Vulnerable Marine Ecosystems

–

Global overview to Indian Ocean

by

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International instruments

1982

United Nations Convention on the Law of the Sea

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　　　　　　　sea, of the air space over the
　　　　　　　territorial sea and of its bed
　　　　　　　and subsoil . . . .

SECTION 2.　LIMITS OF THE TERRITORIAL SEA

1995

UNITED NATIONS

General Assembly

A

Distr.
GENERAL

A/CONF.164/37
8 September 1995

ORIGINAL: ENGLISH

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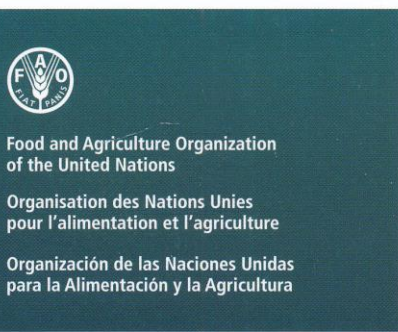Sixth session
New York, 24 July-4 August 1995

2006

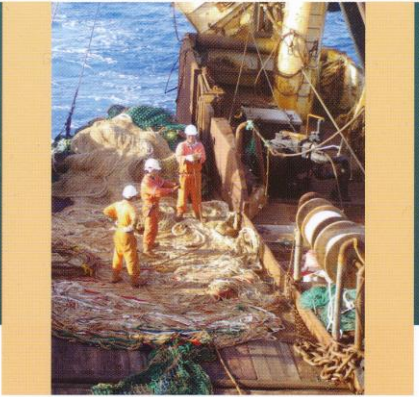**Resolution adopted by the General Assembly**

[*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

http://www.fao.org/3/a-i7009e.pdf

http://www.fao.org/3/a-i5952e.pdf

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

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

Outline of presentation - by agenda item

Time	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)

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;*
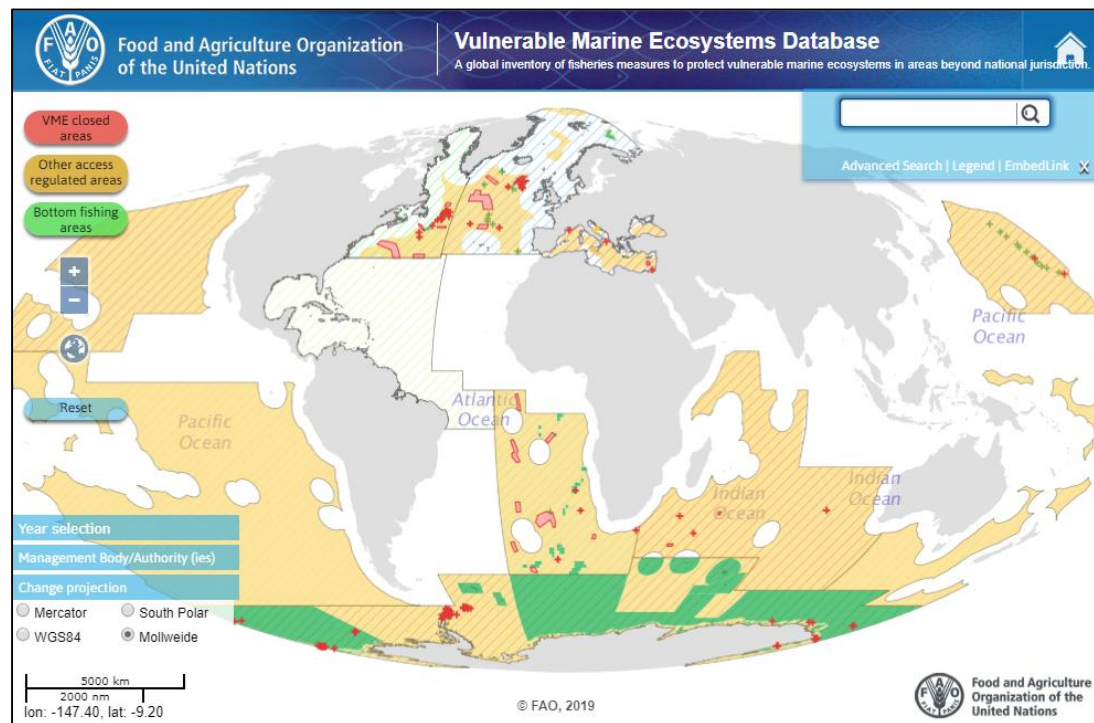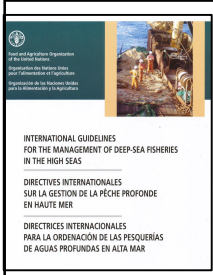
Map shows mapped VMEs in red

