Report of the 2025 ICCAT Atlantic White Marlin Stock Assessment Meeting
(hybrid/ Madrid, Spain, 23-27 June 2025)

The results, conclusions and recommendations contained in this report only reflect the view of the Billfish Species Group (BIL SG). Therefore, these should be considered preliminary until the SCRS adopts them at its annual Plenary meeting and the Commission revises them at its annual meeting. Accordingly, ICCAT reserves the right to comment, object and endorse this report, until it is finally adopted by the Commission.

1. Opening, adoption of agenda, meeting arrangements, and assignment of rapporteurs

The meeting was held in hybrid format, with the in-person meeting being held at the ICCAT Secretariat in Madrid, Spain, from 23 to 27 June 2025. Ms. Karina Ramirez (Mexico), the Billfish Species Group (BIL SG) Rapporteur and meeting Chair, opened the meeting and welcomed participants ("the Group"). Dr Miguel Neves dos Santos, ICCAT Assistant Executive Secretary, welcomed the participants and wished them success in their meeting.

The Chair proceeded to review the Agenda which was adopted with some changes (**Appendix 1**). The List of participants is included in **Appendix 2**. The List of papers and presentations provided at the meeting is attached as **Appendix 3**. The abstracts of all SCRS documents and presentations provided at the meeting are included in **Appendix 4**. The following participants served as rapporteurs:

Sections	*Rapporteur*
Items 1, 12	M. Ortiz
Item 2	F. Ngom, C. Mayor, G. Diaz, M. Ortiz, C. Mayor
Item 3	M. Narvaez, M. Ortiz, B. Mourato, A. Kimoto
Item 4	M. Kai, B. Mourato, A. Kimoto
Item 5	M. Narvaez, M. Ortiz, B. Mourato, A. Kimoto, K. Ramirez, G. Diaz,
Item 6	B. Mourato, M. Ortiz, A. Kimoto
Item 7	G. Diaz, C. Brown, K. Ramirez, M. Ortiz
Item 8	F. Ngom, G. Diaz, M. Neves dos Santos, K. Ramirez, C. Brown
Item 9	F. Ngom, K. Ramirez, M. Neves dos Santos
Item 10	K. Ramirez, M. Neves dos Santos
Item 11	C. Brown

2. Summary of input data for stock assessment

2.1 Biology

The Group was informed that no new or updated information on the biology of white marlin (WHM) has been received since the 2025 ICCAT Atlantic White Marlin Data Preparatory Meeting (Anon., 2025) held in March 2025.

2.2 Catches

The Group reviewed the most recent fisheries information available in the ICCAT database system (ICCAT-DB) for white marlin (WHM) and other billfish species. Specifically, the fishery statistics data were analyzed, including Task 1 Nominal Catches (T1NC), Task 2 Catch and Effort (T2CE), and Task 2 Size Samples (T2SZ).

The Secretariat presented SCRS/P/2025/057 that summarized all available statistical information in ICCAT-DB for the Billfish Species Group. It included Task 1 and Task 2 datasets on billfishes, with a particular focus on white marlin, as well as the tools provided for easy visualization of this information, updated as of 17 June 2025.

Task 1 Nominal Catches

The ICCAT Secretariat presented the catch statistics for white marlin and the entire billfish dataset for the period from 1950 to 2023. The revised Task 1 Nominal Catches (T1NC, containing landings and dead discards (DD)) of the various billfish species including white marlin and roundscale spearfish (RSP) by year and catch type, in the period are presented in **Table 1**. White marlin and roundscale spearfish total catches by gear group and by catch type (landings, dead discards and live discards) are presented in **Figures 1 and 2** respectively. In relation to the live discards of white marlin and other billfish species (**Table 2**) the level of CPCs reporting live discards continues to be low. The Group reiterated that reporting T1NC data, disaggregated by landings, dead discards, and live discards, is mandatory for all ICCAT-managed species.

The SCRS catalogue for white marlin (**Table 3**) and roundscale spearfish (**Table 4**) on Task 1 and Task 2 data availability was also presented to the Group.

The Group noted a decline in reported catches of white marlin since 1998, with nominal catches exhibiting a steady downward trend year after year. The Group reflected on the possible reasons behind this situation and concluded that several factors may have contributed. These include a reduction in longline fishing effort, as well as improvements in the fisheries aimed at minimizing dead discards. It was also suggested that part of the reduction in reported catches might be attributable to underreporting, possibly influenced by current regulatory measures.

After reviewing the discards (DD) and landing (L) estimates produced in previous years for this data series, the Group noted that the estimates for this species have exhibited considerable variability in recent years, ranging from a minimum of 0.28% in 2015 (the lowest value in the time series) to a maximum of 28.13% in 2022 (the highest in the series). The Group also emphasized the importance of understanding how the DD estimates reported by CPCs were produced, particularly regarding the methods and assumptions underlying those estimations.

The Group also questioned the observed decrease in dead discards compared to the 1990s, based on the most recent data reported by CPCs. In the graph illustrating catches by Catch Type (L: landings, DD: dead discards, **Figure 1**), it can be observed that dead discards reported in the 1990s have declined in more recent years. These earlier dead discards estimates were reported primarily by the United States longline fishery. The Group noted that the decline in dead discards may be related to the United States domestic management regulations aimed at reducing billfish bycatch, as well as to a reduction in the fishing effort of its fleet.

Task 2 Catch/Effort

The ICCAT Secretariat presented the detailed catalogue of Task 2 Catch and Effort (T2CE) with important metadata to the Group, noting that no major improvements, including historical revisions, were made recently.

Task 2 Size Data

The detailed Task 2 Size Data (T2SZ) catalogue was provided to the Group. The Secretariat noted that no major improvements, including historical revisions, were made.

2.3 Length compositions

The Secretariat informed the Group that no additional information on size frequency samples (mostly associated with T2SZ) was received after the 2025 ICCAT Atlantic White Marlin Data Preparatory Meeting. Therefore, the stock assessment was conducted with the length composition reviewed and adopted by the Group during that meeting (Anon., 2025).

2.4 Indices of abundance

Document SCRS/2025/141 provided a summary of the correlation analysis for the available white marlin catch per unit of effort (CPUE) series that was proposed during the first intersessional informal meeting of the Sub-group on Technical Gear Changes. The Group considered possible grouping of standardized CPUEs based on their correlation, recognizing the fitting and diagnostic problems when using all indices together. It was agreed that this grouping would reflect hypothetical states of nature, and it was also agreed that this major uncertainty should be integrated into the stock status and advice provided.

- Group 1 for the CPUEs with decreasing trends: BRA-LL, CTP-LL1, JPN-LL1, JPN-LL2, JPN-LL3, JPN-LL prior, USA-LL, and MEX-LL
- Group 2 for the CPUEs with increasing trends: BRA-LL, CTP-LL1, JPN-LL1, JPN-LL prior, VEN-LL, VEN-GN

The Group discussed potential sources for the conflicting trends among indices, particularly in recent years. It was asked if the type of data used by each CPUE standardization was similar among CPCs. As white marlin is primarily a bycatch for main longline fleets, it was enquired if CPUE input included landing data only or if discards were included.

The Group enquired whether the CPUE providers using logbooks incorporated live/dead discards in their CPUE standardizations for better understanding of the indices and possible conflicts among them. For the Japanese longline index, it was standardized using their logbooks, which have no information on live/dead discards. To take live/dead discards indirectly into account in the standardization, the author used the data filtering that removed the data: 1) set-by-set data with no catch of white marlin, and 2) set-by-set data from some areas where there was little catch of white marlin.

The standardized Chinese Taipei longline CPUE was derived from their logbooks that include information on live/dead discards reported by the captains.

The Brazil longline index was standardized using their logbooks. The authors assumed the data after 2005 contained live/dead discards information due to the introduction of a new domestic law for reporting catches.

The standardized Venezuela CPUEs of longline and gillnets used landings data, because white marlin specimens caught are retained and there are not discards at sea.

During the intersessional work conducted in preparation for the stock assessment meeting, it was decided not to include the Chinese Taipei longline (CTP-LL) late index (CTP-LL 2: 1998-2023). This was due to the sharp decrease in the index in a short period of time that was considered to be biologically implausible. The Group also discussed the conflicts among different CPUEs and acknowledged that such conflicts are not uncommon in ICCAT stock assessments. It was suggested to explore the possibility of estimating a joint LL CPUE. This approach has been used by other Species Groups as a way to deal with conflicting CPUE indices. The Group also suggested that the Working Group on Stock Assessment Methods (WGSAM) establish appropriate weighting methods or weighting criteria based on the evaluation table of CPUE or outputs of model diagnostics as a potential method to resolve the issue of the data conflicts.

2.5 Fleet structure

The Secretariat informed that no new data on catch, or fleet structure has been received since the 2025 ICCAT Atlantic White Marlin Data Preparatory Meeting held in March. Therefore, the fleet catch matrix and fleet structure provided after that meeting (Anon., 2025) (**Table 5**) were still valid and no changes were required.

2.6 Other relevant data

The Group was informed that no new/updated information has been provided for white marlin after the 2025 ICCAT Atlantic White Marlin Data Preparatory Meeting (Anon., 2025) that were relevant for the stock evaluation.

3. Methods and model settings

3.1 Stock Synthesis

Document SRCS/2025/137 provided a description of preliminary stock assessment models using fully integrated age-structured modelling platform Stock Synthesis (V3.30.23.2).

The document summarized the initial decisions made at the 2025 ICCAT Atlantic White Marlin Data Preparatory Meeting (Anon., 2025) and the subsequent recommendations from the discussions during the intersessional meetings of the Sub-group on Technical Gear Changes. Compared to the initial model based on the 2019 stock synthesis models, there were four alternative scenarios that addressed two main sources of uncertainty identified by the Group: the conflicting information from the indices of abundance (CPUEs) and the 1998 forward reported total removals after the implementation of management regulations (*Recommendation by ICCAT regarding Atlantic blue marlin and Atlantic white marlin* (Rec. 97-09) e.g. catch and dead discards).

Consistent with the 2019 ICCAT white marlin stock assessment (Anon., 2020), the Stock Synthesis model was structured to include two sexes (female and male). This two-sex configuration allowed for the incorporation of different sex-specific biological parameters. All input data, including CPUE and length composition, were aggregated for both sexes.

Regarding trends in abundance, two alternative states of nature were hypothesized to seek improvement of Stock Synthesis models (in terms of retrospective patterns observed and discussed during intersessional informal technical meetings, in which exploratory runs were presented). One state, Group 1, used the CPUEs with decreasing trends in the latest years, and a second state of nature, represented by Group 2, used the CPUEs with increasing trends.

With regard to recent reported removals, a scenario was configured that used the total removals agreed by the Group during the data preparatory meeting. A second scenario was configured that allowed error in those removals through the use and estimation of a catch multiplier for the 1998 forward period, which basically assumed uncertainty in the reported catch after 1998.

Updated information and model configuration were presented during the meeting, following discussions developed during the technical group intersessional informal meetings and decisions made during the 2025 ICCAT Atlantic White Marlin Data Preparatory Meeting (Anon., 2025).

The initial models and results included four main alternative scenarios as follows:

- Model 6.1: Without catch multiplier estimated and Group 1 CPUE indices (decreasing trend).
- Model 6.2: Without catch multiplier estimated and Group 2 CPUE indices (increasing trend).
- Model 7.1: With catch multiplier estimated and Group 1 CPUE indices (decreasing trend).
- Model 7.2: With catch multiplier estimated and Group 2 CPUE indices (increasing trend).

Biological parameter settings, selectivity, and general model settings used for these models (6 and 7) follow similar structures as in the previous 2019 ICCAT white marlin stock assessment (Anon., 2020), configured to minimize any changes from those. Nonetheless, a few important deviations from the 2019 ICCAT white marlin stock assessment were agreed upon by the Group.

During the intersessional informal meetings, the Group agreed to remove the Chinese Taipei LL-2 (1998-2023) series. In consultation with national scientists, it was indicated that changes in fishing areas and gear configurations related to the number of hooks between floats (HBF), associated with a change in the target species, and that not all potential factors that could affect catchability were included in the standardization procedure.

These preliminary runs showed different results mainly associated with the CPUE grouping (**Figure 3**).

As requested by the Group during the 2025 ICCAT Atlantic White Marlin Data Preparatory Meeting (Anon., 2025), a continuity analysis was carried out to assess the effect of updating the female length at L50 from 162.2 cm lower jaw fork length (LJFL) to 145.04 cm LJFL. This change in the maturity function had no substantial effect on the model results (**Figure 4**). The Group requested the modelers to provide the likelihood profiles for each CPUE series, as well as additional diagnostics such as jackknife and jitter analysis.

The Group highlighted that considering two groups of indices (increasing and decreasing trend) and two scenarios of total removals (with and without catch multiplier), was a good initial approach to consider the two main sources of uncertainty in the stock assessment process.

In terms of the use of a catch multiplier, the Group requested further clarifications on its implementation inside the model. The modelers indicated that the catch multiplier was set to estimate a single average value for the period 1998-2023, even though it is likely that the percentage of unreported catch could have changed over this period. It was suggested that time-varying by year or time block be explored in future white marlin stock assessments. However, the modelers indicated that doing a yearly varying estimate would be highly correlated with the annual fishing mortality estimates, which has not been recommended by the author(s) of Stock Synthesis.

Also, a concern was raised about the possible effect on final reference points when applying the catch multiplier, which increased the annual catch values by around 30% for the period 1998-2023. In this sense, it was remembered by the Group that in the previous 2019 ICCAT white marlin stock assessment (Anon., 2020), a combination of models including the scenario with the catch multiplier were used to assess for stock status, but for the stock projections it was recommended not to be included.

Additional runs were developed and presented during the meeting, as requested by the Group, to explore the possibility of improving diagnostics and in particular to search for an explanation of the strong retrospective patterns observed in all four models. These runs included continuity runs using model settings as close as possible to those presented during the 2019 ICCAT white marlin stock assessment (Anon., 2020) and runs including all CPUE indices, which included the additional four models:

- Model 6.0 without catch multiplier including all CPUEs accepted during the 2025 ICCAT Atlantic White Marlin Data Preparatory Meeting (Anon., 2025) (with the exception of CTP-LL 2 index).
- Model 7.0 with catch multiplier including all CPUEs accepted during the 2025 ICCAT Atlantic White Marlin Data Preparatory Meeting (Anon., 2025) (with the exception of CTP-LL 2 index).
- Model 7.0c: with settings as close as possible to those used in 2019, particularly in the CPUE indices used (e.g. including US-RR and BRA-RR).
- Model 7.0_sigma-r: with settings as close as possible to those used in 2019, particularly in the CPUE indices used, but increasing values of sigma_r on recruitment from 0.2 to 0.6.

Model 7.0_sigma-r as a sensitivity run showed that permitting an increase variability of the stock-recruitment estimated relationship (i.e. recruits deviations), allowed the model to reduce the retrospective patterns observed on the diagnostic tests, albeit retrospective patterns were still outside of the acceptable levels as indicated by the Mohn-rho estimator. The Model 7.0c using the 2019 CPUE indices also indicated that the new data (i.e. new indices, excluded indices) accounted for the different trends seen in the 2025 runs. This run model 7.0c was the closest to a continuity run as possible for the 2019 ICCAT white marlin stock assessment (Anon., 2020).

3.2 Surplus Production models

The most recent version of the JABBA (v2.3.0) Bayesian surplus production model was applied to the time series of catches for the period 1956–2023 (**Table 5**) and standardized CPUE). Document SCRS/2025/140 presented the general methodology, including the prior settings, model formulation and results of the preliminary JABBA models.

In all JABBA models, the default prior for the unfished equilibrium biomass (K), used an uninformative lognormal distribution prior with a coefficient of variation (CV) of 100% and a central value set at eight times the maximum annual catch in the series. The initial depletion prior ($\varphi = B_{1956}/K$) was specified as a beta distribution with a mean of 0.99 and CV=1%.

The prior for intrinsic growth rate *r*, ln(0.229, 0.162), was derived outside of the JABBA models using the Age-Structured Equilibrium Model (ASEM) approach (Winker *et al.*, 2020) with the life history parameters shown in **Table 6**.

Catchability parameters for all CPUE indices were assigned uninformative uniform priors. Additional observation variance parameters for all CPUE series were estimated assuming an inverse-gamma prior to allow internal variance weighting by the model. The process error for log-transformed biomass was freely estimated using an uninformative inverse-gamma prior, with both shape parameters set at 0.001. The observation error for CPUE inputs was fixed at 0.05. All models applied a minimum coefficient of variation (CV) of 0.3 for CPUE indices where the reported CV was ≤ 0.3, and used the reported CV where it exceeded 0.3.

The preliminary JABBA runs (SCRS/2025/140) provided four alternative model configurations developed to explore the influence of different CPUE index groupings on model outputs and to represent plausible alternative states of nature:

- Group_0: All standardized CPUE indices agreed by the Group at the by the Group during the 2025 ICCAT Atlantic White Marlin Data Preparatory Meeting (Anon., 2025).
- Group_1: A subset of indices with correlated trends (decreasing trend), selected to represent one plausible state of nature. This group included BRA-LL, CTP-LL1, JPN-LL1, JPN-LL2, JPN-LL3, JPN-LL prior, USA-LL, and MEX-LL.
- Group_2: An alternative subset of indices (increasing trend) reflecting a different correlated trend structure, consisting of BRA-LL, CTP-LL1, JPN-LL1, JPN-LL prior, VEN-LL, and VEN-GN.
- Group_1 + CTP-LL2: This configuration was based on Group_1 with the addition of CTP-LL2 to evaluate the impact of including this index on model performance and diagnostics.

The Group was informed that Group_0 was set up during model development as an exploratory configuration, while Group_1 + CTP-LL2 was designed for sensitivity analysis to assess the influence of the CTP-LL2 index.

After reviewing the diagnostics of the four configurations and particularly considering the influence of the CTP-LL2 index, the Group decided to focus on Group_1 and Group_2 scenarios, considering these as representing two alternative plausible states of nature.

During the discussion on the JABBA models, the Group inquired about the sensitivity of the models to different assumptions on steepness, natural mortality, and the inverse-gamma prior for process error. The authors explained that testing three alternative steepness assumptions yielded identical results. Regarding natural mortality, the Group noted that insufficient data exist to support testing alternative values at this stage and recommended this as a priority for future research.

The Group requested a sensitivity analysis using several informative inverse-gamma prior assumptions with a small CV to investigate the effect of process errors, especially in recent years. All preliminary JABBA runs applied an inverse-gamma prior with a mean of 0.001 and a CV of 0.001. The Group reviewed five additional assumptions with means of 0.04, 0.08, 0.1, 0.2, and 0.3, all with a CV of 0.001 (**Figure 5**).

The Group further discussed the results comparisons between Stock Synthesis and JABBA models and questioned why the preliminary results in 2025 among model platforms showed different trajectories of biomass and fishing mortality, while in the 2019 ICCAT white marlin stock assessment (Anon., 2020) both model platforms provided similar results.

Based on this, the Group requested an additional set of runs by using all available CPUEs excluding the Chinese-Taipei longline 2 index (Group 0_no_CTP_LL2).

- Group_0_no_CTP_LL2: All available standardized CPUE indices excluding the Chinese-Taipei longline 2 index.

4. Model diagnostics

The Group reviewed diagnostics for all models following Carvalho *et al.* (2021) guidelines, as recommended during the 2025 ICCAT Atlantic White Marlin Data Preparatory Meeting (Anon., 2025). CPUE residuals were evaluated through residual plots and runs tests; goodness-of-fit was assessed using Root Mean Squared Error (RMSE); and for model convergence the trace plots for the JABBA platform and the inverse of the hessian matrix in Stock Synthesis. In addition, the retrospective patterns and hind-cast performance were examined.

4.1 Stock Synthesis

Based on the results of the model diagnostics for four initial scenarios (Models 6.1, 6.2, 7.1, and 7.2) of Stock Synthesis, several CPUEs did not pass the runs test, and there were clear conflicts in the R_0 likelihood profiles between CPUE and length data. Additionally, a significant retrospective pattern was observed, and the hindcast approach showed no predictive ability. There was also poor fitting of the CPUEs. Therefore, the results of the stock assessment were considered highly uncertain. Additional jitter analysis indicated that there was no local minimum issue. The annual recruitment deviation with different catch multipliers for Group-1 scenario (Model 7.1) showed that a lower multiplier decreased the deviation of Recruitment deviation (Rec-dev), while a higher multiplier increased the deviation of Rec-dev. These results indicate that the current model attempts to explain the recent decline in biomass by reducing recruitment. The Group recognized that there are still large uncertainties in the model fitting as the main issues of the current model stem from conflicting fishery data, rather than the modeling.

Overall stock synthesis model diagnostics have somewhat improved with the Model 6.0 and 7.0 scenarios, but the retrospective analysis still exhibits a strong positive bias, and the value of Mohn's rho (-2.33~5.98) greatly exceeds the benchmark (-0.15 to 0.2), which has been identified as a significant problem.

The Group further explored ways to improve the fitting model by down-weighting the length data to remove the data conflict between CPUE and length, removing the Venezuela-longline CPUE data to reduce the data conflict between CPUEs, and applying the "hybrid-F" approach within Stock Synthesis. However, there were still problems with the retrospective patterns, regardless of the attempts of modifications to the model settings used.

The Group attempted a sensitivity run by increasing the sigma-r from 0.2 to 0.6 (Model 7.0_sigma-r) to explore if the retrospective patterns observed could be eliminated. However, this change did not resolve the issue. Additionally, the scenario with increased sigma-r caused high variations in recruitment deviation in the negative range after around 2012, which may pose issues for future projections.

The Group further attempted to use a CPUE scenario similar to 2019 as a "continuity" run, including Brazil and US sports fisheries CPUEs, as well as late CPUE data from Chinese Taipei (CTP_LL2) and excluding MEX_LL (based on Model 7.0), to identify if the retrospective patterns were due to the model structure settings or to the input data (**Figure 6**). The continuity run resulted in a minimal retrospective pattern similar to the results in the 2019 ICCAT white marlin stock assessment (Anon., 2020). This indicated that the source of the retrospective patterns was due to conflicting data and not the model structure.

The Group therefore agreed not to use the Stock Synthesis results for stock status determination.

4.2 Surplus Production models

The sensitivity analysis requested by the Group (see section 3.2) highlighted the conflict between catch and CPUE data, with models adjusting process errors to reconcile these inconsistencies. However, it was noted that the estimated process error after 2012 basically doubles (-0.4) in 2025 compared to the estimated values in 2019 (-0.2) (**Figure 7**). The Group initially agreed that Group 1 and Group 2 models addressed these uncertainties, however they failed to improve the negative trend in recent years for the process error estimates particularly for the Group 1 scenario.

