

REPORT OF THE 2021 ICCAT SMALL TUNAS SPECIES GROUP INTERSESSIONAL MEETING
(Online 17-20 May 2021)

The results, conclusions and recommendations contained in this Report only reflect the view of the Small Tunas Species Group. Therefore, these should be considered preliminary until the SCRS adopts them at its annual Plenary meeting and the Commission revise 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 was held online 17-20 May 2021. Flávia Lucena (Brazil), the Species Group (“the Group”) rapporteur and meeting Chair, opened the meeting and welcomed participants. Mr. Camille Manel (ICCAT Executive Secretary) addressed the Group and welcomed the participants. The Chair proceeded to review the Agenda, which was adopted with minor changes (**Appendix 1**).

The List of Participants is included in **Appendix 2**. The List of Documents and Presentations provided at the meeting is attached as **Appendix 3**. The abstracts of all SCRS documents and presentations are included in **Appendix 4**, as presented by their authors. The following served as rapporteurs:

<i>Sections</i>	<i>Rapporteur</i>
Items 1, 8	M. Neves dos Santos, N.G. Taylor
Item 2	C. Palma, C. Mayor, J. Garcia
Item 3	P. Lino, S. Baibbat, F. Lucena
Item 4	G. Cardoso, T. Fredou
Item 5	F. Lucena, J. Vinas de Puig, D. Macias, R. Muñoz-Lechuga
Item 6, 7	M. Neves dos Santos, F. Lucena

2. Review of fishery statistics

The Small Tunas Species Group (hereafter Group) revised the most up-to-date information available in the ICCAT database system (ICCAT-DB) for the 13 major small tuna species (**Table 1**), namely the fishery statistics (T1NC: Task 1 nominal catches; T2CE: Task 2 catch & effort; T2SZ: Task 2 size frequencies of the samples) and the conventional tagging. The SCRS catalogues on Task 1/2 data availability for the 13 small tuna species for the period 1990 to 2019 are presented in **Appendix 5**.

The species DOL (*Coryphaena hippurus*) was finally removed from the official list of small tuna species, in line with Rec. 19-01.

2.1 Task 1 (catches) data

The Task 1 nominal catch estimations (T1NC) adopted by the Group, for the major small tuna species by year are presented in **Table 2** (cumulative catches by species in **Figure 1**). No major updates were made at the meeting to the existing catches. The Secretariat informed that very little improvements were made over the last year on the reduction of unclassified gears (current status presented in **Figure 2**), on the replacement of the SCRS carryovers by official statistics (**Figure 3**), on data gaps completion, and on historical recoveries. The small tuna species discrimination work (SMT discontinued, and KGX having now only residual catches, and the split of TUN/TUS codes by species) is as a long-term process involving the ICCAT CPCs and the Secretariat, where the progress made is always reported by the Secretariat to the Group.

A full T1NC revision provided by EU-France for the tropical fisheries (baitboat and purse seine) for the period 1991-2019, affected slightly FRI (decrease of 160 t in 2003, increase of 791 t in 2016) and LTA (increase of 144 t in 2016) with minor corrections on both species (values ± 15 t / year) in various years of the series. This revision, presented at the 2021 Intersessional meeting of the Tropical Tuna Species Group, has pending the corresponding SCRS document to be presented at the 2021 Bigeye Tuna Stock Assessment meeting. In consequence, the Group adopted provisionally this French update to T1NC.

The weight of the 13 small tuna species in T1NC between 1950 and 2020 (**Table 3**) represents on average, around 16% of the totals in T1NC. By decade, there is a consistent tendency for a reduction of the weight of the small tuna species, from 31% in the 50s, to 19% in the 80s, and ending with 15% in 2010s. This evidence can have two combined causes: a) the increase of the catches of major tuna and sharks (including historical recoveries); b) the slight reduction on small tuna official statistics reported in the last two decades (since 2007 no more carryovers were made). Overall, several small tunas catch series are still incomplete. The Group reiterated the need to continue the catch series recovery work, using as a reference the small tunas SCRS catalogues (**Appendix 5**). The Secretariat reminded the Group that, Brazil, Mexico, EU-Spain and Senegal also foresee future revisions of their small tuna T1NC catch series, if required with the support of the Secretariat.

Following the ICCAT Methods Working Group recommendation (Anon., 2019) to study the possibility of extending the “scoring” methodology on fisheries data availability (Palma *et al.*, 2019) to small tunas, the Secretariat presented the updated scores of small tuna species for the 30 years period 2000-2019 (overall scorecard presented in **Table 4**, containing all the major ICCAT species already scored). Except for FRI and LTA in the Atlantic (with scores above 5 on the “10 years” time series) all the other 11 cases (species/stock-area combinations) have scores below 5, which indicates absence of Task 2 datasets from the major fisheries when Task 1 exists.

The Group reiterated the proposal to split FRI and LTA Atlantic region into four regions currently considered as stocks/management units by the Group (the MED region shall be retained for LTA). The Secretariat informed that to achieve that objective, the entire FRI and LTA catch series (1950 to 2019) must have a geographical delimitation based on the billfish sampling areas (the “old” Task 1 areas have no geographical delimitation). As shown in **Figure 4**, the 70s and the 80s still have about 30% of the small tuna catches requiring this geographical allocation (unknown billfish sampling areas). As explained to the Group, this ongoing work (started in 2014 and covering all the ICCAT species) had a great progress over the last three years and is planned to be completed on the first trimester of 2022. The Secretariat presented the small tunas reclassification criteria (**Table 5**) which will facilitate the reclassification of the pending 2500 records of T1NC associated with small tunas. This is a crucial exercise to allow both FRI and LTA to be classified into 4 and 5 stocks, respectively.

Following this Group recommendation, the Blackfin tuna (BLF) with a unique Atlantic stock, the corresponding stock suffix “A+M” was replaced “ATL”. There are currently no BLF catches reported for the Mediterranean Sea.

Of the total 13 species included in the Small Tunas Species Group, the seven most important ones represent about 92% of the total small tuna catches in T1NC, between 1950 and 2019. These are (by descending order of importance in weight): BON (*Sarda sarda*) with about 33% of the total catches, LTA (*Euthynnus alletteratus*) with 14%, FRI (*Auxis thazard*) with 13%, KGM (*Scomberomorus cavalla*) and SSM (*Scomberomorus maculatus*) both with 11%, and BRS (*Scomberomorus brasiliensis*) and BLT (*Auxis rochei*) with 5% each. The other six species (BLF: *Thunnus atlanticus*; MAW: *Scomberomorus tritor*; WAH: *Acanthocybium solandri*; COM: *Scomberomorus commerson*; BOP: *Orcynopsis unicolor*; CER: *Scomberomorus regalis*) represent the remainder 8% of the total small tuna catches. The Species Group KGX (*Scomberomorus* spp.) has residual catches only (less than 0.15% of total small tuna catches).

It was noted that catches (both historical and recent periods) of small tuna species (KGM, SSM, LTA, WAH,) are missing from the Gulf of Mexico, North America Atlantic coast and the Caribbean. These missing catches (together with the respective size frequencies) should be provided to ICCAT. A similar situation exists for the eastern Mediterranean and North Africa Mediterranean coast (BON, BLT and LTA). The ICCAT Secretariat should continue its efforts to recover these missing data by directly contacting the related CPCs statistical correspondents.

The Group reopened the discussion on the possibility of including in the small tuna official list of species, the species *Scomberomorus commerson* (COM, Lacepède 1800) known as “Narrow-barred Spanish mackerel”, based on the historical recovery of COM catches in the Mediterranean Sea (Di Natale *et al.*, 2020) presented last year. During the meeting, the Secretariat revised the ICES and EUROSTAT annual COM catches and found almost no catch information of this species. Simultaneously, FAO was also contacted on the same subject and response was given in time to be discussed at the meeting. FAO informed that the major issue is that catches of COM are often reported to FAO under Seerfishes nei (KGX). The Secretariat

compared the available data sources with the yearly COM catches (the FAO catches series of KGX reported to ICCAT during the meeting were left outside this study, for now) and presented to the Group a preliminary Task 1 on COM catches for adoption. The Group evaluated the various possibilities and agreed to give priority to the FAO catches series (National statistics reported to FAO) when more than one catch option existed. After completing a few gaps with carry overs (also available in some years and Countries in the FAO catch series), the Group finally adopted “as preliminary” the first COM Task 1 nominal catches (details in **Table 6**). These estimations were stored into the ICCAT database system (ICCAT-DB) with the respective data source identifiers (FAO, Di Natale *et al.*, 2020, carry over). The Group recalled that each catch series here adopted should be fully revised by the respective ICCAT CPC (Statistical correspondents) with the support of the ICCAT Secretariat.

