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Further action needed to protect VMEs, including all Seamounts

Deep Sea Conservation Coalition (DSCC)

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Abstract	

The DSCC notes the progress made by SIOFA with respect to the management of bottom fishing, and the interim measures adopted to protect vulnerable marine ecosystems from significant adverse impacts. This paper reviews the status of the benthic fishery impact assessment standard and the benthic fisheries impact assessments prepared to date and proposes that they be updated with more recent information, consider cumulative impacts, and include effects of climate change in the standard. This paper includes several proposals:

- All EBSAs located fully or partly within the SIOFA Area be recommended for VME/MPA protection.

- All identified bioregions be considered in conservation efforts, as per criterion 'bioregional representation' listed in the Protocol.

- Any systematic conservation planning analysis considered within the SC be focused on scientific matters. Consideration of economic impacts for example are the remit of the MoP.

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- The usefulness of biodiversity models to identify and evaluate biodiversity hotspots be further considered.

- The MoP be advised that spatial closures are the primary mechanism to manage impacts on benthic habitats.

- The scientific effectiveness of the various options available to support closures be reviewed, and any additional science needed identified.

- The use of the 'fishing intensity impact index' as a standard tool in assessing impact be considered.

- The MoP be advised of the potential risks within Bioregion 1, and particularly subregion 1.2, from existing fishing impacts.

- A VME registry be established.

- Seamounts be recognised as VMEs and closed to bottom trawling.

- Seagrasses be added to the list of VME indicator species in Annex 1 of CMM 2020/01, and precautionary thresholds be applied for move-on rules.

- Other potential indicator taxa be reviewed, including rhodoliths, to reflect the different depths and taxa that make up Saya De Malha Bank.

- The BFIA standard be reviewed every five years to ensure that it reflects best practice. Climate change factors be included in the BFIA Standard template and that all existing BFIAs incorporate such factors.

- Means to determine cumulative benthic impacts of different country BFIAs be developed.

- The encounter thresholds in para 12 of CMM 2020/01 be reviewed to ensure a suitably precautionary and ecosystem approach.

- Taxa be subdivided into similar taxa groups applied in the SPRFMO CMM03-2023.

- Catchability of taxa be considered when establishing encounter thresholds.

- The longline encounter threshold be reviewed to include taxon specific values.

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Contents

1. Introduction

This paper describes the research and action taken by SIOFA thus far to avoid significant adverse impacts on VMEs and identify gaps in management of protection of VMEs. It identifies advice yet to be developed by the Scientific Committee, including further work. necessary to support that advice. The paper contains several recommendations, including the increased application precautionary approach and the ecosystem approach in the protection of vulnerable marine ecosystems (VMEs). Since the establishment of SIOFA, and in line with the various UN General Assembly resolutions calling for action to prevent significant adverse impacts on vulnerable marine ecosystems (see Annex), the SC has undertaken significant research and made several recommendations to the MOP.

The Mop has adopted some relevant interim Measures including a benthic fisheries impact assessment consistent with an agreed benthic fisheries impact standard, the closure of some VMEs to bottom fishing, again with interim status and the adoption of an interim Standard Protocol for future MPA areas designation which includes presence of VMEs as one of its criteria. The MOP has also requested further advice from the Scientific Committee for further measures and arrangements.

Precautionary Action

Precautionary approach requires action to be taken based on the available scientific information.

Article 4(c) of the SIOFA convention includes the principle that:

> the precautionary approach shall be applied in accordance with the Code of conduct and the 1995 Agreement, whereby the absence of adequate scientific information shall not be used as a reason for postponing or failing to take conservation and management measures".

Article 6 of the 1995 UN Fish Stocks Agreement and FAO Code of Conduct (para 6.5) also set out the provisions for taking a precautionary approach. These include specific provisions which are included in the next section.

The United Nations General Assembly (UNGA) has also called on states to take precautionary approach and ecosystem approaches to apply the FAO Guidelines. This recognises the significant uncertainties that will exist in the science underpinning advice of measures to avoid SAI on VMEs.

Since the establishment of SIOFA, and in line with the various UN General Assembly resolutions calling for action to prevent significant adverse impacts on vulnerable marine ecosystems (see Annex), the SC has made several recommendations to the MOP [for taking interim measures].

The MOP has requested further advice from the Scientific Committee for further measures and arrangements. Given the uncertainties, this advice should be consistent with the precautionary approach.

2. General Obligations

a. The SIOFA Convention

The SIOFA Convention includes the precautionary approach and the ecosystem approach as general principles in article 4 of the Convention:

> a. Measures shall be adopted on the basis of the best scientific evidence available to ensure long-term conservation of fishery resources, taking into account the sustainable use of such resources and implementing the ecosystem approach in their management;

> b. the precautionary approach shall be applied in accordance with the Code of conduct and the 1995 Agreement, whereby the absence of scientific information shall not be used as a reason for postponing or failing to take conservation and management measures;

e. fishing practices and management measures shall take due account of the need to minimize the harmful impact that fishing activities may have on the marine environment;

f. biodiversity of the marine environment shall be protected;

These are relevant considerations for the Scientific Committee in providing and recommending advice to the MOP on "international minimum standards for the responsible conduct of fishing operations" (article 6 (1) (e)).

Article 4 also includes relevant considerations for the Scientific Committee in providing "scientific advice and recommendations" to the MOP on "the formulation of the conservation and management measures referred to in article 6 (1) (d)".

a. Measures shall be adopted on the basis of the best scientific evidence available to ensure long-term conservation of fishery resources, taking into account the sustainable use of such resources and implementing the ecosystem approach in their management;

c. the precautionary approach shall be applied in accordance with the Code of conduct and the 1995 Agreement, whereby the absence of scientific information shall not be used as a reason for postponing or failing to take conservation and management measures;

e. fishing practices and management measures shall take due account of the need to minimize the harmful impact that fishing activities may have on the marine environment;

f. biodiversity of the marine environment shall be protected.

b. Fish Stocks Agreement

The UN Fish Stocks Agreement (the 1995 Agreement) in Article 6 lays down some specific provisions on the application of the precautionary approach, including that:

1. States shall apply the precautionary approach widely to conservation, management and exploitation of straddling fish stocks and highly migratory fish stocks in order to protect the living marine resources and preserve the marine environment.

2. States shall be more cautious when information is uncertain, unreliable or inadequate. The absence of adequate scientific information shall not be used as a reason for postponing or failing to take conservation and management measures.

3. In implementing the precautionary approach, States shall:
   a) improve decision-making for fishery resource conservation and management by obtaining and sharing the best scientific information available and implementing improved techniques for dealing with risk and uncertainty;
   b) Apply the guidelines set out in Annex II and determine, on the basis of the best scientific information available, stock-specific reference points and the action to be taken if they are exceeded.
   c) take into account, inter alia, uncertainties relating to the size and productivity of the stocks, reference points, stock condition in relation to such reference points, levels and distribution of fishing mortality and the impact of fishing activities on non-target and associated or dependent species, as well as existing and predicted oceanic, environmental and socio-economic conditions;
   d) develop data collection and research programmes to assess the impact of fishing on non-target and associated or dependent species and their environment, and adopt plans which are necessary to ensure the conservation of such species and to protect habitats of special concern.

5. Where the status of target stocks or non-target or associated or dependent species is of concern, States shall subject such stocks and species to enhanced monitoring in order to

review their status and the efficacy of conservation and management measures. They shall revise those measures regularly in the light of new information.

These provisions are given more weight since they are made specifically applicable to SIOFA.

c. FAO

The FAO Code of Conduct specifically states that:

> 6.5 States and subregional and regional fisheries management organizations should apply a precautionary approach widely to conservation, management and exploitation of living aquatic resources in order to protect them and preserve the aquatic environment, taking account of the best scientific evidence available. The absence of adequate scientific information should not be used as a reason for postponing or failing to take measures to conserve target species, associated or dependent species and non-target species and their environment.

