First Meeting of the Southern Indian Ocean Fisheries Agreement (SIOFA)
Scientific Committee Protected Areas and Ecosystems Working Group (PAEWG)
18–19 March 2019, Yokohama, Japan

REPORT

of the

Protected Areas and Ecosystems Working Group

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Agenda item 1 – Opening

Agenda item 1.1 Opening statement from the Chair

1. The first meeting of the SIOFA SC Protected Areas and Ecosystems (PAEWG1) was opened by Mr Patrice Pruvost, Chairperson of the PAEWG at 10:00 am on 18 March 2019.
2. The Chair welcomed participants from Contracting Parties, SIOFA Observers and External experts.
3. The Japanese delegation was thanked for hosting this meeting and for all the efforts invested into assuring delegates had all the information and guidance necessary to ensure all participants found their way safely to the venue.
4. Gratitude was also expressed to the FAO ABNJ Deep Seas Project for organising the VME workshop and for financing the venue costs and the participation of several invited VME experts.

Agenda item 1.2 Introduction of participants

5. Participants introduced themselves and noted their affiliations. A list of participants in attendance is included at **Annex A**.

Agenda item 2 – Administrative arrangements

Agenda item 2.1 Adoption of the agenda

6. The agenda (Rev 2) was adopted (**Annex B**).

Agenda item 2.2 Confirmation of meeting documents

7. The meeting documents were confirmed with some necessary adjustments associating some papers with the most relevant agenda items as at **Annex C** (List of meeting documents) and **Annex D** (Table of agenda items and related papers).

Agenda item 2.3 Appointment of rapporteurs

8. SIOFA Executive Secretary Mr Jon Lansley was appointed as meeting rapporteur, with agreed assistance from participants.

Agenda item 2.4 Review of terms of reference

9. No comments on the PAEWG ToR.

Agenda item 3 – FAO sponsored workshop on Vulnerable Marine Ecosystems (VME)

Background and introduction

10. Mr Anthony Thompson (FAO Consultant) gave an introductory presentation (**Annex E)** of the international instruments and supporting tools that inform and guide States and R(F)MOs in developing measures to achieve sustainable deep-sea fisheries and the protection of VMEs. It was emphasised that the FAO International Guidelines for the management of deep-sea fisheries in the high seas (FAO DSF

Guidelines) has been used extensively to guide this work. The FAO VME DataBase provides easy access to measures that have been taken globally. The presentation concluded with six slides detailing the SIOFA bottom fisheries impact assessments and that these provide important information that will assist SIOFA in further developing their measures.

11. The SIODFA delegation raised several issues in relation to the issue of 'vulnerable marine ecosystems' (**Annex D**).
12. It was noted that the presentations of the invited experts and subsequent discussion would address questions raised.

Agenda item 3.1 Mapping VMEs

13. This session was introduced by Anthony Thompson (FAO Consultant) with a presentation of slides 6-8 of **Annex E**. Guidance on the mapping of VMEs is given in the FAO DSF Guidelines paragraph 21ii and supported by other paragraphs. The VME DataBase provides a map of the measures associated with the protection of VMEs, including closed areas, the bottom fishing footprints, and other with other access regulations. It was noted that SIOFA SC were requested to map VMEs in the southern Indian Ocean by 2017 (CMM 2018/01). SC in 2018 reported to MoP5 that it was unable to complete this task, and that the work is ongoing and would be assisted by information from observers, a benthic data collection framework and a benthos database.
14. Dr Ashley Rowden (FAO Invited Expert) provided a presentation on mapping VMEs as at **Annex G** summarised as follows. To avoid significant adverse impacts to vulnerable marine ecosystems (VMEs), the FAO guidelines for deep-sea fisheries (FAO, 2009) stipulate that it is necessary to "identify areas where VMEs are known or likely to occur". To map VMEs, the guidelines indicate that RFMOs should use data from stock assessment surveys, independent surveys, fisheries bycatch, as well as use methods to infer the distribution of VMEs where such data are lacking. The FAO guidelines do not provide any methodological detail on how to map VMEs.
15. The presentation by Ashley Rowden provided examples from NAFO and SPRFMO of how to map VMEs. In data-rich areas of NAFO, biomass data from trawl bycatch and stock assessment surveys was used in a Kernel Density approach to map the locations of sites of significant concentrations of VME indicator taxa (sponges, corals, seapens) (Kenchington et al. 2015). In the data-limited area of SPRFMO, habitat suitability models (also known as species distribution models) were used to make predictive maps of 10 VME indicator taxa. Multiple model types were used in this approach and combined to produce an Ensemble model prediction map, and the uncertainty of the model predictions was also mapped (Georgian et al. 2019).
16. The presentation also highlighted mapping issues, and recent methodological developments in mapping VMEs to address these issues which aim to assist in the design of spatial management measures to protect VMEs from SAIs. These included methods to determine an understanding of connectivity amount mapped VMEs (Kenchington et al. 2019), and predictive maps of VMEs based on the identification of VMEs according to ecologically/functional-defined thresholds of the abundance/concentration of VME indicator taxa (e.g., Rowden et al., 2017, Rowden et al. in prep).
17. It was further recommended that future mapping of VMEs should include attempts to: improve the mismatch between scale of environmental predictors and biological records/response variables; incorporate uncertainty in environmental predictor variables in habitat suitability models; model and map recovery potential of VMEs;

and predict and map the effect of future climate change on the habitat suitability for VMEs.

18. The PAEWG thanked NIWA for their presentation on modelling approaches for mapping VME habitat suitability and agreed that such methods should be explored in SIOFA.
19. **RECOMMENDATION:** Despite a probable paucity of data, the PAEWG recommends that attempts are made to model habitat suitability to investigate their use in providing maps of VME habitat.
20. **NOTE:** The PAEWG noted that a VME indicator taxa list could be used in conjunction with information on physico-chemical and geological features (such as vents and cold water seeps) to inform protection of potential VMEs in SIOFA.
21. **NOTE:** In relation to the definition of VMEs, the PAEWG discussed that paragraph 3a of the bottom fishing measure defines VMEs in accordance with paragraph 42 of the deep sea fishing guidelines. However, it was noted that these criteria were inadequate to inform the requirement to map VMEs and that this task required the formulation of a SIOFA-specific list of VME indicator taxa.
22. SIOFA Data Manager gave a short presentation (**Annex G**) recapping references to VMEs in SIOFA CMM 2018/01 Interim Management of Bottom Fishing and SIOFA CMM 2018/02 Data Standards. With reference to CMM 2018.02 Annex B – observer data, it was noted that providing an option for estimating VME taxa quantity as either weight (kg) or volume (m3) may lead to incompatibility of data sets. Following brief discussion it was recommended for estimating VME Taxa quantity to consider recording by weight only and provide guidance to observer how to convert volume to weight (kg). It was suggested that CCAMLR practice may provide guidance.
23. **RECOMMENDATION:** For estimating VME Taxa quantity to consider recording by weight only and provide guidance to observer how to convert volume to weight (kg).

Agenda item 3.2 VME indicator taxa

24. This session was introduced by Anthony Thompson (FAO Consultant) with a presentation of slides 9 - 13 of **Annex E**. Guidance on the use of VME indicators and thresholds is given in the FAO DSF Guidelines paragraph 38 and supported by other paragraphs. R(F)MOs have selected indicator taxa that meet their adopted VME criteria (typically referring to the characteristics provided in para 42 of the FAO DSF Guidelines. Most R(F)MOs have dentification guides that assist vessel masters and observers in the recording of catches of VME Indicators. Catches above a threshold value indicate that the vessel may be fishing in an area containing a VME. Encounter threshold values are typically based on an analysis of historical catch data and are sufficiently high to indicate the presence of a possible VME. Actual selected thresholds vary among regions, though typical ranges for trawl catches are 30-60 kg for corals, 50-600 kg for sponges, and 1-7 kg for sea pens. Thresholds for other groups exist in some regions. Some members of SIOFA have existing thresholds applied to their vessels fishing in the Southern Indian Ocean.
25. Dr. Ellen Kenchington (FAO Invited Expert) provided a presentation on VME Indicators outlining the various indicators used by different RFMOs (**Annex H)**. At the family level and higher, there are many consistencies across RFMOs among the VME indicator taxa. It was suggested that these could be used as a proxy in the absence of more detailed information at that level of taxonomic resolution as it is likely that the species are present in the SIOFA area. She also included VME elements which are geomorphologic features that have been shown to host VMEs. Those were seamounts, knolls, hydrothermal vents, cold seeps, canyons, steep

flanks (slopes) and carbonate mounds amongst others. Some of these are directly mentioned in UNGA resolutions or the FAO guidelines. It was noted that many RFMOS have closed areas over such features without the need to collect further data. Seamount closures were amongst the first to be implemented by the RFMOs. Where some of these features extend over large geographic distances, such as the mid-Atlantic ridge or seamounts in the SEAFO area, RFMOs have selected areas in different parts of the spatial extent to ensure regional representation of the fauna. It was further noted that in many RFMOs (e.g., NAFO, NEAFC) annual updates on VMEs are made by their scientific working groups and that there is a complete re-examination of the information every 5 years ahead of UNGA reporting. This means that there is opportunity to add new information as it becomes available and to make changes as warranted. Review of the FAO VME database illustrates how RFMOs have implemented closures incrementally over the last decade.

26. Discussion followed and the group suggested that SC4 consider as a first step to apply the VME indicators used by CCAMLR as they share a common border and make note of indicator taxa that are not likely to occur outside of the Antarctic waters.

27. Mr Alexis Martin (FR 0.T.) presented the CCAMLR VME Taxa Classification Guide 2009 (https://www.ccamlr.org/en/system/files/VME-guide.pdf) and GBIF VME Taxa list. The CCAMLR list is considered relevant to SIOFA with the exception of one taxon (*Adamussium colbecki*).

28. In relation to the requirement to formulate a list of VME indicator taxa for SIOFA, the PAEWG agreed to use the CCAMLR list as the foundation for this list. This list was considered in the context of SIOFA and was checked against the VME indicator taxa present in the GBIF database.

29. **RECOMMENDATION:** The WG agreed to propose that SC4 consider adopting a VME Indicator taxa list adapted from the CCAMLR VME Taxa Classification guide 2009 comprising the following taxa;

    - Chemosynthetic organisms (CXV), no taxa specified
    - Cnidaria (CNI) including: Gorgonacea (GGW) (Order), Anthoathecatae (AZN) (Order), Stylasteridae (AXT) (Family), Scleractinia (CSS) (Order), Antipatharia (AQZ) (Order), Zoantharia (ZOT) (Order), Actiniaria (ATX) (Order), Alcyonacea (AJZ) (Order), Pennatulacea (NTW) (Order)
    - Porifera (PFR) including Hexactinellida (HXY) (Class), Demospongiae (DMO) (Class)
    - Chordata (CZR) including Ascidiacea (SSX) (Class)
    - Bryozoans (BZN) (Phylum)
    - Brachiopoda (BRQ) (Phylum)
    - Hemichordata (HET) including Pterobranchia (Class)
    - Annelida (NHE) including Serpulidae (SZS) (Family)
    - Xenophyophora (XEF) (Phylum)
    - Arthropoda (AXX) including Bathylasmatidae (BWY) (Family)
    - Echinodermata (ECH) including Stalked crinoid (CWD) (Order), Euryalida (OEQ) (Order), Cidaroida (CVD) (Order)

30. **NOTE:** That the criteria used to define VMEs can be applied on a case by case basis according to regional circumstances.

31. **RECOMMENDATION:** SIOFA SC should review the locations of hydrothermal vents, seamounts and other VME elements and identify areas where VMEs are "likely to occur".

32. **NOTE:** The PAEWG discussed that the setting of thresholds needs to be commensurate with the intended management response and as such, recommendation of thresholds was not entirely a scientific question.

33. **RECOMMENDATION:** In relation to the requirement to advise on thresholds for VME indicator taxa interactions, which could be used to inform the management response if triggered, the PAEWG advised that the thresholds **(Annex I)** for longline gears used by CCAMLR would be an appropriate consistent threshold for SIOFA longline gear. However, the PAEWG noted that CCAMLR has 100% observer coverage for longline gears and requests that the SC consider whether this threshold is suitable for adoption for longline gears in SIOFA.

34. Consensus could not be reached on thresholds for trawl gears. It was decided that this matter could be further discussed at SC4 and/or interested parties could work intersessionally to identify suitable threshold.

Agenda item 3.3 Encounter protocols

35. Anthony Thompson (FAO Consultant) provided guidance on encounter protocols as given in the FAO DSF Guidelines paragraph 67, 70 and 71 and supported by other paragraphs, that requires appropriate protocols for how vessels respond to encounters with VME indicator taxa. Typically this involves a move-on rule, reporting requirements, and temporary closures as appropriate. Other conservation and management measures can include gear modifications and operational procedures designed to reduce the risks of impacts. Further information on encounter protocols and impact assessments can be found in a recent FAO workshop (http://www.fao.org/3/a-i6452e.pdf). SIOFA (CMM 2018/01 paragraphs 6, 12) has already adopted an interim set of encounter protocols upon which advice is being sought from the SC.

36. FAO Invited Expert Dr Keith Reid (CCAMLR) provided a presentation on mapping CCAMLR VME Encounter Protocols as at **Annex J**.

37. Dr Keith Reid described the encounter protocols used by CCAMLR to identify VMEs based on research surveys and fishing data that reflect the difference in the type of data available from those different sources. VMEs identified from research data are published on CCAMLR's VME registry. When the quantity of VME indicator units from demersal longline fisheries exceed a defined trigger level the vessel is required to report this to the CCAMLR Secretariat and a VME Risk Area is declared. This VME Risk Area is closed to fishing until a review is undertaken to determine appropriate management action. The VME Risk Area would not be closed for research surveys as such research may provide an important element of the review process.

38. Dr Reid clarified that all vessels operating in fisheries to which CCAMLR's VME measures apply are required to carry independent scientific observers who also collect data on the occurrence of VME indicator taxa. The data collected requirements for the flag State and for the Observers are independent but complementary and anecdotal reports indicate that the positive relationship between the crew and the observers enhances the overall provision of data on the occurrence of VME indicator taxa.

39. In their absence, the Chairperson briefly introduced 'PAEWG-01-16-VME measures' submitted by the EU. It was noted that SIOFA could consider other measures adopted by other RFMOs.

Agenda item 3.4 Protected area protocols

40. Dr Thompson presented slides 17-20 of **Annex E** providing guidance on protected area protocols that help to identify areas as VMEs are given in the FAO DSF Guidelines paragraph 14-19, 42, Annex 1, and other supporting paragraphs. VMEs are typically benthic communities comprised of structure-forming sessile organisms that provide ecosystem services and are vulnerable to significant adverse impacts fishing gears that contact the sea floor. The FAO DSF Guidelines list five characteristics that VMEs possess that may be applied individuals or collectively. SIOFA have a set of criteria (SIOFA Interim standard protocol for future protected areas designation (MoP5 Annex K and SC3 Annex H)) and MoP5 have asked SC to clarify the application and use of these criteria.
41. Martin Cryer (FAO Invited Expert, New Zealand) presented a summary **(Annex K)** of the procedures and protocols used by a range of RFMO/As to determine when an area should be closed to fishing to avoid significant adverse impacts on VMEs. Almost all such protocols were reactive, being designed to respond to VME encounters by fishing vessels (bycatch of VME indicator species specified in the RFMO/As respective protocols). Most were defined in published management measures. Less common among these protocols was specific guidance on how an RFMO/A would designate a closed area designed to avoid significant adverse impacts on VMEs based on other types of information such as research surveys, predictive models (including habitat suitability models), or anecdotal information. Aspects of these decision-making processes are set out in the Bottom Fishery Impact Assessments required by SPRFMO and SIOFA and in NPFC's science-based standards and criteria for identification of VMEs and assessment of significant adverse impacts, and other RFMO/As have made such decisions. However, no comprehensive protocols covering all decision-making approaches to designating protected areas were available.
42. Mr Alexis Martin (FR 0.T.) presented paper PAEWG-01-13-Methodological approach to complement Siofa area-2.
43. SIODFA noted that aimed trawling can be used as a precise method of sampling bottom fauna, subject to its selectivity characteristics. If fishing, commercial or otherwise, were to be permitted as a means of scientific sampling then aimed-trawling could be a candidate method. However, the strong preference of SIODFA was that no fishing be permitted in SIOFA Protected Areas.
44. Mr Alexis Martin (FR 0.T.) presented paper PAEWG-01-12 Spatial and biophysical analysis of the SIOFA area as a background to complement the Benthic Protected Areas Designation Protocol. This was considered very good work and although good progress achieved it was felt additional work was required.
45. **RECOMMENDATION:** The WG agreed to propose that SC4 consider that the approach be further developed intersessionally within the PAEWG.
46. Mr Alexis Martin (FR 0.T.) presented paper PAEWG-01-14-Management_Plan_Framework-4. Framework supported in principle but needs further discussion in other WGs and SC to consider how management plans relate to this framework.

Agenda item 3.5 Selection of protected areas

47. Anthony Thompson (FAO Consultant) presented slides 21-22 of **Annex E**. The actual selection of protected areas is undertaken at the regional level by the R(F)MO management body (MoP for SIOFA) based on advice provided by the scientific committee and its working groups (SC and PAEWG for SIOFA). SIOFA adopted five areas in the Southern Indian Ocean for the protection of benthic ecosystems based mainly on their bioregional and biodiversity representation value.
48. Ashley Rowden and Martin Cryer (FAO Invited Experts, New Zealand) presented a summary of the process used by New Zealand and Australia to develop a spatial management regime for SPRFMO bottom fisheries **(Annex L)**. The spatial decision-support tool Zonation was used to integrate spatial layers representing the predicted distribution of key VME indicator taxa (habitat suitability models), the estimated "naturalness" of benthic communities, and the value of given locations to the fishing industry. Using these input layers, Zonation generates a new spatial layer of priority for protection from fishing impacts; this layer can be used as a starting point to design spatial closures. Use of the spatial decision-support tool provided a focus for engagement with stakeholders and made explicit the trade-offs between protection of VMEs and access to space for the fishery. The new spatial management regime introduced by SPRFMO in 2019 increased the protection of VME taxa from 65% to almost 85% of their predicted distribution while providing slightly better access to valuable fishing grounds. However, the process is resource-intensive and requires substantial time and engagement with stakeholders to develop understanding and trust.

Agenda item 4 – Implementation of CMM 2018/01 on Interim of Bottom Fishing Annex 2 – Interim Protected Areas

49. Mr Lee Georgeson (AUS) gave background to the following five research and management plans: PAEWG-01-07-MOW-research-management-plan; PAEWG-01-08-WALTERS-SHOAL-research-management-plan; PAEWG-01-09-ATLANTIS-research-management-plan; PAEWG-01-10-CORAL-research-management-plan; and PAEWG-01-11-FOOLS-FLAT-research-management-plan. Explanation was provided regarding what he has done for each research and management plan which included improved objectives and the inclusion of references to management measures with SIOFA CMMs.
50. **RECOMMENDATION:** SC to support the proposed research and management plans and the PAEWG requests the SC to consider whether research monitoring is needed in these areas, and if so, how this monitoring could be undertaken.
51. **RECOMMENDATION:** SC to clarify the SC3 advice to MoP5 on the fishing impacts on the protected areas, in relation to MoP5's decision on non-trawl gears.

Agenda item 5 – Advice to the Scientific Committee

52. Provided within the text above

Agenda item 6 – Future meeting arrangements

53. To be discussed at SC4 following review of the SC Work Plan and work allocated to the PAEWG.

Agenda item 7 – Other business

54. No other business

Agenda item 8 – Adoption of the meeting report

55. This report was adopted at 20:11 on 19 March 2019.

Agenda item 9 – Close of the meeting

56. This meeting was closed at 20:12 on 19 March 2019.

Annex A List of Participants

Delegation	Title	Name	Function	ContactEmail
Chair	Mr	Patrice Pruvost	PAEWG1 Chair	pruvost@mnhn.fr
			SIOFA Contracting Parties	
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			Assistants	
Japan	Ms	Kanna Young	Assistant	
Japan	Ms	Narumi Saito	Assistant	

Annex B Agenda

Agenda

First Meeting of the Protected Areas and Ecosystems Working Group (PAEWG1)

18-19 March 2019

National Research Institute of Fisheries Science, Yokohama,

Japan

Chair: Dr Patrice Pruvost

Registration will be open from 09:30 on the 18th March and the meeting will run 10:00 to 18:00 each day

NOTE: Following this meeting the following two SIOFA SC meetings will convene;

- First Meeting of the Stock and Ecological Risk Assessment Working Group (SERAWG1), 20-22 March
- Fourth Meeting of the Southern Indian Ocean Fisheries Agreement (SIOFA) Scientific Committee, 25-29 March

1. Opening
   1.2 Opening statement from the Chair
   1.2 Introduction of participants

2. Administrative arrangements
   2.1 Adoption of the Agenda
   2.2 Confirmation of meeting documents
   2.3 Appointment of rapporteurs
   2.4 Review of functions and terms of reference

3. FAO sponsored workshop on Vulnerable Marine Ecosystems (VME)
   FAO has been invited by the SIOFA Secretariat to present information to the PAEWG on comparisons of processes adopted in other regions by RFMOs. A separate agenda for this workshop is provided at Annex I

4. Implementation of CMM 2018/01 on Interim Management of Bottom, Fishing Annex 2 – Interim Protected Areas

5. Advice to the Scientific Committee

6. Future meeting arrangements

7. Other business

8. Adoption of the meeting report

9. Close of meeting

Annex C List of documents

Document Reference Nº	Document	Relevant agenda items
SC-04-01	Meeting notice – available on SC3 page of website	
PAEWG-01-01 Rev2	Provisional agenda for the SIOFA Scientific Committee meeting	2.1
PAEWG-01-02	Provisional agenda for Heads of Delegation meeting - tbc	
PAEWG-01-03	List of Meeting Documents	2.2
PAEWG-01-04	Table of agenda items and related papers	2.2
PAEWG-01-05	PAEWG1 Terms of Reference	
PAEWG-01-06	PAEWG1 List of Participants	
PAEWG-01-07	Proposal for a Research and Management Plan for the 'Middle of What' protected area	4
PAEWG-01-08	Proposal for a Research and Management Plan for the 'Walters Shoal' protected area	4
PAEWG-01-09	Proposal for a Research and Management Plan for the 'Atlantis' protected area	4
PAEWG-01-10	Proposal for a Research and Management Plan for the 'CORAL' protected area	4
PAEWG-01-11	Proposal for a Research and Management Plan for the 'FOOLS FLAT' protected area	4
PAEWG-01-12	Spatial and biophysical analysis of the SIOFA area as a background to complement the Benthic Protected Areas Designation Protocol	3.3
PAEWG-01-13	A proposal of methodological approach to complement the SIOFA's Benthic Protected Areas Designation Protocol	3.4
PAEWG-01-14	A proposal of framework to design research and management plans for SIOFA's areas	3.3
PAEWG-01-15	CCAMLR's Vulnerable Marine Ecosystems bioindicator taxa: a relevant tool for benthic ecoregionalisation	3.2
PAEWG-01-16	Summary of VME related management measures adopted by adjacent Regional Management Bodies in the context of SIOFA	3
PAEWG-INFO-01	Expert review of SIODFA proposed Benthic Protected Areas	4
PAEWG-INFO-02	Laying the Foundations for Management of a Seamount Beyond National Jurisdiction	4
PAEWG-INFO-03	Approaches for Assessment and Management of DSF and Ecosystems in RFMOs and RFBs	3.4

Annex D Table of agenda items and related papers

Agenda Item	Related Papers
10. Opening 1.1 Opening statement from the Chair 1.2 Introduction of participants	*No papers provided for this item.*
11. Administrative Arrangements 2.1 Adoption of the agenda 2.2 Confirmation of meeting documents 2.3 Appointment of rapporteurs 2.4 Review of functions and terms of reference	PAEWG-01-01 Provisional Agenda Rev2 PAEWG-01-03 List of meeting Documents PAEWG-01-04 Table of agenda items and related papers PAEWG-01-05 PAEWG ToR PAEWG-01-06 PAEWG List of participants
12. FAO sponsored workshop on Vulnerable Marine Ecosytems 3.1 Mapping VMEs 3.2 VME indicator taxa 3.3 Encounter protocols 3.4 Protected area protocols 3.5 Selection of protected areas	PAEWG-01-15 CCAMLR's Vulnerable Marine Ecosystems bioindicator taxa: a relevant tool for benthic ecoregionalisation PAEWG-01-16 Summary of VME related management measures adopted by adjacent Regional Management Bodies in the context of SIOFA PAEWG-01-14 A proposal of framework to design research and management plans for SIOFA's areas PAEWG-01-13 A proposal of methodological approach to complement the SIOFA's Benthic Protected Areas Designation Protocol PAEWG-01-12 Spatial and biophysical analysis of the SIOFA area as a background to complement the Benthic Protected Areas Designation Protocol
13. Implementation of CMM 2018/01 on Interim Management of Bottom Fishing Annex 2 – Interim Protected Areas	PAEWG-01-07 Proposal for a Research and Management Plan for the 'Middle of What' protected area

	PAEWG-01-08 Proposal for a Research and Management Plan for the 'Walters Shoal' protected area PAEWG-01-09 Proposal for a Research and Management Plan for the 'Atlantis' protected area PAEWG-01-10 Proposal for a Research and Management Plan for the 'CORAL' protected area PAEWG-01-11 Proposal for a Research and Management Plan for the 'FOOLS FLAT' protected area PAEWG-INFO-01 Expert review of SIODFA proposed Benthic Protected Areas PAEWG-INFO-02 Laying the Foundations for Management of a Seamount Beyond National Jurisdiction
14. Advice to the Scientific Committee	*To date no papers provided for this item*
15. Future meeting arrangements	*To date no papers provided for this item*
16. Other business	*To date no papers provided for this item*
17. Adoption of the meeting report	*To date no papers provided for this item*
18. Close of meeting	*To date no papers provided for this item*

Annex D SIODFA Statement

SIODFA STATEMENT

The SIODFA delegation raised several issues in relation to the issue of 'vulnerable marine ecosystems'. It was questioned what it was that was vulnerable: the community, the population or the ecosystem. In the case of the 'ecosystem' there was no clarity to what exactly was the harm the ecosystem was exposed to. This was particularly the case given that the deepwater fishery had been estimated to traverse around 2% of the fishable area. It was noted that this would not render a benthic ecosystem great harm and scarcely render it vulnerable. Concern was expressed about the use of vague poorly defined terms in what should be a scientific context. For example, frequent reference was made to 'likely' events, though logic indicated that this could only mean the probability of uncertain events must be > 0.5. Another vague term often used was that of 'likelihood' though this term had a different specific statistical/mathematical meaning. Use of terms that had one context in a scientific context had a different interpretation in non-scientific contexts, such as meetings of the parties.

It was pointed out again that the fishery for deepwater species was conducted on well-defined fishing tow lines. Any fragile benthic fauna on these lines had probably been long removed and if the fishery was to continue to be sustained there could and would be no recovery of the benthos on the tow lines. In this context it was stressed that any fishery would affect the marine ecosystem of which it was part, whether it be by removal of target species biomass, probably a major effect on the marine ecosystem, or by impact upon benthic sedentary animals.

It was pointed out in this regard that fisheries, as with any food production in society, affected the marine environment.

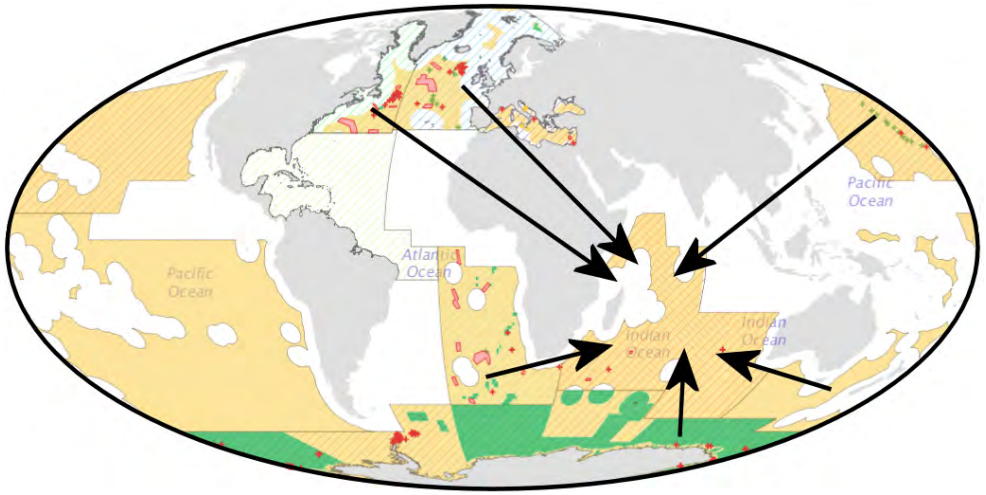
It was noted that trawls provided a poor method of indicating the presence (or absence) of fragile sedentary benthos and that the amounts of bycatch that occurred would likely follow some form of stochastic process given the unpredictable way in which a trawl footrope was in contact with the bottom as it traversed the seafloor and the stochastic nature of the distribution of benthic sedentary animals. It was noted that only two cases of bycatches in excess of threshold values had apparently occurred in fisheries prosecuted by SIODFA vessels during the recent period of the fishery – following entry into force of the agreement.

In one case it was known that unusual currents had moved the trawl of a well-established tow line. In the second case, what was deemed to be a vulnerable marine ecosystem, and thus required to vessel to move off the fish because of the move-on rule, was in fact either a large rock or inorganic material that did not appear to be living. This trivial number of threshold events provided a relevant context to the day's discussions.

It was SIODFA's view that when such thresholds of benthic bycatch were exceeded, the appropriate response would be to undertake a second tow to gain specific insight into the nature of the benthos at that point and so demonstrate if indeed the threshold catch was a random incident, which may always happen or if it did in fact demonstrate the presence of high densities of fragile benthos.

It was pointed out that fish too are constituents of the marine ecosystems and that the removals of large amounts of species biomass would have ecosystem effects that may be considerably in excess of that resulting from the impact of benthos taken as bycatch from trawl tow lines. It seemed to SIODFA that there was a considerable asymmetry in the concern directed to that of fragile benthos, relative to non-sedentary species comprising relevant adjacent ecosystems.

ANNEX E



Vulnerable Marine Ecosystems - Global overview to Indian Ocean

by

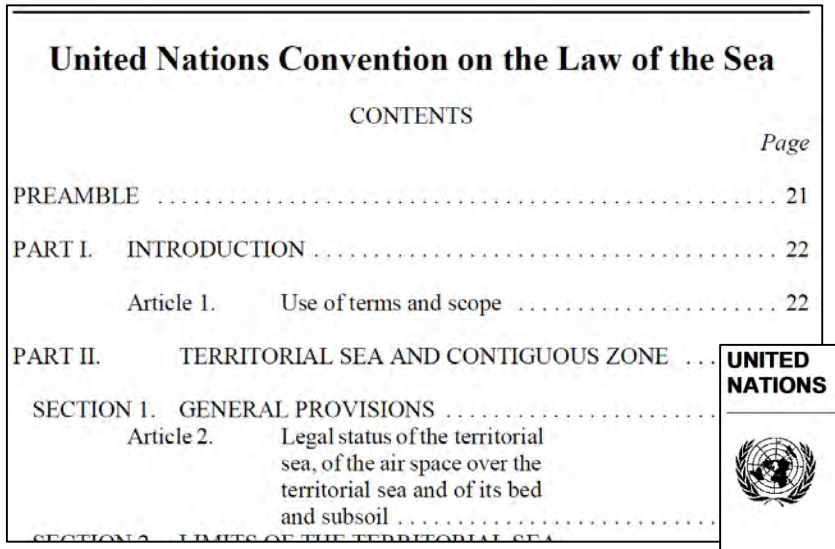
Tony Thompson

FAO Consultant

International instruments

ANNEX E

1982



United Nations Convention on the Law of the Sea

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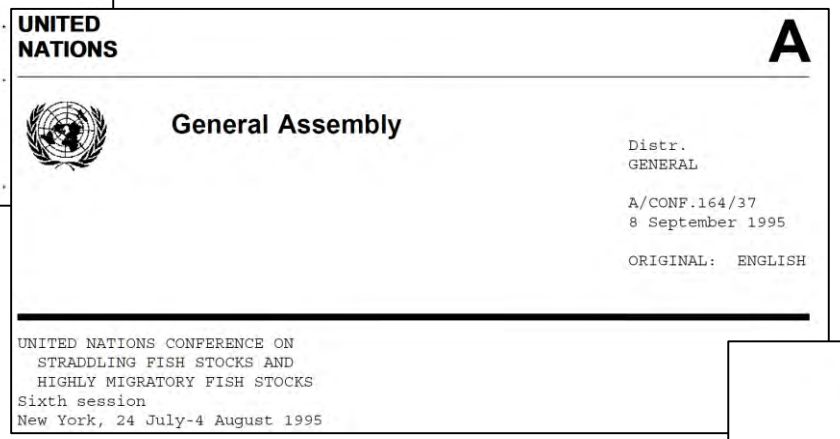
Article 2. Legal status of the territorial sea, of the air space over the territorial sea and of its bed and subsoil .....

1995



UNITED NATIONS

A

General Assembly

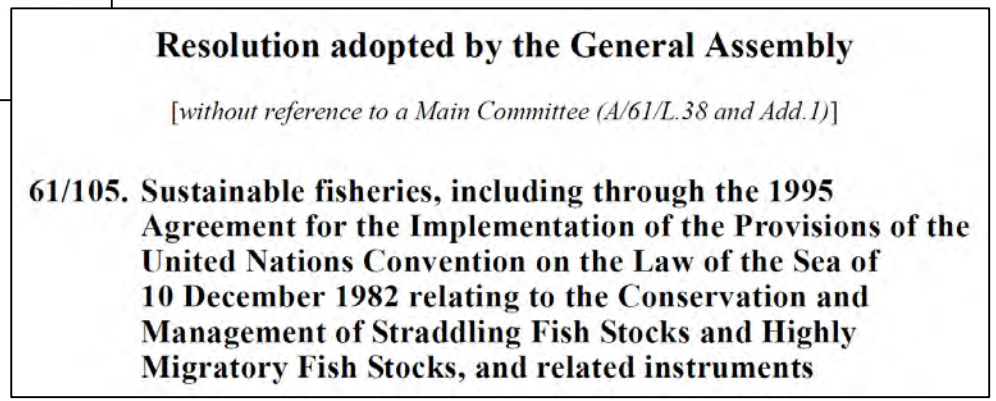
Distr.
GENERAL

A/CONF.164/37
8 September 1995

ORIGINAL: ENGLISH

UNITED NATIONS CONFERENCE ON
STRADDLING FISH STOCKS AND
HIGHLY MIGRATORY FISH STOCKS
Sixth session
New York, 24 July-4 August 1995

2006



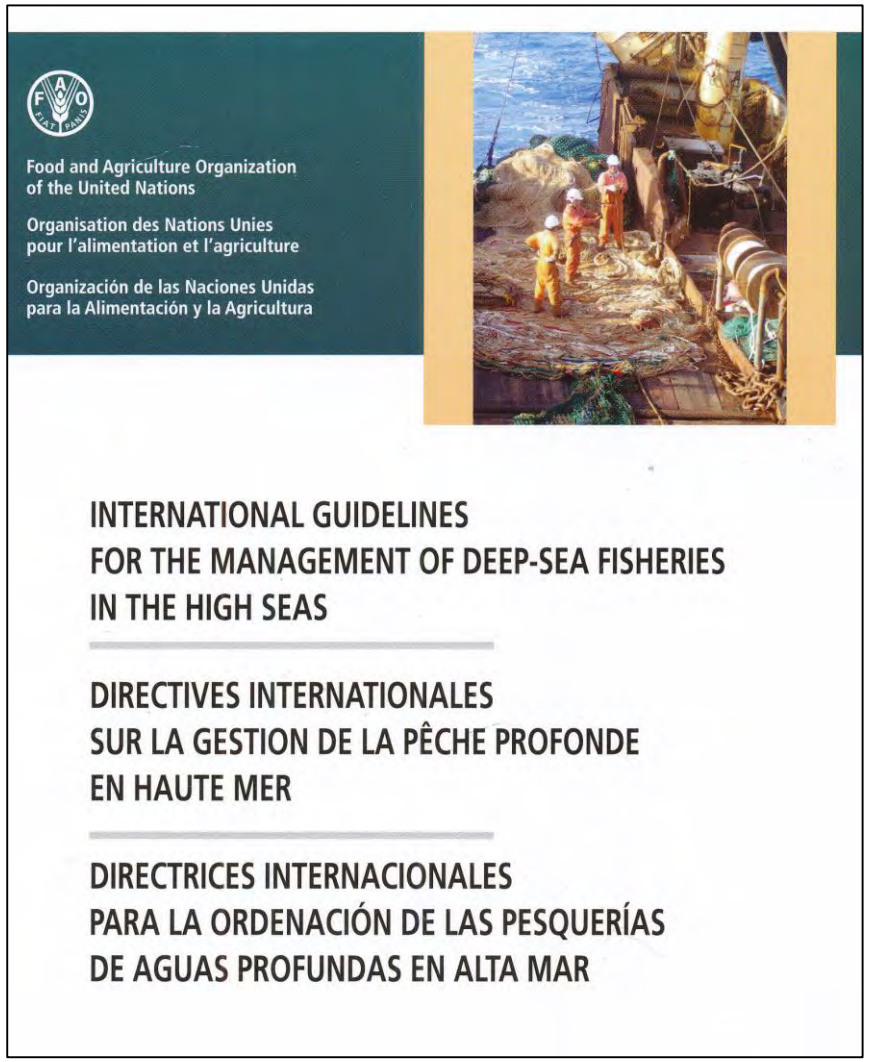
Resolution adopted by the General Assembly

[*without reference to a Main Committee (A/61/L.38 and Add.1)*]

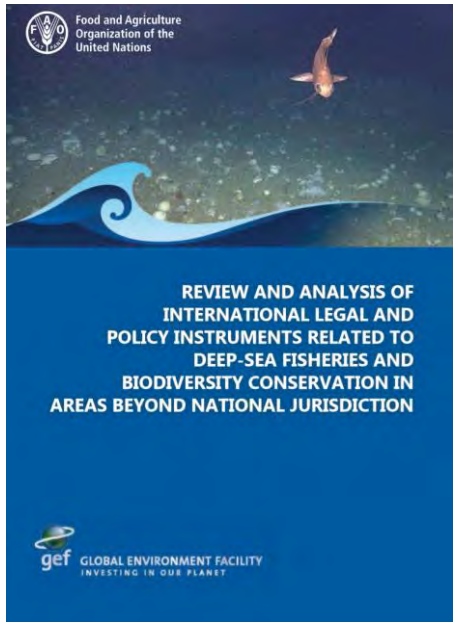
61/105. Sustainable fisheries, including through the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, and related instruments

Supporting tools

ANNEX E



http://www.fao.org/3/i0816t/i0816t00.htm



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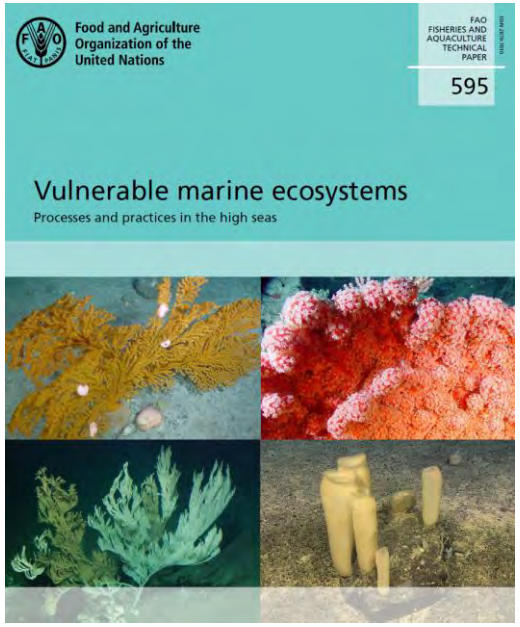

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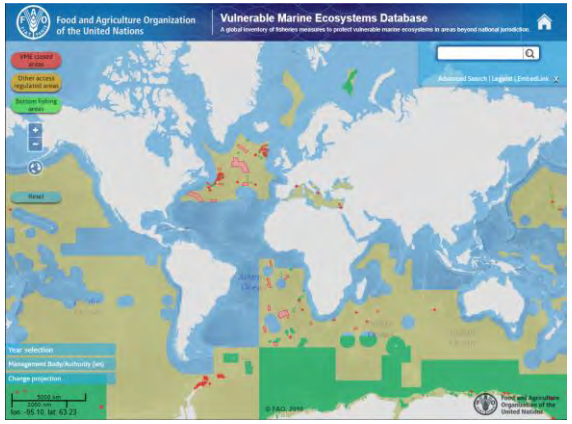


http://www.fao.org/in-action/vulnerable-marine-ecosystems/vme-database/en/vme.html

Outline of presentation - by agenda item

11:35 – 12:05	Coffee
12:05 – 13:00	1 - Mapping VMEs
13:00 - 14:00	Lunch
14:00 – 14:25	1 - Mapping VMEs continued
14:25 – 15:45	2 - VME indicator taxa (+ thresholds)
15:45 – 16:15	Coffee
16:15 – 17:35	3 - Encounter protocols
17:35 – 18:00	4 - Protected area protocols
Day 2	
10:00 – 10:55	4 - Protected area protocols continued
10:55 – 11:30	5 - Selection of protected areas
11:30 – 12:00	Coffee
12:00 – 12:45	5 - Selection of protected areas continued
12:45 – 13:00	Further discussion and drafting recommendations
13:00 – 14:00	Lunch
14:00 – 14:45	Further discussion and drafting recommendations

How do these topics relate to the FAO DSF Guidelines?

What did the SIOFA 5th Meeting of the Parties (MoP5) say?

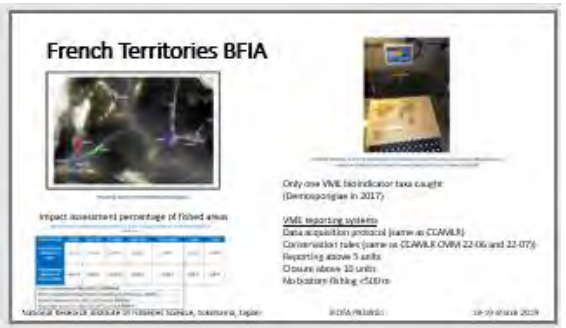
SIOFA Bottom fisheries impact assessments (BFIA)

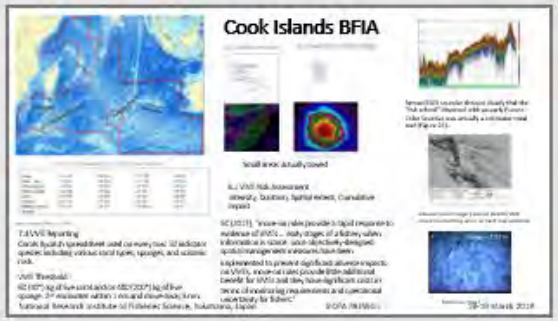
ANNEX E

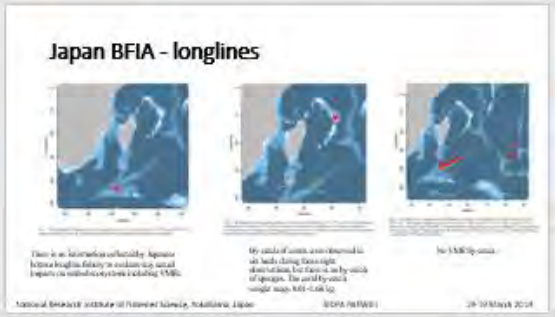
SIOFA | APSOI
Southern Indian Ocean Fisheries Agreement
Accord relatif aux Pêches dans le Sud de l'Océan Indien

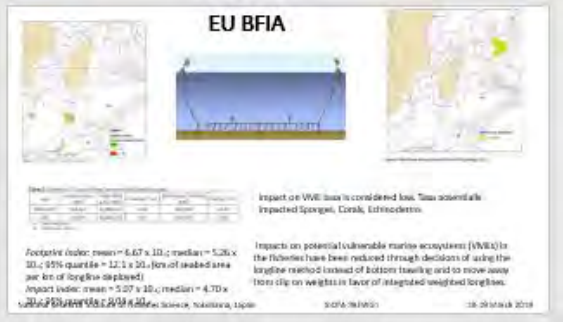
There are 6 slides at the end of the presentation that I do not plan to present.

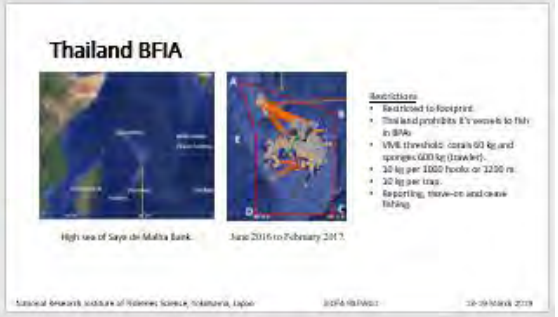
They can be presented on demand should it be necessary



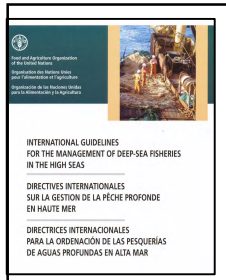




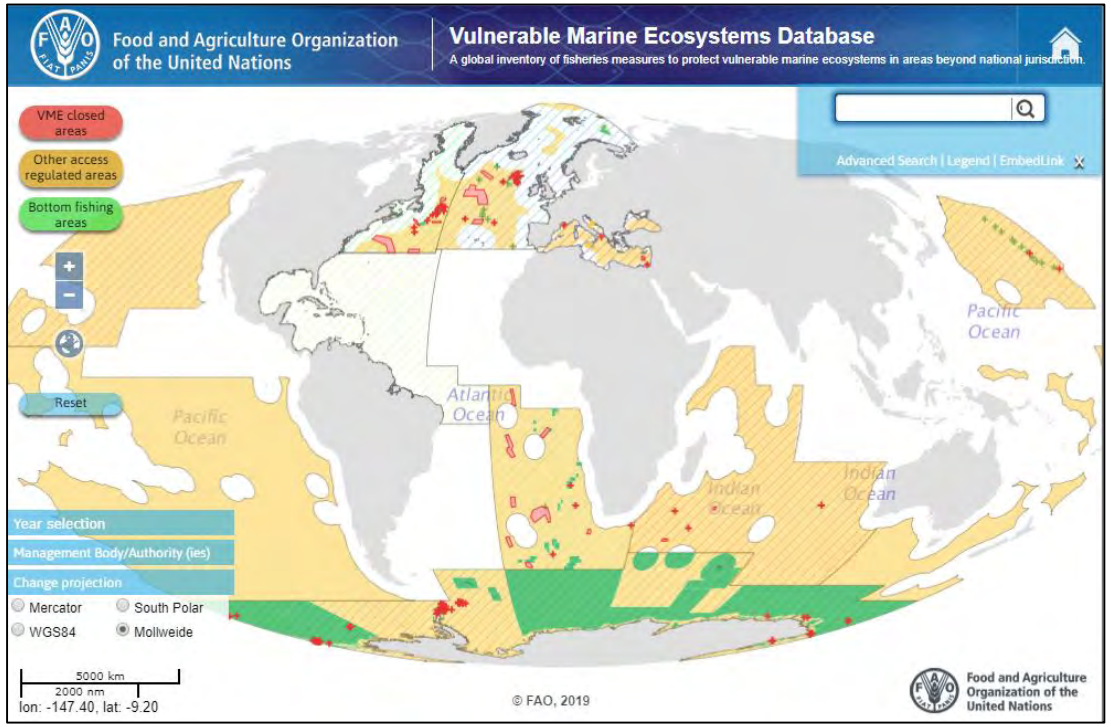




Mapping VMEs



DSF Guidelines Para 21ii: identify areas or features where VMEs are known or likely to occur, and the location of fisheries in relation to these areas and features;



Map shows mapped VMEs in red

Mapping VMEs

SIOFA | APSOI
Southern Indian Ocean Fisheries Agreement
Accord relatif aux Pêches dans le Sud de l'Océan Indien

SC3 reporting to MoP5

Annex J

3. Vulnerable marine ecosystems - Mapping

CMM 2017/01, para 5b tasked the SC to develop maps of where VMEs are known to occur, or likely to occur, by SC 2017

- Mapping VMEs requires a common definition of VMEs. Other RFMOs and CCAMLR have developed definitions
- In absence of SIOFA definition of VME concept:
  - **Agreed** a common definition of VMEs is required
  - **Agreed** a common data collection protocol should be adopted by CPs. Benthos data collection framework presented by France (Territories) could be a source to build this
  - **Noted** data sharing could be done through the Protected Areas and Ecosystems WG (PAEWG) and a common database

ANNEX E

Mapping VMEs

SIOFA | APSOI
Southern Indian Ocean Fisheries Agreement
Accord relatif aux Pêches dans le Sud de l'Océan Indien

MoP5

MoP5 (para 32)

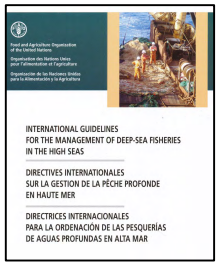
- SC not able to map VMEs at its 3rd meeting (2018)
- SC asked to map VMEs by 2017 (CMM 2018/01 paragraph 5b)

assisted by

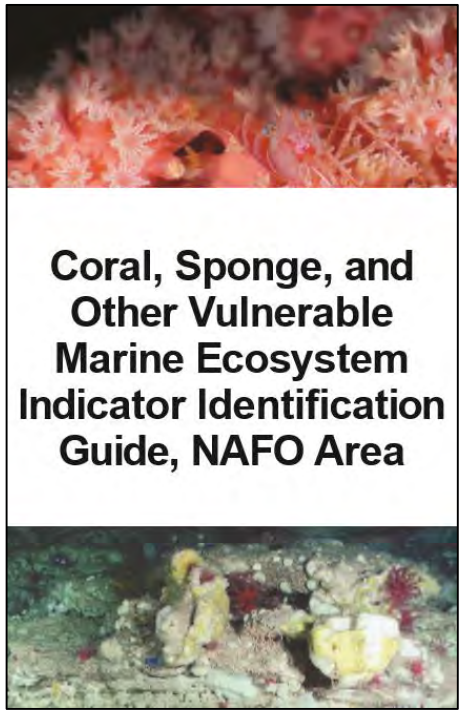
- Observer coverage (CMM 2018/01 paragraph 31, 33)
- Benthos data collection framework (e.g. France (Territories) for Southern Ocean)
- Benthos database and data sharing

VME Indicator taxa (+ thresholds)

ANNEX E

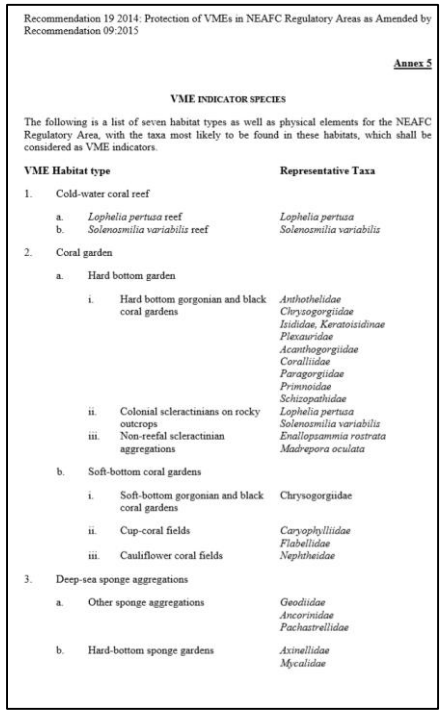


DSF Guidelines Para 38. States and RFMO/As should specify, obtain and apply the information required for adaptive management to prevent significant adverse impacts on VMEs, including the use of indicators and benchmarks, where appropriate.



