

The logo features a blue background with a pattern of fish swimming in various directions. The text "South Pacific Regional Fisheries Management Organisation" is written in white, bold, sans-serif font across the top of the image.

South Pacific Regional Fisheries Management Organisation

1st Meeting of the Scientific Committee

La Jolla, United States of America, 21-27 October 2013

SC-01-08

Australia 2013 Annual Report

Peter Ward, Patty Hobsbawn, Rocio Noriega

20-Sep-13

Australian National Report 2012 SPRFMO Scientific Committee

SC-01-08

ABARES



Australian Government

Department of Agriculture, Fisheries and Forestry

ABARES

Australian National Report on 2012 fishing activities to the South Pacific Regional Fisheries Management Organisation's Scientific Committee

Peter Ward, Patty Hobsbawn, Rocio Noriega

**Research by the Australian Bureau of Agricultural
and Resource Economics and Sciences**

SPRFMO document number: SC-01-08

October 2013

© Commonwealth of Australia

Ownership of intellectual property rights

Unless otherwise noted, copyright (and any other intellectual property rights, if any) in this publication is owned by the Commonwealth of Australia (referred to as the Commonwealth).

Creative Commons licence

All material in this publication is licensed under a Creative Commons Attribution 3.0 Australia Licence, save for content supplied by third parties, logos and the Commonwealth Coat of Arms.



Creative Commons Attribution 3.0 Australia Licence is a standard form licence agreement that allows you to copy, distribute, transmit and adapt this publication provided you attribute the work. A summary of the licence terms is available from creativecommons.org/licenses/by/3.0/au/deed.en. The full licence terms are available from creativecommons.org/licenses/by/3.0/au/legalcode.

This publication (and any material sourced from it) should be attributed as: Ward P, Hobsbawn P & Noriega R, 2013, Australian National Report on 2012 fishing activities to the South Pacific Regional Fisheries Management Organisation's Scientific Committee, SC-01-08, Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES), Canberra, October 2013. CC BY 3.0.

Cataloguing data

Ward P, Hobsbawn P & Noriega R, 2013, Australian National Report on 2012 fishing activities to the South Pacific Regional Fisheries Management Organisation's Scientific Committee, Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES), Canberra, October 2013.

ABARES project: 43350

Department of Agriculture

Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES)

Postal address GPO Box 1563 Canberra ACT 2601

Switchboard +61 2 6272 2010|

Facsimile +61 2 6272 2001

Email info.abares@daff.gov.au

Web daff.gov.au/abares

Inquiries regarding the licence and any use of this document should be sent to: copyright@daff.gov.au.

The Australian Government acting through the Department of Agriculture has exercised due care and skill in the preparation and compilation of the information and data in this publication. Notwithstanding, the Department of Agriculture, its employees and advisers disclaim all liability, including liability for negligence, for any loss, damage, injury, expense or cost incurred by any person as a result of accessing, using or relying upon any of the information or data in this publication to the maximum extent permitted by law.

Contents

1	Description of Fisheries.....	1
	1.1 Data sources.....	1
	1.2 Fleet composition	1
	1.3 Area of operation	2
2	Catch, Fishing Effort and CPUE	3
3	Fisheries Data Collection and Research Activities	7
	3.1 Logbooks and Landings.....	7
	3.2 Vessel Monitoring System	7
	3.3 Research	7
4	Biological Sampling and Length/Age Composition of Catches.....	9
5	Summary of Observer and Port Sampling Programs	11
	5.1 Observer Program	11
	5.2 Port Sampling Program	11
	Appendix A. Fish and shark taxa recorded in the SPRFMO Area, 2012	12
	References.....	14

Tables

Table 1.1	Fishing effort, catches and the number of Australian vessels that actively fished in the SPRFMO Area, 2010–2012	1
Table 1.2	Permitted fishing methods for the SPRFMO Area, 2008–2012	2
Table 2.1	Number of active vessels, fishing effort (hours), annual catch (t) and nominal CPUE (t/trawling hour, in parentheses) of major species reported in logbooks by Australian trawlers in the SPRFMO Area, 1987–2012.....	4
Table 2.2	Number of active vessels and annual catch of major species reported in logbooks by Australian vessels using non-trawl gear in the SPRFMO Area, 1997–2012.....	6
Table 5.1	Summary of demersal fishing effort, observer coverage and sampling in the SPRFMO Area in 2012	11

