

Comisión Interamericana del Atún Tropical
Inter-American Tropical Tuna Commission



Management Strategy Evaluation (MSE) for tropical tuna fisheries in the EPO: Progress report
*Evaluación de Estrategias de Ordenación (EEO) para pesquerías de atunes tropicales en el OPO:
Informe De Avance*

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SAC-14 INF-F

14^a Reunión del Comité Científico Asesor – 15-19 de mayo de 2023
14th Meeting of the Scientific Advisory Committee – 15-19 May 2023

Outline / *Temario*

- Management Strategies and their evaluation (MSE)/ *Estrategias y su evaluación*
- MSE for tropical tunas in the EPO / *EEO para atunes tropicales en el OPO*
- 3rd IATTC MSE Workshop / *3^{er} Taller CIAT sobre EEO*
- MSE work for Bigeye tuna (BET) in the EPO / *EEO para patudo en el OPO*
- Challenges / *Desafíos*
- Current timeline / *Cronograma actual*
- Potential future steps / *Pasos siguientes potenciales*



What are Management Strategies?

¿Que son las Estrategias de Ordenación?

- Combination of monitoring, stock status evaluation, control rule and management actions **designed to achieve fisheries objectives.**
*Combinación de monitoreo, evaluación stocks, regla de control y acciones de manejo diseñadas para lograr **objetivos de ordenación***
- Strategies can't be properly evaluated without **specific** management objectives, data, analyses, control rule, uncertainty, other components
*Estrategias no pueden ser evaluadas sin **especificar** objetivos, datos, análisis, regla de control, incertidumbre y otros componentes*
- Development and success of Management Strategies benefit from **involvement of all stakeholders** in the planning stage
*El desarrollo y éxito de Estrategias de Ordenación se benefician con el involucramiento **de todas las partes interesadas** en su planificación*
- Management Strategy Evaluation components/*Componentes de EEO*
 - **Dialogue:** define alternative strategies to evaluate/***Diálogo:** definir estrategias a evaluar*
 - **Technical:** evaluate strategies via simulations/***Técnico:** evaluar estrategias con simulación*

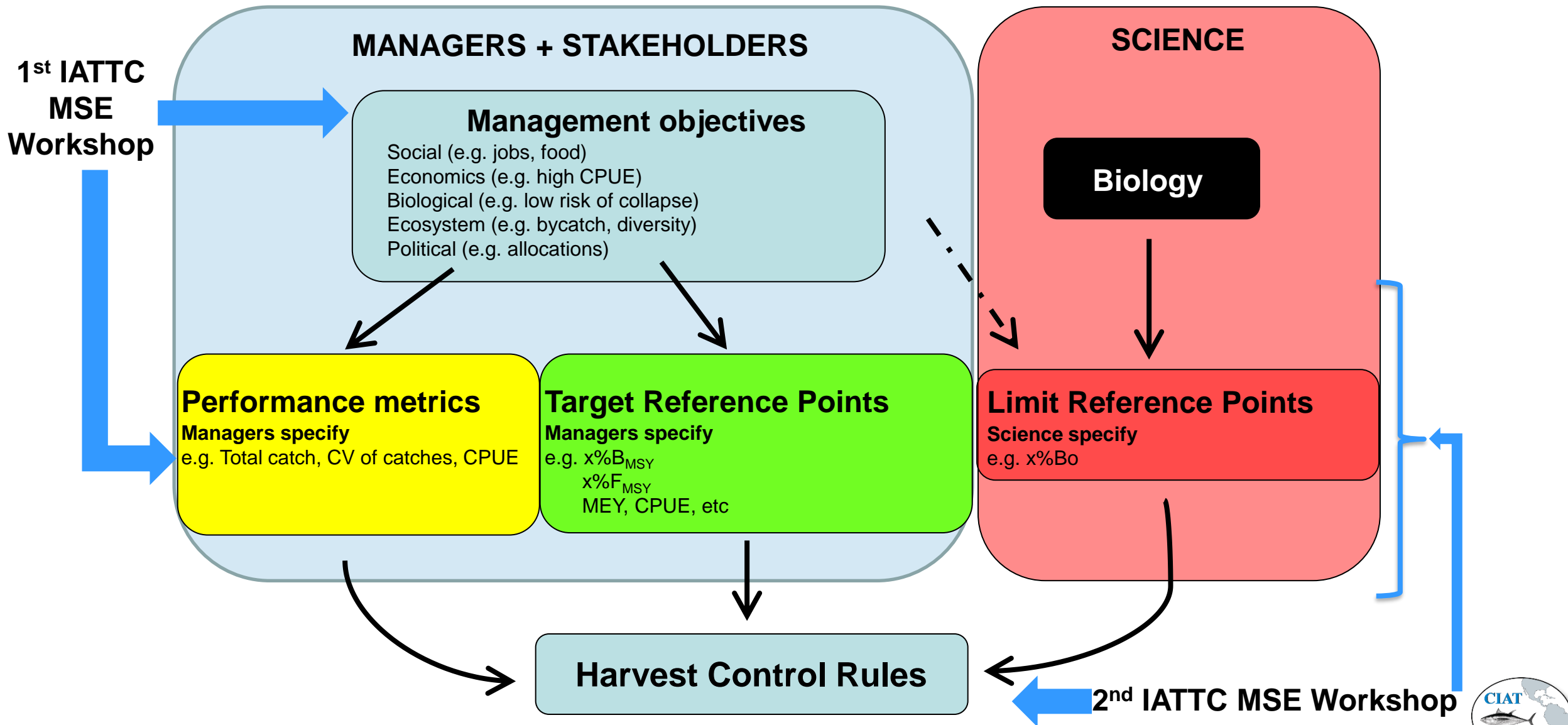
EPO tropical tuna Management Strategy Evaluation

