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Paper for the Seventh Meeting of the Scientific Committee of the South Pacific Regional Fisheries Management Organisation

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Introduction

This paper addresses the issue of thresholds and the encounter protocol for the bottom fishing measure CMM 03-2019. It concludes that the 99% threshold is crucial, as well as arbitrary and extreme, and that the policy choice of a percentile threshold is ultimately one for the Commission, applying the precautionary approach and other provisions of the SPRFMO Convention and following the applicable United Nations General Assembly Resolutions and FAO Deep Sea Guidelines.

Thresholds

The task of this SC is clearly stated in paragraph 36 of CMM 03-2019:

> At its annual meetings in 2019 and 2020, the Scientific Committee shall review and provide advice on the effectiveness of the applied management measures, including:
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> • VME indicator thresholds;
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> • The number of encounters;
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> • The number of encounters that were expected based on habitat suitability models;
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> • The appropriateness of the management approach (e.g. scale);
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> • Additional relevant VME indicator species that have not been modelled, assessed or for which thresholds have not been established;
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> • Refinement of the encounter protocol;
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> • Measures to prevent the catch and/or impacts on rare species; and
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> • Anything else the SC considers relevant to ensure the measure is achieving its objective and the objectives of the Convention.

One crucial issue this SC needs to address is the VME indicator thresholds.

CMM 03-2019 notes[1] UNGA resolution 61/105 (206), which provides that 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, and UNGA Resolution 64/72 (2009), which specifically called upon RFMOS[2] to establish and implement appropriate encounter protocols, including definitions of what constitutes evidence of an encounter with a VME, in particular threshold levels and indicator species; and to implement the FAO International Guidelines for the Management of Deep-sea Fisheries in the High Seas in order to sustainably manage fish

stocks and protect VMEs. It then went on to note UNGA resolution 71/123 (2016), which called on RFMOs to use the full set of criteria in the FAO Guidelines to identify where VMES occur or are likely to occur as well as for assessing significant adverse impacts[3] and resolution 72/72 (2017) which noted the need to improve effective implementation of thresholds and move-on rules.[4]

Both the resolutions and the citation of the resolutions are important: over 11 years, the resolutions not only repeat the importance of the encounter protocol but the importance of implementation of thresholds and move-on rules, to achieve the overall purpose, which is the avoidance of significant adverse impacts (SAIs) on VMEs. To this end, they note the FAO Deep-sea Fisheries Guidelines description of what constitutes significant adverse impacts, factors to be considered when determining the scale and significance of an impact, what constitutes temporary impacts and factors to be considered in determining whether an impact is temporary.

The thresholds are set out in paragraph 28 of CMM 03-2019: they are triggered where VME indicator taxa are encountered in any one tow at or above the threshold limits in Annex 6A, or three or more different VME indicator taxa at or above the weight limits in Annex 6B. But what is not explicit is how those threshold limits were arrived upon.

Pitcher et al (2019) has identified very serious deficiencies in CMM 03-2019: "The results of this work provide strong objective evidence that there are considerable and demonstrable uncertainties as to whether CMM 03-2019 is meeting (or will meet) the objective to manage and prevent SAIs on VMEs at local/site scales, population scales, and regional scales." The paper recommends that the SC:

> "Agrees that there is very high uncertainty with regard to whether CMM 03-2019 will achieve the objective of preventing SAIs on VMEs at local/site, population and regional scales, and in the face of this uncertainty agrees that until full review of the measure is undertaken in 2021, more precautionary VME bycatch trigger levels would help to mitigate and minimise risks of SAIs on VMEs until key uncertainties can be resolved."

This paper underlines that the objective of the CMM will not be achieved.

The catchability paper DW-14[5] notes that:

> Using threshold values of 250 kg for stony corals and 50 kg for sponges that trigger an encounter protocol under CMM 03-2019, the biomass of impacted taxa can be predicted across a gradient of catch efficiencies (Fig.1). For example, at a catch efficiency of 5%, 5000 kg of coral and 1000 kg of sponges would be impacted. Further, strong positive relationships between the biomass of coral and the diversity of associated fauna (Jensen and Frederiksen 1992) suggest the impact of removing 5000 kg of coral could result in the mortality of many thousands of individuals associating with the coral habitat.

