

Advancing marine biodiversity protection through regional fisheries management: A review of bottom fisheries closures in areas beyond national jurisdiction

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ABSTRACT

Fishing is a significant threat to marine biodiversity in areas beyond national jurisdiction (ABNJ). Bottom fishing in particular can impact deep-sea ecosystems, and the UN General Assembly has called on regional fisheries management organisations and arrangements (RFMO/As) to take actions to regulate bottom fisheries, including to close areas to bottom fishing activities where there is likely to be significant adverse impacts to vulnerable marine ecosystems (VMEs). This paper provides an update on the current status of closures, suggesting that RFMO/A biodiversity conservation efforts continue to advance slowly. RFMO/As have been slow to implement additional closures and to act in a precautionary manner based on available scientific evidence. Existing powers are not being fully utilised and best practice is not always followed. Closures have often been temporary or representative, or have not in fact restricted ongoing fishing activity. Some positive outcomes provide examples of good practice, though RFMO/As will need to fully utilise their powers and follow best practice before authorising bottom fishing to proceed in ABNJ.

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1. Introduction

Ocean regions that do not fall under the jurisdiction of any State, areas beyond national jurisdiction (ABNJ)² represent almost half of the planet's surface and a significant portion of its biodiversity. The high seas are increasingly under threat from human activities, including seabed mining, navigation and fishing. The international community has called on regional fisheries management organisations and arrangements (RFMO/As) to take a number of actions to protect vulnerable marine ecosystems (VMEs) in ABNJ including closing areas to bottom fishing.

The aim of this paper is to review the efforts made by RFMO/As to implement high seas bottom fisheries closures and suggest options for improving the protection of VMEs within this framework. This will provide a basis for future research into how fisheries and RFMO/As may be addressed through any new international agreement on high seas biodiversity.³

Section 2 outlines the global context, including an overview of bottom fishing and its impacts, while Section 3 details the context and process for fisheries closures. Section 4 provides an assessment of RFMO/A performance in the Atlantic, Pacific, Southern and Indian oceans. Section 4 considers the role RFMO/As in biodiversity conservation in light of their performance in relation to

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² ABNJ include both the Area and the high seas. According to Article 1.1(1) of UNCLOS, the Area is the "seabed and ocean floor and subsoil thereof beyond the limits of national jurisdiction". Article 86 defines the high seas as "all parts of the sea that are not included in the exclusive economic zone, in the territorial sea or in the internal waters of a State (...)".

³ The United Nations General Assembly has now formally launched a process to develop a new legally binding instrument on the conservation and sustainable use of marine biodiversity beyond national jurisdiction. A Preparatory Commission is to meet twice a year for a period of 10 days in 2016 and 2017 (UNGA A/RES/69/292). The new legal instrument will be informed by the work of the Ad Hoc Open-ended Informal Working Group to study issues relating to the conservation and sustainable use of marine biological diversity beyond areas of national jurisdiction, created in 2004 by UNGA resolution 59/24. See Druel et al. [13] and [53] for background and context.

high seas bottom fisheries closures, and highlights some pathways for strengthening their role. Section 6 concludes by summarising the issues at stake and the possible ways forward.

2. Context

Areas beyond national jurisdiction were once thought to be relatively devoid of life, and maritime activities were mostly confined to coastal waters. However, scientific and technological advancements, coupled with an ever-expanding global appetite for resources, have increased interest in these areas. As well as new activities, such as seabed mining and bioprospecting, existing activities are intensifying.

Seamounts, underwater mountains commonly found near the boundaries of Earth's tectonic plates and hotspots,⁴ are being specifically targeted for seabed mining and fishing: minerals often collect as a result of hydrothermal activity, while the prominent features attract an abundance of marine life. Deep-sea corals on and around seamounts host more than 1300 different species of animals. Until their discovery in 2000, these ecosystems were largely unknown, and scientists have only begun to learn about their characteristics and their importance.⁵

Fishing activities have further expanded into ABNJ as demand has increased and fisheries have collapsed [28,6].⁶ Bottom fishing in particular can cause significant impacts on deep-sea ecosystems [36], damaging or destroying long-lived species, reducing the complexity of the seabed, and decreasing species diversity and faunal biomass [2,37,48]. Bottom trawling is generally considered to be the most destructive method as it involves dragging heavy fishing gear across the seabed, but harm can result from all bottom-contact fishing methods [17,23]. While fishing depths vary depending on the fishery in question, fishing is currently not technologically feasible at depths greater than 2000 m, with the majority of fishing taking place at depths of less than 1500 m, and most commonly at less than 1000 m [38].

The ability of deep-sea ecosystems to recover from these impacts is limited due to the age and slow growth rates of deep-sea bottom species [31]. Some corals grow at a rate of 0.004–0.035 mm per year, and 4550 year old coral bycatch has been documented [21,39]. The impacts are therefore long lasting or irreversible [2]; full recovery may take decades, even centuries [47]. Serious impacts have now been widely reported in all oceans [42].

The management of fisheries has long been the subject of intensive debate, though in recent years deep-sea fisheries in ABNJ has been a particular focus at the United Nations General Assembly (UNGA) and other forums.⁷ In 2004, the UNGA called for urgent action and to consider on a case-by-case basis the interim prohibition of destructive fishing practices in areas falling under their mandate, until appropriate conservation and management measures had been adopted.⁸ In 2006, the UNGA adopted a more

detailed resolution to ensure the long-term sustainability of deep-sea fish stocks that required specific measures to protect VMEs from the significant adverse impacts (SAIs) of bottom fisheries.⁹ This Resolution 61/105 (2006) specifically calls for:

Impact assessments to assess whether individual bottom fishing activities would have SAIs on VMEs, and to ensure that activities are either managed to prevent SAIs, or not authorised to proceed¹⁰

The improvement of scientific research and data collection and sharing, and specific regulation of new and exploratory fisheries¹¹

'Move-on' rules requiring vessels to cease bottom fishing in areas where VMEs are encountered, and to report the encounter so that appropriate measures can be adopted¹² and

Closure of certain areas to bottom fishing: "*In respect of areas where vulnerable marine ecosystems (...) are known to occur or are likely to occur based on the best available scientific information, to close such areas to bottom fishing and ensure that such activities do not proceed unless conservation and management measures have been established to prevent significant adverse impacts on vulnerable marine ecosystems*".¹³

Following a review of progress, the UNGA adopted resolution 64/72,¹⁴ which recalled the importance of resolution 61/105¹⁵ and further called upon States to take immediate action to protect VMEs, in the 2008 International Guidelines for the Management of Deep-sea Fisheries in the High Seas of the Food and Agriculture Organization of the United Nations (discussed below).¹⁶

RFMO/As are the preferred vehicle for fisheries regulation at the regional level, and the United Nations Fish Stocks Agreement (UNFSA) imposes an obligation on contracting parties to cooperate with and through RFMO/As.¹⁷ The UNFSA places an obligation on States to establish RFMO/As where they do not exist in relation to straddling and highly migratory fish stocks.¹⁸ Despite this requirement, deep-sea bottom fisheries were allowed to develop without the establishment of a RFMO/A, in part due to the earlier failure of the UNFSA to directly cover discrete high seas bottom fisheries (Gianni 2005).¹⁹ After the 2006 UNGA resolution 61/105,

(footnote continued)

the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, and related instruments A/RES/59/25 (2004).

⁹ UN. Resolution 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, A/RES/61/105 (2006).

¹⁰ Section 83(a).

¹¹ Section 83(b).

¹² Section 83(d).

¹³ Section 83(c).

¹⁴ UN. Resolution 64/72: 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, A/RES/64/72 (2009).

¹⁵ Section 114.

¹⁶ Section 113.

¹⁷ Art. 8(3). RFMO/As are one type of Regional fisheries bodies (RFB), i.e. a mechanism through which States or entities cooperate on the management of fisheries. See <http://www.fao.org/fishery/topic/16800/en>. In contrast to other RFBs, RFMO/As have a mandate to establish legally binding measures. Some RFMO/As focus on the management of particular highly migratory species, most notably tuna, while others manage all fish stocks in a particular fishery. RFMO/As usually comprise coastal States from the region, as well as countries with interests in the fisheries concerned, such as distant-fishing nations.

¹⁸ Art. 8(5).

¹⁹ This gap was later closed at the UN fisheries review conference, where it was agreed that the resolutions do, in fact, apply to discrete fish stocks. See Review Conference on the 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

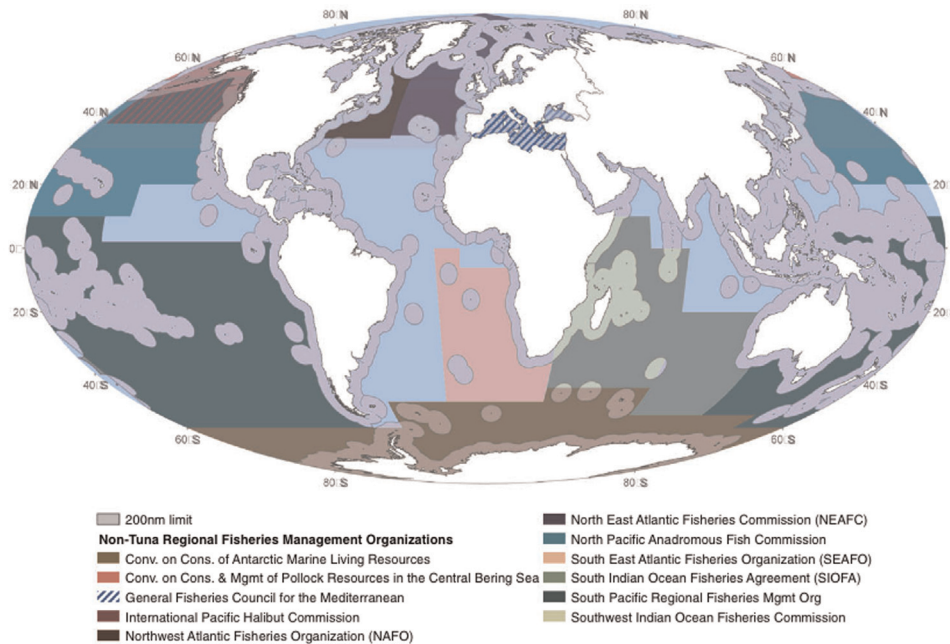
⁴ i.e., Isolated areas within tectonic plates where plumes of magma rise through the crust and erupt at the seafloor.