Other Task 1 issues identified by the Group, such as the Italian catches of *Scomberomorus tritor* (MAW) reported for the Mediterranean Sea, could be in fact other small tuna species. The Group recommends that these series be revised later by EU-Italy.

No major SCRS document on fisheries statistics or biological sampling was presented during the meeting.

2.2 Task 2 (catch-effort and size samples) data

Task 2 catch and effort (T2CE) and Task 2 size information (T2SZ) availability were presented to the Group in the form of the standard SCRS catalogues on statistics (**Appendix 5**) of the major ICCAT small tuna species by stock/area, major fishery. The detailed catalogues and datasets of both T2CE and T2SZ were also made available in the meeting. The Group noted that many Task 2 gaps (missing T2CE and T2SZ) persist in these datasets across all species. The scores of small tunas (scorecard in **Table 4**) indicate the same weaknesses. Efforts should be made to recover those missing datasets. Overall, T2CE information is the most deficient Task 2 dataset.

The T2SZ of Uruguay presented at the last meeting (SCRS/P/2019/040) with WAH in South Atlantic for the period 1998-2013 shall be reported to ICCAT for the next Small Tunas Species Group intersessional meeting.

2.3 Other information (tagging)

The Secretariat provided a presentation SCRS/P/2021/032 on the progress of the ICCAT conventional tagging on small tunas (including AOTTP) with a particular focus on the tagging related activities throughout the Atlantic Ocean (i.e., tag releases, tag recoveries, time at liberty and movements). In addition, it also presented an overview of the ongoing activities on maintenance and development of the tagging database by the Secretariat, aiming for the dissemination of available data collected. Finally, information was provided related to the ongoing fieldwork (i.e., awareness campaigns and tag recovery on AOTTP project).

The Group was also informed about dashboards of the AOTTP Tagging data available in <https://www.iccat.int/aottp/en/aottp-data-release.html> and the AOTTP Symposium webpage where there are now available links to the presentations made (<https://www.iccat.int/aottp/en/aottp-symposium.html>).

The Secretariat informed the Group about a major task related to the quality control required on the small tunas conventional tagging dataset. They were already identified about 300 records with geolocation error that need to be verified and corrected in the future (in quarantine). It has been created a map (**Figure 5**) that displays those release positions with potential errors.

The Group requested the development of a database in geopackage format (gpkg) after the correction of all the existing data and maps for every species. The Secretariat informed the Group about the mid-term plans to develop the entire conventional tagging geo-referencing system. The system includes common layers inside the geopackage for all the ICCAT species, dashboards with querying facilities, and other tools developed under the AOTTP program. All this ongoing work is being made in simultaneous (highly dependent on) with the complex task that will merge the two existing conventional tagging databases (ICCAT historical and AOTTP) into a unique system. Additionally, the Secretariat has also planned to develop the electronic database module and their management tools.

The small tuna species conventional tagging summary information is presented in **Table 7** and **Figure 6** (3 maps) following the standard formats normally presented to the SCRS. The same maps by species are presented in **Figure 7** (grid species and three map types: density releases, density recoveries and apparent movement).

3. Review of available and new information on biology and other life-history information of small tunas such as stock structure

SCRS/2021/077 provided additional recent data on the presence of the Narrow-barred Spanish mackerel (*Scomberomorus commerson*) in Libya (including the eastern region) and in Palestine. The authors emphasized the importance to have this species listed by ICCAT, which was confirmed by the Secretariat that its inclusion was already approved by the SCRS last year. The author also suggested the inclusion of *S. commerson* in the ICCAT Manual for small tunas. The ICCAT Secretariat requested data from official sources to validate the relevance of this fishery and abundance of the species in the Mediterranean.

SCRS/2021/081 provided information on the biometry, growth and histology of the little tunny *Euthynnus alletteratus* captured in the bay of Mostaganem, Algeria. A total of 53 individuals, ranging from 34 to 66 cm were obtained between October 2017 and January 2018. The authors suggested to perform a more in-depth study in order to complete a seasonal cycle, which was corroborated by the group. The Group also suggested the conjoint analysis of this data with those obtained under the SMTYP for the species in the Mediterranean.

SCRS/P/2021/031 provided an update on the status of the biological parameters published on the 12 small tuna species for the 5 ICCAT areas. An extensive review of the publications did not significantly improve the status of knowledge but allowed to further clarify the gaps and research needs. The updated table and reference database was made available to the Group. The authors indicated that many of the publications used were not peer-reviewed and suggested that ICCAT should fund/manage a free online open-access peer-reviewed publication with continuous publishing of documents presented during ICCAT meetings.

Document SCRS/2021/084 described the southward expansion of the distribution and fishing grounds of blackfin tuna *Thunnus atlanticus* in the southwestern Atlantic Ocean and related this expansion with the intensification of the southward flow of the Brazil current. The authors conclude that the species distribution needs to be displaced southward until 34°S.

The Group found the study also important for the Ecosystem Group. It was also suggested to be created opportunities for the different SCRS Officers and Group Chairs to address issues of converging mutual interest.

SCRS/P/2021/034 summarized the research activities conducted on Atlantic bonito in the Western Mediterranean by the Instituto Español de Oceanografía based both in experimental studies and ichthyoplankton surveys. The studies involved the different stages in the life history although most research has been conducted in the early life stages. The authors presented an annual ichthyoplankton monitoring survey (2001-2021) during the spawning season of small tuna species (bullet tuna, bonito, little tunny, among others) in the Balearic spawning ground, in order to evaluate if the Group consider interesting to evaluate their potential use.

The Group acknowledge the availability and found the offer of great importance to potentially provide fishery independent index of spawning biomass index, and also complementary information of the species reproduction.

SCRS/P/2021/035 presented the preliminary length-weight relationships (LWRs) and relative condition factor for LTA, BON and WAH collected under the scope of the SMTYP. The results indicated that all species exhibited a negative allometric growth. A significant difference was observed between b values during the warm and cold periods for all species. The author volunteered to carry on doing this analysis and asked the contribution of the group to provide, not only for these species, but to all SMT, information on length and weight.

The Group also asked the author to provide, in a next meeting, the relationship by ICCAT stock areas.

4. Update of data poor methods and review appropriate approaches for future development of management advice for the different species

Two scientific documents were presented on data-limited approaches for small tunas.

SCRS/2021/083 presented a stock assessment of wahoo for the Southwest Atlantic Ocean area based on the best data available. The authors used a decision support tool (FishPath) in order to select the most appropriate assessment model. Two length-based assessments methods (LB-SPR and SS-DL-tool) were used compiled between 1998 and 2020. All alternative scenarios showed a very depleted stock in the recent years.

The Group pointed out that Uruguay could contribute to the dataset as it was collected size data between 1998 and 2003 (between 19°S to 37°S). The data were presented in 2019 but it was not included in the Task 2-size ICCAT database. The authors welcomed the contribution and indicated that an update would be applied in the future in order to improve the estimates. The Group also noted that the growth parameters were from the NW Atlantic stock, since no estimates are available for the SW Atlantic stock. The Group asked about the length-weight relationship provided since it is not in the database and could be included into the "Life history parameters and reference database" maintained by the Group.

SCRS/2021/086 presented updated life history parameters (L_{∞} , k , L_{mat50} , L_{mat95} , M) of frigate tuna in the northeast Atlantic and attempt of estimating its stock status based on data of by-catch from Russian research surveys [Atlantic branch of VNIRO (AtlantNIRO)] within Morocco, Mauritania, and Senegal waters. According to the outputs, calculated values of life history parameters do not differ significantly the results obtained before by other researchers and could be used for further analyses. The LBSPR approach was applied for the stock assessment of frigate tuna. The obtained spawning potential ratio formally indicates the status of overfishing stock. Conclusion about stock status should be used with caution. According to author point it is expected that the LBSPR method can overestimate F/M and underestimate SPR when confronted with data from a trawl gears with dome-shaped selectivity which are used in Russian resources studies.

