REPORT OF THE 2018 ICCAT INTERESSIONAL MEETING
OF THE SHARKS SPECIES GROUP
(Madrid, Spain, 2-6 July 2018)

1. Opening, adoption of agenda and meeting arrangements

The meeting was held at the ICCAT Secretariat in Madrid, 2-6 July 2018. Dr Enric Cortés (USA), the Species Group ("the Group") rapporteur and meeting Chairman, opened the meeting and welcomed participants. Mr. Camille Jean Pierre Manel (ICCAT Executive Secretary) welcomed the participants and highlighted the importance of the issues to be discussed by the Group aimed at the requests made by the Commission regarding sharks species for the current and upcoming years. The Chair proceeded to review the Agenda, which was adopted with some changes (**Appendix 1**).

The List of Participants is included in **Appendix 2**. The List of Documents presented at the meeting is attached as **Appendix 3**. The abstracts of all SCRS documents presented at the meeting are included in **Appendix 4**. The following served as rapporteurs:

Sections	Rapporteur
Items 1, 11	M. Neves dos Santos
Item 2	E. Cortés, Y. Semba, R. Coelho
Item 3	C. Palma, M. Ortiz
Item 4	N. Abbid, F. Hazin
Item 5	Y. Semba, E. Cortés
Item 6	R. Coelho, D. Rosa, C. Santos
Item 7	D. Courtney
Item 8	H. Bowlby, Y. Swimmer, F. Hazin
Item 9.1	D. Die
Item 9.2 - 9.5	E. Cortés
Item 10	E. Cortés, D. Die

2. Review of the activities and progress of the SRDCP

2.1 Habitat use

Document SCRS/2018/094 provided an update of the study on habitat use for shortfin mako (SMA), developed within the ICCAT Shark Research and Data Collection Program (SRDCP). Currently, all phase 1 (2015-2016) tags and 11 tags from phase 2 (2016-2018) have been deployed by observers on Portuguese, Uruguayan, Brazilian and US vessels in the temperate NE and NW, Equatorial and SW Atlantic. Data from 32 tags/specimens are available and a total of 1260 tracking days have been recorded. Results showed shortfin makos moved in multiple directions, travelling considerable distances. Shortfin mako sharks spent most of their time above the thermocline (0-90 m), between 18 and 22°C. The main plan for the next phase of the project is to continue the tag deployment during 2018 in several regions of the Atlantic.

The Group discussed particularly the long track of one SMA that moved from the equatorial area to the temperate SE along the African continent, crossing the hemispheres. The authors clarified that that particular specimen was a small female (185 cm FL) tagged in November 2017 and tracked during a 4 month period. The Group also questioned if such track would have implications for the stock assessments in terms of stock boundaries. At this point the majority of the tagging data does not seem to contradict the currently assumed stocks (North and South Atlantic stocks). The Group was also informed that that area off Namibia is a hotspot where juvenile sharks are mostly caught.
The Group also commented on other aspects that can be explored from these tagging results, as for example estimation of natural mortality (e.g., know-fate models).

The Secretariat informed the Group that it is currently in the process of developing a database that can hold the satellite tagging data.

2.2 Age and growth

Document SCRS/2018/095 presented results from the ICCAT SRDCP regarding age and growth for SMA in the South Atlantic. Data from 332 specimens, ranging in size from 90 to 330 cm fork length (FL) for females and 81 to 250 cm FL for males were analyzed. The von Bertalanffy growth equation with fixed L_0 (size at birth = 63 cm FL) with resulting growth parameters of L_{INF} = 218.5 cm FL, k = 0.170 $year^{-1}$ for males and L_{INF} = 263.1 cm FL, k = 0.112 $year^{-1}$ for females, seemed to underestimate asymptotic size for this species, while overestimating k. Given the poorly estimated parameters we cannot, at this point, recommend the use of these South Atlantic growth curves.

The Group requested a clarification on the monthly/seasonal availability of the samples, related with the possibility to conduct age verification using marginal increment and/or edge analysis. The authors clarified that age verification with those methods was attempted but it was not possible with the current sample distribution.

The Group commented that the different assumptions regarding band periodicity have implications for the growth models. Currently this study is using the criteria of band count that were established at the 2016 age and growth workshop following mostly the Natanson *et al.* (2006) method, that in practice corresponds to shadow bands deposited in the juveniles but not in the adults. The Group also suggested the exploration of other growth models, as well as considering Bayesian models with a prior for L_0 instead of fixing this parameter. This is something that can be explored and tested in the future.

The Group also discussed considering a meta-analysis as a way to include variability in the growth curves for the stock assessments.

The Group noted that the revised ICCAT conventional tagging database now has sex related information, but for SMA there are only a few specimens (< 1%) where this information was collected and provided so this will be of limited use to try to use in integrated growth models.

The Group noted that for the South Atlantic there are currently no vertebral samples from the SE region, and encouraged CPCs with observer programs in that area to consider collecting vertebrae and participate in this study. Japan indicated that they have collected some samples (33) from the SE region. Namibia mentioned that they can provide size data for sharks and also collect and send SMA vertebral samples to contribute to the age and growth study.

2.3 Population genetics

A brief presentation was made on the current situation of the analysis of the genetic structure of shortfin mako shark, and the future workplan was explained. In the previous analysis, a unique genetic structure was suggested from specimens collected off Uruguay. To further investigate the genetic population structure of shortfin mako in the Atlantic, a new approach using mitochondrial-genome sequencing is proposed.

The Group welcomed the proposal to use NGS (next generation sequencing) techniques to analyze mitochondrial DNA of shortfin mako that could clarify and provide better knowledge on the stock delimitation of this species in the Atlantic. Currently, the main uncertainty is related with the differences between the SW and SE Atlantic, especially related with the differences in the Uruguayan samples. Additional samples from Uruguay, preferably spread along the year, might be needed. The Group also discussed the possibility to try to get samples from the SE Pacific (e.g., Chile) to see if there is some type of relation with the SW Atlantic.

2.4 Reproductive biology

The Group was informed about ongoing work on reproduction of shortfin mako and porbeagle sharks that is being lead by NOAA scientists. The Group encouraged the continuation of this work, and agreed that it might be important to have a workshop in the future to standardize maturity scales across observer programs. Such workshop would be integrated in the ongoing work of the SRDCP.

2.5 Post-release mortality

SCRS/2018/105 presented an update of the post-release mortality study of shortfin mako developed within the ICCAT SRDCP. Up to date, 34 tags (14 sPATs and 20 miniPATs) have been deployed by observers on Brazilian, Portuguese, Uruguayan, and US vessels in the temperate NE and NW, Equatorial and SW Atlantic. Data from 28 out of 34 tagged specimens could be used to obtain preliminary information regarding post-release mortality, resulting in a total of 7 mortality and 21 survival events.

The Group noted that from these results there does not seem to be a direct relationship between the post-release mortality and the fish condition that is recorded by the onboard observers at hauling. One possible explanation is the difficulty for the observers to correctly and consistently estimate the condition of the sharks, particularly in cases of sharks that are released without coming onboard and where making such direct observations is very difficult.

Given that recording the external condition of sharks might not seem a very good predictor of post-release mortality, the Group suggested that we may need additional indicators, including physiological indicators (e.g., taking blood samples).

The Group also noted that with these preliminary results the mortality of sharks whose hooks have been removed is higher than in sharks where the hooks are not removed, because of the additional handling time required and/or further damage caused by removing the hook. These results might in the future contribute to provide best practices to promote the increase of post-release survivorship of the sharks.

General comments related with the SRDCP and future plans

The Group acknowledged the substantial and collaborative work that is being carried out under this ICCAT Research Program and encouraged its continuation and support in the future. The Group was also informed of other ongoing national programs that can contribute data, such as Canada's, which is currently deploying 30 sPATs on SMA and 30 sPATs on POR during 2018-2019, and 12 new miniPATS for POR from a US/NOAA project that will be deployed in US, Uruguay and Portuguese vessels.

The Group was informed by the Secretariat that 20 tags are being acquired this year within the SRDCP. While the original plan was to continue the work mostly on SMA, given that some other national programs are also contributing data on this species, the Group recommended that some tags could be allocated to other priority shark species, with particular emphasis on species that are currently prohibited to be retained in ICCAT fisheries. **Appendix 5** provides a review of previous satellite tags deployed on those species in the Atlantic. With this information, the Group recommended that of the new 20 miniPAT tags, 12 should be deployed on SMA as initially planned and 8 tags on silky sharks. Silky sharks were selected because virtually nothing is known of their movements in the Atlantic (only 3 animals tagged off Cuba) and they were the most vulnerable species in the 2010 ERA (Cortés *et al.*, 2010).

Namibia asked the Group for assistance with possible tagging projects on sharks. Scientists from Namibia want to start a shark project but they do not have the skills or equipment to do so. Observers and scientists would need training. The Group was asked to share or extend guides on tagging or sampling procedures to assist countries like Namibia to develop proper sampling methods. Namibia also asked the Group to consider deploying tags in future research in the Benguela area.

3. Review of updated data from the Secretariat and new data received from national scientists, with special emphasis on shortfin mako and porbeagle sharks

The Secretariat presented to the Group, the most up-to-date information (Task I, Task II, and, conventional tagging) on sharks available in the ICCAT database system (ICCAT-DB). The statistics of the three major shark species (BSH: blue shark, SMA: shortfin mako, POR: porbeagle) were revised with a major focus on SMA and POR. The statistics for the group of other sharks (a large list of more than 40 species) stored in ICCAT-DB should be properly reviewed.

3.1 Task I catch data

The Group reviewed the Task I nominal catches (T1NC: landings and dead discards) of BSH, SMA and POR. No major changes (updates or corrections) were made to the catches of BSH and POR, other than the national catch revisions of the most recent years. However, for SMA, the Group adopted (as preliminary, and only for the years without official statistics) and included in T1NC the catch series estimated (the best scientific estimations available) during the 2017 shortfin mako stock assessment (Anon. 2017a). The new catch series added for the SMA Northern stock were Morocco LL (2003-2010 only, reflecting the beginning of this fishery) and Chinese Taipei LL (1981-1993). The new catch series added for the SMA southern stock were Brazil LL (1971-1998), Chinese Taipei LL (1981-1993), and China LL (2004-2006). Scientists from Morocco and Japan committed to present a scientific document with improved national longline catches for the major shark species as possible.

The Group encourages also Chinese Taipei, China PR, Brazil, and other CPCs with LL fishing activities in the ICCAT Convention area (Korea, Panama, South Africa, Philippines, etc.) to present improved T1NC estimations of the three major shark species.

Other improvements were made to T1NC in relation to fishing gears discrimination. The major one was the USA sport catch series before 2001 (BSH and SMA) which was reclassified as USA RR recreational catches. The final T1NC estimations of BSH, SMA and POR by year (1950-2017) and stock are summarised in **Table 1** (graphically shown in **Figures 1** to **3,** respectively for BSH, SMA and POR). The preliminary catches of 2017 will be updated in September 2018.

The recent updates made to T1NC (several catch series rebuilt and recovered) on the three major shark species, in particular for the last 3 decades, have improved the knowledge of the Group on how much the fishing activity in the ICCAT Convention area has impacted the stocks of these three major shark species. This historical catch rebuilding process is far from being completed and efforts should be made to also recover the earlier period (1950 through 1990). Another cause of concern is the poor knowledge of the level of discards. Only a few CPCs reported officially estimates of dead discards (**Table 2**) and live releases (**Table 3**) for the three major species. The Group reiterates to the CPCs the requirement to report discards (both dead and alive) of BSH, SMA, and POR in Task I.

Document SCRS/2018/098 presented updates to Task I Algeria shark catches for 2016 and 2017.

For practical purposes, the Group also considered the possibility of having in the future three shark species categories in addition to major and other sharks (**Table 4**), as a more efficient mode of handling the large list of shark species. The three categories proposed were: (a) Major ICCAT sharks (3 species), (b) Other ICCAT sharks (~30 species), and, (c) Non-ICCAT sharks (rest of the sharks). This classification should be studied in the future taking into account the ICCAT regulations, particularly those associated with data provision to ICCAT (e.g. include only the first two categories in the T1 & T2 forms, and all three categories in the ST09 observer data collection form).

3.2 Task II catch & effort and size data

For the three major sharks, the information available for Task II (T2CE: catch and effort, T2SZ: size samples) is very incomplete, as shown in the SCRS standard catalogues for BSH, SMA and POR (**Tables 5a** to **5g**, by stock and for the period 1998 to 2017) for the last 30 years. The CPCs were encouraged by the Group to report to ICCAT the T2CE and T2SZ missing information on sharks, requesting whenever necessary the guidance from the Secretariat.

The Group also discussed the feasibility of using quarterly catches (in particular for SMA) in SS3 modelling approaches in the future. The Secretariat informed that this catch structure depends on CATDIS (derived Task I year catches, by trimester and a 5x5 square grid). CATDIS estimations fully depend on the T2CE completeness level. Given the poor T2CE coverage for the major fleets over time ("a" marks shown in the SCRS catalogues, **Table 5[a-g]**) it is almost impossible to create CATDIS estimations for BSH, SMA and POR, with a minimum quality, unless a large T2CE data recovery plan is implemented.

3.3 Tagging data

The Secretariat presented a summary of the conventional tagging data available for the three main shark species, blue shark, porbeagle shark and shortfin mako. Tables of releases with recaptures and

corresponding maps with geographic distributions of releases and recaptures, including maps with inferred displacement of recoveries for the three species were presented (**Figure 4**). It was noted that following a prior request from the Group, a sex variable has been included in the tagging database and it is expected that CPCs can provide this information soon for both historic and new shark tagging data. Furthermore, the Secretariat is developing an electronic tagging database that will incorporate the electronic tagging information for sharks.

4. Fisheries indicators

Under this agenda item, three SCRS documents and two presentations were discussed by the Group. The summary of each of these papers is given in **Appendix 4**.

Document SCRS/2018/104 analysed the shortfin mako bycatch fishery in the south of the Moroccan Atlantic coast in terms of catches and size frequency distribution.

The Group questioned why the size structure of SMA catches for the year 2017 was different from that of the period 2014-2016. The author clarified that all the catches of this species came from the same fishing area and during the same period.

The Group also highlighted that the fish size estimated by the author was converted through the ICCAT length-weight relationship which originally used curved fork length rather than fork length. The Group suggested that the weight of individual fish be submitted to the Secretariat, because the SS3 model is able to use them directly in the 2019 stock assessment for the shortfin mako without the need to convert them into their corresponding sizes.

Document SCRS/2018/098 presented the exploitation of sharks in the Algerian coast. In response to clarifications requested by the Group, the author specified that the catch data for sharks caught by the Japanese longline vessels in Algerian waters between 2000 and 2009 for the period from April 15 to June 1 were collected on board by representatives of the Algerian Fisheries Administration. The author also informed the Group that in Algeria, the major pelagic sharks are mainly caught by small artisanal vessels targeting swordfish and small tunas using longline and trammel nets.

The Group questioned the reason why the shortfin mako did not appear in the national catch statistics during the two last years (2016-2017). The author clarified that this species was rarely caught in the Algerian coast based on the research conducted by scientists. It was explained there is a general problem of shark species identification for the national statistics, especially for the genus *Carcharhinus*. Nevertheless, it was highlighted that much effort has been put towards raising awareness for persons in charge of collecting data to deal with species identification problems, especially for sharks.

Document SCRS/2018/103 provided a standardized CPUE of the Moroccan longline fishery in the south of Moroccan Atlantic waters for shortfin mako for the period 2010-2017.

The Group encourages their continued work for the stock assessment of this species in 2019 and to consider as a possible index of abundance. It was clarified that the data used for the standardization were compiled from a variety of data sources and selected from the main fishing port that accounted for more than 50% of the total catches of shortfin mako by the longline fishery. It was also noted that the data were trip-based, which contains several operations.

The Group also discussed many detailed technical aspects. It was pointed out that the GLM equation included both “month” and “quarter” as explanatory variables, and the Group expressed their concern to use both factors at the same time. It was recommended to select only one of them and to check the data, to which the author noted that the “month” term was more informative than “quarter” in the BRT model.

The Group also suggested to check the assumption of linearity between continuous explanatory variables and the response variable in the GLM.

SCRS/P/2018/043 presented the status of shark fisheries in Liberian waters. The author pointed out that sharks are exploited as primary targets by Kru fishers using longlines and hooks generally within the 6 NM

EEZ, while the Fanti fishermen using a larger type of canoe fish outside the EEZ, targeting deep-sea pelagic species using drift nets capturing sharks as by-catch.

The Group suggested that the size data presented be submitted to the Secretariat for use in the 2019 stock assessment. The author was also requested to revise the mean sizes of some species, such as the hammerhead, as these data were inconsistent with the size frequency data. The Group suggested to carry out further analyses of catches and size data by gear because the species composition of sharks could be different among gears.

Presentation SCRS/P/2018/044 provided catches of the shortfin Mako off the coastal waters of Côte d'Ivoire (West Africa). In response to many questions asked by the Group, the author pointed out that the catches of this species come second to those of blue shark. The author also explained that shortfin mako is mainly caught by artisanal vessels. The author also highlighted that most catches of this species were landed at the Abidjan port and sold in the local market, and the catches of shortfin mako represent about 40-50% of the total pelagic sharks in Côte d'Ivoire.

Document SCRS/2018/102 analysed the influence of climatic and environmental drivers on the spatio-temporal distribution of shortfin mako shark in south-western Atlantic waters, using a GAMM (generalized additive mixed model) approach. A significant positive effect of sea surface temperature (SST) on shortfin mako catches was observed at SST ranging from 17 to 22°C, with the highest values being recorded at 19°C.

