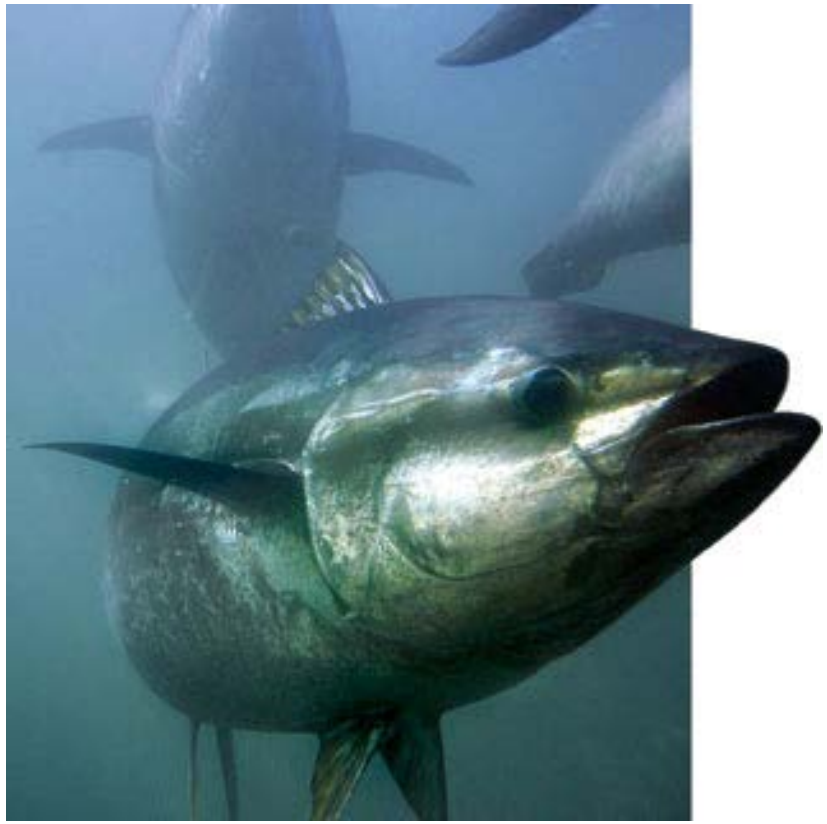

Part 2: 4. An (re) introduction to Management Strategy Evaluation (MSE)

Madrid, March 2019

John Walter[1]
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On behalf of the SCRS BFT working group

References
1. MSE Quick Reference Guide PA2-22
2. BFT MSE Technical Team report PA2-21
3. BFT-MSE Workng group report PA2-23

[1]NOAA-Fisheries
United States National Marine Fisheries Service
Miami, FL

Outline

1. *Some necessary definitions*
2. *Why are we doing this*
3. *Motivation and vision*
4. *Successful example*
5. *Diagram and key concepts*
6. *Take-home messages, again*

Some definitions

Management Strategy Evaluation *is a means to develop a robust, consensus-driven and realistic* ***Management Procedure.*** *It is an iterative process that involves substantial dialogue between Scientists, Managers, and Stakeholders*

Management procedure (MP): *A pre-agreed framework for setting catch limits, designed to achieve specific* ***management objectives****.*

Management objectives (MO): *Formally adopted goals for the fishery.*

Why are we doing this?

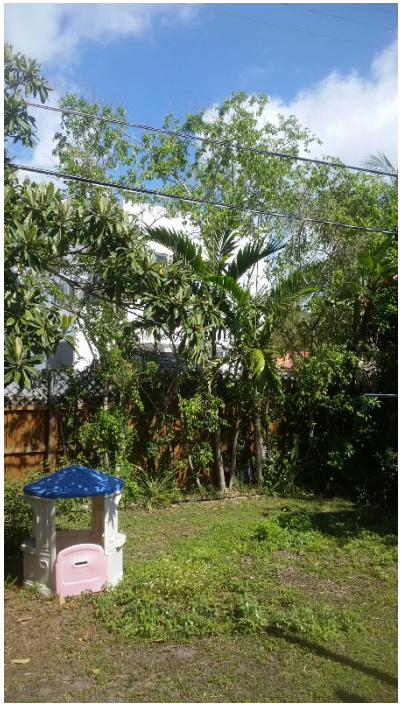
- ICCAT committed to this approach in **Rec. 15-07** and developed a roadmap in 2016 to guide its progress
- It *could* make our lives easier by making TAC setting easier
- It *should* make our fisheries more stable and secure against risk
- Informative to look at
    1. An analogy
    2. A vision for the process
    2. A successful example

MSE analogy: an Air Conditioner thermostat

The system (simulated by Operating Model(s))

management procedure (feedback, response, action)

management objective



22°C!

Key concepts: Management objectives

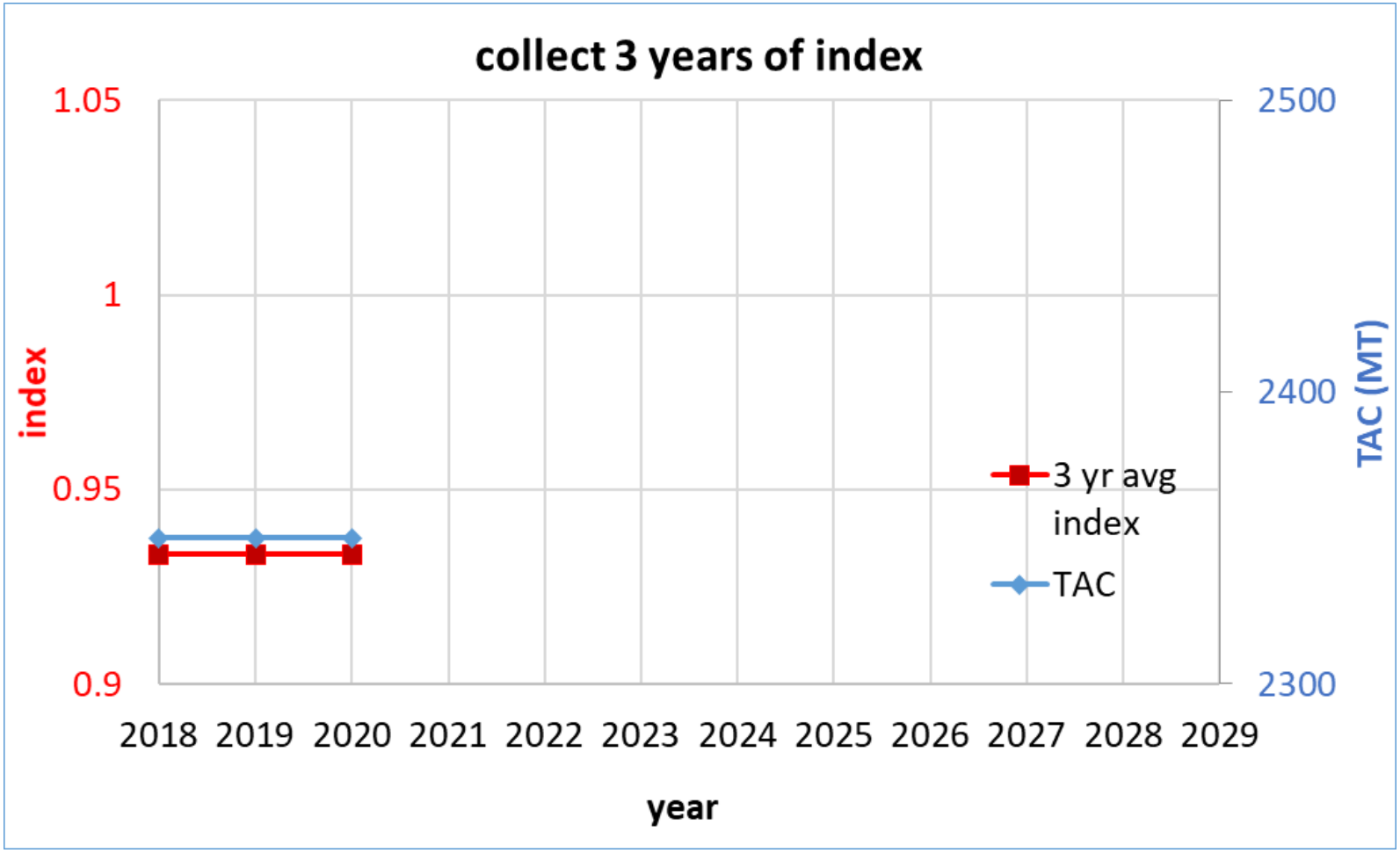
Conceptual Management Objectives: Desired goals for fishery

