

**TERMS OF REFERENCE FOR THE PROVISION OF SCIENTIFIC SERVICES TO THE
IOTC
BLUE SHARK (*PRIONACE GLAUCA*) STOCK ASSESSMENT USING SS3**

Scientific Services to be provided:

The IOTC requires a short term consultancy for the following activities:

BLUE SHARK STOCK ASSESSMENT

Following the preliminary work undertaken in 2014 in preparation for an Indian Ocean blue shark (*Prionace glauca*) stock assessment, the IOTC requires a short term consultancy for the following activities:

1. To develop a fine resolution fishery structure for an integrated model of blue shark in the Indian Ocean by analysing size and other data.
2. The assessment will be expected to consider data submitted before the data submission deadline of 60 days before the meeting (9 July 2015), data received after this will not necessarily be considered by the consultant, and will not be considered if received after 8 August 2015 (less than 30 days before the meeting).
3. To develop a quantitative stock assessment for Indian Ocean blue shark using Stock Synthesis version 3. The assessment shall use the available data (i.e. fishery and biological data). The assessment shall incorporate projections for 10 years and include Kobe II Management Strategy Matrices, as required by the Commission and detailed in the IOTC *Guidelines for the presentation of CPUE standardisations and stock assessment models*, adopted by the IOTC Scientific Committee in 2014.
4. To conduct, to the extent possible in the available time, sensitivity runs with alternative parameters (e.g. natural mortality, growth, selectivity, steepness (or other recruitment functions that are shark specific), aggregate vs. disaggregated spatial structure, etc.) including the following:
 - Review the spatial stratification: The possible assessment structure includes 1 region with multiple longline (LL) fisheries defined by fishery operations, catch-at-size distributions. Limited tag data is available for this species, but should be considered. This limits potential for the model to estimate movement rates among areas. Pursue alternative spatial structures, either through multiple areas or finer fishery resolution in the model, based on known species biology.
 - Explore alternative M, growth rates and recruitment relationships for blue shark. The different tuna-RFMOs use very different M estimates/assumptions in their tropical tuna stock assessments, but it is not clear that there is compelling evidence for real biological differences.
 - Range of values accepted in other RFMOs;
 - Plausible growth rates based on recent results from the Indian Ocean and potential alternatives from the Pacific and Atlantic oceans.
 - Examine conflicts among different sources of data and assumptions. In addition to the explorations above, interactions/conflicts among CPUE and size frequency should be quantified by down-weighting the different data sources. Examining different weights on available CPUE series should be examined as well, particularly in relation to the quality, length of the time series and coverage of each data series.
 - Explore the influence that alternative catch data series have in the models. This includes using the catch data available at the IOTC Secretariat and other alternatives in catch data reconstructions that

may be presented by WPEB11 participants, if time permits.

The above explorations should be summarized to describe which of the plausible assumptions have important implications for management advice. The interactions among the most important assumptions should be recognised in the stock status advice. To the extent possible, estimates of uncertainty need to be provided in relation to all of the important structural assumptions and parameter estimation errors that are of interest for management. The uncertainties associated with model assumptions, biological assumptions and data inputs should be explored appropriately, for example by using a structural sensitivity analysis.

5. To document the assessment in accordance with the “*Guidelines for the presentation of CPUE standardisations and stock assessment models*” including the set of minimum management quantities, detailed in the *Guidelines*; and to provide a draft report to the IOTC Secretariat no later than 30 days prior to meeting of the WPEB11 (7–11 September 2015), i.e. 8th August 2015, and a revised draft report no later than 15 days prior to the meeting of the WPEB11, i.e. 23rd August 2015.
6. To attend and present the results of the work undertaken to the WPEB11 in Olhão, Portugal from 7–11 September 2015.
7. To undertake any additional analyses deemed relevant up to 60 days after the start date of the contract.
8. To provide an updated stock assessment report no later than 15 days after the meeting of the WPEB11, i.e. 26th September 2015, which will be updated using the model run(s) agreed to during the WPEB11 meeting, and the subsequent projections, management quantities and Kobe II Management Strategy Matrices.

Conditions and payment:

In total this Service will require 35 days of work and will include a mission to Olhão, Portugal to attend the 11th Session of the Working Party on Ecosystem and Bycatch.

The IOTC Secretariat will also pay the cost of a return airfare from the contractor’s home to the WPEB11 meeting in Olhão, Portugal. A Daily Subsistence Allowance will be paid in accordance with FAO procedures for attendance at the Working Party meeting.

Expected Outputs:

To provide a draft report of the blue shark stock assessment to the IOTC Secretariat no later than 30 days prior to meeting of the WPEB11, i.e. 8th August, 2015, and the final draft report no later than 15 days prior to the meeting of the WPEB11, i.e. 23st August 2015.

1. To attend and present the results of the work undertaken to the WPEB11 meeting in Olhão, Portugal from 7–11 September 2015.
2. To provide the final report of the blue shark stock assessment no later than 15 days after the meeting of the WPEB11, i.e. 26th September 2015.

Expressions of Interest:

Deadline for Submission: Friday 27 February 2015 - Please refer to the attached Terms of Reference and email application/CV to Secretariat@iotc.org with heading: **BLUE SHARK ASSESSMENT**