

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

“The results, conclusions and recommendations contained in this Report only reflect the view of the Species/Working Group/Sub-Committee. Therefore, these should be considered preliminary until the SCRS adopts them at its annual Plenary meeting and the Commission revise them at its Annual meeting.

Accordingly, ICCAT reserves the right to comment, object and endorse this Report, until it is finally adopted by the Commission.”

1. Opening, adoption of agenda and meeting arrangements

The meeting was held 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 paragraph 10a (“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%20%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 paragraph 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 interessionally 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. japonica*) - 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 conservation 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) Year | BSH | | | POR | | | SMA | | |
|-------------------|-------|-------|-----|------|----|----|------|------|----|
| | 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 | |

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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 | 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.

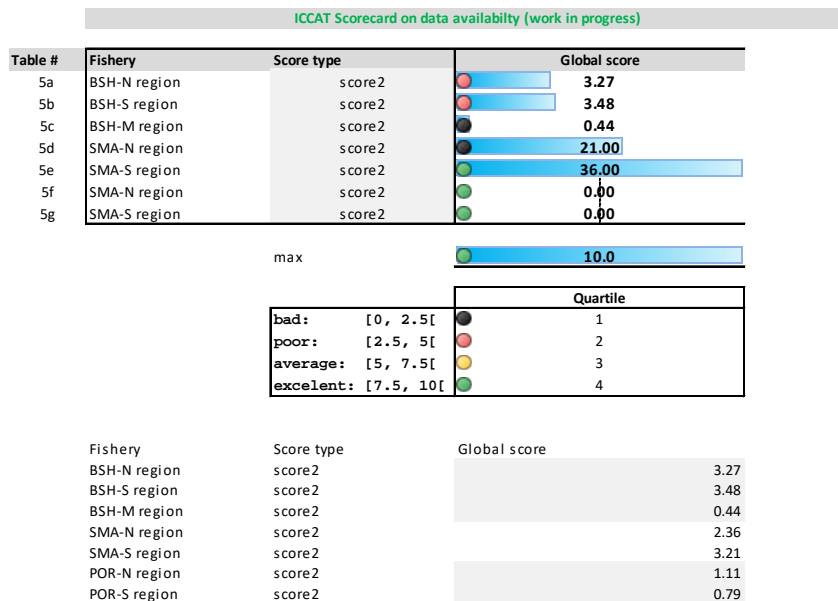
| Species | Stock | Flag | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | |
|------------------|-----------|------------|-----------|------------|-----------|----------|----------|----------|----------|----------|-----------|------------|------------|-----------|--|
| BSH | ATN | Canada | | | | | | | | | | 113 | 132 | | |
| | | Korea Rep. | | | | | | | | | | | 34 | 27 | |
| | | Mexico | | | | | | | | | | 0 | 0 | | |
| | | UK.Bermuda | | | | 2 | 1 | 2 | 0 | 0 | 0 | 0 | 1 | 1 | |
| | ATS | Brazil | | | 327 | 13 | | | | | | | | | |
| | | EU.France | | | | | | | | | | 6 | | | |
| | | Korea Rep. | | | | | | | | | | | 16 | 17 | |
| 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 | |
| | ATS | Mexico | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 1 | |
| | | Brazil | | | 16 | 0 | | | | | | | | | |
| | | EU.France | | | | | | | | | | 0 | 1 | | |
| Korea Rep. | | | | | | | | | | | | 1 | 0 | | |
| SMA Total | | 0 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 6 | 1 | | |