It goes on to state that:

> 7.5.2 In implementing the precautionary approach, States should take into account, inter alia, uncertainties relating to the size and productivity of the stocks, reference points, stock condition in relation to such reference points, levels and distribution of fishing mortality and the impact of fishing activities, including discards, on non-target and associated or dependent species, as well as environmental and socio-economic conditions.

While the Code itself is voluntary, the SIOFA Convention requires implementation of the precautionary approach as described in the Code of Conduct.

The FAO International Guidelines for the Management of Deep-Sea Fisheries in the High Seas (the FAO Guidelines) (para 42) sets out specific criteria to assist in the identification of VMEs. An Annex to the Guidelines includes examples of potentially vulnerable species groups, communities and habitats.

These include cold water corals and hydroids (e.g. stony corals, gorgonians and black corals), sponge communities, bryozoans, and seep and vent communities.

> 7.5.2 In implementing the precautionary approach, States should take into account, inter alia, uncertainties relating to the size and productivity of the stocks, reference points, stock condition in relation to such reference points, levels and distribution of fishing mortality and the impact of fishing activities, including discards, on non-target and associated or dependent species, as well as environmental and socio-economic conditions.

While the Code is itself voluntary, the SIOFA Convention requires implementation of the precautionary approach as described in the Code of Conduct.

d. The United Nations General Assembly (UNGA) resolutions

Several UNGA resolutions on deep water bottom trawling seek to prevent significant adverse impacts (SAIs) on VMEs. For example, UNGA resolution 61/105 (2007) sets out the need to identify vulnerable marine ecosystems and protect them from significant adverse impacts. The resolution identifies VMEs as "including seamounts, hydrothermal vents and cold water corals". There is also a recognition of the degree of uncertainty in identifying VMEs so it includes "where they "are known to occur or are likely to occur based on the best available scientific information".

> 83(3) (c) In respect of areas where vulnerable marine ecosystems, including seamounts, hydrothermal vents and cold water corals, are known to occur or are likely to occur based on the best available scientific information, to close such areas to bottom fishing and ensure that such activities do not proceed unless it has established conservation and management measures to prevent significant adverse impacts on vulnerable marine ecosystems";

UNGA resolution 64/72 (2009) states:

> 119(b) Conduct further marine scientific research and use the best scientific and technical information available to identify where vulnerable marine ecosystems are known to occur or are likely to occur and adopt conservation and management measures to prevent significant adverse impacts on such ecosystems consistent with the Guidelines or close such areas to bottom fishing until conservation and management measures have been established, as called for in paragraph 83(c) of resolution.

And UNGA resolution 77/118 (2022) states:

> 213 (a) To use, as applicable, the full set of criteria in the Guidelines to identify where vulnerable marine ecosystems occur or are likely to occur, as well as for assessing significant adverse impacts on such ecosystems, including their associated and dependent species.

The UNGA resolutions also s call on States (i.e., RFMO members) and RFMOs, such as SPRFMO, to:

- Close areas where VMEs are known or likely to occur;
- Not permit bottom fishing in such areas until measures are established to prevent SAIs;
- Conduct further marine scientific research, such as visual surveys e.g. by using cameras;
- Use the best scientific and technical information available to identify where VMEs are known to occur or are likely to occur, and to adopt measures to prevent SAIs on VMEs consistent with the Guidelines; or
- Close areas where VMEs occur or are likely to occur to bottom fishing until measures have been established to prevent SAIs.

Key provisions of the UNGA resolutions from 2006 to 2023 (e.g. UNGA 61/105 (2006), Resolution 64/72 (2009), Resolution 66/68 (2011), Resolution 71/123 (2017), Resolution 78/68 *(2023)*) relevant to bottom fishing are listed in Appendix I.

e. CBD - Ecologically or Biologically Significant Areas (EBSA)

The CBD identified several Ecologically Biologically Significant Areas (EBSAs) for the Indian Ocean at its 2010 meeting (Convention on Biological Diversity, 2010, X/29.Marine and coastal biodiversity)

These areas are based on criteria similar to that used for the identification of Vulnerable Marine Ecosystems (VMEs (Annex I, Decision IX/20; Convention on Biological Diversity, 2008), and can be proposed by States and intergovernmental organizations. There are currently 11 EBSAs which fall at least partially within SIOFA's Convention Area: Agulhas Front; Walters Shoal; Prince Edwards Islands, Del Caño Rise and Crozet Islands; Saya de Malha Bank; Rusky; East Broken Guyot; Mozambique Channel; Coral seamount and fracture zone feature; Atlantis Seamount; Central Indian Basin; Fools Flat (See https://www.cbd.int/ebsa/).

DSCC Recommendation

- **All EBSAs located fully or partly within the SIOFA Area should be recommended for VME/MPA protection.**

3. SIOFA VME research

a. Review of work done

The SIOFA SC has commissioned several pieces of work related to furthering understanding of identification, distribution and protection of VMEs. The outcomes of these various projects are presented to SC-09 in WP Sc-09-27.

Bioregionalisation of the SIOFA Area based on VME indicator taxa

This project considered the development of bioregionalizations of the SIOFA area based on VME taxa. Three predictive modelling approaches were used to produce maps. The 'group first, then predict' modelling approach, while potentially over predictive, appears to provide the most complete approach. The absence of data generated a significant level of uncertainty for all models used. However, the project identified, predicted, and mapped several biogeographical regions, with varying levels of confidence. This will be important in meeting the Standard Protocol for future marine protected area designation (the Protocol) criteria relating to bioregional representation.

DSCC recommendation

The SIOFA area contains significant diversity of bioregions, all of which should be considered in conservation efforts, as per criterion 'bioregional representation' listed in the Protocol.

Systematic Conservation Planning in SIOFA

This project reviews the possible use of the Marxan systematic conservation planning approach to identify and protect areas of conservation value within the SIOFA area, using three conservation features: Ecologically or Biologically Significant Areas (EBSAs), bioregions based on VME indicator taxa, and geomorphic seafloor features. The fishing footprint was avoided in the analysis. Data paucity particularly at the spatial level potentially limits the usefulness of this process.

DSCC recommendation

- **SC limits its analysis to scientific matters, if applying systematic conservation planning tools. Economic impacts, for example, should be considered within the MoP**
- **SC recommends the MoP provide MPA protection to all EBSAs located fully or partly within the SIOFA Area**

Biodiversity models based on VME indicator taxa

This project explored the applicability of biodiversity models to predict species diversity and composition in environments where there is limited spatial and temporal data. The analysis is limited by the exclusion of taxa that does not occur with frequency, such as rare taxa, but can be adapted to assist with the identification of areas of strong biodiversity or hotspots. While the project reported that the paucity of data limited the usefulness of such models, this method could contribute to identifying and evaluating important biodiversity hotspots.

DSCC Recommendation

- **SC reviews usefulness of biodiversity models to identify and evaluate biodiversity hotspots.**

Holistic framework for assessing and preventing significant adverse impacts on VMEs

This project provides a useful compilation of relevant definitions and possible management measures for the identification and assessment of significant adverse impacts. It concludes that 'spatial closures are widely accepted by stakeholders as the primary mechanism to manage impacts on benthic habitats' and that encounter protocols and 'move-on' rules 'should be established as a secondary measure in support of spatial closures.' It also notes the necessity to share information.

DSCC Recommendation

- **The SC recommend to the MoP that spatial closures are the primary mechanism to manage impacts on benthic habitats;**
- **The SC review and provide additional science needed to support mechanisms for appropriate closures;**
- **The SC review the scientific effectiveness of the various options provided.**

Assessment of significant adverse impacts from fishing activities in SIOFA

This project reviewed existing potential fishing impacts within the fishing footprint against the distribution of three large scale bioregions predicted from VME indicator taxa. The authors developed a '*fishing intensity impact index*'. The report concludes that "for all four gear types and all bioregions, there was fishing occurring in predicted areas of high suitability. Bioregion 1 was the most impacted by trawling, gillnets, and line fishing. The marked spatial distribution of the four gear types in SIOFA results in subregions being affected differently by each gear type, where subregion 1.2 seems to be the most impacted from trawling, gillnets, and line fishing and subregion 2.4 by traps fishing. In addition, potential cumulative impacts, such as fishing along SIOFA's edges from bordering nations, will also need to be considered.