⁵ Woods Hole Institute, *Seamounts*. <http://www.whoi.edu/main/topic/seamounts>.

⁶ Mainly to target highly migratory fish stocks such as tunas, and deep-sea fish stocks.

⁷ For example, the issue has also been raised at meetings of the Conference of the Parties to the Convention on Biological Diversity (CBD), beginning in 2004 at CBD COP-7. In 2010, COP-10 adopted Decision X/29 that called on States and RFMO/As to comply with the relevant international instruments (paragraph 54). See also the Plan of Implementation of the World Summit on Sustainable Development, A/CONF.199/20, Chapter 1, Resolution 2, Johannesburg, September 2002 ("Johannesburg Plan of Implementation"); Rio+20 outcome document (UN. The future we want, Pub. L. No. A/CONF.216/L.1. 2012).

⁸ UN. Sustainable fisheries, including through the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of



Map 1. : Geographical coverage of non-tuna RFMOs (Not showing the North Pacific Fisheries Commission (NPFC)) Source: [5].

there was broad support in the international community to ensure that all high seas fisheries were covered by an RFMO. In part due to subsequent pressure from the UNGA regarding unregulated high seas deep-sea fishing, a number of new RFMO/As have been established (Map 1) or are in the process of being established.²⁰

Despite the strong calls for action, assessments conducted by civil society, the scientific community and the UNGA have highlighted that implementation gaps remain: RFMO/As have increasingly engagement with these issues, but a number of RFMO/As are not yet fully implementing the UNGA resolutions to protect marine biodiversity in the deep ocean [14,42,50].

In September 2011, the United Nation General Assembly held a two-day workshop to examine implementation of the UNGA resolutions on bottom trawling.²¹ Following the workshop, the moderator concluded that it was generally recognised that further efforts were needed in RFMO/As to fully implement the resolutions.²²

Challenges faced by RFMO/As in the implementation of the resolutions were also noted, including lack of scientific information and data, the costs of research activities and the need for greater clarity in definitions and terminology.²³ The need for

RFMOs to make their activities more publicly available was emphasised, as was the need and for assessments to be conducted more frequently.

Following the workshop, the UNGA, in its sustainable fisheries resolution 66/68 (2011),²⁴ made a number of recommendations,²⁵ including to:

strengthen procedures for carrying out assessments and for making the assessments publicly available, recognising that doing so can support transparency and capacity-building globally;

establish and improve procedures to ensure that assessments are updated when new conditions or information so require, and for evaluating, reviewing and revising assessments based on best available science and management measures; and

establish mechanisms to promote and enhance compliance with applicable measures related to the protection of vulnerable marine ecosystems, adopted in accordance with international law.

The resolution also noted that not all impact assessments have been made publicly available, and called upon States, consistent with domestic law, and regional fisheries management organisations and arrangements to publish all assessments without delay. The General Assembly decided to hold a further review in 2015. That review will in fact be held in 2016.²⁶

(footnote continued)

Fish Stocks (New York, 22–26 May 2006 and 24–28 May 2010) (http://www.un.org/depts/los/convention_agreements/review_conf_fish_stocks.htm).

²⁰ In the Southern Indian Ocean, the South Pacific and the North Pacific for instance.

²¹ Workshop to discuss implementation of paragraphs 80 and 83–87 of resolution 61/105 and paragraphs 117 and 119–127 of resolution 64/72 on sustainable fisheries, addressing the impacts of bottom fishing on vulnerable marine ecosystems and the long-term sustainability of deep-sea fish stocks. See http://www.un.org/depts/los/reference_files/workshop_fisheries_2011.pdf.

²² Workshop to discuss implementation of paragraphs 80 and 83–87 of resolution 61/105 and paragraphs 117 and 119–127 of resolution 64/72 on sustainable fisheries, addressing the impacts of bottom fishing on vulnerable marine ecosystems and the long-term sustainability of deep-sea fish stocks: Letter dated 27 October 2011 from the Moderator of the Workshop to the President of the General Assembly. UN Doc. A66/656 (18 November 2011), at http://www.un.org/ga/search/view_doc.asp?symbol=a/66/656.

²³ Ibid.

3. Bottom fisheries closures: context and process

The value and effectiveness of “no-take” marine reserves is well-evidenced by the literature on MPAs, and studies have confirmed these benefits in the context of bottom fisheries closures in

²⁴ A/RES/66/68 - 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. 6 December 2011. At http://www.un.org/depts/los/general_assembly/general_assembly_resolutions.htm.

²⁵ UNGA resolution 66/68 para. 129.

²⁶ Personal communication. The decision to hold the workshop in 2016 is expected to be reflected in the 2015 Sustainable Fisheries resolution.

ABNJ [15,40,46,51]. Given the delicate nature of the ecosystems in question, closing areas to bottom trawling fishing or other bottom contact gear is the only certain method for avoiding significant adverse impacts [14,4].²⁷

Nonetheless, mere declaration of closed areas does not guarantee protection [1]. Closures need to be ecologically coherent [22] and potential distributional effects must be considered [11]. Strong monitoring and enforcement will also be required, along with additional and complementary conservation and management measures. A study of 87 MPAs found the most effective to be “no take” areas that are well enforced, longstanding, large and geographically isolated [15]. These considerations can be applied equally to fisheries closures and should be borne in mind when assessing the actions of RFMO/As.

Fisheries closures are particularly important because other measures are being under-utilised and may in any case be ineffective. For example, there is a high risk that encounters with VMEs are underreported under “move-on” rules [4]. The European Union (EU), for example, recently expressed its concern that no parties to the North East Atlantic Fisheries Commission (NEAFC) have reported encounters with VMEs under its move-on rule,²⁸ stating that it is “not sufficient to have measures in NEAFC legislation – they also have to be effective and consistent with the relevant UNGA Resolutions”.²⁹ Even if such measures were widely used, their effectiveness is questionable: irreversible damage may already have occurred, and the vessels simply “move on” to another potentially vulnerable area [4].

In terms of identifying and establishing high seas bottom fisheries closures, the FAO has published guidelines that expand on key terms such as “Vulnerable Marine Ecosystem” and “Significant Adverse Impact”.³⁰ Vulnerability concerns the “likelihood that a population, community, or habitat will experience substantial alteration from short-term or chronic disturbance, and the likelihood that it would recover and in what time frame”.³¹ Ecosystem characteristics are central to VME identification and the FAO Guidelines call for consideration of: uniqueness or rarity; functional significance; fragility; life-history traits of component species that make recovery difficult; and structural complexity.³² The guidelines provide some examples of species groupings and geological features³³ which may indicate the presence of VMEs.³⁴ Noting the general nature of the criteria in the FAO Guidelines, and the variety of interpretations, Ardron [3] have elaborated a systematic process for identifying VMEs.

SAIs are those that compromise ecosystem structure or function in a manner that: impairs the ability of affected populations to replace themselves; degrades the long-term natural productivity of habitats; or causes significant loss of species richness, habitat or community types.³⁵ The guidelines list six factors to be taken into

consideration when assessing whether an interaction with a VME is a SAI: intensity or severity of the impact; spatial extent of the impact; the sensitivity/vulnerability of the ecosystem; the recovery ability and recovery rate of the ecosystem; the extent to which ecosystem functions may be altered by the impact; and the timing and duration of the impact.³⁶

Information regarding closures had previously been difficult to find, as each individual RFMO/A was responsible for publicising the closures, which they did to varying extents. In December 2014, the FAO greatly improved this situation with the release of its VME Database. The Database contains comprehensive information on VME-related measures in ABNJ for each RFMO. The Database will serve as a collaboration tool among RFMO, as well as serving an informational and awareness raising function for the general public.³⁷

4. A review of bottom fisheries closures

In the following section of this paper, we consider the fisheries closures implemented to date in high seas areas of the Mediterranean Sea and Atlantic, Pacific, Southern and Indian oceans.

4.1. Mediterranean Sea

The General Fisheries Commission for the Mediterranean (GFCM) has prohibited the use of towed dredges and trawlnets fisheries at depths beyond 1000 m, and instituted 3 specific fisheries closures.

The situation of the Mediterranean Sea is particular in that there is no point located at a distance of more than 200 nautical miles from the closest land or island. Therefore, “any waters beyond the limits of national jurisdiction (high seas) would disappear if all the coastal States decided to establish their own exclusive economic zones (EEZ)” [43]. Despite increasing assertions of jurisdiction over EEZs in the region, this is not the case so far: there are still ABNJ in the Mediterranean Sea because some States have not yet declared their EEZ, while others have declared Ecological Protection Zones or Fisheries Protection Zones [16]. There are also overlaps and “grey zones” in States’ EEZ declarations.

The Agreement for the establishment of the GFCM was approved by the FAO Conference in 1949 and entered into force in 1952. In 2005, the GFCM prohibited the use of towed dredges and trawlnets fisheries at depths beyond 1000 m,³⁸ the first such ban to be implemented. This prohibition incorporates over half of the Mediterranean, and was a pre-emptive measure as most fishing up to that point had been in shallow waters.³⁹ In 2006, three specific closures were also instituted for the protection of a reef system, a cold seep, and a seamount.⁴⁰ In general, the GFCM has worked closely with the Barcelona and Mediterranean Action Plan to achieve ecosystem-based management of the Mediterranean, though there appears to have been no further discussion specifically regarding protection of VMEs in the region.

³⁶ Ibid, paragraph 18.

³⁷ See <http://www.fao.org/in-action/vulnerable-marine-ecosystems/en/>.

³⁸ REC.CM-GFCM/29/2005/1, “Management of certain fisheries exploiting demersal and deepwater species”.

