Meta-rules: consideration of exceptional circumstances in 2020

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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 under which the MP was tested, termed "exceptional circumstances", and where appropriate recommend action. In 2020, the ESC will use the new Cape Town Procedure to calculate the recommended TAC for the 2021-2023 TAC block. The planned timing for calculating the TAC was delayed by one year, from the meta-rules schedule, to allow an extra year in the workplan for final testing and adoption of the new MP.

An exceptional circumstance identified in 2019 was the very high CPUE estimate for the Japanese longline for 2018. Further examination of the data and standardisation in 2020 has identified predictions of high CPUE estimates from the standardisation model in areas without observed effort. The CPUE working group and OMMP meeting have reviewed this issue, to the extent possible with the time available, and determined that the CPUE standardisation needs further examination and testing of alternative standardisation methods. As an interim measure, a new CPUE series has been calculated for use in the 2020 stock assessment. The OMMP working group agreed that the CPUE standardisation adopted with the Cape Town MP will be used in running the MP in 2020. A new CPUE series and revised MP will need to be developed before the 2022 ESC to set the next TAC block (i.e. 2024-2026). The alternative CPUE series used in the stock assessment contributes to slight changes in our understanding of the stock population dynamics compared to the conditions under which the MP was tested.

The potential for total catches (member and non-member) to be greater than the TAC (either annually or over the 3-year quota block) has been examined, because this has triggered exceptional circumstances in the past. There is no evidence that this is an exceptional circumstance in 2020. The Cape Town Procedure has been designed to be robust to a level of unaccounted mortality (as part of the MP testing), and the Commission, has adopted a revised definition of attributable catches. These two actions have reduced the likelihood of additional catches or mortality negatively impacting on the SBT rebuilding plan and MP implementation on the proviso that plausible estimates of total catches remain less than that allowed for in the MP testing phase.

An exceptional circumstance identified and assessed in previous years, is the potential selectivity changes associated with a shift in size distribution towards small fish in the Indonesian spawning ground fishery since 2013. This issue has been resolved through provision of new data by Indonesia, and from the testing and tuning of the Cape Town Procedure using these data.

These issues, and their impacts, will need to be considered by the ESC and a process for action agreed, as appropriate.

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.   "Guidelines 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 schedule of activities for implementation of the MP specifies frequency of TAC setting using the MP, stock assessment, MP review and the consideration of exceptional circumstances. The meta-rules provide a safety-net around the implementation of the MP and TAC recommendations, and transparency of decision making by the Commission.

The meta-rules have been revised in 2020 as part of the full specification of the Cape Town Procedure for adoption by the Commission (Anon. 2020a CCSBT-ESC/2008/10; Anon. 2020b).

2   Consideration of exceptional circumstances in 2020

The following items may represent exceptional circumstances in 2020:

1. The very high longline CPUE estimate in 2018 related to issues with the CPUE input series adopted as part of the MP;

2. Changes in estimates of the population dynamics and productivity of the stock in the 2020 stock assessment compared with the range of conditions used for testing the MP in 2019.

Issues that have triggered exceptional circumstances in the past (e.g. Preece et al., 2017), under the Bali Procedure, are revisited:

3. a potential selectivity change to small fish in the Indonesian fishery, and

4. potential total removals larger than the TAC recommended by the MP.

The input data to the Cape Town Procedure are also examined as these are important checks for operation of the MP.

3   Potential exceptional circumstances in 2020

3.1   High 2018 CPUE estimate

The 2019 ESC noted concerns with the very high CPUE estimate for 2018 in the Base CPUE series used when testing the candidate MPs (Anon., 2019). Further examination of CPUE models in 2020 by the CPUE working group, and in preparation for the OMMP technical meeting, identified that several very high CPUE values are predicted for unfished squares (strata) in the series used in the MP (Anon 2020b). Several alternative methods and models for CPUE estimation were examined by the CPUE working group and OMMP meeting 2020, for use in the stock assessment. All indices have shown a generally increasing positive trend in CPUE since 2007. The very high CPUE estimate for 2018 is not evident in the alternative series developed by the CPUE working group and reviewed by the OMMP. The issue with the Base CPUE triggers the next steps in the exceptional circumstances process: further evaluation of severity of the CPUE issue on MP performance and to determine whether any further action is required.

