Overview of the WCPFC Harvest Strategy Approach

WCPFC SMD01 – 1st Capacity Building Seminar

8th June 2022

Harvest Strategies

A formalised and pre-agreed framework for guiding decisions on the management of a fishery.

"Agreeing to the rules before playing the game"

designed to shift from short-term reactive decision making to a longer-term proactive approach to achieve defined management objectives.

Background

CMM 2014-06: at WCPFC11, members agreed to develop and implement a harvest strategy approach for key WCPO fisheries and stocks.

MOW: a series of workshops were convened between 2012 and 2015 to facilitate initial discussions management objectives and harvest strategies.

Additional time has been allocated to the Management Issues theme of the Scientific Committee and to the annual Commission meeting for harvest strategy issues.

Workplan: A schedule for the development and adoption of harvest strategies for the four main tuna stocks and their associated fisheries is annually updated

SMD: The first Science Management Dialogue meeting will be held 19th and 22nd August 2022

Science Management Dialogue

Development of harvest strategies should be a stakeholder led process

"As drivers of the harvest strategy process, fishery managers and the wider stakeholder group will need to define key aspects of the process."

Discussions supported through a Science Management Dialogue process.

Supports the transfer of information between the Scientific Committee and the Commission
Not a decision making body

Science Management Dialogue

Key considerations for managers

- Procedure for selecting the ‘best performing’ management procedure
- Approach for implementing the agreed procedure
- Adoption of Target Reference Points (TRPs) that define desirable states of a stock and fishery
- Definition of fishery controls within the harvest strategy
- Input into candidate Harvest Control Rules (HCRs)
- Feedback on presentational approaches to support decision making
- Development of the monitoring strategy

Science Management Dialogue

Input from the Scientific Committee

- Identifying and agreeing on key sources of uncertainty (operating model development).
- Support TRP definition
- Define candidate Management Procedures (MPs)
  - Data collection program
  - Estimation of the status of the stock
  - Harvest Control Rule
- Refine and evaluate Performance Indicators
- Input to the development of the Monitoring Strategy
- Develop mixed fishery and multi-species approaches.

Many elements requiring Commission level decisions have a significant input from the Scientific Committee

SMD intended to assist in the transfer of information between the two bodies.

WCPFC Harvest Strategy Overview

Overview to the Harvest Strategy approach under development through WCPFC.

Preparation for the 1st Science Management Dialogue meeting (19 & 22 August 2022)

Seminar 1

1. Management Objectives and associated performance indicators.
2. Design and testing of alternative candidate management procedures.
3. Monitoring performance of a management procedure once implemented.

