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Oceans and the law of the sea: sustainable fisheries, including through the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, and related instruments

Actions taken by States and regional fisheries management organizations and arrangements in response to paragraphs 113, 117 and 119 to 124 of General Assembly resolution 64/72, paragraphs 121, 126, 129, 130 and 132 to 134 of General Assembly resolution 66/68 and paragraphs 156, 171, 175, 177 to 188 and 219 of General Assembly resolution 71/123 on sustainable fisheries, addressing the impacts of bottom fishing on vulnerable marine ecosystems and the long-term sustainability of deep-sea fish stocks

Report of the Secretary-General

Summary

The present report has been prepared pursuant to paragraph 205 of General Assembly resolution 73/125, in which the Assembly requested the Secretary-General, in cooperation with the Food and Agriculture Organization of the United Nations, to report to the General Assembly at its seventy-fifth session on the actions taken by States and regional fisheries management organizations and arrangements in response to paragraphs 113, 117 and 119 to 124 of resolution 64/72, paragraphs 121, 126, 129, 130 and 132 to 134 of resolution 66/68, and paragraphs 156, 171, 175, 177 to 188 and 219 of resolution 71/123, in order to facilitate the further review of the actions taken referred to in paragraph 192 of resolution 71/123.

The report is a follow-up to earlier reports prepared by the Secretary-General (A/61/154, A/64/305, A/66/307 and A/71/351). It should also be read in conjunction with earlier interim reports of the Secretary-General on the measures taken by States and regional fisheries management organizations and arrangements to implement resolution 61/105 (A/62/260, paras. 60–96, and A/63/128, paras. 63–78).

* A/75/150.

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Abbreviations

ABNJ	areas beyond national jurisdiction
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
CM	Conservation measure
CMM	Conservation and management measure
FAO	Food and Agriculture Organization of the United Nations
GFCM	General Fisheries Commission for the Mediterranean
ICES	International Council for the Exploration of the Sea
NAFO	Northwest Atlantic Fisheries Organization
NEAFC	North East Atlantic Fisheries Commission
NPFC	North Pacific Fisheries Commission
RFMO	regional fisheries management organization
RFMO/As	regional fisheries management organizations and arrangements
SEAFO	South East Atlantic Fisheries Organization
SIOFA	Southern Indian Ocean Fisheries Agreement
SPRFMO	South Pacific Regional Fisheries Management Organization
UNEP	United Nations Environment Programme
VMEs	vulnerable marine ecosystems

I. Introduction

1. There has been increasing recognition of the importance of maintaining, and where necessary restoring, the health and resilience of marine ecosystems, including deep-sea ecosystems, for the overall well-being of the oceans. Pursuant to relevant General Assembly resolutions, considerable efforts have been undertaken to protect deep-sea ecosystems which, due to their specific characteristics, are particularly vulnerable to the impact of anthropogenic pressures, including bottom fishing activities.

2. Since the adoption of resolution 61/105 in 2006, the General Assembly has been monitoring how States and regional fisheries management organizations and arrangements (RFMO/As) address the impact of bottom fishing on vulnerable marine ecosystems (VMEs) and the long-term sustainability of deep-sea fish stocks. Since then, it has conducted reviews of actions taken by States and RFMO/As in response to its resolutions on sustainable fisheries of 2009, 2011 and 2016.

3. Following the last review in 2016, the General Assembly, in resolution 71/123, welcomed the progress made by States, RFMO/As and those States participating in negotiations to establish a regional fisheries management organization or arrangement competent to regulate bottom fisheries in order to implement the relevant provisions of resolutions 61/105, 64/72 and 66/68 and to address the impact of bottom fishing on VMEs. The General Assembly noted with concern, however, the uneven implementation of those provisions and that, in particular, bottom fishing continues to occur in certain areas beyond national jurisdiction (ABNJ) without an impact assessment having been completed in the 10 years since the adoption of resolution 61/105.

4. In resolution 73/125, the General Assembly recalled its decision to conduct a further review in 2020 of the steps taken by States and RFMO/As in response to paragraphs 113, 117 and 119 to 124 of resolution 64/72, paragraphs 121, 126, 129, 130 and 132 to 134 of resolution 66/68 and paragraphs 156, 171, 175, 177 to 188 and 219 of resolution 71/123, with a view to ensuring effective implementation of the measures therein and, where necessary, making further recommendations. It also decided to precede that review with a two-day workshop, which, owing to the coronavirus disease (COVID-19) pandemic, has been postponed to 2021.

5. The General Assembly also asked the Secretary-General to report to the General Assembly at its seventy-fifth session. The Secretary-General invited States and regional economic integration organizations and RFMO/As to submit detailed information. The Food and Agriculture Organization of the United Nations (FAO) was also asked to provide information.

6. In response, submissions were received from 14 States (Australia, Canada, Chile, Colombia, Côte d'Ivoire, Ghana, Guinea, Japan, Liberia, New Zealand, Norway, Russian Federation, Togo and United States of America), the European Union,[1] FAO[2] and eight RFMO/As.[3] The Secretary-General wishes to express his appreciation for the submissions received.

[1] The European Union contribution included separate contributions from France, Malta and Spain.

[2] The contribution of FAO is summarized in section IV.

[3] CCAMLR, GFCM, NAFO, NEAFC, NPFC, SEAFO and SPRFMO. The International Commission for the Conservation of Atlantic Tunas reported that it did not regulate bottom fisheries.

II. Overview of the impact of bottom fisheries on vulnerable marine ecosystems and the long-term sustainability of deep-sea fish stocks

7. In the present section, previous reports of the Secretary-General on the actions taken to address the impacts of bottom fishing on VMEs and the long-term sustainability of deep-sea fish stocks (A/61/154, A/64/305, A/66/307, and A/71/351) are updated. The latest research is summarized and some key scientific challenges to furthering an understanding of VME ecology and the impact of bottom fisheries on deep-sea ecosystems are highlighted. Research conducted to support current approaches to fisheries impact mitigation and strengthen ecosystem-based fisheries management by RFMO/As is also highlighted.

A. Vulnerable marine ecosystems: an updated review

1. Defining characteristics of vulnerable marine ecosystems

8. There is no universally agreed definition of VMEs but criteria for the identification of VMEs (for species and for habitat-features likely to support VMEs) are provided in paragraph 42 of the FAO International Guidelines for the Management of Deep-sea Fisheries in the High-Seas (FAO Guidelines). It is recognized therein that the defining characteristics of VMEs should "be adapted and additional criteria developed as experience and knowledge accumulate".

9. Since the last report of the Secretary-General (A/71/251), a considerable body of deep-sea research has been conducted in several RFMO/As.[4] That research has helped to develop a better understanding of what constitutes a deep-sea VME and where the identification and mapping of deep-sea habitats and VMEs is an important requirement.

10. Recent research suggests that, broadly, temperature, chemical energy (food supply) and proximity to slope environments are important drivers of biodiversity in much of the deep sea (defined for the purposes of this report as depths of greater than 200 m). The availability of food plays an increasingly important role at greater depths (2,000 m or more).[5]

11. While it is important to use the full set of criteria in the FAO Guidelines to identify where vulnerable marine ecosystems occur or are likely to occur and to assess

[4] Ellen Kenchington and others, "Kernel density surface modelling as a means to identify significant concentrations of vulnerable marine ecosystem indicators", *PLOS ONE*, vol. 10, No. 1 (January 2015); Kerry-Louise Howell and others, "The distribution of deep-sea sponge aggregations in the North Atlantic and implications for their effective spatial management", *Deep-Sea Research Part I*, Oceanographic Research Papers, No. 115, pp. 309–320 (September 2016); Ashley A. Rowden and others, "High-resolution habitat suitability models for the conservation and management of vulnerable marine ecosystems on the Louisville Seamount Chain, South Pacific Ocean", *Frontiers in Marine Science*, vol. 4, No. 335 (October 2017); Owen F. Anderson and others, "Field validation of habitat suitability models for vulnerable marine ecosystems in the South Pacific Ocean: implications for the use of broad-scale models in fisheries management", *Ocean & Coastal Management*, No. 120, pp. 110–126 (February 2016); Ashley A. Rowden and others, "Determining coral density thresholds for identifying structurally complex vulnerable marine ecosystems in the deep sea", *Frontiers in Marine Science*, vol. 7, No. 95 (February 2020).

[5] Skipton N. C. Woolley and others, "Deep-sea diversity patterns are shaped by energy availability", *Nature*, No. 533, pp. 393–396 (May 2016); Chih-Lin Wei and others, "Seafloor biodiversity of Canada's three oceans: Patterns, hotspots and potential drivers", *Diversity and Distributions*, No. 26, pp. 226–241 (2020).

significant adverse impacts, it is generally accepted that habitat structural complexity is an especially important defining characteristic of a deep-sea VME.[6] VMEs of potential significance for fish and fisheries tend to possess some level of habitat structural complexity, including the presence of "significant concentrations" of individuals (or biomass) supporting a high diversity of organisms, which typically cover an area of seabed habitat greater than the space occupied by the VME indicator species themselves.[7] However, the mere presence of a VME indicator species or a habitat feature in itself does not necessarily define the presence of a VME.[8]

12. Although advances have been made in the quantitative determination of what constitutes a "significant concentration" of habitat-forming VME indicator species, defining "significant concentrations" of VME indicator species in the context of identifying and delineating the extent of VMEs remains a challenge for many RFMO/As.[9]

2. Spatial mapping and monitoring

13. Determining the location and extent of deep-sea VMEs (or their likely location and extent) in ABNJs is essential for implementing effective measures to manage bottom fishing.[10] Data on VME indicator species occurrence come mainly from fishery independent surveys, scientific observer programmes and ad hoc scientific research surveys, either coordinated or directly organized by bottom fishing RFMO/As.[11]

14. Additionally, in recent years, a number of international and global geodatabases have been developed that document the presence of VME habitats, VME fishery closures and VME indicator species.[12] Data from those and other initiatives[13] have contributed to the development of objective VME assessment and identification methods,[14] including the identification of biodiversity hotspots for priority

[6] Roberto Danovaro and others, "Ecological variables for developing a global deep-ocean monitoring and conservation strategy", *Nature Ecology and Evolution*, No. 4, pp. 181–192 (February 2020).

[7] Lindsay I. Beazley and others, "Drivers of epibenthic megafaunal composition in the sponge grounds of the Sackville Spur, northwest Atlantic", *Deep-Sea Research Part I*, Oceanographic Research Papers, No. 98, pp. 102–114 (January 2015); Ellen Kenchington and others, "Kernel density surface modelling"; Ashley A. Rowden and others, "Determining coral density thresholds".

[8] Martin Cryer and others, "Criteria for vulnerable marine ecosystems", in "Deep-ocean climate change impacts on habitat, fish and fisheries", Fisheries and Aquaculture Technical Paper No. 638, Lisa Levin, Maria Baker and Anthony Thompson, eds. (Rome, FAO, 2018).

[9] Ellen Kenchington and others, "Kernel density surface modelling"; Ashley A. Rowden and others, "Determining coral density thresholds".

[10] Raúl Vilela and others, "Integrating fishing spatial patterns and strategies to improve high-seas fisheries management", *Marine Policy*, No. 94, pp. 132–142 (2018); Ashley A. Rowden and others, "Examining the utility of a decision-support tool to develop spatial management options for the protection of vulnerable marine ecosystems on the high-seas around New Zealand", *Ocean & Coastal Management*, No. 170 pp. 1–16 (2019).