NAFO

CCAMLR



Recommendation 19 2014: Protection of VMEs in NEAFC Regulatory Areas as Amended by Recommendation 09:2015

Annex 5

VME INDICATOR SPECIES

The following is a list of seven habitat types as well as physical elements for the NEAFC Regulatory Area, with the taxa most likely to be found in these habitats, which shall be considered as VME indicators.

VME Habitat type		Representative Taxa
1.	Cold-water coral reef	
a.	*Lophelia pertusa* reef	*Lophelia pertusa*
b.	*Solenosmilia variabilis* reef	*Solenosmilia variabilis*
2.	Coral garden	
a.	Hard bottom garden	
i.	Hard bottom gorgonian and black coral gardens	*Anthothelidae* *Chrysogorgiidae* *Isididae, Keratoisidinae* *Plexauridae* *Acanthogorgiidae* *Coralliidae* *Paragorgiidae* *Primnoidae* *Schizopathidae*
ii.	Colonial scleractinians on rocky outcrops	*Lophelia pertusa* *Solenosmilia variabilis*
iii.	Non-reefal scleractinian aggregations	*Enallopsammia rostrata* *Madrepora oculata*
b.	Soft-bottom coral gardens	
i.	Soft-bottom gorgonian and black coral gardens	Chrysogorgiidae
ii.	Cup-coral fields	*Caryophylliidae* *Flabellidae*
iii.	Cauliflower coral fields	*Nephtheidae*
3.	Deep-sea sponge aggregations	
a.	Other sponge aggregations	*Geodiidae* *Ancorinidae* *Pachastrellidae*
b.	Hard-bottom sponge gardens	*Axinellidae* *Mycalidae*

NEAFC

Cold water corals include: *Alcyonacea*, *Antipatharia*, *Gorgonacea*, and *Scleractinia*.

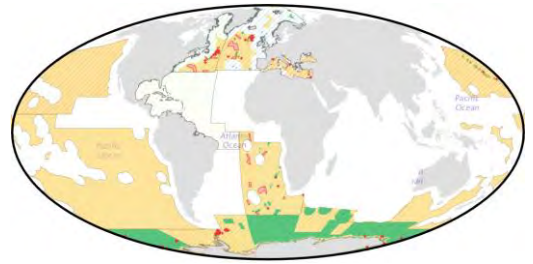
NPFC

VME Encounter Thresholds

ANNEX E

Current Thresholds (2018) (kg) – other regions

		Corals	Sponges	Sea pens
NPFC	All gear	50	-	-
SIOFA		-		
NAFO		60	300	7
NEAFC	Trawl, etc	30	400	
	Longlines	VME Indicators on 10 hooks per 1000 hooks (1200 m)		
CCAMLR	Longline/pots	10 VME Indicator units per 1000 hooks (1200 m)		
SPRFMO		1-250	5-50	1
SEAFO	Trawl (in/out)	600/400	60/60	-
	Longline/pots	10 VME Indicator units per 1000 hooks (1200 m)		

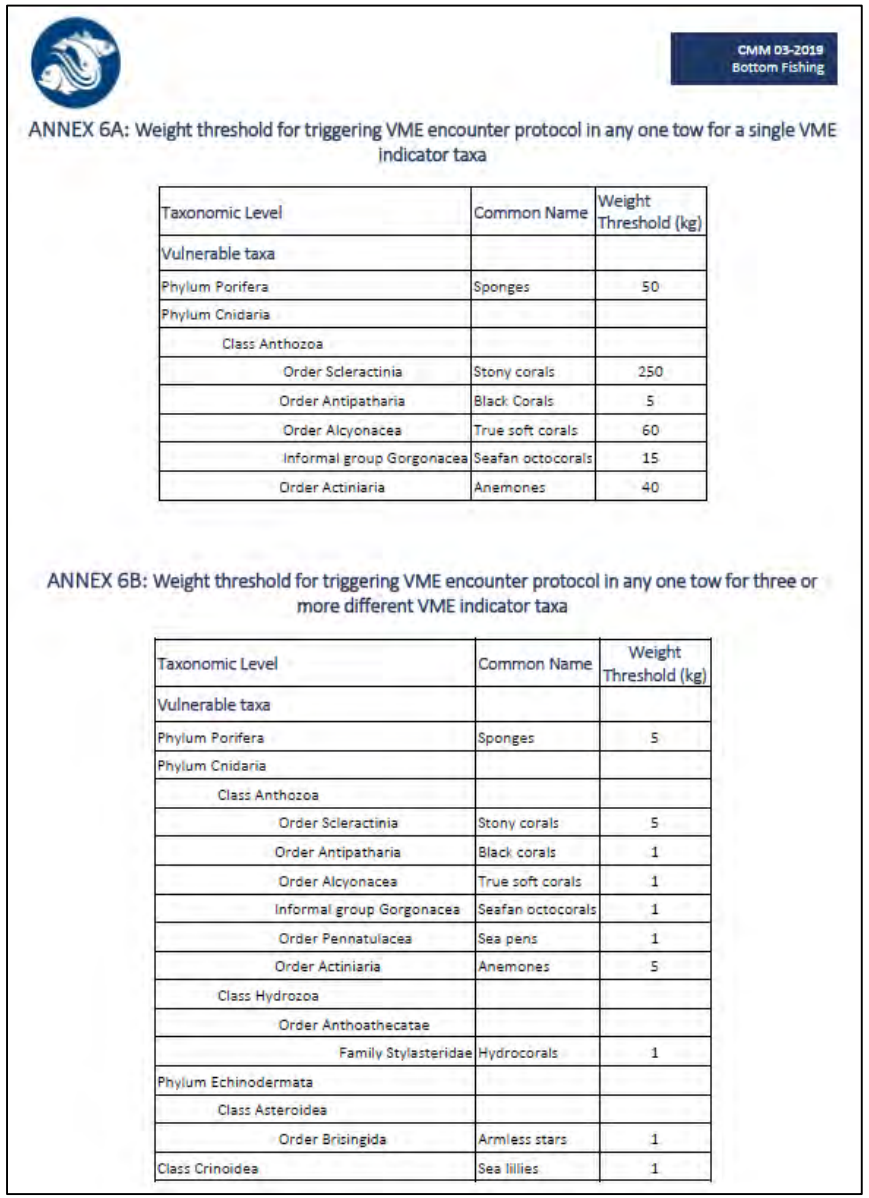


Current Thresholds (2018) (kg) – Indian Ocean Contracting Parties, CNCPs and PFEs

		Corals	Sponges	Sea pens
Australia	All gear	50	50	-
Cook Is.	Trawl	60 (30)	400 (200)	-
French T	Longline/pots	10 VME Indicator units per 1000 hooks (1200 m)		
Thailand	Trawl	60	600	
	Longlines	10 kg per 1000 hooks (1200 m)		
	Pots	10kg		

SPRFMO VME Indicator Thresholds

ANNEX E



CMM 03-2019
Bottom Fishing

ANNEX 6A: Weight threshold for triggering VME encounter protocol in any one tow for a single VME indicator taxa

Taxonomic Level	Common Name	Weight Threshold (kg)
Vulnerable taxa		
Phylum Porifera	Sponges	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	40

ANNEX 6B: Weight threshold for triggering VME encounter protocol in any one tow for three or more different VME indicator taxa

Taxonomic Level	Common Name	Weight Threshold (kg)
Vulnerable taxa		
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
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

SPRFMO
South Pacific Regional Fisheries Management Organisation

CMM 03-2019

Conservation and Management Measure for the Management of Bottom Fishing in the SPRFMO Convention Area

(Supersedes CMM 03-2018)

VME Encounter Thresholds

ANNEX E

CMM 2017/01 - 6. SC in 2019 develop …(b) criteria for what constitutes evidence of an encounter with a VME, in particular threshold levels and indicator species;

SC3 reporting to MoP5

Annex J

1. Overview of SIOFA fisheries

Thresholds of VME indicators

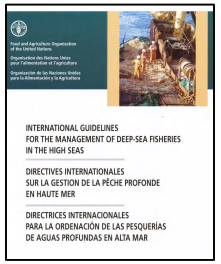
- Threshold weight for coral and sponge vary across parties even where the same gear is used
- Some not described

CMM 2018/01 - 6. SC in 2019 develop …(b) criteria for what constitutes evidence of an encounter with a VME, in particular threshold levels and indicator species;

Encounter protocols

ANNEX E

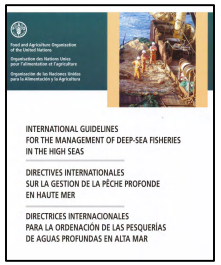
DSF Guidelines



67. States and RFMO/As should have an appropriate protocol identified in advance for how fishing vessels in DSFs should respond to encounters in the course of fishing operations with a VME, including defining what constitutes evidence of an encounter. Such protocol should ensure that States require vessels flying their flag to cease DSFs fishing activities at the site and report the encounter, including the location and any available information on the type of ecosystem encountered, to the relevant RFMO/A and flag State.

Encounter protocols

ANNEX E



DSF Guidelines

70. States and RFMO/As should, based on the results of assessments carried out pursuant to Section 5.2, adopt conservation and management measures to achieve long-term conservation and sustainable use of deep-sea fish stocks, ensure adequate protection and prevent significant adverse impacts on VMEs. These measures should be developed on a case-by-case basis and take into account the distribution ranges of the ecosystems concerned.

71. Conservation and management measures pursuant to paragraph 70, may include:

i. effort controls and/or catch controls;

ii. temporal and spatial restrictions or closures;

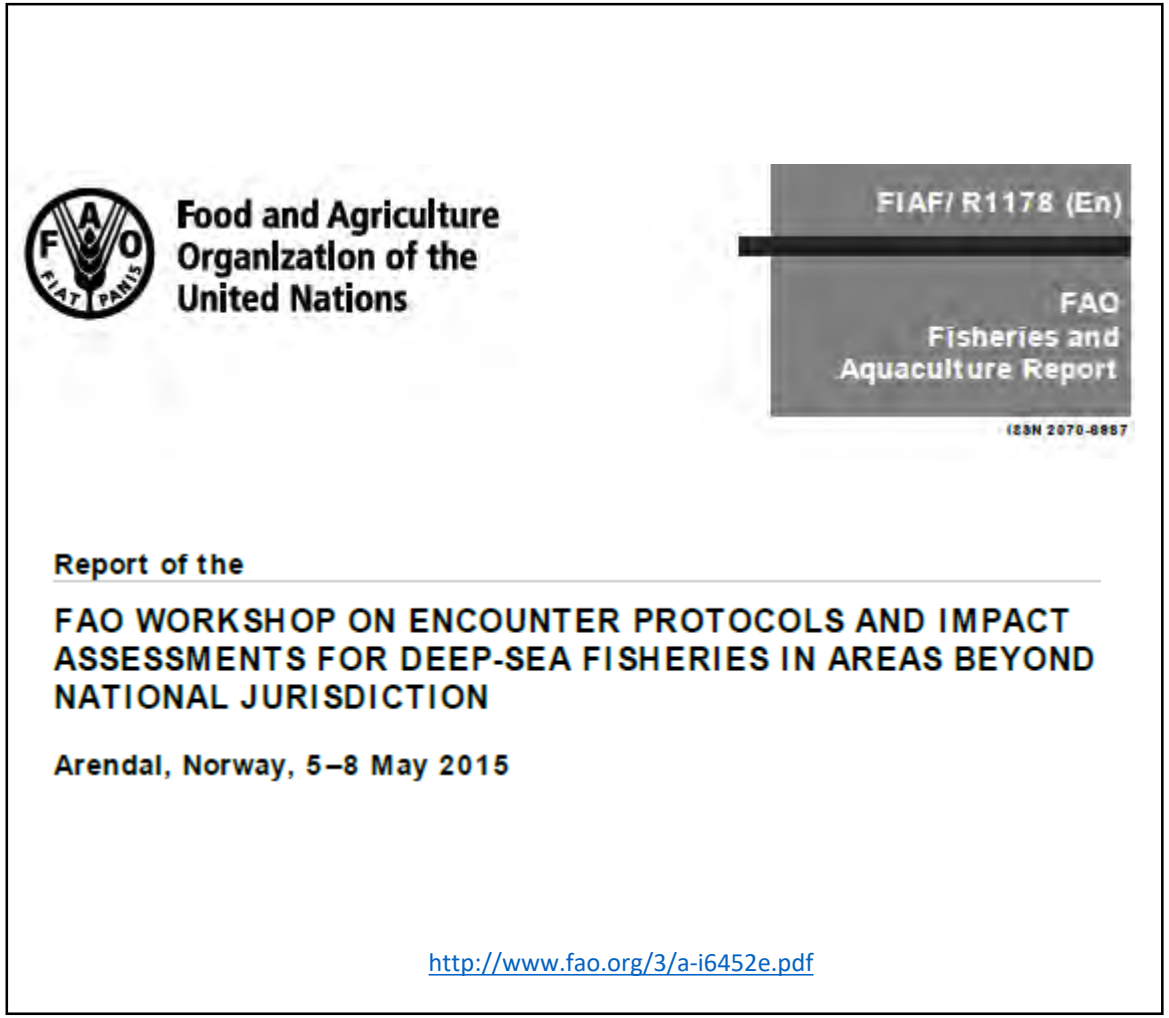
iii. changes in gear design and/or deployment or operational measures (as discussed in the 2006 Bangkok Expert Consultation), including:

- reduction of contact between the fishing gear and the seabed,
- use of effective bycatch reduction devices, and
- use of technical measures to eliminate or minimize ghost fishing; or

iv. other relevant measures necessary to achieve the objective of paragraph 70.

FAO Workshop on encounter protocols

ANNEX E



Food and Agriculture Organization of the United Nations

FIAF/ R1178 (En)

FAO Fisheries and Aquaculture Report

ISSN 2070-6057

Report of the

FAO WORKSHOP ON ENCOUNTER PROTOCOLS AND IMPACT ASSESSMENTS FOR DEEP-SEA FISHERIES IN AREAS BEYOND NATIONAL JURISDICTION

Arendal, Norway, 5–8 May 2015

http://www.fao.org/3/a-i6452e.pdf

- Interim or supplementary measure
- Threshold levels challenging
- Identification guides required
- Move-on rules (temporary closures) consistent with conservation objectives
- Report all encounters with VME indicators

Encounter protocols

ANNEX E

CMM2018/01

6. SC advise on (c) the most appropriate response to a VME encounter, including inter alia closing particular areas to a particular gear type or types;

12. … CCPs 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.

CCPs 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 CCP in respect of the relevant site.

SIOFA | APSOI
Southern Indian Ocean Fisheries Agreement
Accord relatif aux Pêches dans le Sud de l'Océan Indien

Annex 1 - Guidelines for the Preparation and Submission of Notifications of Encounters with VMEs

1. General Information

Include contact information, nationality, vessel name(s) and dates of data collection.

2. VME location

Start and end positions of all gear deployments and/or observations.

Maps of fishing locations, underlying bathymetry or habitat and spatial scale of fishing. Depth(s) fished.

3. Fishing gear

Indicate fishing gears used at each location.

4. Additional data collected

Indicate additional data collected at or near the locations fished, if possible.

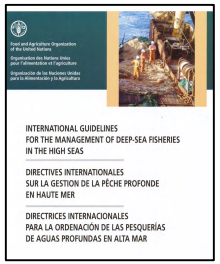
Data such as multibeam bathymetry, oceanographic data such as CTD profiles, current profiles, water chemistry, substrate types recorded at or near those locations, other fauna observed, video recordings, acoustic profiles etc.

5. VME taxa

For each station fished, provide details of VME taxa observed, including but not limited to their relative density, absolute density, or weight and/or number of taxa.

Protected area protocols

ANNEX E



DSF Guidelines

14-19. VMEs are vulnerable to SAI, recovery longer than 5-20 years, risk (vulnerability, threat, mitigation)

5.2 Identifying vulnerable marine ecosystems and assessing significant adverse impacts

42. A marine ecosystem should be classified as vulnerable based on the characteristics that it possesses:

i. Uniqueness or rarity

- endemic species;
- rare, threatened or endangered species that occur only in discrete areas;
- nurseries or discrete feeding, breeding, or spawning areas.

ii. Functional significance of the habitat

iii. Fragility

iv. Life-history traits of component species that make recovery difficult

v. Structural complexity

Protected area protocols

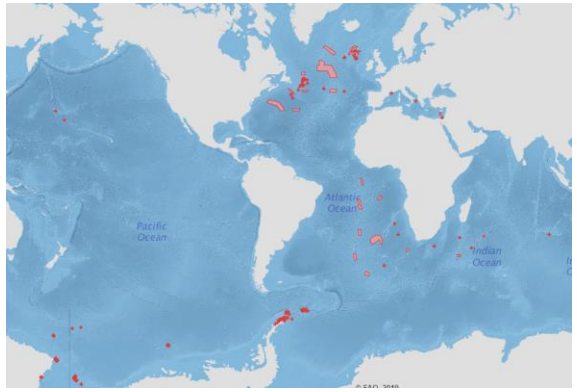
VME "definitions" used by RFMOs

<u>NAFO, NEAFC, NPFC, SEAFO, SPRFMO</u>

para 42, 43 and/or Annex 1 of FAO DSF Guidelines

<u>CCAMLR</u>

VME indictor organism and VME indicator unit



Is it useful to try to find a practical definition from VME areas adopted elsewhere?

Not really – only some well surveyed (NAFO, NEAFC, CCMALR), many poorly surveyed or typography only, huge variety.

VMEs are benthic, delineated, vulnerable, under real or potential threat.

Protected area protocols

SIOFA | APSOI
Southern Indian Ocean Fisheries Agreement
Accord relatif aux Pêches dans le Sud de l'Océan Indien

CMM2018/01 Para 6

(d) the interim SIOFA *Standard Protocol for Future Protected Areas Designation* adopted by the Meeting of the Parties in 2018 [next slide]

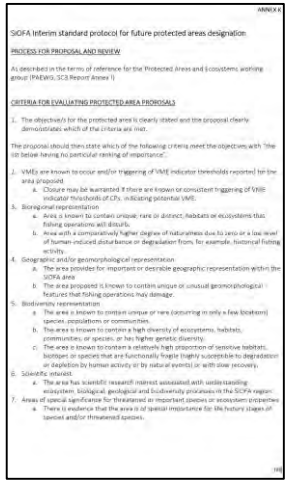
MoP5, para 34-40

- Revised protocol to the Meeting of the Parties adopted (Annex K).
- EU proposed that the Scientific Committee revise the protocol to further elaborate the application of criteria, how the Meeting of the Parties should use the criteria, which criteria may warrant closure and to provide guidance on management options.
- Scientific Committee is requested to clarify the use of the criteria and provide in particular a ranking and a key for using these criteria in view to developing appropriate management plans/measures.

Protected area protocols

ANNEX E

MoP5 Annex K SIOFA Interim standard protocol for future protected areas designation (and SC3 Annex H)


ANNEX K

SIOFA Interim standard protocol for future protected areas designation

PROCESS FOR PROPOSAL AND REVIEW

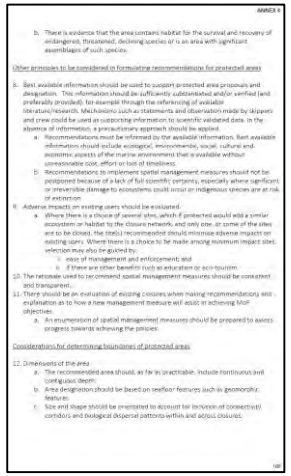
As described in the terms of reference for the Protected Areas and Ecosystems working group (PAEWG, SC3 Report Annex I)

CRITERIA FOR EVALUATING PROTECTED AREA PROPOSALS

1. The objective/s for the protected area is clearly stated and the proposal clearly demonstrates which of the criteria are met.

The proposal should then state which of the following criteria meet the objectives with 'the list below having no particular ranking of importance'.

2. VMEs are known to occur and/or triggering of VME indicator thresholds reported for the area proposed.
   a. Closure may be warranted if there are known or consistent triggering of VME indicator thresholds of CPs, indicating potential VME.
3. Bioregional representation
   a. Area is known to contain unique, rare or distinct, habitats or ecosystems that fishing operations will disturb.
   b. Area with a comparatively higher degree of naturalness due to zero or a low level of human-induced disturbance or degradation from, for example, historical fishing activity.
4. Geographic and/or geomorphological representation
   a. The area provides for important or desirable geographic representation within the SIOFA area
   b. The area proposed is known to contain unique or unusual geomorphological features that fishing operations may damage.
5. Biodiversity representation
   a. The area is known to contain unique or rare (occurring in only a few locations) species, populations or communities.
   b. The area is known to contain a high diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.
   c. The area is known to contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.
6. Scientific interest
   a. The area has scientific research interest associated with undisturbed ecosystem, biological, geological and biodiversity processes in the SIOFA region.
7. Areas of special significance for threatened or important species or ecosystem properties
   a. There is evidence that the area is of special importance for life history stages of species and/or threatened species.


ANNEX K

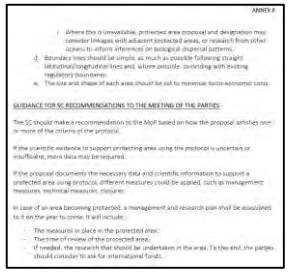
b. There is evidence that the area contains habitat for the survival and recovery of endangered, threatened, declining species or is an area with significant assemblages of such species.

Other principles to be considered in formulating recommendations for protected areas

8. Best available information should be used to support protected area proposals and designation. This information should be sufficiently substantiated and/or verified (and preferably provided), for example through the referencing of available literature/research. Mechanisms such as statements and observation made by skippers and crew could be used as supporting information to scientific validated data. In the absence of information, a precautionary approach should be applied.
   a. Recommendations must be informed by the available information. Best available information should include ecological, environmental, social, cultural and economic aspects of the marine environments that is available without unreasonable cost, effort or lack of timeliness.
   b. Recommendations to implement spatial management measures should not be postponed because of a lack of full scientific certainty, especially where significant or irreversible damage to ecosystems could occur or indigenous species are at risk of extinction.
9. Adverse impacts on existing users should be evaluated.
   a. Where there is a choice of several sites, which if protected would add a similar ecosystem or habitat to the closure network, and only one, or some of the sites are to be closed, the site(s) recommended should minimise adverse impacts on existing users. Where there is a choice to be made among minimum impact sites selection may also be guided by:
      i. ease of management and enforcement; and
      ii. if there are other benefits such as education or eco-tourism.
10. The rationale used to recommend spatial management measures should be consistent and transparent.
11. There should be an evaluation of existing closures when making recommendations and explanation as to how a new management measure will assist in achieving MoP objectives.
   a. An enumeration of spatial management measures should be prepared to assess progress towards achieving the policies.

Considerations for determining boundaries of protected areas

12. Dimensions of the area
   a. The recommended area should, as far as practicable, include continuous and contiguous depth.
   b. Area designation should be based on seafloor features such as geomorphic features.
   c. Size and shape should be orientated to account for inclusion of connectivity corridors and biological dispersal patterns within and across closures.


ANNEX K

i. Where this is unavoidable, protected area proposal and designation may consider linkages with adjacent protected areas, or research from other oceans to inform inferences on biological dispersal patterns.

j. Boundary lines should be simple, as much as possible following straight latitudinal/longitudinal lines and, where possible, coinciding with existing regulatory boundaries.

k. The size and shape of each area should be set to minimise socio-economic costs.

GUIDANCE FOR SC RECOMMENDATIONS TO THE MEETING OF THE PARTIES

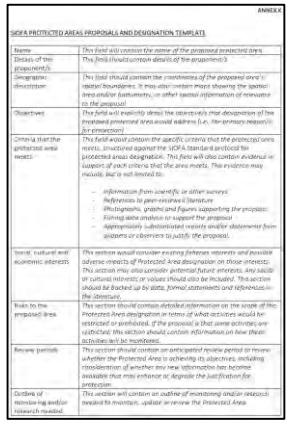
The SC should make a recommendation to the MoP based on how the proposal satisfies one or more of the criteria of the protocol.

If the scientific evidence to support protecting areas using the protocol is uncertain or insufficient, more data may be required.

If the proposal documents the necessary data and scientific information to support a protected area using protocol, different measures could be applied, such as management measures, technical measures, closure.

In case of an area becoming protected, a management and research plan shall be associated to it on the year to come. It will include:

- The measures in place in the protected area;
- The time of review of the protected area;
- If needed, the research that should be undertaken in the area. To this end, the parties should consider to ask for international funds.


ANNEX K

SIOFA PROTECTED AREAS PROPOSALS AND DESIGNATION TEMPLATE

Name	*This field will contain the name of the proposed protected area.*
Details of the proponent/s	*This field should contain details of the proponent/s.*
Geographic description	*This field should contain the coordinates of the proposed area's spatial boundaries. It may also contain maps showing the spatial area and/or bathymetry, or other spatial information of relevance to the proposal.*
Objectives	*This field will explicitly detail the objective/s that designation of the proposed protected area would address (i.e., the primary reason/s for designation).*
Criteria that the protected area meets	*This field would contain the specific criteria that the protected area meets, structured against the SIOFA Standard protocol for protected areas designation. This field will also contain evidence in support of each criteria that the area meets. This evidence may include, but is not limited to:* – *Information from scientific or other surveys* – *References to peer-reviewed literature* – *Photographs, graphs and figures supporting the proposal* – *Filming data analysis to support the proposal* – *Appropriately substantiated reports and/or statements from observers or observers to justify the proposal.*
Social, cultural and economic interests	*This section would consider existing fisheries interests and possible adverse impacts of Protected Area designation on those interests. This section may also consider potential future interests. Any social or cultural interests or values should also be included. This section should be backed up by data, formal statements and references in the literature.*
Risks to the proposed area	*This section should contain detailed information on the scope of the Protected Area designation in terms of what activities would be restricted or prohibited. If the proposal is that some activities are restricted, this section should contain information on how these activities will be monitored.*
Review periods	*This section should contain an anticipated review period to review whether the Protected Area is achieving its objectives, including consideration of whether any new information has become available that may enhance or degrade the justification for protection.*
Outline of monitoring and/or research needed	*This section will contain an outline of monitoring and/or research needed to maintain, update or review the Protected Area.*

Criteria for evaluating Protected Area Proposals

The protocol (left) lists 7 criteria:

1: clear objectives for protected area

2: Closure if VME present

3,4,5: Bioregional, geographic, biodiversity representation

6: Scientific interest

7: Important life-history stages

4b and 5c mention potential SAI concern

Selection of protected areas

MoP5: Australia proposed 5 areas for closure and 7 for VME encounter proposals (para 79)

The information on catch and fishing effort in the proposed areas had been provided by the Secretariat (MoP5-INFO-03, classified as restricted in accordance with CMM 2016/03 on Data Confidentiality). (41)

EU: need to establish better frameworks, and no trawl activity in proposed areas (43)

CPPs: Need for management and research plans (44) [provided at this meeting]

EU: The criterion on the presence of VMEs was not fulfilled. No immediate risks. (82)

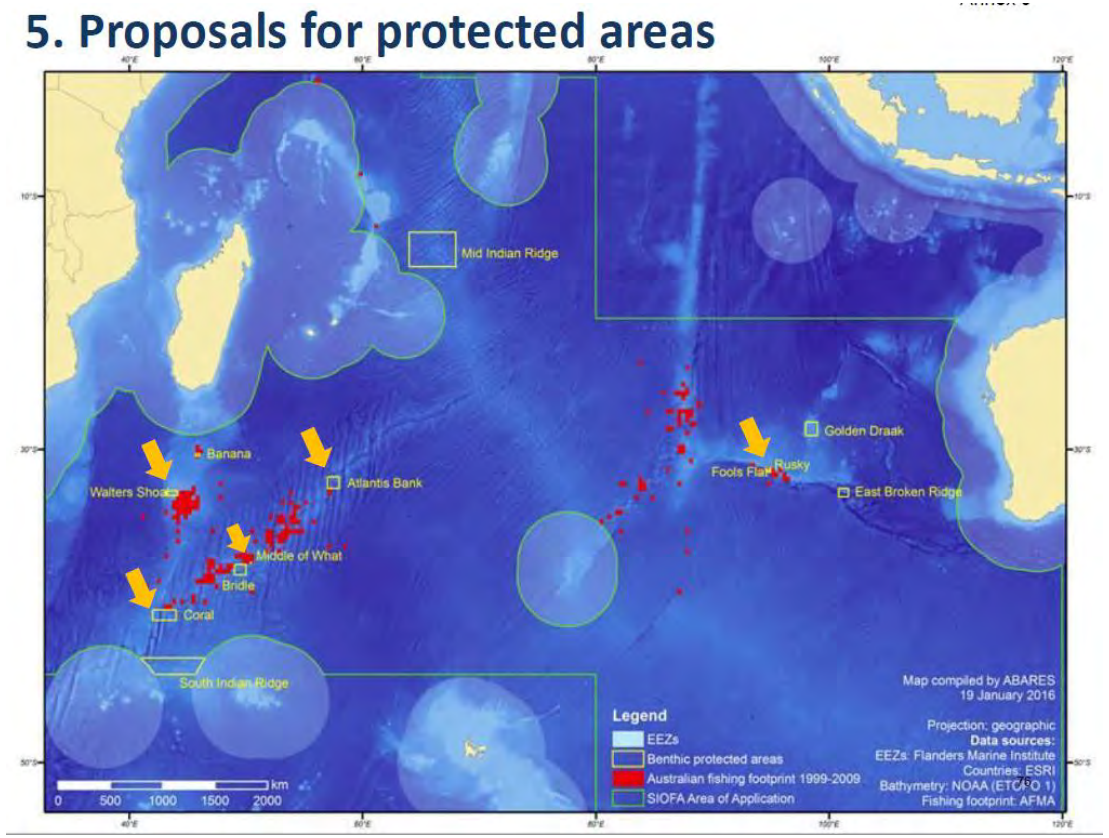
Aus: Forecast and prevent (82)

Selection of protected areas

ANNEX E

Feature SC noted evidence that satisfied criteria (MoP5, annex J, p. 75)

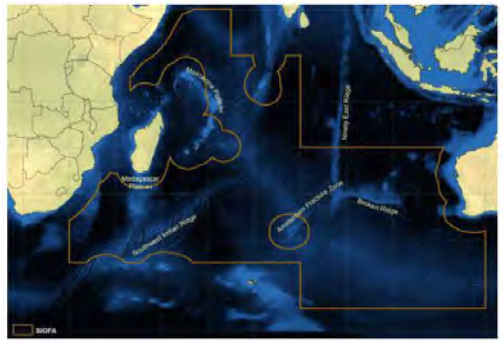
Feature	SC noted evidence that satisfied criteria
Atlantis bank	5b Biodiversity representation 6a Scientific interest
Coral	3b Bioregional representation 5b Biodiversity representation 6a Scientific interest
Fool's flat	3b Biodiversity representation 4a Geographic and/or unique representation 5b Biodiversity representation
Walter's Shoal	3b Bioregional representation 5b Biodiversity representation 6a Scientific interest
Middle of What	3b Bioregional representation



Australia BFIA

National Research FLAGSHIPS Wealth from Oceans CSIRO

Bottom Fishery Impacts Assessment



Australian report for the Southern Indian Ocean Fisheries Agreement (SIOFA)

Marine ecosystem: a dynamic complex of plant, animal and microorganism communities and their nonliving environment interacting as a functional unit.

Vulnerable marine ecosystem: 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 or cold water sponge beds. The most vulnerable ecosystems are those that are easily disturbed and in addition are very slow to recover, or may never recover.

Significant adverse impacts: impacts which compromise ecosystem integrity in a manner that impairs the ability of affected populations to replace themselves and that degrades the long-term natural productivity of habitats, or causes on more than a temporary basis significant loss of species richness, habitat or community types.

Council Regulation (EC) No 734/2008 of 15 July 2008

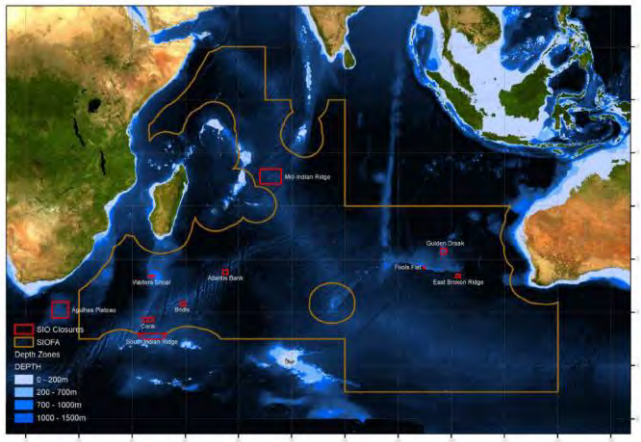


Figure 3.1.4.1 Voluntary BPAs implemented by the SIODFA. Note: 'Rusky' (not labelled) is a small area attached to 'Fools Flat'

trigger limits (currently 50 kg of coral and sponges)

move-on rule is enforced where, on detection of 'evidence of a VME', a temporary closure of 5 n.m. radius

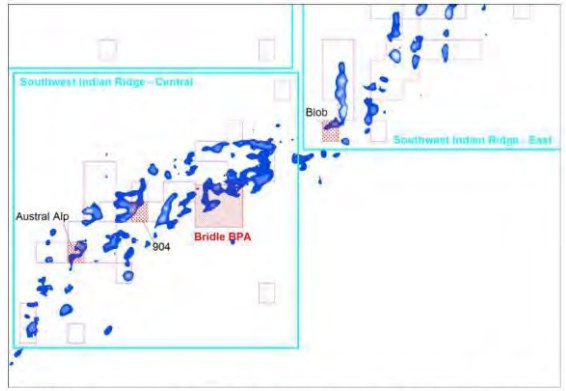


Figure 4.1.5.1 Reported locations (as 20' blocks – red dotted) of catches with VME fauna >100 kg in 2009 resulting in the implementation of the move-on rule; Australian footprint: pink outlines; fishing grounds: light blue outlines; BPA: red hashed..

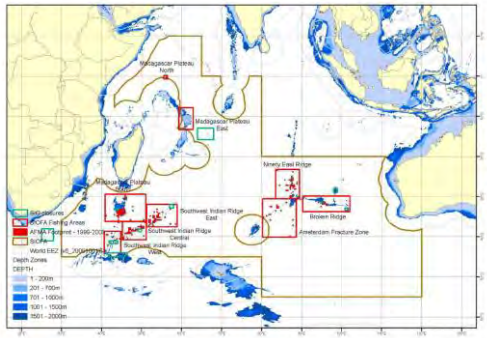


Figure 3.1.3.1 Fishing regions ("fishing grounds") within the SIOFA Area based on the Australian footprint (combined trawl and line fisheries effort distribution 1999-2009). Note: for ease of definition and mapping, the fishing grounds are defined as rectangular boxes, some of which overlay adjacent EEZs; analyses only consider fishing effort within the SIOFA Area.

Porifera (sponges)
Scleractinia (stony corals)
Gorgonacea (octocorals)
Stylasteridae (hydrocorals)
stalked crinoids (sea lilies)

Operational measures to minimise benthic impacts
Fishing operators report the following operational actions to mitigate the impacts of fishing on VMEs:
demersal trawl operators minimise bottom contact by …
auto-longline operators minimise impact by 'peeling' the …
mid-water trawlers use trawl nets with weak links that break …

Cook Islands BFIA

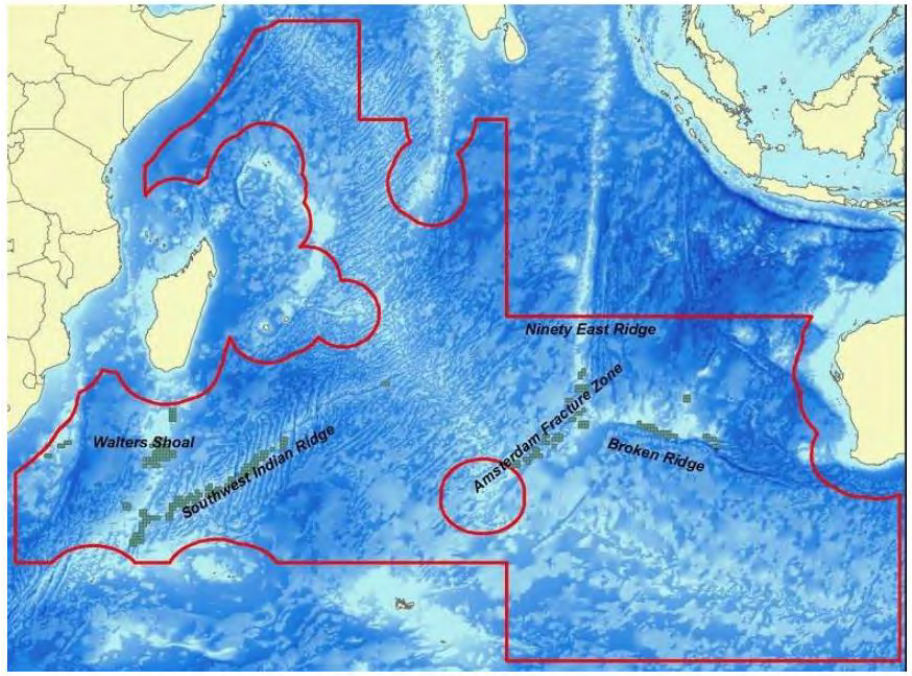


Figure 14 Cook Islands Bottom Fishing Footprint 1996-2016

Rusky	31° 20'	94° 55'	3 1 ° 30'	95° 00'
Fools · Flat	31° 30'	94° 40'	3 1 ° 40'	95° 00'
Atlantis Bank	32° 00'	57° 00'	32° 50'	58° 00'
Walters Shoal	33 ° 00'	43° 10'	33° 20'	44° 10'
Coral	41 ° 00'	42° 00'	41° 40'	44° 00'
Banana	30° 20'	45° 40'	30° 30'	46° 00'
Middle of What (MoW)	37° 54'	50° 23'	37° 56.5. 5'	50° 27

Table 3 Known VMEs in SIOFA

7.4 VME Reporting

Corals Bycatch spreadsheet used on every tow. 52 indicator species including various coral types, sponges, and volcanic rock.

VME Threshold

60 (30*) kg of live coral and/or 400 (200*) kg of live sponge. 2nd encounter within 1 nm and move-away 5 nm.

Figure 20 Fished Area Footprint for one Walters Shoal knoll.

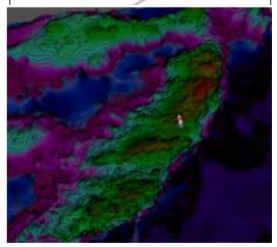


Figure 18 Dissolved trawl tracks on the Southwest Indian Ridge

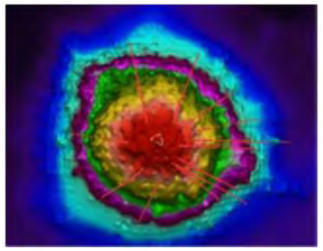


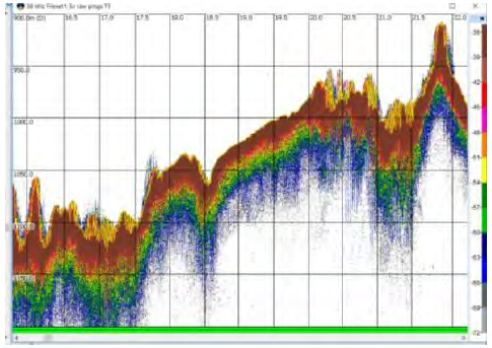
Figure 15 Rusky Knoll with towlines marked in red

Small areas actually towed

6.1 VME Risk Assessment

Intensity, Duration, Spatial extent, Cumulative impact

SC (2017), "move-on rules provide a rapid response to evidence of VMEs … early stages of a fishery when information is scarce. once objectively-designed spatial management measures have been implemented to prevent significant adverse impacts on VMEs, move-on rules provide little additional benefit for VMEs and they have significant costs in terms of monitoring requirements and operational uncertainty for fishers."



Simrad ES60 sounder showed clearly that the "fish school" observed with an early Furuno Color Sounder was actually a coldwater coral reef (Figure 16).

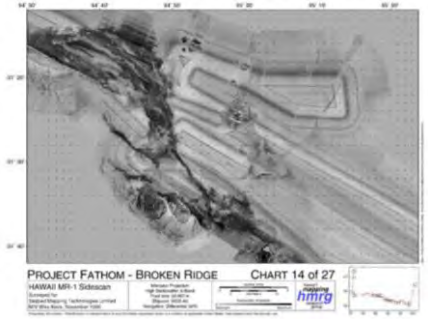


Figure 23 Broken Ridge Sidescan Sonar Image including Fool's Flat and Rusky

Sidescan sonar imagery cannot identify VME structures that may occur on hard rock substrate.

Camera on trawl

EU BFIA

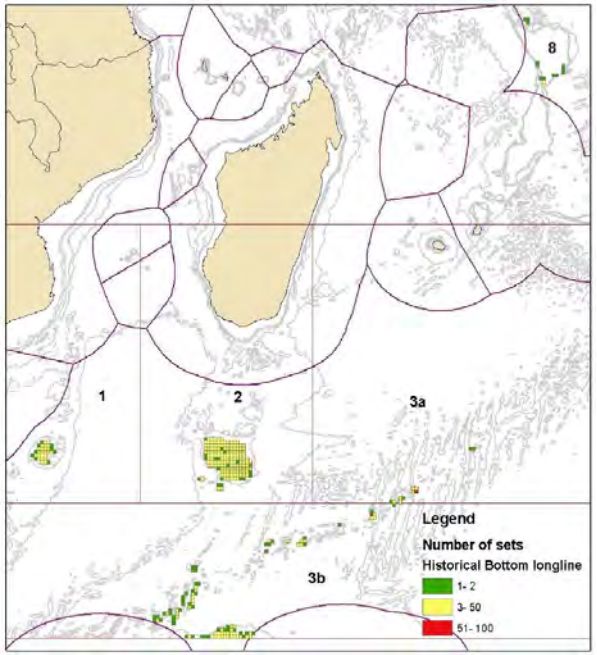
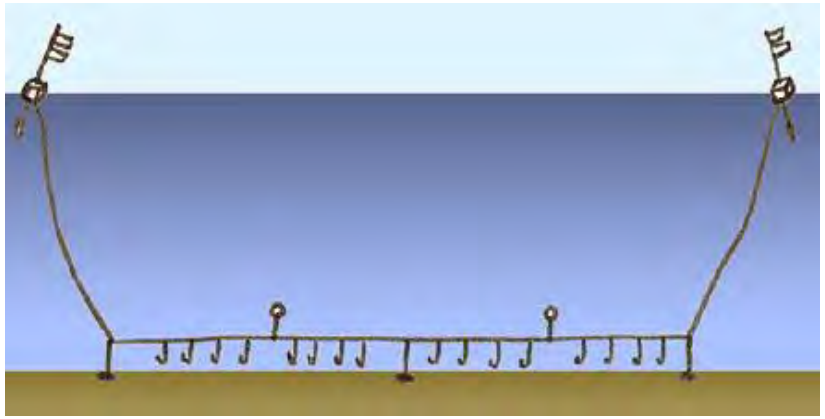


Figure 2.- Historical EU-Spain bottom longline footprint.



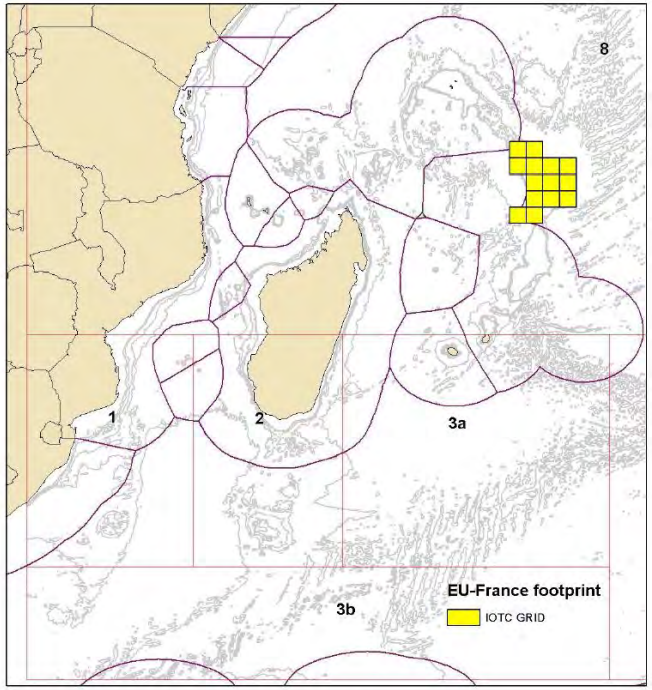


Figure 2: EU-France fishing footprint from IOTC gridding (1°x1°)

Table 2. Overlap of EU-Spain fishing footprint with fishable seabed.

Years	Footprint area (km^2)	Total SIOFA area[1] (km^2)	Overlap [1] (%)	SIOFA area [2] <2000m (km^2)	Overlap [2] (%)
2003-2017	105,301	26,880,647	0.39	466,050	22.59
2017	43,904	26,880,647	0.16	466,050	9.42

(1) Total SIOFA seabed
(2) SIOFA seabed <2000 m

Impact on VME taxa is considered low. Taxa potentially impacted Sponges, Corals, Echinoderms

Footprint index: mean = 6.67 x 10_{-3}; median = 5.26 x 10_{-3}; 95% quantile = 12.1 x 10_{-3} (km_2 of seabed area per km of longline deployed)
Impact index: mean = 5.07 x 10_{-3}; median = 4.70 x 10_{-3}; 95% quantile = 9.04 x 10_{-3}

Impacts on potential vulnerable marine ecosystems (VMEs) in the fisheries have been reduced through decisions of using the longline method instead of bottom trawling and to move away from clip on weights in favor of integrated weighted longlines.

ANNEX E

French Territories BFIA

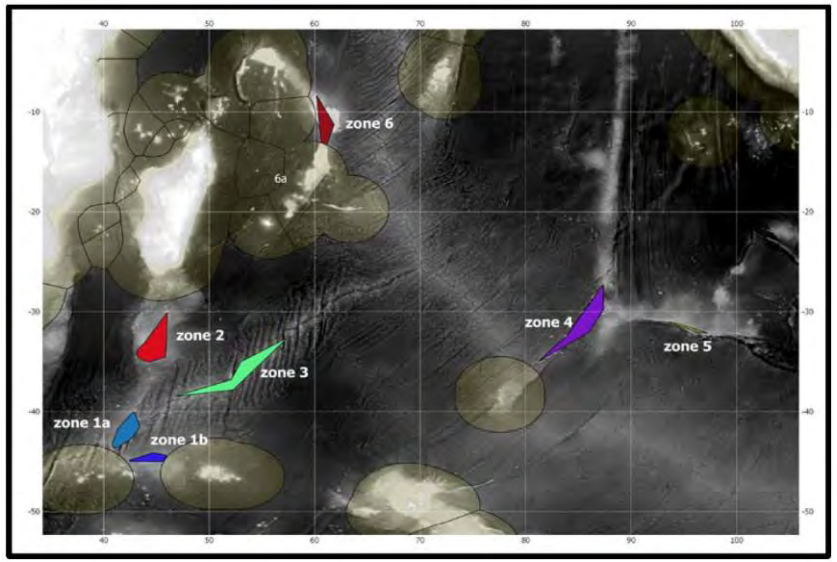


FIGURE 6: MAP OF THE PROPOSED FISHING AREA

FIGURE 9: WEIGHING OF A SET OF BENTHOS BYCATCH SPECIMENS COLLECTED DURING THE HAULING OBSERVATION OF A LONGLINE IN KERGUELEN; PICTURE BY FISHERY OBSERVER HUGUES VERMANDE (2015)

Only one VME bioindicator taxa caught (Demospongiae in 2017)

Impact assessment percentage of fished areas

TABLE 10: FRENCH THEORETICAL MAXIMUM FISHING FOOTPRINT AND REAL FOOTPRINT IN THE 2013-2017 PERIOD IN SIOFA AREA

Bathomes (m)	0-200	201-700	701-1000	1001-1500	1501-2000	>2000	Total
Area (km²) per bathome of zones	20376	16124	14103	40102	62091	221221	374020
Percentage per bathome of zones in SIOFA	**54,47 %**	**50,23 %**	**56,12 %**	**36,20 %**	**23,82 %**	**0,82 %**	**1,39 %**

French fishable areas (500-2000 m): **59305 km²**
French theoretical fishing footprint comparing to SIOFA area: **0,22 %**
French fished area in the 2013-2017 period: **2679 km²**
French real footprint in the 2013-2017 period: **0.0099 %**

<u>VME reporting systems</u>

Data acquisition protocol (same as CCAMLR)
Conservation rules (same as CCAMLR CMM 22-06 and 22-07))
Reporting above 5 units
Closure above 10 units
No bottom fishing <500 m

Japan BFIA - longlines

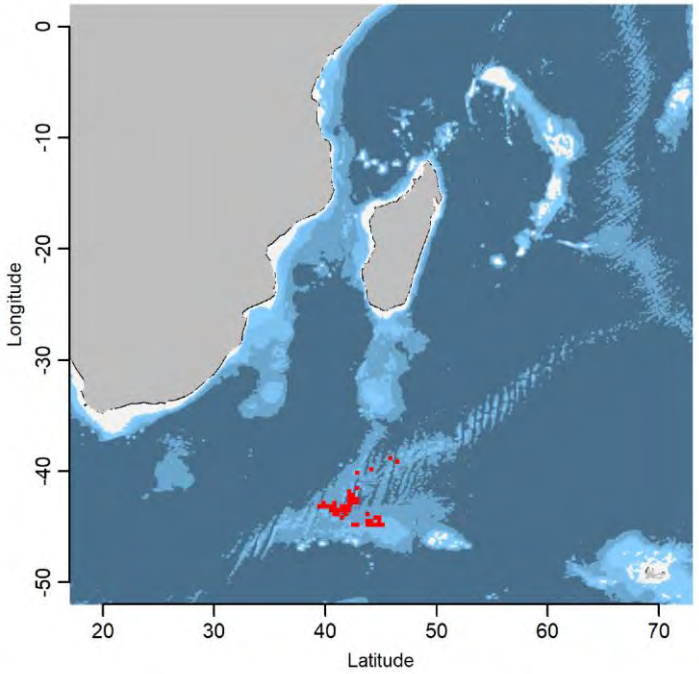


Fig. 1 The footprints of Japanese bottom longline fishery for 9 years (2004-2010, 2013 and 2017). Red squares indicate the foot prints which are described as grid blocks of 20 minutes resolution.

