



**Harvest Strategy Pre-Assessment Workshop (WSHSPA-2023)**

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**WSHSPA-2023-01**

# Summary of the Scientific Committee and the Meeting of Parties reports on the development of harvest strategies

Scientific Committee Chair

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<b>Abstract</b>	
<p>Harvest strategies have been listed in the Scientific Committee's work program since 2016, and there have been two consultancies that have discussed potential approaches to harvest strategies and associated harvest control rules.</p> <p>This document provides a summary of consultancy reports, and paragraphs that have discussed and made recommendations on harvest strategies by the Scientific Committee and the Meeting of Parties.</p> <p>To create this summary, the reports of the Scientific Community and the Meeting of Parties since 2013 were searched for references to harvest strategies or stock reference points. Relevant paragraphs in these reports are described below.</p>	

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## 1. Summary of recommendations and decisions from the Scientific Committee and Meeting of parties for 2013-2015

Early MoP reports (2013-2015) did not specifically discuss reference points or harvest strategies when considering stock assessments. The only relevant comment found was in the MoP1 report (2013) that recorded an intervention by SIODFA, which noted that the objectives of SIODFA included an appropriate harvesting regime for targeted species.

## 2. Summary of recommendations and decisions from the Scientific Committee and Meeting of parties for 2016

### 2.1. The SC1 report (2016) noted the following

Para 101: The Scientific Committee noted there is a requirement to follow the principles of the precautionary approach, whereby the absence of adequate scientific information shall not be used as a reason for postponing or failing to take conservation and management measures (Article 4(c)). Some Members noted that the Scientific Committee could recommend a prohibition on deepwater gillnets that would not necessarily preclude their future use, but that if deepwater gillnet fishing occurred it would be on the basis of having a robust ecological risk assessment undertaken, an agreed harvest strategy with clear harvest control rules.

Para 115: In discussing the management of bottom fishing in the SIOFA area (SC-01-07 (01), SC-01-07 (02), SC-01-INFO 26, SC-01-27) the Scientific Committee advises the MoP that there are several options for limiting fishing effort. Adopting effort control in SIOFA was considered prudent given the absence of quantitative assessments on the status of stocks in relation to biological reference points and an agreed harvest policy.

1. limiting fishing activity in bottom and mid-water fishing in any one year to their maximum effort in any one of the reference years (which would need to be defined). Limits could be defined as total days at sea in the Agreement Area and/or vessel numbers. The Scientific Committee did not have a substantive discussion on the most appropriate effort measure.
2. prohibiting vessels from undertaken bottom fishing in the Area outside their historical bottom fishing footprint. The term 'bottom fishing footprint' means a map of the spatial extent and distribution of historical bottom fishing in the Area of all vessels flagged to a particular Contracting Party, CNCP or PFE over expressed as grid blocks of 20 minute resolution over a reference period (which would need to be defined).

Para 116: The Scientific Committee advised that Option 1 would not necessarily constrain the spatial distribution of effort. Option 2 would not constrain total effort but would constrain the spatial distribution of effort which may assist the MoP with ensuring that impacts on VMEs is minimised by preventing fishing activities from expanding into new areas. The MoP may wish to consider both

options if it chooses to manage effort in terms of total effort and its spatial distribution. The MoP is advised that Scientific Committee did not discuss the implications of effort creep due to increases in fishing power of vessels on these options. The Scientific Committee did not discuss the definition of reference periods for limiting effort, suggesting this be investigated intersessionally and advice provided in future if required.

### 3. Summary of recommendations and decisions from the Scientific Committee and Meeting of parties for 2017

No discussions of harvest strategies or reference points were recorded. However, the SC2 report (2017) noted (Annex M, the SIOFA Scientific Committee Operational Work Plan 2016-2019) that the determination of biological reference points and associated development of harvest strategies was a priority. This work was included in the workplan of the SAWG, which was tasked with assisting with review of methods and outputs used for stock assessments and provide advice to the Scientific Committee on a harvest strategy and fisheries reference points for SIOFA fisheries.

