Report of the 13th Session of the IOTC Working Party on Data Collection and Statistics

Victoria, Seychelles, 26-28 November 2017

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ACRONYMS

ALB	Albacore
ABNJ	Areas Beyond National Jurisdiction
BET	Bigeye tuna
BOBLME	Bay of Bengal Large Marine Ecosystems Project
CMM	Conservation and Management Measure (of the IOTC; Resolutions and Recommendations)
CPCs	Contracting parties and cooperating non-contracting parties of the IOTC
DGCF	Directorate General of Capture Fisheries of Indonesia
DFAR	Department of Fisheries and Aquatic Resources of Sri Lanka
EEZ	Exclusive Economic Zone
EU	European Union
FAD	Fish aggregating device
FMA	Fisheries Management Area
GEF	Global Environmental Facility
ICCAT	International Commission for the Conservation of Atlantic Tunas
IOC	Indian Ocean Commission
IOTC	Indian Ocean Tuna Commission
I.R. Iran	Islamic Republic of Iran
ISSF	International Seafood Sustainability Foundation
IFDCS	Iran Fishery Data Collection System
NARA	National Aquatic Resources Research and Development Agency of Sri Lanka
OFCF	Overseas Fishery Cooperation Foundation of Japan
RFMO	Regional Fisheries Management Organization
ROS	Regional Observer Scheme
Taiwan,China	Taiwan Province of China
USTA	*Unité Statistique Thonière d'Antsiranana*
VMS	Vessel Monitoring System
WPB	Working Party on Billfish of the IOTC
WPDCS	Working Party on Data Collection and Statistics of the IOTC
WPEB	Working Party on Ecosystems and Bycatch of the IOTC
WTmT	Working Party on Temperate Tunas of the IOTC
WPNE	Working Party on Neritic Tunas of the IOTC
WPTT	Working Party on Tropical Tunas of the IOTC
WWF	World Wide Fund for Nature
YFT	Yellowfin tuna

STANDARDISATION OF IOTC WORKING PARTY AND SCIENTIFIC COMMITTEE REPORT TERMINOLOGY

SC16.07 (para. 23) The SC **ADOPTED** the reporting terminology contained in Appendix IV and **RECOMMENDED** that the Commission considers adopting the standardised IOTC Report terminology, to further improve the clarity of information sharing from, and among its subsidiary bodies.

HOW TO INTERPRET TERMINOLOGY CONTAINED IN THIS REPORT

Level 1: ***From a subsidiary body of the Commission to the next level in the structure of the Commission:***
RECOMMENDED, RECOMMENDATION: Any conclusion or request for an action to be undertaken, from a subsidiary body of the Commission (Committee or Working Party), which is to be formally provided to the next level in the structure of the Commission for its consideration/endorsement (e.g. from a Working Party to the Scientific Committee; from a Committee to the Commission). The intention is that the higher body will consider the recommended action for endorsement under its own mandate, if the subsidiary body does not already have the required mandate. Ideally this should be task specific and contain a timeframe for completion.

Level 2: ***From a subsidiary body of the Commission to a CPC, the IOTC Secretariat, or other body (not the Commission) to carry out a specified task:***
REQUESTED: This term should only be used by a subsidiary body of the Commission if it does not wish to have the request formally adopted/endorsed by the next level in the structure of the Commission. For example, if a Committee wishes to seek additional input from a CPC on a particular topic, but does not wish to formalize the request beyond the mandate of the Committee, it may request that a set action be undertaken. Ideally this should be task specific and contain a timeframe for the completion.

Level 3: ***General terms to be used for consistency:***
AGREED: Any point of discussion from a meeting which the IOTC body considers to be an agreed course of action covered by its mandate, which has not already been dealt with under Level 1 or level 2 above; a general point of agreement among delegations/participants of a meeting which does not need to be considered/adopted by the next level in the Commission's structure.
NOTED/NOTING: Any point of discussion from a meeting which the IOTC body considers to be important enough to record in a meeting report for future reference.

Any other term: Any other term may be used in addition to the Level 3 terms to highlight to the reader of and IOTC report, the importance of the relevant paragraph. However, other terms used are considered for explanatory/informational purposes only and shall have no higher rating within the reporting terminology hierarchy than Level 3, described above (e.g. **CONSIDERED**; **URGED**; **ACKNOWLEDGED**).

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EXECUTIVE SUMMARY

The 13th Session of the Indian Ocean Tuna Commission's (IOTC) Working Party on Data Collection and Statistics (WPDCS) was held in Victoria, Seychelles, from the 28th to the 30th of November 2017. A total of 45 participants attended the Session.

The following are a subset of the complete recommendations and decisions from the WPDCS13 to the Scientific Committee, which are provided at Appendix VI.

Resolution 17/01 On an interim plan for rebuilding the Indian Ocean yellowfin tuna stock

WPDCS13.02 (para. 130): Thus, the WPDCS **REQUESTED** that (i) collaborative work is carried out by different Purse Seine fleets of the Indian Ocean, so as to increase the frequency of production of corrected estimates of yellowfin tuna catches to monitor yellowfin quota consumption and (ii) **RECOMMENDED** that alternative management measures (e.g. input control measures) are investigated for the Purse Seiners and other gears that will facilitate the control and monitoring of the management measures adopted by IOTC.

ROS E-reporting and E-monitoring projects

WPDCS13.03 (para. 154): Therefore the WPDCS **AGREED** to add this activity to the program of work and **RECOMMENDED** that funding is allocated for the development of data sharing mechanism between existing software and formats for the collection of observer data (e.g., *ObServe*) and the IOTC Regional Observer Database.

WPDCS13.04 (para. 159): The WPDCS **NOTED** that EMS can complement physical observer programs and also collect other data that would be useful to the SC. For this reason, the WPDCS **AGREED** that it would be beneficial to ensure that the different available systems conform to harmonized installation, data collection and reporting protocols, so as to ensure mutual compatibility. Therefore, the WPDC **RECOMMENDED** that tropical tuna purse seine fleets or CPCs wishing to voluntarily implement EMS follow the guidelines described in the document.

WPDCS13.05 (para. 160): The WPDCS **NOTED** that the ability of Electronic Monitoring Systems to collect specific data fields differs among fishing gears, and **RECOMMENDED** to develop different standards for different gear types.

Revision of the WPDCS Program of work (2018–2022)

WPDCS13.06 (para.214): The WPDCS **RECOMMENDED** that the Scientific Committee consider and endorse the WPDCS Program of Work (2018–2022), as provided at Appendix V.

Review of the draft, and adoption of the report of the 13th Session of the WPDCS

WPDCS13.08 (para. 224): The WPDCS **RECOMMENDED** that the Scientific Committee consider the consolidated set of recommendations arising from WPDCS13, provided at Appendix VII.

1. OPENING OF THE MEETING

1. The 13th Session of the Indian Ocean Tuna Commission's (IOTC) Working Party on Data Collection and Statistics (WPDCS13) was held in Victoria, Seychelles from the 26th to the 28th November 2017. A total of 45 participants (32 in 2016, 20 in 2015, 30 in 2014) attended the Session. The list of participants is provided at Appendix I. The meeting was opened on 26 November 2017 by the Chairperson, Dr. Emmanuel Chassot (EU,France) who welcomed participants to Seychelles.

2. ADOPTION OF THE AGENDA AND ARRANGEMENT FOR THE SESSION

2. The WPDCS **ADOPTED** the Agenda provided at Appendix II. The documents presented to the WPDCS13 are listed in Appendix III.

3. THE IOTC PROCESS: OUTCOMES, UPDATES AND PROGRESS

3.1 Outcomes of the 19th Session of the Scientific Committee

3. The WPDCS **NOTED** paper IOTC–2017–WPDCS13–03 which outlined the main outcomes of the 19th Session of the Scientific Committee (SC19), specifically related to the work of the WPDCS.

4. The WPDCS **NOTED** that in 2016, the SC made a number of requests in relation to the WPDCS12 report (noting that updates on Recommendations of the SC19 are dealt with under Agenda item 3.4). Some of those requests and the associated responses from the WPDCS13 are provided below for reference.

- ***Further analysis of length frequency data and likely impacts on the assessment***
  - (Para. 110) *The SC **NOTED** paper IOTC-2016-WPDCS12-INF05 that provides updates on the relationship between fork length and total weight for yellowfin, bigeye, and skipjack caught with purse seine and **NOTING** that the current length-weight relationships adopted by IOTC tend to underestimate the weight at length for the two latter species **AGREED** that the new length - weight relationships replace the existing IOTC ones.*
  - **Response:** The WPDCS **NOTED** that the revised length-weight relationships for tropical tuna species were adopted in the preparation of the data for the 19th session of the Working Party on Tropical Tunas in October 2017, and are now replacing the previous equations in the default paper disseminated by the IOTC Secretariat.
- ***Resolution 16/01 [Superseded by 17/01] On an interim plan for rebuilding the Indian Ocean yellowfin tuna stock***
  - (Para. 112) *The SC **AGREED** that a project be included in the WPDCS program of work to support CPCs in the improvement of their national data collection systems to support the implementation of Resolution 16/01 On an interim plan for rebuilding the Indian Ocean Yellowfin tuna stock; specifically estimates of fleet composition, time-area catches (and associated catches on the high seas for vessels under 24 meters), and efficiencies in the time required to assess the status of yellowfin tuna catches.*
  - **Response:** The WPDCS **NOTED** that this project is going to be funded in 2018 as per the WPDCS13 program of work, with the assumption that proper target CPCs are identified in time.
- ***Resolution 16/04 On the implementation of a pilot project in view of promoting the regional observer scheme***
  - (Para. 113) *Resolution 11/04 On a Regional Observer Scheme requests the submission of a report after each trip but the SC **AGREED** that on the next revision of the Resolution, this should be amended to request the submission of electronic data (instead of the observer trip reports) with a fixed deadline so that information from multiple trips can be provided.*
  - **Response:** The WPDCS **NOTED** that no action was taken on this important matter and therefore **REQUESTED** that the Scientific Committee reiterates the recommendation from the WPDCS12.
- ***Update on the implementation of the IOTC interim ROS templates***
  - (Para. 114) *Due to the difficulties in collecting detailed data on tori line specifications, the SC **AGREED** that the trip level data reporting requirements be amended to permit the reporting of this information as optional rather than mandatory, as detailed in paper IOTC-2016-WPDCS12-21_Rev_1, in the IOTC Interim observer template (Form Trip-LL).*

- **Response:** The WPDCS **NOTED** that the requested detail has been indicated as optional rather than mandatory, and that this change will be reflected in the ROS e-Reporting interface, also **REQUESTING** that the ROS Observer Manual be amended accordingly.

- ***ROS E-reporting and E-monitoring projects***

  - (Para. 115) *The SC **NOTED** that the guidelines described in document IOTC-2016-WPDCS12-23 provide a useful starting point and **AGREED** these guidelines be adopted as a basis for defining minimum standards for tropical tuna purse seine fleets.*

  - **Response:** The WPDCS **ACKNOWLEDGED** that updated information on this topic will be presented during the meeting (see paper IOTC-2017-WPDCS13-26) and therefore further comments and feedback will be provided in the dedicated section.

3.2 Outcomes of the 21st Session of the Commission

5. The WPDCS **NOTED** paper IOTC–2017–WPDCS13–04 which outlined the main outcomes of the 21st Session of the Commission, specifically related to the work of the WPDCS and **AGREED** to consider how best to provide the Scientific Committee with the information it needs, in order to satisfy the Commission's requests, throughout the course of the current WPDCS meeting.

6. The WPDCS **NOTED** the 8 Conservation and Management Measures (CMMs) adopted at the 21st Session of the Commission (consisting of 8 Resolutions and 0 Recommendation) as listed below:

IOTC Resolutions

- Resolution 17/01 *On an interim plan for rebuilding the Indian Ocean yellowfin tuna stock in the IOTC Area of Competence*
- Resolution 17/02 *Working party on the implementation of Conservation and Management Measures (WPICMM).*
- Resolution 17/03 *On establishing a list of vessels presumed to have carried out illegal, unreported and unregulated fishing in the IOTC Area of competence.*
- Resolution 17/04 *On a ban on discards of Bigeye tuna, Skipjack tuna, Yellowfin tuna, and non-targeted species caught by purse seine vessels in the IOTC Area of Competence*
- Resolution 17/05 *On the conservation of sharks caught in association with fisheries managed by the IOTC.*
- Resolution 17/06 *On establishing a programme for transhipment by large-scale fishing vessels*
- Resolution 17/07 *On the prohibition to use large-scale driftnets in the IOTC Area*
- Resolution 17/08 *Procedures on a fish aggregating devices (FADs) management plan, including a limitation on the number of FADs, more detailed specifications of catch reporting from FAD sets, and the development of improved FAD designs to reduce the incidence of entanglement of non-target species*

7. The WPDCS **NOTED** that pursuant to Article IX.4 of the IOTC Agreement, the above mentioned Conservation and Management Measures became binding on Members, 120 days from the date of the notification communicated by the IOTC Secretariat in IOTC Circular 2017–051 (i.e., 3 October 2017).

8. Participants to WPDCS13 were **ENCOURAGED** to familiarise themselves with the adopted Resolutions, especially those most relevant to the WPDCS.

9. In particular, the WPDCS **NOTED** that a circular was issued in May 2017, following the requirements of Resolution 16/01, informing CPCs of the indicative catch levels determined by the Secretariat for fleets affected by said Resolution, calling all concerned CPCs to confirm or update their estimated catch level.

10. Eventually, following the limited number of responses to this circular, the WPDCS **REMINDED** all concerned parties of the importance – according to Resolution 17/01 – to confirm or update such estimations in order to determine proper Yellowfin tuna catch thresholds for 2017 and following years (when affected).

11. **NOTING** that the Commission also made a number of general comments and requests on the recommendations made by the Scientific Committee in 2016, which have relevance for the WPDCS (details as follows: paragraph numbers refer to the draft report of the Commission (IOTC–2017–S21–R)) the WPDCS **AGREED** that any advice to the Commission would be provided in the relevant sections of the report below.

(Para. 22) *The Commission **NOTED** the status summaries (2011-2015) for species of tuna and tuna-like species under the IOTC mandate, as well as other species impacted by IOTC fisheries (Appendix 6) and **CONSIDERED** the recommendations made by the SC19 in its 2016 report (IOTC–2016–SC19–R, Appendix XXXVII) that related specifically to the Commission. The Commission **ENDORSED** the list of recommendations as its own, while taking into account the range of issues outlined in this Report (S21) and incorporated within Conservation and Management Measures adopted during the Session and as adopted for implementation as detailed in the approved annual budget and Program of Work..*

Consideration of management measures to tropical and temperate tunas

(Para. 25) *The Commission **NOTED** the following statement from Seychelles: "A number of compromises were made to reach a consensus, which include: 1) changing the number of FADs from 300 to 350 and 2) move to a gradual reduction of supply vessels to accommodate the concerns of some CPCs."*

(Para. 26) *The Commission **NOTED** the statement from the Republic of Korea on the final revision of IOTC-2017-S21-PropE as given in Appendix 8a.*

(Para. 27) *The Commission also **NOTED** the statement from the European Union on the final revision of IOTC-2017-S21-PropE as given in Appendix 8b.*

On the status of neritic tunas

(Para. 38) *The Commission **NOTED** that IOTC–2017–S21–PropL On the conservation and management of IOTC Kawakawa, Longtail Tuna and Spanish Mackerel was withdrawn. There was only limited agreement with this proposal, due largely to the uncertainty on the status of the stocks as a result of a general lack of data on catches, as well as concern by one CPC that the proposal could set an unacceptable precedent for allocation by seeking to cap catches. The Commission **ENCOURAGED** CPCs to improve the data collection and submission. The Commission **ENCOURAGED** Coastal States catching neritic tunas to propose and present to next year's Commission meeting possible management measures to recover the over-exploited IOTC neritic stocks, in response to the recommendation of the SC.*

Consideration of management measures related to Billfish

(Para. 41) *The Commission **NOTED** that IOTC–2017–S21–PropJ On the conservation and management of IOTC Billfish was withdrawn. There was only limited agreement with this proposal, even after a gear or management-based approach was explored. Some CPCs highlighted that implementation and effectiveness of this measure could be limited due to billfish being taken as bycatch by many CPCs; furthermore some billfish species are difficult to identify. Some CPCs expressed their concern that the proposal could set an unacceptable precedent for allocation by seeking to cap catches.*

Regional Observer Scheme

(Para. 48) *The Commission **RECALLED** that in 2016 it adopted Resolution 16/04 On the implementation of a pilot project in view of promoting the Regional Observer Scheme of IOTC and **REQUESTED** the Secretariat to develop a comprehensive plan for a Regional Observer Scheme Pilot project, as part of a long-term, holistic strategy for supporting the implementation of the Regional Observer Scheme.*

(Para. 49) *The Commission noted the presentation on the pilot project given by the Chair of the Scientific Committee and **ENDORSED** the framework as outlined in IOTC-2017-S21-10.*

3.3 Review of Conservation and Management Measures relevant to the WPDCS

12. The WPDCS **NOTED** paper IOTC–2017–WPDCS13–05 which aimed to encourage participants at the WPDCS13 to review some of the existing Conservation and Management Measures (CMM) relevant to the WPDCS, noting the CMMs referred to in document IOTC–2017–WPDCS13–04, and as necessary to 1) provide recommendations to the Scientific Committee on whether modifications may be required; and 2) recommend whether other CMMs may be required.

13. The WPDCS **AGREED** that it would consider proposing modifications for improvement to the existing CMMs following discussions held throughout the current WPDCS meeting.

3.4 Progress on the recommendations of WPDCS12

14. The WPDCS **NOTED** paper IOTC–2017–WPDCS13–06 which provided an update on the progress made in implementing the recommendations from the previous WPDCS meeting which were endorsed by the Scientific Committee, and **AGREED** to provide alternative recommendations for the consideration and potential endorsement by participants as appropriate given any progress.

