

MAP 1
High seas deep-sea fishing grounds in the South Pacific Ocean

South Pacific Ocean

FAO Statistical Areas 57 (eastern part), 81, 71 and 77 south of the equator, and a large portion of 87

GEOGRAPHIC DESCRIPTION OF THE REGION

The South Pacific Ocean extends from the equator to the Southern Ocean, and from the Malay Archipelago and Australian continent in the west to the South American continent in the east (Map 1). The Pacific Ocean is the largest, oldest and deepest of the world's oceans. It contains over 30 000 islands; the oceanic islands are the tops of mountains rising from the ocean basin. The high seas areas of the South Pacific extend from the western boundaries of the exclusive economic zones (EEZs) of Pacific Island nations in the Central Western Pacific, and from the western and southern boundaries of the Australian EEZ across to the EEZ boundaries of Chile, Peru and Ecuador in South America. There are many submerged mountains or seamounts, as well as major ridge systems in the South Pacific.

MANAGEMENT REGIME APPLICABLE TO DEEP-SEA BOTTOM FISHERIES IN THE HIGH SEAS

Regional Fisheries Management Organization/Arrangement

The high seas bottom fisheries of the South Pacific have to date been unregulated, with the exception of the fishery on the South Tasman Rise. In this area, catches by Australian and New Zealand vessels have at times been restricted by a total allowable catch (TAC) imposed under a Memorandum of Understanding between the two countries.

An agreement to establish a regional fisheries management organization (RFMO) for the management of fisheries for non-highly migratory species on the high seas of the South Pacific is currently under negotiation. The area to be covered by the South Pacific Regional Fisheries Management Organisation (SPRFMO) has been established, except for the northern boundary. However, for the purposes of the interim measures (see Box 1) agreed at the Third International Meeting on the Establishment of a South Pacific Regional Fisheries Management Organisation, the northern boundary is the equator.

Negotiations were initiated in 2006 and, although no RFMO yet exists, the participants in the negotiations to establish SPRFMO adopted a set of interim conservation and management measures for bottom fisheries in 2007 (described in the section on Conservation and management measures). In support of these measures, an interim secretariat has been established, together with a Science Working Group (SWG), to coordinate the compilation of scientific information to support the establishment of SPRFMO. Two subgroups have been formed to support the SWG; the Jack Mackerel Subgroup and the Deep-water Subgroup, which has still not been convened. A Data and Information Working Group was also formed to support the development of the organization. The tasks of this latter group include identification of the types of data to be collected; development of standards for the collection, verification exchange and reporting of data; and development of standards for data security, as well as terms and conditions for making data available.

DESCRIPTION OF DEEP-SEA BOTTOM FISHERIES IN THE HIGH SEAS

History of fisheries

Trawl fleets from the former Union of Soviet Socialist Republics (USSR) began fishing for deep-sea species in the high seas in the South Pacific in the early 1970s. During this

period, former USSR vessels fished on the Geracyl Ridge, southeast of the Louisville Ridge, with catches of pencil cardinal (bigeye cardinal fish) (reportedly *Epigonus denticulatus*) totalling about 15 000 tonnes (Clark *et al.*, 2007). They also targeted orange roughy (*Hoplostethus atlanticus*), blue grenadier (*Macruronus novaezelandiae*), oreo dories nei and other deep-sea species throughout the 1970s and early to mid-1980s. At the same time, New Zealand first developed deep-sea trawl fisheries for orange roughy inside its EEZ in the late 1970s while, in Australian waters, deep-sea fishing for orange roughy began in the latter half of the 1980s (FAO, 2008).

Expansion of New Zealand and Australian deep-sea fisheries into international waters was followed by the establishment of a fishery on the Louisville Ridge, some 600 kilometres (km) east of the New Zealand EEZ. This began in 1993 and another fishery, on the South Tasman Rise, adjacent to the southern portion of Australia's EEZ (south of Tasmania), was developed in 1997. Vessels of New Zealand and Australia dominated these high seas fisheries, although vessels from other nations such as Norway, Japan, the Republic of Korea, Belize, Ukraine and Panama participated at various points over the years (Gianni, 2004).