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

Mapping VMEs

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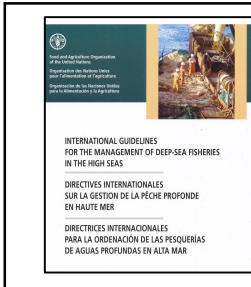
DSF Guidelines Para 38. States and RFMO/As should specify, obtain and apply the information required for adaptive management to prevent significant adverse impacts on VMEs, including <u>the use of indicators and benchmarks</u>, where appropriate.

Coral, Sponge, and Other Vulnerable Marine Ecosystem Indicator Identification Guide, NAFO Area

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

| NAFO | CCAMLR | NEAFC | NPFC |

VME Encounter Thresholds

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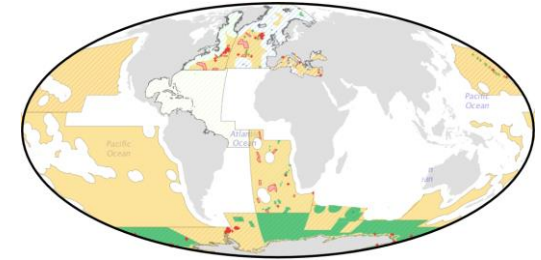
Current Thresholds (2018) (kg) – Indian Ocean Contracting Parties, CNCPs and PFEs

		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		
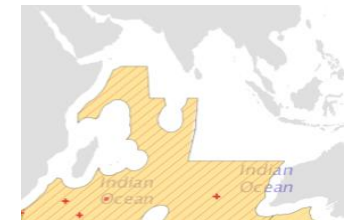
SPRFMO VME Indicator Thresholds

ANNEX 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

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
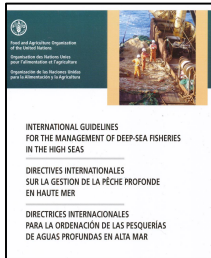
Annex J