Figures

Figure 1	Length frequency of alfonsino measured by observers on an Australian trawler in the SPRFMO Area, 2012.....	9
Figure 2	Length frequency of blue eye trevalla measured by observers on an Australian trawler in the SPRFMO Area, 2012	10

Maps

Map 1	Australia’s fishing footprint and identified fishing grounds in the SPRFMO Area .	4
-------	---	---

1 Description of Fisheries

1.1 Data sources

This report summarises the fishing activities undertaken by Australian-registered vessels in 2012 in the South Pacific Regional Fisheries Management Organisation (SPRFMO) Convention Area. It excludes data from within the Exclusive Economic Zone (EEZ) of mainland Australia and external territories (e.g. Norfolk Island). Data are not reported for tuna and billfish fisheries that operate in the Western and Central Pacific Fisheries Commission (WCPFC) area.

Australian operators in the SPRFMO Convention Area are currently authorised by the Australian Government to target various species with mid-water and demersal trawl, traps, dropline, minor line, automatic longline and demersal longline. The vessels undertaking high seas fishing in the SPRFMO Area do so under permits issued by the Australian Fisheries Management Authority (AFMA).

Data collected under permit requirements include logbook records reported by fishers, 1987–2012. In 2011, the historic data extraction was reviewed during the development of the Australian bottom fishery impact assessment (CSIRO 2011). This review resulted in the removal of fishing records that appeared to be erroneous. This additional data cleaning resulted in a reduction of the number of active fishing vessels using trawl gear between 2002 and 2006 and a reduction of the number of active non-trawl fishing vessels between 1997 and 2007. The number of active trawl vessels was reduced by between one and six vessels in a given year. The number of trawl hours was reduced by between 13 and 21 trawl hours in any given year. There was relatively little change in the reported catches. The number of active non-trawl vessels was reduced by between one and three vessels in a given year. There was relatively little change in the reported number of hooks and catch. The revised data was submitted to the SPRFMO Interim Secretariat.

1.2 Fleet composition

Three Australian-flagged vessels fished in the SPRFMO Area in 2012; one trawler and two non-trawl vessels (Table 1, Table 2).

Table 1.1 Fishing effort, catches and the number of Australian vessels that actively fished in the SPRFMO Area, 2010–2012

	Vessels that actively fished pelagically			Vessels that actively bottom fished					
	2010	2011	2012	non-trawl			trawl		
Year	2010	2011	2012	2010	2011	2012	2010	2011	2012
Vessels	0	0	0	3	1	2	0	1	1
Catch (t)	0	0	0	95	91	110	0	63	287
Effort*	0	0	0	333	443	2 740	0	92	19

Note: *Fishing effort is presented in hours for trawl and as thousands of hooks for non-trawl.

Table 1.2 Permitted fishing methods for the SPRFMO Area, 2008–2012

Classification	Gear type
Bottom gear	Demersal longline
	Demersal trawl
	Dropline
	Automatic longline
	Minor line
Pelagic gear	Mid-water trawl

1.3 Area of operation

In 2011 AFMA revised the high seas permit conditions for vessels operating in the SPRFMO Area (AFMA 2011). The new permit conditions restricted vessels to fishing within the 2002–06 Australian fishing footprint as defined by a series of coordinates (Map 1). All fishing operations in 2012 were within the Australian fishing footprint. The move-on provision of 50 kg of corals or sponges in a shot for trawlers and 10 kg of corals or sponges per 1000 hooks for longliners was not triggered in 2012.

