Report of the 2025 Meeting of the Subcommittee on Ecosystems and Bycatch (SC-ECO)
(Hybrid/Madrid, Spain, 12-16 May 2025)

The results, conclusions and recommendations contained in this report only reflect the view of the ICCAT Subcommittee on Ecosystems and Bycatch (SC-ECO). 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 and meeting arrangements and assignment of rapporteurs

The Co-conveners, Dr Andrés Domingo and Dr Alex Hanke, opened the meeting and welcomed the participants (the Subcommittee). The Assistant Executive Secretary also welcomed the participants and wished them a successful meeting. The Co-conveners then proceeded to review the agenda, which was adopted with minor changes (**Appendix 1**). The list of participants is included in **Appendix 2**. The list of documents and presentations provided to the meeting is included in **Appendix 3**. Summaries of the documents and presentations are available in **Appendix 4**.

Rapporteurs were assigned as follows:

Section 1.   N.G. Taylor
Section 2.   N.G. Taylor, M.J. Juan-Jordà, J. Ford, E. Adonegi-Odriozola,
Section 3.   A. Hanke
Section 4.   J.C. Báez, L. Rueda, D. Torreblanca
Section 5.   J. Bell, S. Jiménez, D. Ochi, H. Wade
Section 6.   M. Grande, G. Díaz
Section 7.   N.G. Taylor, A. Domingo, M. Ortiz
Section 8.   J.C. Báez, R. Coelho, M.A. Saber
Section 9.   N.G. Taylor
Section 10.   N.G. Taylor, A. Domingo
Sections 11-15. A. Hanke, A. Domingo, C. Brown
Section 16.   G. Diaz, M. Neves Santos, C. Brown
Section 17.   N.G. Taylor, A. Hanke, A. Domingo

2. Review the progress on developing status indicators, pressure indicators and reference levels for the components of the Ecosystem Report Card

Document SCRS/2025/096 presented progress on the EcoCard seabird component by outlining four possible methods for generating indicators to quantify the impact of ICCAT fisheries on seabird populations. These methods include: 1) use of direct observations from observer programmes (Form ST09); 2) inferring from the overlap between seabird foraging grounds and fishing effort; 3) inferring from effectiveness of mitigation measures and bycatch rates; and 4) using the Spatially Explicit Fisheries Risk Assessment (SEFRA) approach.

The Subcommittee discussed the four methods, considering their respective merits, limitations and further requirements for generating indicators for EcoCard seabird component.

Regarding Method 1 (direct observations from observer programmes), the Subcommittee noted that fine scale data from individual CPCs would be required to generate seabird bycatch indicators for the EcoCard. The Subcommittee suggested that intersessional meetings with relevant CPCs be held to discuss the available observer data in greater detail, following the collaborative approach previously used by the seabird subgroup of the SC-ECO in the past. The Subcommittee clarified that the data submitted by CPCs via the ST09 form would be useful to generate seabird bycatch indicators. However, the Subcommittee recognized that the aggregated summarized data provided by the ICCAT Secretariat from ST09 submissions in response to data requests are not suitable for generating seabird indicators. Additionally, it was also noted that while the Electronic Monitoring System (EMS) is a powerful tool, it currently lacks the capacity to discriminate between different seabird species, but this functionality may become available in the future. Finally, the Subcommittee questioned whether declining observer coverage rates reported by some CPCs was

widespread and would reduce the amount of observed data available for analyses. A summary of the trends in observer coverage reported in ST09 was prepared by the Secretariat and it indicated that declines in coverage were not widespread across CPCs.

Regarding Method 2 (overlap between fishing effort and foraging areas), the Subcommittee agreed it to be the best available method to generate indicators of seabird bycatch risk at present given the publicly available data in the ICCAT Secretariat. However, for it to be implemented, decisions are needed on which species to prioritise and how often the risk indicator (the analysis) would need updating. The Subcommittee suggested that most commonly bycaught species are likely to be the most relevant to be considered for the analysis and the Subcommittee has identified in the past most vulnerable seabird species to ICCAT fisheries. Therefore, it was suggested to create a vulnerability index using Method 2 for highly vulnerable seabird species, with an emphasis on collaborative work, and data pooling and sharing collaboratively across CPCs to advance this work.

Regarding Method 3 (effectiveness of mitigation measures and bycatch rates), the Subcommittee discussed that unless the CPCs begin systematically collecting data on mitigation measures use, Method 3 cannot be used to generate indicators given the limitation in the data. The Subcommittee noted that recent collaborative work had assessed the effectiveness of mitigation methods on seabird bycatch in response to *Supplemental Recommendation by ICCAT on reducing incidental bycatch of seabirds in ICCAT longline fisheries (Rec. 11-09)*, which has been presented to the Subcommittee in the past and recently published (Bell *et al.*, 2025). This work provides the best available knowledge on seabird bycatch mitigation that could be used to inform the EcoCard seabird component. However, it was also noted that often the effectiveness of mitigation measures depends heavily on the fishing master. The Subcommittee emphasized the importance of continuing work in this collaborative format to support future progress.

Regarding Method 4 (the SEFRA risk assessment), the Subcommittee acknowledged that it is a potential tool to generate indicators to inform the EcoCard seabird component. The Subcommittee noted that the Commission for the Conservation of Southern Bluefin Tuna (CCSBT) has finalized its SEFRA model with updated data and plans to expand the assessment to a global Southern Ocean scale, inviting CPCs of other tuna Regional Fisheries Management Organizations (tRMFOs) (workplan for 2026). Inclusion of additional data from ICCAT CPCs will be valuable for the tuning of SEFRA to the Atlantic.

In support of Method 4, a representative of CCBST provided an update on the SEFRA risk assessment exercise under the Common Oceans Phase II, which replicates and expands the spatially explicit analysis conducted in 2019 under the Common Oceans Phase I.

The discussion that followed indicated how the outputs from the SEFRA risk assessment could be translated into indicators to inform the seabird component of the EcoCard. The CCSBT report noted the coarse spatial (5°x5°) and temporal (monthly) resolution of the analysis and how the generation of such indicators would require careful consideration. The Subcommittee discussed how the SEFRA analysis will produce spatial risk maps periodically (at least for the period of 2019, and for the period of 2026), therefore some indicators could be derived from trends in spatial overlap over time.

The results of the global seabird assessment will be publicly available some time in 2026.

The four methods and activities discussed above would benefit from the use of fine scale (set by set data) from the national observer programmes, through a collaborative joint CPC analysis, as it was done previously within the Standing Committee on Research and Statistics (SCRS).

Document SCRS/2025/107 showed a preliminary Ecopath model for the Tropical Atlantic Ocean (TAO) pelagic oceanic ecosystem, aiming to improve the understanding of its structure and functioning, and to assess the impacts of fisheries on the marine environment.

The Subcommittee noted that the ecosystem model is sensitive to the quality of input data and the number of functional groups included. It highlighted that the best available data and information have been used to parametrize the model. It was recommended to maintain a balance between model complexity and practicality, depending largely on data availability and reliability.

The Subcommittee acknowledged challenges related to the high plasticity in species' diets, making it difficult to incorporate accurate dietary information in the Ecopath model. Caution was advised when interpreting model results in light of these limitations. It was noted, however, that substantial efforts had been made to compile and incorporate available diet studies, considering temporal and regional variability.

The Subcommittee discussed the sources of biomass estimates for species such as seabirds and whales, confirming that these rely on published literature and dedicated research campaigns. Bycatch data used in the current model was described as preliminary, with plans to refine estimates through literature reviews and observer programme data in future model iterations.

The Subcommittee raised the importance of including catch data from fleets outside ICCAT's reporting scope (e.g. Central Equatorial Atlantic (Fishery Committee for the Eastern Central Atlantic (CECAF)) and artisanal bait fisheries) to better capture total removals affecting the ecosystem. It was acknowledged that while this would add value, the current model primarily focuses on oceanic environments where ICCAT fisheries operate.

The Subcommittee noted that the Ecopath with Ecosim (EwE) ecosystem model can be updated over time, allowing iterative improvements as new and better data become available.

The Subcommittee noted the need to address uncertainty in the input data (e.g. biomass estimates, discards, etc.). It was clarified that, for each fishing gear group, the model requires input data on discards and landings and their disposition and the biomass information for target species in the model is based on existing ICCAT fishery stock assessments. It was noted that mechanisms for evaluating model outputs in ecosystem models are less developed compared to fisheries stock assessments, but that other fora (e.g. International Council for the Exploration of the Sea (ICES)) have made progress capturing uncertainty and validating models. It was also noted that EwE models have recently started to be used as operating models within Management Strategy Evaluations (MSEs). There was agreement on the importance of advancing such validation frameworks within this context.

Document SCRS/2025/108 proposed a suite of ecological indicators derived from the EwE model developed for the TAO to inform the ICCAT Ecosystem Report Card (EcoCard). These indicators provide measures of key ecosystem attributes and fishing impacts on the structure and function of the ecosystem.

The Subcommittee noted that the list of potential ecological indicators presented was extensive. It was requested that future work should include explanations of the different indicators, their utility for informing management, and their respective timeframes or time series coverage. It was clarified that the model can be easily updated periodically as new data become available.

The Subcommittee acknowledged that no single indicator can adequately represent the full impact of fisheries on the ecosystem. A multi-indicator approach was recognized as necessary to capture the various structural and functional aspects of the marine environment.

The Subcommittee noted the importance of accounting for regional processes and patterns within the ecosystem, as certain areas may experience specific dynamics worth monitoring. It was highlighted that the current model is not regionalized, but future developments could incorporate spatial resolution through the use of Ecospace.

The Subcommittee discussed the concept of estimating "unfished biomass" levels as a potential reference point for ecosystem health. It was noted that advances on this have been made in other fora such as ICES, and it would be possible to define and simulate such scenarios within this modelling framework. The Subcommittee also noted that the model has the capacity to incorporate climate change scenarios, which could be valuable for assessing future ecosystem dynamics.

The Subcommittee reflected on the experience of other tRFMOs (notably the Western and Central Pacific Fisheries Commission (WCPFC) and the Inter-American Tropical Tuna Commission (IATTC)), where the development of ecosystem models is further advanced (e.g. EwE and Spatial Ecosystem and Population Dynamics Model (SEAPODYM)) as tools to support an Ecosystem Approach to Fisheries Management (EAFM) implementation. It was noted that these tRFMOs and ICCAT share similar challenges using these tools to support existing management advice (which focuses on the management of tunas) as well as opportunities, as ecosystem models continue to evolve.

Document SCRS/2025/117 presented an update on the activities developed in 2024 and 2025 of the TunaMed Observatory case study, which is developing environmental indicators specific to the Mediterranean Sea to support the development of ICCAT Ecosystem Report Card. In 2024/2025, TunaMed advanced work on indicators including marine heatwaves, primary productivity, turbulence, climate velocity, and small pelagic biomass.

The Subcommittee noted that evaluating the purpose of each environmental indicator proposed for the EcoCard is crucial. It was emphasized that a clear description is needed for each indicator, explaining what it measures and whether it serves as a proxy or an actual measure of its effect on specific ecological processes of a species. The Subcommittee requested that indicator developers provide a detailed explanation of the intended purpose of each indicator proposed for the EcoCard. It was pointed out that multiple SCRS documents have already been presented with specific environmental indicators explaining the ecological process of large tunas and tuna-like species in the Mediterranean. It was noted how relevant information regarding the environmental indicators is already available in the SCRS documents, which helps clarify their use and purpose.

The Subcommittee discussed the importance of monitoring relevant environmental indicators (as done in the TunaMed Observatory case study) to better understand key ecological processes of tunas and tuna-like species, such as evaluating the effects of marine heatwaves on species. The Subcommittee proposed that it would be useful to identify relevant connections and hypotheses regarding the influence of climate change and environmental variability on relevant ecological processes of tunas and tuna-like species, which could be captured in Operating Models (OM) and then be tested directly through MSE. This approach would allow for more targeted and evidence-based assessments of effects of climate and the environment on the dynamics of the stocks. Additionally, the authors noted that environmental indicators can be applied not only within the context of MSE (focused on a specific species), but also more broadly within a framework of climate risk assessment in regional areas.

Presentation SCRS/P/2025/037 proposed two economic indicators to inform the socio-economic component of the EcoCard at the scale of the whole ICCAT Convention area: the direct cash earnings from ICCAT species and the estimated landed value of ICCAT species.

