Report of the 14ᵗʰ Session of the IOTC Working Party on Data Collection and Statistics

Victoria, Seychelles, 29 November - 1 December 2018

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ACRONYMS

AIS	Automatic Identification System
ALB	Albacore
ABNJ	Areas Beyond National Jurisdiction
BET	Bigeye tuna
BLM	Black marlin
BOBLME	Bay of Bengal Large Marine Ecosystems Project
CCSBT	Commission for the Conservation of Southern Bluefin Tuna
CMM	Conservation and Management Measure (of the IOTC; Resolutions and Recommendations)
CPCs	Contracting parties and cooperating non-contracting parties of the IOTC
CPUE	Catch Per Unit of Effort
DGCF	Directorate General of Capture Fisheries (Indonesia)
DFAD	Drifting FAD
DFAR	Department of Fisheries and Aquatic Resources (Sri Lanka)
EEZ	Exclusive Economic Zone
EMS	Electronic Monitoring System
ERA	Ecological Risk Assessment
EU	European Union
FAD	Fish aggregating device
FMA	Fisheries Management Area
FAO	Food and Agriculture Organization of the UN
FOB	Floating OBject
GEF	Global Environmental Facility
GFW	Global Fishing Watch
IATTC	Inter-American Tropical Tuna Commission
ICCAT	International Commission for the Conservation of Atlantic Tunas
IFREMER	Institut Francais de Recherche pour l`Exploitation de la Mer (EU,France)
IOC	Indian Ocean Commission
IOTC	Indian Ocean Tuna Commission
IRD	Institut de Recherche pour le Développement (EU,France)
I.R. Iran	Islamic Republic of Iran
ISSF	International Seafood Sustainability Foundation
MFMR	Ministry of Fisheries and Marine Resources (Somalia)
MMAF	Ministry of Marine Affairs and Fisheries (Indonesia)
NARA	National Aquatic Resources Research and Development Agency (Sri Lanka)
OFCF	Overseas Fishery Cooperation Foundation (Japan)
OPAGAC	Organización de Productores de Atún Congelado (EU,Spain)
PET	Protected, Endangered and Threatened species
RFMO	Regional Fisheries Management Organization
ROS	Regional Observer Scheme
SFA	Seychelles Fishing Authority (Seychelles)
SPC	Secretariat of the Pacific Community
SSI	Species of Special Interest
Taiwan,China	Taiwan Province of China
USTA	Unité Statistique Thonière d'Antsiranana (Madagascar)
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
WPTmT	Working Party on Temperate Tunas of the IOTC
WPNT	Working Party on Neritic Tunas of the IOTC
WPTT	Working Party on Tropical Tunas of the IOTC
WCPFC	Western and Central Pacific Fisheries Commission
WWF	World Wide Fund for nature
YFT	Yellowfin tuna

STANDARDISATION OF **IOTC** **W**ORKING **P**ARTY AND **S**CIENTIFIC **C**OMMITTEE 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 14th Session of the Indian Ocean Tuna Commission's (IOTC) Working Party on Data Collection and Statistics (WPDCS) was held in Victoria, Seychelles, from the 29th of November to the 1st of December 2018. A total of **52** participants attended the Session.

The following are a subset of the complete recommendations and decisions from the WPDCS14 to the Scientific Committee, which are provided at Appendix VI.

Revision of the proposed updates to standards and data fields

WPDCS14.01 (para. 146): The WPDCS **NOTED** that all changes to the proposed ROS *Minimum Standard Data Fields* are captured within the summary table in appendix to this document and **RECOMMENDED** that the ROS *Minimum Standard Data Fields* in Appendix VII are adopted by the Commission.

WPDCS14.02 (para. 149): The WPDCS **RECOMMENDED** that the SC evaluate the validity of alternative data collection tools, and combinations of these (such as the use of crew as observers, electronic monitoring and port sampling), as potential alternatives to onboard human observer coverage for the collection of the minimum standard data fields for small-scale vessels.

Proposals for new IOTC ROS data collection and reporting templates

WPDCS14.05 (para. 153): The WPDCS **RECOMMENDED** the development of minimum standards on EMS for IOTC. The WPDCS further **NOTED** the WCPFC are currently drafting standards on EM and **ACKNOWLEDGED** that it would be pertinent for IOTC to follow this process and utilise the outcomes where relevant.

Revision of the WPDCS Program of work (2019–2023)

WPDCS14.06 (para. 194): The WPDCS **RECOMMENDED** that the Scientific Committee consider and endorse the WPDCS Program of Work (2019–2023), as provided at Appendix V.

Review of the draft, and adoption of the report of the 14th Session of the WPDCS

WPDCS14.08 (para. 199): The WPDCS **RECOMMENDED** that the Scientific Committee consider the consolidated set of recommendations arising from WPDCS14, provided at Appendix VI.

1. OPENING OF THE MEETING

1. The 14th Session of the Indian Ocean Tuna Commission's (IOTC) Working Party on Data Collection and Statistics (WPDCS14) was held in Victoria, Seychelles from the 29th of November to the 1st of December 2018. A total of **52** participants (45 in 2017, 32 in 2016, 20 in 2015) attended the Session. The list of participants is provided at Appendix I. The meeting was opened on 29 November 2018 by the Chairperson, Mr. Stephen Ndegwa (Kenya) 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 WPDCS14 are listed in Appendix III.

3. THE IOTC PROCESS: OUTCOMES, UPDATES AND PROGRESS

3.1 OUTCOMES OF THE 20TH SESSION OF THE SCIENTIFIC COMMITTEE AND OF THE 22ND SESSION OF THE COMMISSION

3. The WPDCS **NOTED** paper IOTC–2018–WPDCS14–03 which outlined the main outcomes of the 20th Session of the Scientific Committee (SC20), specifically related to the work of the WPDCS.

4. The WPDCS **NOTED** that in 2017, the SC made a number of requests in relation to the WPDCS13 report (noting that updates on Recommendations of the SC20 are dealt with under Agenda item 3.3). Some of those requests and the associated responses from the WPDCS14 are provided below for reference.

- *Resolution 17/01 On an interim plan for rebuilding the Indian Ocean yellowfin tuna stock*
  - o (Para. 108) The SC **NOTED** that, although no scientific papers were presented at the WPDCS13 directly addressing discussions of definitions of Alternative Management Measures, these were discussed as a possible way to address the issue of correctly monitoring yellowfin tuna catches during periods close to the end of the year, as described by EU-France and EU-Italy PS fleets in document IOTC–2017–WPDCS13–21.
  - o (Para. 109) The SC **REQUESTED** that collaborative work is carried out by different purse seine fleets active in the Indian Ocean, so as to increase the frequency of production of corrected estimates of yellowfin tuna catches to monitor yellowfin quota consumption and **REQUESTED** the WPTT and WPM to investigate additional or complementary management measures (e.g., input control measures) for purse seiners and other gears that will facilitate the control and monitoring of the management measures adopted by IOTC.
  - o **Response:** the WPDCS **NOTED** that this topic was discussed during the 20th Session of the Working Party on Tropical Tuna (WPTT20, 2018) in particular following the presentation of paper IOTC–2018–WPTT20–43 ("*Prospects for an effort-based management of Indian Ocean yellowfin stock*") and IOTC–2018–WPTT20–INF01 ("*Using Effort Control Measures to Implement Catch Capacity Limits in ICCAT PS Fisheries*").

- *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*
  - o (Para. 111) The SC acknowledged the request that, in the interim period, data providers continue to submit FAD activity data using the existing IOTC Form 3_FA and its current categories, and **REQUESTED** that the IOTC Secretariat provide clarifications on definitions of FAD activity in the context of the IOTC classifications to ensure consistency in the data submissions. The SC **REQUESTED** the addition of a *FAD ownership* field to the list of mandatory information to be collected by IOTC Form 3_FA, as this was considered necessary to model and report the tracking status of all FADs (*i) monitored and owned, ii) not monitored, iii) monitored and not owned*), subject to a recorded activity.
  - o **Response:** the WPDCS **NOTED** that the IOTC Secretariat has provided support – through personal communication – to CPCs asking clarification in terms of how to best interpret the activity and FAD type categories required for data reporting, that Form 3_FA (for the submission of FAD information) has been extended with the inclusion of the required field related to FAD ownership, and that this additional information has been successfully provided by three CPCs out of the six that have reported FAD information through Form 3_FA for 2017.

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

  o (Para. 113) The SC **NOTED** that EMS are intended to complement human observer programs and also collect other useful information, and encouraged that different – but mutually compatible EMS systems – conform to harmonized standards in terms of installation, data collection and reporting, and **REQUESTED** that purse seine fleets or CPCs wishing to voluntarily implement EMS in purse seiners follow the guidelines described in document IOTC–2017–WPDCS13–26 and IOTC-2016-SC19-15.

  o (Para. 114) The SC **NOTED** that the feasibility and range of data collected by Electronic Monitoring Systems varies according to type of fishing gear, and **REQUESTED** that the IOTC Secretariat, in collaboration with CPCs, develop standards for data collection and reporting applicable to different gear types.

  o **Response:** The WPDCS **ACKNOWLEDGED** that no activity related to the development of standards for EMS data collection and reporting has been currently initiated by the Secretariat, and **NOTED** that further discussions on topics related to these two requests is expected following the presentations of paper IOTC-2018-WPDCS14-20 ("*The use of electronic monitoring within tuna longline fisheries in the Indian Ocean: implications for data collection, analysis and reporting*") and IOTC-2018-WPDCS14-21 ("*An assessment of electronic monitoring in Australian tuna longline fisheries*").

- *General discussion on data issues*

  o (Para. 116) The SC **NOTED** with concern the lack of information submitted by CPCs on total catches, catch and effort and size data for various IOTC species, despite their mandatory reporting status. For many IOTC stocks the IOTC Secretariat is required to estimate the level of catches, which increases the uncertainty of the stock assessment results using this data.

  o (Para. 117) The SC **REQUESTED** that CPCs comply with IOTC data requirements as requested per Resolution 15/01 and 15/02, given the gaps in available information in the IOTC database and the importance of basic fishery data in order to assess the status of stocks and for the provision of sound management advice, and **NOTED** the adoption of Resolution 16/06 *On measures applicable in case of non-fulfilment of reporting obligations in the IOTC* and possibility of penalty measures for non-compliance of Resolutions 15/01 and 15/02.

  o **Response:** The WPDCS **NOTED** that the IOTC Secretariat will provide an update on the status of the mandatory statistics and their reporting status by CPCs during the course of the meeting, and that Resolution 16/06 has been superseded by Resolution 18/08 *On measures applicable in case of non-fulfilment of reporting obligations in the IOTC*, that establishes additional data reporting requirements to be adopted by CPCs to avoid incurring in penalty measures.

- *The Consolidated List of Authorized Vessels (CLAV)*

  o (Para. 120) The SC acknowledged the importance of the CLAV (Consolidated List of Authorized Vessels) as a tool to combat and deter IUU fishing, and noted that funds from Common Oceans/GEF are due to expire in March 2018, and **REQUESTED** that participants from CPCs that also belong to other tRFMOs reiterate the importance of the CLAV to ensure future support to the initiative from the five major tRFMOs.

  o **Response:** The WPDCS **NOTED** that ABNJ is considering to extend its support (until September 2019) for the work of the consultant responsible for CLAV data quality control and analysis.

5. The WPDCS **NOTED** paper IOTC–2018–WPDCS14–04 which outlined the main outcomes of the 22nd 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 10 Conservation and Management Measures (CMMs) adopted at the 22nd Session of the Commission (consisting of 10 Resolutions and 0 Recommendation) as listed below:

   IOTC Resolutions

   - Resolution 18/01 *On an interim plan for rebuilding the Indian Ocean yellowfin tuna stock in the IOTC Area of Competence*

   - Resolution 18/02 *On management measures for the conservation of blue shark caught in association with IOTC fisheries*

- Resolution 18/03 *On establishing a list of vessels presumed to have carried out illegal, unreported and unregulated fishing in the IOTC Area of Competence*

- Resolution 18/04 *On bioFAD experimental project*

- Resolution 18/05 *On management measures for the conservation for the conservation of billfish, striped marlin, black marlin, blue marlin and Indo-Pacific sailfish*

- Resolution 18/06 *On establishing a programme for transhipment by large-scale fishing vessels*

- Resolution 18/07 *On measures applicable in case of non-fulfilment of reporting obligations in the IOTC*

- Resolution 18/08 *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 design to reduce the incidence of entanglement of non-target species*

- Resolution 18/09 *On a scoping study of socio-economic indicators of IOTC fisheries*

- Resolution 18/10 *On vessel chartering in the IOTC Area of Competence.*

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 2018–051 (i.e., 3 October 2018).

8. Participants to WPDCS14 were **ENCOURAGED** to familiarise themselves with the adopted Resolutions, especially those most relevant to the WPDCS.

9. **NOTING** that the Commission also made a number of general comments and requests on the recommendations made by the Scientific Committee in 2017, which have relevance for the WPDCS (details as follows: paragraph numbers refer to the draft report of the Commission (IOTC–2018–S22–R)) the WPDCS **AGREED** that any advice to the Commission would be provided in the relevant sections of the report below.

Para. 25. *The Commission **NOTED** that 10 Contracting Parties and 2 Cooperating Non-Contracting Parties did not submit a National Report to the Scientific Committee in 2017, and issues with lack of data and poor quality data persist. The Commission reiterated its concerns about the lack and poor quality of data, and again strongly **RECOMMENDED** that CPCs take immediate steps to review, and where necessary, improve their performance with respect to the provision of data through improved compliance with Resolutions 15/01 On the recording of catch and effort data by fishing vessels in the IOTC area of competence, and 15/02 Mandatory statistical reporting requirements for IOTC contracting parties and cooperating non-contracting parties.*

Para. 26. *The Commission **NOTED** the stock status summaries for species of tuna and tuna-like species under the IOTC mandate, as well as other species impacted by IOTC fisheries (Appendix 5) and considered the recommendations made by the SC20 in its report that related specifically to the Commission. The Commission **ENDORSED** the SC 2017 list of recommendations as its own, noting the additional activities requested by the Commission at this meeting.*

Matters related to ecosystems, bycatch and the status of sharks

Para. 33. *The Commission **NOTED** that IOTC–2018–S21–PropL On the conservation of mobula and manta rays caught in association with fisheries in the IOTC Area of competence was deferred. The Commission also **NOTED** that there is no specific research that indicates an association of mobula and manta rays with surface fisheries. One CPC highlighted the need for data be collected in order for the SC to provide potential management advice on the conservation of this species.*

Para. 34. *The Commission **REQUESTED** the SC to review the status of manta and mobula rays and their interaction with IOTC fisheries and to report this to the Commission in 2020. This work should include an evaluation of data availability and data gaps. Where data is insufficient, the SC should propose options for strengthening data collection.*

Para. 35. *The Commission **NOTED** the high uncertainty of catch history estimates used in the stock assessment of blue shark and the estimation method to derive blue shark catch history accounting for reported zero catches for certain fleets and certain areas.*

Para. 38. *The Commission **REQUESTED** the Scientific Committee to identify possible means to improve the submission of complete, accurate and timely catch records for sharks, as well as the collection of species-specific data on catch, biology, discards and trade.*

On the status of neritic tunas

Para. 46. *The Commission **NOTED** that catch of neritic species amounts to around 35% of the total catch of IOTC species, and nearly all the catch of neritic species is taken by coastal States. Furthermore, that around 80% of the catch data available to the Commission on neritic species is estimated i.e. only around 20% of the catch data is derived from catch sampling processes and reported to the IOTC Secretariat.*

Para. 47. *The Commission **NOTED** that neritic tuna are vital resources to the coastal States and **EXPRESSED** its concern that the current nature and extent of management measures applying to the neritic species is much less than that being applied to other IOTC species. The Commission **EXPRESSED** further concern about the overall lack of information on neritic tunas, strongly **ENCOURAGED** the coastal States to improve data collection and reporting, and develop measures to underpin sustainable management of IOTC neritic species. Some CPCs also expressed concern that the concerned coastal States had not tabled conservation and management measures for this stock at this annual meeting in response to the Commission's call to do so at the last annual meeting.*

Report of the 2nd Session of the Technical Committee on Management Procedures (TCMP02)

Para. 73. *The Commission **NOTED** the importance of data quality in developing management procedures and **RECOMMENDED** that the longline CPUE data for swordfish be made available and jointly standardized.*

Overview of the CoC15 Report

Para. 80. *The Commission NOTED the marginal improvement in the levels of compliance of some CPCs in 2017, especially with regards to mandatory statistics. The Commission ENCOURAGED all CPCs and the IOTC Secretariat of the need to respect the 15 days deadlines set in the IOTC Rules of Procedure (2014) to finalise the Compliance Reports.*

3.2 *REVIEW OF CONSERVATION AND MANAGEMENT MEASURES RELEVANT TO THE WPDCS*

10. The WPDCS **NOTED** paper IOTC–2018–WPDCS14–05 which aimed to encourage participants at the WPDCS14 to review some of the existing Conservation and Management Measures (CMM) relevant to the WPDCS, noting the CMMs referred to in document IOTC–2018–WPDCS14–04, 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.

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

3.3 *PROGRESS ON THE RECOMMENDATIONS OF WPDCS13*

12. The WPDCS **NOTED** paper IOTC–2018–WPDCS14–06 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.

13. 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.

14. The WPDCS **NOTED** that two distinct proposals for revision of Resolution 11/04 *On a Regional Observer Scheme* were presented during the 22nd Session of the Commission in 2018, and that consensus could not be reached, therefore deferring any revision to the Resolution (including the specific requests reiterated by the WPDCS in 2017) to the next Session of the Commission in 2019.

15. The WPDCS **NOTED** that no specific action was taken yet in order to establish a public repository of historical CPUE series to be made accessible under a dedicated section of the IOTC website, and **ACKNOWLEDGED** that there is potential for a specific activity in this regard to be included in the work plan.

16. The WPDCS **ACKNOWLEDGED** the efforts made by the Secretariat to simplify the representation of the quality of the information within each standard data sets, and how these result in clearer and more readable charts as presented in the data summary papers relevant for each working party.

17. Furthermore the WPDCS **NOTED** the updates in the IOTC species executive summaries of tropical tuna, including additional and revised maps and figures in line with the outcomes of the consultation held during the 13th Session of the working party.

18. The WPDCS **NOTED** with favour the recent positive updates from I.R. Iran, that completed the submission of its historical catch-and-effort series (for the years 2007-2017) in a format compatible with Resolution 15/02, and that these will be incorporated in the IOTC database following positive validations and quality control checks.

19. Also, the WPDCS **ACKNOWLEDGED** that a data compliance and support mission is scheduled for early 2019 to explore the possibility of a CPUE standardization based on the operational data available for the gillnet fisheries of I.R. Iran.

20. The WPDCS **NOTED** that a data compliance mission to Pakistan, originally planned for July 2018 to address a number of data-related issues (including an assessment of the rationale that lead to the revision of historical Pakistan catch series) had to be postponed due to security concerns in the area.

21. 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.

22. 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.

23. **RECALLING** the potential effects on species composition that might be introduced by recent changes in length-weight relationships for Tropical tuna species, the WPDCS **NOTED** that no revised catch series has been yet provided by the concerned purse-seine fleets and that discussion on this topic has been also undertaken by a number of papers presented during the WPTT20.

24. The WPDCS **NOTED** a preliminary analysis of YFT catch series in the years between 2014 and 2017 showing that the expected reduction in catches was only partially achieved, and that the decrease in industrial catches (although to levels not fully compliant to Resolution 17/01 requirements) has been compensated by increases in artisanal catches that are not subject to the Resolution.

25. Furthermore, the WPDCS **NOTED** that the implementation of data collection mechanisms to achieve close-to-real time monitoring of YFT catches is still ongoing.

26. The WPDCS **NOTED** that several observer trip data provided to the Secretariat over the years (and originally available in non-standard electronic formats) have been processed and incorporated in the ROS Regional Database with support from SIOTI.

27. The WPDCS **ACKNOWLEDGED** that the reiterated request, from some CPCs, to deliver a number of capacity-building workshops and training courses for the R language were partially addressed during the 8th Session of the Working Party on Neritic tunas, that took the form of a workshop providing training in R data processing, exploration and statistical analysis focusing on the development of standardised CPUE series.

4. PROGRESS REPORT OF THE SECRETARIAT ON DATA RELATED ISSUES

4.1 IOTC SECRETARIAT REPORT

28. The WPDCS **NOTED** paper IOTC–2018–WPDCS14–07 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.

29. The WPDCS **NOTED** that the quality of the data available by species is highly dependent on the importance of artisanal fisheries (that account for over 60% of total catches), and which tend to be the least well reported fisheries and often require catches to be at least partially (or fully) estimated by the IOTC Secretariat. The WPDCS further **NOTED** that the catch-and-effort and size data for neritic tunas and billfish continue to be poorly reported, and remain a major challenge for stock assessments which in many cases continue to be highly uncertain.

