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Other Effective Area-based Conservation Measures (OECMs)
NAFO Seamount Bottom-Fishing Closures

New England Seamount, Corner Rise Seamount, Fogo Seamount, Newfoundland Seamount Chains, the Orphan Knoll Seamount and a cluster of 7 individual seamounts in the northern part of the NAFO Regulatory Area

Prepared by the North Atlantic Fisheries Organization (NAFO) Scientific Council and Secretariat (www.nafo.int)

Abstract

The Northwest Atlantic Fisheries Organization (NAFO) has closed 12 seamount areas in the northwest Atlantic in areas beyond national jurisdiction in the NAFO Regulatory Area (NRA) for bottom fishing activities. Here, the New England, Corner Rise, Fogo and Newfoundland Seamount Chains, the Orphan Knoll and a cluster of 7 individual seamounts in the northern part of the NRA are presented as Other Effective Area-based Conservation Measures (OECMs). Different fisheries measures have been put in place by NAFO to protect these seamounts and associated species since 2007.

Some of these seamounts have been described as ecologically or biologically significant areas (EBSA) under two decisions of the Convention on Biological Diversity (CBD 2012, 2014a), and all have been identified by NAFO Contracting Parties as vulnerable marine ecosystems (VME) (NAFO 2021).

NAFO closed the Newfoundland Seamounts, the New England Seamounts, the Corner Rise Seamounts and the Orphan Knoll for bottom fishing effective 2007. The Fogo Seamounts were closed for bottom fishing effective 2009. The boundaries of the New England Seamount Chain were extended, and seamount closure boundaries amended in 2022.

In 2016, NAFO requirements for mid-water trawl gear modification were introduced to avoid bottom contact when fishing in seamount areas.

There was a small mid-water trawl fishery targeting splendid alfonsino (*Beryx splendens*) on parts of the Corner Rise seamounts, however, in 2019, the NAFO Scientific Council concluded the stock to be depleted and recommended imposing a moratorium. This moratorium has been in place since 2020.

Location

*(Indicate the geographic location of the area, including co-ordinates if available. This should include a location map to be added to the '*Maps, Figures and Tables*' section. It should state if the area is within or outside national jurisdiction or straddling both.)*

Within its Regulatory Area, the Northwest Atlantic Fisheries Organization (NAFO) has identified 27 areas as being vulnerable to bottom contact gears and subsequently closed these areas to bottom fishing (Figure 1).

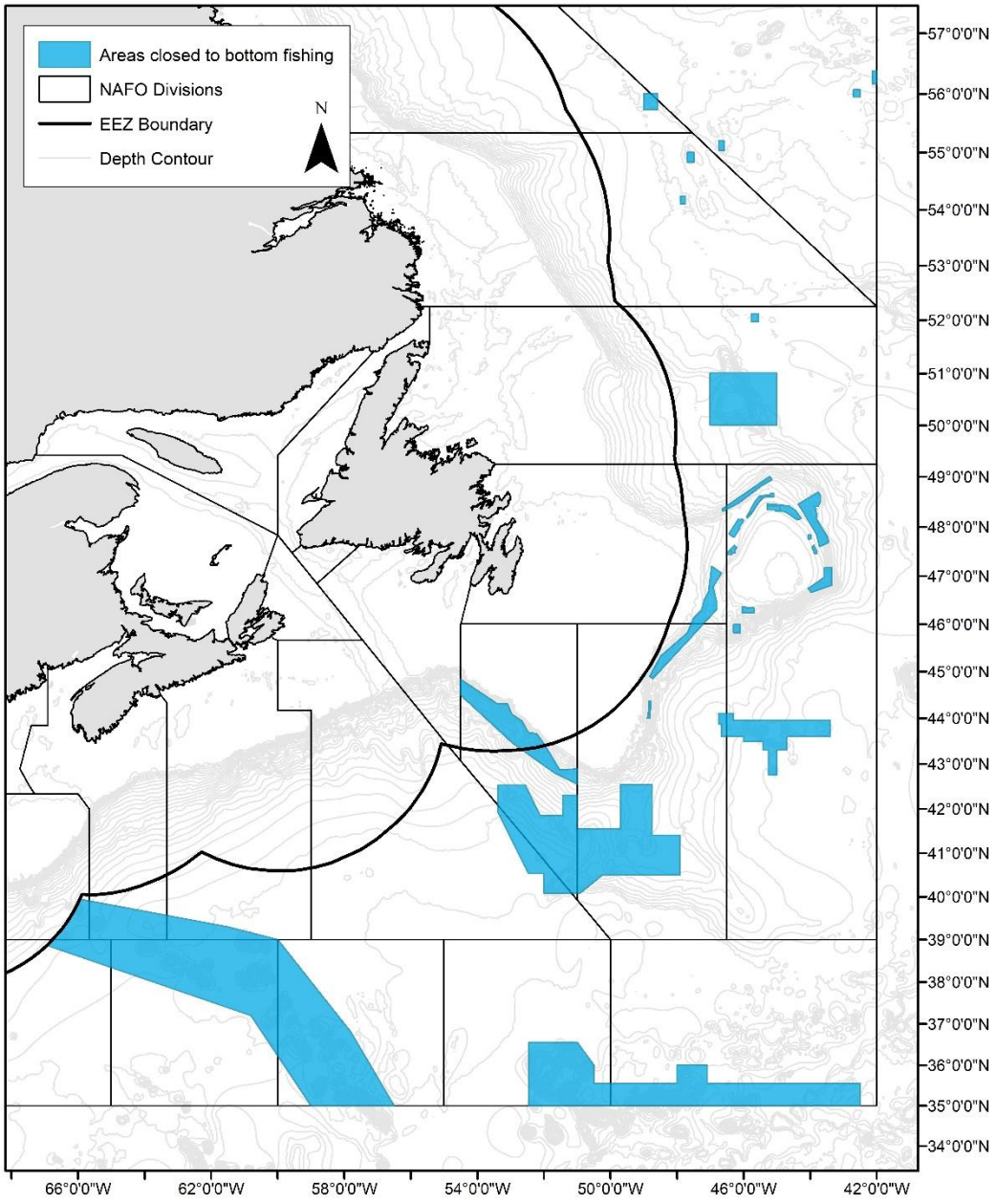

Figure 1. The 27 areas closed to bottom fishing within the NAFO Regulatory Area.