Operational Management Objectives: specific, codified and measurable objectives, with timelines and, in some cases, minimum required probabilities

Conceptual: Keep house habitable

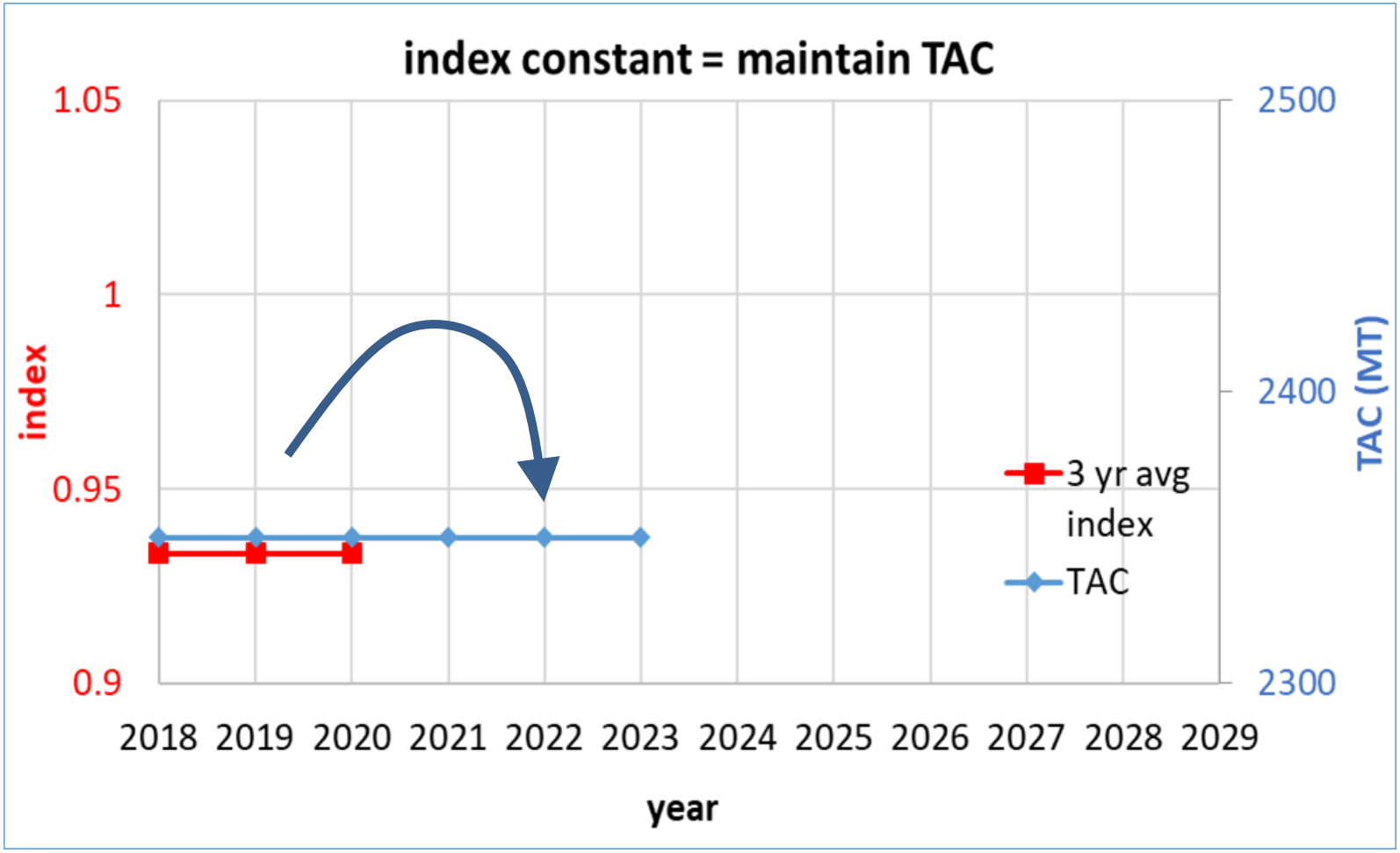
Operational: Keep house at 72°F (22°C) for entire year

