Submission to the Environment Select Committee

Deepwater Group Report

In Response to:

The Petition of Karli Thomas, on behalf of the Deep Sea Conservation Coalition and its member groups (Save deep sea corals – ban bottom trawling on seamounts)

deepwater group

Committed to
Healthy Oceans
Sustainable Fisheries

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EXECUTIVE SUMMARY

Below is a summary of the key findings in this submission. References and data sources are provided within the body of the submission.

Deepwater Group (DWG) submits that the management of New Zealand's Exclusive Economic Zone (EEZ) environment by the Government and the deepwater seafood industry in a global context is not only comprehensive but is also recognised internationally as being second to none.

Seamounts

The DSCC Petition Report incorrectly characterises 'seamounts' as "*any geographically isolated topographic feature on the seafloor taller than 100 m*". The internationally accepted definition of a 'seamount' is an underwater feature with an elevation of more than 1,000 metres. Smaller features are known as knolls and hills.

DWG submits that there are clearly defined, and globally standardised designations of seamounts and other underwater topographical features accepted by the International Oceanographic Commission, the International Hydrographic Organisation and by the New Zealand Geographic Board. The application of unstandardised and putative definitions in a marine management sense will likely lead to inappropriate management responses.

DWG recommends the Select Committee bases their considerations on the scientific designations of seamounts and other underwater topographical features as have been globally standardised and as are recognised by the New Zealand Geographic Board.

Corals on Seamounts

NIWA has advised DWG that there are 142 known seamounts within New Zealand's EEZ, 127 of which (89%) are either closed to trawling or have never been trawled. As bottom trawling has only occurred on 9 (6%) of seamounts over the past decade, fishing does not comprise a threat to the biogenic habitats on seamounts within New Zealand's EEZ.

Scientific and observer records demonstrate that coral species are widespread throughout New Zealand's EEZ occurring over a wide range of depths (both deeper and shallower than those fished) and across a wide variety of habitat types (not just on seamounts, knolls and hills).

Seamounts vary greatly in their substrate types and benthic biodiversity ranging widely across New Zealand's EEZ, from sub-Tropical to sub-Antarctic oceanographic waters.

NIWA records show that of the seamounts for which information on coral presence/absence is available:

- 20% are known to support coral, including seamounts within area closures and those with summits that are deeper than 1,600 m
- 36% of seamounts with summits shallower than 1,600 m are known to support coral.
- 33% of fished seamounts are known to support coral

Corals and Endemism

Deep Sea Conservation Coalition (DSCC) has asserted that the benthic marine fauna in New Zealand waters (corals in particular) have a higher-than-average degree of endemism. Scientific evidence in support of this contention is poor. A priori, given the connectedness of oceans, the New Zealand marine benthic fauna would not be expected to show a greater degree of endemism than other similar oceanic areas.

The data supporting our understanding of benthic fauna distribution is strongly driven by the distribution of known fishing grounds and observed fishing effort. While coral species are known to be widespread throughout New Zealand's EEZ, as the areas outside of the fishing grounds are substantively under-sampled, there is limited detailed knowledge on precise locations of species and their abundances.

DWG reiterates our call to the Government to fund public good science to establish the locations, extent and nature of deepwater corals across New Zealand's EEZ.

NIWA has used modelling approaches to assess the likely areas of suitable coral habitat, based on records of coral captures and environmental parameters. Results from this work assess the overlap of these areas and bottom trawling to be less than 1%. By this measure, almost all of the areas where scientists predict coral may exist are outside of our fishing grounds and are untouched by bottom trawling.

The fishing-related risk to corals within New Zealand's EEZ is low. Stony corals and hydrocorals occur over wide depth ranges, most of which are outside of the depth ranges being trawled. Of the depth range that has been trawled for orange roughy (i.e., 800-1,200 metres) 92.6% remains untouched by bottom trawls. In addition, corals and other benthic organism are afforded protection provided by the Benthic Protection Areas (BPAs) and the Closed Seamount Areas (CSAs).

Corals and Bottom Trawling

Retention of corals in trawl nets is unknown and further work is required to assess this. While likely to be less than 100%, the estimates used by DSCC are based on work that has not been accepted as a valid methodology by FNZ's Science Working Group or by the Scientific Committee of the South Pacific Regional Fisheries Management Organisation (SPRFMO). Work to date has demonstrated that it is very difficult to reliably estimate catchability for deepwater corals - estimates are highly uncertain and are therefore highly likely to misinform estimates of coral abundance.

The estimated amount of coral annually captured by bottom trawling off seamounts, knolls and hills in the New Zealand EEZ, based on observer records over the last three years is 572 kg. This amount could fit into the back of a ute.

Bottom trawling has taken place on fishing grounds which in total comprise only 9% of New Zealand's EEZ – 91% of the EEZ remains untouched. Within these grounds, 1.1% of New Zealand's EEZ is subject to bottom trawling each year. Most of these grounds have been fished for decades and are responsible for the food production from New Zealand's deepwater fisheries resources. DWG estimates that around 80% of the volume of wild seafood produced in New Zealand is harvested by bottom trawl.

Fisheries Management and Seabed Protection

The New Zealand fisheries management system is renowned as one of the best in the world, being comprehensive, integrated, and supporting sustainable deepwater fisheries using a balanced ecosystem management approach. The condition-free certification of 19 of New Zealand's most important fisheries against the robust science-based MSC standard not only demonstrates the success of this management framework but also puts the management of our deepwater fisheries amongst the top 5% best-managed fisheries in the world.

New Zealand's fisheries management framework requires managers to balance the objectives of providing for the utilisation of fisheries resources whilst ensuring their sustainability.

The Fisheries Act 1996 implicitly recognises that the activities of fishing will cause impacts and it provides for these unless they collectively become 'adverse effects on the aquatic environment'. At that point, the obligation on all parties (including the Government) is to put in place measures that will avoid, mitigate or remedy any adverse effects.

In New Zealand, biodiversity is conserved through the application of management and (at times) legal provisions that expressly provide for different levels of food production, conservation and protection. These align with New Zealand's ecosystem approach to fisheries management that emphasises the need for a balanced approach.

Spatial management of bottom trawling on seamounts has been in place since 2001 with the CSAs, strengthened in 2007 with the introduction of BPAs.

CSAs and BPAs are recognised internationally, including in the UNEP-WCMC World Database of Protected Areas as IUCN category IV-VI Marine Protection Areas (MPAs). These closures protect a representative biodiversity of seabed habitat from bottom trawling and comprise 31% of New Zealand's large EEZ, providing one of the highest proportions of marine protection in the world, especially for a country that possesses and accesses deepwater fisheries resources.

DWG strongly disagrees with the need to ban bottom trawling on seamounts, not only because of a low risk to corals and seabed habitats as a result of careful and balanced management but doing so would be disproportional to the balance that is both intended and required by the Fisheries Act 1996.

Food production is an essential component of New Zealand's social and economic wellbeing. As all forms of food production necessitate environmental changes, often wholesale, a balance between retaining natural ecosystems and designating areas for food production is essential.

- On land we have designated 37% for food production and set aside 32% for conservation.
- In our EEZ, 9% of the EEZ has been utilised for food production (91% is un-impacted by food production) and we have set aside 31% for conservation.
- Of the total area New Zealand has set aside for conservation purposes, 94% is within our oceans.

On the balance of the information presented here, bottom trawling does not provide an existential threat to either coral populations or to benthic biodiversity on seamounts as is asserted by DSCC.

DWG remains committed to continuing with informed and rational science-based discussions on further improving the management of bottom trawling and its impacts on the marine benthic habitats, where this may be required.


91% of the seabed within our EEZ is
untouched
and has never been trawled
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1.2 million km²
of New Zealand's seafloor is protected
That's 4.5 times our total land area
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Source: Fisheries New Zealand (2021)


142
seamounts in NZ's EEZ
127
are closed to trawling
or have never been trawled
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Source: NIWA (2021). Update on Seamount Database for Deepwater Group Ltd. Report prepared for DWG, February 2021. 6 p.

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INTRODUCTION

Deepwater Group (DWG) thanks the Environment Select Committee for the opportunity to provide this submission to members in response to the petition and presentations submitted by Karli Thomas on behalf of the Deep Sea Conservation Coalition (DSCC) and its member groups.

We would very much welcome the opportunity to appear in front of the Committee to answer any further questions that you may have.

DWG is a not-for-profit structured alliance of owners of quota in New Zealand's deepwater fisheries. Established in 2005, DWG's role is to provide a professional capacity, assisting quota owners to maintain sustainable harvest levels from New Zealand's deepwater fisheries, manage any environmental effects of these fishing activities and facilitate the further economic and social prosperity of our seafood sector. DWG represents the collective views of the owners of 91% of the quota for deepwater fisheries.

DWG works on behalf of quota owners to deliver their collective vision and mission:

Our vision is ***to be trusted as the best managed deepwater fisheries in the world.***

Our mission is ***to ensure New Zealand's deepwater fisheries resources are managed to optimise their long-term sustainable yields.***

DWG is proud of our strong working relationships with the Ministry for Primary Industries, Fisheries New Zealand (FNZ), the Department of Conservation, fisheries scientists internationally, and others in managing sustainable harvests from New Zealand's deepwater fisheries resources.

Our record of performance in managing New Zealand's deepwater fisheries, as audited against MSC's world class Ecosystem Approach Fisheries Management, is summarised in "*Towards a Deeper Understanding*."[1]

[1] DWG (2021) *Towards a Deeper Understanding*. Deepwater Group Report 2021. 76pp https://deepwatergroup.org/wp-content/uploads/2021/03/DWG-Report-2021-A4-230321.pdf

SUBMISSIONS

The DSCC Petition Report asserts that the current protection measures are not sufficient to protect deep-sea corals.

Put simply, our reading of the DSCC petition report is that they have purposefully collated selected information that asserts four primary tenets:

1. **Seamounts and other seamount features in New Zealand's EEZ are biodiversity hotspots for highly endemic cold-water corals and 'coral gardens'**
2. **New Zealand cold-water coral and biogenic habitats are under threat from bottom trawling (which they assert to be their greatest threat)**
3. **The New Zealand government has failed to protect these habitats (asserting current protections are not enough)**
4. **The only option left is to 'ban bottom trawling on seamounts'**

DWG submits scientific information and analyses in order to correct the misinformation and inconsistencies that form the basis of each these four tenets.

Notably, as the Petitioners report conflates seamounts with other underwater geographic features (including knolls, hills, the continental shelf and slope features that also support biogenic habitat types) much of its content is based on incomplete knowledge and is lacking in essential context.

Much of the information relied upon in the report is historic and therefore incorrect in terms of current deepwater fishery practices. Many of the conclusions (along with much of the reference material) are only relevant in an international context and are not directly applicable within New Zealand's EEZ.

We provide our submission to not only clarify the magnitude of our disagreement with the tenets and content within DSCC's petition report but to also provide the Environment Select Committee with a summary of the pertinent scientific facts with respect to bottom trawling on seamounts on other underwater topographical features and on open flat or gently sloping seabed.

Our submission is that the management of New Zealand's EEZ environment by the Government and the deepwater seafood industry in a global context is not only comprehensive but is also recognised internationally as being second to none.[2]

[2] FAO. Fishery and Aquaculture Country Profiles: New Zealand (FAO Fisheries & Aquaculture - Fishery and Aquaculture Country Profiles - New Zealand) August 2021

1. Seamounts and other seamount features in New Zealand's EEZ are biodiversity hotspots for highly endemic cold-water corals and 'coral gardens'

1.1 Seamounts

The DSCC Petition Report claims that New Zealand's EEZ is one of the largest in the world (true), but that it is also a *"global hotspot for biodiversity"* located on over "*800 known seamounts within our EEZ*[3]".

The DSCC Petition Report incorrectly defines 'seamounts' as:[4]

> *"Any geographically isolated topographic feature on the seafloor taller than 100 m, including ones whose summit regions may temporarily emerge above sea level, but not including features that are located on continental shelves or that are part of other major landmasses."*

Rather than using the internationally accepted definitions for discrete Underwater Topographical Features (UTFs), known as 'seamounts', 'knolls' and' hills', DSCC conflates these different UTFs by applying a biologically based definition which the authors of that definition utilised in an attempt to "*combine diverse perspectives*."[5] The use of contextual names and definitions by the DSCC that are not officially recognised leads to disparity, confusion and unhelpful complexity.

DSCC's putative definition of 'seamounts'[6], is not the internationally accepted geoscience definition[7], nor is it the definition accepted by the New Zealand Geographic Board[8] and, if it were to be applied in a marine management sense, it would likely lead to inappropriate management responses.

What is a Seamount?

The designation of seamounts and other underwater topographical features has been standardised internationally for decades and it doesn't need redefining by biologists or eNGOs in New Zealand. There are a number of discrete UTF types defined and recognised internationally by geophysical science, the three applicable ones in this context are:

Seamount

> *"A distinct generally equidimensional elevation greater than 1,000 meters above the surrounding relief as measured from the deepest isobath that surrounds most of the feature."*[9]
>
> *"An elevation rising generally more than 1,000 meters and of limited extent across the summit"*[10]

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[3] DSCC (2021) Save deep sea corals: ban bottom trawling on seamounts. Pp 7-8

[4] Hubert Staudigel, Anthony A.P. Koppers, J. William Lavelle, Tony J. Pitcher, and Timothy M. Shank (2010) Defining the Word "Seamount" *Oceanography (BOX 1)* 23:1 – 20.

[5] *Ibid*.

[6] *Ibid*.

[7] IHO-IOC (2019) B-6 Standardization of Undersea Feature Names (Edition 4.2.0 – October 2019) defines a Seamount at 2-12 https://iho.int/uploads/user/pubs/bathy/B-6_e4%202%200_2019_EF_clean_3Oct2019.pdf; The General Bathymetric Chart of the Oceans (GEBCO) https://www.gebco.net/data_and_products/undersea_feature_names/

[8] New Zealand Geographic Board (2016) Standard for undersea feature names: NZGBS 60000 (1 August 2016) https://www.linz.govt.nz/system/files_force/media/Standard%20for%20undersea%20feature%20names%20-%20NZGBS60000_1.pdf?download=1

[9] New Zealand Geographic Board (2016) Standard for undersea feature names: NZGBS 60000 (1 August 2016); IHO-IOC (2019) B-6 Standardization of Undersea Feature Names (Edition 4.2.0 – October 2019) defines a Seamount at 2-12 The General Bathymetric Chart of the Oceans (GEBCO)

[10] USBGN (2005) Policies and Guidelines for the Standardization of Undersea Feature Names (Approved by the U.S. Board on Geographic Names Advisory Committee on Undersea Features 6 April, 1999 With US BGN edits incorporated 19 July 2005 (Supersedes Guidelines approved 25 October 1978), p5.

Knoll

> *An elevation rising generally more than 500 meters and less than 1,000 meters and of limited extent across the summit.* [11]

Hill

> *Elevations rising generally less than 500 meters (generally of irregular shape).* [12]

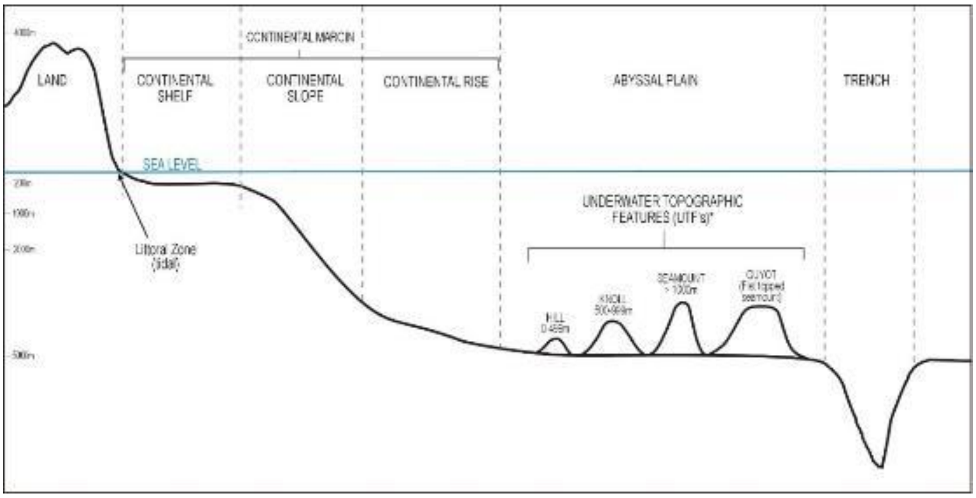

Figure 1: Diagrammatic representation (not to scale) showing terminologies and depths for common Underwater Topographical Features (steepness of features is indicative only). Note that UTFs are depicted here on the abyssal plain but they may also occur on the continental margin. True seamounts do not occur on the continental shelf, as structures of this size would protrude above the sea surface as islands.

Within New Zealand's EEZ most bottom trawling on UTFs is undertaken in tows of very short duration, with less than 10 minutes of bottom contact, down parts of the slopes of knolls and hills on the continental slope. While some of these UTFs may contain coral habitats (in part), many of these UTFs do not harbour corals.

Recognising that we do not fish true seamounts within the EEZ to any great extent, over recent years some fisheries scientists have attempted to incorrectly categorise all UTFs as 'seamounts'.

These unilateral and unauthorised attempts at seamount re-categorisation are unhelpful to international science, to marine conservation, or to managing fisheries sustainably.

Why do the correct definitions matter?

The effective management of UTFs depends very much on the benthic biodiversity on each and on the surrounding oceanic environment. Seamounts, knolls and hills differ greatly in terms of scale, habitats, size, and to their ability to create micro-niches through influencing oceanographic conditions (such as generating upwelling currents).

On land, our management of topographical features is correctly aligned to each, based on criteria such as uniqueness, size, respective ecosystems, microclimates, habitat types. For example, we do not apply the same management model to Mt Eden, in Auckland, or to Mt Victoria, in Wellington, as we do to Mt Ruapehu. The smaller topographical features may be accorded conservation measures, at least on parts, but are not large enough to be designated as National Parks.

It should be no different underwater. It makes as little sense to manage small structures the size of Mt Victoria or Mount Eden (or indeed any of the 48 volcanic cones in the Auckland region) as National Parks as it would do if these were underwater. The sizes and aspects of many of these smaller features on land are not dissimilar to

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[11] New Zealand Geographic Board (2016) Standard for undersea feature names: NZGBS 60000 (1 August 2016)

[12] *Ibid*., See also IHO-IOC (2019) B-6 Standardization of Undersea Feature Names (Edition 4.2.0 – October 2019) defines a Seamount at 2-12 The General Bathymetric Chart of the Oceans (GEBCO)

many of the UTFs fished within the EEZ. These smaller UTFs do need management consideration, and this has been applied.

It is important to comprehend the vast sizes of true seamounts compared with the smaller sizes of most deepwater hills and knolls that are fished. As a basis for comparison, we have used NIWA data to calculate the average areas (ranges) of a number of UTFs:[13]

- Average area of a hill: 6 km^2 (1 – 20 km^2)
- Average area of a knoll: 290 km^2 (120 – 460 km^2)
- Average area of a seamount: 723 km^2 (125 – 2,170 km^2)

By this measure, a seamount covers, on average, 120 times more area than a hill.

The relative sizes of Taranaki/Mt Egmont and the 180º Hills Complex (of which Graveyard Hill is a part) are shown in Figure 2: 3D and cross-section comparisons of Mt Taranaki and the 180 Hills Complex, Northwest Chatham Rise (of which Graveyard Hill is the most southern feature on the transect shown on the 3D image).Figure 2.

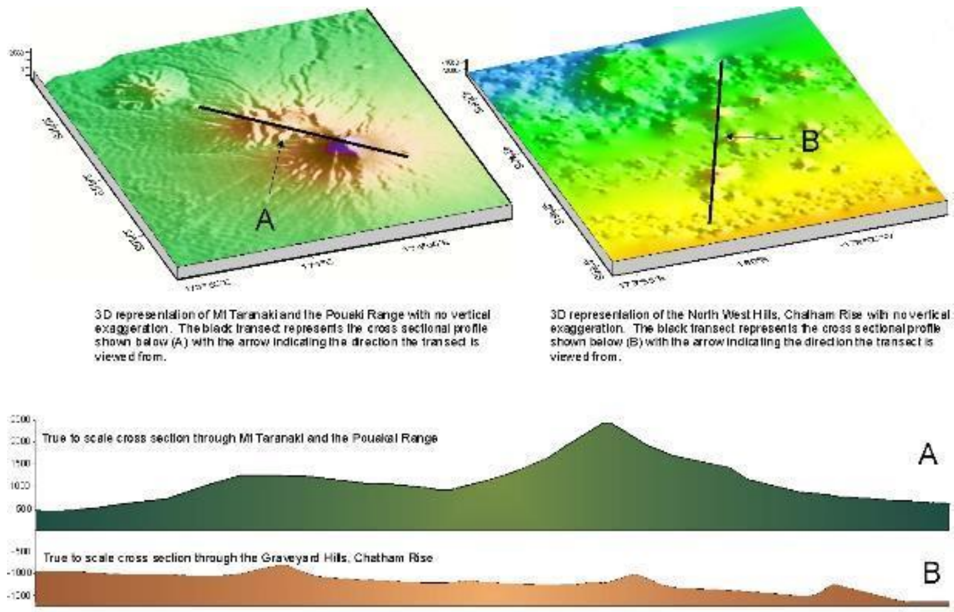

Figure 2: 3D and cross-section comparisons of Mt Taranaki and the 180 Hills Complex, Northwest Chatham Rise (of which Graveyard Hill is the most southern feature on the transect shown on the 3D image).

The DSCC Petition Report incorrectly characterises 'seamounts' as "any geographically isolated topographic feature on the seafloor taller than 100 m". The internationally accepted definition of a 'seamount' is an underwater feature with an elevation of more than 1,000 metres. Smaller features are known as knolls and hills.

DWG submits that there are clearly defined, and globally standardised designations of seamounts and other underwater topographical features accepted by the International Oceanographic Commission, the International Hydrographic Organisation and by the New Zealand Geographic Board. The application of ill-considered and putative definitions in a marine management sense will likely lead to inappropriate management responses.

DWG recommends the Select Committee bases their considerations on the scientific designations of seamounts and other underwater topographical features as have been globally standardised and as are recognised by the New Zealand Geographic Board.

[13] Calculations exclude both the largest hill (Seamount #401, 200km^2) and the largest seamount (Bollons, 35,000 km^2) as each are unusually broad for their size and distort the comparison.

How Many Seamounts in New Zealand's EEZ?

By re-categorising the definition of seamounts, the DSCC Petition Report is able to incorrectly claim that there are over 800 'seamounts' whose biogenic habitats are vulnerable to trawling.

Information provided by NIWA and Fisheries New Zealand (FNZ) on seamounts (i.e., underwater features ≥1,000 m in elevation) within New Zealand's EEZ establishes DSCC's information to be incorrect. FNZ has contracted NIWA to update their database on UTFs and the results of this work are due to be reported shortly.

The best current data from NIWA and FNZ on UTFs within New Zealand's EEZ is that there are:

- 142 known seamounts (features with elevations ≥1,000 m)[14]
- 71 of these seamounts (50%) are closed by law to trawling (being inside the BPAs and/or the 'Seamount' Closures)
- 56 of the 71 seamounts not subject to formal protection have never been trawled
- 36 of these seamounts have summits >1,600 m and are therefore too deep to trawl
- 15 of these seamounts have been trawled once or more during the period 1989-90 to 2018-19
- 9 of these seamounts have been trawled once or more during the last decade
- In addition to seamounts, there are a number of smaller UTFs:
  - 153 known knolls (features with elevation 500-1,000 m)
  - 408 known hills (features with elevations <500 m)

The locations of these seamounts within fishable depths are shown in Figure 3.

NIWA has advised DWG that there are 142 known seamounts within New Zealand's EEZ 127 of which (89%) are either closed to trawling or have never been trawled. As bottom trawling has only occurred on 9 (6%) of seamounts over the past decade, fishing does not comprise the greatest threat to the biogenic habitats on seamounts within New Zealand's EEZ.

[14] Clark, M. (2021). Update on Seamount Database for Deepwater Group Ltd. NIWA Client Report 2021034WN prepared for Deepwater Group Ltd. 6 p.

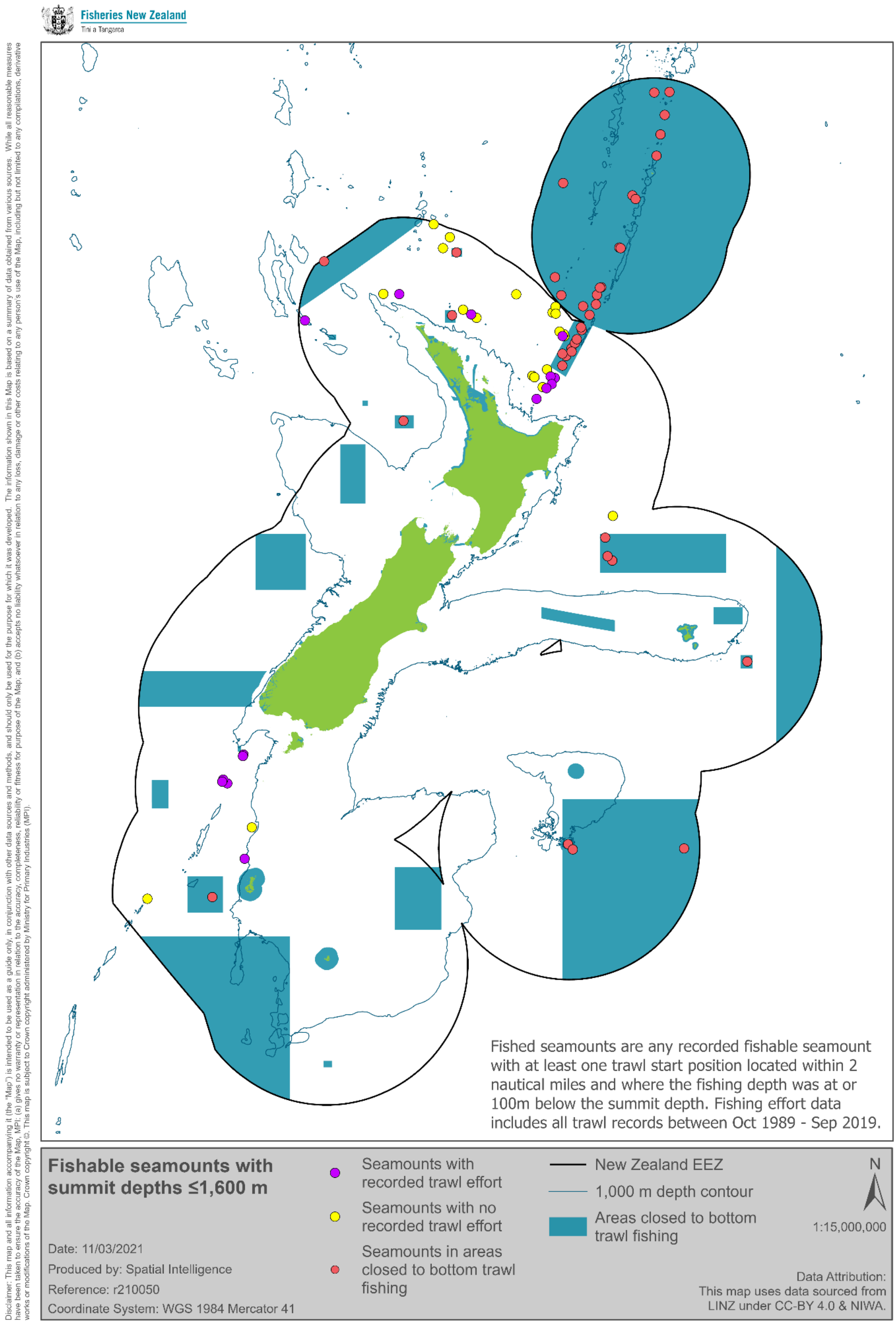

Figure 3: Localities of seamounts at fishable depths either closed (red), unfished (yellow) or fished (purple) within New Zealand's EEZ.

