Management Strategy Evaluation for EPO tropical tunas: status and next steps

2nd IATTC Tropical Tuna MSE Workshop, *by videoconference*, May 03-04, 2021

What are Management Strategies

- Combination of monitoring, stock status evaluation, harvest control rule (with or without Reference Points) and management actions **designed to achieve fisheries objectives**.
- Development and success of Management Strategies benefit from the **involvement of all stakeholders** in the management planning stage.

Management Strategy – Management Procedure

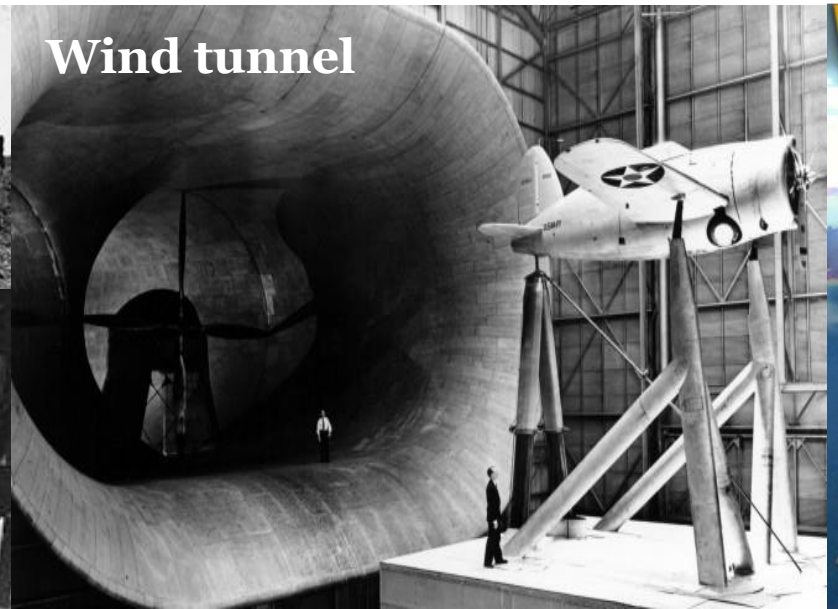
"… is analogous to an autopilot, with the associated advantages. However, this does not mean that the aircraft should be left without a pilot.

The pilot must remain on board to look out for unexpected major course deviations that may not have been factored into the design, including appreciable changes in scientific perceptions concerning the resource. "

Doug S. Butterworth, University of Cape Town

Management Strategy Evaluation (MSE)

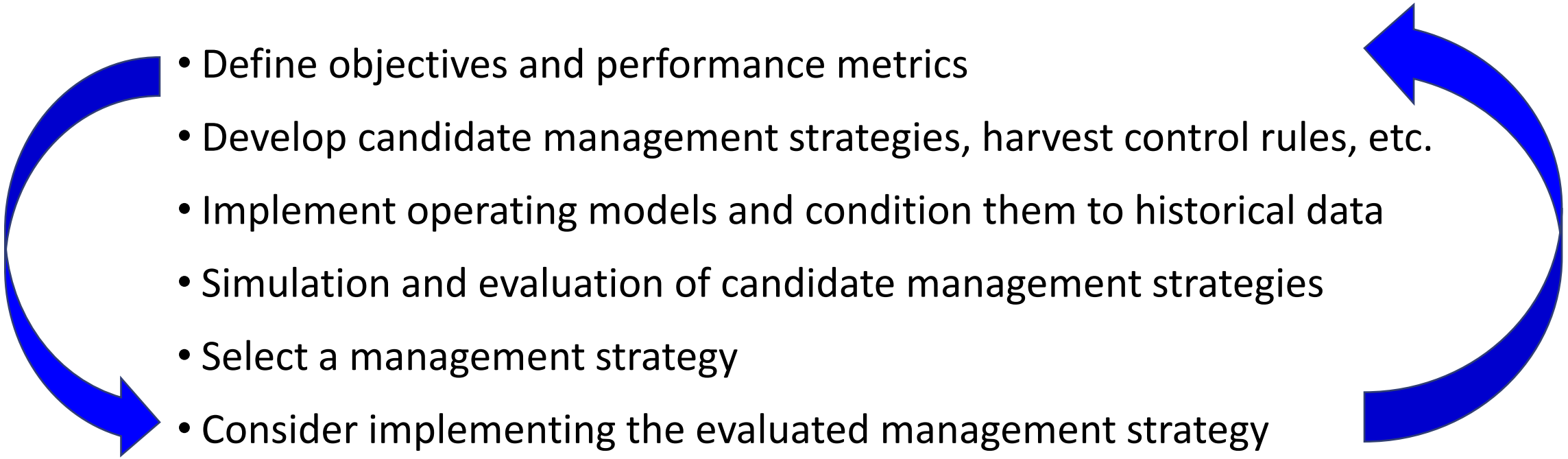
- Useful to formally answer what if questions:
  - Quotas (individual / total);
  - Closures (time / spatial);
  - Fishing gear limits (number of sets, FADs, etc);
  - Number/size of vessels
  - Better/new data (tagging, ageing, genetics, etc)



How to evaluate strategies (example)

- Rarely we can evaluate alternatives analytically (i.e. formula)
- Typically, we evaluate alternative strategies using computer simulations:
  - Specify general objectives
    - Preserve the stock
  - Specify operational objectives
    - Do not fall on the red sector of Kobe plot more than 5% over 100 years
  - Develop candidate management strategies, harvest control rules, etc.
  - Develop models of the system to manage, and its uncertainty
    - Simulation models describing biology, fisheries, sampling, management, etc.
  - Use simulations to explore the results of each alternative strategy
  - Summarize results
  - Decide on what strategy to implement

Management Strategy Evaluation Steps



- Define objectives and performance metrics
- Develop candidate management strategies, harvest control rules, etc.
- Implement operating models and condition them to historical data
- Simulation and evaluation of candidate management strategies
- Select a management strategy
- Consider implementing the evaluated management strategy

PROCESS NOT LINEAR!!!

ITERATIVE!!!

EPO tropical tuna Management Strategy Evaluation

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

  "…comprehensive management strategy evaluation (MSE) is necessary to evaluate the HCR (…) and alternatives (…) to allow the Commission to adopt a permanent HCR."

- MSE Workshops Terms of Reference (Resolution C-19-07)
- SAC-10, 11 Recommendations supports staff's MSE workplan (IATTC 94-02)
- 5-year (2018-2023) IATTC scientific staff MSE Workplan (SAC-10-01a)
- Related workshops in 2015-2019, including 1st IATTC MSE Workshop (Report)
- 2021-2023 MSE funding from the European Union

  - Two components:
    - Consultative/dialogue process (e.g. series of MSE workshops)
    - Technical implementation of MSE

European Commission

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Chronogram of Workshops related to MSE in the EPO

Introduction to Management Strategies (Funded by WWF, FAO/ABNJ)

- **Panamá**, February 2015
- **San Diego**, USA, August 2018

Introduction to MSE to EPO Industry (Funded by WWF, FAO/ABNJ)

- **Manta**, Ecuador. June 13, 2019
- **Panamá** City, Panamá. June 18, 2019
- **San Diego**, USA, August 12, 2019
- **México City**, México, August 14, 2019
- **Colombia**. September 19, 2019

Workshops for scientists, managers, stakeholders to elicit alternative objectives, performance metrics, harvest control rules (Funded by IATTC)

