deepsea conservationcoalition

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Unfinished business: a review of the implementation of the provisions of United Nations General Assembly resolutions 61/105 and 64/72, related to the management of bottom fisheries in areas beyond national jurisdiction

Deep Sea Conservation Coalition

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Executive summary

Contents

Citation:
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The management of deep-sea fisheries in areas beyond national jurisdiction has been the subject of extensive debate over the past 10 years at the UN General Assembly [UNGA]. UNGA resolution 59/25, adopted in 2004, called on States individually or through regional fisheries management organisations [RFMOs] "to take action urgently, and consider on a case-by-case basis and on a scientific basis, including the application of the precautionary approach, the interim prohibition of destructive fishing practices, including bottom trawling that has adverse impacts on vulnerable marine ecosystems, including seamounts, hydrothermal vents and cold water corals located beyond national jurisdiction, until such time as appropriate conservation and management measures have been adopted in accordance with international law".

In 2006, in response to a review of the actions taken by States and RFMOs, the General Assembly adopted resolution 61/105, based on a compromise proposal offered by deep-sea fishing nations, which committed States and RFMOs to take specific measures to protect vulnerable marine ecosystems [VMEs] from the adverse impacts of bottom fisheries in the high seas and to ensure the long-term sustainability of deep-sea fish stocks. These measures included conducting impact assessments to determine whether significant adverse impacts [SAIs] to VMEs would occur, managing fisheries to prevent SAIs on VMEs, and closing areas of the high seas to bottom fishing where VMEs are known or likely to occur, unless regulations are in place to prevent SAIs and to manage sustainably deep-sea fish stocks. The UNGA set a deadline of 31 December 2008 for the implementation of the measures outlined in resolution 61/105 and called on States to ensure that high seas bottom fishing does not occur after this date unless or until regulations consistent with the measures in the resolution are in place.

Again, based on a review in 2009 of the actions taken by States and RFMOS, the UNGA adopted resolution 64/72 that reaffirmed resolution 61/105 and strengthened the call for action through committing States, inter alia, to ensure that vessels do not engage in bottom fishing until impact assessments have been carried out and to not authorise bottom fishing activities until the measures in resolutions 64/72 and 61/105 have been adopted and implemented.

UNGA resolutions

As of July 2011, impact assessments have been produced for most high seas bottom fisheries in the Pacific Ocean and Southern Ocean. However, even the most comprehensive assessments are not fully compliant with the the 2009 Food and Agriculture Organization [FAO] International Guidelines for the Management of Deep-Sea Fisheries in the High Seas [FAO Deep-Sea Guidelines] . No impact assessments have been produced for the high seas bottom fisheries in the Atlantic and Indian Oceans. Substantial areas of the high seas have been closed to bottom fishing to protect VMEs in a number of regions, but many areas where VMEs are likely to occur remain open to bottom fishing with few or no constraints. Moreover, there has been a general reluctance on the part of many States and RFMOs to close high seas areas to protect VMEs where bottom fishing currently takes place. VME encounter protocols and 'move-on' rules are often the only conservation regulations in place to protect VMEs, and some regions lack even these basic regulations. Measures to protect VMEs in many areas have been narrowly focused on coral and sponge species rather than the full suite of species and ecosystems that fit the criteria established in the FAO Deep-Sea Guidelines.

In addition, most high seas bottom fisheries target, and take as bycatch, long lived, slow growing, low fecundity species that are highly vulnerable to overexploitation and depletion. Hundreds of species are taken in high seas bottom fisheries worldwide and the catch of the large majority of these species is unregulated. The long-term sustainability of most deep-sea fish stocks cannot be ensured because of the absence of sufficient information on the biological characteristics and status of most target and bycatch species impacted by high seas bottom fisheries. Indeed, it is questionable whether large-scale industrial deep-sea fisheries in the high seas can be economically viable and sustainable, given that most deep-sea species can potentially sustain only low levels of exploitation.

Finally, outside of the Southern Ocean, all but a small percentage of the high seas bottom catch is taken with bottom trawl gear. Bottom trawl fishing continues to be recognised as the most serious direct threat to deep-sea ecosystems. High seas bottom trawl fisheries continue to be authorised to operate in areas where VMEs are likely to occur. Virtually all deep-sea bottom trawl fisheries cannot currently be considered sustainable and are not likely to be sustainable in the near future unless much more stringent action is taken to manage these fisheries to conserve vulnerable deep-sea species as well as protect VMEs.

KEY FINDINGS

UNGA resolutions 59/25 [2004], 61/105 [2006], and 64/72 [2009] have had an impact on the management of deep-sea fisheries in the high seas. Since 2004:

- Three new agreements negotiated to establish RFMOs in the North Pacific, South Pacific and Southern Indian Oceans to manage deep-sea fisheries in the high seas.
- The resolutions prompted States and RFMOs to take a number of tangible measures to protect VMEs.
- The use of bottom trawls has been prohibited in the high seas in the Southern Ocean by the Commission for the Conservation of Antarctic Living Marine Resources [CCAMLR].
- Several RFMOs have established bans on the use of bottom gillnets in their regulatory areas.
- The Northwest Atlantic Fisheries Organization [NAFO], North East Atlantic Fisheries Commission [NEAFC], and the South East Atlantic Fisheries Organisation [SEAFO] have closed substantial areas of the high seas to bottom fishing.
- The South Pacific RFMO negotiating process adopted Interim Measures that temporarily restricted bottom fishing in the high seas from expanding beyond areas fished over the past several years.
- The General Fisheries Commission of the Mediterranean [GCFM] has prohibited bottom trawling below 1,000 metres.

However, the UNGA resolutions have not been fully implemented by States and RFMOs. VMEs in the high seas are not sufficiently protected from SAIs, and most deep-sea fisheries are not managed to ensure the long-term sustainability of deep-sea fish stocks and species.

- Impact assessments have not been conducted for bottom fisheries in the Atlantic and Indian Oceans and the assessments in other regions are partial, inconclusive, or both.
- Some high seas areas have been closed to bottom fishing, but many areas where VMEs are likely to occur remain open with few or no constraints.

61/105 & 64/72

- Move-on rules are often the only conservation regulation to protect VMEs in existing fishing areas, but are of limited value given the high threshold catch levels established as triggers, and the fact that the move-on rules established by most RFMOs are not likely to prevent continued damage to VMEs, particularly from bottom trawl fishing.
- The identification and protection of VMEs in most areas has been limited to coral and sponge species.
- There has been a general reluctance on the part of States and RFMOs to close areas to protect VMEs where most bottom fishing currently takes place, or has taken place in recent years.
- Evidence suggests that hundreds of species are caught in high seas deep-sea bottom fisheries combined across the Atlantic, Pacific and Indian Oceans. The catch of only about 40 of these species is subject to quotas or catch limits by RFMOs or individual flag States. The catch of the remaining species is essentially unregulated.
- Even the deep-sea species for which quotas have been established are almost all considered overexploited or depleted. In most cases, there is not enough information to determine the status of the stocks or the impact of fishing.
- Most high seas bottom fisheries are not being managed to ensure the long-term sustainability of deep-sea fish stocks. The catch of the large majority of the deep-sea species on the high seas is essentially unregulated.
- Most flag States whose vessels engaged in bottom fisheries in the high seas over the past decade continue to authorise vessels to bottom fish on the high seas.

The exception to the above is the management of the bottom fisheries in the Southern Ocean. The Commission for the Conservation of Antarctic Living Marine Resources [CCAMLR] has come closest to fully implementing the provisions of the UNGA resolutions. CCAMLR has adopted a prohibition on bottom trawl and bottom gillnet fishing on the high seas. It requires all States wishing to bottom fish in the area to submit an impact assessment as a condition for authorisation to fish. The CCAMLR Scientific Committee has identified a wide range of VME related species and species groups for management purposes in addition to coral and sponge species. The move-on rule adopted by CCAMLR has resulted in area closures to protect VMEs. CCAMLR continues to engage in research to determine the potential impact of bottom longlining on VMEs. Bycatch restrictions, including move-on rules, are in place for most species of bycatch in the high seas bottom fisheries regulated by CCAMLR.

Recommendations

The failure of deep-sea fishing nations to implement effectively the UNGA resolutions risks undermining the authority and efficacy of UNGA as the pre-eminent body with oversight and responsibility for the conservation and protection of the biodiversity of the global oceans commons.

- Unless or until the resolutions have been fully and effectively implemented, flag States and RFMOs must prohibit bottom fishing on the high seas.
- Fishing that occurs in contravention of UNGA resolutions 61/105 and 64/72 should be designated as illegal, unreported and unregulated [IUU] fishing.

Introduction

The Deep Sea Conservation Coalition [DSCC] is a coalition of over 70 organisations worldwide, promoting fisheries conservation and the protection of biodiversity on the high seas. Since 2003, the DSCC has been actively involved in the international debate and negotiations to address the adverse impacts of high seas bottom fishing on deep-sea biodiversity and fish stocks in areas beyond national jurisdiction.

Since the adoption of UNGA resolution 59/24 in 2004, member organisations and advisers to the DSCC have been involved in a variety of regional and national efforts to implement the provisions of the UNGA resolutions related to the management of high seas bottom fisheries to protect VMEs and ensure the long-term sustainability of deep-sea fish stocks and species. Over the past several years, DSCC representatives have participated in meetings of the North East Atlantic Fisheries Commission [NEAFC], the Northwest Atlantic Fisheries Organization [NAFO], the Commission for the Conservation of Antarctic Marine Living Resources [CCAMLR], the North Pacific RFMO negotiations and the South Pacific RFMO negotiations, as well as consultative and legislative processes in a number of countries designed to implement regional agreements and the UNGA resolutions at the national level. DSCC representatives also participated in the development of the FAO Deep-Sea Guidelines, negotiated under the auspices of the Food and Agriculture Organization of the UN [FAO] in 2008, and the workshop in May 2010 to review the implementation of the Guidelines co-sponsored by the FAO and Republic of Korea in Busan, South Korea.

On the basis of this experience, and a review of the publicly available information on the actions taken by States and RFMOs to date, the DSCC offers the following observations on the extent to which high seas bottom fishing nations and RFMOs have adopted and implemented the measures called for in resolutions 61/105 and 64/72: specifically, the actions taken by States and RFMOs to conduct impact assessments, identify areas where VMEs are known or likely to occur, and establish measures to protect VMEs and ensure the long-term sustainability of deep-sea fish stocks. This review builds on the DSCC reviews published in May 2009 and June 2010 [the latter jointly with the International Programme on Science and the Oceans] as well as background papers prepared for the Busan workshop and a variety of scientific papers and reports.

Left: Deep Sea Conservation Coaltion web page. For online version of report go to: http://www.savethehighseas.org/

61/105 & 64/72

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Fangtooth (*Anoplogaster cornuta*) has bony, hard body, unlike most deep sea fish, Eastern Pacific

UNGA resolutions

UN General Assembly resolution 64/72, paragraphs 119–120

119. Considers that, on the basis of the review carried out in accordance with paragraph 91 of its resolution 61/105, further actions in accordance with the precautionary approach, ecosystem approaches and international law, are needed to strengthen the implementation of paragraphs 80 and 83 to 87 of its resolution 61/105 and, in this regard, calls on regional fisheries management organizations or arrangements with the competence to regulate bottom fisheries, States participating in negotiations to establish such organizations or arrangements, and flag States to take the following urgent actions in areas beyond national jurisdiction:

[a] Conduct the assessments called for in paragraph 83 [a] of its resolution 61/105, consistent with the Guidelines, and to ensure that vessels do not engage in bottom fishing until such assessments have been carried out;

[b] Conduct further marine scientific research and use the best scientific and technical information available to identify where vulnerable marine ecosystems are known to occur or are likely to occur and adopt conservation and management measures to prevent significant adverse impacts on such ecosystems consistent with the Guidelines, or close such areas to bottom fishing until conservation and management measures have been established, as called for in paragraph 83 [c] of its resolution 61/105;

[c] Establish and implement appropriate protocols for the implementation of paragraph 83 [d] of its resolution 61/105, including definitions of what constitutes evidence of an encounter with a vulnerable marine ecosystem, in particular threshold levels and indicator species, based on the best available scientific information and consistent with the Guidelines, and taking

into account any other conservation and management measures to prevent significant adverse impacts on vulnerable marine ecosystems, including those based on the results of assessments carried out pursuant to paragraph 83 [a] of its resolution 61/105 and paragraph 119 [a] of the present resolution;

[d] Adopt conservation and management measures, including monitoring, control and surveillance measures, on the basis of stock assessments and the best available scientific information, to ensure the long-term sustainability of deep sea fish stocks and non-target species, and the rebuilding of depleted stocks, consistent with the Guidelines; and, where scientific information is uncertain, unreliable, or inadequate, ensure that conservation and management measures are established consistent with the precautionary approach, including measures to ensure that fishing effort, fishing capacity and catch limits, as appropriate, are at levels commensurate with the long-term sustainability of such stocks;

120. Calls upon flag States, members of regional fisheries management organizations or arrangements with the competence to regulate bottom fisheries and States participating in negotiations to establish such organizations or arrangements to adopt and implement measures in accordance with paragraphs 83, 85 and 86 of its resolution 61/105, paragraph 119 of the present resolution, and international law, and consistent with the Guidelines, and not to authorize bottom fishing activities until such measures have been adopted and implemented.

UN General Assembly resolution 61/105, paragraph 83

83. Calls upon regional fisheries management organizations or arrangements with the competence to regulate bottom fisheries to adopt and implement measures, in accordance with the precautionary approach, ecosystem approaches and international law, for their respective regulatory areas as a matter of priority, but not later than 31 December 2008:

[a] To assess, on the basis of the best available scientific information, whether individual bottom fishing activities would have significant adverse impact on vulnerable marine ecosystems, and to ensure that if it is assessed that these activities would have significant adverse impacts, they are managed to prevent such impacts, or not authorized to proceed;

[b] To identify vulnerable marine ecosystems and determine whether bottom fishing activities would cause significant adverse impacts to such ecosystems and the long-term sustainability of deep sea fish stocks, inter alia, by improving scientific research and data collection and sharing, and through new and exploratory fisheries;

[c] In respect of areas where vulnerable marine ecosystems, including seamounts, hydrothermal vents and cold-water corals, 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;

[d] To require members of the regional fisheries management organizations or arrangements to require vessels flying their flag to cease bottom fishing activities in areas where, in the course of fishing operations, vulnerable marine ecosystems are encountered, and to report the encounter so that appropriate measures can be adopted in respect of the relevant site;

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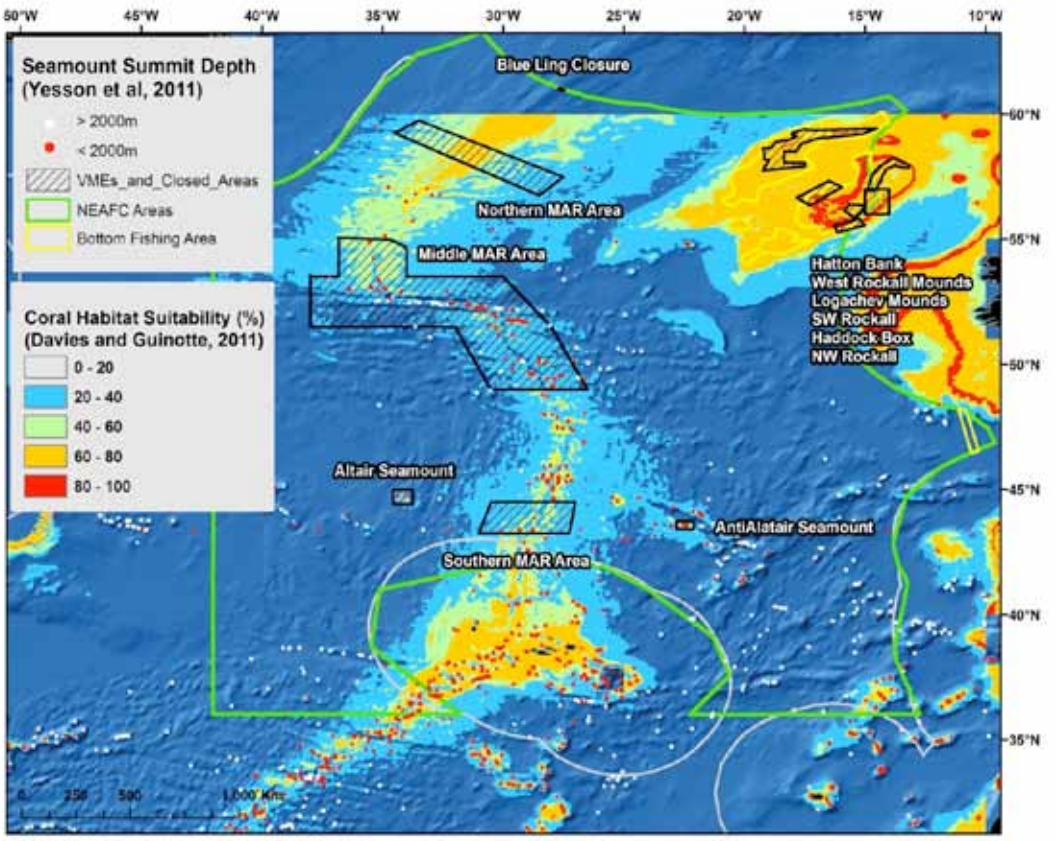

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1. The North East Atlantic Fisheries Commission [NEAFC] governs the regulation of bottom fisheries on the high seas of the North East Atlantic

2.0 NORTH ATLANTIC

2.1 NORTH EAST ATLANTIC

Description of high seas bottom fisheries

Main high seas bottom fishing nations

European Union [EU] (primarily Spain, France and Baltic States), Russian Federation, Norway, Faroe Islands.

Main high seas bottom fisheries

Bottom fisheries for roundnose grenadier, smooth-head, blue ling, common ling, cusk, Greenland halibut, black scabbardfish, conger, and deep-sea shark. Some high seas bottom fishing for cod, haddock and redfish also occurs. Bottom fisheries are predominantly bottom trawl fisheries with some bottom longline fishing also taking place.

Catch

The reported catch of deep-sea species to NEAFC for 2009, the latest year for which catch information is available, was approximately 146,000 tonnes. However, it is clear that NEAFC Contracting Parties countries are reporting some combination of the catch of deep-sea species from fisheries both on the high seas and within exclusive economic zones [EEZs], presumably on straddling stocks, without differentiating between the two areas. Furthermore, the reporting of the catch of deep-sea species has varied widely since 2004, the year that NEAFC first established a regulation to require reporting of catch of deep-sea species. Between 2004 and 2008, the reported catch fluctuated between 26,500 tonnes [2004] and 94,500 tonnes [2007], with the EU reporting approximately 95 percent of the catch. However, in 2009 both Iceland and Norway began reporting large catches of deep-sea species to NEAFC, raising the overall reported catch to close to 150,000 tonnes.[9] The actual catch of deep-sea species in the high seas is likely to be considerably less than this figure: possibly only a few thousand tonnes. However, aside from the fact that NEAFC Contracting Parties do not report high seas catches of deep-sea species to NEAFC separately from the catch within EEZs, there are considerable problems with the data and reporting of deep-sea catches.

Vessels authorised to fish in 2010–11

The NEAFC Secretariat maintains a list of vessels authorised by Contracting Parties to fish in the NEAFC Regulatory Area, but this list has not been made publicly available. However, France has submitted to the FAO a list of 31 vessels authorised to fish on the high seas in the NEAFC Regulatory Area.

Progress in the implementation of measures related to paragraphs 83 of UNGA resolution 61/105 and 119 of 64/72 for the regulation of high seas bottom fisheries

A framework regulation for the management of high seas bottom fisheries in the NEAFC Regulatory Area to implement UNGA resolution 61/105 was adopted at an Extraordinary Meeting of NEAFC in July 2008.

Impact assessments/ Preventing SAIs [83A/119[a]]

No impact assessments have yet been conducted for any of the high seas bottom fisheries in the region.

In 2008, NEAFC adopted the following regulation regarding impact assessments, which came into effect in 2009:

"Each Contracting Party proposing to participate in bottom fishing shall submit to the Secretary information on and, where possible, an initial assessment of the known and anticipated impacts of its bottom fishing activities on vulnerable marine ecosystems, in advance of the next meeting of PECMAS [Permanent Committee on Management and Science]. These submissions shall also include the mitigation measures proposed by the Contracting Party to prevent such impacts." Article 5.3[i][10]

In spite of the provisions adopted in 2008, no impact assessments have been submitted to the NEAFC Secretariat or PECMAS that the DSCC is aware of. It would appear that the term "where possible" in Article 2[i] of the regulation has allowed NEAFC Contracting Parties to treat this regulation as voluntary, though assessments are of course required by the UNGA resolutions. No explanation has been made publicly available [that the DSCC is aware of] as to why Contracting Parties have not found it "possible" to submit impact assessments.

In 2010, NEAFC added the following provision to the bottom fisheries regulation, designed to apply primarily to impact assessments in new fishing areas but, under certain conditions, fishing in existing fishing areas as well:

Article 5.3 "the Commission shall adopt conservation and management measures to prevent significant adverse impacts on vulnerable marine ecosystems. Such measures may include … If proposed bottom fishing is outside of the existing bottom fishing areas identified by the Commission in accordance with Article 3, or if there are significant changes to the conduct, or technology of existing bottom fisheries, or new scientific information indicating a VME in a given area, the Contracting Party proposing to participate in bottom fishing shall submit to the Secretary an initial assessment of the known and anticipated impacts of its bottom fishing activities on vulnerable marine ecosystems, in advance of the next meeting of PECMAS. Assessments should address the elements as set forth in Annex 3."[11]

Annex 3, referred to above, contains most of the criteria regarding the conduct of impact assessments in Paragraph 47 of the FAO Deep-Sea Guidelines. However, it omits the criteria in Paragraph 47 calling for assessing the impacts of bottom fishing on the long-term sustainability of low productivity fish stocks. Thus the impact assessments under this Article would be confined to assessing the impacts of bottom fisheries on VMEs.

It is not entirely clear from the language of Article 5.3 adopted in 2010 whether impact assessments in new fishing areas would be mandatory. This Article seems to imply that they would be mandatory only if the Commission adopts a provision specifically requiring a fishery in a new area to be assessed [or an assessment of a fishery in an existing fishing area under the conditions established in the regulation]. If so, a decision by NEAFC would require a consensus, or at least 4 of 5 votes in favour, from Contracting Parties. In addition, the use of the term *"should"* implies that it is not clear whether the impact assessment would need to be conducted consistent with the internationally agreed criteria for such assessments as set out in Annex 3 of the NEAFC regulation.

Closures of areas where VMEs are known or likely to occur unless or until measures are adopted to prevent SAIs [83C/119[b]]

Several areas along the Hatton and Rockall Banks have been identified as areas where corals are known to occur based on research trawl surveys conducted by Spain and bycatch information in commercial fisheries inside EU waters provided by the UK to the International Council for the Exploration of the Sea [ICES]. Most such areas have been temporarily closed to bottom fishing over the course of the past several years, although ICES has indicated that there are areas where corals are likely to occur that remain open to bottom fishing.