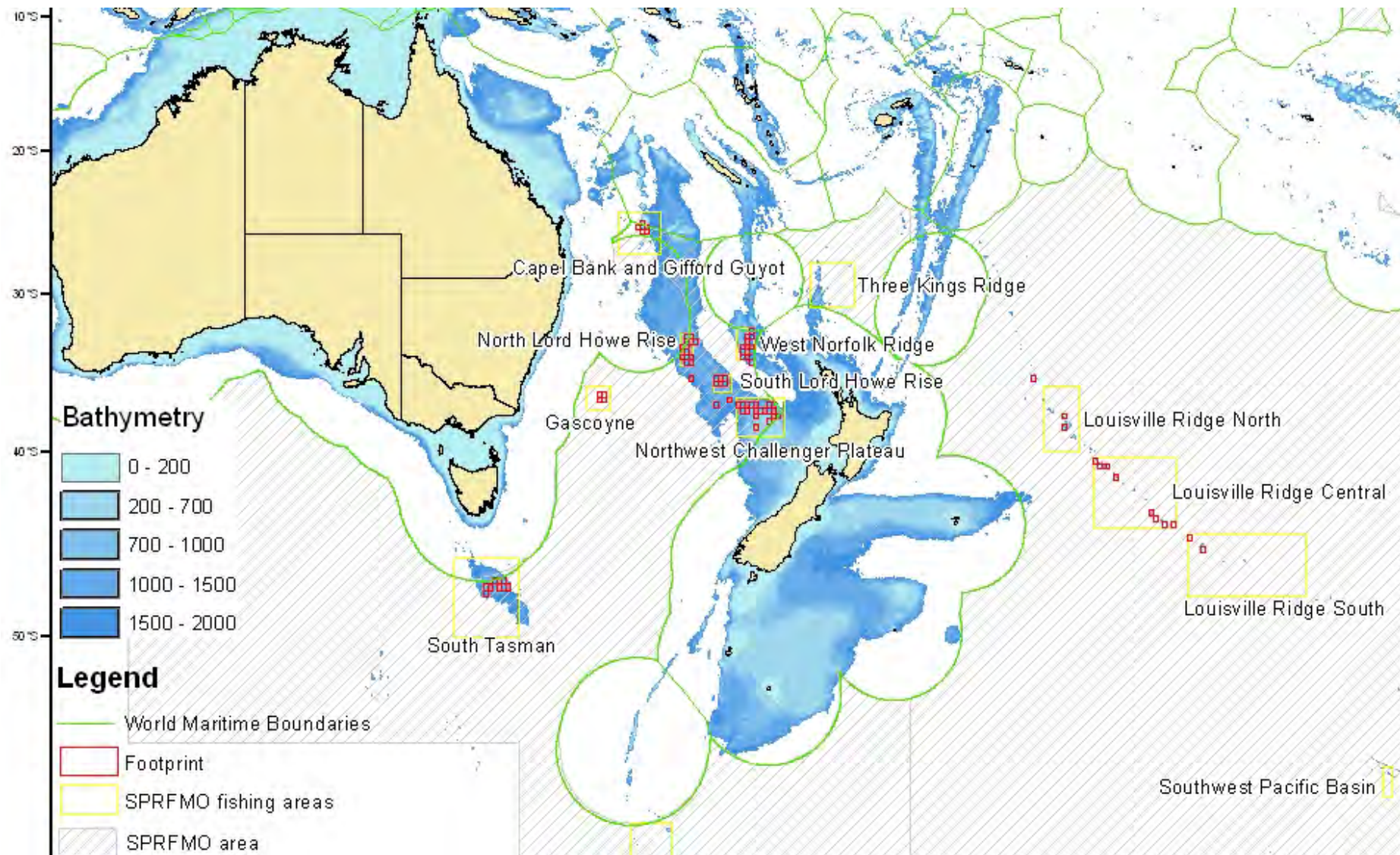
2 Catch, Fishing Effort and CPUE

Australian vessels landed a total catch of 397 tonnes that was caught in the SPRFMO Area in 2012. Alfonsino (*Beryx splendens*), orange roughy (*Hoplostethus atlanticus*), yellowtail kingfish (*Seriola lalandi*), jackass morwong (*Nemadactylus macropterus*) and blue-eye trevalla (*Hyperoglyphe antarctica*) were again the top five species caught by weight. These five species collectively comprised 95 per cent of the total non-trawl catch in 2012. Alfonsino and orange roughy and comprised 20 per cent of the 2012 trawl catch (see Appendix A for species composition in 2012). There was no fishing effort directed at, or catch of, jack mackerel (*Trachurus* species) by Australian vessels operating in the SPRFMO Area in 2012.

Logbook estimates of catch, nominal fishing effort and catch per unit effort (CPUE) are shown for key species in Table 3 (trawl) and Table 4 (non-trawl). Total effort for the trawl fishery declined from 104 trawl hours in 2006 to zero in 2008, 2009 and 2010. Trawl effort increased to 92 hours in 2011 and decreased to 19 hours in 2012. The total number of active vessels in the trawl fishery declined from twelve in 1998 and 2000, to two in 2007 and none in 2008–10. One Australian trawler was active in the SPRFMO Area in 2011 and 2012. The nominal CPUE for orange roughy in the trawl fishery shows substantial variation over time, with no clear trend. Other species caught by trawl included smooth oreo dory (*Pseudocyttus maculatus*), spiky oreo dory (*Neocyttus rhomboidalis*), alfonsino and cardinal fish (Family Apogonidae) also show fluctuations in CPUE over time.

