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SC-02-06 [01]

Draft SIOFA Bottom Fishing Impact Assessment Standard

*Relates to agenda item: **3*** Working paper ☒ info paper ☐

Scientific Committee Chair

Abstract

The third meeting of the parties to SIOFA adopted CMM 2016/01 *Conservation and Management Measure for the Interim Management of Bottom Fishing in the SIOFA Agreement Area*. This CMM notes the United Nations General Assembly (UNGA) Resolution 61/105 and subsequent resolutions that call upon RFMOs to assess, on the basis of the best available scientific information, whether individual bottom fishing activities would have significant adverse impacts on vulnerable marine ecosystems (VMEs). The CMM directs the 2017 Scientific Committee to provide advice and recommendations on a SIOFA Bottom Fishing Assessment Standard (BFIAS) that takes into account the latest scientific information available. A SIOFA BIFAS will guide members in developing their assessment of bottom fishing activities and enable the Scientific Committee to evaluate these assessments. This working paper provides a draft SIOFA BIFAS to facilitate Scientific Committee discussion and drafting. The draft draws on international standards, the FAO International Guidelines for the Management of deep-sea fisheries in the high seas deep sea fisheries guidelines and the South Pacific Regional Fisheries Management Organisation BFIAS.

Recommendations *(working papers only)*

1. That the Scientific Committee review and revise the draft SIOFA BIFAS, towards recommending a SIOFA BIFAS for adoption.

Draft SIOFA Bottom Fishing Impact Assessment Standard

Dr Ilona Stobutzki, SIOFA Scientific Committee Chair

Introduction

The third meeting of the parties to SIOFA adopted CMM 2016/01 *Conservation and Management Measure for the Interim Management of Bottom Fishing in the SIOFA Agreement Area*. This CMM notes the United Nations General Assembly (UNGA) Resolution 61/105 and subsequent resolutions that call upon RFMOs to assess, on the basis of the best available scientific information, whether individual bottom fishing activities would have significant adverse impacts on vulnerable marine ecosystems (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 authorised to proceed.

The CMM 2016/01 includes direction to the 2017 Scientific Committee (SC) in relation to bottom fishing:

5. The Scientific Committee shall, by no later than the close of the ordinary meeting of the Scientific Committee in 2017, 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) 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) standard protocols for future protected areas designation (areas which should be closed to fishing).

The SC work is then directed towards the development of a SIOFA Bottom Fishing Impact Assessment (BFIA) by 2020, that takes into account the activities of all fishing vessels engaged in, or intending to engage in, bottom fishing (paragraph 7, CMM 2016/01).

The development of a SIOFA BIFAS will guide members in developing BFIA for individual bottom fishing activities (paragraph 14, CMM 2016/01) and enable the SC to consider and provide advice on member BFIAs with respect to whether they meet an appropriate standard in light of international standards and the SIOFA BFIAS (paragraph 15, CMM 2016/01).

This working paper aims to assist the SC in the development of a SIOFA BFIAS. In 2016, the SC considered an example of what might be included in a SIOFA BFIAS (SC-01-INFO-25) and agreed to work intersessionally to develop and adopt a standards for bottom fishing impact assessments. A draft table of contents for a BFIAS was agreed by the SC as a starting point. This paper provides a draft SIOFA BFIAS, based on the draft table of contents and drawing from the South Pacific Regional Fisheries Management Organisation (SPRFMO) BFIAS. It is hoped that the draft will facilitate discussion and drafting aimed at agreeing a SIOFA BFIAS.

In discussing the draft BFIAS among other elements, the SC may wish to consider:

- The timeframe within the process for considering BFIA submitted by participants. The CMM 2016/01 expects all BFIA to be evaluated during the SC meetings and that fishing can occur while the assessment is being considered. This could result in a substantial time lag between BFIA submission and evaluation by the SC. Provisions for intersessional consideration by the SC may be appropriate.
- The process for considering any future updates to international standards, the FAO Guidelines or SIOFA CMMs in the BFIAS.
- The expectations on availability of geospatial data from the Secretariat (Section 7.1.2).
- The SPRFMO BFIAS includes a detailed Appendix on the mapping of VMEs, identification of areas of VMEs and associated issues. This level of detail has not been included in the attached draft SIOFA BFIAS as they are expected to be covered under the SIOFA SC work plan.

Draft SIOFA Bottom Fishing Impact Assessment Standard

Contents

1. Introduction

Following the adoption of UNGA Resolution 61/105 in 2006[1], 64/72 in 2009[2] and 66/68 in 2013[3] on deep-sea fisheries, the management of bottom fisheries and protection of deep-sea ecosystems on the high seas has been a priority for the international community.

Measures to implement these UNGA Resolutions have been put in place by a number of States and through RFMOs, including those active in high seas bottom fisheries in the Southern Ocean, North East Atlantic, North West Atlantic and South East Atlantic Oceans.

UNGA Resolution 61/105 calls on high seas fishing nations and RFMOs to take urgent action to protect vulnerable marine ecosystems (VMEs) from destructive fishing practices. In particular, Resolution 61/105 calls on States to:

- Conduct impact assessments to determine whether bottom fishing activities would have significant adverse impacts on VMEs, and ensure effective management to prevent such impacts, or else prohibit the activity;
- Close areas of the high seas to bottom fishing where VMEs are known or likely to occur unless fishing in these areas can be managed to prevent significant adverse impacts to such ecosystems; and
- Establish and implement protocols requiring vessels to cease fishing in areas where an encounter with VMEs occurs and to report the encounter so that appropriate measures can be adopted in respect of the site.

This is further encouraged in UNGA Resolution 64/72, paragraph 113 which, *inter alia*, also encourages States and RFMOs to implement measures in accordance with FAO International Guidelines for the Management of deep-sea fisheries in the high seas ("the FAO Guidelines", FAO 2008).

Of note, UNGA Resolution 64/72, paragraph 119(a) states that fishing should not be permitted until impact assessments have been carried out and made publicly available.

