

Consideration of Exceptional Circumstances for the Swordfish MP 2025

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IOTC WPB 2025

Don Bromhead¹, Ann Preece², Ashley Williams², Thomas Brunel³, Iago Mosqueira³,

1. Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES)
2. Commonwealth Scientific and Industrial Research Organisation (CSIRO)
3. Wageningen Marine Research, Haringkade 1, Postbus 68, 1976CP, IJmuiden, The Netherlands

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Abstract

The IOTC adopted a revised swordfish management procedure (MP) in 2025 (IOTC 2025a), which was used to recommend the Total Allowable Catch (TAC) for this stock (30,527 t per year for 2026 to 2028).

As part of the MP schedule, the Commission has adopted an annual review of evidence for exceptional circumstances, to check for conditions that could make the implementation of the TAC advice risky to the stock or fishery.

The Exceptional Circumstances Guidelines (Appendix 6A in IOTC (2021)) specify a three-stage process: (i) examining evidence for exceptional circumstances, (ii) determining severity and impact, and (iii) recommending any management or research action that should be taken. A wide range of information is reviewed to examine if there is evidence for exceptional circumstances, e.g., changes in the knowledge of stock or fishery uncertainties against which the MP was tested. The Exceptional Circumstances Guidelines provide a scientific process for developing appropriate management responses to exceptional circumstances and, hence, provide transparency in TAC decision-making by the Commission.

This paper summarises the outcomes from a review of a wide range of information, in considering if there is evidence of exceptional circumstances. It is important to note that this current review paper may not yet take account of all new information presented to the WPB23 (September 2025). However, any new and relevant information can be included in a revised paper for consideration by the Working Party on Methods (October 2025). The key conclusions of the current review are:

- **TAC implementing measure** – At its meeting in April 2025, the IOTC Commission failed to propose and agree a measure to implement (and allocate) the TAC recommended by the MP. As such, there is no measure in place to ensure TAC adherence in the 2026-2028 period, increasing the risk of catches increasing above the recommended level. This needs to be urgently addressed by the Commission at its 2026 meeting.
- **Stock status, population dynamics or biology** - The 2023 stock assessment estimates of SB/SB_{MSY} and F/F_{MSY} were shown to be within the 90% probability interval of the estimates from the operating models used to test the performance and tune the MP. No EC relating to biology or population dynamics were identified, but noting that new recent research on stock structure has yet to be reviewed by WPB and SC.
- **Fishery or fishing operations** - There are no identified changes in recent fishery operations (e.g. methods/approaches). Shifts in relative catch proportions by the fishery over time (noted by WPB22 in 2024) have been incorporated into the MSE operating models (OMs), and the subsequent MP performance tested and demonstrated to be acceptable. Fishery catch levels and proportions from the 2 most recent years of data are not substantially different to the most recent levels considered by the OMs, albeit total catch levels continue to show a declining trend in recent years.
- **Catch data inputs** – There have been no significant recent changes in the quality and representativeness of swordfish catch data to be utilised by the MP.
- **CPUE data inputs** – StdCPUE time series estimates from the 2023 standardisation process (for period to 2022) and the 2024 standardisation process (for period to 2023) are very similar. Prediction skill of the NWIO Japanese longline CPUE remains acceptable but Japanese longline effort trends should continue to be monitored and considered in annual EC reviews and as part of the larger MP review in 2031.

1. Introduction

The IOTC first adopted the swordfish management procedure (MP) in 2024 via Resolution 24/08 (IOTC, 2024a) and then adopted a slightly revised MP in 2025 (IOTC, 2025a) via Resolution 25/07¹. The MP is run every 3 years to recommend an annual Total Allowable Catch (TAC) for the subsequent 3-year period. As part of the MP schedule, the Commission has adopted an annual review of evidence for exceptional circumstances, to check for conditions that could make implementing the MP TAC advice risky. Exceptional circumstances are conditions or data that fall outside the range of uncertainties that the MP was tested against, i.e., the reference set of operating models used for Management Strategy Evaluation (MSE), and the robustness tests. The Exceptional Circumstances Guidelines (IOTC–2021–SC24 Appendix 6A) provide a scientific process for examining evidence for exceptional circumstances, evaluating potential impacts, and developing appropriate management responses if necessary. This process of examining evidence for exceptional circumstances provides a safety-net around the MP TAC advice and transparency in TAC decision making by the Commission.

The exceptional circumstances review process has three stages:

- 1) determine whether any exceptional circumstances exist,
- 2) determine the severity and impact of the exceptional circumstances on achieving the objectives of the MP, and
- 3) if necessary, identify the research and/or management actions that could be taken by the IOTC.

The swordfish MP was run for the first time in 2024, resulting in advice from the SC to the Commission on implementing an annual TAC of 30527t for the years 2026 to 2028 (IOTC, 2024f).

This report provides advice on evidence of exceptional circumstances in 2025, using the same report template and structure as developed by Preece and Williams (2022) for bigeye tuna.

2. Examining evidence for the existence of exceptional circumstances in 2024

The information that should be checked for evidence of exceptional circumstances is specified in the Guidelines (IOTC–2021–SC24 Appendix 6A).

The MP is specified in Resolution 25/07 (IOTC, 2025a).

