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Scientific Advisory Committee on Fisheries (SAC)

Report of the first meeting of the Working Group on Vulnerable Marine Ecosystems (WGVME)

Malaga, Spain, 3-5 April 2017

EXECUTIVE SUMMARY

The first meeting of the Working Group on Vulnerable Marine Ecosystems (WGVME)[1] took place from 3 to 5 April 2017 at the La Noria Cooperation Center, Malaga, Spain and was organized in collaboration with the International Union for Conservation of Nature – Mediterranean (IUCN-Med) and Oceana. As agreed by the fortieth session of the GFCM (June 2016, Malta), the meeting discussed appropriate measures related to the protection of VMEs according to the FAO mandate. In particular, it addressed issues relating to the definition and management of deep-sea fisheries (DSF) and vulnerable marine ecosystems (VMEs) in the Mediterranean, within the framework of the 2004, 2006 and 2009 Resolutions of the United Nations General Assembly (UNGA) and of the FAO *International Guidelines for the Management of Deep-sea Fisheries in the High Seas* (2008). The UNGA resolutions and the FAO Guidelines provide guidance to States and regional fisheries management organizations (RFMOs) on the long-term conservation and sustainable use of marine living resources in the high seas, including preventing significant adverse impacts (SAIs) on VMEs by bottom-contact fishing gear. The meeting reviewed the current GFCM management measures specific to deep-sea fisheries and biodiversity protection and the relevant associated conclusions and recommendations from previous meetings (including SAC, Commission and FAO workshops). The meeting formulated proposals to GFCM SAC to further address the management of DSF and the protection of VMEs in the GFCM area of application. This included the adoption of VME indicators (features, habitats and taxa) and management elements for the establishment of a VME encounter protocol, of an exploratory deep-sea bottom fishing protocol, and for the mapping of the existing deep-sea fishing areas for the Mediterranean.

WORKSHOP ARRANGEMENTS AND OPENING SESSION

1. The General Fisheries Commission for the Mediterranean (GFCM) Working Group on Vulnerable Marine Ecosystems (WGVME), organized in collaboration with the International Union for Conservation of Nature – Centre for Mediterranean Cooperation (IUCN-Med) and Oceana, took place from 3 to 5 April 2017 at La Noria Cooperation Centre, Malaga, Spain. Twenty-eight experts from Mediterranean countries attended the meeting, including representatives from Oceana, IUCN-Med, the International Council for the Exploration of the Sea (ICES), the United Nations Environment Programme Mediterranean Action Plan for the Barcelona Convention – Regional Activity Centre for Specially Protected Areas (UNEP/MAP-RAC/SPA), the European Commission

[1] This meeting was supported by the European Union under grant agreement no SI2.741730

(DG MARE), and the GFCM Secretariat. The list of participants is reproduced in Appendix B to this report.

2. Mr Othman Jarboui, Chairperson of the Scientific Advisory Committee on Fisheries (SAC) and of the WGVME, welcomed participants expressing gratitude to the meeting organizers for the invitation to this important meeting and thanking IUCN-Med and Oceana for their collaboration in its organization. He recalled that the organization of the WGVME had been requested by the forty session of the Commission (June 2016, St Julian's, Malta) in order to tackle specific issues and advance towards fully addressing relevant UNGA resolutions on the protection of VMEs in the GFCM area of application. He mentioned in particular the significant progress made towards the management of deep-sea fisheries (DSF) within the remit of the SAC, including early-stage discussions on the adoption of a vulnerable marine ecosystem (VME) encounter protocol for Mediterranean fisheries.

3. Ms Aurora Nastasi, GFCM Secretariat, also thanked IUCN-Med and Oceana for their technical contribution to the organization of the WGVME as well as participants for their attendance and recalled the commitment made by the GFCM to manage DSF and protect VMEs in the recently adopted mid-term strategy (2017–2020) towards the sustainability of Mediterranean and Black Sea fisheries (June 2016). This strategy included a specific output on the protection of VMEs (Target 4) which should be achieved in close cooperation with relevant regional organizations. In this respect, she underlined the importance of providing the SAC with technical advice on relevant measures discussed and agreed between experts on issues related to the protection and conservation of Mediterranean marine ecosystems. She finally conveyed, on behalf of the GFCM Executive Secretary, Mr Abdellah Srour, sincere thanks to Mr Antonio Troya, Director of IUCN-Med, for the significant financial support provided to the working group, including in hosting the meeting and sponsoring the participation of several scientists and experts in deep-sea ecology, who provided key contributions and actively participated in the discussions.

4. Mr Troya welcomed participants to Malaga and introduced the partnership activities carried out within framework of the collaboration agreement and between IUCN and GFCM. The meeting aimed to provide technical expertise to support management measures that allow to balance the conservation of the Mediterranean Sea and the exploitation of marine resources, since fisheries represent an important income for the economy of many coastal areas in the basin. It was within this framework that IUCN offered its knowledge and assistance to the GFCM Secretariat and worked alongside with the organizing partners for the preparation of this working group bringing together the expertise of scientists and different institutions from many countries. He recalled the responsibility of the experts in addressing the needs of the SAC in order to provide advice to the Commission on the roadmap for a better protection of VMEs impacted by fishing activities.

5. Ms Pilar Marin, Marine Scientist, Oceana, recalled that during the last decade, Oceana had been actively participating as an observer in GFCM sessions and had been involved in the modernization process of GFCM legal and institutional framework. The new GFCM constitutive agreement placed scientific advice at the core of the GFCM decision process, with the aim of achieving a sustainable exploitation of stocks through the implementation of an ecosystem approach to fisheries management. In April 2017, fisheries ministers of the Mediterranean states signed, in Malta, a historic declaration which was the first commitment of this kind aimed at reversing the current situation of fish stocks. She framed the WGVME as part of the initiatives addressing such challenge and highlighted the necessary role of scientists, fishermen and citizens, in addition to Mediterranean countries and politicians, in this process. She remarked that Oceana was very pleased to actively contribute to the meeting. The results would be a concrete starting point towards the implementation of an ecosystem approach to fisheries management in the Mediterranean, in line with the United Nations obligation to protect VMEs in the Mediterranean. Lastly, she deeply thanked the GFCM Secretariat for this opportunity, the IUCN for its support and close collaboration, as well as all attendees.

6. The chairperson introduced the agenda, which was adopted with minor changes as reproduced in Appendix B, and invited participants to briefly introduce themselves. Ms Maria del Mar Otero Villanueva, IUCN-Med, and Ms Nastasi were appointed as rapporteurs.

INTRODUCTION

7. The Chairperson briefly presented the main objectives and expected outputs of the meeting, i.e.: i) to review the management measures for the protection of VME adopted by GFCM and other RFMOs; ii) to identify s list of Mediterranean VME indicators, habitats and related features (e.g. seamounts, canyons); iii) to identify and propose means by which data collection on VME and deep-sea fisheries can be established; iv) to identify potential management measures to protect VMEs, including a Mediterranean encounter protocol and a deep-sea bottom fisheries exploratory protocol; and v) to review available information on deep-sea Mediterranean areas that may host VMEs or other sensitive habitats.

8. Mr Tony Thompson, GFCM Consultant, presented a "Definition of VMEs and global deep-sea fisheries (DSF) measures". He introduced the background and concepts of DSF and VMEs within a global context. DSF use fishing gear such as bottom trawls, gillnets, pots and longlines which enter in contact with the seafloor at great depths usually beyond the continental shelves. VMEs are benthic habitats comprising cold-water corals, sponges, and other organisms, which are often associated with underwater features that also rise above the seafloor to form structurally complex ecosystems that could be impacted by bottom fishing gear. The FA*O International Guidelines for the Management of Deep-sea Fisheries in the High Seas* (2008) describe DSF and VMEs characteristics and criteria and aim at assisting regional fisheries management organizations (RFMOs) and States in developing appropriate measures at the regional level by promoting sustainable DSF. Concerns for VMEs gained momentum at the World Summit on Sustainable Development (2002) and were expressed in the UNGA Resolution on sustainable fisheries (57/141) with calls to end destructive fishing practices. From 2003, and most notably in 2006, with the UNGA sustainable fisheries resolution 61/105, the protection of VMEs from significant adverse impacts (SAI) resulting from DSF entered the high seas regional fisheries management organizations (RFMOs) arena. Appropriate measures were to be adopted by 31 December 2008, and this posed challenges for RFMOs and States, not least because many did not have the mandate or infrastructure to develop and adopt such measures relating to the protection of biodiversity. Nevertheless, substantial progress to meet the tight deadline was achieved by some RFMOs. By 2010, about half of the high-seas regions had various protocols and closed areas to protect VMEs inside and outside of their existing bottom fishing areas. The management process for RFMOs on deep-sea fisheries and VMEs included the adoption of conservation management measures that: i) mapped existing fishing areas; ii) required habitat surveys to identify known or likely VMEs; iii) established a list of VME indicators and thresholds for encounter protocols; iv) developed exploratory deep-sea fishing protocols that included impact assessments of fishing with bottom-contact gear; and e) reviewed procedures for the identification of VMEs. The responsibility for GFCM to follow a similar process was finally remarked.

9. The working group asked for clarifications regarding the process mapping the of deep-sea bottom fisheries activities, i.e. to identify the current DSF footprint. It was explained that the final objective would be to know where historical and current deep-sea bottom fisheries were fishing and with what type of gear. It was recalled that most deep-seas RFMOs has undertaken a mapping of the DSF footprint and it was noted that the process could take two years or more.

10. Mr Sebastian Valanko, from the International Council for the Exploration of the Sea (ICES), confirmed that the proposed process to map DSF in the Mediterranean Sea was in line with the process undertaken by the Northwest Atlantic Fisheries Organization (NAFO) and other RFMOs to map DSF activities in their area of application. He added that impact assessments using historical data (from 5 to 20 years, as available) were carried out before allowing a new fishery to develop in new fishing grounds (i.e. areas outside the current fishing footprint).

11. The chairperson considered that similar types of review and impact assessment of DSF could be made in the future within the remit of the WGVME, as new management measures would be implemented by GFCM, but only depending on the final decision of the SAC regarding the mandate of the WGVME (which should be evaluated on yearly basis).

12. Some experts raised question regarding the impact of bottom fisheries on VMEs occurring in shallower waters and asked for clarifications about the possibility to discuss management measures to protect VMEs not only from DSF. Mr Thompson explained that the concept of protecting VMEs from SAI focused on DSF in the high seas, as per UNGA resolutions and the FAO Guidelines, and that most of the deep-sea RFMOs in other regions of the world do not have jurisdiction for coastal areas. The application of FAO Guidelines within areas of national jurisdiction was at the discretion of the coastal States. In the Mediterranean Sea, further measures to protect VMEs in the coastal areas could be considered by GFCM in the future, with no necessity to link such type of protection measures to the management of DSF.

13. It was also clarified that the impact of ghost nets was not *per se* considered within the general concept of SAI on VMEs, although the FAO Guidelines did suggest using technical measures to eliminate or minimize ghost fishing and its negative impacts on other components of the ecosystem. Data from the Mediterranean region could demonstrate the negative effect of ghost nets on VMEs and ad-hoc measures could be foreseen for the protection of VMEs from this type of indirect negative effect from fisheries.

