

**Report of the 2023 Intersessional Meeting of the Tropical Tunas Species Group (including MSE)**  
*(hybrid/Madrid, Spain 27 February - 3 March 2023)*

*The results, conclusions, and recommendations contained in this Report only reflect the view of the Tropical Tuna Species Group. Therefore, these should be considered preliminary until the SCRS adopts them at its annual Plenary meeting and the Commission revises them at its Annual Meeting. Accordingly, ICCAT reserves the right to comment, object and endorse this Report, until it is finally adopted by the Commission.*

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

The meeting followed a hybrid format online and in-person at the ICCAT Secretariat in Madrid, Spain. Dr Serena Wright (UK), the Tropical Tunas Species Group (“the Group”) coordinator, and Dr Shannon Cass-Calay Yellowfin Tuna Rapporteur, opened the meeting and welcomed participants. Mr. Camille Manel, ICCAT Executive Secretary, welcomed the participants and thanked the efforts made by all participants to attend the meeting remotely. This SCRS meeting had a hybrid format and simultaneous interpretation in the three ICCAT official languages was provided.

The Chair reviewed the agenda, which was adopted with some changes (**Appendix 1**). The List of Participants is included in **Appendix 2**. The List of Documents and Presentations provided at the meeting is attached as **Appendix 3**. The abstracts of all SCRS documents and presentations provided at the meeting are included in **Appendix 4**. The following participants served as rapporteurs:

<i>Sections</i>	<i>Rapporteur</i>
Items 1, 10	M. Ortiz
Item 2	S. Cass-Calay, C. Mayor, J. Garcia, C. Palma, M. Ortiz
Item 3	N. Fish, A. Kimoto
Item 4	R. Sant’ Ana, A. Kimoto, M. Ortiz
Item 5	D. Die
Item 6	S. Cass-Calay, A. Kimoto
Item 7	S. Cass-Calay
Item 8	D. Die
Item 9	C. Brown

**2. Overview of the fisheries statistics and definition of the objectives and workplan for the ad hoc technical sub-group on the review of fisheries data quality and gaps contained in the ICCAT databases**

Detailed statistics together with various catalogues (SCRS catalogues and detailed ones), and dashboards to explore and analyse the information were presented by the ICCAT Secretariat, aiming to identify data weaknesses (gaps, inconsistencies, etc.) in tropical tunas data for further corrections, and for consideration of the terms of reference of the ad hoc technical sub-group on the review of fisheries data quality and gaps contained in the ICCAT databases as suggested in the 2023 workplan of this Group. During the meeting discussions, it was concluded that the ad-hoc technical sub-group is not required at present, and rather will follow the proposal of EU scientists to participate in the Regional Coordination Group Large Pelagics (RCG LP) Tropical Tuna Treatment (T3) to assist with the estimations of tropical tunas catch composition and size distribution of catches from surface gears.

The Group noted that following the Commission request ([Rec. 21-01](#), para 66c), an external expert will review and provide a report on the current monitoring, control and surveillance mechanisms in place for the tropical tunas that will inform the Group.

**2.1 Overview of the fisheries statistics and tagging information available at ICCAT**

The ICCAT Secretariat presented to the Group the most up-to-date fishery statistics (T1FC: Task 1 fleet characteristics; T1NC: Task 1 nominal catches; T2CE: Task 2 catch and effort; T2SZ: Task 2 size samples; T2CS: Task 2 catch-at-size report by CPCs) and tagging (CTAG: detailed conventional tagging data; ETAG: electronic tagging data (inventory only)) information on tropical tunas (BET: bigeye; YFT: yellowfin tuna;

SKJ: skipjack). In addition, the latest CATDIS (detailed catch distribution by trimester and 5x5 squares, where T2CE is adjusted to T1NC) estimations, covering the period 1950-2021 for the three species, were provided. The Task 3 information on fishing aggregating devices (FAD) deployment and FAD density report to ICCAT, were also reviewed and presented in document SCRS/2023/023.

Following the 2022 SCRS recommendation the ICCAT Secretariat informed that the T1NC dashboard is available on the ICCAT website, ([T1NC dashboard](#)) and that the CTAG tagging dashboards (two types per species) will be published very soon. Both dashboards have information updated until 31 January 2023.

The total catches (T1NC) of the three species by year, stock/region, and gear group are presented in **Table 1** and **Figures 1, 2, and 3**. The SCRS catalogues, comparing T1NC and availability of Task 2 datasets are presented in **Table 2** (BET), **Table 3** (E-YFT: YFT eastern region), **Table 4** (W-YFT: YFT western region), **Table 5** (E-SKJ: SKJ eastern stock) and **Table 6** (W-SKJ: SKJ western stock).

The Group thanked the ICCAT Secretariat for the way they have globally improved the presentation of the fisheries statistics and tagging data.

#### *T1NC versus T2CE, T2SZ and T2CS*

The SCRS catalogues of the three species of the last 30 years of data (1992-2021) show a general reduction in Task 2 data availability on the major fisheries in the last decade. Many of the cases were already identified in the past. The stock/region inconsistency in Task 1 and Task 2 datasets (YFT and SKJ) is in the process of being solved by the ICCAT Secretariat. Almost finalized is also the T1NC reclassification of “unknown” Sampling Areas (corresponding to the old Task 1 areas without geographical delimitations) into the proper tropical Sampling Areas. Both corrections for the three species will be based on the most recent CATDIS estimations (1950-2021) which use the T2CE geographical locations. In addition, some minor corrections to some geographical locations of T2SZ and T2CS datasets will also have to be made. The outcome of this complex exercise will improve drastically the consistency between Task 1 and Task 2, and therefore will improve the SCRS global scores. This work is planned to be completed by the SCRS annual meeting.

Additionally, there are also some potential data gaps (cells of SCRS catalogues shaded in light-blue, **Tables 2 to 6**) that can be solved in two ways: a) by the ICCAT CPCs (through the statistical correspondent), or b) by the SCRS with preliminary estimates (using carryovers). This ongoing work requires collaboration between CPCs statistical correspondents and the ICCAT Secretariat.

In terms of consistency among the catches by species reported in both T1NC and T2CE over time, several flag CPCs (EU-Spain in particular) are working on a comparative analysis with the support of the ICCAT Secretariat. These studies shall be presented at the SCRS annual meeting.

The Group also noted that some T2CE datasets with species catch composition reported in a number of fish, will require the use of mean weights obtained from T2SZ to obtain the corresponding weight, and consequently allow for a complete comparison between T1NC and T2CE. This validation exercise may require additional time. The ICCAT Secretariat also recalled that the “faux poissons” component of the catches is only available in T1NC (not included in T2CE or T2SZ). This discrepancy has to be considered (discounted from T1NC) in the comparative analyses. An example is discounting the “faux poissons” from T1NC in the PS catch series of EU-France and EU-Spain; there is a reasonable match since 2013. Going backwards in time to try to improve earlier statistics depends heavily on each CPC.

Several CPCs (Curaçao, El Salvador, Guatemala, Panama, Senegal) requested from the ICCAT Secretariat additional explanations about some gaps observed in the SCRS catalogues. The ICCAT Secretariat confirmed that all the information received was made available to the Group and committed to review and respond to each CPC statistical correspondent on each inconsistency identified.

The Group inquired on the availability of indicators for the coverage levels of T2CE with regards to T1NC by species (i.e. T2CE representativeness). The Group suggested to estimate a global coverage ratio by species/stock over time, rather than the CPC-specific values. The ICCAT Secretariat acknowledges that this would be useful and will see if this can be done, after improving the consistency among Task 1 and Task 2 datasets (work described above).

The ICCAT Secretariat noted that historical data revisions are often requested by the Commission for specific purposes. However, the methods of collecting data and the structures to report the data have changed over time and it is not always possible to report historical data in the most recent required formats (higher resolution in general). The CPCs need to communicate to the ICCAT Secretariat when such requests are not possible to be accomplished, as it is not desirable to receive data that are not appropriate, verified, or useful. The Group observed that in the case of Panama, there are missing data from the longline fleet (see SCRS catalogues **Tables 2 and 5**). Panama requested a meeting with the ICCAT Secretariat to understand what happened to the information provided in the past and identify which datasets are missing in ICCAT databases. The ICCAT Secretariat committed to work with Panama to review and improve Panama's fisheries statistics.

The ICCAT Secretariat recalled that, as recommended by the SCRS, all the CPCs should use the SCRS catalogues (published on the [ICCAT website](#) since 2021) to verify their fisheries data completion by species/stocks. Some Task 2 datasets with low resolution (e.g. by year, without geographical definition, large grids (20x20, 10x20), large class bins (10 kg)) are excluded from the computation of the SCRS catalogues. Task 2 catalogue shows cells incomplete as: shaded red (-1), or yellow ("a" or "b"). For those specific cases, CPCs statistical correspondents can use the detailed catalogues made available during the meetings. Where there appear to be inconsistencies between reported catch and information summarised in the SCRS catalogues, CPCs statistical correspondents should contact the ICCAT Secretariat for further actions.

### *T1FC*

The ICCAT Secretariat informed on the ongoing work on the T1FC information (obtained using SCRS form ST01-T1FC) with a brief presentation of the number of active vessels by flag CPC and gear over time (preliminary results from 2014 to 2021). The information was shared with the Group for further analyses. This information on the fleet structure (now used by the SCRS and the Commission) is under revision by the ICCAT Secretariat. The ICCAT Secretariat invited each CPC statistical correspondent to check their information and inform them of possible errors and corrections.

The Group acknowledged the work of the ICCAT Secretariat on this dataset and recommended the continuation of the improvement of T1FC, noting its relevance in the estimation of fishing capacity in the ICCAT Convention area. Further work is required for the SCRS to be able to respond to the Commission on this matter. In this regard, the Group noted that the form ST01-T1FC, in particular, the sub-form ST01A contemplates reporting the information of individual vessels ( $\geq 20$  meters LOA) including vessel name, other identifiers, dimensions, gear used, and information on levels of fishing effort by region, while, sub-form ST01B is intended for the reporting of aggregated data for small-scale vessels (LOA < 20 meters), and data on fishing effort. However, in both sub-forms the reporting of fishing effort data is optional. The Group agreed that making reporting of fishing effort compulsory may assist the SCRS in its response to the Commission regarding an estimate of capacity and recommended that the SCRS considers making reporting of fishing effort in this form obligatory for all species. The Group also recommends that the ST01A sub-form also make the reporting of IMO numbers also mandatory (for all vessels that are eligible to obtain one). The Group also suggested reviewing and considering if the ST01 form should request fish carry capacity information for each vessel in units of total cubic meters of fish hold. This measurement unit is commonly used in other tRFMOs and will allow standard comparisons among diverse fleets.

### *Tagging*

The ICCAT Secretariat provided a presentation on the ICCAT conventional tagging of tropical tunas (BET, YFT, SKJ) including AOTTP data, highlighting the recent contributions from St Helena (1,564 new tag deployments in 2021) and the importance of recent tag recaptures from the ICCAT Atlantic Ocean Tropical Tuna Tagging Programme (AOTTP). The updated datasets (EXCEL files) on conventional tagging of tropical tunas were provided to the Group. The number of recaptures grouped by the number of years at liberty is presented for the three species (BET in **Table 7**, SKJ in **Table 8**, and YFT in **Table 9**). The corresponding maps of the three species are presented in **Figure 4** (species by rows and the map types in columns: density of releases, density of recoveries, and apparent movement).

The ICCAT Secretariat also presented the dashboards (snapshot in **Figure 5**) and map viewer (snapshot in **Figure 6**) on conventional tagging of tropical tunas (BET, YFT, SKJ) with the up-to-date conventional tagging information available. The dashboard and map viewers allow for a more dynamic and interactive analysis of the conventional tagging data ([Tagging data SKJ](#), [YFT](#), [BET](#), [Maps BET](#), [YFT](#), [SKJ](#)) .

The ICCAT Secretariat also informed the Group about a project with Centre for Environment, Fisheries and Aquaculture Science (CEFAS) (UK) and the governments of St Helena and Bermuda which involves implanting 24 internal electronic tags from LOTEK. Some of them are reused tags of the AOTTP programme. Further collaboration with CEFAS included the analysis of recovered internal electronic tags (LOTEK) that were originally implanted around St Helena.

The Group noted the large number of tags released from St Helena and inquired if additional information (e.g. electronic tagging data) is available to corroborate the observed connection between St Helena and the Gulf of Guinea. The ICCAT Secretariat informed that current electronic tagging AOTTP implanted tags in St Helena did not show this connection. However, scientists from St Helena informed the Group of a scientific project to tag tropical tunas with electronic tags (LOTEK and Wildlife Computer mini and micro-PSATs) in March 2023 (using the electronic tags detailed above).

On this matter, the Group acknowledged that long-term recoveries are now available that can improve estimates of growth from tagging data. It was indicated that recoveries from longline fleets are still minimal and suggested to reach out to the longline fleets for a better look at the movements of tropical tunas and avoid potential biases associated with receiving data only from the surface fleets component. The intensity of fishing efforts in the Gulf of Guinea may also result in an over-representation of this region in recovery statistics. Supplementing conventional tagging studies with electronic tagging would help to better elucidate the connection between St Helena and the Gulf of Guinea. However, the initial results suggest that the population around St Helena is not an isolated one which suggests that biological research conducted there could apply to the larger population.

The ICCAT Secretariat reported on the status of the contract with the University of Maine (USA) aiming at tagging activities of tropical tunas off the Northwest Atlantic. As reported by 31 December 2022, a total of 230 tags have been deployed, 22 on bigeye tuna, 198 on yellowfin tuna, and 10 on skipjack, which corresponds to about 16% of the initial target (1400 tag-releases) failing to fulfil the terms of the contract. The ICCAT Secretariat informed that the investigators have requested an amendment of the contract.

The Group discussed the requested changes by the contractor and obtained satisfactory responses to their questions about the benefits and consequences of granting the amendments and extension of the project. The Group agreed to recommend the contract be amended with the condition that reporting on project progress and tagging data submission is substantially improved. It was also noted that the communication between the contractor and the ICCAT Secretariat should improve.

The ICCAT Secretariat informed the Group that activities related to awareness for tag recoveries, tag seeding experiments, and tag rewarding programs have continued, including signed contracts with Côte d'Ivoire and Senegal and voluntary work carried out in Brazil, the Canary Islands, Ghana, and St Helena. Concerning tag seeding, the Group valued the continuity of the tag seeding experiments off the African coast. It is important to know whether the same reporting rates are continued since the end of the AOTTP programme. The ICCAT Secretariat presented a summary table of the evolution of the specimens tagged post-AOTTP by years as well as the percentages of recovery by species and gear code (**Tables 10 and 11**).

The ICCAT Secretariat also reported on other major ongoing activities and projects related to tropical tunas tagging:

- a) A collaboration between the ICCAT Secretariat and U.S. tagging correspondents, to work on full cross-validation of both conventional tagging databases, with the main objective of correcting all the discrepancies and missing information across all species.

- b) The development of an electronic tagging management system database (ETAGS) with the main goal of integrating into a centralized relational database all the information obtained from electronic tags and metadata. Phase one has been completed including the inventory of data, the creation of the loading files, and the installation of the database. The second phase will work on the consolidation of the metadata and loading the electronic tagging data into the system.
- c) The creation of dashboards for conventional tagging (all species, recently terminated YFT and BET) to be published on the ICCAT website.

The Group thanked the ICCAT Secretariat for the tools provided to visualize and download the tagging data. Several CPCs noted that this information is extremely valuable, and the Group thanked the ICCAT Secretariat and the Commission for the resources devoted to these projects.

Two scientific documents were presented in this section.

Document SCRS/2023/023 provided a summary of the data available for floating objects (FOB) / FAD fisheries in the ICCAT databases (an update of a document presented to the Commission based on [Rec. 22-01](#) para 31). A total of 25 flag CPCs (22 in 2021) have provided information through the ST08-FADsDeploy form, but several (9) have reported that they do not have FOB/FAD activities (FAD deployments or FAD fisheries). Data are now available for major FOB fleets since 2014. Over 200,000 FOB deployments have been reported (19,330 in 2021). Since 2015, most FAD deployments (~ 95%) were artificial drifting FOBs equipped with satellite and echosounder electronics. The reports included at least 59 vessel IDs deploying FADs, including fishing vessels (purse seine and baitboats) as well as support vessels.

The Commission has requested the SCRS to estimate the maximum number of FOBs deployments by vessel or flag that would be consistent with the Total Allowable Catch (TAC) recommendation. This is a complex task partially because FAD deployment data is not directly associated with the catch and or effective fishing effort on FADs. The units of effort needed are not available in Task 1 statistics, and by vessel, level estimates would be required by vessel catch and effort information that is not currently available for all CPCs in the ICCAT databases.

The Group indicated that total trends of FAD deployments are not informative, as in recent years data from the main fishing fleets is missing (Table 4 of SCRS/2023/23). It was suggested that if complete FAD deployment information were available, likely the number of FADs deployments would be stable or increasing. The Group asked the ICCAT Secretariat if the vessel list also contains baitboats (BB) and/or support vessels. National scientists and the ICCAT Secretariat confirmed that vessel IDs reporting FAD deployments include fishing vessels (purse seine and baitboats) as well as support vessels. The Group was informed that seismic exploration activity has impacted the presence/deployment of FADs off Mauritania. National scientists informed of the need to review historical landings of tropical tunas off the coast of Mauritania, the ICCAT Secretariat indicated that the spatial distribution of deployed FAD showed in the document SCRS/2023/23 (Figures 1 and 2) is the information provided by CPCs, and no identification of high seas versus national territorial waters (EEZ) is provided or estimated. It was further indicated that moored FADs (e.g. anchored to the sea bottom) have been reported but only for deployments in the Western Caribbean Atlantic region. The Group inquired if deployed FADs included FOB of non-human origin (Table 4 of SCRS/2023/023), and scientists familiar with these fisheries informed that in some cases vessels attach to natural logs electronics and these are used as FOB/FADs for fishing operations. The Group concurred that these FOBs/FADs should be included in the reports also.

The ICCAT Secretariat informed that the document “Status on tropical tunas FAD fisheries data submissions by CPCs in 2022” (PA1\_504\_REV/2022) was made available to the Group, and that this information had been requested by the Chair of Panel 1 for the upcoming Intersessional Meeting of Panel 1 from 27 to 31 March 2023. The document describes the data submitted by CPCs about historical FAD fishing effort in units of the number of FAD sets and the associated catch data ([Rec. 22-01](#) para 31, with extended deadline submission until 31 July 2023). National scientists worked in collaboration with the ICCAT Secretariat to complete and update the tables in this document (PA1\_504\_v2).



The Group inquired about the reports of lost FADs. It was clarified that the term “lost FADs” includes several states of the fate for a given FAD including drifting of FAD by marine currents outside of the fishing grounds, beaching or running aground in the coast, intended deactivation of the electronics of a buoy by the FAD owners, and removal and/or replacement of buoy electronics by non-owners. The ICCAT Secretariat informed that the FOB information is entered in the database as reported, but it has been previously stated by national scientists that in some instances each CPC may have interpreted differently the requested information. It was noted also that there is a higher density of reported lost FADs near the coast, in part also due to the heavy marine traffic in these areas. Finally, the ICCAT Secretariat noted that the original ST08 form was designed to meet the Commission requirements as stipulated in the adopted management recommendations, but it may not include all the factors and situations that arise in the fishery(ries) and that could be of interest to the SCRS.

Discussions during the meeting concluded that it is important to have an estimate of the number of FADs available to the fleets (or vessels) in a given time area definition (e.g. by 1°x1° lat-lon month) and the corresponding catches associated with those available FADs. It was indicated that previous research showed the “average life span of a deployed FAD” (López *et al.*, 2016, Maufroy *et al.*, 2015) and that the number of fishing operations on a given FAD is a function of the biomass accumulated which is closely monitored by the fleets. Thus, potential estimates of a limiting number of FAD deployments should take into account all these factors.

The Group suggested that similar tables as presented in SCRS/2023/023 for deployed FADs, be prepared for lost FADs, to better estimate “active-available FADs” to the fleets within a given time-area strata. It was commented, however, that this information at the level of resolution required is likely available from the vessel’s logbooks directly and it was proposed that CPCs coordinate with national scientists and industry to perform these analyses and that these be presented to the SCRS in the near future. It was further commented that under the definitions of the FAD operations and glossary of the Commission recommendations (Rec. 22-01), often when talking about active FADs the real meaning is “actively monitored FADs”. It is not clear whether this includes FADs that are not monitored with electronics. In relation to the restrictions on the number of actively monitored FADs, it is not yet clear what level would be required to affect the catch rates or the population. Another way to manage them would be to control the number of set deployments. To do this the Group would need the detailed number of sets and the catch associated with each set by species and size composition (for FAD and free school (FSC)). EU scientists noted that an increasing number of terms are used in this subject of FOB/FADs and recalled that it would be good to review and standardize the terminology used in scientific reports to be consistent with the glossary recommended by the [Report of the 3rd Meeting of the Ad Hoc Working Group on FADs](#) and included in Hampton *et al.*, 2017, and the few definitions about FADs adopted by the Commission (Rec. 19-02 / 22-01).