The 12 seamount areas are located in the northwest Atlantic Ocean in areas beyond national jurisdiction, and in the NAFO Regulatory Area (Figure 2). The bounding coordinates are outlined in Table 1.

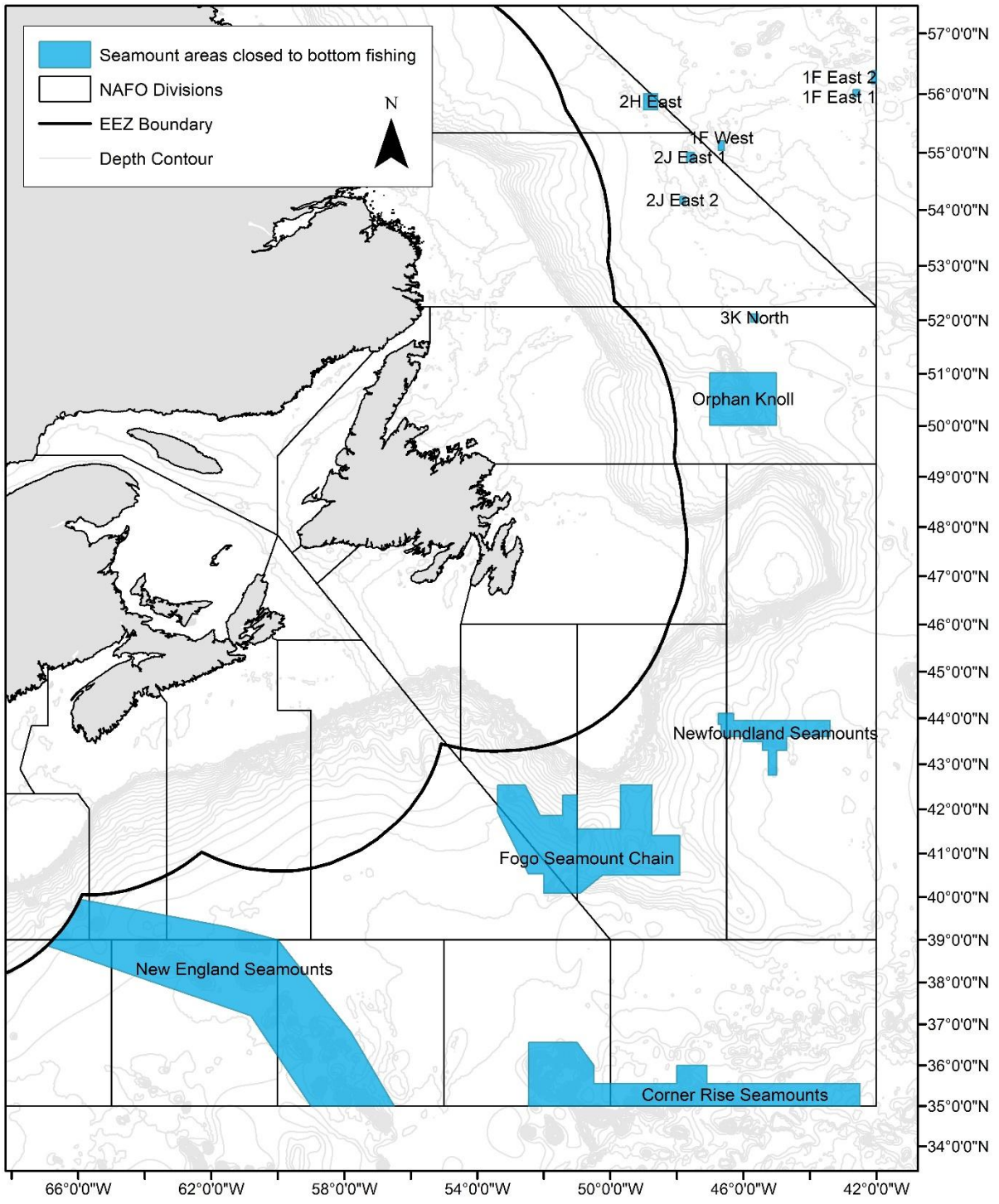

Figure 2. Map showing the location of the current area closed by NAFO to protect Seamounts (blue polygons).

Table 1. VME bottom fishing closure coordinates.

