
OUTCOMES OF THE 20th SESSION OF THE SCIENTIFIC COMMITTEE

PREPARED BY: IOTC SECRETARIAT¹, 02 OCTOBER 2018

PURPOSE

To inform participants at the 20th Working Party on Tropical Tunas (WPTT20) of the recommendations arising from the 20th Session of the IOTC Scientific Committee (SC) held from 30 November -4 December 2017, specifically relating to the work of the WPTT.

BACKGROUND

At the 20th Session of the SC, the SC noted and considered the recommendations made by the WPTT in 2017 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	<i>Thunnus obesus</i>	BET
Skipjack tuna	<i>Katsuwonus pelamis</i>	SKJ
Yellowfin tuna	<i>Thunnus albacares</i>	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–2018–WPTT20–08 and are therefore not presented in this paper.

Based on the recommendations arising from the WPTT19, the SC20 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 22nd Session held in May 2018. A separate paper, IOTC–2018–WPTT20–04 addresses the responses and actions of the Commission.

In addition, the SC20 reviewed and endorsed a Program of Work (2018–2022) for the WPTT, including a revised assessment schedule, as detailed in [Appendix B](#) and [Appendix C](#). A separate paper (IOTC–2018–WPTT19–09) 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 SC20 Report (2017) are provided here for the consideration and action of the WPTT20:

Report of the 19th Session of the Working Party on Tropical Tunas (WPTT19)

Skipjack stock assessment

The SC noted the annual 1% increase in fishing effort that was used to represent the effort creep in the purse seine CPUE analysis since 1995, and **REQUESTED** that the WPTT explore alternative methods of incorporating effort creep in future.

The SC noted the Recommendation from TCMP01, which was subsequently **ENDORSED** by the Commission (S21) that:

“When establishing a catch limit for skipjack tuna using the Harvest Control Rule (HCR) adopted in Resolution 16/02, the following procedure will be applied: after the review of the assessment of skipjack tuna by the SC, the result of the assessment will be used by the SC in the calculation of a catch limit using the adopted HCR. The

¹ secretariat@iotc.org

Secretariat will then notify CPCs of the new catch limit for skipjack tuna that will apply for 2018” (IOTC-2017-S21-R, Para. 56).

The SC noted that catches of skipjack in recent years are close to the recommended annual catch limit from the HCR, and **RECOMMENDED** that the Commission encourage CPCs to closely monitor catches of skipjack tuna to ensure that the integrity of the catch limit is maintained.

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

The SC **AGREED** that development of the next stock assessment of yellowfin tuna should include, or be associated with, a 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), incorporation of unraised samples in addition to the already provided extrapolated EU purse seiners, thorough review of the other 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.

RECOMMENDATION

That the WPTT:

- 1) **NOTE** paper IOTC–2018–WPTT20–03 which outlined the main outcomes of the 20th 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 20th Session of the Scientific Committee to the Commission, relevant to the Working Party on Tropical Tunas.

Appendix B: Program of Work (2018–2022) for the IOTC Working Party on Tropical Tunas (WPTT).

Appendix C: Assessment schedule for the WPTT 2018–2022.

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

SC20.01 (para. 176) 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 four species assigned a stock status in 2017 (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](#)

