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**SCRS REVISED ROADMAP FOR THE DEVELOPMENT OF  
MANAGEMENT STRATEGY EVALUATION (MSE) AND HARVEST CONTROL RULES (HCR)**

*Document adopted during the 2019 Commission meeting  
and revised by the SCRS in 2020 and 2021 (changes are underlined)*

This schedule is intended to guide the development of harvest strategies for priority stocks identified in Rec. 15-07 (North Atlantic albacore, North Atlantic swordfish, eastern and western Atlantic bluefin tuna, and tropical tunas). It builds on the initial road map that was appended to the 2016 Annual Meeting report. It provides an aspirational timeline that is subject to revision and should be considered in conjunction with the stock assessment schedule that is revised annually by the SCRS.\* Due to the amount of cross-disciplinary dialogue that may be needed, intersessional Panel meetings and/or meetings of the Standing Working Group to Enhance Dialogue between Fisheries Scientists and Managers (SWGSM) will be necessary. The aspirational nature of this timeline assumes adoption of a final management procedure for northern albacore in 2021 and interim management procedures for bluefin tuna in 2022, and northern swordfish and tropical tunas as soon as 2023. However, the exact timeline for delivery is contingent on funding, prioritization, and other work of the Commission and SCRS.

\* For 2015 through 2019, the road map reflects progress to-date in some detail. For 2021 onward, more general steps for the SCRS and Commission are anticipated pending outcomes of the 2021 Annual Meeting.

	<i>Northern Albacore</i>	<i>Bluefin Tuna</i>	<i>Northern Swordfish</i>	<i>Tropical Tunas</i>
<b>2015</b>	- Commission established management objectives in Rec. 15-04			<u>Commission provided initial guidance for the development of harvest strategies for priority stocks, including tropical tunas [Rec. 15-07]</u>
<b>2016</b>	- SCRS conducted stock assessment - SCRS evaluated a range of candidate HCRs through MSE - PA2 identified performance indicators			- Commission identified performance indicators (Rec. 16-01). <u>Commission adopted MSE roadmap, including plan for activities for tropical tunas for 2016-2021</u>
<b>2017</b>	- SCRS evaluated the performance of candidate HCRs through MSE, using the performance indicators developed by PA2 - SWGSM narrowed the candidate HCRs and referred to Commission - Commission selected and adopted an HCR with associated TAC at the Annual Meeting (Rec. 17-04)	- SCRS conducted stock assessment - Core modelling group completed development of modelling framework	- SCRS conducted stock assessment	- SCRS reviewed performance indicators for YFT, SKJ, and BET - SWGSM recommended a multi-stock approach for development of MSE framework
<b>2018</b>	- <u>SCRS contracted independent expert to complete peer review of MSE code</u> - Call for Tenders issued for peer review [...] - SCRS tested the performance of the adopted HCR, as well as variations of the HCR, as requested in Rec. 17-04 - SCRS developed criteria for the identification of exceptional	- SCRS conducted joint <u>MSE</u> meeting on BFT/SWO - SCRS reviewed but could not adopt reference set of OMs - SCRS <u>began</u> testing candidate management procedures ( <u>MPs</u> ) - SWGSM <u>considered</u> qualitative management objectives - <u>BFT</u> WG reviewed progress and developed detailed road map - <u>Commission adopted conceptual</u>	- SCRS conducted joint meeting on BFT/SWO MSE - <u>SCRS contracted</u> MSE technical expert <u>to develop OM framework, define initial set of OMs, and conduct</u> initial conditioning of OMs - SWGSM <u>considered</u> qualitative management objectives	- <u>SCRS contracted</u> with technical experts: start development of MSE framework (phase I) - SCRS <u>conducted</u> bigeye tuna stock assessment [...]

