Report of the 2026 Working Group on Stock Assessment Methods (WGSAM) Meeting
(hybrid/ Madrid, 25-28 May 2026)

The results, conclusions and recommendations contained in this Report only reflect the view of the Working Group on Stock Assessment Methods (WGSAM). 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 2026 Intersessional Meeting of the Working Group on Stock Assessment Methods (WGSAM) ("The Group") was held hybrid/Madrid (Spain), from 25 to 28 May 2026. Dr. Fan Zhang (China), the meeting Chair, opened the meeting and welcomed participants. Mr. Camille Manel, ICCAT Executive Secretary, welcomed and wished them success at their meeting. The meeting 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 Documents and Presentations provided at the meeting is attached as **Appendix 3**. The abstracts of all SCRS documents and presentations provided are included in **Appendix 4**. The following served as rapporteurs:

Sections	*Rapporteur*
Items 1, 8	A. Kimoto
Item 2	M. Ortiz, E. Babcock, K. Gillespie
Item 3	G. Diaz, E. Babcock
Item 4	C. Peterson, S. Miller
Item 5.1, 5.2	M. Narváez, A. Kimoto, G. Correa
Item 5.3	A. Kimoto
Item 6.1	F. Zhang
Item 6.2	M. Neves dos Santos
Item 6.3	C. Brown
Item 6.4	A. Kimoto, M. Ortiz
Item 7	F. Zhang, G. Diaz, C. Brown

2. Bycatch Estimation Methods

The Group reviewed 12 SCRS documents and presentations on bycatch estimation methodologies from CPCs focusing mainly on swordfish, shortfin mako, and pelagic longline discards. Even though all the documents were reviewed, the Group considered that first it is necessary to develop a standardized procedure to evaluate the appropriateness of each estimation method before formal conclusion.

A proposed standardized evaluation framework for discard estimation methods was discussed, recommending that SCRS Species Groups - not WGSAM- conduct routine reviews using a diagnostic checklist, with WGSAM reviewing only novel bycatch estimation approaches. The suggested approach for further development is provided in Section 2.2.

2.1 Presentation of bycatch estimation methods

Document SCRS/2026/082 provided a summary of the estimation of bycatch using a ratio-based estimator from the longline (LL) Portuguese fisheries targeting mainly swordfish and blue shark. Estimation is based on the observer program data, with set level resolution of catch, species identification, at-haul-back condition of specimen while fishing effort is extracted from the electronic logbook and Vessel Monitoring System (VMS) data.

The plots of predicted versus total catches (per area) from cross validation showed that the true catches were more variable than the predictions particularly for rare species, implying that different methods might be needed for rare species. Estimation methods include spatial and seasonal components. The need for a generalized method(s) capable of handling both target and non-target species estimation on a regular but consistent basis was emphasized.

It was discussed whether previously reported bycatch estimates would change with new years of data, because of pooling between years in the ratio estimator. This is possible, but the estimates would change less with a ratio estimator than with a model approach, which re-estimates parameters with a new year of data. SCRS Species Groups should not have to review a methods paper every year, if the method has not changed.

Document SCRS/2026/046 showed an estimation of total discards of swordfish (in number and weight) from the Spanish longline fleet operating in the western Mediterranean Sea, from 2015 to 2024 using the Bycatch Estimator Tool (BYET).

Discussions focused on the impact of changing minimum landing size regulations on discard patterns. It was noted that discrepancies between logbook reporting and model estimates require a formal review process before such data can be integrated into official Task 1 statistics. The Group discussed whether models should include a year effect. In the Bycatch Estimator tool, ratio estimators can be pooled across years. For models, one option is to allow the tool to consider a null model (i.e. a model with no predictor variables), so that the model will only include the year effect if it is preferred by the information criteria. This allows the year effect to be included only if the years are sufficiently different to improve the bycatch predictions. Another suggestion was to put the year as a random effect, to dampen out year to year variation. On the other hand, year effects are useful to allow for the possibility that fishers are improving their ability to avoid bycatch.

Document SCRS/2026/097 reviewed the Spanish Atlantic long-distance surface fleet estimation of shortfin mako discards live and dead in the Atlantic.

The Group discussed the complexities of applying a single estimation across two distinct stock units and the necessity of increasing observer coverage to improve model reliability. The authors noted the high mortality at-haul back of short fin mako compared to other longline fleets. It was also commented about the use of a single estimate to convert estimated discard numbers to weight, suggesting using size frequency data when possible. The authors indicated that during fishing operations priority is given to the safe and prompt release of live sharks. In general, the ratio estimators and Generalized Linear Mixed Model (GLMM) methods in the tool have been validated, but the specific settings are context-specific and would be different for different fisheries.

Document SCRS/2026/133 reviewed the bycatch estimation from the South African swordfish longline fleets highlighting the importance of accounting for vessel-level effects in estimations.

The author reported that the inclusion of "vessel" as a random effect was critical in the model, as it accounted for differences in skipper-level targeting behaviors that were not otherwise captured.

The Group acknowledged that this finding reinforces the need for standardized diagnostics when evaluating the performance of bycatch models. It was noted the limitations for a truly random distribution of observers on a high seas fleet and that including vessel as variable in the estimation models can account for this potential bias.

Document SCRS/2026/126 evaluated the estimation of bycatch in the Venezuelan longline fleets for blue shark, wahoo, and yellowfin tuna (main target species) highlighting discrepancies between design-based and model-based estimates compared to reported Task 1 data.

Several participants expressed concern that model-based expansions often diverge from historical logbook records, creating a challenge for stock assessment scientists who rely on these data for index standardization and fishing mortality estimates. Predicting targeted catch from the observer sample and comparing it to the recorded landings is a useful validation technique to identify these potential issues.

Document SCRS/2026/127 estimated the swordfish bycatch in the Chinese Atlantic longline fishery, including environmental data in the model-based predictions.

Document SCRS/2026/128 presented a preliminary analysis of bycatch data of longliners targeting swordfish in the port of Mahdia (Tunisia-central Mediterranean). The analysis provided landing in weight and in number. Authors indicated the need to extend this study in time and areas/ports for better coverage of the fishery.

The Group supported this study and concurred on expanding port sampling data to the whole fleet for the small-scale fishery of Mahdia, Tunisia, potentially using the Bycatch Estimator Tool. It was also noted that the need to monitor sea discards in order to provide more comprehensive estimates of bycatch and discards.

Document SCRS/2026/134 estimated mako live and dead release in the South African longline fishery. The model for the Atlantic and Indian Ocean regions together as shortfin mako distribution and movement patterns cross regularly this boundary will be run. How to handle boundaries between administrative areas should be a part of the best-practices guidelines.

Document SCRS/2026/135 developed a standardized CPUE baseline for shortfin mako (*Isurus oxyrinchus*) live releases in the Namibian pelagic longline fleet for 2023-2024, using a Tweedie Generalized Additive Model (GAM) framework. The standardized index showed minimal contrast between 2023 and 2024, serving as a baseline rather than a trend, with higher CPUE concentrated in the southern Namibian EEZ.

Presentation SCRS/P/2026/051 discussed a research study using simulated random draws from purse seine observer data to compare spatial models (sdmTMB) and ratio estimators across levels of observer coverage (Correa *et al*., 2026). Results are specific to this purse seine fishery, but the simulation method is general.

Presentation SCRS/P/2026/056 provided an overview of Canada's discard estimation methods for swordfish and marlins in its pelagic longline fishery. A variety of estimation approaches were tested and a final method for estimating swordfish live and dead discards was selected.

The Group noted that estimates of bycatch of rare non-target species may not be needed by ICCAT as they are a small component of the total catches.