The Group advised the author concerning the potential misidentification of the frigate and bullet tuna species, within this area. The Group also shared with the author a new tool (SS-DL tool) to consider in future SPR estimations.

5. Review status of SMTYP program to improve collaboration among scientists and obtain the information required for assessment

SCRS/P/2021/036 provided a review of the SMTYP from 2018 to 2020, giving emphasis to the last year contract. The main objectives of the 2018-2019 consortium (led by the Universitat de Girona) were to collect biological samples for estimating growth parameters, assessing the maturity and stock structure analysis (populations genetics) of three small tuna species (LTA, BON and WAH). For the 2020 consortium (led by FADURPE), the main size gaps were identified and the news goals of the project were: (a) collect biological samples to fill the specific gaps for BON and LTA; (b) Estimate growth and maturity parameters for LTA and BON, and provide preliminary results for WAH; and (c) Determine/refine the stock structure for BON, LTA and WAH. Based on the results obtained up to May, not all the objectives for 2020 could be fully met. This was mainly due to the serious constraints caused by the pandemic, specially related to the decreasing of fishery operations, closing of the research laboratories and shipping delays. However, the main gaps were identified by the area coordinators and participants (see the next papers/presentations), and should be overcome in the next contract.

SCRS/2021/081 presented the results on stock structure (genetics) of wahoo with samples obtained from 2018-2021. A total of 276 individual were analyzed from 4 locations in the Atlantic: Spain (Canary Islands); Côte d'Ivoire; Gabon and Brazil; four of these individuals were identified as *Scomberomorus cavalla* and were excluded from the analysis. No genetic differentiation was detected along the Atlantic. The authors also presented a summary of the updated work carried out for LTA and BON. The genomic analysis of Atlantic bonito is underway, waiting for the Radseq sequences in the near future. No further results were presented for this contract. The Atlantic bonito showed a clear genetic differentiation between the Northeast Atlantic and the tropical Atlantic with a putative boundary between these two genetic pools

located between the south of Morocco and Mauritania. A similar situation occurs with little tunny, with a clear and deep genetic differentiation between the same two locations described for Atlantic bonito with the boundary zone located in the south of Morocco. Samples for these two species in this intermixing zone have been collected and should be shipped soon. Finally, bullet tuna and frigate, as a potential new species to be included, and based on previous studies, the author attested that they are extremely morphological alike, and some confusion between species could occur. The authors have developed a genetic methodology for discriminating these two species.

The Group suggested the inclusion of samples of WAH from Northwest Atlantic (e.g., USA) and southern part of the Southwest Atlantic (e.g. Uruguay) in order to confirm the putative hypothesis of a single population in the Atlantic.

SCRS/P/2021/033 provided an exploratory analysis of the reproductive parameters for *Sarda sarda* within the scope of SMTYP. 420 fish were analyzed for the preliminary analysis of L_{50} using microscopic data, and 876 fish for L_{50} estimation and determination of the spawning season, combining macroscopic and histological analysis. Data were analyzed by ICCAT areas and grouped by tentative stocks according to Viñas *et al.* (2020). Regarding the histological analysis for determining L_{50} , the Mediterranean area shows the best estimates and coverage of sizes. In contrast, more small-sized individuals are needed to better fit the logistic curve in the NE-ATL. It was not possible to adjust the logistic curve for the SE-ATL due to the narrow size range of analyzed fish. Good L_{50} estimates were obtained for the Mediterranean and NE-ATL combining microscopic/macroscopic data. However, in the NE-Atlantic area, very few small-sized individuals are still available and could bias the L_{50} estimates. For the SE-ATL, the size distribution of mature fish overlaps with the size distributions of immature ones and hence, L_{50} cannot be estimated. For NE-ATL and SE-ATL, it is necessary to increase the sampling of small-sized individuals and, specifically for SE-ATL, more large-sized individuals are also required. The temporal coverage in the Mediterranean and NE-Atlantic (from May to March) was better than in SE-Atlantic (May to October). In the Mediterranean and for stock 1 (NE-ATL + Portugal), spawning was observed from May to July and, in the NE-ATL, spawning was reported in all months, except September. In the SE-ATL, spawning was observed for all sampled months.

SCRS/2021/085 presented a specific protocol for sampling, preparing, and storing of the first dorsal fin spine that could be applied to small tunas, standardizing and improving the collection and storage procedures before processing. Information about sampling strategy, sample metadata, spine extraction, cleaning, storage and measurements were provided.

SCRS/P/2021/029 provided the growth results of Little tunny (*Euthynnus alletteratus*). A standardized methodology has been established for spines analysis of LTA comparing three transverse sections per individual. It was analyzed 159 fish and 474 processed sections were observed. Data was analyzed by genetic areas according to Viñas *et al.*, (2020). Growth differences were observed between NE-ATL+MED (including Portugal) and SE-ATL (including Senegal) specimens. Growth curve and parameters were provided for NE-ATL+MED but it was not possible for SE-ATL, given some gaps in the sampled sizes. A total of 163 otolith samples were sent for processing by Fish Ageing Services (FAS) (120 annual growth and 43 for daily growth), and the preliminary results will be provided for the next meeting. For the future, the spine analysis will be improved when size gaps are corrected, otoliths and spines structures for ageing analysis will be compared, and the results will be conjointly analysed considering the genetic, growth, reproduction and morphology information.

The Group asked if it is possible to distinguish the growth differences between the NE-ATL / MED and SE-ATL areas and, with these preliminary results, the author confirmed it is. It is necessary to carry out new analyzes such as marginal increment ratios (MIR) to confirm/deny double annulus per year.

SCRS/P/2021/030 presented the growth results of Atlantic bonito (*Sarda sarda*). As for LTA, standardized methodology has been established for spines analysis of BON, comparing three transverse sections per individual. It was analyzed 130 fish with a total of 348 processed sections observed. Not different patterns were observed by spine areas, then data was analyzed with all areas together. Growth curve and parameters estimates were provided. A total of 153 otolith samples were sent for processing by FAS (135 annual growth and 18 for daily growth). Annual analysis has been completed and the preliminary results will be provided for the next meeting. The next steps for this species are similar to the described for LTA.

Within this item of the Agenda, and considering the results provided and the gaps identified by the areas coordinators, the Chair presented some proposals for the new ToR to be evaluated by the Group. The Group agreed that the next ToR should focus on a) conduct additional sampling aiming to fill the specific gaps of the biological samples for estimating the growth and maturity parameters of BON, LTA and WAH; b) collect samples for FRI and BLT in the Atlantic and the Mediterranean Sea for stock structure studies, and partially for future studies on age and growth, and reproduction; c) refine the stock structure analysis for WAH and determinate the stock structure analysis for FRI and BLT and d) investigate genetic species differentiation between FRI and BLT. The SMTYP coordinator will provide, in the next few days, a preliminary table with the sampling size targets (and number of individuals) by species and areas to be evaluated by the area coordinators and hence the CPCs willing to participate.

6. Recommendations

For the SCRS to consider requesting that the Commission develop a process which could support funding of research programmes for periods longer than usual biannual budget period, since SMTYP, as well as other ICCAT research programmes, require multiannual and multiregional initiatives that are difficult to handle based on annual budgets. The ICCAT 2015-2020 Strategic Research Plan recognizes that such long-term commitment is essential for improving scientific advice.

