

Comisión Interamericana del Atún Tropical
Inter-American Tropical Tuna Commission



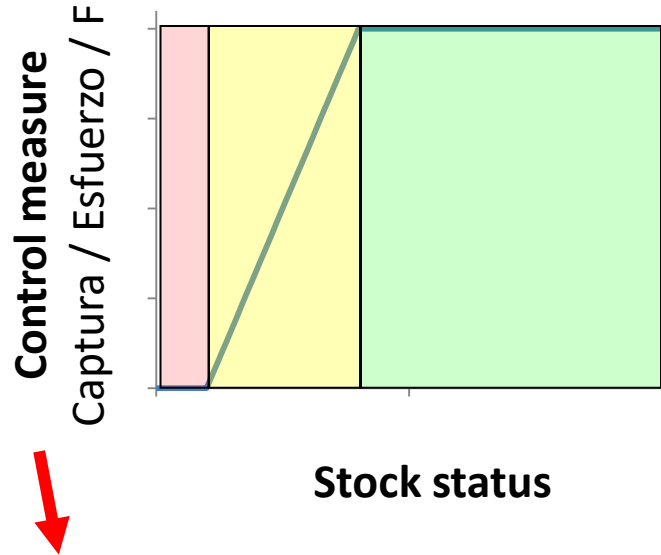
Harvest Control Rules for bigeye tuna MSE in the EPO

Juan L. Valero, Mark N. Maunder, Haikun Xu, Alexandre Aires-da-Silva

4th IATTC Tropical Tuna MSE Workshop, by videoconference, March 20-21, 2025



Harvest Control Rule elements



- **Control measure, tactics:**

- Regulations available to apply the strategy

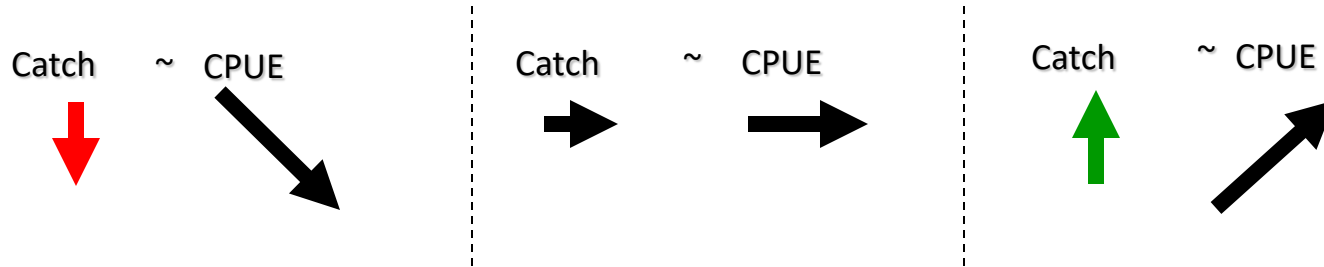
Types of Harvest Control Rules (HCR)

- **Constant**
- **Empirical Rule**
 - Minimum treatment of data
 - Easy to compute, explain and understand
 - Care required to minimize responses to noisy data
- **Model-based Rule**
 - Based on models of varied complexity (e.g. assessments)