In the Subcommittee of Ecosystems and Bycatch, the Ecosystem Traits Index (ETI) identifies ecologically critical 'hub' species and trait groups whose loss would disproportionately affect food web structure and resilience which is not based on catch proportion alone.

Presentation SCRS/P/2026/059 presented an App called FishStatApp that calculates the sample size and the bycatch estimates using ratio estimators, for the Moroccan small-scale fishery. Fishers have a version as an App so they can enter data.

2.2 Review and discuss best practice in estimating bycatch

Following the presentations on bycatch and discards estimation methodologies the Group focused on the role of the WGSAM on the review and advice or recommendations regarding bycatch estimation methodologies. The Chair noted that the WGSAM should focus on the statistical features of methodology. It was concluded that not a single method is valid for all cases of bycatch or discard estimation and that the Species Groups should review the data and method(s) performance used to make estimates of discards for assessment evaluations.

Presentation SCRS/P/2026/055 presented a proposed framework for evaluating bycatch and discard estimation methods and on the incorporation of these estimates into the ICCAT official fisheries statistics (i.e. Task 1 NC) databases. It was indicated that within the SCRS there is not an established process for reviewing bycatch/discards estimates review and approval, therefore this proposal describes a review process along with evaluation criteria for assessing methods and estimates.

The Secretariat clarified that all estimates produced and adopted by the SCRS Species Groups for assessment purposes including bycatch and/or discards are recorded in Task 1 and can be identified compared to the actual reports submitted by CPCs. Noting that the structure of Task 1 database requires a minimum level of resolution including year/fleet/gear and statistical area, thus, any estimates of live or dead discards and bycatch produced by Species Groups or submitted by CPCs are required to have this resolution. The estimates submitted by CPC shall be included in the Task 1. It was further clarified that Task 1 database has not a variance or uncertainty associated for each record. Finally, the Secretariat indicated that normally informs CPCs via their statistical correspondents when estimates of catch (e.g. carry-overs) or discards are included in Task 1 NC for their review.

The Group discussed how this proposed process would work in practice. It was proposed that once a CPC's methodology is approved, subsequent annual data reporting will not need to be accompanied by an SCRS paper for methodological review, unless there are changes to the estimation methodology, or the underlying assumptions in the method are no longer valid. Given that methods are tailored to a particular species/fishery/management scenario etc., the SCRS's approval for a method should not be automatically transferable to other species or fisheries.

The proposed bycatch/discards estimation review table is expected to be used similarly to the CPUE evaluation table. The review table aims to summarize the basic information of the bycatch/discards data used and methodological details in a standard format including diagnostics and validations. Thus, the SCRS Species Groups can efficiently review it and apply consistent evaluation criteria among different flags/fleets.

The review table should reflect details of the input data used: e.g. source of information (observer program, logbooks, EMS, VMS, etc.); time coverage, spatial coverage, type of sampling (at sea, port, auction, fish house, etc.), units measure, specimen condition and/or status, final destination of specimen (landed, live discard vs dead discards); data transformations including raising, matching with other data, aggregations, etc. It should also include information on the estimation method approach(es) evaluated or tested; diagnostics and criteria used for selection of final estimates, indicators of uncertainty of estimates, if diagnostic plots are provided, and comparison of estimates within alternative models or with historic information. In addition, method validation should also be provided.

It was agreed that the WGSAM review and recommendation should be on the statistical methodology, rather than actual results or data input. In this regard, methodology reports evaluated by the Group should include more details that allow the WGSAM to evaluate main assumptions, potential bias, model performance comparisons, impact of data limitations, robustness and consistency of results through time, diagnostics of model fits, residual analyses, indicators and criteria for final model selection, validation(s) options performed and overall indicator(s) of uncertainty of the estimates. It was agreed that once a model is approved by the WGSAM, it should not be revised until major modifications are done by the users or the Species Group make a specific request to the WGSAM.

The Group then revised the proposed draft checklist (**Table 1**), that has 5 main areas: data; methods; diagnostics; validation; and comments summary. The objective is that any document submitted to the SCRS on bycatch/discard estimation will include all the elements indicated in the table, to facilitate the review and decision by the respective SCRS Species Groups. The WGSAM suggests that the section of data be reviewed by the interested SCRS Species Group, while the methodologies should be initially reviewed by the WGSAM, as well as what diagnosis and validations should be included. When a given methodology is endorsed by the WGSAM, the appropriateness of future implementations by the CPCs should be evaluated by the SCRS Species Groups. The final decision or recommendation regarding the acceptance of bycatch estimates for a particular CPC and a particular stock should be made by the Species Groups.

The WGSAM recommended that the SCRS Species Groups use the draft checklist table this year and provide feedback and suggestions for improvement by the WGSAM in 2027.

3. Bycatch estimation tool

3.1 Contractor Progress Report

Documents SCRS/2026/114 and SCRS/2026/115 reported on the results of last year's contract on further development of the Bycatch Estimator Tool (BYET), and a training workshop on the tool.

The Group reiterated that the ability to easily estimate bycatch for individual ICCAT statistical areas for Task 1 reporting is a high priority.

The tool does not include geostatistical models, and the authors recommend using sdmTMB for geostatistical models. If data is in the correct format for the BYET, transitioning to sdmTMB would be fairly straightforward.

The Group discussed whether the BYET could be used in an MSE workflow to incorporate discard estimation variability in the simulations. In principle, this should be possible because the inputs and outputs are in standard R format. It could be useful to see how the large variation in bycatch estimates at low observer coverage levels influence management effectiveness.

Document SCRS/2026/120 provided information regarding the development of a Shiny App for the Bycatch Estimator Tool.

For the current year, the contractors indicated that they will add the design-based estimators to the Shiny App, along with improvements to the user interface, the ability to run the Shiny App offline, and a less technical user guide specific to the Shiny App. The App will eventually be housed at ICCAT. However, for data security and confidentiality, it was recommended running the application offline.

The current version of the Shiny App only allows design-based bycatch estimates. The Group discussed potentially adding the model-based estimates to the Shiny App in a future version. Although this would be technically feasible, it would require some minimum level of statistical modeling knowledge as users need to choose and define initial model settings. The App should not be a "black box" that encourages users to push a button and get an answer without understanding the model settings and diagnostics. CPCs will need to either have expertise or consult with experts to be sure the models are being used appropriately for their particular fisheries and data characteristics.

3.2 2026 and possible 2027 training workshop

The 2026 training workshop on the use of the BYET was initially scheduled for the end of June, however due to a low number of participant requests, the Group discussed changing the dates and format, with the goal of improving attendance. Given the availability of the instructors, two options were provided: option one for an in-person meeting, late in November or the 2nd week in December 2026; and option two for an online workshop after September with dates to be decided. The Group agreed to do a poll among the meeting participants, where of 82 registered participants 23 responded to the poll, with 54% opting for the online option, while 46% prefer an in-person workshop with higher preference for the December dates.

After discussions and considering the close poll results as well as the existing approval of an in-person workshop, the Group agreed to maintain an in-person Bycatch Estimator Tool workshop in December 2026. The Group also agreed to relax the requirements on the data used for the workshop, so that participants without the raw data can attend the workshop and to include participants who are interested in developing new data collection programs. The Secretariat agreed to relaunch the announcement soon and report participation requests at the SCRS meeting in September 2026.

4. Management Strategy Evaluation

4.1 Presentation on papers related to MSE

Document SCRS/2026/038 presented the exploratory climate test, which seeks to evaluate the relative robustness of candidate management procedures (CMPs) to climate-induced stressors, rather than attempting to project CMP performance under forecasts of potential climate impacts.