Evaluación de Estrategias de Ordenación, atunes tropicales en el OPO

- Tropical Tuna Harvest Control Rules / *Reglas de Control* ([Resolution C-16-02](#))
“...MSE is necessary to evaluate the HCR (...) and alternatives (...) to allow the Commission to adopt a permanent HCR”
“...EEO es necesaria para evaluar la RCE (...) y alternativas (...) para permitir a la Comisión adoptar una RCE permanente”
- Workshops Terms of Reference / *Términos de referencia de talleres* ([Resolution C-19-07](#))
- SAC Recs. supported staff’s MSE workplan / *Apoyo del SAC a plan de EEO*
- 5-year (2018-2023) IATTC staff MSE Workplan / *Plan de EEO, 2018-2023* ([SAC-12-01](#))
- Intro WS (2015-2019), 3 IATTC MSE WS (2019-2022) / *Talleres previos* ([WSMSE-1](#); [WSMSE-2](#); [WSMSE-3](#))
- 2021-2023 MSE funding from the European Union
2021-2023, financiación de la Unión Europea para trabajo de EEO   European Commission
 - Two components / *Dos componentes*:
 - Consultative/dialogue process (e.g. series of MSE workshops) / *Proceso de diálogo (ej. serie de talleres)*
 - Technical implementation of MSE / *Implementación técnica de la EEO*

Where we are, where we are going? Stakeholder roles

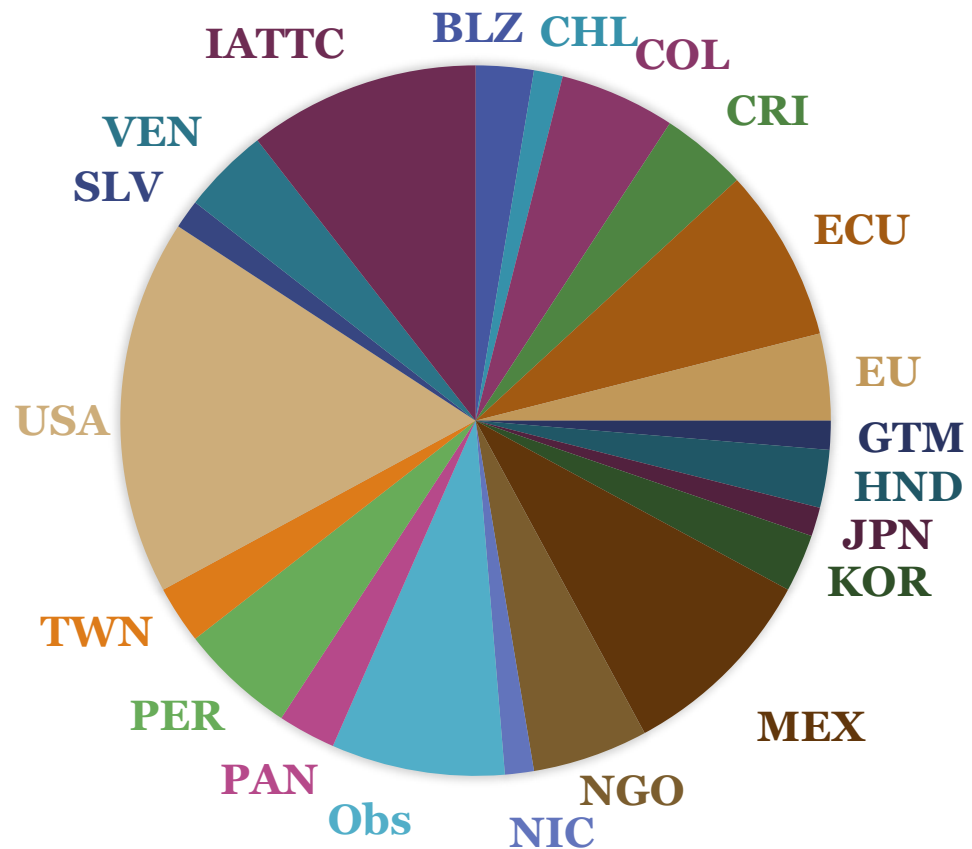
¿Donde estamos, hacia donde vamos? Roles de partes interadas



3rd IATTC Tropical Tuna MSE Workshop, December 2022, participants

3^{er} Taller CIAT sobre EEO, Diciembre 2022, participantes

80 participants / *participantes*



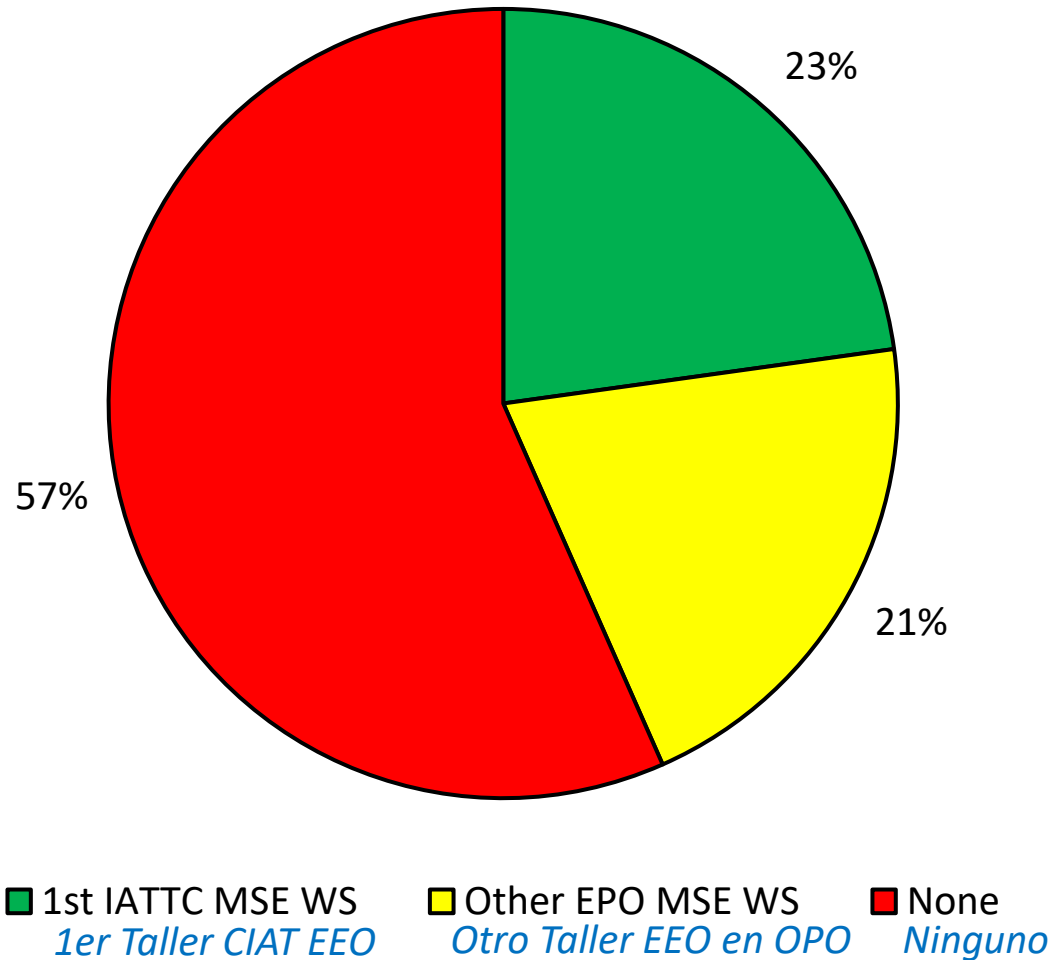
	1st MSE WS	2nd MSE WS	3rd MSE WS
Cooperating Non-Members	FALSE	FALSE	FALSE
	FALSE	TRUE	TRUE
	FALSE	FALSE	TRUE
	FALSE	FALSE	FALSE
	FALSE	FALSE	FALSE
Members	TRUE	TRUE	TRUE
	FALSE	TRUE	FALSE
	FALSE	FALSE	FALSE
	FALSE	FALSE	TRUE
	TRUE	TRUE	TRUE
	TRUE	TRUE	TRUE
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Participants	44	97	80
Members (%)	13 (62%)	15 (71%)	16 (76%)



