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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 compared to the 2021 proposal of the SCRS)*

(submitted by the United States)

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 roadmap 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 2020, the roadmap 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>
2015	- Commission established management objectives in Rec. 15-04			Commission provided initial guidance for the development of harvest strategies for priority stocks, including tropical tunas [Rec. 15-07]
2016	- SCRS conducted stock assessment - SCRS evaluated a range of candidate HCRs through MSE - PA2 identified performance indicators			- Commission identified performance indicators (Rec. 16-01). Commission adopted MSE roadmap, including plan for activities for tropical tunas for 2016-2021
2017	- 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
2018	- SCRS contracted independent expert to complete peer review of MSE code - 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 conducted joint MSE meeting on BFT/SWO - SCRS reviewed but could not adopt reference set of Oms - SCRS began testing candidate management procedures (MPs)	- SCRS conducted joint meeting on BFT/SWO MSE - SCRS contracted MSE technical expert to develop OM framework, define initial set of OMs, and conduct initial conditioning of OMs	- SCRS contracted with technical experts: start development of MSE framework (phase I) - SCRS conducted bigeye tuna stock assessment

	<ul style="list-style-type: none"> - SCRS developed criteria for the identification of exceptional circumstances 	<ul style="list-style-type: none"> - SWGSM considered qualitative management objectives - BFT WG reviewed progress and developed detailed road map - Commission adopted conceptual management objectives (Res. 18-03) 	<ul style="list-style-type: none"> - SWGSM considered qualitative management objectives 	
2019	<ul style="list-style-type: none"> - SCRS addressed recommendations of the peer reviewer - SCRS updated performance of the interim HCR and variants - SCRS produced consolidated report on MSE <p>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</p>	<ul style="list-style-type: none"> - SCRS held three BFT MSE Technical Group meetings with significant progress but advised at least one additional year of work needed - SCRS continued to evaluate candidate MPs - At intersessional meeting, PA2 reviewed and developed initial operational management objectives and identified performance indicators - SCRS held December webinar to review OM progress <p>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</p>	<ul style="list-style-type: none"> - SWO Species Group meeting - SCRS contracted with technical expert to develop initial MSE framework - Commission adopted conceptual management objectives at the Annual Meeting (Res. 19-14) 	<ul style="list-style-type: none"> - SCRS conducted yellowfin tuna stock assessment - SCRS agreed on developing a western skipjack (WSKJ) MSE and a multi-stock MSE (eastern skipjack, bigeye and yellowfin tuna) <p>Commission updated MSE roadmap for the period 2019-2024¹ 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</p>

¹ https://iccat.int/mse/en/COM_ROADMAP_ICCAT_MSE_PROCESS_ENG.pdf

				<i>operations (e.g. purse seine, longline and baitboat) on juvenile mortality and the yield at MSY.” (Rec. 19-02)</i>
2020	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)	1. SCRS conducted stock assessment update and developed TAC advice for 2021 and 2022	1. SCRS continued development of MSE framework, including the operating model conditioning and refinement of the uncertainty grid	COVID slowed progress on multi-stock MSE but SCRS developed a preliminary OM for WSKJ MSE.
	2. SCRS conducted NALB stock assessment (in June)	2. <u>COMM</u> set TACs for at least 2021, based on stock assessment update, at the Annual Meeting (Rec. 20-06, Rec. 20-07).	2. SCRS developed example candidate MPs	
	3. SCRS evaluated existence of exceptional circumstances	3. SCRS continued development of MSE framework including the operating model conditioning and the uncertainty grid		
	4. <u>COMM</u> set new TAC for 2021 based on the HCR and 2020 assessment (Rec. 20-04)			
2021	1. SCRS prepared inputs for a new MSE framework using the Stock Synthesis (SS) model	1. SCRS adopted reference <u>(OM)</u> grid and decided plausibility weighting	1. SCRS continued development and testing of candidate MPs. SCRS continued work on the <u>reference (OM)</u> grid, including diagnostics	1. <u>COMM reviewed and proposed</u> update of tropical tuna MSE roadmap