[11] James B. Bell, Elena Guijarro-García and Andrew Kenny, "Demersal fishing in areas beyond national jurisdiction: a comparative analysis of regional fisheries management organizations", *Frontiers in Marine Science*, vol. 6, No. 596 (2019); Pablo Muñoz and others, "Cold-water corals and deep-sea sponges by-catch mitigation: dealing with groundfish survey data in the management of the northwest Atlantic Ocean high seas fisheries", *Marine Policy* (2019).

[12] See ICES Vulnerable Marine Ecosystems Data Portal, FAO VME Database and the Census of Marine Life (www.coml.org). All accessed March 2020.

[13] The General Fisheries Commission for the Mediterranean (GFCM) is developing a VME indicators species database for the Mediterranean Sea to support VME protection measures. See also Chih-Lin Wei and others, "Seafloor biodiversity".

[14] Telmo Morato and others, "A multi-criteria assessment method for identifying vulnerable marine ecosystems in the northeast Atlantic" *Frontiers in Marine Science*, vol. 5, No. 460 (2018).

conservation action.[15] They have also contributed to a rapid expansion in the development and application of deep-sea habitat and species distribution models, especially in the north Atlantic[16] and south Pacific,[17] which has resulted in a much better understanding of their limitations, especially when applied to VME conservation strategies.[18]

3. Functional significance

15. The scientific understanding of the ecological functions performed by VMEs, including their value to humans,[19] can contribute greatly to the assessment of any significant adverse impact caused by deep-sea bottom fishing activities, as defined in the FAO Guidelines (para. 18).

16. In that regard, certain benthic ecological functions, such as primary and secondary production and benthic-pelagic coupling of nutrients, including particulate and dissolved organic matter, tend to be positively associated with increased diversity in the deep sea.[20] Given the importance of habitat-forming species and the high biodiversity associated with VMEs, it is likely that all VMEs contribute in some way to a range of important ecological functions in the deep sea, at least when assessed at a local scale.[21]

4. Connectivity

17. Ecological or functional connectivity in the deep sea generally refers to processes by which genes, organisms (adults and larvae), nutrients and energy transfer

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[15] Roberto Danovaro and others, “Ecological variables”.

[16] Katleen Robert and others, “Improving predictive mapping of deep-water habitats: considering multiple model outputs and ensemble techniques”, *Deep Sea Research I*, Oceanographic Research Papers, No. 113. pp. 80–89 (2016).

[17] Samuel E. Georgian, Owen F. Anderson and Ashley A. Rowden, “Ensemble habitat suitability modeling of vulnerable marine ecosystem indicator taxa to inform deep-sea fisheries management in the south Pacific Ocean”, *Fisheries Research*, vol. 211, pp. 256–274 (March 2019).

[18] Néstor M. Robinson and others, “A systematic review of marine-based species distribution models (SDMs) with recommendations for best practice”, *Frontiers in Marine Science*, vol. 4, No. 421 (2017); Genoveva González-Mirelis and Pål Buhl-Mortensen, “Modelling benthic habitats and biotopes off the coast of Norway to support spatial management”, *Ecological Informatics*, vol. 30, pp. 284–292 (November 2015); Kerry-Louise Howell and others, “The distribution of deep-sea sponge aggregations”; Samuel E. Georgian, Owen F. Anderson and Ashley A. Rowden, “Ensemble habitat suitability modelling”.

[19] Andrew R. Thurber and others, “Ecosystem function and services provided by the deep-sea”, *Biogeosciences*, No. 11, 394 –3963 (July 2014).

[20] Elisa Baldrighi and others, “Exploring the relationship between macrofaunal biodiversity and ecosystem functioning in the deep sea”, *Frontiers in Marine Science*, vol. 4 (June 2017).

[21] Javier Murillo and others, “Marine epibenthic functional diversity on Flemish Cap (northwest Atlantic) – identifying trait responses to the environment and mapping ecosystem functions”, *Diversity and Distributions* (January 2020); Manuel Maldonado and others, “Sponge grounds as key marine habitats: a synthetic review of types, structure, functional roles and conservation concerns”, in *Marine Animal Forests*, Sergio Rossi and others, eds. (Cham, Switzerland, Springer, 2017); Christopher Kim Pham and others, “Removal of deep-sea sponges by bottom trawling in the Flemish Cap area: conservation, ecology and economic assessment”, *Scientific Reports*, No. 9 (2019); Ellen Kenchington, D. Power and Mariano Koen-Alonso, “Association of demersal fish with sponge grounds on the continental slopes of the northwest Atlantic”, *Marine Ecology Progress Series*, vol. 477, pp. 217–230 (March 2013); Heidi Meyer and others, “Spatial patterns of Arctic sponge ground fauna and demersal fish are detectable in autonomous underwater vehicle (AUV) imagery”, *Deep Sea Research I*, Oceanographic Research Papers, vol. 153, pp. 103–137 (November 2019).

between habitats (pelagic and benthic) in space and time, connecting populations and communities of marine organisms.[22]

18. An understanding of the ecological connectivity between VMEs (of the same type) is particularly important when establishing management measures to protect VMEs, because the number, extent and location of VME protected areas will underpin the sustainability of populations of VME indicator species at levels that maintain their essential functional processes.[23]

19. Biophysical models for replicating the larval dispersion patterns of key taxa are increasingly used to assess the ecological connectivity between spatially discrete habitat areas.[24] However, uncertainties with regard to model parameters, especially in relation to VME indicator species' reproductive biology and larval ecology (for example, planktonic larval durations) currently limit their utility in designing appropriate networks of marine protected areas.[25]

20. Nevertheless, it has been shown for selected deep-sea habitats in the northwest Atlantic that physical currents and their topographic forcing are among the principal factors that determine the patterns of population connectivity, thereby reducing the need for highly accurate biophysical modelling to determine the most effective design for VME fishery closures.[26]

B. Deep-sea fish stocks

1. Characteristics, status and trends

21. It is known, based on deep-sea fish life-history traits, that fish species at depths of greater that 400 m tend to exhibit overall lower biological productivity compared to upper slope and continental shelf species.[27] In the north Atlantic, for example, a significant depth-related change in the species composition of fish assemblages (to one dominated by deep-sea species) is typically observed at a depth of between 400 m and 600 m.[28]

[22] Marine Protected Areas Federal Advisory Committee, *Harnessing Ecological Spatial Connectivity for Effective Marine Protected Areas and Resilient Marine Ecosystems* (Washington D.C., National Oceanic and Atmospheric Administration, 2017); Ellen Kenchington and others, "Connectivity modelling of areas closed to protect vulnerable marine ecosystems in the northwest Atlantic", *Deep Sea Research I*, Oceanographic Research Papers, vol. 143, pp. 85–103 (January 2019); Bethan C. O'Leary and Callum M. Roberts, "Ecological connectivity across ocean depths: implications for protected area design", *Global Ecology and Conservation*, vol. 15 (July 2018).

[23] Amy R. Baco and others, "A synthesis of genetic connectivity in deep-sea fauna and implications for marine reserve design", *Molecular Ecology*, vol. 25, No. 14, pp. 3,276–3,298 (May 2016).

[24] Ana Hilário and others, "Estimating dispersal distance in the deep sea: challenges and applications to marine reserves", *Frontiers in Marine Science*, vol. 2 (February 2015).

[25] Bethan C. O'Leary and Callum M. Roberts, "Ecological connectivity".

[26] Ellen Kenchinton and others, "Connectivity modelling".

[27] Rui P. Vieira and others, "Deep-water fisheries along the British Isles continental slopes: status, ecosystem effects and future perspectives", *Fish Biology*, No. 94 (6), pp. 981–992 (June 2019); Lissette Victorero and others, "Out of sight, but within reach: a global history of bottom-trawled deep-sea fisheries from >400 m depth", *Frontiers in Marine Science*, vol. 5, No. 98 (April 2018).

[28] Stephen C. Mangi and others, "The economic implications of changing regulations for deep-sea fishing under the European Common Fisheries Policy: UK case study", *Science of the Total Environment*, vol. 562, pp. 260–269 (August 2016); Adriana Nogueira, Xabier Paz and Diana González-Troncoso, "Demersal groundfish assemblages and depth-related trends on Flemish Cap (NAFO division 3M): 2004–2013", *Fisheries Research*, vol. 186, pp. 192–204 (2017).

22. Although the status of many deep-sea stocks remains uncertain, especially after decades of over-fishing,[29] the recent development and application of data-limited stock assessment methods[30] (including food-web models[31]), in combination with more ecosystem-based fisheries management approaches,[32] has contributed to improved management of many deep-sea stocks by RFMO/As.[33]

2. Habitat, fish and fishery links

23. It has been argued that most commercially targeted fish species simply favour occupying the same local habitat conditions as VMEs (for instance, because of enhanced or turbulent current flow caused by elevated topography or increased seabed rugosity) rather than actually depending on the presence of the VME species per se.[34]

24. However, a recent systematic review of cold-water coral ecology in the Mediterranean Sea unequivocally revealed the importance of cold-water coral in providing shelter, feeding and life-history critical habitats for many species of fish (including commercially targeted species).[35] Furthermore, a study of sponge grounds (*Geodia* sp.) in the Arctic revealed the extensive presence of egg cases on sponge spicule mats belonging to Arctic skate (*Amblyraja hyperborea*), indicating the potential functional significance of VME sponge grounds in providing an essential habitat for fish.[36]

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[29] Lissette Victorero and others, "Out of sight, but within reach".

[30] Andrew A. Rosenberg and others, "Developing new approaches to global stock status assessment and fishery production potential of the seas", FAO Fisheries and Aquaculture Circular No. 1086 (Rome, FAO, 2014); ICES, "Working group on the biology and assessment of deep-sea fisheries resources (WGDEEP)", ICES Scientific Reports, vol. 1, No. 21 (2019).

[31] Abdelkrim Bentorcha, Didier Gascuel and Sylvie Guénette, "Using trophic models to assess the impact of fishing in the Bay of Biscay and the Celtic Sea", *Aquatic Living Resources*, vol. 30 (January 2017).

[32] Richard Caddell, "Deep-sea bottom fisheries and the protection of seabed ecosystems: problems, progress and prospects", in *The Law of the Seabed: Access Uses, and Protection of Seabed Resources*, Catherine Banet, ed. (Leiden, Netherlands, Brill Nijhoff, 2020); Andrew J. Kenny and others, "Delivering sustainable fisheries through adoption of a risk-based framework as part of an ecosystem approach to fisheries management", *Marine Policy*, vol. 93 (July 2018); Mariano Koen-Alonso and others, "The Northwest Atlantic Fisheries Organization roadmap for the development and implementation of an ecosystem approach to fisheries: structure, state of development, and challenges", *Marine Policy*, vol. 100, pp. 342–352 (February 2019).

[33] FAO, "Worldwide review of bottom fisheries in the high seas in 2016", FAO Fisheries and Aquaculture Technical Paper No. 657 (Rome, FAO, 2020); General Fisheries Commission for the Mediterranean, *The State of Mediterranean and Black Sea Fisheries* (Rome, FAO, 2018); Geoffrey Tingley and Matthew Dunn, eds., *Global Review of Orange Roughy (*Hoplostethus atlanticus*), Their Fisheries, Biology and Management*, FAO Fisheries and Aquaculture Technical Paper No. 622 (Rome, FAO, 2018); Andrew J. Kenny and others, "Delivering sustainable fisheries".

