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pour la Méditerranée

## Scientific Advisory Committee on Fisheries (SAC)

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

FAO headquarters, Rome, Italy, 26 – 28 February 2018

## REPORT

### EXECUTIVE SUMMARY

The second meeting of the Working Group on Vulnerable Marine Ecosystems (WGVME)<sup>1</sup> took place from 26 to 28 February 2018 at the Food and Agriculture Organization of the United Nations (FAO) headquarters, Rome, Italy. As agreed by the forty-first session of the Commission, the meeting addressed the requirements of Resolution GFCM/41/2017/4 to carry out the following tasks: i) collect information and map the distribution of VMEs; ii) advise on new proposals for closures and on the enforcement of existing measures (e.g. of existing fisheries restricted areas [FRAs] addressing VME protection); iii) assess technical information; iv) advise the Scientific Advisory Committee on Fisheries (SAC) on matters related to VMEs; v) contribute to designing and managing a Mediterranean VME geodatabase; and vi) contribute to the establishment of a close collaboration and proper communication channels with scientific bodies from other regional fisheries management organizations (RFMOs). In particular, the objectives of the 2018 WGVME were to: i) review and update the technical elements for the establishment of a VME encounter protocol; ii) discuss additional potential management measures to be applied to deep-sea fishing; iii) update the information on the existence and distribution of Mediterranean VME; and iv) address the newly adopted Resolution GFCM/41/2017/5.

The meeting reviewed the technical elements for the protection of VMEs in the GFCM area of application drafted by the 2017 WGVME, paying particular attention to management elements for the mapping of the existing deep-sea fishing areas for the Mediterranean (by 2020), the establishment of a VME encounter reporting protocol and of an exploratory deep-sea bottom fishing reporting protocol, the adoption of VME indicators (features, habitats and taxa) and the creation and use of a GFCM VME geodatabase. The WGVME also agreed on a process for the establishment and protection of VMEs while determining the fishing footprint.

The WGVME addressed the issue of EFH working towards the objectives of: i) reviewing the information available on EFH and sensitive habitats (SH) in the Mediterranean Sea; ii) creating a network of people working on EFH and SH in the Mediterranean; and iii) defining a roadmap on how to address Resolution GFCM/41/2017/5. Thus the WGVME drafted a catalogue of projects and people working on EFH in the Mediterranean and collected all available model-based maps of EFH of priority species in the Mediterranean to provide a basis for future work on the creation of regional composite maps per species. Finally, the WGVME proposed a roadmap for future work on the establishment of a network of EFH in the Mediterranean.

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## **OPENING AND ARRANGEMENTS OF THE MEETING**

1. The General Fisheries Commission for the Mediterranean (GFCM) Working Group on Vulnerable Marine Ecosystems (WGVME), including a session on Essential Fish Habitats (EFH), was held from 26 to 28 February 2018 at the Food and Agriculture Organization of the United Nations (FAO) headquarters, Rome, Italy. Seventy-one experts from Mediterranean countries attended the meeting, including representatives from partner organizations, the FAO regional projects and the GFCM Secretariat. The list of participants is reproduced in Appendix 2 of this report.

2. Mr Miguel Bernal, GFCM Fishery Resources Officer, opened the WGVME on behalf of the GFCM Secretariat welcoming participants to Rome. Mr Bernal then reminded the working group that this was a technical meeting with the aim of producing precise advice to help the GFCM Scientific Advisory Committee on Fisheries (SAC), and later the Commission, take decisions with respect to Vulnerable Marine Ecosystems (VMEs). Finally, he introduced Mr Othman Jarboui, Chairperson of the SAC, and proposed to appoint him as chairperson of the WGVME for the second year running; the meeting unanimously agreed.

3. Mr Jarboui thanked the working group for his appointment as Chairperson and expressed his satisfaction that the WGVME had become a permanent working group of the GFCM as a result of Resolution GFCM/41/2017/4 on a permanent working group on vulnerable marine ecosystems. He introduced the agenda, which was adopted with minor changes as reproduced in Appendix 1, and invited participants to briefly introduce themselves.

## **INTRODUCTORY SESSION: DEEP-SEA FISHERIES (DSF) AND ESSENTIAL FISH HABITATS (EFH)**

4. Ms Elisabetta Betulla Morello, GFCM Fishery Resources Consultant, gave an overview of the meeting objectives and expected outputs. After an introduction on the history, the objectives, the area of application, the membership and the key functions of the GFCM, she explained the decision-making process within the GFCM. Moreover, she recalled Resolution GFCM/41/2017/4 and explained the terms of reference for the WGVME, particularly stressing the requirement to carry out the following tasks: i) collect information and map the distribution of VMEs; ii) advise on new proposals for closures and on the enforcement of existing measures (e.g. of existing FRAs addressing VME protection); iii) assess technical information; iv) advise the SAC on matters related to VMEs; v) contribute to designing and managing a Mediterranean VME geodatabase; and vi) contribute to the establishment of a close collaboration and proper communication channels with scientific bodies from other regional fisheries management organizations (RFMOs). Finally, Ms Morello outlined the objectives of the 2018 WGVME which sought to: i) review and update the technical elements for the establishment of a VME encounter protocol; ii) discuss additional potential management measures to be applied to deep-sea fishing; iii) update the information on the existence and distribution of Mediterranean VME indicators; and iv) address the newly adopted Resolution GFCM/41/2017/5 on a network of essential fish habitats in the GFCM area of application.

5. Mr Tony Thompson, GFCM Consultant, presented “Provisions of the United Nations General Assembly (UNGA) Resolution 61/105 regarding the protection of VMEs and current GFCM measures in place”. The legal basis for the protection of VMEs from significant adverse impacts (SAIs) of bottom fisheries stems from clauses in the United Nations Convention on the Law of the Sea (1982) and the United Nations Fish Stock Agreement (1995) that require States to consider effects upon associated and dependent species. The actual move to specifically include VMEs came in United Nations General Assembly (UNGA) Res. 57/141 adopted in 2002, though it is UNGA Res. 61/105 adopted four years later that is best known owing to its tight implementation deadlines. By the end of 2008, States, individually or through RFMOs responsible for high seas bottom fisheries, should identify known or likely VMEs and protect them from SAIs through appropriate mitigation measures. This included the need to identify existing areas of bottom fishing (fishing footprint) and ensure that new or exploratory fishing areas were subject to impact assessments if the development of a commercial scale fishery were

to be allowed. The FAO International Guidelines for the Management of Deep-sea Fisheries in the High Seas were developed through a participative process and adopted in 2008 to assist States to implement measures to protect VMEs. Since 2006, all regions having RFMOs have adopted general deep-sea bottom fishery measures to protect VMEs, including the identification of existing fishing areas, protocols for actions required upon an encounter with VME indicator species, and protocols for fishing outside the fishing footprint or inside with a change in gear or effort; the latter included impact assessments. The GFCM made rapid progress in 2005 and 2006 by closing waters deeper than 1000 m to mobile gear and by establishing FRAs protecting benthic habitats. Nevertheless, it appeared to be behind other RFMOs in terms of recommendations to implement more general deep-sea bottom fishing measures offering overall protection to VMEs. A first step in this direction was taken in 2017, when the WGVME drafted the technical elements for the protection of VMEs in the GFCM area of application that outline an extensive and very detailed set of technical measures, including the identification of existing bottom fishing areas (“fishing footprint”), encounter and exploratory fishing protocols, and the identification of further areas in need of stronger protection.

6. Mr Alaa ElHaweet, from the College of Fisheries Technology and Aquaculture of the Arab Academy for Science, Technology & Maritime Transport of Egypt, commented on how the goal of the GFCM had evolved from its establishment in 1949. Its initial aim was to ensure sustainable fisheries. Over time, it has had to modify its agreement to ensure sustainable fisheries while minimizing the impact on biodiversity and the environment. The newly-established RFMOs were founded with this specific mandate, and quickly advanced their deep-sea fisheries measures.

7. Mr Thompson then introduced the timeline for 2016–2018 of the meetings of both the Commission and the SAC as well as their key points. He recalled that the GFCM had made efforts to develop a firm scientific basis for general measures to manage deep-sea fisheries and protect VMEs. This would then support the more specific measures associated to areas that have or are likely to have VMEs. The work of the GFCM in this respect started with a joint workshop with FAO in July 2016 and was developed at the first meeting of the WGVME (Spain, April 2017). The output of this meeting included technical elements that identified VME indicators, encounter and exploratory fishing protocols, a process to map the existing bottom fishing areas and a recommendation to create of a GFCM Mediterranean geodatabase on VME indicator features and species containing all relevant scientific evidence. Owing to difficulties in timing, the review of these technical elements by the subregional committees in 2017 was not possible and they were presented directly to the nineteenth session of the SAC (Slovenia, May 2017). The SAC made some relevant modifications pertaining to the depth realm of the elements themselves. The revised elements were submitted to the forty-first session of the Commission (Montenegro, October 2017), who felt that they would benefit from further development and drafted terms of reference for the WGVME to complete this task at its next meeting. The Commission established the permanence of the WGVME with Resolution GFCM/41/2017/4.

8. Mr Thompson then proceeded in outlining Resolution GFCM/41/2017/5 on a network of essential fish habitats in the GFCM area of application in support of the mid-term strategy (2017–2020) towards the sustainability of Mediterranean and Black Sea fisheries and the MedFish4Ever Ministerial Declaration of March 2017. He ended the presentation by describing the FRA established for the Jabuka/Pomo Pit area (Recommendation GFCM/41/2017/3) to protect EFH and VMEs. This measure sets spatio-temporal management rules for both commercial and recreational fisheries and has parallels to the more extensive bottom fishing technical elements being developed at this WGVME meeting, at both scientific and compliance levels.

9. Mr Bernal underlined the need to agree upon the objectives of this meeting: i) give technical advice towards a generic recommendation on VMEs in the deep-sea; and ii) advance on the catalogue of specific VMEs that should be proposed for protection in the future. In doing so, Mr Bernal reminded the working group should aim at keeping the technical elements as simple as possible and resolving all controversies in order to provide the clearest advice possible to the SAC itself, which would enable the Commission to take a decision.

10. Mr Thompson presented and defined the various “GFCM spatial measures relevant to this meeting” starting from the main tool available, the FRA, recalling Resolution GFCM/37/2013/1 on

area-based management of fisheries, including through the establishment of fisheries restricted areas in the GFCM area of application and coordination with UNEP-MAP initiatives on the establishment of specially protected areas of Mediterranean importance. He reminded the working group that a FRA was an area identified according to sound scientific and technical provisions within which fishing was restricted with a view to maintain and/or recover marine living resources to a healthy state while ensuring the conservation of marine biodiversity for the sustainable exploitation. Mr Thompson explained that FRAs could have different objectives according to the reason for protecting an area. For example, the objective of a FRA could be to protect an EFH, in which case it would be directly linked to the improvement of the exploitation and conservation of fisheries resources.

11. Mr Thompson proceeded in giving the definition of EFH and sensitive habitat (SH) according to Resolution GFCM/41/2017/5. A FRA could, on the other hand, have the objective of protecting a VME. Mr Thompson noted that VMEs were not defined by the GFCM nor by the FAO International Guidelines for the Management of Deep-sea Fisheries in the High Seas although the latter provided criteria for VMEs; the GFCM proposal for technical elements stemming from the 2017 WGVME provided a list of VME indicator features, habitats and taxa. Mr Thompson concluded his presentation showing the existing GFCM FRAs which, to date, are nine: five protecting EFH (i.e. Gulf of Lion, Adventure Bank, Gela basin, Malta Bank and Jabuka/Pomo pit), three protecting VME-type areas (Capo Santa Maria di Leuca, Eratosthenes Seamount and Nile Delta) and a general one protecting areas deeper than 1000m.