15. The WPDCS **RECALLED** that any recommendations developed during a Session, must be carefully constructed so that each contains the following elements:

    - a specific action to be undertaken (deliverable);
    - clear responsibility for the action to be undertaken (i.e. a specific CPC of the IOTC, the IOTC Secretariat, another subsidiary body of the Commission or the Commission itself);
    - a desired time frame for delivery of the action (i.e. by the next working party meeting, or other date);
    - if appropriate, an approximate budget for the activity, so that the IOTC Secretariat may be able to use it as a starting point for developing a proposal for the Commission's consideration.

16. In particular, the WPDCS **NOTED** with favour the recent positive updates from I.R. Iran (following a data support and compliance mission conducted by the Secretariat in November 2017) and that similar positive updates on a range of standing issues are going to be expected from Pakistan following a future mission planned for 2018.

17. Also, the WPDCS **NOTED** a number of recommendations from the last WPDCS meeting were agreed – but not recommended – during the 19th session of the Scientific Committee. For this reason, the WPDCS **RECOMMENDED** that the following topics be reiterated as recommendations at the 20th session of the Scientific Committee:

    (WPDCS12.05 Para. 102) ***Resolution 16/04 On the implementation of a pilot project in view of promoting the regional observer scheme of IOTC***

    *Resolution 11/04 On a Regional Observer Scheme requests the submission of a report after each trip but the WPDCS **RECOMMENDED** that on the next revision of the Resolution, this should be amended to request the submission of data (instead of the observer trip report) with a given deadline so that information from multiple trips can be provided.*

    (WPDCS12.09 Para. 109) ***Update on the implementation of the IOTC interim ROS templates***

    *Due to the difficulties in collecting detailed data on tori line specifications, the WPDCS **RECOMMENDED** that the trip level data reporting requirements be amended to permit the reporting of this information as optional rather than mandatory, as detailed in paper IOTC-2016-WPDCS12-21_Rev_1, in the Observer Template (Form Trip-LL).*

18. The WPDCS **NOTED** that many of the requested updates from CPCs are often marked as *pending* for many years, and therefore encouraged concerned countries to provide further details at their earliest availability.

19. At the same time, the WPDCS **NOTED** that it might be quite common for some activities to remain in the *pending* status for long time, due to their extent and to the limited availability of resources from the Secretariat, preventing pending requests to be timely addressed.

20. Also, the WPDCS **NOTED** that the implementation of recommendations and requests endorsed by the SC will ultimately depend on available resources, and therefore activities need to be prioritized and their implementation carefully planned.

21. The WPDCS **ACKNOWLEDGED** the reiterated request, from some CPCs, that the Secretariat delivers a number of capacity-building workshops and training courses for the R language and **NOTED** that clear objectives and scopes need to be defined for such specific activities (e.g. links with potential objectives of current IOTC CMMs) before these can be considered by the Scientific Committee and eventually included in the WPDCS program of work.

22. Finally, the WPDCS **ACKNOWLEDGED** that the planned review and analysis of longline fleet size data will be conducted in 2018.

4. PROGRESS REPORT OF THE SECRETARIAT ON DATA RELATED ISSUES

4.1 IOTC Secretariat Report

23. The WPDCS **NOTED** paper IOTC–2017–WPDCS13–07 which provided an overview of the status of data holdings in the IOTC Secretariat, in particular catch, effort, size frequency and other biological data for IOTC species, sharks, and other species that are caught incidentally by fisheries directed at IOTC species.

24. The WPDCS **NOTED** the main activities carried out by the Data Section of IOTC Secretariat in 2017, including (but not limited to) the maintenance and further development of the IOTC database, the preparation and

dissemination of datasets for stock assessments and delivery of data capacity activities (including data compliance missions) to Sri Lanka, Maldives, Indonesia, Mauritius, La Réunion, Kenya and I.R. Iran.

25. Additionally, the WPDCS **NOTED** the IOTC Secretariat also provided support for the implementation of ROS-related activities, such as the Electronic-Reporting initiative and the Electronic-Monitoring pilot project.

26. The WPDCS **NOTED** that while there have been some progress in the timeliness of data reported to the IOTC Secretariat in recent years, the overall quality in reported catches remains largely unchanged – and varies considerably according to species and fleet.

27. The WPDCS further **NOTED** that the quality of the data available by species is also highly dependent on the importance of artisanal fisheries, which tend to be the least well reported fisheries and often require catches to be at partially (or fully) estimated by the IOTC Secretariat.

28. The WPDCS **NOTED** the general need to assist CPCs to understand the basic data reporting requirements as well as the data flow currently adopted by the Secretariat to produce the *best scientific estimates*.

29. The WPDCS **AGREED** that the status of the datasets available at the IOTC Secretariat is a cause for concern for several of the important fleets that operate in the Indian Ocean, in particular, but not limited to:

Total catches (including retained catches, discards):

- On-going uncertainty in the total catches, species and gear composition reported for the coastal fisheries of Indonesia in recent years – particularly catches of small tunas around anchored FADs (Rumpons) and possible misidentification of juvenile yellowfin and bigeye tunas as neritic tuna species.
- Uncertain estimates of total catch for the commercial longline fishery of India; driftnet fishery of Pakistan; handline and driftnet fisheries of Yemen; and coastal fisheries of Madagascar.
- Very poor reporting of data on the level of discards of tuna and tuna-like species, and incidentally caught species, across the majority of fisheries and time periods.

Catch-and-effort:

- Insufficient implementation of logbooks and minimum requirements for operational catch-and-effort data, which compromise reporting of catch-and-effort statistics to the IOTC – including the longline fisheries of Indonesia and India; driftnet fisheries of I.R. Iran and Pakistan; gillnet and longline fishery of Sri Lanka.
- Lack of catch-and-effort and indices of abundance for coastal fisheries for the major tuna species and particularly neritic tuna species targeted by artisanal fisheries operating in India and Indonesia.

Size data:

- Lack of size frequency data for most major coastal fisheries, including the coastal longline fishery of India, the driftnet fishery of Pakistan, and coastal fisheries of Indonesia, India and Yemen.
- Low levels of coverage of size data for Japan (until recently) and reliability of length frequencies available for longliners flagged in Taiwan,China in recent years.

Regional observer data:

- Most levels of reporting of (industrial fisheries) observer coverage are below those recommended by the Commission (i.e., a minimum of 5% of the total number of fishing operations shall be covered by scientific observers).
- Little or no observer data collection by CPCs for artisanal fisheries. Since 2014, WWF-Pakistan has funded crew-based observer data collection for Pakistan gillnet in recent years, although no data has been submitted to the IOTC Secretariat, or for any other gillnet fisheries.

30. The WPDCS **NOTED** recent improvements in the reporting of catch-and-effort from Sri Lanka (i.e. since 2014) as a result of the implementation of the new logbook data collection processes, providing gear-specific and spatial information on catch, effort, and size frequencies; also improvements in the availability of size-frequency data in particular for Japan (longliners, 2011-2016), Seychelles (longliners, 2007-2015), Thailand (coastal fisheries, 2005-2016).

31. Also, the WPDCS **NOTED** that the incorporation of revised nominal catches from Pakistan in the period 1987-2016 (reconciled with WWF observer data) will have considerable impact on catches of most species, increasing Pakistan's total catches by over 12% (30% in the last 5 years) and introducing marked changes in the catch proportion of billfish species.

32. Considering the multi-species and multi-gears of Pakistan fisheries, the WPDCS **ACKNOWLEDGED** that Pakistan is actively working to improve data for artisanal fisheries, and is in the process of requesting fishing boats to provide details of their catch after each trip.

33. The WPDCS **NOTED** that the overall quality and reporting of nominal catches of neritic tunas is relatively poor, compared to the other main IOTC species, due to the importance of artisanal fisheries to the contribution of total catches of neritic tunas The WPDCS also **ACKNOWLEDGED** that the low reporting rate of size frequency data for neritic tuna species could be due to that they are in some cases considered non-target species.

34. **NOTING** that the fisheries detailed above (para. 30) account for a substantial quantity of catches of IOTC species, the WPDCS **REQUESTED** that all of the listed CPCs address the issues identified, and report progress made at the next WPDCS.

35. The WPDCS **RECALLED** that the reporting of data, according to deadline of June 30th, as per the requirements of IOTC Resolution 15/02 is essential for ensuring the availability of data to fisheries scientists to assess the status of the stocks

36. The WPDCS **ENDORSED** the proposals from the IOTC Secretariat to undertake the necessary actions to address the issues for each fishery, as provided in Appendix IV.

4.2 Dissemination of IOTC Datasets and documents

4.2.1 IOTC Data Summary: Update

37. The WPDCS **RECALLED** that the current deadline for the stock assessment inputs and related datasets (including CPC standardized indices of abundance) is 45 days prior to Working Party meetings, and **ENCOURAGED** CPCs to provide stock assessment datasets to the IOTC Secretariat prior to the deadline to allow sufficient time for analysis by stock assessment experts, **NOTING** that many CPUEs were provided to the IOTC Secretariat in 2017 *after* the 45 days deadline.

38. The WPDCS further **NOTED** that data for the latest year is published by the IOTC Secretariat at the end of July, the 45 day deadline for publication of meeting datasets means that, in some cases, data for the latest year may not be available, particularly for the Working Party on Billfish and Working Party on Ecosystems and Bycatch which generally are scheduled for early-September.

4.2.2 IOTC Data Dissemination: Discussion of potential improvements

39. The WPDCS **NOTED** that the IOTC Secretariat is currently holding a number of biologically-relevant datasets (e.g. sex and morphometric measurements) as well as CPUE series used for past stock assessments, and **ACKNOWLEDGED** that they lack proper visibility and accessibility.

40. While it was **AGREED** that there is no technical difficulty in handling these data within the IOTC information systems, it was however **NOTED** that CPUE data are the results of statistical models and therefore they require accurate metadata to describe the models (covariates, etc.).

41. **NOTING** that standardised CPUE series are provided to the Secretariat ahead of each assessment and that these are made available as they are submitted, the WPDCS **AGREED** that it would be helpful if the history of CPUE series is made available in a dedicated section of the IOTC website. However, given the issues associated with the format in which these are made available and the number of associated caveats, late changes and final review and selection for the assessments, the WPDCS **REQUESTED** that the Secretariat collaboratively works with concerned Scientists to identify a potential approach to be presented at the next WPDCS.

42. Additionally, the WPDCS **NOTED** that the Indian Ocean has substantial artisanal fisheries and that IOTC is currently the only tRFMO providing information on the quality of its published datasets. For this reason, the WPDCS **REQUESTED** that participants consider the current and potential alternative methods of providing information on data quality and seek to build on, and improve this further.

43. The WPDCS **NOTED** paper IOTC–2017–WPDCS13–INF05 that provides the IOTC Secretariat's feedback on previous suggestions for improved figures to be used in the tropical tunas statistical summaries (document presented at the WPTT19 as IOTC–2017–WPTT19–23_Rev2), including comments on alternative catch series by gear, spatial/temporal distribution of catch effort, average weights, size frequency distribution, tagging data, stock assessment projection, etc.

44. The WPDCS **REQUESTED** feedback to be provided by WPDCS participants on the appropriate figures to be adopted for the Executive summary supporting information, and **ACKNOWLEDGED** the outcome of the

consultation as provided in Appendix VII, **RECOMMENDING** that the proposed updates become integral part of future Executive Summaries supporting information for Tropical tunas.

4.3 Updates on data-related requests from other working parties

45. The WPDCS **NOTED** the recommendation from the WGFAD on the review and revision of the categories used in the FAD data submission form 3_FA will be addressed through the paper IOTC-2017-WPDCS13-27.

46. The WPDCS **NOTED** the request from the WPNT to consider using formal statistical techniques and modelling approaches to address data gaps in the IOTC database, and to improve the methods used to disaggregate catches by species and gear and **ACKNOWLEDGED** that information on these methods were already provided in the following documents from recent, multiple Working Parties: IOTC-2017-WPEB13-22, IOTC-2016-WPDCS12-25_Rev1 and IOTC-2016-WPNT06-09.

47. The WPDCS **NOTED** the request from the WPEB to consider establishing standards for incorporating EMS data into the IOTC database and **NOTED** that this topic will be addressed in document IOTC-2017-WPDCS13-26.

48. The WPDCS **NOTED** the request from the 19th session of the WPTT meeting, to evaluate the proposal of adding new charts or revising some of the existing ones currently available through the Tropical Tunas Executive Summaries supporting information, **ACKNOWLEDGING** that this topic will be addressed in document IOTC-2017-WPDCS13-INF05.

5. UPDATE ON NATIONAL STATISTICS SYSTEMS

5.1 Update on national statistical systems, including the main challenges in collecting and reporting data to the IOTC Secretariat and proposals to improve future levels of compliance with IOTC data requirements

5.1.1 Sri Lanka vessel tracking and data verification systems to combat IUU fishing

49. The WPDCS **NOTED** paper IOTC–2017–WPDCS13–10 which described an electronic data verification module with vessel tracking facilities that is currently used in Sri Lanka to combat IUU fishing, including the following abstract provided by the author:

> "(…) *VMS is one of the high tech solution introduced for the high seas fleet and currently practiced by Sri Lanka, which make the management capable of monitoring the vessels on 24/7. Another aspect was the electronic log book system, recently introduced and this unique system facilitate to fishermen to record catch data using a user friendly front-end. The electronic logbook would ultimately build up the management support and the interactivity between all stakeholders. This project supposes a GPS enable mobile-based electronic logbook which automatically gathers all the boat route details and the catch location details. (…) Since the VMS systems are costly and highly technical, it was proposed to adopt the cruise track which is automatically drawn by the electronic log system based on the location of tables as a vessel tracking tool for fishing vessels. It was also anticipated to develop a methodology to establish an online monitoring system by connecting tablets with satellite services.* (…)" – see paper for full abstract.

50. The WPDCS **NOTED** that the e-logbook system recently introduced by Sri Lanka, has been extended to effectively become a useful tool to address MCS requirements and combat IUU fishing by incorporating an online tracking component in the system, while at the same time still being capable of fulfilling reporting requirements for the collection of fine-scale catch-effort data with high accuracy.

51. The WPDCS **NOTED** that Sri Lanka has proposed a draft regulation to make the e-logbook system mandatory and under this regulation its adoption will be compulsory for all motorized vessels, also **NOTING** that fishermen are requested to undertake training courses on the usage of the e-logbook before the issuance or renewal of their license.

52. The WPDCS **ACKNOWLEDGED** that Sri Lanka, and namely the University of Colombo as its original author, are willing to share the system and the components of the logbook application with the IOTC Secretariat, and **WELCOMED** the possibility for the latter to evaluate the adoption of the same system in other countries within the region.

53. The WPDCS **NOTED** the similarities between the process used to analyse vessel trajectories to identify fishing activities that might not have been recorded by the logbook, and the analysis services provided by Global Fishing Watch (Google) using AIS data in combination with VTS (Vessel Tracking System) data for cross-checking.

54. Therefore, the WPDCS **ENCOURAGED** Sri Lanka to evaluate the possibility of sharing their VTS data with Google for this purpose, following the example of Indonesia and Peru, **NOTING** that due to data secrecy issues this would still present a challenge for Sri Lanka.

55. The WPDCS **ASKED** Sri Lanka to provide a rough estimate of the operational cost of the satellite-based communication system, and **NOTED** that although data is transmitted with a frequency of one message every 30 minutes, the system is indeed cheaper than the conventional INMARSat.

56. The WPDCS **NOTED** the real-time data sharing potential of the approach, that could make it possible for boat owners and captains to sell their catch well before their landing.

57. The WPDCS **ASKED** Sri Lanka about the current coverage of vessels in the high seas, **NOTING** that there are currently 1,500 vessels adopting the system, and **CONGRATULATED** Sri Lanka for the work undertaken so far.

5.1.2 I.R. Iran national data collection systems

58. The WPDCS **NOTED** paper IOTC–2017–WPDCS13–11_Rev1 which provided an overview of the management measures put forward by I.R. Iran to improve their data collection processes and compliance with IOTC regulations, including the following abstract provided by the author:

> "*This document presents summary information about fisheries statistical data in Iran, according to IOTC resolutions and recommendations concerning mandatory minimum data submit to IOTC and basic actions to improving Data collection system with approvals and recommendations of the Scientific Committee and WPDCS* (…)" – see paper for full abstract.

59. The WPDCS **NOTED** that the IOTC Secretariat conducted a Data Compliance and Support mission to I.R. Iran in November to address long standing issues with reporting of mandatory data to the IOTC – specifically the submission of catch-and-effort and size frequency data.

60. The WPDCS further **NOTED** that I.R. Iran has agreed to submit future data in a format and template agreed with the IOTC Secretariat, in accordance with the reporting requirements of Resolution 15/02, including data for the historical time series, and **REQUESTED** the IOTC Secretariat provide an update for the next WPDCS meeting.

61. The WPDCS **NOTED** that I.R. Iran has collected details on vessel licensing and port sampling of gillnetters for over 10 years, including information on catches, effort, fishing grounds, and gear, and **REQUESTED** that the IOTC Secretariat collaborate with I.R. Iran to explore options for developing a standardized gillnet CPUE series (e.g., coastal gillnetters targeting neritic tunas) for use in future stock assessments.

62. The WPDCS **WELCOMED** the effort deployed by I.R. Iran in improving its national data collection procedures and **ACKNOWLEDGED** that size data for YFT, SKJ, BET, KAW, COM and LOT are collected in I.R. Iran through a sampling program mainly from Gillnet, Purse seine and Hook/Troll fishery from four coastal provinces.

63. The WPDCS **NOTED** that I.R. Iran continues to experience difficulties deploying on-board observers, due to lack of space and safety issues placing observers on coastal and offshore (gillnet) vessels..