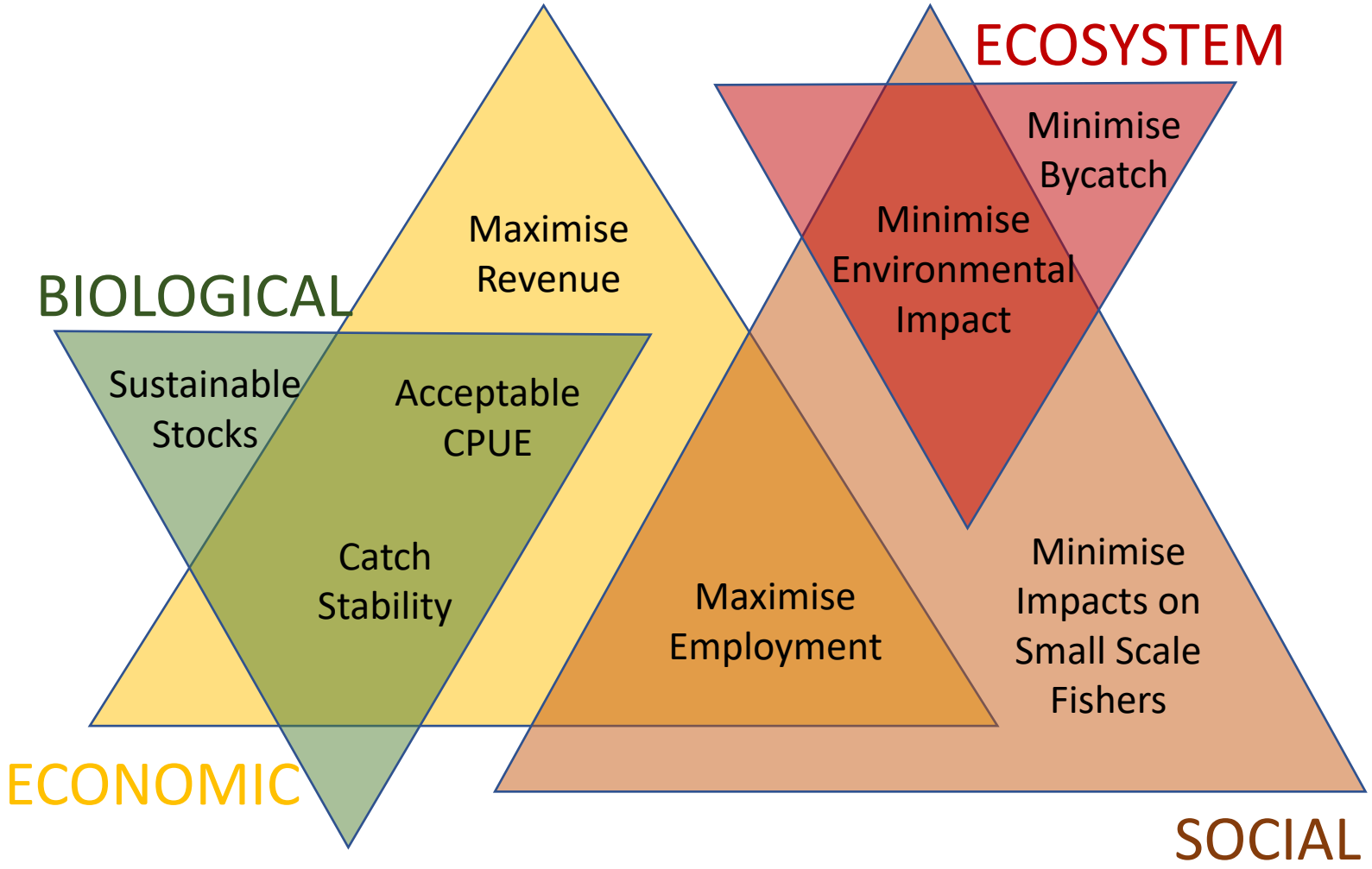
Seminar 2

4. Using performance indicators to identify ‘best performing’ management procedures.
5. Implementing harvest strategies in a mixed fishery context.

Harvest Strategy Components

Management Objectives	• What do you want from your fishery ?
Performance Indicators	• Quantifiable metrics that tell you how well you are achieving your objectives.
Management Procedures	• Pre-agreed rules to manage the fishery to achieve the objectives (includes the harvest control rule HCR)
Management Strategy Evaluation	• Simulation testing of management procedures to select the "best performing“ • Allows to explore trade-offs
Monitoring Strategy	• Is the selected management procedure performing as expected? • How do we know if it’s not working?

Management Objectives



Basis of the harvest strategy approach

Often expressed as high level aspirations.

Objectives will differ amongst members.

Can be revised if and when necessary

Some objectives may conflict.

Management Objectives

What do you want from your fishery ?

- High level, qualitative, long-term
- Basis of the harvest strategy approach
- Can be revised if and when necessary

MOW1 – “strawman” (WCPFC10-2013-15b)

- Initial discussions

Western and Central Pacific Fisheries Commission

COMMISSION
THIRTEENTH REGULAR SESSION
Denarau Island, Fiji
5 – 9 December, 2016

DRAFT MANAGEMENT OBJECTIVES UNDER HARVEST STRATEGY APPROACH

WCPFC13-2016-11b
15 July 2016

Proposal by WCPFC Chair

The attached paper on Management Objectives was circulated to CCMs as WCPFC Circular 2016/34 on 15 July 2016.

Stocks vs Fisheries

- WCPFC harvest strategies to be developed at the fishery level.
- Initial focus is on single species approaches.
- More complex mixed fishery and multi-species approaches under development.

Reference Points

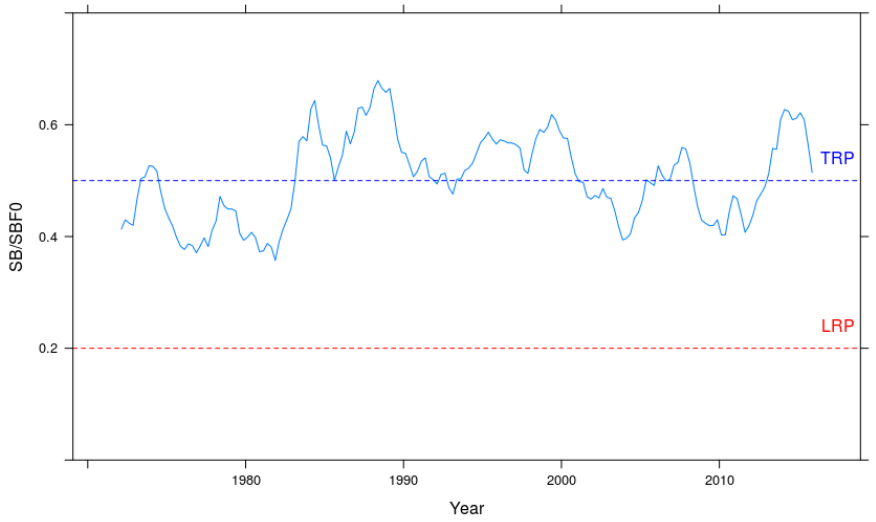
Reference points are used to identify the conditions in a fishery (such as the quantity of adult biomass or the level of exploitation) that are considered desirable (targets) or that you specifically want to avoid (limits).

Limit Reference Points

- Identify the conditions that you want to avoid
- Often based solely on biological considerations

Target Reference Points

- Identify the conditions that are considered desirable, or optimal
- Often include social and economic considerations as well as biology
- Currently expressed in terms of stock depletion
- Represent a prioritisation of management objectives.



LRP	TRP	(SB/SBF0)
0.2	??	
0.2	??	
0.2	-	
0.2	-	

Performance Indicators

Translate management objectives into something that can be measured.