The Group suggested to treat the "month" factor as a categorical explanatory variable rather than a continuous variable with a spline. It was asked if the depth of the mixed layer was included in the CPUE standardization, and the author clarified that this factor was not considered in Document SCRS/2018/101. The author emphasized that the selected model explained about 50% of the total deviance of the response variable. The Group encouraged the author to incorporate this factor in the CPUE standardization, and suggested to utilize oceanographic estimates of the depth of the mixed layer from the World Ocean database.

The Group further asked if the type of hooks was considered in the model because there was a change in the Brazilian regulation related to the use of the circle hooks in the longline fishery. The author responded that it was not considered in the present analysis because the regulation has been introduced recently and there are few years of data.

Document SCRS/2018/101 provided the standardized CPUE of shortfin mako caught by the Brazilian tuna longline fishery in the period between 1978 and 2016, using a GLMM (generalized linear mixed model) approach. The factors quarter, year, area, and fishing strategy significantly influenced the CPUE.

It was clarified that this index was an update of the one discussed in the 2017 stock assessment for shortfin mako, and the method was slightly different but the trend of the CPUE was similar to the previous one.

The Group discussed identification of the targeting strategies. It was clarified that the identification of the fishing strategies was defined based on the analysis of the species composition, and the identification of vessels fishing for those target species. The author pointed out that every fishing operation could target different species, and emphasized that even using the set by set data it is still very difficult to evaluate the targeted species correctly.

5. Updated stock assessment of SMA with SS3 projections

Shortly after the release of Rec. 17-08, specifically paragraph10a ("In 2019, the SCRS shall review the effectiveness of the measures contained in this recommendation and provide the Commission with additional scientific advice on conservation and management measures of North Atlantic shortfin mako, which shall include: a) an evaluation of whether the measures contained in this recommendation have prevented the population from decreasing further, stopped overfishing and begun to rebuild the stock, and if not the probability of ending overfishing and rebuilding the stock that would be associated with annual catch limits at 100 t increments"), the Group interpreted this to mean a new stock assessment of shortfin mako was being requested since the only way to assess whether stock biomass (abundance) stops declining is to determine the status of the stock through an updated stock assessment. It was also noted that a new stock assessment in 2019 would likely include new data for 2016 and 2017 only. Thus it would not allow

evaluation of the effectiveness of the proposed management measures, which will only go into effect in 2018.

Based on these considerations, the Group altered its original plan to conduct a porbeagle shark assessment in 2019 in conjunction with ICES because it would not be able to conduct simultaneously a North Atlantic shortfin mako stock assessment and potentially 4 stock assessments for porbeagle (NW, NE, SW, and SE).

The co-chair of the ICES Working Group on Elasmobranch Fishes (WGEF) gave a short presentation on the work of ICES and the WGEF (SCRS/P/2018/045). Specifically there was an update on the most recent work on porbeagle carried out at the Working Group meeting in June (ICES, 2018) in preparation for the porbeagle assessment planned by ICES for 2019. The EU-France institute Ifremer carried out a porbeagle abundance survey on board a chartered longliner in May-June 2018. This survey will likely be continued in 2019 and maybe also in 2020. During the survey 32 electronic tags were deployed on porbeagle. An initial SPiCT (surplus production in continual time) analysis was carried out using French CPUE and landings data from 1950-2017. Exploratory runs covering different time periods were also carried out. Preliminary results showed that the stock biomass appears to be under or around B_{MSY} and F is estimated to be below F_{MSY}. Following on from this work, new runs will be carried out incorporating the Spanish CPUE longline data.

Although the ICCAT-ICES joint assessment of porbeagle planned for 2019 will not take place, ICES still has a commitment to carry out a porbeagle assessment and to provide advice in 2019. This will focus primarily on the NE Atlantic stock, and support from ICCAT would be welcomed. Two options were discussed:

1) ICCAT will assist the 2019 ICES assessment by:

   - supplying data to ICES when requested;
   - ensuring that there are no clashes as far as agendas of meetings are concerned to enable participation of ICCAT scientists at the assessment meeting;
   - there could be useful outcomes for ICCAT for a potential 2020 porbeagle assessment.

2) The SCRS could approach ICES about the possibility of postponing the ICES-ICCAT plan for assessing porbeagle. If ICES accepts, a plan should be developed for a successful Atlantic wide assessment in 2020. This is, of course, dependent on the commitment that ICES has, which was identified by the co-chair at the time of the ICCAT shark meeting to be to carry out the 2019 assessment. However, ICES will contact the client in the coming weeks, so continued dialogue on this issue is advised.

As far as the South Atlantic is concerned, Japan supplied information on a WCPFC assessment of porbeagle in 2017:
(https://www.wcpfc.int/system/files/SC13-SA-WP-12%20Porbeagle%20Stock%20Assessment%20Rev%202%20%286%20December%202017%29.pdf).

The issue was also raised of the low data availability for the species. Porbeagle has been on Appendix II of CITES since 2013 and other EU regulations have prohibited fishing. For countries where data are available, such as Canada, these only concern discards. This will give a disconnect to the models and methods used and the issue should be addressed prior to any future assessment. Because of the regulations, the quality of data, including those from observer programs, has changed. Observers release porbeagle and not much information is being collected. Also, for the southern stock no reference point has been identified on porbeagle. A whole new methodology should be applied for the stock assessment because it will be the first time that ICCAT will assess a species that is mostly discarded and/or not landed at all since regulations have been implemented.

The Group deemed that an updated stock assessment of North Atlantic shortfin mako would be beneficial because it would allow addressing several important issues related to the SS3 modelling platform that were left unresolved in the 2017 stock assessment (see below) as well as the inclusion of projections with SS3. The Group also considered updating the assessment for the southern stock, as most of the updated catch and CPUE information as well biological information will be available for both stocks and prepared by the same scientists.

The Group noted that Rec. 17-08 parapgraph 10, also asked that "in conducting such review and providing advice to the Commission, the SCRS shall take into account: a) a spatial/temporal analysis of North Atlantic shortfin mako catches in order to identify areas with high interactions; b) available information on growth and size at maturity by sex as well as any biologically important areas (e.g. pupping grounds); and c) the effectiveness of the use of circle hooks as a mitigation measure to reduce mortality". In that respect, the Group thought that item (a) could be potentially investigated by examining Task II data, but the Secretariat clarified that the data currently available do not include catch and effort by 5x5 degrees and will be insufficient to identify potential time-area closures. The Group also noted that for minimum size(s) (item b) and effectiveness of circle hooks (item c), these could be addressed through projections incorporating modifications on selectivity or fishing mortality rates.

Given the complexity of the package of management measures in Rec. 17-08 and the request of the Commission to evaluate these recommendations, the Group discussed three possible ways to respond to the requests: 1) wait several years for the fishery data to be informative enough to evaluate their impact, 2) use stock assessment projections with simplified assumptions (e.g. implement minimum size(s), and / or release of live caught sharks), and 3) determine how individual CPCs have implemented these measures, and through stock projections evaluate the effects of those measures.

SCRS/2018/088 proposed a future workplan for the re-evaluation of stock status for Atlantic shortfin mako. In the last stock assessment of the northern stock (2017), there remained work to be done to reduce uncertainty and thus a review of this assessment is urgently needed to clarify several issues. Regarding the stock assessment models used, especially for stock synthesis (SS3), model diagnostics, sensitivity analyses, and future stock projections are high priorities. In terms of biological parameters, a more in-depth evaluation of the changes introduced to the productivity (r) and natural mortality (M) are high priorities because the estimate of r for the northern stock in the 2017 assessment was one-half of that in the 2012 assessment and M, which is one of the most influential biological parameters in stock assessment models, also varied. A review of the abundance indices for their representativeness and catches used was also discussed and further interpretation of assessment outputs was recommended. A tentative workplan with an associated timeline for a stock assessment in 2019 was proposed.

There were discussions regarding the validity of the values of r, the intrinsic rate of population increase, used to construct a prior for this parameter in the 2017 assessment when compared to the increases shown by some of the abundance indices, which were much higher. Estimates obtained through a meta-analysis with a two-sex age-structured population matrix model (Yokoi *et al*., 2017) were also presented. In contrast, it was also noted that increases in CPUE indices do not always reflect changes in population abundance because they can be much higher than predicted by r values derived with known life history parameters. It was also noted that priors used in production and more complex models, such as integrated models, should be compatible and reflective of the same underlying life history parameters. In that respect, it was noted that the biological parameters used in the 2017 stock assessment models (BSP2JAGS and SS3) were fully compatible because the same biological parameters used to estimate r for the production models were used to analytically derive steepness or as a vector of M values input into SS3.

There were also discussions regarding CPUE indices and catches. For the CPUE indices, the need to review each index derived for each fleet was highlighted, following the evaluation method based on best practices adopted in the 2012 Shortfin Mako Stock Assessment (Anon. 2013), which has recently been updated by the ICCAT Working Group on Stock Assessment Methods (WGSAM) (Anon. 2017b). This framework will allow selection of representative indices of abundance and appropriate weighting schemes. Regarding the catches to be used in the stock assessment, the need for all fleets to reconstruct catches to the earliest time period plausible was also noted.

There were also discussions from a stock assessment standpoint. Several of these discussions centered around the timeline for data provision to the assessment analysts. Particularly for SS3, which requires longer to set up and run than production models, the Data Workshop or possibly a few weeks thereafter, was identified as the deadline to provide all data inputs and model assumptions (catches, CPUE series, size compositions, effective sample sizes, life history, selectivities, etc.) as well the range of sensitivity analyses to be done by the analysts. There were also ensuing discussions about the need to decide on data weighting schemes prior to the assessment workshop. Finally, 2017 was identified as the terminal year to be used in the assessment because Task I and II data are not received by the Secretariat until July and the Data Workshop will take place well before then.

There were also discussions regarding the presentation of projection results from different assessment models in a Kobe risk matrix as was done for the production models in the 2017 stock assessment. In that regard, the planned 2019 assessment should incorporate projections from both the production models and SS3.

The proposed work plan contemplates convening a biology study group and an assessment team to work intersessionally in preparation for the data and assessment meetings. **Appendix 6** summarizes the details of this plan.

Appendix 7 provides a table for evaluating CPUE series by Species Groups template, as adopted by the WGSAM at its 2017 meeting (Anon. 2017b).

6. Continue update of the spatio-temporal distribution and biology (age and growth, reproduction, maturity) of shortfin mako

Document SCRS/2018/096 provided an update on shortfin mako size distribution in the Atlantic. The collection of this data is part of a cooperative program within the ICCAT Sharks Working Group. A total of 43,007 shortfin mako records, mainly from observer programs, has been compiled up to date. It was shown that larger individuals occur mainly in lower latitudes while the reverse happens for smaller individuals. Records by fleet showed that some fleets have bimodal distributions while others have unimodal distributions. Sizes by sex for each fleet were similar, as well as for ICCAT statistical areas, except for BIL91 where the size difference for sex was biggest.

The Group acknowledged the advances in the work and encouraged further analysis, as this work can provide important updated contributions to the 2019 shortfin mako stock assessment. However, the Group also noted that data from some important longline fleets that catch shortfin mako is still missing, and highly encouraged those CPCs to submit data and participate in this cooperative work.

Several specific suggestions were made for this work, described as follows:

- Proposal that for the Japanese fleet the years with few observations could be removed (prior to 1997), as the sample size was very small in those years;
- Suggested that for the distribution plots, two different maps could be produced to better represent the size distributions, as currently some data points can be overlapping others. Specifically, a map with mean size distribution over a 2x2 grid was suggested, as has been produced for the Pacific (Sippel *et al.*, 2015).
- It was also noted that it could be interesting to analyse the differences in size between shallow set longlines (mainly targeting swordfish) and deep set longlines (mainly targeting bigeye tuna); leader type (monofilament vs wire) and hook type (J-hook vs circle hook). The authors will try to compile this information from the various fleets.
- Suggestion to calculate a minimum sample size needed to obtain a sufficient representativeness of the population, as a function of sample variability and maximum admitted error. A preliminary analysis on this calculation was produced and will be refined for the 2019 data preparatory meeting with specific calculations by stratum (stock/fleet/sex/year).

7. Explore the application of an alternative projection approach for Stock Synthesis to evaluate the probability of success of the measures contemplated in ICCAT Rec. 17-08

An outline of an alternative projection approach was presented which combines output from an uncertainty grid of multiple Stock Synthesis model sensitivity runs with forward projection using a software package (FLasher) developed for the Fisheries Library in R (FLR) (SCRS/2018/107). The Group noted that there may not be time to conduct alternative projections because projections with Stock Synthesis have not yet been completed. Instead the Group recommended intersessional work be completed on Stock Synthesis model diagnostics and projections from the 2017 North Atlantic shortfin mako shark stock assessment (Stock Synthesis model) (Anon. 2017a).

8. Review the effectiveness of potential mitigation measures to reduce by-catch and mortality of shortfin mako

In November 2017, ICCAT Rec. 17-08 mandated immediate implementation of a measure requiring that shortfin makos brought to the boat alive be carefully and promptly released, unless the CPC has a minimum size limit (180 cm FL for males and 210 cm FL for females) or a discard ban that prevents profit. CPCs may authorize catch, retention, transshipment, and landing of dead shortfin makos on vessels 12 m or under, and on vessels longer than 12 m that have an observer or an electronic monitoring system to collect necessary data.

In March 2018, the US implemented an emergency, 180-day rule requiring pelagic longliners to carefully release live shortfin makos and allowing the retention of only those that are dead at haulback. Commercial fishermen using other gears must release shortfin makos, dead or alive. US recreational fishermen are encouraged to release shortfin makos, but can retain those measuring 210 cm FL or more. These restrictions are predicted to reduce shortfin mako commercial landings by ~75% and recreational landings by ~83%. More permanent shortfin mako conservation measures are being incorporated into a fishery management plan amendment (NOAA, 2018).

The European Commission instructed EU Member States to ensure implementation of the measure by March 1, 2018. Since April 2018, Canada has required the release of live shortfin makos as a fishing license condition for commercial tuna and swordfish fleets and recreational fishing tournaments.

Rec. [17-08] also request the SCRS to evaluate other potential conservation measures such as circle hooks, spatial temporal analysis of high interactions and biologically important areas (e.g. pupping grounds).

Document SCRS/2018/087 detailed an analysis on the potential effect of circle hooks as a mitigation measure to reduce total mortality of shortfin mako in pelagic longline fisheries. Using the relative risk (RR) for circle vs. J hooks from a recent meta-analysis (Reinhardt *et al.*, 2017), it was found that at-vessel mortality was not reduced far enough to be able to offset the effect of increased catch rates. Under a simple evaluation with sensitivity analysis, total mortality for shortfin mako from circle hooks was estimated to be 1.6 times higher than that from J-hooks. The appropriateness of circle hooks as a mitigation measure to reduce mortality of SMA needs to be discussed carefully taking into account various sources of uncertainty. Multiple background documents were provided to support the analyses as well as the mitigation discussion.

It was noted that this work addressed a specific request from the Commission and therefore it was a very useful initial study. The Group discussed the dangers of over-simplification for research on this type of mitigation measure as well as the need to conduct species-specific research. For the analysis presented, one suggestion was to consider the variability associated with RR estimates, although it was noted that the confidence intervals for both parameters were small and the parameters themselves were highly significant. There was discussion regarding the quality of the data underlying the meta-analysis, and the limitations of the use of meta-analysis as an approach. It was noted that 3 out of 4 studies providing information on mako were conducted in the Atlantic. The catch data used to develop relative risk is more abundant, compared to the data available to evaluate post-release mortality, which is based on satellite tagging data.

Subsequent discussion focused on better understanding of post-release mortality of shortfin mako; specifically, on the need to develop post-release mortality (PRM) from circle vs. J hooks for this mortality component. Research should consider the delayed effects of gut hooking, the rate at which animals might expel hooks, and the condition of sharks at release. Also, it was noted that RR for catch rates should really be understood in terms of retention probabilities. The estimated higher catch rates of sharks on circle hooks may be due to higher rate of bite-offs with J-hooks, which may be also a function of the leader material. Since the J hooks have a much higher rate of hooking the sharks in the gut, the chance of a hooked shark to bite off the leader and escape is much higher than in the case with circle hooks, which tend to hook the shark in the mouth (e.g. Afonso *et al.*, 2011; Gilman *et al.*, 2016). The survival rate of sharks hooked in the gut that bite off and escape is, however, unknown. Experiments comparing the catch rates of circle and J hooks using wire and nylon leaders accounting for the frequency of bite-offs and any subsequent mortality on animals that escape should be undertaken.

Other mitigation measures were discussed. There was a question on whether best handling practices for pelagic sharks have been reviewed and presented for pelagic longline fisheries. A past presentation from French scientists was made available (Poisson *et al.*, 2015) and it was noted that the SCRS has not officially adopted best practice guidelines. The Group agreed that advice relative to spatial and temporal abundance patterns could not be developed from Task 1 and Task 2 data submissions that are aggregated at a high level (5x5 grid and annual). However, it was also discussed that spatial and temporal closures could become important for mitigation to minimize the potential for mortality from fisheries interactions. There would be the potential to develop new research projects to better understand the spatio-temporal distribution of the stocks and interaction with ICCAT fleets. Projections from the current Stock Synthesis assessment model would not be possible, because they will require the Group to develop assumptions about annual fishing mortality reductions by fleet, since the current assessment model formulation does not include spatial or temporal components.