14. Ms Nastasi presented GFCM measures supporting UNGA Resolution 61/105 and the way forward for the management of DSF and protection of VMEs. The overview outlined the GFCM management measures addressing, at least partially, relevant UNGA resolutions. These measures concerned deep-sea bottom fishing and the protection of sensitive marine habitats. As of 2017, the GFCM had established eight FRAs: one large closure to towed gears for waters below 1 000 m in the GFCM area of application was established in 2005; three smaller FRAs were established to protect VMEs in 2006; four FRAs were established to preserve important essential fish habitats, three of which established within a comprehensive multiannual management plan for deep-sea fisheries[2]. The overview also indicated that the main DSF in the Mediterranean targeted deep-water red shrimps (*Aristaeomorpha foliacea* and *Aristeus antennatus*), which were harvested at 400–800 m depths. In addition, there were important deep-sea trawl fisheries targeting deep-water rose shrimp (*Parapenaeus longirostris*), Norway lobster (*Nephrops norvegiucus*) and European hake (*Merluccius merluccius*) at depths of 300–500 m, as well as gillnet fisheries and demersal longliners operating at around 400 m targeting *Merluccius merluccius* and blackspot seabream (*Pagellus bogaraveo*). The presentation also summarized recent GFCM steps towards the adoption of a Mediterranean VME Encounter Protocol, including the first proposal submitted to the SAC in 2016. Ms Nastasi underlined that the adoption of a VME encounter protocol would provide information on the distribution of benthic habitats and interactions with DSF and would lead to better scientific advice on priority areas for the future establishment of new FRAs. On the other hand, an Exploratory Fishing Protocol would be needed as well to understand the effects of DSF on unfished/pristine areas, in which VMEs could also occur. The presentation finally recalled the role of the WGVME in discussing and submitting to the SAC technical proposals for specific VMEs and DSF management measures in the Mediterranean to fully address UNGA resolutions in the GFCM area of application.

15. The meeting discussed the proposed depth range to identify DSF in the Mediterranean. Some participants indicated that, from a biological and ecological point of view, the deep-sea in the Mediterranean was linked to depths of light saturation, which is around 200 m from the end of the continental shelf and beginning of the continental slope, underlining that important deep-sea habitats (e.g. cold-water corals) also occurred in this area.

[2]In 2016, GFCM established a multiannual management plan for deep-sea fisheries exploiting European hake and deep-water rose shrimp in the Strait of Sicily (GSAs 12 to 16).

16. The GFCM Secretariat noted that the upper depth limit of 400 m to identify DSF was originally set in the first proposal of VME Encounter Protocol presented to the SAC in 2016, in agreement with the limit selected for the Mediterranean in the FAO *Worldwide Review of Bottom Fisheries in the High Seas*[3]. Nonetheless, based on the discussions held at the FAO Workshop on the management of VMEs and DSF in the Mediterranean held in 2016[4] (FAO headquarters, July 2016), and taking into account a combination of criteria based on the characteristics of Mediterranean bottom fisheries and on the need to avoid depths reached by coastal and small-scale fishing activities (in which a variety of coastal and deep-sea species are targeted), it was decided to propose 300 m as shallower upper depth limit. Following this pragmatic approach, it was suggested to consider, for Mediterranean DSF, those fisheries operating with bottom-contact gear at depths below 300 m. It was also underlined that currently, the use of towed gear below 1000 m is prohibited in the Mediterranean and other fisheries such as longlines, gillnets and pots, are not supposed to be operating below 1000 m.

17. Some experts noted that not all species of the shrimp *Plesionika* came from deep-sea areas as some species also occurred in shallower areas and that a clear identification of the *Plesionika* species was therefore needed. It was also noted that, some deep-sea fisheries could become coastal at night as the shrimps stocks moved in shallower waters.

18. The GFCM Secretariat and the ICES representative remarked that the objective of any measure dealing with deep-sea bottom fisheries should be adapted and tailored to the regional specificities and characteristics of the local DSF and that discussing protection measures for VMEs or essential fish habitats from coastal and small-scale fishing was out of the scope of the meeting. It was recalled that the FAO Deep-sea Fisheries Guidelines and the UNGA discussions on bottom fisheries addressed fisheries in the high seas, generally understood to include those at great depths in areas beyond the Exclusive Economic Zone (EEZ) and outside national waters.

MEDITERRANEAN VME INDICATOR FEATURES AND SPECIES

19. Ms Maria del Mar Otero Villanueva, from IUCN-Med, presented a Draft list of Mediterranean VME features. Mediterranean deep ecosystems are highly productive oases in the deep sea, and home to extremely fragile, long-lived, rare and sometimes endangered marine life. The presentation provided an overview of surrounding morphological features of the main Mediterranean deep-sea ecosystems (seamounts, canyons, cold seeps, vents and related habitats), highlighting their importance in terms of biodiversity and their vulnerability to different types of fisheries (trawling, longlines, gillnets, , etc.) and lost nets. She explained that different Mediterranean studies have shown that mechanical damage by trawl fisheries, in particular, are highly destructive to benthic communities, including those living on seamounts and canyons, but other fishing activities such as longlines also have a considerable effect on vulnerable communities (e.g. the bamboo coral *Isidella elongata,* sponge fields, black corals, other cold-water corals including gorgonians and scleractinians). Lost fishing gear was also commonly reported at different sites. Trawling, in particular, had been shown to remobilize surface sediments in canyon rims and plains, generate sediment turbidity far from the specific fishing ground and increase sediment accumulation rates and suspension, altering many vulnerable communities and habitat forming species. Although the mapping of deep-sea ecosystems was still ongoing, a first list of vulnerable biodiversity hotspots and main biogenic formations was identified and presented to the meeting. Finally, the need for management plans for deep-sea fisheries was emphasized.

20. The working group acknowledged the important results from the studies carried out by IUCN on the deep sea and agreed that, in the Mediterranean, the impact of fisheries was evident especially on

[3]Bensch, A., Gianni, M., Gréboval, D., Sanders, J.S., & Hjort, A. *Worldwide review of bottom fisheries in the high seas*. FAO Fisheries and Aquaculture Technical Paper. No. 522. Rome, FAO. 2008. 145p.
[4]http://www.fao.org/3/a-i6685e.pdf

canyons. It was also proposed to establish clear definitions of Mediterranean canyons, slopes, seamounts from a geological and/or a biological point of view.

21. Ms Emanuela Fanelli, from the Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile (ENEA), Italy, underlined that *Leptometra* (free-swimming, stemless crinoids) *facies* were recognized as important sensitive habitats in the Mediterranean (STECF[5], 2006), remarking that regrettably these crinoid species were not considered as vulnerable deep-sea species in many regions of the world.

22. Ms Marin then presented a Draft list of VME Mediterranean species. As an initial step towards developing a GFCM list of Mediterranean VME indicators and implementing UNGA Resolutions 59/25, 61/105 and 64/72, Oceana had coordinated, along with Mediterranean experts on deep-sea ecosystems, the preparation of a draft list of the main Mediterranean VME habitat types, as well as the taxa most likely to be found in these habitats. The list of habitats was developed according to FAO criteria and was based on scientific literature and data, as well as direct observations from Oceana at-sea research. Habitats were grouped by type, and examples of representative VME indicator species were presented. Selected scientific references were also provided. The list was drafted considering deep-sea habitats below 200 m beyond the continental shelf-break and where sunlight is insufficient for photosynthesis, as recognized by scientists and international bodies, including the FAO. The provisional list of Mediterranean benthic species that may contribute to form VMEs is reproduced in Appendix C. The WGME agreed to use the document presented as scientific background information to identify Mediterranean VMEs. It also pointed out that a similar list was adopted by NEAFC in 2014[6] as VME indicator species. Ms Marin highlighted the importance of preparing a VME glossary of key concepts for GFCM decisions regarding VME protection.

23. Mr Thompson presented a "Selection of VME indicator features, habitats and taxa in the GFCM area of application". He introduced the purpose and rationale for developing a list of VME indicators (features, habitats and taxa) in the Mediterranean, in line with the FAO Guidelines and with previous work done at regional scale. He noted that the objective of the indicators was to provide the GFCM with guidance on the features and habitats that may host VMEs in order to facilitate their identification and protection from adverse effects caused by bottom fisheries. It was proposed that VME indicator features be selected on the basis of topographical features known to potentially harbor VMEs. This would be completed by a proposed list of VME habitats indicating the types of VMEs expected to be present in the Mediterranean. As an initial stage, it was proposed to select VME indicator taxa mainly at the Phylum, Class and Order taxonomic levels, as these could be more easily be identified by commercial fishing vessels. Mr. Thompson noted that the selection of higher-level VME indicator taxa was a common practice in many regional fisheries bodies and that the taxa were compatible with the Provisional list of Mediterranean species that may contribute to form VMEs presented above.

24. An active discussion took place on VME indicators, more specifically on the basing these indicators on species rather than broader taxonomic groups. Participants were informed that a list of species to be used as VME Indicators had recently been adopted in the northwestern (NAFO area) and, partially, in the northeastern Atlantic Ocean (NEAFC area). However, in the case of the Mediterranean, participants agreed that the taxonomic identification of many species included in the Provisional list of Mediterranean species could only be undertaken by scientists and benthos experts. The meeting agreed that the identification of deep-sea sponges, corals, and other species at the genus or species level, would only be feasible if carried out with trained and/or competent observers on

[5] Ardizzone, G.D. 2006. *Sensitive and Essential Fish Habitats in the Mediterranean Sea*. Working document to the STECF/SGMED-06-01 sub-group meeting on sensitive and essential fish habitats in the Mediterranean; 2006. Rome.

[6] Recommendation on the protection of vulnerable marine ecosystems in the NEAFC Regulatory Area. https://www.neafc.org/system/files/Rec_19-2014_as_amended_by_09_2015_fulltext_0.pdf

board commercial vessels or on deck who could compile ad hoc forms to report such catches with taxonomic information In the case of Mediterranean fisheries, where no scientific or trained observers are on board during fishing operations, the collection of information and, therefore, the adoption of management measures such as a VME encounter protocol would only be feasible if based on broad taxonomic groups.

25. In reply to the representative of Oceana who requested information about the process of running impact assessment of DSF on VMEs without a list of VME species, Mr Thompson explained that impact assessments for bottom fisheries on potential VMEs could be based on taxa or habitat indicators since the main aim should be to assess the effect of bottom fisheries at the level of the habitat/ecosystem. He noted that, in any case, impact assessment would require a good knowledge of the fishing footprint and the distribution of VMEs. In this sense, and in line with the conclusions of the FAO Workshop on the Management DSF and VMEs in the Mediterranean, he suggested that the GFCM take a two-phase approach, with a first phase focusing on collecting data on broad taxonomic classes, habitats and identification of VMEs, and on the spatial distribution of fishing effort, and a second phase incorporating more concrete measures such as the closure to fisheries of areas where VMEs occur or likely occur as well as the application of thresholds and move-on-rules for fisheries.

26. The meeting recognized that it was important to gather more data on the distribution of vulnerable benthic species and habitats and considered that further work was necessary to increase knowledge on the ecology of benthic species vulnerable to bottom fisheries through the basin. However, the Provisional list of benthic species presented to the meeting was considered as a reference document containing the best available scientific information on species forming VMEs in the Mediterranean region.

27. After discussion, the WGVME agreed to adopt a first list of Mediterranean VME indicators (features, habitats, and taxa) as reproduced in Appendix D.