In addition, a section of the Mid-Atlantic Ridge [MAR] and adjacent seamount areas were temporarily closed in 2004. These area closures were renewed and greatly expanded in 2009 based on a proposal from Norway, adopted by NEAFC, to close three large "representative" areas of the MAR to bottom fishing [although fisheries-related scientific research is permitted within the closed areas]. The Norwegian proposal, based on information obtained by the MAR-ECO expedition, stated, in part, that *"the existence of fragile benthic macrofauna [corals, sponges etc.] on the MAR has been documented in several studies*[12] *and it is a fair assumption that most hard-bottom areas of the hills and slopes have or are likely to have such fauna albeit in varying density … In summary, there is a high likelihood that most upper slope areas and the associated range of species have to some extent been affected by past fisheries, and that fragile invertebrate communities occur on many hills."*[13]

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The proposal further stated that the "aims of the closures are to protect and/or facilitate restoration of resources and associated invertebrate communities, and to protect, as called for by UNGA and further defined by FAO, representative vulnerable ecosystems against future potentially significant adverse impacts from present and future fisheries activity." Again, as mentioned in the DSCC review in 2009, the DSCC and Worldwide Fund for Nature [WWF] pointed out at the time that UNGA resolution 61/105, in paragraph 83C, calls for closing areas where VMEs are known or likely to occur unless or until significant adverse impacts on VMEs can be prevented. It does not call for only closing "representative" areas of VMEs.[14] This was further reinforced in paragraph 119b of UNGA resolution 64/72. It is clear that the resolutions call for the protection of all VMEs from significant adverse impacts. Closing representative areas will protect VMEs, assuming the closures are effectively enforced; however, the resolutions call for the protection of all VMEs from significant adverse impacts, which would require that bottom fisheries in areas that remain open to fishing still need to be managed to prevent significant adverse impacts to VMEs. As discussed below, the move-on rule is the main conservation measure in place in areas open fishing; a rule which may slow but not prevent significant adverse impacts.

The EU proposed two additional large area closures along the northern part of the Mid-Atlantic Ridge [the Reykjanes Ridge] in 2009, but these were not adopted by NEAFC, in spite of advice from ICES that they were likely to be helpful in protecting VMEs. The European Commission expressed disappointment that NEAFC did not adopt the measures proposed by the EU, but the EU decided ultimately to support the Norwegian proposal for the closure of a smaller number of areas "in order to make at least some progress in the right direction." Joe Borg, EU Commissioner for Maritime Affairs and Fisheries stated, "The proposed NEAFC measures can 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 in the Atlantic effectively." The Commission stated that the EU would continue to work with the other NEAFC Parties "in order to ensure that the organisation gives a more positive and effective response to the UNGA Resolution."[15] However, in November 2009 the NEAFC Annual Meeting deferred consideration of the EU proposal to ICES for advice. In 2010, ICES advised, "Extending closures on the Mid-Atlantic Ridge will protect any Vulnerable Marine Ecosystem [VME] in the areas concerned against significant adverse impacts resulting from bottom fishing activities on the Reykjanes Ridge".[16] In 2010, in spite of this advice, NEAFC did not adopt these area closures.

Altogether, NEAFC estimates that approximately 54.2 percent of the seabed at fishable depths, defined as areas where the seabed is less than 2,000 metres deep, is now closed to bottom fishing in the largest of the three high seas area that comprise the NEAFC Regulatory Area 1 – the high seas area south of Iceland.[17] A review of the areas designated by NEAFC as closed, new fishing areas and existing fishing areas, estimates that of the 224 seamounts at fishable depths within NEAFC Regulatory Area 1, approximately 80 [36 percent] fall within the closed areas. Another 16 are located within existing fishing areas and the remainder in areas designated as new fishing areas.[18] There are two other high seas areas within the NEAFC convention area: one in the Norwegian Sea, the other in the Barents Sea. No area closures to protect VMEs have been adopted for either of these two areas.

NEAFC has also implemented a prohibition on bottom gillnet fishing below 200 metres. This has been an important step in addressing the depletion of deep-sea fish stocks. However, in 2008, in regard to the relative impacts of various types of bottom fishing gears, ICES provided the following advice in response to a request from NEAFC on identification of VMEs:

"The impact of fishing gear on vulnerable deep water habitat depends on the type of gear, the degree of contact with the seabed and the frequency of contact. Based on extensive research reported by ICES and the wider science community, bottom trawl gears are expected to have the greatest impact on complex biogenic habitats, followed by bottom-set gillnets and longlines. Any other gear that has bottom contact also has the potential to impact deep-water habitats. The impact of fishing gears is greatest when contact with the seabed is continuous and intense [e.g. trawl gears] …"[19]

For those areas that remain open to bottom fishing, the only measure implemented thus far to prevent SAIs is a move-on rule, as noted below.

Move-on rule/cease fishing in areas where VMEs are encountered [83D]

A VME encounter protocol that triggers a move-on rule when 100 kg of 'live' corals or 1,000 kg of sponges are brought up in the fishing gear [trawl, longline, gillnet or pot] was agreed in 2008. In 2009, the thresholds were revised down to 60 kg of 'live' corals or 800 kg of sponges. The move-on rule requires a vessel to cease fishing within an area of 2 nautical miles [nm] from the position that the "evidence suggests is closest to the exact encounter location" [trawl tows along continental slope areas can be up to 20 nm in length]. Within 'historically

fished' areas, the vessel must report the encounter and cease fishing in the area. In the meantime, any other vessel can fish in the area. In "new fishing areas", defined as areas outside of the agreed NEAFC bottom fisheries footprint, the area where the encounter occurs is closed to all vessels, pending a review.[22] The effectiveness of this measure has not been assessed given that, to date, no encounters with VMEs have been reported by any vessels fishing in the NEAFC area.

The deep-sea fisheries in the NEAFC area are characterised by extensive discarding, misreporting and non-reporting of catches.

In 2010, the joint NAFO/ICES Working Group on Deep-Sea Ecology [WGDEC][21], in reviewing the move-on rules adopted by NEAFC and NAFO, concluded that "Reactionary management strategies such as the "encounter clauses" and "move-on rules" are of limited benefit to prevent significant adverse impacts because they still allow damage to occur which will gradually degrade ecosystems over time". The Working Group recognized that, to be effective, separate threshold levels would need to be established, on a scientific basis, for each VME indicator species or species group, each individual gear type or gear configuration, and each biogeographic region within the Regulatory Areas of the RFMOs. However, the Working Group recommended a new approach based on the reverse burden of proof, the need to conduct prior impact assessments to determine where VMEs are likely to occur before allowing bottom fishing to take place, as well as spatial zoning.[22] The recommendations of the joint NAFO/ICES Working Group on Deep-Sea Ecology regarding the move-on rule are discussed in Section 8, as they are relevant to other regions as well.

Ensuring the long-term sustainability of deep-sea fish stocks [83B]

There is a serious lack of scientific information on the structure, size, age, recruitment, status, range or distribution of the stocks of deep-sea species in the North East Atlantic.[23] This lack of information is a major impediment to sustainable management of these fisheries.[24] In spite of the lack of scientific information, ICES estimates that 100 percent of the catch of all deep-sea fisheries managed by the EU individually and jointly with other countries in the North East Atlantic region is "outside safe biological limits". This compares to the estimate of approximately 20 percent of the catch of stocks overall managed by the EU being outside safe biological limits.[25]

The deep-sea fisheries in the NEAFC area are characterised by extensive discarding, misreporting and non-reporting of catches. In response to a request by NEAFC to evaluate the use and quality of vessel monitoring system [VMS] data and records of catch, ICES noted that 70 percent of the vessels reporting catches of demersal species reported only one species in a given reporting period. ICES noted that it is very unlikely that these demersal, deep-water species are caught in single species fisheries, and that the catch reports are likely to incomplete, with vessels reporting only their target or most abundant species. ICES also noted that the species composition of the data showed very high inter-annual variation that could be due to unexplained variation in exploitation patterns, but may also indicate significant amounts of missing data and/or high levels of mis-reporting.[26]

Moreover, bycatch rates are high in the mixed species, deep-sea trawl fisheries in the North East Atlantic, causing broad adverse impacts on whole communities of deep-sea species. ICES sums up the concerns in this regard as follows: *"At depths between about 400 and 1500m, there may be between 40 and 50 demersal species present depending on gear type. Maximum species diversity occurs between 1000–1500m before declining markedly with depth. Deep water species, are typically slow growing, long lived, late maturing and have low fecundity. Fishing has a greater effect on species with such life history traits … making them particularly vulnerable to overexploitation. This applies to both the target and non-target species. A large proportion of deep-water trawl catches [upwards of 50 percent] can consist of unpalatable species and numerous small species, including juveniles of the target species, which are usually discarded ... The survival of these discards is unknown, but believed to be virtually zero due to fragility of these species and the effects of pressure changes during retrieval … Therefore such fisheries tend to deplete the whole fish community biomass."*[27]

This was reinforced by a study published in 2009 that concluded deep-sea fisheries in the North East Atlantic off the coast of Ireland have substantially depleted communities of deep-sea fish stocks and populations, including species of no commercial value, as deep as 2,500 metres, well below the lowest depths of approximately 1,600 metres at which bottom fishing actually occurs.[28] Two species of deep-sea sharks targeted or caught as bycatch in the deep-sea fisheries on the high seas of the North East Atlantic – the leafscale gulper shark and the Portuguese dogfish – are listed as endangered by the IUCN Shark Specialist Group.[29] A third species, the gulper shark, is listed as critically endangered in the North East Atlantic.

A review of the management of deep-sea fish stocks in the North East Atlantic by the European Commission in 2007 concluded, among other things, that *"many deep-sea stocks have such low productivity that sustainable levels of exploitation are probably too low to support an economically viable fishery. It must therefore be recognised that current levels of exploitation on those stocks must inevitably be reduced, either by choice in order to conserve the stocks or else because the stocks become fished to depletion. Moreover, stock recovery times are so long that the reductions in exploitation must be regarded as permanent, not as a means to rebuild stocks to allow higher exploitation rates in the longer term".* The Commission also concluded that very little is known of the ecosystem impacts of deep-sea fisheries beyond the physical impact of bottom fishing gear on deep-sea habitats.[30]

NEAFC regulation for the catch of deep-sea species

In 2004, NEAFC established a cap on fishing effort [no more than the highest level in previous years] for deep-sea species in the NEAFC Regulatory Area – the first measure to regulate fisheries for deep-sea species on the high seas of the North East Atlantic. In 2006, NEAFC Contracting Parties agreed to further reduce fishing effort by 35 percent in fisheries for deep-sea species. In spite of this regulation however, the reported catch of deep-sea species in the high seas bottom fisheries of the NEAFC area has since fluctuated widely from year to year, calling into question whether the measure has had any practical effect on restricting the catch of deep-sea species.

Orange roughy – a case study

Since 2008, ICES has recommended a prohibition on directed fishing for orange roughy and that the bycatch of orange roughy in mixed species fisheries targeting other deep-sea species should be reduced as low as possible. The EU first proposed a ban on the directed fishery for orange roughy in the NEAFC Regulatory Area at the Annual Meeting in 2008, consistent with the advice from ICES. The proposal went to a vote – the EU and Norway voted for the prohibition, Denmark [on behalf of the Faroe Islands] and Russia voted against it, and Iceland abstained. In 2009, the EU again proposed a ban on directed fishing for orange roughy. Denmark on behalf of the Faroe Islands and Greenland proposed that each Contracting Party be allowed a quota of 150 tonnes, equivalent to the amount that a Faroese vessel caught in the NEAFC Regulatory Area. The EU proposal was rejected and, instead NEAFC adopted a quota of 150 tonnes per Contracting Party. However, in voting for the proposal, both Norway and Iceland, along with the EU, declared that they would not permit their vessels to fish for orange roughy but stated that it would be better to have a quota in place than no quota at all for orange roughy – a tacit recognition that effort regulation adopted by NEAFC was not sufficient. Again, at the Annual Meeting in 2010, the EU proposed a prohibition on the fishery for orange roughy, and again the proposal was defeated. In voting against the EU proposal in 2010, Norway stated that it could not support the EU proposal because it did not include a ban on the discard of orange roughy caught as bycatch.[31]

Management of deep-sea fisheries by the EU

The EU manages the catch of deep-sea species in the North East Atlantic on both the high seas and EU waters under regulation 2347/2002. The Council of Fisheries Ministers unilaterally decides every two years to set total allowable catches [TACs] and quotas for deep-sea species. In November 2010, the European Council agreed to reduce the quotas for several stocks of roundnose grenadier and black scabbardfish by up to 10–25 percent over the period 2011 and 2012 and to phase out a bycatch

Table 1.
Reported catch [tonnes] of deep-sea species to NEAFC, 2004–09

Country	2004	2005	2006	2007	2008	2009	Total 2004-09
EU	25,157	69,883	51,346	90,554	42,471	42,408	321,819
Faroe Islands	642	756	253	202	261	406	2,520
Greenland	0	0	1,913	2,391	1,415	2,929	8,648
Iceland	0	0	0	0	0	42,815	42,815
Norway	648	620	963	933	275	52,120	55,559
Russia	56	2,188	148	366	362	65	3,185
Total	26,503	73,447	54,623	94,446	45,054	146,143	434,546
EC share of total 2004-07	**95%**	**95%**	**94%**	**96%**	**95%**	**29%**	

Table source: NEAFC

IMAGEBROKER/FLPA

Black Scabbardfish (*Aphanopus carbo*) is a traditional dish in Madeira, Funchal, Madeira, Portugal

allowance for deep-sea sharks.[32] This latter measure will likely provide a disincentive for vessels to target deep-sea sharks; although substantial quantities of deep-sea sharks will likely continue to be caught [and discarded] given the mixed species nature of the deep-sea fisheries, in particular the bottom trawl fisheries.

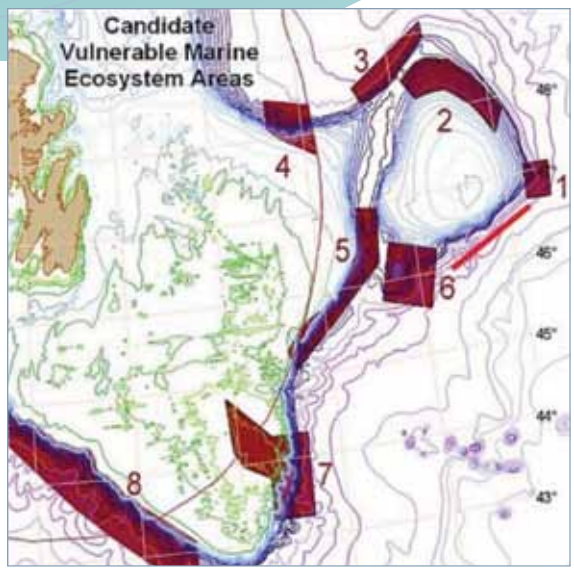
However, for most of the other deep-sea species managed under quota by the EU in the North East Atlantic, the quotas remained more or less the same. Moreover, the European Council only established quotas for 24 deep-sea species. The catch of some 20–40 additional species known or likely to be taken in the North East Atlantic deep-sea fisheries by EU fleets is essentially unregulated.

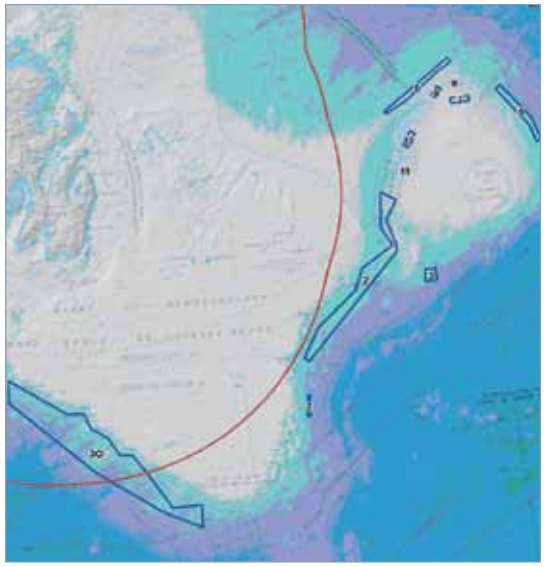
UNGA resolution 64/72 in paragraph 119 [d] calls on States to *"adopt conservation and management measures … on the basis of stock assessments and the best available scientific information, to ensure the long-term sustainability of deep sea fish stocks and non-target species, and the rebuilding of depleted stocks... and, where scientific information is uncertain, unreliable, or inadequate, ensure that conservation and management measures be established consistent with the precautionary approach, including measures to ensure that fishing effort, fishing capacity and catch limits, as appropriate, are at levels commensurate with the long-term sustainability of such stocks"*

The proposal for TACs and quotas for deep-sea species from the European Commission [October 2010] at the November meeting of the Council of Fisheries Ministers stated, "Available information on deep-sea stocks does not allow scientists to fully assess the stock status, neither in terms of population size nor fishing mortality. There are several reasons for this, which hamper progress permanently: These species are often very long-lived and slow-growing, making it impossible to structure the stock into age classes and to assess the effect of fishing on the stock through changes in the length or age structure of catches. The frequency of recruitment of young fish to the stocks is not known. The stocks are widely distributed in depths that are difficult to examine for practical reasons. Data from scientific surveys are often not available due to the reduced commercial importance of these stocks, or do not cover the whole distribution area. Fishing activities are only partly focusing on these species and some have a relatively short history."[33]

For all practical purposes, the decision by the European Council of Fisheries Ministers authorises EU fleets to continue to bottom fish in contravention of the UNGA resolutions.[34] That said, the European Commission is preparing a proposal to amend the basic regulation 2347/2002 governing the management of deep-sea fisheries in the North East Atlantic. A consultation process has been underway since December 2009, and a formal proposal from the European Commission to the European Parliament and Council expected in the autumn of 2011. A number of DSCC member organizations have met on several occasions with Commission officials and urged them to ensure that the Commission proposal incorporate the relevant provisions of the UNGA resolutions.[35]

61/105 & 64/72





SOURCE: NAFO

2. Left: Candidate VME areas recommended in 2008 by the NAFO WGEAFM based on FAO Deep-Sea Guidelines
3. Right: Area closures of vulnerable marine ecosystems (VME) with 'significant concentrations' of corals and sponges, adopted by NAFO in September 2009.

2.2 NORTHWEST ATLANTIC

Description of high seas bottom fisheries

Main high seas bottom fishing nations

EU [Spain, Portugal, Estonia, Latvia, Lithuania, Poland], Russian Federation, Iceland, Norway, Faroe Islands, Canada.

Main high seas bottom fisheries

Bottom trawl fisheries by volume: redfish, shrimp, yellowtail flounder, Greenland halibut, Atlantic cod, skate, and white hake.

Catch

Reported high seas bottom catch in 2009 in NAFO Regulatory Area Divisions 3LNMO: approximately 47,500 tonnes. The quota for the high seas bottom fisheries for 2011 is approximately 66,000 tonnes.

Vessels authorised to fish in 2010–11

This information has not been made publicly available. Virtually all of the high seas bottom fishing in the area is conducted by bottom trawl vessels. NAFO does not publish an authorised vessel list. Fifty-one vessels were reported fishing in the NAFO Regulatory Area in 2009.

Implementation of measures related to paragraph 83 and 119 of UNGA resolution 61/105 and 64/72 for the regulation of high seas bottom fisheries

In May 2008, a framework regulation for the management of high seas bottom fisheries in the NAFO Regulatory Area was adopted at an Extraordinary Meeting of NAFO to implement UNGA resolution 61/105. A number of meetings of the NAFO Working Group on Ecosystem Approach to Fisheries Management [WGEAFM], the Scientific Council, and the Working Group of Fisheries Managers and Scientists [WGFMS] have since addressed the implementation of the UNGA resolutions through the identification of VMEs and closures for corals and sponges through the NAFO Conservation and Enforcement Measures [CEM], agreed at Annual Meetings since 2009.

Impact assessments/Preventing SAIs [83A/119[a]]

In 2008, NAFO adopted a requirement in its Conservation and Enforcement Measures [CEMs] that *"Each Contracting Party proposing to participate in bottom fishing shall submit to the Executive Secretary information and an initial assessment, where possible, of the known and anticipated impacts of its bottom fishing activities on vulnerable marine ecosystems"*. However, Contracting Parties submitted no impact assessments to NAFO, although Japan and Iceland were reported to have submitted fishery plans. At the Annual Meetings of NAFO in 2009 and 2010, the United States put forward proposals to require impact assessments for all high seas bottom fisheries in the NAFO Regulatory Area. The other Contracting Parties did not accept the proposals. Instead, at its Annual Meeting in 2010, NAFO agreed to require impact assessments in new fishing areas outside of the historically fished "footprint" and to require impact assessments for fisheries within the footprint "if new scientific information comes to light on the existence of VMEs, or if significant changes occur in fishing conduct or technology".[36]

In response to the UNGA resolutions and as a result of the scientific information presented by the WGEAFM and adopted by the Scientific Council, a number of areas have been closed to bottom

fishing. In areas that remain open to bottom fishing, no specific measures have been established to prevent SAIs other than an encounter protocol and associated move-on rule. As of April 2011, no reports of encounters have been made to the NAFO Secretariat.

Closures of areas where VMEs are known or likely to occur unless or until measures are adopted to prevent SAIs [83C/119[b]]

In 2006, NAFO closed four seamount areas to bottom fishing. In 2007, NAFO closed to bottom trawling an area of the continental slope along the southern Grand Banks to protect deep-sea corals. This area extends into the Canadian EEZ. The upper boundary of the depth of the closures was set at 1,000m, despite scientific advice that the highest concentration of corals in this area was between 400m and 800m. In 2008, two additional seamount areas were closed to bottom fishing. The seamount closures, according to the 2007 NAFO CEM, allow for fishing "not to exceed 20 percent of the fishable area of each seamount." All of these areas are to protect corals and sponges with the exception of the seamount closures. There are no closures in place for canyon areas, and no measures have been adopted to protect deep-sea fish species, despite NAFO having the information on the distribution of many of these species, as a result of trawl survey information.[37] All area closures are currently temporary and set to expire in December 2011. However, thus far, NAFO has consistently extended the expiry dates of area closures.

In addition, the Scientific Council was requested to identify, on the basis of best available scientific information, VMEs in the NAFO Regulatory Area and map sites where these VMEs are known to occur or likely to occur and provide such data and information to NAFO Contracting Parties. Based on a request from the NAFO's Fisheries Commission, in 2008 the Scientific Council of NAFO through the WGEAFM, and using the criteria in paragraph 42 of the FAO Deep-Sea Guidelines, identified seven high seas areas along the slope of the Grand Banks and Flemish Cap [the areas of the high seas where most bottom fishing occurs in the northwest Atlantic] where VMEs are known or likely to occur. The WGEAFM reviewed the criteria presented in paragraph 42 of the Guidelines and included structural species such as corals and sponges, as well as long-lived fish species, known spawning grounds and canyon areas. These are areas 1, 2, 3, 5, 6, 7, and 8 in the map on the left.

