International Consultations on the Establishment of the South Pacific Regional Fisheries Management Organization
Third International Meeting

REPORT OF THE SCIENCE WORKING GROUP

Reñaca, CHILE
25 – 27 April 2007

1. Welcome & Introductions

The meeting of the interim Science Working Group (SWG) was opened by the nominated Chair, Mr Neville Smith, co-convenor for New Zealand, who welcomed all participants. Participants introduced themselves. (The full list of participants is attached in Annex III)

2. Adoption of Agenda

The Chair noted some minor modifications to the agenda since circulation of the original draft prior to the meeting. Dr Alexander Glubokov noted that the content of the joint presentation by Russia / EC / Ukraine had changed and no longer dealt only with jack mackerel. He suggested that this be presented before the discussions on jack mackerel under agenda item 6. The presentation was moved to the first item under agenda item 6, and the revised agenda was then adopted (Annex I).

3. Administrative Matters

3.1 **Documents Available**

The Chair drew the meeting's attention to SPRFMO-III-SWG-00, the document list for the meeting, and indicated which documents had been made available in printed form, and which were only available in electronic format on the SPRFMO website. Three additional documents were added to the list: a NZ National Data Report, an Australian National Report and a working paper on data inventory. (The final documents list is attached in Annex II)

3.2 **Meeting Arrangements**

Details of logistical arrangements were presented by the meeting secretariat. The Chair outlined a proposed schedule for dealing with the items on the agenda.

3.3 **Nomination of Rapporteurs**

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

4. Review of Intersessional Work Programme

4.1 Progress Against Scientific Work Programme

Progress against the items listed in the scientific work programme from the previous meeting of the SWG was noted and discussed. Considerable progress that had been made on updating of templates, following up on information offers, developing species profiles, developing a template for provision of historic data (in cooperation with the D&IWG), developing profiles for seamounts and seabirds and developing a list of habitats and associated and dependent species.

4.2 Outstanding Tasks

A list was developed of items that were incomplete or had not been commenced and these were carried forward to be discussed under Agenda item 10.2, Future Work Programme. Main outstanding items include completing species profiles e) – k), developing profiles for ridges / plateaus and corals.

Further progress was made at the meeting on developing research proposals and proposing a research and assessment workshop for jack mackerel.

5. Species Profiles, Associated and Dependent Species Profiles and Habitat Profiles

5.1 Review of Existing Profiles

Review of Templates

The meeting reviewed the current SWG templates for preparation of species profiles (SPRFMO-III-SWG-05), associated and dependent species profiles (SPRFMO-III-SWG-06) and habitat profiles (SPRFMO-III-SWG-07).

The SWG noted that, when determining categorical rankings for factors such as biological productivity, it is important to provide quantitative information (such as actual growth rates) and references in support of the rankings given. Where uncertainty or alternate results exist, it is also important to report the uncertainty, or the range of results. Where the answer is unknown, it is better to report it as unknown, rather than allocate a ranking without supporting evidence.

Review of Profiles

The Chair noted that the intention in reviewing the current profiles was to identify major omissions or errors, and particularly to determine whether the overviews in each profile were suitable to be included in the SWG report as summaries of current SWG views regarding characteristics and status of the species concerned. Profiles requiring amendment would be included in the future work programme.

The meeting discussed the status and future revision process for profiles, and recommended that:

- Once finalised and agreed, all profiles should be compiled into a SWG Report, to be published by the future SPRFMO as a benchmark on characteristics and status of the various species, associated species and habitats.
- SWG meetings should then only update the overview statements for each profile annually, to be included in SWG meeting reports, focussing specifically on presenting updated or improved information on description of fisheries, species biology, status of the stocks and other aspects on which recent scientific progress has been made.
- Major reviews and amendments to the compilation of detailed profiles should be conducted periodically, perhaps every 5 years, to update the benchmark report with all the annually updated information gathered since the last profile update.

The species profile template will also be updated to show general changes relevant to all species, including:

  - Where multiple ageing studies have provided conflicting results, information should be provided on ageing and validation methods to allow the relative reliability of these studies to be judged.
  - References to productivity related to growth rates, etc. should be explicitly referred to as biological productivity.
  - Where stock structure is uncertain, and pending the outcome of future studies to develop and adopt working stock structure hypotheses, references to ‘stocks’ or

'state of stocks' should refer to 'assumed' stocks, or to specific regions where assessments were conducted.

The meeting then reviewed the draft species profiles that had been completed to date:

- ***Chub Mackerel (Scomber japonicus) Profile*** (SPRFMO-III-SWG-08a)

  Key points noted during discussion of the draft chub mackerel profile included:

  - Future research requirements need to be documented, perhaps in cooperation with identification of research needs for jack mackerel.

- ***Jumbo Flying Squid (Dosidicus gigas) Profile*** (SPRFMO-III-SWG-09)

  Key points noted during discussion of the draft *D. gigas* profile included:

  - Chinese Taipei has started a squid jigging fishery on the high seas off Peru since 2002, and supplied information during the meeting.

- ***Neon Flying Squid (Ommastrephes bartrami) Profile*** (SPRFMO-III-SWG-10)

  No major changes were proposed for the *O. bartrami* profile.

- ***Purple-Back Flying Squid (Sthenoteuthis oualaniensis) Profile*** (SPRFMO-III-SWG-11)

  No major changes were proposed for the *S. oualaniensis* profile.

- ***Rock Lobster (Jasus caveorum) Profile*** (SPRFMO-III-SWG-12)

  Key points noted during discussion of the draft *J. caveorum* profile included:

  - Catch data for this species had been provided in the New Zealand national report, and should be included in this profile.

- ***Rock Lobster (Projasus parkeri) Profile*** (SPRFMO-III-SWG-13)

There is currently no fishery for this species, and it only constitutes a potential future fishery.