12. Mr ElHawet remarked that it was important for the definition of FRAs to be dynamic taking into account changes over time. Mr Thompson underlined the fact that FRAs need to be regularly reviewed and that fisheries management needs to be dynamic and adaptive. Ms Maria del Mar Otero, Project Officer at the International Union for Conservation of Nature (IUCN), contrasted these notions with the fact that FRAs protecting VMEs should be more permanent measures simply by virtue of the fact they are aimed at protecting permanent features of an area.

13. Mr Bernal thanked Mr Thompson for his presentation, and Mr ElHawet and Ms Otero for their comments. He took the occasion to recall that FRAs are the general tool used within the GFCM for spatial management. What changes in each specific case is the objective of the FRA. Thus a FRA is established through a recommendation which clearly details its objective and defines its area of application; such recommendation has to be very precise and, depending on the objective, may also be dynamic.

## **TECHNICAL ELEMENTS FOR THE MANAGEMENT OF DSF AND THE PROTECTION OF VMEs**

14. Mr Thompson presented “Technical elements for the management of DSF and the protection of VMEs” drafted at the 2017 WGVME. Mr Thompson reviewed the changes proposed by the nineteenth session of the SAC, which mainly entailed clarifications to the scope of sections A and B. The revised technical elements were presented to the forty-first session of the Commission which requested that further discussions be held by the WGVME at its next meeting.

15. In the ensuing discussions, the WGVME focused on the revision and update of the technical elements with the aim of producing a final document to be presented to the SAC. The updated technical elements, with Track Changes, comprise Appendix 3 of this report.

16. Mr Sadok Ben Meriem, Senior Researcher at INSTM La Goulette in Tunisia, pointed out that the exploratory fishing protocol and the process to map the existing bottom fishing areas were not necessarily strictly related to deep-sea fishing or to VMEs and asked for a clarification in this respect. Participants then debated the depth limitation, the fact that VMEs also existed in shallower waters and whether to consider target species instead. In responding, Mr Thompson reminded the working group that one of the objectives of this meeting was to develop elements addressing the UNGA resolution which specifically applied to high seas. The technical elements discussed were thus about the protection of VMEs from deep-sea fisheries and the depth cut-off at 300 m had been agreed as a compromise to facilitate the adoption of initial generic measures, without prejudice to future discussion on additional

measures for shallower depths. Mr Andrew Kenny, benthic ecologist at CEFAS, involved in the Northwest Atlantic Fisheries Organization (NAFO), reminded the working group that adopting this depth cut-off reduces confusion and is a more tangible definition than having a list of deep-sea target species, some of which could be spending part of their lives in shallow waters.

17. Mr Bernal added that the proposed depth limit only applied to these general deep-sea technical elements but that other additional measures could be adopted that would be complementary to this one. To support this, Mr Bernal gave the example of the possibility to adopt more restrictive measures by contracting parties and cooperating non-contracting parties (CPCs) to protect VME features in waters, for example, shallower than 300 m depth.

18. The WGVME discussed the inclusion of slopes as well as of several features of special importance for VMEs (offshore seamounts, canyons and banks) in the definition of the scope of the technical elements. The WGVME agreed that the specific mention of particular features should be limited to those features with a clear spatial definition and boundary. For example, seamounts could be considered such features while the definition of a bank was too loose and the boundaries of the head of a canyon not clear enough. The WGVME agreed on the inclusion of seamounts, while the protection of the heads of canyons should be further evaluated.

19. Mr Marouene Bdioui, Researcher at INSTM, underlined the importance of accurately defining the gear covered by the technical elements, noting that there were kinds of passive gear (e.g. traps) that could be in contact with the bottom or not. Participants agreed that, for the purpose of this report, if any part of the gear were in contact with the bottom, then it would be considered bottom fishing gear. The WGVME finally concluded that the technical elements should have a glossary defining important terms.

20. In order to be able to effectively implement both the encounter and the exploratory fishing protocols outlined in the technical elements, the WGVME agreed on the importance of first determining the fishing footprint in order to understand the areas deeper than 300 m that had historically been fished with bottom contact gear. Ms Covadonga Orejas Saco Del Valle, Senior Researcher at the Instituto Español de Oceanografía (IEO), enquired whether the mapping of the fishing footprint should happen at the same time as the mapping of VMEs. Mr Thompson clarified that the establishment of the fishing footprint did not have the aim of identifying the existence of VMEs but just of mapping the fishing activity. Ms Otero underlined the importance for this footprint to be dynamic and not static, in order to accurately reflect the dynamic nature of bottom fisheries. In order to do this, the WGVME noted that the time period used to define the footprint should be specified as well as a time within which the footprint should be reviewed: the establishment of the footprint based on the previous 5 years of vessel monitoring system (VMS)/Automatic Identification System (AIS) data by gear was suggested, with a review five years later. The working group agreed for this to be done for the first time by 2020.

21. The WGVME discussed the concept of the encounter protocol, noting that the reporting of all VME encounters by fishers should be encouraged, even low catch levels, with management actions being triggered only above a threshold level. In this respect, Mr Fiorentino, Senior Researcher at the Istituto per l'Ambiente Marino Costiero del Consiglio Nazionale delle Ricerche (IAMC-CNR) of Italy, noted that deepsea shrimp fishers, when operating in new areas, had to remove most of benthic organisms in order to allow shrimp to move in and the fishery to be profitable; under these premises it seems unlikely that fishers would report VMEs on soft bottoms in the presence of a corresponding management action (e.g. a move-on rule or a closure). Mr Kenny noted that encounter protocols with move-on rules may not be effective measures because reporting may not occur. In addition to this, thresholds could be difficult to define. Mr Thompson agreed, suggesting that at this early stage, the need to promote accurate reporting was necessary.

22. The WGVME underlined the fact that the technical elements outlined initial measures which would have to be reviewed once further information on fishing activities and/or adequate thresholds are available. With this in mind, the working group suggested that the problem be addressed in two stages: a first stage where the emphasis would be on the reporting of areas previously fished with bottom contact gear and of encounters with VME indicators; and a second stage, following the identification and adoption of the fishing footprint as well as more work done on potential thresholds, when the

recommendation would be reviewed and/or a more comprehensive set of protective measures considered. FRAs could be used as management tools for the protection of specific VMEs in the meantime. Participants noted that an accurate mapping of fishing footprint, as well as the reporting of the appearance of VMEs on parts of this area should be beneficial to all stakeholders, because it allows delimitating the area where exploratory fishing protocols should be used (not fished before) as well as to identify potential areas where ecosystems will benefit from an adequate level of protection. The WGVME suggested that in this first stage, the encounter protocols be renamed encounter reporting protocols. In preparation for the second stage, the WGVME noted that work should be done towards identifying the methodologies that could be used to determine appropriate VME encounter thresholds as well as adequate spatial protection measures to be proposed once the footprint and VME occurrence had been mapped.

23. Mr Jarboui noted the importance of involving observers on board, which were foreseen by the implementation of the GFCM mid-term strategy for discards and incidental catch of vulnerable species, commending them as an important tool that could result in the collection of accurate information on the presence of VME indicator species in catches.

24. The WGVME underlined that the objective of establishing exploratory fishing protocols, once the footprint and VMEs had been mapped, was not to prohibit fishing from happening in new areas, but to allow it to develop in a gradual and controlled way according to specified exploratory fishing rules. The working group noted that, similarly to the encounter protocol, the exploratory fishing protocol should, in this first stage, be renamed exploratory fishing reporting protocol. Further, discussions ensued on how to protect VMEs from new fishing explorations in the absence of a footprint. Participants noted that actions to be taken in this situation would be a direct result of either the prior knowledge of the presence of a VME (which could trigger a FRA proposal) or the reporting of an encounter with a VME indicator species which would be included in a database documenting the presence of VME indicator species (see later). The WGVME agreed that as information on the presence and distribution of VME indicator species, the GFCM, acting on the scientific advice provided by the SAC, should identify the adequate protection mechanisms, in line with existing international agreements. The working group finally underlined the importance of having a well-developed exploratory fishing protocol for fishers to follow once the footprint had been established.

25. Ms Emanuela Fanelli, Researcher of the ENEA-Marine Environment Research Center from Italy, presented an overview of the potential synergies between the WGVME and the IDEM project, carried out within the framework of the Marine Strategy Framework Directive (MSFD) for the deep sea. The MSFD for the deep Mediterranean would be implemented by achieving regionally coherent, coordinated and consistent updates of the determinations of good environmental status, initial assessments and sets of environmental targets. Ms Fanelli presented the activities foreseen under the main tasks of the IDEM project, namely: i) analysis of all scientific publications, national and international reports and grey literature available; ii) analysis of the available datasets from the different Mediterranean subregions; iii) identification of major data gaps about specific descriptors and sub-basin; and iv) dissemination of the outputs of the IDEM project. She highlighted the synergies with the WGVME, since the IDEM project would investigate the features of broad benthic habitat types in the deep sea, including their associated biological communities. The information and data collected could be shared with the WGVME with the final aim of protecting highly-valuable deep-sea areas in the Mediterranean Sea.

26. Ms Marina Gomei, Manager at WWF Mediterranean Marine Initiative, thanked Ms Fanelli for her contribution noting that the need for the creation of conservation priority maps was becoming an urgent matter, both for the conservation and fisheries sectors. She commented that the future trends in the Mediterranean Sea showed that maritime activities (i.e. oil and gas extraction, cables, shipping routes, wind farms) were predicted to expand substantially. Ms Gomei concluded that, in this context, marine conservation and fisheries science should find common grounds and solid arguments to influence the planning processes of growing activities in the maritime space, by also claiming internationally recognized areas of conservation priority.

27. Mr Michele Gristina, Istituto per l'Ambiente Marino Costiero del Consiglio Nazionale delle Ricerche (IAMC-CNR) of Italy, presented “Spatial distribution and temporal evolution of VME in the Strait of Sicily”. Surveys with side-scan sonar and underwater cameras allowed to monitor and map the seafloor, providing images and information on the distribution of deep-sea benthic species. The impact of fisheries on deep-sea habitats had been increasing over the last decades in response to the decline of many shelf commercial stocks, as demonstrated by numerous studies. In the Strait of Sicily important topographical, hydrophysical or geological features (VME elements) were known to occur and could potentially support the species groups or communities referred in the suggested list of GFCM VME indicator species. In particular, seamounts, seamount-like features and submarine canyons all exist in the area. A total of 33 taxa representative of four proposed VME groups (i.e. Coral Gardens, Sea Pen Fields, Mud and Sand Emergent Fauna and Deep-sea Sponge Aggregations) has been identified. By combining scores across all attributes (position, feeding, motility, size, others), individual taxa could be ranked in sensitivity categories (i.e. very resistant, resistant, vulnerable and very vulnerable) to bottom fishing. Maps showed how VMEs in the Strait of Sicily may overlap with recruitment areas of thornback ray (*Raja clavata*), deep-water rose shrimp (*Parapenaeus longirostris*), and European hake (*Merluccius merluccius*). In this respect, the proposal of a FRA as a multi-purpose spatial management tool used to restrict fishing activities in order to protect VMEs and EFH would be particularly useful.