	<i>Northern Albacore</i>	<i>Bluefin Tuna</i>	<i>Northern Swordfish</i>	<i>Tropical Tunas</i>
	circumstances	<u>management objectives (Res. 18-03)</u>		
<b>2019</b>	<p>- <u>SCRS addressed</u> recommendations of the peer reviewer</p> <p>- <u>SCRS updated</u> performance of the interim HCR <u>and</u> variants</p> <p>[...]</p> <p>[...]</p> <p>- <u>SCRS produced consolidated</u> report on MSE</p> <p><u>1. COMM: PA2 considered possible approaches that could be useful in developing guidance on a range of appropriate management responses if exceptional circumstances occur, including those implemented by other RFMOs</u></p>	<p>- <u>SCRS held three</u> BFT MSE Technical Group meetings <u>with significant progress but advised at least one additional year of work needed</u></p> <p>[...]</p> <p>[...]</p> <p>[...]</p> <p>- SCRS <u>continued</u> to evaluate <u>candidate MPs</u></p> <p>- <u>At intersessional meeting</u>, PA2 reviewed <u>and developed</u> initial operational management objectives <u>and identified performance indicators</u></p> <p>[...]</p> <p>- <u>SCRS held</u> December webinar <u>to review OM progress</u></p> <p><u>COMM: PA2 reviewed MSE progress and advised the Commission on next steps, including the need for an update of the stock assessment to provide TAC advice for at least 2021</u></p>	<p>- SWO Species Group meeting</p> <p>- <u>SCRS contracted with</u> technical expert <u>to develop</u> initial MSE framework</p> <p>[...]</p> <p>[...]</p> <p>[...]</p> <p>- <u>Commission adopted conceptual management objectives at the Annual Meeting (Res. 19-14)</u></p>	<p>- <u>SCRS conducted</u> yellowfin tuna stock assessment</p> <p>- <u>SCRS agreed on developing a western skipjack (WSKJ) MSE and a multi-stock MSE (eastern skipjack, bigeye and yellowfin tuna)</u></p> <p><u>Commission updated MSE roadmap for the period 2019-2024<sup>1</sup> and requests that the SCRS “refines the MSE process in line with the SCRS roadmap and continue testing the candidate management procedures. On this basis, the Commission shall review the candidate management procedures, including pre-agreed management actions to be taken under various stock conditions. These shall take into account the differential impacts of fishing operations (e.g. purse seine, longline and baitboat) on juvenile mortality and the yield at MSY.” (Rec. 19-02)</u></p>
<b>2020</b>	<p><u>1. COMM (PA2) developed guidance intersessionally on a range of appropriate management responses should exceptional circumstances be found to occur (5-6 March, PA2 intersessional)</u></p>	<p><u>1. SCRS conducted stock assessment update and developed TAC advice for 2021 and 2022</u></p> <p>[...]</p> <p>[...]</p> <p>[...]</p>	<p><u>1. SCRS continued development of MSE framework, including the operating model conditioning and refinement of the uncertainty grid</u></p> <p>[...]</p> <p>[...]</p> <p>[...]</p>	<p><u>COVID slowed progress on multi-stock MSE but SCRS developed a preliminary OM for WSKJ MSE.</u></p> <p>[...]</p> <p>[...]</p> <p>[...]</p>

<sup>1</sup> [https://iccat.int/mse/en/COM\\_ROADMAP\\_ICCAT\\_MSE\\_PROCESS\\_ENG.pdf](https://iccat.int/mse/en/COM_ROADMAP_ICCAT_MSE_PROCESS_ENG.pdf)

	<i>Northern Albacore</i>	<i>Bluefin Tuna</i>	<i>Northern Swordfish</i>	<i>Tropical Tunas</i>
2020			[...]	
	<u>2. SCRS conducted NALB stock assessment (in June)</u>	<u>2. COMM set TACs for at least 2021, based on stock assessment update, at the Annual Meeting (Rec. 20-06, Rec. 20-07).</u>	<u>2. SCRS developed example candidate MPs</u>	
	<u>3. SCRS evaluated existence of exceptional circumstances</u>	<u>3. SCRS continued development of MSE framework including the operating model conditioning and the uncertainty grid</u>		
	[...]	[...]		
	<u>4. COMM set new TAC for 2021 based on the HCR and 2020 assessment (Rec. 20-04)</u>	[...]		
	[...]			
2021	<u>1. SCRS prepared inputs for a new MSE framework using the Stock Synthesis (SS) model</u>	<u>1. SCRS adopted reference grid and decided plausibility weighting</u>	<u>1. SCRS continued development and testing of candidate MPs. SCRS continued work on the OM grid, including diagnostics</u>	[...] [...] <u>1. Commission to review and provide feedback on:</u>  - <u>management objectives and performance indicators to be used for tropical tunas MSE</u>  - <u>proposed update of tropical tuna MSE roadmap</u>