In addition, exploratory fisheries in the southeastern Pacific were undertaken by Chile in the early 1990s on the Nazca Ridge for Chilean jagged lobster (*Projasus bahamondei*). Three vessels were involved in these fisheries with a total of 267 tows in depths ranging from 260 to 405 m (Arana, 1994).

High seas catches of orange roughy, the principal target species in these high seas bottom trawl fisheries, peaked in the 1994–1995 fishing year at approximately 15 000 tonnes. Over the past several years, however, the catch of orange roughy has fallen to about 2 000–3 000 tonnes per year (Clark, 2008).

TABLE 1
Main target species of bottom fisheries in the high seas of the South Pacific

Common name	Scientific name
Main target species – trawl fishery	
Orange roughy	<i>Hoplostethus atlanticus</i>
Other species – trawl fisheries	
Alfonsino	<i>Beryx</i> spp. (primarily <i>Beryx splendens</i>)
Black oreo	<i>Allocyttus niger</i>
Black cardinal fish	<i>Epigonus telescopus</i>
Grenadiers, rattails nei	Macrouridae
Common mora (ribaldo)	<i>Mora moro</i>
Kitefin shark (seal sharks)	<i>Dalatias licha</i>
Smooth oreo dory	<i>Pseudocyttus maculatus</i>
Giant boarfish (sowfish)	<i>Paristiopterus labiosus</i>
Spiky oreo	<i>Neocyttus rhomboidalis</i>
Main target species – non-trawl fisheries	
Bluenose warehou (blue-eye trevalla)	<i>Hyperoglyphe antarctica</i>
Morwongs (king tarakihi)	<i>Nemadactylus</i> spp.
Yellowtail amberjack (yellowtail kingfish)	<i>Seriola lalandi</i>
Violet warehou (ocean blue-eye trevalla)	<i>Schedophilus velaini</i> (<i>Schedophilus labyrinthica</i>)
Other species – non-trawl fisheries	
Rubyfish	<i>Plagiogeneion rubiginosum</i>
Hapuka (wreckfish)	<i>Polyprion</i> spp.

Current fisheries

The high seas bottom fisheries in the South Pacific have been concentrated in the southwest Pacific Ocean (FAO Statistical Area 81) over the past decade, with the majority of the fishing conducted by vessels flagged to New Zealand and Australia (Gianni, 2004). Elsewhere in the South Pacific, there appears to be little deep-sea fishing on the high seas. However, there is a seamount fishery for orange roughy inside the Chilean EEZ on the Chilean Rise. In addition, deep-sea fisheries in the 1970s and 1980s were conducted on the Nazca and Sala y Gómez Ridge systems by former USSR fleets in the international waters of the southeast Pacific (Clark *et al.*, 2007). Only Belize and Chile have reported any bottom fishing on the high seas of the southeast Pacific in recent years (see section on Other bottom fisheries).¹ Table 1 and Figure 1 present an overview of the main species targeted in the high seas of the South Pacific.

¹ Responses to the 2007 FAO Questionnaire on High Seas Deep-sea Fisheries (hereinafter referred to as the FAO Questionnaire – see Appendix A).