28. Mr Fernando Nieto Conde, independent fisheries expert, presented “Measures implemented for deep-sea fishing and the protection of VMEs”. Regarding monitoring, control and surveillance (MCS) aspects, he recalled the provisions of i) Recommendation GFCM/41/2017/3 on the establishment of a FRA in the Jabuka/Pomo Pit in the Adriatic sea requiring an access regime, effective monitoring of the vessels (authorized vessel lists and tracking by VMS/AIS) and catch/landing/sales, and inspections at sea; and of ii) recommendations GFCM/40/2016/4 establishing a multiannual management for the fisheries exploiting European hake and deep-water rose shrimp in the Strait of Sicily (geographical subareas 12 to 16) and GFCM/41/2017/8 on an international joint inspection and surveillance scheme outside the waters under national jurisdiction in the Strait of Sicily (geographical subareas 12 to 16), on the establishment of three FRAs in the Strait of Sicily through the exchange of best practice, inspector training and capacity building, and the exchange of data/information. Concerning the FRAs in the Strait of Sicily, under the framework of the Rym Project, a range of trawlers were observed and inspected throughout the operations (August–September) indicating the presence of fishing vessels concerned by the GFCM Recommendation for different flags in international waters. Including sightings received from Frontex operations, 346 sightings of vessels and 69 inspections were undertaken, of which 32 inspections resulted in one or more potential infringements (authorized vessels = 849 vessels). The highest number of sightings was related to trawlers inside the Gulf of Gabès. Potential infringements were mostly related to fishing in restricted areas and to technical measures, including in particular unauthorized mesh size. The benefits of an international scheme were shown.

## **MEDITERRANEAN VME INDICATOR FEATURES AND SPECIES**

29. Mr Thompson presented a “Review of proposed VME taxa, species and indicators”, illustrating the list approved by the nineteenth session of the SAC and underlining the fact that this was extensive for an initial list. He also noted that an identification guide to assist fishers, observers and compliance officers with its implementation was needed. Ms Chryssi Mytilineou, Institute of Marine Biological Resources & Inland Waters of Greece, noted that there were two FAO publications<sup>2</sup> on sponges and corals, respectively, which could be used for this purpose.

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<sup>2</sup> Xavier J., Bo M. 2017. Deep-Sea Sponges of the Mediterranean Sea. FAO, I6945.  
Bo M. 2017. Deep-Sea Corals of the Mediterranean Sea. FAO, I7256

30. The WGVME agreed on the presented list as a general list of indicator taxa. The working group noted that, initially, it would be important to record and report listed indicator species, while further work on the advice on thresholds to establish potential management measures will be needed.

31. Ms Orejas suggested that, while it may not be currently possible to have precise thresholds for all VME indicator species and habitat types, it would be advisable to work on a few iconic groups for which information was available (e.g. *Madrepora oculata*, *Lophelia pertusa*) towards establishing such thresholds. Ms Otero reiterated the concept by giving the example of bamboo coral (*Isidella elongata*) which is a critically endangered species included in the IUCN Red list and recently in Annex II of the Barcelona convention. The main damage to this species is caused by trawl fisheries and should be protected regionally. Mr Bernal suggested that, in the presence of good maps of the distribution of these species, the WGVME could produce scientific advice for consideration of the SAC and the Commission towards taking the necessary steps to protect these species. Mr Bernal further reminded the working group that, should the information be available, an interim solution to ensure the adequate level of protection could also be the proposal of FRAs to protect specific sites of interest to the species; he concluded by outlining the formal process behind a FRA proposal. The WGVME agreed to include a map of *Isidella elongata* with the sites already presented as VME by different experts as Appendix 5 of this report. Regarding the proposal of threshold levels of abundance, Mr Bernal noted that the main objective of the working group should be to provide advice on the assessment of a particular species of interest along with an analysis of the outcomes of applying alternative management measures, allowing the Commission to discuss and decide based on this scientific information.

32. Mr Bernal reminded the WGVME that, should the list of VME taxa, species and indicators be agreed at the level of the SAC and the Commission, then it would become a tool to identify the existence of potential VMEs. Consequently, the important issue would thus become how to report these species in a meaningful, standardized and georeferenced manner throughout the Mediterranean (e.g. weight, volume, abundance, density etc...). Participants commented that it would be useful to look at what had been done elsewhere, e.g. the ICES WGDEC. In response, Mr Kenny commented that biomass or wet weight were usually more appropriate than abundance and easy to obtain onboard.

33. The WGVME echoed and supported Mr Jarboui's previous comment on the importance of involving observers onboard in the context of recording the appearance of VME indicator taxa. Mr Bernal agreed and informed the working group that the program of observers on board was in the process of being launched, that monitoring manuals had been drafted and would be presented at the upcoming twentieth session of the SAC. He underlined that at this point, these manuals did not include VME indicator taxa. The WGVME agreed that the VME indicator taxa should be included in the manuals for the monitoring of discards and incidental catch of vulnerable species.

34. Mr Kenny underlined the fact that within NAFO, for example, identification guides were provided to help with the task. The working group welcomed the idea, noting that these guides should likely be adapted to whoever was collecting the data, whether scientists (including observers on board) or fishers. Mr Bernal suggested the existing FAO guidelines could be acceptable and that a two-level approach could be used, with a simplified ID guide for fishers (as for examples those already existing on sponges and corals) and a more complicated/exhaustive one for observers at sea. Ms Fanelli suggested the list provided by Oceana (in some cases providing taxonomic classification down to species level) could be integrated to the one presented by Mr Thompson in the case of observers at sea, while Mr ElHawet underlined the importance of a clear non-technical guide (including pictures) for fishers. Several participants reminded that observers already had a lot of work to do for discards and bycatch and care should be taken in adding to it. Mr Bernal suggested that there may be pragmatic approaches to tackling this problem, including the use of photographs or the collection of boxes to be analyzed on land. Mr Kenny further remarked that this should not be too much of a problem as there would likely be very few significant encounters.

35. Several participants remarked that the use of observers on board was not always welcomed by fishers. The WGVME agreed that several strategies could be used to overcome this issue, individually or in combination. Mr Bernal gave some examples of such strategies: i) the requirement of having observers on board could be incorporated within specific management mechanisms (e.g. if a vessel were

interested in having an authorization to fish deep-water red shrimp, a requirement for obtaining it could be the presence of observers on board); and ii) awareness campaigns illustrating, *inter alia*, the potential positive effects for fishers.

36. Mr Thompson presented “Review of the efficiency of existing measures for the protection of VMEs”. Existing GFCM measures were compared to similar measures adopted in other regions having deep-sea fisheries RFMOs. A baseline was taken from UNGA Res. 61/105 and on how this had been implemented by other RFMOs throughout the world. Generally, its implementation had included the adoption of measures for the identification of existing bottom fishing areas, exploratory fishing protocols, encounter protocols, lists of VME indicator features and taxa, identification of known or likely VMEs, assessment of significant adverse impacts, and mitigation measures including the closure of VMEs to bottom fishing. This should also be accompanied by assessments on targeted deep-sea fish stocks and appropriate effort or catch restrictions to ensure that the fisheries were sustainable. These measures had been implemented in the northwest, northeast and southeast Atlantic, and north and south Pacific, and the Southern Ocean; the southern Indian Ocean was beginning. No significant bottom fisheries in the high seas of the central Atlantic were identified, and no RFMO existed here or in the southwest Atlantic. The GFCM adopted a 1000 m deep-sea ban for mobile gear, and three closures in the Mediterranean to protect benthic habitats, in 2005 and 2006, respectively. The Jabuka/Pomo Pit FRA established in 2017 was a recent addition. In addition to this, the GFCM had done a significant amount of work through vessel registry requirements, port State measures, the implementation of VMS systems, the Data Collection Reference Framework (DCRF), the mid-term strategy and measures to control mesh size. However, currently, there were no general protective measures to control deep-sea bottom fishing as had been applied elsewhere to monitor bottom fisheries and prevent significant adverse impacts on VMEs.

37. Mr Thompson continued by tackling the issue of the “design and management of Mediterranean geodatabase” reminding the working group that the first meeting of the WGVME in 2017 had discussed the need for a VME geodatabase to record benthic species, and particularly the VME indicator taxa, identified during scientific surveys and encountered by commercial vessels. The VME database of the International Council for the Exploration of the Sea (ICES) was presented at the last meeting, and it was suggested that a similar format would suit the needs of GFCM. Mr Thompson underlined that this database would also complement the FAO VME Database of measures adopted to protect VMEs. It would be expected that the database would have facilities for inputting information by members and organizations with delegated responsibilities to do so, storing the data, and downloading the data with the appropriate confidentiality restrictions. The ultimate aim of the database would be to monitor the distribution VME indicator taxa and habitats in the Mediterranean. This database would likely be internally developed to serve the needs of GFCM members.

38. With regards to the outputs expected from the database, Mr Kenny underlined the importance of agreeing on a standard method for the analysis of the data included within, giving the example of ICES where the presence of an indicator taxon/habitat alone was supported by the frequency of encounters and the presence of significant concentrations. Furthermore, Mr Kenny noted that the value of having this kind of geodatabase would be obvious over time as it would allow to build a picture indicating hotspots and allowing a precautionary approach to be taken even in the absence of a strict statistical framework at its basis. This would also benefit from the inclusion of historical survey data. Mr Thompson remarked that the methodology for obtaining such products should be sought from experience matured in other areas (e.g. ICES).

39. Mr Thompson stressed that commitment from people to use and populate this database would be crucial for its success while data confidentiality needed to be ensured. Participants welcomed the proposal, noting this would be worthwhile, albeit a lot of work.

40. In the session following, participants presented relevant information on the presence, location and extent of VMEs in the Mediterranean.

41. Mr Andrea Gori, Post-doctoral Researcher from the Institut de Ciències del Mar, Consejo Superior de investigaciones científicas of Barcelona, Spain, presented the study “Corals and gorgonian

assemblages on the shelf edge and upper slope (Cap de Creus and Menorca Channel)". The study focused on the marine area around the Cap de Creus peninsula, at the south-western end of the Gulf of Lion, and the Menorca Channel in the Balearic archipelago, both in the western Mediterranean. In both areas focus was given to VMEs occurring between the shelf-break and around 400 m depth. Cold-water coral communities dominated by *Madrepora oculata*, *Lophelia pertusa*, *Dendrophylla cornigera*, were found at 180-320 m depth in the Cap de Creus canyon. Coral gardens dominated by deep gorgonian species (e.g. *Eunicella cavolinii*, *Viminella flagellum*, *Callogorgia verticillata* and *Paramuricea macrospina*) occur in high densities on the shelf-edge of the Menorca Channel. Quantitative data regarding the direct relationship between richness and diversity of associated megafauna, and coral density were presented, as well as an example of the large amount of zooplankton in the canyon, with evidence of the presence of larvae from several fish species. In both areas, these communities were not directly affected by bottom trawling, because of the rocky bottom, however, other kinds of fishing still occurred (e.g. longline and trammel net fishing). Considering the slow growth rates of these species, it could be easily understood that any impact caused by fishing activities could have long-lasting and far-reaching effects on the survival of these communities.

42. Mr Vasilis Gerovasileiou, Post-doctoral Researcher of the Hellenic Centre for Marine Research (HCMR) Institute of Marine Biological Resources & Inland Waters of Greece, presented "Vulnerable deep-sea megabenthos in the eastern Mediterranean: benefits of photographic documentation in experimental fishing surveys". The objective of the study was to increase our knowledge on the distribution of protected and threatened deep-sea megabenthic fauna in the Eastern Mediterranean Sea by evaluating data extracted from unpublished photographic material collected during fishing surveys. The study area included the northern Aegean Sea, the southern Aegean Sea, the eastern Ionian Sea and the Levantine Sea. The photographic material of deep-sea fishing catches (on-board and laboratory photos) was collected during various research projects which took place from 1995 to date (MEDITS 1995-2017, INTERREG 1995-2000, RESHIO 2000-2001, CoralFish 2010, EPILEXIS2014-2015, etc.). Eighteen invertebrate taxa (2 Porifera, 13 Anthozoa, 2 Mollusca, 1 Echinodermata) which are protected by international or EU legislation were identified and georeferenced from the photos. Bamboo corals (*Isidella*) were found in the Eastern Ionian, North and South Aegean seas, providing their second record in the eastern Mediterranean Sea (see map of the distribution of *Isidella* in the Mediterranean Sea, appended to this report - Appendix 5). With this information, it was possible to produce distribution maps and identify, for example, coral abundance or presence of protected species in specific zones of interest. It was concluded that photographic documentation from experimental fishing surveys could provide valuable information, extending the known distribution range of rarely reported taxa. The study was undertaken in the framework of DEEPEASTMED, a collaboration project between HCMR and IUCN.