64. The WPDCS further **NOTED** I.R. Iran's request for observer training, facilitated by the IOTC Secretariat as part of the activities planned under Resolution 16/04 Regional Observer Pilot Project, including the delivery of 1 or 2 workshops targeted at enumerators to provide training in observer data collection and reporting.

5.1.3 Electronic reporting and monitoring systems onboard of Thailand high-seas vessels

65. The WPDCS **NOTED** paper IOTC–2017–WPDCS13–12 which provided updates on the installation of electronic reporting systems (ERS) and electronic monitoring systems (EMS) on Thailand vessels registered to operate in the high seas, including the following abstract provided by the author:

> "*Thailand started to enforce its Electronic Reporting System (ERS) and Electronic Monitoring System (EM) for Thai oversea fishing vessels and Thai oversea carrier vessels on 9 August 2017. For Thai oversea fishing vessels, there are reports of fishing information in the fishing logbook via ERS every day from they operated for the whole trip until the vessel is back to port. In addition, the vessels shall send information of fishing activity every time includes the time to start and end operates fishing gear which shall recorded in fishing logbook. Moreover, ERS its used to review the consistency with the data recorded in the fishing logbook. In addition, Thai oversea fishing vessels and carrier vessels shall request for transhipment and transhipment declaration via ERS* (…)*"* – see paper for full abstract.

66. The WPDCS **NOTED** the current status of implementation of the described EMS solution in Thailand, as well as its national plan to further implement this once active vessels are registered again.

67. The WPDCS **NOTED** the good work undertaken by Thailand in ensuring effective electronic data monitoring and reporting and **ENCOURAGED** the Country to continue in this direction.

5.1.4 Pakistan national data collection systems

68. The WPDCS **NOTED** paper IOTC–2017–WPDCS13–13 which provided an update on the status of fisheries data collection and statistics in Pakistan, including the following abstract provided by the author:

> "*Pakistan has multi-species and multi-gear artisanal fisheries. Data for its fisheries is reported as only a few species or in certain cases at family level* (…) *The data is not collected on catch per unit effort (CPUE), therefore, these statistics cannot be used for stock assessment. Attempts are being made to establish a comprehensive data collection system so that data may be recorded by each fishing gear with species level breakdown. In this regard a web-based software has been prepared under Fisheries Resource Appraisal project by FAO and Marine Fisheries Department (MFD). Data from the fish processing industry is planned to be collected for comparison. For the establishment of such a system, provincial and federal fisheries departments are required to be a part of this exercise* (…)" – see paper for full abstract.

69. The WPDCS **NOTED** that there are a number of shortcomings in the data being communicated to IOTC and FAO by the Government of Pakistan, who decided to revise the landings data of tuna and tuna like species taking into consideration the information being collected through WWF-Pakistan crew based observer program as previous studies conducted by the University of British Columbia and Pakistan Bureau of statistics revealed anomalies in the data being reported for fish and fisheries products.

70. Therefore, the WPDCS **NOTED** that a revised catch series for Pakistan (from 1987 onwards) had been submitted to the IOTC Secretariat in 2017, incorporating information collected by the WWF crew-based observer data – but that these data have not been incorporated in the IOTC database, pending a comprehensive evaluation of the quality of new catch series. This revision, in particular, results in an overall increase in catch estimates for all species for the period 1999-2016 period – with the exception of skipjack tuna, that shows a marked decrease compared to the previous estimates for the same period

71. The WPDCS **ACKNOWLEDGED** the WWF's assistance to the Government of Pakistan in terms of compliance with IOTC CMMs, particularly through the implementation of the crew based observer program funded by the ABNJ Project, and **ENCOURAGED** Pakistan to continue their efforts to improve data collection and compliance with IOTC mandatory data reporting requirements.

72. The WPDCS further **NOTED** that the Government of Pakistan is examining various options to ensure continuation of the observer programme initiated by WWF-Pakistan, as the latter may not continue this crew-based observer after the completion of ABNJ project, and that both maritime provinces are being taken onboard for adoption of the observer programme.

73. The WPDCS **NOTED** that the Federal legislation in Pakistan has provision for installation of tempered proof VMS in all categories of vessels operating in the EEZ since 2001. This was implemented on all deep sea fishing vessel (foreign flagged) till 2009 (when last such foreign flagged vessel was operational). Now legislation has been promulgated by one of the maritime province (Balochistan) making it mandatory to install VMS on fishing vessel greater than 15 m (LOA) since October 2016. However implementation could not be initiated because Government is looking for funds to subsidize the installation and operational cost of VMS. Law of other maritime province (Sindh) is being modified.

74. The WPDCS **ACKNOWLEDGED** that an IOTC Data Compliance and Support mission has been scheduled to Pakistan in early 2018 to address a number of data related issues, including the revised catch series, and **REQUESTED** that the IOTC Secretariat present to the WPDCS an update on the status of Pakistan's catch estimates (including the evaluation of the methodology and rationale of the proposed revisions to Pakistan's nominal catches in the IOTC database).

75. The WPDCS also **NOTED** that to improve the data collection for tuna and tuna like species in Pakistan, port sampling is being strengthened in both provinces and a series of training and awareness programme are being arranged in collaboration with WWF-Pakistan for the purpose. Also, a web-based software for Fisheries Monitoring System in Pakistan has been developed by Marine Fisheries Department with the goal of designing and implementing a comprehensive fisheries statistics on catch and fishing effort including catch volumes, species and size composition, temporal and spatial distribution, and corresponding fishing effort.

76. The WPDCS **NOTED** that that Pakistan has proposed several initiatives to improve the quality of fisheries data collection, including: the acquisition and incorporation of AIS data, development of data validation systems, installation of CCTV on selected vessels, adoption of Flywire electronic monitoring systems (already trialled in Indonesian gillnet fisheries), in addition to negotiations between WWF-Pakistan and the Government of Pakistan

to adopt a crew-based observer scheme, to facilitate compliance with IOTC mandatory data reporting requirements.

5.1.5 South Africa challenges in data reporting across the IOTC / ICCAT boundary

77. The WPDCS **NOTED** paper IOTC–2017–WPDCS13–14 which describes the challenges encountered by South Africa when reporting data spanning across the IOTC/ICCAT boundary, focusing on the case-study of shortfin mako, including the following abstract provided by the author:

> "*South Africa's geographical location is such that the IOTC/ICCAT boundary is incorporated in its EEZ at 20 degrees longitude, approximately offshore of Cape Agulhas. This offshore area is locally known as the Agulhas Bank; a renowned fishing bank that exhibits high productivity and diversity as a result of the temperate Atlantic and sub-tropical Indian Oceans meeting. As such, many large pelagic species aggregate on the Agulhas Bank attracting relatively high fishing pressure. This creates a number of RFMO reporting issues. It is common for species-specific catch data from South Africa to exhibit high inter-annual variability which is not an indication of performance but rather an artefact of 'criss-crossing' the RFMO boundary* (…)" – see paper for full abstract.

78. The WPDCS **NOTED** the challenges faced by South Africa in reporting shortfin mako catches (among others) straddling between the IOTC and ICCAT areas of competence to their respective stocks.

79. The WPDSC **NOTED** that the large fluctuations in catches recorded for some species reflect stock movements across the IOTC / ICCAT boundaries, rather than real changes in total catches or abundance.

80. While the WPDCS **ENCOURAGED** South Africa to continue reporting catches to IOTC as per the agreed area of competence, at the same time **REQUESTED** that for all matters related to the assessment of such straddling stocks, South Africa takes proper action in combination with scientists from the involved Secretariats, and also **NOTED** that a similar challenge is encountered in relation to Blue shark, Swordfish, Yellowfin tuna and Albacore.

81. The WPDCS also **NOTED** that Indian Ocean Shortfin mako will be assessed in 2020 and that scientists from ICCAT are expected to participate and further contribute with their expertise to address the identified issues.

82. The WPDSC **NOTED** that similar issues are also commonly occurring across oceanic and RFMO boundaries, (e.g. Albacore around the ICCAT boundary area and Swordfish around the WCPFC boundary area in the south of Australia).

83. The WPDCS **REQUESTED** authors to develop a summary table including information that would help identify for which species and tRFMO the issue is particularly evident, e.g. by including a measure of the overlap and inter-annual variability of the stock.

5.1.6 Comoros national data collection systems

84. The WPDCS **NOTED** paper IOTC–2017–WPDCS13–15 which described the efforts put forward by Comoros in the last six years to improve its national statistics data collection processes, including the following abstract provided by the authors:

> "*Fisheries Data collection system is elaborated in 1995 in Comoros with the support of FAO. After more than seventeen years there is no data collected. IOTC comes back on 2011, to update the collection data system elaborated before then continue to collect new data. Since when the collect is regular with World Bank, IOC projects or IOTC support. After five years, the database is revised, sampling strategy is simplified and number of strata is reduced from 7 to 5, the number of surveyor from 11 to 13 including octopus data collectors. The estimation application is mastered by local experts. The last innovation is introduction of tablet to collect and send data by cloud database.* (…)" – see paper for full abstract.

85. The WPDCS **NOTED** the support over time by a number of partners to improve data collection system in Comoros from 2011 to 2015, including IOTC, OFCF and the World Bank through SWIOFISH project, and that there currently are 15 trained numerators collecting sampling data on pelagic species, using tablets to conduct surveys.

86. The WPDCS also **NOTED** that the main target species for the handline fisheries in Comoros is Yellowfin tuna while Skipjack tuna is the main target species for trolling fisheries.

87. The WPDCS **NOTED** that nominal catches submitted to the IOTC Secretariat in 2017 (for year 2016) included sharp increases in catches for a number of species, particularly billfish, and **REQUESTED** that the IOTC Secretariat and Comoros explore the reason for the increase (e.g., improvements in the weighing and/or data

recording of billfish specimens) and whether catches for earlier years should be scaled upward to ensure consistency with the latest catch estimates.

88. The WPDCS **CONGRATULATED** the progress made in data collection and reporting from Comoros in recent years and **NOTED** the question surrounding the sustainability of the data collection system following the upcoming end (2021) of the World Bank-funded SWIOFISH project.

89. The WPDCS also **NOTED** the major changes in tuna catch composition during 2011-2015 which appear not to be related to a change in sampling method, and **ACKNOWLEDGED** that the substantial increase in the catch of billfish species reported to the Secretariat for 2016 has to be further explored. . [Move after paragraph 87]

90. The WPDCS **ENCOURAGED** Comoros to continue the sampling activities and provide information on the sampling coverage to the next WPDCS.

5.1.7 Characterization of Mozambique artisanal purse seine and handline fisheries

91. The WPDCS **NOTED** paper IOTC–2017–WPDCS13–16 which described the general characterization of artisanal purse seine and handline fisheries off the Northern coast of Mozambique and their impact on tuna and tuna-like species, including the following abstract provided by the authors:

> "*Artisanal purse seine and handline fisheries in the northern coast of Mozambique (10°30'S to 16°00'S) exhibit some targeting on tuna and tuna like species more than in other part of the country. The characterization of these two type of fisheries and their impact on tuna and tuna like species has based on Interviews and sampling during disembarkation on landing sites, conducted during 30 days, between May and June 2016, in the northern provinces of Cabo-Delgado and Nampula.* (…)" – see paper for full abstract.

92. The WPDCS **NOTED** that Mozambique has developed a data collection system for coastal fisheries since 1997, expanded in 2009 throughout the whole country.

93. The WPDCS **NOTED** that coastal fisheries in Mozambique are mainly targeting small demersal and small pelagic species and for which specific catch, effort and size frequencies data are collected.

94. Also, the WPDCS **NOTED** that despite IOTC species being regularly sampled, some of them are not well identified and are consequently reported in aggregated form. Additionally, size-frequency is only sampled for Narrow-barred Spanish mackerel, which is the main IOTC species found in artisanal landings. Therefore, the WPDCS **NOTED** that to address the issues in collecting IOTC species data, actions have been put in place in the Northern coast, a priority region where IOTC primary species are relatively well represented in the catches of coastal fisheries.

95. **NOTING** that Mozambique is trying to promote artisanal fisheries oriented towards tuna targeting, the WPDCS **ACKNOWLEDGED** that Mozambique is also collecting data for IOTC species (mainly, Narrow-barred Spanish mackerel) and that size data will be reported to IOTC in 2018.

96. The WPDCS **NOTED** that WWF-Mozambique is assisting the government to address the issues with identification of species, in particular by translating the species identification guides into Portuguese.

97. The WPDCS **NOTED** that taking pictures during sampling, for later identification of species by experts, could improve the overall level of species correctly identified.

5.1.8 A centralized database for artisanal fisheries in Somalia

98. The WPDCS **NOTED** paper IOTC–2017–WPDCS13–17 which described the challenges and results of developing a central database for artisanal fisheries in Somalia, including the following abstract provided by the authors:

> "*Fisheries management cannot be undertaken efficiently unless the basic data is available. However, Somalia was hindered by a lack of up-to-date scientific information on catch and fishing effort statistics, and other data relevant for the management and conservation of fish stock and marine mammals in Somali territorial waters. There is no reliable and timely statistics, vital for effective policy formulation, for measuring progress, and for accurate reporting on artisanal fisheries. The statistical capacity building activities in the fisheries sector have until recently remained uncoordinated, incoherent, and incomplete* (…) *Therefore, the Ministry of Fisheries and Marine Resources in collaboration with local consultants has been engaged in the development of centralized and common fisheries database with all regions in Somalia. Development and establishment of a robust fisheries information system is essential to Somalia for sustainable management of the fishery sector* (…)" – see paper for full abstract.

99. The WPDCS **NOTED** that notwithstanding Somalia being one of the country with the most productive fishing grounds in the entire region, no proper data collection systems are in place.

100. Although data collection processes were in place since the 1970s and conducted by trained fishery inspectors, the WPDCS **NOTED** that currently data collection happens from different sources and aims mainly at estimating total fish production (i.e. data cannot be used for stock assessment).

101. The WPDCS **NOTED** the lack of guidance for the implementation of data collection system in Somalia, and **REQUESTED** that the Secretariat identifies the type of support that could be provided in terms of possible technical assistance to strengthen artisanal fisheries data collection and database management.

102. The WPDCS **ACKNOWLEDGED** that fisheries in Somalia are multi-species and multi-gears, with no clear information on bycatch, and **NOTED** that a modern data collection system should require better data management capabilities (e.g., adoption of proper SQL data bases) and improved sampling procedures through time and space.

103. **NOTING** that, in the recent past, the World Bank lead project, SWIOFP, has developed a system to be used within the region, the WPDCS **ACKNOWLEDGED** that Somalia is developing its own system, different from those adopted by other countries.

104. The WPDCS **ACKNOWLEDGED** that if the implementation of the new data collection system and processes in Somalia is finalized by 2018, then data for Nominal Catches could likely be provided to the Secretariat by early 2019, including also landings from Somaliland.

105. The WPDCS **ACKNOWLEDGED** that the different regions in Somalia had agreed to work together, although challenges can still be anticipated even in areas where already previously agreed.

106. The WPDCS **NOTED** that further studies are needed to test the accuracy of the sampling strategy, estimation method and the database management system.

107. The WPDCS **NOTED** the lack of guidelines for data collection systems and the low capacity available to the Somalia government, and **RECOGNIZED** the good work performed by Somalia in ensuring measurable progress in data collection, archiving, analysis and reporting.

5.1.9 Roles of Malaysian fisheries management measures in data collection

108. The WPDCS **NOTED** paper IOTC–2017–WPDCS13–18 which described the role of Malaysian fisheries management measures in the fisheries data collection, including the following abstract provided by the authors:

> "*The Department of Fisheries Malaysia is responsible for the collection of national fisheries statistics. For the purpose of collection of landing statistics, the Department of Fisheries divides the coastal belts into fisheries districts. Total catch and effort data collected from various landing sites are recorded in the computer system at the State Office and these data are then send to the main database server in Fisheries Headquarters. For conservation of the national marine resources increases and for better quality data, Department of Fisheries Malaysia has started to implement vessel logbook programs and these programs were initiated for the pelagic longline fisheries* (…)" – see paper for full abstract.

109. The WPDCS **NOTED** that the total estimated catch of marine fish recorded by Malaysia in 2016 was 1.57M metric tons, with an increase of about 6% from 2015 levels.

110. The WPDCS **NOTED** that Malaysia has started implementing vessel logbook programs for the pelagic longline fisheries in September 2017 and that VMS is successfully implemented for all high-seas fishing vessels.

111. The WPDCS also **NOTED** that Malaysia plans to implement observer onboard (OBB) for purse seine vessels fishing in domestic waters and that fisheries data from the marine recreational sector will start to be collected soon.

5.1.10 Kenya Catch Assessment Survey

112. The WPDCS **NOTED** paper IOTC–2017–WPDCS13–36_Rev1 which described the rationale for change in Kenya catch-assessment survey and data collection for coastal fisheries, including the following abstract provided by the authors:

> "*Catch Assessment Surveys (CAS) are dedicated surveys targeting the capture fisheries to collect information on fish catches and fishing effort. Other sources of catch-effort data exist, including the post-harvest sector and markets, although these sources tend to be less accurate, and with lower precision and cannot provide reliable data, especially on fishing effort. CAS designs typically require frame survey data to raise samples to total catch estimates. Catch-effort and frame survey data are important for supporting*

the management process. If catch data is combined with information on fish prices, it can be used to estimate the gross value of production (GVP). (…)" – see paper for full abstract.

113. The WPDCS **REQUESTED** that the IOTC Secretariat continue to provide support to Kenya in order to finalize work on the evaluation of the results of the Catch Assessment Survey; particularly in terms of understanding the differences in catches estimated by the CAS and routine data collection – as well as procedures to revise the historical catch series, if the results of the CAS are formally adopted.

114. While the WPDCS **NOTED** that the data collected by the CAS are a significant improvement over the former routine data collection in terms of the spatial and temporal coverage, the reporting to the species level, and the collection of size frequency data, it also **ACKNOWLEDGED** the discrepancies between the catches collated by the CAS and the previous data collections system, and that further investigations are required to understand the cause of the data gaps between the two systems.

