Impacts of bottom fisheries on vulnerable marine ecosystems and the long-term sustainability of deep-sea fish stocks – ten years since the adoption of UNGA resolution 61/105

Matthew Gianni
Co-founder, Political and Policy Advisor

Deep Sea Conservation Coalition

UNGA Workshop to discuss implementation of paragraphs 113, 117 and 119 to 124 of resolution 64/72 and paragraphs 121, 126, 129, 130 and 132 to 134 of resolution 66/68 on Sustainable Fisheries

1-2 August 2016

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United Nations resolutions on managing the impacts of deep-sea fisheries in ABNJ

2002, 2004, 2006, 2009, 2011, [2016]

implementation by States individually and through RFMOs

UN General Assembly and deep-sea fisheries on the High Seas (2004-2014)

- UN debate - biodiversity, equity, governance, international law
- Four+ UNGA resolutions (59/25, 61/105, 64/72, 66/68); UNGA reviews
- Core Agreement: Prevent "Significant Adverse Impacts" on "Vulnerable Marine Ecosystems" and ensure sustainability:
  - **Prior Environmental Impact Assessments**
  - **Precautionary VME Area Closures**
  - **Sustainable catch/bycatch deep sea species**
  - **Move on Rule**

  Adopt and implement by 31 December 2008 or else not authorize to proceed

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DSCC Engagement

- DSCC formed in 2004, following concern regarding bottom trawl fishing on the high seas
- Active participants in global negotiations since 2004 (e.g. UNICP, UNFAO, CBD)
- Called for moratorium on bottom trawl fishing in ABNJ
- Active participants in implementation of UNGA resolutions through RFMOs since UNGA 61/106 in 2006
- Participated in FAO Guidelines negotiations 2007/2008 and UNGA reviews 2009, 2011 and FAO workshops (2010; 2015)
- Engage with scientists, policy makers, States and civil society towards conservation of the high seas

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Members include

What do we know about the deep-sea and the impact of bottom fishing?

Global Marine Assessment/World Ocean Assessment (UNGA 2015)

Chapter 36F - Open Ocean Deep Sea

- "This truly vast deep-sea realm constitutes the largest source of species and ecosystem diversity on Earth"

- "There is strong evidence that the richness and diversity of organisms in the deep sea exceeds all other known biomes… and supports the diverse ecosystem processes and functions necessary for the Earth's natural systems to function"

- "Deep-sea ecosystems are crucial for global functioning; e.g., remineralization of organic matter in the deep sea regenerates nutrients that help fuel the oceanic primary production that accounts for about half of atmospheric oxygen production."

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Global Marine Assessment/World Ocean Assessment

Chapter 51: Biological communities on seamounts and other submarine features potentially threatened by disturbance (p. 15)

- "The documented widespread extent of deep-water trawl fisheries has led to pervasive concern for the conservation of fragile benthic habitats."
- "The vast majority of deep-water fisheries have been carried out unsustainably, or at least without satisfactory assessments of impacts and sustainability. This has led to the serial depletion of dozens of stocks…Severe impacts have been reported for by-catch species, including other fishes… The extent of benthic impacts has been described for local fishing grounds but has not been assessed globally; however, if the impacts of these regional studies are generalized, we can extrapolate that fishing, and in particular deep-water trawling, has caused severe, widespread, long-term destruction of these environments globally. The time scale for recovery of deep-water reef habitats is unknown but has been estimated to be on the order of centuries to millennia. Although progress has been made toward sustainable management and conservation of fish stocks and associated diverse, vulnerable benthic communities, numerous studies show that progress to date has not been adequate, with fisheries often closed or limited only after severe depletion has already occurred."

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Global Marine Assessment/World Ocean Assessment

Chapter 51: Biological communities on seamounts and other submarine features potentially threatened by disturbance (pp 16-17)

- "Deep-sea ecosystem… are now and will increasingly be subjected to multiple stressors from habitat disturbance, pollutants, climate change, acidification and deoxygenation…The scientific understanding of how these stressors may interact to affect marine ecosystems remains particularly poorly developed. For example, the widespread destruction of deep-water benthic communities due to trawling has presumably reduced their ecological and evolutionary resilience as a result of reduced reproductive potential and loss of genetic diversity and ecological connectivity."

- "Although it is heartening that some seamounts, ridges and other sensitive marine habitats are being protected by fishing closures, Marine Protected Areas and other actions, little scientific understanding of the efficacy of actions implemented to date and few studies to assess this exist. The connectivity between these habitats remains largely unknown, as are the factors that influence colonization, species succession, resilience and variability. Comparative studies of seamount, canyon, and continental margin habitats seem to indicate that many species are shared (but see Richer de Forges et al., 2000); however, community structure differs markedly and the factors influencing such differences remain unknown (McClain et al., 2009). Our starting point in attempting to understand and manage these habitats is, to paraphrase Socrates, that we know almost nothing."

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Other studies/issues

- Pusceddu et al 2014: "intensive and chronic bottom trawling is deemed to transform large portions of the deep continental slope into faunal deserts and highly degraded seascapes" and that bottom trawling “represents a major threat to the deep seafloor ecosystem at the global scale”

- Trueman 2014: bottom dwelling fish inhabiting depths between 500–1,800 meters along the Irish and United Kingdom continental slopes are estimated to capture and store a volume of carbon equivalent to 1-2 million tonnes of CO2 every year.

- 100s of species from an unknown number of stocks/populations caught (most as ‘bycatch’) in deepwater bottom fisheries on the high seas; status of most stocks/species unknown (slow growing, long-lived, low fecundity species)

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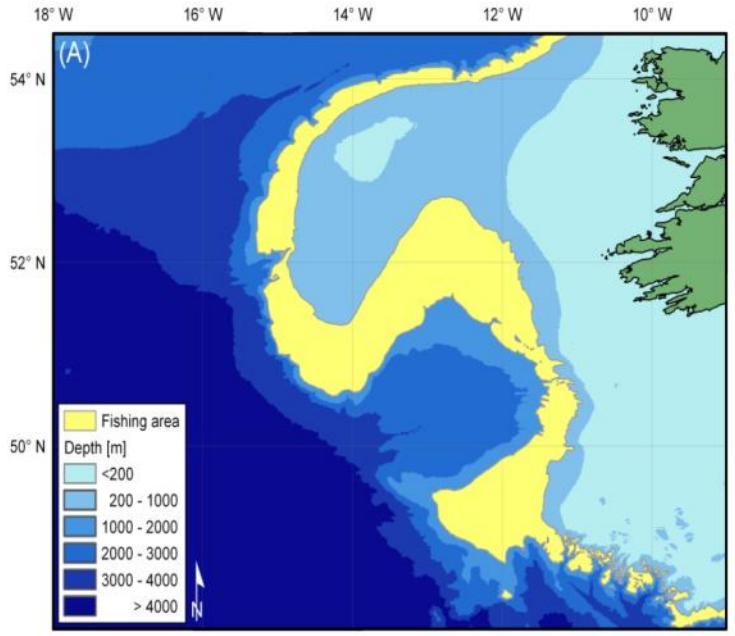
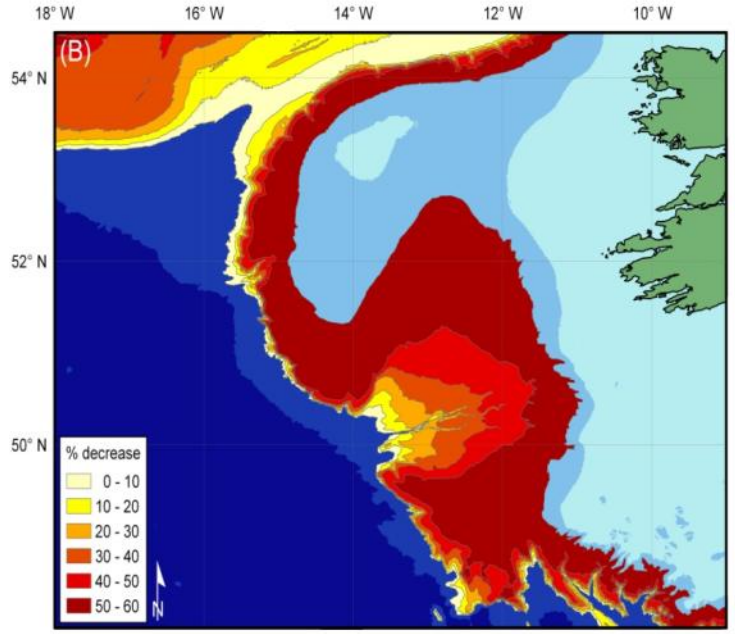
The Porcupine Seabight deep-water fishery and its impact