Recommendations with financial implications

The Group recommended the following activities which will have financial implications in the period of 2022 to 2024 in order of priority from highest to lowest:

- Continuing support to the SMTYP: The Group recommended continuing with the ICCAT SMTYP research program activities in 2022-2024 to further improve the biological information (improving geographical coverage for growth, maturity and stock identification) for *Acanthocybium solandri* (WAH), and beginning new sampling studies for *Auxis thazard* (FRI) and *A. rochei* (BLT). Costs for 2022 are estimated at €55,000.
- The Group recommends that a feasibility study be conducted to determine the budget and associated tagging numbers for Wahoo and LTA species. The results of this study will be presented at the Small Tunas Species Group in September 2021.
- *Regional workshop on the application of data-limited methods to assess small tuna stocks*: Data-limited models include integrated, length, and catch based models. With such tools it is possible to know the status of the population and, depending on the method used, provide reference point to the fishery. Such approaches require inputs from biologists and fisheries experts. As such, the Group recommended that an in-person workshop be held to advance with the data-limited models applied to some small tunas species. This workshop could be held immediately after (back-to-back) the 2022 intersessional meeting of the Small Tunas Species Group, which would reduce traveling costs. This workshop should be updated in 2024, also in the format back-to-back the 2024 intersessional meeting of the Small Tunas Species Group. Costs are estimated at €30,000 per workshop, which would allow for participation of 2 experts and 8-10 national scientists.
- The Commission adopted in 2019 Rec. 19-01, regarding the new ICCAT list of tuna and tuna-like fishes and elasmobranchs that are oceanic, pelagic, and highly migratory. Accordingly, the Group recommended that a new chapter of the ICCAT Manual be added, on the narrow-barred Spanish mackerel (*Scomberomorus commerson*). The costs to conduct such work are estimated to be €1,000.
- *Search Engine for ICCAT Col. Vol. Sci. Pap.*: Considering the difficulties for make an easy and fast search of a document published in the ICCAT Collective Volumes of Scientific Papers, the Group recommends that the ICCAT Secretariat to implement as soon as possible the developed webpage filter-based system which, as a minimum, should include the following fields: name(s) of the author(s), title of the paper, abstract, keywords, year, volume, issue, pages of the publication and SCRS reference. Since all ICCAT publications have been fully digitized, the Group recommends that these documents to be OCRed to make the contents searchable and indexed. For that purpose, funds should be made available for hiring a dedicated staff or, as an alternative, issue a short-term contract to ensure indexing all SCRS papers published.

SMT INTERSESSIONAL MEETING, ONLINE 2021

- *Workshop on maturity staging in 2023 to small tuna stocks*: This workshop would allow for calibration and adopting internationally-agreed macroscopic and microscopic maturity scales for the new studied small tuna species. Costs are estimated at €25,000, which would allow for participation of 1 expert and 8-10 national scientists.

The Table below contains the overall funding requests made by the Group for 2022-2024:

Small tunas	2022	2023	2024
Tagging, rewards and awareness			
Conventional tagging, rewarding and awareness	TBD€*	TBD€*	TBD€*
Biological studies:			
Reproduction	15,000€	25,000€	25,000€
Age and growth	15,000€	25,000€	25,000€
Genetic	15,000€	25,000€	25,000€
Sample collection and shipping	10,000€	25,000€	25,000€
Other fisheries related studies (including data recovery, etc.)		5,000€	5,000€
New chapter of ICCAT Manual (<i>Scomberomorus commerson</i>)	1,000€		
Workshops/meetings			
Workshop on application of data-limited methods	30,000€		30,000€
Workshop on maturity staging		25,000€	
Equipment			
TOTAL	86,000€*	130,000€*	135,000€*

*TBD – To be provided during the September Species Group meeting.

Other recommendations

In addition, the Group recommended:

- The Group recommended that opportunities be created, on a regular basis, for SCRS Officers or their representatives to address issues of mutual interest related to the performance and interests of the different SCRS Groups.
- Although the participation of national scientists has increased in recent years, other CPCs should make the necessary arrangements to ensure increased participation of their national scientists in the Group meetings.
- That CPCs provide indices of abundance and size-frequency sample data, preferably from fishery independent surveys and/or other national programs, which would substantially improve assessments.
- Statistical Correspondent and/or national scientists should revise, update, complete and submit their small tuna T1NC series to the Secretariat. This revision should take into account Appendix 5 (SCRS catalogues), the split of “unclassified” gear catches to specific gear codes, and the completeness of Task 1 gaps identified. The Statistical Correspondent and/or National scientists of CPCs should correct inconsistencies identified in Task 2 datasets (T2CE: catch & effort; T2SZ: size samples). In addition, for the 13 species of small tuna, the T2SZ revision should follow the SCRS recommendation on the T2SZ stratification (month, gear, 1°x1° geographical squares for surface gears /up to 5°x5° squares for longlines, SFL size classes of 1 cm in lower limits). CPCs should further improve their estimates of total catches, as there are still important gaps in the basic data available. These data are required inputs for most of the data-limited stock assessment methods.

- The Secretariat should continue its work on the data recovery and the inventory process of tagging data for small tuna species. This process will require active participation of the national scientists that hold such data.
- The application or update of data-limited assessment models and MSE for species considered of high priority, giving special attention to the input data availability and to their quality.
- The Group recommends that the SCRS create a subgroup to identify problems and solutions associated with the publication of SCRS documents being unavailable when they are retracted from publication in Redbooks. Many of these documents are not submitted to other journals or in peer-reviewed online publications, while others are published in pay-per-read journals. It would be useful to create a small informal group of volunteers from the Group to present on the subject to Species Groups and subsequently to the plenary SCRS meeting.

7. Other matters

7.1 Workplan for 2022

The Group revised the workplan for 2021 and discussed the workplan for 2022, which is included as **Appendix 6** to this report.

The Group revised the basic information to be included on the Terms of Reference (ToRs) for the new phase of the Biological studies on Small Tunas. The Group agreed that the ToRs will be provided later by the SMTYP coordinator to the Secretariat. Furthermore, it was agreed that FADURPE would remain as the contractor for the next *Short-term contract for the continuation of the Small tuna research program-biological samples collection for growth, maturity, and genetics studies*, that will be further developed within the SMTYP.

The Group agree to keep on the workplan for 2022 several activities, including the: revision of small tuna L/W relationships at stock level; update of the biological meta-database; update and/or application of the data-limit models; and proceed with the calibration and adoption of internationally agreed maturity scales for small tunas species.

Finally, the Group discussed and agreed to add a new line of activity within the SMTYP, related to continuing conventional tagging activities done during AOTTP. Particularly, it was agreed to conduct further conventional tagging of wahoo in the Canary Islands and little tunny in the Gulf of Cadiz and the Alboran Sea (Portugal and Spain), that corresponds to areas where AOTTP did not promote tagging campaigns for these species.

7.2 ICCAT manual

The Secretariat informed the Group that the first versions of 7 species sub-chapters (BON, BLT, FRI, KGM, LTA, SSM and BLF) of the ICCAT Manual (Chapter 2) have been received and already made available for revision in the three ICCAT languages, in addition to a new sub-chapter for Plain bonito (BOP). The Group agreed to provide comments on these sub-chapters by 26 May 2021. Three additional sub-chapters will be provided in early June 2021, namely for Wahoo (*Acanthocybium solandri*), Serra/Spanish mackerel (*Scomberomorus brasiliensis*) and Cero (*Scomberomorus regalis*). Feedback should be provided on these sub-chapters to the Secretariat by 15 June 2021.

All the revised and new small tuna sub-chapters shall be provided for adoption during the 2021 SCRS plenary meeting.

8. Adoption of the report and closure

The Chair informed the Group that she was going to stepdown as rapporteur of the Small Tuna Species Group to embrace new professional projects, but that she would remain available to closely work on relevant matters related to these species. The SCRS Chair thanks Dr. Flávia Lucena for all her hard work

over the past 3 years and wished her success for her professional career. He also announced that Dr. Constance Diaha (from Côte d'Ivoire) was invited and will now assume the Group rapporteur responsibilities. The Secretariat also thanked Dr. Lucena for her work and fruitful spirit of cooperation to elevate the quality of the scientific advice and development made in recent years within the SMTYP, and expressed to the new rapporteur its support and assistance on any matter she might need. Finally, Dr. Diaha thanked the confident of the SCRS Chair and of the Group and committed to work hard to keep the Group within the SCRS standards.

The report was adopted by the Group and the meeting was adjourned.