- ***Orange Roughy (Hoplostethus atlanticus) Profile*** (SPRFMO-III-SWG-14)

This profile was extensively updated a few weeks prior to the meeting to reflect comments received. Key points noted during discussion of the draft *H. atlanticus* profile included:

  - It would be useful to insert a figure of orange roughy catches in the central and eastern south Pacific, if available.
  - This profile contains an example of presentation of information useful to understanding relative reliability of alternate ageing studies.
  - It should be emphasized that separate orange roughy stocks are recognized at very small spatial scales in relation to the global distribution of the species, such as in association with small groups of seamounts.
  - Additional catch information presented in the Australian national report should be included, as well as results of the most recent Australian assessment for orange roughy on the South Tasman Rise.
  - It should be noted that orange roughy were classified in 2006 as "*Conservation Dependent*" in terms of Australian domestic legislation, and made subject to a conservation programme.

- ***Chatham Albatross (Thalassarche eremita) Profile*** (SPRFMO-III-SWG-15)

In recognition of the IUCN classification of this seabird as "critically endangered", Chatham albatross has been included as the first associated species profile.

- ***Seamount Habitat Profile*** (SPRFMO-III-SWG-16)

It was agreed that the draft template for habitat profiles should be updated to reflect the structure developed in compiling this first habitat profile for seamounts. Key points noted during discussion of the draft seamounts habitat profile included:

  - Additional information on historical Russian seamounts research should be included once this has been published.
  - A definition of what constitutes the base area of seamount features should be included, if available.

- ***Requirement for Stock Discrimination Hypotheses***

In general discussion, the SWG recognised the critical importance of developing and agreeing on stock structure and stock discrimination hypotheses upon which to base future assessments. Specific proposals made to address this need included:

- Interim stock structure hypotheses will need to be developed as a basis for future assessments of the species concerned, until the SWG agrees to change these stock structure assumptions.
- Additional future research is needed to provide new data and information required to fill gaps in current knowledge regarding stock structure.

5.2 Identification of Additional Data Sources for Updating Profiles

No significant new data sources were identified, but any new data items relevant to aspects of a particular species were noted during the review of each species profile.

5.3 Prioritisation of Further Species Profile Development

The SWG noted a number of previously identified profiles that still require development, and a few additional profile groups for consideration:

- Continue developing species profiles e) – k) (oreos, alfonsino, pelagic armourhead, bluenose, toothfish, cardinalfish and wreckfish).
- Consider inclusion of appropriate bycatch and associated and dependent sharks in the list of species profiles.
- Consider whether profiles are required for any other associated or dependent species.

6. Jack Mackerel Fishery Overview

6.1 Report from Russia/EC/Ukraine

A presentation was made by the Russian Federation (SPRFMO-III-SWG-19) on the scientific objectives of the proposed SPRFMO, work required, the results of previous studies, and suggested priorities for future scientific work. The presentation again emphasized the importance of conducting additional scientific work across the entire proposed high-seas convention area to provide information needed to develop robust stock structure hypotheses for jack mackerel and chub mackerel, to use as a basis for future assessments.

6.2 Report from Chile

Chile presented a comprehensive overview of the research conducted and the results of a recent statistical catch-at-age stock assessment conducted by them for the assumed Chilean jack mackerel stock in the area from the northern Chilean border to 45° S within the EEZ, and out 105°W between 35° S and 45°S (SPRFMO-III-SWG-18 & SPRFMO-III-SWG-20). In terms of this assessment the spawning biomass in this area was estimated to be 5,500,000t, with a confidence interval 2,000,000t – 8,900,000t in 2005. The stock was considered to be fully exploited, with current biomass near the target reference point of $B/B_0 = 40\%$, and the corresponding $F/F_{B40\%} = 1.25$.

The SWG noted the need to consider what effects oceanographic changes (such as El Niño phenomena) may have had on spawner-biomass estimates from egg production among other things, or annual recruitments. It was also noted that that the presentation contained useful information which could be used to update the jack mackerel profile.

The information in the presentation, and underlying data and analyses, should also be provided to the proposed workshop on jack mackerel stock structure.

6.3 Jack Mackerel Species Profile Update

The species profile (SPRFMO-III-SWG-16) was reviewed and agreed amendments and additions were noted for incorporation into the next version of the document. It was also agreed that there were additional data to be incorporated, and some reworking of sections that was required, but that these tasks would be most efficiently accomplished by intersessional work.

6.4 Future Research and Assessment

A research proposal from Chile for multi-disciplinary study of the population structure of jack mackerel (SPRFMO-III-SWG-21) was presented and discussed. There was general support for such a project including for the proposal to use a multi-disciplinary approach to address the question. The SWG agreed that further intersessional work was needed to expand and add more specific detail to the proposal regarding aspects such as research cruise proposals, survey and sample collection design, analysis methods and standards and inter-laboratory calibration.

A *Jack Mackerel Stock Structure Task Team* to conduct this inter-sessional research proposal development work was appointed under joint convenorship of Dr Serra and Dr Glubokov. It was noted that membership of this task team was open to any SPRFMO science participant who wished to contribute to the process. Initial interest in

participating in development of this proposal was expressed by Chile, the Russian Federation, New Zealand, China, Korea and the fishing entity of Chinese Taipei. The purpose of this task team would be to:

- Consider and expand the initial project proposal presented in SPRFMO-III-SWG-21.
- Specifically consider details under various components of the proposal regarding proposed research cruises, survey and sampling design, sample and data collection protocols, sample and data analysis methods and standards and inter-laboratory calibration.
- Present a detailed project proposal to the proposed jack mackerel workshop for review and finalisation.

The SWG also recognised the need to conduct a special *Jack Mackerel Stock Structure and Assessment Workshop* to specifically discuss and develop agreed working hypotheses on jack mackerel stock structure, and to the consider joint assessment requirements and inputs under such stock structure hypotheses. The SWG recommended that the project proposal produced by the Jack Mackerel Task Team also be reviewed and finalised by the proposed workshop.