The third meeting of SIOFA parties adopted CMM 2016/01 *Conservation and Management Measure for the Interim Management of Bottom Fishing in the SIOFA Agreement Area* which notes the expectations within the UNGA Resolutions. This CMM 2016/01 also directed the Scientific Committee (SC) to develop a SIOFA Bottom Fishing Impact Assessment Standard (BFIAS).

The CMM 2016/01 identifies that BFIAs shall be prepared, to the extent possible, in accordance with the FAO Guidelines and meet the standards of the SIOFA BFIAS (once adopted). The draft BFIAS, therefore, seeks to be consistent with the FAO Guidelines.

[1] Particularly paragraphs 80 and 83-87
[2] Particularly paragraphs 117 and 119-127
[3] Particularly paragraphs 128-137

2. Purpose of the Standard

The purpose of the BFIAS is to provide a minimum standard for assessing the potential impacts of proposed bottom fishing activities on VMEs and deep sea fish stocks. The potential impacts include consideration of past fishing activity and the cumulative effects of fishing. This standard is intended to guide SIOFA parties in preparing the required bottom fishery impact assessments (BFIAs), and to guide the Scientific Committee when reviewing these assessments. It is intended to constitute the standardised approach to be taken by all participants when preparing risk and impact assessments for high seas, bottom fishing activities in the SIOFA Area.

The definitions and process in the BFIAS aim to be consistent with international principles and contribute to achieving the main objectives articulated in the FAO Guidelines:

11. The main objectives of the management of deep sea fisheries are to promote responsible fisheries that provide economic opportunities while ensuring the conservation of marine living resources and the protection of marine biodiversity, by:

i. ensuring the long-term conservation and sustainable use of marine living resources in the deep seas; and

ii. preventing significant adverse impacts on VMEs (FAO 2008)

The BFIAS aims to ensure that areas containing VMEs and low productivity deep sea resources are protected from significant adverse impacts due to bottom fishing, by ensuring that management decisions are informed by reliable and robust impact assessments based on the best data available.

As SIOFA management measures for bottom fisheries are developed and implemented , and as information improves on distribution of VMEs, abundance of low productivity deep sea resources and the impacts of bottom fishing activities in the SIOFA Area, this standard should be updated and amended accordingly.

3. Area of Application

The BFIAS applies to all bottom fishing operations within the SIOFA Area as defined in the Agreement. The BFIAS is intended to apply to all fishable depths within the SIOFA Area.

4. Bottom Fishery Impact Assessment Process

The process for preparing, submitting, evaluating and commenting on impact assessments prepared in accordance with this standard consists of the following steps:

1. Participants[4] are required to prepare bottom fishery impact assessments for all proposed bottom fishing activities in the SIOFA Area, irrespective of the proposed scale, area or previous history of such fishing activities. This includes new and exploratory fisheries.
    - The BFIA should be submitted to the SIOFA Secretariat, at least 30 days prior to the commencement of the SC meeting[5]. Participants that have prepared a BFIA prior to the CMM 2016/01 entering into force should submit the BFIA to the SC as soon as possible.
    - For fishing commencing after CMM 2016/01 entering into force, BFIAs are to be prepared and submitted to the SIOFA Secretariat prior to commencement of any bottom fishing evaluated under the assessment.
    - Fishing may then proceed in accordance with the management and mitigation measures proposed in the assessment while the assessment is being evaluated.
    - All bottom fishery impact assessments are to be posted on the SIOFA website for public comment for a period of 30 days, and forwarded to the SC for comment.
2. The SC is required to evaluate all BFIAs received and provide written advice, through the SIOFA Secretariat [within 60 days of assessments being received or 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.
3. Scientific Committee comments on assessments are to be documented in its meeting reports [or if the BFIA is considered intersessionally, posted on the SIOFA website].
4. Flag states are required to respond to the written comments provided by the SC. This response may require a revised BFIA to be submitted for SC evaluation.
5. Participants are required to prepare a new BFIA if a substantial change in the fishery has occurred, such that it is likely that the risk or impacts of the fishery may have changed. Changes that might trigger a re-assessment would include: expansion in fishing effort or catch, changes in intended fishing areas, management measures or the use of new gear.

[4] Participants is used to refer to contracting parties, cooperating non-contracting parties and participating fishing entities

[5] CMM 2016/01 paragraphs 14-17 provide guidance on timelines.

5. Bottom Fishing Impact Assessment Standard

5.1. Definitions

The BFIAS requires clear and specific operational definitions of risk, VMEs and significant adverse impacts. The FAO Guidelines currently provide the most comprehensive international definitions of these terms and the relevant aspects have been directly incorporated in the definitions below. Any definitions used in relevant SIOFA CMMs have also been incorporated.

5.1.1. Bottom Fishing

Bottom fishing means fishing using any gear type likely to come in contact with the seafloor or benthic organisms during the normal course of operations (CMM 2016/01).

5.1.2. Risk

The definition of risk for an assessment needs to be based on clearly stated objectives. The risk that is being assessed is then the risk of not achieving those stated objectives.

The high level objectives from SIOFA CMM 2016/01 are:

1. That there are no significant adverse impacts from bottom fishing on VMEs
2. That deep sea fishery resources, including target fish stocks and non-target species are managed for long-term sustainability.

These objectives need to be operationalized so that they become measurable and the risk can be assessed. This should be clarified in the impact assessment and guidance on this is provided in Section 7.

5.1.3. Low Productivity Deep Sea Resources

The FAO Guidelines (paragraph 13) recognize that marine living resources exploited by deep sea fisheries in the high seas often have low productivity, can only sustain low exploitation rates and are slow to recover once depleted. Key biological characteristics of these low productivity species include maturation at relatively old ages; slow growth; long life expectancies; low natural mortality rates; intermittent recruitment of successful year classes; and spawning that may not occur every year (FAO 2008). Species with these characteristics within the SIOFA area will be considered to constitute low productivity resources, and need to be managed in accordance with the relevant guidelines and best practices for sustainable management of such resources.