43. Mr Cemal Turan, from the Fisheries Faculty of Iskenderun Technical, Iskenderun, Turkey, presented "Deep-sea trawling and shrimps in Turkish marine waters". The presentation gave an overview on the deep-sea bottom trawling activities carried out below 400 m in Turkish Mediterranean waters. The main areas for deep-sea fishing were Iskenderun Bay, Antalya Bay, and Izmir coast while the main exploited species were *Aristaeomorpha foliacea*, *Plesionika martia*, *Parapenaeus longirostris*, *Pasiphaea multidentata*, *Aristeus antennatus* and *Pasiphaea sivado*. Among these species, *Aristaeomorpha foliacea* was caught at a bigger size and more abundantly in the Antalya Bay than in the Aegean Sea, with an average catch of 180 kg/day/boat or 30 000 kg/year/boat (personal communication from trawler fishermen).

44. Mr Thompson ended the session by presenting a "Review of relevant information on the presence, location and extent of VMEs" reminding the working group that the FAO Workshop on the Management of Deep-sea Fisheries and Vulnerable Marine Ecosystems (FAO headquarters, July 2016) had identified 25 VME sites to which the first meeting of the WGVME had added an additional five. Since then, the nineteenth session of the SAC had adopted the FRA in the Jabuka/Pomo pit, the AdriaMed/MedReact Workshop "Essential Fish Habitats and Sensitive Habitats of the Adriatic Sea: state of knowledge and conservation opportunities" (FAO headquarters, February 2018) had identified a further three and this working group an additional three (Appendix 4).

45. Ms Otero enquired as to what kind of process the WGVME would adopt to identify these sites. Mr Thompson replied that criteria were included within the technical elements and in the FAO guidelines. Essentially, they were an adaptation of the deep-sea fisheries guidelines to suit the Mediterranean Sea and the FRA was a way of ensuring their protection within the GFCM. Mr Jarboui added that the list of VMEs should be dynamic in space and time and continuously updated.

46. Mr Bernal underlined the importance of creating a VME database which would be populated with all data related to the presence of VME indicator taxa (e.g. information from scientific surveys as well as from fisheries) as a result of the VME encounter reporting protocol. Regarding the decision of whether to identify a particular area where VME indicators were observed as a VME, Mr Bernal pointed out that the GFCM already had a formal process in place for proposing a FRA through a standard template and that the template could be adapted to compile the required information in support of identifying a VME. Mr Bernal proposed the use of a simplified version of the FRA template, excluding information such as socio-economic data (Appendix 6). The completed form should facilitate the compilation of information required for the SAC to discuss if a particular area could be considered a VME, and therefore could be included in the database. Mr Bernal noted that this process would not prevent anyone from proposing a FRA for the same area. This process would thus establish the criteria for including a VME within the geodatabase and would comprise the first step towards its protection in the future. Subsequent steps would involve the discussion of the forms by the WGVME and the SAC.

47. In addition to the above, the efficiency of existing measures for the protection of VME, as requested by the ToRs of the WG, should be addressed in future meetings of this permanent WG.

#### **WORK TOWARDS THE ESTABLISHMENT OF A NETWORK OF ESSENTIAL FISH HABITATS IN THE MEDITERRANEAN SEA**

48. Ms Morello presented an “Overview of Resolution GFCM/41/2017/5 on a network of essential fish habitats in the GFCM area of application”. After an introduction on the differences between EFH and SH, Ms Morello presented Resolution GFCM/41/2017/5 in its entirety. The presentation continued with the description of a FRA and its role as an essential spatial conservation measure to protect critical life history stages of fishery resources and VMEs. Ms Morello showed how, since 2005, nine FRAs had been established, and illustrated the formal process of establishment of a FRA within the GFCM. She then outlined the objectives of this session: i) reviewing the information available on EFH and SH in the Mediterranean Sea; ii) creating a network of people working on EFH and SH in the Mediterranean Sea; and iii) defining a roadmap on how to address Resolution GFCM/41/2017/5. Ms Morello concluded the presentation listing the expected outcomes: i) to create a catalogue of projects, people and identified areas; ii) to identify what could be presented to the subregional committees (SRCs) in terms of operating proposals towards achieving maximum sustainable yield (MSY) (which species and areas to protect, when to protect them and what the expected impact of the protection would be).

49. Following Ms Morello’s introduction, a review of existing information on the distribution of EFH and SH in the Mediterranean was given by participants.

50. Mr Jean-Nöel Druon, Scientific Officer of the European Commission Joint Research Centre (JRC), presented “The European Commission’s science and knowledge service for the dynamic identification of essential fish habitats in the Mediterranean Sea”. The presentation outlined the main features of a model that allowed scientists to identify favorable fish feeding and spawning grounds building upon daily-satellite-ocean-colour and 3D-physical operational modelling data. Applied to hake nurseries, the model was used to support the EC fisheries policies by helping scientists to identify fish stock recovery areas and to understand the current impact of climate change on fish population dynamics. Mr Druon gave an example of the use of the model to reconstruct (for the last 15 years and in real-time) European hake nurseries to be avoided by fishing. These maps are based on satellite-derived chlorophyll-*a* data (surface content and fronts) and on sea bottom temperature and currents (from operational models of Copernicus Marine Service). The results showed that seasonal variability at a basin scale and regional interannual variability could reach +/- 30%. The changes corresponded to the shift of nurseries in time and space, which is key information for adaptive management through the

implementation of dynamic FRAs. In addition, the model revealed a substantial decrease (-20% per decade) in European hake nurseries in the last 15 years at basin scale as a result of the warming of bottom waters from 30 to 400 m. The sensitivity to a narrow range of favourable bottom temperature corresponding to highly productive nurseries (age 0) was found. The results highlighted the most important aspects of studies related to the identification of EFH, including for fisheries management purposes. These aspects included the identification of the most critical/feasible habitats to focus on (nurseries, spawner grounds, etc.), the setting-up of a GIS platform, the identification of the seasonal/interannual EFH variability and overlapping with other species, etc. Mr Druon concluded by mentioning that real time assessment of nurseries had been available for the past two years and this could easily be included in future dynamic management.

51. Ms Germana Garofalo, Researcher at the per lo studio dell’Ambiente Marino Costiero del Consiglio Nazionale delle Ricerche of Italy, presented “New and old knowledge on EFH of European hake in the Strait of Sicily”. The presentation gave an overview of the state of the art regarding the knowledge on European hake stock and fisheries in the Strait of Sicily, with a focus on recent findings about EFH of the species. Knowledge gaps in this respect were recently filled using an approach making the best use of all available knowledge, combining different sources of information, at different spatial resolutions. Indicators from scientific trawl surveys in the Strait of Sicily were used to identify favourable nursery and spawning habitats and create probability maps of recruit and spawner presence. Four independent probability maps with areas of high probability (>60%) of finding spawners and nursery grounds of European hake were produced and classified. The proposed approach allowed to improve EFH maps gradually as soon as new information was made available and predictive distribution models were developed to identify potential habitat of mature females in the Strait of Sicily. The predicted nursery and spawning areas off the African side of the Strait of Sicily agreed with traditional knowledge of skippers of distant trawlers from Mazara del Vallo. Nevertheless, the predicted distribution of the hake EFHs should be validated by an appropriate trawl survey.

52. Mr Saša Raicevich, researcher at the Istituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA) of Italy, presented the results of the AdriaMed-MedReact Workshop on Essential Fish Habitats and Sensitive Habitats of the Adriatic Sea: state of knowledge and conservation opportunities. He gave an overview of the outcomes of the workshop dedicated to the Adriatic Sea. The workshop discussed the scientific knowledge-base from the area as well as conservation opportunities (potential sites/areas that could deserve protection as EFH, SH, and VMEs). Regarding the scientific knowledge-base, several projects (MEDISEH, STOCKMED) provided maps/analyses of EFH in relation to different life stages of resources, mainly based on trawl-survey data (MEDITS), and experience in the use of predictive models is available in the area. In addition, several different data sources (from discards in trawl surveys, grabs, remotely operated vehicle (ROV) images and acoustic data) were available from the area. The meeting identified significant knowledge gaps mainly in relation to connectivity, the existence of mating areas, habitat mapping at high/medium spatial resolution, predictive tools for assessing effectiveness of EFH protection to contribute to stock recovery and reaching MSY. Seven areas of the Adriatic Sea were identified as candidates for special protection measures from fisheries. Comprehensive documentation was available only in few cases, with some data gaps arising (e.g. fishing effort distribution, socio-economic data, assessment of the feasibility of implementation). One of these areas, located in the Bari Canyon, Italy, southern Adriatic Sea (GSA 18), hosted a community of cold-water corals (*Madrepora oculata*, *Lophelia pertusa*, etc.) and its associated ecosystem, including large sponges, was also believed to be important for the local stocks of European hake, Norway lobster, and deep-water rose shrimp. Mr Raicevich concluded the presentation outlining a roadmap for future work, to be carried out in the short-term and the medium term.

53. Mr Fiorentino presented “Spatial models for fisheries management: the Mantis approach”. The Mantis project – Marine protected Areas Network Towards Sustainable fisheries in the central Mediterranean – investigated how a network of marine management areas (MMAs) could contribute to improve sustainable fisheries in the central Mediterranean focusing on two case studies, the Strait of Sicily and the northern Adriatic Sea. The approach used aimed to integrate geo-referenced information on environment, commercial stocks, and fishing effort, including larval dispersal and migration of juveniles and adults, to simulate stock status and fishery performance in terms of demography of the

standing stock, yield and profit. The target species for the Adriatic Sea were red mullet, hake, sole and Norway lobster, while for the Strait of Sicily they were red mullet, hake, deep water rose shrimp and deep water red shrimp. The main features of the new version of the SMART package, one of the main tools used in the MANTIS Project together with the ISIS-FISH tool, and some examples of results obtained for hake and red mullet in the Strait of Sicily were presented.

54. Mr Giuseppe Scarcella, Researcher of the Istituto di Scienze Marine del Consiglio Nazionale delle Ricerche of Italy, presented “PROTOMEDEA: towards the establishment of marine protected area networks in the eastern Mediterranean”. The presentation described a newly launched project in Greece (Aegean Sea) and Cyprus whose objectives were to: i) map existing MPAs and plan for proposed MPA networks; ii) map EFH; iii) evaluate the effect of MPAs in achieving MSY objectives of the Common Fisheries Policy; iv) develop ECOPATH models for selected case studies; v) use ECOPATH/ECOSIM/ECOSPACE to investigate alternative scenarios with respect to their impact on MSY. EFH of small pelagic and demersal species were mapped using data from MEDITS surveys and the MEDISEH project, and modeled by means of GAM techniques. Preliminary maps of nursery grounds for anchovy, sardine, horse mackerel, mackerel, round sardinella, European hake, red mullet, Norway lobster, deep-water rose shrimp, shortfin squid, lesser octopus, common pandora and goldband goatfish for different areas were presented. Based on these maps, a network of MPAs was planned using the MARXAN model, also taking into account fishing effort, existing FRAs and biodiversity features. Finally, the effect of spatial closures in terms of MSY was examined. The MARXAN output and the ECOPATH models were used to assess the impacts of alternative spatio-temporal management scenarios.