John's conceptual vision for a Bluefin Management Procedure



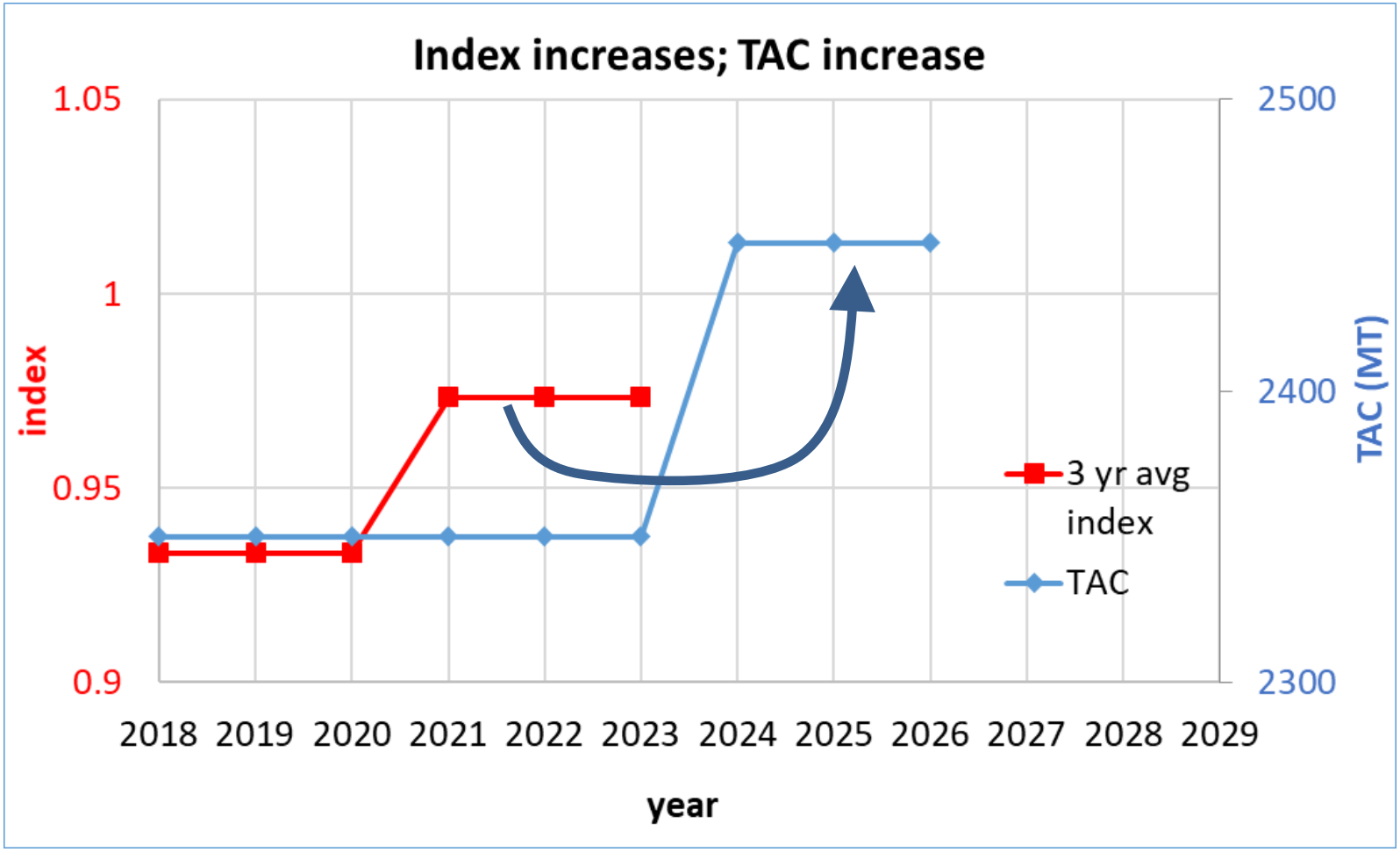
- Empirical Management procedure based on index
- SCRS collects data, applies MP
- Commission sets TAC based upon MP advice
- TAC remains for *X* years

John's conceptual vision for a Bluefin Management Procedure

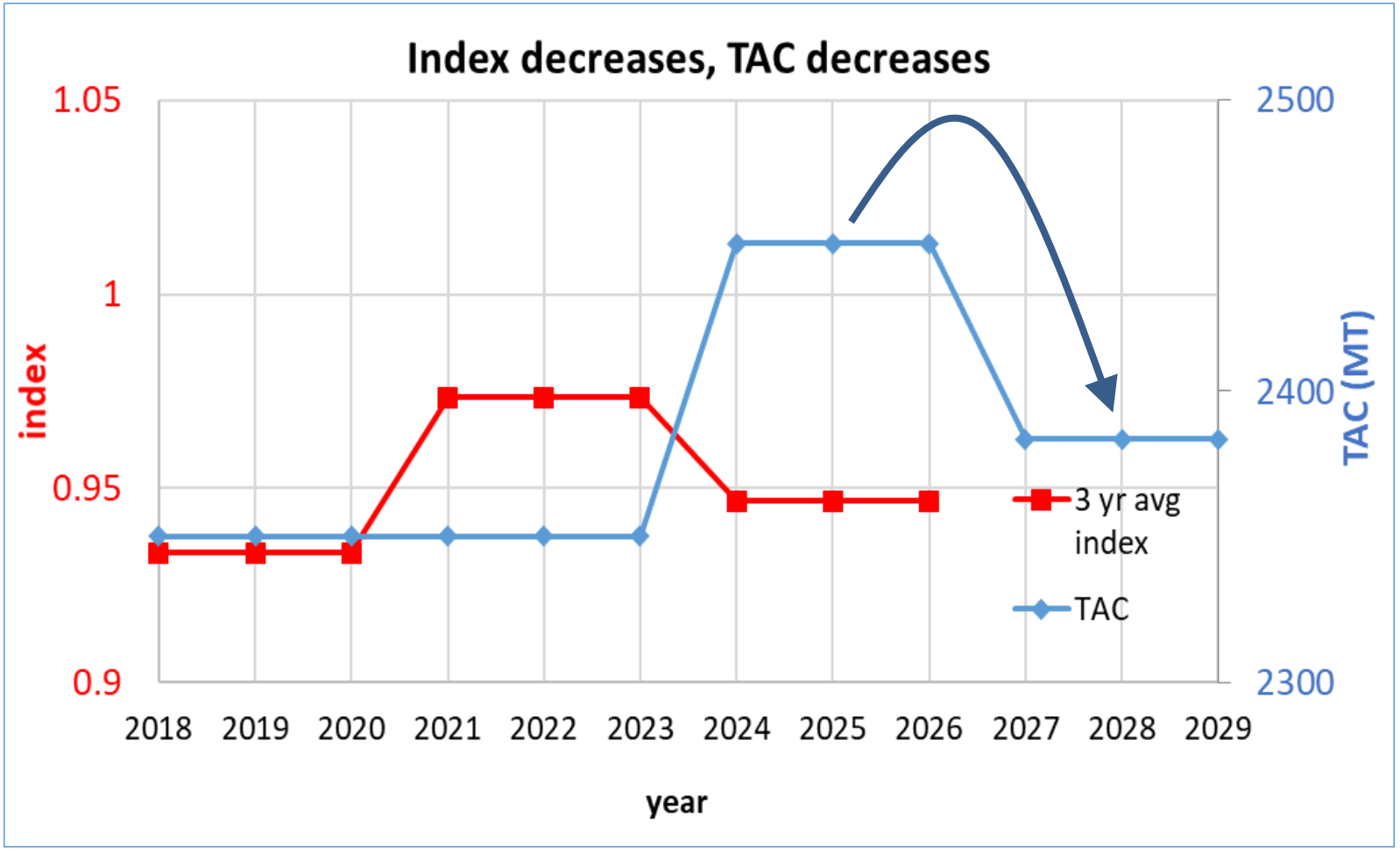


* Note that this is simply for illustration purposes and does not imply what would actually happen in the future.