5.1.4. Vulnerable Marine Ecosystems

The FAO Guidelines outline criteria to identify VMEs, specifically:

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.

The above characteristics should guide the identification and specific definition of VMEs in the SIOFA Area. However, to provide operational definitions for use during fishing operations, it is necessary to use the above characteristics to develop lists of specific taxa (orders, families, genera or species) which are considered to contribute to VMEs in the SIOFA Area. Annex 1 of the FAO Guidelines provides a list of examples of potentially vulnerable species groups, communities and habitats, as well as features that potentially support them and should be used as the basis for determining what constitutes VME taxa in the SIOFA area.

FAO Guidelines Annex 1. Examples of potentially vulnerable species groups, communities and habitats, as well as features that potentially support them.

The following examples of species groups, communities, habitats and features often display characteristics consistent with possible VMEs. Merely detecting the presence of an element itself is not sufficient to identify a VME. That identification should be made on a case-by-case basis through application of relevant provisions of these Guidelines, particularly Sections 3.2 and 5.2.

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 many 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).

Examples 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);

iv. hydrothermal vents (e.g. microbial communities and endemic invertebrates); and

v. cold seeps (e.g. mud volcanoes for microbes, hard substrates for sessile invertebrates).

(FAO 2008)

For the purposes of BFIAs, VMEs are defined as: any marine ecosystem whose integrity is threatened by significant adverse impacts resulting from physical contact with bottom gears in the normal course of fishing operations, including, inter alia, reefs, seamounts, hydrothermal vents, cold water corals, cold water sponge beds and low productivity or vulnerable species.

The definition of VMEs will need to be reviewed periodically, in the light of improved information on VMEs in the SIOFA area.

The unit of analysis for the impact assessment for VMEs is suggested to be 'VMEs' as a group rather than individual taxa. As more information becomes available (such as the location of different types of VMEs) it may be more appropriate to undertake the impact assessment for different types of VMEs, such as particular benthic communities or assemblages.

In terms of deep sea fish stocks the unit of analysis should be the stock, although data availability may similarly constrain the unit of analysis to the species or resource assemblage level. As more information becomes available it may be more appropriate to update assessments to the stock level.

5.1.5. Predictors to Evaluate Likelihood of Occurrence of VMEs

The FAO Guidelines note (paragraph 45) that, "where site-specific information is lacking, other information that is relevant to inferring the likely presence of vulnerable populations, communities and habitats should be used". This is reflected in the examples provided in FAO Guidelines Annex 1, shown above.

The Southern Indian Ocean Deepsea Fishers Association (SIODFA) has undertaken work that can contribute to the mapping of VMEs and understanding the likelihood of occurrence in the SIOFA Area. However, for much of the SIOFA Area, data on seabed biodiversity and benthic community composition are not available. Therefore, ancillary information on other factors that influence the location of VMEs will need to be used to predict likelihood and suitability of areas for supporting VMEs.

Predictive Habitat Modelling

Benthic biodiversity data are scarce for the SIOFA Area and so use of predictive habitat models should be considered to identify areas where VMEs are likely to occur. This will contribute to the quantitative evaluation of the risk of significant adverse impacts and the effectiveness of any proposed management and mitigation measures (Anderson et al. 2016).

While existing global habitat models will be useful for risk assessments, the development of regionally-tailored, high resolution, predictive models for the SIOFA area would be suitable. These should be of the highest resolution permitted by available bathymetric data, and should be designed to predict occurrence of all of the VME species of interest in the SIOFA Area.

Development of regionally tailored models will require, where possible, the collection of high resolution data on bathymetry and bycatch of VMEs and participants should include provisions for the collection of such data into conditions for bottom fisheries in the SIOFA Area. Where possible and appropriate, use should also be made of opportunities presented by presence of fishing vessels in the SIOFA Area to collect seabed imaging information (using underwater video or cameras) to validate and improve regional habitat prediction models.

Seabed Depth Range and Topography

Seabed depth range and topography are good indicators of seabed geology, and therefore of substratum suitability for supporting VME species. In the absence of benthic biodiversity data and predictive habitat modelling, risk assessments should use depth and analysis of topography, particularly depth range, slope, rugosity and specific topographic features, as indicators of habitat likely to support VMEs. The FAO Guidelines recognizes the following as being features that potentially support species, groups or communities which may contribute to forming VMEs:

- *Submerged edges and slopes; summits and flanks of seamounts, guyots, banks, knolls, and*
- *hills; canyons, trenches and hydrothermal vents.*

5.1.6. Significant Adverse Impacts

The FAO Guidelines provide guidance on what would constitute a significant adverse impact on VMEs:

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.

20. In determining whether an impact is temporary, both the duration and the frequency at which an impact is repeated should be considered. If the interval between the expected disturbance of a habitat is shorter than the recovery time, the impact should be considered more than temporary. In circumstances of limited information, States and RFMO/As should apply the precautionary approach in their determinations regarding the nature and duration of impacts.

When evaluating the potential significance of adverse impacts of bottom fishing activities in the SIOFA Area, the above factors should all be considered. Assessments should evaluate the impact that each type of fishing gear is likely to have on areas likely to contain VMEs, both on a per set basis and cumulatively. Paragraph 20 of the FAO Guidelines states that "*In circumstances of limited information, States and RFMO/As should apply the precautionary approach in their determinations regarding the nature and duration of impacts*".

Each BFIA will need to detail how the above factors were used to develop a definition of 'significance' for the purposes of the assessment. This should include at a minimum the criteria:

- The intensity or severity of the impact at the specific site affected (i.e. are entire colonies/habitats destroyed, or just a few branches broken), this will be gear specific (and may link be guided by the Hierarchy of Bottom Fishing Impacts (Table 1);
- The ecological consequence of a given impact (which depends on the distribution, density, and recovery potential of the organisms in question), including estimation of the likelihood of interaction;
- The spatial extent of the impact relative to the extent of the VME and whether there may be offsite impacts;
- The frequency of the impact and the cumulative fishing effort. The rate of impact (on a temporal and geographical scale) in relation to rates of recovery of taxa needs to be considered.

