

Management of Benthic Effects by New Zealand’s Orange Roughy Fisheries

Orange Roughy Habitat Range

In New Zealand waters orange roughy (ORH) are found between approximately 600 – 1600m. They may exist in deeper water but to date these depths have not been sampled by trawling. They frequent areas of flat and sloping ground, are found on and around some Undersea Topographic Features (UTFs) and also occur in the water column well off the seabed where they are known to feed on mesopelagic prey species.

ORH Trawl Footprint in EEZ

The EEZ and Territorial Sea (TS) annual trawl footprint for orange roughy reached a peak in 1998/99 at around 7,200 km², after which it steadily decreased, by almost two-thirds, to around 2,500 km² in 2009/10 (Fig. 1). In contrast, the ORH catch peaked at 51,000 t 10 years earlier in 1988/89 and had been managed down to 16,000 t by 1998/99, suggesting that factors other than TACC drives the trawl footprint extent (e.g. fleet size, catch rates, precision fishing). The EEZ cumulative TACC for the current fishing year (i.e. 2012/13) is 6,941 t.

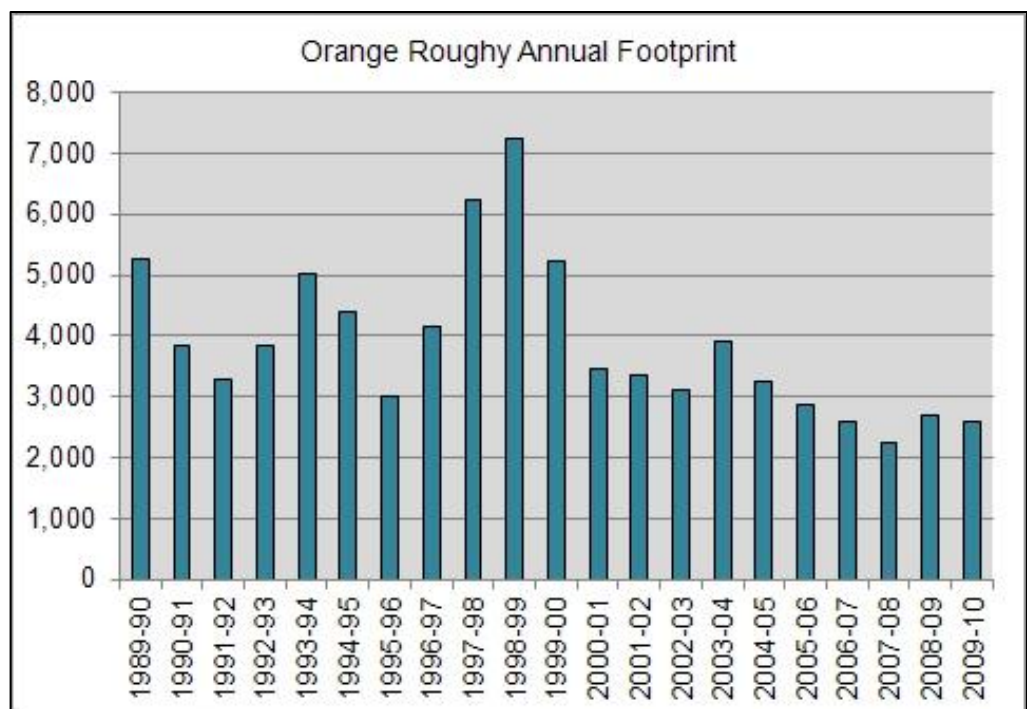


Figure 1: Annual trawl footprint for orange roughy-targeted tows 1989/90 – 2009/10 (Black *et al.* 2013).

The cumulative trawl footprint for orange roughy-targeted trawling for the period 1989/90 – 2009/10 and for the most recent year only, are provided in figures 2 & 3 below. It is immediately evident that the recent footprint is only a small fraction of the cumulative footprint.

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ORH Trawl
Footprint in EEZ
contd.