It is clearly crucial to bear in mind the broader implications of destroying coral habitat and associated taxa. Further, the paper suggests that: "data should be collected from headline and net cameras deployed on commercial trawls, with per-trawl catchability estimates derived from comparisons of the biomass of VME indicator taxa landed on deck with estimates of seabed biomass from the headline and net cameras." This a helpful suggestion, but it is important to be cautious with the implications. In Table 5, the mean trawl biomass estimate for Gorgonacea is less than 1%, yet there can be little doubt that if any Gorgonacea is caught in the net, the net has gone through a coral garden and destroyed it. For instance, if the maximum is set at 0.01, then it must be assumed the tow caught 3500 kg of corals. The paper earlier this year by Clark et al[6] shows that the resilience of deep-sea coral and sponge ecosystems are low, and recovery times are long, at least in the order of several decades.

The Pitcher et al paper SC7-DW21[7] makes a similar point when it observes that:

> "Based on the assumptions in Appendix 1, a trawl catch of 250 kg of corals could scale to a seabed contact of more than 33–104 t of corals on the seabed. Given the estimated impact proportion of 0.82 (Mormede et al. 2017), this contact range may translate to seabed impacts of more than 27–85 t." Simply stated, 250 kg of corals in a net can translate to 104 tonnes of corals destroyed on the seabed. This is borne out by sampling: "even when cover of *Solenosmilia* is very substantive (consistent with 'VME habitat' as defined by FAO 2009) the catches by the sled are small (only ~1–3 kg/Ha at 40–50% cover black fitted line and CIs) — even though sleds typically catch ~17–55× more coral than trawls."… "A trigger-level catch of 250 kg of corals …by a typical SPRFMO trawl,… would correspond to very large biomass contacts and impacts on the seabed."

However, DW-13, the companion paper on VME indicator taxa,[8] make essentially the opposite argument: it claims that "These higher thresholds allow a rapid response to benthic bycatch events (e.g., via a move-on rule) in cases where high VME indicator bycatch suggests that the predicted distributions of VME taxa used to underpin the spatial management measures were misleading." From the above assumptions, if 250 kg of stony corals have been caught, then it is likely that 5000 kg or more have been destroyed. In no way is this precautionary.

Moreover, the exclusion of other taxa is explained as "[t]he ten taxa did not include some groups explicitly mentioned by the FAO guidelines as examples of VMEs because they had not been previously encountered as bycatch in the area (e.g., xenophyophores), were poorly retained by fishing gear (e.g. bryozoans), or were deemed difficult to identify in the field by observers (e.g. hydroids)." Being difficult to identify by observers or being poorly retained in fishing gear does not justify their exclusion: quite the reverse, it justifies a low threshold for them.

Choice of the percentile

In estimating the level of VME by-catch to trigger a move-on SC6-DW09 estimated a percentile of by-catch caught per VME indicator taxon including sponges, a range of corals sea pens and brisingida. The SC6-08 table 4 includes a range of options for percentage ratio that could be used from 0.8 to 0.995.[9]

The 99% thresholds for the move-on rule is both arbitrary and extreme. The current CMM3-2019 uses those extreme values in calculating the thresholds for the move-on rule rather than precautionary values. A 99% threshold level means that very few encounters will be considered to be potential VMEs and a threshold was not set for Stylasteridae (Hydrocorals), Pennatulacea (sea pens), Crinoidea (sea lillies), or Brisingida ('armless' stars). As indicated by SC-7-DW21, Pitcher *et al* 2019, the impacts of bottom fishing on VME indicator species is much greater than the quantity that ends up in the nets. "[A] trawl catch of 250 kg of corals could scale to a seabed contacts of more than 33-104 t of corals on the seabed". Based on an impact ratio of 0.82 from Mormede et al (2017)[10] this would translate to seabed impacts of 27-85 t for slope and a 0.24 ratio for UTF results in 6-19t for hills and other features (Appendix 1 in Pitcher *et al* 2019/DW21). The ratio is an estimate of the area impacted within a footprint. As Mormede *et al* note "fishing effort at repeatedly fished locations near the summit of preferred seamounts is still sufficiently concentrated that the cumulative impact approaches 100%". The 0.24 ratio is then likely to be an under-estimate of the impact on VMEs.

