OUTCOMES OF THE 21th SESSION OF THE SCIENTIFIC COMMITTEE

PREPARED BY: IOTC SECRETARIAT, 08 SEPTEMBER 2019

PURPOSE

To inform participants at the 17h Working Party on Billfish (WPB17) of the recommendations arising from the 21th Session of the IOTC Scientific Committee (SC) held from 3– 7 December 2018, specifically relating to the work of the WPB.

BACKGROUND

At the 21th Session of the SC, the SC noted and considered the recommendations made by the WPB in 2018 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 billfish species.

Billfish caught in the IOTC area of competence

IOTC code	English name	Scientific name
BLM	Black marlin	*Makaira indica*
BUM	Blue marlin	*Makaira nigricans*
MLS	Striped marlin	*Tetrapturus audax*
SFA	Indo-Pacific sailfish	*Istiophorus platypterus*
SWO	Swordfish	*Xiphias gladius*

Based on the recommendations arising from the WPB16, the SC21 adopted a set of recommendations, provided at Appendix A of this paper.

The recommendations contained in Appendix A were provided to the Commission for consideration at its 23nd Session held in June 2019. A separate paper, IOTC–2019–WPB17–04 addresses the responses and actions of the Commission.

In addition, the SC20 reviewed and endorsed a Program of Work (2019–23) for the WPB, including a revised stock assessment schedule, as detailed in Appendix B and Appendix C. A separate paper (IOTC–2019–WPB17–08) will outline the review and development process for a Program of Work for the WPB for the next five years (2020–24).

DISCUSSION

In addition to the recommendations outlined in Appendix A, Appendix B and Appendix C, the SC made several other comments relevant to the WPB, which participants are asked to consider:

Report of the 15th Session of the Working Party on Billfish

The SC recalled its previous **RECOMMENDATION** that on the next revision of the IOTC Agreement, the shortbill spearfish (*Tetrapturus angustirostris*) be included as an IOTC species.

Review of the statistical data available for billfish

The SC noted the IOTC Secretariat has re-estimated the catches for Indonesia's fresh longline fleet and provided the WPB16 meeting with an alternative catch series (IOTC–2018–WPB16–DATA03b). The total catches mostly affect catches of swordfish, blue marlin, and striped marlin to a lesser extent, which have been revised downwards by as much as 30%. The SC further noted that these estimates have been reviewed by WPDCS14.

New information on biology

The SC noted that Chinese scientists used the observer data from Chinese longline fleets to provide the first estimates of the size at maturity for billfishes in the Indian Ocean: the estimates of 50% and 95% size at maturity are 161.4 cm and 226.2 cm for Blue marlin respectively, 177.0 cm and 238.1 cm for striped marlin, 166.9 cm 180.0 cm for black marlin, and 192.6 cm and 254.4 cm for Indo-pacific sailfish. The SC welcomed the study and noted that these estimates are useful in providing advice on the establishment of minimum conservation sizes for marlins and billfishes, as requested by Resolution 18/05

The SC noted a preliminary study showing estimated size at maturity for marlin are much higher than the default minimum landing size specified in Resolution 18/05 (i.e. 60 cm LJFL, as specified in the Blue marlin executive summary). The SC noted the establishment of appropriate minimum conservation size should also take into account gear selectivity, and therefore **ENCOURAGED** CPCs to continue to improve catch sampling to better understand the size composition of marlin species captured by different gear types.

Swordfish stock assessment and MSE

The SC noted that one of the team members involved in the development of the swordfish OM is starting a PhD in 2019 with IO Swordfish MSE included as one objective. The SC noted that salaries are already covered for next years for that team member, but further funding is required to support the travelling and time for two short-term visits to the JRC, as well as to attend IO MSE-technical workshops and WPM meeting in 2019. The SC therefore RECOMMENDED to fund this work during 2019 in order to progress the work on the IOTC MSE for SWO, with a total of 10.000€ requested for 2019, further noting that part of the funds (around 3.000€) should be available earlier in the year to start the work no later than March 2019.

Revision of catch levels of Marlins under Resolution 18/05

The SC noted that Resolution 18/05 On management measures for the conservation of billfish, striped marlin, black marlin, blue marlin and Indo-Pacific sailfish encourages CPCs to "…ensure that the overall catches, of the Indian Ocean Striped Marlin, Black Marlin, Blue Marlin and Indo Pacific Sailfish in any given year do not exceed either the MSY level or, in its absence, the lower limit of the MSY range of central values as estimated by the Scientific Committee…". Moreover, Resolution 18/05 also requires the SC to "…annually review the information provided and assess the effectiveness of the fisheries management measures reported by CPCs on striped marlin, black marlin, blue marlin and Indo-Pacific sailfish and, as appropriate, provide advice to the Commission".