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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 | 2000 | | | | | | | | | | 2010 | | | | | | | | | | | | | | | | | | |
|------------------|-----------------------------|---------|------|-------|-------|-------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----|----|--|
| | | | 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) | Isturus 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 | | | | | | | | | | | | | |
| | 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 | 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Carcharhinus acronotus | CCN | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Carcharhinus albimarginatus | ALS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Carcharhinus altimus | CCA | | | | | | | | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Carcharhinus brachyurus | BRO | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Carcharhinus brevipinna | CCB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Carcharhinus isodon | CCO | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Carcharhinus leucas | CCE | | | | | 0 | 0 | 19 | 3 | 8 | 7 | 1 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | |
| | Carcharhinus limbatas | 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Carcharhinus obscurus | DUS | | | | | 1 | 2 | 1 | 64 | 36 | 270 | 80 | 52 | 48 | 54 | 38 | 48 | 1 | 2 | 0 | 0 | | | | | | | | | | | | | | |
| | Carcharhinus plumbeus | CCP | | | | | 0 | 0 | 1 | 111 | 61 | 146 | 327 | 468 | 343 | 154 | 149 | 174 | 181 | 121 | 120 | 49 | 60 | 40 | 12 | 2 | 2 | 5 | 8 | 4 | 6 | | | | | |
| | Carcharhinus porosus | CCR | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Carcharhinus signatus | CCS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Carcharias taurus | CCT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Carcharodon carcharias | WSH | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Centroponus 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 | | |
| | Centroponus lusitanicus | CPL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Centroponus spp | CWO | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Centroponus squamosus | GIUQ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Centrosyllium fabricii | CFB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Centrosomus coelelepis | CYO | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Centrosomus crepidater | CYP | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Cetorhinus maximus | BSK | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Coastal Sharks nei | CCK | | | | | 981 | 218 | 204 | 199 | 112 | 483 | 289 | 177 | 98 | 154 | 22 | 32 | | | | | | | | | | | | | | | | | | |
| | Dalatis licha | SKC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Dasyatidae | STT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Deania calcea | DCA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Echinorhinus brucus | SHB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Etmopterus princeps | ETN | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Etmopterus spinax | ETX | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Etmopterus spp | SHL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Galeus melastomus | SHO | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Galeus spp | GAU | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Ginglymostoma cirratum | GNC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Ginglymostoma spp | GNG | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Heptranchias perlo | HXT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 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 | | | | | |
| | Isturus paucus | LMA | | | | | 8 | 1 | 1 | 29 | 8 | 18 | 17 | | | | | | | | | | | | | | | | | | | | | | | |

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.



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, :
 ** Rest of the species (not requiring ST05-CAS data)

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

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Table 5a

| | | | | 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 | | | | | | | | | | |
|-------|-----|------|----------------|----------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|-------|------|------|------|------|---|--|--|
| Speci | Stc | 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 | | | | | | |
| 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 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 2 | 16.7% | 86% | | | | | | |
| 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 | | |
| BSH | ATN | CP | EU.Portugal | LL | t2 | | | | | | | | | | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 3 | 5.4% | 91% | | | |
| 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 | | | | | | |
| BSH | ATN | CP | Japan | LL | t2 | | | | | | | | | | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 4 | 2.8% | 94% | | | |
| 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 | | | | 5 | | | | | | |
| BSH | ATN | CP | Canada | LL | t2 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 5 | 1.2% | 95% | | | |
| 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 | | | | 6 | 0.7% | 96% | | | | |
| BSH | ATN | CP | U.S.A. | LL | t2 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 7 | 0.6% | 96% | | | |
| BSH | ATN | NCC | Chinese Taipei | LL | t1 | | | | | | | | | | 487 | 167 | 132 | 203 | 246 | 384 | 165 | 59 | | | | | | | | | | | | | | | | | 8 | | | | | |
| BSH | ATN | NCC | Chinese Taipei | 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 | 9 | 0.6% | 97% | | | | |
| 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 | | | | 10 | 0.6% | 97% | | | | |
| 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 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 11 | 0.6% | 97% | | | |
| BSH | ATN | CP | Belize | LL | t1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 12 | 0.6% | 97% | | | | |
| BSH | ATN | CP | Belize | LL | t2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 13 | 0.6% | 97% | | | | |
| BSH | ATN | CP | Panama | LL | t1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 14 | 0.6% | 98% | | | | |
| BSH | ATN | CP | Panama | LL | t2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 15 | 0.6% | 98% | | | | |
| BSH | ATN | CP | U.S.A. | RR | t1 | 355 | 271 | 87 | 308 | 214 | 672 | 21 | 19 | 277 | 210 | 252 | 217 | 291 | 39 | | | | | | | | | | | | | | | | | | | 16 | 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 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 17 | 0.5% | 98% | | | | |
| BSH | ATN | CP | China PR | LL | t1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 18 | 0.2% | 98% | | | | |
| BSH | ATN | CP | China PR | LL | t2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 19 | 0.2% | 99% | | | | |
| BSH | ATN | CP | Korea Rep. | LL | t1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 20 | 0.2% | 99% | | | | |
| BSH | ATN | CP | Korea Rep. | LL | t2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 21 | 0.2% | 99% | | | | |