³⁹ “Sea beds below 1000m have not yet been explored by Mediterranean fleets and the ban is a precautionary one to protect the still-intact and poorly understood deep sea ecosystems.” WWF press release, <http://mediterranean.panda.org/?18831/Bottom-trawling-beyond-1000m-banned-in-the-Mediterranean>.

⁴⁰ REC.CM-GFCM/30/2006/3, “Establishment of fisheries restricted areas in order to protect the deep sea sensitive habitats”.

²⁷ For this reason, many commentators go even further: a recent study modelled the environmental and economic benefits of complete closure of the high seas, advocating such a course of action [51] while the Global Ocean Commission has recommended the creation of a high seas regeneration zone (Global Ocean Commission 2014).

²⁸ In any case, NEAFC’s move on rules initially had very high bycatch weight thresholds. These were subsequently significantly lowered in accordance with scientific advice.

²⁹ NEAFC. (2013). Report of the 32nd Annual Meeting of the North-East Atlantic Fisheries Commission 11–15 November 2013 Volume II – Annexes (Vol. II), Annex C.

³⁰ FAO, International Guidelines for the Management of Deep-Sea Fisheries in the High Seas (2009).

³¹ Ibid, paragraph 14.

³² Ibid, paragraph 42.

³³ E.g., cold-water corals and sponge-dominated communities, and seamounts and hydrothermal vents.

³⁴ FAO, International Guidelines for the Management of Deep-Sea Fisheries in the High Seas (2009), Annex.

³⁵ Ibid, paragraph 17.



Map 2 : NEAFC bottom fisheries closures along the Mid-Atlantic Ridge (yellow outline) and their partial overlap with OSPAR MPAs (red blocks) Source: German Federal Agency for Nature Conservation. (<http://mare.essenberger.de/en/karte-charlie-gibbs-schutzgebiet.php>.)

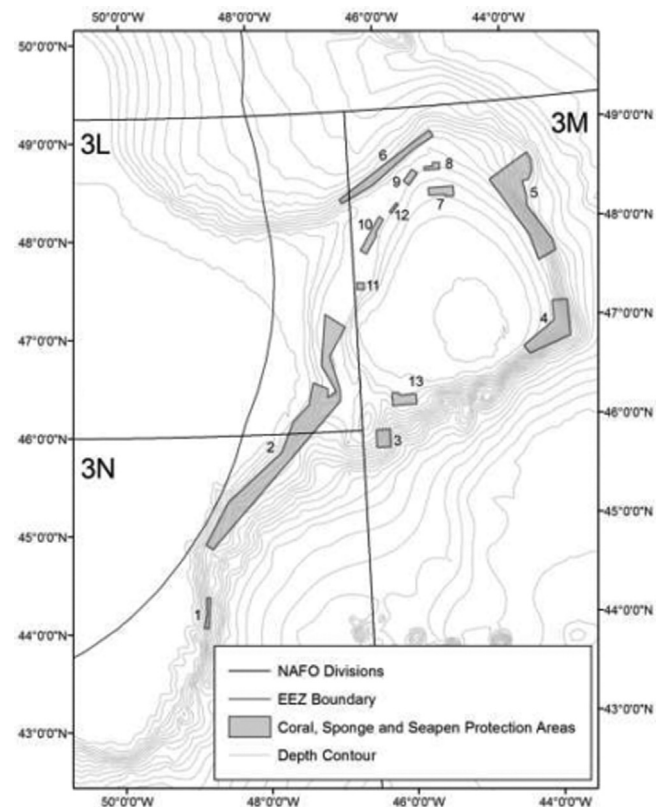
4.2. Atlantic Ocean

4.2.1. North-East Atlantic

NEAFC has closed a number of fished areas around the Hatton and Rockall Banks⁴¹ and has permanently closed large areas of the Mid-Atlantic Ridge⁴² since April 2009, expanding on previous temporary closures.⁴³ These closures, initially made until 2015, were recently extended until 2017.⁴⁴ The last closure to be added was Edora Bank, effective January 2013.⁴⁵ NEAFC is actively debating additional closures, though the issue of possible new closures was postponed until after the September 2014 meeting of its Permanent Committee on Management and Science (PECMAS). Instead, NEAFC's efforts are currently focused on improving the overall framework for protection.

NEAFC has undertaken an exercise to assess whether its regulations are consistent with the UNGA resolutions and FAO Guidelines. This includes work by PECMAS and at the Annual Meetings, as well as a dedicated symposium with outside participation.⁴⁶ The 2012 Annual Meeting of NEAFC concluded that current measures are generally consistent with the relevant UNGA resolutions and FAO Guidelines, but that some improvements could be made. NEAFC's updated rules on the protection of VMEs were formally finalised earlier this year.⁴⁷

In 2008, NEAFC signed a Memorandum of Understanding (MoU) with the OSPAR Convention. The MoU noted that both bodies “have an interest in conserving the living resources of the seas



Map 3 : NAFO bottom fisheries closures. (NAFO, “Northwest Atlantic Fisheries Organization Conservation and Enforcement Measures.” NAFO/FC Doc. 15/01 (2015) 31.) Source: NAFO.

including those located in areas beyond national jurisdiction” and that they agree to “promote mutual cooperation towards the conservation and sustainable use of marine biological diversity including protection of marine ecosystems in the North-East Atlantic”.⁴⁸ The MoU states that they will cooperate “regarding marine spatial planning and area management”.⁴⁹ In this context, it is interesting to note that NEAFC's closures partially overlap with the high seas MPAs established by OSPAR (Map 3). Further to the MoU, NEAFC is also involved in the “Madeira Process”, initiated by the OSPAR Commission in 2009, to advance cooperation on marine biodiversity protection in ABNJ [18,24]. The ultimate goal of that process is to elaborate a “Collective Arrangement” for the collaborative management of selected aspects of biodiversity protection.

The Mid-Atlantic Ridge closures were proposed by Norway with the aim of protecting “representative vulnerable ecosystems”.⁵⁰ The EU noted that these measures could “only be a first step and need to be extended urgently if NEAFC is to respond to the expectations of the international community and protect vulnerable marine ecosystems”.⁵¹

Additional VME closures along the northern part of the Mid-Atlantic Ridge were proposed in 2009 and in 2010 the

⁴¹ The northeastern cluster of closures marked on Map 2, below. See <http://www.neafc.org/closures/hatton-rockall>.

⁴² Faintly visible in the western portion of Map 2, below.

⁴³ Similar areas had been previously been temporarily closed.

⁴⁴ For an overview of current closures, see: <http://www.neafc.org/closures/vme>.

⁴⁵ See <http://www.neafc.org/closures/edorabank>.

⁴⁶ <http://neafc.org/pecmas/symposium>.

⁴⁷ <http://neafc.org/system/files/Rec.19-Protection-of-VMEs.pdf>.

⁴⁸ Memorandum of Understanding between the North-East Atlantic Fisheries Commission (NEAFC) and the OSPAR Commission available at <http://www.neafc.org/basictexts>.

⁴⁹ Ibid.

⁵⁰ Royal Ministry of Fisheries and Coastal Affairs (Norway), “Proposal for Revision of Areas Closed to Bottom Fisheries in the NEAFC Regulatory Area” (2008). Emphasis added.

⁵¹ European Commission, “North East Atlantic : Only Limited Progress Made to Protect Vulnerable Marine Ecosystems” (April 03, 2009) <http://ec.europa.eu/fisheries/news_and_events/press_releases/030409/index_en.htm> .

International Council for the Exploration of the Sea (ICES) recommended extending existing closures and implementing a closure on the Reykjanes Ridge,⁵² which remains classified as an existing fished area.⁵³ The 2012 annual meeting did however see the adoption of one additional closure (Edora Bank), and expansion of one other (Hatton Bank).⁵⁴

In June 2013, ICES again advised boundary extensions for existing closed areas, as well as recommending 3 new closures⁵⁵ and continuing to recommend closure of Reykjanes Ridge.⁵⁶ ICES also advised making temporary closures permanent, given the nature of the VMEs in question.⁵⁷ A notable aspect of ICES' advice in relation to the Josephine Seamount is that it advised a "a closure to bottom fisheries, the boundary of which should correspond to the Josephine Seamount High Seas MPA established by OSPAR".⁵⁸ Such a proposal indicates a willingness to further the cooperative approach to high seas MPAs by continuing to align bottom fisheries closures with high seas MPAs.

At the 2013 annual meeting PECMAS set out the details of the proposed changes to VME management, including establishing new closed areas. There was considerable debate regarding closure of the Josephine seamount as the seafloor is subject to an outer continental shelf claim by a Member State.⁵⁹ The parties were unable agree on any of the recommended closures and PECMAS was asked to attempt to propose measures amenable to all parties at the following meeting.⁶⁰

4.2.2. North-West Atlantic

At present, there are 20 areas closed to bottom fishing in the North-West Atlantic.⁶¹ These closures will remain closed until the end of 2020. NAFO is also currently undertaking a comprehensive review of its Conservation and Enforcement Measures and it is expected that existing closures will be extended indefinitely.⁶² It is envisaged that some of the existing closures may be enlarged and that new closures may be implemented.⁶³

A number of NAFO bodies have considered implementation of the UNGA resolutions through the identification of VMEs and fisheries closures. These include the NAFO Scientific Council (SC), the SC Working Group on Ecosystem Approach to Fisheries Management (previously WGEAFM, now WG-ESA), the Working Group of Fisheries Managers and Scientists on Vulnerable Marine Ecosystems (WGFMS-VME), which has now been subsumed by the new Fisheries Commission and Scientific Council Working Group on the Ecosystem Approach Framework to Fisheries Management (WG-EAFFM), which had its first meeting in July 2014.