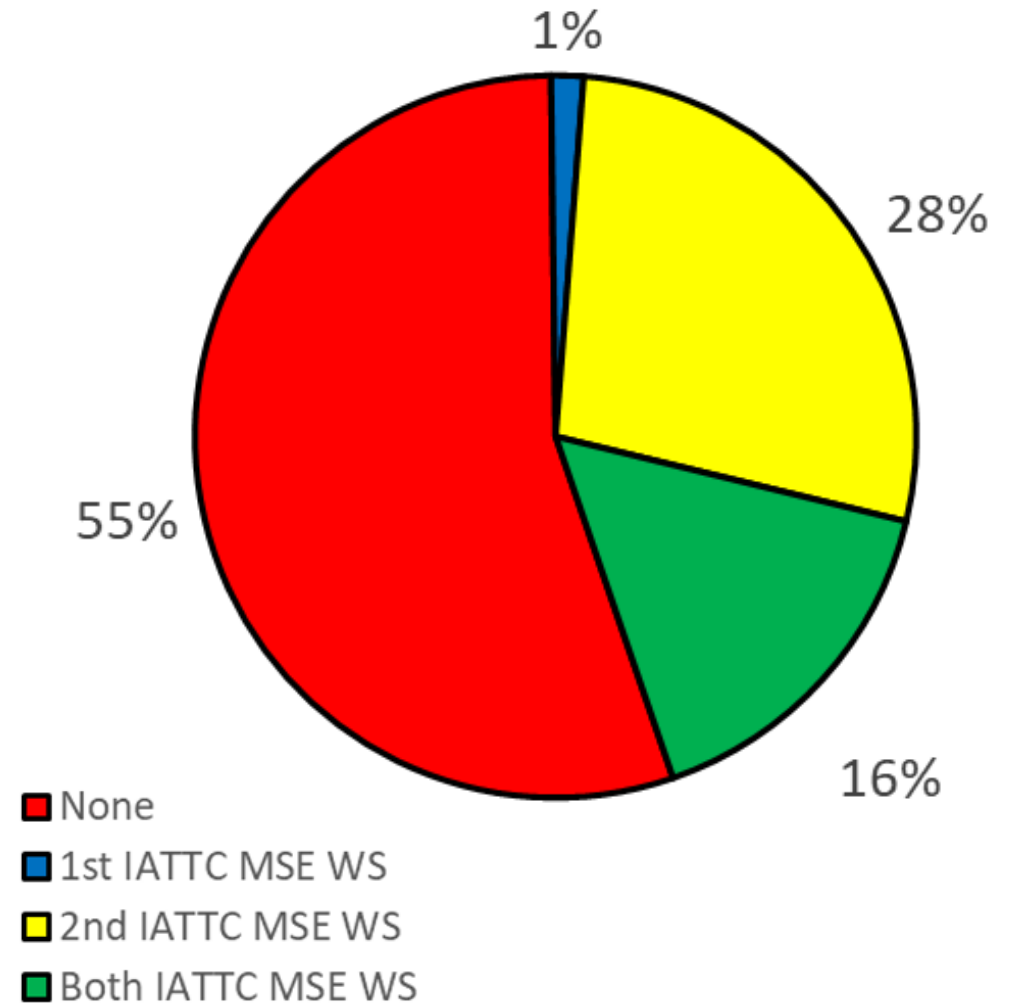
Participation in previous EPO tropical tuna MSE workshops

