OUTCOMES OF THE 19th SESSION OF THE SCIENTIFIC COMMITTEE

PREPARED BY: IOTC SECRETARIAT[1], 26 SEPTEMBER 2017

PURPOSE

To inform participants at the 19th Working Party on Tropical Tunas (WPTT19) of the recommendations arising from the 19th Session of the IOTC Scientific Committee (SC) held from 1-5 December 2016, specifically relating to the work of the WPTT.

BACKGROUND

At the 19th Session of the SC, the SC noted and considered the recommendations made by the WPTT in 2016 that included requests to address the deficiencies in data collection, monitoring and reporting by CPCs, as well as to carry out targeted research and analysis on tropical tuna species.

Tropical tunas caught in the IOTC area of competence and under the WPTT mandate

Common name	Species	Code
Bigeye tuna	*Thunnus obesus*	BET
Skipjack tuna	*Katsuwonus pelamis*	SKJ
Yellowfin tuna	*Thunnus albacares*	YFT

The recommendations on the deficiencies in data collection, monitoring and reporting by CPCs in relation to tropical tunas will be discussed under agenda item 4 and in paper IOTC–2017–WPTT19–07 and are therefore not presented in this paper.

Based on the recommendations arising from the WPTT18, the SC19 adopted a set of recommendations, provide at Appendix A of this paper.

The recommendations contained in Appendix A were provided to the Commission for consideration at its 21st Session held in May 2017. A separate paper, IOTC–2017–WPTT19–04 addresses the responses and actions of the Commission.

In addition, the SC19 reviewed and endorsed a Program of Work (2017–2021) for the WPTT, including a revised assessment schedule, as detailed in Appendix B and Appendix C. A separate paper (IOTC–2017–WPTT19–08) will outline the review and development process for a *Program of Work* for the WPTT for the next five years.

DISCUSSION

In addition to the recommendations outlined in Appendix A, the following extracts from the SC19 Report (2016) are provided here for the consideration and action of the WPTT19:

Report of the 18th Session of the Working Party on Tropical Tunas (WPTT18)

The SC **NOTED** that the first attempt to establish a standardized CPUE series for the EU purse seine fleet was carried out in 2016 and made available to the WPTT, following results of the EU CECOFAD Project. It was **NOTED** that the series needs further work before being included in the assessment process, and therefore the SC **REQUESTED** that the EU scientists continue refining those series in 2017.

The SC **NOTED** that both MSY and depletion-based (B0) reference points are reported in the key management quantity tables of the stock assessments. The SC also **REQUESTED** that estimates of current biomass in the absence of fishing (i.e. Bcurrent, F=0) are included in the management quantity tables for future stock assessments.

Review of the statistical data available for bigeye tuna

The SC **NOTED** that in the case of many coastal fisheries, juveniles of bigeye tuna often account for an appreciable amount of the total catch but are either not reported or assigned to an 'Other' species category. The SC **REQUESTED**

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the IOTC Secretariat and Maldives collaborate to improve reliability of catches of bigeye tuna – particularly for historical catch series prior to the introduction of logbooks in 2010.

Collaborative study of tropical tuna CPUE from multiple Indian Ocean longline fleets

The SC **REQUESTED** continued work on joint analysis of operational catch and effort data from multiple fleets, to further develop methods and to provide indices of abundance for IOTC stock assessments, and **NOTED** that ISSF would be willing to contribute support for future activities, with the aim of normalizing the process of joint analysis of the operational catch and effort data within the IOTC.

Bigeye tuna CPUE summary discussion

The SC **RECOMMENDED** that the multi-nation CPUE standardisation collaboration continue their efforts to improve the understanding of commercial CPUE as relative abundance indices, and expand future work to include other fleets, including the Seychelles longline fleet.

Yellowfin tuna CPUE Summary discussion

The SC **REQUESTED** that efforts to develop abundance indicators using purse seine data should be continued. Given the difficulty of defining effort in purse seine fisheries (particularly in FAD fisheries), and the importance of obtaining an abundance index for skipjack, alternative methods such as those based on ratio methods and standardized species composition should also be considered.