Corals on Seamounts

Seamounts vary greatly in their substrate types and benthic biodiversity and range widely across New Zealand's EEZ, throughout the region from sub-Tropical to sub-Antarctic oceanographic waters.

NIWA records show that of 126 seamounts within the EEZ for which information on coral presence/absence is available:

- 20% are known to support coral, including seamounts within area closures and those with summits that are deeper than 1,600 m
- 36% of seamounts with summits shallower than 1,600 m are known to support coral[15]
- 33% of fished seamounts are known to support coral[16]

Of the 20% of seamounts known to have coral, photographic evidence shows that the distribution of coral does not blanket the entire seamount but is generally found in patches. Figure 4 (below) from a NIWA voyage report on a Louisville seamount chain (outside the New Zealand EEZ) is indicative of the variation of habitat on a seamount. It is important to note that they are not festooned in coral habitat. [17]

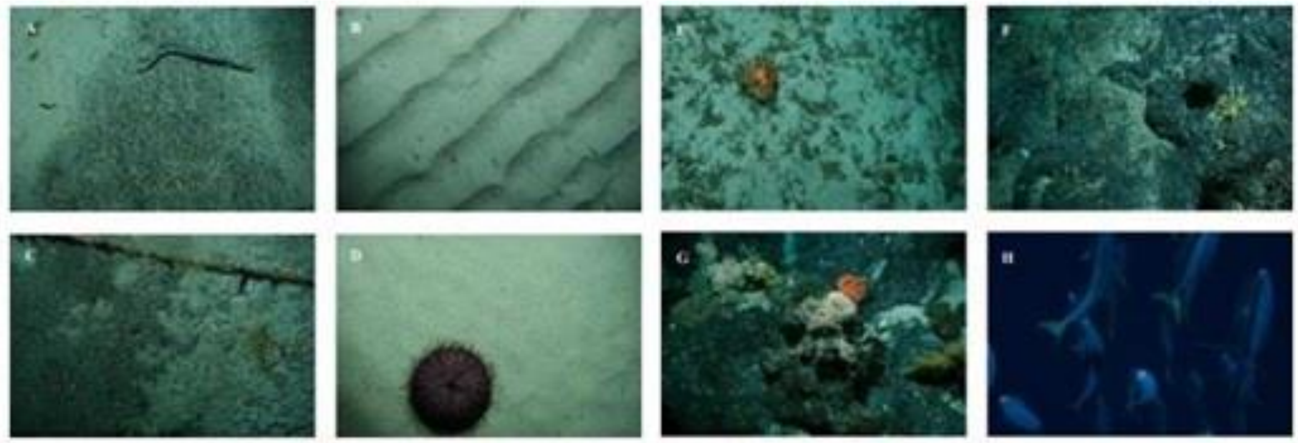

Figure 4: Ghost Seamount. A, conger eel (Bassanago sp.) and zoanthid cnidarians at 664 m; B, tubeworms and holothurians (sea cucumbers) at 1100 m; C, trawl warp with attached stony cup corals at 632 m; D, echinothurioid sea urchin (Sperosoma sp.) at 984 m; E, brisingid asteroid and zoanthids at 671 m; F, crinoid and gastropod at 1068 m; G, stony coral and echinoderms at 1119 m; H, yellowtail kingfish (Seriola lalandi lalandi) at 20 m.

A similar NIWA voyage report that randomly sampled benthic habitats on the Chatham Rise in 2017 provided a majority of photos of benthic habitats that demonstrated a fine muddy substrate with very little evidence of coral and other biogenic structures.[18]

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[15] NIWA UTF Database 2010

[16] FNZ.Replog 13526 Information Request on Coral Captures on Seamounts (March 2021); A 2021 data extract from FNZ showed coral records from 5 out of 15 seamounts fished

[17] Clark, M.R., Owen Anderson, Dave Bowden, Caroline Chin, Steve George, Debra Glasgow, John Guinotte, Santiago Hererra, Deb Osterhage, Arne Pallentin, Steve Parker, Sonia Rowley, Rob Stewart, Di Tracey, Steve Wood, Cong Zeng (2014) Voyage Report of a Survey of Deep-Sea Habitats of the Louisville Seamount Chain (Tan1402) *Project report VMES133* (May 2014) 84p.

[18] Bowden, D.A.; Davey, N.; Fenwick, M.; George, S.; Macpherson, D.; Ray, C.; Stewart, R.; Christensen-Field, C.; Gibson, K. (2017). Quantifying Benthic Biodiversity: a factual voyage report from RV Tangaroa voyage TAN1701 to Chatham Rise, 4 January – 2 February 2017. New Zealand Aquatic Environment and Biodiversity Report No. 185. 98 p. p60.

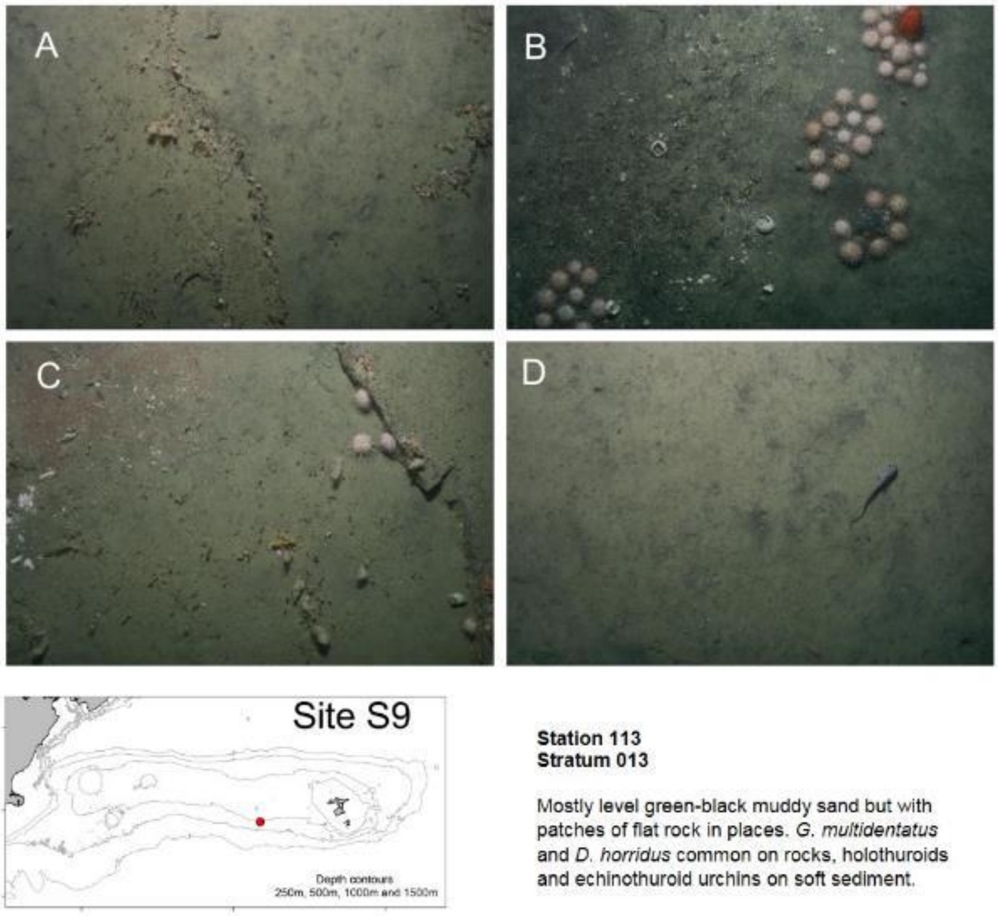

Figure 5: Images showing fine muddy substrate demonstrating very little coral

NIWA's underwater images show small amounts of corals occurring in discrete locations on flat seabed as well as on sloping seabed (such as canyons, drop-offs, seamounts, knolls and hills). Most often corals are seen in groups or clumps and not as contiguous beds covering large areas.

Scientific and observer records demonstrate that coral species are widespread throughout New Zealand's EEZ occurring over a wide range of depths (both deeper and shallower than those fished) and across a wide variety of habitat types (not just on seamounts, knolls and hills).

Seamounts vary greatly in their substrate types and benthic biodiversity ranging widely across New Zealand's EEZ, from sub-Tropical to sub-Antarctic oceanographic waters.

NIWA records show that of the seamounts for which information on coral presence/absence is available:

- ***20% are known to support coral, including seamounts within area closures and those with summits that are deeper than 1,600 m***
- ***36% of seamounts with summits shallower than 1,600 m are known to support coral.***
- ***33% of fished seamounts are known to support coral***

1.2 Corals and Endemism

DSCC assert that New Zealand cold-water coral species exhibit higher than normal endemicity.[19]

> *"We also have extensive coral endemism within our EEZ meaning some of our corals are unique globally"*

Their report also claims that New Zealand has the "*highest proportion of threatened indigenous species in the World*" and overrated an extinction risk that has "*worsened overall in the last 10-15 years*".

The New Zealand landmass is isolated from other landmasses and has been so for a very long period of geological time. This has led to relatively high levels of endemicity in the terrestrial flora and fauna of New Zealand.[20]

The same driver of endemism, isolation, is not present in the marine ecosystem, which is connected to marine ecosystems through the directed oceanic current systems that operate in the wider Tasman Sea, South Pacific and adjacent oceans.[21]

Cairns (1991) reported that 32% of New Zealand Scleractinia were estimated to be endemic,[22] but Clark and Anderson note that "*care must be taken with the interpretation of this number, as it is likely that these species could be found to be more cosmopolitan with an increased sampling effort".*[23]

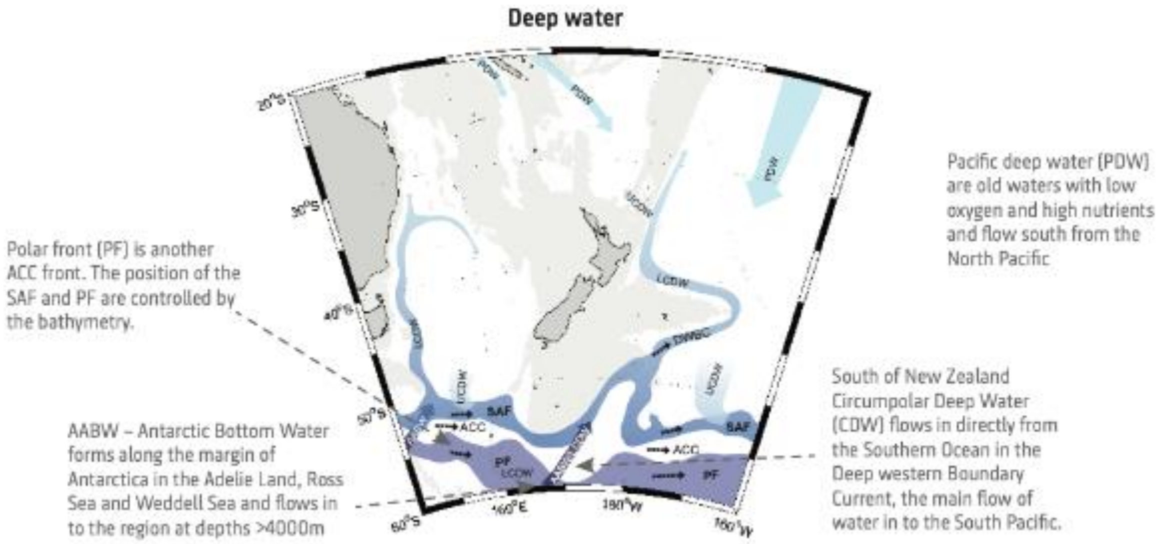

Figure 6: Deepwater Ocean currents, from Tracey & Hjorvarsdottir (2019).

Regarding black corals ,Tracey & Hjorvarsdottir (2019)[24] note:

> *"It is difficult to identify true New Zealand endemics at this stage because, so few adjacent regions have been surveyed as extensively. If we consider, however, most of the new species currently being described in Opresko (submitted) and Opresko et al. (submitted) as endemics then there are about 20 "endemic" species and one "endemic" genus in the New Zealand region, with the total number of black coral species being around 80 (Dennis Opresko pers. comm)."*

[19] DSCC (2021) Save deep sea corals: ban bottom trawling on seamounts. Pp 7-8
[20] See New Zealand Biodiversity Hotspots <https://www.cepf.net/our-work/biodiversity-hotspots/new-zealand/species>, <https://teara.govt.nz/en/native-plants-and-animals-overview/page-1>
[21] Tracey, D.M. & Hjorvarsdottir, F. (eds, comps) (2019). The State of Knowledge of Deep-Sea Corals in the New Zealand Region. *NIWA Science and Technology Series Number 84*. 140 p.
[22] Cairns, S.D. (1991). The Marine Fauna of New Zealand: Stylasteridae (Cnidaria: Hydroida). Memoir N.Z. Oceanographic. Institute. 98: 1-99; Cairns, S. (1995). The marine fauna of New Zealand: Scleractinia (Cnidaria: Anthozoa). Memoir N.Z. Oceanographic Institute, 103: 1–210
[23] Clark, M.R., Anderson, O.A. (2013). Information on the structure and function of "UTF" habitats. Revised presentation material for Deepwater Group Ltd. Orange Roughy MSC pre-assessment meeting 23 August 2013 Presentation to Deepwater Group. Referenced in Clark and Anderson (2015).

Much of the knowledge on coral resilience and fishing impact recovery in New Zealand is based on sampling from one cluster of hills on the Chatham Rise, east of New Zealand (known as the Graveyard hills).[24]

While these underwater hills provide a "*natural experiment*" for studying the impacts of trawling and the recovery of biogenic habitats this is a very localised experiment.[25] Extrapolating any conclusions on benthic biodiversity from here to the larger New Zealand EEZ context, which extends from the sub-Antarctic to the sub-tropical regions, is problematic. As an illustration, there are 48 volcanic cones in Auckland's volcanic field. Could cursory sampling of six be used to draw conclusions in a broad New Zealand context on biodiversity, endemicity or species distribution relating to the several hundred volcanic cones found on land? Could sampling on six Auckland volcanic cones teach us about the biodiversity on Tongariro, Ruapehu, or Ngauruhoe? What about the volcanoes of Dunedin, Lyttleton, or any of the other urban areas situated in the vicinity of volcanic cones?

We simply do not have sufficient data to conclude that New Zealand seamounts harbour endemism to any large degree and, given the connectedness of the oceanic environment at these depths, the best hypothesis might be one based on uniformity of biodiversity. Indeed, studies around the world where sampling has been more detailed have moved away from the hypothesis of endemicity between seamounts in similar oceanographic locations.

One of the best-studied seamounts is the Davidson Seamount, 120 km off the coast of California. This true seamount (>1,000 m in elevation) has been relatively well studied and suffers less from the low sampling bias that has led to a possible misunderstanding of endemicity elsewhere. According to their report, the authors when focussing on questions of endemicity and community structure found:[26]

> *"… little support for the SMEH [seamount endemicity hypothesis] among megafauna of a Northeast Pacific seamount; instead, finding an assemblage of species that also occurs on adjacent continental margins."*

While it is recognised that there will likely be some proven endemicity amongst benthic organisms within parts of New Zealand's EEZ,[27] this study raises questions about claims that there might be high levels of endemicity of corals within New Zealand waters where the scale and extent of research and benthic sampling have been considerably less.

Put simply, there is a very high likelihood that the very low sampling densities will, in and of themselves, present different benthic organisms between samples.

M.R. Clark *et al*., (2019) have acknowledged the need for more comprehensive sampling:[28]

> *"The distribution of benthic communities at small spatial scales on seamounts can be highly variable, driven by multiple habitat-types present in these complex features. This variability is a challenge for survey design, with the need to ensure sufficient area or habitat types within the [seamount] are sampled."*

Deep Sea Conservation Coalition (DSCC) has asserted that the benthic marine fauna in New Zealand waters (corals in particular) have a higher-than-average degree of endemism. Scientific evidence in support of this contention is poor. A priori, given the connectedness of oceans, the New Zealand marine benthic fauna would not be expected to show a greater degree of endemism than other similar oceanic areas.

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[24] Clark MR, Bowden DA, Rowden AA and Stewart R (2019) Little Evidence of Benthic Community Resilience to Bottom Trawling on Seamounts After 15 Years. Front. Mar. Sci. 6:63. doi: 10.3389/fmars.2019.00063
[25] *Ibid*.
[26] McClain C. R., Lundsten L., Ream M. and Barry J, DeVogelaere A (2009) Endemicity, Biogeography, Composition, and Community Structure on a Northeast Pacific Seamount. PLoS ONE 4(1): e4141. doi:10.1371/journal.pone.0004141
[27] See Consalvey, M., MacKay, K and Tracey, D. (2006). Information review for protected deep-sea coral species in the New Zealand region. NIWA Client Report: WLG2006-85, prepared for Department of Conservation, 53p. which listed 420 identified coral species in NZ waters, of which 27% were regarded as being endemic.
[28] Clark MR, Bowden DA, Rowden AA, and Stewart R (2019) Little Evidence of Benthic Community Resilience to Bottom Trawling on Seamounts After 15 Years. Front. Mar. Sci. 6:63. doi: 10.3389/fmars.2019.00063. p 11

Need for More Research on Deep Water Corals

Scientific and observer records demonstrate that coral species are widespread throughout New Zealand's EEZ occurring within a wide range of depths (both deeper and shallower than are trawled) and across a wide variety of habitat types (not just on seamounts, knolls and hills).

There is no scientific evidence that the benthic marine fauna in New Zealand, and corals in particular, have a higher-than-average degree of endemism. A priori, given the connectedness of the oceans, the New Zealand marine benthic fauna would not be expected to show a greater degree of endemism than other locations and the best available information is that care must be taken with such interpretations as it is likely that these species could be found to be more cosmopolitan with an increased sampling effort.[29]

Not all seamounts, knolls or hills are habitats for coral species (NIWA records show that only 20% are known to have coral).[30] Further extensive sampling is required.

Underwater images by NIWA and CSIRO show corals occurring in discrete locations on flat seabed, on sloping seabed (such as canyons, drop-offs) as well as on seamounts knolls and hills. Most often corals are seen to be in groups or clumps and not as contiguous beds covering large areas.

Most of the knolls and hills where trawling has occurred have not had their entire surface covered by trawl tows.[31] Underwater images on some knolls and hills that have been trawled show areas without corals where no trawling has occurred as well as areas with coral that have not been trawled.

As most of the information on the distribution of corals has been derived from fishing vessels, these data do not adequately reflect the true distribution within New Zealand's EEZ because they are an artefact of limited sampling effort from within fishing grounds which comprise only very small portions of coral habitat ranges.

Records of corals from commercial trawls have not consistently distinguished between live and dead coral. Research has identified that over 60% of stony coral samples examined in New Zealand were dead and most likely resultant from historical environmental changes rather than from recent anthropogenic influences.[32]

DWG reiterates our call to the Government to fund public good science to establish the locations, extent and nature of deepwater corals across New Zealand's EEZ.

[29] See Roberts & Hirshfield, (2003) who suggest records of deepwater coral diversity may have more to do with the distribution of marine biologists than the distribution of corals. https://web.archive.org/web/20090226041832/http://www.oceana.org/fileadmin/oceana/uploads/destructive_trawling/savecorals/News/oceana_coral_report_old.pdf

[30] Clark, M., Anderson, O., Dunkin, M., Mackay, K., Notman, P., Roux, M-J and Tracey, D. (2015). Assessment of orange roughy and oreo trawl footprint in relation to protected coral species distribution. A report prepared by NIWA for Deepwater Group Ltd. 57p

[31] *Ibid*.

[32] Burgess (2002) in Consalvey et al., (2006)

Spatial Distribution of Coral

Our understanding of the spatial distribution of corals, sponges and other epi-benthic faunal groups within New Zealand's EEZ and the adjacent wider oceanic region is based on the collection and identification of individual specimens. The two principal sources of this information are samples from scientific research work and sample records from monitoring of fishing activities.

As noted elsewhere, most coral samples collected and identified have come from the monitoring of fishing activities. FNZ's Scientific Observer Programme places trained observers onboard commercial fishing vessels to sample catches of both fish and non-fish species.

Around 48% of trawl tows in deepwater fisheries are observed, with up to 100% of tows being observed in fisheries where there is a high likelihood of interaction with protected species. In addition, since 2009 industry has reported all non-fish bycatch as required by law, and these records are also available.

Most of the scientific surveys have also focused on the known fishing grounds (e.g., routine wide-area trawl surveys on the Chatham Rise, in the sub-Antarctic and along the west coast of the South Island). During these sureys, scientists have sampled all species captured using bottom trawl gear with smaller mesh sizes than are used by commercial vessels. These surveys record captures of corals over areas wider than are commercially bottom trawled.

Within the fishing grounds, where many thousands of samples have been taken, given the size of the geographic area and the numbers of species, the quality of the sampling effort (i.e., numbers of species and identified samples per species per unit area) is very low. Benthic species distributions and associated analyses within the New Zealand EEZ are usually described at a 1 km^2 spatial scale, which recognises the paucity of data. With more data, a finer scale of analyses and improved understandings could be achieved.

The data supporting our understanding of benthic fauna distribution is strongly driven by the distribution of known fishing grounds and observed fishing effort. While coral species are known to be widespread throughout New Zealand's EEZ, as the areas outside of the fishing grounds are substantively under-sampled, there is limited detailed knowledge on precise locations of species and on their abundances.

Modelling Coral Distribution

Recognising that the observed distribution of corals is biased, due to sampling principally relying upon collection from the fishery, NIWA has developed modelling approaches in an attempt to assess suitable habitat based on records of coral captures and environmental parameters, of which depth is the most important.[33]

These models offer an assessment of the likely distribution of suitable habitats, as a proxy for the likely distribution of individual coral species or groups of coral species. The outputs of these models are imprecise due to the sparse data available and the scales at which the models can predict. Ground-truthing these models has proven to be both challenging and expensive and has yet to be adequately completed within New Zealand's EEZ.

The models do, however, provide a useful source of additional information provided that the uncertainties are fully considered.

NIWA undertook analyses in support of the successful bid to have New Zealand's three largest orange roughy fisheries certified as sustainable by the Marine Stewardship Council. The results of these models are presented in Figure 7, Figure 8 and Figure 9, together with other relevant spatial distributions. These additional spatial distributions include the oreo and orange roughy fisheries five-year fishing footprints (2008-09 to 2012-13); the 500 m to 1,500 m depth range; the spatial distribution of the Kermadec bioregion; and the distribution of various

[33] See for example, Tracey, D.M. & Hjorvarsdottir, F. (eds, comps) (2019). The State of Knowledge of Deep-Sea Corals in the New Zealand Region. NIWA Science and Technology Series Number 84. 140 p; Anderson, O., Tracey, D., Bostock, H., Williams, M. and Clark, M. (2014). Refined habitat suitability modelling for protected coral species in the New Zealand EEZ. NIWA report for Marine Species and Threats, Department of Conservation. 46p.

types of marine protected areas (Closed Seamount Areas, Benthic Protection Areas, and Large Marine Reserves).[34]

They are reproduced below to illustrate the form and distribution of the different information within the EEZ and to show and quantify the scale of overlap between the distribution of corals and the deepwater fisheries for orange roughy and oreos.

Figure 7 shows the observed distribution of Scleractinian (stony) corals and the modelled distribution of suitable habitat, where it can be seen that there is a good but not perfect overlap between high habitat suitability (pink and purple) and the observed occurrence of stony corals (red squares). Twenty-one percent (21%) of the high habitat suitability distribution is within areas fully protected from bottom trawling. It is also clear from Figure 7 that, while there is some overlap between the high habitat suitability areas and the oreo/orange roughy fishing footprints (orange), this is very small, having been quantified for the five-year period 2008-09 to 2012-13 to be 0.4%.

Figure 8 shows the same information for gorgonian corals, where it can be seen that there remains an overlap between high habitat suitability (pink and purple) and the observed occurrence of gorgonian corals (red squares) but that this is poorer than that seen for stony corals (Figure 7). This is highly likely due to the considerably smaller numbers of samples of gorgonian corals within the EEZ. Thirteen percent (13%) of the high habitat suitability distribution is within areas fully protected from bottom trawling. Figure 8 also shows that, while there is some overlap between the high habitat suitability areas and the oreo/orange roughy fishing grounds (orange), this is very small, having been quantified for the 5-year period 2008-09 to 2012-13 to be 0.3%.