Description	Coordinate No.	Latitude	Longitude
Fogo Seamount Chain	1	42° 31' 33" N	53° 23' 17" W
	2	42° 31' 33" N	52° 33' 37" W
	3	41° 51' 00" N	52° 07' 00" W
	4	41° 51' 00" N	51° 26' 00" W
	5	42° 18' 00" N	51° 26' 00" W
	6	42° 18' 00" N	51° 00' 00" W
	7	41° 33' 00" N	51° 00' 00" W
	8	41° 33' 00" N	49° 42' 00" W
	9	42° 32' 00" N	49° 42' 00" W
	10	42° 32' 00" N	48° 45' 00" W
	11	41° 24' 00" N	48° 45' 00" W
	12	41° 24' 00" N	47° 55' 00" W
	13	40° 30' 00" N	47° 55' 00" W
	14	40° 30' 00" N	50° 15' 00" W
	15	40° 05' 00" N	50° 55' 00" W
	16	40° 05' 00" N	52° 00' 00" W
	17	40° 31' 37" N	52° 00' 00" W
	18	40° 31' 37" N	52° 27' 49" W
	19	41° 55' 48" N	53° 23' 17" W
Orphan Knoll	1	50° 00’ 30” N	45° 00’ 30” W
	2	51° 00’ 30” N	45° 00’ 30” W
	3	51° 00’ 30” N	47° 00’ 30” W
	4	50° 00’ 30” N	47° 00’ 30” W
Corner Rise Seamounts	1	36° 33' 00" N	52° 27' 00" W
	2	36° 33' 00" N	51° 00' 00" W
	3	36° 00' 00" N	50° 30' 00" W
	4	35° 33' 00" N	50° 30' 00" W
	5	35° 33' 00" N	48° 00' 00" W
	6	36° 00' 00" N	48° 00' 00" W
	7	36° 00' 00" N	47° 06' 00" W
	8	35° 33' 00" N	47° 06' 00" W
	9	35° 33' 00" N	42° 30' 00" W
	10	35° 00' 00" N	42° 30' 00" W
	11	35° 00' 00" N	52° 27' 00" W
Newfoundland Seamounts	1	44° 06' 00" N	46° 45' 00" W
	2	44° 06' 00" N	46° 18' 00" W
	3	43° 57' 00" N	46° 18' 00" W
	4	43° 57' 00" N	43° 24' 00" W
	5	43° 36' 00" N	43° 24' 00" W
	6	43° 36' 00" N	44° 42' 00" W
	7	43° 18' 00" N	44° 42' 00" W
	8	43° 18' 00" N	45° 00' 00" W
	9	42° 45' 00" N	45° 00' 00" W
	10	42° 45' 00" N	45° 15' 00" W
	11	43° 18' 00" N	45° 15' 00" W
	12	43° 18' 00" N	45° 25' 00" W
	13	43° 29' 00" N	45° 25' 00" W
	14	43° 29' 00" N	46° 00' 00" W

Description	Coordinate No.	Latitude	Longitude
	15	43° 36' 00" N	46° 00' 00" W
	16	43° 36' 00" N	46° 40' 00" W
	17	43° 52' 00" N	46° 40' 00" W
	18	43° 52' 00" N	46° 45' 00" W
New England Seamounts*	1	38° 51' 54.000" N	66° 55' 51.600" W
	2	37° 12' 0.000" N	60° 48' 0.000" W
	3	35° 0' 0.000" N	59° 00' 0.000" W
	4	35° 0' 0.000" N	56° 30' 0.000" W
	5	36° 48' 0.000" N	57° 48' 0.000" W
	6	39° 0' 0.000" N	60° 0' 0.000" W
	7	39° 18' 0.000" N	61° 30' 0.000" W
	8	39° 56' 20.400" N	65° 56' 34.800" W
2H East	1	56° 00' 00" N	49° 00' 00" W
	2	56° 00' 00" N	48° 35' 00" W
	3	55° 44' 00" N	48° 35' 00" W
	4	55° 44' 00" N	49° 00' 00" W
2J East 1	1	55° 00' 00" N	47° 42' 00" W
	2	55° 00' 00" N	47° 29' 00" W
	3	54° 50' 00" N	47° 29' 00" W
	4	54° 50' 00" N	47° 42' 00" W
2J East 2	1	54° 14' 00" N	47° 54' 00" W
	2	54° 14' 00" N	47° 45' 00" W
	3	54° 06' 00" N	47° 45' 00" W
	4	54° 06' 00" N	47° 54' 00" W
1F West	1	55° 12' 00" N	46° 45' 00" W
	2	55° 12' 00" N	46° 35' 00" W
	3	55° 02' 00" N	46° 35' 00" W
	4	55° 02' 00" N	46° 45' 00" W
3K North	1	52° 07' 00" N	45° 46' 00" W
	2	52° 07' 00" N	45° 33' 00" W
	3	51° 58' 00" N	45° 33' 00" W
	4	51° 58' 00" N	45° 46' 00" W
1F East 1	1	56° 04' 00" N	42° 42' 00" W
	2	56° 04' 00" N	42° 30' 00" W
	3	55° 57' 00" N	42° 30' 00" W
	4	55° 57' 00" N	42° 42' 00" W
1F East 2	1	56° 23' 00" N	42° 08' 00" W
	2	56° 23' 00" N	42° 00' 00" W
	3	56° 10' 00" N	42° 00' 00" W
	4	56° 10' 00" N	42° 08' 00" W

Description of the proposed area

(Identification of other effective area-based conservation measures should, to the extent possible, document the known biodiversity attributes (include the identification of the range of biodiversity attributes for which the site is considered important (e.g., communities of rare, threatened or endangered species, representative natural ecosystems, range restricted species, key biodiversity areas, areas providing critical ecosystem functions and services, areas for ecological connectivity), as well as, where relevant, cultural and/or spiritual values, of the area and the governance and management in place as a baseline for assessing effectiveness.)

Significant Ecology

Seamounts, typically defined as undersea mountains rising steeply from the seafloor, are some of the most prominent and widespread features of seabed topography globally (Swanborn et al. 2023; Yesson et al. 2020). They are generally volcanic in origin and often conical in shape, although over geological time they tend to become less regular as a result of erosion. Seamounts often have a complex topography of terraces, canyons, pinnacles, crevices and craters (Clark et al. 2006)

It is known that pelagic species associate strongly with bathymetric features such as seamounts, undersea canyons, and oceanic islands (Thompson et al. 2024). Indeed, strong upwelling and hydrodynamic processes associated with seamounts typically results in unique ecosystems with low sedimentation and an abundance of benthic filter-feeding fauna (Paulus 2021), resulting in higher biomass than surrounding ocean waters, particularly in oligotrophic oceans (Xu 2021). Furthermore, it has been asserted that seamounts benefit pelagic biodiversity, as well as providing significant benefits in the conservation of important demersal fish assemblages and many vulnerable benthic marine ecosystems such as deep reef communities given their higher concentration at these features (Thompson et al. 2024; Xu 2021).