Empirical Harvest Control Rules

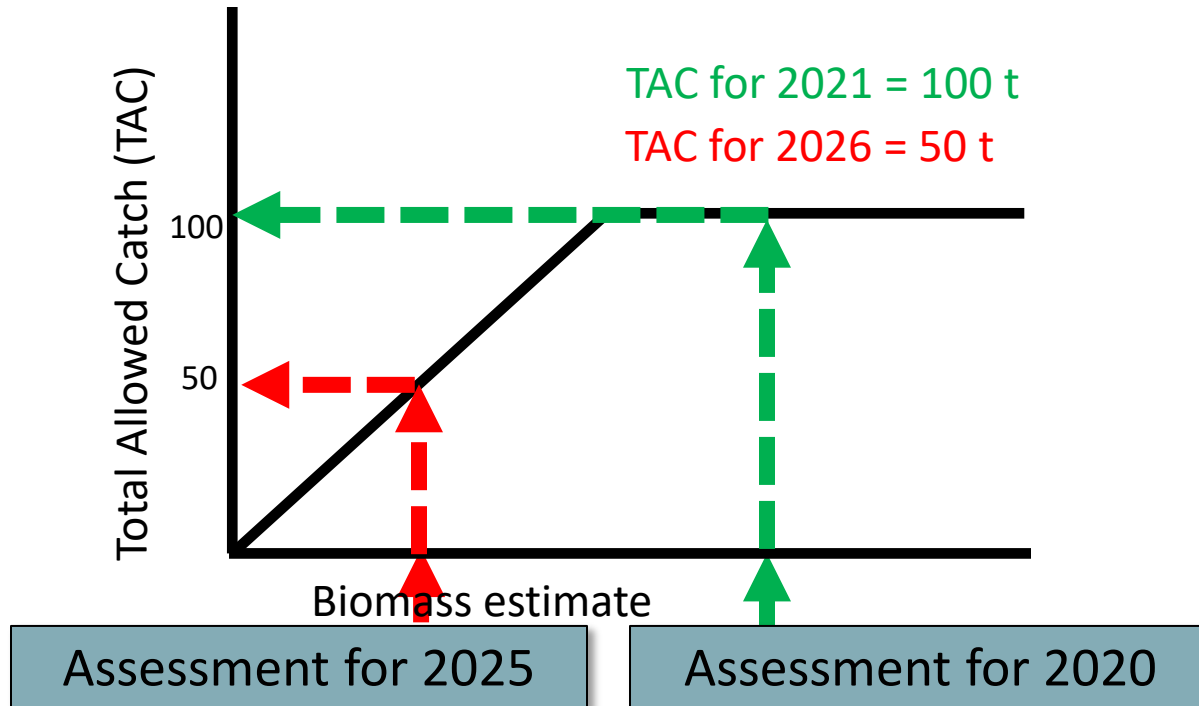
- Based on monitoring and feedback
- Simple rule, even when evaluation of its performance uses complex computer simulations (such as MSE)