Figure 9 shows the Antipatharian (black) corals, where the quality of the overlap between high habitat suitability (pink and purple) and the observed occurrence of Antipatharian corals (red squares) is good in the north and east of the EEZ but poorer in the south and west. Twenty-seven percent (27%) of the high habitat suitability distribution is within areas fully protected from bottom trawling.

NIWA has used modelling approaches to assess the likely areas of suitable coral habitat, based on records of coral captures and environmental parameters. Results from this work assess the overlap of these areas and bottom trawling to be less than 1%. By this measure, almost all of the areas where scientists predict coral may exist are outside of our fishing grounds and are untouched by bottom trawling.

[34] Clark, M., Anderson, O., Dunkin, M., Mackay, K., Notman, P., Roux, *M*-J and Tracey, D. (2015). Assessment of orange roughy and oreo trawl footprint in relation to protected coral species distribution. A report prepared by NIWA for Deepwater Group Ltd. 57p

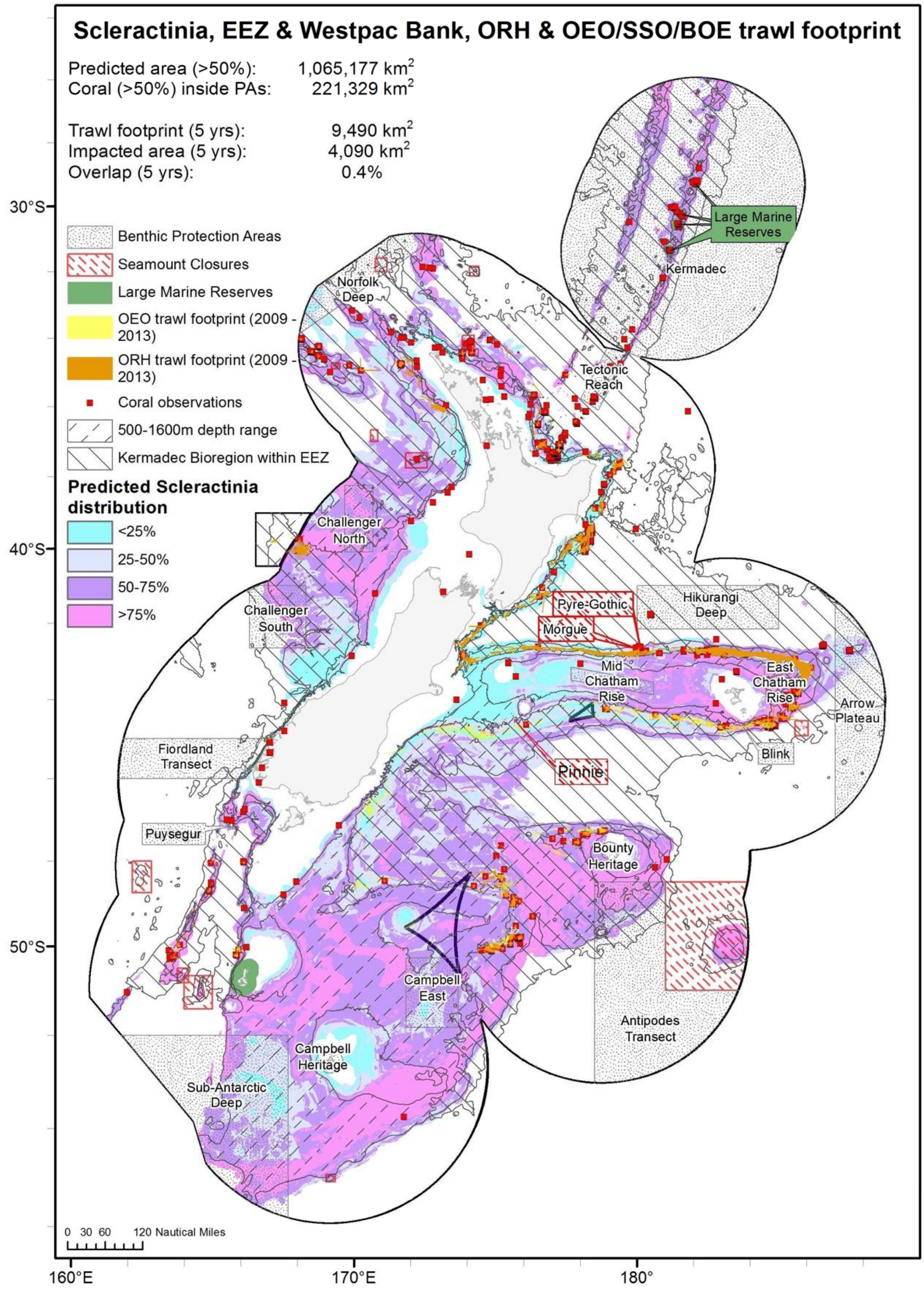

Figure 7: Spatial distribution of observations of and predicted suitable habitat (percentage likelihoods) for Scleractinian stony branching corals (*Goniocorella dumosa, Solenosmilia variabilis, Enallopsammia rostrata, Madrepora oculata*) combined for the New Zealand EEZ. Also plotted within the EEZ are the oreo and orange roughy fisheries five-year fishing footprints for 2008-09 to 2012-13); the 500m to 1500m depth range; the spatial distribution of the Kermadec bioregion; and the distribution of various types of marine protected areas (Closed Seamount Areas, Benthic Protection Areas, and Large Marine Reserves). Source: Clark et al. (2015).

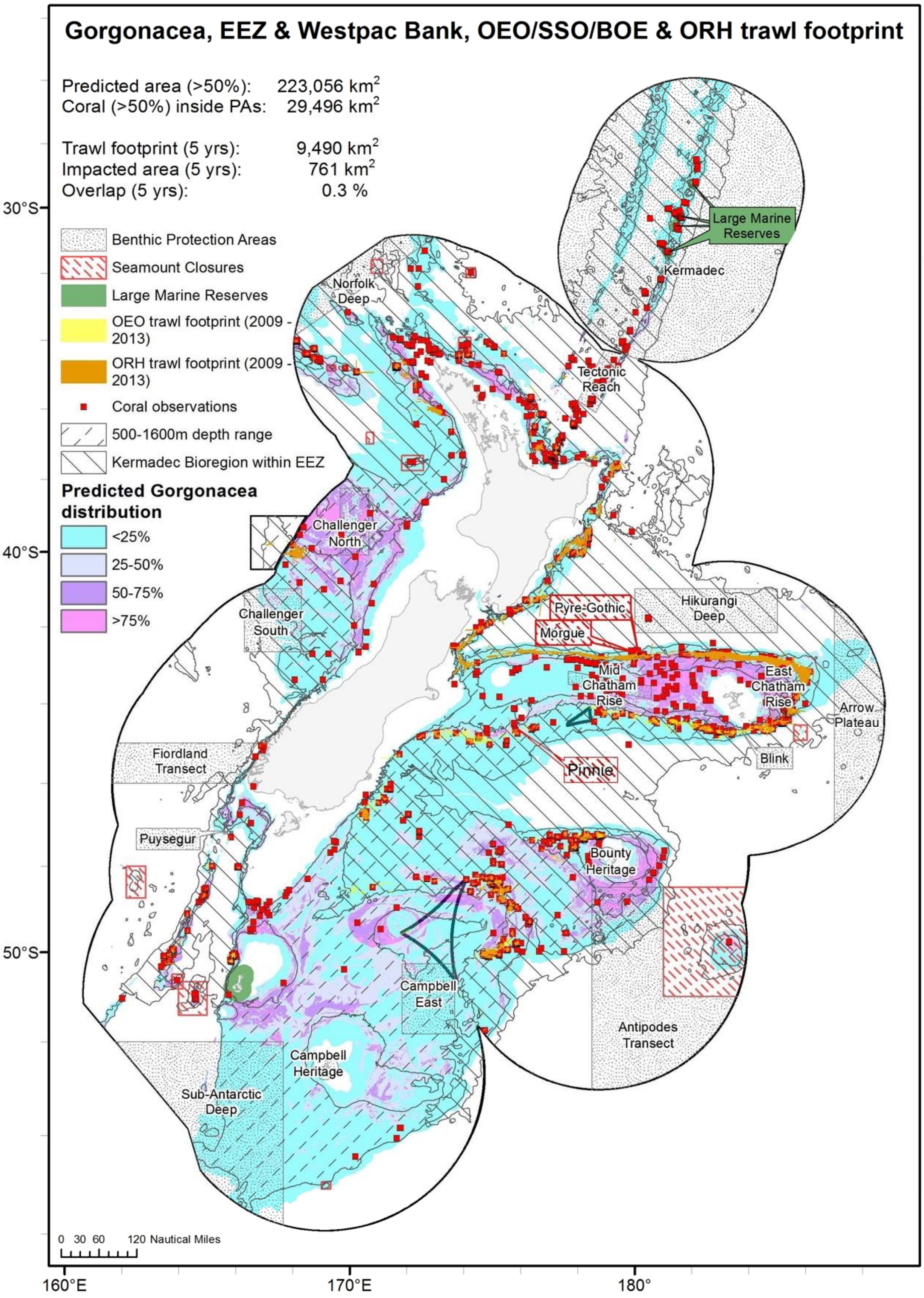

Figure 8: Spatial distribution of observations of and predicted suitable habitat (percentage likelihoods) for Gorgonian corals (all records, selected genera include the precious coral Corallidae (Corallium and Hemicorallium) and selected Primnoids and Plexaurids (sea fans)) for the New Zealand EEZ. Also plotted within the EEZ are the oreo and orange roughy fisheries five-year fishing footprints for 2008-09 to 2012-13); the 500m to 1500m depth range; the spatial distribution of the Kermadec bioregion; and the distribution of various types of marine protected areas (Closed Seamount Areas, Benthic Protection Areas, and Large Marine Reserves). Source: Clark et al. (2015).

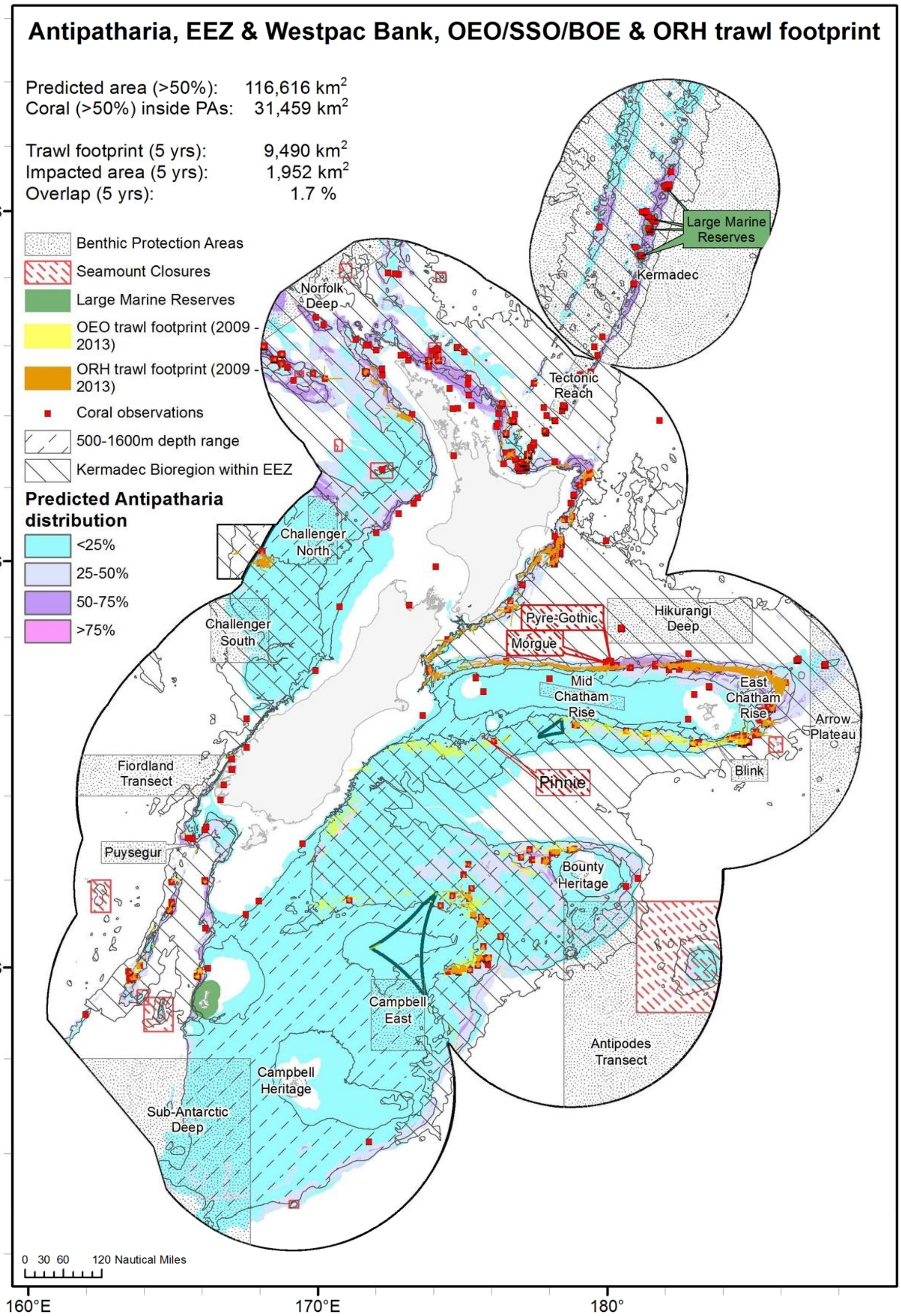

Figure 9: Spatial distribution of observations of and predicted suitable habitat (percentage likelihoods) for Antipatharia (black corals) (Order level, all records). for the New Zealand EEZ. Also plotted within the EEZ are the oreo and orange roughy fisheries five-year fishing footprints for 2008-09 to 2012-13); the 500m to 1500m depth range; the spatial distribution of the Kermadec bioregion; and the distribution of various types of marine protected areas (Closed Seamount Areas, Benthic Protection Areas, and Large Marine Reserves). Source: Clark et al. (2015).

Depth Distribution of Corals

There is a clear link between the spatial and depth distributions of coral.

Information has been collated about specimens of coral and coral-like species reported from the New Zealand region.[35] The depth range information was extracted from these two papers for 106 species of Scleractinian (stony) corals and 59 species of Stylasterid (hydrocoral) corals and are plotted to show the depth distributions of these species and species groups.

Figure 10 shows the full depth distributions from Cairns (1995) for the stony corals. Most of these cold-water corals occur in water shallower than 1,500m but some species are also found much deeper, down to at least 5,000m.[36]

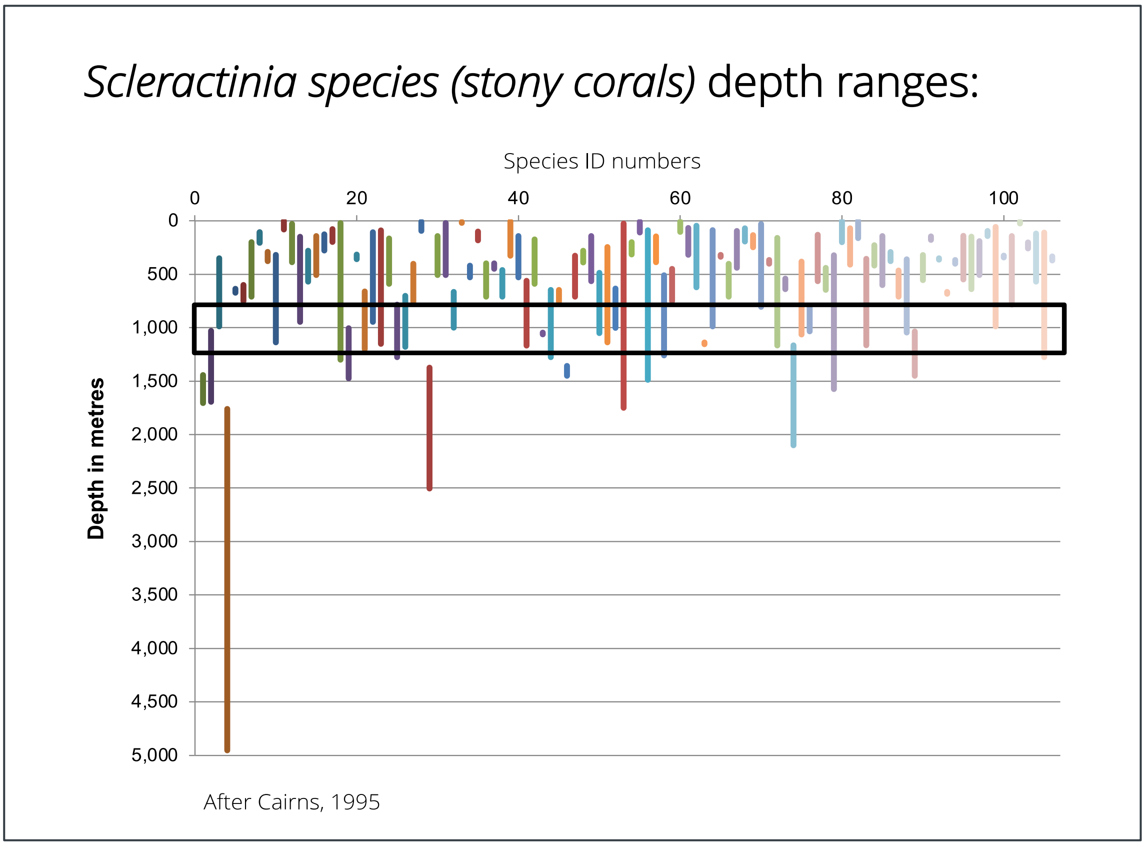

Figure 10: The depth distributions of 106 species of stony corals reported in Cairns, 1995 showing the full depth range. Each coloured (numbered) vertical bar shows the depth range for a different species of stony coral. The box represents the fishing depth range of the orange roughy fishery.

Truncating the depth at 2,200 m allows the depth patterns of the majority of the stony coral species to be more easily seen. This is shown in Figure 11 along with a number of important facets of the relationship between the depth distribution of stony corals and the fisheries for orange roughy (the key fisheries on seamounts and other smaller underwater features).

While there is clearly an overlap between the main fishing depths for orange roughy (defined here as 800 – 1,200 m) and the depth distribution of some of the stony coral species, there is also considerable occurrence of stony corals outside of the depth range of the fishery, in both deeper and shallower waters.

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[35] Cairns, S.D. (1991). The Marine Fauna of New Zealand: Stylasteridae (Cnidaria: Hydroida). Memoir N.Z. Oceanographic. Institute. 98: 1-99; Cairns, S. (1995). The marine fauna of New Zealand: Scleractinia (Cnidaria: Anthozoa). Memoir N.Z. Oceanographic Institute, 103: 1–210.

[36] Cairns, S. (1995). The marine fauna of New Zealand: Scleractinia (Cnidaria: Anthozoa). Memoir N.Z. Oceanographic Institute, 103: 1–210.

Cairns demonstrates that of the 106 species of stony corals:[37]

- 94% have a third or more of their distribution range outside the orange roughy fisheries depth range
- 68% occur completely outside of the depth range of the orange roughy fishery
- 21% have some or all of their distribution in waters deeper than those fished
- 3% (only 3 of the 106 species) have depth distributions exclusively within the fishery depth zone.

From this analysis, it is clear that many stony coral species are not at risk from the orange roughy fishery. Indeed, many are already partially protected within the BPA closures.

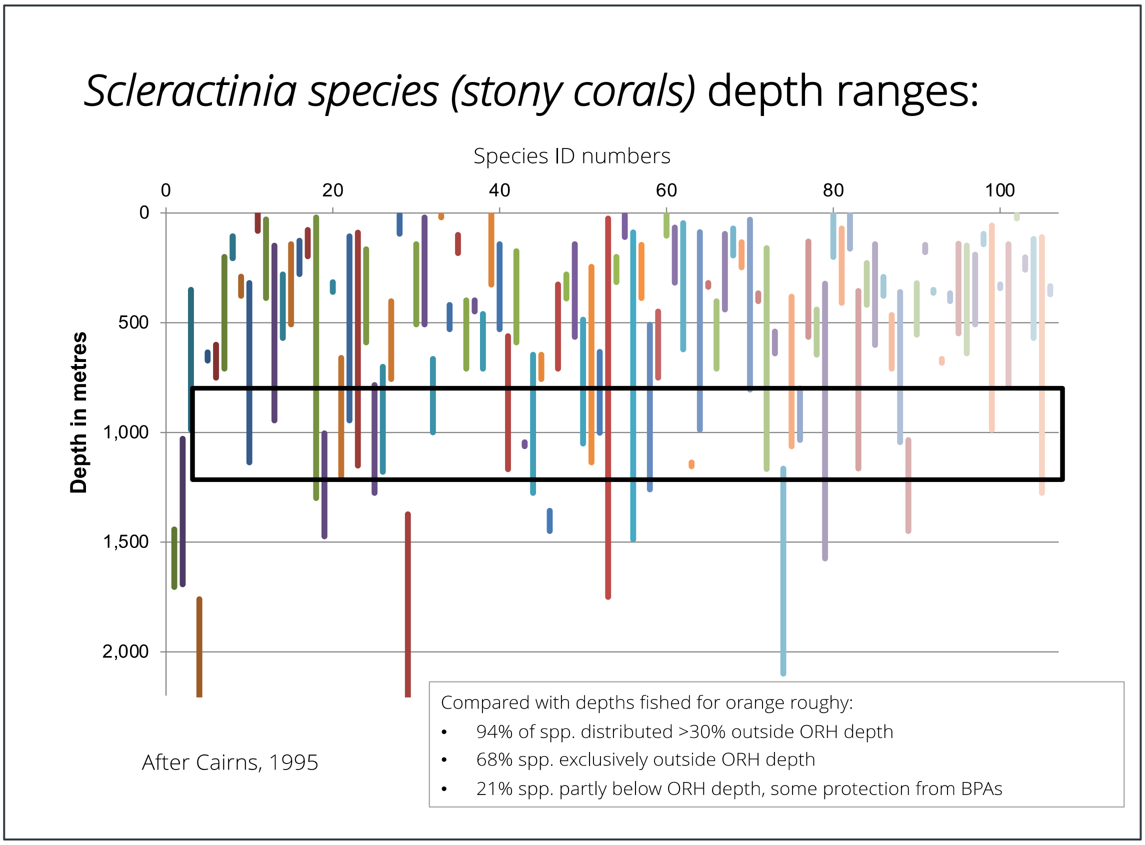

Figure 11: As Figure 10 but with the depth range (y-axis) truncated at 2,500 m. The depth distributions of 106 species of stony corals reported in Cairns, 1995. Each coloured (numbered) vertical bar shows the depth range for a different species of stony coral. The box represents the fishing depth range of the orange roughy fishery.

While stony corals are often considered the most important of the corals due to their structural contribution to the benthic environment, other coral species are also of interest.

[37] Cairns, S.D. (1991). The Marine Fauna of New Zealand: Stylasteridae (Cnidaria: Hydroida). Memoir N.Z. Oceanographic. Institute. 98: 1-99; Cairns, S. (1995). The marine fauna of New Zealand: Scleractinia (Cnidaria: Anthozoa). Memoir N.Z. Oceanographic Institute, 103: 1–210.

Cairns (1991) collated information about hydrocorals, and the same depth distribution information is presented in Figure 12. The depth distribution of hydrocorals is broadly similar to stony corals. The main difference between the two groups is that the hydrocorals do not show the same very deep distribution of some of the stony corals, otherwise broadly similar patterns of overlap can be seen.

Cairns demonstrates that of the 59 species of hydrocorals:

- 97% have a third or more of their distribution range outside the orange roughy fisheries depth range
- 53% occur completely outside of the depth range of the orange roughy fishery
- 24% have some or all of their distribution in waters deeper than those fished
- 4% (only 2 of the 59 species) have depth distributions exclusively within the fishery depth zone

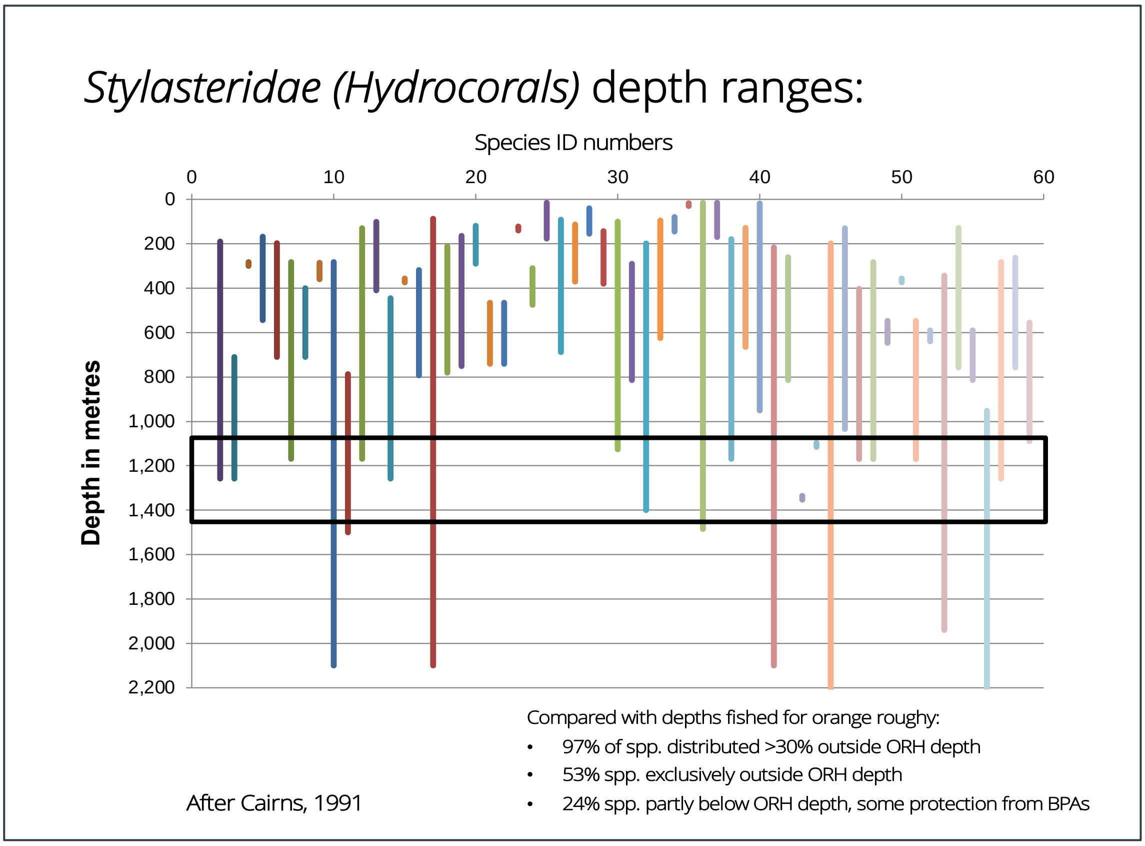

Figure 12: The depth distributions of 59 species of hydrocorals reported in Cairns, 1991 showing the full depth range. Each coloured (numbered) vertical bar shows the depth range for a different species of hydrocoral. The box represents the fishing depth range of the orange roughy fishery.