Participación en talleres previos de EEO de atunes tropicales en el OPO

2nd Workshop / *2^{do} Taller*



3rd Workshop / *3^{er} Taller*

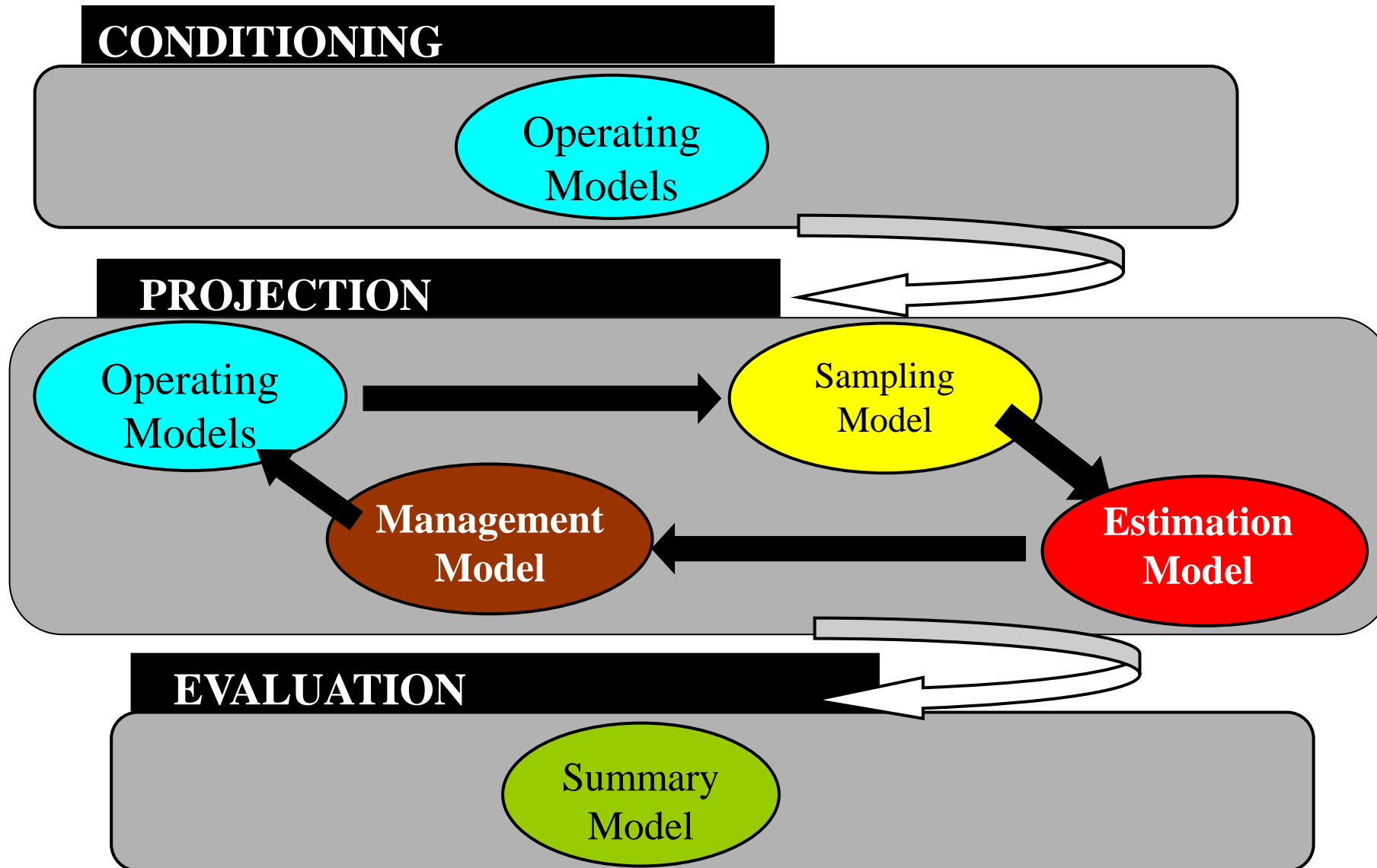


Objectives, quantities and performance indicators summarized during the 3rd IATTC MSE workshop



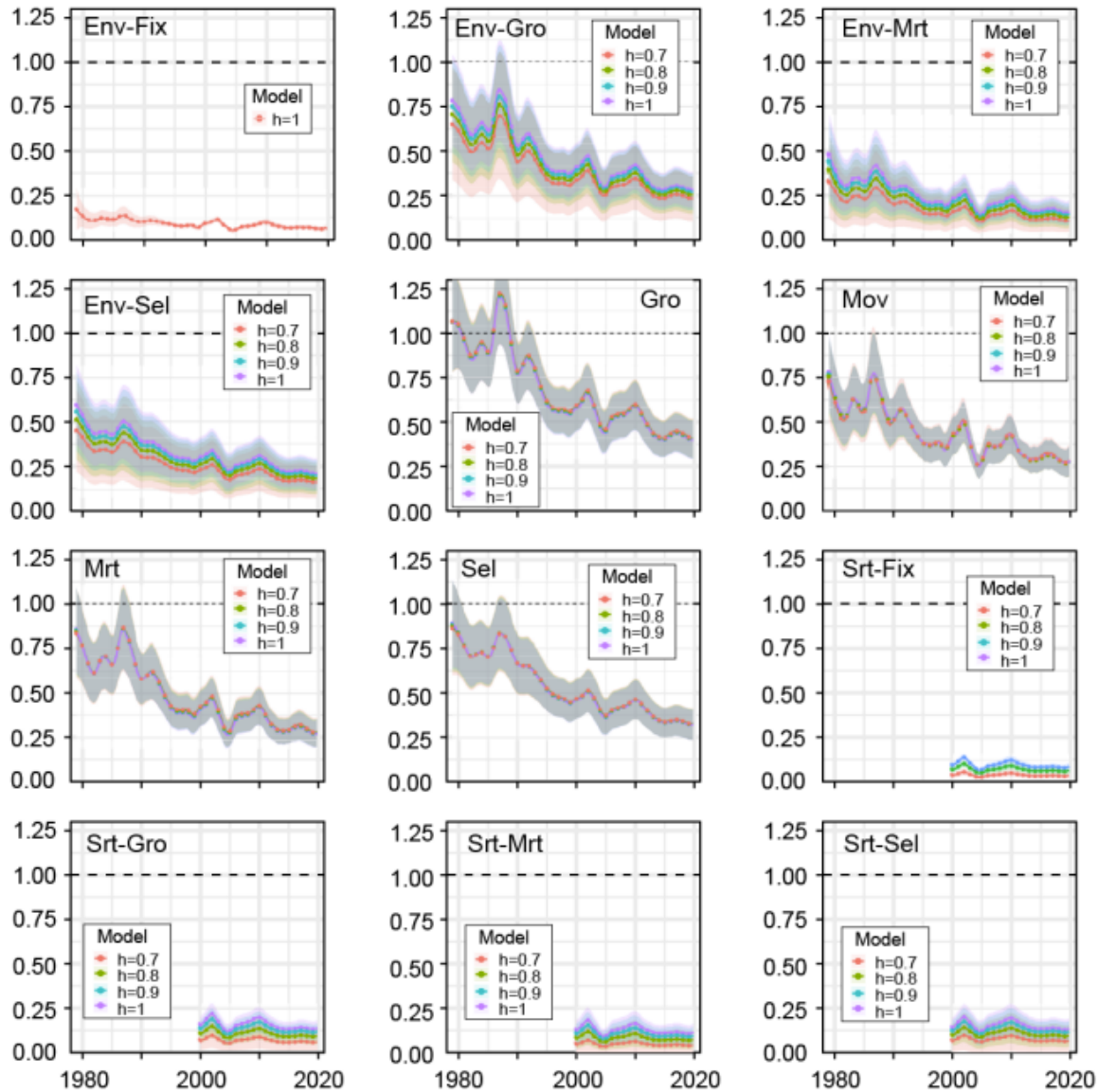
OBJECTIVE	Quantity	Performance Indicators
Safety Maintain stock above limit reference points	Equilibrium virgin spawning biomass SB_0 <ul style="list-style-type: none"> < 10% probability SB below 7.7% of SB_0 < 5% probability SB below 7.7% of SB_0 < 10% P $SB < SB_{msy}$ Flim (< 5% P $F > F_{msy}$)	Ratio of SB_{yr} over SB_0 Probability calculated over projected 30 years (All years, any year by replicates)
Status Maintain stock in green quadrant of Kobe plot	$SB \geq$ dynamic SB_{MSY} and $F < F_{MSY}$ <ul style="list-style-type: none"> 50% probability (too low?) 60% probability 75% probability 80% probability (too high?) 	% of simulated runs falling in Kobe's green quadrant Probability calculated over projected 30 years
Stability Maintain low variability of catch and effort limits, gradual changes in management measures. Caps at 10% (effort), 15% (catch), Min. change (X%)	Standard deviation of annual catch, effort Average interannual proportional change (catch, effort)	% change in catch and/or effort between years Calculated over projected 3, 15 and 30 years
Yield/Abundance Maintain catches/effort/CPUE above historical ranges	Average catch/effort/CPUE by fishery (PS and LL) <ul style="list-style-type: none"> 1994-2019 (since FAD expansion) 2017-2019 (latest status quo) 	Ratio of projected 3, 15 and 30-year average catch/effort/CPUE by fishery over historical period
Status quo Maintain the stock at levels near the (2017-2019) status quo	Spawning biomass, Index (LL CPUE)	Ratio of projected 3, 15 and 30-year average SB , Index (LL CPUE) over status quo period (2017-2019)