The author noted that the two indicators are presented as simple options for providing feedback on the socio-economic component of the EcoCard and that no social indicators were included, given the difficulty of harmonizing and standardizing the social values which are highly influenced by the cultural features of individual countries. The Subcommittee acknowledged that there are ways of developing more sophisticated indicators on the topic, although it tends to be difficult to gather supporting data, in particular for small-scale/artisanal components.

It was clarified that the direct cash earning from ICCAT species corresponds essentially to cash earned by countries through the export and re-export of commodities coming from the tuna industry, and that its value for a given year does not necessarily correspond to the direct tuna production of that year and is not inclusive of information related to fisheries subsidies. The Subcommittee noted that most of the data came from different activities in the value chain, since it accounted for various economic activities related to the tuna industry.

The Subcommittee also noted that the continuous increase of indicators values would be influenced by inflation and was informed that the standardization with international inflation rate would not be necessarily appropriate. It was pointed out that the analysis assumed the price for local markets to be similar to that of exports. Noting that the indicator was the accumulation of individual countries' results, it would therefore be possible to disaggregate the indicator into trends for individual countries and/or according to the different economic status of countries.

Some members of the Subcommittee also informed about their plans to make contributions to this component in the coming years with respect to the potential effects of climate change and also social dimensions. All the ideas were very welcomed by the Subcommittee.

2.1 Review progress on the development of tools that support EcoCard development (e.g. tool for prioritizing species at risk)

Document SCRS/2025/097 explored how spatial indicators - specifically the Gini index (a measure of inequality or dispersion) and D95 (the range or spread of a distribution that contains 95% of the data) - can serve as proxies for stock health and ecosystem monitoring by quantifying spatial patterns in the distribution of tuna and tuna-like species across the Atlantic.

The Subcommittee discussed the document noting that the center-of-gravity indicator showed shifts in the distribution of ICCAT stocks that could be a fishery rather than an environmental effect. The author emphasized the need to examine detailed data to disentangle observation error from process error, noting that a more rigorous analysis would require the participation of someone with deeper knowledge of the fisheries.

The Subcommittee also inquired about the Gini index, specifically how to interpret it. It was explained that the index indicates whether a stock is more uniformly distributed or aggregated. The Subcommittee found the results to be interesting, while some members were unaware that CATDIS and EFFDIS data could be used for this purpose. It was clarified that only EFFDIS estimates after year 2000 were considered appropriate for use, and that EFFDIS was already being used in related work (e.g. SCRS/P/2025/036) for estimating bycatch and that the analysis was exploratory.

The Subcommittee also inquired about the interpretation of spatial distribution patterns. It was suggested that observed spatial shifts could be due to a range of factors.

Document SCRS/2025/111 presented preliminary estimates of spatial longline catch per unit effort (CPUE) for key tuna species in ICCAT-managed fisheries. The analysis combines catch (CATDIS) and imputed effort (EFFDIS) datasets via spatial and temporal joins in R.

The Subcommittee noted the potential of this work to develop a recommended approach for others needing to create CPUE data from the CATDIS and EFFDIS datasets.

Document SCRS/2025/055 applied three statistical modelling approaches - Generalized Additive Mixed Models (GAMMs), Boosted Regression Trees (BRTs), and Bayesian Additive Regression Trees (BART) - to predict the spatio-temporal distribution of silky sharks in the eastern tropical Atlantic using fisheries-dependent data from EU tropical tuna purse seine fisheries.

The Subcommittee asked which predictors contributed to the high probability of occurrence near Brazil, where observed catches were low. The authors responded that it was likely a combination of variables. It was suggested to extend the analysis for other shark species and to apply the approach to a stock that has already been formally assessed. The Subcommittee noted that additional fishery independent information is available to support this analysis.

The Subcommittee noted prior reviews of EASI-Fish results, highlighting discrepancies between EASI-Fish outputs and formal stock assessments (e.g. for blue shark in the Indian Ocean Tuna Commission (IOTC) and IATTC). The Subcommittee urged caution in interpreting results. The authors acknowledged the limitations and expressed interest in incorporating additional data sources. The Subcommittee emphasized the importance of including a more complete set of diagnostics to better assess model performance.

The Subcommittee also received a progress report on the risk assessment tool. It was reported that the work had been suspended until it could leverage more modern artificial intelligence tools.

2.2 Review progress on the ECOtest framework

Document SCRS/2025/109 outlined ECOtest Indicator 2, an artificial intelligence (AI) based approach designed to provide stock status indicators across pelagic species - such as sharks, tunas, and billfish - by leveraging a broad simulation framework.

The Subcommittee discussed the presentation and suggested testing the model on non-fish taxa, such as seabirds or sea turtles. It was also asked whether the tool could be applied to species that have not been assessed or to catch data with spatial indicators (e.g. patchy survey data). The Subcommittee agreed on the value of assessing the predictive skills of the model but noted that incorporating spatial indicators would require characterizing spatial dynamics, which could be difficult.

The Subcommittee also discussed the potential of stock co-occurrence to provide an indicator of stock status for the data poor species. The Subcommittee noted that if a set of stocks is subject to the same exploitation patterns, it might be possible to infer the status of the co-occurring species. Finally, the Subcommittee suggested that a half-day or full-day workshop will help to advance this work.

3. Review of work related to incorporating climate change impacts in management decisions

3.1 Review of the results of the contract to provide climate conditioned, risk equivalent management advice for northern swordfish

Document SCRS/2025/090 demonstrated an approach for providing climate conditioned, risk equivalent advice for North Atlantic swordfish that involves modifying the management procedure's Harvest Control Rule (HCR) using an environmental control factor (ECF). The ECF was based on the relationship between year class strength and the Sea Surface Temperature (SST).

The Subcommittee questioned whether the aspects of the SS3 model parameterization not included in the CASAL2 model parameterization (i.e. time varying selectivity) were influential. It was explained that the sensitivity to time varying selectivity was tested and there was no effect on model fit but a large benefit in terms of reduced computational time, so it was removed. It was also requested to check the equation describing the relationship between year class strength and SST.

The Subcommittee noted that demonstrating a causal relationship between an environmental driver and a population's dynamics is relatively hard to do, however it was noted that even an expert opinion could be used to develop an ECF. The Subcommittee hypothesized that the schooling behaviour (low density aggregations) of swordfish and their spawning habits might mean that swordfish spawning is more influenced by the thermocline than by SST, and it was noted that hypotheses like these are an important part of advancing model conditioning. It was suggested that an alternative to the trialled approach could be to performance test a management procedure over a range of plausible climate change scenarios (based on likelihood, knowledge and potential impact) and/or include the effect in the conditioning of the reference set of operating models. In all approaches, there is still a requirement to understand the mechanism by which the environmental covariate is operating on the population.

Given that the trial focused on an operating model from the swordfish reference models, the Subcommittee questioned how the results would inform the work of that Group to develop climate robustness operating models. The Swordfish Species Group Coordinator indicated that the Swordfish Species Group would be considering the best approach.

The Subcommittee recognized that demonstrating how to provide climate conditioned assessment advice is important and that the scientific community needs to start advancing understanding of how the effects of climate change affect the biological traits and dynamics of ICCAT species.

The responsibility of understanding the functional responses of the different ICCAT species to climatic changes is partially covered by the Subcommittee, but it also requires work occurring in parallel with the Species Groups, since it represents the basic knowledge needed for our models. Given that gaining this understanding will take time, it was strongly recommended that the Subcommittee and the SCRS Species Groups start exploring this field and use best understanding of the functional relationships between climate and fish population dynamics to inform ecosystem and MSE models.

The Subcommittee felt that the best climate predictions come from the Intergovernmental Panel on Climate Change (IPCC). Part of this information is publicly available on accessible data platforms, such as Copernicus, and also as the output of different research projects. The Subcommittee also noted that existing knowledge has increased quite rapidly in recent years and is expected to increase more in the near future. An additional source of environmental data for which forecasted changes are available are platforms like bio-oracle.

Document SCRS/2025/118 provided a review of how management procedures are an effective adaptation tool for managing stocks under changing climate conditions.

The Subcommittee noted several other papers not covered by the review. In particular these were:

1) A presentation made at the Pelagic Advisory Council and A project report on including ecosystem reference points in single species advice frameworks;
2) A paper demonstrating how to include ecosystem reference points in single species advice frameworks to do this is practice by Kell *et al.* (2024);
3) A WGEAWESS report which focuses on using integrated ecosystem assessments (IEAs) to inform the ecosystem approach to marine management of the Atlantic European continental shelf;
4) A review on how to link single species MSE to ecosystem models by de Moor (2023);
5) A review with worked examples, including for Atlantic tropical tuna by Bastardie *et al.* (2022).

3.2 Discuss reporting of climate change and ecosystem impacts in the SCRS annual report

The Subcommittee discussed whether there was sufficient progress on the ecosystem indicators and climate conditioned advice to warrant including text to incorporate:

- A section of the annual report dedicated to describing broad ecosystem and/or climate considerations of general interest to the Species Groups;
- A section of one or more species-specific executive summaries on ecosystem and climate considerations;
- An update of the ecosystem report card.

The consensus was that since most of the indicators in the EcoCard are out of date, except for the recently updated socio-economic indicator, there would be little value in providing an update on one indicator. It was also recognized that others would be contributing additional socio-economic indicators in 2026 and that the teams working on the seabird, environmental and trophic components of the report card would also have updates to contribute in 2026. Consequently, given the commitment to improve the indicators, the Subcommittee agreed to allow the meeting report to reflect the progress that is being made. However, it was noted that it would be beneficial to engage the Commission to gauge its support for the work being done and to help focus the work on indicator development. The Subcommittee indicated that the Meeting of Standing Working Group on Dialogue between Fisheries Scientists and Managers (SWGSM) in July 2025 would be a good opportunity to add ecosystem considerations to their workplan and the subsequent SCRS Science Strategic Plan Meeting would provide an additional opportunity to add emphasis on the ecosystem workplan.

The SCRS Chair noted that the Commission has expressed a desire to consider the impacts of climate change in its management recommendations. This interest provides an opportunity to begin a dialogue between the Commission and the SCRS. The inclusion of ecosystem considerations in the MSE processes and in CPUE standardization also represents an opportunity for the Subcommittee to operationalize part of its work and increase its relevance to the Commission. However, final products could be available soon and would be aided by workshops to advance the development of indicators for the EcoCard. Improving the interaction with SCRS Species Groups was also identified as a truly relevant point that should be taken into consideration and also included in the new Strategic Plan being developed in 2025.

Lastly, it was discussed the importance of conveying to the Commission the value of including indicators in our advice for which there is an established cause-effect relationship between a source of environmental variability and a life history trait but for which the specific response of the population is still to be determined (i.e. included as an axis of uncertainty in MSE operating models). This approach would encourage further studies to validate the impact of the indicator on population dynamics. These studies may help to identify regime shifts forced by the environment and categorize marine areas in relation to their sensitivity to climate change forcing.

Examples of indicators for which the causal relationship with a life history trait have been verified are provided in the **Table** below. These environmental indicators are considered impactful on the species listed within the Mediterranean Sea and should be considered by the Species Groups identified for any climate conditioned modelling.

Table. Environmental indicators and their ecological relevance to ICCAT species.

Indicators	Description	Species	Areas	Ecological Relevance
Marine heatwaves and sea surface temperature anomalies	Frequency and intensity of heat waves and warming in key areas during early life ecology and reproductive aggregations along the Mediterranean Sea	Not species specific, affecting BFT, ALB, SWO	Spawning grounds, possible for juvenile feeding areas and YOY (identified for BFT)	Demonstrated effects of temperature on larval ecology (survival, growth). Methodologies at Juza et al., 2022
Interannual variability of the ocean dynamics shaping tuna habitats	Surface mixing properties associated with coherent Lagrangian structures during the reproductive season will be monitored from finite size Lyapunov exponents	Not species specific, affecting BFT, ALB, SWO	Spawning grounds	Habitat quality for tuna larval stages (Díaz-Barroso et al., 2021)
Climate velocity	Ratio of variability of temperature trends and spatial temperature gradients	Not species specific, affecting BFT, ALB, SWO	Spawning grounds, feed in areas, fishing grounds	For identifying areas more susceptible of being impacted by CC. Isotherm displacements. (Burrows et al., 2011)
Larval habitat spatial coverage trends	Effects of habitat variability on the expansion/contraction of suitable larval habitats	For BFT, ALB, SWO, calculated for species specific	Spawning grounds	Changes on habitat distributions forced by CC (Tugores et al., 2023)
Primary and secondary productivity	Primary production and secondary production trends	Not species specific, affecting BFT, ALB, SWO	Spawning grounds, possible for juvenile feeding areas and YOY (identified for BFT)	Identification of ecosystem productivity shifts, affecting larval and juvenile stadiums
Small pelagic productivity	Abundance trends of small pelagics in tuna key areas	Not species specific, affecting BFT, ALB, SWO	YOY areas and juvenile feeding grounds	Information on ecosystem productivity at higher trophic levels

4. Sea turtles

4.1 Review progress on collaborative work on sea turtles in Mediterranean Sea and presentation of the next steps on sea turtles

The three studies presented under this point are part of an ongoing collaborative effort to evaluate the impact of ICCAT fisheries on sea turtles developed within the framework of ICCAT. The Subcommittee acknowledges the progress made through this collaborative initiative and encourages continued efforts, particularly with the incorporation of additional data sources. Nevertheless, the Subcommittee expressed concern over the limited participation from countries with significant fleets operating in the Mediterranean region. It was also noted that the next meeting on sea turtle bycatch in the Mediterranean will take place in October 2025, and active participation and collaboration were strongly encouraged.