There is no information collected by Japanese bottom longline fishery to evaluate any actual impacts on seabed ecosystems including VMEs.

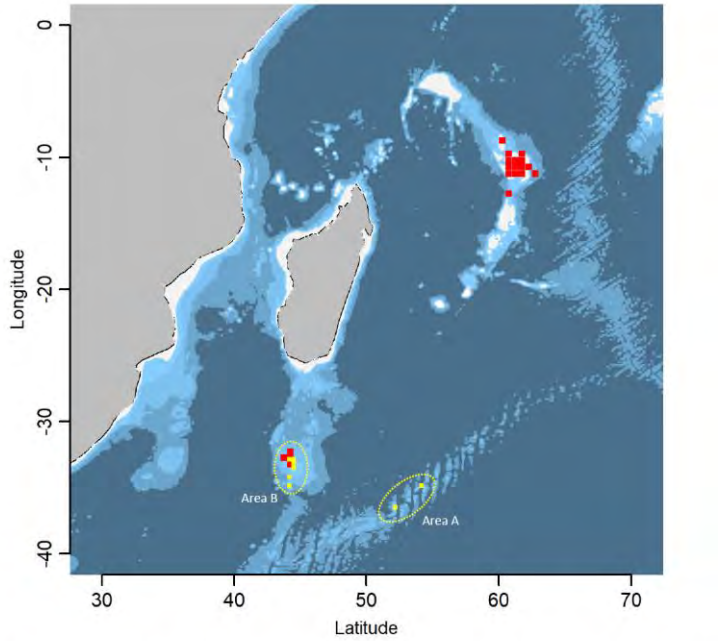


Fig. 1 The footprints of Japanese exploratory bottom trawl fisheries in 1977, 1978, and 2012. Red squares indicate the foot prints in 1977 and 1978 which are described as grid blocks of 30 minutes resolution according to spatial resolution of fishing log book as data sources. Yellow squares represent the foot prints in 2012 which are described as grid blocks of 20 minutes resolution.

By-catch of corals were observed in six hauls during these eight observations, but there is no by-catch of sponges. The coral by-catch weight range 0.01–1.68 kg.

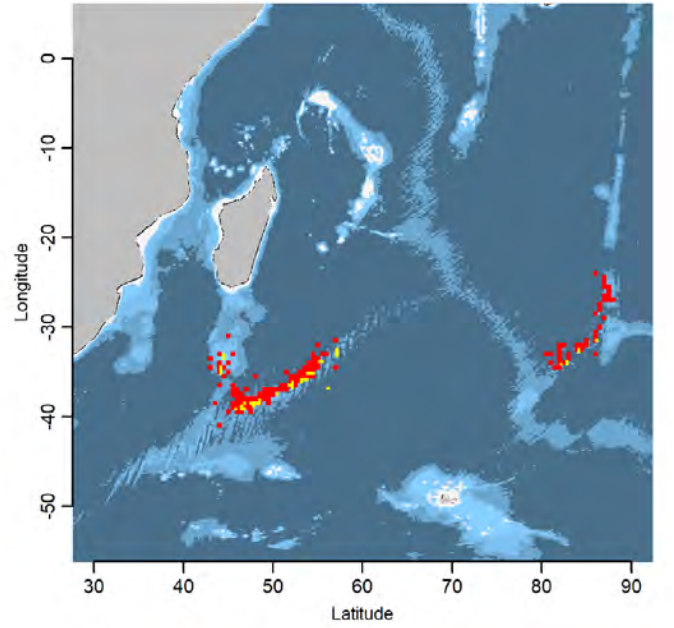
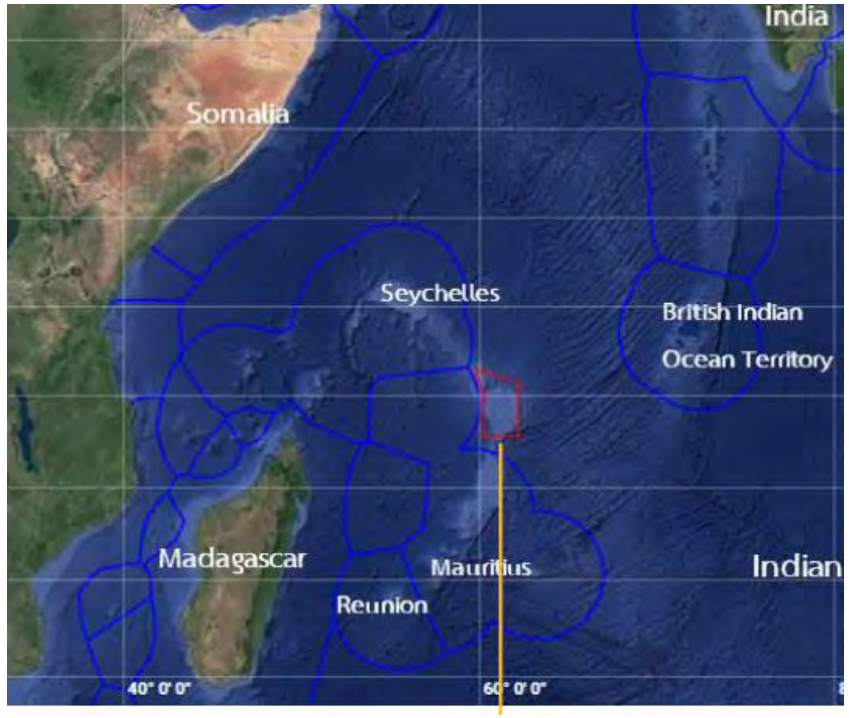


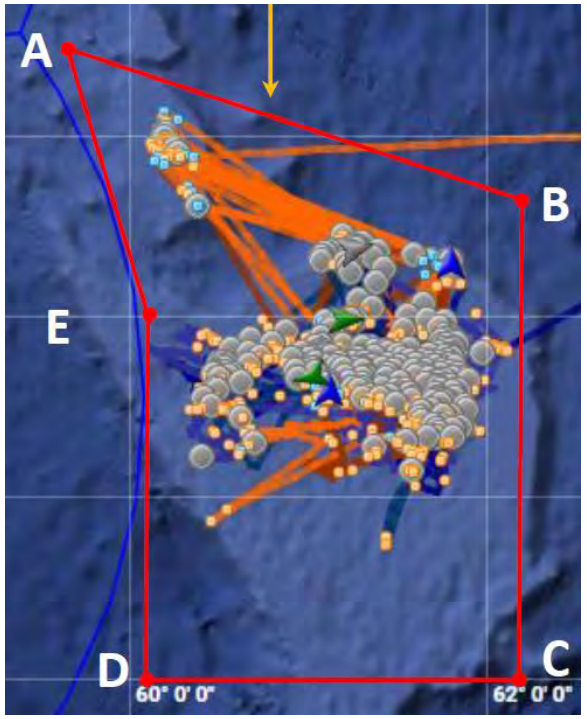
Fig. 1 The footprints of Japanese midwater fisheries with type-T trawling in 2001–2002, 2009–2013, and 2015–2017. Red squares indicate the foot prints in 2001–2002, part of 2010, 2011–2013, and 2015–2016 which are described as grid blocks of 30 minutes resolution according to spatial resolution of fishing log book as data sources. Yellow squares represent the foot prints in 2009, part of 2010, and 2017 which are described as grid blocks of 20 minutes resolution.

No VME by-catch.

Thailand BFIA



High sea of Saya de Malha Bank.



June 2016 to February 2017.

Restrictions

- Restricted to footprint
- Thailand prohibits it's vessels to fish in BPAs
- VME threshold corals 60 kg and sponges 600 kg (trawler).
- 10 kg per 1000 hooks or 1200 m.
- 10 kg per trap.
- Reporting, move-on and cease fishing.

ANNEX F

Mapping VMEs

FAO DSF Guidelines and actions taken by RFMOs in other regions

Ashley A. Rowden

NIWA
Taihoro Nukurangi

TE WHARE WĀNANGA O TE ŪPOKO O TE IKA A MĀUI
VICTORIA
UNIVERSITY OF WELLINGTON

First Meeting of the Protected Areas and Ecosystems Working Group (PAEWG1)

FAO workshop on vulnerable marine ecosystems (VMEs) for the SIOFA region

18-19 March, 2019

National Research Institute of Fisheries Science, Yokohama, Japan

Outline

- FAO Guidelines
- NAFO
- SPRFMO
- Mapping VME issues
- Recent developments and future directions

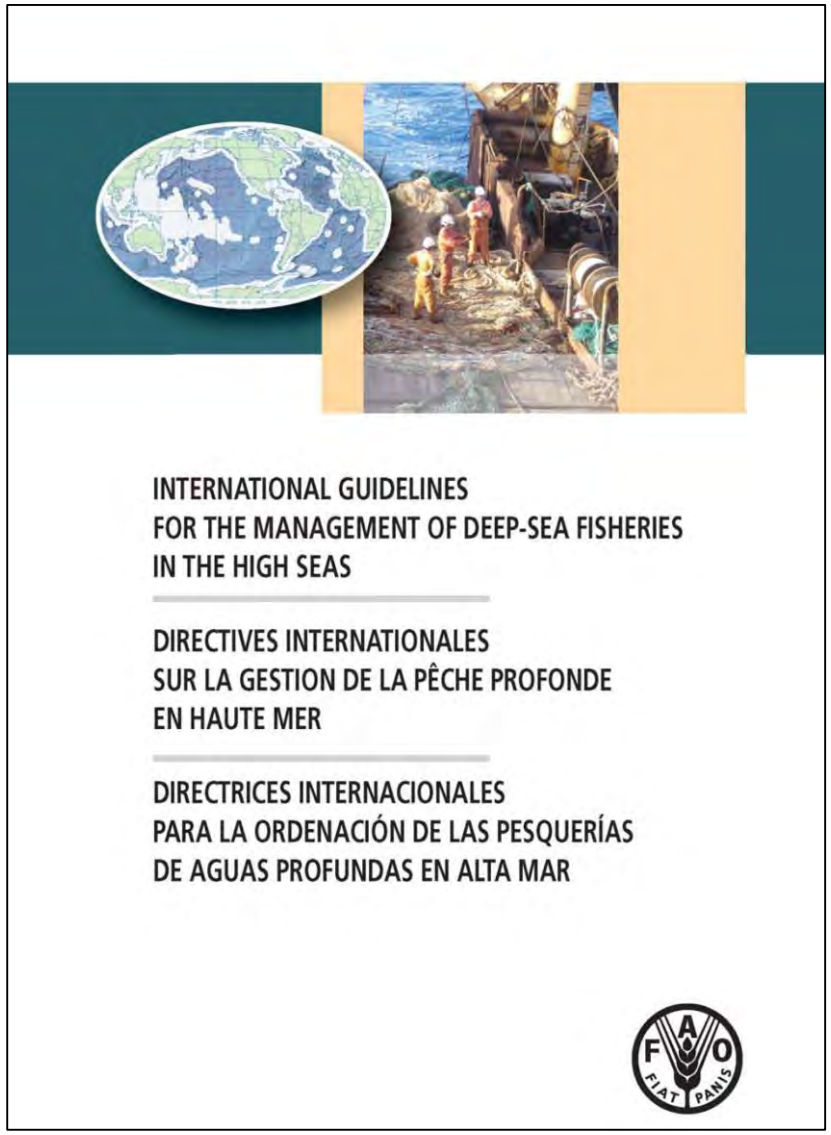
Background

- Bottom trawling impacts seafloor habitats, communities and species
- UNGA passed resolutions to protect VMEs in 2006 and 2009
- RFMOs obliged to prevent SAI to VMEs
- FAO produces guidelines in 2009 to assist RFMOs

ANNEX F

FAO Guidelines

The role of the Guidelines is to provide tools, including guidance on their application, to facilitate and encourage the efforts of States and RFMO/As towards sustainable use of marine living resources exploited by deep-sea fisheries, the prevention of significant adverse impacts on deep-sea VMEs and the protection of marine biodiversity that these ecosystems contain.



ANNEX F

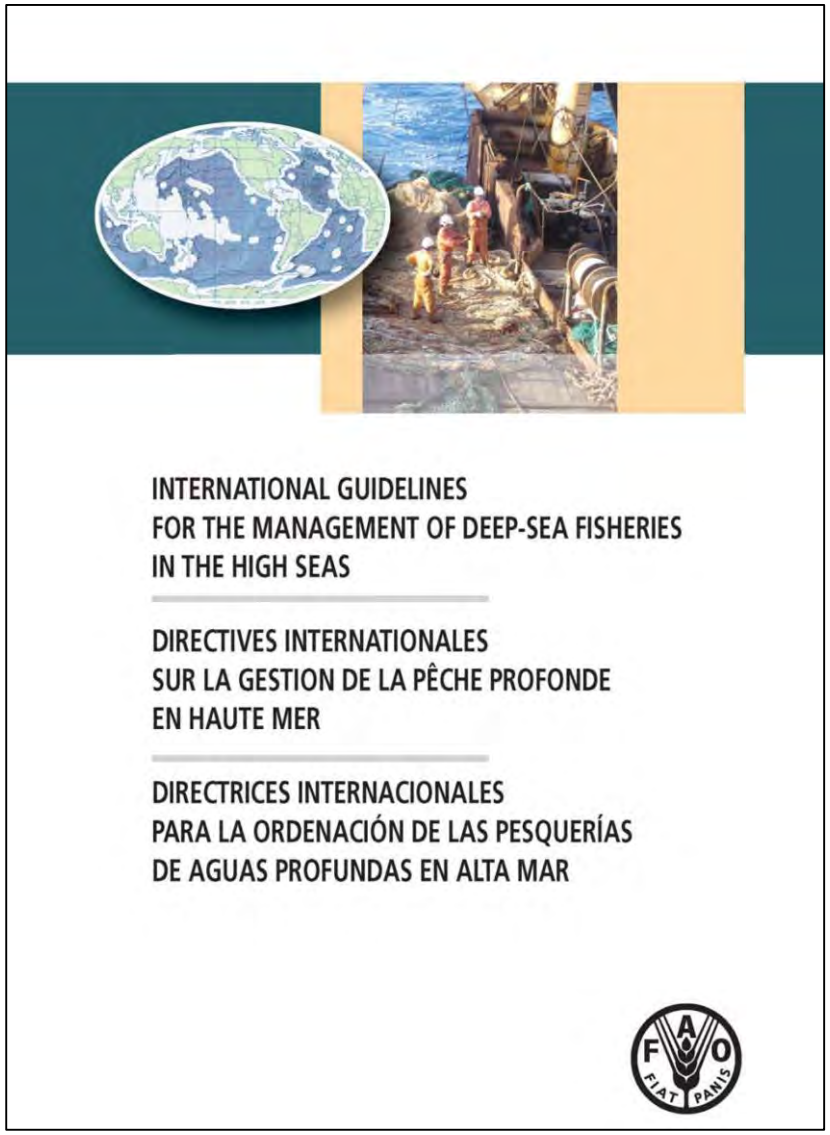
FAO Guidelines

12. **In order to achieve these objectives, States and RFMO/As should:**

…

ii. identify areas where VMEs are known or likely to occur;

…



ANNEX F

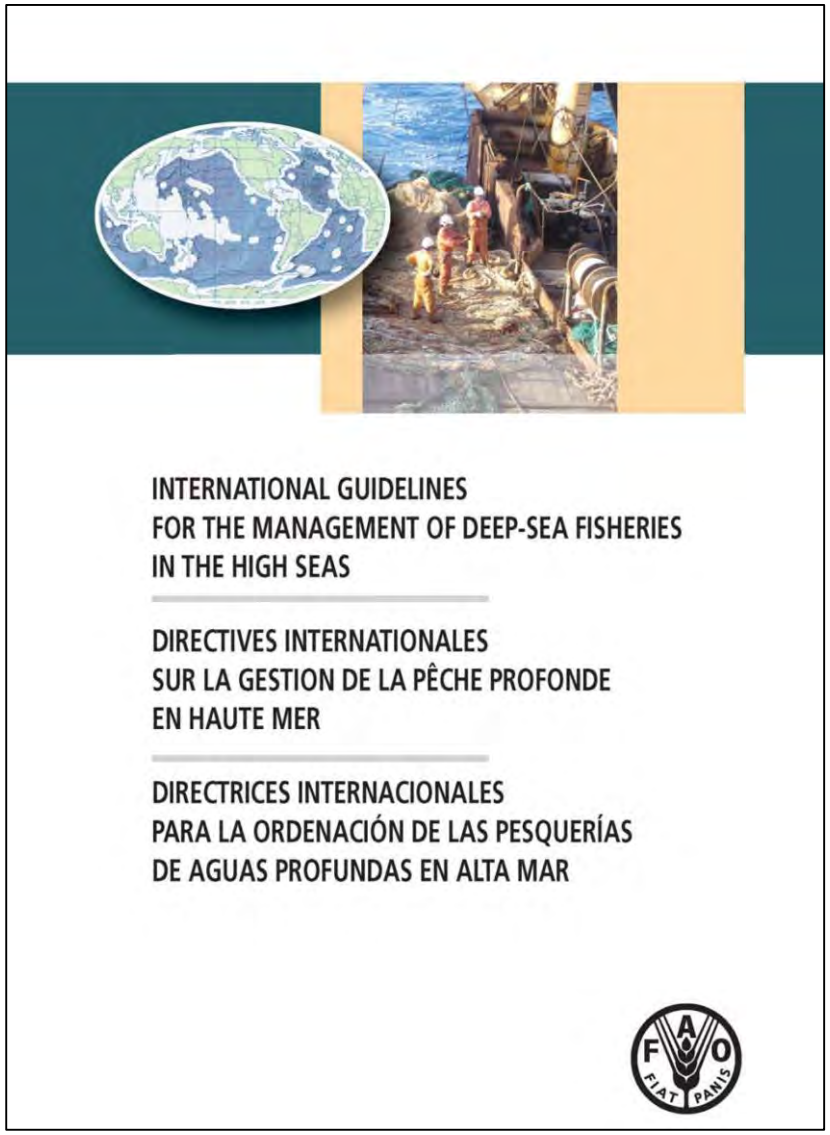
FAO Guidelines

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*:

…

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

…



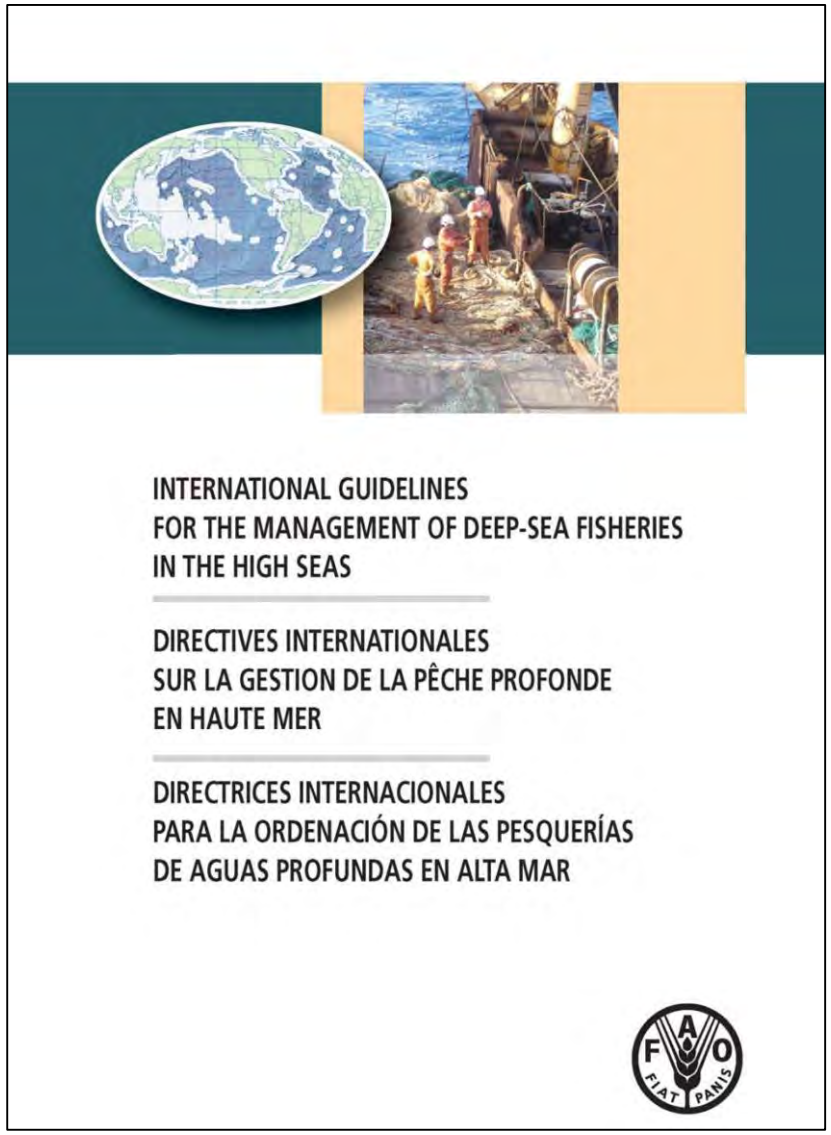
ANNEX F

FAO Guidelines

32. Sufficiently fine-scaled data are required as a basis for the assessment of stock status and impacts on VMEs. In addition, fishery-independent research surveys are encouraged, in particular to provide relevant information on VMEs and how they are affected by anthropogenic activities.

44. As a necessary step towards the identification of VMEs, States and RFMO/As, and as appropriate FAO, should assemble and analyse relevant information on areas under the competence of such RFMO/As or where vessels under the jurisdiction of such States are engaged in DSFs or where new or expanded DSFs are contemplated.

45. 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.



ANNEX F

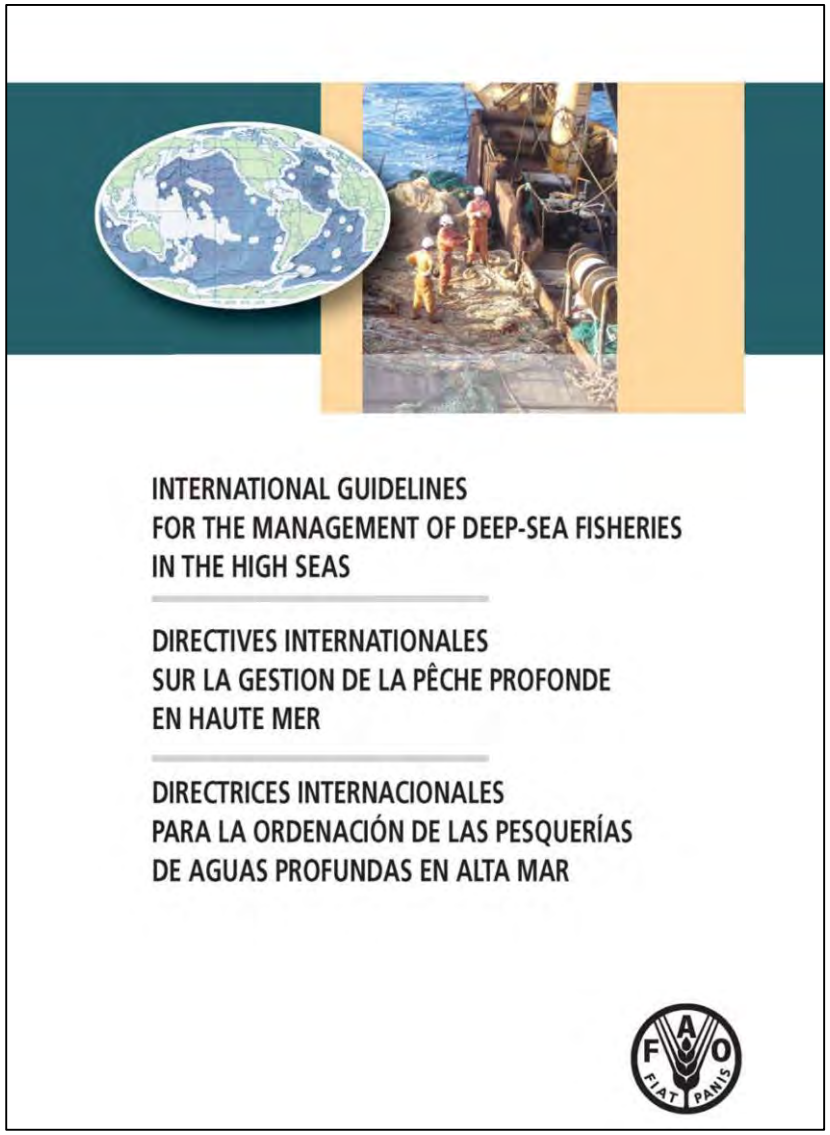
FAO Guidelines

To avoid SAI on VMEs, RFMOS should:

- Identify areas where VMEs are known or likely to occur

➢ Use data from stock assessment surveys, independent surveys, fisheries bycatch

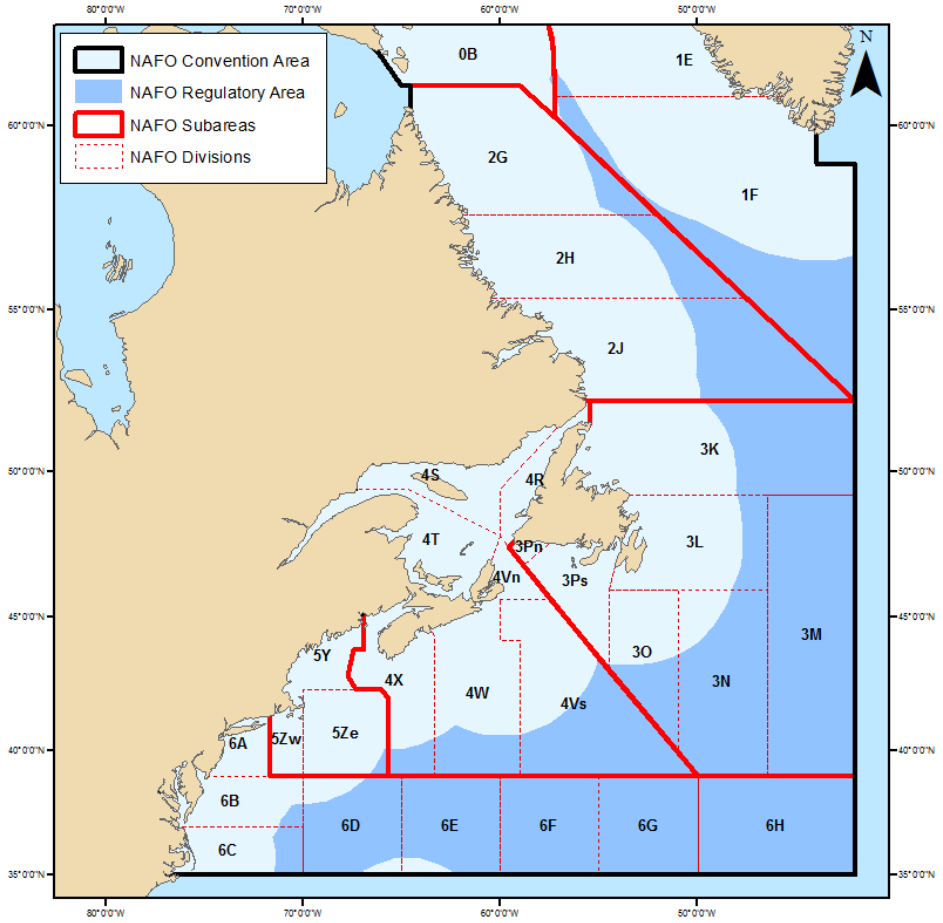
➢ Infer distribution of VMEs where data lacking



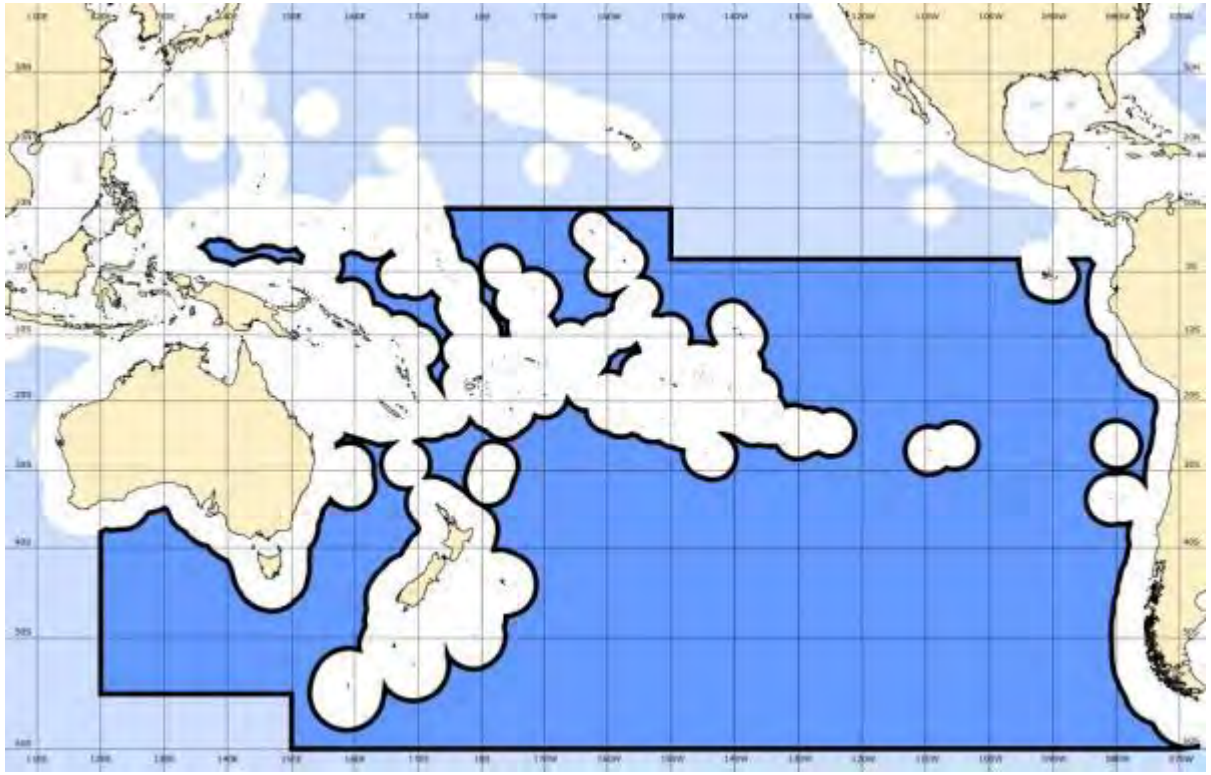
How do you identify areas where VMEs are known or likely to occur?

Examples from…

ANNEX F



Northwest Atlantic Fisheries Organisation



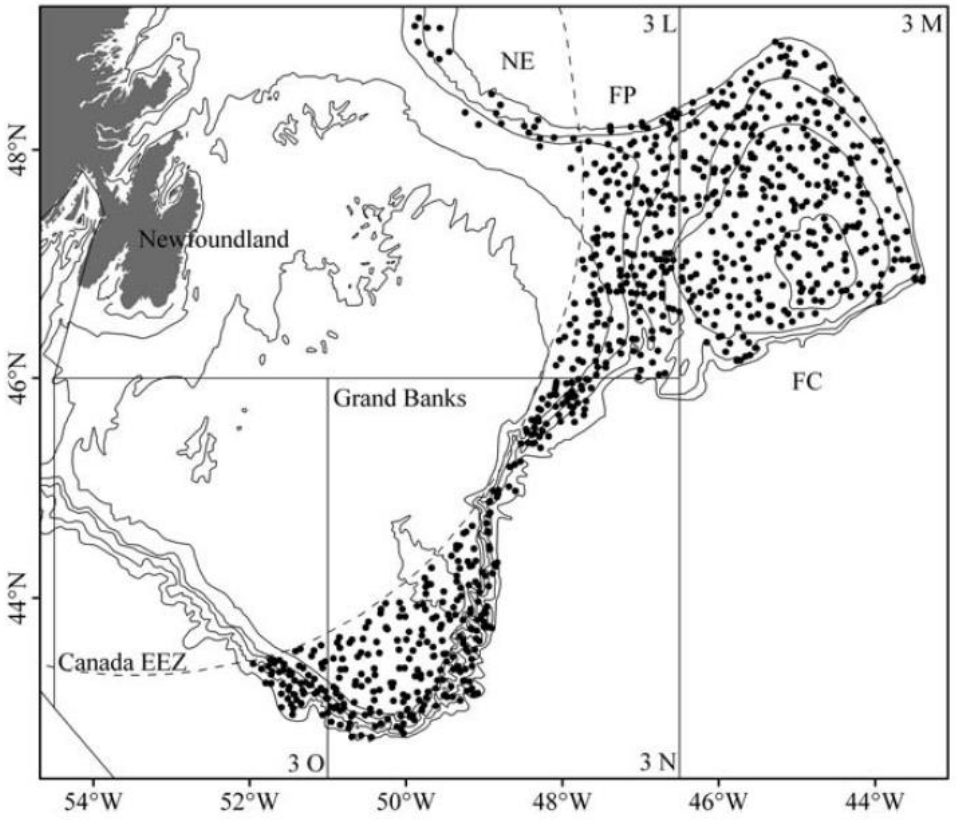
South Pacific Regional Fisheries Management Organisation

ANNEX F

NAFO

- **Biomass and species richness distribution** of VME indicator taxa
- **Kernel density** approach to identify concentrations of VME indicator taxa
- Canadian and Spanish/EU bycatch data for – sponges, corals, seapens

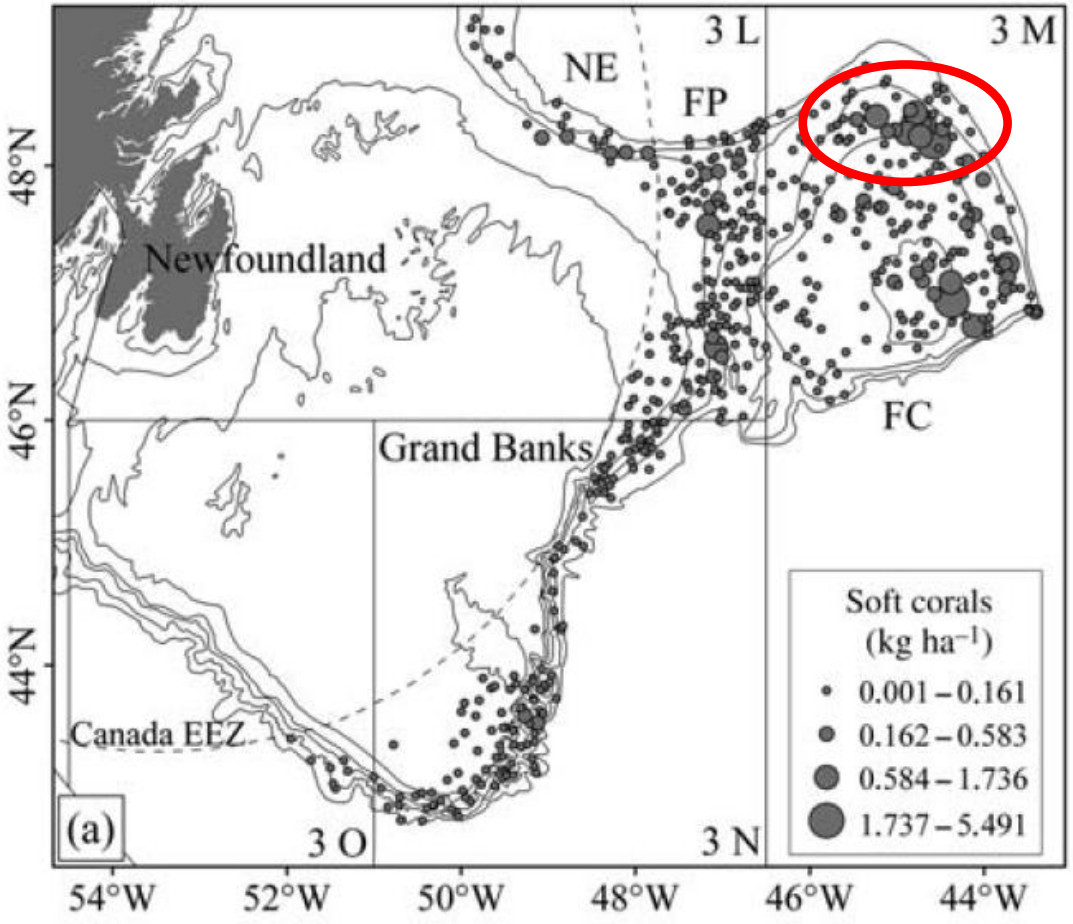
Sample locations



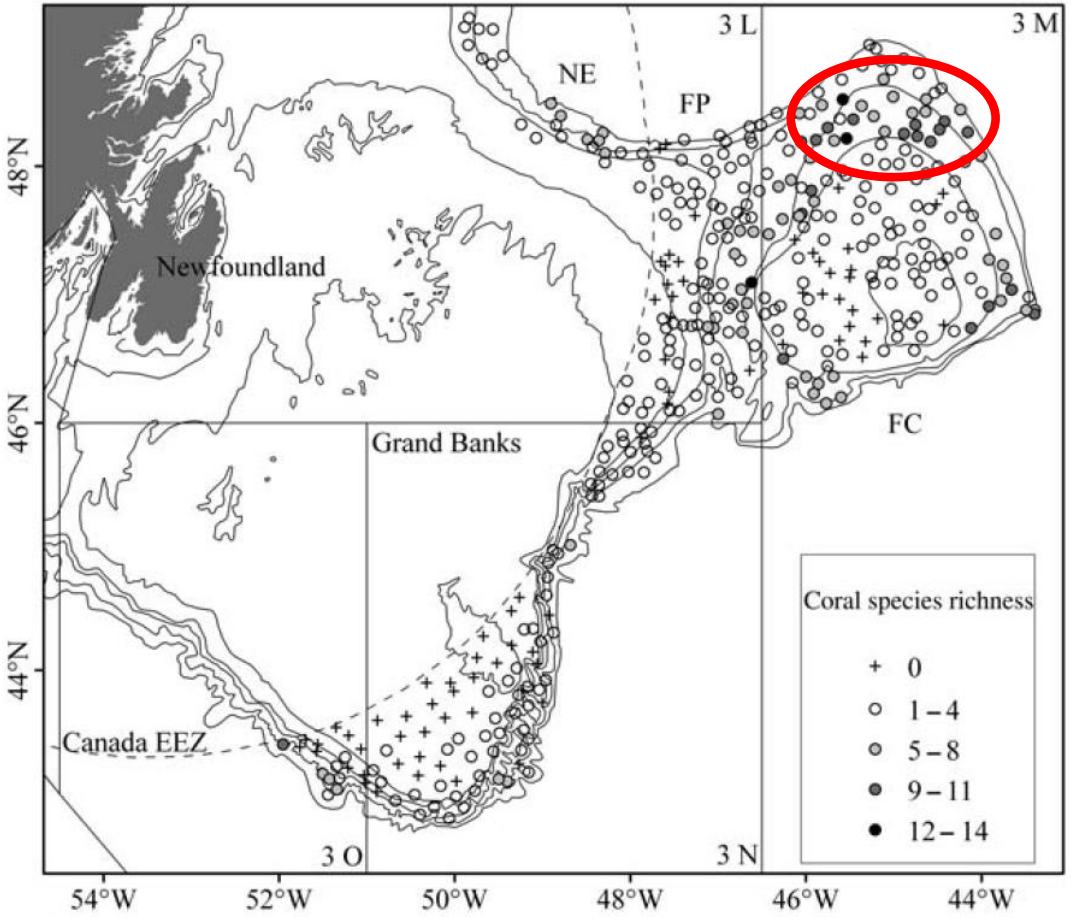
Murillo et al. (2011)

Biomass and species richness distribution

ANNEX F



Biomass



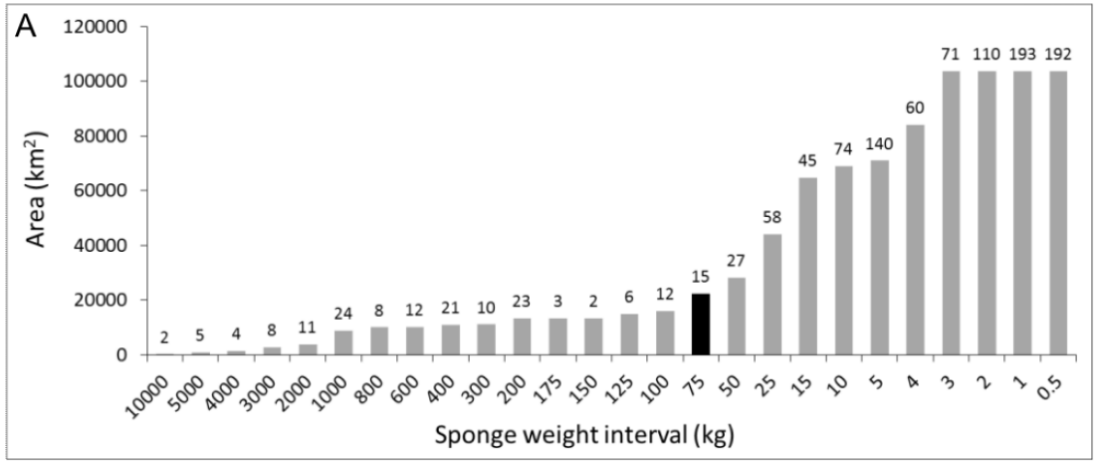
Species richness

Murillo et al. (2011)

Kernel density

- Identifies ‘hotspots’ based on a neighbourhood approach using a spatially-defined threshold

- Software used in GIS to automate production of the polygon surfaces for range of thresholds to identify most appropriate threshold of ‘natural’ concentrations

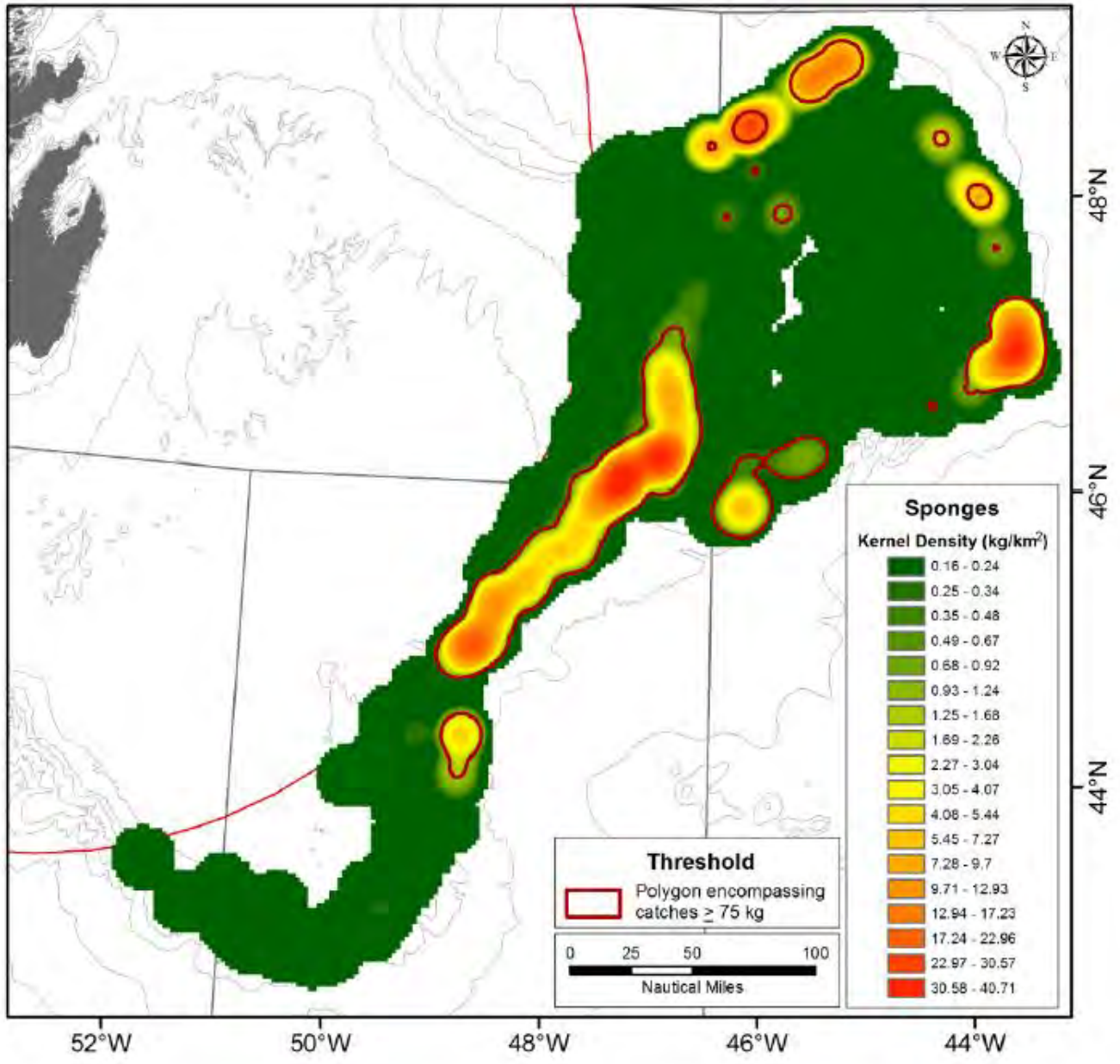


Kenchington et al. (2014)

Kernel density

- Kernel density map showing 75 kg threshold used to define VMEs and range of other biomass thresholds

- Cross-checked against other criteria and data

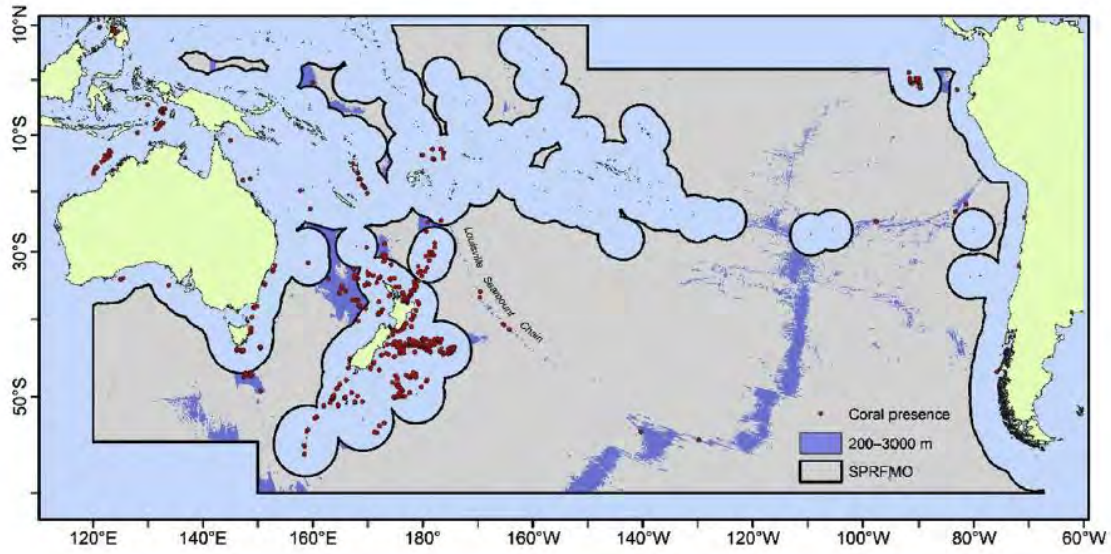


Kenchington et al. (2014)

SPRFMO

- **Habitat suitability modelling** of VME indicator taxa
- Trialled different scales of HSM
- Mostly NZ and Australian data for 10 VME indicator taxa, including corals, sponges etc

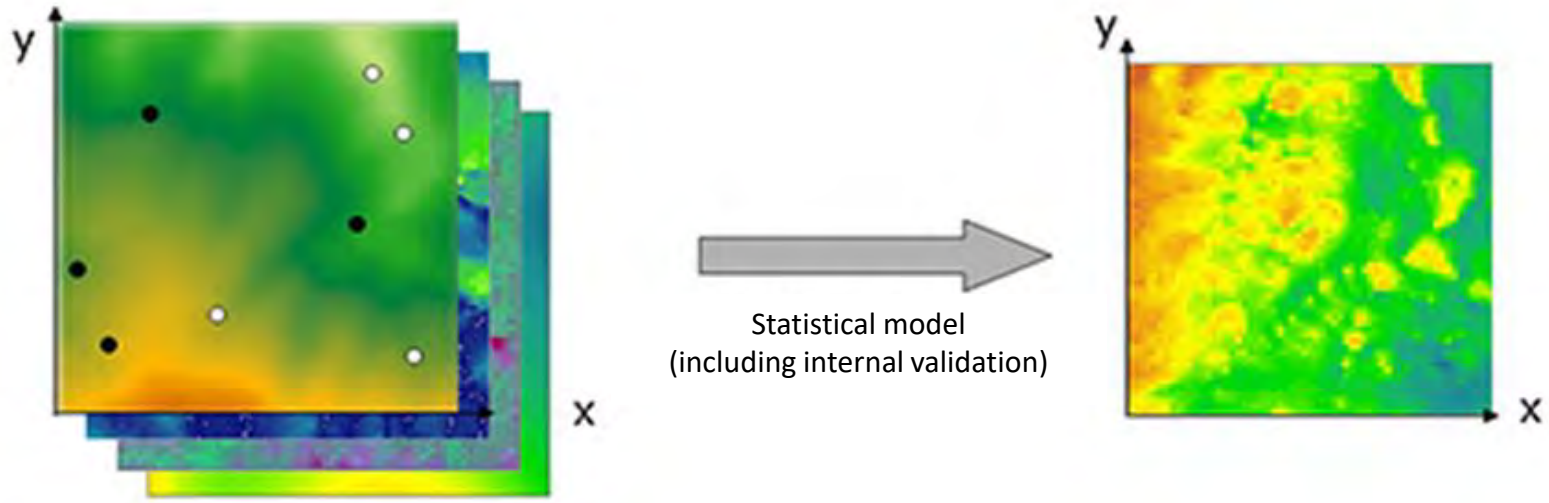
Corals



Anderson et al (2016a)

ANNEX F

Habitat suitability modelling
(also known as Species Distribution Modelling)



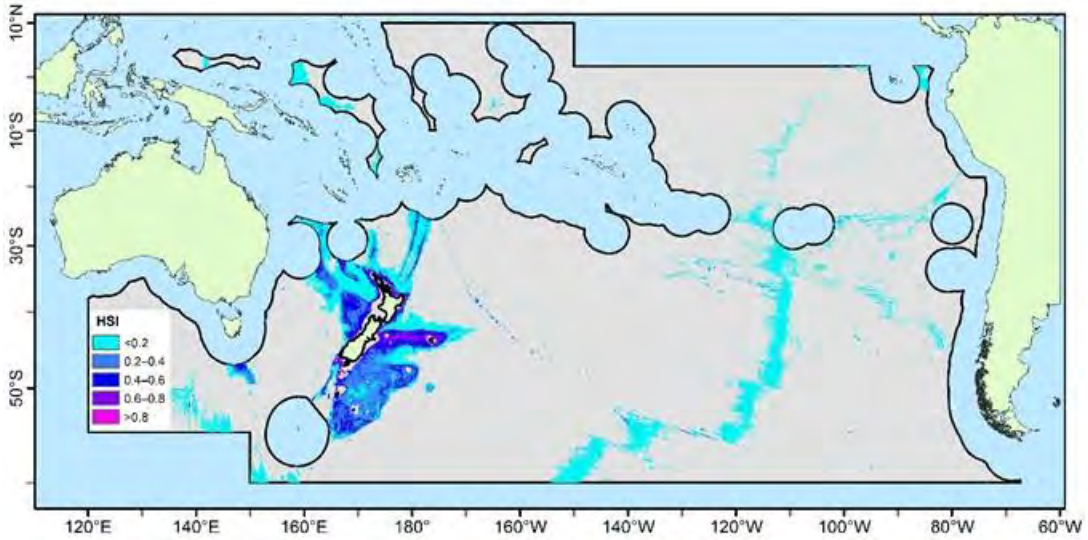
Field records for species or community and maps of environment