9. Other matters

9.1 Responses to the Commission

9.1.1 List of elasmobranch species to be considered for inclusion in an appendix of the ICCAT Convention

The 2018 meeting of the ICCAT Convention amendment requested the SCRS to review the list of elasmobranchs that "… are oceanic, pelagic, and highly migratory…", developed by the SCRS in 2015, and to provide common names in such list. This list is considered to be a living document that is to be periodically reviewed by the SCRS whenever changes in the taxonomy require it. The Group reviewed the taxonomic revision recently conducted on mantas and devil rays (White *et al.*, 2018) and updated the list of scientific names for rays. The Group also added the English, French and Spanish common names adopted by FAO and currently used in the ICCAT databases. Two of the species of rays do not currently have FAO common names. The Group recommends this reviewed list is provided to the Commission.

SHARKS

Rhincodon typus (Smith 1828) - Whale shark, Requin baleine, Tiburón ballena

Pseudocarcharias kamoharai (Matsubara 1936) - Crocodile shark, Requin crocodile, Tiburón cocodrilo

Carcharodon carcharias (Linnaeus 1758) - Great white shark, Grand requin blanc, Jaquetón blanco

Isurus oxyrinchus (Rafinesque 1810) - Shortfin mako, Taupe bleue, Marrajo dientuso

Isurus paucus (Guitart Manday 1966) - Longfin mako, Petite taupe, Marrajo carite

Lamna nasus (Bonnaterre 1788) - Porbeagle, Requin-taupe commun, Marrajo sardinero

Cetorhinus maximus (Gunnerus 1765) - Basking shark, Pélerin, Peregrino

Alopias superciliosus (Lowe 1841) - Bigeye thresher, Renard à gros yeux, Zorro ojón

Alopias vulpinus (Bonnaterre 1788) - Thresher, Renard, Zorro

Carcharhinus falciformis (Müller & Henle 1839) - Silky shark, Requin soyeux, Tiburón jaquetón

Carcharhinus galapagensis (Snodgrass & Heller 1905) - Galapagos shark, Requin des Galapagos, Tiburón de Galápagos

Carcharhinus longimanus (Poey 1861) - Oceanic whitetip shark, Requin océanique, Tiburón oceánico

Prionace glauca (Linnaeus 1758) - Blue shark, Peau bleue, Tiburón azul

Sphyrna lewini (Griffith & Smith 1834) - Scalloped hammerhead, Requin marteau halicorne, Cornuda común

Sphyrna mokarran (Rüppell 1837) - Great hammerhead, Grand requin Marteau, Cornuda gigante

Sphyrna zygaena (Linnaeus 1758) - Smooth hammerhead, Requin marteau commun, Cornuda cruz

RAYS

Pteroplatytrygon violacea (Bonaparte 1832) - Pelagic stingray, Pastenague violette, Raya-látigo violeta

Mobula alfredi (Krefft 1868) (previously *Manta alfredi)* -

Mobula birostris (Walbaum 1792) (previously *Manta birostris)* - Giant manta, Mante géante, Manta gigante

Mobula mobular (Bonnaterre 1788) (Syn. *M. japanica*) - Devil fish, Diable de mer méditerranéen, Manta mobula

*Mobula hypostoma (*Bancroft 1839) (Syn. *M. rochebrunei)*- Lesser devil ray, Mante diable, Manta del Golfo

Mobula tarapacana (Philippi 1892) - Chilean devil ray

Mobula thurstoni (Lloyd 1908) - Smoothtail mobula, Mante vampire, Diablo chupasangre

9.1.2 Criteria for evaluating requests for exemptions to the reporting of shark regulations

CPCs have the ability to request an exemption from their reporting obligations relating to shark regulations. The Commission has asked the SCRS to help develop criteria that will be used to judge the merits of such requests. The Group was provided a check sheet developed by the Commission, which will be used to make such judgment (**Appendix 8**). The Group reviewed this list and provides the following comments:

- For those countries that request exemptions, the SCRS will be able to provide feedback on improvements on the collection of Task I data on catch and discards, Task II data on length and Observer Programs reports (ST-09) relevant to Rec. 04-10 para 1; Rec. 07-06 para 1; Rec. 09-07 para 4; Rec. 10-07 para 1 and 2; Rec. 10-08 para 3 and 4; Rec. 11-08 para 3 and 4; Rec. 11-15 para 1; Rec. 11-15 para 1; Rec. 15-06 para 2.
- The SCRS will only be able to provide feedback on whether the regulations CPCs implement to increase survival of sharks are effective if applications provide information on the specific modifications made to operations (gear changes, handling of live sharks) or results from research programs, carried out by national scientists that directly evaluated these regulations.

9.2 Interactions with the CITES Secretariat

The Group chairman reported that the Secretariat had sent a letter to the CITES Secretariat regarding the difficulties encountered by CPC scientists to collect and ship biological samples due to CITES regulations requesting that they facilitate sampling of CITES-listed species for scientific research conducted under the auspices of ICCAT research programs. The letter identified "introductions from the sea" as one of the main difficulties encountered and that a possible solution would be that a permit be issued directly to ICCAT, which would cover and be distributed to the Contracting Party institute(s) participating in a specific project. However, the US objected to this citing bad precedent-setting. CITES has not yet replied to the ICCAT request, though it is expected an answer will be provided later this year. The goal is to establish non-detrimental findings (NDF) - yet this task requires excessive work. ICCAT has confirmed that CITES does not want to present an obstacle to science and was made aware of a shark working group within CITES where this issue can be taken up.

9.3 Ecosystem report card

The Group chairman reported that a paper (SCRS/2018/076) had been submitted to the Ecosystems and By-catch Sub-committee on initial thoughts for developing a potential indicator for non-retained sharks in support of an ecosystem report card. The paper contains some preliminary ideas for developing potential indicators (e.g., indices of abundance, a method based on life history and an index of abundance, or trends in size by sex) that could be more readily developed since indicators based on total mortality or total interactions in ICCAT fisheries cannot be currently developed due to incomplete catch reporting. It was mentioned that diversity indices or species composition could also be used as indicators, and that observer data should be used to develop indices.

9.4 Longline simulator

The Group chairman also reported that a request had been made by the WGSAM to add a shark species, such as shortfin mako, to the longline simulator as part of an effort to improve the simulator by incorporating additional species reflecting alternative fishing strategies to the existing one for blue marlin. The Group discussed that the required information on depth and temperature was available from the ongoing electronic tagging projects and that it would liaise with the Methods Group to collaborate on the longline simulator initiative.

9.5 Weight conversion ratios and length measurements

There was a discussion on the lack of standardization of length measurements (straight vs curved lengths) and different conversion ratios between round and dressed weight according to the dressing method used by different CPCs. For example, Spain measures straight length vs. Canada that uses curved length. A standardized protocol for measurements must be addressed. Additional discussion centered on the different methods of dressing the carcass, whether the carcass has been frozen or not, and whether fins are attached or not to the dressed carcass. It was noted that for some CPCs due to current regulations, it will be no longer possible to derive conversion factors for dressed to round weight.

The Group chairman presented a spreadsheet for shortfin mako that listed the type of length measurement taken (straight vs. curved), the round to dressed weight conversion ratio, and a description of the dressing procedure for fleets from CPCs present at the meeting to complete (**Table 6**).

10. Recommendations

The Group noted the priorities and Commission requests established in ICCAT Rec. 17-08. On that basis the Group recommends:

- Two intersessional meetings (data preparatory and assessment) of the Group in 2019 to provide a preliminary evaluation of the effects of the implementation of [Rec. 17-08] and an update of the assessment of the Atlantic stocks of shortfin mako.
- CPCs should report on how they implemented Rec. 17-08 in their respective fisheries in order for this Group to properly evaluate the effectiveness of these measures.
- CPCs should comply with the requirement to report discards (both dead and alive) of all sharks and especially for blue shark, shortfin mako, and porbeagle in Task I because data on these discards are generally not provided to the Secretariat.
- CPCs should also report on the estimation protocols for dead discards and live releases, and whether what is reported is total observed or fleet-level estimates.
- That CPCs with significant catches of shortfin mako that will not be able to attend the next data preparatory meeting in 2019 should provide their catches and indices of abundance for review by the Group before the data preparatory meeting.
- The organization of a workshop to standardize shark maturity scales across observer programs as part of the SRDCP.
- The Group recognizes that further research is required to evaluate the effectiveness of proposed and alternative conservations measures to reduce the mortality of shortfin mako. Studies on biologically important areas, spatio-temporal distribution of the stock and fisheries interactions are needed to respond effectively to the Commission requests in Rec. 17-08.
- A study to compare the effects of circle versus J hooks on retention rates, catch rates, and at haulback mortality of sharks. The experimental design should account for the influence of leader materials types (wire vs nylon) and consider possible regional and fleet operational differences.
- Postponement of the ICCAT assessment of porbeagle stocks until 2020, but to help facilitate the participation of SCRS scientists in the 2019 ICES assessment of the NE stock of porbeagle.
- In preparation for the review by the Commission at the 2018 Annual meeting of the first six month catches of shortfin mako (Rec. 17-08 pg 8), the SCRS wants to remind the Commission of the 2017 SCRS finding that annual catches should be at 1,000 t or below to prevent the population from decreasing further, and that catches of 500 t or less would stop overfishing.

In response to a request from the 2018 ICCAT Convention Amendment meeting, the Group recommended:

- A revision of the species of rays to be included in the list of elasmobranchs that are oceanic, pelagic and highly migratory and inclusion of FAO common names. This revised list is included in section 9.1 of this report.

A number of other recommendations were made by the Group in regards to tagging:

- Of the 20 miniPAT tags available for the shark research program, 12 should be deployed on shortfin mako as initially planned and 8 tags on silky sharks;
- To extend the geographical area where sharks are tagged to include the Benguela area;
- To expand the number of scientists that are involved in the Group's tagging projects by facilitating participation in collaborative projects and providing appropriate training and equipment to additional scientists within the Group.

11. Adoption of the report and closure

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

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Table 1. Task I catches of main sharks species (BSH, SMA, POR) by stock and year. AN – North Atlantic; AS – South Atlantic; MD – Mediterranean Sea.

Yield (t)	BSH			POR			SMA		
Year	AN	AS	MD	AN	AS	MD	AN	AS	MD
1950				4			106		
1951				3			71		
1952				3			71		
1953				4			88		
1954			6	1		6	22		
1955			9	2		7	45		
1956			11	1		6	27		
1957			13	3		6	73		
1958			9	3		3	61		
1959			5	3		3	80		
1960			3	2		1	53		
1961			11	1929		2	124		
1962			8	3023		2	168		
1963			5	6566		1	73		
1964			17	9280		5	132		
1965			13	5155		8	105		
1966			10	2123		3	219		
1967			10	597		2	197		
1968			7	942		2	260		
1969			5	876		2	256		
1970			6	215		0	231		
1971			9	788		0	359	97	
1972			16	1272		2	350	60	
1973			13	1234		4	341	212	
1974			10	735		2	518	67	
1975			11	1196		3	618	76	
1976			11	1492		2	290	30	
1977			7	1128		3	478	252	
1978	4		8	1155		3	417	168	
1979	12		9	1580		2	234	299	
1980			11	1606		1	525	324	
1981	204		11	1382		1	1097	375	
1982	9		7	598		1	1313	974	
1983	613		6	1169		1	1229	512	
1984	121		5	726		1	1572	745	
1985	380		8	687		1	3757	786	
1986	1493		6	732		0	3659	609	
1987	1629		26	844		1	3195	386	12
1988	1843		3	1024	1	0	2872	1032	
1989	1818		2	1013	0	1	2100	1546	
1990	3037		1	1309		0	2332	1255	
1991	4306	8	3	1990	0	1	2232	1062	
1992	3560	107	1	2603	0	0	3119	1183	
1993	9589	10	0	1909	1	0	4167	1743	
1994	8590	2704	6	2726	2	0	3758	2233	
1995	8468	3108	8	2136	3	0	5347	3179	
1996	7395	4252	2	1556	3	1	5346	2461	
1997	29283	10145	150	1833	26	0	3580	2213	6
1998	26763	8797	63	1451	17	1	3879	2026	8
1999	26172	10829	22	1393	10	0	2791	1549	5
2000	28174	12444	45	1457	11	1	2592	2555	4
2001	21709	14043	47	507	1	1	2682	2050	7
2002	20066	12682	17	838	11	0	3416	1957	2
2003	23005	14967	11	604	43	0	4070	3779	2
2004	21742	14438	125	725	17	3	4032	2466	2
2005	22359	20642	72	539	31	2	3694	3161	17
2006	23217	20493	178	470	37	1	3598	3008	10
2007	26927	23487	50	512	13	0	4235	2850	2
2008	30723	23097	81	524	85	2	3848	1881	1
2009	35198	23459	185	421	62	1	4591	2063	1
2010	37178	27799	216	119	16	1	4824	2486	2
2011	38083	35069	40	68	21	0	3771	3258	2
2012	36778	26421	42	111	37	1	4478	2905	2
2013	37058	20672	100	156	29	0	3646	2183	0
2014	36574	26148	235	29	38		2904	3274	0
2015	39626	22499	665	56	4		3021	2774	0
2016	44074	25385	729	20	1	1	3381	2763	
2017	144	379					3	269	

Table 2. Task I reported dead discards (t) of BSH, POR and SMA by flag.

Species	Flag	1987	1988	1989	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
BSH	Brazil																					60	14									
	Canada																												0	5	16	
	Chinese Taipei																									4	146	142	118	141	166	
	EU.España																													0		
	EU.France																													6		
	Korea Rep.																										0		0	18	2	46
	South Africa																												1			
	U.S.A.	526	421	480	741	772	184	1136	572	618	711	185	195	101	137	106	68	55	65	66	45	54	130	103	167	206	106	99	122	82	43	
	UK.Bermuda									3	1			8										0	0	0			0		0	
BSH Total		**526**	**421**	**480**	**741**	**772**	**184**	**1136**	**572**	**621**	**712**	**185**	**195**	**109**	**137**	**106**	**68**	**55**	**65**	**66**	**45**	**114**	**144**	**103**	**167**	**210**	**252**	**241**	**242**	**252**	**227**	**46**
POR	Canada																												1	2	3	
	Chinese Taipei																									0	0	0	0	0		
	Korea Rep.																									0						
	U.S.A.						2		1														0		3	1		2	7	34	1	
	Uruguay												1	1																		
POR Total							**2**		**1**				**1**	**1**									**0**		**3**	**1**	**0**	**2**	**8**	**36**	**4**	
SMA	Brazil																					12	0									
	Canada																													0	1	
	Chinese Taipei																									0	9	0	3	3	4	
	EU.España																													0		
	EU.France																													0	1	
	Korea Rep.																													1	0	0
	Mexico									1												0					0			0	0	
	U.S.A.	9	5	9	10	11	38	24	21	28	1											7	10	20	2	9	18	5	11	8	6	
	UK.Bermuda													2																		
SMA Total		**9**	**5**	**9**	**10**	**11**	**38**	**24**	**21**	**29**	**1**			**2**								**18**	**10**	**20**	**2**	**9**	**28**	**5**	**14**	**13**	**11**	**0**

Table 3. Task I reported live releases (t) of BSH, POR and SMA by Flag.

Species	Stock	Flag	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
BSH	ATN	Canada										113	132	
		Korea Rep.											34	27
		Mexico									0		0	
		UK.Bermuda				2	1	2	0	0	0	1	1	
	ATS	Brazil		327	13									
		EU.France										6		
		Korea Rep.											16	17
		South Africa								0	2			
	MED	EU.España										4	2	
BSH Total				**327**	**13**	**2**	**1**	**2**	**0**	**0**	**2**	**123**	**185**	**44**
POR	ATN	Canada										11	24	
	ATS	EU.France										0		
		Korea Rep.											0	
POR Total												**11**	**24**	
SMA	ATN	Canada										1	2	
		EU.France											0	
		Korea Rep.												1
		Mexico	0	0	0	0	0	0	0		0	0	1	
	ATS	Brazil		16	0									
		EU.France										0	1	
		Korea Rep.											1	0
SMA Total			**0**	**16**	**0**	**0**	**0**	**0**	**0**		**0**	**2**	**6**	**1**

Table 4. Task I catches of: (a) Major ICCAT sharks (3 species), (b) Other ICCAT sharks (~30 species), and, (c) Non-ICCAT sharks (rest of the sharks).

