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New Zealand Annual Report

New Zealand

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Fisheries New Zealand
Tini a Tangaroa

New Zealand Annual Report on Fishing, Research Activities, and Observer Implementation in the SPRFMO Convention Area during 2018

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1 Description of Fisheries

1.1 PELAGIC FISHERIES

Jack mackerel
New Zealand conducted no fishing for *Trachurus* species in the SPRFMO Convention Area in 2018.

Chilean Jack mackerel (*Trachurus murphyi)* was first observed in New Zealand waters in 1987, although its distribution in New Zealand waters has changed significantly over time. *T. murphyi* in New Zealand is thought to be a small, periodically separated component of the larger South Pacific stock which undergoes occasional expansions or migrations. It is unknown whether there has been any spawning of *T. murphyi* in New Zealand waters.

Catches of *T. murphyi* within the New Zealand EEZ were highest in the 1990s, estimated at around 20,000 tonnes, but have since decreased significantly. Based on observer sampling of species proportions in fisheries around New Zealand, *T. murphyi* annual catch is estimated be around 5,000 tonnes on average in each of the last three New Zealand fishing years (15/16, 16/17, and 17/18) (Oct-Sept) (Horn et al. (2019b). Langley et al 2016).

Squid
New Zealand conducted no pelagic fishing for *Dosidicus* species in the SPRFMO Convention Area during 2018.

1.2 BOTTOM FISHERIES

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 2008b) available at http://www.southpacificrfmo.org/benthic-impact-assessments/. Bottom fishing activities conducted during 2018 operated largely as described in that document. New Zealand vessels have been bottom fishing in the SPRFMO Area since before 1990.

Specific high seas fishing permits for the SPRFMO Area were first implemented in 2007-08. The number of New Zealand vessels permitted to fish in the SPRFMO Area since 2009; and the number of vessels which actually bottom fished in the Convention Area are shown in Table 1.

Table 1: Summary of the number of New Zealand vessels permitted to bottom fish in the SPRFMO Area, and the number of vessels which actually fished in the Area by year with either bottom trawl or line, since 2009. The data are arranged by permit year, which is a split year from May to April.

Vessel Permit Year	Number of Vessels Permitted to Fish SPRFMO Area	No. of Vessels that Actively Bottom Fished in the SPRFMO Area	Bottom Trawling	Bottom Lining
2009–10	24	9	7	2
2010–11	27	9	7	2
2011–12	24	9	6	3
2012–13	24	8	5	3
2013–14	24	8	5	3
2014–15	31	10	6	4
2015–16	31	9	5	4
2016–17	21	11	6	5
2017–18	16	8	5	3
2018–19	18	9	6	3

Trawl fishing effort (bottom and midwater) declined from a peak of 23 vessels in 2002 and has been stable since 2008 at between 5 and 7 vessels. The number of vessels bottom line fishing peaked at 11 vessels in 2005 and has been stable between 2 and 5 vessels since.

The distribution of vessel size of the permitted vessels from 2009-10 is shown in Table 2, with no clear trend in vessel size over time. The main areas of bottom fishing utilised by New Zealand vessels outside of the New Zealand EEZ since 2006 are shown in Figure 1.

Table 2: Distribution of vessel size (length overall in metres) for New Zealand vessels permitted to bottom fish in the SPRFMO Area for permit years (May - April) from 2009-10.

	Length overall (m)									
Permit year	**≤ 11.9**	**12–17.9**	**18–23.9**	**24–29.9**	**30–35.9**	**36–44.9**	**45–59.9**	**60–74.9**	**≥ 75**	**Total**
2009-10	0	1	3	1	5	6	0	6	2	24
2010-11	0	1	3	3	4	8	2	6	0	27
2011-12	1	1	3	1	2	8	2	6	0	24
2012-13	1	1	3	1	2	8	2	6	0	24
2013-14	0	1	3	2	2	7	2	6	1	24
2014-15	0	1	8	2	3	6	3	7	1	31
2015-16	0	1	7	3	4	7	3	4	2	31
2016-17	0	1	3	2	4	6	3	2	0	21
2017-18	0	1	3	0	3	5	3	1	0	16
2018-19	0	1	2	0	4	5	3	3	0	18

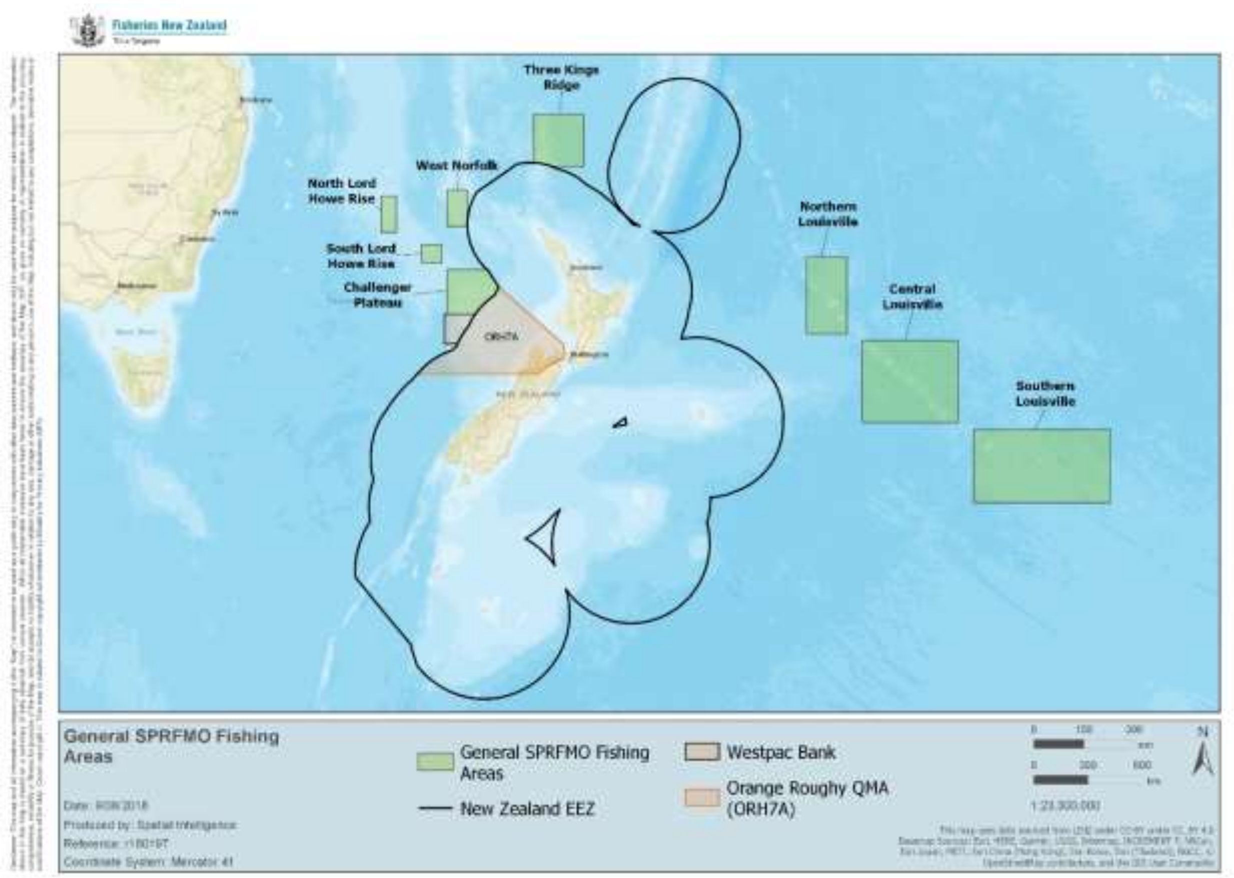

Figure 1: The general areas bottom fished by New Zealand trawlers in the SPRFMO Convention Area since 2006

2 Catch, Effort and CPUE Summaries

2.1 TRAWL FISHERIES

New Zealand's trawl fisheries in the SPRFMO Convention Area are primarily focused on bottom trawling for orange roughy (*Hoplostethus atlanticus*), with limited effort using midwater trawl gear to target alfonsino species (*Beryx splendens, B. decadactylus*) close to the seabed.

Bottom trawl

The annual bottom trawl fishing effort by New Zealand vessels in the SPRFMO Convention Area is summarised in Table 3. Effort has declined from a maximum of 23 vessels completing over 3 500 tows in 2002 to average 5 vessels and between 860 and 1 400 tows over the most recent three years.

Orange roughy (ORY) is the main target species, and has made up 67-99% of the total catch since 2002 with tonnages ranging from 720 – 2 578 tonnes. Fishing effort and catch by area has varied over time, with the majority of catch taken since 2002 in the Challenger and Louisville areas. Further information on bottom trawl effort and orange roughy catch by area is shown in Figure 2 and Tables 4-5 below.

Other species that have been prominent in the catch include alfonsinos (ALF), cardinalfish (EPI), and oreo (BOE/SSO) species, however catch of these species has fluctuated over time and catch of any particular species has never exceeded 300 tonnes.

Table 3: Annual fishing effort (number of vessels and tows) and fisher-reported catch (tonnes) of the top five species by weight (identified by FAO species codes – Appendix 1) by New Zealand vessels bottom trawling in the SPRFMO Convention Area from 2009. Year is calendar year. The number of tows reported here is the number of tows which recorded a fish catch, and excludes tows where there was no catch.

Year	No. Vessels	No. Tows	Avg. Tows/ Vessel	ORY	ONV	BOE	EPI	ALF	SSO	RIB	RTX	SCK	All Species (t)
2009	6	547	91	928	5	–	16	5	<0.1	7	0.1	2	958
2010	7	1 167	167	1 474	9	12	22	244	10	15	6	13	1 864
2011	7	1 158	165	1 079	16	12	108	176	4	22	7	9	1 486
2012	6	652	109	721	10	4	2	39	3	5	7	2	805
2013	5	760	152	1 164	11	20	3	28	5	6	1	-	1 261
2014	5	403	81	998	6	7	0	0	5	2	2	0.4	1 028
2015	5	959	192	1 287	11	2	48	9	10	5	32	7	1 513
2016	6	943	157	954	27	0	19	87	0	23	55	34	1 326
2017	5	1 423	285	1 093	30	22	1	290	7	36	52	20	1 641
2018	6	858	143	1 232	38	11	7	57	5	24	30	7	1 570

Table 4: Bottom trawl effort (number of tows) in the main areas fished by New Zealand bottom trawl vessels fishing in the SPRFMO Area by calendar year from 2009. Reported effort for the Westpac Bank only includes effort on the high seas since 2013.

Year	Challenger Plateau	Westpac Bank	West Norfolk Ridge	Lord Howe Rise	Louisville Ridge	Other Areas	All Areas
2009	156		252	229	–	11	648
2010	409		58	388	303	12	1 170
2011	437		84	379	258	–	1 158
2012	166		58	121	296	11	652
2013	189	7	27	238	299	7	760
2014	64	6	–	70	263	6	403
2015	582	24	32	124	221	–	959
2016	706	92	–	197	40	–	943
2017	421	44	25	583	352	-	1 423
2018	309	183	13	232	77	44	

Table 5: Total estimated catches (tonnes) of orange roughy from the main areas fished by New Zealand bottom trawl vessels fishing in the SPRFMO Area by calendar year from 2009. Landings from the Westpac Bank area (part of the Challenger Plateau) are also reported against New Zealand's ORH7A catch limit. Catches from Westpac Bank between 2007 and 2010 were largely from research surveys. –, less than 1 tonne

Year	Challenger Plateau	Westpac Bank	West Norfolk Ridge	Lord Howe Rise	Louisville Ridge	Other Areas	All Areas
2009	238	23	233	403	–	31	928
2010	415	5	79	385	584	6	1 474
2011	675	5	113	1	285	–	1 079
2012	247	8	49	121	288	8	721
2013	230	3	19	344	565	3	1 164
2014	57	54	0	79	754	54	998
2015	530	118	20	157	462	–	1 287
2016	486	234	0	208	27	-	954
2017	307	129	22	215	420	-	1 093
2018	399	569	5	180	81	-	1 232

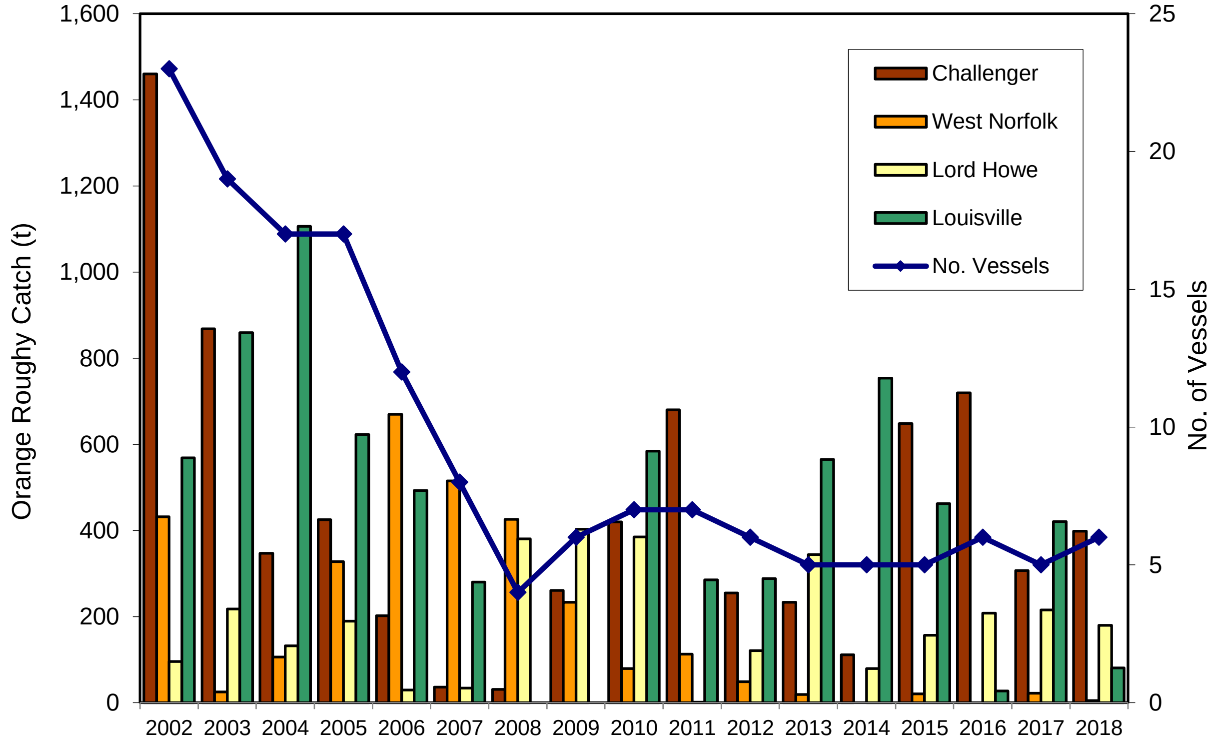

Figure 2: Trends in effort (the number of bottom trawl vessels fishing) and total landings of orange roughy (tonnes) for each of the four main areas fished by New Zealand bottom trawl vessels in the SPRFMO Area by calendar year from 2002.