Used when:

- Developing testing and selecting candidate MP
- Monitoring the performance of an adopted MP

Some Performance Indicators cannot be calculated from the evaluation framework

- Proxies may be used (e.g. effort may be a proxy indicator for employment).

Identify which Management Procedure is most likely to achieve objectives.

- Trade-offs between competing objectives

Performance Indicators Corresponding to Management Objectives

Skipjack	tropical purse seine fishery	(WCPFC13, Attachment M).
Bigeye & Yellowfin	tropical longline fishery	(WCPFC14, Attachment K).
South Pacific Albacore	southern longline fishery	(WCPFC14, Attachment K).

Skipjack Performance Indicators

Maintain SKJ biomass at or above levels that provide fishery sustainability.	• Probability of SB/SBF=0 > LRP	1
✖ Maximise economic yield	• Effort relative to MEY	
Maximize economic yield	• Catch (relative to 2013-2015).	3
Maintain acceptable CPUE.	• CPUE relative to reference period levels (2012)	4
✖ Maximise SIDS revenue from resource rents	• Average value SIDS catch relative to non-SIDS catch	
Catch stability	• Variation in catch	6
Stability and continuity of market supply	• Variation in relative effort	7
Stability and continuity of market supply	• Average distance from TRP over time (assuming 2012 levels)	8
SB/SBF=0	• SB/SBF=0 (and MSY metrics)	

Performance Indicators

https://ofp-sam.shinyapps.io/pimple/

Management Procedures

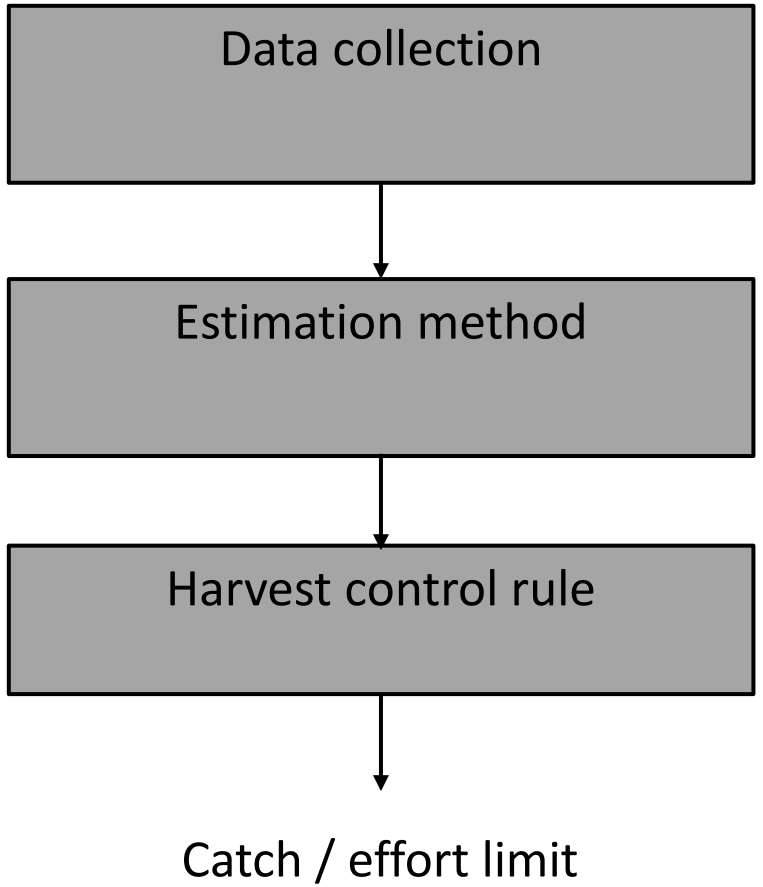
Management Procedures

A pre-agreed and tested procedure that determines the management action for a fishery given the status of the resource.

Three components

1. Data collection (log books, observer, tagging, catch statistics etc).
2. Estimation method to provide an estimate of stock status
3. Harvest control rule (HCR) to set fishing opportunities