The operating models used to MSE test the adopted MP included a range of uncertainties and conditions (Brunel and Mosqueira 2024a, 2024b) (**Table 1**), and the robustness tests (that test implementation errors, 2-year management lag and recruitment failure) are specified in Brunel and Mosqueira (2024c).

The data input specification of the CPUE is in Matsumoto et al. (2023) and the outputs of the 2024 standardisation are found here ([link](#)). Catch data preparation is specified in IOTC (2024a) and IOTC (2024b).

¹ The revised MP had been retuned to correct for errors (during the MSE tuning process) in both the CPUE values applied for 2020-2022, and the lag applied for the period between the final year CPUE and the first year of TAC implementation.

Table 1 – Structural uncertainty grid used to develop the swordfish operating model

Selectivity	Double normal		
Steepness	0.6	0.75	0.9
Growth + Maturity	Slow growth, late maturity (Wang et al., 2010)	Fast growth, early maturity (Farley et al., 2016, otoliths)	
Natural Mortality	Low = 0.2	High = 0.3	Sex-specific Lorenzen M (Farley et al. (2016), otoliths)
Sigma R	0.2	0.4	0.6
ESS	2	20	
CPUE scaling	Biomass		
CPUEs	JPN late + EU.PRT	JPN late	TWN + EU.PRT
Catchability increase	0%	1% / year	

The following items, specified in the Exceptional Circumstances Guidelines (IOTC–2021–SC24 Appendix 6A), have been examined:

- New knowledge about the stock, population dynamics or biology,
- Changes in fisheries or fishing operations,
- Changes to input data to the MP, or missing data, or
- Inconsistent implementation of the MP advice (e.g., total catch is greater than, or less than, the TAC) or changes to the operation of the MP.

Please Note – New and relevant information pertaining to the status, biology, population dynamics or fisheries for IOTC Swordfish, which is presented to and reviewed by WPB23 in September 2025, will be taken into account in a revised EC review paper to the Working Party on Methods in October 2025.

2.1 New knowledge - Stock, population dynamics or biology

2.1.1 Biology and population dynamics

There was no new information on biology or biological parameters for swordfish population dynamics presented at WPB22 in 2024.

Both the 2023 assessment and the MP operating models utilised the same inputs to inform population parameters and similar ranges of these parameters where multiple values were explored in the assessment grid or OMs (**Tables 1** and **2**). Neither the WPB22 (Sept 2024) nor the WPM (October 2024) were presented with any new biological research on swordfish that was relevant to the assessment or OM population dynamics. The SB/SB_{MSY} time-series from the 2023 assessment was shown to be within the range of the operating models and projections and indicated that the population dynamics are reasonably stable (**Figure 1** upper) (Brunel and Mosqueira (2024a)).

The 2024 review of exceptional circumstances (Bromhead et al., 2024), noted that recent papers on swordfish movement (West et al., 2023, Romanov et al., 2023, Neiblas et al., 2023), as reviewed by WPB21 (2023), did not present any evidence to support stock structure assumptions different to those in the assessment and OMs (i.e. single stock). However,

research presented to WPB18 in 2020 (Grewe et al., 2020) identified some evidence of potential north-south stock structuring for IOTC swordfish and WPB22 (2024) noted recent genetic research (subsequently published - Chevrier et al, 2024) that reached similar conclusions (IOTC, 2024e). It was anticipated that this research will be presented to WPB23 in 2025 for consideration in the context of the review of potential EC.

Based on information reviewed by IOTC WPs *to date*, there are currently no exceptional circumstances in relation to biology and population dynamics in 2025.

2.1.2 Stock status

The 2023 stock assessment (Fu, 2023) estimated that the stock is not overfished and not subject to overfishing. The key uncertainties considered in the 48 models in the reference set of models of the 2023 assessment are CPUE, growth, length composition data, recruitment variability and steepness (**Table 2**).

Brunel and Mosqueira (2024a) compared the SB/SB_{MSY} and F/F_{MSY} estimates from the 2023 stock assessment with those from the range of scenarios included in the swordfish operating models (**Figure 1**). The 2023 stock assessment estimates of SB/SB_{MSY} and F/F_{MSY} were shown to be within the 90% probability interval of the estimates from the operating models used to test the performance and tune the MP (**Figure 1**), and therefore Bromhead et al (2024g) considered that there was no evidence for exceptional circumstances with respect to stock status. There is no new information relevant to status in 2025 and the next assessment is currently scheduled for 2026. Subsequently there remains no evidence of exceptional circumstances with respect to stock status.

Table 2 - Final model options for the 2023 assessment consist of a full combination of options below, with a total of 48 models. Reference model options are highlighted (Source – Fu, 2023).