115. The WPDCS **NOTED** that the IOTC Secretariat has scheduled a visit to Kenya in December 2017 to provide an appraisal of the new integrated fisheries database developed by Kenya, which will incorporate data for the Catch Assessment Survey and will include automated procedures for raising to total catches, and **REQUESTED** that Kenya provide an update at the next WPDCS meeting.

5.1.11 Fisheries indicators for EU,France purse-seiners operating in the Indian Ocean

116. The WPDCS **NOTED** paper IOTC–2017–WPDCS13–39_Rev1 which described a number of statistics for the French purse seine fishing fleet targeting tropical tunas in the Indian Ocean in the 1981-2016 period, including the following abstract provided by the authors:

"*French purse seiners operate in the indian ocean target yellowfin (Thunnus albacares), skipjack (Katsuwonus pelamis), and bigeye tuna (Thunnus obesus) through two major fishing modes : floating object-associated schools (FOB) and free-swimming schools (FSC) that result in different species and size compositions of the catches. Statistical data for the French purse seine (PS) fishing fleet have been collected by the 'Institut de Recherche pour le Développement' (IRD) in collaboration with the 'Seychelles Fishing Authority' (SFA) since the arrival of the first purse seiners in the Indian ocean in the early 1980s. The French PS fleet activities are described through a suite of fishery indicators that provide information on fishing capacity, effort, catch, and catch rates for the tropical tuna species (skipjack, yellowfin and bigeye) targeted, with a particular focus on the year 2016* (…)" – see paper for full abstract.

117. The WPDCS **NOTED** the sharp increase in Skipjack tuna catches from Purse Seiners in 2016 when compared to 2015, and that a similar decline in Bigeye catches is recorded over the same period.

118. Authors also **NOTED** that the reason for such trends was not well known, although catches from FADs also increased within the same time. For this reason, the WPDCS **ENCOURAGED** France to follow up with Seychelles and Spain and verify whether similar trends are also recorded for their catches.

5.2 Further analysis of length frequency data and likely impacts on the assessments

5.2.1 Potential effects of new length-weight relationships on the species composition and tuna catch at size for purse seine fleets in the Indian Ocean

119. The WPDCS **NOTED** paper IOTC–2017–WPDCS13–20 which described the potential effects introduced by the new length-weight relationships in the species composition and catch-at-size for tuna catches from purse seine fleets in the Indian Ocean, including the following abstract provided by the author:

"*This work analyzes a statistical bias that has been introduced in the PS catch estimates and catch at size (CAS) by species, by the use of an old length weight (LW) relationships until 2014 followed by the use of a new LW relationship for 2015-2016, to estimate the species composition, average weight and CAS for a large majority of purse seiners active in the Indian Ocean. Alternate corrected series of catches by species are produced by 2 methods based on the sampled sizes for each species, for both floating objects (FOB) and free school catches, during the 1982-2014 period. These tentatively corrected catches of PS are compared to the yearly catches presently declared to the IOTC. This comparison shows that minor but systematic bias have been introduced in the catches by species by the use of the old LW relationships used in the data processing* (…)*"* – see paper for full abstract.

120. The WPDCS **NOTED** that the use of the new length - weight relationships adopted for tropical tunas, mostly affect the estimation of nominal catches by species, and the catch at size of the purse seiners for the historic period during the process of catch estimation.

121. The WPDCS **NOTED** that, beside differences in relative contributions of each species due to the updated length – weight relationships, there are also other issues in relation to the methodology used to estimate total catches for purse seiners that need to be further investigated to reconstruct the historic catch estimation by species for the EU purse seiners (e.g., stratification, strata substitution, TT methodology etc.).

122. The WPDCS **REQUESTED** authors to investigate and analyse all detected issues, revisit historical catch composition by species and share the results with the WPDCS and eventually, for endorsement, with the Scientific Committee before incorporating any change in the IOTC Database.

123. The WPDCS **NOTED** that current length - weight relationship used for Skipjack were calculated using 2014-2016 samples and that historical data do exist, although not in digital format, requesting that these be digitized as soon as possible.

124. The WPDCS also **NOTED** that historical length - weight data for Yellowfin and Bigeye tuna are available and **ENCOURAGED** authors to consider whether or not it would be worth to produce length - weight relationships for both species in different periods and investigate if changes in the length - weight relationship occurred over time may have affected the reconstruction of catches by species.

125. The WPDCS **NOTED** that multispecies sampling is used to correct initial catch estimates and to produce the final nominal catch by species, while length - weight relationships are used to estimate the weight by species.

126. The WPDCS **NOTED** that the Purse Seiners fleets included in the study contributed to 82% of the total Purse Seiners catch.

127. Finally, the WPDCS **NOTED** that the adoption of the new length – weight relationship has a much bigger impact on Skipjack than Yellowfin and Bigeye tuna, leading to an overall 3.7% increase in Skipjack catches in weight when averaging data from 1982 to 2014.

6. REVIEW OF DATA REQUIREMENTS IN CONSERVATION AND MANAGEMENT MEASURES RELEVANT TO THE WPDCS

6.1 Data reporting

6.1.1 Resolution 15/02 Mandatory statistical requirements for IOTC Members and Cooperating Non-Contracting Parties (CPCs)

6.1.2 Resolution 17/01 On an interim plan for rebuilding the Indian Ocean yellowfin tuna stock

128. The WPDCS **NOTED** paper IOTC–2017–WPDCS13–21 that analyses the challenges of monitoring the level of consumption of YFT quota in real time by the French tropical purse seine fleet in 2017, including the following abstract provided by the authors:

> "(...) *Since the beginning of the fishery during the 1980s, it is the first time that a catch quota applies to tropical tuna purse seiners of the Indian Ocean. This new situation has raised issues for ORTHONGEL and its member fishing companies that must carefully follow the consumption of their YFT quota in real time though official catch data are usually produced once a year after a correction of species composition. The objectives of the present document are threefold (i) describe the methodology used by scientific institutes to prepare official catch statistics (ii) describe the methodology adopted by ORTHONGEL in 2017 to monitor YFT catches in real time (iii) report on differences between the two sources of information and discuss potential solutions to overcome these issues.*" – see paper for full abstract.

129. The WPDCS **NOTED** the difficulties in properly monitoring Yellowfin tuna catches in near real-time (as required by Resolution 17/01) primarily due to the necessary correction process required to estimate species composition for Purse Seine catches that cannot be performed in near real-time.

130. Thus, the WPDCS **REQUESTED** that (i) collaborative work is carried out by different Purse Seine fleets of the Indian Ocean, so as to increase the frequency of production of corrected estimates of yellowfin tuna catches to monitor yellowfin quota consumption and (ii) **RECOMMENDED** that alternative management measures (e.g. input control measures) are investigated for the Purse Seiners and other gears that will facilitate the control and monitoring of the management measures adopted by IOTC.

131. The WPDCS **SUGGESTED** that there is also the need to improve real time monitoring of Skipjack tuna catches, once catch limits for the species are implemented in 2018, **NOTING** that Skipjack tuna catch limits will be set at the level of the whole Indian Ocean stock, and not just for individual fleet.

6.2 Regional observer scheme

6.2.1 Resolution 11/04 On a regional observer scheme

6.2.2 Resolution 16/04 On the implementation of a pilot project in view of promoting the regional observer scheme of IOTC

132. The WPDCS **NOTED** paper IOTC–2017–WPDCS13–22 which described the results of Orthongel's voluntary observer program (OCUP 2013-2017) in terms of data collection on board French and Italian tropical tuna purse seiners in the Indian Ocean with common observers, including the following abstract provided by the authors:

> "*In order to comply with the different regulations and commitments requesting the presence of scientific observers onboard French and Italian purse seiners, and since it is not possible to embark more than one observer during a fishing trip, ORTHONGEL has imagined and implemented since July 2013 a program to facilitate and optimize the boarding of well-trained scientific observers. This voluntary program, called OCUP for "Observateur Commun Unique et Permanent" (Common Permanent Unique Observer) was conducted with the Institute for Research and Development (IRD), Oceanic Développement (OD), the Seychelles Fishing Authorities (SFA) and several coastal countries. It was implemented in both Atlantic and Indian Oceans where the fleet of the fishing companies member of ORTHONGEL is active. This paper describes the methodology of the OCUP program and presents and discusses its main results, focusing on the Indian Ocean.* (...)*"* – see paper for full abstract.

133. The WPDCS **NOTED** that the OCUP observer program has been implemented since July 2013 and, as per its definition, observers' tasks currently include collecting scientific data (e.g. observation of vessel activities, fishing sets, activities on FOBs and estimates of bycatch), providing scientific advice to skippers, monitoring best practices and detecting IUU fishing.

134. The WPDCS **NOTED** paper IOTC–2017–WPDCS13–23_Rev1 which described the overview, challenges and perspectives of the Seychelles purse seine fishery observer program, including the following abstract provided by the authors:

> "*The Republic of Seychelles initiated a National Scientific Observer Programme in July 2013 to address the objectives of the IOTC Regional Observer Scheme. The programme is carried out by the Seychelles Fishing Authority (SFA) and follows the methodology in use in the European purse seine fleet, i.e. the same observer protocol and the software ObServe to acquire and manage the data sets. A guide of good practices complements the protocol to provide information on the design of fish aggregating devices (FADs) and the release of incidentally caught species. During 2014-2016, more than 3,300 days at sea were observed throughout more than 100 fishing trips conducted onboard 13 Seychelles purse seiners and 5 Seychelles support vessels. The programme covered more than 2,700 fishing sets observed and a total catch of more than 70,000 mt, representing about 30% of the total catch of the fishery during 2014-2016* (...)" – see paper for full abstract.

135. The WPDCS **NOTED** the data collected by observers in the Seychelles purse seine fishery is compared with logbook data (e.g., FADs deployments) to identify the extent of discrepancies.

136. Also, the WPDCS **NOTED** that catch data are well aligned with logbook data as total catches are usually provided by the skippers, whereas more differences would be expected in the areas where the observers are requested to focus efforts (such as for the bycatch and discards) and that there is also good consistency in the recorded vessel trajectories.

137. The WPDCS **NOTED** that while good datasets are available, only PDF documents have been shared with the IOTC Secretariat so far. The WPDCS therefore **REQUESTED** that processes are established so that the data can be transferred more efficiently to the IOTC Regional Observer Database.

138. The WPDCS **NOTED** the current coordinated effort between the EU, Spain, EU, France and Seychelles to develop common procedures for training observers for purse seine vessels.

6.2.3 Discussion of observer coverage rates

139. The WPDCS **NOTED** paper IOTC–2017–WPDCS13–24_Rev1 which described a number of considerations for designing sampling strategies in observer programs to ensure a representative coverage of key variables, including the following abstract provided by the authors:

> "*Resolution 11/04, which establishes the Regional Observer Scheme (ROS) for the IOTC, requires a minimum level of observer coverage of 5%, and specifies that the coverage should be representative of gear*

types in a CPC's fleet. From a scientific perspective, there are other very important considerations of representative coverage in addition to gear type – including:

1. *fleet/sub-fleet (as defined by flag state, broad gear configurations, broad vessel size category)*
2. *target species (if clear separation is possible e.g. swordfish versus tuna)*
3. *A temporal stratum*
4. *An area stratum*

Achieving representative coverage at 5% of some or all of these strata is almost impossible if total coverage is to be retained at 5%. We propose that 5% coverage for each stratum be achieved and that the Scientific Committee consider recommending an amendment to Res 11/04 to give effect to improved representative sampling of total effort under the ROS (...)" – see paper for full abstract.

140. The WPDCS **NOTED** that the authors suggest current requirement of 5% observer coverage may not be sufficient for accurate estimates of birds bycatch, as some studies suggest a coverage of at least 20%.

141. The WPDCS **ACKNOWLEDGED** the importance of achieving adequate spatial and temporal coverage in observer programs and the significant biases in data that can otherwise arise, particularly for rare events which may not be adequately represented or may conversely be over-represented.

142. However the WPDCS also **NOTED** potential implementation problems with extensive stratification, (e.g., very fine level stratification may result in a need for extremely high coverage levels), or skippers might change their spatial behaviour once an observer is placed onboard and so active management is needed to account for these types of unexpected changes.

143. The WPDCS **AGREED** that more information needs to be collected to highlight the potential issues to the Commission, and **REQUESTED** interested members of the Working Party to collaborate intersessionally to develop guidance on the matter. This could include maps of fishing effort overlaid with observer effort and distribution of species of interest to illustrate potential spatial biases.

144. The WPDCS **AGREED** that, at the next revision of Resolution 11/04, appropriate wording is included to encourage observer programs to achieve representative coverage in terms of key factors such as area, time, target species or vessel size.

145. The WPDCS **NOTED** the potential for the observer scheme to incorporate different objectives; standard representative coverage may be appropriate for the main target species for stock assessment needs, whereas a more risk-based targeted observer coverage approach may be needed for some rare event data such as bycatch.

146. The WPDCS also **NOTED** that the appropriate observer scheme should consider fleet structure, target species, spatial and temporal fishing pattern, and that CPCs should adopt an active management plan to assess the spatial / temporal / target pattern of the fleet to achieve representativeness.

6.2.4 Update on the implementation of the IOTC interim ROS templates

147. The WPDCS **NOTED** the progress in the implementation of supporting tools for the collection of observer data and that therefore the current, *ad interim* Excel templates should be decommissioned in the next future.

6.2.5 IOTC ROS capacity building activities in 2017 / 18

6.2.6 ROS E-reporting and E-monitoring projects

148. The WPDCS **NOTED** paper IOTC–2017–WPDCS13–25_Rev1 which described a number of electronic tools to support and facilitate the collection, management and reporting of observer data according to the specifications set forth by the IOTC ROS manual and by the ROS pilot project, including the following abstract provided by the authors:

"The ROS tools are a set of data models, software components and applications developed by the IOTC secretariat as part of the Regional Observer Scheme (ROS) pilot project, according to IOTC Resolution 16/04. The purpose of the project is to create a set of tools for the collection and management of scientific information collected by observers on-board, and enable automated data exchange between observers and National Institutions as well as between National Institutions and the IOTC Secretariat. The ROS tools do currently include:

- *The E-Reporting interface (targeting scientific observers).*
- *The National Database interface (deployed at national institutions at country level).*
- *The Regional Database interface (hosted by the IOTC Secretariat).*

All these components exchange data through the same Observer Data Model defined in accordance with the gear-specific set of requirements for both data collection and reporting that are part of the ROS Observer Manual specifications (...)" – see paper for full abstract.

149. The WPDCS further **NOTED** that the e-Reporting tool and of the National Observer Database are primarily aimed at supporting CPCs which have not yet fully developed their observer programmes and observer data management systems.

150. The WPDCS **NOTED** the utility of these tools in assisting CPCs which currently have limited observer data management capabilities, and **RECOGNIZED** the possibility of building different client applications on top of the proposed observer data model, to account for different requirements arising from individual CPCs and facilitate data collection, reporting and exchange.

151. The WPDCS **NOTED** that some CPCs submit observer data in a variety of formats and **ACKNOWLEDGED** that the flexibility of the proposed data model guarantees the possibility of implementing converter facilities to transfer data from (and to) a number of different formats, including ICCAT ST09.

152. The WPDCS **NOTED** that the IOTC has a well agreed set of observer data collection and reporting requirements, detailed by the IOTC ROS manual and that these data can be currently be reported in any format, however the WPDCS **NOTED** that the Scientific Committee has recently recommended that standard electronic formats are used to facilitate data transfer.

153. Also, the WPDCS **NOTED** that where well established systems do already exist and are used by a number of CPCs (such as the *ObServe* database among others) then it is beneficial to develop procedures for direct data transfer to improve the efficiency in the data exchange and submission.

154. Therefore the WPDCS **AGREED** to add this activity to the program of work and **RECOMMENDED** that funding is allocated for the development of data sharing mechanism between existing software and formats for the collection of observer data (e.g., *ObServe*) and the IOTC Regional Observer Database.

155. The WPDCS **NOTED** that while several layers of error checking and data validation are included within the electronic reporting interface, this is not present in the national database as the assumption is that the e-reporting validation processes already account for the potential data entry errors.

156. The WPDCS **NOTED** that the validation tools could be expanded in the future as common errors are identified to become even more comprehensive. This would be a second phase once the needs of the main user groups have been established.

157. The WPDCS **NOTED** paper IOTC–2017–WPDCS13–26 which described the strength and weakness of data elements currently collected through Electronic Monitoring Systems in the Indian Ocean, including the following abstract provided by the authors:

"*The objective of this paper is to present an overview of the data currently collected by EM systems in the tropical tuna purse seine fishery, describing strengths and weaknesses in each case. EM is still limited to conduct some duties compared to observers. However, it could be valuable to increase the coverage achieved by human observers on purse seiners, specifically to; verify positions of the vessel, estimate number of sets (stratified by type), estimate total target tuna catches (including retained and discarded fractions), estimate bycatches and to monitor FAD activity. Before obtaining accurate data for the rests of the observer's duties stipulated in Resolution 11/04, such as size frequency and gear characteristics, EM adjustments and new developments are still needed.* I*n view of these findings, pilot studies have given way to the implementation of several EM programs. There are currently several CPCs that have volunteer EM programs in progress on purse seiners (EU Spain, EU France, Seychelles). However, data collected by EM would only be useful for the IOTC Scientific Committee if it is; i) collected in a consistent way, and ii) if it is reported later. In relation to the first point, there are already minimum standards defined for the correct installation and operation of the EM onboard purse seiners (Doc. WPDCS12-23). These standards should continue developing as these programs progress. Regarding the second point, mechanisms for the reporting of the EM data should be adopted. These are essential tasks before EM data can be made available to the IOTC SC.*"– see paper for full abstract.