The analysis also showed that smaller inverse-gamma priors constrained process errors near zero, resulting in weaker fit to CPUEs, whereas larger priors allowed greater process variability, leading to tighter fits to CPUEs (**Figure 8**). The inverse-gamma priors influenced the scale of B/B_{MSY}, but recent trends remained consistent across assumptions. The sensitivity analysis highlighted the conflict between catch and CPUE data, with models adjusting process errors to reconcile these inconsistencies.

The following diagnostic results were obtained for the initial Group 1 and 2 scenarios of the JABBA model:

- The marginal posterior distributions and prior densities for both scenarios (**Appendix 5, Figure A5.1**) indicated posterior to prior median ratios (PPMR) for r consistently below 1 but close, with posteriors strongly influenced by priors as expected. Small posterior to prior variance ratios (PPVR) for K suggested the data were informative. Results were broadly consistent between scenarios, with minor differences in the degree of posterior updating for r and K.
- The overall fit to CPUE indices was poor, with RMSE estimates of 49.2% and 58% for Group 1 and Group 2 models, respectively (**Appendix 5, Figure A5.2** and **A5.3**).
- Several indices (BRA-LL, CTP-LL1, MEX-LL, VEN-LL) failed the runs tests, with residuals showing systematic deviations (**Appendix 5, Figure A5.4**).
- Retrospective patterns were minimal (**Appendix 5, Figure A5.5**), with Mohn's rho values within the acceptable range of -0.15 to 0.20.
- Mean Absolute Scaled Error (MASE) scores below one indicated predictive skill. In Group 1, USA-LL showed MASE values above 1.3, reflecting moderate predictive capacity, whereas JPN-LL3 and MEX-LL had MASE near or slightly above 1. In Group 2, VEN-GN showed acceptable predictive skill, with MASE values near 1 (**Appendix 5, Figure A5.6**).
- The jackknife sensitivity analysis (**Appendix 5, Figure A5.7**) illustrated how removing individual CPUE indices affected assessment results. Patterns remained consistent across models, though each had a key influential index: MEX-LL in Group 1 and VEN-GN in Group 2 post-2000 increased estimated fishing mortality and reduced biomass.

Although the results of the JABBA model with the CPUE Group scenarios 1 and 2 showed relatively good model diagnostics for CPUE residual fit and runs test and the retrospective pattern results, plus a moderate to acceptable hind-cast predictivity; the Group expressed concerns with the negative trend of the process error in recent years in particular with the CPUE Group 1 scenario.

The Group further reviewed diagnostics from an additional JABBA run (Group 0_no_CTP_LL2) with all available CPUEs excluding the CTP-LL 2 index (**Figures 9 to 16**). The diagnostics of Group 0_no_CTP_LL2 were generally similar but slightly better than Group 1.

The Group questioned why the JABBA Group 0_no_CTP_LL2 run did not show any retrospective patterns (**Figure 14** and **Table 7**), while the Stock Synthesis showed a strong pattern in all their scenarios. It was indicated that the JABBA model is a surplus production model and relatively simpler compared to the Stock Synthesis age-structured model that can incorporate length data and consider selectivity of fleets. In addition to the fundamental differences in the model platforms, the JABBA Group 0_no_CTP_LL2 run produced larger negative process errors since the early 2010s (**Figure 13**) than Stock Synthesis to compensate for the conflicting trends among the CPUEs and the consistent declining catch trends since 2010. Instead, with Stock Synthesis the recruitment deviations are restricted by an informative prior and a user defined period (2021 forward) where the Recruitment deviations (Rec-devs are ramped back to the median) predicted by the estimated stock recruitment relationship.

Based on these results, the Group concluded that the JABBA run Group 0_no_CTP_LL2 provided an acceptable model for estimating stock status in 2023, albeit with high uncertainty.

5. Model results

5.1 Stock Synthesis

Results of the alternative models from Stock Synthesis were presented, following the settings described in section 3 of the report. A benchmark summary of the main 4 models (6.1, 6.2, 7.1 and 7.2 models) is included in **Table 8**.

Spawning biomass, recruits, fraction of unfished stock and F/F_{MSY} trajectories for the models are presented in **Figure 3** (see section 3.1). Differences between models that are based in Group 1 indices (Models 6.1 and 7.1) and Group 2 (Models 6.2 and 7.2) were greater than differences between applying and not applying the catch multiplier.

In general, trends are very similar when comparing all 4 scenarios; spawning biomass has declined over the years, with an increasing trend after 2020, corresponding also with an increase in recruits for the same period. In this regard, Models 6.2 and 7.2 (scenarios with increasing trend in population size) showed more optimistic results. In terms of F/F_{MSY}, trajectories are very similar, with highest values in 1998-2000 followed by a declining trend after 2010.

Derived quantity values and standard deviation for the models are presented in **Table 9**. The estimate of the catch multiplier for Model 7.1 was 0.74, and for Model 7.2 was 0.72, which would indicate that the expected total removals after 1998 were on average 26% and 28% higher than the catch agreed by the Group at the 2025 ICCAT Atlantic White Marlin Data Preparatory Meeting (Anon., 2025), respectively.

Differences in steepness (*h*) estimates were observed depending on the CPUEs groups, with higher estimated values for models using Group 2 indices (increasing trend in indices) (**Figure 17**).

The Group noted that the differences in trajectories after 2015 for spawning biomass and the fraction of unfished stock between models using the two different CPUE groups, reflect well the uncertainty about the state of nature of the population (**Figure 3**). Particularly, it was highlighted in the discussions that for Models 6.2 and 7.2 a possible recovery is observed for the most recent years, while for Models 6.1 and 7.1 such recovery is not present.

In regard to results from Models 7.0 (all CPUEs indices with and without catch multiplier), 7.0c (continuity run) and 7.0c_sigma-r (model 7c but increasing values of sigma-r from 0.2 to 0.6), retrospectives and hindcast diagnostics did not show improvement, so they were not developed further. The Group, after reviewing the diagnostics from the stock synthesis models, decided not to use Stock Synthesis results for stock status determination.

5.2 Surplus Production models

The Group agreed to use a JABBA run with all available CPUEs excluding the Chinese-Taipei longline 2 index (Group 0_no_CTP_LL2) as the 2025 reference case of the JABBA model.

Summaries of posterior quantiles for key management benchmarks are presented in **Table 10**.

The process error patterns in the JABBA base case showed a clear negative trend from around 1985 to 2020, suggesting that the model compensated for declining CPUE trends and catches by estimating progressively larger negative process error over this period (**Figure 18**).

The JABBA base case estimated that biomass mostly remained below B_{MSY} since the mid-1970s with some increase in the early 2000s. The median of B/B_{MSY} in recent years showed a slight increasing trend (**Figure 18**). The fishing mortality remained above F_{MSY} until 2000, and the F/F_{MSY} showed a continuous decreasing trend below one since the 2000s. The estimated medians of B/B_{MSY} and F/F_{MSY} in 2023 were 0.80 (95% credibility interval (CRI): 0.39–1.61) and 0.19 (0.09–0.35) (**Figure 18** and **Table 10**). The estimated median of MSY was 1497 t (1160 t –1937 t).

5.3 Comparison of model results

The Group extensively discussed the biomass and fishing mortality trends estimated by the Stock Synthesis and JABBA platforms. Overall, more similar trajectories were observed among the Stock Synthesis scenarios that grouped CPUE indices (Models 6.1, 6.2, 7.1 and 7.2), compared to the JABBA Group 1 and Group 2 outputs (**Figure 19**). This prompted questions on why the 2019 ICCAT white marlin stock assessment (Anon., 2020) had shown more aligned trends between the two platforms than the 2025 ICCAT white marlin stock assessment.

Following these discussions, the Group requested an additional evaluation including all CPUE indices, similar to the 2019 ICCAT white marlin stock assessment (Anon., 2020) configuration in both Stock Synthesis and JABBA models. The resulting runs (**Figure 20**) indicated that when all indices were included, the biomass and fishing mortality trajectories across platforms became more similar and aligned better with the 2019 results.

These outcomes reopened the debate on the concept of two alternative states of nature, which had been proposed by the Group during informal intersessional meetings as a means to address the retrospective pattern observed in the results of an early Stock Synthesis model configuration, and which may reflect alternative hypothesis of stock trajectory. It was noted that, compared to the 2019 ICCAT white marlin stock assessment (Anon., 2020), the 2025 configuration included two new indices (VEN-LL and MEX-LL) and excluded three (BRA-RR, USA-RR, and CTP-LL2). The Japanese and Chinese Taipei longline indices had also different time blocks in 2025 compared to those in 2019. While some inconsistency among indices was already apparent in 2019, that assessment did not assume two states of nature based on CPUE correlation.

The Group concluded that the divergent outcomes between Stock Synthesis and JABBA stem largely from the high uncertainty and conflicting trends among the CPUE indices. In particular, the conflict between recent catch reductions (since 2012) and some CPUE indices that still indicate declining biomass. In Stock Synthesis, this conflict is interpreted as the result of a downward trend in recruitment, whereas in JABBA it appears as a persistent negative trend in the process error parameter. Similar patterns were also noted during the 2019 ICCAT white marlin stock assessment (Figures 11 and 25 in Anon., 2020). These contradictions seem to be amplified when abundance indices are grouped based on their correlation, leading to conflicting signals in model outputs.

5.4 Summary of stock status

After reviewing the latest Stock Synthesis runs and confirming that key diagnostic issues (e.g. retrospective patterns) remained unresolved, the Group decided to provide stock status based solely on the JABBA run with all indices (except CTP_LL2, coded "Group 0_no_CTP_LL2") configuration.

The biomass trajectory estimated by the JABBA Group 0_no_CTP_LL2 model indicated a decline since the late 1950s, stabilizing at relatively low levels after the 1980s, with modest increases in the early 2000s. Biomass remained below B_{MSY} for most of the assessment time series, with the 2023 median B/B_{MSY} estimated at 0.80 (95% credibility intervals (CRI): 0.394 - 1.611). Fishing mortality peaked during the 1970s-1990s, then declined steadily and remained below F_{MSY} since the early 2000s, with the 2023 median F/F_{MSY} at 0.191 (95% CRI: 0.089 - 0.348) (**Figure 21** and **Table 11**).

The Kobe plot for the Group 0_no_CTP_LL2 (**Figure 22**) shows a historical trajectory moving from the overfished and overfishing quadrant (red) in the 1970s toward the overfished but not overfishing quadrant (yellow) through the 1990s and early 2000s. The most recent estimate (2023) lies still within the yellow quadrant, indicating that the stock remains below B_{MSY}, but is being fished at levels below F_{MSY}. The posterior distribution in the Kobe plot shows that 73% of the estimated biomass and fishing mortality combinations fall in the yellow quadrant, and 27% in the green quadrant, suggesting high probability that overfishing is not occurring but that the stock remains overfished.

Therefore, the Group agreed that the stock status of Atlantic white marlin at the end of 2023 indicates that the biomass remained below B_{MSY} with a median B/B_{MSY} estimated at 0.80 (95% CRI: 0.394 - 1.611), and a fishing mortality below F_{MSY} with median F/F_{MSY} at 0.191 (95% CRI: 0.089 - 0.348) (**Figure 21** and **Table 11**).

The Group also concluded that given the uncertainty in stock recruitment dynamics in recent years it is not advisable to estimate stock projections for this stock assessment. Therefore, no projections scenarios were conducted, and no Kobe matrices were provided.

6. Stock projections

The Group discussed the possibility of conducting forward projections based on the JABBA model (Group 0_no_CTP_LL2). However, it was noted that the estimated process errors exhibited a persistent and strong negative trend over the last two decades, indicating that the model has been compensating for declining CPUE trends and catches by estimating progressively larger negative process error. This pattern suggests an ongoing conflict between observed CPUEs and catch data, undermining the reliability of model-derived parameters for use in stock projections.

In addition to the negative trend in process error, the Group emphasized other critical sources of uncertainty, including high variability in CPUE trends and inconsistencies among indices. These factors undermine the reliability of projections.

For these reasons, the Group agreed that stock projections from the JABBA model would not provide a reliable basis for management advice. As in the 2019 ICCAT white marlin stock assessment (Anon., 2020), the Group decided not to use stock projections and recommended that the stock status be interpreted with caution, particularly given the conflicting signals among data sources and uncertainties in the model.

7. Responses to the Commission

During the meeting, the Group reviewed the list of responses to the Commission, which included the *Recommendation by ICCAT on management measures for the conservation of Atlantic sailfish* (Rec. 16-11) (paragraph 2) and the *Recommendation by ICCAT to establish rebuilding programs for blue marlin and white marlin/roundscale spearfish* (Rec. 19-05) (paragraphs 16 and 21).

The Group discussed the current status of each response as summarized below and agreed to draft the responses during the intersessional period, with the goal of having a final proposal ready to be reviewed during the upcoming Billfish Species Group Meeting in September 2025. The plan requires a small group to meet online intersessionally.

The SCRS shall review these data and determine the feasibility of estimating fishing mortality by commercial fisheries. Rec. 16-11, paragraph 2

The Group agreed to address this response after the conclusion of the 2025 ICCAT Atlantic White Marlin Stock Assessment Meeting, once the results have been reviewed and adopted by the Billfish Species Group in September 2025.

Revise the statistical methodology used to estimate dead and live discards and provide feedback to CPCs. Rec. 19-05, paragraph 16

The Group acknowledged the need to review the most recent papers submitted by CPCs, which include the methodologies used to estimate dead and live discards. The relevant document is:

- Yin *et al.* (2025) - Comparing modeling approaches for estimating swordfish discards in the Canadian pelagic longline fishery (SCRS/P/2025/006).

Explore potential technical changes to the terminal gear and fishing practices that could reduce bycatch and bycatch mortality (at-vessel and post-release). Design and implement a study(ies) to compare the effects of hook shape and size on catch rates. Rec. 19-05, paragraph 21

The Secretariat presented a brief overview of previous responses provided by the SCRS and/or its subsidiary bodies in this regard. In addition, the Secretariat noted that there are several SCRS documents and a presentation that have been provided by the Sub-group on Technical Gear Changes since 2021 to meetings of the Billfish Species Group or the Subcommittee on Ecosystems and Bycatch: Anon. (2021), Anon. (2022), and Coelho (2025).

In addition, a reference was made to a recently published peer-reviewed paper by Santos *et al.* (2023), that provided the results of a meta-analysis of 40 publications totaling 59 experiments that was undertaken to review and assess the effects of changing the hook (circle vs. J-hooks or tuna hooks), bait (fish vs. squid) and leader (wire vs. nylon) type on retention and at-haulback mortality rates of teleost (tunas and billfishes), elasmobranchs and sea turtles caught on shallow-sets and deep-sets pelagic longline fisheries.

The Rapporteur of the Sub-group on Technical Gear Changes informed the Group that the work continues, with the current main objective being the completion of the synthesis of the power analysis presented in SCRS/P/2025/035, aiming at establishing future priorities for fisheries where the experimental trials can be carried out, and respective estimated effort/costs needed. A second objective is the preparation of a template for a data-call, from which statistical analysis can be carried out to determine other variables influencing catch rates and by-catch mortality.

The Group noted that the Sub-group on Technical Gear Changes will continue to provide regular updates to the SCRS.

8. Recommendations

8.1 Research and statistics

Research

The Committee recommends continued funding of the Enhanced Programme for Billfish Research (EPBR), including the main activities related to age and growth, age validation, and tagging. During the period 2026-2027, research will be focused on the following areas, by order of priority:

- Continue the growth study of the three priority billfish species in the eastern Atlantic (blue marlin (BUM), white marlin, sailfish (SAI)), including sampling collection and shipping. The plans from 2027 and beyond include: continue the collection of additional samples (priority areas and size classes to be set in 2026); continue processing new samples; analyse current and new data; continue the development and/or complete the age and growth models. The annual costs related to age and growth include: processing and analysis (€14,000), sampling and shipping (€7,000).

- Continue age validation through bomb radiocarbon. Age validation (bomb-radiocarbon) for blue marlin started in 2025 and is expected to be completed in 2026. Future plans include to carry out age validation for white marlin in 2026-2027, and sailfish in 2028-2029. The otoliths collected in the eastern Atlantic (referred in the above line) will be used in these studies. The annual costs related to age validation are €28,000.

- Continue the e-tagging of the three priority billfishes (blue marlin, white marlin and sailfish). The main priority area will be the Northeast Atlantic (southern Portugal) with dedicated tagging campaigns. The Committee also recommends continuing opportunistic e-tagging in other areas (eastern Atlantic, Southwest Atlantic), taking advantage of other ICCAT e-tagging campaigns for other species. These activities imply the acquisition of additional miniPAT tags and related services of data transmission (satellite). The increasing annual costs in the period 2026-2029, which are related to the acquisition of additional e-tags and the new geographic area to be covered on opportunistic tagging, are detailed in the table below.

In addition, the Group recommended that research aimed at improving the basic biological data and population dynamics information for roundscale spearfish to be discussed throughout 2026 and 2027, for possible inclusion in future EPBR activities.

The above activities might be further discussed during the upcoming Billfish Species Group meeting in September 2025, prior to being provided at the 2025 SCRS Plenary meeting.

Breakdown of the requested funds related to billfish for the period 2026-2029 is provided in the table below:

Working group	***2026***	***2027***	***2028***	***2029***	***Explanations***
Tagging					
Tag and tagging material purchases	18500	22200	25900	25900	
Rewarding, awareness and satellite	1500	1800	2100	2100	
Tagging campaign	10000	10000	10000	10000	
Biological studies					
Age and growth	42000	42000	42000	42000	
Sample collection and shipping	7000	7000	7000	7000	
TOTAL	**79000**	**83000**	**87000**	**87000**	

Statistics

- While the Group acknowledged the improvement in billfish statistics, it recognized that significant gaps still exist. Therefore, the Group reiterates once again the need for CPCs to report the required data and make efforts to improve historical statistics.

- The Group recommends exploring the possibility of estimating a joint LL CPUE as has already been done for other ICCAT species, in order to address the conflicting CPUE trends that the Group faced during the billfish stock assessments.

- The Group recommends improving estimates of natural mortality (M) and consider developing a vector of natural mortality M at age for all billfish species.

- The Group recommends a thorough review of the white marlin indices of abundance, including a clear definition of the catch used (landed, landed and discards), fishing effort definition, data source (logbook, observer programmes, others), and if the catch includes strictly identified white marlin *versus* roundscale spearfish. It should also include potential factors that may affect catchability in both target and bycatch fisheries.

- The Group recommends the SCRS to provide guidelines for appropriate ranges of confidence intervals (e.g. 80%, 95% confidence intervals) to express the uncertainty in the stock assessment.

8.2 Management recommendations

Following the completion of the assessment evaluation, the Group focused its discussions on the current stock status using JABBA model results. However, it was not possible to produce projections to generate Kobe matrices, for the reasons explained in sections 5 and 6 of this report.

The Group highlighted that despite the recent reported catches have been below the 355 t landing limits established in paragraph 2 of Rec. 19-05, the stock has shown limited signs of recovery. However, concerns were raised regarding the potential impact of unreported catches, including both dead and live discards, which introduce uncertainty into current catch estimates. In order to better assess the status of the stock and provide more robust management advice, it is essential that CPCs comply with the data reporting requirements (i.e. landings and estimates of discards, size data) and improved indices of abundance. Until this objective is reached, future white marlin/roundscale spearfish stock assessments will continue to be hampered by data uncertainties and will limit the ability of the Group to provide robust management advice for this stock.

However, the Group reiterated the importance that the Commission, at the very least, maintains the landing limit of 355 t as set in paragraph 2 of Rec. 19-05.

8.3 Strategic Plan (proposal)

The SCRS Chair updated the Group on the drafting of the new SCRS Science Strategic Plan 2026-2031. The overall process has entailed starting with the previous Strategic Plan (2015-2020) as a basis, removing objectives that have been achieved or are not currently relevant and which no longer need to be included. New objectives that address current needs are being added, and new or modified strategies are being considered to address the various objectives. This process started at the SCRS Workshop in 2024 (Anon., 2024), was advanced further by the SCRS Officers before being made available at the 2024 SCRS Plenary meeting.

Following the plan agreed at the 2024 SCRS plenary, a group of SCRS scientists has been advancing the drafting of the SCRS Science Strategic Plan 2026-2031 online, editing shared documents. To form this drafting group, all SCRS Officers were invited to participate, and all heads of SCRS scientific delegations were given the opportunity to nominate participants in the process. The drafting is being completed this week in order to have a draft available for review at the Meeting of the Standing Working Group on Dialogue between Fisheries Scientists and Managers (SWGSM) and SCRS Science Strategic Plan Meeting in July 2025.

The SCRS Chair invited the Group to identify any objectives or strategies that should be included in the SCRS Science Strategic Plan, noting that the most effective venues to do so would be at the upcoming Meeting of the Standing Working Group on Dialogue between Fisheries Scientists and Managers and SCRS Science Strategic Plan Meeting.

9. EPBR update on ongoing activities and future planning

The Group was provided with updates on the most recent activities developed within the EPBR and discussed future activities of the programme.

9.1 Reproductive biology

The Group was informed that the national administrative authority of Mexico sent an official letter (RJL/IMIPAS/DIPA/331/2025) to notify the Secretariat that the Mexican research team involved in the Enhanced Programme for Billfish Research had committed to develop the study on the reproduction of blue marlin in the Gulf of Mexico, using internal financial resources from the Instituto Mexicano de Investigación en Pesca y Acuacultura Sustentable (IMIPAS). This response to the difficulties in signing a contract with the ICCAT Secretariat, aiming the development of the planned EPBR study, represents a national effort by Mexico to generate reliable technical information aiming the provision of advice by the SCRS.

It was highlighted that one of the strengths of the proposal is the inclusion of the collection of samples from recreational (sports) fishing boats. The research project document, including detailed plans were presented to the Group, and the first preliminary results are expected to be provided during the Billfish Species Group meeting scheduled for September 2025.

Finally, since funding is available for 2025, the Secretariat agreed to discuss with the study coordinator the acquisition of equipment necessary for the collection of pictures of the gonads.

9.2 Age and growth

Following an email from the leader of the consortium responsible for the age and growth study, the Chair and the Secretariat updated the Group on the ongoing activities. The Group was informed that, albeit the difficulties related to the collection of additional samples, about 20 new samples have been collected so far this year onboard EU-Portugal industrial longliners (including otoliths, spines and tissue for possible genetics studies) and that sampling on artisanal fisheries is also currently being carried out in Senegal, São Tomé e Príncipe and Côte d'Ivoire. The processing is also ongoing for some of the previous samples collected by EU-Portugal and Senegal.