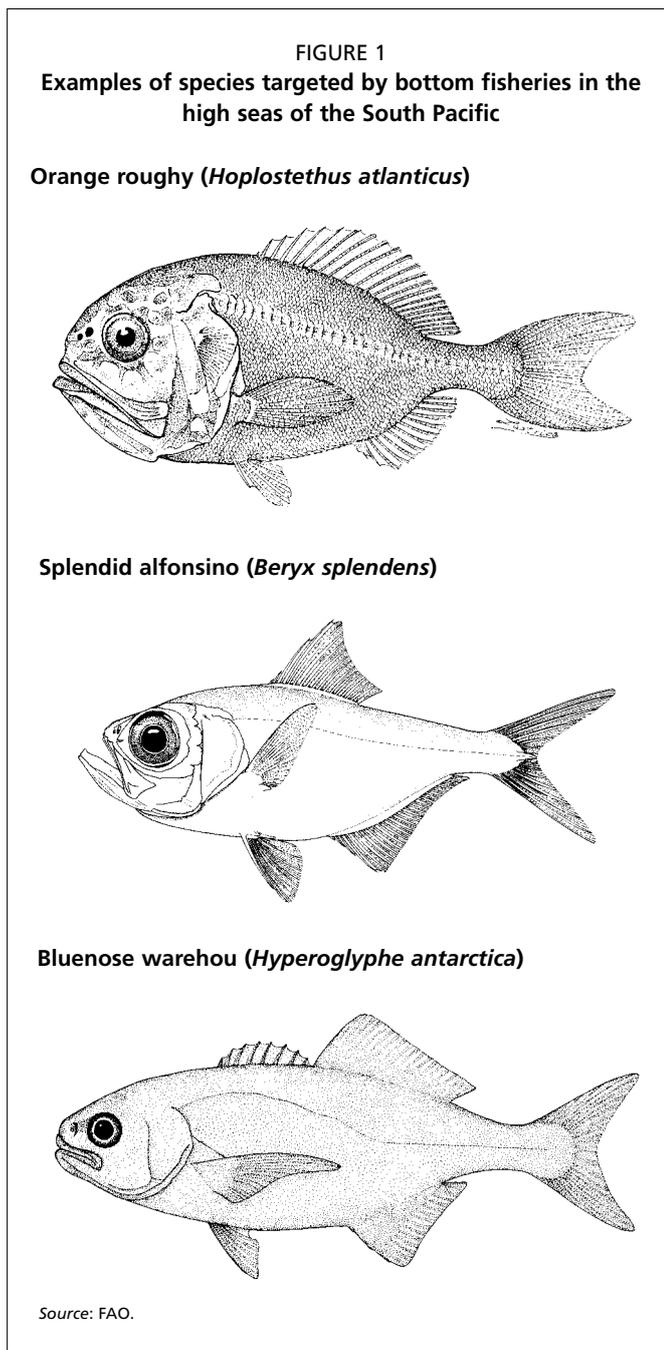
Bottom and mid-water trawl fishery for orange roughy and alfonsino

Over the past few years, the primary areas of international waters where deep-sea bottom trawl fisheries take place are the Northwest Challenger Plateau and the Lord Howe Rise in the Tasman Sea. More recently, a fishery for orange roughy has developed on the West Norfolk Ridge, in the northern Tasman Sea. Deep-sea trawling also takes place on the Louisville Ridge, east of the New Zealand EEZ. The South Tasman Rise, south of the Australian EEZ, was heavily fished over the past decade (Gianni, 2004). In the past few years the orange roughy fishery in this area has declined to very low levels and the fishery in the high seas area was recently (in 2007) closed by the Governments of New Zealand and Australia to their vessels (Clark *et al.*, 2007; New Zealand Ministry of Fisheries, 2007). These areas are all located in the southern portion of the South West Pacific Ocean. Most of the reported catch in recent years has been taken by New Zealand and Australian vessels (Gianni, 2004; Clark, 2008).

New Zealand reported that in the period 2002–2006, between 15 and 28 vessels per year were engaged in bottom fishing on the high seas of the South Pacific. In 2006, there were 15 New Zealand bottom and mid-water trawl vessels. The total catch in 2006 was 1 930² tonnes, consisting of 1 415 tonnes of orange roughy and 28 tonnes of alfonsino. (Penney *et al.*, 2007; SPRFMO Secretariat, personal communication, 2008)

The Australian high seas bottom trawl fishing fleet in 2006 consisted of four trawl vessels.³ The trawl fleet caught 452 tonnes of fish, of which 209 tonnes were alfonsino (*Beryx* spp.) and 166 tonnes were orange roughy. Australia reported the fishing effort for this fleet as 121 hours combined in 2006 (Sampaklis *et al.*, 2007).