Total fishing effort in the demersal longline and dropline fishery increased from 0.443 million hooks in 2011 to 2.740 million hooks in 2012. The number of active vessels in the demersal longline and dropline fishery peaked at five vessels in 2006 and then declined to two vessels in 2012.

Map 1 Australia's fishing footprint and identified fishing grounds in the SPRFMO Area



Source: CSIRO (2011)

Table 2.1 Number of active vessels, fishing effort (hours), annual catch (t) and nominal CPUE (t/trawling hour, in parentheses) of major species reported in logbooks by Australian trawlers in the SPRFMO Area, 1987–2012

Year	No. of vessels	Effort (hours)	Orange roughy	Smooth oreo	Spikey oreo	Alfonsino	Cardinal fishes	Other species	Total catch (t)
1987–1990 ¹	6	105	9 (0.08)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	8	17
1991–1993 ¹	6	85	367 (4.31)	1 (0.01)	107 (1.26)	0 (0.00)	0 (0.00)	4	479
1994	7	257	192 (0.74)	0 (0.00)	6 (0.02)	0 (0.00)	2 (0.00)	3	203
1995–1996 ¹	6	62	21 (0.34)	12 (0.19)	10 (0.16)	0 (0.00)	52 (0.84)	2	98
1997	10	396	1 458 (3.68)	505 (1.27)	448 (1.13)	1 (0.00)	15 (0.03)	41	2 468
1998	12	916	3 098 (3.38)	420 (0.46)	620 (0.68)	1 (0.00)	2 (0.00)	3	4 143
1999	10	777	2 514 (3.23)	106 (0.14)	89 (0.11)	8 (0.01)	1(0.00)	4	2 720
2000	12	752	948 (1.26)	123 (0.16)	86 (0.11)	4 (0.00)	7 (0.00)	1	1 170
2001	9	307	751(2.45)	13 (0.04)	31 (0.10)	1 (0.00)	0 (0.00)	3	799
2002	8	196	376 (1.91)	6 (0.03)	67 (0.34)	3 (0.01)	0 (0.00)	3	453
2003	9	102	166 (1.62)	6 (0.06)	63 (0.61)	2 (0.02)	0 (0.00)	1	238
2004	5	48	369 (7.72)	22 (0.46)	12 (0.26)	1 (0.02)	0 (0.00)	1	406
2005	3	29	207 (7.19)	74 (2.58)	1 (0.02)	81 (2.81)	0 (0.00)	14	377
2006	3	104	166 (1.60)	0 (0.00)	0 (0.00)	209 (2.02)	0 (0.00)	75	451
2007	2	71	148 (2.09)	0 (0.00)	1 (0.01)	86 (1.21)	2 (0.02)	16	253
2008	0	–	–	–	–	–	–	–	–
2009	0	–	–	–	–	–	–	–	–
2010	0	–	–	–	–	–	–	–	–
2011	1	92	2 (0.02)	0 (0.00)	0 (0.00)	47 (0.51)	0 (0.00)	14	63
2012	1	19	56(2.97)	<1(0.01)	<1(0.02)	167 (8.94)	0 (0.00)	119	287

Notes:

¹In earlier years, data had to be combined over several years to meet a policy on not reporting data for fewer than five vessels.

These logbook data are based on visual estimates by skippers of retained catch weights. They do not always exactly match subsequent landings.

Table 2.2 Number of active vessels and annual catch of major species reported in logbooks by Australian vessels using non-trawl gear in the SPRFMO Area, 1997–2012

Year	No. of vessels	Catch of major species (t)					Total catch (t)
		Morwong*	Blue eye trevalla	Ocean blue eye trevalla	Yellowtail kingfish	Other species	
1997	1	1	6	0	0	3	9
1998	3	31	26	0	15	34	106
1999	4	29	22	0	13	26	90
2000	1	79	6	0	14	19	117
2001	3	43	21	35	5	53	157
2002	3	81	27	66	32	38	244
2003	3	16	30	13	1	24	84
2004	3	0	2	7	0	8	18
2005	2	1	4	0	0	4	9
2006	5	10	8	0	22	20	59
2007	2	7	16	0	1	24	48
2008	3	24	3	0	25	125	177
2009	3	13	4	0	11	79	106
2010	3	23	6	0	17	49	95
2011	1	45	17	0	24	5	91
2012	2	40	10	0	54	6	110

Notes:

*Morwong catch from 1997 to 2009 is combined *Nemadactylus macropterus* and *Nemadactylus* spp. Morwong catches in subsequent years were *Nemadactylus macropterus*.