The Group welcomed the work and findings that the adopted SKJ-W and SWO-N MPs are relatively robust to potential climate change impacts. They discussed how this type of test could be added to ICCAT's MSE processes once a shortlist of final CMPs was identified. The author stressed that Climate Test should be considered as an evaluation of a CMP performance attribute, rather than a standard MSE projection result, so Climate Test results should not be presented as part of the reference and robustness operating model results.

The Group questioned how the robustness threshold (i.e., the point at which the MP is defined to fail) was selected. The author noted that it was somewhat arbitrary, but that case studies to date have shown that relative performance is consistent. As a result, the absolute value of the robustness threshold is less influential on the determination of the most robust CMP. This consistency of relative performance can be confirmed for each MSE to allay any concerns about the chosen robustness threshold.

The Group noted that severe shocks (i.e. extreme events) to the system could be among the most profound climate impacts and questioned whether process error should be included in Climate Test. The author explained that more extreme events will likely be considered in the next phase of the work that will incorporate ATLANTIS ecosystem models and that process error was already often included in traditional MSE robustness testing.

The Group highlighted that the Climate Test results were presented as negative impacts on stock biomass, while some climate impacts may be beneficial and yield was also an important performance variable. The author explained that Climate Test intentionally evaluates only negative outcomes and that relative yield performance results are shown in the main MSE results.

4.2 Discuss key issues and priorities of MSEs within ICCAT

The Group discussed what the role of the WGSAM should be in ICCAT's MSE processes. The Group agreed that it would not be appropriate to ask the WGSAM to review all ICCAT MSEs. Noting that the WGSAM has traditionally provided input on novel modelling approaches applicable to multiple stocks, and recognizing the MSE expertise being cultivated within individual Species Groups, the Group agreed that the WGSAM should have two primary functions related to MSE:

- Provide a platform for different Species Groups to jointly discuss important crosscutting issues (e.g. how to calculate performance indicators, robustness of MPs to climate change impacts) and the suitability of emerging, novel approaches; and

- Where appropriate, provide recommendations to Species Groups on best practice approaches (e.g., Punt *et al*., 2014), but do not develop mandatory guidance.

As part of the second role, the WGSAM may consider developing a checklist for MSE processes (e.g., Carruthers, 2024).

The Group also debated whether there was a need for the WGSAM to review the various MSE software packages in use by ICCAT for publication in the software catalogue, but the Secretariat clarified that the software has already been peer-reviewed as part of the code checks of prior ICCAT MSEs.

4.3 Discuss TOR of the MSE workshop

As requested by the WGSAM in 2025, the Commission approved €40,000 per year to host "advanced technical workshops" on MSE in-person in 2026 and 2027. The Group discussed the TORs for the 2026 workshop, which will be finalized once the instructor(s) is(are) selected.

There was extensive discussion about the minimum qualifications for participants since the workshops are meant for advanced technical audiences (e.g., stock assessment modelers) that were approved by the SCRS and the Commission in 2025. There is also interest in providing training for scientists to more meaningfully engage in MSE processes while not necessarily running their own MSEs. It was also emphasized that a smaller number of participants (e.g., 10 participants per 1 instructor) leads to more successful learning outcomes for individuals, so there should be a cap on attendees even if additional participants are able to fund their own travel. Thus, participants will be prioritized according to:

- Knowledge of stock assessment and/or MSE philosophy and concepts;
- Knowledge of computer programming (e.g., R statistical software); and
- Priority will be given to those with experience in modelling related to stock assessments or MSE developments.

The new FAO eLearning Academy course on MPs and MSE (https://elearning.fao.org/course/mp-series-en), or other similar online training course, was recommended as a way to fulfill the first requirement.

The Group agreed that mixing participants with different skill levels would compromise the efficiency of the workshop. It was proposed that the 2026 workshop will target the more advanced scientists, and the 2027 workshop could have more broader participants who want to learn and/or advance their MSE skills. However, some concerns were raised that having broader participants with less technical backgrounds may not be consistent with the intention of this advanced technical workshop which is to increase the technical capacity of MSE development within ICCAT.

The Group finally agreed to hold advanced technical MSE workshops in 2026 and 2027 and to propose more intermediate level MSE workshops in 2028 and 2029. To maximize the utility of the workshop, it was suggested that an ICCAT stock be chosen as a case study for the 2026 workshop and that the MSE be conducted in one of the MSE software packages in use at ICCAT (e.g., openMSE, FLBEIA; TBD based on the instructors contracted to lead the workshop).

5. Stock assessment and software catalogue

5.1 Presentation of papers related to stock assessment

Document SCRS/2026/129 evaluated weighting strategies for ensemble modeling framework that has been widely employed in worldwide fishery stock assessments.

The Group noted that this could be an extremely valuable approach to be considered in the future for model weighting in stock assessment model ensemble. It was inquired whether cross-validation should become the primary weighting method or if it should be blended with other traditional diagnostics (such as Mohn's rho and residual analyses), and whether predictive weighting via cross-validation is directly recommended when traditional diagnostics fail.

The authors clarified that retrospective indicators (e.g., Mohn's rho) proved unstable across different scenarios for the specific purpose of assigning weights. Consequently, the Group noted the importance of obtaining good models before considering ensemble models through standard diagnostics and retrospective analyses as initial filters. Once eliminating poorly specified or problematic models, hindcast cross-validation based on age and CPUE data could be utilized as the primary objective indicator for assigning ensemble weights.

Document SCRS/2026/130 introduced a newly developed model LinCS-IC that is further developed LinCS (a geostatistical framework integrating fishing operations and species distributions; Ijima *et al*., 2025) to utilize both logbook and grid-aggregated spatial catch data.

The Group expressed strong interest in using this spatial model to condition Management Strategy Evaluation (MSE) Operating Models to test empirical spatial management indicators. The author agreed that this model could be used but noted that the model does not yet incorporate size-composition data, which is a major driver of tuna spatial distribution.

The Group pointed out that each spatial grid node (smaller than 10°x10° grid cells) has a specific estimate of carrying capacity in this framework, which required robust and detailed information on population movements among nodes. The Group suggested the author distinguish carefully carrying capacity at a spatial grid node level and overall-population-level. Regarding movement, the author clarified that migration outcomes are implicitly captured through spatial process errors, though future integration of tagging data is being considered. Finally, the Group noted that a future comparison between this spatial model and a standard non-spatial model using the same operating model would be highly beneficial.

Presentation SCRS/P/2026/041 showed how the rebuilding-time-based quantities; demography-based biomass targets ($B_{rebuild}$) and rebuilding times ($T_{rebuild}$) provide an empirically grounded, risk-equivalent way to set limits, triggers and targets that are directly tied to observed recovery trajectories rather than abstract biomass fractions.

The Group asked about the definition of stock recovery in the presented paper and whether it is in terms of biomass or reference points. The authors indicated that recovery could be in terms of any of the above.

The Group indicated that other parameters (such as steepness) might have a relevant influence on the calculations of these reference points. The authors agreed that steepness highly influences and noted that inclusion of other covariates could be considered in the future.

Presentation SCRS/P/2026/042 showed how process-error can help reveal if Stock Synthesis assessments are mis specified, or processes are potentially non-stationary, resulting in biased MSY reference points and over-confident in forecasts.

The Group inquired the author on whether the practice of developing multi-national joint combined CPUE indices conducted by some Species Groups to resolve conflicting trends should be reconsidered, as has been recommended by this Group. The author clarified that such an approach serves a purpose when data are deficient; but predictive skill should be validated by ensuring the assessment model can predict observations, not model outputs.

Presentation SCRS/P/2026/053 compared the JABBA model with the extended JABBA-Select model to evaluate how biomass distortion and alternative CPUE indicators affect Bayesian state-space surplus production model outputs for southern Atlantic albacore using a simulation framework.