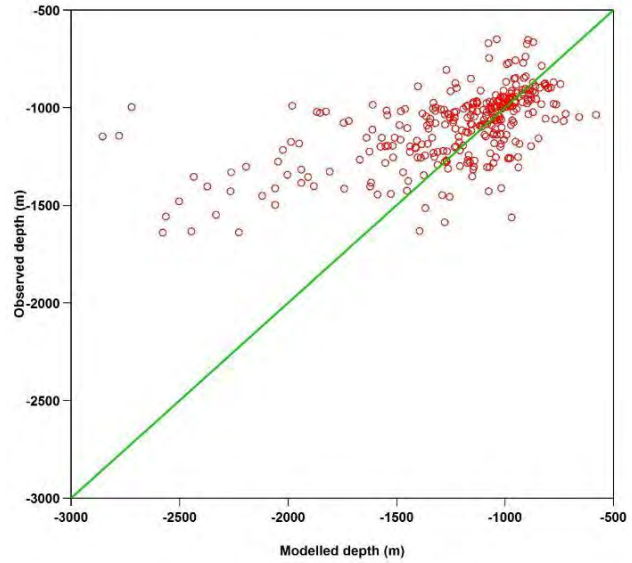
Map of probability that species or community is present

ANNEX F

Habitat suitability modelling

- SPRFMO-scale models
- Ground truth validation revealed poor performance
- Mostly related to inaccurate global bathymetry

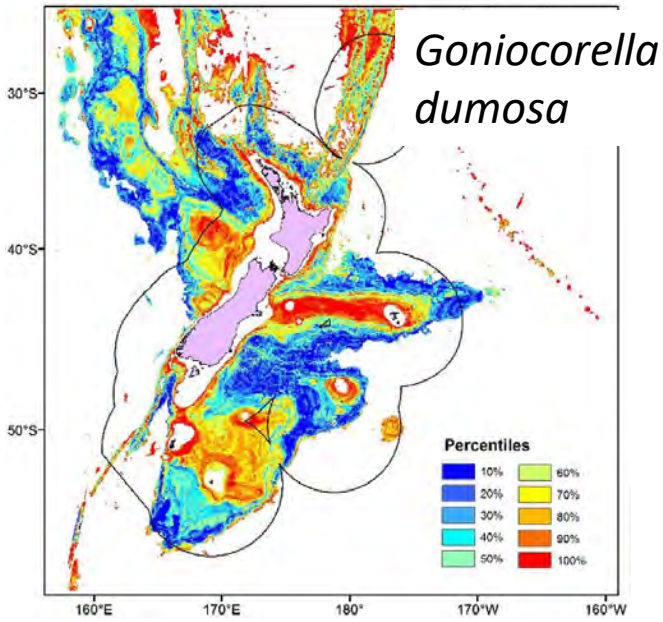


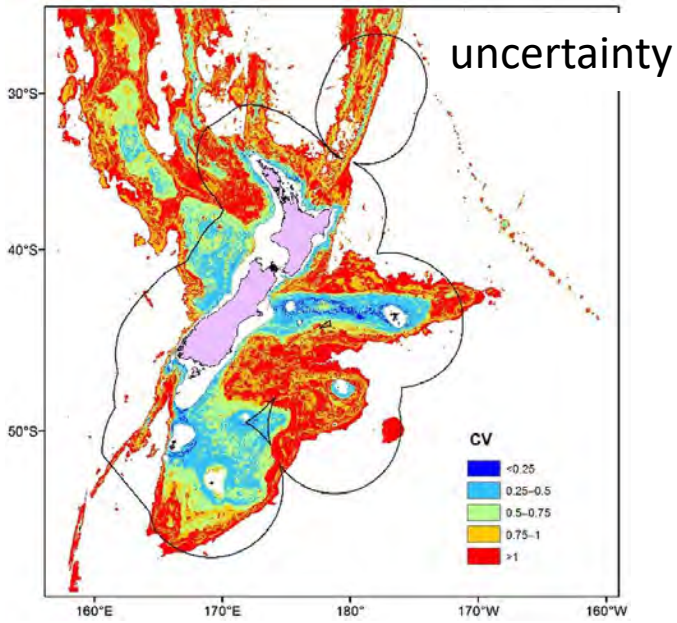


Anderson et al (2016a)

Habitat suitability modelling

- NZ-regional models
- Performed better (internal validation only) using regional bathymetry
- Mapped model uncertainty
- But map did not include all areas of interest

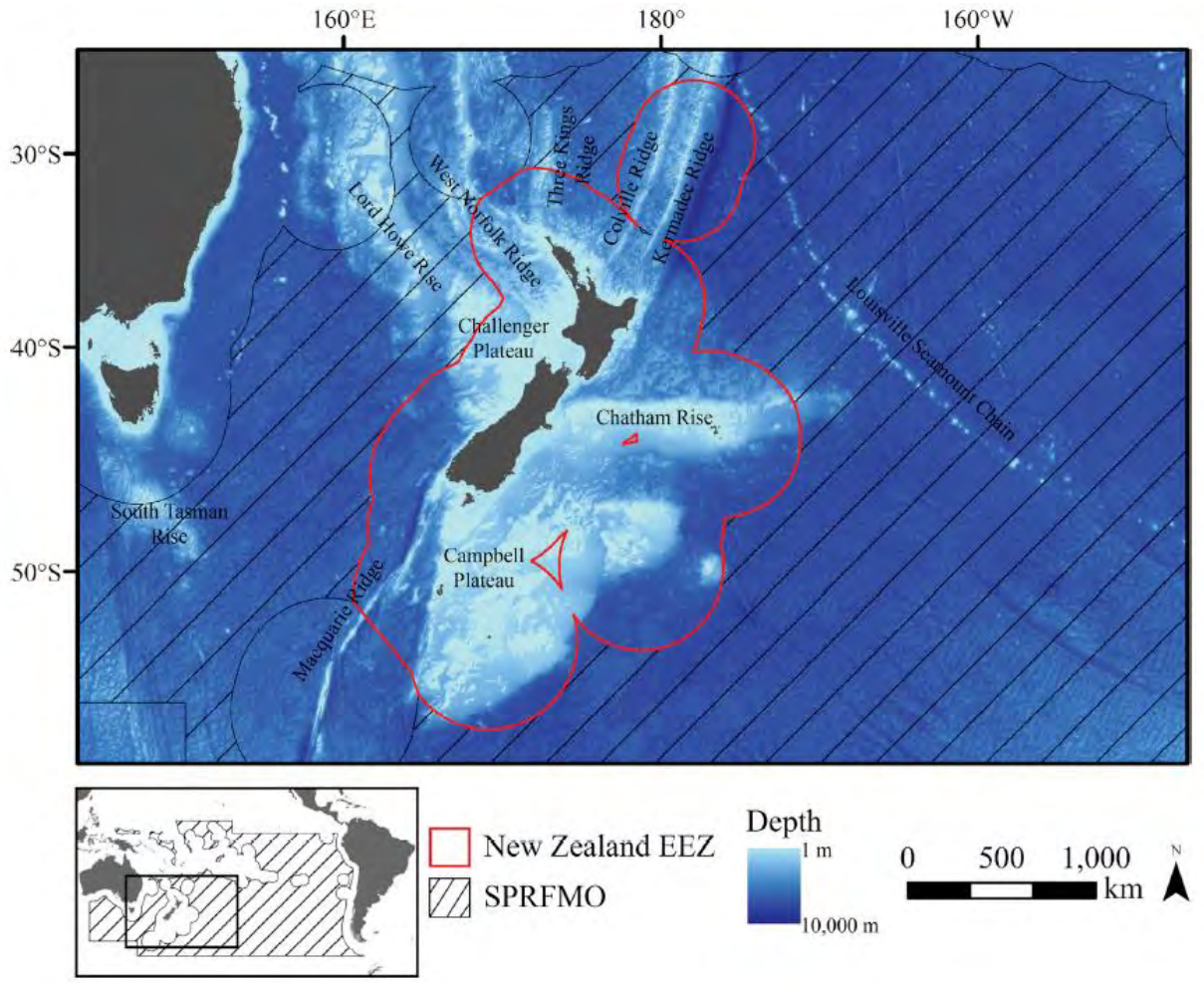




Anderson et al (2016b)

Habitat suitability modelling

- SW Pacific-scale models
- Three types of models - RF, BRT, MaxEnt – for each VME indicator taxon
- Also mapped model uncertainty

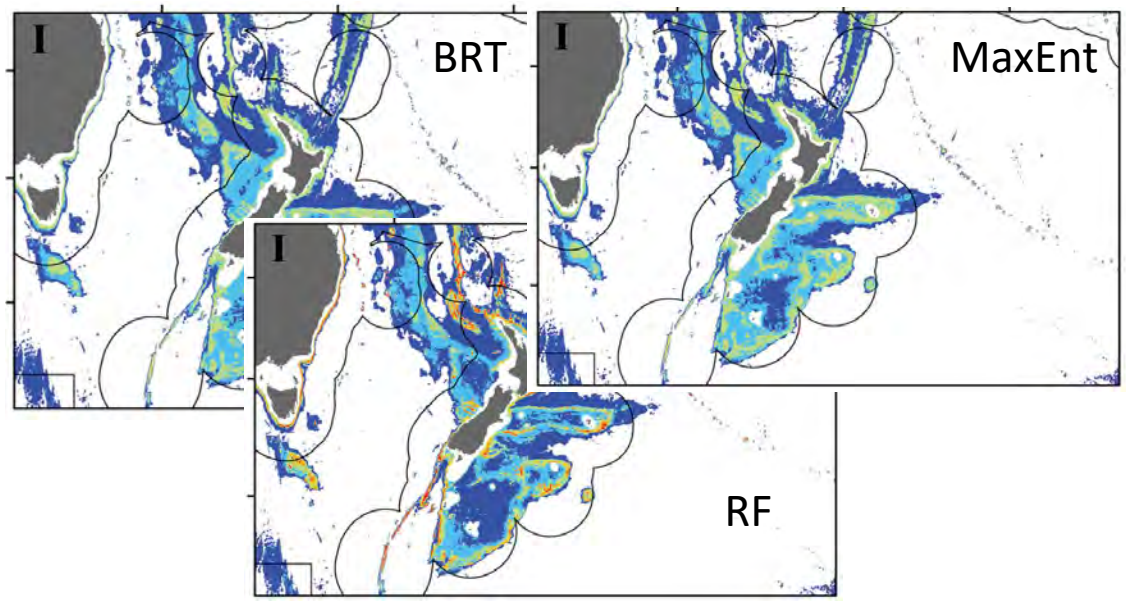


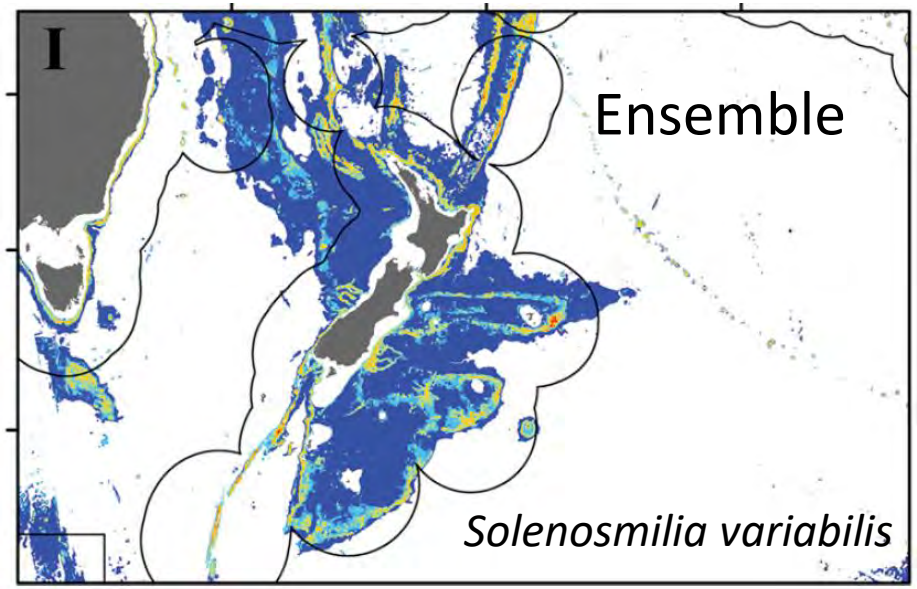
Georgian et al (2019)

Habitat suitability modelling

- Many different types of HSM models – which should you use?

- Ensemble approach combines models by averaging output weighted by individual model performance

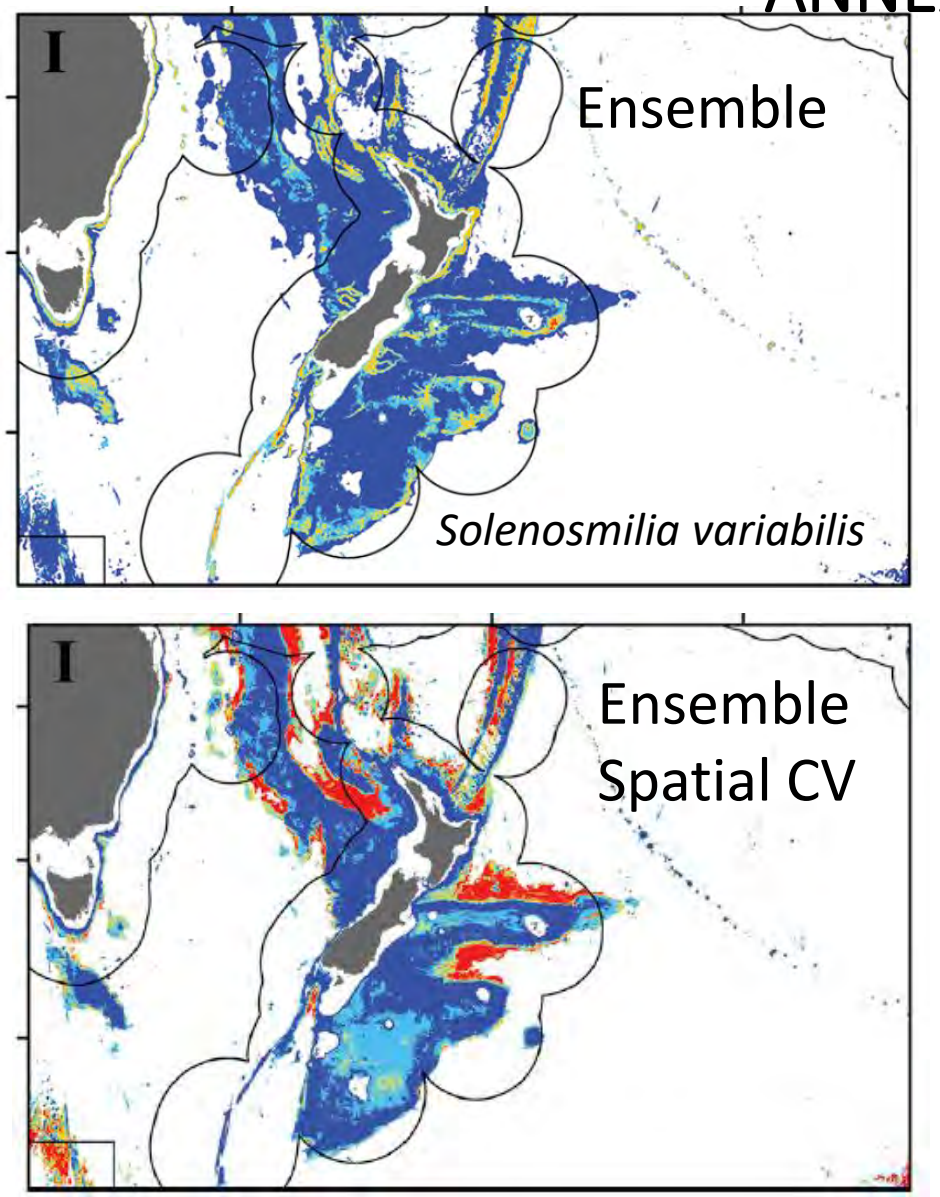




Georgian et al (2019)

Habitat suitability modelling

- Calculated CV (from bootstrapping) as metric of model uncertainty – projected spatially
- There are other ways to measure uncertainty
- Important to do



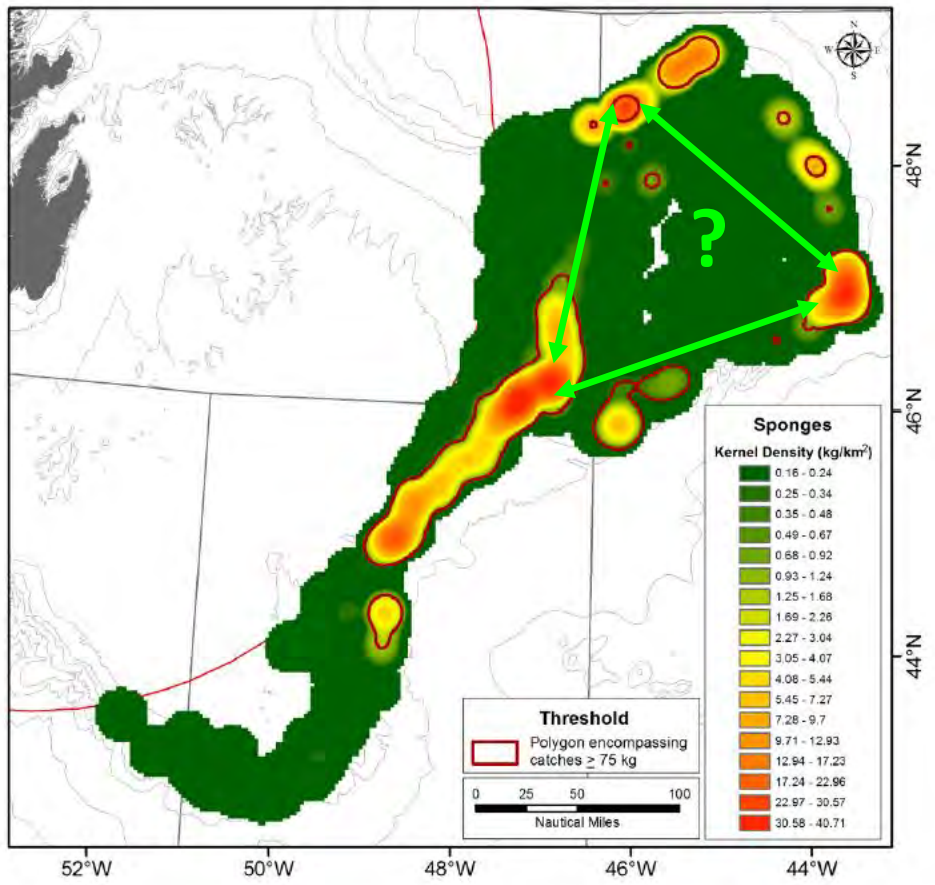
Georgian et al (2019)

“Essentially, all models are wrong, but some are useful.”

George Box

Mapping VME issues

- Are the mapped VMEs connected or isolated? – need to know the likely extent of connectivity among VMEs in different areas



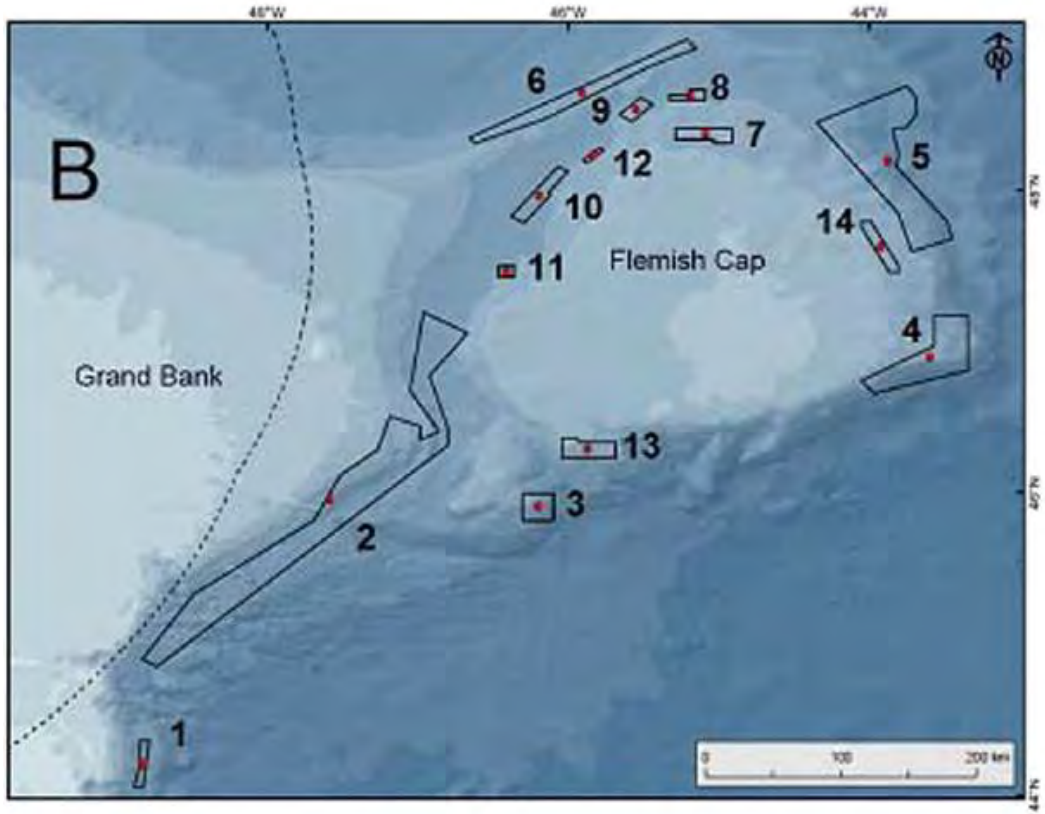
e.g., VMEs in some areas will be more or less important for providing recruits to sustain overall population in region, and recovery in disturbed areas – and thus more important to protect from trawling impacts

ANNEX F

Recent developments and future directions

Determining VME connectivity

- NAFO area study
- Determine connectivity of VME indicator taxa among closed areas to assess their effectiveness



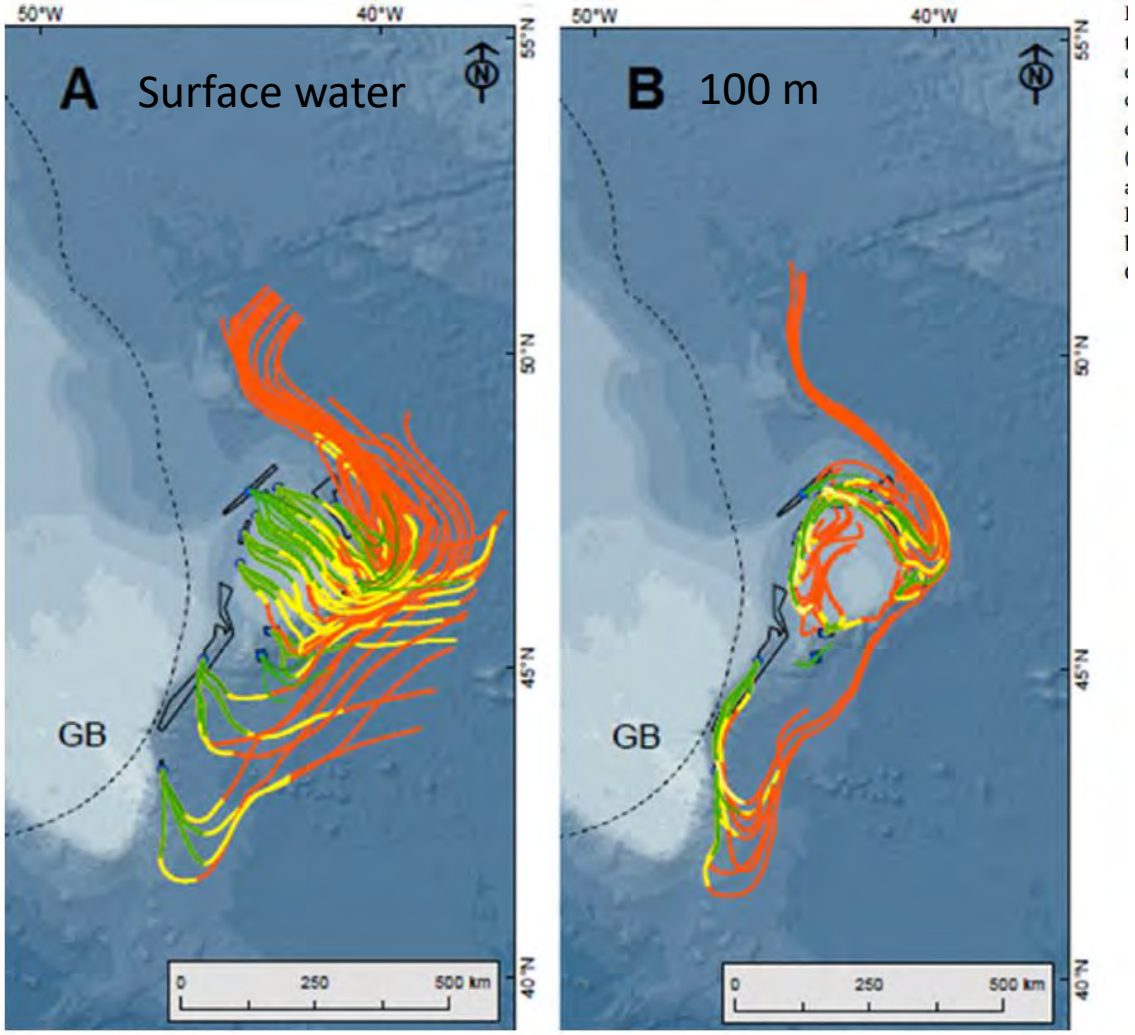
Kenchington et al. (2019)

ANNEX F

Recent developments and future directions

Determining VME connectivity

- Biologically parametrised particle tracking models
- Determine spatial and temporal dispersal paths of theoretical larvae from closed areas



Kenchington et al. (2019)

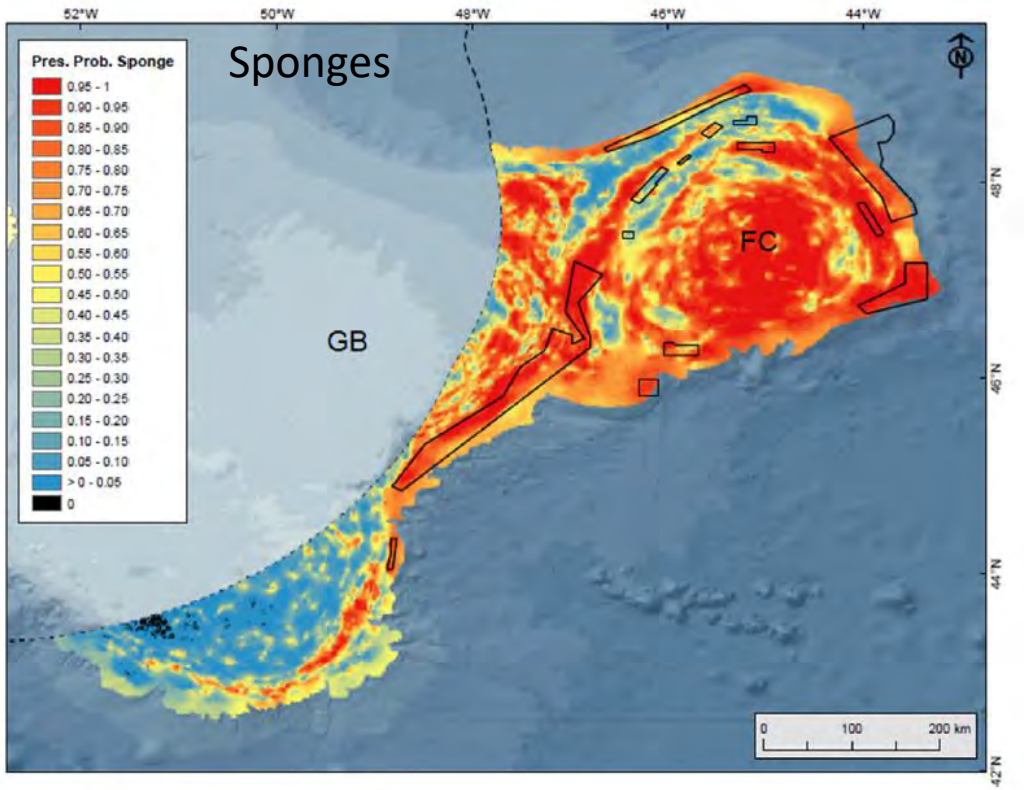
ANNEX F

Recent developments and future directions

Determining VME connectivity

- Hindcast dispersal models to assess the source of larvae for the the closed areas

- Potential source populations inferred from habitat suitability models



Kenchington et al. (2019)

ANNEX F

Recent developments and future directions

Determining VME connectivity

- Dispersal models indicate a degree of connectivity among closed areas, with some areas being key suppliers of recruits
- Hindcasting indicates that some recruitment likely from VMEs outside of closed areas

Table 4
Drift trajectories from closed area centroids that end within or near initial closed area.

Drift depth	Drift duration	Season Spring	Summer	Autumn	Winter
Endpoint within closed area					
100 m	2 weeks	Areas 2, 3, 4, 13		Area 5	Area 4
100 m	1 month	Area 4			
100 m	3 months				Area 4
Endpoint within 2 km of closed area					
100 m	1 month	Area 13		Area 5	
100 m	3 months	Area 4			
Endpoint within 10 km of closed area					
100 m	2 weeks	Areas 5, 9	Areas 13, 11		Area 14
100 m	1 month		Area 2		Area 4

Kenchington et al. (2019)

Mapping VME issues

- Are we actually mapping VMEs? – need to identify abundance or biomass thresholds that relate to the FAO's VME functional criteria

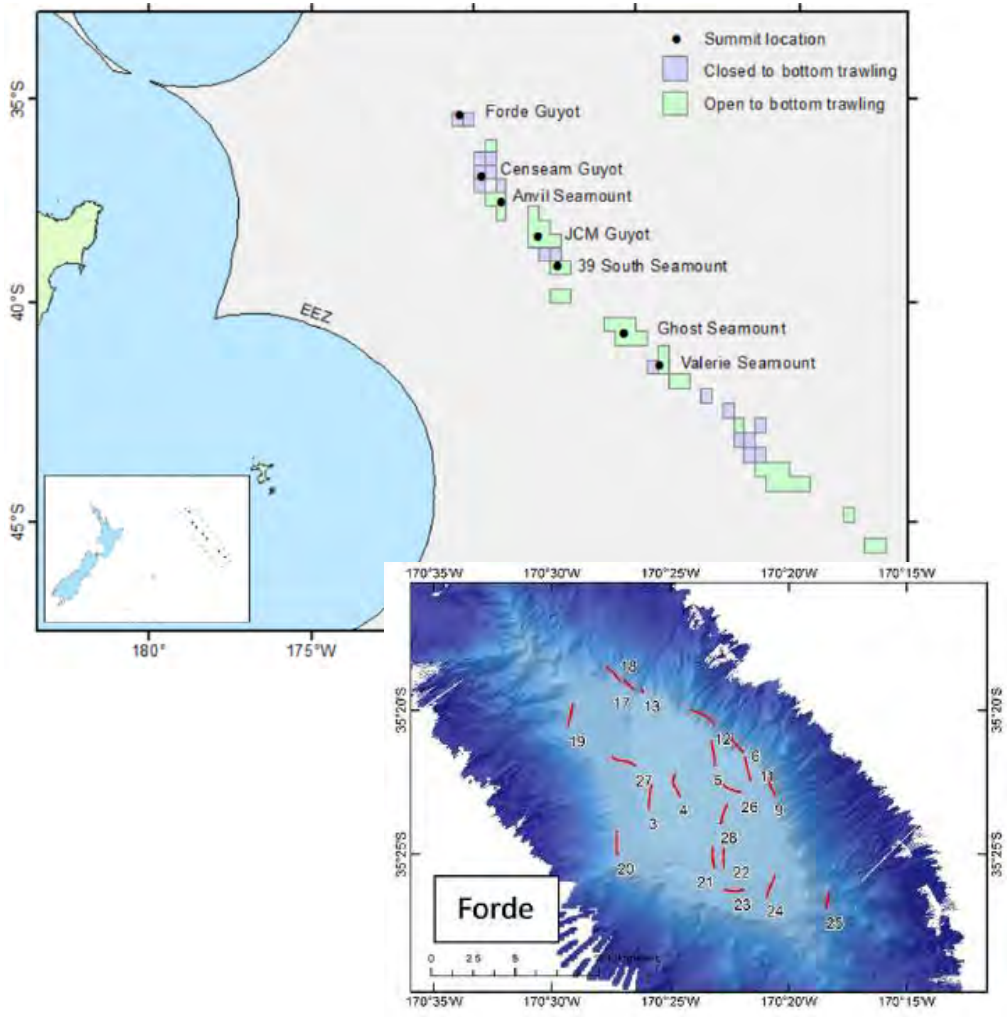
e.g., structurally complex VMEs should be "created by significant concentrations of biotic and abiotic features", ***and*** that "such ecosystems often have high diversity, which is dependent on the structuring organisms"

ANNEX F

Recent developments and future directions

Identifying thresholds

- Seamount-scale models
- 25 m resolution
- Based on image records and bathymetric variables derived from MBES data



Rowden et al. (2017)

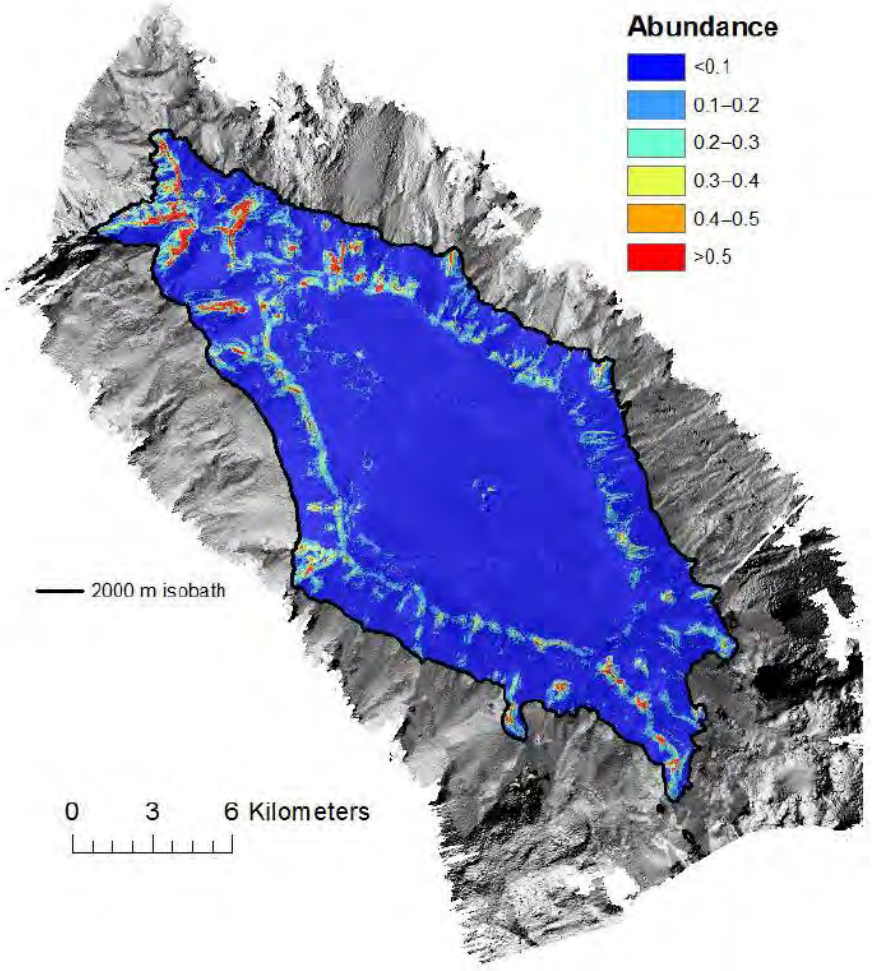
Recent developments and future directions

Identifying thresholds

- Ensemble P/A and abundance models

- Applied a subjective/expert density threshold to abundance models to identify coral reef VMEs

Solenosmilia variabilis

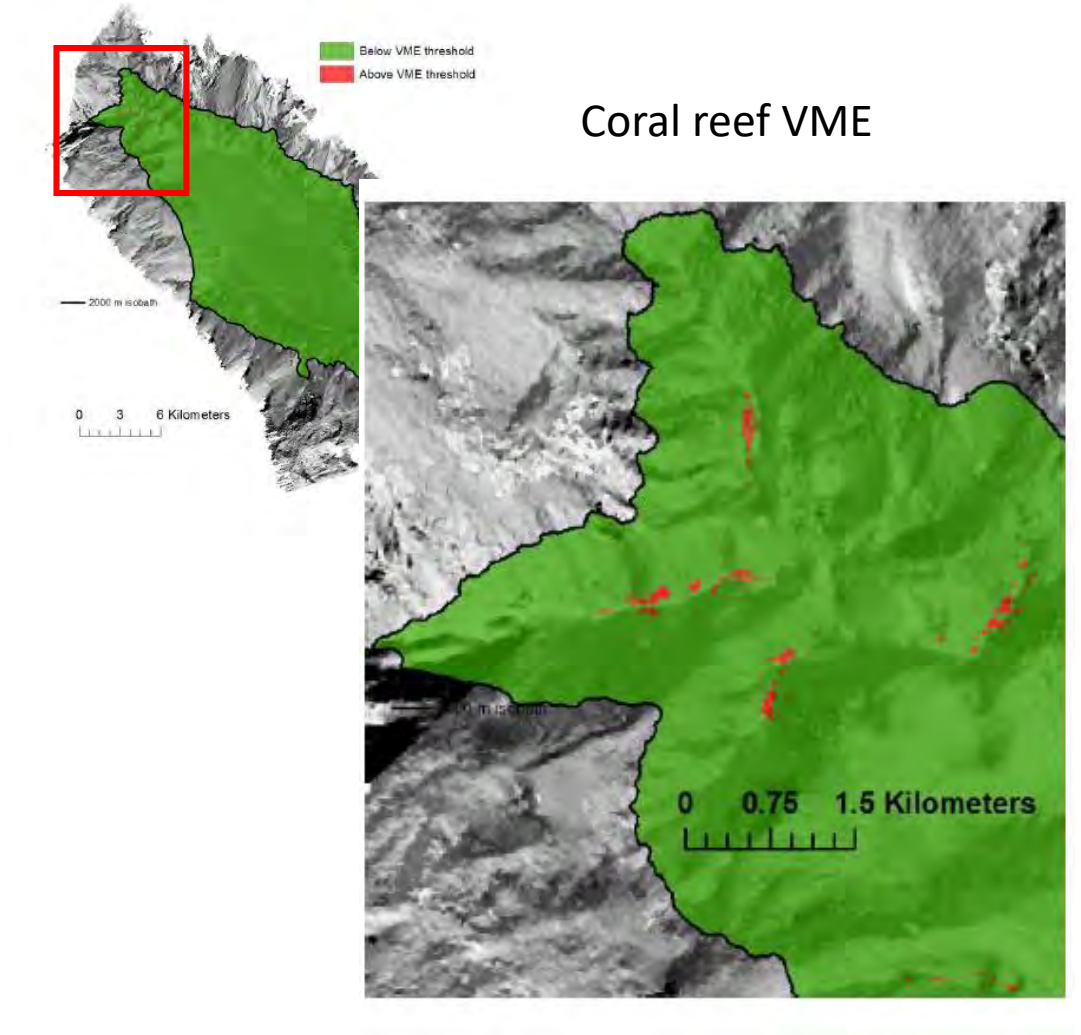


Rowden et al. (2017)

Recent developments and future directions

Identifying thresholds

- Application of threshold identifies only small areas of patch reefs
- But these VME maps depend on the veracity of threshold definition



Coral reef VME

Rowden et al. (2017)

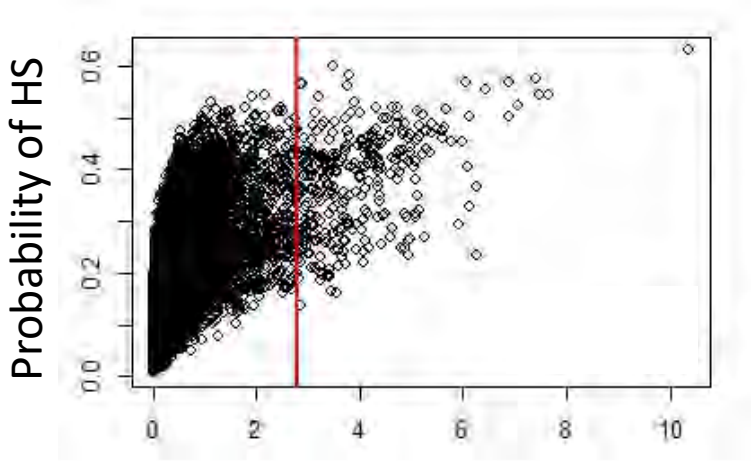
Recent developments and future directions

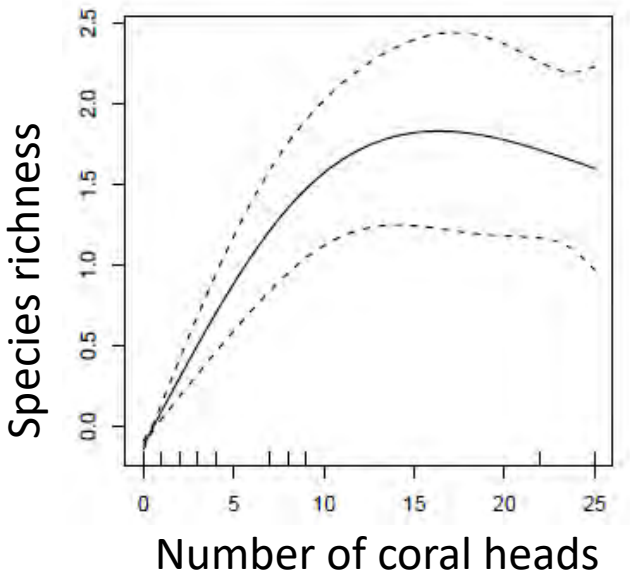
Identifying thresholds

- A later comparison of P/A and abundance models indicates that perhaps threshold is ok

- New work trying to establish link between abundance and function of VME (i.e. elevated biodiversity)

Modelled data for Forde





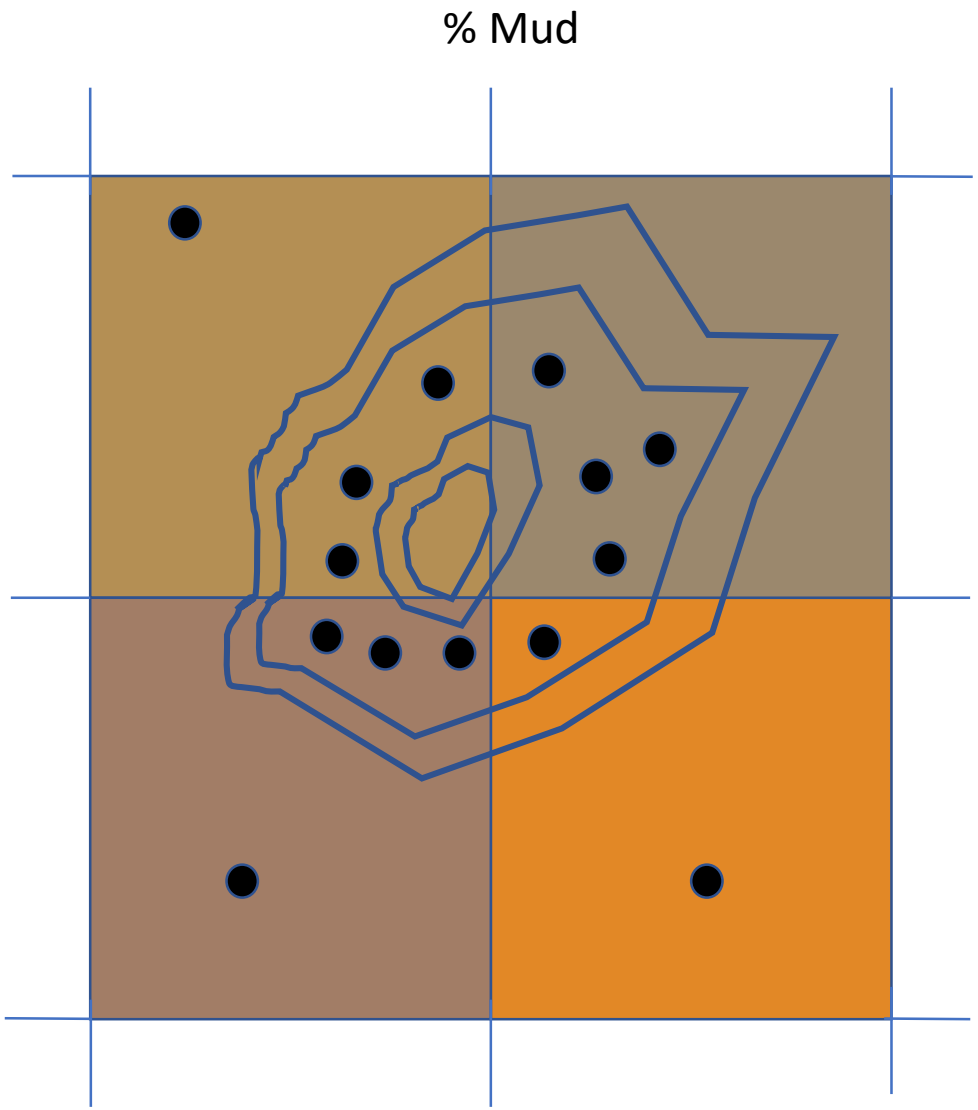
Rowden et al. (in prep.)

ANNEX F

Recent developments and future directions

- Improve mismatch between scale of environmental predictors and biological records/response

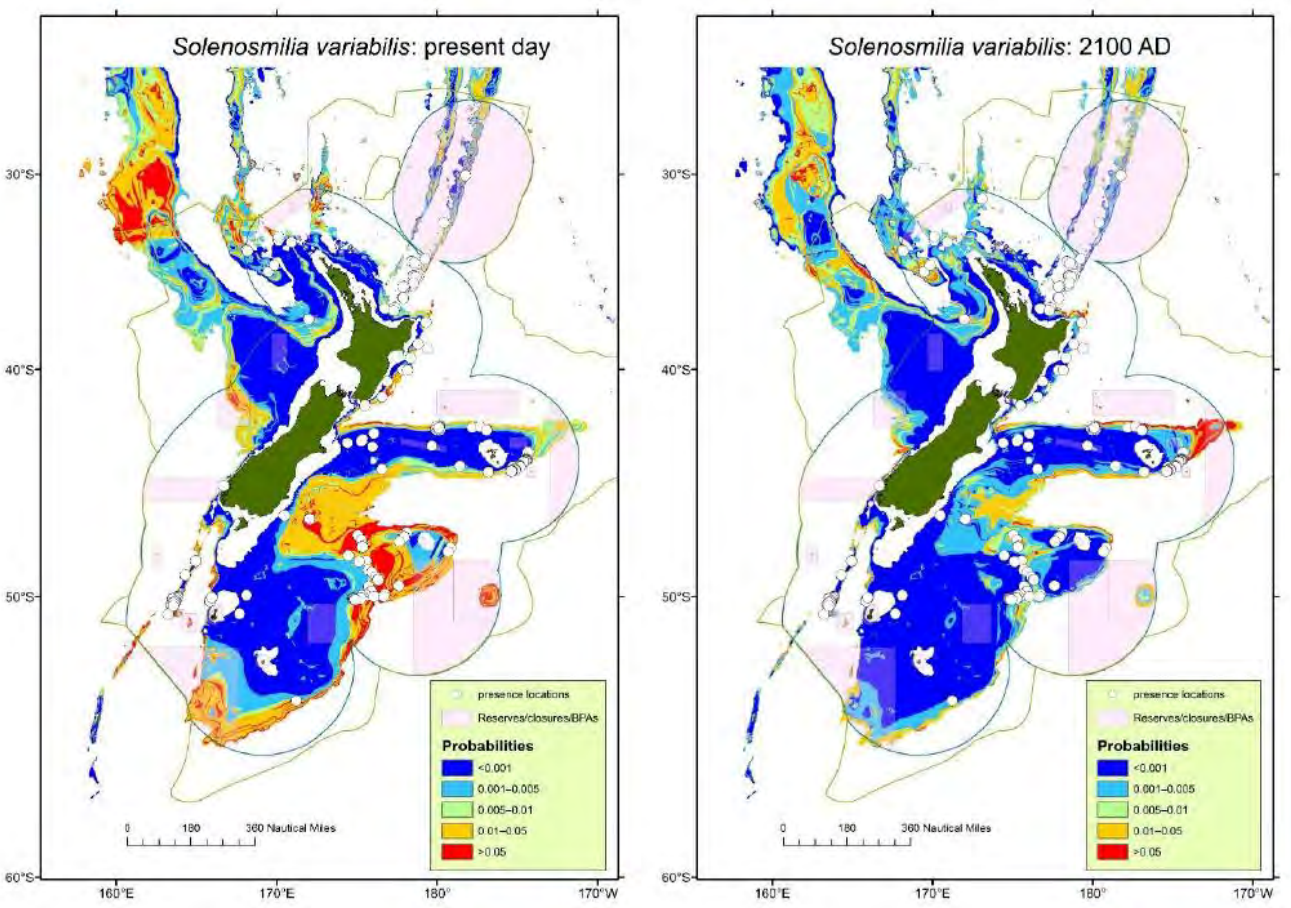
- Incorporate uncertainty in environmental predictor variables in models



ANNEX F

Recent developments and future directions

- Model and map recovery potential of VMEs
- Predict and map effect of future climate change on HS for VMEs



Anderson et al. (2015)

Thank you

Annex G

VME within SIOFA CMMs

Annex G

CMM 2018/01 interim management of bottom fishing

11. Until the Meeting of the Parties has acted on the Scientific Committee's advice on SIOFA threshold levels pursuant to paragraph 6(b), each CCP 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), CCPs 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;[33]

(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. CCPs 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 CCP in respect of the relevant site.