Table1 includes the range of uncertainty that is included in Table 4 from SC6-DW-09 for Scleratinia stony corals. The table shows that the percentile chosen is crucial: if the 80th percentile is chosen, 5 kg in the net represents between 0.7 to 2 tonnes destroyed on the slope, or

0.5 to 1.7 if it is assumed that 18% is not destroyed. But that figure swells to 33-104 and 27-85 tonnes for the 99th percentile, for 250 kg caught in the net.

Table 1

Percentile	80	90	95	98	99
Stony Corals - threshold: (tonnes)[11]	0.05	0.010	0.020	0.060	0.250
Impact slope (tonnes)	0.7-2	1-4	2-8	8-25	33-104
- **Ratio 0.82[12] (tonnes)**	0.5-1.7	1-3	2-7	6-20	27-85
Impact UTF (tonnes)[13]	0.5-1.6	1-3	2-6	6-19	25-79
- **Ratio 0.24**	**0.1-0.4**	**0.2-0.8**	**0.5-1.5**	**1.5-4.5**	**6-19**

The choice of 0.99 percentile is critical: for Scleractinia (Stony corals), it results in a 250 kg threshold, whereas a 0.80 percentile would result in a 5 kg threshold (Table 6). The choice of those percentiles was explained as "[t]hese percentiles were chosen for consistency with the approach used to select the encounter thresholds currently included in SPRFMO CMM03-2019, as outlined in SC6-DW09". This is a circular argument, ultimately relying on the political choice made in CMM03-2019: that paper stated that "[t]he choice of threshold weights within an encounter threshold should also informed by the advice of the SPRFMO Scientific Committee that the threshold for triggering the move-on rule should be high and triggered by rare and large catches of VME taxa that suggest the models used to predict the distribution of VME taxa are misleading." It went on to argue that: (3.2)

> It is not known what bycatch level is biologically significant without further study of the catchability of key taxa and how catches relate to the presence of habitats that constitute VMEs. These uncertainties led us to a pragmatic approach that sets thresholds for triggering a move-on rule relatively high such that they might suggest that the models used to predict the habitat suitability for VME taxa are misleading. We therefore propose using the 99th percentiles of the distributions of positive historical catch records in New Zealand databases for the six most commonly-caught high-level VME indicator taxa as threshold weights for an encounter protocol (Table 7). The four less commonly-caught taxa (for which there are insufficient data) are included within a "biodiversity component" of our proposed encounter protocol.

In other words, the 99th percentile was chosen due to (1) uncertainties including catchability of taxa and (2) adoption of a "pragmatic approach that sets thresholds for triggering a move-on rule relatively high".

Yet the SC7-DW14 paper makes it clear that the low catchability of taxa means that taxa brought up in the net means that the low catch efficiency means that far more taxa is destroyed so that, for instance, "impact of removing 5000 kg of coral could result in the mortality of many thousands of individuals associating with the coral habitat."

Penney's 2014 paper,[14] citing Parker (2008),[15] explained the choice as follows:

> Parker (2008) used the cumulative weight frequency distributions from the analyses shown in Figure 3 to determine a range of threshold weights for each VME taxon, at 50%, 75%, 80% and 90% (see Table 2, e.g. 75% of the tows retained less than 100 kg of Actiniaria). He notes that the choice of which cumulative weight percentile to use to as a threshold weight indicating evidence of a VME encounter is a management choice somewhere between presence/absence (no weight threshold), and an excessively high weight threshold that would be triggered only by rare large bycatches of corals and sponges. He provides a rationale for the choice of the median (50%) cumulative weight level, largely based on the fact that fragile and habitat forming VM species such as corals and hydrozoans are poorly retained by bottom trawl nets, so that "a low weight in the catch indicates much higher densities on the seafloor".