Table 5b

| | | | | 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 | | | | | | | |
|-------|-----|------|----------------|----------|----|------|------|------|------|------|------|------|------|-------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|------|-------|------|------|-----|
| Speci | Stc | 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 | | | |
| 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 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 2 | 15.9% | 62% | | |
| 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 | 3 | 9.1% | 71% | | |
| BSH | ATS | CP | EU.Portugal | 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 | 4 | 8.7% | 80% | |
| BSH | ATS | CP | Namibia | LL | t1 | | | | | | | | | | 0 | | | | | | | | | | | | | | | | | | | | | | | 5 | 8.7% | 89% | |
| BSH | ATS | CP | Namibia | LL | t2 | | | | | | | | | | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 6 | 6.2% | 95% | | |
| BSH | ATS | NCC | Chinese Taipei | LL | t1 | | | | | | | | | | 1232 | 1767 | 1952 | 1737 | 1559 | 1496 | 1353 | 665 | | | | | | | | | | | | | | | | | 7 | 1.5% | 96% |
| BSH | ATS | NCC | Chinese Taipei | 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 | 8 | 0.9% | 97% | |
| BSH | ATS | CP | Brazil | LL | t1 | | | | | | | | | | 743 | 1103 | | | | | | | | | | | | | | | | | | | | | | 9 | 0.6% | 98% | |
| BSH | ATS | CP | Brazil | 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 | 10 | 0.6% | 98% | |
| 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 | 11 | 0.6% | 98% | |
| BSH | ATS | CP | Japan | 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 | 12 | 0.2% | 99% | |
| 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 | 13 | 0.2% | 99% | |
| BSH | ATS | CP | Uruguay | 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 | 14 | 0.2% | 99% | |
| BSH | ATS | CP | South Africa | LL | t1 | | | | | | | | | | 23 | 21 | | | | | | | | | | | | | | | | | | | | | | 15 | 0.2% | 99% | |
| BSH | ATS | CP | South Africa | 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 | 16 | 0.2% | 99% | |
| BSH | ATS | CP | China PR | LL | t1 | | | | | | | | | | 565 | 316 | 452 | | | | | | | | | | | | | | | | | | | | | 17 | 0.2% | 99% | |
| BSH | ATS | CP | China PR | 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 | 18 | 0.2% | 99% | |
| BSH | ATS | CP | Ghana | GN | t1 | | | | | | </ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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

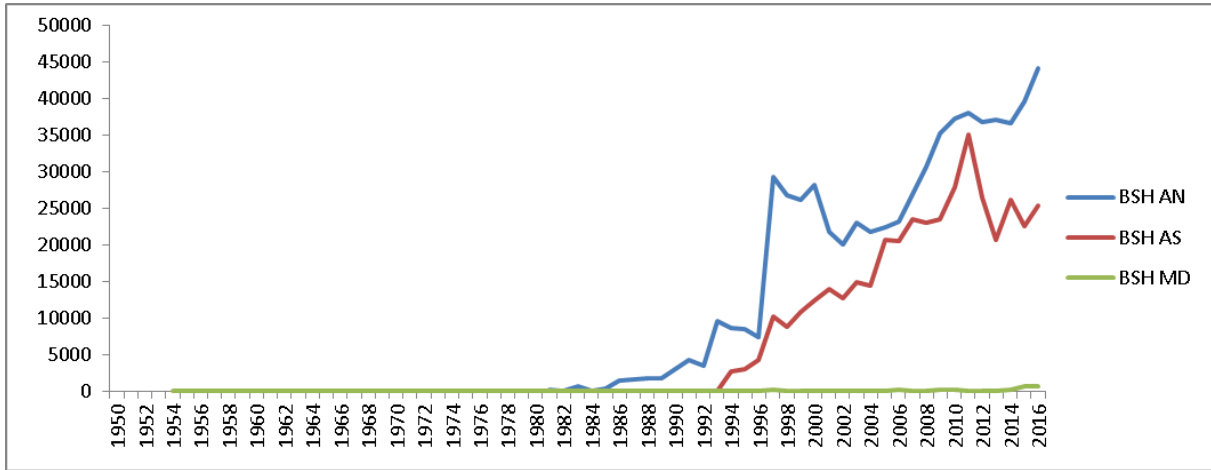


Figure 1. Task 1 nominal catch estimations of blue shark (BSH) by year (1950-2016) and stock.