Document SCRS/2025/101 presented preliminary results from a collaborative ICCAT initiative evaluating loggerhead turtle (*Caretta caretta*) bycatch in longline fisheries across the Mediterranean and adjacent Atlantic regions.

The Subcommittee expressed concern regarding the lack of high-resolution observer data in most areas, which limits the capacity to draw more robust conclusions. In addition, the Subcommittee highlighted the limited data or absence of data reported by CPCs with longline fleets operating in the Mediterranean.

Finally, several factors affecting bycatch (e.g. number of hooks per basket, fishing depth, etc.) were pointed out by the Subcommittee, as additional factors to be considered in the analysis.

Document SCRS/2025/106 dealt with knowledge gaps in the understanding and mitigation of sea turtle bycatch in Mediterranean fisheries, although interest on this topic has grown in recent years.

The Subcommittee emphasizes the importance of explicitly identifying and addressing data gaps identified in the review and the influence that areas with higher number of papers reporting bycatch can have on the interpretation of the results shown in the review. Papers included in the review were examined and authors expressed the difficulties in compiling relevant papers, clearly noting that only papers with geo-referenced information were included in the review.

Presentation SCRS/2025/P/039 showed estimations of bycatch of loggerhead turtles (*Caretta caretta*) in the Mediterranean Sea using the Bycatch Estimation Tool (BYET).

The Subcommittee asked if bycatch mortality was considered in this work. It was clarified that this analysis does not account for mortality associated with bycatch. The authors pointed out that these analyses have not included the effect of other fisheries such as traps or purse seine on bycatch, but noted that information on other gears has been collected.

In the general context of the discussions, it was reported that work was being carried out on the analysis of stranding information as well as the bycatch of sea turtles in the Mediterranean and adjacent Atlantic tuna traps. This information will be presented at the Third Workshop on collaborative work to assess the bycatch of sea turtles in the Mediterranean Sea, scheduled for October 2025. These data are complementary to the work already presented and will provide a better understanding of the impacts of ICCAT fisheries on sea turtles in the Mediterranean Sea.

5. Sea birds

5.1 Update about seabirds and their interaction with fisheries

Information on this item was discussed in 5.2 below.

5.2 Review of new mitigation measures for seabird bycatch

Document SCRS/2025/104 presented the latest best practice guidelines from the Agreement from the Conservation of Albatrosses and Petrels (ACAP). The Subcommittee noted the mitigation measures presented were for consideration in areas south of 20 degrees latitude S, which is the domain of the existing *Recommendation by ICCAT on reducing incidental bycatch of seabirds in longline fisheries* (Rec. 07-07) and *Supplemental Recommendation by ICCAT on reducing incidental bycatch of seabirds in ICCAT longline fisheries* (Rec. 11-09).

The Subcommittee recognized the latest ACAP best practice guidelines for reducing seabird bycatch on pelagic longlines to be the simultaneous use of branch line weighting, bird-scaring (tori) lines and night setting. Though these guidelines represent the best scientific evidence currently available, the Subcommittee also acknowledged some concerns regarding their practicality, and implications for the safety of the crew. In particular, the Subcommittee recognized the importance of branch line weighting as a means to reduce seabird bycatch and noted the recommended minimum sink rate for baited hooks, complementary to specific field-tested configurations for the position and mass of a weight upon the branch line provided by ACAP, allowing vessels to adhere to best practice measures with maximum operational flexibility.

The Subcommittee noted ongoing developments related to seabird bycatch mitigation measures. This included the development of best practice guidance on measuring hook sink rate, for which ACAP intends to supply a protocol in 2026. The Subcommittee also recognized the safe implementation of branch line weighting by some CPC fleets in the ICCAT Convention area, as advised by ACAP, with no impact upon target species catch rates. Furthermore, it was observed that some CPC fleets have incorporated hook shielding devices in their permitting conditions, consistent with ACAP best practice guidelines. The Subcommittee noted that the 'smart tuna hook', one of the hook shielding devices recommended by ACAP, is not currently commercially available.

The Subcommittee recognized that some of the existing mitigation measures, detailed in ICCAT Rec. 07-07 and Rec. 11-09 are inconsistent between the two; and neither are fully consistent with the ACAP recommendation. It was also noted that ongoing and potentially informative work both within ACAP and CCSBT is anticipated to be completed by the beginning of 2027.

Presentation SCRS/P/2025/040 gave an overview of the development and refinement of the SEFRA model under CCSBT, aimed at quantifying seabird bycatch risk based on spatial and temporal overlap with fishing effort.

The Subcommittee noted that this would be highly applicable to the development of indicators relating to seabird bycatch currently being considered for the Ecosystem Report Card. The SEFRA provides an estimation of how vulnerability of seabirds to fisheries bycatch changes through space and time, but does not compare the effectiveness of different mitigation measures directly. The Subcommittee further discussed some limitations of the SEFRA framework, noting first, there are areas where seabird bycatch is reported (so it is known that they are there); however, for some of these areas, there are no seabird tracking data available; indeed, the lack of these data is the reason for the exclusion of species such as giant petrel from the analysis.

The Subcommittee discussed that total seabird bycatch rates are not always suitable for understanding the actual bycatch risk to vulnerable seabird populations, since bycatch tends to be dominated by the most abundant seabird species and this overlooks that some of the rarer interactions are with species of higher conservation concern. The Subcommittee further noted that bycatch rates vary significantly between skippers and that this effect was considered to be one of the most important elements for the effectiveness of a given measure.

The Subcommittee emphasized that inclusion of seabird bycatch observer data from more Atlantic coastal States would be important for further work in applying the SEFRA to the intended southern hemisphere-wide assessment of seabird bycatch. This work is scheduled to be delivered under the Common Oceans Programme in 2026 of the Food and Agriculture Organization of the United Nations (FAO). The Subcommittee suggested that a potential future application of the SEFRA results would be to identify areas of higher bycatch risk where increased observer coverage would be beneficial for ensuring the application of best practice mitigation measures.

6.   Continue review and refining the list of bycatch species

Presentation SCRS/2025/P/031 provided information on the catch composition and bycatch in the Egyptian longline fisheries targeting albacore tuna.

The authors were invited to collaborate on the ongoing project to assess the impact of ICCAT fisheries on the sea turtle populations in the Mediterranean by providing relevant data and by participating in person to share their expertise on their local fisheries. This would help cover areas with less data coverage and expand the scientific group. The Subcommittee also noted that the presentation reported the incidental catch of one angel saw shark (*Squatina aculeate*). The International Union for Conservation of Nature (IUCN) considered the species to be critically endangered, and the Subcommittee encouraged the authors to share information on this species with other scientists in the Mediterranean basin. The Subcommittee noted that in this study, bycatch species status was classified according to IUCN criteria, and the Subcommittee indicated that ICCAT's perspective may differ regarding these criteria.

Document SCRS/2025/102 introduced an IOTC review of the use of circle hooks and monofilament leaders as shark bycatch mitigation measures in shallow longline sets.

The Subcommittee discussed the document and noted that the authors limited their discussion to the use of large circle hooks and monofilament leaders as bycatch mitigation measures. In addition, it was noted that the IOTC review included and discussed a variety of mitigations measures. The Subcommittee agreed that many variables can affect at-vessel mortality and post-release mortality and discussed the variation among previous studies. These variables can include soak time, hook type and if the hooks are removed or not, safe handling and release protocols, etc. The Subcommittee also asked the authors what is considered to be a 'large circle' hook. While circle hooks measurements are not consistent among the many circle hook manufacturers, the authors indicated that in other tRFMOs it has been suggested that 14/0 and larger would be considered a "large" circle hook.

Document SCRS/2025/110 presented a study of silky shark post-release survival in the Atlantic Ocean tropical tuna purse seine fishery, including a baseline for Best Handling and Release Practices.
The Subcommittee requested clarification on how the visual determination of shark status and lactate levels were used to estimate post-release-mortality (PRM). The authors indicated that the visual determination of shark status on twenty-three tagged individuals were used to estimate PRM rate by vitality state. It was further explained that comparing lactate levels with shark status provided mixed results. For example, some sharks that show a poor condition show low levels of lactate. The authors indicated that these results are most probably due to small sample sizes where of the 90 sharks for which lactate levels were measured, 23 were tagged. Efforts are being made to expand the study in the near future.

The Subcommittee also asked about the appropriateness of using only 10 days after the sharks were tagged and released to determine PRM. In other shark studies, periods of up to one month after release are used to determine PRM. The authors indicated that the choice of 10 days to estimate PRM was based on results that indicated that PRM on silky sharks caught in purse seine gear mostly occurs during the first 24 hours. Work conducted in the Indian Ocean confirm this result. In addition, the Subcommittee commented on the fact that visual determination of shark status is subjective, and the assessment of condition can be different among observers. The authors agreed with this comment and indicated that the use of lactate levels to estimate PRM could overcome this potential bias.

The Subcommittee asked for clarification regarding the role of the time of the brailing process on the shark PRM. It was explained that the longer a shark stays inside the net before being brailed, the longer it is subjected to stress conditions that might increase PRM. The authors were also asked if stressors other than lactate (e.g. cortisol) were considered in this study. They indicated that the protocol used in this study could only measure levels of lactate.

Finally, the Subcommittee inquired about the size range of sharks in this study. The authors informed that while the sharks ranged from 80-250 cm fork length (FL), the great majority of the individuals were juveniles.

Presentation SCRS/2025/P/038 presented a preliminary study on the interactions of small tunas with the small artisanal fisheries in the Ghannouch-Gabes region (Southeast Tunisia).

The Subcommittee thanked the presenter for the information provided. But it agreed that the results of this preliminary study might be more relevant for the General Fisheries Commission for the Mediterranean (GFCM) since they correspond to non-ICCAT target fisheries. The Subcommittee encouraged the authors to reach out to the SCRS Small Tunas Species Group to share the results of this preliminary study.

Document SCRS/2025/041 presented the conservation status of the basking shark and white shark in the ICCAT Convention area.

The authors noted that these species are listed in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). ICCAT fisheries are known to interact with these species and currently ICCAT does not have any management measures in place for them. Both species are considered vulnerable, characterized by low productivity, and with limited data availability.

The authors presented the records of these two species in the T1NC ICCAT-DB. The records are considered to be incomplete and underreported so that some specific catch records should be verified. Given their vulnerability and the extent of their interactions with ICCAT fisheries, the Subcommittee discussed the possibility of adopting measures aimed at improving their conservation status and data collection efforts similar to the measures adopted for Mobula rays and whale sharks.

Document SCRS/2025/105 provided an initial review of shark species reported to the ICCAT Task 1NC database, identifying discrepancies in taxonomy, reporting codes, and spatial distributions that may undermine data quality and management decisions.

The Subcommittee discussions covered several points. It was indicated that the Commission, following SCRS recommendation, has adopted a list of elasmobranchs species of particular interest for monitoring and management, and fisheries related data submissions should be at the species levels. However, it also recognized that other 'pelagic' elasmobranchs species are not currently in the statistical forms for data submission and the Subcommittee recommends reviewing, updating, and standardizing the list of sharks and mobulidae species in both Task 1 NC and Task 2 CE statistical forms. Finally, the Subcommittee recommended updating the species list, harmonizing nomenclature, and validating unusual records in collaboration with national scientists to improve the accuracy and reliability of ICCAT's shark catch data.
The Subcommittee noted that the presentation was timely and suggested that some gears like longline fishing near seamounts can catch demersal sharks. A possible solution to resolve this confusion might be to create a distinction between pelagic and demersal sharks.

It was proposed that this document be presented to the Subcommittee on Statistics with specific recommendations on which codes should be added or removed, noting that species that are never caught might be deleted from the species list and that those species that are caught should be added (e.g. missing *Carcharhinus* spp).