DSCC Recommendation
- **SC consider the use of the 'fishing intensity impact index' as a standard tool in assessing impact.**
- **SC note the potential risk of Bioregion 1 from fishing impacts, and particularly the risks in subregion 1.2.**

b. Recognition of seamounts as VMEs

SIOFA has adopted an interim SIOFA Standard Protocol for Future Protected Areas Designation adopted by the Meeting of the Parties in 2018 which includes a number of criteria for assessment of areas for marine protection status. The protocol had been adopted at MoP4 and had been further tested and revised by SC3 (SC3 Report, Annex H) which recommended changes to MOP5 (para 34).

MOP5 adopted the protocol as an interim protocol and requested the SC to review it further. The MOP "requested the Scientific Committee to review the interim protocol for the designation of protected areas. In particular, the Scientific Committee is requested to clarify the use of the criteria and provide in particular a ranking and a key for using these criteria in view to developing appropriate management plans/measures" (para 40).

The MOP5 also requested the Scientific Committee "to identify taxa indicators of VMEs presence and define a common VME encounter protocol" (para 40).

Other RFMOs and CCAMLR have developed processes and measures to protect identified VMEs. SPRFMO CMM03-2023 (para 48) includes an Annex to be established as a register of VMEs.

> To assist the SC and the MOP in the protection of VMEs from significant adverse impacts, SIOFA should include a registry of known VMEs in the CMM. This approach has been adopted by CCAMLR and more recently by SPRFMO. The CCAMLR VME Registry' records the locations and taxa of Vulnerable Marine Ecosystems (VMEs) and associated areas in the CCAMLR Convention Area which have been notified under Conservation Measure 22-06 and Conservation Measure 22-07. The CCAMLR registry currently includes 61 VMEs.

Protecting biodiversity in the marine environment is recognised in the SIOFA Convention which specifically requires that members ensure the long-term conservation and sustainable use of fishery resources and, in so doing, safeguard the marine ecosystems in which these resources occur through the application of the precautionary approach and an ecosystem approach to fisheries management.

In the SIOFA area there are major gaps in the information on both VME indicator taxa and non-VME indicator species associated and dependent on VMEs. These gaps include seamount vulnerability and identification of the full range of species associated with VMEs, (including cryptic and undescribed species), and biological information about these species and ecosystems, such as population structure, connectivity, endemism and source and sink populations – all of which is essential to assessing the impacts of bottom trawling.

Closing Seamounts to bottom trawling

Seamounts are recognised in the FAO Deepwater Guidelines (FAO 2008) as being "topographical, hydrophysical or geological features" that support a range of sensitive and potentially vulnerable species to deep sea fishing. Seamounts are VMEs based on the language of UNGA resolutions (Watling & Auster, 2017). While the protection of these features is included in the UNGA resolutions, they are absent from the SIOFA CMM and SIOFA protected areas. However, seamounts are equally vulnerable to SAIs as other taxa recognized as VMEs by SIOFA. Research by Baco et al., 2020 on the Emperor Seamount Chain, North-western Hawaiian Ridge, identified SAIs caused by deep-sea fishing on all surveyed seamounts. Seamounts are considered to be VMEs by Northwest Atlantic Fisheries Organization (NAFO), VME elements by the North East Atlantic Fisheries Commission (NEAFC), and VME indicator features by the General Fisheries Commission for the Mediterranean (GFCM).

Examples of sensitive and vulnerable species in the guidelines are:

> *Examples of species groups, communities and habitat forming species that are documented or considered sensitive and potentially vulnerable to DSFs in the high-seas, and which may contribute to forming VMEs:*
>> *i. certain coldwater corals and hydroids, e.g. reef builders and coral forest including stony corals (Scleractinia), alcyonaceans and gorgonians (Octocorallia), black corals (Antipatharia) and hydrocorals (Stylasteridae);*
>> *ii. some types of sponge dominated communities;*
>> *iii. communities composed of dense emergent fauna where large sessile protozoans (xenophyophores) and invertebrates (e.g. hydroids and bryozoans) form an important structural component of habitat; and*
>> *iv. seep and vent communities comprised of invertebrate and microbial species found nowhere else (i.e. endemic).* (Annex 1).

The examples of seamounts and similar features listed of *"topographical, hydrophysical or geological features, including fragile geological structures, that potentially support the species groups or communities, referred to above:*
> *i. submerged edges and slopes (e.g. corals and sponges);*
> *ii. summits and flanks of seamounts, guyots, banks, knolls, and hills (e.g. corals, sponges, xenophyphores);*
> *iii. canyons and trenches (e.g. burrowed clay outcrops, corals);*
> (Annex 1)

Watling and Auster (2021) recommendations included:

> (1) using indicator species to identify individual seamount VME Communities, recognizing that protecting part of a seamount identified only by the presence and distribution of an indicator species is not enough;

> (2) using a seamount classification system to delimit groups of similar seamounts to focus conservation management efforts and to distinguish between rare and abundant seamount types;

As Rogers (2018) noted in a recent review "Our understanding of aspects of seamount ecology has advanced, but it is clear that there are many areas that remain poorly understood meaning that management of human activities that exploit seamount ecosystems or impinge upon them has a high risk of impacting biodiversity and ecosystem function."

It is likely that the true scale of impacts on VMEs are likely to be underestimated. For example, we comment late in this paper on catchability of benthic taxa.

The UNGA Resolutions and the FAO Guidelines recognise seamounts as VMEs and for the application of the precautionary approach all seamounts should be closed to bottom trawling.

The DSCC recommends:

That a VME registry be established by SIOFA.

That Seamounts be recognised as VMEs and closed to bottom trawling.

c. Case for Saya de Malha bank

The FAO guidelines were developed without a focus on shallow features on the high seas, such as the Saya de Malha Bank.   However, sea grasses, rhodolith beds and shallow water corals would meet the criteria for identifying VME taxa set out in para 42 of the FAO guidelines:

> 42. A marine ecosystem should be classified as vulnerable based on the characteristics that it possesses. The following list of characteristics should be used as criteria in the identification of VMEs.
>
> i. Uniqueness or rarity – an area or ecosystem that is unique or that contains rare species whose loss could not be compensated for by similar areas or ecosystems. These include:
> > • habitats that contain endemic species;
> > • habitats of rare, threatened or endangered species that occur only in discrete areas; or
> > • nurseries or discrete feeding, breeding, or spawning areas.
> ii. Functional significance of the habitat – discrete areas or habitats that are necessary for the survival, function, spawning/reproduction or recovery of fish stocks, particular life-history stages (e.g. nursery grounds or rearing areas), or of rare, threatened, or endangered marine species.
> iii. Fragility – an ecosystem that is highly susceptible to degradation by anthropogenic activities.
> iv. Life-history traits of component species that make recovery difficult – ecosystems that are characterized by populations or assemblages of species with one or more of the following characteristics:
> > • slow growth rates;
> > • late age of maturity;
> > • low or unpredictable recruitment; or
> > • long-lived.
> v. Structural complexity – an ecosystem that is characterized by complex physical structures created by significant concentrations of biotic and abiotic features. In these ecosystems, ecological processes are usually highly dependent on these structured systems. Further, such ecosystems often have high diversity, which is dependent on the structuring organisms.

Seagrass and rhodoliths found on the Saya De Malha Bank (Rogers 2021) are not included in the current definition of SIOFA VME taxon in the Annex 1 of CMM2020-01. Seagrasses support fisheries and biodiversity, clean the surrounding water and help take carbon dioxide out of the atmosphere.

