Ministry of Fisheries
Te Tautiaki i nga tini a Tangaroa

New Zealand National Report on Fishing and Research Activities in the SPRFMO Area during 2008

1. Description of Fisheries

New Zealand conducted no pelagic fishing in the SPRFMO Area during 2008. The New Zealand high seas bottom trawl and line fisheries are described in detail in the impact assessment '*New Zealand Bottom Fishing Activities by New Zealand Vessels Fishing in the High Seas in the SPRFMO Area during 2008 and 2009'* (New Zealand Ministry of Fisheries 2008) available at http://www.southpacificrfmo.org/benthic-impact-assessments/. Bottom fishing activities conducted during 2008 were as described in that document and in accordance with the impact assessment.

New Zealand vessels have been bottom fishing in the SPRFMO Area since before 1990. Specific high-seas fishing permits for the SPRFMO Area were only implemented in 2007-08 following adoption of the SPRFMO Interim Measures in May 2007. The total number of New Zealand vessels permitted to fish in the SPRFMO Area and with the capability for bottom fishing (from 2007-08 onwards) and the numbers of bottom trawl and bottom line vessels which actually fished in the Area since 2002 are shown in Table 1. The size distribution (length overall) of the permitted vessels in 2007-08 and 2008-09 is shown in Table 2. The fishing areas fished by New Zealand vessels are shown in Figure 1.

Table 1. Summary of the annual number of New Zealand vessels permitted to bottom fish in the SPRFMO Area and with the capability for bottom fishing, and the number of vessels which actually fished in the Area per year with either bottom trawl or line.

Year	No. Vessels Permitted to Fish SPRFMO Area	No. Vessels Actively Bottom Fished in the SPRFMO Area	Bottom Trawling	Bottom Lining
2002	41*	23	23	
2003	55*	22	19	3
2004	66*	24	17	7
2005	60*	28	17	11
2006	58*	22	12	10
2007	38	12	8	4
2008	25	7	4	3

(* There were no specific high seas permits for the SPRFMO Area prior to 2007 These were the numbers of New Zealand vessels issued with general high-seas permits, and which indicated that they had the capability to bottom trawl.)

Table 2. Distribution of vessel size (length overall, m) for New Zealand vessels permitted to bottom fish in the SPRFMO Area, and with the capability for bottom fishing, for the permit years (May - April annually) 2007-08 and 2008-09.

Length Overall (m)	Fishing Permit Year (May - April)	
	2007- 08	2008 – 09
<= 11.9	0	0
12 - 17.9	1	1
18 - 23.9	6	4
24 - 29.9	8	3
30 - 35.9	3	3
36 - 44.9	8	8
45 - 59.9	2	0
60 - 74.9	8	4
>= 75	2	2
Total	**38**	**25**