### 4. Summary of recommendations and decisions from the Scientific Committee and Meeting of parties for 2018

#### 4.1. The SC3 report (2018) noted the following:

Para 192: The SC recalled paragraph 6a of CMM 2016/01 that actions the SIOFA Scientific Committee to provide advice and recommendations to the Meeting of the Parties on the status of stocks of principal deep-sea fishery resources targeted, and, to the extent possible, taken as bycatch and caught incidentally in these deep-sea fisheries, including straddling fishery resources by 2019.

Para 193: Dr Nishida, Chairperson of the SAWG, presented the report of the first meeting of the SAWG (SC-03-07.1.1(03)). The main areas of discussion centred around:

- A tiered assessment framework for SIOFA fisheries
- Stock assessment for seven orange roughy sub-regions
- Future work, including that planned for alfonsino, Patagonian toothfish and other species.

Para 194: The SAWG Chairperson presented the discussion and outcomes regarding the SAWG's consideration of a tiered assessment framework for SIOFA fisheries (based on SAWG(2018)-01-INF06). Such a framework will provide direction for future work of the SC/SAWG and may increase the efficiency of the SC/SAWG's considerations given the large number of species with which SIOFA fisheries interact. It was noted that the quantity, quality and suitability of data will vary among species over space and time and that this variability is likely to influence the parameters that can be estimated, and the associated uncertainties. The tiered framework for prioritising stocks for status assessment was proposed based on the parameters that can be estimated given the data available. Such a tiered framework may eventually assist the SAWG and SC with developing transparent decision rules for advice on recommended biological catches and potential buffers (e.g. 'discount

factors') that may be applied to account for assessment uncertainty. The recommended tiered levels consist of:

- Tier 1 Benchmark assessments that utilise catch data from fishery monitoring, ideally in combination with stock abundance from independent surveys, catch rates and biological data with the purpose of estimating depletion levels and fishing mortality rates.
- Tier 2 Data limited assessments that may utilise catch-only or simple indicators to track status (e.g. CPUE, size composition, Productivity-Susceptibility Analysis).
- Tier 3 No assessment necessary.

Para 195: This tiered framework is not equivalent to those applied in some management approaches, where the tiers have been established to guide the application of harvest control rules and generate effort or quota outputs. Examples of these types of tiered frameworks were presented in papers SAWG(2018)-01-INF06, SAWG(2018)-01-INF07 and SAWG(2018)-01-INF11.

Para 226: The SC agreed that that the outputs of the SAWG and stock assessment [for orange roughy] could be used to provide advice. The SC noted that since the MoP had not provided any instruction on its preferred reference points for this stock, advice on status would not be made but instead the estimates and the ranges around these estimates would be presented.

Para 227: Management Strategy Evaluation (MSE) was discussed and it was noted that MSE could be undertaken to test different harvest strategies for SIOFA stocks.

In the Scientific Committee's 2018 report (2018, Annex L), the Scientific Committee noted that determination of biological reference points and associated development of harvest strategies for alfonsino, orange roughy, and toothfish had not been addressed.

#### 4.2. MoP5 report (2018) noted the following

Para 51: In clarifying the request in CMM2018/01 paragraph 6a, the Meeting of the Parties requested the Scientific Committee provide advice on the status of stocks in relation to MSY until species/stock/fisheries specific reference points are adopted by the Meeting of the Parties.

Para 52: Noting the advice from the SC03 (para 234) requesting further direction from the Meeting of the Parties on the establishment of reference points, the Meeting of the Parties requests the Scientific Committee by the end of SC04 to provide advice on candidate target (TRP) and limit reference points (LRP) for SIOFA orange roughy, alfonsino and toothfish. The LRP should be related to the resilience of the species concerned and to a risk of recruitment failure or collapse. The range of TRPs on which advice is requested would range from  $B_{msy}$  to 50% of the unfished biomass  $B_0$ . The advice requested should address implications of the use of the various reference points.

Para 53: The Scientific Committee (SC04) is requested to develop a framework and a work plan for the establishment of harvest strategies for key SIOFA stocks. Such a plan should include to the extent possible: management objectives, reference points, monitoring strategy, HCR, MSE and any other elements the Scientific Committee might consider appropriate. The Scientific Committee is also requested to facilitate a scientists-fisheries manager dialogue dedicated to the key concepts of harvest strategies.