Many of these criteria are difficult to measure directly for deep sea fisheries and so assumptions must be made based on studies conducted elsewhere or expert input. All assumptions must be clearly documented in the impact assessments to ensure transparency.

5.1.7. Hierarchy of Bottom Fishing Impacts

The intent of UNGA Resolutions (61/105 and 64/72) and SIOFA CMM 2016/01 is to prevent significant adverse impacts on fragile benthic species in deep water. While some benthic ecosystems are more vulnerable to disturbance than others, they are also differentially vulnerable to the impacts of different bottom fishing gears.

Gear type and how the gear is to be fished is an important component of the evaluation of any fishing plan. Gear impact should be evaluated as a product of:

- the typical seabed impact footprint per set or tow of the gear type to be used,
- the planned number of fishing events (to provide an estimate of the overall extent of physical impact),
- the likelihood of encountering vulnerable species in proposed fishing areas (including the proportion of planned deployments occurring in new areas), and
- the expected degree of impact by the gear type concerned.

This will enable an index of potential disturbance to be generated. Default rankings of expected level of impact by gear type are provided in Table 1. This ranking of gear impacts may be revised as necessary, following scientific analyses undertaken in the SIOFA Area.

Table 1 Ratings of benthic habitat and bycatch impacts for each gear class. Ratings scale from 1 (very low) to 5 (very high)

Gear class	Benthic habitat		Suggested consideration
	Physical	Biological	
Dredge	5	5	Not assessed
Gillnet – bottom	3	2	Not assessed
Gillnet – midwater	1	1	Not assessed
Hook and line (dropline)	1	1	None proposed
Longline – demersal	2	2	Impact on biological habitat likely higher than previously recognized
Longline – pelagic	1	1	Not assessed
Pots and traps	3	2	None proposed
Purse seine	1	1	Not assessed
Trawl – demersal	5	5	None proposed
Trawl – midwater	1	1	Some mid-water trawls targeting bentho-pelagic species come in contact with bottom

Sources: impact ratings were by Chuenpagdee et al. (2003) with rating considerations proposed by (Williams et al. 2011b), who only assessed and proposed considerations for gear types used by the Australian fishing fleet in the SPRFMO area.

6. Distribution of Vulnerable Marine Ecosystems

To implement bottom fishing management measures details of species or higher level taxa known or likely to contribute to VMEs in the Southern Indian Ocean, and the catching of which could indicate evidence of such VMEs, need to be established. The CMM 2016/01 states:

11. Until the Meeting of the Parties has acted on the Scientific Committee's advice on SIOFA threshold levels pursuant to paragraph 6(b), Contracting Parties, CNCPs and PFEs shall establish and apply to vessels flying their flag threshold levels for encounters with VMEs, taking into account paragraph 68 of the FAO Deep-sea Fisheries Guidelines. These threshold levels shall be disclosed in the measures referred to in paragraph 9(1).

12. Until the Meeting of the Parties has acted on the Scientific Committee's advice on the most appropriate response to a VME encounter pursuant to paragraph 6(c), Contracting Parties, CNCPs and PFEs shall require any vessel flying their flag to cease bottom fishing activities within:

(a) For bottom or mid water trawling, or fishing with any other net - two (2) nautical miles either side of a trawl track extended by two (2) nautical miles at each end;

(b) For longline and trap activities - a radius of one (1) nautical mile from the midpoint of the line segment;

(c) For all other bottom fishing gear types - a radius of one (1) nautical mile from the midpoint of the operation

where evidence of a VME is encountered above threshold levels established under paragraph 11 in the course of fishing operations. Contracting Parties, CNCPs and PFEs shall report any such encounter in their National Reports to the Scientific Committee in accordance with the guidelines at Annex 1, including any action taken by that Contracting Party, CNCP or PFE in respect of the relevant site.

Implementation of these measures requires definitions of:

- Evidence of a VME to trigger the move-on provisions of CMM 2016/01, described in paragraph 12 (a,b,c); and
- Existence of areas known or likely to contain VMEs, to trigger the management requirements of the relevant interim measure.

A protocol to determine 'evidence of a VME' is required to enable a rapid assessment and immediate management response during actual fishing operations at sea, to limit immediate impact on areas which appear to support significant quantities of VME species. In contrast, 'designating a VME' requires a scientific analysis to integrate data from individual encounters and assess information on occurrence of VMEs across larger spatial scales, in order to identify, map and designate areas which are considered to constitute actual VMEs.

Paragraph 119(b) of UNGA Resolution 64/72 states that States and RFMOs are to "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."

6.1. Detection of 'evidence of VMEs'

UNGA resolution 64/72 in paragraph 119 (c) calls on RFMOs and States to *establish and implement appropriate protocols for the implementation of paragraph 83 (d) of its resolution 61/105, including definitions of what constitutes evidence of an encounter with a vulnerable marine ecosystem, in particular threshold levels and indicator species, based on the best*

available scientific information and consistent with the Guidelines, and taking into account any other conservation and management measures to prevent significant adverse impacts on vulnerable marine ecosystems, including those based on the results of assessments carried out pursuant to paragraph 83 (a) of its resolution 61/105 and paragraph 119 (a) of the present resolution.