30. The WPDCS **NOTED** that the format of cannery data reported to IOTC Secretariat by ISSF participating companies, used for the verification of nominal catches, are submitted in a number of different formats that are time-consuming for the IOTC Secretariat to process and in some cases as data sets which are sub-optimal (e.g., catches aggregated over several vessels). The WPDCS **REQUESTED** that the IOTC Secretariat liaise with ISSF to develop a standardized format for the submission of the cannery data, facilitate the processing of the data and improve the utility of future analyses.

31. The WDPCS **NOTED** that revisions to nominal catches submitted by CPCs, due to improvements in data collection for example, generally focus on recent years' catches and which can result in inconsistencies and breaks in catch series that negatively impact the outputs of stock assessments.

32. While the WPDCS **ACKNOWLEDGED** the importance of CPCs to continually improve the quality and coverage of fisheries data collection, the WPDCS **NOTED** the uncertainty this introduces to catch trends over the longer-term, and the difficulties in revising the historical catch series given the general paucity of information available for many fisheries in the Indian Ocean in previous years.

33. The WPDCS further **NOTED** that changes in time series may result in both increasing and decreasing trends in catch and that there is currently no simple methodology available to correct data over the full time series unless some specific work is conducted in collaboration with the national scientists of the concerned CPCs, on the basis of new assumptions and rescue of historical data.

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

Total catches (including retained catches, discards):

   o 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.
   o 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.
   o 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:

   o 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 Pakistan; gillnet and longline fishery of Sri Lanka.
   o 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:

   o 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.
   o 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:

   o 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).
   o Little or no observer data collection by CPCs for artisanal fisheries. Since 2014, WWF-Pakistan has funded a crew-based observer data collection for Pakistan gillnets, although no data has been submitted to the IOTC Secretariat, or for any other gillnet fisheries.

35. The WPDCS **NOTED** that the reconstructed catch series submitted by the Government of Pakistan to the IOTC Secretariat in 2017, based on the crew-based observer scheme, remains pending upload to the IOTC database subject to a number of outstanding questions related to the scale of the revisions to a number of species, including: a 60% increase in catches of yellowfin tuna between 2014-2016 and 300% increase in the nominal gillnet CPUE since the 1980s.

36. The WPDCS **REQUESTED** that the IOTC Secretariat liaise with WWF-Pakistan and the Government of Pakistan to resolve the outstanding questions on the reconstructed catches, and that Pakistan provide an update at the next WPDCS meeting.

37. 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*

4.2.2   *IOTC Data Dissemination: Discussion of potential improvements*

38. The WPDCS **NOTED** that a number of topics related to both updates to IOTC data summaries and improvements in the dissemination of IOTC data processes are expected to be discussed during other agenda items.

4.2.3   *Alternative data series*

39. The WPDCS **NOTED** paper IOTC-2018-WPDCS14-23 that provides participants at the Working Party on Data Collection and Statistics (WPDCS-14) with an overview of the IOTC Secretariat's estimation of Indonesia's longline catches, current issues related to the reliability of estimated catches, and proposed changes to the methodology in response to the request from the Scientific Committee (SC20 para. 45) "*that the IOTC Secretariat, in collaboration with Indonesia, review the current methods for estimating catches of billfish for Indonesia in the IOTC database and provide an update at the next meeting of the WPB*".

40. The WPDCS **NOTED** that the average catches and species composition used to reconstruct the catch data, formerly estimated from the Taiwanese fresh (small-scale) longline fleet, is no longer applicable as fishing patterns, targeting and the composition of catches are now known to be very different between the Indonesian and Taiwanese longline fleets.

41. The WPDCS **NOTED** the changes to the IOTC Secretariat's methodology in terms of revisions to the estimation of average catches and the species composition of Indonesia's fresh longline catches, and the range of data sources used to validate the new estimates, including:

   i.)   The 2013 Fishing Capacity report, published by the IOTC Secretariat;

   ii.)   Comparisons with the species composition of catches from port sampling conducted by the Research Institute of Tuna Fisheries in Benoa, one of the main landing sites for Indonesia's fresh longline fleets.

   iii.)   Validation of longline observer trips reports submitted by Indonesia.

   iv.)   Comparisons of average catches of vessels unloading in Benoa.

42. The WPDCS **ACKNOWLEDGED** the work of the IOTC Secretariat to develop and improve current estimates of catches of Indonesia's fresh longline fleet. **RECOGNIZING** the need for the Secretariat to report a single nominal catch series for each CPC prior to the IOTC Working Parties, the WPDCS **AGREED** that the catch series provided by the Secretariat is likely the best available information on Indonesian fresh longline catches at present and **REQUESTED** that the possibility of revisions for years prior to 2014 be explored in order to ensure consistency in the catch trends over the longer time period.

43. The WPDCS **ENDORSED** the current methodology developed by the Secretariat to produce the new catch series for scientific use and **REQUESTED** that this methodology be subject to frequent review so as to provide the best available information, given the on-going uncertainties with the quality of Indonesia's official statistics.

44. The WPDCS **NOTED** that the uncertainty inherent in the catch series estimation process is not adequately captured and **REQUESTED** the IOTC Secretariat to facilitate the provision – upon request – of official catches, alternative and revised catch series to the stock assessment scientists where the impact of these could be of particular relevance.

45. The WPDCS **NOTED** the number of on-going and critical issues with the quality of Indonesia's official data, and **AGREED** that the IOTC Secretariat continue to produce their own best scientific estimates of Indonesia's catches for the purposes of stock assessment in order to moderate the effects of:

   i.)   Sharp, and largely unexplained, fluctuations in the catches between years; including a 500% increase in preliminary catches of yellowfin tuna in 2018 from 40k tons in 2016 to over 217k tons in 2017 (subsequently revised to 40k tons).

   ii.)   A 82% decrease in the number of Indonesia longline vessels in the IOTC Active Vessel list (from 1,200 in 2013 to 214 in 2017), apparently the results of de-registration of 'ex-foreign' longline vessels previously according to official DGCF sources.

   iii.)   Inconsistencies in the fishing activities of purse seine and longline vessels between logbooks and VMS data, which question the reliability of time-area catches.

   iv.)   Low levels of logbook submission rates, which until recently have been below 10%.

v.) Inconsistencies in the number of authorized and active vessels. Between 2010 and 2013 the number of active vessels as much as 30% higher than the number of authorized vessels, and no official explanations for the discrepancies have been provided by Indonesia.

46. The WPDCS **REQUESTED** Indonesia to further investigate these issues as a priority, as the number of active vessels is one of the key elements used to reconstruct catches for Indonesia, and to provide an update at the next meeting of the WPDCS.

47. In terms of the inconsistencies between vessel positions from logbooks and VMS, the WPDCS **NOTED** that Indonesian VMS data have been officially released in the public domain in collaboration with Global Fishing Watch and **REQUESTED** that the IOTC Secretariat liaise with Indonesia to access detailed spatial information to address the question of the number of fresh longliners in operation in recent years in line with the data confidentiality rules set out in IOTC Resolution 12/02.

48. The WPDCS also **NOTED** the changes to the Taiwanese small-scale longline fleet, including increases in the average catches per vessel (from 101 tons per year in 2013 to 174 tons per year in 2016) and also changes in the species composition, notably increases in the proportions of swordfish, and **REQUESTED** that Taiwan,China, in collaboration with IOTC Secretariat, revise the catches for small-scale longliners for years prior to 2014 to ensure consistency in the historical catch series.

49. The WPDCS **NOTED** that paper IOTC-2018-WPDCS14-31, providing details on the methodology adopted by the government of Pakistan to reconstruct and reconcile its catch series with the support of WWF Pakistan, was not submitted due to time constraints.

4.3 *UPDATES ON DATA-RELATED REQUESTS FROM OTHER WORKING PARTIES*

50. The WPDCS **NOTED** the summary information provided by the IOTC Secretariat in terms of standing data-related requests issued to the WPDCS from other working parties, including the following:

- **Report of the 16th Session of the Working Party on Billfish (WPB16)**

  o (Para. 50) "*The WPB CONSIDERED the results of the alternative catch series, and REQUESTED that the WPDCS consider endorsing the catch series.*"

  o (Para. 95) "*The WPB AGREED that the systematic deviations in the retrospective analysis provide little confidence in the predictive capabilities of the model, and as such the resultant fishery reference points for black marlin should be treated with caution. The WPB REQUESTED that the catch and effort data provided for this species be discussed by the WPDCS in 2018 and revised information be submitted to the secretariat by CPCs that have catches of black marlin, prior to the next assessment of the species.*"

51. The WPDCS **ACKNOWLEDGED** that the methodologies adopted and the results obtained by the IOTC Secretariat in collaboration with national scientists for the revision of Indonesian fresh-tuna longliners best scientific estimates have been presented under agenda item 4.3 and endorsed by the WPDCS.

- **Report of the 14th Session of the Working Party on Ecosystems and Bycatch (WPEB14)**

  o (Para. 56) "*The WPEB REQUESTED that the IOTC Secretariat discuss during the next WPDCS the possibility of creating a database of biological information that would be particularly useful to the WPEB and WPB among others.*"

52. The WPDCS **NOTED** that the creation of a database of biological information has been identified as a particularly beneficial task by the scientific community and by several IOTC working parties, and **AGREED** to defer discussion on this topic until agenda item 5.2, when a specific paper on this matter will be presented.

  o (Para. 26): "*The WPEB EMPHASIZED that sourcing and reconstructing historical catch and effort data remains a high priority. However, it was also noted that the lack of historical catch data poses a challenge in assessing population status of all IOTC and associated species. Therefore, the WPEB REQUESTED the WPDCS explore the option of addressing this challenge through directed workshops that comprise national scientists with institutional knowledge of national fisheries and international experts to provide guidance and capacity building in analytic approaches and tools for data recovery and catch reconstruction methods.*"

53. **ACKNOWLEDGING** the importance of reliable historical catch data for a number of species under IOTC mandate, the WPDCS **SUGGESTED** to consider the addition of a specific activity in its program of work to support directed workshops targeting national scientists and international experts with knowledge of national fisheries and analytic approaches for catch reconstruction methods.

o (Para. 24): "*NOTING the proposed updates to the IOTC discard reporting form (Form 1_DI) to include seasonal and spatial information, the WPEB REQUESTED CPCs to provide their feedback on the feasibility of submitting data according to the updated requirements, and that this is further discussed at the next WPDCS and SC meetings.*"

54. The WPDCS **NOTED** that the WPEB14 did not provide a clear indication on whether or not fine scale information for bycatch and discards should be provided to the Secretariat through the revised version of Form 1_DI or ultimately only through the data collected from the Regional Observer Scheme.

- **Report of the 20ᵗʰ Session of the Working Party on Tropical Tunas (WPTT20)**

  o (Para. 81) "*The WPTT ACKNOWLEDGED the importance of the proposed harmonisation of FOB types and FOB activity definitions and RECOMMENDED that the concept of harmonisation be taken up by the WPDCS and Scientific Committee with the aim of harmonising IOTC definitions with those used by other tRFMOs in the context of the joint tRFMO Working Group on FADs.*"

55. The WPDCS **CONFIRMED** the importance of this activity in order to properly enable a science based approach to FOB management, and **ACKNOWLEDGED** that discussion on this topic will be held during agenda item 6.2.2.

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 Data and statistics system in Indonesia under one data program

56. The WPDCS **NOTED** that paper IOTC–2018–WPDCS14–10 was withdrawn.

5.1.2 The path towards sustainable fisheries through One Data implementation in the Ministry of Marine Affairs and Fisheries (MMAF) Republic of Indonesia

57. The WPDCS **NOTED** that paper IOTC–2018–WPDCS14–27 that provides a summary of the actions implemented by MMAF to ensure that fisheries management includes integrated processes in the collection of information, analysis, planning, consultation, decision-making and allocation of fish resources was submitted without being presented.

5.1.3 Iran's essential measures to improve catch & effort data

58. The WPDCS **NOTED** paper IOTC-2018-WPDCS14-10_Rev1 that provides 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 **ACKNOWLEDGED** the recent improvements in the reporting of time-area catches by I.R. Iran, with the assistance of the IOTC Secretariat, and **REQUESTED** that the IOTC Secretariat continue to provide support to I.R. Iran in terms of submission of time-area catches for the historical years.

60. The WPDCS **NOTED** the reduction of the fishing pressure on some coastal IOTC species by replacing gillnets by longliners. The WPDCS **NOTED** that the catch by the Iranian purse-seine fleet was relatively small (≈6,000 tons) which is a result of only 5 active purse-seine vessels.

61. The WPDCS also **NOTED** that I.R. Iran had recently introduced logbooks on purse seine vessels (including details of catch, effort and fishing position) and that purse seine catches data reported to the IOTC Secretariat for 2017 were derived for the first time from logbooks.

62. The WPDCS **ENCOURAGED** I.R. Iran to pursue ongoing improvements in the data collection for retained landings for the offshore fisheries, in addition to also PET species like sharks, marine mammals and sea turtles, and to liaise with the IOTC Secretariat to ensure that catch and effort data for the purse-seine fleet collected in the last 5 years could be submitted according to the requirements in Resolution 15/02.

5.1.4 Improving artisanal tuna data collection and reporting: success, challenges, and lessons learnt from electronic pilot data collection in Kenya

63. The WPDCS **NOTED** paper IOTC–2018–WPDCS14–12 which provided updates on the standardized data collection protocol implemented from June to December 2018 for the collection of catch and effort and length data for individual tuna species through electronic forms uploaded to a mobile application, including the following abstract provided by the authors:

> "*This paper looks at the implementation of electronic data collection system introduced to monitor artisanal tuna fishery data collection and reporting. The objective of developing the system was to improve artisanal data collection and reporting in Kenya. The Kenya Fisheries Service in collaboration with County governments and World Wide Fund for Nature (WWF) initiated a six-month pilot study from June to December 2018. (...)"* – see paper for full abstract.

64. The WPDCS **NOTED** the pilot data collection study (June to December 2018) launched by the Kenya Fisheries Service in collaboration with the World Wildlife Fund for Nature (WWF) using a mobile application and **ENCOURAGED** Kenya to continue development of their electronic data collection system.

65. The WPDCS **NOTED** that the survey sites selected were not random, but according to sites of high prevalence of tuna and tuna-like species, and that there may also be the possibility of seasonality given that the majority of data reported were collected during the rough weather season.

5.1.5 Implementation of the monitoring system for small-scale and artisanal fisheries of pelagic fishes in north regions of Madagascar

66. The WPDCS **NOTED** paper IOTC–2018–WPDCS14–13_Rev1 which provides an overview of the development of the data collection system in the northern regions of Madagascar as a substantial step to establish a specific program to improve the level of national data collection and to improve the report provided to IOTC, including the following abstract provided by the authors:

> "*In the framework to improve the fishery statistics in Madagascar, the Ministry of Fisheries, through the Unité Statistique Thonière d'Antsiranana, initiated in 2015 a monitoring system for small-scale and artisanal fisheries of pelagic fish in north regions of Madagascar with two pilot villages. Since 2016, Monitoring has been expanded in other villages where network of investigators have been established in the various potential fishing areas (…)"* – see paper for full abstract.

67. The WPDCS **NOTED** that the CPUE of the artisanal fishery (532 kg per trip) was significantly higher than that of the small-scale fishery (10-26 kg per trip) which could be attributed to trip duration – as small-scale trips generally last only one day while artisanal vessels can make trips of up to one week.

68. The WPDCS **NOTED** the high proportion (>70%) of catches declared as "mixed catches" do not include IOTC tuna and tuna-like species, but **ENCOURAGED** Madagascar to improve the species identification of catches, for example, by training observers attending sites or by taking photos for post sampling identification.

5.1.6 Updates on the implementation of the new Malaysia logbook for tuna fisheries in Indian Ocean

69. The WPDCS **NOTED** paper IOTC–2018–WPDCS14–14 which describes the efforts made by DOFM Malaysia to implement vessel logbook programs since January 2018, how these were initiated for the pelagic longline fisheries and resulted in new requirements for fishermen to collect and report timely information for an accurate estimation of the catch-per-unit-of-effort levels for the fleet, including the following abstract provided by the authors:

> "*As the need for conservation of the national marine resources increases, the need for more and better quality data on how these resources are utilized also increases. One of the most crucial data is the data for catch per unit effort. To meet these needs, Department of Fisheries Malaysia (DOFM) has started to implement vessel logbook programs since January 2018 and these programs were initiated for the pelagic longline fisheries (…)"* – see paper for full abstract.

70. The WPDCS **NOTED** that logbooks have been implemented for all vessels as mandatory requirement, that CCTV system have been installed on some selected vessels (i.e., three vessels) suspected of illegal or suspicious activities.

71. The WPCDS further **NOTED** that currently the CCTV system was only employed to identify illegal fishing practices, and **ENCOURAGED** Malaysia to carry out validation exercise using CCTV electronic information to verify logbook data submissions.

5.1.7 Fisheries data collection and statistics in Pakistan

72. The WPDCS **NOTED** paper IOTC–2018–WPDCS14–15 which provides an overview of the status of fisheries data collection and statistics in Pakistan, including the following abstract provided by the authors (discussions related to this paper were covered during the presentation of paper IOTC-2018-WPDCS14-32):

   "*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. Fisheries statistics includes information about number of fishers, fishing fleet, fish production and export of fish and fishery products. Data about landed species consists of those reported from two maritime provinces (Sindh and Balochistan) as well as those of foreign fishing vessels permitted to operate in the Exclusive Economic Zone of Pakistan (…)*" – see paper for full abstract.

5.1.8 A new protocol collect independently verifiable scientific data from small scale (<24 m) Sri Lankan longline vessels in compliance with IOTC Resolutions

73. The WPDCS **NOTED** paper IOTC-2018-WPDCS14-16_Rev1 which describes the new protocol that build on the strengths of DFAR's existing catch data systems, the availability of qualified human resources and incorporates the skills, knowledge and resourcefulness of Sri Lankan fishermen to generate high quality, independently verifiable digital data about the total catch, including the following abstract provided by the authors:

   "*Independent scientific data is a vital component for effective fisheries management. Scientific data provides an independent source of detailed, high quality information on fishing activity and catch at a sufficient level of resolution to be used for analyses, such as the standardisation of catch rates, the analysis of non-target species and the need for mitigation measures (IOTC, 2016). (…)*" – see paper for full abstract.

74. The WPDCS **ACKNOWLEDGED** the efforts of Sri Lanka to set up a data collection system based on digital photography, electronic logbook and crew as observers on small, multi-day fishing vessels (9.7 m to 28.6 m / average 12.4 m) on the high seas given numerous logistical difficulties such as limited space.

75. The WPDCS **NOTED** that the use of photographs in the data collection system based on digital photography, electronic logbook and crew as observers allowed the data to be independently verifiable and that metadata such as date, time and location could be extracted from the photographs, implementing – *de facto* – a manual form of EMS.

76. The WPDCS **NOTED** possible miscalculations associated with length measurements derived from photographs and **ENCOURAGED** Sri Lanka to explore existing protocols available to improve the accuracy of measurements derived from images.

77. The WPDCS **NOTED** the plans to improve the accuracy of length measurements through the use of a printed scale and the hardware used in South Africa using laser beam technology to generate more accurate measurements from 2D images.

78. The WPDCS **NOTED** that information is collected on both retained catches as well as discards, however, for bycatch species that are not brought onboard, length and weight measurements are not taken. Complementary information on gear attributes are collected through the e-logbook system.

5.1.9 Fisheries data collection of Thai overseas fishing fleet

79. The WPDCS **NOTED** paper IOTC–2018–WPDCS14–17 which described how Thailand, following the reforms undertaken since 2015, has implemented effective means of prevention, deterrence and elimination of IUU fishing, including the following abstract provided by the authors:

   "*Thailand has declared the prevention, deterrence, and elimination of the illegal, unreported and unregulated (IUU) fishing as a national agenda, and has pursued the reform of the entire fisheries system with a view to promote sustainable and responsible fisheries. Thailand has built upon the reforms of all dimensions undertaken during nearly the past 3 years, including the reform of legal framework and implementing regulations, the fisheries management limiting the fishing license issuance in compliance with the quantity of aquatic animals, the fleet management putting control over fishing vessels of all sizes and types, the monitoring, control and surveillance through port-in and port-out control, installation of vessel monitoring system (VMS), and especially installation of electronic reporting system (ERS) electronic monitoring system (EM) for oversea fishing fleet, as well as the development of traceability system for catches from Thai-flagged vessel (…)*" – see paper for full abstract.

80. The WPDCS **NOTED** that the current electronic reporting systems (ERS) and electronic monitoring systems (EMS) employed by the Thai high seas fishing fleet was comprehensive, and that other vessels authorized by Thailand are expected to implement the system next year.

