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Meta-rules: consideration of exceptional circumstances in 2019 and meta-rules for the new MP

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Abstract

The annual review of the CCSBT Management Procedure (MP) input data series, and stock and fishery indicators, is intended to identify conditions and/or circumstances that may represent a substantial departure from conditions against which the MP was tested, termed "exceptional circumstances", and where appropriate recommend action. In 2019, the ESC will review MP implementation in the context of the TAC set for 2020, which was recommended using the MP at the 2016 meeting of the ESC.

A potential new exceptional circumstance in 2019 is the very high Japanese longline CPUE estimate for 2018. Exceptional circumstances that have been identified and assessed in previous years and continue to exist are: 1) the planned absence of the index of recruitment from the scientific aerial survey in 2018 and 2019; 2) changes in estimates of the population dynamics and productivity of the stock identified in 2017 through the updated stock assessment; 3) the shift in size distribution, towards small fish, in the Indonesian spawning ground fishery since 2013; 4) the potential for total catches (members and non-members) to be greater than the TAC (either annually or over the 3 year quota block). These issues, and their cumulative impacts, will need to be considered by the ESC and principles and process for action agreed, if required.

As part of the recommendation of a new MP in 2019, the ESC will need to consider adopting meta-rules that will provide a schedule of activities and a safety-net around the MP TAC recommendations for circumstances or events not included in the MSE testing phase. The meta-rules schedule of activities would include the frequency of: evaluation of exceptional circumstances, TAC setting, assessment of stock status and periodic review of MP performance. The meta-rules will continue to be an essential component of the MP that provides structure and confidence for CCSBT members and stakeholders and transparency in the TAC decisions of the CCSBT.

1   Introduction

The SBT MP meta-rules' schedule of activities includes an annual process for identifying exceptional circumstances. Exceptional circumstances are events, or observations, that are outside the range for which the CCSBT MP was tested and, therefore, indicate that application of the total allowable catch (TAC) generated by the management procedure (MP) may be highly risky, or highly inappropriate.

The exceptional circumstances process under the meta-rules involves the following three steps:

1.   Determining whether exceptional circumstances exist;

2.   A "process for action" that examines the severity (and implications) of the exceptional circumstances for the operation of the MP, and the types of actions that may be considered;

3.   "Principles for action" that determine how recommendations from the MP might be altered, if at all, based on the most recent reconditioning of the Operating Model (OM).

The meta-rules process as adopted by CCSBT can be found at Attachment 10 of the 2013 ESC report (Anon, 2013).

The meta-rules schedule of activities for implementation of the MP TAC specifies frequency of TAC setting, stock assessment, MP review and the consideration of exceptional circumstances. The consideration of exceptional circumstances has identified issues that the Commission or ESC have subsequently responded to, where required, e.g. action on accounting for all sources of mortality and dealing with missing data. The meta-rules provide a safety-net around the MP TAC recommendations and will continue to be an essential component of the implementation of the new MP being developed to replace the Bali Procedure.

2   Potential exceptional circumstances in 2019

The following items may represent exceptional circumstances:

1.   The very high longline CPUE estimate in 2018;

2.   the pre-arranged absence of aerial survey data for 2018 and 2019;

3.   changes in estimates of the population dynamics and productivity of the stock since the tuning and implementation of the MP in 2011;

4.   the shift in size distribution towards small fish in the Indonesian spawning ground fishery since 2013; and,

5.   potential for fishing mortality (from members and non-members) to be greater than the TAC recommended by the MP.

The first item is new in 2019, and the remaining four were reviewed at the 2017 and 2018 ESCs (Preece et al., 2017, 2018a; Anon, 2017, 2018) and are only briefly addressed again here.

In considering the potential for exceptional circumstances arising from these issues, we examine whether: 1) the inputs to the MP are affected, 2) the population dynamics are potentially significantly different from those for which the MP was tested (as defined by the 2011 Reference and Robustness sets of OMs), 3) the fishery or fishing operations have changed substantially, 4) total removals are greater than the MP's recommended TACs, and 5) if there are likely to be impacts on the performance of the SBT rebuilding plan as a result.