Management Strategy Evaluation: Components



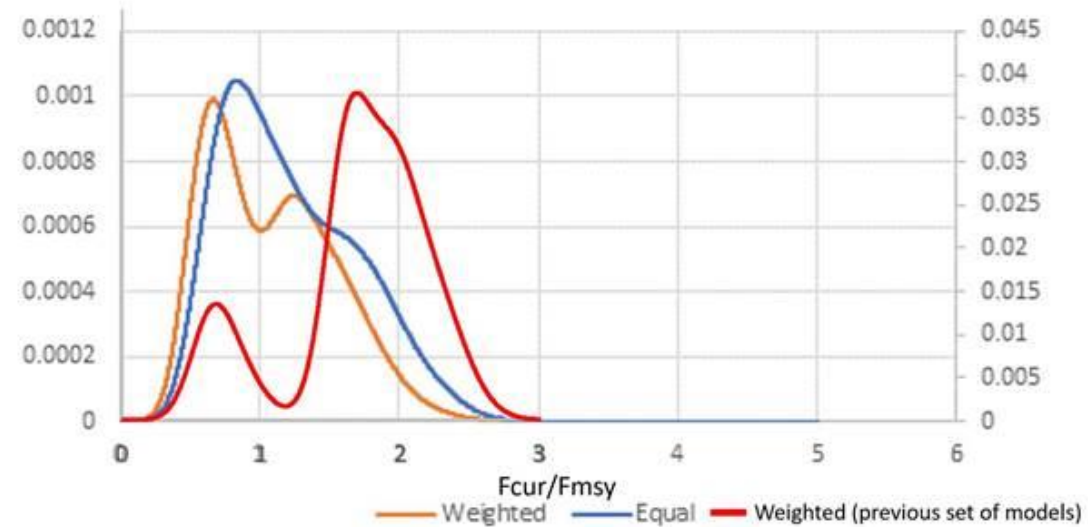
Sample design for OMs from BET reference models

Spawning biomass ratio—Cocientes de biomasa reproductora



Operating Models

Alternative weightings



Alternative EMs for BET (simpler assessment model)

- ASPM in Stock Synthesis
- Pella-Tomlinson model
- Gear-aggregated simpler integrated model in Stock Synthesis
- Others?

**Estimation
Model**

Harvest Control Rules for BET MSE

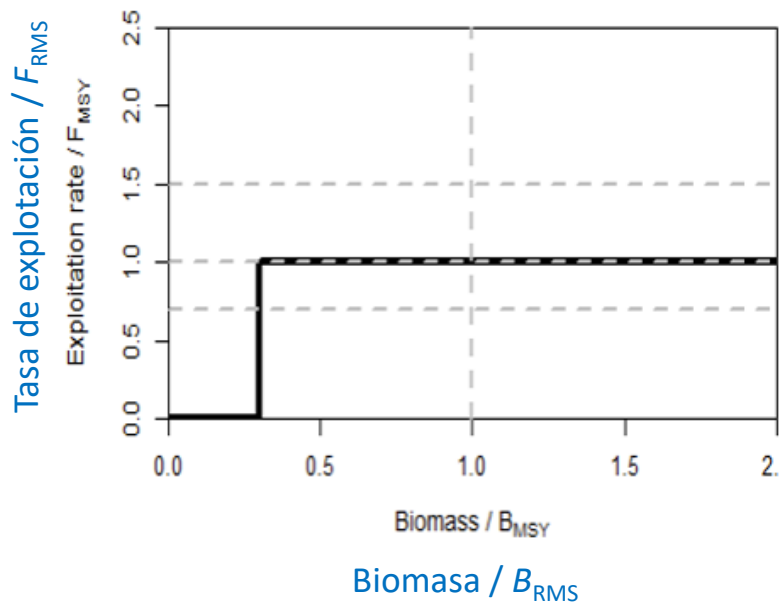
- Tropical Tuna Harvest Control Rules ([Resolution C-16-02](#))

“...MSE is necessary to evaluate the HCR (...) and alternatives (...) to allow the Commission to adopt a permanent HCR.”

