WCPFC harvest strategy workplan

WPEA harvest strategy workshop,
Brisbane, 27-28 June 2022

Harvest Strategy Components

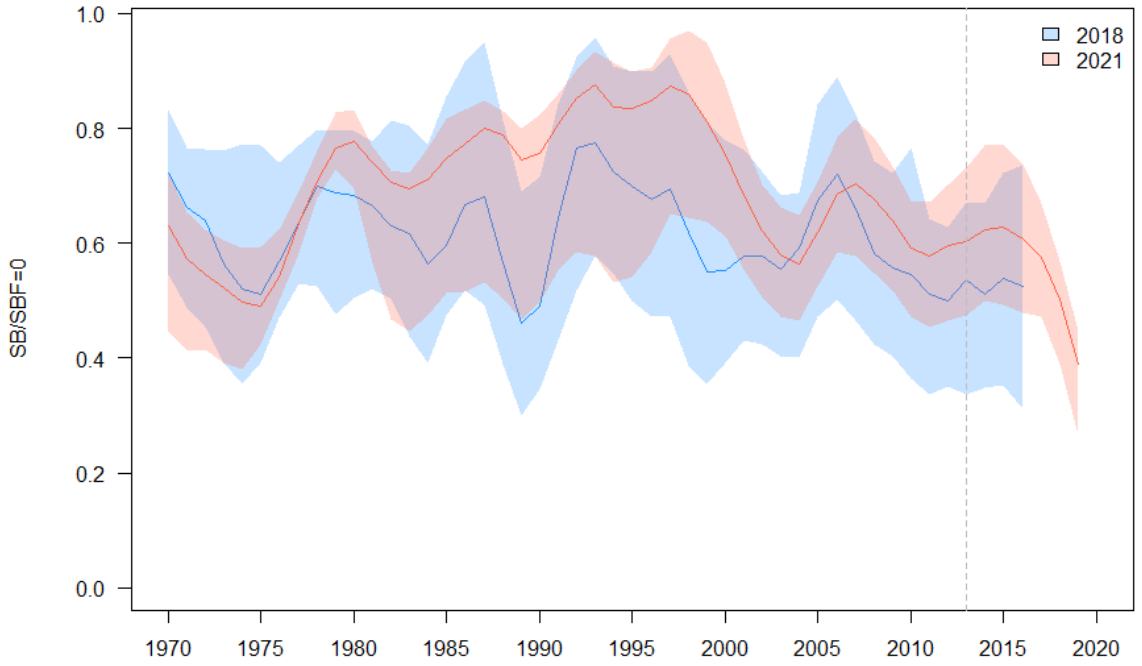
Management Objectives	• What do you want from your fishery ?
Performance Indicators	• Quantifiable metrics that tell you how well you are achieving your objectives.
Management Procedures	• Pre-agreed rules to manage the fishery to achieve the objectives (includes the harvest control rule HCR)
Management 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?

WCPFC Harvest strategy approach

WCPFC18-2021-DP05

	South Pacific Albacore	Skipjack	Bigeye	Yellowfin
2022	**Develop management procedures (e)** **and** **Management strategy evaluation (f)** • SC agree the operating models for MSE. • SC provide advice on performance of candidate management procedures. • SC provides advice on relevant elements of the monitoring strategy. • TCC consider the implications of candidate management procedures. • ~~Commission consider and refine a candidate set of management procedures.~~ Commission review and a~~A~~dopt a **management procedure.**	Develop management procedures (e) and Management strategy evaluation (f) • SC agree the operating models for MSE. • SC provide advice on performance of candidate management procedures. • SC provides advice on relevant elements of the monitoring strategy. • TCC consider the implications of candidate management procedures. Commission review and a~~A~~dopt a **management procedure.** [Updated stock assessment considered by SC18]	[Continue development of multispecies framework] **Develop management procedures** (e) and Management strategy evaluation (f) • SC provide advice on ~~performance of~~ potential management procedures. • ~~TCC consider the implications of potential management procedures.~~ • ~~Commission consider advice on progress towards management procedures.~~ [YFT peer review. Relevant to BET operating models.]	[Continue development of multispecies framework] **Develop management procedures** (e) and Management strategy evaluation (f) • SC provide advice on ~~performance of~~ potential management procedures. • ~~TCC consider the implications of potential management.~~ • ~~Commission consider advice on progress towards management procedures.~~ [YFT peer review. Relevant to operating models.]