The events are considered individually, however, the implications of the combination of events for the performance of the MP and the ability of the ESC to provide robust advice on the status and trends of the stock should also be considered. It is possible that additional exceptional circumstances may also be identified at the ESC's annual review of stock and fishery indicators.

2.1 High longline CPUE estimate in 2018

The updated CPUE time-series (Itoh and Takahashi, 2019) have shown an increasing trend in CPUE since 2007, with very high estimates for 2018 in the base series. The 2018 data point appears to be highly influenced by high catch rates in statistical area 8, which affect the catch-rates assumed in unfished squares (which have historically been fished). Investigation of the GLM effects on the series, noted that the historical extent of the fishery has changed substantially over time with contraction of effort to fewer squares. Takahashi (2019, pers. comm.) has noted that the high value is not outside of the range against which the MP was tested, and therefore it would not trigger exceptional circumstances. This 2018 data point (and the CPUE trend), is a positive indicator for the fishery and has no direct impact on the calculation of the 2020 TAC advice as the TAC was set back in 2016. Therefore, we do not recommend any modification of the 2020 TAC. We do note that these data are being considered for use in the new MP and will therefore need to be further evaluated at the 2019 ESC, and in preparation for the next stock assessment in 2020.

2.2 Absence of scientific aerial survey data

The scientific aerial survey was discontinued after completion of the 2017 survey. This was a planned cessation, agreed by the Commission in 2016. Members recognised the risks involved in foregoing future aerial survey results (Anon, 2016a,b), and that this cessation would mean that a new recruitment monitoring program and management procedure would need to be developed.

The gene-tagging program was developed and adopted as the replacement recruitment monitoring program. A pilot study commenced in 2016 and the program is now ongoing (Preece et al, 2018b). Two abundance estimates (the age 2 cohort in 2016 and 2017) from the gene-tagging program have been submitted through the CCSBT scientific data exchange. The gene-tagging and aerial survey abundance estimates are not directly comparable but there is some over-lap in the age classes surveyed (i.e. the aerial survey index is estimates of relative abundance of 2-4-year-olds, and gene-tagging data provides an absolute abundance of 2-year-olds).

In the context of the TAC recommended for 2020 and advice on exceptional circumstance, the absence of the aerial survey index in 2018 and 2019 means that there is no information on

whether the aerial survey index would have been inside or outside the bounds of the trajectories from the operating models used when testing and tuning the MP adopted in 2011. To examine the potential impact of this exceptional circumstance, we can look at recent information on recruitment: 1) the last 3 points in the aerial survey index (2014, 2016-17) are substantially higher than the long term average of the series; 2) there is an increasing trend in stock assessment recruitment estimates since 2002; 3) the gene-tagging program has been established and has delivered the first two estimates of abundance of 2 year-olds, the first is similar to recent high recruitment estimates in the 2017 stock assessment and the second is below recent recruitment estimates, but not as low as the very low cohorts observed in 1999-2002. In summary, these recruitment indicators are primarily positive and suggest that the absence of the 2018 and 2019 aerial survey data does not require action with respect to the MP recommended TAC for 2020.

2.3 Changes in population dynamics and productivity of the stock

The 2017 stock assessment (Hillary et al., 2017; Anon 2017) indicated that there were substantial differences in the rebuilding timeframe and estimates of stock productivity from the 2011 operating models used to test and tune the current MP. The 2017 assessment indicated the improvement in stock status (relative depletion) over the most recent years and the potential for much earlier rebuilding to the interim target (70% probability of rebuilding to 20%B_0 by 2035) than previously anticipated. Sensitivity tests identified that recent high aerial survey results (2014 and 2016) were the most influential factors in the change in population dynamics since the 2014 assessment[1].

This potential exceptional circumstance was reviewed at the 2017 ESC, and noted the following:

1. Changes to the operating model do not affect the operation of the MP;

2. The changes in population dynamics are positive and lead to earlier rebuilding, even when the 2016 Aerial Survey data are excluded in sensitivity tests (Hillary et al., 2017);

3. The TAC increase recommended by the MP for the 2018-20 quota block was driven by the sustained positive trend in CPUE, with the aerial survey index having a relatively minor influence (Anon, 2016b).