The Group inquired if the authors have considered using the Stock Synthesis framework to construct a very similar model to JABBA-select. The authors indicated that it is possible if size data is available, but the model assumption will be different in each platform. It was also noted that JABBA-select could be sensitive to the assumption on selectivities, which could be tested in the same framework in the future.

The Group expressed that it has been clearly specified that CPUEs used in Surplus Production models should reflect the trend of the entire population and not just a fraction of it, and that using abundance indices in weight is recommended rather than the ones in number, because the unit of indices impacts on the estimates such as B/B_{MSY}.

The authors noted that the JABBA-select tool (software) is still under development, and R codes for creating diagnostics will be added soon.

5.2 Presentation of other papers of interest to the Group

There were no presentations for this section.

5.3 Software catalogue

Document SCRS/2026/131 reviewed a statistical catch at age model called the *Assessment for All Initiative* (a4a) model for inclusion in the ICCAT software catalogue and proposed by the swordfish Species Group. The a4a R-package (FLa4a) is a companion diagnostic R-package (a4adiags), and comprehensive handbook are available online. The authors proposed consider the inclusion of the a4a methodology in the ICCAT software catalogue.

The Group consulted scientists from the Mediterranean region on whether the inclusion of the a4a model could encourage more stock assessment scientists to participate in ICCAT assessments. Positive feedback was received, indicating that several scientists in the Mediterranean has expertise in the a4a model, given that approximately 70–80% of stock assessments conducted in the General Fisheries Commission for the Mediterranean (GFCM) used this software. It was also noted that the SCRS has started collaborating closely with some scientists working on Mediterranean stocks.

The Group requested authors to incorporate the software manual, and update the definitions of the indices used in the equations for the final document. It was also recommended that the document includes the source of the simulation tests and the links to the original source code in order to facilitate version control in the ICCAT software catalogue webpage.

The Group further discussed the estimation of the total catch-at-age (CAA) matrix, a required input by the a4a model with emphasis on the assumptions and procedures normally used in their estimation, as not age data or direct age observations are available for almost all ICCAT stocks. In ICCAT, and upon request from the relevant SCRS Species Groups, the Secretariat generates a CAA matrix by converting the total catch-at-size (CAS) to age using alternative approaches (e.g., Ortiz and Palma, 2020). However, as not all CPCs provide CAS information, several substitutions and assumptions are normally required in this process. Moreover, since 2023 the submission of CAS data for major ICCAT species has become optional. Therefore, it was recommended that SCRS Species Groups that intend to use models where total CAA is required, request it well in advance, thus the CPCs and the Secretariat can compile and process the information accordingly.

It was suggested the application of a Bayesian multiple imputation approach for addressing missing size data when estimating total CAS/CAA, thereby avoiding ad-hoc methodologies (Carruthers *et al*., 2018). Nonetheless, it was acknowledged that CAS/CAA estimates may remain highly uncertain in the absence of robust ageing sampling and or comprehensive growth studies.

Recognizing the advantages offered by this software, the Group endorsed the inclusion of the a4a model in the ICCAT software catalogue.

During the discussion of Presentation SCRS/P/2026/053, the inclusion of JABBA-select in the ICCAT software catalogue was proposed. It was noted that, once the development and publication of the corresponding R packages for this method have been completed, a similar review document could be submitted to the Group for further consideration.

6. Other matters

6.1 Workplan for 2026 and 2027

Workplan for the post-WGSAM meeting period in 2026

The Group reflected on the workplan for 2026, as approved by the SCRS in 2025.

- Conduct a training workshop on the use of BYET.
- Refine the checklist of bycatch estimation method based on feedback from SCRS Species Groups.
- Conduct an advanced technical MSE workshop.

Tentative workplan for 2027

The following items were identified for the 2027 workplan.

- Keep refining the checklist of bycatch estimation methods.
- Based on the refined checklist, continue to review the submitted methods proposed to estimate the dead and live discards (bycatch) occurring in specific fisheries/fleets that have been forwarded from SCRS Species Groups and provide feedback to further improve those methods.
- Review the performance of BYET workshop and advanced technical MSE workshop in 2026.
- Further improve the Shinny App of BYET tool to integrate model-based estimators.

- Conduct a BYET workshop using the latest version of the Shinny App.
- Conduct an advanced technical MSE workshop.
- To the extent possible, the WGSAM will discuss aspects of stock assessment and MSE brought to its attention by SCRS Species Groups in advance of the next meeting.

6.2 Funding and use of science funding

The Secretariat provided the Group with an update on the use of science project funds between 2021-2025. It was noted that the Group has not fully utilized the available funds in recent years (2022 and 2024), in contrast to 2025, when the allocated budget was much greater than that initially requested (130%). In 2026 a substantial amount of the available funds is already committed, and decisions taken during the meeting will allow for the remaining funds to be used during the second semester of 2026.

It was recommended that the Group avoid making major changes to the 2027 funding requests unless such changes were duly justified by achievements made in the interim. Instead, new activities should be discussed within the long-term planning of the activities and funding requests to be considered for the next biennial period (2028-2029).

The Secretariat also highlighted the importance of duly justifying funding requests, particularly by linking them to specific Commission requests. In addition, it was noted that the Group should report back on the progress achieved and inform the Commission of the expected completion dates for the different studies.

6.3 Coordination with Species Groups on Responses to the Commission

The Secretariat has developed an application, "SCRS Responses to the Commission Tracking System", which was presented at previous meetings of the SCRS. This System provides both a historical archive of Commission requests and SCRS response in recent years, and way to track and update the status of response from both the SCRS and Commission perspective. A short overview of the tool was presented by the Secretariat to the Group, highlighting key features including role-based access, status tracking, filtering, and exporting.

The Group thanked the development team and indicated that this tool will be useful to help track requests from the Commission and the status of responses. During the discussion, several clarifications emerged regarding the operational process of the tool:

- Compilation and Validation: The Secretariat has compiled the Requests from the Commission to the SCRS grouped into the main intended SCRS subsidiary bodies. Requests come primarily from the different recommendations and resolutions approved by the Commission and Panels or during intersessional meetings. SCRS Officers are responsible for validating these entries and potentially including additional requests, such as those from intersessional Commission meeting reports. SCRS Officers are responsible for reviewing the contents of this compilation of requests from the Commission for accuracy and completeness.
- User Access and Modifications: Currently, only SCRS and Commission officers can modify selected entries. The SCRS and Commission can consider whether to expand access in the future.
- Data Entry Timing: Responses should only be entered into the system when officially adopted by the SCRS; it was clarified that the tool should not be used to track the progress of ongoing, drafted responses. Furthermore, the SCRS view of the status of the responses should be input by the SCRS Officers, in alignment with those adopted responses.
- Public Availability: The Group inquired about current plans for broader access to the tool, including the potential to make it available to members of the public. The Secretariat indicated that any decision regarding public access must be made by the Commission.

It was noted that there are currently no requests/responses specifically designated for the WGSAM. However, there are certain requests where the Group is expected to collaborate with one or more other SCRS subsidiary bodies in order to prepare a response to the Commission.

The SCRS Chair emphasized the importance of obtaining feedback from the Commission to explicitly understand when responses are considered fully complete. Commission and SCRS Officers would be asked to review the SCRS responses and assign a status to each response. Commission Officers will therefore decide whether they are content with the response prepared by the SCRS, or if further work is required.

The Group was encouraged to request access to the Tracking System (SCRS scientists can request read only access) providing feedback to the Secretariat on corrections or improvements (e.g. missing responses, additional options for response status entries).

6.4 ICCAT webpage

The Secretariat reported that the ICCAT MSE webpage has been published early in 2026 (https://iccat.int/mse/en/index.asp) with the support and endorsement from the SCRS and the Commission.