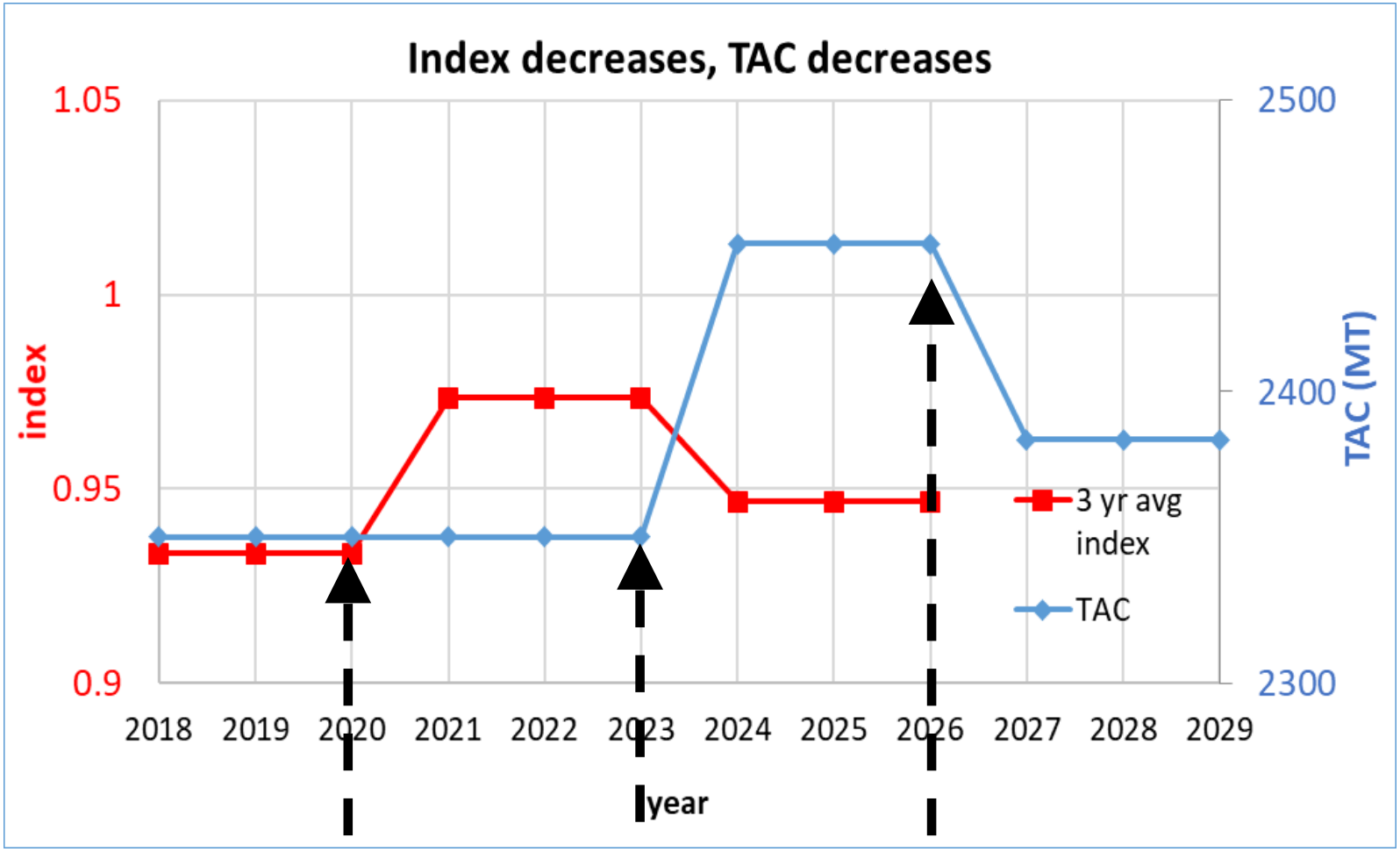
John's conceptual vision for a Bluefin Management Procedure



John's conceptual vision for a Bluefin Management Procedure

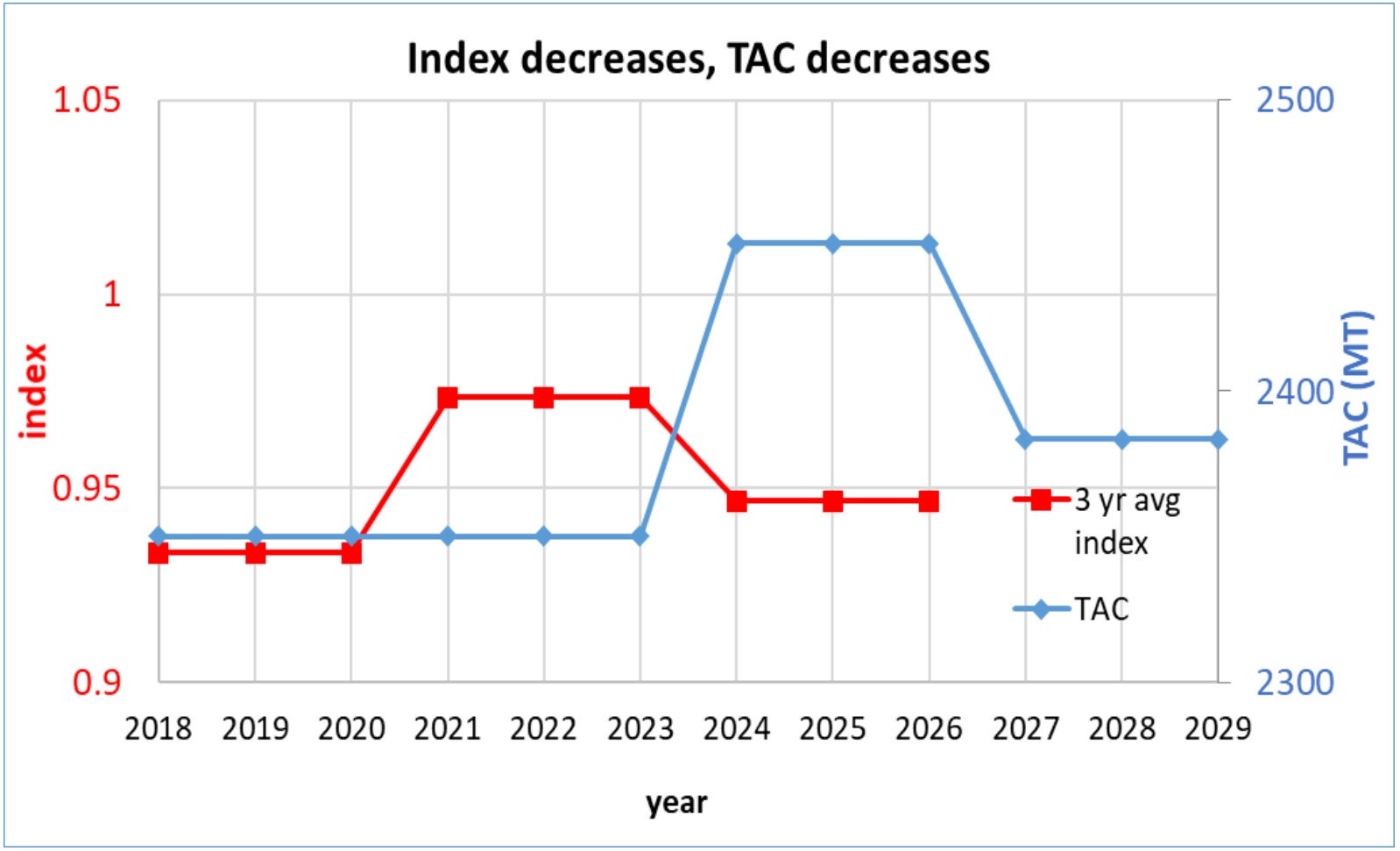


John's conceptual vision for a Bluefin Management Procedure



At pre-specified intervals Commission adopts a new TAC, based on pre-agreed **Management Procedure**

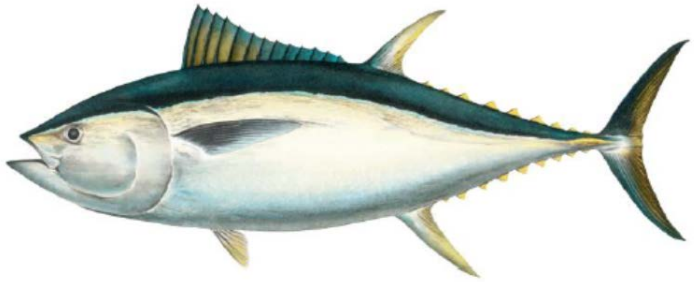
John's conceptual vision for a Bluefin Management Procedure