References

Di Natale A., Bariche M., Lahoud I., Abouelmagd N., and El Aweet A.E.A. 2020. Fisheries of narrow-barred Spanish mackerel (*Scoberomorus commerson* Lacepède, 1800) in the southern and eastern Mediterranean and relevance of the species for ICCAT. Collect. Vol. Sci. Paps. ICCAT 77(9): 85-99.

Agenda

1. Opening, adoption of Agenda and meeting arrangements
2. Review of fishery statistics
 - 2.1. Task 1 (catches) data
 - 2.2. Task 2 (catch-effort and size samples) data
 - 2.3. Other information (tagging)
 - 2.4. Fishery indicators (including length data analysis)
3. Review of available and new information on biology and other life-history information of small tunas such as stock structure
4. Update of Data Poor Methods and review appropriate approaches for future development of management advice for the different species
5. Review status of the Small Tunas Year programme (SMTYP) and update on data needs and analysis
6. Recommendations
7. Other matters
 - 7.1. ICCAT Manual
8. Adoption of the report and closure

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List of Papers and Presentations

Presentations	Presentations	Presentations
SCRS/2021/077	Additional data on the narrow barred Spanish mackerel (<i>Scomberomorus commerson</i> , Lacépède, 1800) in Libya and Palestine	Al Mabruk S.A.A., Di Natale A., and Zava B.
SCRS/2021/081	Etude de quelques paramètres de la biométrie, de la croissance et de l'histologie d'un thonidé mineur ; la thonine commune: <i>Euthynnus alletteratus</i> (Rafinesque, 1810), pêché dans la baie de Mostaganem	Benounnas K.,
SCRS/2021/082	Lack of genetic differentiation in the Atlantic distribution of Wahoo	Ollé J., Pascual-Alayón P.J., Angueko D., Diaha N'G.C., Lucena Frédou F., Silva G., and Viñas J.
SCRS/2021/083	From data mining to the stock assessment of the SW Atlantic wahoo <i>Acanthocybium solandri</i>	Cardoso L.G., Frédou T., Hazin F., Travassos P., Sant'Anna R., Mourato B., Silva G., Cope J., Pons M., Cardoso C., Soares A., Barreto T., and Lucena-Frédou F.
SCRS/2021/084	The southward expansion of the distribution and fishing grounds of blackfin tuna <i>Thunnus atlanticus</i> in the southwestern Atlantic Ocean due to increasing water temperatures	Cardoso L.G., Sant'anna R., Freire M.A., Weigert F.C., Poubel M., and Bezzerra N.
SCRS/2021/085	Protocol for sampling, preparing and storing of first dorsal fin spine for small tuna species: a first step for ageing analysis	Muñoz-Lechuga R., and Lino P.G.
SCRS/2021/086	Updated life history parameters and estimates of spawning potential ratio for frigate tuna <i>Auxis thazard</i> stock in the northeast Atlantic	Zapadaeva N.
SCRS/P/2021/029	Growth studies of Little tunny (<i>Euthynnus alletteratus</i>) for the Small Tunas Year Program	Muñoz-Lechuga R., Silva G., Lino P.G., Macias D., Saber S., Sow F.N., Diaha N'G.C., Angueko D., Hajje G., and Lucena-Frédou F.
SCRS/P/2021/030	Growth studies of Atlantic bonito (<i>Sarda sarda</i>) for the Small Tunas Year Program	Muñoz-Lechuga R., Silva G., Lino P.G., Macias D., Saber S., Sow F.N., Diaha N'G.C., Angueko D., Hajje G., and Lucena-Frédou F.
SCRS/P/2021/031	Life History parameters and reference databases update	Anonymous
SCRS/P/2021/032	ICCAT conventional tagging on small tunas (including AOTTP)	Secretariat
SCRS/P/2021/033	Exploratory analysis of the SMTYP database for Bonito (<i>Sarda sarda</i>) reproductive parameters estimation: preliminary results and steps to improve the analysis	Anonymous
SCRS/P/2021/034	<i>Sarda sarda</i> life cycle research in Western Mediterranean	Reglero P., Blanco E., and Ortega A.

SMT INTERSESSIONAL MEETING, ONLINE 2021

SCRS/P/2021/035	Length-weight relationships and relative condition factor of the Wahoo <i>Acanthocybium solandri</i> (Cuvier, 1832), Little tunny <i>Euthynnus alletteratus</i> (Rafinesque 1810) and Atlantic bonito <i>Sarda sarda</i> (Bloch 1793) fish of the Atlantic Ocean	Pascual-Alayón P.J, Déniz S., Rojo V., Ramos L., and Abascal F.J.
SCRS/P/2021/036	ICCAT SMT Research program: review 2018-21 SMTYP	Lucena F., and Hazin F.

SCRS Document and Presentations Abstracts as provided by the authors

SCRS/2021/077 - The presence of the Narrow-barred Spanish mackerel (*Scomberomorus commerson*) is clearly documented in the ICCAT Convention area and particularly in a large part of the Mediterranean Sea. Fishery data for the Mediterranean Sea have been available mostly in the last few decades and this paper is now providing additional recent data on this species in Libya (including the eastern region) and in Palestine. We stress again the importance to have this species listed by ICCAT and included in the Manual for small tunas, taking into account its relevance for several fisheries in the ICCAT Convention area.

SCRS/2021/081 - Ce travail (mémoire de fin d'études présenté par Mme BENABDELAZIZ Chahrazed et Mlle BOUZID Nabila pour l'obtention du diplôme de Master hydrobiologie marine et continentale, spécialité : ressources halieutiques) a permis d'apporter des éléments d'informations sur quelques paramètres de la biométrie, de la croissance et de l'histologie d'*Euthynnus alletteratus* capturée dans la baie de Mostaganem. L'étude est fondée sur un échantillonnage dans la baie de Mostaganem. Les relations calculées mettent en évidence, une allométrie minorante entre la longueur totale et la longueur fourche et aussi entre la taille et le poids. Cela exprime que la longueur totale croît moins vite que la longueur fourche et que la longueur totale (Lt) croît moins vite que le poids total (Wt). Les paramètres de croissance de Von Bertalanffy, ont été déterminés par l'étude des structures de taille. La longueur asymptotique (L_{∞}) chez *Euthynnus alletteratus*; le coefficient de croissance (K), qui détermine la rapidité du poisson d'approcher la longueur asymptotique. L'étude histologique a permis d'une part d'étudier l'anatomie microscopique des quelques organes cibles comme le foie, les testicules, le cœur et le muscle.

SCRS/2021/082 - In this study we present the analysis of the stock structure of Wahoo (*Acanthocybium solandri*) using the mitochondrial control region as genetic marker. We analyzed 276 individuals distributed in four locations in the east and west Atlantic. Samples were from: North East Atlantic (AT-NE/BIL94B) (Canary Islands, Spain), from South east Atlantic (AT-SE/BIL97) (Côte d'Ivoire and Gabon) and South West Atlantic (AT-SW/BIL96). Four of individuals from South West Atlantic (AT-SW/BIL96) were genetically identified as *Scomberomorus cavalla*. The genetic comparison of the four locations failed to show genetic differences. This result suggests a single genetic pool of the Wahoo in the whole Atlantic. Based on these results, ICCAT should reconsider their management strategies for this species in the area studied.

SCRS/2021/083 - The wahoo, *Acanthocybium solandri*, a widely distributed oceanic fish is one of the most important species caught in the tropical oceans. Recent attempts on assessing the Atlantic stocks were carried out in the Northeast, Northwest and the Southeast, but in general, the results were contrasting due to the use of different methodologies or different data availability. In this study, after an initial step of data gathering, a decision support tool (FishPath) was used to select the most appropriate assessment methods to assess the SWA wahoo. Two different length-based assessments methods (LB-SPR and SS-DL-tool) were selected. Data on life history was gathered from scientific literature, and size compositions were available from several sources for five years, between 1998 and 2019. The results were consistent between methods, indicating a very low stock status. The estimated SPR were higher when considering dome-shaped selectivity than when considering logistic selectivity for the years between 1998 and 2011 but agreed for the final year (0.2). The stock depletion estimates also showed a low stock status in the final year (~0.18) for both selectivity assumptions.