The first NAFO measure was the closure of four seamount areas to bottom fishing in 2007.⁶⁴ The first "Coral Protection Zone" for

the closure of a bottom fishery was defined in a 2008 measure.⁶⁵ However, NAFO concluded that little interaction currently takes place between coral indicator species and fishing activity, despite the findings of the SC,⁶⁶ and requested that the SC review the data on VME locations.⁶⁷

Two additional seamounts were protected in 2008,⁶⁸ and in 2009 the Annual Meeting adopted 11 additional area closures based on the advice of the SC.⁶⁹ The Deep Sea Conservation Coalition (DSCC) reported that closure of these areas was "estimated to have affected approximately 0.7 percent of bottom fishing in the NAFO area (...). In other words, the area closures did not affect approximately 99 percent of the bottom fishing that has occurred in recent years" [14]. Since the initial adoption of these closures, NAFO adopted one additional small closure in 2013,⁷⁰ and another in 2014.⁷¹

Research reported by the SC in these regions suggests that the actual area of the VMEs is much more extensive than the small areas protected by fisheries closures.⁷² The closed areas appear to cover only parts of the fishery that have been relatively little exploited [14]. At its June 2014 meeting, WG-EAFFM noted that SC work on SAIs on VMEs is ongoing, with final results due in 2016.⁷³ It was also noted that available data indicates VME presence in two candidate areas, though these have not yet been considered by the annual meeting.⁷⁴

4.2.3. South-East Atlantic

The South East Atlantic Fisheries Organisation (SEAFO) has closed 11 seamount areas where VMEs are present.⁷⁵ Closures were initially made on a temporary basis in 10 areas in 2007,⁷⁶ with SEAFO subsequently extending the closures until certain conditions were met (mapping of the concerned area, impact assessment, and a research fishery plan).⁷⁷ In 2010 the closures were

(footnote continued)

Enforcement Measures". Vol. 1. NAFO/FC Doc. 07/1 (Revised) (2007). In spite of the closures, small scale and exploratory fishing not exceeding "20% of the fishable area of each seamount" was initially permitted, though this condition has now been removed.

⁶⁵ NAFO, "Northwest Atlantic Fisheries Organization Conservation and Enforcement Measures", vol. 1 (2008) 12.

⁶⁶ NAFO, "Report of the NAFO SC Working Group on Ecosystem Approach to Fisheries Management (WGEAFM) Response to Fisheries Commission Request 9.a" (2008).

⁶⁷ NAFO, "Meeting Proceedings of the General Council and Fisheries Commission for 2008/2009" (2009) 147.

⁶⁸ NAFO, "Northwest Atlantic Fisheries Organization Conservation and Enforcement Measures" (2009) 12.

⁶⁹ NAFO, "Northwest Atlantic Fisheries Organization Conservation and Enforcement Measures" (2010) 13–14.

⁷⁰ An additional closure on the Northwest Flemish Cap. See NAFO, "Northwest Atlantic Fisheries Organization Conservation and Enforcement Measures." NAFO/FC Doc. 14/1 (2014) 22.

⁷¹ An additional closure on the Beothuk Knoll. See NAFO, "Northwest Atlantic Fisheries Organization Conservation and Enforcement Measures." NAFO/FC Doc. 15/01 (2015) 30.

⁷² NAFO, "Report of the NAFO SC Working Group on Ecosystem Approach to Fisheries Management (WGEAFM) Response to Fisheries Commission Request 9.a.", NAFO. Scientific Council Meeting, 22–30 October 2008, Copenhagen, NAFO SCS Doc. 08/26. NAFO, Report of the NAFO SC Working Group on Ecosystem Approach to Fisheries Management (WGEAFM). Response to Fisheries Commission Request 9.b and 9.c. Scientific Council Meeting, 4–18 June 2009, Dartmouth, Canada. NAFO SCS Doc. 09/6.

⁷³ NAFO, "Report of the Fisheries Commission and Scientific Council Working Group on the Ecosystem Approach Framework to Fisheries Management". NAFO FC/SC Doc. 14/03 (2014) 7.

⁷⁴ Ibid 5.

⁷⁵ Conservation Measures 18/10 on the Management of Vulnerable Deep Water Habitats and Ecosystems in the SEAFO Convention Area 2010.

⁷⁶ Conservation Measures 06/06 on the Management of Vulnerable Deep Water Habitats and Ecosystems in the SEAFO Convention Area.

⁷⁷ See Conservation Measure 11/07 Laying Down Conditions for the Resumption of Fishing Activities in Areas Subject to Closure through Conservation Measure 06/06.

⁵² ICES, Report of the ICES Advisory Committee, 2010. Book 9: Widely Distributed and Migratory Stocks. Copenhagen.

⁵³ NEAFC map: <http://www.neafc.org/page/closures>.

⁵⁴ NEAFC, "Report of the 31st Annual Meeting of the North-East Atlantic Fisheries Commission 12–16 November 2012" (2012) 8.

⁵⁵ Hatton–Rockall Basin, Hatton Bank, and the Josephine Seamount. ICES, "Vulnerable Deep-Water Habitats in the NEAFC Regulatory Area." (2013).

⁵⁶ ICES. (2013). General advice: Assessment of the list of VME indicator species and elements Advice. In ICES Advice 2013, Book 1.

⁵⁷ ICES, "OSPAR/NEAFC Special Request on Existing and Potential New Management Measures for Ecologically and Biologically Significant Areas (EBSAs)." 1.5.6.6, 1.

⁵⁸ Ibid. 9.

⁵⁹ NEAFC, "Report of the 32nd Annual Meeting of the North-East Atlantic Fisheries Commission 11–15 November 2013" (2013) 9.

⁶⁰ NEAFC, "Report of the 32nd Annual Meeting of the North-East Atlantic Fisheries Commission 11–15 November 2013."

⁶¹ NAFO, "Northwest Atlantic Fisheries Organization Conservation and Enforcement Measures" (2015) 24–31.

⁶² Personal communication.

⁶³ Personal communication.

⁶⁴ NAFO, "Northwest Atlantic Fisheries Organization Conservation and

revised and made permanent. SEAFO has also delineated its bottom fishing footprint and implemented exploratory fishing protocols for new fishing in previously unexploited areas.

During the 2010 revision, several new closures were adopted, while several initially closed areas were reopened to bottom fisheries. Most contained seamounts at depths greater than 2000 m and as such are unlikely to be affected [14]. The closures were designed to close representative areas of seamounts along the ridge system.

Although several historically fished seamount areas are now subject to closures, areas where most fishing has previously occurred remain open. Of the 11 closed areas, 7 are considered to be unexploited, with the remaining areas being only “slightly exploited”.⁷⁸

The Scientific Committee notes that “any isolated topographic feature that rises to within 1000m of the ocean/sea surface should be regarded as having the potential to host vulnerable marine ecosystems” and appropriate conservation measures should consider any such area.⁷⁹ Accordingly, substantial areas of seamounts and ridge systems remain open to bottom fishing in the SEAFO area under exploratory fishing protocols. This includes a portion of the Walvis Ridge previously surveyed by Spain and Namibia [14].

The Scientific Committee has also previously recommended prohibiting all forms of trawling and gillnet fishing to take a precautionary view towards the VMEs that were not closed.⁸⁰ However, this was not acted on by the commission [32].

The introduction of new closures/identification of VMEs has not been a significant topic for discussion at the SEAFO annual meetings since the implementation of the 2010 closures.

4.2.4. South-West Atlantic

Spain is the only State known to conduct significant bottom fishing activities in the high seas of the South-West Atlantic⁸¹ and has published a list of vessels authorised to bottom fish in ABNJ.⁸² In the absence of a RFMO/A for this region, Spain closed 9 areas to bottom fishing in July 2011, pursuant to a EU regulation that implemented the UNGA resolutions.

Noting that the absence of a competent fisheries body does not exempt States from their obligation to adopt measures for the conservation of marine biodiversity in ABNJ, the EU passed a regulation in 2008 requiring States to identify VMEs in high seas regions where their fishing vessels operate and implement fisheries closures in respect of their vessels.⁸³ It was envisaged that this regulation would mainly apply to the South West Atlantic.⁸⁴ The EU initially intended to review this regulation in 2012,⁸⁵ but to

date such a review has not been carried out.⁸⁶

Between 2007 and 2009, Spain's Oceanographic Institute (Instituto Español de Oceanografía; IEO) conducted a series of 11 multidisciplinary research cruises with the aim of identifying VMEs on the high seas of the South West Atlantic and making a preliminary assessment of how fishing activity was impacting these areas [35]. The research found the incidence of vulnerable species to be low or negligible at the depths where bottom trawling activities take place and that other fishing activity, mostly for cephalopod species of the Patagonian Shelf, probably has a small adverse impact on VMEs [35]. The IEO proposed closing 9 areas containing VMEs. Beginning in July 2011, these areas were closed for bottom fishing for a period of six months ([14] Spain also restricted its bottom fishing footprint to two areas already fished for 25 years, assuming that these areas would not still contain VMEs which could be damaged by bottom fishing.⁸⁷

4.3. Pacific Ocean

4.3.1. North Pacific

No formal closures have been implemented in the North Pacific as the relevant RFMO/A is not yet fully functional. Early State reporting on potential VMEs in the region suggests agreement on closure of one seamount, but mixed positions regarding additional closures and measures.

In March 2011, the substantive negotiations of the *Convention on the Conservation and Management of High Seas Fisheries Resources in the North Pacific Ocean* (North Pacific Ocean Convention, NPOC) were concluded.⁸⁸ The participants agreed to Interim Measures for the Northeast Pacific Ocean and decided to hold preparatory meetings to prepare for implementation of the Convention and establishment of the North Pacific Fisheries Commission (NPFC).⁸⁹ There is little publicly available information regarding the Convention's current status,⁹⁰ though the US' National Oceanic and Atmospheric Administration notes that the Convention text was agreed to by the negotiating participants in February 2012 [30].

While no formal discussion of VME measures has yet taken place, the participating States have each published a report identifying VMEs and assessing the impacts caused by bottom trawl fishing activities. Some agreement appears to have been reached in these reports that certain areas should be closed.

Japan stated that “research results so far do not support the existence of serious adverse impacts on VMEs and marine species” from its fishing activities, but acknowledged that VMEs may exist in areas not covered by the research and that VMEs may have existed in the past.⁹¹ Taking a precautionary approach Japan suggested a “tentative” closed area for part of Koko Seamount where certain species were detected,⁹² tentative prohibition of bottom gillnet

⁷⁸ Conservation Measures 18/10 on the Management of Vulnerable Deep Water Habitats and Ecosystems in the SEAFO Convention Area.