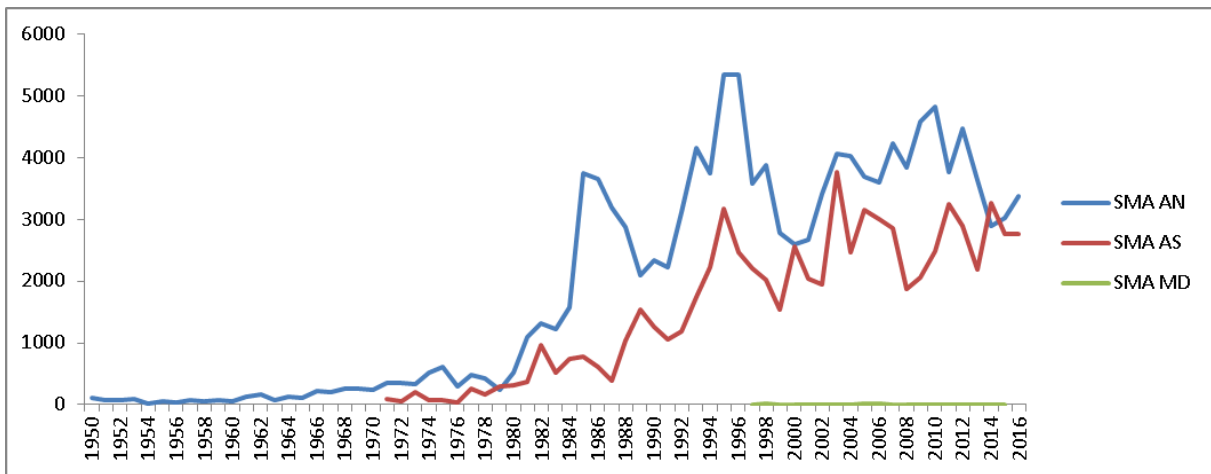


Figure 2. Task 1 nominal catch estimations of shortfin mako (SMA) by year (1950-2016) and stock.

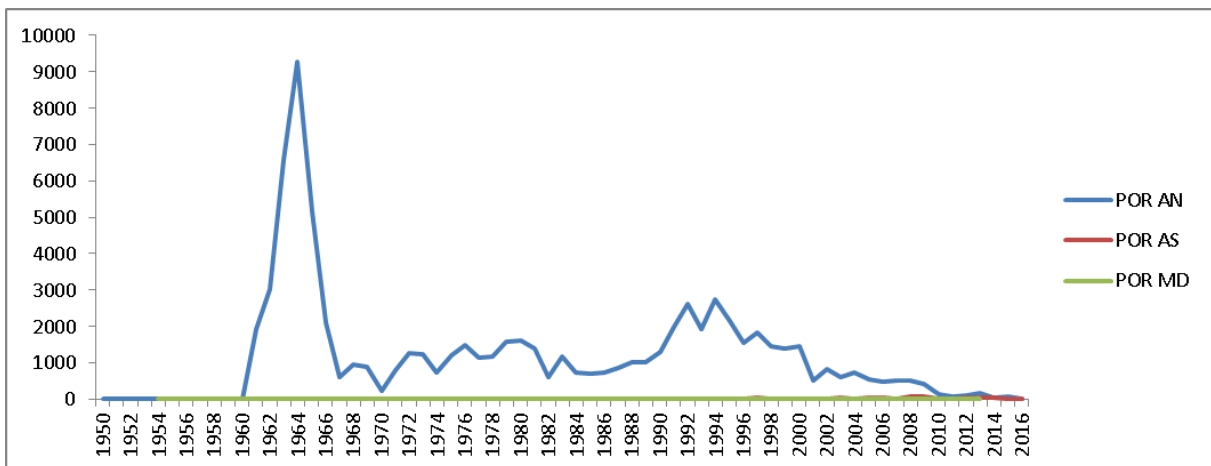


Figure 3. Task 1 nominal catch estimations of porbeagle (POR) by year (1950-2016) and stock.