The Base CPUE series is the specified CPUE input data series for the Cape Town Procedure. The OMMP meeting agreed that because the Base CPUE series was used to test and tune the MP, that this series should continue to be used in 2020 for calculating the MP TAC recommendation. The OMMP group also noted that the MP testing included several CPUE specific robustness tests as part of a suite of mainly pessimistic future scenarios, and the MP was shown to be robust to these. This included a robustness test that omitted the high 2018 point in the CPUE series and the high aerial survey data point in 2016; both of which would act to reduce the influence of this strong year-class on short-term behaviour of the MP. The Cape Town Procedure did not show any signs of catastrophic behaviours for SSB or catches under these robustness scenarios, and had the best performance in terms of risks to biomass (best lower 5th percentile of SSB) and lowest probability of the need to decrease the TAC in the years following increases (which is undesirable for the fishery), relative to other candidate MPs (Anon 2019).

The contribution of the CPUE component in the MP to the TAC calculation was explored in Hillary et al. (2020a). Although CPUE has generally increased since 2007, the threshold level required for an increase in TAC for the CPUE component of the MP is not reached in 2020 (and the recent mean CPUE also does not fall below the lower threshold level that would require a decrease in TAC). The gene-tagging and close-kin mark-recapture (CKMR) components of the MP also do not meet the respective levels for an increase or decrease in the TAC. Therefore, the CPUE component of the MP is not affecting the TAC recommendation in 2020 and the severity of this exceptional circumstance is low.

The interim CPUE series that addresses the anomalous prediction issues associated with the Base CPUE series has been developed for use in the 2020 stock assessment (Anon., 2020b). The trend from this interim series is similar to the Base CPUE series, however, the high 2018 point is reduced, and the 2019 point is slightly more positive. If this interim CPUE series is used in the MP, it results in a small increase in TAC. However, as this series has not been subject to comprehensive testing and tuning of the MP, the OMMP agreed it cannot be used, as it is not possible at this stage to assess the wider robustness of an MP using this interim series (or alternatives that may be

developed). This exploratory calculation using the interim CPUE series in the MP demonstrates, however, that the Base CPUE TAC recommendation is relatively conservative and precautionary in comparison to a TAC derived from the CPUE series that is used in the 2020 stock assessment.

No immediate action on TAC is recommended, but action to resolve the CPUE issue and its use in the MP is needed. The OMMP agreed that further work is required inter-sessionally to comprehensively examine the spatial-temporal issues that contributed to the issue with the Base CPUE and develop a new CPUE series which can be used in the MP in the future (Anon., 2020b). At a minimum, this will include retuning of the Cape Town Procedure with the new CPUE series. This work on CPUE standardisation and revision of the MP will need to be completed in time for the 2022 ESC, when the MP is next scheduled to be run to recommend the TAC block for 2024-2026. This recommended action should resolve the issue in time for the next TAC decision.

In summary, the issue with the Base CPUE standardisation has been explored, to the extent possible in the time available in 2020 and is of concern. The severity of this exceptional circumstance on the operation of the MP this year is low, as the CPUE component of the MP TAC calculation has the same effect on TAC calculation as the other two components (gene-tagging and CKMR) and, therefore, does not affect the TAC recommendation in 2020. No action is suggested to change the recommended TAC from the Cape Town Procedure, however, action over the next two years is required, to examine standardisation methods to address the issues with the CPUE, develop a new series to include in the MP, and then revise and re-tuned MP with a new CPUE series, by 2022.

3.2   Changes in population dynamics and productivity of the stock

There are no substantial changes in our knowledge and understanding of the SBT population dynamics compared to the OM conditioning used to test and tune the Cape Town Procedure in 2019. The 2020 stock assessment (Hillary et al., 2020b) indicates that there is a small difference in the projected rebuilding timeframe for the stock compared with the 2019 OMs. The 2020 stock assessment indicates a slightly slower rebuilding to the target SSB level (reached in 2037 rather than 2035). The difference has occurred because of changes to the reference set of models for the stock assessment compared to the OMs used in 2019 for MP testing (e.g. a different range of steepness values), updated data and the change to the CPUE series being used in the OMs for the stock assessment. This rate of stock size increase is well within the range explored in the robustness testing of the MP.