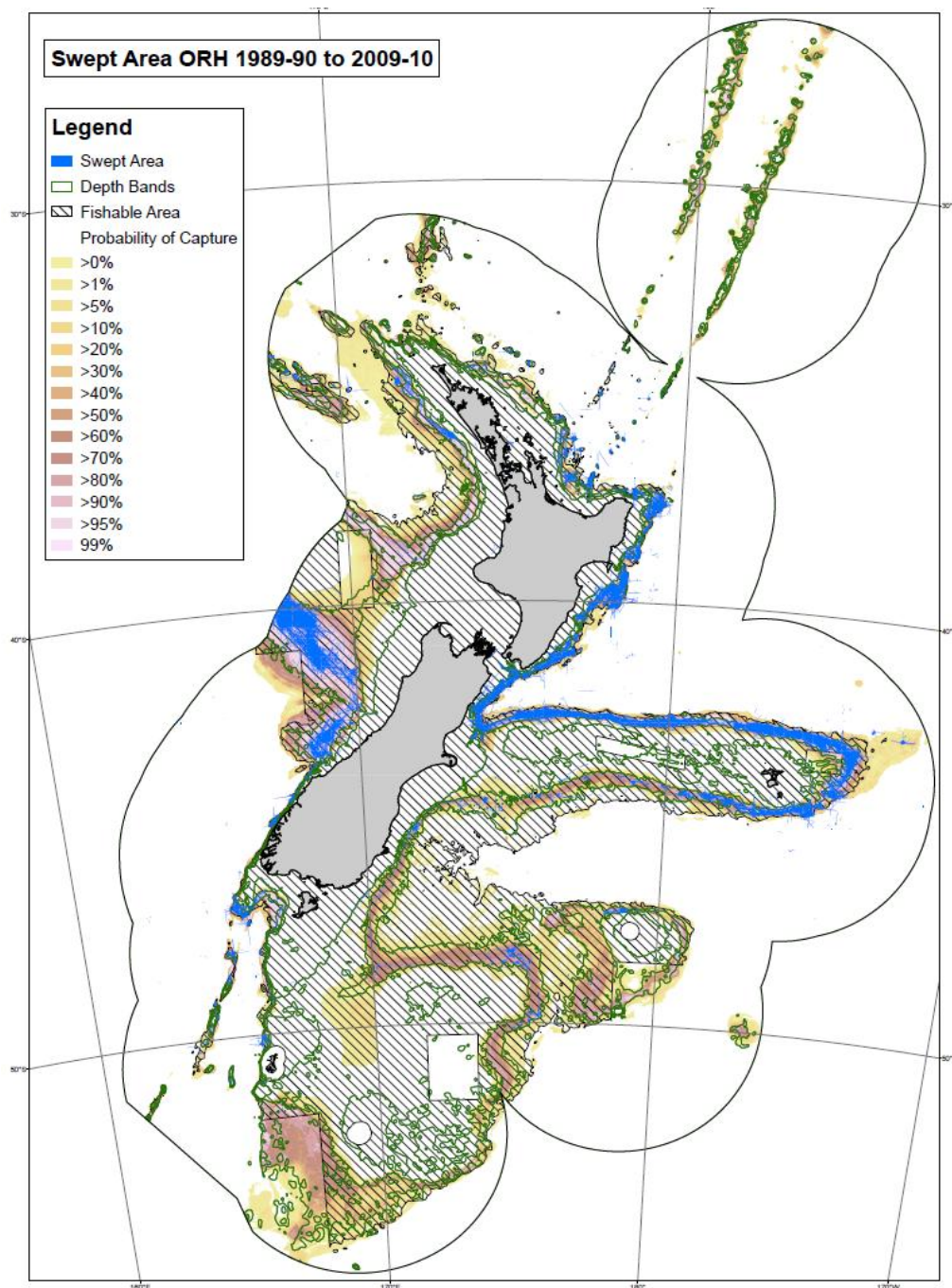


Figure 2: Cumulative ORH trawl fishery footprint for the period 1989/90 – 2009/10.

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ORH Trawl
Footprint in EEZ
contd.