Model options	Description
CPUE	<ul style="list-style-type: none"> • <i>cj – CPUE options from revised model (UJPLL, UPOR, UZAF)</i> • <i>ct</i> - CPUE options from the <i>atl</i>CPUE model (UJPLL, UTWLL, UIND)
growth	<ul style="list-style-type: none"> • GoMf – Otolith based growth estimates by Farley et al. 2016. • <i>GtMf</i> – Estimates by Wang et al. 2010.
Length composition data	<ul style="list-style-type: none"> • CL20 – A maximum of 20 for the effective sample size • CL05 – A maximum of 5 for the effective sample size
Recruitment variability	<ul style="list-style-type: none"> • R2 – recruitment $\sigma_R=0.2$ • <i>R4</i> – recruitment $\sigma_R=0.4$.
Steepness	<ul style="list-style-type: none"> • h70 – Stock-recruitment steepness parameter 0.7 • h80 – Stock-recruitment steepness parameter 0.8 • h90 – Stock-recruitment steepness parameter 0.9

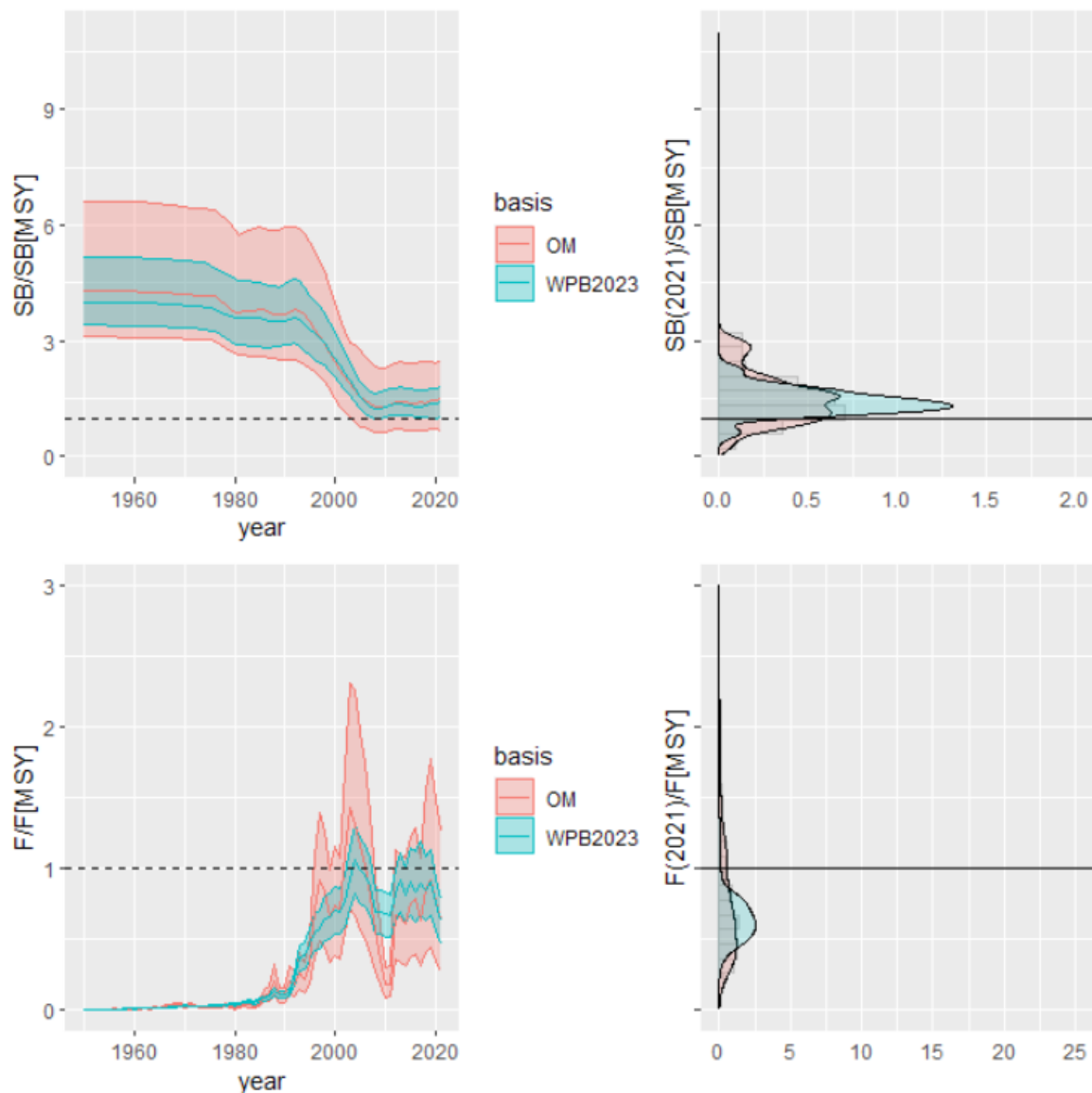


Figure 1 - Historical swordfish stock development (left) and stock status in 2021 (right) in the Operating Model developed for the MSE (red) and in the WPB 2023 swordfish assessment (blue) Brunel and Mosqueira (2024a).

2.2 Fishery or fishing operations

WPB22 (2024) did not identify any recent significant changes in fishery operations (e.g fishing methods, gears etc) in the key fisheries catching swordfish in the Indian Ocean (IOTC, 2024e). An update on this is expected from WPB23 in 2025.

The WPB22 noted, however, that a) there has been a shift in the relative levels of Swordfish catch from distant water fisheries to coastal fisheries over time and, b) in association with that, a decline in Japanese longline fishing effort and catch in the north-west Indian Ocean that might have potential implications for whether the Japanese CPUE can index stock abundance in that area (IOTC, 2024e). The overall shift in catch between fisheries is discussed here (below) and the Japanese CPUE implications are discussed further under section 2.3.2 (below).