⁷⁹ SEAFO, “Report of the SEAFO Scientific Committee” 7–8.

⁸⁰ SEAFO, “Report of the SEAFO Scientific Committee” (2007) s agenda item 8.

⁸¹ One vessel from Estonia also fished in this area in 2010 and was reported to have followed EU regulatory requirements. EU, “EU Report on the Implementation of Measures Pertaining to the Protection of Vulnerable Marine Ecosystems from the Impact of Bottom Fishing on the High Seas in UNGA Resolution 61/105 of 2006 and UNGA Resolution 64/72 of 2010” (2010) 6.

⁸² Spanish Government, “Deep-Sea High Seas Fisheries: Vessels Authorized to Conduct Bottom Fisheries in Areas beyond National Jurisdiction (UNGA 61/105, Paragraph 87).”

⁸³ Council Regulation (EC) No 734/2008 of 15 July 2008 on the Protection of Vulnerable Marine Ecosystems in the High Seas from the Adverse Impacts of Bottom Fishing Gears 2008 8, preamble 2.

⁸⁴ The EU also envisaged application to the Southern Indian Ocean, as there was no RFMO/A at that time: “EU Report on the Implementation of Measures Pertaining to the Protection of Vulnerable Marine Ecosystems from the Impact of Bottom Fishing on the High Seas in UNGA Resolution 61/105 of 2006 and UNGA Resolution 64/72 of 2010” (2010) 2.

⁸⁵ EU, 2010. “EU Report on the Implementation of Measures Pertaining to the Protection of Vulnerable Marine Ecosystems from the Impact of Bottom Fishing on the High Seas in UNGA Resolution 61/105 of 2006 and UNGA Resolution 64/72 of

(footnote continued)

2010.” 2

⁸⁶ Review of the regulation remains on the Commission's work programme for 2013. See EC, “Commission Actions Expected to Be Adopted: 01/11/2013 – 31/12/2013” 1.

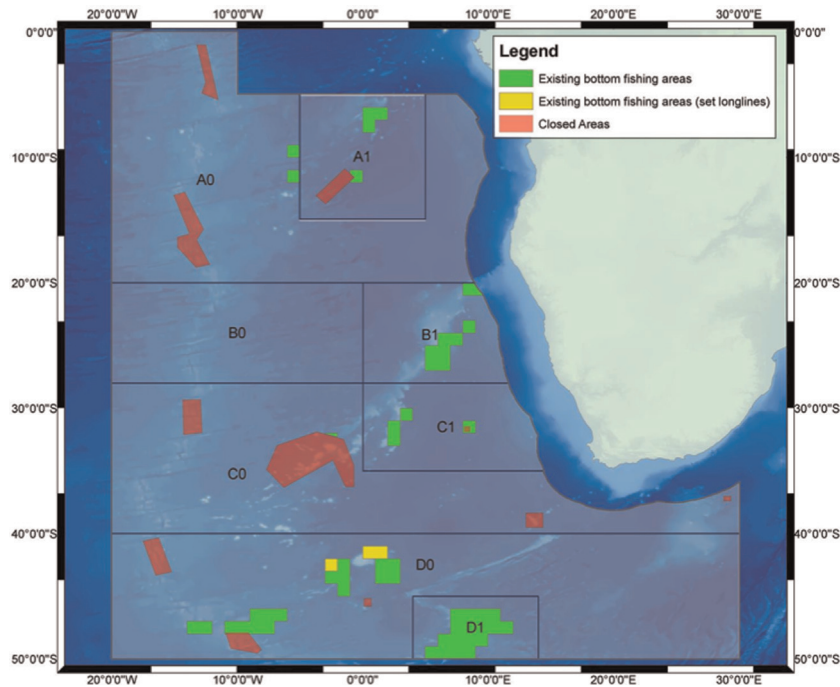
⁸⁷ EU, “EU Report on the Implementation of Measures Pertaining to the Protection of Vulnerable Marine Ecosystems from the Impact of Bottom Fishing on the High Seas in UNGA Resolution 61/105 of 2006 and UNGA Resolution 64/72 of 2010” (2010) 6.

⁸⁸ “Record of the 10th Multilateral Meeting on Management of High Seas Fisheries in the North Pacific Ocean.” 2011. Vancouver, British Columbia.

⁸⁹ Ibid.

⁹⁰ There are no updates on the Convention's official website since the tenth multilateral meeting in 2011. See <http://nwpbfo.nomaki.jp/>.

⁹¹ Fisheries Agency of Japan, “Report on Identification of Vulnerable Marine Ecosystems in the Emperor Seamount and Northern Hawaiian Ridge in the Northwest Pacific Ocean and Assessment of Impacts Caused by Bottom Fishing Activities on Such Vulnerable Marine Ecosystems or Marine Species” (2008) 14.



Map 4. : High seas bottom fisheries closures in the SEAFO area Source: SEAFO. (Conservation Measure 26/13 on Bottom Fishing Activities in the SEAFO Convention Area 2013 5.)

fishing in areas deeper than 1,500m,⁹³ and closure of an additional, smaller seamount (C-H Seamount).⁹⁴

South Korea agreed on tentative closure of the relevant part of the Koko Seamount (Map 6) and temporary closure of C-H Seamount⁹⁵. South Korea also suggested “provisionally” prohibiting bottom fishing north of latitude 40°. Russia also noted the Koko Seamount as an area for closure.⁹⁶ The US agreed on the Koko Seamount closure and proposed a marine stock rebuilding area (SRA) that would be temporarily closed to bottom trawling and all other bottom-fishing operations for up to 6 years.⁹⁷

The closures suggested in these reports remain proposals only and are provisional in nature until the Convention becomes a functioning RFMO. Even if some countries unilaterally prohibit their vessels from fishing in the proposed areas, others would be free to continue bottom fishing in that area.

4.3.2. South Pacific

The South Pacific Regional Fisheries Management Organisation (SPRFMO) has implemented conservation and management measures, while New Zealand (NZ) has closed some large fishing blocks to its vessels as a precautionary measure to protect VMEs.

The *Convention on the Conservation and Management of High Seas Fishery Resources in the South Pacific Ocean* was adopted in November 2009 and entered into force in August 2012.⁹⁸ The first

Scientific Committee meeting, held in October 2013, noted that the level of deep-water fishing activity in the SPRFMO area is currently low, but that it may increase. Given that relatively low levels of demersal fishing can quickly cause long-lasting impacts on VMEs, the Preparatory Conference agreed that the Committee should conduct research, including predictive habitat modelling, to evaluate the probability of the presence of VMEs and bycatch assessment.⁹⁹

The interim approach taken since implementation was that each party declared its 2002–2006 bottom fishing footprint and agreed not fish outside that area,¹⁰⁰ effectively closing those outside areas. At its second meeting in January 2014, the Commission adopted a Conservation and Management Measure for the management of bottom fishing¹⁰¹ that reflects the interim approach, with States agreeing to undertake bottom fishing only within their 2002–2006 footprints until 2016 or until an alternative measure is introduced. As early as 2007 the SPRFMO Science Working Group noted that effective protection of VMEs would likely require the establishment of bottom fisheries closures.¹⁰² The measure provides for the closure of VMEs to fishing activities, it does not specifically identify such an area.¹⁰³ The measure also calls for further research into VMEs from the Scientific Committee¹⁰⁴ and for States to restrict their bottom fishing activities to their historical footprint and catch levels.¹⁰⁵

⁹² Ibid 14–15.

⁹³ Ibid 16.

⁹⁴ Ibid 17.

⁹⁵ Republic of Korea Ministry for Food, Agriculture, Forestry and Fisheries, “Reports on Identification of VMEs and Assessment of Impacts Caused by Bottom Trawl Fishing Activities on VMEs And/or Marine Species” (2008) 6–7.

⁹⁶ Russian Federation, “Report on Identification of VMEs and Assessment of Impact by Bottom Fishing Activities on VMEs and Marine Species” (2008) 7.

⁹⁷ NOAA Fisheries, “Reports on Identification of VMEs and Assessment of Impacts Caused by Bottom Fishing Activities on VMEs and Marine Species” (2008) 39–40.

⁹⁸ For current ratification status, see <http://www.mfat.govt.nz/Treaties-and-International-Law/01-Treaties-for-which-NZ-is-Depositary/0-sprfmo-convention.php>.

⁹⁹ SPRFMO Scientific Committee, “Research Programme 2013.”

¹⁰⁰ “Interim Measures Adopted by Participants in Negotiations to Establish South Pacific Regional Fisheries Management Organisation.”

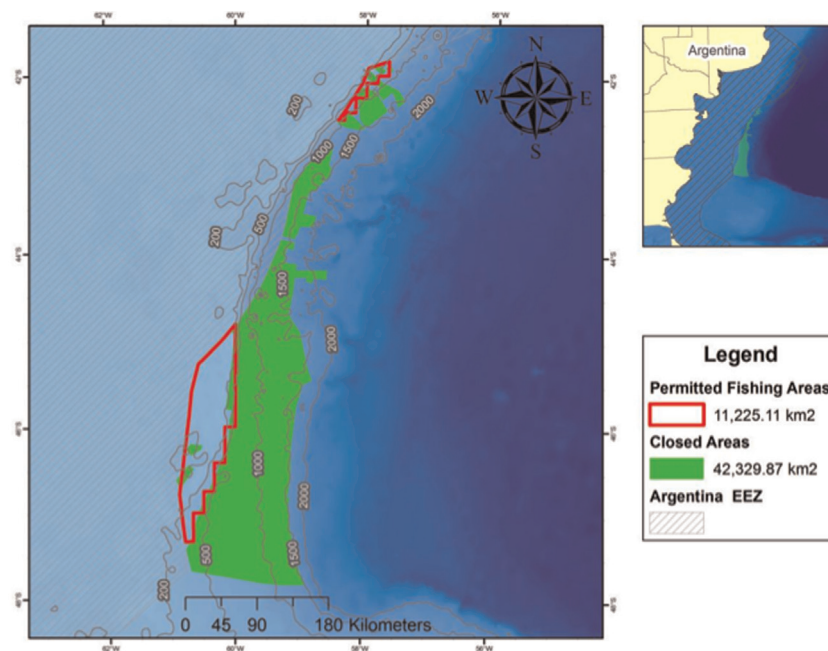
¹⁰¹ SPRFMO, “Second Meeting of the Commission of the South Pacific Regional Fisheries Management Organisation,” vol. 2014 (2014) 3.