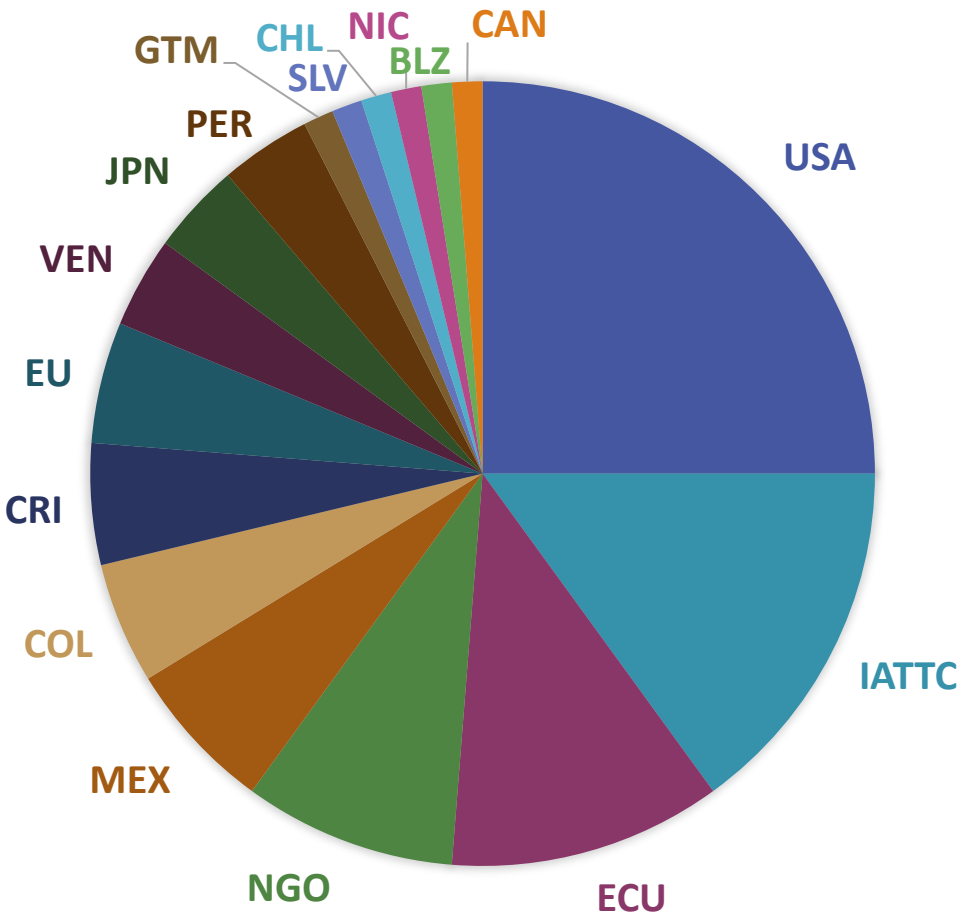
- **San Diego,** December 9-10, 2019
- **San Diego,** just before SAC, 2020...

YOU ARE HERE

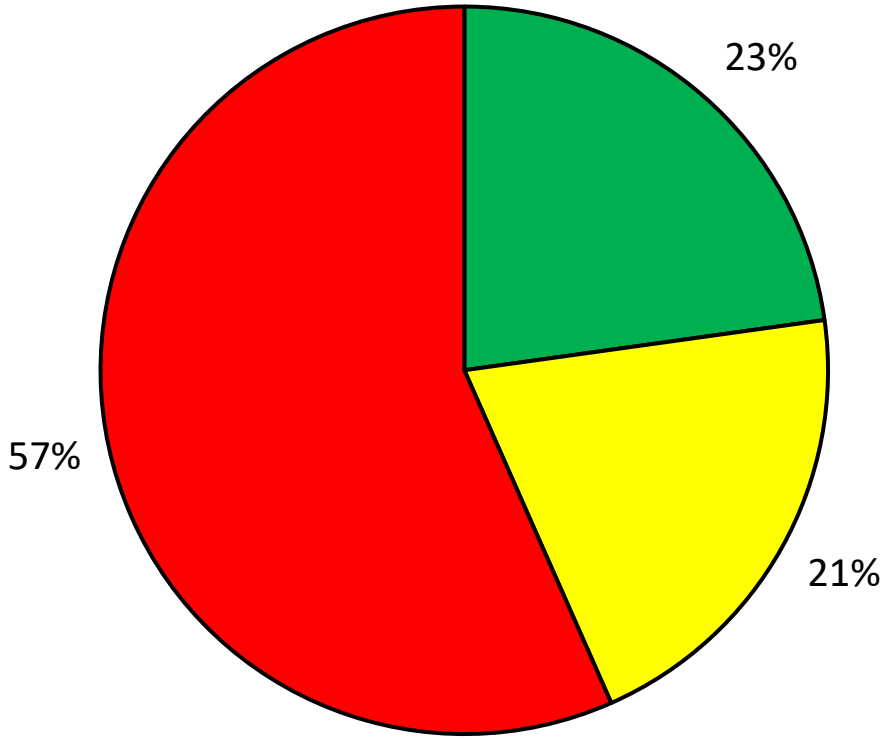
- Videoconference, April 29 and May 3-4, 2021