Example: adjust catch using CPUE trends

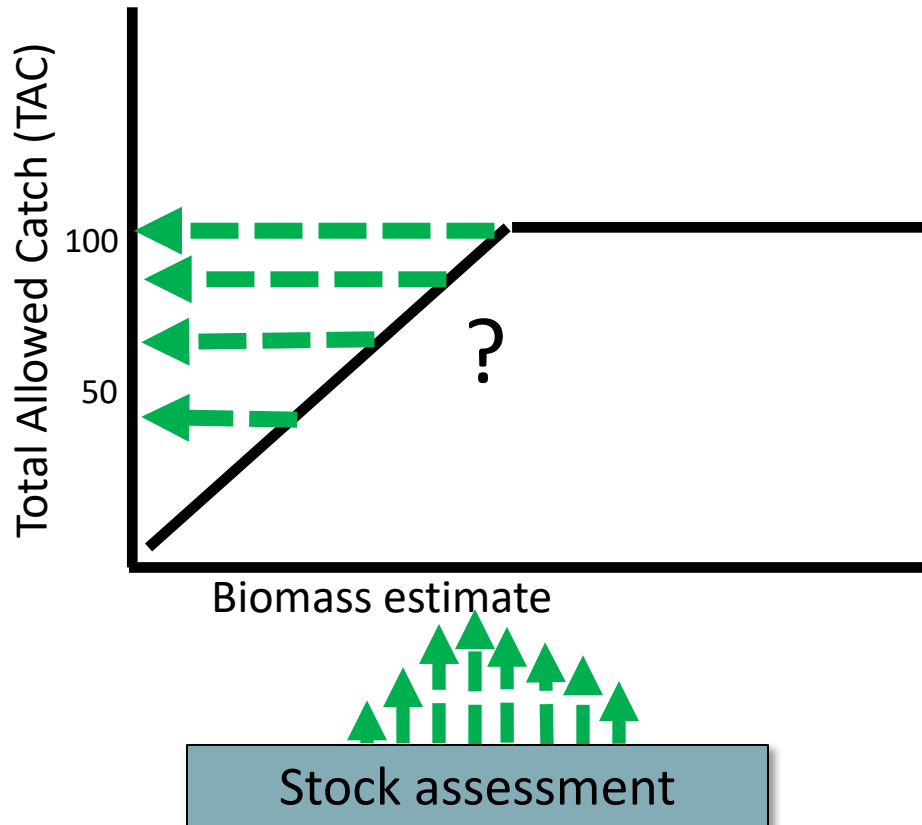


Model-based Control Rule

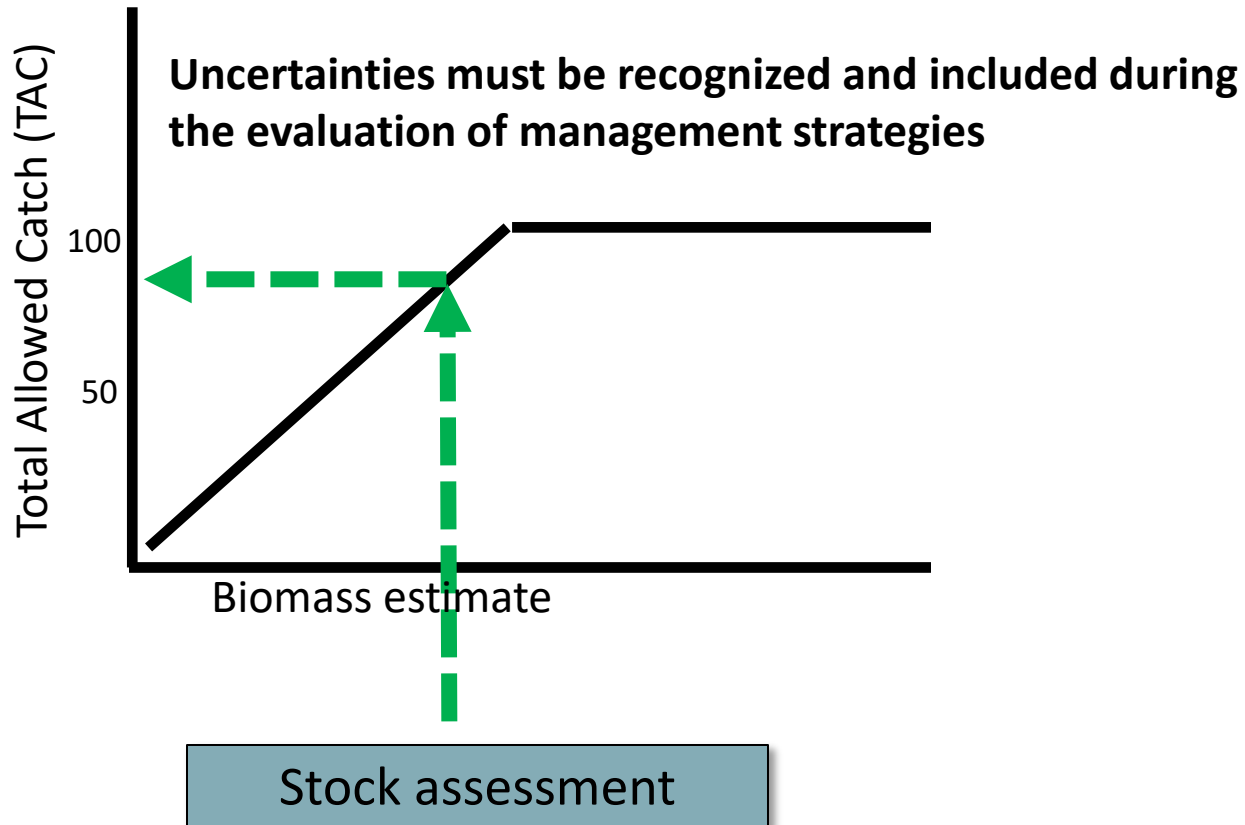
- 1) Fit a pre-specified stock assessment
- 2) Use the HCR to determine next year's TAC