## 5. Summary of recommendations and decisions from the Scientific Committee and Meeting of parties for 2019

### 5.1. SC4 report (2019) noted the following

Para 173: The Chair reminded the SC that the MoP had requested that the SC provide advice on candidate target (TRP) and limit reference points (LRP) for orange roughy, alfonsino and toothfish and develop a framework and a work plan for the establishment of harvest strategies for key SIOFA stocks (MoP5 report, paras 52 – 53).

Para 174: The SC agreed that scientific work was required to inform SC advice on TRPs and LRPs. The SC requests the SERAWG to form a group of key interested parties to work intersessionally with a consultant to draft a technical working paper for submission to the next SERAWG meeting;

- to develop a generic approach for determining reference points for current and future stocks;
- that candidate reference points should take into account the level of data uncertainty in stocks, noting the data-limited nature of some fisheries/stocks;
- that for straddling stocks consistent reference points should be applied across the stock.

Para 175: The SC recommends that the MoP consider including six elements when developing harvest strategies, and the SC begin work to populate those elements: (i) operational objectives, (ii) reference points, (iii) an acceptable level of risk of breaching reference points, (iv) a monitoring strategy, (v) decision rules for achieving reference points, and (vi) a process for evaluating harvest strategies.

Para 178: The SC agreed to a work plan to progress this work (Annex X). The work plan includes scientists – fishery managers – stakeholders dialogues to discuss the key concepts of harvest strategies.

The SC4 report (2019, Annex X) provided a work plan for the development of target and limit reference points and a harvest strategy framework:

The focus is initially the three key species (orange roughy + alfonsino + Patagonian toothfish)

- To implement this task a consultant (expert) needs to be hired because specialised knowledge and skills are required.
- The consultant should propose plausible candidates for target (TRP) and limit (LRP) reference points and harvest strategies considering life history, biology, ecology and availability of data of three species and also by considering linkage between the reference points and harvest strategies. The consultant should consider other SC advice, paras 174-175.
- A dialog involving scientists, managers and stakeholders should be facilitated to develop a shared understanding of the key concepts and elements of harvest strategies.
- As there needs to be a common understanding and also decision points, the work is planned over two years.

In terms of the harvest strategy development, the consultant shall incorporate the following elements of harvest strategies. Initially, information describing these elements needs to be provided and relevant decisions by the MoP facilitated.

- operational objectives;
- Reference points;
- acceptable level of risk of breaching reference points;
- monitoring strategy;
- decision rules for achieving reference points; and
- a process for evaluating harvest strategies.

In 2019, MoP6 (2019) allocated funding to assist with the development of target and limit reference points and harvest strategies.

## 6. Summary of recommendations and decisions from the Scientific Committee and Meeting of parties for 2020

### 6.1. The SC5 (2020) report noted the following

Para 171: No papers were provided for this agenda item [*Agenda item 7.9 Harvest strategies*]. The SC agreed to progress this work, in line with the agreed work plan (SC4 Report, Annex X) and reflected in the SC Operational work plan, noting the MoP6 had approved funding for this work in 2020 (MoP6 Report, Annex Q, EUR 15,000 in 2020, of a requested EUR 30,000 across two years).

No relevant comments on reference points or harvest strategies were found in the MoP7 (2020) report.

## 7. Summary of recommendations and decisions from the Scientific Committee and Meeting of parties for 2021

Paper SC-06-24 (Butterworth et al. 2021) was a SIOFA consultancy that reported on the development of harvest strategies for key target species in the SIOFA area. This paper provided the following summary:

The Terms of Reference for this contract ask for evaluations of use of harvest strategies, and target and limit reference points, by other fishery organisations, and then for recommendations for adoption of similar approaches by SIOFA. Those practices in a number of such organisations are summarised, as are the assessments available for the three major species under harvest in the SIOFA area: alfonsino, orange roughy and Patagonian toothfish. However, for the other main species of commercial interest in this area, because only limited information is currently available, assessments (and hence reference points, and harvest strategies based on those) are not yet possible; hence, a process to move towards developing and then improving these assessments needs to be agreed. This process must include further data collection in particular, especially of catch and effort information.

