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

Interim Science Working Group:
Jack Mackerel Sub-Group

Jack Mackerel Stock Assessment Methods Workshop

Lima, Peru 4 – 8 May 2009

Draft Workshop Programme

Background

The interim measures adopted for pelagic fisheries in the SPRFMO area, require the SWG to provide advice, in 2009, on the status of pelagic stocks in the SPRFMO area, the most important of which is the Chilean jack mackerel. One of the first steps towards the assessment of the stock abundance and the sustainable yield of the Chilean jack mackerel (*Trachurus murphyi*) in the South Pacific Ocean was the development of working population structure hypotheses upon which to base such assessments, and the identification and characterization of the biological, catch and effort data available to use in stock assessments.

Accordingly, at its third meeting (held in Reñaca, Chile, in April 2007), the Science Working Group (SWG) of the South Pacific Regional Fisheries Management Organization (SPRFMO) recommended that a specific Jack Mackerel Stock Structure and Assessment Workshop be convened to specifically discuss and develop agreed working hypotheses on jack mackerel stock structure, and to consider joint fish stock assessment requirements and inputs under such stock structure hypotheses. This Jack Mackerel Stock Structure and Assessment Workshop was held in Santiago, Chile in 2008. The results of this workshop contributed important scientific information for the assessment, and for the provision of the advice requested on the status of Chilean jack mackerel.

The workshop identified four working stock structure hypotheses for Chilean jack mackerel. These comprise alternate hypotheses about the relationship between the stocks off Peru and Chile (hypotheses 1 and 2), and alternate hypotheses about the relationship between stocks off Chile and the adjacent areas of the high seas (hypotheses 3 and 4).

Hypothesis 1: Jack mackerel caught off the coasts of Peru and Chile each constitute separate stocks which straddle the high seas.

This is the current hypothesis expressed in the Jack Mackerel Species Profile and used in past stock assessments. There is a fairly substantial amount of historic and current evidence supporting this hypothesis. However, there are some indications of shifts in

distribution, and perhaps of possible mixing, in the southern Peru / northern Chile area related to oceanographic changes, and additional work is required to determine the most likely boundary between separate Peruvian and Chilean stocks. For the purposes of jack mackerel assessments to be conducted in the immediate future, separation at the Peruvian / Chilean border would be a reasonable and convenient assumption to use under this stock hypothesis, until further information becomes available to improve the definition of stock boundaries.

Hypothesis 2: Jack mackerel caught off the coasts of Peru and Chile constitute a single shared stock which straddles the high seas.

Some new information on similarities in biological and population structure trends observed off southern Peru and off Chile was presented at this workshop in support of this alternate hypothesis.

Additional work is required to further investigate a wider range of data which might support or reject this hypothesis, as proposed under the multi-disciplinary Stock Structure Research Programme.

Hypothesis 3: Jack mackerel caught off the Chilean area constitute a single straddling stock extending from the coast out to about 120°W.

This is one of the current hypotheses expressed in the Jack Mackerel Species Profile, and is the hypotheses currently used in Chilean stock assessments. There is a fairly substantial amount of evidence supporting this hypothesis. However, there is little information upon which to base a reliable definition of the westward boundary of such a stock, and additional work is required to determine the most likely westward boundary of a straddling Chilean stock. For the purposes of jack mackerel assessments to be conducted in the immediate future, the westward boundary of this stock could be assumed to be about 120°W, to cover all areas currently fished in the southeast Pacific Ocean, until further information becomes available to improve the definition of this boundary.

Hypothesis 4: Jack mackerel caught off the Chilean area constitute separate straddling and high seas stocks.

Little information is available upon which to base a reliable definition of the boundary between such stocks. Additional work is required to determine to most likely position of such a boundary.

The 2008 workshop also provided a number of conclusions and recommendations about data needs, future assessment processes and assessment models. Participants are asked to review this report and implement these where appropriate.

Participants are also reminded that the Plenary meeting in October 2008 approved the request from the SWG for the release of non public domain data to the Jack Mackerel Subgroup for the purposes of stock assessment,

This important measure followed one of the recommendations of the 2008 workshop in recognition of the need for data at a finer resolution than 5°x5° square for the conduct of effective stock assessments for jack mackerel.

Because of the unavailability of an independent stock assessment expert for this workshop, it is particularly important that participants arrange for participation of their own experts with skills in stock assessment for the workshop. It is expected that such participants will contribute to the evaluation of the strengths of different assessment methods in a scientifically objective and impartial manner.

Objectives

The following objectives are proposed for the workshop:

1. To agree on standard datasets for use in all stock assessment models under different stock structure hypotheses, and a process for creation and exchange of these data sets.
2. To specify and agree on model specifications, assumptions, values for life history parameters to be used in the stock assessments (M, Sexual maturity, etc.), data (including the level of spatial and temporal data aggregation), and other inputs to the assessments to be undertaken in the 2009.
3. To identify the types of biological reference points that would be calculable and useful for the diagnosis of stock status for Chilean jack mackerel stocks.
4. To conduct a preliminary evaluation of jack mackerel stock assessment models used to date.
5. To agree on stock assessment modelling approaches to take forward in the 2009 and future JM assessments for each of the stock structure hypotheses.
6. To document a stock assessment working protocol covering all the aspects defined above.