A review published in 2009 (Waycott et al 2009) found "Seagrass loss rates are comparable to those reported for mangroves, coral reefs, and tropical rainforests and place seagrass meadows among the most threatened ecosystems on earth."

Seagrasses found on the Bank include *Thalassodendron ciliatum, Halophilia decipens*, and *Enhalus accaroides* (Rogers 2021, pages 7 & 8). Seagrasses are a key part of the marine ecosystem and seagrass are vulnerable to a range of impacts including trawling (Griffiths et al 2020).

The Saya De Malha Bank has been recognised as an Ecologically and Biologically Significant Area (EBSA) by the Convention on Biodiversity.

The catchability of VME indicator taxa is extremely low, and best available science (Pitcher et al. 2019; Stephenson et al (2022) indicates that the amount of VME taxa that comes up in the net is only a small fraction of the amount that is impacted on the seabed. Seagrasses likely show similar characteristics. As Rogers (2021) notes "it is unknown whether seagrass would be retained by fishing gear or rather just torn up and left on the seafloor".

The SIOFA convention includes an obligation to protect biodiversity in the marine environment (article 4 (f)).

A recent review of seagrass ecosystems stated, "seagrass ecosystems among the most threatened ecosystems in the world" (Krause-Jensen et al 2020). Further, "clear water areas offer seagrass refugia from warming in deeper, cooler waters; but trawling can prevent seagrass from reaching these refugia."

They also report that "Trawling may exert both direct physical losses due to uprooting of shoots Lewis, and indirect negative effects caused by resuspension and settling of sediment particles on eelgrass leaves, which reduce light availability and nocturnal oxygen uptake".

Rogers (2021) recommended that the SIOFA list of indicator species be reviewed and modified to reflect VMEs that occur in the Indian Ocean region that may be distinct or even unique to this region and that seagrasses should be added, and other taxa considered as further research is reported on.

DSCC recommends:

- **Seagrasses be added to the list of VME indicator species in Annex 1 of CMM 2020/01;**
- **Other potential indicator taxa be reviewed, including rhodoliths, to reflect the different depths and taxa that makeup Saya De Malha Bank.**
- **precautionary thresholds for sea grasses be applied for move-on rules.**

4. Actions thus far and ongoing

a. Conservation Measures

SIOFA has adopted CMM 01(2023) Conservation and Management Measure for the Interim Management of Bottom Fishing in the Agreement Area (Interim Management of Bottom Fishing). The measure was first agreed in 2019 and has had some small amendment since then.

The measure is only an interim arrangement for the management of bottom fishing until the SC provides additional advice, as requested in paragraphs 5, 6 and 7 of the measure.

Paragraphs 5, 6 and 7 of CMM 01(2023) (Appendix 1) set out the requests for advice from the Scientific Committee to update the measure. The original request was for the SC to report in 2020 but this deadline was delayed due to the pandemic.

The provisions of the CMM request information from the SC including:

- *Bottom Fishing Impact Assessment Standard (BFIAS) which takes account of the latest scientific information available;*
- *maps of where VMEs are known to occur, or likely to occur, in the Agreement Area;*
- *a standard protocol for future protected areas designation;*
- SIOFA bottom fishing footprint based on the data provided by a CCP;
- criteria for what constitutes evidence of an encounter with a VME, in particular threshold levels and indicator species for all gears;
- the most appropriate response to a VME encounter, including inter alia closing particular areas to a particular gear type or types.

In addition, the MOP agreed that the Scientific Committee "shall also periodically review all benthic taxa bycatch data to inform its consideration of the location of potential VMEs and potential impacts thereon."

MOP 10 noted (at para 137) the *potential management options for providing protection for vulnerable marine ecosystems (VMEs), and discussed the table of different VME management options available.*

Further,

The MoP REQUESTED the SC to discuss management options for preventing SAIs on VMEs with a focus on the precautionary approach, spatial management measures, move-on rules, and identifying risks for determining appropriate measures.

In 2023 the SIOFA Commission "*ADOPTED the updated bottom fishing footprint (MoP-10-12) in place of the interim footprint adopted at MoP9.*"

At para "*115. The MoP NOTED the recommendation in paragraph 95 of the SC8 report and AGREED to initiate an intersessional process to discuss the implications of the bottom fishing footprint, including for CMM 2020/01 (Interim Management of Bottom Fishing) and how new fishing should be considered.*"

The MOP also endorsed a SC proposal requiring consideration of VMEs in "*proposals for exploratory fishing both inside and outside of the current fishing footprint should provide information on VMEs and environmental data.*" *(para 138).*

The DSCC urged members to implement a new and exploratory fishing protocol as soon as possible.

The SIOFA CMM 01(2023) for Interim Management of Bottom Fishing, required each SIOFA Contracting Party, CNCPs and PFEs undertaking bottom fishing activity in the Agreement Area to disclose measures established in accordance with the provisions set out in para 10(1) relating to interim bottom fishing measures.

b. Benthic Fisheries Impact Assessment Standard

A Benthic Fisheries Impact Assessment Standard (BFIAS), including a definition, was adopted by the MOP4 in 2017 (para 12) as recommended by the Scientific Committee in 2017, subject to agreement on the definition of new fisheries.

However, "The Scientific Committee Chairperson noted that absence of the definition would not prevent the Scientific Committee using the BFIAS." (para 12(c)).   The MOP4 AGREED (MOP 4, para 75) to apply the BFIA standard in the absence of a definition of new fisheries.

The BFIAS Impact Assessment Process requires the SC to: "evaluate all BFIAs received and provide written advice, through the SIOFA Secretariat at the annual SC meeting, as to:

a.   The likely cumulative impacts of bottom fishing activity from vessels flying the flag of a participant in the Agreement Area; and
b.   Whether each BFIA meets an appropriate standard in light of international standards and the SIOFA BFIAS."

The BFIAS has not been reviewed or updated since 2017. The FAO Guidelines calls on states and RFMOs to "ensure regular and independent reviews of the data and impact assessments." (para 83).

DSCC recommends the BFIA standard should be reviewed every five years to ensure that it reflects best practice. This is consistent with the approach being applied by SPRFMO to BFIAS (SPRFMO CMM03-2023 para 25)**.**

DSCC notes that climate change is not considered in the BFIAS. In 2023 the UNGA Resolution 78/68 (2023) "calls on RFMO to take into account the potential impacts of climate change and ocean acidification". It:

227. Calls upon States, individually and through regional fisheries management organizations and arrangements, to take into account the potential impacts of climate change and ocean acidification in taking measures to manage deep-sea fisheries and protect vulnerable marine ecosystems, including by identifying areas, based on scientific information, where deep-water species and vulnerable marine ecosystems are likely to better survive such impacts, and establishing measures to support their resilience;

DSCC recommends that consideration of climate change factors is included in the BFIA Standard template and that all existing BFIAs incorporate such factors.

DSCC has further discussion and recommendations in our information paper on Climate Change.

c. Benthic Fisheries Impact Assessment

Fishing members have provided information on the Benthic Fisheries Impact Assessments. The BFIA should consider impact, risk and existing monitoring, management and mitigation measures in assessing the potential for SAI on VMEs and should follow the adopted standard (BFIAS).

So far there has been no approach to develop cumulative BFIAs in areas jointly fished by SIOFA members. Most members did not consider the cumulative impact of different fishing methods. Japan produced a BFAIs for each of the fishing method used (bottom trawl, mid-water trawl, and bottom longline) and there was no consideration of the cumulative impact of these methods.

DSCC reviewed the BFIAs against elements of the standards, what benthic bycatch was reported, and whether VMEs where defined and reported on, and whether any significant adverse impacts (SAIs) were assessed.

Table 1 looks at the bycatch reporting and the VME and SAI reporting in published BFAIs. In the review of BFIAs recently conducted by the Secretariat of BFIAs, (SIOFA Secretariat 2024) the bycatch information reported is patchy and they only focus on sponges and coral taxa listed in the CMM01.