DSCC have already submitted to the Scientific Committee that the 99th percentile is far from precautionary, as well as being arbitrary. The SC-6 report noted that: (para 75)

> The SC discussed which of the potential percentiles identified in the analysis would be appropriate to apply as a high threshold, as recommended by SC5. **Although the selection of a particular threshold from the list of candidate thresholds identified by the analysis is somewhat arbitrary,** there was agreement that the 99th percentile was more likely to indicate that the threshold represented evidence a VME had potentially been encountered than a lower threshold (particularly for longer duration tows). DSCC observed that other RFMOs use lower percentiles, for example in NAFO a percentage of 75% is used for bycatch in research trawl surveys.

SC7-DW-14 shows that the crucial justification that "the 99th percentile was more likely to indicate that the threshold represented evidence a VME had potentially been encountered than a lower threshold (particularly for longer duration tows)" is unsupportable, since the low catchability of the taxa means the reverse is true: the low catch efficiency shows that a higher threshold is needed.

This approach specifically breaches the objective of the SPRFMO Convention, Article 2, in not applying a precautionary approach and not safeguarding the marine ecosystems.[16] The precautionary approach is spelled out in Article 3[17] of the SPRMFO Convention. Specifically, when the Commission are deliberating, they must be more cautious when information is uncertain, unreliable, or inadequate; and must not use the absence of adequate scientific information as a reason for postponing or failing to take conservation and management measures.

These conclusions are borne out by a comparison of RFMO thresholds in the **attached** table. NEAFC uses 30 kg of coral, NAFO 60 kg, SEAFO 60 kg, NPFC 50 kg and SIOFA (per country) 50-60. These are similar to the analysis in paper SC7-DW18 but when reading that paper, it is crucial to bear in mind that the measures taken by other RFMOs were taken precisely because the UNGA resolutions 61/105, 64/72 and 70/72 called on them to do so, as it called on SPRFMO to do so, and the UN FAO Deep Sea Guidelines provide the technical guidelines to do so.

It should also be noted that the new VME records from photographic surveys (SC7-DW12) shows that habitat suitability results can be affected by new records (i.e. new records of species in the area, or bycatch taken in areas that previously had not been recorded) and understanding of species distribution.

Conclusion

The percentile chosen for the threshold, and the current 99th percentile choice, is the crucial issue that the SC now faces advising on. Other RFMOs use lower percentiles: for example in NAFO a percentage of 75% is used for bycatch in research trawl surveys. The justification for the 99th percentile is not borne out by the two New Zealand papers, and in fact the companion paper shows that the reverse is true and a much lower (even lower than 80%) is justified. It is very clear from the above discussion that

(1) the percentile choice needs to be precautionary;

(2) the 99% percentile is extreme and thus extremely non-precautionary and

(3) the ultimate choice is for the Commission.

This conclusion is strongly supported by the SC-7-DW17 recommendation that the SC should "Agrees that there is very high uncertainty with regard to whether CMM 03-2019 will achieve the objective of preventing SAIs on VMEs at local/site, population and regional scales, and in the face of this uncertainty agrees that until full review of the measure is undertaken in 2021, more precautionary VME bycatch trigger levels would help to mitigate and minimise risks of SAIs on VMEs until key uncertainties can be resolved." In addition, SC advice a risk assessment and consequences of each choice would be welcome.

Comparison of VME RFMO Trawl Encounter Protocols

RFMO	Trawl Threshold	Encounter Protocol
NEAFC	30 kg coral or 400 kg sponges for trawls (2018)[18]	An area extending 2 nm from both sides of the entire length of the tow will be temporarily closed. Temporary closure applies to all vessels and the NEAFC Secretariat notifies all parties that an encounter has occurred. Temporary closure in place until PECMAS advises.
NAFO	Catch per set (e.g. trawl tow, longline set, or gillnet set) of more than 7 kg of sea pens, 60 kg of other live coral and 300 kg of sponges. [19]	Reporting the encounter to the Contracting Party, ceasing fishing, and moving at least 2 nautical miles away from where the encounter was recorded. NAFO observers are only required to report VMEs if they are encountered outside the fishing footprint (Article 22 (b)). The positions of these vulnerable marine indicators must be reported by the vessel master to the flag state, who in turn must notify the NAFO Secretariat without delay. The flag State may also allow the Master to report directly to the Executive Secretary. The flag State must issue an immediate alert of the encounter to all fishing vessels entitled to fly its flag. It must consider temporarily closing a two mile radius around any reported VME encounter location outside of footprint, unless the Scientific Council does not conclude that the area covered by a temporary closure consists of a VME.
SEAFO	60 kg of live coral and 600 kg of live sponge except 60 kg coral and/or 400 kg sponges for new fishing areas. (bottom trawls) (2015)[20]	Bottom trawl vessels are required to cease fishing and move 2 nm away from the end point of the trawl tow "in the direction least likely to result in further encounters".
NW Pacific	50 kg coldwater corals. Cold water corals include: Alcyonacea,	Members of the Commission shall require vessels flying their flag to cease bottom

