



TERMS OF REFERENCE (TOR) FOR THE PROVISION OF SCIENTIFIC SERVICES TO SIOFA STOCK AND ECOLOGICAL RISK ASSESSMENT WORK GROUP (SERA-WG)

Title: Updating orange roughy stock assessments

Project Code: SER2021-04

1. INTRODUCTION

SIOFA CMM2020/01 (Para 6a) requires the Scientific Committee (SC) to provide advice to the Meeting of Party (MoP) on the status of stocks of principal deep-sea fishery resources (orange roughy, alfonsino and Patagonian toothfish). In 2018, the SIOFA Scientific Committee (SC3) conducted the first orange roughy stock assessments in the SIOFA region and provided to the Meeting of Parties on the stock status and sustainable yields by management unit. As required under CMM2020/15 (Para 5) (periodical orange roughy stock assessment every 3-5 years), the next Scientific Committee (SC7) (March, 2022) will update the orange roughy stock assessments and provide stock statuses and sustainable yields. The financial source for this project is from the SIOFA regular budget, which was approved by MoP8 (2021).

This document describes the Terms of Reference (ToR), work plan, and administrative matters for a consultancy to undertake the orange roughy stock assessments. Once appointed, the Consultant should direct any questions and clarifications to the Executive Secretary (Mr Thierry Clot on thierry.clot@siofa.org) for administrative matters and on technical matters to the SERA-WG Chairperson and the manager of this project (Dr Tom Nishida on aco20320@par.odn.ne.jp).

2. TERMS OF REFERENCE

The ToRs are described as below. The Consultant shall undertake these tasks, and consult with the SIOFA Secretariat and the project manager as necessary.

2.1 Reviews

Review the previous stock assessments, all new information (especially updated growth equations and abundance indices from the acoustic data), and other relevant information to undertake the stock assessments of orange roughy in the SIOFA Area.

2.2 Management units

Review the management (stock) units for the stock assessments, by referring to those used in the previous stock assessments. Revise these, if necessary, with any additional information.

2.3 Reference points

As the SIOFA has not yet adopted target and limit reference points, define provisional points by referring to those used for orange roughy stock assessments and managements in relevant countries and international fisheries organizations.

2.4 Stock assessments

Select the appropriate stock assessment model, conduct assessments, and evaluate results described as below. Conduct all tasks by management unit.

- a. Evaluate the plausible information available for orange roughy in the SIOFA Area and select the most adequate stock assessment model suitable for such information.
- b. Define the base case and sensitivities, then run both.
- c. Evaluate results of the base case and sensitivity runs, and select the most optimum run (point estimate) based on likelihood, residuals, and goodness of fitness for key parameters, R^2 and the Akaike's Information Criterion (AIC) if applicable. The selected run may be the base case, one of sensitivity runs or the combined (integrated) one.
- d. Implement model diagnostics for the selected run (for example, robustness, accuracy, and reliability of parameters estimated, and the fit to the models) using standard stock

assessment diagnostic approaches including evaluation of residuals, retrospective analyses, likelihood profiles of key parameters and ASPM analyses for the integrated models if applicable.

- e. If diagnostics are not satisfied, select the alternative optimum run until the satisfactory results are obtained.

2.5 Uncertainties, projections, and risk assessments

Evaluate uncertainties in the selected run (optimum point estimates) in the previous task, then implement future projections and risk assessments described as below. Conduct all tasks by management unit.

- a. Implement MCMCs, bootstraps etc. to evaluate uncertainties in the selected run and compute future projections under the current catch level, then evaluate uncertainties around the projections. According to SIOFA CMM 2020/15 (Para 3), the period of the projection should be no less than 20 years with 5 years steps.
- b. Conduct the risk assessments to estimate risk probabilities (%) violating MSY levels of biomass and fishing mortality (F) by different catch level in the projection period.
- c. Create Kobe II strategy risk matrix. Refer to the Table below, as an example, from Indian Ocean Tuna Commission (IOTC), showing risk probabilities violating MSY levels for F and B (biomass) next 3 and 10 years in 9 different catch levels (0%, ±10%, ±20%, ±30% and ±40% of the current level).

Table 2. Albacore: SS3 aggregated Indian Ocean assessment Kobe II Strategy Matrix based on the model options (i) Model 1 (ii) Model 2 (iii) Model 3 (Model 4 was not used for management advice). Probability (percentage) of violating the MSY-based target (top) and limit (bottom) reference points for constant catch projections (2017 catch level, ± 10%, ± 20%, ± 30% ± 40%) projected for 3 and 10 years.