The objectives of the proposed workshop would be:

- To review all available information for south Pacific jack mackerel, and to develop a working hypothesis / hypotheses regarding jack mackerel stock structure in the region.
- To review available data and information available for use in jack mackerel stock assessments, and to agree on data inputs, biological parameters and assumptions to use in joint stock assessments of the jack mackerel stocks discriminated under the working hypotheses developed at the workshop.
- To review and finalise the project proposal prepared by the *Jack Mackerel Stock Structure Task Team*.

The terms of reference and tasks to be conducted by the task team and at the workshop need to be refined and agreed inter-sessionally. This should be done fairly rapidly, within a month or two.

With regard to organisation, it was noted that the proposed workshop would benefit from outside participation of independent experts on matters such as stock structure discrimination and assessment of species such as jack mackerel. The SWG suggested that the workshop be hosted by one of the parties to the SPRFMO negotiations, in

cooperation with the FAO. An offer by Chile to host the workshop, and to approach the FAO in this regard, was welcomed by the SWG.

With regard to timing, the SWG noted that it would take some time to finalise the jack mackerel stock structure research proposal and for prospective participants to evaluate their potential data inputs to the workshop. The workshop would specifically benefit from provision of historic catch and effort data in terms of the historic catch and effort data template agreed at the recent joint meeting of the SWG and D&IWG. (See Section 9.1 for additional details)

After considering other commitments of prospective participants, the SWG suggested that the workshop preferably be held between late Oct 2007 and Feb 2008.

6.5 Sub-Group Establishment

There was support for the establishment of a separate jack mackerel subgroup but the details of its convenor, degree of autonomy and work program are yet to be decided. These matters could be usefully be progressed at the proposed jack mackerel workshop.

An organisational chart of proposed interim and future SPRFMO science structures and processes was produced to illustrate expected relationships, status, composition, meeting frequency and purpose of structures like the SWG or Science Committee, Working Groups and Workshops, and is attached in Annex XV.

The meeting noted that, while a jack mackerel workshop had been proposed, a convenor for this workshop still has to be identified. Similarly, while the need for a jack mackerel sub-group was agreed to, a convenor was required for this group also. It was specifically noted that, given the increasing workload that will result from a specific jack mackerel sub-group, the convenor of that group could not be the Chair of the SWG.

With regard to proposed future science structures under a Commission, these ideas would need to be considered at Commission level. Only at that time will it be necessary to give attention to aspects of terms of reference, composition, chairmanship and rules of procedure for any future Science Committee and permanent science Working Groups.

7. Future Scientific Work Programme

7.1 Requirements for 30 April to 04 May 2007

The meeting concluded that there would be no need for any formal sessions of the SWG during the Negotiations. However, if possible, progress should be made in informal discussions on:

- The Terms of Reference and task list for the work of the jack mackerel stock structure research proposal task team being co-convened by Dr Serra and Dr Glubokov.
- A draft framework, and assistance with preparing a submission from Chile to the FAO requesting their assistance, for the proposed *Jack Mackerel Stock Structure Workshop & Assessment Workshop.*

7.2 Short and Medium Term Science Requirements

Science Requirements from this Meeting

A number of specific future science requirements were identified under various agenda items discussed above:

- Continue developing species profiles e) – k) (oreos, alfonsino, pelagic armourhead, bluenose, toothfish, cardinalfish and wreckfish).
- Consider inclusion of appropriate bycatch and associated and dependent sharks in the list of species profiles.
- Consider whether profiles are required for any other associated or dependent species.

With regard to science processes required to support research on jack mackerel, the SWG noted the specific progress and recommendations made at this meeting relating to designing a comprehensive multi-lateral, multi-disciplinary research programme, and conducting a specific stock structure and assessment workshop, to address immediate jack mackerel stock structure and assessment research needs.

Interim Implementation of Scientific Observer Programs

Noting the serious lack of scientific information for the high-seas in the proposed SPRFMO convention area, the SWG recognised an urgent need to implement scientific observer programs in this area. It was noted that the D&IWG had already identified an inter-sessional activity to develop draft standards for scientific observer programs in the

proposed SPRFMO convention area, but that these would take at least a year to develop. Pending development of these standards, information which should be collected by interim scientific observer programs should include:

- Effort data relevant to the fishing method (as per *SPRFMO Draft Standards for Collection, Reporting, Verification and Exchange of Data* Annexes 1, 2 and 3).
- Catch composition data for all species, including retained and discarded by-catches.
- Size-frequency information and otoliths for principal catch species, particularly for jack mackerel.
- Incidental catches and mortalities of associated species.

General Science Requirements

Requirements for robust peer-review of the science work were specifically being addressed for the proposed jack mackerel workshop by proposing the involvement of the FAO and independent scientific experts on stock structure and assessment. The SWG noted the likely future value of retaining some form of independent expert involvement in future SPRFMO science processes, particularly assessments.

The SWG will need to wait for a mandate from the Negotiations before being able to respond regarding science processes required to support interim measures. However, the SWG noted that the proposed science structures illustrated in Annex 15 are designed to be able to deal with any likely future SPRFMO science requirement.

8. Preparation of SWG Report

8.1 Overviews from Species Profiles

The overview sections of the species profiles were agreed during consideration of each profile under agenda item 5.1. These overviews are appended to this report as Annexes IV -XIII.

8.2 Report Back to Negotiations

The meeting identified the most important items to be highlighted in the SWG report-back to the Negotiations.

9. Any Other Business

9.1 Cooperation with the D&IWG

It was noted that a joint meeting had been held earlier between the SWG and the D&IWG, at which a draft template for submission of historic catch and effort data had been jointly prepared. Revisions to the draft were made as agreed at the joint meeting, and the revised data submission template is attached in Annex XIV. The Chair reminded the meeting that a deadline of 31 July had been agreed for notification of proposed revisions to this template.