FISHERIES – VME INTERACTIONS

28. Mr Michele Gristina, IAMC CNR, Italy, presented "Bottom fisheries on or near VME indicator features and likely significant adverse impacts: insights on the effects of bottom-trawling on deep-sea *Funiculina* and *Isidella* communities". She explained that deep-sea coral assemblages were key components of marine benthic ecosystems that generate habitats for fish and invertebrate communities and act as marine biodiversity hot spots. Because of their life history traits, deep-sea corals are highly vulnerable to human impacts such as fishing. They are considered possible VME indicators and their conservation is therefore essential to preserve marine biodiversity. In the Mediterranean Sea, deep-sea coral habitats are associated with commercially important crustaceans and their abundance has dramatically declined due to the effects of trawling. Marine spatial planning is required to ensure the conservation of these habitats. Mr Gristina explained that bottom trawlers and demersal longliners were identified as the most common fisheries operating at great depths (below 400 m) in the Mediterranean and described the possible effects caused by their gear on VMEs. He finally mentioned a case study carried out in certain areas of the Strait of Sicily (GSAs 12–16) which analyzed the role of trawling activities in shaping the spatial distribution of the two coral species. The results and predictive maps showed that the distribution of *F. quadrangularis* partially overlapped with fishing activities, whereas *I. elongata* occurred exclusively where fishing was low or absent, due to its high vulnerability to trawling.

29. The chairperson informed the meeting that, regarding the fine scale mapping of the sea bottom in Italian and Maltese waters within the Strait of Sicily (GSAs 12–16), a similar detailed bottom mapping of the habitats was also carried out in the northern part of the Gulf of Tunis within the EcoSaFiMed Project (2012–2014) and that it could be possible to obtain a more detailed habitat-mapping of most of the area comprised in GSAs 12–16.

30. The WGVME acknowledged the importance of *Isidella* and *Funiculina* communities in deep-sea soft bottoms of the Mediterranean and agreed that aggregations of these soft corals should be protected from trawl fishing, considering the demonstrated sensitivity of *Isidella* to succumb to even

low/intermediate levels of fishing effort. It was further noted that these species are part of the soft-bottom deep-sea ecosystem, which also supports the spawning and feeding grounds of *Parapenaeus longirostris*, *Aristaeomorpha foliacea* and *Aristeus antennatus*. It was suggested that non-impacted areas of *Isidella* and *Funiculina* could be protected to create refugee-zones for important commercial species and to protect their sensitive life-stages and essential habitats. The establishment of closures or of effort limitations to trawlers in certain areas could allow the recovery of the coral communities and of overfished shrimp stocks, and therefore improve the productivity of these fisheries.

31. Some participants underlined that, in some cases, the abandoned Cannizzi gear on the bottom (fishing aggregating devices) acted as artificial reef where deep-sea corals communities could find a suitable substrate to proliferate: several studies demonstrated that the cold-water coral *Lophelia pertusa* could grow on the Cannizzi.

32. Mr Mahmoud Farrag, from the Al-Azhar University, Assiut, Egypt, presented the "Status of deep-sea fisheries in Egypt". He explained that, in the Mediterranean, several areas were deeper than 400 m reaching more than 1000 m and were suitable for bottom trawl activities. Deep-sea fishing occurred over 400 m depth and started recently due to the absence of technology for boats to operate in deep waters and because fishing was usually concentrated in shallower coastal areas. The DSF commercial activity in Egypt was started in 2009 by the General Authority of Fisheries Resources Development (GAFRD). Since then, many scientists and fishers had been monitoring the deep sea-fauna. The first published work in 2011 investigated deep resources and in particularly deep-water shrimps and indicated that the average total catch per (haul) was about 62 kg for the eastern Nile delta while it was 60 kg/haul for the western. The density of shrimps and several other commercial fish species ranged between 95 and 100 kg/km^2*;* of which 55–74kg/km^2 were deep-water shrimps (*Aristaeomorpha foliacea* and *Aristeus antennatus*) together representing 78–84% (as biomass) of the total trawl catch. *A. foliacea* was much more abundant than *A. antennatus*, with percentages from 72–99% of the total red shrimp catch. The bycatch constituted about 16–22% of the landed catch comprising more than 40 species, including four cartilaginous species and eleven bony fish species. The GAFRD encouraged fishers to develop their fishing gear to exploit deep-sea resources, and new licenses were issued in 2014 for around 5 boats to work in deep-sea waters. The first regular catch of deep-water shrimps (both species) in Egypt was around 504 tonnes from the Damietta landing port. Regardless of licensed vessels, a lot of coastal water bottom trawlers have started to operate in deep-sea fisheries since 2016 and two other landing places for red shrimps are now located in El-Maadia and Alexandria ports. The rapid increase in the number of deep-sea bottom trawlers could lead to an overexploitation of these stocks with negative impacts on the bottom ecosystem. The data presented suggested the possibility to sustainably develop deep-water shrimp fisheries while avoiding overfishing by implementing the following measures: i) planning to separate the management of shallower water and deeper water considering the depth limit of 300 m and the use of deep-sea indicator species such as deep-water shrimps and sharks (also to facilitate the protection of VMEs and the use of vessel monitoring systems [VMS]); ii) mapping all deeper water areas in the entire Mediterranean basin for a regional DSF management strategy; and iii) reduce the efforts of deep-sea bottom trawlers.

33. Participants were also informed that the economic value of red shrimp in Egypt was increasing rapidly and that, consequently, the number of authorized sites for landing these species had increased as well as the number of vessels targeting red shrimps (officially from 5 to around 50 boats in the last two years, occasionally reaching 100 boats). Concern was expressed regarding the risk of overexploiting resources with such an increasing level of fishing effort and of a high level of incidental catches of vulnerable demersal sharks. The adoption of urgent management measures by the GFCM to allow for the gradual and sustainable development of DSF was advocated.

34. Mr Farrag finally explained that the enforcement of MCS measures by Egypt differed between the Mediterranean and the Red Sea and that the measures addressing bottom trawlers in Red Sea marine protected areas (MPAs) were stricter than in the Mediterranean basin, and included the confiscation of any vessels infringing the law. This difference was probably due to the fact that the Egyptian Red Sea coast has less than 15% of deeper waters; moreover, the presence of corals and of

many protected areas is needed to maintain the tourism incomes deriving from environmental protection.

35. The WGVME acknowledged that in many countries coastal fishing was moving towards deeper areas and suggested that this could be due to the overexploitation of coastal resources.

36. Mr Luis Gil de Sola Simarro, from the Instituto Español de Oceanografía (IEO), Spain, gave a presentation on "Management measures for VMEs in the Spanish Mediterranean Sea". He explained that the Spanish MEDITS survey (1994 to present) was an important source of information to comply with EU and GFCM requests in terms of fisheries data collection, including to obtain indicators for biodiversity, food webs, contaminants and pollution effects in seafood, marine litter, and improvements in species identification. The presentation also addressed the use of the Spanish MEDITS survey to identify the occurrence of VME species and habitats, as well as the relevance of this information within the framework of the database compilation in support of the EU Marine Strategy Framework Directive (MSFD) to promote a more effective protection of the marine environment and to achieve good environmental status (GES) by 2020 (EC, 2008[7]). It was highlighted that quantitative indicators and reference levels were required to assess progress towards GES. As fishing is considered to be the main human activity affecting the seabed, an ecosystem approach to fisheries management (EAFM) should explicitly consider this, and a framework for the assessment of the impact of mobile bottom gear should include indicators that capture the differences in the sensitivity of seabed habitats for a variety of fishing gear. Other projects, such as LIFE+ and INDEMARES implemented within the framework of Natura 2000, have revealed that the many deep-sea ecosystems of the Mediterranean Sea are extremely sensitive to the effects of trawling and other artifacts used for the extraction of resources at more than 200 m depths.

37. The participants acknowledged that comprehensive data on the distribution of red shrimp spawning grounds in canyons along Mediterranean Spanish coasts had been collected over the years within the framework of many scientific projects at the national and international level (e.g. MEDITs survey). The strong relationship between canyons, upwelling currents and red shrimps occurrence was further noted, as well as the resulting tendency of fisheries to concentrate effort on canyons thus causing the overexploitation of red shrimps stocks.

38. Mr Thompson presented the "Data collection needed by relevant commercial vessels to identify VMEs", describing the needs for information and data collected from DSF vessels in order to implement the various VME protocols required under UNGA Resolution 61/105. He explained that the monitoring of DSF catches and bycatch would require an extension of the data collection systems currently used by the GFCM to monitor and manage harvested fish stocks. Supporting tools would also be necessary to allow for the collection, processing, reporting, and analysis of such information. Within the GFCM, the Data Collection Reference Framework (DCRF) is used to support GFCM measures relating to fish and bycatch data recording and reporting. The main focus of the DCRF is commercial fish stocks, but it also includes various important bycatch groups such as elasmobranchs, seabirds, sea turtles, and marine mammals. The eventual adoption by GFCM of measures relating more directly to the protection of VMEs would require further tools to be added to the DCRF for the identification and collection of the VME indicator taxa, such as corals, sponges, and other vulnerable benthic groups. Furthermore, the implementation of many of the necessary measures to protect VMEs would require the use of fine scale reporting by DSF vessels, such as that currently required by the GFCM for red coral (*Corallium rubrum*) fisheries, and a more extensive use of VMS. Guides on the identification of benthic invertebrates in the Mediterranean would also be required. All of this would help to improve the sustainable management of DSF and the protection of VMEs. It is likely that the

[7] EC 2008. Establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive) 2008/56/EC: 40. http://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX:32008L0056 (last accessed 10 January 2017)

increased demand on detailed data recording and reporting would require DSF vessels to carry trained observers able to identify corals, sponges and other species.

39. Mr Fernando Nieto Conde, independent consultant, presented MCS specific requirements for the protection of VMEs in the Mediterranean basin. He informed that, in 2017, the EU made significant progress implementing the EAFM with the entry into force of the EU regulation 2016/2336 establishing specific conditions for fishing deep-sea stocks in the north-east Atlantic. The specific requirements for the protection of VMEs in this regulation imply a series of challenges linked to its implementation, namely the enforcement and monitoring, and particular the adoption of the encounter protocol for fishing operations with bottom gear below a depth of 400 meters. Mr Nieto recalled the discussions held at the FAO Workshop on the management of deep-sea fisheries and VMEs as well as the suggestion made to use the 300 m depth as an adequate upper limit for DSF in the Mediterranean. He suggested to further discuss the possibility to learn from the measures adopted in the Atlantic area, which included already a number of measures for the management of DSF. His presentation also focused on how best to monitor and enforce specific management measures for DSF fisheries and highlighted that training facilities and a MCS system should be set up, including tools to record information on DSF, and best solutions to report such information should be examined. Mr Nieto also noted that EU definition of DSF took into account the landed species, i.e. DSF were detected if 8% of landings were considered to be deep-sea resources. He finally added that by January 2018 the footprint of DSF in European Atlantic waters was foreseen to be completed.

40. The participants acknowledged the review on MCS measures for DSF implemented in European Atlantic waters and agreed that a 10% coverage of DSF with observers on board could be a feasible target in Mediterranean waters too. They were also informed that the European Fisheries Control Agency (EFCA) was providing training courses on MCS and that funding opportunities also for non-EU countries were available.