For alfonsino, orange roughy and Patagonian toothfish, the alternative merits of three different approaches need to be considered:

1. Maintaining catches at present levels (unless there is evidence of a marked downward trend in the resource) until sufficient further data become available for meaningful improvements to the existing assessments.
2. Implementing an *status-quo* harvesting strategy, which varies catches up or down in proportion to the results from continued collection of some measure or index of abundance.
3. Implementing a harvest strategy based primarily on some multiple of a proxy value of FMSY, where this in turn is based on a proxy value for a BMSY reference point whose value is informed by the most recent assessment of the resource.

The choice amongst these for each of the three species separately will come down primarily to the trade-off between likely greater stability of catch limits over time under the first approach, against possibly larger catches in the short term at least under the second and third.

For the other main, but data-poor, species in the SIOFA area, only the first approach is viable at this time, but needs to be augmented by one or more precautionary provisions. For example, the SAFE methodology might be applied to obtain some indication of whether the current catch is leading to an appreciable reduction in abundance – if so, necessitating a reduction in the present catch.

### 7.1. SC6 report (2021) noted the following

Para 117: The report on the development of harvest strategies for key target species in the SIOFA Area (SC-06-24; also presented at SERAWG3 as SERAWG-03-10) was taken as read. The report included a summary of the use of harvest strategies, and target and limit reference points used by other fishery organisations, a summary of the assessments available for the three major species under harvest in the SIOFA Area (alfonsino, orange roughy and Patagonian toothfish), possible harvest strategy approaches for the aforementioned three major species and the pros and cons of each, and possible ways to move towards developing assessments for the other major species and consequently reference points and harvest strategies based on those assessments.

Para 122: The SC NOTED that for most other SIOFA species that are data limited, assessments and consequently reference points and harvest strategies are not yet possible to develop.

Para 123: For these SIOFA species, the SC NOTED that approach i. could be the most viable at this time, but that this would need to be augmented by one or more precautionary provisions to check whether catches were sustainable and take corrective action in the event that there were persuasive indications to the contrary. The SERAWG NOTED that this approach could be implemented, for example, by application of risk assessment across a broad suite of species using, for example, the SAFE methodology. However, unless the spatial and temporal scale of the fishery is well known, this may not be possible and other options would need to be investigated.

Para 124: The SC RECOMMENDS that the MoP note that an important associated priority is further data collection, especially more and better catch and effort information and the associated analyses of these data through space and time.

Para 125: The SC SUGGESTS that:

- The utility and specifics of the three alternative approaches, as they may apply in each case, be examined before a decision on the best approach is determined.
- The MoP considers interim reference points for orange roughy and alfonsino as follows: Target = BMSY using a proxy of  $= 0.4 \cdot B_0$ , and a Limit =  $0.2 \cdot B_0$  (common surrogates used in other regions). These interim reference points could be considered for SC reporting purposes and would not necessarily be appropriate for management purposes.
- With respect to toothfish, the MoP consider that CMM 2020/15 has an objective to “ensure collaborative and complementary arrangements are in place for *D. eleginoides* between SIOFA and the CCAMLR”. Accordingly, when setting reference points for toothfish, SIOFA consider the reference points adopted by CCAMLR: Target =  $0.5 \cdot B_0$ , and Limit =  $0.2 \cdot B_0$
- The MoP consider fishing fleet behaviour and fish stock structure in the development of harvest strategies for each species.

Para 126: The SC RECOMMENDS that the MoP:

- Undertake analyses to determine the applicability and trade-offs between the three proposed harvest strategy approaches for each of the three species concerned, to provide an objective basis to underpin final decision making. For some approaches this will require consideration of appropriate reference points.

## 7.2. MoP report (2021) noted the following

Para 130: France Territories supported the continuation of the work on harvest strategies by implementing analyses to assess the effectiveness and risks associated with the three strategies proposed in the Scientific Committee report. In view of the little knowledge on the sustainability of harvesting levels for the main species, France Territories supported the implementation of the precautionary principle when choosing the reference points. Regarding toothfish, France Territories supported the adoption of management objectives and reference points as adopted by CCAMLR.