SCRS/2021/084 - Under the current knowledge, the blackfin tuna *Thunnus atlanticus* inhabits warm waters above the 20°C isotherms of the western Atlantic Ocean from Cape Cod/US (40°N) to Rio de Janeiro/Brazil (22°S). The southernmost previously recorded catch for the species was at 28° 27'S in 1972. In this paper, we recorded the first landing of the species at the southernmost state of Brazil, Rio Grande do Sul, in 2019 and catches south of 34° S, a southward expansion of 6 degrees of latitude (~660 km). Using catch and effort data, we described a southward displacement of the species distribution and its fishing grounds. Since 2000, the quinquennial catches of *T. atlanticus* per trip and the frequency of landings with the species have increased for three fishing fleets (pole and line, handline and pelagic longline) in southern Brazil. The spatial distribution of the catches has moved southward mainly for the hand line fishing fleet, which is the most important for the species. The oceanography of three fishing locations recorded during the hand line trip showed that the species were in waters warmer than 21° C at the southern edge of the Brazil current

while displacing southward. In southern Brazil, sea surface temperature anomalies increased from 1960 to 2017, with a more pronounced increase since early 2000 when the values were mostly positive. The size composition of the catches indicated that almost all individuals were adults, larger than the sizes at first maturity. All the evidence supports the conclusion that the species distribution needs to be displaced southward until 34°S and that this phenomenon may have been driven by the intensification of the southward flow of the Brazil current.

SCRS/2021/085 – This document presents a detailed and specific protocol for sampling, preparing and storing of first dorsal fin spine of small tuna species.

SCRS/2021/086 - The scientific work presents the attempt to estimate the status of Frigate tuna stock in the Northeast Atlantic. Stock status estimates were obtained based on biological data from by-catch of Russian resources studies. Analysis of Frigate tuna length composition allowed to obtain estimates of life history parameters. Bertalanffy equation parameters were calculated using the ELEFAN procedure in R ($L_{\infty} = 48.6$ cm, $k = 0.48$). Lengths where 50% and 95% of the fish are mature were calculated by the FSA package in R ($L_{mat50} = 30.1$ cm; $L_{mat95} = 41.2$ cm). A qualitative assessment of Frigate tuna stock status was performed based on the Length-Based Spawning Potential Ratio (LBSPR) methodology. The spawning potential ratio (SPR) was 0.26 in 2015-2016, which is below the biological target reference point and formally indicates the status of overfishing stock.

SCRS/P/2021/029 – Not provided by the authors.

SCRS/P/2021/030 – Not provided by the authors.

SCRS/P/2021/031 – Not provided by the authors.

SCRS/P/2021/032 – Not provided by the authors.

SCRS/P/2021/033 – In this study, we provided an exploratory analysis of the reproductive parameters for *Sarda sarda* within the scope of SMTYP. It was analyzed 420 fish for the preliminary analysis of L_{50} using microscopic data, and 876 fish for L_{50} estimation and determination of the spawning season, combining macroscopic data and histological analysis. Data were analyzed by ICCAT areas and grouped by tentative stocks according to Viñas et al. (2020). For both analyses, the L_{50} for the Mediterranean area shows the best estimates and coverage of sizes. In contrast, more small-sized individuals are needed to better fit the logistic curve in the NE-ATL. It was not possible to adjust the logistic curve for the SE-ATL due to the narrow size range of analyzed fish. The temporal coverage in the Mediterranean and NE-Atlantic (from May to March) was better than in SE-Atlantic (May to October). In the Mediterranean and for stock 1 (Mediterranean + Portugal), spawning was observed from May to July and, in the NE-ATL, spawning was reported in all months, except September. In the SE-ATL, spawning was observed for all sampled months.

SCRS/P/2021/034 - Not provided by the authors.

SCRS/P/2021/035 - Length-weight relationships (LWRs) and relative condition factor are of great importance in fishery assessment studies since it provided information about the growth of the fish. LWRs for 3 small tuna fish species collected from the SMT_ICCAT project in Mediterranean and Atlantic Ocean, were established, and their growth condition was evaluated. The results indicated that all species exhibited a negative allometric growth and tended to be thinner. A significant difference was observed between b values during the warm and cold periods for *Acanthocybium solandri*, *Euthynnus alletteratus* and *Sarda sarda*. The relative condition factor (K_n) fluctuated. The current study provided the first baseline data about LWRs and relative condition factor of fish species from Atlantic Ocean.

Appendix 5

Tables a to m. Small tuna species standard SCRS catalogues on statistics (Task 1 and Task 2) of the major ICCAT small tuna species by stock/area, major fishery (flag/gear combinations ranked by order of importance) and year. Only the most important fisheries (representing about 95 % of Task 1 total catch) are shown. For each data series, Task 1 (DSet= 't1', in tonnes) is visualised against its equivalent Task 2 availability (DSet= 't2') scheme. The Task 2 colour scheme, has a concatenation of characters ('a'= T2CE exists; 'b'= T2SZ exists; 'c'= CAS exists) that represents the Task 2 data availability in the ICCAT-DB. See the legend for the colour scheme pattern definitions."

Table	Species	Scie. Name	% weight in Task I (1950-2019)	Order (#)	Stock/area
a	BLF	Thunnus atlanticus	2.0	8	A+M
b	BLT	Auxis rochei	4.6	7	A+M
c	BON	Sarda sarda	33.4	1	AT
d	BON	Sarda sarda		1	MD
e	BRS	Scomberomorus brasiliensis	4.9	6	A+M
f	COM	Scomberomorus commerson	0.7	12	MD
g	FRI	Auxis thazard	12.5	3	AT
h	KGM	Scomberomorus cavalla	11.1	4	A+M
i	LTA	Euthynnus alletteratus	14.3	2	AT
j	LTA	Euthynnus alletteratus		2	MD
k	MAW	Scomberomorus tritor	2.0	9	A+M
l	SSM	Scomberomorus maculatus	11.2	5	A+M
m	WAH	Acanthocybium solandri	2.0	10	A+M
(not enough data)	BOP	Orcynopsis unicolor	0.8	11	A+M
(not enough data)	CER	Scomberomorus regalis	0.4	13	A+M

Legend (t2)	
a	t2ce
b	t2sz
c	cas
-1	no T2 data
a	t2ce only
b	t2sz only
c	cas only
bc	t2sz + cas
ab	t2ce + t2sz
ac	t2ce + cas
abc	all

SMT INTERSESSIONAL MEETING, ONLINE 2021

Table a. SCRS catalogue: BLF[AT] (*Thunnus atlanticus*).