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

DSF Guidelines

INTERNATIONAL GUIDELINES
FOR THE MANAGEMENT OF DEEP-SEA FISHERIES
IN THE HIGH SEAS

DIRECTIVES INTERNATIONALES
SUR LA GESTION DE LA PÊCHE PROFONDE
EN HAUTE MER

DIRECTRICES INTERNACIONALES
PARA LA ORDENACIÓN DE LAS PESQUERÍAS
DE AGUAS PROFUNDAS EN ALTA MAR

67. States and RFMO/As should have an appropriate protocol identified in advance for how fishing vessels in DSFs should <u>respond to encounters</u> 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 <u>cease DSFs fishing</u> activities at the site and <u>report the encounter</u>, including the location and any available information on the type of ecosystem encountered, to the relevant RFMO/A and flag State.
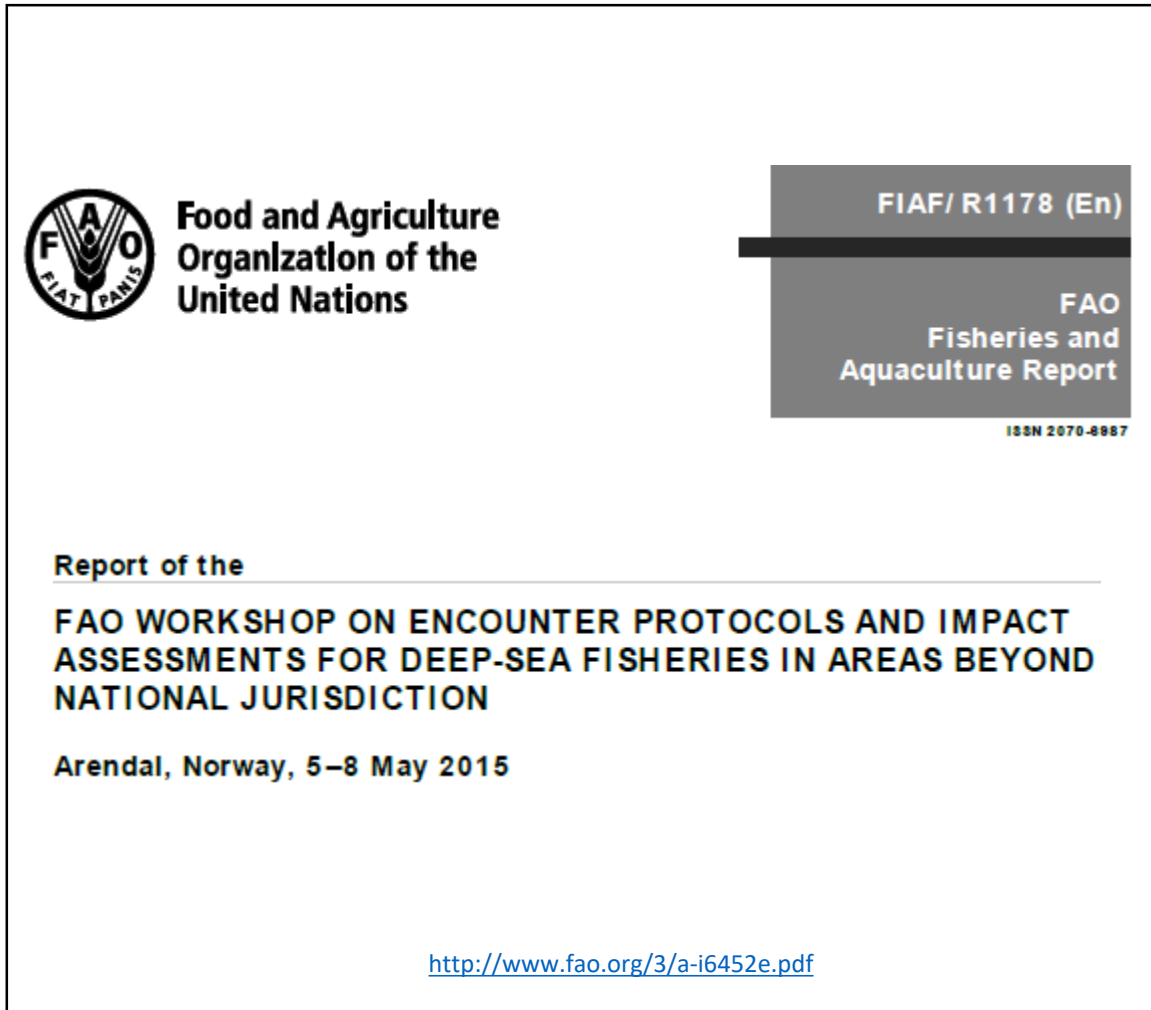
Encounter protocols

DSF Guidelines
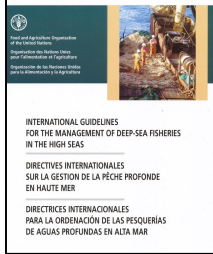
70. States and RFMO/As should, based on the results of assessments carried out pursuant to Section 5.2, <u>adopt conservation and management measures</u> to achieve long-term conservation and sustainable use of deep-sea fish stocks, ensure adequate protection and prevent significant adverse impacts on 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 <u>closures</u>;
iii. changes in <u>gear design</u> and/or deployment or operational measures (as discussed in the 2006 Bangkok Expert Consultation), including:
- <u>reduction of contact between the fishing gear and the seabed</u>,
- use of effective <u>bycatch reduction devices</u>, and
- use of technical measures to eliminate or <u>minimize ghost fishing</u>; or
iv. other relevant measures necessary to achieve the objective of paragraph 70.