¹⁰² Andrew Penney, ‘Spatial analysis of Australian and New Zealand historical bottom trawl fishing effort in the SPRFMO Area’ (Australian Government, October 2013).

¹⁰³ SPRFMO, “Conservation and Management Measure for the Management of Bottom Fishing in the SPRFMO Convention Area” (2014) s 22.

¹⁰⁴ SPRFMO, “Conservation and Management Measure for the Management of Bottom Fishing in the SPRFMO Convention Area” 5.

¹⁰⁵ Ibid 8.



Map 5. : High seas bottom fisheries closures unilaterally declared by Spain. Source: [19].

Pursuant to earlier interim measures, and in accordance with the measure,¹⁰⁶ NZ implemented closures in its footprint area (Map 7).¹⁰⁷ Lightly trawled blocks are closed to bottom fishing and moderately trawled blocks are subject a move-on rule, while heavily trawled blocks generally remain open to bottom fishing.¹⁰⁸ In spatial terms, 41% of the NZ footprint is closed to bottom trawling, 30% is subject to move-on provisions, and 29%, representing 0.13% of the SPRFMO Area, is open.¹⁰⁹ However, only 11 of the 42 large seamounts in NZ's footprint fall within closed areas [14]. It is worth noting that NZ's 2002-2006 footprint represents approximately half of NZ's total bottom fishing footprint, as fishing commenced around 1980, suggesting that a much larger area is effectively closed to NZ vessels.¹¹⁰

Penney and Guinotte [34] conducted a detailed analysis of the NZ closures, concluding that the existing sites are "sub-optimal for protecting likely coral VMEs in all but one of the high-seas fishing areas constituting the New Zealand historical trawl footprint".

These measures were developed in consultation with industry, environmental non-governmental organisations and government departments. Competing objectives understandably emerged in these consultations, principally the conflict between protection of features known to or likely to support VMEs and access to fisheries. Noting the difficulties of identifying VMEs and SAIs, NZ aimed to balance these competing objectives by implementing measures that provide for "adequate and representative protection" [33], p. 344), contrary to the wording of the UN resolutions. Analyses of the options for closures shows that there may be win-win options for better optimisation in some parts of the footprint, in particular ensuring that areas with a high likelihood of the

presence of VMEs are closed [25,26,34]. Any such analysis and ultimate closures must respect the UN resolutions and give a sufficiently wide margin of error to account for the known destructive nature of bottom fishing techniques.

As previously highlighted in relation to Norway's approach within NEAFC, the UNGA resolutions do not mention "adequate" or "representative" areas. It is noted, however, that despite the similarities in approach, the NZ approach is broader, using a wide range of available information to design representative protection measures across the full extent of the fishing footprint,¹¹¹ whereas the NEAFC closures target specific seamounts and coral areas [33]. NZ's approach also complies in a more explicit manner with the FAO Guidelines.

Nonetheless, these were only ever intended to be interim measures. In the long term, "effective protection of benthic VMEs in the Pacific Ocean high seas will probably require the establishment of a series of international spatial closures designed to protect adequate and representative areas of habitats and ecosystems" [33].

4.4. Southern Ocean

The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) established a MPA covering South Orkney Island's southern shelf in 2009,¹¹² and discussions are ongoing regarding the establishment of a network of MPAs [41,12]. CCAMLR has also established a number of high seas bottom fisheries closures. Commercial bottom trawling is prohibited in the high seas within the CCAMLR region, with regulations applying to longline fisheries.

The CCAMLR instituted a high seas bottom fishery closure in 2009, prohibiting fishing for toothfish in depths shallower than 550 m in order to "protect benthic communities".¹¹³ A framework conservation measure for the management of bottom fisheries came into force in 2007 (CM 22-06), setting out the procedures for

¹⁰⁶ Ibid 8(h).

¹⁰⁷ New Zealand Government, "Report on New Zealand's Implementation of Operative Paragraphs 80 and 83-90 of Resolution 61/105" 7-12.

¹⁰⁸ Additional precautionary closures of representative blocks in the moderately and heavily trawled areas may be implemented and further blocks may be closed in any area found to contain significant evidence of VMEs.

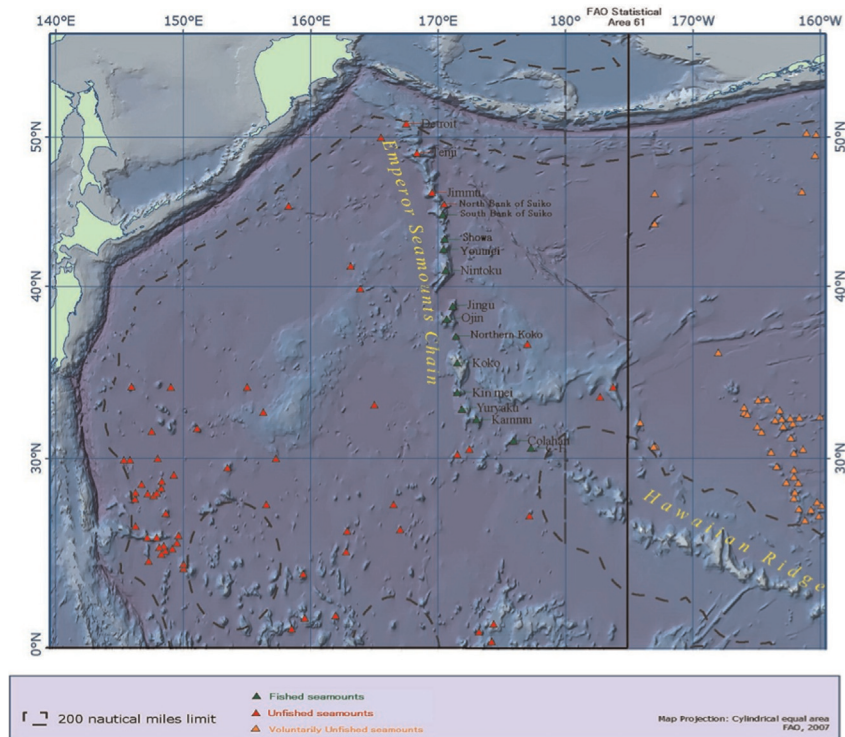
¹⁰⁹ New Zealand Government, "Report on New Zealand's Implementation of Operative Paragraphs 80 and 83-90 of Resolution 61/105" 9.

¹¹⁰ Personal Communication. See also Andrew Penney, 'Spatial analysis of Australian and New Zealand historical bottom trawl fishing effort in the SPRFMO Area' (Australian Government, October 2013).

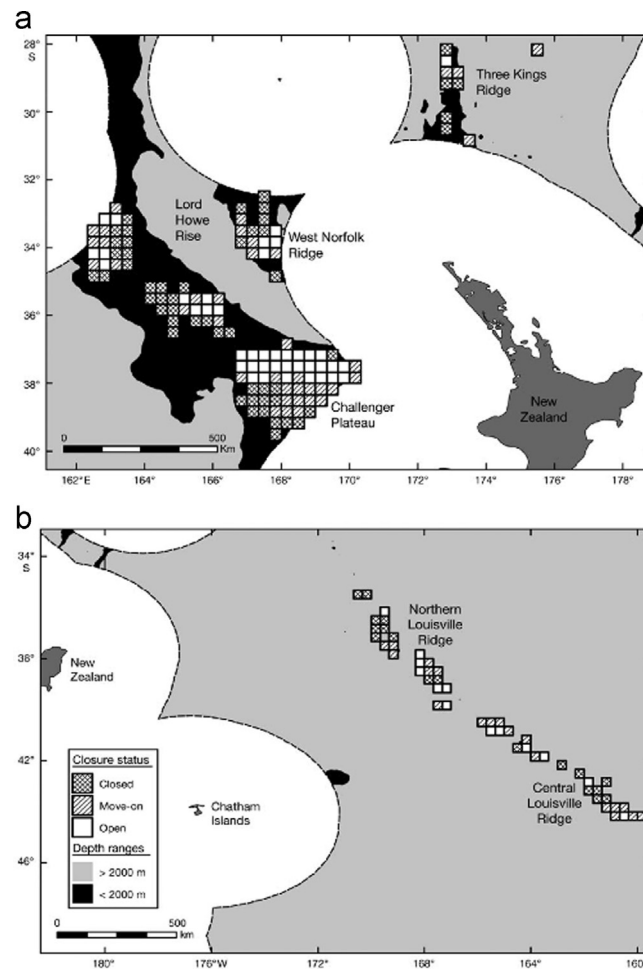
¹¹¹ Such as on fishing intensity, connectivity, depth zones, biogeographic zones and topography, as recommended by Williams and Bax [52].

¹¹² Conservation Measure 91-03.

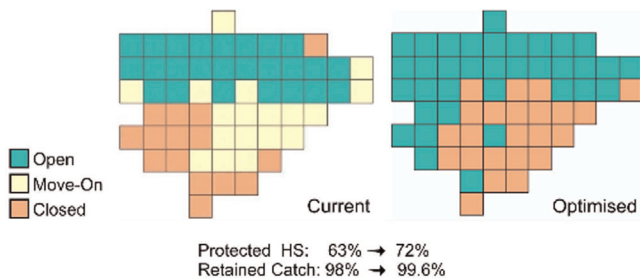
¹¹³ CCAMLR, "Conservation Measure 22-08: Prohibition on Fishing for *Dissostichus* Spp. in Depths Shallower than 550 M in Exploratory Fisheries."



Map 6. : Seamounts within NPOC area. (<http://nwpbfo.nomaki.jp/Map.html>.) Source: NPOC website.