The Secretariat informed that ICCAT species codes follow the FAO Coordinating Working Party on Fishery Statistics (CWP) list of marine species, however it was indicated that the process of updating species taxonomic status, and their respective codes takes time. In the case of ICCAT records of catches of sharks and mobulidae species this is further complicated by issues of misidentification, use of different codes by CPCs or using higher aggregation taxa levels. Therefore, simply updating a code historically requires a careful review and, in most cases, should require a consultation with national scientists to verify the reported species and catch amounts associated before simply making any changes to the official reports.

The Subcommittee understood that for a more accurate approach to information gathering, it would be necessary to have data on all species (ICCAT and non-ICCAT species) caught in fisheries targeting tuna and tuna-like species. Furthermore, the Subcommittee understood that it would be necessary to receive information on ICCAT species caught incidentally in fisheries targeting non-ICCAT species.

Document SCRS/2025/094 presented an ICCAT-wide summary of bycatch, target catch, and unclassified catch using newly structured 2023 Task 1NC (T1NC) data, enabling classification by catch intention (target, bycatch, unknown). The 2023 restructuring of T1NC data was significant because it allowed catch records to be categorized explicitly as target catch, bycatch, or unknown, enabling for the first time a detailed summary of bycatch across all ICCAT fisheries. While the CPC's estimate of bycatch versus target catch is an improvement over designating bycatch or target catch on a species basis, doing it still suffers from a few

practical difficulties. These are that statistical correspondents may have difficulty assigning catch into target and bycatch categories due to changes in fishing behaviour, targeting preferences, and regulation.

The Subcommittee noted that the process of classifying catch as target or bycatch is problematic. Many species serve as target species in some fisheries and as bycatches in others. The classification can vary even within a single fishing trip depending on set-level behaviour or is irrelevant in multi-species fisheries. The designation of catch as bycatch or not may also depend on size where for example, there are size limits or slot limits that prohibit landing of fish of certain sizes. Therefore, classifying a species as bycatch or target at a broad level (e.g. by fleet or species group, for a quarterly time step) is oversimplified and may misrepresent actual fishing practices. In addition, there was no way for the Secretariat to validate these submissions. Moreover, it was noted that for purposes of estimating the mortality rate caused by fishing, labelling fish as bycatch or target catch does not matter too much. What does matter from a stock assessment perspective is the number or biomass of fish killed, whether their capture was intentional or not.

7. Present the progress made by the Sub-group on Technical Gear Changes

Presentation SCRS/P/2025/035 provided an update from the Sub-group on Technical Gear Changes. Recent work synthesized the data on the power-analysis that was provided from various CPCs based on their fleets catch and effort under various longline configurations. The power analysis is very useful for planning purposes of experimental studies.

The Subcommittee acknowledges the efforts of the Subgroup that is collaborating and conducting this work. The Subcommittee noted a previous work carried out by Uruguay on the effort needed to detect a certain number of species (species richness), and on how that could be used to complement the present analysis.

The Subcommittee also noted that previous work has been done by various CPCs with the use of Time-Depth Recorders (TDRs) on pelagic longline fleets, and that the previous data could be analyzed in combination with the data currently being collected.

The Subcommittee noted the importance of conducting those types of power analysis for planning purposes of experimental studies. Those highlight the trade-offs, as the level of effort needed to detect changes of rarer species is higher, as is also the effort needed to detect small statistical differences. With this analysis it is possible to present the trade-offs in terms of cost-benefits for the various species and levels of changes that are aimed at being detected and then plan the studies accordingly.

The Subcommittee noted the importance of knowing and understanding the CPUE levels for each species and each fleet, as those are influential in the types of analysis presented here and ultimately needed for species/fisheries management in general.

The Subcommittee noted the importance of the Subgroup continuing this work, further synthesizing the power analysis and continuing to use the TDRs and other electronic data collection methods. Finally, a recommendation was made for future updates to continue to be presented to the Subcommittee.

Document SCRS/2025/091 provided a preliminary overview of the use of "ring shaped branch lines (Meka-ring)" in Japanese longline fisheries, a method like traplines reported in Mediterranean tuna fisheries. The main capture is swordfish, with minimal bycatch of tunas, billfishes, sharks, or sea turtles and no seabird captures. Current investigations involve collecting information from fishers, and summarizing observers and logbook data, with further detailed reporting planned as research continues in ICCAT areas.

The Subcommittee inquired about the availability of quantitative data from Japan. Since 2021, catch and effort data have been collected from logbooks and fisher interviews and scientific observer data have been available since 2018; however, these datasets remain limited. One major concern is how this gear may influence CPUE estimates for swordfish, thus emphasizing the need to fully understand the operational characteristics of this gear type, as catch rates can differ significantly from those of conventional longline configurations. There is currently no evidence of interactions with seabirds or marine mammals. Preliminary findings suggest a lower incidence of sea turtle bycatch compared to conventional longline gear.

Document SCRS/2025/098 provided the first assessment of the use of traplines, a recent modification of longline gear of the Spanish fleet in the western Mediterranean swordfish fishery, using observer data from 303 fishing operations targeting swordfish.

The Subcommittee asked about the list of species presented, with the presence of some deep-sea demersal sharks (e.g. *Galeus melastomus*). The authors clarified that those were specific from the "piedra-bola" fishery, a semi-demersal longline set closer to the seafloor in some areas, that catches swordfish in the continental slope areas but also captures some deeper sea species.

The Subcommittee noted that the strategy used in the Spanish Mediterranean traplines is different from the Japanese case. In the Japanese fishery they use mainly LED lights and occasionally artificial bait, while in the Spanish Mediterranean fishery they use a mixture of natural and artificial bait and no lights.

Presentation SCRS/P/2025/033 provided the start of a pilot project from the EU Portugal pelagic longline fishery to assess the catchability of the loop gear in comparison to hooks and including both target and bycatch species.

The authors clarified that the logbook forms were adapted to collect data from both terminal gears and for all species, including target, bycatch and vulnerable species. The data were still very limited, but to date any interactions of loops with bycatch have been very few or none, and no captures of vulnerable fauna were reported (e.g. sea turtles, seabirds or mammals). The preliminary size distribution of swordfish between hooks and loop seems relatively similar, but most likely the selectivity curves will be different between the two gears, so this will have to continue to be studied in more detail. The authors will present the first quantitative results of this pilot study during the Species Groups meetings in September 2025.

The Group asked if this gear was now implemented in 100% of the fleet. The authors clarified that the level of implementation is still unknown, and while they believe it is now generally used by most of the fleet, not all the fleet is using these loops. In the future there will be the need to adapt the official electronic logbooks to determine the level of use by the fleet.

The Group asked about the capture mechanisms and at-haulback mortality. The authors clarified that the mechanism seems to be mostly entanglement, and the observer data collected include condition at haulback (both from hooks and loop). Very preliminary observations at sea seem to suggest that the at-haulback mortality of swordfish in loops seems to be at least as high as in hooks.

The Group briefly discussed if these traplines should be considered a "new gear" or a "gear modification". It was noted that a recent EU report mentioning this should be considered a new gear, but that ICCAT has not yet defined how to categorize it. This technological innovation complicates the interpretation of swordfish catch and catch-rate trends.

8.   Update on Common Oceans (formerly ABNJ) projects

8.1 Presentation of the results of the Common Oceans Tuna Project Workshop on Bycatch

The ICCAT Bycatch Coordinator provided a review of the Common Oceans Tuna Project Workshop on Bycatch, which was held at FAO headquarters in Rome from 27–29 January 2025. The workshop brought together 50 experts from tRFMOs, governmental bodies, and Non-governmental Organizations (NGOs) to address bycatch challenges in global tuna fisheries. Participants discussed strategies such as gear modifications, bycatch avoidance techniques, and safe handling practices, with the aim of enhancing collaborative efforts and informing future bycatch mitigation measures across various ocean regions. In addition, the workshop was an opportunity to expand collaboration between tRMFOs, which is particularly important in the case of IOTC and ICCAT due to the existence of proven migrations of species between the jurisdictions of these organizations.

The proceedings will be published as a series of papers in a special issue of Fisheries Research, available here. The Bycatch Coordinator noted that participants who did not attend the workshop may still submit documents for review in the special issue.

The Subcommittee reviewed the call for papers linked above and inquired whether submissions addressing multi-species trophic interactions would be considered. In response, it was clarified that such articles would be accepted, provided they also involve bycatch interactions in fisheries.

Additionally, the Bycatch Coordinator informed the Subcommittee that the Common Oceans Tuna Project convened another workshop on the implementation of the Ecosystem Approach to Fisheries Management (EAFM), held from 21 to 23 January 2025 at FAO Headquarters in Rome. The workshop convened experts, scientists, and policymakers to evaluate progress and identify challenges in EAFM implementation within tuna RFMOs. The discussions focused on the definition and operationalization of EAFM, emphasizing the role of tuna RFMOs in addressing ecosystem-related aspects of tuna fisheries, and the application of risk management and trade-off analysis among multiple objectives as essential components for informing fisheries management advice.

9. Progress in the preparation of a Research Programme on Bycatch

Document SCRS/2025/095 presented a comprehensive outline for an ICCAT Research Programme on Bycatch aimed at improving data collection, scientific analysis, and management recommendations concerning non-target species incidentally caught in Atlantic and Mediterranean fisheries. The document is currently drafted in Spanish, but it is intended to be circulated in both English and French as soon as possible for further review.

The Subcommittee asked whether the elements of this document would be reflected in the Strategic Plan. In response, it was noted that the details of the plan would need to be discussed by the Subcommittee before being included in the Strategic Plan. However, if possible, efforts would be made to integrate elements of this proposal into the Strategic Plan before the SCRS Plenary.

In addition, the Subcommittee inquired whether the plan pertains solely to bycatch or if it also involves ecosystem considerations. A second question was how the Co-convenor preferred that the document be edited. He indicated that he would prefer modifications to be made directly in the Word document using track changes. While online collaboration on the document is encouraged, finalizing the plan may also require several intersessional meetings, like the process followed for completing the Shark Research and Data Collection Programme (SRDCP).

It was also noted that, while the principles outlined in the document could form the basis of a research plan, the current version needs to better clarify and define short and long-term priorities. The Co-convener explained that the draft is intended as a first step to capture the broad range of themes that need to be considered. From this starting point, the document will be further refined.

The Subcommittee asked if the document listed all recommendations made by the Commission and asked whether the proposed research plan would be consistent with those recommendations. In response, it was confirmed that the plan is intended to align with ICCAT recommendations, while also addressing priorities defined by other funding sources. As an example, it was noted that 80% of research funding comes from voluntary contributions, which can only be used for specific purposes. Therefore, any research activity seeking support from these sources must align with the objectives of those contributions.

The Subcommittee also discussed the list of historical recommendations. In this context, the list serves to review the history and evolution of bycatch science and management within ICCAT.

10. Discuss the content for the new SCRS strategic plan related to Ecosystems and Bycatch

The Subcommittee reviewed a draft version of the new SCRS Science Strategic Plan 2026-2031, based on the 2015-2020 Strategic Plan, which had been made available at the 2024 SCRS Plenary meeting. Discussion focused on parts of the draft new Strategic Plan with the most relevance to the work of the Subcommittee.

The SCRS Chair described the ongoing process to advance the drafting of the new Strategic Plan, being carried out by SCRS Officers who have volunteered to participate and by additional SCRS scientists that have been nominated to participate by Head Scientists of CPC delegations. As such, there is no established

mechanism to incorporate comments from a working group directly into the drafting process. Nevertheless, the Convener of the Ecosystem Based Fisheries Management (EBFM) clarified that his intention was to take the views of the Subcommittee into account when he (as a member of the Strategic Plan drafting group) was proposing edits to the Strategic Plan.

With this in mind, the Subcommittee proposed a number of edits and comments to the document. These included the identification of certain elements that reflected objectives and strategies from the 2015-2020 SCRS Science Strategic Plan, but which are no longer required given that the objectives were achieved. For such cases, the Subcommittee indicated that this text should be deleted, and the objectives listed as having been achieved in reporting to the Meeting of the SWGSM and SCRS Science Strategic Plan Meeting in 2025. In other cases, modifications to the existing text were proposed.