The Cook Islands reported that five deep-sea trawlers, ranging in length from 40 to 90 metres (m), have been fishing on the high seas of the South West Pacific (FAO Statistical Area 81) over the past few years. However, only two were in operation under the Cook Islands flag in the South West Pacific in 2006. No information was provided on the catch of this fleet. Given the size of most of the vessels involved, the catch could



² This number may change as the SPRFMO Secretariat receives updated information.

³ Response from Australia to FAO Questionnaire.

TABLE 2
Catch of major species in South West Pacific high seas trawl fisheries, 2002–2006

Flag	Tows	Catch (tonnes) by species										
		ORH	SSO	BOE	SOR	BYX	EPT	RIB	BSH	BOA	RAT	Total
New Zealand ^a	11 145	9 259	248	598	78	250	638	276	120	85	274	11 827
Australia ^b	/	1 263	97	/	77	296	0	/	/	/	/	1 733
Other ^a	2 568	2 767	58	298	2	181	46	15	0	0	1	3 368
Total												16 928

ORH–Orange roughy; SSO–Smooth oreo; BOE–Black oreo; SOR–Spiky oreo; BYX–Beryx spp.; EPT–Cardinal fish; RIB–Ribaldo; BSH–Seal shark; BOA–Sowfish; RAT–Rattails.

/ = Unknown.

Sources:

^a SPRFMO Secretariat, personal communication, 2008. This does not include information separately reported to FAO (FAO, 2008 or FAO Questionnaire).

^b Sampaklis *et al.*, 2007. The total includes 106 tonnes of other species.

be substantial as compared with the catch of other nations' vessels operating in the region.⁴

Belize reported two trawl vessels operating on the high seas of the South Pacific in 2006, with a total catch of 344 tonnes. This catch consisted of 200 tonnes of orange roughy and 101 tonnes of alfonsino, as well as another 43 additional tonnes of unspecified catch.⁵

Ukraine reported that one bottom trawl vessel has occasionally been fishing for orange roughy along the Louisville Ridge over the past few years but did not provide information on the catch.⁶

The Republic of Korea reported a catch of alfonsino in 2005 of 194 tonnes and 464 tonnes respectively in the South West and Western Central Pacific (FAO, 2008). In its answer to the FAO Questionnaire, the Republic of Korea mentioned the activity of two trawlers in the South East Pacific (FAO Area 87) for the same year (2005), and three in 2006.

China also reported catch of orange roughy to the SPRFMO Secretariat, ranging from 500 to 700 tonnes per year, between 2001 and 2006 (570 tonnes in 2006) (SPRFMO, 2008).

Trawl catches by all fleets combined consist primarily of orange roughy, with bycatch species of commercial value including alfonsino, oreo, black cardinal fish (*Epigonus telescopus*), bluenose warehou (blue-eye trevalla) (*Hyperoglyphe antarctica*), common mora (ribaldo) (*Mora moro*), kitefin sharks (seal sharks) (*Dalatias licha*), and grenadiers, rattails nei.

Table 2 provides an overview of the catch of the trawl fisheries between 2002 and 2006 in the South West Pacific.

Bottom longline fisheries

New Zealand reported that nine longline vessels targeted deep-sea species in 2006. They fished a total of 277 days (SPRFMO, 2007a). Australia reported eight longliners and three other vessels identified as "other types or multipurpose vessels".⁷ The total catch in the 2005/2006 season for these vessels was 8 tonnes. Non-trawl fishing effort has been largely focused on the Gascoyne and Standards seamounts area, Capel Bank (Map 2) and a large area along the boundary of the Australian EEZ from the Great Australian Bight to 140°E. Most of the catch was taken in the Gascoyne and Standard Seamounts area (Sampaklis *et al.*, 2007).