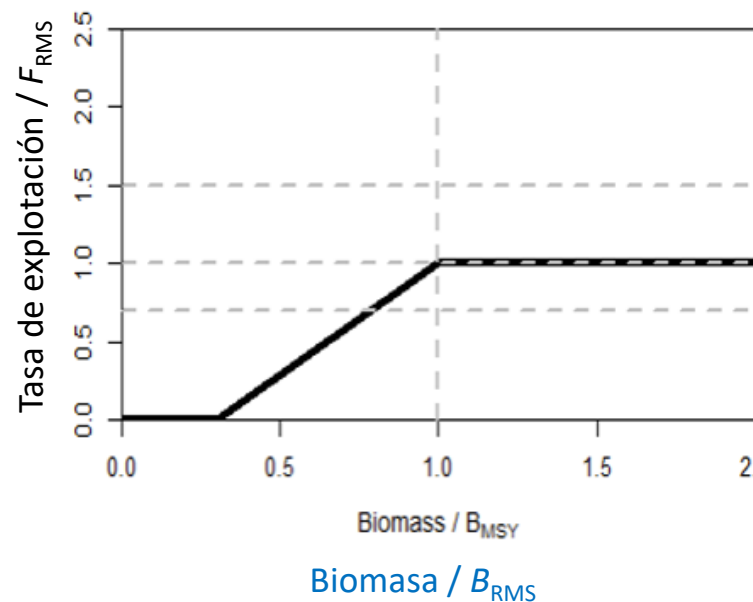
ALTERNATIVE HCRs

- 1) Empirical HCR based on standardized Japanese longline index of abundance
- 2) Model based HCR, based on surplus production model (ASPM, Pella-Tomlison)