5.1.10   Timeline and story of the Spanish purse seiner fishery targeting on tropical tuna from Indian Ocean: a historical review

81. The WPDCS **NOTED** paper IOTC–2018–WPDCS14–18_Rev1 which describes how policies and Resolutions implemented by IOTC and aimed at reducing the number of DFADs have impacted the behaviour of the Spanish fleet, including the following abstract provided by the authors:

> "*The aim of the present study is to describe the main milestones of the Spanish purse seine fishery targeting on tropical tunas in the Indian Ocean, since the first fishing prospecting survey in the 1980s to the present. We also review the scientific effort that has been done for this period to obtain reliable scientific fishing estimations. Finally, the current situation of this fleet is described, after the economic crisis of this last decade. All these milestones are important to understand some peak and down in the historical data series from Spanish tropical tuna catches, and scientific estimations.* (…)" – see paper for full abstract.

82. The WPDCS **NOTED** that while catches of Spanish purse seiners decreased in 2017, the fishery has not achieved the target 15% reduction in yellowfin catches (i.e., relative to the 2014 baseline), as specified in Resolution 18/01, partly based to the difficulties of monitoring catches in real time.

83. The WPDCS further **NOTED** that industrial fisheries have direct contact with the skippers at sea and when they arrive at port, that enables catches to be monitored in number of different ways, including T3 that enables close to real-time data, albeit with short delay.

84. The WPDCS **NOTED** that the scientific data presented by the paper shows that the ratio between yellowfin and skipjack catches depends on the set type and the area (e.g., near Somalia EEZ waters the sets are mainly on FADs).

5.1.11   Assessing the contribution of purse seine fisheries to overall levels of bycatch in the Indian Ocean

85. The WPDCS **NOTED** paper IOTC–2018–WPDCS14–26_Rev1 which described the concrete actions that the OPAGAC fleet has undertaken to reduce or eliminate the environmental impacts its activities cause on non-target species and the habitat, including the following abstract provided by the authors:

> "*Principle 2 of the Fishery Improvement Project run by the Producers' Organization OPAGAC contains actions intended to assess the environmental impacts of OPAGAC's purse seine fleet in the three oceans, which include the evaluation of the contribution of purse seine fisheries to overall levels of bycatch mortality in the Indian Ocean with a focus on endangered, threatened and protected species. This study represents a first attempt at evaluating impacts in the Indian Ocean in recent years.* (…)" – see paper for full abstract.

86. The WPDCS **NOTED** that this work does not cover the impact of ghost fishing and recalled previous research that concluded that mortality of silky shark in FADs using panel nets (entangling FADs) is high. It was noted that following the implementation of a Code of Good Practice by EU and Seychelles purse seine operators, ghost fishing through entanglement has been almost eliminated, as more than 95% of the observed FADs from EU,Spain and Seychelles used in the Indian Ocean are non-entangling tails, with only some less-entangling, as per ISSF classification. Those fleets are likely to further transition to non-entangling biodegradable FADs, if the BIOFAD Project they are implementing proves successful.

87. The WPDCS **NOTED** that less-entangling FADs may still pose a risk as nets may open, in particular when FADs are lost and beached. It was **NOTED** that OPAGAC has implemented a FAD-Watch, which had documented a very low mortality rate of marine turtles over a long period. However, the WPDCS **AGREED** on the value of extending the estimates to incorporate the mortality to ghost fishing of purse seine and other gears.

88. The WPDCS **NOTED** that once electronic exchange mechanisms have been fully developed for ROS data, then more information will be available for inclusion in this analysis.

5.1.12   Statistics of the French purse seine fishing fleet targeting tropical tunas in the Indian Ocean (1981-2017)

89. The WPDCS **NOTED** paper IOTC–2018–WPDCS14–30 which described a number of statistics for the French purse seine fishing fleet targeting tropical tunas in the Indian Ocean in the 1981-2017 period, including the following abstract provided by the authors:

"French tuna purse seiners have been fishing yellowfin tuna (Thunnus albacares), skipjack tuna (Katsuwonus pelamis), and bigeye tuna (Thunnus obesus) in the Indian Ocean since the early 1980s. Tuna schools are harvested through two major fishing modes that result in different species and size composition of the catch, i.e. tunas in free-swimming schools (FSC) and tunas associated with drifting Floating OBjects (FOB) now predominated by artificial Fish Aggregating Devices (FAD). The French purse seine fishery activities and catches are monitored by the 'Institut de Recherche pour le Développement' (IRD) since the late 1980s in collaboration with the 'Seychelles Fishing Authority' (SFA). Here, we report a synthesis of the fishing activities of the French purse seiners during the period 1981-2017 based on the collection of logbooks and landing reports and sampling operations conducted at ports during unloading for target species (i.e skipjack, yellowfin tuna and bigeye tuna) which are analysed with the T3 process (…)" – see paper for full abstract.*

90. The WPDCS **NOTED** the high proportion of sets on FOBs (76%), which is the highest value estimated since the beginning of the time-series in the early-1980s, as well as a 3% decrease in the proportion of yellowfin tuna in EU,France purse seine catches (from 47% to 44%) between 2016 and 2017 and a decrease in catches on free swimming schools.

91. The WPDCS **NOTED** the changes in the spatial distribution of the French purse seine fishery between the two time periods presented, particularly the absence of effort near the African coastline in 2017, as a result of changes in access agreements.

92. The WPDCS **NOTED** the time series of mean weight estimated for the different species did not incorporate the latest length-weight relationship and the WPDCS **ENCOURAGED** EU,France to use the latest available information (disseminated on the IOTC website).

5.1.13 Improving the catch data collection system for Somali fisheries: project Kalluun

93. The WPDCS **NOTED** paper IOTC–2018–WPDCS14–38 which describes the actions taken by MFMR Somalia in collaboration with FAO, City University and Secure Fisheries to establish a pilot catch data collection system for its pelagic fisheries (project Kalluun) in order to comply with the requirements of IOTC, including the following abstract provided by the authors:

"In order to comply with requirements of IOTC (Resolution 10/02), the Ministry of Fisheries and Marine Resources (MFMR) is improving its collection of fisheries data. IOTC requires catch and effort data to be collected, continuously, according to craft-gear combination and craft type, covering a wide range of species and size categories, for all major large pelagic varieties. Somalia's existing decentralized data collection systems faced challenges fulfilling the requirements of IOTC: they had low sampling coverage, poor species identification, high levels of species aggregation, a lack of gear-based data, and low resulting accuracy of statistics. The uncertainty resulting from poor quality of the statistics has been discussed in the IOTC WPDCS during the last few years. Therefore, Somalia has taken actions to improve the catch data collection system for pelagic fisheries. Project Kalluun – a partnership between MFMR, City University, Secure Fisheries, and FAO – will pilot new fisheries data collection and community engagement. (…)" – see paper for full abstract.

94. The WPDCS **ENCOURAGED** Somalia to continue expanding its catch data collection program by training fisheries officers in fish-identification, measurements and data collection and reporting best practices. The WPDCS **RECOGNIZED** the efforts of Somalia to prioritise data collection in the face of capacity training challenges, **NOTING** the inclusion of local universities and fisheries collectives in data collection programs.

95. The WPDCS **NOTED** the recent fishery access agreement between China and Somalia, to facilitate access to Somali EEZ by Chinese longline vessels, is a preliminary agreement that will be subject to review.

96. The WPDCS **NOTED** that both China and Somalia will be involved in the process of data collection and **ENCOURAGED** Somalia to ensure the homogeneity of the data collection processes.

5.1.14 Considerations on combined strategies for collecting information and sampling of multiple variables for statistical tasks and scientific studies on tuna and tuna-like species: ethical reflections on scientific activity in the context of t-RFMOs

97. The WPDCS **NOTED** that paper IOTC–2018–WPDCS14–19 which proposes a critical consideration of some ethical issues that may arise as a result of the biased or misleading interpretation of data and scientific studies, including the following abstract provided by the author was not presented:

"This paper remind the combined systems applied by flag states and/or scientists to obtain representative multiple variables for these fish species which can be used to prepare basic statistics tasks and/or to prepare

scientific studies on different species and topics. It also pays attention to observations at sea which, together with other mechanisms in place, are used to obtain statistical tasks and to carry out research. The results obtained from research are regularly presented via scientific papers which improve the knowledge about fish and other species, provide indicators in some cases considered representative of abundance and examine various issues for improving stock assessments. (…)" – see paper for full abstract.

5.2 FURTHER ANALYSIS OF LENGTH FREQUENCY DATA AND LIKELY IMPACTS ON THE ASSESSMENTS

5.2.1 Biometric and allometric relationships for large pelagic species collected in Reunion Island: contribution to an IOTC database?

98. The WPDCS **NOTED** paper IOTC-2018-WPDCS14-28 that provides the results of the biometric relationships derived for a number of large pelagic species from measurement collected by longliners operating in the areas around Reunion, including the following abstract provided by the authors:

   "*Biometric relationships are critical to convert measurement performed at landings (fish with head, tail cut or gutted and gilled) to standardized measurements which can be used in stock assessment and scientific purposes. In the Indian Ocean, while tuna species are relatively well described, there is a critical lack of information for billfish and the interannual and seasonal variations of these relationships are rarely investigated. To cope with this issue, the relationships used at IOTC are coming from other oceans or close species which is not scientifically satisfactory. In this document, we present the biometric relationships for 6 large pelagic species over 267 individuals in 2017 and 2018 from catches of Reunionese longliners. (…)"* – see paper for full abstract.

99. The WPDCS **NOTED** that importance of biometric relationships which can impact the stock assessments, and the limitations of many of the biometric indicators currently available that are often based on previous historical studies, or from data collected in other oceans.

100. The WPDCS **AKCNOWLEDGED** the progress made in the collection and collation of morphometric data and the formulation of preliminary biometric relationships of specimens taken in the Indian Ocean, and **NOTED** that strict guidelines are needed in the data collection protocols, such as accurate reporting of specimen catch location, and recording the state (fresh or frozen, etc.) of the specimen when measurements are taken.

101. The WPDCS **NOTED** that the majority of the data required for biometric analyses is not of a sensitive nature and can be shared among CPCs.

102. The WPDCS **CONSIDERED** the utility of developing a common database to store Indian Ocean specific biological information, but **REQUESTED** further details on the kinds of information that should be included, and who should be assigned responsibility of the collation and maintenance of a common database.

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)

103. The WPDCS **NOTED** the extent of the changes, in terms of the magnitude of the recordset and the increased detail to be included in each record, as introduced by the revised version of Form 1_DI for the reporting of fine-grained information about time-area discards, and **CONFIRMED** that further feedback is expected by CPCs to assess the feasibility of reporting discard data according to the revised version of the form, as well as the advantages of this reporting format over the same type of information reported as part of the Regional Observer Scheme.

6.1.2 Resolution 18/01 On an interim plan for rebuilding the Indian Ocean yellowfin tuna stock

104. The WPDCS **NOTED** that – notwithstanding Resolution 17/01 (now superseded by 18/01) was requesting to proportionally reduce the catches of Yellowfin tuna with respect to the baseline of 2014 for a number of fleet / gear combinations – the impact of measurable reductions implemented by the industrial fleets has been partially mitigated by the corresponding increase in catches from artisanal fleets not subject to any type of measure.

105. For this reason, the WPDCS **ENCOURAGED** concerned CPCs to provide timely and accurate Yellowfin tuna catch series (in accordance with Resolution 15/02) to help better understanding the impact of the Resolution on the status of the affected resources.

6.1.3 *Resolution 18/07 On measures applicable in case of non-fulfilment of reporting obligations in the IOTC*

106. The WPDCS **NOTED** the additional data reporting template to be used by all CPCs to inform the IOTC Secretariat, following the submission of mandatory statistical data on retained catches through Form 1_RC, of the species / gear combinations for which 0 (zero) catches and discards are recorded by the fleet. This, in order to ensure an accurate fulfilment of reporting obligations and prevent the entry in effect of the penalty mechanisms envisaged by the resolution.

6.1.4 *Resolution 17/05 On the conservation of sharks caught in association with fisheries managed by IOTC*

107. The WPDCS **NOTED** paper IOTC-2018-WPDCS14-37 that provides preliminary studies assessing the potential impact and extent of shark finning activities in the fisheries operating within the IOTC area, including the following abstract provided by the author:

> "*Shark finning is the practice of removing and retaining all or some of a shark's fins and discarding its carcass at sea . With the adoption of the 1999 FAO International Plan of Action-Sharks the international community agreed to the principle of minimizing waste and discards from shark catches, citing in particular the need to retain carcasses if fins are removed (FAO 1999). Following this, regional fisheries management organizations, as well as some of their member States, adopted regulations designed to implement this principle.* (…)*" – see paper for full abstract.

108. The WPDCS **NOTED** that this study was conducted in response to a request from the Commission in 2018 (IOTC-2018-S22-R):

*(Para. 39) The Commission **AGREED** to the requests made to the Compliance Committee and Scientific Committee in working paper IOTC-2018-S22-06Rev1:*

- *to analyse and document, wherever possible, whether the practice of shark finning still takes place in IOTC and to what extent, despite the adoption of Resolution 17/05, and to review the compliance with the requirements contained in Res 17/05, including the shark finning prohibition and the fins naturally attached requirement adopted by IOTC (Compliance Committee);*

- *to identify possible means to improve the submission of complete, accurate and timely catch records for sharks, as well as the collection of species-specific data on catch, biology, discards and trade. (Scientific Committee).*

109. The WPDCS **ACKNOWLEDGED** that this document covers both points requested by the Commission, however, the WPDCS only has the mandate to address the second point as the first point is expressly aimed at the Compliance Committee.

110. As such, the WPDCS **REQUESTED** that the Secretariat extracts the recommendations that are relevant to the second point and make them available to the WPEB in 2019.

111. The WPDCS subsequently **REQUESTED** that the WPEB discuss these extracted recommendations during their meeting in 2019 and provide feedback as to which could be endorsed by the SC, providing any additional comment, input or recommendations as necessary.

112. The WPDCS **NOTED** that although IOTC requires that sharks landed fresh must have fins naturally attached, those landed frozen must not have on board fins that total more than 5% of the weight of sharks on board.

113. For the latter scenario, the WPDCS **ACKNOWLEDGED** that fin identification tools are required to verify the fins and it was **NOTED** that these tools already exist (FAO iSharkFin). The WPDCS therefore **REQUESTED** that these be reviewed and made available to help improve species identification.

114. The WPDCS further **STRESSED** that mitigation measures are a proactive measure to reduce shark bycatch and these methods should receive greater attention.

6.2 *DATA RECORDING (LOGBOOKS)*

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

6.2.2 *Resolution 18/08 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*

115. The WPDCS **NOTED** paper IOTC-2018-WPDCS14-39 that provides a global analysis of the major issues preventing a proper standardization of FOB data collection and reporting across all tRFMOs, and the possible identification of best global standards on data collection, including the following abstract provided by the authors:

> "*A major concern for tropical tunas, on these last years, has been the worldwide increasing use of drifting FOBs by purse seiners, which are equipped with satellite buoys and echo-sounders. The use of these floating objects has contributed to increase the catch of skipjack tuna, but also of juveniles of yellowfin and bigeye tunas. Moreover, it has increased the amount of by-catch (including some species classified as vulnerable or endangered) and has likely resulted in adverse effects on the ecology of fish and on vulnerable areas (e.g. beaching events on coral reef areas). Despite the increasing FOB use and concerns, little information is available on FOB use worldwide for an appropriate monitoring and management. Thus, FOB monitoring has become a priority in all tuna t-RFMOs. However, the data collection and reporting requirements around FOBs are not standardized and there are significant data gaps.* (…)" – see paper for full abstract.

116. The WPDCS **NOTED** the proposed standards of data reporting for floating objects and **ACKNOWLEDGED** that such information is already shared between scientists of countries with purse seine fleets, and have already been used for scientific analysis such as the standardization of purse seiner Catch Per Unit of Effort.

117. The WPDCS **NOTED** that scientific collaboration with the industry is currently ongoing, and that this is supported through an EU-funded project that aims at collating historical and current data on FOBs in a format consistent with the one proposed.

118. The WPDCS also **NOTED** that the FAD ownership (defined by the presence of a vessel-specific buoy) can often change at sea through buoy transfers, and that such changes are monitored in logbooks and by onboard observers through a dedicated sampling form. On the contrary, the ownership of a buoy changes very seldom as this has to be done through the satellite provider company.

119. The WPDCS **NOTED** the differences in classification and reporting requirements between this proposal and the existing IOTC classifications and **ACKNOWLEDGED** that the joint tuna RFMOs FAD working group to be held in May 2019 will be the appropriate forum for harmonizing FAD classifications across RFMOs.

120. Therefore the WPDCS **REQUESTED** that *harmonization of terminology and data collection / reporting requirements for FOB and instrumented buoys* is considered for inclusion as one of the topics to be addressed during the agenda of the forthcoming joint tuna RFMOs FAD working group.

121. The WPDCS also **REQUESTED** that outcomes from this working group be considered and further discussed by the IOTC Secretariat and the scientific community to help the WPDCS identify potential actions to improve and rationalize IOTC FOB and instrumented buoys terminology and data collection / reporting requirements and fully enable a science based approach to FOB management.

7. REGIONAL OBSERVER SCHEME

7.1 *RESOLUTION 11/04 ON A REGIONAL OBSERVER SCHEME*

7.1.1 *Crew based observer programme of Pakistan*

122. The WPDCS **NOTED** paper IOTC-2018-WPDCS14-32 that describes how the crew-based observer programme initiated by WWF-Pakistan can provide information about catch and other fishing indicators through data collected by crew members (mostly skippers) onboard tuna gillnet vessels, including the following abstract provided by the authors:

> "*Provision for an Observer Programme is made in the Deep Sea Policy in Pakistan since 1982 when Federal Government permitted operation of foreign flag vessel in Pakistan under a Joint Venture Programme. Since 1982 various permissions have been granted for both foreign and local fishing vessels of various categories*

to operate in the Exclusive Economic Zone of Pakistan under various policies and programmes. A new Deep Sea Fishing Licensing Policy, 2018 was issued by Federal Government in April 2018 (DSFP, 2018). Like all previous policies and programmes it has provision for having an observer on board. Clause 6.2.q. of this Policy states "Scientists/Researchers will be deputed by MFD (Marine Fisheries Department) on vessels as and when required for collection of fisheries data. Fishing vessels will also carry onboard a representative of MFD as Observer". (…)" – see paper for full abstract.

123. The WPDCS **THANKED** the authors for the presentation and **ACKNOWLEDGED** the significant work done by WWF-Pakistan in establishing a functioning crew-based observer programme in Pakistan.

124. The WPDCS **NOTED** the success of the programme to-date using crew to collect observer data and that expansion of the programme to independent observers is currently not possible given the small size of the vessels and the reluctance of skippers to have additional persons on board.

125. The WPDCS **NOTED** that the data from the crew observer programme is consistent with data collected from other vessels and compares well to photographs taken of the catch during each trip. However, the WPDCS also **NOTED** that discarded catch may not be reported as well as retained catch as there is limited opportunity for the discard catch to be recorded.

126. The WPDCS **NOTED** that approximately 10% of the fleet is covered by the crew observer programme, and that Pakistan is currently implementing a similar programme for smaller vessels that operate in coastal waters.

127. The WPDCS **NOTED** that the crew observers receive significant training over a period of years to develop skills in species identification, dissecting and identifying the sex of individual fish, and safe release procedures for threatened, endangered and protected species. The WPDCS also **NOTED** that crew observers participate in an extensive debriefing following each trip.

128. The WPDCS **NOTED** the requirement of the Commission for observers to be independent of the fishing vessel as set out in the Code of Conduct in the ROS manual.

129. The WPDCS **NOTED** that while resources and capacity for the crew observer programme are limited, due to the significant contribution from WWF Pakistan are planning to adopt the programme by the end of 2019.

7.2 RESOLUTION 16/04 ON THE IMPLEMENTATION OF A PILOT PROJECT IN VIEW OF PROMOTING THE REGIONAL OBSERVER SCHEME OF IOTC

7.2.1 An assessment of electronic monitoring in Australian tuna longline fisheries

130. The WPDCS **NOTED** paper IOTC-2018-WPDCS14-21_Rev1 that describes how the Australian Fisheries Management Authority (AFMA) uses the integrated EM systems installed onboard of the Australian longline fleet (among others) to validate fisher-reported logbook information and assess the veracity of logbook data as a reliable source for the management of fisheries, including the following abstract provided by the authors:

"Electronic monitoring (EM) has the capacity to collect fisheries-dependent data to support fisheries management decision-making. In Australia, an integrated EM system was implemented as a replacement for at-sea observers in several managed fisheries, including the tuna longline fisheries from 1 July 2015. In these fisheries, EM is used as an audit tool to independently validate fisheries logbook information. To assess whether the Australian EM system was meeting key objectives we: (i) compared EM analyst and fisher-reported logbook data to examine the level of congruence in reporting of both retained and discarded catch and protected species interactions and; (ii) analysed changes in logbook reported nominal catch and discard per unit effort (CPUE and DPUE) and interactions with protected species per-unit-effort (IPUE) post EM implementation. (…)" – see paper for full abstract.