		TOTAL	3888	4202	4353	3535	2719	4051	4488	3258	3395	3203	2483	4034	4756	1303	1926	1031	1937	1927	1669	1442	1837	2083	2849	2134	1152	1306	1920	1334	1539	1252									
Species	Stock	Status	FlagName	GearGrp	DSet	1990	1991	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	Rank	%	%cum			
BLF	A+M	CP	U.S.A.	RR	t1		0		389	482	518	388	469	647	568	288	420	287	365	638	191	806	402	631	594	888	946	1893	1301	551	725	1224	904	1025	724	1	24%	24%			
BLF	A+M	CP	U.S.A.	RR	t2	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	1					
BLF	A+M	CP	EU.France	UN	t1	865	1210	1170	1140	1330	1370	1040	1040	1040	1040	1040	1040	1040																			2	19%	42%		
BLF	A+M	CP	EU.France	UN	t2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	2				
BLF	A+M	CP	Venezuela	PS	t1	935	1241	1905	1007	13	621	691	415	907	844	472	891	324	204	605	121	165	742	202	291	238	416	195	155	69	76	161	25	33			3	18%	61%		
BLF	A+M	CP	Venezuela	PS	t2	a	a	a	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	-1		3			
BLF	A+M	CP	Grenada	TR	t1	293	195	146	253	189	123	164	126	233	94	164	223	255	335	268	306	371	291	290	291	291	291	291	291	291							4	7%	68%		
BLF	A+M	CP	Grenada	TR	t2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	4				
BLF	A+M	CP	Venezuela	BB	t1	215	357	243	214		64	60	108		224	859	821	107	127	104	71	34	29	1	92	13	25	25	4	3	35	4		0		5	5%	73%			
BLF	A+M	CP	Venezuela	BB	t2	a	-1	a	ab	ab	ab	ab	b	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	a	ab	ab		-1		5				
BLF	A+M	NCO	Dominican Republic	UN	t1	520	536	110	133	239	892	892	231	158	18	19																					6	5%	78%		
BLF	A+M	NCO	Dominican Republic	UN	t2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	6			
BLF	A+M	CP	Brazil	UN	t1	317	74	12		6		382	297	55	55	38	149	1518				240		248	0							31	33				7	4%	82%		
BLF	A+M	CP	Brazil	UN	t2	-1	-1	-1		-1		-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	7			
BLF	A+M	NCO	Sta. Lucia	TR	t1													96	169	96	126	182	151	179	165	203	229	192	147	104	80	156	119				8	3%	85%		
BLF	A+M	NCO	Sta. Lucia	TR	t2													-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	8			
BLF	A+M	NCO	Cuba	BB	t1	487	318	196	54	223	156	287	287																									9	3%	88%	
BLF	A+M	NCO	Cuba	BB	t2	-1	-1	-1	-1	-1	-1	-1	-1					b																			9				
BLF	A+M	CP	Brazil	BB	t1	16	56	35	20	31	153	265	93					151	1	118	90		233	18	10	8	40	56	18	130	0			100	50		10	2%	90%		
BLF	A+M	CP	Brazil	BB	t2	-1	a	a	-1	-1	-1	-1	-1				-1	a	-1	-1		ab	-1	-1	a	-1	a	a	a	-1	a	a	a	a	a	a	a	10			
BLF	A+M	CP	Brazil	LL	t1	2		2	2	1		2	28						1	2	0	0		1	1	68	92	111	262	158	119	159	121				11	1%	92%		
BLF	A+M	CP	Brazil	LL	t2	-1		-1	-1	-1		-1	-1						a	a	a	a	a	a	a	ab	-1	a	a	a	a	a	a	a	a	a	a	11			
BLF	A+M	CP	U.S.A.	LL	t1	51	108	123	87	10	55	49	62	43	27	24	28	22	14	13	13	10	5	4	8	10	9	10	7	11	11	8	15	16	21		12	1%	93%		
BLF	A+M	CP	U.S.A.	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	ab	12		
BLF	A+M	CP	Curaçao	UN	t1	70	60	60	65	60	50	45	45	45	45	45	45	45																				13	1%	94%	
BLF	A+M	CP	Curaçao	UN	t2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	13		
BLF	A+M	CP	Brazil	HL	t1																					5											14	1%	95%		
BLF	A+M	CP	Brazil	HL	t2																				a	-1		a	-1	-1	a	a	a	a	a	a	a	14			
BLF	A+M	CP	Venezuela	LL	t1				3	8	3	3	23	19	348		38	66	9				1	0		0	1	2	1	0	1	1	1	4	9	4		15	1%	95%	

SMT INTERSESSIONAL MEETING, ONLINE 2021

Table f. SCRS catalogue: COM[MD] (*Scomberomorus commerson*).

		TOTAL																																					
		1393	405	463	770	688	1036	1348	951	1087	1037	953	1128	1898	1742	1595	1001	1087	1564	1810	1778	1625	978	628	520	709	790	1007	1113	1128	797	Rank	%	%cum					
Specie	Stoc	Statt	FlagName	GearG	DSé	1990	1991	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	Rank	%	%cum	
COM	MED	CP	Egypt	UN	t1	86	144	112	299	270	530	1071	594	576	562	548	778	1301	903	986	426	1087	1564	1810	1689	1578	939	494	478	658	699	895	1019	1017	696	1	72%	72%	
COM	MED	CP	Egypt	UN	t2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	1			
COM	MED	CP	Algerie	UN	t1	1307	261	315	471	418	506	277	357	511	475	405	350	597	839	609	575																2	25%	97%
COM	MED	CP	Algerie	UN	t2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1																2		
COM	MED	NCO	Israel	UN	t1			36																	89	47	39	134	42	42	42	45	42	42	42	3	2%	99%	
COM	MED	NCO	Israel	UN	t2			-1																	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	3			
COM	MED	NCO	Lebanon	UN	t1																							9	49	67	52	69	59				4	1%	100%
COM	MED	NCO	Lebanon	UN	t2																							-1	-1	-1	-1	-1	-1	-1	-1	4			

SMT INTERSESSIONAL MEETING, ONLINE 2021

Table h. SCRS catalogue: KGM[A+M] (*Scomberomorus cavalla*).

		TOTAL	10420	13241	14691	16331	14777	14930	17782	19815	16394	17717	16342	15408	17258	15863	12830	11766	8252	17936	7344	7826	11697	10452	10151	9712	11039	9899	10834	11251	11840	11781										
Species	Stock	Status	FlagName	GearGrp	DSet	1990	1991	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	Rank	%	%cum				
KGM	A+M	CP	U.S.A.	RR	t1	1931	6385	7073	7046	5878	5246	4731	5933	4732	3660	4448	4358	3952	4619	4619	4619																					
KGM	A+M	CP	U.S.A.	RR	t2	b	b	b	b	b	b	-1	a	a	a	a	a	a	a	a	a	a	a																			
KGM	A+M	CP	Mexico	LL	t1	2689	2147	3014	3289	3097	3214	4661	4661	3583	4121	3688	4200	4453	4369	4564	3447	4201	3526	3113	3186	3040	3130	3090	3335	3019	3281	3130	3233	3825	3231	2	27%	58%				
KGM	A+M	CP	Mexico	LL	t2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1		
KGM	A+M	CP	U.S.A.	HL	t1	167	696	620	769	928	1105	1297	1532	1335	1363	1436	1370	1402	1680	1672	1487	1823	12506	2063	3058	2635	2318	2034	1691	2179	1853	2145	2495	2311	2571	3	15%	73%				
KGM	A+M	CP	U.S.A.	HL	t2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1		
KGM	A+M	CP	Brazil	UN	t1	2069	959	940	1380	1365	1328	2887	2398	3595	3595	2344	200	2316	3311	247	201	315	33	0																		
KGM	A+M	CP	Brazil	UN	t2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
KGM	A+M	CP	Venezuela	UN	t1	1069	1228	1307	800	2484	2485	2139	2139	340	2424	2424	2424	2424																								
KGM	A+M	CP	Venezuela	UN	t2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
KGM	A+M	CP	Trinidad and Tobago	UN	t1	424	657		1192		471	1029	875	746	447	432	410	1457		801	577	747	661	566	1043	1001	1001	720	391	494	494		494	494	494	494	6	5%	91%			
KGM	A+M	CP	Trinidad and Tobago	UN	t2	-1	-1		-1		-1	-1	-1	-1	-1	-1	-1	-1	-1	a	a	a	a	a	-1	a	a	a	a	a	a		-1	-1	-1	-1	-1	-1	-1	-1	-1	
KGM	A+M	CP	U.S.A.	TR	t1	1731	830	974	740	544	371	281	540	431	447	596	561	343	375	478	559	665	655	557																		
KGM	A+M	CP	U.S.A.	TR	t2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
KGM	A+M	CP	U.S.A.	GN	t1	294	37	178	646	75	280	415	353	340	486	244	240	194	195	281	422	315	309	376	451	345	272	230	253	323	287	289	288	287	368	8	2%	96%				
KGM	A+M	CP	U.S.A.	GN	t2	ab	ab	ab	b	b	b	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
KGM	A+M	NCC	Guyana	GN	t1							270	440	398	214	239	267	390	312	245	168	326	174	91	59	75	90	99		358	314	192	143									
KGM	A+M	NCC	Guyana	GN	t2							-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
KGM	A+M	CP	U.S.A.	UN	t1	0	265	498	409	403	344		333	358	531	494	38	37	94	74	48	27	16	6	11	32	26	19	14	3	1	1	0	0		9						
KGM	A+M	CP	U.S.A.	UN	t2	b	b	b	b	b	b	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
KGM	A+M	NCO	Dominican Republic	UN	t1	33	34	47	52			589	288	230	226	226	226																									
KGM	A+M	NCO	Dominican Republic	UN	t2	-1	-1	-1	-1			-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	

SMT INTERSESSIONAL MEETING, ONLINE 2021

Table 1. SCRS catalogue: SSM[A+M] (*Scomberomorus maculatus*).