SIOFA CMM 2016/01 paragraph 12 is intended to apply in cases of unexpected interactions with VMEs during individual fishing operations, in areas where no other pre-determined management action has been implemented to prevent significant adverse impacts. In developing a protocol to detect evidence of a VME, the appropriate scientific analyses should be conducted and the following principles should be considered:

Principles for a Protocol to Identify 'Evidence of a VME'

- Evidence of a VME needs to be defined in a way which makes this measure implementable at sea. The protocol should be rapid to implement at the end of each tow or set, and should not require a high level of taxonomic identification expertise. Relatively few, higher order taxonomic groups should be used, rather than individual species or genera.
- The evidence must be defined in terms of benthic bycatch made during individual bottom fishing operations (e.g. trawl tows or line sets).
- Evidence should be derived from species which possess the characteristics considered to make them vulnerable to deep sea bottom fisheries, as defined in the FAO Guidelines. Emphasis should be placed on taxonomic groups which may contribute to forming VMEs (FAO 2008, Annex 1) in the SIOFA Area.
- A measure of quantity needs to be incorporated to allow the protocol to distinguish between a sporadic capture of a single organism which may not indicate evidence of a VME and a quantity of by-catch which is considered to constitute evidence of a VME.
- The thresholds chosen to indicate evidence of encounter with a VME should be based on analysis of bycatch data for the fishery and gear type concerned, or a comparable fishery using the same gear type. The thresholds should be also be precautionary.
- Higher ranks / scores should be accorded to species considered more vulnerable to fishing impacts, or which are considered to be strong indicators of VMEs. The protocol should also incorporate some measure of biodiversity, to accord higher scores to bycatches of many species, as opposed to a single species.

6.1.1. Designation of Taxa Constituting Evidence of a VME

The FAO Guidelines (paragraph 42) identify characteristics of species or communities that should be considered to be vulnerable to impacts of bottom fishing. Annex 1 of the FAO Guidelines provides examples of taxonomic groups of organisms which have those characteristics, and which could contribute to forming VMEs (FAO 2008). A CCAMLR VME Workshop (CCAMLR 2009) expanded on the FAO guidelines to develop a set of criteria that characterise species constituting VMEs:

Habitat-forming *– One of the main characteristics of the structural species within VMEs is the degree to which they create habitat that could be used by other organisms. Organisms that are large, with a strong three-dimensional shape, or which create a complex surface by clustering in high densities, or changing the character of the substratum (e.g. sponge spicule mats), create habitats for other organisms.*

Longevity *– Mortality of long-lived organisms can result in long recovery periods to regenerate unfished age structure, from decades to centuries. Vulnerability of these species is proportional to longevity.*

Slow growth *– Organisms which grow slowly will take a longer time to attain a large size or reproductive maturity. Slow growth rates of organisms are correlated with high longevity, but independent of age, slow growth requires longer times to generate maximum size.*

Fragility *– The potential for damage or mortality resulting from physical disturbance from bottom fishing gear.*

Larval dispersal potential *– The range of dispersal by larvae and propagules influences the ability of a species to recolonise impacted areas. Species which brood larvae, or otherwise have limited dispersal abilities, are less resilient to fishing disturbance because new recruits may not be available from a nearby source, and recruitment, recolonisation and recovery could be delayed. Organisms with high dispersal potential have a higher probability of supplying larvae to a disturbed area and are therefore more resilient.*

Lack of adult motility *– Motility in itself should not exclude taxa from being vulnerable or less resilient to bottom fishing gear, as organisms which can move to some degree may still meet all the other criteria of vulnerability. However, the lack of motility does add some degree of vulnerability and decreases resilience because as adults those organisms cannot redistribute themselves in response to a direct disturbance, adjust their position if altered in some way, or move into a disturbed area to recolonise.*

Rare or unique populations *– Vulnerable taxa containing species that create dense, isolated populations are intrinsically vulnerable because they have a more limited potential for recovery. This criterion also indicates vulnerability to physical disturbance and is independent of the habitat-forming characteristics of the taxon.* (CCAMLR 2009)

Taxonomic groups which meet the above criteria, and which have been encountered in bottom trawl fisheries in the SPRFMO Area, are described in Table 2. Taxa such as bryozoans and feathery hydroids have been excluded from this list because they are generally not retained by bottom fishing gears. Table 2 provides an example of taxonomic groups that could be used to identify evidence of a VME within the SIOFA area.

Table 2. Example of a list of taxonomic groups which could be used to identify evidence of a VME in the South Pacific Ocean, based on the work of Parker et al. (2009)

Taxonomic Group	**Common Name**
Phylum: Cnidaria	
Class Anthozoa:	
Order: Actiniaria	anemones
Scleractinia	stony corals
Antipatharia	black corals
Alcyonacea	soft corals
Gorgonacea	sea fans
Pennatulacea	sea pens
Class: Hydrozoa:	

Taxonomic Group	**Common Name**
Order: Anthoathecatae	
Family Stylasteridae	hydrocorals
Unidentified corals	corals
Phylum: Echinodermata	
Class: Crinoidea	sea lilies
Order: Brisingida	armless stars

Parker et al. (2009) describe a 'VME Evidence Protocol' for bottom trawl fisheries in the SPRFMO Area, combining the taxa with VME vulnerability scores and weight thresholds determined from analysis of historical New Zealand bottom trawl benthic by-catch data. This VME evidence protocol may be transferable to the SIOFA Area. VME taxonomic lists may need to be developed separately for separate regions of the SIOFA area, and for different gear types.

7. Bottom Fishery Impact Assessment Sections

The FAO Guidelines (FAO 2008) provide guidance on the content of impact assessments for deep sea fisheries:

47. *Flag States and RFMO/As should conduct assessments to establish if deep-sea fishing activities are likely to produce significant adverse impacts in a given area. Such an impact assessment should address, inter alia:*

i. type(s) of fishing conducted or contemplated, including vessels and gear types, fishing areas, target and potential bycatch species, fishing effort levels and duration of fishing (harvesting plan);

ii. best available scientific and technical information on the current state of fishery resources and baseline information on the ecosystems, habitats and communities in the fishing area, against which future changes are to be compared;

iii. identification, description and mapping of VMEs known or likely to occur in the fishing area;

iv. data and methods used to identify, describe and assess the impacts of the activity, the identification of gaps in knowledge, and an evaluation of uncertainties in the information presented in the assessment;

v. identification, description and evaluation of the occurrence, scale and duration of likely impacts, including cumulative impacts of activities covered by the assessment on VMEs and low-productivity fishery resources in the fishing area;

vi. risk assessment of likely impacts by the fishing operations to determine which impacts are likely to be significant adverse impacts, particularly impacts on VMEs and low-productivity fishery resources; and

vii. the proposed mitigation and management measures to be used to prevent significant adverse impacts on VMEs and ensure long-term conservation and sustainable utilization of low-productivity fishery resources, and the measures to be used to monitor effects of the fishing operations.