41. Mr Nieto underlined that the GFCM was making important steps regarding MCS measures, and recalled the newly adopted management plan for demersal resources in the Strait of Sicily (Recommendation GFCM/40/2016/4 establishing a multiannual plan for the fisheries exploiting European hake and deep-water rose shrimp in the Strait of Sicily [GSAs 12 to 16]), in which clear indications on MCS were provided (although in the absence of benchmark references). He also considered crucial that VMS rather than the automatic identification system (AIS) should be used for MCS purposes since AIS was developed by the International Maritime Organization (IMO) to avoid collisions and the captain of any vessel had the freedom to switch it off with no legal consequences if no collisions occur. In addition, for DSF management purposes, Mr Nieto remarked that countries should provide GFCM with raw VMS data with no previous processing.

MANAGEMENT MEASURES IMPLEMENTING THE UNITED NATIONS GENERAL ASSEMBLY RESOLUTION 61/105

42. Mr Thompson presented a draft set of technical elements for the management of DSF and VMEs which could be used as a basis for WGVME advice to the SAC: i) Mapping of DSF in the Mediterranean, ii) VME encounter protocol including the list of VME indicators (features, habitats and taxa), and iii) Exploratory deep-sea bottom fishing protocol. These elements were presented in three parts to simplify discussions, but could be brought together later in a single GFCM decision containing a comprehensive suite of management measures to ensure the sustainability of DSF and the protection of VMEs from any significant adverse impacts that DSF may cause. The preparation of the technical elements started with the definition of deep-sea bottom fisheries in the Mediterranean and the identification of the main fisheries and species caught. The next step would be to identify the areas where deep-sea bottom fishing had historically occurred (DSF footprint), and hence those areas that had not been previously fished. A proposal of elements for an exploratory deep-sea bottom fishing protocol was presented to ensure that the development of new fisheries, principally outside the DSF footprint, occurs at a rate commensurate with the level of knowledge on the impacts that these new fisheries may have on stocks and vulnerable habitats in areas where information on the ecosystem is limited. A Mediterranean-tailored VME encounter protocol to be applied when VME indicator taxa are caught during a fishing operation was also proposed. The main objectives of the exploratory deep-sea bottom fishing and the VME encounter protocol are to collect information that would contribute to the development of maps of existing bottom fishing areas and of VMEs distribution. Mr Thompson underlined that deep-sea bottom fisheries operating on VME indicator features would be treated as exploratory DSF and hence subject to information reporting requirements. In line with the mid-term strategy 2017–2020, the GFCM should promote programmes of trained observers on DSF vessels targeting red shrimps and monitor DSF occurring on VME indicator features.

43. The GFCM Secretariat explained that the proposed measures would apply in all DSF and would include obligations to host observers on board, regardless of whether DSF were operating in national or international waters, since the mandate of the GFCM encompassed the entire Mediterranean.

44. The WGVME envisaged the possibility of meeting on a regular basis as a permanent working group in order to provide advice and review the information that the GFCM would receive on VMEs and DSF.

45. The GFCM Secretariat and the chairperson recalled that some of the data submitted to the GFCM would be subject to confidentiality policy (e.g. VMS data) and that these aspects would be further discussed at the SAC level, including the possibility of giving mandate to the WGVME to review the information collected through a potential VME encounter protocol and deep-sea exploratory fishing protocol.

46. Regarding the proposed VME indicator habitats, some participants suggested to include crinoid fields and giant oysters based on the scientific information presented (see Appendix C). Mr Thompson clarified that the list of VME indicators (features, habitats and taxa) would be a flexible instrument that could be amended with new data through the proposed protocols. The GFCM Secretariat also specified that the proposed protocols were designed in a simple manner to allow self-reporting by fishers and that the GFCM should produce Mediterranean guides (e.g. posters) to facilitate the identification of VME indicator taxa in the near future.

47. The meeting advised to specify in the proposed VME encounter protocol that the VME indicator taxa should be weighed, counted or measured on deck (i.e. live weight) and to foresee the possibility for fishers to take pictures of the taxa caught and to submit these to the GFCM Secretariat along with the filled VME encounter protocol; this would potentially allow appointed experts to perform the taxonomic identification of these benthic organisms from the pictures.

48. As for the preparation of Mediterranean guides to facilitate the identification of VME indicator taxa by fishers, some participants highlighted that, according to their knowledge, an FAO poster on Mediterranean coral and sponges had been recently finalized. They requested clarification to the GFCM Secretariat, which confirmed that the GFCM had been informed about the preparation of an FAO poster but was not further involved in its preparation and was not aware of the current state of this work.

49. The ICES representative remarked the technical importance of the measures proposed, highlighting that NAFO and NEAFC had been through a similar process in 2008–2010. Should the proposed measures be finally adopted by the Commission, he advised the GFCM Secretariat about the immediate need to have dedicated staff analyzing VMS data and building the DSF footprint, considering the important volume of work and time this complex task would require.

50. Regarding the need to protect VMEs occurring in shallower areas, i.e. between 200 and 300 m, the participants suggested that the obligation to apply a VME encounter protocol be extended, in the future, to coastal fisheries in the GFCM area of application, taking into account the boundaries of the historical DSF footprint that would become available to the GFCM upon the potential implementation of the proposed measure on DSF mapping.

51. The WGVME recognized the importance of the measures discussed and agreed to support i) the establishment of a VME encounter protocol, ii) the establishment of an exploratory deep-sea bottom fishing protocol, and iii) the mapping of the existing deep-sea fishing areas in the GFCM area of application, based on the technical elements included in Appendixes E, F and G respectively.

DEEP-SEA MEDITERRANEAN AREAS THAT MAY HOST VMEs OR OTHER SENSITIVE HABITATS

52. Mr Lorenzo Angeletti, from the Institute of Marine Sciences, National Research Council (ISMAR-CNR), Italy, presented "The vulnerable cold water coral ecosystems of the Bari canyon, Southern Adriatic Sea, Italy". The Bari canyon is an E–W oriented two-branch incision indenting the shelf and reaching down the basin area at more than 1000 m depth; it is characterized by subvertical flanks and by a levee complex. The Bari canyon is active and efficiently transports water masses, sediments and nutrients from the shelf down to the bathyal area. It is affected by flushing events which enables dense shelf waters to flow from the northern Adriatic down to the Otranto strait at intermediate depths (e.g. 400 – 700 m). The canyon is also affected by the Levantine intermediate waters driving complex water mixing. The combination of oceanographic factors and favourable topography sustains a biodiversity hotspot characterized by valuable megafaunal sessile assemblages which are largely dominated by the highly emblematic cold water corals (CWC) *Madrepora oculata* and subordinately *Lophelia pertusa*, sponges (*Pachastrella monilifera* and *Poecillastra compressa*) and other benthos. Thanks to the consistent presence of live CWC, the Bari canyon can be defined as a CWC province whose complex and rugged topography has discouraged thus far significant fishing practices such as large scale destructive trawling. The anthropic impact seems to be limited to dumping in deeper areas, abandoned longlines and litter. The fish population is diverse and hosts commercially important species such as *Merluccius merluccius* and *Polyprion americanus* but also includes vulnerable IUCN Mediterranean Red List species such as *Centrophosus granulosus* and *Hexanchus griseus* sharks. Based on the information presented, the importance of protecting the fragile ecosystem in the Bari canyon and its vulnerable species by adopting adequate measures to regulate activities such as fishing was highlighted. It was pointed out that both demersal longlines and ghost fishing (caused by abandoned fishing gear) as well as, to a lesser extent, dumping, were negatively impacting the ecosystem.

53. Ms Marin pointed out that the Bari canyon was also important for the biology of exploited resources and for other non-commercial vulnerable species, recalling that this area had been taken into

consideration by Oceana within the MedNet proposal[8] for the establishment of a well-connected and well-distributed network of deep-sea MPAs; this proposal included in particular the Pomo Pit zone in the Adriatic Sea and the recently designated FRAs in the Strait of Sicily.

54. The GFCM Secretariat recalled that a proposal to establish a GFCM FRA in the Pomo Pit area had been presented in February 2017 to the Subregional Committee for the Adriatic Sea (SRC-AS) and that it would be presented to the SAC in May 2017.

55. Mr Marco Taviani, from ISMAR-CNR, Italy, presented "The vulnerable cold water coral ecosystem of the Nora Canyon, Sardinian Channel". He explained that a considerably large cold water coral population, dominated by the colonial scleractinian *Madrepora oculata* and associated with the emblematic species *Lophelia pertusa* and the pseudocolonial solitary scleractinian *Desmophyllum dianthus*, had been recently identified in the Nora canyon of the Sardinian channel. 30 nautical miles offshore the city of Cagliari (between 38°50' and 38°20' latitude N and 8°50' and 9°10' longitude E). The richness and extent of this newly discovered CWC ecosystem in the Capo Spartivento canyon system was such that this site was promoted as the "Sardinia CWC province". In the Nora canyon, maximum coral growth is observed at a depth of 380–460 m and the mega- and macrobenthos includes cnidarians, sponges, echinoids, brachiopods, polychaetes, decapods and molluscs including live specimens of the deep oyster *Neopycnodonte zibrowii*, which are only seldom reported in the Mediterranean Sea. Fish is relatively abundant in the water column and on the bottom around the CWC. The new coral province is located on the path of the Levantine intermediate waters between the central Mediterranean CWC provinces (Bari canyon, Santa Maria di Leuca, southern Malta) and the western and northern ones (Melilla, Catalan-Provençal-Ligurian canyons). Remotely operated vehicle (ROV) inspections have documented the common occurrence of anthropogenic litter accumulated in the canyon, including longlines and lost/abandoned nets at times entangled on the coral grounds. As for other CWC, this province offers a number of ecosystem services and is a likely nursery ground to fish and other resources of potential interest. The he survival of the fragile CWC ecosystem in the Nora canyon should therefore be ensured by promoting appropriate measures to regulate human activity in this area, including fisheries.

56. Ms Covadonga Orejas, from IEO, Spain, and Mr Carlos Jiménez, from the Enalia Physis Environmental Research Centre (ENALIA), Cyprus, presented "Soft-bottom communities dominated by *Isidella elongata* and *Dendrophyllia ramea*: two singular habitats in need of management measures". They explained that VMEs had been generally associated to hard substrates. However, in the Mediterranean, important deep-sea benthic ecosystems also developed on soft bottoms and deserved even more attention than those on hard bottoms due to their vulnerability to face anthropogenic impacts, in particular adverse impacts from fishing activities such as bottom trawling and bottom longline fishing. Soft bottom communities were presented in two case studies illustrating how vulnerable and endangered these ecosystems were in the Mediterranean basin, as well as the current knowledge on the species and threats on these specific cases. The information gathered through these case studies would contribute in particular to support the implementation of UNGA Resolutions related to VME protection [59/25, 61/105 and 64/72] at the Mediterranean level. Case study 1: the first species presented in this case study mainly occurs in the western Mediterranean, including the Alboran Sea, and is a sedimentary bottom community dominated by the bamboo coral *Isidella elongata*. This habitat forming species is essential for other demersal and suprabenthic species and forms special assemblages where commercial species are present and abundant (e.g. deep-water rose shrimp *Parapenaeus longirostris* and Norway lobster *Nephrops norvegicus*). Moreover, as a matter of concern, this octocoral species has been recently classified as "critically endangered" in the IUCN Red List of Mediterranean anthozoans since it has disappeared from many areas due to its extreme vulnerability to fishing activities, more specifically bottom trawling. Case study 2: the other

[8] Oceana MedNet: MPA Network proposal for the Mediterranean Sea
http://eu.oceana.org/sites/default/files/reports/OCEANA_MEDNet_ING_16012012.pdf

community of interest is dominated by the scleractinian coral *Dendrophyllia ramea*. This community was recently discovered in the south-eastern insular margin of Cyprus (Levantine Sea). Large *D. ramea* colonies have been found in dense populations on sedimentary bottom areas, which is in stark contrast to other areas in the Atlantic where this species is found regularly on hard substrates. There is evidence of the endangered situation faced by this species due to a high level of bycatch in the area. Both case studies illustrated the vulnerability of unique sedimentary bottom communities in need of urgent management measures before they are irremediably lost. A proper management of VMEs would protect these habitats from the negative impact of fishing activities.

