Summary of activities of the Indian Ocean yellowfin workplan towards a new stock assessment

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Abstract

In 2018, a new stock assessment was carried out for Indian Ocean yellowfin using Stock Synthesis III, a fully integrated model that is used for the three tropical tuna stocks in the IOTC (bigeye, yellowfin and skipjack). However, the lack of understanding of stock dynamics due to various uncertainties led the IOTC's Scientific Committee (SC) to develop a workplan to address these uncertainties in 2019 before providing management advice. The adopted workplan has two main components: *uncertainty on data* and *uncertainty on models*, each one of them with a series of specific items. In this document we describe how the tasks of the workplan have been organized and undertaken. The assessments of the three tropical tuna stocks face common problems and complexities in the IOTC and therefore, parts of this workplan could contribute to the harmonization of stock assessment strategies across stocks. In this document we identify areas for improvement that are common to all stocks in the IOTC.

Background

In 2018, the IOTC Scientific Committee adopted a Workplan for addressing the identified uncertainty on the yellowfin stock assessment in 2019. The assessment of the three tropical stocks of the Indian Ocean, skipjack, yellowfin and bigeye tuna, faces common problems and therefore, it is expected that the workplan for yellowfin will also contribute to improving the assessments of bigeye and skipjack. The 2019 workplan has two main components (Table 1): *Uncertainty on data* and *model uncertainty*.

Table 1. Workplan adopted by the SC in 2018.

Item	Options	Responsibility	Timeline*
Uncertainty in Data			
Catch	Explore scenarios of alternative time series/catch histories	Secretariat in collaboration with Chair/Vice-Chair	Short term
Tagging Data	Evaluate alternative use of tagging data	Secretariat for SA	Short term
Size data	Review of size frequency data	Secretariat through a consultancy	Short term
CPUE	Alternative series (EU, Maldives)	CPCs	Short term
	Options for LL CPUE • Joint • Clustering to identify targeting • Long series	CPCs, Consultant identified by IOTC	Short term
Model Uncertainty			
Alternative models	• Biomass dynamic (JABBA, mpb) • Age/size structured (VPA) • Fully integrated (SS3)	CPCs, modelers, WPTT contractor, Secretariat	Short term
Spatial and stock structure	1, 2, 4 areas?	CPCs, modelers, WPTT, contractor, Secretariat	Short, mid-term
Key uncertainty inputs • Weighting of data sources • Key parameters (Growth, tag mortality, steepness) • Catch reporting scenarios	• Weighting of data sources • Decision on options for parameters and seek agreement to reduce options	• Group of experts • data prep • workshop	Short to mid-term
Statistical uncertainty	Bootstraps, Delta methods (Ref case), others…	Modelers, contractor, Secretariat	Short, mid-term
Characterization of uncertainty	• Across models • Across scenarios • Statistical analyses	Modelers, contractor, Secretariat	Short, mid-term
Agreed set of diagnostics (compulsory)	• Retrospectives, likelihoods, jitter analysis hindcasting… similar to the stock assessment, at least on a proposed Reference Case. • Develop protocol for retrospectives correction in stock status	Modelers, contractor, Secretariat, WPTT, WPM	Short, mid-term
Management Strategy Evaluation (contribution to SA)	• Evaluate influence of data • Characterize sources of uncertainty • Improve fits	Contractor, modeler, WPTT, WPM	Short, mid-term

* Short term – Pre WPTT21, Mid-term – Pre SC22

Practical development of workplan

The development of the workplan required progress on different areas of the stock assessment. In order to coordinate progress on all items. In order to monitor the progress, transparency and common understanding of the paths followed towards the new stock assessment of yellowfin

tuna, a number of coordination activities have taken place (Table 2). Here, we describe these and provide an overall assessment of their effectiveness in order to evaluate and strength the efficacy of the future intersessional work of the WPTT for improving the scientific advice.

Table 2. Activities to coordinate the 2019 worklpan for yellowfin.

Organization tool	Description	Assessment
Steering Committee	In order to foresee the progress of the workplan. Composed by Chairs of SC, WPTT and WP, experts from WPTT and IOTC Secretariat.	Not very active
Teamwork site	What's in there, how many invited, price, what for?	Very useful
Modelling team	Emails and Skype	Very active, transparency on the model development, colleagues from outside IOTC.
OwnCloud	Share files of model tests and development, how many invited?	Transparency, useful, common understanding, for modellers mostly,
Working Groups	-Workshop on longline CPUE -Workshop on purse seine CPUE	Very collaborative, transparent, data available for model development (date of each)

Steering Committee

In order to ensure that the yellowfin workplan proceeds smoothly, a steering committee was formed. The initial plan was that this committee would oversee the progress of the project. The steering committee was called through email and consists of eight scientists, including participants from the IOTC Secretariat, the former Chair of the SC, the Chair and vice-Chair of the WPTT, the Chair of the WPM and experts that regularly attend the WPTT. In reality, this committee has not been active, but its members have monitored the progress of the plan for yellowfin through other channels such as the inter-sessional meeting of the WPM-MSE working group, by monitoring teamwork cloud site, and communications with the modelling team. The different tasks of the IOTC workplan have been developed independently and this committee has not played a relevant role in this.