FAO Workshop on encounter protocols

Food and Agriculture Organization of the United Nations

FIAF/ R1178 (En)

FAO
Fisheries and
Aquaculture Report

ISSN 2070-6987

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

CMM2018/01

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

12. … CCPs shall require any vessel flying their flag to <u>cease bottom fishing activities</u> within:

(a) For <u>bottom or mid water trawling</u>, 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 <u>longline and trap</u> activities - a radius of one (1) nautical mile from the midpoint of the line segment;
(c) For all <u>other bottom fishing gear</u> 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 <u>report any such encounter</u> 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 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

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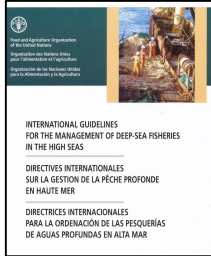
14-19. VMEs are vulnerable to SAI, recovery longer than 5-20 years, risk (vulnerability, threat, mitigation)

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

NAFO, NEAFC, NPFC, SEAFO, SPRFMO
    para 42, 43 and/or Annex 1 of FAO DSF Guidelines

CCAMLR
    VME indictor organism and VME indicator unit
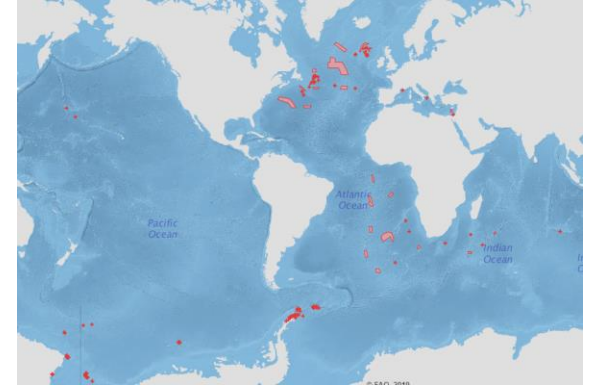
Is it useful to try to find a practical definition from VME areas adopted elsewhere?

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

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

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

<u>Criteria for evaluating Protected Area Proposals</u>

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

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

5. Proposals for protected areas

Australia BFIA

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

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

Bottom Fishery Impacts Assessment

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

Figure 3.1.4.1 Voluntary BPAs implemented by the SIODFA. Note: 'Rusky' (not labelled) is a small area attached to 'Fools Flat'
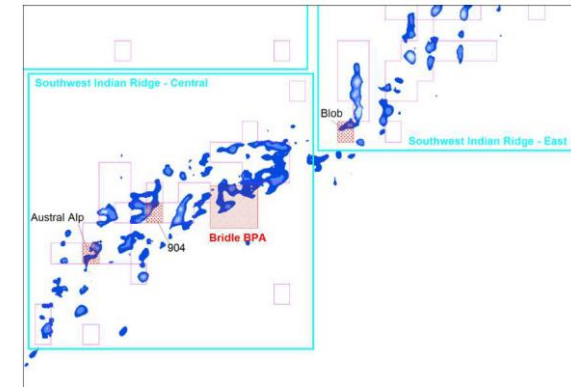
Figure 4.1.5.1 Reported locations (as 20' blocks – red dotted) of catches with VME fauna >100 kg in 2009 resulting in the implementation of the move-on rule; Australian footprint: pink outlines; fishing grounds: light blue outlines; BPA: red hashed..

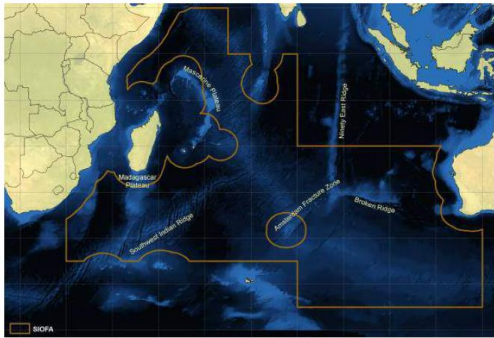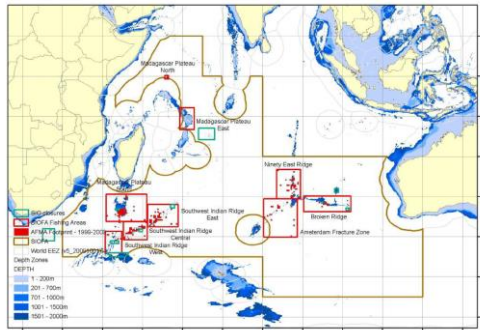Figure 3.1.3.1 Fishing regions ("fishing grounds") within the SIOFA Area based on the Australian footprint (combined trawl and line fisheries effort distribution 1999-2009). Note: for ease of definition and mapping, the fishing grounds are defined as rectangular boxes; some of which overlay adjacent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

National Research Institute of Fisheries Science, Yokohama, Japan

Figure 20 Fished Area Footprint for one Walters Shoal knoll.