It is important to note that these analyses only consider the presence in terms of distribution and not the abundance. Adequate abundance data has yet to be collected by the government for benthic fauna in New Zealand's EEZ.

The risk of depletion due to trawling to most of these coral species is very low, even if all of the depth zone was to be fished, which it is not. During the period 2007 to 2017 only 7.4% of the 800m - 1,200m depth zone was fished, leaving 92.6% untouched[38].

If corals are to be considered as an indicator of a broader group of benthic organisms, as, for good reasons they often are, the risk from orange roughy fishing on underwater features to many other benthic organisms (sponges, sea fans, etc.) will also likely be low.

[38] See Table 4: Baird, S.J.; Mules, R. (2021). Extent of bottom contact by commercial trawling and dredging in New Zealand waters, 1989–90 to 2018–19. New Zealand Aquatic Environment and Biodiversity Report (*in press*)

Based on these published data, coupled with what is known about the distribution of fishing effort in the deeper waters in the New Zealand EEZ, there is no evidence to support a wider closure of fishing on seamounts or other underwater features.

The fishing-related risk to corals within New Zealand's EEZ is very low. Stony corals and hydrocorals occur over wide depth ranges, most of which are outside of the depth ranges being trawled. Of the depth range that has been trawled for orange roughy (i.e. 800-1,200 metres) 92.6% remains untouched by bottom trawls. In addition, corals and other benthic organism are afforded protection provided by the Benthic Protection Areas (BPAs) and the Closed Seamount Areas (CSAs).

Coral as a habitat for orange roughy

Much of the discussion about corals on seamounts and other underwater features relates to the fishery for orange roughy. In New Zealand waters, orange roughy aggregate to spawn and to feed in particular locations. Some of these aggregations are associated with underwater features such as knolls, hills, and canyons but they also occur over flat ground.[39]

Orange roughy aggregations continue to occur at these locations, even in the absence of high densities of coral, either because of removal due to trawling or because there was never a high coral density present, indicating that any linkage between coral and orange roughy aggregations is unlikely.

Juvenile orange roughy tend to have been found on flat areas of seabed away from large underwater features.[40] No linkages between coral and fish nursery grounds have been identified for deepwater corals in New Zealand.

Risks to New Zealand deepwater coral populations

There are no deepwater corals that co-occur in the areas of orange roughy fisheries that are identified as vulnerable, endangered or data deficient at a population level on the Red List of the International Union for Conservation of Nature (IUCN).[41]

The relative risks to deepwater black, stony and gorgonian coral groups within New Zealand's EEZ in relation to bottom trawling may be characterised by the assessing the overlap between their predicted distributions and our fishing grounds.[42]

Results of these analyses, undertaken by NIWA, are shown in Table 1, and demonstrate that when the known trawl grounds are overlaid with the modelled coral distributions for the black, stony and gorgonian coral groups, the overlap amounts to less than 1% in all cases.[43]

[39] Tingley, G. & Dunn, M., Eds. (2018). Global review of orange roughy (*Hoplostethus atlanticus*), their fisheries, biology and management. *FAO Fisheries and Aquaculture Technical Paper No. 622.* Rome. 128 pp. Licence: CC BY-NC-SA 3.0 IGO.
[40] Dunn, M.R. & Devine, J.A. (2010). An holistic approach to determining stock structure of orange roughy on the Chatham Rise. *New Zealand Fisheries Assessment Report 2010/17*. 65 pp; Dunn, M.R. & Forman, J.S. 2011. Hypotheses of spatial stock structure in orange roughy *Hoplostethus atlanticus* inferred from diet, feeding, condition, and reproductive activity. *PLoS ONE*, 6(11): e26704; ICES (2015)b. Stock Annex. Orange Roughy (Hoplostethus atlanticus) in I, II, IIIa, IV, V, VI, VII, VIII, IX, X, XII, XIV. March 2011 [online]. [Cited 23 June 2018]. http://ices.dk/sites/pub/Publication%20Reports/Stock%20Annexes/2015/ory-comb_SA.pdf
[41] Tingley, G. & Dunn, M., Eds. (2018). Global review of orange roughy (*Hoplostethus atlanticus*), their fisheries, biology and management. *FAO Fisheries and Aquaculture Technical Paper No. 622*. Rome. 128 pp. Licence: CC BY-NC-SA 3.0 IGO.
[42] Clark, M., Anderson, O., Dunkin, M., Mackay, K., Notman, P., Roux, *M*-J and Tracey, D. (2015). Assessment of orange roughy and oreo trawl footprint in relation to protected coral species distribution. A report prepared by NIWA for Deepwater Group Ltd. 57p.
[43] *C*lark, M., et al. (2015)

Table 1: Trawl footprint overlap with predicted distributions of black, stony and gorgonian coral groups (average annual footprint 2016-17 to 2018-19).[44]

	Black corals	Stony corals	Gorgonian corals
Predicted coral distribution >50th percentile (km^2)	593,615	599,384	423,778
Trawl footprint-coral overlap	0.40%	0.66%	0.05%

Data sources, quality and reliability

Most of the information on the distribution of the different species of coral in the New Zealand EEZ and the wider Southwest Pacific Ocean come from samples taken by scientific observers on fishing vessels. There is only a paucity of samples taken during research activities in areas not normally fished. Clearly, this pattern of sampling inevitably creates a potential, or even a likelihood of bias, towards thinking corals predominantly occur in areas that are fished and assuming they do is likely to be wrong.

The best scientific information is that coral species are known to be widely distributed, including in areas and at depths not normally fished. This is recognised by both Fisheries New Zealand and NIWA:

> *"The impact of fishing on habitat-forming invertebrates, e.g., corals, cannot be estimated from non-target catch data alone; further studies are needed to evaluate the effect of fisheries*"[45]
>
> Tracey (2011a) noted that the distributional data of corals derived from fishing vessels "*do not adequately reflect the true distribution for the region and are an artefact of limited sampling effort from within fishing grounds which comprise only very small portions of coral habitat ranges*".[46]

Sampling of corals from commercial trawls has not consistently distinguished between live and dead coral. Burgess (2002), in Consalvey et al. (2006), reported that over 60% of stony coral samples examined in New Zealand were dead and "*most likely resultant from historical environmental changes, e.g., in circulation, rather than recent anthropogenic influences*."[47]

Often, reported samples of coral from fishing substantially overstate the occurrence of live corals, especially when it is 'counted' as live when more than 60% of stony corals have been assessed to be dead.

It is also of note that, while dead coral may provide a structural habitat, it neither forms part of the living community of benthic organisms nor contributes to the transfer of energy through the trophic interactions of the benthic food web.

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[44] Black, J (2021) GNS Science. *Pers comm* (19 August 2021) (Report pending)

[45] FNZ (2020). Aquatic Environment and Biodiversity Annual Review 2019– 20. Compiled by the Aquatic Environment Team, Fisheries Science and Information, Fisheries New Zealand, Wellington New Zealand. 765p.

[46] Tracey, D.; Baird, S.J.; Sanders, B.M. and Smith, M.H. (2011a). Distribution of protected corals in relation to fishing effort and assessment of accuracy of observer identification. NIWA Client Report No: WLG2011-33 prepared for Department of Conservation, Wellington. 74 p.

[47] Consalvey, M., MacKay, K and Tracey, D. (2006). Information review for protected deep-sea coral species in the New Zealand region. NIWA Client Report: WLG2006-85, prepared for Department of Conservation, 53p.

2. New Zealand cold-water coral and biogenic habitats are under threat from bottom trawling (which are asserted to be their greatest threat)

2.1 Bottom Trawling and Benthic Species

Statements made in submissions provided by DSCC such as *"Bottom trawling was ranked by an expert-based international assessment as the highest environmental threat to our ocean from marine-based human activity"* should be given no weight where no context or source is provided.

As one example, this statement above provides no context of who the 'experts' were and what questions they were asked, or what the scope of their consideration included.

It is difficult to accept that this statement is true, especially given our knowledge of the very small areas within New Zealand's EEZ that are contacted by bottom trawling and our understanding of climate change and the potential changes in sea temperature, ocean acidity, current magnitudes and directions, which are expected to dwarf any impacts of bottom trawling.[48]

Questions remain about other anthropogenic impacts due, for example, to the unmanaged and uncontrolled release of persistent chemical pollutants and plastics. Key elements of the information provided by many opponents to bottom trawling are similarly lacking in context and science.

DWG disagrees with the DSCC's assertions, and our submissions below provide the requisite factual basis for this disagreement.

Deepwater Trawling and UTFs within New Zealand's EEZ

The New Zealand seabed is being portrayed by DSCC as being home to over 800 large and precipitous underwater mountains inhabited by rare and unique animal life, all of which are vulnerable to bottom trawling. They have elsewhere been described as *"islands of biodiversity"* and *"enclaves of endemism"*.

The known reality of fishing on underwater topographical features in the New Zealand EEZ is quite different from this.

Government research effort should be focussed on better understanding the spatial distribution of the relatively small number of coral species that are only found within the fishing depth zone and ensuring that the spatial closure-based approach to management is delivering adequate protection to these species.

Most of the UTFs important to the seafood industry are only small knolls, hills or rises with elevations of a few hundred metres or less. The common and erroneous perception of these features as steep-sided undersea mountains has arisen because fishermen and scientists alike have perceived them through echograms like the one shown in Figure 13.

Vertical exaggeration by echo sounders makes even a gentle rise look like a precipitous hill. Fishing skippers frequently refer to these small hills as "pinnacles" as their perception is also largely through the images on echo sounders. In reality, most of the underwater features trawled within New Zealand's EEZ are more akin to large underwater "speed bumps" with very gentle slopes. This is because the simple physics of trawling preclude fishing trawl nets down very steep-sided undersea mountains. On steep slopes, it is not possible to both maintain contact with the seabed (to catch fish) and to tow the net forward (to maintain door spread to keep the net open and fishing).

As an example, Figure 13 shows Graveyard Hill, a typical underwater hill fished for orange roughy on the Chatham Rise. The echo sounder image on the left portrays this hill as a steep-sided peak, but the true cross-section of this hill shows that it is 315 metres high (not a seamount) and with shallow slopes of about 14º. Even so, many aspects of this hill make it too steep and rough to be trawled.

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[48] IPCC (2019) *Intergovernmental Panel on Climate Change Special Report on the Ocean and Cryosphere in a Changing Climate* [H.-O. Pörtner, D.C. Roberts, V. Masson-Delmotte, P. Zhai, M. Tignor, E. Poloczanska, K. Mintenbeck, A. Alegría, M. Nicolai, A. Okem, J. Petzold, B. Rama, N.M. Weyer (eds.)]. <https://www.ipcc.ch/srocc/>

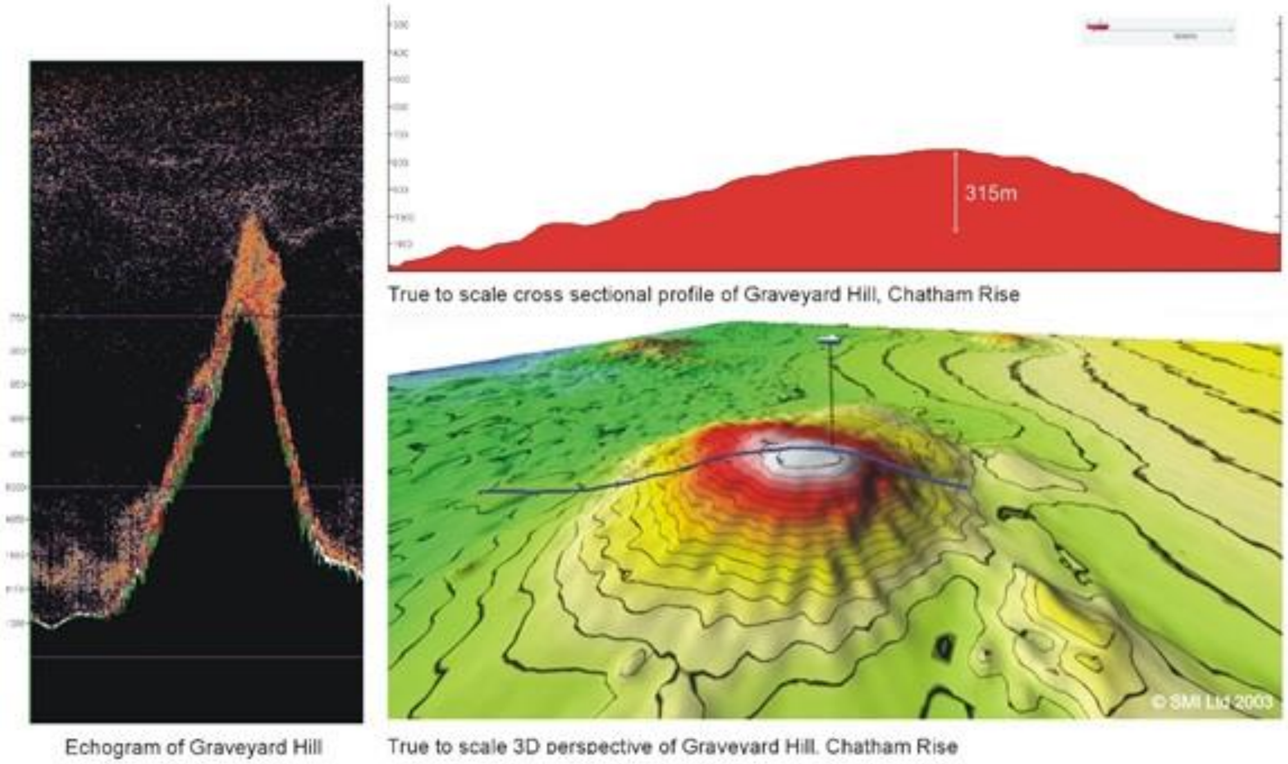


Figure 13: Different perspectives of Graveyard Hill, Northwest Chatham Rise.

Coral Captures by Bottom Trawling within New Zealand's EEZ

FNZ has provided DWG with information on the locations of commercial trawl tows and observer reports of coral captures for the current deepwater fishery, based on the most recent three-year period (2017-18, 2018-19 and 2019-20). This period was chosen because it represents current fishing activities and because there has been a requirement to reporting the positions of bottom trawl tow locations in much finer scale since 1 October 2017.[49]

GNS Science has provided DWG with a report, analysing these data to identify the locations of all trawl tows where captures of corals were observed.[50] The summit positions of seamounts, knolls and hills were used to locate observed coral captures onto these features. Coral captures in areas where no known underwater features are located are assumed to have occurred on flat/sloping ground.

This analysis was undertaken for all trawl fisheries with bottom contact over New Zealand's EEZ.

Observer records of quantities of coral catches were scaled up in size, based on the proportions of tows observed in each fishery, to estimate the total quantities of corals captured.

The average annual catch of corals taken by deepwater trawling over this period is estimated from observer records to be 10,542 kg. Of this, only 572kg was annually captured from seamounts, knolls or hills (Table 2):

- 113 kg on seamounts
- 170 kg on knolls and
- 289 kg on hills

[49] J. Moriarty (2021) MPI, dataset 13830. Report to Deepwater Group (20 Aug 2021)
[50] Black, J (2021) GNS Science. *Pers comm* (19 August 2021) (Report pending)

Observer records of coral captures support the scientific observations that corals occur across widely distributed areas throughout New Zealand's EEZ and are not confined to seamounts, knolls and hills.

Table 2: Average annual observed and estimated coral catches (kg) in New Zealand's EEZ fisheries from seamounts, knolls and hills for the three-year period 2017-18 to 2019-20.[51]

All EEZ Trawl Fisheries	Seamounts	Knolls	Hills
Observer Reports of Capture	41.9	23.8	52.0
Observer Coverage	37%	14%	18%
Estimated Coral Captured	113.2	170.0	288.9

The estimated amount of coral annually captured by bottom trawling off seamounts, knolls and hills in the New Zealand EEZ, based on observer records over the last three years is 572 kg. This amount could fit into the back of a ute.

Coral captures from Westpac Bank

The orange roughy fishery (ORH 7A) located on the Challenger Plateau extends outside of New Zealand's EEZ and is managed as a straddling stock under UNCLOS provisions. The designated area immediately adjacent to New Zealand's EEZ within which a portion of the ORH7A stock exists is known as the Westpac Bank. This falls within the jurisdictional area of the South Pacific Regional Fisheries Management Organisation (SPRFMO).

Westpac Bank covers an area of 14,381 km^2, of which only 680 km^2 (4.7%) is open to bottom trawling under SPRFMO regulations.

Over the 3-year period (2017-18, 2018-19, and 2019-20), the observed average annual catch of coral from Westpac Bank by New Zealand trawlers was 6.9 kg.[52]

It is mandatory for all New Zealand vessels to carry FNZ observers when fishing within SPRFMO waters.

Coral Captures from the Tasman Sea in International Waters

The capture of a large specimen of bubblegum coral (*Paragorgia arborea*) in 2005, as illustrated in the well-used image (Figure 10) in DSCC's Petition Report, is regrettable. This coral, depicted in Figure 14, was captured some 16 years ago outside of New Zealand waters on a mix of muddy/stony ground, not on a UTF.

This is a common species, known to be globally distributed in waters at depths of between 200 – 1,300 m.

Also of note is that this is a soft coral with a spongy texture rather than with the calcareous skeleton associated with corals that have very slow growth rates.

This image has little relevance to understanding the nature and extent of coral on seamounts within New Zealand's EEZ and the impacts of bottom trawling on these habitats.

[51] J. Moriarty (2021) MPI, dataset 13830. *Pers Comm* to Deepwater Group (20 Aug 2021)
[52] T. Northern (2021) MPI Rep Log 13849, *Pers Comm* to Deepwater Group (20 Aug 2021)

Figure 14: 2005 Capture of Bubblegum coral (*Paragorgia arborea*), in international waters on the Norfolk Ridge, some 410 kilometres offshore of New Zealand

The Nature of Deepwater Trawling on UTFs in New Zealand

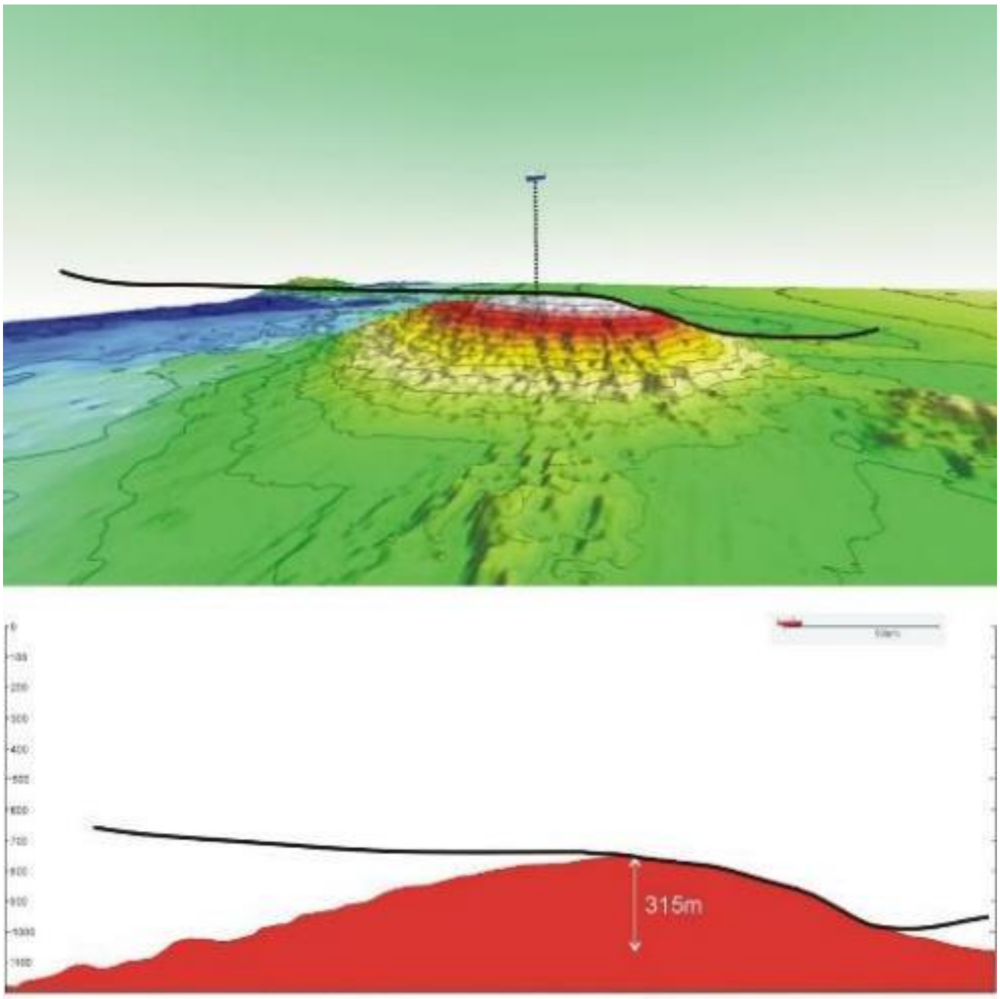
Variety of Features Both Fished and Unfished

Most of the UTFs in the New Zealand EEZ are not accessible to bottom trawling because they are either too deep, their slopes are too steep, their substrates are too rough, or they are otherwise inaccessible by bottom trawls (e.g., due to strong tides or current flows, bottom trawls cannot be used to fish on them).

The UTFs accessible to bottom trawling are not steep-sided but typically have gradients of 20º or less.

Fishing on these features for species such as orange roughy requires the skilled operation of landing the trawl on or near the top and then fishing it down the slope until the desired number of fish is seen entering the net on the net monitor before lifting out. These trawls need to maintain contact with the bottom in order to fish and may only be on the bottom for a few minutes, or less, and travel a few hundred metres down the slope (Figure 15).

It is not possible to land a net and fish on steep slopes and, for this reason, many of the steeper UTFs remain untouched by fishing.



True to scale cross sectional profile of Graveyard Hill, Chatham Rise

Figure 15: Images were taken from a 3D net positioning software package showing a net coming into land on the top of a hill and its path down the side of the hill. Graveyard Hill, 180º Hills Complex, Northwest Chatham Rise.

Some UTFs that are trawled do have hard substrates, which are suitable for attachment by sponges and corals. Assessments of catches by trawls and of underwater video footage of the seabed demonstrate that many of the UTFs that are amenable to bottom trawling are covered with soft sediments or are composed of muds or clays and are relatively barren and show no epibenthic fauna damaged by trawling.

Fishing Grounds: Area Affected by Bottom Trawling is consistent year after year

Sustainable catch limits and the quota management system is designed to maintain stock abundances at high levels, enabling fisheries to return to the same grounds to catch their quota.

The deepwater seafood industry fishes on the same grounds and the same undersea features from year to year, for the most part within the same defined trawl corridors that have now been used for many years.

Numbers of Seamounts that Have been Trawled Once or More

FNZ has provided DWG with data summarising bottom trawling on seamounts data. Of the 15 seamounts that have been trawled once or more during the period 1989-90 to 2018-19:[53]

- In most years 5 or fewer seamounts have been trawled (Figure 16)
- The main fish species caught during the past 10 years are black oreo, orange roughy and smooth oro (Figure 17)
- These catches over the past 10 years have come from only 9 seamounts.

The number of seamounts that have been contacted by bottom trawls each year over the period 1989-90 to 2018-19 are shown in Figure 16. During this period, between 1 and 9 of the 142 seamounts were fished in any year. Over the past 20 years between 1 and 5 seamounts were contacted by bottom trawl in any year

Annual catches by bottom trawling from seamounts over the period 1989-90 to 2018-19 are shown in Figure 17. Catches of black oreo, smooth oreo and orange roughy, are less than 60 tonnes apart from a large catch of smooth oreo in 2018-19alrs.

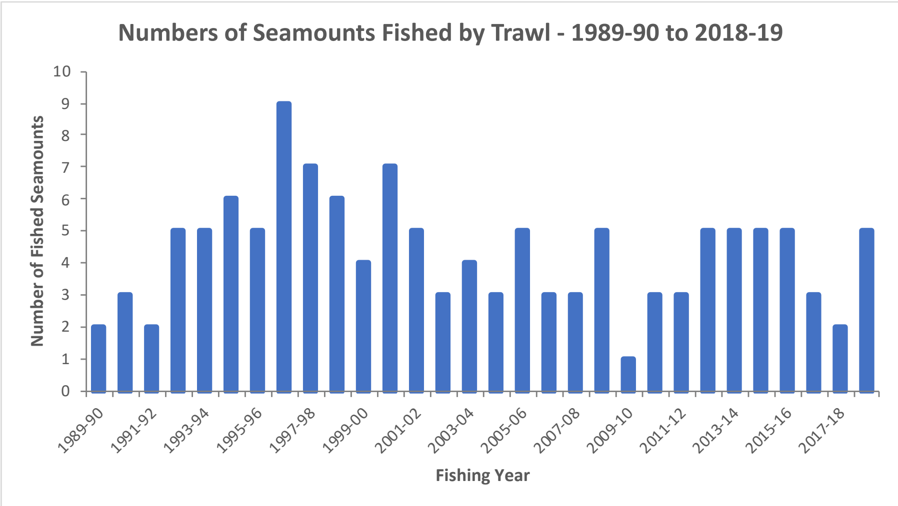


Figure 16: Numbers of seamounts trawled by year from 1989-90 to 2018-19.