48. Risk assessments referred to in paragraph 47 (vi) above should take into account, as appropriate, differing conditions prevailing in areas where DSFs are well established and in areas where DSFs have not taken place or only occur occasionally. (FAO 2008)

Following these guidelines, BFIA for proposed bottom fishing activities in the SIOFA Area should provide information under the following sections:

7.1.1. Description of the Proposed Fishing Activities

Assessments shall contain a detailed fishing plan, providing a quantified description of the planned fishing activities, including:

- Details of the vessels to be used, providing all vessel data required in terms of the SIOFA
- Data Standards for vessel data, and confirmation that they appear on the list of approved
- SIOFA vessels submitted by flag states to the SIOFA Secretariat.
- Detailed description of fishing methods (trawls, hook and lines, traps, gillnets, tangle nets) to be used, including a description and gear plan, providing the information

needed to evaluate potential impacts, such as net or bottom line types, net dimensions or bottom line lengths / number of hooks, trawl-door type, size and weight, footrope dimensions and type, ground gear (bobbins, rock-hopper gear, etc), range in fishing height off bottom, net opening and any factors affecting gear selectivity.

- Seabed depth range to be fished.
- Target species, and likely or potential by-catch species.
- Intended period and duration of fishing.
- Effort indices: How many vessels, how many tows (cumulative effects), estimated tow durations or distance (ranges).
- Estimated total catch and discard quantities by target and bycatch species.

In instances where new or exploratory fisheries are being undertaken, assessments shall provide a quantified description of the planned fishing activities, including:

- Details of the vessels to be used, providing all vessel data required in terms of the SIOFA Data Standards for vessel data, and confirmation that they appear on the list of approved SIOFA vessels submitted by flag states to the SIOFA Secretariat.
- Detailed description of fishing methods (trawls, hook and lines, traps, gillnets, tangle nets) to be used, including a description and gear plan, providing the information needed to evaluate potential impacts, such as net or bottom line types, net dimensions or bottom line lengths / number of hooks, trawl-door type, size and weight, footrope dimensions and type, ground gear (bobbins, rock-hopper gear, etc.), range in fishing height off bottom, net opening and any factors affecting gear selectivity.
- Seabed depth range to be fished.
- Target species, and likely or potential by-catch species.
- Intended period and duration of fishing.
- Effort indices: How many vessels, how many tows (cumulative effects), estimated tow durations or distance (ranges).

Given the nature of new or exploratory fisheries, the expected or planned characteristics of the fishery in terms of the above information should be provided. Once the new or exploratory fishery has concluded, detailed quantification of the above information should be submitted to the Secretariat.

7.1.2. Mapping and Description of Proposed Fishing Areas

Maps of the proposed fishing areas in relation to available information on VMEs and seabed bathymetry should be presented including:

- Maps of the intended fishing areas, at the appropriate resolution (see Appendix B) in relation to the most recent SIOFA maps of historically fished areas.
- Mapping of results of predictive habitat models for VME species occurring in the SIOFA Area

- Area, or topographic features likely to support such VMEs, including geospatial data available from the Secretariat on predicted distribution of VMEs and topographic features.
- Mapping of all known VMEs, or evidence of VMEs, in the proposed fishing areas, in particular, all geospatial data available from the Secretariat on distributions of known VMEs or evidence of VMEs.
- Baseline data and description of the proposed fishing areas, presenting any available information that might be useful to assessing the potential impacts of fishing – such as past history of fishing, seabed type, depth ranges, location / presence of any known seabed topographic features and VMEs.

Where possible, the SIOFA Secretariat will make the SIOFA geospatial maps of VMEs, predicted VME habitat, bathymetry and historically fished areas available to facilitate mapping of proposed fishing activities in context with this baseline geo-spatial information.

To facilitate evaluation of the relationship between proposed fishing areas, an appropriate SIOFA bottom fishing footprint and existing VME maps, participants should provide all maps related to proposed fishing activities to the Secretariat in a compatible GIS format, for inclusion in the SIOFA geo-spatial database (where possible, noting confidentiality restrictions).

7.1.3. Impact Assessment

Scoping of Issues of Concern

The initial step in a risk assessment process should be a scoping. This includes explicitly stating the management objectives against which the risk will be assessed and the identification of all of the potential issues of concern (hazards) related to the proposed fishing activities. These will be guided by the UNGA Resolutions 61/105 and 64/72, the SIOFA CMM 2016/01 and the FAO Guidelines.

The risk assessments should evaluate the potential impact of the 'hazards':

- Fishing activity, this will need to be evaluated for each gear type used by a participant's vessels (e.g. trawling, longlining, etc.)
- Loss of bottom fishing gear, including the risk of ghost fishing and ongoing physical impact of lost gear.
- For each activity (hazard) to be evaluated a brief description of the expected impacts should be provided, in terms of what may be affected and how.

Risk Assessment

The level of risk posed by each activity (hazard) should be assessed in a transparent, scientific manner. Determining the level of risk for each activity should be based on quantifiable criteria where possible. Where qualitative criteria are used due to data gaps, qualitative judgements should be underpinned as far as possible by quantitative analyses, and sufficient documentation should be provided to enable the Scientific Committee to determine if the assigned risk levels are appropriate.

In determining the level of risk (low, medium, high) posed by an activity, the elements that should be specifically evaluated are:

1. **Intensity -** The intensity or severity of the impact at the specific site affected. This may be quantified by previous studies or an expert evaluation of the magnitude of the impact. e.g. *None* (no detectable impact); *Low* (some physical damage to some

taxa/colonies); *Medium* (substantial damage to a small proportion of colonies/taxa, or small damage to a large number of taxa at the site, likely to modify biological and ecological processes e.g. reproduction) or *High* (significant damage to a significant proportion, where environmental functions and processes are significantly altered such that they temporarily or permanently cease).