The SWG proposed that, should no changes be received, the template should be considered to be adopted after 31 July in its current form. Otherwise, changes would be agreed inter-sessionally and the revised template adopted. As noted in the report of the DIWG, historic data submission should be required in terms of the final template by 30 September 2007.

9.2 National Reports

It was noted that Australia and New Zealand had provided national reports to this year's SWG meeting. There was general agreement that annual national reports would provide a useful mechanism for providing overviews of fisheries-related information to annual SPRFMO meetings.

From the science perspective, such reports could usefully provide summaries of information related to changes in fishing fleet composition and fishing areas, summaries of fishing effort and catches by species, overviews of research activities conducted and information on implementation of scientific observer programs in the preceding year.

It was not clear what emphasis should be placed on this matter under the current interim arrangements. However, it was noted that it would fall within the role of the negotiation process or future Commission to discuss the requirement and standards for annual national reports.

9.3 Chair of the SWG

The Chair of the SWG noted his intention to step down from his position following this meeting. There was agreement that New Zealand continue in the position of Chair, and Mr Andrew Penney was recommended as Chair of the next meeting of the SWG.

10. Future Work Programme

Elements of the future work programme of the SWG are contained in various sections of this report. (See Sections 5.1, 6.3, 6.4, 6.5, 7 and 9.1 for additional details)

11. Adoption of Report

The report was adopted by consensus.

The Working Group thanked the Mr Neville Smith for his hard work throughout the meeting and during meeting preparations.

ANNEX I

AGENDA – SCIENCE WORKING GROUP
Reñaca, CHILE, 25 – 27 April 2007

1. Welcome & Introductions

2. Adoption of Agenda

3. Administrative Arrangements
- 3.4 Documents available
- 3.5 Meeting arrangements

4. Review of intersessional work programme
- **4.3** Progress against scientific work programme
- **4.4** Outstanding tasks

5. Species profiles, associated and dependent species profiles and habitat profiles
- **5.4** Review of existing profiles
- **5.5** Identification of additional data sources for updating profiles
- **5.6** Prioritisation of further species profile development

6. Jack mackerel fishery overview
- 6.6 Report from Russia/EC
- 6.7 Report from Chile
- 6.8 Jack mackerel species profile update
- 6.9 Future research and assessment
- 6.10 Sub-group establishment

7. Future scientific work programme
- 7.3 Requirements for 30 April to 04 May
- 7.4 Short & medium term science requirements

8. Preparation of SWG report
- 8.3 Summary statements from species profiles
- 8.4 Report back to negotiations

9. Any other business
10. Future work programme
11. Adoption of report

SCIENCE WORKING GROUP
Document List

SPRFMO-III-SWG-00: SWG Document List for Third Negotiating Session

SPRFMO-III-SWG-01: Draft SWG agenda for 25 – 27 April 2007 meeting

SPRFMO-III-SWG-01a: SWG Agenda for 25 – 27 April 2007 meeting

SPRFMO-III-SWG-02: Annotated SWG agenda for 25 – 27 April 2007 meeting

SPRFMO-III-SWG-03: Schedule for SWG 25 – 27 April 2007 meeting

SPRFMO-III-SWG-04: SWG Work programme II (second intersessional period)

SPRFMO-III-SWG-05: Species profile template

SPRFMO-III-SWG-06: Associated and dependent species profile

SPRFMO-III-SWG-07: Habitat profile

SPRFMO-III-SWG-08: Draft chub mackerel profile

SPRFMO-III-SWG-08a: Revised chub mackerel profile

SPRFMO-III-SWG-09: Final *D. gigas* profile

SPRFMO-III-SWG-10: Final *O. bartrami* profile

SPRFMO-III-SWG-11: Final *S. oualaniensis* profile

SPRFMO-III-SWG-12: Revised *J. caveorum* profile

SPRFMO-III-SWG-13: Revised *P. parkeri* profile

SPRFMO-III-SWG-14: Revised orange roughy profile

SPRFMO-III-SWG-15: Final *T. eremita* profile

SPRFMO-III-SWG-16: Revised jack mackerel profile

SPRFMO-III-SWG-17: Draft seamount profile

SPRFMO-III-SWG-18: Report from Chile on jack mackerel research and stock assessment

SPRFMO-III-SWG-18a: *Presentation on* Report from Chile on jack mackerel research and stock assessment

SPRFMO-III-SWG-19: *Presentation* (Glubokov et al.): Objectives of science in functioning of RFMO in relation to the establishment of a new organization in the South Pacific

SPRFMO-III-SWG-20: Data inventory for jack mackerel stock assessment

SPRFMO-III-SWG-21: Jack mackerel stock structure research proposal

SPRFMO-III-SWG-21a*: Presentation on* Jack mackerel stock structure research proposal

SPRFMO-III-SWG-22: Catch history template developed with D&I WG

SPRFMO-III-SWG-23: New Zealand National Data Report

SPRFMO-III-SWG-24: Australian National Report

SCIENCE MEETING - LIST OF ATTENDANTS

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Reñaca, CHILE, 25- 27 APRIL 2007

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Information describing chub mackerel (*Scomber japonicus*) fisheries relating to the South Pacific Regional Fishery Management Organisation

Overview

Scomber japonicus, Houttuyn, 1782, has a widespread pelagic distribution, primarily coastal. It also occurs to a lesser extent in the epi-pelagic and meso-pelagic over the continental slope. In the South Pacific the species is generally restricted to the eastern areas (it is replaced by the morphologically and ecologically similar *Scomber australasicus* in the west). It only appears to occur on the high seas of the South Pacific at the southern end of its range in the Southeast Pacific. The species occurs from the surface to about 250 or 300 m depth.