The Group concluded that in order to complete the Commission’s request for providing estimates of a maximum number of sets per vessel or fleet/flag substantial intersessional work would be required and recommended adopting a well-defined workplan to complete the work before September’s SCRS meeting.

The document SCRS/2023/024 presented a review of the Atlantic PS fisheries for tropical tunas from the fleets of Central America and the Caribbean CPCs. This document summarizes the status of the purse seine fisheries for tropical tunas in the Atlantic Ocean carried out by vessels registered in countries of Central America and the Caribbean region. It covers the fishing activities of purse seiners flagged in Belize, Curaçao, El Salvador, Guatemala and Panama, over the period 2016-2022. The document describes the number and types of vessels involved in the fishery; trends in effort and catches of tropical tunas and other species, by fishing mode, and season; and composition of the catch; by year, over the period 2016-2022. Data show the negative impacts that the measures in place, combined with the impacts of COVID-19 and the energy crisis triggered by the war in Ukraine are having on the economic sustainability of the purse seine fleet. The authors recommend that the scientific advice be made more precise with reduced uncertainty and that ICCAT adopt measures in line with the requested scientific advice and the status of the fisheries for, and stocks of, tropical tunas.

The Group congratulated the authors for providing, for the first time, a joint document on the Atlantic PS tropical tunas fisheries. The Group noted that while declines in the catch were observed that were attributed to the effects of the FAD closure periods in the Atlantic, there were increases in the proportion of mature fish caught over the same period. Questions arose on the source of the data used in this work, and it was confirmed that information was gathered from the ICCAT-published databases.

## 2.2 Definition of terms of reference for the ad hoc technical sub-group

During the 2022 Tropical Tunas Species Group September meeting it was recommended the creation of an ad hoc technical sub-group to address comments from EU scientists informing about inconsistencies and missing data observed in the tropical fisheries datasets available in ICCAT. The information presented by the ICCAT Secretariat (SCRS catalogues on BET, YFT and SKJ), indicated inconsistencies and missing information, and specific tasks were proposed:

- Identification of potential gaps in T1NC (e.g. incomplete series, the existence of Task 2 data)
- Arrange communications with CPCs to request the status of the identified missing information
- CPCs would provide a document to be presented to the Tropical Tunas Species Group
- CPCs would then modify the statistics *if* they agree with the recommendations of the SCRS.

The specific points raised in the working paper would be prioritized. The Group needs to establish whether data needed to fill these gaps exist, and what resources are needed to recover these data. This process is expected to extend for several years.

The Group noted that current assessment models and the management strategy evaluation (MSE) process allow for a better understanding and incorporation of uncertainties such as total catch, catch composition, and, or missing information. National scientists indicated that historical data are not simple to recover as in many cases, modifications of sampling programmes, data collection protocols, non-electronic storage of data, resolution of data compiled, etc. prevent the proper compilation of historical datasets. The Group agreed that CPCs should report to the ICCAT Secretariat when a request for historical data is not possible and present this information to the Commission.

It was further noted that the SCRS is already saturated with too many meetings and working sub-groups, and it will be more efficient to use already existing groups and coordinate compatible tasks. In this regard, EU scientists informed of the already ongoing activities of the T3 subgroup (sub-group of the European Union Data Collection Framework (EU-DCF)), which can invite colleagues from interested CPCs involved in tropical tunas treatment data to attend these meetings. This may be the best way forward, in particular for improvement in the estimations of the total catch, catch composition and size composition. The EU indicated that meetings of T3 are in two parts, a technical meeting, and a restitution aspect, and that organizers of the technical meetings for T3 would need to consider how to best invite ICCAT partners.

It was also noted that T3 deals primarily with surface fisheries (PS and BB), but other gaps with other fishing gears should be also addressed. The ICCAT Secretariat informed that the fisheries statistics submitted by CPC for all fisheries are reviewed with quality control checks, as part of the routine operations of the Statistics Department which is regularly in contact with the national statistical correspondent for the resolution of data issues.

The other main source of uncertainty in the catch of tropical tunas is related to the estimates and reporting of the so-called “faux poissons” component. It was clarified by national scientists that “faux poissons” catch is landed and for several CPCs reported with the official reports of Task 1 NC. It was also recalled to the Group that “faux poissons” is composed of target species (major tuna species) of small size or damaged and bycatch species retained onboard. It was further noted that size sampling of “faux poissons” in a routinary manner is very complex and difficult to achieve, nonetheless, it was suggested that special sampling programmes be considered for sampling “faux poissons” as done on previous occasions (Chavance *et al.*, 2015, Ngom., 2015).

## 3. Review of updated relative indices of abundance for YFT and BET stocks

SCRS/2023/018 presented an update on the standardization of bigeye tuna catch per unit effort (CPUE) in the Atlantic Ocean from the Japanese longline fleet. Catch and effort data at the set level were used from 1975-2021. The data included vessel ID, catch in number, year, month, and day of operation, location to 1° of latitude and longitude, number of hooks between floats (HBF), and number of hooks per set. For standardization, the data were divided into 3 spatial areas (**Figure 7**), similar to those used to distinguish fleets in the SS3 model from the previous stock assessment (except for northern and southern limits for regions 1 and 3, respectively). Generalized linear models assuming a lognormal distribution for CPUE were

utilized for standardization (with a constant added to CPUE to correct for zero data). Variables included in the standardization included year, quarter, vessel, location (lat-long), a clustering variable, and year\*quarter effects. The residual diagnostics were deemed acceptable. The standardized index trend was similar among regions (**Figures 8 and 9**), with a general decreasing trend until around 2010 after which indices from regions 2-3 increased to the end of the time series, and region 1 is variable but continues to decrease. The trend of CPUE in this study is similar to that in a previous study (Matsumoto *et al.*, 2021), and there are some small scale differences, especially in regions 1 and 3 towards the end of the time series.

In order to facilitate making inferences about the changes in BET catch that have been observed in recent years, the Group inquired if indices from the surface fleets (purse seine) could also be presented, as the LL fleet only makes up a portion of the total effort and catch in the BET fishery. The Group noted that they have not had time to conduct updating and standardization of the surface fleet CPUEs in time for this current intersessional meeting, however, they would be ready by the September species groups meetings.

SCRS/2023/019 presented an update on the standardization of yellowfin tuna CPUE in the Atlantic Ocean from the Japanese longline fleet. The variables used in the standardization, the cluster analysis, and the generalized linear model were all the same as that used for the JPN LL BET standardization (described above). The areas used in the analysis were the same as those used for determining fleets from the SS3 model used in the previous assessment of YFT (**Figure 10**, except for northern and southern limits for regions 1 and 3, respectively). The residual diagnostic q-q plots showed some skew for regions 1 and 3 but overall were deemed acceptable (**Figure 11**). The standardized CPUE by area (**Figures 12 and 13**) showed a similar trend between region 1 and region 2, with an increase to about 1990, followed by a decreasing index to 2000 and generally flat thereafter. For region 3, the index depicts an increase throughout the time series, in particular between 2010-2021. The author noted similar trends compared to the previous index developed for this YFT LL fleet.

The Group inquired about the difference between the nominal CPUE and standardized CPUE in the later years for region 1. Japan noted this difference might be a function of the change in fishing season and fishing ground and noted they would check whether there was some change in these years that might explain the large difference between nominal and standardized indices.

SCRS/P/2023/005 was presented to the Group on a summary of fishery indicators for U.S. tropical tunas fisheries fleets. Overall, longline effort declined sharply in recent years coinciding with a contraction in spatial distribution over the last decade to areas closer to the coast (**Figure 14**), and U.S. landings were notably lower over the last decade compared to historical removals, primarily due to a decline in rod and reel catches of yellowfin. Standardization of the longline fleet was done using a generalized linear model with negative binomial distribution and a log link using variables year, a quarter\*area variable, target, and a gear category. Standardized indices of bigeye and yellowfin tuna relative abundance from the longline showed stable or increasing trends over the last ten years (**Figure 15**). Standardization of the rod and reel fleet was also done using a generalized linear model with negative binomial distribution and a log link using the variables year, month, area, and a vessel type category. Standardized indices of yellowfin tuna and skipjack relative abundance from the rod and reel fleet showed increasing and decreasing trends over the last ten years, respectively (**Figure 16**).

The Group inquired whether the reductions in landings of tropical tunas may be due to a regulatory effect. The author noted this was worth further exploration. It was brought up that there have been reductions in bag limits and/or the total number of fish per vessel, particularly for yellowfin tuna, and that this has the potential for affecting the landings however likely not the indices (as fish are still caught but released).

The Group inquired whether the rod and reel (recreational fisheries) and the longline (commercial) fisheries encounter fish of different sizes and if that might explain the conflicting trends for yellowfin between the fleets. The author noted that this was a possibility and would explore this for discussion at the September species groups meetings.

The Group inquired whether tournament data were included in the rod and reel indices and if these tournaments were impacted by COVID. The tournaments were included in the data and no large reduction in fishing effort was observed during COVID, in fact, the effort typically increased for recreational fisheries. A reduction of commercial fishing effort did occur as markets were closed. The author was not certain if the tournaments occurred during 2020/2021, but suggested that would be an avenue of further exploration.



The Group noted that the U.S. Rod and Reel index was developed from the large pelagic survey, which is based in the northeast section of the United States. The large pelagic survey does not cover the entire extent of the species distribution or the recreational fishery, which extends South through the eastern seaboard and into the Gulf of Mexico.

The Group inquired whether the sharp decreases in effort coinciding with sharp increases in the longline indices might be due to a change in targeting. The author noted that this may be partly due to a change in targeting for BET and could also be due to a change in fish availability, for example, a northward shift in the species distribution, or a change in stock abundance. The targeting category in the standardization is a “tuna” category and as such, it cannot differentiate between YFT and BET targeting, but it should differentiate from swordfish.

The Group inquired whether the area term in the standardization would allow for the ability to test the hypothesis that there has been a northward shift in these species. The author suggested that this exploration of range shift may be possible (using a year\*area effect), however, could be confounded with fleet contraction. This could be explored in preparation for the September species groups meetings.

The Group inquired whether vessel ID was available for standardization and could be included as a random factor. The author noted that this is possible, and would be included for a standardized index in an assessment (as these indices were not), however, it is unlikely to have changed the inference regarding trends.

SCRS/P/2023/006 presented an update on CPUE standardization for bigeye and yellowfin tuna caught in the Brazilian longline fishery from 1998-2022. This update provided information for the entire area where fishery effort was distributed from the Brazilian longline fleet. The methods for cleaning and preparing the datasets, as well as the exploratory analysis and modelling were kept the same as those used in the last standardizations conducted in respective species stock assessments (Hoyle *et al.*, 2018). This included a two-stage delta-lognormal generalized linear model using a year-quarter variable, a lat-long variable (5° spatial cell), a vessel ID variable, the number of hooks, hooks between floats, and a clustering variable with three levels. In general, the residual diagnostics for each standardization were acceptable (**Figure 17**). Both standardized indices estimated for bigeye and yellowfin tuna have shown a stable trend in recent years, where the standardized trend for bigeye was more variable than the trend for yellowfin (**Figures 18 and 19**).

The Group noted that it would be helpful to include the nominal data points in the figures of the BRA longline standardized indices. The author agreed to provide these by the September species groups meetings, in addition to the separation of indices by region. The Group inquired as to how many vessels had never caught the target species and how many data points were removed from the dataset. The authors indicated that fewer than 10% of the records were removed from data filtering.

The Group noted that in order to help understand the recent drop in catches of tropical tunas, it would be very informative if updated buoy acoustic indices were to be developed. The species group chairs recommended that other indices be updated for the September species group meetings including PS, BAI, Chinese Taipei longline, and Korea longline fleets.

For skipjack, the Group also noted it would be beneficial to update the indices that were used in the most recent assessments before the September meetings.

The previous BET and YFT assessments, both use joint indices. The Group suggested it would be very helpful to show plots (or tables) of individual CPC standardized indices and the joint indices used in the last assessments, and add to the plots the trends in catches. The ICCAT Secretariat developed these plots with the indices made available during this current meeting, however, they are missing updated indices from the surface fleets. The resulting standardized indices from the JPN LL, the USA LL, and the BRA LL were compared for the different fleets in each region (**Figures 20 and 21**).

There was a discussion of the difference in the 2018 and 2021 iterations of the Joint LL indices. The Group noted that it is important to construct the new joint index by early 2024 in advance of any data preparatory meeting in a manner similar to what had been done in 2018-2019, with as many longline fisheries as are able to provide the required data. It was noted that since the pandemic was over they could return to sharing operational data to allow for conducting a joint CPUE standardization, provided that the meeting to carry out that task is conducted in person. The Group considered that it would be optimal to develop indices for both YFT and BET at the same meeting.

#### **4. Biological research**

##### **4.1 Update on the research on biological parameters from the AOTTP programme**

The Group was informed that there are ongoing collaborative research activities by multiple organizations. The authors of SCRS/2023/021 introduced to the Group a summary of the recent activity by the alliance being established between AZTI (EU-Spain), Institut de recherche pour le développement (IRD) (EU-France), Instituto Español de Oceanografía (IEO) / Consejo Superior de Investigaciones Científicas (CSIC) (EU-Spain) and Centre National de Recherches Océanologiques Abidjan (CRO) (Côte d'Ivoire), but informed that the document will be presented at the Tropical Tunas Species Group meeting in September 2023. The alliance has been established with the aim to implement an Atlantic-wide sampling scheme for the collection of biological samples and standardize protocols of analysis for the three tropical tuna species, yellowfin (*Thunnus albacares*, YFT), bigeye (*Thunnus obesus*, BET), and skipjack (*Katsuwonus pelamis*, SKJ) tunas, to develop and update biological indicators to be included in the assessments. Some of the priorities identified are the reproductive parameters of the three species (YFT, BET, and SKJ), growth and age of skipjack, the population structure of yellowfin, and the trophic ecology of bigeye and yellowfin.

SCRS/P/2023/004 presented an agent-based bio-economic model (POSEIDON) developed with the Inter-American Tropical Tuna Commission (IATTC) for tropical tunas in the Eastern Pacific Ocean (EPO). The model uses a fully integrated approach to incorporate data pertaining to markets, management, multi-species biology, and the environment. Individual fishing vessels are represented as agents in the model. The calibrated model was able to capture key behavioural components of large purse seine vessels in the EPO including total catch, action types, and other trip characteristics. The adaptive fishing agents can react to complex management interventions, assess biological and economic trade-offs, and help identify unintended consequences of management interventions such as changing fishing strategies or locations. The POSEIDON model can be adapted to a wide range of data types and availability.

The Group congratulated the authors for their research and was interested in understanding more deeply how the POSEIDON model works and how it could be applied to ICCAT stocks in the Atlantic Ocean. Several questions were inquired related to model settings, incorporation of data, and parameterization in the model. It was questioned how the model interprets fish movements in space and/or how this is associated with habitat preferences. It was explained that, in general, the movements in the model were linked to the FAD fishery dynamics. The author noted that the POSEIDON model has been developed in collaboration with the stock assessment experts, and emphasized that the model has flexibility to various data types (e.g. observed data, habitat suitability predictions, tagging data, FAD drifts, and echosounder buoy data), and has a potential for applying to the Atlantic species.

##### **4.2 Identification of research priorities for the establishment of a Tropical Tunas Research Programme**

Following the SCRS 2023 workplan ([Report for Biennial Period, 2022-23, Part I, Vol. 2](#)), the Tropical Tunas Species Group will be establishing the Tropical Tunas Year Programme (TTYTP) to coordinate research activities for bigeye, yellowfin and skipjack tunas. The Group agreed to identify major research activities needed to address the management objectives of the Commission and the SCRS for these stocks, while taking into consideration the results and advances accomplished under the AOTTP programme.

During this meeting, the Group started the review of the main research priorities that were initially proposed for the AOTTP programme (Table 2 in Anon., 2014) considering if they were fully, or partially addressed by the results of the AOTTP for each species. New research areas were also identified. The Group suggested that items under environmental factors, habitat, behaviour, and interactions between tropical

tunas/trophic relationships were consolidated into a main research area of “Habitat and environment” to consolidate interactions between tropical tunas, in particular for school aggregations and their interactions with the mixed fisheries. The Group also indicated the need for updating basic biological size-weight conversion factors for Atlantic tropical tunas, because the ones used currently by the SCRS were sampled more than 40 years ago. Another important main research area is the interactions of tropical tunas with FOB/FADs given the interest of the Commission to formulate management control measures to control fishing mortality on juveniles.

**Table 12** was proposed by the Group as a base for future work. For the continuation of this work, the Group agreed to establish a Tropical Tunas Technical Sub-group on Research Planning that will work intersessionally to develop an SCRS document to be presented at the species group meeting in September, with the main lines of research areas, operational objectives, descriptions, priority schedules, and estimated budget lines. The Chair invited all interested scientists to contribute to the Sub-group’s intersessional work, where initial drafts and suggestions will be exchanged via email, and one or more online informal meeting(s) will be scheduled to complete the SCRS document.

The Group noted that valuable information can still be extracted from data and samples collected under the AOTTP and agreed that the Tropical Tunas Year Programme should cover the analyses needed to exploit these data.

Finally, the Group acknowledged the importance of the close collaboration between the fishery industry and different scientific groups for research on tropical tunas worldwide and in the Atlantic in particular that has been developed in recent years.

## 5. Tropical tunas MSE review

A paper (SCRS/2023/017) was presented that investigated the similarities between skipjack tuna and forage fish, including trophic dynamics and life history, as it pertains to MSE and management procedure (MP) development. Like forage fish, such as herring and mackerel, skipjack tuna are important sources of prey for other species managed by ICCAT including large-bodied tropical tunas, billfish, and sharks. They also have much shorter life cycles than larger tunas, similar to forage fish. As such, MSE and MP development for W-SKJ may benefit from applying more precautionary reference points and probabilities applied to previous forage fish MSEs and MPs, to reflect ecosystem considerations.

The Group discussed the paper and agreed to further investigate the implications of trophic positioning for both the W-SKJ and E-SKJ stocks. The Group also expressed that it is unclear whether small pelagic fish and skipjack tuna should be considered in the same line with regard to MSE.

### 5.1 Update on the technical review of the W-SKJ MSE and progress

The Commission agreed on a resolution ([Res. 22-02](#)) for W-SKJ that contained conceptual management objectives but did not operationalize them with specific time frames or probabilities. Some potential reference points ( $B_{LIM}$ ) were discussed during the meeting.

The Commission had requested performance indicators by period (short, medium, and long) only for yield but not for status, safety, or stability. Though the Group discussed and supported the list of performance statistics provided by the technical team that included period reference points for status, safety, yield, and stability. Among these, the Group agreed that performance indicators for safety that reflected the entire simulation time period (1-30 years) better reflect the performance of MPs as the short-term indicators are dependent on the current stock status. For stability, the Group also preferred performance indicators for the entire simulation time period (1-30 years) as the short-term indicator is of no use if it is calculated over the first three years of the simulation when yield (i.e. TAC) is constant. The Group agreed to retain performance indicators for each period (short: 1-3, medium: 4-10, and long: 11-30) and add one for the entire simulation period (1-30 years) for status, safety, and stability (**Table 13**).

There was a long discussion about the definition of  $B_{LIM}$  with suggestions that  $B_{LIM}$  could be calculated with reference to  $B_{zero}$  rather than  $B_{MSY}$ . The Group agreed to recommend a definition of  $B_{LIM}$  as  $0.4 B_{MSY}$ , as adopted for other ICCAT stocks as this is also appropriate for W-SKJ. The Group agreed to investigate in the future whether there is any need to depart from this definition of  $B_{LIM}$  as  $0.4 B_{MSY}$ . Research should also investigate whether the value of 0.4 should be changed, and should also be conducted on the possibility of changing to a  $B_{zero}$  based  $B_{LIM}$ .

There was also a discussion on how the probability of falling below  $B_{LIM}$  was calculated. The Tropical Tunas Technical Sub-group on MSE for W-SKJ confirmed the probability of falling below  $B_{LIM}$  was calculated by assigning any simulation run where the biomass falls at least once below  $B_{LIM}$  as falling below  $B_{LIM}$ .

A comment was made that the current universe of operating models (OMs) for W-SKJ is such that almost every simulation run starts in the green area of the Kobe plot. It was proposed that in the future some scenarios for robustness tests could be performed that considers an unlikely scenario where the current status is not as positive as reported.

## **5.2 Update on the tropical tunas multi-stock MSE process**

Two presentations were made to the Group updating the progress of this MSE, one about potential management objectives (SCRS/2023/020), and one about the current status of the development of operating models and their conditioning (SCRS/2023/P/007).