Regarding the shift in catch from distant water to coastal fisheries (point *a* above), it is clear from the most recent reviews of IOTC statistical data for Swordfish (IOTC, 2024c; IOTC, 2025b) that this has been occurring since 2004, with significant shift in total amount and relative proportions of catch by fishery type occurring between 2010 and 2020 (**Figure 2, Figure 3**). While shifts in relative catch levels between fisheries can have implications for size selectivity of the fisheries and associated fishing mortality at age, these changes in catch data have been incorporated into MSE operating models, and the MP performance has been tested under these conditions. The most recent 2 years of data are not substantially different to recent catches (IOTC 2024c, IOTC Secretariat, pers com., 2024, **Figure 3**), albeit noting total catch levels continue to show a declining trend in recent years.

On the basis that there are no identified changes in recent fishery operations (to be confirmed at WPB23) and no substantial differences in the recent relative proportions of catch by fishery type to those used the OM for the MSE, there are not any identified exceptional circumstances in relation to fisheries and fishing operations.

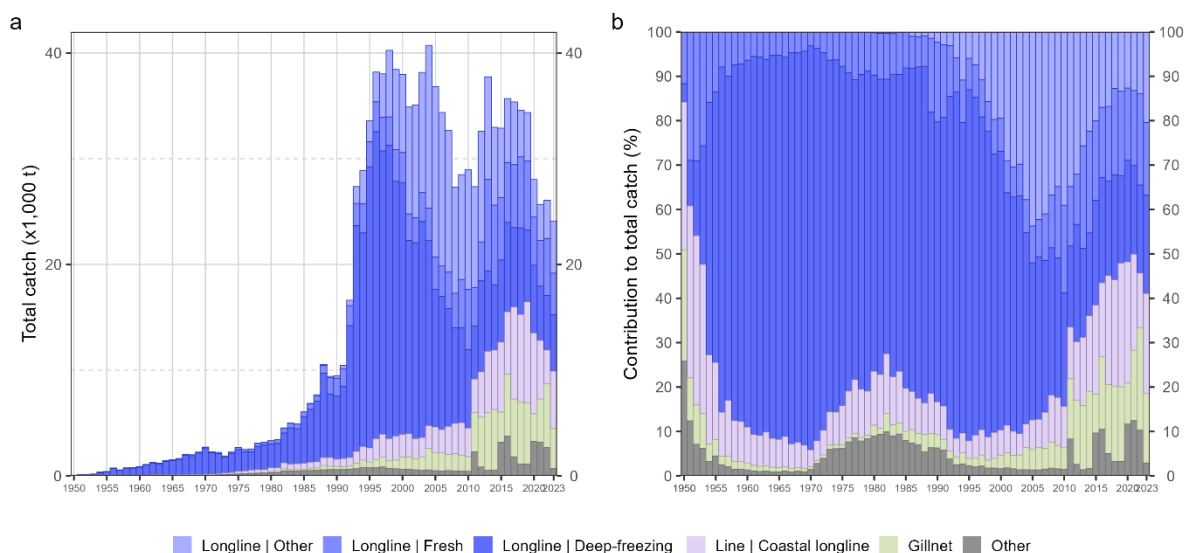


Figure 2 - Annual time series of cumulative retained absolute (a) and relative (b) catches (metric tonnes; t) of swordfish by IOTC fishery type for the period 1950-2022. Data source: best scientific estimates of retained catches. (Source IOTC 2024c).

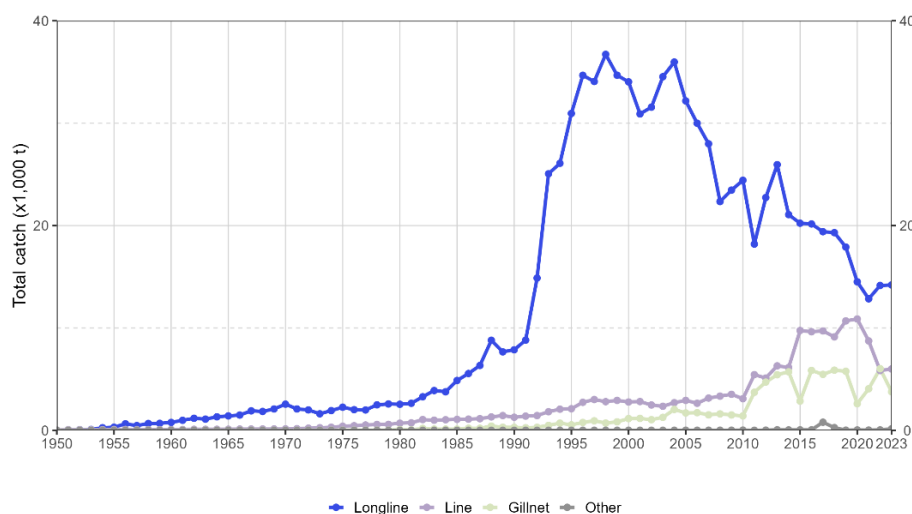


Figure 3 – Annual time series of retained catches (metric tonnes; t) of swordfish by fishery group for the period 1950-2023. Data source: IOTC best estimates of retained catches, 2024.