SpeciesGrp	ScieName	Species	1950	1960	1970	1980	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
4-Sharks (major)	Isurus oxyrinchus	SMA	644	1586	5099	28616	3587	3293	4302	5910	5991	8526	7808	5799	5913	4345	5151	4739	5375	7851	6500	6871	6615	7087	5730	6655	7311	7031	7385	5829	6178	5796	6144	272
	Lamna nasus	POR	59	30522	10816	9790	1309	1991	2603	1910	2729	2140	1560	1859	1469	1403	1469	509	848	648	745	571	507	525	611	484	136	90	149	185	67	60	22	
	Prionace glauca	BSH	53	89	118	8195	3039	4318	3668	9600	11300	11584	11650	39578	35623	37023	40664	35800	32765	37983	36305	43072	43888	50464	53901	58842	65193	73192	63241	57830	62956	62790	70188	523
5-Sharks (other)	Alopias pelagicus	PTH																							7	3				1	1	0	0	
	Alopias spp	THR				435	62	42	60	38	65	60	98	140	102	112	172	90	32	70	47	90	36	58	109	26	69	118	213	140	210	172	286	
	Alopias superciliosus	BTH								20	18	39	14	185	114		43	108	114	133	121	74	83	131	108	135	50	19	81	35	32	27	24	
	Alopias vulpinus	ALV				30				2	7	9	0	30	46	1	15	25	136	30	65	104	109	158	70	148	51	42	15	69	75	167	409	
	Apristurus spp	API																							0	1	0	0	0	1				
	Carcharhinidae	RSK					389	375	1034	1016	1720	998	1586	425	1084	1133	1714	2103	1669	1743	1874	5851	1454	1415	2114	517	617	1278	150	13	1137	1932	709	
	Carcharhiniformes	CVX																		2279	232	148	127	1741	234	1262	825	692	3664	9			0	
	Carcharhinus acronotus	CCN																			49													
	Carcharhinus albimarginatus	ALS																									0	0						
	Carcharhinus altimus	CCA							5						1					0	43				0		0							
	Carcharhinus brachyurus	BRO																1				1	2	3	8	1	51					0		
	Carcharhinus brevipinna	CCB							1		1		22	7	5	6	3	1	0	0	19					0			0	3				
	Carcharhinus falciformis	FAL				0		13	341	139	92	127	531	343	33	140	118	42	358	476	316	74	7	232	31	70	1	104	63	123	37	155	139	
	Carcharhinus galapagensis	CCG										10	5	4	6		10									1							
	Carcharhinus isodon	CCO																			0													
	Carcharhinus leucas	CCE				0		0	19	3	8	7	1	0	0		7	0		375	138	1	0	0	11	0	0	9	2	0		0	0	
	Carcharhinus limbatus	CCL				32	7	13	40	20	120	44	50	206	21	24	101	34	107	53	219	565	42	58	62	48	12	6	5	69	9	0		
	Carcharhinus longimanus	OCS				2	0	0	8	11	10	14	8	12	15	2	642	543	205	179	189	82	78	36	246	54	132	6	4	4	6	1	3	
	Carcharhinus melanopterus	BLR																						0			0							
	Carcharhinus obscurus	DUS				1	2	1	64	36	270	80	52	48	54	38	48	1	2	0	0			19	2	15	0	15	8	5	4	0		
	Carcharhinus plumbeus	CCP				0	0	1	111	61	146	327	468	343	154	149	174	181	121	120	49	60	40	12	2	22	5	8	4	6				
	Carcharhinus porosus	CCR												23			192	114	306			130	10		0	0							
	Carcharhinus signatus	CCS								0	3	1	0	21	23	27	91	30	9	24	0			13	42	35	47	13	34	6605	1	0	0	
	Carcharias taurus	CCT								0										2	0	5	0	1	52	4	3	7	5	0				
	Carcharodon carcharias	WSH				5	2	3														8		177			18	92	13	25	7			
	Centrophorus granulosus	GUP	2	17	31	47	49	13	10	17	12	18	5	5	4	4	4	95	9	0	65	143	266	312	176	27	7	2	1	1	1			
	Centrophorus lusitanicus	CPL																				0	0	218	274	438	271	434	531	488				
	Centrophorus spp	CWO																															1	
	Centrophorus squamosus	GUQ																1			801	538	758	333	208	256	149	3	0	0				
	Centroscyllium fabricii	CFB																			56	4		6	133	90	81	0	0		0			
	Centroscymnus coelolepis	CYO																13			708	752	754	704	549	155	118	1						
	Centroscymnus crepidater	CYP																			7	9	418	144	39	33	2							
	Cetorhinus maximus	BSK														0		1	200	135	319		224	16	11	2	0	0	2	24	0	0		5
	Coastal Sharks nei	CXX				981	218	204	199	112	483	289	177	98	154	22	32							397	4	10				275			275	
	Dalatias licha	SCK									1	0										354	42	5	17	2	7	10	0		15			
	Dasyatidae	STT																													8		4	
	Deania calcea	DCA																				153	97	46	74	27	4	1						
	Echinorhinus brucus	SHB																				0	1	1		2	1	0	1	0				
	Etmopterus princeps	ETR																							20	0	0	0	0					
	Etmopterus spinax	ETX																						8		1		1		19	0			
	Etmopterus spp	SHL																				0	0				0	0	0					
	Galeocerdo cuvier	TIG				12	4	7	13	11	10	20	5	5	9	1	13	10	4	4	22	1	8	65	65	69	23	92	58	20	23	3	3	
	Galeorhinus galeus	GAG											93	100	90	89	110	66	38	141	862	1172	768	822	745	843	371	336	187	337	21			
	Galeus melastomus	SHO									1	0	1	1	0	2	2	2	1	0	0	52	31	42	16	22	6	4	1	22				
	Galeus spp	GAU																								0	7	0	0	0				
	Ginglymostoma cirratum	GNC																0		2	30	2	3	4	1	3	3	4	5	3	7	3	4	
	Ginglymostoma spp	GNG																					0											
	Heptranchias perlo	HXT																											0					
	Hexanchus griseus	SBL				17	5	3	2	6	8	3	3	4	5	4	5	7	10	6	5	17	21	60	5	10	21	21	25	62				
	Isurus paucus	LMA				8	1	1	29	8	18	17	3	29	10	2	20	51	67	63	52	0	1	65	15	109	79	91	154	130	94	316	114	
	Lamnidae	MSK															254								70	8							
	Manta birostris	RMB																														0	1	
	Mobula japanica	RMJ																														0		
	Mobula mobular	RMM																														0		
	Mustelus asterias	SDS																				10	23	31	9	16	7	22	29	42	8			
	Mustelus henlei	CTK																	1908									2						
	Mustelus mustelus	SMD					398	462	386	437	690	379	596	158	100	155	255	4019	78	143	109	107	277	258	275	387	352	1178	412	434	370			
	Mustelus spp	SDV																76		71	2477	2588	432	3180	3382	220	3605	3759	821	2866	172		172	
	Negaprion brevirostris	NGB																		0	53		0	0	0	0	0	0		0				
	Notorynchus cepedianus	NTC																									0							
	Oxynotus centrina	OXY																				38	244	100	63	76	50	15	3	4				
	Oxynotus paradoxus	OXN																						1					1					
	Pelagic Sharks nei	PXX									661	996	275	1011	85	440	716							47	1166	81						0		
	Pseudocarcharias kamoharai	PSK																														1		
	Pseudotriakis microdon	PTM																								17								
	Pteroplatytrygon violacea	PLS																												1	3	2	4	
	Rhincodon typus	RHN																									0	0				0		
	Rhizoprionodon acutus	RHA					52	9	7	12	5	5	12		5	10	20	138	11	23	1	11	16	5		68		6						
	Rhizoprionodon spp	RHZ																					0						3					
	Rhizoprionodon terraenovae	RHT							2								22				144		1681	988		370	384							
	Scyliorhinidae	SYX																			133		4	13	5	24	12	28	129	56	56			
	Scyliorhinus canicula	SYC									1	1	1	1	2	1	1	1	0		5648	5792	141	5937	5422	3052	6152	5568	1847	6167	524			
	Scyliorhinus spp	SCL				17	4	2	1	2	1	1	1	1	2	2	3	2	2	0	42	526	336	370	139	1929	645	411	273	463				
	Scyliorhinus stellaris	SYT																			181	405	425	171	596	652	707	689	313	705				
	Scymnodon obscurus	SYO																										0						
	Scymnodon ringens	SYR																						178	117	94	121	4	1					
	Selachimorpha(Pleurotremati	SKH				482	50	37	339	348	2821	4690	3727	2934	4950	1715	249	120	98	95	31	34	59	59	67	46	73	505	1098	241	867	570	6	13
	Somniosus microcephalus	GSK								41	42	43	61	73	87	51	45	57	56	55	58	54	33	2	45	26	52							
	Somniosus rostratus	SOR																								0	0	1						
	Sphyrna lewini	SPL							363	14	33	93	50	185	16	23	272	319	16	22	20	0		0	56	63	0	21	1	3	35	34	40	
	Sphyrna mokarran	SPK							19	2	4	1			1						0		0	1	1	1	7	0	14	2	5	5	2	
	Sphyrna spp	SPN				483	303	292	238	257	318	254	230	1009	889	166	690	2018	583	1003	917	599	474	657	337	435	219	609	528	48	1304	485	519		
	Sphyrna tiburo	SPJ																			77													
	Sphyrna zygaena	SPZ				3			4		3	1	42	83	48	38	40	38	44	58	40	56	360	57	6	17	9	190	168	459	4	25	5	0
	Sphyrnidae	SPY																							198		2	13	403		4		244	
	Squalidae	DGX					3	2							1	1		8	519		19	849	27	764	122	213	269	425	308	151	316			
	Squalidae / Scyliorhinidae	DGH															13	40	10			5	309	300	222	2714	372	578	119	87	78			
	Squaliformes	SHX				550	332	259	275	250	284	322	2666	1232	6427	5986	6417	8967	7998	7127	9591	8490	3503	3681	4554	2869	2371	71	430	105	8	1	0	
	Squaliolus laticaudus	QUL																														133	83	
	Squalus acanthias	DGS								109	97	166	157	106	78	57	97	1826	1519	1321	1962	3253	2081	1372	749	1035	548	231	39	41	0			
	Squalus blainville	QUB	99	203	306	418	36	15	26	33	29	24	28	28	23	18	19	17	24	17	20	19	15	20	19	13	21			21				
	Squalus megalops	DOP																	379									0						
	Squalus spp	DGZ																564	14	58	108	0				0	45	17	62	56				
	Squatina squatina	AGN	26	16		2	1	0	0	0	0	0	0		0	0	0	0		0	2	3	0	1	0	1	2	1	0					
	Squatinidae	ASK																				10	8	8	10	3	6	375	0					
	Triakidae	TRK																				0			0	1	0			0				
	Triakis semifasciata	LES																										0						
TOTAL			883	32434	16369	50128	9853	11359	14167	20429	28000	31285	31984	56087	57648	53188	59914	62977	55568	62494	71151	83977	66630	83570	83316	84852	91709	98446	83027	84265	74644	72678	79408	808

Table 5 [a - g] Standard SCRS catalogues on statistics (Task-I and Task-II) of the 3 major ICCAT shark species by stock, major fishery (flag/gear combinations ranked by order of importance) and year (1996 to 2016). Only the most important fisheries (representing ±97.5% of Task-I total catch) are shown. For each data series, Task I (DSet= "t1", in tonnes) is visualised against its equivalent Task II availability (DSet= "t2") scheme. The Task-II colour scheme, has a concatenation of characters ("a"= T2CE exists; "b"= T2SZ exists; "c"= CAS exists) that represents the Task-II data availability in the ICCAT-DB. See the legend for the colour scheme pattern definitions.

ICCAT Scorecard on data availabilty (work in progress)

Table #	Fishery	Score type	Global score
5a	BSH-N region	score2	3.27
5b	BSH-S region	score2	3.48
5c	BSH-M region	score2	0.44
5d	SMA-N region	score2	21.00
5e	SMA-S region	score2	36.00
5f	SMA-N region	score2	0.00
5g	SMA-S region	score2	0.00
		max	10.0

	Quartile
bad: [0, 2.5[	1
poor: [2.5, 5[	2
average: [5, 7.5[	3
excelent: [7.5, 10[	4

Fishery	Score type	Global score
BSH-N region	score2	3.27
BSH-S region	score2	3.48
BSH-M region	score2	0.44
SMA-N region	score2	2.36
SMA-S region	score2	3.21
POR-N region	score2	1.11
POR-S region	score2	0.79

LEGEND and color schemes used to show Task-II (t2) availability

character	represents
a	t2ce
b	t2sz
c	cas

color scheme	t2 availability score	
concatenated string	represents	score3 (*) score2 (**)
-1	no T2 data	0 0
a	t2ce only	1 1
b	t2sz only	1 1
c	cas only	1 1
bc	t2sz + cas	1 1
ab	t2ce + t2sz	2 2
ac	t2ce + cas	2 2
abc	all	3 2

* Species requiring ST05-CAS data (ALB, BFT, BET, YFT, S
** Rest of the species (not requireing ST05-CAS data)

(number of years in the score)	totYears	30
(score scale adopted)	scale	10

Table 5a

Speci	Sto	Stat	FlagName	GearG	DS	T1 Total	1843	1818	3037	4306	3560	9589	8590	8468	7395	29283	26763	26172	28174	21709	20066	23005	21742	22359	23217	26927	30723	35198	37178	38083	36778	37058	36574	39626	44074	144			
							1988	1989	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	Rank	%	%cum
BSH	ATN	CP	EU.España	LL	t1											24497	22504	21811	24112	17362	15666	15975	17314	15006	15464	17038	20788	24465	26094	27988	28666	28562	29041	30078	29019		1	69.1%	69%
BSH	ATN	CP	EU.España	LL	t2											-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	b	b	b	b	b	b	b	b	b		1		
BSH	ATN	CP	EU.Portugal	LL	t1				1387	2257	1583	5726	4669	4722	4843	2630	2440	2227	2081	2110	2265	5642	1751	4026	4337	5283	6164	6248	8256	6508	3725	3694	2994	3808	7679			2	16.7%	86%
BSH	ATN	CP	EU.Portugal	LL	t2				-1	-1	-1	-1	-1	a	a	a	a	a	a	a	a	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab		2		
BSH	ATN	CP	Japan	LL	t1								1203	1145	618	489	340	357	273	350	386	558	1035	1729	1434	1921	2531	2007	1763	1227	2437	1808	3287	4011	4217			3	5.4%	91%
BSH	ATN	CP	Japan	LL	t2								-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	ab	ab	ab	a	a	a	a	a			3		
BSH	ATN	CP	Canada	LL	t1		968	978	680	774	1277	1702	1260	1494	528	831	612	547	624	581	836	346	965	1134	977	843	0	0	0	0	1	0	1	5	16			4	2.8%	94%
BSH	ATN	CP	Canada	LL	t2		-1	-1	-1	-1	-1	-1	-1	-1	a	a	a	a	a	-1	a	a	a	a	-1	a	a	a	a	a	a	a	a	a	a			4		
BSH	ATN	CP	U.S.A.	LL	t1		421	480	742	772	185	1144	580	622	607	181	172	96	137	105	68	55	70	68	47	54	137	106	176	232	123	114	142	82	43			5	1.2%	95%
BSH	ATN	CP	U.S.A.	LL	t2		-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	b	c	-1	b	b	b	b	b	ab	ab	ab	ab	ab	ab	ab	ab	a		5		
BSH	ATN	NCC	Chinese Taipei	LL	t1								487	167	132	203	246	384	165	59		171	206	240	588	292	110	73	99	148	107	123	83	238	293			6	0.7%	96%
BSH	ATN	NCC	Chinese Taipei	LL	t2								-1	-1	-1	-1	-1	-1	-1	-1		ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	a		6		
BSH	ATN	CP	EU.France	UN	t1		91	79	130	187	276	322	350	266	278	213	163	399	395	207	221	57	95	120	99	50	46	30	3	6	0	0	105	1	14			7	0.6%	96%
BSH	ATN	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	a		-1	-1			7		
BSH	ATN	CP	Belize	LL	t1																							114	461	1039	903	1216	392	4	6			8	0.6%	97%
BSH	ATN	CP	Belize	LL	t2																							ab	ab	ab	ab	a	a	a	a			8		
BSH	ATN	CP	Panama	LL	t1													9							254	892	613	1575				289	153		262			9	0.6%	98%
BSH	ATN	CP	Panama	LL	t2													-1							a	a	a	a				a	a		-1			9		
BSH	ATN	CP	U.S.A.	RR	t1		355	271	87	308	214	672	21	19	277	210	252	217	291	39										38	39	18	19	31	30			10	0.5%	98%
BSH	ATN	CP	U.S.A.	RR	t2		-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1										-1	-1	-1	-1	-1	-1			10		
BSH	ATN	CP	China PR	LL	t1															185	104	148				367	109	88	53	109	98	327		1	27			11	0.2%	98%
BSH	ATN	CP	China PR	LL	t2															-1	-1	-1				a	a	a	a	a	a	a		ab	a			11		
BSH	ATN	CP	Korea Rep.	LL	t1																									537	299	327	113	18	11	132		12	0.2%	99%
BSH	ATN	CP	Korea Rep.	LL	t2																									ab	abc	abc	a	b	a	a		12		