Para 131: Australia welcomed the significant consultant report exploring the potential development of harvest strategies in SIOFA and stated that it continues to be a strong advocate of harvest strategies as a best practice in fisheries management in order to achieve SIOFA’s objectives. Australia could support the proposed interim reference points on orange roughy, alfonsino, and toothfish, but recognised that further consideration may be needed within the Scientific Committee and amongst CCPs and so Australia did not advocate for a decision on reference points at this MoP. Australia supported the recommendation on further work to examine the applicability of the three proposed harvest strategy approaches, and work to develop objectives for these fisheries.

Para 132: The Cook Islands expressed its support for the development of a harvest strategy process, noting that, while some of the issues need broader consideration, the work done so far by the Scientific Committee is a good step forward. The Cook Islands noted that, for all three stocks concerned, the scientific information available make the development of an efficient, well-balanced, and carefully thought out harvest strategy challenging, and suggested that it may be necessary to consider simpler approaches in the interim.

Para 133: The European Union welcomed the work done to progress the harvest strategy approaches and suggested that a roadmap be developed and the work be progressed further in the



intersessional period before the Scientific Committee meeting to enable it to make recommendations in time for the next Meeting of the Parties.

Para 134: The European Union highlighted the need for enhanced cooperation between scientists and managers when developing harvest strategy approaches.

Para 135: The Meeting of the Parties requested the Scientific Committee to develop a roadmap for developing harvest strategies at the seventh Scientific Committee meeting and, as recommended in paragraph 126 of the SC6 report, consider analyses to determine the applicability and trade-offs between the three proposed harvest approaches for orange roughy, alfonsino, and toothfish.

## 8. Summary of recommendations and decisions from the Scientific Committee and Meeting of parties for 2022

Report SC-07-INFO-24 (Butterworth 2022) was a SIOFA consultancy that reported on a roadmap for the development of harvest Strategies for SIOFA. This report provided the following summary:

The Consultants past experience with conducting assessments of and/or providing management advice for SIOFA fish stocks has indicated that a key problem has been the lack of background information on the data available and how they relate to the way the fishery operates. That missing information is a key input to the assessment process, and its ability to provide reliable results. The International Whaling Commission's "harvest strategy roadmap" is reviewed. Their first step for any stock of a "pre-assessment" process to compile the data to be used in the harvest strategy analyses and how they should be interpreted, is suggested to be an essential component of any similar SIOFA roadmap. This process should be put into practice by the appointment, for any stock for which a harvest strategy is to be developed, of a Technical Sub-Committee which would meet separately from the SIOFA Scientific Committee and report back to it. This Sub-Committee would include persons with the relevant expertise about the stock to provide this missing information and to develop ToR's for the basis on which the harvest strategy development should proceed. Overview comments are provided about the process that would then follow. An important decision to be made is whether the harvest strategy for a specific stock is to be based on the "best assessment plus harvest control rule" approach or on Management Strategy Evaluation (MSE). A table is provided summarising the details associated with this "Technical Sub-Committee" pre-assessment component of a harvest strategy development roadmap.

**Table 1: Elements of the initial stage of a recommended harvest strategy roadmap for SIOFA, focussing on the suggested pre-assessment process (Table 1 from Butterworth 2022).**

- Step 1 The Scientific Committee selects a stock for the potential development of a harvest strategy. Note that at any one time, probably no more than two stocks should be in process towards such development (this in the light of likely resource limitations in terms of “person-power”)
- Step 2 The Scientific Committee appoints a Technical Sub-Committee to initiate the harvest strategy development process for that stock through what is termed a “Pre-assessment”. In broad terms, the role of that Sub-Committee is to oversee the compilation of the data to be used in that process and to comment on how they are to be interpreted in developing stock assessment models and the basic hypotheses on which those models are to be based (this may extend beyond single interpretations of components of that information, and include alternatives for which sensitivities will need to be investigated).
- Step 3 The Technical Sub-Committee is to comprise of persons with the appropriate expertise to advise on the data available for the stock and how they are to be interpreted. They are to be drawn both from Scientific Committee members and from outside persons with relevant expertise.
- Step 4 At the start of the process, the Scientific Committee should appoint likely analysts, but at that stage “preliminarily”, i.e., for participation in the activities of the Technical Sub-Committee only.
- Step 5 A primary role of the Technical Sub-Committee is to report back to the Scientific Committee when they consider that the pre-assessment process has been successfully completed to the stage that they would be prepared to recommend to the Scientific Committee that the quantitative assessment analyses by the analysts previously “provisionally” appointed can commence
- Step 6 The Technical Sub-Committee must also advise the Scientific Committee on:
- Likely timelines for completion of the harvest strategy development.
  - If pertinent, broad indications of likely appropriate values for target and limit reference points.
  - ToR for the analysts who will be developing the harvest strategy.
  - Whether to aim for a “best assessment plus harvest control rule approach” or for a full MSE harvest strategy, with the addition of further details desirably specified immediately for whichever option is preferred.
- Step 7 The Scientific Committee then considers the recommendations/advice provided by the Technical Sub-Committee, and decides whether the harvest strategy development for the stock under consideration is to proceed, together with specifying the ToR for the analysts.