These logbook data are based on visual estimates by skippers of retained and discarded catch weights. They do not always exactly match subsequent landings. Some of the yellowtail kingfish and 'other species' catches presented in previous reports for 2010 were found to have occurred outside the SPRFMO Area. Those catches have been corrected and now match the data submission for 2010.

3 Fisheries Data Collection and Research Activities

Australian vessels require a permit from AFMA to fish in the SPRFMO Area. The permits are issued for a period of up to 12 months. As part of the permit requirements, AFMA collects detailed information on fishing trips, in accordance with the SPRFMO Data Standards. All Australian flagged vessels fishing on the high seas are required to have a vessel monitoring system (VMS) to verify certain logbook information.

No changes to fisheries data collection or research activities were recorded in the fishery in 2012.

3.1 Logbooks and Landings

Since 2002, the permit conditions have included the requirement to record daily catch and fishing effort data in logbooks on a set-by-set (or tow-by-tow) basis, including the location of fishing operations. Fishers are also required to record bycatch and discards in the logbooks. Landings are monitored by AFMA through catch disposal records. The logbook and catch disposal record data have been submitted to the SPRFMO Secretariat, in as required by the SPRFMO Data Standards.

3.2 Vessel Monitoring System

VMS has been required in all Australian Government – managed fisheries since 1 July 2007, including vessels fishing on the high seas. The AFMA VMS is based on Automatic Location Communicators (ALCs) with a built-in Global Positioning System (GPS) fitted to each vessel nominated against a Commonwealth fishing concession. These ALCs transmit data on vessel registration, date, time, vessel position, course and speed via Inmarsat communications satellites to a land earth station. This information is subsequently relayed to AFMA through a secure network. The frequency and accuracy of the VMS position reports meet the SPRFMO Data Standards.

VMS data are transferred via a virtual private network (VPN) internet link to the AFMA office in Canberra. At AFMA, vessel tracks are continuously displayed as plots in a geographic information system and can be automatically cross referenced against spatial rules. AFMA requires all high seas vessels to comply with a stringent installation and maintenance standard for all ALC reporting.

3.3 Research

AFMA commissioned a bottom fishing impact assessment of Australian fishing activity in the SPRFMO Area and this was submitted to SPRFMO Science Working Group in 2011 (CSIRO 2011).

In 2011 AFMA commissioned ABARES to assess the sustainability of the harvest of key commercial species in the SPRFMO Area by Australian vessels (Woodhams et al. 2012). Results indicate that:

- 1) The main data that could be used for sustainability assessments for deepwater species in the SPRFMO Area are the catch and effort data of fishery participants. For the assessment, Australia had to rely primarily on data for the Australian fleet, with some data on catches by other participants. It will be necessary to obtain catch and effort data from all participants,

at adequate spatial scales (at least 0.1 degree square, but preferably shot-by-shot) to evaluate alternative assessment approaches, and conduct deepwater sustainability assessments for the SPRFMO Area.

- 2) Even if data can be obtained from all participants, catch and effort data for deepwater fisheries are typically limited, and may not provide reliable indices of abundance for use in standard stock assessment approaches. Assessments of this nature are likely to remain difficult for any high seas demersal fishery.
- 3) Alternative assessment approaches will therefore need to be considered for these deepwater fisheries. Options include:
 - Application of meta-analysis or similar approaches such as those identified by Clark et al. (2000, 2010), to estimate carrying capacity for seabed features or fishing areas. These could be used to provide estimates of sustainable yields by feature or fishing area.
 - The development of spatial habitat prediction models for demersal fish species, analogous to the global habitat prediction models developed by Davies & Guinotte (2011) for coldwater corals. These could be used to develop spatial protection approaches for proportions of fish species populations, using suitable habitat as a proxy for biomass.

Australia, in collaboration with New Zealand, is undertaking research and literature reviews that are intended to inform SPRFMO Scientific Committee discussions on a bottom fishing. Specific tasks include:

- identification of vulnerable benthic taxa in the SPRFMO Area and review of move-on rules for different gear types
- identification and mapping of vulnerable marine ecosystems in the SPRFMO Area
- mapping of bottom fished areas and consideration of fishing reference periods in the SPRFMO Area
- options for determining stock status and sustainable yield levels for target demersal species in the SPRFMO Area.

4 Biological Sampling and Length/Age Composition of Catches

Length–frequency data were collected by Australian observers in the SPRFMO Area in 2012 and submitted to the SPRFMO Secretariat in September 2012. The length frequencies of alfonsino and blue eye trevalla caught by trawl in 2012 are presented in Figures 1 and 2.