In the South Pacific *S. japonicus* catches are usually associated with the jack mackerel (*T. murphyi*) fishery and the species is generally taken as a commercially important bycatch in that fishery rather than as a target species in its own right.

Global landings of *S. japonicus* reached their peak (3 412 602 t) in 1978; since then they decreased to a low of 963 302 t in 1991 but, in the recent years, have slightly increased up to 1 556 888 t in 1995. The total global landings reported for this species by FAO for 1999 was 1 955 053 t.

Reported South Pacific (FAO Area 87) landings also peaked in 1978 (835,958 t), falling as low as 44,115 t in 1994 and increasing back up to 527,729 t in 1999 (27% of the global total in that year). Landings remained high from 2001 to 2004 (393,000 t to 699,000 t), but recent information from Chile, Peru and Ecuador suggests landings are at the lower end or below that range in 2005 and 2006.

Growth and physical characteristics of *S. japonicus* are reasonably well known, but the general biology of the species especially as it relates to stock structure and spawning are less well known.

The biological productivity of *S. japonicus* is likely to be moderate. The species is preyed upon by a large range of species and *S. japonicus* forms an important trophic link between production levels and top predators.

There has only been one recent assessment conducted for chub mackerel (by Chile in 2005). This covered the area from the northern Chilean border to 40° S within the EEZ, and out 84°W between 33° S and 40°S. The spawning biomass in this area was estimated to be 985,000t, with a confidence interval of 835,000t – 1,150,000 t in 2004. There have been no other assessments conducted on chub mackerel in the high seas proposed convention area.

There are currently no known management measures in place for *S. japonicus*.

The species profile upon which this summary is based is a living document. It is a draft report and requires additional information to complete.

Note: The full species profile for chub mackerel is available at
http://www.southpacificrfmo.org/working-groups/public/current-work/

Information describing jumbo flying squid (*Dosidicus gigas*) fisheries relating to the South Pacific Regional Fishery Management Organisation

Overview

Dosidicus gigas is the largest ommastrephid squid and occurs only within the Eastern Pacific Ocean from northern California to southern Chile. Within the equatorial area the range is stretched westward as a strip, narrowing to the west and reaching 140˚ W (Figure 1). *D. gigas* supports a major fishery off Chile, Peru and the Gulf of California, with combined cephalopod landings of 772 156 tonnes in 2004 (FAO 2004). *D. gigas* is monocyclic and dies after spawning, therefore populations are highly variable. The abundance of *D. gigas* is thought to be largely influenced by environmental variables such as ENSO events. During El Nino years populations have decreased and landings have reflected this by declining sharply.

The Chilean fishery for *D. gigas* is small and generally the result of bycatch, occurring predominantly within the EEZ. The Peruvian and Korean fisheries are the largest within the South Pacific, starting in 1991 and 1977 respectively. *D. gigas* are mainly caught by jigging at night with large lights to attract the squid.

D. gigas are fast growing and relatively short lived therefore biological productivity is high and extractions can potentially be large.

With their ~1 year lifespan, every *D. gigas* squid fishing season is based on incoming recruitment which is highly dependent on environmental conditions and typically variable. Accordingly, it is not possible to calculate reliable yield estimates from historical catch and effort data.

Squid jig is a very selective fishing method. The extent of the adverse impacts on the ecosystem from squid fishing is unknown. However, as with any large extraction of resources from the system, ecosystem effects are likely. The loss of fishing gear from squid fisheries may also have some minimal adverse effect. There is likely to be negligible damage to the habitat due to the fishing methods employed.

There are currently no known management measures in place for *D. gigas*.

The species profile upon which this summary is based is a living document. It is a draft report and requires additional information to complete.

Note: The full species profile for jumbo flying squid is available at
http://www.southpacificrfmo.org/working-groups/public/current-work/

Information describing neon flying squid (*Ommastrephes bartrami*) fisheries relating to the South Pacific Regional Fishery Management Organisation

Overview

Ommastrephes bartrami is the most broadly distributed species in the family Ommastrephidae with a circum-global distribution. *O. bartrami* is found in subtropical and warm temperate waters of all oceans except the Southeast Pacific. It is most prominent in the North Pacific, off the east coast of Japan and the west coast of USA. Within ocean basins the distribution of *O. bartrami* is patchy and highly aggregated.

O. bartrami is a large oceanic squid which schools at the surface at night. Little is known about their spawning behaviour. Spawning in Australian waters is thought to occur in spring to summer and over the continental shelf. *O. bartrami* matures between the ages of 7-10 months and has an estimated life span of ~1 year.

There is no information on migratory movements within the South Pacific, however in the North Pacific, *O. bartrami* make an annual round-trip migration between subtropical spawning grounds and northern feeding grounds near the sub-arctic boundary. There is no information about population structure within the South Pacific Ocean.

O. bartrami is fast growing and relatively short lived therefore biological productivity is high and extractions can potentially be large. The abundance of *O. bartrami* is highly variable and highly correlated with environmental variables. Extremely low squid abundances have been correlated with El Nino events.

With their 1 year lifespan, every *O. bartrami* fishing season is based on incoming recruitment which is highly dependent on environmental conditions and typically variable. Accordingly, it is not possible to calculate reliable yield estimates from historical catch and effort data.

In contrast to the North Pacific where major fisheries for *O. bartrami* exist, there is currently no known commercial harvest in the South Pacific Ocean. *O. bartrami* has been caught in small quantities as bycatch in the Australian arrow squid jig fishery.

In the period 1985-2005 the countries fishing *O. bartrami* in the Northern Pacific Ocean have been Japan, Chinese-Taipei and Republic of Korea. Since the wide-scale closure of driftnet fishing an increasing number of Chinese vessels have entered the fishery. Recently in the literature there have been reports of complaints about crowded conditions on the fishing grounds. Vessels from Canada and the United States have also recently entered the fishery. As the fishing pressure and the number of fishing nations increase, the potential for expanding fishing grounds into South Pacific grows.