Teamwork site

A project management website was prepared to monitor the progress of the workplan for yellowfin and to keep the key participants on updated on the progress of the different tasks (https://yellowfin.teamwork.com/#/projects/393451/overview/summary). Twentysix participants have access to the website and some have communicated with the other members through emails and sharing files. Updates on the model development, progress of different tasks and preliminary papers have been shared through this platform. The web-platform contains tools to define tasks, calendars, milestones and even for instant communication. This tool has proven useful to keep all participants on the different tasks informing of the progress. The free version of the site was used for yellowfin and we recommend this, or similar platforms are used to organize intersessional work of IOTC working groups.

Modelling team

A modelling team was enlisted to monitor the development of a new Stock Synthesis model for yellowfin. This team comprised of experts from the IOTC but other institutions too including SS3 developers and stock assessment experts from ICCAT/IOTC. Email threads have been used to update and communicate the modelling choices towards building a new model including the analyses made to decide each of them. It has been aimed that the new model development is fully transparent and when possible, choices have been agreed between the participants of the modelling team. Through this channel modellers have received advice and discussed options with SS3 experts from in and outside the IOTC. Overall, this group has been very active and been the main source of information to develop new SS3 model for yellowfin. It is recommended that such groups be created to guide the model development of IOTC species. However, in practice it is unlikely all experts will be available for collaboration and, therefore smaller groups may be formed between the entire pool of modelling experts specific to each species with defined roles for each stock.

Owncloud

In order to facilitate the common analyses between the modelling team a file sharing platform was created (ownCloud). This placeholder allows to increase transparency on the modelling choices made and makes all files available for the modelling team during model development. This placeholder has proven very useful and it is therefore recommended for cases where the stock assessment model is developed inter-sessionally. In the yellowfin tuna case, the placeholder was created under the initiative of a group of scientists but in the future this could be organized by the IOTC secretariat.

Working Groups

A major impediment for CPUE standardization work during inter-sessional period is reluctance by national scientist to making available operational logbook data to experts. To overcome this, IOTC has supported CPUE workshop in member countries where these data are held. Under strict term of conditions such data have been made available during these workshops. Starting from 2015, annual workshops, rotation of countries where these workshops are held, and continued hiring by the IOTC of the same lead-expert has tremendously helped in developing and improving longline CPUE standardization for yellowfin and bigeye tuna. Unfortunately access to these data is still restricted only during the workshop.

These workshops have several advantages including capacity building of national scientists and building trust with fellow national scientists and experts for sharing data. It is recommended to continue holding such workshops and encourage CPCs to share this data more openly and outside the workshops for further development of LL CPUE analyses.

The joint CPUE index for yellowfin tuna from longline fleets is the basis of the yellowfin stock assessment (Hoyle et al., 2018). The protocol for developing this index, as well as the most recent data available, are discussed in an annual workshop (IOTC, 2019). The outcome of this workshop aims at improving the abundance index and therefore, to improve one of the key

inputs for the yellowfin stock assessment. The workshop carried out a range of analyses including the preparation of the data, characterization of the fisheries, clustering analysis, and the CPUE standardizations for individual fleet. The 2019 Joint CPUE analysis included the data from the Japanese (1952-2018), Korean (1971-2018), Taiwanese (2005-2018), and Seychelles (2000-2017).

The results of these workshop were made available for the model developers soon after the end of the meeting and five months in advance of the WPTT. We recommend that these workshops continue to accept open discussions and that scientists other than those providing data and the contractor running the analyses attend this meeting.

The European purse seine fleets are one of the main gear-types catching yellowfin. CPUE data from these fleets is regularly presented to the WPTT but in 2018, the free school CPUE was used as a sensitivity case. The CPUEs have been available for the model developers one month before the WPTT. Purse seine fleets are responsible of approximately 25% of yellowfin tuna catches and they are the most representative fleets operating in western tropical region where the majority of catches are taken. Therefore, we stress the need to continue working on developing CPUEs for purse seine fleets. It would also be beneficial if these workshops are open to participants of the longline CPUE workshop and other stock assessment experts in the IOTC.

Lessons learnt to organize intersessional works for IOTC working groups

The use of organization tools can facilitate the management of large projects. The workplan of Indian Ocean yellowfin has used a project management website that has helped a common monitorization and track of progress of its different tasks. However, there are many areas that could have been better. A meeting of all the members of the steering committee has not taken place and the communication has mostly taken place through emails and other electronic communication tools. The group of modelling experts has facilitated the coordination of the new model configuration with specific communications regarding the spatial structure and adequacy of information. The creation of specific placeholders for model input and other files has proven efficient to facilitate communication between the modelling experts and it is highly recommended for common development of models. Some of the tasks have been undertaken by specific working groups such as the two CPUE standardization workshops. Under the 2019 workplan for yellowfin, the participation to these workshops has been fostered and both standardizations have improved from 2018 indicators.

References

Hoyle, S.D., Chassot, E., Fu, D., et al. (2018) Collaborative study of yellowfin tuna CPUE from multiple Indian Ocean longline fleets in 2018. Working Party of Tropical Tunas, Seychelles, October 2018. IOTC-2018-WPTT20-33.

IOTC (2019) Report of the Sixth IOTC CPUE Workshop on Longline Fisheries. San Sebastian, April 28th – May 3rd.