International Consultations on the Establishment of the
South Pacific Regional Fisheries Management Organisation

SPRFMO IV REPORT – ANNEX B

REPORT OF THE SCIENCE WORKING GROUP
Noumea, New Caledonia
4 – 7 September 2007

1. Welcome & Introductions

The meeting of the Science Working Group (SWG) was opened by the Chair, Mr Andrew Penney (New Zealand), who welcomed all participants. The participants in the SWG meeting were the same as those in the Joint SWG & D&IWG meeting, and are listed in Annex 2 to the report of the D&IWG meeting.

2. Adoption of Agenda

The agenda was adopted without modification, and is attached in Annex 1.

It was agreed that the recently established Jack Mackerel Sub-Group should meet separately in the margins of the SWG meeting to discuss the items under SWG agenda items 9.2 and 9.3, and report back to the SWG.

3. Administrative Arrangements

3.1 Meeting Documents

The full list of documents tabled at the meeting is attached in Annex 2.

3.2 Meeting Arrangements

The Chair informed participants of the meeting arrangements and proposed meeting schedule.

4. Nomination of Rapporteurs

Martin Cryer (New Zealand), Sandy Morison (Australia) and Aquiles Sepúlveda (Chile) volunteered to act as rapporteurs for the meeting.

5. Inter-Sessional Work Programme

5.1 Progress against inter-sessional scientific work programme

Progress against the inter-sessional scientific work programme developed at the previous meeting of the SWG was reviewed. Four additional species profiles had been compiled, although a few of the planned profiles remained outstanding. Draft standards had also been developed for VMS reporting, scientific observer programmes and benthic risk assessments, for discussion at this meeting.

6. Consideration of the Draft VMS Standard

This item was discussed in the joint meeting of the D&IWG and SWG, and is reported on in the report of the D&IWG.

7. Consideration of the Draft Observer Standard

This item was discussed in the joint meeting of the D&IWG and SWG, and is reported on in the report of the D&IWG.

8. Consideration of the Draft Benthic Assessment Framework

The interim measures require participants to conduct assessments to determine whether proposed bottom fishing activities will have '*significant adverse impacts on vulnerable marine ecosystems and the long-term sustainability of deep sea fish stocks*', and require the SWG to '*design a preliminary interim standard for reviewing the assessments and develop a process to ensure comments are provided to the submitting Participant and all other Participants*'.

The Chair noted that the bottom fishing interim measures clearly imply a number of specific questions that the SWG will need to address in reviewing and commenting on assessments submitted in accordance with these provisions:

Interim Measure	Question to be answered when reviewing assessments
1	Will the proposed fishing activity be within recent average (2002 – 2006) effort levels ?
2	Will the proposed fishing activity be within areas where fishing is 'currently occurring' ?
6	Is proposed fishing going to be conducted in areas where VMEs are known or likely to occur ? If so, will those areas be closed to fishing ? If such areas won't be closed, will adequate conservation and management measures be put in place to prevent 'significant adverse impact' on VMEs, and to ensure the long-term sustainability of deep-sea fish stocks ?
7	What provisions have been made to detect evidence of fishing on VMEs, and to move 5nm away from such areas ? How will such evidence be documented and reported ?
9	Will observers be appointed to each vessel, and will observer coverage levels be 'appropriate' ?
10	Have all vessels been equipped with operational VMS ?
11	Are the proposed fishing activities likely to have significant adverse impacts on VMEs ? If so, will such activities be managed to prevent such impacts, or not authorized to proceed ?

8.1 Discussion of key issues relevant to the benthic assessment standard

There are a number of uncertainties in the interim measures which will require decisions, to provide an objective basis for reviewing assessments. In particular:

- What reference period should be used when interpreting where fishing is 'currently occurring ?
- How should the 'current' fishing area (trawl footprint) be spatially defined (mapped), and at what resolution ?

These questions are explored in paper SPRFMO-IV-SWG-05, which contains analyses of New Zealand bottom trawl catch and effort data in the SPRFMO area over the period 2002 – 2006. Key results in the paper were presented by the Chair. In addition to summary tables of catch and effort by year and species for the various high seas trawl fishing areas, the paper specifically explores the implications of mapping a 'trawl footprint' around actual trawl tracks at various spatial resolutions.

There is a trade-off between increased accuracy in the mapping of impacted areas, and confidentiality concerns and complexity of the trawl footprint map. Finer grid-block resolutions more correctly reflect the actual areas impacted by trawling operations, but raise confidentiality concerns at publication of fine-scale information, and result in complex footprint maps. Coarser grid blocks reduce the confidentiality concerns and result in simpler footprint maps, but result in incorporation of a rapidly increasing area of untrawled ground around trawl tracks, as grid blocks increase in size.

SWG participants asked questions about likely reasons for reported declines in effort and catches of some species in some areas over the period, and increases in others. Reasons for these catch and effort trends were not explored in the paper and would require consideration of standardised CPUE analyses for the various areas and species, and analyses of changes in fleet deployment patterns and targeting practices. Such analyses should be conducted as part of the assessment work of the proposed Deepwater Species Sub-Group.

8.2 Consideration of the draft benthic assessment framework

The Chair presented an overview of the draft benthic assessment framework (SPRFMO4-SWG-06). This is intended to provide an initial guide to flag states and the SWG on the expected structure and composition of assessments for bottom fisheries, while the detailed SPRFMO Benthic Assessment Standard is being developed. It is expected that a draft of the full standard should be available by April 2008, by which time it should be possible to incorporate key conclusions and recommendations of the FAO Expert Consultations on Management of Deepwater Fisheries, which are currently underway.

In discussion of the resolution to be used for mapping of a trawl footprint, it was agreed that 10 minute grid blocks would be scientifically preferable, and would more accurately reflect the area being 'currently fished'. However, the group did recognise the confidentiality concerns, and that excessively complex maps would create administrative and compliance difficulties. There was no support for a grid block resolution coarser than 20 minutes. The SWG therefore specifically agreed that:

- The joint trawl footprint should be developed using a grid block resolution of 20 minutes, including all blocks experiencing at least one tow over the period 2002 – 2006.
- The Interim Secretariat should obtain the necessary data, and develop a geospatial database of a joint SPRFMO trawl footprint for fishing by all flag states.

Noting that this joint footprint map would essentially have to be publicly available, at this stage the map would only contain the fished 20 minute blocks, with no other data, and would specifically not include the original trawl track data used to develop the grid blocks. However, the SWG noted the value of having an effort index associated with each block, such as total number of trawls, to provide an index of relative past impact in each block. Participants were requested to ascertain whether they might be able to authorise publication of total effort indices for each block, provided that these gave no reference to flag state, number of vessels or catches.