Table 1: Published BFIAs on the SIOFA Website

Country	Date	Methods	Protected areas/ Known VMEs reported	VME bycatch reported	Corals and Sponges taxa assessed	Other benthic bycatch taxa assessed	VME definition
Australia	Oct 2011	Bttm Trawl Mid-Trawl Bttm-LL	10 areas	Yes	Yes	No	Yes
Cook Islands	2018	Bttm Trawl	7 areas	No	No	No	Y
EU	Update 2021	Bttm LL	No	Sites but not Taxa	Partial	No	No
French Territories	Feb 2018	Bttm LL	No	No	No	No	No
Japan	2017 2017 2017	BttmLL BttmTrawl Mid-Trawl	No No	No Yes No	No No No	No No No	No No No
Thailand	2017	Bttm Trawl Trap/pots	11 areas	No	No	No	Partial - applies only to trigger levels of sponges and corals
Comoros	2019	Handline	No	No	No	No	No

Notes to table: The EU Assessment (EU BFIA 2021) states: "This assessment will be revised taking into account the results of all catches, the distribution and abundance of bycatch species and when a new assessment on the composition, distribution and abundance of VME indicator species becomes available."

Japan produced three BFIAs, one for each of the method of fishing used, ie, bottom trawl, mid-water trawl and bottom longline.

Our analysis shows that the BFIAs, apart from the EU, are more than five years old. There is little detail in the BFIAs on benthic bycatch and no analysis of the bycatch of VME taxa other than a

generic assessment of corals and sponges. The oldest assessment by Australia is actually the most detailed on bycatch information but was produced prior to the BFIA standard being agreed.

Table2 looks at other aspects of the BFIA including whether there is information on footprint, whether information on gear used and lost gear is reported, whether a risk assessment is used, any consideration of SAIs on VMEs, and where any VME criteria was applied to the footprint reported.

Table 2: Application of BFIAs to the published BFIA

Country	Date	Methods	Footprint or potential footprint included	Detail on Gear Used	Loss of fishing gear	Risk assess-ment included	SAI on VMEs considered	VME criteria applied to footprint
Australia	Oct 2011	Bttm Trawl Mid-Trawl Bttm-LL	Yes	Yes for LL but not for other gear	No	Yes	Yes	No
Cook Islands	2018	Bttm Trawl	Yes	Yes	Yes	Definitions only	Partial	No
EU	Update 2021	Bttm LL	Yes	Yes	N	Partial - no detail	No	No
French Territories	Feb 2018	Bttm LL	Yes	Yes	N	No	No	No
Japan	2017 2017 2017	BttmLL Bttm Trawl Mid-Trawl	Yes Yes Yes	No Partial Partial	No No No	No Partial Partial	No Partial No	No No No
Thailand	2017	Bttm Trawl Trap/ pots	Yes	Yes	No	No	No	No
Comoros	2019	Handline	No	No	No	No	NA	No

Note: Partial - only some information included or not considered in detail.

The annual reports by members have more detail on benthic bycatch than in individual BFIAs. For example, Thailand does not include information on any reported VME bycatch in its BFIA but the last two Annual Country Reports to the SC does contain this information. DSCC welcomes this level of reporting, and it should be used as the basis of reporting in updated BFIAs.

There was very little reporting on lost gear in the BFIAs. The Secretariat report SC-08-INFO-08 (SIOFA Secretariat 2023a) on lost gear should assist members in developing this section in their revised and updated BFIAs.

DSCC recommends that:

- **All BFIAs be updated every five years and include updated information on gear used, what gear is lost annually, how SAIs on VMEs are being assessed and impacts mitigated;**

- **All BFIAs to be reviewed and updated in line with the revised SIOFA BFIA standard, they should include effects of climate change and ocean acidification.**
- **The SC determines how cumulative benthic impacts of different country BFIAs can be assessed.**

d. Encounter and Move-On Rules

It is important to separate the process of identifying the actual presence of a VME with the management actions. The former is a scientific assessment; the second is a management response to the assessment. Obviously, the triggering of an encounter protocol, although designed to identify VME indicator species, is strong evidence of a VME, especially with a very high threshold and wide range of such indicator species. Other steps may be taken to confirm this, such as the use of cameras. But the process of recognising (rather than designating) a VME is to be followed by the management response, which has been repeatedly stated by the UNGA to be to close the area to bottom fishing, unless the measure can otherwise prevent SAIs on that VME.

The current VME encounter thresholds for trawling in CMM 01(20023) apply to two taxa groups only and for longline all taxa are combined. This approach ignores the different biological characteristics of the taxa impacted by bottom fishing. This includes elements of the species caught are highlighted in the FAO Deepwater Guidelines (Para 14 and 18 of FAO Guidelines 2008) including:

- Uniqueness or rarity of the species
- Presence of endemic species;
- Presence of rare, threatened, or endangered species;

Different taxa have different vulnerability, fragility, and resilience and recovery time. If taxa are amalgamated, then the most at risk VME and VME indicator species are likely to be missed. The approach taken by SPRFMO in dividing taxa into lower taxonomic units and considering a biodiversity component is a more ecologically appropriate way of considering impacts of bottom fishing.

Catchability of species by bottom trawl gear is an important consideration when reviewing encounter thresholds.

Catchability of VME taxa

The catchability of VME indicator taxa is extremely low, and best available science (e.g. Pitcher et al (2019); Stephenson et al (2022) indicates that the amount of VME taxa that comes up in the net is only a small fraction of the amount that is impacted on the seabed. Seagrasses likely show similar characteristics.

These differences in selectivity and catchability varies across taxa due to differences in morphology, ecology, and life history (Parker and Bowden, 2010).

The primary source of VME records is the bycatch data gathered during fisheries surveys and commercial fishing operations (Morato et al., 2018). However, bycatch data is not representative of the impacted bottom communities as not all of the impacted individuals are captured in fisheries gear (Wassenberg et al. 2002, Auster et al. 2011, Jones and Lockhart 2011, Pitcher et al. 2019).

In the South Pacific Regional Fisheries Management Organisation (SPRFMO), trawl catches of 30 kg of coral are estimated to equate to seabed coverage of 65-80% of *Solenosmilia variabilis*, suggesting that the gear will contact more than 3.9–12.5 tonnes of coral biomass and cause seabed impacts of more than 3.2–10.2 tonnes (Pitcher et al. 2019). In other words, some 100 to 400 times more coral are estimated to be damaged or destroyed on the seabed even with only 30 kg 'caught' in a single trawl tow. In the Louisville Seamount Chain (SPRFMO), evidence of VMEs were only recorded in 4 out of 255 trawl tows but camera tows did record VME indicator species repeatedly (Clark et al. 2015, Watling and Auster 2017). These discrepancies highlight that no true absence data can be obtained using bycatch data (Gros et al., 2022; Knudby et al., 2013; Preez et al., 2016; Watling &

Auster, 2017).Visual surveys or high-resolution mapping are required to understand the distribution of VMEs and to prevent deep-sea fisheries from causing adverse as per the UNGA resolutions (61/105, paragraphs 80–91).

Watling and Auster (2021) estimate that catch efficiency for taxa retained in the net is as low as 10% or even 1%. Williams et al (2010) estimated the catch efficiency for deep-sea trawl net to be 0 to <0.01 for *Gorgoneia* (now Gorgonian Alcyonacea). Further, several groups of corals do not show in the net.

Given the uncertainty over catchability the precautionary approach should be used to use lowest realistic values when setting limits under any encounter protocol.

DSCC recommends that SC undertake a review of the values used in the encounter protocol which recognises the low level of catchability of VME indicator taxa ending up in nets or on hooks, applies the precautionary approach, considers taxa threshold applied by SPRFMO to bottom trawl VME encounters.

FISHING METHOD

We firstly look at bottom trawling requirements and then also consider the bottom longline provisions.

