SPRFMO

3rd Meeting of the Scientific Committee

Port Vila, Vanuatu
28 September - 3 October 2015

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Draft terms of reference for jack mackerel age reading guidelines development

Fisheries Research Institute - Chile

SOUTH PACIFIC REGIONAL FISHERIES MANAGEMENT ORGANIZATION

DRAFT FOR DISCUSSION

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Terms of reference for jack mackerel (*Trachurus murphyi)* age reading guidelines development.

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The main recommendation of the "Chilean jack mackerel otolith interpretation and ageing Workshop" held in Lima in July 2011 was to continue the work of comparison and discussion of ageing estimation criteria and to move towards the development of an ageing protocol that could be applied by countries conducting age estimations of this species, and whose results are used in the stock assessment.

The SWG during the 11th Meeting gave a high priority to the age determination work programme based on exchanging otolith images in order to develop a standardized otolith reading protocol which is cost-effective and could bring important insights into the current uncertainty and request country members to nominate scientists to this working group.

Objective

To prepare a manual for age reading including date of birth, interpreting rings and borders, and guidelines to achieve the best readings.

To prepare an overview of how the ageing technique was validated.

To establish a reference collection of otoliths and their images for jack mackerel collected in the Eastern South Pacific to be used in the inter-calibration exercise and future training.

Confirmed task team

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Since Chile offered to conduct this process, Francisco Cerna was nominated to coordinate the task team.

Materials and Methods

The sample consists of 100 otolith images from a wide length distribution. The sample contains 37 images of otoliths sampled in the Peru region, 26 provided by the Fisheries National Institute (Instituto Nacional de Pesca) from Ecuador, and 37 from Chile. The length distribution from Ecuador was rather narrow, explaining the smaller number considered for this region.

The otoliths were selected, cleaned and photographed with an image analyzer system (a camera mounted on a stereomicroscope, connected to a computer equipped with the software Image-Pro Plus). Whole otoliths were immersed in oil over a dark background and illuminated with reflected light. The photographs were taken at 10X magnification and each photograph contains a reference measure of 1 millimeters.

The collection of the 100 otoliths is kept at IFOP.

IFOP will distribute the images to participants and each is requested to read the complete set of 100 file images and share the results with all participants. The read data should include:

a) number of the image,

b) number of hyaline rings,

c) type of edge (H = hyaline, O= opaque),

d) Total hyaline rings (hyaline rings number plus the edge when it is hyaline).

In the “Chilean Jack Mackerel Otolith Interpretation and Ageing Workshop” this simple rule for whole otoliths was agreed.

# Rings	Type of border	Age
1	Opaque	1
1	Hyaline	2
3	Opaque	3
3	Hyaline	4

The images file will be available to the task team in a Dropbox site.

From the Chilean Jack Mackerel Otolith Interpretation and Ageing Workshop Report, the following criteria and rules taken can be considered as a starting point. This Report should also be considered as background information for the present working group.

These simple rules include:

- The first *annulus* could be identified using the information from validation studies available. Keep in mind that Large serration in the shape of rings is an indication that it is a false ring or check.
- Consistency of the width of subsequent increments is a second important criterion. Split rings were also often observed in the first three years. The principle of gradual growth letdown by age can be used to recognize those split rings.
- Many additional rings (checks) are visible and impede or make very hard to identify annual rings in the central part of otolith when magnification is more than 20x. It is therefore recommended to read large otoliths using different magnifications for the central and marginal zones.
- A practical criterion is that the ring should be well defined to follow around the otolith. Nonetheless, in some otoliths this is not possible especially near the edge due to the concave shape of the otolith and that it starts to build rings in the internal face of it in older (larger) fish. The best solution in this case is to compare the reading of whole and cross-section otolith. When a ring is not possible to be followed then it can be identified as a false ring.
- The examination should be all over the otolith, in the caudal and the rostrum. This is especially true when the caudal zone is disputable, then it is also necessary to examine the rostrum. False rings should also be checked in the rostrum.
- The distance of the first three hyaline rings should be measured to facilitate future discussions.

In older fish (40 cm FL and larger) it is necessary to complement the readings with cross-section of otoliths to avoid under-estimation of the age. This is because jack mackerel starts to lay down ring in the internal face of the otolith and therefore they cannot be seen when reading the whole otolith. These readings should be conducted during the first workshop.

The IFOP Laboratory will analyze the results of all participant readers. The precision analysis will be carried out according to the procedures described by Campana et al. (1995) and Campana (2001); another option is the “Guidelines and tools for age Reading” by Eltink et al. (2000) that was used in the workshop held.

Proposed Time schedule

August, 2015	The proposed terms of reference will be sent and the images file be available in the Dropbox site.
To end December	Reading period
January 4th 2016	Reading results should be sent to Francisco Cerna.
January 25th	IFOP will send the result of the exercises.
March 14 to 18	Date for the 2nd Workshop (Chair: Dr. Beatriz Morales-Nin)

It is necessary to discuss the results in a jack mackerel otolith interpretation and ageing workshop and start to write the ageing protocol. Intersessional work should continue to produce an ageing guide draft. A final discussion and review of the ageing guide should be conducted on a second workshop. The venue and dates of the 2nd workshop should be agreed in the 1st workshop.

Age validation

Some validation methods could be the verification of the first annual ring through daily rings counts, absolute age from radiocarbon analysis or following strong year classes. The results on edge pattern formation and following year classes was informed by IFOP in the first workshop. Russia also informed results using modal length in commercial catches and daily rings. Then, in the second meeting of the Scientific Committee, Peru presented a validation study carried out by IMARPE (Goicochea *et al*., 2013).

Participants could decide to accomplish validation studies in order to contribute to the work but this has to be done in parallel to present reading exercise. Some participants, on the other hand, could agree on a join effort, especially the identification of the first annual ring, which could deserve additional work with daily rings due to the discussions that arises during the first workshop.

References

Report from the Chilean jack mackerel otolith interpretation and ageing WS. SPRFMO Web page.

Goicochea C., J. Mostacero, P. Moquillaza, T. Dioses, Y. Topiño & R. Guevara-Carrasco. 2013. Validación del ritmo de formación de los anillos de crecimiento en otolitos del jurel Trachurus murphyi Nichols 1920. En: Csirke J., R. Guevara-Carrasco & M. Espino (Eds.). Ecología, pesquería y conservación del jurel (Trachurus murphyi) en el Perú. Rev. peru. biol. número especial 20(1): 053-060.