Figure 1 Length frequency of alfonsino measured by observers on an Australian trawler in the SPRFMO Area, 2012

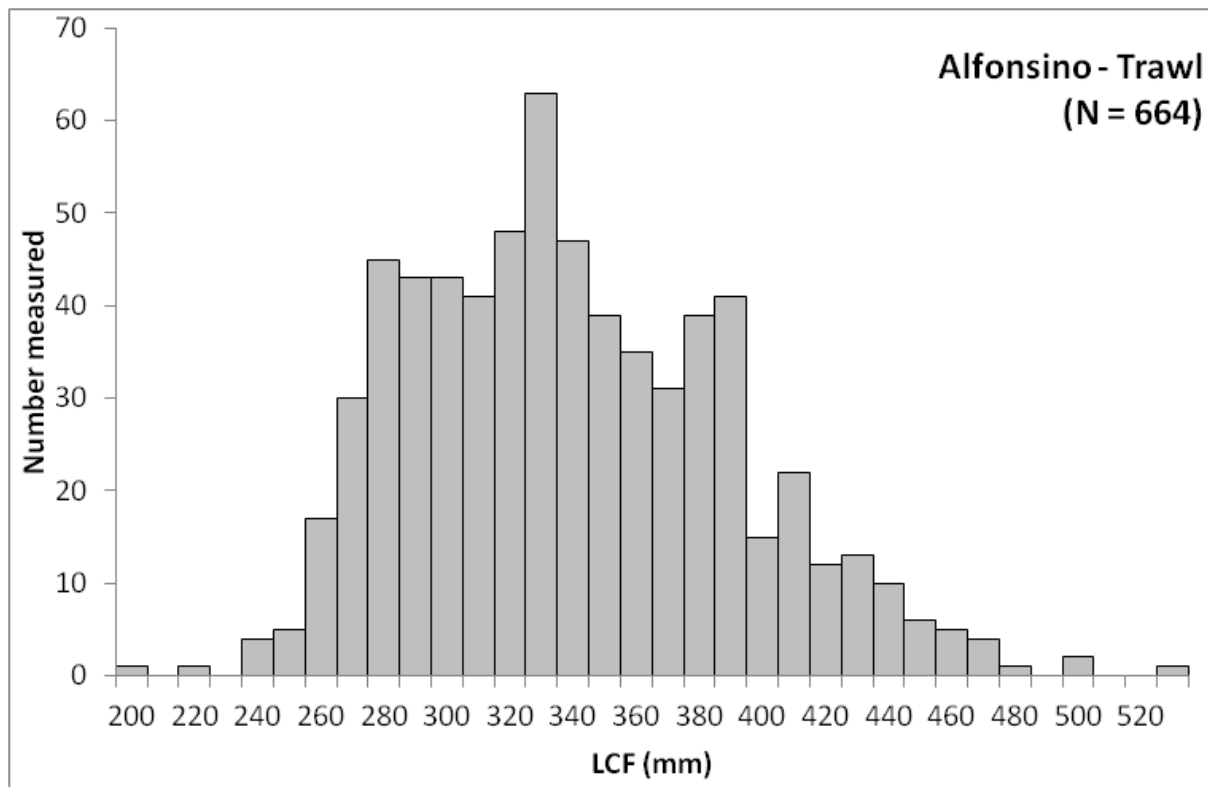
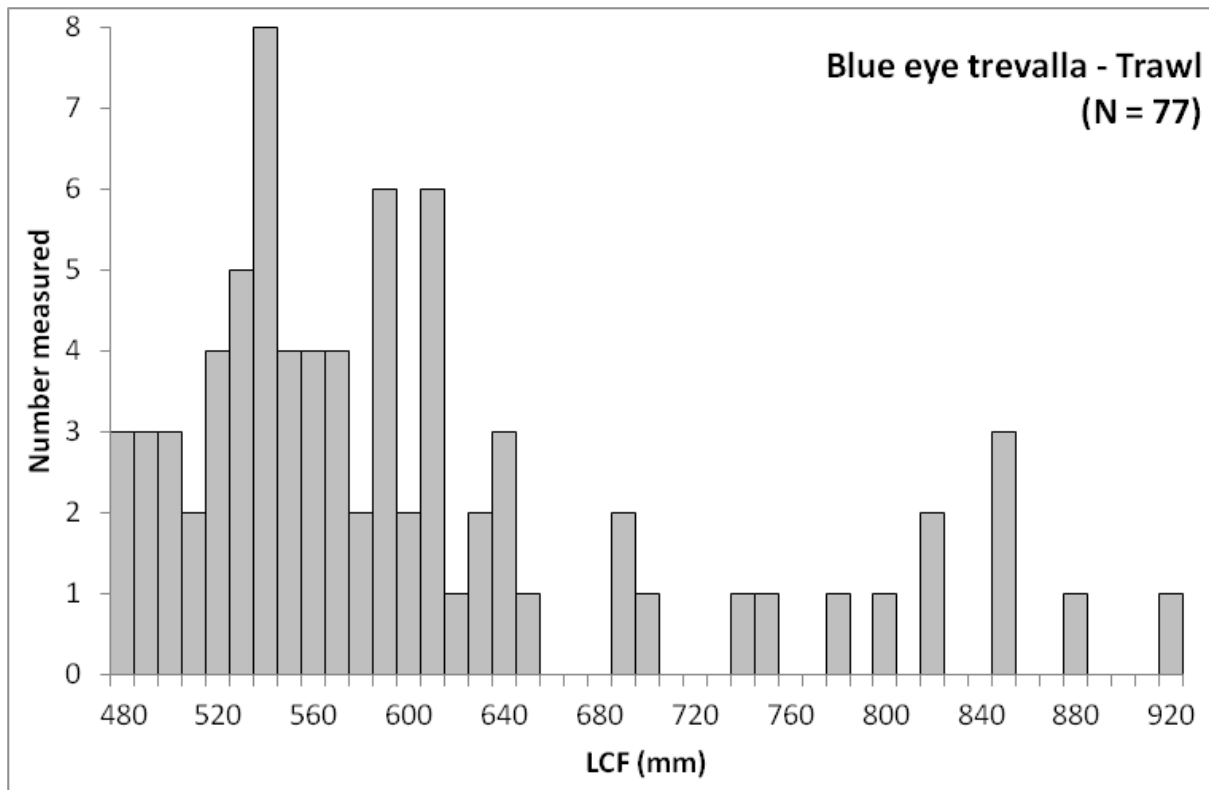