2. **Duration –** how long the effects of the impact are likely to last.
3. **Spatial extent** – The spatial impact relative to the extent of the VMEs (e.g. will fishing impact 5%, 30% or 80% of the VME distribution) and whether there may be offsite impacts (e.g. will reproduction be impacted at a broader spatial scale).
4. **Cumulative impact** - The frequency of the impact will influence the risk, with activities occurring repeatedly at a site likely to have a greater risk. This will depend on the amount of fishing effort and should be considered in relation to the recovery of the VMEs/taxa.

Overall Risk. The overall risk ranking of an activity is then evaluated from the combination of the criteria used. The method for combining these criteria to assign low, medium or high risk to an activity should be detailed in the assessment report.

- Low: Where the impact will have a negligible influence on the environment and no active management or mitigation is required. This would be allocated to impacts of low intensity and duration, but could be allocated to impacts of any intensity, if they occur at a local scale and are of temporary duration.
- Medium: Where the impact could have an influence on the environment, which will require active modification of the management approach and / or mitigation. This would be allocated to short to medium-term impacts of moderate intensity, locally to regionally, with possibility of cumulative impact.
- High: Where the impact could have a significant negative impact on the environment, such that the activity(ies) causing the impact should not be permitted to proceed without active management and mitigation to reduce risks and impacts to acceptable levels. This would be allocated to impacts of high intensity that are local, but last for longer than 5-20 years, and/or impacts which extend regionally and beyond, with high likelihood of cumulative impact.

The risk assessment should be based on criteria that are independent, such that they provide separate measures of risk. Criteria should also be quantifiable, preferably with the method of quantification and ranking categories determined beforehand.

If a robust stock assessment for deep sea stocks is available, with relevant reference points, this would constitute a high standard of risk assessment; the outputs of the stock assessment, relative to the reference points, indicates the risk to the stocks. This should be worked towards for key stocks.

Where there are data limitations a robust expert based risk assessment should be used which considers the criteria above.

Examples of different risk assessment approaches include:

- CSIRO Ecological Risk Assessment for Effects of Fishing: ERAEF is a hierarchical framework that moves from a Level 1 qualitative analysis through to a more focussed semi-quantitative Level 2 to Level 3 which is model based and fully quantitative. This approach leads to a rapid identification of high risk activities, and evaluation of how fishing impacts on ecological systems (Hobday *et al*. 2007).
- ICES: There have been two main approaches to assessing the sensitivity of habitat to fishing: i) ranking sensitivity of habitat units (physical and biological) to

disturbance; and ii) ranking the impacts of the gear. ICES conclude that these approaches should be combined.

- NOAA EIS: Spatial and temporal analysis of the distribution of habitat type, distribution of biota, habitat use, habitat sensitivity, dynamics of fishing effort.
- MarLin: Approach consists of i) Identify "key / important" species in habitat/biotype; ii) Assess biotype sensitivity based on key species; iii) Assess recoverability of key/important species (Tyler-Walters *et al*. 2001).
- UK Department for Environment, Food & Rural Affairs: (DEFRA) Guidelines for Environmental Risk Assessment and Management.
- CCAMLR An impact assessment framework for bottom fishing methods in the CCAMLR convention area (Sharp et al. 2009).

Interactions with VMEs

This section should specifically address the expected and potential interaction and impacts of the proposed fishing gear on VMEs:

- What impacts are likely to result from the fishing gears to be used? All impacts should be identified, characterised and quantified or ranked. All interactions of fishing gear with the seabed will have some impact, but the nature and severity will be species / habitat dependent. Information on known or likely species and habitats in the proposed fishing area should be used to evaluate potential impacts of the fishing gears to be used.
- What will the probability, likely extent (% of habitat targeted) and intensity of the interaction between the proposed fishing gear/targeting practices on the VMEs in the proposed fishing areas be?
- What are the characteristics of the habitats and benthic communities which may be impacted? Are the fished seabed features likely to support VMEs? Do these VMEs include fragile or biogenic habitat-forming species? What proportion of the estimated distribution range of these VMEs areas will the proposed fishing activities impact? How widespread or rare are the VMEs / species? How vulnerable are the VMEs to impact by the fishing gears to be used?
- How diverse is the ecosystem in the proposed fishing areas, and will the fishing activity reduce this biodiversity? Do the proposed fishing areas contain rare species which do not occur elsewhere? What are the levels of endemism - could fishing lead to localised / global extinctions?
- What is the likely spatial scale and duration of the impacts? Will impacts be cumulative with previous impacts in the area? The overall scale of impact will be the product of spatial scale, duration and cumulative impact on VMEs and low productivity resources. Loss of substantial areas of habitat forming coral could have a prolonged impact on the environment, whereas other faunal groups may be able to recover quickly. To the extent possible, rates of recovery, regeneration and re-colonisation should be quantified or estimated.
- Are there any other threats or issues of concern expected from the proposed fishing activities, such as gear loss and ghost fishing, incidental bycatch discards, protected or endangered species mortalities, effects on ecosystem functioning?

In instances where new or exploratory fisheries are intended to be undertaken the assessment should include:

- What impacts are likely to result from the fishing gears to be used? All impacts should be identified, characterised and ranked. Information on known or likely species and habitats in the proposed fishing area should be used to evaluate potential impacts of the fishing gears to be used.
- What will the probability, likely extent (% of habitat targeted) and magnitude of the interaction between the proposed fishing gear / targeting practices on the VMEs in the proposed fishing areas be?
- What are the characteristics of the habitats and benthic communities which may be impacted? Are the fished seabed features likely to support VMEs?
- How diverse is the ecosystem in the proposed fishing areas, and will the fishing activity reduce this biodiversity? Do the proposed fishing areas contain rare species which do not occur elsewhere?
- What is the likely spatial scale and duration of the impacts? The overall scale of impact will be the product of spatial scale, duration and cumulative impact on VMEs and low productivity resources. To the extent possible, rates of recovery, regeneration and re-colonisation should be quantified or estimated.
- Are there any other threats or issues of concern expected from the proposed fishing activities, such as gear loss and ghost fishing, incidental bycatch discards, protected or endangered species mortalities, effects on ecosystem functioning?