We note that the changes to the OMs used for the stock assessment do not affect the operation of the MP. Rather, they are reviewed to determine whether the current understanding of status and dynamics of the stock/fishery are substantively different from those under-which the MP was tested and tuned. We also note that this difference in population dynamics will be resolved through the development of a new CPUE series and re-testing and re-tuning of the MP over the next two years (to address the CPUE issue reviewed above), as the MP will be re-tuned to meet the rebuilding objective. No changes are recommended for the current MP derived TAC, but action to test and re-tune the MP using a new CPUE series is suggested to be completed before 2022.

4 Updates on issues that were previously considered through the meta-rules

4.1 Potential changes in the Indonesian fishery selectivity

Commencing in 2013, unusually large numbers of small fish, relatively to previous years, have been recorded in the Indonesian catch monitoring data from Benoa, Bali (see Sulistyaningsih et al., 2018; 2020; Fahmi et al., 2019). There was concern that this may have reflected a change in selectivity in the Indonesian fishery after the Bali Procedure was adopted. Fahmi et al. (2019) subsequently identified whether the fish came from statistical area 1 (spawning ground) or 2 (to the south of area 1) for the seasons since 2015/16. Updated data were provided for 2015-16 to 2018-19 and only data on catches from statistical area 1, where >70% of the vessel track is in Area 1, have been included in the age and length data analysis. Small fish detected in 2013/14 appear as a mode in subsequent years, and this mode has now combined with catches of older fish (Sulistyaningsih et al., 2020). Sulistyaningsih et al. (2020) report that in the most recent two seasons that the proportion of small SBT has decreased and the mean length of SBT has increased.

These data were used in the OMS used for testing the new MP in 2019, and therefore the selectivity assumed in the testing MP performance is consistent with the current assessment models and the issue is resolved. We also note that these data are not used directly in the MP and, therefore, do not directly influence its operation.

4.2 Total fishing mortalities exceeding the TAC

Previous concerns regarding catches in excess of the recommended TAC have been addressed in several ways by the Commission, as these catches had the potential to undermine the rebuilding of the stock under the Bali Procedure, if they were occurring (Anon 2014). The Commission has developed an agreed definition of attributable catch to account for all sources of mortality from members, and the new Cape Town Procedure has been designed to be robust to uncertainty in unreported catches – up to a certain level. Reported catches by members have not exceeded the TAC since the 2015 fishing season (Anon, 2020c). The ESC agreed that an unaccounted mortality scenario ('UAM1', consisting of up to 1000t of small fish and 1000t of big fish) would be included in the base set of OMss 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.

The ESC members have continued to refine approaches to estimate potential unreported catches by non-members (e.g. Edwards et al., 2020; 2019) through the evaluation of areas fished by non-members (using effort reported to RFMOs other than CCSBT) and the corresponding catch rates by CCSBT members in those areas and times to characterise targeted and by-catch fishing for SBT. We note that the estimates of catches derived from this method are 'potential' catches and there has not been recent evidence provided to the ESC to demonstrate directly that these catches have been taken. The recent estimates using a "targeted" or "bycatch" catch rate are lower than the level of unaccounted mortality incorporated into the OMs for tuning and testing of the Cape Town Procedure and therefore the MP is robust to these potential levels of unaccounted mortality.

5   Input data to the MP

5.1   Gene-tagging data in the MP

The gene-tagging program was developed and adopted as a recruitment monitoring program that provides absolute abundance of 2-year-old fish in the year of tagging for use in the MP. A pilot study was successfully completed between 2016-2018 (Preece et al., 2018) and the program is now ongoing. Three abundance estimates (of the age 2 cohorts from 2016, 2017 and 2018) from the gene-tagging program have been submitted through the CCSBT scientific data exchange (Preece et al., 2020) and incorporated into the stock assessment for the first time in 2020.