	<i>Northern Albacore</i>	<i>Bluefin Tuna</i>	<i>Northern Swordfish</i>	<i>Tropical Tunas</i>
2021				
	<u>2. SCRS evaluated existence of exceptional circumstances</u>	<u>2. SCRS initiated independent peer review of MSE code</u>	<u>2. SCRS to continue work on criteria for determining exceptional circumstances and will be informed by the exceptional circumstances protocol developed by Panel 2 for northern albacore</u>	<u>2. SCRS agreed on major sources of uncertainty to be considered in the MSE and candidate performance indicators for tropical tuna MSEs</u>
	<u>3.COMM (PA2) met intersessionally to review interim HCR and recommend MP to the Commission for possible adoption at the Annual Meeting (4-5 March, PA2 intersessional)</u>	<u>3. SCRS to continue development and testing of candidate MPs</u>	<u>3. SCRS initiated independent peer review of MSE code</u>	<u>3. SCRS conducted bigeye stock assessment</u>
	<u>4. COMM to:</u> <u>a. review and endorse guidance developed intersessionally on management responses in the case of exceptional circumstances</u> <u>b. review the interim HCR and adopt a long-term MP, including the TAC, at the Annual Meeting</u>	<u>4. SCRS/BFT SG initiated two additional subgroups on Indices and Modeling to address key issues. Subgroup on Growth in Farms continued its work</u>	<u>4. COMM (SWGSM/PA4) to recommend initial operational management objectives and identify performance indicators either intersessionally or during the Annual Meeting</u>	<u>4. SCRS recommended modifying OM for WSKJ to include the whole of the western Atlantic</u>
		<u>5. COMM (PA2) – Intersessional Meetings. Dialogue with Chair on MSE progress (March, September), initiate Ambassadors workshops in October</u>	<u>5. COMM (SWGSM/PA4) to review MSE progress, example candidate MP results, and provide feedback to the SCRS, either intersessionally or during the Annual meeting</u>	<u>5. ICAP/ICCAT Training workshops on MSE and HCR for Portuguese and Spanish speaking scientists and managers</u>

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<b>2021</b>		<u>6. COMM review candidate MPs at the Annual Meeting (1-day prior). Dialogue with PA2 on CMPs, operational management objectives and performance indicators. Preliminary results of candidate MPs and tangible performance statistics values to be presented to show trade-offs.</u>	<u>6. The Group will provide an update on the progress of the MSE to the Commission/PA4</u>	
		[...]	[...]	
		[...]		
<b>2022</b>	<u>1. SCRS to initiate independent peer review of MSE process</u>			
	<u>2. SCRS to develop a new reference case using the SS model for Northern ALB</u>	<u>2. COMM (SWGSM/PA2) intersessionally to:</u> - <u>recommend final operational management objectives and identify performance indicators</u> - <u>develop guidance on range of appropriate management responses should exceptional circumstances be found to occur</u> [...] [...] [...]	<u>2. SCRS to conduct stock assessment (North and South Atlantic)</u> [...] [...] [...]	<u>2. SCRS conducts skipjack stock assessments</u>
	<u>3. SCRS to evaluate existence of exceptional circumstances</u>	<u>3. SCRS to conduct data preparatory meeting for EBFT (based on work conducted by subgroups on models</u>	<u>3. SCRS to recondition OMs considering new information from the stock assessment and finalize OM grid</u>	<u>3. SCRS reconditions OMs for SKJ in WSKJ MSE model and ESKJ in mixed species MSE model in light of</u>

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<b><u>2022</u></b>		and indices)		new SKJ assessments
		<u>4. SCRS to complete MSE, incorporating feedback from Commission through PA2/SWGSM</u>	<u>4. SCRS to continue work on criteria for determining exceptional circumstances and will be informed by the exceptional circumstances protocol developed by Panel 2 for northern albacore</u>	<u>4. SCRS initiates development and testing of candidate Management procedures (CMP) for western SKJ</u>
		<u>5. COMM (SWGSM/PA2) and SCRS to present final CMPs for review.</u>	<u>5. SCRS dialogue with SWGSM/PA4 on CMPs, operational management objectives and performance indicators</u>	[...] [...] <u>5. The Commission (or Panel 1 intersessional or SWGSM) will provide feedback on evaluation criteria and WSKJ CMPs to be evaluated further</u>
		<u>6. COMM to:</u> <u>a. review and endorse guidance developed intersessionally on management responses in the case of exceptional circumstances, and</u> <u>b. adopt a MP at the Annual Meeting, including TAC</u>	<u>6. COMM (SWGSM/PA4) and the SCRS to:</u> <u>- refine CMP(s)</u> <u>- recommend final operational management objectives and identify performance indicators (2022 COMM meeting)</u>	<u>6. Independent review of tropical tuna MSE process and technical review of Western SKJ MSE</u>
		<u>7. SCRS to continue work on criteria for determining exceptional circumstances and will be informed by the Exceptional Circumstances Protocol developed by Panel 2 for northern albacore</u>		