Annex G

CMM 2018/01 interim management of bottom fishing

Annex 1 - Guidelines for the Preparation and Submission of Notifications of Encounters with VMEs

1. General Information

Include contact information, nationality, vessel name(s) and dates of data collection.

2. VME location

Start and end positions of all gear deployments and/or observations.

Maps of fishing locations, underlying bathymetry or habitat and spatial scale of fishing. Depth(s) fished.

3. Fishing gear

Indicate fishing gears used at each location.

4. Additional data collected

Indicate additional data collected at or near the locations fished, if possible.

Data such as multibeam bathymetry, oceanographic data such as CTD profiles, current profiles, water chemistry, substrate types recorded at or near those locations, other fauna observed, video recordings, acoustic profiles etc.

5. VME taxa

For each station fished, provide details of VME taxa observed, including but not limited to their relative density, absolute density, or weight and/or number of taxa.

Annex G

CMM 2018/01 interim management of bottom fishing

Scientific observer coverage

31. Each CCP shall ensure that any vessel flying its flag and undertaking bottom fishing in the Agreement Area:

(a) using trawl gear has 100 percent scientific observer coverage for the duration of the trip; and

(b) subject to paragraph 36(b), using any other bottom fishing gear type has 20 percent scientific observer coverage in any fishing year[4].

32. Consistent with paragraph 13 of the SIOFA Data Standards CMM (CMM 2018/02), the Scientific Committee shall review the observer coverage levels prescribed in paragraph 31 at its ordinary meeting in 2018 and provide advice to the Meeting of the Parties thereon.

Annex G

CMM 2018/02 Data Standards

Annex B – observer data

Interactions with Vulnerable Marine Ecosystems (VME)

General information

Name of observer
Name of vessel
Date
Trip number
Set number

VME location

Start and end positions of all gear deployments and/or observations. (Latitude/longitude)
Depth(s) fished (m)

Fishing Gear

Indicate fishing gears used at each location

Annex G

CMM 2018/02 Data Standards

Annex B – observer data

VME Taxa

a) Species (identified taxonomically as far as possible, or accompanied by a photograph where identification is difficult).

b) An estimate of the quantity (weight (kg) or volume (m3)) of each listed benthic species caught in the tow.

c) An overall estimate of the total quantity (weight (kg) or volume (m3)) of all invertebrate benthic species caught in the tow.

d) Where possible, and particularly for new or scarce benthic species which do not appear in ID guides, whole samples should be collected and suitably preserved for identification on shore.

e) Collect representative biological samples from the entire VME catch. (Biological samples shall be collected and frozen when requested by the scientific authority in a Contracting Party). For some coral species that are under the CITES list photographs should be taken.

ANNEX H

VME Indicators

Dr. Ellen Kenchington
Fisheries & Oceans Canada,
Bedford Institute of Oceanography
Dartmouth, Nova Scotia, Canada

ANNEX H

Five Criteria Outlined

I. Uniqueness or rareness: 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;
    - 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.

ANNEX H

Five Criteria Outlined

III. Fragility: an ecosystem that is highly susceptible to degradation by anthropogenic activities.

IV. Life-history of species 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.

ANNEX H

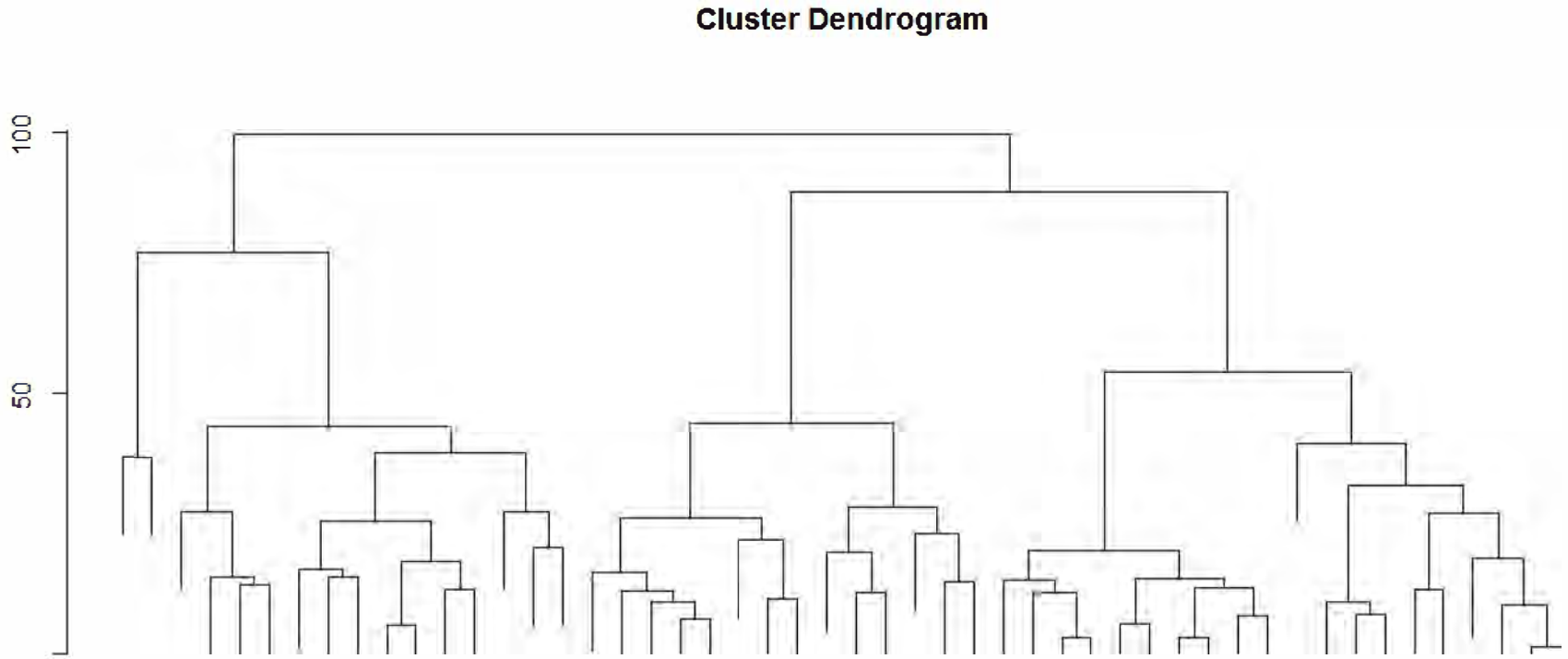
in·di·ca·tor

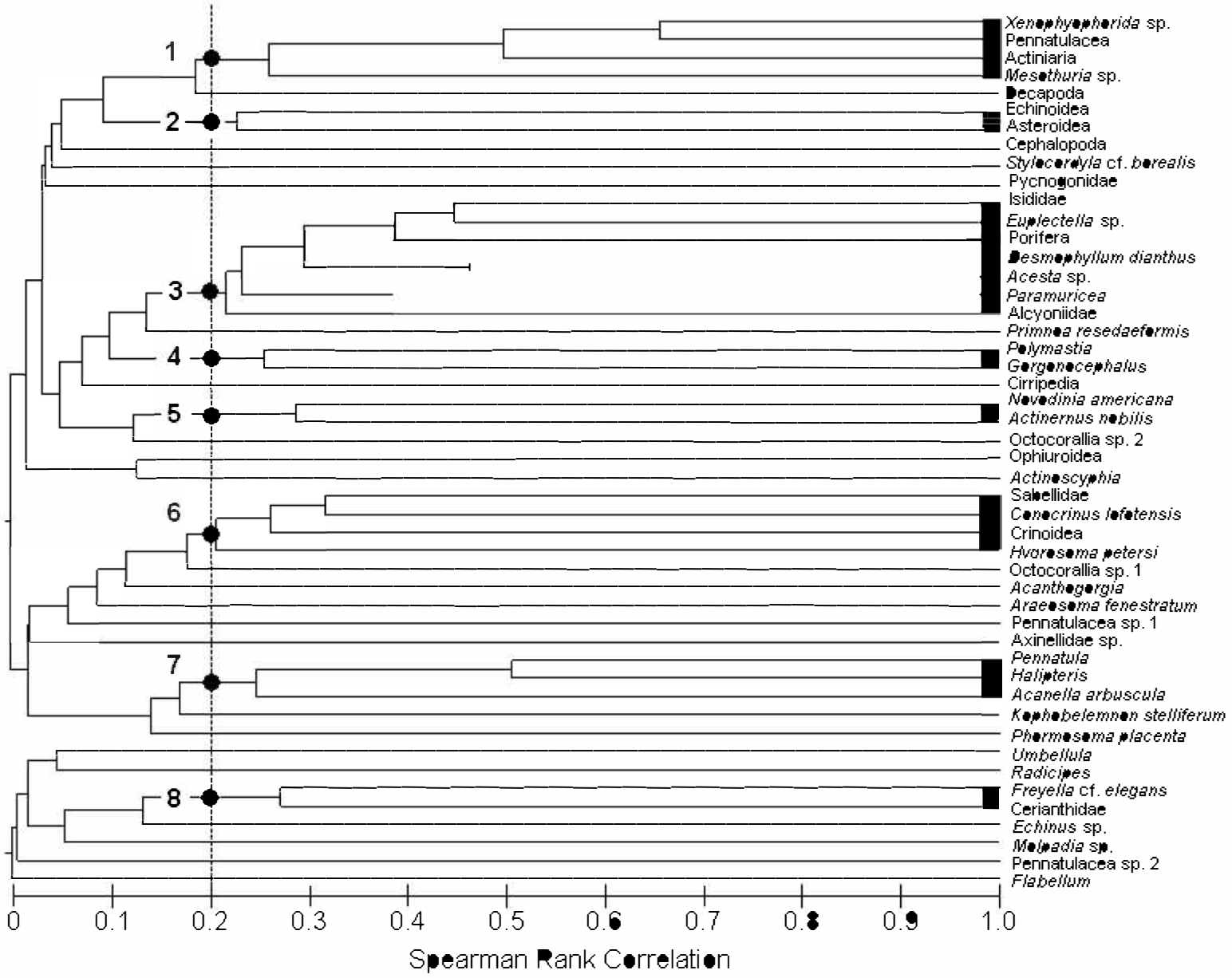
1 a sign that shows you what something is like or how a situation is changing

- *The economic indicators are better than expected.*
- *These atmospheric waves are a reliable indicator of weather changes.*


©DFO

ANNEX H




1
2
3
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5
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7
8
Xenophyophorida sp.
Pennatulacea
Actiniaria
Mesothuria sp.
Decapoda
Echinoidea
Asteroidea
Cephalopoda
Stylocerelyla cf. borealis
Pycnogonidae
Isididae
Euplectella sp.
Porifera
Desmophyllum dianthus
Acesta sp.
Paramuricea
Alcyoniidae
Primnoa resedaeformis
Polymastia
Gorgonocephalus
Cirripedia
Novodinia americana
Actinernus nobilis
Octocorallia sp. 2
Ophiuroidea
Actinoscyphia
Sabellidae
Conocrinus lofotensis
Crinoidea
Hyoreoma petersi
Octocorallia sp. 1
Acanthogorgia
Araeosoma fenestratum
Pennatulacea sp. 1
Axinellidae sp.
Pennatula
Halipteris
Acanella arbuscula
Kophobelemnon stelliferum
Pheremosoma placenta
Umbellula
Radicipes
Freyella cf. elegans
Cerianthidae
Echinus sp.
Molpadia sp.
Pennatulacea sp. 2
Flabellum
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Spearman Rank Correlation

ANNEX H

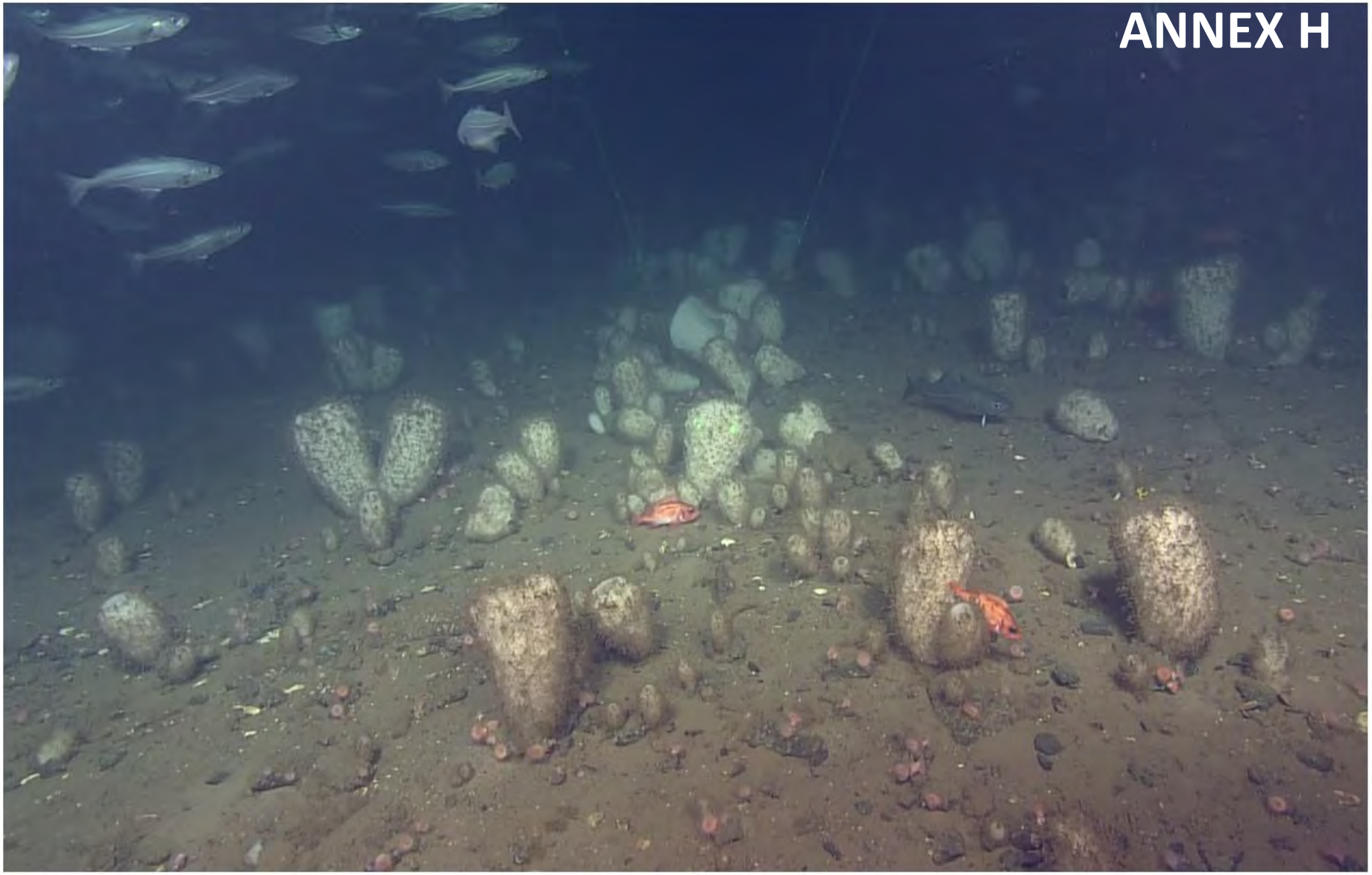
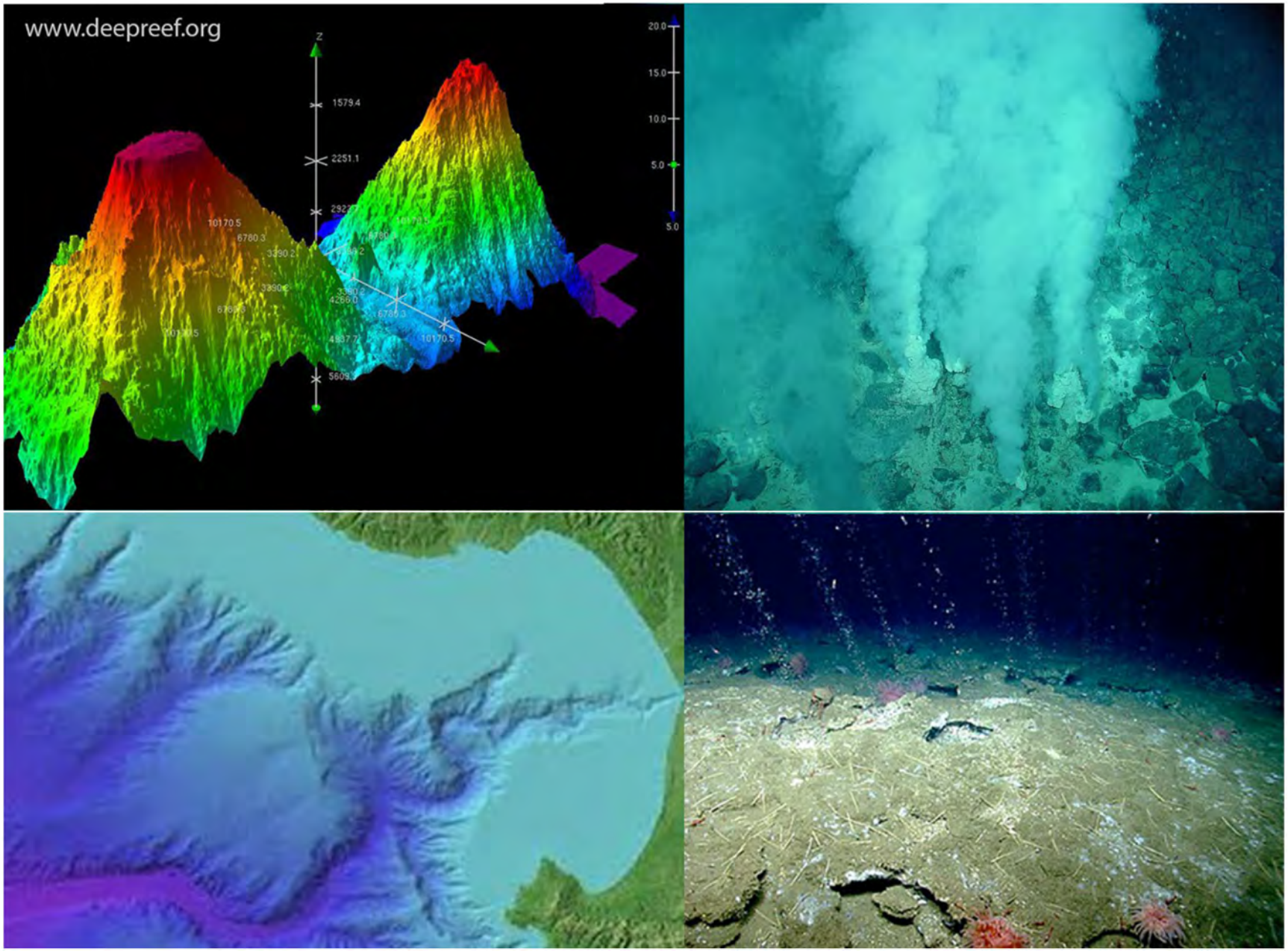


Fig 1. Glass sponge *Vazella pourtalesi* [32] in Emerald Basin, Nova Scotia, Canada. Image is a framegrab from video collected using the ROV ROPOS in 2017. Depth is 195 m, location is 43˚52.1225 N, -63˚2.8945 W.


www.deepreef.org
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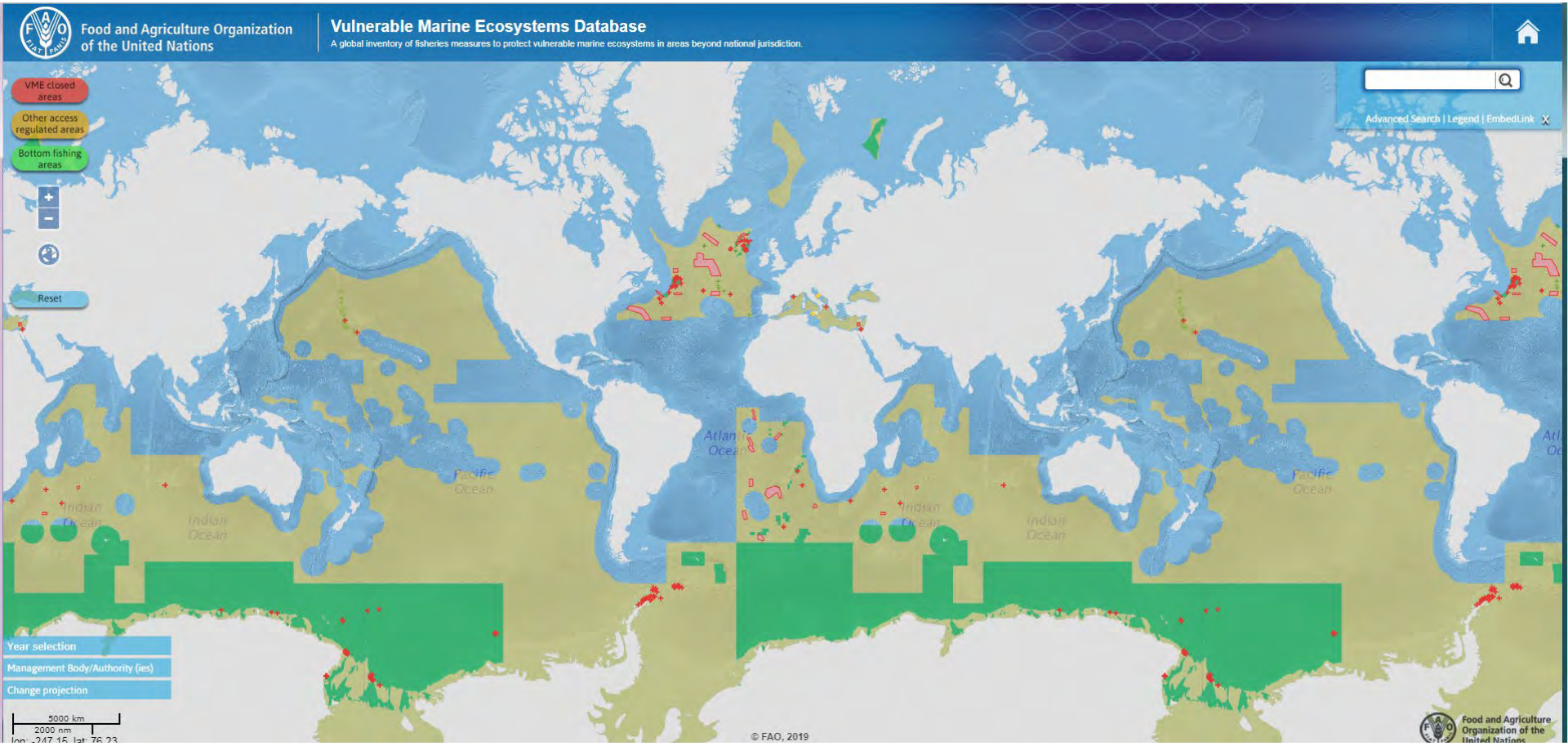
FAO VME Database

ANNEX H



Accessed 13 March 2019

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

ANNEX H

	NAFO	NEAFC	SEAFO	NPFC	GFCM	CCAMLR
Seamounts	x	x	x	x	x	
Knolls	x					
Ridges (MAR)		x	x			
Mounds		x				
Cold seeps					x	
Canyons	(x)					
Steep flanks	(x)					
VME Indicator Species	x	x	x	x	x	x

NAFO

- ~ 500 invertebrate species caught in research vessel trawls were screened against the FAO criteria
- No unique or rare species identified to date (review in 2019)
- Functional group designations: e.g., Large Gorgonian Corals, Sea Pens

File Edit View Insert Format Tools Data Window GenAlEx QI Macros 2009 Help

Type a question for help

Arial 10

E2 late age of maturity

		LIFE HISTORY TRAITS						
		life span	growth rate	late age of maturity	recruitment	Comments	VME indicator sp	
	Species							
PORIFERA	Geodia (Genus)	Infered: Maximum age i			unpredictable	sponge dom	yes	Uniqueness or rarity
	Stryphnus ponderosus	Infered: Maximum age i			unpredictable	sponge dom	yes	
	Stelleta normani	Infered: Maximum age i			unpredictable	sponge dom	yes	Functional significance of the habitat
	Thenea (Genus)	Infered: Maximum age i			unpredictable	sponge dom	yes	
	Polymastia (Genus)	Infered: Maximum age i			unpredictable			
	Mycale (Genus)	Infered from Mycale sp.	Infered from N		unpredictable			
	Iophon piceum	Average life span more			unpredictable			
	Forcepia (Genus)	Infered: Maximum age i	Infered from N		unpredictable			Fragility
	Gellius (Genus)	Infered: Maximum age i	Infered from N		unpredictable			
	Crella (Genus)	Not large, fast growth, s	Infered from C		unpredictable			Life-history traits o component species that make recovery difficult
	Craniella cranium	This is smaller than oth			unpredictable			
	Asconema foliatum	Infered from Rhabdocaly	Infered from R		unpredictable			
CORALS	Duva florida	Infered from Dendronepl	Prymary poly		unpredictable			
	Gersemia (Genus)	Infered from Anthomast	G. rubiformis:	G. fructicosa: It is pos				
	Hteropolypus cf. insolitus	Infered from Anthomast	Infered from A					
	Paragorgia arborea	80 yr (Sherwood & Edin	axial growth 1			in FAO	yes	Structural complexit
	Paramuricea (Genus)	71-103 yr (Sherwood &	axial growth 0	Infered from P. clavata	Infered from P	in FAO	yes	
	Anthoptilum grandiflorum	Infered from Halipteris w			unpredictable	sea pens co	yes	
	Halipteris finmarchica	Infered from Halipteris w	Infered from H		unpredictable	sea pens co	yes	
	Pennatula (Genus)	Infered from Ptilosarcus		Infered from Ptilosarcus	gurneyi (Per	sea pens co	yes	
	Stauropathes arctica	55 - 82 yr (Sherwood &	axial growth 2		unpredictable	in FAO	yes	

Sheet1 Sheet2 Sheet3

AutoShapes

NUM

Internet 100%

largest catches did not increase very much as smaller catches were included - up to a

e 8 Sec 1 8/20 At 12.1cm Ln 10 Col 1 REC TRK EXT OVR English (U.K

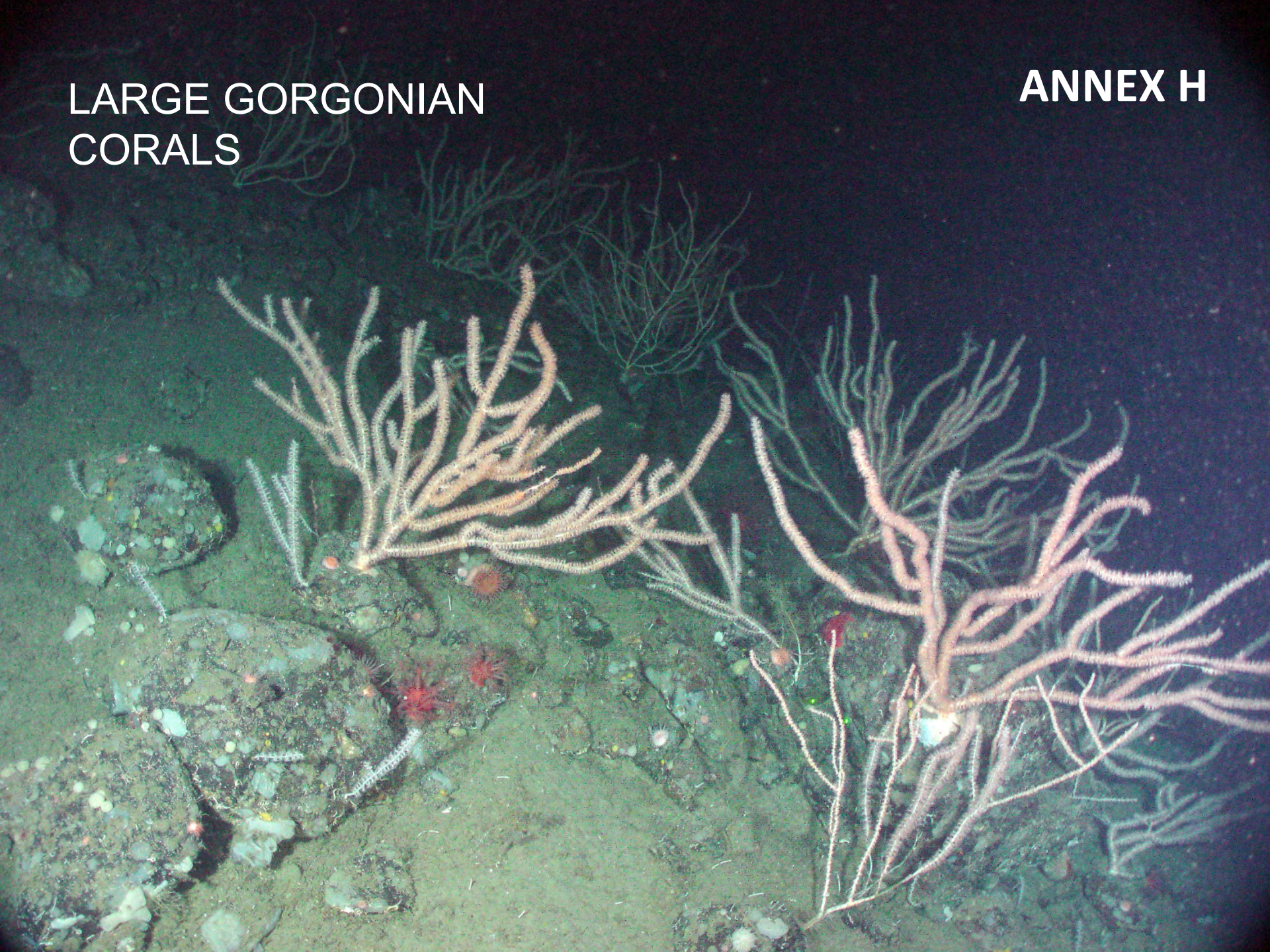
ANNEX H

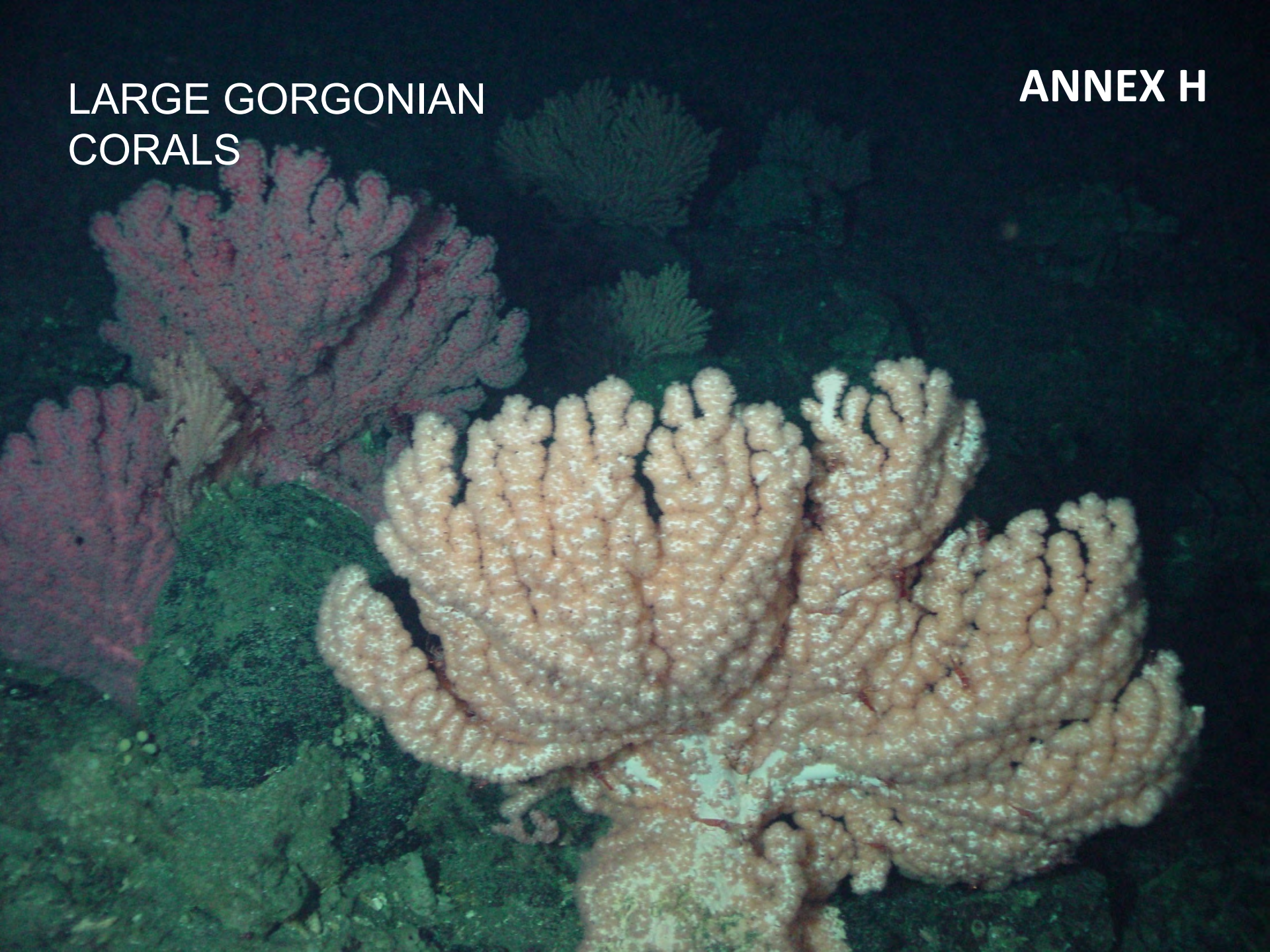
Table 1. List of structure-forming benthic VME indicator species (benthic invertebrates) in the NAFO Regulatory Area. For each VME indicator species group it is the dense aggregations (beds/fields) that are considered to be VME in order to establish functional significance. Many are associated with one another and so encounter protocols are at the aggregate level. See the NAFO coral and sponge guides for identification. http://www.nafo.int/publications/frames/science.html

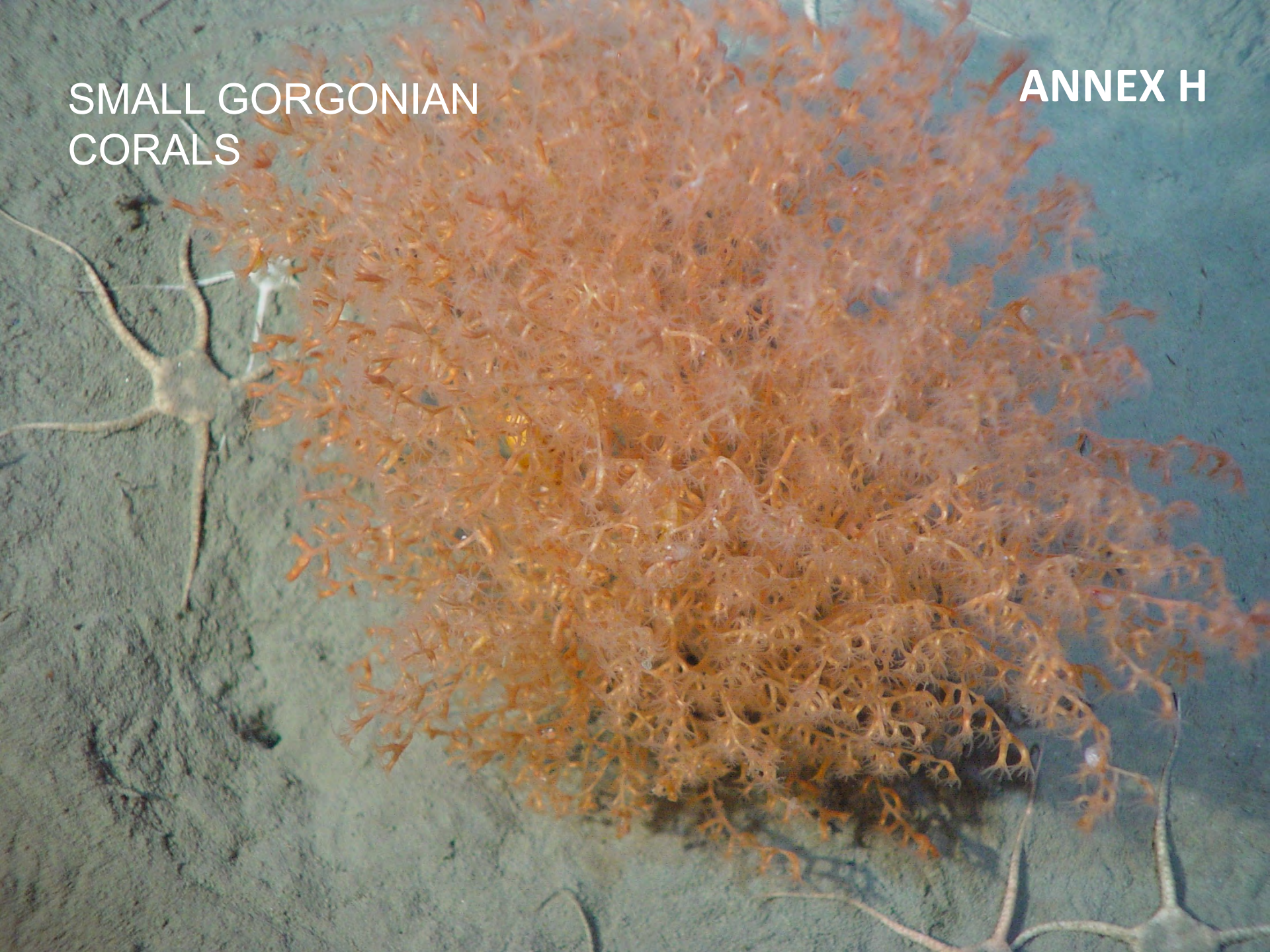
Benthic Invertebrate VME Indicator Species			
Common name of taxonomic group	**Known Taxon**	**Family**	**Phylum**
Large-sized sponges	*Iophon piceum*	Acarnidae	Porifera
	Stelletta normani	Ancorinidae	
	Stelletta sp.	Ancorinidae	
	Stryphnus ponderosus	Ancorinidae	
	Axinella sp.	Axinellidae	
	Phakellia sp.	Axinellidae	
	Esperiopsis villosa	Esperiopsidae	
	Geodia barretti	Geodiidae	
	Geodia macandrewii	Geodiidae	
	Geodia phlegraei	Geodiidae	
	Mycale (Mycale) lingua	Mycalidae	
	Thenea muricata	Pachastrellidae	
	Polymastia spp.	Polymastiidae	
	Weberella bursa	Polymastiidae	
	Weberella sp.	Polymastiidae	
	Asconema foliatum	Rossellidae	
	Craniella cranium	Tetillidae	

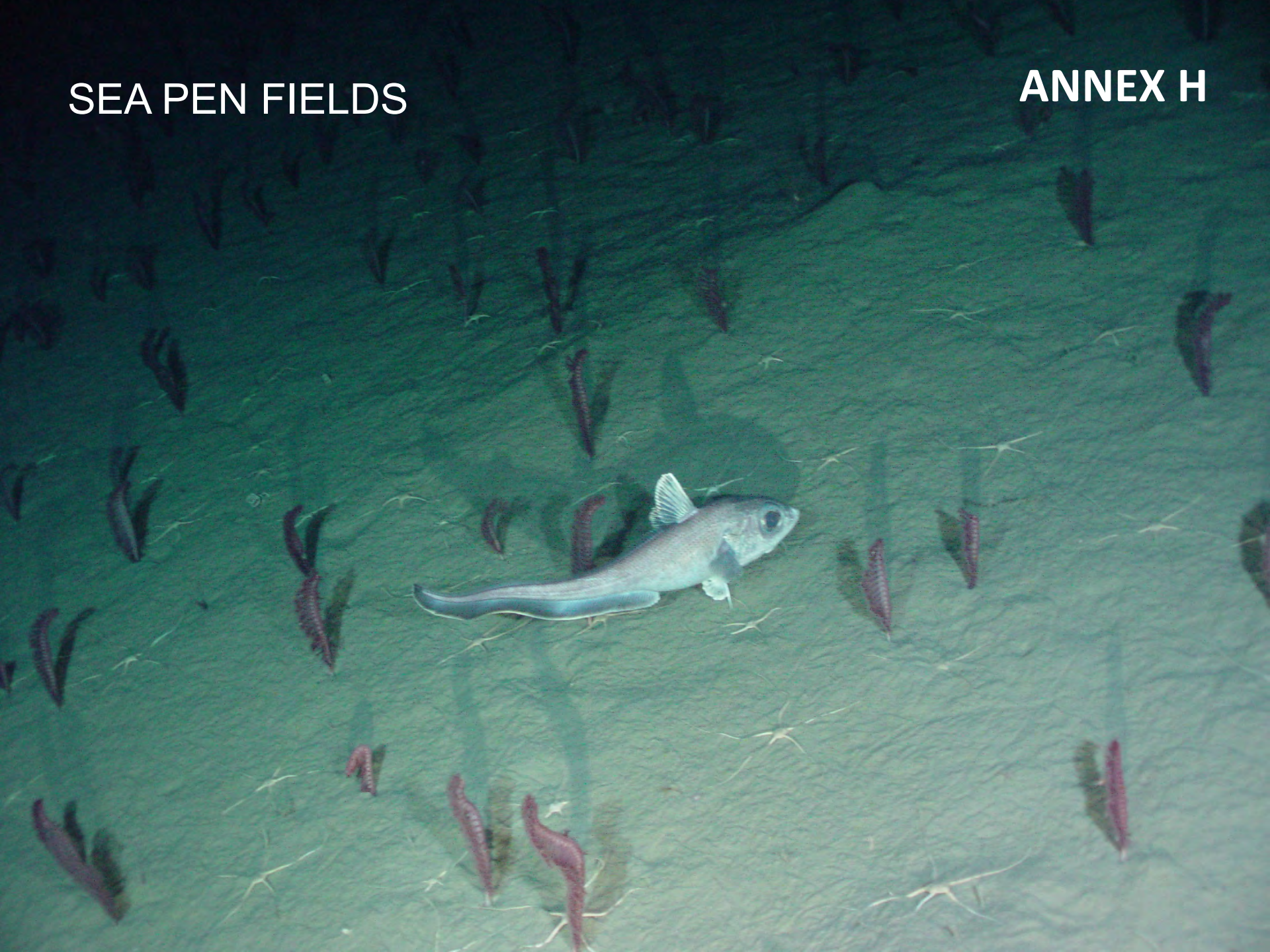
LARGE GORGONIAN CORALS

ANNEX H




LARGE GORGONIAN
CORALS
ANNEX H

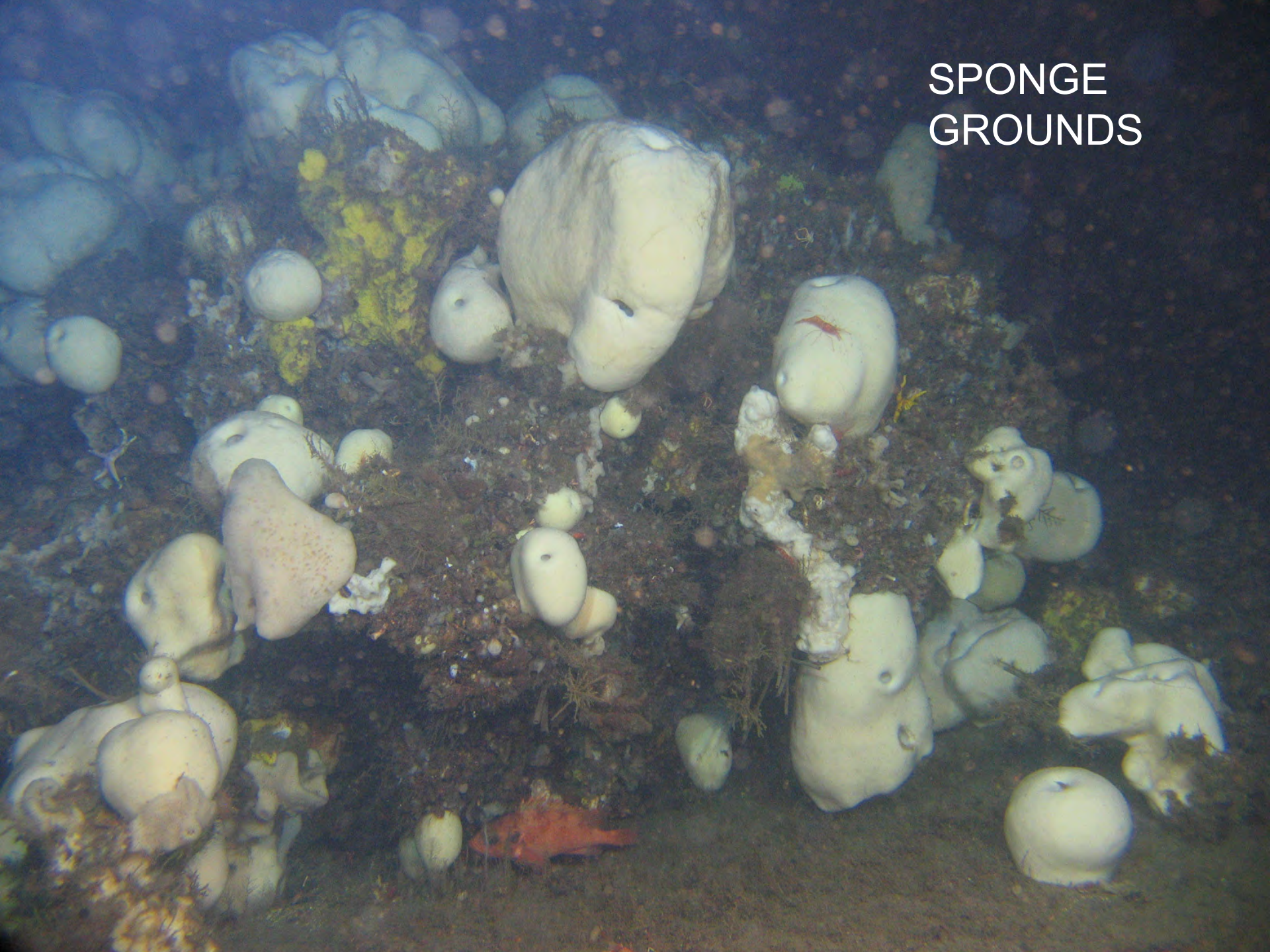

SMALL GORGONIAN
CORALS
ANNEX H


SEA PEN FIELDS
ANNEX H

BLACK CORAL – SPECIAL CASE

A black coral colony, Scotian slope


STONY
CORALS


SPONGE
GROUNDS

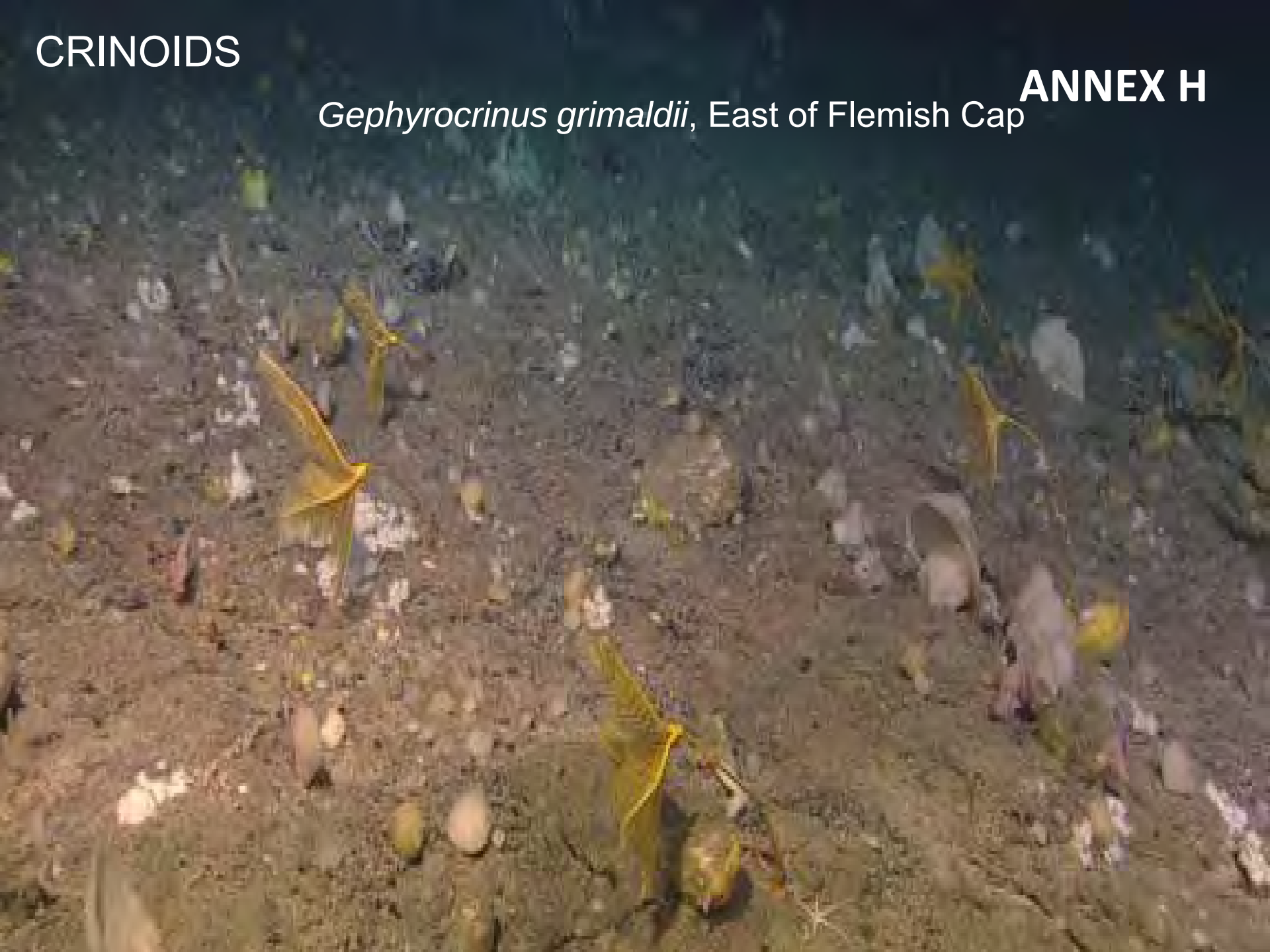

ANNEX H

TUBE DWELLING ANEMONE FIELDS

ANNEX H

CRINOIDS

ANNEX H



Gephyrocrinus grimaldii, East of Flemish Cap

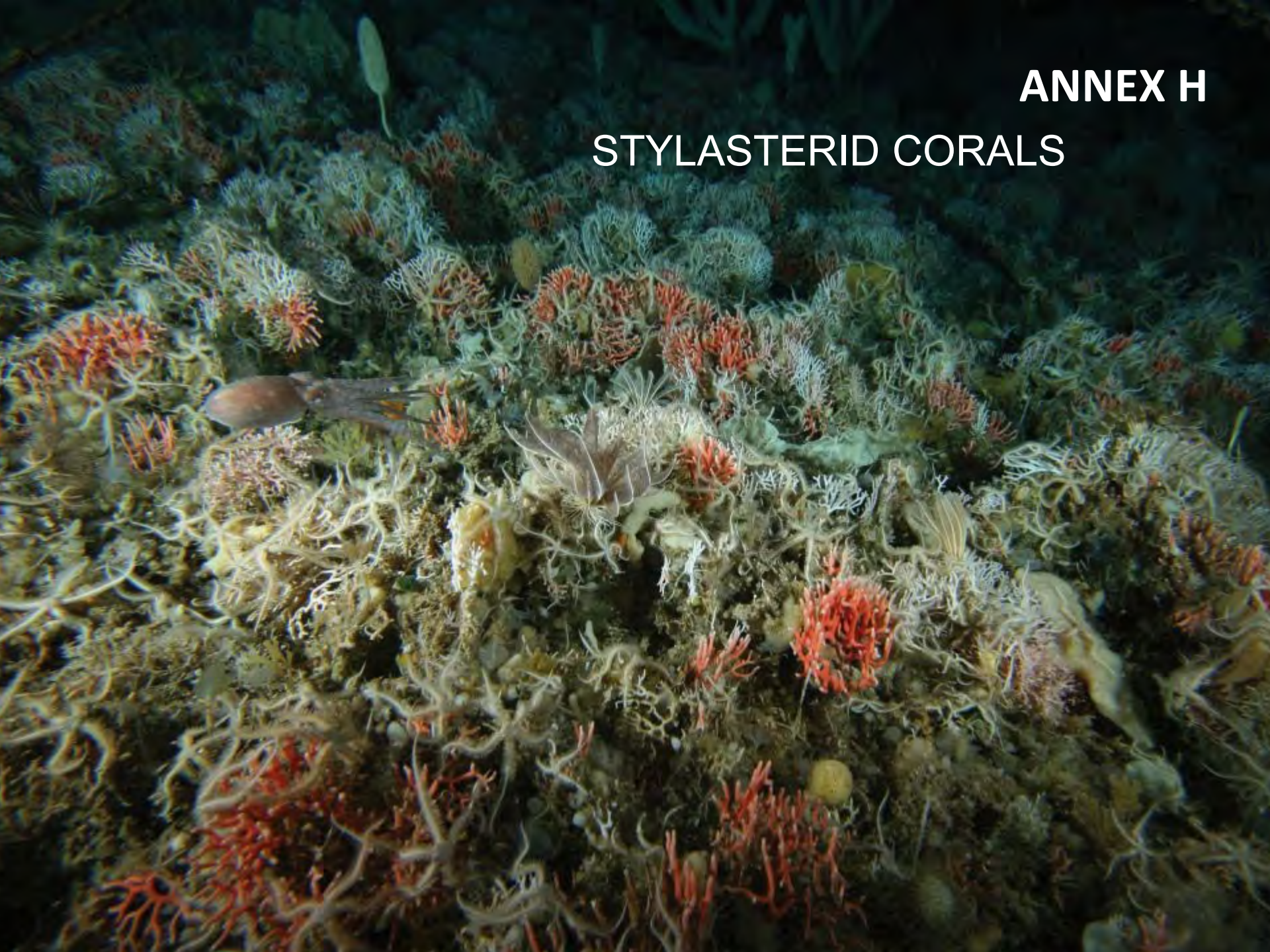
ERECT BRYOZOANS

Tail of the Grand Bank

LARGE SEA SQUIRTS (STALKED TUNICATES)