There are currently no known management measures in place for *O. bartrami*.

The species profile upon which this summary is based is a living document. It is a draft report and requires additional information to complete.

Note: The full species profile for neon flying squid is available at http://www.southpacificrfmo.org/working-groups/public/current-work/.

Information describing purple back flying squid (*Sthenoteuthis oualaniensis*) fisheries relating to the South Pacific Regional Fishery Management Organisation

Overview

Sthenoteuthis oualaniensis is thought to be the most abundant large squid in the tropical and sub-tropical waters of the Indo-Pacific region (Young and Hirota 1998, Dunning 1998). It has a patchy distribution and occurs from the Red Sea to Australia and from the west coast of Central America to the east coast of Africa, occupying a band about 40˚ north and south of the equator.

The population structure of *S. oualaniensis* appears complex with sub-populations of small, medium and large forms whose geographic ranges partially overlap. Their lifespan is approximately 1 year, they spawn and then die.

Little is known of their spawning behaviour. At present, *S. oualaniensis* is predominantly caught in the Northern Pacific as bycatch due to the low value of this squid. Little is known about catch history for this species.

S. oualaniensis are fast growing and relatively short lived therefore productivity is potentially high.

With their ~1 year lifespan, every *S. oualaniensis* squid fishing season is based on incoming recruitment which is highly dependent on environmental conditions and typically variable. Accordingly, it is not possible to calculate reliable yield estimates from historical catch and effort data.

There are currently no known management measures in place for *S. oualaniensis*.

The species profile upon which this summary is based is a living document. It is a draft report and requires additional information to complete.

Note: The full species profile for purple back flying squid is available at http://www.southpacificrfmo.org/working-groups/public/current-work/.

Information describing Chilean jack mackerel (*Trachurus murphyi*) fisheries relating to the South Pacific Regional Fishery Management Organisation

Overview

This carangid mackerel is widespread throughout the South Pacific, from the shelf adjacent to Ecuador, Peru, and Chile; throughout the oceanic waters along the Subtropical Convergence Zone; in the New Zealand EEZ south of about 34 ºS; and, in south-eastern waters of the Australian EEZ.

From mitochondrial DNA sequencing *Trachurus murphyi* has been identified as a distinct species (Poulin et al. 2004). Some earlier biological summaries have assumed synonymy with T. symmetricus and incorporated information from Californian studies of that species, which may therefore be misleading.

T. murphyi has become an important commercial species following a substantial increase in its abundance, confirmed by assessments, in the early seventies in the east; a large-scale westward expansion process into oceanic waters; and a subsequent invasion of New Zealand and Australian waters. Research has been extensive in some of these fisheries.

There have been a number of competing stock structure hypotheses, and up to four separate stocks have been suggested: a Chilean stock which is a straddling stock with respect to the high seas; a Peruvian stock which is also a straddling stock with the high seas; a central Pacific stock which exists solely in the high seas; and, a southwest Pacific stock which straddles the high seas and both the New Zealand and Australian EEZs. However, further collaborative research is required to confirm and/or clarify this hypothesised stock structure as a basis for effective management regimes.

Jack mackerel are predominantly caught by purse seine and midwater trawl.

Since the start of the fishery in 1950 the majority (~75%) of the global catch has been taken by Chilean vessels predominantly within its EEZ. During the period 1978-1990 the fleet of the former USSR took a catch of ~10 million tonnes in the high seas area. Between 1994 and 2002, most of the Chilean catch of *T. murphyi* was taken within its EEZ, but in 2003 and 2004 32% and 28% was taken outside the EEZ. In 2004 the Chilean catch was ~363 000 tonnes from the high seas within the South Pacific region. In recent years other flags including China, Netherlands, Republic of Korea, and Russia have taken catches on the high seas in the South Pacific region. At the western extent of the species range the high seas catch is much smaller, with New Zealand catches of <1 tonne in 2005. It is not currently possible to accurately quantify high seas catches as reporting is incomplete and those data that are reported do not separate between high seas and within EEZ catches.

The biology of *T. murphyi* is reasonably well known and biological productivity is believed to be medium, with first spawning at 20 – 25cm, moderate fecundity, fairly rapid growth and a maximum age of ~20-30 years. Annual replacement yields are moderately high.

Currently, with the exception of Chilean vessels, there are no management measures in place for jack mackerel fisheries on the high seas (although all New Zealand and Australian flagged vessels that may take this species as an occasional bycatch are regulated by a high seas permitting regime).

Due to the nature of the straddling Chilean stock, the same regulatory controls that apply within the Chilean EEZ also apply on the high seas. These controls include maximum catch limits per vessel owner and minimum size limits.

Although jack mackerel constitute a large resource, there have been concerns at a regional (assumed stock) level. For example, the Chilean straddling stock of *T. murphyi* is currently considered to be fully exploited. There is also an important ecological consideration related to potential over-harvesting of the jack mackerel resource. This relates to potential changes in predator-prey relationships. Jack mackerel constitute both a large predator pool, and a large prey resource, and probably fulfil an important role as a critical node in Pacific Ocean predator-prey networks. Experiences in other ecosystems have shown that substantial changes in the biomass of key species in the food web can lead to substantial and unpredictable responses in both their predators and their prey. Significant changes in predator-prey relationships are likely to cause shifts in food-web structure which are then not necessarily reversed by the reduction of fishing pressure.

For the Chilean (straddling) stock, current stock assessment suggests that the stock is at full exploitation and, given the moderate productivity of this species, caution with respect to any increases in fishing mortality is needed.

For the other stocks given the absence of current information, it is not appropriate to provide detailed comment. However, given the moderate productivity of this species and the lack of information about current stock biomass levels, due caution is appropriate.

