

A CHECK OF OPERATING MODEL PREDICTIONS FROM THE VIEWPOINT OF IMPLEMENTATION OF THE MANAGEMENT PROCEDURE IN 2023

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Abstract: We examined observations of input index/data (Japanese longline GAM CPUE, age 2 abundance estimate from the gene-tagging, and close-kin mark recapture data) for the Cape Town procedure (CTP) comparing to the 2019 operating model (OM) prediction. These examinations indicate that all the observations are consistent with the predicted ranges from the 2019 OM. Regarding the input index/data for the CTP, therefore, there is no evidence to support a declaration of Exceptional Circumstances. Accordingly, regarding a decision on implementation of the recommended TAC (20,647 t, calculated by the CTP in 2022 to be applied to the 2024-2026 fishing seasons) for the 2024 season, it is concluded that no modification of the value of this TAC is required because: 1) there is no conclusive evidence to support a declaration of Exceptional Circumstances from the viewpoints of a check of the OM predictions and other potential factors (the extent by which the total reported global catch exceeds the TAC, unaccounted mortality, results of stock assessment conducted in 2023); and 2) no unexpected change has been detected in the fisheries and scientific survey indicators examined.

要旨： ケープタウン方式 (CTP) の入力指数/データ (日本はえ縄 GAM CPUE、遺伝子標識からの2歳魚資源尾数推定値、近縁遺伝子標識再捕データ) の観測値を 2019 年のオペレーティングモデル (OM) の予測値と対比させて精査した。この精査では全ての観測値が 2019 年の OM の予測範囲と矛盾しないことを示している。したがって、CTP の入力指数/データに関しては、例外的状況の宣言を支持する証拠はない。これらに基づき、2024 年漁期に対して勧告された TAC (2024-2026 年漁期に適用するため 2022 年に CTP によって算定された 20,647 トン) の実施の決定に関して、この TAC 値の変更は必要ないと判断される。理由は以下の通り：1) OM 予測の確認ならびにその他の可能性のある要因 (総報告全球漁獲が TAC を超過する程度、未考慮漁獲死亡および 2023 年に実施された資源評価の結果) の観点から例外的状況の宣言を支持する決定的な証拠がないこと；2) 精査した漁業ならびに科学調査指標に予期せぬ変化がなかったこと。

1. Introduction

Since 2011, the Commission for the Conservation of Southern Bluefin Tuna (CCSBT) has used a management procedure (MP) to guide the setting of the global total allowable catch (TAC) for southern bluefin tuna (SBT; *Thunnus maccoyii*). The previous MP ("Bali procedure") was replaced with a newly developed and adopted MP ("Cape Town procedure (CTP)") in 2019. The CTP was developed because of cessation of the scientific aerial survey in 2018 which had provided an index of recruitment required for the input to the Bali procedure. The CTP was used to recommend TACs for the 2021-2023 seasons in 2020 and the 2024-2026 seasons in 2022.

The CTP was adjusted (tuned) and tested to achieve the management objective¹ under

¹ The CCSBT management objective is to rebuild the stock to the reference point of 30% of the pre-exploitation spawning stock biomass by 2035 with a 50% probability.

certain assumptions/predictions about SBT stock and fishery. Thus, it is essential to check whether the current status of SBT stock falls within the range predicted when the CTP was developed in 2019, and whether any of the assumptions made then have subsequently been shown to be invalid. As a part of the “metarules” process for the MP (CCSBT 2012²), the Extended Scientific Committee (ESC): (1) annually reviews stock and fishery indicators, and any other relevant data or information on the stock and fishery; and (2) every three years conducts an in-depth stock assessment. Then, on the basis of (1) and (2) above, the ESC determines whether there is evidence for Exceptional Circumstances. If the ESC agrees that Exceptional Circumstances exist, then the ESC will (1) determine the severity of the Exceptional Circumstances; (2) formulate advice on the action required depending upon the severity; and (3) report to the Extended Commission (EC) that Exceptional Circumstances exist and provide the advice mandated in such an eventuality.