55. Mr Alessandro Ligas, Researcher of the Consorzio per il Centro Interuniversitario di Biologia Marina of Italy, presented “SafeNet: Sustainable Fisheries in EU Mediterranean waters through network of MPAs”. SafeNet (together with Mantis and PROTOMEDEA) is an EU funded project under the EU Call for Proposals MARE/2014/41. The aim of the SafeNet project, carried out in the north-western Mediterranean Sea, was to identify coherent networks of MPAs whose emergent properties (interactive effect of scaling-up MPAs) could help fisheries to achieve sustainability and fishers to maximize over the long-term socio-economic benefits. Background data were gathered on species composition and biological aspects, size/age distributions, biological and ecological characteristics of nursery and spawning areas, economic characteristics and recreational fisheries. An extensive field survey was also carried out in 2017 inside and outside MPAs in Italy, Spain and France for a total of 163 sampled sites. Abundance and size data were collected for 64 coastal taxa. Data were analyzed using qualitative and quantitative food web models and a bioeconomic model. Analyses are still underway, but preliminary results indicated that i) all coastal MPAs were too small; ii) the structure of the local food webs was similar between different areas of protection; iii) the dependency of species within local food webs of coastal MPAs to surrounding areas was large since most species tended to move in and out of MPA subareas; iv) fishing activity was occurring in many MPAs with a significant impact in the structure of local food webs. Finally, a stakeholder consultation on the perception on MPAs revealed that, not surprisingly, a positive impact on fisheries was perceived only in enforced MPAs.

56. Ms Maria Teresa Spedicato, from COISPA Tecnologia & Ricerca, presented “Mapping the Mediterranean sensitive habitats and essential fish habitats, the contribution from the MEDISEH project”. The presentation gave an overview of the results of the MEDISEH project carried out by a consortium of institutions from several Mediterranean countries. The project gathered relevant data on the distribution of EFH in the Mediterranean Sea and sought to understand to what degree these EFH were effectively protected as well as how this information could be used within a fisheries management perspective. An integrated methodology used for the mapping allowed to identify nursery and spawning grounds of thirteen demersal species and of six small-pelagic species. The results obtained were shared by means of different interactive platforms and databases such as EMODnet, Adriplan, and EurOBIS and used by several EU new projects and by the Scientific, Technical and Economic Committee for Fisheries (STEF).

57. Ms Orejas presented “Vulnerable marine ecosystems dominated by *Isidella elongata*: a strong candidate for future FRA designations”. The presentation focused on the *Isidella* communities in the

Balearic Islands. Ms Orejas recalled the international recognition of *I. elongata* as key species of Mediterranean vulnerable deep-sea ecosystems, referring to important outputs of GFCM, IUCN, EU-STEFCF, the Barcelona Convention, UNGA, etc. She also mentioned the outcomes of the first meeting of the WGVME, in which the importance of protecting *Isidella* communities in deep-sea soft bottoms of the Mediterranean from trawling was recognized. This would also contribute to the recovery of overexploited stocks, since *Isidella* communities supported spawning and feeding grounds of *Parapenaeus longirostris*, *Aristaeomorpha foliacea* and *Aristeus antennatus*. Deep-sea ROV surveys in the Balearic Islands indicated the presence of massive pristine *Isidella* communities from 485 m to 616 m depth with estimated mean densities of 2 300–2 683 colonies/ha. Considering the high biodiversity associated to these communities, including species of commercial value, and the potential negative impact of bottom trawling that would destroy most of these vulnerable ecosystems, it was concluded that these *Isidella* communities in the Balearic Islands could be protected with the establishment of a FRA in the near future.

58. The WGVME thanked Ms Orejas for her interesting presentation and reiterated the importance of protecting *Isidella* from fishing activities on the grounds that it comprises both a VME indicator taxon as well as a well-known EFH for a number of species. The WGVME took note of the intention to propose this area of the Balearic Islands as a FRA to protect *Isidella* but also noted that the most appropriate forum for such proposal would be the subregional committee for the western Mediterranean (SRC-WM). Finally, the WGVME reiterated the advice given earlier in the meeting, recommending measures be taken regionally to protect *Isidella elongata*. To this end, a map of the distribution of *Isidella* compiling also a summary of the most relevant information to take into consideration in the Mediterranean Sea is included in this report as Appendix 5.

59. Ms Sondes Marouani, Researcher of the National Institute of Sciences and Technologies of the Sea of Tunisia, presented “First information on the spatial distribution of Elasmobranch species in the Gulf of Gabès (GSA 14) based on observer on-board method”. Ms Marouani outlined the problem related to the fact that sharks were mainly caught as bycatch by most fisheries and there was a lack of recording of landings and discards of elasmobranch species with a concurrent misidentification of those recorded. In this regard, observers on board had been crucial for the collection of precise data on the catch of these vulnerable species. The main objectives of observers on board was to collect data on: i) shark catches (landings and discards by species and season); ii) population composition and structure (length, age, maturity, sex); iii) geographic distribution of fishing effort; and iv) biomass estimation by species. These data would improve the quality of the outputs of assessment models and allow the mapping of critical habitats (nurseries and reproduction areas of vulnerable species). She underlined the importance of the Gulf of Gabès in terms of elasmobranch diversity (27 shark and 21 batoid species reported) and production (60% of Tunisian elasmobranch production came from the Gulf of Gabès), as well as an elasmobranch nursery area. She mentioned that, to date, eleven fishing trips had had observers on board for a total of 107 days at sea and 478 hauls, with 40 – 60 species being caught per haul. Ms Marouani finally gave an overview of the elasmobranch species caught and the abundance hotspots of rays in different seasons.

60. Mr Stefanos Kavadas, Researcher of the Hellenic Centre of Marine Research, Institute of Marine Biological Resources & Inland Waters of Greece, presented “Unreported trawling in the deep waters of GSAs 20 and 23”. The main objective of the presentation was to highlight the need to record the activity, in terms of fishing effort and catch, of non-Greek trawlers fishing in the international deep waters of GSAs 20 and 23. The data presented came from AIS (2012–2017) and VMS (2016–2017) data analysis. A total of 36 Italian trawlers were found to fish in the international waters of GSAs 20 and 23 (the number would probably increase when the analysis will be completed). Landings ports of these trawlers were identified in Italy. These trawlers fished in waters deeper than 600 m, probably targeting deep-water red shrimps and exploring for new fishing grounds. Some of these trawlers were found to fish for a large part of the year in GSAs 20 and 23, sometimes reaching the international waters off Turkey and Cyprus, however the catch and effort of these Italian trawlers were not reported in the fished GSA but in the GSAs of origin of these vessels. It was highlighted that, at least for scientific purposes, it would be very important to know the fishing effort, species assemblages and catches to support stock

assessment and to identify the fishing footprint and the corresponding impact on sensitive deep-sea habitats. The work was carried out in the framework of DEEPEASTMED project.

61. Ms Mytilineou presented “Trying to identify essential habitats of *Pagellus bogaraveo* in the Hellenic Seas”. The presentation described the results of studies on *Pagellus bogaraveo* in Greece, a species living near the coast as a juvenile and on the slope down to 800 m as an adult, forming small shoals in deep waters, and preferring seabeds of mud and rocks, offshore banks, seamounts and cold-water coral banks. Owing to its low growth rate, protandrous hermaphroditism and a late female maturation, this species is considered vulnerable to fishing activities. It is common in the western Mediterranean, but less abundant in the eastern Mediterranean, although it is an important target of local recreational fishery, and no information on the catches of the species are available. Considering the overfishing status of the western Mediterranean stock, the Greek stock should be properly studied and managed. In Greece, the species is fished mainly in the Ionian Sea, southern Aegean Sea and Cretan Sea with longlines, gillnets and trammel nets at depths from 200 to 600 m. The blackspot seabream fishery had started in the early 1980s with longlines and in the 1990s this gear was mostly replaced by gillnets and the abundance of the species rapidly decreased: from 80-100 kg/day in the early 1990s to 61.7 kg/day at the end of the decade. The DEEPFISHMAN project (2009–2012) attempted an assessment of the status of *P. bogaraveo* in the eastern Ionian Sea based on data from landings and the MEDITS trawl survey biomass data 2003–2008: the stock was close to overfishing in the 1998-2002 period, while in 2008 (last assessed year) the picture had improved with biomass and yields close to MSY and this coincided with the reduction of the fishery in the area. The collation of all data available for the species in the area allowed an effort to be made at mapping the presence of juveniles and mature females leading to the conclusion that more attention by fisheries managers should be paid to adult individuals in deep waters, which are targeted by unreported commercial and recreational small-scale fishing activities. The work was carried out in the framework of DEEPEASTMED project.

62. Mr Ligas commented that these results could also be presented at the Working Group for the Stock Assessment of Demersal species (WGSAD).

63. Mr Kostas Kaporis, Researcher at the Hellenic Centre of Marine Research, Institute of Marine Biological Resources & Inland Waters of Greece, presented “Important essential fishing grounds for red shrimps in the eastern Ionian Sea and Argolikos Gulf”. Scientific projects aimed at studying the deep-sea fauna in Greek waters had been carried since 1996. The surveys allowed to determine the abundance and population dynamics of both *Aristaeomorpha foliacea* and *Aristeus antennatus* along the Greek coast of GSA 19. Recruitment of *Aristaeomorpha foliacea* is known to occur in April with the spawning season of female giant red shrimp spanning from late spring to late summer. Both average absolute and relative fecundity estimated for *Aristeus antennatus* were statistically higher than those estimated for *Aristaeomorpha foliacea*. The recruitment of both sexes of *Aristeus antennatus* in the Ionian Sea occurred mainly in the shallower depth zone (<550 m) during winter and early spring. Whilst the stocks of both species were heavily exploited in the western and central Mediterranean, the eastern Mediterranean stocks were considered pristine during the previous decade and their exploitation was not very developed. However, Italian trawlers are relatively recently known to exploit them intensively in various areas of the eastern Mediterranean. In this respect, the introduction of comprehensive management plan for red shrimp fisheries by the GFCM was strongly supported. The work was carried out in the framework of DEEPEASTMED project.

64. Mr Bernal was impressed by the breadth and pertinence of the work presented on EFH and, in trying to consolidate all the information available, he suggested to start from the compilation of a catalogue of i) information on known projects related to EFH and SH in the Mediterranean, and ii) all model-based maps of EFH and SH available for the Mediterranean, at least for the mid-term strategy priority species. This catalogue is included as Appendix 7/i.

65. The WGVME agreed, commenting this would provide a sound basis for future work. Mr Raicevich suggested to summarize the information available on the models used to generate these maps as well as their resolution. Mr Bdioui also suggested information be collected on the gear used to collect the information at the basis of these maps, but this aspect could be tackled, as needed, by the newly reinstated Working Group on Fishing Technology (WGFIT).

66. Mr Bernal reflected on the current data collection programs (e.g. the MEDITS) and reminded the work initiated by the GFCM and the FAO regional projects in response to the mid-term strategy regarding the organization of surveys and the use of observers on board. In this respect, he suggested that work be initiated towards the use of these data to produce composite observation-based maps for some of the GFCM priority species in order to validate model-based predictions. Ms Sandrine Vaz, from IFREMER, France, and Ms Spedicato underlined that a good start for this activity would be the yearly MEDITS working group, to get full access of the data at the Mediterranean level and agree on a methodology to use them. Ms Mytilineou underlined that the MEDITS provided a snapshot of one season, so MEDITS data should then be integrated with all other available data to gain a full picture of nursery and spawning areas.

67. Mr Fiorentino underlined the fact that, once the working group had gained an idea of where the EFH and the SH were, the next step would be to understand how they were connected (e.g. how many recruits in a given area were born within the same area or came from elsewhere, or did spawners provide recruits just to one nursery or to several adjacent ones). Understanding this kind of dynamics would allow the proposal of EFH networks that could then be used for management purposes.