Figure 2 Length frequency of blue eye trevalla measured by observers on an Australian trawler in the SPRFMO Area, 2012



5 Summary of Observer and Port Sampling Programs

5.1 Observer Program

Since 2010, Australian permit conditions for bottom fishing in the SPRFMO Area have required 100 per cent observer coverage on all vessels permitted to use trawl gear. This was achieved for the six trips undertaken by the one Australian trawler active in the Area in 2012.

Ten per cent observer coverage is required for vessels using other demersal fishing methods. Observers monitored 2 of the 11 trips of the two non-trawl vessels in the SPRFMO Area in 2012, amounting to about 18 per cent observer coverage of all reported sets.

AFMA recruits and trains the observers. About twenty observers are currently employed in the AFMA observer program. Observers have a scientific background or experience in the fishing industry or other maritime industries and must demonstrate skills in collecting biological data at sea, fisheries research methodologies and collection of associated scientific data. Observers also hold a marine radio operators certificate of proficiency (or similar qualifications), a sea safety certificate and medical certificate, and have completed an AFMA observer training course.

Observers collect a range of data on vessel characteristics, fishing activity, catch composition, discarding and bycatch. There were no changes to observer requirements in 2012.

Observers did not detect any bycatch of marine mammals, seabirds or marine reptiles in trawl or non-trawl operations in the SPRFMO Area in 2012.

Table 5.1 Summary of demersal fishing effort, observer coverage and sampling in the SPRFMO Area in 2012

Gear	Logbook			Observer		
	No. of trips	No. of tows or sets ^a	Reported catch (t)	No. of trips	No. of tows or sets ^b	No. of fish measured
Trawl	6	354	287	6	529	2867
Longline	11	60	110	2	29	188

^a Tows or sets with a zero catch are not reported in the logbook.

^b Observer data include tows or sets with a zero catch in addition to those where a catch was taken. Slight discrepancies may occur due to delays in data being added to the database.

5.2 Port Sampling Program

Australia does not have a port sampling program for vessels that fish in the SPRFMO Area. The disposal of the catch is monitored through catch disposal records where the catch is verified by an AFMA-registered fish receiver. These data have been submitted to the SPRFMO Secretariat.