As indicated previously, NAFO had already agreed to close area 8 in 2007. However, in 2008 NAFO decided not to close any of the other areas indicated by the Scientific Council. Rather, NAFO concluded that "based on preliminary information presented related to catch of corals by commercial vessels in areas currently fished, there appears to be little interaction between species of corals and fishing activity in the regulatory area". NAFO requested the Scientific Council to further review the information on the known or likely locations of VMEs and, in the meantime, agreed to keep all of these areas open for bottom fishing in 2009.

In 2009, the Scientific Council revised its proposal for area closures, based on review of areas of "significant concentrations" of certain species of corals and sponges. These areas were identified by the relatively higher bycatch of species of corals and sponges in fisheries research trawl surveys conducted by both Spain and Canada over the course of several years. The 2009 Annual Meeting of NAFO adopted 11 additional area closures on the basis of the information provided by the Scientific Council. The closure of these areas was estimated to have affected approximately 0.7 percent of bottom fishing in the NAFO area, based on VMS data from bottom fisheries over the previous several years. In other words, the area closures did not affect approximately 99 percent of the bottom fishing that has occurred in recent years.

The closed areas appear to where little fishing has taken place in the past. It is worth noting that the bycatch of corals and sponges in the fisheries research trawl surveys occurred in many deep-sea areas across the slope of the Grand Banks and Flemish Cap. This implies that there may be additional areas of "significant concentrations" of corals and sponges that have not been closed to bottom fishing. Moreover, there are likely to be lesser concentrations of corals and sponges across wide areas of the Grand Banks and Flemish Cap that may continue to be under threat from bottom fishing. This would appear to be supported by the information in NAFO's coral identification guide, which lists 27 species of coral known to occur in the area across a wide range of depths.[38] NAFO also published a sponge identification guide in 2010, with 35 species included.[39]

The criteria for identifying VMEs in the FAO Deep-Sea Guidelines call for, among other things, identifying VMEs on the basis of "structural complexity", which is defined as "an ecosystem that is characterized by complex physical structures created by significant concentrations of biotic and abiotic features" [paragraph 42v]. It may be that the area closures adopted by NAFO in 2009 cover many or most of the relatively higher concentrations or patches of corals and sponges – areas that fit the definition of complex physical structures created by significant concentrations of biotic features. However, the Guidelines also call for identification of VMEs on the basis of a range of other criteria, including the functional significance of the habit, fragility, and structural complexity created by abiotic features [for example, submarine canyons, canyon heads]. While the initial WGEAFM meeting in May 2007 identified all known VMEs in the NAFO Regulatory Area that qualify under each of the criteria in paragraph 42 of the FAO Guidelines, subsequent analysis and area

Cutlassfish on sale at the Mercado dos Lavradores, Espada, deep-sea fish, market, Funchal, Madeira, Portugal, Europe.

MARIA BREUER/FLPA

closures have only been established in areas of relatively high concentrations of VMEs considered "structural species" [corals and sponges].

Move-on rule/cease fishing in areas where VMEs are encountered [83D/119[c]]

In 2008, NAFO Contracting Parties agreed to a VME encounter protocol that triggers a move-on rule only if 100 kg of 'live' corals or 1,000 kg of sponges are brought up in the fishing gear. No scientific analysis was used to address the appropriateness of these thresholds, and there were no records in NAFO of a commercial bottom fishing vessel or a research trawl vessel ever reporting a catch of 100 kg of coral. In 2009, the threshold levels were reduced to 60 kg live coral and 800 kg of sponges.

The NAFO move-on rule requires a vessel to cease fishing within an area of 2 nm surrounding the end point of a trawl tow or haul or the point during the tow/set at which the skipper of the vessel believes that the VME was encountered. Within 'historically fished' areas, the vessel must report the encounter, and the Scientific Council is required to review the information. In the meantime, any other vessel can continue to fish in the area. In 'new areas' – the areas that are located outside of the historical footprint – the location where the encounter occurs or is thought to occur becomes closed to all vessels within a 2 nm radius, pending a review by the Scientific Council.

The NAFO Scientific Council, in commenting on the original threshold levels for coral, stated that this threshold "is too high to offer protection to deepwater coral species", particularly in light of the fact that 100 kg of coral had never been caught either by research trawls or reported in fisheries observer data.[40] For the purpose of mapping areas of significant concentrations of coral and sponge areas, the Scientific Council chose a threshold level of 0.2–2 kg of coral [depending on coral species] in research trawl surveys and 75 kg of sponges as a more realistic indicator of the presence of 'significant concentrations' of VMEs.[41] One Contracting Party proposed these threshold levels [2 kg of corals and 75 kg of sponges] for the commercial fisheries but this proposal was rejected.

As a result of VME identification, using information collected in trawl surveys [WGEAFM, 2007], three scientific research cruises under the NEREIDA project were conducted in 2009 and 2010. This research resulted in multi-beam bathymetry data for the NAFO Regulatory Area, and the collection of benthic samples as well as in situ submersible remote operated vehicle [ROV] work in the Sackville Spur closed area. The December 2010 Meeting of the WGEAFM re-examined the efficacy of the threshold values for sponges, and through simulated

trawl analysis, recommended that the threshold be reduced to 30–50 kg and that the sponge closure on the Sackville Spur be expanded.[42]

As of July 2011, no contracting party had reported encounters either above or below the current threshold values of 60 kg of live coral or 800 kg of sponges.[43]

In 2010, the Joint ICES/NAFO WGDEC extensively discussed the move-on rule. WGDEC concluded that current encounter protocols and move-on rules adopted by both NAFO and NEAFC are too high and provide little, if any, protection to VMEs. [See the discussion of the move-on rule in the North East Atlantic section and in Section 8].[44]

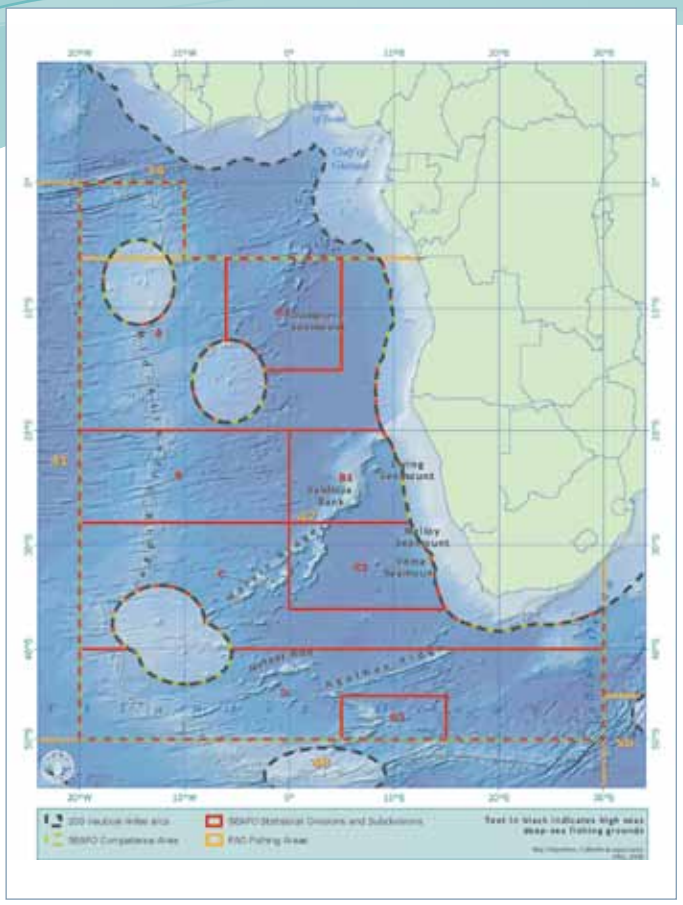
Ensuring the long-term sustainability of deep sea fish stocks [83B/119[d]]

Quotas and/or effort restrictions are in place for 11 of 25 species commercially targeted in the NAFO Regulatory Area including the main species targeted in high seas bottom fisheries: Greenland halibut, redfish, great northern prawn, skate, and yellowtail flounder.[45] Other deep-sea species, such as grenadier [rattail], are not subject to quotas or other catch restrictions. Most deep-sea species taken in the high seas bottom fisheries in the NAFO area are considered overexploited with several stocks under moratoria. In 2009, the cod fishery in 3M Division opened with a directed fishery of 5,000 tonnes, and in 2010 the quota doubled to 10,000 tonnes, partially due to the declining shrimp populations in this area. For 2011, NAFO agreed to close the fishery for northern prawn on the Flemish Cap as a result of the depletion of the stock.

The Flemish Cap fishery for northern prawn, a deep-water bottom trawl fishery operating at depths ranging from 300 to 1000 metres, began in the 1990s after the collapse of the shelf fisheries for cod and other species of groundfish. This fishery was the largest fishery in the NAFO Regulatory Area over the course of the previous decade as measured by volume of catch. However, in the past couple of years the fishery has collapsed and NAFO established a moratorium on this fishery in 2010. The Greenland halibut fishery is currently managed under a 15-year rebuilding program, initiated in 2004. Nonetheless, seven years into the plan, the biomass of this species is estimated to be at its lowest point. The agreed TAC has exceeded the scientific advice [that is, in 2010 the NAFO Scientific Council in 2010 advised a quota of 8,800 tonnes. Moreover, the intensity of the impact[46] that the TAC agreed for 2011 was for 17,185 tonnes].[47]

Altogether NAFO regulates only 11 of the 25 species of fish caught commercially in the region. Nonetheless, there is at least some information on the status of a number of unregulated species. In January 2006, a paper published in the journal Nature concluded that the two main commercial valuable species of grenadier [roundnose and rough-head] taken in the bottom trawl fishery on the high seas were critically endangered based on the International Union for Conservation of Nature [IUCN] Red List criteria.[48] The catch of grenadier in the high seas areas of the Grand Banks and Flemish Cap is unregulated by NAFO. Two species of wolf fish are also recognized as threatened and a third categorised as a species of "special concern" under Canada's Species At Risk Act [SARA].[49] The high seas catch of wolf fish is also unregulated by NAFO.

During the 2008 meeting of the WGEAFM, 18 deep-sea fish species were identified as vulnerable according to the criteria in the FAO Deep-Sea Guidelines, yet no measures have been taken to address the impacts of fishing on these unregulated species, to assess their population status, or to protect their populations from fishing.[50]



FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

4. Map of the SEAFO Regulatory Area. The South East Atlantic Fisheries Organisation [SEAFO] governs the regulation of bottom fisheries on the high seas of the South East Atlantic. UN FAO Worldwide Review of Bottom Fisheries in the High Seas, 2009[51]

3.0 SOUTH ATLANTIC

3.1 SOUTH EAST ATLANTIC

Description of high seas bottom fisheries

Main high seas bottom fishing nations
Namibia, Spain, Japan, Cook Islands, South Korea.
Estimated number of vessels in 2006: 7

Main high seas bottom fisheries
Bottom trawl fisheries for orange roughy and other deep-sea species. Bottom longline fisheries for toothfish and pot fisheries for deep-sea red crab.

Catch
Approximately several hundred tonnes per year in recent years, primarily orange roughy and alfonsino in bottom trawl fisheries, Patagonian toothfish in bottom longline fisheries, and deep-sea red crab in bottom pot fisheries. Quota for bottom fisheries in 2011 is 880 tonnes.

Vessels authorised to fish in 2011
SEAFO published a list of 37 vessels currently authorised to bottom fish on the high seas in the SEAFO area. It includes the following: Spain, 30 vessels, predominantly bottom trawl vessels; Japan, 2 longline vessels [one also authorised to fish with pots]; Namibia, 2 longline vessels; South Africa, 1 longline vessel; South Korea, 2 vessels [1 trawler, one pole and line].

Progress in the implementation of measures related to paragraphs 83 of UNGA resolution 61/105 and 119 of 64/72 for the regulation of high seas bottom fisheries
A framework regulation for the management of high seas bottom fisheries in the SEAFO Area consistent with UNGA resolutions 61/105 and 64/72 was adopted in 2009.

Impact assessments/Preventing SAIs [83A/119[a]]
Like NAFO and NEAFC, SEAFO adopted a measure requiring that *"Each Contracting Party proposing to participate in bottom fishing shall submit to the Executive Secretary information and an initial assessment, where possible, of the known and anticipated impacts of its bottom fishing activities on vulnerable marine ecosystems, in advance of the next meeting of the Scientific Committee.*

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These submissions shall also include the mitigation measures proposed by the Contracting Party to prevent such impacts."[52] However, no impact assessments have been submitted by any of the Contracting Parties whose vessels continue to engage in high seas bottom fisheries in the region. No specific measures have been established to prevent SAIs in any of the bottom fisheries [though some areas have been temporarily closed to bottom fishing as noted below], other than a move-on rule. In 2007 the Scientific Committee of SEAFO recommended a temporary prohibition on bottom trawling and bottom gillnet fishing in the SEAFO area. The recommendation to prohibit bottom gillnet fishing was adopted in 2009; however, bottom trawling continues to be authorised by SEAFO. Spain and Namibia recently conducted an independent benthic research survey of the Walvis Ridge seamounts. A preliminary estimate of the species collected included 127 species of fish, 41 species of crustacean, 18 species of cephalopod [such as octopus and squid] and benthic species from four taxonomic groups: Actiniaria [sea anemone], Echinoidea [sea urchin], Thaliacea, and Opistobranchia [sea slug].[53] The National Oceanography Centre [NOC] in the UK has provided information on where VMEs are likely to occur within the SEAFO convention area.[54]

Closures of areas where VMEs are known or likely to occur unless or until measures are adopted to prevent SAIs [83C/119[b]]

Closures of 10 out of 13 seamount areas where VMEs [for instance, corals] are known to occur or likely to occur were adopted, on a temporary basis, in 2007. The area closures were revised in 2010.[55] Several closed areas adopted in 2007 reopened to bottom fisheries in 2010 [although most contained seamounts at depths greater than 2000 metres and thus were considered unfishable], while several new area closures – the majority along the Mid Atlantic Ridge – were adopted. The five Mid Atlantic Ridge closures were designed to close representative areas of seamounts along the ridge system. The revisions to the area closures, adopted by SEAFO in 2010, did not always follow the advice of the SEAFO Scientific Committee.[56]

Based on historic fisheries footprint information reviewed by the Scientific Committee of SEAFO, it appears that although several seamount areas that have been historically fished are now closed, areas where most of the fishing has occurred over the previous 15 years remain open to bottom fishing. Substantial areas of seamounts and ridge systems at fishable depths [less than 2,000 metres deep], including the northern portion of the Walvis Ridge surveyed by Spain and Namibia, are open to bottom fishing. A systematic identification of areas where VMEs are known or likely to occur in the SEAFO area has not yet taken place. However, while the report from the NOC notes that "data on South Atlantic seamounts, especially in terms of biologically-significant data is at best described as very patchy and of variable quality", the report goes on to say 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".[57] The Scientific Committee recognised that this should apply to any topographic feature rising to within 2,000 metres of the surface, as this is the current maximum depth at which bottom fishing takes place in the SEAFO area.

Move-on rule/cease fishing in areas where VMEs are encountered [83D/119[c]]

A move-on rule has been implemented. Initially the threshold levels for triggering the move-on rule were a bycatch of 100 kg of "live" coral or 1,000 kg of sponges or more per tow or set of the gear. In 2009, hese thresholds were revised down to 60 kg of live coral and/or 800 kg of live sponge. [For further discussion of the move-on rule, please see Section 8.]

Ensuring the long term sustainability of deep sea fish stocks [83B/119[d]]

The status of the exploitation of the deep-sea stocks is unknown and the Scientific Committee of SEAFO has consistently indicated that it has been difficult to give specific management advice for any of the species harvested in the SEAFO area because of a lack of sufficient data for stock assessments. However, the Committee has indicated that the stocks of deep-sea red crab are not likely to be depleted. SEAFO has established relatively restrictive quotas for 2011 and 2012 for the deep-sea fisheries for orange roughy [50 tonnes], alfonsino [200 tonnes], toothfish [230 tonnes] and red crab [400 tonnes].[58]

61/105 & 64/72

NGS IMAGE COLLECTION

A hooked Patagonian toothfish is brought to the side of a fishing boat.

3.2 SOUTHWEST ATLANTIC

No RFMO nor any interim measures have been established to regulate the high seas bottom fisheries of the southwest Atlantic, nor are there any negotiations underway to establish an RFMO in the region. However, DSCC has been informed that Spain has recently closed to fishing by Spanish fishing vessels, the nine areas identified by the Instituto Español de Oceanografía [IEO] where VMEs are known or likely occur.

Description of high seas bottom fisheries

Main high seas bottom fishing nations

Spain, Estonia, South Korea, and possibly others. FAO catch statistics suggest that other countries may also be involved in bottom fishing on the high seas in the area.

Main high seas bottom fisheries

Bottom trawl fisheries for hake and squid along portions of the Patagonian shelf and upper slope extending into international waters. Longline fishery for Patagonian toothfish in deeper waters.

Catch

Estimated catch in 2006 was 111,000 tonnes.

Vessels authorised to fish in 2011

Spain has publicised through the FAO a list of 44 vessels authorised ["that can opt to"] to bottom fish on the high seas in the southwest Atlantic.[59] No other country has publicised a list of vessels authorised to fish in the region.

Progress in the implementation of measures related to paragraphs 83 of UN GA resolution 61/105 and 119 of 64/72 for the regulation of high seas bottom fisheries

In July 2008, the EU adopted a framework regulation for the management of high seas bottom fisheries by EU vessels in areas of the high seas where no regional fisheries management organization [RFMO] exists or where multilaterally agreed interim measures have been established, including the southwest Atlantic. The EU adopted the regulation to implement the key provisions of UNGA resolution 61/105. It is not clear whether any other flag States whose vessels engage in high seas bottom fisheries in the region have adopted similar measures.

Impact assessments/Preventing SAIs [83A/119[a]]

A report, published in November 2010 by the European Commission, determined that Spain had not complied with the impact assessments provisions of the EU regulation, adopted by Council in 2008, to implement the UN General Assembly resolutions with respect to bottom fisheries in the southwest Atlantic. As far as the DSCC is aware, no impact assessments have yet been conducted or publicised for any of the high seas bottom fisheries by other countries whose vessels conduct bottom fisheries in the region.

Closures of areas where VMEs are known or likely to occur unless or until measures are adopted to prevent SAIs [83C/119[b]]

The IEO conducted a series of research surveys between 2007 and 2010 to identify VMEs on the high seas of the southwest Atlantic Ocean.[60] On 4 April

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2011, the results of the research were presented at an event in Madrid, hosted by the Spanish Ministry of the Environment and Rural and Marine Affairs [MARM]. The IEO proposed that nine large areas on the high seas along the Patagonian Shelf and slope be designated as VMEs and closed to bottom trawling. Seven of the areas cover most of the slope between 300 and 1,000 metres [the maximum depth of the research], while the remaining two cover areas along the shelf at depths shallower than 300 metres. These areas are located between latitude 42–48 degrees south, an area where a fleet of approximately 20 Spanish bottom trawlers fish, primarily for hake and squid.

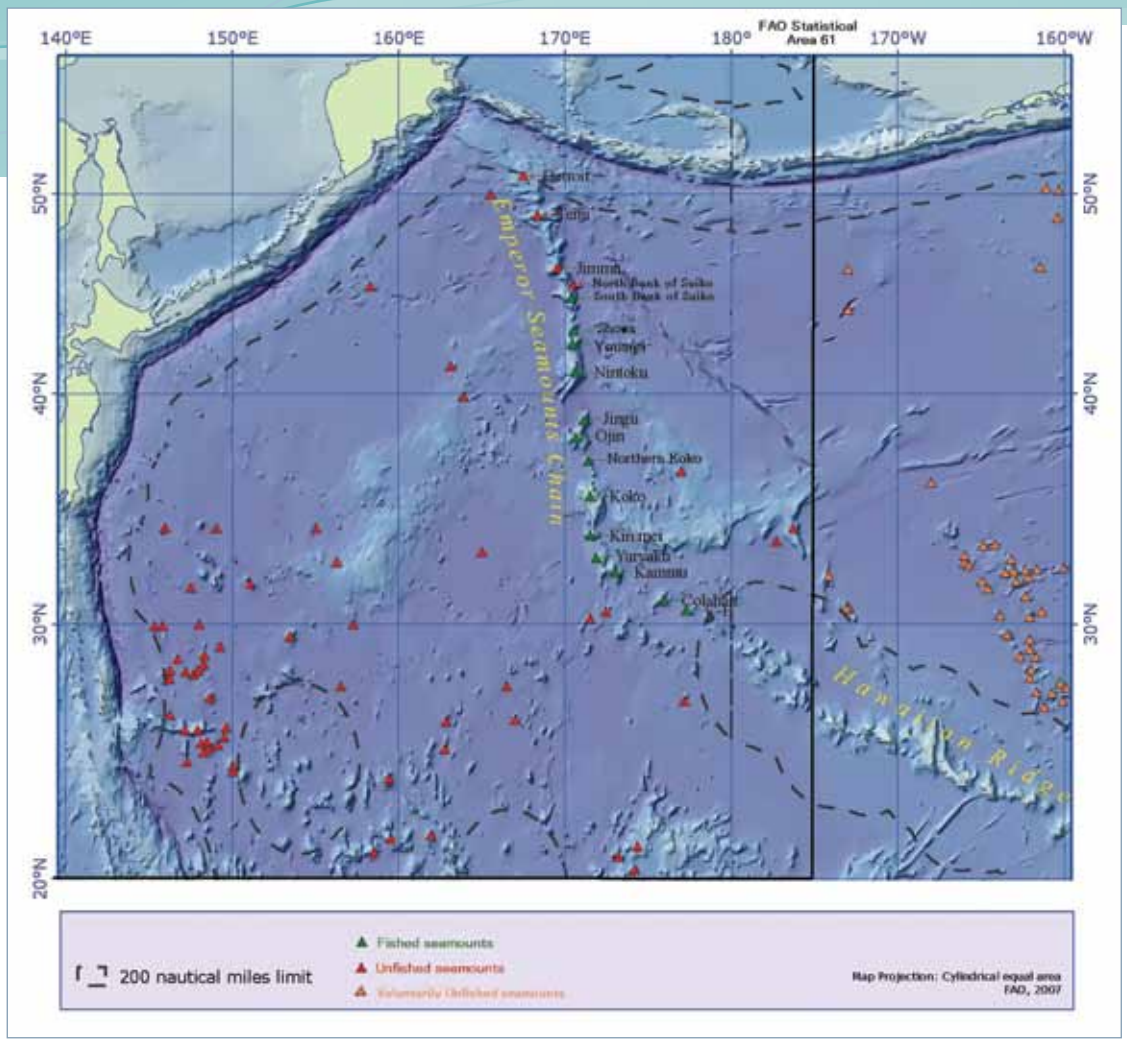
Beginning in July 2011, these areas have been closed to the bottom trawl fleet for a period of six months, essentially restricting bottom trawl fishing in the area to depths shallower than 300 metres.[61] The area total closures 41,000 square kilometres of the 59,000 square kilometres surveyed by the IEO over the past several years.[62] The survey took place on the high seas along the Patagonian Shelf and slope in an area roughly between latitude 42–48 degrees south. The closure is a measure contained in a permit to fish in the region issued by the Government of Spain, pursuant to EC regulation 734/2008. As far as the DSCC is aware, no other flag State has closed any areas where VMEs are known or likely to occur.