A specific workshop agenda to address these objectives will be finalised and agreed at the start of the workshop.

It is expected that, as an outcome of its analyses and discussions, the Workshop will produce a technical report with its findings, conclusions and recommendations on the above matters. Such a report should be comprehensive and clear enough to provide guidance to participants in the inter-sessional preparation of jack mackerel stock assessments under the various stock structure hypotheses, for review at the next Jack Mackerel Sub-Group stock assessment meeting, towards the end of 2009.

Venue and Dates

The workshop will be held from 4 to 8 May 2009 in Lima, Peru at Foresta Hotel and Suites:
Avenida Libertadores N° 490, San Isidro, Lima

http://www.southpacificrfmo.org/7th-international-meeting-Information-for-Delegates/

Inputs to the Workshop

In order to meet the proposed objectives and produce the desired results, participants are expected to provide the Interim Secretariat with the data required under the agreed Data Standards, and are also requested to provide the types of data identified in the 2008 Workshop Report[1], and listed in the Annex attached to this draft workshop programme. These data should either be submitted to the Interim Secretariat prior to the start of the workshop, or alternatively should be brought along to the workshop itself.

This workshop should be less formal than the 2008 workshop, with fewer papers and presentations, and more emphasis on technical discussions around suitable stock assessment methods and data inputs. An update from each of the major catching countries on their latest assessment results would be useful if these have been updated since last year's workshop. Prospective participants should provide titles and short abstracts (maximum half a page) of any proposed papers in electronic form by email addressed ***to the Interim Secretariat (interim.secretariat@southpacificrfmo.org)*** as soon as possible, and preferably ***by Friday 24 April 2009***, to facilitate planning of the various workshop sessions. The actual technical documents and other written contributions to be reviewed and used during the Workshop should be provided in advance so that contributions can be compiled and circulated to other participants in advance of the workshop.

Appropriate stock assessment modelling approaches for jack mackerel will be developed after careful consideration by the workshop of what data will be available for use in such assessments, including consideration of data coverage (by area or time) and representivity (whether data have been adequately stratified across known stock distribution ranges and size / age classes). Adequate data will specifically be required to assess stocks under any of the agreed stock structure hypotheses.

The revised draft of the Chilean jack mackerel profile that is available on the SPRFMO web pages[2] reflects the current knowledge of the species biology and main fisheries including the information provided to the 2008 workshop. Any documents to be provided should not repeat such information. Relevant information not contained in the current profile could be made available to allow an updated version to be prepared during the workshop.

[1] http://www.southpacificrfmo.org/chilean-jack-mackerel-workshop/
[2] http://www.southpacificrfmo.org/science-working-group/swg-profiles/species-profiles

Workshop Sessions

In order to meet the agreed objectives, it is proposed that the workshop be organized in working sessions indicated below. The time allocated to each session can be varied as necessary to ensure that issues are adequately discussed and positions agreed.

Day 1

Session	1. Opening Session
09h00 - 10h30	1.1 Opening of the Workshop. 1.2 Workshop arrangements. 1.3 Nomination of rapporteurs. 1.4 Review and approval of the workshop objectives and agenda. 1.5 Review of results of 2008 workshop.
	2. Overview of recent assessment results
11h00 - 12h30	2.1 Updates on fishery characterizations and results of recent assessments from major catching countries.
	3. Development of standard datasets
14h30 - 16h00	3.1 Development of agreed standard datasets and process for data sharing.
	4. Model inputs
16h30 - 18h00	4.1 Review of common input parameters to assessment models: natural mortality, size and age at maturity, growth etc.

Evening work: Drafting of summary of first day's activities by Chair and rapporteurs.

Day 2

Session	5. Identification of target and limit reference points
09h00 - 10h30	5.1 Identification of potential target and limit reference points and appropriate indicators **[suggested background documents?]**
	6. Evaluation of current assessment models
11h00 - 16h00	6.1 Assessment models relevant to Stock Structure Hypothesis 1. *Including data availability, model structure, alternative scenarios, and future modelling approaches.*
16h30 - 18h00	6.2 Assessment models relevant to Stock Structure Hypothesis 2. *Including data availability, model structure, alternative scenarios, and future modelling approaches.*

Evening work: Drafting of summary of second day's activities by Chair and rapporteurs.