[34] Les Watling and others, "Linkage between VME species, fish and fisheries", in "Deep-ocean climate change impacts on habitat, fish and fisheries", Lisa Levin, Maria Baker and Anthony Thompson, eds., FAO Fisheries and Aquaculture Technical Paper No. 638 (Rome, FAO, 2018); Christopher Kim Pham and others, "The importance of deep-sea vulnerable marine ecosystems for demersal fish in the Azores", *Deep Sea Research I*, Oceanographic Research Papers, vol. 96, pp. 80–88 (February 2015); Brynn Devine and others, "Habitat associations and assemblage structure of demersal deep-sea fishes on the eastern Flemish Cap and Orphan Seamount", *Deep Sea Research I*, Oceanographic Research Papers, vol. 157, pp. 103–210 (January 2020).

[35] Gianfranco D'Onghia, "Cold-water corals as shelter, feeding and life-history critical habitats for fish species: ecological interactions and fishing impact", in *Mediterranean Cold-Water Corals: Past, Present and Future*, Covadonga Orejas and Carlos Jiménez, eds., *Coral Reefs of the World*, vol. 9 (Cham, Switzerland, Springer, 2019).

[36] Heidi Meyer and others, "Spatial patterns of Arctic sponge ground fauna".

3. Productivity and climate effects

25. Some populations of commercial fish species (including certain species targeted by fisheries managed by RFMO/As) have experienced changes in their long-term spatial distribution and productivity owing to climate change.[37] Some of the most significant negative changes in the distribution and productivity of fish species are likely to occur in the north Atlantic and Southern Oceans, where deep-sea taxa such as Antarctic toothfish, golden redfish and a variety of cold-water coral species are particularly sensitive.[38]

C. Impact of bottom fishing on vulnerable marine ecosystems and deep-sea fish stocks

26. Bottom fishing gear used on the high seas are dominated by otter trawl and long-line gear types, with the majority of deep-sea demersal catches (in terms of tonnage) obtained using bottom otter trawls.[39] Deep-sea otter trawls are robust and heavy in order to withstand the large forces associated with fishing at depths of up to 2,000 m.[40] Modified otter trawls (lacking heavy footropes and ground tackle) are often used to fish just above the seabed, especially when targeting shoals of deep-water species on seamounts such as alfonsinos.[41]

1. Impacts on vulnerable marine ecosystems

27. Benthic biodiversity and species density or biomass (especially megafaunal density and biomass) are widely reported to be negatively correlated with bottom-contact fishing activities in the deep sea.[42]

28. Recent observations on seamounts where bottom fishing is not permitted reveal some measurable recovery of deep-sea coral communities over periods of between 30 and 40 years,[43] where previously (after 5 to 10 years) no recovery had been evident.[44]

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[37] Melissa A. Karp and others, "Accounting for shifting distributions and changing productivity in the development of scientific advice for fishery management", *ICES Journal of Marine Science*, vol. 76, No. 5, pp. 1,305–1,315 (April 2019); Christopher M. Free and others, "Impacts of historical warming on marine fisheries production", *Science*, vol. 363, No. 6430 (March 2019).

[38] Lisa Levin, Maria Baker and Anthony Thompson, eds., "Deep-ocean climate change impacts on habitat, fish and fisheries", FAO Fisheries and Aquaculture Technical Paper No. 638 (Rome, FAO, 2018).

[39] FAO, "Worldwide review of bottom fisheries in the high seas in 2016".

[40] Lissette Victorero and others, "Out of sight, but within reach".

[41] Daniela Diz, "The Seamounts of the Sargasso Sea: Adequately Protected?", *The International Journal of Marine and Coastal Law*, vol. 31, No. 2, pp. 359–370 (June 2016).

[42] Francisco Javier Murillo and others, "Mapping benthic ecological diversity and interactions with bottom-contact fishing on the Flemish Cap (northwest Atlantic)", *Ecological Indicators*, vol. 112, pp. 106–135 (May 2020); Martina Pierdomenico and others, "Effects of trawling activity on the bamboo-coral *Isidella elongata* and the sea pen *Funiculina quadrangularis* along the Gioia Canyon (Western Mediterranean, southern Tyrrhenian Sea)", *Progress in Oceanography*, vol. 169, pp. 214–226 (February 2018); Cherisse Du Preez, Kelly D. Swan and Janelle M. R. Curtis, "Cold-water corals and other vulnerable biological structures on a north Pacific seamount after half a century of fishing", *Frontiers in Marine Science*, vol. 7 (February 2020); Rui P. Vieira and others, "Deep-sea sponge aggregations (*Pherolnema carpenteri*) in the Porcupine Seabight (NE Atlantic) potentially degraded by demersal fishing", *Progress in Oceanography*, vol. 183 (April 2020).

[43] Amy R. Baco, E. Brendan Roark and Nicole B. Morgan, "Amid fields of rubble, scars, and lost gear, signs of recovery observed on seamounts on 30- to 40-year time scales", *Science Advances*, vol. 5, No. 8 (August 2019).

[44] Veerle A. I. Huvenne and others, "Effectiveness of a deep-sea cold-water coral Marine Protected Area, following eight years of fisheries closure", *Biological Conservation*, vol. 200, pp. 60–69 (August 2016).

That figure accords with the findings of a global review of marine life recovery rates, in which it is suggested that substantial recovery in the abundance, structure and function of marine life could be achieved after 30 years if major pressures (including those relating to climate change) were appropriately mitigated.[45]

29. Although some recovery can be seen in specific VME types, the fact that it appears to take several decades for many deep-sea species to recover effectively precludes the removal of restrictions on bottom fishing in many areas where VMEs are currently closed to fishing.

30. Studies show that not all VME indicator species respond to bottom fishing disturbance in the same way and that some species are potentially more sensitive (or less resilient) to physical disturbance than others, even when inhabiting the same substrate type.[46]

31. Methods for assessing the impact of bottom fishing that use an analysis of species biological traits in response to bottom fishing disturbance can provide a more mechanistic and process-based approach to determining the significance of potential VME functional losses at the local ecosystem level.[47] The biological traits associated with body form, adult body size, structural rigidity or flexibility and mode of seabed attachment are particularly important when assessing the sensitivity of sessile mega-epifaunal VME indicator species to disturbances caused by bottom fishing.[48]

32. The presence of abandoned, lost or otherwise discarded fishing gear, and other sources of seabed litter, including microplastics, is having a growing impact on deep-sea VMEs.[49] Deep-sea hot spots of marine litter, much of it derived from fishing activities, have been observed. It has been shown that they coincide with areas known to be important for VMEs.[50] Seabed camera surveys also show that significant quantities of derelict fishing gear (including traps, long lines, trawl doors, chains and nets), accumulated over many decades, tend to become entangled with structure forming VME species, potentially causing significant damage to VMEs over time.[51]

2. Impact on deep-sea fish stocks

33. In 2016, the global catch from bottom fishing on the high seas was estimated at 225,924 tonnes,[52] representing only about 0.3 per cent of the total global marine fish catch.[53] The estimated total catch of deep-sea fish species is currently about half of the peak catches that were recorded in 2005.[54] The rapid decline and subsequent low levels of catches recorded since 2005 are attributable mainly to an initial and rapid

[45] Carlos M. Duarte and others, “Rebuilding marine life”, *Nature*, vol. 580 (April 2020).

[46] Valentina Lauria and others, “Species distribution models of two critically endangered deep-sea octocorals reveal fishing impacts on vulnerable marine ecosystems in central Mediterranean Sea”, *Scientific Reports*, vol. 7 (August 2017).

[47] Christopher Kim Pham and others, “Removal of deep-sea sponges”.

[48] Valentina Lauria and others, “Species distribution models”; Javier Murillo and others, “Marine epibenthic functional diversity”.

[49] Cherisse Du Preez, Kelly D. Swan and Janelle M. R. Curtis, “Cold-water corals and other vulnerable biological structures”; Ana García-Alegre and others, “Seabed litter distribution in the high seas of the Flemish Pass area (NW Atlantic)”, *Scientia Marina*, vol. 84, No. 1 (February 2020); Lisa A. Levin and others, “Global Observing Needs in the Deep Ocean”, *Frontiers in Marine Science*, vol. 6 (May 2019).

[50] Ana García-Alegre and others, “Seabed litter distribution”.

[51] Cherisse Du Preez, Kelly D. Swan and Janelle M. R. Curtis, “Cold-water corals and other vulnerable biological structures”.

[52] FAO, “Worldwide review of bottom fisheries in the high seas in 2016”.

[53] FAO, *The State of World Fisheries and Aquaculture 2018 – Meeting the Sustainable Development Goals* (Rome, 2018).

[54] Lissette Victorero and others, “Out of sight, but within reach”.

decline in the stock biomass of most species, changes in the economics of deep-sea fisheries and the implementation of a range of management measures.[55]

34. A recent study on the status of 51 stocks of deep-sea fish targeted by bottom fishery RFMO/As, as determined mainly by their stock biomasses, revealed that the status of 16 stocks was relatively good status and that of 10 others was negative. The status of 25 stocks was unknown.[56]

35. Those figures highlight that most global deep-sea stocks remain unassessed. The majority of the officially reported high-seas demersal fish catches (63 per cent) are managed by NAFO and NEAFC, where 71 per cent of the targeted stocks are assessed.[57]

36. There is some evidence, however, to suggest that catch underestimates remain a significant issue for some high-seas fisheries,[58] especially as deep-sea bottom trawl fisheries tend to be mixed fisheries with the potential for capturing elevated quantities of non-target fish species that are subsequently discarded at sea.[59]

3. Mitigation measures

37. The potentially adverse impact on VMEs is most commonly mitigated by establishing a "fishing footprint" to confine fishing to areas that are currently and were historically fished or by establishing VME fishery closures.[60]

38. It has been argued that the risk of new VME fishery encounters and adverse impact in areas previously heavily fished is relatively low, especially compared with fishing in areas of VME habitat that have no recent history of fishing.[61]

39. Improved fishing vessel positional tracking and monitoring shows that the area of seabed fished tends to be much smaller than the fishable area or, where defined, the "fishing footprint".[62] It has been estimated that substantially less than half of the total fishable area of seabed (at a depth of between 200 m and 1,000 m) globally is actually fished.[63]

40. Increasingly, risk-based approaches are being developed that optimize the protection of VMEs while ensuring that areas which are important for fishing remain open.[64] When implemented as part of an ecosystem approach to fisheries framework, they can lessen the need to rely on VME encounter protocols and move-on rules as the primary VME mitigation measure.[65]

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[55] ICES, "Working group"; Richard Caddell, "Deep-sea bottom fisheries".

[56] FAO, *The State of World Fisheries*.

[57] Ibid.

[58] Lissette Victorero and others, "Out of sight, but within reach".

[59] Jo Clarke and others, "A scientific basis for regulating deep-sea fishing by depth", *Current Biology*, vol. 25, pp. 2,425–2,429 (September 2015); Stephen C. Mangi and others, "The economic implications".

[60] Richard Caddell, "Deep-sea bottom fisheries".

[61] Stephen C. Mangi and others, "The economic implications".

[62] Ricardo O. Amoroso and others, "Bottom trawl fishing footprints on the world's continental shelves", *Proceedings of the National Academy of Sciences*, vol. 115 (October 2018); NAFO, "Report of the NAFO Joint Fisheries Commission–Scientific Council working group on ecosystem approach framework to fisheries management" (2016).

[63] Ricardo O. Amoroso and others, "Bottom trawl fishing footprints".