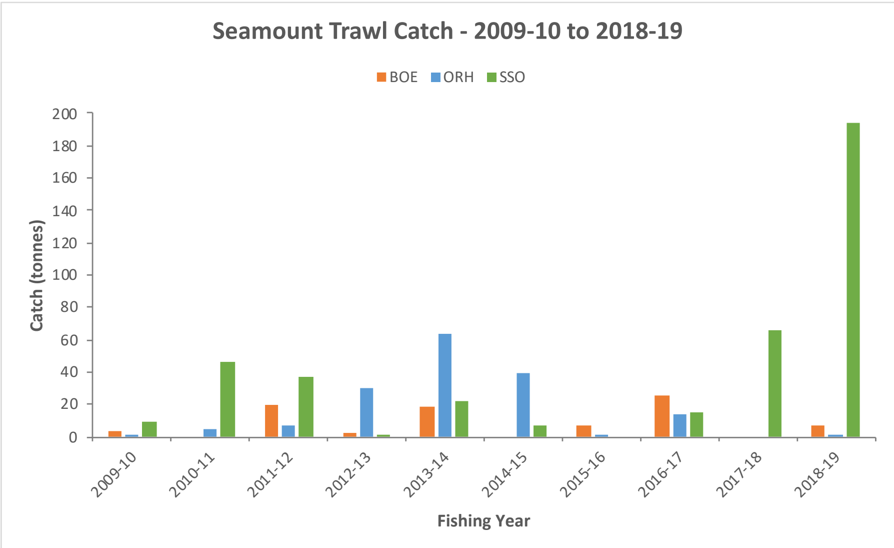


Figure 17: Annual trawl catches from seamounts 2009-10 to 2018-19.

[53] FNZ.Replog 13526 Information Request on Coral Captures on Seamounts (March 2021)

Retention or Catchability of Coral in Trawl Nets

Fish taken in bottom trawling gear have a property described as their 'catchability'. Catchability can be thought of as a measure of the effectiveness of the fishing gear and represents the proportion of the fish in the path of the net that are caught and retained by the trawl gear. The United Nations Food and Agriculture Organisation defines catchability as "*the relationship between the catch rate and the true population size*".[54]

Species other than fish that are caught in bottom trawl gear also have a catchability, including corals.

The catchability of corals will depend on many factors, particularly the size of the coral pieces captured on the bottom by trawl gear in relation to the mesh sizes in the net. Catchability for coral is likely to range from close to 100% (for large pieces of coral) to very low percentages (for a small piece of dead coral rubble).

DSCC has used scalars to make estimates of the likely amount of coral impacted by trawling, firstly to raise the coral catch based on the proportions of tows observed, and secondly by then applying a further scalar to account for coral catchability by trawl nets.

DWG rejects these estimates as being speculative, non-scientific and most likely to be substantially over-estimating the true amounts of corals we interact with.

Research has been conducted to try and estimate the catchability of corals to establish a direct link between what is brought up in the net and the abundance on the seabed.[55] To date this work has demonstrated that it is difficult to reliably estimate catchability for deepwater corals – the estimates are highly uncertain and are therefore highly likely to misinform on coral abundance.

Due to the high degree of uncertainty, this approach has not been accepted as a valid methodology within the FNZ Science Working Group or at the Scientific Committee of the South Pacific Regional Fisheries Management Organisation (SPRFMO).

Retention of corals in trawl nets is unknown and further work is required to assess this. While likely to be less than 100%, the estimates used by DSCC are based on work that has not been accepted as a valid methodology by FNZ's Science Working Group or by the Scientific Committee of the South Pacific Regional Fisheries Management Organisation (SPRFMO). Work to date has demonstrated that it is very difficult to reliably estimate catchability for deepwater corals - estimates are highly uncertain and are therefore highly likely to misinform estimates of coral abundance.

[54] Eyolf Jul-Larsen, Jeppe Kolding, Ragnhild Overå, Jesper Raakjaer Nielsen, Paul A.M. van Zwieten (2003) Management, Co-Management or No Management? FAO synthesis Report. 2.1 Fisheries Concepts. http://www.fao.org/3/Y4593E/y4593e03.htm

[55] See for example, Pitcher, R. Williams, A. and Georgeson, L. (2019). Progress with investigating uncertainty in the habitat suitability model predictions and VME indicator taxa thresholds underpinning CMM 03-2019. Paper for SPRFMO SC7, SC7-DW21_rev1. https://www.sprfmo.int/assets/2019-SC7/Meeting-Docs/SC7-DW21-rev1-Uncertainty-in-model-predi ctions-and-VME-thresholds-for-CMM-03-2019.pdf

Mitigation of Benthic Effects During Deepwater Bottom Trawls

Technology innovations improve fishing

Science has greatly assisted the deep sea fishing sector to innovate and implement technology to solve issues that research might have identified. In turn, technology has assisted researchers to better understand our ocean environments. Together science and industry are important collaborators for ongoing advances.

Like most sectors, the increase in technology advances in the fishing industry has been exponential over the last 30 years.

Accuracy crucial to fishing operations – deepwater trawling is not "tow and hope"

Fishers have express legal requirements to avoid, remedy, or mitigate any adverse effects of fishing on the aquatic environment. The operational imperatives to do the same are just as clear, especially to those engaged in commercial fishing.

Fishers are after a clean catch. They are not interested in catching non-target species nor any other unwanted species that could damage the saleable catch and their trawl gear.

Generally, deepwater trawling is aimed at known aggregations of fish on known fishing grounds and towlines. Deepwater bottom trawling is not a "*tow and hope*" operation, as is implied by DSCC in their report.

Deepwater targeted trawling is a high-cost operation where the best of technology is required to find, identify, and then catch fish. The nature of the fishing and the inherent risk to the catch and gear means that accuracy and precision of gear placement with minimal seabed contact are a major part of operational investment and decisions.

While some bottom contact is required for species such as orange roughy and oreo, other species can be caught using midwater trawls without any bottom contact (e.g., bluenose, alfonsino and hoki at times). Note that in many midwater trawl fisheries where the gear may come very close to the bottom, sacrificial links on the ground rope allow the ground rope to break if it touches the bottom, this then results in substantial mending of the net and is something that is avoided if at all possible.

It is important to note the salient points about deepwater bottom trawling and the continuous development of gear to ensure minimal bottom contact.

- Most of the tow time is shooting and hauling, due to the depths being fished. The period of time the gear is in contact with the seabed on UTFs is very short compared to most trawling (e.g., 3-10 minutes bottom time vs 2-5 hours on flat ground)
- Bottom contact results in costs to the vessel operator as it wears the gear or places entire trawl systems at risk (worth up to $100,000) incentivising continual investment in systems that catch fish efficiently with minimal bottom contact
- Incidental catches of corals and other benthos damages and contaminates the catch, incentivising fishing in areas known to contain little, if any, coral
- A major driver of efficiency in these fisheries is the accuracy and precision of placement of the gear. Because of the risk of gear damage or loss, and because of the aggregated nature of the fish, there has been significant investment in acoustic, navigational and gear systems to precisely locate the net position (in relation to the seabed and the fish being targeted), to reduce the amount of "misses", and to keep actual trawling time on the seabed to an absolute minimum.

Electronic navigational aids provide location accuracy

Since the advent of trawling in waters deeper than 700 m, there has been a complete adoption of improved navigational systems to precisely position the vessel and the trawl net.

These systems now include GPS (global positioning system) with an accuracy of 1.5 m. Vessels carry more than one system to ensure continuous service. This system is now integrated into navigational plotters and echosounders and catch reporting systems.

Video plotters mean no experimental tows needed

3D plotters integrated with GPS and echo sounders allow for detailed mapping of fishing grounds bathymetry, tow lines, and the vessel's position in relation to it. More recently the advent and use of 3D plotters such as Piscatus^{3D} have meant that a vessel is capable of rapidly producing three-dimensional maps of an area without the need for experimental tows.

The level of detail available from such plots allows very precise placement of the gear, consistently. The same electronic systems, Piscatus^{3D}, Maxsea, etc, also accurately record the vessel footprint for verification of habitat impact. These systems provide much more accurate tracking than VMS.

Electronic fishing aids providing quicker information

The advent of deepwater fishing drove the need for echo sounders capable of giving a clear definition of both the target fish and the seabed. This has led to echo sounders with greater power (10 kW) and lower frequencies (28 kHz) capable of delivering this. More recently, acoustic systems have moved to PC-based technologies which allow for faster and enhanced signal processing as well as ceramic transducers for better signal transmission and pickup.

Sonar providing accurate spatial information

Sonar is an acoustic search system able to be targeted away from the path of the vessel, this can be used to follow the shape of the seabed or path of fish schools.

Fishing gear monitoring equipment

Deepwater trawlers have moved to acoustic link monitors placed on the trawls to feed information back to the vessel. Key information is the vertical position of the trawl in relation to the sea surface and seabed. Hence the amount of contact with the seabed can be monitored in real time on the bridge.

These systems can also provide information on water temperatures and depth and volumes of fish entering the trawl net. Net positioning systems, such as the Simrad ITI, allow accurate placement of the net on the target trawl zone, minimising the impact of currents that would normally push the net off the tow line. Acoustic link systems are required, as cable systems are banned in most southern hemisphere waters because of concerns with their potential to cause seabird interactions.

Winches for better and effective response

The ability to control the gear, using the feedback from systems noted above is completely dependent on the power and control of the vessel's winches. Hence the move to hydraulically or electrically controlled self-tensioning systems that have sufficient power to be very responsive to the vessel's command.

Fishing Gear Innovation that minimises bottom contact

Since the commencement of deepwater trawling in New Zealand, there have been major changes to the trawl gear. These changes have been driven by the need to minimise bottom contact by the net, doors and sweeps, as contact can result in "fasteners" with the gear (and hence vessel) fixed to the bottom for considerable periods of time or gear loss.

- **Trawl doors:** Initially, these were of the older style "vee-door" or "polyvalent" type as skippers were concerned with the stability of the door during the fishing process. These doors have a low aspect ratio (i.e., their length is greater than their height). This leads to more stability along with far more dependence on bottom contact (ground sheer forces) to create forces to spread the trawl net opening. Since skippers were provided with better electronics and winch systems, there has been a move to high aspect ratio doors (i.e., their height may be 1.5-1.8 times their length). These doors depend solely on hydrodynamic forces to generate spread (i.e., they do not require bottom contact to spread the net). The desire for both lower drag and increased control of trawl doors has led to operators seeking smaller and more efficient doors from high-tech producers such as Nichimo, Hampidjan, Morgere etc. At times, bottom trawl nets can be deployed without the trawl doors being in contact with the seabed.

- **Trawl Nets:** Deepwater bottom trawling is a method of targeted fishing aimed at relatively dense aggregations of fish. This is in contrast to the herding type of fishing when trawling for flatfish or cod. Given the nature of the seabed and hence the risk of gear damage, plus the fish behaviour patterns, deepwater trawling rapidly moved to trawl net systems that minimised ground rope lengths (e.g., 18-24 metres) and net sizes. Further development occurred in the rigging where the length of sweeps and bridles (being the herding wires between the trawl doors and the net opening) were significantly reduced to provide better control over the gear and less likelihood of contact for example:
  - Hoki trawls have a sweep length of between 140 to 210 m and a bridle length of 30 m
  - Orange roughy trawls have a sweep length of 100 m and a bridle length of 12 m

  The first deepwater trawlers used steel bobbins on the ground rope, these being standard on Northern Hemisphere cod trawlers. It has been found that these are not necessary, and that gear efficiency is improved, and bottom contact reduced by incorporating rubber components in the ground rope. Subsequently, there has been a shift from rubber bobbins to rubber discs in the “rockhopper” format. The concept here is to have a ground rope that has tension in it so if it snags on the seabed it tends to spring up rather than drag through any obstacles.

Experience of skippers

Successful deepwater skippers in recent years have built up experience working in various crew positions on deepwater vessels. The value of this experience cannot be underestimated, when avoiding, mitigating or reducing benthic habitat impacts

3. The New Zealand Government has failed to protect these habitats (asserting current protections are not enough)

DSCC's report makes a number of claims with respect to the insufficiency of current Seamount and EEZ protections (particularly BPAs). They assert that these closures have no scientific basis with respect to their biodiversity value and their representativeness, primarily castigating the Industry and the Government for their location "*in areas where very little or no trawling took place*."[56]

DSCC criticised the protection of biodiversity outside fishing depths as a "*shortfall*", claiming that BPAs protected water that was simply "*too deep to fish*."[57] In addition, their report referred to a map[58] that showed the location of hundreds of 'seamounts' in relation to BPAs and claimed that not enough of them were inside the BPAs.

With respect to 'seamounts', the DSCC petition report asserted that current protections for seamounts are not enough. They acknowledged that while 52% are protected, 48% were still open to bottom trawling. The report also posited that 82% of underwater topographical features (UTFs) (these included seamounts in these numbers) were open to trawling while 28% were protected.[59]

DWG unequivocally disagrees with each of these claims.

As established above, the DSCC report conflates seamounts with smaller Underwater Topographical Features (UTFs), misunderstands the purpose of BPAs and largely ignores their acceptance internationally as MPAs.

Our submissions below address DSCC's claims.

3.1 Very limited areas of New Zealand's EEZ are Contacted by Bottom Trawling

Skippers of deepwater trawl vessels operating trawl gear are required to report commercial fishing activity using Trawl Catch Effort Processing Return (TCEPR) forms.[60] TCEPR were introduced in October 1989 and have been used continuously to report fishing trawl location data, including the start and end locations of every trawl tow. It is noted that since October 2017, the Electronic Reporting System (ERS) has replaced the TCEPR.[61]

These data have been used to quantify the nature and extent of the bottom trawling on the seabed in the EEZ since 1989. Bottom Trawling (defined as including trawl gear used within a metre of the seafloor) is conducted mainly in continental shelf waters in depths defined by the distribution of target species, generally in waters shallower than 1600 m.[62]

These cumulative data are analysed and presented annually by Fisheries New Zealand in a New Zealand Aquatic Environment and Biodiversity Report (AEBR).

Figure 18 summarises the both the annual and cumulative footprint within the EEZ since 1990 in both a spatial and temporal context. It shows that since 2004, the annual bottom trawling footprint has been consistent, with its extent remaining between 50-60% within the total area of the cumulative footprint.[63]

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[56] DSCC (2021) Save deep sea corals: ban bottom trawling on seamounts. P 25.
[57] *Ibid*.
[58] Bowden, D.A.; Anderson, O.A.; Escobar-Flores, P.; Rowden, A.A.; Clark, M.R. (2019). Quantifying benthic biodiversity: using seafloor image data to build single-taxon and community distribution models for Chatham Rise, New Zealand. *New Zealand Aquatic Environment and Biodiversity Report No. 235*. 65:1p.
[59] DSCC (2021) Save deep sea corals: ban bottom trawling on seamounts. P 24.
[60] Reg 11 Fisheries Reporting Regulations 2001; see also Schedule 2 Form 5 *which is to be used by all trawl vessels over 28m in length as well as certain smaller vessels that have been informed in writing by the Chief Executive.*
[61] Baird, S.J.; Mules, R. (2021). Extent of bottom contact by commercial trawling and dredging in New Zealand waters, 1989–90 to 2018–19. *New Zealand Aquatic Environment and Biodiversity Report* (in Press)
[62] Baird, S.J.; Wood, B.A.; Bagley, N.W. (2011). Nature and extent of commercial fishing effort on or near the seafloor within the New Zealand 200 n. mile Exclusive Economic Zone, 1989–90 to 2004–05. New Zealand Aquatic Environment and Biodiversity Report No. 73. 143 p.
[63] Baird, S.J.; Mules, R. (2021). Extent of bottom contact by commercial trawling and dredging in New Zealand waters, 1989–90 to 2018–19. *New Zealand Aquatic Environment and Biodiversity Report* (in Press). Page 26

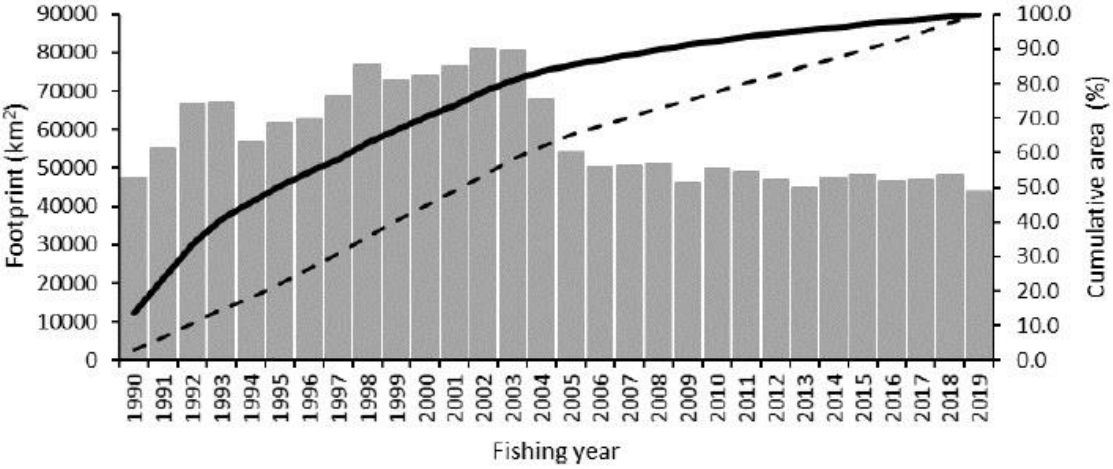

Figure 18: Annual deepwater footprint (bars) and cumulative footprint (solid line) and aggregate area (dashed line) presented as percent of the total (see Table 7), assuming 1990 is the first year of bottom-contacting effort.

The AEBR notes:[64]

> "*Over the time series, the number of Tier 1 bottom-contacting tows increased from about 31 220 in 1990 to nearly 57 600 in 1998, then decreased each year to about 29 400 tows in 2007. A small amount of TCER data was included in subsequent years, but the decrease in numbers of tows continued, with between about 23 000 and 24 000 tows during 2012–2017. In 2018 and 2019, tow numbers increased to about 24 900 a year; and the predominant data collection was by ERS*."

The AEBR notes that spatially the trawl footprint for the deepwater fishstocks has decreased:[65]

- For all years, deepwater fisheries contacted almost 9% of the area of the EEZ (& TS) and 25% of the fishable area. The greatest annual overlap was during 1992–2004.
- From 2006 the footprint overlap has been 1.1–1.2% of the EEZ (& TS) and 3.2–3.7% of the fishable area
- In 2019 the overlap was 1.1 of the EEZ (& TS) and 3.2% of the fishable area.[66]

Figure 23 provides a spatial depiction of the cumulative trawl footprint and the total fishable area.[67]

Bottom trawling has taken place on fishing grounds which in total comprise only 9% of New Zealand's EEZ – 91% of the EEZ remains untouched. Within these grounds, 1.1% of New Zealand's EEZ is subject to bottom trawling each year. Most of these grounds have been fished for decades and are responsible for the food production from New Zealand's deepwater fisheries resources. DWG estimates that around 80% of the volume of wild seafood produced in New Zealand is harvested by bottom trawl.

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[64] *Ibid*., Page 24
[65] *Ibid*.,
[66] P25
[67] See Figure 23; FNZ (2021) New Zealand Commercial Trawl Fishing Intensity (October 2007 – September 2019). https://www.mpi.govt.nz/dmsdocument/39356-New-Zealand-Commercial-Fishing-trawl

3.2 Very Limited Sampling in BPAs Gives Unreliable Results

The DSCC Petition Report references a study that purported to demonstrate the efficacy of New Zealand's BPAs and SCAs to provide for the protection of benthic biodiversity.[68]

Drawing such a conclusion from this preliminary study on biodiversity within BPAs is flawed, due to very limited sampling within BPAs and the high likelihood that this sampling was not representative. Indeed, on page 1 of the report the authors acknowledge: [69]

> *"It was beyond the Scope of the Study to undertake a full description of the characteristics of the species lists or undertake comparative analyses of the community structure of the BPAs… this would require more sampling."*

This study is based on 1,467 benthic stations within the BPAs. Together, BPAs and CSAs cover 1.2 million km^2, an area 4.5 times the size of New Zealand's landmass. What would the results look like if all that we knew about biodiversity on land was obtained from a Zeppelin at 1,000 metres height above the cloud layer and sampling with a grab 1m wide from 326 stations (adjusted given the smaller size of the New Zealand landmass)? Each station could be considered a unique event and one could (incorrectly) conclude that there is endemism at each station.

3.3 Current Marine Protections

Marine protected areas (MPAs) are one of several tools for conserving marine biodiversity. The New Zealand Government remains committed to protecting marine biodiversity for future generations and healthy oceans and set a goal to protect 10% of New Zealand's waters.[70] This goal has been achieved with over 30% of New Zealand waters now protected under various marine protection measures.

New Zealand has led global marine protection with the establishment of the Marine Reserves Act in 1971, the creation of one of the world's first no-take marine reserves in 1975, and the implementation of large MPAs within our 200 nm EEZ (BPAs and CSAs under the Fisheries Act).

These MPAs have been recognised for their contribution to New Zealand's conservation estate, to New Zealand's international obligations, and global marine protection efforts.

Marine Protection Areas (MPAs) in New Zealand

Marine protected areas (MPAs) are one of several tools for conserving marine biodiversity.

The 1992 Convention on Biological Diversity (CBD) was ratified by New Zealand in 1993 and recognises that MPAs can take many forms, including those that allow for sustainable uses that do not undermine their conservation objectives.

The New Zealand Government remains committed to protecting marine biodiversity for future generations and healthy oceans and has set a goal to protect 10% of New Zealand's waters.[71] This has been achieved with over 30% of New Zealand waters now protected under MPAs (which include BPAs, CSAs, MPAs and other marine reserves (see Figure 19). These MPAs cover an area 14 times the size of New Zealand's protected land area and 4.5 times the size of New Zealand's land area overall.

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[68] Bowden, D.A.; Anderson, O.A.; Escobar-Flores, P.; Rowden, A.A.; Clark, M.R. (2019). Quantifying benthic biodiversity: using seafloor image data to build single-taxon and community distribution models for Chatham Rise, New Zealand. *New Zealand Aquatic Environment and Biodiversity Report No. 235*. 65:1p.
[69] *Ibid.*
[70] DOC (2011) Coastal marine habitats and marine protected areas in the New Zealand Territorial Sea: a broad scale gap analysis. Department of Conservation and Ministry of Fisheries. 50p; see also DOC and MFish (2005) Marine Protected Areas: Policy and Implementation Plan. Department of Conservation and Ministry of Fisheries. December 2005. 25p
[71] New Zealand Government. (2000). New Zealand Biodiversity Strategy 2000-2020.

These MPAs have been recognised for their contribution to New Zealand's conservation estate, to New Zealand's international obligations, and global marine protection efforts.[72]

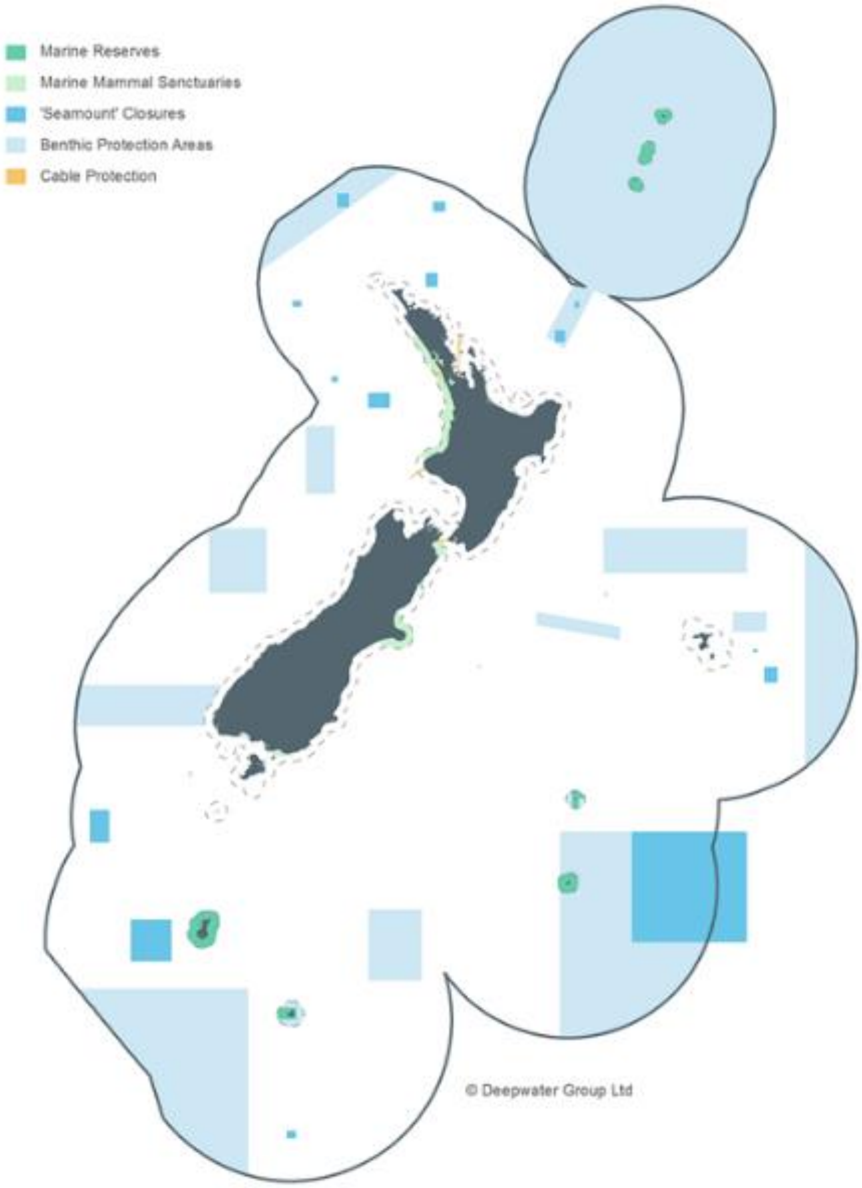

Figure 19: New Zealand's Marine Protected Areas

While definitions of MPAs vary, the following definition, as set out by the World Conservation Union (IUCN), has proved remarkably resilient over many years.