South Pacific albacore



Comparison of depletion estimates from the 2018 and 2021 stock assessment model grids

South Pacific albacore

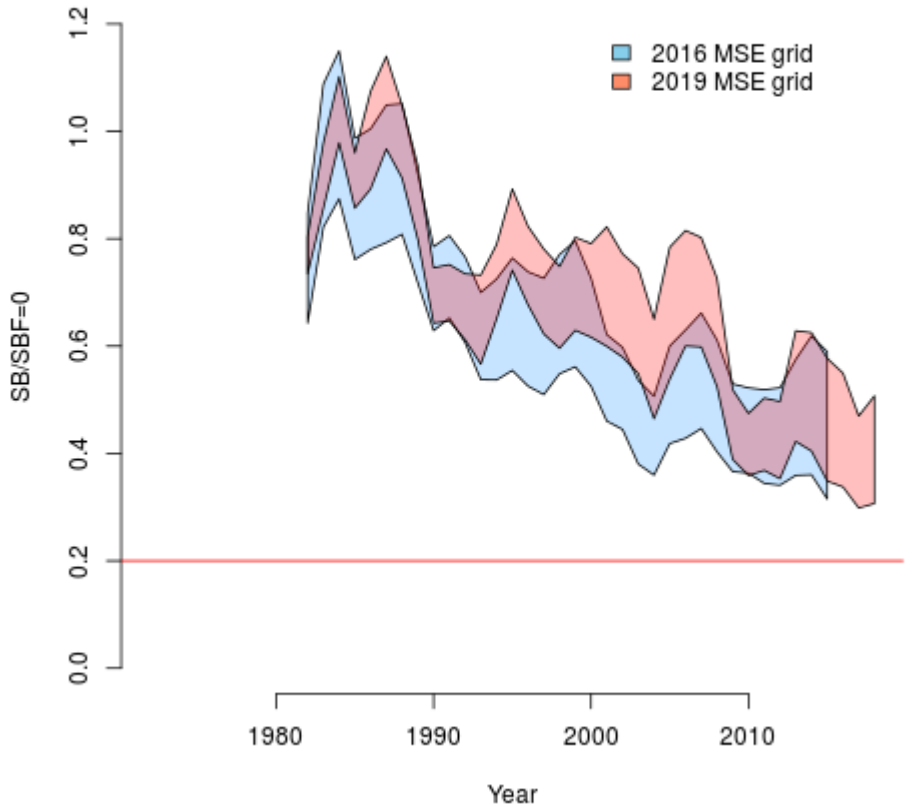
Initial focus on empirical MPs

Shift to model based MPs using simple biomass dynamic models (JABBA, SPICT)

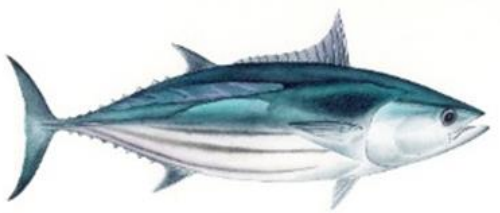
Conflict between CPUE and length composition data