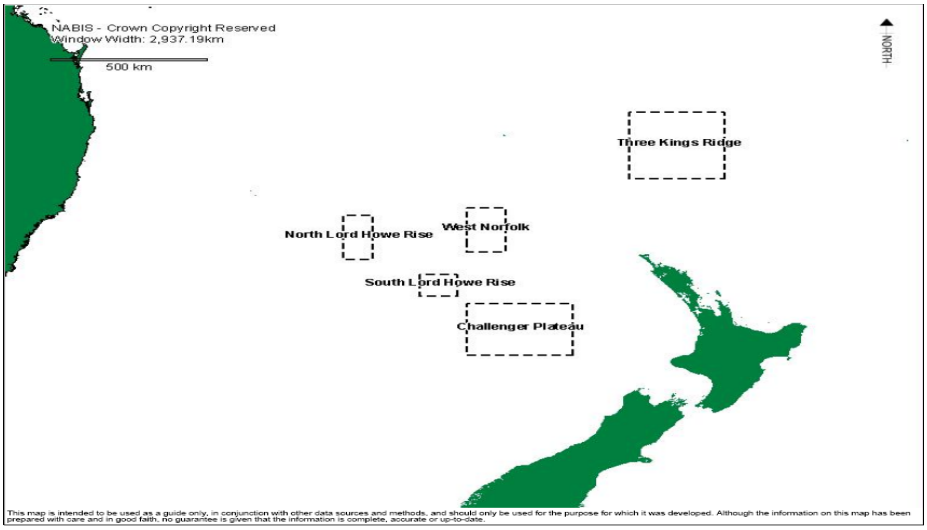

Figure 1. Map showing position of the main bottom fishing areas fished by New Zealand vessels in the SPRFMO Area (from the National Aquatic Biodiversity Information System - NABIS http://www.nabis.govt.nz).

The declining trend in bottom trawl fishing effort (vessels and tows) since 2002 described in Ministry of Fisheries (2008) continued in 2008. This decline in effort has coincided with an increased focus on bottom trawling in the West Norfolk Ridge and southern Lord Howe Rise fishing areas, with relatively little effort being expended in past target areas such as the NW Challenger Plateau and Louisville Ridge.

2. Catch, Effort and CPUE Summaries

The total annual fishing effort (number of vessels and number of bottom trawl tows) and total landed catch of the main bottom trawl target and bycatch species is summarised in Table 3. The number of vessels continued to decline from 23 in 2002 to 4 vessels during 2008, with the number of tows declining from 2,944 to 208 over this period. Orange roughy (*Hoplostethus atlanticus*) continues to be the main bottom trawl target species, contributing an increasing proportion of total bottom trawl catch over the past four years, from 67% in 2005 to 99% in 2008. Other species make minor contributions to catches, with the main bycatch species being black oreo, cardinalfish and alfonsino.

Table 3. Annual fishing effort (number of vessels and tows) and total bottom trawl catch (t) of the main target and bycatch species by New Zealand vessels fishing in the SPRFMO Area from 2002 - 2008 (see Appendix 1 for list of species).

Year	No. Vessels	No. Tows	ORY	BOE	EPI	ALF	SSO	RIB	RTX	SCK	All Species
2002	23	2,944	2,578	121	159	17	50	43	61	37	3,180
2003	19	2,928	1,973	62	226	94	25	92	84	56	2,937
2004	17	1,952	1,697	90	42	85	91	46	34	8	2,188
2005	17	2,186	1,597	268	189	26	75	63	67	5	2,395
2006	12	1,135	1,415	57	21	28	6	33	27	15	1,652
2007	8	415	866	151		2	22	9	5	1	1,076
2008	4	208	837			2	<0.5	3	<0.5	1	846

The decline in New Zealand high seas orange roughy catch from 2002 - 2008 has resulted primarily from declines in fishing effort and catch in the main historical high seas target areas of the NW Challenger Plateau and Louisville Ridge, and has been associated with a shift in effort to areas such as the southern Lord Howe Rise and West Norfolk Ridge. 50% of the fishing effort (number of tows) in 2008 was conducted on the West Norfolk Ridge. Trends in annual high seas orange roughy catch from 2002 - 2008 from the four main fishing areas (see Figure 1) are summarised in Table 4 and shown in Figure 2.

Table 4. Distribution of total annual catch (t) of orange roughy between the main areas fished by New Zealand bottom trawl vessels fishing in the SPRFMO Area from 2002 - 2008.

Year	Challenger	West Norfolk	Lord Howe	Louisville	Other	All Areas
2002	1,460	432	96	568	22	2,578
2003	868	25	218	859	3	1,973
2004	347	106	132	1,106	5	1,697
2005	425	327	190	623	33	1,597
2006	202	670	29	493	22	1,415
2007	36	515	34	280		866
2008	31	426	380			837

