

## REVISION OF THE PROGRAM OF WORK (2023–27) FOR THE IOTC SCIENCE PROCESS

PREPARED BY: IOTC SECRETARIAT, SC CHAIR AND WP CHAIRS, 04 NOVEMBER 2022

### PURPOSE

To provide the Scientific Committee (SC) with a proposed Program of Work for each of its Working Parties (WP), including preliminary prioritisation of the elements requested by each WP. The aim is to develop an overall Program of Work for 2023–27 which will deliver the information the Commission has requested to meet the objectives of the IOTC.

### BACKGROUND

#### *Scientific Committee*

At the 24<sup>th</sup> Session of the SC:

- (Para. 175) The SC **NOTED** IOTC–2021–SC24–08 which provided the SC with a proposed Program of Work for each of its working parties, including prioritisation of the elements requested by each working party.
- (Para. 176) The SC **NOTED** the proposed Program of Work and priorities for the SC and each of the working parties and **AGREED** to a consolidated Program of Work as outlined in Appendix 35a-g and in accordance with the IOTC Strategic Science Plan 2020-2024. The Chairpersons and Vice-Chairpersons of each working party will ensure that the efforts of their respective working parties 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.
- (Para. 178) The SC **AGREED** on the consolidated table of priorities across all working parties, as developed by each working party Chairperson, and **REQUESTED** that the IOTC Secretariat, in consultation with the Chairpersons and vice-Chairpersons of the SC and relevant working parties, develop ToRs for the specific projects to be carried out.
- (Para. 179) The SC **NOTED** that the consolidated table of priorities does not replace the full programme of work of each working party (Appendix 35a-g) and that adequate attention and focus should still be allocated to those activities where possible. The SC further **NOTED** that Table 3 has been developed by the SC and working party Chairs to provide more specific direction to the IOTC Secretariat and the SC Chair as to the priorities of the SC so that, if and when external funding becomes available intersessionally, it is possible to clearly prioritise across all working parties based on the objectives of the SC (as agreed in IOTC–2014–SC17–R, para. 179).
- (Para. 180) The SC **ADOPTED** a revised assessment schedule, ecological risk assessment and other core projects for 2022–26, 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 36.

### DISCUSSION

The SC is requested to consider the priorities set by the Commission, via Conservation and Management Measures, and consider and revise as necessary, its Program of Work to match those priorities.

The draft schedule of stock assessments for IOTC species and species of interest from 2023–2027, and for other working party priorities is provided in [Appendix I](#). The highest three (3) priority projects by each Working Party are presented in [Appendix II](#) and all the priority projects agreed to by each WP meeting in 2022 are referenced in [Appendix III](#).

### RECOMMENDATION

That the Scientific Committee:

- 1) **NOTE** paper IOTC–2022–SC25–08, which encouraged the SC to further develop and refine its Program of Work for 2023–27, which is based on those of its Working Parties, to ensure it is aligned with the requests and directives from the Commission.
- 2) **ADOPT** a revised Program of Work for 2023–27.

## APPENDIX I

DRAFT: SCHEDULE OF STOCK ASSESSMENTS FOR IOTC SPECIES AND SPECIES OF INTEREST FROM  
2023–2027, AND FOR OTHER WORKING PARTY PRIORITIES

<i>Working Party on Neritic Tunas</i>					
Species	2023*	2024*	2025**	2026*	2027*
Bullet tuna	Data preparation	<b>Assessment</b>	Data preparation	Data preparation	<b>Assessment</b>
Frigate tuna	Data preparation	<b>Assessment</b>	Data preparation	Data preparation	<b>Assessment</b>
Indo-Pacific king mackerel	Data preparation	<b>Assessment</b>	Data preparation	Data preparation	<b>Assessment</b>
Kawakawa	<b>Assessment</b>	Data preparation	Data preparation	<b>Assessment</b>	Data preparation
Longtail tuna	<b>Assessment</b>	Data preparation	Data preparation	<b>Assessment</b>	Data preparation
Narrow-barred Spanish mackerel	<b>Assessment</b>	Data preparation	Data preparation	<b>Assessment</b>	Data preparation

<i>Working Party on Billfish</i>					
Species	2023	2024	2025	2026	2027
Black marlin		<b>Full assessment</b>			<b>Full assessment</b>
Blue marlin			<b>Full assessment</b>		
Striped marlin		<b>Full assessment</b>			<b>Full assessment</b>
Swordfish	<b>Full assessment</b>		Indicators**	<b>Full assessment</b>	
Indo-Pacific sailfish			<b>Full assessment*</b>		

\* Including data poor stock assessment methods; Note: the assessment schedule may be changed depending on the annual review of fishery indicators, or SC and Commission requests.