Fishing Area
52,000 km^2

Reduction in Fish Abundance

Area of Impact
142,000 km^2
2.74 × fishing area



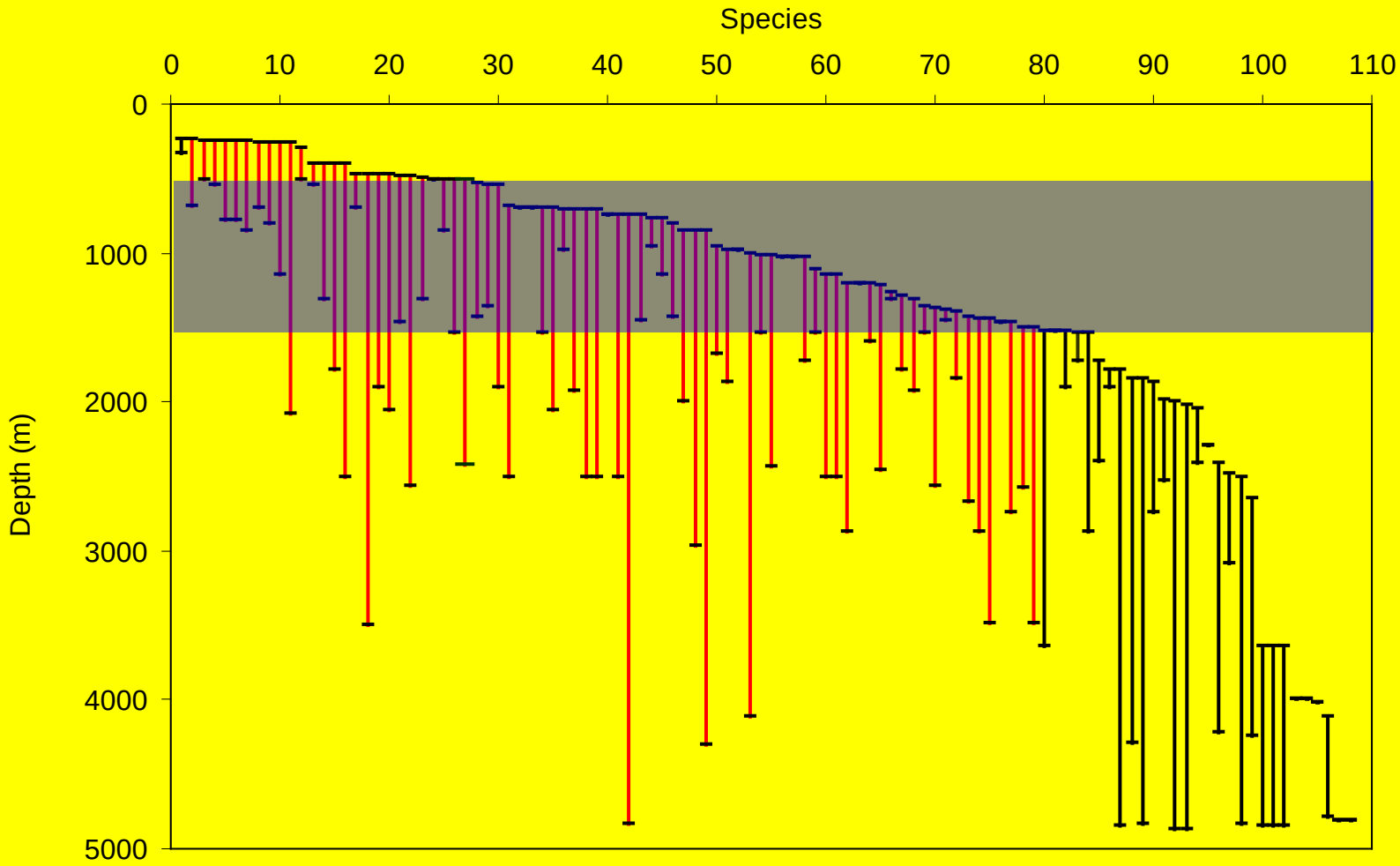


Priede I.G. *et al.* (2011) *ICES Journal of Marine Science*; **68**: 281–289. doi:10.1093/icesjms/fsq045

The Porcupine Seabight deep-water fishery and its impact

Fishery at 500 – 1500 m

By-catch includes up to 78 species intersecting the depth of fishery (500-1500m)



Priede *et al.*(2010) *Marine Ecology* **31:**247-260.
10.1111/j.1439-0485.2009.00330.x

Deep-sea demersal fish species richness in the Porcupine Seabight, NE Atlantic Ocean: global and regional patterns. Imants G. Priede, Jasmin A. Godbold, Nicola J. King, Martin A. Collins, David M. Bailey & John D. M. Gordon. Marine Ecology 31 (2010)

Study period 1977-1989 & 1997-2002

77 species at fishable depths. Average decline in fish abundance: 69%

Alepocephalus agassizii	Cottunculus thomsonii	Malacocephalus laevis
Alepocephalus australis	Deania calcea	Merluccius merluccius
Alepocephalus bairdii	Dipturus nidarosiensis	Microchirus variegatus
Alepocephalus productus	Echiodon drummondii	Molva dypterygia
Alepocephalus rostratus	Epigonus telescopus	Molva macrophthalma
Antimora rostrata	Etmopterus spinax	Mora moro
Aphanopus carbo	Gaidropsarus argentatus	Myxine ios
Apristurus laurussonii	Gaidropsarus macrophthalmus	Neocyttus helgae
Argentina silus	Galeus melastomus	Neoraja caerulea
Argentina sphyraena	Galeus murinus	Nezumia aequalis
Bathypterois dubius	Glyptocephalus cynoglossus	Notacanthus bonaparte
Beryx decadactylus	Guttigadus latifrons	Notacanthus chemnitzii
Caelorinchus caelorhincus	Halargyreus johnsonii	Pachycara crassiceps
Caelorinchus labiatus	Halosauropsis macrochir	Paraliparis hystrix
Cataetyx alleni	Halosaurus johnsonianus	Phycis blennoides
Cataetyx laticeps	Helicolenus dactylopterus dactylopterus	Polyacanthonotus rissoanus
Centrophorus squamosus	Hoplostethus atlanticus	Rajella bigelowi
Centroscymnus coelolepis	Hoplostethus mediterraneus mediterraneus	Rajella fyllae
Chimaera monstrosa	Hydrolagus mirabilis	Rhinochimaera atlantica
Conocara macropterum	Ilyophis blachei	Rouleina attrita
Conocara murrayi	Lepidion eques	Scymnodon ringens
Coryphaenoides carapinus	Lepidorhombus boscii	Spectrunculus grandis
Coryphaenoides guentheri	Lepidorhombus whiffiagonis	Synaphobranchus kaupii
Coryphaenoides mediterraneus	Leucoraja circularis	Trachyrincus murrayi
Coryphaenoides rupestris	Lophius piscatorius	Trachyrincus scabrus
	Lycodes terraenovae	Trachyscorpia cristulata echinata

Catch limits for only 14 of the 77 species – majority “zero” TAC

Orange roughy Blue ling
Greater forkbeard
Black scabbardfish
Roundnose grenadier
Alfonsinos
Leafscale gulper shark
Portuguese dogfish
Birdbeak dogfish
Velvet belly
Blackmouth catshark (Blackmouth dogfish)
Mouse catshark
Knifetooth dogfish
Deep-water catsharks

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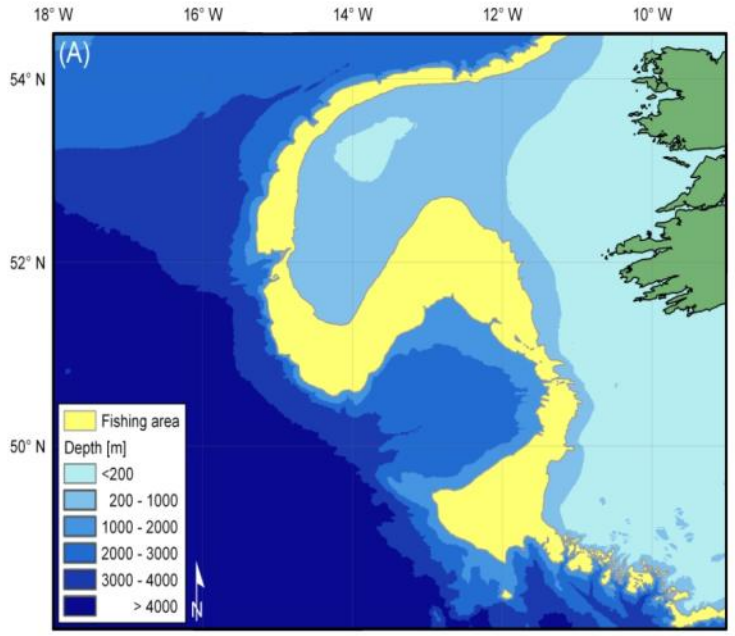

