Report of the Subcommittee on Ecosystems and Bycatch (SC-ECO)
(*Madrid, Spain / hybrid, 8-12 May 2023)*

1. Opening, adoption of the agenda and meeting arrangements

The co-convenors opened the meeting and welcomed the participants of the Subcommittee on Ecosystems and Bycatch (the Subcommittee). The Assistant Executive Secretary greeted the participants, expressing his thanks for everyone's attendance and his hopes for a productive meeting. The agenda was approved. The agenda is contained in **Appendix 1**, the list of participants in **Appendix 2**, the list of presentations and papers in **Appendix 3**. The authors´ abstracts are in **Appendix 4.** Rapporteurs were assigned as follows:

Item 1.	N. G. Taylor
Item 2.	A. Hanke and M.J. Juan-Jordá
Item 3.	D. Alvarez-Berástegui
Item 4.	M.J. Juan-Jordá
Item 5.	C. Brown, A. Hanke and A. Domingo
Item 6.	N.G. Taylor, J-C Baez and A. Domingo
Item 7.	N.G. Taylor and A. Domingo
Item 8.	R. Coelho
Item 9.	A. Domingo and A. Hanke
Item 10.	A. Domingo and A. Hanke
Item 11.	N.G. Taylor
Item 12.	J. Bell, S. Tsuji, S. Jiménez and A. Domingo
Item 13.	A. Hanke
Item 14.	C. Brown, A. Domingo and A. Hanke
Item 15.	A. Hanke
Item 16.	A. Domingo and G. Díaz
Item 17.	A. Domingo and M.J. Juan-Jordá
Item 18.	A. Domingo, A. Hanke and G. Díaz
Item 19.	N.G. Taylor and C. Brown

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

SCRS/P/2023/037 presented an index of myctophid biomass as a potential indicator reflecting the health of prey important to ICCAT species in the pelagic ecosystem. A timeseries of myctophid biomass beginning in 2011 is available for the Gulf of Mexico as part of a continued sampling effort that is funded through at least 2029. The Gulf of Mexico Atlantis ecosystem model was presented as a tool for testing the utility of myctophid biomass as an indicator, and for assessing its relationship to other ecosystem state variables and potentially large pelagic populations via trophic pathways.

The Subcommittee discussed whether an indicator of myctophid biomass would be indicative of variability in prey important to ICCAT species. It was suggested that feeding on myctophids was largely opportunistic and the product of upwelling, consequently the dependence would be small. However, it was noted that the dependence and importance of myctophids to the diet of ICCAT species varied regionally as evidenced by stable isotope studies conducted on swordfish and bluefin tuna in the Bay of Biscay and the Mediterranean Sea (Cardona *et al*., 2012; Chancollon *et al*., 2006). Similar stable isotope work is underway for the Gulf of Mexico. It was clarified that the sampling surveys collected adult myctophids which support the development of length at weight relationships used to convert length to biomass for the ecosystem models. These ecosystems could be used to explore the relationships of myctophids with ICCAT species.

The Subcommittee supported including the ecosystem context for myctophids and the index in the Interamerican ecoregion overview report. It also encouraged exploring how variability in myctophid abundance and availability might affect survival and productivity.

SCRS /P/2023/045 summarized environmental variability effects on tuna survival during their early life stages for a Mediterranean case study and considered the consequences for the ecosystem report card.

The Subcommittee recommended testing the sensitivity of the indicator to alternative assumptions on feeding and pre-flexion growth. It was further discussed if the indicator reflected changes in recruitment or spawning stock biomass. It was clarified that the index was meant to be used as a tool for understanding changes in the environment that could affect stock productivity and status at early life history stages. The prey and temperature dynamics were considered interesting and further work on identifying the linkages between these quantities and their significance to the affected stock was recommended.

The Subcommittee discussed modifying the indicator. It was clarified that the work presented could be extended to other species and regions within ICCAT. Furthermore, it was explained how the index is currently supported by the European Union (EU) to collect the feeding, temperature, and larval abundance data; this support is expected to continue.

Extensions of the work to other regions was acknowledged with particular emphasis on the Gulf of Mexico, but it was questioned how the work could be extended to species other than bluefin tuna.

2.1 Review progress on the development of methods for prioritizing risks and screening and validating indicators

SCRS/2023/085 described the data collection efforts funded by a short-term contract that supported the development of a quasi-quantitative risk assessment approach.

The Subcommittee noted that the World Register of Marine Species that was used to define the data for the quasi-quantitative risk assessment, contained many more species than were collated into the species database that will support the identification of species of priority for management. It was explained that in the case of crustaceans, some classes were considered not relevant for future modeling and thus were included in low numbers, while in other cases species could not be collated because they lacked sufficient auxiliary information needed to conduct the analysis. Cephalopods species were all considered to be relevant and were omitted only when auxiliary data were lacking.

SCRS/2023/074 described improvements to the database containing Atlantic marine species, their distribution, and preferences.

The Subcommittee discussed the improvements to the species database and recognized that its structure and content would dictate the type of questions that could be addressed with it. The formulation of these questions will depend on discussions of the Subcommittee. The Subcommittee noted that, in some cases, there were close relationships between variables (e.g. habitat and behaviour) used to characterize the species and it was questioned if that would affect the analyses. It was suggested that the model would not be overly sensitive to the similarities between the variables and that in any case, the sensitivity of model results to the presence of the variables could be tested.

The Subcommittee discussed what questions the current structure of the database could address, and it was clarified that the analyses would identify priority species for management, some of which are not managed. A secondary objective would be identifying species linkages. The resolution of the data was considered important to make good predictions and the Subcommittee recommended exploring the effects of changing data resolution. However, the issue of resolution is only relevant for non-categorical components of the data.

The Subcommittee discussed the workplan for future database refinements and questioned what fisheries interaction data could be used. It was noted that sources like CPC observer data would qualify for use in this work.

It was recognized that preliminary analyses, used to predict fishery interactions for test data using a machine learning model that used expert judgement informed species characterizations, had good true positive success rates which could be useful in predicting when and where fishing interactions are likely to occur.

SCRS/2023/074 provided results of a preliminary analysis of the species data using machine learning approaches.

The Subcommittee discussed the preliminary results of fitting machine learning models to the species data and associated catches. Catches were predicted using species characteristics and while predictions of the test data were like the observed catches, some dissimilarities were noted. The analyst encouraged the Subcommittee to examine the results and recognized that these processes of model fitting are in their initial stages. The Subcommittee suggested that the source of catch data be considered carefully to avoid erroneous predictions and spurious correlations between species. It was suggested to implement significance testing to eliminate correlations that were statistically insignificant before reviewing model performance. It was clarified that what was interpreted as correlations were similarity index values. It was further suggested that model development and database improvement could be informed by 1) consideration of which species were predicted to have catches when in fact catches are unlikely, 2) considering the validity of similarities for target species rather than species with less data, and 3) considering how well the similarities reflect true relations between species caught by purse seiners which in the case of tropical tunas catch large numbers of juveniles. A final consideration for future modeling was that while unlikely fishery-species interactions have been observed in the past, these should not be included in the analyses.

SCRS/2023/071 demonstrated a productivity-susceptibility tool that worked in a multi-species context including mammals, target species, turtles, seabirds and sharks, as examples.

The Subcommittee discussed if the tool could be used to develop indicators and to identify the most vulnerable species. It was clarified that not only was this possible, but that the indicators could be region specific. The tool was considered appropriate for making predictions under future climate scenarios that affect productivity and/or susceptibility and it could quantify the cumulative effects of multiple gears. Considering the usefulness of the tool for the Subcommittee, it was inquired if it could be made available for the use of the Subcommittee and it was indicated that it would be made available upon request.

2.2 Review development of case studies and ecoregions

The case studies, presented and supported by the Subcommittee are intended to evaluate different approaches for advancing the components of the EcoCard at regional scales and to improve collaboration among scientists. Topics include the impacts of fisheries on the ecosystems and the effects of environmental and ecosystem variability on the highly migratory species managed by ICCAT. Additional objectives are to facilitate interaction with other researchers, initiatives, and organizations whose activities will help the work of the Subcommittee including strengthening biodiversity conservation in the face of a changing environment.

SCRS/2023/075 presented work being done under the GEF-UNDP-IOC-SSC project, Strengthening the stewardship of an economically and biologically significant high seas area – the Sargasso Sea.

The Subcommittee was reminded that the EcoCard was developed using the Driver-Pressure-State-Impact-Response (DPSIR) framework, while GEF projects on Large Marine Ecosystems (LME) have historically conducted an Ecosystem Diagnostic Analysis (EDA). Therefore, the authors extended DPSIR to DAPSI(W)R(M), to make it compatible with EDA. Where Drivers (D) now refer to fundamental (basic) needs (e.g. food, energy, space, movement of goods, security, or recreation) necessary for sustaining human life. To fulfil these basic needs, economic sectors develop specific Activities (A), such as fishing, shipping, and deep-sea mining, which may impact human Welfare (W). The framework also includes effective responses, i.e. Management Measures (M).

There was no discussion about DAPSI(W)R(M) framework.

SCRS/2023/083 presented the Terms of Reference for a case study on a Mediterranean eco-region focused on describing and monitoring the variability of environmental processes in the Mediterranean Sea that affect the ecology of large pelagic fishes - with a particular attention on tunas -, and the possible role of climate change on this variability.

The main purpose of preparing the terms of references (ToRs) for each case study were 1) to state the vision and objectives of the case study 2) present ongoing research activities and projects supporting the work, 3) present the expected outputs and types of indicators that would be developed and how they could contribute to the EcoCard, and 4) present the main partners and researchers involved in the case studies. The ToRs aim to be used to communicate widely this type of work to the SCRS and strengthen the case studies to attract more participation and attract potential funding sources.

A general observation of the Subcommittee was to focus on an approach to improve the linkage between the indicators contained in the EcoCard and the management process. The Subcommittee suggested that one way to do this would be to link environmental and ecosystem indicators to the ongoing MSE processes in ICCAT in the single species working groups. The MSE groups could be asked to conduct robustness tests to evaluate the effect of these indicators on the management procedure (MP) driving the stock to undesired levels.