The SC noted that catches in recent years for Black Marlin, Blue Marlin, Striped Marlin and Indo-Pacific Sailfish have all exceeded the catch limits set by Resolution 18/05, and that current catch trends for all four species show no signs of decline in line with meeting the catch limits by 2020. As such, the SC urgently **RECOMMENDED** that measures are agreed to reduce current catches to the limits set for all four species covered by Resolution 18/05 as per the management advice given in the Executive Summaries.

RECOMMENDATION/S

That the WPB:

1) **NOTE** paper IOTC–2019–WPB17-03 which outlined the main outcomes of the 21th Session of the Scientific Committee (SC21), specifically related to the work of the WPB.
2) **CONSIDER** how best to progress these issues at the present meeting.

APPENDICES

Appendix A**:** Consolidated set of recommendations of the 21th Session of the Scientific Committee to the Commission, relevant to the Working Party on Billfish.
Appendix B**:** Program of work (2019–2023) for the IOTC Working Party on Billfish (WPB).
Appendix C**:** Schedule of stock assessments for the WPB (2019–23).

APPENDIX A

CONSOLIDATED SET OF RECOMMENDATIONS OF THE 21th SESSION OF THE SCIENTIFIC COMMITTEE (4– 7 December 2018) TO THE COMMISSION RELEVANT TO THE WORKING PARTY ON BILLFISH

Extract of the Report of the 21th Session of the Scientific Committee

(IOTC–2018–SC20–R; Appendix XXXIX, Page 249)

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

Billfish

SC21.02 (para. 200) The SC **RECOMMENDED** that the Commission note the management advice developed for each billfish species under the IOTC mandate, as provided in the Executive Summary for each species, and the combined Kobe plot for the five species assigned a stock status in 2018 (Fig. 6):

- Swordfish (*Xiphias gladius*) – Appendix 12
- Black marlin (*Makaira indica*) – Appendix 13
- Blue marlin (*Makaira nigricans*) – Appendix 14
- Striped marlin (*Tetrapturus audax*) – Appendix 15
- Indo-Pacific sailfish (*Istiophorus platypterus*) – Appendix 16

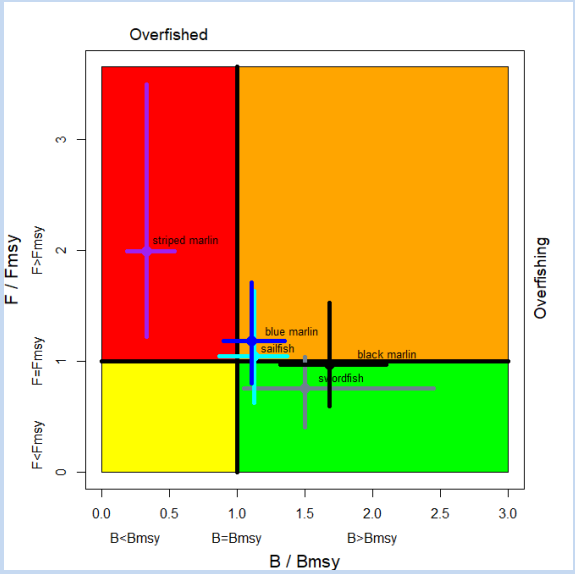

Fig. 4. Combined Kobe plot for swordfish (grey: 2015), indo-pacific sailfish (cyan: 2014), black marlin (black: 2018), blue marlin (blue: 2015) and striped marlin (purple: 2018) showing the estimates of stock size (SB or B, species assessment dependent) and fishing mortality (F) in relation to MSY-based reference points. 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.

GENERAL RECOMMENDATIONS TO THE COMMISSION, TO SPECIFIC CPCs AND/OR OTHER BODIES

REPORT OF THE 16TH SESSION OF THE WORKING PARTY ON BILLFISH (WPB16)

SC21.12 (para. 44) The SC recalled its previous **RECOMMENDATION** that on the next revision of the IOTC Agreement, the shortbill spearfish (*Tetrapturus angustirostris*) be included as an IOTC species.

Swordfish MSE

SC21.13 (para. 66) The SC noted that one of the team members involved in the development of the swordfish OM is starting a PhD in 2019 with IO Swordfish MSE included as one objective. The SC noted that salaries are already covered for next years for that team member, but further funding is required to

support the travelling and time for two short-term visits to the JRC, as well as to attend IO MSE-technical workshops and WPM meeting in 2019. The SC therefore **RECOMMENDED** to fund this work during 2019 in order to progress the work on the IOTC MSE for SWO, with a total of 10.000€ requested for 2019, further noting that part of the funds (around 3.000€) should be available earlier in the year to start the work no later than March 2019.