158. The WPDCS **WELCOMED** the encouraging progress made on implementing EMS in the purse seine fleets and the problems associated with collecting some data fields (e.g. catch composition, collection of biological samples) from current Electronic Monitoring Systems.

159. The WPDCS **NOTED** that EMS can complement physical observer programs and also collect other data that would be useful to the SC. For this reason, the WPDCS **AGREED** that it would be beneficial to ensure that the different available systems conform to harmonized installation, data collection and reporting protocols, so as to

ensure mutual compatibility. Therefore, the WPDC **RECOMMENDED** that tropical tuna purse seine fleets or CPCs wishing to voluntarily implement EMS follow the guidelines described in the document.

160. The WPDCS **NOTED** that the ability of Electronic Monitoring Systems to collect specific data fields differs among fishing gears, and **RECOMMENDED** to develop different standards for different gear types.

161. The WPDCS **NOTED** that Resolution 11/04 does not currently include EMS, as it explicitly refers to human on-board observers, and that EMS is seen as a complementary tool to onboard human coverage.

162. Nevertheless, the WPDCS also **ACKNOWLEDGED** that EMS may be a suitable alternative in situations where human onboard observers cannot physically be deployed and might be used in combination with complementary port sampling in these cases.

163. The WPDCS **REQUESTED** that CPCs who are currently exploring EMS in their longline fisheries (Australia and Taiwan,China) provide - at the next meeting of the WPDCS in 2018 - preliminary results which could be useful to design minimum standards.

6.3 Data recording (logbooks)

6.3.1 Resolution 15/01 On the recording of catch and effort data by fishing vessels in the IOTC area of competence

6.3.2 Resolution 17/08 Procedures on a fish aggregating devices (FADs) management plan, including a limitation on the number of FADs, more detailed specifications of catch reporting from FAD sets, and the development of improved FAD designs to reduce the incidence of entanglement of non-target species

164. The WPDCS **NOTED** paper IOTC–2017–WPDCS13–27 which provided an alternative interpretation of the FAD data reporting requirements and a proposal for more suitable classifications of all involved details, including the following abstract provided by the authors:

> "*This document presents the interpretation of EU scientists and fishing operators with regards to the IOTC's data reporting requirements for activities on Floating Objects (herein referred to as FOBs, including Fish Aggregating Devices (FADs) and logs) from the tropical tuna purse seine fishery. The controversial points on actual form 3FA have been identified and a proposal for collecting suitable data is presented here.*" – see paper for full abstract.

165. The WPDCS **NOTED** the suggestions arising from European scientists and operators about how to improve the reporting of FAD data to the IOTC Secretariat, according to Resolution 15/02 and by using the existing Form 3_FA, also **NOTING** the list of proposed changes to improve the clarity of the data reporting fields and overall structure of the template.

166. Also, the WPDCS **ACKNOWLEDGED** the difficulties in interpreting the existing IOTC classifications for FAD types and FAD activity types that are preventing CPCs from providing reasonable and comprehensive data. For this reason, the WPDCS **NOTED** the suggestion of adopting CECOFAD classification for both data categories (FAD and FAD activity types) as well as the request to incorporate FAD ownership information, vessel type and the number of vessels and days at sea recorded in a given grid during one month.

167. The WPDCS **CONSIDERED** the comments from the IOTC Secretariat as presented through paper IOTC-2017-WPDCS13-INF03, in particular **ACKNOWLEDGING** the different purposes implicit within the IOTC and CECOFAD classifications, **NOTING** that the former is mostly focused on the availability of nets and presence of tracking equipment, while the latter has a more *environmental*-related target.

168. While the required additions and changes to Form 3_FA were not considered an issue by the IOTC Secretariat, at least when considered from a data management point of view, the WPDCS **ACKNOWLEDGED** that some of the additional details (namely the number of vessels and days at sea within a given grid) are not really needed, and only contributed to increasing the level of stratification of the required data. Therefore the WPDCS **REQUESTED** that the SC considers the addition of the *FAD ownership* field to the list of required information in form 3_FA.

169. The WPDCS **ACKNOWLEDGED** the suggestion from the IOTC Secretariat to temporarily continue using the original IOTC classifications for both FAD and FAD activity types, complementing these classifications with clearer instructions about how to interpret the different activities.

170. However the WPDCS **REQUESTED** the IOTC Secretariat to work intersessionally with interested scientists and industry partners to agree on the best FAD classifications and data submission forms to be used to provide FAD-related data and activities according to Resolution 17/08 and that these be presented at the next WPDCS.

171. The WPDCS **NOTED** that an informed decision on the proper classifications to be used could only be taken once a shared agreement is found on the type of analysis that is expected to be performed on the collected data.

172. The WPDCS **NOTED** paper IOTC–2017–WPDCS13–29 which provided details about a possible procedure to split effort between monitored and unmonitored FOBs by the French tropical purse seiners fleet, including the following abstract provided by the authors:

> "*Fishing on floating objects (FOBs) dominates catch in tropical tuna purse seine fisheries. One frequently cited advantage of deploying GPS-monitored FOBs is that the position information can be used for directed fishing to reduce search time for tuna. However, purse seiners also fish on foreign objects for which position information is not available. It is critical to quantify the prevalence of fishing on GPS-monitored versus unmonitored FOBS in order to understand how they impact fishing effort and catch per unit effort (CPUE). We analyzed French commercial, observer, and FOB trajectory data in the Atlantic and Indian oceans to determine how often purse seine vessels fish on GPS-monitored FOBs. Only 2.7-20.4% of French FOB fishing sets over 2007-2013 in both oceans were made on GPS-monitored FOBs. Though increasing over time, the low percentage suggests that French vessels do not primarily use GPS-monitored FOBs to reduce search time for tuna. We hypothesize that fishery-wide FOB deployments have important collective consequences for overall fishing effort, and recommend that future effort metrics should be based on fishery-wide FOB activities.*" – see paper for full abstract.

173. The WPDCS **NOTED** that not all FOB fishing sets are associated with reductions in search time, and that estimates indicate that only 2.8% to 20.4% of French FOB sets were made on monitored FOBs over 2007-2013 in the Indian Ocean

174. The WPDCS **NOTED** the importance of accounting for the effects of fishing on FOBs in the standardization of CPUE data, **ACKNOWLEDGING** the difficulties in dealing with datasets including long time series and relatively poor data in early years, creating problems with the standardisation.

7. CAPACITY BUILDING ACTIVITIES: DATA COLLECTION AND PROCESSING IN COASTAL COUNTRIES, AND COMPLIANCE WITH MINIMUM REQUIREMENTS

7.1 Capacity Building Activities: Data Collection and Processing in Coastal Countries, and Compliance with Minimum Requirements

175. The WPDCS **NOTED** paper IOTC–2017–WPDCS13–08 on the capacity building activities of the Secretariat in 2016 including the following abstract provided by the authors:

> "*Since its inception the Commission has allocated funds from its regular budget to assist developing coastal CPCs in the Indian Ocean in the implementation of the IOTC data requirements. In addition to the funds allocated by the Commission, the IOTC Secretariat has also secured funding from external sources; in recent years, funds sourced from third parties have been well above those allocated by the Commission. Since April 2002, the Overseas Fisheries Cooperation Foundation of Japan has been assisting developing coastal states in the IOTC Area of Competence with their statistical data collection, processing, and reporting systems, with a view to enhancing the capacity of institutions in those countries and improve their compliance with IOTC requirements for statistics and other scientific data used on the assessments of IOTC species. In recent years, the IOTC has also received substantial funding for capacity building activities from other sources, in particular the Bay of Bengal Large Marine Ecosystems Project (BOBLME), the IOC-SmartFish Project and, more recently, the GEF-Areas Beyond National Jurisdiction Project (ABNJ) and EU DG-Mare. This document presents the activities undertaken by the IOTC and its partners during the last year (2017), including those activities that will extend to 2018 and following years, where appropriate.* (...)" – see paper for full abstract.

176. The WPDCS **THANKED** the IOTC Secretariat for the delivery of capacity building activities to support the data collection and reporting systems of developing coastal CPCs, and **ACKNOWLEDGED** in particular the outcomes of the Data compliance and support mission to I.R. Iran, that should lead to positive improvements in the availability of data submitted to the IOTC Secretariat.

177. The WPDCS further **NOTED** that the review and analysis of the distant water longline fleet size data will be conducted in 2018, pending approval of funding.

178. However the WPDCS **NOTED** with concern that non-reporting of mandatory data continued to fundamentally affect the quality of stock assessments and management of IOTC species.

179. The WPDCS **ACKNOWLEDGED** the reiterated request, from some CPCs, that the IOTC Secretariat facilitates training courses for the R language in the context of processing, analysis and reporting of fisheries data to the IOTC, and **REQUESTED** that potential funding sources be identified .

180. The WPDCS **NOTED** paper IOTC–2017–WPDCS13–30 providing the final report of the consultation and validation workshop (October 2017) for the development of an integrated Monitoring And Reporting Information System (e-MARIS), with a particular focus on the aspects related to mandatory statistical data submissions, including the following abstract provided by the authors:

"*In recent years, the Indian Ocean Tuna Commission (IOTC) has engaged in Performance Review process following calls from the international community for a review of the performance of RFMOs, which IOTC agreed to in 2007 with the conduct of the first performance review. In 2013, the IOTC agreed to undertake a 2nd performance review to evaluate the progress made on the recommendations arising from the 1st performance review, and evaluate strengths, weaknesses, opportunities and risks to the organisation. Two main recommendations related to the e-MARIS initiative were originating from the report of the PRIOTC02 (IOTC–2016–PRIOTC02–R) adopted via correspondence on 22 January 2016:*

- *Compliance with data collection and reporting requirements*

  Para 102. The Commission, through its Compliance Committee, needs to strengthen its compliance monitoring in relation to the timeliness and accuracy of data submissions. To that end, the PRIOTC02 RECOMMENDED that:

  "b) to facilitate thorough reviews of compliance, the Commission should invest in the development and implementation of an integrated electronic reporting program. This should include automatic integration of data from CPCs into the IOTC Secretariat's databases and automatic cross-referencing obligations and reports for the various obligations, in particular related to the provision of scientific data."

- *Follow-up on infringements*

  Para 153. The PRIOTC02 RECOMMENDED that:

  "b) The IOTC further develop an online reporting tool to facilitate reporting by CPCs and to support the IOTC Secretariat through the automation of identification of non-compliance."

This document contains the report of the workshop and the background information presented at the meeting. The report, and in particular the recommendations addressed by the workshop, will serve as basis for further work on the development and implementation of an integrated electronic reporting system. (...)" – see paper for full abstract.

181. The WPDCS **ACKNOWLEDGED** the support provided by ABNJ Common Oceans to the IOTC Secretariat in the delivery of the recent consultation and validation workshop on E-MARIS (*Electronic Monitoring And Reporting Information System*), **NOTING** the innovative approach proposed by the project to support CPCs in the fulfilment of all IOTC data and information reporting requirements for compliance and scientific purposes.

182. The WPDCS also **NOTED** that E-MARIS is a long-term project whose goal and basic principles are also shared by other (tuna) RFMOs, such as ICCAT, that are currently expected to follow the same approach.

183. At the same time, the WPDCS **ACKNOWLEDGED** that being the goal of E-MARIS to enable CPCs to self-report information to the Secretariat, including mandatory statistical data, then for CPCs to be able to leverage E-MARIS to increase their level of compliance, these should be able to i) collect all required details as per Resolutions 15/01 and 15/02 - at least, and ii) submit this information to the Secretariat using the dedicated IOTC standard forms.

184. The WPDCS **ENCOURAGED** all CPCs that as of today cannot positively respond to either of the two requirements above, to liaise with the IOTC Secretariat and agree about future Data Compliance and Support activities aimed at increasing the level of understanding of current data reporting requirements.

185. The WPDCS **NOTED** paper IOTC–2017–WPDCS13–40 that provided details about phase V of the IOTC-OFCF collaborative project, focusing on enhancing capacity building to evaluate socio-economic contributions of IOTC tuna resource use, including the following abstract provided by the authors:

"*The IOTC-OFCF Collaborative Project was established the collaboration in 2002 for the purpose of enhancing the data collection, reporting and dissemination capacity of the developing coastal states in the*

IOTC Area of Competence and since then, the Project has supported capacity building of around 20 countries. After the completion of the Phase IV of the Project in 2017, the OFCF expressed its intention to provide a support for an additional three years starting from April 2017 as Phase V. Correspondingly, the 21st Session of the IOTC Commission meeting, held in Yogjakarta, Indonesia, between 22 and 26 May 2017, approved the extension of the existing Memorandum of Understandings (MOU) with the IOTC. (...)" – see paper for full abstract.

186. The WPDCS **NOTED** that the Commission requested, at its 21st Session in 2017, a scoping study to identify the social and economic data that are relevant to CPCs and IOTC, and develop comprehensive methods to acquire these data.

187. The WPDCS also **NOTED** the timeliness in the introduction of economic evaluation in tuna fisheries, and **THANKED** OFCF for the continuing support in capacity building activities for developing coastal states.

8. FISHERIES INFORMATION AND DISSEMINATION SYSTEMS

188. The WPDCS **NOTED** that the results presented by paper IOTC–2017–WPDCS13–37, describing the challenges and potential issues in estimating the fraction of EEZ catches in the IOTC database, will be discussed during the 20th Session of the Scientific Committee in 2017.

8.1 Updates on the adoption of metadata standards in the fisheries domain

189. The WPDCS **NOTED** paper IOTC–2017–WPDCS13–31_Rev1 that described a methodological approach to manage a wide range of ecological data for tuna and tuna-like species in the Indian Ocean, including the following abstract provided by the authors:

"(...) *describe the methodological approach developed to collect and manage a large range of ecological data for tuna sampled throughout several routine monitoring and research programs conducted in the Indian Ocean in the last decades. To cover the large habitats of occurrence of tunas, collaboration with fishermen and processing factories was instrumental in fish sampling. We propose a minimum set of standard variables to be collected to describe and keep track of the fishing environment. In industrial fisheries, information from logbooks and traceability of tunas through the storage process is key to fully represent the spatio-temporal uncertainty associated with the capture of each fish. Morphometric measurements and ecological tracers are hosted in a relational database in a way that allows for any type of measure to be added without modifying the database design and structure*. (…)" – see paper for full abstract.

190. The WPDCS **NOTED** that an advanced database named "*Tissue bank*[1]" has been developed by SPC to describe the origin and type of tuna samples collected in the Western-Central Pacific Ocean, as well as provide a number of different access mechanisms to the samples.

191. The WPDCS **NOTED** that the EU has recently made mandatory the description of samples through metadata (including location), ant that this has been made available to the public domain since 2014.

192. The WPDCS **ACKNOWLEDGED** that the proposed database will be beneficial to foster research and reduce risks of potential data-loss, therefore **ENCOURAGING** its further development.

193. The WPDCS **NOTED** paper IOTC–2017–WPDCS13–32_Rev1 that described the rationale of a harmonized database of public domain data collected from the five tRFMOs and the tools specifically developed to disseminate and exploit the collated information, including the following abstract provided by the authors:

"*Assessing the status of tuna and tuna-like populations for providing management advice requires the analysis of multiple data sets collected by the contracting parties and cooperating non-contracting parties of Tuna Regional Fisheries Management Organizations (tRFMOs) Conventions. Data on the magnitude and composition of landings, discards, and fishing effort are currently managed at basin scale by the Secretariats of the tRFMOs. Consequently, data formats and reference codes have evolved rather independently despite some links with the Food and Agriculture Organization (FAO) Coordinating Working Party on Fishery Statistics. (...) We had introduced the global harmonized database for tuna fisheries that we have developed by collating the public domain datasets (total catch, monthly-spatially aggregated catch and effort) from the International Commission for the Conservation of Atlantic Tunas (ICCAT), the Indian Ocean Tuna Commission (IOTC), the Inter-American Tropical Tuna Commission (IATTC), the Western-Central Pacific Fisheries Commission (WCPFC) and the Commission for the Conservation of Southern Bluefin Tuna (CCSBT). We had as well introduced the set of open source codes (the « toolbox ») to handle the data, i.e.*

[1] http://www.spc.int/tagging/webtagging/BioDaSys/BioDaSys/Samples

transform the data formats, load the standardized data into the database, and compute a suite of indicators (...)" – see paper for full abstract.

194. The WPDCS **NOTED** that factors used for converting numbers into weight may have a substantial impact on total catch estimates, and that the current approach provides a full description of the configuration for each processing step used to compute global datasets, allowing users to define their own parameters.

195. The WPDCS **NOTED** that third-party use of the collated data requires a thorough understanding of the assumptions made to produce the data sets, and that data dissemination should be conducted in close collaboration with the IOTC Secretariat to ensure, among other things, that up-to-date information could be obtained from the database.

196. Therefore, the WPDCS **ENCOURAGED** further development of this project **ACKNOWLEDGING** its potential in increasing the transparency of processing methods and the reproducibility of fisheries data processes.

197. The WPDCS **NOTED** paper IOTC–2017–WPDCS13–33 that described how the adoption of standards for metadata and data interoperability would improve the accessibility of the standard IOTC data sets, including the following abstract provided by the authors:

"*Most fisheries data sets managed by the IOTC are in the public domain. These data sets are accessible and well described but currently hard to locate outside the IOTC website and require an improved description for facilitating their use, e.g., making explicit the license rights, the data structure, the codifications used, and specifying available Web Services to access or subset the data. Metadata can be of great help to the users and also improve the citation of data management work with digital object identifiers (DOI) and data papers. Moreover, similar data sets are managed by the other Regional Fisheries Management Organizations and it would be helpful to standardize (meta-)data formats and access protocols at a global scale. In this paper, we present a method based on standards for metadata and data interoperability which enables a rich description of data sets by complying with widely used standards. We showcase how it is possible with these standards and the related applications which implement them to better describe and discover fisheries and stock assessment data as well as to build additional services like data access and visualization tools.* (...)" – see paper for full abstract.