Stock Synthesis III (SS3) assessment of yellowfin tuna

NOTING the discussions on the tagging mixing period during previous WPTT meetings, related to the assessment of yellowfin and other tropical tuna stocks, the SC **RECOMMENDED** that additional work to be conducted to elucidate the most appropriate approach to tag modelling in IOTC stock assessments.

Parameters for future analyses: Yellowfin tuna CPUE standardisation and stock assessments

The SC **RECOMMENDED** that development of the next stock assessment of yellowfin tuna should include a detailed review of the existing data sources (conducted by the stock assessment consultant, in collaboration with the IOTC Secretariat and main longline and purse seine fleets), including:

i.   Size frequency data: Evaluation of the reliability of length composition from the longline fisheries (including recent and historical data), review of issues with the use of the (EU) purse seine length composition data prior to 1991, and the need for a thorough review of the size frequency data held by IOTC, in collaboration with the fleets involved, to improve the utilization of these data in tropical tuna stock assessments.

ii.   Collaborative longline CPUE: Further refinement of the procedures to standardize the composite longline logsheet data sets to develop the longline CPUE indices;

iii.   Tagging data: Comprehensive analysis of the tag release/recovery data set;

iv.   Alternative CPUE series: a review of the available data from the Indian tuna longline survey data.

RECOMMENDATION

That the WPTT:

1)   **NOTE** paper IOTC–2017–WPTT19–03 which outlined the main outcomes of the 19th Session of the Scientific Committee, specifically related to the work of the WPTT.

2)   **CONSIDER** how best to progress these issues at the present meeting.

APPENDICES

Appendix A: Consolidated set of recommendations of the 19th Session of the Scientific Committee to the Commission, relevant to the Working Party on Tropical Tunas.

Appendix B: Program of Work (2017–2021) for the IOTC Working Party on Tropical Tunas (WPTT).

Appendix C: Assessment schedule for the WPTT 2017–2021.

APPENDIX A
CONSOLIDATED SET OF RECOMMENDATIONS OF THE 19TH SESSION OF THE SCIENTIFIC COMMITTEE (1–5 DECEMBER 2016) TO THE COMMISSION

STATUS OF TUNA AND TUNA-LIKE RESOURCES IN THE INDIAN OCEAN AND ASSOCIATED SPECIES

Tuna – Highly migratory species

SC19.01   (para. 142) The SC **RECOMMENDED** that the Commission note the management advice developed for each tropical and temperate tuna species as provided in the Executive Summary for each species, and the combined Kobe plot for the three species assigned a stock status in 2016 (Fig. 4):
- Albacore (*Thunnus alalunga*) – Appendix VIII
- Bigeye tuna (*Thunnus obesus*) – Appendix IX
- Skipjack tuna (*Katsuwonus pelamis*) – Appendix X
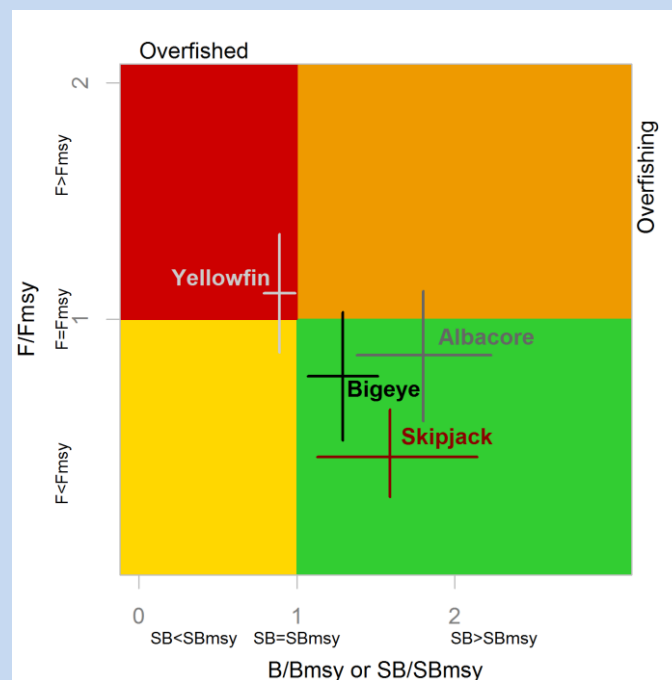- Yellowfin tuna (*Thunnus albacares*) – Appendix XI