Bottom trawling

The current CMM provisions for bottom trawling only apply measures to corals and sponges collectively i.e. "For trawl vessels that caught alive corals more than sixty (60) kg, or alive sponges more than three hundred (300) kg per haul." There is no assessment of the impact of individual species. The current thresholds for move-on rules for corals and sponges are high when compared to other RFMOS: In Table 3 we make a comparison of the SIOFA encounter thresholds with those applied in South Pacific Regional Fisheries Management Organisation (SPRFMO).

SPRFMO CMM03-2023 has two different weight thresholds for VME encounter protocol. Annex 6A sets out the trigger levels when one tow catches a single VME indicator taxon. The trigger taxa are divided into six taxonomic values. Annex 6B sets out the trigger level when three or more different indicator taxa.

Among the compilation of documents related to BFIAs compiled by the Secretariat (SIOFA Secretariat 2024) the Cook Islands noted:

"The VME indicator list from the FAO VME database accessed by the vessels includes 52 potential indicators, with 115 items observed caught in 2016. One single trawl caught 60 kg of stony coral when a strong current pushed the trawl into an area known as "Suicide Drive". Subsequent trawls on this seamount did not hit the 30 kg trigger. This area is now under consideration by the Cook Islands as a potential "no bottom contact area", in line with the spatial management program recommended by the UNGA."

SIOFA Secretariat 2023b (SC-08-26-Rev1) indicated there available VME indicator taxa from the SIOFA Observer database includes 42 taxa groups (Table 3) plus two general reporting categories. This is greater than the division of taxa that is applied in SPRFMO for encounter measures.

Table 3 : Comparisons of Weight Thresholds for Triggering VME Encounter Protocols under SPRFMO (CMM03 (2023)) and SIOFA CMM2020/01

SPR

Vulnerable taxa Taxonomic Level	Common Name	SPRFMO Weight Threshold (kg) for three or more VME indicator taxa	SPRFMO Weight Threshold single encounter	SIOFA CMM	Reported in observed SIOFA Bycatch (Secretariat 2023)
Phylum Porifera	Sponges	5	25	300	Y
Phylum Cnidaria					
Class Anthozoa					
Order Scleractinia	Stony corals	5	60	60	Y
Order Antipatharia	Black corals	1	5	Incl in corals	Y
Order Alcyonacea	True soft corals	1		Incl in corals	Y
Informal group Gorgonian Alcyonacea	Seafan octocorals	1	15	Incl in corals	Y
Order Pennatulacea	Sea pens	1		Incl in corals	Y
Order Actiniaria	Anemones	5	35	NA	Y
Order Zoantharia	Hexacorals	1	10	Incl in corals	Y
Class Hydrozoa	Hydrozoans	1		NA	Y
Order Anthoathecatae					
Family Stylasteridae	Hydrocorals	1		Incl in corals	Y
Phylum Bryozoa	Bryozoans	1		NA	Y
Phylum Echinodermata					
Class Asteroidea					Y
Order Brisingida	Armless stars	1		NA	Y
Class Crinoidea	Sea lillies	1		NA	Y

NA = not included.

The SIOFA "coral" category used in the CMM is taxonomically coarse.   It includes a range of taxa from different orders of the Phylum Cnidaria which are subdivided into six taxa in SPRFMO CMM03-2023. The amalgamation of taxa creates a range of potential problems:

- The very coarse taxonomic resolution of the modelled VME indicator taxa may mask ecological patterns and vulnerabilities, and abundance, at scales of communities, populations and species level

- Risks of damaging or destroying other taxa, including populations of rare, cryptic and undescribed species.

- Assessment at a coarse taxonomic level assumes that different species within a taxonomic group have similar characteristics and environmental preferences affecting their vulnerability and distribution. This is clearly not always true.

- Diverse life-history traits, distribution patterns, and/or meta-population dynamics within coarser taxonomic resolutions will likely lead to the ecological patterns and vulnerabilities at the population/species level being obscured.

The Annex to the FAO Guidelines (2009) includes a number of different taxa as potentially vulnerable species groups, communities and habitats. Examples of species groups, communities and habitat forming species include:

v.   *certain coldwater corals and hydroids, e.g. reef builders and coral forest including: stony corals (Scleractinia), alcyonaceans and gorgonians (Octocorallia), black corals (Antipatharia) and hydrocorals (Stylasteridae);*
v.   *some types of sponge dominated communities;*
v.   *communities composed of dense emergent fauna where large sessile protozoans (xenophyophores) and invertebrates (e.g. hydroids and bryozoans) form an important structural component of habitat; and*
v.   *seep and vent communities comprised of invertebrate and microbial species found nowhere else (i.e. endemic)."* (Annex 1).

Para 67-69 of the guidelines defined the measures needed for encounter protocols.

The review last year of the benthic bycatch available from observer shows that there is sufficient information to review the thresholds and taxa groups in CMM2020/01. Improved reporting by observers and vessels will assist in the implementation of any change. The SC can make precautionary recommendations to the MOP on changes to the thresholds in para 2020/01.

DSCC recommends that:

- **The SC should review the encounter thresholds in para 12 of CMM 01 (2023) undertaking a precautionary and ecosystem approach; and**
- **Taxa should be subdivided into similar taxa groups applied in the SPRFMO CMM03-2023.**
- **Catchability of taxa should be considered when establishing encounter thresholds.**

Bottom longline provisions

CMM03-2023 provisions relating to bottom longline fishing are based on those used by CCAMLR (CMM22-07) which applies a much lower weight threshold than is used for corals or sponges.

Thailand reported in its BFIA that it is applying this threshold to their fish trap vessel.

CCAMLR threshold-based protection measures, which SIOFA applies, are not taxon specific, "this results in an incomplete assessment of vulnerability" (Lockhart and Hocevar, 2021).

Lockhart and Hocevar (2021) note "It is clear that CCAMLR's single threshold combining all VME indicator taxa is insufficient and indeed CCAMLR has recognized this insufficiency itself for many years (e.g., CCAMLR, 2009, 2019c). Moreover, it was clearly set out in the scientific guide to the FAO

guidelines (Rogers et al., 2008) that separate thresholds for different taxa be used, or alternatively a diversity index be used in combination."

DSCC considers SIOFA should review the longline thresholds. This could include discussion with CCAMLR SC on the values used.

DSCC Recommends that the longline encounter threshold be reviewed so that it includes taxon specific values.

e. Scientific Committee Work Plan

The Scientific Committee Work plan and the MOP responses and requests are relevant to the discussion on the protection of VMEs from SAIs.

DSCC notes that the annual Scientific Committee work plan includes:

- Review of VME indicator taxa list;
- Annual report of VME encounters;
- Annual review of VME encounters.

MoP10 responses and requests from the SC
The MOP10 responded to the SC Report and requested advice from the SC:

- *to discuss management options for preventing SAIs on VMEs with a focus on the precautionary approach, spatial management measures, move-on rules, and identifying risks for determining appropriate measures. (para 137)*
- *provide additional advice of reporting VME indicator taxa:*

and in Para 142 MOP:

- *NOTED the request in paragraph 289 of the SC8 report that the MoP consider revisions to either CMM 2020/01 (Interim Management of Bottom Fishing) or CMM 2022/02 (Data Standards) that would ensure that vessel reported VME indicator taxa captures and Observer data reports are consistent with the provisions for longline VME encounters in CMM 2020/01 that require VME encounters to be recorded by longline segment rather than by entire haul. The MoP REQUESTED the SC to provide further advice on potential management options for resolving the issue, specifically what potential amendments would be required to CMM 2020/01 or to CMM 2022/02, and what the implications of such amendments would be for scientific work and data collection onboard vessels.*

The Agenda for SC9 includes consideration of vulnerable marine ecosystems and revision of taxa and preventing SAIs on VMEs. As Part of this discussion the SC should consider the Benthic Fisheries Impact Assessment Standard and Benthic Fisheries Impact Assessments prepared to date.

5. Recommendations:

EBSA:

- All EBSAs located fully or partly within the SIOFA Area should be recommended for VME/MPA protection.