Difficult to get a reliable index of stock status

WCPO skipjack



Comparison of depletion estimates from the 2016 and 2019 MSE grids

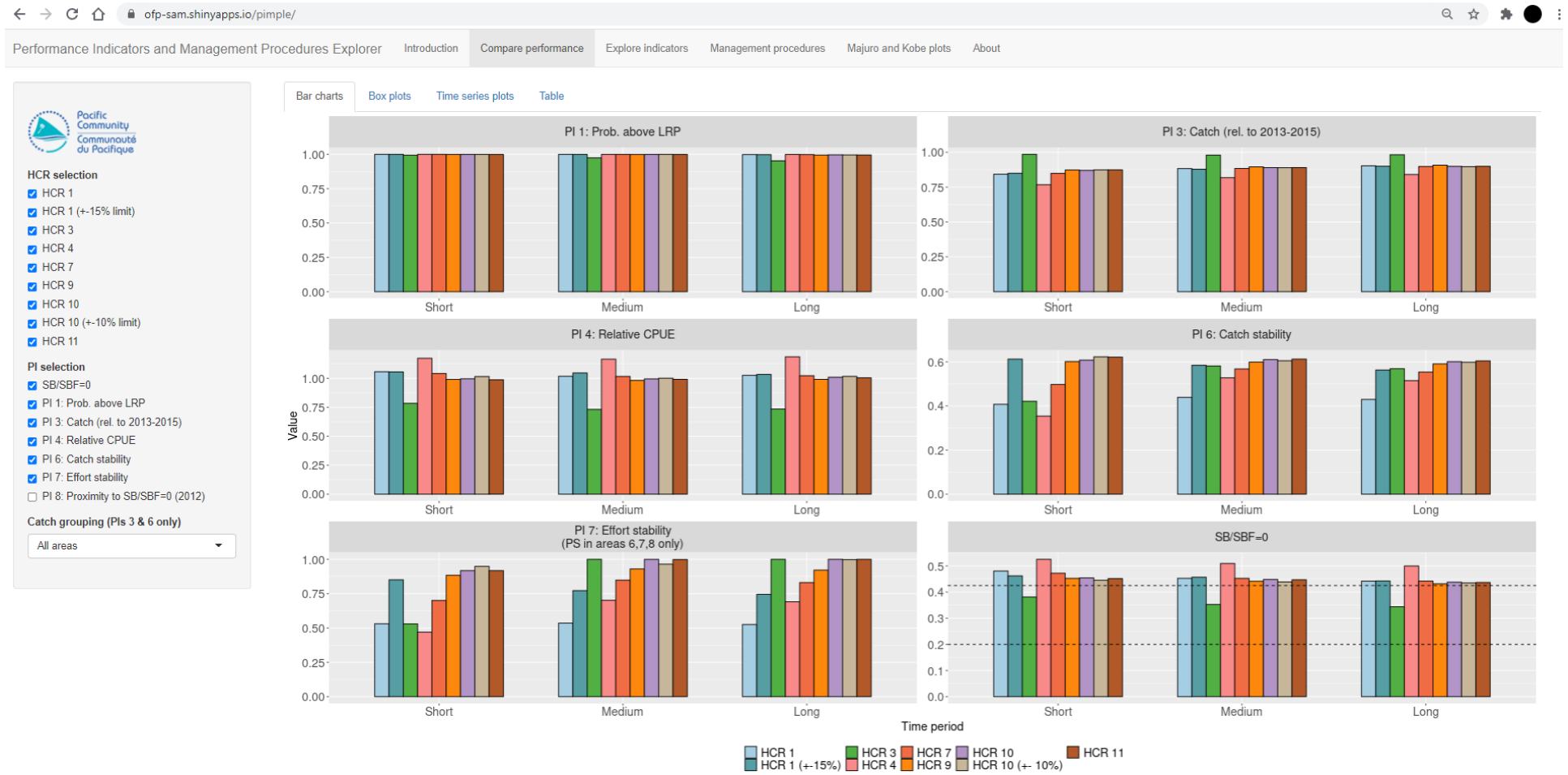


WCPO skipjack

Focus on model-based MPs

Performance Indicators

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



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

- Are the operating models still valid – or should they 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.

Summary of progress

	SKJ	SP-ALB	BET	YFT
	Tropical Purse Seine	Southern Long Line	Tropical Long Line	
Management Objectives	Noted	Noted	Noted	
Performance Indicators	Identified	Identified	Identified	
Reference Points	LRP Interim TRP	LRP Interim TRP	LRP	LRP
Harvest Control Rules	Candidate HCRs X	Example HCRs X		
Management Strategy Evaluation	Developed X	Developing X	X	X
Monitoring Strategy	Developing X			