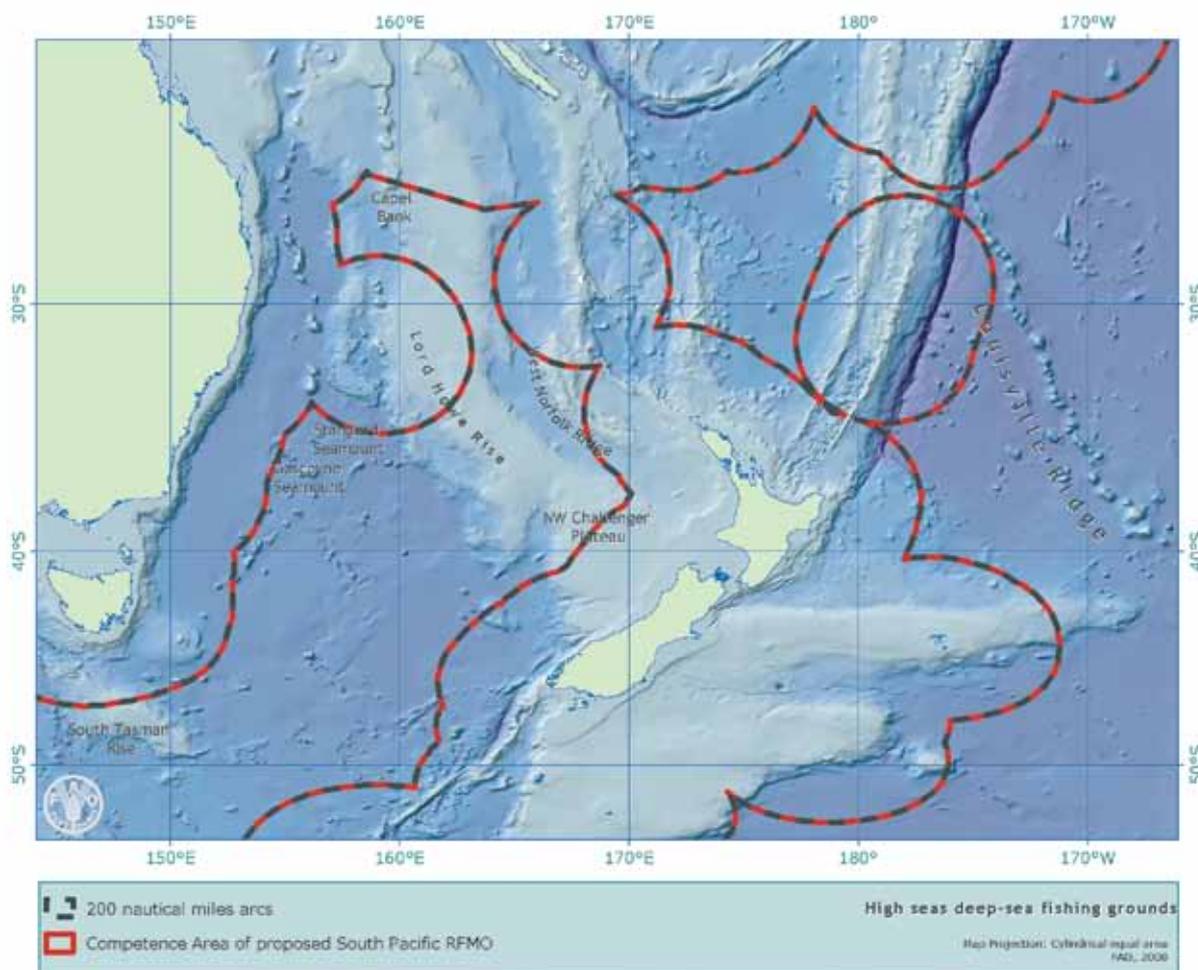
The longline and related catch consists primarily of bluenose warehou, morwongs (king tarakihi) (*Nemadactylus* spp.), violet warehou (ocean blue-eye trevalla)

⁴ Response from the Cook Islands to FAO Questionnaire.

⁵ Response from Belize to FAO Questionnaire.

⁶ Response from Ukraine to FAO Questionnaire.

⁷ Response from Australia to FAO Questionnaire.



MAP 2
High seas areas just off the EEZs of Australia and New Zealand

(*Schedophilus velaini*), yellowtail amberjack (yellowtail kingfish) (*Seriola lalandi*) and hapuka (*Polyprion* spp.).