2nd IATTC Tropical Tuna MSE Workshop participants

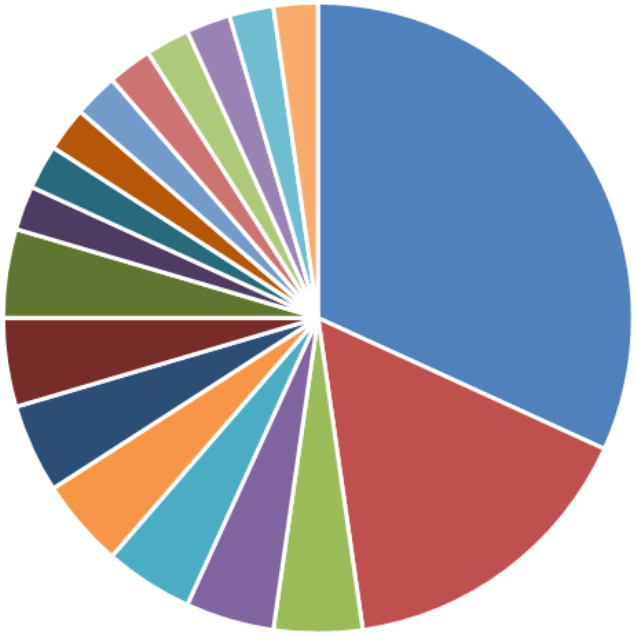
80 participants as of April 28



Participation in previous EPO Tropical tuna MSE workshops



1st IATTC MSE Workshop, Dec 2019



44 participants

Workshop report link

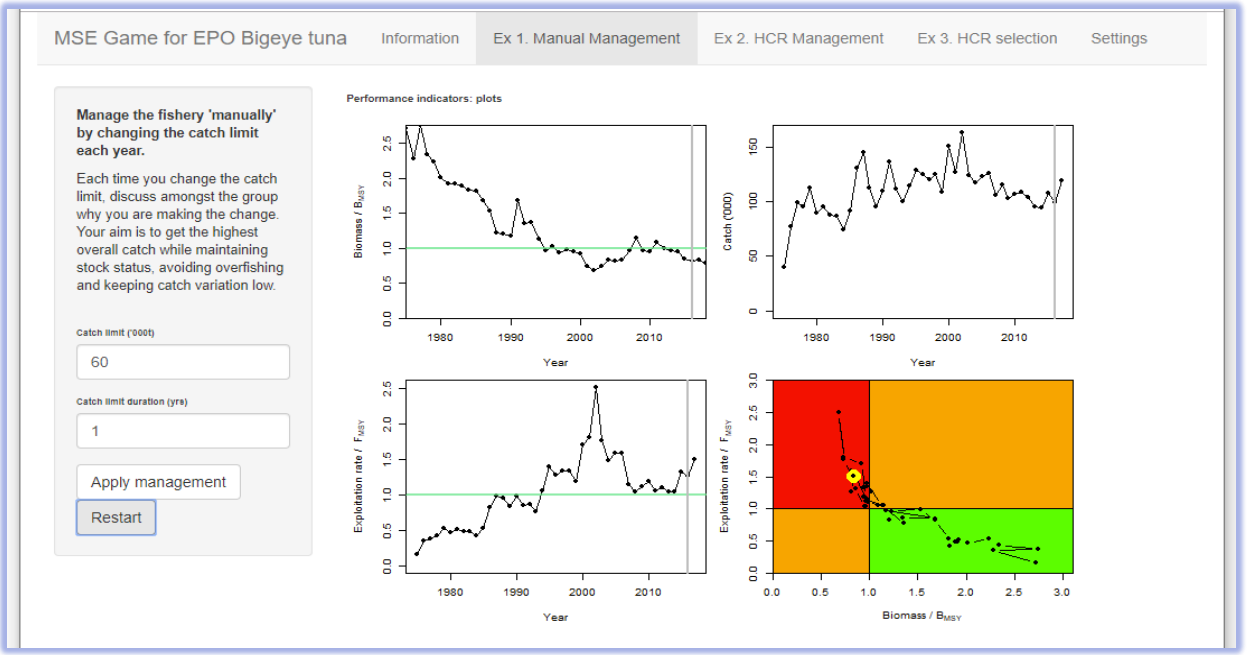
Participants affiliation

IATTC, USA, Korea, Ecuador, Nicaragua, Panama, Costa Rica, Guatemala, Mexico, Belize, Colombia, NGO-ISSF, NGO-Pew, Peru, NGO-WWF, Venezuela, Japan, Observer

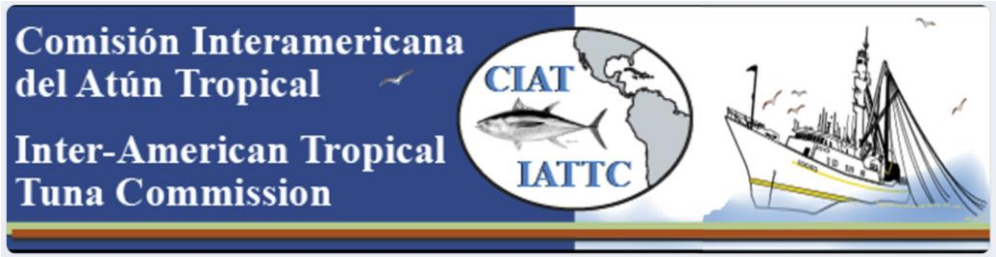
1st IATTC MSE Workshop, Dec 2019

Presentations, dialogue and discussions

Demos and hands-on exercises



Online questionnaires



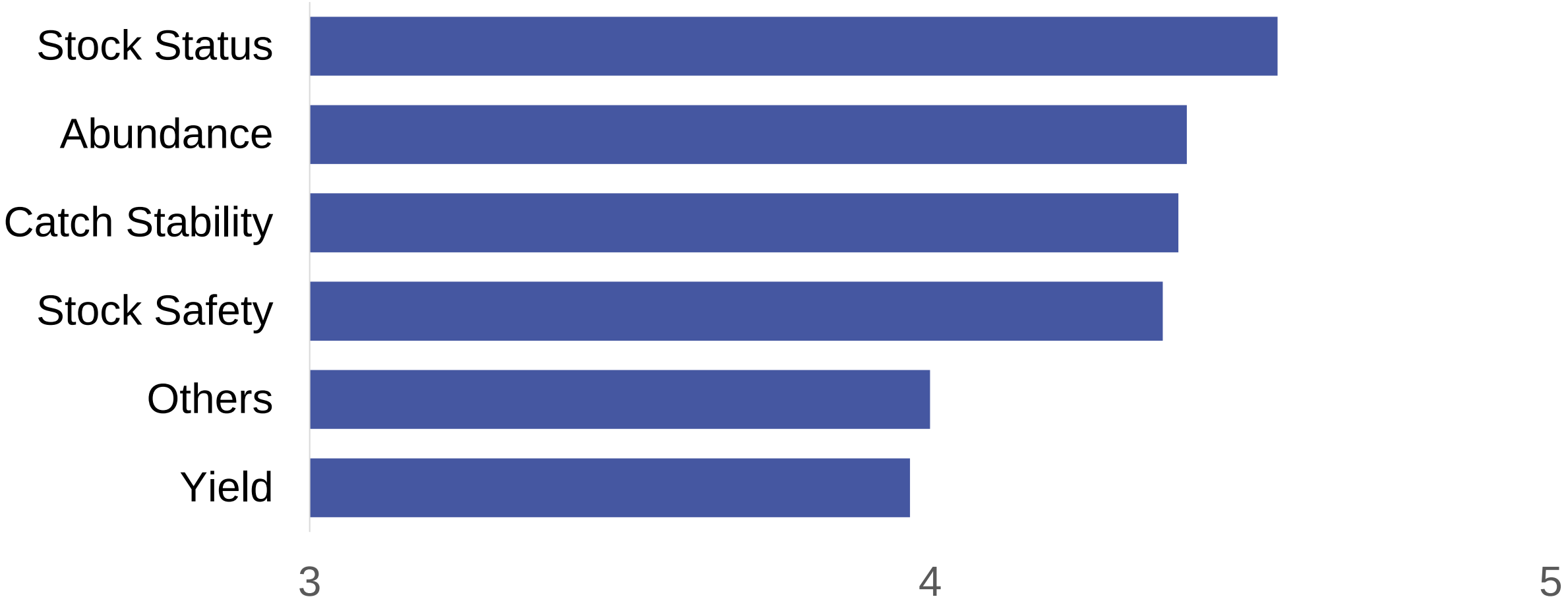
EPO Tropical Tuna Workshop Questionaire / Cuestionario de Taller Atunes Tropicales del OPO