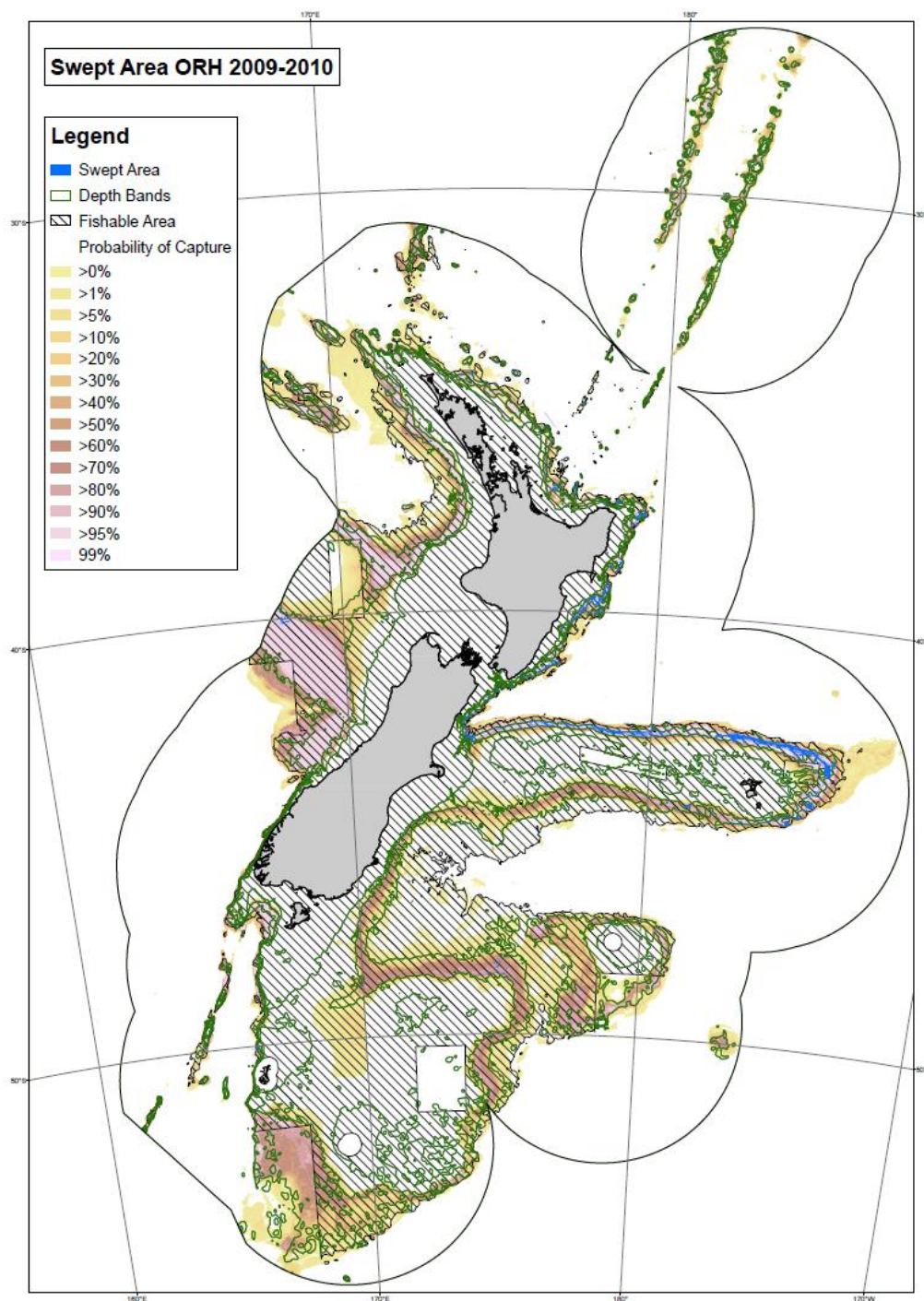


Figure 3: ORH trawl fishery footprint for the 2009/10 fishing year.

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ORH Trawl Footprint in EEZ by Depth Range

At the scale of the New Zealand EEZ, the estimated swept area by orange roughy targeted tows (for methodology see Black *et al.*, in press) during the most recent five-year period amounts to less than 1% of the primary habitat range for orange roughy of between 800 – 1200 m (Table 1).