Appendix A. Fish and shark taxa recorded in the SPRFMO Area, 2012

Common Name	Scientific Name
Alfonsino	<i>Beryx splendens</i>
Barracouta	<i>Thyrsites atun</i>
Bight Redfish	<i>Centroberyx gerrardi</i>
Black Cardinalfish	<i>Apogon melas</i>
Black Shark - (roughskin)	<i>Centroscymnus</i>
Black/Seal Shark	F. Squalidae
Blacktip sharks	<i>Carcharhinus</i> spp.
Blue Eye Trevalla	<i>Hyperoglyphe antarctica</i>
Blue Grenadier	<i>Macruronus novaezelandiae</i>
Blue Shark	<i>Prionace glauca</i>
Blue Skate	<i>Notoraja</i> spp.
Boarfish	F. Pentacerotidae
Brier Shark	<i>Deania calcea</i>
Bull Shark	<i>Carcharhinus leucas</i>
Dogfishes	F. Squalidae
False Catshark	F. Pseudotriakidae
Gemfish	<i>Rexea solandri</i>
Ghost shark	F. Chimaeridae
Grey Spotted Catshark	<i>Asymbolus analis</i>
Hapuku	<i>Polyprion oxygeneios</i>
Hapuku and Bass Groper-NSW	<i>Polyprion</i> spp.
Hussar	<i>Lutjanus adetii</i>
Imperador	<i>Beryx decadactylus</i>
Jackass Morwong	<i>Nemadactylus macropterus</i>
Lantern fishers	F. Myctophidae
Ling	<i>Genypterus blacodes</i>
Mirror Dory	<i>Zenopsis nebulosus</i>
Mixed reef fish	Mixed reef fish
Northwest Ruby Fish	<i>Etelis carbunculus</i>
Ocean Perch	<i>Helicolenus Percoides</i>
Oilfish	<i>Ruvettus pretiosus</i>
Orange Perch	<i>Lepidoperca pulchella</i>
Orange Roughy	<i>Hoplostethus atlanticus</i>
Oreo Dory - unspecified	<i>Oreosomatidae</i> spp.
Oxeye Oreo	<i>Oreosoma atlanticum</i>
Pacific Spookfish	<i>Rhinochimaera pacifica</i>
Pigfish	<i>Bodianus vulpinus</i>
Ray's Bream	<i>Brama brama</i>
Ribaldo	<i>Mora moro</i>
Richardson's Boarfish/Southern	<i>Pseudopentaceros richardsoni</i>
Rosy Jobfish / King Snapper	<i>Pristipomoides filamentosus</i>
Rubyfish	<i>Plagiogeneion</i> spp.
Salpid Salps	F. Salpidae

Common Name	Scientific Name
Sawbellies	F. Trachichthyidae
Shortfin Mako	<i>Isurus oxyrinchus</i>
Skates	F. Rajidae
Slender Cod	<i>Halargyreus johnsonii</i>
Small scale	<i>Alepocephalus</i> sp.
Smooth oreo	<i>Pseudocyttus maculatus</i>
Southern Frostfish	<i>Lepidopus caudatus</i>
Spiky Oreo	<i>Neocyttus rhomboidalis</i>
Splendid perch	<i>Caprodon longimanus</i>
Squids	F. Teuthoidea
Striped Trumpeter	<i>Latris lineata</i>
Whiptail shark	F. Chimaeridae
Yellowtail Kingfish	<i>Seriola lalandi</i>

Source: Australian vessel logbook data

References

Australian Fisheries Management Authority (AFMA). 2011. High seas: conservation and management measures to prevent significant adverse impacts on vulnerable marine ecosystems. SPRFMO Paper SWG-10-DW-01b.

Clark, M.R., Dunn, M.R.; Anderson, O.F. 2010. Development of estimates of biomass and sustainable catches for orange roughy fisheries in the New Zealand region outside the EEZ: CPUE analyses, and application of the "seamount meta-analysis" approach. *New Zealand Fisheries Assessment Report 2010/19*.

CSIRO Marine and Atmospheric Research. 2011. Bottom Fishery Impact Assessment. Report to the Australian Fisheries Management Authority (AFMA). SPRFMO Paper SWG-10-DW-01a.

Davies, A.J. & Guinotte, J.M. 2011. Global Habitat Suitability for Framework-Forming Cold-Water Corals. PLoS ONE 6(4): e18483. doi:10.1371/journal.pone.0018483

Woodhams, J, Stobutzki, I, Noriega, R & Roach, J 2012, Sustainability of harvest levels by Australian flagged vessels in the high seas areas of the South Pacific Ocean and South Indian Ocean, ABARES report to client prepared for the Australian Fisheries Management Authority, Canberra, November 2012.