In discussion of the actual proposed Environmental Impact Assessment (EIA) / Environmental Risk Assessment (ERA) components, it was noted that the framework only provided a basic guide to the sorts of information that should be included. The final standard will provide more detail on information requirements, methodology and best practice in this section. Recognising the requirement in the interim measures for assessments to address whether proposed fishing operations will have significant adverse impacts on long-term sustainability of the deepwater stocks to be fished, the SWG agreed that a new section on state of stocks to be fished should be added to this list of EIA / ERA components.

The draft Benthic Assessment Framework was revised to include all proposed changes, and the revised framework was adopted by the SWG (attached in Annex 3).

The SWG expressed serious concern at the consequences of the lack of clear objectives or guidance in the interim measures regarding what might constitute '***significant adverse impacts***' on VMEs, or appropriate management measures to avoid such impacts. It is inevitable that assessments for proposed bottom trawling activities submitted after 30 September will indicate the intention of participants to bottom trawl for deepwater species on seamounts. In terms of UNGA61/105, the SPRFMO Interim Measures and the working definition adopted in the Benthic Assessment Framework, seamounts are considered to be, or to support, VMEs, and fishing on seamounts will therefore inevitably be conducted in areas where VMEs '***are known to occur or are likely to occur***'. What would constitute adequate management measures to avoid significant adverse impacts on these VMEs ?

In reviewing and commenting on such assessments, the SWG will therefore be required to make a judgement on whether the proposed fishing activities will have significant adverse impacts, and whether proposed management measures will be adequate to avoid these. Two possible extreme interpretations of any proposed plan to fish on seamounts within the joint trawl footprint could be:

- All such areas are vulnerable, and it is not possible to fish such areas without damaging slow-growing corals or other VMEs. All such impacts would be significant and adverse, so all seamounts should be closed to fishing.
- Any fishing within the joint trawl footprint will be on seamounts already fished extensively over a long period, and these are therefore already heavily impacted. Further fishing will create no further significant adverse impact, and so any proposed fishing within the footprint should be permitted.

In attempting to balance the objectives of conservation and utilization, and to develop a reasonable compromise between these two extreme views, the SWG recognised that an effective approach to this dilemma would probably require the establishment of specific

spatial closures designed to protect adequate and representative proportions of various VMEs. However, the SWG specifically emphasized that it would be critically important to ensure that any such spatial closures were based on best available information on distribution of VMEs, biodiversity and relative sensitivity of various habitat types to the impacts of fishing.

The SWG requested that the future SPRFMO Commission specifically consider and adopt clear objectives to guide the design of future conservation and management measures for VMEs. This requirement is specifically noted in the Benthic Assessment Process document discussed below.

8.3 Consideration of the proposed assessment process

The Chair tabled a document outlining a proposed benthic assessment process (SPRFMO-IV-SWG-07). In discussion of this document, the SWG agreed that each flag state will need to nominate a key science representative to serve as the official contact for the purpose of inter-sessional reviews by the SWG of submitted assessments.

With some minor revisions, the SWG then adopted the revised proposed benthic assessment review process document attached in Annex 4

9. Jack Mackerel Research

9.1 Election of Convenor of the Jack Mackerel Sub-Group

The Chair noted that Australia had offered Mr Sandy Morrison as Convenor of the Jack Mackerel Sub-Group, and that Mr Morrison had acted as interim JM Sub-Group convenor during the inter-sessional period since the Reñaca meeting.

The SWG accepted the nomination, and Sandy Morrison was unanimously accepted as Convenor of the JM Sub-Group.

The Jack Mackerel Sub-Group convened separately to deal with agenda items 9.2 and 9.3 and the entire report of the first Jack Mackerel Sub-Group Meeting is included directly under these agenda items below.

9.2 Report back on progress with development of the Jack Mackerel Stock Structure Research Programme

Progress on the regional joint research programme proposal on the stock structure of jack mackerel was outlined (SPRFMO-IV-SWG-13). The multi-method approach to the issue was endorsed by the sub-group. A desire was expressed for this research to be the start of an ongoing research programme on jack mackerel.

Aspects discussed included the importance and value of industry support in the collection of samples, the need to develop detailed sampling protocols to enable samples to be consistently collected and preserved, and the need to refine the spatial aspects of the sampling plan. The group expressed support for the use of existing knowledge in the design of the sampling plan, rather than the alternative of assuming no knowledge and aiming for a spatially uniform distribution of samples. The group recognised that for the purposes of the research programme it is very important to collect samples from fishing vessels as far as possible beyond the boundaries of EEZs.

Important issues still remain with regard to the potential and likely funding sources, the timing of the research, and the form and extent of involvement by Participants other than Chile in the proposed project.

A revised version of the proposal will be distributed to key scientific members of the SWG and will be made available on the SPRFMO website. Additional comments on the proposal are invited in addition to expressions of the willingness of other countries to participate in any aspects of the research, including the provision of research or industry vessels.

9.3 Report back on progress with arrangements for the Jack Mackerel Stock Structure and Assessment Workshop

Progress made to date with arrangements for the workshop was outlined (SPRFMO-IV-SWG-14). The proposed workshop has been given preliminary indications of support by FAO. The timing of the workshop has been revised and is now proposed to take place in April or May in Santiago, Chile. Potential keynote speakers are to be approached as soon as possible concerning their availability at this time.

The proposal was endorsed in principle by the sub-group with some minor amendments. These included the addition of an objective to indicate that the workshop will be important for providing guidance on future stock assessments for jack mackerel, noting that the SWG will be required to provide advice on the status of pelagic fish stocks in 2009.

A revised proposal with a proposed workshop programme and budget will be submitted to FAO shortly. The final version of the proposal will be distributed to key scientific members of the SWG and will be made available on the SPRFMO website. Additional comments on the workshop programme are invited.

10. SPRFMO / WCPFC Science Interests

10.1 Presentation on relationships between pelagic species covered by SPRFMO and the WCPFC

Dr Valerie Allain of the SPC gave a presentation on her paper '*Preliminary study on interactions between tuna and associated species and species of interest to the south pacific regional fisheries management organisation*' (SPRFMO-IV-SWG-12). Using a preliminary list of 115 species of interest to SPRFMO, and diet composition data from 1,242 non-empty stomachs, this work found that the dominant SPRFMO species in the diet of tunas were squid and alfonsino. SPRFMO species made up only 5% of the overall diet of tunas in the area, and prey were almost entirely juveniles less than 15cm length, so predation by tunas does not directly impact adult stocks of SPRFMO species. However, predation may impact juvenile recruitment. Myctophid fish made up about 50% of the diet of bigeye tuna, and so there is direct competition between bigeye tuna and squid, which also prey on myctophids. It was noted that sampling under this study did not cover the entire region, and further diet studies are required on tuna caught on the high seas south of 25° S.

10.2 Discussion of options for future cooperation on matters of possible common scientific interest between SPRFMO and WCPFC

In response to recommendation in the paper for improvement in collection of data on catches of all species, the Chair noted that this again emphasized the importance of scientific observer programs, as one of the few ways to collect reliable data on by-catch species and discards.