131. The WPDCS **NOTED** that independent contractors are responsible for the collection and processing of images and the issues with the high data storage requirements associated with EM data is currently being managed by the Australian government by only storing video data for a limited time period (6 months).

132. The WPDCS **NOTED** that while no automatic species identification or size measurements are currently taking place, a project at CSIRO is currently evaluating the potential to integrate automatic species identification into EM systems, and the intention is to include these capabilities in future.

133. The WPDCS **NOTED** the potential benefits of EM data, including the reduced costs, increased coverage and ability to improve species identification by seeking inputs from experts. This has led to rapid uptake in new trials around the Indian Ocean, including a feasibility study taking place in Reunion, a trial for the longline fleets in Seychelles, an IOTC pilot study in Sri Lanka and EM activity in Indonesia.

134. The WPDCS also **NOTED** the issue highlighted in the study regarding bycatch not visible to cameras (e.g. bite-offs) that led to higher numbers of discards reported through logbooks than EM, however, this might be overcome through the strategic repositioning of cameras to better capture the areas where discarding and interactions occur.

135. The WPDCS also **NOTED** that EM has a significant effect on logbook reporting, reflected in the improvement in reporting through logbooks when EM is installed. This effect is expected to be ongoing for the duration a camera is installed, regardless of whether the footage is monitored and so this provides a cost saving by allowing only a proportion of the total footage to be reviewed.

136. However, the WPDCS **NOTED** the potential for reporting to deteriorate if fishers come to realise that the EM data are not capturing as much information on bycatch as the logbooks are. Nevertheless, this might be overcome this by keeping up to date with technological advancements and ongoing improvements to the systems.

137. The WPDCS **NOTED** that for longline vessels, LL EM footage review can be time consuming, however, this can be overcome by only sampling a proportion of the footage; currently 10% is reviewed.

7.3 *OUTCOMES OF THE EXPERT WORKSHOP TO REVIEW THE ROS STANDARDS*

7.3.1 *Revision of the proposed updates to standards and data fields*

138. The WPDCS **NOTED** paper IOTC-2018-WPDCS14-35_Rev1 that presents the report of the expert review workshop on standards for the IOTC ROS, and its outcomes in terms of a comprehensive review of current standards and the proposed revisions for the WPDCS to consider, including the following abstract provided by the authors:

> "*Fisheries observer data is important for fisheries management, as it provides a source of detailed information on fishing activities that is independent from logbooks. At a sufficient level of resolution it can be used for analyses such as the standardisation of catch rates and analysis of bycatch mitigation measures. In 2011, during the 15th Session of the Indian Ocean Tuna Commission (IOTC), a Regional Observer Scheme (ROS) was introduced to collect verified catch data and other scientific data related to the fisheries for tuna and tuna-like species in the IOTC area of competence through the implementation of national programmes.* (…)" – see paper for full abstract.

139. The WPDCS **AGREED** that harmonisation of standards among tRFMOs is advantageous in terms of reducing the reporting burden for CPCs and improving global datasets. The WPDCS **ACKNOWLEDGED** that the work undertaken on the IOTC standards has been based closely on the standards implemented by other tRFMOS.

140. The WPDCS **NOTED** that the original ROS data requirements consisted of two sets of mandatory fields marked as *mandatory for collection* and *mandatory for reporting*, and that this distinction is not really needed in practice and can be a source of confusion.

141. Therefore the WPDCS **AGREED** on the definition of a set of ROS *Minimum Standard Data Fields* that will include both mandatory and optional data fields for reporting purposes.

142. The WPDCS **AGREED** that data fields that are not collected on a routine basis (e.g.: sex, maturity, etc.) should be included as *optional* data fields in the list of ROS *Minimum Standard Data Fields*.

143. The WPDCS **NOTED** the new proposed section on bait fishing that has been added to the reporting requirements for pole and line fisheries, and **AGREED** that this represents an important information to be recorded to assess the ecosystem impacts of these fisheries.

144. The WPDCS **AGREED** that information on FAD density obtained from buoy providers and FAD logbooks is more accurate and reliable than observer data and so should be removed from the reporting requirements for purse seine fleets.

145. The WPDCS **RECALLED** that as per Res. 18/10 *On vessel chartering in the IOTC Area of Competence*, where chartering occurs the chartering state will be responsible for the deployment of observer and the forwarding of ROS information to the IOTC Secretariat.

146. The WPDCS **NOTED** that all changes to the proposed ROS *Minimum Standard Data Fields* are captured within the summary table in appendix to this document and **RECOMMENDED** that the ROS *Minimum Standard Data Fields* in Appendix VII are adopted by the Commission.

147. The WPDCS **AGREED** that the original set of data fields reviewed by the Expert Workshop (IOTC-2018-WPDCS14-INF03 Rev_1) be used to update all ROS materials, including forms and electronic tools, and for capacity building purposes.

148. **NOTING** the difficulties faced by CPCs in implementing the regional observer scheme in small-scale artisanal tuna fisheries, the WPDCS **ACKNOWLEDGED** the alternative data collection systems presented by some CPCs to bridge the gap in data collection from small-scale artisanal tuna fleets, including the use of crew as observers, electronic monitoring and port sampling.

149. The WPDCS **RECOMMENDED** that the SC evaluate the validity of alternative data collection tools, and combinations of these (such as the use of crew as observers, electronic monitoring and port sampling), as potential alternatives to onboard human observer coverage for the collection of the minimum standard data fields for small-scale vessels.

150. The WPDCS also **RECOMMENDED** that the SC considers and endorses the list of species considered of special interest (SSI) as defined by the Expert Workshop and reported in Appendix VIII.

151. The WPDCS **NOTED** the *draft programme standards* developed by the ROS Expert Workshop and **AGREED** that there was insufficient time during the meeting as well as lack of appropriate expertise to fully review these standards and therefore **RECOMMENDED** this draft be discussed at Commission level.

7.3.2 *Proposals for new IOTC ROS data collection and reporting templates*

152. The WPDCS **NOTED** paper IOTC-2018-WPDCS14-20_Rev1 that assesses the capability of EM technology to collect fields required for mandatory reporting of longline fisheries observer data (according to the IOTC ROS specifications) on the basis of the outputs from two Pacific Community data process standard technical workshops, including the following abstract provided by the authors:

> "*At-sea observer coverage in global fishing fleets has often been lower than anticipated due to scheduling and logistical difficulties associated with placing observers on board vessels, as well as financial costs. Electronic monitoring (EM), consisting of on-board video imagery and on-shore analysis, offers an alternative or supplement to at-sea observer programs in global fishing fleets. However, the capability of EM to collect and support interpretation of records into data for all fields currently collected by at-sea observers is still under assessment. We evaluate the Indian Ocean Tuna Commission (IOTC) regional observer scheme mandatory reporting data fields for longline fisheries, their current scientific application in the IOTC, and the capability of EM technology to collect these fields based on output from two Pacific Community (SPC) data process standard technical workshops in 2016 and 2017. (…)*" – see paper for full abstract.

153. The WPDCS **RECOMMENDED** the development of minimum standards on EMS for IOTC. The WPDCS further **NOTED** the WCPFC are currently drafting standards on EM and **ACKNOWLEDGED** that it would be pertinent for IOTC to follow this process and utilise the outcomes where relevant.

7.4 *UPDATES ON THE ROS SUPPORTING TOOLS AND THE REGIONAL OBSERVER DATABASE*

154. The WPDCS **NOTED** paper IOTC-2018-WPDCS14-33 that provides updates on the current status of implementation and testing of the electronic tools in support of the ROS data collection and management workflow, and how these can be effectively used to collect, report and disseminate scientific information according to the ROS specifications and requirements, including the following abstract provided by the authors:

> "*The ROS electronic tool suite is a set of data models, software components and applications developed by the IOTC Secretariat – with additional support from NOAA, WWF and SIOTI – as part of the Regional Observer Scheme pilot project (Resolution 16/04 On the implementation of a pilot project in view of promoting the Regional Observer Scheme of IOTC). The purpose of the ROS tools is to facilitate the process of collecting, reporting and managing ROS data at national and regional level, by providing a fully integrated and flexible solution to all IOTC CPCs that currently lack a comprehensive data management workflow for their scientific observer data (to be collected according to the requirements set forth by Resolution 11/04 On a regional observer scheme). (…)*" – see paper for full abstract.

155. The WPDCS **NOTED** the suite of electronic tools developed by the IOTC Secretariat in support of the ROS data collection and management workflow, and how these tool map on the different domains and *actors* (from scientific observers to the global scientific community).

156. The WPDCS **NOTED** the different components of the toolbox, namely the ROS MD (abstract data model), ROS CI (e-collection and management interface), ROS NDB (National database) and ROS RDB (Regional database).

157. The WPDCS **NOTED** that the current dissemination interfaces presented by the Secretariat are in their prototypal form, and that the historical data currently stored within the ROS RDB and disseminated through the interfaces still needs further clean-up.

158. For this reason, the WPDCS **ACKNOWLEDGED** that the IOTC Secretariat will publicly announce the availability of these interfaces once the known issues are solved.

159. The WPDCS **NOTED** that data collected from Electronic Monitoring Systems (EMS) could be incorporated into the ROS electronic tool suite if the EMS systems follow the minimum standards.

7.4.1 *Outcomes of the national workshops on the adoption of the ROS supporting tools*

7.5 *IOTC ROS CAPACITY BUILDING ACTIVITIES IN 2018 / 19*

160. The WPDCS **NOTED** that an overview of the national workshops delivered during 2017 and 2018 on the adoption of the ROS tools and the related IOTC capacity building activities planned for 2018 and 2019 will be discussed during agenda item 8 ("Capacity building activities").

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

161. The WPDCS **NOTED** paper IOTC–2018–WPDCS14–08 on the capacity building activities of the Secretariat in 2017 - 2018 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, including 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 (2018), including those activities that will extend to 2019 and following years, where appropriate. (...)*" – see paper for full abstract.

162. 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 progress implementing the Regional Observer Pilot Project, including development of the IOTC Regional Database, finalization of electronic data collection and reporting tools within national CPCs, and procurement of the Electronic Monitoring Systems for Sri Lanka, that should lead to improvements in the reporting coverage and quality of observer data reported to the IOTC.

163. 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 (particularly neritic tunas and billfish), and that the overall quality and reporting coverage is disproportionately related to a number of CPCs important for artisanal fisheries such as Indonesia, India and Pakistan.

164. The WPDCS **NOTED** that the review and analysis of the distant water longline fleet size data will be conducted in 2019 (for Japan, Rep. of Korea, Seychelles, Taiwan,China), in conjunction with the joint-CPUE and an update will be provide to the IOTC Working Parties in 2019.

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

166. The WPDCS further **NOTED** that a scoping study has been initiated by the IOTC Secretariat to begin in 2019, at the request of the Commission, to identify the social and economic data that are relevant to CPCs and IOTC and to recommend comprehensive methods to acquire these data.

167. The WPDCS **NOTED** paper IOTC–2018–WPDCS14–29 that describes the development of the OFCF-supported project in the Seychelles and how it is addressing the needs of understanding the dependencies of national economy on fish resource utilization, using currently available information on activities in support of the fishing operations (e.g. fuel, gear, and machinery supply, port services) and those relying on the products from fishing (e.g. processing, marketing, retailing), including the following abstract provided by the authors:

"Fisheries and fish processing are one of most important economic activities in the Seychelles. Seychelles fleets were composed of four components: industrial purse seine (49 boats, 11,650 tons), industrial longline (41 boats, 3,205 tons), semi-industrial longline (11 boats, 195 tons) and artisanal fisheries (445 boats, 3,214 tones). The figures within the parentheses correspond to the number of licenses and catch production in 2015 for respective components and the former three rely on the IOTC resources, i.e. mainly capturing the large pelagics. In addition, 36 purse seiners and 26 longliners under the foreign flags were licensed to operate within the Seychelles EEZ in 2015 and produced 38,300 tons and 850 tons from the area. Port Victoria also provides an excellent hub of tuna landings and transshipments, and total 270 thousands tons of tunas were either landed or transshipped in 2015. Fees and service provided at the time of port use and access fees to the Seychelles waters bring substantial economic benefit to the country. (...)" – see paper for full abstract.

168. The WPDCS **ACKNOWLEDGED** the progress in development of the fisheries satellite account for Seychelles and **NOTED** that the Seychelles National Bureau of Statistics plans to disseminate the fishery satellite account together with the revised its National Account at the end of 2019 and the commitment expressed by Thai Union for a continued support through data provision to enhance tuna management capacity. The WPDCS **ENCOURAGED** additional indicators to be considered that measure the social impact of the fisheries sector..

169. The WPDCS also **NOTED** the close collaboration and coordination of the project with other related activities, including Marine Space Planning and economic flow analysis. The Seychelles and OFCF explained that the differences from previous estimates were partially derived from the extent of economic activities included in the analysis and a limited coverage of fishing production in the national statistics in the past.

9. FISHERIES INFORMATION AND DISSEMINATION SYSTEMS

170. The WPDCS **NOTED** paper IOTC-2018-WPDCS14-22_Rev1 that investigates the difference between AIS data provided by Global Fishing Watch and the VMS and logbook data for the Seychelles deep-water tuna fishery, comprising both industrial purse seine and drifting longline vessels, including the following abstract provided by the authors:

"Significant advances in monitoring fishing activity have been greatly aided by technological advances in vessel monitoring. Historically, fishing activities have been mainly monitored through fishers' logbooks and observer programs, which record daily instances of positions and quantities of catch and effort, as well as port sampling programs. Since 2006, the vessel monitoring system (VMS) was broadly adopted to complement calculations of fishing activity, increasing the temporal resolution of fisheries data from days to hours, and enabling global spatial coverage via surface-to-satellite communication. Increased spatio-temporal resolution allowed calculations of effort using speed profiles and bearing to identify the different vessel activities at sea. With the advent of the automatic identification system (AIS), initially implemented for ship-to-ship collision avoidance, the temporal resolution of monitoring has been further refined from hours to minutes or seconds. This high-frequency data source has allowed the development of high precision algorithms of vessel behavior, such as those developed by Global Fishing Watch. These algorithms have the potential to identify global trends in fishing activity, and the potential to infer fisheries effort. (…)" – see paper for full abstract.

171. The WPDCS **NOTED** how AIS can be used to predict spatial effort at the grid resolution required by IOTC and that this approach could be useful to provide alternative sources of information for data-poor fisheries.

172. The WPDCS **ACKNOWLEDGED** that there might be alternatives to the Global Fishing Watch (GFW) algorithm (based on neural networks processing speed and behaviour of the vessels at sea) to process AIS data, but that these were not explored since the work was conducted in strict collaboration with GFW.

173. The WPDCS **NOTED** that AIS data could be useful in predicting fishing hotspots but cannot be consistently used to derive CPUE time series due to their limited availability in time (from mid 2010s onwards) and the inconsistency in data availability due, for instance, to changes in satellite coverage.

174. The WDCS **NOTED** that the improvement in the prediction results was due to the increase in the number of satellites receiving the AIS signal (from about 15 in 2016 to 50 in 2017).

175. The WPDCS **RECALLED** that AIS should be considered as *complement* to VMS and not as a *replacement*, since it is possible to switch off AIS and tamper with its equipment.

176. The WDPCS **NOTED** that purse seiners operating within the Indian Ocean switch off AIS when they leave port due to piracy threats, as it is an open signal that can be captured by anyone.

177. The WPDCS **NOTED** paper IOTC-2018-WPDCS14-25_Rev1 that describes how the outcomes of the POPSTAR project (developing electronic tags for marine species that collect information on the organism and its environment) can be used to geo-localise and perform trajectory analysis to understand ecological processes, including the following abstract provided by the authors:

> "*Geolocalisation and trajectory analysis can aid in understanding the ecological processes driving an organism. By associating satellite-derived environmental data with individual trajectories of electronically-tagged organisms, it could be possible to define environmental characteristics of the tagged species' functional habitats (i.e., reproduction, nutrition). These data can also help identify biotic envelopes or predict the effects of climate change on marine species distributions. The objective of the present work, undertaken as a collaboration between IFREMER and IRD, is to standardize electronic tag data files into network common data format (NetCDF) format, following the standards defined within the POPSTAR project for tag data, and enrich the positional data with satellite-derived surface environment data (e.g., sea surface temperature, salinity, sea level) and model-derived environment data at observed depths (e.g., temperature, salinity, currents). (…)*" – see paper for full abstract.

178. The WPDCS **NOTED** that this approach allows to consider several alternative sources of environmental variables (e.g., Sea Surface Temperature).

179. The WPDCS **NOTED** the benefits of using NetCDF (a format incorporating metadata) to store and expose these type of tracking data, and that by adopting this approach information can easily be enriched with other environmental details (SST, chlorophyll levels, etc.) as already done by IRD, France when enriching FADs data with seas surface currents.

180. The WPDCS **NOTED** paper IOTC-2018-WPDCS14-36 that provides suggestions related to the addition of a ocean climate web page to the IOTC website, including the following abstract provided by the author:

> "*In the vein of the growing interest of fisheries scientists from the Indian Ocean to incorporate environmental factors and climate variability in fisheries research and fish stock assessment, we propose to develop an "ocean climate web page" for the Indian Ocean, to be hosted on the FAO/IOTC web site, with regular updates of the information posted on this web page. In this paper, we present a draft of the site structure and possible content that is open to discussion at the WPDCS14. (…)*" – see paper for full abstract.

181. The WPDCS **NOTED** the rationale behind the proposal of creating a dedicated section under the IOTC website to present environmental indicators and how this activity was encouraged during the WPTT19.

182. The WPDCS **NOTED** that there is currently no section of the IOTC website providing a single access point to useful educational resources, and that getting access to this information (a collation of external resources dealing with several aspects important for fisheries scientists) would be an important tool for the community.

183. The WPDCS **NOTED** the need to find a balance between the efforts required by the IOTC Secretariat to successfully manage this additional information and the benefits provided to the Scientific community, and **SUGGESTED** that a scoping study focusing on the availability of the information, the format used for its dissemination and the potential for an automated update of the presented information be explored.

9.1 *PROPOSED METADATA STANDARDS FOR THE FISHERIES DOMAIN*

184. The WPDCS **NOTED** paper IOTC-2018-WPDCS14-34 that describes the benefits of adopting the same methodologies for the generation of standard metadata already explored for catch-and-effort and stock assessment data sets to the domain of tagging and biological data, including the following abstract provided by the authors:

> "*In 2017, a first attempt has been done to describe some IOTC datasets (dealing with stock assessment model outputs Nieblas et al. [2017] and fishing catch, effort, size class Barde et al. [2017]). Since, the method has been improved to make it more generic and reusable with other data sources. This paper gives an update of this work and focuses on ongoing efforts to describe other datasets of interests for IOTC. The description of datasets is achieved by using online collaborative environment which facilitate the contribution of the users. The descriptions of the users are then turned into proper metadata by implementing widely used standards to describe any kind of dataset or more specific kinds of data (eg spatial or biodiversity data). We present the main lines of the method, showcase some examples of outputs (metadata, datasets and related access protocols) which have been produced by focusing on two databases (RTTP tagging data, biological data, tracking data from pop-up). (…)*" – see paper for full abstract.

185. The WPDCS **ACKNOWLEDGED** the inherent benefits in enriching the IOTC data sets with standard metadata descriptions according to the general principles and rationale presented by the paper.

186. The WPDCS **NOTED** that further processing of the IOTC data disseminated according to the FAIR (Findable / Accessible / Interoperable / Reusable) principles could generate some confusion and raise concerns about the original data ownership.

187. With respect to this issue, the WPDCS **NOTED** that the proposed standard metadata methodology can explicitly include the ownership of the original data and describe the data status and changes through each processing step, so as to potentially avoid any confusion about ownership and status of the information.

188. Furthermore, the WPDCS **RECOGNIZED** that the use of Digital Object Identifiers (DOIs) for both data sets and IOTC publications would be an efficient way to acknowledge and inform about their origin and ownership and to link the IOTC data sets to the papers producing and / or using them.

189. The WPDCS **SUGGESTED** the IOTC Secretariat explore further opportunities for collaboration on this activity, **NOTING** that additional resources might be provided by external funding entities funding (INTERREG projects).

9.2 BEST PRACTICES FOR (META)DATA ACCESS AND VISUALIZATION

190. The WPDCS **NOTED** that elements of Resolution 12/02 relating to data confidentiality policies and procedures are outdated due to the evolving information types and formats being managed by the Secretariat, and to the increasing technical value of accessing confidential operational information to augment the analyses required by the Commission.

191. The WPDCS also **NOTED** that the Secretariat is working to take inventory of the confidential assets currently under its management as well as the types of requests for access that have been received in recent years, and is also in the process of providing updated guidelines on information confidentiality and access to sensitive resources. Therefore, the WPDCS **REQUESTED** that the Secretariat table a report on the outcomes of this work at its meeting in 2019.