The Group agreed that plans for 2026-2027 with regards to age and growth should include: the collection of additional samples of the various marlin species; continue processing previous and new samples; analyzing current available and new data; and continue the development of the age and growth models.

Age validation

The Group was also informed that the work on blue marlin age validation (using bomb-radiocarbon) has started already and that the first preliminary results will be presented in September 2025.

The Group highlighted the importance of this activity and acknowledged that the plan is to complete the age validation of blue marlin throughout 2026. In addition, the Group agreed that future plans should also include carrying out the age validation study for white marlin in 2026-2027, and extend this activity to sailfish in 2028-2029. The Group will discuss possibly extending this study to other species in the future.

9.3 Tagging activities

The Group was informed that within the course of an ICCAT e-tagging campaign targeting sharks carried out by Instituto Portugues do Mar e Atmosfera (IPMA, EU-Portugal), a large blue marlin was tagged with a miniPAT in the Gulf of Guinea. There are plans to conduct additional opportunistic e-tagging in marlins during other ongoing and planned ICCAT e-tagging campaigns targeting swordfish in the Gulf of Guinea, Northeast and Southwest Atlantic, as well as during another e-tagging campaign in the Southwest Atlantic. Finally, the Group was informed that a dedicated tagging campaign was scheduled for late summer/autumn 2025 off the southern Portuguese coast.

The Group discussed future plans for 2026-2027 with regards tagging billfishes, that should include e-tagging of the three main species (blue marlin, white marlin and sailfish). It was suggested to continue the dedicated marlin tagging campaign off southern Portugal, and to continue opportunistic tagging in other areas as much as possible taking advantage of other ICCAT e-tagging campaigns targeting other species (i.e. swordfish and sharks). This opportunistic billfish e-tagging should continue in the campaigns taking place in the eastern Atlantic and, if possible, be extended to the southwestern Atlantic. These activities will imply the acquisition of new miniPAT tags and related services of data transmission (satellite).

9.4 Other activities

The need to improve the identification between white and roundscale marlins was highlighted as the most effective way to improve the reporting of fisheries statistics for these species. Due to difficulties faced in the past implementing a genetics study to assess the proportion of each species on the catches, the Group agreed and recommended developing some capacity building initiatives among the national observer plans. Particularly, it was suggested gathering of ID materials (e.g. ID manual and videos) and dissemination among the relevant CPCs.

Finally, due to the importance of the EPBR programme and the need to support its continuation, aiming to draft a draft long-term budget (for the next two biennial cycles, 2026-2029), the Secretariat presented a review of the funding and execution of the EPBR over the period 2020-2024 and presented the current status for the year 2025. This was the basis for the discussion of the budget requested contained in section 8 of this report, which will be finalized during the Billfish Species Group meeting in September 2025.

10. Draft billfishes executive summaries

Following the adoption by the Commission in 2024 of new guidelines and of a template for the species executive summaries, the Billfish Species Group Rapporteur and meeting Chair prepared together with the Secretariat the draft executive summaries of blue marlin and sailfish.

The Group discussed and reviewed the content of these draft executive summaries. The discussions highlighted the importance of the SCRS maintaining up-to-date and standardized executive summaries for all species, in order to support more transparent and consistent scientific advice. The Group agreed on the content of the billfishes draft executive summaries, which will be presented and adopted during the Billfish Species Group meeting in September 2025, noting that in the meantime the Secretariat will update Table 1 and the current yield (for 2024) figure in the summary table.

11. Other matters

There were no other matters at this meeting.

12. Adoption of the report and closure

The report was adopted during the meeting. The Chair thanked all the participants for their efforts. The meeting was adjourned.

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Table 1. Task 1 nominal catches (C) in tons, including landings (L) and dead discards (DD) of the various billfish species by year, stock and catch type (C=catches, L =landings, LF= landings corresponding to faux poisons and DD=dead discards) for the 1950-2023 data series. Catch type "C" of historical years (before 1995) are mostly landings (L). Continuous efforts are being made to discriminate and merge those two catch types (C and L) eliminating the need of generic type "C". (BUM, blue marlin, SAI, sailfish, SPF, spearfish, WHM, white marlin, BLM, black marlin. MLS, striped marlin, RSP, roundscale spearfish, SSP, shortbill spearfish)

Year	BUM				SAI							SPF						WHM			BLM			MLS		MSP		RSP		SSP		
	A+M				ATE				ATW			ATE			ATW			A+M			A+M			A+M		A+M		A+M		A+M		
	C	L	LF	DD	C	L	LF	DD	C	L	DD	C	L	DD	C	L	DD	C	L	DD	C	L	DD	L	DD	L	DD	L	DD	C	L	DD
1950	0								0									0														
1951	0								0									0														
1952	0								0									0														
1953	0								0									0														
1954	0								0									0														
1955	0								0									0														
1956	0	39							0	1		0				0		0	19													
1957	0	764				71			0	24			19			4		0	160													
1958	0	772				32			0	66			7			13		0	161													
1959	0	841				4			0	5			8			11		0	112													
1960	103	2712				50			111	65			41			59		60	253													
1961	315	3768				173			329	21			131			36		138	692													
1962	244	7064				218			301	63			241			80		143	1921													
1963	244	8794				230			236	118			282			135		138	2476													
1964	251	7760				264			259	274		1	280		1	411		169	3566													
1965	217	5939			3	794			330	649		3	589		3	554		161	4745													
1966	209	3654			5	535			312	337		39	789		42	380		199	3314													
1967	287	1959			90	758			347	346		145	204		59	249		214	1213													
1968	300	2227			89	831			354	517		23	413		77	332		247	1802													
1969	289	2817			95	867			352	400		84	225		140	202		397	1875													
1970	292	2594			98	530			709	549		69	269		200	371		189	1958													
1971	392	3006			126	790			636	607		68	285		197	163		233	2033													
1972	441	1973			161	709			426	378		66	671		192	49		516	1773													
1973	400	2826			160	510			396	253		26	404		42	88		378	1490													
1974	526	2569			3156	417			448	305		22	224		36	85		264	1511													
1975	508	2763			4855	423			428	304		17	201		19	40		265	1496													
1976	508	1911			4721	677			554	298		57	396		19	127		291	1548													
1977	567	1614			937	520			701	199		17	320		20	12		499	651													
1978	568	1074			2033	496			680	99		5	267		4	12		415	560													
1979	582	945			2798	432			653	214		1	260		7	29		426	613													
1980	662	1186			1516	553			622	219		7	293		21	44		293	683													
1981	817	1253			1518	620			730	238		7	358		13	75		389	874													
1982	664	2044			2059	737			740	303		10	396		11	66		277	823													
1983	836	1306			2976	730			1115	71		1	350		18	28		560	1220		1											
1984	1047	1841			1918	527			884	267		10	259		28	42		439	774		6											
1985	985	2414		0	1823	446			788	216		9	277		39	49		393	1337		2											
1986	916	1184		0	1573	491			1090	162		0	292		58	65		485	1203		16											
1987	818	1321		138	2086	469			884	267	42	12	271		75	26		418	1133	62	0											
1988	753	1991		124	1641	469			810	275	57	4	291		11	226		538	875	60						0						
1989	1044	3089		191	1184	526			719	276	57	5	305		12	97		380	1436	107	26					0						
1990	684	3749		159	1611	704			881	292	62	4	413		10	55		405	1253	81	2					0						
1991	500	3554		142	1084	390			880	282	64	8	123		0	84		528	1125	90	5					1						
1992	625	2306		146	1329	447			1168	259	36	1	254		1	17		455	1015	88						0						
1993	816	2203		127	1353	472			1017	334	63	13	407		8	115		650	969	67	4					0						
1994	1136	2969		111	786	385			775	317	28	1	197		4	119		343	1816	43	34					0						
1995	1186	2847		153	856	375			977	208	29	6	201		4	22	6	405	1374	101	117					1						
1996	1678	3491		197	1096	784			852	222	69	3	125		13	24	1	464	1150	65	52	18				1						
1997	1398	4133		139	1069	278			900	300	57	2	192		4	4		414	1028	70	149	2				2						
1998	1766	3819		52	964	398			1031	557	27	9	183		1	76		495	1417	33	171	6				3						
1999	1987	3255		83	958	384			887	622	72	31	226		22	28		434	1295	58	142	5				3				0		
2000		5354		60		1980				1964	45		181			99			1499	41		49				5						
2001		4352		25		2805				1787	11		81			108			1060	18		53				28						
2002		3759		49		2347				2058	7		84			96			979	33		17				54						
2003	160	4141		19		2639			6	1491	5		54			79		8	821	17		54				105					2	
2004	8	3075		35		2612			22	1714	7		51		0	140		14	803	28		12				88		2				
2005	19	3469		25		2266			58	1783	4		68			105			760	18		16		9		50		3				
2006	117	2915		39		1916			18	1916	6		84			264			599	12		28		20		2		6				
2007	112	4113		43		2578			11	1546	8		66			104			712	36		24		22		5		2			0	
2008		3569		38		2232				1727	10		60			109			691	21		21		1		269		5			0	
2009		3070		61		2138				1619	10		78			64			730	26		440		59		392		4			7	
2010		2998		20		1858		0		1234	5		128	0		120			508	12		14		0		150		4			0	
2011		2749		56		1553		1		1383	10		73	0		80	0		528	27		45	0	7	0	92		0			0	
2012		2731		82		1596		5		1298	20		170	0		60	0		461	27		23	6	75		37		3			3	0
2013		2086		64		1342		0		975	12		95	0		353	0		644	12		4	7	8		45		8			5	0
2014		2712		61		1164		0		873	11		16	0		36	0		442	12		9	5	14		118		16			1	0
2015		1965		114		1241		6		998	7		18	0		60	2		508	11		2	0	26		20		12			44	1
2016		2084		69		1422		1		1437	7		14	0		61	0		449	11		2		14	0	11		22			40	3
2017		2640		109		1641		9		1463	7		29	0		321	1		451	14		4	0	19		10		36			50	3
2018		1849		150		935		9		1719	7		23	13		137	1		250	36		0	0	19	0	23		11			54	1
2019		1861		129		2241		29		1472	5		49	11		54	5		241	66		5		27	0	68		11			40	3
2020		2279		129		1199		19		1322	3		195	10		71	4		233	11		379	0	235	0	31		9	0		143	2
2021		2394		157		1728		4		910	2		178	5		289	2		163	9		296	0	120	0	26		9			89	2
2022		1643	31	121		1087	79	17		1074	3		133	1		146	2		213	8		0	0	11	7	126	1	7	0		17	1
2023		1795	12	133		1056	5	20		1253	4		137	2		518	3		156	17		1	0	13	0	13	0	11	0		24	2

Table 2. Live discards in tons of white marlin and other billfish species by stock for the 2000-2023 data series. (BUM, blue marlin, SAI, sailfish, SPF, spearfish, WHM, white marlin, BLM, black marlin. MLS, striped marlin, RSP, roundscale spearfish, SSP, shortbill spearfish)

Year	BUM	SAI		SPF		WHM	BLM	MLS	MSP	RSP	SSP
	A+M	ATE	ATW	ATE	ATW	A+M	A+M	A+M	A+M	A+M	A+M
2000						0.34					
2001						0.08					
2002						0.68					
2003						0.23					
2004	2					0.30					
2005						0.10					
2006	47		13			15					
2007	59		5			25					
2008	20		2			6					
2009	60		0.06			6					
2010	31		0.09			15					
2011	111		0.13			36					
2012	118		0.03			18					
2013	141		0.20			4	0.01				
2014	94		11			6					
2015	145	0.07	0.03		0.02	1	0.09				
2016	74		12		0.02	4			0.01		
2017	125		16		0.01	2	0.00				
2018	122		8		0.04	4	0.40	0.13			
2019	82	0.10	4		0.01	4					0.00
2020	50		4			2				0.04	
2021	37		2		0.17	4					
2022	48	0.02	2			3					
2023	77		2			5	0.02	0.32		0.03	

Table 3. SCRS Catalogue of Task 1 in tons and Task 2 (T2 availability) data for Atlantic white marlin (WHM), detailing the most important fisheries (representing 95% of catches) between 1994 and 2023. T2 availability is classified as: 'a' (T2CE only), 'b' (T2SZ only), 'ab' (both T2CE & T2SZ), and '-1' (no data).

Score 5.19

Species	Stock	Status	FlagName	GearGrp	DSet	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
				T1 Total		2,202	1,880	1,679	1,513	1,946	1,786	1,540	1,078	1,012	845	844	777	612	748	712
WHM	A+M	NCC	Chinese Taipei	LL	t1		907	566	441	506	465	437	152	178	104	172	56	44	54	38
WHM	A+M	NCC	Chinese Taipei	LL	t2	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab
WHM	A+M	CP	Venezuela	LL	t1	206	271	258	168	297	210	166	176	198	158	116	143	169	103	47
WHM	A+M	CP	Venezuela	LL	t2	ab	ab	ab	ab	ab	ab	ab	b	b	ab	ab	ab	ab	ab	ab
WHM	A+M	CP	Brazil	LL	t1	91	101	70	105	102	158	108	172	342	266	80	243	87	63	41
WHM	A+M	CP	Brazil	LL	t2	a	a	a	a	a	ab	ab	ab	ab	a	a	ab	ab	ab	ab
WHM	A+M	NCO	NEI (ETRO)	LL	t1	214	237	285	359	526	498	322	180	11	9					
WHM	A+M	NCO	NEI (ETRO)	LL	t2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1					
WHM	A+M	CP	EU-España	LL	t1	7	36	141	93	101	119	186	61	6	22	64	58	51	46	32
WHM	A+M	CP	EU-España	LL	t2	ab	b	b	ab	b	b	b	b	b	b	b	b	b	b	b
WHM	A+M	CP	Japan	LL	t1	92	57	112	58	56	40	83	56	16	33	36	34	39	21	34
WHM	A+M	CP	Japan	LL	t2	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab
WHM	A+M	NCO	NEI (BIL)	LL	t1	1	1					34	78	4	30	134	42	38	180	214
WHM	A+M	NCO	NEI (BIL)	LL	t2	-1	-1					-1	-1	-1	-1	-1	-1	-1	-1	-1
WHM	A+M	CP	S Tomé e Príncipe	TR	t1	21	21	30	45	40	36	37	37	37	37	21	33	29	35	36
WHM	A+M	CP	S Tomé e Príncipe	TR	t2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
WHM	A+M	CP	Korea Rep	LL	t1	43	23	59	23	35	39	0			11	40	7		113	96
WHM	A+M	CP	Korea Rep	LL	t2	a	a	a	a	-1	-1	-1			-1	a	a		-1	a
WHM	A+M	CP	USA	LL	t1	44	100	65	70	32	57	41	17	29	17	27	17	9	8	9
WHM	A+M	CP	USA	LL	t2	a	a	a	a	a	ab	a	ab	abc	ab	ab	ab	ab	ab	ab
WHM	A+M	CP	Barbados	LL	t1	26	43	15	41	33	25	25	24	15	15	18	16	33	22	24
WHM	A+M	CP	Barbados	LL	t2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
WHM	A+M	CP	Trinidad and Tobago	LL	t1	11	18	8	32	10	13	4	2	5	12	6	6	5	12	10
WHM	A+M	CP	Trinidad and Tobago	LL	t2	-1	-1	-1	-1	-1	-1	-1	-1	-1	a	a	a	a	a	a
WHM	A+M	CP	Mexico	LL	t1	7	11	3	1	3	6	11	13	16	15	28	25	16	14	14
WHM	A+M	CP	Mexico	LL	t2	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab
WHM	A+M	CP	Venezuela	GN	t1	12	5	2	3	13	18	12	7	17	10	19	13	21	28	16
WHM	A+M	CP	Venezuela	GN	t2	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab
WHM	A+M	CP	Grenada	LL	t1							1	15	8	14	33	10	12	11	17
WHM	A+M	CP	Grenada	LL	t2							-1	-1	-1	-1	a	a	a	a	a
WHM	A+M	CP	EU-Portugal	LL	t1					1	1			1	5	19	39	22	2	35
WHM	A+M	CP	EU-Portugal	LL	t2					-1	-1			-1	a	a	a	a	a	ab
WHM	A+M	NCO	Mixed flags (FR+ES)	PS	t1	11	9	7	7	9	8	12	13	12	13	13	11	10	9	10
WHM	A+M	NCO	Mixed flags (FR+ES)	PS	t2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
WHM	A+M	CP	China PR	LL	t1	9	11	9	11	15	30	2	20	23	8	6	9	6	10	5
WHM	A+M	CP	China PR	LL	t2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

FlagName	DSet	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Rank	%	%cum
T1 Total		755	520	555	488	656	455	518	460	465	286	307	244	172	221	173			
Chinese Taipei	t1	28	20	28	17	7	7	12	12	7	7	5	5	5	2	1	1	22.13	22.13
Chinese Taipei	t2	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	a	ab	1		
Venezuela	t1	109	108	154	106	63	74	104	158	150	94	106	36	32	43	59	2	16.04	38.17
Venezuela	t2	ab	ab	ab	ab	a	ab	ab	ab	ab	ab	a	a	a	a	a	2		
Brazil	t1	32	30	79	72	241	98	121	67	47	62	76	46	0	41	13	3	12.00	50.17
Brazil	t2	ab	ab	ab	ab	a	a	a	a	a	a	ab	a	-1	a	a	3		
NEI (ETRO)	t1																4	10.38	60.55
NEI (ETRO)	t2																4		
EU-España	t1	17	111	5	34	37	93	113	89	108	2	2	37	48	42	4	5	6.93	67.48
EU-España	t2	b	b	b	b	b	b	b	-1	b	b	-1	-1	b	a	a	5		
Japan	t1	43	41	31	42	24	6	8	9	10	8	12	8	8	3	10	6	4.04	71.52
Japan	t2	ab	ab	ab	ab	ab	a	ab	a	a	a	a	a	a	a	a	6		
NEI (BIL)	t1	210	2	13	2	1	0	0	4	6	3	4	3	2	3	3	7	3.98	75.50
NEI (BIL)	t2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	7		
S Tomé e Príncipe	t1	37	38	39	40	41	42	17	15	13	1	10	11	20	27	27	8	3.43	78.93
S Tomé e Príncipe	t2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	8		
Korea Rep	t1	78	45	45			0	0	0	0	0	0	1	0	0	0	9	2.59	81.52
Korea Rep	t2	a	-1	-1			ab	-1	-1	b	-1	a	-1	-1	-1	-1	9		
USA	t1	13	8	23	20	10	11	8	3	5	2	2	1	1	1	1	10	2.55	84.07
USA	t2	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	10		
Barbados	t1	26	3	2	4	5	5	10	12	14	15	10	14	9	9	7	11	2.05	86.12
Barbados	t2	-1	-1	a	a	a	a	ab	ab	ab	a	a	a	a	a	a	11		
Trinidad and Tobago	t1	11	15	14	39	33	38	32	20	30	27	26	28	0	18	0	12	1.91	88.03
Trinidad and Tobago	t2	a	a	a	a	a	a	a	a	-1	-1	-1	-1	a	-1	a	12		
Mexico	t1	19	20	28	36	31	20	26	20	12	16	9	10	12	8	8	13	1.81	89.83
Mexico	t2	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	13		
Venezuela	t1	19	8	6	15	12	18	15	10	9	8	11	8	10	10	9	14	1.43	91.27
Venezuela	t2	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	a	14		
Grenada	t1	14	14	15	14	14	14	37	15	9	11	19	14	1	5	13	15	1.29	92.56
Grenada	t2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	15		
EU-Portugal	t1	40	11	18	25	12	9	7	12	14	2	2	2	11	2	5	16	1.17	93.73
EU-Portugal	t2	ab	ab	ab	ab	ab	ab	ab	ab	ab	b	b	a	ab	a	a	16		
Mixed flags (FR+ES)	t1	12	12	37													17	0.84	94.57
Mixed flags (FR+ES)	t2	-1	-1	-1													17		
China PR	t1	9	8	3	4	2		0	0	3	2	3	2	2	2	2	18	0.84	95.40
China PR	t2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	18		

Table 4. SCRS Catalogue of Task 1 in tons and Task 2 (T2 availability) data for roundscale spearfish (RSP), detailing all fisheries between 1994 and 2023. T2 availability is classified as: 'a' (T2CE only), 'b' (T2SZ only), 'ab' (both T2CE & T2SZ), and '-1' (no data).

Score 0.00

Species	Stock	Status	FlagName	GearGrp	DSet	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
				T1 Total		0	0	0	0	0	0	0	0	0	0	2	3	6	2	5
RSP	A+M	CP	EU-España	LL	t1															4
RSP	A+M	CP	EU-España	LL	t2															-1
RSP	A+M	CP	Venezuela	LL	t1											2	3	6	2	2
RSP	A+M	CP	Venezuela	LL	t2											-1	-1	-1	-1	-1
RSP	A+M	CP	USA	RR	t1															
RSP	A+M	CP	USA	RR	t2															
RSP	A+M	CP	South Africa	LL	t1															
RSP	A+M	CP	South Africa	LL	t2															
RSP	A+M	CP	UK-Bermuda	LL	t1															
RSP	A+M	CP	UK-Bermuda	LL	t2															
RSP	A+M	NCC	Chinese Taipei	LL	t1															
RSP	A+M	NCC	Chinese Taipei	LL	t2															

FlagName	DSet	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Rank	%	%cum
T1 Total		4	4	0	3	8	16	12	22	36	11	11	9	9	7	11			
EU-España	t1		1		1	5	5	11	7	8	9	10	7	8	6	11	1	51.00	51.00
EU-España	t2		-1		-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	1		
Venezuela	t1	2	2		2	3	11		16	28	2	2	0	0	1	0	2	44.67	95.68
Venezuela	t2	-1	-1		-1	-1	-1		-1	-1	-1	-1	-1	-1	-1	-1	2		
USA	t1		0		0	0	0	0	0	0	1	0	2	1	1	0	3	2.92	98.60
USA	t2		-1		-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	3		
South Africa	t1	2															4	1.35	99.95
South Africa	t2	-1															4		
UK-Bermuda	t1												0		0	0	5	0.03	99.98
UK-Bermuda	t2												-1		-1	-1	5		
Chinese Taipei	t1															0	6	0.02	100.00
Chinese Taipei	t2															-1	6		

Table 5. Total removals (catch + dead discards + post-release mortality associated with live discards) of white marlin and roundscale spearfish by fleet structure ID (LL =longline, PS = purse seine, GN = gillnet, and RR = rod & reel, sport and other gears) used as input for the Stock Synthesis model platform 2025 assessment.

