

9th MEETING OF THE SCIENTIFIC COMMITTEE

Held virtually, 27 September to 2 October 2021

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**Addendum to the Cumulative Bottom Fishery Impact Assessment for Australian
and New Zealand bottom fisheries in the SPRFMO Convention Area 2020**

New Zealand

South Pacific Regional Fisheries Management Organisation

9th Meeting of the Scientific Committee

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**Addendum to the Cumulative Bottom Fishery Impact Assessment for
Australian and New Zealand bottom fisheries in the SPRFMO Convention
Area, 2020**

New Zealand

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Purpose

This paper aims to provide an addendum to the Cumulative Bottom Fishery Impact Assessment for Australian and New Zealand bottom fisheries in the SPRFMO Convention Area 2020 (BFIA 2020), which was presented at the 8th meeting of the Scientific Committee. The addendum details missing information on the current protection levels afforded in the Westpac Bank area.

Background

During the latest efforts for the task to develop spatial protection scenarios of VME taxa in the SPRFMO area, New Zealand has become aware that some information on current protection levels was not provided in the BFIA 2020. The missing information was relative to the Westpac Bank area, which was not included in the Fisheries Management Areas (FMAs) defined by Clark et al. (2016), that were used in the BFIA 2020.

An assessment of the current protection levels afforded in the Westpac Bank area was run, with the same criteria and methods defined in the BFIA 2020, and the missing information is provided in this paper to be appended to the BFIA 2020.

Furthermore, the Westpac Bank has been included in the protection scenarios work, which will be submitted to the 9th Scientific Committee with other papers on the August deadline.

Westpac Bank addendum

The tables below mimic the original format of the BFIA 2020 (including headings and numbering, for easier reference and context) and detail protection levels afforded by the current CMM in the Westpac Bank area, as defined in footnote 8 of the CMM03a-2020 (clipped to avoid overlapping with previously assessed FMAs). Figure 1 shows the location and extent of the Westpac Bank FMA and open area in the wider context of the Tasman Sea.