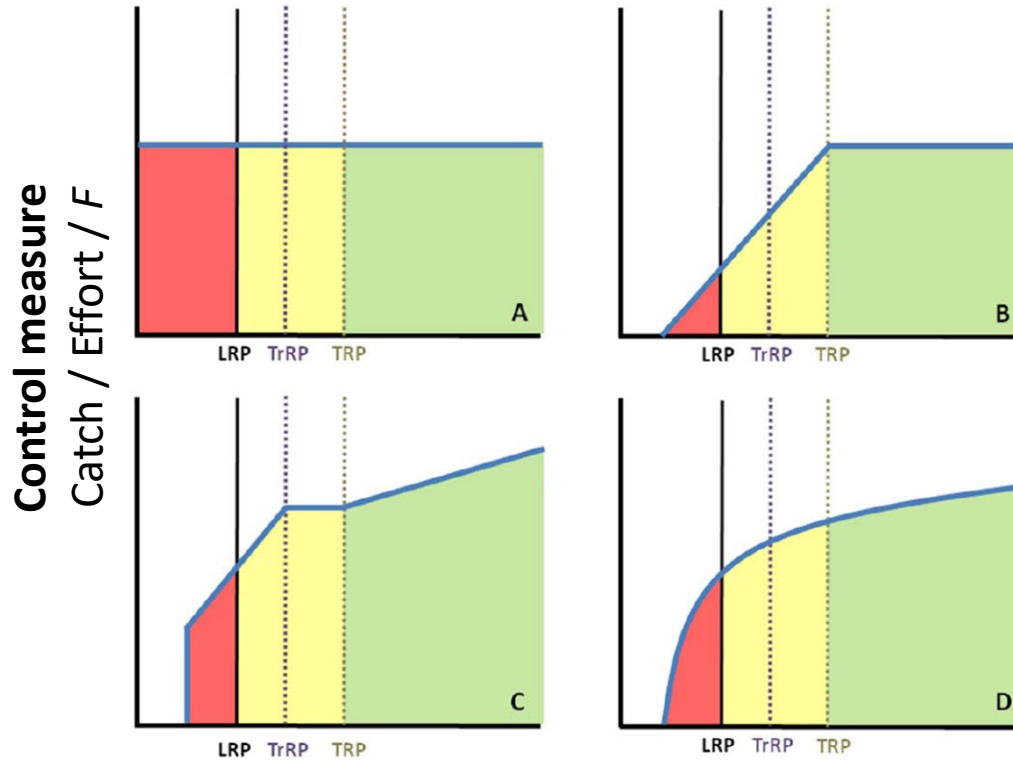
Stock Assessment Uncertainty



HCR must provide unique action



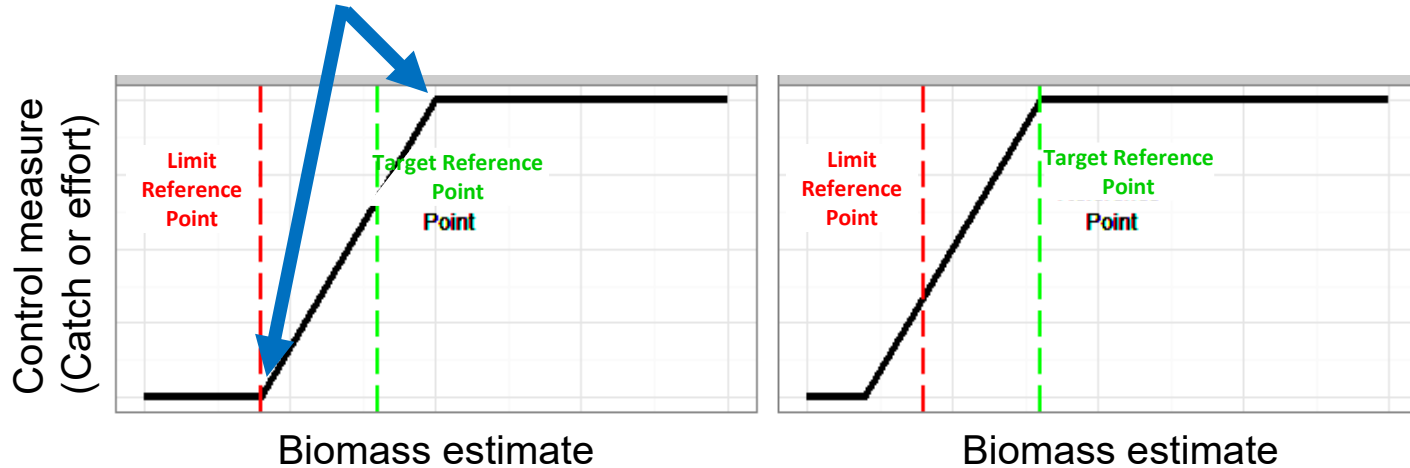
HCR and Reference Points



Stock status

HCR, control parameters and Reference Points

Control parameters (threshold / trigger points)