57. Ms Chryssi Mytilineou, from the Hellenic Centre for Marine Research (HCMR), Institute of Marine Biological Resources and Inland Waters, Greece, presented the "State of knowledge for a potential deep-water FRA in the eastern Ionian Sea". She explained that the occurrence of a potential deep-water FRA in the eastern Ionian Sea has been investigated based on scientific studies carried out in the area by HCMR and on data from other sources. Information concerning the area, the presence of vulnerable species (e.g. corals, chondrichthyans) or important deep-water commercial resources (e.g. red shrimps, blackspot seabream, wreckfish) as well as anthropogenic impacts (e.g. fisheries, litter, shipping traffic) was presented.

58. Ms Nastasi welcomed this presentation and the results obtained so far, which also indicated that the area could be a nursery ground for the endangered ray *Raja clavata*. She encouraged the experts to continue working towards the preparation of a formal FRA proposal to GFCM, also considering that no major fishing activities were reported to occur (6 days per year from Greek bottom trawlers) and that this would facilitate the quick adoption of precautionary protection measures, considering minor socio-economics effects deriving from a potential closure to relevant fisheries.

59. Participants welcomed the presentations on Mediterranean areas that host VMEs or other sensitive habitats presented to the WGVME, as summarized in Appendix H. In this respect, the GFCM Secretariat recalled the existing mechanism to propose specific FRAs and suggested that, in case sufficient scientific evidence existed for any of these areas, the formal FRA request could be made using the official form to be submitted to a relevant SAC technical group (e.g. subregional committees) so that it could be validated and presented to the SAC and, ultimately the Commission. It was also noted that a list of these potential areas, as well as all supporting scientific information, would be instrumental for future GFCM work to identify VMEs.

ANY OTHER MATTER

60. Mr Sebastian Valanko, from ICES, presented "Exploring synergies with the ICES Working Group on Deep-water Ecology (WGDEC)?". He explained that the ICES Working Group on Deep-water Ecology (WGDEC) was a joint ICES/NAFO expert group that dealt with the biology and conservation of deep-sea habitats in the North Atlantic. He underlined that WGDEC contributed to ICES annual advice to the European Commission (EC) and the North-East Atlantic Fisheries Commission (NEAFC) on the distribution of VMEs – deep-sea habitats such as CWC banks and clusters of deep-sea sponges that were particularly sensitive to bottom-contact fishing gear. As part of this advice, ICES also provided information on fisheries activities in and around VME habitats across the NEAFC regulatory area. The data forming the backbone of the advice was derived from a central ICES VME database, which was used to show the distribution and abundance of these vulnerable ecosystems. From these records, it appeared that there was clear evidence of VMEs and indicators species which suggested, to varying degrees of certainty, the presence of this type of ecosystem. An annual VME data call to ICES member countries was made to ensure that new and old records indicating the presence of VMEs were submitted to ICES. The data came from a range of sources including fisheries and scientific visual seabed surveys. This new information, alongside existing database records, was evaluated by WGDEC at its annual meetings. Based on the new records, ICES may advise on changes to fisheries management. The VME database also included a data portal (http://www.ices.dk/marine-data/data-portals/Pages/vulnerable-marine-ecosystems.aspx) allowing users to view and download data on VME indicators and habitats.

61. In reply to some questions raised by participants and the chairperson, Mr Valanko clarified that the WGDEC provided management advice to EU, NEAFC, and NAFO on possible fishery closures, and that ICES was usually addressing issues from a regional perspective and, only in a few cases, subregional issues were tackled at the local level. Participants were always self-funded as they usually could find sponsors to attend the ICES meetings.

62. The GFCM Secretariat welcomed the proposal to investigate on potential synergies between the WGDEC and the WGVME and recommended that the ICES and GFCM Secretariats further discuss possible ways of cooperation. In response to the requests made by some experts to build a GFCM database on areas already known to host VMEs, Ms Nastasi mentioned that ICES and GFCM could start collaborating on this specific aspect, considering that ICES had already developed its own database for European waters and that synergies could be found to extend/develop this database at the Mediterranean scale. She further clarified that the existing FAO VME Database[9] provided an up-to-date overview of the current management measures adopted by the different regional management bodies to protect VMEs in their area of competence (i.e. bottom closures, encounter protocols, exploratory fishing protocols), and that VMEs not associated with fisheries management measures would therefore not appear in the FAO VME Database.

63. Mr Christos Maravelias, from the EC DG MARE, took the floor and acknowledged the interesting debate that took place during the meeting. He recalled that funding possibilities in support of scientific advice were available to EU and non-EU scientists and experts, including on deep-sea ecology and DSF. He also remarked that mapping VMEs and DSF were important steps and that the EC would be supporting any initiative in this sense, acknowledging that a multi-phased approach for the GFCM area of application would be an ideal solution. Mr Maravelias recalled that, in EU waters, the mapping of VMEs was carried out under the umbrella of the MSFD and invited all experts present to continue participating in GFCM relevant technical meetings and present their work and studies. He also acknowledged the quality and importance of the work presented to the WGVME highlighting that it was crucial to submit this information to the SAC for its advice to the Commission. He mentioned that defining DSF was not an easy task and that it would be important to launch the debate for the Mediterranean and envisage further advice by the SAC on this matter. He finally mentioned that it would be crucial to understand the local socio-economic impacts before establishing any closure to fisheries.

64. The GFCM Secretariat further clarified that the mandate of this first WGVME meeting did not foresee any task related to the potential assessment of socio-economic impacts deriving from the closure of certain areas to fisheries and that other GFCM technical groups were established to tackle this specific issue.

65. The representative of Oceana recalled that the GFCM Form[10] to propose the establishment of a FRA to GFCM contained a dedicated section to describe the socio-economic importance of the area selected to for potential restrictive management measures existed and that this provided a good baseline assessment of socio-economic implications.

CONCLUSIONS AND RECOMMENDATIONS

66. The WGVME specifically addressed issues relating to the definition and management of deep-sea fisheries (DSF) and vulnerable marine ecosystems (VMEs) in the Mediterranean, within the framework of UNGA Resolutions 61/105 (2006), 64/72 (2009), and 66/68 (2011), as well as to the FAO International Guidelines for the Management of Deep-sea Fisheries in the High Seas (2008).

[9] http://www.fao.org/in-action/vulnerable-marine-ecosystems/vme-database/en/vme.html

[10] Standard form for the submission of proposals for GFCM Fisheries Restricted Areas (FRA) in the Mediterranean and Black Sea

These guidelines provide guidance to States and regional fisheries management organizations on the long-term conservation and sustainable use of marine living resources in the high seas, including to prevent SAI on VMEs by bottom-contact fishing gear.

67. The WGVME reviewed the current GFCM management measures specific to DSF and biodiversity protection and discussed the characterization of Mediterranean DSF and VMEs, including a first definition of Mediterranean VME indicators (features, habitats and taxa), as well as management measures to address the sustainable management of DSF and to protect VMEs, in line with existing UNGA resolutions. The following conclusions and recommendations were formulated by the WGVME:

Mediterranean deep-sea fisheries (DSF)

68. The WGVME agreed that Mediterranean deep-sea bottom fisheries, i.e. vessels with the technological capacity to fish at great depths (from 300 m), were not yet fully developed in all Mediterranean countries and that existing DSF were dominated by demersal longliners and trawlers – targeting respectively valuable shrimp species and fish species whose large individuals (adults) mainly occur in deep waters. In general, bottom trawlers targeted valuable deep-sea shrimp species such as *Aristeus antennatus* (red and blue shrimp) and *Aristaeomorpha foliacea* (giant red shrimp), which occurred between 400–800 m depths. Bottom trawlers also targeted *Parapenaeus longirostris* (deep-water rose shrimp), *Nephrops norvegicus* (Norway lobster) and *Merluccius merluccius* (European hake) at depths of 300–500 m. Gillnet fisheries and demersal longliners operating from around 300 m targeted large individuals of *Merluccius merluccius* and *Pagellus bogaraveo* (blackspot seabream). Deep-sea pots and traps targeted the small shrimps of the genus *Plesionika* (mainly *P. martia* and *P. edwarsii*). It was underlined that, among the above mentioned target species, only *Aristeus antennatus, Aristaeomorpha foliacea* and *Plesionika martia,* lived exclusively below 400m depth, while *Merluccius merluccius*, *Parapenaeus longirostris*, *Pagellus bogaraveo* and *Nephrops norvegicus* were also fished in shallower waters mainly from 100 m.

69. According to the characteristics of Mediterranean Sea in which most of the coastal fishing occurred between 100 and 300 m depth, including by small-scale fishing vessels, and considering the difficulties in identifying *a priori* DSF based on the landed species (with the exception of *Aristeus antennatus, Aristaeomorpha foliacea* and *Plesionika martia,* which occur below 400 m), the WGVME proposed to conventionally consider all vessels above 15 m (i.e. equipped with VMS) fishing with bottom-contact gear , as DSF vessels when they are operating below 300 m or on any VME indicator feature (e.g. seamounts, mud volcanoes, canyons and trenches, slopes, etc.) at all depths. The list of VME indicator features is reproduced in Appendix D.

70. The WGVME recognized that previous definitions of DSF considered an upper depth limit of 400 m and it was underlined the importance of shifting it to 300 m, following a precautionary approach. Nonetheless, some participants noted that, from a biological and ecological point of view, deep sea in the Mediterranean was considered to start at 200 m depth, where sunlight became insufficient for photosynthesis. They remarked that vulnerable habitats *sensu lato* also occurred between 200 and 300 m and that further fisheries management measures towards the protection of shallower VMEs should be likewise taken into consideration.

71. The WGVME therefore suggested the SAC and the GFCM to evaluate the possibility of extending future relevant management measures that would address the protection of VMEs to fisheries operating in the coastal zone at depths less than 300 m.

72. With regard to the impact of DSF on Mediterranean VMEs, several studies have demonstrated the destructive effects of deep-sea bottom trawling on soft bottoms populated by *Isidella elongata* and *Funiculina quandrangularis* and other vulnerable pennatulaceans species. The WGVMWE concluded that these soft-bottom aggregations should be considered as habitats of special concern in the Mediterranean Sea since they could be more immediately vulnerable and impacted by deep-sea bottom fishing activities. It was also noted that these coral species aggregations were often associated with shrimps such as *Aristeus antennatus, Aristaeomorpha foliacea,* and *Parapenaeus longirostris*

and that the protection of this type of soft-bottom habitats from fishing activities could also protect essential habitats of commercially important crustacean species.