Bioregions:

- The SIOFA area contains significant diversity of bioregions, all of which should be considered in conservation efforts, as per criterion 'bioregional representation' listed in the Protocol.

Systematic Conservation Planning:

- SC limits its analysis to scientific matters, if applying systematic conservation planning tools. Economic impacts, for example, should be considered within the MoP;

- SC recommends the MoP provide MPA protection to all EBSAs located fully or partly within the SIOFA Area

Biodiversity hotspots:

- SC reviews usefulness of biodiversity models to identify and evaluate biodiversity hotspots.

Spatial closures:

- The SC recommend to the MoP that spatial closures are the primary mechanism to manage impacts on benthic habitats.
- The SC review and provide additional science needed to support mechanisms for appropriate closures.
- The SC Review the scientific effectiveness of the various options provided.

Fishing intensity:

- SC consider the use of the 'fishing intensity impact index' as a standard tool in assessing impact.
- SC note the potential risk of Bioregion 1 from fishing impacts, and particularly the risks in subregion 1.2.

VME and Seamounts:

- That a VME registry be established by SIOFA.
- That Seamounts be recognised as VMEs and closed to bottom trawling.

Saya De Malha Bank:

- Seagrasses be added to the list of VME indicator species in Annex 1 of CMM 2020/01;
- Other potential indicator taxa be reviewed, including rhodoliths, to reflect the different depths and taxa that makeup Saya De Malha Bank.
- precautionary thresholds for sea grasses be applied for move-on rules.

BFIA Standard:

- The BFIA standard should be reviewed every five years to ensure that it reflects best practice.
- that consideration of climate change factors is included in the BFIA Standard template and that all existing BFIAs incorporate such factors.
- DSCC has further recommendations in our information paper on Climate Change.

BFIAs:

- All BFIAs be updated every five years and include updated information on gear used, what gear is lost annually, how SAIs on VMEs are being assessed and impacts mitigated;
- All BFIAs to be reviewed and updated in line with the revised SIOFA BFIA standard, in particular they should include effects of climate change and ocean acidification;
- The SC determines how cumulative benthic impacts of different country BFIAs can be assessed.

Trawling encounter thresholds:

- The SC should review the encounter thresholds in para 12 of CMM 02 (2023) undertaking a precautionary and ecosystem approach; and
- Taxa should be subdivided into similar taxa groups applied in the SPRFMO CMM03-2023.
- Catchability of taxa should be considered when establishing encounter thresholds.

Longline encounter thresholds:

The longline encounter threshold be reviewed so that it includes taxon specific values.

6. Conclusions

DSCC acknowledges the interim progress that has occurred in the protection of VMEs from SAIs in the SIOFA area. This paper highlights the areas where the SC should provide further assistance to the MOP. This includes: the protection of EBSAs and seamounts, and all VMEs; the use of bioregions; evaluation of biodiversity hot spots and the fishing intensity impact index, noting the risk in bioregion 1 and particularly 1.2; closing seamounts and Saya de Malha Bank to bottom trawling; adding sea grass to the list of VME taxa; regularly revising the BFIA standard and BFIAs for all bottom fishing countries; Including climate change and ocean acidification in the standard and assessments; reviewing encounter thresholds and the taxa divisions used for triggering encounters for both trawling and longlining.

Acknowledgments

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Appendices

Appendix I United Nations General Assembly Resolutions and FAO Guidelines

There are a number of UN General Assembly Resolutions relevant to the considerations of the Scientific Committee starting from 2006.

UNGA Resolution 61/105 (2006)
UNGA resolution 61/105 (2006) requires four steps in para 83.
(a) Assessment whether individual bottom fishing activities would have SAIs on VMEs, and to ensure that if it is assessed that these activities would have significant adverse impacts, they are managed to prevent such impacts, or not authorized to proceed;
(b) Identify VMEs and determine whether bottom fishing activities would cause SAIs on the VMEs;
(c) Where VMEs are known to occur or are likely to occur, to close the areas to bottom fishing, and keep them closed unless measures are established to prevent SAIs on VMEs; and
(d) Have an encounter protocol so that appropriate measures can be adopted.

Following the resolution, the FAO Deep Sea Guidelines were developed.

FAO Deep Sea Guidelines

The FAO Deep Sea Guidelines set out what should be done as a result of an encounter:
69. States and RFMO/As should, in light of reports (as referred to in paragraph 67), and in accordance with developed protocols and paragraphs 42 to 53, adopt or modify management measures, appropriate for the DSF concerned, in regard to the relevant site or area to prevent significant adverse impacts on the VME.
70. States and RFMO/As should, based on the results of assessments carried out pursuant to paragraphs 42 to 53, adopt conservation and management measures to achieve long-term conservation and sustainable use of deep-sea fish stocks, ensure adequate protection and prevent significant adverse impacts on VMEs. These measures should be developed on a case-by-case basis and take into account the distribution ranges of the ecosystems concerned.
71. Conservation and management measures pursuant to paragraph 70, may include:
i.   effort controls and/or catch controls;
ii.   temporal and spatial restrictions or closures;
iii.   changes in gear design and/or deployment or operational measures (as discussed in the 2006 Bangkok Expert Consultation), including:
      • reduction of contact between the fishing gear and the seabed,
      • use of effective bycatch reduction devices, and
      • use of technical measures to eliminate or minimize ghost fishing; or
iv. other relevant measures necessary to achieve the objective of paragraph 70.
72. Some of the above management measures for DSFs, such as effort, catch and temporal controls, may be limited in their effectiveness for the protection of some types of VMEs. Effective protection of such VMEs will usually require complementary measures, such as gear restrictions and spatial controls, as appropriate.

Significant Adverse Impacts are defined in the Guidelines:
17. Significant adverse impacts are those that compromise ecosystem integrity (i.e. ecosystem structure or function) in a manner that:
(i) impairs the ability of affected populations to replace themselves;

(ii) degrades the long-term natural productivity of habitats; or
(iii) causes, on more than a temporary basis, significant loss of species richness, habitat or community types.

Impacts should be evaluated individually, in combination and cumulatively.

18. When determining the scale and significance of an impact, the following six factors
should be considered:
i. the intensity or severity of the impact at the specific site being affected;
ii. the spatial extent of the impact relative to the availability of the habitat type affected; iii. the sensitivity/vulnerability of the ecosystem to the impact;
iv. the ability of an ecosystem to recover from harm, and the rate of such recovery;
v. the extent to which ecosystem functions may be altered by the impact; and
vi. the timing and duration of the impact relative to the period in which a species needs the habitat during one or more of its life-history stages.
19. Temporary impacts are those that are limited in duration and that allow the
particular ecosystem to recover over an acceptable time frame. Such time frames should be decided on a case-by-case basis and should be in the order of 5-20 years, taking into account the specific features of the populations and ecosystems.
Clearly:
(1) the conservation measure must have as its objective to "ensure adequate protection and prevent significant adverse impacts on VMEs." (para 71)
(2) Significant adverse impacts are those that compromise ecosystem integrity (i.e. ecosystem structure or function) in the manner described (para 17)
(3) the assessment and imposition of appropriate measures following an encounter must follow the Guidelines, in order to prevent significant adverse impacts.

Additional UNGA Resolutions:
UNGA Resolution 64/72 (2009)
Resolution 64/72 called on (para 113) States to immediately and consistent with the precautionary approach and ecosystem approaches to apply the FAO Guidelines, and protect VMEs, "recognizing the immense importance and value of deep sea ecosystems and the biodiversity they contain," reaffirmed (para 114) the operational paragraphs of resolution 61/105 and emphasised the need for full implementation, and called on States to (para 119) establish and implement encounter protocols, including definitions of what constitutes evidence of an encounter with a VME, in particular threshold levels and indicator species and importantly and called on (para 120) States not to authorize bottom fishing activities until the stated measures have been adopted and implemented.