* Required

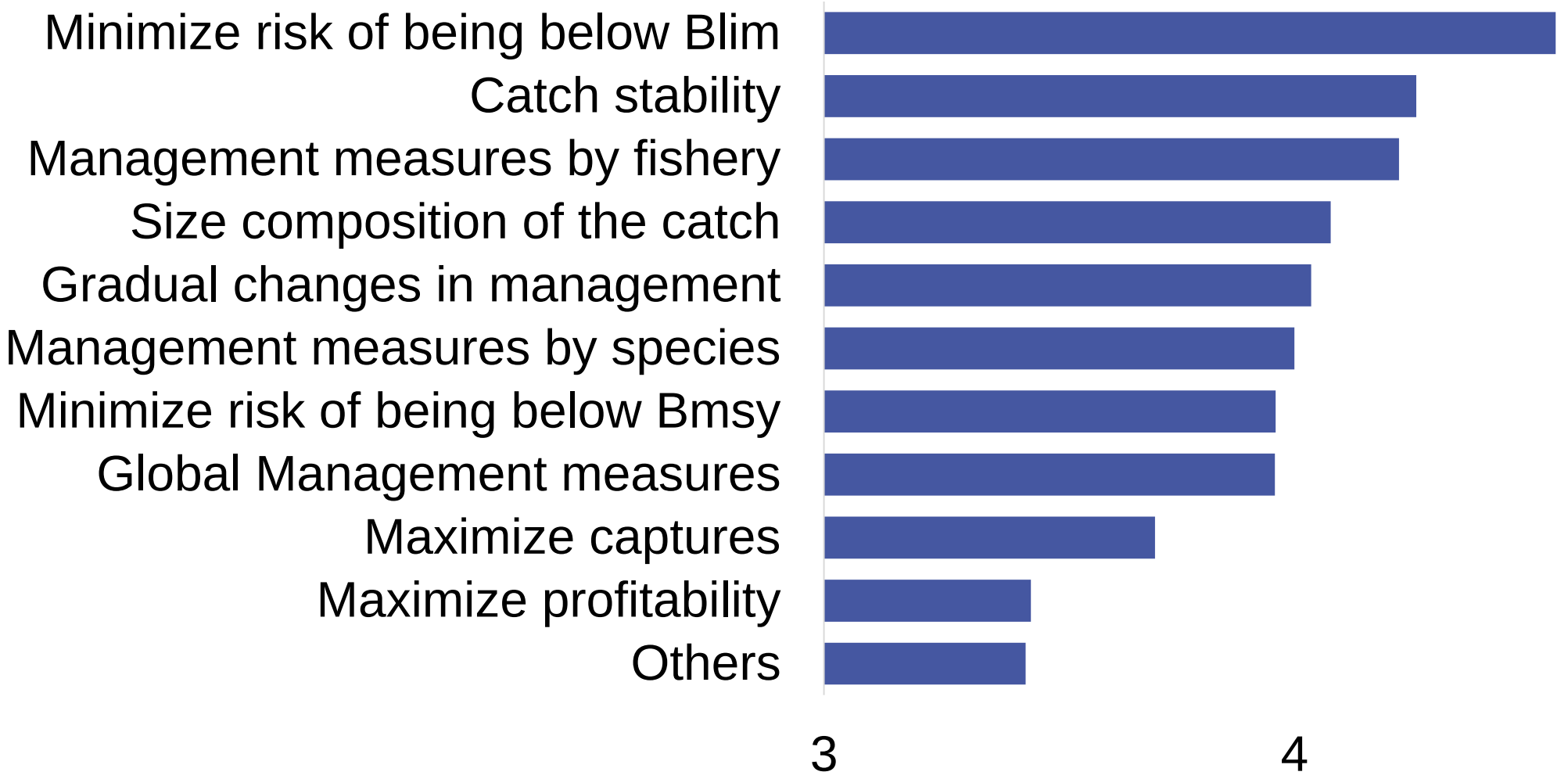
What types of objectives are important to you? Que tipos de Objetivos son importantes para usted?

	1.Not important / No importante	2.	3 Somewhat important / Algo importante	4.	5. Very important / Muy importante
Status / Estado	○	○	○	○	○
Safety / Seguridad	○	○	○	○	○

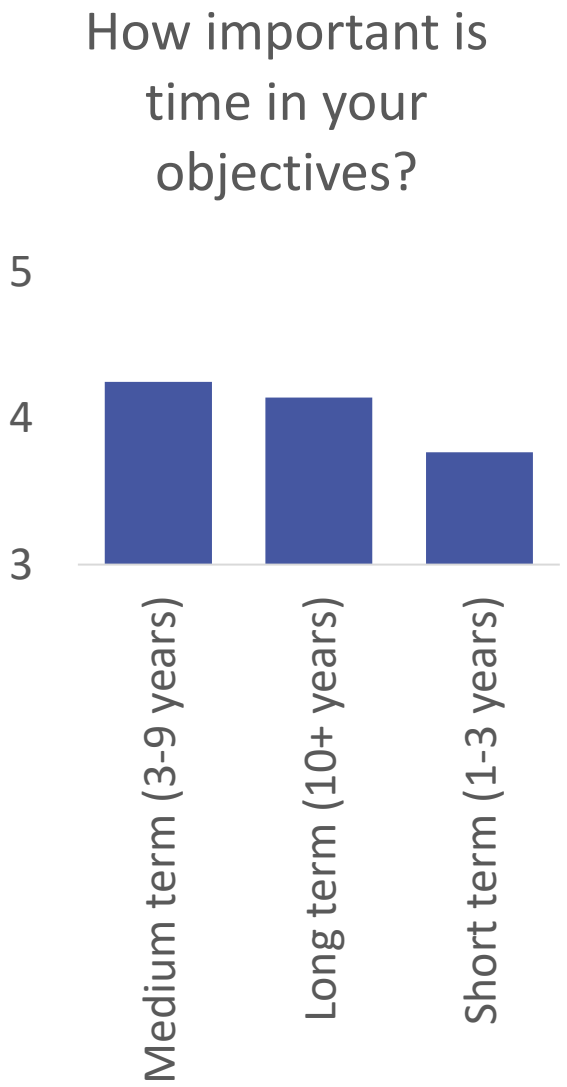
What types of objectives are important to you?



Objectives and their importance



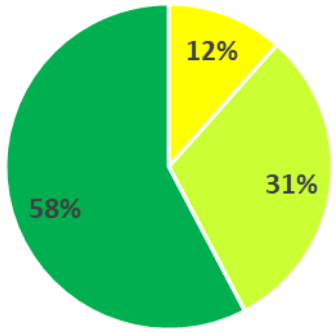
1st IATTC MSE Workshop, Dec 2019



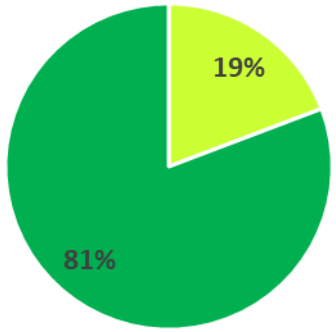
1st IATTC MSE Workshop, Dec 2019

Importance of Harvest Strategies

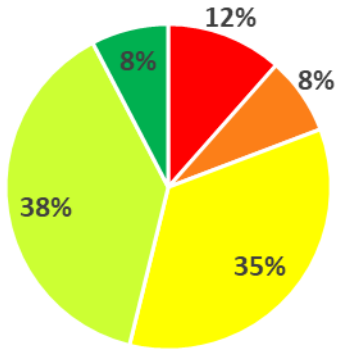
Before

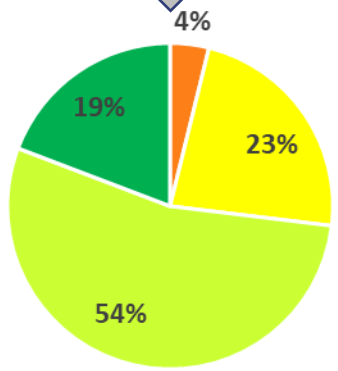


After

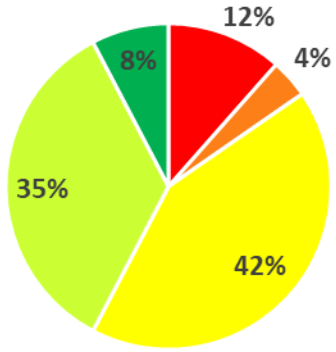


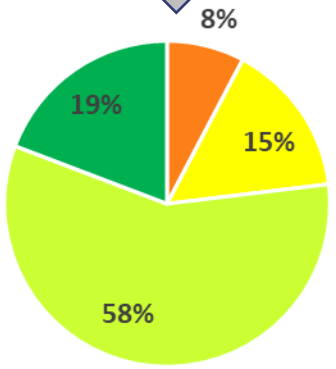
Understanding of Harvest Strategies and Reference Points