The SWG noted that there are common interests between WCPFC and SPRFMO science processes resulting from the evident trophic interactions between the species falling under the respective jurisdictions of the two organizations. The SWG should investigate opportunities for future collaboration on matters of common scientific interest, particularly related to improvement in understanding of trophic relationships in the region.

11. Deepwater Species Assessment Approaches

11.1 Options for assessment of deepwater stocks

11.2 Management options for low-productivity deepwater species

The SWG held a short general discussion of both of these agenda items together. It was noted that the interim measures for pelagic fisheries call upon the SWG to report on the state of pelagic stocks in the SPRFMO area in 2009. However, no similar requirement has yet been documented for assessment of the state of deepwater stocks.

The SWG noted that the interim measures for bottom fishing make frequent reference to the need to prevent significant adverse impacts of bottom fisheries on the long-term sustainability of deep sea fish stocks. The proposed Benthic Assessment Framework adopted at this meeting also requires those participants proposing to conduct bottom fishing activities in the SPRFMO area to report any known information on the state of the deepwater stocks to be fished. These requirements indicate that the SWG will need to be able to report on the state of deepwater stocks in future.

In recognition of the importance of initiating processes to evaluate the state of deepwater stocks in the SPRFMO area, the SWG recommended that:

- A Deepwater Species Sub-Group should be established at some appropriate future time to specifically address research and assessment requirements for deepwater species.
- SWG participants should consider inter-sessionally what the terms of reference for this sub-group should be.
- Participants should also start considering effective options for assessment and management of deepwater species such as orange roughy, oreos and alfonsino.

12. Species and Habitat Profiles

12.1 Review of new profiles

The meeting reviewed the new draft species profiles completed since the last meeting:

- ***Comments Relevant to All Species Profiles***
  - References to age estimates should indicate whether sectioned or whole otoliths were used, as this is relevant to the interpretation of their potential reliability.
  - Where stock status is unknown, no assumptions should be made about exploitation rate.
  - There was a request for improvements to the depiction of species distributions on the distribution maps.
  - Comments in the overview to there being no management measures in place were clarified to indicate that this referred only to the high seas.

- Information on the status of stocks within the Australian EEZ was updated (Larcombe & McLoughlin (eds) (2007): "Fishery Status Reports 2006. Status of fish stocks managed by the Australian Government." Bureau of Rural Sciences, Canberra).

- ***Black Cardinalfish (*Epigonus telescopus*) Profile*** (SPRFMO-IV-SWG-08)

  Key points noted during discussion of the draft cardinalfish profile included:

  - The reference to quotas being in place for Australian fisheries within its EEZ was removed.

- ***Alfonsino (*Beryx splendens*) Profile*** (SPRFMO-IV-SWG-09)

  Key points noted during discussion of the draft alphonsino profile included:

  - Additional information on stock structure was identified as being available through work in New Caledonia and the results of this work have been incorporated into the profile.
  - An update on current fishing activity in New Caledonia was provided.
  - The reference to quotas being in place for Australian fisheries within its EEZ was removed.

- ***Bluenose (*Hyperoglyphe antarctica*) Profile*** (SPRFMO-IV-SWG-10)

  Key points noted during discussion of the draft bluenose profile included:

  - Comments on the Australian distribution were clarified
  - The results of a recent Australian preliminary study on stock structure were provided and incorporated into the profile.
  - Information on existing management measures inside EEZs was added.
  - Information on ecosystem considerations was revised including an addition on the low impact of longlines.
  - Current research activities were revised.
  - Within the Australian SESSF the species is considered to be not over-fished and not subject to over-fishing (with a target fishing mortality of F=M).

- ***Oreos (Oreosomatidae) Profile*** (SPRFMO-IV-SWG-08)

  Key points noted during discussion of the draft oreos profile included:

  - Additional data on age estimation from Australia will be incorporated into a revised profile.

The SWG noted that work on the oreos profile was still in progress and deferred adoption of this profile until it has been completed.

The overviews for the cardinalfish, alphonsino and bluenose profiles are attached in Annexes 5, 6 and 7.

12.2 Revisions to existing profiles

The Convenor of the Jack-Mackerel Sub-Group noted that some information had been provided inter-sessionally by participants for possible inclusion in the jack mackerel profile, but that the profile had not yet been revised.

The SWG agreed that revision of the jack mackerel profile should be deferred until after the planned Jack Mackerel Workshop in 2008, after which the jack mackerel profile would probably require substantial revision to reflect new information presented at the workshop.

12.3 Prioritisation of further species profile development

The SWG proposed ongoing development of the following species profiles:

- Continue developing species profiles for oreos, pelagic armourhead, toothfish and wreckfish.
- Consider whether profiles are required for any other associated or dependent species.

13. National Reports

13.1 Consideration of requirement for annual National Reports

At the meeting in Reñaca, Chile, in May 2007, it was agreed that annual national reports would provide a useful mechanism for providing overviews of fisheries-related information to annual SWG meetings. The Chair noted that the draft Observer Programme standard discussed in the Noumea D&IWG had proposed that such annual National Reports should specifically include a section on implementation of scientific observer programmes.

There was substantial support within the SWG for national reports providing overview information on description of flag state fisheries, changes in fishing fleet composition and fishing areas, summary tables and trends in fishing effort and catches by species, and overviews of research activities conducted in the preceding year.

13.2 Development of proposed framework for National Reports

The SWG recommended that the SPRFMO Interim Secretariat be requested to obtain examples of National Report guidelines used by other RFMOS. The Chair offered to prepare a synopsis of these guidelines, and a draft proposal for a SPRFMO National Report guideline.

14. Future Scientific Work Programme

14.1 Identification of short & medium term science requirements

The SWG identified the following workplan items to be progressed in the inter-sessional period before the next meeting:

- Complete the profile for oreos, continue developing species profiles for pelagic armourhead, toothfish and wreckfish, and consider whether profiles are required for any other associated or dependent species.
- The Jack Mackerel Task Team, and Convenor and participants in the Jack Mackerel Sub-Group, are to complete the development of the draft *Jack Mackerel Multi-Disciplinary Research Programme* proposal, and the arrangements for the *Jack Mackerel Stock Structure and Assessment Workshop*, in preparation for the workshop.

- Development of the detailed draft Benthic Assessment Standard, based on the Benthic Assessment Framework adopted at this meeting, will continue, for adoption at the next SWG meeting. It is hoped to have a draft Benthic Assessment Standard drafted by April 2008.
- Participants were requested to prepare views and submissions on possible terms of reference for a deepwater species sub-group, and effective assessment approaches and management options for deepwater species, for discussion at the next SWG meeting.
- Nominated key scientific representatives from each flag state will be approached to review and make comment on any benthic assessments submitted to the SWG for comment in terms of the bottom fishing interim measures, in accordance with the proposed benthic assessment process.