- Adopted MP would have been simulation tested
- To have high probability of achieving **Operational Management Objectives**
- Process has inherent stability, typically uses terminal year TAC, % change usually limited
- Routine, but less frequent stock assessments would continue

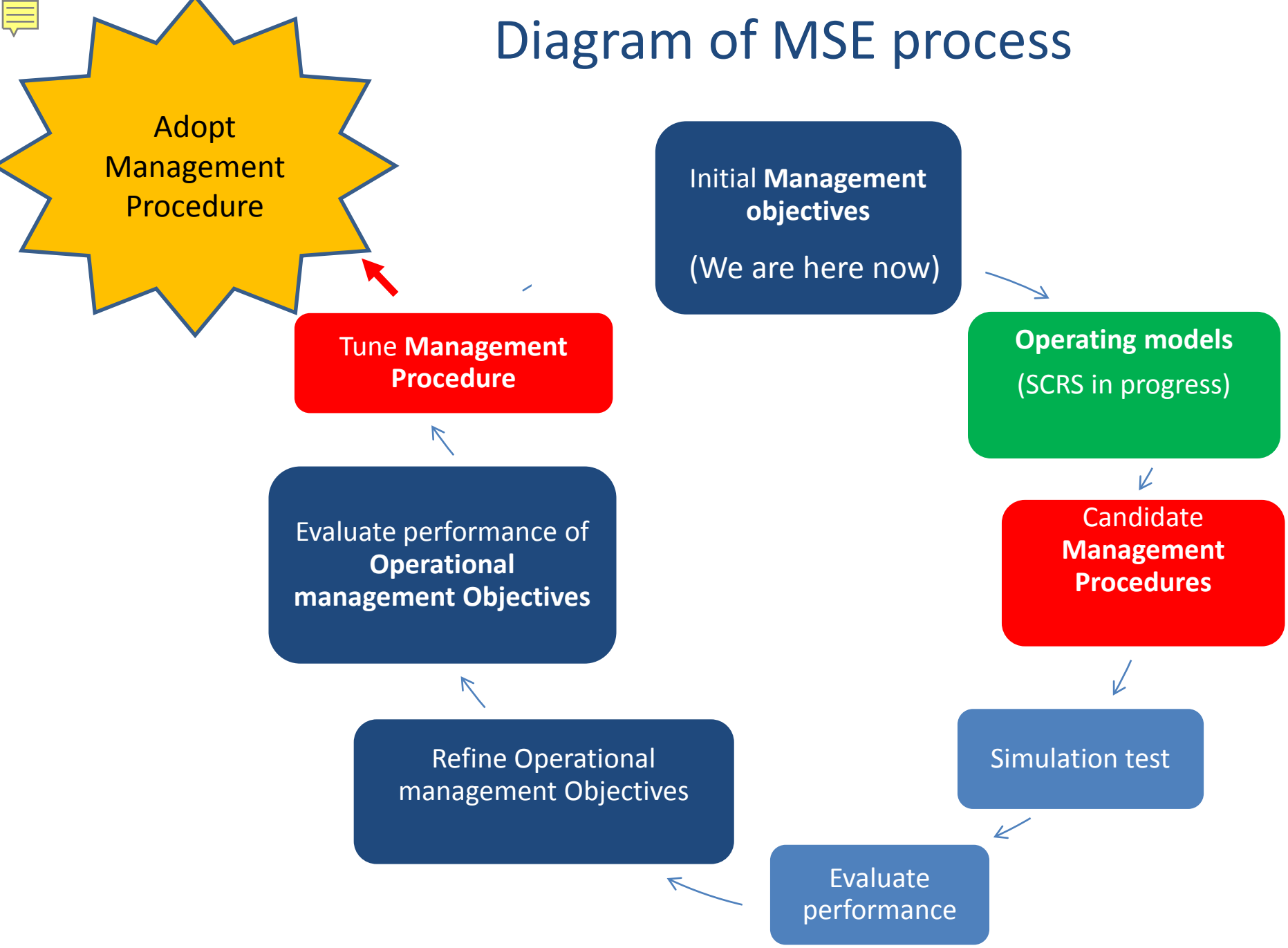
CCSBT: The 'Bali' Procedure

- MP uses longline and aerial survey indices
- MP tuned to rebuilding to 20% SSB0 by 2035
- Minimum TAC change (increase or decrease) of 100 t
- Maximum TAC change (increase or decrease) of 3,000 t
- TAC set for 3-year periods

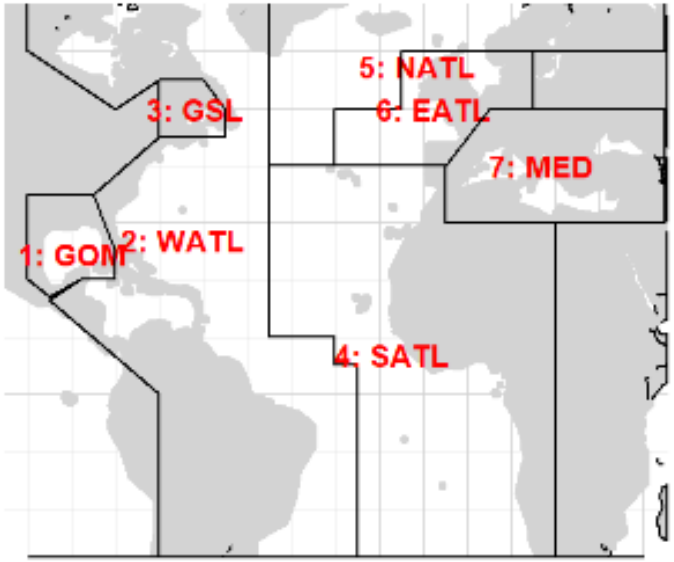


https://www.ccsbt.org/sites/ccsbt.org/files/userfiles/file/docs_english/general/MP_Specifications.pdf

Diagram of MSE process



Key concepts: Operating models



- represent “true” underlying status of population, fishery, and monitoring program dynamics.
- capture full range of uncertainties in resource and fishery.
- always multiple models
- For BFT, 2 stocks, 7 areas with movement & mixing; more details later.

Conditioning: Grounding Operating models to data and assumptions

- i.e. ensure that they are consistent with historical data to be considered plausible.
- OMs reflect full range of plausible past stock trajectories.
- include regime shifts compatible with hypotheses considered in past assessments
- Key data for Bluefin tuna: Catch, Indices, Length composition, Movement (Electronic tags) and mixing (otolith chemistry and genetics)

Key concepts: Operating models

Reference set: most plausible scenarios or hypotheses with greatest impact on outcomes, can be equally or differentially weighted

Robustness set: unlikely but still possible scenarios or hypotheses. What-if and worst-case scenarios.