On seamounts with deeper summits (> 1000 m depth), the dominant megafauna are the attached, sessile organisms that feed on particles of food suspended in the water. The predominant suspension feeders are typically from the phylum Cnidaria and include sea anemones, sea pens, hydroids, stony corals, gorgonian corals and black corals (Clark et al. 2006). Indeed, it has been shown the majority of seamounts that may provide suitable habitat for stony corals on their summits are located in the Atlantic Ocean (Clark et al. 2006).

New England and Corner Rise Seamount Chains

Named seamounts within the New England Seamount chain include: Allegheny Seamount, Asterias Seamount, Balanus Seamount, Bear Seamount, Buell Seamount, Gerda Seamount, Gilliss Seamount, Gosnold Seamount, Gregg Seamount, Hodgson Seamount, Kelvin Seamount, Kiwi Seamount, Manning Seamount, Michael Seamount, Mytilus Seamount, Nashville Seamount, Panulirus Seamount, Picket Seamount, Physalia Seamount, Rehoboth Seamount, Ret riever Seamount, San Pablo Seamount, Sheldrake Seamount and Vogel Seamount. Named seamounts within the Corner Rise Seamount chain include: Bean Seamount, Caloosahatchee Seamount with Milne-Edwards Peak, Verrill Peak, Cast le Rock Seamount, Corner Seamount with Goode Peak and Kukenthal Peak, Justus Seamount, MacGregor Seamount, Rockaway Seamount and Yakutat Seamount. Given the large distance of about 300 km between the two seamount chains, these seamounts have been described as an Ecologically or Biologically Significant Area (EBSA) under two decisions of the Convention on Biological Diversity (CBD 2012, 2014a), and have been identified by NAFO contracting parties as a vulnerable marine ecosystem (VME) (NAFO 2021).

Substantial environmental and biological information is available from several surveys on the Corner Rise and New England Seamounts. The Corner Rise Seamounts and New England Seamounts host complex coral and sponge communities, including numerous endemic species and species new to science (Watling and France 2011). Benthic diversity is very high relative to the surrounding abyssal areas. Seamount slopes and deeper summit environments (greater than 2000 m from the surface) currently remain free of any direct impacts of human activities, although some of the shallower seamounts have been commercially fished (CBD 2014b).

Waller *et al.* (2007) explored five of the Corner Rise Seamounts using a remotely operated vehicle (ROV) and documented pristine coral areas as well as 'dramatic evidence of large scale trawling damage' on the summits of Kukenthal peak and Yukutat Seamount (CBD 2014b).

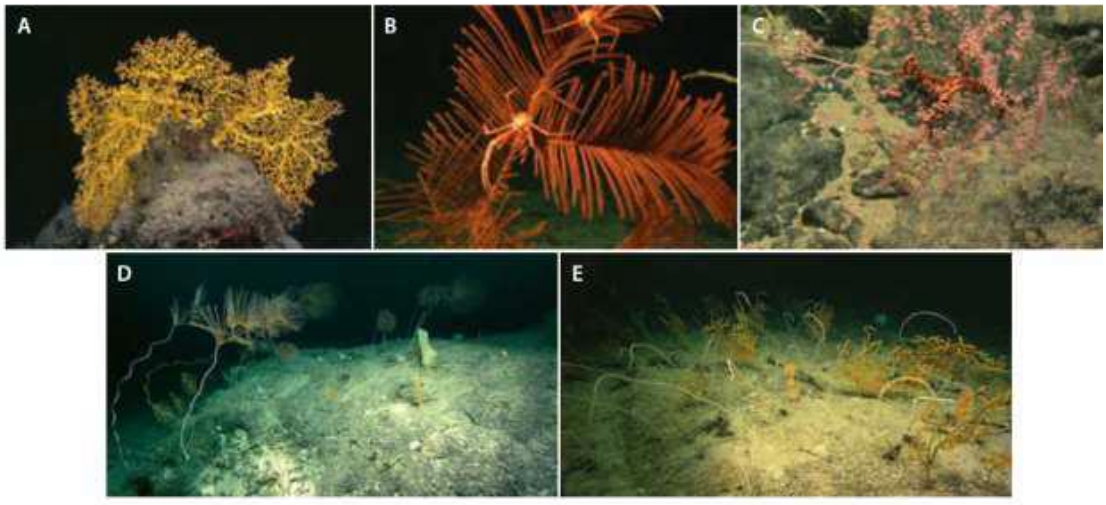

Figure 2. Characteristic features of the New England and Corner Rise seamounts. Habitat-forming coral ecosystems support diverse invertebrate associations on the New England and Corner Rise seamounts, including (a) ophiuroids, shrimp, hydroids, and galatheid crabs associated with the scleractinian *Enallopsammia* on Lyman Seamount (1450 m), (b) chyrostylid crabs on the antipatharian *Plumapathes* on Kükenthal Seamount (915 m), (c) *Ophinocreas oedipus* ophiuroid wrapped around the coral *Metallogorgia melanotrichos*, (d) spiraling *Iridogorgia* corals along with *Metalogorgia* corals and sponges living on an outcrop on the Corner Rise Seamounts, and (e) a soft coral community of *Paramuricea* sp., *Calyptrophora* sp., and *Chrysogorgia* sp. from Corner Seamount (1220 m) (from Shank,**(2010)**).