Midwater trawl

Midwater trawling for bentho-pelagic species is included in the SPRFMO definition of bottom fishing as the gear occasionally comes into contact with the bottom. Midwater trawling for bentho-pelagic species by New Zealand vessels began in 2011, when three vessels completed 61 tows targeting alfonsino species. Effort has been variable over time, but reached a peak in 2018 with 145 tows (Table 6).

Catch from midwater trawling fluctuated around 150 tonnes per year from 2011-2013, was less than 100 tonnes form 2014-2017, and increased to over 200 tonnes in 2018. Catch from midwater trawling is predominantly alfonsino, which has comprised over 95% of catch in the most recent three years.

Table 6: Annual fishing effort (number of vessels and tows) and fisher-reported catch (tonnes) of the top five species by weight (identified by FAO species codes – Appendix 1) by New Zealand vessels midwater trawling for bentho-pelagic species in the SPRFMO Convention Area from 2009. Year is calendar year. The number of tows reported here is the number of tows which recorded a fish catch, and excludes tows where there was no catch.

Year	No. Vessels	No. Tows	Avg. Tows/Vessel	ALF	EDR	ONV	BWA	All Species (t)
2011	3	61	20	64	76	21	2	164
2012	3	59	20	115	25	0	3	145
2013	1	120	120	122	9	0	10	145
2014	0	0	–	0	0	0	0	0
2015	2	21	11	34	0	0	2	37
2016	3	42	14	82	3	0	0	86
2017	1	33	33	35	0	0	0	36
2018	3	145	48	211	3	0	3	219

2.2 BOTTOM LINE FISHERIES

The annual fishing effort (number of vessels and hooks fished) and catch of the main bottom line target and bycatch species are summarised in Table 7. The number of active line vessels peaked at 11 in 2005, then declined and has fluctuated between 3 and 5 vessels since 2007. The numbers of hooks set has fluctuated over time, peaking at 780,000 hooks in 2014. The number of hooks has been steady at around 115,000 hooks for the past two years.

There have been three bottom line fishing methods used by New Zealand vessels in the SPRFMO Area, bottom longline, Dahn line, and hand line. Dahn and hand line are very similar, with both methods employing a vertical line with hooks that is either attached to a float (Dahn line) or remains attached to the fishing vessel (hand line). Given the similarities, Dahn line and hand line are treated as a single fishery, and data reporting by commercial fishers and observers is the same for both methods.

Table 7: Effort and estimated catches for New Zealand vessels bottom longlining in the SPRFMO Area by calendar year from 2009. Effort is presented as the number of vessels, trips, and number of hooks set, with catches in tonnes of the target and main bycatch species (codes detailed in Appendix 1).

Year	No. Vessels	No. Trips	No. Hooks (000's)	Hooks/ Vessel (000's)	BWA	HAU	DGS	MOW	RTX	TOA	Total catch (t)
2009	5	12	236	47	58	23	7	1	<1	–	89
2010	2	5	48	24	15	24	–	1	<1	–	45
2011	2	6	71	36	23	25	6	<1	<1	–	57
2012	3	10	90	30	44	40	2	3	<1	–	95
2013	3	13	479	160	64	41	6	3	<1	–	124
2014	4	18	784	196	33	45	4	11	<1	–	99
2015	4	15	179	45	35	63	4	2	<1	–	126
2016	5*	10	111	28	20	54	5	3	<1	29**	87+
2017	3	14	115	38	46	47	3	3	2	29**	106+
2018	3	8	110	37	34	27	10	3	0	–	78

* This includes one vessel that fished only using hand lines, and one vessel that participated only in the exploratory fishery for toothfish

** Bottom line catch of TOA (and TOP in 2017) from exploratory fishing under CMM 4.14

+ totals do not include TOA catch taken in exploratory fishing under CMM 4.14

Bluenose (BWA, *Hyperoglyphe antarctica*) catches peaked in 2006 at 271 tonnes but have declined and have fluctuated from 20-46 tonnes in the most recent 5 years. The other main species caught by bottom line is wreckfish (HAU, *Polyprion oxygeneios* and *P. americanus*) which has been caught in quantities of 27 to 63 tonnes annually in the last 5 years. Together, these species have made up around 80% of the catch in the most recent five years.

Other species making minor contributions to bottom line catches include spiny dogfish (DGS), king tarakihi (MOW), kingfish (YTC), and sea perch (ROK).

Bluenose catch by main fishing areas since 2009 is shown in Table 8 and is compared with fishing effort in Figure 3. There are no clear trends in nominal CPUE (Figure 4).

Table 8: Total catch of bluenose, BWA, in tonnes, from the main areas fished by New Zealand bottom line vessels fishing in the SPRFMO Area by calendar year since 2009

Year	Challenger Plateau	West Norfolk Ridge	Three Kings Ridge	Louisville Ridge	Other Areas	All Areas
2009	13	29	16	–	–	58
2010	2	13	–	–	–	15
2011	–	11	11	–	–	23
2012	11	15	18	–	–	44
2013	31	10	24	–	–	64
2014	8	11	14	–	–	33
2015	23	10	2	–	–	35
2016	5	15	-	-	-	20
2017	31	8	3	-	4	46
2018	27	7	-	-	-	34

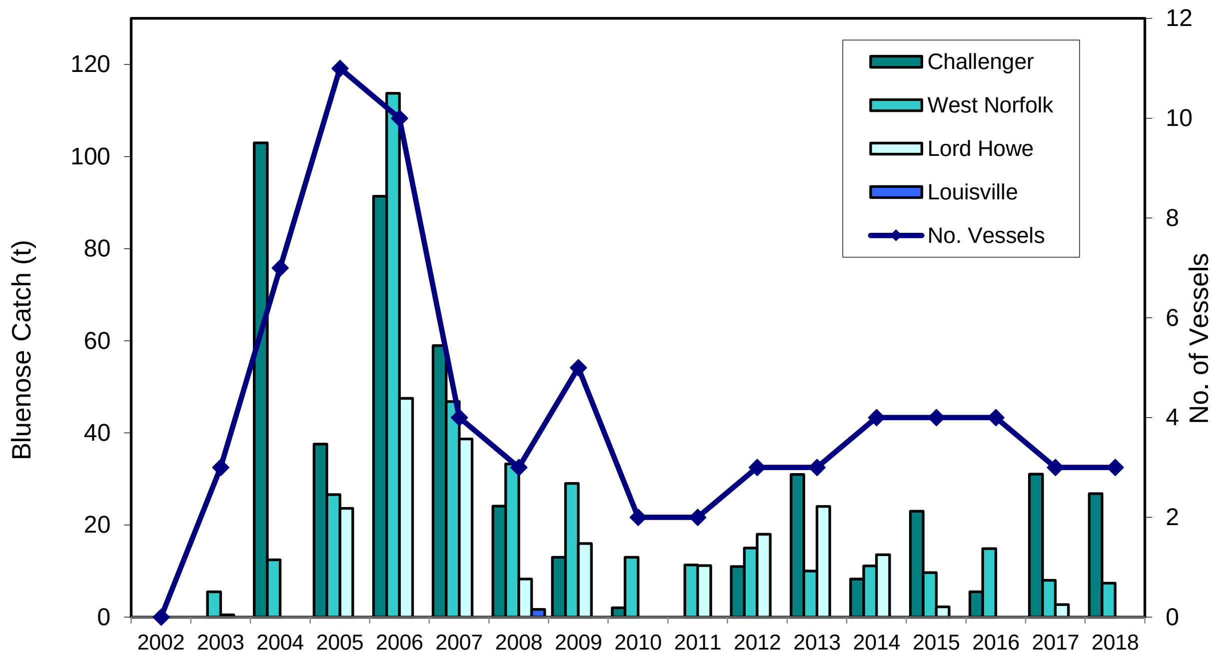

Figure 3: Trends in number of bottom line vessels and total bluenose catch from the four main areas fished by New Zealand bottom line vessels in the SPRFMO Area by calendar year from 2002.

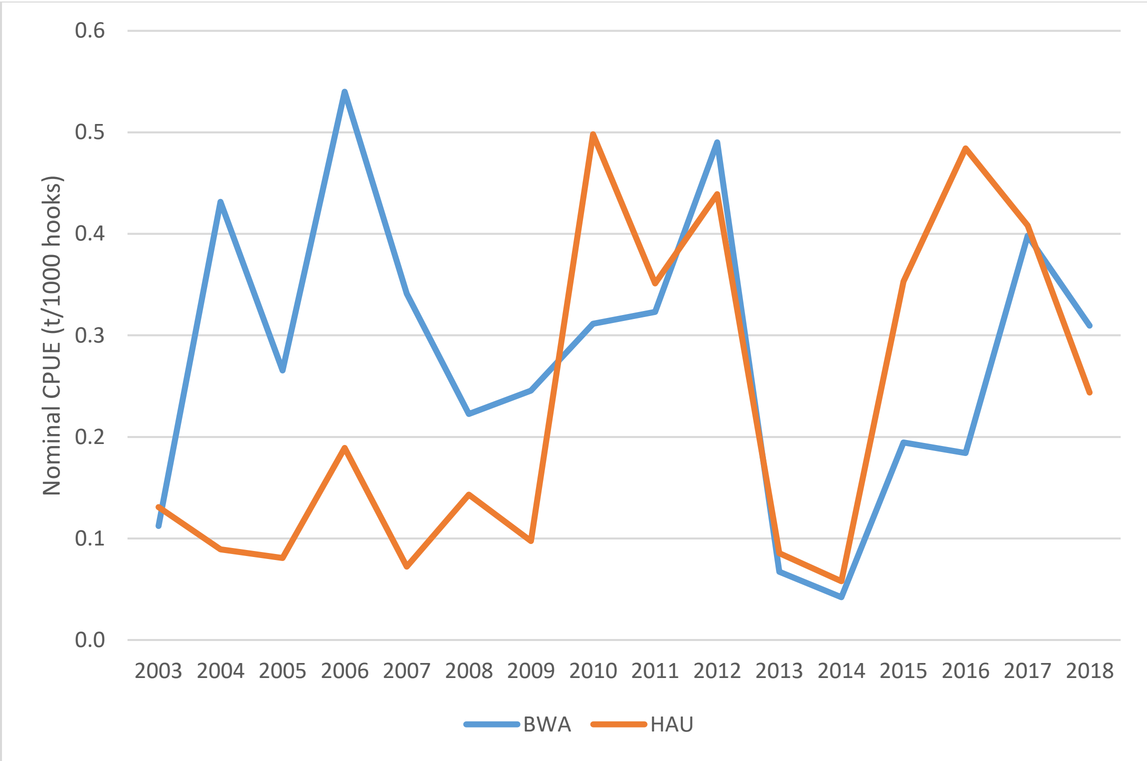

Figure 4: Trends in nominal CPUE (tonnes per 1000 hooks set) for bluenose (BWA) and wreckfish (HAU) by New Zealand bottom longline vessels fishing in the SPRFMO Area since 2003 (effort includes all nominated target species combined).

Bottom longline comprises the majority of the fishing effort (110,000 hooks in 2018) and catch (78 tonnes in 2018). Effort using other bottom line methods is significantly less and more variable. Table 9 shows effort and catch from fishing using other bottom line methods from 2014.

Table 9: Effort and estimated catches for New Zealand vessels using other bottom line methods in the SPRFMO Area by calendar year from 2014. Effort is presented as the number of vessels and number of hooks set, with catches in tonnes of the target and main bycatch species (codes detailed in Appendix 1).

Year	No. Vessels	No. Hooks	BWA	HAU	MOW	YTC	Total catch (t)
2014	1	12,250	4	1	2	1	8
2015	3	4,861	19	10	4	-	33
2016	1	128	1	<1	1	-	2
2017	1	49	<1	<1	<1	-	<1
2018	1	120	<1	<1	<1	-	<1

3 Fisheries Data Collection and Research Activities

3.1 FISHERIES CATCH & EFFORT DATA COLLECTION SYSTEMS

The data collection systems implemented for New Zealand high seas bottom fishing vessels have been described in detail (Ministry of Fisheries, 2008b). Detailed tow-by-tow catch and effort data for all high seas fishing operations have been collected since 2007 using the at-sea catch and effort logbooks and landings recording forms. Detailed observer Benthic Materials Forms have been completed for all observed bottom fishing (100% of trawling and at least 10% lining) to record benthic bycatch to the most detailed possible taxonomic level. In addition, Vulnerable Marine Ecosystem (VME) Evidence Forms are used by observers in the move-on areas for trawlers.

From 1 October 2017, New Zealand trawl vessels >28m in length overall operating on the high seas started transitioning to reporting through a new electronic catch reporting system The data fields are consistent with previous paper forms, however data is now submitted on a daily basis. In the 2018 calendar year, 75% of fishing events in the SPRFMO Convention Area were reported through the electronic catch reporting system.

3.2 RESEARCH ACTIVITIES

As presented to the sixth meeting of the Scientific Committee (SC6-DW12) and the 2019 SPRFMO Commission (COMM6-INF05_rev1, COMM6-INF09), New Zealand has worked with Australia to progress a number of workstreams to inform the development of the revised bottom fishing conservation and management measure (CMM). Progress updates on many of these have been presented to a number of workshops, the fourth, fifth, and sixth Scientific Committees, and the sixth and seventh meetings of the Commission. A brief summary of each aspect of this work is provided below, noting that the majority of this work was reported in individual papers to the sixth meeting of the Scientific Committee.