> *A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.*

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[72] Protected Planet, the most up to date source of information on protected areas managed by the UN: www.protectedplanet.net/country/NZL UNEP-WCMC and IUCN (2016). Protected Planet Report 2016.
Spalding, M. et al (2013). Protecting Marine Spaces: global targets and changing approaches.
Spear, B. and Cannon, J. (2012). Benthic Protection Areas: Best Practices and Recommendations.
Toropova, C. et. al. (2010). Global Ocean Protection: Present Status and Future Possibilities.
New Zealand Environmental Protection Authority. (2015). Decision on Marine Consent Application: Chatham Rock Phosphate Limited.
New Zealand Government. (2013). New Zealand's Fifth National Report to the UN Convention on Biological Diversity.
New Zealand Government. (2009). New Zealand's Fourth National Report to the UN Convention on Biological Diversity.

IUCN has developed a set of categories to classify protected areas based on the main conservation objective (Table 3). This classification system recognises that there is a range of protection measures and that the different approaches in each have a role to play in protecting biodiversity. The UN and many governments have long used these categories.

Table 3: IUCN Protected Areas Classification System

IUCN Classification	Type of Area	Main Objective
I a	Strict nature reserve	Managed mainly for science and environmental baseline monitoring
I b	Wilderness area	Managed mainly for the protection of wilderness qualities
II	National Park	Managed mainly for ecosystem protection and recreation
III	Natural monument	Managed mainly for conservation of specific natural or cultural features
IV	Habitat/species management area	Managed mainly for conservation through management interventions
V	Protected landscape/seascape	Managed mainly for landscape/seascape conservation and recreation
VI	Managed resource protected area	Managed mainly for the sustainable use of natural ecosystems and resources

The New Zealand Government has not adopted the IUCN categories. The New Zealand MPA Policy sets the standard for designating MPAs within New Zealand and classifies areas according to a more restricted set of categories largely based around whether an area is enacted under the Marine Reserves Act 1971 (i.e., no-take marine reserves) or not (Table 4).[73]

Table 4: New Zealand MPA Policy Classification

NZ MPA Policy Classification	Type of Area	Main Objective
Type 1 MPA	Marine reserves	Established under the Marine Reserves Act to preserve marine life for scientific study
Type 2 MPA	Other MPAs	Meets the MPA Policy's Protection Standard but has not been established under the Marine Reserves Act such as marine mammal sanctuaries
Protection Tools	-	Not recognised as an MPA because does not meet the MPA Policy Standard but still recognised as a protection tool

[73] Department of Conservation. (2005). MPA Policy and Implementation Plan.

Why are MPAs important to New Zealand?

MPAs are one of several tools for conserving marine biodiversity.

In some jurisdictions, MPAs are an important component of fisheries management. However, in New Zealand MPAs have less importance as a fisheries management tool because our fisheries are managed within a comprehensive, science-based and well-developed ecosystem approach to fisheries management (EAFM) framework that encompasses all of the main commercial and bycatch species, as well as requiring any adverse effects of fishing on the aquatic environment to be avoided, remedied, or mitigated.

Table 5: Existing MPAs in New Zealand[74]

	EEZ		Territorial Sea		Total	
	km^2	%	km^2	%	km^2	%
Type 1 MPA	0	0.0	17,539	9.4	17,539	0.4
Type 2 MPA	0	0.0	4,584	2.5	4,584	0.1
Benthic Protection Areas	1,124,539	28.5	13,926	7.7	1,138,465	27.6
'Seamount' Closures	78,466	2.0	0.0	0.0	78,466	1.9
Total Protected Area	1,200,748	30.5	21,813	12.0	1,222,561	29.7

3.4 Marine Protection in New Zealand's Exclusive Economic Zone

To date, New Zealand's MPA Policy has only been applied to the 12 nm Territorial Sea (the Marine Reserves Act only applies in the Territorial Sea).

DSCC's report acknowledges the lack of dedicated legislation to provide for MPAs within New Zealand's EEZ.

DWG and quota owners recognised this when they promoted closing a network of areas representative of New Zealand's oceanic environmental categories. It is noted that dedicated statutory provision for the extension of New Zealand's MPA Policy into the Exclusive Economic Zone was always the intention (i.e., New Zealand's jurisdictional waters which extend 12 nm to 200 nm offshore from 2013)[75]. However, to date, its application to the EEZ remains a work in progress.

In the interim, the Fisheries Act 1996 (and more importantly regulations promulgated pursuant to the Act) remain the primary legislation for establishing marine protection within New Zealand's EEZ.[76]

The main protection measures established in the EEZ to date have been the 'Seamount' Closures and the BPAs.

[74] Analyses performed by GNS Science based on shapefiles provided by the Department of Conservation and Land Information New Zealand as of 25 February 2015.

[75] Ministry of Fisheries and Department of Conservation. (2008). Marine Protected Areas: Classification, Protection Standard and Implementation Guidelines.

[76] See Fisheries (Benthic Protection Areas) Regulations 2007

Closed Seamount Areas

Under the "Draft Seamount Strategy", the Minister of Fisheries closed 19 areas to bottom and midwater trawling in 2001, with the total area of seabed closed comprising more than 102,000 km^2 (27,700 nm^2), or 2% of New Zealand's EEZ. This was seen as a first step by fisheries managers and quota owners.

The Draft Seamount Strategy has the stated purpose of implementing management measures to avoid, remedy, or mitigate the adverse effects of fishing on "seamounts" and, in particular, their benthic communities. The Ministry of Fisheries proposal is to achieve this objective by developing a strategy to manage the impacts of fishing on a representative sample of "seamounts". The objective is to spread the sample group over the representative range of biodiversity and habitats present on "seamounts" in New Zealand fisheries waters. The Strategy acknowledges that:

- The actual number of "seamounts" required to be closed to maintain the biodiversity of seamounts in New Zealand waters is unknown
- The level of endemism between "seamounts" is unknown
- Fishing on "seamounts" is generally restricted to relatively small areas that are accessible to bottom trawling fishing gear
- Many "seamounts" have proven too rough or steep to be fished by trawl
- Others have only one or two relatively small areas that can be accessed by trawl

In these cases, fishing may not affect most of the "seamount" surface.

Benthic Protection Areas

In 2007, New Zealand Government established Benthic Protection Areas (BPAs) under the Fisheries Act 1996, setting aside large areas based upon the best available scientific information, New Zealand's Marine Environment Classification developed by the Ministry for the Environment in 2005.[77]

The purpose of BPAs was to set aside a network of MPAs that encompass a representative range of the benthic (seabed) biodiversity within New Zealand's EEZ. BPAs close 17 large areas to bottom trawling and dredging, with the total area of seabed closed comprising over 1.1 million km^2 of largely pristine seabed.

This conservation initiative, driven by deepwater quota owners and Iwi representatives and supported by Government, was promoted on the recognition of the need for a network of representative MPAs throughout New Zealand's EEZ. However, as there was not (and there still is not) any statutory mechanism to promulgate MPAs within the EEZ and, recognising concerns that bottom trawling was the only anthropogenic activity at the time, the interim solution was to close large representative areas through the Fisheries Act 1996.

BPAs are not a 'fisheries management' tool to manage the sustainable utilisation of New Zealand's fisheries resources. They have been deliberately selected to set aside large areas that broadly represent the wide variety of benthic habitats and communities within the EEZ, based on the best available scientific information at that time. Preference has been given to the closure of areas unmodified by human activity.

BPAs arose from:

- Concerns that bottom trawling may have adverse effects on benthic biodiversity
- Unsubstantiated claims that these effects are widespread; despite independent analyses showing less than 10% of the EEZ has been contacted once or more by bottom trawling and, in any year only 1-2% of the EEZ is contacted by bottom trawling, the same areas being fished each year for the most part[78]

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[77] Snelder, T., Leathwick, J., Image, K., Weatherhead, M. and Wild, M. (2004). The New Zealand Marine Environment Classification. NIWA Client Report CHC2004-071 prepared for Ministry for the Environment. 86 p.

[78] Baird, S.J. & Wood, B.A. (2018). Extent of bottom contact by New Zealand commercial trawl fisheries for deepwater Tier 1 and Tier 2 target fish stocks, 1989-90 to 2015-16. *New Zealand Aquatic Environment Biodiversity Report No. 193*; Black, J. & Tilney, R. (2017). Monitoring New Zealand's trawl footprint for deepwater fisheries: 1989-90 to 2012-13. *New Zealand Aquatic Environment Biodiversity Report No. 176*.

- Concerns that, because regeneration times increase with increasing depths, deepwater environments may be more vulnerable to impacts from fishing than shallower environments, and
- Calls for management measures to address such impacts.

Within the BPAs, bottom trawling and dredging is prohibited. Deepwater quota owners have also placed a moratorium on Danish seining within BPAs, pending legislative amendments to exclude this fishing method.

Criteria for BPA selection

BPAs, which were implemented to protect the benthos in the EEZ, were selected based on four key criteria:

- **Large:** both as individual parcels and cumulatively.
- **Simple in form**: to facilitate ease of interpretation and compliance.
- **Unimpacted:** Unfished (largely unfished) or otherwise impacted by human activity. This was important. Given the purpose of BPAs is to protect benthic biodiversity, it was important to close areas where the biodiversity both structurally and functionally was unaltered by human activity. Closing areas within the fishing grounds cannot achieve the purpose of BPAs, because the benthic biodiversity has been altered. One would not close cattle farmed areas to cattle farming to protect representative biodiversity (e.g., native podocarp forest, flaxlands, high country tussock lands) because these areas have already been modified for cattle farming. Native biodiversity protection would be impossible.
- **Broadly Representative**: protection of not less than 10% of each of the identified marine environments within the EEZ:
    - *Marine Environment Classification (MEC) areas within the EEZ* – the MEC was developed by the Ministry for the Environment, the Ministry for Fisheries, the Department of Conservation and the National Institute of Water and Atmospheric Research as an "*ecosystem-based spatial framework for marine management purposes*." [79] The MEC describes 11 coastal and 9 oceanic classes. BPAs close between 11% and 86% of eight of the MEC oceanic classes. The ninth oceanic class (Class 55) lies predominantly within coastal waters adjacent to the northern North Island and is not fished by deepwater trawlers.
    - *Biodiversity areas identified by the World Wildlife Fund* – key biodiversity areas identified by WWF-NZ in their report "Shining a Spotlight on the Biodiversity of New Zealand's Marine Ecoregion" were incorporated into the development of the BPAs.
    - *Geologic regions* – the New Zealand maritime area extends across the Indo-Australian tectonic plate (in the west) and the Pacific tectonic plate (in the east) and the zone between these two. To encompass the full range of geological habitats and structures, BPAs have been determined so that half of the closed area is to the west and half to the east.
    - *Oceanographic regions* – the New Zealand maritime area also extends from sub-tropical waters (in the north) to sub-Antarctic waters (in the south) and includes the sub-tropical convergence between these. To encompass the full range of oceanographic conditions, BPAs have been determined so that half of the closed area is to the north and half is to the south.
    - *Depth ranges* – BPAs were selected based on representative consideration of the depth regions 0-200 m, 200-750 m, 750-1,500 m and >1,500 m. Being representative, these protected depths had to correspond with the amount of representative area (biodiversity) at those depths.
    - *Underwater Topographical Features (UTFs)* – BPAs were selected to close a range of known UTFs which include underwater seamounts (>1,000 m elevation), knolls (500-1,000 m elevation) and hills (<500 m elevation). In addition, known hydrothermal vents were also considered. BPAs, when combined with the existing 'Seamount' Closures, protect 28% of known UTFs, 52% of known true seamounts and 88% of known active hydrothermal vents within the EEZ.
    - *Transects* – as little is known of the exact spatial extent and locations of the various marine benthic habitats and communities, part of the selection criteria for the BPAs was to select large areas that

[79] Snelder, T., Leathwick, J., Image, K., Weatherhead, M. and Wild, M. (2004). The New Zealand Marine Environment Classification. NIWA Client Report CHC2004-071 prepared for Ministry for the Environment. 86 p.

transect from 12 to 200 nm offshore, contiguous with MPAs inside of the 12 nm TS. These are Fiordland Transect, Antipodes Transect and Kermadec.

- *Alignment with the Australian Fishing Zone (AFZ)* - to leverage off existing MPAs, the Sub Antarctic Deep BPA is contiguous with the Macquarie Island Marine Park in the south and the Norfolk Deep BPA aligns with the NZ EEZ-AFZ boundary in the north.

Representativeness and Depth

The DSCC paper refers to a paper in Marine Policy that found ownership generated incentives for seafloor stewardship (BPAs) were not great at closing areas that were subject to fishing for biodiversity protection, concluding that there are more deeper areas protected by BPAs than shallower areas at fishing depths. The authors acknowledge the efficacy of BPAs:[80]

> "*Though many of the BPAs are too deep to fish and/or do not contain high levels of biodiversity, the BPAs encompassing the Kermadec Islands and portions of the Chatham Rise (one of the most productive regions in all of New Zealand's waters) are known to harbour vulnerable marine ecosystems*."

The paper also acknowledges that New Zealand's BPAs are a ''*broadly representative sample of benthic habitats, in essentially pristine condition, to avoid any future adverse effects of fishing on the seabed*''[81] and then forgets about the representativeness, criticising those BPAs that were too deep.

Table 6: Comparison of areas of depth intervals within New Zealand EEZ and BPAs[82]

Depth Intervals (m)	New Zealand EEZ		Within BPAs		
	km^2	% EEZ	km^2	% EEZ	% BPA
<200	120,168	3	4,087	3.4	0.4
200-750	538,311	14	57,437	10.7	5.0
750-1,500	705,073	18	139,031	19.7	12.3
<1,500	2,543,110	65	933,534	36.7	82.3
All Depths	3,906,662	100	1,134,089	29	100

In the establishment of BPAs, a number of biodiversity-related factors were considered to ascertain representative areas of biodiversity within the EEZ, one of which was depth.

Table 6 (above) summarises the relative success of BPAs of protecting representative biodiversity areas with the EEZ in relative proportion to habitat depths (e.g., 18% of the biodiversity within NZ's EEZ is between 750-1,500 m, BPAs protect almost 20% of it, 65% of the biodiversity within NZ's EEZ is deeper than 1,500 m, BPAs protect almost 37% of it).

However, Reiser (2013) makes the mistake of measuring the representative depths of BPAs within themselves, this is irrelevant. BPAs designed to have every representative depth within each BPA. Given the nature of the New Zealand EEZ, such a requirement would make finding representative locations very difficult indeed. What is more, depth would become the dominant criterion, subtracting from other criteria, like size. It is noted biogenic habitat in the New Zealand EEZ is located much deeper than 1,500 m, with some species of coral found as deep as ~5,000 m.[83]

[80] Rieser, A., Watling, L., & Guinotte, J., (2013) Trawl fisheries, catch shares and the protection of benthic marine ecosystems: Has ownership generated incentives for seafloor stewardship? *Marine Policy* 40 (2013) 75–83:79
[81] Rieser, A., Watling, L., & Guinotte, J., (2013) Trawl fisheries, catch shares and the protection of benthic marine ecosystems: Has ownership generated incentives for seafloor stewardship? *Marine Policy* 40 (2013) 75–83. Pp 77-78.
[82] *Ibid*., p 79.
[83] Consalvey, M., MacKay, K and Tracey, D. (2006). Information review for protected deep-sea coral species in the New Zealand region. NIWA Client Report: WLG2006-85, prepared for Department of Conservation, 53p.

The first and key information source for ascertaining the representativeness of benthic biodiversity was the Marine Environment Classification (MEC), which was developed by NIWA with support from the Ministry for the Environment, Department of Conservation, and Ministry of Fisheries as "*a spatial framework for analysis and management of marine conservation and resource management issues*."[84] According to a 2019 study, the MEC was derived from physical variables, *"... with limited biological data, but at the time was the best ecological classification available [at the time BPAs were designed]."*[85]

As can be seen in Figure 20, BPAs aimed to accommodate the natural variation present in MEC classes by ensuring that each MEC class was protected by at least two different BPAs and, where possible, on the eastern and western geological/tectonic plates.[86]

[84] Snelder et al. (2005) Marine Environment Classification. Ministry for the Environment.
[85] Clark MR; Mills S; Leduc D; Anderson OF; Rowden AA (2019). Biodiversity of Benthic Protection Areas and Seamount Closure Areas: a description of available benthic invertebrate data, and a preliminary evaluation of the effectiveness of BPAs for biodiversity protection. *New Zealand Aquatic Environment and Biodiversity Report No. 227*. 270 p at page 3.
[86] Helson J, Leslie S, Clement G, Wells R, Wood R (2010) Private rights, public benefits: Industry-driven seabed protection. Marine Policy 34, at page 561.

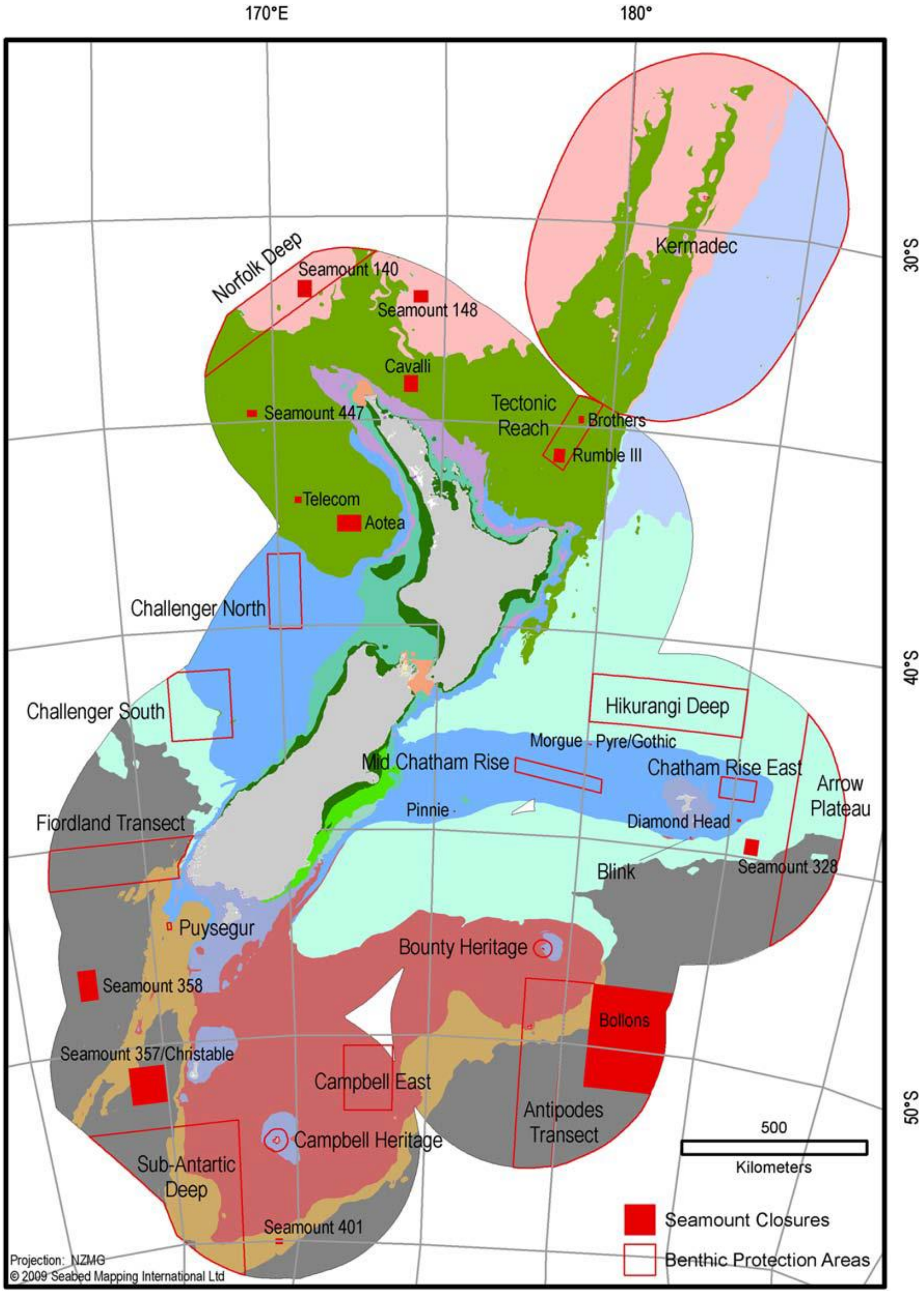

Figure 20: Marine Environmental Classes in New Zealand showing BPAs.[87]

Furthermore, in 2004, WWF–New Zealand published an independent, scientific assessment of New Zealand's biodiversity and identified 15 biodiversity hotspots that have more than half their area in the EEZ.[88] Although several of the hotspots are small, BPAs cover nine of them, and of these, six are 10% or more protected (Figure 21). Helson et al.'s analysis concluded that 87% of WWF–New Zealand's biodiversity ''hotspots'' are either protected by BPAs or have never been impacted by trawl gear.[89]

[87] Helson, Stefan Leslie, George Clement, Richard Wells, Ray Wood (2010) Private rights, public benefits: Industry-driven seabed protection. *Marine Policy* 34 (2010) 557-566: 561; See also: https://niwa.co.nz/sites/niwa.co.nz/files/import/attachments/mec_overview.pdf.
[88] Arnold, A. editor. Shining a spotlight on the biodiversity of New Zealand's marine ecoregion: experts workshop on marine biodiversity. 27–28 May 2003, Wellington, New Zealand. WWF–New Zealand, Wellington; 2004.
[89] Helson *et al*. (2010), at p 563.

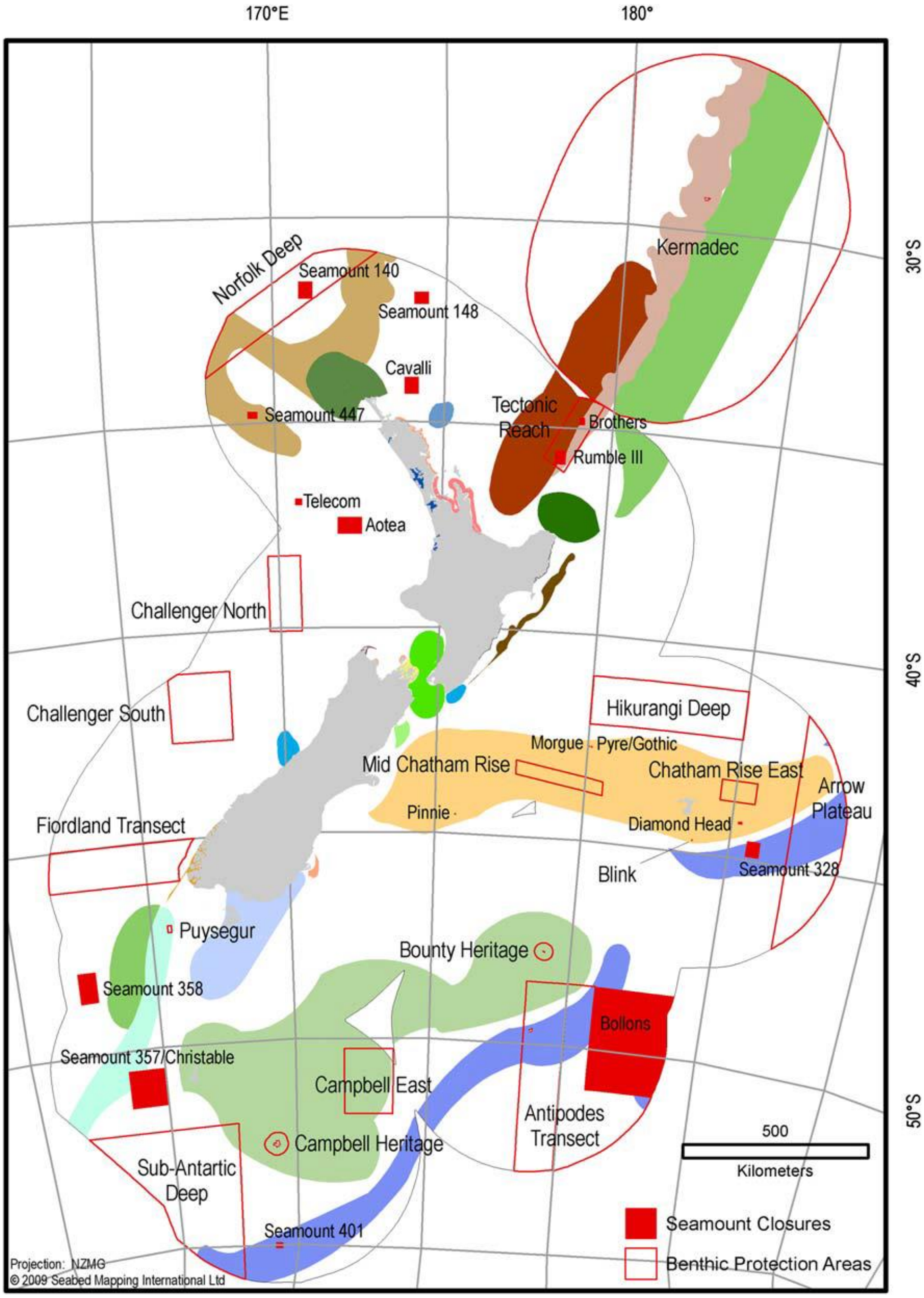

Figure 21: Location of BPAs in relation to the biodiversity hotspots identified in the 2004 WWF-New Zealand assessment[90]

[90] Helson *et al*. (2010), at p 564.

Are BPAs MPAs?

BPAs are clearly defined geographical areas, designated under the *Fisheries (Benthic Protection Areas) Regulations 2007,* for the express purpose of protecting benthic biodiversity and associated ecosystem services; they comprehensively meet this definition.

When implementing BPAs, the then Minister for Fisheries, Hon Jim Anderton, expressly recognised that they made a significant contribution to several important obligations and objectives, namely:[91]

- the New Zealand Biodiversity Strategy where the Crown had the objective of protecting a full range of natural marine habitats and ecosystems to effectively conserve marine biodiversity using a range of appropriate mechanisms, including legal protection (Objective 3.6),
- the United Nations Convention on the Law of the Sea that specifies a duty to protect and preserve the marine environment (Article 193),
- and the Fisheries Act 1996 requirement to ensure sustainability in part by avoiding, remedying, or mitigating any adverse effects of fishing on the aquatic environment (section 8(2)(b)).