2.3 MP input data and operation of the MP

2.3.1 Catch data

Total IOTC catch estimates, including 2023 catches, were available for running the MP in 2024.

The WPDCS21 (2023) and WPB22 (2024) reviewed recent nominal catches, fishery features, quality and representativeness of catch data relative to previous years and have noted similar quality and representativeness of reported data (IOTC, 2024c). The most recent review of IOTC statistical data for IOTC Swordfish (IOTC 2024c) noted that “*The quality of the total retained catches of swordfish is considered to be good and overall the best among the five billfish species under IOTC mandate*” and this level of quality has been maintained in the most recent year estimated (**Figure 4**) (IOTC, 2025b).

On the basis of this, there is no evidence of exceptional circumstances pertaining to the catch data.

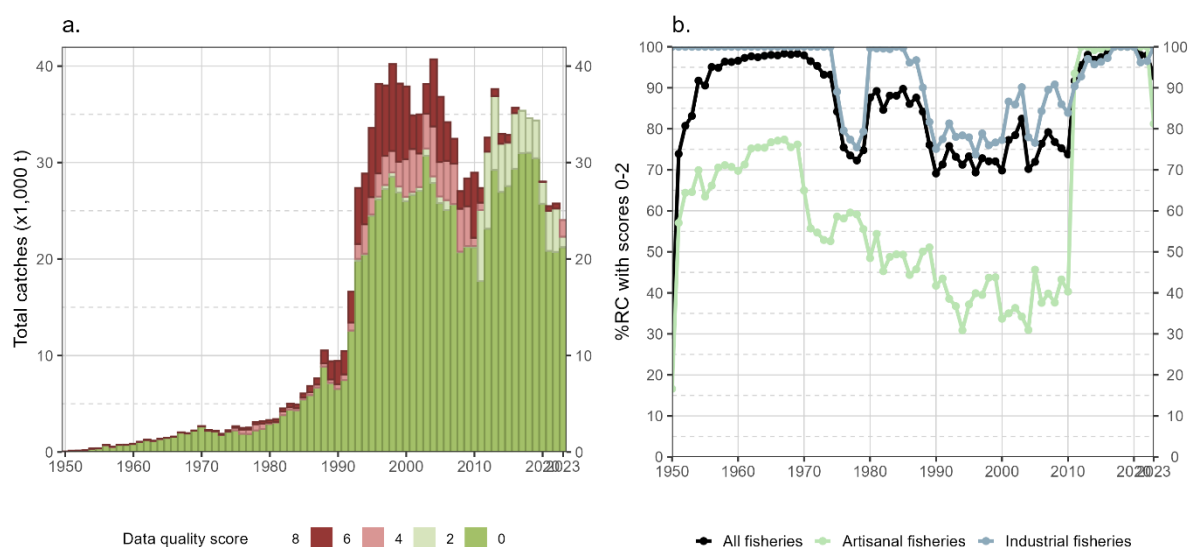


Figure 4 – (a) Annual retained catches (metric tonnes; t) of swordfish estimated by quality score whereby 0 is highest quality and 8 is poorest quality; and (b) percentage of total retained catches fully or partially reported to the IOTC Secretariat for all fisheries and by type of fishery, in the period 1950-2022 (Source – IOTC, 2024c).

2.3.2 CPUE data

As planned, there was no update to the standardised CPUE index (used within the Swordfish MP) in 2025. An updated CPUE will be required to be produced by mid-2027, in time for the next run of the Swordfish MP (late 2027), to generate a TAC for Commission consideration in 2028, and implementation in 2029-2031.

Figure 5 compares the stdCPUE time series estimates from the 2023 standardisation process (for period to 2022) and the 2024 standardisation process (for period to 2023), showing the two series to be very similar in trends and have relatively small differences, primarily in the more recent years.