The section below summarises relevant research New Zealand has completed in the most recent 1-2 years, including research to support the development of the revised bottom fishing CMM.

3.2.1 Identification of fishing footprint and/or impact analysis

New Zealand provided a spatially-explicit bottom impact evaluation for bottom fisheries in the SPRFMO Area based on the method used in CCAMLR (Sharp, 2009). This method can be used to estimate the likely cumulative impact of one or more bottom fishing methods on benthic organisms with different levels of fragility, and allow comparisons between fisheries employing different bottom fishing methods. The results of the application of the method provided an index of the "naturalness" of the benthic community in given locations affected by fishing, which was then used as an input layer for spatial decision-support software. This analysis was provided to SC-05 (SC5-DW06), and an updated analysis including bottom line methods was provided to SC-06 (SC6-DW10).

3.2.2 Mapping of vulnerable marine ecosystem (VME) distribution

New Zealand has developed habitat suitability models to directly map the predicted distribution of VMEs or VME indicator taxa. The most recent maps include very fine-scale predictions of the spatial distribution of five VME indicator taxa based on presence and absence records as well as abundance data, as reported to the Deep Water Working Group in May 2017 (SCW3-Doc15) and published by Georgian et al. (2019). Work is currently being undertaken to compile available data for VME indicator taxa subsequent to the production of habitat suitability models to assess if these additional data are sufficient for a validation test of the habitat suitability models to assess model robustness.

3.2.3 Spatial management open/closed areas

Predicted distributions of VME indicator taxa from habitat suitability models were combined with the bottom footprint/impact analysis, a naturalness layer, and a cost layer to support the design of spatial management areas that provide for fishing while avoiding significant adverse impacts on VMEs. The decision-support tool Zonation software (Moilanen 2007) was used to inform the design of spatial management measures and to explore sensitivity of scenario choices. A paper demonstrating the application of the approach within the SPRFMO area was published by Rowden et al (2019). Preliminary results of this work were reported to SC3 (SC03-DW-04), to the SPRFMO 3rd Workshop: Deep Water Working Group in May 2017 (SCW3-Doc16), at the fifth meeting of the SC (SC5-DW03, SC5-DW05), and a final update provided to the sixth meeting of the SC (SC6-DW11).

Zonation outputs include maps prioritising the landscape based on representation where areas of high priority are those that contribute the most to the representation of VMEs. Other outputs include the proportion of the distribution for each VME taxon that is protected, and the proportion of fishing activities that are displaced.

3.2.4 Deriving thresholds for VME encounter protocols

The revised bottom fishing CMM includes an encounter protocol, describing the actions a vessel or Member must take should an encounter with a potential VME occur (often referred to as a 'move-on rule'). SC-05 recommended that '*move-on rules should be viewed only as 'back-stop' measures (if required) to complement spatial closures'* and that '*should a move-on rule be implemented as part of the revised CMM for bottom fisheries, the threshold for triggering such a rule should be high…..involving weights of bycatch of benthic fauna that would indicate the models used to predict the distribution of VME taxa are misleading'*.

Following this advice, New Zealand used a data-informed method based on historical records of VME indicator bycatch from the New Zealand bottom trawl fishery within the SPRFMO Convention Area. The distribution of bycatch weights for individual VME indicator taxa were examined, with bycatch weights greater than a reference value used to identify "thresholds weights" for key VME indicator taxa that would trigger an 'encounter protocol'. Recognizing that several VME indicator taxa in a tow below their taxon-specific "threshold weights" may indicate that a fishing event has encountered an area with diverse seabed fauna, the encounter protocol also included a biodiversity component, whereby a single tow returning three of more VME indicator taxa above taxon-specific "biodiversity weights" would also trigger a move-on event. The encounter protocol, including thresholds and biodiversity weight triggers was included in the revised CMM for bottom fisheries. This work was presented to SC-06 as a standalone document SC6-DW09.

3.2.5 Monitoring biomass of target species

The main target species of bottom fishing in the SPRFMO Area are orange roughy (*Hoplostethus atlanticus)*, bluenose (*Hyperoglyphe antarctica*), and alfonsino (*Beryx* spp.), with orange roughy making up roughly 65% of New Zealand's total catch in the SPRFMO Area. All of these fisheries are relatively data poor; however, there are some data available, including historic catches, various effort data, and some biological data. New Zealand has focused stock assessment efforts on orange roughy in the first instance, as it remains the primary target of New Zealand and Australia's bottom trawl fisheries.

New Zealand has commissioned a range of approaches to estimate stock status and sustainable catch levels for SPRFMO orange roughy stocks. This work culminated in the fifth meeting of the Scientific Committee reviewing a number of stock assessment approaches and providing advice to the Commission on the setting of catch limits for two orange roughy areas (Report of 5th Scientific Committee).

In 2018, New Zealand has contracted the ageing of around 1 500 orange roughy otoliths taken from the Louisville Ridge in 1995 and between 2013 and 2015. This information will be used to update the stock assessment for the Louisville Ridge in 2019 (Horn et. al 2019a).

Additionally, New Zealand completed a combined trawl/acoustic survey in June/July 2018 for the Southern Challenger Plateau orange roughy stock which straddles the New Zealand EEZ and the Westpac Bank Area within in the SPRFMO Convention Area (Ryan et al. 2019). The outputs from this survey were incorporated into an update of the ORH 7A stock assessment which will be provided to SC7 and discussed in a standalone document (Cordue, 2019, SC7-DW06, and Bock & Cryer 2019 SC7-DW07).

3.2.6 Design of a generic acoustic survey design for spawning orange roughy

A generic acoustic survey design appropriate for surveying spawning and other aggregations of orange roughy in the SPRFMO Area was developed to enable efficient design for specific surveys.

Acoustic surveying of aggregations of orange roughy forms a key input to robust assessments of stock biomass and status. Surveys must be appropriately designed to ensure the resulting data can be correctly interpreted into a biomass estimate to inform stock assessment. The generic survey design considers all aspects of the survey including vessel, equipment, personnel, survey design, and data analysis. This document was presented and approved by SC6 (SC6-DW05 and Report of the 6th Scientific Committee).

3.2.7 Coral biodiversity in deepwater fisheries bycatch

The diversity and relationship of octocoral species impacted by deep water fisheries is not currently understood since morphological identification by observers and taxonomic expert often only places specimens with higher taxonomic rankings and relies on comparisons to existing species descriptions. This research uses DNA sequence data to infer the identity of 74 octocoral species and their relatedness to similar reference specimens, plus related species for which sequence data is available. This research will allow the quantification of species-level diversity contained in deep water fisheries bycatch to improve the understanding of fishery impacts.

3.2.8 Identification and storage of cold-water coral bycatch specimens

Accurate identification of coral taxa is vital to understand benthic impacts. The cryptic nature of many coral species makes at sea coral identification problematic for observers. This research supports fisheries management by undertaking expert identification of returned bycatch specimens and photographs in order to progressively improve the accuracy of at sea identification by updating observer briefing manuals and training materials. Tissue samples will also be available for appropriate collections and related research programmes (Conservation Service Annual Plan 2019/20). A report on the first phase of this project is available at the following page: https://www.doc.govt.nz/contentassets/9abc0c46cdd6469883b18916697ec855/int2015-03-coral-id-draft-annual-report.pdf.

3.2.9 Population research into key at-risk seabird species

A series of population studies have been undertaken for key at-risk seabird species. These use aerial and ground count methodologies to collect both population size and demographic data. Draft reports are available through the Department of Conservation - Conservation Services Programme website (www.doc.govt.nz/our-work/conservation-services-programme/meetings-and-project-updates/2019/).

3.2.10 Antipodean Albatross distribution

The Antipodean wandering albatross (*Diomedea antipodensis antipodensis*) is endemic to the Antipodes Islands, New Zealand. Since 2004, this population has declined: males at 6% per annum and females at 12%. At the current rate of decline, the Antipodean wandering albatross will be functionally extinct in 20 years. A recent study compared an updated at-sea distribution of Antipodean albatrosses to fishing effort data (sourced from Global Fishing Watch http://globalfishingwatch.org) which indicated a significant overlap with fishing activity in the South Pacific.

New Zealand is intending to propose listing the Antipodean Albatross on Appendix I of the Convention on Migratory Species in recognition of the rapid decline in population size measured in New Zealand. The proposal includes a draft Concerted Action for the species which is focused on managing fisheries bycatch across national jurisdictions and on the high seas. The proposal will be considered at the next Conference of the Parties in February 2020. More information on the proposal will be available on the CMS website (cms.int) in late September 2019.

4 Observer Implementation Report

4.1 OBSERVER TRAINING

MPI requires all observers to successfully complete a three-week training course before they are accepted into the programme. The course outline is as follows. Sessions preceded with a number are unit standards registered on the New Zealand Qualifications Framework:

- Observer Programme overview, Trip Planning.
- Catch effort logbooks (CELB)
- Catch effort logbook exercises
- Overview of the Observer manual
- 12306 – Identify common parts, fittings and equipment on a vessel
- 12310 – Prevent, extinguish and limit the spread of fire on a vessel
- 497 – Protect health & safety in the workplace
- 6213 – Use safe working practices in the seafood industry
- 12309 – Demonstrate knowledge of abandon ship procedures and demonstrate sea survival skills
- 15679 – Demonstrate a basic knowledge of commercial fishing methods
- Volumetric measurement
- Density factors
- Time Sampling
- Catch Assessment
- Mixed tows
- 19847 – Describe the reduction of marine mammal and turtle incidental capture during commercial fishing, including assessment
- 5332 – Maintain personal hygiene and use hygienic work practices working with seafood
- 19877 – Demonstrate knowledge of protection of the marine environment during seafood vessel operations
- Department of Conservation – Marine mammals and seabirds, mitigation devices
- Non-fish bycatch forms
- Benthic form
- Personal clothing and stores

- Communications / Key vessel personnel / Emergency Evacuation codes
- The psychology of deployment – Observer health and safety issues
- Code of conduct / complaint procedure
- QMS overview
- Scales
- Net bursts / discards / Schedule 6 releases
- Product states
- 19846 – Describe the reduction of seabird incidental capture during commercial fishing including assessment
- 23030 – Use basic knife skills as a fisheries observer
- 23027 - Demonstrate knowledge of information displays aboard seafood harvesting vessels
- The Compliance Business and Observer Compliance Contribution
- 20168 – Work on a commercial fishing vessel
- Briefing / Debriefing / General paperwork
- Performance Assessment System
- Conversion factors / practical exercise
- Fish ID book
- Fish ID practical
- Otoliths/Staging
- Biological sampling forms practical
- Biological Manual
- First Aid kits
- Tablets and at-sea data entry
- Observer Powers
- Compliance Investigation Services - Role, Use of Observer data, Profiling, Forensics.
- Employment Agreement
- MPI Science use of observer data
- Examination

Successful recruits are deployed with an observer trainer for one to two trips of an average duration of 30 days per trip before they can be deployed independently.

4.2 OBSERVER PROGRAMME DESIGN AND COVERAGE

New Zealand has had an observer programme in place since 1986, operating as a unit within the New Zealand Ministry for Primary Industries (MPI) or predecessor organisations. It delivers coverage days for a number of clients, who are provided with some or all or the information collected. These clients include: The Ministry for Primary Industries (Science, Field Operations, Fisheries Management groups), The Department of Conservation through the Conservation Services Levy, The National History Unit of the Museum of New Zealand, the New Zealand Fishing Industry, the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), the Ministry of Business Innovation and Employment, Maritime New Zealand, and the Conversion Factors Working Group, which is a joint MPI and industry working group.

New Zealand observers collect a wide range of data to inform scientific analyses including both target stock assessments and quantification of bycatch, monitoring of compliance with requirements including seabird mitigation measures, and the collection of more general biological information. Forms used by New Zealand observers to report on high seas fishing effort are included as Appendix 2.

The MPI observer programme makes provision in its annual plan to meet the observer coverage levels set out in SPRFMO CMM 03-2018 (Bottom Fishing in the SPRFMO Convention Area, recently replaced with CMM-03-2019 which has the same specified levels of coverage):

i. for vessels using trawl gear in the Convention Area, ensure 100% observer coverage for vessels flying their flag for the duration of the trip.

ii. for each other bottom fishing gear type, ensure that there is at least 10% observer coverage each fishing year.

All vessels intending to fish in the SPRFMO Convention Area are required to provide a 5 working day notification to the Fisheries New Zealand observer programme to allow for the deployment of an observer as required. Observers are deployed on all trawl trips and generally the first bottom line trip of the year. Subsequent bottom line trips may be required to carry an observer based on the overall level of effort (to ensure that a 10% minimum is observed), if they are intending to use a different gear type (e.g. hand or dahn line), or to provide additional information as observer resources are available.

Table 10 provides details on the number of fishing days and number of observed fishing days by month for each gear type. Note that for some months, the number of days fished may not match between vessels and observers due to differences in the criteria for reporting fishing events for commercial vessels and observers.

Table 10: Monthly fishing effort (and observer coverage) on New Zealand vessels fishing in the SPRFMO Area during 2018. Numbers in () are observed.