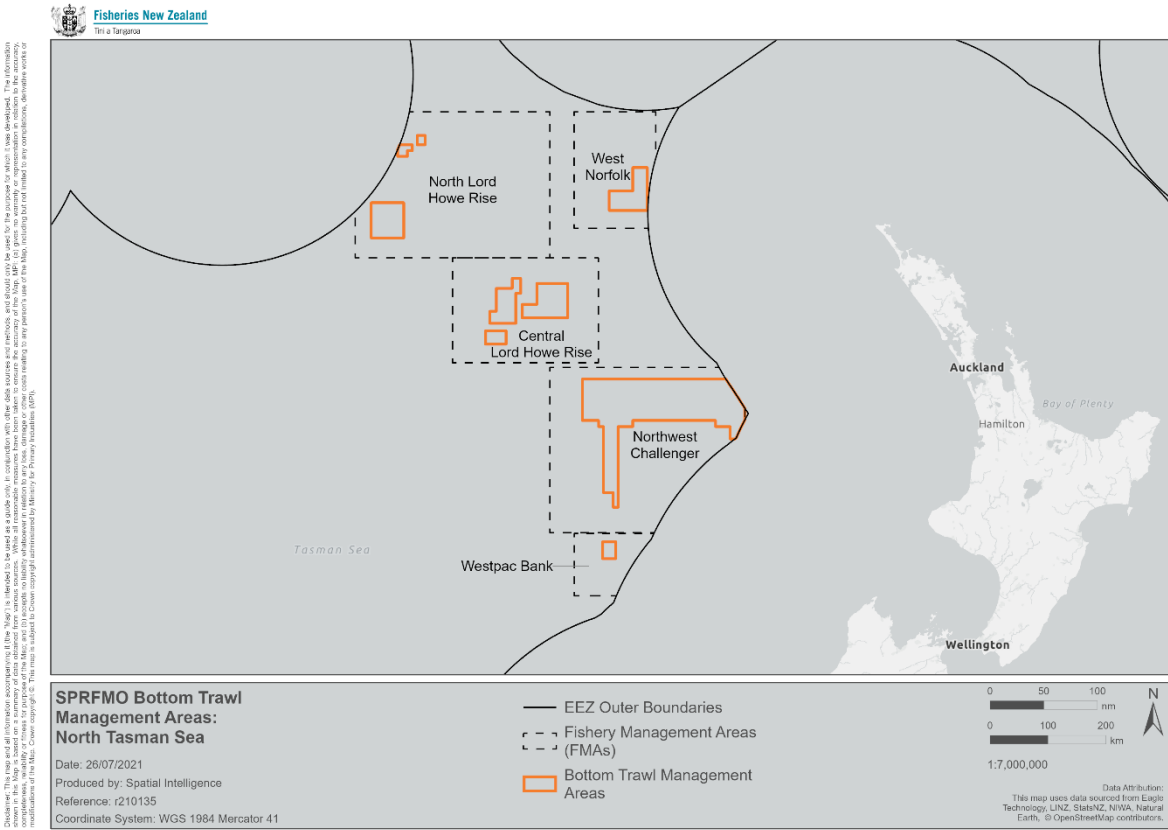


Figure 1 – Location and extent of the Westpac Bank area in the context of all Tasman Sea Bottom Trawl Management Areas under CMM03a (orange lines) and Fisheries Assessment Areas (FMAs, dashed lines)

Appendix J Details of post-accounting results to estimate the proportion of each VME indicator taxon outside the bottom trawl management areas

This appendix includes the detailed post-accounting results at scales finer than the Evaluated Area: the relevant bioregions (after Costello et al. 2017), five broad fisheries administrative units as used in the 2018 assessment to support CMM 03-2019, and the ten orange roughy fishery management areas.

Table J.19: Estimated percentage of each modelled VME indicator taxon within the Westpac Bank FMA and outside the areas open to fishing for each of three post-accounting methods. ROC = percent of suitable habitat estimated using a HSI cutoff estimated from the receiver operating characteristic (ROC) curve; Linear = percent of total abundance estimated by assuming a linear relationship between habitat suitability indices (HSI) and abundance; Power_High and Power_Low = percent of total abundance estimated by assuming power relationships between HSI and abundance where Power_Low is the mean estimated relationship minus 1 standard deviation and Power_High is the mean estimated relationship plus 1 standard deviation. Taxa within each group as in Table 33.

Group	Code	ROC		Power Low		Power High		Linear	
		% of taxon within FMA	% of taxon outside fishing areas	% of taxon within FMA	% of taxon outside fishing areas	% of taxon within FMA	% of taxon outside fishing areas	% of taxon within FMA	% of taxon outside fishing areas
Stony corals	ERO	4.61	88.69	4.32	87.32	4.02	86.82	1.87	92.01
	GDU	0.46	85.80	1.24	91.96	1.24	91.96	1.24	91.96
	MOC	3.28	86.62	3.25	89.16	4.26	89.15	1.52	93.12
	SVA	2.46	77.56	0.03	67.83	0.00	74.94	1.51	89.82
Other VME indicators	COB	3.09	85.71	2.59	83.14	2.93	77.05	1.69	90.81
	COR	0.01	90.38	0.02	84.01	0.00	76.68	0.93	92.34
	DEM	0.83	100.00	0.87	100.00	0.19	100.00	1.06	96.71
	HEX	0.72	99.79	0.10	99.86	0.01	99.99	0.99	96.23
	PTU	0.96	98.92	0.67	99.98	0.59	100.00	1.08	96.68
	SOC	1.93	89.47	1.78	85.46	1.61	38.12	1.40	92.21

Appendix K Sensitivity analysis for excluding areas of low environmental coverage in HSI model inputs

Sensitivity trial 1 using ROC threshold post-accounting

This post-accounting approach estimates the proportion of suitable habitat outside of the areas open to fishing. Results are given for the entire Evaluated Area (Table K1), for each relevant bioregion (after Costello et al. 2017, Tables K2–K6) and for each orange roughy management area (FMA, Tables K7–K29). For the sensitivity run in each location, the domain was clipped to cells with good environmental coverage for the respective ensemble habitat suitability model (>0.05 following Stephenson et al. 2020). No discounting for naturalness is included.