Other bottom fisheries

Other fishing gear reportedly used by bottom fisheries have included Dahn lines, trot lines and other line gears over the past few years, as well as pots, traps and Danish seines.

New Zealand reported an additional three vessels engaged in deep-sea fisheries on the high seas in 2006, two of which used Dahn lines and the third listed as “other”. These vessels fished for a total of 26 days on the high seas in 2006. Over the past four years, several New Zealand flagged vessels have also used trot lines and fished with Danish seines in bottom fisheries on the high seas (SPRFMO, 2007a). As mentioned above, Australia reported three vessels as using gear other than trawl or longline.⁸

Belize reports two vessels engaged in deep-sea trap set fishing on the high seas of the South East Pacific targeting lobsters, with a catch of 65 tonnes in 2006.⁹

Catch and effort summary

Table 3 provides a summary of total catch and effort of the fisheries described above for 2006.

⁸ Response from Australia to FAO Questionnaire.

⁹ Response from Belize to FAO Questionnaire.

TABLE 3
Summary of available data, 2006

Country	No. of vessels	Catch (tonnes)
Trawl (mid- and bottom trawl) fishery		
Australia	4	452 ^a
Belize	2	344
China ^b	/	570
Cook Islands	2	/
New Zealand ^c	15	1 930
Rep. of Korea	3	/
Ukraine	1	/
Bottom longline fishery		
Australia ^a	8	8 ^d
New Zealand ^e	9	/
Other (gillnet, trap, Dahn line, drop line, trot line, pot)		
Australia ^a	3	/
Belize	2	65
New Zealand ^e	3	/

/ = Unknown

Note: there are discrepancies between different sources in terms of number of New Zealand and Australian vessels.

Source: country response to FAO Questionnaire, except where otherwise noted.

^a Sampaklis *et al.*, 2007.

^b SPRFMO, 2008.

^c Penney *et al.*, 2007.

^d The catch of 8 tonnes in 2005/2006 is for all non-trawl vessels combined.

^e SPRMO, 2007a.

Illegal, Unreported and Unregulated (IUU) fishing

As there previously were no multilaterally agreed conservation measures in place, the high seas bottom fisheries in the South Pacific Ocean could not be considered illegal fishing as such. Prior to 30 September 2007, these fisheries could best be characterized as largely unreported and unregulated. However, from 30 September 2007, these fisheries have become subject to the voluntary multilateral Interim Measures Agreement adopted by the parties to the Third International Meeting on the Establishment of a South Pacific Regional Fisheries Management Organisation.

STATUS OF THE STOCKS, BYCATCH AND IMPACTS ON VULNERABLE MARINE ECOSYSTEMS

Status of target stocks

Stock assessments have been attempted for several of the high seas orange roughy stocks based on catch per unit effort (CPUE) data. However, they have not been accepted as sufficiently robust because of the highly variable levels of effort and catch between years within each of the fisheries, which can make the use of CPUE as an index of abundance uncertain (O'Driscoll, 2003; Clark and Anderson, 2003). There are no available

estimates of stock size, biomass or fishing mortality for bluenose warehou – the principal target species in the high seas bottom longline fishery (SPRFMO, 2007c).

Status of bycatch stocks

Over 100 species have been reported taken in both the New Zealand and Australian high seas bottom fisheries in the South Pacific. However, the amount taken of bycatch of non-commercial species is not known, nor is the status of most, if not all, bycatch species.

Impacts on Vulnerable Marine Ecosystems (VMEs)

The South West Pacific is one of the few areas in the world where considerable information has been gathered on the impact of deep-sea trawling on the sea bed. The information is based primarily on the impacts of fishing within the Australian and New Zealand EEZs, although some information is available for the fisheries on the high seas.