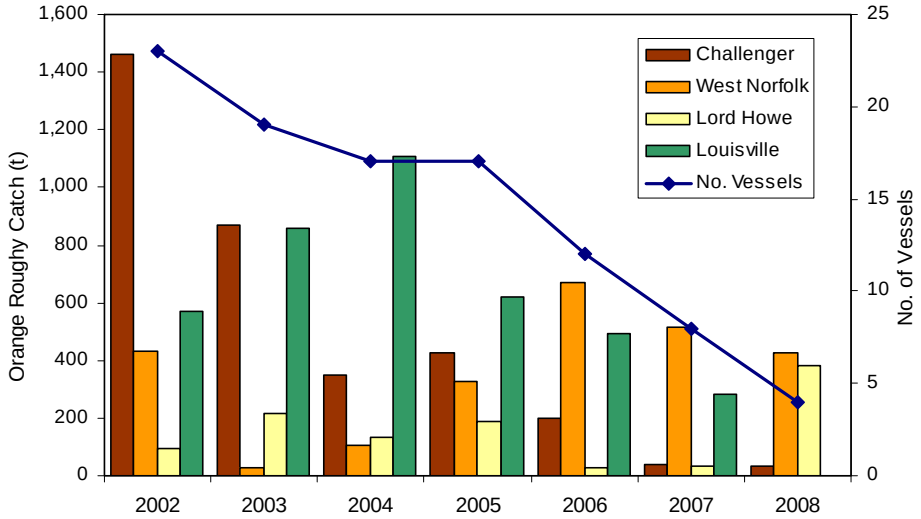

Figure 2. Trends in annual number of bottom trawl vessels and total landed orange roughy catch in the four main areas fished by New Zealand bottom trawl vessels in the SPRFMO Area from 2002 - 2008.

The total annual fishing effort (number of vessels and hooks fished) and total landed catch of the main bottom line target and bycatch species is summarised in Table 5. 96% of the effort in 2007 was bottom longline, with some dahn line effort. All line effort in 2008 was bottom longline. The number of active line vessels increased from 3 in 2002 to 11 in 2005, and has since declined to 3 vessels again. There has been less of a decline in hooks fished, with the number of hooks in 2008 being 60% of the peak of effort in 2006. Bluenose (*Hyperoglyphe antarctica*) continues to be the main bottom line target species, contributing 70% of the total catch over 2004 - 2007. There was an increased contribution by wreckfish in 2008 to make up one third of the catch. Other species making minor contributions to bottom line catches include spiny dogfish and king tarakihi.

Table 5. Annual fishing effort (number of vessels and hooks fished) and total bottom line catch (t) of the main target and bycatch species by New Zealand vessels fishing in the SPRFMO Area from 2002 - 2008 (see Appendix 1 for List of Species).

Year	No. Vessels	No. Hooks	BWA	HAU	DGS	MOW	RXX	YTC	ROK	TOP	All Species
2002											
2003	3	53,438	6	7	1	1				1	17
2004	7	268,809	116	24		6	2	1		3	154
2005	11	384,031	102	31	13	10	2	3	1		163
2006	10	501,810	271	95	6	6	2	2	2		385
2007	4	423,420	144	31	4	5	3	3	1		202
2008	3	302,310	67	43	1	2	1	1	8		123

The increase and subsequent decrease in fishing effort and bluenose catch over 2003 - 2008 is summarised in Table 6 and shown in Figure 3. Apart from the high catch of bluenose reported from the NW Challenger Plateau in 2004, trends in effort and bluenose catch have been similar between fishing areas.

Table 6. Distribution of total annual catch of bluenose between the main areas fished by New Zealand bottom line vessels fishing in the SPRFMO Area from 2002 - 2008

Year	Challenger	West Norfolk	Three Kings	Louisville	Other	All Areas
2002						
2003		5	1			6
2004	103	12			1	116
2005	38	27	24		14	102
2006	91	114	48		19	271
2007	59	47	39			144
2008	24	33	8	2		67