Since then, the New Zealand government has also recognised the protection that BPAs provide and the contribution they make to protecting global marine biodiversity. In the Government's Fourth and Fifth national reports to the United Nations Convention on Biological Diversity (CBD), BPAs are specifically referenced for their contribution toward international marine protection targets. For example, in noting progress against Aichi Target 11 on protected areas, the Fifth National Report states that:[92]

> *In addition to no-take marine reserves, New Zealand protects a further 1,268,369 km^2 under a variety of protection measures:*
>
> *27.4% of the marine and coastal area is protected from fishing impacts on the benthic marine environment [through BPAs] and a further 2.6% is seamounts protected from trawl impacts.*

Notwithstanding New Zealand's current domestic position on whether BPAs are MPAs, the international community has been consistent in accepting that these protection measures are MPAs. In assessing New Zealand's MPA coverage, the OECD relied on the protection afforded by the BPAs in determining that 29% of New Zealand's EEZ is contained within Marine Protected Areas (Figure 22).[93]

This 29% was based on consideration of the IUCN's MPA categories IV, V, and VI. These three categories indicate that an MPA is either a habitat or species management area, a protected landscape or seascape, or a protected area with sustainable use of natural resources, respectively. The 29% MPA coverage is further supported by the OECD Environmental Performance Review on New Zealand in 2017 which included BPAs when calculating the percentage of marine protected areas in New Zealand from 2010 to 2014.[94]

It is important to note that while the IUCN management categories are listed from I-VI, the IUCN cautions that *"the categories do not imply a simple hierarchy, either in terms of quality and importance or in another way."*[95] They further expand on the importance of matching the management categories to each unique situation, stating that:[96]

> *Objectives should be chosen with respect to the particular situation; not all categories are equally useful in every situation. Choice of categories is often a complex challenge and should be guided by the needs and*

[91] Accord Relating to Benthic Protection Areas within New Zealand's Exclusive Economic Zone, agreed between Minister of Fisheries Hon Jim Anderton and the Deepwater Group Ltd.
[92] Department of Conservation 2019: New Zealand's Sixth National Report to the United Nations Convention on Biological Diversity. Reporting period: 2014–2018. Department of Conservation, Wellington, New Zealand, at page 117.
[93] OECD (2019), Compare your country: Environment at a Glance – Sustainable Ocean Economy, OECD https://www1.compareyourcountry.org/environment-ocean/en/7/1696/default/2019/OECD.
[94] OECD (2017), OECD Environmental Performance Reviews: New Zealand 2017, OECD Publishing, Paris. http://dx.doi.org/10.1787/9789264268203-en, 21.
[95] Dudley, N. (Editor) (2008). Guidelines for Applying Protected Area Management Categories. Gland, Switzerland: IUCN. x + 86pp. With Stolton, S, P. Shadie and N. Dudley (2013). IUCN WCPA Best Practice Guidance on Recognising Protected Areas and Assigning Management Categories and Governance Types, Best Practice Protected Area Guidelines Series No. 21, Gland, Switzerland: IUCN. pp24.
[96] Ibid at page 24.

urgency of biodiversity conservation, the opportunities for delivery of ecosystems services, the needs, wants and beliefs of human communities, land ownership patterns, strength of governance and population levels.

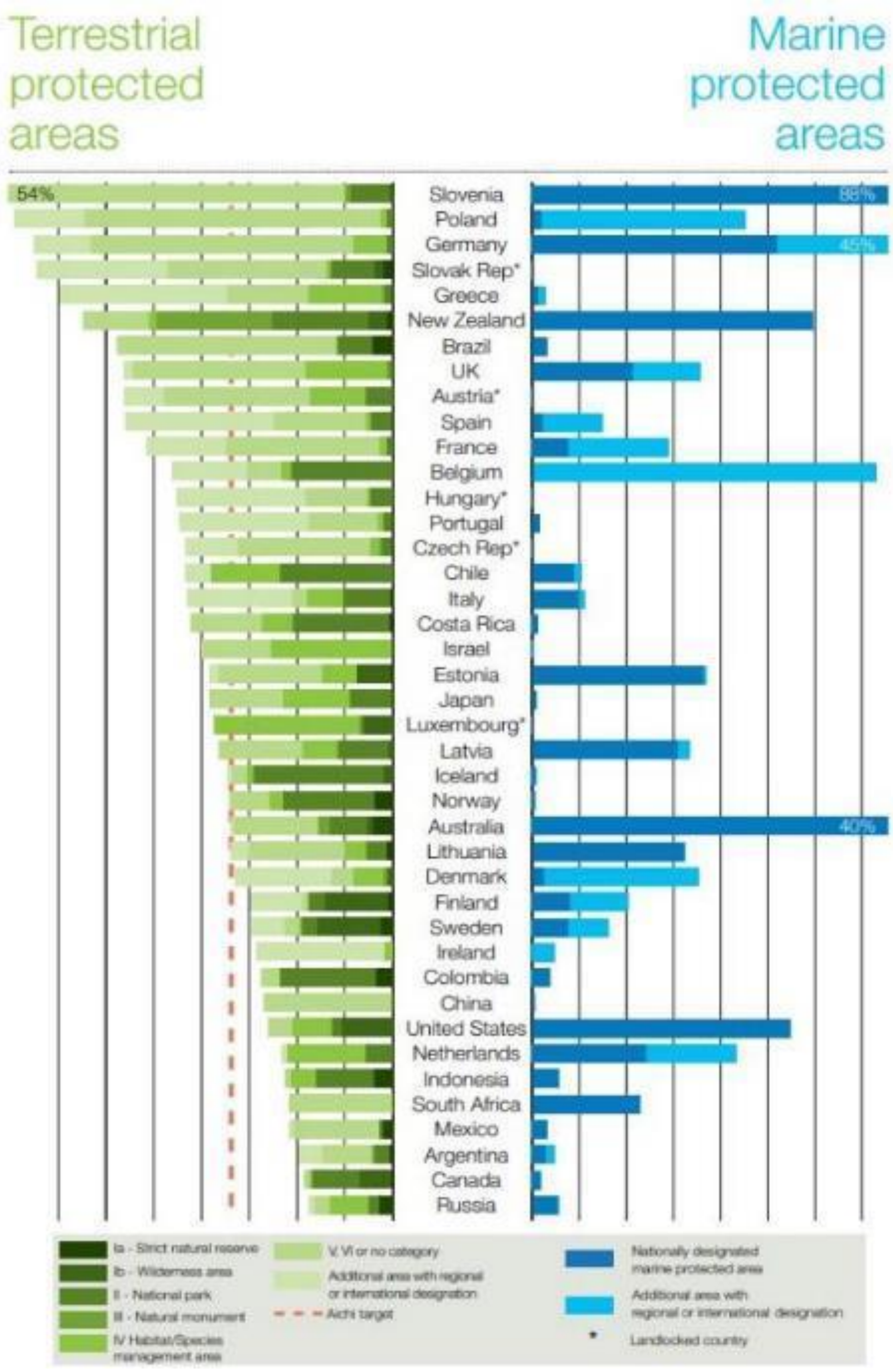

Figure 22: Extent of MPA coverage as a share of the Exclusive Economic Zone[97]

The IUCN has itself considered BPAs as Marine Protected Areas when determining the number of total protection areas within New Zealand's EEZ (Figure 23).[98] Globally, in terms of Marine Area Protection, the UNEP-WCMC recognises every BPA as an IUCN Category VI MPA.[99]

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[97] OECD (2019), Compare your country: Environment at a Glance – Sustainable Ocean Economy, OECD https://www1.compareyourcountry.org/environment-ocean/en/7/1696/default/2019/OECD.

[98] UNEP-WCMC (2021). Protected Area Profile for New Zealand from the World Database of Protected Areas, August 2021. Available at: www.protectedplanet.net

[99] *Ibid*., at UNEP-WCMC Protected Planet site: https://www.protectedplanet.net/country/NZL

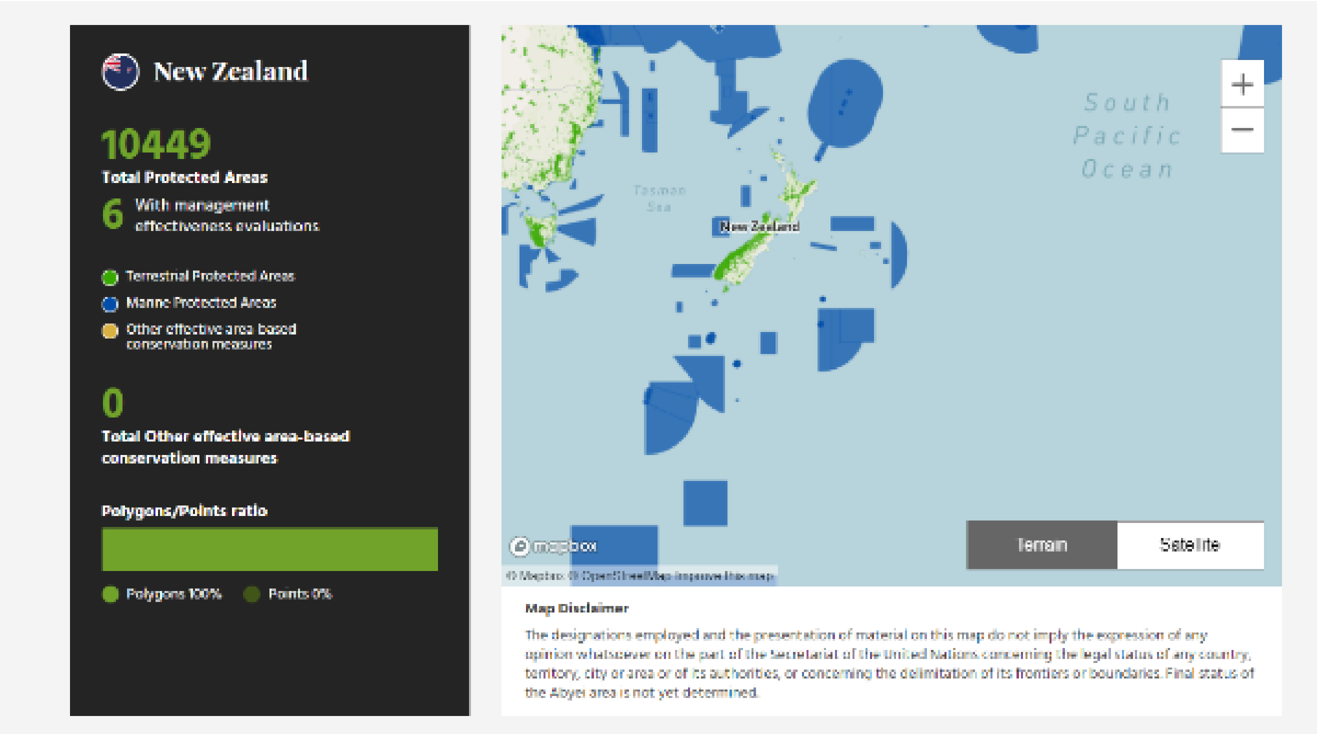

Figure 23: IUCN's classification of Marine Protected Areas in New Zealand.[100]

The DSCC Petition purports that BPAs are not effective for benthic conservation. This view is not aligned with the support by provided by most eNGOs for the proposal by Pew to introduce further conservation measures within the Kermadec region.[101]

DWG recognised the marine conservation values of this huge region when proposing it as a BPA in 2007. The Government recognised this too and implemented our proposal in full. The Kermadec BPA covers 620,537 km^2, or 51.4% of the total area set aside for marine conservation under the BPAs and the Seamount Closed Areas.[102]

Almost all of the Kermadec area has never been fished and is too deep or steep to bottom trawl. None of that matters in respect of its widely recognised marine conversation values. DWG submits that most of the other areas closed to bottom trawling under BPAs and Seamounts Closed Areas similarly will be recognised as having high marine conservation values once further representative scientific sampling has been undertaken.

Spatial management of bottom trawling on seamounts has been in place since 2001 with the Closed Seamount Areas (CSAs), strengthened in 2007 with the introduction of Benthic Protection Areas (BPAs).

CSAs and BPAs are recognised internationally, including in the UNEP-WCMC World Database of Protected Areas as IUCN category IV-VI Marine Protection Areas (MPAs). These closures protect a representative biodiversity of seabed habitat from bottom trawling and comprise 31% of New Zealand's large EEZ, providing one of the highest proportions of marine protection in the world, especially for a country that possesses and accesses deepwater fisheries resources.

[100] UNEP-WCMC (2021) Protected Area Profile for New Zealand from the World Database of Protected Areas, (August 2021) https://www.protectedplanet.net/country/NZL

[101] The PEW Environment Group (2010) DEEP: Talks and thoughts Celebrating Diversity in New Zealand's Untouched Kermadecs. *Proceedings. Kermadec Symposium* (Aug 2010). 98pp https://www.pewtrusts.org/-/media/post-launch-images/2014/kermadecs/assets/kermadec_symposium_aug_2010_proceedings.pdf

[102] C. Hindle, (2007) Seabed Mapping International, *pers. comm*. (2007; also see R. Mules, MPI Geospatial Team *pers. comm*. (2021)

3.5 Providing Food Production while managing any *Adverse Effects* on the Environment

All forms of food production have an impact on the environment; indeed, they all necessitate some degree of environmental modification.

Wine production requires the entire removal of natural biodiversity and the replacement of the native animals and plants with a monoculture of exotic species *(Vitis vinifera*) and the maintenance of this crop species at the expense of any reemergent native biodiversity. The same occurs for the growing of vegetables (which often require the construction of infrastructure, such as greenhouses). Forestry also requires wholesale removal of native vegetation to be replaced by a monoculture of exotic timber-producing species.

Milk and meat production similarly requires the wholesale removal of native biodiversity and replacing this with cultivated pasture and livestock species.

On farms, some areas may be put aside to protect areas of native biodiversity. In these areas, there is no food production. Instead, biodiversity is conserved through the application of different management and (at times) legal provisions that expressly provide for different levels of food production, conservation and protection.

The harvesting of wild fish is no different. Fishing takes place on the fishing grounds, most of which have been fished for decades and continue to sustainably deliver food production from New Zealand's fisheries resources. DWG estimates that close to 80% of the seafood produced in New Zealand by volume is procured by bottom trawling.

Within New Zealand's EEZ we annually produce some 700,000,000 servings of seafood from fishing grounds that cover only 1.1% of the area. 31% of New Zealand's EEZ is expressly set aside from food production as marine protected areas. The balance of the EEZ is not fished, providing large expansive areas of undisturbed benthic ecosystems.

The New Zealand Commercial Fishing Grounds (2007-19), as well as closed areas and unfished areas within New Zealand's EEZ are shown in Figure 23.[103]

[103] FNZ (2021) New Zealand Commercial Trawl Fishing Intensity (October 2007 – September 2019). https://www.mpi.govt.nz/dmsdocument/39356-New-Zealand-Commercial-Fishing-trawl

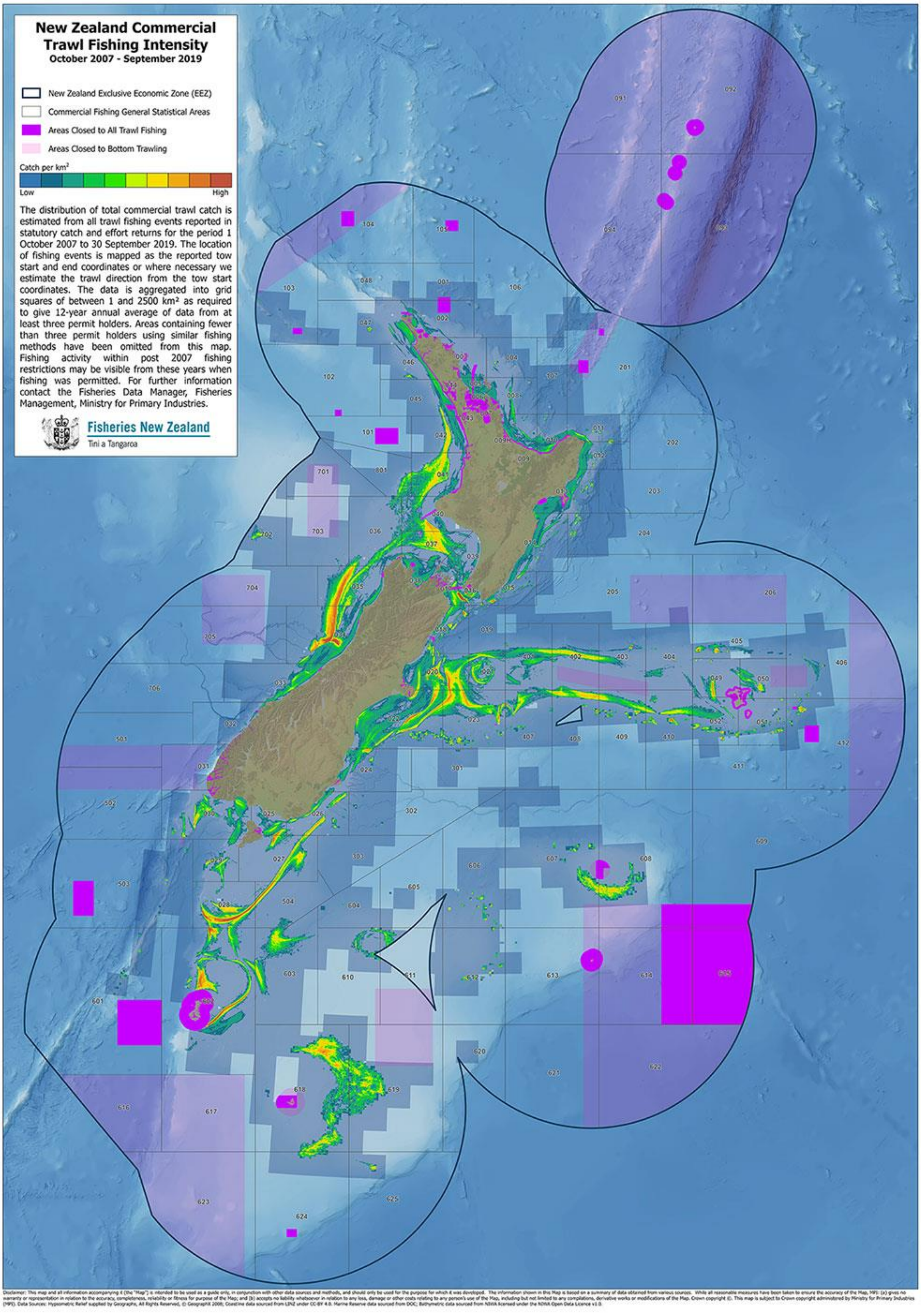

Figure 24: New Zealand Commercial Fishing Grounds (2007-2019) relative to closed areas and unfished areas within the New Zealand EEZ

DSCC's report skips over any acknowledgement of deepwater fisheries in the context of New Zealand society's need for food production, for jobs, for export earnings and for economic prosperity. DSCC attempts to paint a picture of the entire seabed being vulnerable to trawling.

This contention is flawed in that it lacks context or balance and is based on incomplete knowledge.

The DSCC petition report notes:[104]

> *"Many of the impacts of bottom trawling on seamounts and other underwater features have been documented from within our own EEZ …. Characterised by a lack of attached fauna, or scattered fragments often referred to as rubble."*

As with all forms of food production, including organic farming, fishing has an impact on the environment. Just as the impacts of agricultural or horticulture only occur on farms, market gardens, orchards and vineyards, the impacts of fishing only occur on the fishing grounds. In the same way, as one expects to see long lines of vines in a vineyard, furrowed ground supporting fields of wheat or corn, or turned up muddy ground near gates that lead to a cowshed on a dairy farm, one can observe the impacts of trawl tracks on the seabed within the fishing grounds.

The keys here are always context, knowledge and balance.

On land in New Zealand 37% of the area is utilised for food production and we have set aside 32% as Conservation Lands.

In our oceans, 9% of the EEZ has been utilised for food production (91% is un-impacted by food production) and we have set aside 31% as part of our 'Marine Conservation Estate'.

DSCC's report does not recognise these distinctions.

The Fisheries Act 1996 (the Act) enables the management of fishing in New Zealand and implements both the United Nations Convention on the Law of the Sea 1982 (UNCLOS) and the FAO Code of Conduct for Responsible Fisheries 1995 (FSA) and codifies an Ecosystem Approach to Fisheries Management (EAFM). The Act implements and enables the FAO's focus on 'principles' rather than 'prescription'; noting that while principles reside generally across all jurisdictions, prescriptive measures may not.

While sections 9 and 10 of the Act are principle-based, enabling marine environmental principles and the precautionary approach, s 8 of the Act provides for sustainable utilisation –anticipating and expressly providing for aquatic environmental impact, but drawing the line at adverse effects, which the Act deems as inconsistent with sustainability.

"Adverse Effects"

Section 8 of the Act provides for the Act's purpose. This Section anticipates that a balance must be sought between the "*utilisation*" of fisheries resources whilst ensuring "*sustainability*".

The Act implicitly recognises that the activities of fishing will cause impacts, and it provides for these unless they collectively become 'adverse effects on the aquatic environment'. At that point, the obligation on all parties (including the Government) is to put in place measures to avoid, mitigate or remedy the adverse effects. While Government policy is not well developed to determine when adverse impacts might collectively constitute adverse effects, effective policy has been implemented for seabirds and marine mammals to manage impacts on a population basis, not on the basis of impacts to individual animals.

DWG urges the development of effective policies on this basis for corals and other epibenthic organisms, to manage any adverse impacts on their populations, rather than a focus on zero captures. To give effect to the latter would result in an unacceptable loss to New Zealand's capability to sustainably produce food for the world, to provide employment and to support New Zealand's economy through the annual earning of billions in export revenues.

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[104] DSCC (2021) Save deep sea corals: ban bottom trawling on seamounts. P 13.

To find that bottom trawling on seamounts should be excluded inappropriately reads down both the Section 8 *"ensuring sustainability"* purpose of the Act (which specifically enables *adverse effects* to be avoided, remedied, or mitigated) and the imperative to maintain the potential of fisheries resources to meet the reasonably foreseeable needs of future generations.

The Act envisages the utilisation of fisheries resources and anticipates adverse effects and the avoiding, remedying or mitigating thereof. It is not a "no effects statute" and prohibiting all bottom trawling on seamounts that cause adverse effects without considering whether those effects could be appropriately (or even entirely – such as through midwater trawling) remedied or mitigated - frustrates rather than gives effect to the purposes of the Act.

There are different expressions of "adverse effects" across various instruments, however, it is notable that what comprise "adverse effects" in those instruments are expanded on within the instruments (unlike the FA 96).The following are worth noting:

A. *EEZ Act:* Similar "adverse effects" language is used in the EEZ Act where Section 10(1) requires promotion of sustainable management as part of the statutory purpose.

10 Purpose

(1) The purpose of this Act is—

(a) to promote the sustainable management of the natural resources of the exclusive economic zone and the continental shelf; and
(b) in relation to the exclusive economic zone, the continental shelf, and the waters above the continental shelf beyond the outer limits of the exclusive economic zone, to protect the environment from pollution by regulating or prohibiting the discharge of harmful substances and the dumping or incineration of waste or other matter.

(2) In this Act, sustainable management means managing the use, development, and protection of natural resources in a way, or at a rate, that enables people to provide for their economic well-being while—

(a) sustaining the potential of natural resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and
(b) safeguarding the life-supporting capacity of the environment; and
(c) avoiding, remedying, or mitigating any adverse effects of activities on the environment.

B. *The New Zealand Coastal Policy Statement (NZCPS) is a national policy statement under the Resource Management Act 1991 (RMA). To consider the nature and effect of the RMA and the NZCPS an applicant is required to be satisfied that a proposal will not have significant adverse effects on important ecological values and would not result in deterioration or degradation of the CMA. In particular, the following features of the NZCPS are relevant:*

(a) the explicit incorporation of the precautionary approach in Policy 3.1.
(b) the requirement in Policy 11 to avoid adverse effects on threatened and vulnerable taxa;
(c) the requirement in Policy 13 to avoid adverse effects in areas with outstanding natural character, and to avoid significant adverse effects on natural character in all other areas of the coastal environment;
(d) the requirement in Policy 15 to avoid adverse effects of activities on outstanding natural features in the coastal environment, and to avoid significant adverse effects of activities on other natural features in the coastal environment;

It follows that in the absence of express definition or expansion of what comprise "*adverse effects*" (or what is required to establish an adverse effect) within a statute, the term must be read in light of the purposes and principles of the statute. In the case of the Fisheries Act – this must be in the context of seeking a balance between conservation and utilisation.

The concept of "*adverse effects*" is often conflated by the eNGOs with the definition of '*significant adverse impacts*' that is given in the International Guidelines for the Management of Deep-sea Fisheries in the High Seas.[105]

Significant adverse impacts, as described in the guidelines, are those that compromise ecosystem integrity (i.e., ecosystem structure or function) in a manner that:[106]

- impairs the ability of affected populations to replace themselves,
- degrades the long-term natural productivity of habitats, or
- causes, on more than a temporary basis, significant loss of species richness, habitat or community types

Arising from this, are two points worth noting:

- Given that the Act is the New Zealand statute that provides for the utilisation of fisheries resources within the EEZ (as opposed to on the High Seas), and that the regulations promulgated under the Act specifically mandate bottom trawling, it is incorrect for eNGOs to incorporate this language into the interpretation of the Act. This applies, in particular, the reference to the application of the precautionary principle referred to in para [20] of the FAO 2009 Bottom Fishing Guidelines referred to above.
- International instruments are only binding to the extent that they are incorporated into domestic legislation.[107]

The correct (and intended) approach in considering an "*adverse effect*" is to read and apply the environmental principles in Section 9 with Section 8 as follows:

- **Section 9** - All persons exercising or performing functions, duties, or powers under this Act, in relation to the utilisation of fisheries resources or ensuring sustainability, shall consider the following environmental principles:

  (a) Associated or dependent species should be maintained above a level that ensures their long-term viability

  (b) Biological diversity of the aquatic environment should be maintained

  (c) Habitat of particular significance for fisheries management should be protected.