Progress in developing harvest strategies for WCPFC stocks and fisheries

Harvest Strategy Components

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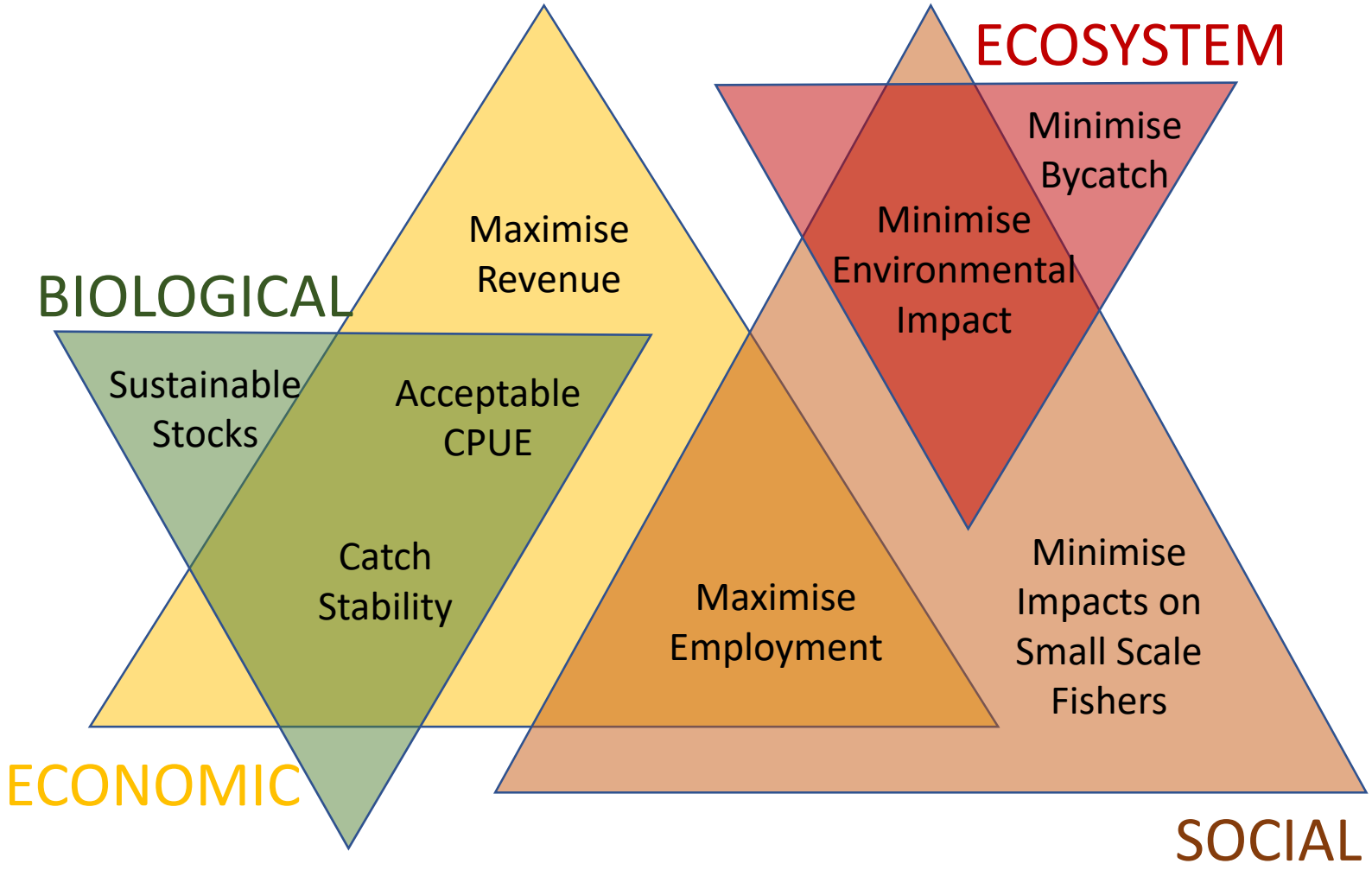
Management Objectives



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.

TROPICAL PURSE SEINE

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Type	Objective
Biological	Maintain SKJ & YFT & BET biomass at or above levels that provide fishery sustainability throughout their range
Economic	Maximise economic yield from the fishery
	Maintain acceptable CPUE
	Taking Article 30 of the WCPFC convention into account: Maximise SIDS revenues from resource rents
	Catch stability
	Stability, predictability and continuity of market supply
Social	Food security in developing states (import replacement)
	Avoid adverse impacts on subsistence and small scale fishers
Ecosystem	Minimise bycatch

SOUTHERN LONGLINE

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Type	Objective
Biological	Maintain ALB (and SWO, YFT and BET) biomass at or above levels that provide stock sustainability throughout their range
Economic	Maximise economic yield from the fishery
	Maintain acceptable CPUE
	Taking Article 30 of the WCPFC convention into account: Maximise SIDS revenues from resource rents
	Catch stability
	Stability and continuity of market supply
Social	Food security in developing states (import replacement)
	Avoid adverse impacts on small scale fishers
	Maintain / develop domestic fishery
	Human resource development
Ecosystem	Minimise bycatch
	Optimise capacity

TROPICAL LONGLINE

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Type	Objective
Biological	Maintain YFT and BET (and SWO) biomass at or above levels that provide fishery sustainability throughout their range
Economic	Maximise economic yield from the fishery
	Maintain acceptable CPUE
	Increase fisheries-based development within developing states economies
	Optimise fishing effort
	Maximise SIDS revenues from resource rents
	Catch stability
	Effort predictability
	Maintain BET, YFT (and SPA & SWO) stock sizes around the TRP
Social	Food security in developing states
	Employment opportunities
	Maintain / develop domestic fishery
	Human resource development
Ecosystem	Minimise catch of non-target species
	Minimise fishery impact on the ecosystem

Performance Indicators

Translate management objectives into something that can be measured.