However, it was noted that in some cases the indicators might not yet be ready to be linked to the MSE process. In the case of the Mediterranean case study, the work presented showed how specific environmental processes (heatwaves) are known to affect specific biological processes of the early stages of bluefin tuna. This work is now being used to generate and test new hypothesis to better understand the mechanisms linking these environmental processes to the biology and ecology of bluefin tuna's early life stages. Therefore, this type of work is considered an important intermediate step before we try to link this work to the MSE process of bluefin tuna. The Subcommittee was reminded that the work of the Mediterranean case study has just started, and while the example provided in the presentation referred to several bluefin tuna spawning grounds, the Mediterranean case study aims to generate multiple indicators to provide insights about how environmental variability affects the early life stages of several tuna species and how this type of work could also be extrapolated to other regions.

The Subcommittee reflected on how both types of indicators, surveillance indicators and operational indicators, can be used to monitor different attributes of the ecosystems. While operational indicators might be preferable, because they are associated with target reference points and therefore might initiate a management response, surveillance indicators can still be used to monitor key aspects of the ecosystems when there is insufficient evidence to define target reference points.

The Subcommittee noted how the case studies should be seen as working laboratories to stimulate research and generate new ideas and hypotheses and could be used as a platform for collaboration to generate and test new ideas. The Subcommittee noted how each case study was addressing specific objectives of particular ecosystem components of the EcoCard. Yet over time, it will be desirable that the different case studies inform as broadly as possible the content of all the components.

The Subcommittee discussed how different environmental and ecosystem indicators generated in these case studies could be maintained and updated over time. It was noted that while the environmental and habitat spawning indicators proposed in the Mediterranean case study can be easily updated annually because the sources of data used to estimate the indicators are available and maintained by different EU programmes, other indicators might be more difficult to sustain over time, and how this is addressed would be case specific.

The Mediterranean case study aims to generate an environmental report summarizing what type of indicators would be used to monitor environmental variability in key ecological areas of the Mediterranean ecoregions and its impact on tuna habitats. The Subcommittee supported this initiative and invited the speaker to present this report at the next SC-ECO meeting.

The Subcommittee was asked to endorse the ToRs of the Mediterranean case study as a way to strengthen and give more visibility to the case study. It was noted that by endorsing the ToRs, it would allow to create a stronger collaborative framework and facilitate fundings of future research projects. The Subcommittee discussed the implications of endorsing these ToRs for the SC-ECO and agreed that explicitly supporting the ToRs would be of mutual benefit to both the case study groups and SC-ECO.

SCRS/2023/066 presented how three recently funded research activities together will contribute to develop further the bycatch and food web components of the EcoCard for the Tropical Atlantic Ecoregion. The funded activities will support (1) bycatch assessments with a focus on pelagic sharks and rays interacting with tropical tuna fisheries, (2) an ecosystem assessment of the tropical Atlantic and (3) a fishery-ecosystem overview of the tropical Atlantic Ecoregion.

The Subcommittee noted how some of the activities presented might overlap with the ongoing activities of the Shark Species Group (SSG) and suggested them to be presented there. The presenter clarified that the research team involved in the tropical Atlantic case study plans to participate and present the progress of this project in the SSG, to ensure the research activities related to sharks interacting with tropical EU purse seine fisheries are well coordinated within the plans and research agenda of the SSG.

The Subcommittee noted how the spatial scale and boundaries of the ecoregions do not agree with the boundaries of the main distributions of tuna, billfish and shark species which are known to be widely distributed and highly migratory. It was explained that ecoregions have not been designed to match the spatial distributions of the core tuna, billfish and shark species or inform the single species assessments of processes in ICCAT. Instead, the ecoregions are meant to be a tool providing a spatial framework (where boundaries need to be interpreted as transition zones) to facilitate the synthesis of evidence related to bycatch, ecosystem and environmental research that informs the Ecosystem Approach to Fisheries Management (EAFM) process for a particular region. They will also help to stimulate integrated research and advice across a range of topics (bycatch, ecosystems and environmental) on a more regional bases, and in the case of the Atlantic tropical region, with a focus on tropical tuna fisheries.

The Subcommittee noted that the potential use and applicability of the ecoregions have been clarified over time and noted how ecoregions are being used now to structure the ecosystem-related work of the Subcommittee with the assistance of the case study regions. The Subcommittee noted that the development of the case studies is still in the early stages. The case study seeks to be collaborative frameworks to stimulate research for generating bycatch, ecosystem, and climate indicators relevant to core fisheries and species in specific regions for review by the Subcommittee. It was noted that for ecosystem-based advice to be effective, it needs to be context specific and linked to specific fisheries and ecoregion. It was noted that while some indicators will need to be reported at a more regional scale, some indicators will need to match the scale of a species distribution and in those cases, it is important to keep close collaborations with the relevant species groups.

The Subcommittee noted how this tropical Atlantic case study is working towards developing some sections of a Fishery Ecosystem Overview, and it encourages the case study group to present a pilot product to the SC-ECO.

The Subcommittee asked how ecoregions units and the regional management units (RMU) used by sea turtle specialists can be reconciled. It was noted how the ecoregion units are not meant to replace other spatial frameworks used by different taxonomic groups (sea turtles or other taxa groups) which have been defined for different purposes. When a Fishery Ecosystem Overview is done at the ecoregion level, it will be used to visualize if any RMU for any sea turtle is present in the region and support their work.

SCRS/2023/076 presented Terms of Reference for the Sargasso Sea Case (SSC) Study. The ICCAT Convention area includes the Sargasso Sea, the Sargasso Sea Commission's Area of Collaboration, established by the Hamilton Declaration Signatories. The main objective of the SSC is to adopt stewardship options for better conservation and protection of biodiversity and the goods and services supported by the Sargasso Sea. This requires acknowledgement of, and adherence to, the role of existing sectoral and other organizations and institutions with responsibilities and interests in the Sargasso Sea area such as ICCAT. Signatories to the Hamilton Declaration include some ICCAT CPCs.

The SSC and the Hamilton Signatories, through the UN and GEF, also support the Sargasso Sea as a case study for strategic action to conserve and protect the Sargasso Sea on an Ecosystem-Based management/stewardship approach. The UNDP GEF Sargasso Sea Project will provide opportunity and support for member States of the relevant RFMOs such as ICCAT to better fulfill their obligations under the United Nations Convention on the Law of the Sea (UNCLOS), in particular Articles 116 to 119 on conservation and management of the living resources of the high seas and other relevant articles. The Sargasso Sea Project recognizes ICCAT as a direct stakeholder to the project and will be given a direct

stakeholder role and input to the development of a Strategic Action Programme that will strengthen the stewardship of this economically and biologically important area in which ICCAT members operate and over whose action ICCAT has responsibility.

The scientific components of the Sargasso Sea case study, funded under GEF, can be tailored to support the Subcommittee objectives related to indicator development for ecosystem components which would be of interest to multiple Regional Fisheries Management Organizations (RFMOs) and that it could provide approaches for providing risk equivalent, climate conditioned advice. The Subcommittee asked if the Sargasso case study team would also develop a Fishery Ecosystem Overview for the ecoregion occupied by the Sargasso Sea. It was clarified that this case study does not have resources to support the development of this product.

ICCAT was recognized as a stakeholder in the Common Ocean Sargasso Sea project, and the Subcommittee asked to clarify what that term implies, whether at the scientific level or Commission level, for ICCAT in this project. It was indicated that the Memorandum of Understanding (MoU) currently being developed will clarify this. The Sargasso Sea Project is part of the "Common Oceans - Sustainable utilization and conservation of biodiversity in areas beyond national jurisdiction" program, an objective of which is "to facilitate a collaborative, cross-sectoral, and sustainable stewardship approach for the Sargasso Sea through improvement of the knowledge base and strengthened frameworks for collaborative management and governance". ICCAT is an organization with responsibilities and interests in the Sargasso Sea area and will be given a direct role in the project.

The Subcommittee discussed how the case studies aim to support the development of tools and methods, stimulate research and ideas to assist in delivering ecosystem advice, and how the case studies will help to contextualize these tools and products, so they are relevant to the management of fisheries in those regions.

The Subcommittee suggested that the case studies not only need to target the development of indicators and be linked to ongoing MSE processes, but they should also contribute to other efforts and ways to provide ecosystem-based advice (e.g. development of ecosystem and climate indicators to monitor the condition of the ecosystem on a more regional basis, other spatial management tools to manage spatial areas of interest).

3. Review the intersessional work of the sub-group working on the applicability and functionality of the Ecosystem Report Card (EcoCard) as a tool for monitoring the impacts of ICCAT fisheries

SCRS/2023/065 presented a summary of the second meeting of the Sub-group on the Ecosystem Report Card that is reviewing the functionality and applicability of the ecosystem report card. The outputs of the last meeting were dedicated to assessing the ongoing activities on the development of the EcoCard. The main objectives of that meeting were to discuss how the ongoing case studies can contribute to EcoCard development and to identify potential synergies and collaborations with two outside international projects. These international projects were: the Common Ocean Tuna Project activity "Modeling impacts of climate change on global tuna fisheries with SEAPODYM", a Commission for the Conservation of Southern Bluefin Tuna (CCSBT) project "Enhancing Education on and implementation of seabird measures within fisheries", and the initiative "The Gulf of Mexico Atlantis ecosystem model as a tool for providing EAFM advice". The study authors explained that the EcoCard sub-group ToRs indicated that each case study should be presented to the Subcommittee to facilitate the evaluation of their activities and to provide explicit support. A new case study was proposed in that meeting for the Inter-American Ecoregion.