Month & year	Trawl: N vessels (N observed)	Trawl: N days	Bottom longline: N vessels	Bottom longline: N days	Dahn line: N vessels	Dahn line: N days	Hand line: N vessels	Hand line: N days
Jan-18	2 (2)	30 (30)	1 (0)	3 (0)	0	0	1	1
Feb-18	1 (1)	4 (5)	0 (0)	0 (0)	0	0	0	0
Mar-18	1 (1)	9 (8)	1 (1)	7 (7)	1	1	0	0
Apr-18	0 (0)	0 (0)	1 (0)	8 (0)	0	0	1	1
May-18	4 (4)	35 (35)	0 (0)	0 (0)	0	0	0	0
Jun-18	5 (5)	80 (82)	0 (0)	0 (0)	0	0	0	0
Jul-18	4 (4)	33 (33)	0 (0)	0 (0)	0	0	0	0
Aug-18	2 (2)	16 (17)	0 (0)	0 (0)	0	0	0	0
Sep-18	2 (2)	12 (12)	0 (0)	0 (0)	0	0	0	0
Oct-18	3 (3)	37 (38)	0 (0)	0 (0)	0	0	0	0
Nov-18	2 (2)	29 (29)	2 (1)	21 (6)	0	0	0	0
Dec-18	2 (2)	14 (14)	2 (0)	15 (0)	0	0	0	0
Total	**6 (6)**	**299 (303)**	**3 (2)**	**54 (13)**	**1 (0)**	**1 (0)**	**1 (0)**	**2 (0)**

Overall, the following levels of coverage were attained in 2017:

- Bottom contacting trawl: 100% (303 days)
- Bottom longline: 24% (13 observer days out of 54 commercial days)
- Dahn line: 0% (0 observer days out of 1 commercial day)
- Hand line: 0% (0 observer days out of 5 commercial days)
- Total bottom line (excluding exploratory fishing): 22% (13 observer days out of 59 commercial days)

A total of six New Zealand trawl vessels bottom fished under permit in the SPRFMO Area during 2018 and all 18 trips carried at least one New Zealand observer, representing 263 vessel days and 858 tows. All fishing days were observed and 792 of the 858 tows (94%) were observed. Scientific observers measured fish from 26% of bottom trawl tows (Table 11). A total of 7,995 fish were measured, 83% of which were the principal catch species, orange roughy.

Midwater trawl gear for bentho-pelagic species was used on seven trips by three vessels comprising 55 vessel days and 145 tows. 133 of the tows were observed, 25 of which were sampled resulting in 1,164 fish being measured, 91% of which were alfonsinos.

Three New Zealand bottom line vessels operated in the SPRFMO Area during 2018. Two bottom line trips were observed comprising 13 vessel days with 47 sets observed. 396 fish were sampled from 40 sets.

Table 11: Summary of observer and sampling coverage of bottom and midwater trawl and bottom longlining in the SPRFMO Convention Area during 2018. Days and events (trawl tows or line sets) relate to observed trips and days only.

Method	No. obs trips	Obs Vessel days	Total events	Events observed	Events measured	Retained catch (t)	Measured catch (kg)	No. Fish Measured
Bottom trawl	18	263	892	792	233	1 667	10 234	7 995
Midwater trawl	7	55	133	133	25	225	1 792	1 164
Bottom longline	2	13	47	47	40	19	1 723	396

Note: Tows/sets reported here are all tows conducted, including those which had no catch, and so may exceed the tows which had a catch, as reported in the effort summary tables. Landings in this table are in greenweight and include all species caught.

4.3 BIOLOGICAL SAMPLING AND LENGTH/AGE COMPOSITION OF CATCHES

The deepwater fisheries continued to be monitored by scientific observers during 2018 and a summary of the length-frequency sampling is provided in Table 12. A high proportion of all fish measured were orange roughy, the principal demersal trawl target species, with most of the remaining fish measured being alfonsino.

The unscaled length-frequency distribution of orange roughy from bottom trawl and alfonsino from midwater trawl are shown in Figures 5 and 6.

Table 12: Summary of length-frequency sampling for those species or species groups with a sample size of 100 fish or more conducted by scientific observers aboard New Zealand vessels conducting bottom fishing in the SPRFMO Area in 2018.

Scientific Name	Method	Common Name	Measure Used	Length (cm) Min	Mean	Max	Number Measured
H. atlanticus	Bottom trawl	Orange roughy	Standard	19	33.24	50	6 597
P. decacanthus	Bottom trawl	Yellow boarfish	Total	17	27.58	34	214
M. moro	Bottom trawl	Ribaldo	Total	25	47.92	83	473
N. rhomboidalis	Bottom trawl	Spiky oreo	Total	27	36.09	46	389
Beryx spp.	Bottom trawl	Alfonsino	Fork	23	33.87	45	170
Beryx spp.	Midwater trawl	Alfonsino	Fork	23	34.27	51	1061
H. antarctica	Bottom longline	Bluenose	Fork	47	69.01	98	164
						Total	**9 068**

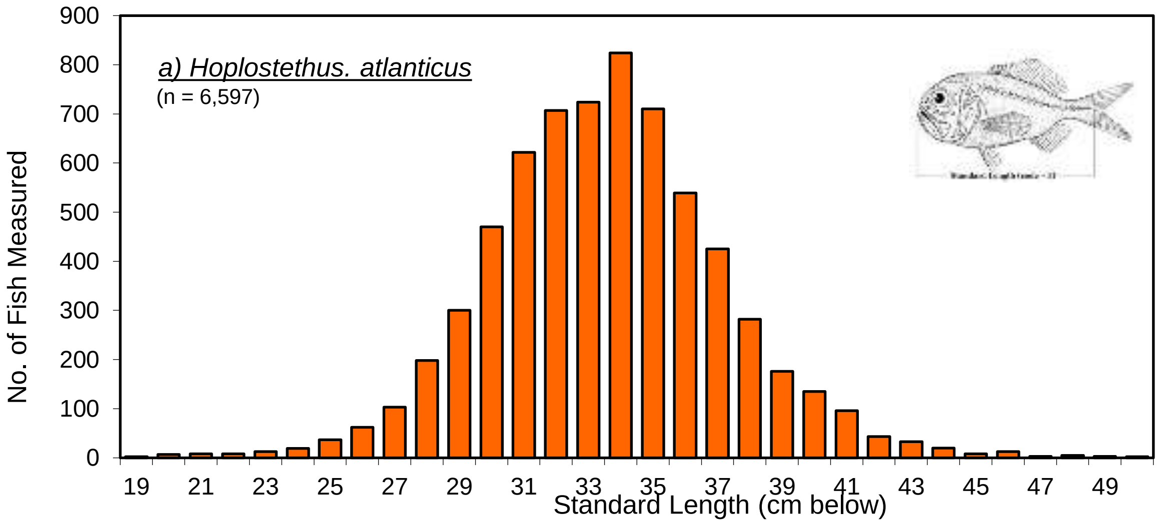

Figure 5: Length frequency distribution (unscaled) for orange roughy (*Hoplostethus atlanticus*) measured by scientific observers aboard New Zealand vessels fishing using bottom trawl in the SPRFMO Area during 2018.

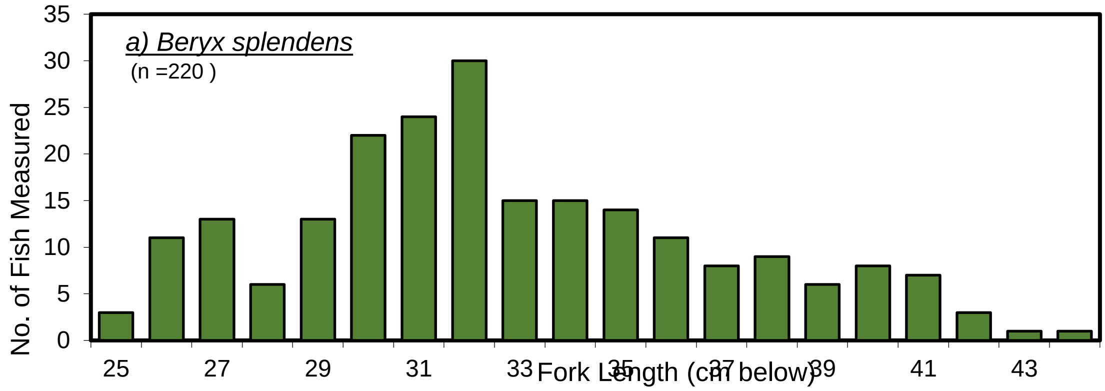

Figure 6: Length frequency distribution (unscaled) for alfonsino (*Beryx* spp.) measured by scientific observers aboard New Zealand vessels fishing using midwater trawl in the SPRFMO Convention Area in 2018

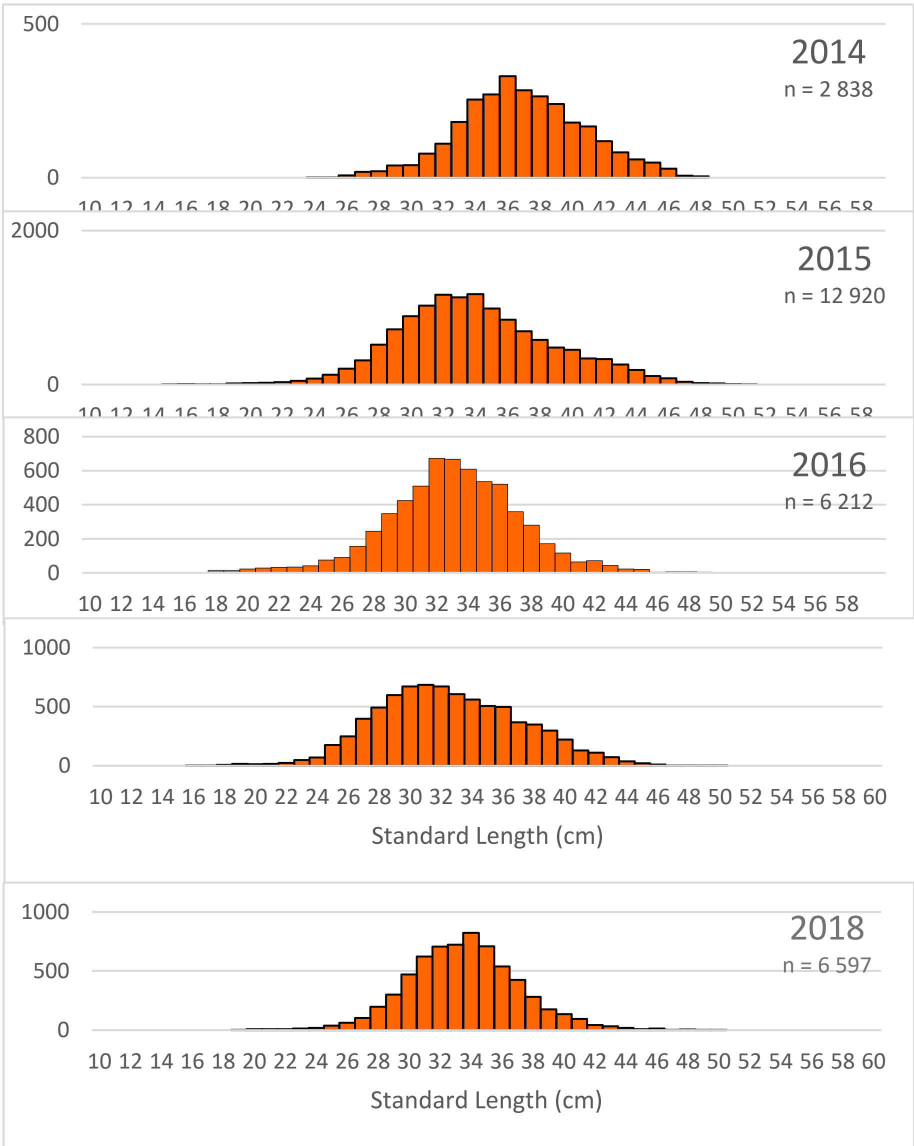

Figure 7: Length frequency distributions (unscaled) in the last 5 years to 2018 in the SPRFMO Area.

Comparison of length frequency distributions from 2014 to 2018 (Figure 7) suggests that the size of orange roughy caught in bottom trawls is relatively consistent over time. Differences, primarily in 2017, are thought to be a result of changes in the location of fishing.

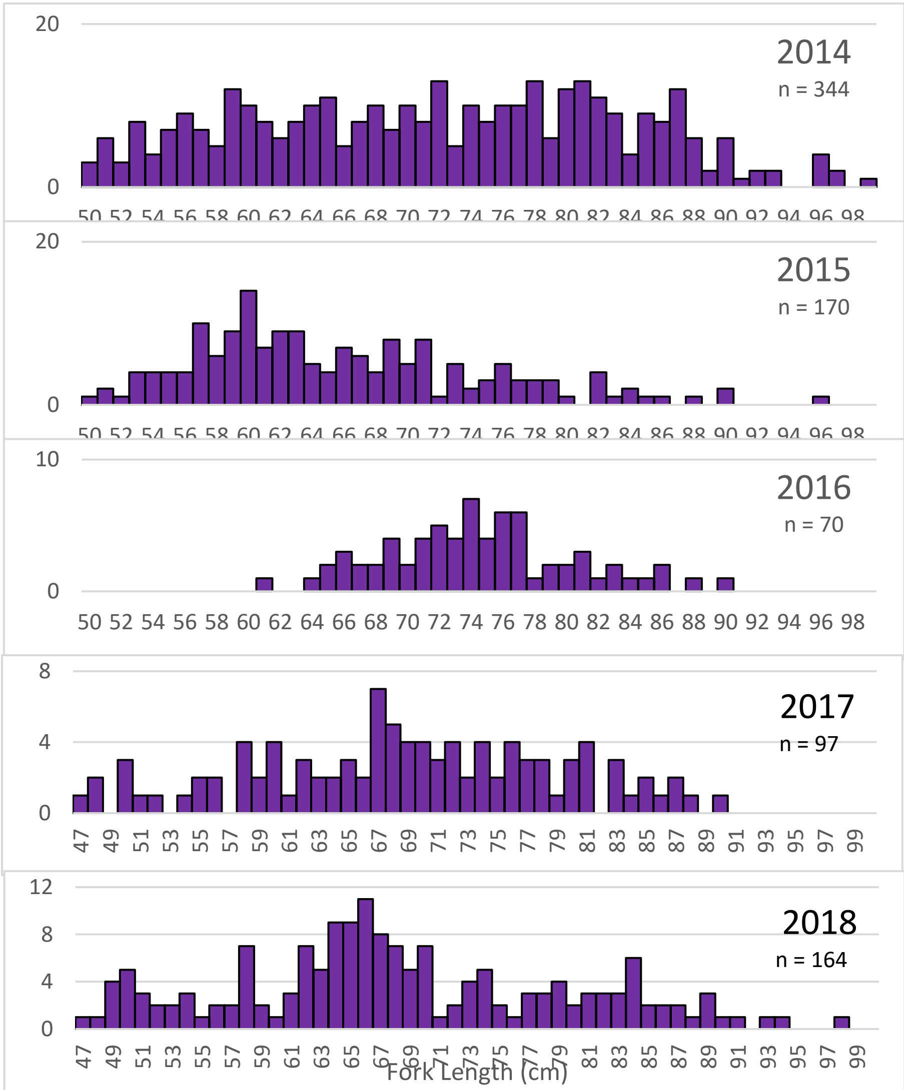

Figure 8: Length frequency distributions (unscaled) for bluenose measured by scientific observers aboard New Zealand vessels fishing in the five years up to and including 2018 in the SPRFMO Convention Area.