Figure 18 Dissolved trawl tracks on the Southwest Indian Ridge
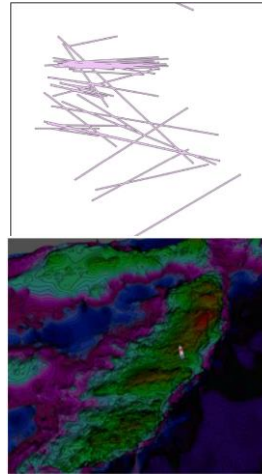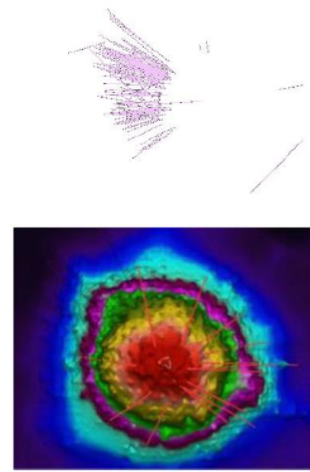

Figure 15 Rusky Knoll with towlines marked in red

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."

SIOFA PAEWG1
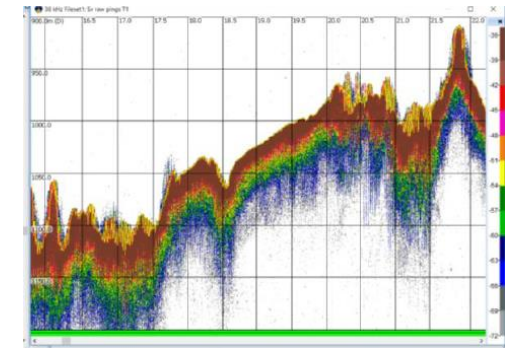
Simrad ES60 sounder showed clearly that the "fish school" observed with an early Furuno Color Sounder was actually a coldwater coral reef (Figure 16).
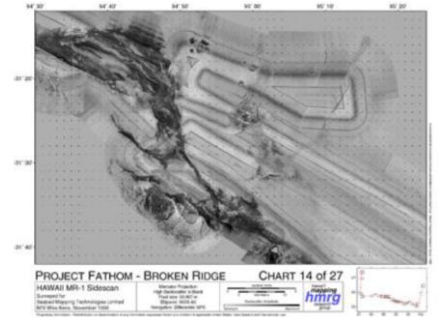

Figure 23 Broken Ridge Sidescan Sonar Image including Fool's Flat and Rusky

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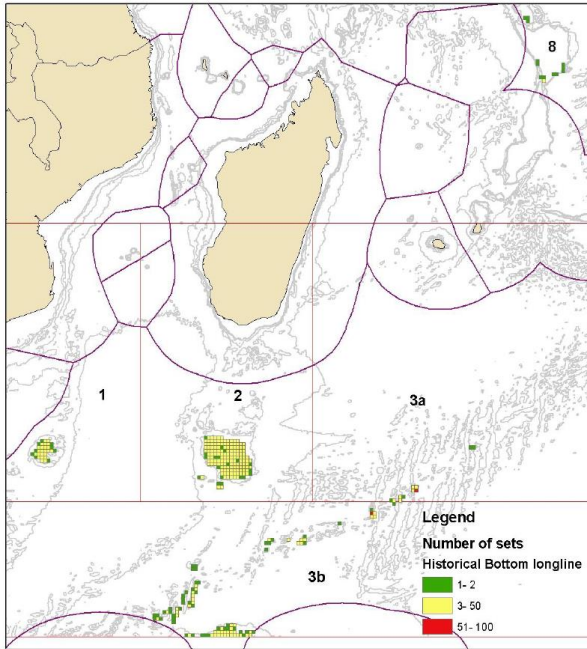