Reference point and projection timeframe	Alternative catch projections (relative to the catch level for 2017) and probability (%) of violating MSY-based target reference points ($SB_{targ} = SB_{MSY}$; $F_{targ} = F_{MSY}$)								
	60% (22,901)	70% (26,718)	80% (30,534)	90% (34,351)	100% (38,168)	110% (41,985)	120% (45,802)	130% (49,618)	140% (53,435)
$SB_{2020} < SB_{MSY}$	0.614	0.678	0.715	0.769	0.818	0.828	0.87	0.883	0.898
$F_{2020} > F_{MSY}$	0.074	0.224	0.4	0.556	0.654	0.731	0.766	0.788	0.782
$SB_{2027} < SB_{MSY}$	0.176	0.307	0.456	0.572	0.713	0.823	0.898	1	1
$F_{2027} > F_{MSY}$	0.002	0.085	0.287	0.473	0.718	0.878	1	1	1

2.6 Alternative stock assessment

If possible, implement the additional (second) stock assessment using the different model with different specifications from the first model by following the same steps described as above. Then, compare results between the primary (first) and alternative (second) assessment model to evaluate reliability of the primary model.

2.7 Advice

Provide the current stock status and risks (probabilities) violating MSY levels of biomass and fishing mortality by different level of catch scenarios using provisional target and limit reference points by management unit, for consideration by the SERA-WG and Scientific Committee.

2.8 Presentation of the results

Provide a report to the SERA-WG and SC detailing the results of the stock assessments, methods and analyses, assumptions, and diagnostic analyses, including the Kobe I (stock status trajectories), and Kobe II (risk strategy matrix) shown in the previous page as an example. Refer to Section 3. REFERENCES AND SOURCES OF INFORMATION) on the Kobe process (Kobe I and II) and sample guidelines on the presentation of stock assessment results.

3. REFERENCES AND SOURCES OF INFORMATION

Relevant references and some sources of information are listed below. Although some SIOFA documents are restricted, the successful Consultant can obtain a copy from the Secretariat. If the Consultant needs to contact any SIOFA MoP member countries for further information, clarification, questions, etc., the Secretariat will assist with contacting suitable experts.

Data

- SIOFA database (to be provided by the SIOFA Secretariat).
- FAO FishStatJ: Software for Fishery and Aquaculture Statistical Time Series
<http://www.fao.org/fishery/statistics/software/fishstatj/en>

- SIOFA (2018). Summary of historical orange roughy catch (Mar 6, 2018).xlsx. SAWG (2018)-01-08 (Rev_1). [1st Stock Assessment Working Group \(SAWG1\) workshop | SIOFA \(apsoi.org\)](#)

SIOFA reports

- SIOFA SC reports and National Reports. [Scientific Committee Meeting | SIOFA \(apsoi.org\)](#)
- MoP reports. [Meeting of the Parties | SIOFA \(apsoi.org\)](#)

Scoping study

- SIOFA (2018). Preparation for stock assessments and harvest control rules on orange roughy stocks. SAWG (2018)-01-03 (final version) by SIOFA SAWG (Stock Assessments Working Group).
[https://www.apsoi.org/sites/default/files/documents/meetings/SAWG_%282018%29-01-03 Preparation for orange roughy SA%20BHC%20%28final%2013.02.2018%29.pdf](https://www.apsoi.org/sites/default/files/documents/meetings/SAWG_%282018%29-01-03%20Preparation%20for%20orange%20roughy%20SA%20BHC%20%28final%2013.02.2018%29.pdf)

Age and growth

- Cook Islands (2018). Age Composition of Sleeping Beauty Spawning Aggregation 2017. SAWG (2018)-01-04. [SAWG \(2018\)-01-04 Orange Roughy Age Readings from Sleeping Beauty 0.pdf \(apsoi.org\)](#)
- Horn P. *et al* (2019). Age Distribution Of Orange Roughy Harvested From The Sleeping Beauty Seamount, Southern Indian Ocean (SERAWG-01-Info-03).
[SERAWG-01-INFO-03 AGE DISTRIBUTION OF ORANGE.pdf \(apsoi.org\)](#)
- SIOFA (2021). Orange Roughy (*Hoplostethus atlanticus*) Age Estimation by Otolith. Terms Of Reference (Tor) For the Provision of Scientific Services to SIOFA Stock and Ecological Risk Assessment Work Group (SERAWG). Project Code: SER2021-02. The report will be available by Oct 30, 2021.