The 2017 and 2018 ESCs concluded there was no reason to modify the 2018 and 2019 TAC recommendations (respectively). We suggest that this reasoning also applies to the 2020 TAC for this exceptional circumstance. The operating models were updated in 2019 for further testing of candidate management procedures. The updated population dynamics and results are consistent with the 2017 stock assessment, with further improvement in estimates of stock status (Hillary et al, 2019).

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[1] Close-kin parent-off-spring pair data were included in the operating models in 2014 which resulted in changes to the reference set. These were the influential factors in changes in population dynamics in 2014.

2.4 Potential changes in the Indonesian fishery selectivity

Since 2013, unusually large numbers of small fish have been recorded in the Indonesian catch monitoring data from Benoa, Bali (see Sulistyaningsih et al., 2018; Fahmi et al. 2019). New analysis of data covering the most recent years indicates that most of the small fish <160cm were caught off the spawning ground (Fahmi et al., 2019). Updating data back to 2013 is on-going and it is anticipated that any updated data will be available for the 2020 stock assessment. Until the data analysis is completed, the potential change in selectivity remains of concern in terms of their potential influence on the operating models for stock assessment and MP testing and, also, as input for Close-Kin Mark-Recapture abundance estimation. As these data do not directly influence the operation of the MP, we do not recommend modification to the MP TAC for 2020.

2.5 Total fishing mortalities exceeding the TAC

The design and simulation testing of the current MP (the Bali Procedure) assumed that all removals from the stock were accounted for, i.e. the implementation of the TAC was exact. Additional unaccounted mortality by members and non-members has the potential to undermine the MP-based rebuilding strategy of the Commission. Sensitivity tests, using the reconditioned models for the 2017 stock assessment and an additional catch scenario (UAM1) developed in 2014 (Anon, 2014), indicated that additional catches would impact rebuilding of the stock, but the rebuilding target would likely still be met (given the more optimistic population dynamics resulting from the 2017 reconditioning). The conclusion at previous ESC meetings were that if these unaccounted catches are occurring, they would trigger exceptional circumstances. The 2018 ESC agreed that the UAM1 additional catch scenario was still considered plausible (Anon, 2018). The ESC has agreed that an unaccounted mortality scenario (UAM1) will be included in the base set of operating models used for testing and tuning candidate MPs. This mechanism is intended to improve the robustness of the new MP to uncertainty in total catches and, ideally, avoid the triggering of exceptional circumstances due to this uncertainty in the future.

Accounting for sources of additional mortalities by members has progressed, with the Extended Commission's common definition for member's "attributable catch". Members have been required to account for all sources of mortality, as defined by the Commission, within their TAC since 2018 and report on their attributable catches to the ESC and Compliance Committee. If the catch quantities to be attributed to total catch by members do not account for their total fishing mortality, then the potential for impact on the rebuilding plan for SBT will remain.

Potential non-member catches are difficult to quantify (Anon, 2017; Edwards et al., 2016; 2019). The Commission has deducted 306t from the annual TAC available for allocation to members for the 2018-2020 TAC block as a temporary 'direct approach' aimed at mitigating the impact of unaccounted fishing mortality in this period on performance of the MP. This direct approach is applied only for the 2018-2020 block while a new MP is being developed that will be more robust to a certain level of unaccounted mortality.

The new estimates of potential non-member UAM provided by Edwards et al (2019) are larger than the estimates considered at the 2016 ESC due to changes in the data used (additional historical data, change in use of Japanese RTMP and ADJ (logbook) data to ADJ only, change in spatial allocation in IOTC and ICCAT data (5° square shift)). The new estimates for the more recent

years (2015-2017) are substantially larger than the estimates for earlier years. This estimated increase in potential non-member catch is of concern, however as noted above, catches of this scale would impact on the level of rebuilding but the rebuilding target may still be met, given the optimistic population dynamics from the 2017 assessment. Therefore, we do not recommend that the MP TAC for 2020 needs to be adjusted. We do note, however, that the continued potential for total removals to be in excess of the TAC recommended by the MP and set by the Commission is a concern as, if they are in fact occurring, they will reduce the rate of stock rebuilding and undermine confidence in the monitoring, control and surveillance systems of the members and Commission.