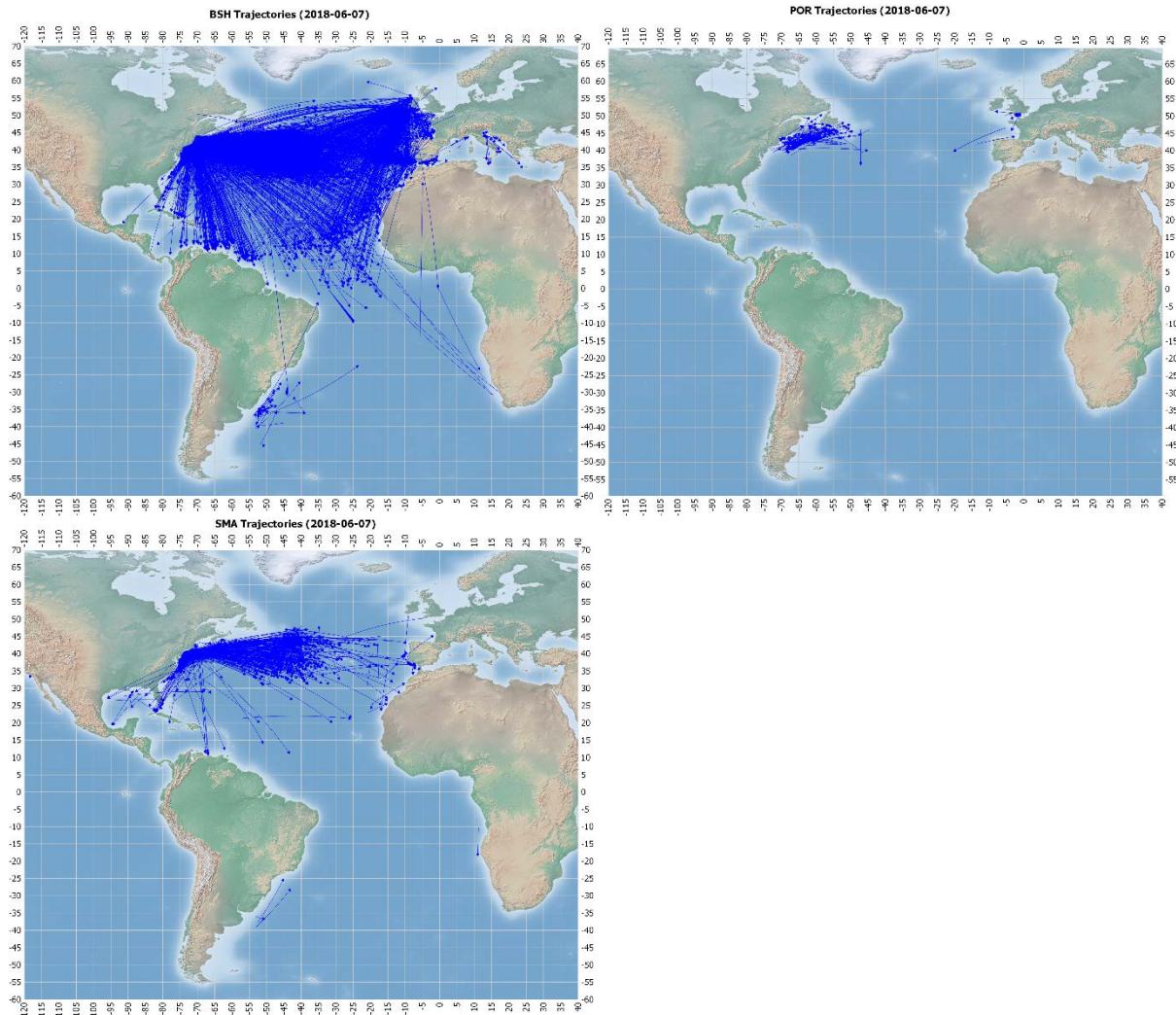


Figure 4. Inferred displacement from conventional tag release and recapture (triangle) points for blue (BSH), porbeagle (POR) and shortfin mako (SMA) sharks (source: ICCAT database).