Acoustic data and abundance estimation

- FAO (2017). Report of the Workshop to review orange roughy acoustic data (FAO-ABNJ-DSP-2017-Doc-02). <http://www.fao.org/3/i7566e/i7566e.pdf>
- Kloser *et al* (2018). Orange roughy biomass estimation in SIOFA: Review of the use of acoustics from industry vessels. SAWG (2018)-01-INF09. [CSIRO report template \(apsoi.org\)](#)
- Scouling *et al* (2018). Review of SIOFA orange roughy acoustic data. SAWG (2018)-01-INF010.
[https://www.apsoi.org/sites/default/files/documents/meetings/SAWG%282018%29-01-INFO10 Review of SIOFA OR acoustic data. CISRO%2C 2018.pdf](https://www.apsoi.org/sites/default/files/documents/meetings/SAWG%282018%29-01-INFO10%20Review%20of%20SIOFA%20OR%20acoustic%20data.%20CISRO%2C%202018.pdf)

- SIOFA (2021). Orange Roughy (*Hoplostethus atlanticus*) Acoustic Data Processing Project Code: SER2021-01. Terms Of Reference (TOR) for the Provision of Scientific Services to SIOFA Stock and Ecological Risk Assessment Work Group (SERAWG). Project Code: SER2021-02. To be provided by the Secretariat. The Consultant report will be available by Nov 15, 2021.

Orange roughy stock assessments using the acoustic data

- Cordue (2014). The 2014 orange roughy stock assessments. New Zealand Fisheries Assessment Report 2014/50. 135 p. New Zealand Ministry for Primary Industries, Wellington, New Zealand. SIOFA-SAWG (2018)-01-INFO-04. [The 2014 orange roughy stock assessments \(apsoi.org\)](#)
- Cordue (2018). Stock assessment of orange roughy in the Walter's Shoal Region. SAWG (2018)-01-05. [Microsoft Word – WSRassessment.docx \(apsoi.org\)](#). [restricted document] To be provided by the Secretariat.
- Cordue (2018). Assessments of orange roughy stocks in SIOFA statistical areas 1, 2, 3a, and 3b. SAWG (2018)-01-06. [Microsoft Word – lotsassess.docx \(apsoi.org\)](#). [restricted document] To be provided by the Secretariat.

Stock assessments (guideline and manuals)

- NAFO (2020). Guidance for providing advice on Stocks Assessed with an Analytical Model. <https://www.nafo.int/Portals/0/PDFs/sc/2020/scs20-01.pdf>
- IOTC (2014). [Revised: Guidelines for the presentation of CPUE standardisations and stock assessment models \(2014\) | IOTC](#)
- Bull et al (2012). CASAL (C++ algorithmic stock assessment laboratory) User Manual v2.30-2012/03/21. NIWA Technical Report 135. National Institute of Water and Atmospheric Research, Wellington, 280 p.
- Methot et al (2021). Stock Synthesis User Manual. Version 3.30.17. NOAA Fisheries, USA. <https://vlab.noaa.gov/web/stock-synthesis>

Kobe process

- Kell, L.T. *et al.* (2012). A Kobe Strategy Matrix based upon probabilistic reference points: an example using a biomass dynamic assessment model. Collective volume of scientific papers, ICCAT 68(3), 1030–1043.
- IOTC and BOBP (2014) Kobe process (Phase Plots and Decision Matrices) advice on Stock. <https://www.nafo.int/Portals/0/PDFs/sc/2020/scs20-01.pdf>

4. Submission of the information and confidentiality

The Consultant shall submit all the information collected to the SIOFA Secretariat (including that sourced from the Secretariat) before the final payment of the contract is made to the consultant. Such information includes electronic data files, analysis codes, biological samples, and other relevant data if applicable. Any arrangements for ownership, storage, or disposal of physical samples shall be agreed by SIOFA as a part of the contract. All Intellectual Property generated as a part of this contract shall become the property of SIOFA unless otherwise excluded in the proposal and agreed by SIOFA in the contract. The Consultant shall not release confidential data provided for conducting this study to any persons nor any organisations, other than SIOFA Secretariat. The consultant shall delete all the confidential data upon the completion of the contract.

5. Report

The Consultant shall provide a report addressing the terms of reference, and submit it to the SIOFA Secretariat. The draft report will be reviewed by the Scientific Committee and the Consultant shall provide the final report incorporating comments and/or requests (revisions, additional works, etc.) made by the SC. The Consultant shall present the report in SERA-WG4 (February 28 – March 4, 2022) and SC7 (March 21 – 25, 2022). Refer to the report submission schedule in Section 7 (Page 9).