Mediterranean VME indicators and VME encounter protocol

73. The WGVME discussed the Mediterranean topographical, physical and geological features such as seamounts and mud volcanoes, canyons and trenches, slopes, etc., which potentially favoured the presence of benthic communities and habitats that may constitute VMEs including on soft and muddy bottoms. It reviewed the results of different studies carried out at the regional level outlining the characteristics of Mediterranean VMEs, including the the main important taxa, features and habitats.

74. A comprehensive list of Mediterranean benthic species occurring below 200 m depth, recently compiled by a partnership of regional experts on deep-sea ecosystems under the coordination of Oceana, was presented to the WGVME and is reproduced in Appendix C. The WGVME recognized that the information presented in this list was important and could be considered as a background scientific reference for deep-sea benthic habitats and species that may contribute to forming VMEs in the Mediterranean.

75. Based on the information presented namely the measures and definitions already adopted by other RFMOs in other regions of the world and the Provisional list of Mediterranean habitat types and representative species that may contribute to form VMEs (Appendix C), the WGVME agreed on a first list of Mediterranean VME indicator features, habitats and taxa (corals, sponges and other vulnerable groups that could signal the occurrence of VMEs) for the Mediterranean Sea. The list of VME indicators is reproduced in Appendix D. The WGVME highlighted that the proposed list of Mediterranean VME indicators should be regarded as a dynamic tool which should be completed and updated as new scientific information and evidence would be made available to GFCM.

76. Furthermore, the WGVME discussed on the characteristics of a VME encounter protocol tailored to Mediterranean fisheries and agreed that, during a first phase of implementation, Mediterranean DSF should report to GFCM all incidental catches of VME indicator taxa. The meeting agreed that such VME encounter protocol should be considered as a tool to encourage self-reporting by fishers without any immediate management consequences (e.g. automatic closure of the area in which an encounter is reported). This would encourage reporting and would help in mapping VMEs throughout the Mediterranean. In addition, the WGVME suggested that GFCM develop benthic taxa identification guides (e.g. posters), in collaboration with relevant partner organizations, in order to facilitate the identification of the VME indicator taxa by the fishers.

77. Proposed management elements for the establishment of a VME Encounter Protocol in the GFCM area of application are presented in Appendix E.

78. The WGVME, based on the FAO Deep-sea Guidelines, recommended that once VMEs are clearly identified by the SAC, they should be promptly covered by adequate spatial management measures (i.e. establishment of GFCM FRAs) to ensure that SAIs from fishing activities are avoided.

Mapping of existing deep-sea fishing areas

79. The WGVME acknowledged that most RFMOs have already defined areas where DSF have historically occurred, and adopted maps of existing deep-sea bottom fishing areas or fishing footprint. The WGVME therefore agreed on the need to identify, also in the GFCM area of application, existing fishing areas in the Mediterranean where deep-sea bottom fishing has historically occurred.

80. In order to allow for the GFCM to create updated and comprehensive maps of existing DSF areas in its area of application, the WGVME recommended that raw data by gear type from VMS/AIS and/or other available georeference data be expressed in as precise spatial and temporal resolution as possible. These should be submitted to the GFCM Secretariat by contracting parties and cooperating non-contracting parties (CPCs). Priority should be given to mapping deep-sea bottom trawling, although deep-sea fishing activities carried out with other types of gear entering in contact with the

seafloor (e.g. bottom-set longlines, gillnets, trammel nets, and pots) should also be included, especially when fishing on VME indicator features.

81. Management elements for mapping existing deep-sea bottom fishing areas in the GFCM area of application are presented in Appendix F of this report.

Exploratory deep-sea fishing protocol

82. In order to allow for the controlled development of exploratory and new DSF and to avoid SAI in poorly known areas, the WGVME agreed to define exploratory deep-sea bottom fishing activities as those activities conducted: i) on VME indicator features; ii) outside existing mapped bottom fishing areas, or iii) within existing bottom fishing areas when significant changes in the fishing patterns or in the technology used in the fishery occurred.

83. The WGVME agreed that DSF should report detailed information to the GFCM Secretariat regarding new fishing activities carried out under one of the above mentioned conditions, in order to prevent any SAI of new deep-sea fishing activities on the sea bottom ecosystem.

84. Management elements for the establishment of an exploratory deep-sea bottom fishing protocol in the GFCM area of application are presented in Appendix G of this report.

Observers on board

85. To ensure the effective implementation of any proposed management measure related to DSF, the WGVME underlined the crucial importance of specialized observers during fishing operations to gather information on VME species distribution and on bycatch composition (including vulnerable sharks and other non-commercial species, etc.) at the lowest taxonomic level possible.

86. The WGVME therefore recommended that the GFCM develop a programme of observers on board that should cover at least 10 percent of the DSF fishing trips, giving priority to red shrimp bottom-trawl fisheries. Countries were also encouraged to develop national programmes with observers on other DSF (e.g. longliners), especially when fishing on VME indicator features.

GFCM database on VME indicator taxa

87. In light of the information presented, the WGVME concluded that valuable information on the spatial distribution and composition of VMEs was already available on different areas of the Mediterranean for any management purposes.

88. The WGVME recommended that the GFCM develop a regional database with maps showing the location of VME indicator taxa throughout the Mediterranean. This database could be developed using in particular the information gathered through the VME encounter protocol as well as information directly submitted by regional experts and scientists working on this topic.

Role of the WGVME and regional cooperation

89. In light of the productive discussions and results achieved, the WGVME experts expressed their will to continue meeting on a regular basis within the framework of this newly established working group. This would enable to follow up the progress made by the GFCM towards the management of DSF and the protection of VMEs, including the evaluation of information received by the GFCM Secretariat through the proposed VME encounter protocol and exploratory fishing protocol (subject to GFCM data confidentiality policy), and to discuss and propose new relevant measures for DSF and VMEs.

90. The WGVME highly appreciated the well-established collaboration between GFCM, Oceana and IUCN-Med as well as the initiative of co-organizing the meeting, which had allowed, *inter alia*, to gather around the same table fisheries experts, deep-sea ecologists, national administrations and international organizations and to enhanced the level of the discussions as well as the technical advice

to the SAC. The experts considered that this initiative was an extremely positive example of regional cooperation and recommended that these organizations keep working together on relevant topics. The WGVME also welcomed the future collaboration and participation of experts nominated by ICES.

91. In order to maintain appropriate coordination between UN organizations and to ensure that activities are harmonized, especially regarding the implementation of the Dark Habitats Action Plan and the current process to update the Reference List of Mediterranean Habitats, the RAC/SPA expressed its will to join the collaboration and contribute to the organization of future meetings of the WGVME.

CLOSURE OF THE MEETING

92. Mr Jarboui closed the meeting underlining that the discussions had been very fruitful and thanked the participants for their input. He expressed gratitude to IUCN-Med, the GFCM Secretariat and the FAO regional projects for providing financial coverage to support the participation of several experts.

93. Gratitude was expressed by the participants to IUCN-Med for hosting the meeting and to the GFCM Secretariat, IUCN-Med and Oceana for the successful co-organization of the WGVME.

Appendix A

Agenda

1. **Opening and arrangement of the meeting**
2. **Introductory session**
3. **Mediterranean VME indicator features and species**
4. **Fisheries – VME interactions**
5. **Management measures implementing the United Nations General Assembly (UNGA) Resolution 61/105**
6. **Deep-sea Mediterranean areas that may host VMEs or other sensitive habitats**
7. **Any other matter**
8. **Formulation of conclusions and recommendations**
9. **Closure of meeting**

Appendix B

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Appendix C

Provisional list of Mediterranean habitat types and representative species that may contribute to form VMEs

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VME HABITAT[11] TYPE	Representative Species	IUCN Red List*	References (see end of the report)
COLD-WATER CORAL REEFS			
A. *Lophelia pertusa* reefs	*Lophelia pertusa*	*EN*	7, 8, 19, 28, 30, 31, 32, 38, 47, 57, 72, 73, 76, 90, 91, 101, 111
B. *Madrepora oculata* reefs	*Madrepora oculata*	*EN*	7, 8, 19, 28, 30, 31, 32, 38, 47, 57, 72, 76, 90, 101, 111
C. Desmophyllum dianthus reefs	*Desmophyllum dianthus*	*EN*	M. Fourt, pers. comm.
CORAL GARDENS			
A. Hard-bottom coral garden			
A.1. Hard-bottom gorgonians, black coral gardens and other corals			
A.1.1.**GORGONIANS** (Order Alcyonacea)			
ACANTHOGORGIIDAE	*Acanthogorgia hirsuta*		51, 76, 83, 81
CORALLIIDAE	*Corallium rubrum*	*EN*	19, 17, 30, 57, 84, 88, 101
DENDROBRACHIIDAE	*Dendrobrachia bonsai*		89
ELLISELLIDAE	*Ellisella paraplexauroides* *Viminella flagellum*	*VU*	4, 11, 51, 65, 101
GORGONIIDAE	*Eunicella verrucosa*		45, 81
PLEXAURIDAE	*Bebryce mollis*		11, 76

[11]Habitats considered in the list occurred in the deep-sea below 200 meters depth, beyond the continental shelf-break and where sunlight became insufficient for photosynthesis (Herring, 2002; Thistle, 2003; UNEP, 2007; FAO, 2010; FAO, 2013; UN, 2016).

VME HABITAT[11] TYPE	Representative Species	IUCN Red List*	References (see end of the report)
	Paramuricea macrospina *Swiftia pallida* *Villogorgia bebrycoides*		
PRIMNOIDAE	*Callogorgia verticillata*		11, 17, 51, 81, 85
A.1.2. **BLACK CORALS** (Order Antipatharia)			
ANTIPATHIDAE	*Antipathes dichotoma* *Antipathes fragilis*		71, 76
APHANIPATHIDAE			M. Bo, pers. comm.
MYRIOPATHIDAE	*Antipathella subpinnata*		13, 18, 17, 29
LEIOPATHIDAE	*Leiopathes glaberrima*	*EN*	7, 15, 19, 30, 71, 76, 81, 83, 90
SCHIZOPATHIDAE	*Parantipathes larix*		17, 76, 81, 83
A.1.3. **HEXACORALS** (Subclass Hexacorallia)			
CARYOPHYLLIIDAE - Solitary corals	*Caryophyllia calveri* *Desmophyllum dianthus*	*EN*	30, 71, 90, 76
PARAZOANTHIDAE	*Savalia savaglia*		26, 76
A.1.4. SCLERACTINIANS (Order Scleractinia)			
DENDROPHYLLIDAE	*Dendrophyllia cornigera*	*EN*	28, 57, 61, 74, 101
A.2. Colonial scleractinians on hard rock outcrops and non-reefal scleractinian aggregations			
CARYOPHYLLIIDAE	*Lophelia pertusa* *Anomocora fecunda*	*EN*	76
DENDROPHYLLIDAE	*Dendrophyllia cornigera*	*EN*	7, 31, 47, 57, 72, 76, 90, 101
OCULINIDAE	*Madrepora oculata*	*EN*	
A.3. Soft corals			
ALCYONIIDAE	*Alcyonium palmatum*		5
NIDALIIDAE	*Chironephthya mediterranea* *Nidalia studeri*		62
PARALCYONIIDAE	*Paralcyonium spinulosum*		63, M. Fourt, pers. comm.
A.4. Hydrocorals			
STYLASTERIDAE	*Errina aspera*		4, 87
B. Soft-bottom coral gardens			
B.1. Soft-bottom gorgonian and other coral gardens			
GORGONIIDAE	*Eunicella filiformis*		
ISIDIDAE	*Isidella elongata*	*CR*	8, 12, 15, 23, 38, 64, 70, 71, 76, 79, 90
PLEXAURIDAE	*Spinimuricea atlantica* *Spinimuricea klavereni*		24
B.2. Cup-coral fields			
CARYOPHYLLIIDAE	*Caryophyllia smithii* f. *clavus*		29
B.3. Cauliflower coral fields			
NIDALIIDAE	*Nidalia studeri*		63, 81