SCRS/2023/020 provides a list of possible operational objectives to guide the multi-stock tropical tuna MSE. These alternative multispecies management objectives were based on options developed for mixed fisheries in the International Council for the Exploration of the Seas (ICES), with a focus on procedures that consider interactions between gears and the three tropical tuna species. The adoption of management objectives is one of the key components of the MSE process. This document presented options for multispecies management objectives. This document aims to foster discussions within the Tropical Tuna Species Group and with Panel 1.

The Group discussed the list of operational objectives and made some suggestions for its modification. It was identified that the current set of objectives does not include any operational objective relative to the desire expressed by some members of the Commission to reduce the catch of juvenile YFT and BET from surface fisheries. Such desire has been the primary reason for the Commission to impose seasonal closures for FAD fisheries. Consideration could be given to developing new performance indicators related to the proportion of juveniles in the catch.

Similarly, the Commission has had an objective to protect the harvest opportunities for small-scale fishers targeting tropical tunas and it would be ideal to have an operational objective that reflects that. Some members of the Group made the point that candidate management procedures (CMPs) could include effort controls as well as TAC-based controls.

The Group discussed the challenges associated with tradeoffs in performance indicators between individual stocks, as the Group has not yet agreed on potential multi-stock indicators. Views were expressed that it may be preferable to define reference points in different ways for each of the three stocks, with the probabilities associated with some reference points being more precautionary than others.

A discussion took place regarding the fact that MSY has changed in the historical period for BET and YFT as a result of changes in the overall selectivity of the fishery. Performance indicators could be developed that refer to an overall selectivity that has occurred in the past to evaluate the impact of changes in selectivity.

The Group agreed that it should consider lessons learned from other MSEs, in particular, that of BFT which dealt with two stocks. However, it was noted that within the BFT MSE the MP is set by area, not by stock. At present this is not considered in the tropical tunas mixed stock MSE, where the majority of the catch is taken in the same area for the three stocks. Some of the important lessons learned from the BFT MSE were:

- Early agreement by the Commission on operational objectives
- Restrict the number and type of CMPs considered for testing

- A wide range of operational models with expanding hypotheses beyond those considered in the assessment

SCRS/2023/P/007 reports on how in recent years ICCAT has made significant advances in developing MSE frameworks for its main commercial tuna stocks to evaluate harvest strategies. However, single-stock MSEs cannot anticipate the unintended consequences of single-stock management frameworks on other tropical tunas and/or fleet responses to management measures. The aim of this study is to support the development of a robust advice framework consistent with the Precautionary Approach and to evaluate CMPs for the common management of the tropical tuna stocks in the Atlantic, addressing the multispecies fisheries nature of these species. A preliminary MSE framework to evaluate multispecies management objectives, a conditioned multi-species OM for Atlantic Ocean tropical tuna stocks and fleets to demonstrate the utility of multi-species Management Procedures, and the development of an Observation Error Model, were presented to the Group. The analysts explained that the presented results are only a preliminary version of the MSE and focused their efforts on describing how the fleet structure of the MSE was adapted from the recent assessments of E-SKJ, YFT, and BET. The next steps will be to expand and explore the range of OMs using the latest assessment grids and to further develop CMPs and Harvest Control Rules (HCRs).

The current OM has a modified fleet structure derived from the fleet structures used in the SS3 models developed in the latest assessments of BET, YFT, and E-SKJ (**Table 14**).

The observation error model generates a single stochastic index for each stock. For BET and YFT it generates annual joint longline indices, for E-SKJ a seasonal index akin to the EU purse seine non-owned FOB/FADs index. In the simulation, indices were generated with a given bias, and assumed to have normally distributed residuals. Residuals were obtained by fitting a loglinear regression to the spawning stock biomass (SSB) and the CPUE used in the conditioning of the OMs. The Group noted that the first developments of a CMP include empirical HCRs which change TAC on the basis of the recent trend in the indices for each stock. However, further MPs will be evaluated when the MSE is at more advanced stages. Also, the current model does not contain implementation error, the yield for each species is equal to the TAC set for each management period and each fleet obtains a share of the quota equal to its historical share.

The modeling team plans to conduct the following steps: i) to identify multispecies management procedures, ii) to explore different HCR options, and iii) to review the fleet structure to investigate the potential of including technical interactions between fleets. It was noted that although the axis of uncertainties was identified last year by the Group, the current framework has not yet expanded the OMs to include all the uncertainty axes.

The Group made a number of suggestions for the technical modelling team to consider, although it accepts that the appropriateness of these suggestions has yet to be determined:

- Other indices e.g. the buoy index may be considered as candidates for the management procedure
- Taking into consideration the autocorrelation of indices when determining their suitability for projections for use in CMPs
- Introduce implementation error in the translation of the quota into yields
- Estimate a performance indicator that represents the mean size or age of fish in the catch
- Develop a trial specification living document in coordination with the ICCAT Secretariat (e.g. <https://iccat.github.io/abft-mse/>)

The technical team agreed to start developing a living document containing the trial specifications for the multi-stock MSE during the intersessional period. Much of the information about the modeling framework is already contained within the FLBEIA description documents and in previous documents presented to the SCRS (Merino *et al.*, 2020).

The Group discussed the limitations that this process has had due to the decisions of the Commission regarding funding and the lower priority given to the tropical tunas MSE in comparison to those for other stocks. The lack of capacity in the Group to review the developments of the modelling team and the low investment of the Commission in the multi-stock MSE has created an environment where tropical tuna scientists have not felt it was possible/wise to review the MSE progress adequately. The Group agreed that this needs to be overcome by seeking additional funding from the Commission and by encouraging members of the Group to participate in this process, especially those that have had expertise in other MSE

processes. A Tropical Tunas MSE Technical Team as a sub-group of the Tropical Tunas Species Group will be established. Moreover, efforts should be made to involve representatives from tropical tuna stakeholders that have not been part of the development of this or other ICCAT MSEs. The implementation of MSE training workshops and the establishment of MSE ambassadors for tropical tunas are two ways this Group expects to encourage such participation in the MSE process.

The Group agreed that the development of the two MSEs for tropical tunas takes into consideration the diagnostics used by other groups in ICCAT to support the development of other MSEs. Additionally, the Working Group on Stock Assessment Methods (WGSAM) has had a standard item on MSE to discuss methods and standards. The WGSAM is developing a review of the MSE process ICCAT-wide and a workplan and a budget for it. The WGSAM Chair encouraged the Group to help draft the Terms of Reference (ToRs) for the review of MSE methods and standards.

#### *Workplan for tropical tunas multi-stock MSE*

The Group agreed to identify members from the Group who will serve on a technical sub-group to evaluate the MSE progress and the meeting schedule/frequency. The Group agreed that such a sub-group should use the plan originally developed in 2018 and the latest MSE road map agreed by the Commission ([Revised roadmap for the ICCAT MSE processes adopted by the Commission in 2022](#)) to develop a detailed workplan for this MSE. Such a workplan should consider the progress made up to date and include short-term and medium-term actions that allow the Group to achieve the Commission’s roadmap. In the short term the workplan should aim to:

1. Prepare a trial specifications document with the axes of uncertainty defined in Merino *et al.* (2021)
2. Develop an example Operating Model report
3. To facilitate evaluation, establish a public repository, and organize available information. Useful examples include: <https://iccat.github.io/nsw-mse/> and <https://iccat.github.io/abft-mse/>

In the medium term, the workplan should include a technical review of the tropical tuna multi-stock MSE process. Ideally, the workplan should allow for widening the membership of the technical group to include additional external experts that can support operating model, conditioning, and management procedure development. The workplan needs to have a budget commensurate with the resources needed to achieve it as lately the only source of funding for the continued development of the operating model and its conditioning is associated with the funding provided to a PhD student at AZTI. The Commission has allocated funds to continue the Tropical Tunas MSE programmes for 2022 and 2023 as shown in **Table 15**.

The technical team should prepare this roadmap prior to September SCRS species groups meetings for consideration by the Group.

### **5.3 Workplan development for the 2023 training workshops on tropical MSE**

Following recommendations from the [Report of the 2022 Intersessional Meeting of the Tropical Tunas \(TT\) Technical Sub-group on Management Strategy Evaluation \(MSE\)](#), the SCRS proposed capacity building workshops to focus on MSE for 2023:

- “In addition, the Sub-group recommended that there be a 2023 technical review of the West SKJ MSE and capacity building programmes for tropical tuna scientists and stakeholders, to increase the knowledge of the MSE principles, approaches, and details related to Atlantic tropical tunas.”
- “The Group recommends the formation of a formal team of ambassadors with representation by native speakers of each of the three official ICCAT languages, as well as other languages, for the purpose of developing communication materials, organizing, and engaging in stakeholder outreach efforts related to MSE.”
- “The Group recommends capacity building programs for tropical tuna scientists and stakeholders, to increase the knowledge of the MSE principles, approaches, and details related to Atlantic tropical tunas. Training workshops are recommended to be held in 2023 in different languages (English, Spanish, and French at a minimum).”



The overall goal of these workshops is to increase the capacity of ICCAT CPCs so that their scientists and managers can actively participate in the process of tropical tunas MSE. Workshops proposed for 2023 were planned to be in a similar manner to the successful workshops coordinated by ICCAT scientists from Brazil in 2021. These workshops were conducted online and with English and Portuguese speaking instructors and translation to Spanish and Portuguese. Workshops introduced theory of MSE but also provided practical sessions<sup>1</sup>. Two of such workshops were aimed at scientists and one for stakeholders and managers.

During the SCRS annual meeting, the SCRS approved proposing to the Commission to organize three workshops and conduct them in the three official languages of ICCAT.

“The Committee will support the organization and implementation of training workshops on MSE. These workshops will follow a modified format following the experience of the workshops conducted in Brazil and funded by ICCAT in 2021. Workshops will be conducted in French, Spanish and English depending on the countries invited to attend. Priority will be placed on CPCs that did not attend the 2021 workshops, and ideally will be organized at the regional level (West Africa, Central American/Caribbean, etc.). Workshops will use the experience from the Brazilian 2021 workshops and other previous experiences from other organizations to improve training outcomes. Six online workshops for scientists (4 in 2023 and 2 in 2024) and 6 for stakeholders (2 in 2023 and 4 in 2024) will be conducted.”<sup>2</sup>

“Training workshops for scientists (4 in 2023 and 2 in 2024) and stakeholders (2 in 2023 and 4 in 2024), with translation in all official languages”<sup>3</sup>.

During the Commission meeting, the following decisions were taken by the Commission ([Report for Biennial Period, 2022-23, Part I, Vol. 1](#)):

- “Training workshops for scientists (2) and stakeholders (1), with translation in all official languages”
- Approved dates for such workshops:
  - 25-26 April 2023
  - 13-14 June 2023
  - 13-14 October 2023

### *Discussion*

The ICCAT Secretariat and the SCRS Chair informed the Group that they believed the decision of the Commission to mean that interpretation should be provided in the three languages for each workshop.

The Group agreed that if interpretation is provided in the three languages the workshops will not be able to be implemented as the 2021 workshops organized by Brazilian scientists. It would be impossible to have active practice sessions in the three languages simultaneously. The only viable option would be to have workshops that cover only theory and concepts. The workshops will not offer one-to-one interactions between workshop participants and instructors, nor will they have active learning workshop sessions. Given that, these workshops could accommodate more participants and potentially be reduced to only two during 2023, one for scientists and one for managers.

Others in the Group interpreted that there was no unequivocal request from the Commission that each workshop must be provided with interpretation in the three languages. Therefore, some in the Group preferred to retain the ideas from the SCRS to organize regional workshops with a single language focus and interpretation to a second language that can facilitate instructors' participation. This Group also preferred to retain the idea to have workshops of the style implemented by Brazilian scientists in 2021, with active learning workshop sessions that offer one-to-one interactions between workshop participants and instructors. Workshops would be conducted during time zones that facilitate the participation of

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<sup>1</sup> FADURPE 2022. FINAL REPORT. MSE training courses to build capacity on Management Strategy Evaluation methods for fisheries scientists, managers and stakeholders.

<sup>2</sup> From Tropical Tunas Workplan for 2023, section 15.1.10. of the [Report for Biennial Period, 2022-23, Part I, Vol. 2](#).

<sup>3</sup> From budget table of recommendations with financial implications for tropical tunas, section 16.1.9 of the [Report for Biennial Period, 2022-23, Part I, Vol. 2](#).

scientists from the language of focus (Eastern workshop with interpretation in French and English, Western workshop with interpretation in Spanish and English).

The Group agreed that regardless of the option implemented, there was a strong preference for ensuring the use of ICCAT interpreters, as these individuals have strong experience in technical aspects of the ICCAT work that are not available with other interpretation services.

Given these two differing views about the workshops, the two alternatives were presented to the Group for consideration (**Table 16**). These alternatives have different budget implications as interpretation in the three languages comes with a price of €40,000 for six days of interpretation.

The Group discussed the two options and expressed a preference for the first option to be implemented in 2023 but retained the intention to organize workshops that provide more practical training in 2024. The Group also discussed whether it was necessary to give priority to developing CPCs to participate in the workshop and there was strong support for providing such priority. The point was made, however, that most CPCs are developing countries thus it is still possible that the selection of participants will remain challenging. The Group developed the elements required for the terms of reference for option A, which should be finalized between the rapporteurs and the ICCAT Secretariat.

#### **5.4 Workplan for the MSE dialogue with Panel 1 in 2023**

There are three planned meetings for Panel 1 in the intersessional period of 2023 (27-31 March, 5 May, and 19-23 June). Only the 5 May meeting has an explicit agenda dedicated to MSE, as it is an online meeting dedicated to the Western SKJ MSE. The other two meetings do not have agenda items on MSE or science, however, the SCRS Chair reported to the Group that he intends to ask the Chair of Panel 1 for the opportunity to present some information from the SCRS to one of the other two meetings of Panel 1. It was also mentioned that the June meeting will only take place if the work intended to be completed at the first meeting is not completed in March. The Group agreed to be prepared to present information on both MSEs to Panel 1 in case there is an opportunity to do so at the 2023 meetings of this Panel, giving priority to the presentation of the W-SKJ MSE.

##### *Multi-stock MSE*

The technical team for the Multistock MSE should prepare a summary of:

1. List of potential operational objectives
2. List of potential performance indicators
3. List of identified uncertainties considered for the operating models

The aim of this presentation would be for Panel 1 to primarily discuss the first two points of the above list for the March meeting of Panel 1.

##### *Western SKJ MSE*

The W-SKJ MSE technical team will attempt to re-run simulations in preparation for the May meeting to be able to provide the performance measures requested by the Commission and listed in section 5.1 above. If such simulations are not completed and checked in time for the May meeting the team will present the results of the performance of tested management procedures with the performance measures already calculated by the team and presented in Mourato and Cardoso (2022), which do not include measures for the entire simulation period of years 1-30.

A communications team will draft a summary document on the MSE for submission to the 5 May meeting, as has been done for the bluefin tuna and swordfish MSEs. The SCRS Chair will also contact the Chair of Panel 1 to assist in developing an agenda for the May 5 meeting to ensure that the W-SKJ MSE analysts get the input they need to finalize the MSE by September, in line with the Commission's MSE roadmap.

## **6. Responses to the Commission**

The Group reviewed the requests from the Commission ([Revised roadmap for the ICCAT MSE processes](#))

adopted by the Commission in 2022) listed below with lead scientists, and discussed how the questions are going to be addressed from now to the SCRS meeting in September:

1. Development of Management Objectives for W-SKJ MP tested through MSE, [Res. 22-02](#) para 2. R Sant' Ana and B. Mourato
2. Discards in purse seine fisheries, [Rec. 17-01](#) para 4. ICCAT Secretariat and S. Cass-Calay
3. Fishing prohibited with FADs, [Rec. 22-01](#) para 28. ICCAT Secretariat and S. Cass-Calay
4. SCRS to inform on CPCs that have provided by 31 July 2023 the required historical FAD set data, [Rec. 22-01](#) para 31. ICCAT Secretariat
5. The SCRS shall refine the MSE process in line with the SCRS roadmap and continue testing the candidate management procedures, [Rec. 22-01](#) para 62. D. Die
6. Efficacy that full fishery closures along the lines of those proposed in PA1\_505A/2019, [Rec. 22-01](#) para 66a. M. Herrera
7. Estimate of capacity in the Convention area, to include at least all the fishing units that are large-scale or operate outside the EEZ of the CPC they are registered in, [Rec. 22-01](#) para 66b. ICCAT Secretariat and S. Cass-Calay
8. The SCRS and the ICCAT Secretariat shall prepare TORs to carry out an evaluation of the monitoring, control, and surveillance mechanisms in place in ICCAT CPCs, [Rec. 22-01](#) para 66c. S. Wright, D. Die, D. Angueko, R. Sant' Ana, and S. Cass-Calay

## 7. Intersessional workplan responses to the Commission and others

- Tropical Tuna Rapporteurs will collaborate with national scientists and the ICCAT Secretariat to prepare information available and draft potential responses prior to mid-July 2023. The Rapporteurs proposed to hold an informal meeting of the Tropical Tunas Species Group in early September 2023, after they compile the data and the draft to review prior to the Species Group Meeting in September for the SCRS.
- The established Tropical Tunas MSE Technical Sub-group will prepare materials for the Multi-stock MSE, led by Dr Merino, by the March meeting of Panel 1. This Sub-group proposed to hold an informal meeting in early April for the W-SKJ MSE, led by the W-SKJ Rapporteur, among the specified members to review and prepare materials for the May meeting of Panel 1. Furthermore, this Sub-group will prepare a draft update of the MSE roadmap prior to the September SCRS species groups meetings.
- The established Tropical Tunas Technical Sub-group on Research Planning will work intersessionally led by the Tropical Tunas Species Group Coordinator to present an SCRS Document at the Tropical Tunas Species Group Meeting in September 2023. The first draft of this research plan will be circulated to the sub-group for comments by the end of June 2023, with an informal meeting planned for early July.
- National scientists are requested to provide their updated abundance indices of BET and YFT to the Chairs by early September, including PS-FAD, BAI, Chinese Taipei longline, and Korean longline fleets.

## 8. Recommendations

- Continuation on the improvement of T1FC, noting its relevance in the estimation of fishing capacity in the ICCAT Convention area.
- Update for ST01-T1FC (fleet characteristics), to make mandatory the fishing effort (field "fishing days") in both sub-forms (ST01A and ST01B) and add two additional mandatory fields: IMO number and Carrying capacity for tropical tuna fisheries.
- That the contract with the University of Maine on Tropical Tuna tagging be amended as requested by the contractor, with the condition that reporting on project progress and tagging data submission is improved, as well as the communication with the ICCAT Secretariat.

- Estimation of relative abundance indices for PS, BAI, ChiTaiLL, and KorLL, prior to the 2023 Tropical Tunas Species Group meeting.
- The Commission provides the resources to develop a Joint LL CPUE index for the next assessments of BET and YFT, as outlined in section 3 of this report.
- Reduce the number of planned MSE capacity building workshops in 2023 to two workshops and change their structure as specified in the ToRs to be finalized by the Rapporteurs and the ICCAT Secretariat.
- That the Commission, and a greater number of CPCs, provide additional funding and commit more resources to support the development of multi-stock MSE to be able to implement the Commission's MSE road map, further details and budget will be provided during the SCRS September meeting.

## 9. Other matters

SCRS/2023/022 presented results on the evaluation of the energy efficiency and carbon footprint of the purse seine fleet operating in the Atlantic Ocean, comparing different fishing strategies (FAD vs FSC) in the context of FAD fishery closures. FAD closures constitute an ideal experimental scenario for quantifying the energy efficiency of FSC in isolation. The variables analyzed were Fuel Use Intensity (FUI, as L fuel/catch t), carbon footprint (kg\_CO<sub>2</sub>/catch t), and economic indicators (€ catch /€ fuel). On average, the purse seine vessels studied showed an FUI of 856 L fuel/t catch. By fishing strategy, FAD trips (675 L/t) were more efficient and showed a lower carbon footprint (1839.6 ± 839.6 kg\_CO<sub>2</sub>/t) than FSC trips (FUI: 2044 L/t; 5569.9 ± 5176.4 kg\_CO<sub>2</sub>/t).

The Group requested that further information be provided on the components that were used to define the consumption and carbon footprint of the fishing activities, with specific consideration to be given to the costs associated with support vessels, personnel, the carbon footprint of vessel materials (steel hull, etc.) and equipment (buoys). The author confirmed that more work could be done to explore a number of these elements but concluded that it would be difficult to accommodate a number of these suggestions. The Group recommended presenting this paper to the Climate Change Expert Meeting which is scheduled for 11-12 July 2023.