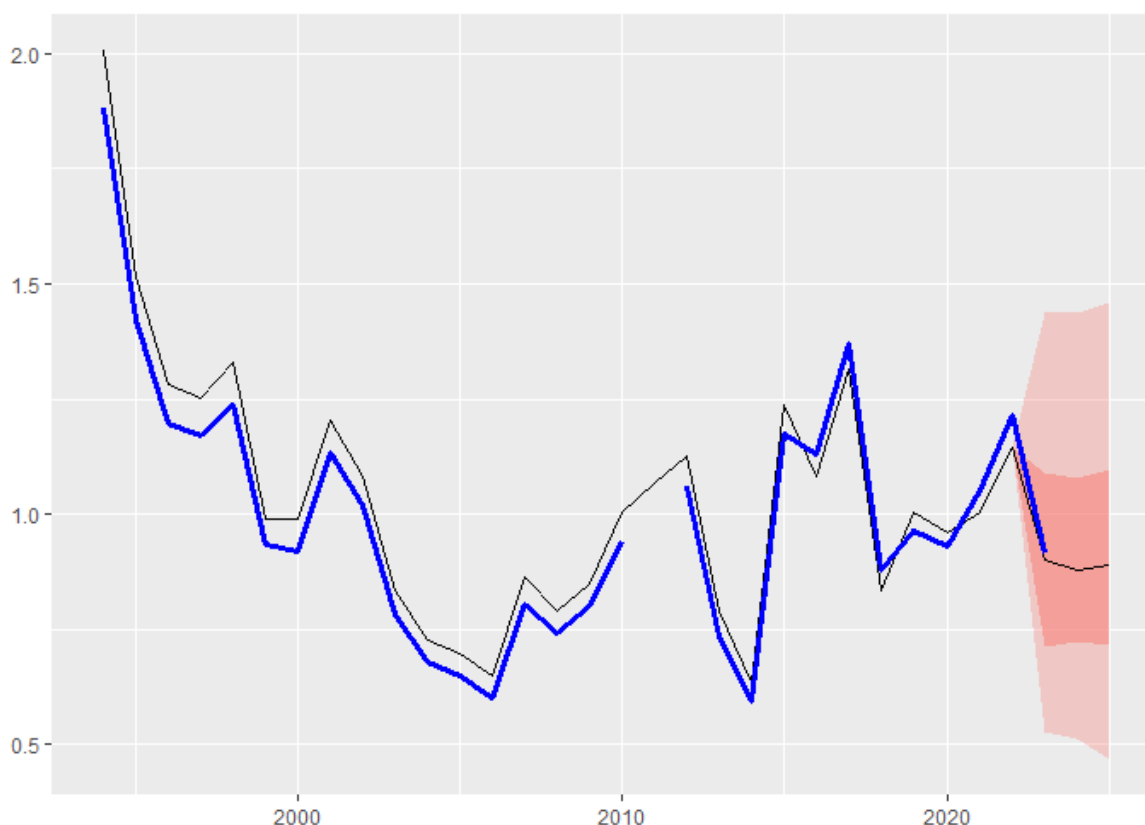


Figure 5 – Comparison of relative stdCPUE time series estimates from the 2023 standardisation process (black line, for the period to 2022) and the 2024 standardisation process (blue line, for the period to 2023) and the near future predicted CPUE (black line, 2023-2025).

In 2024, the WPB22 had noted with concern the decline in Japanese longline fishing effort and catch in the north-west Indian Ocean (an area of significant swordfish catch), and questioned if that might have potential implications for whether the Japanese CPUE can still index stock abundance in that area (IOTC, 2024e). Bromhead et. al. (2024) noted that the decline in effort in this region has been occurring since at least 2007 (Matsumoto et al 2023) (**Figure 6**), and as such, this is not a new issue and should not affect the specified CPUE standardisation or the implementation of the MP at this point in time. The MSE operating models incorporated a range of alternative CPUE series, and MP performance (using the Japan LL CPUE) was robust to these uncertainties, and was shown to reach the target. Furthermore, the NW JP LL CPUE was chosen based on prediction skill and discussions with WPB in previous years. A subsequent and more recent examination of the prediction skill of the NW JP CPUE from the 2023 assessment model indicates that the prediction skill remains acceptable (**Figure 7**).

However, acknowledging this, and that the issue of representativeness of this CPUE series is separate to the function of the MP, the issue of declining Japanese effort should nonetheless continue to be monitored and given more explicit consideration as part of the review of the MP planned for 2031. Further research on alternative sources of monitoring data or new CPUE series, for use in future MPs, could be considered and the evaluation of well-developed alternatives could also form part of the review.

On the basis of the assessment above, there is no evidence of exceptional circumstances pertaining to CPUE data.