	Antipatharia, Gorgonacea, and Scleractinia. [21] SC is to develop an encounter protocol.[22]	fishing activities in that location. In such cases, the vessel shall not resume fishing activities until it has relocated a sufficient distance, which shall be no less than 2 nautical miles, so that additional encounters with VMEs are unlikely. All such encounters, including the location and the species in question, shall be reported to the Secretariat, who shall notify the other Members of the Commission so that appropriate measures can be adopted in respect of the relevant site.
SPRFMO	Where VME indicator taxa are encountered in any one tow at or above the threshold limits in Annex 6A: Phylum Porifera 50 Phylum Cnidaria: Class Anthozoa: Order Scleractinia Stony corals 250 Order Antipatharia Black Corals 5 Order Alcyonacea True soft corals 60 Informal group Gorgonacea Seafan octocorals 15 Order Actiniaria Anemones 4023 Or three or more different VME indicator taxa at or above the weight limits in Annex 6B: Phylum Porifera Sponges 5 Phylum Cnidaria Class Anthozoa: Order Scleractinia Stony corals 5 Order Antipatharia Black corals 1 Order Alcyonacea True soft corals 1 Informal group Gorgonacea Seafan octocorals 1 Order Pennatulacea Sea pens 1	1 NM, report encounter to flag State and Secretariat. Bottom fishing is suspended in the encounter area until the Commission determines management actions that would permit the resumption of bottom fishing in the area.

	Order Actiniaria Anemones 5 Class Hydrozoa Order Anthoathecatae Family Stylasteridae Hydrocorals 1 Phylum Echinodermata Class Asteroidea Order Brisingida Armless stars 1 Class Crinoidea Sea lillies 1	
SIOFA	Under development. The thresholds are set by individual fishing countries, pending thresholds to be adopted by SIOFA. Australia: The VME threshold limits which trigger Australia's move-on rule are 50 kg of corals or sponges per tow for trawlers. [24] Cook Islands: 60 kg of live coral and/or 400 kg of live sponge, then 2nd encounter of 30 kg coral/200 kg sponges. [25] Japan: 50 kg coral.[26]	Australia: 2 NM[27] Japan: 1 NM. Cook Islands: If subsequent trawl contains more than 30 kg of coral or 200 kg of sponges, must move away 5 NM and report, pending investigation. However, if the vessel deploys an underwater camera system on the trawl net, and the Cook Islands Observer verifies that no substantial VME structures (such as a Cold water reef community) are present, fishing can continue.[28]
CCAMLR	Bottom trawling prohibited.[29]	

[1] NOTING United Nations General Assembly (UNGA) Resolution 61/105 which calls 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;
FURTHER NOTING UNGA Resolution 64/72 which calls upon RFMOs to establish and implement appropriate protocols for the implementation of UNGA Resolution 61/105, including definitions of what constitutes evidence of an encounter with a VME, in particular threshold levels and indicator species; and to implement the FAO International Guidelines for the Management of Deep-sea Fisheries in the High Seas (FAO, 2009; FAO Deep-sea Fisheries Guidelines) in order to sustainably manage fish stocks and protect VMEs; and
FURTHER NOTING UNGA Resolutions 71/123 and 72/72 which call upon RFMOs to use the full set of criteria in the FAO Deep-sea Fisheries Guidelines to identify where VMEs occur or are likely to occur as well as for assessing significant adverse impacts, to ensure that impact assessments, including for cumulative impacts of activities covered by the assessment, are conducted consistent with the FAO Deep-sea Fisheries Guidelines, are reviewed

periodically and are revised 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 authorising bottom fishing activities, and to ensure that CMMs 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
BEARING IN MIND the description in the FAO Deep-sea Fisheries Guidelines of what constitutes significant adverse impacts, factors to be considered when determining the scale and significance of an impact, what constitutes temporary impacts and factors to be considered in determining whether an impact is temporary;