The SWG noted that they were also requesting the Interim Secretariat to conduct the following inter-sessional tasks before the next meeting:

- In cooperation with members, develop the proposed geospatial database of the joint bottom trawl footprint, known and likely seamounts and VMEs, seabed bathymetry and EEZ boundaries.
- Coordinate the dissemination of benthic assessments and SWG reviews and comments in accordance with the proposed Benthic Assessment Process.
- Remind participants of data submission requirements, and prepare a summary of the submitted data (catch and effort by species, flag state and year) for information at the next SWG meeting.
- Review reported catches in the existing species profiles against submitted data, and revise catch information in the profiles as necessary. Summaries of total catches should be included in the profile overviews.
- Obtain exampled of National Report guidelines developed by other RFMOs, and provide these to the SWG Chair as a basis for preparing draft SPRFMO annual National Report guidelines.

15. Other Matters

15.1 Chair of the Science Working Group

Andrew Penney was unanimously nominated to continue in the position of SWG Chair.

16. Adoption of Report

The SWG report was adopted, following inclusion of revisions proposed by participants.

17. Meeting Closure

The Chair thanked participants for their contributions to discussions. The meeting was closed at 12h00 on Fri 7 September 2007.

Annex 1 – SWG Agenda

AGENDA – SCIENCE WORKING GROUP

Noumea, New Caledonia

4 - 7 September 2007

1. Welcome & Introductions

2. Adoption of Agenda

3. Administrative Arrangements
- 3.1. Meeting documents
- 3.2. Meeting arrangements

4. Nomination of Rapporteurs

5. Inter-Sessional Work Programme
- 5.1. Progress against inter-sessional scientific work programme

6. Consideration of the Draft VMS Standard

(This item will be discussed in the Joint D&IWG and SWG meeting)

7. Consideration of the Draft Observer Standard

(This item will be discussed in the Joint D&IWG and SWG meeting)

8. Consideration of the Draft Benthic Assessment Framework
- 8.1. Discussion of key issues relevant to the benthic assessment standard
- 8.2. Consideration of the draft benthic assessment framework
- 8.3. Consideration of the proposed assessment process

9. Jack Mackerel Research
- 9.1. Election of convenor of the Jack Mackerel Sub-Group
- 9.2. Report back on progress with development of the *Jack Mackerel Stock Structure Research Programme*
- 9.3. Report back on progress with arrangements for the *Jack Mackerel Stock Structure and Assessment Workshop*

10. SPRFMO / WCPFC Science Interests
- 10.1. Presentation on relationships between pelagic species covered by SPRFMO (mackerels and squids) and the WCPFC
- 10.2. Discussion of options for future cooperation on matters of common scientific interest between SPRFMO and WCPFC

11. Deepwater Species Assessment Approaches

11.1. Options for assessment of deepwater stocks

11.2. Management options for low-productivity deepwater species

12. Species and Habitat Profiles

12.1. Review of new profiles

12.2. Revisions to existing profiles

12.3. Prioritisation of further species profile development

13. National Reports

13.1. Consideration of Requirement for annual National Reports

13.2. Development of proposed framework for National Reports

14. Future Scientific Work Programme

14.1. Identification of short & medium term science requirements

15. Other Matters

16. Adoption of Report

17. Meeting Closure

Annex 2

SCIENCE WORKING GROUP

Document List – SPRFMO IV 2007, Noumea, New Caledonia

SPRFMO-IV-SWG-01:	SWG Agenda for 03 – 07 September 2007 meeting
SPRFMO-IV-SWG-02:	Annotated SWG agenda for 03 – 07 September 2007 meeting
SPRFMO-IV-SWG-03:	SWG Document List for Fourth Negotiating Session
SPRFMO-IV-SWG-04:	Proposed Timetable for D&IWG and SWG 03 – 07 September 2007 meetings
SPRFMO-IV-SWG-05:	Descriptive Analysis of New Zealand Bottom Trawl Catch & Effort in the Proposed Convention Area of the South Pacific Regional Fisheries Management Organization (Penney *et al* 2007)
SPRFMO-IV-SWG-06:	Draft Benthic Assessment Framework
SPRFMO-IV-SWG-07:	Proposed Process for Preparation and Evaluation of Benthic Assessments for Proposed Bottom Fishing Operations in the SPRFMO Area
SPRFMO-IV-SWG-08:	Species profile: Black cardinalfish (*Epigonus telescopus*)
SPRFMO-IV-SWG-09:	Species profile: Alphonsino (Slender beryx, *Beryx splendens*)
SPRFMO-IV-SWG-10:	Species profile: Bluenose (*Hyperoglyphe antarctica*)
SPRFMO-IV-SWG-11:	~~Species profile: Oreos (Oreosomatidae)~~
SPRFMO-IV-SWG-12:	Preliminary study on interactions between tuna and associated species and species of interest to the south pacific regional fisheries management organisation (Allain 2007)
SPRFMO-IV-SWG-13	Jack Mackerel Task Team Progress Report
SPRFMO-IV-SWG-14	Chile / FAO Jack Mackerel Stock Structure and Assessment Workshop Proposal

Benthic Assessment Framework

1. Introduction

The Interim Measures adopted at the 3rd meeting of the negotiations to establish a South Pacific Regional Fisheries Management Organization (SPRFMO) in Reñaca, Chile, in May 2007, in relation to assessments for bottom fishing activities, require the Science Working Group (SWG) to "*design a preliminary interim standard for reviewing the assessments and develop a process to ensure comments are provided to the submitting Participant and all other Participants*". The SPRFMO Benthic Assessment Standard is intended to guide the SWG in evaluating and commenting on assessments submitted by flag states that wish to continue bottom fishing activities in the SPRFMO Area after the interim measures implementation date of 30 September 2007.

Work is currently underway to develop a detailed SPRFMO Benthic Assessment Standard, but this will only be completed by about mid-2008. Pending the development and adoption of the detailed benthic assessment standard, an initial framework and guideline is required to guide flag states in preparation of assessments, and the SWG in evaluating those assessments, from 30 September onwards. This document contains the proposed draft interim SPRFMO Benthic Assessment Framework, and is intended to serve as that interim guideline pending development of the full standard.

2. Purpose

The purpose of this framework is to provide initial guidelines for flag states in preparing assessments and management plans for proposed bottom fishing activities in the SPRFMO area, and to guide the SPRFMO SWG in evaluating and commenting on submitted assessments. This framework provides contextual information to be considered in preparing assessments, including relevant definitions and baseline maps (Sections 1 - 6). Section 7 then lists the sub-sections that are expected to be included in benthic assessments for bottom fisheries, with broad descriptions of the expected contents of each section.