The Sub-group on the Ecosystem Report Card discussed the need to identify coordinators for the development of these regional ecosystem reports. M.J.J Jordá (EU-Spain) was nominated for the subtropical Atlantic ecoregion, David Die (U.S.) for the Inter-American Ecoregion, and Diego Alvarez-Berástegui (EU-Spain) for the Mediterranean Ecoregion. These individuals will be the link between the Subcommittee and the mentioned external projects to optimize the incorporation of the results of these studies into the EcoCard. The proposal by the Sub-group on the Ecosystem Report Card to include the Inter-American Ecoregion as a new case study was deferred until the Subcommittee could review the specific ToRs. The Subcommittee recognized the importance of the case studies and discussed how to best reflect the value of this work in future discussions and work planning. It was emphasized that the support needs to be transparent in order to facilitate the ongoing activities of the case study as outlined in their respective ToRs.

The Subcommittee discussed the recommendation by the Sub-group on the Ecosystem Report Card to create example Ecosystem Overview Reports. The Subcommittee recommended reviewing a prototype Overview report for the subtropical Atlantic ecoregion before making a final determination. The Subcommittee also discussed if the ecoregions are sufficient for analyses and for monitoring of ICCAT fishery impacts on target species. The Subcommittee considered that these spatial units do not always completely match the spatial distribution of highly migratory species and whether to link the work developed in these ecoregions with the single species stock assessments conducted by the SCRS. The relationship between assessments and ecoregions for stocks managed in Alaska was considered a model that could be emulated. However, the different fisheries management structure in Alaska may well limit the extent to which their EAFM framework could be considered in ICCAT.

Finally, the Subcommittee reviewed the recommendation by the Sub-group on the Ecosystem Report Card to include ecosystem considerations in the SCRS Executive Summaries. It discussed how to include these considerations in the SCRS report which is supported by the *Resolution by ICCAT to standardize the presentation of scientific information in the SCRS annual report and in working group detail reports* (Res. 11-14)and the *Resolution by ICCAT to complete the standardization of the presentation of scientific information in the SCRS annual report* (Res. 13-15). It was proposed to integrate the advice as a new section in the species Executive Summaries and to create a new section in the SCRS annual report entitled Ecosystem Considerations. The SCRS Chair indicated that changes to the Executive Summary were a priority, but that these changes must be considered carefully because new information with no clear applicability could generate confusion.

4. Discuss content of a workshop to advance the identification of draft ecoregions and foster discussions on their potential use to facilitate the implementation and operationalization of Ecosystem Approach to Fisheries Management (EAFM) within ICCAT

SCRS/2023/067 provided a terms of reference document for the development of a pilot product to test the utility of ICCAT ecoregions for delivering advise-products to decision-makers.

The Subcommittee provided guidance concerning the overall project objectives and the potential to achieve those objectives given the limited funding, data gaps and time available.

The Subcommittee suggested that the objectives were too aspirational given the quantity of work that was proposed. Further, the Subcommittee asked how the objectives represented a test of ecoregion utility given their stated purpose. It was explained that in order to test the usefulness of ecoregions, the study aims to develop Fishery Ecosystem Overviews for the two sections selected, focusing on describing the core fisheries and target species within each ecoregion, and main bycatch taxa and species interacting with the core species in each region. It was indicated that for the ecoregions being considered, the section summarizing the status of assessed species would only include a summary of those stocks previously identified in the ecoregion. Also, it was suggested that the seabird data would be insufficient to make comparisons given the availability of data. It was indicated that the primary data source to inform several sections of the Fishery Ecosystem Overview would be what could be gleaned from a systematic literature review. The sections described in the Fishery Ecosystem Overview will illustrate the state of knowledge based on most recent years.

The Subcommittee had a number of suggestions that need to be taken into consideration when conducting the work as follows:

- ICCAT Task1 data are reported to statistical areas that do not conform to the ecoregions which complicates how to assign the data to ecoregions. One option, when appropriate, is to use Task 2 "catch and effort data" and CATDIS data which have georeferenced data.
- Given time constraints, the exercise should be limited to a smaller number of taxa and species.
- Use ICCAT data preferentially where appropriate but also include data from other sources.
- Add a task so that the contractor provides and evaluation of the utility of the ecoregions.

The Subcommittee encouraged the project to provide useful advice and that it be consistent with the work on the EcoCard. It was agreed that the ToRs needed to be redeveloped considering the Subcommittee's comments and that this work should be completed well before the July call for tenders.

5. Review a draft Memorandum of Understanding to be signed between the Secretariats of ICCAT and the Sargasso Sea Commission

The Subcommittee reviewed the scientific component of a draft of the substantive/operative provisions of a proposed MOU between ICCAT and the Sargasso Sea Commission (SSC), with the aim of determining whether the Subcommittee would agree with the proposed text.

In carrying out the review, the Subcommittee agreed that it would not evaluate clauses that fell in the Commission's purview. Therefore, the Subcommittee limited its review to sections 2 and 3 of the proposed draft MOU. The Subcommittee emphasized that an important aspect of this review would be to understand the potential implications of this MOU, including the commitments that would be required both in time and resources, as well as any potential benefits that might come as a result of agreeing to the MOU.

There was general agreement that any such MOU should be more general in nature with respect to collaborations that would be undertaken. To that end, the Subcommittee determined that both the reference to the Driver-Pressure-State-Impact-Response Framework in paragraph 2a and in 2c to the work currently being undertaken by the international Committee on Earth Observation Satellites sponsored project on Ocean Variables Enabling Research and Applications for GEO be removed from the document. The enshrinement of specific projects within any MOU could prove problematic if new approaches emerge that might be preferred, or if priorities shift. The removal of these projects from mention within the MOU would be without prejudice as to the potential value of such collaborations. These and other potential collaborations should be carefully considered through a mechanism that could be developed under the auspices of the MOU. The Subcommittee also pointed out that once the identification of a particular project in 2c is removed, sections 2b and 2c could be merged, as they reflect similar themes.

Furthermore, the Subcommittee agreed that references to the collection and curation of data should be removed. These potentially reflect open-ended commitments and systems to accomplish which already exist within ICCAT. The Subcommittee noted that references to the exchange of data and analysis may be worthwhile objectives if this is intended to reflect two-way exchanges of data between ICCAT and SSC, as well as the facilitation and encouragement of collaborative work, but that if this is the intention this point needs to be more explicit.

Under section 3, Financial Contributions, it was pointed out that, while there may not be direct monetary contributions unless agreed otherwise in advance in writing, there would clearly be substantial in-kind contributions from both parties to do any collaborative analyses or preparation of data.

One important, but neglected point highlighted by the Subcommittee was a clear understanding of what the SSC would bring to the proposed collaboration between ICCAT and the SSC. The SSC acknowledged the Subcommittee concerns and indicated that it will address them in the next draft of the MOU.

6. Sea turtles

6.1 Review progress on collaborative work on sea turtles and presentation of the next steps

SCRS/P/2023/040 provided an update on collaborative work to assess sea turtle bycatch in pelagic longline and purse seine fleets (Atlantic and Western Indian Oceans). It involved collaborators from a large and diverse set of CPCs. The project aims to assess the temporal trends and spatial variation in bycatch for the various species of sea turtles in the pelagic longline and purse-seine tuna and tuna like-species fisheries in the Atlantic and Western Indian Oceans and to put this information into the context of their conservation status according to the Regional Management Units for Sea Turtles (RMUs). Using set-by-set longline and purse seine observer data from diverse countries, it uses the distribution (1x1 degree) of the fishing effort in pelagic longline (number of hooks) and in purse-seine (number of sets) fisheries (Atlantic and Western Indian Oceans, 2002-2018). The distribution of the captures and standardized CPUE of loggerhead, leatherback, olive ridley and green turtle by fishery and RMUs were estimated. In addition, the effect of set type (deep *vs* shallow for longline, and free-swimming schools FSC *vs* fishing aggregating objects FOB for purse seine). The key results included:

i) this was the first assessment of the large-scale temporal fluctuations in sea turtle bycatch in tuna fisheries, determining the most affected RMUs, for the Atlantic and Western Indian Oceans.
ii) the fluctuations found in the catch rates of the main species caught in pelagic longlines possibly may only reflect the variation in the observed effort but that due to low observer coverage, it was not possible to confirm that the results represent longline sea turtle catches trends in both oceans.
iii) each species had particular RMUs with higher captures rates.
iv) at large scale, it was possible to confirm that surface longline fleets catch more turtles than deep longlines, while in purse seines, turtles were caught mainly in floating object sets, with much lower catches in free schools sets.
v) that to address small sample sizes, increased observer coverage is essential to obtain information to conduct species and population or management unit assessments.

The Subcommittee expressed their appreciation for the work presented. The Subcommittee discussed how RMUs were used in the modeling. A suggestion was that spatio-temporal analysis might be a more appropriate method for the analysis of these data. With respect to the use of RMU, they had tried different methods but in the end were treated as factors in the modelling.

6.2 Advance the secondary objectives of the collaborative work on sea turtles

SCRS/P/2023/038 provided information on a roadmap for sea turtle workshops in the Mediterranean Sea. It identified possible collaborators for future work including General Fisheries Commission for the Mediterranean (GFCM), the International Union for Conservation of Nature (IUCN), the Regional Activity Centre for Specially Protected Areas, and others. The workshops aimed to i) estimate turtle catches, ii) generate CPUE indices, and iii) identify other potential collaborators.

The Subcommittee considered the initiative laudable and congratulated the Subcommittee on its initiative. It was noted that in many Mediterranean countries, the amount of reported sea turtle data has diminished by the implementation of different regional or national legislation. It was further asked how data used for the project would be managed. In response, it was noted that the data came from observer programmes from their CPCs and that those data were used only for the collaboration. The Subcommittee further inquired about data availability in the Mediterranean Sea for gears other than longline. By way of response on this point, it was noted that sea turtles, like other species, are subject to impacts from many other fisheries than those managed by ICCAT and that the project aimed to search data on fisheries affecting turtles and that this point had to be highlighted in the overall work.

Quantifying the mortality experienced by turtles in these fisheries would remain a significant challenge. Some non-ICCAT fisheries, in particular set nets might impose significant mortality on sea turtles. The Subcommittee also noted that GFCM had done a study on the status of turtles in the Mediterranean and that it might be a possible source of information to support this project. Other participants noted that they might also have data to support the initiative in future iterations. The Subcommittee concluded that a detailed understanding of the impact of ICCAT fisheries on sea turtle populations in the Mediterranean is important.