2021	2. SCRS evaluated existence of exceptional circumstances	2. SCRS initiated independent peer review of MSE code	2. SCRS continued work on criteria for determining exceptional circumstances, <u>taking into account</u> the exceptional circumstances protocol for NALB	2. SCRS agreed on major sources of uncertainty to be considered in the MSE and candidate performance indicators for tropical tuna MSEs
	[...]	3. SCRS continued development and testing of candidate MPs	3. SCRS initiated independent peer review of MSE code	3. SCRS conducted bigeye stock assessment
	3. COMM: a) reviewed and endorsed guidance developed intersessionally on management responses in the case of exceptional circumstances [b] reviewed the interim HCR and adopt a long-term MP, including the TAC, at the Annual Meeting]	4. SCRS/BFT SG initiated two additional subgroups on Indices and Modeling to address key issues. Subgroup on Growth in Farms continued its work	[...]	4. SCRS recommended modifying OM for WSKJ to include the whole of the western Atlantic
		5. COMM (PA2) – Intersessional Meetings held and updates on MSE progress provided by SCRS (March, September). Ambassadors workshops held in October.	4. COMM (PA4) reviewed MSE progress, and began considering performance indicators and a limit reference point at the 1st Intersessional PA4 meeting. Additional dialogue in 2022 was proposed.	5. JCAP/ICCAT Training workshops on MSE and HCR held for Portuguese and Spanish speaking Scientists and Managers
		6. The SCRS presented an overview on the progress of the BFT MSE to the COMM (PA2) at the Annual Meeting (1-day prior), including conceptual illustrations on how candidate MPs would work and on the trade-offs in achieving different objectives. The	5. The Group provided an update on the progress of the MSE to COMM/PA4 at the Annual Meeting	

		<u>workplan to complete the MSE was discussed, including the plan for future dialogue meetings. PA2 provided feedback to support next steps.</u>		
2022	1. SCRS to initiate independent peer review of MSE process			
	2. SCRS to <u>work on developing</u> a new <u>MSE reference grid</u> using the SS model for <u>NALB</u>	2. <u>COMM (PA2) to meet</u> interessionally to: - recommend final operational management objectives and identify performance indicators - develop guidance on range of appropriate management responses should exceptional circumstances be found to occur	2. <u>COMM (PA4) to recommend initial operational management objectives and identify performance indicators either interessionally or during the Annual Meeting</u>	2. SCRS to <u>conduct SKJ</u> stock assessments
	3. SCRS to evaluate existence of exceptional circumstances	3. SCRS to conduct data preparatory meeting for EBFT (based on work conducted by subgroups on models and indices)	3. <u>SCRS to conduct stock assessment (North and South Atlantic)</u>	3. SCRS dialogue with PA1 on <u>management objectives and performance indicators to be used for tropical tunas MSE</u>
		4. SCRS to complete MSE, incorporating feedback from <u>COMM to be provided at dialogue meetings with PA2</u>	4. <u>SCRS to recondition OMs considering new information from the stock assessment and finalize OM grid</u>	4. <u>SCRS to recondition OMs for SKJ in WSKJ MSE model and ESKJ in mixed species MSE model in light of new SKJ assessments</u>
		5. <u>COMM (PA2) and SCRS to meet interessionally to consider final CMPs</u>	5. <u>SCRS to continue work on criteria for determining exceptional circumstances taking into account the exceptional circumstances protocol for NALB</u>	5. <u>SCRS to initiate development and testing of candidate Management procedures (CMP) for WSKJ</u>
2022				