Camera on trawl

EU BFIA

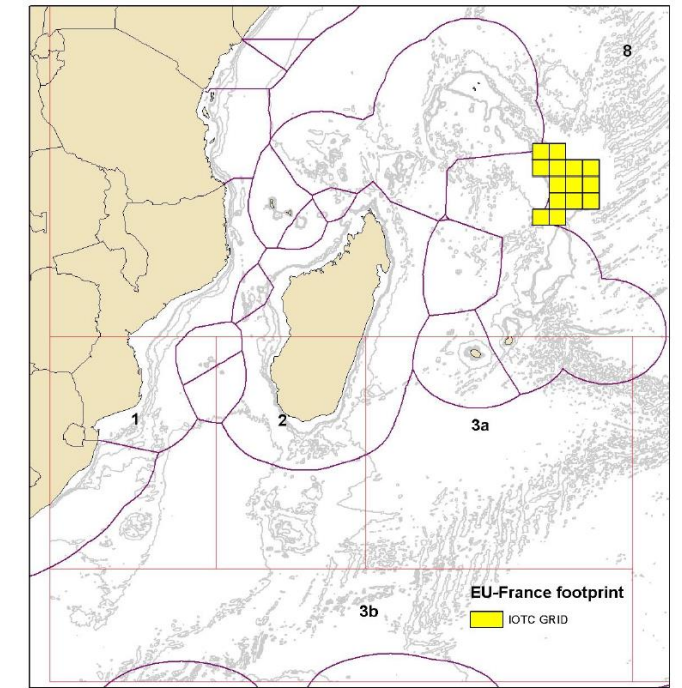Figure 2.- Historical EU-Spain bottom longline footprint.
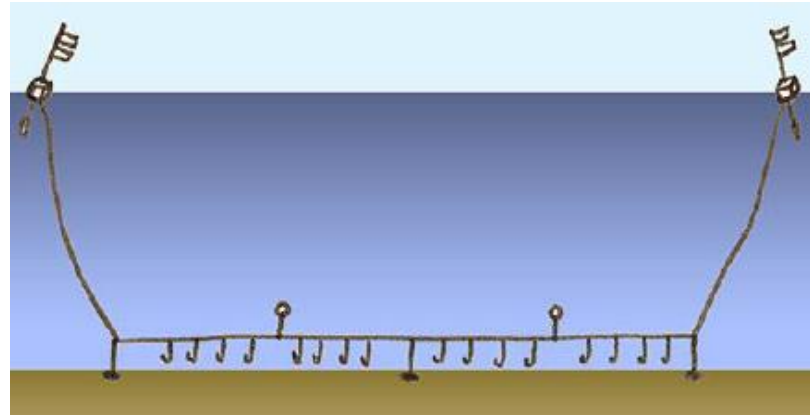
Figure 2: EU-France fishing footprint from IOTC gridding (1°x1°)

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 ; 95% quantile = 9.04 x 10

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.

French Territories BFIA

FIGURE 6: MAP OF THE PROPOSED FISHING AREA
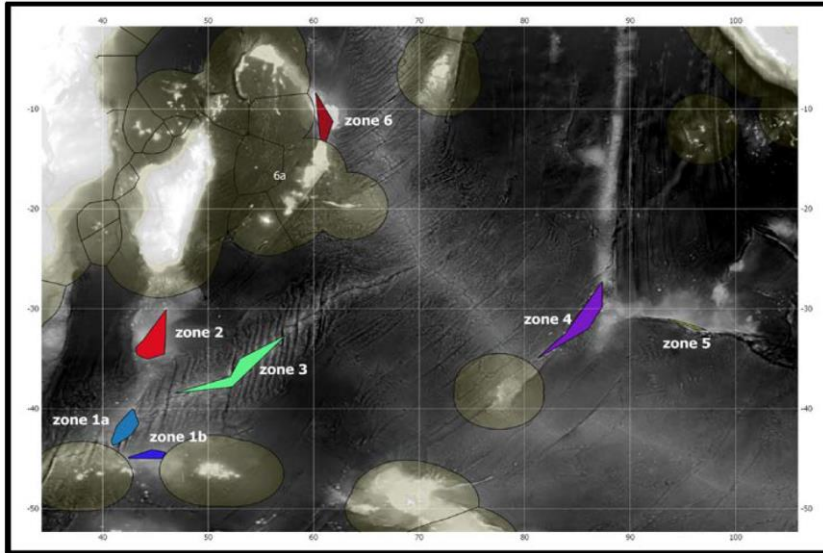

FIGURE 9: WEIGHING OF A SET OF BENTHOS BYCATCH SPECIMENS COLLECTED DURING THE HAULING OBSERVATION OF A LONGLINE IN KERGUELEN; PICTURE BY FISHERY OBSERVER HUGUES VERMANDE (2015)