This framework does not, at this stage, provide detailed guidance on the information to be provided under each sub-section of the assessments, what specific assessment methods should be used, or what international best practice procedures should be followed. It is intended that the full SPRFMO Benthic Assessment Standard, which will replace this framework, will fully review relevant international best practices, and provide more specific guidelines under each section.

3. Definition of Vulnerable Marine Ecosystems

The key requirements of the SPRFMO interim measures for bottom fishing relate to implementing measures to either avoid fishing on vulnerable marine ecosystems (VMEs), or to implement fishing practices and / or mitigation methods to "*prevent significant adverse impacts on vulnerable marine ecosystems*" or "*determine that such activities will not have adverse impacts*" on VMEs.

VMEs have not yet been formally defined in the context of deepwater fisheries. They are referred to in UN General Assembly Resolution 61/105 as "*vulnerable marine ecosystems, including seamounts, hydrothermal vents and cold water corals*". The SPRFMO interim measures expand on this to recognise that VMEs "*include seamounts, hydrothermal vents, cold water corals and sponge fields*".

For the purposes of interpretation and implementation of this framework, Table 1 contains a list of geological and biological definitions of VMEs that together constitute a proposed working definition to use in developing and evaluating assessments for bottom fishing activities in the SPRFMO area[1].

Table1. List of proposed geological and biological definitions of vulnerable marine ecosystems, together constituting a working definition of VMEs to use in preparing and evaluating assessments for bottom fishing activities under the SPRFMO Interim Measures.

Geological Definitions
• **Seamounts:** Seamounts should be defined ecologically rather than geologically In terms of this working definition, seamounts are defined as topographically distinct seafloor features that are $\geq$ 100m in height, and do not break the surface (Pitcher *et al* 2007, in press). Pitcher *et al* (2007, in press) further define "large" seamounts as exceeding 1,500m in height and it is these whose global distribution can be well resolved using methods such as satellite altimetry. The distribution of smaller seamounts (< 1,500 m) must be inferred from localised acoustic mapping. Seamounts that are entirely below 1,500m water depth are excluded from this working definition, as these are considered to be too deep to be fished with current technology, and so are not considered to be vulnerable.
Biological Definitions
• **Cold Water Corals**: The main benthic community of concern identified in recent studies are the cold water stony corals. The ecosystem function of cold water corals varies depending on morphology: reef formers vs. non reef formers, with concern focussed on the 'habitat-forming' corals. However, some non-reef formers still represent structurally important habitat in the deep-sea e.g. bubble gum corals (Paragorgiidae), black corals (Antipatharia), and should be included.
• **Sponge Gardens**: Sponge gardens also constitute 'habitat forming' communities, and can also represent structurally important components of deep-sea benthic communities.

Definitions of the basal area of seamounts still need to be agreed.

Other vulnerable communities or species are likely to be identified from information collected by observer programmes on bottom fisheries in the SPRFMO area. The above working definition of VMEs should be periodically updated to reflect these.

[1]The FAO is currently conducting expert consultations with a view to preparing guidelines for management of deepwater fisheries, and the results of this FAO process will be integrated into the SPRFMO Benthic Assessment Standard, when these become available. The FAO process is likely to contribute to definitions of VMEs and vulnerability. The issue of vulnerability relates specifically to the potential threat that fishing might have on such ecosystems. Hydrothermal vents are specifically mentioned in UNGA 61/105 and the SPRFMO interim measures. Similarly, cold-water seeps and seabed canyons are increasingly recognised as supporting vulnerable marine communities. However, no fishing is currently known to occur in association with, or in close proximity to, any of these features, and so they are currently not 'vulnerable' in that sense. For the interim period, these features may be excluded from the working definition of VMEs used by SPRFMO, and the focus of assessments should remain on seamounts (as ecologically defined in Table 1) and the listed biological communities.

4. Mapping of Vulnerable Marine Ecosystems

At this stage, given the limited knowledge of the distribution of deepwater benthic species, seamounts will have to be the main focus for mapping the distribution of potential VMEs. This focus is justified, given the known association of complex deepwater benthic communities with seamounts,. Initially, mapping of VMEs will necessarily amount to mapping of seamounts and other topographic features that have a high probability of supporting the biological communities listed in Table 1. Current maps of seamounts only show the distributions of large seamounts (> 1500m), notably that by Kitchingman & Lai (2004) (Figure 1). Further work is required to identify smaller seamounts, in accordance with the ecological definition in Table 1. Contextual information also needs to be added to GIS VME maps to identify vulnerable or diverse systems, and to provide a scientific basis for moves towards higher levels of protection for the more vulnerable systems, or development of proposals to protect certain proportions of each significant habitat type.

Figure 1. Distribution of potential seamounts predicted by satellite altimetry analyses (from Kitchingman & Lai 2004). This technique is thought able to detect seamount features with an elevation of 1,500m or greater.

It is, however, currently feasible to map the distribution of seamounts estimated to have suitable habitat for stony corals based on Environmental Niche Factor Analysis (ENFA) of global coral data (Clark *et al* 2006, UNEP CenSeam report) (Figure 2). This map provides an initial basis for determining whether proposed bottom fishing activities will impact upon habitat with 50% probability of supporting VMEs[2].

[2] Future work should emphasize options for obtaining additional information on type, characteristics, vulnerability and habitat classifications to improve and extend this identification and classification of VMEs. It is also important to consider the spatial, and possibly temporal, distribution of VMEs, and the associated potential distribution of biota. Typically, VMEs that are more isolated may have an increased likelihood of containing endemic fauna, compared to VMEs that occur as part of a chain, or closer to a land mass. Isolated VMEs should be considered to be more vulnerable to any fishing activities, and worthy of a higher level of protection.

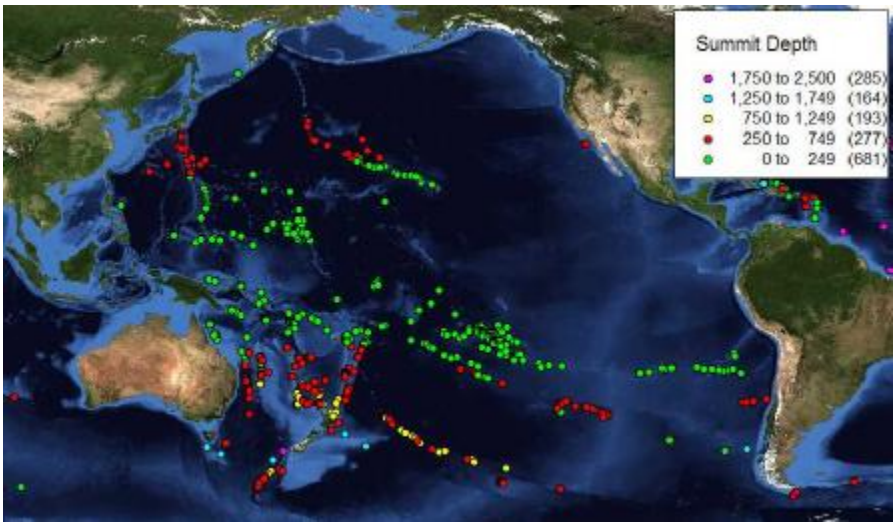

Figure 2. Distribution of seamounts considered to have suitable habitat for stony corals based on environmental factor analysis of coral data (Clark *et al* 2006). Seamount data from Figure 1 are used, with those shown here having stony coral habitat suitability 50% or greater. Estimated water depths of the seamount summits are colour coded.