Where quantitative risk assessment approaches are used, evaluations of interactions will be directly provided by those assessments.

7.1.4. Information on Status of the Deep-sea Stocks to be Fished

This section should provide information on the estimated state of the deepwater stocks of the intended target and by-catch species. Such information should include:

- A list of the intended target and likely by-catch species.
- Tables of historic catches and catch trends of these species in the intended fishing area.
- Tables, figures of analyses of historic nominal and/or standardised CPUE trends in these species.
- Results of any surveys conducted on the stocks to be fished.
- Results of the most recent stock assessments that have been conducted for the stocks to be fished, if any such stock assessments have been conducted.
- Any other information relevant to understanding the status and sustainability of target and bycatch species.

In instances where new or exploratory fisheries are being undertaken the assessment should include:

- A list of the intended target and likely by-catch species.
- Tables of historic catches and catch trends of these species in the intended fishing area, if available.
- Results of any surveys conducted on the stocks to be fished.
- Results of the most recent stock assessments that have been conducted for the stocks to be fished.

- Any other information relevant to understanding the status and sustainability of target and bycatch species.

Predictive Stock Assessments

Representative abundance indices for deepwater fish stocks are generally not available for use in quantitative stock assessments. Under such circumstances, predictive modelling approaches, could be attempted. Such predictive approaches can use indices of abundance of deepwater species from historical fisheries, related to topographic and oceanographic predictor variables, particular seamount size, height, profile, latitude and longitude, to predict abundance of those species in other areas. Clark et al. (2010) provide an example of such an approach for orange roughy fisheries on seamounts in the western SPRFMO Area.

7.1.5. Monitoring, Management and Mitigation Measures

Monitoring, management and mitigation measures would be expected to address the risks identified in the impact assessment. This section should detail proposals for how the fishing activities will be planned and managed to avoid or minimise significant adverse impacts on VMEs and ensure long term sustainability of deep sea fish stocks. There should be a detailed description of specific monitoring, management and mitigation measures that are currently in place or planned to be implemented to reduce impacts to acceptable levels. Proposed management measures must be specifically designed to achieve the following results for each level of significance.

Effective monitoring measures should be implemented to ensure the effectiveness of the measures and to detect any change in the degree of impact which would prompt the need for a re-assessment.

In addition to proposed management or mitigation measures, the following monitoring measures should be implemented including the use of observers, should follow the SIOFA Data Standards and include:

1. VMS positional information should be collected in accordance with the SIOFA Data Standards. Provide details of VMS systems to be operated on vessels, including who these will report to, reporting frequency and reporting accuracy.
2. Details of catch and effort data collection systems to be used, including catch and effort reporting systems to the flag states concerned, and additional systems to be implemented specifically for the proposed activity. Report how these data collection systems comply with the SIOFA Data Standards. These monitoring systems should specifically address how retained and discarded by-catches are to be monitored and reported. There should also be reporting systems in place to record whether a VME has been encountered during fishing.
3. Details of any scientific observer coverage planned for the proposed fishing activity, including levels of coverage, how deployments will be designed to achieve statistically representative coverage of the proposed fishing activities, and what information observers will be collecting. Observer data should be collected in accordance with the SIOFA Observer Data Standard.
4. Description of the data that will be provided to the SIOFA Secretariat for the fishing activity including, as a minimum, data required in terms of the adopted SIOFA data standards, but also describing other information (e.g. seabed bathymetry or mapping, VME identification and characterization) that will be provided. Details regarding the reporting of evidence of a VME to the SIOFA Secretariat should be included.

Where quantitative risk assessment approaches are used, these approaches should also be used to evaluate the effectiveness of proposed mitigation measures, by quantitatively evaluating the reduction in risk resulting from those mitigation measures (see e.g. Penney & Guinotte 2013).

8. New and Exploratory Fisheries

The bottom fishing impact assessment for new and exploratory fisheries would be expected to consider all the elements of Section 7, except where differences have been identified. The following section describes these differences.

8.1. Description of the Proposed Fishing Activities

The estimates of total catch and discard quantities would not be available given the nature of the fisheries and so estimates of the other factors, such as fishing duration, number of tows and potential catch rates should be provided. Once information is available from the new or exploratory fishery the impact assessment would be updated using this data.

8.2. Impact Assessment

Where little information is available, predictive approaches should be used to evaluate the likelihood of interaction with, and potential impact on, VMEs. All assumptions used in the impact assessment should be clearly stated. This section should include a trigger for when a new assessment should be completed.

8.3. Information on Status of the Deepwater Stocks to be Fished

Predictive approaches and information from other fisheries should be used to inform the assessment of impact on deepwater stocks to be fished.

8.4. Monitoring, Management and Mitigation Measures

In situations where new or exploratory fisheries are being undertaken monitoring and precautionary measures are critical. As outlined in the FAO Guidelines:

65. *Precautionary conservation and management measures, including catch and effort controls, are essential during the exploratory phase of a DSF, and should be a major component of the management of an established DSF. They should include measures to manage the impact of the fishery on low-productivity species, non-target species and sensitive habitat features.*

Implementation of a precautionary approach to sustainable exploitation of DSFs should include the following measures:

i. precautionary effort limits, particularly where reliable assessments of sustainable exploitation rates of target and main by-catch species are not available;

ii. precautionary measures, including precautionary spatial catch limits where appropriate, to prevent serial depletion of low-productivity stocks;

iii. regular review of appropriate indices of stock status and revision downwards of the limits listed above when significant declines are detected;

iv. measures to prevent significant adverse impacts on vulnerable marine ecosystems; and

v. comprehensive monitoring of all fishing effort, capture of all species and interactions with VMEs

875 Therefore, assessments for new or exploratory fisheries must include a description of the monitoring, mitigation and precautionary management measures that will be in place, as outlined above. Details regarding the reporting of evidence of a VME to the SIOFA Secretariat should be included.

9. References

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