Map 7. : Open, move-on and closed blocks in NZ's bottom trawl footprint. (Southern Louisville footprint blocks not shown. Dark grey shading shows the trawlable seabed area < 2000 m depth.) Source: [33].

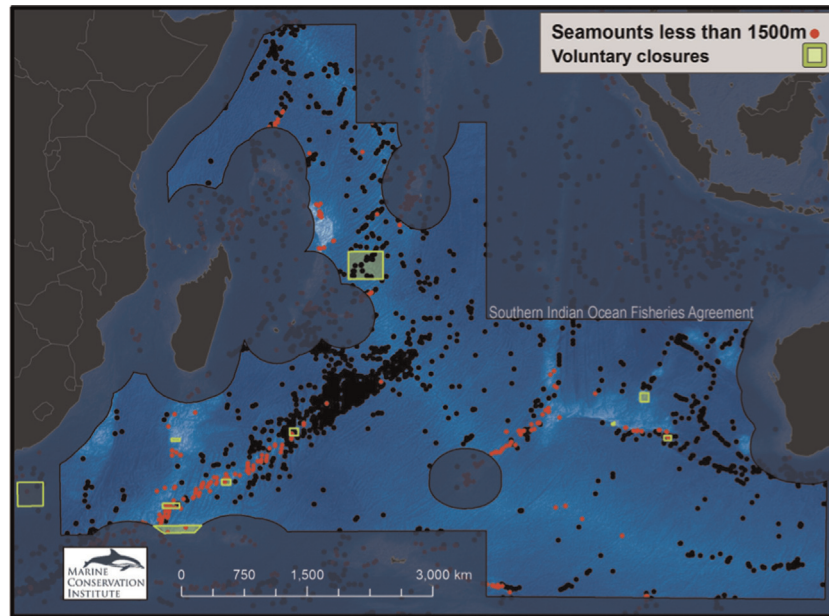


Map 8. : Example of optimised high seas bottom fisheries closures on the Challenger Plateau. (Assumes closure of 40% of the blocks and achieving at least 75% of the range in average habitat suitability, while retaining at least 75% of total historical catch.) Source: [34].

identified and 37km were closed to bottom fishing.¹¹⁹ These areas, in the Dumont d'Urville Sea, fall within an area currently closed to bottom fishing. At its 31st meeting in 2012, the Commission noted, "all VMEs are currently afforded protection through specific area closures... and general closures to bottom fishing activities".¹²⁰ No further VMEs were highlighted as requiring additional protection in the 2013 meetings of the Scientific Committee and discussions centred on other issues.¹²¹

4.5. Indian Ocean

The South Indian Ocean Fisheries Agreement (SIOFA) has only recently been concluded, and no closures have yet been implemented. However, the Southern Indian Ocean Deep Sea Fishers



Map 9. : SIOFA Benthic Protected Areas as of 2011 and seamounts at fishable depths within the Southern Indian Ocean Fisheries Agreement area. Source: Marine Conservation Institute, 2011 (unpublished data).

assessment of bottom fishing activities by the Scientific Committee, encounters with VMEs and monitoring and control.¹¹⁴ In 2008 the CCAMLR created a VME registry to manage data provided in VME encounter reports.¹¹⁵

In 2008 the first specific closures for VMEs were instituted, comprising two small areas totalling 4.64 km.¹¹⁶ This followed two notifications of encounters with potential VMEs made under CM 22-06 and subsequent recommendations of the Working Group on Ecosystem Monitoring and Management (WG-EMM) and the Scientific Committee that these areas be closed.¹¹⁷ These areas were the first VME encounters in an area still open to toothfish fishing, and therefore represented the first opportunity to further protect VMEs in the CCAMLR area.¹¹⁸ In 2012, a further two VMEs were

Association (SIODFA), an association comprising the 5 commercial fishing operators in the region has declared 13 voluntary closures.

The Agreement establishing SIOFA was signed in July 2006¹²² and entered into force in June 2012.¹²³ During their first meeting in October 2013, Contracting Parties recognised the need to give effect to the UNGA resolutions prior to the next meeting in 2015. At the second meeting of SIOFA, in March 2015, the parties failed to agree on binding conservation measures, though it was agreed that "each Contracting Party would endeavour to limit the deep sea trawl fishing effort to recent historical levels until the 2016 annual session of the Meeting of the Parties".¹²⁴ The DSCC and the commercial fishers association for the region questioned the

¹¹⁴ CCAMLR, "Conservation Measure 22-06: Bottom Fishing in the Convention Area."

¹¹⁵ See <http://www.ccamlr.org/en/wg-fsa-10/07>.

¹¹⁶ CCAMLR, "Conservation Measure 22-09: Protection of Registered Vulnerable Marine Ecosystems in Subareas, Divisions, Small-Scale Research Units, or Management Areas Open to Bottom Fishing".

¹¹⁷ Scientific Committee of the Conservation of Antarctic Marine Living Resources, "Report of the Thirtieth Meeting of the Scientific Committee" (2011) 33, 362.

¹¹⁸ Ibid 164. 32 notifications had been made in areas where bottom-fishing activities were already restricted.

¹¹⁹ CCAMLR, "Conservation Measure 22-09: Protection of Registered Vulnerable Marine Ecosystems in Subareas, Divisions, Small-Scale Research Units, or Management Areas Open to Bottom Fishing".

¹²⁰ [44]. "Report of the Thirty-First Meeting of the Scientific Committee", Hobart [44], p. 34).

¹²¹ Scientific Committee of the Conservation of Antarctic Marine Living Resources, "Report of the Thirty-Second Meeting of the Scientific Committee (Preliminary Version)" (2013) 46–48.

¹²² Ibid.

¹²³ "Southern Indian Oceans Fisheries Agreement: Signatories and Parties to the Agreement."

¹²⁴ Report of the Second Meeting of the Parties to the Southern Indian Ocean Fisheries Agreement, Mauritius, 17–20 March 2015, paragraph 27.

Table 1
Summary of fisheries closures in areas beyond national jurisdiction.

Region	Body State	Type of body	Parties	Closures
Mediterranean	GFCM	RFMO	Albania, Algeria, Bulgaria, Croatia, Cyprus, European Community, Egypt, France, Greece, Israel, Italy, Japan, Lebanon, Libya, Malta, Monaco, Montenegro, Morocco, Romania, Slovenia, Spain, Syria, Tunisia and Turkey	1 Blanket closure (areas below 1000 m); 3 specific closures to protect particular features
North-East Atlantic	NEAFC	RFMO	Denmark (Faroe Islands & Greenland), EU, Iceland, Norway, Russia	11 closures, in place until 2017
North-West Atlantic	NAFO	RFMO	Canada, Cuba, Denmark (Faroe Islands & Greenland), EU, France (Saint Pierre & Miquelon), Iceland, Japan, South Korea, Norway, Russia, Ukraine, US	20 closures, in place until the end of 2020
South-East Atlantic	SEAFO	RFMO	Angola, EU, Japan, South Korea, Namibia, Norway, South Africa	11 permanent closures
South-West Atlantic	EU Spain Estonia	Regional body/States	Spain	9 temporary closures (expired)
North Pacific	NPPC	RFMO	Canada, Japan, Russia, South Korea, US	Formal closures yet to be declared, agreement on tentative closure of one seamount; some agreement on tentative closure of another
South Pacific	SPRFMO	RFMO	Australia, Belize, Chile, China, Cook Islands, Cuba, EU, Denmark (Faroe Islands), New Zealand, Russia, South Korea, Chinese Taipei (Taiwan), Vanuatu	Formal closures yet to be declared, 'footprint' approach taken effectively limits fishing activity; closures implemented by New Zealand
Southern Ocean	CCAMLR	RFMO	Australia, Argentina, Belgium, Brazil, Bulgaria, Canada, Chile, China, Cook Islands, EU, Finland, France, Germany, Greece, India, Italy, Japan, Korea, Mauritius, Namibia, Netherlands, New Zealand, Norway, Pakistan, Panama, Peru, Poland, Russia, South Africa, Spain, Sweden, Ukraine, UK, US, Uruguay, Vanuatu	1 MPA; 1 blanket closure in relation to toothfish fisheries; 4 additional closures. Commercial bottom trawling prohibited throughout the CCAMLR region. Regulations apply to mainly longline fisheries
Indian Ocean	SIOFA	RFMO	Australia, Cook Islands, EU, Mauritius, Seychelles	13 voluntary protected areas
Indian Ocean	SIOFA	Industry association	Austral Fisheries (Pty) Ltd., (Australia) ORAFCO Limited (Cook Islands) United Frame Investments Ltd. (Cook Islands) Kanal Fisheries Co. Ltd., Hokkaido (Japan) B&S International Ltd. (Mauritius) ^a	

^a Ceased fishing operations in the SIODFA area in 2011.

wisdom of further delaying the implementation of concrete conservation measures.¹²⁵

Following the meetings to establish SIOFA, there was concern among some commercial fishery operators that little more could be achieved at the political level until a fisheries agreement was ratified, yet this process was proving time-consuming and there was no certainty as to when an agreement would be concluded [45]. In the meantime, fishing operations continued unabated with no leadership or direction regarding capturing catch and effort data. Realising that they would play the major role in implementing an eventual agreement, three of the four operators in the region approached the FAO to seek its assistance in organising informal meetings to advance management and prepare for implementation of SIOFA [45]. In 2006, the four operators formed the Southern Indian Ocean Deepsea Fishers Association (SIODFA) and held two meetings to discuss management actions for the fishery.

A key outcome of these meetings was the decision to declare eleven areas in the southern Indian Ocean as “*benthic protected areas*” (Map 9). SIODFA stated that it sought to ensure that these areas were declared only in areas where their trawlers actually operated, stating: “*extending the boundaries of the no-trawling zones to large areas of adjacent abyssal areas simply to ‘make the numbers look good’*” would be counterproductive, particularly as some of these adjacent areas may be the subject of extractive activities in the future [45]. Overall, 94.5% of seamounts and 93.3% of the seafloor of fishable depth using current technology (less than 1500 m) remain available to fishing (Map 9; Marine Conservation Institute, 2011, unpublished data).