Fig. 4. Combined Kobe plot for bigeye tuna (black: 2016), skipjack tuna (brown: 2014), yellowfin tuna (grey: 2016), and albacore tuna (dark grey: 2016) showing the estimates of current stock size (SB) and current fishing mortality (F) in relation to optimal spawning stock size and optimal fishing mortality. Cross bars illustrate the range of uncertainty from the model runs with a 80% CI. Note that for skipjack tuna, the estimates are highly uncertain as F_{MSY} is poorly estimated, and as suggested for stock status advice it is better to use B_0 as a biomass reference point and $C(t)$ relative to C_{MSY} as a fishing mortality reference point.

GENERAL RECOMMENDATIONS TO THE COMMISSION

Bigeye tuna CPUE summary discussion

SC19.25 (para. 93) The SC **RECOMMENDED** that the multi-nation CPUE standardisation collaboration continue their efforts to improve the understanding of commercial CPUE as relative abundance indices, and expand future work to include other fleets, including the Seychelles longline fleet.

Stock Synthesis III (SS3) assessment of yellowfin tuna

SC19.26 (para. 95) **NOTING** the discussions on the tagging mixing period during previous WPTT meetings, related to the assessment of yellowfin and other tropical tuna stocks, the SC **RECOMMENDED** that additional work to be conducted to elucidate the most appropriate approach to tag modelling in IOTC stock assessments.

Parameters for future analyses: Yellowfin tuna CPUE standardisation and stock assessments

SC19.27 ([para. 96](#)) The SC **RECOMMENDED** that development of the next stock assessment of yellowfin tuna should include a detailed review of the existing data sources (conducted by the stock assessment consultant, in collaboration with the IOTC Secretariat and main longline and purse seine fleets), including:

   v. Size frequency data: Evaluation of the reliability of length composition from the longline fisheries (including recent and historical data), review of issues with the use of the (EU) purse seine length composition data prior to 1991, and the need for a thorough review of the size frequency data held by IOTC, in collaboration with the fleets involved, to improve the utilization of these data in tropical tuna stock assessments.

   vi. Collaborative longline CPUE: Further refinement of the procedures to standardize the composite longline logsheet data sets to develop the longline CPUE indices;

   vii. Tagging data: Comprehensive analysis of the tag release/recovery data set;

   viii. Alternative CPUE series: a review of the available data from the Indian tuna longline survey data.

Summary discussion of matters common to Working Parties (capacity building activities – stock assessment course; connecting science and management, etc.)

Data collection and capacity building

SC19.34 ([para. 121](#)) The SC **AGREED** that, while external funding is helping the work of the Commission, funds allocated by the Commission to capacity building are still too low, considering the range of issues identified by the SC and its Working Parties, particularly in relation to the implementation of the Regional Observer Scheme and data collection and reporting for artisanal fisheries and **RECOMMENDED** that the Commission further increases the IOTC Capacity Building budget to fund these activities in the future.

Meeting participation fund

SC19.35 ([para. 123](#)) The SC reiterated its **RECOMMENDATION** that the IOTC Rules of Procedure (2014), for the administration of the Meeting Participation Fund be modified so that applications are due not later than 60 days, and that the full Draft paper be submitted no later than 45 days before the start of the relevant meeting. The aim is to allow the Selection Panel to review the full paper rather than just the abstract, and provide guidance on areas for improvement, as well as the suitability of the application to receive funding using the IOTC MPF. The earlier submission dates would also assist with Visa application procedures for candidates.

IOTC species identification guides: Tuna and tuna-like species

SC19.36 ([para. 124](#)) The SC **RECOMMENDED** that the Commission allocates budget towards continuing the translation and printing of the IOTC species ID guides so that hard copies of the identification cards can continue to be printed as many CPCs scientific observers, both on board and port, still do not have smart phone technology/hardware access and need to have hard copies on board.