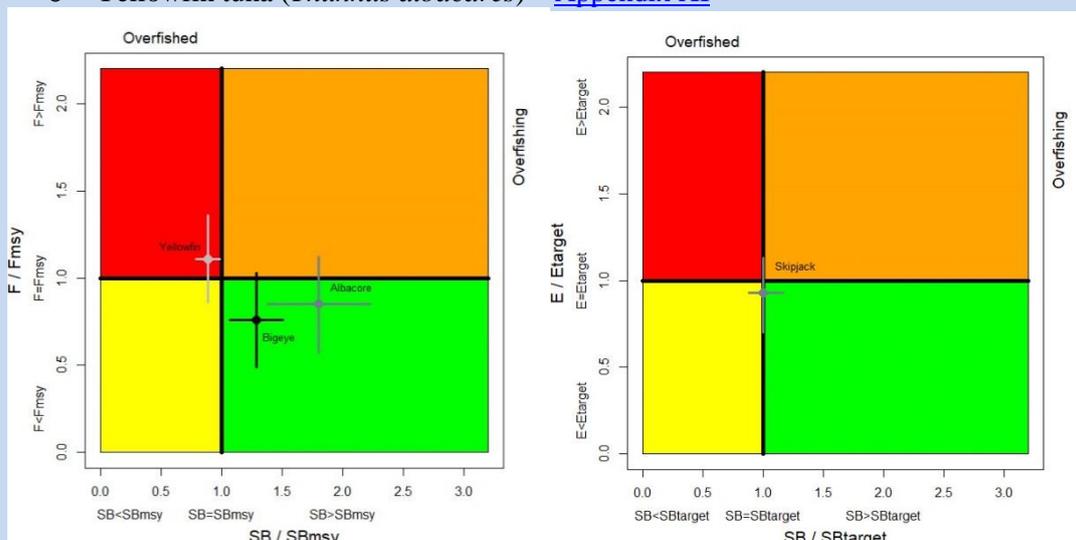


Fig. 4. (Left) Combined Kobe plot for bigeye tuna (black: 2015), yellowfin tuna (grey: 2015), and albacore tuna (dark grey: 2014) showing the estimates of current spawning stock size (SB) and current fishing mortality (F) in relation to SBtarget and Ftarget. (Right) Kobe plot for skipjack tuna (2016) showing the estimates of the current spawning stock status (SB) and exploitation rate in relation to SBtarget and Etarget. Numbers in brackets indicate the last year of data available at the time of the assessment. Cross bars illustrate the range of uncertainty from the model runs with 80% CI.

GENERAL RECOMMENDATIONS TO THE COMMISSION

Skipjack stock assessment

Review of new information on the status of bigeye tuna: Nominal and standardised CPUE indices

SC20.26 (para. 78) The SC acknowledged the efficiency value of making the operational logbook data available to appropriate analysts outside of the responsible CPCs, and **RECOMMENDED** that high level arrangements for sharing and confidentiality should be pursued. Noting the confidentiality issues with some of the datasets, the SC **REQUESTED** that the IOTC Secretariat and main stakeholders explore options to facilitate future data sharing agreements which, once in place, may not necessitate face-to-face meetings and could instead include remote processes

SC20.27 (para. 79) The SC **RECOMMENDED** that the joint longline CPUE standardization for tropical tunas should continue, and that further development work should be assigned a high priority. Acknowledging that the law of diminishing returns will affect similar future analyses, the SC suggested that immediate priorities should focus on the following areas:

- develop joint CPUE indices for other IOTC species (i.e., billfish and sharks);

- explore possibilities for including CPUE data provided by other IOTC CPCs (particularly coastal fisheries);
- identify a unified approach for species targeting using simulation testing (for example, the value of cluster analysis is clear in the temperate regions, but less so in tropical regions);
- recover vessel identification details from historical data;
- further develop the work on time-area interactions. Include a detailed examination of catch rates and related data in the piracy area, comparing pre-piracy and post-piracy effects. Potentially also consider the effects of localised depletion and renewal processes on catch rates.
- conduct further analyses to explore 1977 discontinuity (other oceans);
- develop an Indian Ocean CPUE reference manual for practitioners to use
- explore other density probability functions to improve model fit.

Skipjack stock assessment

SC20.28 (para. 88) The SC noted that catches of skipjack in recent years are close to the recommended annual catch limit from the HCR, and **RECOMMENDED** that the Commission encourage CPCs to closely monitor catches of skipjack tuna to ensure that the integrity of the catch limit is maintained.

SC20.28 (para. 88) The SC noted that catches of skipjack in recent years are close to the recommended annual catch limit from the HCR, and **RECOMMENDED** that the Commission encourage CPCs to closely monitor catches of skipjack tuna to ensure that the integrity of the catch limit is maintained.

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

Data collection and capacity building

SC20.39 (para. 122) 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.

Invited Expert(s) at the WP meetings

SC20.40 (para. 124) Given the importance of external peer review for working party meetings, the SC **RECOMMENDED** that the Commission continues to allocate sufficient budget for an invited expert to be regularly invited to all scientific WP meetings.