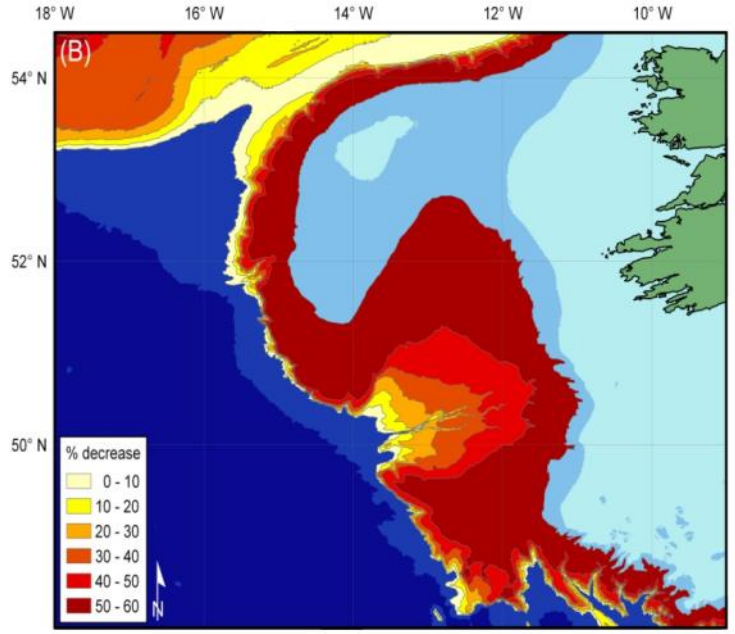

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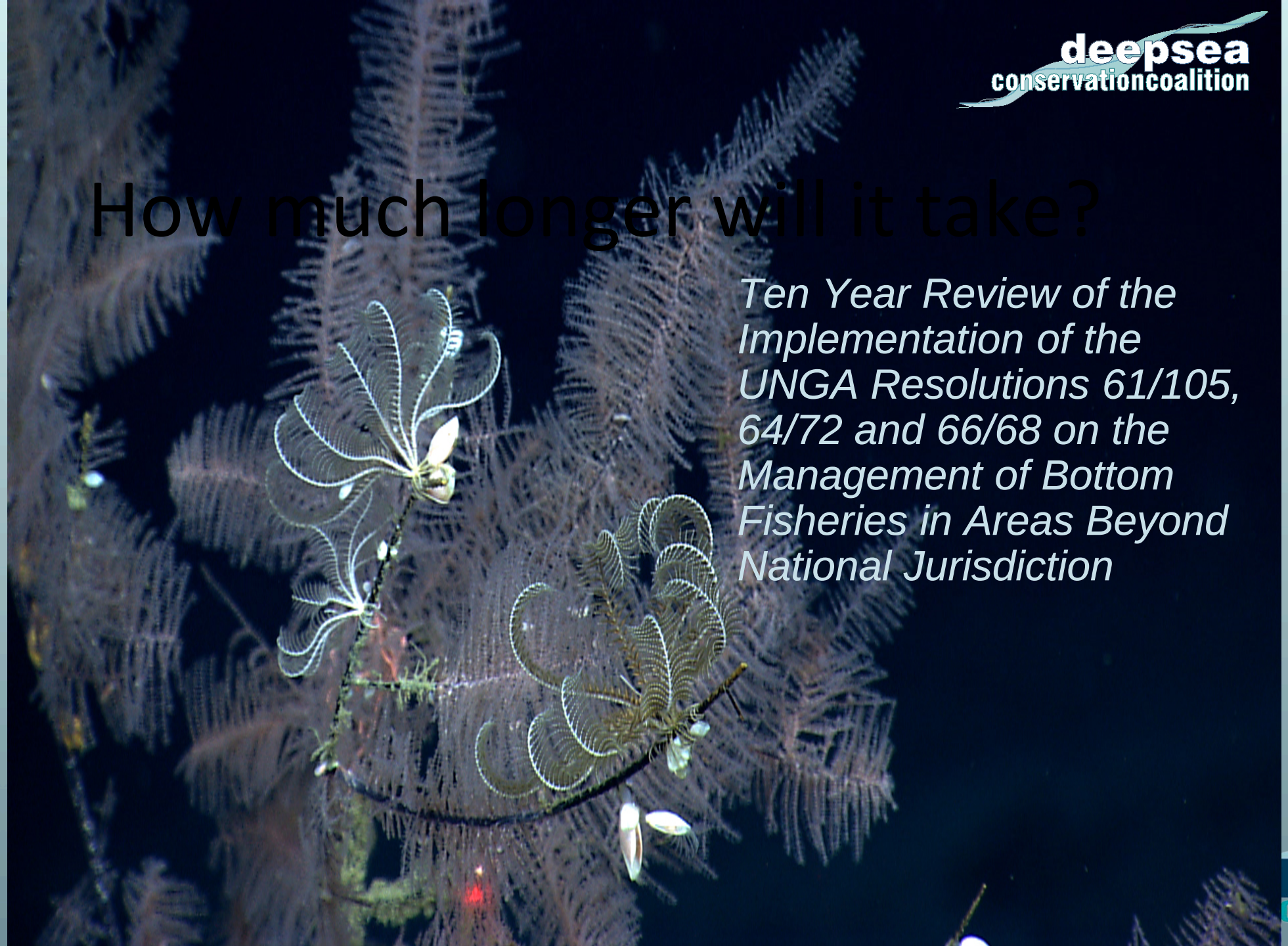

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How much longer will it take?

Ten Year Review of the Implementation of the UNGA Resolutions 61/105, 64/72 and 66/68 on the Management of Bottom Fisheries in Areas Beyond National Jurisdiction

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Progress to Date

- Three new RFMO agreements: North Pacific, South Pacific and Southern Indian Oceans
- Framework regulations and interim measures adopted by most RFMO/As
- Impact Assessments (IAs) for all DSF required by CCAMLR, North and South Pacific RFMOs, NAFO (2016)
- IAs required in “new” fishing areas or when new scientific information becomes available in NE, NW, and SE Atlantic RFMOs
- EU adopted regulation 734/2008 to require IAs and reverse burden of proof to implement UNGA resolution in non-RFMO/A areas (e.g. SW Atlantic). Others?

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Progress to Date cont.

- Freezing footprint & delineating 'existing fishing areas': SPRFMO, NEAFC, NAFO, SEAFO, NPFC; imposing restrictions on fishing in 'new' fishing areas
- A number of known or representative areas of VMEs closed NAFO, NEAFC, CCAMLR, GFCM, NPFC, SPRFMO, SEAFO
- Closing seamounts to bottom fishing (NAFO)
- Prohibition of bottom trawling (CCAMLR; GFCM > 1000m)
- Prohibition of bottom gillnet fishing (SPRFMO, NEAFC (>200m) SEAFO, CCAMLR)
- Gear restrictions/regulations in other area (e.g. set gillnets in North Pacific)
- NON-RFMO areas: EU legislation, Spain closed most areas as VME areas below 300-400m to bottom fishing in SW Atlantic based on extensive impact assessment. Others?

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Shortcomings in Implementation

- **Inadequate or partial impact assessments: failure to follow FAO Guidelines; scientific uncertainties; mapping not done; unverified assumptions concerning risk; restricted interpretation of VMEs**

- **No cumulative impact assessments (VME degradation over time; other stressors e.g. ocean acidification and deep-sea corals)**

- **Identified VMEs in some areas remain open to bottom fishing without impact assessments**

- **Excessively large footprints (i.e. app 50-90% of seabed at key depths in NAFO, SPRFMO and in South Indian Ocean**

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Shortcomings in Implementation

- **Bottom trawling remains dominant method of bottom fishing on high seas (GMA/WO, others)**
- **Move-on rules vary widely from region to region but rarely triggered outside of CCAMLR area (thresholds too high)**
- **Overfishing, no stock assessments for many target species; little to no information on impacts of bycatch species (South Pacific: 22 target species; 115 bycatch species)**
- **Most species impacted long lived, slow growing low fecundity: in some cases endangered species (IUCN NE Atlantic Red List - roundnose grenadier, blue ling, deep-sea shark)**

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Additional Conclusions

Relatively small number of flag States: Several EU Member States (Spain, Portugal); Australia; New Zealand, Japan, Republic of Korea; Russian Federation; Cook Islands; several others

Numbers of vessels and volume of catch varied over past 10 years but probably less than was estimated to be the case in 2001 (IUCN) and as reported in 2006 (UN FAO)

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General approach to VME protection:

- closed areas where concentrations of VMEs identified (though not in all cases);
- closure of ‘representative’ areas where VMEs likely to occur; establish fisheries footprint;
- require move-on rule in areas open to fishing;
- require impact assessments for bottom fishing outside of footprint/open areas

RFMO/Regional MAPS
MCI for DSCC: Mapping Methodology & Data Sources

- Used global data sources for ecological and biological data – bathymetry, seamounts, predicted coral habitat
- Aggregated RFMO footprint and closure data – started with FAO VME database and updated with more accurate and/or recent data from RFMO websites and publications
- Analyzed footprint and closures in ABNJ for amount of ‘fishable’ areas (varied by RFMO), seamounts and predicted habitat