IOTC Secretariat staffing

SC19.37 ([para. 126](#)) **NOTING** the very heavy workload at the IOTC Secretariat and the ever increasing demands by the Commission and the Scientific Committee, and also the capacity to respond to requests for assistance by countries, the SC **RECOMMENDED** that the recommendation from the Performance Review PRIOTC02.07(g) is implemented, and that permanent staff of the IOTC Data and Science Section be increased by two (2) (1 x P4 and 1 x P3 level positions), supplemented by additional short-term consultants, to commence work by 1 January 2018 or earlier, and that funding for these new positions should come from both the IOTC regular budget and from external sources to reduce the financial burden on the IOTC membership.

Collaborative Longline CPUE

SC19.38 ([para. 127](#)) The SC **ACNOWLEDGED** the work of the WPTT and WPTmT and especially improvements in the joint CPUE standardization work which is critical for reliably estimating the stocks. The SC **NOTED** that the joint CPUE has become a critical component for the assessments of temperate and

tropical tuna species and the SC **RECOMMENDED** that this work continue under the current framework, but that plans should be developed to formalize the process within the IOTC in the near future.

Chairpersons and Vice-Chairpersons of the SC and its subsidiary bodies

SC19.39   (para. 128) The SC **RECOMMENDED** that the Commission note and endorse the Chairpersons and Vice-Chairpersons for the SC and its subsidiary bodies for the coming years, as provided in Appendix VII.

Implementation of the Regional Observer Scheme

Development of a proposal for a Pilot Project to be presented to the Commission 2017

SC19.40   (para. 160) The SC **NOTED** the substantial resourcing that the proposed framework will require and **RECOMMENDED** that the Commission provide adequate resources to enable implementation of the project.

Progress on the Implementation of the Recommendations of the Second Performance Review Panel

SC19.41   (para. 168) The SC **RECOMMENDED** that the Commission note the updates on progress regarding Resolution 16/03, as provided at Appendix XXXIII.

Program of work and schedule of Working Party and Scientific Committee meetings

Consultants

SC19.42   (para. 179) **NOTING** the highly beneficial and relevant work done by IOTC stock assessment consultants in 2016 and in previous years, the SC **RECOMMENDED** that the engagement of consultants be continued for each coming year based on the Program of Work. Consultants will be hired to supplement the skill set available within the IOTC Secretariat and CPCs. The draft budget provided in Table 5, shall be incorporated into the overall IOTC Science budget for the consideration of the Commission.

Consideration of Resolution 15/09 On a fish aggregating devices (FADs) working group

SC19.43   (para. 185) The SC further **NOTED** that the intention of this is to hold a dialogue meeting between Commissioners as well as scientists and **RECOMMENDED** that the Commission consider holding an internal IOTC meeting in early 2017 in advance of the global meeting.

APPENDIX B

WORKING PARTY ON TROPICAL TUNAS PROGRAM OF WORK (2017–2021)

The SC **NOTED** the proposed Program of Work and priorities for the Scientific Committee and each of the Working Parties and **AGREED** to a consolidated Program of Work as outlined in Appendix XXXIVa-g. (IOTC–2016–SC19–R, Para. 170).

Table 1. Priority topics for obtaining the information necessary to develop stock status indicators for tropical tunas in the Indian Ocean.

Topic	Sub-topic and project	Priority ranking	Lead	Est. budget (potential source)	TIMING				
					2017	2018	2019	2020	2021
1. Stock structure (connectivity and diversity)	1.1. Genetic research to determine the connectivity of tropical tuna species throughout their distribution (including in adjacent Pacific Ocean waters as appropriate) and the effective population size.	MED (on-going)	CSIRO/AZTI/IRD/RITF	1.3 m Euro: (European Union; 20% additional co-financing)	▨	▨	▨		
	1.1.1 Next Generation Sequencing (NGS) to determine the degree of shared stocks for tropical tuna species in the Indian Ocean. Population genetic analyses to decipher inter- and intraspecific evolutionary relationships, levels of gene flow (genetic exchange rate), genetic divergence, and effective population sizes.				▨	▨	▨		
	1.1.2 Nuclear markers (i.e. microsatellite) to determine the degree of shared stocks for tropical tuna species in the Indian Ocean with the Pacific Ocean, as appropriate.				▨	▨	▨		
	1.2. Connectivity, movements and habitat use								
	1.2.1 Connectivity, movements, and habitat use, including identification of hotspots and investigate associated environmental conditions affecting the tropical tuna species distribution, making use of conventional and electronic tagging (P-SAT).	MED		US$?? (TBD)	▨	▨	▨	▨	▨
	2.1 Age and growth								