Reference set → screen all MPs

Robustness set→ screen top performing MPs

Key concepts: Management procedures

Empirical management procedures

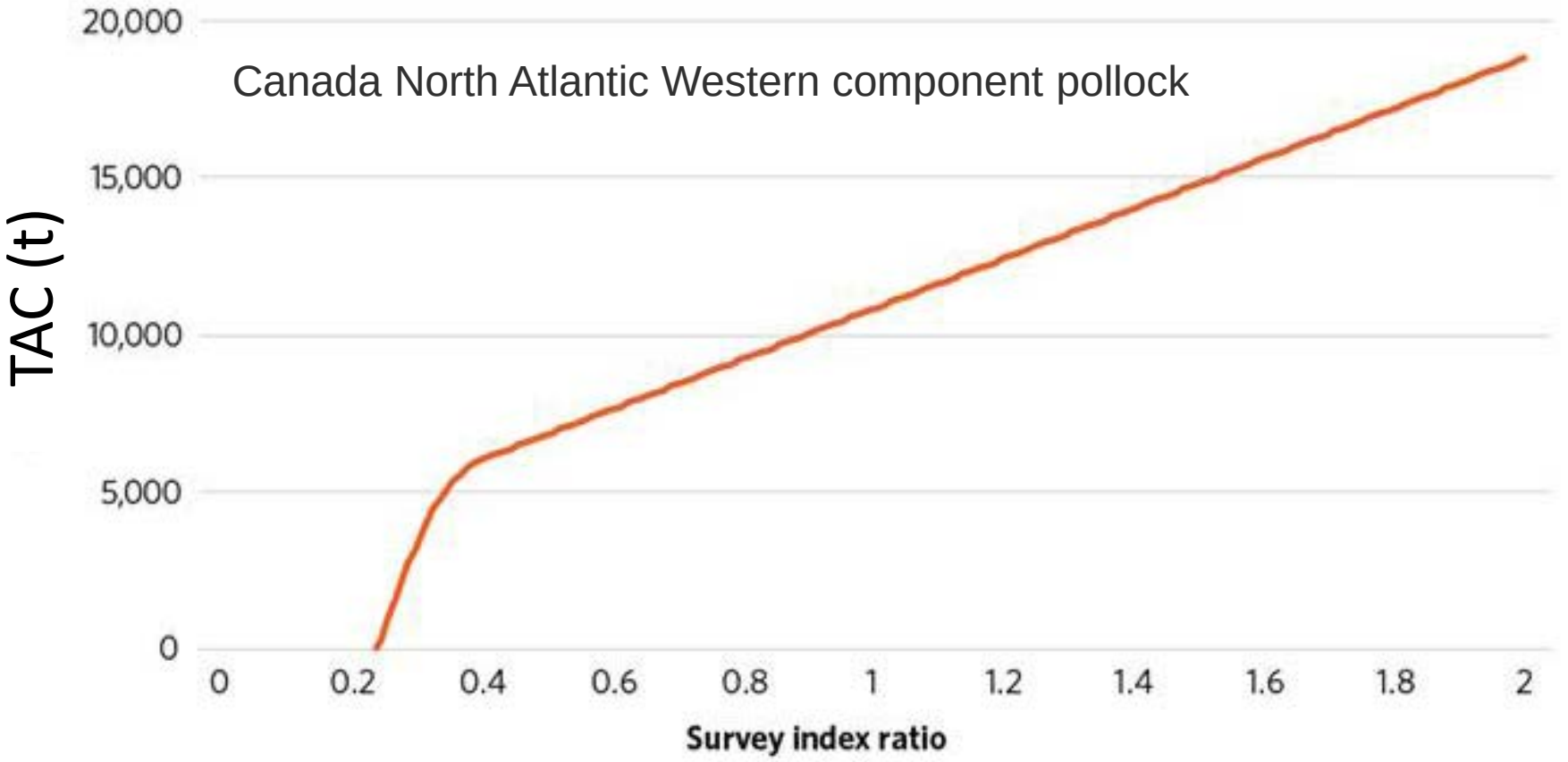
- Use empirical "proxies" of biomass, such as indices
- Simple to explain and implement: index ⬆ TAC ⬆ and index ⬇ TAC ⬇

Model based management procedures

- Use quantities estimated from stock assessment model (e.g. B_{MSY}, F_{MSY}) to derive TAC advice.
- Similar to stock assessment advice framework

Key concepts: Management procedures

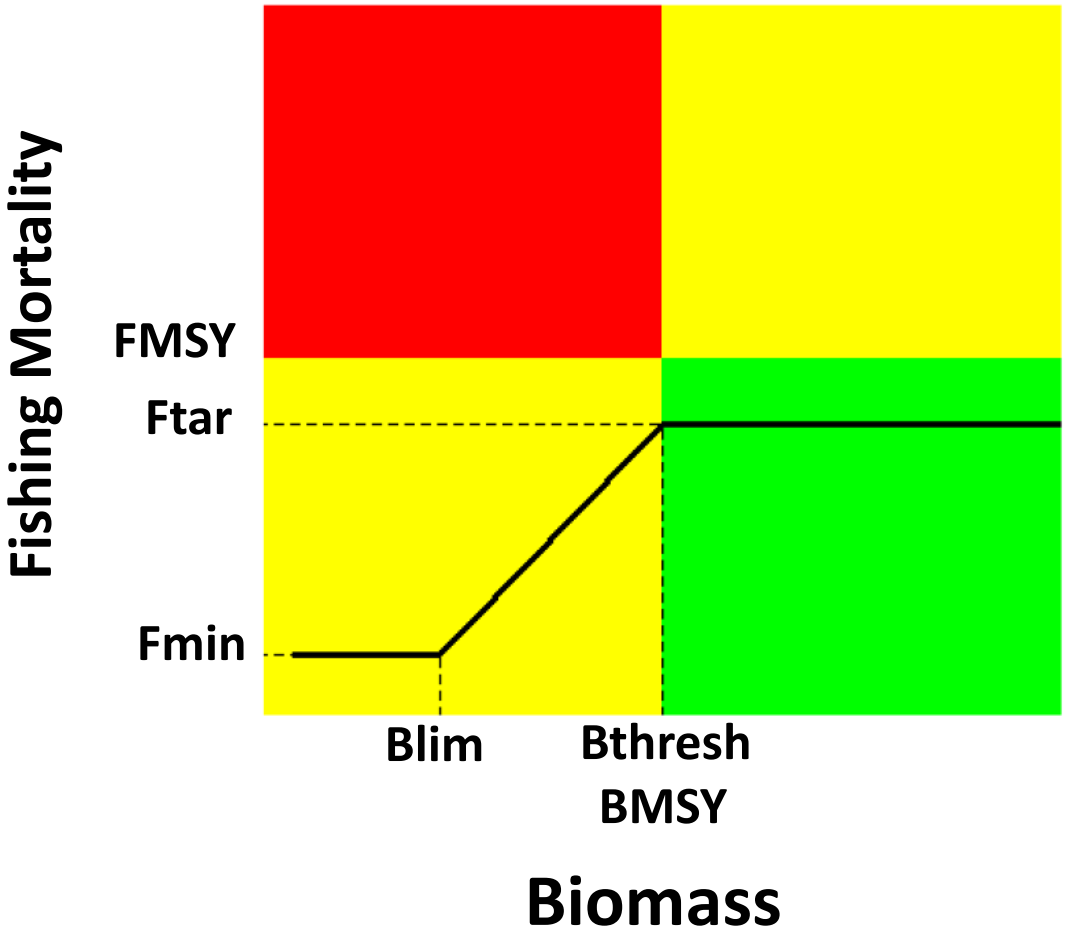
Empirical (or indicator based) management procedure



As survey index increases the TAC increases, as survey index decreases TAC decreases.