[2] Paragraph 119(d).
[3] Paragraph 180(a).
[4] Paragraph 184(c).
[5] Shane W. Geange, Ashley A. Rowden, Martin Cryer, Tiffany D. Bock. *Evaluating the availability of data to assess catchability of VME indicator taxa.* At https://www.sprfmo.int/assets/0-2019-SC7/Meeting-Docs/SC7-DW14-Availability-of-Data-to-Assess-Catchability-of-VME-Indicator-Taxa.pdf. At https://www.sprfmo.int/assets/0-2019-SC7/Meeting-Docs/SC7-DW21-Uncertainty-in-SPRFMO-habitat-suitability-model-predictions-and-VME-indicator-taxa-thresholds.pdf.
[6] Malcolm R. Clark, David A. Bowden, Ashley A. Rowden and Rob Stewart. "Little Evidence of Benthic Community Resilience to Bottom Trawling on Seamounts After 15 Years." Frontiers in Marine Science. 2019. At https://www.frontiersin.org/articles/10.3389/fmars.2019.00063/full.
[7] Roland Pitcher, Alan Williams, Lee Georgeson. "Progress with investigating uncertainty in the habitat suitability model predictions and VME indicator taxa thresholds underpinning CMM 03-2019". September 2019.
[8] Shane W. Geange, Ashley A. Rowden, Martin Cryer, Tiffany D. Bock. *"A review of VME indicator taxa for the SPRFMO Convention Area".* SC7-DW13. At https://www.sprfmo.int/assets/0-2019-SC7/Meeting-Docs/SC7-DW13-A-review-of-VME-indicator-taxa-for-SPRFMO.pdf.
[9] Cryer, M., Geange, S.W., Nicol, S., 2018. SC6-DW09 Methods for deriving thresholds for VME encounter protocols for SPRFMO bottom fisheries. 6th Meeting of the SPRFMO Scientific Committee. Puerto Vara, Chile, 9-14 September 2018 and Mormede, S., Sharp, B, Roux, MJ., Parker, S. (2017) Methods development for spatially-explicit bottom fishing impact evaluation within SPRFMO: 1. Fishery footprint estimation. SPRFMO SC5-DW06.
[10] Mormede, S., Sharp, B, Roux, MJ., Parker, S. (2017) Methods development for spatially-explicit bottom fishing impact evaluation within SPRFMO: 1. Fishery footprint estimation. SPRFMO SC5-DW06. At https://www.sprfmo.int/assets/SC5-2017/SC5-DW06-Spatial-impact-assessment-method.pdf.
[11] From Table 4 in SC6-DW09
[12] Assuming 0.82 is destroyed an 0.18 is not within a footprint: based on Mormede et al. 2017.
[13] Underwater topographical features – seamounts, guyots, hills and similar features.
[14] A.J. Penney, Review of the biodiversity component of the New Zealand Vulnerable Marine Ecosystem Evidence Process. 2014. MPI. At https://www.mpi.govt.nz/dmsdocument/4723/send
[15] Parker, S.J. (2008). Development of a New Zealand High Seas Bottom Fishery Impact Assessment Standard for Evaluation of Fishing Impacts to Vulnerable Marine Ecosystems in the South Pacific Ocean. Final Research Report for Ministry of Fisheries Research Projects IFA2007-02, Objectives 3 and 4. (Unpublished report held by Ministry for Primary Industries, Wellington.)
[16] Article 2: The objective of this Convention is, through the application of the precautionary approach and an ecosystem approach to fisheries management, to ensure the long-term conservation and sustainable use of fishery resources and, in so doing, to safeguard the marine ecosystems in which these resources occur.
[17] Article 3: 1. In giving effect to the objective of this Convention and carrying out
decision making under this Convention, the Contracting Parties, the Commission and subsidiary bodies established under Article 6 paragraph 2 and Article 9 paragraph 1 shall: (b) apply the precautionary approach and an ecosystem approach in accordance with paragraph 2.
2. a) The precautionary approach as described in the 1995 Agreement and the Code of Conduct shall be applied widely to the conservation and management of fishery resources in order to protect those resources and to preserve the marine ecosystems in which they occur, and in particular the Contracting Parties, the Commission and subsidiary bodies shall:
(i) be more cautious when information is uncertain, unreliable, or inadequate;
(ii) not use the absence of adequate scientific information as a reason for postponing or failing to take conservation and management measures; and
(iii) take account of best international practices regarding the application of the precautionary approach, including Annex II of the 1995 Agreement and the Code of Conduct.