Lapointe *et al*. (2020) have described the megabenthic assemblages in the lower bathyal (700 – 3000 m) on the New England and Corner Rise Seamounts based on 34 dives occurred from 2003 to 2014 on 17 seamounts/peaks and over 400 hours of bottom time video. Depth, temperature, position along the chain and substrate composition were the major factors correlated with the assemblage composition. The shallowest depth samples were characterized by several coral species, such as the gorgonians *Placogorgia* sp., *Muriceides* sp., and *Acanella arbuscula* and the black coral *Parantipathes larix*, whereas some corals observed deeper than 2500 m included the black coral *Bathypathes* sp. and the gorgonian *Paragorgia johnsoni*. They observed several sponges, mainly hexactinellids, and some species of corals deeper than 3000 m depth, however, these data were not included in the analysis as they were abyssal in nature. This new information provides continued support for the

designation of these areas as VMEs and provides new information that VME indicator taxa can be found deeper than 3000 m depth.

In 2021, the NOAA Ocean Exploration and partners conducted the "2021 North Atlantic Stepping Stones: New England and Corner Rise Seamounts" expedition, aboard the NOAA Ship Okeanos Explorer (Galvez 2021). Thirteen ROV dives were conducted in the NAFO closed areas surveying 6 seamounts in the Corner Rise and 7 seamounts in the New England Seamount Chains. NAFO VME Indicator taxa identified on the dives were deep-sea sponges, stalked crinoids, small and large gorgonian corals, black coral, stony coral, sea pens, xenophyophores, and cerianthid anemones (Waller et al. 2021). In particular, the rock pen, a rare type of sea pen that is able to attach to rock, was observed and it is likely that several species of sponge and coral are new to science. At two of the seamounts the VME Indicators formed extensive habitats representing VMEs. Even the deepest dives at ~4,000 m observed VME indicator taxa. Collectively these ROV dives support the presence of VME Indicators on the seamounts to depths of 4,000 m and more. Deep-sea coral and sponge communities were observed on every expedition dive targeting benthos (Waller et al. 2021)

González-Costas and Lorenzo (2007) identified Kukenthal Peak and the western portion of the Corner Rise, as areas of high fish species diversity and abundance. The most abundant species encountered were alfonsino, black scabbardfish (*Aphanopus carbo*), and wreckfish (*Polyprion americanus*).

Fogo Seamounts

The Fogo Seamounts are located on oceanic crust in the central North Atlantic Ocean, southwest of the Grand Banks of Newfoundland and form a broad zone of volcanoes that parallels the transform margin. They rise to depths of 2,000–4,000 m. This zone is narrowest in the northwest and widens to 200 km in the southeast. This pattern differs from the narrow linear arrangement of a typical seamount channel, such as the Newfoundland and New England Seamounts. Seven seamounts found near the location of the RMS Titanic (Carpathia Seamount, Birma Seamount, Algerine Seamount, Frankfurt Seamount, Mount Temple Seamount, Montmagny Seamount (formerly Minia Seamount) and the Mackay-Bennet Seamount), were so named in honour of vessels who offered aid or participated in the recovery efforts. Baker *et al*. (2012) conducted 7 ROV dives in 3 canyons (Haddock Channel, Halibut Channel, and Desbarres Canyon) to depths of 2245 m on the Grand Bank slope to the northwest of the Fogo Seamounts. Over 160,000 coral colonies and 28 species were found. Corals spanned the entire depth range sampled and inhabited all bottom types surveyed, but boulder and cobble habitats were the most species-rich. Sea pen meadows covering large tracts of muddy seafloor spanning >1 km were observed. Vinogradov, 2000 described the presence of the coral *Chrysogorgia agassizi* in the area associated with the RMS Titanic wreck. A slow growth rate of 1 cm per year was estimated.

Orphan Knoll

A knoll is similar to a seamount in that it is a mountain arising abruptly from the sea floor, however a knoll is less than 1000 m in height. Orphan Knoll provides an island of hard substratum and uniquely complex habitats that rise from the seafloor from the surrounding deep soft sediments of Orphan Basin. It is an irregularly shaped feature with a single peak reaching to above 1800 m, with one named seamount adjacent to the southeast (Orphan Seamount) and several un-named seamounts occurring to the east and northeast (Pe-Piper *et al*., 2013). Within the Knoll, mounds are found at depths between 1800 and 2300 m creating heterogeneous habitats. For example, Einarsson

Mound is 1500-2000 m wide and 300 m tall, and Nader Mound is between 400-800 m wide and 300 m tall (Enachescu 2004).

Orphan Knoll is relatively well described in terms of its topography, surficial geology, and oceanographic setting (Edinger et al. 2011; Enachescu 2004; Greenan et al. 2011; Meredyk et al. 2020; Pe-Piper et al. 2013). The mid-depth waters above Orphan Knoll are in a are highly advective boundary region between outflow from the Labrador Sea (subpolar gyre) and the northward flow of the North Atlantic Current (subtropical gyre) (Greenan et al. 2011). Near-bottom current measurements provided evidence for anti-cyclonic (clockwise) circulation around the knoll. A west-east gradient in nutrients was observed and is likely related to water mass differences between Orphan Basin and the region east of Orphan Knoll.

Orphan Knoll is relatively well described in terms of its benthic communities (Lecours et al. 2020; Meredyk 2017; Wudrick et al. 2020). Over 250 morphotypes of benthic taxa drawn from 9 phyla have been identified from *in situ* image transects, with the Porifera being the most specious and abundant (Wudrick et al. 2020). A new species of sponge, *Tedania* (*Tedaniopsis*) *rappi*, has been described from the Orphan Seamount within the Orphan Knoll closed area between 3000 and 3450 m depth (Ríos et al. 2021). This unique sponge was found on rock, with at least 10 specimens of the same species, and 39 in the whole transect (11,515 m length). Other sponges, such as those from the genus *Geodia*, considered Vulnerable Marine Ecosystem Indicator taxa (NAFO 2021), were found associated with the same habitat.