198. The WPDCS **NOTED** the benefits introduced by the proposed approach in terms of harmonization and formal description of relevant data, at the same time **NOTING** that the amalgamation of public IOTC data sets and their decoration through third-party metadata might raise concerns in terms of the proper attribution of the original data ownership and its correct identification as authoritative source of truth.

199. For this reason, the WPDCS **ENCOURAGED** the IOTC Secretariat, FAO and all other involved stakeholders to strengthen their collaboration in this field with the purpose to produce validated and comprehensive metadata.

200. The WDPCS also **SUGGESTED** that tutorials be developed to help users (e.g., data managers) to better understand the distinct aspects of the proposed approach, and **NOTED** that *R* packages are being developed with this purpose, while the dissemination work is still under way.

201. The WPDCS **NOTED** paper IOTC–2017–WPDCS13–38_Rev2 that described a standardized workflow to produce repeatable stock assessments and simple statistical visualization in a collaborative, cloud-based environment, including the following abstract provided by the authors:

"*Traceability is an increasingly desired end product of any work flow, including a stock assessment work flow. To be able to verify the history, location, or application of a process or data by means of documented recorded identification allows a work flow to be fluidly and rapidly exchanged between users and environments and ensures continuity and replicability. This can be achieved by applying standard protocols to each step of the work flow. Here, we provide an example of a standardized work flow, showcasing standardized data formats, metadata, access protocols, and statistical visualization as applied to the 2017 IOTC skipjack (Katsuwonus pelamis) stock assessment* (...)" – see paper for full abstract.

202. The WPDCS **NOTED** that the proposed approach is particularly interesting as it facilitates the description, extraction and visualization of all outputs produced by SS3 which has become the *de facto* reference model in stock assessment.

203. The WPDCS **NOTED** that the depicted tool describes model specifications through proper metadata, thus allowing the reproducibility of past stock assessments.

204. **NOTING** the complexity of the SS3 outputs, the WPDCS **SUGGESTED** that the stock-specific parameters and model outputs present in the RAM Legacy Database could serve as reference for the selection of outputs to be displayed with the application, **ACKNOWLEDGING** that while this approach might be used by the IOTC

Secretariat to provide the information expected by both the RAM legacy database and FIGIS, this is not a straightforward process.

205. Therefore, the WPDCS **ENCOURAGED** authors to further pursue developments based on this innovative approach.

8.2 Updates on the Sport Fisheries databases

206. The WPDCS **NOTED** that further updates on paper IOTC–2017–WPDCS13–34_Rev1 that describes the outcomes of a pilot project to collect catch-and-effort and size data from sports fisheries in four countries of the western Indian Ocean, will be provided during the 20th session of the Scientific Committee.

8.3 The Consolidated List of Authorized Vessels (CLAV)

207. The WPDCS **NOTED** paper IOTC–2017–WPDCS13–35_Rev1 that described the status – as of end October 2017 – of the CLAV database, including the following abstract provided by the authors:

> "*The main purpose of the CLAV is to make the information, pertaining authorized vessels, available to help fighting and deterring IUU activities. Efforts by the Secretariats of the five t-RFMOs to consolidate a list of all vessels authorized to fish tuna and tuna-like species go back a while now. A coordinated effort by all five t-RFMOS was expressed already at the 2007 Kobe meeting. A first consolidated list was created in 2009, a second list in 2010. Since 2011, updates of the CLAV were performed regularly (monthly or bimonthly). Two workshops, February 2011 and June 2012, on exchange of information and maintenance of the CLAV were convened at FAO HQ. That far the results were just mere snapshots requiring notable (manual) efforts. Since mid-2014, with the support of the Common Oceans Tuna Project, FAO has been providing the expertise and technical assistance to maintaining the CLAV updated at close-to-real time.* (...)" – see paper for full abstract.

208. The WPDCS **NOTED** the importance of the CLAV database as a tool to combat and deter IUU fishing, as well as its potential interest for estimating global fishing capacity, despite the mismatch between the numbers of authorized and active vessels it records.

209. The WPDCS **NOTED** that the historical data available within the CLAV starts with records dating back to the year 2000, although it is only from December 2014 that a proper collection of historical records is available thanks to its improved real-time data reporting mechanisms.

210. Also, the WPDCS **ACKNOWLEDGED** the extent of the support to the CLAV implementation and maintenance provided by the Common Oceans program over the years, and **RECOGNIZED** that being the CLAV a joint effort between the five major tuna-RFMOs, a shared agreement about its long-term support plans should be sought.

211. Considering that many representatives from CPCs that are member of other t-RFMOs beside IOTC will be attending the next Scientific Committee (e.g., European Union, Japan, South Africa etc.) the WPDCS **AGREED** that a message supporting the CLAV initiative and informing CPCs about its need for a long term plan could be conveyed to its audience.

9. WPDCS PROGRAM OF WORK

9.1 Revision of the WPDCS Program of work (2018–2022)

212. The WPDCS **NOTED** paper IOTC–2017–WPDCS13–09 which provided an opportunity to consider and revise the WPDCS Program of Work (2018–2022), by taking into account the specific requests of the Commission, Scientific Committee, and the resources available to the IOTC Secretariat and CPCs.

213. The WPDCS **RECALLED** that the SC, at its 18th Session, made the following request to its working parties:

> "*The SC **REQUESTED** that during all future Working Party meetings, each group not only develop a Draft Program of Work for the next five years containing low, medium and high priority projects, but that all High Priority projects are ranked. The intention is that the SC would then be able to review the rankings and develop a consolidated list of the highest priority projects to meet the needs of the Commission. Where possible, budget estimates should be determined, as well as the identification of potential funding sources*." (SC18. Para 154)

214. The WPDCS **RECOMMENDED** that the Scientific Committee consider and endorse the WPDCS Program of Work (2018–2022), as provided at Appendix V.

215. The WPDCS **RECALLED** that, compared to staffing resources in other tRFMOS, the IOTC Secretariat is under-resourced and limited in its current capacity to provide support for the following core functions:

- Assist countries to facilitate reporting and improve compliance in terms IOTC mandatory statistical data collection and reporting requirements, including the Regional Observer Scheme.
- Improve the quality and transparency of data in the IOTC database, including documentation of data reviews and dataset processing procedures, development of data quality indicators and quantifying uncertainty in catch estimates.
- Provide technical support to countries in the region in establishing and maintaining statistical systems for collecting and reporting data to the IOTC, particularly in relation to sampling of artisanal fisheries.
- Support for new priorities identified by the Scientific Committee and Commission, including the Regional Observer Scheme pilot project, Electronic-monitoring, and implementation of Resolution 16/01 On an Interim Plan for Rebuilding the Indian Ocean Yellowfin tuna Stock in the IOTC area of competence.
- Dissemination of information on data-related Commission activities through the IOTC website, metadata, graphical representation of the data, and data exchange between tRFMOs and related organizations.

216. **NOTING** the very heavy workload at the IOTC Secretariat and the ever increasing demands by the Commission and the Scientific Committee, and also the capacity to respond to requests for assistance by countries, the WPDCS reiterated its previous **RECOMMENDATION** that the permanent staff of the IOTC Data and Science Section be increased by two (2) (1 x P4 and 1 x P3 level positions), supplemented by additional short-term consultants, to commence work by 1 January 2019 or mid. 2018.

10. OTHER BUSINESS

10.1 Date and place of the 14th and 15th Sessions of the WPDCS: 2018 & 2019

217. The WPDCS **THANKED** Seychelles for hosting the 13th Session of the WPDCS and commended the IOTC Secretariat on the warm welcome, the excellent facilities and assistance provided to participants in the organisation and running of the Session.

218. The WPDCS **REQUESTED** that the IOTC Secretariat liaise with CPCs to determine the host country for the 14th and 15th sessions of the WPDCS respectively (Table 1).

Table 1. Draft meeting schedule for the WPDCS (2018 and 2019)

	2018			2019		
Meeting	**No.**	**Date**	**Location**	**No.**	**Date**	**Location**
Working Party on **Data Collection and Statistics** (WPDCS)	14th	TBD	Seychelles (TBC)	15th	TBD	TBD

10.2 Election of a Chairperson and Vice-Chairperson for the next biennium

Chairperson

219. The WPDCS **NOTED** that the second term of the current Chairperson, Dr. Emmanuel Chassot, is due to expire at the end of the current WPDCS meeting and, as per the IOTC Rules of Procedure (2014), participants are required to elected a new Chairperson for the next biennium.

220. The WPDCS **THANKED** Dr. Chassot for his Chairmanship over the past four years and looked forward to his continued engagement in the activities of the WPDCS in the future.

221. **NOTING** the Rules of Procedure (2014), the WPDCS **CALLED** for nominations for the newly vacated position of Chairperson of the IOTC WPDCS for the next biennium. Mr. Stephen Ndegwa was nominated, seconded and elected as Chairperson of the WPDCS for the next biennium.

Vice-Chairperson

222. The WPDCS **NOTED** that the term of the current Vice-Chairperson, Mr. Stephen Ndegwa, is due to expire at the closing of the current WPDCS meeting and, as per the IOTC Rules of Procedure (2014), participants are required to elect a new Vice-Chairperson for the next biennium.

223. **NOTING** the Rules of Procedure (2014), the WPDCS **CALLED** for nominations for the position of the Vice Chairperson of the IOTC WPDCS for the next biennium. Dr. Julien Barde was nominated, seconded and re-elected as Vice-Chairperson of the WPDCS for the next biennium.

10.3 Review of the draft, and adoption of the report of the 13th Session of the WPDCS

224. The WPDCS **RECOMMENDED** that the Scientific Committee consider the consolidated set of recommendations arising from WPDCS13, provided at Appendix VII.

225. The report of the 13th Session of the Working Party on Data Collection and Statistics (IOTC–2017–WPDCS13–R) was **ADOPTED** on the 28th November 2017.

APPENDIX I
LIST OF PARTICIPANTS

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APPENDIX II
AGENDA FOR THE 13TH WORKING PARTY ON DATA COLLECTION AND STATISTICS

Date: 26th – 28th November 2017
Location: Seychelles
Venue: Eden Blue Hotel conference room, Eden Island
Time: 09:00 – 17:00 daily

Chair: Dr. Emmanuel Chassot (EU,France); **Vice-Chair:** Mr. Stephen Ndegwa (Kenya)

1. **OPENING OF THE MEETING** (Chair)
2. **ADOPTION OF THE AGENDA AND ARRANGEMENTS FOR THE SESSION** (Chair)
3. **THE IOTC PROCESS: OUTCOMES, UPDATES AND PROGRESS** (IOTC Secretariat)
   - 3.1 Outcomes of the 19th Session of the Scientific Committee and of the 21st Session of the Commission
   - 3.3 Review of Conservation and Management Measures relevant to the WPDCS
   - 3.4 Progress on the recommendations of WPDCS12
4. **PROGRESS REPORT OF THE SECRETARIAT ON DATA RELATED ISSUES** (IOTC Secretariat)
   - 4.1 IOTC Secretariat Report
   - 4.2 Dissemination of IOTC data sets and documents
     - 4.2.1 IOTC Data Summary: Update
     - 4.2.2 IOTC Data Dissemination: Discussion of potential improvements
   - 4.3 Updates on data-related requests from other Working Parties
5. **UPDATE ON NATIONAL STATISTICAL SYSTEMS** (CPCs)
   - 5.1 Update on national statistical systems, including the main challenges in collecting and reporting data to the IOTC Secretariat and proposals to improve future levels of compliance with IOTC data requirements.
   - 5.2 Further analysis of length frequency data and likely impacts on the assessments (IOTC Secretariat & CPCs)
6. **REVIEW OF DATA REQUIREMENTS IN CONSERVATION AND MANAGEMENT MEASURES RELEVANT TO THE WPDCS** (IOTC Secretariat)
   - 6.1 Data reporting (to the IOTC Secretariat)
     - 6.1.1 Resolution 15/02 *On mandatory statistical reporting requirements for IOTC Contracting Parties and Cooperating Non-Contracting Parties (CPCs)*
     - 6.1.2 Resolution 17/01 *On an interim plan for rebuilding the Indian Ocean yellowfin tuna stock*
   - 6.2 Regional Observer Scheme
     - 6.2.1 Resolution 11/04 *On a regional observer scheme*
     - 6.2.2 Resolution 16/04 *On the implementation of a pilot project in view of promoting the Regional Observer Scheme of IOTC*
     - 6.2.3 Discussion of observer coverage rates
     - 6.2.4 Update on implementation of the IOTC interim ROS templates
     - 6.2.5 IOTC ROS capacity building activities in 2017 / 18
     - 6.2.6 ROS E-reporting and E-monitoring projects

6.3 Data recording (logbooks)

6.3.1 Resolution 15/01 *On the recording of catch and effort data by fishing vessels in the IOTC area of competence*

6.3.2 Resolution 17/08 *Procedures on a fish aggregating devices (FADs) management plan, including a limitation on the number of FADs, more detailed specifications of catch reporting from FAD sets, and the development of improved FAD designs to reduce the incidence of entanglement of non-target species*

7 CAPACITY BUILDING ACTIVITIES: DATA COLLECTION AND PROCESSING IN COASTAL COUNTRIES, AND COMPLIANCE WITH MINIMUM REQUIREMENTS (IOTC Secretariat)

8 FISHERIES INFORMATION AND DISSEMINATION SYSTEMS (Chair & IOTC Secretariat)

8.1 Updates on the adoption of metadata standards in the fisheries domain

8.2 ROS supporting tools and the Regional Observer Database

8.3 Updates on the Sport Fisheries databases

8.4 The Consolidated List of Authorized Vessels (CLAV)

9 WPDCS PROGRAM OF WORK (Chair & IOTC Secretariat)

9.1 Revision of the WPDCS Program of Work 2018–2022

10 OTHER BUSINESS

10.1 Date and place of the 14th and 15th Sessions of the WPDCS: 2018 & 2019 (Chair)
10.2 Election of a Chairperson and Vice-Chairperson for the next biennium (IOTC Secretariat)
10.3 Review of the draft, and adoption of the report of the 13th Session of the WPDCS (Chair)

APPENDIX III
LIST OF DOCUMENTS

Document	Title	Availability
IOTC–2017–WPDCS13–01a	Agenda of the 13th Working Party on Data Collection and Statistics	✓(5 October 2017)
IOTC–2017–WPDCS13–01b	Annotated agenda of the 13th Working Party on Data Collection and Statistics	✓(30 October 2017) ✓(27 November 2017)
IOTC–2017–WPDCS13–02	List of documents of the 13th Working Party on Data Collection and Statistics	✓(30 October 2017) ✓(27 November 2017)
IOTC–2017–WPDCS13–03	Outcomes of the 19th Session of the Scientific Committee (IOTC Secretariat)	✓(31 October 2017)
IOTC–2017–WPDCS13–04	Outcomes of the 21th Session of the Commission (IOTC Secretariat)	✓(31 October 2017)
IOTC–2017–WPDCS13–05	Review of current Conservation and Management Measures relating to the WPDCS (IOTC Secretariat)	✓(2 November 2017)
IOTC–2017–WPDCS13–06	Progress on the recommendations of WPDCS12 (IOTC Secretariat)	✓(3 November 2017) ✓(25 November 2017)
IOTC–2017–WPDCS13–07	Report on IOTC Data Collection and Statistics (IOTC Secretariat)	✓(17 November 2017)
IOTC–2017–WPDCS13–08	IOTC capacity building activities in support of developing coastal IOTC CPCs (IOTC Secretariat)	✓(17 November 2017)
IOTC–2017–WPDCS13–09	Revision of the WPDCS Program of Work (2018–2022) (IOTC Secretariat, Chairperson & Vice-Chairperson)	✓(8 November 2017)
IOTC–2017–WPDCS13–10	Electronic Data Verification module with vessel tracking facility to combat IUU fishing (Gunawardane N-D-P)	✓(10 November 2017)
IOTC–2017–WPDCS13–11_Rev1	Iran's basic measures to improving Data Collection and Statistics in 2016 (Khorshidi-Nergi S)	✓(8 November 2017) ✓(27 November 2017)
IOTC–2017–WPDCS13–12	Installation of the Electronic Reporting System (ERS) and Electronic Monitoring System (EM) into the Thai Fleets registered with the DOF to operate in oversea (Wongkeaw A, Yawanopas S, Lirdwittayaprasid P)	✓(11 November 2017)
IOTC–2017–WPDCS13–13	Fisheries data collection and statistics in Pakistan (Wasim Khan M)	✓(11 November 2017)
IOTC–2017–WPDCS13–14	Data reporting challenges associated with spanning across the IOTC/ICCAT boundary: a case study of shortfin mako - *Isurus oxyrinchus* (Parker D, Winker H, da Silva C, Kerwath S-E)	✓(11 November 2017)
IOTC–2017–WPDCS13–15	Six years for improving statistics data collection in Comoros (Mohamed Toihir I)	✓(11 November 2017)
IOTC–2017–WPDCS13–16	General characterization of artisanal purse-seine and handline fisheries of Northern Mozambique and their impact on tuna and tuna like species (Mutombene R, Sulemane N-B, Salenca A, Jamal G, Maurício E, Quibuana T, Chaúca I, Chacate O)	✓(11 November 2017)
IOTC–2017–WPDCS13–17	Development of central database for artisanal fisheries in Somalia (Sheikheile A-I)	✓(16 November 2017)
IOTC–2017–WPDCS13–18	Understanding the role of Malaysian Fisheries Management in the fisheries data collection (Sallehudin J, Samsudin B, Effarina M-F, Nor Azlin M)	✓(28 October 2017)
IOTC–2017–WPDCS13–19	Implementation of the monitoring system for small-scale and artisanal fisheries of pelagic fishes in northern Madagascar (Joachim L)	[WITHDRAWN]
IOTC–2017–WPDCS13–20	Potential changes affecting species composition and tuna catch at size for purse seine fleets by using the new length-weight relationships for tropical tunas in the Indian Ocean (Marsac F, Baez J-C, Floch L, Fonteneau A)	✓(11 November 2017)