10. WPDCS PROGRAM OF WORK

10.1 REVISION OF THE WPDCS PROGRAM OF WORK (2019–2023)

192. The WPDCS **NOTED** paper IOTC–2018–WPDCS14–09 which provided an opportunity to consider and revise the WPDCS Program of Work (2019–2023), by taking into account the specific requests of the Commission, Scientific Committee, and the resources available to the IOTC Secretariat and CPCs.

193. 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)

194. The WPDCS **RECOMMENDED** that the Scientific Committee consider and endorse the WPDCS Program of Work (2019–2023), as provided at Appendix V.

195. 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:

o Assist countries to facilitate reporting and improve compliance in terms IOTC mandatory statistical data collection and reporting requirements, including the Regional Observer Scheme.

o 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.

o 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.

o Support for new priorities identified by the Scientific Committee and Commission, including the Regional Observer Scheme pilot project, Electronic-monitoring, and implementation of Resolution 18/01 On an Interim Plan for Rebuilding the Indian Ocean Yellowfin tuna Stock in the IOTC area of competence.

o 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.

11. OTHER BUSINESS

11.1   DATE AND PLACE OF THE 15TH AND 16TH SESSIONS OF THE WPDCS: 2019 & 2020

196. The WPDCS **THANKED** Seychelles for hosting the 14th 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.

197. The WPDCS **NOTED** that there has been an increase in participation and submission of documents to the WPDCS in recent years. The WPDCS further **NOTED** that the current duration of the meeting (3 days) is not sufficient to facilitate the presentation and discussion of these documents. The WPDCS therefore **RECOMMENDED** that future sessions of the WPDCS be extended to four days.

198. The WPDCS **REQUESTED** that the IOTC Secretariat liaise with CPCs to determine the host country for the 15th and 16th sessions of the WPDCS respectively (Table 1).

Table 1. Draft meeting schedule for the WPDCS (2019 and 2020)

Meeting	2019			2020		
	No.	Date	Location	No.	Date	Location
Working Party on **Data Collection and Statistics** (WPDCS)	15th	TBD	Seychelles (TBC)	16th	TBD	TBD

11.2   REVIEW OF THE DRAFT, AND ADOPTION OF THE REPORT OF THE 14TH SESSION OF THE WPDCS

199. The WPDCS **RECOMMENDED** that the Scientific Committee consider the consolidated set of recommendations arising from WPDCS14, provided at Appendix VI.

200. The report of the 14th Session of the Working Party on Data Collection and Statistics (IOTC–2018–WPDCS14–R) was **ADOPTED** on the 1st December 2018.

APPENDIX I
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APPENDIX II
AGENDA FOR THE 14TH WORKING PARTY ON DATA COLLECTION AND STATISTICS

Date: 29th November – 1st December 2018
Location: Seychelles
Venue: Eden Blue Hotel conference room, Eden Island
Time: 09:00 – 17:00 daily

Chair: Mr Stephen Ndegwa (Kenya); **Vice-Chair:** Dr Julien Barde (EU,France)

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 20th Session of the Scientific Committee and of the 22nd Session of the Commission
   3.2 Review of Conservation and Management Measures relevant to the WPDCS
   3.3 Progress on the recommendations of WPDCS13

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: updates
      4.2.2 IOTC Data Dissemination: discussion of potential improvements
      4.2.3 Alternative data series

   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 18/01 *On an interim plan for rebuilding the Indian Ocean yellowfin tuna stock in the IOTC area of competence*

      6.1.3 Resolution 18/07 *On measures applicable in case of non-fulfilment of reporting obligations in the IOTC*

      6.1.4 Resolution 17/05 On the conservation of sharks caught in association with fisheries managed by IOTC

   6.2 Data recording (logbooks)

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

6.2.2 Resolution 18/08 *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 REGIONAL OBSERVER SCHEME (IOTC Secretariat & CPCs)

7.1 Resolution 11/04 *On a regional observer scheme*

7.2 Resolution 16/04 *On the implementation of a pilot project in view of promoting the Regional Observer Scheme of IOTC*

7.3 Outcomes of the *Expert Workshop to Review the ROS Standards*

    7.3.1 Revision of the proposed updates to standards and data fields

    7.3.2 Proposals for new IOTC ROS data collection and reporting templates

7.4 Updates on the ROS supporting tools and the Regional Observer Database

    7.4.1 Outcomes of the national workshops on the adoption of the ROS supporting tools

7.5 IOTC ROS capacity building activities in 2018 / 19

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

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

9.1 Proposed metadata standards for the fisheries domain

9.2 Best practices for (meta)data access and visualization

10 WPDCS PROGRAM OF WORK (Chair & IOTC Secretariat)

10.1 Revision of the WPDCS Program of Work 2019–2023

11 OTHER BUSINESS

11.1 Date and place of the 15th and 16th Sessions of the WPDCS: 2019 & 2020 (Chair)
11.2 Review of the draft, and adoption of the report of the 14th Session of the WPDCS (Chair)

APPENDIX III
LIST OF DOCUMENTS

Document	Title	Availability
IOTC-2018-WPDCS14-01a	Agenda of the 14th Working Party on Data Collection and Statistics	✓(10 October 2018)
IOTC-2018-WPDCS14-01b	Annotated agenda of the 14th Working Party on Data Collection and Statistics	✓(5 November 2018) ✓(28 November 2018)
IOTC-2018-WPDCS14-02	List of documents of the 14th Working Party on Data Collection and Statistics	✓(5 November 2018) ✓(1st December 2018)
IOTC-2018-WPDCS14-03	Outcomes of the 20th Session of the Scientific Committee (IOTC Secretariat)	✓(9 November 2018)
IOTC-2018-WPDCS14-04	Outcomes of the 22nd Session of the Commission (IOTC Secretariat)	✓(9 November 2018)
IOTC-2018-WPDCS14-05	Review of current Conservation and Management Measures relating to the WPDCS (IOTC Secretariat)	✓(9 November 2018)
IOTC-2018-WPDCS14-06	Progress on the recommendations of WPDCS13 (IOTC Secretariat)	✓(14 November 2018)
IOTC-2018-WPDCS14-07	IOTC data capacity building activities in 2018 (IOTC Secretariat)	✓(22 November 2018)
IOTC-2018-WPDCS14-08	IOTC capacity building activities in support of developing coastal IOTC CPCs (IOTC Secretariat)	✓(14 November 2018)
IOTC-2018-WPDCS14-09	Revision of the WPDCS Program of Work (2019–2023) (IOTC Secretariat, Chairperson & Vice-Chairperson)	✓(30 November 2018)
IOTC-2018-WPDCS14-10	Data and statistics system in Indonesia under one data program (Anas M)	[WITHDRAWN]
IOTC-2018-WPDCS14-11_Rev1	Iran's essential measures to improve catch & effort data (Khorshidi S)	✓(16 November 2018) ✓(26 November 2018)
IOTC-2018-WPDCS14-12	Improving artisanal tuna data collection and reporting: success, challenges, and lessons learnt from electronic pilot data collection in Kenya (Mueni E, Mwasi L, Ndegwa S)	✓(16 November 2018)
IOTC-2018-WPDCS14-13_Rev1	Implementation of the monitoring system for small-scale and artisanal fisheries of pelagic fishes in north regions of Madagascar (Razafimandinby Y, Jaona G)	✓(19 November 2018)
IOTC-2018-WPDCS14-14	Updates on the implementation of the new Malaysia logbook for tuna fisheries in Indian Ocean (Sallehudin J, Samsudin B, Noor Hanis A, Tengku Balkis T, Nor Azlin M)	✓(16 November 2018)
IOTC-2018-WPDCS14-15	Fisheries data collection and statistics in Pakistan (Khan M-F)	✓(18 October 2018)
IOTC-2018-WPDCS14-16_Rev1	A new protocol collect independently verifiable scientific data from small scale (<24 m) Sri Lankan longline vessels in compliance with IOTC Resolutions (Gunawardane N, Chandrakumara S, Chanrdasiri G, Hewapathirana K, Creech S)	✓(16 November 2018) ✓(27 November 2018)
IOTC-2018-WPDCS14-17	Fisheries data collection of Thai overseas fishing fleet (Lirdwitayaprasit P, Wongkeaw A, Luesrithawornsin P)	✓(16 November 2018)
IOTC-2018-WPDCS14-18_Rev1	Timeline and story of the Spanish purse seiner fishery targeting on tropical tuna from Indian Ocean: a historical review (Baez J-C, Ramos M-L, Rojo V, Ariz J, Cort J-L, Herrera M, Fernández F, Pascual P-J, Deniz S, Abascal F)	✓(16 November 2018) ✓(27 November 2018)
IOTC-2018-WPDCS14-19	Considerations on combined strategies for collecting information and sampling of multiple variables for statistical tasks and scientific studies on tuna and tuna-like species: ethical reflections on scientific activity in the context of t-RFMOs (Mejuto J)	✓(16 November 2018)
IOTC-2018-WPDCS14-20_Rev1	The use of electronic monitoring within tuna longline fisheries in the Indian Ocean: implications for data collection, analysis and reporting (Emery T, Williams A, Hoyle S, Coelho R, Fu D)	✓(16 November 2018) ✓(26 November 2018)
IOTC-2018-WPDCS14-21_Rev1	An assessment of electronic monitoring in Australian tuna longline fisheries (Emery T, Williams A, Noriega R, Larcombe J)	✓(16 November 2018) ✓(26 November 2018)
IOTC-2018-WPDCS14-22_Rev1	Potential applications and methodologies for AIS use in Seychelles deep-water tuna fisheries (Nieblas A-E, Barde J, Louys J, Lucas J, Assan C, Gerry C, Chassot E)	✓(27 November 2018) ✓(28 November 2018)
IOTC-2018-WPDCS14-23	Revision to IOTC scientific estimates of Indonesia's fresh longline catches (Geehan J, Setyadji B)	✓(15 November 2018)

Document	Title	Availability
IOTC-2018-WPDCS14-24	Comments on proposals for new IOTC ROS data collection and reporting templates (Japan Observer Program)	[WITHDRAWN]
IOTC-2018-WPDCS14-25_Rev1	Enrichment of trajectories with environmental data, and standardisation of tagging data using NetCDF (Nieblas A-E, Barde J, Bernard S, Imzilen T, Kerzerho V, Rouyer T, Bonhommeau S)	✓(16 November 2018) ✓(28 November 2018)
IOTC-2018-WPDCS14-26_Rev1	Assessing the contribution of purse seine fisheries to overall levels of bycatch in the Indian Ocean (Garcia A, Herrera M)	✓(16 November 2018) ✓(26 November 2018)
IOTC-2018-WPDCS14-27	The path towards sustainable fisheries through One Data implementation in the Ministry of Marine Affairs and Fisheries (MMAF) Republic of Indonesia (Ismayanti M)	✓(22 November 2018)
IOTC-2018-WPDCS14-28	Biometric and allometric relationships for large pelagic species collected in Reunion Island: contribution to an IOTC database? (Bonhommeau S, Evano H, Huet J, Le Foulgoc L,Richard E, Tessier E, Chanut J, Nieblas A-E)	✓(27 November 2018)
IOTC-2018-WPDCS14-29_Rev2	Development of the Fishery Satellite Account in the Seychelles (Bistoquet K, Marguerite M, Lucas T, Morel S, Elizabeth N-J, Michaud P, Tsuji S)	✓(16 November 2018) ✓(29 November 2018)
IOTC-2018-WPDCS14-30	Statistics of the French purse seine fishing fleet targeting tropical tunas in the Indian Ocean (1981-2017) (Floch L, Dewals P, Médieu A, Depetris M, Duparc A, Lebranchu J, Bach P)	✓(16 November 2018)
IOTC-2018-WPDCS14-31	Review of Pakistan's reconstructed catch series (Khan F, Khan M, Geehan J)	[WITHDRAWN]
IOTC-2018-WPDCS14-32	Crew based observer programme of Pakistan (Khan M)	✓(16 November 2018)
IOTC-2018-WPDCS14-33_Rev1	Electronic tools in support of the IOTC ROS data collection and reporting workflow (IOTC Secretariat)	✓(23 November 2018) ✓(27 November 2018)
IOTC-2018-WPDCS14-34	Describing and accessing biological and tagging data (Barde J, Blondel E, Bodin N, Bonhommeau S, Chassot E, Nieblas A-E)	✓(16 November 2018)
IOTC-2018-WPDCS14-35	Outcomes of the expert ROS standards review workshop (ROS Expert Working Group)	✓(16 November 2018)
IOTC-2018-WPDCS14-36	Proposal for the development of an ocean-climate web page for the IOTC (Marsac F)	✓(16 November 2018)
IOTC-2018-WPDCS14-37	An assessment of shark finning in Indian Ocean Tuna Commission fisheries (Clarke S)	✓(16 November 2018)
IOTC-2018-WPDCS14-38	Improving the Catch Data Collection System for Somali Fisheries: Project Kalluun (Sheikheile A-I, Glaser S, Hassan J, Farah L-I, Weheliye F-M)	✓(16 November 2018)
IOTC-2018-WPDCS14-39	Best standards for data collection and reporting requirements on FOBs: towards a science-based FOB fishery management. (Grande M, Baez J, Ramos M, Ruiz J, Krug I, Zudaire I, Santiago J, Pascual P, Abascal F, Gaertner D, Cauquil P, Floch L, Maufroy A, Muniategi A, Herrera M, Murua H.)	✓(16 November 2018)
IOTC-2018-WPDCS14-40	The use of instrumented buoys to monitor the activity of the purse seine fleet fishing on FADs (Grande M, Santiago J, Ruiz J, Zudaire I, Murua J, Krug I, Guery L, Gaertner D, Justel-Rubio A, Maufroy, A, Moniz I, Baéz J-C, Ramos M-L, Murua H)	✓(16 November 2018)
Information papers		
IOTC-2018-WPDCS14-INF01	Fish aggregating devices drift like oceanographic drifters in the near-surface currents of the Atlantic and Indian Oceans (Imzilen T, Chassot, E, Barde J, Demarcq H, Maufroy A, Roa-Pascuali L, Ternon J-F, Lett C)	✓(26 November 2018)
IOTC-2018-WPDCS14-INF02	Progress Report of the IOTC-OFCF Collaborative Project, Phase V (Tsuji S)	✓(28 November 2018)
IOTC-2018-WPDCS14-INF03	Outputs from the expert review workshop on standards for the IOTC ROS – data collection fields (ROS Expert Working Group)	✓(16 November 2018)
IOTC-2018-WPDCS14-INF04	Terms of reference: monitoring of artisanal fisheries in the Indian Ocean (IOTC Secretariat)	✓(28 November 2018)

Document	Title	Availability
IOTC-2018-WPDCS14-INF05	The use of electronic monitoring within tuna longline fisheries: implications for international data collection, analysis and reporting (Emery T, Noriega R, Williams A, Larcombe J, Nicol S, Williams P, Smith N, Pilling G, Hosken M, Brouwer S, Tremblay-Boyer L, Peatman S)	✓(29 November 2018)
IOTC-2018-WPDCS14-INF06	Measuring congruence between electronic monitoring and logbook data in Australian Commonwealth longline and gillnet fisheries (Emery T, Noriega R, Williams A, Larcombe J)	✓(29 November 2018)
IOTC-2018-WPDCS14-INF07	Changes in logbook reporting by commercial fishers following the implementation of electronic monitoring in Australian Commonwealth fisheries (Emery T, Noriega R, Williams A, Larcombe J)	✓(29 November 2018)

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 ad-hoc collaboration with DGCF (dependent on available funds/resources) and support for 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. • Support the implementation of the ROS e-Reporting system; also trialing of electronic monitoring systems (for 6 gillnet/longline vessels) commencing in early-2019.
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.
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), while no data has been reported for 2018. Limited opportunities for engagement at present.
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 support for appraisal of the data. • Revised catch series submitted in 2017 for the last 30 years, which are currently being evaluated by the IOTC Secretariat. Pending upload to the IOTC database. • A data compliance and support mission by the IOTC Secretariat has been scheduled for 2018; currently postponed.
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 (<10% in recent years).
India & **Malaysia** & **Oman** Longlines **Pakistan**: Driftnets	• As part of the IOTC Data Compliance and Support missions, provide assistance to CPCs to understand the IOTC data

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 to 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. • Implementation of the pilot study of electronic monitoring systems in Sri Lanka for coastal fisheries for which there are difficulties placing on-board observers.
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 2019 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 fishery of **I.R. Iran.**	• The IOTC Secretariat to continue to provide assistance to I.R. 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.	• A scoping study has been initiated by the IOTC Secretariat to begin in 2019, at the request of the Commission, to identify the

	social and economic data that are relevant to CPCs and IOTC and to recommend comprehensive methods to acquire these data. • IOTC-OFCF Project to continue support for development of fisheries satellite national account in Seychelles, and other CPCs (where applicable).

APPENDIX V
WORKING PARTY ON DATA COLLECTION AND STATISTICS PROGRAM OF WORK (2019–2023)

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				
				2019	2020	2021	2022	2023
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	HIGH	US$??? (Co-funding IOTC)					
	1.2 Scoping study on monitoring of artisanal fisheries in the Indian Ocean • Evaluation of the status of coastal fisheries data collection for priority CPCs identified as important for catches of artisanal fisheries (i.e., IOTC species and CITES species) • Best practice flow diagram for artisanal port sampling data collection • Develop general guidelines for data collection from artisanal fisheries at the landing place • Recommendations on short term and long term strategies for obtaining data and capacity building for artisanal fisheries in the IOTC Area of Competence	HIGH / MED	US$ 30K (FAO / CITES with possibility of extra funds from WWF – TORs for consultancies available as paper INF04)					
2. Assistance to CPCs for the fulfillment of Resolution 18/01 mandate	2.1 Provide support to requesting CPCs to increase their level of monitoring and reporting in accordance with paragraph 8 of Resolution 18/01	MED / LOW	US$ 30K (EU cofund.)					

#	Activity	Sub-activity	Priority	Cost					
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	MED	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 implementation and follow-up activities required. Priority to be given to the following fisheries:	HIGH	US$ 5-10K each (EU cofund.)					
		• Indonesia			▩				
		• Pakistan			▩				
		• Sri Lanka			▩				
		• India			▩	▩			
		• Yemen					▩		
		4.2 Analyzing the impact and requirements for the harmonization of terminology and data collection / reporting requirements for FOB and instrumented buoys	HIGH		▩				
5.	IOTC Data Access	5.1 Establishment of a public repository of historical CPUE series to be made accessible under a dedicated section of the IOTC website	MED	US$??? (TBD – Consultant ?)	▩				
		5.2 Assessing the requirements needed for an automated incorporation of environmental information under the IOTC website	HIGH / MED	US$??? (TBD)	▩				
		5.3 Enrichment of IOTC data sets and documents with standard metadata for improved access and dissemination	HIGH	US$??? (INTERREG funds?)	▩	▩			
		6.1 ROS tools							

6.	ROS – Support for the implementation of the IOTC Regional Observer Scheme	6.1.1 Support the adoption of the ROS e-tools for CPCs not having any existing observer data collection and management system in place	HIGH	US$??? (TBD)	▓	▓				
		6.2 ROS Regional Database								
		6.2.1 Finalize the development of automated mechanisms for the exchange of information between the ROS database and other well-established scientific observer data collection systems (e.g. *ObServe*, *SWIOFP*, custom databases)	HIGH	US$??? (Already funded - Consultant)	▓					
		6.2.2 Implement dissemination best-practices for data collected by the ROS Regional Database	HIGH	US$??? (TBD - Consultant)	▓					
		6.3 ROS Electronic Monitoring Systems								
		6.3.1 Implement pilot EMS system on gillnet / coastal longline vessels for fleets insufficiently covered by on-board observers (noting that work has started already in LKA)	HIGH	US$ 150k (CPCs, EU cofunded)	▓					
		6.3.2 Collaborate with CPCs for the development of standards for EMS data collection and reporting applicable to different gear types	HIGH	US$??? (TBD)	▓					
		6.4 Scoping study to assess and endorse the feasibility of using crew-based observer programmes for ROS purposes	HIGH	US$??? (TBD)	▓					

APPENDIX VI
CONSOLIDATED RECOMMENDATIONS OF THE 14TH SESSION OF THE WORKING PARTY ON DATA COLLECTION AND STATISTICS

Note: Appendix references refer to the Report of the 14th Session of the Working Party on Data Collection and Statistics (IOTC–2018–WPDCS14–R)

Revision of the proposed updates to standards and data fields

WPDCS14.01 (para. 146): The WPDCS **NOTED** that all changes to the proposed ROS *Minimum Standard Data Fields* are captured within the summary table in appendix to this document and **RECOMMENDED** that the ROS *Minimum Standard Data Fields* in Appendix VII are adopted by the Commission.