Table K29: Sensitivity to excluding areas of poor environmental coverage of the estimated overall percentage of each modelled VME indicator taxon within the Westpac Bank FMA and outside the areas open to fishing. The base approach here assumes a linear relationship between HSI from the ensemble model for that taxon and abundance. For the sensitivity run, the domain was clipped to locations with good environmental coverage.

Group	Code	Base linear approach		Linear restricted to good environmental coverage		% difference outside fishing areas
		% of taxon within FMA	% of taxon outside fishing areas	% of taxon within FMA	% of taxon outside fishing areas	
Stony corals	ERO	1.87	92.01	3.71	90.75	-1.26
	GDU	1.24	91.96	2.38	90.87	-1.10
	MOC	1.52	93.12	3.78	91.70	-1.42
	SVA	1.51	89.82	3.41	88.32	-1.50
Other VME indicators	COB	1.69	90.81	3.16	89.59	-1.22
	COR	0.93	92.34	1.97	90.24	-2.10
	DEM	1.06	96.71	2.34	95.22	-1.49
	HEX	0.99	96.23	2.56	95.05	-1.19
	PTU	1.08	96.68	3.15	95.13	-1.55
	SOC	1.40	92.21	3.11	90.45	-1.76

Appendix L Sensitivity analysis of a fishable depth cutoff in post-accounting

In this sensitivity analysis, the proportion of suitable habitat (using the ROC post-accounting method) and the proportion of estimated abundance (using the Power-Low post-accounting method) for each VME indicator taxon are re-calculated after assuming that there will be no fishing-related disturbance deeper than 1400 m. Over the 30-year history of the bottom trawl fishery for orange roughy, virtually all bottom trawl tows have been shallower than 1250 m (see Figure 8) and the depth distribution of tows has shown no directional change. Two post-accounting methods are applied, calculating the percentage of suitable habitat estimated using a HSI cutoff from the receiver operating characteristic (ROC) curve, see Table 32, and the percentage of total abundance estimated by assuming a power relationships between HSI and abundance where (in this analysis, the mean estimated relationship minus 1 standard deviation). It is acknowledged that there is limited information as to the abundance of a number of taxa below these depths. Taxa within each group as in Table 33.

Table L9: Sensitivity to an assumed lower depth limit for bottom trawling of estimated percentage of habitat (ROC post accounting method) or abundance (using a power curve relationship between model HSI and abundance) of each modelled VME indicator taxon within the Westpac Bank FMA and outside the areas open to fishing.

Taxon	ROC				Power			
	% of taxon within FMA	% of taxon outside fishing areas	% of taxon outside fishing areas or >1400m	% difference after depth cutoff	% of taxon within FMA	% of taxon outside fishing areas	% of taxon outside fishing areas or >1400m	% difference after depth cutoff
ERO	4.61	88.69	88.69	0	4.32	87.32	87.32	0
GDU	0.46	85.80	85.80	0	1.24	91.96	92.48	0.52
MOC	3.28	86.62	87.44	0.82	3.25	89.16	89.56	0.41
SVA	2.46	77.56	79.55	1.99	0.03	67.83	70.04	2.21
COB	3.09	85.71	85.90	0.19	2.59	83.14	83.34	0.19
COR	0.01	90.38	90.38	0	0.02	84.01	84.29	0.28
DEM	0.83	100.00	100.00	0	0.87	100.00	100.00	0
HEX	0.72	99.79	99.79	0	0.10	99.86	99.87	0.01
PTU	0.96	98.92	99.18	0.26	0.67	99.98	99.99	0
SOC	1.93	89.47	89.98	0.51	1.78	85.46	85.88	0.42

References

Clark, M., P. McMillan, O. Anderson, and M. Roux. 2016. Stock management areas for orange roughy (*Hoplostethus atlanticus*) in the Tasman Sea and western South Pacific Ocean. *New Zealand Fisheries Assessment Report* **19**:27.