Scientists from EU-Cyprus described the Turtle Watch project. The intention of the initiative was to adopt this tool for the waters for EU-Cyprus. It aims to identify areas with a higher probability of sea turtle captures. This project has sparked some debate due to its reliance on the number of turtles in an area. The more turtles present, the higher the chance of capturing one. This raises important questions about managing populations of vulnerable species, especially once their decline has been reversed. It is essential to balance fishing activities with the potential increase in turtle populations. Accordingly, it is important to find ways to protect these species while also supporting sustainable fishing practices. This is a challenging task that requires input from various stakeholders and experts.

6.3 Review of the draft ST12 form

The Subcommittee discussed the development of the new ST-12 electronic form to report sea turtle interactions data requested by the *Recommendation by ICCAT on the bycatch of sea turtles caught in association with ICCAT fisheries (combine, streamline, and amend Recommendations 10-09 and 13-11)* (Rec. 22-12). The Secretariat presented a preliminary version of the form. The Subcommittee discussed the timing for the final approval of the new ST-12 form. The ST-12 form will be reviewed by the Subcommittee on Statistics (SC-STAT) in its upcoming meeting in September 2023 and by the SCRS at its plenary meeting for approval. However, the Subcommittee recognized that it will not be able to review the new form until

its 2024 meeting. The Subcommittee discussed that if it finds that no changes are needed to the new form, then ST-12 will be available to report data in 2024. But if changes are needed, then the revised form will have to be approved by the SCRS at its 2024 annual meeting and, therefore, delay its implementation until 2025. The Subcommittee agreed that the Commission should be informed that the final approval of ST-12 will occur in 2024 at the earliest or 2025 at the latest. The Subcommittee also agreed that once ST-12 is made available, CPCs will be required to report data from 2022 onwards to comply with Rec. 22-12. The Subcommittee commended the Secretariat for the work done in the development to date of the new ST-12 electronic form.

During the discussion, it was pointed out that all marine turtle species are listed in the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and there are currently many practical difficulties when studying these species. There are many legal restrictions linked to CITES requirements. CITES rules require a formal application to the national CITES scientific committee for getting individual sampling permits. For ICCAT fisheries this is practically impossible. Therefore, given that this problem has already been acknowledged for some shark species, the Subcommittee recommended that the SCRS take all possible measures for trying to solve this recurrent and serious problem.

7. Effect of the mitigation measures: intra and inter taxa

SCRS/P/2023/041 provided a case study of bycatch mitigation actions for pelagic longline targeting swordfish in the South Adriatic (Central Mediterranean). The presentation concluded that: the South Adriatic is a key area for blue shark bycatch in longline fisheries targeting swordfish; that circular hooks do not quantitatively affect blue shark bycatch; catch condition can have a significant impact on post-release mortality; fishing strategies have a large quantitative impact on blue shark bycatch; and that it is important to consider that there has been a significant reduction in target catches. Based on these preliminary results, further trials should be implemented.

The Subcommittee discussed the presentation. They noted that the data collected appeared to be useful and that it would be beneficial to share them with ICCAT so that they can be considered by the SCRS. The presenters agreed to explore the mechanisms by which these data could be shared. The Subcommittee asked about the lack of significant differences in the use of circle hooks for sea turtle bycatch. The presenter responded that small sample sizes could explain the lack of significance.

SCRS/P/2023/039 provided a summary of the scientific observer program on board Tunisian purse seiners fishing bluefin tuna. It summarized the operations of the Tunisian purse seine fleet, data collection, and identification practices for vulnerable species. During the 2021 bluefin tuna fishing campaign, the following was observed: three captured turtles (*Caretta caretta*) were returned to the sea alive; dolphins (*Stenella coeruleoalba*; *Tursiops truncatus*; *Delphinus delphis*) were observed alive in the fishing grounds; seabirds (*Larus michahellis; Calonectris diomedea; Yelkouan shearwater; Scopoli's shearwater; Phalacrocorax carbo; Lauris audouinii*) were observed alive in fishing grounds; and no shark bycatch was recorded.

The Subcommittee thanked the presenter and noted that the presentation and the programme itself provided some potentially very useful data.

SCRS/2023/077 (i) provided an overview of the evolution of Best Practices onboard French purse seiners, (ii) presented the current approach to train fishing crews to Best Practices and (iii) presented the current approach to monitor Best Practices with onboard observers in the Observateur Commun Unique et Permanent (OCUP) programme. They explored why unsuitable practices have been used and concluded that to improve the Best Practices the paper proposes i) further improving the data collection form, ii) further improving data collection by observers, iii) further supporting fishing crews and fishing companies in the application of Best Practices, and iv) identifying and equipping all vessels with the specific equipment needed to release sensitive species.

The Subcommittee noted that it might be a good opportunity for collaboration on these platforms for placing electronic tags on sharks and inquired if this might be a possibility. The response was that this was possibility.

SCRS/2023/072 demonstrated how to model variation in the distribution of leatherback turtle bycatch occurrence using a spatio-temporal model and Japanese longline observer data. The analysis showed that leatherback turtles encounters, and bycatch rates were higher in the Atlantic tropical waters and around the Gulf of Guinea in the first quarter, with relatively smaller hotspots occurring over a wider area from the North Atlantic to the tropical area in the fourth quarter. The effects of sea surface temperatures (SSTs) on encounter and bycatch rates were shown to have opposite effects depending on the season.

The Subcommittee asked several questions. The first of these was about the number of observations (number of sets/hooks/turtles etc.) used to infer the results. The response was that the project was still in preliminary stages and that it had used the full set of Japanese observer data; while information about sample sizes, hooks and sets were available, the presenter did not have them immediately at hand. The second inquiry was if the intention was to apply this analysis to other sea turtle species. The presenter's response was yes. The third question was about how so-called hotspots were defined and the fourth if it would be possible for Japan to return to working in the existing collaborative work on sea turtles. The presenters responded that that was their hope. In broad terms, the Subcommittee will need to see sample sizes and other detailed information about the data as well as the diagnostics used to evaluate the fit of the model. In conclusion, the Subcommittee looked forward to seeing the future results of this analysis.

SCRS/2023/069 presented the vulnerability status and efficacy of potential conservation measures for the East Pacific leatherback turtle (*Dermochelys coriacea*) stock. The modelling approach was Easi-fish (Griffith and Lezama-Ochoa, 2021). This modelling exercise provided detailed results that enable evaluation of the potential efficacy of Conservation and Management Measures (CMMs) established in IATTC Resolution C-19-04 for reducing impacts of fisheries bycatch on EP leatherbacks and can inform the development of fisheries specific strategies to implement CMMs.

The Subcommittee thanked the presenters and had some concerns about the use of Easi-fish. They noted that a few of the assumptions put into EASI-Fish could not be supported and that additional diagnostics would be needed to consider it for use in assessing the efficacy of CMMs. Among these concerns was that there could be multiple reasons for the decline of sea turtles that do not include fishing mortality. The response was that while there are assumptions in the analysis, the estimates are as robust as could be given the available information. The Subcommittee further inquired about what information was available for artisanal fisheries to support the species distribution mapping and about if shorter time scales (monthly) might be considered. The response was that where there was information about the spatial fisheries distribution (maps etc.), then this information would be used.

The Subcommittee expressed concern that the apparent benefits of the mitigation measures were as effective as spatial closures and that this appeared to be unrealistic. The Subcommittee also asked how effects of a CMM on the target species were considered; unfortunately target species cannot be considered in EASI-Fish but that it was a priority to consider it in the future.

8. Progress made by the Sub-group on Technical Gear Changes

The Subcommittee reviewed a short presentation provided by the convenor of the Sub-group on Technical Gear Changes on the progress of this Subgroup. The Subgroup is exploring the effects of terminal gear modification to address paragraph 21 of the *Recommendation by ICCAT to establish rebuilding programs for blue marlin and white marlin/roundscale spearfish* (Rec. 19-05) pertaining to billfishes. To address this, the Subgroup is working on three tasks: 1) collect, review, and summarize past studies for refining experimental study designs and identify data-gaps, 2) design experimental studies to assess the effects of terminal gear modifications on catch rates, retention rates, at-haulback mortality and post-release mortality, and 3) to design a study on the effects of fishing practices (e.g. timing, soaking time, bait, depths, areas) that could reduce bycatch and bycatch mortality.

The Subcommittee requested to the Subgroup that with regards to Tasks 2 and 3, the focus and priorities should be established taking into consideration the data-gaps identified in Task 1.

The Subcommittee noted that while the work was started mainly in response to an ICCAT Recommendation pertaining to billfishes (Rec. 19-05), the work has been subsequently expanded to consider other taxa, as there are often trade-offs on such technical gear changes that need to be considered.

The Subcommittee expressed concerns that the requests for the SCRS in Rec. 19-05 are complex and imply considerable work and costs. On the other hand, the Subcommittee also recognized that the task of this Subcommittee is to provide options to the SCRS and the Commission, and that having budgets for such field work, even if preliminary, should be useful for helping the Commission to decide on priorities.

The Subcommittee agreed that the Subgroup continues the work and meet intersessionally in 2023 and 2024 to further the progress made to date. The main priorities for future work under the specific task defined are: 1) synthesize the revision work done up to date, 2) complete the power analysis and provide a tentative budget for experimental field work, and 3) synthesize information that might already be available at ICCAT for this task and prepare a data call template for requesting, on a voluntary basis, detailed fishery observers operational data that could be used for statistical modeling of potential variables affecting bycatch.

Finally, the Subcommittee reiterated that the Subgroup should continue to report on its progress addressing the different tasks.

9. Revise the list of bycatch species that are found in the ICCAT database, in conjunction with the Secretariat and national scientists for the purposes of validating those species for ultimate use in research and reports (e.g. ecosystem components)

The Subcommittee discussed the potential of the project identifying fish species vulnerable to ICCAT fisheries as a source to expand the SCRS list of bycatch species. It was indicated that the project would model the impacts on 17,568 species. It was noted that many of these species, if identified as critically impacted, are not part of the list of bycatch species (contained in the ST09 form) and therefore they cannot be reported using the ST09 form. For those species that are not in the database, it would normally be incumbent on CPCs to identify novel species being caught before the list could be updated. Without CPCs properly identifying new species, they are recorded as being an unknown species or associated with the appropriate genus. The Subcommittee was reluctant to include species identified using a modeling approach and questioned how to validate the predictions.