A recent assessment of the likely distribution of stony or hard cold-water corals in relation to seamounts worldwide concluded that they are likely to be found in association with seamounts at fishable depths throughout the South Pacific Ocean (particularly in FAO Statistical Areas 81 and 87) between 40° and 20°S latitude (Clark *et al.*, 2006). Biogeographic assessments of the likely distribution of other species potentially vulnerable to deep-sea bottom fisheries have yet to be conducted, both with respect to seamounts and other underwater features.

One example of trawling impacts related to a high seas bottom fishery in the region, is the orange roughy fishery on the seamounts of the South Tasman Rise. Large quantities of corals were taken as bycatch in the first year of this trawl fishery. Approximately 1.6 tonnes of coral per hour of towing a trawlnet during the 1997/1998 fishing season were estimated as bycatch by observers. In the 165 tows observed, a total of 1 762 tonnes of coral was estimated to have been brought up in the trawlnets. These figures do not include coral damaged but not brought to the surface by the nets. The authors of the study state that it is unknown as to whether such large rates of bycatch are taken in

other seamount fisheries, but that anecdotal evidence indicates that there have been large catches of coral in other high seas fisheries on the Northwest Challenger Plateau. (Anderson and Clark, 2003) Other examples of studies on the impacts of trawling are described in Koslow *et al.* (2001) and Clark and O’Driscoll (2003).

Changes in fishing patterns and, in particular, longer trawl duration and distance due to a preference for using long tows on flat bottoms, rather than short tows on hill features, were noted by Clark (2008) and SPRFMO (2007d) over the last decade. This has substantially increased the area of habitat affected by trawl gear in several seamount areas (e.g. Northwest Challenger Plateau).

CONSERVATION AND MANAGEMENT MEASURES

As mentioned in a previous section, participants in the negotiations to establish the new SPRFMO adopted a set of voluntary interim measures in May 2007 for bottom fisheries on the high seas of the South Pacific (see Box 1). These interim measures apply to the high seas of the South Pacific from the equator to the boundary of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) Convention Area, and in the west from the boundary of the Southern Indian Ocean Fisheries Agreement south of Australia and the EEZ boundaries of Australia and Pacific Island nations in the Central West Pacific, across the South Pacific to the EEZ boundaries of Ecuador, Peru and Chile in the South East Pacific (see Map 1).

The participants in the negotiations that have adopted these interim measures for the South Pacific are as follows: Australia, Canada, Chile, the Cook Islands, China, Peru, Colombia, Ecuador, European Community, Faroe Islands, Federated States of Micronesia, France (on behalf of its overseas territories), Japan, New Zealand, Niue, Palau, Papua New Guinea, the Russian Federation, the Republic of Korea, Taiwan Province of China, Ukraine, the United States of America and Vanuatu (SPRFMO, 2007e).

Since the adoption of the interim measures for the South Pacific in 2007, at least one state (at the time of publication of this document), New Zealand, has adopted regulations to implement the measures. The New Zealand regulations are only a first step, since new legislation will be required for full implementation. Some measures will initially be applied through the New Zealand high seas fishing permits, required by all vessels flying the New Zealand flag on the high seas. Measures implemented through the fishing permits will include, *inter alia*, application of the “move on” rule (see Box 1) in some areas and spatial restrictions. New Zealand is closing all blocks (“the footprint” was defined through fishing activity in grid blocks of 20 minute resolution) that have been only lightly fished (31 percent of the total area) and another 10 percent of other areas to protect representative habitats. Bottom trawling, until 2010, is restricted to the current footprint (i.e. no expansion of fisheries). One hundred percent observer coverage is now required on all vessels while bottom trawling on the high seas. (Penney *et al.*, 2008)

To date, it appears that there are still gaps in implementation of the SPRFMO interim measures by participants in the SPRFMO negotiations. Furthermore, parties other than New Zealand have yet to publicize measures that they have taken to implement the interim measures for bottom fisheries in the high seas.