Move-on rule/cease fishing in areas where VMEs are encountered [83D/119[c]]

A move-on rule is required in the EU regulation, but has yet to be developed and implemented as far as the DSCC is aware.

Ensuring the long-term sustainability of deep sea fish stocks [83B/119[d]]

The high seas bottom fisheries in the region are not subject to quotas or other catch restrictions as far as the DSCC is aware. Argentine hake is considered to be fully or overexploited.[63] The status of bycatch species is unknown.



SOURCE: NORTH PACIFIC OCEAN FISHERIES ORGANIZATION WEBSITE

5. The northwest Pacific Ocean showing the Emperor seamount chain

4.0 NORTH PACIFIC OCEAN

Negotiations to establish a regional RFMO to regulate high seas bottom fisheries began in 2006, and concluded with the adoption of the Convention on the Conservation and Management of High Seas Fisheries Resources in the North Pacific Ocean in March 2011. A Secretariat and Scientific Working Group was established in 2006 to facilitate negotiation of both the treaty and interim measures. Interim measures were initially adopted for the deep-sea bottom fisheries in the northwest Pacific Ocean in 2007, and for the northeast Pacific in March 2011. Both sets of interim measures will remain in place pending entry into force of the new Convention. Most of the bottom fishing in the region currently takes place in the northwest Pacific along the Emperor seamount chain, but some experimental bottom longline fishing has occurred on seamounts on the high seas of the northeast Pacific just outside the 200 mile EEZs of the US and Canada.

Description of high seas bottom fisheries

Main high seas bottom fishing nations

Japan, South Korea, Russian Federation
Historically, vessels from Taiwan have also fished in the region and several were sighted bottom fishing over the past several years.

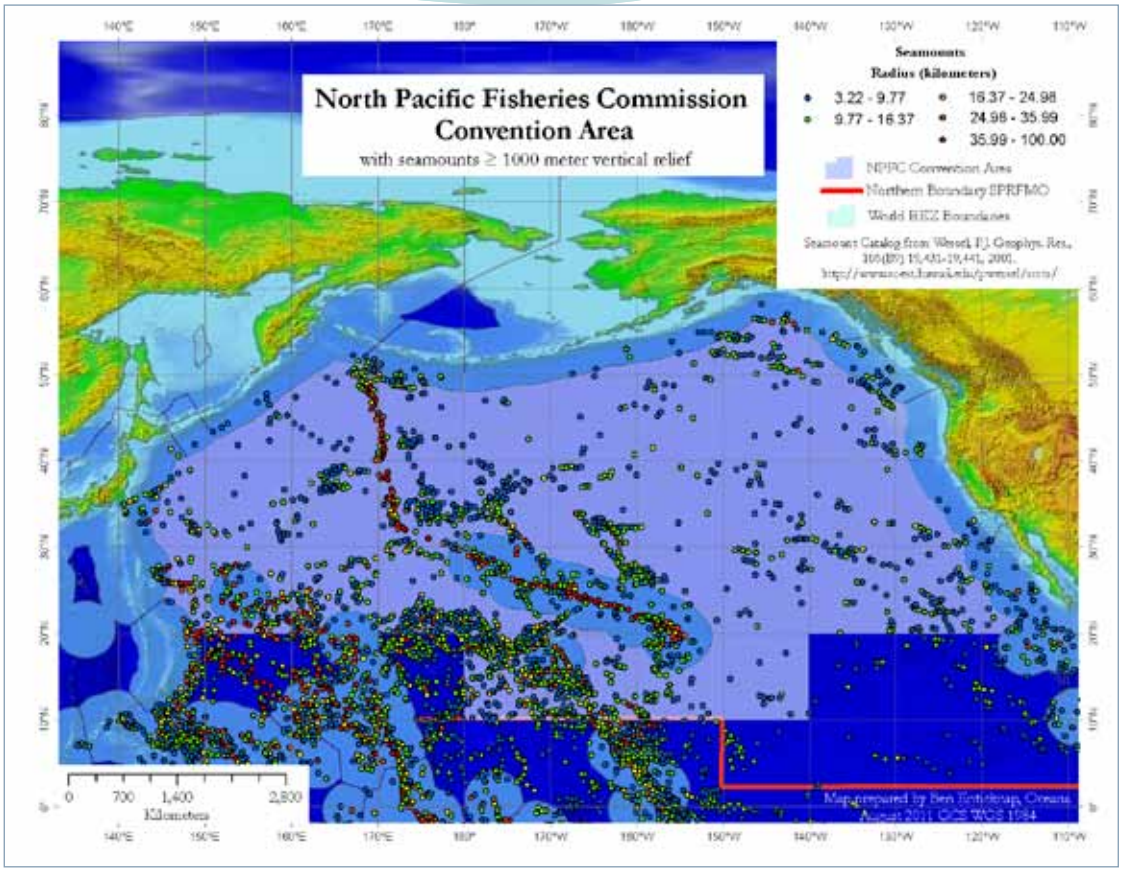
Main high seas bottom fisheries

Bottom trawl fisheries target splendid alfonsino and pelagic armourhead along the Emperor seamount chain and the Northern Hawaiian Ridge in the northwest Pacific Ocean. There are limited bottom gillnet, longline, trap and pot fisheries for deep-sea red crab, oreo, deep-sea shark, mirror dory, scorpionfish, rockfish, skilfish and other species in the northwest Pacific. Historically some bottom trap and pot fishing has occurred on seamounts outside the US/Canadian EEZ in the northeast Pacific.

Catch

Approximately 8,000–20,000 tonnes per year over the past decade

UNGA resolutions



6.

SOURCE: OCEANA

Vessels authorised to fish in 2010–11

According to the information published on the website of the North Pacific Fisheries Commission, Japan has authorised 7 vessels [6 trawlers and 1 gillnetter], South Korea has authorised 9 vessels [7 bottom trawlers and 2 longline vessels], and the Russian Federation has authorised 26 vessels [15 bottom trawlers and 11 longline vessels].[64] It would appear however that only 7 Japanese vessels and 2 vessels from the South Korea were active in 2009. No information is available in regard to whether Belize, which reported five vessels pot fishing on the high seas in the northwest Pacific in 2006, continues to authorise vessels to bottom fish in the region. In February 2011, Japan reported that 3 vessels – one flagged to Togo, one to Curaçao, and another with an unknown flag – were observed deep-water gillnet fishing in the northwest Pacific in 2010.

Progress in the implementation of measures related to paragraphs 83 of UN GA resolution 61/105 and 119 of 64/72 for the regulation of high seas bottom fisheries

Interim Measures to implement UNGA resolution 61/105 were adopted by Japan, South Korea, Russian Federation and the United States in February 2007 for the northwest Pacific and revised in October 2007, October 2008, and again in February 2009. The Interim Measures provide that bottom fisheries in the area where VMEs are known to occur or likely to occur, based on the best scientific information, will cease by 31 December 2008, unless conservation and management measures have been established to prevent significant adverse impacts on VMEs. A freeze of the footprint was initially agreed in 2007. This has now been lifted and replaced by an exploratory fisheries protocol for "new" bottom fisheries [those in previously unfished areas or using fishing gear not previously used in existing fishing areas] beginning in 2009.

In March 2011, interim measures were adopted for the high seas bottom fisheries in the northeast Pacific by Japan, South Korea, Russian Federation and the United States, Canada and China [with Taiwan]. Though not as detailed as those adopted for the northwest Pacific, they nonetheless incorporate many key elements of UNGA 61/105 and 64/72, including that no bottom fishing should occur without a prior impact assessment. A major exception is the absence of an agreed move-on rule for vessels encountering VMEs, explicitly mandated in both UN resolutions 61/105 and 64/72.

Impact assessments/Preventing SAIs [83A/119[a]]

Japan, Russia, South Korea and the United States have submitted impact assessment reports of varying detail to the interim Science Working Group.[65] By far the most comprehensive assessment reports have been produced by Japan, the nation with the largest reported number of vessels engaged in high seas bottom fishing in the region, and the United States. The US is concerned over the continued depletion of straddling seamount fish stocks within its zone as a result of continued overfishing on the high

61/105 & 64/72

seas [the US does not conduct high seas bottom fishing and has closed adjacent seamounts within its zone to bottom trawling since 1986, but has yet to see recovery of depleted straddling stocks].

The Japanese impact assessment report concluded that the Emperor seamount chain could form a unique ecosystem, given its distance from other seamount and continental shelf areas. The report includes a review of remotely operated vessel [ROV] surveys conducted in 2006 and drop camera surveys in 2008 in a number of seamount areas along the Emperor seamount chain. The analysis of the surveys and other relevant information to determine whether VMEs were present and whether SAIs would occur was only conducted for four types of corals – Alcyonacea [soft coral], Gorgonacea [sea whip, sea fan], Antipatharia [black coral] and Scleractinia [stony coral] – although other VME indicator species are known to exist and have been observed on seamounts in the area.

Japan reports that the surveys found evidence of the presence of the four orders of corals "as individuals" in most areas surveyed, but only found aggregations "which may constitute ecosystems" in two areas, both of which Japan concludes are areas inaccessible to bottom trawl vessels. However, the assessment states that there were a number of limitations and uncertainties in the data and surveys used to review potential bottom fishing impacts. These included 1] the area covered by ROV and drop cameras was only a tiny fraction of the area subject to fishing, 2] some of the deep sea life found was difficult to identify on video, and 3] due to the lack of good scientific information, it is not clear whether some of the species seen constitute VMEs.

The US assessment concluded that while the efforts to remotely view the seamount summit benthos from drop-camera photography and ROV video observations have been informative, they will require much more survey effort. An independent review of the images produced by Japan concluded that a number of the areas were likely to contain octocoral gardens and that the surveys done to date do not support the conclusion that there are no VMEs on other seamounts in the Emperor chain.[66] The percentage or portion of the areas surveyed that will, or are likely to, be fished in the future is not clear.

The impact assessment report from Japan also concluded it is difficult to assess the impacts of bottom fishing on the fragility of ecosystems formed by corals, due to lack of knowledge on structure and function of coral ecosystems. Furthermore, no information is yet available comparing the spatial extent of potential impacts relative to the availability of habitat type affected, the ability of an ecosystem to recover from harm and rates of such recovery, the extent of which ecosystem functions may be altered by the impact of bottom fishing, and the timing and duration of the impacts relative to the period in which a species needs the habitat during one or more life-history stages. The US impact assessment report reaches similar conclusions.

Finally, Japan's assessment report concluded that extensive bottom drag fishing for precious corals on the Emperor seamount chain in the past has probably resulted in significant reductions in the occurrence of precious corals on seamounts in the region. Japan provided evidence that two vessels from Taiwan had been bottom drag fishing for precious corals on seamounts in the North Pacific as recently as several years ago.

South Korea and the Russian Federation come to the same conclusions as Japan, largely based on the information, analysis and scientific assessment provided by Japan. With regard to the bottom gillnet, longline and pot fisheries, which target a range of species, the Russian Federation impact assessment concluded, in each case, that "inadequate catch statistics for this fishery does not make it possible to accurately conduct stock assessment, evaluate the sustainability of the fishery, and assess SAI on VMEs."

Japan proposed to introduce several measures for bottom trawl and gillnet fisheries, including 100 percent observer coverage on trawl vessels ["in principle"] and gillnet vessels beginning in April 2009, a "tentative" prohibition of trawl and gillnet fishing below 1,500 metres [which is below the depth at which bottom fishing currently takes place], a move-on rule [discussed below], and a limit on the number of trawlers to seven. The Russian Federation will deploy 100 percent observer coverage on bottom trawl vessels and South Korea committed to deploy 100 percent observer coverage on all bottom trawl vessels by the end of 2009. In respect of areas where fishing currently takes place, Japan, South Korea and the Russian Federation only propose to close one small area on one seamount to protect VMEs [discussed in the following section].

The impact assessment reports are publicly available on the website of the North Pacific Ocean Fisheries Organization.[67]

The impact assessments were submitted to the Scientific Working Group in late 2008. Since then, as far as the DSCC is aware, no further revisions of the assessments or efforts to resolve the uncertainties in the assessments in regard to the occurrence of VMEs or potential impacts on VMEs have been submitted to the Scientific Working Group. No impact assessments have been done for high seas bottom fisheries in the northeast Pacific areas.

Closures of areas where VMEs are known or likely to occur unless or until measures are adopted to prevent SAIs [83C/119[b]]

VMEs are likely to occur, or have occurred, on many of the seamounts on the high seas in the northwest Pacific. Nonetheless, Japan, South Korea and the Russian Federation appear to have 'tentatively' agreed to close only a small area of one seamount, the Koko Guyot, where the coral Corallium spp. were found through bottom surveys. South Korea and Japan additionally agreed to close to bottom fishing the smaller and less important of two seamounts proposed for closure by the US to rebuild depleted populations of straddling stocks that occur both within and outside the US EEZ in the northwest Pacific. Though this measure is primarily intended to conserve fisheries, it would also have the effect of temporarily protecting any VMEs from the impact of bottom fishing by Japanese and South Korean vessels on this seamount. All told, in the area of the high seas of the northwest Pacific where bottom fishing currently takes place, the three fishing nations propose to close only one of the areas [a small portion of one of the seamounts] identified through drop camera surveys and other methods as containing or likely to contain VMEs.

Japan proposed a "tentative" prohibition of trawl and gillnet fishing below 1,500 metres and a "tentative" prohibition of trawl and gillnet fishing above latitude 45 degrees north. These regions are not currently of interest to the fishing industry. South Korea suggested prohibiting bottom fishing in all areas not currently fished and proposed to "provisionally" prohibit bottom fishing north of latitude 40 degrees north. However, the closures under consideration by the participants in the North Pacific negotiations are, at this stage, only proposals, tentative and/or provisional in nature. Even if all three countries unilaterally prohibited their flagged vessels from fishing in the areas they have proposed to close, all but the one small portion of the Koko Guyot would remain open to bottom fishing [for example, Japanese and Russian vessels would still be permitted to continue bottom fishing in the areas closed by South Korea].

Move-on rule/cease fishing in areas where VMEs are encountered [83D/119[c]]

The Interim Measures for the bottom fisheries in the northwest Pacific stipulate that vessels must cease fishing and move 5 nm from the site of an encounter with a VME prior to resuming fishing. However, no agreement has been reached as to how the move-on rule should be applied. A 'tentative' threshold of 50 kg of corals per tow or set observed in the fishing gear has been adopted by Japan as the limit that would trigger the move-on rule. Not only is this level quite high, but also Japan would only require that a vessel move 2 nm from the site where the tow or set occurred: not 5 nm as agreed in the interim measures. Neither South Korea nor the Russian Federation have implemented a threshold level

GAVIN NEWMAN/GREENPEACE

Black coral, (*Antipathella wolastoni*), is a cold water coral that only possesses its spectacular appearance if underwater. In air, it progressivley turns black while dying away.

61/105 & 64/72

PHOTO RESEARCHERS/FLPA

Clawed Armhook Squid (*Gonatus onyx*) adult, specimen trawled from 1000ft. depth, Northern Pacific Ocean, Monterey, California

or trigger for the move-on rule. No move-on rule has been agreed as part of the interim measures adopted for the northeast Pacific.

Ensuring the long term sustainability of deep sea fish stocks [83B]

Target stocks/species

The status of splendid alfonsino and pelagic armourhead, the two main target species in the bottom trawl fisheries in the northwest Pacific, is not well known. There are no reliable biomass estimates of these two species. However, major declines in the catch per unit effort [CPUE] in the fisheries for both species – from approximately 50–60 tonnes/ per hour of trawling at the respective peaks of the fisheries in the 1970s and 1980s to well less than 1 tonne/per hour of trawling over the past several years – suggests that both stocks/species have been heavily overexploited and depleted over the past 30–40 years of fishing. Both pelagic armourhead and alfonsino appear to be straddling stocks, forming one population that extends into the US EEZ off Hawaii. The portions of the populations that occur within the US EEZ have not recovered, despite the closure of fisheries for these species on seamounts just inside the US zone since 1986.

Japan, South Korea and the Russian Federation have proposed reducing fishing mortality by approximately 20– 25 percent on both stocks. The three countries assert that this will be achieved primarily through a seasonal closure of bottom fisheries in November and December, but do not present evidence as to whether the seasonal closure will achieve the desired reduction in fishing mortality. The US states that stocks of pelagic armourhead and alfonsino are at risk of significant adverse impacts given: 1] the tendency of these species to form schools, presumably even at low abundance; 2] the efficiency with which modern trawlers can electronically detect, then target and capture these schools; 3] the continued pursuit of this fishery after the crash of the historic fishery in 1977, despite low annual catches during most years; 4] the increasing trend in fishing effort of the Japan trawl fleet from 1,825 nominal trawling hours in 1990 to 10,107 nominal hours in 2007; 5] the notion that the next recruitment pulse of pelagic armourhead can be safely "fished up" at sustainable levels; and 6] the high trawl selectivity for juvenile stage alfonsino. In regard to target species in other bottom fisheries, the US states that insufficient information is available to detect trends in the fisheries.

A workshop to review the information on stock assessments for the two main target species in the bottom fisheries in the northwest Pacific was scheduled for early 2011, but the results of the workshop are not yet publicly available. Very little information has been made available on the high seas longline fisheries on seamounts in the northeast Pacific.

Bycatch stocks/species

Current estimates of the amount and status of most of the bycatch species impacted in the bottom fisheries is unknown. The impact assessments of the three countries indicated that some two dozen or more species or species groups are taken as bycatch in all bottom fisheries combined, apparently including both species of commercial value and those of non-commercial value. In an appendix to the impact assessment report provided by Japan relating to bycatch species, in 1993 some 40–50 species or species groups were recorded caught by a trawl research vessel in 56 tows in five seamount areas currently open to bottom fishing.

5.0 SOUTH PACIFIC OCEAN

Negotiations for a regional agreement to establish an RFMO to regulate high seas bottom fisheries [and other fisheries for non-highly migratory species] were conducted since 2006, and agreement was reached on 14 November 2009 with the adoption of the Convention on the Conservation and Management of the High Seas Fishery Resources of the South Pacific Ocean in Auckland, New Zealand. Interim Measures have been agreed for deep-sea bottom fisheries and in place since May 2007. An interim secretariat, scientific working group, and a data and information working group have been formed. A Preparatory Conference has been established and has held meetings in July 2010 and January 2011, and a third session is scheduled to take place in Chile from 30 January–3 February 2012. An interim measure banning deep sea gillnets was adopted in November 2009.

Description of high seas bottom fisheries

Main high seas bottom fishing nations

Australia, New Zealand.

Main high seas bottom fisheries

Bottom trawl fisheries for orange roughy, bottom longline and mid-water trawl for alfonsino, bottom longline fishery for Antarctic butterfish [blue-eye trevalla, bluenose sea bass], warehou and morwong.

Catch

New Zealand: approximately 958 tonnes in 2009. New Zealand reports that over 95 percent of the reported catch consists of orange roughy, but also, altogether over the past several years, a catch of 22 target species and 115 non-target species in the high seas bottom fisheries.[68] *Australia:* approximately 60 tonnes in 2009. Red-throat emperor, morwong [two species], sea bream, yellowtail kingfish and Antarctic butterfish [blue-eye trevalla] appear to be the primary target catches. Some 32 tonnes were reported as bycatch.[69]

Vessels authorised to fish in 2010

New Zealand authorised 21 vessels to bottom fish on the high seas in 2009–10 of which only 10 vessels, including 6 bottom trawlers, participated in the fishery. New Zealand reports that the number of bottom trawl vessels fishing on the high seas declined from 23 in 2002 to 4 vessels in 2008, increasing to 6 vessels in 2009. Similarly, the number of bottom trawl tows declined from 2,944 to 208 in 2008, and increased to 545 in 2009. New Zealand longline effort has also declined from half a million hooks in 2006 to 236,000 hooks in 2009. Australia reports that 3 vessels engaged in bottom longline and/or drop line fishing in 2009. As far as the DSCC is aware, no other country has publicised a list of vessels authorised to bottom fish on the high seas in the South Pacific, although Australia is known to have authorised several vessels to bottom fish.

Progress in the implementation of measures related to paragraphs 83 of UNGA resolution 61/105 and 119 of 64/72 for the regulation of high seas bottom fisheries

Interim Measures were adopted in May 2007 to implement UNGA resolution 61/105 incorporating the provisions of paragraph 83 of the resolution. In addition, the Interim Measures included a requirement to establish 100 percent observer coverage on bottom trawl vessels, 10 percent coverage on bottom fishing vessels using other gear types, and to "freeze the footprint" of high seas bottom fisheries until 2010. However, the method established to delineate the area of the footprint allowed for 20-minute longitude by 20-minute latitude grid blocks of ocean space surrounding any area where any trawling had occurred between 2002 and 2006 [including even a single trawl tow] to be included in the 'footprint'. According to New Zealand, the result has been an "exponentially increasing exaggeration of the mapped footprint in comparison with actual seabed impact area of individual trawl tracks". This has meant that large areas of the seabed of the South Pacific that are not likely to have been previously impacted by bottom trawl fishing have been incorporated into country footprints. The footprint of New Zealand's high seas bottom trawl fishery, for example, includes 218 such blocks, each approximately 800–1,200 square kilometres in size, depending on the latitude. Chile has also stated that it has a bottom trawl footprint for 2002–06, but has yet to indicate whether any vessels have been authorized to fish.[70]

In commenting on the New Zealand approach to managing bottom fisheries, the United States expressed concern that 20-minute blocks allow the incorporation of large swaths of "new" areas that would not otherwise be included in the South Pacific Regional Fisheries Management Organisation [SPRFMO] bottom fishing footprint if a smaller block area was used and that the size of the 20-minute blocks allows bottom fishing in "new" or previously unfished areas, even in "heavily trawled blocks". The US also expressed concerns regarding the lack of information on the specific impacts of fishing gear types on the seabed and the impacts of bottom fishing on target species other than orange roughy as well as bycatch species.[71] New Zealand reports it is not actually feasible for vessels to accurately trawl exactly the same track as trawled previously, notwithstanding the substantial improvements in navigational equipment over the past decade. New Zealand cites an analyses conducted by O'Driscoll & Clark [2005] that shows vessels do not repeat

their trawl tracks when fishing the seamount features typically targeted in the deep-water trawl fisheries and that although there are some directional preferences on certain seamounts related to the topography of the seamount concerned, vessels may conduct radial trawls on seamounts from almost any direction in other instances.[72] Thus even on 'heavily trawled' seamounts, areas of the seamount that have not been previously fished may still be vulnerable to the impact of continued bottom fishing. New Zealand reported that most of the bottom trawling over the past several years has taken place in the heavily trawled blocks [where no restrictions are in place] given industry reluctance to operate in areas where a move-on rule is in place, but that within the heavily trawled blocks, the industry reports that new, previously unfished features were being fished.[73]

Impact assessments/Preventing SAIs [83A/119[a]]

New Zealand has submitted "Benthic Impact Assessment" reports to the South Pacific RFMO Science Working Group. The reports contain quite comprehensive and detailed information on the potential impact of bottom fishing on VMEs on the high seas and the regulations New Zealand has established. However, the reports are not impact assessments *per se* as measured against the criteria for impact assessments in paragraph 47 of the FAO Deep-Sea Guidelines. Rather, New Zealand has chosen to close 41 percent of the area within its historic trawl footprint. For those areas that remain open, a move-on rule has been established in 'moderately' fished areas, which is applicable to 30 percent of the footprint, and no restrictions are in place in the heavily fished areas.