It was noted that the Marine Stewardship Council certification process expects a full accounting of all bycatch species, consequently there was interest among some of the participants to expand the list.

10. Explore the use of scientific reference points as a tool for assessing and managing ICCAT fisheries with respect to bycatch species

No documents were discussed in this section.

11. Investigate available information on high bycatch per unit effort (BPUE) to aid in the management of ICCAT fisheries with respect to bycatch species

SCRS/2023/037 presented how nominal CPUEs estimated using ICCAT Task 2 Catch and Effort database were analyzed to develop spatial distribution models for six species (BUM, WHM, SMA, BSH, BET, SWO). It used spatial factor analysis (SFA) which is a multivariate ordination technique that can identify common spatial trends among species to inform spatial dynamics in EcoTest operating models. SFA is a flexible stand-alone approach for describing spatial bycatch dynamics across ecoregions. Depending on data availability, it can explore:

- Presence/absence models
- Multiple species (ecologists use Species Distribution Models for hundreds of species)
- Changes over time (Task 2 CE database did not seem to estimate much contrast over time)
- Derived quantities, e.g. odds ratio, catch ratios

The Subcommittee discussed the paper. Some of the first comments related to incidental capture and the need to define which captures were clearly incidental. The Subcommittee further discussed how the results of species distribution modeling were done using single-species models *vs* the multi-species approach. By way of response, it was noted that the key benefit is that it produces a spatial correlation matrix between species for visualizing bycatch interactions. The Subcommittee noted that while the analytical approach was promising, the use of Task 2 CE data made it difficult to arrive at reliable inferences based on the analysis. In addition, the Subcommittee also discussed that different fleets target different species, and this fact should be taken into consideration when modeling species distribution based on fishery dependent data.

12. Update about seabirds and their interaction with fisheries

SCRS/2023/078 presented a joint proposal between the Agreement on the Conservation of Albatrosses and Petrels (ACAP) and BirdLife International to conduct a review of Rec. 11-09 at the Subcommittee next meeting in 2024. A review of the efficacy of the *Supplemental Recommendation by ICCAT on reducing incidental by-catch of seabirds in ICCAT longline fisheries* (Rec. 11-09) in reducing seabird bycatch had been due to occur in 2015. This has not been completed due to challenges associated with the availability of data for such an assessment. However, there has been considerable progress in mitigation measures research since 2011. The document briefly provided the current recommended best practices to reduce seabird bycatch in pelagic longline vessels.

The Subcommittee recognized that the mitigation measures stipulated in Rec. 11-09 are partially aligned with ACAP best practices advice. ACAP recommends using three measures (night setting, bird scaring lines and branch line weighting) simultaneously. The ACAP advice has also incorporated changes in the branch line weighting regimes recommended for pelagic long line vessels and new mitigation devices that were not available at the time of Rec. 11-09. The Subcommittee supported conducting a review of Rec. 11-09 and including it as part of its work plan for 2024. The Subcommittee discussed if a specific workshop to address this revision should be conducted to make progress intersessionally towards making recommendations to the SCRS prior to the 2024 Subcommittee meeting. The Subcommittee, however, considered that this review should be conducted entirely at its 2024 meeting.

The multi-year seabird strategy, developed and adopted at the Commission for the Conservation of Southern Bluefin Tuna (CCSBT) recently, was introduced together with its work plan as an information document. It was noted that the strategy added species-specific consideration by introducing the concept of priority species for management and a species-specific collaborative risk assessment. The first outputs of the collaborative risk assessment were expected at the next meeting of the Ecologically Related Species Working Group of CCSBT to be held sometime between February and May 2024. Japan promised to keep the Subcommittee informed on its progress.

13. Review feedback received from Species Groups regarding their needs and contributions towards integration of ecological considerations into management procedures, including bycatch considerations. Discuss additional mechanisms to effectively coordinate, integrate and communicate ecosystem-relevant research across the ICCAT Species Groups and within the SCRS

There were no documents discussed for this agenda item.

14. Discuss the Resolution by ICCAT on climate change and its relevance to the work of the Subcommittee (Res. 22-13)

To provide a basis for discussion on this topic, the SCRS Chair updated the Subcommittee on the still developing plans for this meeting. Noting that the agenda for the meeting was still very tentative and therefore subject to change and not yet ready for distribution, the SCRS Chair nevertheless was able to share with the Subcommittee the general conceptual approach being considered, so that the Subcommittee and the SCRS more broadly could prepare for its participation.

The general approach being considered would involve participation of external experts to provide information on the expected changes in the oceanic environment resulting from climate change, the potential biological and ecological impacts on ICCAT stocks, and the resulting difficulties in developing scientific advice and management implementation. There may be discussion of existing international and domestic programmes being undertaken to address the impacts of climate change, as well as discussion of how climate-related information could be incorporated into the development of scientific advice as well as the decision-making process of management.

Given this general approach, the SCRS Chair asked that the Subcommittee assist in the development of an SCRS presentation for the Climate Change Expert meeting. This presentation should include a review of past and current SCRS activities that incorporate climate change considerations. This review should also provide an evaluation of current capabilities (e.g. access to data, relevant expertise, available models) to address climate change. In addition, the SCRS should describe the tools and information needed to better address climate change implications.

During discussion, it was noted that SCRS work has been undertaken to evaluate the influence of environmental factors on biology, ecosystems and behaviour – much of it undertaken by SC-ECO – as well as including environmental factors in the stock assessment process (e.g. in abundance index standardization and model parameterization). Nevertheless, the characterization and quantification of influences on critical factors such as recruitment (variability and stock-recruit relationships), natural mortality, growth, productivity, distribution and availability remain largely unclear. Although SCRS scientists have been involved in the consideration of climate change impacts in work carried out outside of SCRS activities (Bastardie *et al*., 2022; Bentley *et al*., 2021), relatively few SCRS exercises have focused on this. These cases include some SCRS documents, and some climate change related hypotheses considered in MSE testing of candidate management procedures.

Some ongoing ecosystem related projects were identified as potential candidates to serve as a basis for developing indicators or as tools that could be modified for use in predicting changes due to climate change. The SCRS Chair requested that a sub-group be formed including Dr Alex Hanke (Subcommittee on Ecosystems Convener on Ecosystem Approach to Fisheries Management) as well as other interested scientists to develop the SCRS information and presentation(s) for the Climate Change Experts meeting.

15. Review Terms of Reference for additional activities to be conducted by the Subcommittee

SCRS/2023/068 identified a new project that sought financial support and provided a draft terms of reference document for the development of a decision support tool for providing integrated bycatch management advice.

The Subcommittee noted an apparent similarity with projects that already have funding and suggested to combine them, but given the limited resources allocated to those projects it would not be possible to include the additional work. Further, it was suggested that there were relatively few bycatch measures in place in the study area and it was uncertain where the expected information on measures would come from (e.g. CPCs).

Terms of reference for modeling work associated with the risk prioritization tool were considered by the Subcommittee in order to ensure the objectives were achievable and consistent with the work plan. The modeling would ultimately identify fish most vulnerable to ICCAT fishing but not a managed target species.

The Subcommittee asked if the modeling included the ecoregions or distinguished stocks within species. While the relationship of results to ecoregions was not contemplated, it was recognized that disaggregating some species to the stock level could be useful for modelling purposes. It was clarified that species vulnerability would be used to rank them and that the vulnerability was the fraction of ICCAT removals to total removals. The vulnerability of non-target species would be predicted using the estimated relationship between vulnerability and the predictors in the model.

Further refinement of the ToRs was promised and would involve those interested in participating.

16. Assess the effects of the Recommendation by ICCAT on the bycatch of sea turtles caught in association with ICCAT fisheries (Rec. 22-12) (combine, streamline, and amend Recommendations 10-09 and 13-11)

In accordance with the Commission's request in Rec. 22-12 on the southern latitudinal limit of sea turtles, the Subcommittee agreed that given the new available information on the distribution of the loggerhead turtle, this limit could be extended in the western South Atlantic to 40°S. For the eastern South Atlantic, it should be kept at 35°S as stated in the Recommendation. The limit for the division between eastern South Atlantic and western South Atlantic is proposed to be at 20°W.

17. Other matters

17.1 Bycatch monitoring

SCRS/P/2023/029 described an Ocean sunfish (*Mola mola*) monitoring and tagging programme in the Spanish trap fishery in the western Mediterranean Sea.

The Subcommittee asked about the absence of tag recoveries and their causes and about the possibility of contributing biological samples from the Atlantic for the genetic analysis in the project. The presenter explained how the *Mola mola* are probably caught in traps during migration, which might explain the low number of recoveries. The low number of tagged fish to date could also contribute to the absence of recoveries. The presenter also welcomed the offer of analyzing samples from the Atlantic Ocean in the Mediterranean programme. The Subcommittee asked about the presence of *Ranzania laevis* in the catches of the Spanish traps, and it was clarified the project has not found *Ranzania laevis* in Spanish traps to date.

17.2 Integrating ecosystem considerations into management advice

A presentation on risk equivalency in a fisheries context was discussed as well as the related issue of providing climate conditioned advice to managers. References to both these approaches occurred during the meeting in the context of the work of the case studies, in relation to the upcoming July meeting (11-12 July 2023) on the impacts of climate change on ICCAT fisheries and during discussions on integrating ecosystem considerations into science advice to managers.

Given that the methodology could be implemented in an ICCAT assessment context, it was suggested to trial the approach for an assessed species in order to better be able to review its appropriateness.