[18] https://www.neafc.org/system/files/Rec.19-2014_as_amended_by_09_2015_and_10_2018_fulltext-and-map.pdf
[19] Northwest Atlantic Fisheries Organization Conservation and Enforcement Measures 2019. CHAPTER II Protection of Vulnerable Marine Ecosystems (VMEs) in the Regulatory Area from Bottom Fishing Activities. Article 22.
At https://www.nafo.int/Portals/0/PDFs/COM/2019/comdoc19-01.pdf.
[20] Conservation Measure 30/15 on Bottom Fishing Activities and Vulnerable Marine Ecosystems in the SEAFO Convention Area. At http://www.seafo.org/media/8933d489-854c-4c99-895e-66573c7010a4/SEAFOweb/CM/open/eng/CM30-15_pdf
[21] CMM 2018-05. Conservation and Management Measure for Bottom Fisheries and Protection of Vulnerable Marine Ecosystems in the Northwestern Pacific Ocean. At https://www.npfc.int/system/files/2018-11/5.%20CMM%202018-05%20FOR%20BOTTOM%20FISHERIES%20AND%20PROTECTION%20OF%20VMEs%20IN%20THE%20NWPO.pdf
[22] NPFC CMM 2018-05 https://www.npfc.int/cmm-2018-05-bottom-fisheries-and-protection-vmes-nw-pacific-ocean and https://www.npfc.int/system/files/2018-11/5.%20CMM%202018-05%20FOR%20BOTTOM%20FISHERIES%20AND%20PROTECTION%20OF%20VMEs%20IN%20THE%20NWPO.pdf.
See Scientific Committee report, North Pacific Fisheries Commission 4th Meeting of the Scientific Committee (2019) para 9: https://www.npfc.int/sites/default/files/2019-08/NPFC-2019-SC04%20Final%20Report.pdf
[23] CMM 03-2019 https://www.sprfmo.int/assets/Fisheries/Conservation-and-Management-Measures/2019-CMMs/CMM-03-2019-5Mar2019.pdf. Annex 6A
[24] SC-03-29 National Report Cook Islands. http://apsoi.org/sites/default/files/documents/meetings/SC-04-29%20Annual-National-Report-Cook_Islands.pdf
[25] SC-03-29 National Report Cook Islands. http://apsoi.org/sites/default/files/documents/meetings/SC-04-29%20Annual-National-Report-Cook_Islands.pdf
[26] SC-04-10 (REV_1) Annual National Report of Japan. http://apsoi.org/sites/default/files/documents/meetings/SC-04-10_Rev1%20National%20Report%20of%20Japan%20%28Mar%201%29.pdf
[27] SC-03-12. Australia's National Report http://apsoi.org/sites/default/files/documents/meetings/SC-04-12-Annual-National-Report-Australia..pdf
[28] SC-03-29 National Report Cook Islands. http://apsoi.org/sites/default/files/documents/meetings/SC-04-29%20Annual-National-Report-Cook_Islands.pdf
[29] CCAMLR sets a combined threshold for longline and pot fisheries of 10 kg or 10 litres per 1200m line or 1000 hooks (Conservation Measure 22-07).