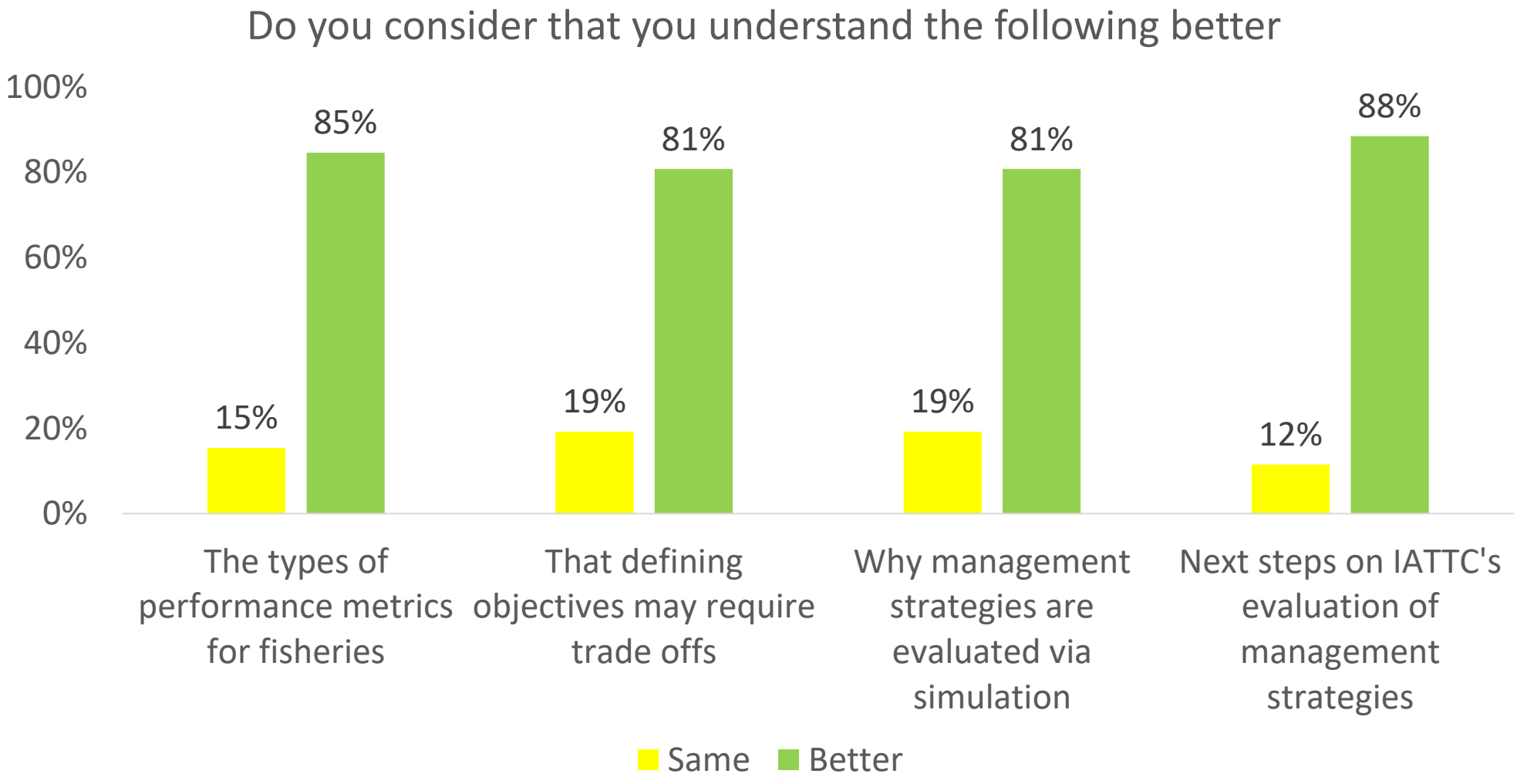


Understanding of needs for implementing Harvest Strategies



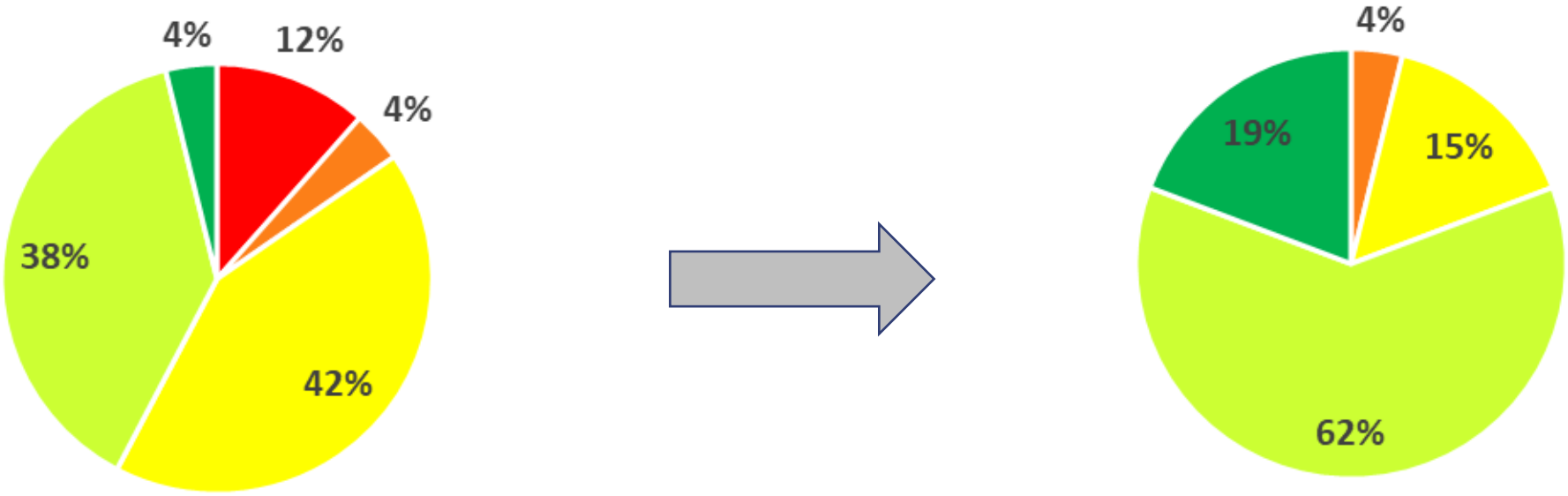


1st IATTC MSE Workshop, Dec 2019



1st IATTC MSE Workshop, Dec 2019

Confidence in engaging in dialogues including formulation of Management Strategies