Year	LL	PS	GN	RR	Total
1950	-	-	-	-	-
1951	-	-	-	-	-
1952	-	-	-	-	-
1953	-	-	-	-	-
1954	-	-	-	-	-
1955	-	-	-	-	-
1956	19.0	-	-	-	19.0
1957	160.0	-	-	-	160.0
1958	161.0	-	-	-	161.0
1959	112.0	-	-	-	112.0
1960	253.0	-	-	60.0	313.0
1961	763.0	-	-	67.0	830.0
1962	1985.0	-	-	79.0	2064.0
1963	2548.0	-	-	66.0	2614.0
1964	3661.0	-	-	74.0	3735.0
1965	4827.0	-	-	79.0	4906.0
1966	3425.0	1.0	-	87.0	3513.0
1967	1335.0	1.0	-	91.0	1427.0
1968	1949.0	2.0	-	98.0	2049.0
1969	2171.0	3.0	-	98.0	2272.0
1970	2027.0	4.0	-	116.0	2147.0
1971	2153.0	6.0	-	107.0	2266.0
1972	2171.0	9.0	-	109.0	2289.0
1973	1750.0	9.0	-	109.0	1868.0
1974	1645.0	15.0	-	115.0	1775.0
1975	1634.0	16.0	-	111.0	1761.0
1976	1680.0	20.0	25.0	114.0	1839.0
1977	1011.0	25.0	3.0	111.3	1150.3
1978	837.0	25.0	2.0	111.2	975.2
1979	900.1	23.0	5.0	111.0	1039.1
1980	822.0	27.0	15.4	112.0	976.4
1981	1011.0	31.0	149.7	71.9	1263.6
1982	990.0	32.0	32.8	45.4	1100.2
1983	1512.5	31.0	157.8	78.5	1779.8
1984	1053.6	22.0	72.4	65.5	1213.4
1985	1618.6	23.0	44.6	43.7	1729.9
1986	1547.9	25.0	83.4	32.2	1688.6
1987	1487.5	25.0	63.4	37.6	1613.5
1988	1282.0	25.0	136.4	29.0	1472.3
1989	1794.8	27.0	84.6	16.6	1922.9
1990	1626.5	37.0	50.7	24.5	1738.8
1991	1665.4	11.0	47.7	19.1	1743.2
1992	1477.2	10.0	48.7	21.5	1557.4
1993	1594.9	12.0	49.8	29.7	1686.4
1994	2107.4	11.0	53.4	30.1	2201.9
1995	1821.3	9.0	27.5	22.0	1879.8
1996	1599.5	7.0	48.9	24.0	1679.3
1997	1437.3	7.0	54.6	14.0	1512.9
1998	1748.9	9.0	181.5	6.2	1945.6
1999	1695.4	8.0	76.8	6.2	1786.4
2000	1449.1	12.0	77.8	1.7	1540.6
2001	987.7	14.0	73.0	3.5	1078.2
2002	863.7	11.5	130.8	6.2	1012.2
2003	773.2	13.1	58.5	0.8	845.5
2004	786.4	12.7	46.3	1.3	846.7
2005	717.9	10.6	50.1	1.4	780.0
2006	554.0	10.2	54.9	2.1	621.2
2007	672.8	9.0	73.2	1.3	756.2
2008	630.6	9.9	75.8	2.0	718.4
2009	660.4	12.2	86.5	2.0	761.1
2010	452.2	11.8	60.9	2.8	527.8
2011	469.5	37.0	54.7	2.6	563.8
2012	424.6	0.1	69.2	1.4	495.2
2013	492.8	0.0	168.6	3.9	665.4
2014	401.6	0.2	65.2	2.2	469.2
2015	492.0	0.2	35.3	3.1	530.5
2016	449.4	0.4	31.7	1.6	483.2
2017	457.5	6.5	35.8	2.2	501.9
2018	267.3	0.9	26.4	3.6	298.2
2019	288.7	0.3	28.3	2.1	319.4
2020	215.0	1.6	30.9	6.3	253.8
2021	146.1	0.2	31.9	4.1	182.2
2022	188.2	0.4	38.3	2.2	229.1
2023	141.2	0.4	43.5	1.4	186.4

Table 6. The parameters used in ASEM approach to derive the prior for r in the JABBA models for the Atlantic white marlin stock.

Parameters	**Values**
Natural mortality (M)	0.2 (CV = 30%)
Length-at-50% maturity	Females: 145.04 cm LJFL, Males: 140.03 cm LJFL (Pinheiro *et al.*, 2021)
Growth	Females: Linf = 172.0 cm LJFL and k= 0.32, Males: Linf= 160.6 cm LJFL and k = 0.54, and $t_0 = -1$ (Drew *et al.*,2010)
Maximum age	20 years (Winker *et al.*, 2020)
Steepness (h)	0.6, consistent with the 2019 stock Assessment

Table 7. Mohn's rho for JABBA Group0_no_CTP_LL2.

	B	F	B_{MSY}	F_{MSY}	procB	MSY
2023	0.007	-0.007	0.011	-0.021	0.018	0.024
2022	0.043	-0.042	0.067	-0.068	0.037	-0.012
2021	0.009	-0.009	0.060	-0.060	0.059	-0.004
2020	0.082	-0.075	-0.082	-0.039	0.155	0.115
2019	0.037	-0.036	0.010	-0.070	0.059	0.046
rho.mu	0.036	-0.034	0.013	-0.052	0.065	0.034

Table 8. Derived quantity values and standard deviations for the 4 preliminary Stock Synthesis models.

	Model_6.1		Model_6.2		Model_7.1		Model_7.2	
Quantity	Value	Std. Dev	Value	Std. Dev	Value	Std. Dev	Value	Std. Dev
F_2023 (end)	0.543	0.174	0.171	0.079	0.468	0.148	0.163	0.059
Bratio_2024 (begin)	0.286	0.097	0.907	0.402	0.413	0.153	1.190	0.426
SSB_unfished	7,631	496	7,269	414	7,707	541	7,252	419
Totbio_unfished	18,310	1190	17,442	994	18,495	1,298	17,401	1,006
SmryBio_unfished	18,281	1188	17,415	993	18,465	1,296	17,373	1,004
Recr_unfished	210	14	200	11	212	15	199	12
SSB_MSY	2,079	282	1,861	233	2,095	299	1,816	229
SPR_MSY	0.379	0.036	0.348	0.031	0.377	0.037	0.338	0.031
annF_MSY	0.248	0.036	0.279	0.036	0.249	0.037	0.290	0.037
Dead_Catch_MSY	1,465	45	1,503	39	1,481	44	1,533	36
Ret_Catch_MSY	1,465	45	1,503	39	1,481	44	1,533	36
B_MSY/SSB_unfished	0.272	0.019	0.256	0.018	0.272	0.020	0.250	0.017

Table 9. Estimated parameters in the Stock Synthesis models (Models 6.1, 6.2, 7.1, and 7.2).

	Model_6.1						Model_6.2					
Parameter							Value	Status	Parm_StDev	Pr_type	Prior	Pr_SD
Catch_Mult:_2_LongLine_2_BLK2repl_1!	1.000	N/A	N/A	N/A	N/A	N/A	1.000	N/A	N/A	N/A	N/A	N/A
SR_LN(R0)	5.345	OK	6.50E-02	Normal	5	99	5.297	OK	5.70E-02	Normal	5	99
SR_BH_steep	0.630	OK	4.32E-02	Normal	0.6	0.05	0.668	OK	3.87E-02	Normal	0.6	0.05
LnQ_base_Japan_LL_prior(5)	-5.528	OK	2.62E-01	No_prior	NA	NA	-5.396	OK	2.59E-01	No_prior	NA	NA
Q_extraSD_Japan_LL_prior(5)	0.488	OK	1.32E-01	No_prior	NA	NA	0.509	OK	1.36E-01	No_prior	NA	NA
LnQ_base_Japan_LL_early(6)	-4.465	OK	2.96E-01	No_prior	NA	NA	-4.273	OK	3.00E-01	No_prior	NA	NA
Q_extraSD_Japan_LL_early(6)	0.053	OK	7.45E-02	No_prior	NA	NA	0.052	OK	7.59E-02	No_prior	NA	NA
LnQ_base_Japan_LL_mid(7)	-3.742	OK	2.83E-01	No_prior	NA	NA	-2.266	OK	1.24E+05	No_prior	NA	NA
Q_extraSD_Japan_LL_mid(7)	0.141	OK	7.29E-02	No_prior	NA	NA	0.500	OK	1.84E+03	No_prior	NA	NA
LnQ_base_Japan_LL_late(8)	-3.221	OK	4.64E-01	No_prior	NA	NA	-2.048	OK	1.24E+05	No_prior	NA	NA
Q_extraSD_Japan_LL_late(8)	0.414	OK	1.85E-01	No_prior	NA	NA	0.500	OK	1.84E+03	No_prior	NA	NA
LnQ_base_Ven_LL(9)	-2.014	OK	1.24E+05	No_prior	NA	NA	-3.913	OK	3.71E-01	No_prior	NA	NA
Q_extraSD_Ven_LL(9)	0.486	OK	1.84E+03	No_prior	NA	NA	0.453	OK	1.66E-01	No_prior	NA	NA
LnQ_base_Ven_GN(10)	-2.773	OK	1.23E+05	No_prior	NA	NA	-5.432	OK	3.77E-01	No_prior	NA	NA
Q_extraSD_Ven_GN(10)	0.511	OK	1.84E+03	No_prior	NA	NA	0.341	OK	1.19E-01	No_prior	NA	NA
LnQ_base_US_LL(11)	-3.457	OK	3.12E-01	No_prior	NA	NA	-2.121	OK	1.24E+05	No_prior	NA	NA
Q_extraSD_US_LL(11)	0.179	OK	7.08E-02	No_prior	NA	NA	0.499	OK	1.84E+03	No_prior	NA	NA
LnQ_base_Chin_Tai_LL_early(14)	-10.201	OK	2.93E-01	No_prior	NA	NA	-10.039	OK	2.85E-01	No_prior	NA	NA
Q_extraSD_Chin_Tai_LL_early(14)	0.407	OK	9.92E-02	No_prior	NA	NA	0.362	OK	9.47E-02	No_prior	NA	NA
LnQ_base_Chin_Tai_LL_late(15)	-3.840	OK	1.22E+05	No_prior	NA	NA	-4.622	OK	1.21E+05	No_prior	NA	NA
Q_extraSD_Chin_Tai_LL_late(15)	0.491	OK	1.84E+03	No_prior	NA	NA	0.500	OK	1.84E+03	No_prior	NA	NA
LnQ_base_Mex_LL(16)	-7.400	OK	3.31E-01	No_prior	NA	NA	-4.749	OK	1.20E+05	No_prior	NA	NA
Q_extraSD_Mex_LL(16)	0.401	OK	1.00E-01	No_prior	NA	NA	0.500	OK	1.84E+03	No_prior	NA	NA
LnQ_base_Brazil_LL(18)	-6.232	OK	2.88E-01	No_prior	NA	NA	-6.123	OK	2.84E-01	No_prior	NA	NA
Q_extraSD_Brazil_LL(18)	0.311	OK	8.30E-02	No_prior	NA	NA	0.289	OK	8.01E-02	No_prior	NA	NA
Size_DblN_peak_Gill_Net_1(1)	164.642	OK	1.82E+00	Normal	164.3	99	164.707	OK	1.80E+00	Normal	164.30	99
Size_DblN_top_logit_Gill_Net_1(1)	-9.522	OK	7.11E+01	Normal	-10	99	-9.450	OK	7.30E+01	Normal	-10.00	99
Size_DblN_ascend_se_Gill_Net_1(1)	5.326	OK	1.83E-01	Normal	4.97	99	5.326	OK	1.80E-01	Normal	4.97	99
Size_DblN_descend_se_Gill_Net_1(1)	5.484	OK	4.52E-01	Normal	5.13	99	5.482	OK	4.50E-01	Normal	5.13	99
Size_DblN_end_logit_Gill_Net_1(1)	-2.037	OK	7.30E-01	Normal	-2	99	-2.031	OK	7.22E-01	Normal	-2.00	99
Size_DblN_peak_LongLine_2(2)	170.397	OK	2.29E+00	Normal	170	15	170.756	OK	2.35E+00	Normal	170.00	15
Size_DblN_ascend_se_LongLine_2(2)	6.977	OK	9.06E-02	Normal	7	99	6.973	OK	9.20E-02	Normal	7.00	99
Size_DblN_peak_Sport_4(4)	164.712	OK	1.86E+00	Normal	160.3	99	165.164	OK	1.83E+00	Normal	160.30	99
Size_DblN_ascend_se_Sport_4(4)	5.530	OK	1.72E-01	Normal	5.7	99	5.536	OK	1.64E-01	Normal	5.70	99

	Model_7.1						Model_7.2					
Parameter	Value	Status	Parm_StDev	Pr_type	Prior	Pr_SD	Value	Status	Parm_StDe	Pr_type	Prior	Pr_SD
Catch_Mult:_2_LongLine_2_BLK2repl_1!	0.741	OK	1.08E-01	Normal	1	99	0.716	OK	9.15E-02	Normal	1	99
SR_LN(R0)	5.355	OK	7.02E-02	Normal	5	99	5.294	OK	5.78E-02	Normal	5	99
SR_BH_steep	0.633	OK	4.45E-02	Normal	0.6	0.05	0.682	OK	3.82E-02	Normal	0.6	0.05
LnQ_base_Japan_LL_prior(5)	-5.578	OK	2.71E-01	No_prior	NA	NA	-5.422	OK	2.62E-01	No_prior	NA	NA
Q_extraSD_Japan_LL_prior(5)	0.486	OK	1.31E-01	No_prior	NA	NA	0.510	OK	1.36E-01	No_prior	NA	NA
LnQ_base_Japan_LL_early(6)	-4.600	OK	3.21E-01	No_prior	NA	NA	-4.398	OK	3.09E-01	No_prior	NA	NA
Q_extraSD_Japan_LL_early(6)	0.056	OK	7.46E-02	No_prior	NA	NA	0.054	OK	7.59E-02	No_prior	NA	NA
LnQ_base_Japan_LL_mid(7)	-4.082	OK	3.52E-01	No_prior	NA	NA	-2.413	OK	1.24E+05	No_prior	NA	NA
Q_extraSD_Japan_LL_mid(7)	0.150	OK	7.43E-02	No_prior	NA	NA	0.499	OK	1.84E+03	No_prior	NA	NA
LnQ_base_Japan_LL_late(8)	-3.646	OK	5.35E-01	No_prior	NA	NA	-2.181	OK	1.24E+05	No_prior	NA	NA
Q_extraSD_Japan_LL_late(8)	0.414	OK	1.82E-01	No_prior	NA	NA	0.499	OK	1.84E+03	No_prior	NA	NA
LnQ_base_Ven_LL(9)	-2.050	OK	1.24E+05	No_prior	NA	NA	-4.275	OK	3.87E-01	No_prior	NA	NA
Q_extraSD_Ven_LL(9)	0.482	OK	1.84E+03	No_prior	NA	NA	0.390	OK	1.52E-01	No_prior	NA	NA
LnQ_base_Ven_GN(10)	-2.823	OK	1.23E+05	No_prior	NA	NA	-5.792	OK	3.78E-01	No_prior	NA	NA
Q_extraSD_Ven_GN(10)	0.515	OK	1.84E+03	No_prior	NA	NA	0.301	OK	1.14E-01	No_prior	NA	NA
LnQ_base_US_LL(11)	-3.822	OK	3.84E-01	No_prior	NA	NA	-2.259	OK	1.24E+05	No_prior	NA	NA
Q_extraSD_US_LL(11)	0.153	OK	6.84E-02	No_prior	NA	NA	0.498	OK	1.84E+03	No_prior	NA	NA
LnQ_base_Chin_Tai_LL_early(14)	-10.338	OK	3.17E-01	No_prior	NA	NA	-10.159	OK	2.95E-01	No_prior	NA	NA
Q_extraSD_Chin_Tai_LL_early(14)	0.396	OK	9.67E-02	No_prior	NA	NA	0.364	OK	9.35E-02	No_prior	NA	NA
LnQ_base_Chin_Tai_LL_late(15)	-3.909	OK	1.22E+05	No_prior	NA	NA	-4.922	OK	1.20E+05	No_prior	NA	NA
Q_extraSD_Chin_Tai_LL_late(15)	0.488	OK	1.84E+03	No_prior	NA	NA	0.500	OK	1.84E+03	No_prior	NA	NA
LnQ_base_Mex_LL(16)	-7.770	OK	4.01E-01	No_prior	NA	NA	-5.057	OK	1.20E+05	No_prior	NA	NA
Q_extraSD_Mex_LL(16)	0.372	OK	9.79E-02	No_prior	NA	NA	0.499	OK	1.84E+03	No_prior	NA	NA
LnQ_base_Brazil_LL(18)	-6.477	OK	3.30E-01	No_prior	NA	NA	-6.375	OK	3.03E-01	No_prior	NA	NA
Q_extraSD_Brazil_LL(18)	0.281	OK	7.83E-02	No_prior	NA	NA	0.267	OK	7.58E-02	No_prior	NA	NA
Size_DblN_peak_Gill_Net_1(1)	164.481	OK	1.81E+00	Normal	164.30	99	164.545	OK	1.79E+00	Normal	164.30	99
Size_DblN_top_logit_Gill_Net_1(1)	-9.705	OK	6.66E+01	Normal	-10.00	99	-9.658	OK	6.76E+01	Normal	-10.00	99
Size_DblN_ascend_se_Gill_Net_1(1)	5.322	OK	1.84E-01	Normal	4.97	99	5.323	OK	1.81E-01	Normal	4.97	99
Size_DblN_descend_se_Gill_Net_1(1)	5.487	OK	4.42E-01	Normal	5.13	99	5.485	OK	4.39E-01	Normal	5.13	99
Size_DblN_end_logit_Gill_Net_1(1)	-2.066	OK	7.27E-01	Normal	-2.00	99	-2.061	OK	7.18E-01	Normal	-2.00	99
Size_DblN_peak_LongLine_2(2)	169.892	OK	2.32E+00	Normal	170.00	15	170.288	OK	2.33E+00	Normal	170.00	15
Size_DblN_ascend_se_LongLine_2(2)	6.982	OK	9.18E-02	Normal	7.00	99	6.978	OK	9.29E-02	Normal	7.00	99
Size_DblN_peak_Sport_4(4)	164.483	OK	1.86E+00	Normal	160.30	99	164.962	OK	1.83E+00	Normal	160.30	99
Size_DblN_ascend_se_Sport_4(4)	5.527	OK	1.72E-01	Normal	5.70	99	5.533	OK	1.65E-01	Normal	5.70	99

Table 10. Summary of benchmark estimates (posterior quantiles presented in the form of marginal posterior medians and associated 95% credibility intervals) for the Bayesian state-space surplus production (JABBA) model for Atlantic white marlin. Biomass values correspond to the end of the year estimates.

	Group 0_no_CTP_LL2				
Estimates	**Median**	**95%LCI**	**95%UCI**	**80%LCI**	**80%UCI**
K	22315	16228	31027	18099	27820
r	0.2	0.151	0.264	0.166	0.24
F_{MSY}	0.168	0.127	0.222	0.14	0.202
B_{MSY}	8926	6491	12410	7239	11128
MSY	1497	1160	1937	1267	1765
B_{1956}/K	0.834	0.517	1.233	0.611	1.099
B_{2023}/K	0.32	0.158	0.644	0.201	0.508
B_{2023}/B_{MSY}	0.8	0.394	1.611	0.503	1.27
F_{2023}/F_{MSY}	0.191	0.089	0.348	0.118	0.289

Table 11. Biomass relative to B_{MSY} (B/B_{MSY}) at the end of the years and fishing mortality relative to F_{MSY} (F/F_{MSY}) with 95% credibility intervals (CI) for the final base case model (JABBA Group 0_no_CTP_LL2) for the Atlantic white marlin.