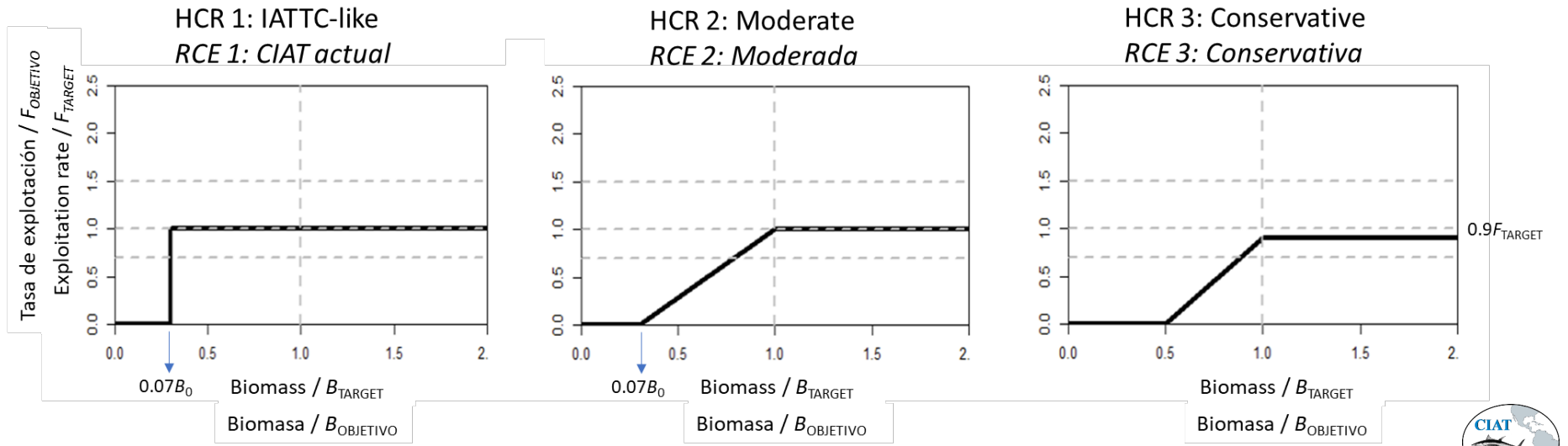
- Harvest Control Rules (HCR) can have arbitrary control parameters
- Formal Reference Points (**limit**, **target**) can be used to evaluate the performance of the HCR (but they do not need to be part of the HCR...)

Harvest Control Rules / Reglas de Control de Extracción

Use the perceived stocks status and trends to derive management action



Model-based Harvest Control Rule, based on surplus production model (ASPM-R)