The Group also was informed that the current ICCAT Stock Assessment webpage (https://iccat.int/en/assess.html) will be updated with a new format, and that a proposal of the new structure is intended to be presented at the upcoming SCRS meeting in September 2026.

The Group inquired whether the ICCAT stock assessment results would be downloadable on the newly formatted ICCAT webpage, as this functionality can be useful for scientists conducting meta-analyses. It was clarified that a table of stock assessment results (e.g. B_{ratio} and F_{ratio}) used for management advice has been available in the stock assessment detailed report in the past. The Group discussed which data should be publicly available and concluded that it is premature to provide any guidance at this stage because this requires further careful consideration.

The Group was also informed that the Secretariat currently provides data upon request from scientists and collaborates with FAO Fisheries and Resources Monitoring System (FIRMS), as well as the RAM Legacy Stock Assessment Database. However, given the current workload and resource limitations at the Secretariat, it is challenging to support all additional requested tasks. The Secretariat staff will continue to make every effort to respond to these tasks. It was suggested that the Group could make a formal recommendation to the Commission to allocate the resources needed for this task.

7. Recommendations

Recommendation with financial implications

- The Group recommended that a Bycatch Estimation Tool (BYET) training workshop be organized in 2027, with the expectation that this will increase the number of CPCs that will report (dead and live discards). Based on the CPCs needs for additional BYET workshops, the Group will consider scheduling additional training workshops in 2028 and 2029.
- The Group recommended that a training workshop (5-days) be organized for advanced technical MSE in 2027.
- The Group recognized the need to increase capacity building at the SCRS level in MSE, and it recommends training workshops (5-days) for an intermedial technical MSE in 2028 and 2029.

The breakdown of the funds (in euros) requested related to the WGSAM for the next biennial period (2027/2028) is detailed in the table below (a breakdown of requested funds and associated activities for 2029/2030 will be provided in 2028):

Table 7.1. Summary of the budget requests for the period 2027-2029.

WGSAM	*2027*	*2028*	*2029*	*Explanations*
Workshops/Meetings				
Training workshops for the BYET*	30,000			It is estimated new training workshops are needed to further develop CPCs capacity building to use BYET to comply with report requirements on bycatch.
Training workshops for advanced/intermedial technical MSE*	40,000	40,000		It is estimated new advanced and intermedial technical workshops are needed to further develop SCRS capacity building on MSE development.
Modelling				
Further development of the BYET	20,000			To incorporate possible feedback from the training workshop held in 2025.
Science coordination				
Science coordination	2,398			The amount related to science coordination was estimated by the Secretariat as a proportion of the WGSAM total budget in relation to the overall science budget (GBYP excluded). Total coordination costs estimated at €30,000 and €60,000 in 2026 and 2027, respectively.
TOTAL	**92,398**			

* Includes the labor costs of the instructors (2) and financial assistance for the instructors and selected participants in attendance at the workshop.

Recommendation without financial implications

- SCRS Species Groups to test the usability of the draft checklist of bycatch estimation methods evaluation and work with the WGSAM to further refine the checklist.
- CPCs scientists to follow the checklist and include sufficient information when submitting a bycatch estimation document for review. Recommending that CPCs estimate live and dead discards by fleet and ICCAT statistical areas (the minimum stratification required to report Task 1 NC data) so they can be incorporated into the ICCAT database.
- In 2027 the WGSAM should consider organizing a workshop addressing non-stationary population dynamics in stock assessment and MSE under climate change by inviting experts from ICCAT and other organizations in 2028.
- The Sub-Committee on Statistics to consider the potential implications of changes in historical values of discards/bycatch when annual updates are conducted with model-based approaches.

8. Adoption of the report and closure

The Report of the 2026 Intersessional Meeting of the Working Group on Stock Assessment Methods was adopted. Dr. Fan Zhang thanked the participants and the Secretariat for their hard work and collaboration in finalizing the report on time. The meeting was adjourned.

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Table 1. Proposed checklist of bycatch/discard estimation method evaluation.

SCRS Doc No:

Stock:

FlagName:

Gear type:

Category	***Contents***	***Evaluation/Description/ Additional notes***
Data (SCRS Species Groups responsibility)	Describe the key features of the data in detail (e.g. data source, unit, time period, geographical area, data resolution (set, trip, etc.))	
	Describe how the observers are allocated to trips/sets (random, design, opportunistic)	
	Indicate percent coverage for Observer, Effort, and other input data (VMS, EMS)	
	Is there appropriate spatial-temporal and gear/métier overlap between different data sources?	
	Indicate data exclusions or classifications	
	Are the data exclusions appropriate?	
	Are there sufficient discard events (positive catches) to support analysis?	
Method (the WGSAM to review technical aspects, SCRS Species Groups to review in context of a specific application)	Is there a description of the estimation approach (ideally mathematical equations)	
	Is the method appropriate given the frequency distribution of discard events (e.g. proportion of zero observations in the data)?	
	Specify the estimates produced and units (e.g. numbers vs weight) (catch, discards, live or dead discards) by the method	
	Are estimates expanded to represent all fishing effort that interacts with the species?	

	Does the discard estimation account for known factors that influence catchability/selectivity, if necessary? (e.g. type of hook, bait type, depth etc.)	
	Does the method produce a measure of uncertainty? (e.g. CV, StD)	
Diagnosis (the WGSAM to review technical aspects, SCRS Species Groups to review in context of a specific application)	Are sufficient diagnostics provided to assess model performance?	
	How does the model perform relative to the diagnostics?	
Validation (the WGSAM to review technical aspects, SCRS Species Groups to review in context of a specific application)	Is there a test for predicative ability? i.e. cross validation (if so, what is the methods' predictive skill?)	
Comments and Summary (SCRS Species Groups responsibility)	Are the discard estimates roughly consistent with the expectations of experts in the fishery?	
	Other comments.	
	Final recommendation on whether and how these estimates/data should be used in stock evaluation and/or submitted to official fisheries statistics (i.e. Task 1 NC)	

Appendix 1

Agenda

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

2. Bycatch estimation methods
   2.1 Presentation of bycatch estimation methods
   2.2 Review and discuss best practice in estimating bycatch

3. Bycatch estimation tool
   3.1 Contractor progress report
   3.2 2026 and possible 2027 training workshop

4. Management Strategy Evaluation
   4.1 Presentation on papers related to MSE
   4.2 Discuss key issues and priorities of MSEs within ICCAT
   4.3 Discuss TOR of the MSE workshop

5. Stock assessment and software catalogue
   5.1 Presentation of papers related to stock assessment
   5.2 Presentation of other papers of interest to the Group
   5.3 Software catalogue

6. Other matters
   6.1 Workplan for 2026 and 2027
   6.2 Funding and use of science funding
   6.3 Coordination with Species Groups on Responses to the Commission
   6.4 ICCAT webpage