17.3 Review of Evergreen Document content

A prototype Evergreen Manual Documenting the Work of the Subcommittee on Ecosystems and Bycatch was introduced to the Subcommittee in order that they could speak on the contents included to date, and on any items that might be missing. This public-facing document would allow people interested in the work of the Subcommittee to quickly acquaint themselves with all its objectives, projects, products, plans and processes. The Subcommittee has been developing the EcoCard since 2017 and this document aims to better document the process for EcoCard development, its current state, and its future plans. The document will be a living document to be used internally by the Subcommittee on Ecosystems and Bycatch to keep track of their work over time, to make easily accessible key information, such as the ToRs and remit. It will help to document and communicate in a more transparent way the EcoCard process to the larger ICCAT community, to the Bycatch and Ecosystems community and to outside groups with similar interests.

The Subcommittee questioned whether the document was to be used by both ecosystems and bycatch and no reservations were expressed to including both provided it was of benefit to both. It was noted that the document would undergo further review by the “subgroup” and that it needed an appropriate home to be easily accessed and consulted.

17.4 ST09 and the collection of electronic monitoring system data

The Subcommittee was reminded that observer data using EMS systems are being collected and need to be properly identified and curated in the form ST09. It was suggested how to improve the format of the database to accommodate these data.

The Secretariate recognized the significance of this emerging issue and endorsed a recommendation to improve the form.

17.5 Update from the Technical Sub-group on Electronic Monitoring (EM)

SCRS/P/2023/044 provided an update on the progress to develop minimum standards for the implementation of Electronic Monitoring Systems (EMS) in ICCAT fisheries. There was broad support for the work of the sub-group which appeared to have a very complete appreciation of all the issues that might affect implementation except its potential costs.

18. Recommendations and Work Plan

Recommendations for the Ecosystem component of SC-ECO

The Subcommittee recommends that the coordinators of the ecosystem case studies, where species specific indicators are being developed, inform the corresponding species groups regarding the plans to develop such indicators in order to obtain their feedback and ensure alignment of the work plans.

The Subcommittee recommends that the reports for each ecosystem case study include specific information on the indicators being developed and achievements of the objectives specified in the ToRs. In addition, the reports should include information on the indicators with respect to 1) their sustainability, 2) the specific component of the ecosystem report card where they can potentially apply, and 3) the potential application in stock assessments. These reports should be reviewed by the Subcommittee for inclusion in the ICCAT Ecosystem Report Card.

The Subcommittee recommends that the different groups conducting the ecosystem case studies interact with each other in order to exchange know-how and maximize advances.

Recognizing that Res. 11-14 and Res. 13-15 support the inclusion of "information on the by-catches of the different fleet segments and fisheries, as well as other ecosystems considerations" in the Executive Summaries, the Subcommittee recommended that the SCRS explore how to include ecosystem considerations in the species Executive Summaries and other sections of the SCRS annual report.

Recommendations for the Bycatch component of SC-ECO

The Subcommittee recommends that the SCRS explore the mechanisms and processes for providing fine scale data to advance the work on the multispecies spatial distribution in longline fisheries.

The Subcommittee recommends that the SCRS inform the Commission that the new ST-12 electronic form to report sea turtle data requested by Rec. 22-12 will not be available until 2024 at the earliest or 2025 at the latest. Once ST-12 is made available, CPCs should report their sea turtle data requested in Rec. 22-12 from 2022 onwards. The CPCs are reminded that the existing reporting requirements for sea turtles in form ST09 remain in effect.

While recognizing and commending the advances made by national scientists to characterize the impact of ICCAT fisheries in the Mediterranean Sea on sea turtle populations, the Subcommittee recommends that such efforts continue in the near future.

The Subcommittee recommends that the Secretariat revise the ST-09 DomObsProg form to allow the collection of information regarding the implementation of EMS in different fleets, the % coverage of the EMS, the purpose of the EMS (i.e., scientific, compliance, or both), and if the data reported were collected by EMS or scientific observers. This can be done using a format that the Secretariat considers to be the most convenient to record such information. The revised ST-09 form should be presented at the 2023 meeting of the Subcommittee on Statistics for discussion.

Recommendations with financial implications

Recognizing that environmental variability affects stock dynamics and stock status and that it should be taken into consideration when providing scientific advice, the Subcommittee requests support to trial a risk equivalent management approach for a target species in order to demonstrate how to implement climate conditioned advice in an ICCAT assessment context. A total of €20,000 was requested.

The Subcommittee recommends holding a workshop to continue the collaborative work that assesses the impact of ICCAT fisheries on sea turtles in the Mediterranean and request funds to support the attendance of invited experts and the Secretariat. A total of €25,000€ was requested.

19. Adoption of the Report and closure

The agenda was completed. The report was adopted at the meeting. It was agreed that the summary of the meeting for the SCRS plenary report would be adopted by correspondence. The meeting was adjourned.

References

Bastardie, F., Feary, D.A., Brunel, T., Kell, L.T., Döring, R., Metz, S., Eigaard, O.R., Basurko, O.C., Bartolino, V., Bentley, J., Berges, B. 2022. Ten lessons on the resilience of the EU common fisheries policy towards climate change and fuel efficiency - A call for adaptive, flexible and well-informed fisheries management. Frontiers in Marine Science, 9, p.947150.

Bentley, J.W., Lundy, M.G., Howell, D., Beggs, S.E., Bundy, A., De Castro, F., Fox, C.J., Heymans, J.J., Lynam, C.P., Pedreschi, D., Schuchert, P. 2021. Refining fisheries advice with stock-specific ecosystem information. Frontiers in Marine Science, 8, p.602072.

Cardona, L., Álvarez de Quevedo, I., Borrell, A., Aguilar, A. 2012. Massive Consumption of Gelatinous Plankton by Mediterranean Apex Predators. PLoSONE 7(3): e31329. doi:10.1371/journal.pone.0031329.

Chancollon, O., Pusineri, C., Ridoux, V. 2006. Food and feeding ecology of Northeast Atlantic swordfish (*Xiphias gladius*) off the Bay of Biscay. e ICES Journal of Marine Science, 63: 1075e1085.

Griffiths, S.P., Lezama-Ochoa, N. 2021. A 40-year chronology of the vulnerability of spinetail devil ray (*Mobula mobular*) to eastern Pacific tuna fisheries and options for future conservation and management. Aquatic Conservation: Marine and Freshwater Ecosystems, *31*(10), 2910–2925. https://doi.org/10.1002/aqc.3667

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 (EcoCard)

    2.1 Review progress on the development of methods for prioritizing risks and screening and validating indicators

    2.2 Review development of case studies and ecoregions

3. Review the intersessional work of the sub-group working on the applicability and functionality of the Ecosystem Report Card (EcoCard) as a tool for monitoring the impacts of ICCAT fisheries

4. Discuss content of a workshop to advance the identification of draft ecoregions and foster discussions on their potential use to facilitate the implementation and operationalization of Ecosystem Approach to Fisheries Management (EAFM) within ICCAT

5. Review a draft Memorandum of Understanding to be signed between the Secretariats of ICCAT and the Sargasso Sea Commission

Pertaining to Bycatch

6. Sea Turtles

    6.1 Review progress on collaborative work of sea turtle and presentation the next steps

    6.2 Advance the secondary objectives of the collaborative work on sea turtles

7. Effect of the mitigation measures: intra and inter taxa

    7.1 Factors effecting bycatch and interactions

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

9. Revise the list of bycatch species that are found in the ICCAT database, in conjunction with the Secretariat and national scientists for the purposes of validating those species for ultimate use in research and reports (e.g. ecosystem components)

10. Explore the use of scientific reference points as a tool for assessing and managing ICCAT fisheries with respect to bycatch species

11. Investigate available information on high bycatch per unit effort (BPUE) to aid in the management of ICCAT fisheries with respect to bycatch species

12. Update about seabirds and their interaction with fisheries

Pertaining to Ecosystem and Bycatch

13. Review feedback received from Species Groups regarding their needs and contributions towards integration of ecological considerations into management procedures, including bycatch considerations. Discuss additional mechanisms to effectively coordinate, integrate and communicate ecosystem-relevant research across the ICCAT Species Groups and within the SCRS

14. Discuss the Resolution by ICCAT on climate change (Res. 22-13) on climate change and relevance to the work of the Subcommittee

15. Review Terms of Reference for additional activities to be conducted by the Subcommittee

    15.1 Organize a Workshop on Collaborative work to assess marine turtle bycatch in pelagic longline fleets

16. Assess the effects of the Recommendation by ICCAT on the bycatch of sea turtles caught in association with ICCAT fisheries (Rec. 22-12) (combine, streamline, and amend Recommendations 10-09 and 13-11)

17. Other matters

    17.1 Bycatch monitoring
    17.2 Integrating ecosystem considerations into management advice

        17.2.1 Review of Responses to the Commission
        17.2.2 Providing Risk Equivalent Advice

    17.3 Review of Evergreen Document content
    17.4 ST09 and the collection of electronic monitoring system data
    17.5 Update from the Technical Sub-group on Electronic Monitoring (EM)

18. Recommendations and Work Plan

19. Adoption of the Report and closure

Appendix 2

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Appendix 3

List of papers and presentations

DocRef	*Title*	*Authors*
SCRS/2023/037	Spatial Distribution of Multispecies Longline Catch Per Unit Effort	Hyun Q., Carruthers T.
SCRS/2023/065	Report of the 2nd Meeting of the Sub-group on the Ecosystem Report Card	Juan-Jordá M.J., Domingo A., Di Natale A., Inrh B., Luckhurst B., Brown C., Die D., Álvarez-Berástegui D., Díaz G., Murua H., Bell J., Stobberup K., Kell L., Schirripa M., Daisuke O., Obregón P., Lehodey P., Sabarros P., Scott R., Wanless R., Tsuji S., Jimenez S., Corrales X., Hanke A.
SCRS/2023/066	Terms of Reference for the Tropical Atlantic Ecoregion Case Study	Juan-Jordá M.J., Andonegi E., Murua H., Corrales X., Lopetegui L., Arrizabalaga H., Ruiz-Gondra J., Sabarros P., Ramos-Alonso M.L., Baez J., Álvarez D., Kell L., Die D., Hanke A.
SCRS/2023/067	Terms of Reference for the development of a pilot product to test the utility of ICCAT ecoregions for delivering advise-products to decision-makers	Juan-Jordá M., Ortuño G., Andonegi E., Murua H.
SCRS/2023/068	Terms of Reference for the development of decision support tool for providing integrated bycatch management advice to decision-makers	Juan-Jordá M.J., Ortuño G., Andonegi E., Grande M., Murua H.
SCRS/2023/069	Vulnerability Status and Efficacy of Potential Conservation Measures for the East Pacific Leatherback Turtle (Dermochelys coriacea) Stock Using the Easi-Fish Approach	East Pacific Leatherback Ad Hoc Joint Working Group of the Inter-American Tropical Tuna Commission, Inter-American Convention for the Protection and Conservation of Sea Turtles
SCRS/2023/071	Productivity-Susceptibility Analysis Tool	Leach A., Kell L., Mumford M.
SCRS/2023/072	Seasonal and Inter-Annual Variation in the Distribution of Leatherback Turtle Bycatch Occurrence Using a Spatio-Temporal Model with Japanese Longline Observer Data	Nishimoto M., Ueno S., Ochi D.
SCRS/2023/074	Development of a Database Supporting a Quasi-quantitative Risk Assessment Approach	Tsuji S., Nishimoto M.
SCRS/2023/075	From Dpsir to Dapsi(W)R(M)	Oenoto M., Leach B., Mumford J., Kell L.
SCRS/2023/076	Terms of Reference for the Sargasso Sea Case Study	Kell L.R., Luckhurst B., Leach A., Roe H.