All three components are agreed together as a package

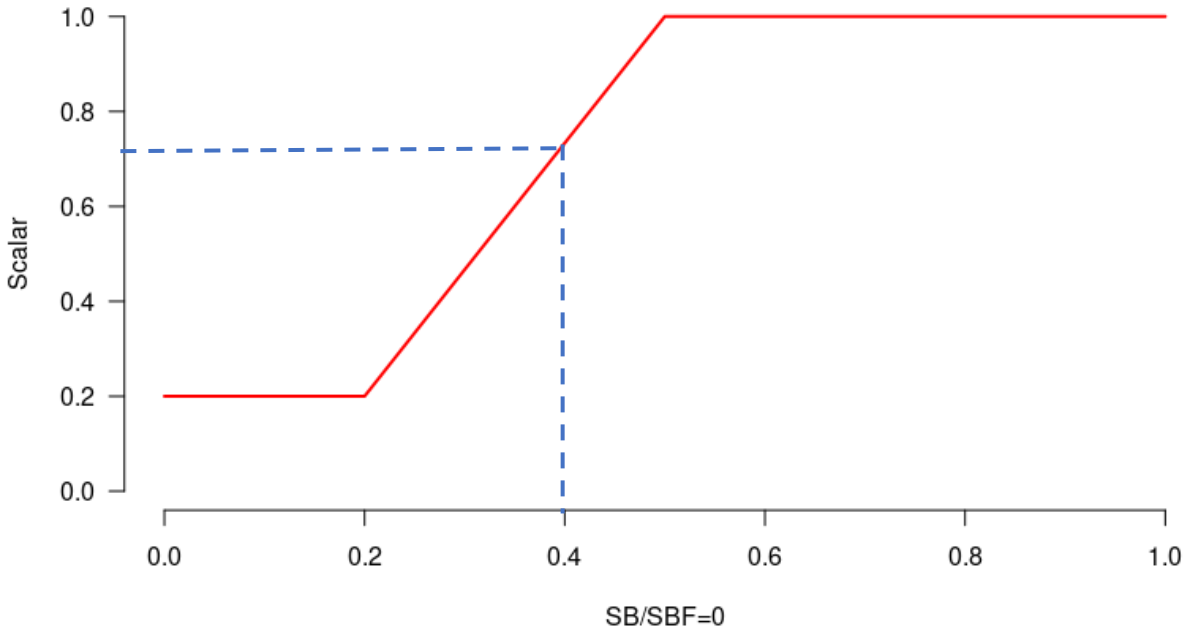


Estimation Method

Traditional Stock Assessment Approach	Harvest Strategy Estimation Method
Complex model that changes each time	Simpler model that does not change
Many models for each assessment	Single model
Redefine management reference points	Reference points don't change
Typically MULTIFAN-CL	Could be something different • CPUE trends • Surplus production model • MFCL
No longer used to set management levels	Used by the harvest control rule (HCR) to set management levels
Essential component of the Monitoring Strategy	Tested as part of the management procedure

Harvest control rule

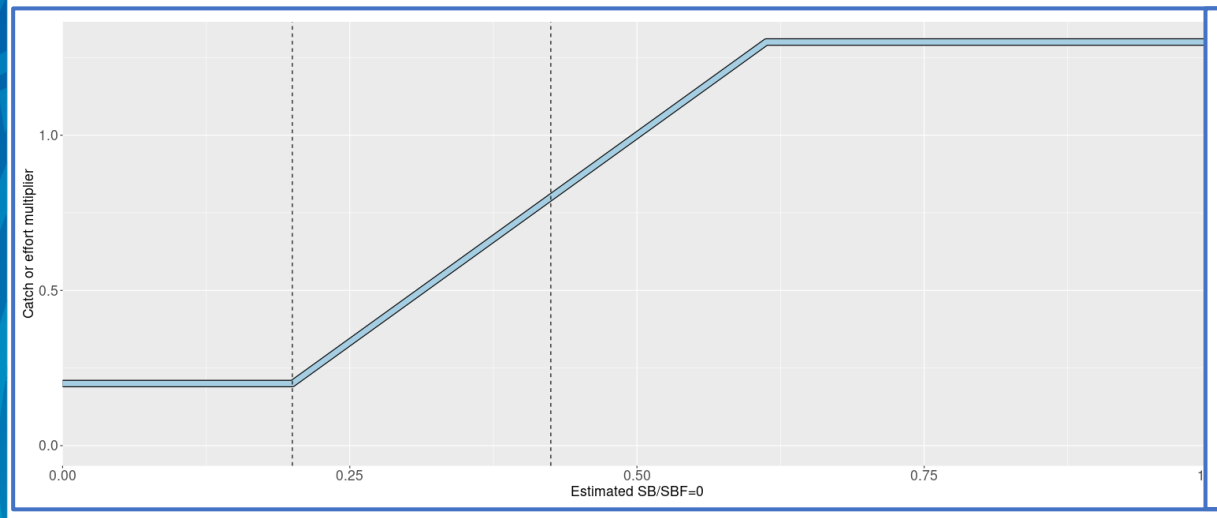
Uses the estimated stock status from the **estimation method** to set fishing opportunities.