Table 1: Trawl footprint by depth zone in the EEZ and TS for the five-year period 2005/06 – 2009/10. The metrics for the main fishing area (800 – 1200 m) are highlighted

Recent 5-Year Average (2005/06 - 2009/10)	Area (km ²)	Swept Area (km ²)	Swept Area (%)
EEZ & TS	4,121,131	2,595	0.06%
0 - 400m	407,963	5	0.00%
400 - 800m	473,433	82	0.02%
800 - 1200m	386,530	1,968	0.51%
1200 - 1600m	2,853,205	539	0.02%

For the entire 21-year period for which TCEPR data are available the trawl footprint has amounted to less than 8% of the primary habitat range (i.e. 92% of the benthic habitat has not been fished during this period), (Table 2).

Table 2: Trawl footprint by depth zone in the EEZ and TS for the 21-year period 1989/90 – 2009/10. The metrics for the main fishing area (800 – 1200 m) are highlighted

All Years (1989/90 - 2009/10)	Area (km ²)	Swept Area (km ²)	Swept Area (%)
EEZ & TS	4,121,131	38,820	0.94%
0 - 400m	407,963	416	0.10%
400 - 800m	473,433	2,047	0.43%
800 - 1200m	386,530	27,796	7.19%
1200 - 1600m	2,853,205	8,561	0.30%

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Swept Area Analysis by Fishery Area

The extent of the area closures within the depth range 800 – 1200 m (i.e. encompassing the primary fishery area), in each of the four fisheries is provided in Table 3 below. Note that the ORH7A fishery area includes an area beyond the EEZ boundary known as Westpac Bank (WB) where orange roughy are fished and managed as a straddling stock.

Table 3: Analysis of the area either closed, swept, or closed and/or unswept, within the primary fishery area (i.e. 800 – 1200 m) for the recent five-year period 2007/08 – 2011/12

Orange Roughy Fishery Area	Habitat Swept (%)	Habitat Closed (%)	Habitat Closed and/or Unswept (%)
E&SCR	5.2	5.0	94.9
NWCR	8.4	0.4	91.7
MEC	13.4	0.0	86.6
ORH7A & WB	0.31	8.8	99.7

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Management of Benthic Effects

New Zealand has implemented multiple initiatives to monitor and mitigate the effects of bottom trawling on the benthic environment:

1. Spatial management through legislated area closures ("Seamount" Closures and BPAs), (Fig. 4):
 - "Seamount" Closures – A total of 17 UTFs closures implemented in 2001, where all trawling is prohibited
 - Benthic Protection Areas (BPAs) – A total of 17 BPAs implemented in 2007, amounting to over 30% of the EEZ, where bottom trawling and dredging is prohibited

Between them these closures cover over 30% of the EEZ and include:

 - 28% of underwater topographic features (including seamounts)
 - 52% of seamounts over 1,000 m in height
 - 88% of known active hydrothermal vents.
 2. Annual monitoring of trawl footprint extent in accordance with MPI's 10-Year Research Plan
 3. Assessment of Adverse Environmental Effects of Fishing. A workshop was held in August 2013 to assess AEEF in the orange roughy trawl grounds.
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UTFs Fished in the EEZ

Pertinent to the determination of benthic effects by trawling is a clear definition of the UTFs that occur in the orange roughy habitat range. Three kinds of UTF are recognised here, namely 'hills', 'knolls' and 'seamounts'. These are characterised by the US Board on Geographic Names (2005), as follows:

- Hills – a vertical elevation from sea floor of less than 500 m
- Knolls – a vertical elevation from sea floor of between 500 m and 1,000 m
- Seamounts – a vertical elevation from sea floor of more than 1,000 m and with a limited extent across the summit.