### 9.1 *New approach to Executive Summaries*

The SCRS Chair informed the Group that a topic of discussion during the SCRS Officers' meetings early in 2023 has been the possible revision of the format of the Executive Summaries, possibly to include one new format for stocks that have been assessed during the year, and another new format for stocks which have not been assessed. The purpose for considering these changes included both the improvement in communication to Commissioners and to improve the efficiency of adoption during the Plenary (e.g. to facilitate the adoption of Executive Summaries for stocks that were not assessed that year, providing more time to focus on other items in the Plenary agenda, such as Responses to the Commission).

The SCRS Chair further clarified that, although these discussions are taking place during the SCRS Officers meetings during 2023, the intent is to broadly take into account the views of SCRS scientists, and therefore discussion of this topic by the Tropical Tunas Species Group would be useful to the process, noting that final decisions must take into account the views of SCRS scientists across working groups as well as the views of the Commission.

During the ensuing discussion, there was a general agreement that Executive Summaries for all stocks should be included in the SCRS Report. However, there was a range of views on whether or not, and how, Executive Summaries should be updated for stocks that were not assessed. For instance, there was a proposal that Executive Summaries for stocks that were not assessed should have no changes at all, save for updates to Task 1NC statistics carried out by the ICCAT Secretariat and a header indicating that the Executive Summary had not been updated since "X" year. Others expressed the need to inform the Commissioners of new information that may be important to take into consideration when developing management measures, with suggestions including new text being underlined or in a separate section reserved for important updates, with other sections left unchanged if no new assessment had occurred.

The Group also expressed interest in improving how information is conveyed, such as through improved graphics, or supplemental information; such as further development of summary pages providing important information for all stocks in one place, in a concise manner.

The SCRS Chair informed the Group that an approach being considered would be to provide the two example versions of the Executive Summaries to Commissioners alongside with the current format. This would facilitate obtaining feedback from the Commission but would require some extra work on behalf of the relevant species groups and their rapporteurs. The SCRS Chair noted that previous efforts to develop a new format included as an example YFT, and asked if the Group and its rapporteur would support the continued focus on YFT as one of the two examples.

There was concern expressed that such example new formats would need to be defined no later than July to allow the preparation of the example Executive Summaries in time for discussion at the September 2023 Species Groups meetings, if the goal is to include them in the 2023 SCRS Report (note: a goal to include them in the 2023 SCRS Report has not yet been determined).

Views were also expressed that, until final decisions are made on any new formats or changes to the process of adoption, it would be good to take the approach of avoiding changes to Executive Summaries of stocks not assessed during the year unless those changes were substantive in nature and important for Commissioners to be aware of. At the same time, there were views that the SCRS should proceed cautiously before changing the long-established practice of carefully reviewing each Executive Summary during the Species Groups meetings and SCRS Plenary.

This input from the Group should be taken into account in the process for determining any changes from the current process.

## ***9.2 Feedback from participants on the implications of interpretation during the meeting***

This Intersessional Meeting of the Tropical Tunas Species Group is the first SCRS meeting to have simultaneous interpretation in the three official ICCAT languages since the Commission agreed to support interpretation during several SCRS meetings this year. The SCRS Chair asked for feedback from participants, specifically regarding whether or not the interpretation had improved communication and understanding, and broadened the inclusion of different perspectives, expertise, and local knowledge.

Participants noted that understanding was improved with interpretation even for non-native English speaking participants who have a reasonable level of proficiency in English because native English speakers often speak too fast. Often, non-native English speakers have to process the discussion more slowly, needing to turn their attention away from the discussion to look up the meaning of words, and as a consequence they miss parts of the discussion or otherwise, fall behind.

The interpretation allowed those non-native English speakers who may be less familiar with a particular technical topic to better understand the topic with interpretation. Participants who are native English speakers also noted that interpretation improved their understanding of the points being made by non-native English speakers, as those speakers were much more able to express themselves fully in their native language. In general, there was broad agreement that interpretation is very useful and helps everyone, whether French, Spanish, or English speakers, to understand each other – and that therefore it should be continued.

It was noted that interpretation does require some adjustments to facilitate interpretation – the use of good audio equipment, turning on the video to help the interpreters understand what the speaker is saying, and strict adherence to the planned meeting hours in order to provide interpreters with timely breaks. It was further noted that having the interpretation provided for online participants was essential, as online participation might be the only option for some participants.

The ICCAT Secretariat proposed to work with the Tropical Tunas rapporteurs and SCRS Chair to develop a poll to more fully capture the views of the participants regarding the interpretation. The Group expressed its gratitude to the interpreters for their hard work and valuable contribution.

The Group unanimously expressed the strong recommendation that interpretation continues and expands as it greatly facilitated communication among the working group members, and has profound potential to enhance the inclusion, participation, and leadership of non-native English speakers.

***9.3 Summary report of this meeting (for inclusion in the annual SCRS Report)***

As a new practice this year, the brief summary reports of intersessional meetings to be included in the SCRS Report will be adopted by the participants of the meeting. This is expected to improve the efficiency of the SCRS Plenary sessions, as this summary report text would not be subject to modification at the SCRS Plenary. This approach will also allow the ICCAT Secretariat to translate the summary meeting report text well in advance of the SCRS Plenary, with an aim to reduce the translation workload of the ICCAT Secretariat during the period immediately before and during the SCRS Plenary. It should be noted that this approach does not preclude the inclusion in the SCRS Report of important points arising from the Plenary discussion of the intersessional meeting. The Group adopted the text of the summary meeting report.

**10. Adoption of the report and closure**

The Report of the 2023 Intersessional Tropical Species Group Meeting was partially adopted during the meeting, with the exception of sections 7 and 9 of the agenda that were adopted by correspondence.

The Chairs and the ICCAT Secretariat thanked all the participants and the interpreters for their efforts to work effectively and efficiently throughout the meeting. Dr. Cass-Calay, the YFT Rapporteur, congratulated the new Tropical Coordinator, Dr. Wright, for her success at the first meeting.



## References

- Anonymous. 2014. Report of the 2013 Tropical Tunas Species Group Intersessional Meeting (Tenerife, Spain, 18-21 March 2013). Collect. Vol. Sci. Pap. ICCAT, 70(6): 2499-2545.
- Chavance, P., Dewals, P., Amandé M.J., Delgado de Molina, A., Damiano, A., Tamegnon, A. 2015. Tuna fisheries catch landed in Abidjan (Côte d'Ivoire) and sold on local fish market for the period 1982-2013 (preliminary data). Collect. Vol. Sci. Pap. ICCAT, 71(1): 183-188.
- Hampton *et al.*, 2017. What does well-managed FAD use look like within a tropical purse seine fishery? WCPFC-SC13-2017/ MI-WP-06.
- Hoyle, S.D., Huang, H., Kim, D.N., Lee, M.K., Matsumoto, T., Walter, J. 2018. Collaborative study of bigeye tuna CPUE from multiple Atlantic Ocean longline fleets in 2018. Collect. Vol. Sci. Pap. ICCAT, 75(7): 2033-2080.
- López J., Moreno G., Boyra G., Dagorn, L. 2016. A model based on data from echosounder buoys to estimate biomass of fish species associated with fish aggregating devices. Fish. Bull. 114:166-178.
- Matsumoto T., Satoh K, Kitakado T., Hoyle, S. 2019. Standardization of bigeye tuna CPUE in the Atlantic Ocean by the Japanese longline fishery which includes cluster analysis. Collect. Vol. Sci. Pap. ICCAT, 75(7): 2098-2116.
- Matsumoto, T., Yokoi, H., Satoh, K. 2021. Standardization of bigeye tuna CPUE in the Atlantic Ocean by the Japanese longline fishery which includes cluster analysis. Collect. Vol. Sci. Pap. ICCAT, 78(2): 210-226.
- Maufroy, A., Chassot, E., Joo, R., Kaplan, D. 2015. Large-scale examination of spatio-temporal patterns of drifting fish aggregating devices (dFADs) from tropical tuna fisheries on the Indian and Atlantic Oceans. PLoS ONE 10(5):e0128023. <https://doi.org/10.1371/journal.pone.0128023>
- Merino, G., Die, D., Urtizbera, A., Laborda, A. 2021. Characterization of structural uncertainty in tropical tuna stocks' dynamics. Collect. Vol. Sci. Pap. ICCAT, 78(2): 36-45 (2021) 36.
- Merino, G., Urtizbera, A., Garcia, D., Santiago, J., Murua, H., Harford, W., Walter, J., Gaertner, D. 2020. Final report of the ICCAT short-term contract: Modelling approaches support to ICCAT Tropical Tunas MSE Process. Collect. Vol. Sci. Pap. ICCAT, 76(6): 997-1009.
- Mourato, B., Cardoso, L.G., Sant'Ana, R. 2022. Management strategy evaluation for the western Atlantic skipjack tuna with operating model conditioning based on the stock synthesis model. Collect. Vol. Sci. Pap. ICCAT, 79(1): 851-906.
- Ngom Sow, F. 2015. Composition en taille du faux poissons débarqués par les thoniers au port de Dakar. Collect. Vol. Sci. Pap. ICCAT 71(1):510-514.







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Table 5. SCRS catalogue of E-YFT for the last 30 years (1992-2021).

Global Score	T1 Total																														Rank	%	%cum								
6.69	125398	124725	124849	119431	116151	104363	113615	103601	96825	112772	106797	98205	88267	75559	77614	78667	93744	99135	97251	94678	91176	82445	89880	102473	114124	98841	102632	108093	124675	92222											
Species	Stock	Status	FlagName	GearGrp	Dset	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021						
YFT	ATE	CP	EU-France	PS	t1	31233	35052	33720	28903	32651	29123	31145	29662	30420	31519	33291	32936	23961	22299	18480	13279	15981	18748	20155	21772	18590	20359	22264	20515	26003	25769	24743	17839	15992	12821	1	24.2%	24%			
YFT	ATE	CP	EU-France	PS	t2	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	2	22.2%	46%		
YFT	ATE	CP	EU-España	PS	t1	48952	40044	39734	37707	31866	23901	28282	19332	24764	30433	30343	23665	20454	11121	10607	12833	23557	32140	24191	18238	17898	11336	13463	20429	18349	11236	10208	13844	18812	9714	3					
YFT	ATE	CP	EU-España	PS	t2	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	4				
YFT	ATE	CP	Ghana	PS	t1	108				2542	5628	4710	9640	5222	12240	11120	9127	5502	6364	4865	5396	9197	9602	13951	11730	10221	9031	12384	12573	12843	13368	16130	19570	20531	15892	5	8.8%	55%			
YFT	ATE	CP	Ghana	PS	t2	a				abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	6				
YFT	ATE	CP	Ghana	BB	t1	9223	13283	9984	9268	5640	9459	9139	11810	7451	11605	7426	6711	9943	6655	9173	10174	7325	6257	6301	6771	5774	4521	6042	6324	6739	5602	5841	4529	4068	4219	4	7.4%	63%			
YFT	ATE	CP	Ghana	BB	t2	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	7			
YFT	ATE	CP	Panamá	PS	t1	7041	7781	8548	10854	5759	3137	1753	775	1087	574	1022		1887	6325	8682	9539	6289	5911	5102	4459	5058	4062	4646	3202	4305	5073	4071	5863	8187	8408	5	4.5%	67%			
YFT	ATE	CP	Panamá	PS	t2	a	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	8			
YFT	ATE	CP	Curaçao	PS	t1					3183	6082	6110	3962	5441	4793	4035	6185	4161	15	1964	1390	7367	6469	5397	4501	6906	3813	5230	6140	7905	6535	7543	7751	8986	7767	6	4.6%	72%			
YFT	ATE	CP	Curaçao	PS	t2					ab	ab	ab	a	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	9			
YFT	ATE	CP	Japan	LL	t1	2124	2627	4194	4770	4246	2733	4092	2101	2286	1550	1534	1999	5066	3088	4206	8496	5266	3563	3041	3348	3637	3843	3358	2857	2914	2708	2953	3400	2572	2662	7	3.3%	75%			
YFT	ATE	CP	Japan	LL	t2	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	10			
YFT	ATE	CP	Belize	PS	t1					963			321	406																						8	2.5%	78%			
YFT	ATE	CP	Belize	PS	t2					a			ab	ab																						8					
YFT	ATE	CP	Cape Verde	PS	t1					0	6	12	884	246																						9	2.4%	80%			
YFT	ATE	CP	Cape Verde	PS	t2	a				a	a	a	a	a																							9				
YFT	ATE	CP	Guatemala	PS	t1																																10	2.0%	82%		
YFT	ATE	CP	Guatemala	PS	t2																																	10			
YFT	ATE	NCC	Chinese Taipei	LL	t1	1554	1301	3851	2681	3985	2993	3643	3389	4014	2787		3363	4946	4145	2327	860	1707	807	1180	537	1463	819	1023	902	927	761	563	550	464	437	180	11	1.9%	84%		
YFT	ATE	NCC	Chinese Taipei	LL	t2	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	11			
YFT	ATE	CP	El Salvador	PS	t1											933																					12	1.4%	85%		
YFT	ATE	CP	El Salvador	PS	t2																																12				
YFT	ATE	CP	Senegal	PS	t1																																	13	1.2%	87%	
YFT	ATE	CP	Senegal	PS	t2																																	13			
YFT	ATE	CP	EU-España	BB	t1	1758	1498	1767	1101	3069	996	3509	1311	601	504	917	1379	1292	798	928	769	1055	874	1561	3010	973	593	1043	1068	1393	1416	696	914	742	303	14	1.2%	88%			
YFT	ATE	CP	EU-España	BB	t2	abc	ac	ac	ac	ac	ac	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	abc	ac	abc	abc	abc	abc	abc	abc	abc	abc	abc	14			
YFT	ATE	CP	Cape Verde	HL	t1	1202	1344	1560	1362	1289	1299	1145	1185	1388	1374	918	1617	1501	985	1218	1048	648	1121	1054	800	1164	1167	1167	1167	2057	1265	1572	1459	1448	1212	15	1.2%	89%			
YFT	ATE	CP	Cape Verde	HL	t2	b	ab	ab	ab	ab	ab	ab	ab	ab	ab	a	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	15			
YFT	ATE	CP	Maroc	PS	t1	2653	2396	3017	2290	3430	1947	2276	2307	2441	3000	2032	1567	719	1757	127							9	8	21	17	11	35	27	35	69	104	312	16	1.1%	90%	
YFT	ATE	CP	Maroc	PS	t2	a	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	16			
YFT	ATE	CP	St Vincent and Grenadines	PS	t1	4936	5391	2476	2142	2969	3017	3327	1916	1987	3640																							17	1.0%	91%	
YFT	ATE	CP	St Vincent and Grenadines	PS	t2	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	17		
YFT	ATE	NCO	NEI (Flag related)	LL	t1	1315	1157	2524	2975	3588	3368	5464	5182	3072	2019	43	466																					18	1.0%	92%	
YFT	ATE	NCO	NEI (Flag related)	LL	t2	-i	-i	-i	-i	-i	-i	-i	-i	-i	-i	-i	-i	-i	-i	-i	-i	-i	-i	-i	-i	-i	-i	-i	-i	-i	-i	-i	-i	-i	-i	-i	-i	18			
YFT	ATE	CP	Russian Federation	PS	t1	1862	2160	1503	2936	2696	4275	4931	4359	737																								19	0.8%	93%	
YFT	ATE	CP	Russian Federation	PS	t2	b	ab	ab	b	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	19		
YFT	ATE	CP	EU-France	BB	t1	3104	2588	25																																	

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Table 6. SCRS catalogue of W-YFT for the last 30 years (1992-2021).

Global Score		4.81		T1 Total	38289	38836	48336	35294	33056	32941	30946	31217	35628	40329	29665	24987	31305	29516	28278	24176	18130	18780	21029	19239	22510	23888	25144	28226	37262	38678	33898	28922	32017	27075						
Species	Stock	Status	FlagName	GearGrp	Dset	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Rank	%	%cum		
YFT	ATW	CP	Venezuela	PS	t1	9693	12659	19587	6338	10777	11653	9157	6523	7572	13934	7961	4607	3185	2634	4439	2341	2067	1363	2722	2253	3291	3635	2581	1920	2367	3373	1527	760	725	591	1	17.9%	18%		
YFT	ATW	CP	Brazil	HL	t2			60	18	69	156						272			30	22	25	2	61	415	1570	5208	10415	12123	13658	16878	15159	10993	11038	11052	2	12.0%	30%		
YFT	ATW	CP	USA	RR	t2	957	1898	4523	4053	4032	3569	2927	3967	3862	4185	2887	5328	3759	3657	4908	2966	1033	1011	1400	1802	2405	2532	1621	1660	2743	2904	1770	1669	2808	3189	3	9.5%	39%		
YFT	ATW	CP	Brazil	LL	t1	1568	2044	1365	1378	734	849	1285	2930	2754	4954	3323	1941	4115	4987	2543	4093	2326	2906	2989	1954	2558	1141	1112	1206	2579	1118	842	1296	1287	1617	4	7.2%	47%		
YFT	ATW	CP	USA	LL	t2	ab	a	ab	a	a	a	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	a	a	a	a	ab	ab	ab	ab	ab	ab	ab	4			
YFT	ATW	CP	Venezuela	LL	t1	5337	3886	3246	3645	3320	3773	2449	3541	2901	2200	2573	2164	2492	1746	2010	2395	1394	1686	1218	1462	2270	1544	1446	1041	1300	1431	855	877	795	721	5	7.2%	54%		
YFT	ATW	CP	Venezuela	BB	t1	3616	3296	4350	2684	2604	2632	4267	4152	3660	4296	3166	2475	2030	1631	1481	951	489	929	809	1068	788	673	395	428	771	500	339	244	48	46	6	6.0%	60%		
YFT	ATW	CP	Brazil	BB	t1	2660	3087	2744	2613	1956	1643	1229	1197	3093	1276	2843	1289	2838	2236	1214	1353	397	402	627	1243	511	928	118	315	445	366	376	618	778	983	7	4.6%	64%		
YFT	ATW	CP	China Taipei	LL	t1	2974	2895	2809	2017	2668	1473	1685	1022	1647	2018	1296	1540	1679	1269	400	240	315	211	287	305	252	236	139	293	181	213	395	272	433	288	8	3.5%	68%		
YFT	ATW	CP	Mexico	LL	t2	742	855	1093	1126	771	826	788	1283	1390	1084	1133	1313	1208	1050	943	896	961	1220	924	1183	1421	1006	1048	971	1282	1244	1033	763	821	885	9	3.4%	71%		
YFT	ATW	CP	St Vincent and Grenadines	LL	t1								649	1956	1341	1151	543	4227	3430	2633	2972	2532	2230	819	927	551	325	481	124	434	642	307	67	83	3	10	3.1%	75%		
YFT	ATW	CP	Panama	LL	t2	2297							5	20	28					2804	227	153	119	2134	1126	1630	1995	902	1370	1837	1604	2104	2375	4195	1304	11	3.1%	78%		
YFT	ATW	CP	Japan	LL	t1	1591	469	589	457	1004	806	1081	1304	1775	1141	571	755	1194	1159	437	541	986	1431	1539	1106	1024	734	465	612	462	415	147	655	349	722	12	2.8%	80%		
YFT	ATW	CP	Venezuela	LL	t1	459	707	850	687	383	381	560	504	421	451	266	323	559	828	593	613	712	898	1249	1090	736	738	790	773	1060	1181	878	1024	1159	1337	13	2.4%	83%		
YFT	ATW	CP	NEI (Flag related)	LL	t2	2521	1514	1880	1227	2374	2732	2875	1578	2197	765	14	112																				14	2.2%	85%	
YFT	ATW	CP	Grenada	LL	t1	595	858	385	409	523	302	484	430	403	759	593	749	460	492	502	633	756	630	673					1108	1535	1177	1297	708	739	287	15	1.9%	87%		
YFT	ATW	CP	Trinidad and Tobago	LL	t1	4	120	79	183	223	213	163	112	122	125	186	224	295	459	615	520	629	788	798	930	1128	1141	1179	1057	889	1214	982	973	1244	16	1.8%	89%			
YFT	ATW	CP	Colombia	PS	t1	2404	3418	7172																													17	1.4%	90%	
YFT	ATW	CP	Ghana	PS	t1																																	18		
YFT	ATW	CP	Belize	LL	t1																																	19	0.8%	92%
YFT	ATW	CP	EU-France	LL	t2																																	20	0.7%	93%
YFT	ATW	CP	Vanuatu	LL	t1																																	21	0.6%	94%
YFT	ATW	CP	China PR	LL	t1																																	22	0.6%	94%
YFT	ATW	CP	Barbados	LL	t1	179	161	156	255	160	149	150	155	155	142	115	146	181	243	160	133	135	60	86	103	145	175	194	258	316	217	225	111	170	209	23	0.6%	95%		
YFT	ATW	CP	EU-España	PS	t2	1290	810																															24	0.4%	95%
YFT	ATW	CP	Canada	LL	t1	25	71	52	170	154	100	57	20	105	125	69	72	302	239	292	276	168	53	166	50	92	74	34	59	19	192	15	108	75	111	25	0.4%	95%		
YFT	ATW	CP	USA	HL	t1	91	64	97	91	82	91	65	219	284	300	244	200	249	160	164	148	42	84	48	44	86	67	58	67	38	38	22	53	43	38	26	0.4%	96%		
YFT	ATW	CP	Korea Rep	LL	t1	45	11	6	84	156																												27	0.3%	96%



**Table 7.** Summary of BET conventional tagging data: number of recoveries grouped by number of years at liberty in each year of release. The last column shows the recovery rate (%).