5. Hierarchy of Bottom Fishing Impact

The provisions of the SPRFMO interim measures for bottom fishing apply to all bottom fishing methods. However, not all bottom fishing activities have the same expected severity, magnitude or extent of impact on seabed communities. Benthic communities are therefore differentially 'vulnerable' to the impacts of different bottom fishing gears.

The intent of UNGA Resolution 61/105 and the SPRFMO Interim Measures is clearly to minimise adverse impacts on the types of biological VMEs listed in Table 1. Concerns are mainly focused on the impact of moving fishing gears that are designed to, or are likely to, be dragged across the seabed during fishing, causing direct physical damage to habitat forming benthic species. Table 2 shows the hierarchy of expected impact (magnitude, extent and duration) ranking of the various bottom fishing gears.

Table 2. Hierarchy of expected extent and magnitude of impacts of various bottom fishing gears on the vulnerable marine ecosystems listed in Table 1.

Fishing Gear		Expected Impact
Active fishing gears	Bottom Dredge	High
	Benthic Trawl	High
	Bentho-Pelagic Trawl[3]	Med - High
Passive fishing gears	Set, Gill or Tangle Nets	Low - Med
	Trap and Pot Fishing	Low - Med
	Bottom Longlines	Low - Med
	Drop Lines	Low - Med

The SWG will explicitly take this hierarchy of expected impact into account when evaluating and commenting on assessments for proposed bottom fishing activities in the SPRFMO area.

[3] Bentho-pelagic trawl means any 'midwater' trawl net fished in such a way that it has a likelihood of coming into contact with the seabed at some time during the trawling operation.

6. Mapping of the SPRFMO Trawl Footprint

Trawling (benthic and bentho-pelagic trawling) is currently the main bottom fishing activity in the SPRFMO area. In terms of the hierarchy in Table 2, these methods are expected to have potentially high impact on VMEs. Efforts to map bottom fishing footprint areas, at least during the interim period, should therefore focus on trawling.

The SWG, working in cooperation with the SPRFMO Secretariat, shall develop and maintain an electronic geo-spatial map of a 'joint trawl footprint' for all participants in bottom fisheries in the SPRFMO area. The Secretariat should include information on EEZ boundaries, seabed bathymetry and the SPRFMO maps of VMEs in this geospatial database.

This joint footprint map is to be expressed as grid blocks of 20 minute resolution, with a 'fished' block being defined as any grid block partially crossed by at least one trawl track. The period 2002 to 2006 is to be used as the reference period for developing this joint trawl footprint map.

Participants should provide bottom fishing data at adequate resolution (tow-by-tow, 20 minute resolution) to generate this joint trawl footprint. The Secretariat shall be responsible for requesting these data, and for developing and maintaining the SPRFMO joint trawl footprint geospatial database and map, at the agreed grid block resolution. The trawl track data themselves shall not form part of the geospatial trawl footprint database.

Participants in trawl fisheries in the SPRFMO area will be required, in terms of the interim measures, to not fish outside of this joint trawl footprint, until 2010. The SWG will take this into consideration when evaluating the fishing plan component of assessments for proposed trawl fishing activities in the interim period.

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7. Proposed Benthic Assessment Sections

Each flag state wishing to conduct bottom fishing activities in the SPRFMO area after 30 September 2007 will be required to submit at least one assessment for their proposed bottom fishing activities for the coming fishing year, either submitting separate assessments per gear type, or making a clear distinction within assessments between the descriptions and evaluations of risks and impacts associated with each gear type to be used.

Benthic assessments submitted by flag states for evaluation and comment by the SWG will be expected to contain the following sub-sections:

7.1 Description of the Proposed Fishing Activities

Assessments shall contain a detailed fishing plan, providing a quantified description of the planned fishing activities, including:

- Fishing methods (trawls, hook and lines, traps, gillnets, tangle nets) to be used, including a description of gear plan of relevant aspects of the gear needed to evaluate potential impacts, such as net types, net dimensions, trawl-door type, size and weight, footrope dimensions and type, ground gear (bobbins, rock-hopper gear, etc), range in fishing height off bottom (for bentho-pelagic trawl gear), net opening and any gear selectivity issues.
- Depth range to be fished.
- Target species, and likely or potential by-catch species.

- Intended period and duration of fishing.
- Effort indices: How many vessels, how many tows (cumulative effects), estimated tow durations or distance (ranges).
- Estimated catch and discard quantities.
- Information on vessels to be used: Vessel numbers, sizes, GRT, horsepower, names, confirmation that they appear on the list of approved SPRFMO vessels, flags and callsigns. These vessels should appear on the list of approved vessels submitted by flag states to the SPRFMO Secretariat.

7.2 Mapping and Description of Proposed Fishing Areas

This section should present maps of the proposed fishing areas in relation to available information on VMEs and seabed bathymetry, as well as any additional available information describing the proposed fishing areas, including:

- Maps of the intended fishing areas, in relation to the joint trawl footprint.
- Localised mapping of the VMEs, or topographic features likely to support VMEs, in the proposed fishing areas[4].
- Description of the proposed fishing areas, presenting any available information which might be useful to assessing potential impacts (past history of fishing, seabed type, depth ranges, location / presence of any known seabed topographic features and VMEs).

The SPRFMO Secretariat will make the SPRFMO geospatial maps of VMEs, bathymetry and joint trawl footprint available to facilitate mapping of proposed fishing activities in context with this baseline geo-spatial information.

To facilitate evaluation of the relationship between proposed fishing areas, the joint trawl footprint and existing VME maps, Flag States should provide their maps for proposed fishing activities to the Secretariat in a compatible GIS format, for inclusion in the SPRFMO geo-spatial database.

7.3 Evaluation of Expected Interaction with VMEs and Ecosystem Impacts

This section should specifically address the expected and potential interaction and impacts of the proposed fishing gear on VMEs. Recognising that information may be limited, an attempt should nonetheless be made to address the following questions:

- What impacts are likely to occur ? All impacts should be identified, characterised and ranked. All interactions of fishing gear with the seabed will have some impact, but the nature and severity will be species / habitat dependant.
- What will the probability, likely extent (% of habitat targeted) and magnitude of the interaction between the proposed fishing gear / targeting practices on the VMEs in the proposed fishing areas be ?