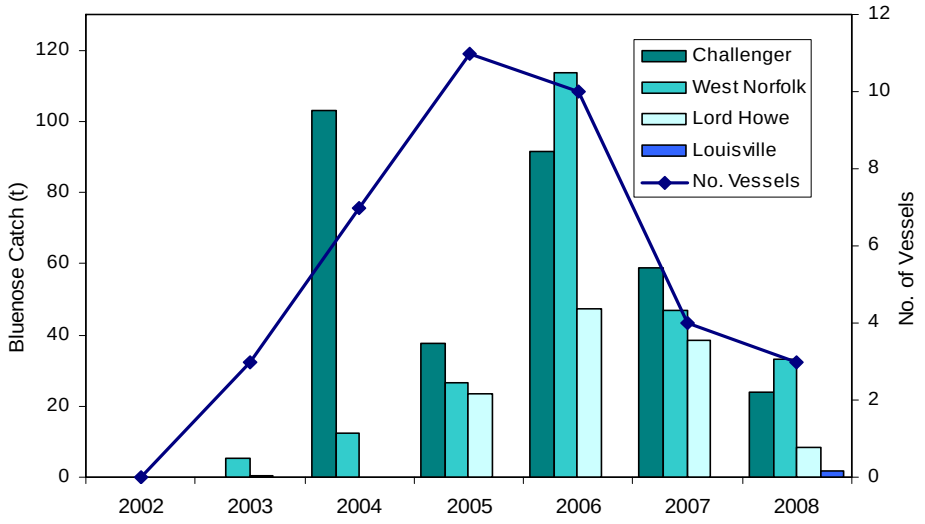

Figure 3. Trends in annual number of bottom line vessels and total landed bluenose catch in the four main areas fished by New Zealand bottom line vessels in the SPRFMO Area from 2002 - 2008.

New Zealand has conducted regular analyses of nominal CPUE for high seas orange roughy catches (see Clark 2008 for the most recent report). As part of a project related to estimation of high seas sustainable catches and feature limits in the SPRFMO Area, in 2009 the Ministry of Fisheries contracted further work to investigate trends in standardised orange roughy CPUE in the main high seas areas fished by New Zealand bottom trawlers. Initial results are shown in Figure 4 (from Clark and Dunn, in prep).