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SCRS/2023/077	An Update on Best Practices Onboard French Tropical Tuna Purse Seiners of the Atlantic Ocean	Wain G., Maufroy A.
SCRS/2023/078	Proposal to Review ICCAT Seabird Mitigation Measures	Jiménez S., Gianuca D., Debski D., Wade H., Butfield B.
SCRS/2023/083	Terms of Reference for the Med Tuna Habitat Observatory Initiative	Álvarez-Berástegui D., Tugores M.P., Juza M., Hernández-Carrasco I., Sanz-Martín M., Reglero P., Macías D., Balbín R., Lázaro G., Antoine L., Mavruk S., Cuttitta A., Russo S., Patti B., Torri M., Reyes E., Moure B., Orfila A., Gordoa A., Abascal C., Laiz R., Amengual J., Hidalgo M., Cabanellas-Reboredo M., Báez J.C., Juan Jordá M.J., Kell L., Hanke A., Die D., J.Tintoré, Cardin V.
SCRS/2023/085	Delivery Note On The Dataset Created Under The Short-Term Contract For Work Supporting A Quasi-Quantitative Risk Assessment Approach	Tsuji S.
SCRS/2023/086	Progress In Developing A Quasi-Quantitative Risk Assessment Model to Support ICCAT EAFM	Tsuji S., Nishimoto M.
SCRS/P/2023/029	Ocean sunfish (*Mola mola* Linnaeus, 1758) monitoring program Spanish Trap fishery in the Western Mediterranean	García–Barcelona S., Nyegaard M., Navarro J., Varela J.L., Miras A., Conesa M., Gómez-Vives M.J., Asensio E., Guzmán Gómez S., Hernández Millán G., Tornero J., Puerto M.A., Macías D.
SCRS/P/2023/037	A Myctophid Index as a potential indicator for the pelagic ecosystem	Scott R.
SCRS/P/2023/038	La hoja de ruta del taller de tortugas del MED	Domingo A., Baez J.C.
SCRS/P/2023/039	Scientific observer program on board Tunisian purse seiners fishing bluefin tuna	Zarrad R.
SCRS/P/2023/040	Los resultados del trabajo colaborativo de tortugas	Anonymous
SCRS/P/2023/041	Bycatch mitigation actions for pelagic longline targeting swordfish: South Adriatic (Central Mediterranean) case study	Carbonara P, Prato G., Niedermüller S., Buzzi A., Alfonso S., Neglia C., Zupa W., Bitetto I., Follesa M.C., Spedicato M.T.
SCRS/P/2023/044	Update from the SCRS EMS Subgroup	Coelho R.
SCRS/P/2023/045	Monitoring environmental variability effects on tuna survival during their early life stages. Indicators for the Mediterranean study case and the ecosystem report card	Reglero R., Fiksen F., Blanco B., Tugores T., Pérez-Torres P., Martin M., Santandreu S., Calcina C., Balbín B., Santiago S., Álvarez-Berástegui A.

DocRef	*Title*	*Authors*
SCRS/P/2023/046	Recommendation 22-12 and new Statistical Form ST12	Taylor N.G., Palma C., Mayor C.
SCRS/P/2023/050	Update from the SCRS on Sub-group on Technical Gear Changes	Coelho R.

Appendix 4

SCRS Documents and Presentation Abstracts as provided by the authors

SCRS/2023/037 - Catch per unit effort (CPUE) from the ICCAT Task 2 database were analyzed to develop spatial distribution models for six species: bigeye tuna (BET), blue marlin (BUM), blue shark (BSH), shortfin mako shark (SMA), swordfish (SWO), and white marlin (WHM). Historically, longline effort has increased linearly from the 1950s until 2000 followed by a decrease. Spatial distribution of effort has been relatively constant through time among the four ICCAT quadrants. Spatial factor analysis is a multivariate ordination technique that can identify common spatial trends among species. CPUE from the Japanese and USA longline fleet were chosen to characterize distribution based on their spatial coverage for the eastern and western Atlantic, respectively. The best model was a six-factor model that primarily modeled the distribution separately for each of the six species, but notable cross-correlations were estimated by taxa for marlin (BUM and WHM) and shark (BSH and SMA) species. The predicted spatial density can be used to inform stock distribution in multispecies spatial operating models.

SCRS/2023/065 - This second Sub-Group meeting had the objective of advancing the intersessional work for improving the applicability and functionality of the Ecosystem Report Card by 1) discussing how the ongoing case studies (Mediterranean case study, Tropical Atlantic case study and the Sargasso Sea case study) can contribute to the EcoCard development, and 2) identifying and discussing potential synergies and collaborations with outside international projects and initiatives to support the EcoCard development. This report summarizes the main discussions and recommendations made by the sub-group to be presented at the SC-ECO meeting.

SCRS/2023/066 - This document presents the Terms of Reference for the Tropical Atlantic Ecoregion case study. This case study aims to assist the SC-ECO and SCRS to provide ecoregional integrated advice - ecosystem based advice - to the Commission. It seeks to keep advancing the scientific understanding and building the scientific knowledge base for better monitoring and assessing the effects of fishing, environmental variation and climate change on the tropical tuna and tuna-like species complex and associated ecosystems in the tropical Atlantic Ecoregion. Furthermore, it also seeks to assist in the delivery of advice by developing regional ecosystem based advice products based on the existing and new scientific knowledge in this region and provide recommendations on how the science and data flows can be further utilized, developed, and improved. Last, it seeks to provide a platform for collaborations to stimulate research and work within the ICCAT scientific community, help coordinate and improve the monitoring of fisheries and marine ecosystems in this region.

SCRS/2023/067 - Since 2019, the ICCAT Subcommittee on Ecosystems has been developing a process to advance the identification of ecologically meaningful regions (ecoregions) within the ICCAT Convention areas to support the implementation of the EAFM. Ecoregions can provide a spatial framework to support regional collaborative and cross-sectoral ecosystem planning and prioritization, incentivize ecosystem research, and the development of integrated ecosystem-based advice to inform fisheries management-decisions in ICCAT. A total of eight candidate ecoregions have been identified within the ICCAT Convention area. This study will support the development of a pilot product for two selected ecoregions (The Tropical Atlantic Ecoregion and the Southern Temperate Atlantic Ecoregion) to test the utility of the ecoregions as reporting units for developing ecosystem-advise products. Based on a systematic literature review, this pilot study will 1) characterize the main fishing fleets operating in the selected ecoregions, 2) provide information on the composition of catches and bycatches for each major fleet in the ecoregions, and characterize among the bycatch species those that are considered endangered, threatened or protected (ETP) species across taxa groups (i.e. fish, sea turtles, sea birds and mammals), and 4) conduct a comparative analysis of the bycatch interactions by fishery and taxa in the selected ecoregions.

SCRS/2023/068 - A piece-meal and fragmented bycatch management persists focused on specific taxa groups instead of a more integrated cross-taxa bycatch management approach. Furthermore, the application of a sequential mitigation hierarchy would allow the evaluation of alternative bycatch management strategies to meet pre-agreed bycatch management objectives (ecological, social and economic). This study has the objective to advance towards the development of a decision support tool for providing integrated bycatch management advice accounting for multitaxa interactions in the multi-species tropical tuna fisheries in the tropical Atlantic Ocean Ecoregion. Specifically, this study will apply the decision support tool

for integrated fisheries bycatch management developed by Gilman *et al*. (2022, 2023) to ICCAT fisheries operating in the Tropical Atlantic Ecoregion to provide options for achieving bycatch-neutral fisheries for ETP species caught incidentally by ICCAT fisheries. Based on a systematic literature review, this study will provide an overview of bycatch mitigation methods options for ICCAT fisheries operating in the Tropical Atlantic Ecoregion across multiple taxa groups (i.e. billfishes, sharks, rays, sea turtles, marine mammals, seabirds) and the evidence of their efficacy to avoid and reduce bycatch and minimize fishing mortality. Once developed, this decision tool could be used to evaluate alternative bycatch management strategies, guided by a sequential mitigation hierarchy of options against a set of established criteria to determine which best meets ecological and socioeconomic objectives.