Before

After

1st IATTC MSE Workshop, Dec 2019

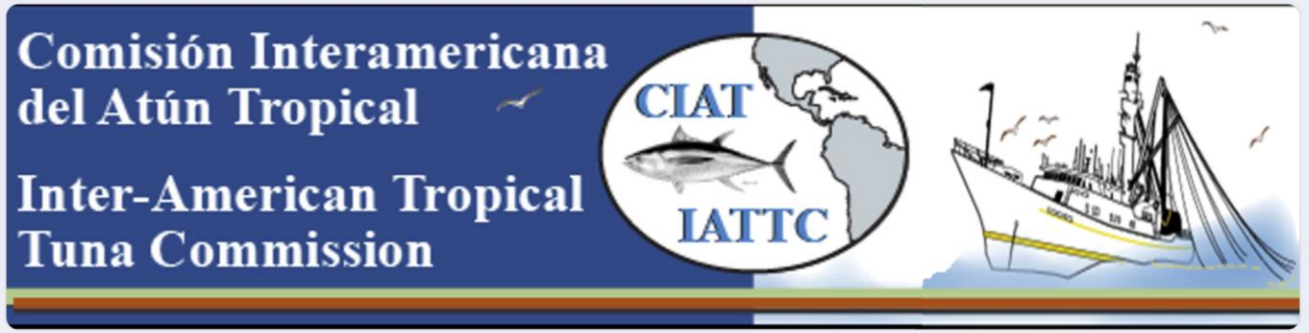
Proposed objectives (preliminary, refined in next workshops)

- Maintain stocks at healthy levels in the green sector of the Kobe plot (with a high probability)
- Maintain stocks at healthy levels in the green sector of the Kobe plot (50%)
- Minimize annual probability of falling below trigger/limit reference points (spawning biomass)
- Maintain catches by different fisheries above historical ranges
- Increase the maximum sustainable yield (MSY)
- Maximizing economic yield (MEY) in the long term
- Minimizing the bycatches of juvenile stages of non-target species
- Establish rebuilding plans by stock status and life-history of species
- Maintain viable fisheries in the long term (CPUE, all fisheries)
- Maintain low variability of catch or effort (e.g. 10%, consider asymmetry of change)
- Define emergency rules when faced with substantial changes
- Consider climate change

1st IATTC MSE Workshop, Dec 2019

Feedback from Participants (in descending priority order)

- More time for dialogue
- Longer workshops
- More hands-on exercises
- Continue the use of analogies
  - Highly effective
- Continue the discussion
  - Remotely or via working groups
- Create online repository
  - Material, key scientific papers
- Fisheries-specific management measures
- Control of bycatch of juveniles and FADs
- Socioeconomics



Feedback Survey 1st IATTC MSE Workshop / Cuestionario 1er Taller CIAT sobre EEO

We are collecting information on who attended the workshop, what participants gained from it, and how to improve future workshops. Please answer all questions that you can. The information will be aggregated with other answers collected, and any reports related to this feedback will not identify individual respondents. This should only take a few minutes. Thank you for your participation!

IATTC Staff Activities and Research Plan (PREVIOUS)

MSE - EEO

DOCUMENT SAC-10-01a

Green: completed; blue: funded; red: unfunded

SSP ref.	Target/Project	2018		2019		2020		2021		2022		2023	
		1	2	1	2	1	2	1	2	1	2	1	2
1. SUSTAINABLE FISHERIES													
Goal I: Test harvest strategies using Management Strategy Evaluation (MSE)													
I.1.	MSE for tropical tunas in the EPO: bigeye tuna												
I.1.a	1. Conduct an MSE for tropical tunas in the EPO												
	a. Improve the bigeye assessment for use as spatial OM												
	b. Run preliminary simulations with spatial OM												
	c. Technical meeting to agree on overall/revised MSE Plan by IATTC staff and collaborators												
	2. Continue technical development of MSE, HCR, MP, outputs (with Project R.1.b)												
	a. Run preliminary MSE based on initial input from managers and stakeholders												
	b. Run final MSE based on revised input from managers and stakeholders												
	c. Propose evaluated HCR/MP to Commission for adoption, plan work for other tropical tunas												
2. KNOWLEDGE TRANSFER AND CAPACITY BUILDING													
Goal R: Improve communication of scientific advice													
R.1.	Improve communication of the staff's scientific work to CPCs												
R.1.a	Workshop on training, communication and evaluation of management strategies for tuna fisheries in the EPO												
	a. Other MSE workshops for scientists-managers (to be planned)												
R.1.b	Technical development, communication and evaluation of MSEs for tropical tuna fisheries in the EPO involving managers, scientists and other stakeholders												
R.2	Participate in global initiatives for the communication of science: t-RFMO MSE working group												

Funds?

IATTC Staff Activities and Research Plan (REVISED)

MSE - EEO

DOCUMENT SAC-12-01

GREEN: COMPLETED; BLUE: FUNDED; RED: UNFUNDED, Text ~~struck through~~ indicates completed or terminated projects

SSP ref.	Target/Project	2018		2019		2020		2021		2022		2023	
		1	2	1	2	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												
	b. Stakeholder workshops on training and communication on MSE development and results												
	2. Technical development of MSE, HCR, MP, outputs												
	~~a. Improve the bigeye assessment for use as spatial OM~~												
	~~b. Run preliminary simulations with spatial OM~~												
	a. Run preliminary MSE based on initial input from managers and stakeholders												
	b. Run final MSE based on revised input from managers and stakeholders												
	c. Present evaluated HCR/MP to Commission, plan work for other tropical tunas												

European Commission

2. KNOWLEDGE TRANSFER AND CAPACITY BUILDING													
Goal R: Improve communication of scientific advice													
R.1.	Improve communication of the staff's scientific work to CPCs												
~~R.1.a~~	~~Workshop on training, communication and evaluation of management strategies for tuna fisheries in the EPO~~												
	~~a. Other MSE workshops for scientists managers (to be planned)~~												
~~R.1.b~~	~~Technical development, communication and evaluation of MSEs for tropical tuna fisheries in the EPO involving managers, scientists and other stakeholders~~												
R.2	Participate in global initiatives for the communication of science: t-RFMO MSE working group												

Species focus, Timeline (REVISED)

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

Expected Timeline and Deliverables:

2018: Improved bigeye assessment for use as spatial operating model (OM).
Workshop on training, communication and evaluation of management strategies (San Diego).