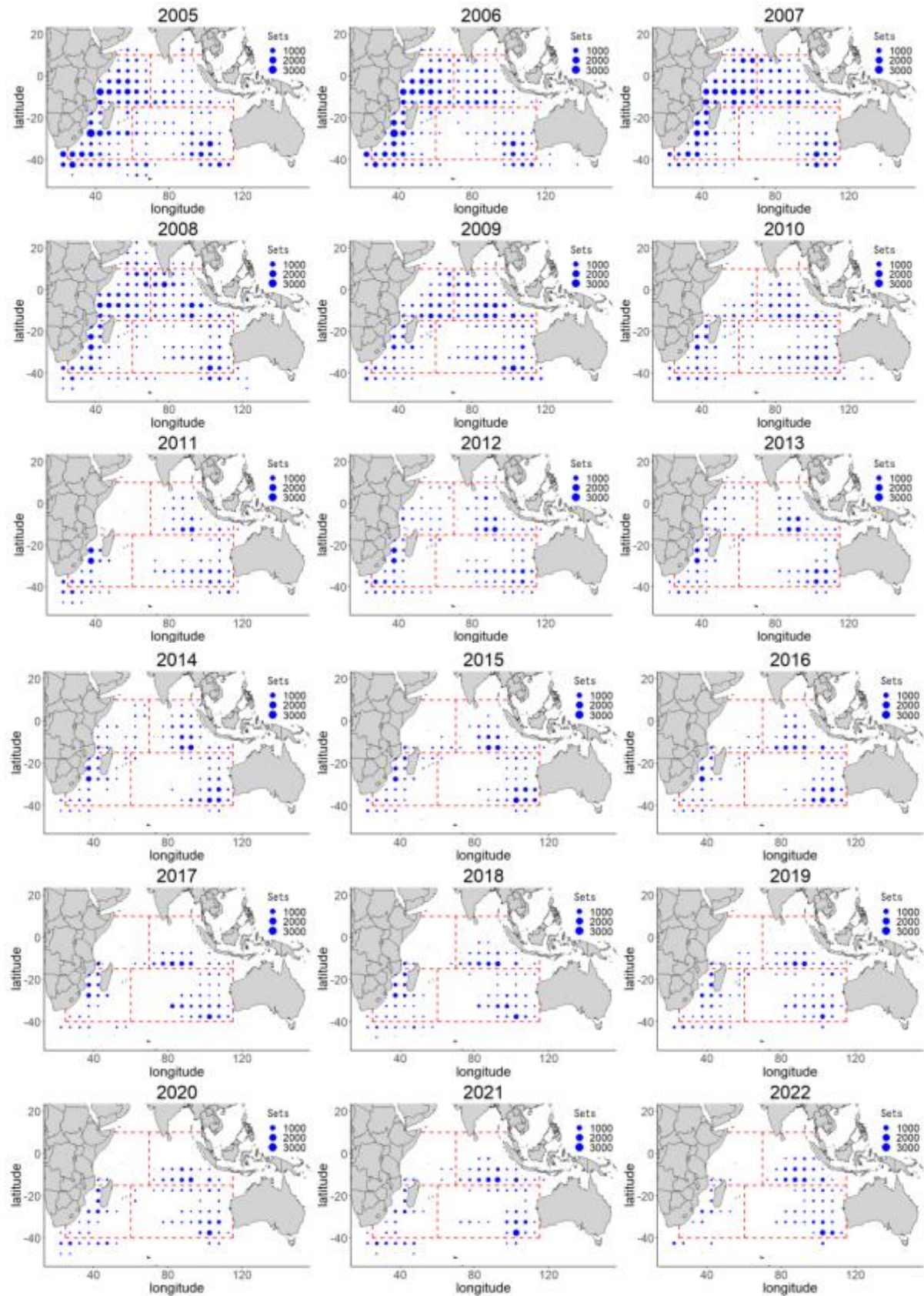


Figure 6. Distribution of fishing effort (number of sets) by Japanese longline fishery in the Indian Ocean (annual from 2005). Dashed lines show boundary for the areas for CPUE standardization (Source – Matsumoto et al 2023).

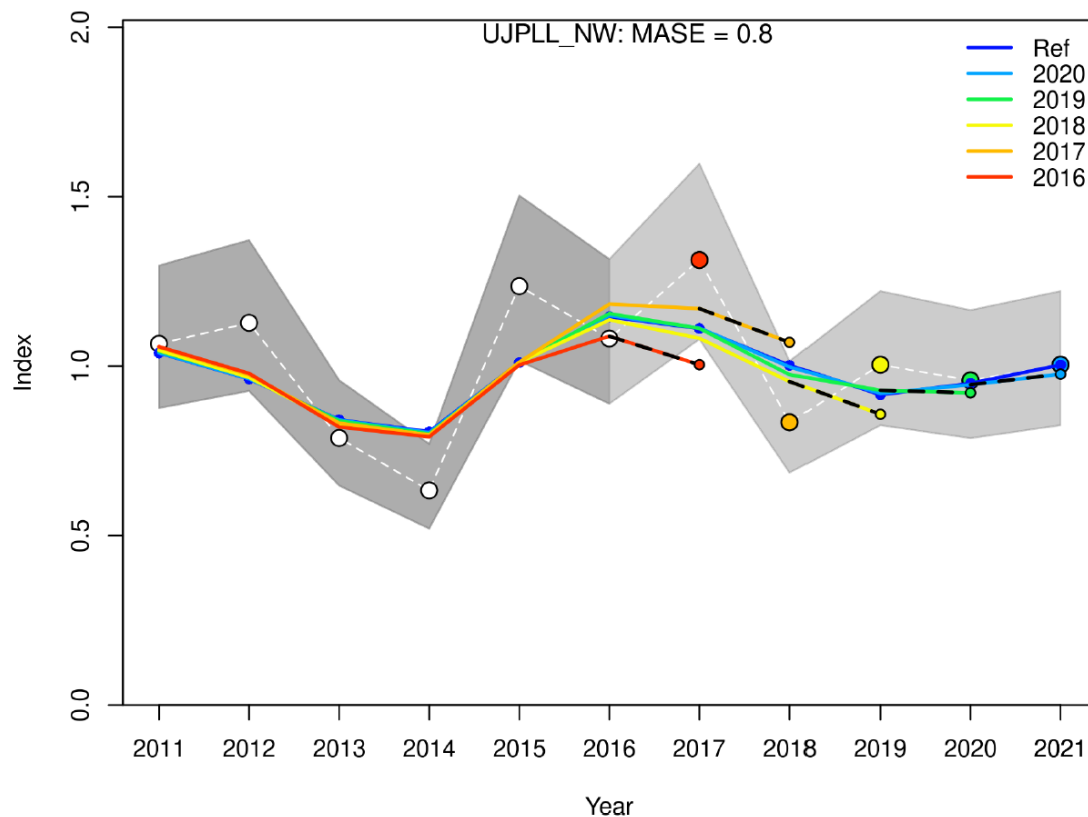


Figure 7 – Prediction skill of the base case 2023 assessment model for the north-west Indian Ocean Japanese longline CPUE. Large, coloured dots, show the CPUE observations over the last five years considered (2017-2021). Coloured lines show the one-year-ahead predictions obtained from a catch-based hindcast (as per Carvalho et al., 2021). MASE values less than 1 indicate that the model is able to generate predictions for this series that are better than random.