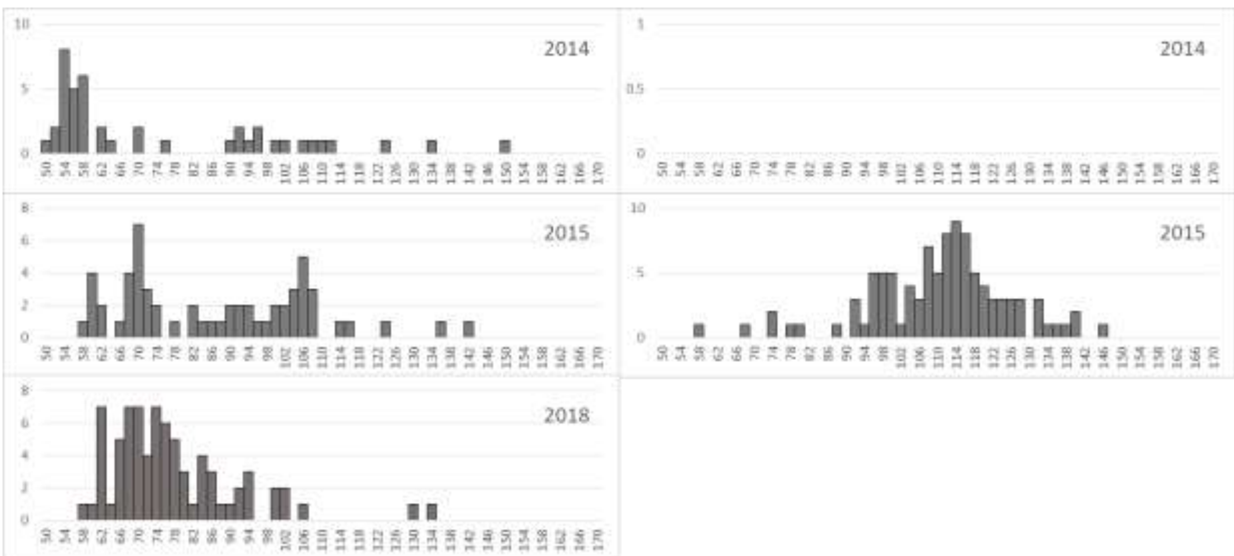

Figure 9: Length frequency distributions (unscaled, 2 cm bins) for wreckfish measured by scientific observers aboard New Zealand vessels bottom longlining for the 5 years leading up to and including 2018 in the SPRFMO Area. Left panel, bass (*Polyprion americanus*); right, hapuku (*Polyprion oxygeneios*). Insufficient fish were measured in 2016 (0 fish) and 2017 (16 fish) to produce length frequency distributions.

The recorded sizes of bluenose and wreckfish vary considerably between years (Figures 8 and 9), likely as a result of small sample sizes and shifts in fishing locations. Very few wreckfish have been measured in recent years.

Length frequency distributions for alfonsino (Figure 10) for midwater and bottom trawl suggest variable distributions, although sample sizes have been very small in some years.

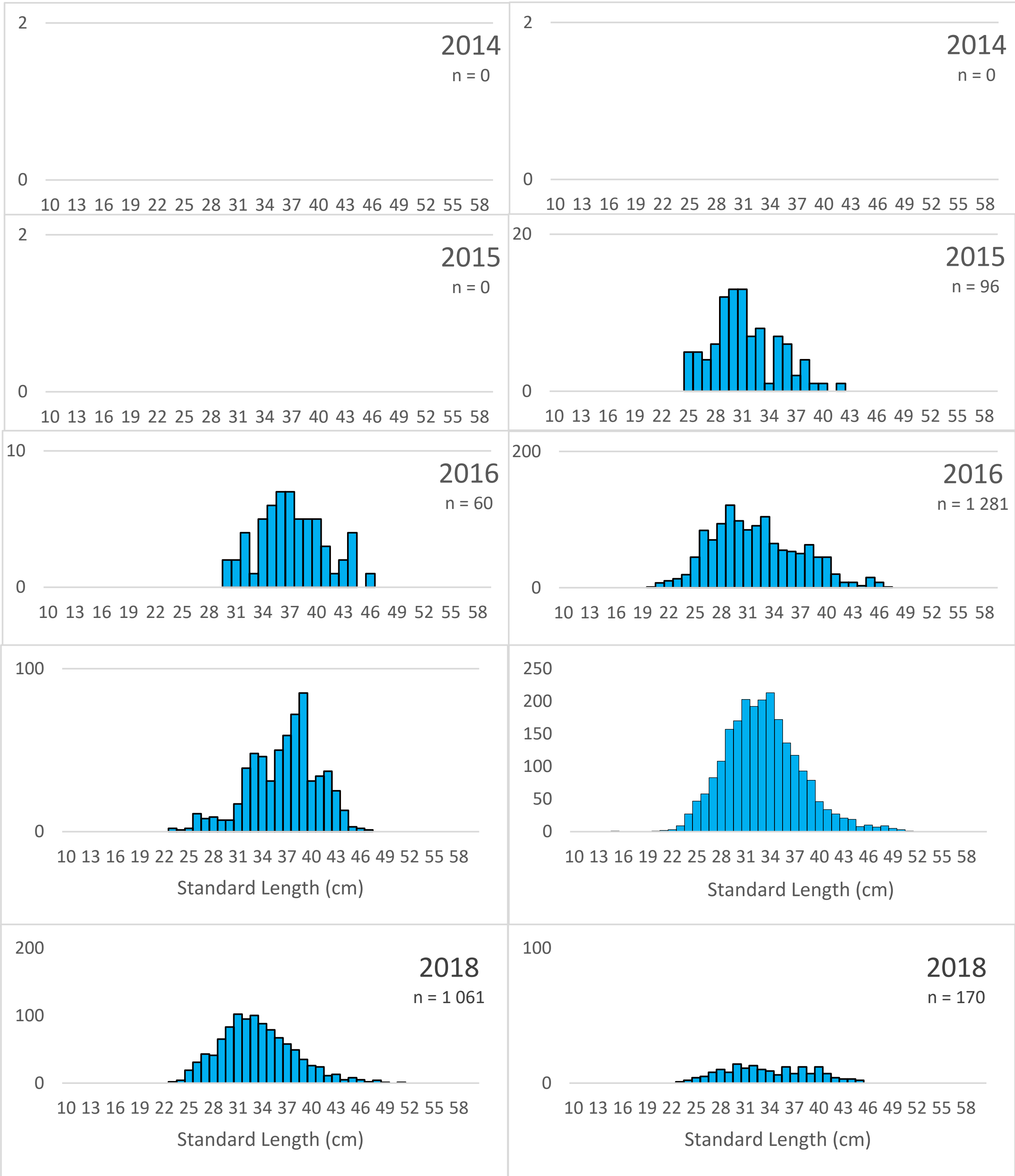

Figure 10: Length frequency distributions (unscaled) for alfonsino (*Beryx splendens* and *B. decadactylus* combined) for the five years to 2018 measured by scientific observers aboard New Zealand trawl vessels fishing in the SPRFMO Area. Left panel, from midwater trawls; right, from bottom trawls.

5 Ecosystem Approach considerations

5.1 SEABIRD MITIGATION MEASURES

New Zealand vessels fishing in the SPRFMO Area are required to deploy seabird mitigation commensurate with CMM 09-2017.

For bottom line vessels, this includes the combined use of a line weighting system, streamer (tori) lines, setting at night (between nautical dark and nautical dawn), and controlling/avoiding the discharge of any biological material during shooting or hauling where possible.

For trawl vessels, this requires the deployment of streamer (tori) lines or a bird baffler where it is not operationally feasible to deploy streamer lines, and management of the discharge of biological material. Trawl vessels must, where possible, prohibit the discharge of biological material during shooting and hauling; convert offal into fish meal; retain all waste material related to fish processing; and restrict discharge to liquid discharge/sump water.

All New Zealand trawl vessels >28 metres in length also have a vessel specific ‘Vessel Management Plan’ (VMP), which sets out the practices and processes that the vessel will follow to minimise the risk of seabird interactions. VMPs include a commitment to manage the discharge of biological material, to clean nets after every shot to remove ‘stickers’, and to minimise the time the net is on the water during hauling. VMPs also identify contingency plans in the case of gear or equipment malfunction which may otherwise result in increased risk of seabird interactions (e.g. meal plant breakdown or winch malfunction). Adherence to the VMPs is monitored by Fisheries New Zealand observers and reported on each year by MPI.

5.2 OBSERVED INTERACTIONS WITH SEABIRDS AND OTHER SPECIES OF CONCERN

New Zealand observers report captures of all seabirds, marine mammals, reptiles, and sharks protected under New Zealand’s Wildlife Act 1953, and other species of concern, on the ‘non-fish and protected species bycatch’ form. In addition, all non-targeted marine invertebrates, marine plants, or benthic organisms are reported on the Observer Benthic Materials Form (Appendix 2). This information is recorded to a high standard and includes information on the species, the deployment of mitigation devices, adherence to other mitigation practices, and situational details about the capture where possible including where and how it was captured.

Observer coverage of the trawl fisheries in the SPRFMO Area has historically been high (70 - 100% of tows observed per year). New Zealand observers are present on about 10% of bottom line fishing trips by New Zealand vessels and typically observe 10–15% of all line sets each year.

Over the last five years, seven seabird captures have been observed on New Zealand vessels: two great-winged petrels (one dead, one alive) on bottom longlines, and two great-winged petrels, one white-faced storm petrel, one unidentified prion, and one storm petrel from trawl fisheries (all released alive) (Table 13).

In relation to other species of concern as specified in Annex 14 of CMM 02-2017, observers reported 50 kg of porbeagle shark (*Lamna nasus*) in 2015 from the Challenger area. No information on the number of individuals or the life status is available.

Table 13: All records from observer non-fish bycatch forms for seabirds, marine mammals, reptiles, and other species of concern captured by New Zealand vessels since 2011 including life status or catch weight as appropriate

Year	Area	Fishing method	Species	Dead/ alive	Catch weight	Notes
2014	Three Kings Ridge	Bottom longline	Great-winged petrel	Dead		
2015	Lord Howe Rise	Trawl	Great-winged petrel	Alive		
2015	Lord Howe Rise	Trawl	Great-winged petrel	Alive		
2015	Challenger	Bottom longline	Porbeagle shark (*Lamna nasus*)		50 kg	
2016	Challenger	Trawl	White-faced storm petrel	Alive		
2017	Southern Ocean	Bottom longline	Prion (unidentified)	Alive		
2017	Lord Howe Rise	Trawl	Great-winged petrel	Alive		
2017	Louisville Ridge	Trawl	Storm petrel	Alive		
2018	Wanganella Bank	Bottom longline	Black petrel	Alive		
2018	Wanganella Bank	Bottom longline	Black petrel	Alive		
2018	Wanganella Bank	Bottom longline	Black-browed albatross	Alive		
2018	Lord Howe Rise	Trawl	Great-winged petrel	Alive		

5.3 ECOSYSTEM CONSIDERATIONS

In order to better understand the impacts of fishing on the wider ecosystem, New Zealand's scientific observers record details on quantities of all species caught during fishing activities in the SPRFMO Convention Area. Commercial fishers are also required to report the top eight species per fishing event.

Table 14 provides a summary of the top five non-target teleost species and top five chondrichthyan species reported by observers in bottom contacting trawl fisheries. Table 15 provides a summary of the same information as reported by commercial fishers in New Zealand bottom line fisheries in the SPRFMO Convention Area.

Table 14: Top five non-target (non-orange roughy or alfonsino) teleost species and top five chondrichthyan species observed caught and quantities (tonnes) in New Zealand bottom-contacting trawl fisheries in the SPRFMO Convention Area from 2013 to 2018

Species	2013	2014	2015	2016	2017	2018
Teleosts						
Unicorn rattail *Trachyrincus* spp.	0.2	0.3	28.3	72.1	45.6	35.9
Rattails *Macrouridae* spp.	2.3	1.8	36.8	90.2	29.5	12.9
Ribaldo *Mora moro*	9.7	2.9	21.1	42.3	42.6	31.1
Spiky oreo *Neocyttus rhomboidalis*	12.3	7.8	14.1	28.8	33.4	38.7
Cardinalfish *Epigonus telescopus*	3.5	.01	52.0	19.4	3.3	5.3
Chondrichthyans						
Shovelnose dogfish *Deania calcea*	2.8	2.0	37.7	100.9	58.8	26.0
Widenosed chimaera *Rhinochimaera pacifica*	0.2	0.04	16.1	40.1	10.6	5.9
Seal shark *Dalatias licha*	6.6	0.4	6.6	33.9	20	6.7
Baxter's lantern dogfish *Etmopterus baxteri*	5.8	2.9	4.5	3.5	13.7	3.0
Long-nosed chimaera *Harriotta raleighana*	0.1	0.2	8.2	14.1	5.9	5.7

Table 15: Top five non-target chondrichthyan species commercially reported caught (tonnes) in New Zealand bottom line fisheries in the SPRFMO Convention Area (non-target teleosts are covered in Table 7)

Species	2013	2014	2015	2016	2017	2018
			Chondrichthyans			
Spiny dogfish *Squalus acanthias*	5.6	4.0	3.8	4.7	3.5	9.6
Seal shark *Dalatias licha*	.03	0	4.3	0	0.01	0.0
Northern spiny dogfish *Squalus griffini*	0.5	0.2	1.6	0.5	0.7	0.5
Shovelnose dogfish *Deania calcea*	0	0.03	2.4	.02	0	0.2
Mako shark *Isurus oxyrinchus*	0.2	0.6	0.3	0.7	0.3	0.6

5.4 VME ENCOUNTERS AND STATE PROCESSES

The VME Evidence Process and move-on rule implemented within move-on blocks in the bottom trawl fishing footprint are described in Ministry of Fisheries (2008b) and Parker *et al*. (2009). Scientific observers deployed on New Zealand bottom trawling trips in the SPRFMO Area are required to complete VME Evidence Process forms for each tow conducted within a move-on area.