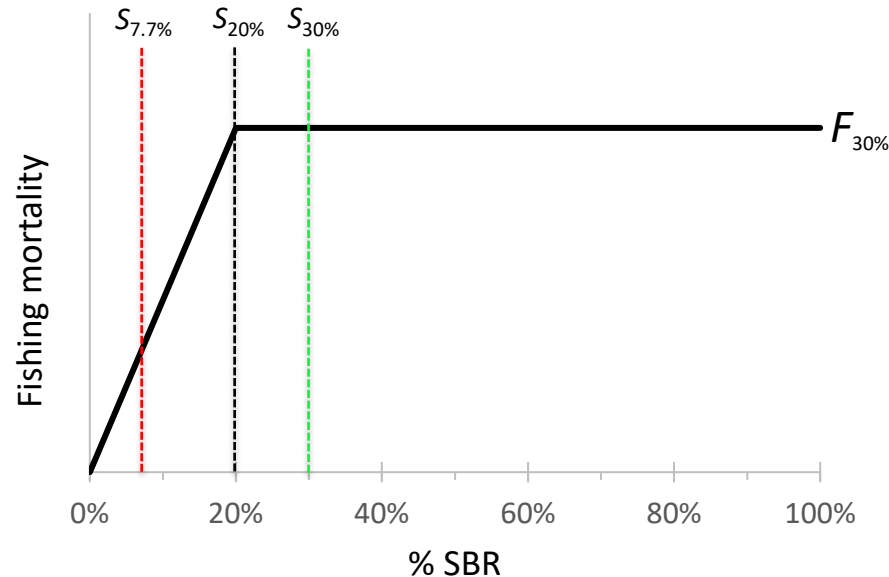


Harvest Control Rules / Reglas de Control de Extraccion

Use the perceived stocks status and trends to derive management action

Management
Model

Model-based Harvest Control Rule, based on surplus production model (ASPM-R)



Harvest Control Rules / Reglas de Control de Extracción

Management Model

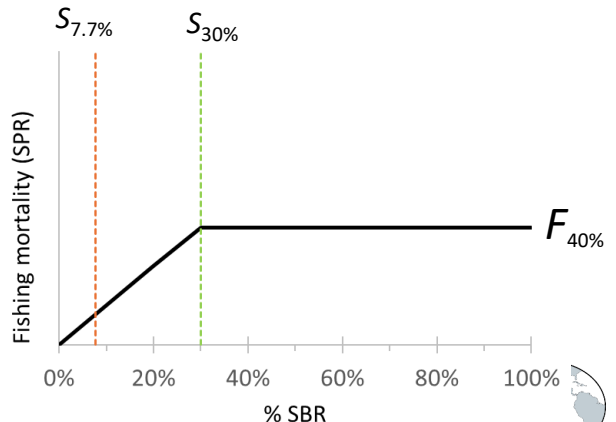
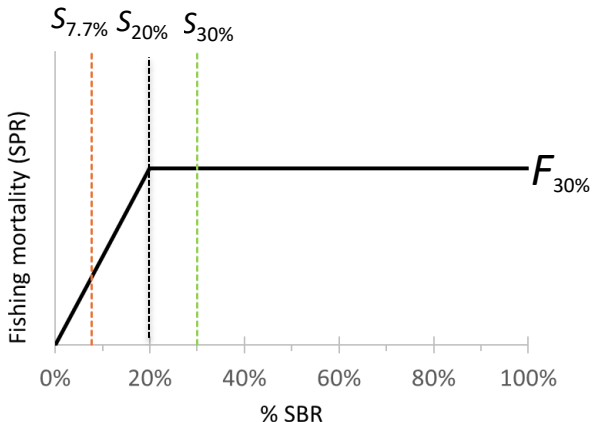
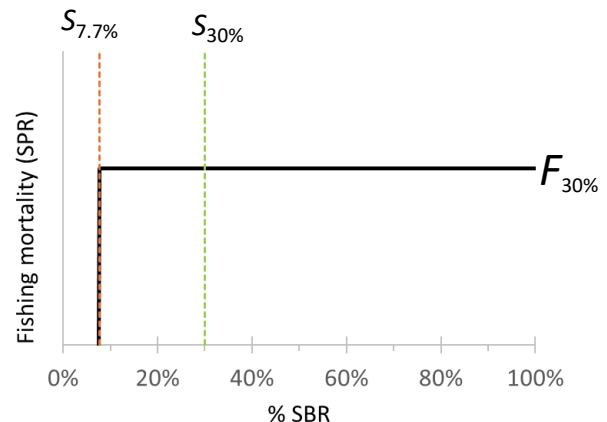
Use the perceived stocks status and trends to derive management action

Model-based Harvest Control Rule, based on surplus production model (ASPM-R)