11. Discuss contribution to SWGSM meeting

The Subcommittee expressed appreciation that the SWGSM has been reestablished, noting the frequent expressed desire in the past to engage in dialogue with fishery managers on a variety of topics. In initiating this discussion on how the Subcommittee might contribute to the Meeting of the SWGSM in 2025, it was pointed out that the meeting would be largely focused on the development of the SCRS Science Strategic Plan for 2026-2031 and would be limited to one meeting day. Therefore, it was highlighted that the best opportunities for the Subcommittee to contribute to the meeting would be either through calling for a new topic under the SWGSM agenda item "Other matters", or to propose topics to be considered under the agenda item "SWGSM workplan" as areas for discussion in future SWGSM meetings.

The Subcommittee suggested requesting direction and feedback from the Commission on the value of the EcoCard and Ecosystem Fisheries Review Reports. It was also recognized that it would be important to discuss with the Commission the importance of following the precautionary approach when risk is increasing but the impact of that risk cannot be easily quantified. The Subcommittee agreed to make a proposal for feedback on these topics to be addressed in the workplan to be developed at the Meeting of the SWGSM in July 2025. A more fulsome dialogue will be planned for 2027 when a presentation will be provided along with an elicitation of feedback to clearly worded questions.
A small subgroup was identified to conduct intersessional work to create a brief presentation for review at the Meeting of the SWGSM on 8 July 2025.

12. Recommendations

Pertaining to Ecosystems

The Subcommittee recommended to reissue a Call for tenders (ICCAT Circular 12449/24) to support the collection of environmental data for the Atlantic basin in order to be able to develop indicators that compliment what is currently available for the Mediterranean Sea. Funding has been approved for this activity in 2025.

With financial implications

The Subcommittee recommended conducting a series of workshops to support EcoCard development. The focus of the first workshop in 2026 is to advance the development of indicators for a subset of components of the EcoCard, while the second workshop in 2027 will primarily focus on advancing the development of environmental indicators.

Pertaining to Bycatch

The Subcommittee recommended continuation of its review of the existing seabird bycatch mitigation measures and to advise upon updates in its 2027 meeting, as necessary. It encourages members to submit relevant scientific information to the Subcommittee to support this review.

Hook Shielding Devices are an accepted means of bycatch mitigation in IOTC, WCPFC and some ICCAT coastal States. Consequently, the Subcommittee recommends that currently available Hook Shielding Devices, per specifications in the ACAP best practice guidelines, should be considered as an alternate standalone measure to the currently accepted measures, within the domain of Rec. 07-07 and Rec. 11-09.

The Subcommittee recommended that the SCRS Sharks Species Group review, if available, any additional information on biological vulnerability of basking and white sharks in addition to the information presented in document SCRS/2025/041. Based on the information received until present, the Subcommittee recommends considering both basking shark and great white shark as species of greatest biological vulnerability and that precautionary management measures for their conservation should be considered by the Commission. Specifically, measures similar to those adopted for mobulid rays and whale shark should be considered (reference to *Recommendation by ICCAT for the conservation of whale sharks* (Rhincodon typus) *caught in association with ICCAT fisheries* (Rec. 23-12) and *Recommendation by ICCAT on mobulid rays (family Mobulidae) caught in association with ICCAT fisheries* (Rec. 24-12)).

The Subcommittee acknowledged the progress made by national scientists in characterizing the impact of ICCAT fisheries in the Mediterranean on sea turtles and recommended that these efforts continue and be extended to other bycatch species.

The Subcommittee reiterated that the Sub-group on Technical Gear Changes should continue to report to the Subcommittee on its progress in carrying out its various tasks.

The very rapid expansion of the use of new trapline (in the longline operations) highlights the importance of knowing more about this gear. Accordingly, the Subcommittee recommends that the CPCs compile relevant information on the current use of this gear in the greatest possible detail and communicate this information to all relevant SCRS groups.

In addition, the Subcommittee recommends that the Subcommittee on Statistics review the use of trapline (in the longline operations), and if appropriate discuss if new type codes should be added to the current list of ICCAT codes.

With financial implications

The Subcommittee recommends organizing a workshop focused on the Subcommittee's Research and Data Collection Programme, as well as the development of guidelines for coordination with other bycatch groups of tuna RFMOs. Funding is requested to support the participation of 6 to 7 scientists in this workshop.

This workshop would serve to finalize the preparatory work already initiated for the Research and Data Collection Programme by establishing priorities and activities. Additionally, it would allow for the development of strategies and thematic areas for coordination with other groups.

Pertaining to both

The work of the Subcommittee was hampered by the late submission of nearly all documents and presentations. The Subcommittee recommends that the submission deadline for documents and presentations be enforced by the SCRS while taking into consideration the need to have some flexibility on a case-by-case basis. In addition, SCRS officers should also assess if submitted documents are relevant for the issues to be discussed in their particular meetings. Documents considered not to be relevant may not be accepted.

The Subcommittee requested that Subcommittee participants send any feedback on the ST09 form related to sea turtles to the ICCAT Bycatch Coordinator by 31 August 2025, to be compiled, addressed, and reported to the Subcommittee on Statistics. The Subcommittee recommends that the Subcommittee on Statistics take this feedback into account in its consideration of proposed changes to the ST-09 form.

13. Responses to the Commission

Resolution by ICCAT on the implementation of biodiversity conservation instruments (Res. 23-23)

This is a Miscellaneous Resolution on the implementation of biodiversity instruments, namely:

1) The Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction.
2) The Kunming-Montreal Global Biodiversity Framework under the Convention on Biological Diversity.

The Resolution requests that:

1) The Secretariat collaborate with the SCRS to evaluate the possibility of the SCRS providing expertise and advice for the implementation of the instruments and exploring ways in which the workload of the SCRS could accommodate this new task.
2) The SCRS should investigate workable examples of how marine biodiversity can be conserved in a way that is compatible with the conduct of responsible and sustainable fisheries, including other effective area-based conservation measures (OECMs), either as complementary or alternative measures to other area-based approaches.
3) CPCs, the SCRS, and the Secretariat should report regularly to the Commission on progress on the above.
4) To add a standing agenda item on this issue to the annual meetings of the Commission and the SCRS.

During the 2024 Meeting of the Subcommittee on Ecosystems and Bycatch it was noted that the Resolution would require a considerable amount of the Subcommittee's time and capacity to address the request and that this would further impede progress on the development of the EcoCard. It was suggested that, given the Sargasso Sea Case Study´s current objectives align with the Commission request, they could provide some limited responses.

2025 update

The conservation of marine biodiversity, and efforts towards implementing the Ecosystem Approach to Fisheries Management within areas beyond national jurisdiction are long-standing objectives of the Subcommittee. At the 2025 Meeting the Subcommittee on Ecosystems and Bycatch reviewed work presented at the meeting that contributes to marine biodiversity conservation. A list of ongoing work includes:

1) Ongoing work that improves knowledge and the conservation status of several Endangered, Threatened, and Protected (ETP) species or species groups, including seabirds in the South Atlantic, sharks in the tropical Atlantic ecoregion, or sea turtles in the Mediterranean. These approaches are being considered in the context of continued improvement within responsible and sustainable fisheries.
2) The Sargasso Sea's Socio-Ecosystem Diagnostic Analysis (SEDA) which offers a structured framework - similar to the Driving forces, Pressures, State, Impacts, and Responses (DPSIR) approach - for developing indicators related to climate impacts, connectivity, and trophic interactions. The Sargasso Sea case study demonstrates how indicators can be developed to support Biodiversity Beyond National Jurisdiction (BBNJ) requirements for best available science, adaptive management, and transboundary governance.
3) The further development of the ECOtest modelling platform which facilitates the development and validation of indicators for bycatch species.
4) The further development of Ecopath with Ecosim models that elaborate on the impacts of climate change and ICCAT fisheries on the food web and ecosystem function.

The Subcommittee considers that this response is preliminary. It will be updated as further results become available.

14. Workplan for 2026

Ecosystems

Consistent with the ongoing exercise of developing an EcoCard and implementing an EAFM framework for ICCAT, a workplan was drafted considerate of the limited capacity of the Subcommittee. The priority items for the coming year are identified.

1) *Pertaining to Ecosystems Report Card Development: Priority 1*

The Subcommittee recognized the need to continue the development of indicators reviewed at the 2025 Meeting of Subcommittee on Ecosystems and Bycatch recognizing that many would be available for an update of the EcoCard in 2026. It was emphasized that development and/or updates of indicators for some of the other ecosystem components should also be prioritized. The EcoCard components identified for updates or development are described in the **Table** below. The schedule of updates for ecosystem components for which an indicator was adopted will be discussed at the 2026 meeting while those under development are expected to remain in the workplan until adopted.

It is recommended to host in person workshops to advance the work on the EcoCard in 2026 and 2027. The first is required to review indicators developed for select components of the EcoCard, and the second is to review indicators being proposed for the environmental component.

2) *Pertaining to the work of the EcoCard subgroup: Priority 2*

Prior to the 2026 Meeting of the Subcommittee on Ecosystems and Bycatch, the subgroup will meet (October 2025) with the EcoCard teams to review the progress in developing or updating the indicators of the EcoCard.

3) *Pertaining to the development of a Risk Screening Tool: Priority 2*

Recognizing that the database supporting the risk screening of marine species potentially impacted by ICCAT fisheries has been updated (turtle and seabird species added), and the advanced state of the analytical approach, the Subcommittee recommended that the development of the risk screening tool be advanced to completion as soon as possible.

Advancements in the method are proposed for review in 2026 and entail exploring the use of AI methods. Collaboration of experts with machine learning (ML) and AI methods experience are needed to advance the work.

4) *Pertaining to the progress on Case Studies: Ongoing work*

The Case Study groups are making progress towards achieving the objectives identified in the ToRs, in particular the Mediterranean and the Tropical Atlantic Case Studies. Progress made during the intersessional period will be presented in 2026. While there will be no formal review of the progress of the Case Studies in 2026, they continue to contribute through their support of indicator development for the EcoCard.

5) *Pertaining to other ecosystem items*

- *ECOtest: Priority 3*
  The Subcommittee will continue to advise on the development and validation of indicators and to explore the potential inclusion of marine turtle and seabird species.
- Response to Commission requests. Goals and objectives for components of the EcoCard.

Goal/Timing	EcoCard Component	Objective	Contributor/s
No expectation of development in 2026	Retained species: Not assessed	Perform PSA for select retained unassessed species	
Update for 2026	Retained species: Assessed	Update B_{RATIO} and/or F_{RATIO} values from recent assessments and deal with $F_{0.1}$ and MSE issue.	Alex/Eider
Update for 2026	Non-retained sharks (silky shark)	Increase the scope of the data used in the analysis. Include other gear types. Silky shark risk assessment based on SDM or vulnerability index.	Rui/Leire
Develop	Marine turtles	Perform risk assessment for loggerhead and leatherback turtles and indicator development Check progress of other tRFMOs.	Ochi/Andres
Develop	Seabirds (albatross/petrel)	Create vulnerability indicator based on overlap of species distribution with longline & purse seine fisheries. ICCAT and/or SEFRA data.	James/Sachiko/Sebastian/Helen
Develop	Marine mammals	Discuss collaborations with IWC and ICES. Following scoping exercise, develop index from Ecosim model of the tropical Atlantic.	Josu/Eider
Develop	Trophic structure, community and diversity indicators	Develop indicators from EwE to monitor the biomass structure, size structure and trophodynamics of the ecological communities in the tropical Atlantic in response to fishing pressure and environmental drivers.	Josu/Eider/Maria Jose
No expectation of development in 2026	Habitat	Create indicators to monitor climate-induced and fishing-induced habitat changes in ICCAT species.	
Update and develop for 2026	Socio economic	Develop indicators based on socio-economic data. Develop tool to extract the socio-economic data. Adjusted for inflation and per ton of catch.	Sachiko/Jose Carlos/Diego
Develop	Fishing pressure	Develop an indicator based on fishing effort or capacity.	Diego/TunaMed

Goal/Timing	EcoCard Component	Objective	Contributor/s
Develop	Environmental pressure	Develop indicators that have a causal relationship with stock life history traits.	TunaMed/Diego/Maria Jose
Develop	Marine debris (abandoned, lost or otherwise discarded fishing gears (ALDFG))	Quantify annual ALDFG strandings.	Erin/Maitane

Bycatch

a) Conduct a workshop focused on the Research Programme and data collection of the Subcommittee.

    The workshop would finalize the preparatory work already initiated by defining priorities and activities.

b) The bycatch of species is crosscutting across all species groups, and particularly sharks, so there is a need for coordination between these groups regarding the definition of bycatch species and appropriate reference points, the listing of species in ICCAT databases, among other issues.

c) Advance an assessment process of the impact of ICCAT fleets in the Mediterranean on the bycatch of other species (megafauna, endangered and protected species) that are not sea turtles.