While New Zealand has delineated its bottom longline footprint, it has yet to apply any specific measures to this fishery. It is not clear whether other flag States have delineated their footprints and/or allow bottom fishing on the high seas of the South Pacific in the areas that New Zealand has closed to bottom trawling. No specific measures have been established to prevent SAIs in any of the bottom fisheries, with the exception of a move-on in a portion of the area within the New Zealand footprint that remains open to bottom trawl fishing.

Spain/EU was the only other country to submit an impact assessment in respect of deep-water gillnet vessels seeking to fish in the area. On the basis of the impact assessment, which followed the criteria established in the FAO Deep-Sea Guidelines, the participants in the SPRFMO negotiations agreed that bottom gillnet fishing should be prohibited in the SPRFMO area. No other country has submitted an impact assessment report to the SPRFMO negotiating process as of the time of writing, although Australia indicated at the January 2011 meeting of SPRFMO in Chile that it would present an impact assessment in May 2011.

Both New Zealand's Benthic Impact Assessment and the impact assessments submitted by Spain/EU are publicly available on the SPRFMO website.[74]

Development of a Draft Bottom Fishery Impact Assessment Standard for all countries engaging in bottom fishing on the high seas of the South Pacific has been under way since 2007, but has it has still not been finalised.[75] The latest version will be further discussed at the SPRFMO Science Working Group scheduled for 19–23 September 2011. The DSCC has submitted a critique of the most recent version of the Draft. While recognising that it contains many positive elements consistent with the UNGA resolutions and FAO Deep-Sea Guidelines, the DSCC has recommended changes to the Draft to address, among other things: the threshold quantities; the failure to make it clear that fishing should not be allowed in areas where VMEs are known or likely to occur unless significant adverse impacts on VMEs can be prevented; the fact that it places too great an emphasis on a move-on rule as a means of managing bottom fisheries in new areas; and the fact that the Draft focuses on target and "main" bycatch species and does not explicitly require an assessment of the impact on other fish species, including rare or endemic species.

Closures of areas where VMEs are known or likely to occur unless or until measures are adopted to prevent SAIs [83C/119[b]]

As indicated previously, New Zealand has closed a substantial portion of its footprint, including areas where VMEs are known or likely to occur, through closing all previously "lightly trawled" areas within its footprint and approximately 15 percent of "moderately" and "heavily" trawled areas within its footprint. The effect of these measures has been to close bottom trawling in 41 percent of the total 217,463 km2 that fall within the New Zealand bottom trawl footprint surface area, with 30 percent [the moderately trawled areas] made subject to a move-on rule, and 29 percent [heavily trawled areas] left open to bottom trawling with no constraints. New Zealand reports that the open areas represent 0.13 percent of the entire SPRFMO Area. However, this estimate is based on the relative size of the area closures to the entire SPRFMO area. In terms of the numbers of seamounts within the New Zealand footprint, of the 42 large seamounts within the footprint, 11 fall within the closed areas and the remaining 31 are located within the areas where bottom fishing is permitted.[76]

The 60 percent of the footprint that remains open is likely to include areas that had not been fished prior to 2007, with the industry reporting fishing in new areas within the heavily trawled portion of the footprint.

No systematic identification of areas where VMEs are known or likely to occur within the footprint has taken place, although New Zealand states that VMEs are likely to occur in most high seas areas of the South Pacific where bottom fishing occurs [for example, seamounts, rises, ridge systems]. Nonetheless, New Zealand has chosen to close only a portion of its footprint to bottom fishing. The rationale provided by New Zealand for this approach is that, on the basis of consultations with the high seas fishing industry, environmental non-governmental organisations and Government departments concerned with environmental conservation, the Government attempted to strike a balance between competing objectives: on the one hand, the protection of all features known or likely to support VMEs from any SAIs by bottom fishing operations; and on the other, to provide access to adequate and suitable target areas to provide for a viable and sustainable deep-water high seas trawl fishery.[77] Thus, rather than closing all areas where VMEs are known or likely to occur unless fisheries can be managed to prevent SAIs on VMEs, New Zealand has chosen to close some areas to bottom fishing [approximately 40 percent of the footprint] and allow continued bottom fishing in the remaining areas, with no effective measures in place to prevent significant adverse impacts on VMEs in the heavily fished areas.

The freezing of the footprint has resulted in the temporary closure to bottom fishing of many areas of the high seas in the South Pacific where VMEs are known or likely to occur, including the seamount and ridge system areas in the high seas of southeast Pacific off the coasts of Chile, Peru and Ecuador. New Zealand notes that based on work done by Allain et al. [2008] some 1,450 seamount features occur in the high seas of the SPRFMO Area though it is not clear how many of these features occur at fishable depths [for example, less than 2,000 metres], nor whether this figure also includes hills, knolls and rises [such as the Lord Howe Rise]. Thus it is difficult to compare the numbers of seamounts potential vulnerable to bottom fishing in the SPRFMO area with the number within the New Zealand footprint, although the former is likely to be far higher. However, the freeze on fishing areas within notified footprints expired in January 2010, potentially allowing bottom fishing to take place in any high seas area of the South Pacific pending the adoption by SPRFMO of a Benthic Fisheries Impact Assessment Standard which would allow fishing in 'new' areas contingent on the conditions established in the standard.

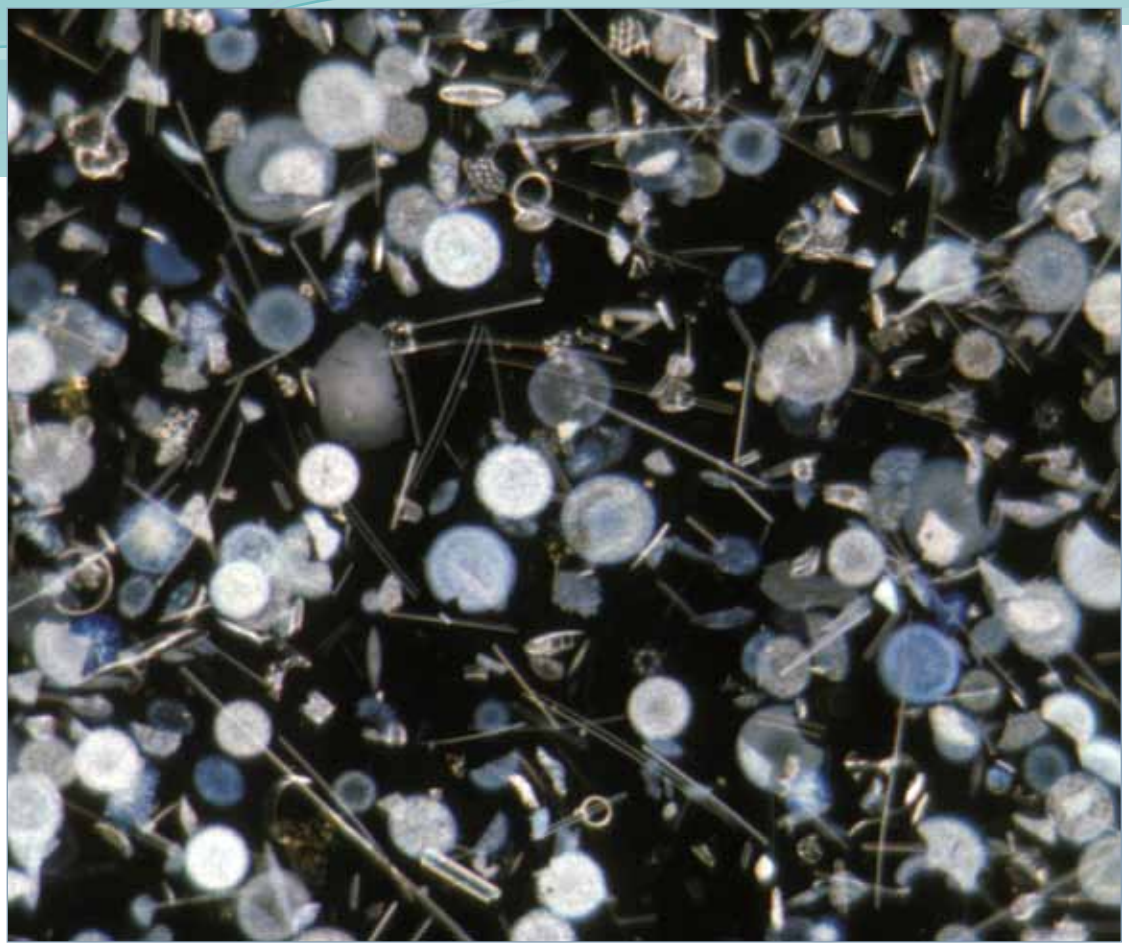
Move-on rule/cease fishing in areas where VMEs are encountered [83D/119[c]]

A move-on rule has been adopted by New Zealand, the only country to notify the SPRFMO negotiating process of a move-on rule. However, the rule is only applicable to bottom fishing in 30 percent

NORBERT WU/MINDEN PICTURES/FLPA

Elephant Fish (Callorhynchus milii) trunk-like snout detects prey in sea bottom, primitive fish relative to sharks, lives in the deep sea, New Zealand

61/105 & 64/72



D P WILSON/FLPA

Pl'ton-(Diatom ooze)
1950 fathoms /
Australia / x30

[the 'moderately' fished areas within its existing footprint] of the high seas areas where New Zealand vessels are currently permitted to bottom trawl fish. Bottom fishing in the 'heavily fished' blocks of the New Zealand footprint is not covered by the rule. Furthermore, according to the Benthic Impact Assessment submitted by New Zealand to the SPRFMO negotiating process, the move-on rule only requires that a vessel move 5 nm from the site of the encounter "for the remainder of that fishing trip". It would appear that a vessel could return to bottom fish in the same area on a subsequent trip and other vessels could also bottom fish in the same area. The move-on rule was triggered once in 2009, of 14 tows within the move-on blocks. Four additional tows resulted in benthic taxa being reported.[78] From January to September 2010, New Zealand trawlers conducted 44 tows within move-on blocks, 20 of which reported benthic taxa, but which did not exceed the move-on score, and 2 of which triggered a move-on.[79] In the "heavily trawled" areas, although the thresholds were exceeded on several occasions, the move-on rule is not required, thus no closures resulted from the encounters.[80]

The threshold levels New Zealand has established for triggering the move-on rule are 1–30 kg of corals [depending on the species] and 50 kg of sponges. These levels are substantially lower than these agreed by NAFO, NEAFC and SEAFO, but, as elsewhere, the threshold levels do not correspond to a quantifiable or measurable amount of damage to VME indicator species on the seabed, nor do they allow for a determination of SAIs. According to the New Zealand Benthic Impact Assessment, *"Although catch weights [of VME indicator species] may appear small, trawl selectivity for many taxa is poor, so small individuals are not retained and large individuals are broken and not well retained. Comparisons of video with sled and trawl tows demonstrate the low selectivity and the small weights typically encountered … Few datasets exist to investigate the relationship between what benthic invertebrates are actually on the bottom and what comes up in a trawl."* In reviewing the information from an area where such data sets do exist, New Zealand states that corals appeared in the net in only one of nine trawls on a seamount area known to contain high concentrations of corals "highlighting the poor ability of these trawls to retain benthic materials, assuming the same areas were fished." New Zealand states that "trawl nets remain poor tools to sample benthic materials, and much of the benthic material damaged, and perhaps even initially caught, by trawl nets is lost through the meshes, particularly the fragile and vulnerable cold water corals" and concludes that "Dedicated before/after or control/impact scientific surveys are probably the only way to reliably and quantitatively evaluate benthic impacts of deepwater trawling operations."[81]

Nonetheless, New Zealand reports that 'benthic taxa' were found in the nets of almost half [27] of the 59 trawl tows observed in the 2009–10 fishing season in the areas where New Zealand has established a

move-on rule and in approximately 33 percent of all trawl tows in both the heavily fished and moderately fished areas combined. In 11 cases, the quantities of benthic taxa met or exceeded the rule's thresholds levels, although vessels were required to move out of the area in only three cases. Most of the high seas bottom trawling – 648 tows in 2009 – takes place in areas where no move-on rule or other conservation measures are in place to protect VMEs.

Ensuring the long term sustainability of deep sea fish stocks [83B/119[d]]

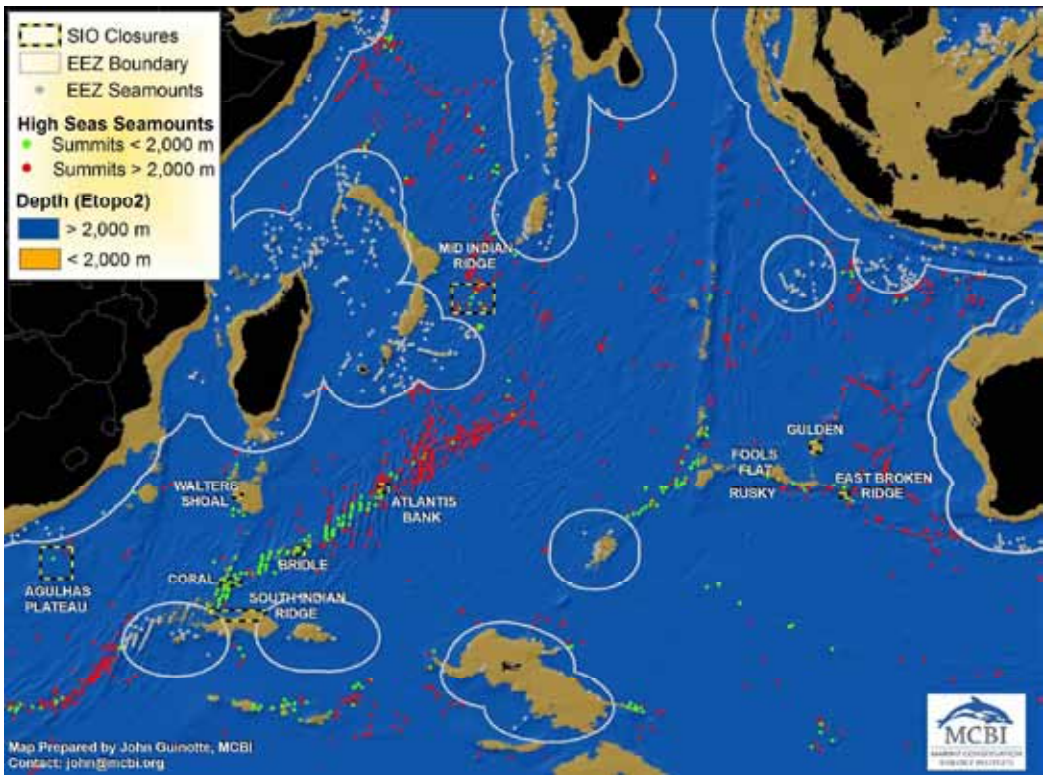
There are no limits on the catch or other measures to ensure the long-term sustainability of target or bycatch fish stocks and species. Altogether, 137 species have been recorded caught in the New Zealand high seas bottom fisheries of the South Pacific, with 22 regarded as target species. Most of these species are, or are likely to be, long-lived and have low productivity. Detailed information is not available from other countries that have bottom fished in the region.

At time of writing, New Zealand was consulting on proposals to establish catch limits for one species – orange roughy. The status of high seas stocks of orange roughy, the primary target species in the high seas bottom trawl fishery, is either unknown or considered depleted [for example, the South Tasman Rise population – a fishery now closed]. Nonetheless, New Zealand has proposed establishing a catch limit of 1,852 tonnes of orange roughy for all high seas areas combined. This level would exceed limits suggested from a review of the catches.

The total maximum sustainable yield [MSY] of orange roughy for fished areas is estimated at 1,566 tonnes: a figure obtained by averaging catches in the years 2002–06, when catches were higher, whereas catches in 2009 were only 928 tonnes and in 2008 were 837 tonnes. Yet New Zealand is proposing to issue a catch limit of 1,852 tonnes. These catches are unsustainable. The New Zealand Government has acknowledged that the risk of over-exploitation of deep-water trawled species is high,[82] and that catches are unlikely to be low enough to ensure the long-term stock sustainability of orange roughy stocks in all areas.[83] Thus it is clear that proposed catches at this level are likely to exceed MSY in some, if not all, cases.[84] Catch limits should, to be consistent with UNGA resolution 64/72, ensure the long-term sustainability of deep sea fish stocks and non-target species, and be made on the basis of stock assessments and the best available scientific information. Setting aside the issue of bycatch, given that there have been no adequate orange roughy stock assessments, then no total catch should be permitted. Even if complying stock assessments had been made, the permit should allow a total catch of orange roughy no greater than MSY, in each area, and in total, reduced by an appropriate factor to allow for the uncertainties in the calculation of MSY.

There are no reliable estimates of the stock size, biomass, or fishing mortality of Antarctic butterfish [blue-eye trevalla, bluenose sea bass], the primary target species in the bottom longline fishery and another long-lived species [maximum age of 50–60 years].

The status of the stocks of the other 135 species reported caught in the New Zealand bottom fisheries on the high seas, including the 20 species reported as target species in addition to orange roughy and bluenose, is unknown and no catch limits are in place or have been proposed for stocks of any of these species.



JOHN GUINOTTE / MARINE CONSERVATION INSTITUTE

7. Map of the Indian Ocean showing high seas areas; seamounts <2,000m summit depth (green dots), seamounts >2,000m depth (red dots) and BPAs

Number of fishable high seas seamounts [under 2,000 m]: 268

Number of high seas seamounts too deep to fish [more than 2,000 m]: 935

The SIOFA-proposed benthic protected areas [BPAs] contain 15 fishable seamounts: 6 percent of the total of 268 fishable seamounts.

6.0 INDIAN OCEAN

The Southern Indian Ocean Fisheries Agreement [SIOFA] to establish an RFMO to regulate high seas bottom fisheries was concluded in 2006, and ratified by the Seychelles, the EU, and Mauritius and the Cook Islands acceded to the Agreement.[85] The Agreement has yet to enter into force, since the Cook Islands acceded to, rather than ratified, the agreement. No meetings have yet been held and, in the meantime, no interim measures have been established to manage bottom fisheries on the high seas by States fishing in the region, including the signatories to SIOFA.

Description of high seas bottom fisheries

Main high seas bottom fishing nations

Australia, Cook Islands, Mauritius, Namibia, and China. An estimated 20–22 vessels were engaged in high seas bottom fisheries in the Indian Ocean in 2006. No new information is currently available.

Main high seas bottom fisheries

Bottom trawl fishery for orange roughy and deep-water mid-water trawl fisheries for alfonsino. Bottom longline fishery for deep-water longtail red snapper [ruby snapper].

Catch

Approximately 5,000–6,000 tonnes in 2006 [only China has reported catch]. No updated information on catch available, as far as the DSCC is aware.

Vessels authorised to fish in 2010–11

The Cook Islands has authorised two large trawlers to engage in high seas bottom fishing, which are fishing in the Indian Ocean [and possibly elsewhere].[86] As far as the DSCC is aware, no other country has publicised a list of vessels authorised to bottom fish on the high seas of the Indian Ocean.

Progress in the implementation of measures related to paragraphs 83 of UNGA resolution 61/105 and 119 of 64/72 for the regulation of high seas bottom fisheries

No multilateral regulations or interim measures have been established by SIOFA for high seas bottom fisheries in the region. With the exception of the Chinese longline fishery, the high seas bottom fishery catch is unreported as far as DSCC is aware. Aside from China, no other country submitted high seas bottom fish catch information to the FAO for the FAO's World Wide Review of Bottom Fisheries in the High Seas. Nor have any countries reported catches of orange roughy or alfonsino – the two main target species in the deep-water high seas fisheries in the Indian Ocean – in the southwest Indian Ocean [FAO Statistical Area 51] in the period 2007–09 [the latest year for which global catch statistics are available]

UNGA resolutions

as reflected in FAO FishStat Plus database.[87] Only Australia has reported a catch of orange roughy in the southeast Indian Ocean [FAO Statistical Area 57] to the FAO, though it is not clear whether this includes the catch from the high seas, Australia's EEZ, or both.

Orange roughy, the main target species in the deep-sea trawl fisheries, is highly vulnerable to overexploitation. Several companies operating deep-sea trawlers have voluntarily agreed to refrain from fishing in 11 deep-sea areas. These closed areas cover approximately 6 percent of the seamounts on the high seas in the region, and there is no reason to believe that the closed areas are representative, or that areas remaining open do not contain VMEs. Indeed, VMEs [such as cold-water corals] associated with seamounts and ridge systems are likely to occur throughout the high seas areas of the southern Indian Ocean, including areas where the deep-sea bottom fishing currently occurs.[88] As of 31 December 2010, as far as the DSCC is aware, none of the provisions of paragraph 83 of UNGA resolution 61/105 or of paragraph 119 of 64/72 to protect VMEs from SAIs or ensure the long-term sustainability of deep-sea fish stocks have been adopted or implemented by flag States for the high seas bottom fisheries in the region. The deadline for implementation of UNGA resolution 61/105 in the Indian Ocean region was 31 December 2007.

STEPHEN MCGOWAN, AUSTRALIAN MARITIME COLLEGE, 2006/MARINE PHOTOBANK

Orange roughy and bycatch on the deck of a research trawler the FTV Bluefin off East Coast of Tasmania

61/105 & 64/72

8. The Commission for the Conservation of Antarctic Marine Living Resources [CCAMLR] manages the regulation of bottom fishing south of the Antarctic Convergence.

7.0 SOUTHERN OCEAN

The Commission for the Conservation of Antarctic Marine Living Resources [CCAMLR] manages the regulation of bottom fishing south of the Antarctic Convergence.

Description of high seas bottom fisheries

Main high seas bottom fishing nations

Australia, Chile, Japan, South Korea, New Zealand, Russia, South Africa, Spain, United Kingdom, Uruguay.
Australia, France, South Africa and the UK also license vessels to bottom fish in declared fishing zones and EEZs within the CCAMLR area.

Main high seas bottom fisheries

Bottom longline fishery for toothfish [Patagonian and Antarctic toothfish].

Catch

About 4,500 tonnes of toothfish are caught annually on the high seas, while another 10,000 tonnes is caught within EEZs in the CCAMLR areas. [This figure does not include the estimated IUU catch per year of some 4,000 tonnes].