Topic	Sub-topic and project	Priority ranking	Lead	Est. budget (potential source)	TIMING				
					2017	2018	2019	2020	2021
2. Biological and ecological information (incl. parameters for stock assessment)	2.1.1 Design and develop a plan for a biological sampling program to support research on tropical tuna biology. The plan would consider the need for the sampling program to provide representative coverage of the distribution of the different tropical tuna species within the Indian Ocean and make use of samples and data collected through observer programs, port sampling and/or other research programs. The plan would also consider the types of biological samples that could be collected (e.g. otoliths, spines, gonads, stomachs, muscle and liver tissue, fin clips etc), the sample sizes required for estimating biological parameters, and the logistics involved in collecting, transporting and processing biological samples. The specific biological parameters that could be estimated include, but are not limited to, estimates of growth, age at maturity, fecundity, sex ratio, spawning season, spawning fraction and stock structure.	High	CPCs directly	US$?? (TBD)	▓	▓	▓	▓	▓
	2.2 Age-at-Maturity								
	2.2.1 CPCs to provide further research reports on tropical tuna biology, namely age and growth studies including using through the use of fish otoliths, either from data collected through observer programs or other research programs.	High	CPCs directly	US$?? (TBD)	▓		▓	▓	▓
3. Ecological information	3.1 Spawning time and locations								
	3.1.1 Collect gonad samples from tropical tunas to confirm the spawning time and location of the spawning area that are presently hypothesised for each tropical tuna species.	Med		US$?? (TBD)	▓				
4. Historical data review	4.1 Changes in fleet dynamics need to be documented by fleet				▓				
	4.1.1 Provide an evaluation of fleet-specific fishery impacts on the stock of bigeye tuna, skipjack tuna and yellowfin tuna. Project potential impact of realizing fleet development plans	Med	Consultant	US$30K	▓				

Topic	Sub-topic and project	Priority ranking	Lead	Est. budget (potential source)	2017	2018	2019	2020	2021
	on the status of tropical tunas based upon most recent stock assessments.				▓				
5. CPUE standardisation	5.1 Develop standardised CPUE series for each tropical tuna fleet/fishery for the Indian Ocean (numbering check)								
	5.1.1 Further development and validation of the collaborative longline CPUE indices using the data from multiple fleets (see Terms of Reference, Appendix IXa below).	High (on-going)	SC and consultants	US$40K (IOTC)	▓	▓	▓	▓	▓
	5.1.2 That standardised CPUE index for juvenile yellowfin tuna and bigeye tuna caught by the EU purse seiner fleets, be estimated and submitted to the WPTT before the next round of stock assessments of tropical tunas.		CPCs directly	US$?? (TBD)	▓				
	5.1.3 Development of minimum criteria (e.g. 10% using a simple random stratified sample) for logbook coverage to use data in standardisation processes; and 2) identifying vessels through exploratory analysis that were misreporting, and excluding them from the dataset in the standardisation analysis.		CPCs directly	US$?? (TBD)	▓				
	5.1.4 Vessel identity information for the Japanese fleets for the period prior to 1979 should be obtained either from the original logbooks or from some other source, to the greatest extent possible to allow estimation of catchability change during this period and to permit cluster analysis using vessel level data.		Japan	US$?? (TBD)	▓				
	5.1.5 The standardisation of purse seine CPUE be made where possible using the operational data on the fishery.		CPCs directly	US$?? (TBD)	▓				
	Bigeye tuna: High priority fleets	High	CPCs directly	US$?? (TBD)			▓		
	Skipjack tuna: High priority fleets	High	CPCs directly	US$?? (TBD)	▓			▓	▓
	Yellowfin tuna: High priority fleets	High	CPCs directly	US$?? (TBD)		▓			