One of the most important criteria used to determine the existence of Exceptional Circumstances is whether input index/data (observations) for the CTP are outside the predicted (projected) range for which the CTP was tested, where this “range” is defined as the 95% probability intervals for projections for the index/data in question made using the reference set of operating models (OMs) during the testing of the MP (CCSBT 2012). The Japanese core vessel longline CPUE (Itoh and Takahashi 2022), absolute abundance estimate (for 2-year old SBT) and the number of matches from the gene-tagging (GT) project (Preece and Bradford 2023), and parent-offspring pairs (POPs) and half-sibling pairs (HSPs) data from the close-kin mark recapture (CKMR) project (Farley et al. 2023) were originally necessary inputs for the CTP (Hillary et al. 2020). As CPUE input for the CTP, the core vessels CPUE was replaced with a newly developed CPUE series in 2022 due to technical problems recognized in the core vessels CPUE (CCSBT 2022a). The new CPUE series is based on standardization by generalized additive model (GAM) and all vessels data (Itoh and Takahashi 2023) whereas the core vessels CPUE was standardized by generalized linear model (GLM). The GAM CPUE index was used as an input for the CTP to calculate TAC for the 2024-2026 seasons in 2022 (CCSBT 2022b).

In this paper, the Base case (reference set) OM prediction done in 2019 is compared to the most recent observations of the input index/data for the CTP to check whether these index/data are within the range predicted by the OM projection. Based on this examination, the possible occurrence of Exceptional Circumstances and its severity are discussed along with other factors that are also related to the possibility of the occurrence of Exceptional Circumstances.

² The technical specifications of the CTP are available from <http://www.ccsbt.org/>.

2. Japanese longline GAM CPUE index

The GAM CPUE index for 2023 barely lies within the 95% probability intervals for the Base case OM predictions conducted in 2019 (Fig. 1).

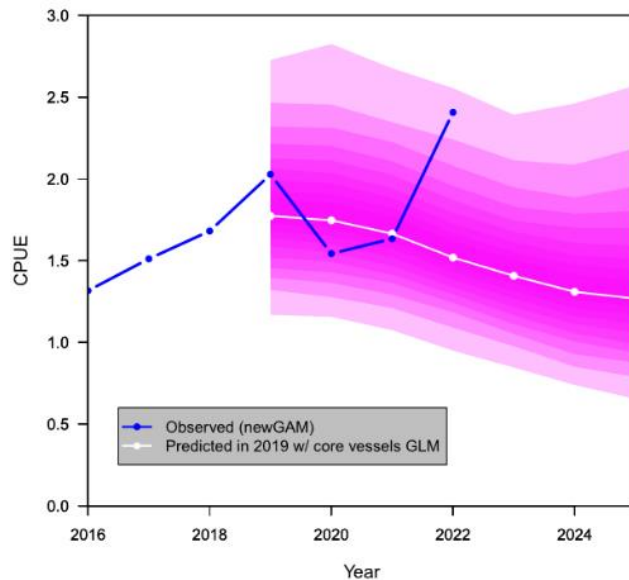


Fig. 1. The Japanese longline GAM CPUE series, observed over 2016-2022 (blue line with points) and the future index as projected in 2019 from 2019 to 2025 for the "Base case" ("reference set") OM, where the white line with points is the median projected CPUE, and the purple shades represent percentiles from 2.5% to 97.5% in increments of 5%.

3. Abundance for 2-year old SBT estimated from the gene-tagging (GT)

Absolute abundance estimates for age 2 SBT obtained from the GT are used as a recruitment indicator in the CTP. Currently, five estimates are available for age 2 SBT of 2016, 2017, 2018, 2019, and 2021 (Preece and Bradford 2023). There is not an estimate of 2020, because the 2020 tagging field work was cancelled due to COVID-19 restrictions, poor weather conditions and difficulty finding fish (Preece and Bradford 2023). The CTP uses the number of matches and the abundance estimates for age 2 in TAC calculation (as the 5-year average weighted by the number of matches; Hillary et al. 2022).

The abundance estimate for age 2 SBT and the number of matches for 2021 lie within the 95% probability intervals for the Base case OM predictions in 2019 (Fig. 2).