Identify pressures and threats on biodiversity

(Inventory of known or reasonably foreseeable pressures and threats on biodiversity features, their nature, scale and source, and the range of societal and ecological values attached to the components.)

The NAFO Scientific Council has identified bottom fishing activities as being the main threat to VMEs in the NRA (NAFO 2015a). NAFO has closed the seamounts from bottom fishing activities. Mid-water trawl for alfonsino could potentially pose a threat to biodiversity in cases such as: moratorium is lifted in absence of a robust stock assessment that informs the TAC, and effective bycatch measures to prevent the bycatch of vulnerable species. There are pelagic fisheries in the area managed by ICCAT (www.iccat.int), including swordfish and tuna, but they are not conducted with bottom fishing gear and management of salmon fisheries is by NASCO (www.nasco.int), which prohibits fishing for salmon beyond areas of fisheries jurisdiction of its members

Oil and gas activities can include disturbance and injury of mammals and seabirds by anthropogenic noise, oil spills and associated increase in vessel traffic. Exploration and development activities can impact VME indicator taxa.

Deep seabed mining and climate change and ocean acidification could pose a threat to the VMEs on the seamounts.

New England and Corner Rise Seamount Chains.

Lapointe *et al.* (2020) sampled an area on the Kükenthal Peak on Corner Seamount at depths shallower than 1000 m, that had been previously trawled by commercial fisheries (Vinnichenko 1997; Waller et al. 2007; Watling, Waller, and Auster 2007). The basal structures of a variety of corals and sponges were found but most were dead, although there were several small, presumably young, colonies of *Parantipathes larix* and a few colonies of the plexaurid gorgonian coral, *Placogorgia* sp.).

Orphan Knoll

The saturation state of seawater on the Orphan Knoll sediment surfaces is less than 1.2 and, therefore, organisms with shells and skeletons composed of aragonite and calcite with high magnesium content may be affected by ocean acidification (Greenan et al. 2011).

Data and information available on the fisheries and the ecosystem

(Describe the available data sources, e.g., distribution maps; fleets size and composition; fishing gears; target and non-target species; stock assessment; governance types; key stakeholders and participation processes; legal frames; management measures; compliance; catch; socio-economic parameters; biodiversity features of concern; ecosystem services (including food and livelihoods) and other relevant values affecting conservation; possible threats and pressures; existing MPAs (networks, seascapes) and other conservation measures. Provide details of the sources in the 'Relevant Databases' section)

All relevant information on NAFO, organizational as well as information on fisheries and the ecosystem are publicly available at the NAFO website (www.nafo.int).

The NAFO Convention (NAFO 2017) is the general legal framework for the organization, including participatory processes and is the basis for all NAFO compliance and enforcement measures.

Compliance and enforcement measures are updated annually and published on the NAFO website (NAFO CEM) as well as distributed to NAFO Contracting Parties in a printed format.

Detailed information on NAFO fisheries is publicly available at the NAFO website through the yearly Compliance Review (https://www.nafo.int/Fisheries/Compliance), including number of vessels, fishing gear and catches.

The primary data sources on the distribution of the VMEs and activities potentially effecting it (fisheries oil and gas etc.), are from reports of NAFO Scientific Council and its various working groups, in particular Scientific Council Working Group on Ecosystem Science and Assessment (WG-ESA). https://www.nafo.int/Library/.

Assessment of the areas against CBD Criteria

(Discuss the area in relation to each of the CBD Criteria and relate the best available science. Please note where there are significant information gaps)

A. Not a protected area

NAFO Seamount VME bottom fishing closures are not reported as MPAs.

B. Area is governed and managed

B.1 Geographically defined space

Seamount closures have well defined spatial boundaries whose location and coordinates are outlined in Table 1 above.

B.2 Legitimate governance authorities

I. Governance has Legitimate Authority and is appropriate for achieving in situ conservation of biodiversity within the area.

NAFO is an international organization and the Convention on Cooperation in the Northwest Atlantic Fisheries (NAFO 2017) specifies that NAFO has the mandate to regulate the following fishery resources in the NAFO Area: all fish, molluscs and crustaceans excluding: (i) sedentary species over which coastal States may exercise sovereign rights consistent with Article 77 of the 1982 United Nations Convention on the Law of the Sea; and (ii) in so far as they are managed under other international treaties, anadromous and catadromous stocks and highly migratory species listed in Annex I of the 1982 United Nations Convention on the Law of the Sea. The general principles of the NAFO Convention include taking due account of the impact of fishing activities on other species and marine ecosystems and in doing so, adopt measures to minimize harmful impact on living resources and marine ecosystems as well as taking due account of the need to preserve marine biological diversity.

II. Governance by indigenous peoples and local communities is self-identified in accordance with national legislation and applicable international obligations.

All NAFO governance and management measures are based on the principles set out in the NAFO Convention. Governance by indigenous peoples and local communities is the responsibility of the individual Contracting Parties within the framework of the NAFO Convention.

III. Governance reflects the equity considerations adopted in the CBD Convention.

The NAFO Convention stipulates in Article XXI – Relation to Other Agreements, that the Convention shall not alter the rights and obligations of Contracting Parties that arise from other Agreements compatible with the Convention and that do not affect the enjoyment by other Contracting Parties of their rights or the performance of their obligations under the Convention. For the purposes of equity considerations in the CBD Convention, these considerations would apply to those NAFO Contracting Parties that are members of the CBD.

IV. Governance may be by a single authority and/or organization or through collaboration among relevant authorities and provides the ability to address threats collectively.

NAFO is the international organization that has the legal mandate to manage bottom fishing activities in the NAFO Regulatory Area, see B2, I, above. The areas are subject to management of pelagic fisheries of tuna and tuna like species by ICCAT (www.iccat.int) which does not include bottom fishing, and management of salmon fisheries by NASCO (www.nasco.int), which prohibits fishing for salmon beyond areas of fisheries jurisdiction.

