMEs. The scientific advisors to both NAFO and NEAFC are conducting analyses of the patchiness of coral and sponge concentrations in their regulatory areas, and when these analyses are complete, they may provide additional information on what types of spatial provisions might provide protection to VMEs encountered during fishing operations.

Major Gap: None of the encounter protocols being developed by RFMO/As are including triggers for any features associated with the VME criteria in paragraph 42 and The Annex except corals and sponges. This leaves all other types of VMEs unprotected by current encounter protocols.

Major Gap: The triggers for encounter protocols are currently measures of the amount of coral or sponge in fishing tows and/or entangled in longlines. These are acknowledged to be poor indicators of the presence of VMEs, with errors much more likely to be misses (VME present but no or insufficient coral or sponge in the catch) than false alarms (coral or sponge in the catch, but no VME actually present). This is exactly the wrong type of detection errors for a measure intended to function in a risk management (and particularly a precautionary) framework. Other indicators of the presence of all VMEs, including corals and sponges, that are reliable in fishery operations, are needed urgently.

Major Gap: The primary conservation measures in the current encounter protocols and those under development are spatial. However, at least the ecosystem features of greatest concern at present (corals and sponges) are known to often be patchy on fine scales, but the patterns of these features is poorly quantified in most areas. Hence it is very difficult to design and evaluate the likely effectiveness of specific spatial measures such as move on provisions, with regard to the protection they can provide to VMEs that have been encountered in fishing operations.

Opportunity: Many of the conservation issues associated with provisions of encounter protocols, including indicators to be used for detecting presence, trigger values on the indicators, and specific response measures, particularly spatial ones, are shared among all the RFMO/As. The specific provisions of such protocols will always be case specific. However, a set of "best practices" for such protocols, and for the scientific and technical analyses underpinning such protocols, will increase efficiency of all the RFMO/As and ensure a consistently high standard of practice is achieved. These "best practices" could include the practices for:

- testing candidate indicators of an encounter;
- selecting indicators based on the results of the tests;
- designing standards for ecologically consistent and meaningful triggers on the indicators;
- conducting and interpreting the spatial pattern analyses needed to design effective move-on (or other) provisions for protecting poorly documented VMEs from SAIs; and
- setting conservation measures in the encounter protocols, based on the results of the spatial pattern analyses.

3.15 Information for VME protocols and encounters (paragraph 68)

To the extent that detailed seabed surveys and mapping information is available, all RFMO/As are making use of that information. The need to use the seabed survey and mapping results to identify areas which meet or are likely to meet the criteria in paragraph 42, or have the feature in The Annex are requiring new types of analyses and modeling. RFMO/As and their member States are supporting experts to conduct such analyses and develop such models. Measures being implemented are being developed in the context of other management measures already in place, for example with regard to requirements for monitoring and reporting of catches by observers and for using VMS and related technologies for tracking and managing the footprint of fishery operations. The review found no reference to explicit actions by RFMO/As to harmonize all new measures to protect VMEs with measures for other objectives. Neither, however, did the review find indicators that the RFMO/As were finding the new measures to be incompatible with other measures, beyond the inevitable consequence that the additional measures to protect VMEs would lead to further restrictions on fishing opportunities, and increase demands on fishery officers. This concern was particularly high with regard to the additional duties expected of fishery observers.

Opportunity: Some of the scientific challenges in making best use of information from seabed surveys and mapping are common to all RFMO/As and all criteria. The specific analyses and the conclusions and inferences based on them will always be case specific. However, scientific experts for all the RFMO/As could work together on developing and testing analyses and geo-statistical methodologies for analyses of such data. Any results could increase efficiency of all the RFMO/As and ensure a consistently high standard of practice is achieved.

3.16 Modification and adoption of management measures (paragraph 69)
The types of measures referred to in paragraph 67 are either still in development or have only recently been implemented. Several of the RFMO/As have called for a review of experience with the protocols after a few years of use, an action that is a necessary precursor modifying or adapting the management measures. However, it is premature to expect action on this paragraph at this stage in the overall implementation of the set of Guidelines.