The move-on-rule has been triggered in the demersal fishery seven times in the 397 trawl tows in move-on areas conducted since 2008 (Table 16). This average rate of less than 2% of tows triggering a move-on is less than the expected rate of about 8% predicted by Penney (2014), probably because the catch rates of VME taxa in the SPRFMO Area are lower than from inside the New Zealand EEZ. The move-on-rule was triggered mostly by exceeding one or more of the weight thresholds of individual VME taxa (six occasions) and less by capturing three or more different indicator taxa from the list of such taxa (two occasions). There were no move-on rule triggers in 2017.

Table 16: Data relating to the implementation of the move-on rule within the New Zealand bottom trawl fishery for the last 10 years. The numbers of tows are those fished in the move-on rule areas only.

Bottom trawling in move-on-rule areas							
Year	No Tows	Observed tows.	Percentage observed	No of move-on events	Exceeded thresholds	Exceeded biodiversity count	Percentage of tows moved-on
2009	18	18	100%	1	1	0	5.6%
2010	56	50	89%	2	2	0	4.0%
2011	79	77	97%	2	2	0	2.6%
2012	22	22	100%	1	0	1	4.5%
2013	14	14	100%	0	–	–	0%
2014	2	2	100%	0	–	–	0%
2015	44	44	100%	0	–	–	0%
2016	69	69	100%	1	1	1	1.5%
2017*	92	92	100%	0	-	-	0%
2018*	24	24	100%	0	-	-	0%
Total	423	414	98%	7	6	2	1.7%

* Includes all effort that either started or finished in a move-on area (may not be consistent with previous years)

In the midwater trawl fishery for bentho-pelagic species the move-on rule was triggered for the first time in 2018 (Table 17). New Zealand conducted no midwater trawling for bentho-pelagic species in move-on areas in 2014 or 2015 and only 3 tows in move-on areas in 2016. There was a significant increase in midwater trawling in move-on areas in 2018.

Table 17: Data relating to the implementation of the move-on rule within the New Zealand midwater trawl fishery for bentho-pelagic species for the last 10 years. The numbers of tows are those fished in the move-on-rule areas only.

Midwater trawling for bentho-pelagic species in move-on-rule areas							
Year	**No Tows**	**Observed tows.**	**Percentage observed**	**No of move-on events**	**Exceeded thresholds**	**Exceeded biodiversity count**	**Percentage of tows moved-on**
2009	0	0	–	–	–	–	–
2010	6	6	100%	0	–	–	0%
2011	16	16	100%	0	–	–	0%
2012	7	7	100%	0	–	–	0%
2013	5	5	100%	0	–	–	0%
2014	0	0	–	0	–	–	–
2015	0	0	–	0	–	–	–
2016	3	3	100%	0	–	–	–
2017	1	1	100%	0	–	–	–
2018	108	108	100%	1	1	–	1%
Total	143	143	100%	0			<1%

Fisheries New Zealand observers also collect information on the bycatch of benthic fauna, whether or not a vessel is fishing in a move-on area. Information on the taxa and quantity of benthic bycatch reported by observers in New Zealand's bottom fishing activities is summarised for the last five years in Table 18. This information has been used to inform the development of the comprehensive bottom fishing measure that was adopted by the Commission in 2019.

Table 18: The weight in kg (and number of positive reports) of benthic bycatch reported by observers from New Zealand bottom trawl and bottom longline fisheries in the SPRFMO Area between 2014 and 2018. Where taxonomic resolution allows, bycatch is presented at the Class level, otherwise at the Phylum level.

Taxon	Common Name	2014	2015	2016	2017	2018
Bottom-contacting Trawl						
Arthropoda						
Branchiopoda	Shrimp	0 (0)	2 (2)	0 (0)	0 (0)	0 (0)
Hexanauplia	Barnacles	0 (0)	1.3 (3)	1.7 (4)	0 (0)	0.6 (3)
Malacostraca	Crabs, prawns	0 (0)	0.1 (1)	6.1 (5)	29.9 (13)	2.9 (4)
Pycnogonida	Sea spiders	0 (0)	0 (0)	0 (0)	1 (1)	0 (0)
Brachiopoda	Lamp shells	0 (0)	0 (0)	0 (0)	1 (1)	0 (0)
Bryozoan	Lace corals	0 (0)	0 (0)	0 (0)	0 (0)	0.4 (2)
Chordata						
Ascidiacea	Sea squirts	0 (0)	0 (0)	0 (0)	20 (4)	0 (0)
Thaliacea	Tunicates	0 (0)	0 (0)	4.7 (8)	12.1 (13)	0 (0)
Cryptophyta	Hydrocorals	3.2 (6)	0 (0)	0 (0)	2 (2)	0 (0)
Cnidaria						
Anthozoa	Anemones, corals, sea pens	218.7 (102)	10557.5 (432)	1775.6 (399)	5143.6 (382)	2495.62 (308)
Hydrozoa	Hydroids	20.1 (6)	4.7 (9)	3 (2)	2 (3)	19.6 (14)
Echinodermata						
Asteroidea	Sea stars, starfish, armless stars	0 (0)	10.1 (5)	3.1 (7)	11.7 (8)	2.3 (2)
Crinoidea	Sea lillies	0 (0)	0 (0)	3.2 (5)	1.7 (13)	3.54 (6)
Echinoidea	Sea urchins	0 (0)	0.2 (1)	1037.2 (38)	215.9 (45)	52.5 (6)
Holothuroidea	Sea cucumbers	0 (0)	0.3 (1)	17.5 (14)	19.6 (7)	0 (0)
Ophiuroidea	Brittlestars	0 (0)	0 (0)	253 (70)	11.3 (16)	2 (1)
Mollusca		-	-	-	-	-
Bivalvia	Mussels, clams	0 (0)	0 (0)	0.2 (2)	0.7 (3)	0.1 (1)
Gastropoda	Snails, whelks, tritons	0 (0)	0 (0)	1.8 (5)	6.1 (7)	0 (0)
Ochrophyta						
Phaeophyceae	Brown algae	0 (0)	0.2 (2)	10 (6)	0 (0)	0 (0)
Porifera	Sponges	51 (8)	3329.4(174)	189.4 (126)	425.9 (95)	169.5 (73)
Sipuncula	Peanut worms	0 (0)	0 (0)	0 (0)	3 (1)	0 (0)
Unidentified	Unidentified	0 (0)	0 (0)	2 (1)	0.8 (1)	0 (0)
Bottom Line						
Cryptophyceae	Hydrocorals	-	0.1 (1)	0 (0)	0.1 (1)	0 (0)
Cnidaria						
Anthozoa	Anemones, corals, sea pens	-	0.3 (2)	0.6 (4)	3.3 (5)	1.5 (5)
Hydrozoa	Hydroids	-	0.2 (1)	3.1 (2)	2.1 (3)	0.3 (3)
Echinodermata						
Crinoidea	Sea lillies	-	0 (0)	0.3 (1)	1 (1)	0.6 (1)
Ophiuroidea	Brittlestars	-	0.5 (2)	0.3 (1)	0 (0)	0 (0)
Porifera	Sponges	-	0 (0)	0.1 (1)	4 (4)	0.2 (4)

5.5 INFORMATION RELATING TO ABANDONED, LOST, DISCARDED OR RETRIEVED FISHING GEAR

A new conservation and management measure on fishing gear and marine plastic pollution in the SPRFMO Convention Area was agreed by the SPRFMO Commission in 2019 that came into force in May 2019. To date, no lost gear has been reported in 2019. Fisheries New Zealand observers currently report on abandoned, lost, or discarded fishing gear. They also record the catch of fishing materials, primarily small amounts of debris that can be identified as having come from fishing activities. Commercial fishers using ERS also report any fishing gear abandoned or lost during fishing activities on their vessel.

6 Implementation of Management Measures

6.1 DESCRIPTION OF MANAGEMENT MEASURES

A detailed description of New Zealand's implementation of the SPRFMO interim CMM adopted in 2007 can be found in Ministry of Fisheries (2008b) and Penney *et al*. (2009). The management approach, subsequently codified in CMMs 2.03, 4.03, 03-2017, and 03-2018, is summarised below:

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 these permit conditions include:

- Schedules designating open, move-on and closed bottom trawling areas within the historical (2002–2006) New Zealand high seas bottom trawl fishing footprint, and prohibiting bottom trawling within closed areas and everywhere else in the SPRFMO Area. These areas were last modified in 2015.
- The move-on rule VME Evidence Process for bottom trawling within move-on areas, with the requirement to report to the Ministry for Primary Industries and move-on 5 nautical miles from where the VME Evidence threshold is reached.
- A requirement to carry at least one observer on all bottom and midwater trawl trips. Observers are provided by the Ministry for Primary Industries and the costs are recovered from industry.
- Requirements for the deployment/implementation of seabird mitigation measures as per CMM 09-2017.
- Prohibition of fishing for *Trachurus* species or using set nets in the SPRFMO Area, including notice to the Ministry for Primary Industries in advance of transiting the SPRFMO Area with a set net on board.

The effect of these measures has been to close bottom trawling in 41% of the total 217 463 km^2 New Zealand bottom trawl footprint surface area, with 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. Maps showing all open areas and those open areas subject to the move-on rule are included in Appendix 3.

These measures changed substantially and were made consistent across all bottom fishing Members with the adoption of CMM-03-2019, but 2018 fishing reported here was conducted pursuant to CMM-03-2018.

6.2 MANAGEMENT OF THE SOUTHWEST CHALLENGER PLATEAU STRADDLING STOCK ORANGE ROUGHY FISHERY

New Zealand manages components of an orange roughy stock which straddles the New Zealand EEZ and the Westpac Bank area in the SPRFMO Convention Area. The fishery in this area began in the 1980s and the first catch limit in the area was set in 1986. New Zealand has completed a number of surveys and stock assessments of the area, and has, to date, set and managed catch limits for the full biological stock. The in-zone portion of the stock is comprised of New Zealand Quota Management Area ORH 7A.

The fishery was closed from 2000 to 2010 when it was re-opened with a TAC of 525 tonnes following a stock assessment completed by New Zealand that estimated there to be at least a 70% probability that the biomass had increased above the 'Soft Limit' of 20% B_0 (Ministry of Fisheries 2008a).

The stock was assessed again in 2014, supported by a number of trawl and acoustic surveys (2010, 2013) with the stock estimated to be well above the lower end of the agreed management target range of 30-50% B_0. The Total Allowable Commercial Catch was subsequently increased in 2014 to 1,600 tonnes.

The New Zealand bottom trawl footprint includes two open blocks (of six within New Zealand's declared footprint) on the Westpac Bank in the SPRFMO Convention Area where the stock straddles the New Zealand EEZ.

New Zealand vessels fishing on the Westpac Bank in the SPRFMO Area are required to report all catches against New Zealand's SPRFMO catch limit and also balance those catches with New Zealand Annual Catch Entitlement to ensure catches are accounted for within the New Zealand Total Allowable Catch for the whole stock.

In 2018, New Zealand undertook a combined trawl/acoustic survey and subsequently updated the stock assessment of the Southwest Challenger Plateau orange roughy stock. The outputs from the stock assessment informed a review of the domestic catch limit (total allowable commercial catch) for the ORH 7A. Advice on the catch limit is being provided to the Minister of Fisheries who is expected to make a decision at the end of September 2019.

New Zealand has provided the 2019 Southwest Challenger Plateau stock assessment as a paper for the Scientific Committee (Cordue, 2019, SC7–DW-06), and has provided a further paper summarising stock assessment outputs and proposing options for the Committee to make recommendations on an appropriate catch limit for the Westpac Bank Area (Bock & Cryer 2019, SC7-DW-07).

6.3 EXPLORATORY FISHERY FOR TOOTHFISH

New Zealand presented a proposal to the third meeting of the Scientific Committee in 2015 (MPI 2015, SC-03-DW-01) for a 2-year exploratory fishery for toothfish (Patagonian toothfish, *Dissostichus eleginoides*, and Antarctic toothfish, *Dissostichus mawsoni*) using the method of bottom longlining. This proposed fishery was outside New Zealand's existing bottom line fishing footprint (Figure 11) and in excess of average catches during the reference years 2002–2006. The Scientific Committee assessed New Zealand's proposal and confirmed that the proposal was acceptable under Article 22 (then CMM2.03, now CMM 03-2017) and the Bottom Fishery Impact Assessment Standard. The Compliance and Technical Committee and Commission considered the proposal in early 2016 and the Commission approved a 2-year exploratory fishery with a retained catch limit of 30 tonnes of *Dissostichus* spp. (both species combined) each year (see CMM-14-2016).