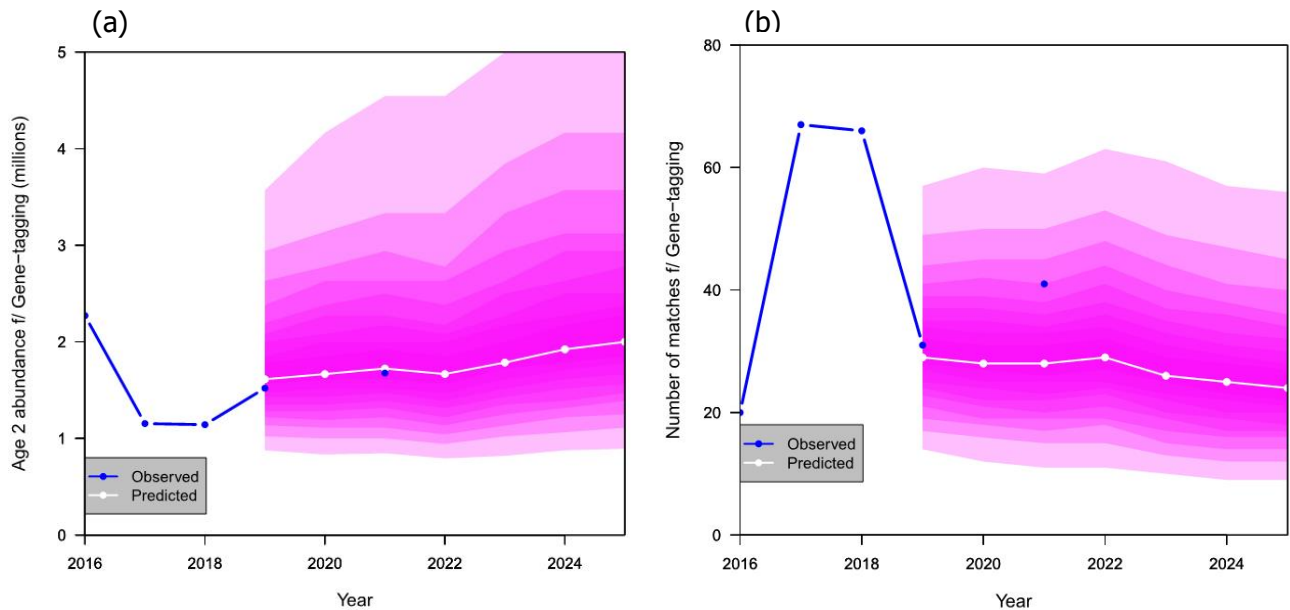


Fig. 2. The age 2 SBT abundance estimate (a) and the number of matches (b) for 2021 from this year's (2023) gene-tagging (GT) analysis, and the future abundance estimates and numbers of matches as projected in 2019 from 2019 to 2025 for the "Base case" ("reference set") OM, where the white lines with points are the medians, and the purple shades represent percentiles from 2.5% to 97.5% in increments of 5%.

4. Data from the close-kin mark recapture (CKMR)

Parent-offspring pairs (POPs) and half-sibling pairs (HSPs) data from the CKMR are used to estimate time series of spawning stock abundance in the CTP (Hillary et al. 2022). For the CKMR data, observed CKMR data available in 2023 were compared with simulated data based on the OM used in the 2023 stock assessment since we could not retrieve simulated CKMR data from the 2019 OM. The 2023 assessment shows improvement of the stock status which is on track for the management objective (Hillary et al. 2023), and thus the simulated CKMR data from the 2023 OM is consistent with that from the 2019 OM. Fig. 3 compares observed CKMR data available in 2023 (Farley et al. 2023) and the predicted CKMR data from the 2023 OM. The observed CKMR POPs and HSPs data fall within the predicted range.