WPDCS14.02 (para. 149): The WPDCS **RECOMMENDED** that the SC evaluate the validity of alternative data collection tools, and combinations of these (such as the use of crew as observers, electronic monitoring and port sampling), as potential alternatives to onboard human observer coverage for the collection of the minimum standard data fields for small-scale vessels.

WPDCS14.03 (para. 150): The WPDCS also **RECOMMENDED** that the SC considers and endorses the list of species considered of special interest (SSI) as defined by the Expert Workshop and reported in Appendix VIII.

WPDCS14.04 (para. 151): The WPDCS **NOTED** the *draft programme standards* developed by the ROS Expert Workshop and **AGREED** that there was insufficient time during the meeting as well as lack of appropriate expertise to fully review these standards and therefore **RECOMMENDED** this draft be discussed at Commission level.

Proposals for new IOTC ROS data collection and reporting templates

WPDCS14.05 (para. 153): The WPDCS **RECOMMENDED** the development of minimum standards on EMS for IOTC. The WPDCS further **NOTED** the WCPFC are currently drafting standards on EM and **ACKNOWLEDGED** that it would be pertinent for IOTC to follow this process and utilise the outcomes where relevant.

Revision of the WPDCS Program of work (2019–2023)

WPDCS14.06 (para. 194): The WPDCS **RECOMMENDED** that the Scientific Committee consider and endorse the WPDCS Program of Work (2019–2023), as provided at Appendix V.

Date and place of the 15th and 16th sessions of the WPDCS: 2019 & 2020

WPDCS14.07 (para. 197): The WPDCS **NOTED** that there has been an increase in participation and submission of documents to the WPDCS in recent years. The WPDCS further **NOTED** that the current duration of the meeting (3 days) is not sufficient to facilitate the presentation and discussion of these documents. The WPDCS therefore **RECOMMENDED** that future sessions of the WPDCS be extended to four days.

Review of the draft, and adoption of the report of the 14th Session of the WPDCS

WPDCS14.08 (para. 199): The WPDCS **RECOMMENDED** that the Scientific Committee consider the consolidated set of recommendations arising from WPDCS14, provided at Appendix VI.

APPENDIX VII – ROS MINIMUM STANDARD DATA FIELDS

IOTC ROS Minimum Reporting Standard Data Fields & Instructions

The format of how these data fields will be presented for collection by observers is up to the observer programmes to develop. However if providers need a format to use as a guide that includes all the fields in this set of minimum data standard fields, they can use forms and formats developed by the IOTC-ROS. These are available on the IOTC Website under Science: Regional Observer Scheme[1] and could be adapted to suit your programme.

Unless otherwise instructed:

- **All dates to be reported to the IOTC Secretariat as YYYY/MM/DD independently of the format in which they were collected.**
- **All times to be reported to the IOTC Secretariat in UTC[2] (hh:mm) independently of the time fuse and format in which they were collected.**
- **All positions to be reported to the IOTC Secretariat as dd°mm,m' mentioning if collected South or North of the equator (independently of the format in which they were collected).**
- **All units of measure to be clearly indicated.**

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[1] http://www.iotc.org/science/regional-observer-scheme-science

[2] Coordinated Universal Time

General vessel and trip information for all vessel types

Data field name	Data field description	Mandatory
Observed trip number	This is the observed trip unique identifier. This should begin with trip's start date (YYYY-MM-DD), followed by IOTC observer number, and vessel main gear code as per IOTC classification (E.g. 2018/01/23-IOTCFRA001-PS).	**Yes**
VESSEL IDENTIFICATION		
Name of the vessel	Vessel full name as recorded on vessel official documentation and crosschecked with the name recorded on the vessel itself (any discrepancies are to be reported to the IOTC Secretariat). Care should be taken to record the correct spelling of the vessel's name including any corresponding numbers. i.e. "Agnes 83".	**Yes**
Flag state (or where chartering occurs, chartering state)	Name of country in which vessel is registered as shown on its registration documents according to the IOTC categories (**Table 1**). Note this should be chartering state, where chartering occurs. Note this may not be the same as the nationality from which the vessel originates.	**Yes**
Vessel's IOTC number	Vessel IOTC number as per the IOTC Record of Authorized Vessels[3] and crosschecked with the number recorded on vessel certificates (any discrepancies are to be reported to the IOTC Secretariat).	**Yes**
Vessel's IMO or Lloyd's number	This is the number allocated to the vessel when registered to the International Maritime Organization of the United Nations. Example: IMO8814275.	**Yes**
Vessel's Port of registration	The name of vessel's port of registry (also called home port), shown on its registration documents and lettered on the stern of the ship's hull.	**Yes**
Licensed target species	Vessels will generally target a narrow range or aggregation of species. Report licensed target species as specified in vessel licences or permit conditions (FAO spp. 3-alpha code).	**No**
OBSERVER DETAILS		
Observer IOTC registration number	Observer registration number allocated by the IOTC Secretariat to be used on all observer data submissions.	**Yes**
OBSERVER TRIP INFORMATION		
Number of fishing events/sets conducted by the vessel while the observer was on-board.	The total number of fishing events/sets conducted by the vessel while the observer was on-board, independently of their success and of being sampled or not by the observer. (Note that this should not include pole and line bait fishing events/sets).	**Yes**
Number of fishing events/sets observed	The total number of fishing sets/events monitored by the observer. (Note that this should not include pole and line bait fishing events/sets).	**Yes**

[3] http://www.iotc.org/vessels/current

Number of days searching	The total number of days that the vessel was engaged in actively searching for fish (this include active fishing days).	**Yes**
Number active fishing days	The total number of days that the vessel actually fished (when the vessel had gear in the water).	**Yes**
Number of days lost	The total number of days where the vessel was unable to fish dues to factors such as adverse weather conditions, mechanical failure or other unforeseen events.	**Yes**
Reasons for days lost	The reasons why the vessel was unable to fish: (i) adverse weather conditions, (ii) mechanical breakdown or inoperative gear or (iii) unforeseen events (specify).	**Yes**
VESSEL ATTRIBUTES		
Tonnage (specify units)	The vessel tonnage as specified in vessel registration papers. Specify if the vessel is registered using Gross Tonnage (GT) or Gross Registered Tonnage (GRT).	**Yes**
Length overall (specify units)	The vessel overall length as specified in vessel registration papers (specify units).	**Yes**
Fish storage capacity	The vessel total maximum capacity to store catches in metric Tons (mT.) or cubic meters (m^3). This should include blast freezer(s) capacity.	**Yes**
Hull material	The vessel hull material (s) (steel, wood, aluminium, fibre glass, etc.), according to IOTC categories (**Table 2. Vessel hull** material).	**Yes**
Main engines (make/ power)	The make and power of the main engines (specify units: HP, Kilowatt or BHP).	**Yes**
VESSEL ELECTRONICS		
Global Positioning System (GPS)	Indicate Yes if on board No if not sighted	**Yes**
Vessel Monitoring System	Indicate Yes if on board No if not sighted	**Yes**
Radars	Indicate Yes if on board No if not sighted	**Yes**
Track Plotter	Indicate Yes if on board No if not sighted	**Yes**
Depth Sounder	Indicate Yes if on board No if not sighted	**Yes**
Sonar	Indicate Yes if on board No if not sighted	**Yes**
Doppler Current Meter	Indicate Yes if on board No if not sighted	**Yes**
Expendable Bathythermograph (XBT)	Indicate Yes if on board No if not sighted	**Yes**

Longline information

Data field name	Data field description	Mandatory
SPECIAL EQUIPMENT OR MACHINERY		

Line setter	Indicate Yes if on board No if not sighted - Many long line vessels will be fitted with equipment or machinery that regulates line setting speed allowing the line to be set at uniform depth.	**Yes**
Line hauler	Indicate Yes if on board No if not sighted - Most long line vessel will be fitted with equipment or machinery that hauls the line in after it has been set.	**Yes**
Bait casting machine	Indicate Yes if on board No if not sighted - Most vessels manually deploy branch lines with the bait. However there are a number of vessels that use automatic bait casting machines.	**Yes**
GENERAL GEAR ATTRIBUTES		
Mainline material	The material the mainline is made out of, e.g. kevlar, nylon, nylon multifilament according to the IOTC categories (**Table 3**).	**Yes**
Mainline length	The total length of the mainline in kilometres (i.e. mainline maximum length).	**Yes**
Branchline lenght (specify units)	The length of each of the branchline sections (1, 2, 3 and 4), where section 1 is that closest to the mainline and section 4 is the leader.	**Yes**
Branchline diameter (specify units)	The diameter of each of the branchline sections (1, 2, 3 and 4), where section 1 is that closest to the mainline and section 4 is the leader.	**Yes**
TORI LINE DETAILS	If the vessel was equipped with a tori line provide tori line details below. If no tori line wasn't present on-board fill in NA for not applicable.	
Tori line length (specify units)	The total length of the tori line (not including streamers).	**Yes**
Streamer type	The type of streamers used with the tori line (e.g. paired or single).	**Yes**
Streamer line length (specify units)	The length of individual streamer lines (minimum and maximum where lengths vary).	**Yes**
No. streamers per line	The number of streamers that are attached to a single tori line	**Yes**
Attached height (specify units)	The height that the tori line is attached above the water level.	**Yes**
SETTING OPERATIONS		
Start setting date and time	The date at the time the first dhan buoy and / or radio buoy is deployed to start the setting of the line.	**Yes**
Start setting position	The position in latitude and longitude for the start of the setting operation.	**Yes**
End setting date and time	The date and time that the last dhan buoy and / or radio buoy is deployed. (Note that longline vessels often set lines at the night and the setting operation may continue beyond midnight and into the following day.)	**Yes**
Length of mainline set (specify units)	The mainline total set length (i.e. the total deployed length of the mainline for the specific set). Usually calculated by multiplying the total time to set the line and the average line setter speed. (Note take into account any interruption times).	**Yes**

Shark lines set	Indicate Y or No if shark lines were set during the operation. (Note: shark lines are branch lines running directly off the longline floats or drop lines, specifically for targeting sharks).	**Yes**
Total number of hooks set	The total number of hooks deployed for the set, usually calculated by multiplying number of baskets by the average number of hooks between the baskets.	**Yes**
Target species	The target species for the set (FAO spp. 3-alpha code).	**Yes**
VMS on	Indicate Y or No to sign if he VMS was on or not while setting and hauling.	**No**
Mitigation measures		
Number of Tori lines deployed	The total number of tori lines deployed during the setting operation. Zero if none was deployed.	**Yes**
Low light night setting	Indicate Y or No - minimum deck lighting is used during night setting.	**Yes**
Branch line weighted	Indicate Y or No if the branch line is weighted.	**Yes**
Sinkers average weight (specify units)	The average weight of weights/sinkers attached to the branchlines.	**Yes**
Proportion weighted	The proportion of branchlines weighted (%). If all weighted than record 100%.	**Yes**
Hook-sinker distance (specify units)	The distance of the weights/sinkers from the eye of the hook.	**Yes**
Hook type	The type of hooks used according to the IOTC categories (**Table 4**).	**Yes**
% of hooks set by type	The percentage (%) of hooks set by type according to IOTC categories (**Table 4**).	**Yes**
Bait type	The bait type/condition used to according to the IOTC categories (**Table 5**).	**Yes**
Bait species	The bait species used (FAO spp. 3-alpha code).	**Yes**
Bait ratio (%)	The approximate proportion of each bait type and species used across all hooks in the set.	**Yes**
HAULING OPERATIONS		
Start hauling date and time	The date and time when the first dhan buoy and / or radio buoy is hauled back on-board to start hauling the line.	**Yes**
Start hauling Position	The position in latitude and longitude for the start of the hauling operation.	**Yes**
Sampling protocol	The sampling protocol followed by the observer according to IOTC categories (**Table 21**).	**Yes**
Number of retrieved hooks observed	The number of hooks observed for catch and bycatch composition. (Note this must not include the time that the observer spent on the deck measuring and collecting biological data on the catch as observers should be in a position during these observations to record the hooks coming directly out of the water and record the fate of released species.)	**Yes**
CATCH DETAILS (i.e. information on catch for each set)		

Species code	The species code for each specimen observed (FAO spp. 3-alpha code). If species FAO code is not available, the species scientific name.	**Yes**
Fate	The species fate which includes whether it was retained or discarded and the reason according to the IOTC categories (**Table 11**).	**Yes**
Depredation details		
Depredation source	For depredated specimens, the depredation source based on depredation scar characteristics according to the IOTC categories (**Table 18**). For non-depredated specimens record NA.	**Yes**
Predator Observed	For depredated specimens, the predator species directly observed and identified (FAO spp. 3-alpha code). If the predator was not observed record UNK (unknown). For non-depredated specimens record NA.	**Yes**
Additional catch details on non-target species	Catch details on non-target species to be collected where possible and reported to the IOTC Secretariat as recommended by the Scientific Committee.	
Condition at capture	The condition of the specimen at capture according to the IOTC categories (**Table 16**).	**No**
Condition at release	The condition of the specimen at the time of release according to the IOTC categories (**Table 16**).	**No**
Additional catch details on SSIs[4]	Additional catch details on Species of Special Interest (p.) to be collected where possible and reported to the IOTC Secretariat as recommended by the Scientific Committee.	
Gear interaction	The interaction of the specimen with the fishing gear according to IOTC categories (**Table 15**).	**No**
Hook type	The type of hook the individual was hauled on according to the IOTC categories (**Table 4**). *[Consistent with IOTC Res 12-04]*	**No**
Bait type	The type of bait the individual was hauled on according to the IOTC categories (**Table 5**). *[Consistent with IOTC Res 12-04]*	**No**
Leader material	The leader material the individual was hauled on according to the IOTC categories (**Table 3**). *[Consistent with IOTC Res 12-04 and IOTC Res. 17/05]*	**No**
Leader thickness	The thickness of the leader the individual was hauled on. *[Consistent with IOTC Res 12-04 and IOTC Res. 17/05]*	**No**
De-hooker/line cutter	The de-hooking or line cutting device used to extract the hook. *[Consistent with IOTC Res 12-04]*	**No**
Brought on board	Indicate Yes or No, if the specimen brought on board. *[Consistent with IOTC Resolutions 13/04; 13/05; 12/04; 12/06; 12/09]*	**No**

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[4] List of Species of Special Interest (SSI) approved by IOTC Scientific Committee (SC) is included at the end of this document under the Codes and guideline section.

Hauling method	The detail how the specimen was brought on-board according to the IOTC categories (**Table 17**). *[Consistent with IOTC Res 12-04]*	**No**
SAMPLING DETAILS Details concerning any sampling conducted, including where possible extra biometric measurements, sex, maturity and the collection of samples.		
Sampling methods for the collection of biological information	The sampling method used for the collection of biological sub-sample according to the IOTC categories (**Table 19**).	**Yes**
Length code 1	The length code used for the measurement according to the IOTC categories (**Table 23**).	**Yes**
Length 1	The length corresponding to the length type taken rounded to the lower centimetre. For LD1 this should be rounded to the lower half centimetre.	**Yes**
Length code 2	When an additional length measurement is taken. The length code used should be reported according to the IOTC categories (**Table 23**).	**No**
Length 2	When an additional length measurement is taken. The corresponding length should be reported rounded to the lower centimetre. For LD1 this should be rounded to the lower half centimetre.	**No**
Weight (specify units)	The specimens' weight corresponding to the specified product type. If the fish hasn't been processed than make sure to record the unprocessed (or round, whole, live) weight (i.e. RD).	**No**
Weight code	The code corresponding to the type of processing the specimen underwent previous to be weighted according to the IOTC categories (**Table 14**).	**No**
Weight estimation method	The weight estimation method used to collect weight according to the IOTC categories (**Table 13**).	**No**
Sex	The sex, male or female of the sampled fish specimen. If unknown record UNK.	**No**
Maturity stage	The stage of maturity of the sampled fish specimen according to standard maturity scales approved by the IOTC. If unknown record UNK.	**No**
Sample collected	The details on the collection of samples: a) type (e.g. otoliths, spine clippings, and genetic samples) b) preservation method (e.g. alcohol, frozen, etc.) c) destination (i.e. location to be sent/stored)	**No**
TAG DETAILS Note that all tagged specimens are to be identified to species level and to be sampled for length. Elasmobranches and turtles are also to be sexed.		
Tag release	Indicate Yes or No, whether this individual was re-released with a tag attached	**Yes**
Tag recovery	Indicate Yes or No, whether a tag was recovered from this individual	**Yes**

Tag number	Provide the tag number. If a turtle make sure to provide both tag numbers (right and left flipper).	**Yes**
Tag type	The type of tag used according to the IOTC categories (**Table 20**).	**Yes**
Tag finder	The name and contact details of the person who recovered the tag.	**Yes**

Gillnet information

Data field name	Data field description	Mandatory
SPECIAL EQUIPMENT OR MACHINERY		
Net drum/hauler	Indicate Yes if on board No if not sighted - Vessels are normally equipped with a hydraulic net hauler; However they can also use net drums to both haul and store the net.	**Yes**
GILLNET ATTRIBUTES Detail the specifications of each gillnet present on-board during the observed trip.		
Total number of nets	The total number of operational pelagic gillnets held on-board.	**Yes**
Gillnet sequential number	Specify gillnet sequential number. (Note: a unique sequential number is allocated to different gillnets to allow to relate gillnet used with its specifications).	**Yes**
Total number of panels	The number of panels[5] making up the net[6].	**Yes**
Panels stacked	Indicate Yes or No if there are any panels stacked. (Note: two panels of netting can be sewn together vertically, one on top of the other, to intentionally fish "double deep").	**Yes**
Net length (specify units)	The net string length. Usually calculated by multiplying the panel average length by the number of panels used in the net.	**Yes**
Stretched mesh sizes (specify units)	The mesh average stretched lengths (knot to knot) and range. Usually calculated by measuring at least 10 meshes from 5 panels in different areas of the net.	**Yes**
Hanging ratio (%)	The ratio between the length of the float line and the length of the stretched mesh hanging on the float line. Usually calculated by counting 10 or 12 meshes horizontally, measuring the length of the floatline they are attached to, and comparing that distance to the stretched out length of the meshes.	**Yes**
Net web colour	The colour(s) of the net webbing according to the IOTC categories (**Table 6**).	**Yes**
SETTING OPERATIONS		
Start setting date and time	The date and the time that first panel enters the water (i.e. start of the setting of the net).	**Yes**
Start setting position	The position in latitude and longitude for the start of the setting operation.	**Yes**

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[5] A section of continuous netting of exactly the same characteristics between two end-lines (up and down lines).

[6] A string of panels sewn together. The entire string may be referred to as "the net".

Data field name	Data field description	Mandatory
End setting date and time	The date and time the gillnet is secured to the vessel, an anchoring device, or completely deployed (i.e. end of net setting). (Note that gillnet vessels often set dusk and the setting operation may continue beyond midnight and into the following day.)	**Yes**
Gillnet sequential number (previously named 'Net type')	Specify gillnet used on this set by recording its sequential number. (Note: a unique sequential number is allocated to different gillnets to allow to relate gillnet used with its specifications).	**Yes**
Net setting strategy (previously named 'Set type')	How the net is set according to the IOTC categories (**Table 7**).	**Yes**
Vertical set	The level the net is set at vertically in the water column. I.e. if the net is set at the surface or at sub-surface	**Yes**
Mitigation measures		
Mitigation measures	Indicate Yes or No if any bycatch mitigation devices were used during the set. .	**Yes**
HAULING OPERATIONS		
Start hauling date and time	The date and time at the start of line hauling. I.e. the time when the hauling equipment is put into gear or when the net starts being hauled. (Note: vessels often haul nets in the early morning after a night soak period).	**Yes**
Start hauling position	The position in latitude and longitude for the start of the hauling operation.	**Yes**
Net condition	The condition of the net at haul-back (even if the condition was the same at setting) according to the IOTC categories (**Table 12**).	**Yes**
Number of net panels retrieved	The total number of net panels retrieved at haul.	**Yes**
Number of net panels observed	The total number of hauled net panels that are observed.	**Yes**
CATCH DETAILS (i.e. information on catch for each set)		
Sampling methods *for obtaining total catch estimates per species*	The sampling method used to obtain total catch estimates per species for the observed set according to the IOTC categories (**Table 10**).	**Yes**
Species code	The species code for the species observed (FAO spp. 3-alpha code). If species FAO code is not available, the species scientific name.	**Yes**
Fate	The species fate which includes whether it was retained or discarded and the reason according to the IOTC categories (**Table 11**).	**Yes**
Number	The number of individuals per species for each specified fate. If weight is recorded, insert NA here (Note: for large fish, record number of individuals).	**Yes**

Data field name	Data field description	Mandatory
Weight (specify units)	The weight corresponding to the specified species and fate category. For small fish, record weight. (Note: if number of individuals is recorded, insert NA here).	**Yes**
Weight estimation method	The weight estimation method used to collect weight according to the IOTC categories (**Table 13**). (Note: If number of individuals is recorded, insert NA here).	**Yes**
Weight code	The code corresponding to the type of processing the specimen underwent previous to be weighted according to the IOTC categories (**Table 14**). If the fish hasn't been processed than make sure to record code for unprocessed (or round, whole, live) weight (i.e. RD). (Note: If number of individuals is recorded, insert NA here).	**Yes**
Depredation details		
Depredation source	For depredated specimens, the depredation source based on depredation scar characteristics according to the IOTC categories (**Table 18**). For non-depredated specimens record NA.	**Yes**
Predator Observed	For depredated specimens, the predator species directly observed and identified (FAO spp. 3-alpha code). If the predator was not observed record UNK (unknown). For non-depredated specimens record NA.	**Yes**
Additional catch details on non-target species	Catch details on non-target species to be collected where possible and reported to the IOTC Secretariat as recommended by the Scientific Committee.	
Condition at capture	The condition of the specimen at capture according to the IOTC categories (**Table 16**).	**No**
Condition at release	The condition of the specimen at the time of release according to the IOTC categories (**Table 16**).	**No**
Additional catch details on SSIs[7]	Additional catch details on Species of Special Interest (p. 71) to be collected where possible and reported to the IOTC Secretariat as recommended by the Scientific Committee.	
Gear interaction	The interaction of the specimen with the fishing gear according to IOTC categories (**Table 15**).	**No**
Brought on board	Indicate Yes or No, if the specimen brought on board. *[Consistent with IOTC Resolutions 13/04; 13/05; 12/04; 12/06; 12/09]*	**No**
Hauling method	The detail how the specimen was brought on-board according to the IOTC categories (**Table 17**). *[Consistent with IOTC Res 12-04]*	**No**
SAMPLING DETAILS Details concerning any sampling conducted, including where possible extra biometric measurements, sex, maturity and the collection of samples.		