    Leverage the experience and collaborative work on the Mediterranean's sea turtles by extending activities to other taxonomic groups of interest to the Subcommittee.

d) Continue work within the Sub-group on Technical Gear Changes.

    Within this Sub-group's objectives, activities relevant to bycatch can be framed.
e) Continue reviewing and refining the list of bycatch species in the ICCAT database.

    The ICCAT databases contain a list of various taxa that require review by specialists.

f) Coordinate with other bycatch groups of tuna RFMOs to explore and reflect on different approaches for bycatch assessment and mitigation.

g) Continue the ongoing review of best-practice mitigation measures for seabird bycatch.

15. Other matters

Document SCRS/2025/022 presented a review prepared by the Caribbean FAD Tracking Project (CFTP) of fish aggregating devices (FADs) drifting from fishing grounds to the western Atlantic.

The Subcommittee thanked the presenter for the informative presentation. It was acknowledged that the Caribbean is one of several areas that are depositional area for drifting FADs. As the Subcommittee has been discussing different indicators for the EcoCard, the presenter was invited to collaborate in the development of a FAD associated indicator. The Subcommittee inquired if the available FAD stranding data could be used to create a standardized index, to which the presenter indicated that it is possible to do so.

In addition, the Subcommittee asked if there were any existing records of beached FADs with any entangled megafauna. It was informed that the programme has only received two reports of entangled megafauna, but they could not be verified. The Subcommittee inquired if CFTP is collaborating with other organizations to collect information on beached FADs and it was informed that they are currently collaborating with organizations in the Mediterranean and other ocean basins.

As most of the FADs deployed in the Caribbean are anchored FADs, the Subcommittee asked if the reported data allow identifying anchored from drifting FADs and the presenter replied that such identification is possible.

In addition, it was asked if the available data allow us to map of where FADs originated. It was informed that at this time that is not possible, but CFTP is currently working with buoys manufacturers to create a recovery plan that includes identification and geolocation of the FAD. This plan will allow us to establish where FADs were deployed and their drifting paths.

The Subcommittee also inquired whether CFTP has seen any trends in the type of FADs being reported (e.g. non-biodegradable vs. biodegradable), but the Subcommittee was informed that the nature of the current data does not allow to identify if such trends exist.

Finally, the Subcommittee encouraged the authors to present this information to the Tropical Tunas Species Group.

15.1 Funding requests

The Secretariat provided the background for the new rules related to SCRS science funding requests that should be followed by the Subcommittee while drafting the Recommendations with financial implications. This included an overview of the available funding and use made by the Subcommittee between 2020 and 2024. It was explained that the Explanatory note on the draft ICCAT budget for financial year XXXX, which is annually prepared by the Secretariat and discussed during the annual meeting of the Commission aiming the approval of the regular budget, shall now include much more information regarding the science budget, including among others: i) a general overview on the use of funds made available over the previous 5 years; ii) the balance of the science budget; iii) clear description and justification of the activities to be developed, together with thorough estimates of the associated funding requests; iv) the rationale for those activities that are planned for multi-years; and, v) that the funding requests be estimated for the upcoming two biennial cycles of the Commission regular budget, and compiled in the budget table template developed by the Secretariat.

Accordingly, a new template has been developed by the Secretariat to be filled by the SCRS subsidiary bodies, while drafting their Recommendations with financial recommendations (see below). However, since the first draft of the Explanatory note on the draft ICCAT budget for financial year 2025 is due by late June, it would be essential that Chairs/rapporteurs provide a tentative list of activities and estimates of associated cost by major line of activity as detailed in the **Table** below in advance.

Working group	2026	2027	2028	2029	Explanations
Tagging					
Tag and tagging material purchases					
Rewarding, awareness and satellite					
Tagging campaign					
Biological studies					
Reproduction					
Age and growth					
Genetic					
Other (sample bank)					
Sample collection and shipping					
Other fisheries related studies					
Consumables					
Workshops/meetings					
Modelling:					
MSE					
Stock assessment					
Other					
Science coordination (e.g. GBYP, Steering committee)					
TOTAL					

An Excel file has also been made available by the Secretariat to allow more thorough estimates related to traveling and subsistence costs, that should be used by the SCRS to estimate costs associated with the invitation of experts and/or instructors to meetings and workshops.

During discussion, it was pointed out that budget shortfalls can occur with respect to workshops because the proposed budgets are developed assuming a certain number of participants, but those expected participants may cancel plans. To help avoid this problem, it was recommended that a prioritized list of potential participants be provided to the Secretariat early in advance of the meeting. Potential participants should be contacted in order of priority in order to obtain a firm commitment to participate, and to allow support of their participation up to the budgeted amount.

The Subcommittee was informed that the SCRS Science Strategic Plan Ad Hoc Drafting Group will be working intersessionally to advance the drafting of the 2026-2031 SCRS Science Strategic Plan for review at the SCRS Science Strategic Plan meeting (9-11 July 2025). The SCRS Chair reminded the Subcommittee that all species groups have been asked to develop 6-year plans within their research programmes, in parallel with the Strategic Plan development, to encourage strategic research planning and to facilitate collaborative efforts across species groups and noted that the SC-ECO could also benefit from such strategic research planning. He suggested that the budget table template could serve as a good format for 6-year research plan summary tables as well, since the headings included are fairly comprehensive, and new rows could be added under each heading for separate research projects. This would also greatly facilitate synchronizing the budget template for the funding requests with the strategic research plans.

15.2 Discussion on document submission

The Secretariat reminded the Subcommittee of the deadline to submit documents for SCRS meetings. In the case of this 2025 Meeting of the Subcommittee on Ecosystems and Bycatch, the Secretariat indicated that only three documents were submitted before the deadline. The established deadline (i.e. one week before the start of the meeting) was adopted by the SCRS to facilitate the work of species groups and Subcommittee Chairs to prepare the agenda and develop a general plan for the meetings. However, Chairs rarely reject documents submitted after the submission deadline. This practice has created a culture among meeting participants where the document deadline submission is mostly ignored. In addition, late document submissions do not allow meeting participants to fully review the documents in advance of the meeting, and they have to rely on the short presentation of the documents to assess their contents.

The Subcommittee discussed several potential actions to correct this problem. In the end, the Subcommittee agreed that, as a first step, it is necessary to remind all SCRS Officers of the need to enforce the rules in place while understanding the need to have some flexibility. There might be cases where documents that were submitted after the deadline are of the utmost importance to successfully conduct a certain meeting (e.g. documents with stock assessment results) and, therefore, should not be rejected by the Chair. Acceptance of documents submitted after the deadline should be made by the Chairs on a case-by-case basis. In addition, Chairs can also reject documents that are not considered to be relevant for the issues to be discussed in their particular meetings. In summary, the Subcommittee believes that there is a need to enforce the document submission deadlines in order to change the practice of ignoring such deadlines.

15.3 ST09 update

The Subcommittee reviewed a new version of the ST09 form. It decided to forward the form to the Subcommittee on Statistics for its review and approval.

16.   Adoption of the report and closure

The report was adopted during the meeting and the meeting was closed.

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Appendix 1

Agenda

1. Opening, adoption of the agenda and meeting arrangements

Pertaining to Ecosystems

2. Review the progress on developing status indicators, pressure indicators and reference levels for the components of the Ecosystem Report Card

    2.1   Review progress on the development of tools for prioritizing species at risk
    2.2   Review progress on the ECOtest framework

3. Review of work related to incorporating climate change impacts in management decisions

    3.1   Review the results of the contract to provide climate conditioned, risk equivalent management advice for northern swordfish
    3.2   Discuss reporting of climate change and ecosystem impacts in SCRS annual report

Pertaining to Bycatch

4. Sea turtles

    4.1   Review progress on collaborative work of sea turtles in Mediterranean Sea and presentation the next steps on sea turtles

5. Sea birds

    5.1   Update about seabirds and their interaction with fisheries
    5.2   Review of new mitigation measures for seabird bycatch

6. Continue reviewing and refining the list of bycatch species. ICCAT databases contain a list of various taxa that need to be reviewed by specialists

7. Present the progress made by the Sub-group on Technical Gear Changes

8. Update on Common Oceans (formerly ABNJ) project(s)

    8.1 Presentation of the results of the Common Oceans Tuna Project Workshop on Bycatch

9. Progress in the preparation of a Research Programme on Bycatch

Pertaining to Ecosystems and Bycatch

10. Discuss contents for the new SCRS strategic plan related to Ecosystems and Bycatch

11. Discuss contribution to SWGSM meeting

12. Recommendations (including budget for the period 2026-2029)

13. Responses to the Commission (Rec. 22-12, paras 4-6-7-10; Rec. 23-13, para 1A; Rec. 23-15, para 4; Res. 23-23)

14. Workplan for 2026

15. Other matters

     15.1 Funding requests
     15.2 Discussion on document submission
     15.3 ST09 updates

16. Adoption of the report and closure

Appendix 2

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List of papers and presentations

DocRef	Title	Authors
SCRS/2025/022	Lost in Transit: FADs drifting from fishing grounds to the Caribbean and the U.S. East coast	Kimak E., Kerstetter D., Pitchford T. Restrepo V., Moreno G.
SCRS/2025/041	Conservation status of basking shark *Cetorhinus maximus* and white shark *Carcharodon carcharias* in the ICCAT area	Ellis J., Bowlby H., Coelho R., da Silva C., Domingo A., Forselledo R., Reeves S., Taylor N.G.
SCRS/2025/055	Species distribution models for silky shark in the eastern tropical Atlantic Ocean	Lopetegui-Eguren L., Arrizabalaga H., Murua H., Lezama-Ochoa N., Griffiths S., Lopez J., Ruiz-Gondra J., Sabarros P., Ramos-Alonso M., Juan-Jordá M.,
SCRS/2025/090	Investigating potential North Atlantic swordfish climate-conditioned management approaches	Mormede S., Hanke A., Gillespie K.
SCRS/2025/091	"Ring-shaped Branchline" in Japanese Longline Fisheries	Ochi D., Shiode D., Ijima H., Kai M., Semba Y.
SCRS/2025/094	Task 1 Estimates of Bycatch in ICCAT Fisheries	Taylor N.G., Palma C., Mayor C., Ortiz M.
SCRS/2025/095	Programa de recopilación de datos e investigación sobre la captura fortuita	Domingo A., Taylor N.G.
SCRS/2025/096	ICCAT Sub-Committee on Ecosystems and Bycatch: Ecosystem Report Card Sub-group Status of development for an indicator for threatened seabirds	Bell J., Wade H.
SCRS/2025/097	Spatial indicators for stock assessment and ecosystem monitoring	Kell L.
SCRS/2025/098	Spatiotemporal distribution and bycatch associated with surface longlines using traplines in the western Mediterranean	Macías D., Moreno de la Rosa J., Garcías-Barcelona S., Alegría A., Báez J.C.
SCRS/2025/101	Analysis of loggerhead turtle (*Caretta caretta*) bycatch occurrence in the Mediterranean Sea and adjacent Atlantic waters	Rueda L., Báez J-C., Coelho R., Jiménez S., Thasitis I., Tserpes G., Pappalardo L., Macías D., Moreno J., Torreblanca D., Taylor N.G., Santos M.N., Ramos L., Domingo A.
SCRS/2025/102	Shark bycatch mitigation in shallow set longlines	Keller B., Diaz G.
SCRS/2025/104	ACAP Best practice advice for reducing the impact of ICCAT pelagic longline fisheries on seabirds	ACAP
SCRS/2025/105	An update to the sharks species list at ICCAT	Forselledo R., Domingo A., Taylor N.G., Mayor C.
SCRS/2025/106	Gaps in the knowledge on sea turtle bycatch from the Mediterranean: an overview	Torreblanca D., Rueda L., Domingo A., Báez J-C.
SCRS/2025/107	Preliminary food web model of the tropical Atlantic Ocean: evaluating the potential effects of fishing and climate change on the pelagic oceanic ecosystem	Meléndez-Arteaga J., Andonegi E., Juan-Jordá M-J, Zudaire I., Forrestal F., Die D., Corrales X.
SCRS/2025/108	Model derived indicators to feed ICCAT products in support to the implementation of the EAFM: a preliminary proposal	Meléndez-Arteaga J., Andonegi E., Juan-Jordá M-J, Zudaire I. Forrestal F., Die D., Corrales X.
SCRS/2025/109	Ecotest indicator 2: A general-purpose stock status indicator for sharks, billfish and tunas	Carruthers T., Taylor N.G.