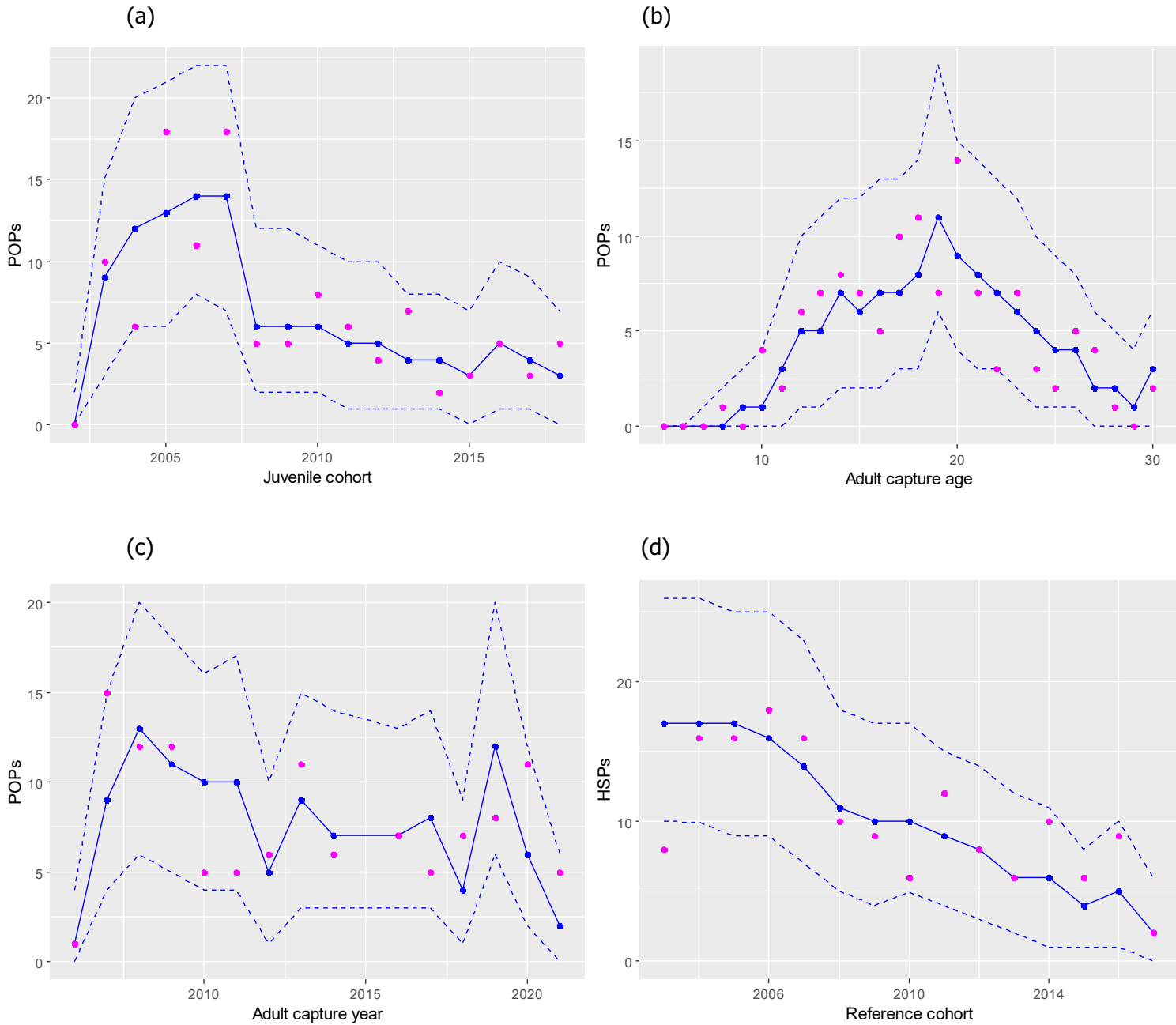


Fig. 3. Observations (magenta points) available in 2023 and predictions (blue solid and dashed lines indicate the median and 95% probability intervals) from the 2023 OM of CKMR POPs and HSPs data. POPs aggregated by juvenile cohort (a), POPs aggregated by adult capture age (b), POPs aggregated by adult capture year (c), HSPs aggregated by the initial (reference) cohort level (d), and total matches of POPs and HSPs (e).