(*) IUCN Red List Categories: CR, Critically Endangered; EN, Endangered; VU, Vulnerable;

VME HABITAT TYPE (cont.)	Representative Species	IUCN Red List*	References
DEEP-SEA SPONGE AGGREGATIONS			
A. Ostur sponge aggregations			
GEODIIDAE	*Geodia conchilega* *Geodia nodastrella* *Geodia barretti*		23
PACHASTRELLIDAE	*Pachastrella monilifera*		7, 16, 31
B. Hard-bottom sponge gardens			
AXINELLIDAE	*Phakellia ventilabrum* *Phakellia robusta* *Phakellia hirondellei*		31, 81 M. Fourt, pers. comm.
AZORICIDAE – Stone sponge reefs	*Leiodermatium lynceus* *Leiodermatium pfeifferae*		64
CHALINIDAE	*Haliclona* spp.		21, 103
STYLOCORDYLIDAE	*Stylocordyla pellita*		
TETHYIDAE	*Tethya aurantium* *Tethya citrina*		M. Bo, pers. comm.
VULCANELLIDAE	*Poecillastra compressa* *Vulcanella gracilis*		16, 31
C. Glass sponge communities			
PHERONEMATIDAE	*Pheronema carpenteri*		
ROSSELLIDAE	*Asconema setubalense*		2, 76
D. Sponge aggregations on soft bottoms			
THENEIDAE	*Thenea muricata*		
CLADORHIZIDAE – Carnivorous sponges	*Cladorhiza abyssicola* *Lycopodina hypogea*		2
STYLOCORDYLIDAE	*Stylocordyla pellita*		
SUBERITIDAE	*Rhizaxinella* spp. *Suberites* spp.		55, 77 77
SEA PEN FIELDS			
PENNATULIDAE	*Pennatula* spp (e.g. *P. phosphorea*, *P. rubra*, *P. aculeata*) *Pteroeides* spp.	*VU (P. phosphorea, P. rubra, Pteroeides spinosum)*	71, 76, 102
FUNICULINIDAE	*Funiculina quadrangularis*	*VU*	8, 38, 76, 79, 81, 90, 102
KOPHOBELEMNIDAE	*Kophobelemnon stelliferum*		69, 76, 79
PROTOPTILIDAE	*Protoptilum carpenteri*		68
VERETILLIDAE	*Veretillum cynomorium*		
VIRGULARIIDAE	*Virgularia mirabilis*		81, 102
TUBE-DWELLING ANEMONE PATCHES			
CERIANTHIDAE	*Cerianthus membranaceus* *Arachnanthus* spp.		
MUD- AND SAND-EMERGENT FAUNA			
Echinodermata - Crinoidea			
ANTEDONIDAE	*Leptometra celtica* *Leptometra phalangium*		10, 101 1, 8, 27, 39, 46, 76, 81, 93
Brachiopoda			
TEREBRATULIDAE	*Gryphus vitreus*		8, 83, 81, 105
BRYOZOAN PATCHES			19, 57, 91, 95
BITECTIPORIDAE	*Pentapora fascialis*		101, M. Bo, pers. comm.

VME HABITAT TYPE (cont.)	Representative Species	IUCN Red List*	References
BUGULIDAE	*Kinetoskias* spp.		
HORNERIDAE	*Hornera lichenoides*		
MOLLUSCS (habitat forming)			
GRYPHAEIDAE	*Neopycnodonte cochlear* *Neopycnodonte zibrowii*		
LUCINIDAE (cold seep communities)	*Lucinoma kazani*		28, 101
MYTILIDAE (cold seep communities)	*Idas modiolaeformis*		86
PINNIDAE	*Atrina fragilis*		75
ANNELIDS			
SABELLIDAE			
SIBOGLINIDAE (cold seep communities)	*Lamellibrachia anaximandri* *Siboglinum* spp.		74, 81, 96 74
TEREBELLIDAE	*Lanice conchilega*		76, 81
CRUSTACEANS			
AMPELISCIDAE	*Haploops* spp.		
CALLIANASSIDAE (cold seep communities)	*Calliax* sp.		96

Appendix D

List of Mediterranean VME Indicator Features, Habitats and Taxa

(a) Mediterranean VME Indicator Features

The following features potentially support VMEs:

Seamounts and volcanic ridges
Canyons and trenches
Steep slopes
Submarine reliefs (*slumped blocks, ridges, cobble fields, etc*.)
Cold seeps (*pockmarks, mud volcanoes, reducing sediment, anoxic pools, methanogenetic hard bottoms*)
Hydrothermal vents

(b) Mediterranean VME Indicator Habitats

The following habitats potentially support VMEs:

Cold-water coral reefs
Coral gardens
- Hard-bottom coral garden
- Soft-bottom coral gardens

Sea pen fields
Deep-sea sponge aggregations
- "Ostur" sponge aggregations
- Hard-bottom sponge gardens
- Glass sponge communities
- Soft-bottom sponge gardens

Tube-dwelling anemone patches
Crinoid fields
Oyster reefs and other giant bivalves
Seep and vent communities
Other dense emergent fauna

(c) Mediterranean VME Indicator Taxa

Phylum	Class	Subclass (Order)
Cnidaria	Anthozoa	Hexacorallia (Antipatharia, Scleractinia)
		Octocorallia (Alcyonacea, Pennatulacea)
		Ceriantharia
	Hydrozoa	Hydroidolina
Porifera (sponges)	Demospongiae	
	Hexactinellida	Amphidiscophora
		Hexasterophora
Bryozoa	Gymnolaemata	
	Stenolaemata	
Echinodermata	Crinoidea	Articulata
Mollusca	Bivalvia	Gryphaeidae (*Neopycnodonte cochlear, N. zibrowii*)
		Heterodonta* (Lucinoida) (e.g. *Lucinoma kazani*)
		Pteriomorphia* (Mytiloida) (e.g. *Idas modiolaeformis*)
Annelida*	Polychaeta	Sedentaria (Canalipalpata) (e.g. *Lamellibrachia anaximandri*, *Siboglinum* spp.)
Arthropoda*	Malacostraca	Eumalacostraca (Amphipoda) (e.g. *Haploops* spp.)

*only chemosynthetic species that indicate the presence of a cold seep or hydrothermal vent are considered

Appendix E

Management elements for the establishment of a VME encounter protocol in the GFCM area of application

1. Introduction

Resolutions of the United Nations General Assembly on sustainable fisheries of 2004[12], 2006[13] and 2009[14] call upon regional fisheries management organizations (RFMOs) to take urgent action to protect vulnerable marine ecosystems (VMEs) from significant adverse impact in areas beyond national jurisdiction.

2. Objective

Further implement the precautionary approach for managing deep-sea fisheries (DSF) with respect to VMEs, due to the difficulty in acquiring data on VMEs location and extent and with a view to avoiding the risk of significant adverse impacts (SAIs) by fisheries, GFCM should adopt a VME Encounter Protocol for the DSF operating in its area of application.

GFCM Contracting Party or Cooperating non-Contracting Party (CPCs) should consider, as necessary, applying additional management measures to their flagged vessels undertaking DSF to avoid overexploitation of resources and to avoid SAIs on VMEs.

3. Definitions

The list of VME Indicator Features, Habitats and Taxa for the Mediterranean Sea is given in Annex I.

4. Scope

Geographical coverage: Mediterranean Sea (GSAs 01 to 28)
Fisheries
The following fisheries shall be regarded as deep-sea fisheries (DSF):

i. all fishing vessels above 15 m (LOA) operating with bottom contact fishing gear fishing for *Aristaeomorpha foliacea, Aristeus antennatus,* or *Plesionika martia*

ii. all fishing vessels above 15 m (LOA) operating with bottom contact gears (bottom trawls, longlines, gillnets and pots and traps) at depths deeper than 300 m;

iii. all fishing vessels above 15 m (LOA) operating with bottom contact gears (bottom trawls, longlines, gillnets and pots and traps) on VME Indicator Features at all depths (see Annex I a)

5. Encounter protocol

Encounter: an encounter with VME Indicator Taxa is defined as any catch of VME Indicator Taxa obtained by any DSF.

Encounter rule: following an encounter with VME Indicator Taxa during DSF, the vessel captain shall immediately report the encounter to the flag State, on the form provided in Annex II, including the following information:

[12] A/RES/59/25
[13] A/RES/61/105
[14] A/RES/64/72

i. the position of the vessel, either by the start and end point of the tow or set, or by another position that is closest to the exact encounter location;

ii. the fishing characteristics of the vessel;

iii. the groups of the VME Indicator Taxa encountered and the best estimates of their live weight (kg).

6. Reporting to GFCM Secretariat

Upon notification by the vessel captain, as described above, relevant CPCs shall forward, within 30 days, the encounter information reported by the vessel captain, to the GFCM Secretariat, including by electronic means.

7. Review of the information gathered by mean of the VME Encounter Protocol

The GFCM Secretariat shall compile the data received with the encounter protocols and set up maps of the distribution of encounters with VME Indicator Taxa, including their abundance by group. The GFCM Secretariat shall regularly inform the SAC about the reported catches of VME Indicator Taxa in Mediterranean fisheries. The SAC shall review this information and, based upon the best scientific evidence available, evaluate the occurrence of VMEs and propose to the Commission, as appropriate, the establishment of new management measures, including FRAs, to ensure the protection of these ecosystems.

8. Observers

The use of scientific observers to assist the crew in data collection is encouraged in order to allow the identification of the VME Indicator Taxa to the lowest taxonomic level and to obtain information on bycatch composition.

9. CPCs responsibilities

CPCs should consider adopting temporary closures and apply these to their flagged vessels if they consider that the encounter has identified a VME. Any measure adopted in this sense should be reported to the GFCM Secretariat for further notification to the SAC.

Appendix E/Annex I

Mediterranean VME Indicator Features, Habitats and Taxa

(a) Mediterranean VME Features

The following features potentially support VMEs:

Seamounts and volcanic ridges
Canyons and trenches
Steep slopes
Submarine reliefs (*slumped blocks, ridges, cobble fields, etc*.)
Cold seeps (*pockmarks, mud volcanoes, reducing sediment, anoxic pools, methanogenetic hard bottoms*)
Hydrothermal vents

(b) Mediterranean VME Indicator Habitats

The following habitats potentially support VMEs:

Cold-water coral reefs
Coral gardens
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- Soft-bottom coral gardens

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- Hard-bottom sponge gardens
- Glass sponge communities
- Soft-bottom sponge gardens

Tube-dwelling anemone patches
Crinoid fields
Oyster reefs and other giant bivalves
Seep and vent communities
Other dense emergent fauna

(c) Mediterranean VME Indicator Taxa

Phylum	Class	Subclass (Order)
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		Octocorallia (Alcyonacea, Pennatulacea)
		Ceriantharia
	Hydrozoa	Hydroidolina
Porifera (sponges)	Demospongiae	
	Hexactinellida	Amphidiscophora
		Hexasterophora
Bryozoa	Gymnolaemata	
	Stenolaemata	
Echinodermata	Crinoidea	Articulata
Mollusca	Bivalvia	Gryphaeidae (*Neopycnodonte cochlear, N. zibrowii*)
		Heterodonta* (Lucinoida) (e.g. *Lucinoma kazani*)
		Pteriomorphia* (Mytiloida) (e.g. *Idas modiolaeformis*)
Annelida*	Polychaeta	Sedentaria (Canalipalpata) (e.g. *Lamellibrachia anaximandri*, *Siboglinum* spp.)
Arthropoda*	Malacostraca	Eumalacostraca (Amphipoda) (e.g. *Haploops* spp.)