68. The WGVME agreed and proposed a two-step roadmap to address Resolution GFCM/41/2017/5. A first phase would concentrate on identifying existing EFH and SH in the Mediterranean by priority species, including the production of composite observation-based maps of EFH and SH. A second stage would be aimed at understanding how these were connected ecologically. The WGVME noted that work would have to be done during the intersession, possibly through the identification of a coordinator to lead the work.

69. The WGVME noted that this technical session was a first attempt to address the resolution but that it was obvious that, to fulfill its requests, a lot of work was needed both during future meetings and in the intersession. Participants questioned whether work on EFH should be integrated within the work of the WGVME or whether it should be tackled within a separate working group. The WGVME noted that separating the groups would divide the expertise and that, given the fact that the two issues (VME and EFH/SH) were not always independent, the real value of having such a heterogeneous group of people working together would result in an integration of knowledge. The WGVME concluded by remarking that, if the groups were to be kept together, the length of the meeting should be extended and have well-defined terms of reference, as proposed in Appendix 8. Participants also noted the importance of carefully considering the structure of the meetings to make them as efficient as possible, and possibly deviate from the symposium-like format adopted in 2018. Finally, the WGVME also suggested there be one or two members of the working group specifically following the activities of the SAC and reporting back to the WGVME.

## **CONCLUSIONS AND RECOMMENDATIONS**

70. In 2018, the WGVME, which had now been established as a permanent GFCM working group through Recommendation GFCM/41/2017/4, had the main objectives of:

- reviewing and updating the Technical elements for the protection of VMEs in the GFCM area of application drafted during the 2017 WGVME and validated by the nineteenth session of the SAC;
- discussing additional potential management measures to be applied to deep-sea fishing, in line with the request included in Resolution GFCM/41/2017/4;
- updating the information and distribution on Mediterranean VME indicators, including proposed VME taxa, species and indicators, the efficiency of existing measures for the protection of VME, the design and management of a Mediterranean VME geodatabase, the review of relevant information on the presence, location and extent of VMEs; and
- addressing the newly adopted Resolution GFCM/41/2017/5.

71. Based on these objectives, the working group formulated the following conclusions and recommendations:

## A. Revision of the technical elements

### *Scope*

- While the WGVME agreed that the general scope of the technical elements pertained to depths deeper than 300 m, it also acknowledged that this depth limitation would exclude some areas expected to host VMEs, such as the top of seamounts, or the part of submarine canyons and steep slopes above those depths, and that these areas should also be provided with appropriate measures that minimize and mitigate any potential negative impact of fishing activities on VMEs. Offshore seamounts should be included in the scope, regardless of their depth, while the protection of the head of canyons should be further investigated.
- The working group agreed that VMEs in waters shallower than 300 m should also be provided with adequate protection measures, either by coastal states or within the context of the GFCM. In this respect, it noted the importance to continue compiling scientific and fisheries information describing the distribution of VME indicator taxa, disregarding the depth and suggested to increase efforts to prepare proposals for the establishment of FRAs when relevant, either alone or in the form of a network. The working group acknowledged the process for establishing a FRA, through the preparation of a GFCM *Standard form for the submission of proposals for GFCM fisheries restricted areas (FRAs) in the Mediterranean and the Black Sea* and its presentation to relevant SAC subsidiary bodies (e.g. the subregional committees or the WGVME itself) and to the SAC itself.

### *Determination of the bottom fishing footprint*

- The WGVME agreed that the determination of the historical bottom fishing footprint is crucial for the adequate management of deep-sea fisheries, and in particular to produce adequate management measures for the protection of VMEs, including through the adoption of encounter and/or exploratory fishing protocols. The determination of the fishing footprint will, thus, comprise a necessary first phase of work upon which more consolidated measures could be based. In particular, it considered that this footprint should be dynamic and according to gear type.
- The WGVME recommended that, in order to obtain such a dynamic picture, the bottom fishing footprint be determined using VMS data from the recent past (five years was suggested) and be revised regularly (every five years was suggested).
- The working group recommended that the statistical methodologies used to determine the footprint be investigated in the intersession, also based on the experience matured by other RFMOs.

### *Encounter protocols and VME indicator taxa/features*

- The WGVME agrees that, conceptually, the determination of an automatic or semi-automatic process of management measures (e.g. temporary closures) stemming from the application of an encounter protocol, and with the objective to protect VMEs from significant impacts would comprise an ideal future direction. Nevertheless, the working group also acknowledged that this process should follow a two-phase implementation. In the first phase, in the absence of a fishing footprint, the encounter protocol should simply be an encounter reporting procedure through which both fishing and scientific operations will report the incidence of VME indicator taxa at all levels of occurrence, with the ultimate objective to compile scientific evidence that allows the SAC to provide an advice on areas to be protected.
- The WGVME recommended that, during the first phase of this process during the intersessional periods, it should work towards developing methodologies for the identification of the appropriate thresholds to be potentially used. The results of this work should then be presented at the next meeting of the WGVME for discussion.
- In addition to the reporting procedure, the working group also suggest that once the fishing footprint had been established, and further assessment of adequate thresholds is carried out,

both encounter protocols that could imply automatic or semi-automatic process for implementing protective measures, and exploratory fishing protocols that imply stricter observation/mitigation measures should be adopted.

- The WGVME agreed that all data available, from fishing operations and scientific surveys, should be used towards understanding the presence and distribution of VME indicator taxa and/or features.
- The WGVME recommends the obligation of recording data on VME indicators during scientific surveys and by observers-on-board fishing vessels. To this end, the list of taxa provided by the technical elements should be incorporated in the operating manuals followed by surveys and observers on board.
- The working group agreed that this list of taxa should be considered as a general guideline for the collection of information on broad faunistic categories and comprises a minimum reporting requirement. The monitoring capacity provided by these two observing methods should be also used, when possible, to provide more specific indications on the composition of these broader faunistic categories.
- The WGVME agreed that, in order to facilitate the collection of information on board, appropriate faunistic guides should be compiled and used.

#### *Exploratory fishing protocols*

- The WGVME agreed on the importance to record and manage exploratory fishing, however, the working group recognized the difficulty of implementing concrete exploratory protocols until the fishing footprint is determined.
- The working group underlined that should there be the prior knowledge of the existence of a VME or on the distribution of a vulnerable species, two possible steps could be taken: i) should the knowledge be preliminary, then the data collected should be included in a catalogue of VMEs or VME indicator species (see section below on the geodatabase); or ii) should the evidence be available, an additional FRA, or a network of FRAs, should be proposed in order to ensure its protection; in order to do this, the working group recognized that the appropriate supporting scientific evidence should be provided (e.g. maps of distribution), as per the usual process of proposing a FRA.
- Fishing on an area that has already been included in the catalogue of VMEs (as endorsed by the SAC) should be subject to stricter scrutiny.
- The WGVME agreed that, once the fishing footprint is established, then an exploratory fishing protocol that includes a mitigation response should be put in place to determine how to manage fishing activities happening outside the footprint towards protecting any possible VMEs encountered.
- The working group further agreed that exploratory fishing should be subject to stronger scrutiny.

72. Based on the conclusions above, the WGVME revised the Technical elements for the protection of VMEs in the GFCM area of application and agreed on a number of changes which are provided as track changes in Appendix 3.

#### **B. GFCM geodatabase of VMEs**

- The WGVME agreed upon the importance of creating a tool for identifying VME indicator hotspots, and ultimately VMEs, through the statistical analysis of all datasets available. It further acknowledged the importance of overlaying this information on the fishing footprint

towards determining the most appropriate spatial management of fisheries in the context of protecting VMEs.

- The WGVME recommended the creation of a GFCM Mediterranean geodatabase on VME indicator features and species containing all such scientific evidence, based on the already existing ICES VME Data Portal. The GFCM geodatabase will be complementary to the FAO database on VME measures.
- The WGVME acknowledged that, to be useful, such a tool will have to contain all available data, thus requiring the contribution of existing data as well as the inclusion of newly collected data.
- The WG revised the list of potential VMEs compiled last year and updated it with new potential VMEs (namely the Drowned Karst Off Gargano, the Montenegro Canyon Margin and *Isidella elongata* in the Balearic Islands – complete list included in Appendix 4). In the case of *Isidella elongata*, given the conservation importance recognized by UNEP/MAP and its distribution in the Mediterranean Sea (see Appendix 5), the working group recommended precautionary mitigation measures be taken to protect this species.
- The WGVME suggested that for each potential VME, a standard form be compiled (included in Appendix 6) and presented to the WGVME for discussion and proposition to the SAC, before its inclusion in the database.

### **C. Essential Fish Habitats**

- The WGVME held a session towards working towards addressing Resolution GFCM/41/2017/5, with the overall objectives of reviewing information available on EFH and SH in the Mediterranean Sea, creating a network of people working on EFH and SH, and defining a roadmap on how to address Resolution GFCM/ 41/2017/5.
- The working group agreed to draft an appendix (Appendix 7) to the WGVME report i) compiling a catalogue of projects working on EFH and SH in the Mediterranean Sea; and ii) incorporating model-derived maps of EFH and SH in the Mediterranean Sea, at least for available GFCM priority species at a regional level. The GFCM Secretariat will coordinate the collation of the information presented and append it to the report, as well as a table summarizing information on the models used to produce the maps.
- The working group underlined the importance of incorporating data from all countries and, at least, priority species, within the roadmap for addressing the EFH resolution. It further highlighted that this would also facilitate the identification of knowledge gaps in the Mediterranean area.
- The WGVME discussed the possibility of creating composite observation-based EFH maps for some of the GFCM priority species. It agreed to work during the intersession, in coordination with the MEDITS working group, towards producing such maps, also taking into account the fact that additional data collection is foreseen through new surveys-at-sea organized within the framework of the mid-term strategy.
- The WGVME discussed on a roadmap to address Resolution GFCM/41/2017/5, the first step been the collation of ongoing projects and existing information to determine the location of EFH and SH in the Mediterranean Sea (initiated during the working group and as included in Appendix 7). In addition, participants agreed that a second step should be to work towards determining how these habitats are connected, in order to provide advice on EFH networks. This analysis should include scientific knowledge of how nursery and spawning habitats are ecologically connected.

### **D. General considerations**

- Participants discussed the adequacy of covering issues related to VMEs on one side and EFH and SH on the other within the remit of the WGVME. It was highlighted that addressing the

Terms of Reference (ToRs) drafted by Resolution GFCM/41/2017/4 on VMEs, as well as providing advice in relation to EFH in line with Resolution GFCM/41/2017/5, required an important amount of technical work, which cannot be dealt with in a limited duration of time as available for this year's meeting (2.5 days). In this sense, the WGVME suggested to expand the duration of the next session to 4/5 days. The working group further agreed to keep the discussions technical, supported by few focused presentations.

- Participants discussed on potential ToRs for the next meeting of the WG, as included in Appendix 8.
- Considering the permanent nature of this working group, the WGVME suggested that a representative of the group should attend the SAC in order to present the main conclusions and suggestions emanating from the group.

### **CLOSURE OF THE MEETING AND ADOPTION OF THE REPORT**

73. Mr Jarboui closed the meeting underlining that the discussions had been very fruitful and thanked the participants for their input.

74. The meeting formally adopted the conclusions and recommendations of this report on 28 February 2018. The full report was adopted by e-mail on 14 June 2018.

**Agenda**

- 1. Opening and arrangements of the meeting**
- 2. Introductory session: deep-sea fisheries and essential fish habitats**
- 3. Technical elements for the management of DSF and the protection of VMEs**
- 4. Mediterranean VME indicator features and species**
- 5. Work towards the establishment of a network of EFH in the Mediterranean Sea**
- 6. Formulation of conclusions and recommendations**
- 7. Any other matter**
- 8. Closure of the meeting**

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## Technical elements for the protection of VMEs in the GFCM area of application

### A – Technical elements for the establishment of a VME encounter reporting protocol in the GFCM area of application

#### 1. Introduction

Resolutions of the United Nations General Assembly on sustainable fisheries of 2004<sup>3</sup>, 2006<sup>4</sup> and 2009<sup>5</sup> 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 considered:

- 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 and all offshore seamounts;

For the purposes of these technical elements, the fisheries described above shall be referred to as “deep-sea fisheries” (DSFs).