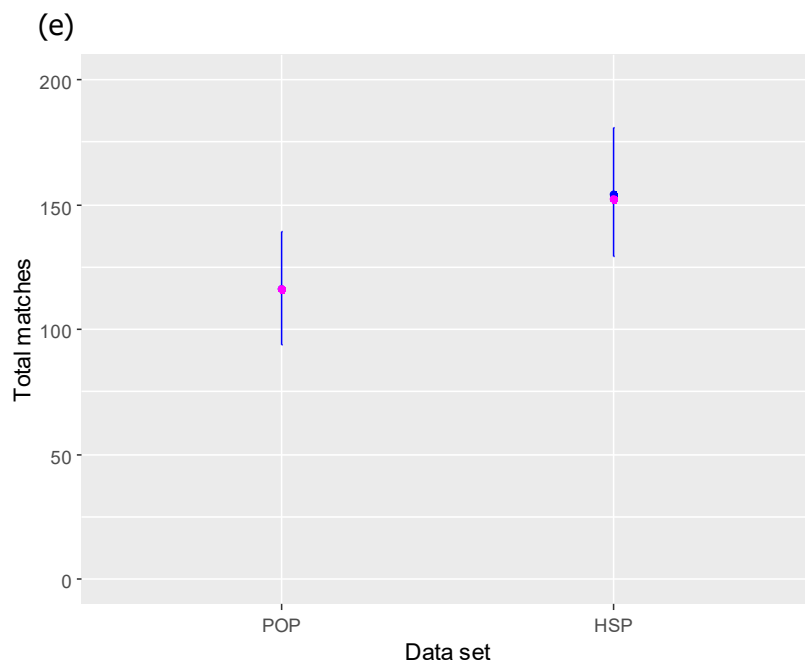


Fig. 3 (cont'd). Observations (magenta points) available in 2023 and predictions (blue solid and dashed lines indicate the median and 95% probability intervals) from the 2023 OM of CKMR POPs and HSPs data. POPs aggregated by juvenile cohort (a), POPs aggregated by adult capture age (b), POPs aggregated by adult capture year (c), HSPs aggregated by the initial (reference) cohort level (d), and total matches of POPs and HSPs (e).

5. Discussion and conclusion

We examined observations of input index/data available in 2023 (longline GAM CPUE, age 2 abundance from the GT, CKMR POPs and HSPs) for the CTP comparing to the 2019 OM predictions in sections 2 to 4 above. These examinations indicate that all the current observations are consistent with the predicted ranges from the 2019 OM (Figs. 1 to 3). Regarding the input index/data for the CTP, therefore, there is no evidence to support a declaration of Exceptional Circumstances.

In addition to those input index/data for the CTP, the following factors are considered to check whether there is possible evidence for Exceptional Circumstances: 1) the extent by which the total reported global catch exceeds the TAC (the overcatch of the TAC); 2) unaccounted mortality (UAM); and 3) current stock status information from in-depth stock assessment/updated OM reconditioning and future projections.

When testing the CTP in 2019, the assumption was made that TACs would not be exceeded in future years. The recent reported catches in 2017, 2018, 2019, 2020, 2021, and 2022 were below the global TAC by 535 t, 399 t, 505 t, 1382 t, 967 t, and 1184 t (tentative),

respectively (CCSBT Secretariat 2023). Accordingly, this does not provide evidence for Exceptional Circumstances.

The CTP was developed and tested considering non-cooperating Non-Members (NCNM) UAM (i.e., the “MP approach”, see paragraph 53 in CCSBT (2016)), and thus it is not necessary to care NCNM UAM as far as its scale is smaller than that was assumed when the CTP was tested in 2019. The amount which is equal to a 10% of LL1 catch was assumed as NCNM UAM in the OM. A 10% of the quota for LL1 (Japan, New Zealand, Korea, European Union, and South Africa longlines) for 2022 is approximately 890 t. The average actual estimate for NCNM UAM over 2007 to 2020 ranges 223 t to 632 t (Edwards and Hoyle 2023). On average, the actual scale of the estimates for NCNM UAM is smaller than the assumed, and accordingly does not seem to provide evidence for Exceptional Circumstances. However, yearly estimates of longline effort for NCNM UAM appear to increase recent years (Edwards and Hoyle 2023), and thus the ESC should continue to keep a careful watch on changes of the scale of NCNM UAM.

The key stock status summary ratios resulted from the 2023 stock assessment are improved compared to the last (2020) assessment (e.g., median relative Total Reproductive Output, TRO, is 0.20 in 2019 and 0.23 in 2022) (CCSBT 2020, Hillary et al. 2023). Future projections based on this 2023 reconditioning show that the CTP reaches a median TRO depletion of 0.30 with a probability of 0.51 by 2035, which indicates achieving the management objective. Thus, there is no evidence for Exceptional Circumstances with respect to updated stock status.

Regarding a decision on implementation of the recommended TAC (20,647 t, calculated by the CTP in 2022 to be applied to the 2024-2026 fishing seasons) for the 2024 season, it is therefore concluded that no modification of the value of this TAC is required because: 1) there is no conclusive evidence to support a declaration of Exceptional Circumstances related to the factors discussed above; and 2) no unexpected change has been detected in the fisheries and scientific survey indicators examined (Patterson 2023, Takahashi and Itoh 2023).

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