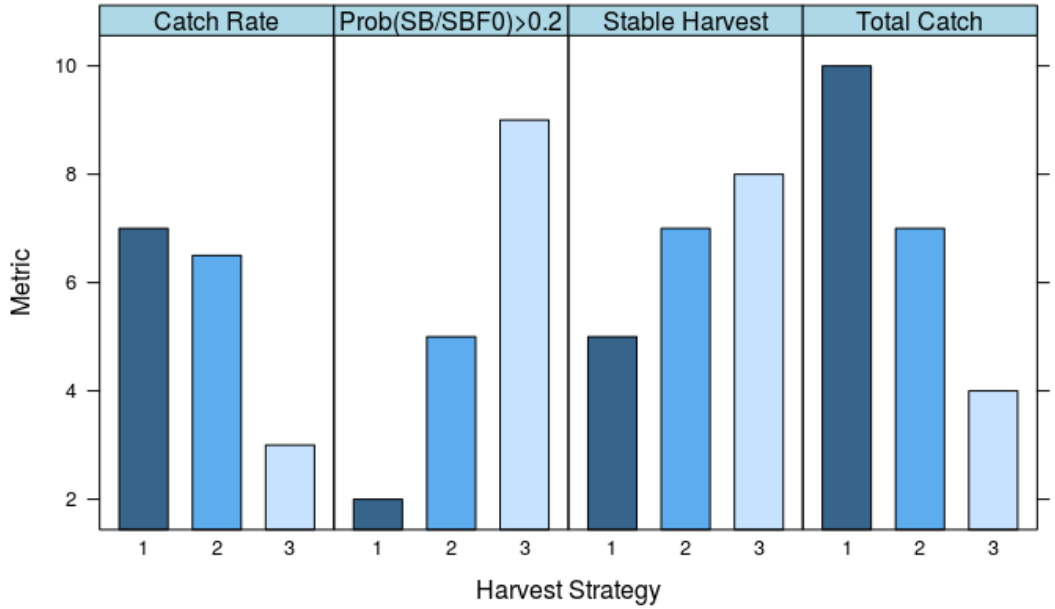
- Need to closely resemble objectives.
- Proxies may be used (e.g. effort may be a proxy indicator for employment).

Identify which Management Procedure is most likely to achieve objectives.

- Trade-offs between competing objectives
- E.g. maximise catches vs. Minimise risk of falling below LRP

Performance indicators

- Translate high level objectives into quantitative metrics
- Used when :
  - Developing, testing and selecting candidate HCRs
  - Monitoring the performance of an adopted HCR.
  - Ideally these two sets of PIs will be the same
  - Some PIs cannot be calculated from the simulation framework