We have examined whether the 2018 estimate is within the expected range of estimates from the 2019 OMs used for testing the MP, as the 2018 estimate was not used in conditioning of the OMs in 2019. The 2016 and 2017 estimates cannot be compared in this way because they were included in the conditioning. Figure 1 shows the age-2 estimates from the 2019 OM (pink), and the age-2 estimates calculated from the stock-recruitment relationship (green). The 2018 age-2 estimates in the OM are mainly informed by the recent mean recruitment estimates. The 2018 estimate is below the recent recruitment trend, with overlap in the confidence interval (CI). Figure 2 shows the recent range of age-2 estimates from the 2020 preliminary reconditioning of the OM using all the gene-tagging data, the stock-recruitment estimates (at age 2) and the 2016-2018 gene-tagging estimates. The gene-tagging estimates of age 2 abundance are within the range of estimates from the OMs (Anon 2020b).The MP has been designed to be robust to low recruitment, and we note that the 2016-2018 gene-tagging estimates are well above the OM age 2 estimates in 2002-2004 (Figure 2; Anon., 2020b) which correspond with the very low recruitment observed in 2000-2002 (Hillary et al., 2020b).

Figure 1 The gene-tagging age-2 abundance estimate for 2018 (blue) and corresponding age-2 predicted estimates from the 2019 OM when GT2018 was not included in conditioning (pink) and age-2 estimates predicted from the stock-recruitment function (OM-(S-R), green).
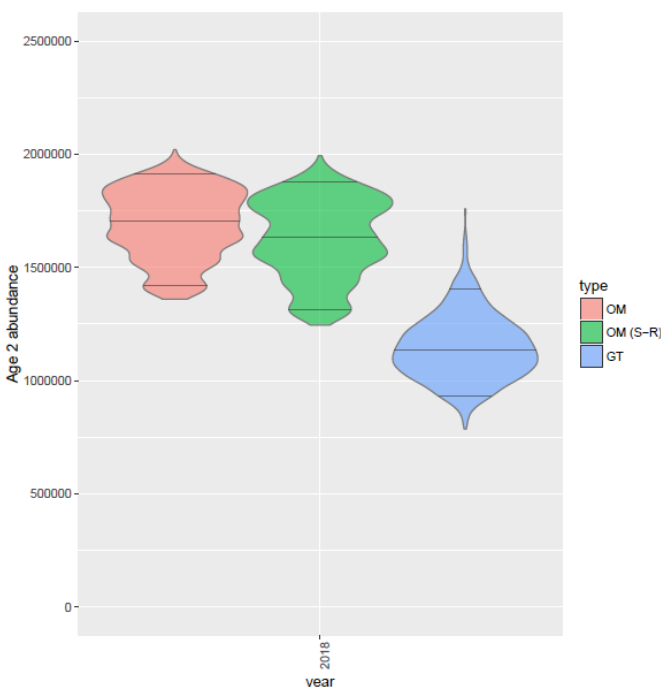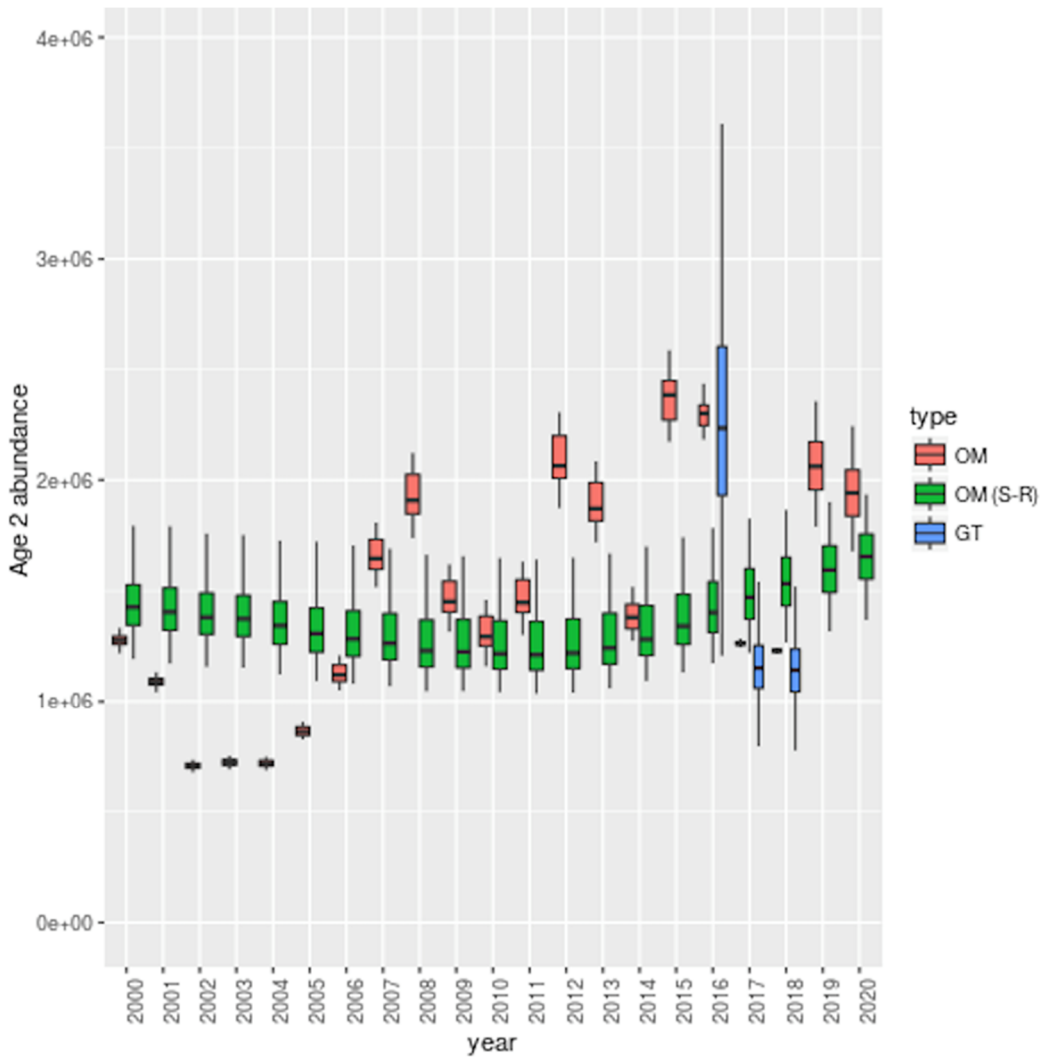
Figure 2 Comparison of gene-tagging age-2 abundance estimates (blue) and recent age-2 estimates from the 2020 preliminary reconditioning of the OM (red) and those predicted from the stock-recruitment function (OM-(S-R)) (green).