	B/B_{MSY}			F/F_{MSY}		
Year	Median	95%LCI	95%UCI	Median	95%LCI	95%UCI
1956	2.086	1.293	3.083	0.006	0.004	0.009
1957	1.900	1.100	2.977	0.051	0.032	0.086
1958	1.707	0.977	2.778	0.057	0.034	0.101
1959	1.599	0.885	2.667	0.044	0.026	0.078
1960	1.889	1.158	2.929	0.132	0.075	0.238
1961	2.320	1.528	3.200	0.294	0.180	0.489
1962	2.609	1.753	3.308	0.600	0.397	0.931
1963	2.747	1.877	3.349	0.677	0.473	1.037
1964	2.734	1.820	3.339	0.921	0.655	1.379
1965	2.416	1.523	3.248	1.217	0.859	1.871
1966	2.170	1.337	3.129	0.981	0.653	1.615
1967	2.147	1.350	3.102	0.442	0.280	0.747
1968	1.955	1.225	2.934	0.642	0.410	1.041
1969	1.718	1.079	2.675	0.784	0.488	1.256
1970	1.511	0.954	2.412	0.840	0.509	1.349
1971	1.287	0.810	2.106	1.010	0.597	1.600
1972	1.095	0.680	1.871	1.196	0.689	1.908
1973	0.963	0.596	1.639	1.145	0.640	1.850
1974	0.821	0.514	1.429	1.239	0.693	1.992
1975	0.691	0.430	1.220	1.441	0.785	2.287
1976	0.597	0.350	1.115	1.787	0.971	2.827
1977	0.708	0.410	1.307	1.292	0.661	2.186
1978	0.775	0.450	1.448	0.927	0.476	1.577
1979	0.830	0.484	1.546	0.902	0.459	1.530
1980	0.875	0.513	1.605	0.794	0.398	1.339
1981	0.721	0.429	1.324	0.978	0.502	1.626
1982	0.650	0.400	1.164	1.030	0.528	1.673
1983	0.583	0.355	1.062	1.856	0.972	2.879
1984	0.606	0.376	1.065	1.410	0.731	2.218
1985	0.689	0.425	1.226	1.936	1.038	2.961
1986	0.706	0.433	1.252	1.657	0.883	2.586
1987	0.698	0.418	1.263	1.553	0.815	2.423
1988	0.655	0.401	1.160	1.425	0.737	2.265
1989	0.658	0.402	1.164	1.984	1.046	3.075
1990	0.704	0.430	1.238	1.794	0.942	2.786
1991	0.692	0.422	1.245	1.679	0.888	2.626
1992	0.828	0.492	1.467	1.531	0.790	2.399
1993	0.887	0.524	1.611	1.385	0.712	2.236
1994	0.827	0.478	1.515	1.690	0.848	2.734
1995	0.712	0.414	1.301	1.543	0.768	2.543
1996	0.726	0.418	1.344	1.607	0.808	2.614
1997	0.764	0.446	1.399	1.414	0.696	2.337
1998	0.780	0.451	1.454	1.731	0.862	2.838
1999	0.763	0.430	1.445	1.558	0.756	2.580
2000	0.667	0.371	1.288	1.377	0.662	2.337
2001	0.667	0.365	1.306	1.097	0.517	1.901
2002	0.681	0.370	1.336	1.035	0.473	1.815
2003	0.792	0.429	1.543	0.846	0.389	1.490
2004	0.811	0.439	1.612	0.728	0.337	1.296
2005	0.736	0.398	1.436	0.655	0.299	1.172
2006	0.705	0.385	1.372	0.576	0.265	1.030
2007	0.716	0.391	1.395	0.729	0.336	1.285
2008	0.751	0.407	1.457	0.683	0.317	1.202
2009	0.820	0.442	1.596	0.687	0.320	1.221
2010	0.961	0.515	1.871	0.436	0.200	0.783
2011	1.094	0.583	2.163	0.397	0.188	0.725
2012	1.049	0.562	2.029	0.306	0.141	0.557
2013	1.028	0.558	1.989	0.431	0.201	0.773
2014	0.986	0.534	1.896	0.310	0.144	0.550
2015	0.910	0.495	1.752	0.366	0.171	0.648
2016	0.785	0.429	1.526	0.361	0.168	0.634
2017	0.708	0.384	1.402	0.435	0.202	0.765
2018	0.687	0.374	1.367	0.286	0.131	0.509
2019	0.561	0.303	1.127	0.316	0.144	0.560
2020	0.542	0.290	1.077	0.308	0.139	0.551
2021	0.581	0.313	1.132	0.229	0.104	0.415
2022	0.665	0.354	1.287	0.269	0.124	0.483
2023	0.800	0.394	1.611	0.191	0.089	0.348

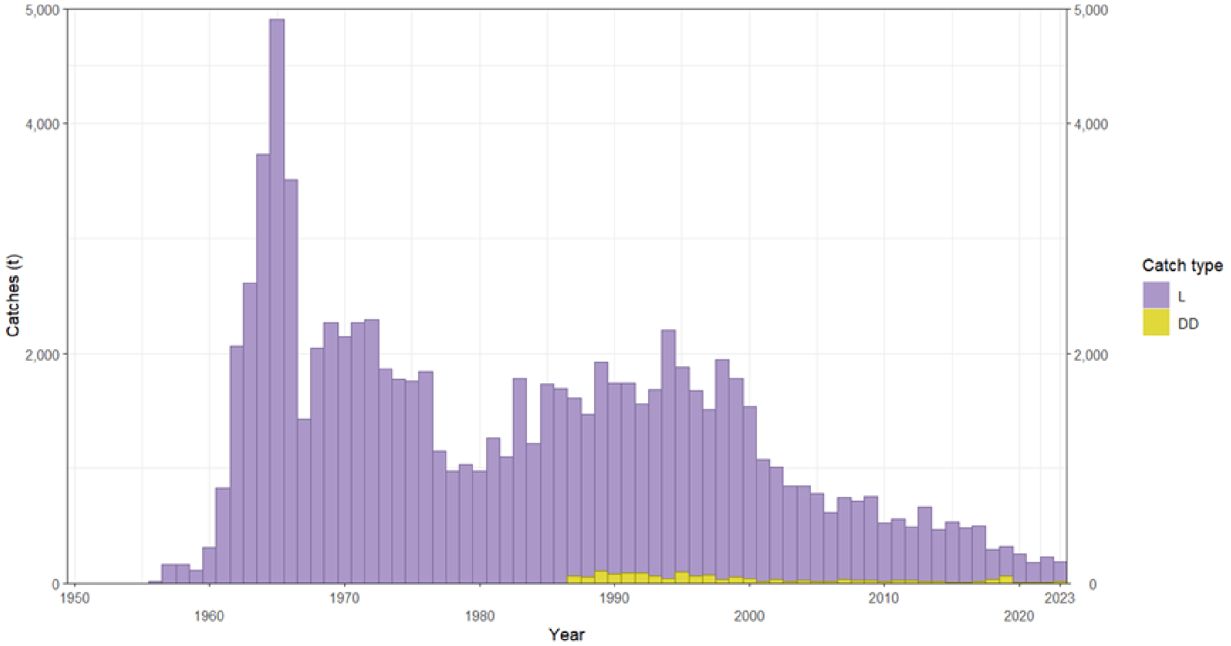


Figure 1. Task 1 Nominal catches (tons) of Atlantic white marlin (WHM) and roundscale spearfish (RSP) by catch type, 1950-2023 (L =landings and DD=dead discards).

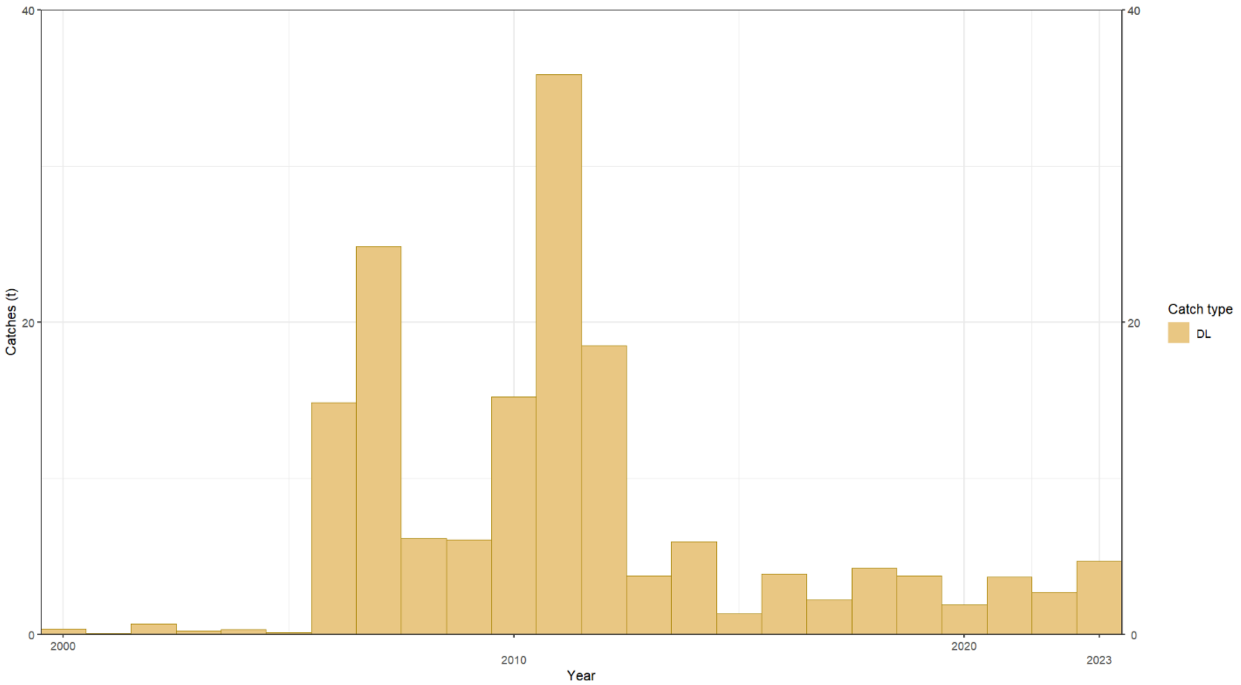


Figure 2. Live discards (DL, tons) of Atlantic white marlin (WHM) and roundscale spearfish (RSP), 2000-2023.

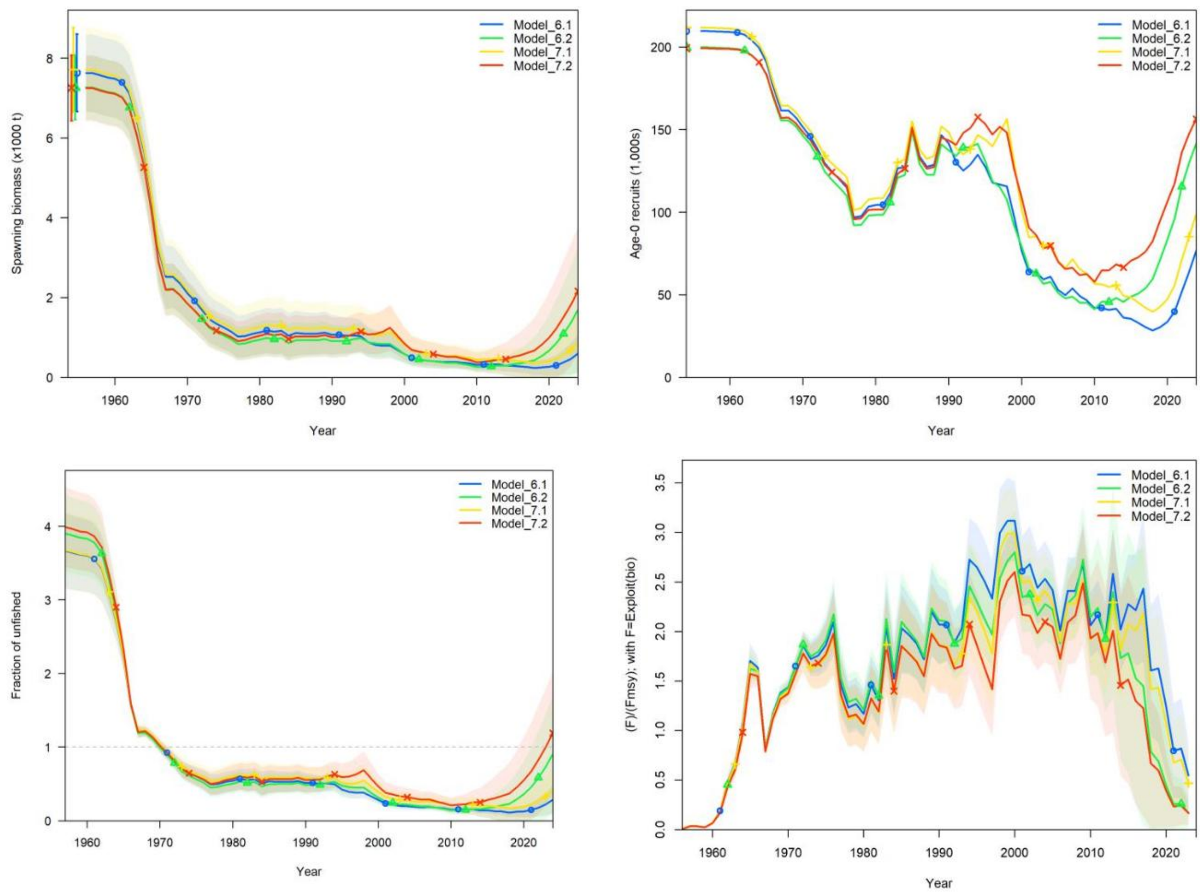


Figure 3. Estimated trends in (upper left) spawning stock biomass, (upper right) recruitment, (lower left) SSB/SSB_{MSY} and (lower right) F/F_{MSY} from the 4 preliminary models (Models 6.1, 6.2, 7.1 and 7.2).

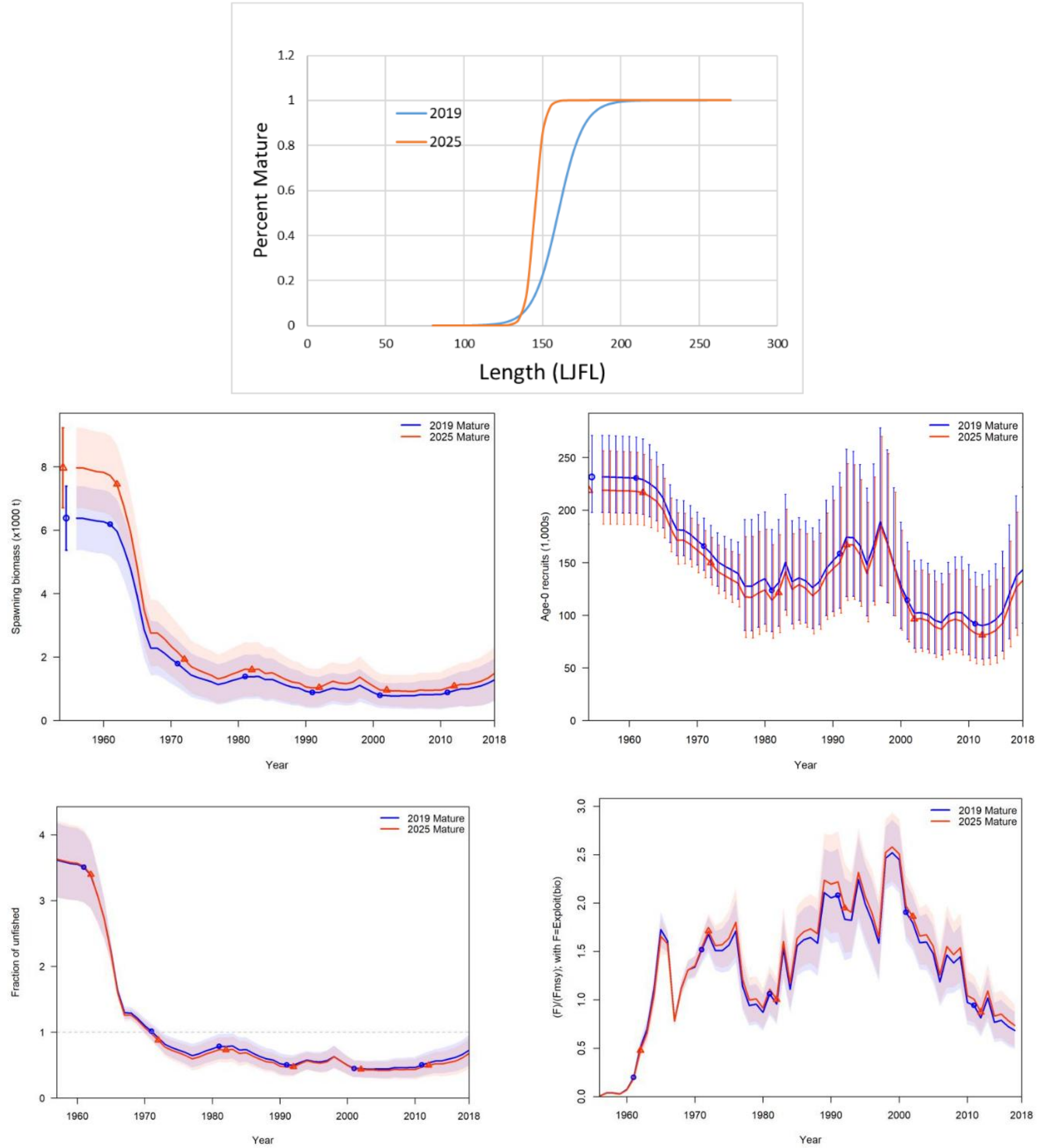


Figure 4. Continuity analysis contrasting results from changes in L_{50} for females (top panel). Red lines represents the model run using 2019 at L_{50} of 162.2 cm LJFL, and blue lines uses the updated value of 145.04 cm LJFL.

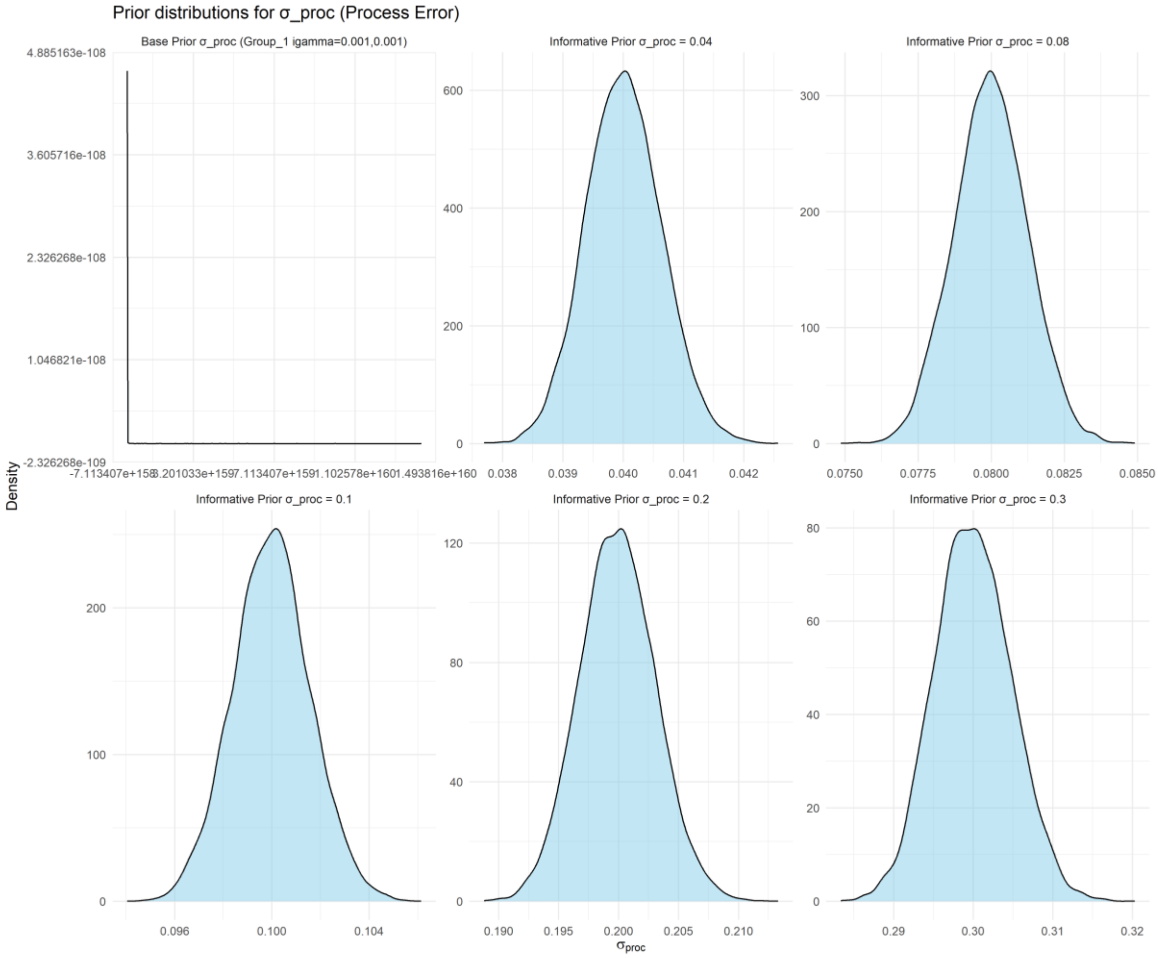


Figure 5. Five different assumptions on inverse-gamma priors for sensitivity analyses. The top left panel shows the assumption in all preliminary JABBA models.

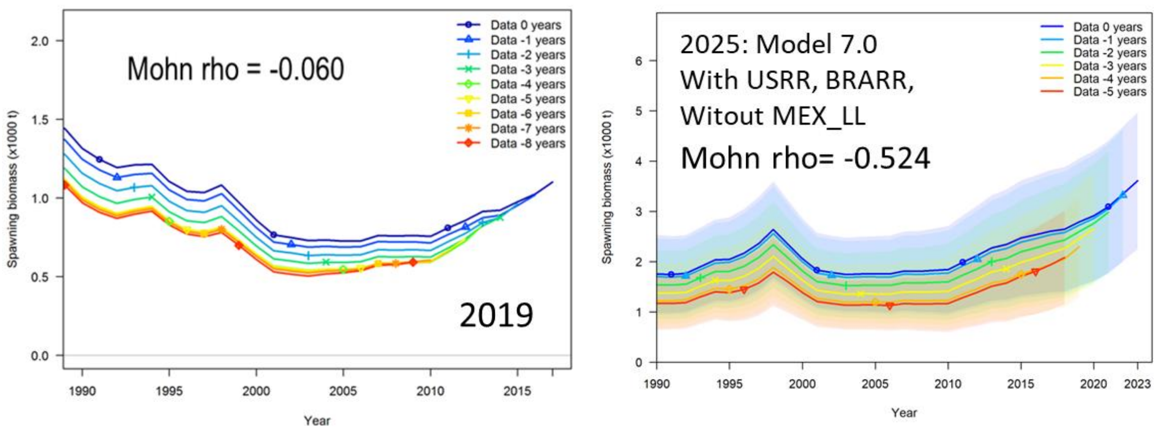
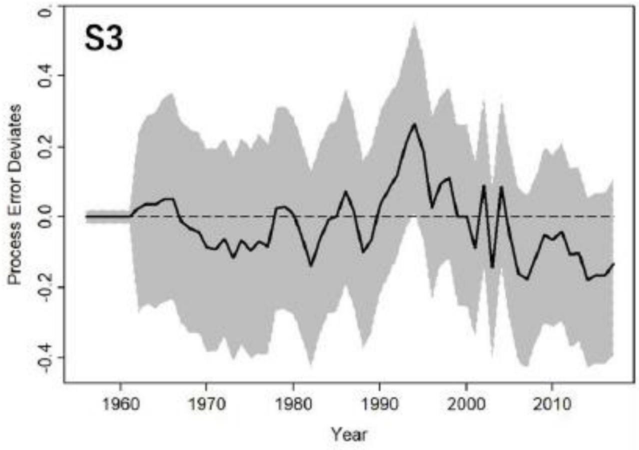


Figure 6. Retrospective analysis in the 2019 ICCAT white marlin stock assessment (Anon., 2020), (left panel), and the 2025 Model 7.0 with US-RR and BRA-RR, and without MEX_LL (right panel).