SCRS/2023/069 - Industrial and small-scale coastal (i.e., 'artisanal') fisheries in the eastern Pacific Ocean (EPO) interact with one of the most vulnerable fishery bycatch species, the Critically Endangered East Pacific (EP) leatherback turtles (*Dermochelys coriacea*). On 1 January 2021, a revised resolution on sea turtles (C-19-04) entered into force that requires EPO tuna fisheries to implement various measures designed to reduce the bycatch of sea turtles, in particular the use of circle hooks and finfish baits in shallow longline sets. This paper describes a collaborative research project conducted by an ad hoc joint working group of participants from the Inter-American Tropical Tuna Commission (IATTC), the Inter-American Convention on the Protection and Conservation of Sea Turtles (IAC), and international sea turtle experts used the Ecological Assessment for the Sustainable Impacts of Fisheries (EASI-Fish) was used to explore the changes in the vulnerability status of the EP leatherback turtle subpopulation under hypothetical CMM scenarios that may mitigate fishery-imposed risks to the species. This modelling exercise provided detailed results that enable evaluation of the potential efficacy of CMMs established in in IATTC Resolution C-19-04 in reducing impacts of fisheries bycatch on EP leatherbacks and can inform development of fisheries-specific strategies to implement CMMs described.

SCRS/2023/071 - As part of the Sargasso Sea case study, a risk analysis tool (based on a Productivity-Susceptibility Analysis) is being developed. This will incorporate elicitation and web-based data into a framework for assessing the vulnerability of a species or stock to various human activities that inflict pressures on marine ecosystems. A working prototype has been developed that demonstrates the concept through the collation and summary of data for eight species of marine animals that may be vulnerable to pelagic longlines in the Sargasso Sea. The species were chosen to represent various taxa of interest to stakeholders (e.g. RFMOs, NGOs and governmental science bodies)".

SCRS/2023/072 - To examine the historical and seasonal variability of leatherback bycatch rates associated with tuna longline vessels operating in the Atlantic Ocean, Japanese longline observer data (leatherback bycatch numbers, effort, latitude and longitude, and SST at the line setting) from 2002-2019 were used for spatial distributions of bycatch rate in the first (January-March) and fourth (October-December) quarters of the year. Nominal bycatch of leatherback turtles was high in the North Atlantic and tropical regions and none in the southern bluefin tuna fishery (south of 35°S), but for accurate spatial autocorrelation and hotspot/hot moment estimation, these observation sites were also included in the analysis data. Using a spatio-temporal hurdle-gamma model that can handle zero-excess data, we analyzed leatherback turtle encounter and bycatch rates. The analysis revealed that both the encounter and bycatch rates of leatherback turtles were higher in the Atlantic tropical water and around the Gulf of Guinea in the first quarter, with relatively smaller hotspots occurring over a wider area from the North Atlantic to the tropical area in the fourth quarter. The effects of SSTs on encounter and bycatch rates were shown to have opposite effects depending on the season.

SCRS/2023/074 - The paper reported the progress made in the improvement of supporting database, including an integration of biological and ecological information collation supported by the ICCAT. The database was now expanded to cover crustaceans and cephalopods, thanks to the ICCAT support, in addition to fish. The collation on seabirds was under way, though turtles and marine mammals remained uncovered. The database was transformed into a form easy to be handled with machine analysis, including a disassembling text description into around 10 items temperature and habitat with categorical contents, separation of numeric information and change into a database format, though currently different forms coexisted depending to the taxonomic groups. Also, the WoRMS Aphia-ID was introduced as a species unique identifier. The model to distinguish those species that might be captured by the ICCAT fisheries was developed using three machine-learning algorithms based on small dataset of fish species. The same model was applied to larger dataset and the filtered species, combined with the species with historical capture records, was defined as a work file to be used for further development of risk assessment model.

SCRS/2023/075 - The Sargasso Sea is a major component of the ICCAT Convention area and provides various ecosystem services in the Atlantic region. These include products such as fish for food and processes that regulate and maintain our environment and cultural experiences. The ecosystem report card (EcoCard) was developed using a Driver-Pressure-State-Impact-Response (DPSIR) approach. We extend the approach to help develop a shared understanding of how human activities affect the Atlantic ecosystem by extending the DPSIR to DAPSI(W)R(M). Where Drivers (D) now refer to fundamental (basic) needs (e.g. food, energy, space, movement of goods, security, or recreation) necessary for sustaining human life. To fulfil these basic needs, economic sectors develop specific Activities (A), such as fishing, shipping, and deep-sea mining, which may generate Pressures (P) on the environment. These pressures lead to a change in the State of the environment and ecosystem services, such as provisioning and cultural services, impacting human Welfare (W). Effective Responses as Management Measures (M) depend on scientific knowledge to inform the appropriate policies and regulations. Therefore, the Sargasso Sea provides an ideal case study for ICCAT to collaborate with other RFMOs and management bodies responsible for implementing EAFM within the Atlantic and other regions, particularly for developing fishery-independent and model-based indicators.

SCRS/2023/076 - We present the Terms of Reference for a Sargasso Sea ecoregion study case. The Sargasso Sea is a significant component of the ICCAT Convention area and provides various ecosystem services to ICCAT and other Regional Fisheries Management Organisations (RFMOs) in the Atlantic region. Ecosystem services include various products, such as fish for food, and processes that regulate and maintain our environment and cultural experiences. The ecosystem report card was developed using a Driver-Pressure-State-Impact-Response (DPSIR) approach. The approach was extended to cover more maritime sectors and ecosystem components (e.g. habitat, environment, and trophic interactions) to develop a shared understanding of how human activities affect the Sargasso Sea ecosystem. The Sargasso Sea, therefore, provides an ideal case study for ICCAT to collaborate with other RFMOs and management bodies responsible for implementing ecosystem management within the Atlantic and other regions.

SCRS/2023/077 - During the last decades, the issue of mortality of sensitive species incidentally caught by fishing vessels has become a major concern for the sustainability of fisheries. In 2012, the collaboration with French scientists of the French Institute for Research and Development (IRD) and Ifremer resulted in the first manual of safe handling and releasing techniques for sharks, whale sharks, rays and sea turtles (Poisson *et al.*, 2012, 2014b). In 2020, a comprehensive assessment of the application of Best Practices onboard French and associated flag purse seiners of the Atlantic and Indian Oceans was carried out (Maufroy *et al.*, 2020). This study was used to identify avenues for improvement, make changes to the OCUP observation program and implement new projects. This document (i) provides an overview of the evolution of Best Practices onboard these vessels (ii) present the current approach to train fishing crews to Best Practices and (iii) presents the current approach to monitor Best Practices with onboard observers in the frame of the OCUP program.

SCRS/2023/078 - ICCAT has adopted Recommendations to achieve the aim of reducing seabird bycatch, namely Rec. 07-07 and supplementary Rec. 11-09. These Recommendations outline technical bycatch mitigation and other measures that vessels are required to implement in defined areas. A formal review of the efficacy of Rec. 11-09 in reducing seabird bycatch was due to take place in 2015. From 2011 to the present, there has been considerable progress in studies on the effectiveness of mitigation measures to reduce seabird bycatch in pelagic longline fisheries. Based on this progress, we propose that the SC-ECO schedule a formal review of Rec. 11-09 at its next meeting.

SCRS/2023/083 - We present the Terms of Reference for a case study on a Mediterranean eco-region focusing on the environmental component of the Ecosystem Report Card. The objective of this case study is to describe and monitor the variability of environmental processes in the Mediterranean Sea that affect the ecology of large pelagic fishes - with a particular attention on tunas -, and the possible role of climate change on this variability. Here we define the objectives and activities of the initiative, the participant roles, primary indicators and the methodological approach.

SCRS/2023/085 - The paper provided a quick explanation on the dataset delivered based on the short-term contract with the ICCAT for the work supporting a quasi-quantitative risk assessment approach. This work was carried out under the provision of the ICCAT Science Envelope and the ICCAT - EU Grant Agreement No. EMFAF-2021-VC-ICCAT5-IBA-02. Strengthening the scientific basis for decision-making in ICCAT. The dataset of collated ecological and biological information covering 7,045 crustaceans and 767 cephalopods was prepared in a database format. The dataset clearly indicated a scarcity of species-specific information on small species of no commercial value.

SCRS/2023/086 - The paper reported the progress in the development of a machine-learning tool to facilitate prioritization in implementation of ecosystem-based approach to the fisheries management (EAFM). Two trial exercises, one based on simple clustering and the other assuming fisheries vulnerability to be defined through ecological similarity among species, were conducted using the common data set developed in ***. The results were examined against the existing ICCAT management framework to identify its potential loopholes and weakness. The establishment of small working group was proposed to supervise an overall direction of model development, to ensure effectiveness and applicability of finalized model in the ICCAT situation.

SCRS/P/2023/044 - This presentation provided a summary and an update of the work conducted by the SCRS EMS Sub-group. The work conducted by this subgroup addresses the request directed to the SCRS contained in ICCAT Rec. 19-05. The subgroup started working in 2021, and until 2022 focused mostly on preparing and drafting the minimum standards to be implemented in ICCAT longline fisheries. Those have been adopted by the SCRS in late 2022. In the present year of 2023, the sub-group is focused on preparing and drafting the minimum standards to be implemented in ICCAT purse seine fisheries targeting tropical tunas. The Subgroup reviewed the adequacy of such EMS systems to collect the data that is currently required to be collected with human observer programs. While it is not possible to collect all data as human observers can collect, the EMS systems are useful and can be used to collect important information. The sub-group therefore recommends that such systems are used as a complement, and not as a substitute, to human observer programs.

SCRS/P/2023/046 - Here we provide a summary of the Commission's requirements for sea turtle reporting as described in Rec. 22-12 and a candidate statistical form by which these data might be submitted in the future.

SCRS/P/2023/050 - This presentation provided a summary of the work conducted by the SCRS Sub-group on Technical Gear Changes. This subgroup was created in 2021 and has been tasked with 3 main tasks: 1) collect, review and summarize past studies for refining experimental study designs, 2) designing experimental studies to assess the effects of terminal gear modifications (such as hook shape and size, leader type) on catch rates, retention rates, at-haulback mortality and post-release mortality, and 3) designing a study on the effects of fishing practices (e.g., timing, soaking time, bait, depths, areas) that could reduce bycatch and bycatch mortality. The work conducted to date has focused mostly on tasks 1 and 2, namely by preparing tables of fisheries descriptions, carrying out power analysis to identify the minimum effort required to detect specific changes for gear effects in experimental studies on hook types for various species and fleets, and summarizing past studies.