The majority of fishing currently takes place at depths of less than 1000 m,¹²⁶ suggesting that the level of current protection may be underestimated in the map below. However, as the trend of fisheries is to fish progressively deeper over time [49], it is reasonable to conclude that deeper areas left accessible to fishing may be targeted in the future. SIODFA itself has expressed its concern that fishing effort will expand in the coming years.¹²⁷

Clark et al. [7] note: “*the number and ‘class’ of seamounts protected under the SIODFA... network was clearly inadequate. Most protected seamounts were in one class (which was too deep for trawling), and the total number of seamounts protected was comparatively low*”. SIODFA disputes some of Clark’s conclusions, arguing that many of the unprotected seafloor features, though ostensibly ‘accessible’, have never been associated with commercial fishing or are unfishable for other reasons.¹²⁸ Some of the accessible areas may nonetheless be fished in the future if left unprotected.

One global study has noted the pitfalls of allowing users to self-regulate in a similar context, that of conservation measures implemented by fishing quota owners, stating that under-protection is common and that, “*the protection of both benthic ecosystems and essential fish habitat (EFH) are marginal at best when quota owners have primacy in determining the boundaries of bottom trawl closures*” [38].

In October 2013, SIODFA announced that a further two areas were to be closed;¹²⁹ these closures are at fishable depth.¹³⁰

Unlike RFMO/A closures, the SIODFA closures apply only to member companies,¹³¹ with no means of compelling non-members

¹²⁵ Ibid, Appendices Q and T.

¹²⁶ Personal communication.

¹²⁷ Report of the Second Meeting of the Parties to the Southern Indian Ocean Fisheries Agreement, Mauritius, 17–20 March 2015, Appendix Q.

¹²⁸ Ibid.

¹²⁹ IUCN, “Biggest Zone Closed to Fishing Announced” (2014) < <http://www.iucn.org/fr/presse/communiqués/?13875/Biggest-zone-closed-to-fishing-announced> > .

¹³⁰ Personal Communication

¹³¹ Under the UNFSA, non-members of RFMO/As are obliged to comply with their conservation and management measures.

or new operators to comply,¹³² and, like other closures, the SIODFA closures cannot control other activities in these areas. Nonetheless, the SIODFA has noted the limitations of its closures and stated that “a decision by the members of the IOTC to observe the [Benthic Protected Areas] would be welcome” and that it hoped that “other agencies would observe and support this initiative and not undermine its intent” [45].

In this regard, adherence to the closures form part of the licensing conditions in two of the three flag States (Australia & Cook Islands).¹³³ The Japanese government does not oppose the closures but has not yet been in a position to formally endorse them through licensing conditions; the Japanese member has agreed to observe the closures.¹³⁴

4.6. Summary of high seas bottom fisheries closures

Table 1 below provides a summary of the closures implemented to date.

5. What role for RFMO/As in marine biodiversity conservation?

5.1. The shortcomings of RFMO/As

The above discussion of fisheries closures shows that few additional closures have been implemented since the previous reviews were carried out by the UN Review Conferences¹³⁵ and civil society [14,42,50]. There also remain some issues regarding how closures are identified and implemented. This reflects broader discontent with the ability or willingness of RFMO/As to effectively integrate biodiversity conservation into fisheries management.

RFMO/As have sometimes been slow to follow the advice of their respective scientific bodies in considering closures, either disregarding recommendations or adopting closures that do not fully meet the demands of the scientific evidence. In many cases, the pace of action is inconsistent with the precautionary principle, with RFMO/As requesting further evidence of the presence of VME rather than taking a precautionary approach. RFMO/As have at times not closed areas where there is strong evidence of the presence of VMEs, implemented temporary closures when permanent closures are needed, and closed only representative areas. Often closures cover depths that are considered unfishable in any case [19,38], or do not cover relevant seamounts and other structures. When identifying VMEs, the focus has generally been on corals and sponges, rather on the wide range of other species and habitats that would fit the criteria in the FAO Guidelines [3]. Overall, there is a strong likelihood that a great many VMEs remain open to bottom fishing in ABNJ.

A number of RFMO/As have taken the approach of ‘freezing the footprint’ of fishing activities, meaning that closures are implemented only in non-fished areas. However, even in heavily fished areas evidence has been found of highly biodiverse seabed areas [47,8], possibly because “unfished areas occurring within ‘fished area’ footprints defined at coarse resolution are likely to contain undamaged benthic communities” [34]. Therefore closures should also be implemented in areas that are currently fished, in some particular cases.

Taken together, these shortcomings evidence an approach to fisheries closures, and to conservation generally, that is piecemeal, inconsistent, and contrary to the precautionary approach. This unsatisfactory situation persists in regions with established regulatory frameworks, yet in some regions, such as the Indian Ocean and North Pacific, the competent RFMO/As are fledgling. Their development has generally been very slow or only weak interim measures have been implemented, if action has been taken at all.

Moreover, RFMO/As have only a limited mandate, and hence at best could only establish measures directed at specific fishing activities. RFMO/As cannot establish MPAs directed at the full range of threats posed by other industries. Given the foregoing, it is clear high seas bottom fisheries closures can therefore only ever be a starting point, but also a very important part of a broader framework for integrated conservation that considers the full range of human pressures and threats

5.2. Improving RFMO/A performance

Despite the issues raised above, there are some positive lessons learned from the experiences of RFMO/As in implementing high seas bottom fisheries closures. CCAMLR provides an example of a regulatory body that is reacting quickly to protect VMEs, following up on VME encounters, and following the advice of its SC. Nonetheless, CCAMLR is not without problems of its own, and discussions on MPAs established for broader conservation purposes have been in deadlock for some years. The MoU between NEAFC and OSPAR, and the Madeira Process, highlights a potential avenue for furthering conservation through cooperation between Regional Seas programmes and RFMO/As, while the establishment of SIODFA highlights a potential role for industry associations and voluntary closures. Nonetheless both of these approaches also require substantial elaboration and improvement if they are to be effective. For example, voluntary organisations, such as SIODFA, have no formal powers: they can only engage member companies and compliance is entirely voluntary.

Against this background, some recommendations can be made for RFMO/As to better ensure the conservation of high seas biodiversity, specifically in relation to high seas bottom fisheries closures.

First, it is crucial that RFMO/As follow the advice of their respective scientific bodies more closely and in a timely manner. Temporary closures should be made permanent where VMEs exist in the area, and closures should be quickly established in all areas where a VME encounter has been reported or VMEs are likely to exist. In turn, the use of move-on rules should be reconsidered, and in any case must be much more precautionary in their formulation, as well as better implemented and monitored. Closures must be made wherever VMEs occur, rather than confined to fished areas, ‘representative’ areas, or areas where there is minimal impact on fisheries [10]. The tendency for discussions to be of a political nature should be reversed: the focus should return to environmental protection and implementation of the UNGA resolutions. The value of global scrutiny and assessment of regional progress should not be underestimated, but it is clear that three years is too long an interval for UNGA review given the slow progress being made.

RFMO/As also need to collaborate with other regional bodies, especially Regional Seas programmes and other regional agreements. For instance, SPRFMO could collaborate with the Secretariat of the Pacific Regional Environment Programme (SPREP) to establish joint MPAs/fisheries closures in the high seas ‘pockets’ between Pacific island States. Similarly, the possible extension of the Abidjan Convention to ABNJ could enable collaboration with fisheries bodies in the Atlantic Ocean to establish MPAs based on existing high seas bottom fisheries closures.¹³⁶ Such cooperation could greatly

¹³² Though SIODFA membership is predicated on acceptance of the closures: <http://www.siodfa.org/programmes/iucn-project/>.

¹³³ Personal communication.

¹³⁴ Personal communication.

¹³⁵ UN DOALOS, Review Conference on the 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 (New York, 22 to 26 May 2006 and 24 to 28 May 2010), http://www.un.org/depts/los/convention_agreements/review_conf_fish_stocks.htm.

¹³⁶ At its most recent meeting, the COP to the Abidjan Convention requested

improve high seas governance, particularly in relation to the establishment of high seas MPAs.

Other studies have noted that RFMO/As have been “slow in incorporating modern management principles such as the ecosystem or precautionary approaches” [27] and recommend a range of best practices that should be followed by RFMO/As in relation to conservation [27,29,9]. A range of best practices and reforms have also been proposed in relation to participation, transparency, accountability and enforcement ([3,20,9,27]).

6. Conclusion

Exploitation of the high seas has increased dramatically in recent decades, as have efforts to regulate activity and preserve marine biodiversity. Bottom fishing has been a particular concern due to its destructive nature, and the international community has repeatedly called on RFMO/As to take action.

Experience with high seas bottom fisheries closures shows that RFMO/As can respond to global calls to protect ecosystems, but that their response to date has been weaker than is necessary if marine biodiversity in ABNJ is to be adequately preserved. Specifically, RFMO/As have been slow to implement additional closures and to act in a precautionary manner based on available scientific evidence, have often implemented temporary or representative closures, and have made closures that do not in fact restrict ongoing fishing activity. While some positive outcomes provide examples of good practice, particularly in the North East Atlantic and Southern oceans, it is clear that much remains to be done if the full intent of the UNGA resolutions is to be realised.

While RFMO/As will most likely continue to be the primary vehicle for fisheries management and stopgap conservation measures in ABNJ in the short- to medium-term, their role in the conservation of marine biodiversity should be re-considered. It is clear that RFMO/A measures, including high seas bottom fisheries closures, can only ever be one element of a broader framework for integrated conservation.

Map 2, Map 4, Map 5, Map 8

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(footnote continued)

that the secretariat to set up a working group to study all aspects of the conservation and sustainable use of marine biological diversity in ABNJ within the framework of the Abidjan Convention. The Convention does not currently apply to ABNJ, however this working group could be the first step towards extended the scope of the Convention. Decision CP. 11/10. *Conservation and Sustainable use of the Marine Biodiversity of the Areas Located beyond National Jurisdictions* (2014).

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