Prior to 2007, some conservation and management measures were already in place, but on a country-by-country basis. For example, since 1999, the Australian Government has required Australian-flagged fishing vessels to be authorized to fish on the high seas. Among other things, operators using Australian-flagged vessels on the high seas are required to mark their vessels in accordance with the FAO standard specifications, facilitate the carriage of observers, complete catch and effort logs, and operate a VMS. Australian-flagged vessels are required to operate in a manner that does not contravene Australia’s obligations under international agreements and

BOX 1

Interim measures adopted by participants in negotiations to establish South Pacific Regional Fisheries Management Organisation

The main elements of the Interim Measures Agreement, which came into effect on 30 September 2007, are summarized as follows:

- Limit bottom fishing to existing levels of fishing effort and areas fished within the last several years (2002–2006).
- No further expansion of bottom fishing activities until 2010 and only then on the basis of prior impact assessments and management measures in place to ensure no significant adverse impacts on VMEs in new areas.
- Establish conservation and management measures to prevent significant adverse impacts on VMEs, and ensure long-term sustainability of deep-sea fish stocks.
- Assess whether individual bottom fishing activities would have significant adverse impacts on VMEs and, if so, then bottom fisheries are not authorized to proceed unless they can be managed to prevent such impacts.
- Cooperate to map sites where VMEs are located.
- Close areas where VMEs are known or likely to occur to bottom fishing activities unless an assessment has been undertaken and management measures are in place to ensure no significant adverse impacts.
- Cease bottom fishing activities within 5 nautical miles (nm) of VMEs and where VMEs are encountered during the course of fishing operations and report the encounter to the Interim Secretariat to ensure that appropriate measures can be adopted in respect of that site.
- Ensure 100 percent observer coverage on all bottom trawl vessels and an appropriate level of observer coverage on vessels using other bottom fishing gears.

other arrangements to which Australia is a party. Furthermore, Australia reports that observer coverage occurs on an ad hoc basis on high seas bottom fishing vessels.¹⁰

INFORMATION AND REPORTING GAPS

There is a need for more accurate information on catch, bycatch and the locations of areas fished in relation to potential impacts on VMEs (e.g. seamounts), in particular from nations other than New Zealand engaged in high seas bottom fishing in the region. In addition, assessments are needed on the known or likely distribution of VMEs. There are also potential issues in relation to the confidentiality requirements of fisheries data in some countries. Furthermore, no reliable stock assessments have been conducted for fisheries for deep-sea species on the high seas, and there have been no systematic assessments of the impact of fisheries on non-target, associated and dependent species or vulnerable benthic ecosystems. These issues are in the process of being addressed through the SPRFMO negotiating process, i.e. the development of data standards by the Data and Information Working Group, the development of an Interim Benthic Assessment Standard by the Science Working Group, and the requirement that impact assessments for bottom fishing activities be conducted as a condition to authorize any bottom fishing activities on the high seas after 30 September 2007.

SOURCES OF INFORMATION

In their reply to the FAO Questionnaire, Australia, Belize, the Cook Islands, New Zealand, the Republic of Korea and Ukraine officially provided some information regarding deep-sea fishing in the high seas of the South Pacific Ocean. Other sources

¹⁰ Response from Australia to FAO Questionnaire.

used include FAO reports, country submissions to the International Meetings on the Establishment of a South Pacific Regional Fisheries Management Organisation, and the Census of Marine Life.

SUMMARY TABLE FOR 2006

Main flag states involved in fisheries	Australia, Belize, Cook Islands, New Zealand, Republic of Korea and Ukraine		
Estimated total number of vessels	52		
Total reported catch (tonnes)	3 369		
Main fisheries			
Gear	Target species	Fishing grounds	Regional Area
Bottom trawl/ mid-water trawl	Orange roughy, alfonsino	Lord Howe Rise, Northwest Challenger Plateau and West Norfolk Ridge in the Tasman Sea; South Tasman Rise south of the Australian EEZ; Louisville Ridge	FAO Area 81
Longline/other (gillnet, trap, Dahn line, drop line, trot line, pot)	Bluenose warehou, hapuka, morwongs, violet warehou, lobster	Gascoyne and Standard Seamounts area; Capel Bank and along the boundary of the Australian EEZ	FAO Areas 77, 81 and 87

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