Table 5b

Speci	Sto	Stat	FlagName	GearG	DS	T1 Total	0	0	0	8	107	10	2704	3108	4252	10145	8797	10829	12444	14043	12682	14967	14438	20642	20493	23487	23097	23459	27799	35069	26421	20672	26148	22499	25385	379			
							1988	1989	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	Rank	%	%cum
BSH	ATS	CP	EU.España	LL	t1											5272	5574	7173	6951	7743	5368	6626	7366	6410	8724	8942	9615	13099	13953	16978	14348	10473	11447	10133	10107			1	46.1%	46%
BSH	ATS	CP	EU.España	LL	t2											-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	b	-1	b	b	b	b	b	-1	b		1		
BSH	ATS	CP	EU.Portugal	LL	t1									847	867	1336	876	1110	2134	2562	2324	1841	1863	3184	2751	4493	4866	5358	6338	7642	2424	1646	1622	2420	5609			2	15.9%	62%
BSH	ATS	CP	EU.Portugal	LL	t2									-1	-1	a	a	a	a	a	a	a	a	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab		2		
BSH	ATS	CP	Namibia	LL	t1														0		2213	2316	1906	6616	3536	3419	1829	207	2351	2633	1176	1147	2471	2137	2775			3	9.1%	71%
BSH	ATS	CP	Namibia	LL	t2													-1		a	-1	ab	ab	ab	ab	ab	ab	ab	ab	a	ab	a	a	a				3		
BSH	ATS	NCC	Chinese Taipei	LL	t1								1232	1767	1952	1737	1559	1496	1353	665		521	800	866	1805	2177	1843	1356	1625	2142	2074	2257	2240	1854	1985			4	8.7%	80%
BSH	ATS	NCC	Chinese Taipei	LL	t2								-1	-1	-1	-1	-1	-1	-1	-1		ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	a		4		
BSH	ATS	CP	Brazil	LL	t1								743	1103		179	1683	2173	1966	2160	1568	2520	2533	2309	1625	1268	1500	1913	1607	2013	2551	2420	1334				5	8.7%	89%
BSH	ATS	CP	Brazil	LL	t2								-1	a		-1	ab	a	a	a	a	a	ab	a	ab	a	ab	ab	ab	ab	a	a	a	a				5		
BSH	ATS	CP	Japan	LL	t1								1388	437	425	506	510	536	221	182	343	331	209	236	525	896	1789	981	1161	1483	3060	2255	3232	2278	2102			6	6.2%	95%
BSH	ATS	CP	Japan	LL	t2								-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	ab	ab	ab	a	a	a	a	a			6		
BSH	ATS	CP	Uruguay	LL	t1					8	107	10	84	57	259	180	248	118	81	66	85	480	462	376	232	337	359	942	208	725	433	130						7	1.5%	96%
BSH	ATS	CP	Uruguay	LL	t2					-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	b	ab	ab	ab							7		
BSH	ATS	CP	South Africa	LL	t1												23	21		82	63	232	128	154	90	82	126	119	112	317	158	179	525	402	356	275		8	0.9%	97%
BSH	ATS	CP	South Africa	LL	t2												-1	-1	ab	a	ab	ab	ab	ab	ab	ab	ab	ab	a	ab	ab	ab	ab	ab	ab	a		8		
BSH	ATS	CP	China PR	LL	t1															565	316	452				585	40	109	41	131	84	64	48	20	30			9	0.6%	98%
BSH	ATS	CP	China PR	LL	t2															-1	-1	-1				a	a	a	a	a	a	a	ab	a	ab			9		
BSH	ATS	CP	Ghana	GN	t1																												1583	385	429			10	0.6%	98%
BSH	ATS	CP	Ghana	GN	t2																												a	a	a			10		
BSH	ATS	CP	Belize	LL	t1																		37	259		236	109		273	243	483	234	171	105	167			11	0.6%	99%
BSH	ATS	CP	Belize	LL	t2																		a	a	a	a	a		a	ab	a	a	a	a	a			11		
BSH	ATS	CP	S. Tomé e Príncipe	PS	t1																									143	147	152	156	206	183			12	0.2%	99%
BSH	ATS	CP	S. Tomé e Príncipe	PS	t2																									-1	-1	-1	-1	-1	-1			12		
BSH	ATS	CP	Korea Rep.	LL	t1																								222	125	112	61	10	71	252	104		13	0.2%	99%
BSH	ATS	CP	Korea Rep.	LL	t2																								b	ab	abc	abc	a	a	ab	a		13		
BSH	ATS	CP	Panama	LL	t1													168	22								521											14	0.2%	99%
BSH	ATS	CP	Panama	LL	t2													-1	-1						a	a	a	a				a	a					14		

Table 5c

Speci	Stc	Stat	FlagName	GearG	DS	T1 Total	3	2	1	3	1	0	6	8	2	150	63	22	45	47	17	11	125	72	178	50	81	185	216	40	42	100	235	665	729	650				
							1988	1989	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	Rank	Rank	%	%cum
BSH	MED	CP	Libya	LL	t1																													580	650	1	1	35.9%	36%
BSH	MED	CP	Libya	LL	t2																													-1	-1	1	1		
BSH	MED	CP	EU.España	LL	t1											146	59	20	31	6	3	3	4	8	61	3	2	7	48	38	39	37	53	65	58	2	2	20.3%	56%
BSH	MED	CP	EU.España	LL	t2											-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	a	-1	a	ab	ab	ab	ab	2	2		
BSH	MED	CP	EU.Italy	UN	t1																		67		95				165			3	44			3	3	11.0%	67%
BSH	MED	CP	EU.Italy	UN	t2																		-1		-1				-1			-1	-1			3	3		
BSH	MED	CP	EU.Italy	LL	t1																		32	1		44	75	9				25	129		16	4	4	9.8%	77%
BSH	MED	CP	EU.Italy	LL	t2																		-1	-1		-1	-1	-1				-1	-1		-1	4	4		
BSH	MED	CP	EU.Italy	GN	t1																		12			2	166								1	5	5	5.4%	82%
BSH	MED	CP	EU.Italy	GN	t2																		-1			-1	-1								-1	5	5		
BSH	MED	CP	EU.Portugal	LL	t1												2		5	41	14	3		56	22				2							6	6	4.3%	87%
BSH	MED	CP	EU.Portugal	LL	t2												-1		-1	-1	a	a	a	a	a				a							6	6		
BSH	MED	CP	EU.Italy	TW	t1																						0	1				29			1	7	7	1.1%	88%
BSH	MED	CP	EU.Italy	TW	t2																						-1	-1				-1			-1	7	7		
BSH	MED	CP	EU.Malta	UN	t1		3	2	1	3	1	0	1	1	1	2	2	2	1	1	1	0		0	0											8	8	0.9%	89%
BSH	MED	CP	EU.Malta	UN	t2		-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1		-1	-1											8	8		
BSH	MED	CP	EU.Cyprus	LL	t1														9			3	6	5												9	9	0.9%	90%
BSH	MED	CP	EU.Cyprus	LL	t2														a			a	a	a												9	9		
BSH	MED	CP	EU.Malta	LL	t1																					1	1	2	1	1	2	2	4	5	3	10	10	0.9%	91%
BSH	MED	CP	EU.Malta	LL	t2													a	a					a		a	ab	ab	ab	ab	abc	ab	abc	a	ab	10	10		
BSH	MED	CP	EU.France	LL	t1																							0	0	0	0	3	4	14		11	11	1.0%	92%
BSH	MED	CP	EU.France	LL	t2																							-1	-1	-1	-1	-1	b	-1		11	11		
BSH	MED	CP	Japan	LL	t1								5	7	1	1						1	1	2			2	0								12	12	0.9%	93%
BSH	MED	CP	Japan	LL	t2								-1	-1	-1	-1						-1	-1	-1			-1	a								12	12		
BSH	MED	CP	EU.Italy	SP	t1																		2													13	13	0.4%	93%
BSH	MED	CP	EU.Italy	SP	t2																		-1													13	13		
BSH	MED	CP	EU.France	UN	t1																					0	0	0	0	0			0	0		14	14	0.4%	93%
BSH	MED	CP	EU.France	UN	t2																					-1	-1	-1	-1	-1			-1	-1		14	14		
BSH	MED	CP	EU.France	GN	t1																							0	0		0	0	0	1		15	15	0.5%	94%
BSH	MED	CP	EU.France	GN	t2																							-1	-1		-1	-1	-1	-1		15	15		
BSH	MED	CP	Algerie	LL	t1																													1		16	16	0.5%	94%
BSH	MED	CP	Algerie	LL	t2																													a		16	16		
BSH	MED	CP	EU.Italy	TN	t1																														1	17	17	0.5%	95%
BSH	MED	CP	EU.Italy	TN	t2																														-1	17	17		
BSH	MED	CP	EU.France	TN	t1																								0			0	0			18	18	0.5%	95%
BSH	MED	CP	EU.France	TN	t2																								-1			-1	-1			18	18		
BSH	MED	CP	EU.France	TW	t1																								0		0	0	0	0		19	19	0.6%	96%
BSH	MED	CP	EU.France	TW	t2																								-1		-1	-1	-1	-1		19	19		
BSH	MED	CP	EU.France	TP	t1																							0			0	0	0			20	20	0.6%	97%
BSH	MED	CP	EU.France	TP	t2																							-1			-1	-1	-1			20	20		
BSH	MED	CP	EU.France	PS	t1																													0	0	21	21	0.6%	97%
BSH	MED	CP	EU.France	PS	t2																													-1	-1	21	21		
BSH	MED	CP	EU.Malta	TW	t1																											0			0	22	22	0.6%	98%
BSH	MED	CP	EU.Malta	TW	t2																										bc	-1			-1	22	22		
BSH	MED	CP	EU.France	HL	t1																											0			0	23	23	0.7%	99%
BSH	MED	CP	EU.France	HL	t2																											-1			-1	23	23		

Table 5d

Speci	Sto	Stat	FlagName	GearG	DS	1988	1989	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	Rank	%	%cum
					T1 Total	2872	2100	2332	2232	3119	4167	3758	5347	5346	3580	3879	2791	2592	2682	3416	4070	4032	3694	3598	4235	3848	4591	4824	3771	4478	3646	2904	3021	3381	3			
SMA	ATN	CP	EU.España	LL	t1	1851	1079	1537	1390	2145	1964	2164	2209	3294	2416	2223	2051	1561	1684	2047	2068	2088	1751	1918	1816	1895	2216	2091	1667	2308	1509	1481	1362	1574		1	53.1%	53%
SMA	ATN	CP	EU.España	LL	t2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	b	b	b	b	b	b	b	b	b	1		
SMA	ATN	CP	EU.Portugal	LL	t1			193	314	220	796	649	657	691	354	307	327	318	378	415	1249	399	1109	951	1540	1033	1169	1432	1045	1023	817	209	213	257		2	17.3%	70%
SMA	ATN	CP	EU.Portugal	LL	t2			-1	-1	-1	-1	-1	a	a	a	a	a	a	a	a	a	a	a	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab		2		
SMA	ATN	CP	U.S.A.	RR	t1	795	670	268	210	250	667	318	1422	232	164	148	69	290	215	248	0	333	282	257	158	156	163	168	178	229	219	201	189	163		3	8.3%	79%
SMA	ATN	CP	U.S.A.	RR	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	b		3		
SMA	ATN	CP	Japan	LL	t1	113	207	221	157	318	425	214	592	790	258	892	120	138	105	438	267	572			82	131	98	116	53	56	33	69	45	74		4	6.3%	85%
SMA	ATN	CP	Japan	LL	t2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1			-1	-1	ab	ab	ab	a	a	a	a	a		4		
SMA	ATN	CP	Maroc	LL	t1																147	169	215	220	151	283	476	636	390	380	616	580	807	1000		5	5.8%	91%
SMA	ATN	CP	Maroc	LL	t2																-1	-1	-1	-1	-1	-1	-1	-1	-1	a	a	-1	a	ab		5		
SMA	ATN	CP	U.S.A.	LL	t1	106	123	93	113	161	302	332	310	234	242	195	89	164	181	167	141	188	187	129	222	197	221	226	213	198	190	207	131	138		6	5.2%	96%
SMA	ATN	CP	U.S.A.	LL	t2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	b	b	b	b	b	b	ab	ab	ab	ab	ab	ab	ab	ab	a	6		
SMA	ATN	CP	Canada	LL	t1								93	56	99	55	54	59	60	61	63	69	74	64	64	39	50	39	37	28	35	53	84	82		7	1.3%	97%
SMA	ATN	CP	Canada	LL	t2								-1	a	a	a	a	a	-1	a	a	a	a	-1	a	a	a	abc	ab	ab	ab	ab	ab	ab		7		
SMA	ATN	NCC	Chinese Taipei	LL	t1	4	2	9	39	16	9	61	21	16	25	31	48	21	7		84	57	19	30	25	23	11	14	13	15	8	4	15	8		8	0.6%	98%
SMA	ATN	NCC	Chinese Taipei	LL	t2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1		ab	ab	ab	ab	ab	ab	a	ab	ab	ab	ab	ab	ab	ab	a	8		
SMA	ATN	CP	Maroc	PS	t1																								30	26	51	44	140	50		9	0.3%	98%
SMA	ATN	CP	Maroc	PS	t2																								-1	-1	-1	-1	-1	-1		9		
SMA	ATN	CP	Belize	LL	t1																						23	28	69	114	99	1	1	1		10	0.3%	99%
SMA	ATN	CP	Belize	LL	t2																						ab	ab	ab	ab	a	a	-1	a		10		
SMA	ATN	CP	Venezuela	LL	t1	3	8	1	2	1	1	3	4	12	3	1	2	2	20	16	22	58	20	6	11	2	35	22	18	24	6	7	7	7		11	0.3%	99%
SMA	ATN	CP	Venezuela	LL	t2	-1	-1	-1	-1	-1	-1	b	b	b	b	b	b	b	b	b	b	ab	a	ab	ab	ab	ab	ab	a	ab	a	a	a	a		11		
SMA	ATN	CP	China PR	LL	t1													0							81	16	19	29	18	24	11	5	2	4		12	0.2%	99%
SMA	ATN	CP	China PR	LL	t2													-1							a	a	a	a	a	a	a	a	a	a		12		
SMA	ATN	CP	Canada	GN	t1								17	10	9	12	14	17	8	14	8	9	15	6	7	2	3	2	0	1	0	1	0	0		13	0.1%	99%
SMA	ATN	CP	Canada	GN	t2								a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	ac	a	ab	a	a	a	a		13		
SMA	ATN	CP	Panama	LL	t1												1	0						0	49	33	39				19	7				14	0.1%	99%
SMA	ATN	CP	Panama	LL	t2												-1	-1						a	a	a	a				a	a				14		
SMA	ATN	CP	Mexico	LL	t1								10					10	16		10	6	9	5	8	6	7	8	8	8	4	4	4	4		15	0.1%	99%
SMA	ATN	CP	Mexico	LL	t2								-1					-1	b		a	a	a	a	ab	a	a	a	a	a	a	a	a	a		15		

Table 5e

Speci	Sto	Stat	FlagName	GearG	DS	1988	1989	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	Rank	%	%cum
					T1 Total	1032	1546	1255	1062	1183	1743	2233	3179	2461	2213	2026	1549	2555	2050	1957	3779	2466	3161	3008	2850	1881	2063	2486	3258	2905	2183	3274	2774	2763	269			
SMA	ATS	CP	EU.España	LL	t1	378	809	552	327	421	772	552	1084	1482	1356	984	861	1090	1235	811	1158	703	584	664	654	628	922	1192	1535	1207	1083	1077	862	882		1	38.5%	39%
SMA	ATS	CP	EU.España	LL	t2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	b	-1	b	b	b	b	b	b	b	1		
SMA	ATS	CP	Japan	LL	t1	525	618	538	506	460	701	1369	1617	514	244	267	151	264	56	133	118	398			72	115	108	103	132	291	114	182	109	75		2	14.6%	53%
SMA	ATS	CP	Japan	LL	t2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1			-1	-1	ab	ab	ab	a	a	a	a	a		2		
SMA	ATS	CP	Namibia	LL	t1												1			459	375	509	1415	1243	1002	295	23	306	328	554	9	950	661	799		3	13.3%	66%
SMA	ATS	CP	Namibia	LL	t2												-1			a	-1	ab	ab	ab	ab	ab	ab	ab	ab	a	ab	a	a	a		3		
SMA	ATS	CP	EU.Portugal	LL	t1								92	94	165	116	119	388	140	56	625	13	242	493	375	321	502	336	409	176	132	127	158	393		4	8.1%	75%
SMA	ATS	CP	EU.Portugal	LL	t2								-1	-1	a	a	a	a	a	a	a	a	a	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab		4		
SMA	ATS	CP	Brazil	LL	t1	70	71	103	79	158	122	95	119	83	190	233	27	219	409	226	283	177	426	183	152	121	92	128	179	193	276	256	172	124		5	7.4%	82%
SMA	ATS	CP	Brazil	LL	t2	-1	-1	-1	-1	-1	-1	-1	-1	-1	a	-1	-1	ab	a	a	a	a	ab	a	a	a	a	a	a	a	a	a	-1	a		5		
SMA	ATS	CP	South Africa	LL	t1					64	43	23	46	36	29	168	66	103	68	12	115	101	111	86	224	137	146	152	218	108	250	476	613	339	261	6	5.9%	88%
SMA	ATS	CP	South Africa	LL	t2					-1	-1	-1	-1	-1	-1	-1	-1	ab	a	ab	ab	ab	ab	ab	ab	ab	ab	ab	a	ab	ab	ab	ab	ab	a	6		
SMA	ATS	NCC	Chinese Taipei	LL	t1	35	29	36	80	44	31	116	166	183	163	146	141	127	63		626	121	128	138	211	124	117	144	204	158	157	161	154	95		7	5.8%	94%
SMA	ATS	NCC	Chinese Taipei	LL	t2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1		ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	a	7		
SMA	ATS	CP	China PR	LL	t1						34	45	23	27	19	74	126	305	22	208	260	68	45	70	77	6	24	32	29	8	9	9	5	3		8	2.3%	96%
SMA	ATS	CP	China PR	LL	t2						-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	a	a	a	a	a	a	a	a	a	a		8		
SMA	ATS	CP	Uruguay	LL	t1	23	19	26	13	20	28	12	17	26	20	23	21	35	40	38	188	249	146	68	36	41	106	23	76	36	1					9	2.0%	98%
SMA	ATS	CP	Uruguay	LL	t2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	ab	ab	ab	a	-1	ab	ab	ab					9		
SMA	ATS	CP	Côte d'Ivoire	GN	t1				9	13	10	20	13	15	23	10	10	9	15	15	30	15	14	16	25					19	33	19	11	13		10	0.5%	98%
SMA	ATS	CP	Côte d'Ivoire	GN	t2				-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	b	b	-1	-1	-1	a					a	a	ab	a	a		10		
SMA	ATS	CP	Belize	LL	t1																		38		17	2		32	59	78	88	1	15	14		11	0.5%	99%
SMA	ATS	CP	Belize	LL	t2																		a	a	a	a		a	ab	ab	a	a	a	a		11		
SMA	ATS	CP	Brazil	UN	t1																	61	0	27	5	78	7		7	2						12	0.3%	99%
SMA	ATS	CP	Brazil	UN	t2																	-1	-1	-1	-1	-1	-1		-1	-1						12		
SMA	ATS	CP	Korea Rep.	LL	t1																							29	13	7	7	4	4	18	9	13	0.1%	99%
SMA	ATS	CP	Korea Rep.	LL	t2																							-1	ab	a	abc	a	a	ab	a	13		