3.17 Management measures based on assessment results (paragraph 70)
All RFMO/As have either adopted conservation and management measures following assessments pursuant to paragraphs 42 to 53, or else have such measures under consideration. All were developed on a case-by-case basis. All were intended to reduce the likelihood of SAIs on identified VMEs, and at least the large closed areas (or risk areas) implemented by CCAMLR and NEAFC, and the closures of all or most of some seamounts by NAFO, SPRFMO and the developing North Pacific RFMO/A are expected to be effective for as long as they are in place. However, no RFMOs have to this point implemented any measures to achieve long-term conservation and sustainable use of living resources other than corals and sponges that may meet any of the criteria in paragraph 42, or have other features in The Annex. The gaps associated with paragraphs 42 and particularly paragraph 46 are relevant here as well. Until the full suite of criteria for VMEs are used in assessments, long-term conservation of VMEs and sustainable use of the full range of biodiversity cannot be ensured.

Major Gap: Because only some of the criteria for VME identification have been used to this point, even if all measures that have been implemented are well chosen and effectively implemented, only some types of VMEs are receiving protection. Moreover, as discussed under paragraphs 65 and 67 (0, 0), the effectiveness of the various measures for protecting VMEs and for ensuring sustainable use of species with vulnerable life histories has not yet been evaluated, so even the effectiveness of present measures is not yet established.

3.18 Types of conservation and management measures (paragraph 71, (i, ii, iii, iv))
Effort controls are being encouraged by several RFMOs/As, particularly those in the Pacific, as a way to reducing risk to VMEs identified or potentially present. However, as described in the information on several previous paragraphs, temporal and particularly spatial restrictions are by far the preferred method for protection of VMEs for which RFMOs have so far taken action. This is consistent with the focus on corals and sponges as the types of VMEs given priority by the RFMO/As to this point. There has been no special discussion of gear modifications relative to protecting VMEs, although all RFMO/As have been proactive to varying degrees in promoting gear modifications and technical measures as overall tools for conservation of biodiversity and sustainable use of targeted fish and invertebrates. In this context there has been some general attention by all the RFMO/As to matching the performance of gears to general conservation objectives. However, there has been no focused review of such measures specifically in the context of protecting species and habitats that meet the various criteria in paragraph 42 or show the features in the Annex.

Opportunity: All RFMO/As have experience with the use of the various types of management measures listed in this paragraph of Guidelines. One or more focused workshops, perhaps collaboratively among several or all the RFMO/As, to provide explicit guidance on the conditions that may influence the effectiveness of each class of management measure to provide protection to VMEs meeting each of the criteria in paragraph 42 or showing the features in The Annex, could speed the process of selecting management measures to protect VMEs as they are identified, and ensure both greater consistency and greater transparency in the actions taken by the RFMO/As.

3.19 Complementary "suites" of management measures for VME protection (paragraph 72)
The discussion under paragraph 71 largely covers the information on this found in the reports by the RFMO/As. Likewise, the expert workshop(s) suggested under the opportunity for progress under paragraph 71 could specifically consider the potential synergies and conflicts among management measures to protect various types of VMEs, and between measures intended to protect VMEs and measures to achieve other management objectives.

3.20 Management of activities to ensure prevention of SAIs (paragraph 73)

The review of RFMO/A activities found that only some of the RFMO/As directly evaluated whether specific fisheries would pose a risk of SAIs to identified or potential VMEs. This was perhaps most thoroughly done by the developing North Pacific RFMO, where each State presented an analysis of each of its fisheries (defined by gear and target species). Discussion in the Mediterranean RFMO/A also addressed the threats posed by some specific fisheries to some specific ecosystem features consistent with the presence of VMEs. However, the work of this RFMO/A has not yet progressed to the point where VMEs have been identified and management measures have been adopted for implementation by States. In the RFMOs where such fishery-specific evaluations have not occurred, the management measures adopted are generally closures that would affect all gears used by fisheries under the jurisdiction of the RFMO. There are some concerns that the measures adopted may not fully ensure fisheries that authorized to proceed pose little risk of SAIs to VMEs, but these concerns are already discussed under previous paragraphs, particularly 65, 67, 70 and 71 (0, 0, 0, 0). The additional consideration in this Paragraph is the suggestion that RFMOs should be doing some form of impact assessment for each fishery under their jurisdiction, at least relative to SAIs on identified or likely VMEs. Some of the RFMOs have risk assessments for such a role under development, with at least CCAMLR and NAFO giving moderate priority to building such impact assessment frameworks. They are building on experience with developing risk assessment frameworks for fisheries in national jurisdictions of some member states. However fisheries generally are being authorized to proceed in all areas except those where there is strong positive evidence of the presence of VMEs.