2019: SAC-10: Report improvements to BET model for its use as OM.
Introductory harvest strategies workshops for the Industry (Ecuador, Panama, USA, Mexico, Colombia)
Workshops for scientists-managers to elicit objectives, performance metrics (1st IATTC Trop. Tuna MSE WS, USA)

2020: Work on alternative ways to incorporate uncertainty in parameters and model structure during the MSE modeling phase, including incorporating results from the risk analysis

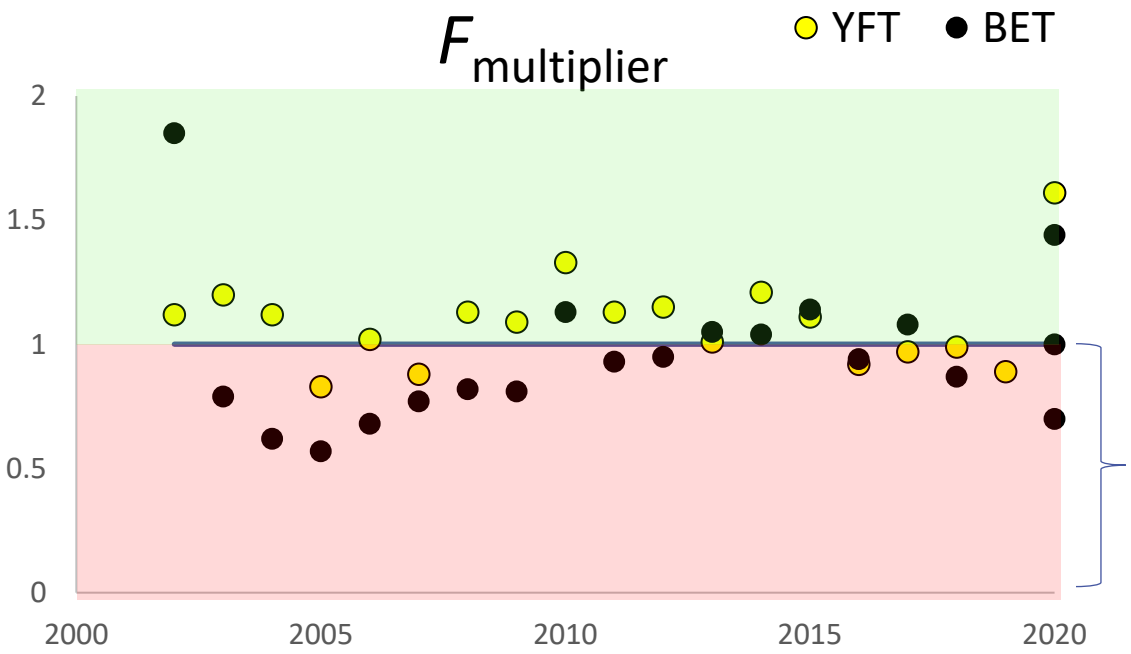
2021: Workshop to discuss alternative HCRs and refine strategy elements from previous Workshops.
SAC-12 and Annual Meeting: Report on revised MSE plan and outcomes of workshops
Technical development of MSE components and framework, testing.

2022: Workshop to show MSE updated results, gather feedback, plan additional evaluation work
SAC-13 and Annual Meeting: Report on revised MSE plan and preliminary results based on outcomes of workshops
Technical implementation of MSE, evaluation work.

2023: Workshop to discuss MSE results, plan for other tropical tunas
SAC-14 and Annual Meeting: Report and presentation of MSE results and plan for other tropical tunas.
Technical implementation of revised MSE, evaluation.
Presentation of revised MSE results incorporating stakeholder input to IATTC Annual Meeting.

Species focus, rationale

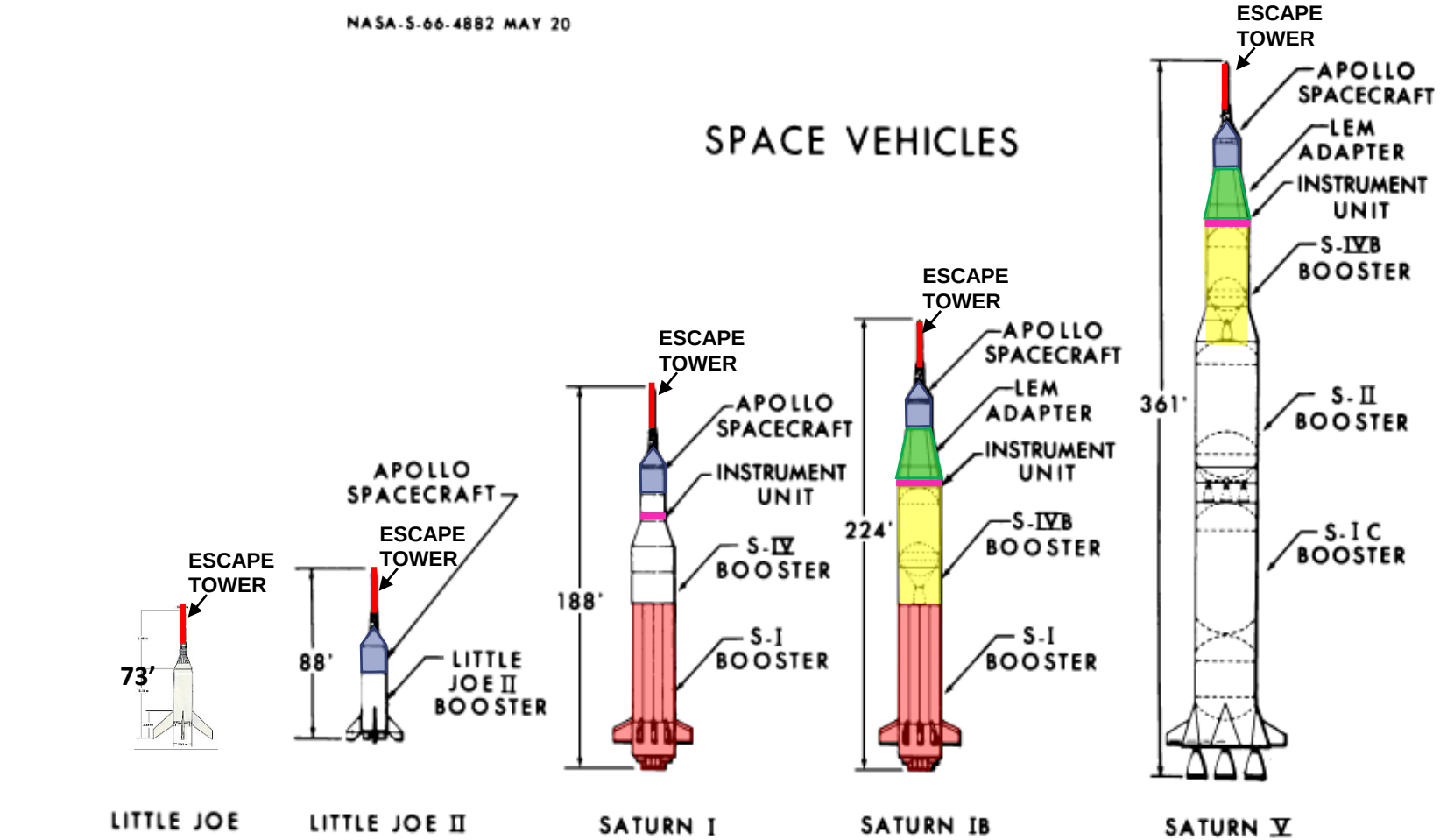
Initial MSE work focus on bigeye, moving to other species towards the end of current work plan