7. Recommendations

8. Adoption of the report and closure

Appendix 2

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Appendix 3

List of documents and presentations

Number	*Title*	*Authors*
SCRS/2026/038	Applying the exploratory climate test for western skipjack tuna and North Atlantic swordfish	Carruthers T., Hordyk A., Sant'Ana R., and Scott R.
SCRS/2026/046	Swordfish Discard Estimates in the Spanish Mediterranean Longline Fleet Using the Bycatch Estimator Tool	Rueda L., Moreno J., Ortiz de Urbina J., Puerto M. A., and Macías D.
SCRS/2026/082	Methods to estimate multi-species discards from the Portuguese pelagic longline fishery in the Atlantic Ocean	Coelho R., Rosa D., and Lino P.G.
SCRS/2026/097	Estimates of live and dead discards of shortfin mako sharks in Spanish surface longline fisheries in the Atlantic Ocean using Bycatch-Estimation Tool	Baez J.C., Alegría A., Rueda L., Salmeron F., DeLaRosa J., Torreblanca D., Ramos M.L., and Macias D.
SCRS/2026/114	Technical improvements to the bycatch estimation toolkit and prototype web-based application	Babcock E.A., Adao A., and Harford W.J.
SCRS/2026/115	Second training workshop on the Bycatch Estimator Toolkit	Babcock E.A., Adao A., and Harford W.J.
SCRS/2026/120	Development of a prototype no-code approach to bycatch estimation	Harford W.J., and Babcock E.A.
SCRS/2026/126	Application of the Bycatch Estimator Tool to estimate bycatch in the Venezuelan industrial longline fleet	Narvaez M., Marín H., Evaristo E., Gutiérrez X., and Arocha F.
SCRS/2026/127	Swordfish bycatch estimation for the Chinese longline fleet in the Atlantic	Jiang M., Wang R., Cheng X., Dong S., and Zhang F.
SCRS/2026/128	Preliminary data model analysis of bycatch from Tunisian swordfish fishery: case of Mahdia port	Zarrad R.
SCRS/2026/129	Evaluating weighting strategies for ensemble model averaging in fisheries stock assessment	Wang R., and Zhang F.
SCRS/2026/130	Development report on a spatial production model	Ijima H.
SCRS/2026/131	Review of the assessment for all initiative (a4a) statistical catch-at-age framework for the ICCAT software catalogue	Jardim E., Mantopoulou Palouka D., Tserpes G., and Kimoto A.
SCRS/2026/133	Estimation of swordfish discards in the South African longline fleet, using the Bycatch Estimator Tool	West W.M., and DaSilva C.
SCRS/2026/134	Estimation of shortfin mako discards in the South African longline fleet	DaSilva C., and West W.M.
SCRS/2026/135	Assessing shortfin mako live-release catch rates in Namibia using a Tweedie GAM standardization framework	Jagger C.E., Hanghome G., Nambahu T., and Paulus S.C.
SCRS/P/2026/041	Rebuilding-Time Based Reference Points: A Forward-Looking Risk-Equivalent Framework for Fisheries Management	Kell L., Mildenberger T.K., Griffiths C.A., Taylor M.H., Cardinale M., and Berg C.W.
SCRS/P/2026/042	Process Error Diagnostics: Case Study for North Atlantic Shortfin Mako Shark Stock Synthesis SCRS/2026/074	Kell L., and Cardinale M.
SCRS/P/2026/051	How observation coverage shapes bycatch estimates in a tropical tuna purse seine fishery	Correa G.M., Ramos M.L., Mugerza A., Herrera M., Alzorriz N, and Báez J.C.

SCRS/P/2026/053	Effects of Biomass Distortion and CPUE Metrics on Bayesian State-Space Surplus Production Models	Mourato B., Sant'Ana R., Sharma R., Kell L., and Winker H.
SCRS/P/2026/055	A proposed process for evaluating discards estimation methods for ICCAT stocks	Gillespie K., Rueda L., Coelho R., Bowlby H., and Ikkiss A.
SCRS/P/2026/056	Canada's discard estimation methods for swordfish and marlins	Gillespie K., and Akia S.
SCRS/P/2026/059	An integrated transferable framework for estimating catches, bycatch and discards in data-limited artisanal and small-scale fisheries	Serghini M., Abid N., Baibbat S.A., El_Joumani E.M., and Ikkiss A.

Appendix 4

SCRS document and presentations abstracts as provided by the authors

SCRS/2026/038 - The Exploratory Climate Test was used to rate the climate robustness of management procedures (MPs) to decrease in four aspects of single stock dynamics commonly cited as likely negative impacts on exploited fish populations: decreasing somatic growth, increasing natural mortality rate, decreasing condition factor and decreasing mean recruitment. Using a reference operating model, this performance rating was performed on the three MPs considered for adoption in the final round of the Western Atlantic Skipjack Tuna MSE. Similarly, the two MPs in the final round of consideration in the North Atlantic Swordfish MSE were also comparatively rated for climate robustness. In both the Skipjack Tuna and Swordfish case studies, the MPs ranked the same across the four exploratory climate tests and the relative rating of the MPs was comparable. These results suggest that it is possible to obtain a rapid comparative rating of climate robustness of MPs using an accessible framework that does not rely on plausible forecasts. Future research will compare the results of such tests with those arising from complex stock projections from ecosystems dynamics models. The Climate Test provides a concise rating of climate robustness allowing managers to further discriminate among candidate MPs and select and MP that is likely to be more robust to potential climate impacts.

SCRS/2026/046 - This study uses the Bycatch Estimator Tool (BYET) to estimate total catches of discards of swordfish by the Spanish longline fleet operating in the western Mediterranean Sea, used as a proxy for discards estimation.

SCRS/2026/082 - This document presents information to address the ICCAT Commission data request for estimation and reporting of discards, including dead discards and live releases. A novel multi-species method based on ratios is provided, calculated from observer data CPUEs by area and season, applied to the Portuguese pelagic longline fishery. The discard ratios for each area and season combination were estimated, followed by an estimate of the total species-specific discards using the total Portuguese pelagic longline fleet effort, by year, date and location. Similar methods were already in place for several of the main species captured by this fishery, and in this document the method is expanded to generalize it and estimate discards for all the main species captured by the fleet, both target and bycatch. Preliminary estimates of both dead discards and live releases for all species for the period between 2012 to 2024 are presented. Pending on the acceptance of this methodology, updates of those discard estimates will be regularly provided on a yearly basis.

SCRS/2026/097 - This study evaluated trends in shortfin mako shark discards by the Spanish long-distance surface longline fleet operating in the Atlantic ICCAT area using the ICCAT Bycatch Estimator Tool (ByET). Previous DEA-based estimates were converted to biomass and compared with ByET outputs. Although both approaches showed strong correlations (Pearson's r = 0.94–0.95), DEA-based estimates were consistently higher than those generated by ByET. The ByET methodology was considered more robust due to its standardized modelling framework; however, uncertainties remain because both Atlantic stocks had to be analysed jointly owing to uneven observer coverage, potentially introducing spatial bias into the estimates.

SCRS/2026/114 - The R package BycatchEstimator uses model-based and design-based procedures in a semi-automated process to estimate total bycatch by expanding the data from an observer program to the total effort from logbooks or landing records. The authors of the tool conducted a workshop in 2023 directed to experts in statistical aspects of fisheries bycatch estimation, and a workshop in 2024 directed to CPC scientists responsible for bycatch estimation. Workshop participants made many suggestions to improve user experience of the toolkit and technical recommendations. This report details the changes and improvements made to the BycatchEstimator R package and its documentation, and the development of a prototype RShiny application interface to the R package.

SCRS/2026/115 - The R package BycatchEstimator uses model-based and design-based procedures in a semi-automated process of estimating total annual bycatch by expanding the data from an observer program to the total effort from logbooks or landings records. The authors of the tool conducted a training workshop in Panama City, Panama, on 21-23 July, 2025. The goal of this training was to provide scientists responsible for bycatch and discard reporting with the tools and skills they need to expand observer data to the total fishery and provide discard estimates. The participants applied the tools to their own data sets and discussed challenges and requirements to conduct bycatch estimation on the fisheries from their countries.

SCRS/2026/120 - The R package BycatchEstimator uses model-based and design-based procedures in a semi-automated process to estimate total bycatch by expanding the data from an observer program to the total effort from logbooks or landing records. To foster accessibility and capacity for bycatch estimation, a prototype R Shiny web application was developed as a no-code solution to application of the BycatchEstimator R package. This report details development and improvements made to the R Shiny web application between 2025 and 2026, including workflow to enable data inputs, data checks and diagnostics, design-based bycatch estimation, and semi-automated report generation. This R Shiny application is positioned to provide accessibility to a wider audience to improve ease-of-use in applying methodologies for bycatch estimation.