[7] List of Species of Special Interest (SSI) approved by IOTC Scientific Committee (SC) is included at the end of this document under the Codes and guideline section.

Data field name	Data field description	Mandatory
Sampling methods for the collection of biological information	The sampling method used for the collection of biological sub-sample according to the IOTC categories (**Table 19**).	**Yes**
Length code 1	The length code used for the measurement according to the IOTC categories (**Table 23**).	**Yes**
Length 1	The length corresponding to the length type taken rounded to the lower centimetre. For LD1 this should be rounded to the lower half centimetre.	**Yes**
Length code 2	When an additional length measurement is taken. The length code used should be reported according to the IOTC categories (**Table 23**).	**No**
Length 2	When an additional length measurement is taken. The corresponding length should be reported rounded to the lower centimetre. For LD1 this should be rounded to the lower half centimetre.	**No**
Sex	The sex, male or female of the sampled fish specimen. If unknown record UNK.	**No**
Maturity stage	The stage of maturity of the sampled fish specimen according to standard maturity scales approved by the IOTC. If unknown record UNK.	**No**
Sample collected	The details on the collection of samples: a) type (e.g. otoliths, spine clippings, and genetic samples) b) preservation method (e.g. alcohol, frozen, etc.) c) destination (i.e. location to be sent/stored)	**No**
TAG DETAILS Note that all tagged specimens are to be identified to species level and to be sampled for length. Elasmobranches and turtles are also to be sexed.		
Tag release	Indicate Yes or No, whether this individual was re-released with a tag attached	**Yes**
Tag recovery	Indicate Yes or No, whether a tag was recovered from this individual	**Yes**
Tag number	Provide the tag number. If a turtle make sure to provide both tag numbers (right and left flipper).	**Yes**
Tag type	The type of tag used according to the IOTC categories (**Table 20**).	**Yes**
Tag finder	The name and contact details of the person who recovered the tag.	**Yes**

Purse-seine information

Data field name	Data field description	Mandatory
SPECIAL EQUIPMENT OR MACHINERY		
Power block	Indicate Yes if on board No if not sighted.	**Yes**
Purse winch	Indicate Yes if on board No if not sighted.	**Yes**
GENERAL GEAR ATTRIBUTES		
Maximum length of the net (specify units)	The maximum length of the net; This corresponds to the length of the topline.	**Yes**
Maximum depth of the net (specify units)	The maximum fishing depth according to the net specifications.	**Yes**
Bag stretched mesh size	The mesh average stretched lengths (knot to knot) of the bag of the net. Usually calculated by measuring 3 stretched mesh lengths.	**Yes**
Mid-net stretched mesh size	The mesh average stretched lengths (knot to knot) of the mid-net. Usually calculated by measuring 3 stretched mesh lengths.	**Yes**
Maximum Brail Capacity	The maximum weight capacity of a full brail in metric tonnes (Mt).	**Yes**
SETTING OPERATIONS		
Start setting date and time	The date and time the skiff is launched to start the setting operation.	**Yes**
Start setting position	The position in latitude and longitude for the start of the setting operation.	**Yes**
School sighting cue	Report up to the first three cues which leads the vessel to detect the presence of a tuna school according to IOTC categories (**Table 22**).	**Yes**
School type	The type of school detected according to IOTC categories (**Table 22**)	**Yes**
Time net pursed	The time when the net is fully pursed. All rings are up	**Yes**
Object Details	For sets conducted on FADs (natural or artificial), the following detailed information should be collected where possible and reported to the IOTC Secretariat.	
Buoy ID	For every activity involving artificial or a natural FADs equipped with a buoy report BUOY ID (i.e. Buoy marking or any information allowing identifying the owner). *[Consistent with IOTC Res 18/08]*	**No**
Buoy equipped with artificial lights	Report if devices equipped with artificial lights are deployed and/or recovered. *[Consistent with IOTC Res 16/07]*	**No**
Artificial FAD design	Characterize artificial FAD design using codes provided to describe raft (floating part) and tail (underwater hanging structure) materials (**Table 9**). *[Consistent with IOTC Res. 12/04 and Res 18/08]*	**No**

Data field name	Data field description	Mandatory
Cetaceans and whale sharks sightings during setting	Details on cetaceans and whale sharks sightings during purse-seine setting are to be collected where possible and reported to the IOTC Secretariat. [Consistent with IOTC Res 13/04 and 13/05]	
Sighting occurred before setting	Indicate YES if the sighting occurred before setting or NO if it occurred after.	**No**
Species	The species code for the sighted specimen/s (FAO spp. 3-alpha code). If species FAO code is not available, the species scientific name.	**No**
N° sighted	The number of individuals sighted per species.	**No**
Caught inside the net	Indicate YES or NO whether sighted specimen/s was/were caught inside the net once the purse line was closed.	**No**
CATCH DETAILS (i.e. information on catch for each set)		
Sampling methods *for obtaining total catch estimates per species*	The sampling method used to obtain total catch estimates per species for the observed set according to the IOTC categories (**Table 10**).	**Yes**
Species code	The species code for the species observed (FAO spp. 3-alpha code). If species FAO code is not available, the species scientific name.	**Yes**
Fate	The species fate which includes whether it was retained or discarded and the reason according to the IOTC categories (**Table 11**).	**Yes**
Number	The number of individuals per species for each specified fate. If weight is recorded, insert NA here (Note: for large fish, record number of individuals.)	**Yes**
Weight (specify units)	The weight corresponding to the specified species and fate category. For small fish, record weight. (Note: if number of individuals is recorded, insert NA here).	**Yes**
Weight estimation method	The weight estimation method used to collect weight according to the IOTC categories (**Table 13**). (Note: If number of individuals is recorded, insert NA here).	**Yes**
Weight code	The code corresponding to the type of processing the specimen underwent previous to be weighted according to the IOTC categories (**Table 14**). If the fish hasn't been processed than make sure to record code for unprocessed (or round, whole, live) weight (i.e. RD). (Note: If number of individuals is recorded, insert NA here).	**Yes**
Additional catch details on non-target species	Catch details on non-target species to be collected where possible and reported to the IOTC Secretariat as recommended by the Scientific Committee.	
Condition at capture	The condition of the specimen at capture according to the IOTC categories (**Table 16**).	**No**
Condition at release	The condition of the specimen at the time of release according to the IOTC categories (**Table 16**).	**No**

Data field name	Data field description	Mandatory
Additional catch details on SSIs[8]	Additional catch details on Species of Special Interest (p. 71) to be collected where possible and reported to the IOTC Secretariat as recommended by the Scientific Committee.	
Gear interaction	The interaction of the specimen with the fishing gear according to IOTC categories (**Table 15**).	**No**
Brought on board	Indicate Yes or No, if the specimen brought on board. *[Consistent with IOTC Resolutions 13/04; 13/05; 12/04; 12/06; 12/09]*	**No**
Hauling method	The detail how the specimen was brought on-board according to the IOTC categories (**Table 17**). *[Consistent with IOTC Res 12-04]*	**No**
SAMPLING DETAILS Details concerning any sampling conducted, including where possible extra biometric measurements, sex, maturity and the collection of samples.		
Sampling methods for the collection of biological information	The sampling method used for the collection of biological sub-sample according to the IOTC categories (**Table 19**).	**Yes**
Length code 1	The length code used for the measurement according to the IOTC categories (**Table 23**).	**Yes**
Length 1	The length corresponding to the length type taken rounded to the lower centimetre. For LD1 this should be rounded to the lower half centimetre.	**Yes**
Length code 2	When an additional length measurement is taken. The length code used should be reported according to the IOTC categories (**Table 23**).	**No**
Length 2	When an additional length measurement is taken. The corresponding length should be reported rounded to the lower centimetre. For LD1 this should be rounded to the lower half centimetre.	**No**
Sex	The sex, male or female of the sampled fish specimen. If unknown record UNK.	**No**
Maturity stage	The stage of maturity of the sampled fish specimen according to standard maturity scales approved by the IOTC. If unknown record UNK.	**No**
Sample collected	The details on the collection of samples: a) type (e.g. otoliths, spine clippings, and genetic samples) b) preservation method (e.g. alcohol, frozen, etc.) c) destination (i.e. location to be sent/stored)	**No**
TAG DETAILS Note that all tagged specimens are to be identified to species level and to be sampled for length. Elasmobranches and turtles are also to be sexed.		

[8] List of Species of Special Interest (SSI) approved by IOTC Scientific Committee (SC) is included at the end of this document under the Codes and guideline section.

Data field name	Data field description	Mandatory
Tag release	Indicate Yes or No, whether this individual was re-released with a tag attached	**Yes**
Tag recovery	Indicate Yes or No, whether a tag was recovered from this individual	**Yes**
Tag number	Provide the tag number. If a turtle make sure to provide both tag numbers (right and left flipper).	**Yes**
Tag type	The type of tag used according to the IOTC categories (**Table 20**).	**Yes**
Tag finder	The name and contact details of the person who recovered the tag.	**Yes**
Well	The well number from which the tagged fish has been recovered, if the fish is recovered during shifting, transhipping or unloading. (Note: this information will allow tracing back tagged fish to the location where it was caught).	**Yes**

Pole and line information

Data field name	Data field description	Mandatory
SPECIAL EQUIPMENT OR MACHINERY		
Live bait tanks capacity	The total volume of the tanks used to keep the live bait, in cubic metres (m3).	**Yes**
Number of automatic poles	The total number of automatic poles that are fixed on a vessel.	**Yes**
GENERAL GEAR ATTRIBUTES		
Number of anglers	The maximum number of anglers observed during the trip.	**Yes**
Pole material	The material the pole is made of (e.g. bamboo, fibre glass, carbon).	**Yes**
Hook type	The type of hooks used according to the IOTC categories (**Table 4**).	**Yes**
TUNA FISHING OPERATIONS		
Event date and time	The data and time that the first line enters the water.	**Yes**
Event start position	The position in latitude and longitude at the start of the fishing event.	**Yes**
Event end time	The time when the last line comes out of the water. If the vessel targets the same school more than once and it stops fishing for a period of at least 10 minutes than it should be considered that the fishing event ended even if fishing is to restarts shortly after.	**Yes**
Maximum lines fishing at the same time	The maximum number of lines fishing at the same time, these should include lines deployed from manual and automatic poles. Specify if other lines are deployed and include them in the total count. This should be one count taken when the fishing activity is well established (not right at the beginning or right at the end).	**Yes**

Data field name	Data field description	Mandatory
Bait used (Y/N)	Indicate Yes or No, whether any bait was used during the fishing event.	**Yes**
Bait type	The bait type/condition used to according to the IOTC categories (**Table 5**).	**Yes**
Bait species	The species of bait used (FAO spp. 3-alpha code).	**Yes**
Number of hooks lost	The total number of hooks lost during the poling operation.	**Yes**
CATCH DETAILS (i.e. information on catch for each set)		
Sampling methods *for obtaining total catch estimates per species*	The sampling method used to obtain total catch estimates per species for the observed set according to the IOTC categories (**Table 10**).	**Yes**
Species code	The species code for the species observed (FAO spp. 3-alpha code). If species FAO code is not available, the species scientific name.	**Yes**
Fate	The species fate which includes whether it was retained or discarded and the reason according to the IOTC categories (**Table 11**).	**Yes**
Number	The number of individuals per species for each specified fate. If weight is recorded, insert NA here (Note: for large fish, record number of individuals.)	**Yes**
Weight (specify units)	The weight corresponding to the specified species and fate category. For small fish, record weight. (Note: if number of individuals is recorded, insert NA here).	**Yes**
Weight estimation method	The weight estimation method used to collect weight according to the IOTC categories (**Table 13**). (Note: If number of individuals is recorded, insert NA here).	**Yes**
Weight code	The code corresponding to the type of processing the specimen underwent previous to be weighted according to the IOTC categories (**Table 14**). If the fish hasn't been processed than make sure to record code for unprocessed (or round, whole, live) weight (i.e. RD). (Note: If number of individuals is recorded, insert NA here).	**Yes**
Depredation details		
Depredation source	For depredated specimens, the depredation source based on depredation scar characteristics according to the IOTC categories (**Table 18**). For non-depredated specimens record NA.	**Yes**
Predator Observed	For depredated specimens, the predator species directly observed and identified (FAO spp. 3-alpha code). If the predator was not observed record UNK (unknown). For non-depredated specimens record NA.	**Yes**
Additional catch details on non-target species	Catch details on non-target species to be collected where possible and reported to the IOTC Secretariat as recommended by the Scientific Committee.	

Data field name	Data field description	Mandatory
Condition at capture	The condition of the specimen at capture according to the IOTC categories (**Table 16**).	**No**
Condition at release	The condition of the specimen at the time of release according to the IOTC categories (**Table 16**).	**No**
Additional catch details on SSIs[9]	Additional catch details on Species of Special Interest (p. 71) to be collected where possible and reported to the IOTC Secretariat as recommended by the Scientific Committee.	
Gear interaction	The interaction of the specimen with the fishing gear according to IOTC categories (**Table 15**).	**No**
Brought on board	Indicate Yes or No, if the specimen brought on board. *[Consistent with IOTC Resolutions 13/04; 13/05; 12/04; 12/06; 12/09]*	**No**
Hauling method	The detail how the specimen was brought on-board according to the IOTC categories (**Table 17**). *[Consistent with IOTC Res 12-04]*	**No**
SAMPLING DETAILS Details concerning any sampling conducted, including where possible extra biometric measurements, sex, maturity and the collection of samples.		
Sampling methods for the collection of biological information	The sampling method used for the collection of biological sub-sample according to the IOTC categories (**Table 19**).	**Yes**
Length code 1	The length code used for the measurement according to the IOTC categories (**Table 23**).	**Yes**
Length 1	The length corresponding to the length type taken rounded to the lower centimetre. For LD1 this should be rounded to the lower half centimetre.	**Yes**
Length code 2	When an additional length measurement is taken. The length code used should be reported according to the IOTC categories (**Table 23**).	**No**
Length 2	When an additional length measurement is taken. The corresponding length should be reported rounded to the lower centimetre. For LD1 this should be rounded to the lower half centimetre.	**No**
Sex	The sex, male or female of the sampled fish specimen. If unknown record UNK.	**No**
Maturity stage	The stage of maturity of the sampled fish specimen according to standard maturity scales approved by the IOTC. If unknown record UNK.	**No**
Sample collected	The details on the collection of samples: a) type (e.g. otoliths, spine clippings, and genetic samples) b) preservation method (e.g. alcohol, frozen, etc.)	**No**

[9] List of Species of Special Interest (SSI) approved by IOTC Scientific Committee (SC) is included at the end of this document under the Codes and guideline section.

Data field name	Data field description	Mandatory
	c) destination (i.e. location to be sent/stored)	
TAG DETAILS		
Note that all tagged specimens are to be identified to species level and to be sampled for length. Elasmobranches and turtles are also to be sexed.		
Tag release	Indicate Yes or No, whether this individual was re-released with a tag attached	**Yes**
Tag recovery	Indicate Yes or No, whether a tag was recovered from this individual	**Yes**
Tag number	Provide the tag number. If a turtle make sure to provide both tag numbers (right and left flipper).	**Yes**
Tag type	The type of tag used according to the IOTC categories (**Table 20**).	**Yes**
Tag finder	The name and contact details of the person who recovered the tag.	**Yes**
BAIT FISHING OPERATIONS		
Event date and time	The data and time when chumming for bait starts.	**Yes**
Event start position	The position in latitude and longitude at the start of the fishing.	**Yes**
Event depth	Depth of the place where the net is being deployed (specify units).	**Yes**
CATCH DETAILS (i.e. information on catch for each set)		
Sampling methods *for obtaining total catch estimates per species*	The sampling method used to obtain total catch estimates per species for the observed set according to the IOTC categories (**Table 10**).	**Yes**
Species code	The species code for the species observed (FAO spp. 3-alpha code). If species FAO code is not available, the species scientific name.	**Yes**
Fate	The species fate which includes whether it was retained or discarded and the reason according to the IOTC categories (**Table 11. Fate**).	**Yes**
Weight (specify units)	The weight corresponding to the specified species and fate category. (Note: small amounts are to be recorded in numbers).	**Yes**
Weight code	The code corresponding to the type of processing the specimen underwent previous to be weighted according to the IOTC categories (**Table 14**). If the fish hasn't been processed than make sure to record code for unprocessed (or round, whole, live) weight (i.e. RD).	**Yes**
Weight estimation method	The weight estimation method used to collect weight according to the IOTC categories (**Table 13**).	**Yes**
Additional catch details on SSIs	Additional catch details on Species of Special Interest (SSI) to be collected where possible and reported to the IOTC Secretariat as recommended by the Scientific Committee.	