Table 5f

Speci	Sto	Stat	FlagName	GearG	DS	T1 Total	1024	1013	1309	1990	2603	1909	2726	2136	1556	1833	1451	1393	1457	507	838	604	725	539	470	512	524	421	119	68	111	156	29	56	20	0
POR	ATN	CP	Canada	LL	t1		83	73	78	329	813	919	1575	1351	1045	1322	1055	956	899		223	130	220	191	184	83	115	50	65	22	29	16	8	3	2		
POR	ATN	CP	Canada	LL	t2		-1	-1	-1	-1	-1	-1	-1	-1	a	a	a	a	a		a	a	a	a	-1	a	a	a	abc	ab	ab	ab	ab	ab	a		
POR	ATN	CP	EU.France	UN	t1		446	341	551	300	496	633	820	565	267	315	219	240	410	361	461	303	194	276	194	83	83	153									
POR	ATN	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									
POR	ATN	NCO	Faroe Islands	LL	t1		373	477	550	1189	1149	165																									
POR	ATN	NCO	Faroe Islands	LL	t2		-1	-1	-1	-1	-1	-1																									
POR	ATN	CP	EU.Denmark	UN	t1		33	33	46	85	80	91	93	86	72	69	85	107	73	76	42								0		2						
POR	ATN	CP	EU.Denmark	UN	t2		-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1								a		a						
POR	ATN	CP	EU.España	LL	t1		69	42	26	47	15	21	52	19	41	25	25	18	13	24	54	27	11	14	34	8	41	77		0							
POR	ATN	CP	EU.España	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							
POR	ATN	CP	EU.France	LL	t1																		185			271	184	46		1	0				0		
POR	ATN	CP	EU.France	LL	t2																		-1			-1	-1	-1		-1	-1				-1		
POR	ATN	CP	Norway	UN	t1		11	25	43	32	41	24	24	26	28	17	27	32	22			19			1	8	9	6	12	11	17						
POR	ATN	CP	Norway	UN	t2		-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1			-1			-1	-1	-1	-1	-1	-1	-1						
POR	ATN	CP	U.S.A.	LL	t1		0	1	1	4	4	50	108	35	78	56	9	0	1	0	1	0	1	0	0	0	0	0	3	2	0	2	7	34	1		
POR	ATN	CP	U.S.A.	LL	t2		-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	b	b	b	b	b	b	b	ab	ab	ab	ab	ab	ab	ab	ab	a	
POR	ATN	CP	EU.Portugal	LL	t1		3	2	2	1	0							0	7	4	10	101	50	14	6	0	3	17	7	0	0						
POR	ATN	CP	EU.Portugal	LL	t2		-1	-1	-1	-1	-1							-1	-1	-1	a	a	a	a	a	a	a	a	a	a	a			b	b		
POR	ATN	CP	Japan	LL	t1										5	4										12	10	13	13	14	49	98	0	0	2	
POR	ATN	CP	Japan	LL	t2										-1	-1										-1	-1	ab	ab	ab	a	a	a	a	a	a	
POR	ATN	CP	Canada	GN	t1									2	4	8	11	6	2	7	12	11	10	10	6	10	8	11	18	7	2	0	1	1	0		
POR	ATN	CP	Canada	GN	t2								a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	ac	a	a	a	a	a	a		
POR	ATN	NCO	Faroe Islands	UN	t1								48	44	8	9	7	10																			
POR	ATN	NCO	Faroe Islands	UN	t2								-1	-1	-1	-1	-1	-1																			
POR	ATN	CP	EU.Ireland	UN	t1													8	2	6	3	11	18		4	8	7		0								
POR	ATN	CP	EU.Ireland	UN	t2													-1	-1	-1	-1	-1	-1		-1	-1	-1		-1								
POR	ATN	CP	EU.France	TW	t1																		24				22	14		1	3			3		
POR	ATN	CP	EU.France	TW	t2																		-1				-1	-1		-1	-1			-1		
POR	ATN	CP	EU.United Kingdom	UN	t1		3	15	9					0			1	6	8	12	10															
POR	ATN	CP	EU.United Kingdom	UN	t2		-1	-1	-1					-1			-1	-1	-1	-1	-1										b						
POR	ATN	CP	Norway	GN	t1															6	3			8	26	1	2	2			8			5		
POR	ATN	CP	Norway	GN	t2															-1	-1			-1	-1	-1	-1	-1			-1			-1		
POR	ATN	CP	U.S.A.	RR	t1																									8	4	27	7	9	5		
POR	ATN	CP	U.S.A.	RR	t2																									-1	-1	-1	-1	-1	b		
POR	ATN	CP	EU.United Kingdom	GN	t1																			8	10	14	13	10								
POR	ATN	CP	EU.United Kingdom	GN	t2																			a	a	a	-1	a						b	b		
POR	ATN	CP	Iceland	GN	t1							2	4	6	5	3	3	2	2	3	2	1	1	0	0	0	0	0								
POR	ATN	CP	Iceland	GN	t2							-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1								
POR	ATN	CP	Canada	TW	t1									1	2	4	3	2	1	1	1	1	1	2	2	0	0	1	0	1	2	3	0	2	2	
POR	ATN	CP	Canada	TW	t2									a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	ac	a	ab	a	a	a	a	

Table 5g

Speci	Sto	Stat	FlagName	GearG	DS	T1 Total	1	0	0	0	0	1	2	3	3	26	17	10	11	1	11	43	17	31	37	13	85	62	16	21	37	29	38	4	1	0
POR	ATS	CP	Uruguay	LL	t1										3		5	14	3	4		8	34	8	28	34	3	40	14	6	12	12					
POR	ATS	CP	Uruguay	LL	t2									-1		-1	-1	-1	-1		-1	-1	-1	-1	a	a	b	a	-1	ab	ab	b						
POR	ATS	CP	Japan	LL	t1											3	14										5	41	34	8	7	25	15	13	4	1	
POR	ATS	CP	Japan	LL	t2										-1	-1											-1	-1	a	a	a	a	a	a	a	a		
POR	ATS	CP	EU.España	LL	t1												2	2	2	7	1	2	9	4	0	3	5	4	13								
POR	ATS	CP	EU.España	LL	t2												-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1								
POR	ATS	CP	Ghana	PS	t1																												25				
POR	ATS	CP	Ghana	PS	t2																												-1				
POR	ATS	CP	Korea Rep.	LL	t1																											14					
POR	ATS	CP	Korea Rep.	LL	t2																											abc			b		
POR	ATS	NCO	Benin	UN	t1												4	0	4																		
POR	ATS	NCO	Benin	UN	t2												-1	-1	-1																		
POR	ATS	CP	EU.Portugal	LL	t1																				4	2											
POR	ATS	CP	EU.Portugal	LL	t2																				a	a	a										
POR	ATS	NCC	Chinese Taipei	LL	t1																									2	0	0	1	0	0		
POR	ATS	NCC	Chinese Taipei	LL	t2																									a	-1	a	a	-1	-1		
POR	ATS	CP	Japan	TW	t1			1						1	0	0		0	0	1																	
POR	ATS	CP	Japan	TW	t2			-1						-1	-1	-1		-1	-1	-1																	
POR	ATS	CP	Brazil	LL	t1																										2						
POR	ATS	CP	Brazil	LL	t2																			a			a				-1						
POR	ATS	NCO	Falklands	TW	t1									0		0	0	0	1	0	0																
POR	ATS	NCO	Falklands	TW	t2									-1		-1	-1	-1	-1	-1	-1																
POR	ATS	CP	EU.Poland	TW	t1				0				0	0	1																						
POR	ATS	CP	EU.Poland	TW	t2			-1					-1	-1	-1																						

Table 6. Type of length measurement taken by CPCs/fleets and round to dressed weight conversion ratios for shortfin mako shark (SMA).

CPC	Length type	RW to DW conversion	Dressing description	Frozen?	Comments
USA	straight	1.96*	Head off, tail off, gutted, belly flaps on, fins off	not	
Spain	straight	1.44-1.46	Head off, tail off, gutted, belly flaps on, fins off	both	Until 2012
Spain	straight	1.37	Head off, tail off, gutted, belly flaps on, fins attached	both	From 2013
Portugal	straight	1.44-1.46	Head off, tail off, gutted, belly flaps on, fins off	both	Until 2012
Portugal	straight	1.37	Head off, tail off, gutted, belly flaps on, fins attached	yes	From 2013
Canada	curved	1.46	Head off, tail off, gutted, belly flaps on, fins off	not	Until 2017
Japan	straight			yes	
Brazil	straight				
Mauritania	straight				
Cote d'Ivoire	straight				
Morocco	curved				
Liberia	straight			not	
Algeria	straight			not	
France	curved				
Namibia	straight				

- Being re-evaluated

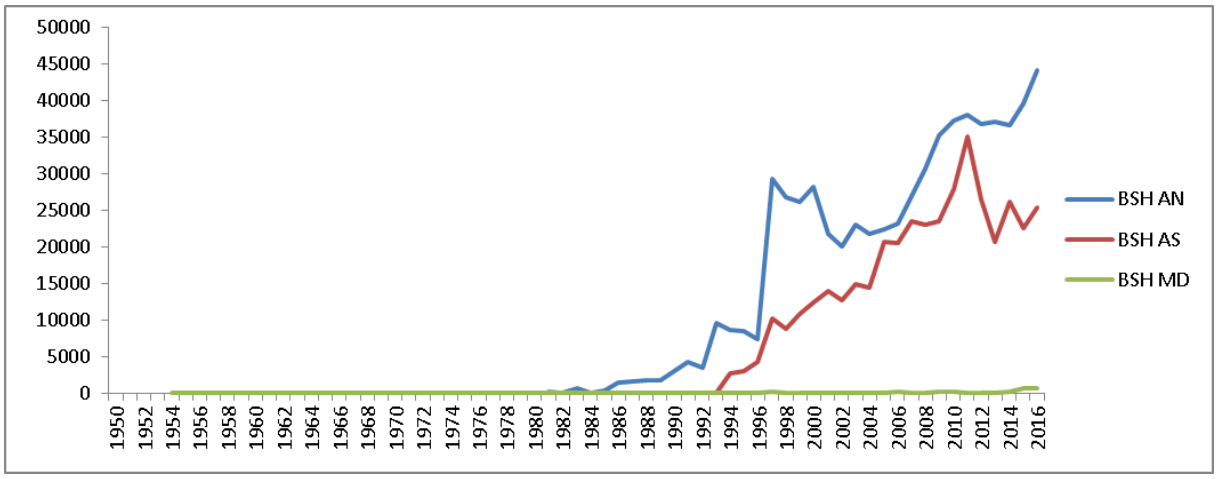

Figure 1. Task 1 nominal catch estimations of blue shark (BSH) by year (1950-2016) and stock.

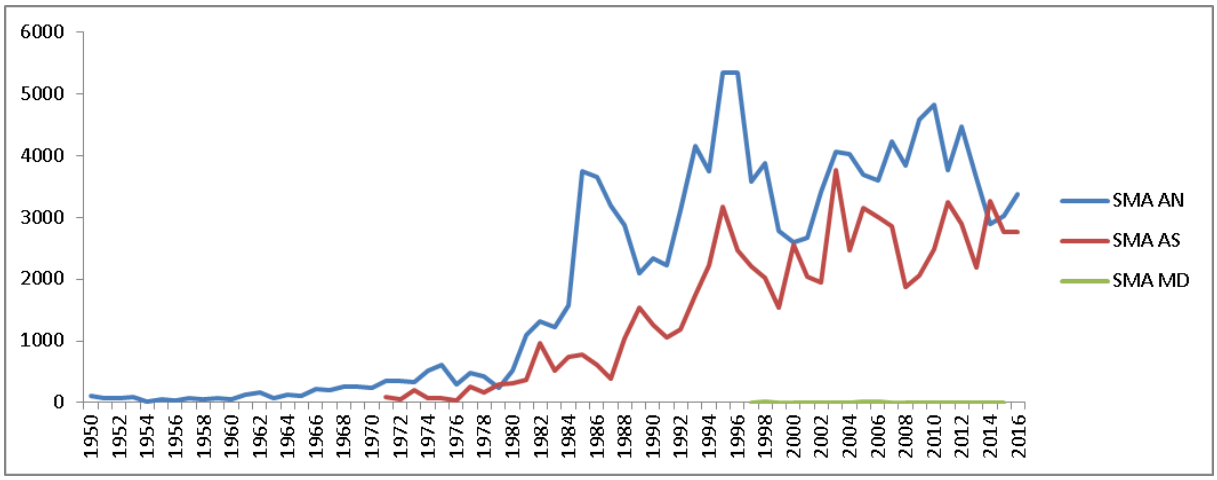

Figure 2. Task 1 nominal catch estimations of shortfin mako (SMA) by year (1950-2016) and stock.

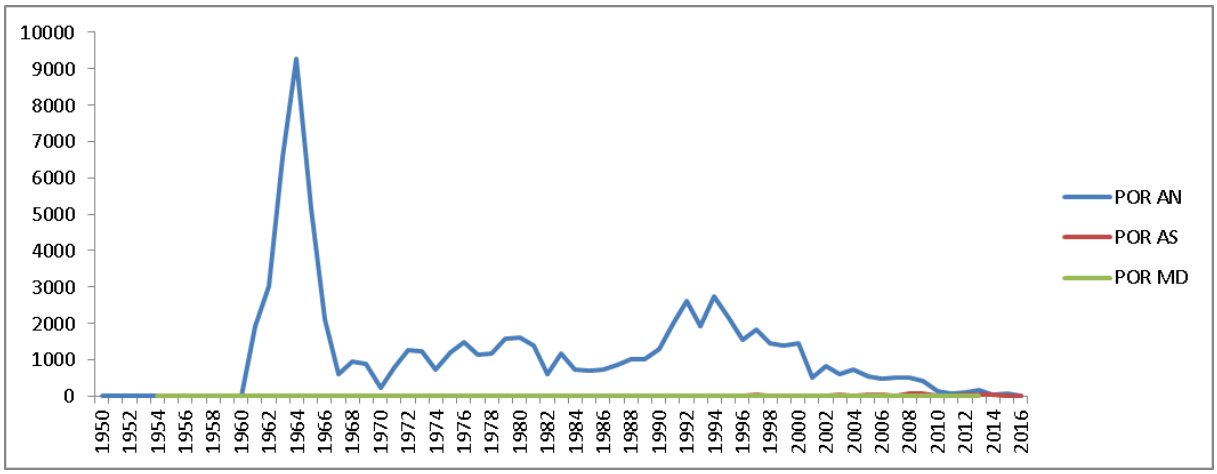

Figure 3. Task 1 nominal catch estimations of porbeagle (POR) by year (1950-2016) and stock.

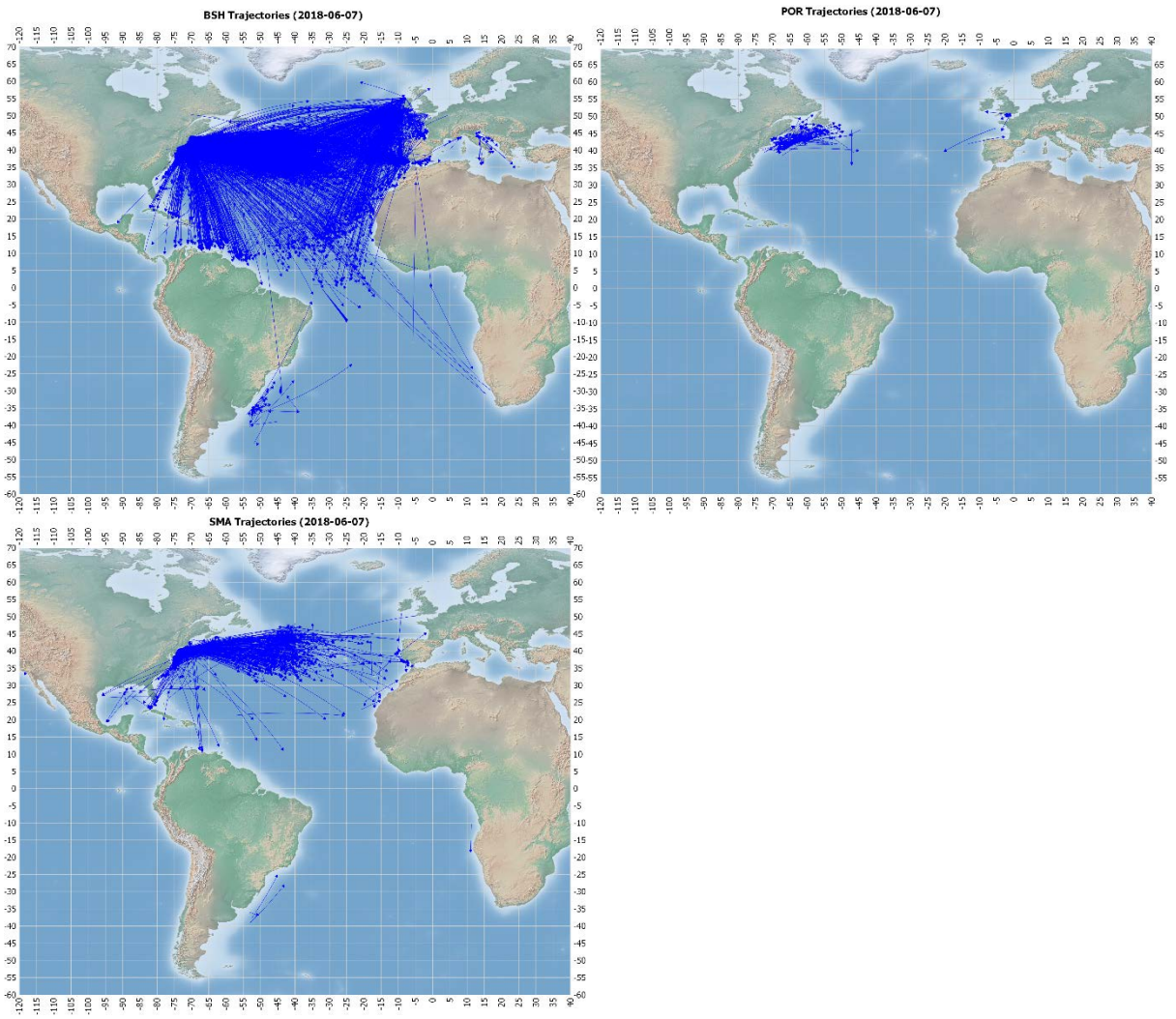

Figure 4. Inferred displacement from conventional tag release and recapture (triangle) points for blue (BSH), porbeagle (POR) and shortfin mako (SMA) sharks (source: ICCAT database).