SCRS/2026/126 - Bycatch estimation in pelagic longline fisheries is essential for stock assessment and ecosystem-based fisheries management. This study applies the Bycatch Estimator Tool to data from the Venezuelan industrial longline fleet, combining scientific observer records and fishing logbooks for the period 1991-2012. Blue shark (Prionace glauca) and wahoo (Acanthocybium solandri) were used as case study bycatch species, and yellowfin tuna (Thunnus albacares) was included as a target species for validation purposes. Observer coverage averaged 14.82% of total fishing sets during the study period, with a marked decline in coverage after 2006. Both design-based (ratio and delta estimators) and model-based (Tweedie and delta-lognormal) approaches were applied and compared, yielding generally consistent trends across methods. However, systematic underestimation was observed when tool outputs were validated against total catch reported in logbooks and ICCAT Task 1 data for all three species. These discrepancies suggest that, while the tool represents a valuable and promising framework for bycatch estimation, additional considerations specific to the Venezuelan fleet and the geographic characteristics of its fishing grounds may be needed to improve the accuracy and representativeness of the estimates.

SCRS/2026/127 - This study estimated swordfish bycatch for the Chinese longline fleet in the Atlantic using the BycatchEstimator toolkit. Chinese observer data from 2020–2025 were used to estimate landings, live discards, and dead discards through model-based and design-based approaches. For landings and live discards, the Tweedie model showed the best overall performance based on residual diagnostics, cross-validation, and comparison with observed landings. For dead discards, the delta-lognormal model was selected based on model diagnostics and the correlation between observed and predicted values. Total estimated swordfish catch ranged from 38,539 kg in 2021 to 214,630 kg in 2023. These estimates improve the transparency and reproducibility of swordfish bycatch estimation for the Chinese longline fleet and provide a quantitative basis for future bycatch reporting and stock assessment work.

SCRS/2026/128 – Landings of swordfish and bycatch species were monitored on samples of the coastal fishing fleet at the port of Mahdia (central-eastern Tunisia). This monitoring was carried out at the port auction. The sampling years extend from 2018 to 2025. The number of observations was around 387. The fleet monitored is the longliners targeting swordfish during the campaign. The results showed that on average swordfish accounted for 79.1% of catches by weight and 77.8% by number. The two main species in bycatch are albacore (8.5%) and tuna (6.7%) these values by weight. While our number represents consecutively: 8.3% and 7.1%.

SCRS/2026/129 - Three operating-model scenarios representing well-specified and mis-specified ensembles were examined. Ensemble outputs were integrated using equal weighting, information-theoretic weighting, and predictive weighting approaches, including cross-validation-based optimization methods. Performance was evaluated using relative error, mean absolute relative error, and coverage probability for stock status indicators and time-series quantities. Equal weighting performed well when the ensemble adequately represented the true parameter values but showed increased bias and overly conservative uncertainty under misspecification. Information-theoretic weighting exhibited comparatively poor robustness across scenarios. Predictive weighting approaches generally improved estimation performance, particularly under mis-specified ensembles. Among these, the cross-validation optimization approach based on retrospective rho statistics produced the most stable estimates and lowest estimation errors, whereas the cross-validation optimization approach based on mean absolute scaled error provided the best uncertainty calibration. The results demonstrate that predictive weighting provides a practical and robust alternative for ensemble stock assessment under structural uncertainty.

SCRS/2026/130 - Stock assessment models are widely utilized as the foundation for fisheries management; however, critical unresolved challenges remain, including effort creep, hyperstability, fish migration, and statistical model comparison. To address these issues, this study developed LinCS (Linking Complex fishery operations to Species distributions), a geostatistical stock assessment framework designed to integrally handle complex fishing activities and species distributions. Here, we report on the current development status of LinCS-IC (Index and locational catch), a state-space model that integrates logbook and gridded catch data. The framework employs a spatially explicit theta-logistic model for its process model, while utilizing the Tweedie distribution and the Baranov catch equation for its observation model. Simulation analyses conducted via Template Model Builder (TMB) demonstrated that LinCS-IC generally achieves robust estimation performance. Conversely, non-identifiability issues emerged between the spatial structures of carrying capacity and process errors, leaving unresolved challenges in MSY (maximum sustainable yield) estimation. Furthermore, the incorporation of spatial catch data resulted in a substantial increase in computational burden. Future work will focus on enhancing model stability and estimation accuracy by incorporating AR(1) process errors and environmental covariates.

SCRS/2026/131 – The Assessment for All Initiative (a4a) is a statistical catch-at-age (SCA) stock assessment framework originally developed by the European Commission Joint Research Centre (JRC) to simplify, standardize, and scale up fish stock assessment. The framework is built on the Fisheries Library for R (FLR) and uses an age-structured population dynamics model with a flexible, submodel-based formulation that allows the analyst to express fishing mortality, catchability, recruitment, variance, and initial population abundance as linear models using standard R formula syntax—including generalized additive models (GAMs) via the mgcv package. The model has been applied to more than 200 stock assessments in the Mediterranean Sea through the General Fisheries Commission for the Mediterranean (GFCM) and the Scientific, Technical and Economic Committee for Fisheries (STECF). It supports full uncertainty propagation through maximum likelihood estimation (MLE), MCMC, and simulation, as well as short-term projections and Management Strategy Evaluation (MSE) conditioning. The a4a R-package (FLa4a) and its comprehensive handbook are openly available via the FLR r-universe and GitHub repositories. The authors recommend ICCAT consider the registration of the a4a methodology in the ICCAT software catalogue.

SCRS/2026/133 – Swordfish is considered a valuable species and is a target species in the varied fishing strategies deployed. Various factors influence whether a caught swordfish is retained or discarded in this fishery, including minimum size, market factors, storage capacity and vessel preference. The model-based approach of the Bycatch Estimator tool (BYET) was used to estimate total bycatch using set level observer data. The final tweedie model retained year, quarter, and vessel as a random effect, while spatial area and fishing tactic were not selected by the BIC criterion. The greatest variability in estimates of swordfish bycatch was expected in the earlier period due to varied observer coverage. The observer-collected length frequency data for retained swordfish indicate a decline in undersized swordfish (<119 cm LJFL) following the minimum size regulation after 2015, and from 2021 onward indicate an increase in smaller individuals. Patterns in the non-retention of swordfish is unlikely to reflect a change in overall fishing effort, but rather shifts in the size composition of swordfish encountered by the fleet, changes in targeting behaviour, or changes in skipper-level retention decisions.

SCRS/2026/134 – A preliminary assessment of shortfin mako (Isurus oxyrinchus) dead discards by the South African pelagic longline fleet for 2015–2024 was conducted using the Bycatch Estimator Tool (BYET). The final delta-Lognormal retained Year only, while month, spatial area, fishing tactic and vessel random effects were not retained. Annual estimated dead discards fluctuate without a clear monotonic trend, ranging from ~78–335 individuals in low years to a 2024 estimate of 544 individuals (95% CI 232–713). Applying the observed mean individual weight (20.9 kg) gives an approximate 2024 biomass of 11.3 t (95% CI ≈ 4.8–14.9 t). Several single year estimates exhibit high relative uncertainty (many CVs ≥ 0.5), so year to year differences should be interpreted cautiously. Model families yield broadly similar temporal patterns, though the Tweedie formulation produced larger and less precise totals in some years; residual diagnostics supported the delta–Lognormal choice. Future work will incorporate live release mortality, reassess random effect structures (vessel), explore finer spatial covariates and consider multiyear aggregations to improve precision and management relevance. These results provide a transparent baseline for annual updates and further methodological refinement.