#### 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:

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<sup>3</sup> A/RES/59/25

<sup>4</sup> A/RES/61/105

<sup>5</sup> 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.

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

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

### VME encounter reporting 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<sup>6</sup>

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.*

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<sup>6</sup> Refer to: GFCM, 2016. GFCM Data Collection Reference Framework (DCRF) (<http://www.fao.org/gfcm/data/dcrf/en/>)

**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.*

## **B - Technical elements for mapping 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<sup>7</sup>, 2006<sup>8</sup> and 2009<sup>9</sup> 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 according to the map adopted under Section B Paragraph 5..

“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 considered:

- 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 and all offshore seamounts;

For the purposes of these technical elements, the fisheries described above shall be referred to as “deep-sea fisheries” (DSFs).

### **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 20[20] comprehensive maps of existing deep-sea bottom fishing areas [during the five-year period of 2012-2016] 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 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

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<sup>7</sup> A/RES/59/25

<sup>8</sup> A/RES/61/105

<sup>9</sup> A/RES/64/72

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 bottom fishing areas in the GFCM area of application. The map shall be revised regularly to incorporate any new relevant information.

## **C - Technical elements for the establishment of an exploratory deep-sea bottom fishing reporting protocol in the GFCM area of application**

### **1. Introduction**

Resolutions of the United Nations General Assembly on sustainable fisheries of 2004<sup>10</sup>, 2006<sup>11</sup> and 2009<sup>12</sup> 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 according to the map adopted under Section B Paragraph 5.

“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:

- 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, the discards, and fishing effort;

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<sup>10</sup>A/RES/59/25

<sup>11</sup>A/RES/61/105

<sup>12</sup>A/RES/64/72

- 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<sup>13</sup>.

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<sup>13</sup>Refer to: GFCM, 2016. GFCM Data Collection Reference Framework (DCRF) (<http://www.fao.org/gfcm/data/dcrf/en/>).

**Exploratory deep-sea fishing reporting 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<sup>14</sup>**

Fleet segment:

Fishing gear:

**Area information**

**GSA:**

**Statistical grid<sup>15</sup>:**

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*

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<sup>14</sup> Refer to: GFCM, 2016. GFCM Data Collection Reference Framework (DCRF) (<http://www.fao.org/gfcm/data/dcrf/en>)

<sup>15</sup> Refer to: Appendix M - Geographic statistical grid for red coral, DCRF. GFCM, 2016. GFCM Data Collection Reference Framework (DCRF)

**D. Bycatch summary**

*Provide details of bycatch species*

**D. VME Indicator Taxa**

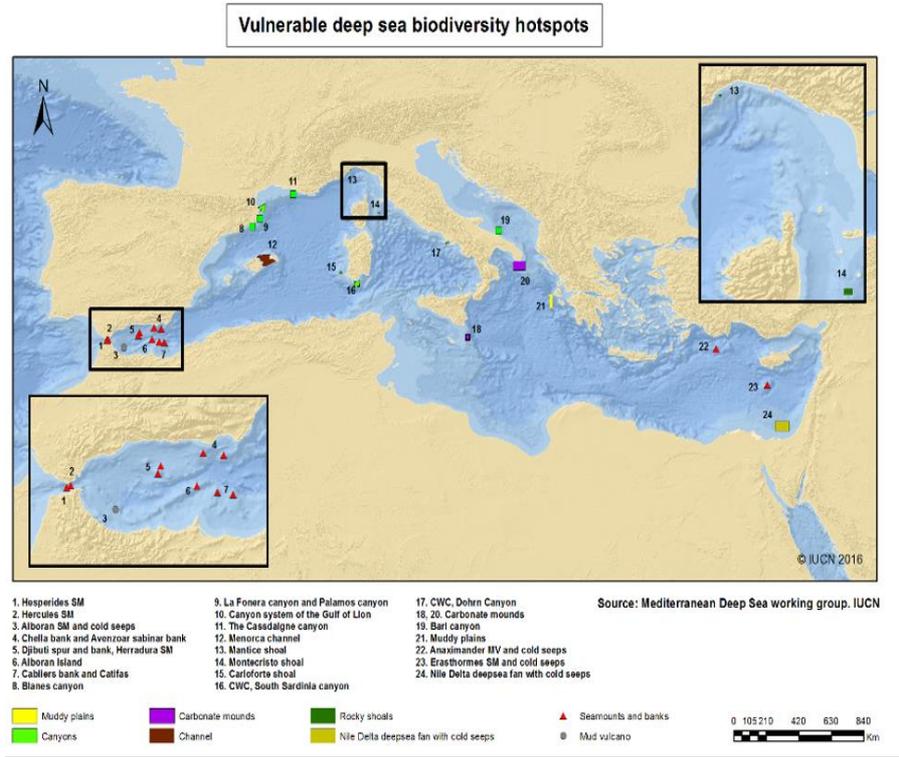
*Use the provided VME Encounter Protocol for any catch of VME Indicator Taxa*

**E. Comments (by fishing crew)**

Updated list of potential areas with VMEs

Meeting	Primary author/presenter	Location
FAO VME workshop (2016)	Ms Fanelli, Italian National Agency for New Technologies	canyons of Ligurian sea
	Maria del Mar Otero, IUCN	24 sites (see map below)
1 <sup>st</sup> WGVME (2016)	Mr Lorenzo Angeletti ISMAR-CNR	Bari canyon, Southern Adriatic Sea, cold water coral ecosystems
	Mr Marco Taviani, ISMAR-CNR	Nora Canyon, Sardinian Channel, cold water coral ecosystem
	Ms Covadonga Orejas, IEO	western Mediterranean, including the Alboran Sea, <i>Isidella elongata</i>
	Ms Covadonga Orejas, IEO	Scleractinian coral <i>Dendrophyllia ramea</i> . south-eastern insular margin of Cyprus (Levantine Sea).
	Ms Chryssi Mytilineou HCMR	eastern Ionian Sea (corals, chondrichthyans)
19 <sup>th</sup> SAC (2017)	MedReact	Pomo/Jabuka Pit (some evidence of VMEs presented)
Adriamed-MedREACT workshop + 2 <sup>nd</sup> WGVME	Adriamed-MedREACT workshop	Drowned Karst Off Gargano (oysters, sponges, fishes)
	Adriamed-MedREACT workshop	Central Adriatic 1 (seapens, sponges)
	Adriamed-MedREACT workshop	Montenegro Canyon Margin (cnidarians + chimney forest)
2 <sup>nd</sup> WGVME	Ms Covadonga Orejas	Mallorca channel between Ausias March and Oliva bank ( <i>Isidella elongata</i> )
	Mr Andrea Gori	Cap de Creus (cold water corals)
	Mr Andrea Gori	Menorca channel (gorgonians, cold water corals)

**Twenty-four potential areas with VMEs proposed by IUCN at the FAO VME workshop (2016)**



### Scientific evidence and observed distribution of *Isidella elongata*

*Isidella elongata*, also known as bamboo coral, is a deep-sea alcyonacean belonging to the Isididae family (Cnidaria; Anthozoa; Octocorallia). In the Mediterranean Sea, this species is known to form dense facies on bathyal compact mud between 500 and 1200 m depth (occasionally shallower, up to 110 m in depth) on relatively flat or gently inclined bottoms. The population probably represents the great majority of the global distribution, with very few Atlantic records, such that the species is considered nearly-endemic.

Despite historical records of dense aggregations, at present this species may be considered almost disappeared in the Mediterranean Sea. The main cause of its current status is attributed to the effect of intense bottom trawling activity on the majority of the known *Isidella* grounds of the Mediterranean Sea. Coral by-catch by long line fishing is also reported to occur in certain areas. Long-term monitoring suggests fast removal of bamboo corals and limited recovery from trawling impact. Its present known distribution is at most sites with low densities and limited to the shallowest or deepest of its bathymetric range, respectively in shallow water refuges of muddy bottoms protected by trawling activities or in deeper areas grounds where trawling is forbidden, for example on slope grounds or below 1000 m depth. There are, however, few exceptions within the bathyal range (for example South Adriatic Sea or Catalan margin).

The recovery ability of this species in front of mechanical disturbances is very low, due to its physical fragility but also to the extremely slow growth rates, low dispersal ability, and a very long life span. The destruction of these coral gardens is accompanied by a great biodiversity loss due to the high number of species, benthic, demersal or pelagic, that gravitate around these habitats. A rich invertebrate and fish commercial fauna is associated to the fields of *I. elongata* which could provide essential habitats for crustacean species of commercial interest such as deep-water shrimps *Aristeus antennatus*, *Aristaeomorpha foliacea* and *Plesionika martia*.

The WGVME<sup>16</sup>, at its first meeting in 2017, already acknowledged the importance of *Isidella* communities in Mediterranean deep-sea soft bottoms and recognized this species as Vulnerable Marine Ecosystem (VME) indicator taxon. Bamboo coral aggregations should be protected from trawl fishing considering: (a) its demonstrated sensitivity to succumb to even low/intermediate levels of fishing effort; and (b) the occurrence of significant assemblages with high-value commercial species. Aiming to improve the productivity of these fisheries and recovery of coral communities, the WGVME at its second meeting in Rome (2018) suggested the establishment of spatial-based management measures.

Additionally, Contracting Parties to the Barcelona Convention at its 20<sup>th</sup> Ordinary Meeting adopted the decision<sup>17</sup> to include *Isidella elongata* in the Annex II<sup>18</sup> to the Protocol concerning Specially Protected Areas and Biological Diversity. Such a decision was taken according to science behind its classification as “Critically Endangered” by the IUCN Red list of Mediterranean anthozoans.