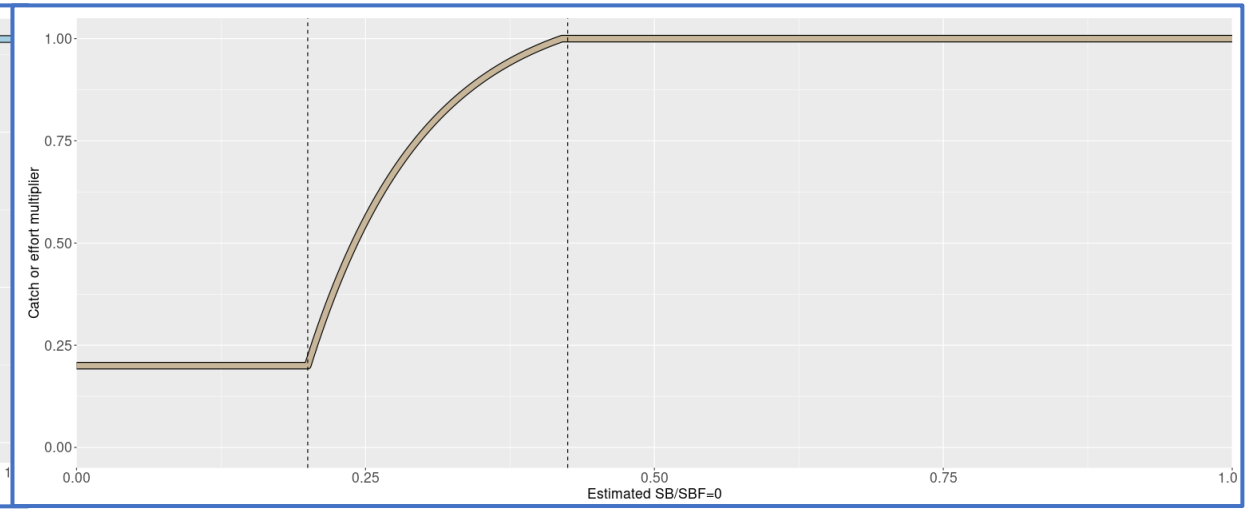


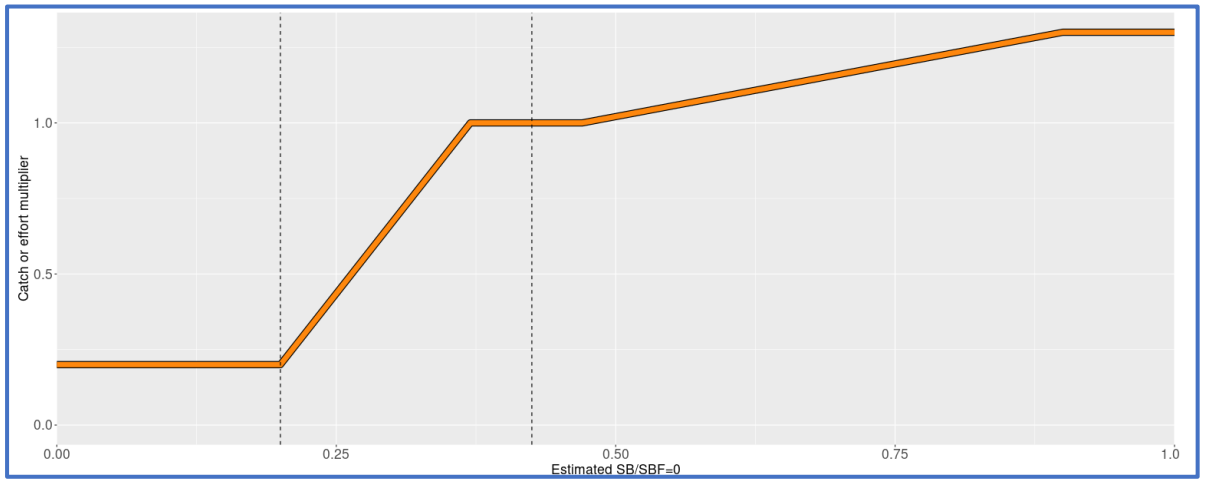
Example: the skipjack management procedure

- All fisheries subject to the management procedure (except archipelagic waters)
- Purse seine controlled by effort; other fisheries controlled by catch
- Harvest control rule output: scalar of 1.0 = 2012 levels
- 3 year management period
- In this example HCR,
  - if estimated SB/SBF=0 = 0.4,
  - output scalar = 0.7
  - effort / catch in next management period = 0.7 * 2012 level