ANNEX H

Boltenia ovifera

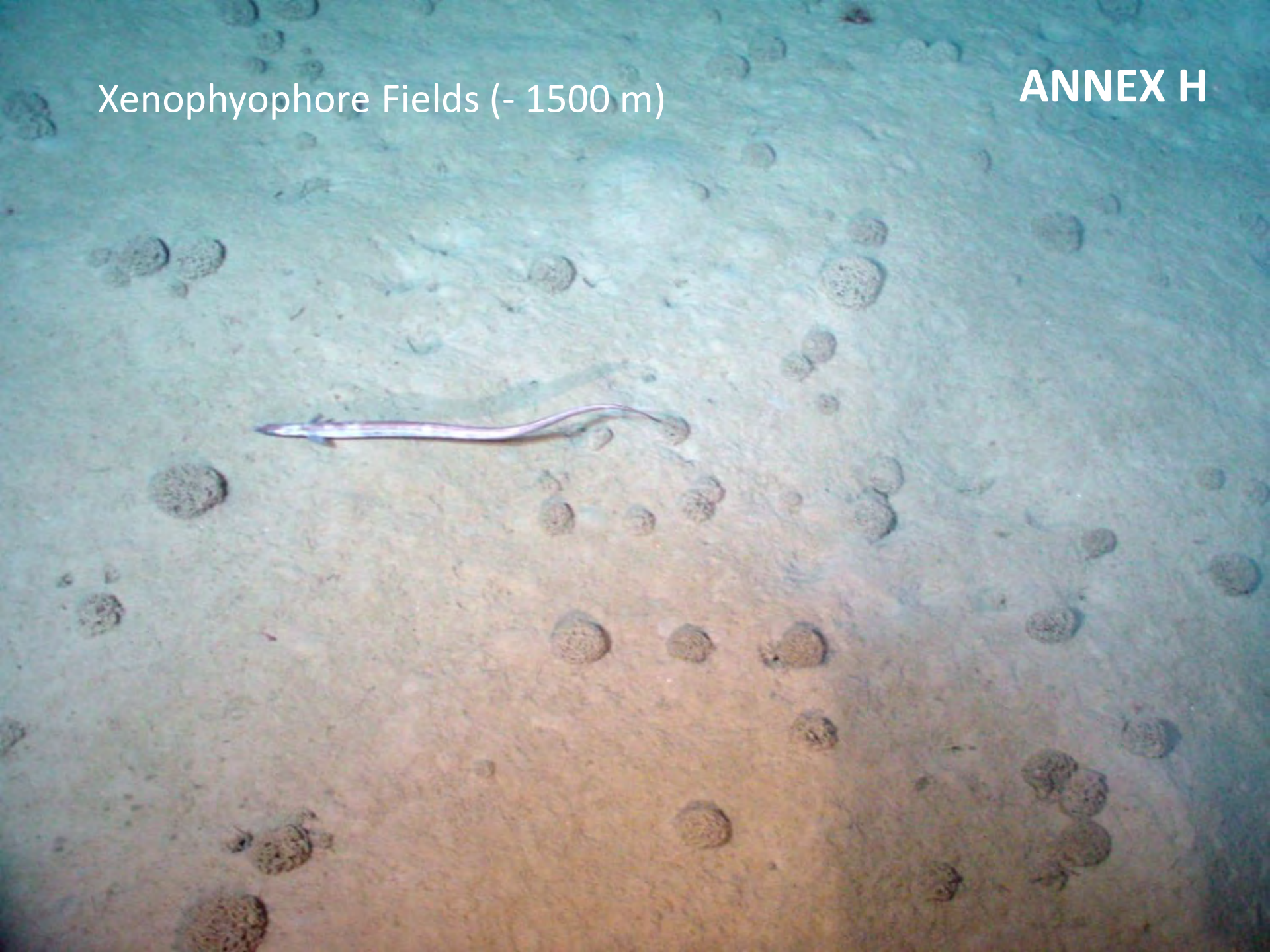


ANNEX H

STYLASTERID CORALS

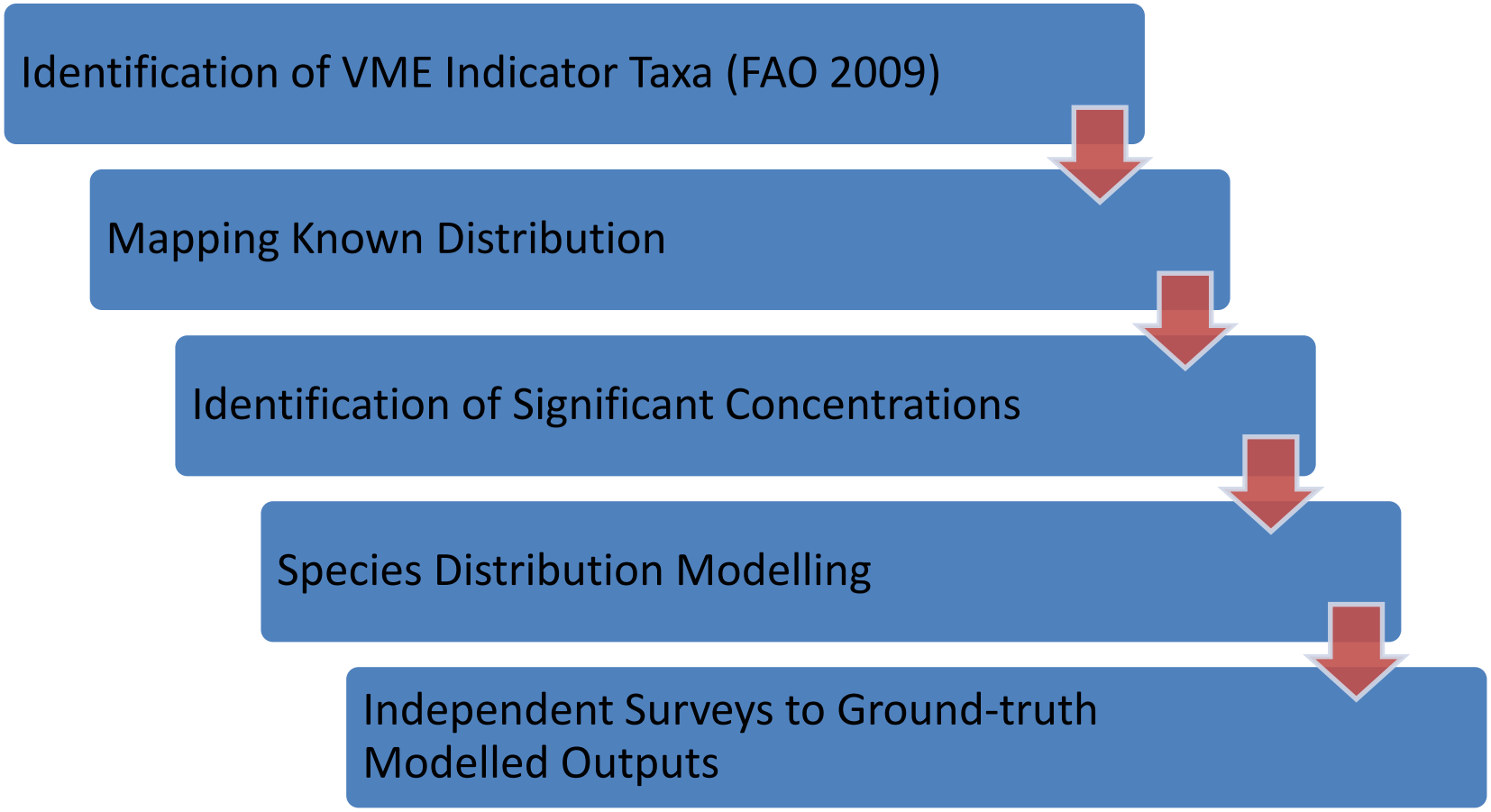
Xenophyophore Fields (- 1500 m)

ANNEX H

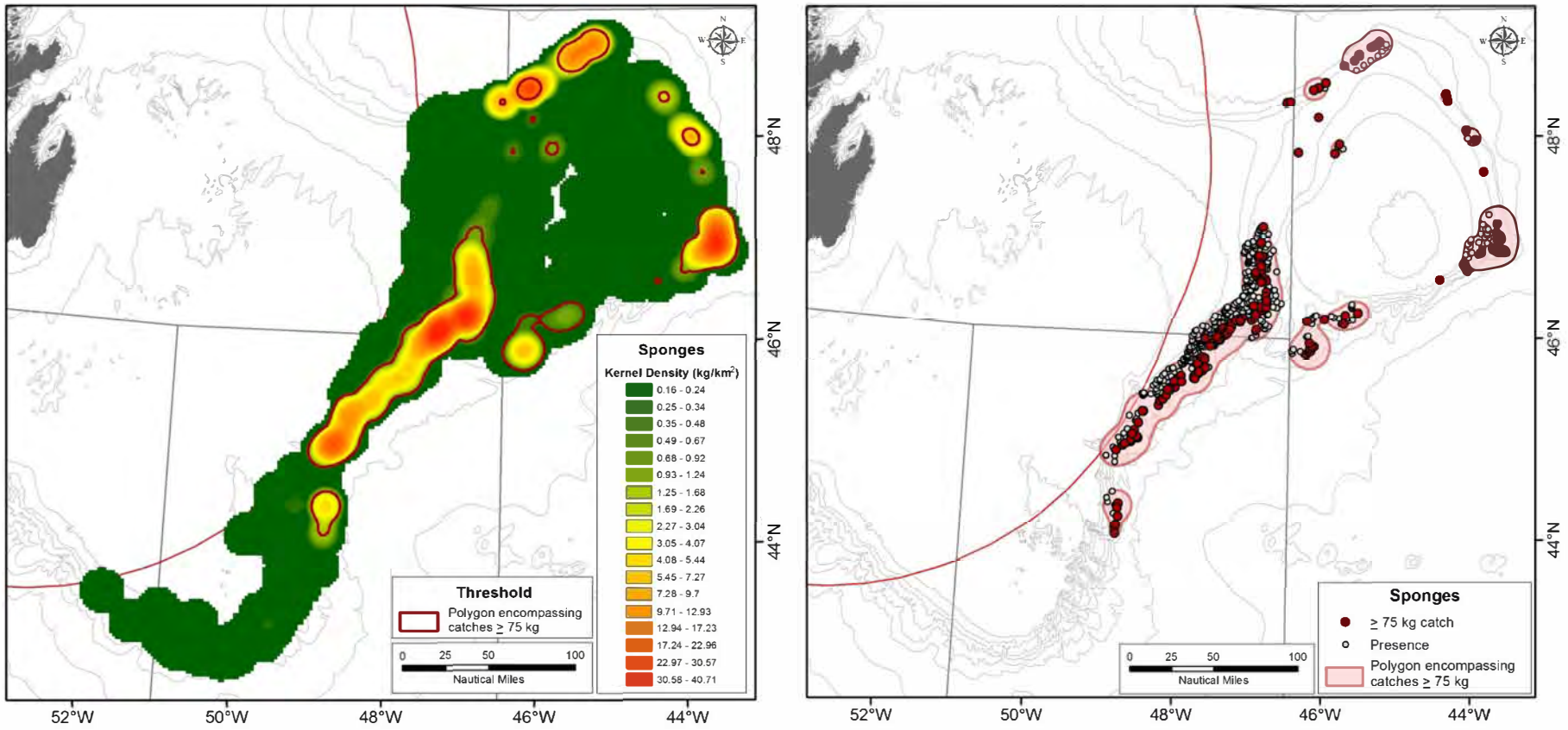


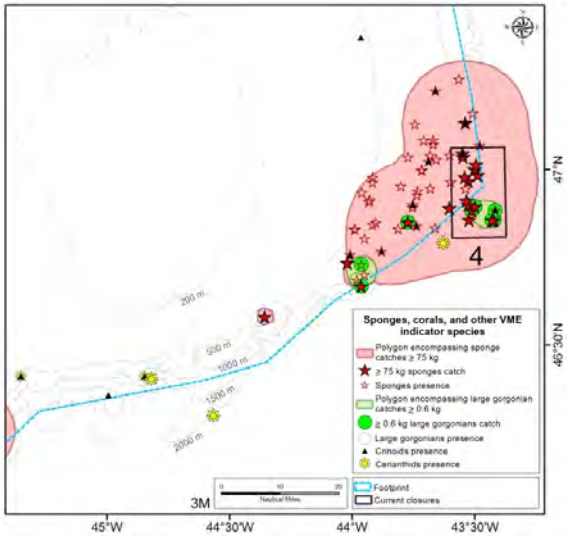
Defining and Delineating VME Areas in the NW Atlantic

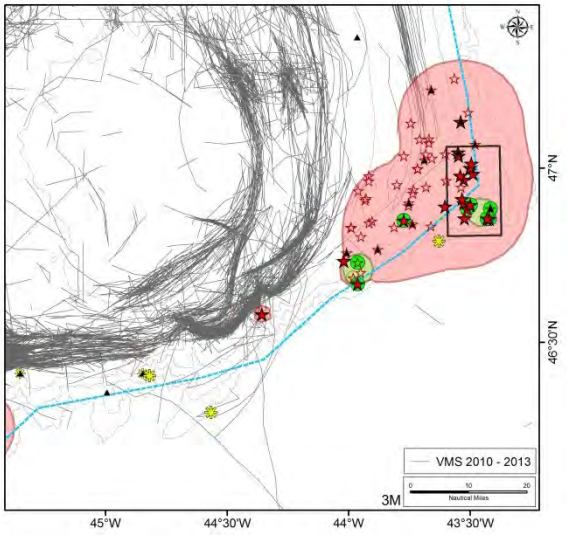
ANNEX H

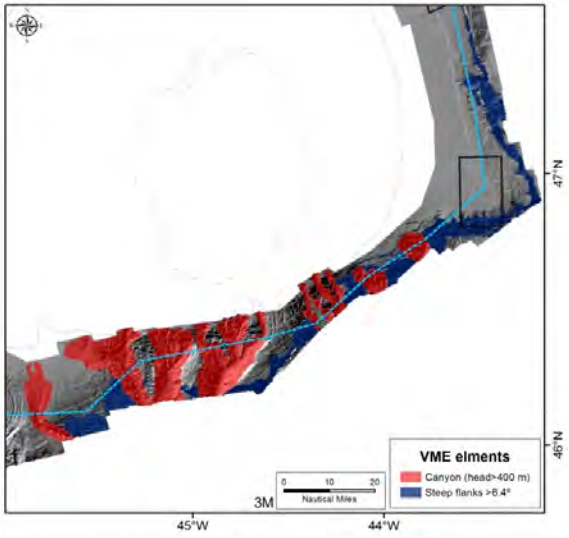


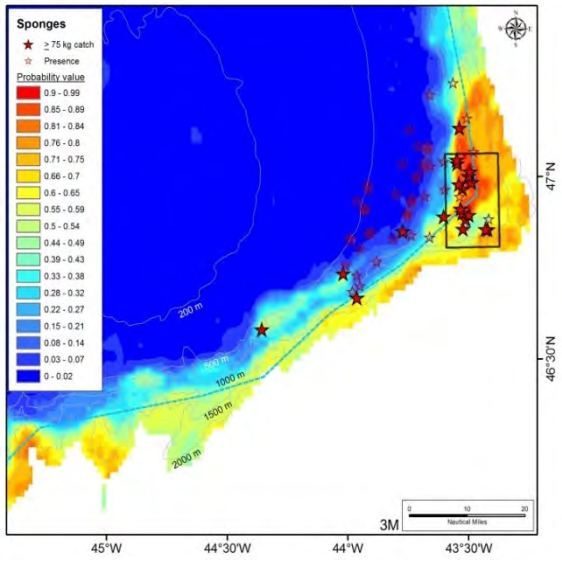
ANNEX H

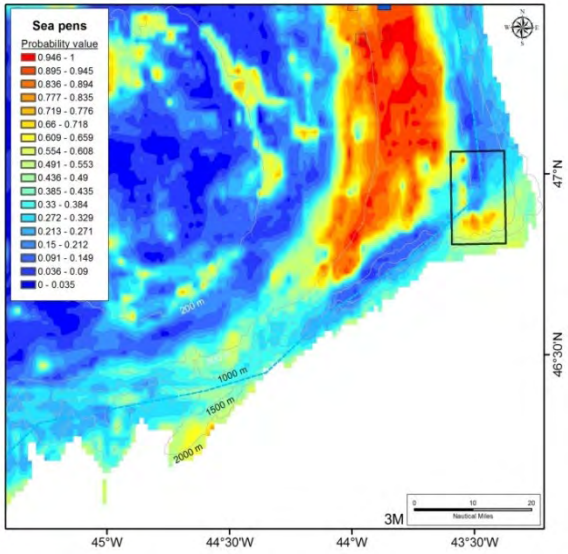

Sponges
Kernel Density (kg/km²)
0.16 - 0.24
0.25 - 0.34
0.35 - 0.48
0.49 - 0.67
0.68 - 0.92
0.93 - 1.24
1.25 - 1.68
1.69 - 2.26
2.27 - 3.04
3.05 - 4.07
4.08 - 5.44
5.45 - 7.27
7.28 - 9.7
9.71 - 12.93
12.94 - 17.23
17.24 - 22.96
22.97 - 30.57
30.58 - 40.71
Threshold
Polygon encompassing catches ≥ 75 kg
0 25 50 100
Nautical Miles
52°W
50°W
48°W
46°W
44°W
48°N
46°N
44°N
Sponges
≥ 75 kg catch
Presence
Polygon encompassing catches ≥ 75 kg
0 25 50 100
Nautical Miles
52°W
50°W
48°W
46°W
44°W
48°N
46°N
44°N

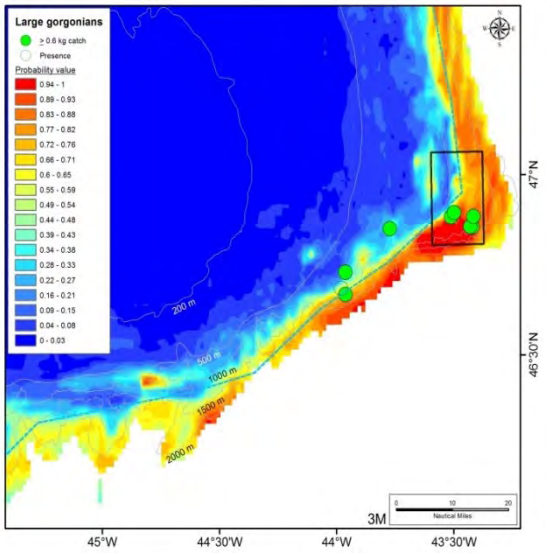






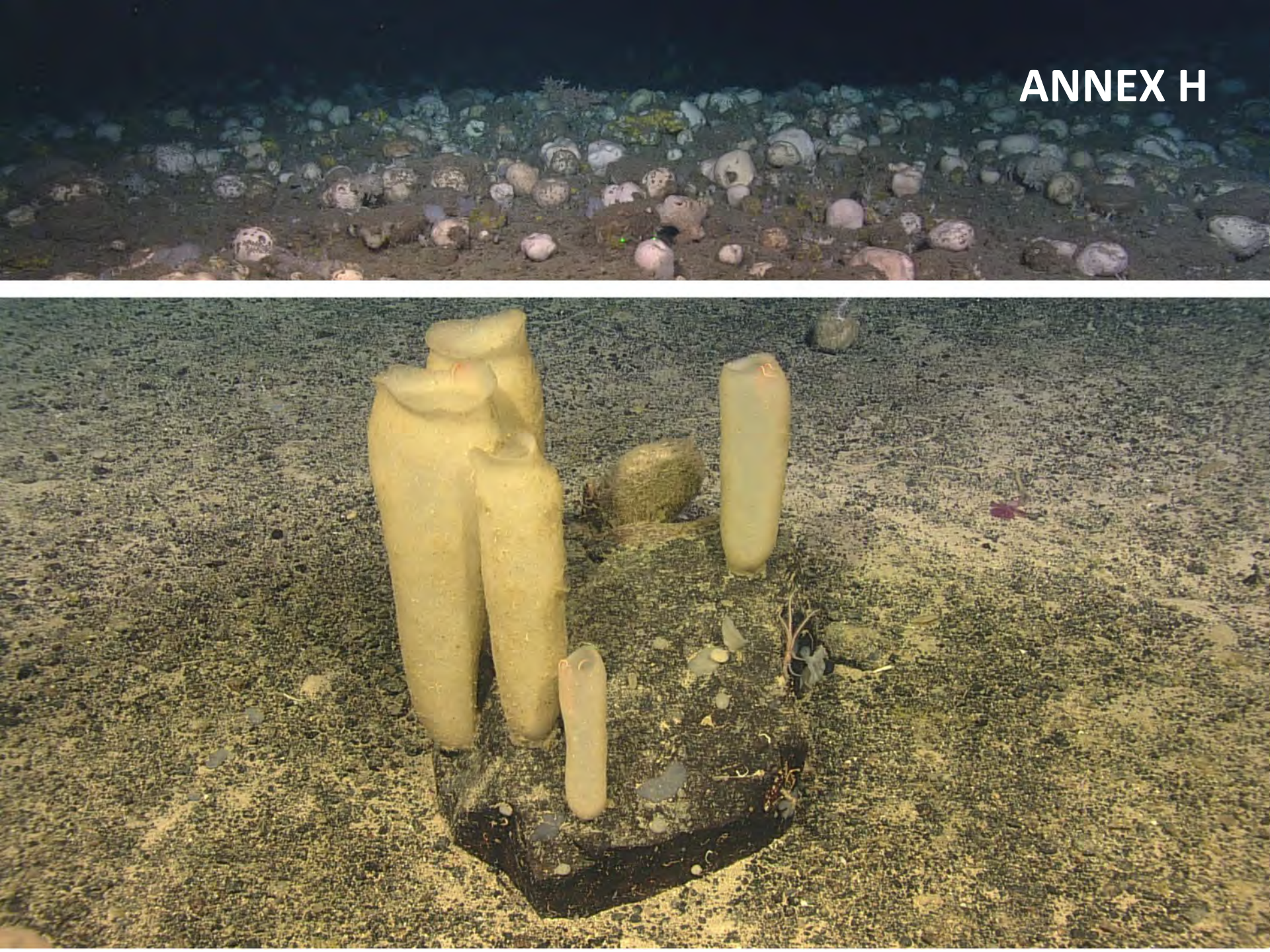






Combine all sources of information (KDE, SDM, indicators, fishing) to inform management decisions

ANNEX H



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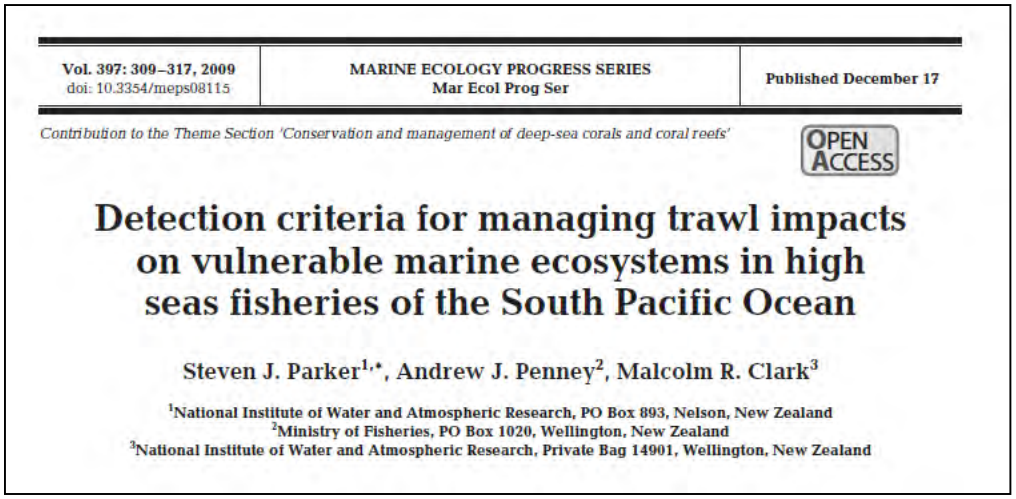


Vol. 397: 309–317, 2009
doi: 10.3354/meps08115

MARINE ECOLOGY PROGRESS SERIES
Mar Ecol Prog Ser

Published December 17

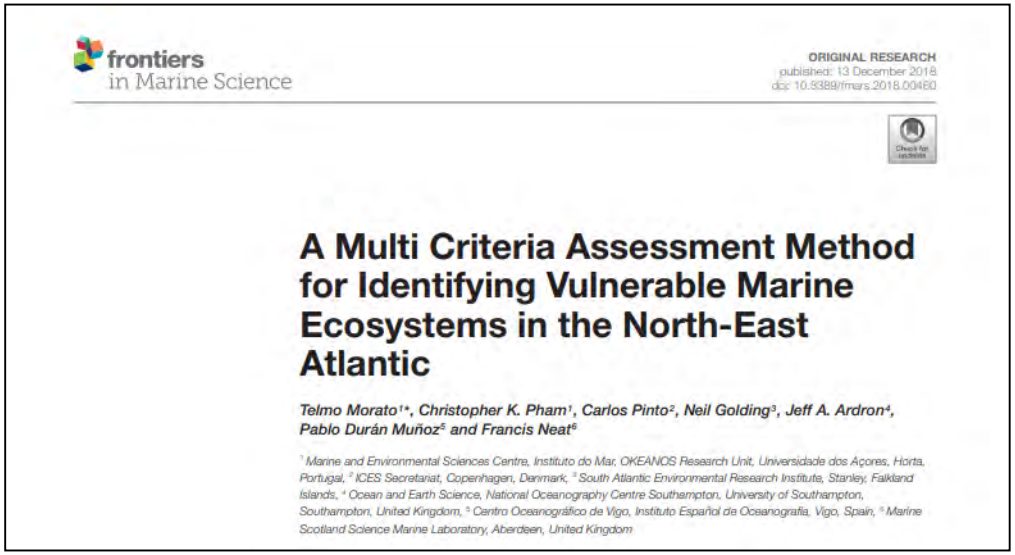
Contribution to the Theme Section 'Conservation and management of deep-sea corals and coral reefs'

OPEN ACCESS

Detection criteria for managing trawl impacts on vulnerable marine ecosystems in high seas fisheries of the South Pacific Ocean

Steven J. Parker[1,*], Andrew J. Penney[2], Malcolm R. Clark[3]

[1]National Institute of Water and Atmospheric Research, PO Box 893, Nelson, New Zealand
[2]Ministry of Fisheries, PO Box 1020, Wellington, New Zealand
[3]National Institute of Water and Atmospheric Research, Private Bag 14901, Wellington, New Zealand



frontiers in Marine Science

ORIGINAL RESEARCH
published: 13 December 2018
doi: 10.3389/fmars.2018.00460

A Multi Criteria Assessment Method for Identifying Vulnerable Marine Ecosystems in the North-East Atlantic

Telmo Morato[1], Christopher K. Pham[1], Carlos Pinto[2], Neil Golding[3], Jeff A. Ardron[4], Pablo Durán Muñoz[5] and Francis Neat[6]*

[1] Marine and Environmental Sciences Centre, Instituto do Mar, OKEANOS Research Unit, Universidade dos Açores, Horta, Portugal, [2] ICES Secretariat, Copenhagen, Denmark, [3] South Atlantic Environmental Research Institute, Stanley, Falkland Islands, [4] Ocean and Earth Science, National Oceanography Centre Southampton, University of Southampton, Southampton, United Kingdom, [5] Centro Oceanográfico de Vigo, Instituto Español de Oceanografía, Vigo, Spain, [6] Marine Scotland Science Marine Laboratory, Aberdeen, United Kingdom

General approach used by NEAFC, SPRFMO, CCAMLR

ICES VME Database

ANNEX H

DATA PORTALS

- ICES data portal

THEMATIC

- All data
- Acoustic trawl surveys
- Biodiversity
- DATRAS
- DOME (Marine Environment)
- Eggs and larvae
- Fish stomach
- Historical plankton
- Oceanography
- SmartDots
- Underwater Noise
- **Vulnerable Marine Ecosystems**

LOGIN REQUIRED

- InterCatch
- Regional DataBase FishFrame

Vulnerable Marine Ecosystems

Print it | Send to | Share it

Portal to view and download observations of Vulnerable Marine Ecosystem (VME) indicators and habitats in the North Atlantic

Contact usA central portal for data on the distribution and abundance of Vulnerable Marine Ecosystems (VMEs), (and organisms considered to be indicators of VMEs) across the North Atlantic has been set up by the Joint ICES/NAFO Working Group on Deep-water Ecology (WGDEC). Criteria used to select habitats and indicators for inclusion in the database were those described in the FAO International Guidelines for the Management of Deep-sea Fisheries in the High Seas (FAO, 2009).

The database is comprised of: 1) 'VME habitats' that are records for which there is unequivocal evidence for a VME, e.g. ROV observations of a coral reef, 2) 'VME indicators' which are records that suggest the presence of a VME with varying degrees of uncertainty. For VME indicators a weighting system of vulnerability and uncertainty is provided as part of the database to aid interpretation.
The VME database may be used for many purposes; ICES will use it when providing scientifically-robust advice on the distribution of VMEs and recommending possible management solutions such as bottom fishing closures within NEAFC (North East Atlantic Fisheries Commission) waters to protect VMEs.

Relationship with the FAO VME database

The ICES VME Database differs from the FAO VME database (see link in right menu). The ICES VME Database contains observations of VME indicators and habitats throughout the North Atlantic, whereas the FAO database contains records of management measures implemented by Regional Fisheries Bodies throughout the world's oceans.

© Joint Nature Conservation Committee (JNCC), UK 2009

SUBMIT DATA

DOWNLOAD DATA

VIEW ON MAP

QUERY WEB SERVICES

CONTACT US

LINKS

http://www.ices.dk/marine-data/data-portals/Pages/vulnerable-marine-ecosystems.aspx

X

Responsible fisheries in the marine ecosystem

76. *Encourages* States to apply by 2010 the ecosystem approach, notes the Reykjavik Declaration on Responsible Fisheries in the Marine Ecosystem[13] and decision VII/11[14] and other relevant decisions of the Conference of the Parties to the Convention on Biological Diversity, notes the work of the Food and Agriculture Organization of the United Nations related to guidelines for the implementation of the ecosystem approach to fisheries management, and also notes the importance to this approach of relevant provisions of the Agreement and the Code;

77. *Also encourages* States, individually or through regional fisheries management organizations and arrangements and other relevant international organizations, to work to ensure that fisheries and other ecosystem data collection is performed in a coordinated and integrated manner, facilitating incorporation into global observation initiatives, where appropriate;

Thank you for inviting me to make this presentation

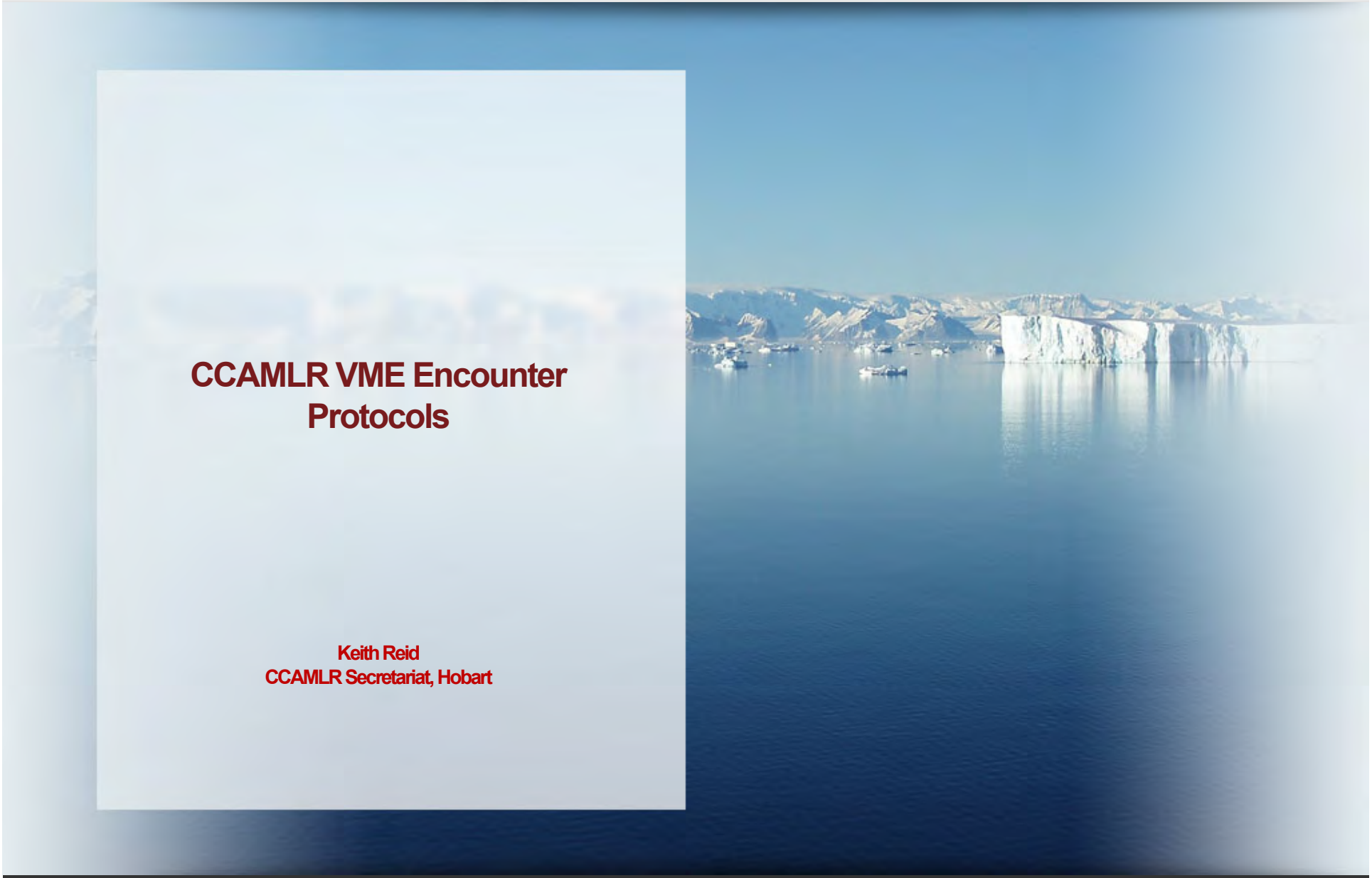
Annex I

CCAMLR Longline VME encounter thresholds

Vessels using bottom longlining gear are required to segment their lines and then report the number of VME-indicator units recorded on each line segment. The move-on rule is triggered when five or more indicator units are reported within one segment. Such instances must be reported to the Secretariat immediately so that other vessels in the fishery may be informed that this area is closed and not to fish in this area. An indicator unit is defined as:

VME indicator unit' means either one litre of those VME indicator organisms that can be placed in a 10 -litre container, or one kilogram of those VME indicator organisms that do not fit into a 10-litre container.

Line segment is defined as: 'Line segment' means a 1000-hook section of line or a 1 200 m section of line, whichever is the shorter, and for pot lines a 1 200 m section.



CCAMLR VME Encounter Protocols

Keith Reid
CCAMLR Secretariat, Hobart

CCAMLR Conservation Measures

Conservation Measure 22–06 *Bottom fishing in the Convention Area*

Sets out the process to protect vulnerable marine ecosystems from significant negative impacts of bottom fishing.

It defines a VME “encounter” and a notification process.

Encounters with VMEs can arise from research surveys and bottom fishing activities

Encounters during research are notified by Members and reviewed by the Scientific Committee

Expert judgement based process for review by the Scientific Committee

CCAMLR Conservation Measures

Conservation Measure 22–07 *Interim measure for bottom fishing activities subject to Conservation Measure 22–06 encountering potential vulnerable marine ecosystems in the Convention Area*

This measure 'operationalises' the requirements of Conservation Measure 22–06 with respect to encounters with VMEs during bottom fishing.

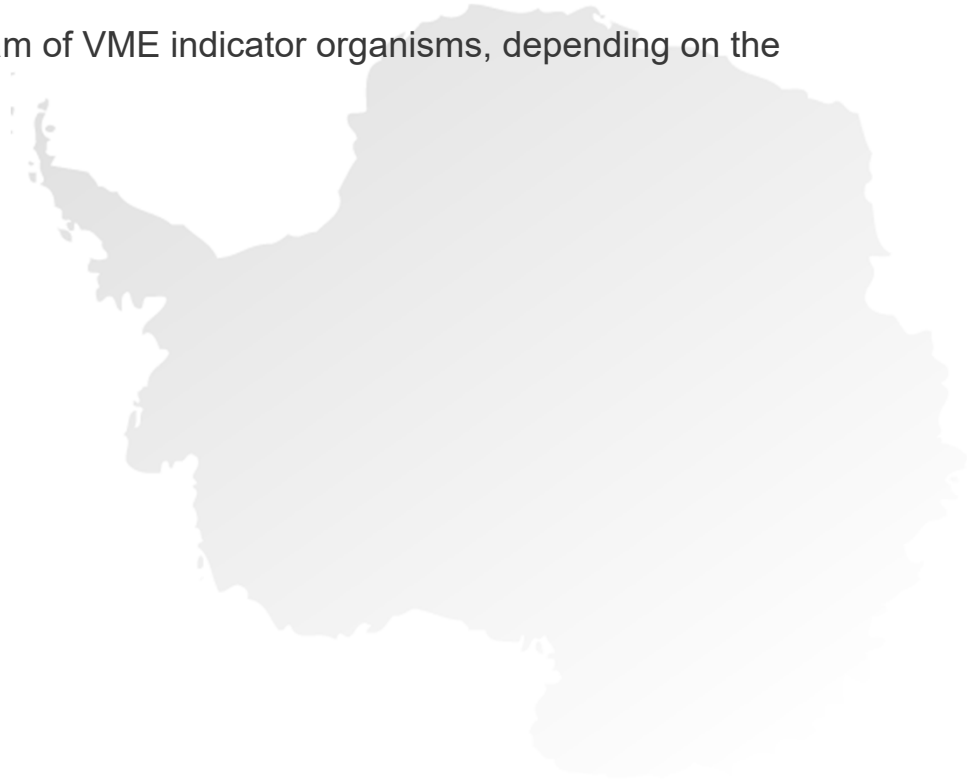
It defines a "VME indicator unit" for use during fishing and the resulting course of action to be taken by a vessel.

A VME Encounter during bottom longline fishing

Fishing vessels divide longlines into segments of 1,000-hooks or 1,200 m

Monitor the catch of an VME indicator organisms in each segment.

A *VME indicator unit* is either one litre or one kilogram of VME indicator organisms, depending on the morphology of those organisms



A VME Encounter during bottom longline fishing

When 10 or more VME indicator units are recovered in one line segment, an area of 1 nautical mile radius from the mid-point of the segment is considered a ‘VME risk area’.

Vessels are required to complete hauling any lines in that risk area and immediately communicate the location to the flag State and to the CCAMLR Secretariat.

The Secretariat notifies all fishing vessels in the fishery (and the respective flag States) that the area concerned is closed to further fishing and that all vessels must immediately cease setting lines intersecting that risk area.

A 'possible' VME Encounter

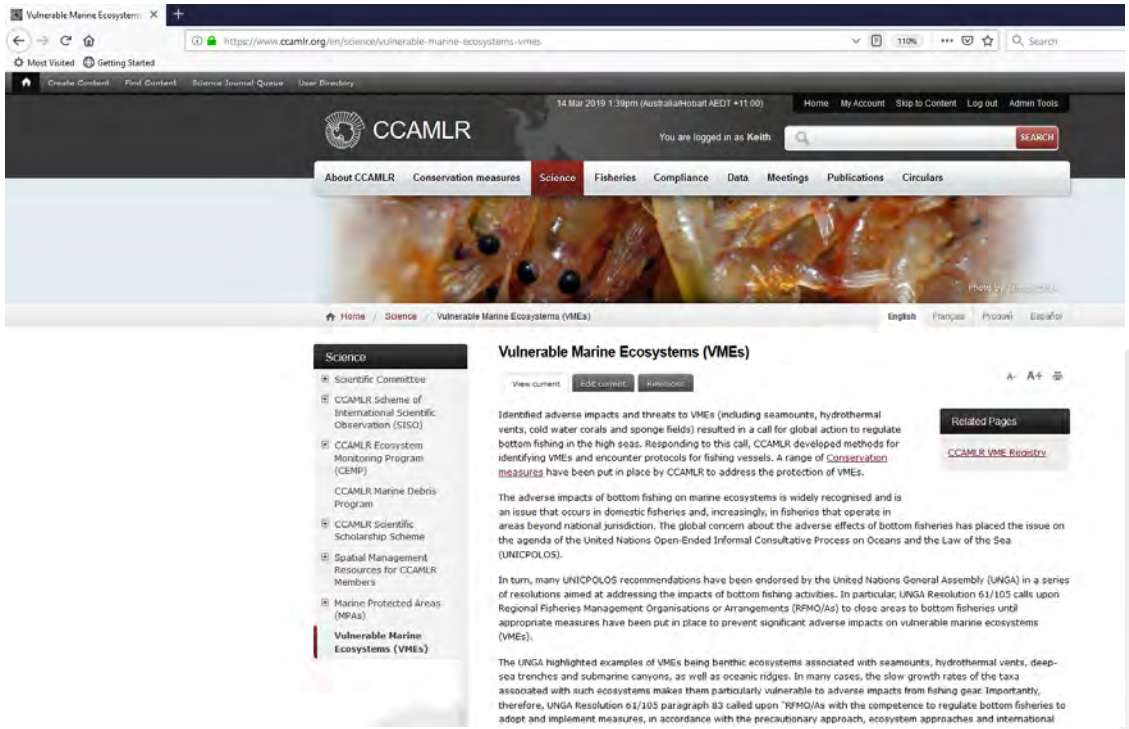
When >5 and <10 VME indicator units recovered within one line segment

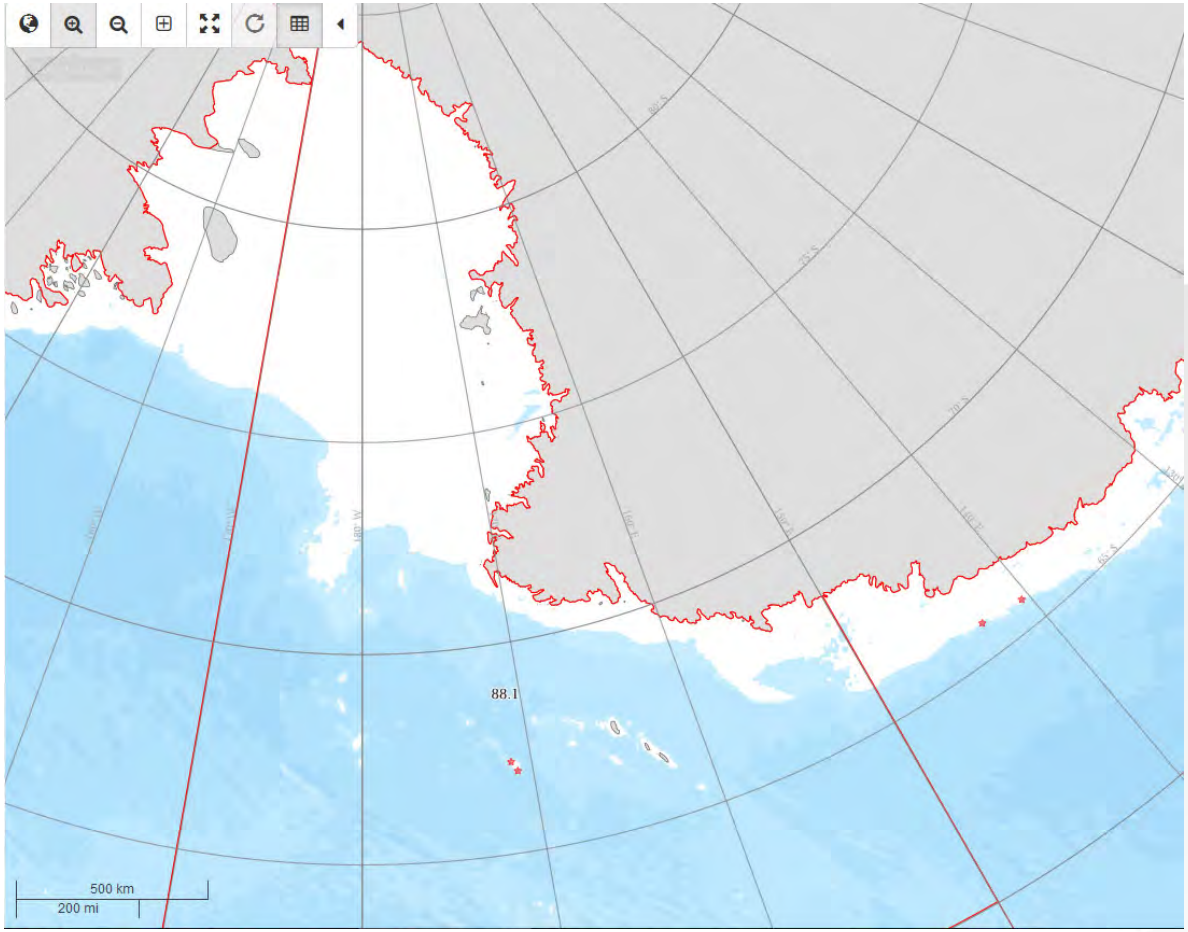
There is some evidence of the VME presence, but this is not sufficient to trigger a 'VME risk area'.