Revision of catch levels of Marlins under Resolution 18/05

SC21.14 (para. 69) The SC noted that catches in recent years for Black Marlin, Blue Marlin, Striped Marlin and Indo-Pacific Sailfish have all exceeded the catch limits set by Resolution 18/05, and that current catch trends for all four species show no signs of decline in line with meeting the catch limits by 2020. As such, the SC urgently **RECOMMENDED** that measures are agreed to reduce current catches to the limits set for all four species covered by Resolution 18/05 as per the management advice given in the Executive Summaries.

SUMMARY DISCUSSION OF MATTERS COMMON TO WORKING PARTIES (CAPACITY BUILDING ACTIVITIES – STOCK ASSESSMENT COURSE; CONNECTING SCIENCE AND MANAGEMENT, ETC.)

Invited Expert(s) at the WP meetings

SC21.29 (para. 177) 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

SC21.30 (para. 178) 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

SC21.31 (para. 179) 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

SC21.32 (para. 180) 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. 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

SC21.33 (para. 181) 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 7.

PROGRESS ON THE IMPLEMENTATION OF THE RECOMMENDATIONS OF THE PERFORMANCE REVIEW PANEL

SC21.34 (para. 214) The SC **RECOMMENDED** that the Commission note the updates on progress regarding Resolution 16/03, as provided at Appendix 33.

PROGRAM OF WORK AND SCHEDULE OF WORKING PARTY AND SCIENTIFIC COMMITTEE MEETINGS

Consultants

SC21.35 (para. 234) Noting the highly beneficial and relevant work done by IOTC stock assessment consultants 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.

IOTC SCIENTIFIC STRATEGIC PLAN

SC21.36 (para. 247) The SC **AGREED** that the draft IOTC Strategic Science Plan 2020–2024 will be distributed to Heads of Delegation from each CPC for comment during early 2019, following which time comments will be collated and consolidated and another version sent to CPCs for final review. Pending agreement of CPCs, and noting that the IOTC Strategic Science Plan would be a dynamic document that would change over time, the SC **RECOMMENDED** that the revised draft of the IOTC Strategic Science Plan 2020–2024 be tabled at the Commission meeting in 2019.

REVIEW OF THE DRAFT, AND ADOPTION OF THE REPORT OF THE 18TH SESSION OF THE SCIENTIFIC COMMITTEE

SC21.37 (para. 250) The SC **RECOMMENDED** that the Commission consider the consolidated set of recommendations arising from SC21, provided at Appendix 40.

APPENDIX B

PROGRAM OF WORK (2019–2023) FOR THE SCIENTIFIC COMMITTEE AND ITS SUBSIDIARY BODIES

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.

The Chairpersons and Vice-Chairpersons of each working party shall ensure that the efforts of their working party are focused on the core areas contained within the appendix, taking into account any new research priorities identified by the Commission at its next Session (IOTC–2017–SC20–R, Para. 204).

Working Party on Billfish (WPB)

(Extracts from IOTC–2019–SC21–R: Appendix 35C, *Page 210)*

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

Topic	Sub-topic and project	Priority ranking	Est. budget and/or potential source	Timing				
				2019	2020	2021	2022	2023
1. Stock structure (connectivity and diversity)	1.1 Genetic research to determine the connectivity of billfish throughout their distribution (including in adjacent Pacific and Atlantic waters as appropriate) and the effective population size.		1.3 m Euro: (European Union)					
	1.1.1 Next Generation Sequencing (NGS) and nuclear markers (i.e. microsatellites) to determine the degree of shared stocks for billfish within the Indian Ocean and with the southern Atlantic Ocean and Pacific Ocean, as appropriate. Population genetic analyses to decipher inter- and intraspecific evolutionary relationships, levels of gene flow (genetic exchange rate), genetic divergence, and effective population sizes. Highest priority species: blue, black, striped marlin and sailfish.	High (15)						
	1.1.2 Initiate discussion (e.g., small workshop for CSIRO or request to present results in WPB) on the possibility to develop a close-kin mark recapture method (see *Bravington et al.* 2016) on marlins to estimates population size and other important demographic parameters..	High (14)						
	1.2 Tagging research (PSAT tags) to determine connectivity, movement rates and mortality estimates of billfish (Priority species: swordfish).	High (1)	US$400,000					
	2.1 Age and growth research	High (2)						