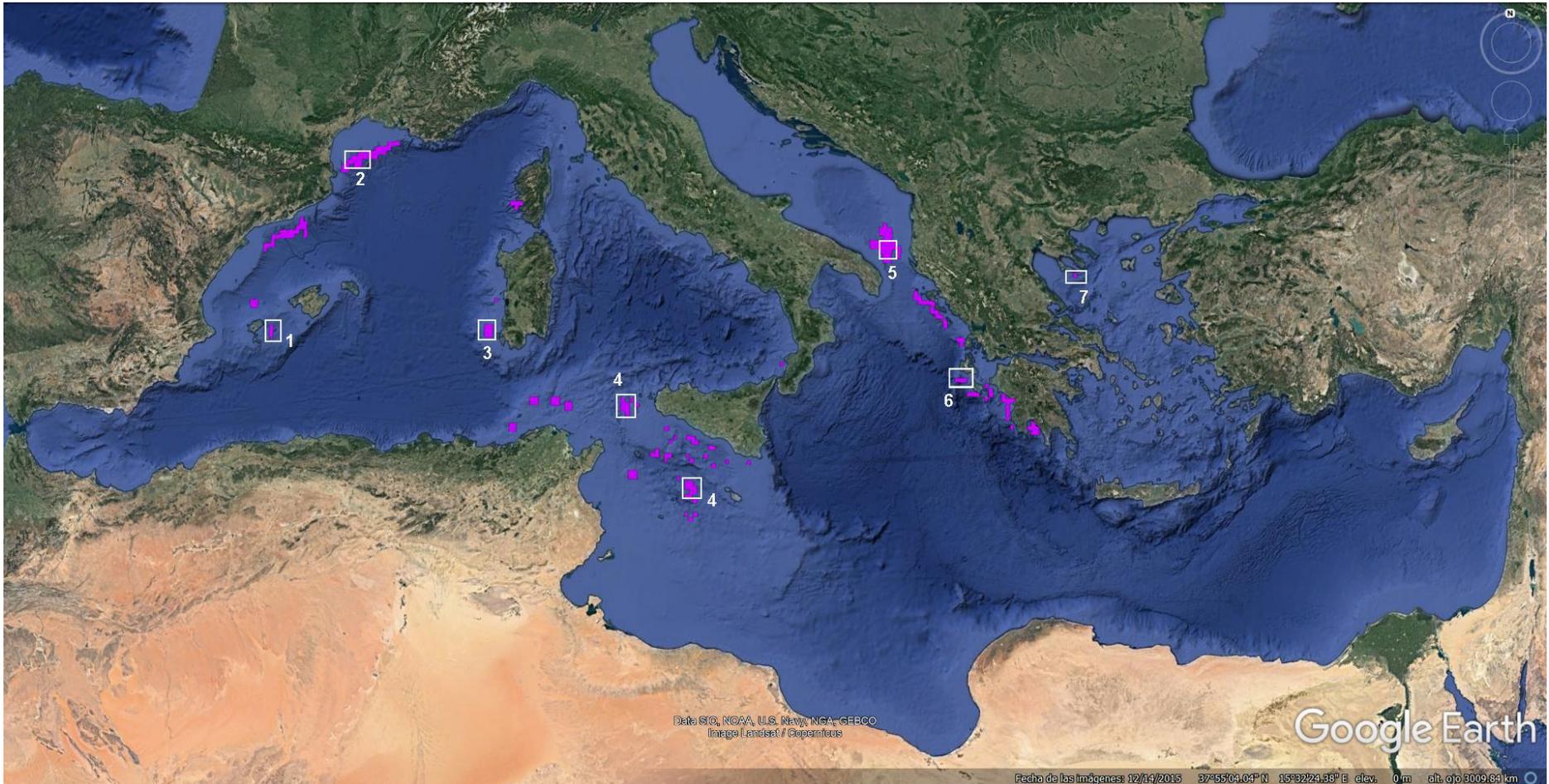
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<sup>16</sup> GFCM. 2017. Report of the first meeting of the Working Group on Vulnerable Marine Ecosystems (WGVME) Malaga, Spain, 3-5 April 2017.

<sup>17</sup> Decision IG.23/10. In: Report of the 20<sup>th</sup> Ordinary Meeting of the Contracting Parties to the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean and its Protocols. Tirana, Albania, 17-20 December 2017. UNEP(DEPI)/MED IG.23/23

<sup>18</sup> List of endangered or threatened species

Known occurrence of the bamboo coral *Isidella elongata* based on scientific information available (pink polygons; see references below). Priority VME sites as presented at the WGVMes are also highlighted (white square boxes): (1) South Balearic seamounts (Ses Olives-Ausias March seamounts); (2) Canyons at Gulf of Lion; (3) Carloforte shoal; (4) Sicilian channel; (5) Otranto strait; (6) Cephalonia Island; (7) Toroneos Gulf - North Aegean Sea.



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**DRAFT STANDARD FORM FOR THE SUBMISSION OF PROPOSALS FOR THE INCLUSION  
OF VME INDICATORS IN THE GFCM VME GEODATABASE**

**Proposal revised by (SAC technical group/subregional committee):**

**Date of endorsement:**

**Name of the Area:**

**Submitted by (institution, scientists, GFCM contracting parties, etc.):**

**Date of submission:**

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## **1. EXECUTIVE SUMMARY**

Summary of the information contained in sections 2 to 8, including expected results (500 words maximum).

## **2. AREA IDENTIFICATION**

### **2.1. GFCM GEOGRAPHICAL SUBAREA**

[www.fao.org/gfcm/data/map-geographical-subareas](http://www.fao.org/gfcm/data/map-geographical-subareas)

### **2.2. NAME OF THE AREA**

### **2.3. GEOGRAPHICAL LOCATION**

#### **2.3.1. General location**

#### **2.3.2. Precise location of the area**

Provide geographical coordinates (latitude and longitude in degrees, minutes and seconds) for the vertex of a polygonal area.

#### **2.3.3. Location map**

Include geographical coordinates of the core and buffer areas, bathymetry and boundary of international waters. Add a global reference map of the Mediterranean with the location of the site.

#### **2.3.4. Depth range**

In meters. Specify core and buffer area, if applicable.

## 2.4. SURFACE AREA

In ha and km<sup>2</sup>.

## 3. SITE DESCRIPTION

### 3.1. MAIN PHYSICAL FEATURES

#### 3.1.1. Geology/Geomorphology

Briefly describe geological aspects, sedimentation and erosion processes observable in the area and other geomorphologic features or geological risks. Indicate bibliographical sources.

#### 3.1.2. Other relevant physical or chemical features

E.g. hydrodynamics, frontal areas, upwelling, etc.

### 3.2. BIOLOGICAL FEATURES

#### 3.2.1. VME indicators

Briefly describe the dominant marine habitats associated to the reported VME species, including GFCM Mediterranean VME indicator features and VME indicator habitats

Notes:

1) Regional status: rare [r], endemic [e] and/or threatened [t]

2) Abundance can be:

Relative abundance: common [C], uncommon [U] or occasional [O];

Density (N·km<sup>-2</sup>), % coverage (%), catch-per-unit-effort (e.g. kg·haul<sup>-2</sup>)

VME indicator feature	VME indicator habitat	VME indicator taxon	Species	1 - Regional status	2 - Abundance	3 – Method for the collection of data



### **4.3. OTHER RELEVANT FEATURES**

#### **4.3.1. Educational interest**

E.g. particular value of the site for environmental education or awareness activities.

#### **4.3.2. Scientific interest**

Particular value of the site for research.

### **5. OTHER RELEVANT INFORMATION**

### **6. RELEVANT CONTACTS**

Stakeholders (if applicable), name(s), position(s) and contact address(es) of the person(s) who compiled the form and/or can provide further information.

## Catalogue of projects working on EFH and SH in the Mediterranean Sea

Project	Website	Coordinator	Contact	Main objective	Maps available
Fish Habitat – JRC institutional activity	<a href="https://fishreg.jrc.ec.europa.eu/fish-habitat">https://fishreg.jrc.ec.europa.eu/fish-habitat</a>	Jean-Noel Druon (JRC)	jean-noel.druon@ec.europa.eu	Identification of the daily habitat of key marine species using satellite-derived data of the sea surface	Hake nurseries in the Mediterranean Sea (section 1)
MEDISEH - Mediterranean Sensitive Habitats – MAREA Project, Specific Contract n°2 - MAREA/2009/05		MEDISEH Coordinator: Marianna Giannoulaki (HCMR) MAREA Coordinator: Maria Teresa Spedicato (COISPA)	marianna@hcmh.gr spedicato@coispa.it	Review and map existing information on nurseries and spawning grounds of small pelagic and demersal species included in the DCF	Nursery and spawning grounds for demersal and small pelagic species (section 2)
PROTOMEDEA - PROtecting MEDiterranean East - MARE/2014/41	<a href="http://www.protomedea.eu">http://www.protomedea.eu</a>	Paraskevi Karachle (HCMR)	pkaracle@hcmr.gr	To design a network of MPAs in the Eastern Mediterranean	Nursery and spawning grounds for demersal and small pelagic species in the Eastern Mediterranean Sea (section 3)
NURSERY project - Ministry of Agricultural, Food and Forestry Policies – Research Program 6A92		SIBM, Giuseppe Lembo	lembo@coispa.it	Identification of areas where juvenile stages of commercial species are concentrated and the analysis of their time persistence	Nursery grounds for demersal species in GSA 16 (section 4)
MANTIS - Marine protected Areas Network Towards Sustainable fisheries in the Central Mediterranean - MARE/2014/41	<a href="http://jadran.izor.hr/mantis/">http://jadran.izor.hr/mantis/</a>	Fabio Fiorentino (CNR-IAMC)	fabio.fiorentino@iamc.cnr.it	To design a network of MPAs in the Central Mediterranean	Not provided, still in progress
SAFENET - Sustainable Fisheries in EU Mediterranean Waters through Network of MPAs - MARE /2014/41	<a href="http://www.criobe.pf/recherche/safenet">http://www.criobe.pf/recherche/safenet</a>	Joachim Claudet (CNRS)	joachim.claudet@gmail.com	To design a network of MPAs in the Western Mediterranean	Not provided, still in progress
SOLEMEN		Giuseppe Scarcella (CNR-ISMAR)	g.scarcella@ismar.cnr.it	To collect data on distribution and relative abundance on commercial fish species in Northern Adriatic	Outputs from MEDISEH project
Inventaire des zones fonctionnelles pour les ressources halieutiques		Olivier LE PAPE	olivier.le.pape@agrocampus-ouest.fr	Creation of an inventory of data for the identification of functional areas in the French MSFD area.	Outputs from MEDISEH project for demersal species

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dans les eaux sous  
souveraineté française

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DEEPEASTMED:

State of the knowledge of  
deep-water vulnerable  
species and habitats in the  
Eastern Mediterranean

Chryssi Mytilineou (HCMR)

chryssi@hcmr.gr

To investigate and map the occurrence of  
deep-water vulnerable commercial  
species (such as the red shrimps,  
blackspot seabream, wreckfish and  
bluemouth rockfish) and identify areas of  
high abundance and areas that constitute  
their essential habitats.

Still in progress

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**List of scientific papers from which additional maps were taken:**

<b>Authors and Year</b>	<b>Title</b>	<b>Maps available</b>
Alessandro Criscoli, Paolo Carpentieri, Francesco Colloca, Andrea Belluscio & Giandomenico Ardizzone (2017)	Identification and Characterization of Nursery Areas of Red Mullet <i>Mullus barbatus</i> in the Central Tyrrhenian Sea, Marine and Coastal Fisheries	Red mullet nurseries in the Central Tyrrhenian Sea (section 5)
Colloca F, Garofalo G, Bitetto I, Facchini MT, Grati F, Martiradonna A, et al. (2015)	The Seascape of Demersal Fish Nursery Areas in the North Mediterranean Sea, a First Step Towards the Implementation of Spatial Planning for Trawl Fisheries	Nursery areas for demersal species, using the outputs of MEDISEH project (section 6)
Garofalo G., Ceriola L., Gristina M., Fiorentino F., Pace R. (2010)	Nurseries, spawning grounds and recruitment of <i>Octopus vulgaris</i> in the Strait of Sicily, central Mediterranean Sea	Nursery and spawning grounds for <i>Octopus vulgaris</i> in the Strait of Sicily (section 7)

**Model-derived maps of EFH and SH for selected Priority species for the above mentioned projects**

This appendix can be found on the WGVME sharepoint under Working documents, or at this [LINK](#)

**Terms of Reference for the next meeting of the WGVME**

VMEs

- Collect information and map the distribution of VMEs (annual update), based on the information presented through a standard template agreed during the intersession, and taking into account any other technical information provided by fishers and other institutions
- advise on new proposals for closures and on the enforcement of existing measures (efficiency of existing FRAs addressing VME protection);
- advise the SAC on any VME related matter and coordinate the elaboration of management tools (including future protocols)
- contribute to the design and management of the GFCM VME geodatabase
- contribute to the establishment of a close collaboration and proper communication channels with SAC subsidiary bodies (WGFIT), scientific bodies from other RFMOs (e.g. ICES working group on deep-water ecology), scientific national institutions and the FAO

Essential Fish Habitats

- Review the information available on Essential Fish Habitats (EFH) and Sensitive Habitats (SH) in the Mediterranean Sea (in particular in relation to, at least, priority species)
- Continue to identify priority EFH and SH by priority species
- Analyse connectivity between EFH in the life cycle of, at least, GFCM priority species
- Propose potential networks of FRAs, by, at least, species