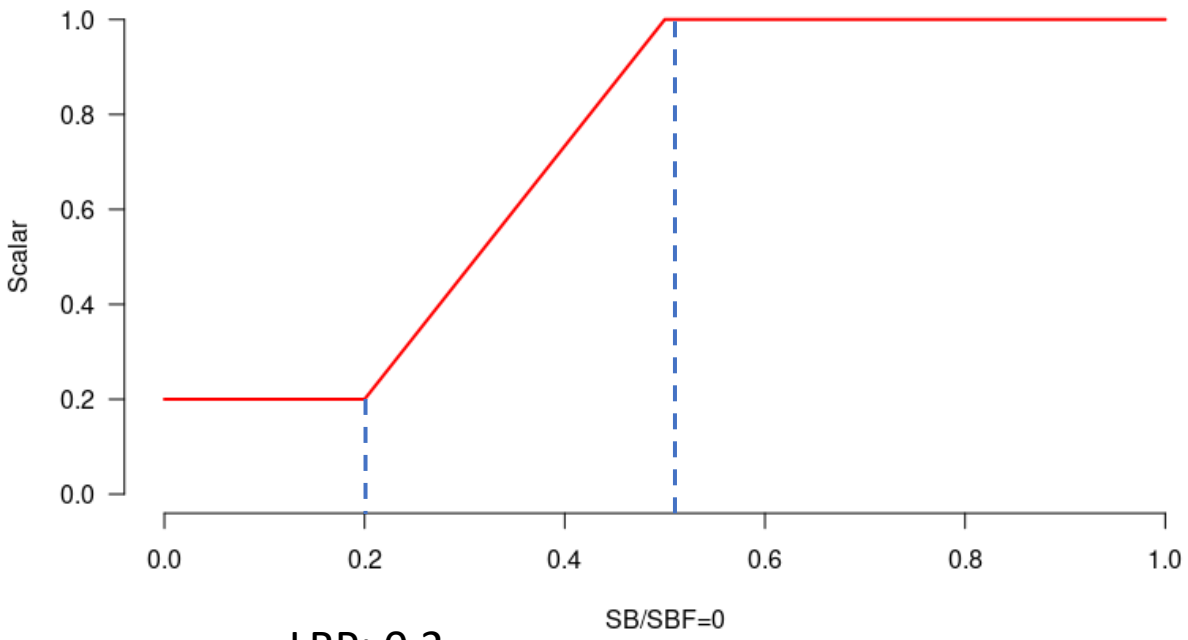
HCR design – general shape







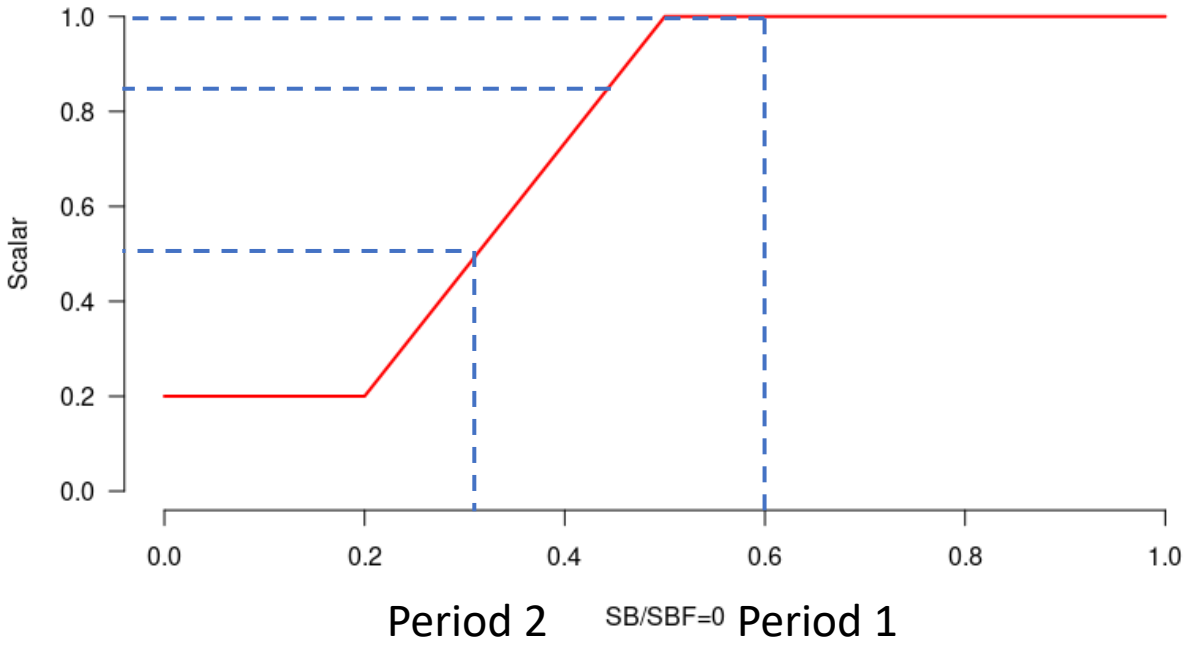
HCR design – specific shape



LRP: 0.2

- Difficult to anticipate how a HCR will perform just by looking at it – better to test it.
- WCPFC requirement – HCR reduces fishing if the stock approaches the limit reference point (LRP)
- If your stock is heading towards the LRP it means that the HCR is not performing well.
- Maximum scalar? E.g. a maximum output of 1.0 would mean catch / effort never higher than 2012 level
- At what SB/SBF=0 should we set the maximum scalar?