Meeting participation fund

SC20.41 (para. 126) 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

SC20.42 (para. 127) The SC reiterated its **RECOMMENDATION** 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

SC20.43 (para. 128) 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 late-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.

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

SC20.44 (para. 132) 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](#).

Outcomes of the IOTC and joint t-RFMO FAD Working Group

SC20.45 (para. 150) Noting that Resolution 17/08 provides a start date for the implementation of non-entangling FADs, but no end date, the SC **RECOMMENDED** that this Resolution is revised to include a date by which non-entangling FADs should be fully implemented.

“To reduce the entanglement of sharks, marine turtles or any other species, the design and deployment of FADs shall be based on the principles set out in Annex III, which will be applied gradually from 2014” (Resolution 17/08, para. 13).

Biodegradable FAD (BIOFAD) project

SC20.46 (para. 163) The SC noted the challenges in conducting studies on biodegradable FADs (for example the limit on the number of active FADs per purse seine vessel in the Indian Ocean that may hinder the deployment of BIOFADs following experimental sampling designs, and also engagement with the fleet to deploy BIOFADs that may not be successful for fishing). Thus, the SC **RECOMMENDED** the Commission consider special allocations for experimental FADs deployed for the collection of scientific data for vessels willing to participate in biodegradable FAD testing under protocols reviewed and endorsed by the Scientific Committee.

Implementation of the Regional Observer Scheme

SC20.47 (para. 197) The SC therefore **RECOMMENDED** that the EMS standards presented for purse seine fisheries (IOTC-2016-SC19-15) are adopted and **REQUESTED** that draft standards are similarly proposed for the longline fleets by CPCs currently trialling and implementing EMS on these vessels and that draft standards are also developed for gillnet fleets through the ROS Pilot Project.

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

SC20.48 (para. 201) 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***

SC20.49 (para. 212) 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.

Other Business***Template for Invited Experts***

SC20.50 (para. 237) Noting the recommendation of the IOTC Performance Review (PRIOTC02.02d), the SC **AGREED** that a comprehensive, formal external peer review is sometimes important for important or contentious assessments. Thus, the SC **RECOMMENDED** that a process is established and that the Commission allocates funding for external peer review of stock assessments to take place periodically, based on priorities identified by the SC, and **REQUESTED** that the Secretariat develop ToRs for these, with input from the SC Chair and Vice-Chair, and potentially based on a framework similar to that established for the Center for Independent Experts.

Review of the Draft, and Adoption of the Report of the 18th Session of the Scientific Committee

SC20.51 (para. 239) The SC **RECOMMENDED** that the Commission consider the consolidated set of recommendations arising from SC20, provided at [Appendix XXXVII](#).

APPENDIX B
WORKING PARTY ON TROPICAL TUNAS PROGRAM OF WORK (2018–2022)

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 XXXVIa-g. (IOTC–2017–SC20–R, Para. 204).

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				
					2018	2019	2020	2021	2022
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.	High (on-going)	CSIRO/AZ TI/IRD/RI TF	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).	Medium		US\$?? (TBD)					
	1.2.2 Investigation into the degree of local or open population in main fishing areas (e.g., the Maldives and Indonesia – archipelagic								

Topic	Sub-topic and project	Priority ranking	Lead	Est. budget (potential source)	TIMING				
					2018	2019	2020	2021	2022
	and open ocean) by using techniques such flux in FAD arrays or used of morphological features such as shape of otoliths.	Medium		Some work ongoing – MDV, IDN					
2. Biological and ecological information (incl. parameters for stock assessment)	2.1 Age and growth								
	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 gonad maturity studies, or through 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 periods and locations								
	3.1.1 Collect gonad samples from tropical tunas to confirm the spawning periods and location of the spawning area that are presently hypothesised for each tropical tuna species.	Medium		US\$?? (TBD)					
4. Historical data review	4.1 Changes in fleet dynamics need to be documented by fleet								