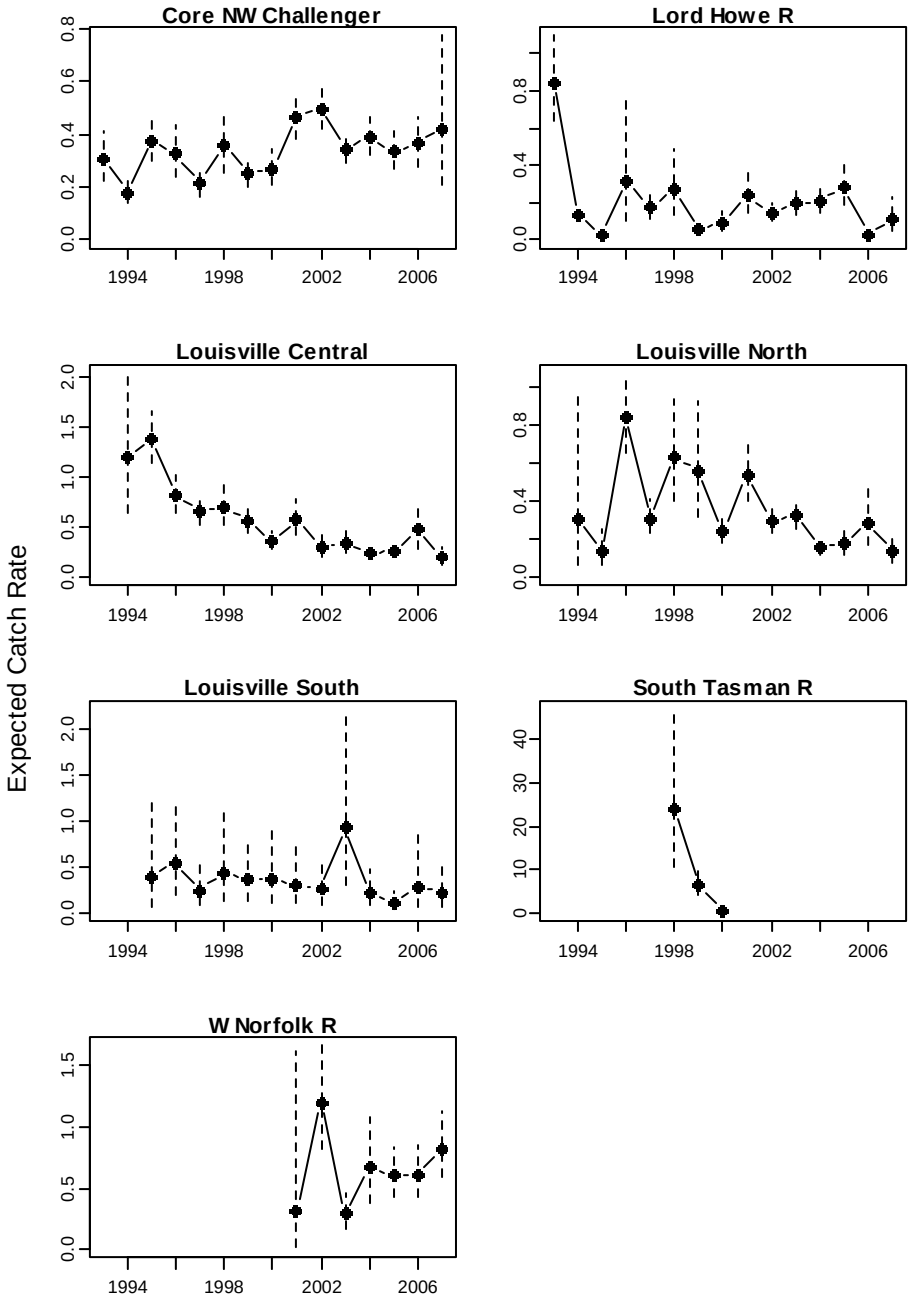

Figure 4. Model predictions for the fishing year effect (standardised CPUE) of the normal model for orange roughy CPUE outside of the EEZ, made with all other predictors set to the median (fixed) values (from Clark & Dunn, in prep).

3. Fisheries Data Collection and Research Activities

3.1 Fisheries Catch & Effort Data Collection Systems

The data collection systems implemented on New Zealand high seas bottom trawl and line fishing vessels is described in detail in Ministry of Fisheries (2008). Detailed tow-by-tow catch and effort data for all high seas fishing operations was collected for all fishing activities during 2007 and 2008 using the various at-sea catch and effort logbooks and landings recording forms described in that document.

In addition to the vulnerable marine ecosystem (VME) evidence forms used by observers to record evidence of encounters with VMEs in the move-on blocks within the New Zealand high seas bottom fishing footprint, detailed observer Benthic Materials forms have been implemented on all observed New Zealand bottom trawls to record all benthic bycatches to lowest possible taxonomic level.

3.1 Other Research Activities

During 2009 the Ministry of Fisheries commissioned a research project on '*Development of Estimates of Annual Sustainable Catches, and of Sustainable Feature Limits, for Orange Roughy Bottom Trawl Catches in Specific Fishing Sub-Areas in the Proposed Convention Area of the South Pacific RFMO*'. A draft research report for this project is currently undergoing scientific peer review and will be tabled at a future SPRFMO SWG meeting in support of discussions on principles and methodology for determining and establishing sustainable catch limits for low productivity deepwater species in the SPRFMO Area.

New Zealand continues to develop geospatial data files on seabed bathymetry, fishing footprints and VME distribution for eventual provision to the SPRFMO Secretariat and inclusion in the SPRFMO Geospatial Database.

4. Biological Sampling and Length / Age Composition of Catches

A summary of the length-frequency sampling conducted is provided in Table 7. 99% of the fish measured were orange roughy, which was the target species in all tows, and a plot of the standard length-frequency distribution of orange roughy is provided in Figure 5.