HCR design – additional rules



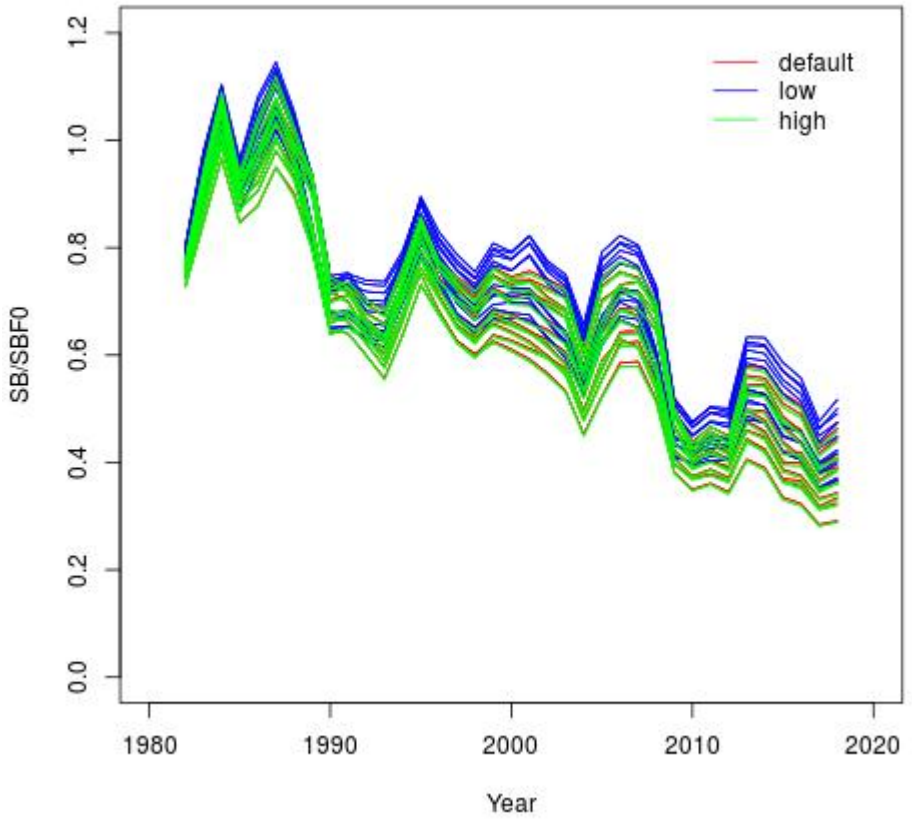
A constraint on changes in catch or effort from one management period to the next.

Example:

- A 15 % constraint
- If in management period 1 the SB/SBF=0 is 0.6 the output scalar is 1.
- If in management period 2 the SB/SBF=0 is 0.3, the output scalar is 0.5 = **50% cut in effort**.
- With a 15% constraint, the output scalar in management period 2 would be restricted to 0.85.

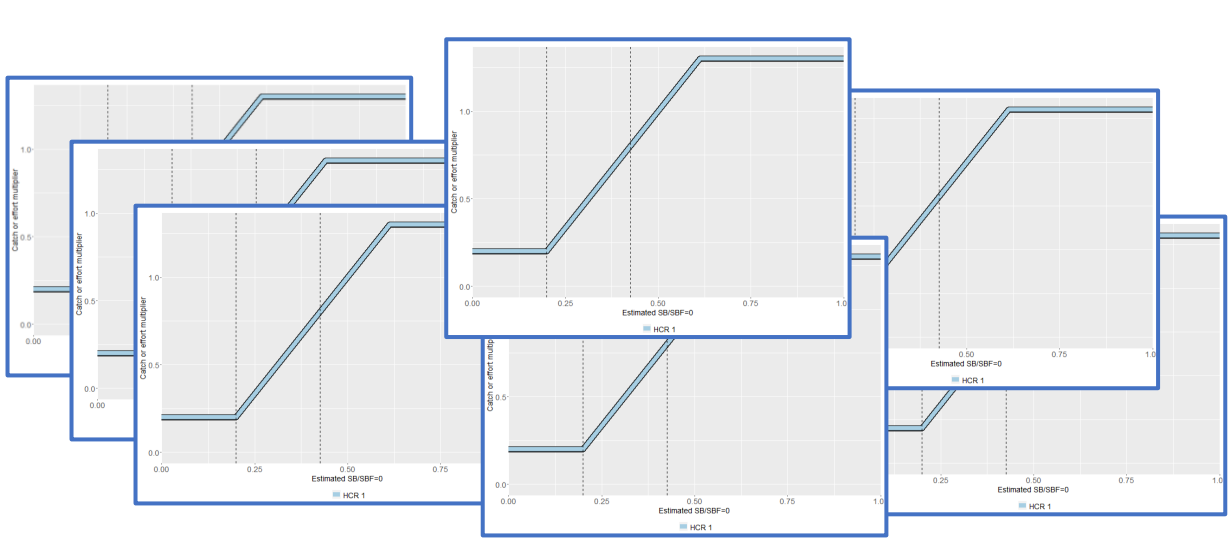
Uncertainty and testing of MPs

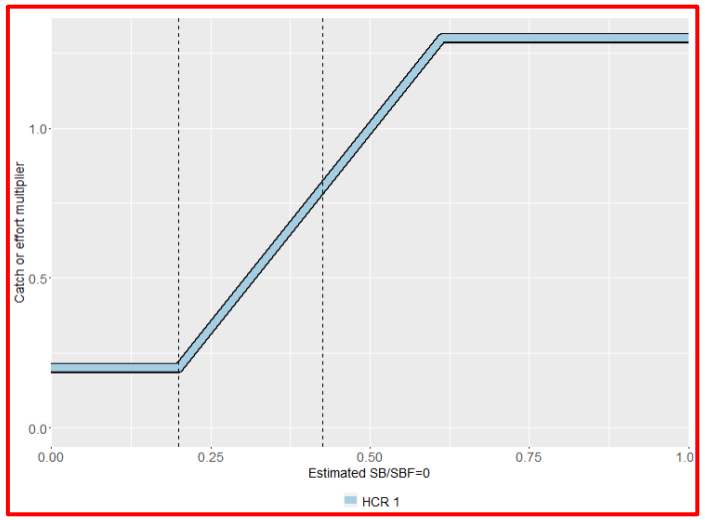
- Fisheries management has many uncertainties – current state and the future
- MP expected to work well across a broad range of uncertainties, e.g. in biology, fishery behaviour, environment etc.
- Candidate MPs tested with computer simulations: Management Strategy Evaluation (MSE)
- Uncertainty captured by the use of many ‘operating models’ – plausible states of nature
- For skipjack there are 96 models.