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 %

Only one VME bioindicator taxa caught (Demospongiae in 2017)

VME reporting systems
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
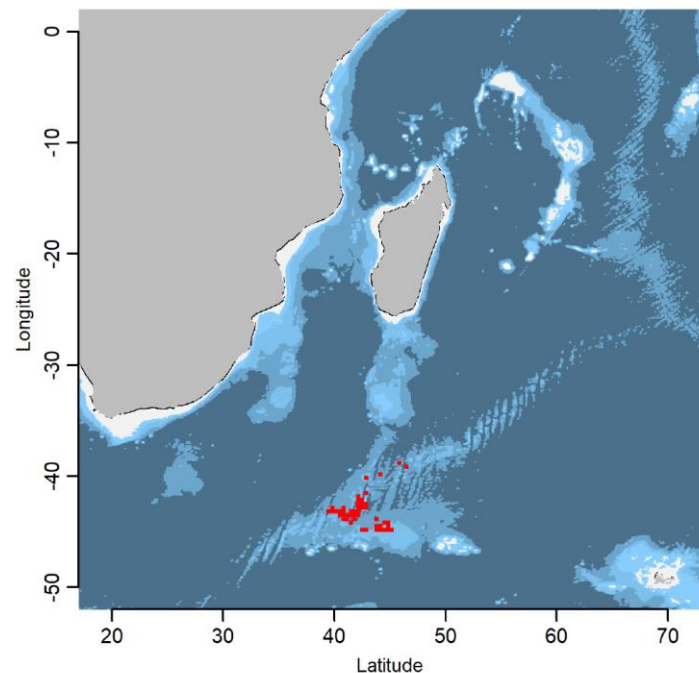
Japan BFIA - longlines

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.
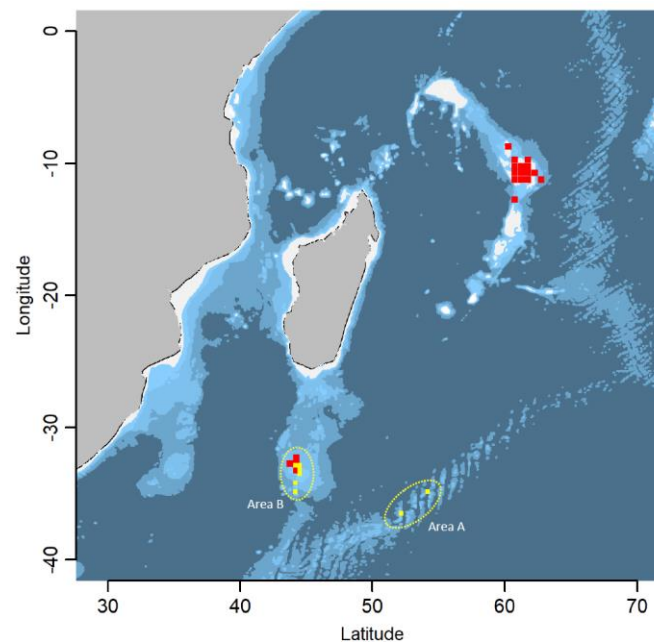

Fig. 1 The footprints of Japanese exploratory bottom trawl fisheries in 1977, 1978, and 2012. Red squares indicate the foot prints in 1977 and 1978 which are described as grid blocks of 30 minutes resolution according to spatial resolution of fishing log book as data sources. Yellow squares represent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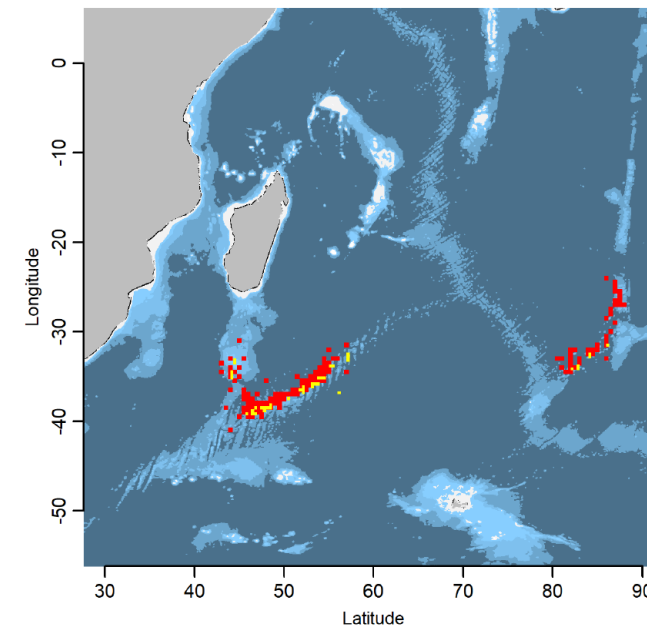