2019 JABBA S3 - base case



2025 JABBA sensitivity runs for five different assumptions on inverse-gamma priors in Group 1 scenario

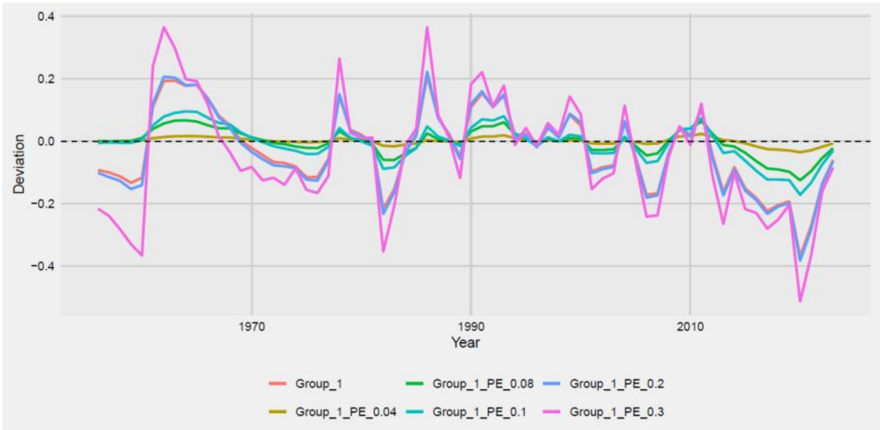
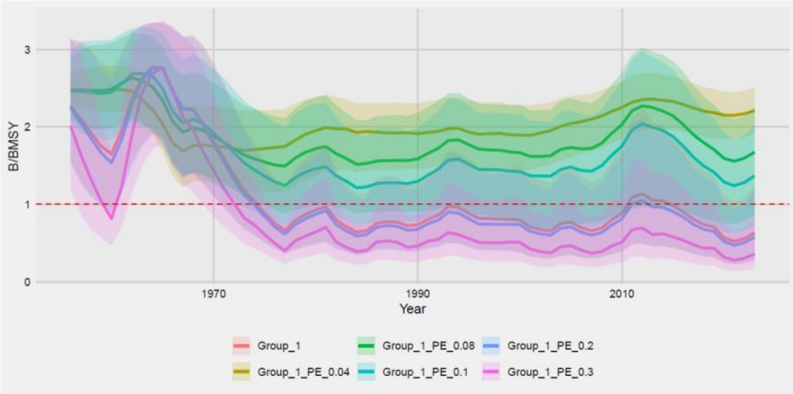
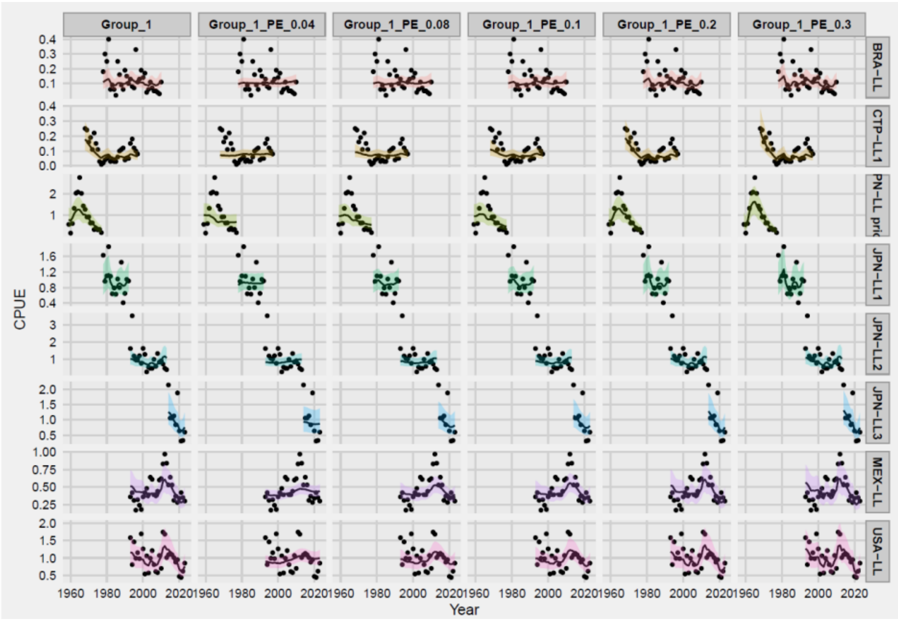


Figure 7. Process errors estimated in 2019 JABBA S3 base case (upper panel) and estimated in 2025 Group 1 scenario with five different assumptions on inverse-gamma priors (bottom panel).

a) B/BMSY Trajectories



b) Time-series of observed (circle) and predicted (solid line) CPUE



c) Residual diagnostic plots of CPUE indices

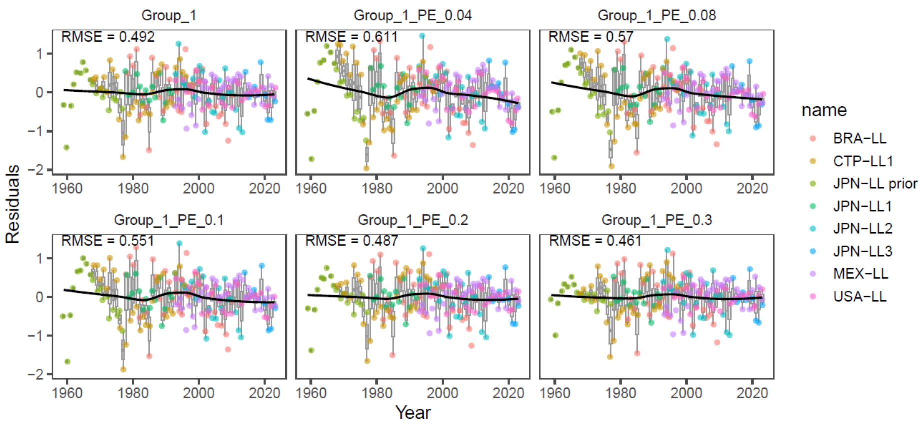


Figure 8. Sensitivity analysis for the process error in the JABBA Group 1 scenario model by giving 5 different informative inverse-gamma prior assumptions with a small CV. Estimates of (a) B/BMSY trajectories and (b) CPUE fits, and (c) CPUE residuals diagnostics were provided.

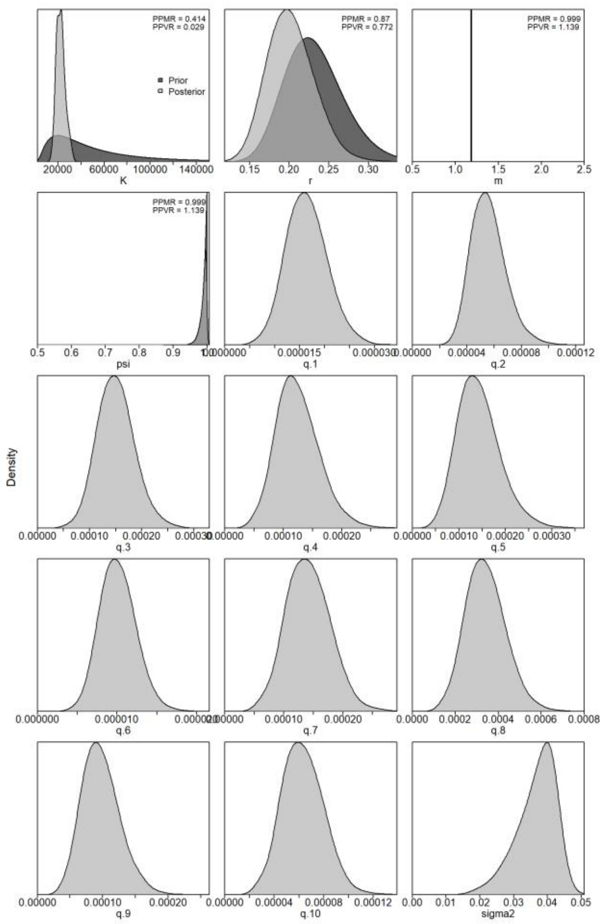


Figure 9. Prior and posterior distributions of various parameters for the JABBA Group 0_no_CTP_LL2 model scenario for Atlantic white marlin. PPMR: Posterior to Prior Median Ratios; PPVR: Posterior to Prior Variance Ratios.

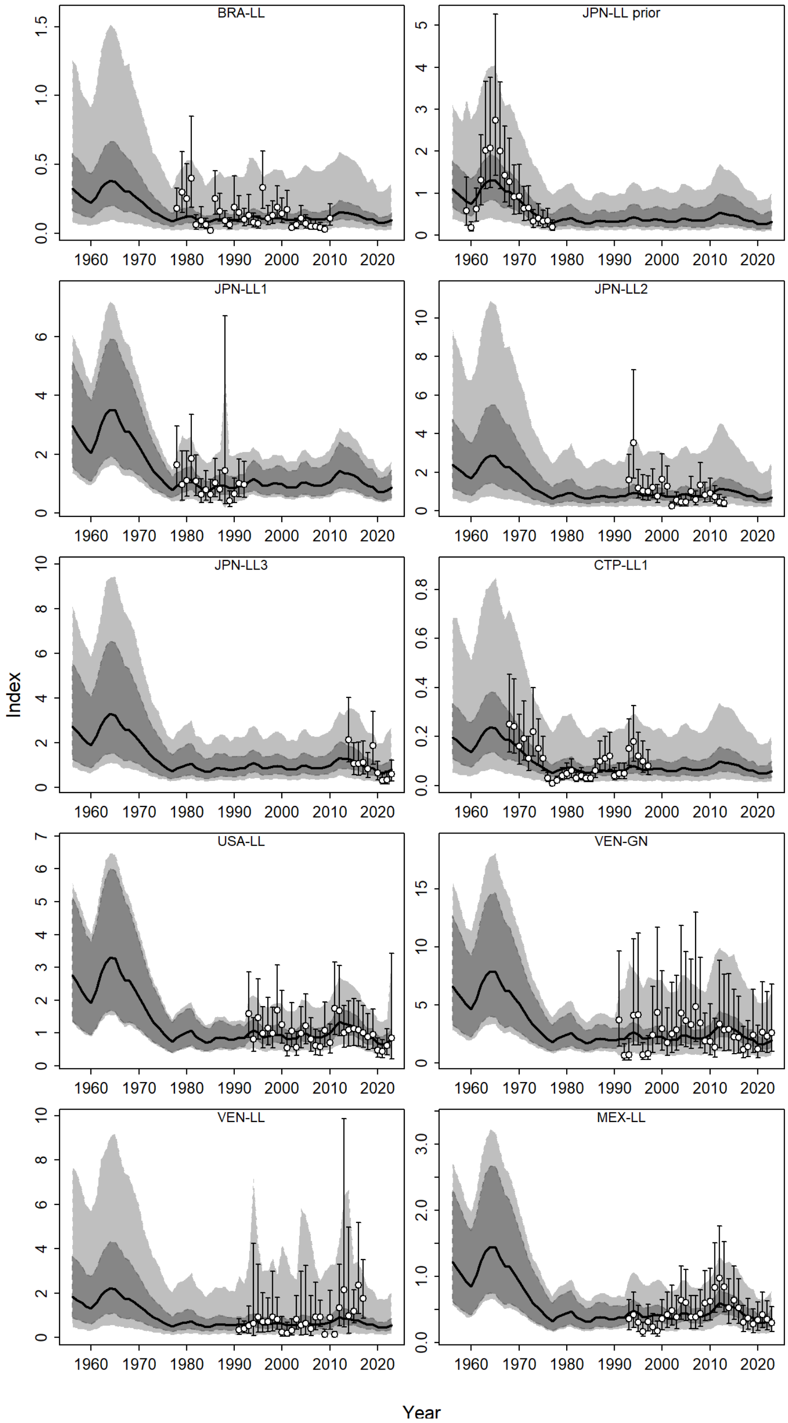
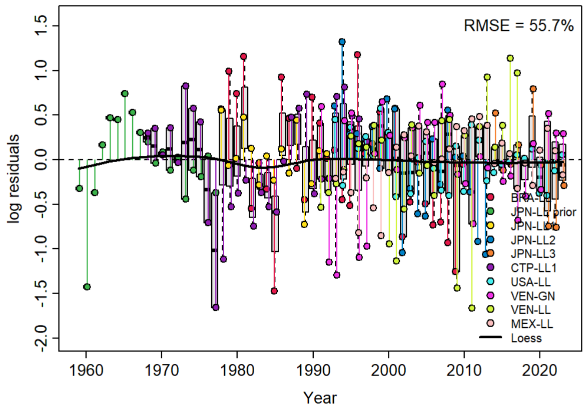


Figure 10. Time-series of observed (circle) and predicted (solid line) CPUE of Atlantic white marlin for the JABBA Group 0_no_CTP_LL2 model scenario. The shaded areas show 95% credibility intervals of the expected mean CPUE.



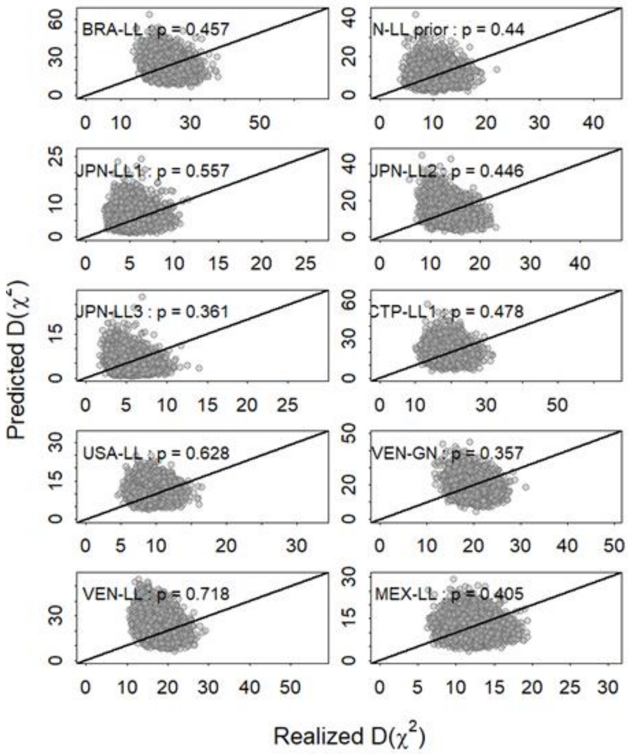


Figure 11. Residual diagnostic plots of CPUE indices (left panel) and posterior predictive checks by CPUE (right panel) for the Atlantic white marlin JABBA Group 0_no_CTP_LL2 model scenario. Boxplots indicate the median and quantiles of all residuals available for any given year, and solid black lines indicate a loess smoother through all residuals.

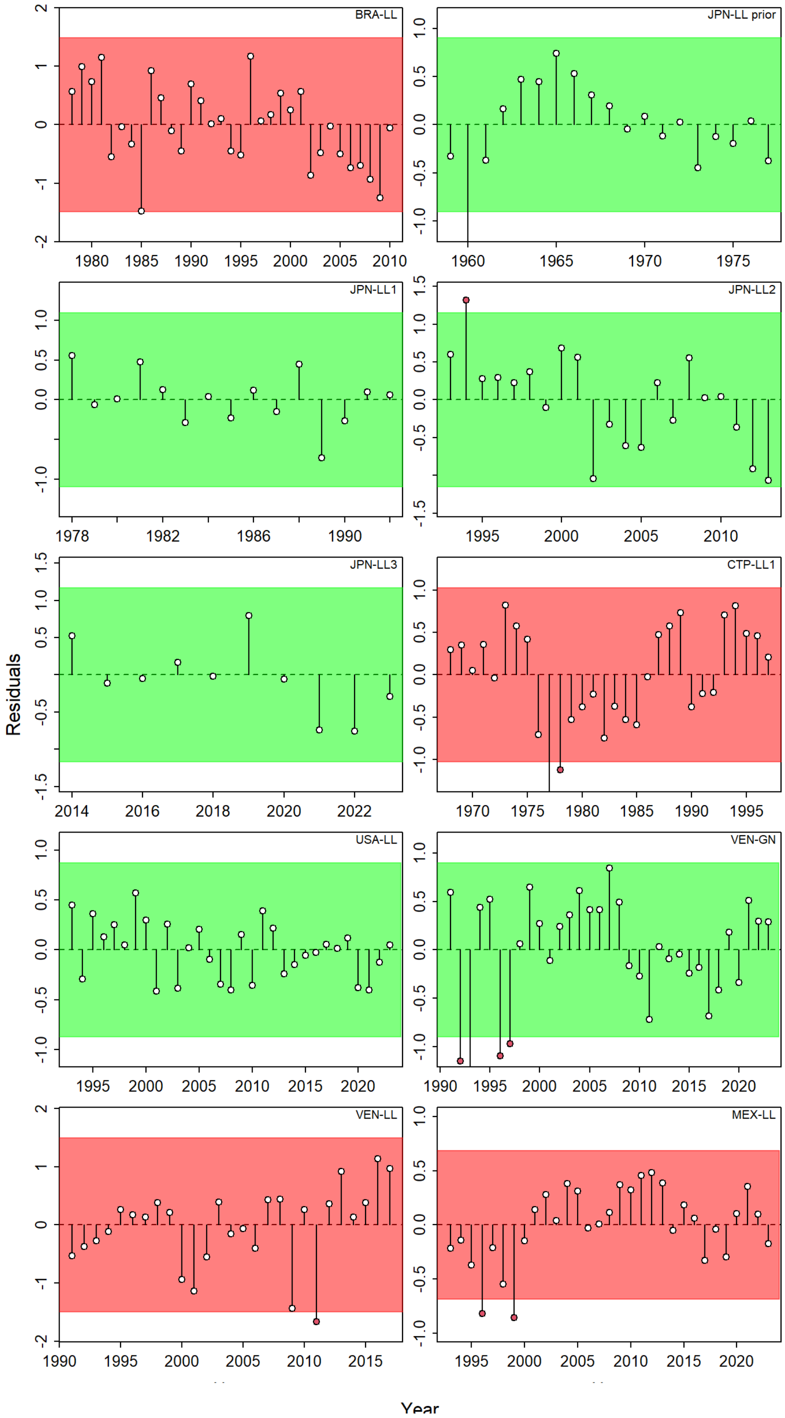


Figure 12. Runs tests to evaluate the randomness of the time series of CPUE residuals for the JABBA Group 0_no_CTP_LL2 model scenario. Green panels indicate no evidence of lack of randomness of time-series residuals (p>0.05) while red panels indicate possible autocorrelation. The inner shaded area shows three standard errors from the overall mean.

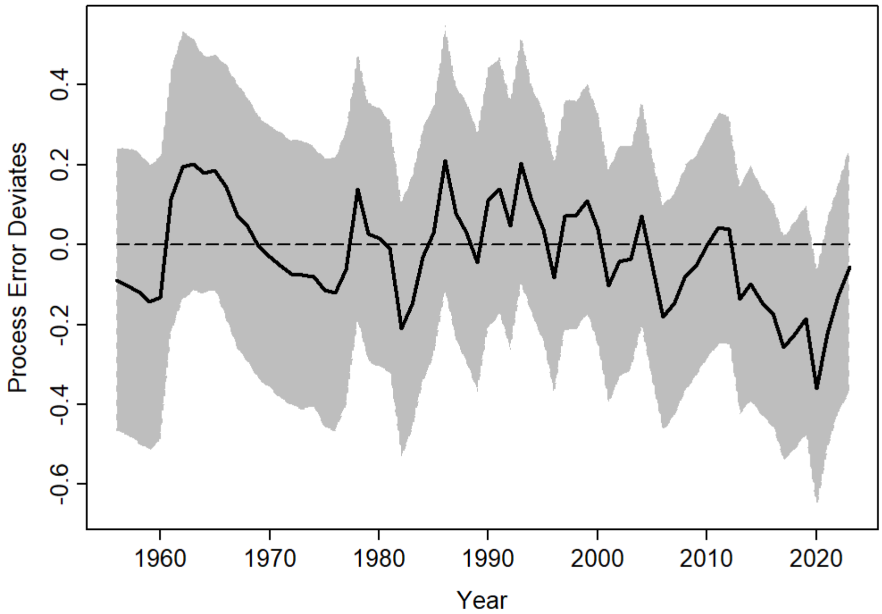


Figure 13. Process error deviates (median: solid line) for the Atlantic white marlin JABBA Group 0_no_CTP_LL2 model scenario. The shaded grey area indicates 95% credibility intervals.

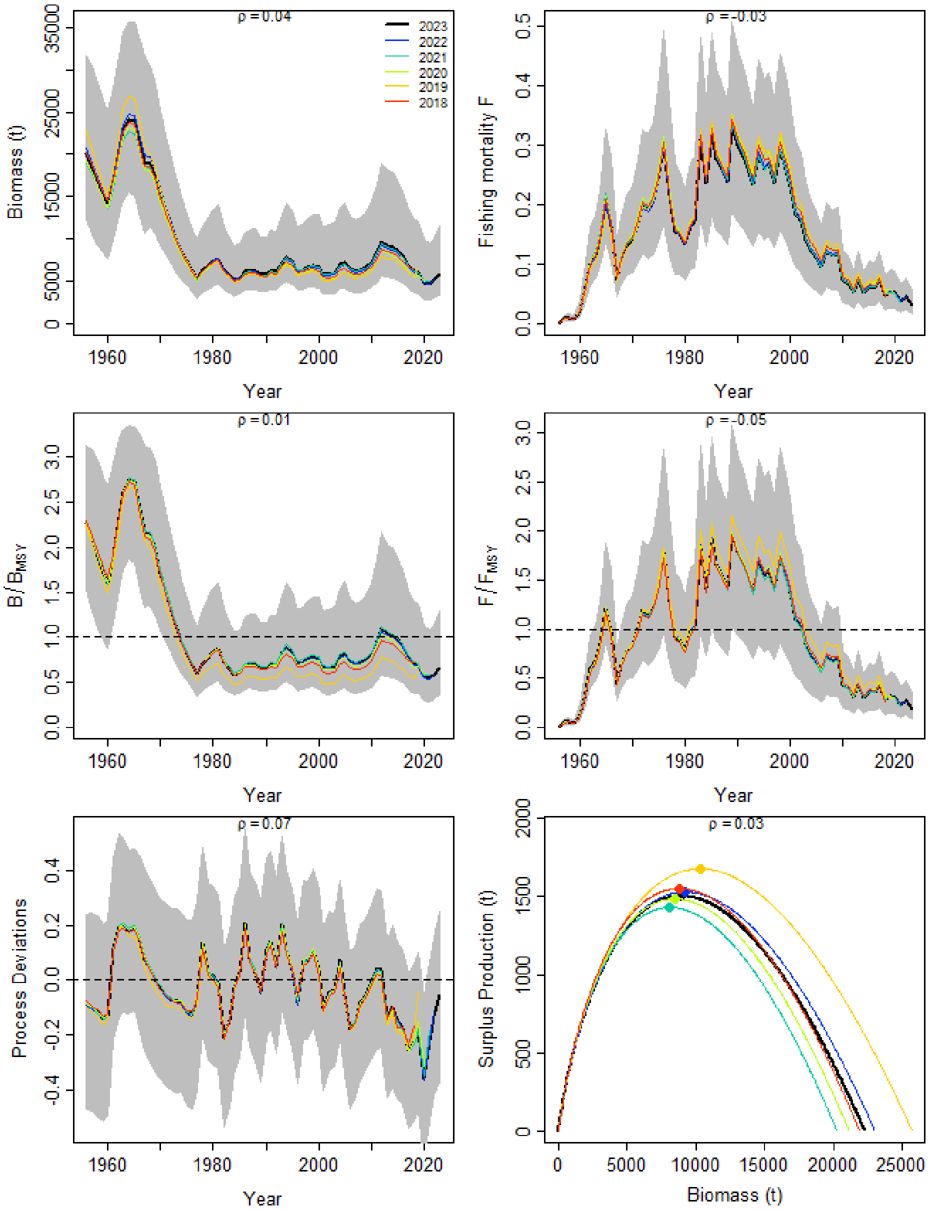


Figure 14. Retrospective analysis performed to the JABBA Group 0_no_CTP_LL2 model scenario, for the Atlantic white marlin assessment, by removing one year at a time sequentially (n=5) and predicting the trends in biomass and fishing mortality (upper panels), biomass relative to B_{MSY} (B/B_{MSY}) and fishing mortality relative to F_{MSY} (F/F_{MSY}) (middle panels) and biomass relative to K (B/K) and surplus production curve (bottom panels).