[64] Ashley A. Rowden and others, "Examining the utility of a decision-support tool to develop spatial management options for the protection of vulnerable marine ecosystems on the high seas around New Zealand", *Ocean and Coastal Management*, vol. 170, (March 2019); Andrew J. Kenny and others, "Delivering sustainable fisheries".

[65] FAO, "Report of the FAO workshop on encounter protocols and impact assessments for deep-sea fisheries in areas beyond national jurisdiction", 5–8 May 2015, FAO Fisheries and Aquaculture report No. 1178 (Rome, 2016).

III. Actions taken by States and regional fisheries management organizations and arrangements to address the impact of bottom fisheries on vulnerable marine ecosystems and the long-term sustainability of deep-sea fish stocks

A. Actions taken by regional fisheries management organizations and arrangements with competence to regulate bottom fisheries

41. The present section describes actions taken to give effect to the relevant paragraphs of General Assembly resolutions 64/72, 66/68 and 71/123 by RFMO/As with the competence to regulate bottom fisheries:[66] the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), the General Fisheries Commission for the Mediterranean (GFCM), the Northwest Atlantic Fisheries Organization (NAFO), the North East Atlantic Fisheries Commission (NEAFC), the North Pacific Fisheries Commission (NPFC), the South East Atlantic Fisheries Organization (SEAFO), the South Indian Ocean Fisheries Agreement (SIOFA) and the South Pacific Regional Fisheries Management Organization (SPRFMO).

1. Identifying vulnerable marine ecosystems and assessing the significant adverse impact of bottom fishing

42. A number of RFMO/As reported on the criteria used for identifying VMEs, applying the FAO Guidelines, and related research activities for identifying VMEs.[67] Some also reported on related measures for assessing the impact of bottom fisheries on VMEs.[68]

43. CCAMLR reported that it was continuing to implement conservation measures 22-06 (updated and in force since 2019) and 22-07 (updated and in force since 2013), which required preliminary assessment of the impact of planned activities on VMEs. Those measures also provided mechanisms for cataloguing VMEs identified through scientific research or VME risk areas identified through encounters with fishing gear, and prohibited fishing on VMEs or VME risk areas.

44. GFCM reported that, although it had not defined VMEs in its conservation and management measures, it had adopted fisheries restricted areas as a multi-purpose area-based management tool to restrict fishing and protect essential fish habitats and deep-sea sensitive habitats based on the ecosystem approach to fisheries. The criteria for those restricted areas followed those for VMEs under the FAO Guidelines.[69]

45. NAFO reported that its European Union-funded NEREIDA project represented a major multidisciplinary research effort on sensitive habitats and fishing activities in the northwest Atlantic and also provided an in-depth analysis of the impact of fishing on VMEs.[70] NAFO noted that its Scientific Council had the task, under article 23 of

[66] The information is drawn from the contribution of the particular RFMO/A to which reference is made, unless otherwise indicated. Supplemental information was provided by States and the European Union or drawn from publicly available sources.

[67] See also General Assembly resolutions 64/72 (para. 119 (b)), 66/68 (paras. 132 and 133) and 71/123 (para. 180 (a)).

[68] See also General Assembly resolutions 64/72 (para. 119 (a)), 66/68 (paras. 129 (a) to (c)) and 71/123 (para. 180 (a)).

[69] GFCM defines a fisheries restricted area as “a geographically-defined area in which all or certain fishing activities are temporarily or permanently banned or restricted in order to improve the exploitation and conservation of harvested living aquatic resources or the protection of marine ecosystems”.

[70] See www.nafo.int/About-us/International-Cooperation.

the NAFO Conservation and Enforcement Measures for 2019, of identifying VMEs and providing the Executive Secretary with the resulting data for circulation to the Contracting Parties.[71]

46. SEAFO noted that the definition of VMEs in its conservation measure 30/15, which had come into force in 2016, was derived from paragraphs 42 and 43 of the FAO Guidelines. Basic mapping and identification of VMEs and fisheries resources in a selection of seamounts and seamount complexes had been conducted in research cruises in 2015 and 2019. With support from the EAF (ecosystem approach to fisheries) Nansen Programme, another survey had been proposed for 2020.

47. SIOFA reported that it had used the criteria set forth in paragraph 42 of the FAO Guidelines for the definition of VME in its interim conservation and management measure 2019/01. Its Scientific Committee was required to provide recommendations to the SIOFA Meeting of the Parties on, among other things, a SIOFA bottom fishing impact assessment standard taking into account the latest scientific information and maps indicating where VMEs were known or likely to occur in the SIOFA Agreement Area.

48. SPRFMO reported that the definition of VMEs in its conservation and management measure 03-2020 was based on paragraph 42 of the FAO Guidelines and on the annex thereto.

49. CCAMLR reported that conservation measures 22-06 and 22-07 required preliminary assessment of the impact of planned bottom fishing activities on VMEs. Under conservation measure 22-06, on bottom fishing in the CCMLR Convention Area, all such activities were subject to assessment by the Scientific Committee to determine whether, taking account of the history of bottom fishing in the proposed areas, they would contribute to any significant adverse impact on VMEs.

50. In 2019, GFCM had agreed to develop a database on VME indicator features, habitats and species in the Mediterranean Sea as a scientific tool for its technical groups. Its aim was to identify priority areas for which fisheries protection measures would be proposed. Once the database was populated with relevant information and priorities identified, protection measures to prevent negative impacts would be adopted.

51. NPFC reported that fine-scale analysis on the spatial distribution of trawl and bottom gillnet fishing activities within its fished seamounts had revealed that the density of potential VME indicator taxa was generally low. No potential VME sites had been detected in the existing fishing grounds of the fished seamounts. To assist fishers and on-board observers in identifying VMEs encountered during fishing operations, NPFC was developing a VME taxa identification field guide for coral identification, which would be completed in 2020.

52. In accordance with the NPFC conservation and management measures on bottom fishing and the protection of VMEs in the northwest and northeast Pacific Ocean, members of NPFC were required to conduct regular impact assessments to ensure that existing fisheries or exploratory fisheries did not have any significant adverse impact on VMEs. Scientific research was conducted by NPFC members in accordance with its Scientific Committee research plan but more research was needed to enhance measures for avoiding such impact.

53. SPRFMO reported that, under conservation and management measure 03-2020, proposals to engage in bottom fishing were subject to an assessment process based on the best available scientific information and taking into account the history of bottom fishing in the areas proposed and the cumulative impact of past and proposed fishing.

[71] See also annex I.E (V) of the Conservation and Enforcement Measures for 2019.

The aim of the assessment was to determine whether fishing would contribute to a significant adverse impact on VMEs, in which case such fishing either must be managed or was not authorized.

2. Adopting and implementing conservation and management measures, including the development of protocols for encounters with vulnerable marine ecosystems

54. RFMO/As reported on the adoption and implementation of conservation and management measures based on the best available scientific information, including protocols for encounters with VMEs, in response, among other things, to the calls made by the General Assembly, in particular, in paragraph 119 (c) of resolution 64/72 and paragraph 180 (c) of resolution 71/123. Those measures also relate more generally to ensuring the long-term sustainability of deep-sea fish stocks and non-target species and the rebuilding of depleted stocks, as provided for in paragraph 119 (d) of resolution 64/72 and paragraph 186 of resolution 71/123.

55. As noted above, CCAMLR reported that its conservation measures 22-06 and 22-07 provided mechanisms for cataloguing in its VME registry VMEs identified through scientific research or VME risk areas identified through encounters with fishing gear and prohibited fishing on VMEs or in VME risk areas.

56. GFCM reported that it had partially addressed the protection of VMEs through the establishment of fisheries restricted areas in its Agreement Area, including the Jabuka/Promo Pit in the Adriatic Sea, which had been established in 2018 and contributed to the protection of essential fish habitats for demersal stocks. GFCM had also adopted a mid-term strategy for the period 2017–2020 for the sustainability of Mediterranean and Black Sea fisheries. One target of the strategy was to minimize and mitigate unwanted interactions between fisheries and marine ecosystems and environment, including the impact of fisheries on VMEs.[72] GFCM was also considering a phased approach for the adoption of an exploratory fishing protocol and an encounter protocol, including move-on rules.

57. NEAFC reported that, under measures in force and apart from restricted exploratory fisheries, bottom fishing could only take place in the NEAFC Regulatory Area in areas established for that purpose, where the best available scientific advice had suggested that VMEs did not, or were unlikely to, occur. Areas open for bottom fishing were subject to various measures, including reporting duties and VME encounter protocols that had resulted in temporary closures.

58. In 2018, NEAFC had updated its 2016 recommendation on deep-sea fisheries to switch from an approach based on effort limitation in relation to the maximum effort made in previous years to a precautionary approach. NEAFC Contracting Parties were thus required to manage deep-sea fisheries stocks not subject to other NEAFC conservation and management measures, such as specific catch limits.

59. NAFO reported that, in order to mitigate the possible impact on VMEs outside areas closed to bottom fishing, it had established thresholds for significant encounters on the basis of scientific assessments inside the fishing footprint and on adjacent continental slopes. Catches in excess of those amounts triggered a move-on rule, requiring vessels to move two nautical miles away before recommencing fishing operations and to inform their national administrations of the encounter. The latter then passed the information to the NAFO Secretariat and Scientific Council.

60. NPFC reported that it set limits on all authorized fishing vessels for key target species with no increase in effort permitted until the completion of stock assessments. The expansion of bottom fisheries into certain areas where such fishing was not taking

[72] See also resolution GFCM/40/2016/2.

place was prohibited. Under an encounter protocol developed on the basis of existing interim and voluntary measures to safeguard VMEs, members were required to ensure that vessels flying their flags ceased bottom fishing in areas where the threshold had been met and not to resume fishing until they had relocated far enough away to render further encounters with VMEs unlikely.

61. SIOFA reported that its interim measures related to effort limitation, identification of VMEs, move-on rules and the provision of data by the Contracting Parties (conservation and management measure 2019/01). In 2019, SIOFA had adopted conservation and management measures 2019/13 and 2019/15 for demersal stocks in the SIOFA Agreement Area.[73]

62. SPRFMO reported that in 2020 it had adopted amendments to its conservation and management measures relating to the weight thresholds for triggering the VME encounter protocol with a view to making the bottom fishing framework more precautionary.

3. Closing areas containing vulnerable marine ecosystems to bottom fishing until conservation and management measures are adopted

63. Following the calls by the General Assembly in paragraph 119 (b) of resolution 64/72, paragraph 132 of resolution 66/68 and paragraph 182 of resolution 71/123, a number of RFMO/As have closed or kept closed areas where VMEs occur or are likely to occur pending the adoption of conservation and management measures.

64. GFCM reported that it had established fisheries restricted areas that, although they might not address the protection of VMEs as a conservation priority, would protect essential and vulnerable fish habitats within the closed areas. Three such restricted areas had been established in the Strait of Sicily in 2016 and one in the Adriatic Sea in 2018, thereby helping to protect essential habitats for demersal stocks such as European hake and Norway lobster.

65. NAFO reported that, on advice from its Scientific Council that VMEs in the NAFO Regulatory Area could best be protected by closing areas with significant concentrations of VME indicator species,[74] it had identified 21 areas within its Convention Area as vulnerable to bottom contact gear and closed them to bottom fishing.[75] The closed areas were divided into two categories: seamount closures and sponge, coral and sea pen closures. As reflected in article 17 of its Conservation Enforcement Measures for 2020, no vessel was allowed to engage in bottom fishing in any of the closed areas.[76]

66. NEAFC reported that areas in existing and new bottom fishing areas had been closed to bottom fishing to prevent any significant adverse impact on VMEs. Parts of other existing bottom fishing areas were subject to various measures, including reporting duties and encounter protocols. A reported encounter with a VME would result in a temporary closure of the relevant area.