Fig. 1 The footprints of Japanese midwater fisheries with type-T trawling in 2001–2002, 2009–2013, and 2015–2017. Red squares indicate the foot prints in 2001–2002, part of 2010, 2011–2013, and 2015–2016 which are described as grid blocks of 30 minutes resolution according to spatial resolution of fishing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

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

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.

No VME by-catch.

Thailand BFIA
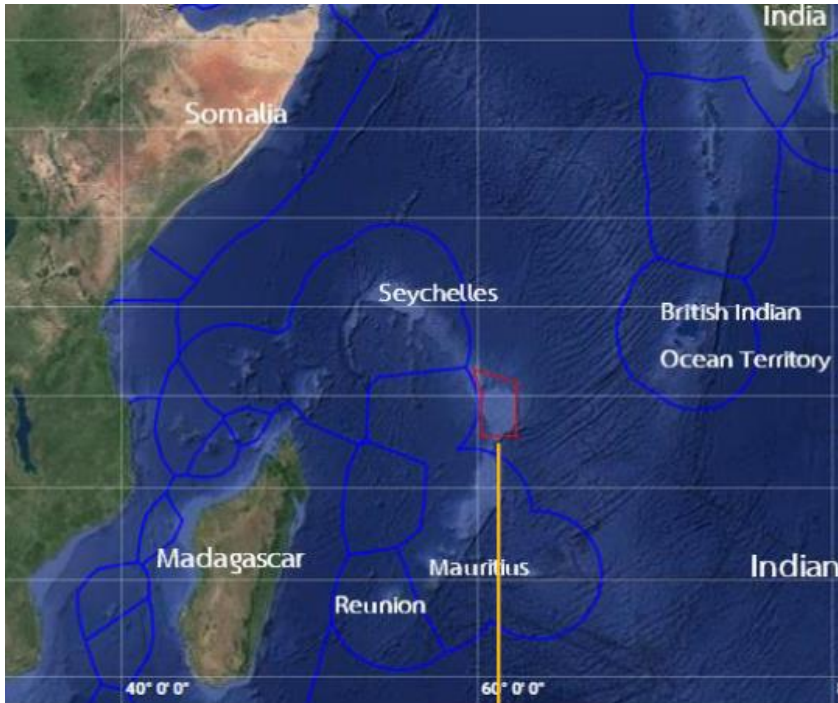
High sea of Saya de Malha Bank.
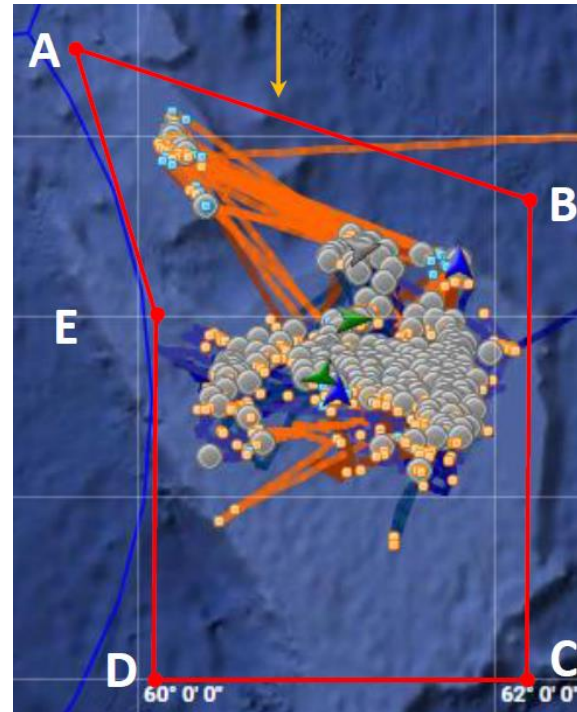
June 2016 to February 2017.

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.