Number of tag Bigeye tuna ( <i>Thunnus obesus</i> )			Years at liberty							% recapt*
Year	Releases	Recaptures	< 1	1 - 2	2 - 3	3 - 4	4 - 5	5 - 6	Unk	
1960	2	0								
1962	9	0								
1963	45	0								
1964	34	0								
1965	4	0								
1966	21	0								
1967	3	0								
1969	2	0								
1971	4	4	2	2						100.0%
1972	17	17	14						3	100.0%
1973	126	125	124	1						99.2%
1974	17	16	11	1					4	94.1%
1975	16	16	14	1					1	100.0%
1977	9	9	9							100.0%
1978	108	107	101	5		1				99.1%
1979	11	0								
1980	939	92	72	10					10	9.8%
1981	690	208	189	8	1				10	30.1%
1982	7	0								
1983	5	3	3							60.0%
1984	23	5	3	1					1	21.7%
1985	5	0								
1986	96	90	87						3	93.8%
1987	23	0								
1988	10	0								
1989	28	2	1	1						7.1%
1990	69	0								
1991	215	1		1						0.5%
1992	255	1	1							0.4%
1993	220	3		2	1					1.4%
1994	257	32	27	4					1	12.5%
1995	157	12	10	1				1		7.6%
1996	119	21	18	3						17.6%
1997	609	243	233	8	2					39.9%
1998	45	7	6	1						15.6%
1999	3659	1464	1381	58	9	1			15	40.0%
2000	1414	192	174	14	2	1			1	13.6%
2001	356	14	9	4					1	3.9%
2002	1212	138	129	6	1				2	11.4%
2003	272	46	43	3						16.9%
2004	4	0								
2005	24	1							1	4.2%
2006	11	0								
2007	3	0								
2008	1	1				1				100.0%
2009	8	0								
2011	8	2	1				1			25.0%
2013	18	0								
2014	1	1	1							100.0%
2016	9145	2558	2350	129	26	8	1		44	28.0%
2017	6403	1683	1557	74	9	1			42	26.3%
2018	5641	532	417	84	3	5			23	9.4%
2019	2004	304	286	8					10	15.2%
2020	1059	87	70	15	2					8.2%
2021	22	1	1							4.5%
(blank)	5	1	1							20.0%
Grand Total	35443	8037	7343	445	56	18	2	1	172	22.7%

**Table 8.** Summary of SKJ conventional tagging data: number of recoveries grouped by number of years at liberty in each year of release. The last column shows the recovery rate (%).

Number of tag Skipjack Tuna ( <i>Katsuwonus pelamis</i> )			Years at liberty					% recapt*
Year	Releases	Recaptures	< 1	1 - 2	2 - 3	3-4	Unk	
1959	1							
1961	24							
1962	26							
1963	8							
1964	586		1					
1965	393							
1966	780							
1967	41							
1968	22							
1969	53							
1970	111							
1971	40							
1972	36							
1973	53							
1974	17							
1975	62							
1976	28							
1977	60	0						
1978	119	2	2					1.7%
1979	113	12	12					10.6%
1980	6454	438	392	31	1		14	6.8%
1981	7975	1121	998	57	2		64	14.1%
1982	2172	1928	1899	4			25	88.8%
1983	120	28	28					23.3%
1984	242	94	82	1	1		10	38.8%
1985	242	29	29					12.0%
1986	225	44	39	1			4	19.6%
1987	15	3	1				2	20.0%
1988	43	1	1					2.3%
1989	155	21	21					13.5%
1990	2231	229	226				3	10.3%
1991	821	68	68					8.3%
1992	1352	158	156	1			1	11.7%
1993	8	0						
1994	959	140	140					14.6%
1995	76	9	9					11.8%
1996	546	71	67	1			3	13.0%
1997	3094	676	670	5			1	21.8%
1998	418	5	5					1.2%
1999	3041	558	549	5			4	18.3%
2000	1495	68	66				2	4.5%
2001	3648	137	129	2			6	3.8%
2002	4556	891	876	1			14	19.6%
2003	3							
2004	22							
2005	4							
2006	21							
2007	3							
2009	1							
2010	45							
2011	8							
2012	59	1		1				1.7%
2013	1							
2015	7							
2016	12085	1829	1789	14	4		22	15.1%
2017	13374	763	704	25	2		32	5.7%
2018	16313	412	353	25	8	1	25	2.5%
2019	4796	618	593				25	12.9%
2020	507	3	3					0.6%
2021	527							
2022	7							
?	116	116					116	100.0%
<b>Grand Total</b>	<b>90360</b>	<b>10473</b>	<b>9908</b>	<b>174</b>	<b>18</b>	<b>1</b>	<b>373</b>	<b>11.6%</b>

**Table 9.** Summary of YFT conventional tagging data: number of recoveries grouped by the number of years at liberty in each year of release. The last column shows the recovery rate (%).

Number of tag Yellowfin tuna ( <i>Thunnus albacares</i> )											
Year	Releases	Recaptures	Years at liberty							Unk	% recapt*
			<1	1-2	2-3	3-4	4-5	5-10	10+		
1940	4	2								2	50.0%
1956	102	0									
1957	1	0									
1960	59	0									
1961	18	0									
1962	4	0									
1963	28	0									
1964	104	0									
1965	17	0									
1966	23	1	1								4.3%
1967	50	0									
1968	26	0									
1969	14	0									
1970	12	0									
1971	36	0									
1972	13	0									
1973	17	0									
1974	28	1	1								3.6%
1975	24	1		1							4.2%
1976	68	1	1								1.5%
1977	137	5	5								3.6%
1978	99	15	15								15.2%
1979	91	2	2								2.2%
1980	1123	106	79	21	1					5	9.4%
1981	469	319	216	34	3					66	68.0%
1982	195	7	2	2		2		1			3.6%
1983	342	38	28	7	1			1		1	11.1%
1984	318	31	26	3	1		1				9.7%
1985	178	8	2	4	2						4.5%
1986	393	73	64	1	2	3				3	18.6%
1987	214	11	7	2	1					1	5.1%
1988	321	8	4	1	2	1					2.5%
1989	307	12	5	5	1	1					3.9%
1990	626	17	9	5	1	2					2.7%
1991	1038	35	24	7	3			1			3.4%
1992	558	17	12	4		1					3.0%
1993	923	44	29	12	2	1					4.8%
1994	1522	145	100	35	6	1		2		1	9.5%
1995	826	54	43	5	3	2	1				6.5%
1996	365	33	27	2	2					2	9.0%
1997	423	80	75	3	2						18.9%
1998	563	24	16	7	1						4.3%
1999	1129	137	130	1	1					5	12.1%
2000	892	42	40	1						1	4.7%
2001	2025	36	31	3						2	1.8%
2002	1914	216	209	2						5	11.3%
2003	180	16	10							6	8.9%
2004	108	6	1	1						4	5.6%
2005	88	6	2	2						2	6.8%
2006	32	4	1							3	12.5%
2007	20	1	1								5.0%
2008	15	1								1	6.7%
2009	69	0									
2010	1	0									
2011	19	2	1				1				10.5%
2012	4	0									
2013	3	0									
2015	30	9		9							30.0%
2016	6508	2137	1433	650	18	1	2			33	32.8%
2017	14057	3451	3146	213	17	5	3			67	24.6%
2018	11820	1476	892	409	26	13				136	12.5%
2019	8104	1810	1639	84	21	1				65	22.3%
2020	1867	315	273	26	2					14	16.9%
2021	1167	67	66	1							5.7%
2022	47	0									
Unk	4	3								3	75.0%
Grand Total	61782	10825	8668	1563	119	34	8	4	1	428	17.5%

**Table 10.** Number of tag seeding implanted during the AOTTP and its evolution to date.

Institution	Country	AOTTP	Aug-21	Feb-22	Feb-23
ISRA (Dakar)	Senegal (SEN)	245	261	303	<b>377</b>
CRO (Abidjan)	Côte D'Ivoire (CIV)	320	320	329	<b>340</b>
IEO (Canarias)	España (EU.ESP)	23	23	34	<b>39</b>
MFRD (Tema)	Ghana (GHA)	381	381	406	<b>485</b>
	<b>Total</b>	<b>969</b>	<b>985</b>	<b>1072</b>	<b>1241</b>

**Table 11.** Number of tag seeding releases (RE), recoveries (RC), and % of recoveries (% RC) by gear per species.

GEAR CODE	BET			SKJ			UNK			YFT			Total Re	Total Rc	% Rc
	RE	RC	% Rc	RE	RC	% Rc	RE	RC	% Rc	RE	RC	% Rc			
BB	54	49	91%	209	178	85%	40	35	88%	115	78	68%	418	340	81%
PS	140	92	66%	368	284	77%	7	4	57%	303	197	65%	818	577	71%
UNCL	1	1	100%	2	2	1				2	2	100%	5	5	100%
<b>TOTAL</b>	<b>195</b>	<b>142</b>	<b>73%</b>	<b>579</b>	<b>464</b>	<b>80%</b>	<b>47</b>	<b>39</b>	<b>83%</b>	<b>420</b>	<b>277</b>	<b>66%</b>	<b>1241</b>	<b>922</b>	<b>74%</b>

**Table 12.** Summary review of the main research areas for the tropical tunas species (BET, YFT, SKJ) from the initial AOTTP research proposal.

<i>Main Research Areas</i>	<i>Description and Objectives</i>	<i>Comments</i>	
1. Movements and stock structure	Confirm current stock structure for tropical tunas by studying their movements.	AOTTP already address this in part. Genetic study is pending, SKJ stock structure in West ATL and Gulf of Mexico.	Movement of juvenile YFT/BET from FAD associated schools. High, SKJ stock structure.
2. Fishing mortality	Estimate recent fishing mortality rates in a way that is not dependent on catch and CPUE.	Update estimates of fishing mortality from AOTTP data.	Fishing mortality on PS gear.
3. Growth and Max Age estimates	Estimate age-sex specific growth rates.	Need: Validation, complete size sampling.	Research Epigenetics for growth.
4. Natural mortality	Estimate age-specific natural mortality rates.	Explore other Methods to estimate M by age/size.	
5. Environmental factors	Study the link between environmental conditions and distribution and abundance of tropical tunas.	Productivity of tropical species related with FADs.	Electronic tagging for environmental habitat definition.
6. Habitat and behavior	Describe the habitat used by tropical tunas to help in the interpretation of relative abundance indices derived from CPUE.		
7. Interactions between tropical tunas / trophic relationships	Determine whether fishery productivity of tropical tunas is independent of the productivity of each stock.	[may integrate items 5, 6, 7 into single one for research funds]	
8. FADs	Determine whether the use of FADs changes the ecology and population dynamics of tropical tunas.	Commission Request on FADs.	Project POSEIDON potential application in Atlantic tropical tunas (SCRS/P/2023/004).
9. Reproduction and spawning	Improve knowledge on spawning patterns for tropical tunas.		Include Maturation update research. Genetic indicators for maturation/spawning for tropical tunas.
10. Allometry coefficients and conversion factors	Improve the relationship between biological variables, as length and weight, of major tropical tunas used in scientific studies and stock assessment models.	Influence of conversion factors on stock evaluations.	
11. Index of abundance			

**Table 13.** Management objectives (from [Res. 22-02](#)) and the proposed corresponding performance statistics for the WSKJ MSE. Note that [Res. 22-02](#) included a footnote “The SCRS will advise on an appropriated  $B_{LIM}$  for western Atlantic skipjack tuna.”

<b>Management Objectives (Res. 22-02)</b>	<b>Proposed Corresponding Performance Statistics</b>
<p><b>Status</b> The stock should have a [XX% or greater] probability of occurring in the green quadrant of the Kobe matrix using a [X]-year projection periods</p>	<p><b>PGK<sub>short</sub></b>: Probability of being in the Kobe green quadrant (i.e., <math>SSB \geq SSB_{MSY}</math> and <math>F &lt; F_{MSY}</math>) in year 1-3  <b>PGK<sub>medium</sub></b>: Probability of being in the Kobe green quadrant (i.e., <math>SSB \geq SSB_{MSY}</math> and <math>F &lt; F_{MSY}</math>) in year 4-10  <b>PGK<sub>long</sub></b>: Probability of being in the Kobe green quadrant (i.e., <math>SSB \geq SSB_{MSY}</math> and <math>F &lt; F_{MSY}</math>) over years 11-30  <b>PGK all period</b> 1-30 yrs / to be estimated</p>
<p><b>Safety</b> There should be no greater than [XX]% probability of the stock falling below <math>B_{LIM}</math> at any point during the X-year projection periods.</p>	<p><b><math>B_{LIM}</math></b>: <math>0.4 * B_{MSY}</math> as interim  <b>LRP<sub>short</sub></b>: Probability of breaching the limit reference point (i.e., <math>SSB &lt; 0.4 * SSB_{MSY}</math>) over years 1-3  <b>LRP<sub>medium</sub></b>: Probability of breaching the limit reference point (i.e., <math>SSB &lt; 0.4 * SSB_{MSY}</math>) over years 4-10  <b>LRP<sub>long</sub></b>: Probability of breaching the limit reference point (i.e., <math>SSB &lt; 0.4 * SSB_{MSY}</math>) over years 11-30  <b>LRP all period</b> 1-30 yrs / to be estimated</p>
<p><b>Yield</b> Maximize overall catch levels in the short (1-3 years), medium (4-10 years) and long (11-30 years) terms</p>	<p><b>AvC<sub>short</sub></b> – Median catches (t) over years 1-3  <b>AvC<sub>Medium</sub></b> – Median catches (t) over years 4-10  <b>AvC<sub>long</sub></b> – Median catches (t) over years 11-30</p>
<p><b>Stability</b> Any changes in TAC between management periods should be [XX]% or less.</p>	<p><b>VarC<sub>medium</sub></b> – Variation in TAC (%) between management cycles 4-10 yrs  <b>VarC<sub>long</sub></b> – Variation in TAC (%) between management cycles 11-30 yrs  <b>VarAll</b> period 1-30 yrs /to be estimated</p>



**Table 14.** Current fleet structure in the operating model of the multi-stock tropical tunas MSE.

New Fleet Structure			
PS	BET	YFT	SKJ
PSBB_GH	BET	YFT	SKJ
Area2_BB	-	YFT	-
Dakar_BB	BET	YFT	SKJ
North_BB	BET	YFT	SKJ
JP_LL	BET	YFT	-
Other_LL	BET	YFT	SKJ
CTP_LL	BET	-	-
HL_Bra	BET	YFT	-
RR_US	BET	YFT	-
West_PS	BET	YFT	-
Others	BET	YFT	-

**Table 15.** Approved budget for the continuation of the development of tropical tunas MSE programmes for 2022 and 2023. Funds from 2022 were extended to be used in the 2023 fiscal year.

Tropical tunas activities	YEAR	2022	2023
<b>MSE</b>			
Western SKJ		€50,000	€75,000
Multi-stocks MSE			
Independent external reviewer for W-SKJ MSE			€10,000
Training workshops for scientists (2) and stakeholders (1), with translation in all official languages			€50,000

**Table 16.** Current 2023 MSE workshop scheduled alternatives.

<b>Option A: 2 workshops with interpretation in three languages</b>
Theory and concepts only (50 participants per workshop) - One instructor
<ul style="list-style-type: none"> <li>13-14 June Western Atlantic Scientists (Spanish &amp; English translation)</li> <li>13-14 October Eastern Atlantic Managers (all three languages)</li> </ul>
<b>Option B: 3 workshops in two languages</b>
Theory and practice (20 participants per workshop) - Two instructors
<ul style="list-style-type: none"> <li>25-26 April Eastern Atlantic Scientists (French &amp; English)</li> <li>13-14 June Western Atlantic Scientists (Spanish &amp; English)</li> <li>13-14 October Eastern Atlantic Managers (French &amp; English)</li> </ul>

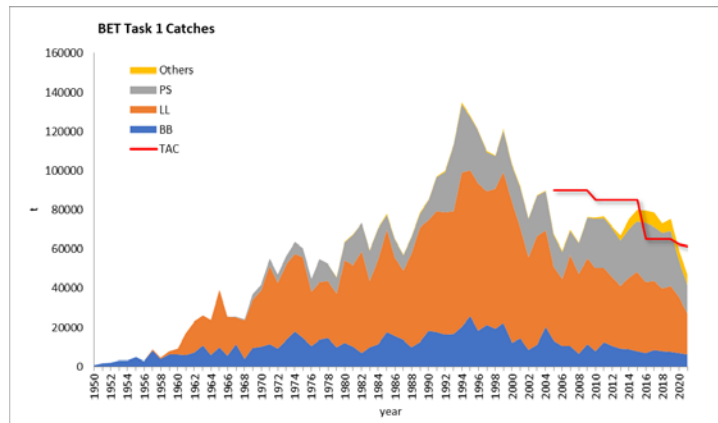


Figure 1. BET Task 1 nominal catches (t).

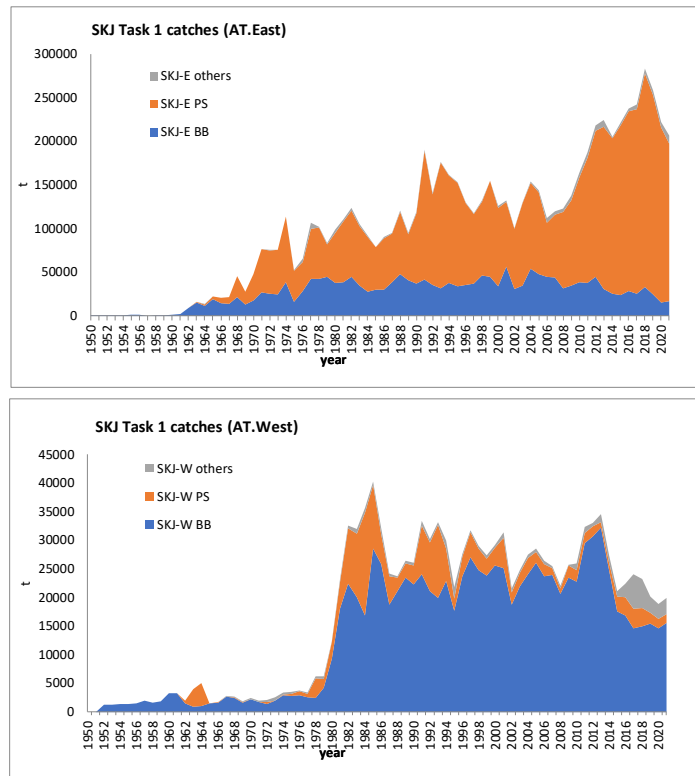


Figure 2. SKJ Task 1 nominal catches (T1NC) (t) (SKJ-E: top, SKJ-W: bottom).

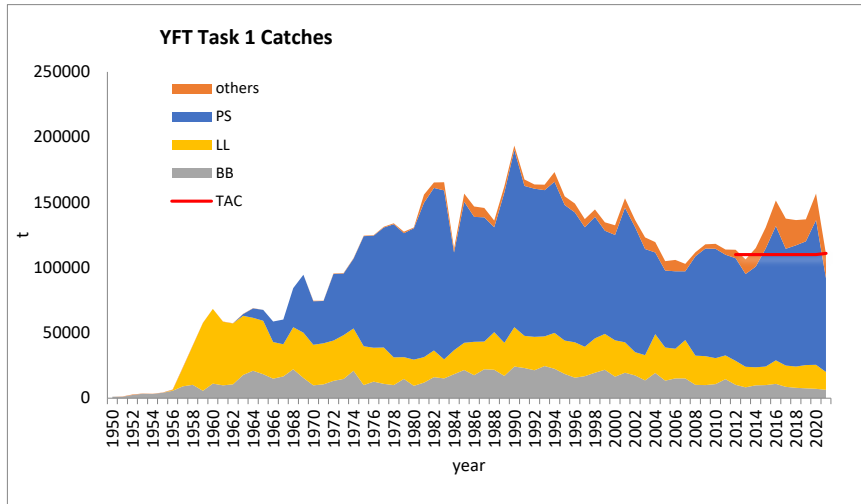


Figure 3. YFT Task 1 nominal catches (t).