		TOTAL	12782	15318	16285	16317	14490	13697	16571	15403	8877	9837	8220	8383	9414	9793	8119	10472	6308	6118	5900	6199	11788	10916	10156	12684	7798	7741	8668	8331	4331	13112								
Species	Stock	Status	FlagName	GearGrp	DSet	1990	1991	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	Rank	%	%cum		
SSM	A+M	CP	Mexico	LL	t1	8194	8360	9181	10066	8300	7673	11050	11050	5483	6431	4168	3701	4350	5242	3641	5723	3856	3955	4155	4251	4128	4026	3321	3581	3857	4077	3820	3701	4321	3870	1	53%	53%		
SSM	A+M	CP	Mexico	LL	t2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	1				
SSM	A+M	CP	U.S.A.	RR	t1	106	2349	2686	1887	1471	1084	1364	1871	1452	1920	2335	2634	2944	2356	2356	2356					5793	4976	4965	7211	3922	3652	4825	4611	6	6620	2	25%	78%		
SSM	A+M	CP	U.S.A.	RR	t2	b	b	b	b	b	b	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1					-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	2			
SSM	A+M	CP	U.S.A.	GN	t1	2227	2961	2704	3028	2779	2094	1354	1416	1350	1163	1208	1260	976	1117	801	1265	1295	1201	971	1086	1029	1059	1044	1051						1748	3	12%	90%		
SSM	A+M	CP	U.S.A.	GN	t2	b	b	b	b	b	b	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1																3			
SSM	A+M	NCO	Dominican Republic	UN	t1	1290	728	735	739	1330	2042	2042	231	191	125	158	158	158																			4	3%	93%	
SSM	A+M	NCO	Dominican Republic	UN	t2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1																	4		
SSM	A+M	CP	U.S.A.	UN	t1	120	181	224	128	84	75	67	141	72	75	195	439	478	887	1044	738	725	602	363	483	423	454	433	441						213	5	3%	96%		
SSM	A+M	CP	U.S.A.	UN	t2	b	b	b	b	b	b	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	5				
SSM	A+M	CP	U.S.A.	HL	t1	21	86	22	41	28	103	74	70	82	109	151	181	211	188	273	384	326	339	407	373	390	383	387	385						656	6	2%	98%		
SSM	A+M	CP	U.S.A.	HL	t2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	6				
SSM	A+M	NCO	Cuba	TR	t1	538	538	611	310	409	548	613	613	236																							7	1%	100%	
SSM	A+M	NCO	Cuba	TR	t2	-1	-1	-1	-1	-1	-1	-1	-1	-1																							7			

Small Tuna Workplan for 2022

This workplan foresees both short and long-term objectives (see specific timeframes below).

Progress on the biological studies of Small Tunas :

- *Background/objectives:* The SMTYP started in 2016-2017 with the initial aim of recovering small tunas historical data (statistical and biological data) from the main ICCAT fishing areas including a specific component of biological studies. A consortium led by Univ. Girona was set in 2018 for the collection of samples aiming biological studies (reproduction and aging LTA, BON WAH) as well as stock (LTA, BON,WAH, FRI, BLT) and species (LTA, FRI, BLT) differentiation studies. In 2020, new consortium led by Brazil (FADURPE) was set to continue these studies. The program is ongoing and currently covers different activities related to biological studies.
- *Priority:* High (1st priority with financial implication)
- *Leader/Participation:* In 2021, the consortium led by Brazil (FADURPE) will continue the biological studies (reproduction and aging) as well as stock and species differentiation studies.
- *Timeframe:* Ongoing work with annual updates scheduled to be provided to the SMT Species Group.

Conventional tagging, recovery and awareness activities

- *Background/objectives:* Following the AOTTP tagging activities and results of the SMTYP from 2018 to 2021, the Group recognized the importance of increasing conventional tagging, recovery and awareness campaigns aimed at artisanal fisheries, and the support for further conventional tagging of wahoo in the Canary Islands and little tunny in the Gulf of Cadiz and the Alboran Sea (Portugal and Spain). The latter correspond to the areas where AOTTP did not promoted tagging campaigns of these species. This would complete the information provided by the Program (growth, reproduction and stock structure) in order to define stock boundaries for those species.
- *Priority:* High (2nd highest priority with financial implication)
- *Leader/Participation:* EU-Spain and EU-Portugal, with collaboration of CPCs willing to participate
- *Timeframe:* A SCRS paper or presentation will be presented during the next Species Group meeting

Revision of small tunas L/W relationships at stock level:

- *Background/objectives:* There are several L/W equations available for small tunas at local level, and several more are being currently developed by various CPCs/national scientists. The Group recommends that joint analyses are carried out using detailed data collected by observer, so that L/W relations representative of the stocks at regional level can be presented and adopted by ICCAT.
- *Priority:* High
- *Leader/Participation:* EU-Spain, with collaboration of CPCs willing to participate/share observed L/W data from observer and sampling programs. EU- Spain and Portugal, Morocco and Brazil have already committed to participate. Other CPCs are expected to join this collaborative effort.
- *Timeframe:* The leader (Pedro Pascual, EU-Spain) will soon circulate a data template and CPCs are invited to submit individual observations of length (cm, SFL) and weight (g, total weight) data on this template by January 2022. A SCRS paper will be presented to the next meeting of the Group in 2022.

Updating the biological meta-database:

- *Background/objectives:* In 2016, the SMT Group started a biological meta-database. The Group recognized the importance of continuously updating this database as new biological information becomes available, also developing criteria for replacing existing parameters when available. Such information is then provided to update the SMT executive summaries and will eventually be used for both qualitative and quantitative assessments for the different species and stocks.
- *Priority:* High

- *Leader/Participation*: EU.PRT, with collaboration of CPCs willing to participate, will continue to update the meta-database and provide updated information (in the form of SCRS papers or presentation) to the Species Group. The next update is planned for the next meeting of the Group in 2022. Scientists that have access to recent literature on SMT biology that can inform this database are encouraged to send that information to the coordinator and the SMT chair. Leaders: Pedro G. Lino and Rubén Muñoz-Lechuga (EU-Portugal)
- *Timeframe*: A SCRS paper will be presented annually to the Species Groups or Intersessional meeting.

Updating and/or applying the Data-Limit Models:

- *Background/objectives*: The SMT Group started applying data-limited methods in 2016 and, although the Group has improved in applying a range of models, the robustness still needs to be evaluated before they can be used to provide management advice. In 2022 the Group will develop the specific ToRs and an agenda for the proposed workshop on data-limit models well before the 2022 intersessional meeting.
- *Priority*: Medium (2nd highest priority with financial implication)
- *Leader/Participation*: Brazil and Morocco will continue to update the application of Data-Limited methods to SMT, with collaboration of CPCs willing to participate.
- *Timeframe*: A workshop in Data-Limit models could be held immediately after (back-to-back) the 2022 intersessional meeting of the Small Tunas Species Group, which would allow the reduction of travel related costs. This workshop should be updated in 2024, also in the format back-to-back the 2024 intersessional meeting of the Small Tunas Species Group. Also, SCRS papers to be presented annually to species Group meetings or Intersessional meeting.

Calibration and adopting internationally agreed Maturity scales:

- *Background/objectives*: During 2020 ICCAT Workshop, studies on small tunas on growth and reproduction, including drafting protocols and training of sample processing and analysis of maturity stage, were carried out. However, the Group feels that further work still needed as regards the calibration and adopting internationally agreed maturity scales for *Acanthocybium solandrii*, *Auxis rochei*, *Auxis thazard*.
- *Priority*: low (3rd highest priority with financial implications)
- *Leader/Participation*: Spain will continue to lead the reproduction studies, with collaboration of CPCs willing to participate.
- *Timeframe*: A new workshop on maturity would be held in 2023. Also, SCRS papers to be presented annually to species Group meetings or Intersessional meeting.