		6. <u>COMM</u> to: a. <u>consider SCRS</u> guidance developed intersessionally on management responses in the case of exceptional circumstances, and b. adopt an MP at the Annual Meeting, including TAC	6. <u>SCRS</u> dialogue with <u>PA4</u> on CMPs, operational management objectives and performance indicators	6. <u>COMM</u> (at Annual meeting or Panel 1 intersessional) to <u>provide feedback on evaluation criteria and WSKJ CMPs to be evaluated further</u>
		7. <u>SCRS</u> to continue work on criteria for determining exceptional circumstances <u>for inclusion in the exceptional circumstances protocol for BFT to be developed by Panel 2, based on the exceptional circumstances protocol adopted for NALB</u>	7. <u>COMM (PA4)</u> and the <u>SCRS</u> to: - refine CMP(s) - recommend final operational management objectives and identify performance indicators (2022 <u>COMM</u> meeting)	7. <u>SCRS</u> to <u>contract</u> independent review of tropical tuna MSE process and technical review of WSKJ MSE
2023*	1. <u>SCRS</u> <u>will</u> continue to conduct assessments <u>periodically</u> to ensure that the conditions considered in MP testing are still applicable to the stock. The first <u>such</u> assessment is scheduled for 2023	1. Once an MP is adopted, <u>SCRS</u> to conduct assessments to ensure that the conditions considered in MP testing are still applicable to the stock	1. <u>SCRS</u> to continue MSE, incorporating feedback from <u>COMM</u> through PA4/SWGSM	1. <u>SCRS</u> to conduct yellowfin assessment
	2. <u>SCRS</u> <u>will</u> <u>finalize a grid of reference and robustness OMs based on Stock Synthesis as part of a new MSE, after reconsidering the main axes of uncertainty.</u>	2. <u>SCRS</u> to provide final advice to <u>COMM</u> on criteria for determining exceptional circumstances	2. <u>COMM</u> to: a) review candidate MPs intersessionally. Dialogue with PA4 on CMPs, operational management objectives and performance indicators. At this point the <u>SCRS</u> should have 2-3 candidate MPs and tangible performance statistics values to show trade-offs. b) adopt an interim MP at the	2. <u>COMM</u> to <u>consider</u> final evaluation of WSKJ MPs and <u>adopt</u> an interim WSKJ MP at the Annual Meeting

			Annual Meeting, including the TAC	
	<u>3. SCRS to evaluate existence of exceptional circumstances</u>	3. On the predetermined timescale for MP setting, SCRS to evaluate existence of exceptional circumstances	3. <u>COMM</u> to review and finalize an exceptional circumstances protocol	3. <u>SCRS to initiate</u> independent technical review of multi-stock MSE
	<u>4. COMM to continue use of the MP to set TAC at the Annual Meeting, on the predetermined timescale for MP setting</u>	4. <u>COMM</u> to continue use of the MP to set TAC based on the MP at the Annual Meeting, on the predetermined timescale for MP setting		
2024*	1. SCRS to improve Observation Error Model by incorporating statistical properties of CPUE residuals		1. COMM to review and finalize, as needed, guidance on a range of appropriate management responses should exceptional circumstances be found to occur.	1. SCRS <u>to test</u> final set of MP candidates for multi-stock MSE
	2. SCRS to test the available (i.e. production model) and alternative candidate MPs (e.g. based on Jabba, or empirical)			2. SCRS <u>to provide</u> advice on exceptional circumstances for the implementation of the MP
	3. SCRS to evaluate existence of exceptional circumstances			3. <u>COMM to consider</u> final evaluation of MPs for multi-stock MSE
				4. <u>SCRS to deliver</u> multi-stock MSE, including fully conditioned operating models and candidate management procedures to COMM

				<p>5. <u>COMM</u> to:</p> <p>a) review and endorse guidance on management responses in the case of exceptional circumstances, and</p> <p>b) considers adopting interim MP(s) for BET, YFT and eastern SKJ</p>
2025 and beyond*	1. According to the frequency outlined in the exceptional circumstances protocol, SCRS to evaluate existence of exceptional circumstances	1. According to the frequency outlined in the exceptional circumstances protocol, SCRS to evaluate existence of exceptional circumstances	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	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
	2. <u>COMM</u> to continue use of the MP to set management measures on the predetermined timescale defined in the MP setting	2. <u>COMM</u> to continue use of the MP to set TAC based on the MP at the Annual Meeting, on the predetermined timescale for MP setting	2. On the predetermined timescale, SCRS to evaluate existence of exceptional circumstances	2. On the predetermined timescale for MP setting, SCRS to evaluate existence of exceptional circumstances
	3. SCRS to conduct periodic assessments to ensure that the conditions considered in MP testing are still applicable to the stock	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	3. <u>COMM</u> to continue setting TAC based on the MP at the Annual Meeting, on the predetermined timescale for MP setting	3. <u>COMM</u> to continue use of the MP to set management measures on the predetermined timescale defined in the MP setting

*Assumes that the workplan is accomplished as described.

LIST OF ACRONYMS:

BET = Bigeye tuna

BFT = Bluefin tuna

BFT SG = SCRS Bluefin Tuna Species Group

COMM=Commission

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