*only chemosynthetic species that indicate the presence of a cold seep or hydrothermal vent are considered

Appendix E/Annex II

VME Encounter Protocol in the GFCM area of application

Separate forms to be completed for each deployment of the fishing gear (haul/set) in which VME Indicator Taxa are caught.

A. Fishing Trip Information	
Country:	
Vessel name:	
Captain (name and last name):	
Date of encounter (dd/mm/yyyy):	
B. Fleet and gear information[15]	
Fleet segment:	
Fishing gear:	
C. VME Encounter coordinates	
GSA:	**Statistical grid:**
Point 1 (Start)	**Point 2 (End)**
Latitude:	Longitude:
Latitude:	Longitude:
Fishing depth (average or range, m):	
VME Feature and/or Habitat (Annex I a and b)	
D. VME Indicator Taxa catch information (Annex I c)	
Total live weight of **corals** in the haul/set (kg):	
Total live weight of **sponges** in the haul/set (kg):	
Total live weight of **other vulnerable benthic taxa** in the haul/set (kg):	
E. VME Indicator Taxa (by trained observers on board)	
Identify VME Taxa to lowest taxonomic level (species if possible) and provide comments.	

F. Pictures of VME Indicator Taxa (by fishers and/or observers on board)
Take pictures of the different VME Indicator Taxa and submit them as an attachment to the current form.

[15] Refer to: GFCM, 2016. GFCM Data Collection Reference Framework (DCRF) (http://www.fao.org/gfcm/data/dcrf/en/)

Appendix F

Management elements for mapping of the existing deep-sea fishing areas in the GFCM area of application

1. Introduction

Resolutions of the United Nations General Assembly on sustainable fisheries of 2004[16], 2006[17] and 2009[18] call upon regional fisheries management organizations (RFMOs) to take urgent action to protect vulnerable marine ecosystems (VMEs) from significant adverse impact in areas beyond national jurisdiction.

2. Objectives

The deep-sea bottom fisheries of the Mediterranean target only a few species that are fished on specific habitats. In order to manage these fisheries sustainably, and prohibit any significant adverse impacts they may cause on non-target species and VMEs, it is necessary to map the distribution of the existing deep-sea bottom fishing areas.

3. Definitions

"Existing deep-sea bottom fishing areas", means that portion of the GFCM area of application where deep-sea bottom fishing has occurred up to and including 2019.

"Exploratory (or new) deep-sea bottom fishing" occurs during the initial development phase of a DSF when the DSF operates in areas that have not been previously fished or in fished areas following significant changes in the gear or effort, as described in paragraphs 23, 55, 61 and 65 of the *FAO International Guidelines for the Management of Deep Sea Fisheries in the High Seas*.

4. Scope

Geographical coverage: Mediterranean Sea (GSAs 01 to 28)
Fisheries
The following fisheries shall be regarded as deep-sea fisheries (DSF):

i. bottom trawlers above 15 m (LOA) fishing for *Aristaeomorpha foliacea, Aristeus antennatus,* or *Plesionika martia;*

ii. all fishing vessels above 15 m (LOA) operating with bottom contact gears (bottom trawls, longlines, gillnets and pots and traps) at depths deeper than 300 m;

iii. all fishing vessels above 15 m (LOA) operating with bottom contact gears (bottom trawls, longlines, gillnets and pots and traps) on VME Indicator Features at all depths (see Annex I a)

5. Management measure

GFCM Contracting Party or Cooperating non-Contracting Party (CPCs) with vessels involved in "deep-sea bottom fisheries" shall submit to the extent possible and no later than 31 December 2019 comprehensive maps of existing deep-sea bottom fishing areas to the GFCM Secretariat. Maps shall be based on VMS/AIS data and/or other available geo-reference data and be expressed in as precise spatial and temporal resolution as possible. The submission of the detailed gear deployment position information will facilitate the mapping process. Priorities should be given to bottom trawling below

[16] A/RES/59/25
[17] A/RES/61/105
[18] A/RES/64/72

300 m, but it is highly desirable to map other types of fishing gears that contact the seafloor during normal use, e.g. bottom set longlines, gillnets, trammel nets, and pots. Contracting Parties may, in the future, consider the possibility of refining these maps on the basis of haul-by-haul information, if available. GFCM Secretariat shall compile a composite map, preferably by gear type, of the existing deep-sea bottom fishing areas within the GFCM area of application. The SAC shall review this information and based upon the scientific evidence available, adopt the map defining the existing fishing areas in the GFCM area of application.

Appendix G

Management elements for the establishment of an exploratory deep-sea bottom fishing protocol in the GFCM area of application

1. Introduction

Resolutions of the United Nations General Assembly on sustainable fisheries of 2004[19], 2006[20] and 2009[21] call upon regional fisheries management organizations (RFMOs) to take urgent action to protect vulnerable marine ecosystems (VMEs) from significant adverse impact in areas beyond national jurisdiction.

2. Objectives

To ensure that exploratory or new deep-sea fishing activities are only allowed to expand at a rate consistent with the knowledge and management of that fishery. This will avoid overexploitation of targeted deep-sea fish stocks. Further, great care needs to be taken to ensure that VMEs are mapped and known, and suitable mitigation measures applied to ensure their protection from significant adverse impacts resulting from any new fishery.

3. Definitions

"Existing deep-sea bottom fishing areas", means that portion of the GFCM area of application where deep-sea bottom fishing has occurred up to and including 2019.

"Exploratory (or new) deep-sea bottom fishing" occurs during the initial development phase of a DSF when the DSF operates in areas that have not been previously fished or in fished areas following significant changes in the gear or effort, as described in paragraphs 23, 55, 61 and 65 of the *FAO International Guidelines for the Management of Deep Sea Fisheries in the High Seas*.

4. Scope

Geographical coverage: Mediterranean Sea (GSAs 01 to 28)

Fisheries: All fishing vessels above 15 m (LOA) operating with bottom contact gears (bottom trawls, longlines, gillnets and pots and traps) are considered undertaking Exploratory (or new) deep-sea bottom fishing when operating:

i. On VME Indicator Features (see Annex I a)
ii. Outside of the existing bottom deep-sea fishing areas
iii. Inside of existing bottom fishing areas with bottom-contact fishing gears not previously used or when significant increases of effort are planned or when a new fishery is developing

5. Management measure

GFCM Contracting Party or Cooperating non-Contracting Party (CPCs) of flagged fishing vessels undertaking exploratory (or new) deep-sea bottom fishing shall be required to complete the Exploratory deep-sea bottom fishing protocol provided in Annex I, including the following information:

[19] A/RES/59/25
[20] A/RES/61/105
[21] A/RES/64/72

i. the start and end point of each tow or set;

ii. the fishing characteristics of the vessel including the gear used;

iii. the GSA area and the Statistical Grid where the exploratory deep-sea fishing occurred;

iv. the catch, the bycatch and fishing effort;

v. VME Indicator Taxa (if any) through the VME Encounter Protocol.

6. Reporting to GFCM Secretariat

Upon notification by the vessel captain, as described above, relevant CPCs shall forward, within 30 days, the exploratory deep-sea bottom protocol form reported by the vessel captain, to the GFCM Secretariat, including by electronic means.

7. Review of the information gathered through the exploratory deep-sea bottom protocol

The GFCM Secretariat shall compile the data received with the exploratory deep-sea bottom protocol and shall regularly inform the SAC. The SAC shall review this information.

8. Observers

The use of scientific observers to assist in data collection and reporting is highly desirable according to the GFCM DCRF[22].

[22]Refer to: GFCM, 2016. GFCM Data Collection Reference Framework (DCRF) (http://www.fao.org/gfcm/data/dcrf/en/).

Appendix G/Annex I

Exploratory deep-sea fishing protocol in the GFCM area of application (Mediterranean Sea)

Separate forms must be completed for each new exploratory deep-sea fishing trip.

A. Fishing Trip Information
Country:
Vessel name:
Captain (name and last name):
Dates of exploratory fishing trip (dd/mm/yyyy format):

B. Fleet and gear information[23]
Fleet segment:
Fishing gear:

Area information	
GSA:	**Statistical grid**[24]**:**
Area fished (coordinates-attach map):	
VME Indicator Feature (if any):	
Depth range fished (m):	
Fishing effort:	

C. Catch summary
List main commercial species and quantities caught during the exploratory deep-sea bottom fishing

D. Bycatch summary
Provide details of bycatch species

D. VME Indicator Taxa
Use the provided VME Encounter Protocol for any catch of VME Indicator Taxa

E. Comments (by fishing crew)

[23] Refer to: GFCM, 2016. GFCM Data Collection Reference Framework (DCRF) (http://www.fao.org/gfcm/data/dcrf/en)
[24] Refer to: Appendix M - Geographic statistical grid for red coral, DCRF. GFCM, 2016. GFCM Data Collection Reference Framework (DCRF)

Appendix H

Mediterranean areas that host VMEs or other sensitive habitats presented to the first meeting of the WGVME

Deep sea[25]

1- Cold-water coral ecosystems of the Bari Canyon, Southern Adriatic Sea, Italy

Area comprised within the following vertices: 17°03.24' E, 41°23.824' N; 17°19.273' E, 41°15.455' N; 17°02.712' E, 41°16.22' N; 41°23.437' N - 17°19.933' E.

Depth range: 200-1000 m

2- Cold-water coral ecosystem of the Nora Canyon, Sardinian Channel

Area comprised within the following vertices: 8°53.063' E, 38°41.819' N; 8°53.048' E, 38°43.99' N; 8°55.56' E, 38°44.008' N; 8°55.575' E, 38°41.837' N.

Depth range: 250-600 m

3- *Isidella elongata* habitat in the Balearic Sea

Area comprised within the following vertices: 01º 57.803'E, 39º03.835'N, 02º 08.673'E, 38º 54.791'N, 01º 47.761' E 38º 39.412'N, 01º 36.888' E, 38º48.424'N

Depth range: 87-995 m

4- Potential deep-water Fisheries Restricted Area (FRA) in the Eastern Ionian Sea

Area comprised within the following vertices: approximately 20.15 / 38.02
20.20 / 37.56

Depth range: 300-850 m

Coastal areas

1- *Dendrophyllia ramea* habitat off Cyprus

Area comprised within the following vertices: 34º 5.08'E, 35º 3.19'N, 34º 6.32'E, 35º 1.51'N, 34º 6.02'E, 35º 1.08'N, 34º 4.88'E, 35º 1.17'N, 34º 3.86'E, 35º 2.58'N (five coordinates are given as the area is included in an irregular polygon)

Depth range: 80-290 m

[25] Considered to start from 300 m, according to the fisheries management approach (i.e. definition of Mediterranean deep-sea fisheries)

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