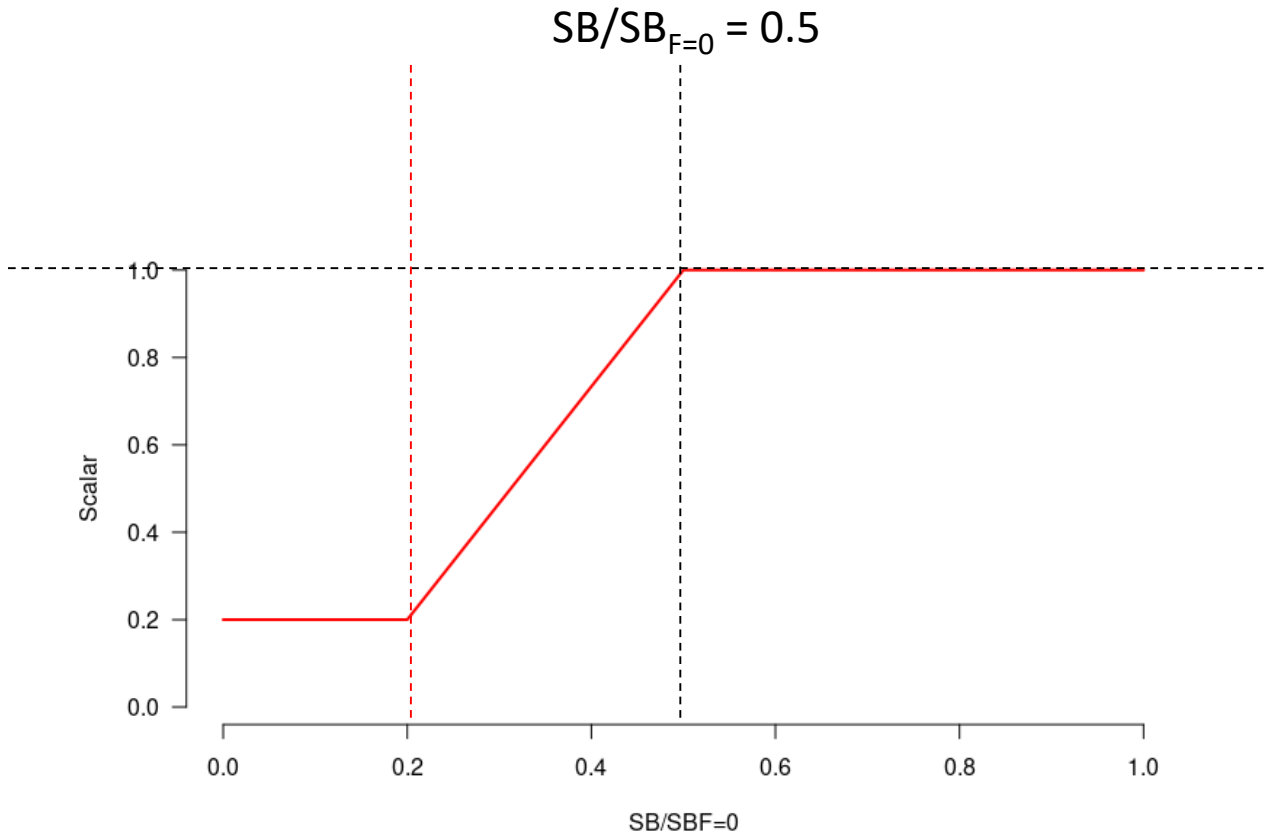
Performance Indicators Corresponding to Management Objectives

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 depletion levels)	8
•SB/SBF=0	• SB/SBF=0	