Table 7. Summary of length-frequency sampling conducted by observers aboard New Zealand bottom trawlers fishing in the SPRFMO Area during the 2008 calendar year, showing the number of fish of each species measured and the minimum, mean and maximum recorded lengths.

Scientific Name	Common Name	Measure Used	Length (cm)			Number Measured
			Min	Mean	Max	
Hoplostethus atlanticus	orange roughy	standard	22	37.1	50	5,714
Beryx splendens	alfonsino	fork	32	38.5	46	41
Pseudocyttus maculatus	smooth oreo	total	39	49.9	65	20
Mora moro	ribaldo	total	50	60.7	73	12
Epigonus telescopus	cardinal fish	fork	38	49.8	60	9
				Total		**5,796**

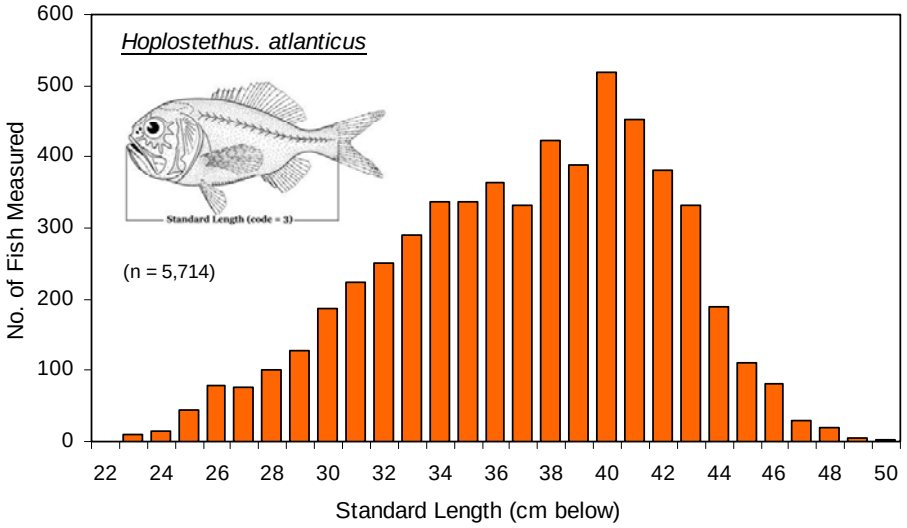

Figure 5. Length frequency distribution (standard length, nearest cm below) of the target species orange roughy (*Hoplostethus atlanticus*) measured by scientific observers aboard New Zealand bottom trawl vessels fishing in the SPRFMO Area during the 2008 calendar year.

Gonad maturity was determined for orange roughy measured during length-frequency sampling. Additional biological sampling conducted was sex and gonad stage determination and otolith collection for 12 ribaldo (*Mora moro*), 2 smooth oreos (*Pseudocyttus maculatus*) and 2 cardinalfish (*Epigonus telescopus*).

Length-frequency or biological data are not available for bottom trawling in the SPRFMO Area in years prior to 2008.

5. Summary of Observer Programmes

Detailed summary tables describing New Zealand observer programme activities in the SPRFMO Area during 2008 are included in the New Zealand SPRFMO Annual Observer Implementation Report for 2008. New Zealand vessels conducted five bottom trawling trips in the SPRFMO Area during 2008, conducting a total 245 tows during 155 vessel days at sea in the Area. 49% of this effort was fished on the West Norfolk Ridge area, 40% on the Lord Howe Rise and 11% on the NW Challenger Plateau. Scientific observers were deployed on all trips, observed 100% of tows and measured fish on 30% of tows (74 tows) (Table 8). The total weight of fish sampled was 10.6 t, about 1% of the estimated 900 t retained catch. In total 5,796 fish were measured, 99% of which were the target species, orange roughy.