[4] Initially, data may be limited to the VME baseline maps maintained by the SPRFMO Secretariat. However, over time, industry may be able to provide additional information to update the Secretariat VME maps based on industry acoustic surveys or observer information. These modifications may include addition of VMEs, or removal of areas incorrectly identified as likely VMEs. Flag states may also conduct more detailed bathymetric surveys. These may be followed with spot > regular > systematic sampling to assess the presence or absence of potentially vulnerable benthic fauna. The introduction of remote technologies may also be considered, such as towed camera platforms as a means of surveying prospective fishing grounds.

- Are the VME habitats which may be impacted biogenic (produced by living organisms or biological processes) or geological ? What areas do the habitat cover ? How widespread or rare are the habitats ? How fragile are the habitats ? What are the rates of natural disturbance in those habitats ?
- As far as possible, characteristics of the biota should be evaluated, including target species, by-catch species and benthic fauna. What are the key species in the VME ? How diverse is the system, and will the fishing activity affect just one faunal group or many ? What is the population structure of the faunal groups present - how will fishing activity impact on recruitment, age classes etc ? Are there any threatened species present, and what are the levels of endemism - could fishing lead to localised / global extinctions ? Are there any life history characters which may lead to fauna being more susceptible / sensitive to fishing - slow growing, long lived ?
- What are the likely consequences of interaction with fishing gear ? Consider both physical (damage to environment, loss of habitat) and biological (loss of keystone species, extinctions) impacts.
- What is the likely temporal scale of the consequences ? The scale of the consequence will be defined by the constituent parts of the VME. Loss of substantial areas of habitat forming coral could have a prolonged impact on the environment, whereas other faunal groups may be able to recover quickly. To the extent possible, rates of recovery, regeneration and re-colonisation should be quantified.
- Are there any other hazards: gear loss or ghost fishing, catch discards, effects on ecosystem functioning ?

7.4 Information on Status of the Deepwater Stocks to be Fished

This section should provide information on the state of the deepwater stocks of the intended target and main by-catch species. Such information could include:

- A list of the intended target and likely main by-catch species.
- Tables of historic catches and catch trends of these species in the intended fishing area.
- Tables, figures of analyses of historic nominal and/or standardised CPUE trends in these species.
- Results of any scientific assessment surveys conducted on the stocks to be fished.
- Results of the most recent stock assessments that have been conducted for the stocks to be fished, if any such stock assessments have been conducted.

7.5 Management and Mitigation Measures

This section should detail proposals for how the fishing activities will be planned and managed to avoid or minimise significant adverse impacts on VMEs[5], including:

- Description of gear selection, design, modification or deployment to prevent or reduce adverse impacts.
- The process to be used to detect evidence of fishing on VMEs, and the procedure to adhere to the SPRFMO requirement to move 5 nautical miles away from any VME detected while fishing. If this will be monitored by observers, then this should be cross-referenced in Section 7.6, and details provided on the information to be recorded by observers to document the presence of VMEs.

[5] See Shotton *et al*. (2006), Management of Demersal Fisheries Resources of the Southern Indian Ocean

7.6 Information Gathering and Reporting

This section should detail all data and information gathering and reporting systems that will be used to monitor the proposed fishing activities, catches and interactions with VMEs, including:

- Details of any VMS systems to be operated on vessels, including who these will report to, reporting frequency and reporting accuracy.
- Catch and effort data collection systems to be used, including catch and effort reporting systems to the flag states concerned, and additional systems to be implemented specifically for the proposed activity. These monitoring systems should specifically address how retained and discarded by-catches are to be monitored and reported. There should also be reporting systems in place to record whether a VME has been encountered during fishing.
- Details of any scientific observer coverage planned for the proposed fishing activity, including levels of coverage, how deployments will be designed to achieve statistically representative coverage of the proposed fishing activities, and what information observers will be collecting.
- Description of the data that will be provided to the SPRFMO Secretariat for the fishing activity including, as a minimum, data required in terms of any adopted SPRFMO standards, but also describing any other information (e.g. seabed bathymetry or mapping, VME identification and characterization) that may be provided.

7.7 Environmental Impact Assessment

A concluding Environmental Impact Assessment (EIA) section should present an overview and summary EIA, identifying all likely impacts on VMEs at each stage of the proposed fishing activity, and ranking each impact in terms of factors such as expected extent, severity and duration of the proposed fishing activity on VMEs. For all impacts ranked as being above moderate, proposed monitoring, mitigation and management measures to detect, measure, minimise, manage or prevent significant adverse impacts should be described.

The detailed SPRFMO Benthic Assessment Standard will provide recommendations on specific environmental assessment approaches and best practices to use in developing this EIA section[6]. In the interim, participants should refer to the following of EIA approaches, noting that this list is neither prescriptive nor exhaustive:

- ICES: There have been two main approaches to assessing the sensitivity of habitat to fishing: i) ranking sensitivity of habitat units (physical and biological) to disturbance; and ii) ranking the impacts of the gear. ICES conclude that these should be combined.
- NOAA EIS: Spatial and temporal analysis of the distribution of habitat type, distribution of biota, habitat use, habitat sensitivity, dynamics of fishing effort.
- MarLin: Approach consists of i) Identify “key / important” species in habitat/biotype; ii) Assess biotype sensitivity based on key species; iii) Assess recoverability of key/important species (Tyler-Walters *et al.* 2001).

[6] The primary role of the SWG will be to critically evaluate this impact assessment against the standard, and to comment on whether the indicated impact rankings are appropriate or not. The SWG will need to work towards adopting an appropriate ranking system for these EIAs, and to identify the best risk management technique. Definition of a habitat classification system for SPRFMO area deepwater habitats will contribute substantially to developing an effective final standards framework.

- Sensmap: A sensitivity index for benthic species or habitat to physical disturbance from fishing has been adapted to include chemical contamination and other environmental disturbance. Sensitivity is assessed based on intolerance to the disturbance (fragility of biota and intensity of fishing) as well as ability to recover. Sensmap uses the UK Marine Habitat Classification (MacDonald *et al.* 1996). Similar to MarLin.
- Canadian and US Framework: Damage schedule approach which ranks the severity of fishing gear impacts on a binary questionnaire (Chuenpagdee *et al.* 2003).
- CSIRO Ecological Risk Assessment for Effects of Fishing: ERAEF is a hierarchical framework that moves from a Level 1 qualitative analysis through to a more focussed semi-quantitative Level 2 to Level 3 which is model based and fully quantitative. This approach leads to a rapid identification of high risk activities, and evaluation of how fishing impacts on ecological systems (Hobday *et al.* 2007).
- UK Department for Environment, Food & Rural Affairs (DEFRA) Guidelines for Environmental Risk Assessment and Management.

The effects of frequency of disturbance may have been overlooked to some extent in prior frameworks, and may require specific consideration. Additionally the use of Strategic Environmental Assessments (SEA), which focus on larger-scale programmes rather than individual activities, could be considered.