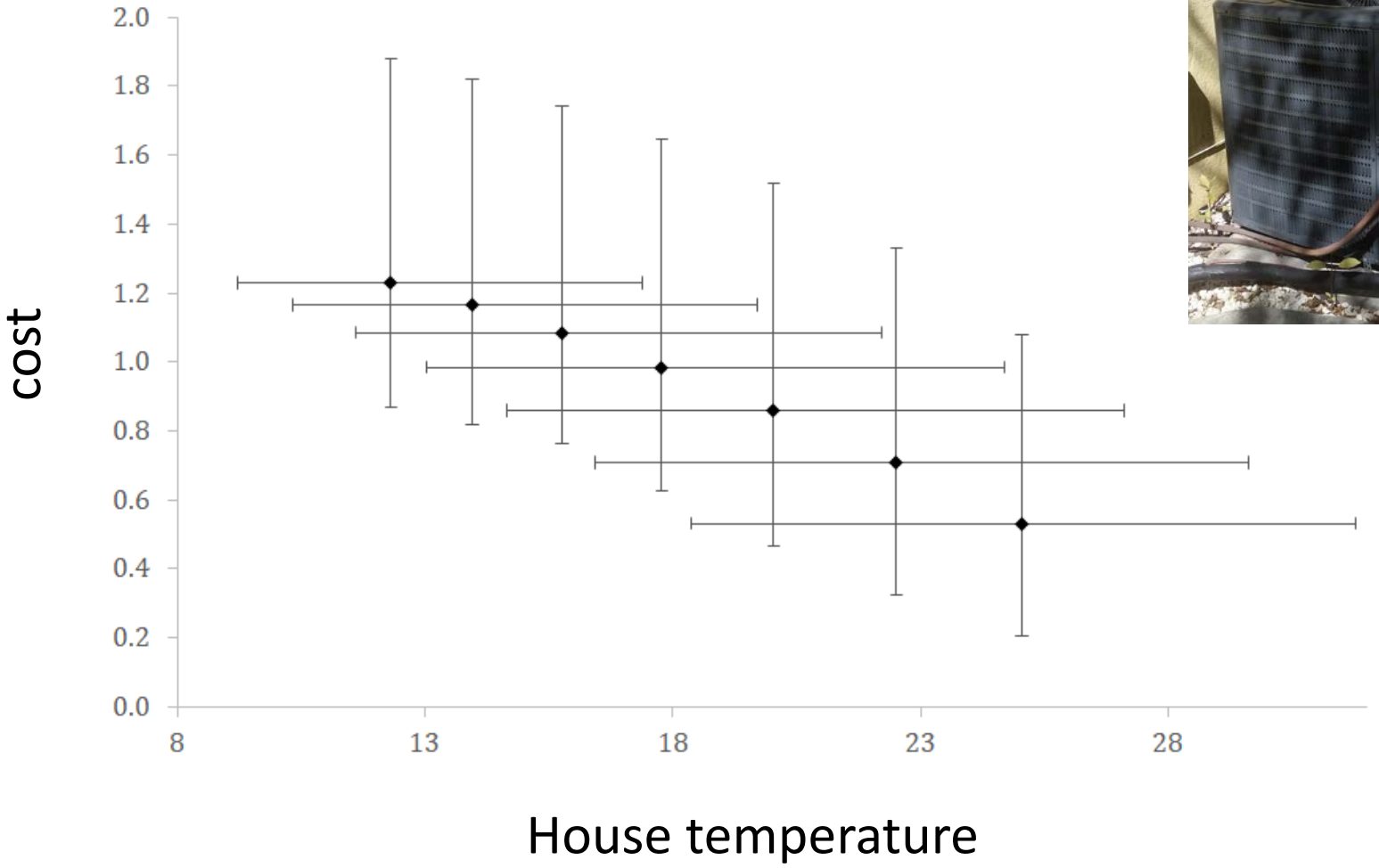
Key concepts: Management procedures

N Alb Model-based management procedure (Rec 17-04)

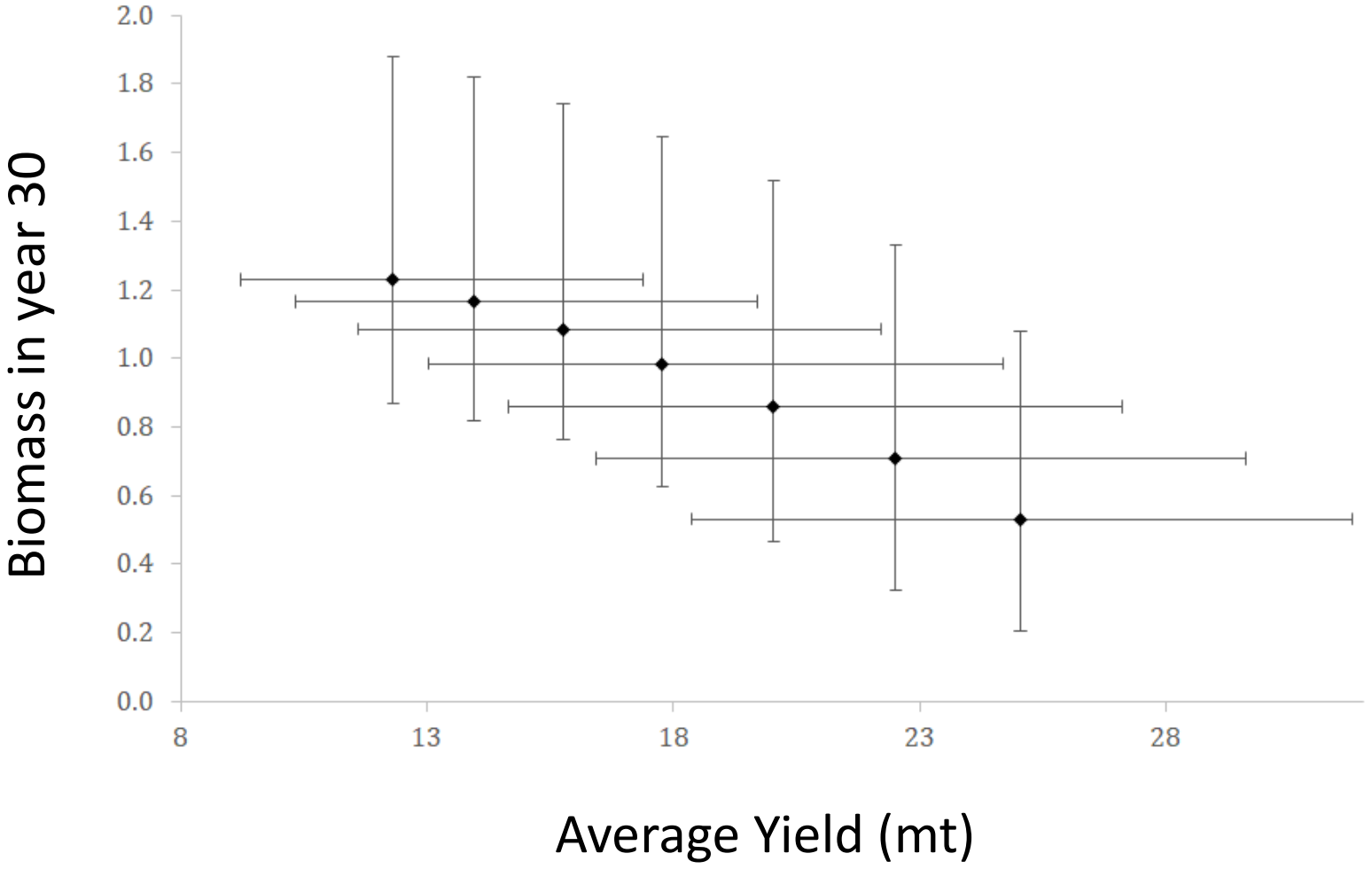


- TAC ~ B/B_{msy}
- Requires estimate of B/B_{msy} and F/F_{msy}
- Comes from model

Key concepts: elucidation of tradeoffs



Key concepts: elucidation of tradeoffs



Miller et al. 2019. **Improving communication: the key requirement to improve the effectiveness of MSE processes** Can. J. Fish. Aquat. Sci.