The New Zealand High Court reinforced Parliament's intention, ruling that the Fisheries Act must be interpreted from its text and in light of its purpose, and not, (as the High Court noted in the TTR matter in the context of the EEZ Act), some "*extraneous precautionary ideal*".[108] Blind adherence to biological allocation and management criteria, at the expense of considered opportunity to utilise the stocks sustainably, is not consistent with New Zealand's international obligations as established by provisions in UNCLOS. The adoption of this approach creates an unintended bias towards extreme environmental objectives rather than allowing the continuation of sustainable and rational fishing activities by nations.

The DSCC report completely overlooks the unique jurisdictional nature of the EEZ where a coastal state's sovereign rights are exercised *subject* to corresponding obligations to the international community under the UNCLOS (i.e., other state parties).

Part XII of UNCLOS establishes the obligations concerning the protection and preservation of the marine environment. These include:

- States have a general obligation "*to protect and preserve the marine environment* …" (art. 192).
- A state's "sovereign right to exploit their natural resources" is exercised "in accordance with their duty to protect and preserve the marine environment …" (art. 193).

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[105] See FAO (2009) International Guidelines for the Management of Deep-sea Fisheries in the High Seas (http://www.fao.org/3/i0816t/I0816T.pdf)

[106] See The FAO International Guidelines for the Management of Deep-sea Fisheries in the High Seas (http://www.fao.org/fishery/topic/166308/en)

[107] Helu v Immigration and Protection Tribunal [2016] 1 NZLR 298 (SC), at [143].

[108] Taranaki-Whanganui Conservation Board v Environmental Protection Authority [2018]NZHC 2217, [2019] NZRMA 64, at [336]

- “States shall take all measures consistent with” UNCLOS “that are necessary to prevent, reduce and control pollution of the marine environment from any source…” (art. 194).
- “Coastal states shall adopt laws and regulations to prevent, reduce and control pollution of the marine environment arising from or in connection with seabed activities subject to their jurisdiction…” (art. 208).

The FAO FSA also provides for the protection of fisheries habitat:

- Article 6.8: all critical fisheries habitats should be protected and rehabilitated
- Article 8.4.7: assess the implications of habitat disturbance prior to the introduction on a commercial scale of new fishing gear, methods, and operations in the area

The Fisheries Act (particularly Section 9) is consistent with these internationally accepted principles for the protection of fisheries habitat. While there are no specific requirements for an impact assessment, the Minister’s ability to regulate fishing methods and areas (Section 11) enables the implications of habitat disturbance to be considered, with section 8 expressly requiring adverse effects to be avoided, remedied, or mitigated.

New Zealand’s fisheries management framework requires managers to balance the objectives of providing for the utilisation of fisheries resources whilst ensuring their sustainability.

The Fisheries Act 1996 implicitly recognises that the activities of fishing will cause impacts and it provides for these unless they collectively become ‘adverse effects on the aquatic environment’. At that point, the obligation on all parties (including the Government) is to put in place measures that will avoid, mitigate or remedy any adverse effects.

In New Zealand, biodiversity is conserved through the application of management and (at times) legal provisions that expressly provide for different levels of food production, conservation and protection. These align with New Zealand’s ecosystem approach to fisheries management that emphasises the need for a balanced approach

3.6 Marine Stewardship Council (MSC) Certification

The MSC is an ecolabel and fishery certification standard with the mission "*to contribute to the health of the world's oceans by recognising and rewarding sustainable fishing practices, influencing the choices people make when buying seafood and working with our partners to transform the seafood market to a sustainable basis*."[109]

The MSC Fisheries Standard is a robust global science-based gold standard. It is a normative standard where stakeholders (e.g., other fisheries, NGOs, governments, or other bodies) are invited to participate and submit in the fishery assessment process from the outset, throughout the assessment, stakeholders are given the opportunity to submit information and comment on reports, all of which are made public and available for anyone to see on the MSC website. Fisheries that meet the science-based MSC standard as assessed by a team of fishery and marine environmental experts who are independent of both the fishery and the MSC are certified as sustainable.

New Zealand hake, hoki, ling, orange roughy and southern blue whiting fisheries are certified sustainable in conformance with the MSC Fisheries Standard. What is more, the New Zealand certified fisheries, all of them employing bottom trawl fishing gear, are certified without any conditions of certification, which puts them in the top 5% of the world's best managed and independently assessed fisheries.

The recent report from the Office of the Prime Minister's Chief Science Advisor noted that a "*strength of the MSC standards is that fisheries have to maintain certification, not just achieve it once*."[110] The report added:

> *"Ongoing improvements in fishing sustainability are key to gaining and maintaining certification, which can include approaches such as establishing new harvest strategies, developing measures to minimise bycatch, mitigating fishing impacts on vulnerable species, habitats and ecosystems, and changing governance or policy practices. In addition to annual audits to make sure standards are continuing to be met, recertification has to be achieved every five years. In that time, the standards will have evolved to reflect improved knowledge and understanding about the wider impacts of fisheries, making sure that the bar for sustainable practice continues to be raised."*

The MSC Standard has a benthic habitats component which has to be met if the fishery wants to be certified sustainable. A non-conformance in one component results in the fishery not meeting the standard.

To meet the habitats component of the MSC Standard, the fishery has to demonstrate that it is:[111]

(a) ***highly unlikely*** *to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm.*
(b) ***highly unlikely*** *to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm.*

The Standard requires that:[112]

- the assessors determine and justify which habitats are commonly encountered, vulnerable marine ecosystems (VMEs), and all other habitats. Commonly encountered habitat is defined as a habitat that regularly comes into contact with a gear used by the UoA, considering the spatial (geographical) overlap of fishing effort with the habitat's range within the management area(s). VMEs are defined consistently with FAO VME Guidelines.[113] The MSC Standard requires the term "VME" to also include "potential VME" to cover situations when a governance body uses a precautionary approach (e.g., where there is doubt over whether a habitat is a VME or not) and when a habitat is being treated as a potential VME.
- "serious or irreversible harm" be interpreted as "reductions in habitat structure and function such that the habitat would be unable to recover at least 80% of its structure and function within 5-20 years if fishing on the habitat were to cease entirely." In the case of VMEs "serious or irreversible harm" is interpreted as "reductions in habitat structure and function below 80% of the unimpacted level."

[109] MSC Website https://www.msc.org/about-the-msc/what-is-the-msc#
[110] Prof. Dame J. Gerrard. (Feb 2021). *The Future of Commercial Fishing in Aotearoa New Zealand.* A report from the Office of the Prime Minister's Chief Science Advisor. Pp 331-332
[111] Marine Stewardship Council (MSC) Fisheries Standard v2.01 (31 August 2018) at SA3.13. P.I. 2.4.1 (pp 111-112)
[112] Marine Stewardship Council (MSC) Fisheries Standard v2.01 (31 August 2018) at SA3.13.3 and SA3.13.4
[113] Food and Agriculture Organization of the United Nations (FAO). (2009). International guidelines for the management of deep-sea fisheries in the high seas.

The evidential burden of meeting is such that if the assessors do not have enough information to assess habitats against the above requirements (due to low information), the assessors refer to a global best practice risk assessment framework to assess the risk of fishing to benthic habitats. The risk assessment methodology that is used, Consequence Spatial Analysis (CSA),[114] is a semi-quantitative relies on scientific and wide stakeholder input to both identify affected habitats (categorised based on their substratum, geomorphology, and characteristic biota characteristics) and assist in the scoring of the consequence and spatial attributes (considering habitat-productivity attributes (biota regeneration and Natural disturbance) and gear-habitat interaction attributes.[115]

In addition to demonstrating the (un)likelihood of reducing habitat structure and function, the standard also requires that there is a strategy in place for managing the impact of fishing on benthic habitats and VMEs (PI 2.4.2) and that the "*nature, distribution and vulnerability of the main habitats in the UoA area are known at a level of detail relevant to the scale and intensity of the fishery*" with adequate information to "*allow for identification of the main impacts of the UoA on the main habitats, and there is reliable information on the spatial extent of interaction and the timing and location of use of the fishing gear*."[116]

The New Zealand fisheries management system is renowned as one of the best in the world, being comprehensive, integrated, and supporting sustainable deepwater fisheries using a balanced ecosystem management approach. The condition-free certification of 19 of New Zealand's most important fisheries against the robust science-based MSC standard not only demonstrates the success of this management framework but also puts the management of our deepwater fisheries amongst the top 5% best-managed fisheries in the world.

[114] Williams, A., Dowdney, J., Smith, A.D.M., Hobday, A.J., and Fuller, M. (2011). Evaluating impacts of fishing on benthic habitats: A risk assessment framework applied to Australian fisheries. Fisheries Research 112(3):154-167.
[115] MSC Fisheries Certification Process V 2.2 (Mar 2020). PF7 Conducting a Consequence Spatial Analysis (CSA) pp 78-89
[116] Marine Stewardship Council (MSC) Fisheries Standard v2.01 (31 August 2018) at SA3.14-15. P.I. 2.4.1 (pp 113-116)

4. The only option left is to ‘ban bottom trawling on seamounts’

Balancing Food Production with an Ecosystem Approach to Fisheries Management

The DSCC petition paper asserts that, as they consider bottom trawling to be the most immediate threat to seamounts and the coral on them, and that it should be banned.

This paper has provided information that contextualises food production, bottom trawling and seamounts and demonstrates that:

- There are 142 known seamounts within New Zealand’s EEZ 127 of which (89%) are either closed to bottom trawling or have never been trawled. As bottom trawling has only occurred on 9 (6%) of seamounts over the past decade, fishing does not comprise an immediate threat to the biogenic habitats on seamounts in New Zealand’s EEZ.
- Corals are widespread across New Zealand’s EEZ, most are not found on seamounts
- Bottom trawling within New Zealand’s EEZ occurs only in discrete areas. Annually, the total area of contact by bottom trawls comprises 1.1% of the EEZ and only 9% has been contacted once or more by bottom trawls since records began in 1989-90.
- 91% of New Zealand’s EEZ has never been contacted by bottom trawls.
- Management measures for bottom trawling are in place, including closure of 31% of the EEZ by law to bottom trawling (1,206,439 km^2).

Food production is an essential component of New Zealand’s social and economic wellbeing. As all forms of food production necessitate environmental changes, often wholesale, a balance between retaining natural ecosystems and designating areas for food production is essential:

- On land we produce food from 53.4% of our land area, or 138,000 km^2 (exotic forestry is produced on an additional 8.1% of our land area or 21,000 km^2).[117]
- Annually we produce food from less than 2% of our oceanic areas (Territorial Sea and EEZ), or 81,055 km^2.
- On land, 33.4%, or 87,633 km^2, is classed as ‘conservation lands’ and is therefore closed (or restricted) to food production. Clearly, not all conservation lands are suitable for food production and large parts are unaffected by anthropogenic activities.[118]
- In our oceans, 30%, or 1,244,146 km^2, is closed (or restricted) to food production. Not all of the areas closed for marine conservation purposes are suitable for food production and almost all are unaffected by anthropogenic activities.
- Overall, conservation measures has is excluded (or at least restricted) food production from 30% (1,330,294 km^2) of New Zealand’s total land and ocean jurisdiction.
- Of the total area New Zealand has set aside for conservation purposes, 94% is within our oceans.

On the balance of the information presented here, bottom trawling does not provide an existential threat to either coral populations or to benthic biodiversity on seamounts.

[117] Journeaux, P., Van Reenen, E., Manjala, T., Pike, S., Hanmore, I., & Millar, S. (2017) Analysis of Drivers and Barriers to Land Use Change. *A Report prepared for the Ministry for Primary Industries by AgFirst* (August 2017). 90p Page 9.
[118] MfE (2010) Legally Protected Conservation Land in New Zealand. *Environmental Snapshot* (April 2010).

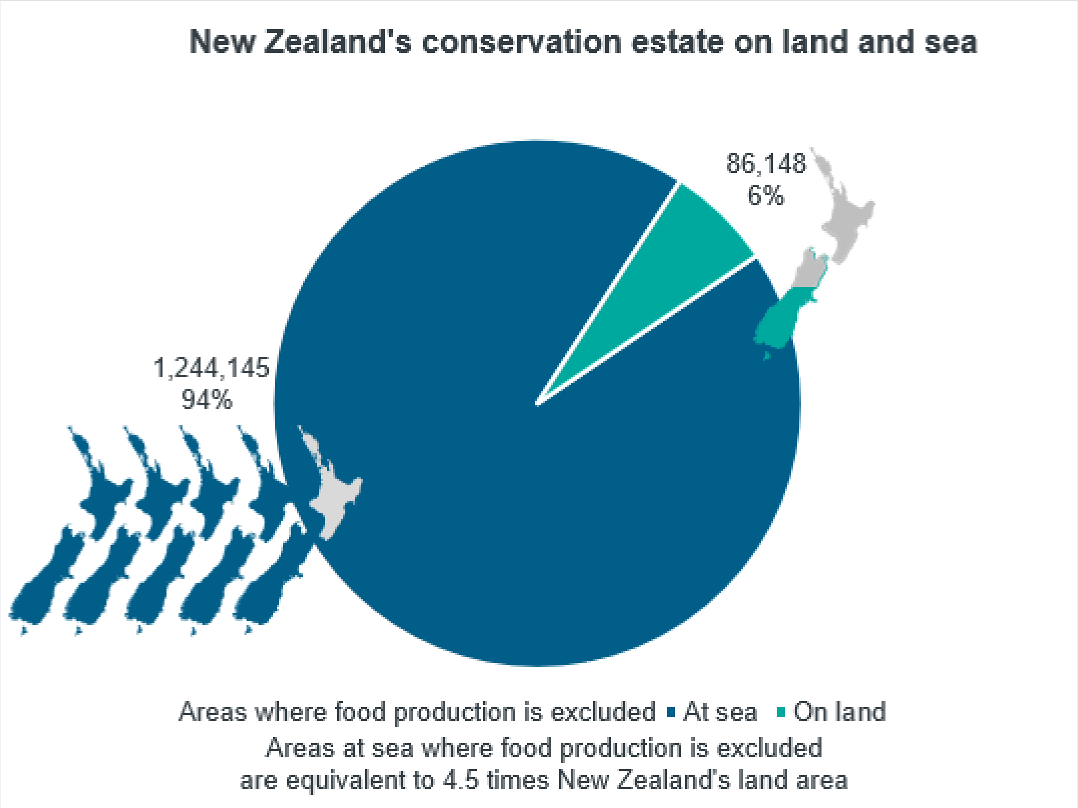

Figure 25: New Zealand's conservation estate on land and sea

The authors of a number of papers that were used in the DSCC Petition Paper posited in 2019 that:[119]

> "*Spatial Management is likely to be the most effective strategy to conserve benthic communities of seamount ecosystems. This approach is best achieved by restricting the distribution of fishing effort and putting in place a network of open and closed areas, with closure of unfished seamounts where benthic communities occur in their natural state*."

DWG agrees and supports a balanced spatial management, one that expressly provides for both food production and for marine conservation. This support is based on management measures that expressly provide for the utilisation of fisheries resources while ensuring the sustainability of these resources.[120]

Recommendations of blanket bans have shown to be unhelpful in many jurisdictions. While they may be effective in terms of biodiversity protection, but they are blunt tools:[121]

> "*Recognising the overwhelming global targets for the protection of marine habitats, there needs to be more consideration for the way that people fit into the way that conservation programmes are designed and implemented. Bearing in mind the factors that are widely considered to make marine protected areas successful, the governance strategies involved, and the resources needed to implement the number of protected areas required, the situation is extremely complex*."[122]

[119] Clark MR, Bowden DA, Rowden AA and Stewart R (2019) Little Evidence of Benthic Community Resilience to Bottom Trawling on Seamounts After 15 Years. Front. Mar. Sci. 6:63. doi: 10.3389/fmars.2019.00063 p 14
[120] Section 8. Fisheries Act 1996 No 88
[121] Jessica M. Savage, Malcolm D. Hudson and Patrick E. Osborne (2020) Chapter 18 - The challenges of establishing marine protected areas in Southeast Asia. in John Humphreys and Robert W.E. Clark (Eds) Marine Protected Areas. Science, Policy and Management (2020). Pp 343-359.
[122] *Ibid*.

Imposing a blanket ban, especially in the context of the requirement to undertake a balanced ecosystem approach to fisheries management within a jurisdiction that has significant fisheries resources is not recommended.

The best approach is to employ targeted measures that are evidence-based and data-driven, as are anticipated and provided for within New Zealand's ecosystem approach to fisheries management framework.[123]

Need for Systematic Benthic Research

In an Accord[124] between the Minister of Fisheries and Deepwater Quota owners signed in 2007 with the implementation of Benthic Protecting Areas (BPAs), "*it is acknowledged that bottom trawling has an impact on the benthic environment*, but also that *the nature and diversity of the benthic environment in different geographical locations, and at different depth in the EEZ, is not well researched or understood, but is thought to comprise a diverse range of benthic flora and fauna*."[125]

This Accord acknowledges that the inadequate information on the nature and extent of benthic biogenic habitats and on the impacts that bottom trawling may be having on these has led to tension between commercial fisheries, eNGOs and successive governments.[126] The Accord outlines an agreement to protect 17 geographic areas (known as BPAs) with an acknowledgement that there may be a need for further closures within the EEZ to avoid, remedy or mitigate any adverse effects of bottom trawling, or to maintain the biodiversity of the benthic environment. These matters are to be considered in the third cycle of the Marine Protected Areas Policy and Implementation Plan process. It was provided that any need for further closures would be subject to the terms of the Accord and relevant legislation including the application of the best available information.[127]

To these ends, the Accord expressly provides for expenditure and cost recovery for Deepwater Benthic Research and recognises the increased public interest in Deepwater Benthic Research, providing for contributions from the seafood industry for required fisheries services of which the Commercial Industry will pay a third ($333k per annum), although any Deepwater Benthic Research in the EEZ undertaken in the public interest is not restricted.[128]

DWG submits that before it can be attested and asserted that *"all seamounts in [New Zealand] waters should be considered VMEs"* warranting *"full protection in order to meet our domestic policies and international commitments"*[129] a scientific and representative inventory of the benthic ecosystems throughout New Zealand's EEZ is required. The objective of this work is to establish the nature, extent and composition of the biodiversity and biogenic habitats that exists within the closed areas (e.g., BPAs and the 'Seamount' Closures) and in the areas that are not trawled, rather than relying primarily on fisheries-related information (e.g., what can be found in fishing nets) or what can be cost recovered further to fisheries and conservation services projects.

Assertions as to the nature and extent of New Zealand's deepwater biodiversity throughout our EEZ based on what can be deduced from the fishing grounds and in-depth studies of some isolated UTFs and applying it to all seamounts and seamount features throughout the EEZ (including the 127 of the total 142 known seamounts, that have never been fished), is no different from deducing the nature and extent of native rainforest biodiversity throughout New Zealand based on analyses on the biodiversity found in the Marlborough Wine region.

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[123] Sections 8-12, 15. Fisheries Act 1996 No 88
[124] Accord Relating to Benthic Protection Areas within New Zealand's Exclusive Economic Zone (EEZ) agreed between Minister of Fisheries Hon Jim Anderton and the Deepwater Group Ltd.
[125] *Ibid*., (see Clauses 2.5 and 2.6
[126] *Ibid*., Cl. 2.7
[127] Accord Relating to Benthic Protection Areas within New Zealand's Exclusive Economic Zone (EEZ) agreed between Minister of Fisheries Hon Jim Anderton and the Deepwater Group Ltd. See clauses 4.1 – 4.2, 5.1 – 5.6.
[128] Accord Relating to Benthic Protection Areas within New Zealand's Exclusive Economic Zone (EEZ) agreed between Minister of Fisheries Hon Jim Anderton and the Deepwater Group Ltd. See Cl. 5.6
[129] Deepsea Conservation Coalition (2021) Save our deep sea corals, ban bottom trawling on seamounts. P10.

Seafood Industry Benthic Science Initiatives

The seafood industry's ability to assess the risks that deepwater trawling may pose to benthic biodiversity remains constrained due to the lack of scientific information on the nature and extent of benthic habitats within the EEZ. An inventory of the biodiversity within our oceans in the public interest is the role of the Government, one that it has yet to adequately deliver on.

The performance of our main deepwater fisheries is independently assessed annually under MSC's ecolabel programme. DWG finds that these science-based reviews are all too often hampered due to the lack of comprehensive baseline ecological information beyond the relatively small areas in the EEZ where we fish.

DWG has recently agreed to purchase an additional $4.4 m of science from CSIRO over the next five years to further our understanding of the deepwater benthic biodiversity and on biogenic habitats. There are two main themes to give effect to this:

1. **Habitat surveys of the benthic biodiversity within selected areas**

   Benthic surveys will be undertaken to quantitatively assess then nature and distribution of benthic organisms in the habitats of selected Underwater Topographic Features (UTFs) using CSIRO's underwater towed video system (with real-time connectivity to the survey vessel). The objective is to quantitatively map and assess the habitat types within each survey area (e.g., mud, sand, rock, biogenic) and to quantify species' occurrences within biogenic habitats (i.e., areas containing corals, sponges and other epibenthic invertebrate communities) using CSIRO's Artificial Intelligence (AI) capabilities.

   Over five years, the plan is to survey the benthic habitats of up to 25 of the key UTFs. The survey information will then be analysed with other data, such as trawl paths, enabling assessments of any risks posed by trawling and the extent of areas untouched by trawling.

2. **Industry trawl camera systems**

   DWG and vessel owners have contracted CSIRO to develop and deploy bespoke SMART-cam technology (Seafloor Monitoring, Automated Recording of Trawls). Once developed, the objective is to routinely deploy robust underwater camera and lighting systems during commercial bottom trawling. The high-resolution digital imagery collected of the seabed will be analysed to identify and quantify the benthic habitat types and their biodiversity along trawl pathways. We will apply CSIRO's proven solutions for deepwater engineering, automated data download, data management and analyses using their proven AI capabilities in New Zealand waters.

   This project will deliver a unique seafloor monitoring programme, the results from which will provide a scientific basis for an informed strategy for assessing and managing risks to benthic communities from deepwater trawling.

An improved scientific baseline inventory is essential, not only to underpin New Zealand's delivery of an Ecosystem Based Approach to Fisheries Management (EAFM) but also to understand New Zealand's marine biological capital and the risks that may be posed to this by trawling.

In the meantime, the seafood industry is developing a 'whole-of-industry' bottom trawling policy, while considering the merits of a separate approach alongside this for true seamounts that might enable the implementation of a statutory based measure outside an overall bottom trawling policy.

The Minister for Oceans and Fisheries has acknowledged the work done to date by DWG:

> *"I appreciate the contribution that deepwater quota owners, through Deepwater Group, have made to improving the environmental performance of New Zealand's deepwater fisheries and the continued efforts to expand the knowledge base to support monitoring of the effects of trawling. This of course is appropriate given the effects of bottom trawling on benthic environments.*
>
> *As you are aware, the impacts of bottom trawling are an important focus for me as Minister for Oceans and Fisheries, and an area that has been highlighted in the recently released Prime Minister's Chief Science Advisor's Report into Commercial Fishing.*

Fisheries New Zealand is developing robust information to support consideration of further management options and I look forward to the Deepwater Group actively engaging with the Ministry for Primary Industries on this work as we develop management options.

I would ask that you work with officials to record an agenda to advance. From our discussions when we met, I would include:

- *Innovation in trawl technology to reduce bottom contact;*
- *Prohibiting trawling of previously untrawled areas;*
- *Habitat research via cameras on trawl nets; and*
- *Seamount definition and protection.*

Addressing this issue will require investment and I expect the Deepwater Group to take a leading role working with the Ministry for Primary Industries, and the wider industry to drive the steep change that is needed to reduce the impacts of bottom trawling."[130]

Food production is an essential component of New Zealand's social and economic wellbeing. As all forms of food production necessitate environmental changes, often wholesale, a balance between retaining natural ecosystems and designating areas for food production is essential.

- ***On land we have designated 37% for food production and set aside 32% for conservation.***
- ***In our EEZ, 9% of the EEZ has been utilised for food production (91% is un-impacted by food production) and we have set aside 31% for conservation.***
- ***Of the total area New Zealand has set aside for conservation purposes, 94% is within our oceans.***

On the balance of the information presented here, bottom trawling does not provide an existential threat to either coral populations or to benthic biodiversity on seamounts as asserted by DSCC.

DWG remains committed to continuing with informed and rational science-based discussions on further improving the management of bottom trawling and its impacts on the marine benthic habitats, where this may be required.

[130] Letter to DWG from Hon., David Parker (Minister of Oceans and Fisheries). 12 July 2021

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Abbreviations

BOE	Black oreo
BPA	Benthic Protection Area
CDL	Cardinal Fish
CMA	Coastal Marine Area
CSA	Closed Seamount Area
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DSCC	Deep Sea Conservation Coalition
DWG	Deepwater Group Limited
EAFM	Ecosystem Approach to Fisheries Management
EEZ	Exclusive Economic Zone
eNGO	Environmental Non-Governmental Organisation
ER	Electronic Reporting
FAO	Food and Agriculture Organization of the United Nations
FNZ	Fisheries New Zealand
FSA	Food Systems Assessment
GNS	GNS Science - formerly known as the Institute of Geological and Nuclear Sciences
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
LOS	Law of the Sea
MEC	Marine Environment Classification
MPA	Marine Protected Areas
MSC	Marine Stewardship Council
NGO	Non-Governmental Organisation
NIWA	National Institute of Water and Atmospheric Research
OECD	Organisation for Economic Co-operation and Development
ORH	Orange roughy
SPRFMO	South Pacific Regional Fisheries Management Organisation
SSO	Smooth oreo
TS	Territorial Sea
TTR	Trans-Tasman Resources Ltd
UNCLOS	United Nations Convention on the Law of the Sea
UNEP-WCMC	UN Environment Programme World Conservation Monitoring Centre
UNESCO	United Nations Educational, Scientific and Cultural Organization
UTF	Underwater Topographical Feature
VME	Vulnerable Marine Ecosystem
VMS	Vessel Monitoring System
WWF	World Wildlife Fund