There has been a substantial amount of historical research on this species, particularly by Russia and Chile. However, substantially less research has been conducted over the past decade, except within the EEZs of a few coastal states.

Research is required to improve the understanding of the stock structure of *T. murphyi* to aid the development of appropriate management units, to obtain biomass estimates for stocks actively fished as inputs to stock assessment modelling, to undertake stock assessment for the fished stocks to provide robust fisheries management advice, and to evaluate bycatch levels , bycatch composition and levels of incidental catch of associated and dependent species in the active high seas fisheries to address issues associated with an ecosystem approach to fisheries management.

The species profile upon which this summary is based is a living document. It is a draft report and requires additional information to complete. **Note:** The full species profile for jack mackerel is available at http://www.southpacificrfmo.org/working-groups/public/current-work/.

Information describing orange roughy (*Hoplostethus atlanticus*) fisheries relating to the South Pacific Regional Fishery Management Organisation

Overview

This species occurs in the north and south Atlantic, in the south-central Indian ocean, in the Tasman sea, on the New Zealand shelf, on seamounts and ridges to the east of New Zealand, and off central and Southern Chile. In the South Pacific, orange roughy aggregates in deep, cold waters over steep continental slopes, canyons, ocean ridges, and underwater topographical features such as seamounts, especially during spawning and feeding.

Orange roughy have very low biological productivity. This is due to a combination of late onset of maturity; low fecundity; low annual growth rate; and high longevity.

Target trawl fisheries for orange roughy have occurred in the South Pacific since the late 1970's to the present day. The Lord Howe Rise and Northwest Challenger Plateau have been the main areas of orange roughy catch in the Tasman Sea outside the New Zealand and Australian EEZs. A fishery on the Norfolk Ridge is a recent development, and the Louisville Ridge fishery to the east of New Zealand continues. Catches peaked in the area in the mid 1990s at around 15,000 t, but in recent years have been 2,000-3,000 t.

Incidental captures of seabirds, through interaction with trawl warps have been reported in some orange roughy trawl fisheries but none have been reported to date by observers on vessels fishing in the Southwest Pacific high seas area.

The main commercial bycatch species when targeting orange roughy on the high seas include: oreos (*Allocyttus niger*, *Pseudocyttus maculatus*, *Neocyttus rhomboidalis*), cardinalfish (*Epigonus telescopus*), ribaldo (*Mora moro*), seal sharks (*Dalatias* spp.), alfonsino (*Beryx splendens*), and rattails. A further 100 plus fish species have been recorded as bycatch from orange roughy fisheries by observers on vessels fishing in the Southwest Pacific high seas area. The mix of species that orange roughy is associated with varies with latitude.

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, knolls and pinnacles has substantial impacts on habitat and benthic invertebrate species, but the reciprocal impact of this on the orange roughy populations or other species is unknown.

There are no regulations regarding limits on catch in international waters of the South Pacific with the exception of the South Tasman Rise region.

There are currently no accepted stock assessments for orange roughy high seas fisheries in the South Pacific and the status of the five known high seas orange roughy stocks (fisheries) in the Southwest Pacific is unknown but likely to range from fully exploited to over exploited.

The species profile upon which this summary is based is a living document. It is a draft report and requires additional information to complete. **Note:** The full species profile for orange roughy is available at http://www.southpacificrfmo.org/working-groups/public/current-work/.

Information describing deepwater rock lobster (*Projasus parkeri*) fisheries relating to the South Pacific Regional Fishery Management Organisation

Overview

This palinurid lobster appears to be widespread in the western South Pacific Ocean between approximately 33°S and 45°S. It has most often been found associated with seamounts, banks, and ridges, at depths of 330–1200 m. There is no known commercial fishing of this lobster in the South Pacific, but it is likely that in some locations this lobster exists in commercial quantities. Little is known of its biology. Based on similarities with closely related lobster species it is assumed that there is a long-lived (many months) phyllosoma larval stage that is reasonably widespread in the South Pacific Ocean.

P. parkeri has been commercially fished (down to >1000 m) on seamounts north and northeast of St Paul and Amsterdam Islands in the Indian Ocean (W.R. Webber, MONZ, pers. comm.). *P. bahamondei* has been, and probably still is being, fished in international waters in the eastern South Pacific Ocean by vessels using crab pots on trot lines.

P. parkeri may be locally common in places, and with successful commercial fishing of it in the Indian Ocean, it is expected that it will eventually be targeted in the South Pacific.

There are currently no known management practices in place for *P. parkeri*.

The species profile upon which this summary is based is a living document. It is a draft report and requires additional information to complete.

Note: The full species profile for deepwater rock lobster is available at http://www.southpacificrfmo.org/working-groups/public/current-work/.

Information describing rock lobster (*Jasus caveorum*) fisheries relating to the South Pacific Regional Fishery Management Organisation

Overview

This palinurid lobster appears to be confined to one chain of seamounts, southeast of Pitcairn Island, where it has been sporadically fished over the past 10 years yielding catches in the tens of tonnes. Little is specifically known of its biology, although it is likely to be very similar to that of all other Jasus species and particularly its nearest neighbours *J. frontalis at* Juan Fernandez Islands and *J. edwardsii* in New Zealand. It is assumed that there is a long-lived (many months) phyllosoma larval stage that is reasonably widespread within the south-east Pacific Ocean.

It is not envisaged that this species will be the subject of anything but sporadic targeted fishing because of the remoteness of the Foundation Seamounts and apparently small size of the stock; none of the several visits to the area seems to have returned large quantities of product. Other isolated *Jasus* stocks have been quickly fished down to uneconomic levels (e.g., *J. tristani* on the Vema Seamount—Heydorn 1969), and the impression is that these relatively small populations developed over the eons and are unable to sustain heavy fishing pressure.