B.3 Managed

I. Managed in ways that achieves or expects to achieve positive and sustained outcomes for the conservation of biological diversity.

The seamount areas qualify as Vulnerable Marine Ecosystems in relation to high seas fisheries, according to Criteria developed by FAO found in the International Guidelines for the Management of Deep-sea Fisheries in the High Seas (FAO 2009).

The seamount areas are currently protected from significant adverse impacts from bottom fishing activities under NAFO's VME measures provided by Article 17.3 of the 2024 NAFO Conservation and Enforcement Measures, see the NAFO website (NAFO CEM).

II. Relevant authorities and stakeholders are identified and involved in management.

NAFO is the international organization with a legal mandate to manage bottom fishing in the area for those species set out in the NAFO CEM. Stakeholders can participate in the NAFO management process through attendance as accredited observers (NGOs) at NAFO meetings, in both the Commission and Scientific Council, or in the capacity of members to NAFO Contracting Party delegations (these may include stakeholders such as industry representatives or NGOs).

III. A management system is in place that contributes to sustaining the in-situ conservation of biodiversity.

The NAFO Scientific Council has advised the NAFO Commission to close the seamount areas to bottom fishing to protect VMEs from possible significant adverse impact. In turn, the NAFO Commission has closed these areas to bottom fishing and has a management, control and enforcement system in place to monitor the closures.

IV. Management is consistent with the ecosystem approach with the ability to adapt to achieve expected biodiversity conservation outcomes, including long-term outcomes, and including the ability to manage a new threat.

The NAFO Conventions' General Principles include that NAFO Contracting Parties individually or collectively, as appropriate, shall apply the precautionary approach in accordance with Article 6 of 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 of 4 August 1995; take due account of the impact of fishing activities on other species and marine ecosystems and in doing so, adopt measures to minimize harmful impact on living resources and marine ecosystems; take due account of the need to preserve

marine biological diversity The seamount bottom fishing closures are an integral part of the NAFO SC work on furthering an ecosystem approach to fisheries.

Sustained positive outcomes are expected on the benthic ecosystem from the seamount bottom fishing closures but further understanding between the benthic-pelagic coupling would be beneficial to further assess the effectiveness of the measures in place.

C. Achieves sustained and effective contribution to *in situ* conservation of biodiversity *(Produces long-term* in situ *biodiversity conservation outcomes)*

C.1 Effective

I. The area achieves, or is expected to achieve, positive and sustained outcomes for the in situ conservation of biodiversity.

The seamount areas are closed to bottom fishing to protect VMEs. The NAFO Scientific Council has advised the NAFO Commission that bottom fishing closures are the most effective measures to protect VMEs from potential significant adverse impacts arising from such fisheries in the NRA (NAFO 2015).

II. Threats, existing or reasonably anticipated ones are addressed effectively by preventing, significantly reducing or eliminating them, and by restoring degraded ecosystems.

The seamount bottom fishing closures address the main threat to seamount VMEs and are aimed at preventing serious adverse impacts of bottom fishing to these VMEs.

III. Mechanisms, such as policy frameworks and regulations, are in place to recognize and respond to new threats.

NAFO is committed to work with other international organizations with competence to manage human activities in the NRA.

Full reviews of the status of bottom fishing closures to protect VMEs as well as the status of those VMEs in the NRA are conducted every 5 years. All NAFO bottom fishing closures have been subject to review by the Scientific Council in 2014 and 2021 to ensure they are effective in achieving their conservation aims (NAFO 2014 and 2021). The next full review of the NAFO VME and assessment of bottom fisheries is expected in 2027.

An MoU has been signed between the NAFO Secretariat, and the Secretariat of the Sargasso Sea Commission and outreach has been made to the International Seabed Authority (ISA) for exchange of information.

IV. To the extent relevant and possible, management inside and outside the other effective area-based conservation measure is integrated.

All of the seamount closures are outside of the fishing footprint (Footprint and Exploratory Fisheries). In addition to the protection afforded by the fishery closures, any potential fishing activity adjacent to the closure outside of the footprint is prohibited without *a priori* an appropriate assessment being undertaken as part of an 'exploratory fishing protocol' (endorsed by the Scientific Council) and permission granted (see CEM Article 16).

C.2 Sustained over long-term

The other effective area-based conservation measures are in place for the long-term or are likely to be. 'Sustained' pertains to the continuity of governance and management and 'long-term' pertains to the biodiversity outcome.

Bottom fishing closures to protect seamount VME were first established in NAFO in 2007 (NAFO 2009b). Management measures are included in Article 17.3 of the NAFO Conservation and Enforcement Measures.

In 2012, 2014, 2015 and 2021 following advice from NAFO Scientific Council, revisions to the seamount VME closure boundaries were introduced increasing the overall area and biomass of VMEs protected in the NRA.

Current closures to bottom fishing activities are subject to review every 5 years. Previous reviews conducted in 2014 and 2021 verified the continued presence of VME and their continued protection through bottom fishery closure measures.

C.3 *In situ* conservation of biological diversity

Recognition of other effective area-based conservation measures is expected to include the identification of the range of biodiversity attributes for which the site is considered important (e.g., communities of rare, threatened or endangered species, representative natural ecosystems, range restricted species, key biodiversity areas, areas providing critical ecosystem functions and services, areas for ecological connectivity).

The seamounts qualify as Vulnerable Marine Ecosystems, according to the Criteria developed by FAO in the International Guidelines for the Management of Deep-sea Fisheries in the High Seas (FAO 2009).

The seamount closures are justified by scientific assessments conducted by the Scientific Council and its Working Group on Ecosystem Science and Assessment (WG-ESA), which describe their biodiversity. All of the Scientific Council meeting reports can be found on the NAFO website.