5.2   Close-Kin Mark-Recapture data in the MP

Similarly, the CKMR estimates are not considered to be unusual or outside the range predicted by the operating models used for testing the MP. Figure 3 shows the predicted 2020 CKMR data from the 2019 conditioned OMs (Hillary et al., 2019) and the observed data. The observed and predicted estimates are POPs aggregated by juvenile cohort (a) and adult capture age (b), and HSPs aggregated by the initial cohort level (c). The observed data fall within the range of model estimates used in MP testing in 2019.

Figure 3 The observed (magenta dots) and predicted estimates (blue lines, median and range) are POPs aggregated by juvenile cohort (a) and adult capture age (b), and HSPs aggregated by the initial cohort level (c).
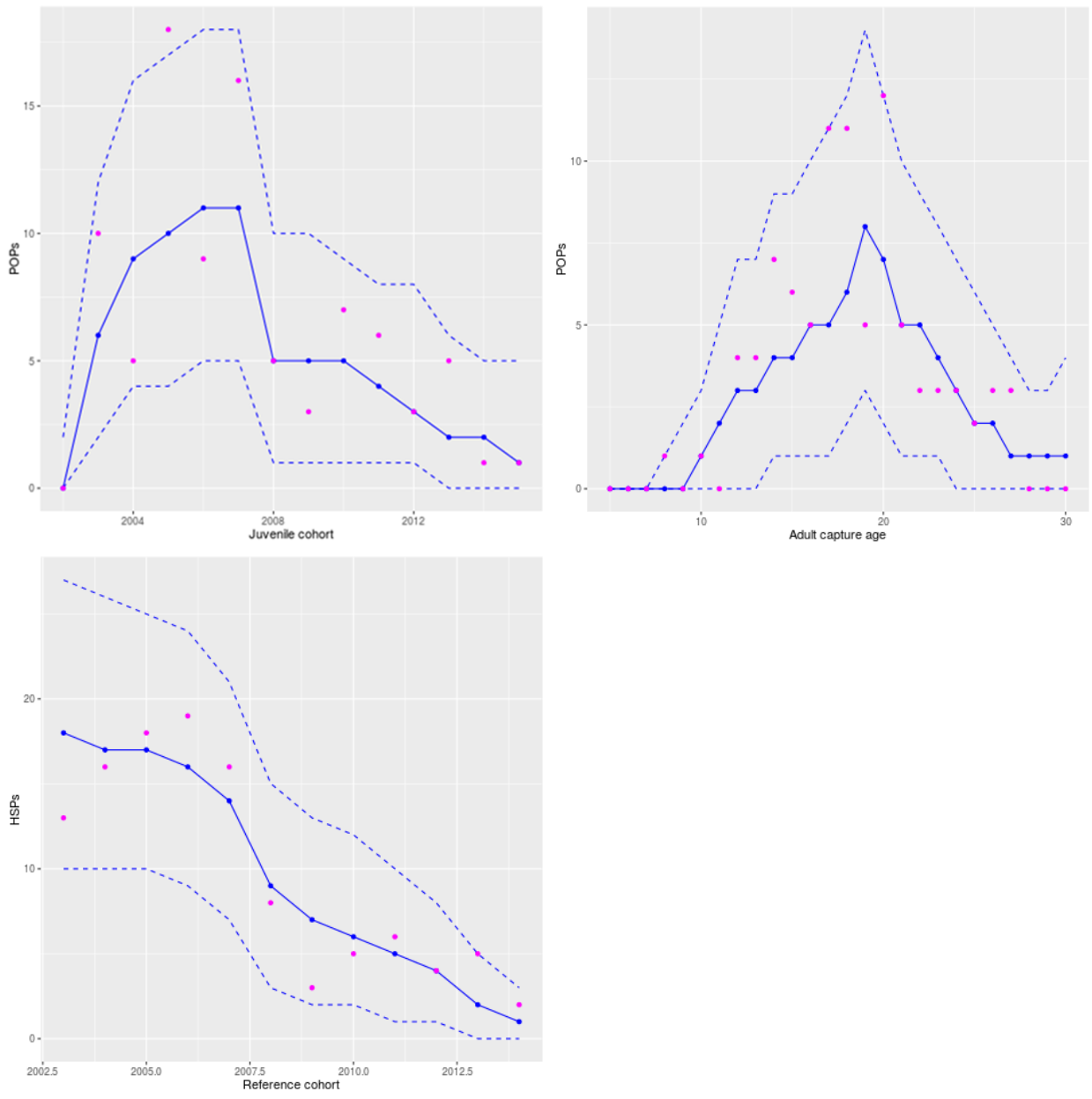
5.3 CPUE data

The CPUE data is used directly in the MP, and issues identified and recommended actions are described in sections 3.1 and 3.2.

6 Conclusion

In considering the potential for exceptional circumstances, we have examined 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 2019 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.

In summary:

1. The high 2018 CPUE data point in the Base CPUE series is of concern, and the recommended action is to work on a new CPUE series in time for review and retuning of the MP before the TAC recommendation for 2024-2026 quota block in 2022. The review of performance of the adopted MP will need to be reconsidered when a new CPUE standardisation is agreed for use in the MP prior to the 2022 ESC.

2. Small changes in the estimates of the population dynamics in the reconditioned operating models for the 2020 stock assessment do not affect running of the MP or the recommendation for the 2021-2023 TAC.

3. The impacts of catches above the recommended TAC have been effectively dealt with by the Commission. Members have a common definition for accounting for attributable catches, and the MP TAC recommendations are robust to a level of non-cooperating non-member catches.

4. The potential change in selectivity in the Indonesian fishery in the models has been resolved. New data have been provided for 2015-16 to 2018-19 to identify which fish were caught in statistical area 1 and the MP has been tested and tuned using operating models that included the updated data in 2019.

Based on 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. The thorough and systematic annual examination of exceptional circumstances assists the ESC to provide 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.

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