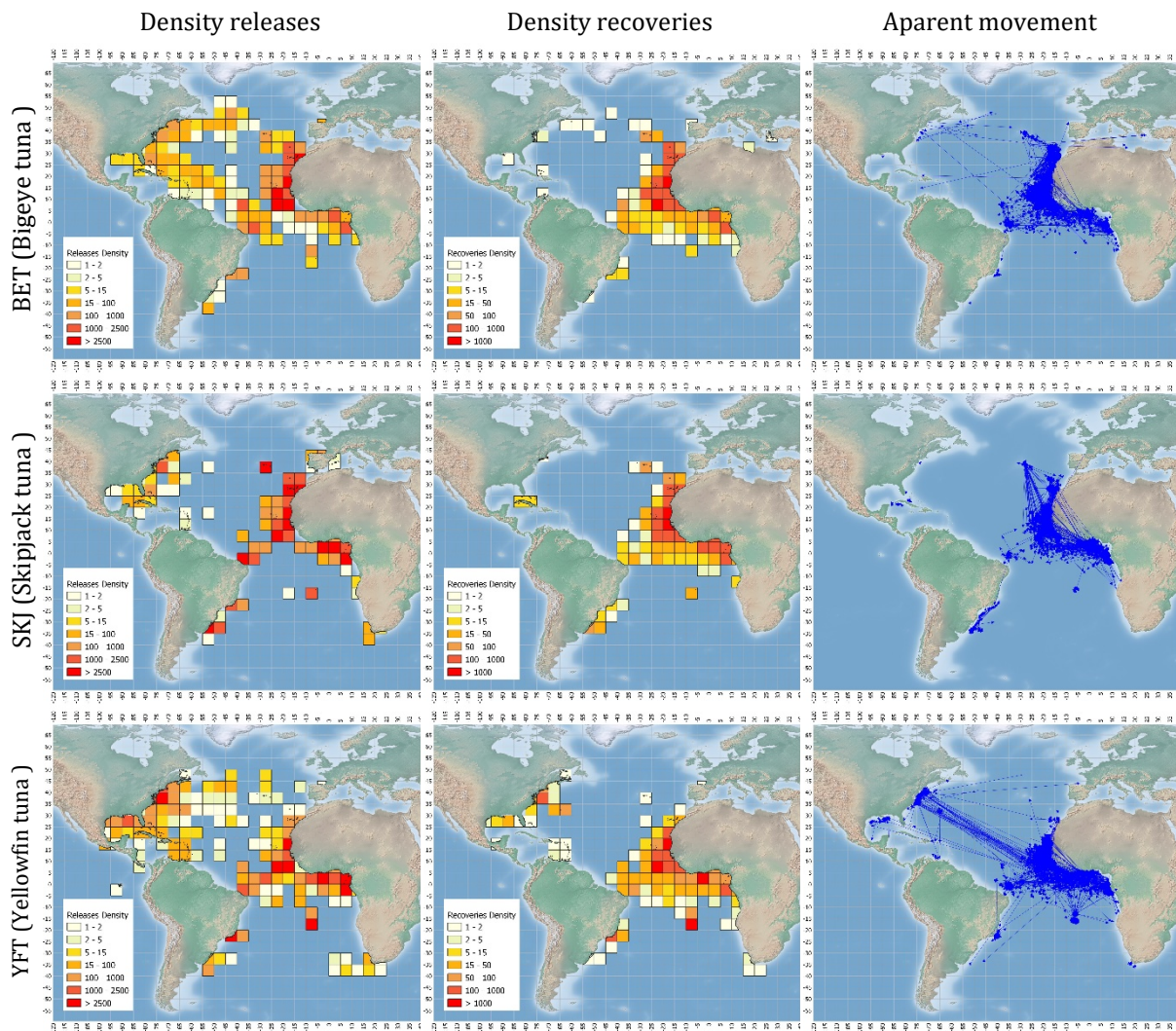


Figure 4. Nine maps with conventional tagging of the three main tropical tunas species (rows) showing: the density of releases in a 5x5 grid (left); the density of recoveries in a 5x5 grid (centre); the apparent movement (straight line from the release to the recovery position).

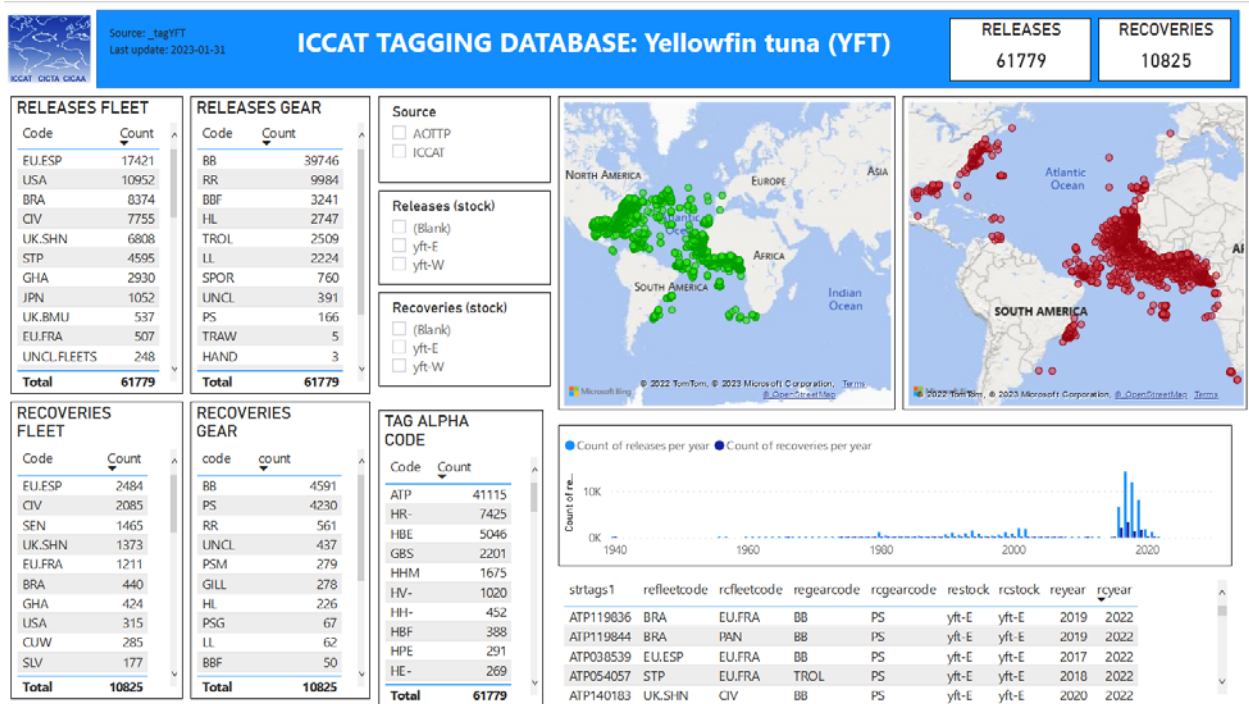


Figure 5. Screenshot of the conventional tagging dashboard (YFT example).

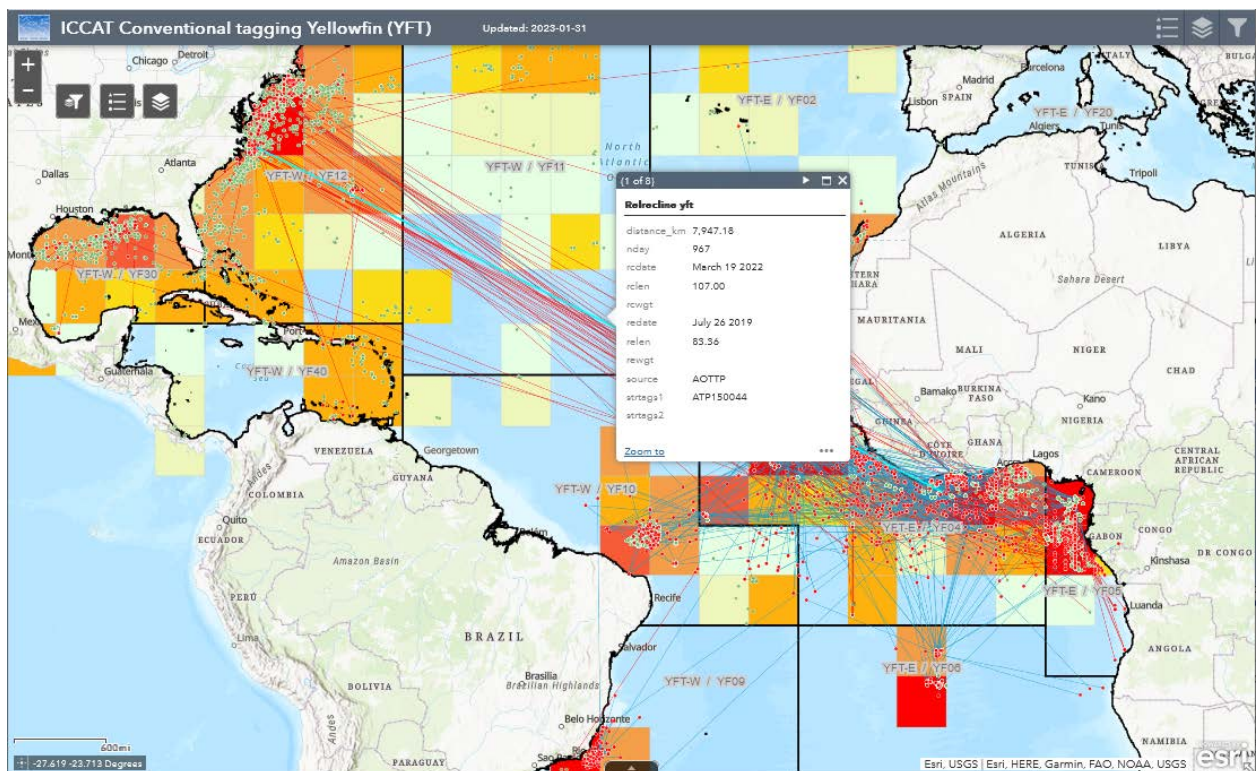


Figure 6. Screenshot of the conventional tagging map viewer (YFT example).



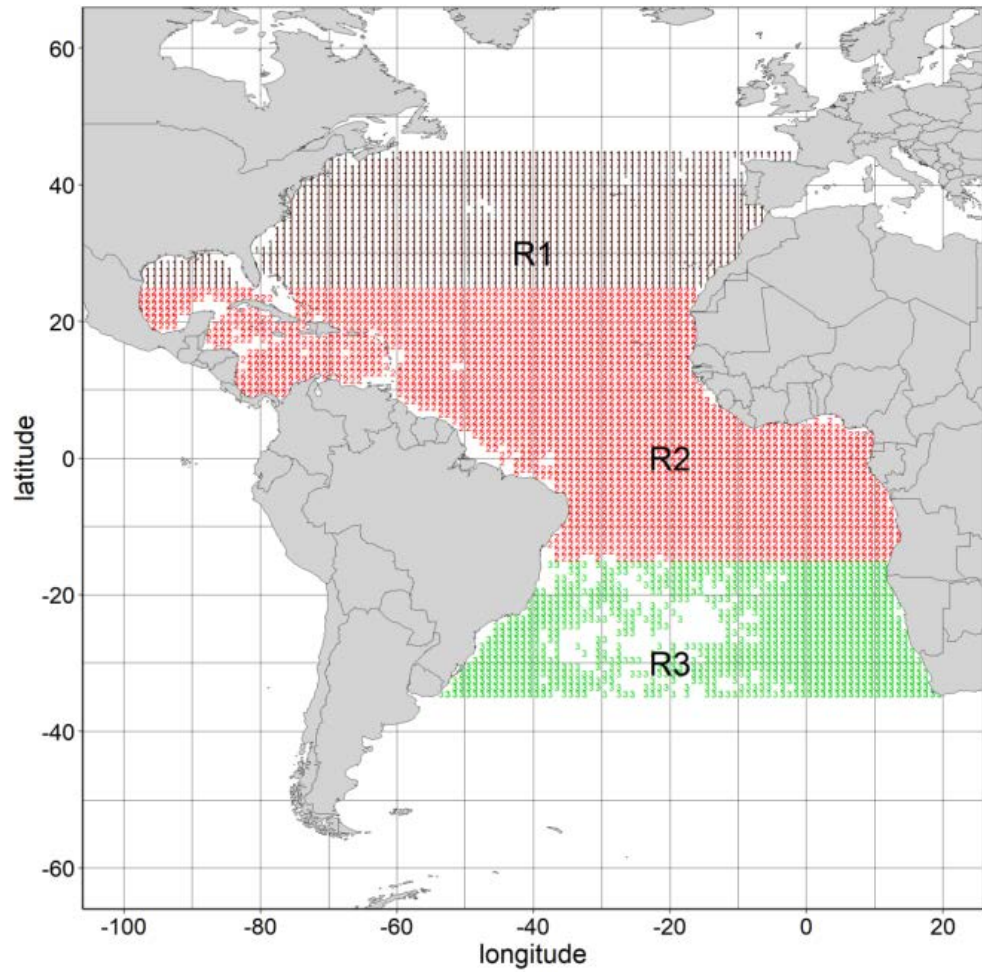


Figure 7. Map of the regional structures used to estimate bigeye CPUE indices for JPN LL fleet.

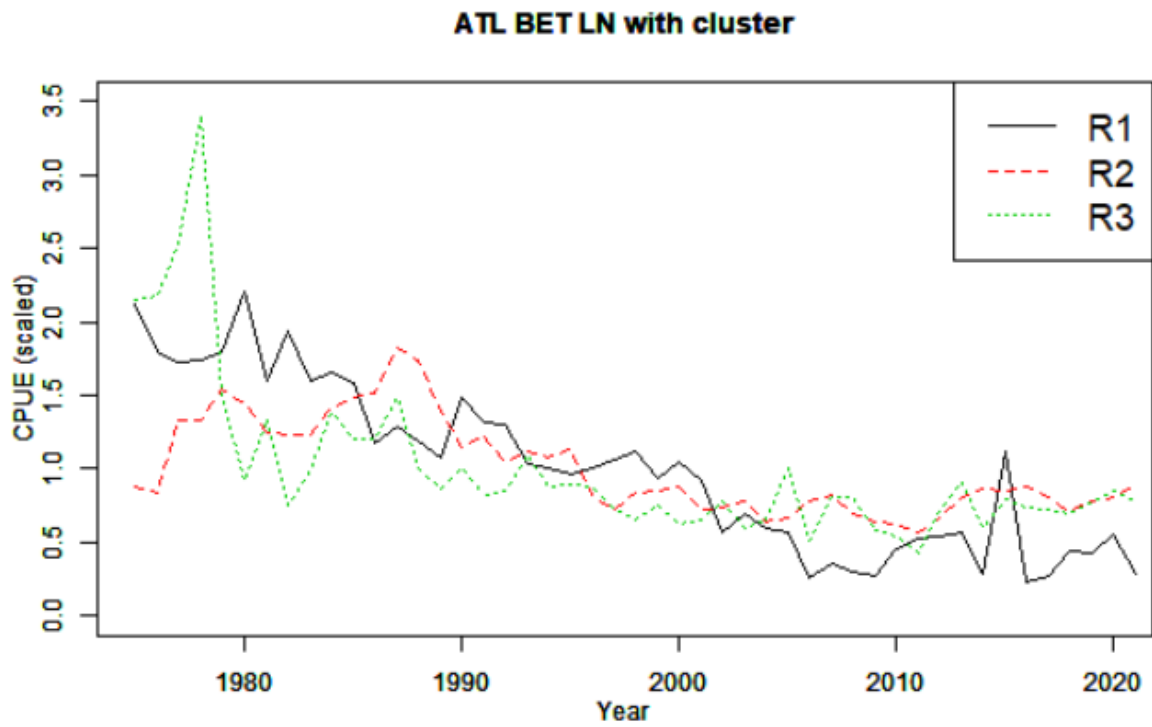
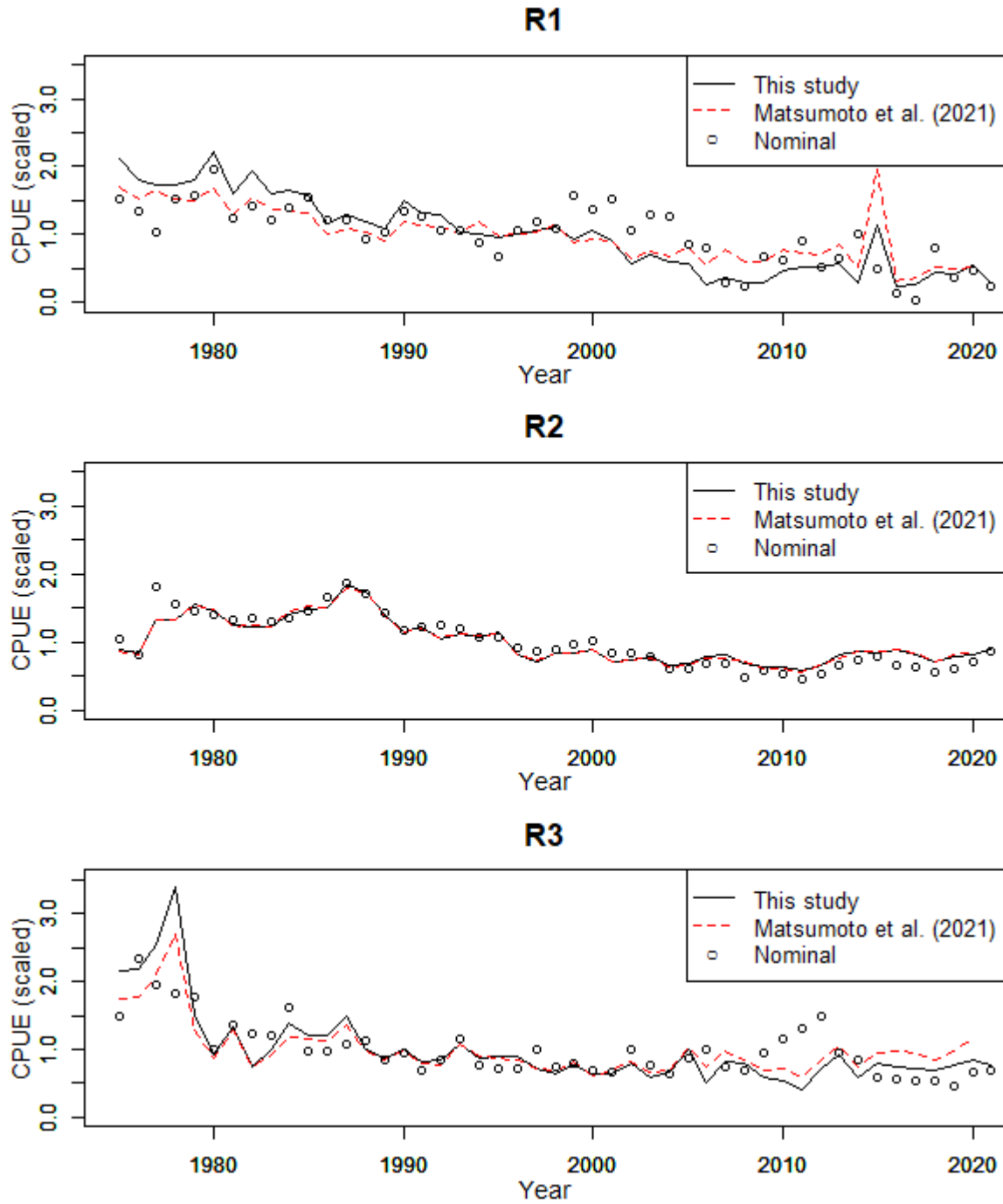
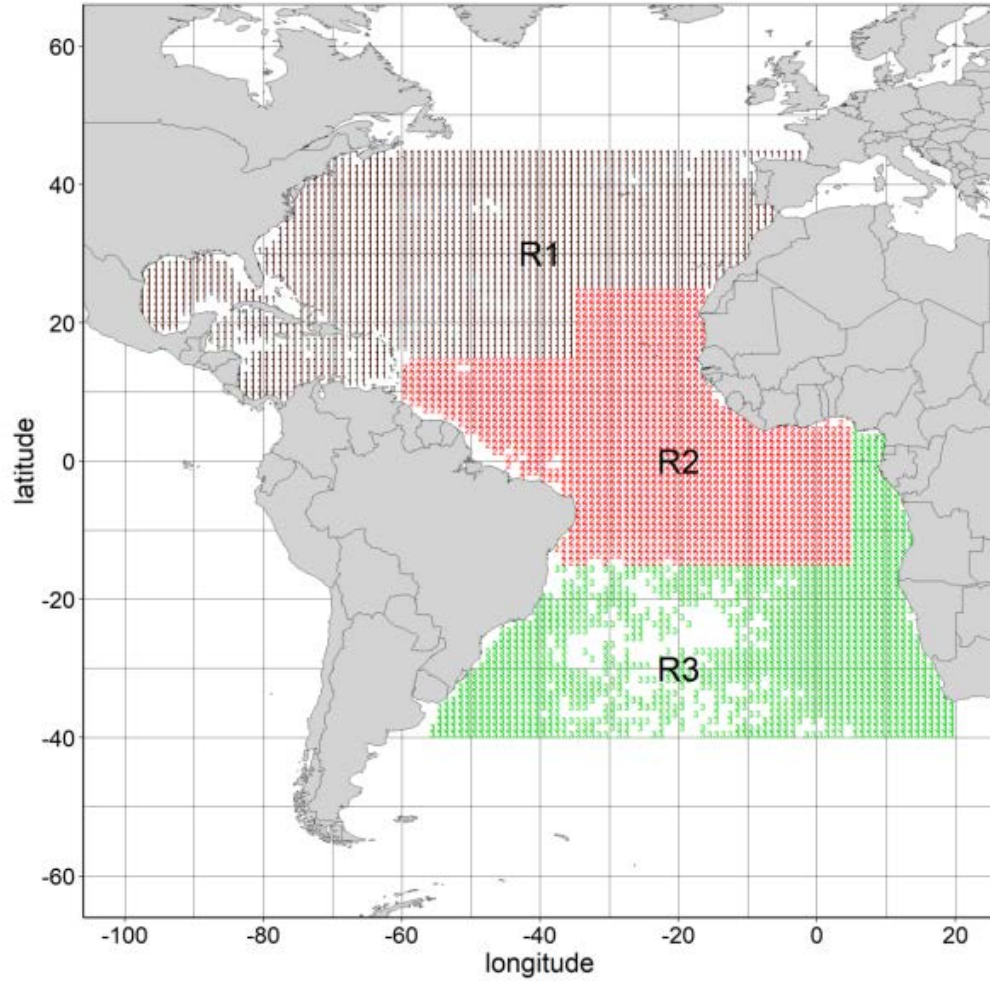


Figure 8. Trend of CPUE of bigeye by Japanese longline for each region.