Vessels authorised to fish in 2010/2011

CCAMLR has published a list of vessels "licensed" to bottom longline fish for toothfish in high seas portions of the CCAMLR area [CCAMLR areas 48.6, 58.4.1–3, 88.1–2]. The list indicates that 12 of these vessels are authorised to conduct bottom fishing on the basis of an impact assessment in accordance with CCAMLR Conservation Measure 2-06, paragraph 7. Another 8 vessels are listed as licensed to bottom longline fish for toothfish in one or more of the same high seas areas, but are not identified as being authorised to bottom fish pursuant to Conservation Measure 2-06, paragraph 7.[89]

Progress in the implementation of measures related to paragraphs 83 of UN GA resolution 61/105 and 119 of 64/72 for the regulation of high seas bottom fisheries

CCAMLR has adopted a series of measures to implement the UNGA resolutions, including several in 2006 just prior to the adoption of UNGA resolution 61/105. The measures adopted in 2006 included: an interim prohibition on commercial bottom trawl fishing in high seas areas of the Convention Area [initially for the 2006–07 and 2007–08 seasons, with a permanent measure adopted in 2008]; a ban on the use of gillnet fishing in the area; and setting the Scientific Committee to review the criteria for determining significant harm to benthos and benthic communities. Since 2006, CCAMLR has amended and updated the original conservation measures, as well as adopted additional measures consistent with the UNGA resolutions [including Conservation Measures 22-05, 22-06, 22-07 and 22-08].[90]

UNGA resolutions

Impact assessments/Preventing SAIs [83A/119[a]]

In 2009, all Contracting Parties proposing to participate in bottom fishing were required to submit information on their fishing plans, a preliminary assessment of the known and anticipated impacts of bottom fishing activities on VMEs [including benthos and benthic communities], and mitigation measures to prevent impacts, no less than three months in advance of the October–November 2008 annual meeting of CCAMLR. However, only Australia, New Zealand, Spain, Japan and the United Kingdom submitted interim assessments. At the 2008 Annual Meeting, CCAMLR adopted a measure that prohibited fishing in 2010 by any country that did not submit an impact assessment in 2009. As a result, all States intending to engage in high seas bottom fishing submitted impact assessments.

The Scientific Committee was requested to determine if such activities would contribute to having significant adverse impacts on VMEs. Based on advice from the Scientific Committee, the Commission would then determine whether to allow, prohibit or restrict bottom fishing activities within particular areas, apply specific mitigation measures for bottom fishing activities, allow, prohibit or restrict bottom fishing with certain gear types, and /or determine any other relevant requirements or restrictions to prevent significant adverse impact to VMEs.

The impact assessments submitted by the five flag States in 2008 varied considerably in quality and detail. Several of the flag States indicated that information independent of fisheries, including benthic surveys of areas to be fished and underwater video footage of the interaction between fishing gear and benthic ecosystems, would be of benefit and should be included in future research and impact assessments. However, none of the impact assessments appear to have contained such information. New Zealand, in reviewing available information to date concluded, "There have been no direct studies on the impacts of autoline longlines on VMEs". Australia concluded that the impact of bottom longline fishing on all VME indicator species reviewed in the assessment is "unknown" although "Likely to cause damage and possible mortality on contact."[91] According to the CCAMLR Fisheries Working Group, the "preliminary impact assessments submitted in 2010 were much more complete compared to those submitted in 2009, and most provided detailed information and diagrams of gear configuration, proposed effort and anticipated impacts allowing a more meaningful review and estimation of cumulative proposed fishing footprint."

Although the impact assessments state that some VME indicator species, including various species of corals and sponges, are regularly observed in the fishing gear, they all appear to have concluded that the bottom longline fisheries will not have significant adverse impacts on VMEs. This conclusion appears to be based primarily on the quantity, volume and/or weight of VME-related species observed brought up from the bottom in the gear of commercial longline fishing vessels during one or more previous seasons [CCAMLR requires 100 percent observer coverage on all vessels authorised to fish for toothfish] and the relatively small area of seabed presumed impacted by bottom longline gear. This was based on an assumption that the maximum area of seabed likely to be impacted by bottom longline fishing was approximately 1,000 m2 for each kilometre of longline set. Typically 7 to 10 kilometres of line are used per set of the gear, deploying some 900–1,000 hooks per kilometre.[92] However, a review of available information by the CCAMLR Fish Stock Assessment Working Group in 2010 concluded that the maximum impact of bottom longlining on the seabed could be as high as 25,000 m2 per kilometre of gear deployed, primarily in cases where the longline gear is dragged across the seabed during the haulback of the gear.

This new information notwithstanding, a number of CCAMLR Contracting Parties have expressed the view that the impact of bottom longline fishing on the seabed is much less severe than the impact of bottom trawl fishing and thus the risk of significant adverse impacts from bottom fisheries permitted in the high seas portions of the CCAMLR area is significantly less than in other high seas regions given the prohibition on bottom trawling.

New Zealand, in its impact assessment, stated this view as follows: *"a deliberate decision was made by New Zealand not to use trawl fishing methods for toothfish in the exploratory fisheries. The reason for this was to avoid potential significant adverse impacts on the marine environment".*[93]

Closures of areas where VMEs are known or likely to occur unless or until measures are adopted to prevent SAIs [83C]

The Scientific Committee has been requested to identify areas where VMEs are known or likely to occur. No areas have yet been closed as a direct result of this process. Australia has identified one area that the Scientific Committee agreed met the definition of a VME. Nonetheless, numerous areas of the high seas are closed to bottom fishing. All high seas areas shallower than 550 metres are closed to bottom longline fishing for toothfish to protect benthic communities.[94] In 2010, a large area south of the South Orkney Islands was closed to bottom fishing. In addition, a number of areas have been closed as a result of the move-on rule [see below].

CCAMLR has also published a list of VME indicator species to which the move-on rule and other VME related conservation measures apply. This list includes numerous taxa of sea anemone [Actiniaria], sea pen, sea squirt, chemosynthetic species, xenophyophore and other species in addition to species and taxa of stony coral [Scleractinia] and soft coral [Alcyonacea] and sponge.[95]

Move-on rule/cease fishing in areas where VMEs are encountered [83D/119[c]]

A move on rule has been adopted by CCAMLR for bottom longline fishing that requires the closure of a 1 nm area surrounding an area where either 10 litres of VME species [for example, sponges] that fit in a container per 1,000 hooks/1,200 metres, or 10 kg of VME species [for example, corals] per 1,000 hooks/1,200 metres are observed on the longline gear.[96] The ability to pinpoint the location of a VME on the basis of the bycatch in longline fisheries is much greater than for bottom trawl gear, given the relatively stationary nature of the gear. At least 15 high seas areas have been closed thus far in CCAMLR areas 88.1 and 88.2 as a result of the move-on rule, with an additional two areas closed in area 58.4.1.[97]

However, the CCAMLR Working Group on Ecosystem Monitoring and Management in 2010 noted that setting appropriate trigger levels relies on estimating the relationship between VME by-catch observed onboard the vessel and the abundance of actual VME taxa density on the seafloor.[98] The Fisheries Working Group in 2010 came to a similar conclusion, stating that the relationship between the amounts of VME indicator species retrieved in the fishing gear "should be confirmed with independent sampling to link actual densities on the seafloor with amounts of by-catch observed using different fishing methods". In addition, the working group recognised that "some VMEs may consist of rare or unique communities. Even with high detectability, the utility of using by-catch information is not likely to provide information about the extent of distributions of these taxa. Establishing alternative means of detecting these communities is desirable".[99]

Ensuring the long term sustainability of deep sea fish stocks [83B/119[d]]

CCAMLR has established conservation and management measures, including quotas, for fisheries for Patagonian and Antarctic toothfish – the main target species in the high seas bottom longline fisheries in the CCAMLR region. Nonetheless, Patagonian toothfish stocks are considered to be fully exploited or overexploited, in part due the prevalence of IUU fishing in the Southern Ocean.[100]

Because of the well-developed scientific observer programme in CCAMLR, there is detailed and comprehensive reporting of bycatch, in terms of species or species group, area, weight and numbers. The majority of the bycatch by numbers and weight consist of species of skate, ray and grenadier [Macrouridae]. CCAMLR has established limits on the catch of these species for specific areas – small-scale research units [SSRUs] – within CCAMLR statistical subareas or divisions ranging from 5 percent of the catch limit for toothfish or 50 tonnes [whichever is greater] per area for macrouridae to 16 percent of the catch limit for toothfish or 20 tonnes [whichever is greater] per area for all skate and ray combined. Additional provisions include a requirement that skate and ray be released alive where possible and that vessels temporarily cease fishing within 5 nm of an area, defined as the "path" or entire length of the set of the gear, where over one ton of either group of species is taken in a single haul. The catch limit per SSRU for all other bycatch species combined is 20 tonnes.[101]

Nonetheless, a large number of other species are also reported caught in the high seas bottom longline fisheries, including some taken in substantial quantities such as crocodile icefish [Channichthyidae], blue antimora [Antimora rostrata], cod icefish [Nototheniidae] and moray cod [Muraenolepis spp]. Others are taken in relatively small numbers.[102] The bycatch rates reported for the 2009–10 season were considered low, generally less than 1 percent of the catch of the target species, with the exception of the fishery in sub area 88.2 [4 percent]. However, it is not clear to what extent the 20-tonnes limit per SSRU of bycatch of all species combined [excluding skate, ray and grenadier] is sufficient to ensure the long-term sustainability of these non-target species.

8.0 FLAG STATE PERFORMANCE

In addition to calling for the regional implementation of UNGA resolutions, all three resolutions place emphasis on flag States to take action, both individually and through RFMOs, to protect VMEs and sustainably manage the impact of fishing on deep-sea fish stocks.

According to the FAO Worldwide Review of Bottom Fisheries in the High Seas, 80 percent of the high seas bottom fishing fleet in 2006 was flagged to 10 States. Of the estimated 285 vessels engaged in bottom fishing that year, 228 vessels were flagged to Spain, South Korea, New Zealand, the Russian Federation, Australia, Japan, France, Portugal, Belize, and Estonia.[103] The numbers of vessels per country currently bottom fishing, or authorised to bottom fish in 2011, on the high seas may be substantially different than in 2006. Thus their ranking may have changed since the publication of the FAO report. However, updated information is not currently available for all countries in regard to the numbers of vessels currently fishing, nor have all countries published information on whether and how many of their vessels are currently authorised to bottom fish on the high seas. Nonetheless, based on available information, these 10 countries, with the possible exception of Belize, continue to authorise vessels to engage in bottom fishing on the high seas.

One measure of the performance of flag States in the implementation of the UNGA resolutions is the extent to which the top 10 countries in 2006 have conducted impact assessments and made publicly available the measures they have taken to manage the fisheries as well as lists of vessels authorised to bottom fish on the high seas. The following three tables contain information on the above.

Table 2.
Top ten high seas bottom fishing nations in 2006: Impact Assessments

Country	Has submitted impact assessment to relevant RFMO/A [as of June 2011][104]	Has not submitted impact assessment to relevant RFMO/A [as of June 2011]
Spain	Southern Ocean, South Pacific	North East Atlantic, northwest Atlantic South East Atlantic, [southwest Atlantic][105]
South Korea	North Pacific, Southern Ocean	South East Atlantic [southwest Atlantic]
New Zealand	Southern Ocean, South Pacific	
Russian Federation	North Pacific	North East Atlantic northwest Atlantic
Australia		South Pacific, Indian Ocean
Japan	North Pacific, Southern Ocean	northwest Atlantic South East Atlantic
France		North East Atlantic
Portugal		northwest Atlantic
Belize[106]		
Estonia		northwest Atlantic

Table 3. List of vessels authorised by flag States to engage in bottom fishing on the high seas submitted to the FAO pursuant to paragraph 87 of UNGA resolution 61/105		
Country – info submitted to FAO[107] [08/09/2010]	**Number of vessels**	**Areas of the high seas authorised to fish**
Cook Islands	2	Area[s] not identified
Estonia	5	northwest Atlantic [NAFO Regulatory Area]
France	up to 31	North East Atlantic [NEAFC Regulatory Area]
Japan	10	Area[s] not identified [however, all Japanese vessels on FAO list are also listed on North Pacific, CCAMLR and SEAFO authorised vessel lists]
Spain	44	southwest Atlantic

Table 4. Countries/RFMOs that have made lists of vessels authorised to bottom fish publically available		
Region/RFMO	**Number of vessels**	**Countries**
South Pacific	21–30	**New Zealand** authorised between 21–30 vessels in the 2008 and 2009 fishing periods.[108] **Australia** currently authorises an unknown number of vessels to target various species with mid-water and demersal trawl, traps, drop-line, minor-line, auto-longline, and longline, although Australia reported only 3 vessels using demersal dropline and/or longlines were bottom fishing in 2008–09.[109]
North Pacific[110]	42	**Japan:** 6 trawl and 1 gillnet vessel[111] **Russian Federation:** 15 bottom trawl and 11 longline vessels **South Korea:** 7 bottom trawl and 2 longline vessels
Southern Ocean [CCAMLR][112]	12–20	CCAMLR list of vessels "licensed" to bottom longline fish for toothfish in high seas portions of the CCAMLR area [CCAMLR areas 48.6, 58.4.1-3, 88.1-2] indicates that 12 vessels flagged to **Japan, South Korea, New Zealand, Russia, South Africa, Spain, and the UK** are authorised to conduct bottom fishing on the basis of an impact assessment in accordance with CCAMLR Conservation Measure 2-06, paragraph 7. Another 8 vessels flagged to South Korea, Russia and Uruguay are listed as licensed to bottom longline fish for toothfish in one or more of the same high seas areas, but are not identified as being authorized to bottom fish pursuant to Conservation Measure 2-06, paragraph 7.
North East Atlantic [NEAFC][113]	?	The NEAFC Secretariat keeps a central list of vessels licensed by all the Contracting Parties to fish in the NEAFC area but this list is not publicly available. **France** [up to 31 vessels] is the only country to publish a list of vessels authorised to fish on the high seas in the NEAFC area.
Northwest Atlantic [NAFO]	?	In 2006 NAFO reported that 92 vessels were engaged in bottom fishing in the NAFO Regulatory Area. However, NAFO does not publish a list of vessels authorized to fish.
South East Atlantic [SEAFO][114]	35	SEAFO maintains a published list of vessels authorised to engage in bottom fisheries. **Spain** has authorised 30 vessels, predominantly bottom trawl vessels[115] **Japan**[116] **and Namibia** each authorise 2 longline vessels **South Africa:** 1 longline vessel **South Korea:** 2 vessels [1 trawler, 1 pole and line]

9.0 KEY POINTS FOR CONSIDERATION IN THE REVIEW BY THE 66TH SESSION OF THE UN GENERAL ASSEMBLY IN 2011

Following are a number of key issues that should be considered by the UN General Assembly in its 2011 review of the implementation of paragraphs 80 and 83 to 87 of resolution 61/105 and paragraphs 117 and 119 to 127 of resolution 64/72. These issues are based on the information and analysis presented in the previous sections as well as information obtained from several reviews of the implementation of the resolutions over the past several years.[117]

Impact assessments

Paragraph 119 [a] of resolution 64/72 calls on States to *"ensure that vessels do not engage in bottom fishing until such [impact] assessments have been carried out"*.

States have not conducted impact assessments for any of the high seas bottom fisheries in the Atlantic or Indian Oceans. For the bottom fisheries in the northwest Pacific, impact assessments consistent with the FAO Deep-Sea Guidelines have been carried out, but in many respects they have been inconclusive as to whether significant adverse impacts on VMEs would or would not likely occur. The fishing States concerned assert that SAIs are not likely to occur because VMEs are not present except in only one area of one of the seamounts in the region. However, an independent review of the limited information available on the location and likely occurrence of VMEs in the region suggests otherwise.[118] In the South Pacific, New Zealand has submitted detailed information of its high seas bottom fisheries but has not conducted a compliant impact assessment. Rather, although New Zealand has recognized that VMEs are likely to occur on seamounts throughout its high seas fisheries footprint, it has agreed to a compromise with the

NORBERT WU/MINDEN PICTURES/FLPA

Pencil Urchin (*Ctenocidaris perrieri*) and Brittle Star (*Ophionotus victoriae*) similar to deep sea species, New Harbor, Antarctica

61/105 & 64/72

fishing industry whereby approximately 40 percent of the footprint is closed to bottom fishing. In the remaining 60 percent of the fisheries footprint, no impact assessments have been conducted.

In the CCAMLR area, impact assessments are required of all Contracting Parties intending to bottom longline fish in the Convention area. The impact assessments vary considerably in detail and quality but, for the most part, the States concerned assert that although the impacts on VMEs from bottom longline fishing is not known, there is little risk of significant adverse impacts because the extent of the fishery in relation to the size of the CCAMLR convention area is small and that longline gear is much less destructive than bottom trawl gear.

One of the reasons often cited for failure to conduct impact assessments is that it is too expensive, in particular in relation to sub-paragraphs ii & iii of the FAO Deep-Sea Guidelines that call for collecting "baseline information on the ecosystems, habitats and communities in the fishing area, against which future changes are to be compared" and the "identification, description and mapping of VMEs known or likely to occur in the fishing area". This raises an important issue. The continued authorisation of bottom fishing on the high seas allows companies within the jurisdiction of the flag State and the flag State itself [for example, through tax revenues] to profit from this activity. So, in effect, some flag States are profiting from deep-sea fisheries on the high seas, while potentially damaging or destroying VMEs as a result of failing to fund the cost of the impact assessments. The position of the flag State is in this regard untenable, more so in cases where high seas bottom fleets are subsidised to fish, and where the management of the fisheries by the flag State cannot ensure that significant adverse impacts on VMEs will be prevented or that the long-term sustainability of deep-sea fish stocks will be ensured because the cost of conducting a proper impact assessment is 'prohibitive'.

Some have interpreted paragraph 48 of FAO Deep-Sea Guidelines as meaning that no impact assessments are required or necessary in historically trawled areas. The reason often given is that where bottom trawling has occurred in the past, fishing has already destroyed any VMEs that might have been present. This is an incorrect interpretation of paragraph 48 of the Guidelines. This paragraph simply states that

"Risk assessments referred to in paragraph 47 [vi] above should take into account, as appropriate, differing conditions prevailing in areas where DSFs [Deep Sea Fisheries] are well established and in areas where DSFs have not taken place or only occur occasionally."

Paragraph 48 only refers to the risk assessments in part vi of the paragraph 47 criteria for impact assessments and not the overall requirement to conduct an impact assessment. It is important to note that:

The risk assessment can only be done after the criteria in subparagraphs i–v of paragraph 47 of the FAO Deep-Sea Guidelines has been completed, including obtaining baseline information on the ecosystems, habitats and communities in the fishing area and the identification, description and mapping of VMEs known or likely to occur in the fishing area.

Depending on the information gathered in conducting the impact assessment consistent with steps i–v of paragraph 47, the risk assessment may find that there are no VMEs or low productivity fish species in historically fished areas [for example, fisheries on sandy bottoms on the continental shelf for high productivity species] and thus continued fishing in these areas will not likely result in significant adverse impacts to VMEs. Alternatively, the baseline information may show that VMEs and/or low productivity species do exist in historically fished areas and they have been heavily degraded or depleted as a result of past fishing. In this case, the risk assessment would determine that they are even **more** vulnerable to continued bottom fishing [for example, degraded cold-water coral reefs may become completely obliterated, low-productivity fish species may now be endangered with extinction]. Thus, to conclude, paragraph 48 of the FAO Deep-Sea Guidelines cannot be interpreted to mean that deep-sea fisheries in historically fished areas or existing fishing areas are exempt from the requirement to conduct impact assessments.

More generally, the argument that existing or historically fished areas do not need to be subject to impact assessments [and regulations to protect VMEs] is often based on the false assumption that in areas where extensive bottom trawl fishing has occurred in the past, any VMEs that may have existed in such areas have already been destroyed. Again, there is ample scientific information indicating that while in some areas where VMEs occur and bottom trawling has occurred, the VMEs have been obliterated by intensive trawling [for example, the coral cover on several seamounts off Tasmania in Australia], in other areas where VMEs such as cold-water coral reefs have been damaged by bottom trawling, substantial portions of the VMEs reefs still remain intact [for example, the carbonate mounds in the Porcupine Seabight off Ireland, cold-water coral reefs within the Norwegian EEZ, and sponge fields in the NAFO Regulatory Area of the North Atlantic] and that these VMEs, although found in "historically" fished areas or the declared fisheries footprint, require protection.[119]

Identify VMEs and close areas where VMEs are known or likely to occur unless management measures are in place to prevent significant adverse impacts

Most of the effort to date to identify VMEs has focused on species of corals and sponges, which is only a subset of the types of benthic species and habitats that fit the criteria for the identification of VMEs in the FAO Deep-Sea Guidelines [paragraph 42]. A number of States have used, or made available to RFMOs, information on the bycatch of corals and sponges in fisheries research trawl surveys and/or records of bycatch in commercial fisheries to identify areas where VMEs are known or likely to occur.

There is a considerable amount of work to be done by States and within RFMOs to identify the full spectrum of VMEs and implement protective measures to prevent significant adverse impacts.

In addition, several countries have conducted benthic surveys in areas where bottom fishing occurs to determine whether VMEs exist in the areas. Arguably the most comprehensive benthic surveys have been conducted in the Atlantic by the Instituto Español de Oceanografía [IEO], often in conjunction with partners [that is, from Canada, UK, Russia and Namibia]. Other notable surveys have been the MAR-ECO surveys in the North Atlantic led by the Institute for Marine Research in Norway. Gathering detailed baseline information on the known and likely locations of VMEs is a critical component of conducting an impact assessment. However, biogeographic information and predictive modelling for at least some types of corals, though widely available,[122] has been used only sparingly, if at all, by many RFMOs as a basis for considering area closures and/or mitigation measures to prevent significant adverse impacts on VMEs. There is a considerable amount of work to be done by States and within RFMOs to identify the full spectrum of VMEs and implement protective measures to prevent SAIs.

The only proven method of preventing SAIs on VMEs to date is to entirely close areas to bottom fishing. In areas where bottom fishing is permitted, it is difficult to "manage the fisheries to prevent significant adverse impacts" because of a lack of baseline information on the presence of VMEs and the difficulty, if not impossibility, of determining the extent of an impact on a VME or VMEs based on the presence of VME indicator species in the fishing gear. Again, this strengthens the case for the need for prior impact assessments. Without comprehensive baseline information on the presence and locations of VMEs in an area, it is impossible to establish mitigation measures to manage the fisheries in these areas to prevent significant adverse impacts.

In some high seas regions, substantial areas have been closed to bottom fishing. Large "representative" areas of the high seas have been closed along northern and southern portions of the Mid-Atlantic Ridge and within the New Zealand footprint in the Southwest Pacific. However, the UNGA resolutions call on States and RFMOs to do more than protect representative areas of VMEs. While representative area closures are an important component of the overall suite of measures to protect VMEs, permitting continued bottom fishing in areas outside of the closed areas where VMEs are likely to occur with no meaningful measures in place to protect VMEs does not fulfil the conditions of the UNGA resolutions and is not consistent with international law, in particular the United Nations Convention on the Law of the Sea [UNCLOS] and the UN Fish Stocks Agreement.