8. References

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Annex 4

Proposed Process for Preparation and Evaluation of Benthic Assessments for Proposed Bottom Fishing Operations in the SPRFMO Area

Category		Task	Timeframe	Responsibility
Preparatory Phase	1	• Agree that key science representatives from each flag state are to be responsible for conducting inter-sessional evaluations of benthic assessments. • Agree on interim SPRFMO Benthic Assessment Framework to be implemented after 30 September.	Done at the SPRFMO4 meeting, Noumea, New Caledonia.	SPRFMO SWG
	2	• Preparation of the SPRFMO geospatial VME, joint trawl footprint, bathymetric and EEZ boundary geo-spatial database.	Immediately after SPRFMO4 meeting.	SPRFMO Interim Secretariat (Assisted by the SWG and Flag States)
Annual Assessment and Review Process	3	• Preparation of benthic impact assessments for proposed bottom fishing operations in the SPRFMO Area, in accordance with the SPRFMO Benthic Assessment Framework (or the Benthic Assessment Standard, once adopted). • Submit benthic impact assessments to the SPRFMO Secretariat, for forwarding to the SWG.	Required for any bottom fishing after 30 September 2007. To be prepared and submitted before fishing commences. (Fishing may proceed in accordance with the management and mitigation measures proposed in the assessments while the assessments are evaluated by the SWG)	Flag States
	4	• Assessments submitted to the nominated SWG key scientific representatives for evaluation and comment. • Assessments also to be posted on the SPRFMO	Immediately upon receipt from Flag States. Public comment required within	SPRFMO (Interim) Secretariat

		website for public comment, and notification of each posting to be sent to other SPRFMO flag states. • Receive, collate and provide public comments on benthic assessments back to the SWG key scientific representatives.	30 days of posting. Public comments received are to be provided to SWG key representatives immediately after 30 days commentary period.	
	5	• Evaluate and prepare comments on submitted assessments. • Provide written comments back to flag states, through the Secretariat.	Within 60 days of receiving Flag State assessments from the Secretariat.	SPRFMO SWG
	6	• Provide SWG comments back to the flag state, and notify other flag states of the SWG comments on each assessment. • Post SWG comments on assessments on the SPRFMO website.	Immediately upon receipt of comments from the SWG.	SPRFMO (Interim) Secretariat
Flag State Response	7	• Respond to comments or questions received from the SWG.	?	Flag States
Ongoing Improvement and Review Process	8	• Agree on detailed SPRFMO Benthic Assessment Standard. • Periodically review and update the Benthic Assessment Standard and Process.	Once this has been drafted (about mid-2008). At annual SWG meetings.	SPRFMO SWG
	9	• Review performance of the SWG Benthic Assessment Standard and Process, and SWG assessment evaluations conducted. • Determine objectives for SWG to use in future evaluations of bottom fishing benthic assessments.	Once SPRFMO Commission established.	SPRFMO Commission

Annex 5

Information describing black cardinalfish (*Epigonus telescopus*) fisheries relating to the South Pacific Regional Fisheries Management Organisation

Overview

Black cardinalfish (*Epigonus telescopus*) are widely distributed in the North Atlantic and South Atlantic, Indian, and Southwest Pacific Oceans.

They are found at depths of 75–1200 m and caught mainly by deepwater bottom trawl as bycatch of fisheries targeting alfonsino or orange roughy.

Unvalidated otolith readings from the South Pacific indicate that black cardinalfish is relatively slow-growing and long lived. The juveniles are pelagic and undergo major ontogenetic changes. Little is known of adult movements. Reproductive biology is not well known. There is no information on black cardinalfish stock structure as data is lacking on genetics, distribution of spawners, and adult movements.

Black cardinalfish are typically by-catch of fisheries targeting alfonsino (*Beryx splendens*) (characteristically >400 m) or orange roughy (typically about 800 m). Since 1992 large catches of black cardinalfish have been taken on the high seas on the Northern Challenger Plateau and the southern Lord Howe Rise.

The main method used to catch black cardinalfish is a high-opening trawl generally fished hard down on the bottom. Trawling for this species on seamounts impacts habitat, but the precise impact of this on the black cardinalfish populations or other species on the seamounts is unknown.

Black cardinalfish is a deepwater species with limited habitat in the high seas area of the South Pacific and assumed low resilience to fishing pressure. Given their longevity and late maturation the biological productivity of black cardinalfish is likely to be low.

There are currently no known management measures in place for black cardinalfish on the high seas..

Annex 6

Information describing alfonsino (*Beryx splendens*) fisheries relating to the South Pacific Regional Fishery Management Organisation

Overview

Beryx splendens, Lowe, 1834, has a circum-global distribution, from about 65° N to 43° S, excluding the northeast Pacific Ocean. It inhabits the outer continental shelves and slopes, and is often associated with seamounts.

Target fisheries for *B. splendens* have occurred in the South Pacific from the early 1980s to the present day.

The basic biology of *B. splendens* is reasonably well known, although aspects of their reproduction and stock structure are still poorly understood.

The biological productivity of *B. splendens* is likely to be moderate to low.

The main method used to catch this species is a high-opening trawl generally fished hard down on the bottom. Trawling for this species on seamounts impacts habitat, but the precise impact of this on the alfonsino populations or other species on the seamounts is unknown.

There are currently no known management measures in place for *B. splendens* on the high seas.

Annex 7

Information describing bluenose (*Hyperoglyphe antarctica*) fisheries information relating to the South Pacific Regional Fisheries Management Organisation

Overview

Bluenose (*Hyperoglyphe antarctica*) has a southern ocean distribution, from about 25°–55° S, from the South Atlantic across the Indian Ocean, to the southwest Pacific. It is most common over rocky areas in depths of 200–750 m, and is often associated with seamounts. Target fisheries for bluenose have occurred in the South Pacific from the early 1980s to the present day.

Relatively little is known about spawning aggregations and migratory movements for this species. Tagging survey data indicate that bluenose may be generally sedentary in the short term (6-8months), although age specific migration may occur.

Bluenose appear to prefer cold water as part of their habitat characteristics. Schools of relatively small adults (50–60 cm) are occasionally taken by trawl over smooth, muddy substrates.

Maximum recorded size is 140 cm fork length; females reach a larger size than males. Age and growth have been investigated in New Zealand and Australian specimens, but an ageing method has yet to be validated. However, analyses of bomb ^{14}C in otoliths indicates that maximum age for the species is at least 25 years.

Spawning occurs off Tasmania from late summer to autumn, but the aggregations can begin to form some months before spawning starts. No confirmed spawning areas have yet been identified in or around the New Zealand EEZ.

Relationships between the Australasian stocks of bluenose and those beyond the EEZs are unknown.

Biological productivity is moderate. There are no available estimates of stock size, biomass or fishing mortality.

There are currently no known management measures in place for bluenose on the high seas.