67. On advice from the International Council for the Exploration of the Sea (ICES) in 2018, NEAFC had renewed to 31 December 2022 closures that had been due to expire by 31 December 2017. Area (l) Hatton–Rockall Basin had been significantly enlarged to take into account new records of deep-sea sponge aggregations found at a depth of 1,200 m.

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[73] See also the report of the Sixth Meeting of the Parties to the Southern Indian Ocean Fisheries Agreement (SIOFA), held from 1 to 5 July 2019 in Flic en Flac, Mauritius.

[74] See also A/71/351 (para. 74).

[75] See www.nafo.int/Fisheries/VME.

[76] See www.nafo.int/Portals/0/PDFs/COM/2020/CEM-2020-web.pdf.

68. SIOFA reported that, in provisionally protected areas under annex 3 of conservation and management measure 2019/01, Contracting Parties, cooperating non-contracting parties, participating fishing entities and cooperating non-participating fishing entities (collectively, CCPs) were required to prohibit all vessels flying their flag from engaging in bottom fishing, excluding line and trap methods. For all other gear, CCPs were required to ensure a scientific observer was on board such vessels at all times while fishing inside such areas.

69. SEAFO reported that 11 of the 12 areas closed to bottom trawling in its Convention Area had, since 2015, remained closed to all bottom fishing. One area had been opened to bottom fishing with pots and longlines.[77] Seamount areas that fell within the existing bottom fishing areas were open for fishing and the fisheries permitted in those areas had not been assessed for any potential significant adverse impact on VMEs.

70. SPRFMO reported that it had ruled, under the terms of conservation and management measures 03-2020 and 03a-2020 (deep-water species) that bottom fishing was allowed to take place only in three management areas in the Convention Area: the bottom trawl management area, mid-water trawl management area and bottom line management area. The measures effectively provided for the establishment of bottom fishing footprints that would close most of the SPRFMO Convention Area to bottom fishing for most members. Conservation and management measure 13-2020 (management of new and exploratory fisheries in the SPRFMO Convention Area) did not apply to bottom fishing in the three management areas.

4. Establishing mechanisms to promote and enhance compliance with applicable measures

71. The General Assembly has repeatedly called on RFMO/As to establish mechanisms to promote and enhance compliance with applicable measures relating to the protection of VMEs adopted in accordance with international law (for instance, in paragraph. 129 (d) of resolution 66/68) and to adopt the appropriate monitoring, control and surveillance measures (for instance, in paragraph 119 (d) of resolution 64/72 and paragraph 186 of resolution 71/123).

72. CCAMLR reported that, in its second performance review, which had been conducted during the 2016–2017 intersessional period, it had found that an impressive array of monitoring, control and surveillance measures and cooperative mechanisms had been adopted to monitor compliance and detect non-compliance and illegal, unreported and unregulated fishing activities. Measures included Contracting Party and non-contracting party lists of illegal, unreported and unregulated vessels, a centralized vessel monitoring system, a catch documentation scheme, licensing and inspection obligations and transhipment notification conservation measures. Discussions in the Standing Committee on Implementation and Compliance had been robust with respect to cases of non-compliance and the sharing of information regarding illegal, unreported and unregulated activities by vessels and sightings of such vessels, enforcement patrols, international cooperation, satellite imagery projects, progress in prosecutions and the imposition of domestic legal remedies.[78]

73. GFCM reported that technologies in line with regional standards, including vessel monitoring and automatic identification systems, were being used to enhance knowledge of the distribution of fishing effort in its area of application.

[77] See also A/71/351 (paras. 76 and 77).

[78] See www.ccamlr.org/en/system/files/e-cc-xxxvi-01-w-cp.pdf.

74. NAFO reported that, under article 24 of its Conservation and Enforcement Measures, it was required to review its VME measures in 2020.

75. NEAFC reported that its binding recommendations were backed up by a comprehensive scheme of control and enforcement, including measures to ensure that all fishing vessels were notified and authorized to fish in the NEAFC Regulatory Area. Vessels were required to have suitable vessel position reporting equipment and to report catches of regulated species while in the Regulatory Area. By means of inspections at sea and port State control, NEAFC regulations could be enforced using the monitoring and catch information generated under the scheme. The NEAFC Secretariat sent alerts to Contracting Parties when any vessel entered the Regulatory Area outside existing fishing areas and exhibited behaviour consistent with bottom fishing. The scheme was updated and improved by the Committee on Monitoring and Compliance annually.

76. Since 2016, it had compiled annual reports on compliance by vessels of Contracting Parties with NEAFC regulations, including with regard to bottom fishing and VMEs. In a shift from the current catch reporting system, authorized fishing vessel lists would be published from 2020. They would be based on electronic logbooks kept by the vessels and improve the accuracy and timeliness of data exchanged between Contracting Parties and the NEAFC Secretariat.

77. NPFC reported that it was developing its compliance mechanisms and tools to protect deep-sea fisheries, ecosystems and biodiversity elements. No vessel was permitted to operate in the NPFC Convention Area without authorization from a NPFC member recorded in the vessel registry or interim vessel registry for non-member vessels. The vessel registry included all deep-water fishing vessels and approximately 1,200 small pelagic vessels. All vessels engaged in bottom fishing were required to have an active vessel monitoring system when in the Convention Area. A regional vessel monitoring system managed by the NPFC Secretariat would become operational in 2020. No bottom fishing vessel was permitted to operate in the Convention Area without full observer coverage. Members were monitoring vessel activities in the Convention Area by boarding vessels for inspection at sea. In the first year since inspections had begun, 38 had been carried out. Monitoring had led to the inclusion of 33 vessels in the list of illegal, unreported and unregulated vessels, which was shared with FAO and 11 RFMO/As.

78. SEAFO reported on its system of observation, inspection, compliance and enforcement, which addressed gear retrieval, catch and fishing effort, and vessel monitoring system information. The SEAFO Commission had adopted vessel reporting requirements and Contracting Parties were required to ensure that their vessels fishing in the SEAFO Convention Area sent reports to the SEAFO Secretariat.

79. SIOFA reported that, in its Agreement Area, CCPs were required to ensure that any vessels flying their flags and undertaking bottom fishing had a certain percentage of scientific observer coverage, depending on the gear used, and that they submitted vessel monitoring system reports in electronic format to the SIOFA Secretariat, in accordance with conservation and management measures adopted by the SIOFA Meeting of the Parties.

80. SPRFMO reported that conservation and management measure 10-2020 provided for the establishment of a compliance and monitoring scheme in its Convention Area to improve implementation by SPRFMO members and cooperating non-contracting parties. The scheme was also designed in order to identify areas in which members and cooperating non-contracting parties might need technical assistance or capacity-building in order to become compliant and identify potential

improvements in conservation and management measures.[79] The scheme provided for preventive and remedial action to be taken in cases of non-compliance, in accordance with paragraph 16 (a) of conservation and management measure 10-2020.

81. Compliance among SPRFMO members had improved and there had been a decrease in priority non-compliance, as highlighted in the report of its Compliance and Technical Committee. SPRFMO had agreed to all the recommendations proposed by that body, including with regard to the selection of the SPRFMO observer accreditation provider.[80]

5. Review of identifications, assessments and measures

82. Some RFMO/As have established ongoing procedures or mechanisms to review and update their conservation and management measures, including with regard to the identification of VMEs and the assessment of the impact of bottom fishing on them (see paragraph 129 (c) of General Assembly resolution 66/68 and paragraph 180 (b) of resolution 71/123).

83. NAFO reported that it had maintained a cycle of advice, review and implementation regarding its management measures so as to ensure that the ecosystem approach was considered when fisheries management decisions were taken. It had conducted a reassessment of its bottom fishing activities in 2016 and would conduct another in 2021 and every five years thereafter. It had also established a process for reviewing measures to protect VMEs on the basis of the latest scientific information. NAFO was specifically required under its conservation and enforcement measures to review its VME measures in 2020.

84. NEAFC reported that a NEAFC working group had conducted a major review of deep-sea fisheries in its Regulatory Area and issued a report in 2017. The working group had found that landings and effort in the Regulatory Area had declined significantly for most Contracting Parties between 1973 and 2016.

85. In 2019, NEAFC had reviewed the effectiveness of its binding recommendation No. 19 of 2014 on the protection of vulnerable marine ecosystems in the NEAFC Regulatory Area. The Permanent Committee on Management and Science had concluded that the Commission had been, and continued to be, advised effectively by ICES on all issues relating to the protection of VMEs, including on areas that should be closed (see also para. 67 above), and that compliance with closures had been effective. Records indicated that limited unauthorized fishing had taken place. Most bottom fishing had been carried out in existing bottom fishing areas.

86. In 2019, the Commission had agreed to the Permanent Committee re-examining any earlier ICES advice regarding closures that had not been acted upon and reporting on its findings to the Commission's annual meeting in 2020.

87. NPFC reported that it reviewed its VME indicator taxa definition annually, taking into consideration new data based the research conducted by its members.

88. SEAFO reported that review procedures had been incorporated into its management measures, which applied to existing bottom-fishing areas and, specifically, the assessment of proposed exploratory bottom fishing and encounters with possible VMEs.[81] SEAFO closed areas were currently closed to all types of fishing managed by the Organization and no review date had been set for them.

[79] Those findings and subsequent actions did not replace any review procedure under article 30 of the SPRFMO Convention.

[80] See www.sprfmo.int/assets/0-2020-Annual-Meeting/Reports/CTC7-Meeting-Report-10Mar2020.pdf.

[81] See www.seafo.org/media/8933d489-854c-4c99-895e-66573c7010a4/SEAFOweb/CM/open/eng/CM30-15_pdf.

89. SIOFA reported that, under conservation and management measure 2019/01, the Scientific Committee was required to provide advice and recommendations to the SIOFA Meeting of the Parties whenever a substantial change in the fishery occurred or new data warranting changes in the measure became available.[82] The Meeting of the Parties was required to act on such advice and recommendations at its following ordinary meeting. In addition, there was a requirement that the measure be reviewed no later than at the ordinary SIOFA Meeting of the Parties in 2019, taking into account, among other things, the Committee's latest advice.[83]

90. SPRFMO reported that, at its eighth Commission meeting in February 2020, it had amended the review dates for conservation and management measures 10-2020 and 13-2020 to 2023 and 2021, respectively.[84] The Organization was required to review conservation and management measure 03-2020 in 2021 and at least every three years thereafter and, in doing so, to take appropriate action to meet the objectives of the measures and the SPRFMO Convention in view of the advice and recommendations of the Scientific Committee. In each such review, the protocol for encounters with VME, indicator taxa and the appropriateness of applied management measures must be examined.

B. Actions taken by States to regulate bottom fisheries

91. Many respondents reported on the implementation of the relevant provisions of General Assembly resolutions 64/72, 66/68 and 71/123, in line with the FAO Guidelines, including by becoming parties to the Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (Cambodia) or by enacting and implementing national laws and regulations (Côte d'Ivoire, Guinea and Togo).

92. Several respondents reported on their fishing vessels operating in the areas of RFMO/As with competence to regulate bottom fisheries and that they had addressed the regulation of bottom fisheries by implementing measures adopted by those RFMO/As (Australia, Chile, European Union, Iceland, Japan, New Zealand, Norway, Russian Federation and United States). Some respondents noted that fishing vessels flying their flags were not engaged in bottom fishing (Cambodia, Ghana and Liberia).