Topic	Sub-topic and project	Priority ranking	Lead	Est. budget (potential source)	TIMING				
					2017	2018	2019	2020	2021
	5.1.6 That methods be developed for standardising purse seine catch species composition using operational data, so as to provide alternative indices of relative abundance.	High	Consultant and CPCs directly	US$?? (TBD)					
	5.1.7 Investigate the potential to use the Indian longline survey as a fishery-independent index of abundance for tropical tunas.	High	Consultant And CPCs directly	US$30K (TBD)					
6. Stock assessment / stock indicators	6.1 Develop and compare multiple assessment approaches to determine stock status for tropical tunas	Med	Consultant and CPCs directly	US$?? (TBD)					
	6.2 Scoping of ageing studies of tropical tunas to provide information on population age structure (based on species and age composition of sampled catches)	Med							
	6.3 Develop a high resolution age structured operating model that can be used to test the spatial assumptions including potential effects of limited tags mixing on stock assessment outcomes (see Terms of Reference, Appendix IXb below).	Med		US$60K					
	6.4 Stock assessment priorities – detailed review of the existing data sources, including: i. Size frequency data: Evaluation of the reliability of length composition from the longline fisheries (including recent and historical data), review of issues on the use of the (EU) purse seine length composition data prior to 1991, and the need for a thorough review of the size frequency data held by IOTC, in collaboration with the fleets involved, to improve the utilization of these data in tropical tuna stock assessments. ii. Tagging data: Further analysis of the tag release/recovery data set. iii. Alternative CPUE series: a review of the available data from the Indian tuna longline survey data.	Med		US$?? (TBD)					
7. Fishery independent monitoring	7.1 All of the tropical tuna stock assessments are highly dependent on relative abundance estimates derived from commercial fishery catch rates, and these could be substantially biased despite efforts to standardise for operational variability (e.g. spatio-temporal variability in operations, improved efficiency from new technology,		CPCs directly	US$?? (TBD)					

Topic	Sub-topic and project	Priority ranking	Lead	Est. budget (potential source)	TIMING				
					2017	2018	2019	2020	2021
	changes in species targeting). Accordingly, the IOTC should continue to explore fisheries independent monitoring options which may be viable through new technologies. There are various options, among which some are already under test. Not all of these options are rated with the same priority, and those being currently under development need to be promoted, as proposed below: i. Acoustic FAD monitoring, with the objective of deriving abundance indices based on the biomass estimates provided by echo-sounder buoys attached to FADs ii. Longline-based surveys (expanding on the Indian model) or "sentinel surveys" in which a small number of commercial sets follow a standardised scientific protocol iii. Aerial surveys, potentially using remotely operated or autonomous drones iv. Genetics-based tagging techniques using recaptured individuals or identification of closely-related pairs	High High Med Med							
8 Target and Limit reference points	8.1 To advise the Commission, on Target Reference Points (TRPs) and Limit Reference Points (LRPs).								
	8.1.1 Used when assessing tropical tuna stock status and when establishing the Kobe plot and Kobe matrices	High	CPCs directly	US$?? (TBD)					

APPENDIX C
SCHEDULE OF STOCK ASSESSMENTS FOR IOTC SPECIES AND SPECIES OF INTEREST FROM 2017–2021, AND FOR OTHER WORKING PARTY priorities

The SC **ADOPTED** a revised assessment schedule, ecological risk assessment and other core projects for 2017–21, for the tuna and tuna-like species under the IOTC mandate, as well as the current list of key shark species of interest, as outlined in Appendix XXXV. (IOTC–2016–SC19–R, Para. 177)

Extract of the Report of the 19th Session of the Scientific Committee

(IOTC–2016–SC19–R; Appendix XXXV, Pages 206 & 207)

Working Party on Tropical Tunas					
Species	**2017**	**2018**	**2019**	**2020**	**2021**
Bigeye tuna	Indicators	Indicators	**Full assessment**	Indicators	Indicators
Skipjack tuna	**Full assessment**	Indicators	Indicators	**Full assessment**	Indicators
Yellowfin tuna	Indicators	**Full assessment**	Indicators	Indicators	**Full assessment**

Note: the assessment schedule may be changed dependant on the annual review of fishery indicators, or SC and Commission requests.