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

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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 (<i>Isurus oxyrinchus</i>) 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 (<i>Isurus oxyrinchus</i>) for the Moroccan longline fishery | Serghini M., Moustahfid H., Habiba H., Aziza L., Abid N., and Baibbat S. |
| SCRS/2018/104 | Shortfin mako (<i>Isurus oxyrinchus</i>) 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. |

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 L_0 , instead of t_0 , 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 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, $k = 0.012$ 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 regularly 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 30°S, 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 20°C. Following an increase of 3°C, catch rates dropped by 25-28% and distribution was confined to a small area between 30-35°S and 25-40°W, from July to August. Finally, an increase of 4°C 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.

Tagging studies on ICCAT priority shark species

| <i>Species</i> | <i>N</i> | <i>Region</i> | <i>References</i> |
|------------------------------------------------------|----------|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Carcharhinus longimatus</i> (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 |
| <i>Carcharhinus longimatus</i> (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 (<i>Carcharhinus longimanus</i>) in the western North Atlantic. PloS one, 2013, 8.2: e56588. |
| <i>Carcharhinus longimatus</i> (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 (<i>Carcharhinus longimanus</i>). Fishery Bulletin, 115.3: 380-402. |
| <i>Carcharhinus falciformis</i> (Silky shark) | 3 | Tropical NW | Hueter R.E., et al. 2018. Movements of three female silky sharks (<i>Carcharhinus falciformis</i>) as tracked by satellite-linked tags off the Caribbean coast of Cuba. Bulletin of Marine Science, 94.2: 345-358. |
| <i>Alopias superciliosus</i> (Bigeye thresher) | 1 | Gulf of Mexico | Weng K.C., Bloc, B.A, 2004. Diel vertical migration of the bigeye thresher shark (<i>Alopias superciliosus</i>) a species possessing orbital retina mirabilia. Fish. Bull. 102: 221e229. |
| <i>Alopias superciliosus</i> (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. |
| <i>Alopias superciliosus</i> (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. |

| | | | |
|------------------------------------------------|----|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Sphyrna lewini</i> (Scalloped hammerhead) | 1 | Gulf of Mexico | Hoffmayer E.R., et al. 2013. Diel vertical movements of a scalloped hammerhead, <i>Sphyrna lewini</i> , in the northern Gulf of Mexico. <i>Bulletin of Marine Science</i> , 89.2: 551-557. |
| <i>Sphyrna lewini</i> (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. <i>Proceedings of the National Academy of Sciences</i> , 113.6: 1582-1587. |
| <i>Sphyrna mokarran</i> (Scalloped hammerhead) | 1 | Temperate/Tropical NW (Florida, USA) | Hammerschlag N., et al. 2011. Range extension of the Endangered great hammerhead shark <i>Sphyrna mokarran</i> in the Northwest Atlantic: preliminary data and significance for conservation. <i>Endangered Species Research</i> , 13.2: 111-116. |
| <i>Sphyrna mokarran</i> (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. <i>Diversity and Distributions</i> , 22.5: 534-546. |
| <i>Sphyrna mokarran</i> (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. <i>Proceedings of the National Academy of Sciences</i> , 113.6: 1582-1587. |
| <i>Sphyrna zygaena</i> (Smooth hammerhead) | 8 | Equatorial; Tropical NE | Santos C.C., Coelho R. 2018. Migrations and habitat use of the smooth hammerhead shark (<i>Sphyrna zygaena</i>) in the Atlantic Ocean. <i>PloS one</i> , 13.6: e0198664. |

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 |

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 | | | | | |

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.

| <i>Rec. #</i> | <i>Para #</i> | <i>Requirement</i> | <i>Status of implementation</i> | <i>Note</i> |
|---------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| 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. |

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| | 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 (<i>Lamna nasus</i>) and North Atlantic shortfin mako sharks (<i>Isurus oxyrinchus</i>) | 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 (<i>Alopias superciliosus</i>) 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 <i>Alopias</i> spp other than <i>A. superciliosus</i> in accordance with ICCAT data reporting requirements. The number of discards and releases of <i>A. superciliosus</i> 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. |

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| 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 <i>Sphyrna tiburo</i>), 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 <i>Sphyrna</i> | 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 <i>Sphyrna tiburo</i>) 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. |

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|-------|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| | 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 <u>prohibition against silky shark fisheries</u> | 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. |