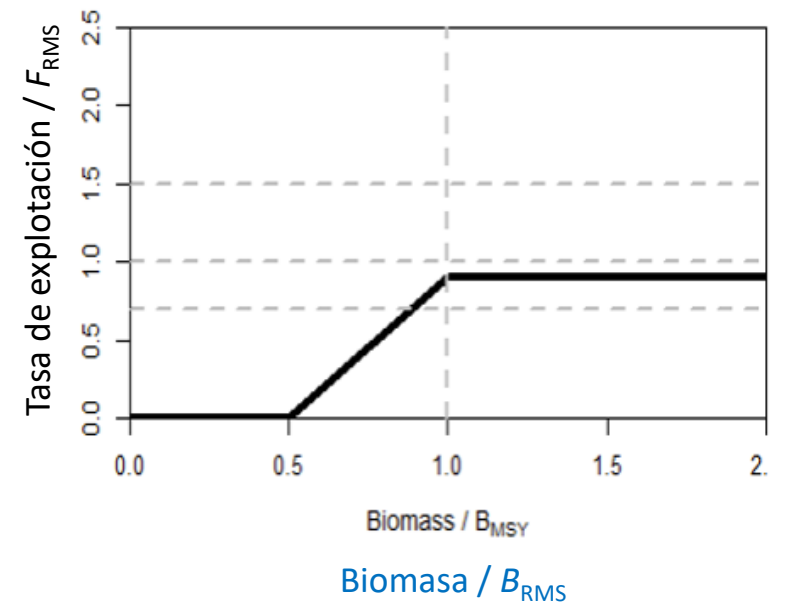
HCR 1: IATTC-like
RCE 1: CIAT actual



HCR 2: Moderate
RCE 2: Moderada



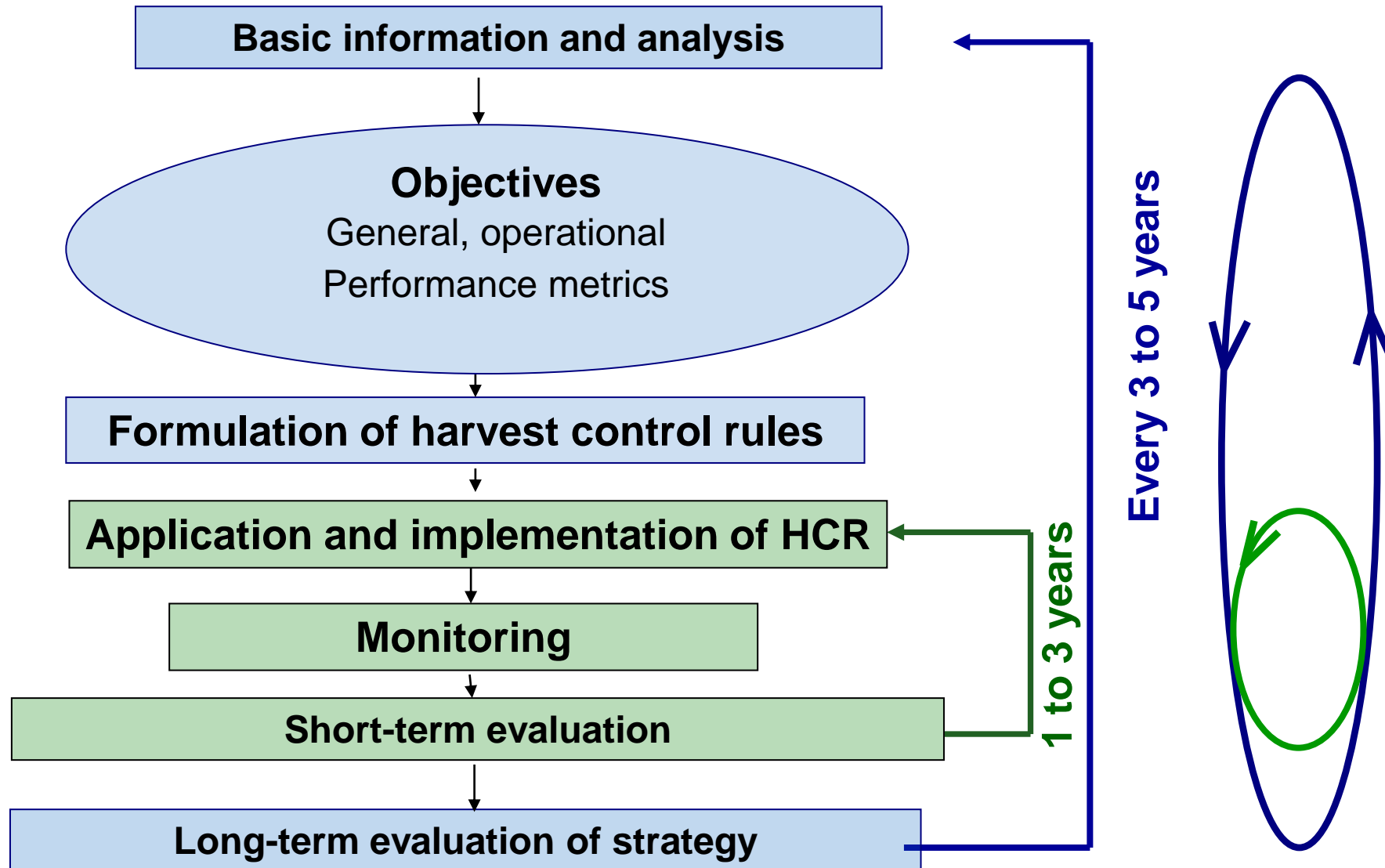
HCR 3: Conservative
RCE 3: Conservativa



Harvest Control Rules for BET MSE

- Applied on a 3-year cycle
- Effort controls (days of closure) for surface fleets, Catch limits for longline fleets
- Data inputs for HCR:
 - Empirical HCR: standardized Japanese longline index of abundance
 - Model-based HCR: standardized Japanese longline index of abundance and total catches

Feedback cycles / *Ciclos de retroalimentación*



Potential chromogram of harvest strategy implementation for EPO bigeye tuna

Cronograma tentativo, implementación estrategia de ordenación para patudo en el OPO

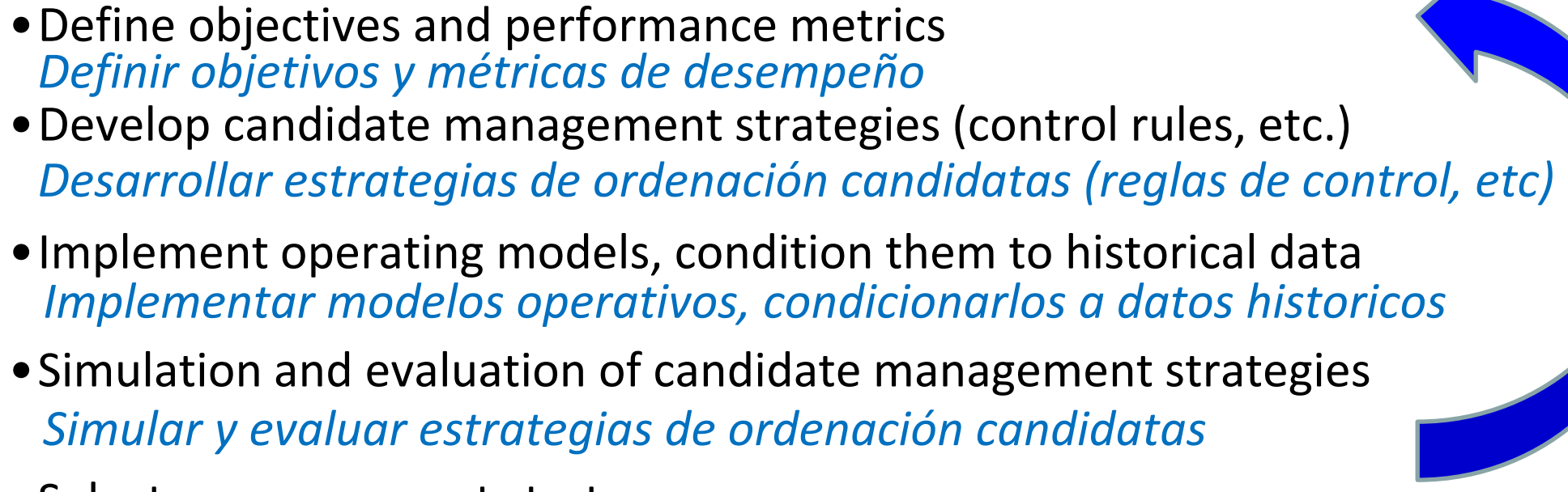
	2023	2024	2025	2026	2027
SAC		Second round MSE			
AM		Select/Adopt BET MP Set Measures (2025-2027)			Set Measures (2028-2030)
Staff work	First round MSE	Check Excep. Circumst. Assess stock status	Check Excep. Circumst.	Collate data for MP Run MP Check Excep. Circumst.	Check Excep. Circumst. Assess stock status



- **COVID-19 pandemic / *Pandemia de COVID-16***
Limitations of virtual workshops, changes to workplan timeline
Pandemia de COVID-16, inhabilidad de tener talleres en persona
- **Limited-representation** by some CPCs, high turnover of representatives
Representación limitada de algunas CPCs, alto recambio de representantes
- **Multiple extraordinary meetings during 2020-2021**
Múltiples reuniones extraordinarias durante 2020-2021
- **Some challenges expected to ameliorate/Algunos desafíos se espera que mejoren**
COVID pandemic, workplan extended to 2024, conservation measures for 2022 to 2024
Pandemia de COVID, plan de trabajo hasta 2024, medidas de conservación de 2022 a 2024
- **Funding** for tropical tuna MSE work after 2023 has not been secured yet
Fondos para EEO de atunes tropicales luego de 2023 no están asegurados
Work is conducted by contractor with EU funds through the end of 2023
El trabajo es realizado por un contratista con financiación de EU hasta el fin de 2023