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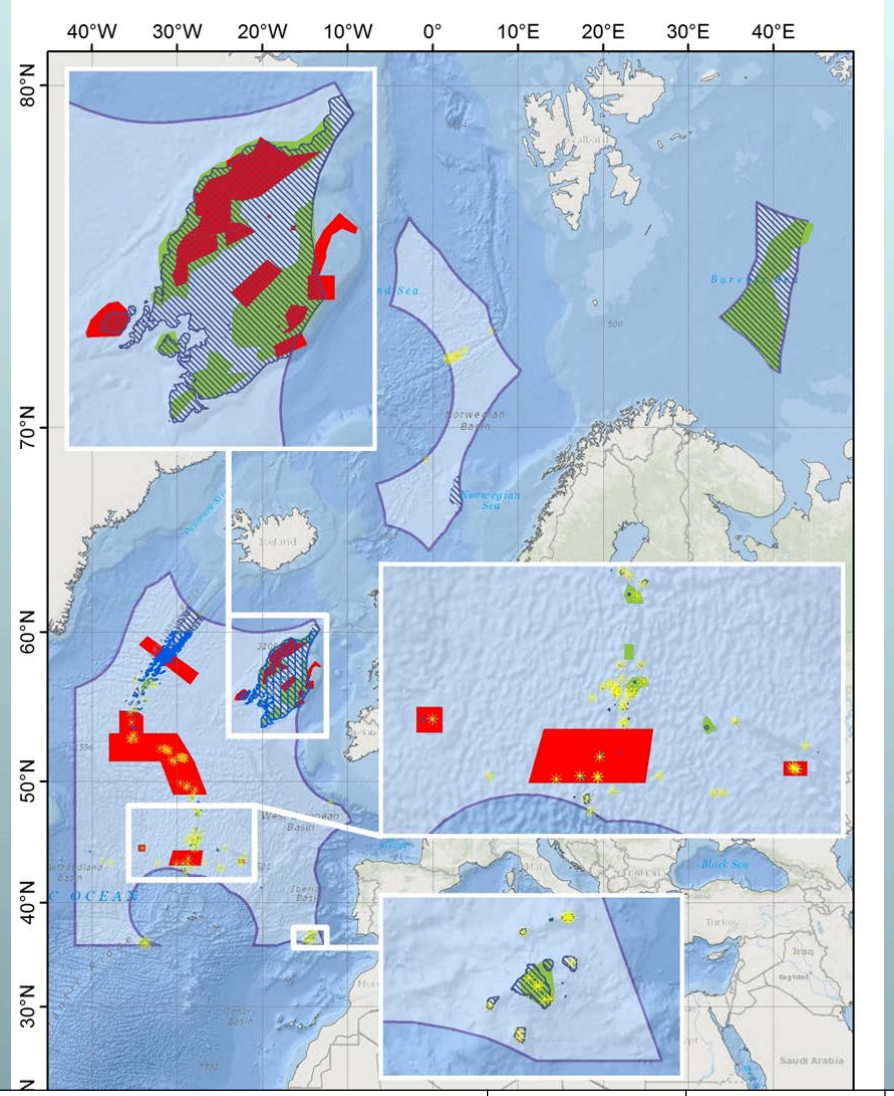
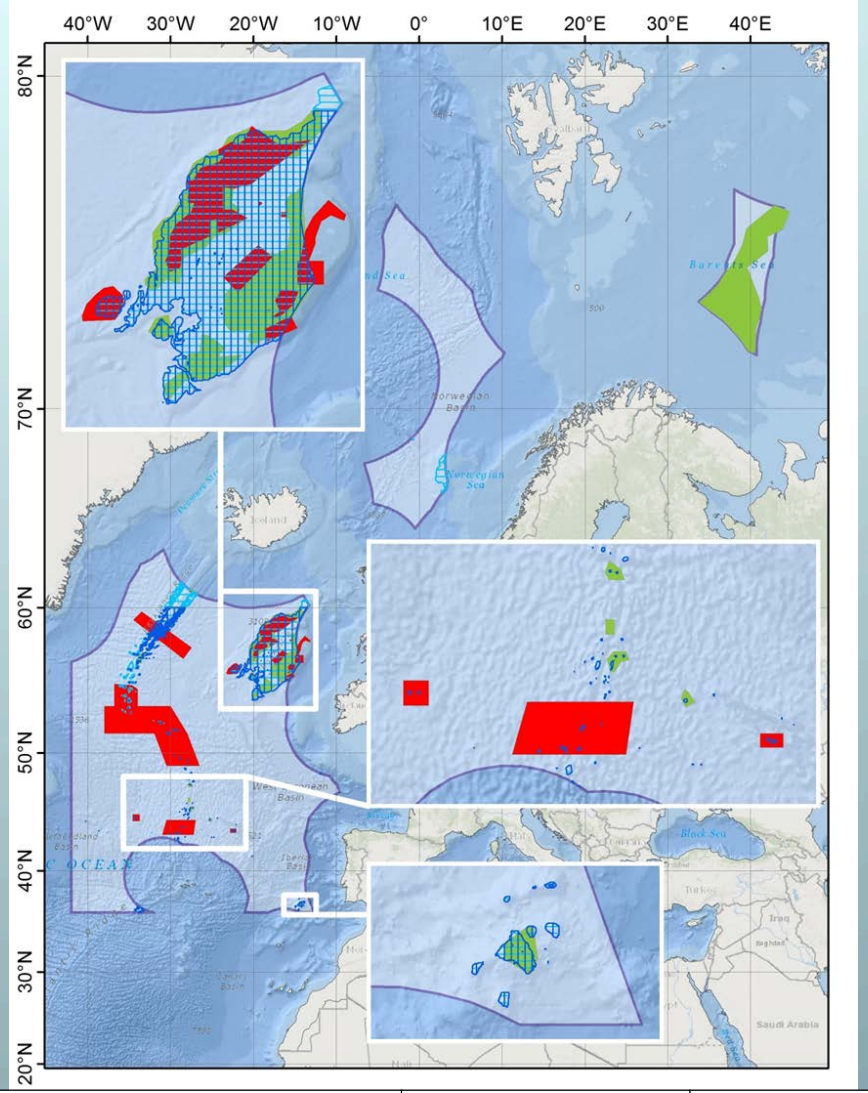
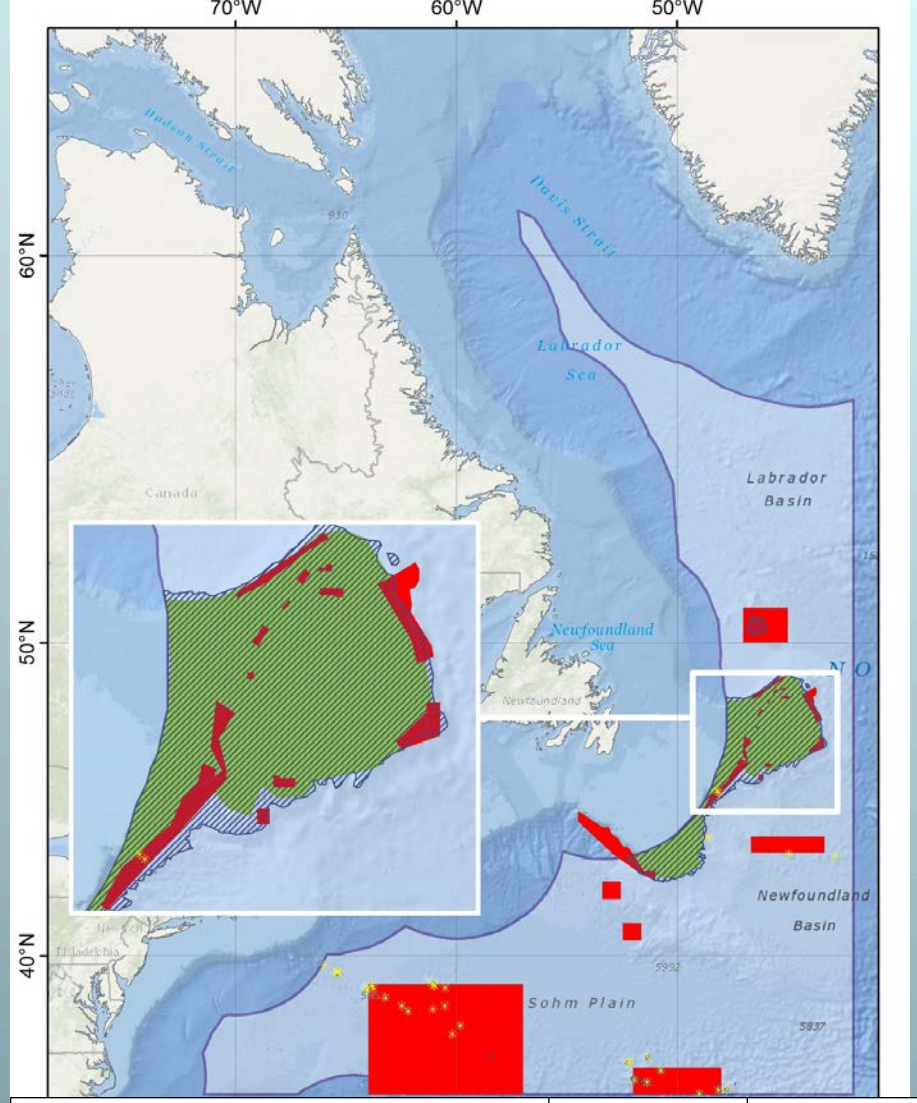
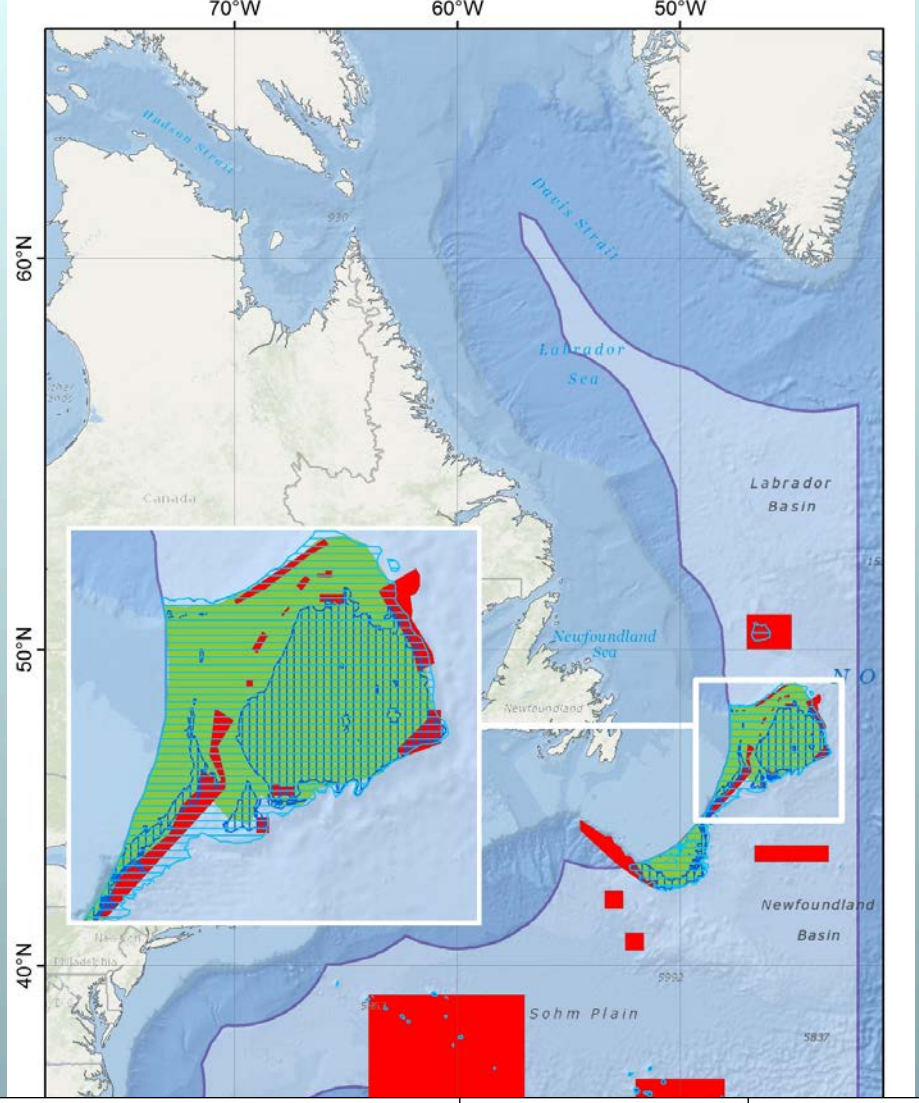