3 Meta-rules for the new Management Procedure for TACs 2021 and beyond

The meta-rules for the MP adopted in 2011, have been an essential framework for orderly implementation and review of performance of the MP. They provide for structured examination of the potential existence of exceptional circumstances, their likely impacts on the MP and the process for action. They have been used by the ESC as part of providing TAC advice from 2012 through to the current year. The thorough and systematic annual examination of exceptional circumstances has assisted the ESC to provided transparent and clearly reasoned TAC recommendations to the Commission in the context of the objectives of the MP and the conditions under which it was tested. As they are currently documented, the meta-rules for the MP are intentionally not too particular or prescriptive and therefore could be adopted as part of the new meta-rules associated with the new MP.

The metarules also provide a schedule of events for timing of key steps in the implementation of the MP: the annual review of exceptional circumstances, 3-year blocks for TAC recommendations from the MP, 3 yearly assessment of stock status (off-set from year of TAC advice), and 6 -year period for review of MP performance. This schedule has provided structure for ESC planning and more time and resources to focus on specific research and monitoring priorities (e.g. CKMR and gene-tagging; refinements of the operating models). The ESC and Commission would be well served by carrying over an updated and revised schedule of activities for the implementation of the new MP. Assuming this proposal is adopted, in 2020 this would involve the annual review of exceptional circumstances, TAC advice via the MP (2020 with no lag, then resuming normal schedule in 2022, 2025, and onwards) and a full stock assessment.

The 3-year frequency for provision of stock status advice is short enough for relatively up-to-date advice on current stock status, given the relative slow dynamics of the SBT spawning stock, and long enough to see changes in key indicators from the previous assessment. The review of performance of the adopted MP could be considered in 2026 at which time the TAC will have been set for a period of 9 years, through to 2029 (i.e. in 2020 TAC will be set for 2021-23, in 2022 TAC will be set for 2024-26 and in 2025 TAC will be set for 2027-29). A review may be triggered earlier via the normal consideration of exceptional circumstances, if required.

The consideration of exceptional circumstances requires the specification of the operating models and test conditions used during the selection and final tuning of the adopted MP, as these are used as a reference in future years to determine whether indicators, our understanding of population dynamics, and MP inputs are still within the range considered during testing. Therefore, the current code, inputs and outputs need to be carefully archived as a reference for future comparisons. The operating model code is likely to be changed and reference sets altered for the provision of stock assessment advice, which for the CCSBT is a separate process to the TAC advice generated from MP models. The latter are not altered once adopted.

4   Conclusion

Through the meta-rules process we have examined: 1) changes in the (most likely) population dynamics since the MP was adopted in 2011, 2) the potential shift in selectivity in the Indonesian fishery, 3) the potential for total catches to be greater than the TAC, 4) the absence of the aerial survey data and impact on MP, and 5) the recent very high CPUE data point in the timeseries. The impacts of these issues have been considered in the context of the 2020 TAC (as recommended in 2016).

In summary, the change in the estimates of the population dynamics in the reconditioned operating models does not affect running of the MP or the 2020 TAC recommendation.

The Indonesian selectivity change is in the process of being investigated, and similarly, does not directly impact on the running of the MP or TAC advice.

The potential for total catches to be greater than the TAC remains a concern, although the CCSBT has made progress on accounting for these. Members now account for attributable catches, and an allowance (a reduction of the MP recommended TAC by 306t) for non-cooperating non-member catches has been made in the 2018-2020 TAC block. Estimates of potential non-member catches based on effort reported to IOTC and WCPFC are substantially larger than previous estimates.

The absence of aerial survey data in 2018 and 2019 technically triggers exceptional circumstances, however, it is mitigated by the high levels of recruitment in the most recent years of the survey and development of a replacement recruitment monitoring program, which has provided abundance estimates for use in candidate MPs (Hillary et al., 2019).

The high 2018 CPUE data point is understood to be within the range of values used to test the MP in 2011 and does not affect the 2020 TAC recommendation.

On the basis of this review, no change is recommended for the 2020 TAC.

The meta-rules process has provided a schedule of activities for the implementation and review of performance of the MP. We recommend that the existing meta-rules be considered for adoption with the new MP, to ensure continuity of review and transparency of TAC advice by the CCSBT under the new MP.

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