Steps in Management Strategy Evaluation

Pasos en Evaluación de Estrategias de Ordenación

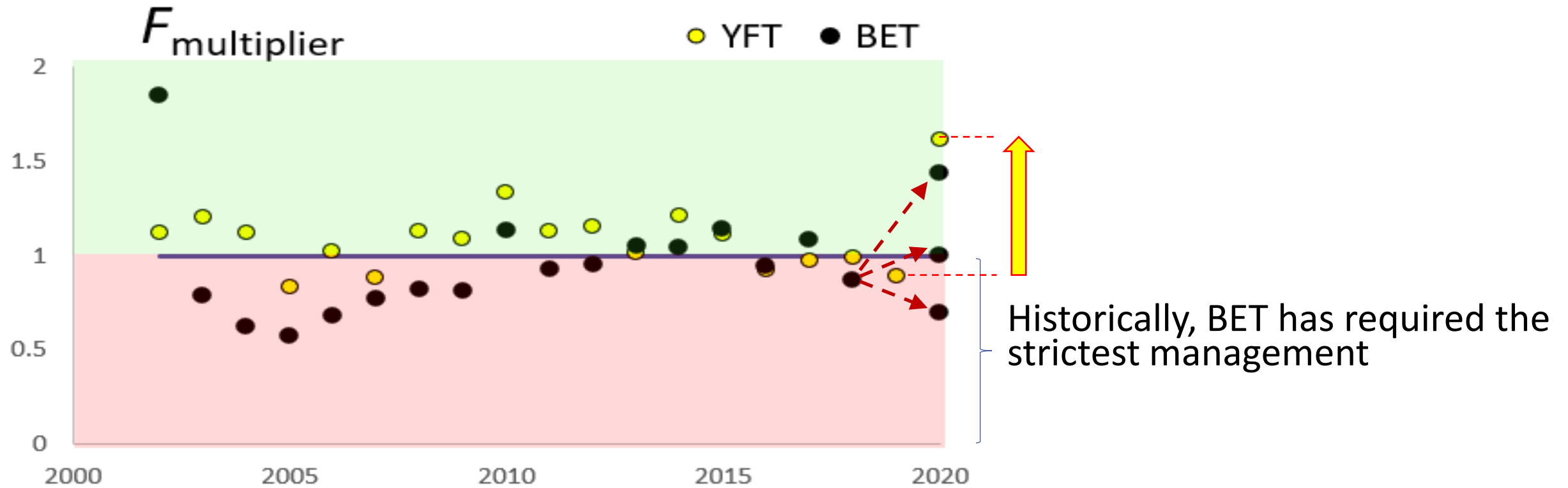
- 
- Define objectives and performance metrics
Definir objetivos y métricas de desempeño
 - Develop candidate management strategies (control rules, etc.)
Desarrollar estrategias de ordenación candidatas (reglas de control, etc)
 - Implement operating models, condition them to historical data
Implementar modelos operativos, condicionarlos a datos históricos
 - Simulation and evaluation of candidate management strategies
Simular y evaluar estrategias de ordenación candidatas
 - Select a management strategy
Seleccionar una estrategia de ordenación
 - Consider implementing the evaluated management strategy
Considerar implementar la estrategia de ordenación evaluada

PROCESS NOT LINEAR!!! / *Proceso no lineal!!!*

ITERATIVE!!! / *Iterativo!!!*

Species focus (BET), rationale

Initial MSE technical focus on BET, moving to other species towards the end of current work plan



- Recent work to improve YFT modeling and develop operating models for MSE
- Recent lack of assessment models (or operating models) for SKJ (although recent interim assessment in 2022)
- Need YFT (and SKJ) modeling work to incorporate hypotheses for assessment and operating models
- As SKJ and YFT models are developed, they could be included in the MSE work

Beyond BET MSE

- Multispecies (BET, YFT, SKJ), multi-gear (PS, LL) and fishing modes (FAD, Dolphin, NOA) present several challenges:
 - More difficult to simulate and evaluate
 - Different objectives for different fisheries?
 - Weak-stock management? Or 3 species individually? or two species?
- Very few truly multispecies MSEs in the world, oftentimes they focus on gear interactions
- Need to discuss and plan as part of the next 5-year scientific strategic plan

Timeline of current project and future steps

Cronograma del proyecto actual y siguientes pasos

MSE tropical tunas – EEO atunes tropicales

DOCUMENT SAC-14 INF-F

GREEN: COMPLETED; **BLUE:** FUNDED; **RED:** UNFUNDED

SSP ref.	Target/Project	2021		2022		2023		2024	
		1	2	1	2	1	2	1	2
	1. SUSTAINABLE FISHERIES								
	Goal I: Test harvest strategies using Management Strategy Evaluation (MSE)								
I.1.	Conduct a comprehensive MSE for bigeye tuna and plan MSEs for the other tropical tuna species								
I.1.a	1. Stakeholder and technical MSE workshops								
	a. Technical meetings to agree on overall/revised MSE Plan by IATTC staff and collaborators					Blue	Blue		
	b. Stakeholder workshops on training and communication on MSE development and results	Green			Green	Blue	Blue	Red	Red
	2. Technical development of MSE, HCR, MP, outputs	Green	Green	Green	Green	Blue	Blue	Red	Red
	a. Run preliminary MSE based on initial input from managers and stakeholders					Blue	Blue		
	b. Run final MSE based on revised input from managers and stakeholders						Blue	Red	Red
	c. Present evaluated HCR/MP to Commission, plan work for other tropical tunas						Blue	Red	Red

Transition of MSE work to other tropical species (YFT, SKJ) after 2014 to be outlined in the new IATTC Strategic Science Plan (planned in 2023)
Transición a EEO de otros atunes tropicales (YFT, SKJ) en 2014 detallado en el nuevo Plan Estratégico Científico de la CIAT (planeado en 2013)

Funds?  **¿Fondos?** 



Preguntas / Questions