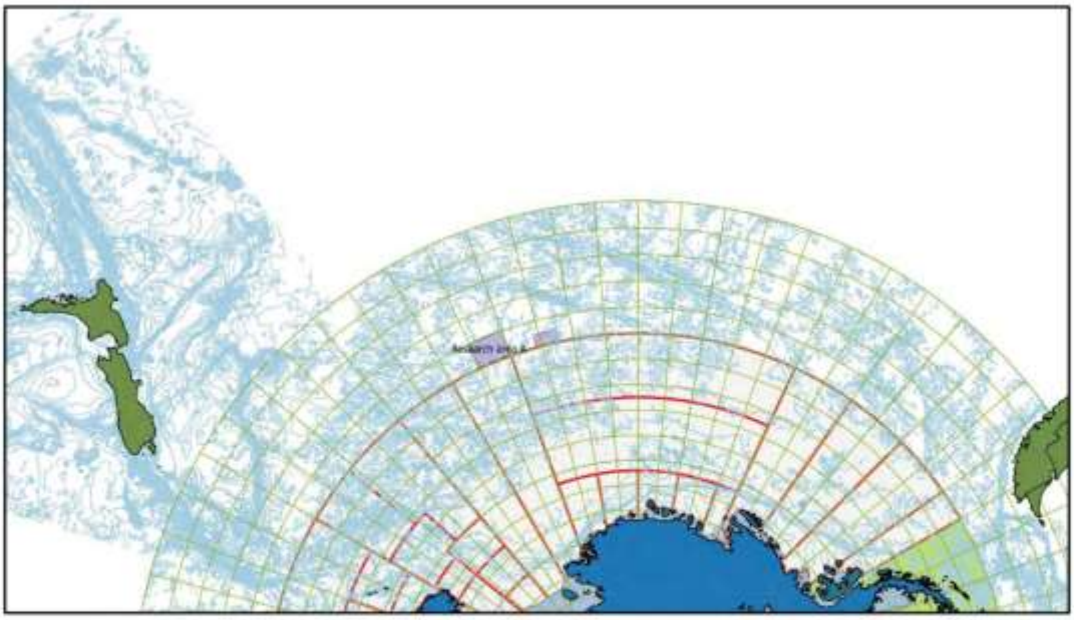

Figure 11: General location of the research fishing blocks for New Zealand's exploratory fishery for toothfish. All area south the research fishing block is managed by CCAMLR.

Two exploratory fishing voyages were completed, the first in August 2016 (see Fenaughty & Cryer 2016, SC-04-DW-02), the second in August/September 2017. Detailed results from both voyages were presented to SC-06 as part of the proposal for a continuation of the exploratory fishery (SC-06-DW-03-rev2). Generally, catch-rates in the exploratory fishery were very high compared with those typically recorded from most of the CAMLR Convention Area. Most fish caught were large Antarctic toothfish and in relatively poor post-spawning condition, suggesting the area is close to a spawning ground. Only two Patagonian toothfish were caught and fish bycatch was less than 1% of the total catch by weight in both years. Invertebrate bycatch was less than 1 kg in total for both years.

The Commission approved the continuation of exploratory fishing under CMM-14a-2019, starting in 2019, designed to cover key gaps in our knowledge of the distribution and life cycle of Antarctic toothfish in the South Pacific Ocean and Ross Sea to underpin understanding and management of those stocks. This work complements the exploratory fishing work in the winter longline survey of Antarctic toothfish in the northern region of CCAMLR Subareas 88.1 and 88.2 proposed by New Zealand. As at the time of reporting, no fishing had been conducted in 2019, but fishing may have started by the time SC meets.

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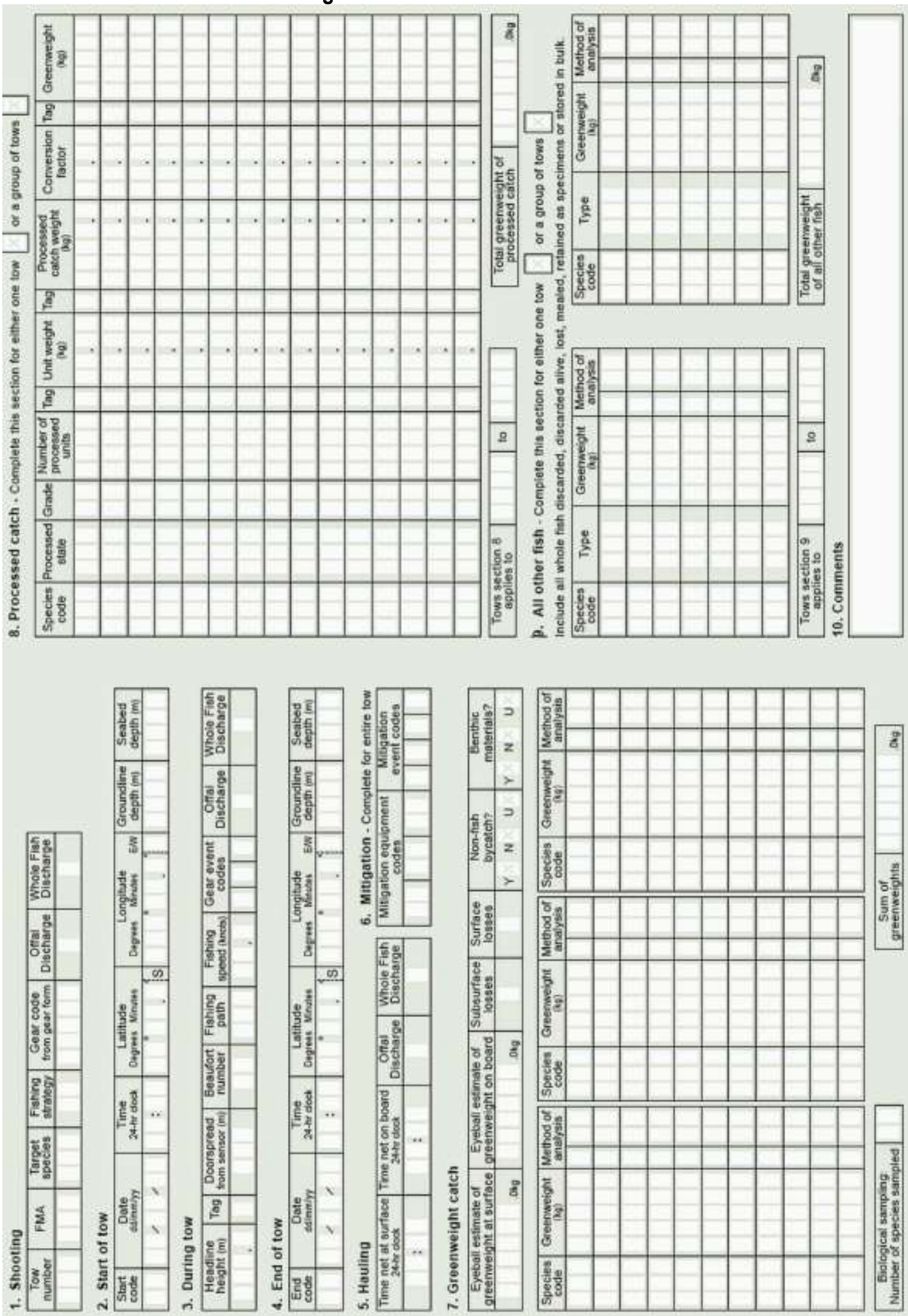
Appendix 1. List of Species Codes, Scientific Names and Common Names Used

FAO Code	NZ Code	Scientific Name	Common Name
ALF	BYX	*Beryx splendens, B. decadactylus*	Alfonsino & Long-finned beryx
BOE	BOE	*Allocyttus niger*	Black oreo
BWA	BNS	*Hyperoglyphe antarctica*	Bluenose
DGS	SPD	*Squalus spp.*	Spiny dogfish, northern spiny dogfish
EDR	SBO	*Pseudopentaceros richardsoni*	Southern boarfish
EPI	CDL	*Epigonus telescopus*	Deepsea cardinalfish
HAU	HPB	*Polyprion oxygeneios, P. americanus*	Wreckfish (Hapuku & Bass)
MOW	KTA	*Nemadactylus sp.*	King tarakihi
ONV	SOR	*Neocyttus rhomboidalis*	Spiky oreo
ORY	ORH	*Hoplostethus atlanticus*	Orange roughy
RIB	RIB	*Mora moro*	Ribaldo
ROK	SPE	*Helicolenus spp.*	Sea perch
RTX	RAT	*Macrouridae (Family)*	Rattails
RXX	SKI	*Rexea spp.*	Gemfish, southern kingfish
SCK	BSH	*Dalatias licha*	Seal shark
SEM	WAR	*Seriollela brama*	Common warehou
SEP	SWA	*Seriollela punctata*	Silver warehou
SNK	BAR	*Thyrsites atun*	Barracouta
SSO	SSO	*Pseudocyttus maculatus*	Smooth oreo
TOA	TOT	*Dissostichus mawsoni*	Antarctic toothfish
TOP	PTO	*Dissostichus eleginoides*	Patagonian toothfish
YTC	KIN	*Seriola lalandi*	Kingfish

Appendix 2. Observer data collection forms used to monitor New Zealand high seas fisheries

- **Observer Trawl catch Effort Logbook**



1. Shooting
Tow number | FMA | Target species | Fishing strategy | Gear code from gear form | Offal Discharge | Whole Fish Discharge

2. Start of tow
Start code | Date dd/mm/yy | Time 24-hr clock | Latitude Degrees Minutes S | Longitude Degrees Minutes E/W | Groundline depth (m) | Seabed depth (m)

3. During tow
Headline height (m) | Tag | Doorspread from sensor (m) | Beaufort number | Fishing path | Fishing speed (knots) | Gear event codes | Offal Discharge | Whole Fish Discharge

4. End of tow
End code | Date dd/mm/yy | Time 24-hr clock | Latitude Degrees Minutes S | Longitude Degrees Minutes E/W | Groundline depth (m) | Seabed depth (m)

5. Hauling
Time net at surface 24-hr clock | Time net on board 24-hr clock | Offal Discharge | Whole Fish Discharge

6. Mitigation - Complete for entire tow
Mitigation equipment codes | Mitigation event codes

7. Greenweight catch
Eyeball estimate of greenweight at surface (kg) | Eyeball estimate of greenweight on board (kg) | Subsurface losses | Surface losses | Non-fish bycatch? Y N U | Benthic materials? Y N U
Species code | Greenweight (kg) | Method of analysis | Species code | Greenweight (kg) | Method of analysis | Species code | Greenweight (kg) | Method of analysis
Biological sampling: Number of species sampled | Sum of greenweights (kg)

8. Processed catch - Complete this section for either one tow or a group of tows
Species code | Processed state | Grade | Number of processed units | Tag | Unit weight (kg) | Tag | Processed catch weight (kg) | Conversion factor | Tag | Greenweight (kg)
Tows section 8 applies to | to | Total greenweight of processed catch (kg)

9. All other fish - Complete this section for either one tow or a group of tows
Include all whole fish discarded, discarded alive, lost, mealed, retained as specimens or stored in bulk.
Species code | Type | Greenweight (kg) | Method of analysis | Species code | Type | Greenweight (kg) | Method of analysis
Tows section 9 applies to | to | Total greenweight of all other fish (kg)

10. Comments

- ***Observer Benthic Materials Form***

Observer Benthic Materials Form (Version 1 - October 2007)

1. Benthic Material includes all **Non-targeted** marine invertebrates, marine plants and/or structures that are connected with the seafloor. You should complete a **separate row** for each individual identifiable item.

2. Write the trip number [ ] and Observer code/s (*first letter of first name then first three letters of surname*) [ ] and [ ]

Sample number	Tow/Set number	MFish code	End Type	Weight (kg)	Method of analysis	Life status	Links	Quantity (code)	Number (optional)	Comments
B				.						
B				.						
B				.						
B				.						
B				.						
B				.						
B				.						
B				.						
B				.						
B				.						
B				.						
B				.						
B				.						
B				.						
B				.						
B				.						

3. This form is page number [ ] for this trip. Is this form the last page for this trip? → Yes [ ] No [ ]

- **Bottom Longline Catch Effort Data**

Bottom Longline Catch Effort Data

Page ☐ of ☐

Trip Number | Method | Target Species | FMA | Vessel | Observer

Start of Set

Set No. | Date of Set (Day, Month, Year) | Time NZST | Latitude. (DEG, MIN, S) | Longitude. (DEG 1, MIN, E/W) | Bottom Depth (m) | Topography | Number of Hooks Set | Bait 1 | Bait 2 | % Hooks Baited

End of Set

Latitude. (DEG, MIN, S) | Longitude. (DEG 1, MIN, E/W) | Bottom Depth (m)

Start of Haul

Date of Haul (Day, Month, Year) | Time NZST | Number of Hooks Lost | LF Y / N | Catch Assessment.

Catch Details

Species Name	Species Code	Number of Fish	Greenweight (kg)	Weighing Method	Species Name	Species Code	Number of Fish	Greenweight (kg)	Weighing Method	Species Name	Species Code	Number of Fish	Greenweight (kg)	Weighing Method

Comments:

- **VME Identification Form and associated VME Species Identification Guide implemented on New Zealand high seas bottom trawlers in 2018**

Vulnerable Marine Ecosystem Evidence Process (Version 1.0 - Apr 08)

1. Trip, tow, and vessel information

Trip number	Tow number	Observer/s	Name of vessel master
		. .	

2. Date, time, and position that hauling of the gear commenced

Date dd/mm/yy	Time 24-hr clock	Latitude Degrees Minutes	Longitude Degrees Minutes E/W
/ /	:	° . ' S	° . '

3. Instructions

Assess the total weights of all organisms whether dead or alive in each of the relevant taxonomic groups and record in Section 4.

If the Observed Weight of a taxonomic group is **greater than** (not equal to) the Threshold Weight, write the VME Indicator Score for that group in the "Score" Column.

If a taxonomic group is present, but the Observed Weight is **not** greater than the Threshold Weight, tick in the "Tick" column.

Sum the scores and count the ticks. Record these totals at the bottom of the columns. Add the Sum of scores to the Count of ticks and record it as the Total VME Indicator Score.

If the Total VME Indicator Score is 3 or greater, the area is considered to have Evidence of a Vulnerable Marine Ecosystem.

The taxonomic groups recorded on this form may not be a complete record of all benthic material present in the tow.

4. Relevant taxonomic groups, weights, and scores

Taxonomic Group	Code	Method of Weighting	Observed Weight (kg)	Threshold Weight (kg)	VME Indicator Score	Score if Threshold Weight exceeded	Tick if not scored but present
PORIFERA	ONG		.	50	3		
CNIDARIA							
Anthozoa (class)							
Actiniaria (order)	ATR		.	0	1		
Scleractinia (order)	SIA		.	30	3		
Antipatharia (order)	COB		.	1	3		
Alcyonacea (order)	SOC		.	1	3		
Gorgonacea (order)	GOC		.	1	3		
Pennatulacea (order)	PTU		.	0	1		
Hydrozoa (class)	HDR		.	6	3		
Unidentified Coral	COU		.	0	1		
ECHINODERMATA							
Crinoidea (class)	CRI		.	0	1		
Brisingida (order)	BRG		.	0	1		
						Sum these scores	Count these ticks

Total VME Indicator Score → Sum of scores + count of ticks =

5. Vessel notification

As soon as the form is completed for any tow provide a copy to the person in charge of the vessel.