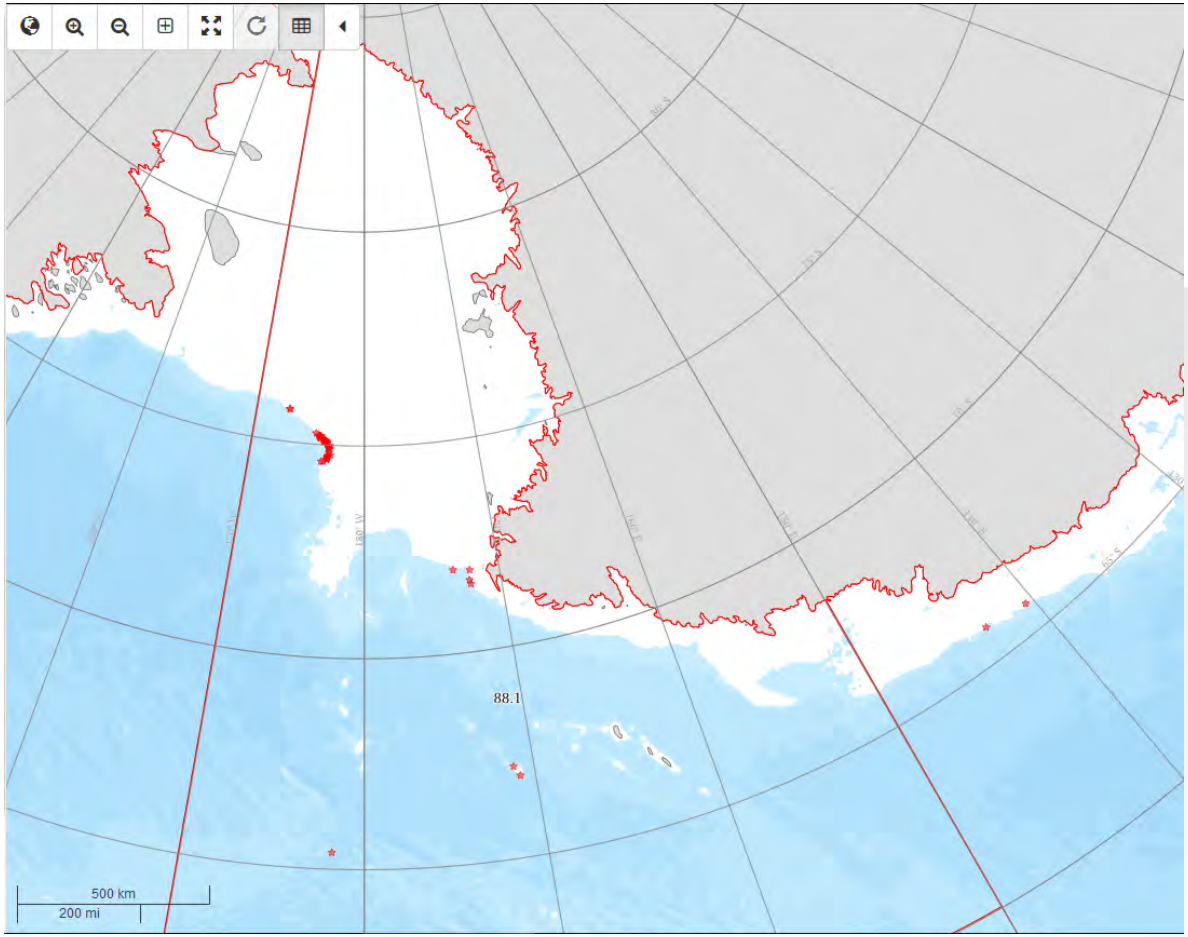
Vessels report the location of 'possible encounters' to CCAMLR

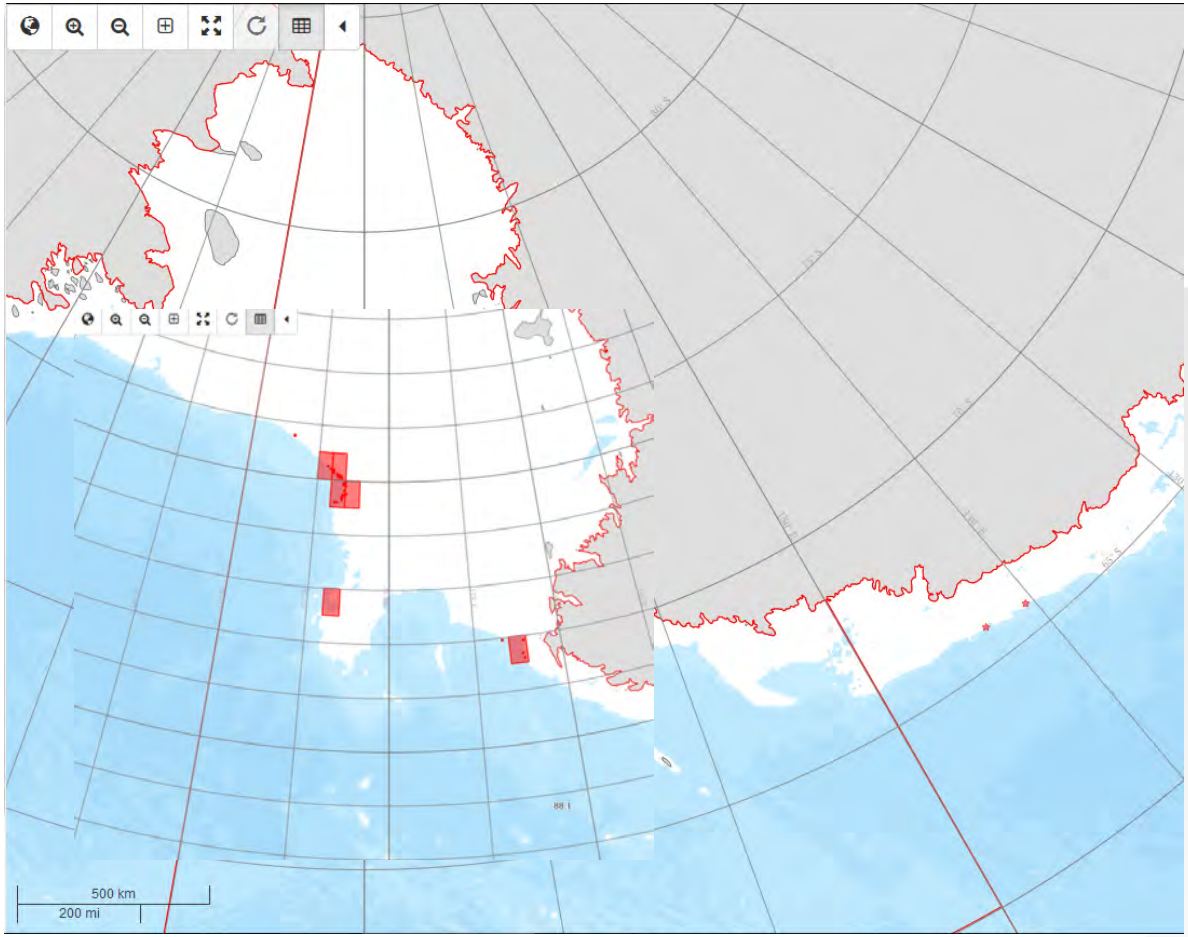
When there are five "possibles" in a single 0.5o latitude by 1o longitude rectangle the Secretariat publishes the location of that rectangle to advise that VMEs may well occur in that area.

CCAMLR VME Registry




88.1
500 km
200 mi


88.1
500 km
200 mi


500 km
200 mi

VME Encounter Protocol - the CCAMLR Experience

Definition
Sampling Units
Trigger levels
Communication
Action
Review

Not a straightforward process - operational definition of a VME is 'elusive'

Nobody would use a longline as a sampling tool for detecting VMEs

Not finding evidence for a VME on a longline ≠ no VME present

ANNEX K

Ministry for Primary Industries
Manatū Ahu Matua

Agenda item 4: Some thoughts on Protected Area Protocols (FAO)

Martin Cryer, Principal Adviser Fisheries Science, Fisheries New Zealand

SIOFA-PAEWG1, Yokohama, Japan, 18-19 March 2019

www.mpi.govt.nz

ANNEX K

Protected Area Protocols: acknowledging assistance from Masashi Kiyota

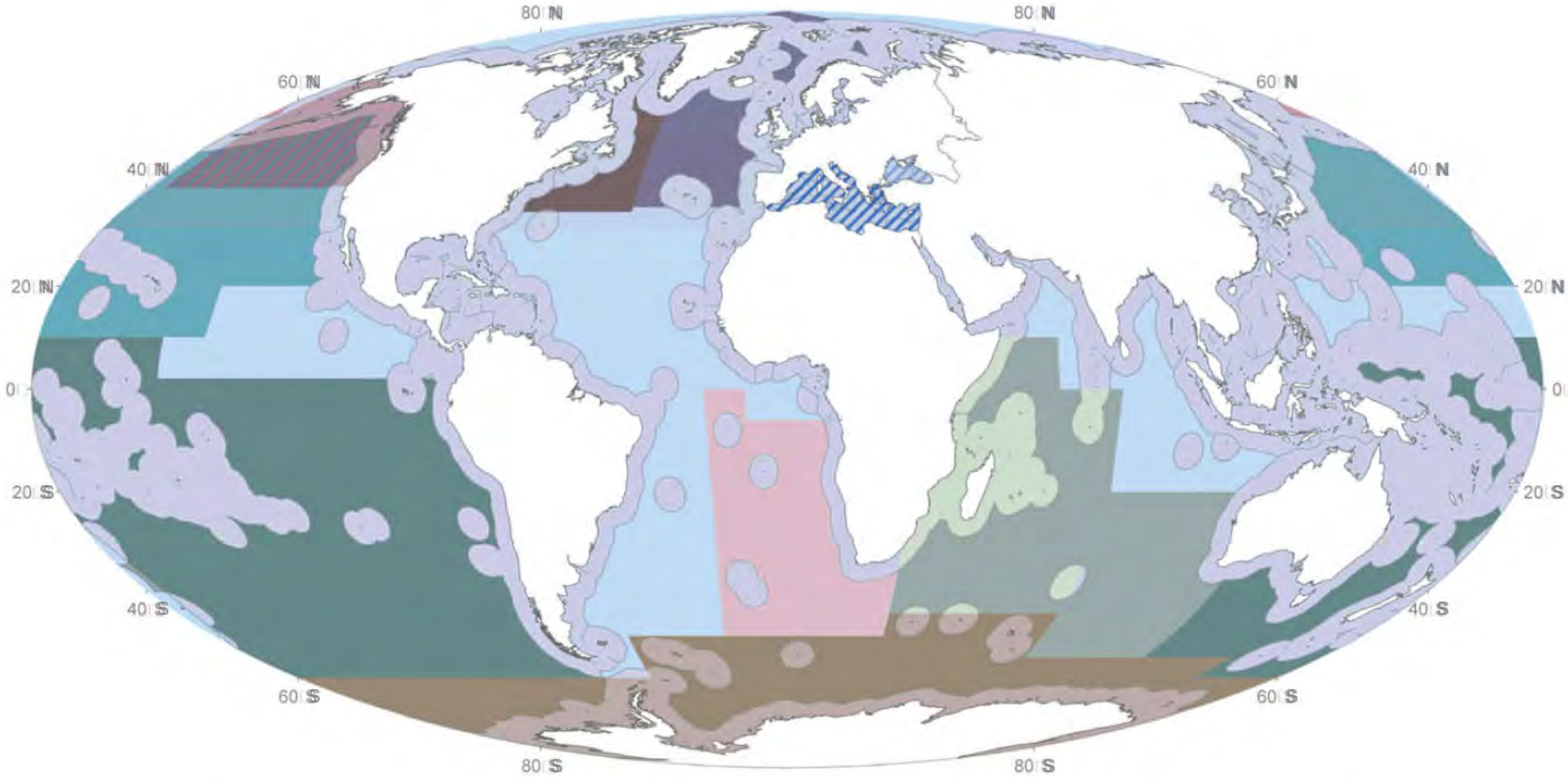
North Pacific Fisheries Commission

NPFC-2018-WS VME01-WP02

Updated summary comparison of VME encounter protocols in bottom fish RFMO/As

Masashi Kiyota
Oceanic Ecosystems Group, National Research Institute of Far Seas Fisheries
Fisheries Research and Education Agency, Japan

RFMO/As managing high seas bottom fisheries



200nm limit

Non-Tuna Regional Fisheries Management Organizations

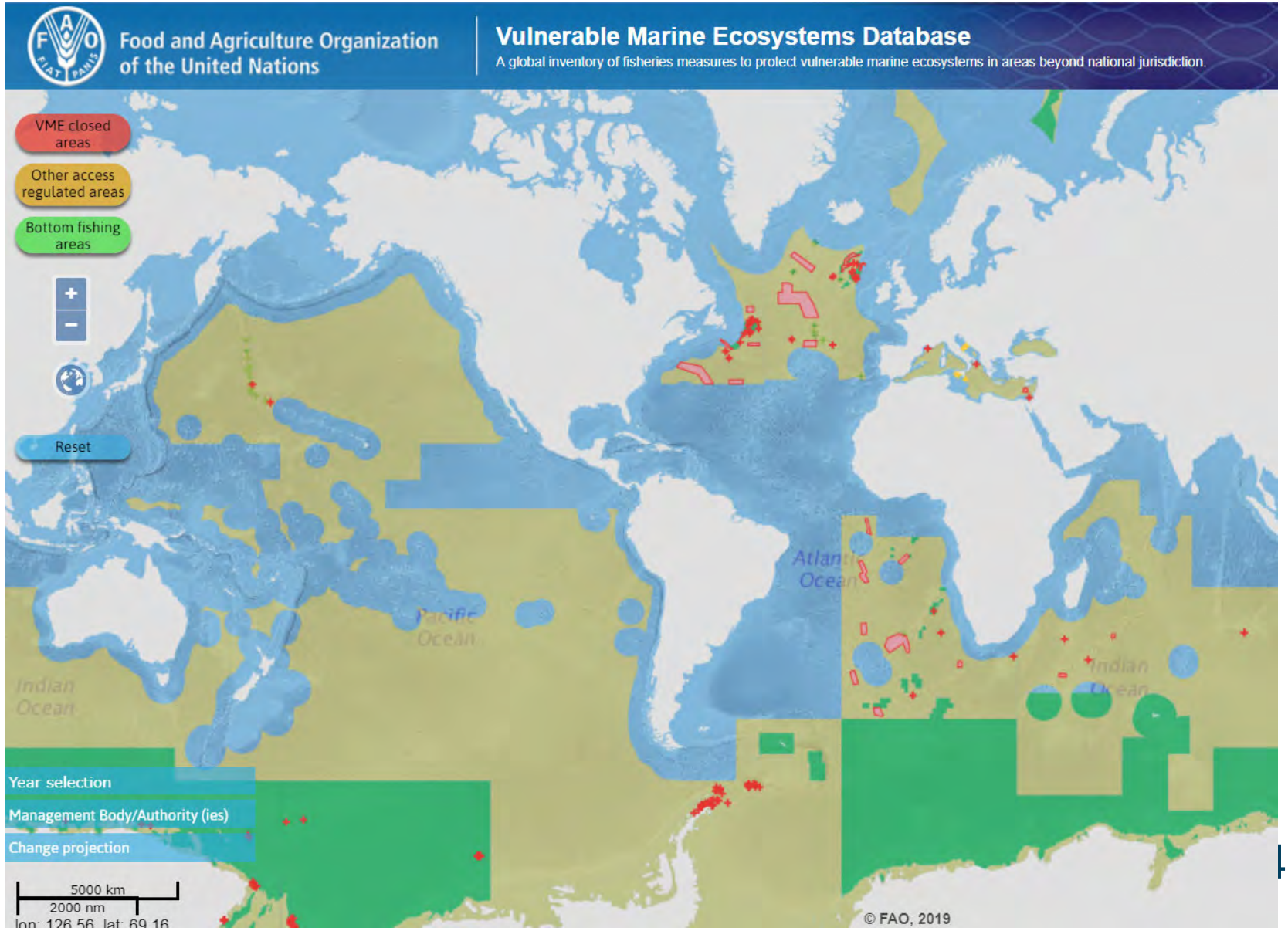
- Conv. on Cons. of Antarctic Marine Living Resources
- Conv. on Cons. & Mgmt of Pollock Resources in the Central Bering Sea
- General Fisheries Council for the Mediterranean
- International Pacific Halibut Commission
- Northwest Atlantic Fisheries Organization (NAFO)
- North East Atlantic Fisheries Commission (NEAFC)
- North Pacific Anadromous Fish Commission
- South East Atlantic Fisheries Organization (SEAFO)
- South Indian Ocean Fisheries Agreement (SIOFA)
- South Pacific Regional Fisheries Mgmt Org
- Southwest Indian Ocean Fisheries Commission

Ban et al 2014: Conservation Letters 7: 41–54

ANNEX K

FAO VME database

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

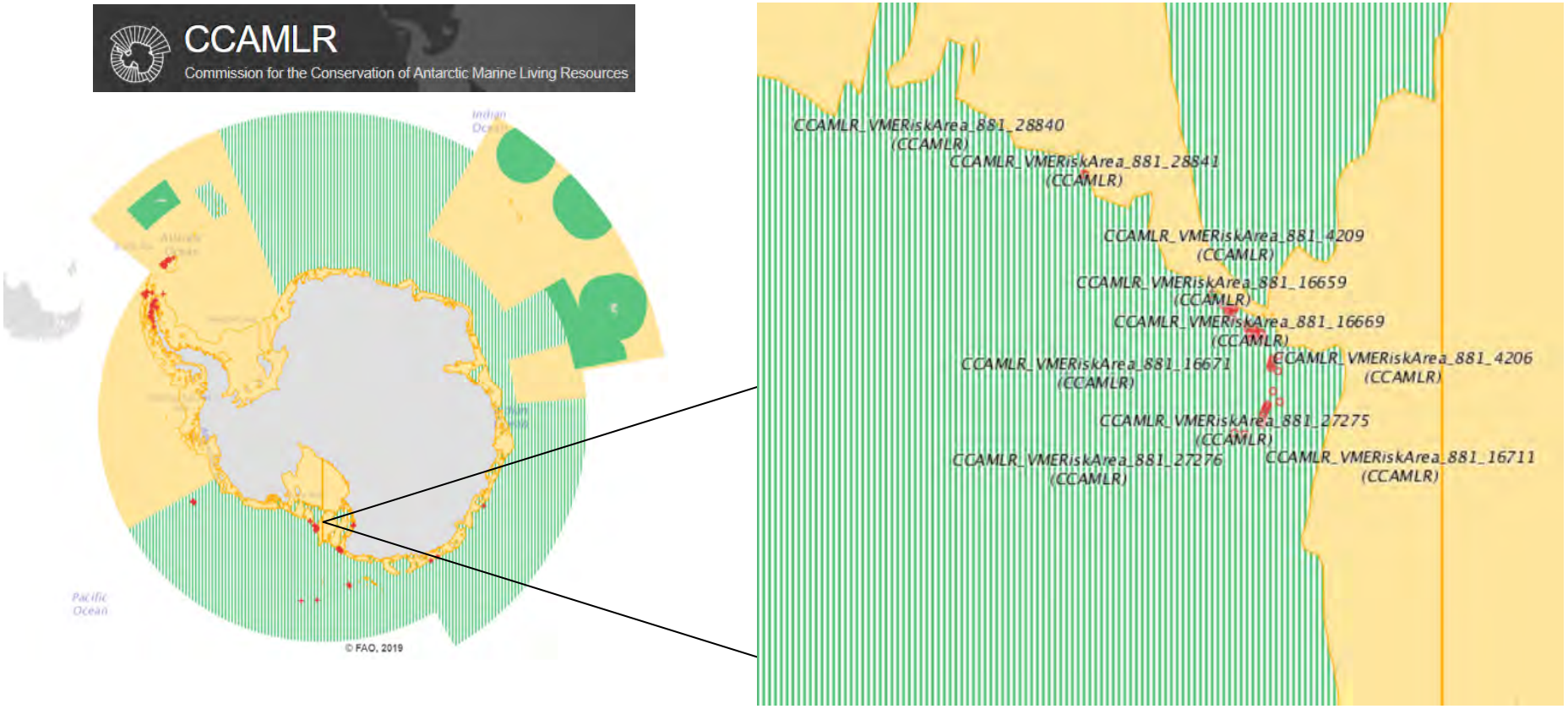


What I have here…

- CCAMLR (Antarctic)
- NAFO (NW Atlantic Ocean)
- NEAFC (NW Atlantic Ocean)
- SEAFO (SE Atlantic Ocean)
- GFCM (Mediterranean Sea)
- SPRFMO (S Pacific Ocean)
- NPFC (NW and NE Pacific Ocean)

- Key aspects for each highlighted

CCAMLR Protocols



- Closed areas and protocols specified in Conservation Measure 22/07 (2013): *encountering potential vulnerable marine ecosystems*
- Very many small Risk Areas already closed (plus MPA);

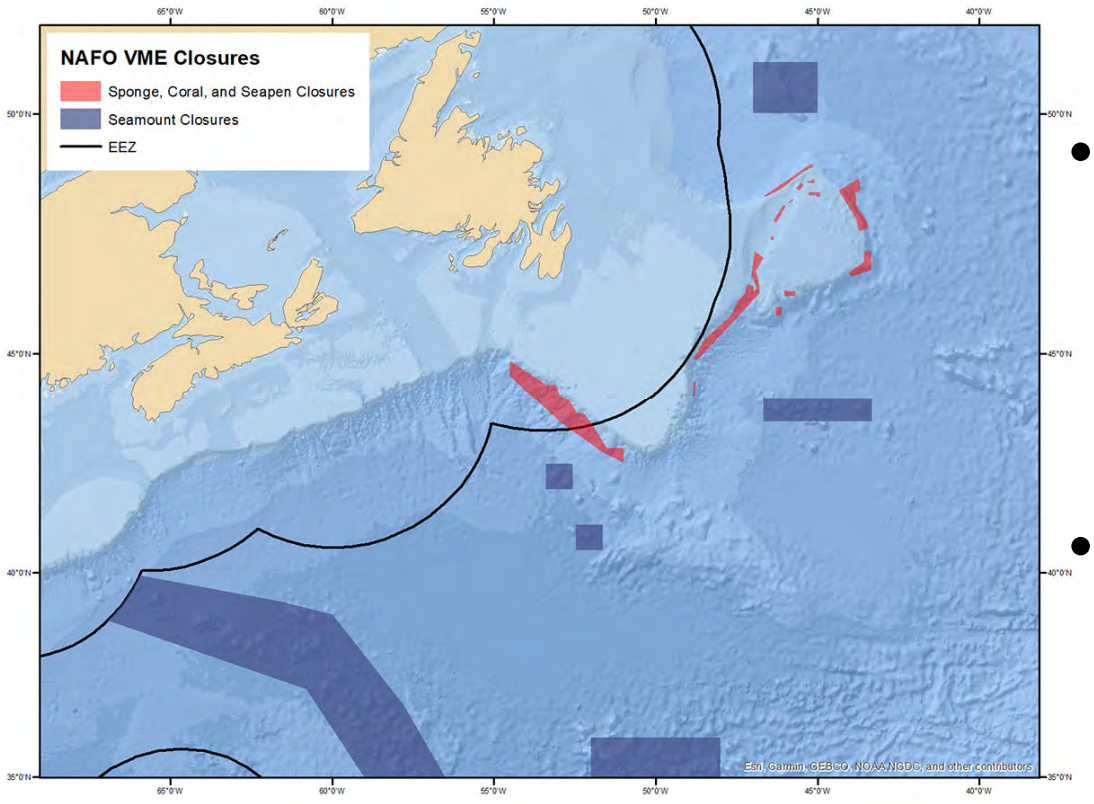
  http://www.fao.org/in-action/vulnerable-marine-ecosystems/vme-database/en/vme.html

CCAMLR Protocols
CM22-07 (2013)

Following a VME encounter:

- Master hauls lines, sets no further lines, immediately reports to the Secretariat and Flag State (Article 4);
- Secretariat notifies Risk Area (radius 1 nm from mid-point of line segment) as closed. All vessels cease setting lines that intersect with the Risk Area (Article 6-ii);
- Risk Area remains closed until reviewed by Scientific Committee and management actions are determined by Commission (Article 9);
- After 5 notifications in a VME fine-scale rectangle, Secretariat notifies the coordinates of that rectangle;
  - Fishing may continue the rectangle (Article 7);
- Registered VMEs can be permanently closed by Commission (CM22-09 (2012))

NAFO Protocols



- Many large areas already closed
- Closed areas specified in Article 17 of NAFO's Conservation & Enforcement Measures
- NAFO COM Doc. 19-01 Serial No. N6901

https://www.nafo.int/Fisheries/VME

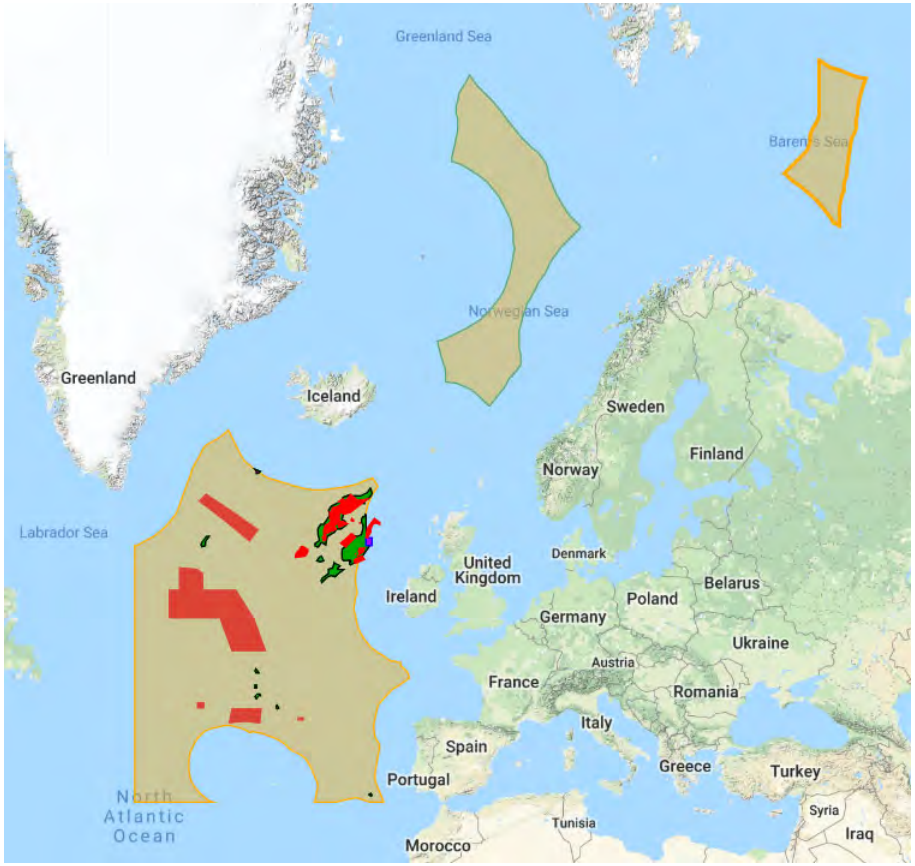
NAFO Protocols

Following a VME encounter:

- Fishing master reports the encounter, ceases fishing, moves at least 2nm from the endpoint of the tow/set;
- Executive Secretary requests all Contracting Parties to implement and maintain a temporary closure of 2 nm radius around the encounter location outside of footprint (Article 22.3, c, d);
- Executive Secretary reports annually to Scientific Council on details of all single & multiple encounters and exploratory fishing (Article 22.3, b);
- SC analyses all information and advises Commission on the need for action, using FAO guidelines as a basis (Article 22.4, a-c)

NEAFC Protocols

NORTH-EAST ATLANTIC FISHERIES COMMISSION
Managing Fisheries in the North-East Atlantic



- Many large areas already closed;
- Closed areas and protocols specified in Recommendation 19 2014: *Protection of VMEs in NEAFC Regulatory Areas* as Amended by Rec 09:2015

https://www.neafc.org/managing_fisheries/vmec

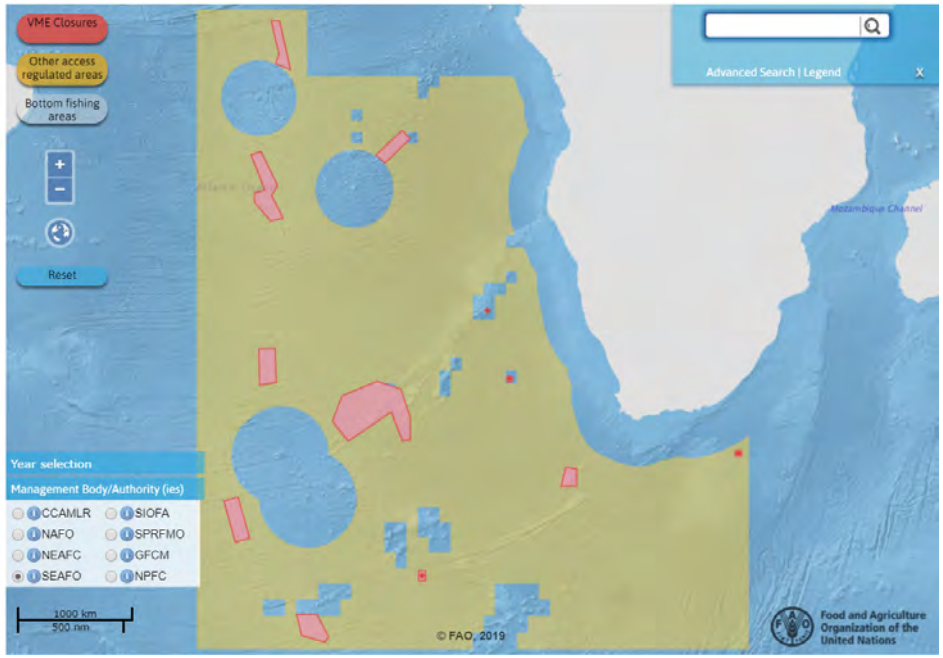
NEAFC Protocols:
Rec 19-2014 (amended by Rec 9-2015)

Following a VME encounter:

- Master ceases fishing, moves at least 2nm, reports the encounter to the Executive Secretary (Article 8.1, b-iii);
- Executive Secretary informs CPs & ICES, implements temporary closure in those areas (Article 8.2);
- Sea bed mapping using echo-sounders or multi-beam conducted and submitted to ICES (Article 8.3);
- Permanent Committee on Management and Science considers closure and any ICES advice (Article 8.4);
- If PECMAC advises likely VME, CPs requested to maintain temporary closure until Commission has acted;
- If the PECMAS concludes no VME, CPs may re-open the area to their vessels (Article 8.4)

http://extwprlegs1.fao.org/docs/pdf/mul165665.pdf

SEAFO Protocols



- Many large areas already closed;
- Closed areas and protocols specified in Conservation Measure 30/15: *Bottom Fishing Activities and Vulnerable Marine Ecosystems*

http://www.seafo.org/Management/VME-Protection

SEAFO Protocols
CM30-15

Following a VME encounter:

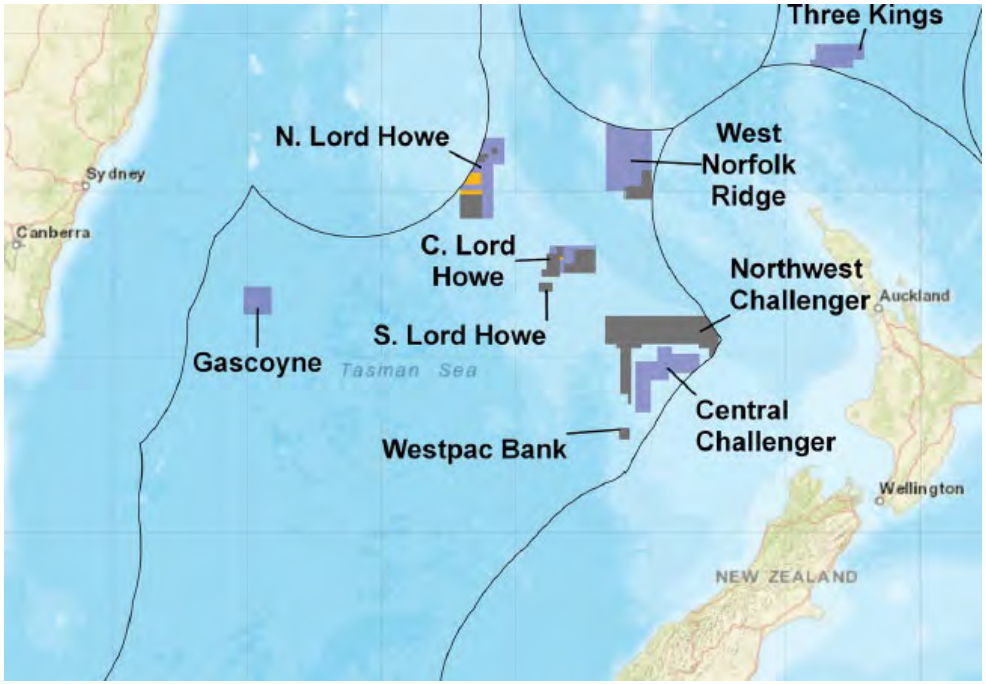
- Master ceases fishing, moves at least 2nm from end of trawl tow, defining a buffer area 2 nm radius, 1 nm for other gears (Articles 8.1 b-i and b-ii);
- Master reports to CP, Executive Secretary (Article 8.1, b-iii);
- Executive Secretary implements temporary closure if outside existing fishing areas (Article 8.2);
- Sea bed mapping using echo-sounders or multi-beam conducted, submitted to Scientific Committee (Article 8.3);
- SC evaluates mapping and advises Commission (Article 8.4);
- SC examines temporary closure: if sufficient evidence of VME, CPs maintain closure until Commission has acted;
- If insufficient evidence of VME, CPs may re-open the area to their vessels.

GFCM Protocols

- Some areas already closed;
- Fishing deeper than 1000 m prohibited by GFCM/2005/1;
- Area closures specified in GFCM/30/2006/3;
- No specified protocols?

https://gfcm.sharepoint.com/CoC/Decisions%20Texts/REC.CM_GFCM_30_2006_3-e.pdf

SPRFMO Protocols



- Bottom fishing restricted to method-specific bottom fishing management areas;
- All other areas closed to bottom fishing;
- Management areas carefully designed to provide very high protection for VMEs <u>at a regional scale</u>
- Closed areas and protocols specified in CMM-03-2019: *Bottom Fishing*

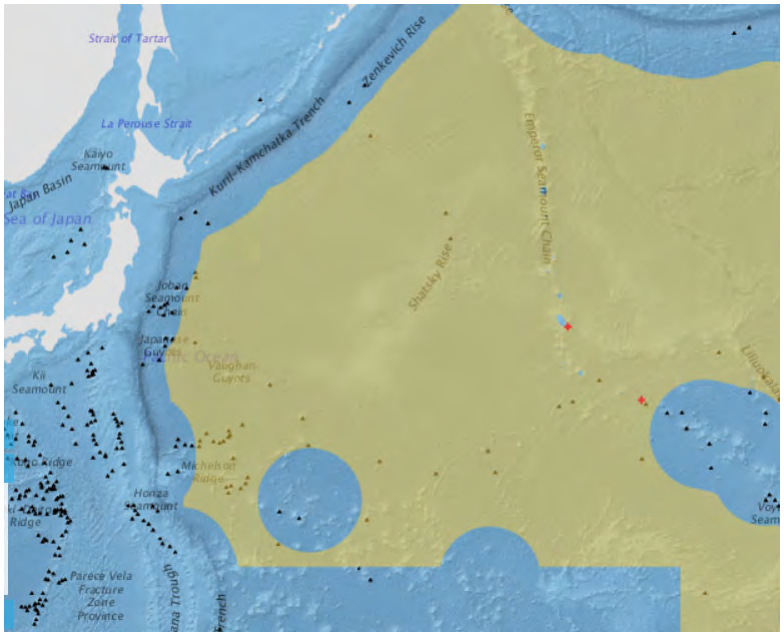
http://www.sprfmo.int/assets/Fisheries/Conservation-and-Management-Measures/2019-CMMs/CMM-03-2019-5Mar2019.pdf

SPRFMO Protocols

Following a VME encounter:

- Master ceases fishing within 1 nm of trawl track (Article 28a);
- Reports to Member and Secretariat in accordance with specified guidelines (Article 28b, Annex 7);
- Secretariat suspends fishing in encounter area, notifies Members (Article 30);
- Member submits to Scientific Committee a detailed comparison of the encounter with model predictions, and suggested actions to prevent SAIs on VMEs (Article 32);
- SC reviews all encounters and determines whether any were unexpected based on VME habitat suitability models, and advises Commission (Article 33);
- Commission determines management actions for each encounter area (Article 34).

NPFC Protocols



- Some areas already closed;
- Closed areas and protocols specified in Conservation & Management Measures for bottom fisheries: CMM2018-05 (NW Pacific), CMM2017-06 (NE Pacific), (including Annex 2 of both)

https://www.npfc.int/active-conservation-and-management-measures

NPFC Protocols:
CMM2018-05 (NW Pacific), CMM2017-06 (NE Pacific), Annex 2

Following a VME encounter:

- Master ceases bottom fishing and moves no less than 2 nm, so that additional encounters with VMEs unlikely;
- All encounters reported to the Secretariat, who notifies other Members so that appropriate measures can be adopted (Article 4G of CMM2018-05 and 3j of CMM2017-06);
- Subsequent protocols via assessment of SAIs on VMEs…

NPFC Protocols:
CMM2018-05 (NW Pacific), CMM2017-06 (NE Pacific), Annex 2

5. Assessment of SAIs on VMEs or marine species

5. Each member … is to conduct assessments to establish if bottom fishing activities are likely to produce SAIs in … VMEs. Such an impact assessment is to address …
6. Impact assessments are to consider … the information in these Standards & Criteria, relevant information from similar … fisheries, ecosystems;
7. Where an assessment concludes that the area does not contain VMEs or SAIs are not likely, assessments are to be repeated when there have been significant changes to fishery, other activities or natural processes

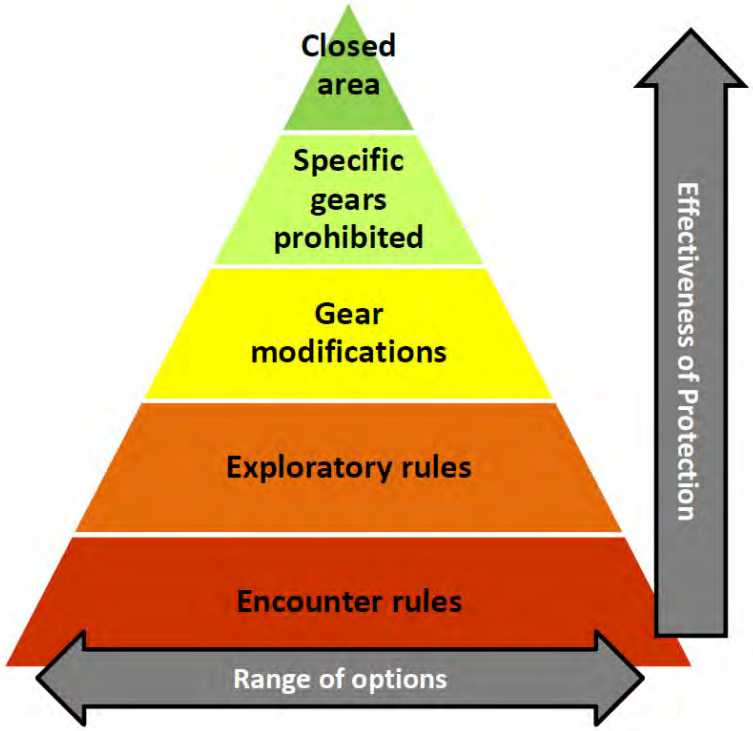
6. Proposed CMMs to prevent SAIs

As a result of the assessment in 5, if it is considered that fishing is likely to cause SAIs on VMEs or marine species, the member … is to adopt CMMs to prevent SAIs. The member … is to clearly indicate how such impacts are expected to be prevented or mitigated by the measures.

What's "missing" here?

- Published protocols are nearly all "reactive" to encounters by fishing vessels;
- But most RFMO/As have large VME closures based on (e.g.) surveys, features, precaution;
- Few formal protocols on how to designate such areas;
- Some guidance on information requirements contained in BFIAs (SPRFMO, SIOFA) or in scientific standards & criteria (NPFC);
- I suggest closures generally based on proposals and papers to SC or equivalent bodies who advise their Commissions?

Hot off the press…



https://publications.europa.eu/en/publication-detail/-/publication/0f2b559b-4610-11e9-a8ed-01aa75ed71a1/language-en

European Commission

Specific Contract No. 8

FRAMEWORK CONTRACT

EASME/EMFF/2016/008

Scientific Approaches for the Assessment and Management of Deep-Sea Fisheries and Ecosystems in RFMOs and RFBs

FINAL REPORT

Cefas azti tecnalia MRAG ipma

November – 2018

Acknowledgments

- To FAO for their invitation and support of this workshop;
- To Masashi Kiyota for access to his excellent summary;
- To National Research Institute of Fisheries Science and SIOFA for hosting

ANNEX L

Fisheries New Zealand
Tini a Tangaroa

Fisheries New Zealand Maori Crest.png

Ministry for Primary Industries
Manatū Ahu Matua

Selection of protected areas: SPRFMO's approach

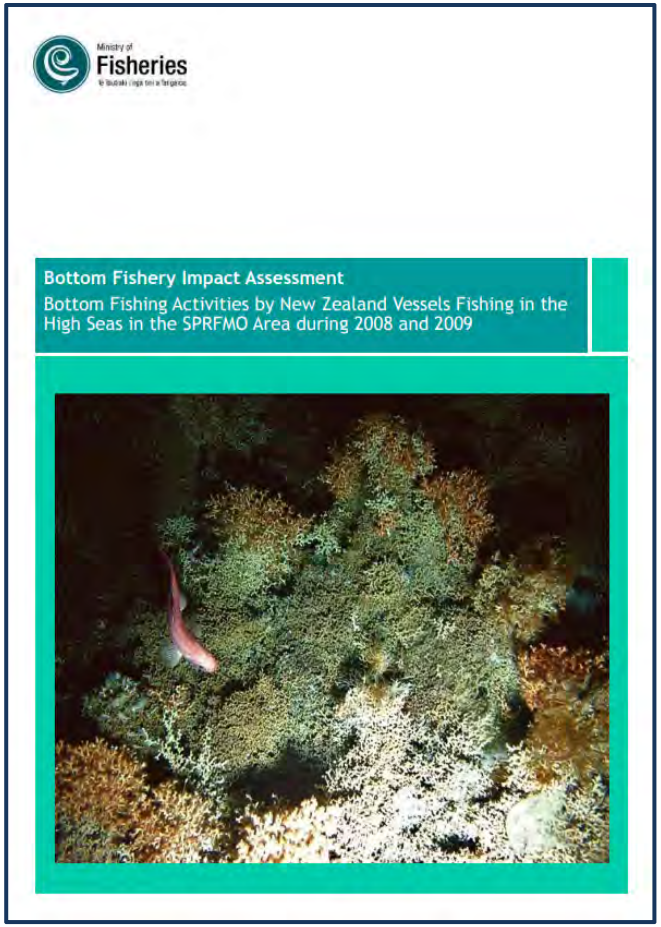
Martin Cryer, Ashley Rowden, Carolyn Lundquist, Tiffany Bock, Shane Geange, Lee Georgeson, Simon Nicol

SIOFA-PAEWG, 18-19 March 2019

www.mpi.govt.nz

Management measures for bottom fisheries

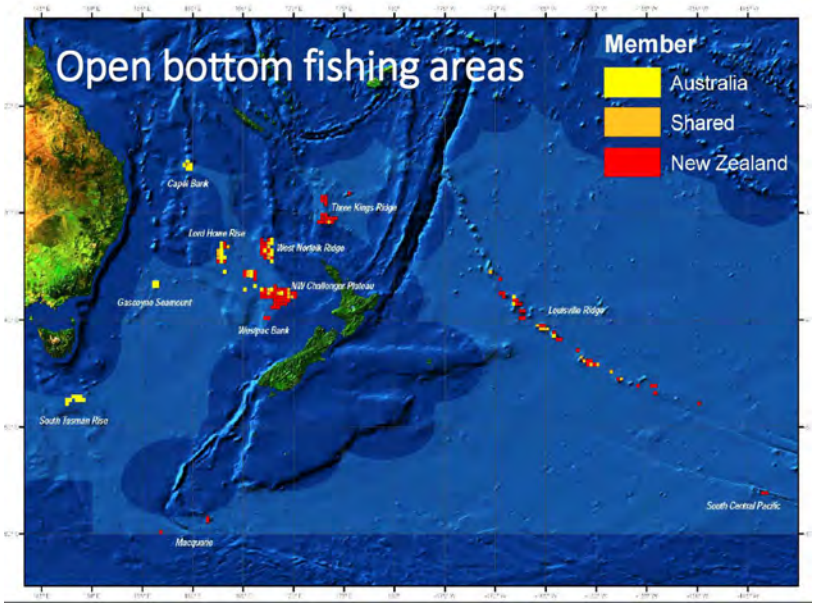
- Starting with Interim Measures in 2007:
- Reference period 2002–2006
- Members not to exceed average catch in reference years
- Members not to fish outside their footprint in reference years
- Members to implement measures to avoid significant adverse impacts (SAIs) on vulnerable marine ecosystems (VMEs)
- Fishing allowed only after footprint advised and Bottom Fishery Impact Assessment provided
- So far, only Australia and New Zealand have completed these steps



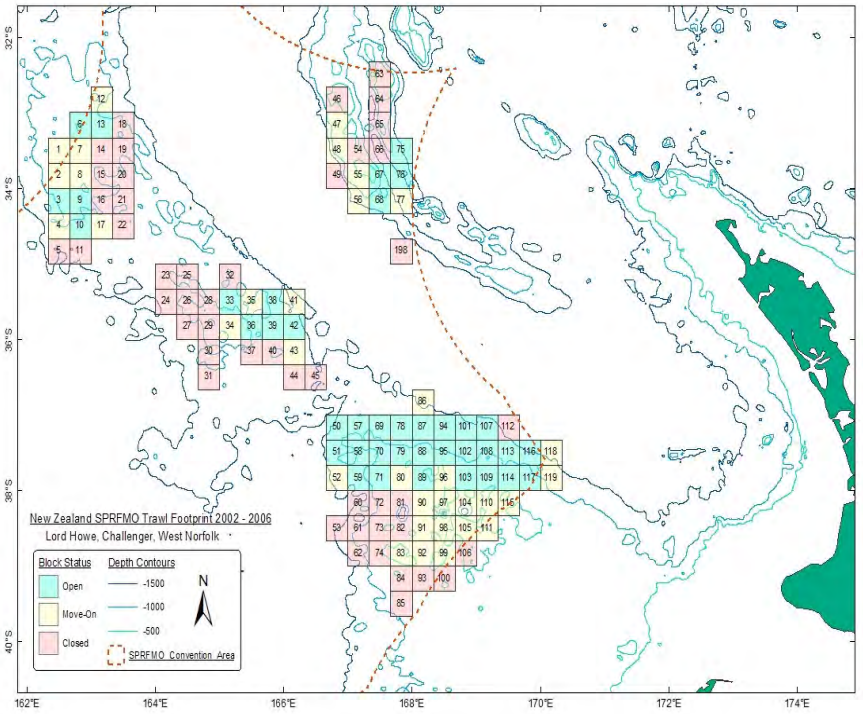
https://www.sprfmo.int/assets/Meetings/Meetings-before-2013/Scientific-Working-Group/SWG-06-2008/a-Miscellaneous-Documents/New-Zealand-Bottom-Fishery-Impact-Assessment-v1.3-2009-05-13.pdf

Complexity of the interim management measures: the need for a new approach

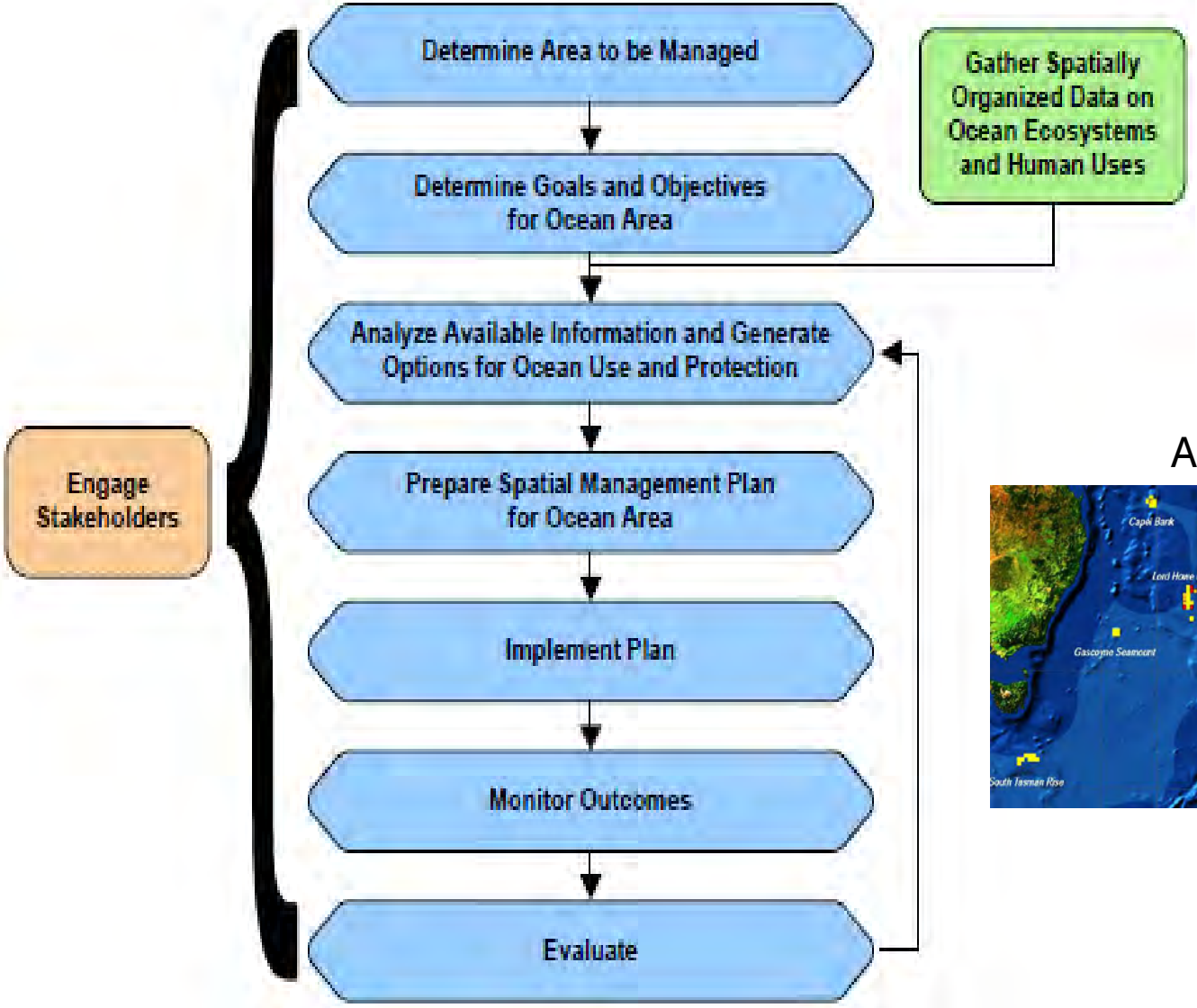
- Australian and New Zealand interim measures had different:
  - Catch limitation approaches
  - Spatial footprints
  - VME trigger levels
  - Move-on arrangements



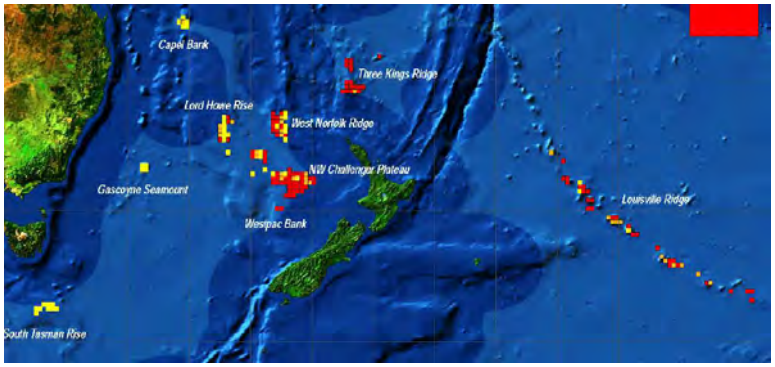
New Zealand's stratified spatial measures



Generic spatial management planning process



Area to be managed



Who needs to be involved?