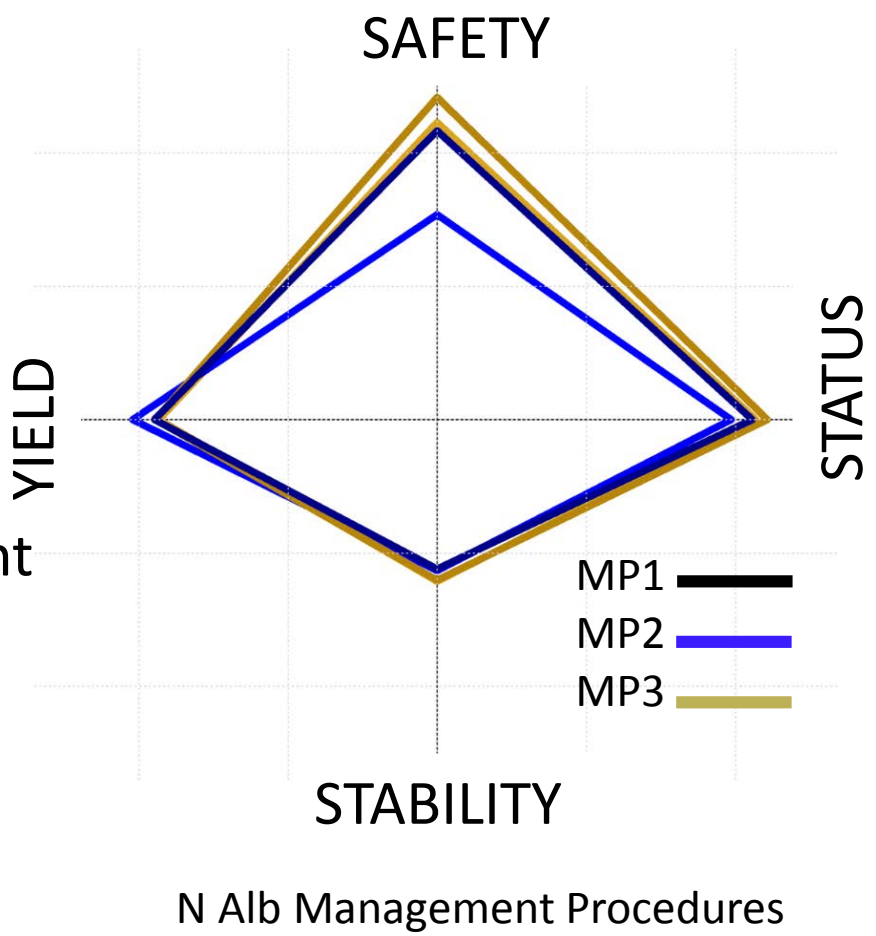
Key concepts: elucidation of tradeoffs

"Spider" plots visualize ***performance statistics*** of multiple ***management procedures***

Better values are towards outside, worse values are towards inside.

Here each colour represents a different ***management procedure.***

"Weighting" of components possible



N Alb Management Procedures

Key concepts: **Exceptional circumstances**: provisions which specify situations when management strategy's TAC recommendations may be over-ridden.

2017 Bluefin tuna projections, being run by generator after Hurricane Irma

For instance:

- Survey vessel breaks down
- when observed conditions fall outside of model predictions e.g. a CPUE result outside the range for which the MP was tested.
- When essential data cannot be updated, e.g. acts of nature

Key concepts: roles in the process

	Scientists	Managers
Operating models	Construct, **adopt** reference grid and robustness set	Provide *advice*
	Adopt plausibility weights for OMs	Provide *advice*
Management objectives	Propose options for initial Management Objectives	Provide *advice* on initial Management Objectives
	Propose options for refined MOs	**Adopt** Operational MO
Management Procedures	Propose Candidate MPs	Provide advice on feasibility of Candidate MPs
	Test performance of CMPs on OMs	**Adopt** Interim MP
	Advise on Exceptional circumstances	**Adopt** 'rules' for MPs and Exceptional circumstances

Roles in process

Initial **Management objectives**

Evaluate performance of **Operational management Objectives**

Refine Operational management Objectives

SCRS advises
Commission/
Managers adopt

Operating models
(SCRS in progress)

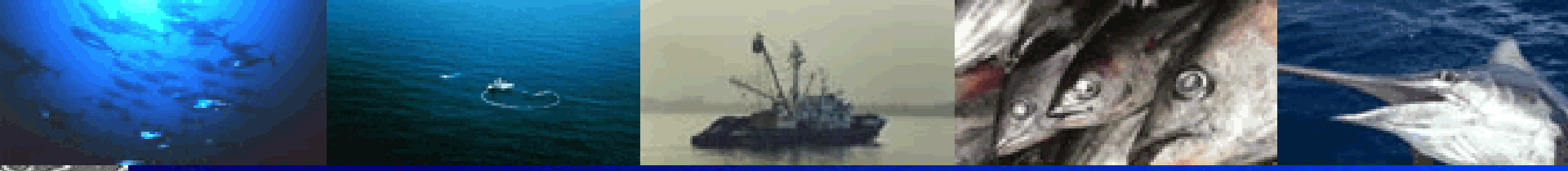
SCRS adopts
Managers adise

Candidate **Management Procedures**

Tune **Management Procedure**

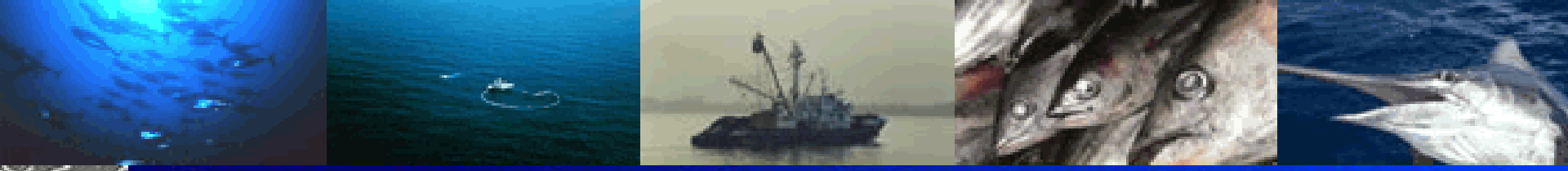
Adopt Management Procedure

SCRS advises
Commission/
Managers adopt



Acknowledgements

- GBYP for funding my travel
- SCRS Species WG
- Andre Punt, Doug Butterworth, Shana Miller, Grantly Galland, Pew Charitable Trusts, David Die for providing valuable materials that I have borrowed.
- ICCAT and EU sponsored workshops on MSE taught in 2018 by Rishi Sharma and Iago Mosquiera



Questions?