Name (if not vessel master)	Received by person in charge (signature)	Date received (dd/mm/yy)	Time received (24-hr clock)
		/ /	:

DRAFT version 1.0

Note these are MFish codes

Classification guide for potentially vulnerable invertebrate taxa in the SPRFMO Area

Thes. groups art notInduded

Code	SIA p71-79	COB p 57-58	SOC pg 55-56	GOC p 59-65					COR p 9; 66-68	HYF p 9
Level	Scleractinia (Order)	Antipatharia (Order)	Alcyonacea (Order)	Gorgonacea (Order)					Anthoathecate (Family)	Hydroida (Order)
Taxo	Stony corals	Black corals	Soft corals	Isididae (Bamboo)	Coralliidae (Red / Precious)	Primnoidae (Bottle brush, Sea fans)	Paragorgiidae (Bubblegum)	Chrysogorgiidae (Golden)	Stylasterids (Hydrocorals)	Hydroids
n Form, Size	 **Branching:** Can form large matrices, often forms thickets **Cups:** usually small (<20cm), solitary or in small clusters	 Semi-rigid, woody, not very dense, dark brown or black skeleton, can be large (>2m). Branch tips can look like hydroids or small gorgonian	 Can be mushroom shaped. Floppy or soft, leather-like surface texture. Usually multiple large polyps, body not symmetrical, no foot or stalk	 Solid calcified trunk with brown joints (nodes), rings in x-section, branching 2D or 3D, fine tips, tree like branch tips	 Calcified skeleton, no spines. Thick, stubby stems with fine side branches	 Dark or metallic tree-like branches, flexible	 Large (up to 2m), red, thick stems, breaks when flexed	 Gold, black or green metallic lustre, Semi-rigid single, main axis with semi-soft tissue cortex. Small specimens can be feathery like hydroids or bushy like black coral	 Calcified, no rings in X-section, often pink or white. Often uniplanar, side branches lattice from obviously thicker main stems	 Entire organism small, <30cm, flexible and plant-like, often feathery, no soft tissue covering
Detail (Texture, colour, polyps)	 Calcified, very hard or brittle **Branching:** Often smooth stems **Cups:** Can be ridged Polyp calyces well formed with ridged edges, large, hard polyps	 Slimy flesh on branches. Surface with minute spines, may appear smooth. 3D, fine or bushy tips	 Similar polyps to seapens, but soft corals are not stalked	 Can scrape off surface tissue, skeleton surface smooth between nodes	 Can scrape surface tissue off. Smooth (not sandpapery) with knobbly ends. No pores on skeleton	 Usually no spines, some metallic lustre on skeleton, 3D Bushy branches, obvious polyps	 Chalky material, not hard. No spines, can scrape off surface. Bulbous ends with polyps	 Can be non-branching and whip-like. Usually no spines, metallic lustre. Fine or sparse 3D branching	 Coarse sandpaper texture, can't scrape off surface tissue. Has minute pores	 Indistinct polyps, feathery tips
Commonly mistaken	 Branching form can look like hard sponges but sponges are light with spicules	 Hydroid if small, or small pieces of dead Gorgonacea	 Small pieces of Coralliidae. Can also resemble Demosponges, which have no polyps	 Other gorgonians if in small pieces, but won't break easily	 Soft corals, which always have soft stems			 Antipatharia, but tips are not slimy	 Small, hard Bryozoans or pieces of Coralliidae	 Small specimens of Gorgonacea or Antipatharia

Hydroids Small pieces but Small pieces of Cor. llae

Developed by: D Tracey, S Parker, E Mackay, O Anderson, C Ram, (2008)

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ONG p 20-45		ATR p 51-54	PTU p 69-70	CRI p 230-232	BRG p 207
Porifera (Phylum)		Actiniaria (Order)	Pennatulacea (Order)	Crinoidea (Class)	Brisingida (Order)
(Glass sponges)	Demospongiae (Siliceous sponges)	Anemones	Sea pens	Crinoids	Armless stars
					
Often hollow central chamber can be vase like. Diverse shapes: fibrous or crystalline hard forms	Many shapes, some small & hydroid-like to round hard solid masses	Rubbery bottom with single polyp with lots of tentacles. Usually in retracted hardened cylinder form when captured	Feather-shaped with fleshy polyps. Non-branching to whip-like cartilaginous stalk. Fleshy foot or anchor present, body symmetrical. Can be tall, >1 m	Stalked. Small cuplike body. Arms usually branched. Crinoids are generally fragile, often only fragments. A long stalk, some bearing whorls of hooklike cirri	At least 6 arms, usually more than 10. Arms easily separated from central disc and often all that is taken
					
Pores often visible, glass spicules visible or fibre-glass like texture in hard forms	Fleshy, slimy or rubbery. Textures stony, woody, fibrous or airy	Knobbly, slimy, with tentacles. Tentacles sometimes look like worms when detached	Fleshy polyps. Flower or feather like polyp mass	Fragile, not flexible. Brittle and segmented	Long spines on ventro-lateral margin
					
Bryozoans or scleractinians that are small and of a hard matrix	Alcyonaceans or ascidians, which are not spongy and have polyps or siphons	Alcyonaceans, which usually have several polyps or the Corallimorpharia a coral called jewel anemone	Alcyonaceans or some Gorgonians due to large polyps and size	Arm fragm brisingids	

Appendix 3. Areas open to New Zealand flagged vessels for bottom fishing in 2018

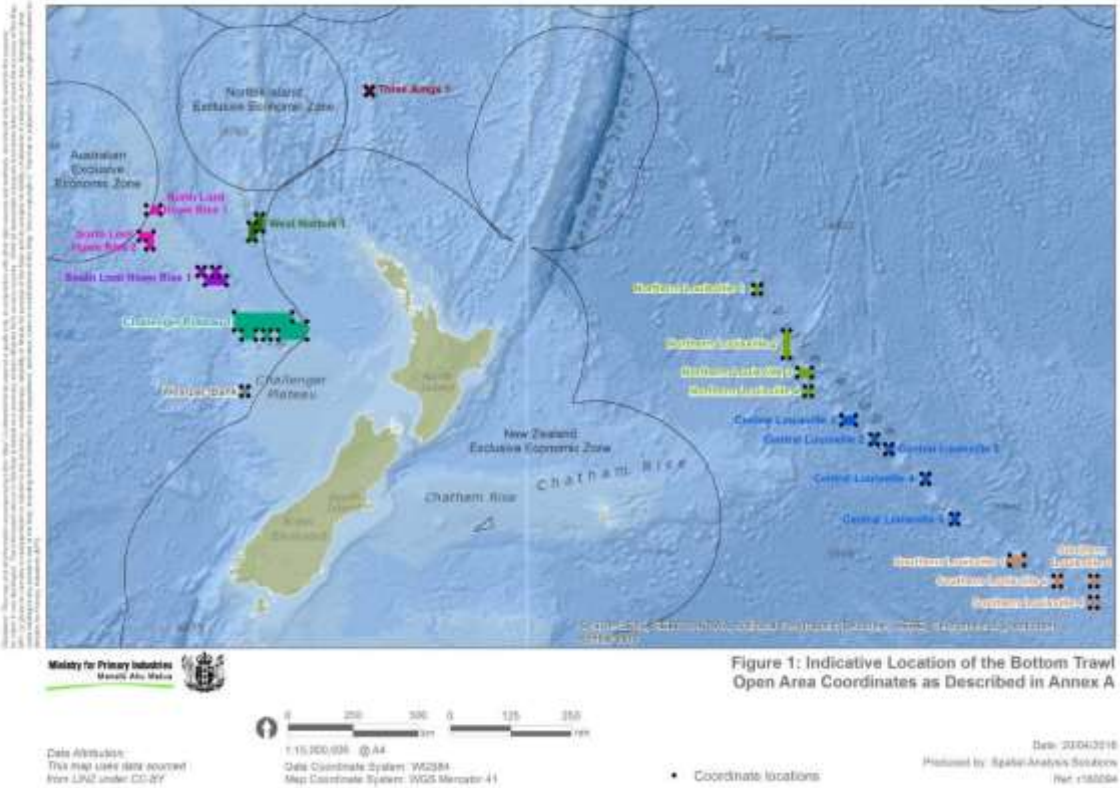


Figure 1: Indicative Location of the Bottom Trawl Open Area Coordinates as Described in Annex A

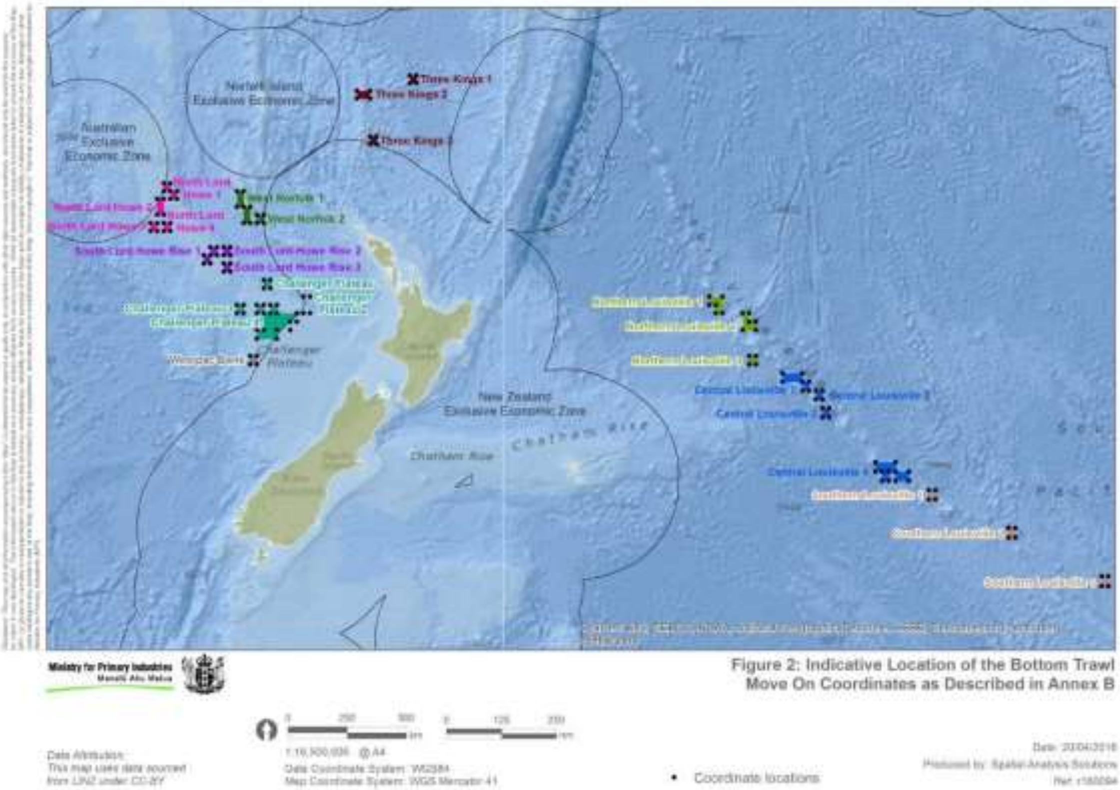
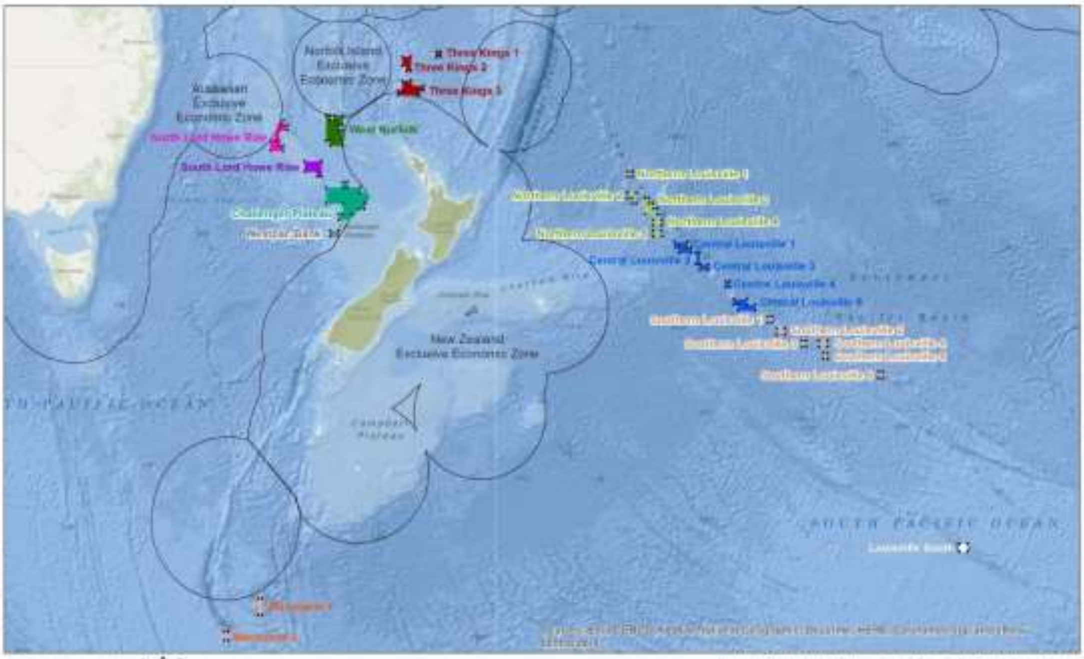


Figure 2: Indicative Location of the Bottom Trawl Move On Coordinates as Described in Annex B



Ministry for Primary Industries
Manatū Ahu Matua

Figure 3: Indicative Location of the Open Area Coordinates for Bottom Longline as Described in Annex C

Data Attribution:
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0 400 800 km | 0 200 400 nmi
1:26,000,000 @ A4
Data Coordinate System: WGS84
Map Coordinate System: WGS Mercator 41

Date: 10/04/2018
Produced by: Spatial Analysis Solutions
Ref: r163094