### 8.1. SC7 report (2022) noted the following

Para 124. The SC ENDORSED the recommendation in SC-07-INFO-12 rev 1 (Butterworth 2022):

- to specify a pre-assessment process involving the appointment of a Technical Sub-Committee to oversee the collection of relevant data and to provide the interpretations of those data that are necessary before the assessment of and harvest strategy development for any stock can proceed.
- that subsequent harvest strategy development would be highly dependent on the reports from such Technical Sub-Committees, so it would be premature at this time to get into more details about the later stages of a harvest strategy roadmap for SIOFA.

Para 125. As the next steps, the SC RECOMMENDED:

- that the Secretariat work intersessionally to prepare as much information as possible for understanding the data available on the alfonsino, orange roughy and toothfish fisheries and any potential trends in the data.
- that a two-day harvest strategy pre-assessment workshop be held in 2023 prior to SC8, with the participation of scientists, managers, industry representatives, and observers, to:
  - i. discuss the planning and implementation of the harvest strategy development roadmap.
  - ii. interpret the data.
  - iii. identify data gaps for informing a stock assessment.
  - iv. discuss which stocks are to be assessed.
- That the outcomes of the workshop be presented to the SC and its working groups for further discussion.

Para 126: The SC encouraged CCPs to conduct characterisations of their alfonsino, orange roughy and toothfish fisheries, and to present this information to the abovementioned workshop.

Para 170: With regard to the development of a harvest strategy roadmap, the SC RECOMMENDED the MoP:

- ENDORSE the specification a pre-assessment process involving the appointment of a Technical Sub-Committee to oversee the collection of relevant data and to provide the interpretations of those data that are necessary before the assessment of and harvest strategy development for any stock can proceed.
- NOTE that subsequent harvest strategy development would be highly dependent on the reports from such Technical Sub-Committees so it would be premature at this time to get into more details about the later stages of a harvest strategy roadmap for SIOFA.
- task the Secretariat to work intersessionally to prepare as much information as possible for understanding the data available on the alfonsino, orange roughy and toothfish fisheries and any potential trends in the data.
- ENDORSE that a two-day harvest strategy pre-assessment workshop be held, with the participation of scientists, managers, industry representatives, and observers, to:
  - i. discuss the planning and implementation of the harvest strategy development roadmap.
  - ii. interpret the data collected intersessionally.
  - iii. identify data gaps for informing a stock assessment.
  - iv. discuss which stocks are to be assessed.
  - v. develop identification guides to assist the recording of species by the vessel crew and observers.
- that the outcomes of the workshop be presented to the SC and its working groups for further discussion.

## 8.2. MoP report (2022) noted the following

Para 130: The Meeting of the Parties ENDORSED the recommendations in paragraph 170 of the SC7 report regarding the development of a harvest strategy roadmap.

Para 131: The Meeting of the Parties AGREED that the holding of the harvest strategy preassessment workshop, as well as other workshops, should be done in a hybrid format to enable maximum participation, including by observers.

Para 268: The Meeting of the Parties AGREED that the joint MoP-SC workshop on harvest strategy pre-assessment will take place from 17 to 18 March 2023, the workshop on deepwater sharks in the SIOFA Area will take place from 20 to 21 March 2023, and the eighth meeting of the SC will take place from 22 to 31 March 2023, in Tenerife, Spain.

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