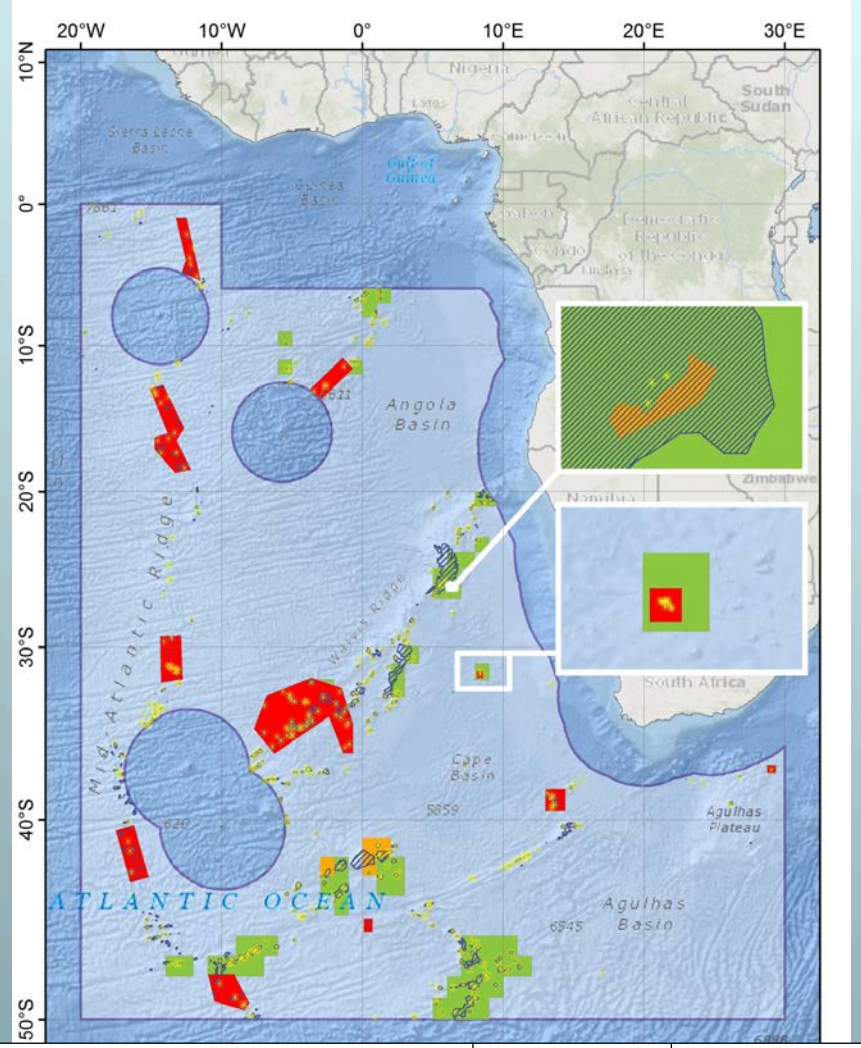


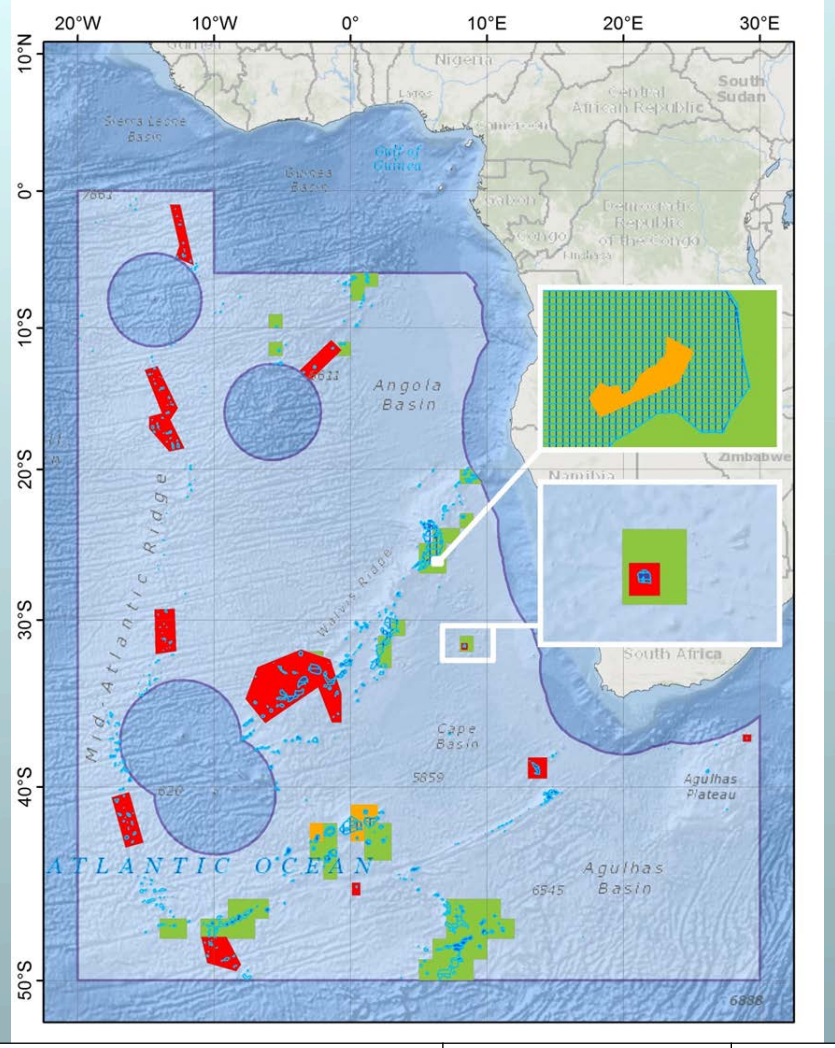
NEAFC	% "Fishable" Area	% "Fishable" Seamounts		NEAFC	% Predicted Coral Habitat - Octocorals	% Predicted Coral Habitat - Scleractinian sp.
Areas closed to all bottom fishing	16.7%	33.1%		Areas closed to all bottom fishing	22.6%	25.0%
Areas where bottom fishing is permitted	37.3%	8.6%		Areas where bottom fishing is permitted	25.9%	29.9%
Areas where prior impact assessment required before bottom fishing can occur	46.0%	58.3%		Areas where prior impact assessment required before bottom fishing can occur	51.5%	45.2%
TOTAL	300,646 km2	139 seamounts		TOTAL	222,512 km2	189,897 km2





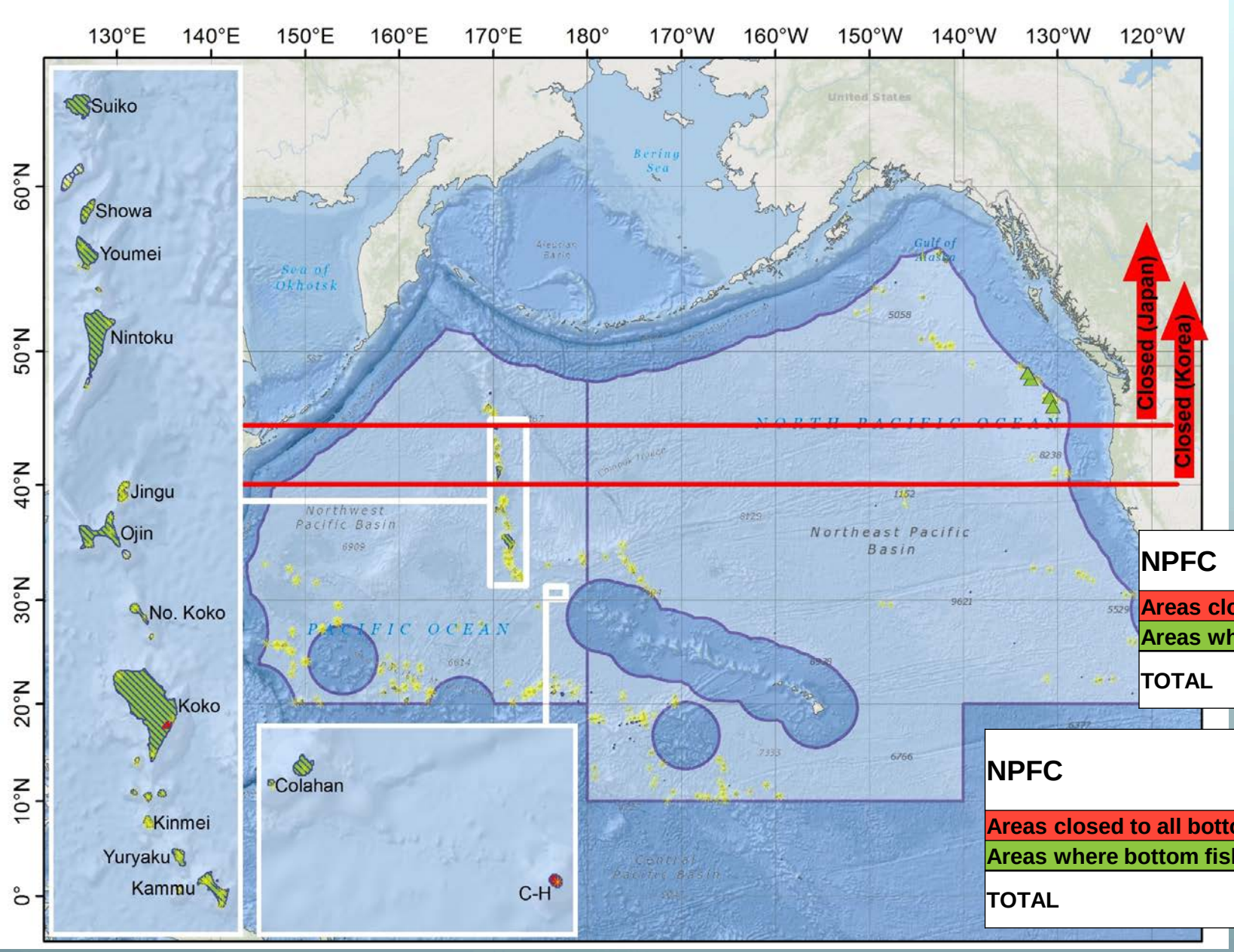
NAFO	% "Fishable" Area	% "Fishable" Seamounts		NAFO	% Predicted Coral Habitat - Octocorals	% Predicted Coral Habitat - Scleractinian sp.
Areas closed to all bottom fishing	12.9%	57.6%		**Areas closed to all bottom fishing**	12.9%	10.1%
Areas where bottom fishing is permitted	79.0%	0.0%		**Areas where bottom fishing is permitted**	78.9%	86.4%
Areas where prior impact assessment required before bottom fishing can occur	8.1%	42.4%		**Areas where prior impact assessment required before bottom fishing can occur**	8.1%	3.5%
TOTAL	140,368 km2	33 seamounts		**TOTAL**	139,431 km2	60,482 km2