SCRS/2025/110	Silky shark post-release survival in the Atlantic Ocean tropical tuna purse seine fishery: a baseline for best handling and release practices	Grande M., Krug I., Cuevas N., Salgado A., Murua J., Erauskin-Extramiana M., Onandia I., Ruiz J., Santiago. J
SCRS/2025/111	Preliminary estimates of spatial catch per unit effort using iccat task 1 catch data and ICCAT imputed effort data	Taylor N.G., Palma C., Mayor C., Ortiz M.
SCRS/2025/117	Advances on indicators of the TunaMed Observatory for the environmental component of the ICCAT EcoCard	Álvarez-Berastegui D., Tugores P., Juza M., Hernández I., Omedes I., Sanz M., Soto M., Mourre B., Reglero P.
SCRS/2025/118	Management procedures and climate change - a review of the literature	Scott R., Ward E.
SCRS/P/2025/031	Assessment of catch composition and bycatch in albacore longline fisheries off the Egyptian coast	Saber M.
SCRS/P/2025/033	A project to assess the efficacy of the new "trap/loop lines" gear for swordfish catches and other species bycatch	Coelho R.
SCRS/P/2025/035	Update of the Sub-group on Technical Gear Changes	Coelho R.
SCRS/P/2025/036	Bycatch Estimation Tool for turtles in the Mediterranean Sea	Anonymous
SCRS/P/2025/037	Update of economic indicators of ICCAT Eco-Card	Tsuji S.
SCRS/P/2025/038	Étude préliminaire des interactions des thonidés mineurs avec la pêche artisanale dans la région de Ghannouch-Gabès (Sud-Est de la Tunisie)	Hajjej G.
SCRS/P/2025/039	Preliminary estimate of loggerhead sea turtle bycatch in pelagic longline fisheries from the Mediterranean and adjacent Atlantic waters	Lourdes-Ramos L.
SCRS/P/2025/040	Progress in CCSBT Spatially Explicit Fisheries Risk Assessment (SEFRA)	Tsuji S.

SCRS documents and presentation abstracts as provided by the authors

SCRS/2025/022 - The commercial tuna industry has used Fish Aggregating Devices (FADs) for decades, a specialized fishing accessory to enhance the catch-size and efficiency of harvesting tropical tuna species. Drifting FADs (dFADs) are deployed by the thousand annually in the Atlantic region, set adrift with a geolocating buoy. It is estimated that 10 to 20% of deployed FADs end up lost or abandoned. Currently there are specific measures that indirectly reduce the impact of lost and abandoned FADs, such as a limit on their active number at sea per vessel, and a transition to biodegradable FADs. However, there is no direct measure on the reduction of dFAD loss and abandonment, or their tracking and recovery. Derelict dFADs often drift to coastlines in North and South America where they impact benthos, shores and the species that inhabit them. The Caribbean FAD Tracking Project (CFTP), a community-science database, crowd-sourced reports of derelict FADs, including photos and descriptions of composition. To date, reports of 417 FADs have been collected, 100% of which were composed of non-biodegradable materials based on photographic analysis of reported FADs.

SCRS/2025/041 - Basking shark *Cetorhinus maximus* and white shark *Carcharodon carcharias* are both species of low productivity. Whilst life-history data are limited for both species are limited, published estimated rates of population growth are low (r = 0.1346 year–1for basking shark, and 0.026 to 0.074 year–1for white shark). Both species are of conservation concern, being listed on CITES (Appendix II) and CMS (Appendices I and II). Their population sizes in the ICCAT area are unknown, and catch data are incomplete. Both species will have some interaction with ICCAT fisheries. Available evidence indicates that both species would meet the definition of being "a taxon of the greatest biological vulnerability and conservation concern for which there are very few data". A prohibition on the retention of both species would align ICCAT Recommendations with the requirements their CMS Appendix I listings.

SCRS/2025/055 - Given the statistical challenges involved in modeling the distribution of wide-ranging and highly mobile species, and the fact that silky sharks are the most frequently caught elasmobranch bycatch species in the tropical Atlantic across multiple fisheries, this study uses the EU tropical tuna purse seine fishery observer data collected from 2010 to 2023, to build a SDM for characterizing the spatiotemporal distribution and environmental preferences of silky shark in the eastern tropical Atlantic Ocean. To address the complexities of species distribution modelling and better capture uncertainty and predictive capacity, we employed three complementary methodologies: Generalized Additive Mixed Models (GAMMs), Boosted Regression Trees (BRTs) and Bayesian Additive Regression Trees (BARTs). Results were consistent across modelling platforms. This type of studies are essential for better understanding fishery-related risks and informing more effective bycatch mitigation strategies across multiple fisheries that catch silky shark incidentally.

SCRS/2025/090 - The management implications of not properly accounting for the effects of environmental variability in an assessment or management strategy evaluation (MSE) context was tested on the North Atlantic swordfish stock. A functional relationship between trends in the North Atlantic sea-surface temperature (SST) and swordfish year class strength (YCS) was quantified. This relationship was used as a proxy for projecting the future productivity of the stock and assessing the performance of a harvest control rule under a suite of climate change scenarios. Declines in stock status occurred when environmental conditioning was not a component of the harvest control rule or when the environmental conditioning did not match the scale of the projected declines in YCS. This work also highlights the trade-offs that providing risk equivalent, climate conditioned advice imposes in terms of yield and stability.

SCRS/2025/091 - This document provides a preliminary overview of the use of "ring shaped branch lines (Meka-ring)" in Japanese longline fisheries, a method similar to trap lines reported in Mediterranean tuna fisheries. The gear was originally developed by fishers targeting large squid. Subsequently, it spread to tuna longline fisheries. The main capture would be swordfish, with minimal bycatch of tunas, billfishes, sharks, or sea turtles and no seabird captures. Current investigations involve collecting information from fishers, and summarizing observers and logbook data, with further detailed reporting planned as research continues in ICCAT areas.

SCRS/2025/094 - Getting estimates of bycatch in ICCAT fisheries depends in some part on the definition of bycatch. Changes to statistical reporting of Task 1 data in 2024 mean that it is now possible to query the Task 1 data for nominal catches reported as either bycatch, target catch, or unknown. Using these data, we summarize the Task 1 data split into these categories and summarize these for the ICCAT area. Further, we calculated a set of ratios with the 2023 data that allowed us to impute historical bycatches, target catches, and unclassified catches.

SCRS/2025/095 - It outlines progress on the development of a collaborative Research Programme on Bycatch under ICCAT, focusing on reinforcing coordination, filling knowledge gaps, and improving management responses for bycatch species. It builds upon the work of the Subcommittee on Ecosystems and Bycatch and ongoing efforts under the Common Oceans (ABNJ) Tuna Project. The authors propose a phased research framework, prioritizing five thematic areas: 1) bycatch data harmonization and access, 2) improved species identification and life-history understanding, 3) estimation of bycatch rates and mortality, 4) evaluation of mitigation measures, and 5) socioeconomic and compliance dimensions. The report emphasizes the need for intersessional work, including technical workshops and regional collaborations, and proposes a timeline leading up to 2029. Key recommendations include aligning the programme with ongoing RFMO initiatives, securing funding commitments, and enhancing engagement with stakeholders, including CPCs and relevant experts. The document aims to support the development of robust, science-based bycatch advice and management strategies across ICCAT fisheries, contributing to broader biodiversity conservation goals.

SCRS/2025/096 - As part of the sub-group of the ICCAT Subcommittee on Ecosystems and Bycatch, a number of potential components for the Ecosystem Report Card are being considered. This paper investigates possible options for indicators that could be used to describe the impact of ICCAT fisheries upon seabird populations.

SCRS/2025/097 - This paper explores spatial indicators as a tool for stock assessment and ecosystem monitoring, since healthy stocks are expected to show more uniform spatial distributions and a greater area of occupancy than depleted stocks. Therefore, spatial indicators that describe distribution patterns (aggregation, occupancy, dispersion) can serve as proxies for stock health and support ecosystem approaches to management, helping ICCAT to align with international requirements such as the Biodiversity Beyond National Jurisdiction (BBNJ) Agreement. Catch and effort data were used to calculate spatial indicators (Gini index, D95, proportion of presence) for the main tuna and tuna-like species. Despite limitations due to the coarse 5°×5° resolution, aggregation indicators appear to be able to capture important stock dynamics. Spatial indicators offer a potential science-based approach to improve ICCAT stock assessments and ecosystem monitoring.

SCRS/2025/098 - This study provides the first systematic assessment of the use of traplines - a recent modification of surface longline gear - in the western Mediterranean swordfish fishery. Observational data from 303 fishing operations targeting swordfish revealed that trapline sets (LOSET) resulted in comparable catch rates in number of individuals of *Xiphias gladius* to traditional hook sets (TRADSET), with a tendency toward capturing larger individuals (mean size 132 cm vs. 112 cm, p < 0.001). Sets using trapline showed a dramatic reduction - approximately 98% - in the number of non-target species caught compared to TRADSET. These findings suggest traplines may represent a promising tool for mitigating bycatch of endangered, threatened, and protected (ETP) species, including sea turtles. However, key uncertainties remain regarding the full ecological impact of traplines and their optimal deployment. Further research is needed to determine whether attaching traplines directly to the mainline or incorporating them into branchlines yields better outcomes in terms of selectivity, efficiency, and gear performance. Given their potential to reduce bycatch significantly without reducing target catch efficiency, we recommend expanded experimental trials under scientific monitoring. Such efforts could support sustainable fisheries and align with EU conservation commitments under regional and international frameworks.

SCRS/2025/101 - This study presents preliminary findings from a collaborative ICCAT initiative evaluating loggerhead turtle (*Caretta caretta*) bycatch in Mediterranean and adjacent Atlantic longline fisheries. Using observer data from 2000-2023 across five countries, binomial GAMs revealed significant spatial, temporal, and environmental patterns. Higher bycatch probabilities were linked to warmer months, deeper waters, and specific oceanographic conditions. Regional hotspots of higher bycatch occurrence were identified.

SCRS/2025/102 - The use of large circle hooks significantly decreases at-haulback mortality for a number of shark species, including shortfin mako. Large circle hooks also decrease injury rates due to decreased gut-hooking relative to J-hooks and increase retention rates for some target species. One tradeoff of large circle hook use is a decrease in swordfish retention. Nevertheless, some fleets use large circle hooks in shallow set longline fisheries in the Atlantic as part of the menu approach outlined in ICCAT's recommendation on the bycatch of sea turtles Rec. 22-12. In addition, nylon or monofilament leaders decrease shark bycatch and increase catch rates of some target species; however, some fleets use steel leaders when targeting sharks to avoid reductions in catch. Collectively, the combined use of large circle hooks and monofilament leaders reduce bycatch and at-haulback mortality and injury of sharks. Depending on the target species and option employed from Rec. 22-12, these configurations might choose to be used by certain fleets. Here, the benefits and tradeoffs of monofilament and large circle use for reducing shark bycatch and mortality in shallow-set longlines are reviewed.

SCRS/2025/104 - The bycatch of seabirds in pelagic longline fisheries continues to be a serious global concern, especially for threatened albatrosses and petrels. The International Commission for the Conservation of Atlantic Tunas (ICCAT) has adopted Recommendations 07-07 and 11-09 with the aim of reducing seabird bycatch. In May 2024, the ICCAT Subcommittee on Ecosystems and Bycatch (SC-ECO) began reviewing these Recommendations, a process that will continue at its 2025 meeting. The Agreement on the Conservation of Albatrosses and Petrels (ACAP) through its Seabird Bycatch Working Group (SBWG), routinely reviews and updates the best practice mitigation advice for industrial fishing gear types (principally pelagic and demersal longline, and trawl gear). The most recent review took place in August 2024, at the 12th meeting of the Seabird Bycatch Working Group (SBWG12), with updates endorsed by the 14th meeting of ACAP's Advisory Committee (AC14). This document presents the updated ACAP Review of mitigation measures and Best Practice Advice for Reducing the Impact of Pelagic Longline Fisheries on Seabirds. ACAP's best practice advice is that the simultaneous use of weighted branch lines, bird scaring lines and night setting is the most effective approach to mitigate seabird bycatch in pelagic longline fisheries. Three hook-shielding devices, the 'Hookpod-LED', 'Hookpod-mini' and the 'Smart Tuna Hook', and one underwater bait setting device, the 'Underwater Bait Setter (Skadia Technologies)' have been included in the list of best practice measures for mitigating seabird bycatch in pelagic longline fisheries. SBWG12 updated the minimum standards for the ACAP advice on branch line weighting. It is advisable that the Recommendations be reviewed considering the available mitigation measures supported by ACAP advice.