\*\* Including biological parameters, standardized CPUE, and other fishery trend.

<i>Working Party on Tropical Tunas</i>					
Species	2023	2024	2025	2026	2027
Bigeye tuna	Indicators	Indicators <b>MP to be run</b>	<b>Data preparatory meeting</b> <b>Full assessment</b>	Indicators	Indicators
Skipjack tuna	<b>Data preparatory meeting</b> <b>Full assessment</b>	Indicators	Indicators	<b>Data preparatory meeting</b> <b>Full assessment</b>	Indicators
Yellowfin tuna	External Review of 2021 Assessment	<b>Data preparatory meeting</b> <b>Full assessment</b>	Indicators	Indicators	<b>Data preparatory meeting</b> <b>Full assessment</b>

<b>Working Party on Ecosystems and Bycatch</b>					
<b>Species</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>
Blue shark	–	–	Data preparatory meeting Full assessment	-	–
Oceanic whitetip shark	–	Data preparation	Indicator analysis	-	Data preparation
Scalloped hammerhead shark	–	–	–	-	–
Shortfin mako shark		Data preparation Full assessment	–	-	Data preparatory meeting Full assessment
Silky shark	Assessment*	-	–	Assessment*	-
Bigeye thresher shark	-	–	–	Assessment*	–
Pelagic thresher shark	-	–	–	Assessment*	–
Porbeagle shark	Assessment*	–	–	-	–
Mobulid Rays	-	Interactions/ Indicators	–	-	Interactions/ Indicators
Marine turtles	Indicators	–	–	-	–
Seabirds	–	Development of draft workplan	–	Review of mitigation measures in Res. 12/06	–
Marine Mammals	–	–	Review of mitigation measures	-	–
Ecosystem Based Fisheries Management (EBFM) approaches		Ecoregions pilot study			
Series of multi-taxa bycatch mitigation workshops	Focus: gillnets	Focus: gillnets	Focus: tbd	Focus: tbd	Focus: tbd

\*Including data poor stock assessment methods; Note: the assessment schedule may be changed dependent on the annual review of fishery indicators, or SC and Commission requests.

<b>Working Party on Temperate Tunas</b>					
<b>Species</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>
Albacore	–		Data preparatory Meeting (4 days) (April/May/June) Stock assessment meeting (5 days) (July/August)	–	–

## APPENDIX II

## TOP THREE PRIORITY PROJECTS FOR EACH IOTC WORKING PARTY

All priorities come from the 2022 reports of each WP except for the WPDCS which comes from the 2021 report and will be updated for the SC report.

Priority	1	2	3
<b>WPTT</b>	<p><b>Stock assessment priorities</b></p> <p>Address the issues identified as priorities by the yellowfin tuna peer review panel (February 2023)</p>	<p><b>CPUE standardisation</b></p> <p>Develop standardised CPUE series for each tropical tuna fleet/fishery for the Indian Ocean</p> <ul style="list-style-type: none"> <li>• Review period where stock was assessed as being overfished without experiencing overfishing.</li> <li>• Regional scaling parameters</li> <li>• Effect of piracy on CPUE after piracy period</li> </ul>	<p><b>Fisheries impact analysis</b></p> <p>Impact of individual fisheries on stock parameters</p>
<b>WPEB</b>	<p><b>Fisheries data collection</b></p> <p>1.1 Historical data mining for the key species and IOTC fleets (e.g., as artisanal gillnet and longline coastal fisheries) including workshops:</p> <p>1.1.2 Historical data mining for the key species, including the collection of information about catch, effort and spatial distribution of those species and fleets catching them</p> <p>1.1.3 Catch composition reconstruction (initial focus Pakistan and Indonesia)</p> <p>1.2 Implementation of the Pilot Project (Resolution 16/04) for the Regional Observer Scheme</p> <p>1.2.1 Development of a Regional Observer database and population with historic observer data</p> <p>1.2.2 Development, piloting and implementation of an electronic reporting tool to facilitate data reporting</p>	<p><b>Shark research plans</b></p> <p>Consultancy to develop shark research plans</p> <p>Priority species: scalloped hammerhead sharks</p>	<p><b>Ecoregions development</b></p> <p>Support for the development and refinement of ecoregions in the Indian Ocean:</p> <ul style="list-style-type: none"> <li>• Development of a pilot study (focused on two ecoregions: one coastal, the Somali Current ecoregion and one oceanic, the Indian Ocean Gyre ecoregion)</li> </ul>