2. Biological and ecological information (incl. parameters for stock assessment and provide answers to the Commission)	2.1.1 CPCs to provide further research on billfish biology, namely age and growth studies including through the use of fish otolith or other hard parts, either from data collected through observer programs, port sampling or other research programs. (Priority: all billfishes: swordfish, marlins and sailfish)		(CPCs: age & growth study = 50,000)						
	2.2 Reproductive biology study	High (3)							
	2.2.1 CPCs to conduct reproductive biology studies, which are necessary for billfish throughout its range to determine key biological parameters including length-at-maturity, age-at-maturity and fecundity-at-age, which will be fed into future stock assessments, as well as provide advice to the Commission on the established Minimum Retention Sizes (Res 18-05, paragraphs 5 and 14c). (Priority: marlins and sailfish)		(CPCs: Maturity study = 30,000)						
	2.3 Spawning time and locations	High (4)							
	2.3.1 Collect gonad samples from billfish to confirm the spawning time and location of the spawning area that are presently hypothesized for each billfish species. This will also provide advice to the Commission on the request for alternative management measures (Res. 18-05, paragraph 6)		(CPCs: Spawning study =30,000)						
3. Historical data review	3.1 Changes in fleet dynamics								
	3.1.1 Continue the work with coastal countries to address recent changes and/or increases of marlins catches especially in some coastal fleets. The historical review should include as much explanatory information as possible regarding changes in fishing areas, species targeting, gear changes and other fleet characteristics to assist the WPB understand the current fluctuations observed in the data and very high increases in some species (e.g., black marlin mainly due to very high catches reported by India in recent years). Priority countries: India, Pakistan, Iran, I.R., Indonesia.	High (5)	WPDCS						
	3.2 Species identification								
	3.2.1 The quality of the data available at the IOTC Secretariat on marlins (by species) is likely to be compromised by species miss-identification. Thus, CPCs should review their historical	High (6)	(CPCs directly)						

		data in order to identify, report and correct (if possible) potential identification problems that are detrimental to any analysis of the status of the stocks.			■				
4.	CPUE standardization	4.1 Develop and/or revise standardized CPUE series for each billfish species and major fisheries/fleets for the Indian Ocean.			■	■	■	■	■
		4.1.1 Swordfish: Priority LL fleets: Taiwan,China, EU(Spain, Portugal, France), Japan, Indonesia	High (12)	(CPCs directly)		■			■
		4.1.2 Striped marlin: Priority fleets: Japan, Taiwan,China	High (13)	(CPCs directly)			■		
		4.1.3 Black marlin: Priority fleets: Longline: Taiwan,China; Gillnet: I.R. Iran, Sri Lanka	High (10)	(CPCs directly)			■		
		4.1.4 Blue marlin: Priority fleets: Japan, Taiwan,China	High (11)	(CPCs directly)	■			■	
		4.1.5 I.P. Sailfish: Priority fleets: Priority gillnet fleets: I.R. Iran and Sri Lanka; Priority longline fleets: EU(Spain, Portugal, France), Japan, Indonesia;	High (9)	(CPCs directly)	■			■	
		4.1.6 Joint analysis of operational catch and effort data from Indian Ocean longline fleets as recommended by WPM	High (8)	Consultant/ US$40K		■	■	■	■
5.	Stock assessment / Stock indicators	5.1 Workshops on techniques for assessment including CPUE estimations for billfish species in 2019 and 2020. Priority fleets: Gillnet fisheries	High (7)	Consultant US$11,750	■				
6	Target and Limit reference points	6.1 To advise the Commission, by end of 2016 at the latest on Target Reference Points (TRPs) and Limit Reference Points (LRPs).	High (16)						
		6.1.1.Assessment of the interim reference points as well as alternatives: Used when assessing the Swordfish stock status and when establishing the Kobe plot and Kobe matrices.		WPM	■				
7	Management measure options	7.1 To advise the Commission, on potential management measures having been examined through the Management Strategy Evaluation (MSE) process.	High (17)						
		7.1.1 These management measures will therefore have to ensure the achievement of the conservation and optimal utilization of stocks as laid down in article V of the Agreement for the establishment of the IOTC and more particularly to ensure that, in as short a period as possible and no later than 2020, (i) the fishing mortality rate does not exceed the fishing mortality rate allowing the stock		WPM	■				

	to deliver MSY and (ii) the spawning biomass is maintained at or above its MSY level.				

APPENDIX C
ASSESSMENT SCHEDULE FOR IOTC SPECIES AND SPECIES OF INTEREST FROM 2019–2023

Extract of the Report of the 21th Session of the Scientific Committee

(IOTC–2018–SC21–R; Appendix 36, Page 236)

The SC **ADOPTED** a revised assessment schedule, ecological risk assessment and other core projects for 2019–23, for the tuna and tuna-like species under the IOTC mandate, as well as the current list of key billfish species of interest, as outlined in Appendix 36 (*IOTC–2018–SC21–R*).

Working Party on Billfish					
Species	**2019**	**2020**	**2021**	**2022**	**2023**
Black marlin			**Full assessment**		
Blue marlin	**Full assessment**			**Full assessment**	
Striped marlin			**Full assessment**		
Swordfish	**Indicators**	**Full assessment**		**Indicators**	**Full assessment**
Indo-Pacific sailfish	**Full assessment***			**Full assessment***	