SCRS/2025/105 - This document is an initial review of the list of shark species with reported catches (landings and discards) to ICCAT that are currently included in the Task 1 Nominal Catch (T1NC) database. The purpose of this review is to provide the Secretariat with input to produce a more accurate list of species and/or updated T1NC data. We hope this review can be supplemented by SCRS scientists with knowledge of local fisheries, as well as species distribution and potential catch.

SCRS/2025/106 - In recent years, there has been an increased interest in sea turtles and their bycatch in Mediterranean fisheries. There are significant knowledge gaps regarding the loggerhead sea turtle (*Caretta caretta*), particularly regarding bycatch patterns in the Mediterranean. This review seeks to synthesize recent scientific literature on the topic and identify persistent uncertainties, with a specific focus on fisheries managed under the International Commission for the Conservation of Atlantic Tunas (ICCAT). Filling these gaps is critical for designing effective conservation strategies and for informing science-based fisheries management policies. A total of 465 documents were reviewed. Of these, 25 addressed surface longline bycatch (published between 1995 and 2023), 19 focused on bottom trawl fisheries (2001-2024), and 12 examined gillnet fisheries (2003-2024).

SCRS/2025/107 - Increasing efforts are being made within ICCAT to align with international policies and commitments that require the development of integrated and ecosystem-based products and tools. In this study, we present a preliminary ecosystem model for the Tropical Atlantic Ocean (TAO) pelagic oceanic ecosystem, aiming to improve the understanding of its structure and functioning, and to assess the impacts of fisheries on the marine environment. This model represents the ecosystem of the early 2000s, covering an area of over 18 million km2, and it is composed by the main components of the ecosystem. It integrates different information as input data, including biomass estimates, diet compositions, production and consumption rates, and annual landings (t/km2) and discards (t/km2) for the different fishing fleets operating in the region. Preliminary outputs of the model showed that the TAO ecosystem is far from a pristine condition, and that its functioning is suffering perturbations most likely exerted by the fisheries pressure. The model also provides insights into the direct and indirect effects of fishing fleets on key functional groups, as well as competition effects between them.

SCRS/2025/108 - Food web models are considered as valuable tools for monitoring the effects of fishing, environmental variation and climate change. In this document, we propose the use of a suite of ecological indicators derived from Ecopath and Ecosim models of the Tropical Atlantic Ocean (TAO) in order to feed the Ecosystem Report Card (EcoCard) within ICCAT. A selection has been made based on the capacity of indicators to describe key ecosystem attributes related to structural and functional properties, and to measure fishing-induced impacts on the marine ecosystem. However, the proposed indicators remain to be tested with the Ecosim model, and it would be of interest to incorporate uncertainty analyses in the process of informing EcoCards.

SCRS/2025/109 - EcoTest Indicator 1 was previously developed for the specific case of the multi-species, multi-fleet North Atlantic longline fishery. Those neural networks were trained on historical patterns of exploitation rate and assumed the same life-history parameters specified in the most recent stock assessments. Indicator 1 provided good to excellent predictive ability for the two target species, swordfish and bigeye tuna, and the four bycatch species, shortfin mako shark, blue shark, white marlin and blue marlin. The aim of Indicator 2 was to drastically widen the applicability of the A.I. methods: a much larger and broader training data set was simulated including a wide diversity of historical and future fishing dynamics and spanning the life histories of the families Istiophoridae (marlins), Scombridae (mackerels, tunas and bonitos) and Carcharhinidae (requiem sharks). Under a range of data availability conditions (e.g. catch, indices, length and age data). Indicator 2 provided reasonable to good predictive capacity, for example correctly identifying depleted stocks (below 50% B_{MSY}) in 78% of simulations where all data were available and multiple fleet and covariate stock information were provided.

SCRS/2025/110 - Popup Satellite Archival Tag (PSAT) marking programs are crucial for evaluating post-release survival (PRS) of Endangered, Threatened, and Protected (ETP) species that are incidentally caught in fishing operations. This study presents for the first time, results on post-release survival estimates of silky shark released during a fishing trip following protocols from the Code of Good Practices implemented by the OPAGAC fleet in a purse seine vessel. Twenty-three silky sharks were satellite tagged, and blood samples from 90 sharks were collected to evaluate lactate levels as an indicator of shark PRS. A vitality index based on state and behavior at release was also assigned to all the accidentally caught sharks. Subsequently, the relationship between mortality and vitality status, as well as the relationship between mortality and the lactate concentration in each captured individual, was established. The predicted silky shark survival rate for the overall trip was close to 26% based on satellite tag data and vitality index, while the survival rate predicted using lactate concentration threshold was 49%. Shark survivorship decreased as the brailing operation advanced and vitality index declined.

SCRS/2025/111 - Spatial longline Catch-Per-Unit-Effort data are an essential element for the standardization, spatial stock assessment, and spatial redistribution modeling required for modern stock assessment. ICCAT has both spatial effort data and spatial catch data. To construct a set of spatial Catch Per Unit Effort longline series, we use combine 5x5 CATDIS and EFFDIS data. The basic approach was to convert both datasets into spatial-time-series data frames in R and then join them. We left joined the CATDIS data with EFFDIS data based on year (YearC), the centroid of the longitude and latitude data fields (xLon5, yLat5), the flag (FlagCode), the fleet (FleetCode), and quarter of the year (Trimester for CATDIS and Quarter for EFFDIS with a many-to-many relationship i.e. that for each spatial effort data cell in EFFDIS, there would be longline catches corresponding to each species in CATDIS. We confine this analysis to yellowfin tuna, swordfish, skipjack tuna, bigeye tuna and albacore tuna. This returns the nominal catch per unit effort by 5x5 cell for each fleet. The number of fleets considered in this analysis varies by species with as many as 67 fleets for swordfish and as few as 27 for skipjack tuna. We visualize the results of this analysis using animations. In order to be interpreted correctly, the nominal CPUE information requires considerable additional analyses.

SCRS/2025/117 - The TunaMed Observatory supports ICCAT's Ecosystem Report Card by developing environmental indicators specific to the Mediterranean. It responds to the ICCAT Subcommittee on ecosystems to develop an EcoCard and the ICCAT's 2022 resolution on climate change, focusing on how environmental variability impacts tuna habitats. During 2024, TunaMed advanced indicators such as marine heatwaves, primary productivity, turbulence, climate velocity, and small pelagic biomass. These aim to guide ecosystem-based fisheries management and conservation measures. The initiative collaborates with FAO/GFCM, MONGOOS, and the Tropical Atlantic case study, promoting regional integration. The first TunaMed report will synthesize these indicators to inform climate-smart marine policies.

SCRS/2025/118 - A preliminary literature review was conducted of relevant work about the intersection of climate change with management procedures, in order to evaluate and summarize the state of knowledge in the field. The review found that there are a range of considerations at play when seeking to design climate-informed management procedures (MPs), as well as a diversity of options available to managers seeking to develop them. Five major themes emerged in the review of the selected literature that should be considered as ICCAT implements Resolution 22-13: 1) Management procedures are an effective adaptation tool for managing stocks under conditions of a changing climate; 2) there are opportunities and limitations to the explicit incorporation of climate-related environmental factors into harvest control rules (HCRs) and management strategy evaluation (MSE); 3) "climate-informed" MPs should be designed to include extreme events as 'Exceptional Circumstances'; 4) "climate-informed" MPs should account for shifts in geographic distribution across management regimes; and 5) MPs can be applied for both data-rich and data-poor fisheries.

SCRS/P/2025/031 - *Not provided by the author.*

SCRS/P/2025/033 - The presentation provides an update on a novel gear type used in Atlantic pelagic longline fisheries. This "trap/loop" system has gained attention due to preliminary reports indicating higher catch rates (CPUE) for swordfish (SWO) and significantly reduced bycatch of vulnerable species such as sea turtles, birds, and sharks. In response, the SCRS recommended that CPCs and the ICCAT Secretariat implement measures to track the gear's use and analyze its effects. In early 2025, the Portuguese Fisheries Administration (DGRM) and IPMA launched a pilot project targeting the Portuguese longline fleet. Customized logbooks and observer protocols were developed to collect detailed set-by-set data on gear use, catch composition, sizes, and fishing effort. Preliminary observations suggest loops catch mostly swordfish, with occasional tuna or blue sharks, and slightly larger swordfish sizes compared to hooks. However, hooks are not entirely replaced fleets use a combination of hooks and loops. Ongoing data collection will continue throughout 2025, with preliminary results expected in late 2025. A sea trial is planned for 2026 to better assess selectivity and gear performance under controlled conditions.

SCRS/P/2025/035 - This presentation outlines the ongoing work of the ICCAT Subcommittee on Ecosystems (SC-ECO) to assess how gear and fishing practice modifications can reduce bycatch and related mortality. Originating from ICCAT Recommendation 19-05, the subgroup was established in 2021 to design and implement studies that examine the effects of changes to terminal gear (e.g., hook type, size, leader material) and fishing practices (e.g., depth, bait, timing). Three main tasks were defined: reviewing past studies to inform new experimental designs (Task 1); developing and conducting experiments on gear changes and their effects on catch rates, at-haulback mortality, and post-release mortality (Task 2); and analyzing how fishing practices influence bycatch outcomes (Task 3). Subtasks include designing trials using various hook types and leader materials, running power analyses to estimate required fishing effort, and evaluating species-specific vertical habitat use with miniPAT and TDR data. Next steps include expanding trials, finalizing study designs, and building a detailed operational database. The ultimate goal is to inform ICCAT policy through robust scientific evidence on how to effectively minimize bycatch while maintaining fishery performance.

SCRS/P/2025/037 - It provides revised metrics to assess the economic importance of ICCAT-managed species. Two primary indicators are proposed: (1) direct cash earnings from the export or re-export of commodities derived from target species, and (2) estimated landing value, calculated by multiplying landings by country-specific fish prices derived from average export prices. The analysis focuses on ICCAT's major species, including tunas, bonitos, billfishes, sharks, rays, and chimaeras, using FAO FishStat as the main data source. Several methodological refinements were introduced. The definition of target species was updated from the broad ISSCAAP group to a more focused list aligned with ICCAT priorities. Missing country-specific fish prices are now estimated using a more systematic pro-rata approach based on global averages. The time series was also extended through 2022/2023, and the percentage contributions from Contracting and Non-Contracting Parties (CP/NCP) are now included. These improvements aim to offer a clearer picture of the economic value of ICCAT species, enhancing the Eco-Card's role as a decision-making and policy-support tool within international fisheries governance.

SCRS/P/2025/038 - This study presents a case study of interactions between ICCAT-listed species and non-ICCAT fisheries, with a focus on artisanal fishing activities in Ghannouch, southern Tunisia. The objective is to better understand the dynamics of bycatch and support balanced, ecosystem-based fisheries management. Data were collected in two phases: structured interviews with 35 fishers (representing 10% of the local fleet) conducted in November-December 2024, and continuous landing monitoring throughout 2025. The study primarily examines the use of trammel nets (targeting cuttlefish and shrimp) and traps, as well as their associated catch composition and bycatch rates. The study primarily examines fishing gear types namely trammel nets and traps catch composition, and bycatch rates. Findings indicate that gear type significantly influences both catch selectivity and the incidence of bycatch. Small tunas were rarely recorded in landings, suggesting limited interaction; however, the main fishing season for these species (April-July) was not covered, which constrains interpretation of their actual impact. Elasmobranchs and turtles were predominantly associated with trammel net captures. These results highlight the critical role of gear choice in promoting sustainable fishing practices and reducing incidental capture.

SCRS/P/2025/039 - Here is a 120-word summary of the presentation titled "Preliminary Estimate of Loggerhead Sea Turtle Bycatch in Pelagic Longline Fisheries from the Mediterranean and Adjacent Atlantic Waters": This study presents a preliminary estimate of loggerhead sea turtle bycatch in Mediterranean pelagic longline fisheries using data from Cyprus, Greece, Italy, Portugal, and Spain. Nearly 9,000 fishing sets were analyzed, focusing on spatial effort and catch-per-unit-effort (CPUE) using a 5x5 degree grid. The Bycatch Estimation Tool (BYET) applied Tweedie and Negative Binomial GLMs, which produced similar results, with higher bycatch in earlier years. Only Mediterranean data and fleets with available observer data were included. Future improvements include integrating gear type, depth, more countries, and spatial variability. Despite limitations, the study offers a critical step toward quantifying sea turtle bycatch in ICCAT fisheries and guiding regional conservation strategies.

SCRS/P/2025/040 - *Not provided by the author.*