6. Submission of applications

The applicants should have many years of experiences and high levels of knowledges on stock assessments, preferably orange roughy. The applicants should submit a proposal that contains the following items:

- A current CV that summarises the applicant(s) relevant educational background and professional experience (maximum 3 pages);
- A brief proposal outlining the proposed methods and analyses, including a description of how the objectives of the ToRs will be achieved;
- Any proposed exclusions to the intellectual property clause;

- The proposed consultancy price (including all consultant expenses and project related costs), noting that the budget for this work is a maximum of 25,000 EUROS;
- Identification of any project risks and associated mitigation and management required to successfully complete the project;
- A statement that identifies any perceived, potential, or actual conflicts of interest of the applicant(s), including those described in paragraph 4 of the SIOFA recruitment procedure (see Box 1); and
- Any additional information the applicant(s) wish to submit.

Box 1 Conflicts of interest: Paragraph 4 of SIOFA's Recruitment Procedure

To ensure that situations relating to potential and actual conflict of interests are avoided, persons falling into the following categories may not normally be considered for SIOFA consultancy: (i). any person designated as a designated representative or alternate representative of a CCP to the Meeting of Parties (MOP) as per Rule 3.1 of the Rules of Procedure, and to the SC and any other subsidiary bodies of the MOP, as per Rule 21.3 of the Rules of Procedure; (ii). Any person fulfilling the function of Chair or Vice-Chair of the MOP or Chair or Vice-Chair of a SIOFA subsidiary body or working group; (iii). Any person acting as a member of a delegation involved in the SIOFA decision-making process resulting in recommendations and/or approval for the SIOFA work requiring the engagement of a consultant; and (iv). Individuals who were SIOFA Secretariat staff members at the time when the recommendations and/or approval for the SIOFA works were adopted or who are members of immediate family (e.g., spouse or partner, father, mother, son, daughter, brother, or sister) of any Secretariat staff member or of the persons identified in 4 (i), (ii), and (iii).

Announcement of Call for the consultant will be placed in the SIOFA home page on September 7 and will be circulated to all Cooperating and Contacting Parties (CCPs). The application must be submitted to Thierry Clot, Executive Secretary, Thierry.clot@siofa.org, by September 27, 2021 (1 pm UTC time).

7. Work plan and payment schedule

Table 1 describes the work plan and the payment schedule which may change subject to the situation. The Consultant shall follow this work plan.

Table 1 Work plan and the payment schedule

Topic	Period	Duration	Activities
Initial administrative matters	Sept 7 – 27 (2021)	3 weeks	Call for the consultant through the SIOFA web site and through the circulation to Cooperating and Contacting Parties (CCPs) and other relevant agencies.
	Sept 28 – 30 (2021)	3 days	Selection of the consultant by the evaluation panel.
	Oct 1 (2021)		Project inception. The Secretariat will make a <u>first payment</u> corresponding to 20% of the cost of the studies validated in the contract.
ToR	Oct 1 to Dec 31 (2021)	3 months	The Consultant shall implement ToR and submit the draft report by Dec 31, 2021.
	Jan 1–13 (2022)	2 weeks	SC will review the draft report and make comments and/or request (revisions, additional works, etc.) by Jan 13, 2022.
	Jan 14–31 (2022)	2 weeks	The Consultant shall submit the final report incorporating SC's comments and/or requests by Jan 31, 2022. The Secretariat will make the <u>2nd payment</u> corresponding to 60% of the cost of the studies validated in the contract.
Presentation reports (SEAR-WG4 and SC7)	SERA-WG4 Feb 28–Mar 25 (2022)	2 weeks	The Consultant shall present the report to SERA-WG4 and SC7. After the presentations are completed, the Consultant shall submit all materials to the Secretariat and delete electronic files used in this project. Then, the Secretariat will make the <u>last (4th) payment</u> corresponding to 20% of the cost of the studies validated in the contract.
	SC7 Mar 21 –25 (2022)		

8. EVALUATION CRITERIA FOR THE SELECTION OF CANDIDATES

The selection criteria will be developed by the evaluation panel along with the project manager, the Secretariat, and the Chairpersons of the relevant subsidiary bodies. The criteria may include following items:

- Adequate submission of information to allow the panel to evaluate the candidate;
- Evaluation of the proposal from the candidate, including the proposed contract price;
- Ability to undertake and complete the analyses or work required in the ToR;
- The candidate's agreement with confidentiality provisions required for the project;
- Acceptable conflict of interest statement;
- Agreement with the data submission and intellectual property terms required in this ToR and;
- Financial and resourcing considerations.

9. CONTACT PERSONS

- SIOFA Secretariat (administrative matters)
Thierry Clot, SIOFA Executive Secretary (thierry.clot@siofa.org)
- Project Manager (technical matters)
Tom Nishida, SERA-WG chairperson (aco20320@par.odn.ne.jp)