VME encounter and move-on provisions

States and RFMOs continue to manage bottom fisheries on the high seas in areas where fishing is permitted, primarily with a VME encounter and move-on rule as a substitute for, as opposed to a complement to, impact assessments and mitigation measures based on these assessments. The VME encounter and move-on regulations adopted by RFMOs to date are generally regarded as being of limited, if any, conservation value in regards to mobile fishing gear [for example, bottom trawling]. In the CCAMLR area, the VME encounter provisions are likely to be more effective as the bottom fishing is primarily conducted with fixed longline gear. Thus the location of the 'encounter' with a VME can be determined with a reasonable degree of accuracy and further damage can be avoided through closing or restricting fishing in the area. Encounters in the CCAMLR area have resulted in area closures.

In the case of bottom trawl gear, especially in fisheries where the gear is towed for several kilometres or more, it is difficult to determine where the encounter occurred, and thus where the VME is located, much less the size of the VME and the extent of the damage to the VME, based on the quantity of VME indicator species in the fishing gear. While the threshold levels established by New Zealand for the bottom trawl fisheries in the South Pacific are much stricter than those adopted by NAFO, NEAFC and SEAFO, no areas of the high seas have been closed as a result of the move-on rule outside of the

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Deep ocean fish swimming among giant tube worms (*Riftia pachyptila*) by a hydrothermal vent.

CCAMLR area as far as the DSCC is aware. In some areas there has been no reporting of encounters, suggesting either that the threshold level is too high or that vessels are simply not reporting encounters. Moreover, the move-on rule is reactionary not precautionary: it will not prevent damage to VMEs but may only, if effectively applied, prevent further harm after damage to VMEs has already occurred.

With the possible exception of CCAMLR, no RFMO or flag State has applied the encounter provisions and move-on rule consistent with resolution 64/72, paragraph 119 [c].This paragraph recognises that a prior impact assessment, including detailed information on the types, characteristics and locations of VMEs known or likely to occur in an area, is a prerequisite to protecting VMEs and determining what type of encounter regulations would be most effective in preventing significant adverse impacts in areas that remain open to bottom fishing.

As indicated in the North Atlantic section, the joint NAFO/ICES Working Group on Deep-Sea Ecology [WGDEC] met in 2010 and, among other issues, reviewed the move-on rules adopted by NEAFC and NAFO.[123] The move-on rules adopted by one or more States bottom fishing on the high seas in the North Pacific as well as by SEAFO are similar to the rules adopted by NAFO and NEAFC.

The Working Group stated that separate threshold levels and move-on rules should be developed for individual VME species or taxonomic groups, gear types and configurations, and specific biogeographic regions. However, the Working Group concluded that *"The damage caused by deep-sea bottom fishing activities to marine habitats and species, in particular VME indicators, is likely to remain unrecovered for decades to centuries. Reactionary management strategies such as the "encounter clauses" and "move-on rules" are of limited benefit to prevent significant adverse impacts because they still allow damage to occur which will gradually degrade ecosystems over time."* Rather, the Working Group recommended that *"because the current encounter and move-on rules would still permit pervasive and cumulative destruction of VMEs in the NAFO and NEAFC management areas, a new management strategy needs to be developed. This new approach is based on the following principles:*

1] Bottom habitats at fishable depths within the North Atlantic are not inhabited by one fauna that ranges over the whole region, thus there can be no uniform "rule";

2] exploratory fishing with bottom contact gear in the deep sea is unacceptable because of the long-term damage such gear does to bottom habitats;

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3] exploratory fishing with bottom contact gear is unnecessary because modern data management tools and computer modeling techniques can provide a mechanism for making predictions about where vulnerable marine ecosystems are likely to be present; and

4] the burden of proof regarding whether any particular area of the seabed can be fished with bottom contact gear without causing damage to VMEs must reside with the entity proposing to do the fishing."

These principles put fishing on a more equal footing with other industries who extract resources from the ocean and whose activities might have adverse or harmful effects on resident organisms."

Sustainability of deep-sea fish stocks and bycatch species

Most high seas bottom fisheries target low productivity species highly vulnerable to overexploitation and depletion [for example, orange roughy, grenadier, and deep-sea shark]. There are exceptions, such as the bottom fisheries for Argentine hake and squid in the southwest Atlantic and great northern prawns in the northwest Atlantic, though in the case of the latter, the depths at which this fishery occurs means it is likely to impact low productivity fish species in addition to cold-water corals and sponges. In addition, a large number of species have been recorded in the bycatch of many high seas bottom fisheries, in particular bottom trawl fisheries, the majority of which are likely to be low productivity species. The status of target species and bycatch species in deep-sea fisheries on the high seas is largely unknown or, where information is available, considered overexploited or depleted. Regulations are in place in some fisheries in some areas [CCAMLR, NAFO, NEAFC, SEAFO] to manage the target catch and at least some species of commercial value taken as bycatch in high seas bottom fisheries. However, the catch of many target species is unmanaged and the impact on few, if any, of the bycatch species of non-commercial value is subject to controls or management measures. Most fisheries impacting deep-sea stocks or species on the high seas cannot be considered sustainable and it is unlikely that the situation will improve significantly in the near future. This is one of the most significant failures in the implementation of the resolutions by flag States and RFMOs.

High seas bottom trawling

Bottom trawling is the dominant method of deep-sea bottom fishing on the high seas. As mentioned previously, bottom trawling has been prohibited in high seas areas in the CCAMLR Convention area. Outside of the CCAMLR area – that is to say on the high seas of the Atlantic, Pacific and Indian Oceans – well over 95 percent of the bottom fish catch is likely to be taken by bottom trawl fisheries [the remainder is caught by a combination of bottom pot, longline and gillnet gear]. Numerous reports and studies over the past several years continue to point to bottom trawling in the deep-sea as a fishing practice of particular concern, and the single greatest direct threat to vulnerable marine benthic ecosystems.[122] Benn et al. estimate that the cumulative area of deep seabed [greater than 200 metres deep] impacted by bottom trawling on the Hatton and Rockall Banks in the North East Atlantic in 2005 was between 741 km^2 and 37,160 km^2. The physical impact on the seabed of high seas bottom trawling is likely to be several orders of magnitude higher than the impact of high seas bottom longlining and other bottom gears, although it is important to recognize that bottom longline fishing can also damage VMEs.[123]

A very rough estimate of the cumulative area of seabed impacted over the past decade by high seas bottom trawling could put the figure between 50,000–250,000 km^2 per year.[124] Trawling involves dragging heavy steel plates, cables and nets across the ocean floor. Bottom longline gear, by comparison, involves hooks and lines dangling above the seabed that may tangle with VME species, or catch fish that in turn thrash about and potentially damage VME species. While evidence of entanglement with cold-water corals has been documented in bottom longline fisheries, as indicated in Section 2, ICES concludes: "the impact of bottom trawl is far more detrimental to the seabed than static gear".[125] This has been reinforced by a recent review by Hogg et al. of deep-water sponge grounds in terms of their distribution, biology, ecology and present-day uses in biotechnology and drug discovery. The report states, "Mobile fishing gear that contacts the seabed, particularly trawling, is the fishing apparatus that poses the greatest threat to deep-water sponge grounds."[126]

New Zealand also recognised the adverse impact of bottom trawling in the impact assessment submitted to CCAMLR for the bottom longline fisheries in the Southern Ocean, stating: "a deliberate decision was made by New Zealand not to use trawl fishing methods for toothfish in the exploratory fisheries. The reason for this was to avoid potential significant adverse impacts on the marine environment".[127]

In the view of the DSCC, high seas bottom trawling continues to be a major concern and none of the deep-sea high seas bottom trawl fisheries can be considered sustainable in terms of their impacts on target and bycatch species, nor have any of them yet been managed to fully implement the UNGA resolutions to protect VMEs.

The one exception to the above may be the Spanish high seas bottom trawl fishery in the

southwest Atlantic, an area where no RFMO exists nor is under negotiation. At least one flag State, Spain, which authorises bottom fishing to occur on the high seas in the region has recently largely confined bottom fishing by Spanish vessels on the high seas to areas shallower than 300 metres as a condition for authorisation to fish. The measure came into effect on 1 July 2011, and was based on an extensive survey conducted by the Instituto Español de Oceanografía [IEO] to identify VMEs, based on the criteria in the FAO Deep-Sea Guidelines, in the region where Spanish flagged vessels operate. The measures have not been made publicly available and no independent review of the measures has yet taken place. Moreover, vessels flagged to other States are engaged in bottom fishing in the same area and the measures established by these States, if any, have not been made publicly available.

In the view of the DSCC, high seas bottom trawling continues to be a major concern and none of the deep-sea high seas bottom trawl fisheries can be considered sustainable in terms of their impacts on target and bycatch species.

Delineating the bottom fishing footprint

Many of the RFMOs and RFMO negotiating processes have agreed to establish "footprints" of high seas bottom fishing areas designed to differentiate between 'historically' fished areas and new or previously unfished areas. Generally the footprint has been defined on the basis of areas fished in the 5–20 years prior to 2007. However, the footprints are often crudely defined or delineated, and are not based on precise set-by-set or tow-by-tow information. Most of the footprints are likely to include areas or VMEs not previously impacted by fishing or only lightly impacted by fishing. With few exceptions, the footprint delineations do not take into account the intensity of fishing that has occurred in the past: some areas of the seabed have been trawled heavily in the past, others less so. While it is important to protect VMEs in areas that have not been impacted, or only lightly impacted, by bottom fishing in the past – and the footprint approach can be helpful in this regard – it is also important to ensure the protection and, where possible, restoration of VMEs wherever they may occur, including within areas that have previously been fished.

The fisheries footprints established by RFMOs have not meant that fisheries are confined to the footprint – the so-called "freeze the footprint" approach. The exception is the South Pacific RFMO process, which established a freezing of the footprint in 2007. However, the 'freeze' here technically expired in 2010. Rather, the delineation of the footprint has generally resulted in the application of less stringent management measures within the footprint. For the most part, the delineation of the footprint and the adoption of less stringent regulations for the management of bottom fisheries within the footprint have been done as a concession to, or a compromise with, the fishing industry. The question for the UNGA is whether these compromises made with the fishing industry by flag States that authorise bottom fishing in the high seas, whether individually or through RFMOs, are acceptable to the international community as a whole, are sustainable, and avoid causing significant adverse impacts on VMEs.

RFMO performance and transparency

The reasons for the shortcomings in the implementation of the resolution by a number of RFMOs and RFMO negotiating processes vary from region to region and are not always clear. For example, the reasons for the failure of the Contracting Parties of a number of RFMOs to conduct prior impact assessments may be due either to the failure by member States to conduct the assessments or to a refusal by member States to agree to measures requiring the impact assessments. As discussed in the North Atlantic section, the decisions regarding the adoption of management measures for the fishery for orange roughy by NEAFC in the North East Atlantic is an example where the record of the decision-making process of the RFMO, as reflected in the Annual Reports of NEAFC, indicates that the problem can be traced to a single Contracting Party's interest in continuing to maintain a targeted fishery for this species, in spite of scientific advice to the contrary and the opposition of a majority, though not all, of the other Contracting Parties. On the other hand, the decision-making process that led to the failure of the NAFO to adopt a measure requiring impact assessments for existing fisheries, in spite of a formal proposal put forward in both 2009 and 2010 by one Contracting Party, is not clear from the record of the Annual Meetings. Without a clear record of the RFMO decision-making process, it is impossible

to determine whether a single county or 'blocking minority' of countries has prevented an RFMO from adopting or implementing one or more of the provisions of the UNGA resolutions, or whether the RFMOs are constituted in such a way as to make it difficult or impossible to implement certain provisions of the resolutions. The decision-making processes of RFMOs are often, though not always, opaque.

In the case of the Indian Ocean, while the negotiations for an agreement to establish an RFMO were concluded in 2006, the agreement has still not entered into force in 2011. In the meantime, the countries whose flagged vessels engage in high seas bottom fisheries in the region have never even met, as far as the DSCC is aware, to negotiate and adopt interim measures to implement the UNGA resolutions pending the establishment of the RFMO, despite repeated requests by the UNGA in the Sustainable Fisheries resolutions to do so. In this case, the reason appears to be a clear lack of political will, on the part of the flag States concerned, to establish multilaterally agreed interim measures to manage the deep-sea fisheries on the high seas in the region, in spite of the 2007 deadline for doing so contained in paragraph 85 of UNGA resolution 61/105.

Convention on Biological Diversity [CBD]

Finally, it is worth noting that this issue has also been raised at meetings of the Conference of the Parties [COP] to the Convention on Biological Diversity [CBD] over the past seven years, beginning with CBD COP-7 in February 2004. In October 2010, CBD COP-10 adopted Decision X/29 that, in paragraph 54, reinforces the importance of the implementation of the UNGA resolutions through calling on Parties to the CBD to take the following action:

54. Encourages Parties and other Governments to fully and effectively implement paragraphs 113 through 130 of the United Nations General Assembly resolution 64/72 on responsible fisheries in the marine ecosystem, addressing the impacts of bottom fishing on vulnerable marine ecosystems and the long-term sustainability of deep-sea fish stocks, in areas beyond national jurisdiction, in particular paragraphs 119 and 120 of the resolution, calling on States and/or regional fisheries management organizations [RFMOs], consistent with the Food and Agriculture Organization of the United Nations International Guidelines for the Management of Deep-Sea Fisheries in the High Seas and consistent with the precautionary approach, ***to conduct impact assessments, conduct further marine scientific research and use the best scientific and technical information available to identify areas where vulnerable marine ecosystems are known or likely to occur, either adopt conservation and management measures to prevent significant adverse impacts on such ecosystems or close such areas to fishing, and adopt measures to ensure the long-term sustainability of deep-sea fish stocks [both target- and non-target stocks], and not to authorize bottom-fishing activities until such measures have been adopted and implemented.***[128]

The CBD has reinforced the call for action contained in resolutions 61/105 and 64/72. The effective implementation of the resolution is essential both for the protection of deep-sea ecosystems and to maintain the integrity of international efforts through the UNGA and other fora to provide multilateral solutions to address and manage the impacts of human activities on marine biodiversity in areas beyond national jurisdiction.

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10.0 CONCLUSION

Have UNGA resolutions 59/25, 61/105, and 64/72 had an impact on the management of deep-sea fisheries on the high seas?

The answer is yes.

Over the past seven years, two new agreements to establish RFMOs to manage deep-sea fisheries in the high seas have been negotiated. One agreement covers most of the North Pacific and the other covers the South Pacific. The scope of both agreements has been expanded to cover other fisheries for non-highly migratory species as well. The UNGA resolutions also helped prompt the conclusion of the negotiation of the Southern Indian Ocean Fisheries Agreement in 2006, though the agreement has still not entered into force.

In addition, the resolutions have prompted States and RFMOs to take a number of concrete measures to protect VMEs. The use of bottom trawls has been prohibited on the high seas in the CCAMLR area. Several RFMOs [NEAFC, CCAMLR, SPRFMO, and SEAFO] have established bans on the use of bottom gillnets in their regulatory areas. New Zealand has temporarily confined high seas bottom fishing by its vessels to an area of approximately 140,000 km2 on high seas of the South Pacific. NAFO, NEAFC, and SEAFO have closed substantial areas in the high seas to bottom fishing in the northwest Atlantic, North East Atlantic and South East Atlantic respectively. The General Fisheries Commission of the Mediterranean has prohibited bottom trawling below 1,000 metres.

Have States and RFMOs fully implemented the resolutions? Are VMEs in the high seas now fully protected from significant adverse impacts and are deep-sea fisheries on the high seas managed for long-term sustainability?

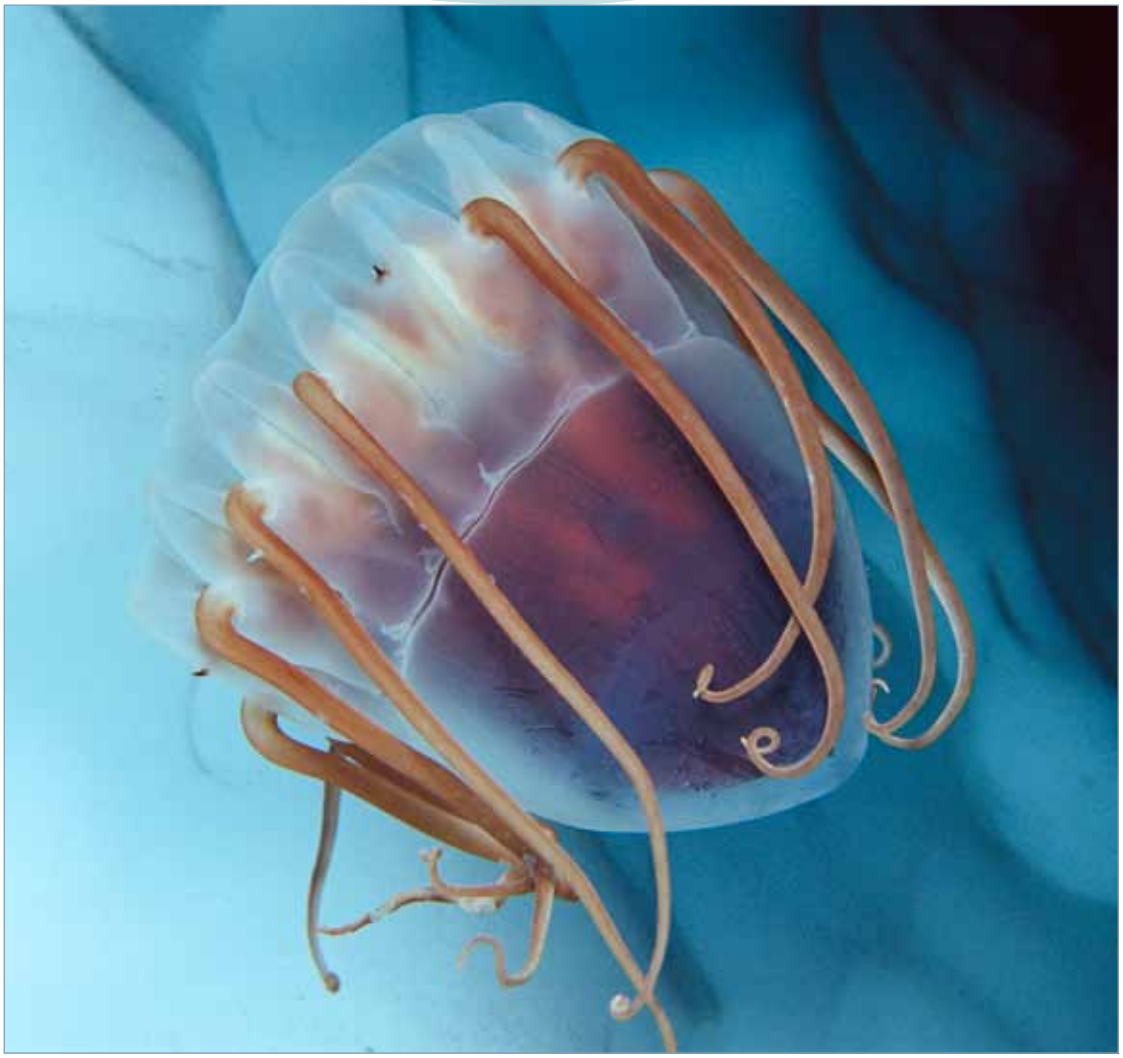
The answer is no.

In summary, no impact assessments have been conducted for the high seas bottom fisheries in the Atlantic and Indian Oceans. In the North and South Pacific, the impact assessments produced to date are partial and do not fully comply with the FAO Deep-Sea Guidelines, and the mitigation measures established as a result have not ensured that significant adverse impacts on VMEs would be prevented in high seas areas where bottom fishing is authorised. Some high seas areas have been closed to bottom fishing, but many high seas areas where VMEs are likely to occur remain open to bottom fishing with few or no constraints. There has been a general reluctance on the part of many States and RFMOs to close areas where bottom fishing currently takes place, primarily as a concession to the high seas bottom trawl industry.

The move-on rule is often the only conservation regulation in place to protect VMEs in both existing and new or unfished areas. However, the move-on rule is of limited conservation value given: the high threshold levels established as triggers for the rule in many fisheries; the fact that the rule only applies to corals and sponges in most areas; and that this management measure is essentially reactionary, not preventative or precautionary, and at best can only prevent further damage to VMEs after damage has already occurred. Outside of the CCAMLR region, no areas have been closed as a result of the move-on rules adopted by States and RFMOs as far as the DSCC is aware.

Most high seas bottom fisheries target [and/or take as bycatch] long-lived, slow growing, low productivity species that are highly vulnerable to overexploitation and depletion. Other than in a relatively small number of cases, the catch of deep-sea species in high seas bottom fisheries is not being managed on the basis of stock assessments and catch limits by flag States and RFMOs, as called for in paragraph 119[d] of resolution 64/72. Where management measures are in place, for the most part the long-term sustainability of the target stocks, the rebuilding of depleted stocks and/or the sustainability of bycatch species has not been ensured. Moreover, the deep-sea fisheries on the high seas outside of the CCAMLR area are almost all bottom trawl fisheries, most of which take significant numbers of species as bycatch. The absence of sufficient information on the biological characteristics and status of most target and bycatch species impacted by high seas bottom trawl fisheries renders it impossible to establish conservation and management measures, other than the prohibition of fishing, to ensure long-term sustainability.

The exception to the above is the management of high seas bottom fisheries in the Southern Ocean. The Commission for the Conservation of Antarctic Marine Living Resources [CCAMLR] has come closest to fully implementing the provisions of the UNGA resolutions. CCAMLR has adopted a prohibition on bottom trawl fishing [as well as bottom gillnet fishing] and requires all contracting parties to submit impact assessments as a condition for authorisation to fish. The CCAMLR Scientific Committee has identified VME-related species and species groups for management purposes beyond corals and sponges, and substantial measures are in place to manage the catch of Patagonian toothfish,



NORBERT WU/MINDEN PICTURES/FLPA

Jellyfish or Medusa (*Periphylla periphylla*) in Antarctica, widely distributed and abundant in deep water, worldwide

the main target species in the bottom fisheries in the region, although stocks are considered overexploited in at least some areas. Furthermore, the catch of at least some deep-sea species [for example, grenadier, skate and ray] taken as bycatch in the bottom fisheries is being monitored and bycatch limits are in place. The move-on rule adopted by CCAMLR has resulted in area closures to protect VMEs, and scientific research is underway to gain a better understanding of the physical interaction between bottom longline gear and VMEs.

The UN General Assembly must continue to act, and act effectively

It is in every State's interest that deep-sea fisheries in areas beyond national jurisdiction are managed to prevent the destruction of deep-sea biodiversity. The deep sea, much of which lies in areas beyond national jurisdiction, is one of the greatest reservoirs of biodiversity on Earth. Deep sea fishing, in particular deep-sea bottom trawl fishing, is widely recognised as the most serious direct threat to deep-sea ecosystems. In the DSCC's view, failure to effectively implement the UNGA resolutions risks undermining the authority and efficacy of the UNGA as the pre-eminent body with oversight and responsibility for the conservation and protection of the biodiversity of the global oceans commons. It also risks undermining international law. The UNGA must make it clear to nations that allow their vessels to engage in bottom fishing on the high seas that unless or until the resolutions have been fully and effectively implemented, as high seas fishing nations have committed to do, then such fishing must be prohibited. Resolution 64/72 said as much, in stating that countries should not authorise their vessels to fish, but it has not been effective. The UNGA must be even more specific in order to achieve compliance.