UNGA Resolution 66/68 (2011)
Resolution 66/68 followed the 2011 bottom fishing workshop emphasised (para 129) individual, collective and cumulative impacts, and recognized (para 131) that different types of marine scientific research, including seabed mapping carried out in different parts of the oceans, have resulted in identification of areas where VMEs occur and in the adoption of conservation and management measures to prevent significant adverse impacts on such ecosystems, including the closure of areas to bottom fishing in accordance with paragraph 119 (b) of resolution 64/72. The UNGA encouraged (132), RFMO/As and flag States to consider the results available from marine scientific research, including those obtained from seabed mapping programmes concerning the identification of areas containing VMEs, and to adopt conservation and management measures to prevent significant adverse impacts from bottom fishing on such ecosystems, consistent with the Guidelines, or to close such areas to bottom fishing until such conservation and management measures are adopted, as well as to continue to undertake further marine scientific research.

UNGA Resolution 71/123 (2017)
Following the 2016 UNGA bottom fishing review, the UNGA passed resolution 71/123, which called for:
180 (a) To use, as applicable, the full set of criteria in the Guidelines to identify where vulnerable marine ecosystems occur or are likely to occur as well as for assessing significant adverse impacts;
(c) To ensure that conservation and management measures adopted by States and regional fisheries organizations and arrangements are based on and updated on the basis of the best available scientific information, noting in particular the need to improve effective implementation of thresholds and move-on rules; and
181. Recognizes that different types of marine scientific research, such as, inter alia, seabed mapping, mapping of vulnerable marine ecosystems based on information from the fishing fleet, on-site camera observations from remote vehicles, benthic ecosystem modelling, comparative benthic studies and predictive modelling have resulted in identification of areas where vulnerable marine ecosystems are known or are likely to occur and in the adoption of conservation and management measures to prevent significant adverse impacts on such ecosystems, including the closure of areas to bottom fishing in accordance with paragraph 119 (b) of resolution 64/72; and
182 Encouraged RFMO/As and Sates to consider the results available from different types of marine scientific research, including, as appropriate, those listed in paragraph 181 above, concerning the identification of areas containing VMEs, and to adopt conservation and management measures to prevent significant adverse impacts from bottom fishing on such ecosystems, consistent with the Guidelines, or to close such areas to bottom fishing until such conservation and management measures are adopted, as well as to continue to undertake further marine scientific research, for the above-mentioned purposes, in accordance with international law, as reflected in Part XIII of the Convention;

UNGA Resolution 78/68 (2023)
Following the 2023 UNGA bottom fishing review, the UNGA passed resolution 78/68, which:
214. *Reaffirms* the importance of paragraphs 80 to 90 of resolution 61/105, paragraphs 113 to 127 of resolution 64/72, paragraphs 121 to 136 of resolution 66/68 of 6 December 2011 and paragraphs 156, 171 to 188 and 219 of resolution 71/123 of 7 December 2016 addressing the impacts of bottom fishing on vulnerable marine ecosystems and the long-term sustainability of deep-sea fish stocks and the actions called for in those resolutions, and emphasizes the need for full implementation by all States and relevant regional fisheries management organizations and arrangements of their commitments under those paragraphs on an urgent basis;
215. *Urges* States and regional fisheries management organizations and arrangements to ensure that their actions in sustainably managing deep-sea fisheries and implementing paragraphs 80 and 83 to 87 of resolution 61/105, paragraphs 113 and 119 to 124 of resolution 64/72, paragraphs 121, 129, 130 and 132 to 134 of resolution 66/68 and paragraphs 156, 171 to 188 and 219 of resolution 71/123 are consistent with the Guidelines;

Further:

222. *Calls upon*, in this regard, States, regional fisheries management organizations and arrangements with the competence to regulate deep-sea fisheries, and States participating in negotiations to establish such organizations or arrangements to take, in particular, the following urgent actions regarding bottom fishing in areas beyond national jurisdiction:
(a) To use, as applicable, the full set of criteria in the Guidelines to identify where vulnerable marine ecosystems occur or are likely to occur, as well as for assessing significant adverse impacts on such ecosystems, including their associated and dependent species;
(b) To ensure that impact assessments, including for cumulative impacts of activities covered by the assessment, are conducted for all types of bottom -fishing activities consistent with the Guidelines, particularly paragraph 47 thereof, are reviewed periodically and are revised thereafter whenever a substantial change in the fishery has occurred or there is relevant new information, and that, where such impact assessments have not been undertaken, they are carried out as a priority before authorizing bottom-fishing activities;

(c) To ensure that the precautionary approach is applied, including in the utilization of impact assessments to inform management decisions and consideration of significant adverse impacts on vulnerable marine ecosystems, including their associated and dependent species;

(d) To ensure that conservation and management measures adopted by States and regional fisheries organizations and arrangements are based on and updated on the basis of the best available scientific information, noting in particular the need t o improve the effective implementation of thresholds and move-on rules;

Appendix II CMM01 Requests of Scientific Committee

Paragraphs 5, 6 and 7 of CMM 01(2023) set out the requests for advice from the Scientific Committee to update the measure.

 5.	*The Scientific Committee shall, by no later than the close of the ordinary meeting of the Scientific Committee in 2020, and thereafter whenever a substantial change to the fishery has occurred or new data has otherwise been provided to the Scientific Committee warranting changes, develop and provide advice and recommendations to the Meeting of the Parties on:*

a. SIOFA Bottom Fishing Impact Assessment Standard (BFIAS) which takes account of the latest scientific information available;

b. maps of where VMEs are known to occur, or likely to occur, in the Agreement Area;

c. guidelines for evaluating and approving electronic observer programs for scientific data collection for consideration by the Meeting of the Parties; and

d. a standard protocol for future protected areas designation (areas in which special management rules apply, that may include, inter alia, fishing closures for specific gears or all gears)."

6. The Scientific Committee shall, by no later than the close of the ordinary meeting of the Scientific Committee in 2020, and thereafter whenever a substantial change to the fishery has occurred or new data has otherwise been provided to the Scientific Committee warranting changes, develop and provide advice and recommendations to the Meeting of the Parties on:

a. the status of stocks of principal deep-sea fishery resources targeted, and, to the extent possible, taken as bycatch and caught incidentally in these deep-sea fisheries, including straddling fishery resources;

b. criteria for what constitutes evidence of an encounter with a VME, in particular threshold levels and indicator species for all gears;

c. the most appropriate response to a VME encounter, including inter alia closing particular areas to a particular gear type or types;

d. the interim SIOFA Standard Protocol for Future Protected Areas Designation adopted by the Meeting of the Parties in 2018; and

e. research and management plans, to be adopted at MoP6, for each of the protected areas listed in Annex 3. Such plans shall include, inter alia, conservation and management objectives taking socio-economic considerations into account where possible, appropriate measures to implement these objectives and timeframes for evaluation and review.

7. The Scientific Committee shall, by no later than the close of the ordinary meeting of the Scientific Committee in 2020, and thereafter whenever a substantial change to the fishery has occurred or new data has otherwise been provided to the Scientific Committee warranting changes, develop and provide advice and recommendations to the Meeting of the Parties on:

a. an appropriate SIOFA bottom fishing footprint based on the data provided by CCPs to the Secretariat under paragraph 20; and

b. a SIOFA Bottom Fishing Impact Assessment (SIOFA BFIA). The SIOFA BFIA shall take into account the activities of all fishing vessels to which this CMM applies that, at the time the SIOFA BFIA is prepared, are engaged in, or intending to engage in, bottom fishing within the agreed SIOFA bottom fishing footprint;

8. The Scientific Committee shall also periodically review all benthic taxa bycatch data to inform its consideration of the location of potential VMEs and potential impacts thereon.

9. Upon receipt of advice and recommendations from the Scientific Committee on the matters listed in paragraphs 5 to 7, the Meeting of the Parties shall act on the Scientific Committee's advice and recommendations at its next ordinary meeting. This may include, when the Meeting of the Parties considers it appropriate, to authorise any document or other output arising from the advice or recommendations, and amendments thereto.