How do we know what MP to use

- Assemble a lot of ‘candidate’ MPs
- Test them using computer simulation (Management Strategy Evaluation)
- Measure the performance of each MP using **Performance Indicators**
- Remember that Performance Indicators relate to your **Objectives**
- Compare the Performance Indicators and choose your MP
- This is an important step and will be covered in detail in the second WCPFC seminar





Monitoring Strategy

Monitoring Strategy

Tracks the actual performance of the selected management procedure, once it has been implemented, to see if it is performing as expected.

Information sources for monitoring

- Stock assessment
- Catch, effort, …
- Other data not included in the evaluation process (e.g. economic surveys)

Questions to ask during monitoring

- Is the MSE framework used to test the candidate MPs still valid – or should it be updated ?
- Is the management procedure still the best – or can we improve it ?

Monitoring Strategy

Performance indicators

To evaluate the actual performance of the MP and to compare the real performance of the fishery and stock to that expected from the MSE simulations;

Stock assessment

To inform some of the performance indicators, particularly the biologically based ones;

Review of the MSE simulations

To ensure that the data and assumptions that underpin the simulations used to select the MP remain appropriate;

Exceptional circumstances

To identify situations that fall outside the range of assumptions over which the adopted MP has been tested.

Monitoring Strategy

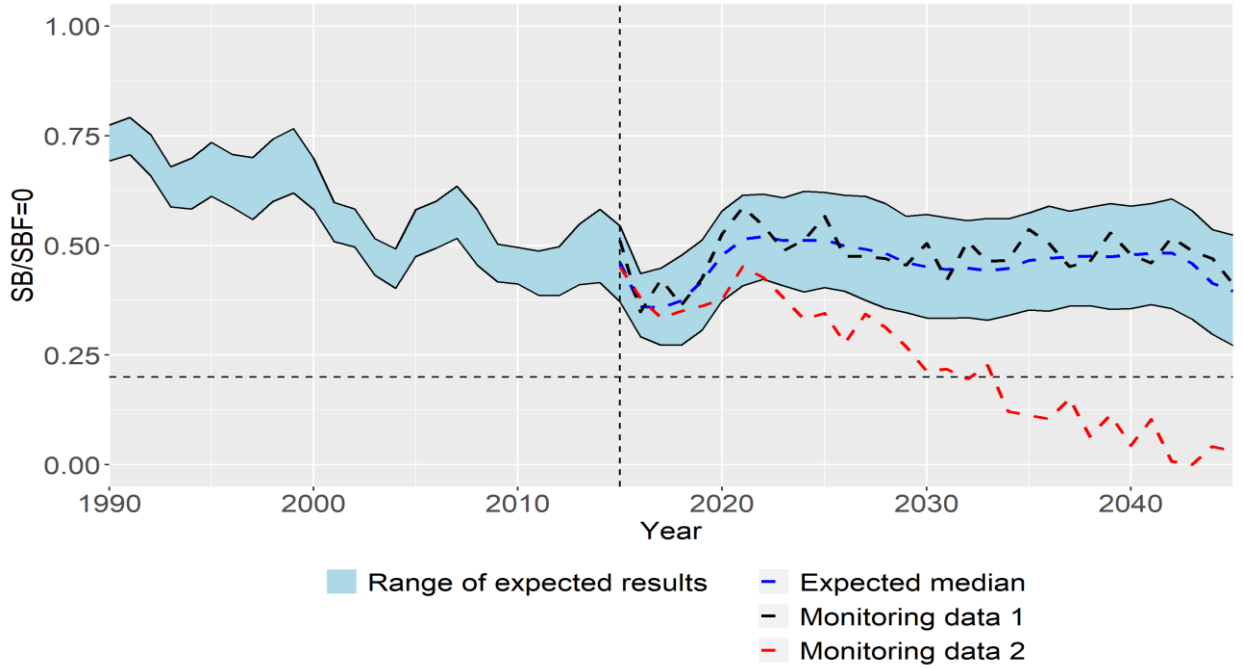
Exceptional Circumstances:

Events that are outside the range of expected behaviour

Defined in broad terms

Not a mechanism for making regular adjustments to the management procedure

How to agree on exceptional circumstances (scientific committee)



Wrap up

Science Management Dialogue

Key considerations for managers

- Procedure for selecting the ‘best performing’ management procedure
- Approach for implementing the agreed procedure
- Adoption of Target Reference Points (TRPs) that define desirable states of a stock and fishery
- Definition of fishery controls within the harvest strategy
- Input into candidate Harvest Control Rules (HCRs)
- Feedback on presentational approaches to support decision making
- Development of the monitoring strategy

Contact us

Contact us: fame-harvest-strategies@spc.int

Next WCPFC harvest strategy seminar is: 7th July 2022

- Use performance indicators to select management procedure(s)
- Implementing harvest strategies that consider mixed fisheries