It has been seven years since the UNGA, in resolution 59/25, first called for urgent action to protect seamounts and other vulnerable deep-sea marine ecosystems from destructive fishing practices. More than enough time has passed for States to adopt and implement regulations to ensure the sustainability of deep-sea fisheries and the protection of VMEs. It is clear by now that the failure to conduct impact assessments consistent with the internationally agreed standard established in the FAO Deep-Sea Guidelines, the failure to implement effective move-on rules, and the failure to assess deep-sea fish stocks and non-target species and implement measures to ensure their long sustainability, is not due to insufficient time but

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insufficient will. Fishing cannot and must not carry on as if the resolutions are fully complied with, when it is clear that they are not.

Resolution 64/72, the product of lengthy negotiations, was very clear. Paragraph 119 [a] called on RFMO/As and States to "conduct the assessments called for in paragraph 83 [a] of its resolution 61/105, consistent with the FAO Deep-Sea Guidelines, and to ensure that vessels do not engage in bottom fishing until such assessments have been carried out."

Paragraph 120 of the same resolution also made it clear that RFMO/As and States were to "adopt and implement measures in accordance with paragraphs 83, 85 and 86 of its resolution 61/105, paragraph 119 of the present resolution, and international law, and consistent with the Guidelines, and not to authorize bottom fishing activities until such measures have been adopted and implemented." This requirement not to authorise bottom fishing activities unless the resolutions have been fully implemented has been completely ignored. The DSCC repeats its observation made in 2009: fishing in breach of the applicable resolutions must be considered IUU fishing: it is illegal, being in violation of international obligations to protect biodiversity in the marine environment and conserve fish stocks, and/or unregulated, in the sense that there are no compliant conservation or management measures and the fishing is inconsistent with State responsibilities for the conservation of living marine resources. In some cases, such as the high seas bottom fisheries in the Indian Ocean, the catch in these fisheries is unreported as well.

It is clear that in its 66th Session, the UNGA must do more than simply renew its call for: impact assessments, consistent with the FAO Deep-Sea Guidelines; properly implemented move-on rules, with appropriate encounter protocols; and stock assessments and other management measures to ensure the long-term sustainability of deep sea fish stocks and non-target species.

There should be an immediate cessation of high seas bottom fishing, except where conservation measures consistent with UNGA resolutions 61/105 and 64/72, and any subsequent UNGA resolutions, are in force and have been effectively and fully implemented.

To enhance compliance with the UNGA resolutions, the UNGA should designate high seas bottom fishing as IUU fishing when it is conducted in contravention of international instruments, including UNGA resolutions 61/105 and 64/72, regional measures, such as UNGA compliant conservation and management measures adopted by RFMO/As, or UNGA compliant national rules.

The UNGA should ensure the protection of all VMEs as identified in paragraph 42 of the FAO Deep-Sea Guidelines, including long-lived fish species, spawning areas on the high seas and unique habitats such as seamounts and canyons.

Additional actions to be considered by States and/or the UNGA include implementing international sanctions and/or an international liability and redress regime to ensure that damage to deep-sea ecosystems is compensated, and/or initiating legal action through the International Tribunal for the Law of the Sea [ITLOS]. New approaches must be used, which ensure that fishing in breach of the resolutions does not take place and that deep-sea species and ecosystems in areas beyond national jurisdiction are effectively conserved and protected. The UNGA has recognized "the immense importance and value of deep sea ecosystems and the biodiversity they contain".[129] In light of this recognition, it is critical that the UNGA resolutions on the management of deep-sea fisheries in areas beyond national jurisdiction be fully and effectively implemented, particularly in view of the global commitments to manage fisheries from an ecosystem approach and eliminate destructive fishing practices made at the World Summit on Sustainable Development, and in view of the upcoming Rio+ 20 conference. It is time to act on this recognition, and safeguard deep-sea ecosystems and biodiversity.

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ANNEX: FAO GUIDELINES FOR THE MANAGEMENT OF DEEP-SEA FISHERIES IN THE HIGH SEAS

Impact Assessments, Identifying VMES and SAIs

1. FAO Guidelines, paragraph 47: Impact Assessments

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

i. type[s] of fishing conducted or contemplated, including vessels and gear-types, fishing areas, target and potential bycatch species, fishing effort levels and duration of fishing [harvesting plan];
ii. best available scientific and technical information on the current state of fishery resources and baseline information on the ecosystems, habitats and communities in the fishing area, against which future changes are to be compared;
iii. identification, description and mapping of VMEs known or likely to occur in the fishing area;
iv. data and methods used to identify, describe and assess the impacts of the activity, the identification of gaps in knowledge, and an evaluation of uncertainties in the information presented in the assessment;
v. identification, description and evaluation of the occurrence, scale and duration of likely impacts, including cumulative impacts of activities covered by the assessment on VMEs and low-productivity fishery resources in the fishing area;
vi. risk assessment of likely impacts by the fishing operations to determine which impacts are likely to be significant adverse impacts, particularly impacts on VMEs and low productivity fishery resources; and
vii. the proposed mitigation and management measures to be used to prevent significant adverse impacts on VMEs and ensure long-term conservation and sustainable utilization of low-productivity fishery resources, and the measures to be used to monitor effects of the fishing operations.

2. FAO Guidelines, paragraph 42: vulnerable marine ecosystems [VMEs]

42. A marine ecosystem should be classified as vulnerable based on the characteristics that it possesses. The following list of characteristics should be used as criteria in the identification of VMEs.

i. Uniqueness or rarity - an area or ecosystem that is unique or that contains rare species whose loss could not be compensated for by similar areas. These include:
- habitats that contain endemic species;
- habitats of rare, threatened or endangered species that occur only in discrete areas; or
- nurseries or discrete feeding, breeding, or spawning areas.

ii. Functional significance of the habitat – discrete areas or habitats that are necessary for the survival, function, spawning/reproduction or recovery of fish stocks, particular life-history stages [for example, nursery grounds or rearing areas], or of rare, threatened or endangered marine species.
iii. Fragility – an ecosystem that is highly susceptible to degradation by anthropogenic activities.
iv. Life-history traits of component species that make recovery difficult – ecosystems that are characterized by populations or assemblages of species with one or more of the following characteristics:
- slow growth rates;
- late age of maturity;
- low or unpredictable recruitment; or
- long-lived.

v. Structural complexity – an ecosystem that is characterized by complex physical structures created by significant concentrations of biotic and abiotic features. In these ecosystems, ecological processes are usually highly dependent on these structured systems. Further, such ecosystems often have high diversity, which is dependent on the structuring organisms.

Examples of potentially vulnerable species groups, communities, and habitats, as well as features that potentially support them are contained in Annex 1.

3. FAO Guidelines, paragraphs 17–20: significant adverse impacts [SAIs]

17. Significant adverse impacts are those that compromise ecosystem integrity [i.e. ecosystem structure or function] in a manner that: [i] impairs the ability of affected populations to replace themselves; [ii] degrades the long-term natural productivity of habitats; or [iii] causes, on more than a temporary basis, significant loss of species richness, habitat or community types. Impacts should be evaluated individually, in combination and cumulatively.

18. When determining the scale and significance of an impact, the following six factors should be considered:

i. the intensity or severity of the impact at the specific site being affected;
ii. the spatial extent of the impact relative to the availability of the habitat type affected;

iii. the sensitivity/vulnerability of the ecosystem to the impact;
iv. the ability of an ecosystem to recover from harm, and the rate of such recovery;
v. the extent to which ecosystem functions may be altered by the impact; and
vi. the timing and duration of the impact relative to the period in which a species needs the habitat during one or more life-history stages.

19. Temporary impacts are those that are limited in duration and that allow the particular ecosystem to recover over an acceptable time frame. Such time frames should be decided on a case-by-case basis and should be in the order of 5-20 years, taking into account the specific features of the populations and ecosystems.

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

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100. See Maguire et al, *supra* note 65, p.84.
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103. See Bensch et al, *supra* note 53.
104. Assessments in many cases are not compliant with UNGA or FAO standards.
105. No RFMO exists in the southwest Atlantic. However, Spain was required European Commission [2010 to conduct impact assessments for the bottom fisheries in the region under European Council Regulation 734/2008. A review of compliance by EU Member States with regulation 734/2008 published by the European Commission in November 2010 concluded that Spain had not conducted impact assessments of the bottom fisheries in the region.
106. While Belize vessels were reported bottom fishing in 2006 in the FAO Worldwide Review of Bottom Fishing in the High Seas, it is not clear from available information whether Belize continues to authorise vessels to engage in high seas bottom fisheries.
107. See Deep-Sea High Seas, *supra* note 89.
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110. See Vessel List, *supra* note 66.
111. All seven of Japan's vessels are also on the FAO list of authorised vessels.
112. CCAMLR [2010]. CCAMLR Vessels licensed to Harvest in the Convention Area in the 2010/11 Intersessional Period. Available at: www.ccamlr.org/pu/e/sc/fish-monit/vess-licensed.htm
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114. SEAFO. Authorised Vessels. Available at: www.seafo.org/welcome.htm.
115. Most of the Spanish vessels on the SEAFO authorized vessel list are also on the FAO list of authorized vessels.
116. The two Japanese vessels also appear to be on the FAO list of authorized vessels.
117. The following papers and publications provide useful reviews of the implementation of the UNGA resolutions and/or the FAO Guidelines for the Management of Deep-Sea Fisheries in the High Seas:
    i. Rice, J. [2010, 10-12 May]. Review of Progress on Implementation of the FAO International Guidelines for the Management of Deep-Sea Fisheries in the High Seas – Experience of RFMO/As with identifying and protecting VMEs, Preparedfor the Workshop on the Implementation of the FAO Guidelines for the Management of Deep-Sea Fisheries in the High Seas: challenges and solutions hosted by the Government of the Republic of Korea. Busan, Korea.
    ii. See Rogers & Gianni, *supra* note 68.
    iii. See ICES, WGDEC, *supra* note 25.
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    v. Watling, L., et al. [2010]. Can Ecosystem-Based Deep-Sea Fishing Be Sustained? Report of a workshop held 31 August–3 September 2010, University of Maine.
118. See Rogers & Gianni, *supra* note 68.
119. Friewald, A., Fosså, J.H., Koslow, T., Roberts, J.M. [2004], Cold-water coral reefs, UNEP-WCMC, Cambridge, UK.
120. See for example:
    i. Davies A.J., Guinotte J.M. [2011], Global Habitat Suitability for Framework-Forming Cold-Water Corals. PLoS ONE 6[4]: e18483. doi:10.1371/journal.pone.0018483
    ii. Tittensor et al. [2009], Predicting global habitat suitability for stony corals on seamounts, Journal of Biogeography [2009], 36, 1111–1128
    iii. Clark M.R., Tittensor, D., Rogers, A.D., Brewin, P., Schlacher, T., Rowden, A., Stocks, K., Consalvey, M. [2006], Seamounts, deep-sea corals and fisheries: vulnerability of deep-sea corals to fishing on seamounts beyond areas of national jurisdiction, UNEPWCMC, Cambridge, UK.
121. See ICES WGDEC, *supra* note 25.
122. See Benn, A.R., Weaver, P.P., Billet, D.S.M., van den Hove, S., Murdock, A.P., et al. [2010], Human Activities on the Deep Seafloor in the North East Atlantic: An Assessment of Spatial Extent. PLoS ONE 5[9]: e12730, doi:10.1371/journal.pone.0012730; Also, Hogg, M.M., Tendal, O.S., Conway, K.W., Pomponi, S.A., van Soest, R.W.M., Gutt, J., Krautter, M. and Roberts, J.M. [2010], Deep-sea Sponge Grounds: Reservoirs of Biodiversity, UNEP-WCMC Biodiversity Series No. 32, UNEP-WCMC, Cambridge, UK; See also Davies, A.J., Roberts, J.M. & Hall-Spencer, J. [2007], "Preserving deep-sea natural heritage: Emerging issues in offshore conservation and management", Biological Conservation 138: 299-312.
123. See for example:
    i. Edinger, E., Baker, K., Devillers, R., Wareham, V. [2007], Coldwater corals in Newfoundland and Labrador waters: distribution and fisheries impacts, WWF-Canada, 41pp.
    ii. Durán Muñoz, P., Murillo, F.J., Sayago-Gil, M., Serrano, A., Laporta, M., Otero, I., and Gómez, C. [2010]. New data on deep-sea communities and vulnerable marine ecosystems on the Hatton Bank outcrop, Northeast Atlantic, The ICES-NAFO Working Group on Deepwater Ecology [WGDEC], Copenhagen, Denmark, 22–26 March, 2010. Available at: www.ices.dk/reports/ACOM/2010/WGDEC/wgdec_final_2010.pdf
124. This is an estimate based on the following assumptions: 250 bottom trawlers fishing on average 100 days per year impacting an area of approximately 2–10 km2 of seabed per day. The amount of seabed trawled per day per vessel would be much higher in continental slope fisheries than in seamount fisheries. Towing time along the seabed in the case of seamount fisheries is usually much shorter, sometimes only 10–15 minutes per tow, as opposed to tows that can commonly last 2–4 hours in slope fisheries or fisheries on large underwater features

[for example, banks and rises]. Note that this is an estimate of cumulative impact, not the actual area of seabed impacted, as many trawl tows would likely be repeated over the same area. For a comparison, the New Zealand Ministry of the Environment estimated the cumulative seabed impact of large-scale bottom trawl fishing by New Zealand vessels in 2008 [most, if not all, of which occurred within the New Zealand EEZ]: a fleet of 68 large fishing vessels, primarily vessels longer than 28 m, operating in waters deeper than 200 m, conducted 38,648 trawls in 2008 with a cumulative impact of 85,222 km2 on the seabed. www.mfe.govt.nz/environmental-reporting/report-cards/seabed-trawling/2010/

125. ICES [2007], NEAFC request to evaluate the use and quality of VMS data, ICES Advice 2007, Book 9. Available at: www.ices.dk/committe/acom/comwork/report/2008/Special%20Requests/NEAFC%20request%20on%20VMS%20data.pdf
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127. See CCAMLR, *supra* note 94.
128. CBD [2010]. COP 10 Decision X/29, Marine and coastal biodiversity. Available at: www.cbd.int/decision/cop/?id=12295
129. UNGA [2006]. Resolution 61/105, paragraph 80 and UNGA resolution 64/72, paragraph 112.

ACRONYMS AND GLOSSARY OF TERMS

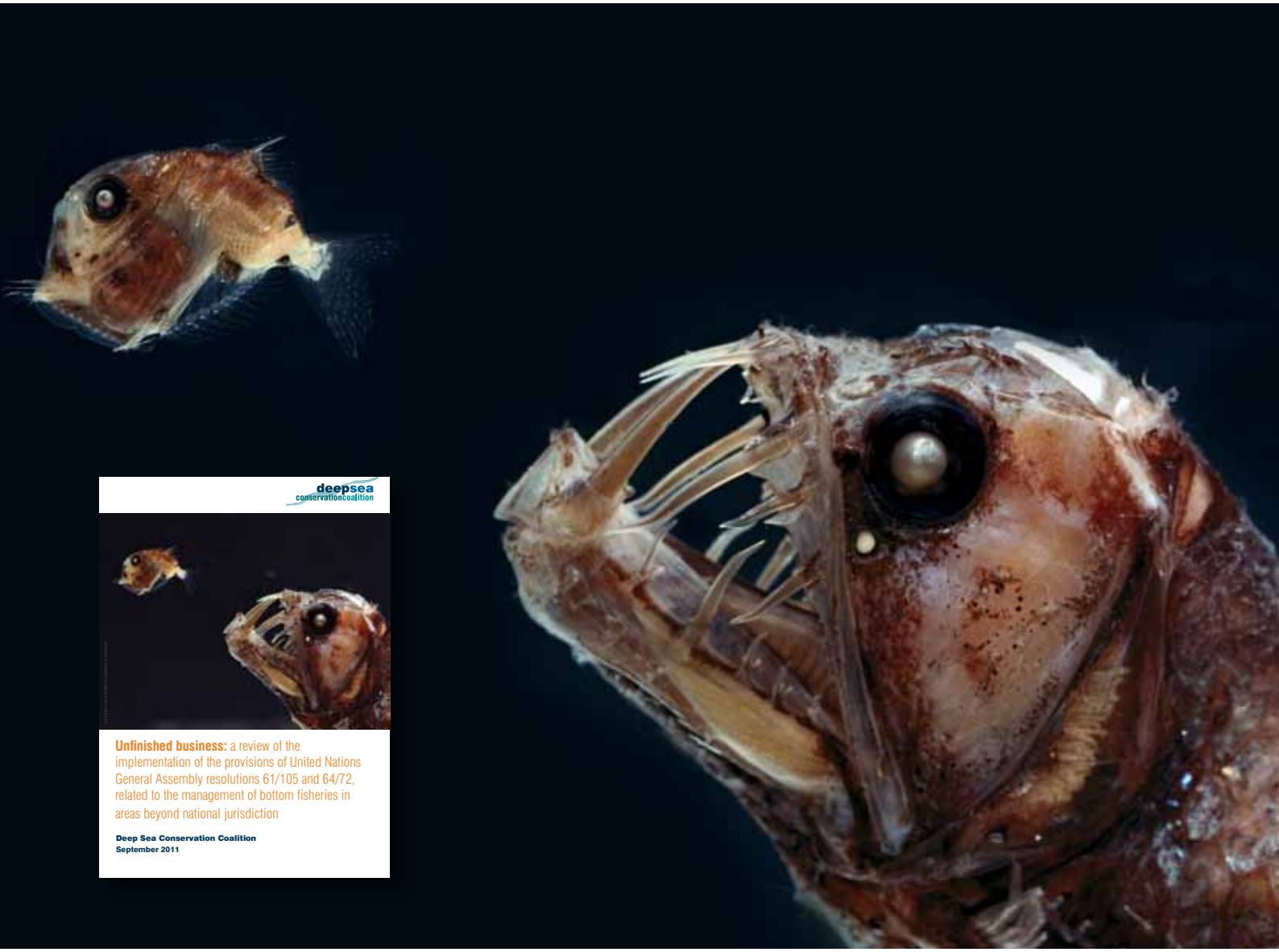
BFIAS	Bottom Fishery Impact Assessment Standard
BPA	benthic protected area
CBD	Convention on Biological Diversity
CCAMLR	Commission for the Conservation of Antarctic Living Marine Resources
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CEM	Conservation and Enforcement Measure
COP	Conference of the Parties
CPUE	catch per unit effort
DSCC	Deep Sea Conservation Coalition
EEZ	exclusive economic zone
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
GCFM	General Fisheries Commission of the Mediterranean
ICES	International Council for the Exploration of the Sea
IEO	Instituto Español de Oceanografía
IUCN	International Union for Conservation of Nature
ITLOS	International Tribunal for the Law of the Sea
IUU	illegal, unreported and unregulated
MARM	Ministry of the Environment and Rural and Marine Affairs, Spain
MAR	Mid-Atlantic Ridge
MSY	maximum sustainable yield
NAFO	Northwest Atlantic Fisheries Organization
NEAFC	North East Atlantic Fisheries Commission
NM	Nautical mile
NOC	National Oceanography Centre
RFMO	regional fisheries management organisation
ROV	remote operated vehicle
SAI	significant adverse impact
SARA	Species At Risk Act
SEAFO	South East Atlantic Fisheries Organisation
SIOFA	South Indian Ocean Fishery Agreement
SPRFMO	South Pacific Regional Fisheries Management Organisation
SSRU	small-scale research unit
TAC	total allowable catch
UNCLOS	United Nations Convention on the Law of the Sea
UNGA	UN General Assembly
VME	vulnerable marine ecosystem
WGDEC	NAFO/ICES Working Group on Deep-Sea Ecology
WGEFM	NAFO Working Group on Ecosystem Approach to Fisheries Management
WGFMS	Working Group of Fisheries Managers and Scientists
WWF	World Wildlife Fund

MARINE LIFE

alfonsino	*Beryx* spp.
Antarctic butterfish	*Hyperoglyphe antarctica*
Antarctic toothfish (Antarctic cod)	*Dissostichus mawsoni*
Argentine hake	*Merluccius hubbsi*
Atlantic cod	*Gadus morhua*
black coral	Antipatharia
black scabbardfish	*Aphanopus carbo*
blue antimora (violet cod)	Antimora rostrata
blue-eye trevalla	*see* Antarctic butterfish
blue ling	*Molva dypterygia*
bluenose sea bass	*see* Antarctic butterfish
cod	*Gadus spp.*
cod icefish	Nototheniidae
common ling	*Molva molva*
crocodile icefish	Channichthyidae
cusk	*Brosme brosme*
deep-sea red crab	*Geryon quinquedens*
deep-sea shark	*see* leafscale gulper shark and Portuguese dogfish
deep-water longtail red snapper	*Etelis coruscans*
great northern prawn	*Pandalus borealis*
Greenland halibut	*Reinhardtius hippoglossoides*
grenadier	Macrouridae
haddock	*Melanogrammus aeglefinus*
hake	Phycidae (northern), Merlucciidae (southern), *see* Argentine hake, white hake
leafscale gulper shark	*Centrophorus squamosus*
ling	*see* blue ling, common ling
mirror dory	*Zenopsis nebulosa*
moray cod	*Muraenolepis* spp.
morwong	Cheilodactylidae
orange roughy	*Hoplostethus atlanticus*
oreo	Oreosomatidae
Patagonian toothfish	*Dissostichus eleginoides*
pelagic armourhead	*Pseudopentaceros richardsoni*
Portuguese dogfish	*Centroscymnus coelolepis*
rattail	*see* grenadier
ray	Batoidea
redfish	*Sebastes* spp.
red-throat emperor	*Lethrinus miniatus*
rockfish	*Sebastes* spp.
rough-head grenadier	*Macrourus berglax*
roundnose grenadier	*Coryphaenoides rupestris*
scorpionfish	Scorpaenidae
sea anemone	Actiniaria
sea bream	Sparidae
sea fan	Gorgonacea
sea pen	Pennatulacea
sea slug	Opistobranchia
sea squirt	Tunicata
sea whip	Gorgonacea
sea urchin	Echinoidea
shrimp	Caridea
skate	Rajinae
skilfish	*Erilepis zonifer*
smooth-head	Alepocephalidae
soft coral	Alcyonacea
sponge	Porifera
squid	Teuthida
stony coral	Scleractinia
toothfish	*see* Antarctic toothfish, Patagonian toothfish
warehou	*Seriolella* spp.
white hake	*Urophycis tenuis*
wolf fish	*Anarhichas* spp.
yellowtail flounder	*Pleuronectes ferruginea*
yellowtail kingfish	*Seriola lalandi lalandi*

61/105 & 64/72

deepsea conservationcoalition



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