SEAFO	% "Fishable" Area	% "Fishable" Seamounts	
Areas closed to bottom trawling	5.1%	1.8%	
Areas closed to all bottom fishing including bottom trawling	16.1%	21.5%	
Areas where bottom fishing is permitted	42.9%	25.5%	
Areas where prior impact assessment required before bottom fishing can occur	41.0%	53.0%	
TOTAL	175,943 km2	502 seamounts	

SEAFO	% Predicted Coral Habitat - Octocorals	% Predicted Coral Habitat - Scleractinian sp.
Areas closed to bottom trawling	4.8%	6.9%
Areas closed to all bottom fishing	16.3%	13.6%
Areas where bottom fishing is permitted	42.7%	44.9%
Areas where prior impact assessment required before bottom fishing can occur	41.0%	41.5%
TOTAL	170,756 km2	104,992 km2



NPFC	% "Fishable" Area	% "Fishable" Seamounts
Areas closed to all bottom fishing	0.5%	0.3%
Areas where bottom fishing is permitted	38.9%	12.1%
TOTAL	49,823 km2	398 seamounts

NPFC	% Predicted Coral Habitat - Octocorals	% Predicted Coral Habitat - Scleractinian sp.
Areas closed to all bottom fishing	0.5%	1.0%
Areas where bottom fishing is permitted	38.9%	69.8%
TOTAL	49,778 km2	7,820 km2

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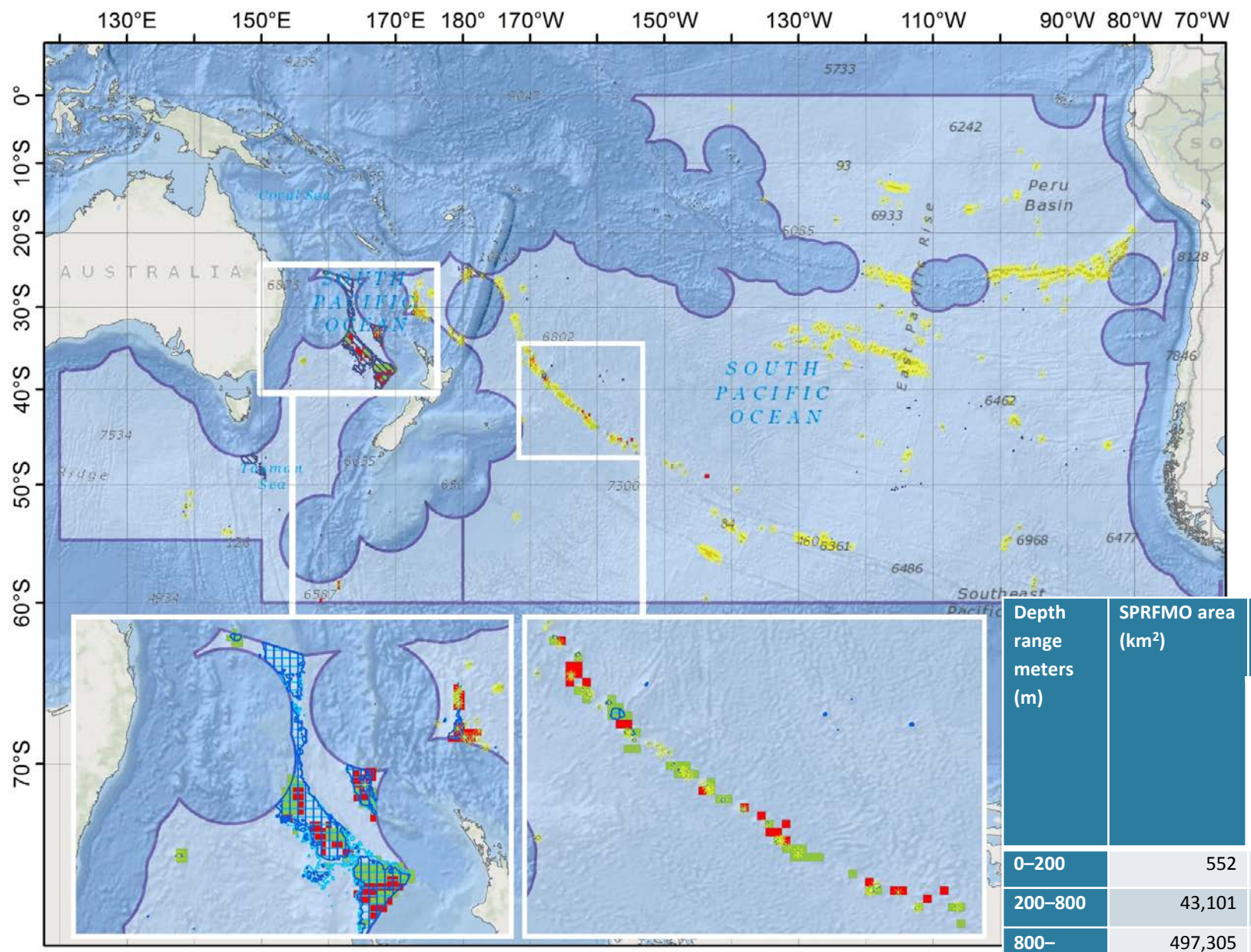
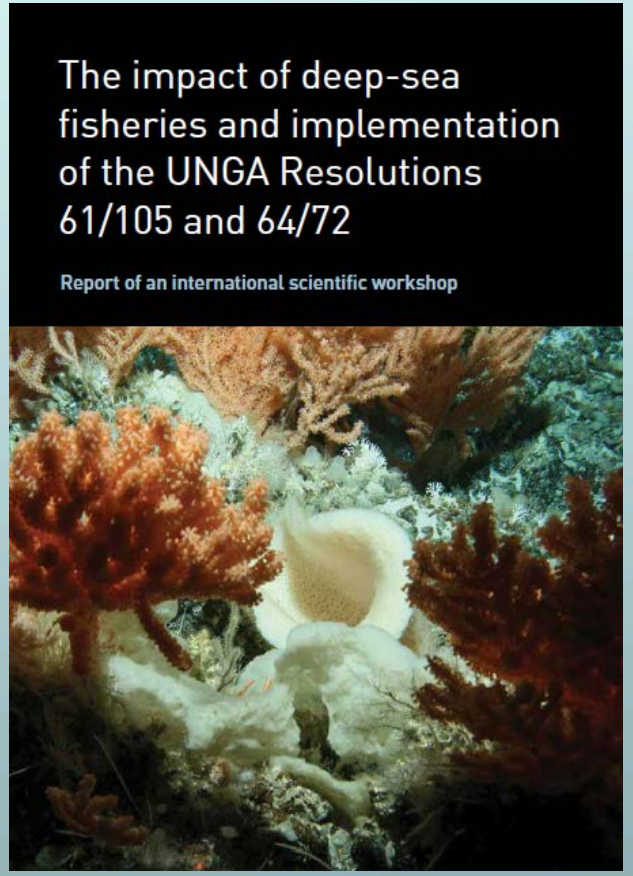