Document	Title	Availability
IOTC–2017–WPDCS13–21	The challenge of monitoring the consumption of the YFT quota in real time: the case of the French tropical tuna purse seine fleet in 2017 (Maufroy A, Goujon M, Floch L, Bach P)	✓(11 November 2017)
IOTC–2017–WPDCS13–22_Rev1	Collecting data on board French and Italian tropical tuna purse seiners with common observers: results of Orthongel's voluntary observer program OCUP (2013-2017) in the Indian Ocean (Goujon M, Maufroy A, Relot-Stirnemann A, Moëc E, Bach P, Cauquil P, Sebarros P)	✓(11 November 2017) ✓(26 November 2017)
IOTC–2017–WPDCS13–23_Rev1	The Seychelles purse seine fishery observer program: Overview, challenges, and perspectives (Lucas J, Lucas V, Krug I, Tirant A, Assan C, Mein M, Jupiter D, Chassot E)	✓(13 November 2017) ✓(26 November 2017)
IOTC–2017–WPDCS13–24_Rev1	Considerations for designing sampling strategies in observer programs to ensure representative coverage of key variables (Wanless R, Small C)	✓(10 November 2017) ✓(26 November 2017)
IOTC–2017–WPDCS13–25_Rev1	Data collection and management tools to support the Regional Observer Scheme pilot project (Anello E, Fiorellato F)	✓(13 November 2017) ✓(21 November 2017)
IOTC–2017–WPDCS13–26	Strength and weakness of the data elements currently collected through Electronic Monitoring Systems in the Indian Ocean (Ruiz J, Bach P, Krug I, Briand K, Murua H, Bonnieux A)	✓(15 November 2017)
IOTC–2017–WPDCS13–27	Interpreting IOTC's data reporting requirements for activities on floating objects: an outlook from EU scientists and fishing operators (Baez J-C, Bach P, Capello M, Floch L, Gaertner D, Goujon M, Grande M, Herrera M-A, Lopez J, Marsac F, Maufroy A, Moniz I, Muniategi A, Murua H, Pascual P-J, Ramos M-L, Rojo V, Sebarros P, Santiago J, Abascal F-J)	✓(11 November 2017)
IOTC–2017–WPDCS13–28	Information note on the number and the monitoring of active GPS buoys for the French purse seine fleet in the Indian Ocean over 2011-2017 (Maufroy A, Floch L, Goujon M)	[WITHDRAWN]
IOTC–2017–WPDCS13–29	How French tropical tuna purse seiners split fishing effort between GPS-monitored and unmonitored FOBs and what it says about effort standardization (Kaplan D, Snouck-Hurgronje J, Chassot E, Maufroy A, Gaertner D)	✓(11 November 2017)
IOTC–2017–WPDCS13–30	Progress report on the consultation and validation workshop for the development of an integrated Monitoring And Reporting Information System (e-MARIS) (IOTC Secretariat)	✓(21 November 2017)
IOTC–2017–WPDCS13–31_Rev1	Open ecological data for tuna: The time has come! (Chassot E, Barde J, Floch L, Ibanez L, Bodin N)	✓(16 November 2017) ✓(24 November 2017)
IOTC–2017–WPDCS13–32_Rev1	Global datasets for tuna fisheries (Taconet P, Chassot E, Blondel E, Barde J)	✓(13 November 2017) ✓(27 November 2017)
IOTC–2017–WPDCS13–33	Collaboration between fisheries and computer scientists for improved data description: The case of IOTC data sets (Barde J, Blondel E, Chassot E, Imzilen T, Nieblas A-E, Taconet P)	✓(15 November 2017)
IOTC–2017–WPDCS13–34_Rev1	Facilitating the acquisition of catch-and-effort and size data from sports fisheries in the western Indian Ocean (Pepperell J, Griffiths S, Kadagi N)	✓(22 October 2017) ✓(8 November 2017)
IOTC–2017–WPDCS13–35_Rev1	Progress report of the Consolidated List of Authorized Vessels at October 2017 (Jara-Senn F, Fiorellato F)	✓(26 October 2017) ✓(6 November 2017)
IOTC–2017–WPDCS13–36_Rev1	Evaluation of the Kenya catch assessment survey (Ndegwa S, Geehan J)	✓(22 November 2017) ✓(23 November 2017)
IOTC–2017–WPDCS13–37	Estimation of EEZ catches in the IOTC database: report on the availability and quality of catch estimates (IOTC Secretariat)	✓(21 November 2017)
IOTC–2017–WPDCS13–38_Rev2	Standardization of metadata, data formats, access protocols and statistical visualization of SS3 stock assessment outputs (Nieblas A-E, Bonhommeau S, Imzilen T, Fu D, Fiorellato F, Barde J)	✓(17 November 2017) ✓(27 November 2017)

Document	Title	Availability
IOTC–2017–WPDCS13–39_Rev1	Statistics of the French purse seine fishing fleet targeting tropical tunas in the Indian Ocean (1981-2016) (Floch L, Damiano A, Billet N, Bach P)	✓(10 November 2017) ✓(26 November 2017)
IOTC–2017–WPDCS13–40	IOTC-OFCF Collaborative Project Phase V activity - Enhancement of capacity to evaluate socio-economic contribution of the IOTC tuna fisheries (Tsuji S)	✓(11 November 2017)
Information papers		
IOTC–2017–WPDCS13–INF01	Resolution 17/01 (IOTC Secretariat)	✓(31 October 2017)
IOTC–2017–WPDCS13–INF02	Resolution 17/08 (IOTC Secretariat)	✓(31 October 2017)
IOTC–2017–WPDCS13–INF03	Further feedback on the proposed changes to FOB types and activity types, as well as on FOB data reporting forms (IOTC Secretariat)	✓(26 November 2017)
IOTC–2017–WPDCS13–INF04	eMARIS technical specifications (IOTC Secretariat)	✓(21 November 2017)
IOTC–2017–WPDCS13–INF05_Rev1	Feedback on the proposed updates to tropical tuna species executive summaries (IOTC Secretariat)	✓(22 November 2017) ✓(23 November 2017)
Data and code		
IOTC-2017-WPDCS13-CODE01 – TUNAATLAS.R	Tutorial R script to start handling the 'rtunaatlas' package.	✓(27 November 2017)

APPENDIX IV
MAIN DATA ISSUES IDENTIFIED BY THE WPDCS AND ACTIONS PROPOSED TO ADDRESS THEM

Nominal catches	
Main Issues	**Proposed Actions**
Indonesia: coastal fisheries. Issue: Improve estimates of total catch and species composition of artisanal fisheries.	• Continue collaboration with DGCF (dependent on available funds) and support for the pilot sampling of artisanal fisheries, to ensure Indonesia has capacity to monitor artisanal fisheries and fulfill IOTC data reporting requirements.
Sri Lanka: Coastal and offshore fisheries. Issue: Support for implementation of ROS / ROS pilot project.	• IOTC Secretariat to continue support for Sri Lanka, primarily through development of the Regional Observer Scheme. • Piloting of ROS E-Reporting system from December 2017; also explore feasibility of electronic monitoring systems on Sri Lankan gillnet/coastal longline vessels to improve the estimates of catches by species, and bycatch.
Yemen: Handline fishery. Issue: Improve quality of catch estimates.	• FAO catch estimates currently used; the IOTC Secretariat to explore options for further improvements in the catch estimates, (dependent on available staff and funding).
India: Commercial longline fishery and coastal fisheries Issue: Inconsistencies in reported catches.	• Conflicting catches reported by India's national fisheries institutions continue to be noted by the IOTC Secretariat, and brought to the attention of the IOTC WP and SC. • India has indicated that the IOTC shall use official figures, irrespective of how incomplete (or inconsistent) they may be. • In 2017 data was submitted late (October), and also reported inconsistences in the catches from previous years.
Pakistan: Drifting gillnet fishery. Issue: Validation of revised catch series; improvements in data collection and reporting of IOTC data.	• ABNJ-WWF Project crew-based observer pilot initiated in 2014; IOTC Secretariat liaising with Pakistan in terms of possible assistance for data entry, processing and submission of ROS data via the Pakistan government (e.g., using the new IOTC E-Reporting system) • Revised catch series submitted in 2017 for the last 30 years, which are currently being evaluated by the IOTC Secretariat. • A data compliance and support mission by the IOTC Secretariat is scheduled for Q1 2018.
Madagascar: Coastal fisheries and longline fisheries Issue: Lack of data collection, including catch and effort and size data (longline fleet).	• Provide assistance in the sampling of artisanal fisheries upon request (dependent on staff / funds available).
Catch-and-Effort	
Main Issues	**Proposed Actions**
Implementation of minimum requirements for operational data (logbook)	
Indonesia: Longline Issue: Inconsistencies between logbook and VMS data.	• IOTC to encourage strengthening management and validation of logbook data – particularly inconsistencies with VMS data and issues of low reporting rates of submitted logbooks (around ≈5%).
India & **Malaysia** & **Oman** Longlines	• As part of the IOTC Data Compliance and Support missions, provide assistance to CPCs to understand the IOTC data

Pakistan: Driftnets Issue: Data either not submitted, or falls short of the IOTC data reporting requirements.	requirements and processing of information and urge them to implement requirements and report data to the IOTC.
Most fisheries	• Implement minimum data requirements for sharks (noting that those for India are different as it has objected the logbook Resolution)
Catch-and-effort not available for coastal fisheries	
Issue: Many CPCs have failed to report catches and effort per month for their coastal fisheries.	• As a minimum, request CPCs report catches and fishing by species, gear, and month, in addition to the total numbers of fishing craft operated by gear, and month (or year).

Observer Schemes	
Main Issues	**Proposed Actions**
Observer reports. Issue: Very poor rates of reporting.	• Explore ways of facilitating reporting of data using the new IOTC ROS electronic reporting tool. • Organize ROS training and workshops to assist CPCs with implementation of the ROS data reporting requirements. • Implement pilot study of electronic monitoring in coastal fisheries for which there are difficulties placing on-board observers (e.g., Sri Lanka coastal gillnet/longline fleets)
Size Frequency	
Issue: Data not reported	
Coastal fisheries of **India**, **Indonesia**, **Malaysia**, **Oman**, **Yemen**, and longlines of **India**	• Assist CPCs to understand data requirements, and provide support to pilot sampling and processing of fisheries data and urge them to strictly implement IOTC mandatory data reporting requirements.
Driftnets of **Pakistan**	• ABNJ-WWF Project crew-based observer pilot initiated in 2014, which includes collection of size frequency samples. • IOTC Secretariat is liaising with Pakistan in terms of possible assistance for data entry, processing and submission of ROS data via the Pakistan government (e.g., using the new IOTC E-Reporting system) • A data compliance and support mission by the IOTC Secretariat is scheduled for Q1 2018, to support improvements in the reporting of data.
Issue: Data poor quality	
Longline fisheries of **Japan** and **Taiwan,China**: Catch-and-effort and size data conflicting over the time series.	• Project planned for 2018 to examine the inconsistencies in size frequency data reported by distant water fishing nations and resolve longstanding inconsistencies between average weights derived from length frequencies and catch-and-effort between fleets operating in comparable time-area strata.
Data not by IOTC standards for the gillnet & longline fishery of **Sri Lanka** and the driftnet fishery of **I.R. Iran.**	• Data compliance and support missions conducted to Sri Lanka and Iran in 2017: o Sri Lanka to re-submit SF data according to Res.15/02 standards (with corrected size; o Iran to submit size data according to fishing ground (rather than landing site) based on port sampling (as logbooks are currently being piloted on a limited number of vessels).
Socio-Economic Data	

Issue: Limited data available, and collated within the IOTC database.	• Propose standards for the reporting of data, as requested in the IOTC Agreement including the adoption of form 7_PR. • Collaboration with OFCF to development standards for collection and assimilation of socio-economic data into the IOTC core datasets.

APPENDIX V
WORKING PARTY ON DATA COLLECTION AND STATISTICS PROGRAM OF WORK (2018–2022)

The Program of Work consists of the following, noting that a timeline for implementation would be developed by the SC once it has agreed to the priority projects across all of its Working Parties:

Table 1. Priority topics for obtaining the information necessary to deliver the necessary advice to the Commission.

Topic	Sub-topic and project	Priority ranking	Est. budget (potential source)	Timing				
				2018	2019	2020	2021	2022
1. Artisanal fisheries data collection	1.1 Assist the implementation of data collection and sampling activities of coastal fisheries in countries/fisheries insufficiently sampled in the past; priority to be given to the following fisheries: • Coastal fisheries of Indonesia • Coastal fisheries of Pakistan • Coastal fisheries of Sri Lanka • Coastal fisheries of Kenya • Coastal fisheries of I.R. Iran • Coastal fisheries of Somalia	1	US$??? (TBD)					
2. Assistance to CPCs for the fulfillment of Resolution 17/01 mandate	2.1 Provide support to identified CPCs to increase their level of monitoring and reporting in accordance with paragraph 8 of Resolution 17/01	**FUNDED**	US$ 60K (EU cofund.)					
3. Review Size Data Longline Fisheries	3.1 Assistance to historical review of length frequency data for longline fisheries, in particular longliners from Taiwan,China and Japan	**FUNDED**	US$ 48K (EU cofund.)					
4. Compliance with IOTC Data Requirements	4.1 Data support missions 4.1.1 Identification of indicators to assess performance of IOTC CPCs against IOTC Data Requirements; evaluation of performance of IOTC CPCs with those Requirements; development of plans of action to address the issues identified, including timeframe of	**FUNDED**	US$ 5-10K each (EU cofund.)					

		implementation and follow-up activities required. Priority to be given to the following fisheries: • Pakistan • Indonesia • Sri Lanka • India • Yemen							
5.	IOTC Data access	5.1 Develop software libraries (in the most widely adopted languages for statistical analysis, e.g. R, Python etc.) to simplify access to the new IOTC Remote data services by scientists	3	US$ 5K (Consultant, TBD)					
		5.2 Identify and add descriptive metadata to main IOTC data sets	3	US$ 30K (Consultant, IOC / IRD ?)					
		5.3 Deliver *R* capacity building support (workshops, training courses) for the manipulation of IOTC data by national scientists	4	US$??? (TBD)					
6.	ROS – Support for the implementation of the IOTC Regional Observer Scheme	6.1 ROS tools							
		6.1.1 Support the adoption of the ROS e-Reporting and ROS national database tools by countries not having any existing observer data collection and management system in place	2	US$??? (TBD)					
		6.2 ROS Regional Database							
		6.2.1 Incorporate all historical observer data currently available in other proprietary data formats (e.g. ObServe database dumps, ICCAT ST09 and other custom observer forms)	2	US$ 20K (Consultant, TBD)					
		6.2.2 Add import / export capabilities from proprietary data collection systems to the ROS Observer Data Model format	2	US$ 35K (Consultant, TBD)					

6.2.2	Implement dissemination best-practices for all data collected by the ROS Regional Database	2	US$ 20K (TBD - Consultant)					
6.3	ROS Electronic Monitoring Systems							
6.3.1	Implement pilot EMS system on gillnet / coastal longline vessels for fleets insufficiently covered by on-board observers	**FUNDED**	US$ 150 k (CPCs, EU co-funded)					

APPENDIX VI
CONSOLIDATED RECOMMENDATIONS OF THE 13TH SESSION OF THE WORKING PARTY ON DATA COLLECTION AND STATISTICS

Note: Appendix references refer to the Report of the 13th Session of the Working Party on Data Collection and Statistics (IOTC–2017–WPDCS13–R)

Progress on the recommendations of WPDCS12

WPDCS13.01 (para. 17): Also, the WPDCS **NOTED** a number of recommendations from the last WPDCS meeting were agreed – but not recommended – during the 19th session of the Scientific Committee. For this reason, the WPDCS **RECOMMENDED** that the following be reiterated as recommendations at the 20th session of the Scientific Committee:

> *(WPDCS12.05 Para. 102)* ***Resolution 16/04 On the implementation of a pilot project in view of promoting the regional observer scheme of IOTC***
>
> *Resolution 11/04 On a Regional Observer Scheme requests the submission of a report after each trip but the WPDCS* ***RECOMMENDED*** *that on the next revision of the Resolution, this should be amended to request the submission of data (instead of the observer trip report) with a given deadline so that information from multiple trips can be provided.*
>
> *(WPDCS12.09 Para. 109)* ***Update on the implementation of the IOTC interim ROS templates***
> *Due to the difficulties in collecting detailed data on tori line specifications, the WPDCS* ***RECOMMENDED*** *that the trip level data reporting requirements be amended to permit the reporting of this information as optional rather than mandatory, as detailed in paper IOTC-2016-WPDCS12-21_Rev_1, in the Observer Template (Form Trip-LL).*

Resolution 17/01 On an interim plan for rebuilding the Indian Ocean yellowfin tuna stock

WPDCS13.02 (para. 130): Thus, the WPDCS **REQUESTED** that (i) collaborative work is carried out by different Purse Seine fleets of the Indian Ocean, so as to increase the frequency of production of corrected estimates of yellowfin tuna catches to monitor yellowfin quota consumption and (ii) **RECOMMENDED** that alternative management measures (e.g. input control measures) are investigated for the Purse Seiners and other gears that will facilitate the control and monitoring of the management measures adopted by IOTC.

ROS E-reporting and E-monitoring projects

WPDCS13.03 (para. 154): Therefore the WPDCS **AGREED** to add this activity to the program of work and **RECOMMENDED** that funding is allocated for the development of data sharing mechanism between existing software and formats for the collection of observer data (e.g., *ObServe*) and the IOTC Regional Observer Database.