1. Identifying vulnerable marine ecosystems and assessing significant adverse impact from bottom fishing on the basis of marine scientific research and other sources of information

(a) Identification of vulnerable marine ecosystems

93. Australia reported that two of the VMEs declared by CCAMLR had been revealed by Australian research and that the country was working to advance the scientific work of SIOFA, including through ecological risk assessments for teleosts and chondrichthyans, close collaboration on stock assessments and the development of a stock assessment framework and the bottom fishing impact assessment standard.

94. Canada noted, given that areas in that country and adjacent NAFO areas were closed in order to protect VMEs, that the emphasis of scientific research had shifted to the evaluation of the effectiveness of closures.

[82] See www.apsoi.org/sites/default/files/documents/cmm/CMM%202019_01%20Interim%20Bottom%20Fishing%20Measures_0.pdf.

[83] Ibid.

[84] See www.sprfmo.int/meetings/comm/8th-commission-2020/documents/.

95. Chile reported that, during 2020, a Chilean-flagged fishing vessel would undertake exploratory fishing for toothfish in the SPRFMO Convention Area, which would provide information on the bathymetry of the fishable area.

96. The European Union reported that the mandatory list of research surveys at sea for its multiannual programme for data collection under the Data Collection Framework included surveys that were directly relevant to VME, complementing data from commercial fishing activities. France drew attention to its Obsmer programme for the collection of information by scientific observers on board vessels.

97. The European Union also reported that several schemes provided for the collection of data on the high seas, including in the northeast Atlantic (European Union waters), in the NAFO area and for fishing activities outside the scope of any RFMO/A.

98. Spain reported, in connection with its fishing activities in the Svalbard area, that it had a scientific observer programme that collected not only stock assessment data but also VME indicators. Spain also reported on its VMEs research using research vessels and through experimental fishing surveys conducted on board commercial fishing vessels. In Project Atlantis, it was conducting VME studies above the Patagonian platform to a depth of up to 1,500 m. Spain also carried out an annual scientific assessment survey on stock evaluation in which data on VME indicators were collected.

99. Guinea noted that neither specific research on deep-sea species and ecosystems nor assessments of the impact of fishing on target and non-target species had been conducted.

100. Japan reported that it had deployed research vessels in order to contribute to the conservation and sustainable use of fish stocks and to protect VMEs.

101. Liberia reported that it planned to conduct a stock assessment of that country's biomass, which could lead to a tightening of regulations governing bottom fishing on the high seas and identify VMEs.

102. New Zealand reported that it was researching the location of VMEs in the Ross Sea region. CCAMLR had benefited from data by observers on its vessels in the Ross Sea exploratory fishery and information from its research voyages to the Ross Sea. New Zealand was also conducting research, including habitat suitability modelling, to predict the distribution of 10 VME indicator taxa for the southwest Pacific and inform the bottom fishing measure of SPRFMO. Decision-support software was being used to combine those predicted distribution maps and the historical distribution of fishing to identify and prioritize areas for closure and areas to be left open for fishing.

103. Norway reported that it had mapped 219,950 km^2 of bathymetry data (depth and topography, sediment composition, contaminants, biological communities and biotopes and habitats) on the Norwegian sea floor since 2005 through the MAREANO programme.

104. The United States reported that, since 2015, it had led major expeditions in the Pacific and Atlantic Oceans, in which new VMEs had been discovered and an enhanced understanding of their importance and connectivity had been acquired. They included the three-year Campaign to Address Pacific monument Science, Technology and Ocean NEeds (CAPSTONE) and surveys of important fishing grounds in the Emperor seamount chain. The National Oceanic and Atmospheric Administration kept a database of deep-sea corals and sponges that included more than 740,000 records, of which more than 7,000 were from high seas areas at fishable depths. The United States was also leading modelling efforts to better understand the distribution of VMEs and VME indicators and their habitat suitability.

(b) Impact assessments

105. Australia reported that it had submitted its bottom fishing impact assessment in the SIOFA Area in 2018. It had already been developed in 2011 in line with General Assembly resolutions 64/72 and 66/68. An updated assessment had been submitted to the SIOFA Scientific Committee in 2020.

106. The European Union reported that, under Regulation (EU) 2016/2336 of the European Parliament and of the Council of 14 December 2016 establishing specific conditions for fishing for deep-sea stocks in the north-east Atlantic and provisions for fishing in international waters of the north-east Atlantic and repealing Council Regulation (EC) No 2347/2002, an evaluation of the impact of measures should be carried out by no later than 13 January 2021.

107. In connection with the obligation to carry out an impact study, France reported on its risk analysis for Natura 2000 sites.

108. New Zealand reported that it had conducted impact assessments of all bottom fishing activities by its vessels in the CCAMLR and SPRFMO Convention Areas. As required by SPRFMO, New Zealand and Australia were undertaking a joint cumulative bottom fishing impact assessment in 2020. New Zealand had also contributed to improving procedures within CCAMLR for evaluating, reviewing and revising assessments.

2. Measures to regulate bottom fishing vessels or prohibit bottom fishing

109. Several respondents reported on a wide range of conservation and management measures to regulate bottom-fishing vessels or prohibit bottom fishing, including through restrictions on certain fishing activities and the use of particular fishing gear. New and ongoing efforts to sustainably manage fish stocks, including efforts to ensure the long-term sustainability of deep-sea fish stocks and non-target species and to rebuild depleted stocks were also identified. Several respondents also referred to actions taken in the implementation of the FAO Guidelines in that regard.

110. Australia reported that Australian-flagged vessels fishing in the SPRFMO Convention Area, the SIOFA Area and CCAMLR Convention Area operated under permits issued by the Australian Fisheries Management Authority, the conditions of which implemented, at the domestic level, the conservation and management measures adopted under those RFMO/As.

111. Chile reported that it only allowed bottom-fishing activities on seamounts where scientific research had demonstrated that the fishing activity did not generate any adverse effect on VMEs in the area.

112. The European Union referred to several regulations and policies providing a system for the management of deep-sea fisheries and their impact on the marine ecosystem, in particular VMEs, including through the granting of fishing permits and regular monitoring by the flag States. The main aims of a recent regulation were to reduce catches of juveniles, improve selectivity, reduce discards and minimize the negative impact of fishing gear on habitats, including VMEs, through technical measures. Member States had the right thereunder to develop equally or more stringent measures and the regulation contained specific provisions on the use of innovative gear. There were various environment laws and regulations for area-based fisheries management and the establishment of protected areas, including specific areas in the Mediterranean.

113. The European Union also reported on a range of measures for managing deep-sea bottom fisheries in ABNJ where no RFMO/A had been established or where no interim measures were in place (mainly for the southwest Atlantic), encounters with

VMEs, area closures, reporting obligations and observers. Those measures also required permits, which were issued only after an assessment concluded that activities were unlikely to have a significant adverse impact on VMEs.

114. Other recent regulations were designed to ensure long-term conservation of deep-sea fish stocks in European Union waters in areas of the northeast Atlantic and the Fishery Committee for the Eastern Central Atlantic. The European Union noted the establishment of specific regimes for deep-sea fishing in multiannual plans for the North Sea and the Western Waters. The plans included requirements for target stocks, based on maximum sustainable yield, and for by-catch stocks, which were managed in line with the best available scientific evidence.

115. Ghana noted that there had been no reports of vessels from that country catching deep-sea species, and provided an overview of what it had done to identify deep-sea species, including through the use of catch records.

116. Guinea reported that Guinean-flagged fishing vessels could fish commercially beyond areas under its national jurisdiction only where specifically authorized to fish on the high seas.

117. Iceland reported that Icelandic vessels with permits to fish on the high seas were subject to the national legal regime and the obligations therein to protect living marine resources. Vessels were also obliged to comply with any rules and decisions of RFMO/As of which Iceland was a member and for which it had not raised objections.

118. Japan reported that it had taken the measures necessary to conserve and sustainably use fish stocks and protect VMEs, based on scientific information and taking into account the characteristics of the species and areas.

119. Liberia reported that obligations applying to its distant water fishing fleet included the requirement to comply with fishing licences, transhipment authorizations and notices and fishing permits.

120. New Zealand reported on ongoing measures to prevent any significant adverse impact from bottom fishing on VMEs and to manage deep-sea fish stocks in ABNJ and in its exclusive economic zone. In those areas where New Zealand-flagged vessels engaged in bottom fishing, measures included, in addition to impact assessments, conditions on permits, vessel inspections, documentation schemes and patrolling. New Zealand-flagged vessels were not permitted to conduct bottom fishing on the high seas outside the CCAMLR and SPRFMO Convention Areas.

121. The Russian Federation reported that national laws provided for conservation measures designed to limit bottom fishing for certain species in vulnerable areas. The measures included area closures, both in waters under national jurisdiction and on the high seas. Restrictions were also imposed on the use of certain types of bottom fishing gear that might be harmful to VMEs.

122. Spain reported that Spanish-flagged fishing vessels authorized to operate on the high seas of the southwest Atlantic Ocean were subject to a number of management and control measures. They included gear requirements, vessel monitoring systems, catch documentation requirements, export certificates, and control and scientific observers. The measures also included rules to follow in case of encounters with VMEs and a prohibition on bottom fishing in nine marine protection zones.

123. The United States reported that all fishing activities in ABNJ were subject to a system of permits, reporting and regulations. No vessels were currently authorized to conduct bottom fishing in ABNJ outside RFMO/As. Such permits were subject to an assessment of impact on the environment, including on VMEs.

(a) Monitoring, control and surveillance measures and mechanisms to promote and enhance compliance

124. Many respondents reported on actions taken by them to carry out surveillance of fishing activities and on mechanisms established to promote and enhance compliance with conservation and management measures. In particular, several respondents (Cambodia, Côte d'Ivoire, Japan, Liberia, New Zealand, Russian Federation and Togo) drew attention to measures to prevent, deter and eliminate illegal, unreported and unregulated fishing.

125. The European Union reported that its deep-sea access regime contained reinforced control measures, such as a system of designated ports, prior notification before landing, the reporting of catches on a haul-by-haul basis, the withdrawal of fishing permits for certain infringements and required observer coverage.

126. New Zealand reported that it undertook pre-trip and post-trip port inspections for CCAMLR toothfish fisheries, implemented the CCAMLR Catch Documentation Scheme for toothfish through domestic regulations and undertook aerial and surface patrolling in the Pacific and Southern Oceans.

(b) Action taken to protect vulnerable marine ecosystems in areas under national jurisdiction

127. A number of respondents also identified conservation and management measures to regulate or prohibit bottom fishing in areas within their national jurisdiction, including through area closures.

128. Chile reported that it had implemented a ban on bottom fishing on the 177 seamounts within its jurisdictional waters. It had created marine protected areas, some of which contained no-take areas, that included several seamounts. Chile had also prohibited any extractive fishing with gear, equipment and other fishing implements that affected the seabed in its territorial sea and inland waters.

129. France reported that plans were being developed in the European Union to limit the abrasion and suffocation of VMEs caused by bottom fishing and to protect those habitats in marine protected areas.

130. Guinea reported that it had established two marine protected areas (Tristao and Alcatraz) to protect VMEs.

131. Liberia noted that trawlers operating within its national jurisdiction were subject to gear restrictions and reporting requirements for lost gear.