Data field name	Data field description	Mandatory
Condition at capture	The condition of the specimen at capture according to the IOTC categories (**Table 16**).	**No**
Gear interaction	The interaction of the specimen with the fishing gear according to IOTC categories (**Table 15**).	**No**
Brought on board	Indicate Yes or No, if the specimen brought on board. *[Consistent with IOTC Resolutions 13/04; 13/05; 12/04; 12/06; 12/09]*	**No**
Hauling method	The detail how the specimen was brought on-board according to the IOTC categories (**Table 17**). *[Consistent with IOTC Res 12-04]*	**No**
Condition at release	The condition of the specimen at the time of release according to the IOTC categories (**Table 16**).	**No**
DAILY ACTIVITY INFORMATION		
Date and time	The date and time at the start of the activity.	**Yes**
Position	The position in latitude and longitude at the start of the activity	**Yes**
Activity	Every change in vessel's activity is to be signalled according to IOTC categories (**Table 8**).	**Yes**
School sighting cue	Report up to the first three cues which leads the vessel to detect the presence of a tuna school according to IOTC categories (**Table 22**).	**Yes**
School type	The type of school detected according to IOTC categories (**Table 22**)	**Yes**
Object ID	For every activity involving artificials FAD (DFAD/AFAD) report FAD identifier (i.e. FAD marking or beacon ID or any information allowing identifying the owner).	**No**
Buoys equipped with artificial lights	Report if devices equipped with artificial lights. *[Conforms to IOTC Res 16/07]*	**No**

IOTC codes to be used to describe activities, detection and school associations

Table 1. Country codes/names FAO[10] (ISO3)

Code	English name
AUS	Australia
BLZ	Belize
CHN	China
COM	Comoros
ERI	Eritrea
FRA	European Union
GIN	France (EU)
IND	Guinea
IDN	India
IRN	Indonesia
ITA	Iran
JPN	Italy (EU)
KEN	Japan
KIR	Kenya
KOR	Kiribati
AUS	Korea, Republic of
LBR	Lyberia
MDG	Madagascar
MYS	Malaysia
MDV	Maldives
MUS	Mauritius
MOZ	Mozambique
NLD	Netherlands (EU)
OMN	Oman
PAK	Pakistan
PAN	Panama
PHL	Philippines
PRT	Portugal (EU)
SYC	Seychelles
SLE	Sierra Leone
SGP	Singapore
SOM	Somalia
ZAF	South Africa
ESP	Spain (EU)
LKA	Sri Lanka
SDN	Sudan
TZA	Tanzania
THA	Thailand
GBR	United Kingdom (EU)
YEM	Yemen

Table 2. Vessel hull material

Code	English description
STE	Steel
FRP	Fibre glass reinforced plastic
WOO	Wood
ALU	Aluminium
OTH	Other

Table 3. Line material types

Code	English Description
MON	Monofilament nylon
GLW	Galvanized wire (mat)
SSW	Stainless steel wire (bright)
TR3	3 strand tarred rope (red or black)
BRL	Braided line (kuralon- braided nylon)
SKW	Sekiyama wire (central part of the wire is surrounded by a cotton or synthetic fiber thread, and usually tarred)
MUN	Multifilament nylon
MUC	Multifilament Cremona
MOC	Monofilament Cremona
MUD	Multifilament Dyneema
MOD	Monofilament Dyneema
MUK	Multifilament Kevlar
MOK	Monofilament Kevlar
MUT	Multifilament Tetoron
MOT	Monofilament Tetoron

Table 4. Hooks type and size[11]

Code	English Description
C11	Circle hooks 11/0
C12	Circle hooks 12/0
C13	Circle hooks 13/0
C14	Circle hooks 14/0
C15	Circle hooks 15/0
C16	Circle hooks 16/0
C18	Circle hooks 18/0
H32	Japan tuna hooks 3.2
H34	Japan tuna hooks 3.4
H36	Japan tuna hooks 3.6
H38	Japan tuna hooks 3.8
H40	Japan tuna hooks 4.0
H42	Japan tuna hooks 4.2
J08	J Hooks 8/0
J09	J Hooks 9/0
J10	J Hooks 10/0
J12	J Hooks 12/0
S01	Spanish hooks 1
S02	Spanish hooks 2
S03	Spanish hooks 3
S04	Spanish hooks 4
T32	Teracima hooks 3.2 sun
T34	Teracima hooks 3.4 sun
T36	Teracima hooks 3.6 sun
T38	Teracima hooks 3.8 sun

Table 5. Bait type/condition

Code	English description
BLI	Live bait
FRC	Frozen/chopped
THC	Thawed/chopped
FRW	Frozen/whole
THW	Thawed/whole
BOT	Other

Table 6. Gillnet web colour

Code	English description
GRE	Green
CLA	Clear

[10] http://www.fao.org/countryprofiles/iso3list/en/
[11] www.spc.int/DigitalLibrary/Doc/FAME/Manuals/Beverly_09_LLTerminalGear.pdf

WHI	White
PIN	Pink
BLA	Black
GRY	Grey
BLU	Blue.
MUL	Multi-colour
RED	Red
OTH	Other

Table 7. Net setting strategy

Code	English description
NAN	Net anchored (i.e. remains attached to boat or another anchoring method)
NDR	Net is left drifting
GEN	Encircling
DOL	Dolphin associated
NTA	No tuna associated (blank set)
SM	Seamount (common for P&L)
UNK	Unknown
OTH	Other, record on comments

Table 8. Pole and line activity codes

Code	English description
BA	Searching / gathering bait Vessel is engaged in the process of searching for bait using vessel sonar or gathering bait using lights to attract and concentrate bait near the vessel.
BF	Bait fishing (the net is set or launched)
CH	Chasing a tuna school Chumming should be part of the Tuna fishing activity.
DF	Drifting with a tuna school, log or FAD.
DN	Drifting during the night (engine stopped)
DT	Drifting due to mechanical problems
DW	Drifting because of bad weather
FI	Tuna Fishing (Spraying, chumming or poling)
PO	In port
SE	Searching in general (for tuna schools, logs, or FADs or other vessels)
SI	Steaming towards (& investigating) observed system (birds, floating object, etc.) associated to the tuna school.
ST	Transit (steaming without searching day or night).
OT	Other activities (describe in comments)

Table 9. Artificial FAD design/materials[12]

Code	Proposed revision IOTC-ROS
RE	Raft covered with ecological materials (Burlap, Canvas of sisal, thick fabric,

	tarpaulin, rafia, canvas claustra, horticultural felt).
RNS	Raft covered using a net with a stretched mesh of less than 7 cm
RNL	Raft covered with large mesh net (stretched mesh of more than 7 cm)
RNC	Raft not covered
TNS	Tail made of nets rolled in "sausages"
TNS	Tail made of nets panels with a stretched mesh of less than 7 cm
TRO	Tail made of ropes
TRC	Tail made of ropes and canvas
TNL	Tail made of hanging large mesh net (stretched mesh of more than 7 cm)

Table 10. Sampling methods for obtaining total catch estimates per species

Code	English Description
EXS	Exhaustive Sampling: The observer weighted/counted every individual for the entire catch (only feasible if the catch is small)
MRS	Observer collected Multiple Random Samples, divided fish into species and weighted/counted them. Observer raised sample to obtain set catch per species (e.g. brail capacity x brail tally; fish weight x number of fish)
SPS	Systematic Proportional Sampling: a proportion (%) of the catch or of the individuals caught and brought on-board was weighted/counted in a systematic way to obtain set catch composition (e.g. every 3rd hook/ panel/brail, first 10 fish per section/panel/brail, 20 minutes/hour of hauling/brailing/fishing, etc.)
VES	Observer used Vessel Estimates to estimate catch per species (e.g. logbook, well contents, etc.)
CMB	Observer used a Combination of vessel estimates for retained catch and own estimates for discards to estimate catch per species.
OTH	Other. Provide details in comments

Table 11. Fate

Code	English Description
DTS	Discarded - too small. Fish of no commercial value due to being of small size
DUS	Discarded - unwanted species (e.g. with no commercial value or other than target species)
DRB	Discarded - retention ban on the species due to flag state measures
DFL	Discarded - vessel fully loaded
DUD	Discarded – due to IOTC retention ban
DPQ	Discarded – are unfit for human consumption[13]
DDL	Discarded - too difficult to land

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[12] ISSF GUIDE FOR NON-ENTANGLING FADs, International Seafood Sustainability Foundation (ISSF), 2015

[13] IOTC Res 17/04 : "unfit for human consumption" are fish that:

- is meshed or crushed in the purse seine; or

- is damaged due to depredation; or

- has died and spoiled in the net where a gear failure has prevented both the normal retrieval of the net and catch, and efforts to release the fish alive;

Code	English description
DFR	Discarded - trunk - fins retained (shark only)
DTR	Discarded - trunk retained, fins discarded (shark only)
RCC	Retained - crew consumption
RFL	Retained - for landing / sold
RFR	Retained trunk - fins retained (shark only)
RFT	Retained for at-sea-transhipment
ESC	Escaped
UNK	Unknown fate

Table 12. Gillnet condition at hauling

Code	English description
NGD	No gear damage or very few small, scattered holes.
005	Less than 5% of the net torn
025	Between 5% and 25% of the net torn.
050	Between 25% and 50% of the net torn.
075	Greater than 50% of the net torn.
100	Net totally rolled up.
OTH	Other, specify in comments
UNK	Unknown

Table 13. Weight estimation method

Code	English Description
EB	Electronic balance
SB	Spring balance
MB	Mechanical balance
EM	Eye measurement (observer)
LO	Vessel logbook (eye measurement crew)
LW	Length weight relationship

Table 14. Processing/product type

Code	English Description
RD	Unprocessed; Round (whole, live)
GG	Gilled-and-gutted (bill-off)
HD	Headed-and-gutted
PD	Headed and caudal peduncle-off
HT	Headed and tailed
HG	Headed, gutted and tailed
FL	Fish loins
GT	Gilled, gutted and tailed
GO	Gutted only (gills left)
FW	Fillet
FT	Fins and trunk (shark)
SF	Fins (shark)

Table 15. Gear interaction

Code	English Description
HB	Hooked in the beak or mouth
HR	Hooked in the rostrum (billfish only)
HJ	Hooked in the fish/shark jaw (include jaw hinge, lower and upper jaw).
HL	Hooked in the fish/shark lip
HG	Hooked in the gills / gill plate / gill slits)
HI	Hooked in the throat (internal including gullet)
HG	Hooked in the gut (internal)
HO	Foul hooked (any other external location)
EN	Entangled in the net
EN	Entangled in the line
EF	Entangled with FAD
EG	Entangled in ghost fishing gear
OT	Other (describe)
UK	Unknown

Table 16. Condition

Code	English description
A0	Alive excellent condition (Hutchinson, et al 2015 MEPS)
A1	Alive - active, healthy
A2	Alive - injured, distressed
A3	Alive - very weak, dying
S	Stunt – condition unknown
D	Dead
U	Condition unknown

Table 17. Hauling methods

Code	English description
HD	By hand
GR	Using the gear
GF	Using a gaff
BR	Using a brailler
SN	Using a scoop net
ON	Using another net
OT	Using another method (describe)

Table 18. Depredation source

Code	English Description
SH	Shark
TW	Toothed whales
SW	Sharks/toothed whales
MM	Marine mammal
CC	Cookie-cutter shark
BA	Depredation on bait
SQ	Squid
SB	Birds
OT	Other (specify)
UNK	Unknown

Table 19. Sampling methods for the collection of biological information

Code	English Description
EXS	Exhaustive Sampling: the totality of the catch or all individuals caught for this species has been subsampled.
SPS	Systematic Proportional Sampling: a proportion (%) of the catch or of the individuals caught and brought on-board for this species has been subsampled in a systematic way. (E.g. every 10th fish is sub-sampled).
SSS	Stratified Sampling of a sample taken via "Spill method". The observer tipped the fish from a pile/receptacle/conveyer belt into a bin to avoid hand selection of individual fish, divided fish into homogeneous subgroups before subsampling. (e.g.: observer sub-sampled 50 fish for large fish ($\geq$15 kg))
SSG	Stratified Sampling of a sample taken via "Grab method". The observer pulls by hand a selected number of fish from a pile/ receptacle/ conveyer belt and divided fish into homogeneous subgroups before subsampling (e.g.: observer sub-sampled 50 yellowfin tuna).
SRF	Systematic Random sampling of a Fixed number of each species: of the random sample taken, the fish are identified to species level. Once the main species have been determined, a pre-determined number of fish of each species is subsampled.

SRM	Systematic Random sampling of a Mixed species sample: of the random sample taken, a small random subsample is taken and biological information extracted.
SRP	Systematic Random sampling of Priority species: of the random sample taken, priority species are selected and biological information extracted.
OTH	Other. Provide details in comments

Table 20. Tag type

Code	English description
TC	Conventional (plastic spaghetti or dart tags are attached on the back of the fish)
TR	Rototags (a two-piece, plastic cattle ear tag, which is inserted through the first dorsal fin)
TS	Sonic tags (miniature radio transmitting devices that are surgically implanted inside the tuna. Since these are not visible externally, a conventional tag of a certain colour will be visible on the outside).
TP	Pop-up tags (Pop-up Satellite Archival Tags are inserted with an anchor and a tether into the dorsal musculature, recording temperature, pressure, and light, and they detach from the animal on a pre-programmed date).
TI	Internal archival tags (internal archival tags are implanted in the body cavity and record internal body temperature and the environment's temperature, pressure, and light).
TT	Smart Position or Temperature Transmitting tags are attached to the dorsal fin and send a signal to a satellite every time the animal surfaces
MB	Metal legband tag used to tag seabirds
MT	Metal tag used to tag sea turtles flippers (a different tag number for each flipper, make sure to collect both numbers if both tags are present).
ST	External satellite tag placed in turtle / bird back.
TO	Other (specify)

Table 21. Sampling protocol for longliners

Code	English Description
EX	Exhaustive Sampling: The totality of the hooks hauled was observed.
MRS	Random sampling: hooks were sampled randomly (e.g. Batch of 10 hooks selected at random along the line, or all hooks sampled for a period of 10 minutes selected at random during the hauling time).
SPS	Systematic sampling: a proportion (%) of the line was observed (e.g. Batch of 10 hooks selected at every 100 hooks along the line or all hooks sampled for a period of 10 minutes every hour).

Table 22. School sighting cue / School type

Sighting code	School sighting description	School type code	School type description
NSC	No sighting cue	**0**	**Undetermined**
UTS	Tuna school (no details given on the type of school)	**2**	**Free school**
CSA	Changes on sea surface appearance. Marks left by the fish on the surface of the water. It can take the form of a track or oil marks left by the presence of tuna. It can be a rippling of the sea surface, an area of extremely choppy sea, an area of very choppy / foamy sea surface. Or the presence of a fish school can be indicated by the jump of individual tuna.	**2**	**Free school**
DTS	Presence of a deep tuna school	**2**	**Free school**
BIR	Presence of birds	**2**	**Free school**
LWH	Presence of large whales (killer whales, sperm whales, baleen whales))	**2**	**Free school**
SWH	Presence Small toothed whales / dolphins (dolphins, pilot and/or false killer whales)	**2**	**Free school**
SHA	Presence of shark(s)	**2**	**Free school**
OVF	Another tuna vessel	**1**	**Associated school**
STS	Same school that escaped the previous set	**0**	**Undetermined**
SAV	School associated to the tuna vessel	**1**	**Associated school**
SEM	Fishing on a seamount	**1**	**Associated school**
OTH	Other (to detail in the comments)	**0**	**Undetermined**
SBV	Supply or bait-boat vessel	**1**	**Associated school**
WSB	Whale shark seen before set	**1**	**Associated school**
WSA	Whale shark seen later during set	**1**	**Associated school**
AFAD	Artificial FAD (man-made)	**1**	**Associated school**
NFAD	Natural FAD (non-man made)	**1**	**Associated school**
FSB	Feeding on bait fish	**2**	**Free school**

Table 23. Length measurement descriptions[141516]

Code	Tools	Type EN	Description EN
CKL	Caliper	Cleithrum-keel length	Projected straight distance between the point on the cleithrum that provides the shortest possible measurement to the anterior portion of the caudal keel. The cleithrum is the semi-circular bony structure at the posterior edge of the gill opening17.
D2FL	Caliper	Second dorsal fork length	Projected straight distance between the most anterior insertion of the second dorsal fin and the fork of the tail
DFL	Caliper	Dorsal fork length	Projected straight distance between the most anterior insertion of the dorsal fin and the fork of the tail
EFL	Caliper	Eye fork length	Projected straight distance from the caudal margin of orbit to the fork of the tail
FL	Caliper	Fork length	Projected straight distance from the tip of the upper jaw (snout) to the shortest caudal ray (fork)
IDS	Caliper	Interdorsal space	First dorsal-second dorsal (projected straight distance between the most posterior insertion of the first dorsal fin and the most anterior insertion of the second dorsal fin)
LD1	Caliper	Pre-dorsal length	Length to the first dorsal fin (projected straight distance from the tip of the snout to the anterior based of the first dorsal fin)
LJFL	Caliper	Lower jaw fork length	Projected straight distance from the tip of the lower jaw to the shortest caudal ray (fork of the caudal fin)
P1A	Caliper	Pectoral anterior margin	Projected straight distance between the tip and the base of the anterior margin of the pectoral fin (shark fin)
PAL	Caliper	Pectoral-anal length	Projected straight distance between the most anterior insertion of the pectoral fin to the most posterior rim of the anal sphincter
PDL	Caliper	Pectoral dorsal length	Projected straight distance between the most anterior insertion of the pectoral fin and the most anterior insertion of the second dorsal fin

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14 IOTC-2013-WPDCS09-13 Rev_1

15 Collette, B.B. and C.E. Nauen, 1983. FAO species, catalogue. Vol. 2. Scombrids of the world. An annotated and illustrated catalogue of tunas, mackerels, bonitos and related species known to date. FAO Fish.Synop., (125)Vol.. 2: 137 p.

16 Nakamura, I., 1985. FAO species catalogue. Vo1.5. Billfishes of the World. An annotated and illustrated catalogue of marlins, sailfishes, spearfishes and swordfishes known to date. FAO Fish.Synop., (125)Vo1.5:65 p.
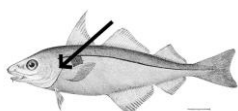
17 Location of the cleithrum

PFL	Caliper	Pectoral fork length	Projected straight distance between the most anterior insertion of the pectoral fin and the fork of the tail
PPS	Caliper	Pectoral-pelvic space	Projected straight distance between the most posterior insertion of the pectoral fin to the most anterior insertion of the pelvic fin
TL	Caliper	Total length (relaxed)	Projected straight distance from the most forward point of the head to the tip of the tail when the tail is left in the 'natural position' (unsqueezed)
CKLT	Tape measure	Curved cleithrum keel length	Projected curved body distance between the point on the cleithrum that provides the shortest possible measurement to the anterior portion of the caudal keel. The cleithrum is the semi-circular bony structure at the posterior edge of the gill opening.
D2FLT	Tape measure	Curved second dorsal fork length	Projected curved body distance between the most anterior insertion of the second dorsal fin and the fork of the tail
DFLT	Tape measure	Curved dorsal fork length	Projected curved body distance between the most anterior insertion of the dorsal fin and the fork of the tail
EFLT	Tape measure	Curved eye fork length	Projected curved body distance from the caudal margin of orbit to the fork of the tail along the contour of the body in a line that runs along the top of the pectoral fin and the top of the caudal keel
FLT	Tape measure	Curved fork length	Projected curved body distance from the tip of the upper jaw (snout) to the shortest caudal ray (fork)
IDST	Tape measure	Curved interdorsal space	Projected curved body distance between the most posterior insertion of the first dorsal fin and the most anterior insertion of the second dorsal fin
LD1T	Tape measure	Curved pre-dorsal length	Projected curved body distance from the tip of the snout to the anterior base of the first dorsal fin
LJFLT	Tape measure	Curved lower jaw fork length	Projected curved body distance from the tip of the lower jaw to the shortest caudal ray (fork of the caudal fin)
P1AT	Tape measure	Curved pectoral anterior margin	Projected curved body distance between the tip and the base of the anterior margin of the pectoral fin (shark fin)
PALT	Tape measure	Curved pectoral anal length	Projected curved body distance between the most anterior insertion of the pectoral fin to the most posterior rim of the anal sphincter
PDLT	Tape measure	Curved pectoral dorsal length	Projected curved body distance between the most anterior insertion of the pectoral fin and the most anterior insertion of the second dorsal fin
PFLT	Tape measure	Curved pectoral fork length	Projected curved body distance between the most anterior insertion of the pectoral fin and the fork of the tail
PPST	Tape measure	Curved pectoral pelvic space	Projected curved body distance between the most posterior insertion of the pectoral fin to the most anterior insertion of the pelvic fin
TLT	Tape measure	Total length (relaxed)	Projected curved body from the most forward point of the head to the tip of the tail when the tail is left in the 'natural position' (unsqueezed)
PCL	Caliper	Precaudal Length	Projected straight distance from the most forward point of the head to the anterior portion of the caudal keel (sharks).
PCLT	Tape measure	Precaudal Length	Projected straight distance from the most forward point of the head to the anterior portion of the caudal keel (sharks).
TWT	Tape measure	Total width	Total disc width (for skates and rays)
TW	Caliper	Total width	Total disc width (for skates and rays)
CLXT	Tape measure	Carapace Length	Total carapace length – maximum length from the anterior-most part of the carapace to the posterior-most tip of the carapace on the same side (turtles)
CLX	Caliper	Carapace Length	Total carapace length – maximum length from the anterior-most part of the carapace to the posterior-most tip of the carapace on the same side
CLNT	Tape measure	Carapace Length	Total carapace length – notch to notch (turtles)
CLN	Caliper	Carapace Length	Total carapace length - notch to notch (turtles)
TL	Caliper	Total length	Tip of bill to tip of tail (birds)
WL	Caliper	Wing length	Bend of the wing to the tip of the longest primary feathers (birds)
TI	Caliper	Tail length	Base of tail to tip of longest feathers (birds)
TS	Caliper	Tarsus length	Inner bend of the tibiotarsal articulation to the base of the toes (often marked by a difference in scalation) (birds)
CL	Caliper	Culmen length	Tip of the upper mandible and the other at base of the skull (birds)

APPENDIX VIII – SPECIES OF SPECIAL INTEREST (SSI) FOR THE IOTC

i. **All marine turtles**
ii. **All marine mammals**
iii. **All seabirds**
iv. **Designated shark species**
- Species with a <u>retention ban</u> (*Whale shark*, *Oceanic whitetip shark* and *Thresher sharks*);

- Species ranked as <u>high vulnerability</u> in the most recent ERA[18] (*Mako spp.*, *Silky shark*, *Porbeagle*, *Blue shark*, *Hammerhead sharks spp.*, *Tiger shark*, *Crocodile shark*, *Great white shark*, *Rays spp.*).

v. **All billfish species**[19]

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[18] Murua et al. 2018. IOTC-2018-SC21-14

[19] Resolution 18/05 indicates that the Commission is interested in the conservation of striped marlin, black marlin, blue marlin and Indo-Pacific sailfish so the addition of all billfish species has been proposed for practical reasons (i.e. to avoid potential species misidentification issues).