Major Gap: Few RFMOs have complete and required processes for the evaluation of the risk that specific fisheries would cause SAIs to the various types of VMEs known or likely to occur in an area. Several RFMOs have such processes under development, but in the meantime fisheries usually are allowed to operate under their usual conditions except where general closures to fishing have been implemented. These have rarely been implemented in places where fisheries are currently or have recently been active. Thus, de facto it seems to be assumed that no existing fisheries pose risk of SAI to VMEs, under status quo operations.

Opportunity: Many of the challenges in developing and implementing practices associated with assessing the risks that particular fisheries would cause SAIs to are shared among all the RFMO/As. The specific provisions of such risk assessments will always be case specific. However, a set of "best practices" for such assessments and for prioritizing which types of fisheries are most likely to pose risks to which types of VMEs could increase the efficiency of all the RFMO/As and ensure a consistently high standard of practice is achieved.

3.21 How to proceed if VMEs are present (paragraph 74, (i, ii, iii))

To this point RFMOs seem to have either determined VMEs are present and required some form of conservation measure (often a closure) is implemented, or have continued with "business as usual" while encounter protocols have been developed. Some of the RFMO/As have closed or labelled as "risk areas" quite large regions, particularly CCAMLR and NEAFC, or taken anticipatory closure action in some areas where information was sparse (SPRFMO). However there has been no systematic effort to partition regulatory areas into those where assessments have determined that VMEs are present or likely, where there is evidence to support a conclusion that VMEs are unlikely to be present, and intermediate areas where there is uncertainty about the presence of VMEs. The work of the science advisory bodies for several RFMOS, including those in the North Atlantic, Pacific and Southern Ocean could be the basis for such a classification of areas, but to this point the fisheries management components of those RFMO/As have not used the information for comprehensive classifications of their regulatory areas in that way. Nor, as reviewed in the commentary on paragraphs 67-69, have encounter protocols been completed and adopted for use in areas that were designed as highly uncertain regarding the presence of VMEs. Hence the gaps and opportunities under those paragraphs are also relevant here.

Major Gap: A comprehensive evaluation of the regulatory area of each RFMO/A into areas where VMEs are known or likely, not likely, and uncertain has not been completed. To varying extents at

least portions of the information needed for such evaluations could be extracted from work undertaken by the science advisory bodies to the RFMOs, but the consolidation of that information into that three-part classification has not been completed in any case.

Assessment and review

3.22 Review of information on VMEs (paragraph 82)

Review of existing information is covered fully in the information provided on the previous paragraphs, particularly 42-46 and 65-72. All RFMO/As are still in the first round of identifying VMEs and implementing measures for their protection. Several have called explicitly for a review of experience with the measures, and for reassessment of the areas which may meet the criteria of paragraph 42 or show the types of features specified in The Annex. Some (e.g. NAFO, SPRFMO, have specified dates for such reviews). It is premature to expect any such reviews to have been conducted at this stage in the implementation of these Guidelines.

4 SPECIAL REQUIREMENTS FOR DEVELOPING COUNTRIES

4.1 The actions of RFMO/As to Paragraphs 84 and 85 are presented together.

Reports of the RFMO/As in the South Atlantic, South Pacific, and Mediterranean have all called attention to the need for capacity building overall for implementation of these Guidelines, and for increasing participation of the less developed States in each region. Aside from the specific theme, the suggestions (and in a few cases, such as the Mediterranean, specific proposals) for capacity building and addressing the special needs of developing countries relative to these Guidelines had few unique features that would not be seen in proposals for capacity building and special needs in many similar fisheries management issues. However, the cases for addressing these needs were made clearly, and underscored by reference to the comments even from the RFMOs in the North Atlantic that capacity to implement the Guidelines was limited, and new types of expertise was needed. This review did not explore in-depth the types of resources that are available to developing States, but neither did it find encouraging evidence that substantial new resources were being provided for capacity building and addressing the special needs of developing countries.