Appendix 1

Agenda

1. Opening, adoption of Agenda and meeting arrangements
2. Review of the activities and progress of the SRDCP
3. Review of updated data from the Secretariat and new data received from national scientists, with special emphasis on shortfin mako and porbeagle sharks.
   3.1. Task I and II catch data
   3.2. Task II effort and size data
   3.3. Tagging data – particularly sex-specific information
4. Fisheries Indicators
5. Updated stock assessment of SMA with SS3 projections,
6. Continue update of the spatio-temporal distribution and biology (age and growth, reproduction, maturity) of shortfin mako
7. Explore the application of an alternative projection approach for Stock Synthesis to evaluate the probability of success of the measures contemplated in ICCAT Rec. 17-08
8. Review the effectiveness of potential mitigation measures to reduce by-catch and mortality of shortfin mako
9. Other matters
   9.1. Responses to the Commission
   9.2. Interactions with CITES
   9.3. Ecosystem report card
   9.4. Conversion ratios and size-relationships
   9.5. Review Executive Summary and workplan 2019
10. Recommendations
11. Adoption of the report and closure

Appendix 2

List of Participants

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Appendix 3

List of Papers and Presentations

Reference	Title	Authors
SCRS/2018/087	A trial evaluation of the effectiveness of the use of circle hooks to reduce mortality of shortfin mako shark in pelagic long line fisheries - mortality of shortfin mako shark on circle hooks vs j-hooks	Semba Y., Kai M., Oshima K., Ochi D., and Honda H.
SCRS/2018/088	Proposals of discussion for the re-evaluation of stock status for the Atlantic shortfin mako	Semba Y., Kai M., and Honda H.
SCRS/2018/094	Habitat use and migrations of shortfin mako in the Atlantic using satellite telemetry	Santos C.C., Domingo A., Carlson J., Natanson L., Cortes E., P. Miller P., and Coelho R.
SCRS/2018/095	Age and growth of shortfin mako in the South Atlantic	Rosa D., Mas F., Mathers A., Natanson L.J., Domingo A., Carlson J., and R. Coelho
SCRS/2018/096	An updated revision of shortfin mako size distributions in the Atlantic	Coelho R., Domingo A., Courtney D., Cortés E., Arocha F., Liu K-M., Yokawa K., Yasuko S., Hazin F., Bowlby H., Abid N., Rosa D., and Lino P.G.
SCRS/2018/098	Exploitation des requins en Algérie	Labidi-Neghli N.
SCRS/2018/101	Standardized catch rates of shortfin mako sharks Caught by the Brazilian tuna longline fleet (1978-2016) using generalized linear mixed models (GLMM)	Hazin F.H.V., Hazin H.G., Sant'Ana R., and Mourato B.
SCRS/2018/102	Spatiotemporal distribution of shortfin mako sharks (*Isurus oxyrinchus*) in southwestern Atlantic waters: Possible influence of climatic and environmental drivers	Hazin H., Comassetto L., Mourato B., Afonso A.S., Sant'Ana R., Da Mata-Oliveira I., Menezes R., and Hazin F.H.V.
SCRS/2018/103	Standardized catch per unit effort (CPUE) of shortfin mako (*Isurus oxyrinchus*) for the Moroccan longline fishery	Serghini M., Moustahfid H., Habiba H., Aziza L., Abid N., and Baibbat S.
SCRS/2018/104	Shortfin mako (*Isurus oxyrinchus*) bycatch fishery in the south of the Moroccan Atlantic waters	Baibbat S.A., Abid N., Serghini M., and Ikkiss A.
SCRS/2018/105	Post-release mortality of shortfin mako in the Atlantic using satellite telemetry: preliminary results	Domingo A., Santos C.C., Carlson J., Natanson L., Cortes E., Mas F., Miller P., Hazin F.H.V., Travassos P., and Coelho R.
SCRS/2018/107	Outline of a risk analysis approach to address recent Commission recommendations to reduce mortality for north Atlantic shortfin mako	Courtney D., Coelho R., and Rosa D.

SCRS/P/2018/043	Status of the Liberian Shark Fisheries	Daniels R.S.
SCRS/P/2018/044	Catch state of Shortfin Mako off the coastal waters of Côte d'Ivoire (West Africa)	Konan K.J., Diaha N.C., and Bahou L.
SCRS/P/2018/045	ICES Working Group Elasmobranch Fishes	Walker P.

Appendix 4

SCRS Document and Presentation Abstracts as provided by the authors

SCRS/2018/087 - The recommendation by ICCAT on the conservation of North Atlantic stock of shortfin mako shark caught in association with ICCAT fisheries contemplated in ICCAT Rec. 17-08 includes that the SCRS shall take into its account the effectiveness of the use of circle hooks as a mitigation measure to reduce mortality in conducting review the effectiveness of the measures. In this study, we estimated the total mortality of shortfin mako shark consists of at-vessel and post-release mortalities by hook types, i.e. circle hooks versus J-hooks, with 5 different combinations of at-vessel and post-release mortality rates of shortfin mako shark in pelagic long line fisheries based on the literatures. In conclusion, the estimated total mortality with circle hooks was more than 1.6 times higher than that with J-hooks in every combination. From this result, it was considered that the use of circle hooks may cause substantial increases of overall mortality of shortfin mako shark.

SCRS/2018/088 – We raise several issues to be solved in the next stock assessment of Atlantic shortfin mako, especially for the northern stock. It is important to review the past assessment and clarify the problems in advance of the assessment meeting to progress the request by Commission (re-evaluation of the stock status of Atlantic shortfin mako), on schedule. Thorough exploration of the stock assessment models, the verification of the output of models, and review of major biological parameters, are required to improve the assessment. Regarding the stock assessment models, especially for the stock synthesis (SS3), model diagnostics, sensitivity analysis, and future projection are high priorities to complete. Regarding the biological parameter, developments of in-depth explanations to change the productivity (r) and natural mortality (M) are high priorities because the estimate of r in the northern stock in 2017 assessment was changed to one-half of that in 2012 assessment and M is one of the most influential biological parameters in stock assessment models. We also propose tentative inventory and timeline of their works for the next stock assessment.

SCRS/2018/094 – This paper provides an update of the study on habitat use for shortfin mako, developed within the ICCAT Shark Research and Data Collection Program (SRDCP). Currently, all phase 1 (2015-2016) tags (23 tags: 9 miniPATs and 14 sPAT) have been deployed by observers on Portuguese, Uruguayan, Brazilian and US vessels in the temperate NE, temperate NW, Equatorial and SW Atlantic. Data from 32 tags/specimens is available and a total of 1260 tracking days have been recorded. Results showed shortfin makos moved in multiple directions, travelling considerable distances. Shortfin mako sharks spent most of their time above the thermocline (0-90 m), between 18 and 22 °C. The main plan for the next phase of the project is to continue the tag deployment during 2018 in the several regions of the Atlantic.

SCRS/2018/095 – The shortfin mako, *Isurus oxyrinchus* (Lamnidae), is regularly caught as bycatch in pelagic longline fisheries and is among the most vulnerable sharks to this fishery. The age and growth of *I. oxyrinchus* was studied along a wide South Atlantic region. Data from 332 specimens ranging in size from 90 to 330 cm fork length (FL) for females and 81 to 250 cm FL for males were analysed. Growth models were fitted using the von Bertalanffy growth equation re-parameterised to calculate L0, instead of t0, and a modification of this equation using the known size at birth. Growth models were compared using the Akaike information criterion (AIC) and Bayesian Information Criterion (BIC). The von Bertalanffy growth equation with fixed L0 (size at birth = 63 cm FL) with resulting growth parameters of Linf = 218.5 cm FL, k = 0.170 year-1 for males and Linf = 263.1 cm FL, k = 0.012 year-1 for females, seemed to underestimate maximum length for this species, while overestimating k. Given the poorly estimated parameters we cannot, to this point, recommend the use of the South Atlantic growth curves.

SCRS/2018/096 – As part of an ongoing cooperative program for fisheries and biological data collection within the ICCAT Sharks Working Group, information collected by fishery observers and scientific projects from several fishing nations in the Atlantic (EU.Portugal, Uruguay, Taiwan, USA, Japan, Brazil Venezuela, Canada and Morocco) were analyzed. Datasets included information on geographic location, size and sex. A total of 43,007 shortfin mako records collected between 1989 and 2017 were compiled, with the sizes ranging from 30 to 366 cm FL (fork length). Of those, sex information was available for 25,867 specimens. Considerable variability was observed in the size distribution by region and season, with larger sizes tending to occur in equatorial and tropical regions and smaller sizes in higher latitudes. Variability between coastal and more oceanic waters is also likely. Most fleets showed unimodal distributions, but in some cases there were bimodal patterns. The distributional patterns presented in this study provide an advance in the understanding of shortfin mako size distribution in the Atlantic, and can be used in the next update of the ICCAT SMA stock assessment.

SCRS/2018/098 – Thirty-one species belonging to 12 shark families have been reported in Algeria. Some species are regulary exploited by fishermen while others are accidentally caught by artisanal fisheries targeting swordfish and small tunas. Statistical data from landings in the commercial fishery for 2016 and 2017 revealed that the information collected does not give a precision on many landed species, especially those belonging to the genus Carcharhinus. The analysis of catch data from commercial fishing trips for large highly migratory fish carried out by Japanese longliners in waters under Algerian national jurisdiction between 2000 and 2009 for a period from the 15 April to 1 June, shows 3 families of sharks considered as associated fauna of bluefin tuna *Thunnus thynnus*. Also, a bibliographic synthesis reveals that the biological studies carried out in Algeria deal with the systematics, the ecology and the biology of the sharks caught in Algerian waters.

SCRS/2018/101 – Catch and effort data from the Brazilian tuna longline fleet (national and chartered) in the equatorial and southwestern Atlantic Ocean from 1978 to 2016, including more than 90,000 sets, were analyzed. The CPUE of Shortfin Mako was standardized by a Generalized Linear Mixed Models (GLMM) using a Delta Lognormal approach. The factors initially considered in the models were: quarter, year, area, length of boats, hook per basket, sea surface temperature, bathymetry and fishing strategy. The final model, however, included only quarter, year, area, and fishing strategy. The standardized CPUE series shows an oscillation over time, but with a relative stability, with a few peaks (1993, 2009) and drops (2006). Except for these extreme values, however, the scaled index has fluctuated from 0.5 to 1.5 throughout almost the entire period. In the most recent years, the standardized CPUE has been unusually stable, around 1.5 (1.4 to 1.6), with a drop, however, in 2016, back to a value a bit lower than 1 (0.85).

SCRS/2018/102 – This study aims at assessing the spatiotemporal distribution of vulnerable mako sharks in the South Atlantic Ocean and predicting the effects of selected environmental variables on the catch rate of this species, particularly under a global warming scenario. Data from the Brazilian tuna longline fishery from 1978 and 2016 were analyzed by generalized additive mixed models with spatiotemporal structure and Tweedie error distribution, by incorporating catch rate data as a response variable and a set of fisheries, environmental and spatiotemporal data as candidate explanatory variables. A significantly positive effect of sea surface temperature (SST) on mako shark catch was mainly observed at SST ranging from 17 to 22°C, with the highest values being recorded at 19°C. A seasonal pattern of latitudinal migration, likely driven by temperature variation, was evidenced, with mako sharks tending to be absent from the equatorial region, south of 30ºS, during the austral summer. The simulated scenarios for increased SST projected a reduction in the mako catch rate by 3-5% following an increase of 1°C of SST, with the greatest effect occurring in the equatorial area between January and March. Following an increase of 2˚C, catch rates dropped by 15-20%, with mako shark distribution being mostly restricted to the period from May to October and to higher latitudes with SST values below 20ºC. Following an increase of 3ºC, catch rates dropped by 25-28% and distribution was confined to a small area between 30-35ºS and 25-40ºW, from July to August. Finally, an increase of 4ºC may result in a 96%-reduction in catch rates, with this species occurring strictly in the peak of austral winter. Such a strong predicted effect of increased SST on mako shark distribution is particularly worrisome and warrants further research on its thermal tolerance to understand the ecological implications of global warming and to guide effective management strategies for the conservation of this species.

SCRS/2018/103 – Shortfin mako shark *Isurus oxyrinchus* is harvested as bycatch by the Moroccan longliners targeting swordfish *Xiphias gladius* in the south of Moroccan waters. A time series of standardized catch per unit effort (CPUE) for shortfin mako was estimated by first analysing the fleet dynamic and identification of fishing tactics using multi-table method, and then using two statistical models, including Generalized Linear Models (GLM) and Boosted Regression Trees model (BRT) with main effects and two-way interactions. BRT with two-way interactions was selected as the best model to estimate CPUE with less RMSE and high PDE.

SCRS/2018/104 – The shortfin mako is a species caught mainly as bycatch by Moroccan longliners targeting swordfish in the south of the Moroccan Atlantic waters. A series of catch and individual weight data were analyzed in order to derive the exploitation indicators for this species.

SCRS/2018/105 – This paper provides an update of the study on post-release mortality of the shortfin mako, Isurus oxyrinchus developed within the ICCAT Shark Research and Data Collection Program (SRDCP). Up to date, 34 tags (14 sPATs and 20 miniPATs) have been deployed by observers on Brazilian, Portuguese, Uruguayan, and US vessels in the temperate NE and NW, Equatorial and SW Atlantic. Data from 28 out of 34 tagged specimens could be used to obtain preliminary information regarding post-release mortality, resulting in a total of 7 mortality and 21 survival events.

SCRS/2018/107 – An alternative projection approach may be useful to evaluate the effectiveness of recent conservation measures recommended by ICCAT to reduce North Atlantic shortfin mako shark mortality in

association with ICCAT Fisheries. An outline of an alternative projection approach is presented which combines output from an uncertainty grid of multiple Stock Synthesis model sensitivity runs with forward projection using a software package (FLasher) developed for the Fisheries Library in R (FLR).

SCRS/P/2018/043 – A brief study to determine the status of the Liberian shark population was conducted using available time series data on sharks collected from 2013 to April 2018 at West Point (Monrovia). The study found that some 1,663 specimen of sharks were landed at West Point (over 302 sampling days) during this period. It was also found that 17 shark species made up the harvest, with all species found on the IUCN Red List of Threatened Species. Analysis further showed that the Blacktip shark (*Carcharhinus limbatus*) and the Longfin mako (*Isurus paucus*) accounted for about 75% of all species harvested. Moreover, the average total lengths of longfin makos (*Isurus paucus*), shortfin makos (*Isurus oxyrinchus*), and great hammerheads (*Sphyrna mokarran*) reduced between 2016 and 2017, a characteristic future of growth overfishing. Sharks are primarily exploited by semi-industrial fishermen using large motorized canoes (12–15m length) and drift nets. These findings highlight the need for Government to address the management of this fishery. Currently, there exists no legal protection framework for sharks in Liberia coupled with the fishery being largely unmonitored and unmanaged.

SCRS/P/2018/044 – not provided by the author.

SCRS/P/2018/045 – not provided by the author.