Topic	Sub-topic and project	Priority ranking	Lead	Est. budget (potential source)	TIMING				
					2018	2019	2020	2021	2022
	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 on the status of tropical tunas based upon most recent stock assessments.	Medium	Consultant	US\$30K					
5. CPUE standardisation	5.1 Develop standardised CPUE series for each tropical tuna fleet/fishery for the Indian Ocean								
	5.1.1 Further development and validation of the collaborative longline CPUE indices using the data from multiple fleets and to provide joint CPUE series for longline fleets where possible	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)					
	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				
					2018	2019	2020	2021	2022
	5.2 That methods be developed for standardising purse seine catch species composition using operational data, so as to provide alternative indices of relative abundance (see Terms of Reference, Appendix IXb below).	High	Consultant and CPCs directly	US\$?? (TBD)					
	5.3 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)					
	5.4 Further investigate and use of gillnet CPUE series from Sri Lankan gillnet fishery	High	Consultant And CPCs directly	US\$ (TBD)					
6. Stock assessment / stock indicators	6.1 Develop and compare multiple assessment approaches to determine stock status for tropical tunas	Medium	Consultant and CPCs directly						
	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)								
	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 IXa below).								
	6.4 Stock assessment priorities – detailed review of the existing data sources, including:	Medium	Consultant and CPCs directly						
	i. <i>Size frequency data: Evaluation of the reliability of length composition from the longline fisheries (including recent and historical data), review of anomalies in the (EU) PS length composition data, 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.</i>								
	<i>ii. Tagging data: Further analysis of the tag release/recovery data set.</i>								
	<i>iii. Alternative CPUE series: a review of the available data from the Indian tuna longline survey data.</i>								

Topic	Sub-topic and project	Priority ranking	Lead	Est. budget (potential source)	TIMING				
					2018	2019	2020	2021	2022
7. Fishery independent monitoring	7.1 Develop fishery independent estimates of stock abundance to validate the abundance estimates of CPUE series.		Consultant and CPCs directly	US\$?? (TBD)					
	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, 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:			US\$60K					
	i. Acoustic FAD monitoring, with the objective of deriving abundance indices based on the biomass estimates provided by echo-sounder buoys attached to FADs			US\$?? (TBD)					
	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	High							
	iii. Aerial surveys, potentially using remotely operated or autonomous drones	High							
iv. Studies (research) on flux of tuna around anchored FAD arrays to understand standing stock and independent estimates of the stock abundance.	Medium								
v. Genetics-based tagging techniques using recaptured individuals or identification of close-related pairs. Use of Close Kin Mark Recapture (CKMR) methods to study fishery independent methods of generating spawner abundance estimates based on genotyping individuals to a level that can identify close relatives (e.g. parent-offspring or half-siblings). The method avoids many of the problems of conventional tagging, e.g. live handling is not required (only catch needs to be sampled), tag shedding, tag-	Medium								

Topic	Sub-topic and project	Priority ranking	Lead	Est. budget (potential source)	TIMING				
					2018	2019	2020	2021	2022
	induced mortality and recovery reporting rates are irrelevant. It has been cost-effective in a successful application to southern bluefin tuna, but it remains unknown how the cost scales with population size. It would be valuable to conduct a scoping exercise to evaluate the applicability to the tropical tuna species								
8	<p>Target and Limit reference points</p> <p>8.1 To advise the Commission, on Target Reference Points (TRPs) and Limit Reference Points (LRPs).</p> <p>8.1.1 Used when assessing tropical tuna stock status and when establishing the Kobe plot and Kobe matrices</p>	High	CPC's directly	US\$?? (TBD)					

APPENDIX C

SCHEDULE OF STOCK ASSESSMENTS FOR IOTC SPECIES AND SPECIES OF INTEREST FROM 2018–2022, AND FOR OTHER WORKING PARTY PRIORITIES

The SC **ADOPTED** a revised assessment schedule, ecological risk assessment and other core projects for 2018–22, 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 XXXVII. (IOTC–2017–SC20–R, Para. 210)

*Extract of the Report of the 20th Session of the Scientific Committee
(IOTC–2017–SC20–R; Appendix XXXVII, Pages 221 and 222)*

<i>Working Party on Tropical Tunas</i>					
Species	2018	2019	2020	2021	2022
Bigeye tuna	Indicators	Full assessment	Indicators	Indicators	Full assessment
Skipjack tuna	Indicators	Indicators	Full assessment	Indicators	Indicators
Yellowfin tuna	Full assessment	Indicators	Indicators	Full assessment	Indicators

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