Major Gap: Even the RFMOs associated with the areas where some of the most developed States are located are noting the high demands on science and management capacity to implement these Guidelines. RFMOs/As in areas bordered by some less-developed States are highlighting the special needs of developing countries. However, at least this review has not found evidence of any coordinated program to mobilize such resources, whether following the approaches suggested in paragraph 84 or through other modalities. Failure to ensure the capacity building and to address the special needs for developing countries could result in the undesirable situation where experts from the developed world, whether for governments, intergovernmental organizations (IGOs) or non-governmental organizations (NGOs) will assemble the information, conduct the central analyses and largely deliver finished products for use in assessments and developing management measures in areas where the less-developed countries have a central interest.

5 ADDITIONAL CONSIDERATIONS ON IMPLEMENTATION

5.1 Global database on VMEs (paragraph 87)

RFMO/As will be receiving assistance from FAO in the form of a global database on VMEs in areas beyond national jurisdiction. This reviewer is aware of interactions among FAO, other inter-governmental organizations (IGOs) and non-governmental organizations (NGOs), and potential funders with regard to creation of such a database. A concept note on the functions and content of a global database on VMEs in areas beyond national jurisdiction has been developed and FAO is interacting with potential donors with regards to their potential support. It is expected that the workshop for which this report is being prepared will contribute to the discussions on how and what type of assistance RFMOs/A can provide to "populate" this database.

6 ANNEX

The actions of RFMO/As with regard to identifying areas having the types of features listed in this Annex and providing protection to those areas are presented in the material on paragraphs 42-46 of the Guidelines. Likewise the Gaps and Opportunities in those paragraphs are relevant to application of this Annex as well. In particular, it should be noted that:

Major Gap: Although science advisory bodies of the RFMO/As consider the criteria ecologically sound, they express the need for additional guidance on how they should be applied. This is the case for all the types of features listed in both parts of the Annex.

Major Gap: Little progress has been made with species groups and habitats in The Annex other than corals, some types of sponges, seamounts, and in a very few cases hydrothermal vents. De facto, for most RFMOs efforts to identify and protect VMEs have become efforts to identify and protect areas of deep-sea corals and sponges, or selected seamounts. NEAFC and CCAMLR have gone further than other RFMOs in trying to uses criteria other than corals and sponges, but there is a need to give more balanced attention to the all the marine features in The Annex in more comprehensive assessments of likelihood of VMEs.

Major Gap: Most experience has been gained with efforts to assess the presence of "significant concentrations" of corals and sponges. The absence of clear and consistent scientific and technical guidance on how to apply the concept of "significant concentration" in practice is proving a major impediment to progress for all the types of VMEs, including corals and sponges.

7 CONCLUSIONS

RFMOs/As have all taken actions to assess the presence of VMEs and protect them from SAIs. Almost all the efforts of RFMOs/As have focused on identifying areas with "significant concentrations" of corals and sponges, and in a few cases seamounts. Very little work has been done with other VME criteria.

In almost all cases RFMOs/As have noted that the absence of clear standards for how to interpret "significant concentrations" has impeded progress on identification of VMEs based on presence of corals and sponges.

Incomplete information on distribution, abundance and species composition of corals and sponges specifically, but more generally of all the ecosystem features that may meet the VME criteria, also impedes progress of RFMOs/As to implement the FAO Guidelines. However, in all cases the RFMOs/As have been able to assemble enough information to make at least partial progress on identification of areas where corals and sponges are present.

Management measures used to protect VMEs have been almost exclusively closures of areas considered to have significant concentrations of corals and sponges (and in a few cases, seamounts). There is some exploratory work with other mitigation measures, but such work is in early stages.

There are numerous gaps remaining in the implementation of the International Guidelines, many arising from either the focus on corals and sponges at the expense of attention to other VME criteria and from the lack of operational guidance on how to interpret "significant concentrations".

There are also numerous opportunities for activities to increase progress. Most of these involve collaborative efforts among RFMOs/As, and usually with FAO playing a major role in facilitating the collaborations. Development of a global database on known VMEs (and the criteria they meet), and sponsoring Expert meetings for provision of "best practice" guidance would be roles that should return particularly high benefits.

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