C.4 Information and monitoring

Identification of other effective area-based conservation measures should, to the extent possible, document the known biodiversity attributes, as well as, where relevant, cultural and/or spiritual values, of the area and the governance and management in place as a baseline for assessing effectiveness

I. *Monitoring system informs management on the effectiveness of measures with respect to biodiversity, including the health of ecosystems.*

The management measures adopted for the NRA Seamounts are based on a scientific description of the area by the NAFO Scientific Council and its Working Group on Ecosystem Science and Assessment (WG-ESA).

Full reviews of the status of VME closures and VMEs in the NRA are conducted every 5 years. All NAFO bottom fishing closures were subject to review by Scientific Council in 2014 and 2021 to ensure they are effective in achieving their conservation aims (NAFO 2014 and 2020). The next full review of the NAFO VME bottom fishing closures (including the seamounts closures) is expected in 2027.

All control, monitoring and enforcement measures pertaining to fishing activities in the NAFO Regulatory Area are contained in the most recent NAFO CEM (NAFO CEM). These include recording of all catches, discards and live releases of all fish species caught as well as haul-by-haul data. All fishing vessels in the NRA are required to send VMS positioning information on an hourly basis, this information is used to verify that no bottom fishing operations are taking place within the closed areas.

II. Processes should be in place to evaluate the effectiveness of governance and management, including with respect to equity.

In regard to the seamount areas, two processes to evaluate the effectiveness of governance and management are relevant. Firstly, NAFO Scientific Council undertakes a full scientific review of the status of VME bottom fishing closures and VMEs in the NRA every 5 years, the next review is scheduled for 2027. Secondly, NAFO Convention, Article XVIII – Review, states that the Commission shall periodically initiate reviews and assessments of the adequacy of provisions of this Convention and, if necessary, propose means for strengthening their substance and methods of implementation in order to address any problems in attaining the objective of the Convention. NAFO has undertaken two external performance reviews, to assess the Organization's performance regarding its mandate and objectives defined in the NAFO Convention (NAFO 2017), the first one in 2010 and the second one in 2018 (Performance Reviews).

***III.* General data of the area such as boundaries, aim and governance are available information.**

All information on the areas, boundaries, governance and management are publicly available on the NAFO website (www.nafo.int).

D. Associated ecosystem functions and services and cultural, spiritual, socio-economic and other locally relevant values (*Maintains ecosystem functions and services, and upholds locally relevant values*)

D.1 Ecosystem functions and services

I. ***Ecosystem functions and services are supported, including those of importance to indigenous peoples and local communities, for other effective area-based conservation measures concerning their territories, taking into account interactions and trade-offs among ecosystem functions and services, with a view to ensuring positive biodiversity outcomes and equity.***

All NAFO governance and management measures are based on the principles set out in the NAFO Convention (NAFO 2017). Relevant governance by indigenous peoples and local communities is the responsibility of the individual Contracting Parties within the framework of the Convention.

There has been increased efforts by the NAFO Scientific Council in assessing the ecosystem functions and services associated with VMEs within and in the adjacent areas of the NAFO fishing footprint. The NRA seamounts are located outside the fishing footprint and are not regularly monitored, although some of the seamounts have been subject to scientific investigations (Cho 2008; Lapointe et al. 2020; Pante and Watling 2012; Shank 2010; Simpson and Watling 2011; Watling et al. 2007). The functions and services may be inferred by comparison with other regions, or from other studies conducted on seamounts (Wang et al. 2020). The EBSA description of the seamount areas notes the

role of those seamounts collectively in providing a series of spatially structured features that form a broad corridor that may facilitate gene flow among deep sea populations and pelagic fauna, nursery, or feeding opportunities for migratory species (CBD 2014b).

II. ***Management to enhance one particular ecosystem function or service does not impact negatively on the sites overall biological diversity information.***

The areas in question are closed to bottom fishing by commercial vessels, but research vessels are still able to conduct scientific activities within the areas.

D.2 Cultural, spiritual, socioeconomic and other locally relevant values

I. ***Governance and management measures identify, respect and uphold the cultural, spiritual, socioeconomic, and other locally relevant values of the area, where such values exist.***

The fisheries in the NRA have important social and economic value for the coastal communities from where the fisheries are operated. All NAFO governance and management measures are based on the principles set out in the NAFO Convention (NAFO 2017). Governance by indigenous peoples and local communities is the responsibility of the individual Contracting Parties within the framework of the NAFO Convention.

I. ***Governance and management measures respect and uphold the knowledge, practices and institutions that are fundamental for the in situ conservation of biodiversity.***

All NAFO governance and management measures are based on the principles set out in the NAFO Convention (NAFO 2017) including the following ones contained in Article III, (b) adopt measures based on the best scientific advice available to ensure that fishery resources are maintained at or restored to levels capable of producing maximum sustainable yield; (c) apply the precautionary approach in accordance with Article 6 of the 1995 Agreement; (d) take due account of the impact of fishing activities on other species and marine ecosystems and in doing so, adopt measures to minimize harmful impact on living resources and marine ecosystems; (e) take due account of the need to preserve marine biological diversity;.

E. Assessing additional OECM properties (Optional)

Are there any potential overlapping fisheries management measures which would infer additional protection or governance for the features under consideration, e.g., a fishing footprint.

All of the seamounts in the NRA are located outside of the NAFO fishing footprint. In addition to the specific fishery control measures associated with all NAFO bottom fishing closures, no directed bottom fishing activity is permitted outside the fishing footprint without *a priori* an appropriate assessment being undertaken as part of an 'exploratory fishing protocol' (endorsed by the Scientific Council) and permission granted (see CEM Article 16).

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Maps, Figures and Tables

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