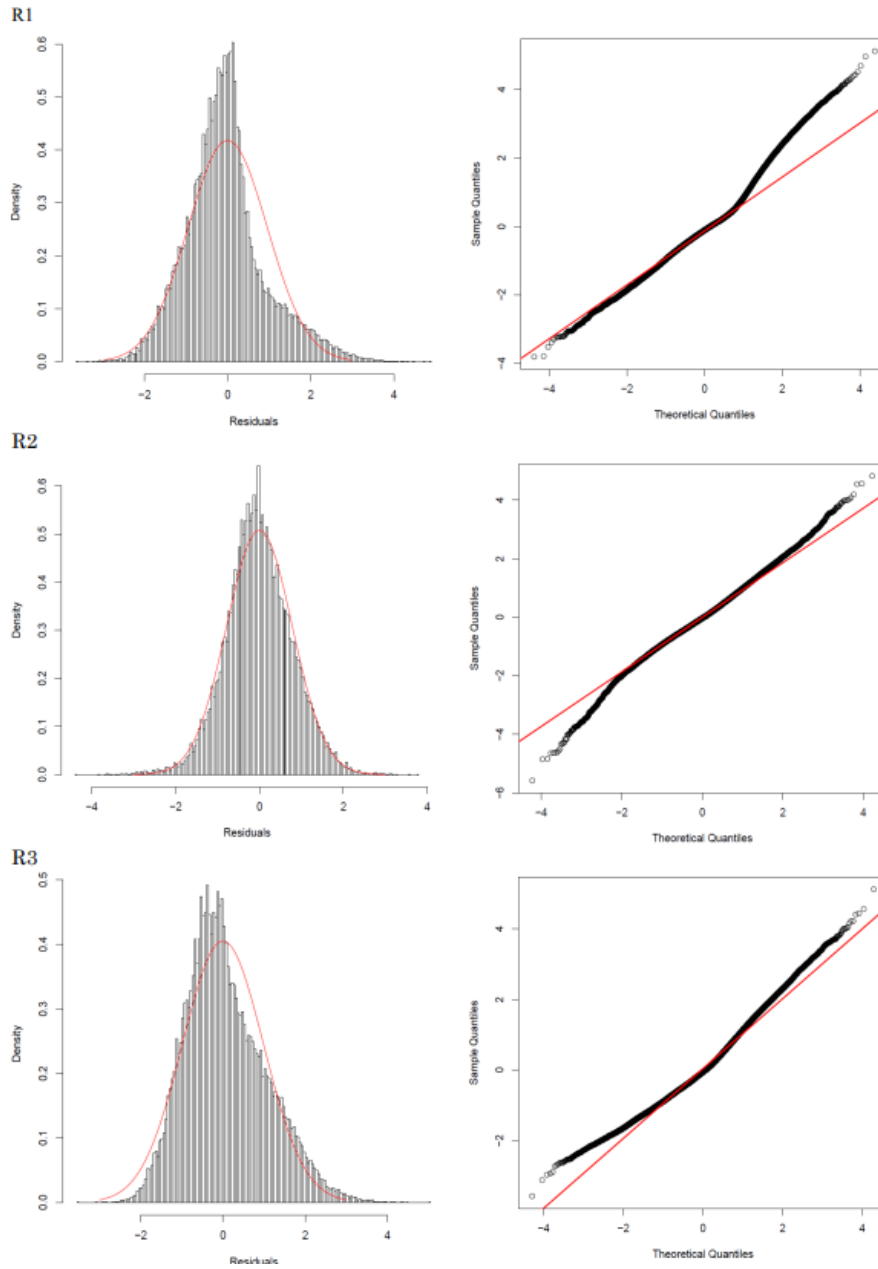


**Figure 9.** Comparison of CPUE series of bigeye tuna in each area from JPN longline. Included are the nominal CPUE (open circles), a standardization based on previous study (Matsumoto *et al.*, 2021; red line) and the standardization from this study (black line). The top row depicts region 1, the middle region 2, and the bottom row region 3.



**Figure 10.** Map of the regional structures used to estimate YFT CPUE indices for JPN LL fleet.





**Figure 11.** Standardized residuals of CPUE standardization for yellowfin from JPN LL.

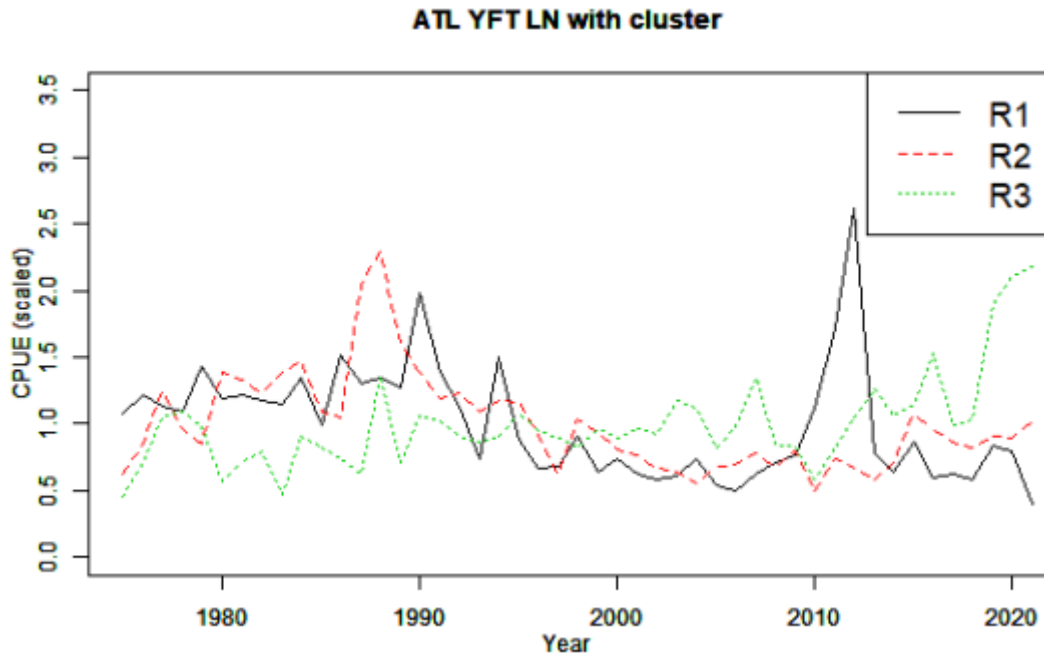
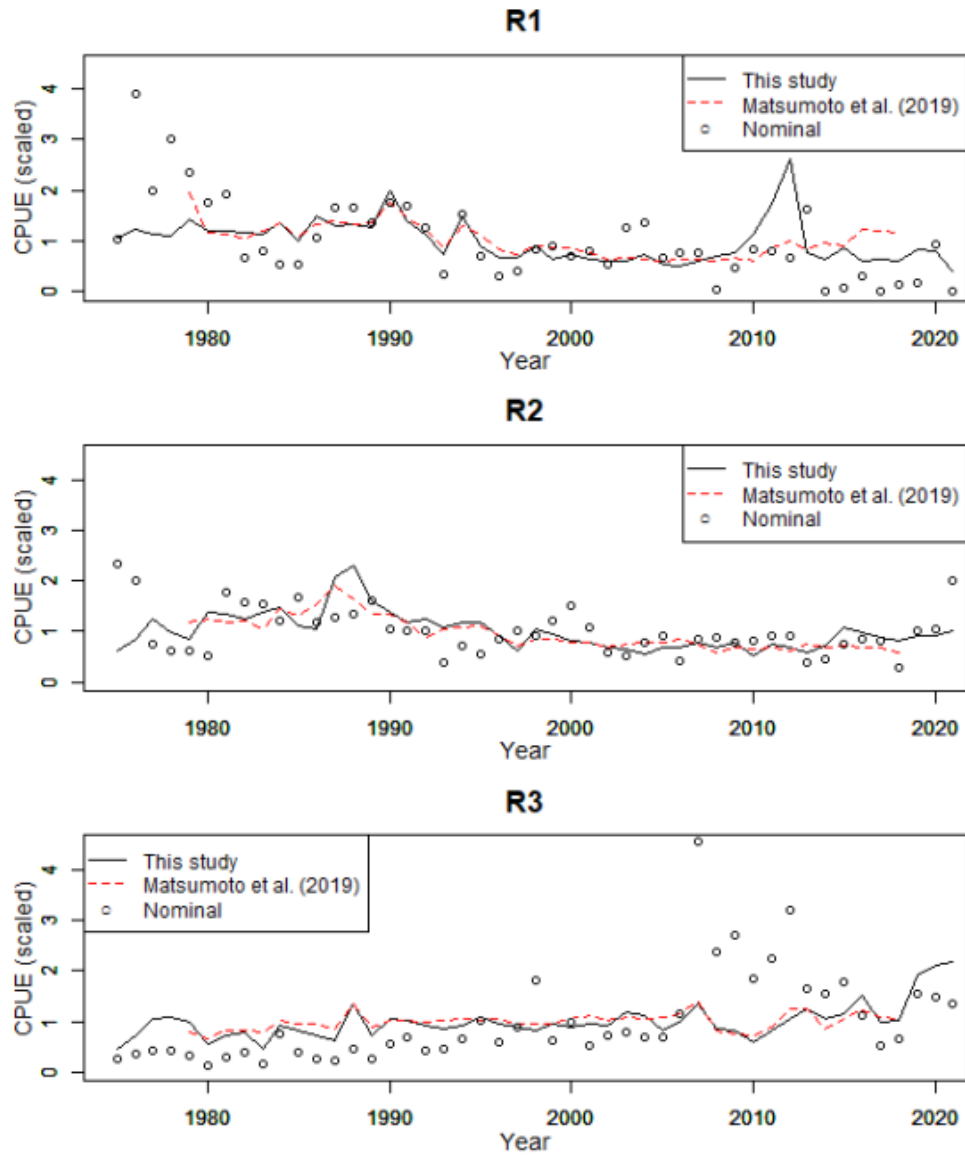
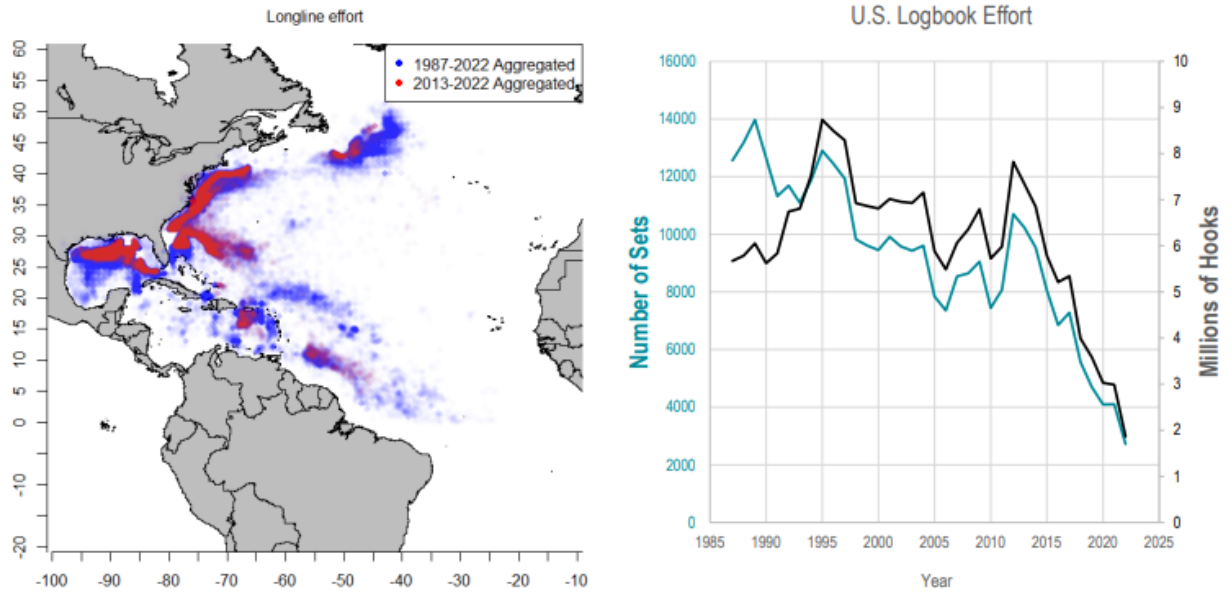


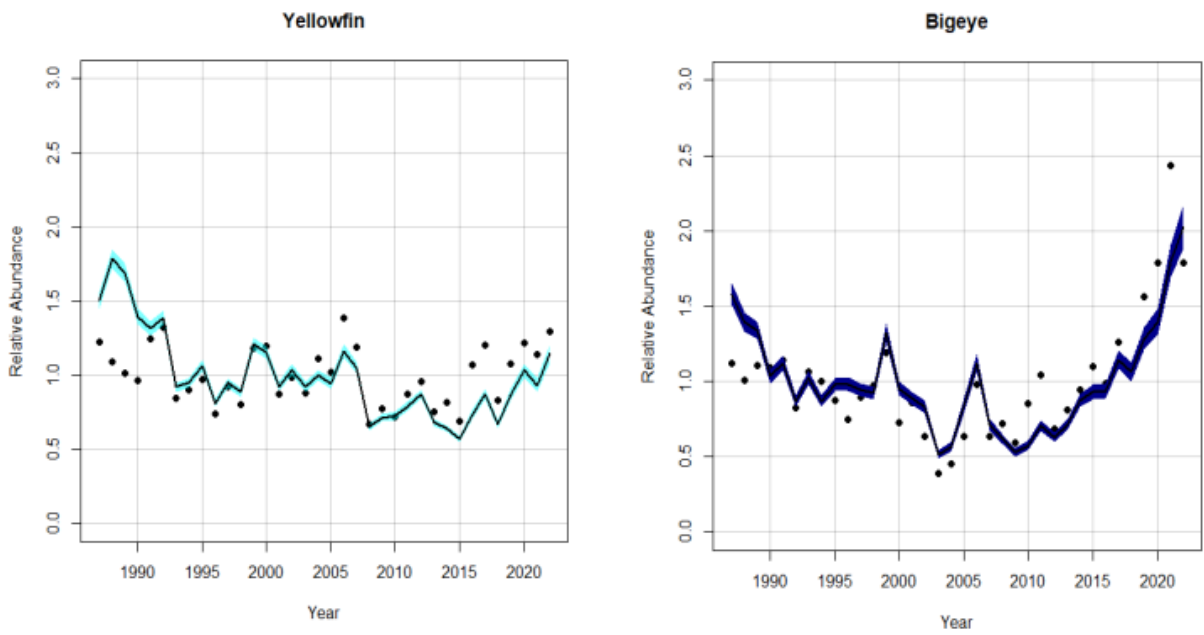
Figure 12. Trend of CPUE of yellowfin by Japanese longline for each region.



**Figure 13.** Comparison of CPUE series of YFT tuna in each area from JPN longline. Included are the nominal CPUE (open circles), a standardization based on previous study (Matsumoto *et al.*, 2019; red line) and the standardization from this study (black line). The top row depicts region 1, the middle region 2, and the bottom row region 3.



**Figure 14.** Spatial distribution of the U.S. longline fleet for 1987-2022 and for 2013-2022 (left plot). The right plot depicts the number of annual sets and millions of hooks deployed in the US longline fishery from 1987-2022.



**Figure 15.** Standardized indices of abundance for YFT and BET for the U.S. longline fleet.

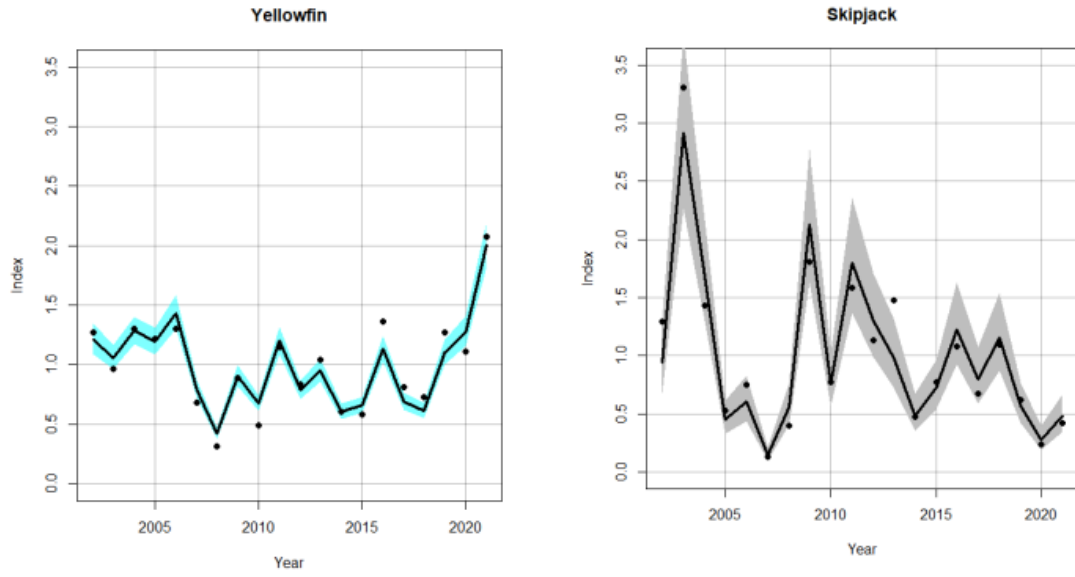


Figure 16. Standardized indices of abundance for YFT and SKJ for the U.S. rod and reel fleet.