Appendix 5

Tagging studies on ICCAT priority shark species

Species	***N***	***Region***	***References***
Carcharhinus longimatus (Oceanic whitetip)	1	Gulf of Mexico	Carlson J.K., Gulak S.J.B., 2012. Habitat use and movements pattern of oceanic whitetip, bigeye thresher and dusky sharks based on archival satellite tags. Collect. Vol. Sci. Pap. ICCAT 68, 1922e1932
Carcharhinus longimatus (Oceanic whitetip)	11	Temperate and tropical NW	Howey-Jordan L.A., et al. Complex movements, philopatry and expanded depth range of a severely threatened pelagic shark, the oceanic whitetip (*Carcharhinus longimanus*) in the western North Atlantic. PloS one, 2013, 8.2: e56588.
Carcharhinus longimatus (Oceanic whitetip)	8	Equatorial	Tolotti M.T. et al. 2015. Vulnerability of the oceanic whitetip shark to pelagic longline fisheries. PloS one, 10.10: e0141396. Tolotti M.T. et al. 2017. Fine-scale vertical movements of oceanic whitetip sharks (*Carcharhinus longimanus*). Fishery Bulletin, 115.3: 380-402.
Carcharhinus falciformis (Silky shark)	3	Tropical NW	Hueter R.E., et al. 2018. Movements of three female silky sharks (*Carcharhinus falciformis*) as tracked by satellite-linked tags off the Caribbean coast of Cuba. Bulletin of Marine Science, 94.2: 345-358.
Alopias superciliosus (Bigeye thresher)	1	Gulf of Mexico	Weng K.C., Bloc, B.A, 2004. Diel vertical migration of the bigeye thresher shark (*Alopias superciliosus*) a species possessing orbital retia mirabilia. Fish. Bull. 102: 221e229.
Alopias superciliosus (Bigeye thresher)	1	Gulf of Mexico	Carlson J.K., Gulak S.J.B., 2012. Habitat use and movements pattern of oceanic whitetip, bigeye thresher and dusky sharks based on archival satellite tags. Collect. Vol. Sci. Pap. ICCAT 68, 1922e1932.
Alopias superciliosus (Bigeye thresher)	12	Equatorial and Tropical N	Coelho, Rui; Fernandez-Carvalho, Joana; Santos, Miguel N. 2015. Habitat use and diel vertical migration of bigeye thresher shark: Overlap with pelagic longline fishing gear. Marine environmental research, 112: 91-99.

Sphyrna lewini (Scalloped hammerhead)	1	Gulf of Mexico	Hoffmayer E.R., et al. 2013. Diel vertical movements of a scalloped hammerhead, Sphyrna lewini, in the northern Gulf of Mexico. Bulletin of Marine Science, 89.2: 551-557.
Sphyrna lewini (Scalloped hammerhead)	2	Temperate/Tropical NW	Queiroz N. et al. 2016. Ocean-wide tracking of pelagic sharks reveals extent of overlap with longline fishing hotspots. Proceedings of the National Academy of Sciences, 113.6: 1582-1587.
Sphyrna mokarran (Scalloped hammerhead)	1	Temperate/Tropical NW (Florida, USA)	Hammerschlag N., et al. 2011. Range extension of the Endangered great hammerhead shark *Sphyrna mokarran* in the Northwest Atlantic: preliminary data and significance for conservation. Endangered Species Research, 13.2: 111-116.
Sphyrna mokarran (Scalloped hammerhead)	18	Temperate/Tropical NW (Florida, USA)	Graham F. et al. 2016. Use of marine protected areas and exclusive economic zones in the subtropical western North Atlantic Ocean by large highly mobile sharks. Diversity and Distributions, 22.5: 534-546.
Sphyrna mokarran (Scalloped hammerhead)	12	Temperate/Tropical NW	Queiroz N. et al. 2016. Ocean-wide tracking of pelagic sharks reveals extent of overlap with longline fishing hotspots. Proceedings of the National Academy of Sciences, 113.6: 1582-1587.
Sphyrna zygaena (Smooth hammerhead)	8	Equatorial; Tropical NE	Santos C.C., Coelho R. 2018. Migrations and habitat use of the smooth hammerhead shark (Sphyrna zygaena) in the Atlantic Ocean. PloS one, 13.6: e0198664.

Appendix 6

Work plan for the biology study group and assessment team that will work intersessionally in preparation for the data and assessment meetings

Topic	Contents of discussion	Timeline	Relation to model	Assignment or candidate	Remarks
Biological parameters	Derivation of productivity (*r*) (including sensitivities)	Data preparatory meeting	BSP	Biology study group	
	Derivation of natural mortality (*M*)		BSP, SS		
	Update of growth parameters		BSP, SS		Southern stock
	Update of steepness		SS		
	Discussion of other parameters (e.g. longevity, maturity size, fecundity, reproductive cycle)		BSP, SS		
Fishery data	Review of abundance index of each fleet to be used (updated or not)	Data preparatory meeting	BSP, SS	Each CPC	Use scoring methodology developed during the Assessment & Methods WG (Ref of meeting 2017 secretariat)
	Review of catch to be used for the assessment (updated or not)		BSP, SS	Each CPC	
	Review of size data with fleet definition, setting of selectivity		SS	All CPCs contributing data and Secretariat	
Assessment model	BSP (BSP2JAGS, JABBA)	Stock assessment meeting	BSP	Assessment study group	Both stocks
	CMSY		CMSY		Southern stock
	Stock Synthesis		SS		Northern stock
Model settings	Assessment period	Data preparatory meeting	BSP, SS, CMSY	Assessment study group	
	Derivation of shape parameter (approach/setting)		BSP		
	Sensitivity (combination of parameters)		BSP, SS, CMSY		
	Data weighting (Methods)		SS		
	Future projection (Scenarios)		BSP, SS		Including the effect of conservation measures (e.g. size limit, live release, using circle hooks)

Appendix 6 (Continued)

Topic	Contents of discussion	Timeline	Relation to model	Assignment or candidate	Remarks
Model Diagnostics	Residual plots, Likelihood profile, Retrospective analysis and Age-structured production model and Bayesian diagnostics	Intersessional work between meetings	SS, BSP	Assessment study group	E-mail or Webinar
Discussion of the results	Sensitivity runs, stock status, Future projections, Future work and recommendations, etc.	Stock assessment meeting	BSP, SS		
	Discussions on conclusions, stock status, recommendations, and future work				
Current Proposal	Test-run of SS with data in 2017	Data preparatory meeting	SS		E-mail or Webinar

Appendix 7

Table for evaluating CPUE series by Species Groups (as adopted by the WGSAM in 2017)

	Will be used in current stock assessment? State model/s.					
	SCRS Doc No:					
	Index Name:					
	Data Source (state if based on logbooks, observer data etc.):					
1	Do the authors indicate the percentage of total effort of the fleet the CPUE data represents?	Yes		No		NA
2	If the answer to 1 is yes, what is the percentage?	0-10	11-20	21-30	31-40	41-50
		51-60	61-70	71-80	81-90	91-100
3	Are sufficient diagnostics provided to assess model performance?	Sufficient		Incomplete		None
4	How does the model perform relative to the diagnostics	Well		Mixed		Poorly
5	Documented data exclusions and classifications?	Yes		No		NA
6	Data exclusions appropriate?	Yes		No		NA
7	Data classifications appropriate?	Yes		No		NA
8	Geographical Area	Atlantic	Atl N	Atl S	Atl NW	Atl NE
		Atl SW	Atl SE	Tropical	Med	Localised (<10x10)
9	Data resolution level	Set		Trip		OTH
10	Ranking of Catch of fleet in TINC database (use data catalogue)	1-5		6-10		11 or more
11	Length of Time Series	0-5 year			6-10 years	
		11-20 years			Longer than 20 years	
12	Are other indices available for the same time period?	None		Few		Many
13	Are other indices available for the same geographic range?	None		Few		Many
14	Does the index standardization account for Known factors that influence catchability/selectivity? (e.g. Type of hook, bait type, depth etc.)	Yes			No	
15	Estimated annual CVs of the CPUE series	High		Medium	Low	Variable
16	Annual variation in the estimated CPUE exceeds biological plausibility	Likely		Possible		Unlikely
17	Are data adequate for standardization purposes?	Yes			No	
18	Is this standardised CPUE time series continuous?	Yes			No	
19	For fisheries independent surveys: what is the survey type?	Acoustic			Aerial	
		Larval			Other (explain below)	
20	For 19: Is the survey design clearly described?	Yes			No	
21	Other comments					

Appendix 8

Shark Implementation Check Sheet

(**Name of CPC)**_____

Note: Each ICCAT requirement must be implemented in a legally binding manner. Just requesting fishermen to implement measures should not be regarded as implementation.

Rec. #	*Para #*	*Requirement*	*Status of implementation*	*Note*
04-10	1	Contracting Parties, Cooperating non-Contracting Parties, Entities or Fishing Entities (CPCs) shall annually report Task I and Task II data for catches of sharks, in accordance with ICCAT data reporting procedures, including available historical data	Yes or No or N/A (Not applicable)	If "No" or "N/A", explain the reason.
	2	CPCs shall take the necessary measures to require that their fishermen fully utilize their entire catches of sharks. Full utilization is defined as retention by the fishing vessel of all parts of the shark excepting head, guts and skins, to the point of first landing	Yes or No or N/A	If "Yes", explain the details of the measures, including ways to monitor the compliance. If "No" or "N/A", explain the reason.
	3	(1) CPCs shall require their vessels to not have onboard fins that total more than 5% of the weight of sharks onboard, up to the first point of landing	Yes or No or N/A	If "Yes", explain ways to monitor the compliance. If "No" or "N/A", explain the reason.
		(2) CPCs that currently do not require fins and carcasses to be offloaded together at the point of first landing shall take the necessary measures to ensure compliance with the 5% ratio through certification, monitoring by an observer, or other appropriate measures	Yes or No or N/A	If "Yes", explain the details of the measures, including ways to monitor the compliance. If "No" or "N/A", explain the reason.
	5	Fishing vessels are prohibited from retaining on board, transshipping or landing any fins harvested in contravention of this Recommendation	Yes or No or N/A	If "Yes", explain ways to monitor the compliance. If "No" or "N/A", explain the reason.
07-06	1	Contracting Parties, Cooperating non-Contracting Parties, Entities and Fishing Entities (hereinafter referred to as CPCs), especially those directing fishing activities for sharks, shall submit Task I and II data for sharks, as required by ICCAT data reporting procedures (including estimates of dead discards and size frequencies) in advance of the next SCRS assessment	Yes or No or N/A	If "No" or "N/A", explain the reason.

	2	Until such time as sustainable levels of harvest can be determined through peer reviewed stock assessments by SCRS or other organizations, CPCs shall take appropriate measures to reduce fishing mortality in fisheries targeting porbeagle *(Lamna nasus*) and North Atlantic shortfin mako sharks (*Isurus oxyrinchus*)	Yes or No or N/A	If "Yes", explain the details of the measures, including ways to monitor the compliance. If "No" or "N/A", explain the reason.
09-07	1	Contracting Parties, and Cooperating non-Contracting Parties, Entities or Fishing Entities (hereafter referred to as CPCs) shall prohibit, retaining onboard, transshipping, landing, storing, selling, or offering for sale any part or whole carcass of bigeye thresher sharks (*Alopias superciliosus*) in any fishery with exception of a Mexican small-scale coastal fishery with a catch of less than 110 fish	Yes or No or N/A	If "Yes", explain ways to monitor the compliance. If "No" or "N/A", explain the reason.
	2	CPCs shall require vessels flying their flag to promptly release unharmed, to the extent practicable, bigeye thresher sharks when brought along side for taking on board the vessel	Yes or No or N/A	If "No" or "N/A", explain the reason.
	4	CPCs shall require the collection and submission of Task I and Task II data for Alopias spp other than *A. superciliosus* in accordance with ICCAT data reporting requirements. The number of discards and releases of *A. superciliosus* must be recorded with indication of status (dead or alive) and reported to ICCAT in accordance with ICCAT data reporting requirements	Yes or No or N/A	If "No" or "N/A", explain the reason.
10-06	1	CPCs shall include information in their 2012 Annual Reports on actions taken to implement Recommendations 04-10, 05-05, and 07-06, in particular the steps taken to improve their Task I and Task II data collection for direct and incidental catches	Yes or No or N/A	If "No" or "N/A", explain the reason.
10-07	1	Contracting Parties, and Cooperating non-Contracting Parties, Entities or Fishing Entities (hereafter referred to as CPCs) shall prohibit retaining onboard, transshipping, landing, storing, selling, or offering for sale any part or whole carcass of oceanic whitetip sharks in any fishery	Yes or No or N/A	If "Yes", explain ways to monitor the compliance. If "No" or "N/A", explain the reason.
	2	CPCs shall record through their observer programs the number of discards and releases of oceanic whitetip sharks with indication of status (dead or alive) and report it to ICCAT	Yes or No or N/A	If "No" or "N/A", explain the reason.

10-08	1	Contracting Parties, and Cooperating non-Contracting Parties, Entities or Fishing Entities (hereafter referred to as CPCs) shall prohibit retaining onboard, transshipping, landing, storing, selling, or offering for sale any part or whole carcass of hammerhead sharks of the family Sphyrnidae (except for the *Sphyrna tiburo*), taken in the Convention area in association with ICCAT fisheries	Yes or No or N/A	If "Yes", explain ways to monitor the compliance. If "No" or "N/A", explain the reason.
	2	CPCs shall require vessels flying their flag, to promptly release unharmed, to the extent practicable, hammerhead sharks when brought alongside the vessel	Yes or No or N/A	If "No" or "N/A", explain the reason.
	3	(1) Hammerhead sharks that are caught by developing coastal CPCs for local consumption are exempted from the measures established in paragraphs 1 and 2, provided these CPCs submit Task I and, if possible, Task II data according to the reporting procedures established by the SCRS. If it is not possible to provide catch data by species, they shall be provided at least by genus Sphryna	Yes or No or N/A	If "No" or "N/A", explain the reason.
		(2) Developing coastal CPCs exempted from this prohibition pursuant to this paragraph should endeavor not to increase their catches of hammerhead sharks. Such CPCs shall take necessary measures to ensure that hammerhead sharks of the family Sphyrnidae (except of *Sphyrna tiburo*) will not enter international trade and shall notify the Commission of such measures	Yes or No or N/A	If "Yes", explain the details of the measures, including ways to monitor the compliance. If "No" or "N/A", explain the reason.
	4	CPCs shall require that the number of discards and releases of hammerhead sharks are recorded with indication of status (dead or alive) and reported to ICCAT in accordance with ICCAT data reporting requirements	Yes or No or N/A	If "No" or "N/A", explain the reason.
11-08	1	Contracting Parties, and Cooperating non-Contracting Parties, Entities or Fishing Entities (hereafter referred to as CPCs) shall require fishing vessels flying their flag and operating in ICCAT managed fisheries to release all silky sharks whether dead or alive, and prohibit retaining on board, transshipping, or landing any part or whole carcass of silky shark	Yes or No or N/A	If "Yes", explain ways to monitor the compliance. If "No" or "N/A", explain the reason.

	2	CPCs shall require vessels flying their flag to promptly release silky sharks unharmed, at the latest before putting the catch into the fish holds, giving due consideration to the safety of crew members. Purse seine vessels engaged in ICCAT fisheries shall endeavor to take additional measures to increase the survival rate of silky sharks incidentally caught	Yes or No or N/A	If "No" or "N/A", explain the reason.
	3	CPCs shall record through their observer programs the number of discards and releases of silky sharks with indication of status (dead or alive) and report it to ICCAT	Yes or No or N/A	If "No" or "N/A", explain the reason.
	4	(1) Silky sharks that are caught by developing coastal CPCs for local consumption are exempted from the measures established in paragraphs 1 and 2, provided these CPCs submit Task I and, if possible, Task II data according to the reporting procedures established by the SCRS. CPCs that have not reported species-specific shark data shall provide a plan by July 1, 2012, for improving their data collection for sharks on a species specific level for review by the SCRS and Commission	Yes or No or N/A	If "No" or "N/A", explain the reason.
		(2) Developing coastal CPCs exempted from the prohibition pursuant to this paragraph shall not increase their catches of silky sharks. Such CPCs shall take necessary measures to ensure that silky sharks will not enter international trade and shall notify the Commission of such measures	Yes or No or N/A	If "Yes", explain the details of the measures, including ways to monitor the compliance. If "No" or "N/A", explain the reason.
	6	The prohibition on retention in paragraph 1 does not apply to CPCs whose domestic law requires that all dead fish be landed, that the fishermen cannot draw any commercial profit from such fish and that includes a prohibition against silky shark fisheries	Applicable or N/A	
11-15	1	CPCs shall include information in their Annual Reports on actions taken to implement their reporting obligations for all ICCAT fisheries, including shark species caught in association with ICCAT fisheries, in particular the steps taken to improve their Task I and Task II data collection for direct and incidental catches	Yes or No or N/A	If "Yes", explain the details of the actions. If "No" or "N/A", explain the reason.

14-06	1	CPCs shall improve their catch reporting systems to ensure the reporting of shortfin mako catch and effort data to ICCAT in full accordance with the ICCAT requirements for provision of Task I and Task II catch, effort and size data	Yes or No or N/A	If "No" or "N/A", explain the reason.
	2	CPCs shall include in their annual reports to ICCAT information on the actions they have taken domestically to monitor catches and to conserve and manage shortfin mako sharks	Yes or No or N/A	If "No" or "N/A", explain the reason.
15-06	1	Contracting Parties, and Cooperating non-Contracting Parties, Entities or Fishing Entities (hereafter referred to as CPCs) shall require their vessels to promptly release unharmed, to the extent practicable, porbeagle sharks caught in association with ICCAT fisheries when brought alive alongside for taking on board the vessel	Yes or No or N/A	If "No" or "N/A", explain the reason.
	2	CPCs shall ensure the collection of Task I and Task II data for porbeagle sharks and their submission in accordance with ICCAT data reporting requirements. Discards and releases of porbeagle sharks shall be recorded with indication of status (dead or alive) and reported to ICCAT in accordance with ICCAT data reporting requirements	Yes or No or N/A	If "No" or "N/A", explain the reason.