WPDCS13.04 (para. 159): The WPDCS **NOTED** that EMS can complement physical observer programs and also collect other data that would be useful to the SC. For this reason, the WPDCS **AGREED** that it would be beneficial to ensure that the different available systems conform to harmonized installation, data collection and reporting protocols, so as to ensure mutual compatibility. Therefore, the WPDC **RECOMMENDED** that tropical tuna purse seine fleets or CPCs wishing to voluntarily implement EMS follow the guidelines described in the document.

WPDCS13.05 (para. 160): The WPDCS **NOTED** that the ability of Electronic Monitoring Systems to collect specific data fields differs among fishing gears, and **RECOMMENDED** to develop different standards for different gear types.

Revision of the WPDCS Program of work (2018–2022)

WPDCS13.06 (para. 214): The WPDCS **RECOMMENDED** that the Scientific Committee consider and endorse the WPDCS Program of Work (2018–2022), as provided at Appendix V.

WPDCS13.07 (para. 216): **NOTING** the very heavy workload at the IOTC Secretariat and the ever increasing demands by the Commission and the Scientific Committee, and also the capacity to respond to requests for assistance by countries, the WPDCS reiterated its previous **RECOMMENDATION** that the permanent

staff of the IOTC Data and Science Section be increased by two (2) (1 x P4 and 1 x P3 level positions), supplemented by additional short-term consultants, to commence work by 1 January 2018 or earlier.

Review of the draft, and adoption of the report of the 13th Session of the WPDCS

WPDCS13.08 (para. 224): The WPDCS **RECOMMENDED** that the Scientific Committee consider the consolidated set of recommendations arising from WPDCS13, provided at Appendix VII.

APPENDIX VII
AGREED UPDATES TO CHARTS AND FIGURES IN THE TROPICAL TUNAS EXECUTIVE SUMMARIES SUPPORTING INFORMATION DOCUMENTS

References are to sections of document IOTC–2017–WPDCS13–INF05

Nominal (total) catches by gear – NC01

Response from the WPDCS13: **ADD** chart proposed in Figure 1, ensuring that the same gear classifications as in the existing one are kept.

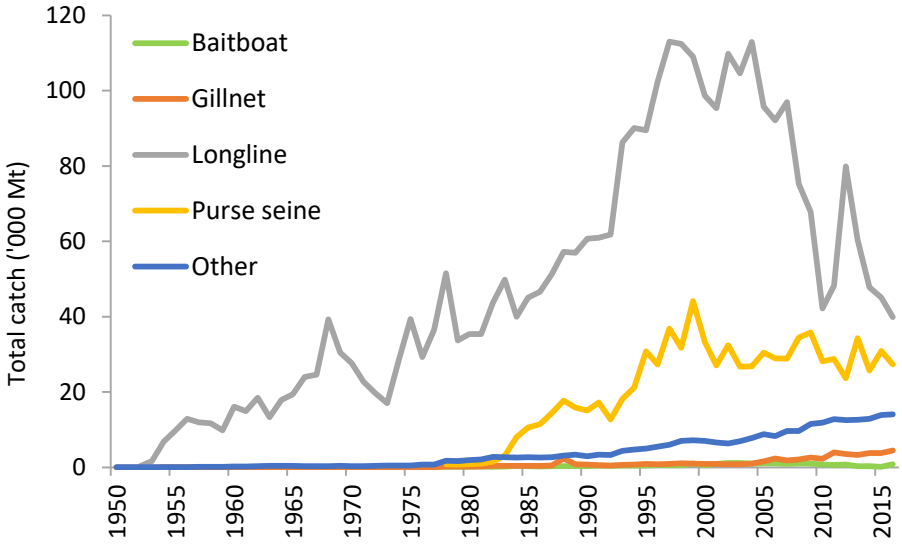

Figure 1. New chart: absolute nominal catches by species, gear and year

Catch-and-effort spatial / temporal distribution – CE01

Response from the WPDCS13: **KEEP** current time intervals (1950s, 1960s, 1970s, 1980s, 1990s, 2000s, 2007-2011 and last five years of data).

Catch-and-effort spatial / temporal effort distribution for PS – CE02

Response from the WPDCS13: **UPDATE** the Purse Seine catch-and-effort spatial / temporal effort distributions to 1x1 degrees grid, using *heatmaps* (see Figure 2) in place of pie charts, eventually producing two set of maps for EU and Other Purse Seines respectively.

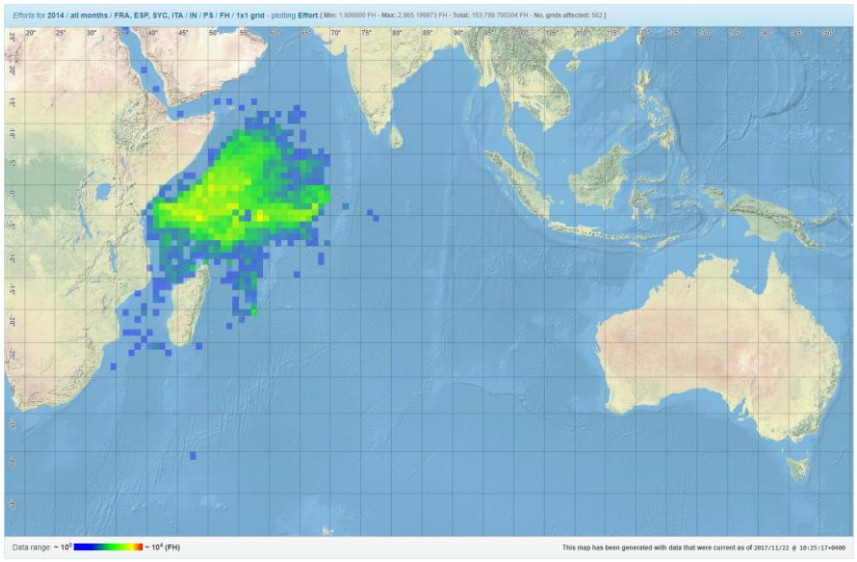

Figure 2. Plotting yearly effort (fishing hours) for the Purse Seine fleet as no. fishing hours per 1x1 degrees grid

Catch-and-effort coverage – CE03

Response from the WPDCS13: **UPDATE** the existing charts showing catch-and-effort coverage by species (as the fraction of nominal catches for which such data is reported) by breaking down existing chart in two, one for industrial (Figure 3) and one for artisanal fisheries (Figure 4).

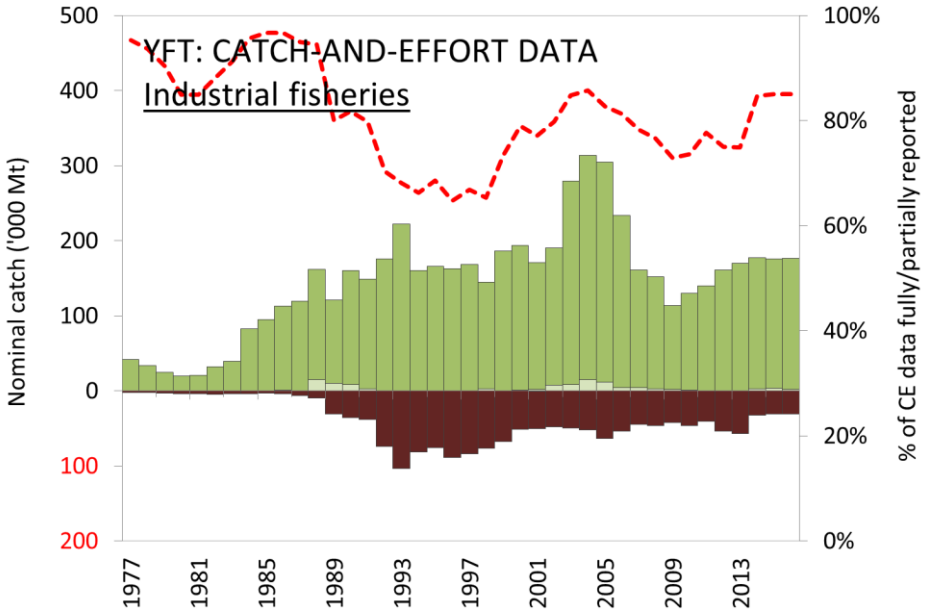

Figure 3. Catch-and-effort coverage over years for industrial fisheries

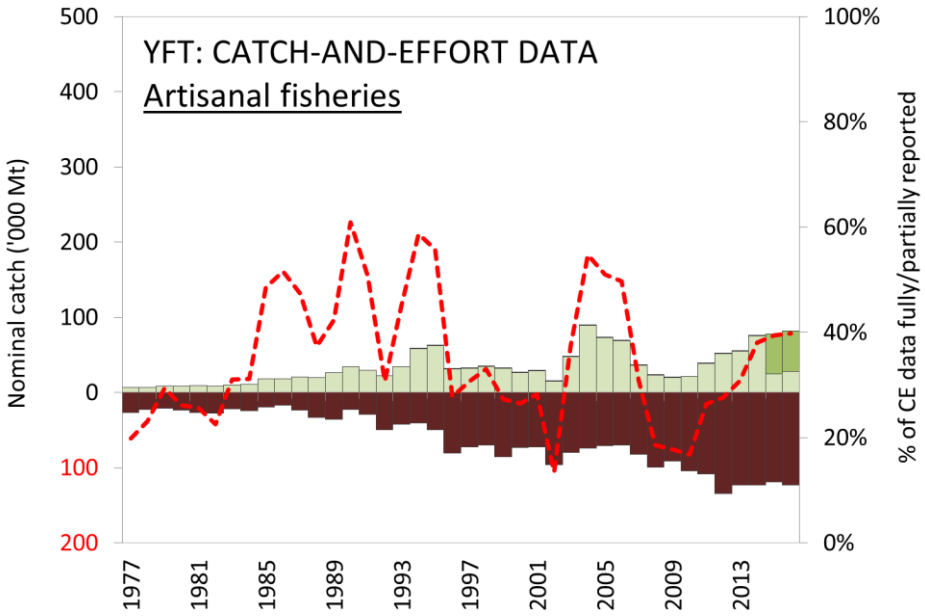

Figure 4. Catch-and-effort coverage over years for artisanal fisheries

Purse seine catches by school type – CE04

Response from the WPDCS13: **ADD** chart in Figure 5 showing the proportion of Purse Seine Log-school catches over total catches by fleet and species, ensuring that absolute catches for Purse Seine Log and Free school by year and species are kept in the nominal catch charts.

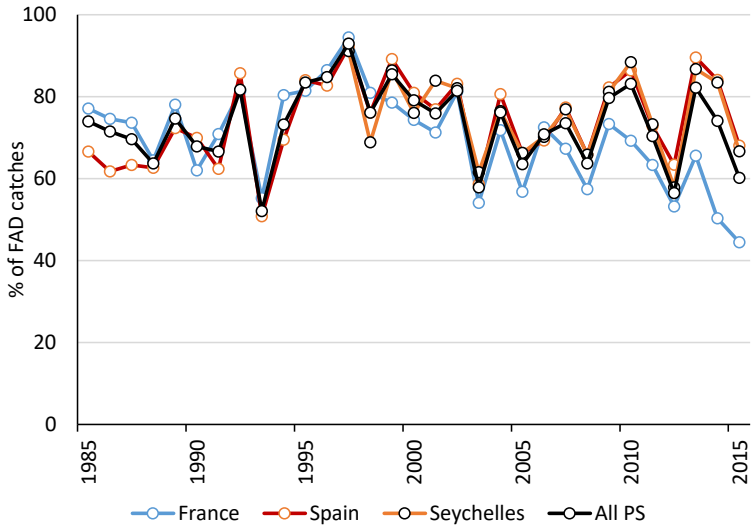

Figure 5. Proportion of Purse Seine log school catches over total catches by fleet and species

Size-frequency: available samples – SF01

Response from the WPDCS13: **KEEP** the existing charts showing size-and-frequency coverage by species (as the fraction of nominal catches for which such data is reported).

Average weights by gear – SF02

Response from the WPDCS13: **REMOVE** all existing distinct average weights by year and gear charts **KEEPING** only the combined chart.

Purse seine size-frequency distribution – SF03

Response from the WPDCS13: **KEEP** the existing charts showing normalized size-frequencies by species, year and school type as violin plots.

Distribution of catch-at-size – SF04

Response from the WPDCS13: **KEEP** the existing charts providing the same type of information through the combination of nominal catches by year and gear with average weights by year and gear.

Tagging data (RTTP-IO) – TD01

Response from the WPDCS13: **UPDATE** the existing chart by providing two separate density maps (one for releases and one for recaptures) and extending the latter with the addition of arrows showing the apparent movements of a random, limited number of tagged specimen.

Stock status information – SS01

Response from the WPDCS13: **ADD** the proposed chart as in Figure 6, ensuring that the trajectory from T_0 to $T_{current}$ is shown with a single color. Multiple colors should remain for future projections.

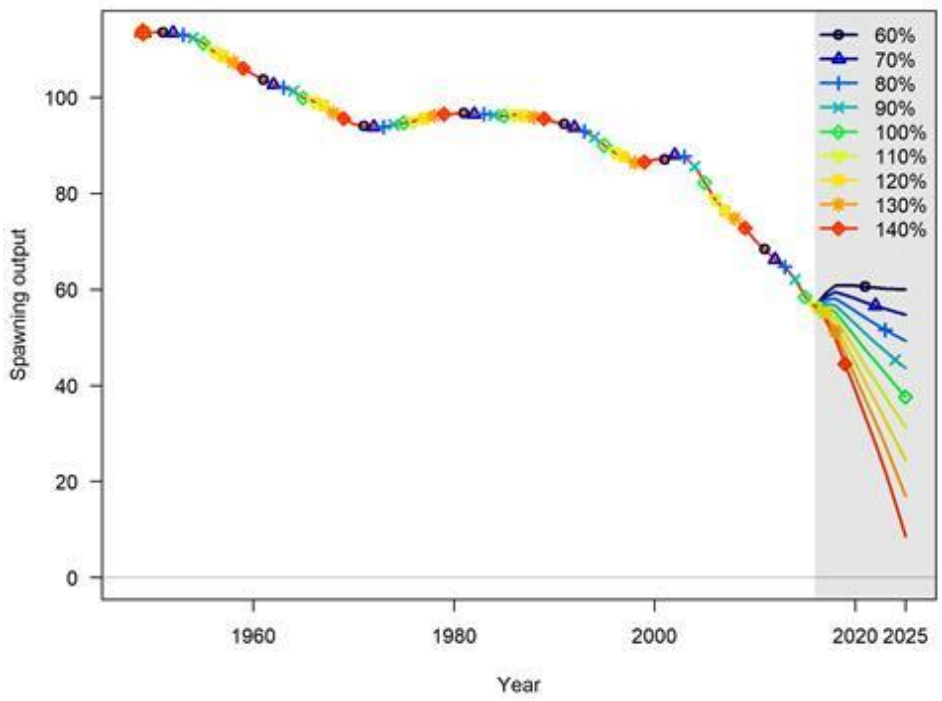

Figure 6. Proportion of Purse Seine log school catches over total catches by fleet and species

Stock status information: what to present? – SS02

Response from the WPDCS13: **USE** SSB/SSB_0 as the information to be presented in the additional stock status information charts.

Time-area catches of adult Yellowfin tunas – YFT01

Response from the WPDCS13: **ADD** a geo-spatial heatmap plot showing total catches (all years and gears) of *adult* (> 100 cm in fork-length) Yellowfin tuna (in tons) by 5x5 degrees grid (see Figure 7, to be updated to the heatmap format). Please note that this information should come from the raised YFT Catch-at-Size produced by the Secretariat prior to the WPTT.

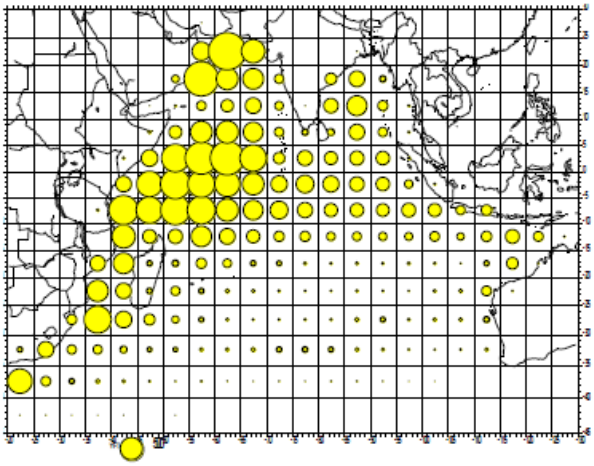

Figure 7. Total catches of adult Yellowfin tuna (1960-2016, all gears)

Distribution of Skipjack catches by Longline fisheries – SKJ01

Response from the WPDCS13: **ADD** a geo-spatial heatmap plot showing average catches (all years) of *Skipjack* tuna (in numbers) by 5x5 degrees grid for all longline fleets (see Figure 8, to be updated to the heatmap format). Please note that this information should come from the SKJ raised Catch-at-Size produced by the Secretariat prior to the WPTT.

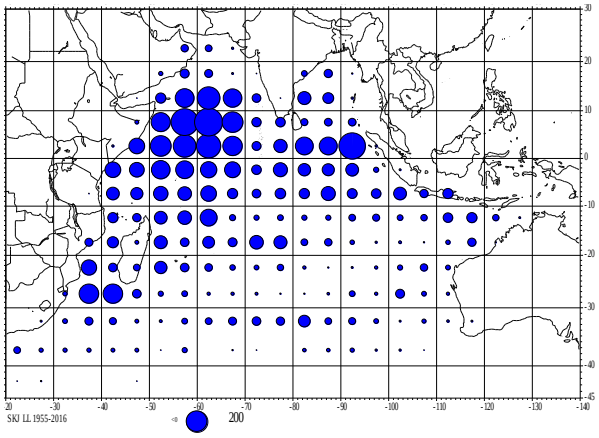

Figure 8. Average catches (in numbers) of Skipjack tuna from longline fleets (1955-2016)