Note that:

- New Zealand's "Seamount Closures" include UTFs in all three of the above categories
 - No seamounts are fished in the four fishery areas under consideration; all fished UTFs are either hills or knolls.
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BPA and "Seamount" Closures

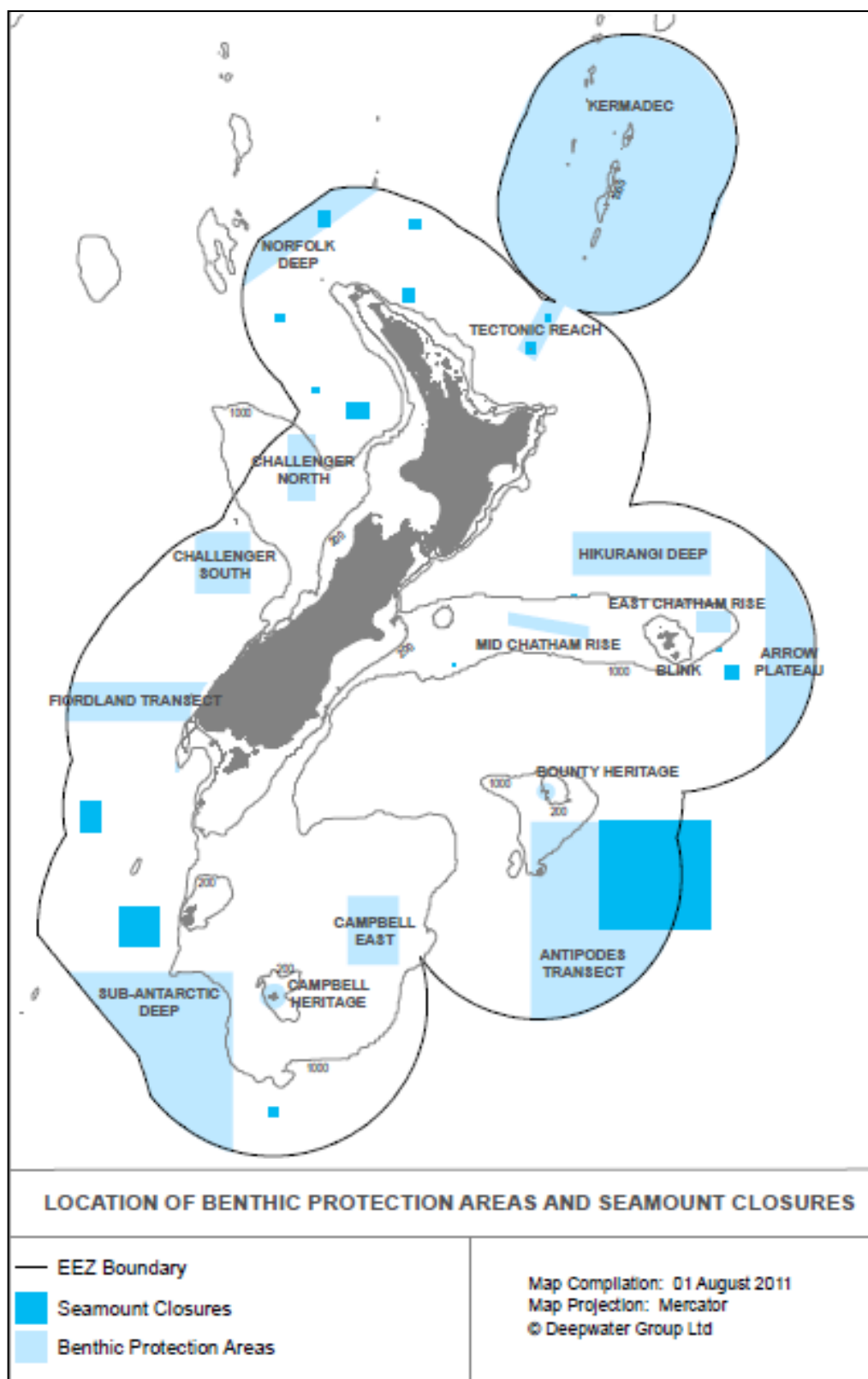


Figure 4: Benthic Protection Areas and "Seamount" Closures.

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References

Black, J., Wood, R., Berthelsen, T. and Tilney, R. (In Press). Monitoring New Zealand's trawl footprint for deepwater fisheries: 1989-1990 to 2009-2010. New Zealand Aquatic Environment and Biodiversity Report No. xxxx.

US Board on Geographic Names (2005). Policies and Guidelines for the Characterization of Undersea Feature Names. 6 p. <http://earth-info.nga.mil/gns/html/underseafeatures.html>

Dr R. Tilney
Project Manager, Clement & Associates Ltd

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