132. Norway reported that it regulated bottom fishing in its territorial waters and exclusive economic zone, and in the fisheries protection zone around Svalbard and the fisheries zone around Jan Mayen, with the aim of protecting VMEs from destructive practices. The regulations were based on the FAO Guidelines and included rules of conduct in case of a VME encounter. More rigorous obligations, especially with regard to reporting and protocol routines and scientific observers, applied for fishing activities in areas below a depth of 1,000 m. In 2019, new provisions to ensure protection of VMEs in the Barents Sea had been adopted and 10 areas there were now closed to bottom fishing. There were also regulations to protect cold-water coral reefs, including through a ban on the use of bottom fishing gear in some coral reef areas.

133. The United States reported on a number of measures taken in areas under its national jurisdiction to reduce the risk of any significant adverse impact of deep-sea fishing on VMEs. New protected areas had been established and existing ones expanded, including those with seamounts and VME resources. Bottom fishing activities and gear were restricted in those areas.

3. New regional fisheries management organizations and arrangements

134. In October 2018, the Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean was signed. Its aim is to prevent unregulated fishing on the high seas portion of the central Arctic Ocean through the application of precautionary conservation and management measures as part of a long-term strategy to safeguard healthy marine ecosystems and to ensure the conservation and sustainable use of fish stocks.

135. The United States reported that it had taken part in and supported the preparatory process undertaken by the Western Central Atlantic Fishery Commission to consider the Commission's future as a regional fisheries management entity or arrangement. In 2014, the United States had participated in a technical workshop on bottom fisheries on the high seas of the Western Central Atlantic, at which the location of VMEs in the area and the potential impact of fishing on them had been examined.

4. Other actions

(a) Impact of human activities other than bottom fishing on vulnerable marine ecosystems

136. With regard to the work of the International Seabed Authority, New Zealand noted that important steps had to be taken before mining could take place so as to protect VMEs from any significant adverse impact. Such steps included the establishment of a robust environmental impact assessment process and ensuring that regional environmental management plans were developed.

137. Norway reported that NEAFC was taking part in efforts to increase cooperation and coordination among entities with legal competence under international law, such as the OSPAR Commission, to manage different types of human activities in areas beyond national jurisdiction.

138. The European Union reported that it was a contracting party to regional seas conventions that addressed marine waters around Europe, including the Barcelona Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean, the Convention on the Protection of the Marine Environment of the Baltic Sea Area (Helsinki Convention) and the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention), which provided forums for international cooperation on marine ecosystem protection and enabled States members of the European Union to work together in fulfilling their obligations under the Marine Strategy Framework Directive.

(b) Potential impact of climate change and ocean acidification

139. Canada reported that it had conducted research on whether closed areas for the establishment of VMEs would continue to achieve conservation goals in the future under climate change projections.

140. The United States reported that the Sustainable Fisheries Management and Biodiversity Conservation of Deep-sea Ecosystems in the Areas Beyond National Jurisdiction project under the Common Oceans initiative had supported scientific advances, including novel work on the importance of sponge communities to the overall functioning of benthic environments and in mitigating the effects of climate change in the deep ocean.

C. Actions taken by States and competent regional fisheries management organizations and arrangements in cooperating to undertake marine scientific research, collect and exchange scientific and technical data and information and develop or strengthen data-collection standards, procedures and protocols and research programmes

1. Exchanging best practices and developing regional standards (paragraph 122 (a) of resolution 64/72)

141. States and RFMO/As reported on efforts to exchange best practices and develop regional standards. The European Union reported that its member States provided their respective survey data to ICES. Data, as well as best practices, were made available to the RFMO/As to which the European Union was a party.

142. Guinea noted that sharing experiences and good practices in the field of deep-sea fisheries management was done within the framework of multilateral and bilateral cooperation.

143. New Zealand reported that it had shared knowledge and experiences on the development of measures to sustainably manage deep-sea fish stocks and prevent significant adverse impact on VMEs by submitting papers and progress reports, publishing articles, funding and participating in workshops and making presentations.

144. Norway reported that NAFO participated in regular exchanges in international forums, through FAO or bilaterally with other RFMO/As, to develop and implement best practices.

145. SEAFO reported that it played an active role in promoting and setting standards and enhancing the exchange of best practices by participating in forums such as the Sustainable Fisheries Management and Biodiversity Conservation of Deep-sea Ecosystems in the Areas Beyond National Jurisdiction, of which it was a Steering Committee member.

2. Making assessments and adopted measures publicly available (paragraph 122 (b) of resolution 64/72 and paragraph 130 of resolution 66/68)

146. RFMO/As with the competence to regulate bottom fisheries reported that details of conservation measures adopted by their Contracting Parties were available to the public on their respective websites.

147. Some States reported on the publication of assessments or measures by RFMO/As. Japan and the United States reported that the measures adopted by some of the RFMO/As to which they were party, namely CCAMLR, NAFO, NPFC, SEAFO and SPRFMO, were publicly available on the websites of those entities.

148. CCAMLR reported that all its conservation measures had been made available on its website.

149. NAFO reported that data was exchanged through its Scientific Council working group on ecosystem science and assessment and that all assessments regarding the extent of VMEs in the NAFO Regulatory Area and those concerning the impact of fishing activity on them were made available on its website and through the FAO VME database.

150. NEAFC reported that information available on its website included annual catch information, aggregated by country and area, conservation measures and all meeting reports, including on meetings of all committees and working groups. Meeting documents, unless restricted, were usually available on the public pages of its website.

151. SEAFO reported that assessments conducted by its scientists were compiled in scientific reports and made available on the SEAFO web page. Catch data were submitted to FAO annually.

3. Submission to FAO by flag States of lists of authorized vessels and relevant adopted measures (paragraph 122 (c) of resolution 64/72)

152. Cambodia noted that, since it had terminated its registration programme in 2015, no Cambodian-flagged vessels had engaged in fishing or related activities on the high seas. It was planning to re-open its flag State registration programme in the near future.

153. Colombia reported that, while a technological tool for the registration of national vessels and existing regulations was being developed, it had provided a list to FAO of its flagged vessels.

154. Ghana reported that it did not have registered and licensed vessels for deep-sea bottom fishing. Should deep-sea species be discovered in Ghanaian catch records, the Fishery Committee for the Eastern Central Atlantic would be informed.

155. Liberia reported that none of its vessels engaged in direct bottom fishing even in areas without RFMO/As but that it shared updated registration information with the relevant RFMO/As.

156. New Zealand reported that in 2009 it had provided to FAO a list of New Zealand-flagged vessels with permits to fish on the high seas using bottom fishing methods.

157. The United States reported that only one of its vessels was authorized to conduct bottom fishing in areas beyond national jurisdiction in the NAFO Convention Area. As vessels flying its flag were not authorized to conduct bottom fishing in areas beyond national jurisdiction outside of RFMO/As, it did not maintain a list of such vessels.

4. Sharing information on vessels engaged in bottom fishing where the flag State responsible cannot be determined (paragraph 122 (d) of resolution 64/72)

158. New Zealand reported that it carried out aerial and surface patrols in the Pacific and Southern Oceans and supplied detailed information on sightings of any illegal, unreported and unregulated vessels or illegal activities to the relevant flag States and the Secretariat of any relevant fisheries management body.

159. NAFO reported that it maintained a list of vessels linked to illegal, unreported and unregulated fishing on its website and exchanged details on them with other RFMO/As.

160. NEAFC reported that it would publish its lists of authorized fishing vessels in 2020. It alerted the Contracting Parties regarding any vessel that entered the Regulatory Area outside existing fishing areas and exhibited behaviour consistent with bottom fishing.

161. NPFC reported that the monitoring of the vessels active in its Convention Area had already resulted in 33 vessels being placed on its list of illegal, unreported and unregulated vessels. The list had been shared with FAO and 11 other RFMO/As.

162. SEAFO reported that it had an agreement with CCAMLR, NAFO, SIOFA and NEAFC to jointly list vessels involved in illegal, unreported and unregulated fishing.

5. Developing or strengthening data-collection standards, procedures and protocols and research programmes (paragraph 123 of resolution 64/72)

163. Canada reported that its scientific research was focused on evaluating the effectiveness of VME measures, including in the light of climate change projections.

164. Chile reported on the development of regulations on VMEs, including an operational protocol, an evidence protocol and the requirements for conducting research activities on seamounts and in areas subject to the VME Operational Regime. In 2020, a Chilean-flagged fishing vessel would begin a three-year exploratory voyage focusing on toothfish in four blocks of the SPRFMO Convention Area, in the southeast Pacific. The vessel would also gather other information, including on the bathymetry of the fishable area.

165. Colombia reported that it gathered information to ensure that national decision-making was based on the best available scientific evidence in all fishing sectors.

166. The European Union reported that its member States collected data under the Data Collection Framework. At the same time, they respected other legal data collection and monitoring obligations, such as the collection of data required by RFMO/As. There was an obligation to collect data on the high seas for fishing activities outside the scope of RFMO/As. Spain reported that its scientific observer programme collected data relating to stock assessment and VMEs indicators, including through its annual assessment survey.

167. Japan reported that it authorized the deployment of scientific research vessels to contribute to the conservation and sustainable use of fish stocks and the protection of VMEs, based on the best available scientific information.

168. New Zealand indicated that, since 2016, CCAMLR had refined its data reporting requirements in order to improve the effectiveness of VME impact assessments and corresponding management measures. Research on habitat suitability modelling had been done to inform the bottom fishing measure of SPRFMO. That research had contributed to the development of a definition of the taxa constituting evidence of VMEs, a VME encounter protocol based on threshold by-catch weights, and a biodiversity index.

169. The United States reported on its scientific programme to improve the understanding of deep-water ecosystems, with the goal of informing management decisions. The aim of its latest modelling efforts was to better understand the distribution of VMEs and VME indicators and their habitat suitability.

170. CCAMLR reported that its Contracting Parties would be prohibited from bottom fishing if data arising from conservation measures relevant to that bottom fishery had not been submitted to CCAMLR for the most recent season in which fishing took place.

171. GFCM reported that, in 2019, its Scientific Advisory Committee on Fisheries had recommended the adoption of a binding decision on mapping existing deep-sea fishing areas in the GFCM area of application, according to agreed technical elements, including through the collection of scientific information. That highlighted the need for a clear roadmap and timetable for action.

172. NEAFC reported that it had formed a joint advisory group with NAFO on data management and agreed to a joint deployment plan to coordinate control and inspection activities. A memorandum of understanding with ICES provided a platform for the confidential provision to ICES of consolidated data for scientific analysis. Through its working group on deep-water ecology, NEAFC had recently developed a

central portal for data on the distribution and abundance of VMEs across the north Atlantic and observations of VME indicators and habitats.

173. NPFC reported that it had developed a five-year research plan for the period 2017–2021 to address such VME issues as a review of the encounter protocol and the exploratory fishery protocol, the development of identity guides for VME indicators and a by-catch list, the development of an NPFC VME map, an assessment of significant adverse impact on VMEs indicator species, and a review of the availability of VME-related data.

174. SEAFO reported that its Commission had adopted data collection protocols developed by its Scientific Committee. They ensured that a representative part of all catches was sampled. With support from the EAF-Nansen Programme and in accordance with ongoing review procedures, research surveys had been conducted in some closed areas. The latest had been conducted in 2019 to cover the Discovery seamounts complexes within the SEAFO Convention Area. A further survey had been proposed for 2020.