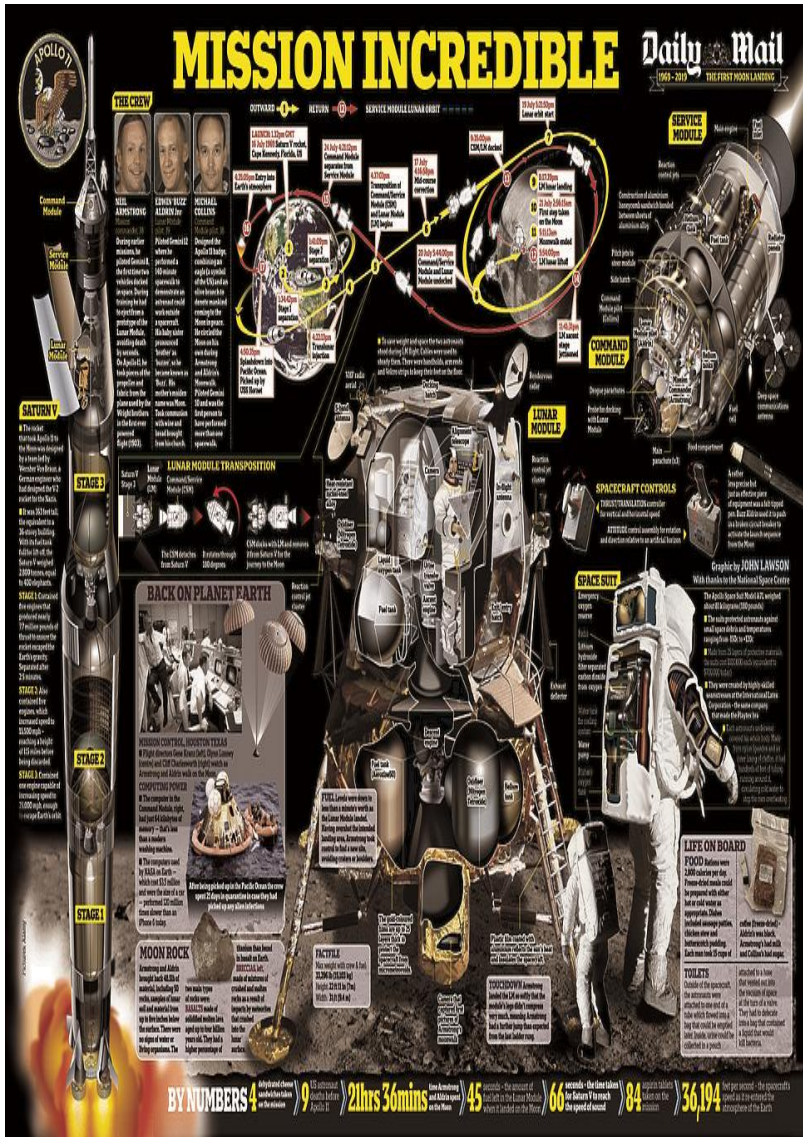
Historically, BET is the species that requires the strictest management

Species focus, rationale

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

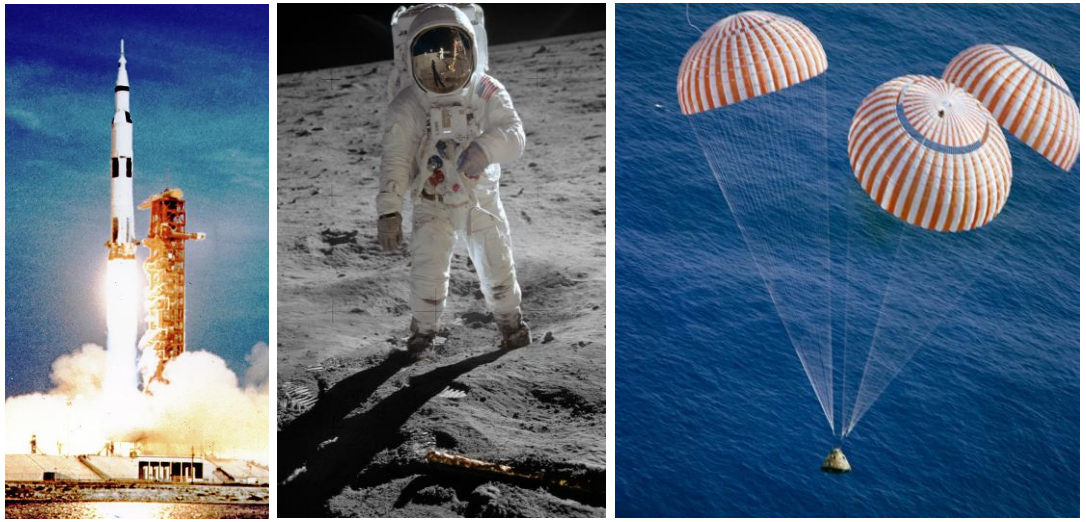


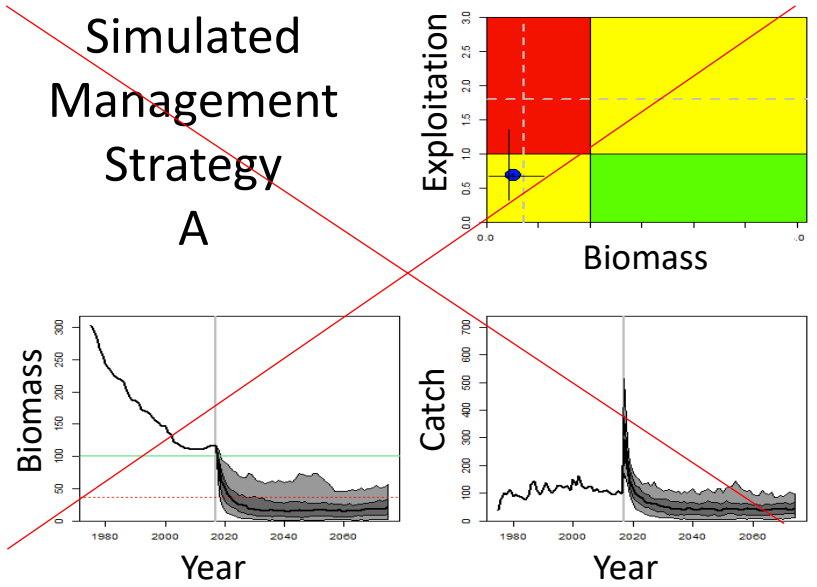
	LITTLE JOE	LITTLE JOE II	SATURN I	SATURN IB	SATURN V
Launches	8	5	10	9	13
% Success	75%	80%	100%	100%	96%
First launch	1959	1963	1961	1966	1967

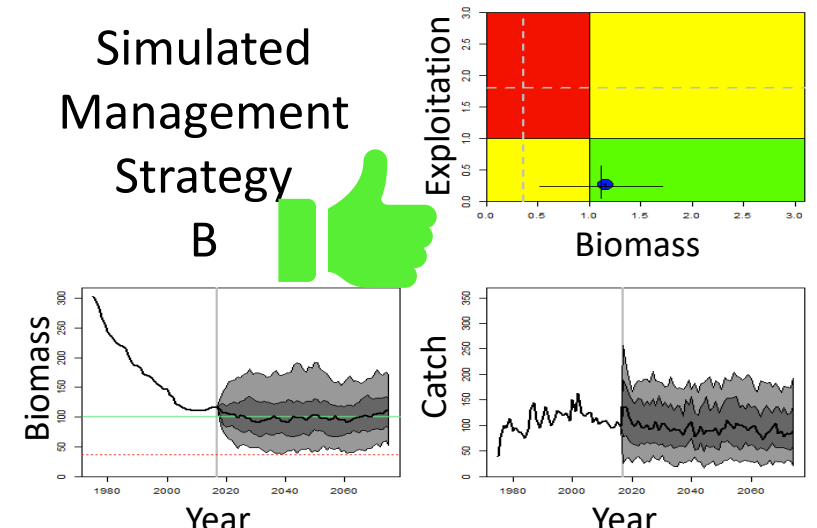


Failure is not an option; it is expected, part of process

- “Well, we need to fail. We need to fail down here, so we don’t fail up there” (Neil Armstrong, *First Man*)







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Questions?