	1.2.3 Development and trial of Electronic Monitoring Systems for gillnet fleets 1.2.4 Port sampling protocols for artisanal fisheries		
<b>WPNT</b>	<p><b>Stock structure (connectivity)</b> Genetic research to determine the connectivity of neritic tunas throughout their distributions (This should build on the stock structure work conducted in other previous studies)</p>	<p><b>Stock assessment / Stock indicators</b> Explore alternative assessment approaches and develop improvements where necessary based on the data available to determine stock status for longtail tuna, kawakawa and Spanish mackerel</p> <ul style="list-style-type: none"> <li>The Weight-of-Evidence approach should be used to determine stock status, by building layers of partial evidence, such as CPUE indices combined with catch data, life-history parameters and yield-per recruit metrics, as well as the use of data poor assessment approaches (eg. CMSY, OCOM, LB-SPR, Risk based methods).</li> <li>Exploration of priors and how these can be quantifiably and transparently developed</li> <li>Take into consideration the outputs of genetic studies to investigate stock structure and regional differences in populations</li> </ul> <p>Improve the presentation of management advice from different assessment approaches to better represent the uncertainty and improve communication between scientists and managers in the IOTC.</p>	<p><b>Data mining and collation</b> Collate and characterize operational level data for the main neritic tuna fisheries in the Indian Ocean to investigate their suitability to be used for developing standardised CPUE indices. The following data should be collated and made available for collaborative analysis:</p> <ol style="list-style-type: none"> <li>1) catch and effort by species and gear by landing site;</li> <li>2) operational data: stratify this by vessel, month, and year for the development as an indicator of CPUE over time; and</li> <li>3) operational data: collate other information on fishing techniques (i.e. area fished, gear specifics, depth, environmental condition (near shore, open ocean, etc.) and vessel size (length/horsepower)).</li> <li>4) Reconstruction of historical catch by CPCs using recovered or captured information.</li> <li>5) Re-estimation of historic catches for assessment purposes (taking into account updated identification of uncertainties and knowledge of the history of the fisheries)</li> </ol> <ul style="list-style-type: none"> <li>(Data support missions to priority countries: India, Oman, Pakistan)</li> </ul>
<b>WPTmT</b>	<p><b>Biological information (parameters for stock assessment)</b> 2.1 Biological research (collaborative research to improve understanding of spatio-temporal patterns in age and growth and reproductive parameters)</p> <p>2.1.1 Age and growth studies: Uncertainty about the growth curve is a primary source of uncertainty in the stock assessment. A preliminary growth curve was developed in 2019, but there is substantial work to be done to ensure that growth curves include data from smaller size classes, and that spatio-temporal patterns in growth are quantified for use in the stock assessment. Collaborative sampling programs, involving a combination of observer- and port-based sampling, are required to ensure that adequate samples are collected.</p> <p>2.1.2 Quantitative biological studies are necessary for albacore throughout its range to determine</p>	<p><b>Size frequency data</b> 4.1 Further investigate the size information provided by CPCs in order to better understand the stock dynamics and inputs into the assessment models. This is particularly necessary for the purse seine data.</p>	<p><b>CPUE standardisation</b> 3.1 Continue the development of standardized CPUE series for each albacore fishery for the Indian Ocean, with the aim of developing appropriate CPUE series for stock assessment purposes.</p> <p>3.1.1 Spatio-temporal structure and target changes need to be considered carefully, as fish density and targeting practices can vary in ways that affect CPUE indices. Developments may include changes to fishery spatial structure, new approaches for area weighting, time-area interactions in the model, and/or indices using VAST.</p>