There are currently no known management practices in place for *J. caveorum*.

The species profile upon which this summary is based is a living document. It is a draft report and requires additional information to complete.

Note: The full species profile for rock lobster is available at http://www.southpacificrfmo.org/working-groups/public/current-work/.

Information describing seamount habitat relevant to the South Pacific Regional Fisheries Management Organisation

Overview

Seamounts are elevated seafloor features. The geological definition of a seamount is any feature greater than 1000 m in elevation from the seabed and of limited extent across the summit. Other underwater features with less than the 1000 m elevation are also usually referred to as seamounts by biologists due to the similarity in biological communities between such features and geologically defined seamounts. The biological definition of seamounts, which is any elevated seafloor feature above 250 m, is used here.

Seamounts are typically associated with upwelling, elevated levels of productivity and support unique biological communities with high levels of endemism. Seamounts are an important habitat for commercial deepwater fish stocks such as cardinalfish, orange roughy, oreos, alfonsino and bluenose, which aggregate around these features for either spawning or feeding.

Seamounts are becoming increasingly vulnerable to fishing as technology has allowed the expansion of fishing fleets beyond areas of national jurisdiction and onto the high seas. The predominant fishing method over seamounts is the bottom trawl. The effects of trawl gear have been well documented and, depending on the degree of contact with the bottom, these include effects such as scraping and ploughing of the seabed, sediment re-suspension, the destruction of non-target benthic animals, especially calcified structural forms like corals and sponges.

Very little is known about the interactions between the biological communities that inhabit seamounts and the level of dependence of the specific community components on one another. Bottom trawling is likely to have negative effects on the long-term sustainability of seamount habitats, and hence on associated components, including commercial fish populations, although the likely duration of these effects have not yet been properly quantified.

There are currently minimal management practices in place to protect the biodiversity on seamounts on the high seas in the South Pacific Ocean. Recently the United Nations General Assembly agreed to implement an ecosystem approach to fisheries management, and requires interim measures to avoid the adverse impacts of bottom trawling to be in place by December 2007 (UNGA Sustainable Fisheries Resolution 61/105).

The habitat profile upon which this summary is based is a living document. It is a draft report and requires additional information to complete.

Note: The habitat profile for seamounts is available at http://www.southpacificrfmo.org/working-groups/public/current-work/

Information describing the associated and dependent species Chatham albatross *Thalassarche eremita* relating to the South Pacific Regional Fisheries Management Organisation

Overview

The Chatham albatross breeds at a single site in the Chatham Islands, New Zealand, and migrates each year across the South Pacific to spend the austral winter in the EEZs of Peru and Chile. It is one of 10 or more species of albatross that migrate annually across the South Pacific. While the proportion of time spent in high seas areas is relatively low, this albatross species has a small effective population size and high threat status making them vulnerable to any increase in mortality through interaction with fisheries.

By-catch rates in the high seas areas are largely unknown, but by-catch of Chatham albatrosses and other species in trawl fisheries has been recorded within New Zealand and South American EEZs. Given their high threat status it is important to monitor by-catch rates within fisheries of the South Pacific. Management of offal and discards is likely to be a key measure to reduce seabird by-catch in trawl fisheries. Research elsewhere has indicated that tori lines or other bird scaring devices can also be used effectively to reduce seabird warp strikes and by-catch by trawlers.

The associated and dependent species profile upon which this summary is based is a living document. It is a draft report and requires additional information to complete.

Note: The associated and dependent species profile for T. eremita is available at http://www.southpacificrfmo.org/working-groups/public/current-work/.

Preliminary template for compilation of historical catch and effort data

25 April 2007

Participants are to collate pre-2007 data on fishing activities in the Area and provide these to the interim Secretariat of the proposed SPRFMO by 30th September 2007 in sufficient detail to facilitate effective stock assessment. The fields of data to be provided are as follows:

Standard for historical trawl fishing activity data in the proposed Convention Area

As a minimum	Preferably	If practical
Number of vessels fishing	Vessel call sign	The fields described in Annex 1 of the *SPRFMO Standards for the collection, reporting, verification and exchange of data (25 April 2007)*
Calendar year	Calendar year and Month	
FAO statistical area	5 degree by 5 degree grid; separating inside areas of national jurisdiction and high seas	
Catch retained by species in live weight	Catch by species by above strata in live weight	
Total vessel days fished, if available	Number of bottom trawls made in month; number of mid-water trawls made in month	

Standard for historical purse seine fishing activity data in the proposed Convention Area

As a minimum	Preferably	If practical
Number of vessels fishing	Vessel call sign	The fields described in Annex 2 of the *SPRFMO Standards for the collection, reporting, verification and exchange of data (25 April 2007)*
Calendar year	Calendar year and Month	
FAO statistical area	5 degree by 5 degree grid; separating inside areas of national jurisdiction and high seas	
Catch retained by species in live weight	Catch by species by above strata in live weight	
Total vessel days fished, if available	Number of purses set in month	

Standard for historical bottom long lining fishing activity data in the proposed Convention Area

As a minimum	Preferably	If practical
Number of vessels fishing	Vessel call sign	The fields described in Annex 3 of the *SPRFMO Standards for the collection, reporting, verification and exchange of data (25 April 2007)*
Calendar year	Calendar year and Month	
FAO statistical area	5 degree by 5 degree grid; separating inside areas of national jurisdiction and high seas	
Catch retained by species in live weight	Catch by species by above strata in live weight	
Total vessel days fished, if available	Number of hooks deployed in month	

Data will be provided in accordance with the specifications and format described in annex 5 of the *SPRFMO Standards for the collection, reporting, verification and exchange of data (25 April 2007).*

Historic data submissions should be accompanied by metadata describing the data sources for each data set and providing some information on the precision and reliability of each data set.

South Pacific RFMO
Proposed Science Structures & Processes