SCRS/2026/135 - This study evaluates shortfin mako (Isurus oxyrinchus) live-release catch rates for the Namibian pelagic longline fleet, developing a standardized CPUE baseline for 2023-2024 under ICCAT Recommendation 22-11. Following a Ministerial directive to the industry in March 2023 for vessels to live-release shortfin mako to avoid exceeding Namibia's 256 mt retention allocation. A total of 617 longline sets were analysed using a Tweedie generalized additive model with vessel identity, month, and year. Vessel effects were the strongest CPUE predictors: vessels B and C exhibited 4.0-fold and 2.8-fold higher catchability than vessel A. A clear seasonal pattern was detected, with CPUE peaking during austral summer. Live-release CPUE was approximately 25% lower pre-Rec. 22-11 than post (ratio = 0.77; p = 0.105 with seasonal model); a subsampling sensitivity analysis confirmed this directional finding in 92.1% of 1000 balanced comparisons, indicating the catch limit was operationally binding within year one. The standardized index showed minimal interannual contrast, representing a baseline rather than a trend. Spatial analyses highlighted higher CPUE in the southern Namibian EEZ. These findings support continued refinement of shortfin mako live-release reporting under Rec. 25-08.

SCRS/P/2026/041 – This study introduced a process-error diagnostics framework for Stock Synthesis in which surplus-production residuals are interpreted as an integrated signal of non-stationarity and structural misspecification, rather than merely noisy recruitment deviations. It showed how temporal trends, autocorrelation and biomass-dependent patterns in these residuals can help identify biased MSY reference points, unstable Kobe trajectories and over-confident forecasts even when standard fits and AIC appear satisfactory. The paper recommended that assessments adopt a minimum diagnostic checklist, systematically apply process-error plots, retrospectives, hindcasts and backtests before providing advice, and treat non-stationary or biased process error as a trigger for alternative model structures, ensemble projections and MSE robustness tests

SCRS/P/2026/042 – This study proposed a rebuilding-time-based reference-point framework built around two quantities: Brebuild, the lowest biomass from which a stock can reach a chosen Btarget within an agreed horizon under specified Frebuild, and Trebuild, the time needed to reach that target from the current state. Using age-structured trajectories for 82 data-rich stocks, it illustrated how these quantities can deliver risk-equivalent limits and triggers across life histories and assessment tiers, and support policy-conditional targets that can go beyond BMSY towards demography-based or ecosystem objectives. The paper argued that reporting Trebuild alongside SSB and embedding Brebuild and explicit horizons into harvest control rules would make ICCAT recovery plans for tunas and sharks more transparent, empirically grounded and easier to calibrate via MSE.

SCRS/P/2026/051 – Investigating the effects of fishing on non-targeted (bycatch) species is crucial for conservation and management matters. Information from on-board observers provides a valuable source for estimating bycatch; however, due to several factors such as their high costs and logistic challenges, observer programmes usually cover a small percentage of the fishery. To estimate bycatch for the unobserved fishing activity, a ratio estimator is commonly used, which assumes a linear relationship between the ratio of bycatch and total target catch or effort. In this study, we implemented a simulation experiment to evaluate the performance of two ratio and one model-based estimators under different sampling coverage scenarios. The tested model-based estimator followed the geostatistical spatio-temporal modelling framework. We used information from the Spanish-owned tuna purse seine vessels operating in the Atlantic Ocean as case study. Our results suggest that the ratio estimators may underestimate annual bycatch when the sampling coverage is lower than ~ 20%, even for the most common taxa. Conversely, the model-based estimator generally produced accurate estimates even under low sampling coverage scenarios, although it displayed poor performance for rare taxa. While our results are only applicable to the analyzed fishery, this study presents a simulation framework that may be applied to other fisheries, supporting the implementation of observer programmes from which appropriate estimates of bycatch can be obtained.

SCRS/P/2026/053 – This presentation explored how biomass distortion and CPUE metrics can influence the performance and interpretation of Bayesian state-space surplus production models. Using an age-structured operating model based on South Atlantic albacore, we evaluated scenarios in which spawning biomass (SB) and exploitable biomass (EB) were either aligned or substantially divergent due to differences between maturity and selectivity schedules. Simulated CPUE indices expressed in both biomass and numbers were fitted using the standard JABBA model and an extended formulation, JABBA-Select, which explicitly incorporates selectivity dynamics and distinguishes SB from EB. Results showed that traditional surplus production models may develop systematic bias when CPUE reflects exploitable biomass rather

than reproductive biomass, particularly under size-selective fishing scenarios. By explicitly incorporating selectivity and biologically informed productivity relationships, JABBA-Select reduced structural inconsistencies and improved the interpretation of management-related quantities such as B/B_{MSY} and F/F_{MSY}.

SCRS/P/2026/055 – This presentation describes Canada's discard estimation methods for swordfish and marlins in its pelagic longline fishery. Twenty-two years of observer data and commercial catch logs were analyzed and covariates included fishing operation features environmental variables and spatial habitat zones. Eleven different approaches were tested ranging from simple mean estimators to regressions, machine learning, and complex spatial-temporal models. Following model selection, methods were tested for predictive skill. A generalized linear model was the most appropriate method for swordfish. Dead discards account for an average of roughly 3% of Canadian pelagic longline total catch and live releases are approximately 0.4%. Given the rarity of marlin capture in this fishery, the authors were unable to identify a statistically defensible method for estimating discards.

SCRS/P/2026/056 – Several recent ICCAT recommendations require CPCs to develop statistical methodologies for estimating discards. However, the SCRS has no established procedure for evaluating those methods and then incorporating estimates into the ICCAT databases. This presentation proposes such a procedure along with standardized criteria for evaluating estimation methods. The authors suggest a peer review process organized within the species groups which assesses methods on the basis of the data inputs, methodological approaches, diagnostics, and validation processes.

SCRS/P/2026/059 - Small-scale and artisanal fisheries are often poorly covered by conventional observer-based monitoring programmes, yet management bodies increasingly require defensible estimates of catches, bycatch, and discards. This paper presents a transferable alternative framework designed for data-limited artisanal fisheries and validated through a ten-year simulator-based experiment. The framework combines (i) an explicit stratification engine indexed on super-strata, geographical strata, landing sites, gears, months, species, and discard statuses; (ii) five complementary surveys that together reconstruct a design-based composite estimator $\hat{P} = \hat{R} \times \hat{E}$ with month m / m+1 retrospective coupling; (iii) a stratified paired-strata bootstrap that propagates the composite covariance structure; (iv) an explicit precision-risk classifier that distinguishes estimable from non-estimable analytical cells; and (v) a simulator that generates realistic monthly field data over ten years, reproducing real-world constraints such as variable coverage, missing m+1 retrospective surveys, real-zero observations, non-observed cells, and weakly paired designs. Six scenarios are defined to stress-test the estimation pipeline under controlled conditions, from fully estimable designs to designs in which every analytical cell is supported by a single paired geographical stratum. The simulator reproduces the complete methodology, verifies the production identity $\hat{P} = \hat{R} \times \hat{E}$, confirms that confidence intervals are returned only when statistical support is sufficient, quantifies the effect of sampling choices on precision risk, and converts non-estimable cells into field-planning recommendations. The approach was initially developed and is currently being progressively operationalised in Morocco's artisanal fisheries, which motivated the simulator-based validation strategy, but the present contribution is framed as a general methodological protocol transferable to other data-limited small-scale and artisanal fisheries worldwide. The simulated dataset is explicitly not intended to represent real production levels: it is a controlled, reproducible benchmark for evaluating estimator behaviour, sampling design, and precision diagnostics without exposing operationally sensitive field data.