Table 8. Summary of fishing effort (number of tows) observer coverage and sampling coverage by observers aboard New Zealand bottom trawlers fishing in the SPRFMO Area during the 2008 calendar year. (Note: catch weights shown here are onboard estimates, and not final landed weight data.)

No. of Trips	Total Tows	Tows Observed	Tows Measured	Retained Catch (kg)	Measured Catch (kg)	No. Fish Measured
5	245	245	74	899,683	10,649	5,796

There was no observer coverage of high seas bottom line vessels during 2008.

6. Implementation of Management Measures

A detailed description of New Zealand's implementation of the SPRFMO interim conservation and management measures can be found in New Zealand Ministry of Fisheries (2008). It is summarised here to support interpretation of the above information.

High seas bottom trawling measures were established in the SPRFMO Area in the form of high seas fishing permit conditions, imposed from 1 May 2008. The key elements of the new permit conditions include:

- Schedules designating Open and Move-On bottom trawling areas, and prohibiting bottom trawling everywhere else on the high seas.
- The move on rule VME Evidence Process for bottom trawling, with the requirement to report to the Ministry of Fisheries and move on 5nm where the VME Evidence threshold is reached.
- Requirement to carry at least one observer on all bottom trawling trips.

The effect of these measures was to close to bottom trawling 41% of the total 217,463 km^2 New Zealand bottom trawl footprint surface area, 30% made subject to a move-on rule, and 29% left open to bottom trawling. The open area represents 0.13% of the entire SPRFMO Area. Observers are provided by the Ministry of Fisheries and cost recovered.

7. References

Clark, M.R. 2008. Descriptive analysis of orange roughy fisheries in the New Zealand region outside the EEZ: Lord Howe Rise, Northwest Challenger Plateau, West Norfolk Ridge, South Tasman Rise, and Louisville Ridge to the end of the 2005–06 fishing year. Ministry of Fisheries, *Fisheries Assessment Report*, 2008/12, 45 pp.

Clark, M.R. and M.R. Dunn (in prep). Development of estimates of annual sustainable catches, and of sustainable feature limits, for orange roughy bottom trawl catches in specific fishing sub-areas in the proposed convention area of SPRFMO. *Research Report for Ministry of Fisheries Research Project IFA2008/05*, National Institute of Water and Atmospheric Research.

Ministry of Fisheries 2008. *New Zealand Bottom Fishing Activities by New Zealand Vessels Fishing in the High Seas in the SPRFMO Area during 2008 and 2009*. Ministry of Fisheries - Bottom Fishery Impact Assessment submitted to SPRFMO under the requirements of the SPRFMO Interim Measures for Bottom Fisheries, 102 pp.

Appendix 1. List of Species Codes, Scientific Names and Common Names Used

Scientific Name	Common Name	FAO Code	NZ Code
Hyperoglyphe antarctica	Bluenose	BWA	BNS
Allocyttus niger	Black oreo	BOE	BOE
Dalatias licha	Seal shark	SCK	BSH
Beryx splendens, B. decadactylus	Alfonsino & Long-finned beryx	ALF	BYX
Epigonus telescopus	Deepsea cardinalfish	EPI	CDL
Polyprion oxygeneios, P. americanus	Wreckfish (Hapuku & Bass)	HAU	HPB
Seriola lalandi	Kingfish	YTC	KIN
Nemadactylus sp.	King tarakihi	MOW	KTA
Hoplostethus atlanticus	Orange roughy	ORY	ORH
Dissostichus eleginoides	Patagonian toothfish	TOP	PTO
Macrouridae (Family)	Rattails	RTX	RAT
Mora moro	Ribaldo	RIB	RIB
Rexea spp.	Gemfish, southern kingfish	RXX	SKI
Squalus spp.	Spiny dogfish, northern spiny dogfish	DGS	SPD
Helicolenus spp.	Sea perch	ROK	SPE
Pseudocyttus maculatus	Smooth oreo	SSO	SSO