Day 3

Session	6. Evaluation of current assessment models (Cont'd)
09h00 - 10h30	6.2 Assessment models relevant to Stock Structure Hypothesis 2 (Cont'd). *Including data availability, model structure, alternative scenarios, and future modelling approaches.*
11h00 - 16h00	6.3 Assessment models relevant to Stock Structure Hypothesis 3. *Including data availability, model structure, alternative scenarios, and future modelling approaches.*
16h30 - 18h00	6.4 Assessment models relevant to Stock Structure Hypothesis 4. *Including data availability, model structure, alternative scenarios, and future modelling approaches.*

Evening work: Drafting of summary of third day's activities by Chair and rapporteurs.

Day 4 :

Session	6. Evaluation of current assessment models (Cont'd)
09h00 - 10h30	6.4 Assessment models relevant to Stock Structure Hypothesis 4. (Cont'd) Including data availability, model structure, variation from defaults, alternative scenarios, and future modelling approaches.
11h00 - 12h30	6.5 Synthesis and review of agreed assessment approaches
	7. Documentation of a stock assessment working protocol
14h30 - 16h00	7.1 Identification of important elements of a stock assessment protocol 7.2 Document a draft protocol for the assessment of Chilean jack mackerel.
	8. Review of progress
16h30 - 18h00	8.1 Review of progress and agreement on the use of remaining time.

Evening work: Preparation of the draft Workshop Report by Chair and rapporteurs.

Day 5

Session	9. Review and Adoption of Workshop Report
09h00 - 10h30	9.1 Presentation of the Draft Report of the Workshop
11h00 - 2h30	9.2 Review and Adoption of the Workshop Report. 9.3 Closing of the Workshop

Annex A to the Programme for the Chilean Jack Mackerel Workshop
Santiago, Chile, June/July 2008

INVENTORY OF POTENTIALLY USEFUL DATA FOR JACK MACKEREL STOCK STRUCTURE DISCUSSION AND STOCK ASSESSMENTS

The following data are considered to be potentially useful to either stock structure discussions or stock assessments. Workshop participants are particularly requested to bring actual data, analyses and technical summary papers of data relevant to stock structure discrimination.

Participants are requested to provide overviews, descriptions, inventories and characterizations of data relevant to stock assessments.

1. Description of fisheries
   - § Location and distribution of the main fishing grounds and landing sites.
   - § Types / numbers / sizes of vessels, description of fishing methods, and how these have changed over time.
   - § Catch and effort distributions, stratified by month, year and spatial scale (preferably at spatial resolution of 1° or finer).
   - § Distribution fishing patterns and jack mackerel catches by month, year and area, including detailed descriptions of density distributions of catches, and how these changes over time (season and years).

2. Jack Mackerel Distribution
   - § Information on known distribution of jack mackerel from fisheries-independent surveys or other data sources, including how these distributions have changed over time (seasons and years), and what is known of the size / age structure of fish in different time / area strata.

3. Removals from the Population
   - § Jack mackerel catches stratified by fleet, month, year and area (5° block or finer).
   - § Estimates of jack mackerel discards in absolute terms or as a percentage of landed catch, seasonal and by fleet and/or type of gear.

4. Catch Size-Frequency and Age-Frequency Distribution
   - § Size / Age frequency data and analyses, stratified by fleet, season, year and area (1° or 5° blocks).
   - § Data on gear selectivity for the various fleets and historic time periods.
   - § Descriptions of the sampling design used to collect data on size / age frequency.
   - § Summary descriptions of age determination methods and protocols used to age fish.

5. Biological Information: Weight at size and age

   Data and analyses of:
   - § Length-weight relationships, how these differ by area, and how these have changed over time.

- Mean size and weight at age, how these differ by area, and how they have changed over time.
- Detailed descriptions of how fish are measured and weighed: what size intervals are used and what measurements are taken.

6. Biological Information: Sexual maturity, spawning and fecundity

Data and analyses of:

- Maturity classification systems used, including descriptions of gonad staging methods.
- Maturity curves, size and age at maturity for males and females, and how these differ by area, or have changed over time.
- Data and analyses of spawning seasons (proportions of fish in each maturity stage), stratified by month, year and area.
- Identification of spawning areas and Information on how spawning season may differ between spawning areas or years, or has changed over time.
- Data and information on fecundity of fish by age class, and how this may differ between areas.

7. Indices of Abundance

Absolute and/or relative annual abundance indexes (such as CPUE), including detailed description of the methods used, including: sampling design; data standardizations; linearity between the abundance indexes and stock abundance; what portion of the stock is represented by the indexed part of the population (spawning stock, exploitable biomass, recruitment, etc). Indices which may be relevant include those derived from:

- Swept area method (trawl surveys).
- Acoustic surveys.
- Egg surveys (daily egg production method).

8. Environmental Data

- Description of relevant environmental, description of availability of data by month, year and area (1° or 5° squares), and description how these data might be used in assessments.

9. Stock Assessment Models

Presentation of descriptions and results of assessments conducted, including consideration of:

- Fisheries, time periods and areas covered by such assessments.
- Comparative results from age or size structure models, sequential analysis or statistical catch at age (size) models.
- Descriptions of data requirements, assumptions and biological inputs and assessment of uncertainty using proposed modelling approaches.