HCR 1: IATTC-like
RCE 1: CIAT actual

HCR 2: Moderate
RCE 2: Moderada

HCR 3: Conservative
RCE 3: Conservativa



Management Model / Modelo de Ordenación

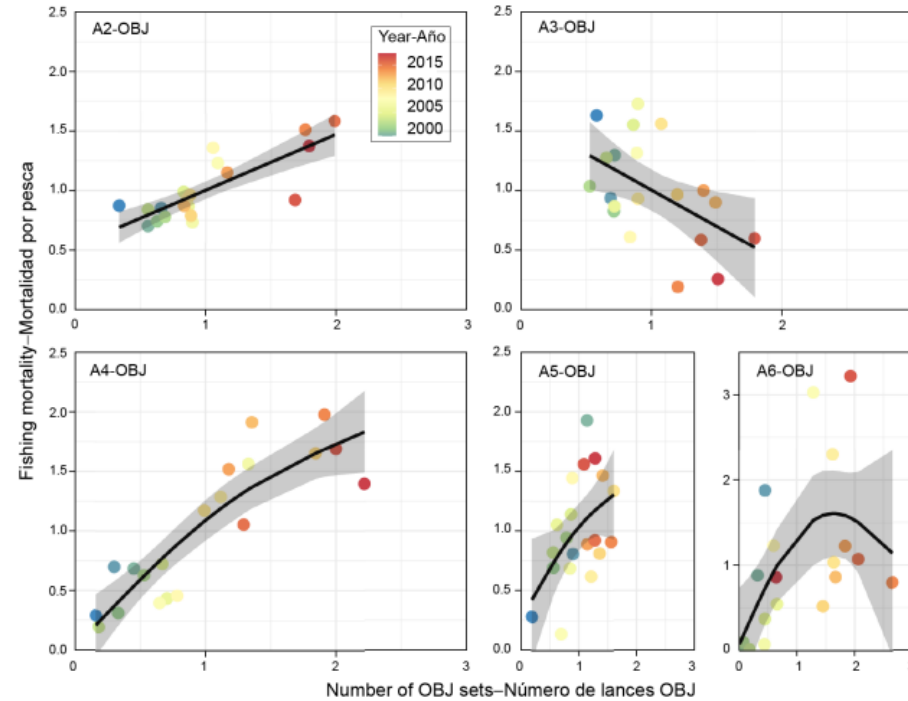
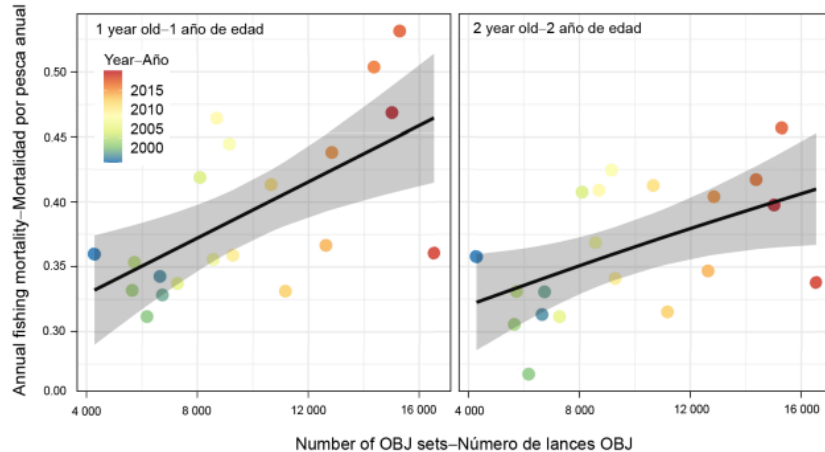
Management
Model

- Applied on a 3-year cycle
 - Effort controls (days of closure, F) for surface fleets
 - Catch limits for longline fleets or keep F at previous historical 3-year average F
- Data inputs for Model-based HCR:
 - Standardized Japanese longline index of abundance and total catches for ASPM-R

Implementation error

- Rick Deriso's formula between Fishing mortality (F) and closure days
- Other relationships (e.g. F & OBJ sets) and their uncertainty could be included in the future if more information about their relationships with F is available
- Implementation error between intended and realized changes in F (0%, 10%, 20%) to represent the different approaches to implement the HCR (e.g. closure days, IVT, active FAD limits).

Management Model





Questions? / ¿Preguntas?