D. Recognition of the special circumstances and requirements of developing States

175. Due consideration should be given to the special circumstances and requirements of developing States in the implementation of the relevant provisions of General Assembly resolutions 66/68, 64/72 and 71/123. Cambodia highlighted the importance of capacity-building and technical assistance. Liberia underscored that developing States needed capacity-building in order to address the impact of bottom fishing on VMEs and the long-term sustainability of deep-sea fish stocks.

176. NAFO reported that it was taking part in and making in-kind contributions to FAO initiatives, such as the Fisheries Resources Monitoring System, the ABNJ Deep Seas Project and Aquatic Sciences and Fisheries Abstracts database, and the NEREIDA project. NAFO also provided technical assistance and training to more recently established RFMO/As.

177. NEAFC reported that, although none of its Contracting Parties were developing countries and capacity-building for such countries was not a core activity, it contributed to building their capacity by sharing experiences. The Commission also shared experiences in other regions as part of cross-sectoral engagement at the level of regional intergovernmental bodies. It had worked closely with the Secretariat of SIOFA to set up the latter’s website and participated in the ABNJ Deep Seas Project.

178. SEAFO reported that the need of developing States and their coastal communities for equitable benefit from living marine resources was reflected in article 21 of its Convention. A special requirements fund, to which Norway and the European Union had contributed, had been set up in 2009. One developing State had already received capacity-building assistance from the fund. SEAFO offered developing countries special training with regard to port inspections and scientific observers.

179. SPRFMO reported that its compliance and monitoring scheme could be used to identify areas in which technical assistance or capacity-building might be needed (see para. 80).

180. Guinea reported on a capacity-building project on stock assessment, impact assessments and scientific and technical training funded by the World Bank. Negotiations were underway with the Russian Federation regarding capacity-building. Côte d’Ivoire reported that, in October 2019, it had hosted a training

workshop on identifying and describing ecologically or biologically sensitive sea areas.

181. Spain reported that it had 22 memorandums of understanding on capacity-building with African and Latin American countries. In particular, it used three fisheries oceanographic vessels and one fisheries cooperation vessel to provide training in a number of those countries. Courses included modules on research and data collection, basic on-board safety, the use of selective fishing gear, oceanography, fisheries control and institutional strengthening.

182. Japan reported that it provided developing countries with capacity-building assistance directly and through international and regional organizations.

183. New Zealand reported that it was open to exploring ways of accommodating the special circumstances and challenges faced by developing countries in fully implementing the General Assembly resolutions.

184. The United States reported that it was involved in the ABNJ Deep Seas Project, which helped developing countries to implement the FAO Guidelines. RFMO/A management measures had been examined and best practices developed for consideration by organizations, industry partners and other stakeholders in a variety of partner projects.

IV. Activities of the Food and Agriculture Organization of the United Nations

185. FAO reported that the aim of its deep-sea fisheries programme was to improve fisheries management, increase knowledge of fish and fisheries and protect vulnerable areas in the deep-sea high seas collaboratively with a range of stakeholders. Through targeted contributions and projects supported by various donors,[85] FAO promoted the implementation of its Guidelines; provided expert technical guidance, tools and resources to improve management practices; designed state-of-the-art data collection and sharing systems on VMEs; and facilitated dialogue, collaboration and networking among key stakeholders in order to strengthen the effective management of deep-sea fisheries.

(a) Management of deep-sea fisheries

186. The five-year ABNJ Deep Seas Project, which had been supported by the Global Environment Facility and implemented by FAO in collaboration with the United Nations Environment Programme and 20 partner organizations, had come to an end in 2019. Its aims had included improving the implementation of existing policy and legal frameworks; reducing the adverse impact on VMEs; improving planning and adaptive management for deep-sea fisheries in ABNJ; and developing and testing methods for area-based planning. A second phase of the ABNJ Deep Seas Project was being developed.

187. In a review entitled “Vulnerable marine ecosystems: processes and practices in the high seas”, FAO had catalogued achievements in each region with regard to the identification and protection of VMEs between 2006 and 2016.

(b) Awareness-raising and technical guidance on vulnerable marine ecosystems

188. FAO had undertaken activities to share knowledge and raise awareness of VMEs, including through the dissemination of technical guidance. Past and current

[85] See www.fao.org/fishery/topic/16160/en.

management measures adopted by RFMO/As to protect VMEs could be consulted on its VME Database.

189. FAO had organized or supported regional multi-stakeholder workshops to facilitate information-sharing and discussion on issues relating to VMEs, including on fisheries management and conservation measures.

190. FAO had partnered with the University of Bergen in the north Atlantic deep-sea sponges (SponGES) project (2016–2020), the aim of which had been to deepen knowledge of sponges and their ecosystems, facilitate awareness of that knowledge among policy-makers and at the management level and enhance science-policy interactions. A report on technical measures and environmental risk assessments for sponge conservation had been produced and would be followed by a regional training workshop on deep-sea sponges in the context of fisheries management at SEAFO in 2020.

(c) Research programmes, exchange of scientific and research data and management measures

191. FAO reported that, in 2018, a survey of the Mascarene plateau had been carried out. The following year, a research cruise in the SEAFO Convention Area on seamounts and seamount complexes of the southeast Atlantic had been undertaken as part of the EAF-Nansen Programme. Key objectives had included the analysis of occurrence and abundance of benthopelagic fish and sessile epibenthos, including indicators of VMEs, in selected existing fishing areas and areas closed to fishing. Further collaborative research work was planned for 2020.

192. FAO had developed, in a consultative process with stakeholders, a set of identification guides for vulnerable deep-sea species to assist in the implementation of fisheries management measures and reporting obligations. The work on the development of identification tools for sponges and corals had also progressed.[86] The Organization had issued its illustrated *Marine Species Biological Data Collection Manual*.

193. An electronic application for reporting on-board observations from deep-sea fisheries vessels, known as SmartForms, had been developed with a group of RFMO/As. It could collect information, including photographs, GPS location, and physical characteristics, about deep-sea fisheries. A reporting component and an optional application for biodiversity elements would be added.

(d) Improved information on fish and fisheries, stock assessment and assessment of fishing activities

194. The "Worldwide review of bottom fisheries in the high seas in 2016", a technical paper published by FAO in 2020, had been the first comprehensive treatment of the world's deep-sea fisheries. It provided improved estimates of regional catches and showed how varied the fisheries were in the different regions. In relation to specific species of deep-sea fish stocks, FAO had published its *Global Review of Alfonsino (*Beryx *spp.), Their Fisheries, Biology and Management* in 2016 and its *Global Review of Orange Roughy* (hoplostethus atlanticus)*, Their Fisheries, Biology and Management* in 2018.

195. Pursuant to paragraph 122 (c) of General Assembly resolution 64/72, FAO had made publicly available on its website, as a subsection of the fishing vessels finder, information reported to it by flag States regarding vessels authorized to conduct

[86] See www.fao.org/3/a-i6945e.pdf, www.fao.org/3/a-i7256e.pdf and www.fao.org/3/a-i6324e.pdf.

bottom fishing in ABNJ and the measures that they had adopted to give effect to the relevant provisions of General Assembly resolutions 61/105 and 64/72.

196. It had been highlighted in a FAO technical paper, entitled “Deep-ocean climate change impacts on habitat, fish and fisheries”, that information from the deep oceans, although limited, was sufficient to identify changes attributable to climate change at the oceanographic and biological levels. It had been predicted that significant changes would occur in deep oceans in the coming 20 to 30 years.

(e) Special consideration for developing countries

197. Capacity-building had been incorporated at various levels in the Organization’s activities to support the implementation of the FAO Guidelines. Initiatives included the use of species identification tools, on-the-job training during research surveys, training in the analysis of the resulting information, and training and capacity development in relation to all aspects of the FAO Guidelines.

198. An FAO training workshop on the identification and biological sampling of deep-sea benthic fauna, with a focus on corals and sponges, had been held in Vigo, Spain, from 13 to 15 November 2018. Nine scientists from Mauritania, Mauritius, Mozambique, Namibia, Senegal, the Seychelles and Sierra Leone had been trained on the taxonomy of deep-sea invertebrates and had acquired basic skills in on-board sampling, preservation techniques and the storage of specimens.

V. Concluding remarks

199. In the 2030 Agenda for Sustainable Development, States made a commitment to end destructive fishing practices and sustainably manage and protect marine and coastal ecosystems in order to avoid significant adverse impact, including by strengthening their resilience, and to work to restore them in order to achieve healthy and productive oceans by 2030.

200. Since the adoption of General Assembly resolution 61/105, States and RFMO/As have made considerable progress with regard to the sustainability of deep-sea fish stocks and the protection of VMEs from the impact of bottom fishing, in line with General Assembly resolutions and the FAO Guidelines. Great strides have been made in understanding the functionality of VMEs and how they help to support healthy fisheries. That has facilitated the development of more tailored conservation measures. However, implementation of resolutions 64/72, 66/68 and 71/123 remains uneven and incomplete.

201. Increased experience in implementing measures and improved knowledge of VMEs, the impact on them of bottom fishing and the long-term sustainability of deep-sea fish stocks has allowed States and RFMO/As to begin fine-tuning their measures by expanding area closures, improving assessment requirements and procedures, refining encounter protocols and strengthening monitoring, control and surveillance mechanisms. Nonetheless, more scientific work on those subjects is needed and measures will need to be reviewed periodically to ensure that they remain effective.

202. Taking into account the adverse effects of climate change on fisheries, many RFMO/As may have to adapt and plan for permanent changes in the composition and availability of their managed resources and, specifically, to re-evaluate the appropriateness of their spatial and temporal management measures. Pressures on VMEs arising from new uses of the ocean and global challenges such as ocean acidification, plastic pollution and anthropogenic underwater noise should also be monitored and evaluated.

203. The coronavirus disease (COVID-19) pandemic has presented States and RFMO/As with a new set of challenges with regard to the management of fisheries and the protection of VMEs, including difficulties in conducting research, adopting and reviewing measures and undertaking monitoring, control and surveillance activities. The impact of those challenges on VMEs and the sustainability of deep-sea stocks will need to be monitored.[87]

204. Flag States, the vessels of which engage in bottom fishing, have continued to implement measures, including in furtherance of RFMO/A measures, to protect deep-sea ecosystems. There is insufficient information, however, to assess the extent to which such measures are being reviewed on a regular basis.

205. Global and cross-regional cooperation for the sharing of experiences and best practices, capacity-building and the advancement of scientific research, including through the FAO-led ABNJ Deep Seas Project, has benefited States, RFMO/As and other stakeholders. FAO has undertaken a number of studies to compile and disseminate existing knowledge regarding bottom fisheries and their impact across regions and on deep-sea species and ecosystems. Related work is being done in the framework of the Convention on Biological Diversity to identify and protect VMEs, in the context of the intergovernmental conference on an international legally binding instrument under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction, and in relation to the United Nations Conference to Support the Implementation of Sustainable Development Goal 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development (Ocean Conference) and its preparatory process.

206. New evidence of the long-term effects of bottom fishing and the important goods and services provided by healthy deep-sea ecosystems underscore the value of continuing to review the actions of States and RFMO/As in addressing the impact of bottom fishing on VMEs and the long-term sustainability of deep-sea fish stocks. The current framework, if fully implemented, appears to be sufficient to protect VMEs and deep-sea ecosystems but it requires consistent and ongoing development, implementation, review and the updating of measures to be fully effective.

[87] FAO, *The Impact of COVID-19 on Fisheries and Aquaculture; a Global Assessment from the Perspective of Regional Fishery Bodies: Initial Assessment*, No. 1 (Rome, May 2020).