2.3.3 Catch relative to TAC

The MP recommended TAC in 2026 will be the first TAC to be implemented for swordfish by the IOTC, therefore there is no exceptional circumstance, because a comparison of catch relative to TAC does not exist. It is also important to note however that following the running of the MP by the SC in 2024, and the SC's advice to implement the MP derived TAC of 30527 t, the IOTC Commission failed in 2025 to propose and agree a measure to implement (and allocate) the TAC recommended by the MP. As such, there is no measure in place to ensure TAC adherence in the 2026-2028 period, increasing the risk of catches increasing above the recommended level. This needs to be urgently addressed by the Commission at its 2026 meeting.

2.3.4 Operation of the MP

During the process of undertaking the previous (2024) review for potential exceptional circumstances (Bromhead et al 2024), errors were identified in the MSE process (used to develop and test the MP) that constituted an exceptional circumstance. Specifically, issues were identified relating to both the CPUE values applied for the period 2020-2022 (simulated values were applied rather than the observed values), and the lag applied for the period between the final year CPUE and the first year of TAC implementation (1 year instead of 2). The MP was corrected for both issues and retuned, resulting in a small change to the target CPUE.

However, this did not result in any significant change in the MP performance (from the MP adopted in 2024)(Brunel and Mosqueira, 2024d) or TAC advice for 2026-2028. Subsequently, upon advice from the Scientific Committee (IOTC, 2024f), the IOTC Commission adopted the retuned and revised MP in 2025 via Resolution 25/07 (IOTC, 2025a). There are no new EC identified relating to the operation of the MP in 2025.

3. Discussion and Conclusion

The Exceptional Circumstances Guidelines make it clear that identifying exceptional circumstances does not necessarily result in changes to the recommended TAC. In fact, changes to the recommended TAC should be avoided except in situations where the TAC advice would pose a risk to the stock or the fishery if implemented. The alternatives are to collect more information, or do research, to inform the review of evidence of exceptional circumstances in the next year or years. Another alternative is to proceed with the TAC advice (or precautionary advice) and trigger a review of the MP earlier than planned. Recommending a change to the TAC is appropriate if there is a high risk to the stock. If the TAC is to be adjusted, further evaluation of the scale and severity of the exceptional circumstance provides guidance (% change) on how to calculate an adjustment to the TAC.

A wide range of items are reviewed to examine if there is evidence for exceptional circumstances, i.e., the data inputs to the MP, the range of uncertainties against which the MP was tested, and implementation of MP TAC advice. This review is conducted annually to provide advice to the SC on any risks with the operation of the MP and TAC advice.

The annual review of exceptional circumstances is an important component of providing management advice using an adopted management procedure. It is the safety net process that evaluates the extent to which the MP is operating as expected (from the MP testing) and identifies any risks associated with implementing the MP TAC advice. The review requires consideration of evidence for exceptional circumstances. It provides a scientific process for developing appropriate management responses if any exceptional circumstances are identified and, hence, provides transparency in TAC decision making by the Commission.

It is important to note that this current review paper may not yet take account of all new information presented to the WPB23 (September 2025). However, such information can be included in a revised paper for consideration by the Working Party on Methods (October 2025). The key conclusions of the current review are:

- **TAC implementing measure** – At its meeting in April 2025, the IOTC Commission failed to propose and agree a measure to implement (and allocate) the TAC recommended by the MP. As such, there is no measure in place to ensure TAC adherence in the 2026-2028 period, increasing the risk of catches increasing above the recommended level. This needs to be urgently addressed by the Commission at its 2026 meeting.
- **Stock status, population dynamics or biology** - The 2023 stock assessment estimates of SB/SB_{MSY} and F/F_{MSY} were shown to be within the 90% probability interval of the estimates from the operating models used to test the performance and tune the MP. No EC relating to biology or population dynamics were identified, but noting that new recent research on stock structure has yet to be reviewed by WPB.
- **Fishery or fishing operations** - There are no identified changes in recent fishery operations (e.g. methods/approaches). Shifts in relative catch proportions by the fishery over time (noted by WPB22 in 2024) have been incorporated into the MSE operating

models (OMs), and the subsequent MP performance tested and demonstrated to be acceptable. Fishery catch levels and proportions from the 2 most recent years of data are not substantially different to the most recent levels considered by the OMs.

- **Catch data inputs** – There have been no significant recent changes in the quality and representativeness of swordfish catch data to be utilised by the MP.
- **CPUE data inputs** – StdCPUE time series estimates from the 2023 standardisation process (for period to 2022) and the 2024 standardisation process (for period to 2023) are very similar. Prediction skill of the NWIO Japanese longline CPUE remains acceptable but Japanese longline effort trends should continue to be monitored and considered in annual EC reviews and as part of the larger MP review in 2030.

In summary, while there are no EC pertaining to the swordfish MP as per the EC Guidelines, the failure of the Commission to adopt a Resolution to implement (and allocate) the MP derived TAC for 2026-2028 needs to be urgently addressed by the Commission.

Note that the annual review of exceptional circumstances for the Swordfish MP is to be updated and presented to both the WPB and WPM each year.

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