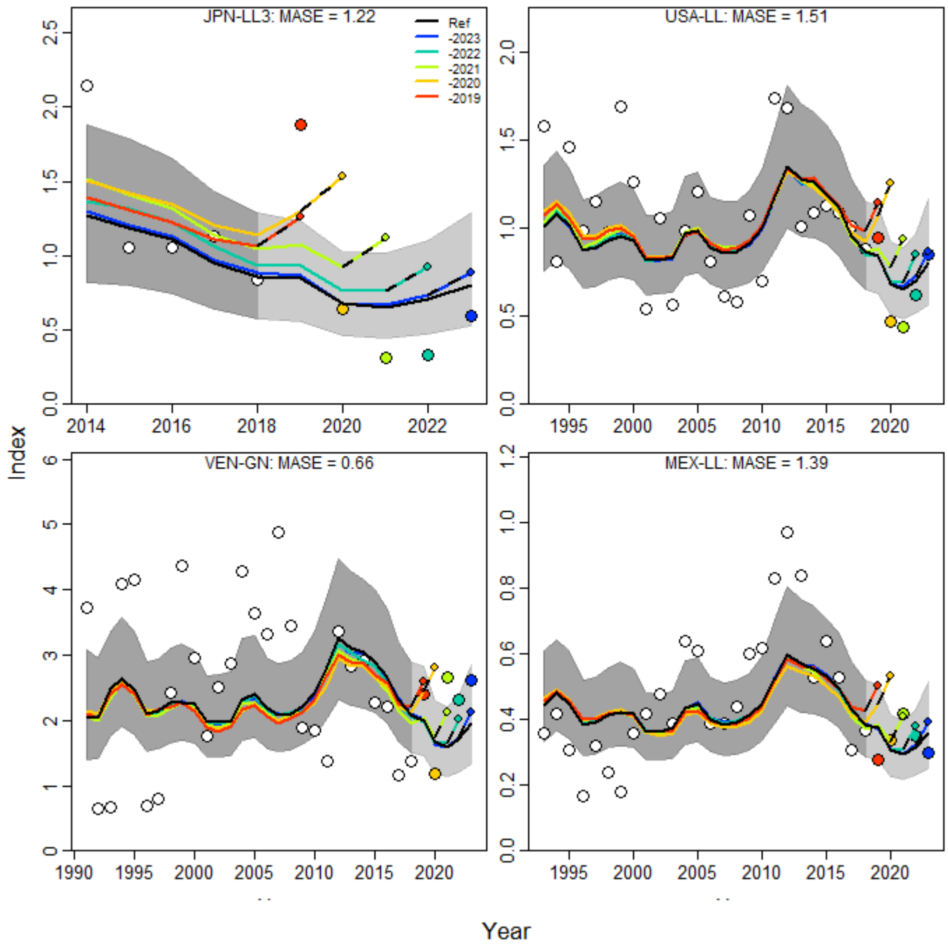


Figure 15. Hindcasting cross-validation results for the JABBA Group 0_no_CTP_LL2 model scenario for the Atlantic white marlin, showing one-year-ahead forecasts of CPUE values (2019-2023), performed with five hindcast model runs relative to the expected CPUE. The CPUE observations, used for cross-validation, are highlighted as color-coded solid circles with associated light-grey shaded 95% confidence interval.

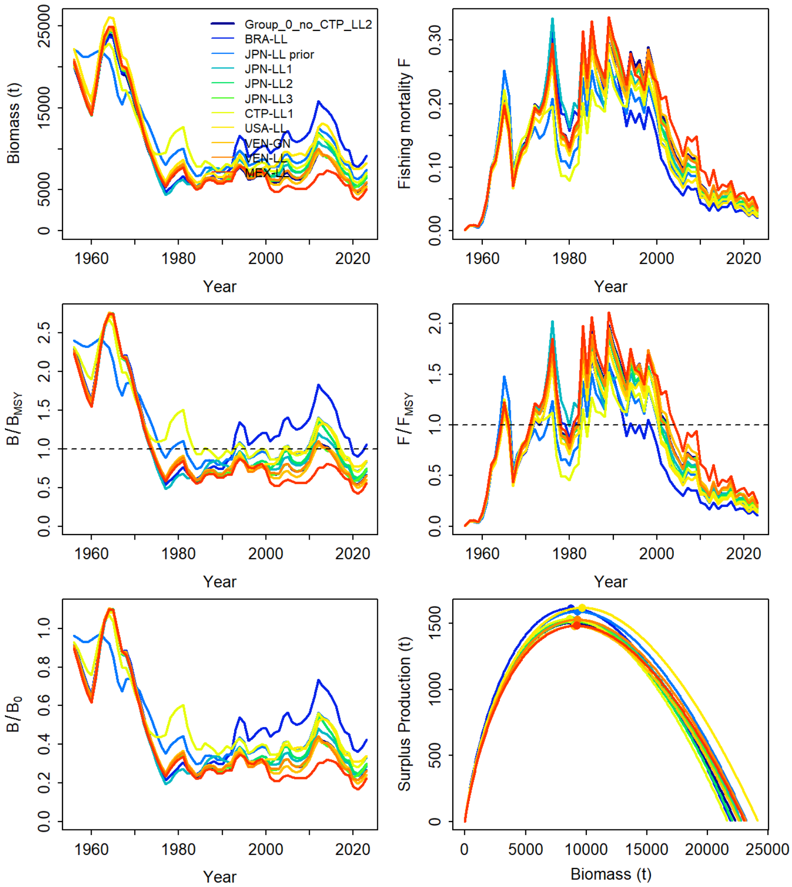


Figure 16. Jackknife index analysis performed to the JABBA Group 0_no_CTP_LL2 model scenario of the Atlantic white marlin assessment, by removing one CPUE fleet at a time and predicting the trends in biomass and fishing mortality (upper panels), biomass relative to B_{MSY} (B/B_{MSY}) and fishing mortality relative to F_{MSY} (F/F_{MSY}) (middle panels) and biomass relative to K (B/K) and surplus production curve (bottom panels).

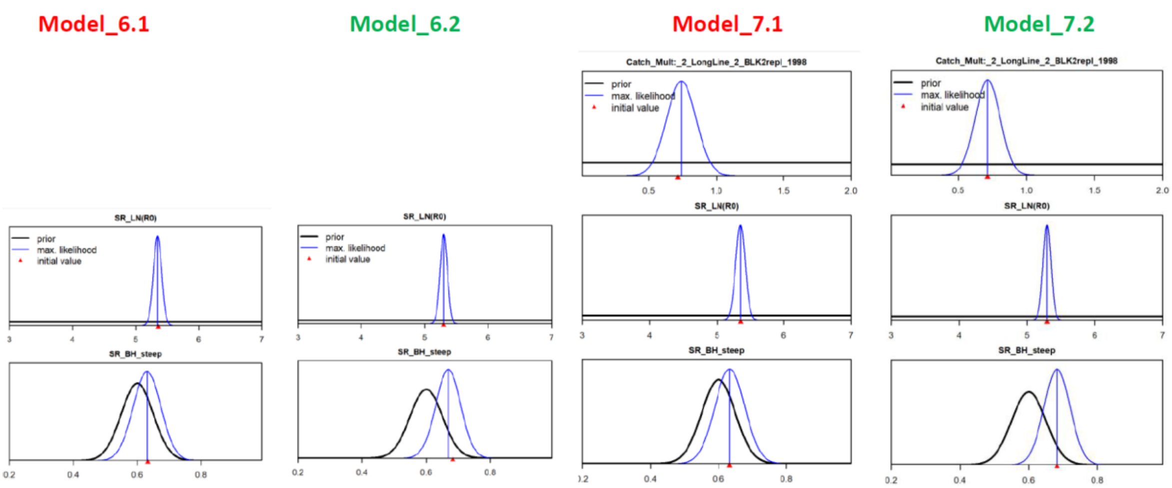


Figure 17. Distribution of prior for parameter estimates and initial starting value of catch multiplier, virgin recruitment (R_0), and steepness (h).

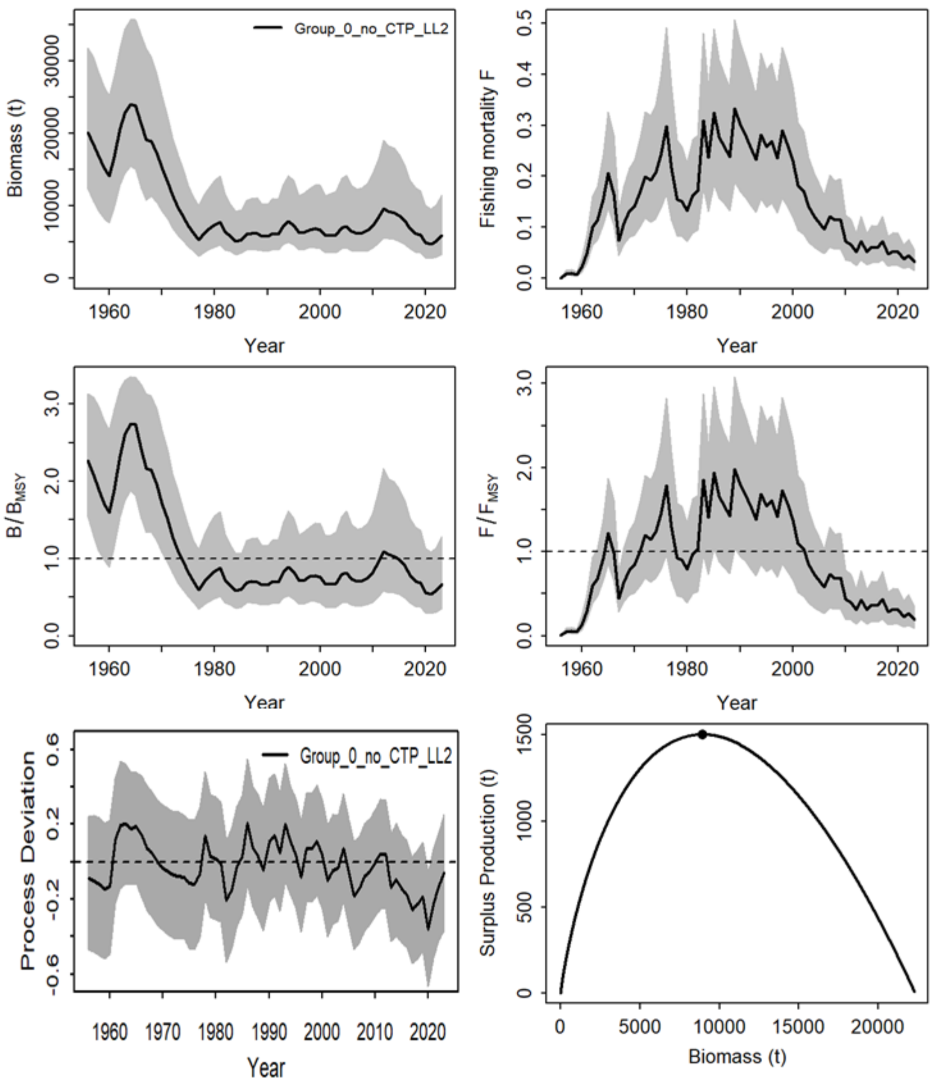


Figure 18. Comparison of biomass and fishing mortality (middle panels), biomass relative to B_{MSY} (B/B_{MSY}) and fishing mortality relative to F_{MSY} (F/F_{MSY}) (upper panels), and process error and surplus production curve (bottom panels), for JABBA Group 0 without Chinese-Taipei LL2 scenario for Atlantic white marlin.

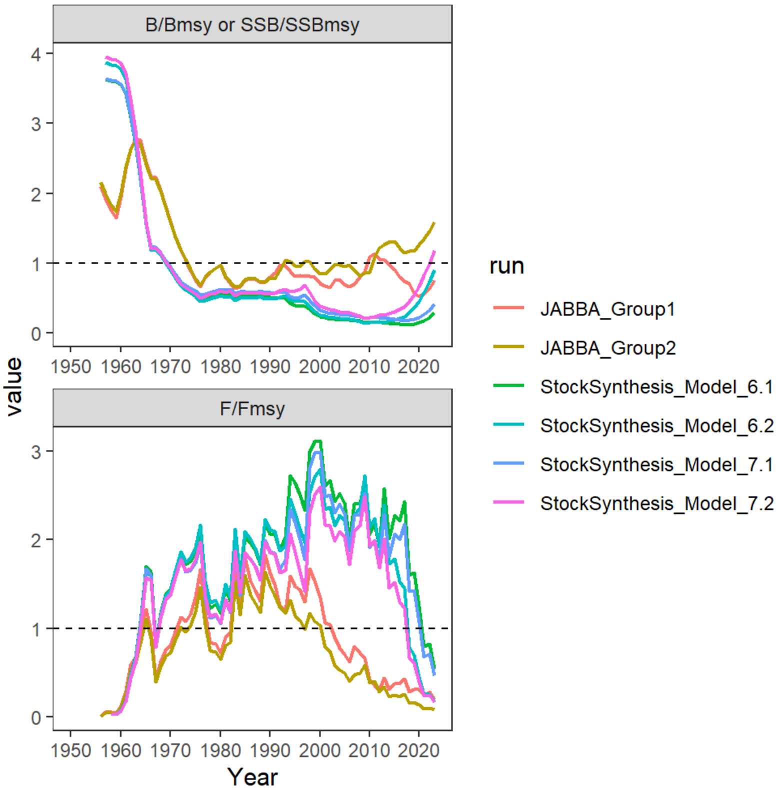
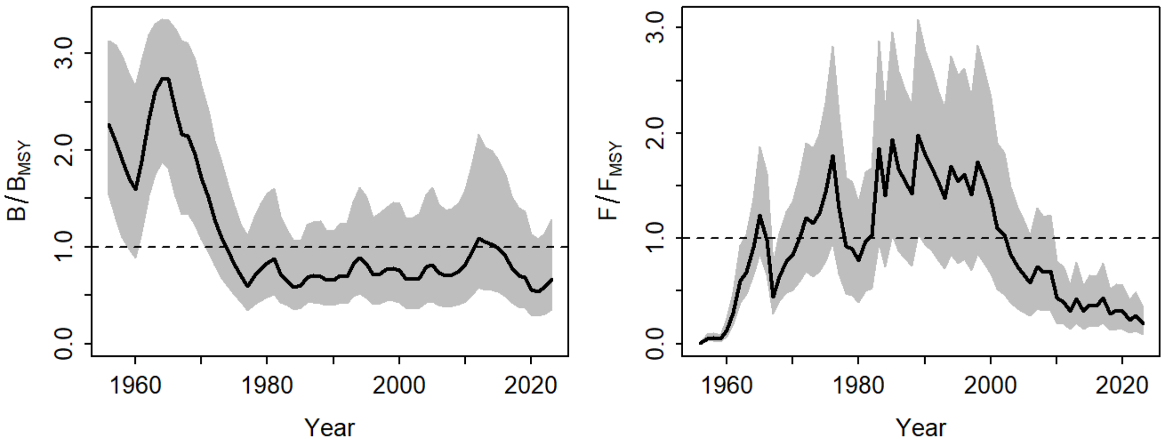


Figure 19. Comparisons of SSB/SSB$_{MSY}$ or B/B$_{MSY}$ and F/F$_{MSY}$ from 6 models (Stock Synthesis Models 6.1, 6.2, 7.1, and 7.2, and JABBA Group 1 and 2).

JABBA



Stock Synthesis

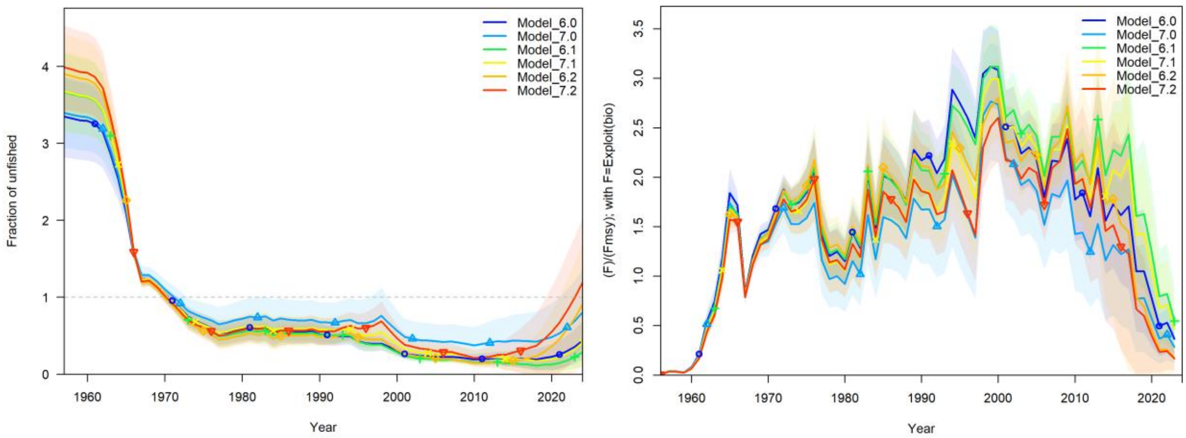


Figure 20. Comparisons of SSB/SSB$_{MSY}$ or B/B$_{MSY}$ and F/F$_{MSY}$ from Stock Synthesis Models 6.0 and 7.0, and JABBA Group 0_no_CTP_LL2.

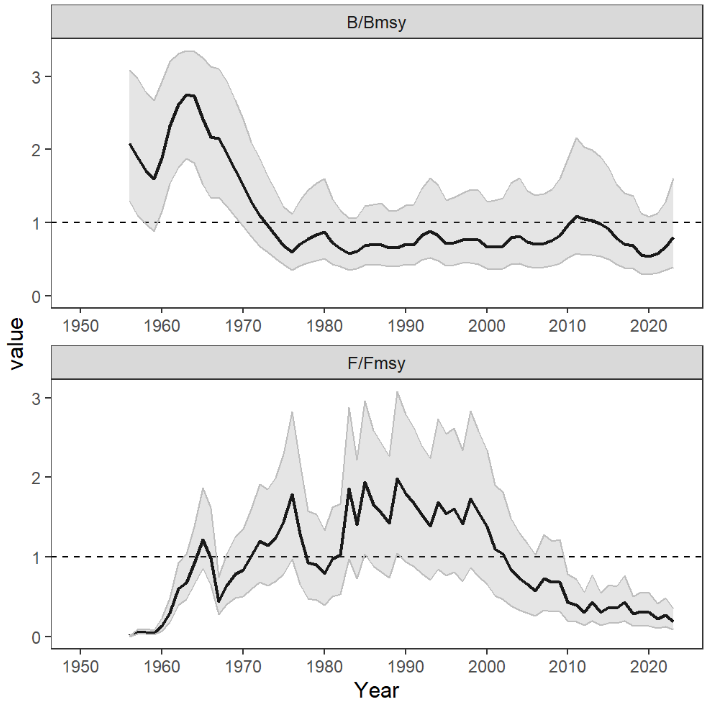


Figure 21. Trajectories of biomass relative to B_{MSY} (B/B_{MSY}) at the end of the years and fishing mortality relative to F_{MSY} (F/F_{MSY}) for the final base case model (JABBA Group 0_no_CTP_LL2) for the Atlantic white marlin, the shaded area indicates the 95% CRI bounds.

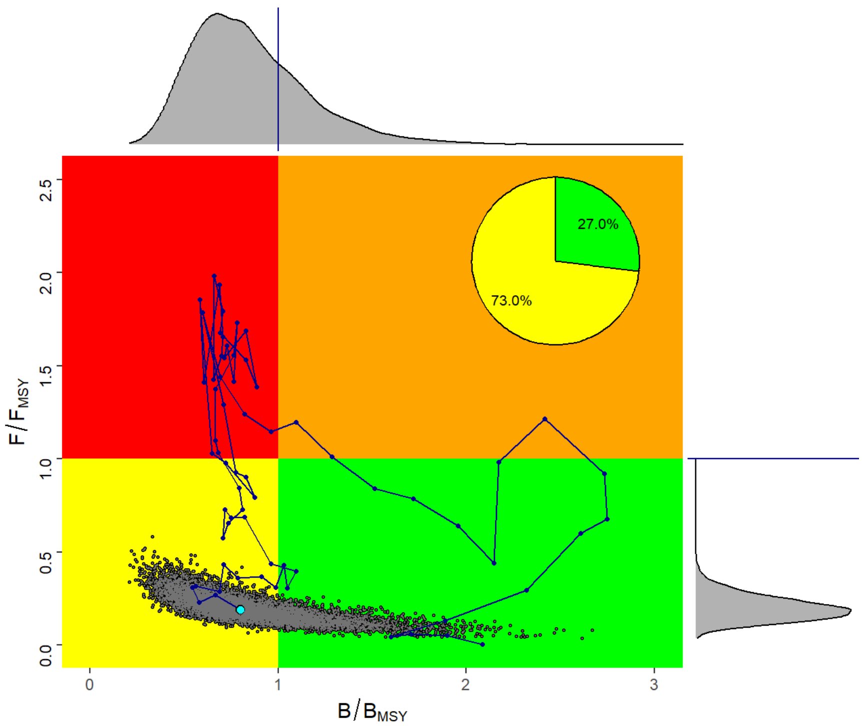


Figure 22. Kobe plots for the result of the JABBA model (JABBA Group 0_no_CTP_LL2) for the Atlantic white marlin.