	spatio-temporal patterns in key reproductive parameters including sex ratio; female length- and age-at-maturity; spawning location, periodicity and frequency; batch fecundity at length and age; spawning fraction and overall reproductive potential, to inform future stock assessments.		
<b>WPB</b>	<p><b>Reproductive biology study</b></p> <p>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). Propose to have a two-day workshop to discuss the standard of billfish maturity staging inter-sessionally prior to the next WPB. Funding are needed to support the workshop participation of CPCs and expert(s) on billfish reproduction (expecting to have confirmation from the host organization).</p>	<p><b>Biological and ecological information</b></p> <p>2.1 Age and growth research  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)</p> <p>2.2 Spawning time and locations  2.2.1 Collect gonad samples from billfish or utilise any other scientific means to confirm the spawning time and location of the spawning areas 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). Partially supported by EU, on-going support and collaboration from CPCs are required.</p>	<p><b>Stock structure (connectivity and diversity)</b></p> <p>Continue work on determining stock structure of Billfish species, using complimentary data sources, including genetic and microchemistry information as well as other relevant sources/studies.</p>
<b>WPDCS</b>	<p><b>Artisanal fisheries data collection</b></p> <p>1.1. Implement a region-wide study focusing on the application of FAO methodology for the characterization of artisanal fisheries (Secretariat, CPCs)</p> <p>1.2. Assist the implementation of data collection and sampling activities for artisanal fisheries in countries/fisheries insufficiently sampled in the past; priority to be given to the following fisheries:</p> <ul style="list-style-type: none"> <li>· Coastal fisheries of Indonesia</li> <li>· Coastal fisheries of India</li> <li>· Coastal fisheries of Bangladesh</li> <li>· Coastal fisheries of Pakistan</li> <li>· Coastal fisheries of I.R. Iran</li> <li>· Coastal fisheries of Kenya</li> <li>· Coastal fisheries of Somalia</li> <li>· Coastal fisheries of Sri Lanka</li> </ul> <p>1.3 Enhance the use of electronic tools to support data collection in artisanal fisheries</p> <p>1.3.1. Define minimum standards for artisanal fisheries data collection</p>	<p><b>Evaluation of catch data uncertainties</b></p> <p>2.1 Review of historical catch data for all stocks being assessed in the following year to determine the level of uncertainty to be used for stock assessment and management procedures</p>	<p><b>Compliance with IOTC data reporting requirements</b></p> <p>3.1. Data support missions</p> <p>3.1.1. Drafting 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 CPCs / fisheries:</p> <ul style="list-style-type: none"> <li>· Indonesia</li> <li>· India</li> <li>· Pakistan</li> <li>· Oman</li> <li>· Sri Lanka</li> <li>· Somalia</li> </ul> <p>3.2. Workshops to clarify data reporting requirements</p> <p>3.3. Support the documentation of sampling protocols and processing</p>

	1.3.2. Encourage and support sharing of experience and initiatives already implemented by IOTC CPCs in this regard		3.4. Strengthen collaboration with the WGFAD to propose new terminology for FAD activities and types
<b>WPM</b>	<b>MSE</b> Continuation of Management Strategy Evaluation for Albacore, Skipjack, Yellowfin, Bigeye tunas as well as Swordfish		

**APPENDIX III**  
**REFERENCES TO THE INDIVIDUAL IOTC WORKING PARTY PROGRAMS OF WORK**

<b>Report number</b>	<b>Report title</b>	<b>Appendix number</b>
IOTC-2022-WPNT12-R	Report of the 12 <sup>th</sup> Session of the Working Party on Neritic Tunas	Appendix VI
IOTC-2022-WPB20-R	Report of the 20 <sup>th</sup> Session of the Working Party on Billfish	Appendix XI
IOTC-2022-WPEB18-R	Report of the 18 <sup>th</sup> Session of the Working Party on Ecosystems and Bycatch	Appendix XVII
IOTC-2022-WPM13-R	Report of the 13 <sup>th</sup> Session of the Working Party on Methods	Appendix IV
IOTC-2021-WPDCS17-R*	Report of the 17 <sup>th</sup> Session of the Working Party on Data collection and Statistics	Appendix V
IOTC-2022-WPTT24-R	Report of the 24 <sup>th</sup> Session of the Working Party on Tropical Tunas	Appendix IX

\*2022 report not available at the time of drafting the document.