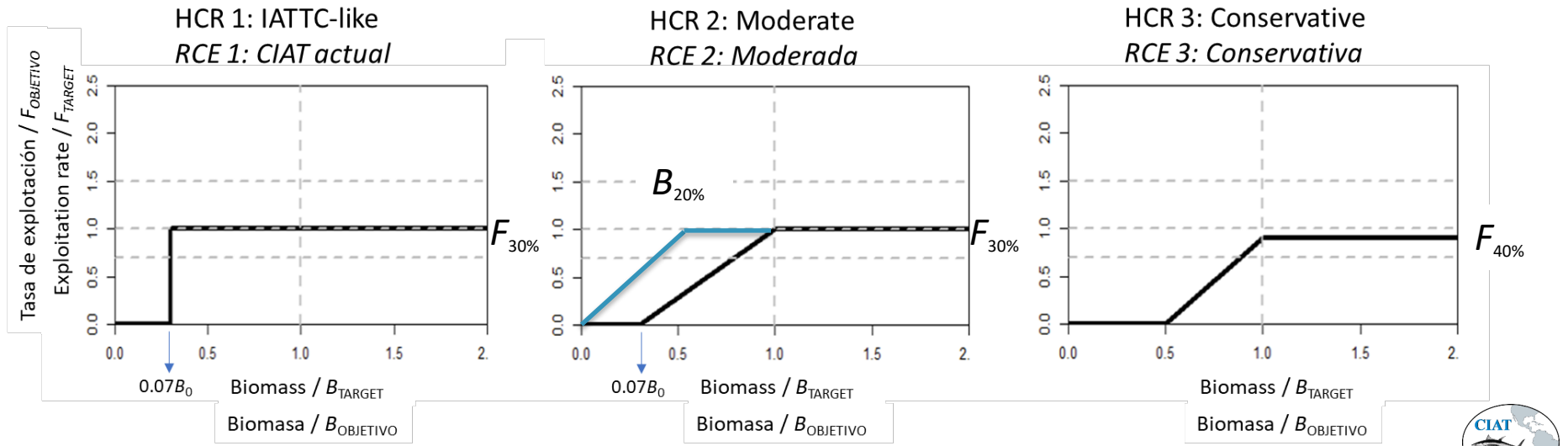


Harvest Control Rules / Reglas de Control de Extraccion

Management Model

Use the perceived stocks status and trends to derive management action

Model-based Harvest Control Rule, based on surplus production model (ASPM-R)



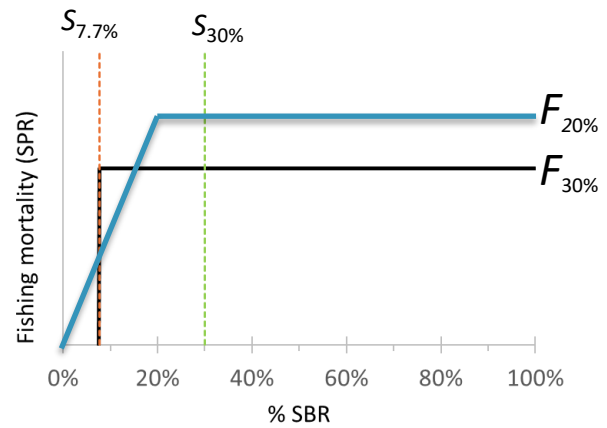
Harvest Control Rules / Reglas de Control de Extracción

Management Model

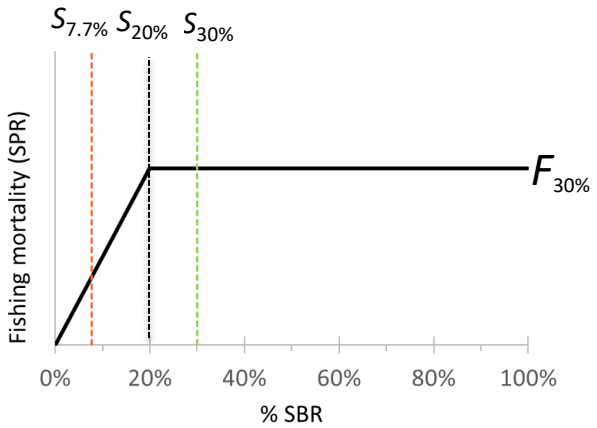
Use the perceived stocks status and trends to derive management action

Model-based Harvest Control Rule, based on surplus production model (ASPM-R)

HCR 1: IATTC-like
RCE 1: CIAT actual



HCR 2: Moderate
RCE 2: Moderada



HCR 3: Conservative
RCE 3: Conservativa