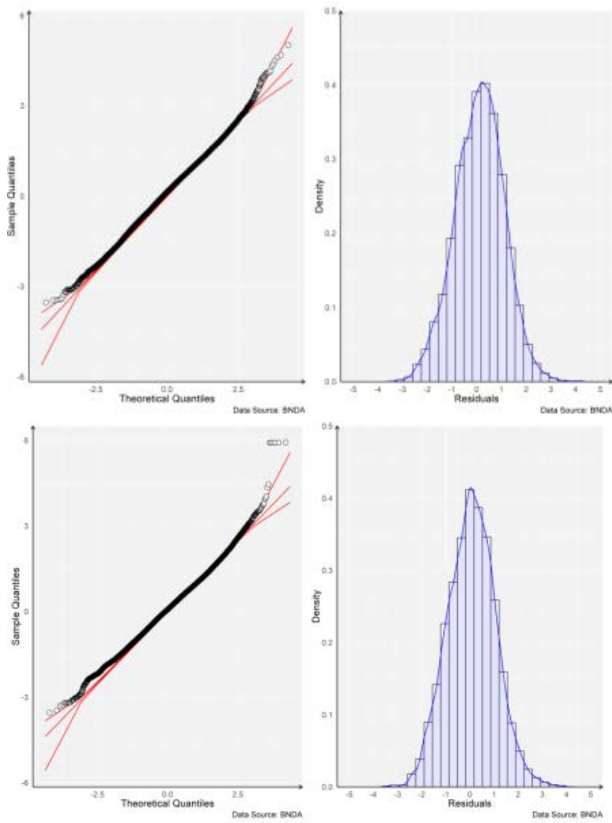
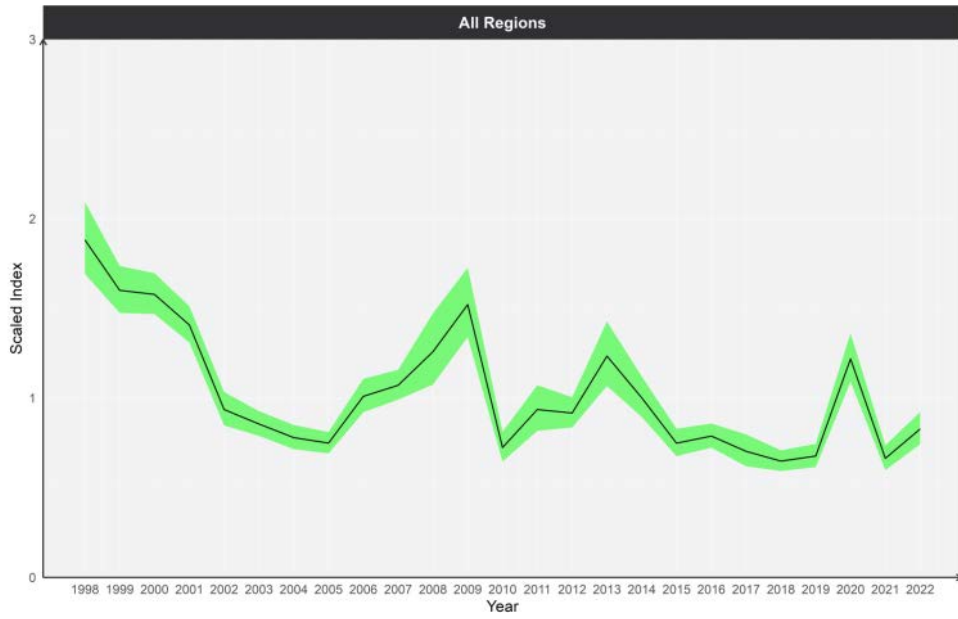
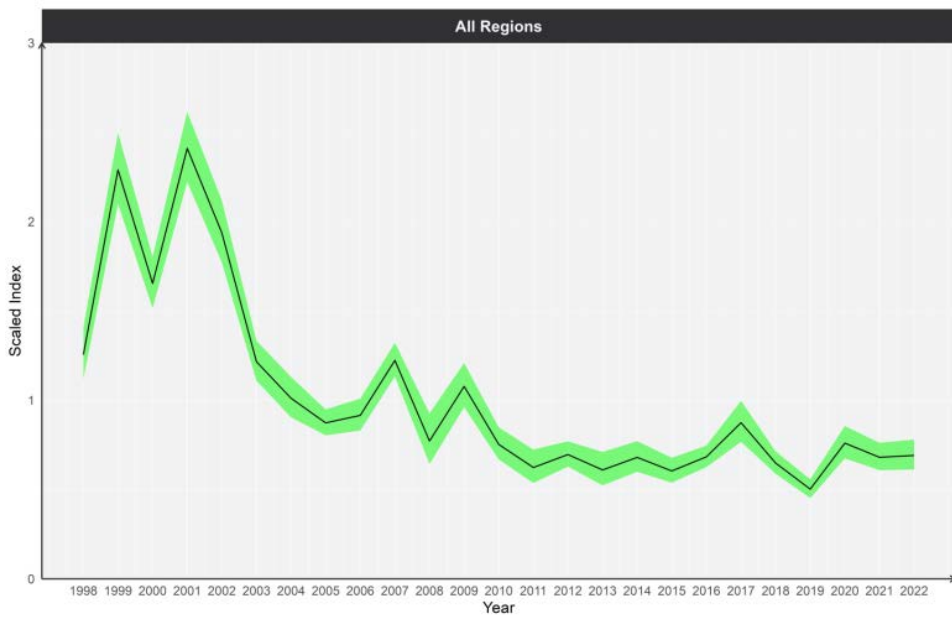


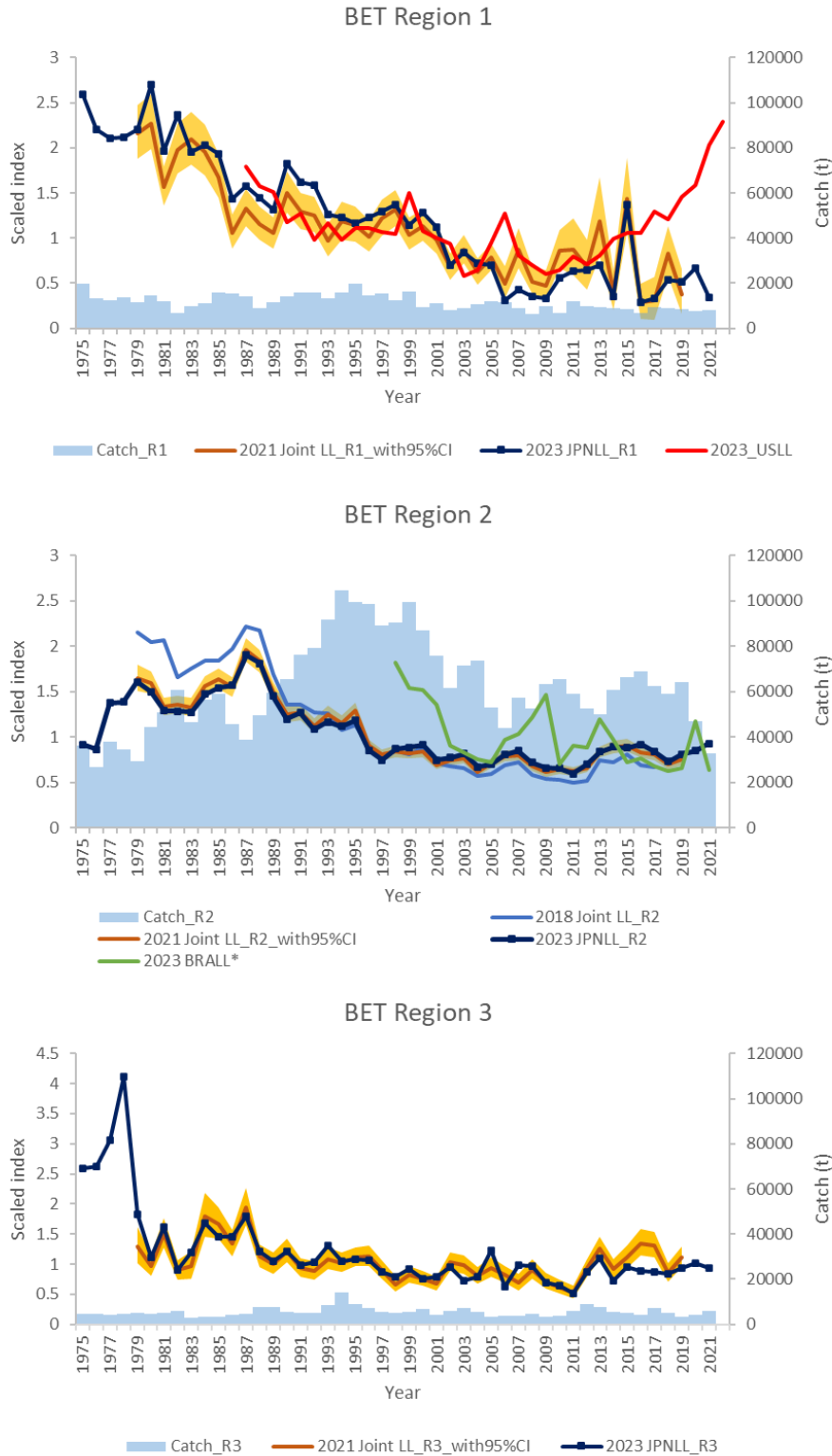
Figure 17. Residual diagnostics for CPUE standardization for BET (left) and YFT (right) regarding the BRA longline fleet.



**Figure 18.** Standardized yearly CPUEs and associated 95% confidence intervals for BET from the BRA longline fleet.

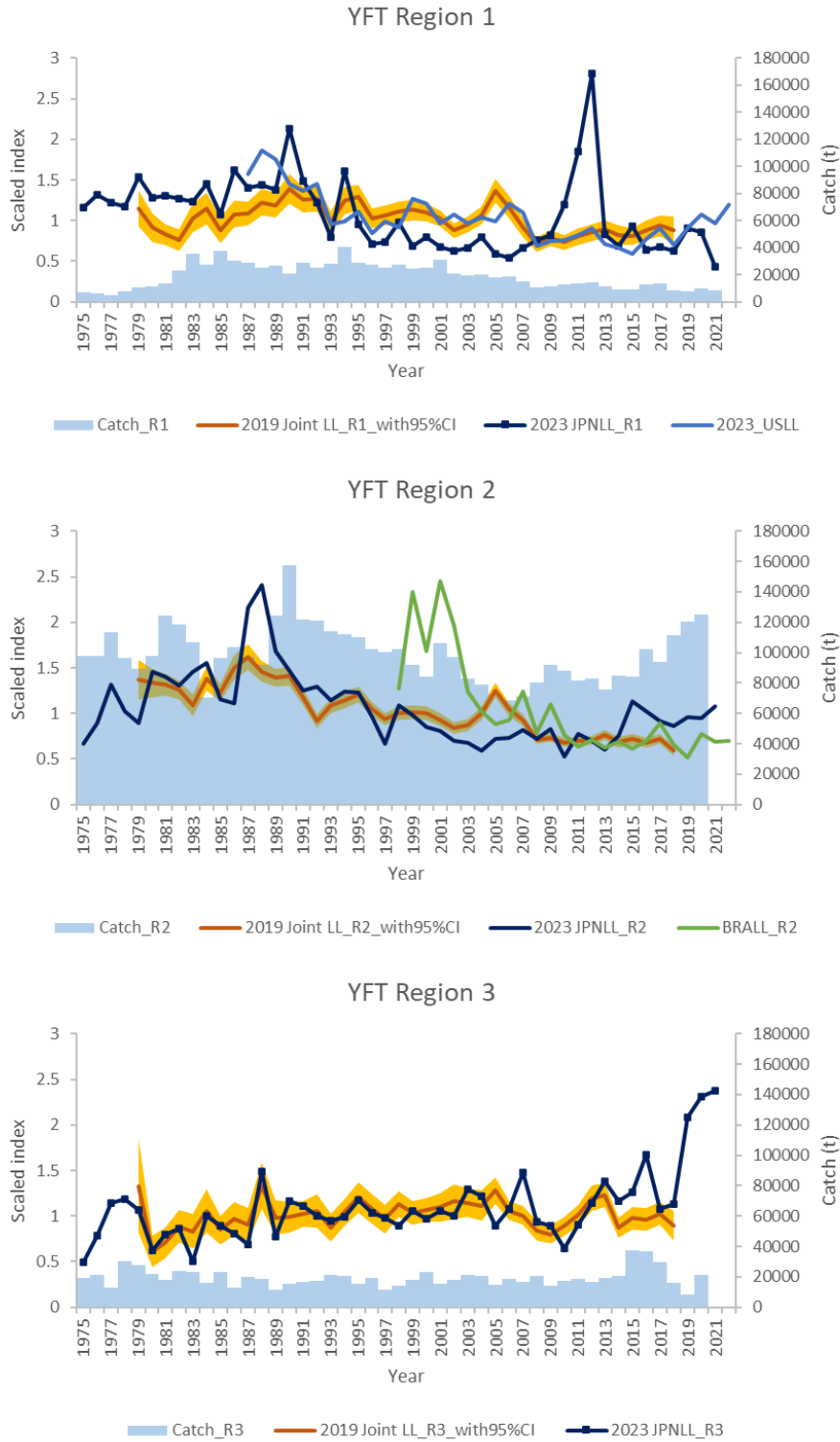


**Figure 19.** Standardized yearly CPUEs and associated 95% confidence intervals for YFT from the BRA longline fleet.



**Figure 20.** Comparisons of abundance indices among available indices in 2023 and the joint longline indices in 2018 and 2021 by region used in the 2021 stock assessment of Atlantic bigeye tuna. Brazilian longliner index (\*) includes information for both regions 2 and 3.





**Figure 21.** Comparisons of abundance indices among available indices in 2023 and the joint longline index in 2019 by region used in the 2019 stock assessment of Atlantic yellowfin tuna. Brazilian longliner index (\*) includes information for both regions 2 and 3.

**Annotated agenda**

1. Opening, adoption of agenda, and meeting arrangements
2. Overview of the fisheries statistics and definition of the objectives and workplan for the ad hoc technical sub-group on the review of fisheries data quality and gaps contained in the ICCAT databases
  - 2.3 Overview of the fisheries statistics, catch-effort, size, tagging, FAD deployments, etc., available at ICCAT
  - 2.4 Definition of terms of reference for the ad hoc technical sub-group
3. Review of updated relative indices of abundance for YFT and BET stocks
4. Biological research
  - 4.1 Update on the research on biological parameters from the AOTTP programme
  - 4.2 Identification of research priorities for the establishment of a Tropical Tunas Research Programme
5. Tropical tunas MSE review
  - 5.1 Update on the technical review of the W-SKJ MSE and progress
  - 5.2 Update on the tropical tunas multi-stock MSE process
  - 5.3 Workplan development for the 2023 training workshops on tropical MSE
  - 5.4 Workplan for the MSE dialogue with Panel 1 in 2023
6. Responses to the Commission
7. Intersessional workplan responses to the Commission and others
8. Recommendations
9. Other matters
  - 9.1 New approach to the Executive Summaries
  - 9.2 Feedback from participants on the implementation of interpretation during the meeting
  - 9.3 Summary report of this meeting (for inclusion in the annual SCRS Report)
10. Adoption of the report and closure

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## List of papers and presentations

<i>Doc Ref</i>	<i>Title</i>	<i>Authors</i>
SCRS/2023/017	Trophic dynamics and life history of Atlantic skipjack tuna ( <i>Katsuwonus pelamis</i> ) call for a 'forage fish approach' to management procedures	Bohorquez J., Galland G., and Miller S.
SCRS/2023/018	Standardization of bigeye tuna CPUE in the Atlantic Ocean by the Japanese longline fishery	Matsumoto T.
SCRS/2023/019	Standardization of yellowfin tuna CPUE in the Atlantic Ocean by the Japanese longline fishery	Matsumoto T.
SCRS/2023/020	Options for multispecies management objectives for tropical tunas.	Merino G., Urtizberea A., Laborda A., Santiago J., Grande M., and Arrizabalaga H.
SCRS/2023/022	Energy efficiency of the purse seine fishery, FAD vs free swimming school strategy	Grande M., Santiago J., and Cabezas O.
SCRS/2023/023	Summary and review of the FOB/FADs deployed ST08-FADsDep ICCAT database 2011 – 2021	Ortiz M., and Mayor C.
SCRS/2023/024	Atlantic purse seine fisheries for tropical tunas in Central America and the Caribbean: Summary of status, trends, and impacts	Martinez C., Galdamez M., Robinson R., Pino Y., Mambie S., Chavarria B., and Herrera M.
SCRS/P/2023/004	Development of an Agent-Based Bio-Economic Model of Pacific Tropical Tunas Fisheries (POSEIDON)	Vert-Pre K.A., Payette N., Carrella E., Lopez J., Powers B., Drexler M., Madsen J.K., Ananthanarayanan A., Aires-da-Silva A., Lennert-Cody C.E., Maunder M., Saul S., and Bailey R.
SCRS/P/2023/005	U.S. Tropical Tuna Fisheries Indicators	Lauretta M.
SCRS/P/2023/006	Update of the Catch-per-unit-effort standardizations for bigeye and yellowfin tuna based on Brazilian longline fishery data (1998 - 2022)	Sant'Ana R., Mourato B., and Travassos P.
SCRS/P/2023/007	Atlantic tropical tunas Management Strategy Evaluation (MSE)	Laborda A., Merino G., and Urtizberea A.

**SCRS papers and presentation abstracts as provided by the authors**

SCRS/2023/017. Nearly 3 million tonnes of skipjack tuna are caught and landed each year, the most of any tuna species and the third most of any wild caught fishery in the world. The Atlantic is currently the only ocean basin without a management procedure (MP) or harvest control rule in place for skipjack. As MPs are developed for the eastern and western Atlantic stocks, ICCAT should consider adopting management objectives, reference points, and other MP components more typical of forage fishes than the larger-bodied tunas. As a small species of tuna, skipjack has a life history and broader ecosystem impact that are characteristic of forage fishes, a conclusion that is highly relevant to MP development. This paper reviews the scientific basis for managing skipjack in this way and discusses some features of forage fish MPs to be considered by ICCAT managers and its skipjack MP development teams. We argue that MPs for Atlantic skipjack should be (i) flexible, (ii) precautionary, and (iii) inclusive of broader ecosystem impacts and that these considerations should be made early in the development process, including when finalizing management objectives to be tested using management strategy evaluation.

SCRS/2023/018. Standardization of bigeye tuna CPUE by Japanese longline in the Atlantic Ocean was conducted using generalized linear models (GLM) with lognormal errors. The models incorporated fishing power based on vessel ID and used cluster analysis to account for targeting. The variables year, quarter, vessel ID, lat lon 5 (five degree latitude longitude block), cluster, and year quarter interaction were used in the standardization. The number of clusters was 4 per region. Dominant species differed among clusters. The trend of CPUE was similar among regions with some differences. CPUE usually shows decreasing until around 2010 and is increasing after that in regions 2 (central) and 3 (south). The CPUE trends were similar to those in the previous study.

SCRS/2023/019. Standardization of yellowfin tuna CPUE by Japanese longline in the Atlantic Ocean was conducted using generalized linear models (GLM) with lognormal errors. The models incorporated fishing power based on vessel ID and used cluster analysis to account for targeting. The variables year, quarter, vessel ID, lat lon 5 (five-degree latitude-longitude block), cluster, and year-quarter interaction were used in the standardization. The number of clusters was 4 or 5 per region. Dominant species differed among clusters. The trend of CPUE was similar between regions 2 (central) and 3 (south), with some differences. The CPUE trends were similar to those in the previous study.

SCRS/2023/020. The International Commission for the Conservation of Atlantic Tunas (ICCAT) is in the process of adopting Management Procedures (MP) for the most important tuna stocks under its purview. The Management Strategy Evaluation (MSE) process aims at providing support for a robust management framework and, for tropical tunas, it started in 2018 with a design of the steps to develop a multispecies MSE process. One of the key components of the MSE process is the adoption of management objectives for the stocks of interest. For tropical tunas, a multispecies management framework is being developed and therefore, contrary to other MSEs developed in ICCAT and other tuna RFMOs, the management objectives need to be multispecies too. In this work, we propose a series of alternative multispecies management objectives based on ICES mixed fisheries management framework and recent scientific publications.

SCRS/2023/022. This study aims to evaluate the energy efficiency of the purse seine fishery and to determine the differences between fishing strategies (FAD vs FSC) in the Atlantic Ocean within a FAD closure period, for an isolated assessment of the free-swimming school fishing and for providing carbon footprint indicators in line with Rec. 2022-13. The analysis has been performed with data provided by ANABAC and OPAGAC on purse seiner and supply vessels (i.e., vessel specifications, departure and entry date to port, miles navigated by trip, fuel levels at departure and entry to port, bunkering at sea, catch by set type (FAD and FSC) including species and size composition and reference sale prizes. Fuel consumption (L), FUI (L/t), and profitability indicators were estimated for pure FAD, pure FSC and mixed trips. On average, Atlantic purse seiners have an FUI of 856 L fuel/t catch. By fishing strategy, FAD trips (675 L/t) are more efficient and show a lower carbon footprint ( $1839.6 \pm 839.6$  kgCO<sub>2</sub>/t) than FSC trips (FUI: 2044 L/t;  $5569.9 \pm 5176.4$  kgCO<sub>2</sub>/t).

SCRS/2023/023. A summary and preliminary review of the data submitted for the FOB/FADs deployment by CPCs to the ICCAT Secretariat is presented for the 2011-2021 period.

SCRS/2023/024. This document summarizes the status of the purse seine fisheries for tropical tunas in the Atlantic Ocean carried out by vessels registered in countries of Central America and the Caribbean region. It covers fishing activities of purse seiners flagged in Belize, Curaçao, El Salvador, Guatemala, and Panama, over the period 2016-2022. The document describes the number and types of vessels involved in the fishery; trends in effort and catches of tropical tunas and other species, by fishing mode, and season; and composition of the catch; by year, over the period 2016-2022. Data shows the negative impacts that the measures in place, combined with the impacts of COVID-19 and the energy crisis triggered by the war in Ukraine are having on the sustainability of the purse seine fleet, and the need for ICCAT to consider the adoption of measures more in line with the scientific advice and the status of the fisheries for, and stocks of, tropical tunas.