Important to determine stakeholders so we can identify all relevant objectives:

- Fishing industry, participating or intending companies, both Australian and New Zealand, representative bodies, etc;
- Environmental organisations, national and international, DSCC, ECO, Pew, etc;
- Management agencies and those who will have to implement measures (MPI, AFMA, SPRFMO);
- Various other interested parties (MFAT, DOC, ABARES, NOAA, GOBI/CBD, SPC, …)

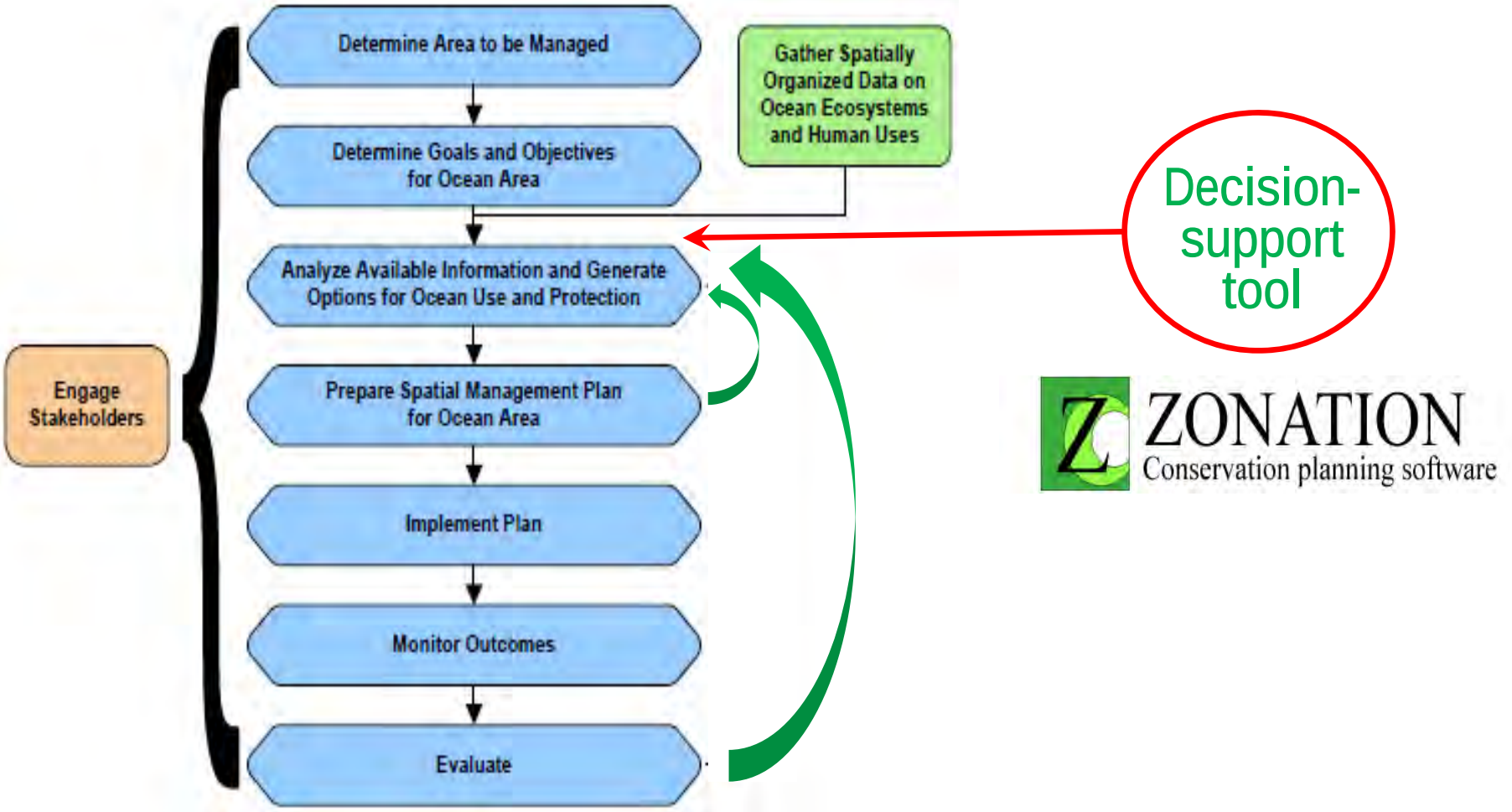
Objectives for spatial management planning

Important because they drive the decision-support tools and metrics to be calculated: need to be clear what stakeholders wish to achieve:

Abbreviated objectives for SPRFMO work:

- Access to as much economically productive fishing ground as possible;
- Provide a management approach that industry can confidently promote as sustainable;
- UNGA resolutions and Conventions implemented, including closing areas to trawling where VMEs likely to occur (unless managed to avoid SAIs);
- Impacts on VMEs to be minimised;
- Management measures that are easily-understood, practical, enforceable, and without un-necessary complexity and cost;
- Noting constraints of the legal and policy framework.

How do spatial decision-support tools fit in?



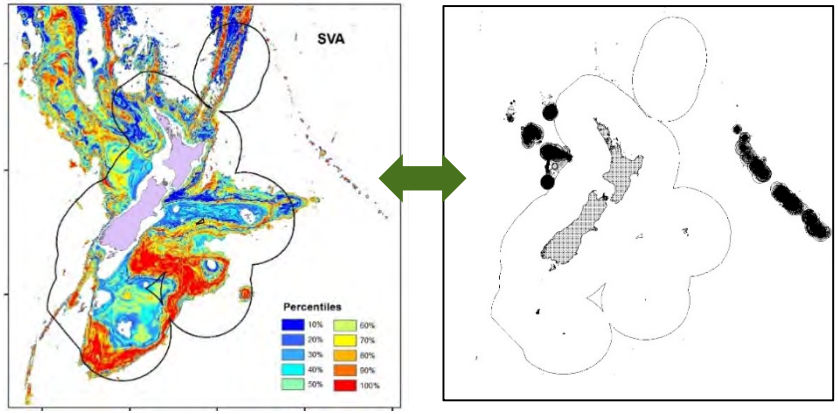
Spatial Management Planning process

Decision support tool: key concepts

Tool for bringing all information together in objective analyses of how choices influence outcomes

VME value:

- Habitat suitability models for 10 VME indicator taxa (weighting corals)
- Model uncertainty
- Naturalness (based on fishing effort)



Value to fishing:

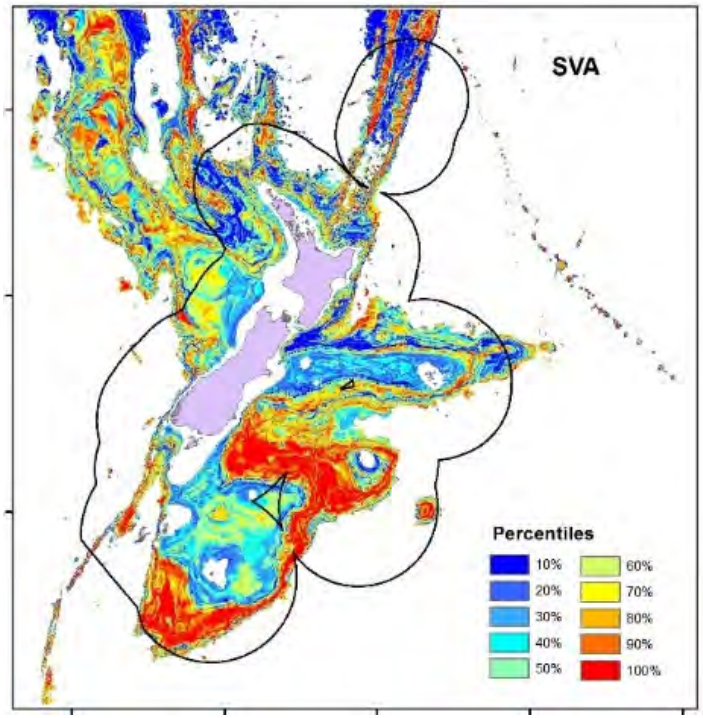
- Catch data for two fishing methods, four time periods
- Can consider different industry value metrics
- Practicalities

- But (NB!) application is not straightforward or "robotic"
- Outputs explicitly portray trade-offs inherent in any candidate spatial regime for stakeholders' stated objectives
- Recall that stated objectives reflect very different viewpoints!

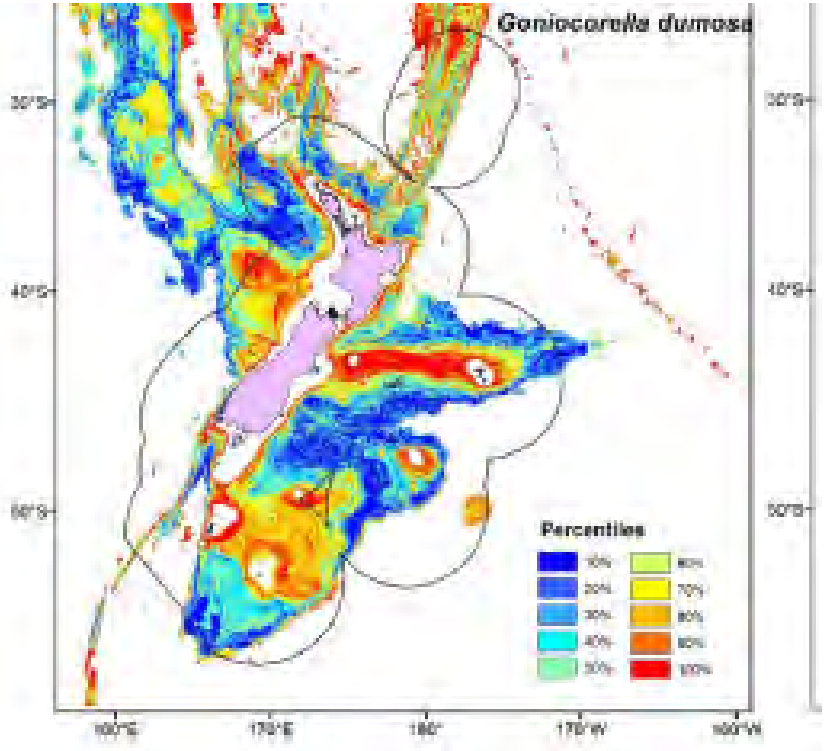
Which biodiversity features to include?

- Choice and weighting of biodiversity datasets to represent multiple objectives of the stakeholder process
- Vulnerable Marine Ecosystems using predictive habitat suitability layers

Solenosmilia variabilis

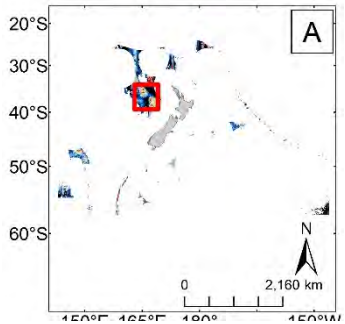


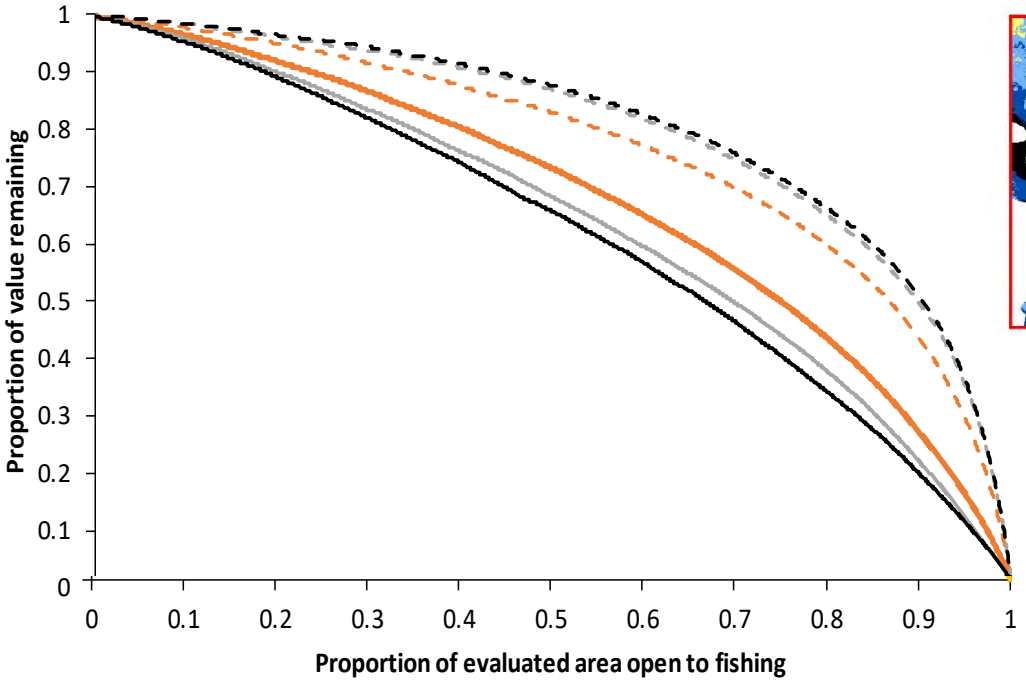
Goniocorella dumoas

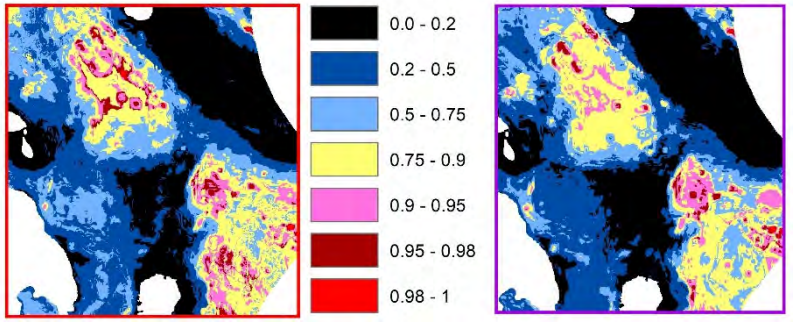


Impact of playing with weights

- **Curves for stony corals (dashed) and other VME taxa (line)**
- **Equal weighting (orange)**
- **Stony corals 3 x's other VME taxa (grey)**
- **Stony corals 5 x's other VME taxa (black)**



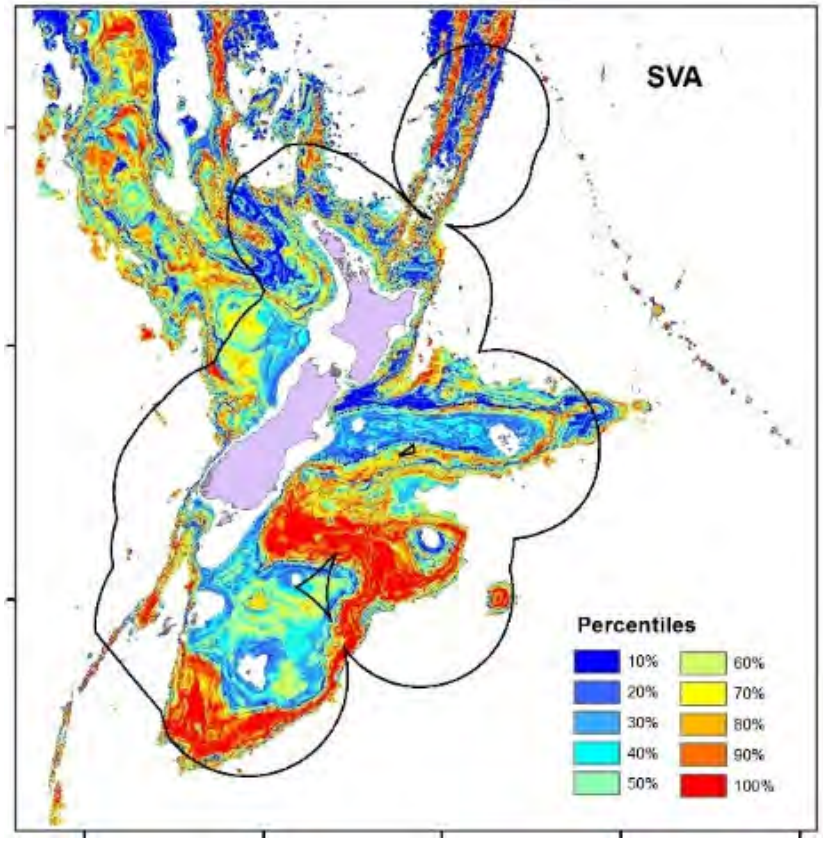




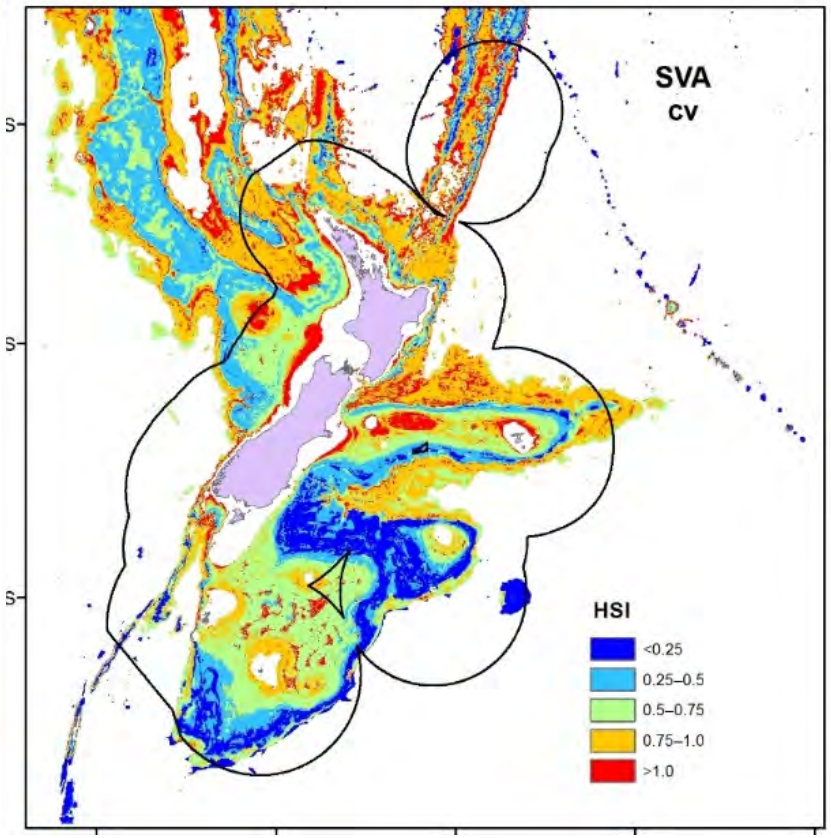
Only relatively small, localized differences in the distribution of prioritization values

Can also include uncertainty in habitat suitability model predictions

Solenosmilia variabilis



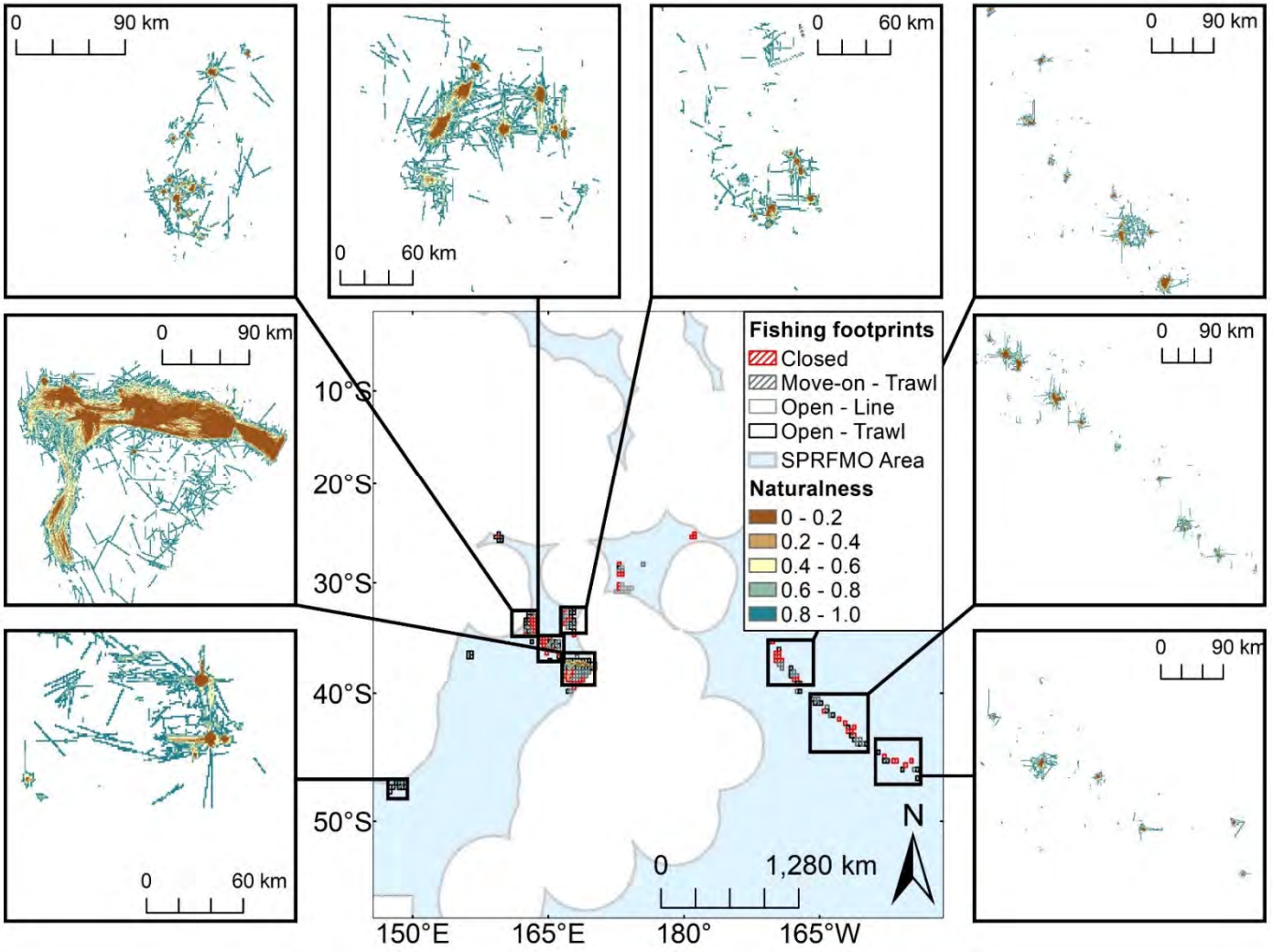
Habitat Suitability Layer



Uncertainty Layer

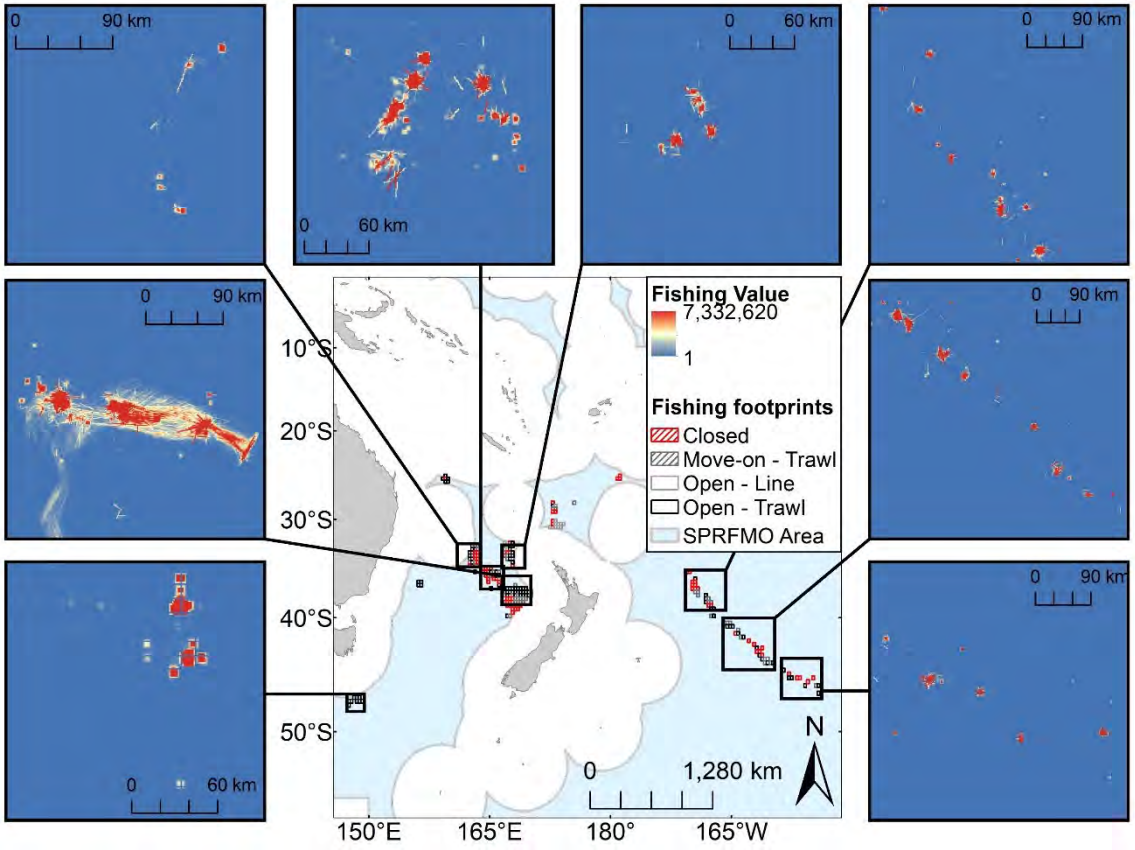
Layer for estimated naturalness was included

- **0 = all local conservation value has been lost**
- **1 = habitat remains locally in “pristine state”**



Industry supplied a layer to indicate value to fishery

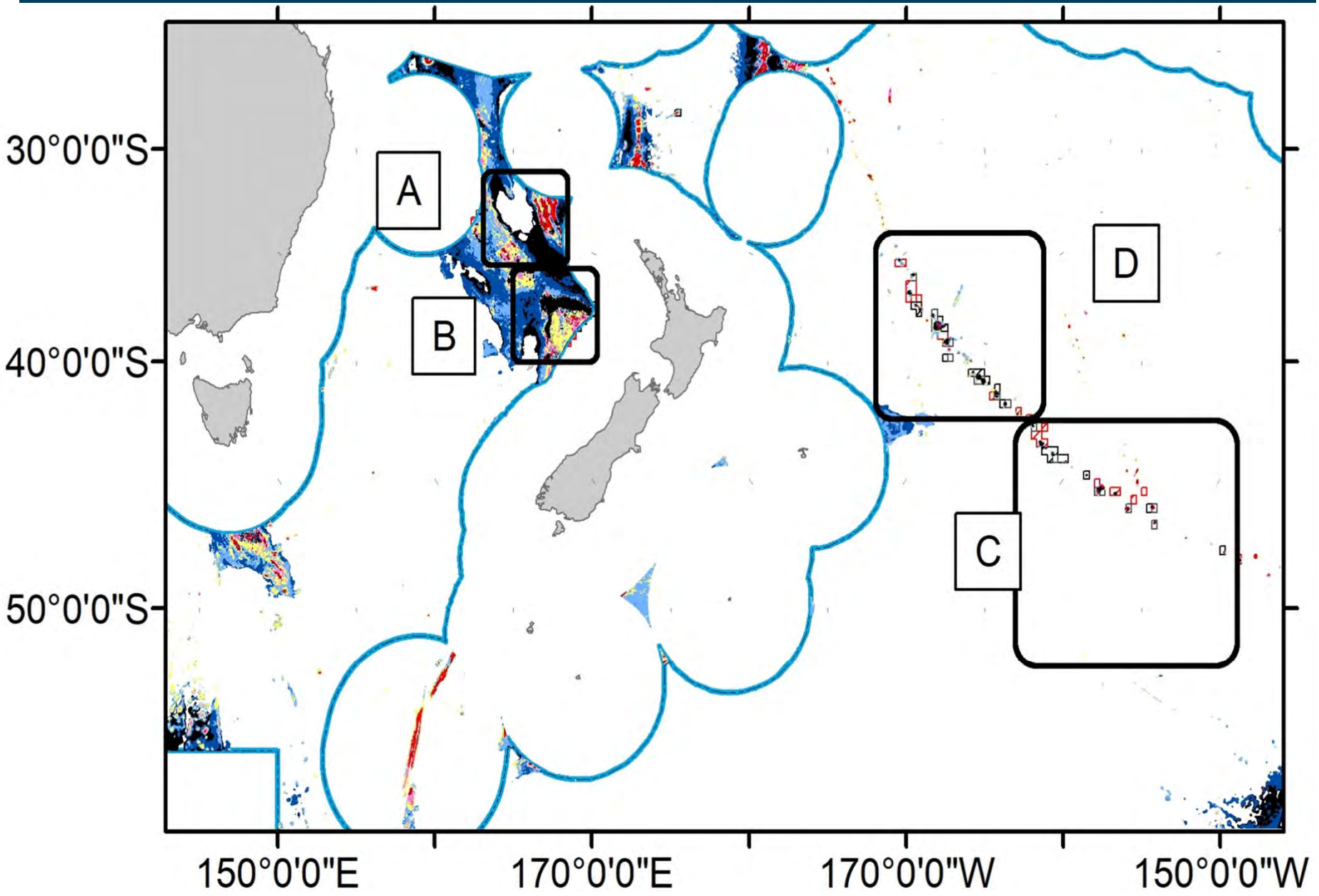
- **Accumulated value to the fishery as a cost layer (Cordue, unpublished) (multiple iterations)**
- **layers included a 'buffer zone' to allow for logistics of deploying gear**
- **NB: Naturalness ≠ cost layer**



Tag team…

ANNEX L

How do we get from this map to open/closed areas?



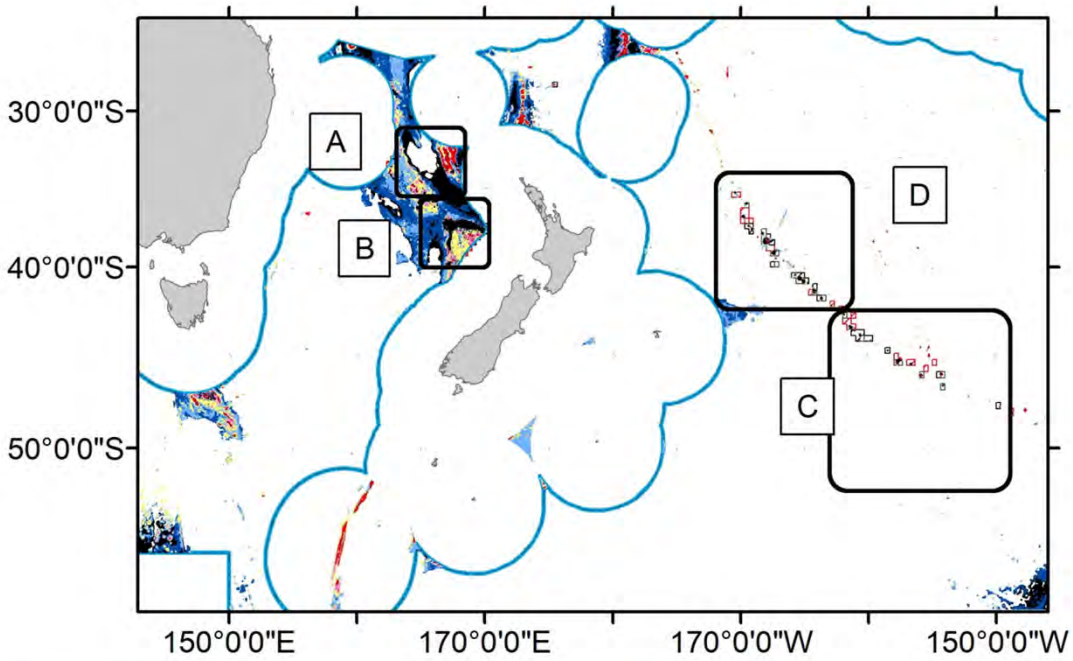
ANNEX L

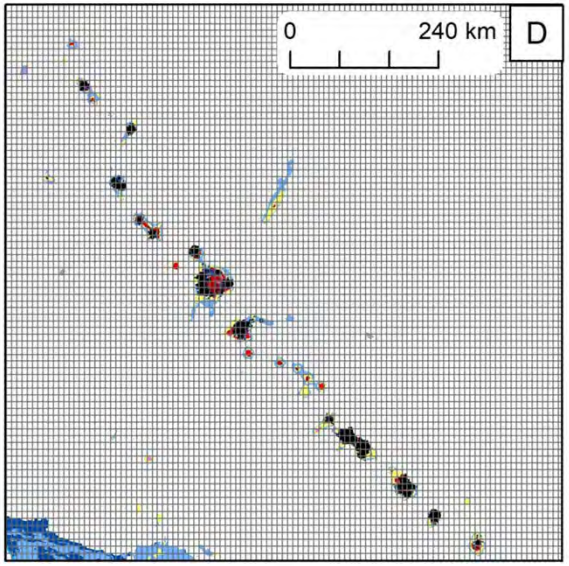
Stakeholder / technical engagement meetings

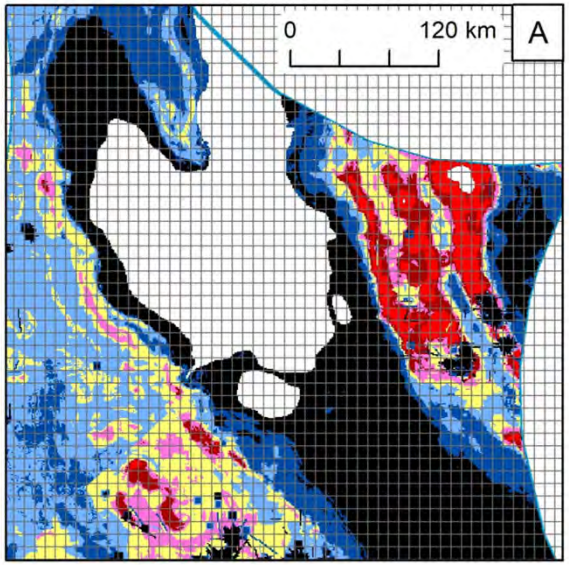
	VME project	SPACWG	Specific engagement	SPRFMO meetings
Pre-2014	SAG x 2	–	–	SWG/SC x 12
2014 Qtr 1				
2014 Qtr 2	SAG3			
2014 Qtr 3		SPACWG x 4		
2014 Qtr 4				SC-02
2015 Qtr 1	SAG4			Comm-03
2015 Qtr 2				
2015 Qtr 3		SPACWG x 3		
2015 Qtr 4				SC-03
2016 Qtr 1	SAG5			Comm-04
2016 Qtr 2				
2016 Qtr 3		SPACWG x 2		
2016 Qtr 4				SC-04
2017 Qtr 1	SAG6	SPACWG x 1		Comm-05
2017 Qtr 2		SPACWG x 1	SCW-03	
2017 Qtr 3		SPACWG x 2	Workshop x 4	
2017 Qtr 4			Consultation x 2	SC-05
2018 Qtr 1				Comm-06
2018 Qtr 2		SPACWG x 2		
2018 Qtr 3		SPACWG x 3	Workshop x 2	
2018 Qtr 4			Consultation x 2	SC-06
2019 Qtr 1				Comm-07

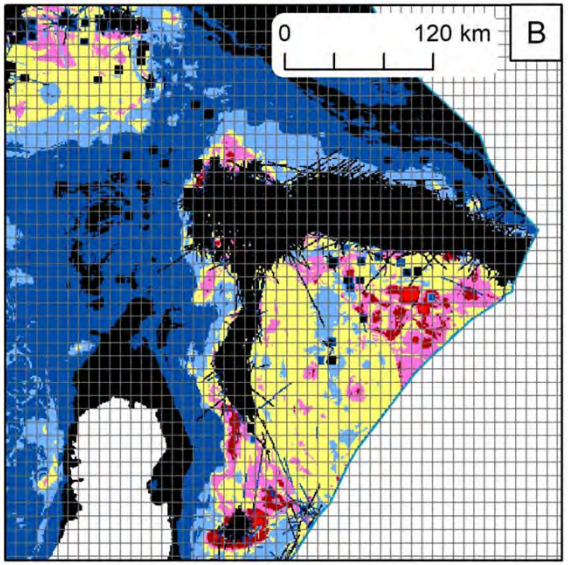
Designing spatial management areas: Officials' first stab at a spatial management proposal, 9 November 2017

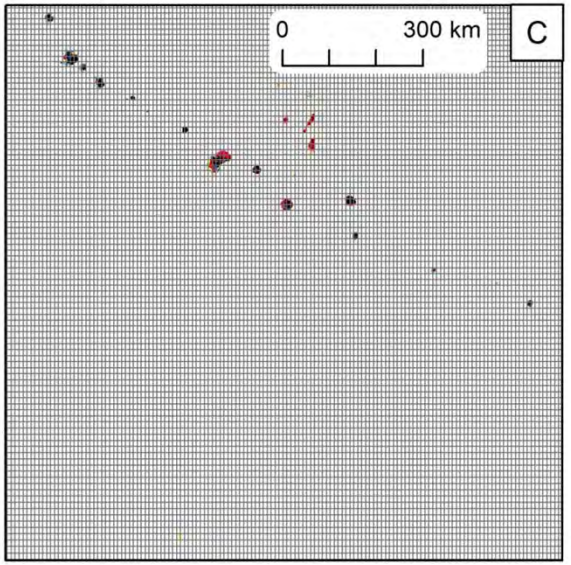
- Officials took *Zonation* output and stakeholder feedback from all those workshops and meetings;
- Developed candidate spatial management areas for final discussions with stakeholders:
  - Automated GIS search for 6-minute cells of lowest VME value to open for fishing;
  - Automated GIS search for 6-minute cells of highest fishing value to open for fishing;
  - Merge these two GIS searches;
  - Officials "nuance" boundaries targeting:
  - VME protection; fishing grounds; simple boundaries;
- Candidate areas taken to more workshops...





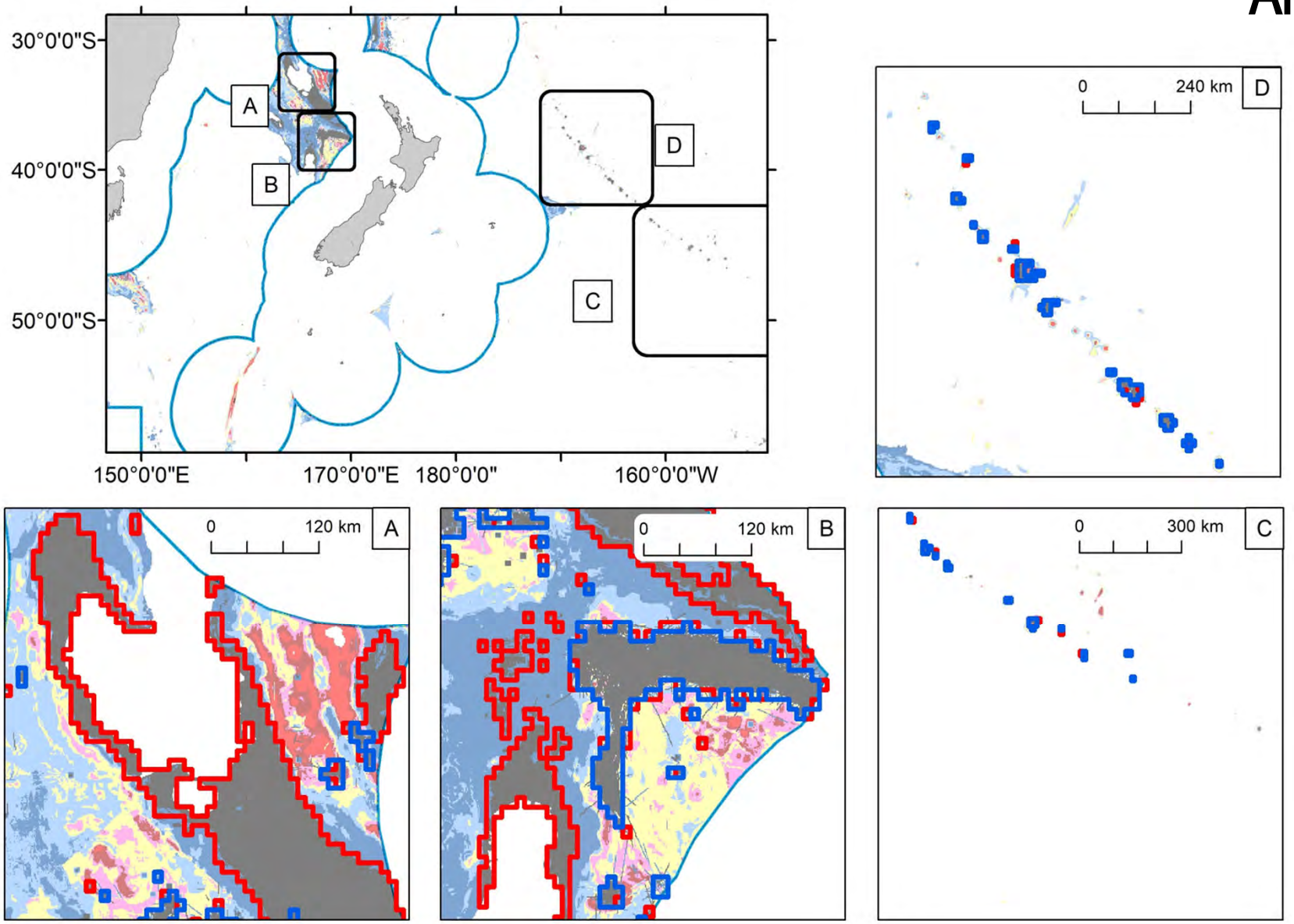






Create 6 m.o.a. grid

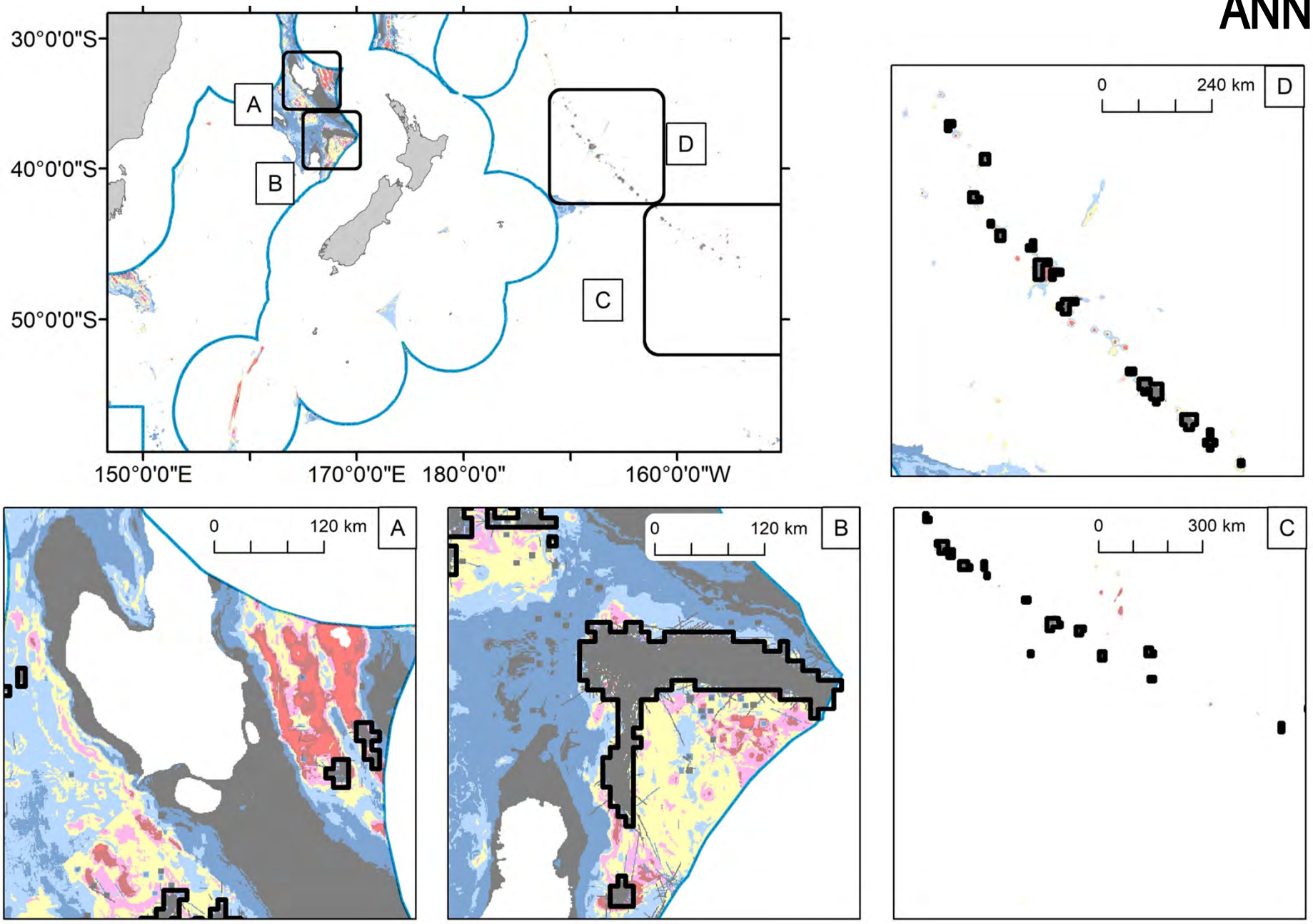
ANNEX L



GIS searches for "good" cells to include

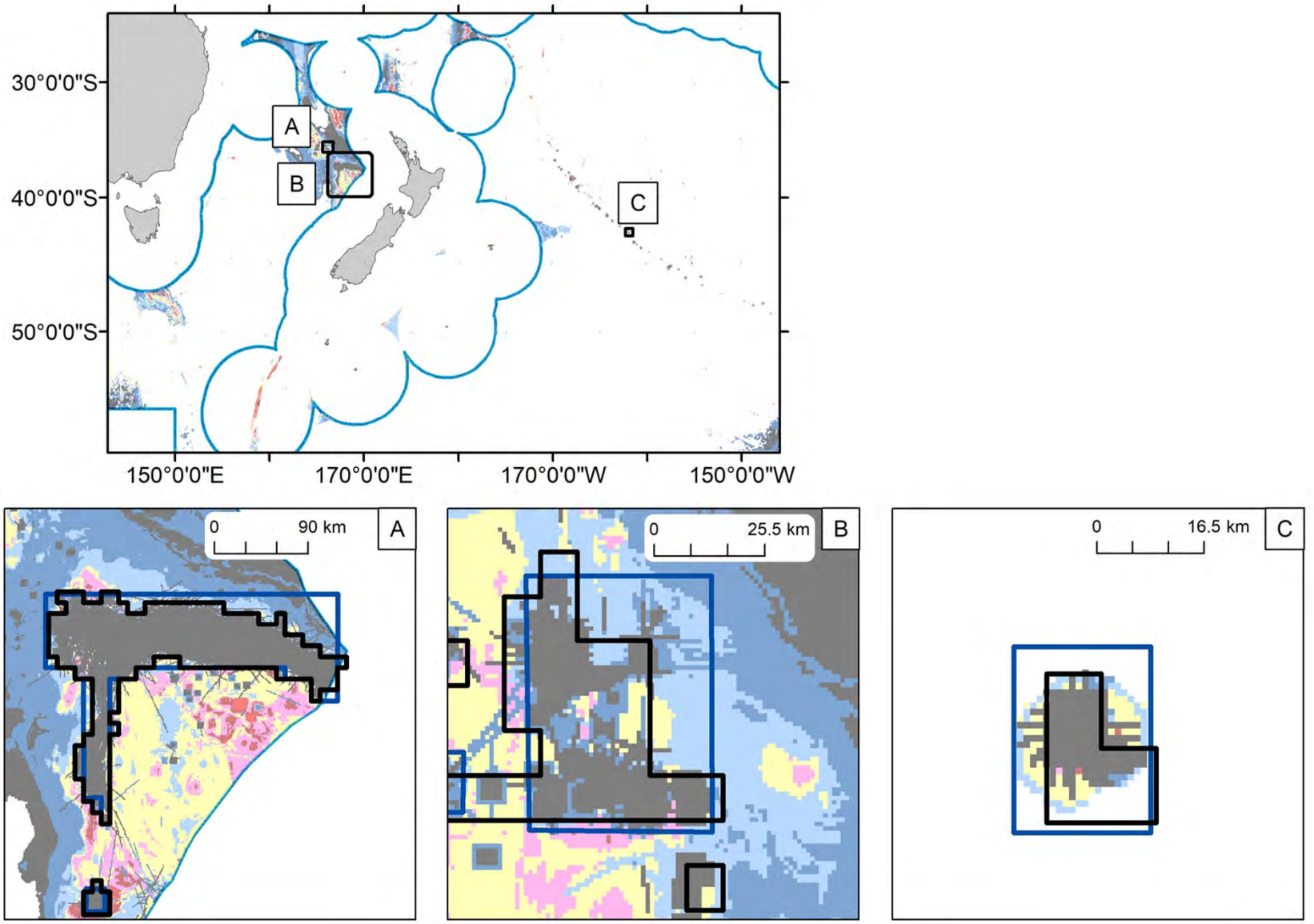
Blue = high interest to industry, red = low biodiversity-VME loss

ANNEX L



Intersection of GIS searches >>>> computer's first cut

ANNEX L



"Nuancing" of boundaries (by officials…)

Final development of candidate spatial management areas: near-final consultation

- "Final" stakeholder workshop to view/discuss:
  - Morning: development and discussion of proto-candidate spatial management areas;
  - Afternoon: draft measure including all aspects of management of bottom fishing;
  - On reflection, ~~probably~~ way too rushed!
- Shapefiles distributed to stakeholders for any further thoughts;
- Officials make final adjustments in response to feedback on 29-Nov-2017;
- Spatial management areas included in bottom fishing measure submitted to SPRFMO…

Gains to be made using decision-support tools: moving from interim 20 m.o.a. blocks to "designed" spatial management areas (29 November 2017 iteration)

Location	Percent of fishing industry value layer unavailable ("cost")		Overall percent of VME habitat protected	
	Existing	Proposed	Existing	Proposed
Overall	8.7	7.9	65.4	84.1
Tasman Sea	10.9	2.9	61.0	86.5
Louisville	6.3	12.7	56.2	74.4
Other areas	95.8	100.0	86.2	100.0

Development of candidate spatial management areas: “final” outcome in 2019

- Draft bottom fishing measure submitted to SPRFMO late 2017 as a joint Australia – New Zealand proposal;
- Australia – New Zealand negotiations continued on details;
- Agreement on some aspects not possible in available time (catch allocation);
- Draft measure converted to an information paper for SPRFMO Commission to show progress;
- New measures not adopted in February 2018 ☹
- Following several more workshops and consultations, slightly modified measures adopted in January 2019 ☺

Take-home lessons from SPRFMO experience

- Science not easy – tricky and expensive, sparse data, modelling still developing;
- Spatial decision-support tools (e.g., *Zonation*) useful for explicitly weighing up different / opposing objectives;
- NOT robotic, lots of calls to be made and lots of levers and dials to play with;
- It takes a long time to get the confidence and buy-in of stakeholders in the software and process;
- Need multiple discussions, workshops, consultation as well as technical forums
- Complete agreement is unlikely but trade-offs are made explicit

Designing spatial management areas (where fishing is allowed): Officials' first stab at it, 9 November 2017

Key data layers on-screen in GIS:

- Zonation prioritisation map (colours black through yellow to red)
- Fishing tows and value (not shown)

Automated GIS outputs:

- All 6-moa blocks where >30% of 1km cells had a low VME priority value (solid pale blue)
- All 6-moa blocks where >50% of 1km cells had a fishery value higher than 1% of its maximum (hatched)

Product (pale blue backgrounded):

- Orthogonal boundaries "nuanced" to:
  - Maximise VME protection;
  - Maximise access to catch and ability to tow (including shooting);
  - Simplify overall boundaries.

Challenger Plateau
(Tasman Sea)