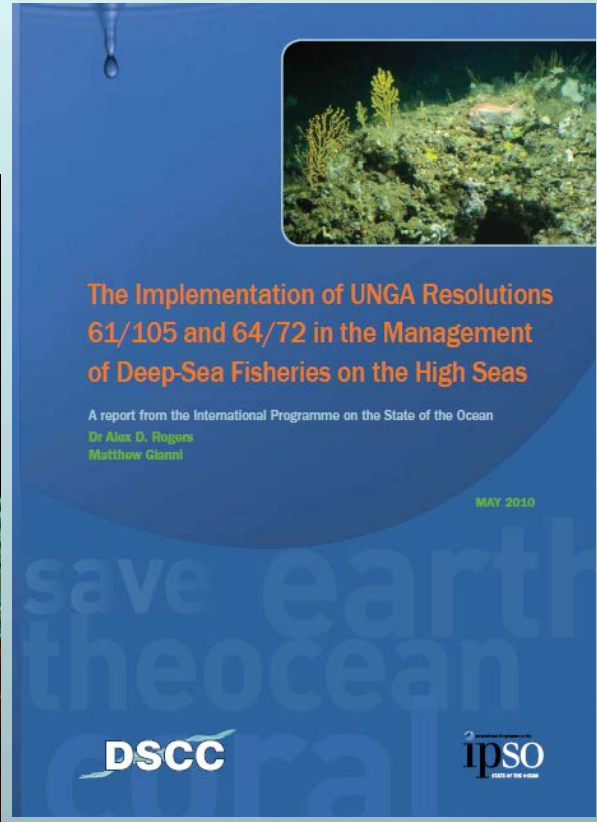
SPRFMO	% "Fishable" Area	% "Fishable" Seamounts
Areas closed to all bottom fishing	0.0%	0.0%
Areas closed to bottom trawl by New Zealand	15.6%	3.3%
Areas closed to bottom fishing by Australia	0.0%	0.0%
Areas where bottom fishing is permitted by New Zealand	7.5%	3.1%
Areas where bottom fishing is permitted by Australia	14.9%	3.1%
Areas where prior impact assessment required before bottom fishing can occur for New Zealand vessels	76.9%	93.6%
Areas where prior impact assessment required before bottom fishing can occur for Australian vessels	85.1%	96.9%
TOTAL	371,117 km2	880 seamounts

Depth range meters (m)	SPRFMO area (km^2)	Bottom trawl footprint % of seabed in SPRFMO area				Footprint Total %	Approximate size of seabed where bottom trawl fishing permitted (km^2)
		Closed	Open (Move-on rule)	Open (no Move-on rule)	Open Total		
0–200	552	100	0	0	0	100	0
200–800	43,101	35.5	40.0	14.6	54.6	90	23,533
800–2,000	497,305	9.0	4.9	8.2	13.1	22.0	65,147
> 2,000	53,309,911	0.1	0	0	0	0.1	0
Total	53,850,868	0.2	0.1	0.1	0.2	0.4	88,680

Penny (2013) New Zealand's bottom fisheries footprint and areas open to bottom trawl within SPRFMO Convention Area

Publications





DSCC

www.savethehighseas.org

And thanks to the Adessium Foundation, Synchronicity Earth, Pew Charitable Trusts, Kaplan Fund, Oceans 5, DSCC member organizations and the many scientists, NGOs and others working on deep-sea fisheries and biology

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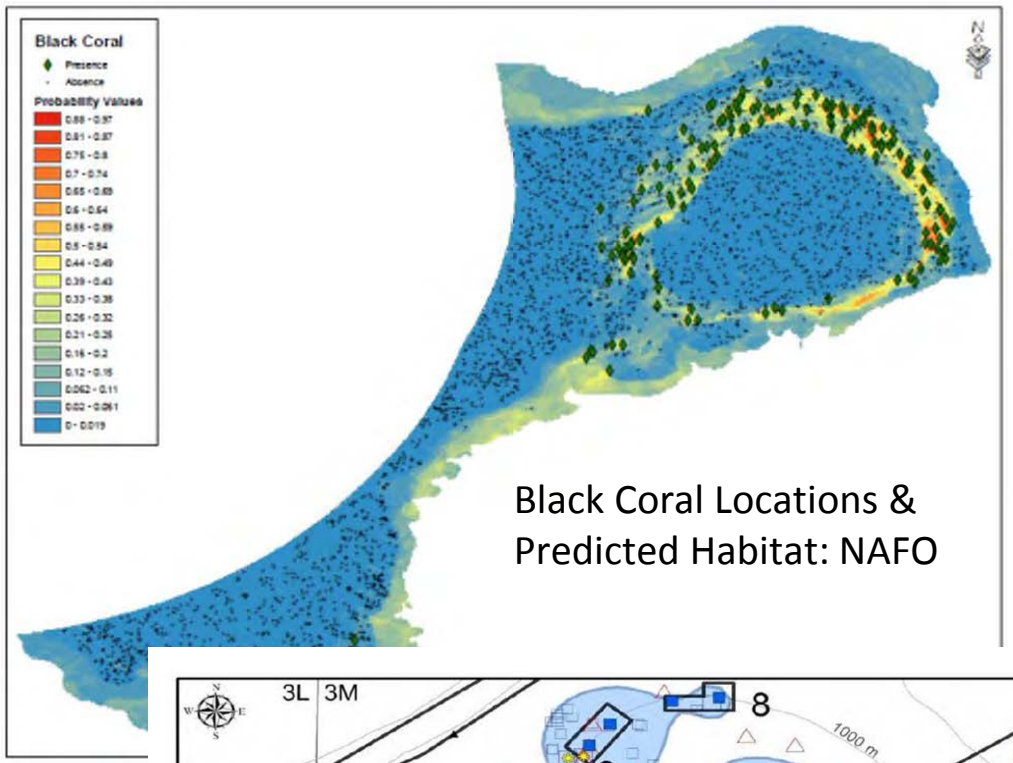
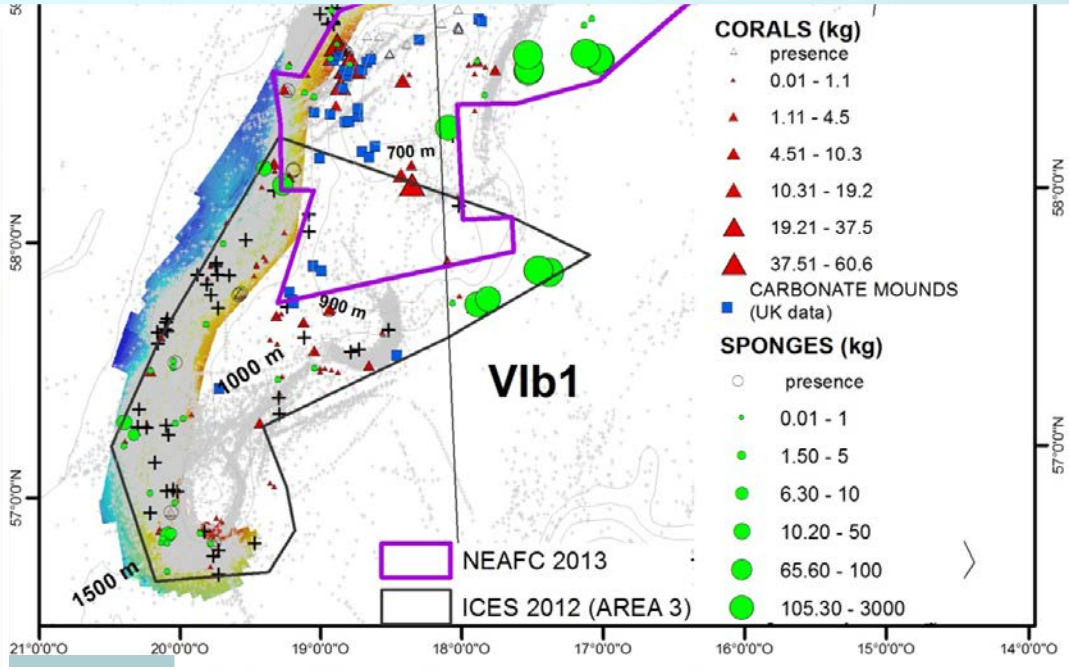
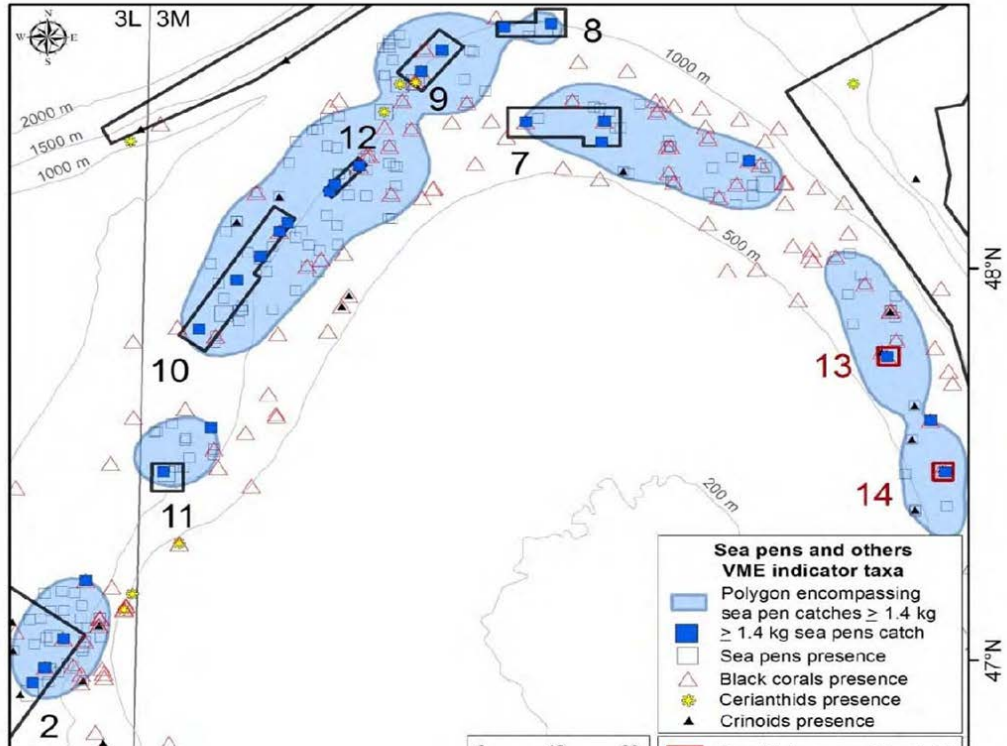
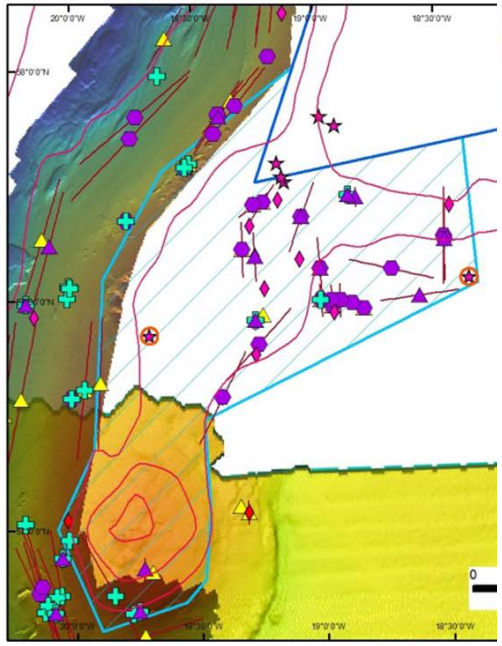