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<b>2023*</b>	<u>1. Once an MP is adopted, SCRS to conduct assessments to ensure that the conditions considered in MP testing are still applicable to the stock. The first benchmark assessment is scheduled for 2023, where a SS reference case as well as a grid of reference and robustness OMs is to be adopted after reconsidering the main axes of uncertainty.</u>	<u>1. Once an MP is adopted, SCRS to conduct assessments to ensure that the conditions considered in MP testing are still applicable to the stock</u>	<u>1. SCRS to continue MSE, incorporating feedback from Commission through PA4/SWGSM</u>	<u>1. SCRS to conduct yellowfin assessment</u>
	<u>2. SCRS to evaluate existence of exceptional circumstances</u> [...] [...]	<u>2. SCRS to provide final advice to the Commission on criteria for determining exceptional circumstances</u>	<u>2. COMM to:</u> a) <u>review candidate MPs intersessionally. Dialogue with PA4 on CMPs, operational management objectives and performance indicators. At this point the SCRS should have 2-3 candidate MPs and tangible performance statistics values to show trade-offs.</u> b) <u>adopt an interim MP at the Annual Meeting, including the TAC</u>	<u>2. Commission considers final evaluation of WSKJ MPs and adopts an interim WSKJ MP at the Annual Meeting</u>
	<u>3. COMM to continue use of the MP to set TAC at the Annual Meeting, on the predetermined timescale for MP setting</u>	<u>3. On the predetermined timescale for MP setting, SCRS to evaluate existence of exceptional circumstances</u>	<u>3. COMM to review and finalize an exceptional circumstances protocol</u>	<u>3. Independent technical review of multi-stock MSE</u>
		<u>4. COMM to continue use of the MP to set TAC based on the MP at the Annual Meeting, on the predetermined timescale for MP setting</u>		

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<b><u>2024 *</u></b>	<u>1. SCRS to improve Observation Error Model by incorporating statistical properties of CPUE residuals</u>		<u>1. COMM to review and finalize, as needed, guidance on a range of appropriate management responses should exceptional circumstances be found to occur.</u> [...] [...] [...]	<u>1. SCRS tests final set of MP candidates for multi-stock MSE</u>
	<u>2. SCRS to test the available (i.e. production model) and alternative candidate MPs (e.g. based on Jabba, or empirical)</u>			<u>2. SCRS provides advice on exceptional circumstances for the implementation of the MP</u>
	<u>3. SCRS to evaluate existence of exceptional circumstances</u>			<u>3. Commission considers final evaluation of MPs for multi-stock MSE</u>
				<u>4. Oct -Dec Final delivery of multi stock MSE, including fully conditioned operating models and candidate management procedures to Commission</u>
				<u>5. Commission to:</u>  <u>a) review and endorse guidance on management responses in the case of exceptional circumstances, and</u> <u>b) considers adopting interim MP(s) for BET, YFT and eastern SKJ</u>

	<i>Northern Albacore</i>	<i>Bluefin Tuna</i>	<i>Northern Swordfish</i>	<i>Tropical Tunas</i>
<b>2025 and beyond*</b>	<u>1. According to the frequency outlined in the exceptional circumstances protocol, SCRS to evaluate existence of exceptional circumstances</u>	<u>1. According to the frequency outlined in the exceptional circumstances protocol, SCRS to evaluate existence of exceptional circumstances</u>	<u>1. SCRS to conduct assessments as per the agreed-to assessment interval to ensure that the conditions considered in MP testing are still applicable to the stock</u>	<u>1. Once an MP is adopted, SCRS to conduct periodic assessments to ensure that the conditions considered in MP testing are still applicable to the stock</u>
	<u>2. Commission to continue use of the MP to set management measures on the predetermined timescale defined in the MP setting</u>	<u>2. Commission to continue use of the MP to set TAC based on the MP at the Annual Meeting, on the predetermined timescale for MP setting</u>	<u>2. On the predetermined timescale, SCRS to evaluate existence of exceptional circumstances</u>	<u>2. On the predetermined timescale for MP setting, SCRS to evaluate existence of exceptional circumstances</u>
	<u>3. SCRS to conduct periodic assessments to ensure that the conditions considered in MP testing are still applicable to the stock</u>	<u>3. Once an MP is adopted, SCRS to conduct assessments to ensure that the conditions considered in MP testing are still applicable to the stock</u>	<u>3. COMM to continue setting TAC based on the MP at the Annual Meeting, on the predetermined timescale for MP setting</u>	<u>3. Commission to continue use of the MP to set management measures on the predetermined timescale defined in the MP setting</u>

\*Assumes that the workplan is accomplished as described.

**LIST OF ACRONYMS:**

**BET** = Bigeye tuna

**BFT** = Bluefin tuna

**BFT SG** = SCRS Bluefin Tuna Species Group

**HCR** = Harvest Control Rule

**MP** = Management Procedure

**MSE** = Management Strategy Evaluation

**OM** = Operating Model

**SCRS** = Standing Committee on Research and Statistics

**SWGSM** = Standing Working Group to Enhance Dialogue between Fisheries Scientists and Managers

**TAC** = Total Allowable Catch

**TRO** = Tropical tunas