Appendix 1

Agenda

1. Opening, adoption of the agenda, and meeting arrangements

2. Summary of input data for stock assessment

   2.1 Biology
   2.2 Catches
   2.3 Length compositions
   2.4 Indices of abundance
   2.5 Fleet structure
   2.6 Other relevant data

3. Methods and model settings

   3.1 Stock Synthesis
   3.2 Surplus Production models

4. Model diagnostics

   4.1 Stock Synthesis
   4.2 Surplus Production models

5. Model results

   5.1 Stock Synthesis
   5.2 Surplus Production models
   5.3 Comparison of Model results
   5.4 Summary of stock status

6. Stock Projections

7. Responses to the Commission

8. Recommendations

   8.1 Research and statistics
   8.2 Management Recommendations
   8.3 Strategic Plan (proposal)

9. EPBR update on ongoing activities and future planning

   9.1 Reproductive biology
   9.2 Age and growth
   9.3 Tagging activities
   9.4 Other activities

10. Draft billfishes executive summaries

11. Other matters

12. Adoption of the report and closure

Appendix 2

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Appendix 3

List of papers and presentations

Number	Title	Authors
SCRS/2025/137	Current status of the white marlin (*Kajikia albida*) stock in the Atlantic Ocean 2025: predecisional stock assessment model	Schirripa M.
SCRS/2025/140	Stock status of Atlantic white marlin in 2025: initial JABBA model runs	Mourato B., Sant'Ana R., Kikuchi E., Cardoso L.G., Kimoto A., Ortiz M.
SCRS/2025/141	Correlation analysis of white marlin indices of abundance CPUEs for assessment models	Ortiz M., Kimoto A.
SCRS/P/2025/057	Summary of available statistical data for the white marlin stock assessment	Secretariat

Appendix 4

SCRS document and presentations abstracts as provided by the authors

SCRS/2025/137 **-** Pre-decisional stock assessment configurations, diagnostics and results are described for the 2025 fully integrated assessment model for Atlantic white marlin (*Kajikia albida*). The model was minimally updated from the previous (2019) assessment model. The ad hoc Technical Team identified three models (Group_0, Group_1 and Group_2) to be highlighted, each representing an equally weighted possible state of nature. Diagnostics included profile analysis, run tests on CPUE fits, examination of residual trends, and retrospective analysis. Estimates of maximum sustainable yield ranged from 1,441 t – 1,533 t. Estimates of F/F_{MSY} for the end of 2023 ranged from 0.16 to 0.47. Estimates of SSB/SSB_{MSY} for the beginning of 2024 ranged from 0.41 to 1.19. The model results indicated that overfishing is likely not occurring but the status regarding overfished or not as clear.

SCRS/2025/140 **-** The 2025 stock assessment of Atlantic white marlin (*Kajikia albida*) applied a Bayesian state-space surplus production model (JABBA) using updated catch and CPUE data from 1956 to 2023. Four model configurations explored alternative hypotheses, grouped broadly into two patterns: Group 1-type scenarios, which suggested the stock is recovering but not fully rebuilt, and Group 2 scenario, which indicated a more optimistic stock status with rebuilding largely achieved. All models showed consistent overall trends in biomass and fishing mortality, although the magnitude of estimates varied among scenarios. Kobe plots and jackknife analyses revealed that, despite differences in scale, the general trajectory of stock recovery was similar across configurations. Given the uncertainties associated with life history parameters, stock structure, catch data, and CPUE trends, combining information from both Group 1- and Group 2-type models could represent a viable and precautionary approach for management advice, providing a balanced view of potential stock conditions.

SCRS/2025/141 **-** A review of the trends and overlap of the available standardized CPUE series for the white marlin (*Kajikia albida*) stock assessment was done based on their correlation. This analysis intends to group indices with similar trends that would facilitate the performances and fitting of the current assessment models. A proposed two groups of indices are provided that intend to reflect alternative states of nature.

SCRS/P/2025/057 **-** It summarizes all available statistical information in the ICCAT-DB for the Billfish Species Group. It includes Task 1 and Task 2 datasets on billfishes, with a particular focus on WHM and RSP, as well as the tools available for easy visualization of this information, updated as of June 17, 2025. Additionally, it highlights the new nominal catches received since the 2025 ICCAT Atlantic White Marlin Data Preparatory Meeting for 2023 from Venezuela and Panama.

Appendix 5

Diagnostics for JABBA Group 1 and 2 scenarios

Group 1 Group 2

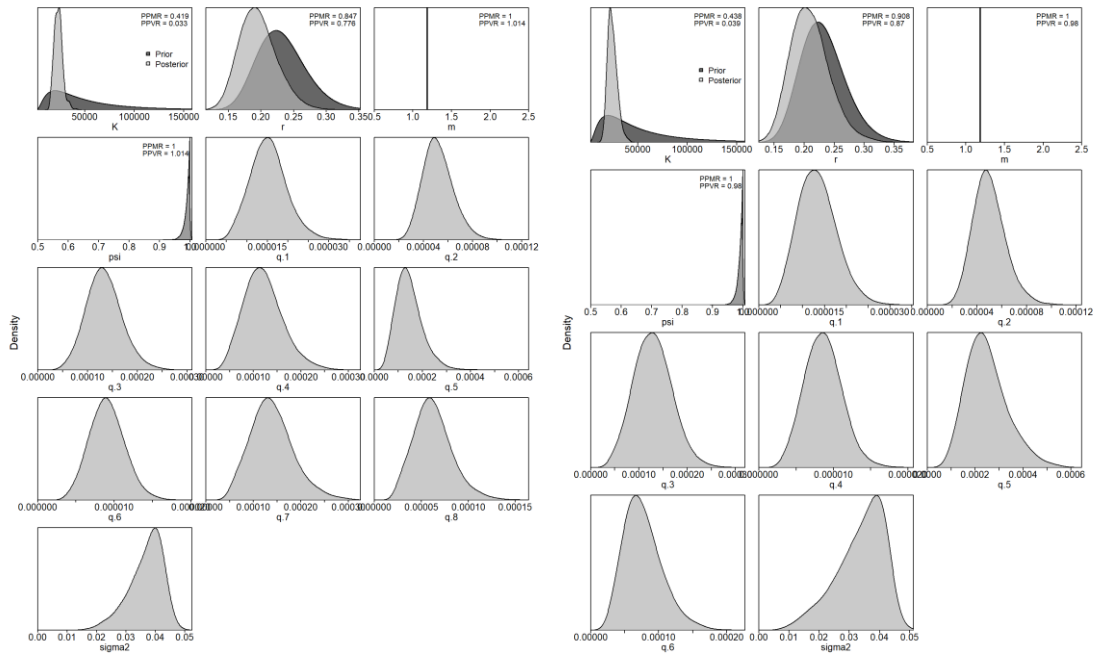


Figure A5.1 Prior and posterior distributions of various models and derived parameters for the JABBA Group 1 and Group 2 model scenarios for Atlantic white marlin. PPRM: Posterior to Prior Ratio of Means; PPRV: Posterior to Prior Ratio of Variance.

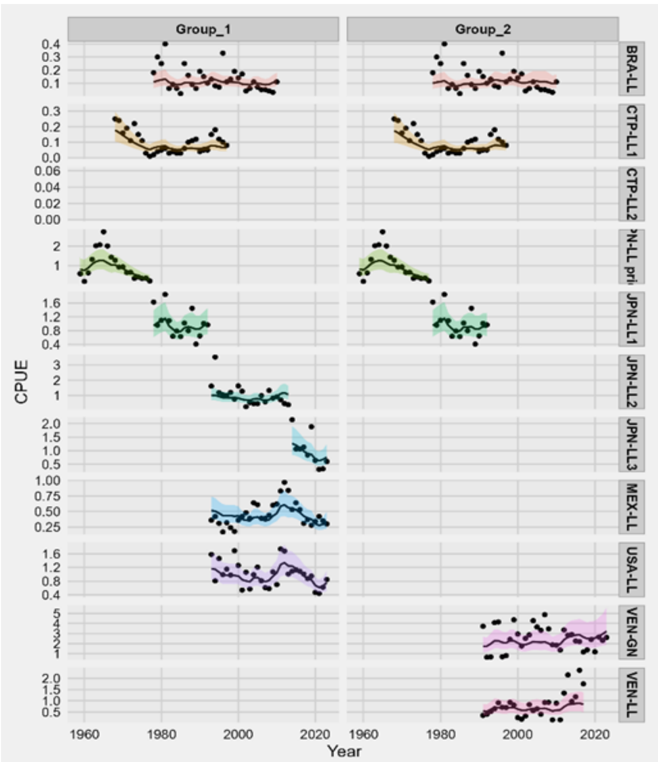


Figure A5.2 Time-series of observed (circle) and predicted (solid line) CPUE of Atlantic white marlin for the JABBA Group 1 and Group 2 model scenarios. The shaded areas show 95% credibility intervals of the expected mean CPUE.

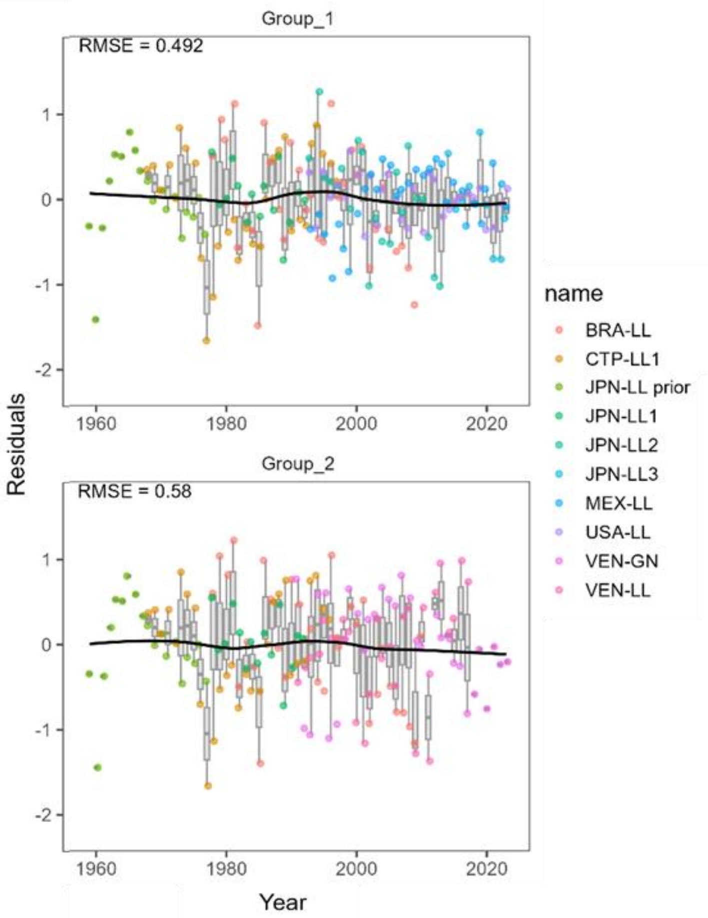
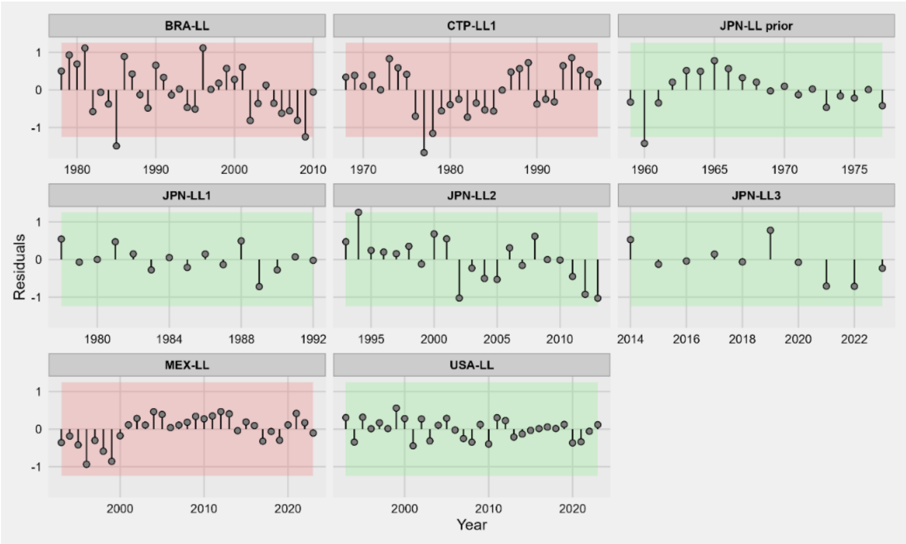


Figure A5.3 Residual diagnostic plots of CPUE indices for the Atlantic white marlin JABBA Group 1 and Group 2 model scenarios. Boxplots indicate the median and quantiles of all residuals available for any given year, and solid black lines indicate a loess smoother through all residuals.

Group 1



Group 2

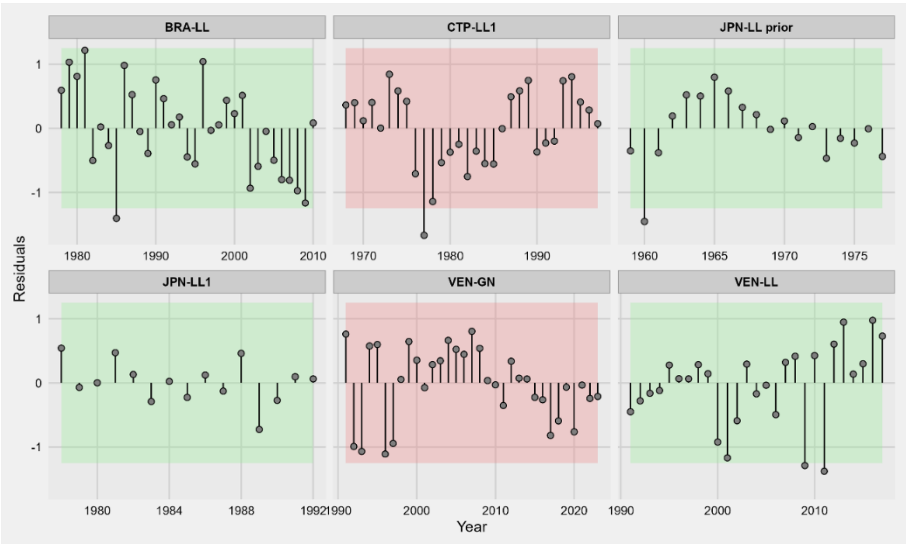


Figure A5.4 Runs tests to evaluate the randomness of the time series of CPUE residuals for the JABBA Group 1 (upper panel) and Group 2 (bottom panel) model scenarios. Green panels indicate no evidence of lack of randomness of time-series residuals (p>0.05) while red panels indicate possible autocorrelation. The inner shaded area shows three standard errors from the overall mean.

Group 1 Group 2

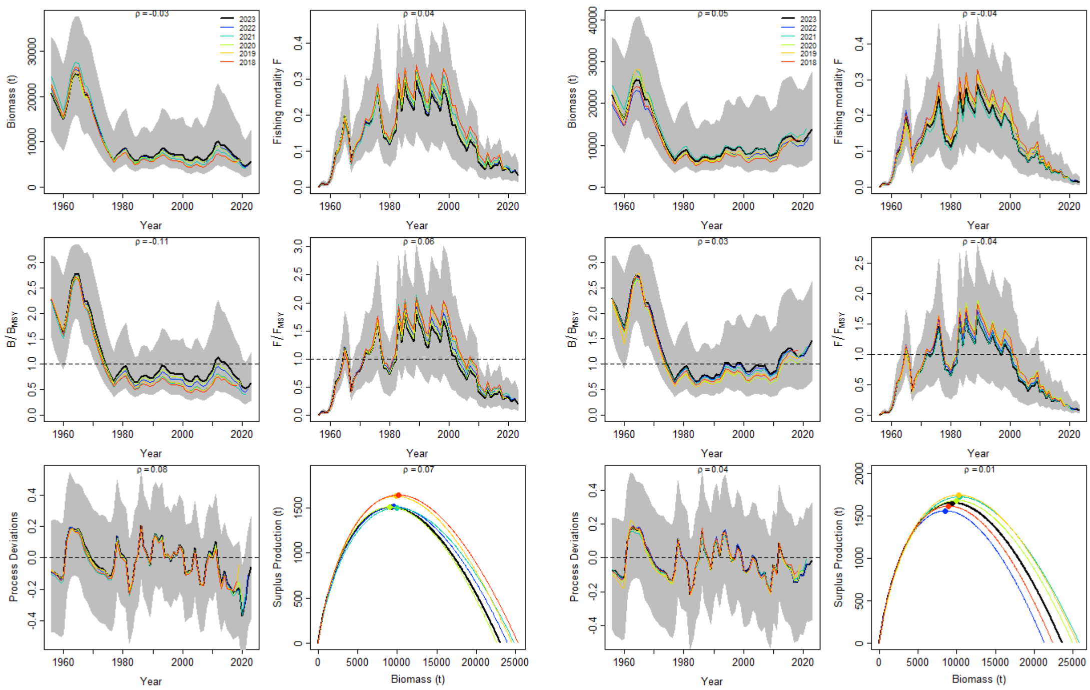


Figure A5.5 Retrospective analysis performed to the JABBA models: Group 1 and Group 2, for the Atlantic white marlin assessment, by removing one year at a time sequentially (n=5) and predicting the trends in biomass and fishing mortality (upper panels), biomass relative to B_{MSY} (B/B_{MSY}) and fishing mortality relative to F_{MSY} (F/F_{MSY}) (middle panels) and biomass relative to K (B/K) and surplus production curve (bottom panels).

Group 1 Group 2

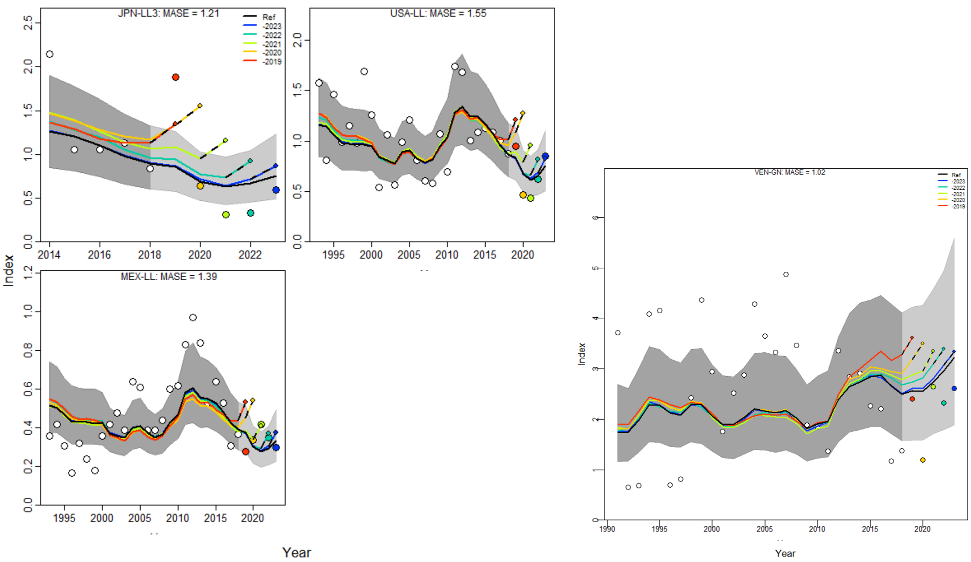


Figure A5.6 Hindcasting cross-validation results for the JABBA Group 1 and Group 2 models for the Atlantic white marlin, showing one-year-ahead forecasts of CPUE values (2019-2023), performed with five hindcast model runs relative to the expected CPUE. The CPUE observations, used for cross-validation, are highlighted as color-coded solid circles with associated light-grey shaded 95% confidence interval.

Group 1 Group 2

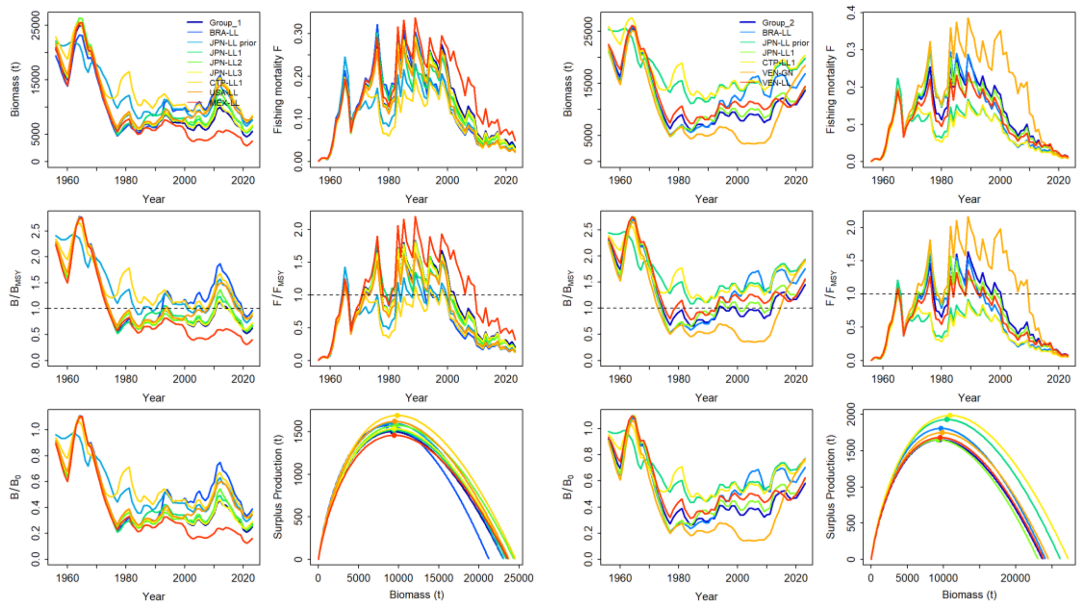


Figure A5.7 Jackknife index analysis performed to the JABBA Group 1 and Group 2 models of the Atlantic white marlin assessment, by removing one CPUE fleet at a time and predicting the trends in biomass and fishing mortality (upper panels), biomass relative to B_{MSY} (B/B_{MSY}) and fishing mortality relative to F_{MSY} (F/F_{MSY}) (middle panels) and biomass relative to K (B/K) and surplus production curve (bottom panels).