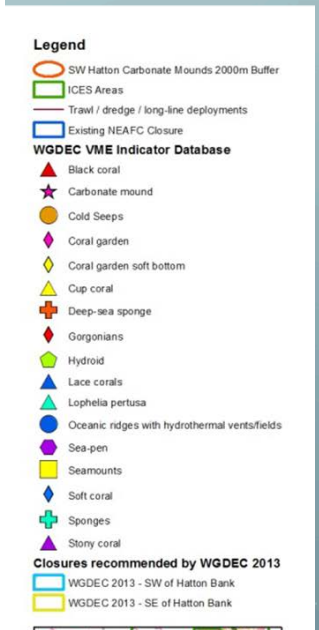
Black Coral Locations &
Predicted Habitat: NAFO

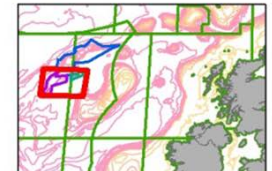




Hatton Bank: Recommended bottom fishing closures to the south of Hatton Bank







PROTECTING THE UK'S DEEP SEA

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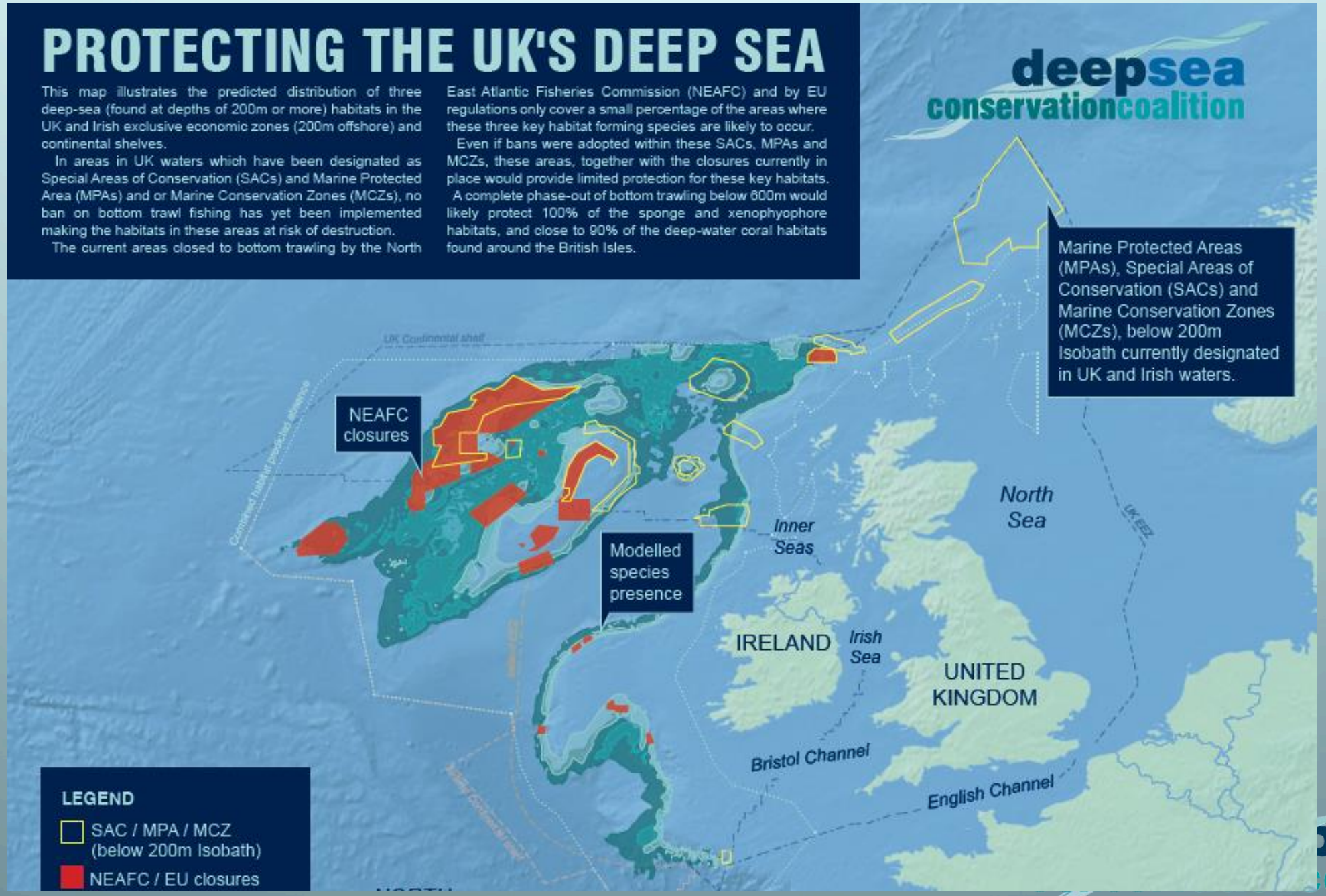
This map illustrates the predicted distribution of three deep-sea (found at depths of 200m or more) habitats in the UK and Irish exclusive economic zones (200m offshore) and continental shelves.

In areas in UK waters which have been designated as Special Areas of Conservation (SACs) and Marine Protected Area (MPAs) and or Marine Conservation Zones (MCZs), no ban on bottom trawl fishing has yet been implemented making the habitats in these areas at risk of destruction.

The current areas closed to bottom trawling by the North East Atlantic Fisheries Commission (NEAFC) and by EU regulations only cover a small percentage of the areas where these three key habitat forming species are likely to occur.

Even if bans were adopted within these SACs, MPAs and MCZs, these areas, together with the closures currently in place would provide limited protection for these key habitats.

A complete phase-out of bottom trawling below 600m would likely protect 100% of the sponge and xenophyophore habitats, and close to 90% of the deep-water coral habitats found around the British Isles.



NORTH ATLANTIC OCEAN

MODELLED SPECIES PRESENCE

All three habitats qualify (as with all deep sea habitats) as vulnerable marine ecosystems (VMEs) under United Nations General Assembly Resolutions and UN FAO Guidelines

EXISTING SITUATION
Percentage currently protected by existing closures of areas to deep-sea bottom fishing

Percentage that would be protected in addition to existing closures if SACS, Scottish MPAs and MCZs in UK waters were also closed to bottom trawling

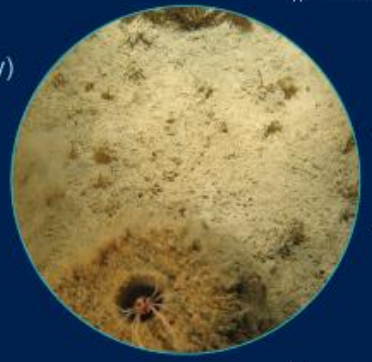
Percentage that would be protected if bottom trawling were prohibited below 600 m

Lophelia pertusa reefs
(a cold-water coral reef)

Deep-sea corals species often form complex and ornate reefs, some of which have been dated at 8000 years old. Ancient cold-water coral reefs may not only hold many undiscovered innovations, but they are also teeming with species that depend on them.

Pheronema carpenteri aggregations
(a sponge-dominated community)

Deep-sea sponge communities are extremely bio-diverse, create complex habitats, provide food and shelter to an array of deep-sea species, are a source of new medicines, and have an important role in recycling nutrients. Sponge aggregations tend to be found living near seamounts, shelfs and banks where there is an abundance of nutrients.



Syringammina fragilissima aggregations
(a xenophyophore community)

Found only in the deep sea, xenophyophores are the largest known single celled organisms, at times measuring up to 25 cm in diameter. While forming communities of up to 7–10 individuals per meter squared, they create a highly biodiverse habitat for many species large and small.

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National Oceanography Centre, Southampton, UK
image provided by Veerle Huvenne

*Ross., R, Howell, K.L. (2013) Use of predictive habitat modelling to assess the distribution and extent of the current protection of 'listed' deep-sea habitats. Diversity and Distributions. 19(4), 433-445.

Shortcomings in Implementation

- Inadequate or partial impact assessments: scientific uncertainties; mapping not done; unverified assumptions concerning risk; restricted interpretation of VMEs; no cumulative impact assessments (degradation over time; other stressors e.g. ocean acidification)

- Some areas where VMEs known to occur remain open to bottom fishing; some representative areas closed; reluctance to apply precautionary approach, restricted approach to identify areas where VMEs 'likely' to occur

- Widespread unsustainable exploitation of deep-sea fish stocks/species

deepsea conservationcoalition

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