Management Procedures

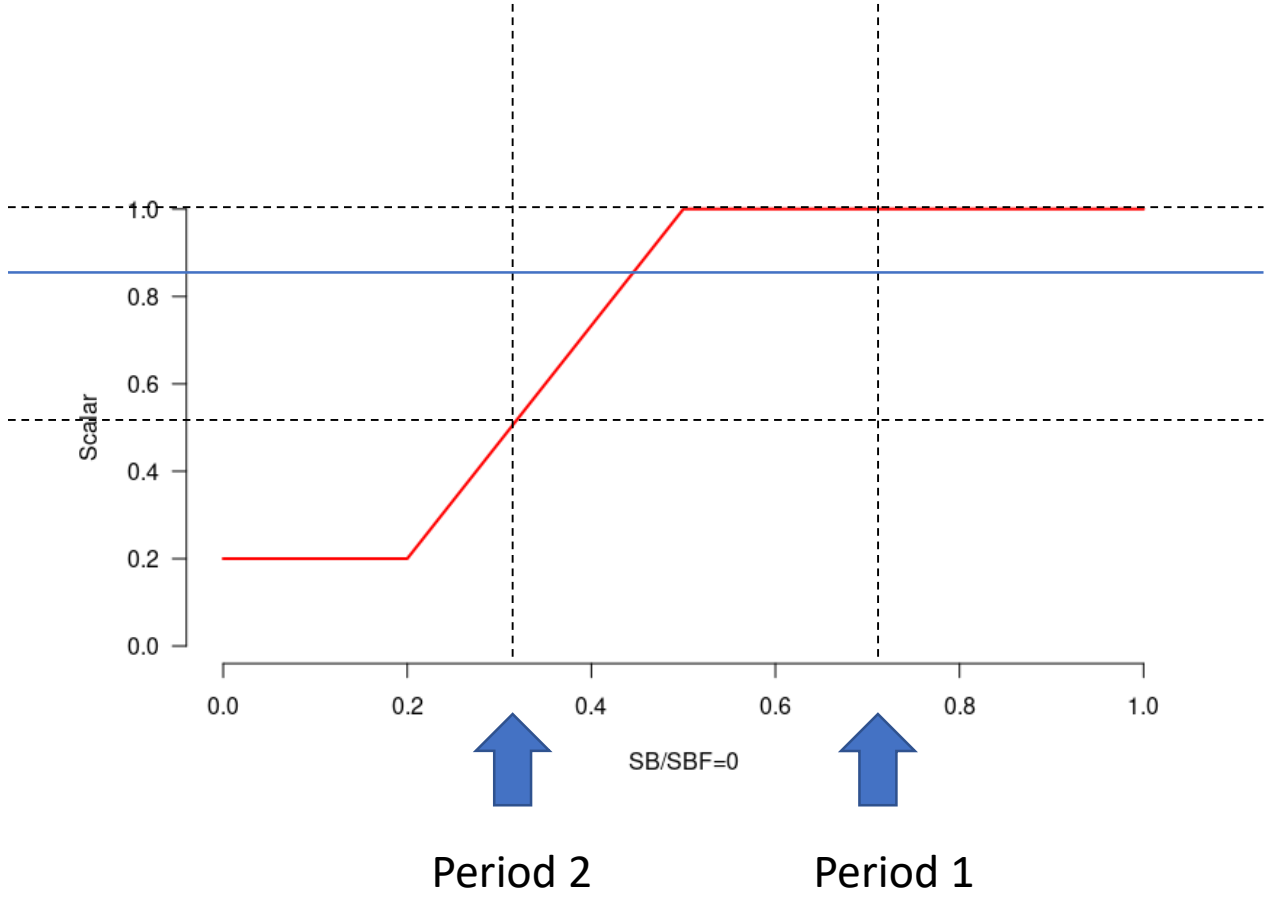


Basis of the HCR:

Allows for management by catch or effort for different fisheries

Reference year for catch and effort levels

Management Procedures



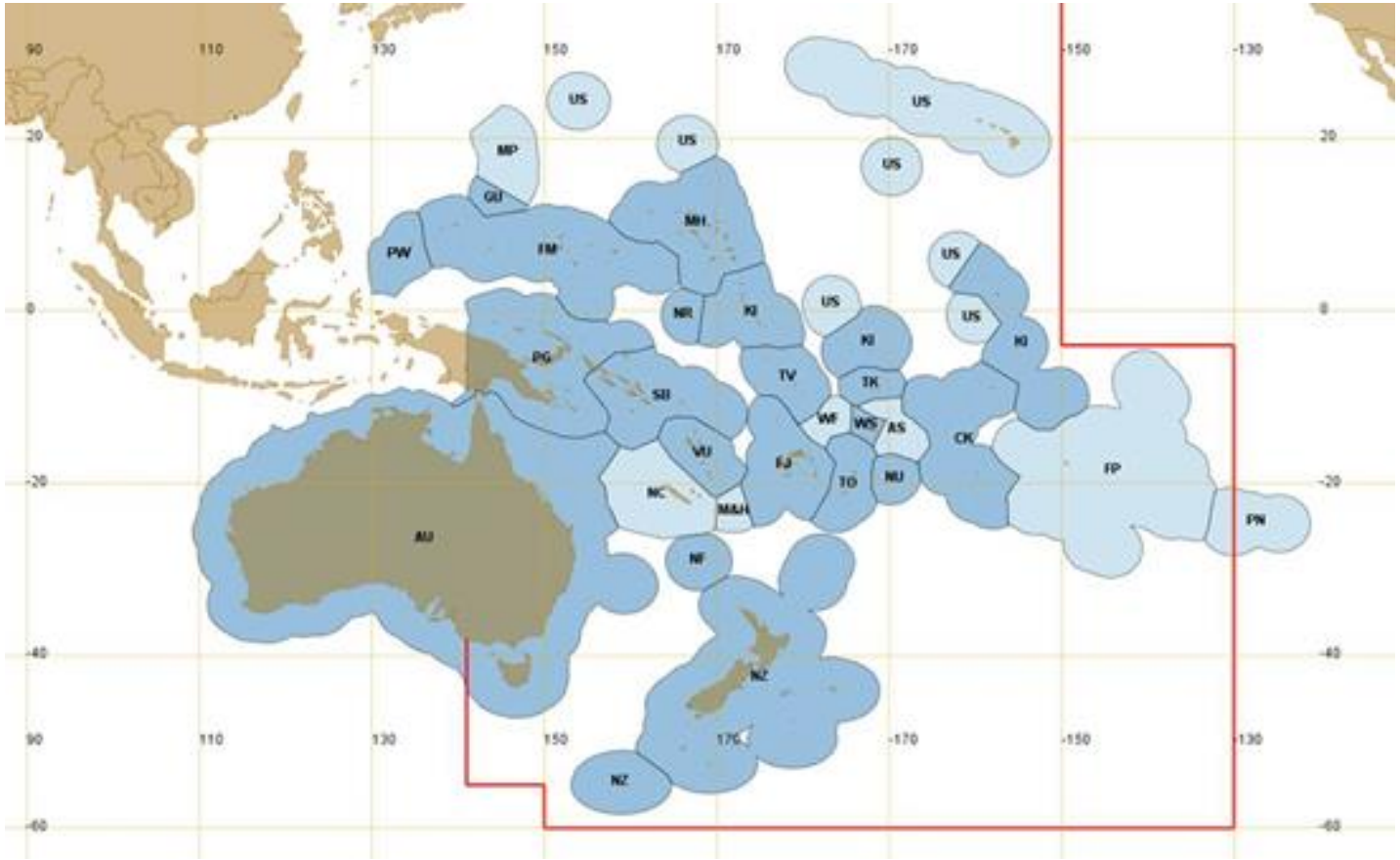
HCR meta-rules

- E.g. a 15% constraint on changes in catch or effort from one management period to the next

  Fishing level – period 1

  Fishing level – period 2

Management procedure



Will the MP operate at the WCPFC-CA scale ?

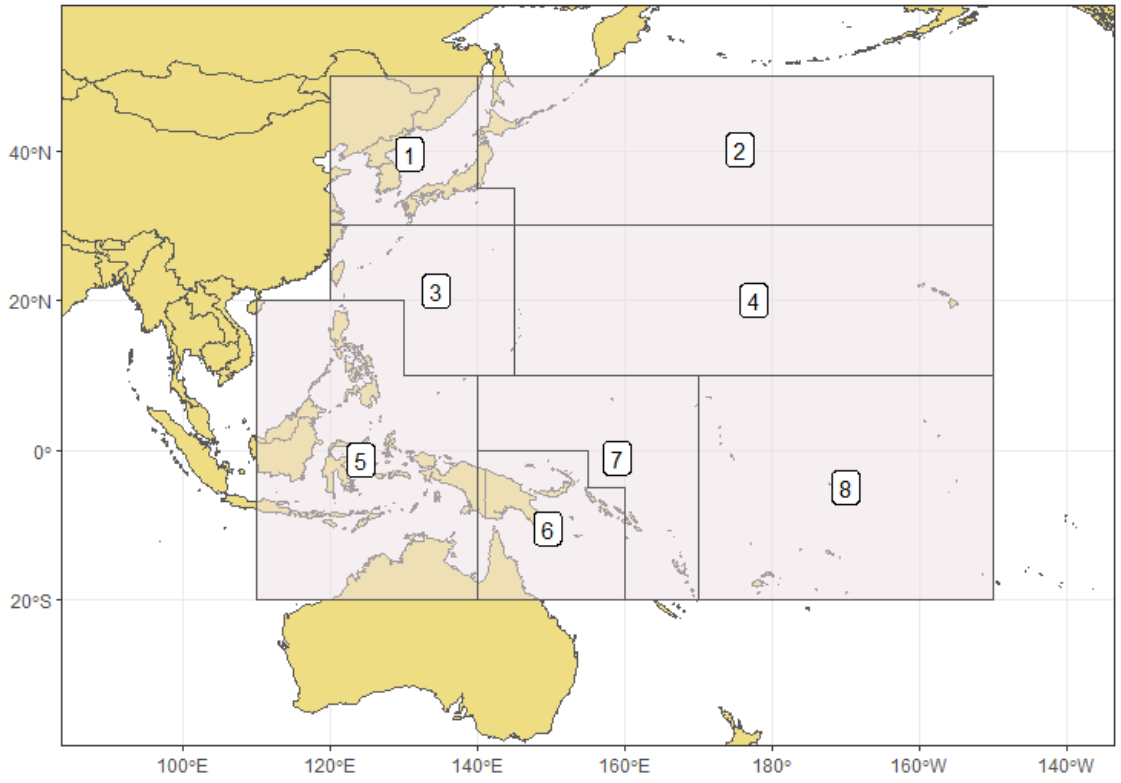
Will the MP control all fisheries ? (Mixed fishery considerations)

Will the MP control catch or effort ? (or something else?)

Management procedures for skipjack

Modelling Framework

SC18 to agree the operating models for MSE



Operating Models

- Grid of alternative model assumptions
  - Growth
  - Recruitment
  - etc.
- Grid should cover the range of uncertainty in the fishery and the stock
- Must also consider uncertainty in future conditions
  - Catch and effort reporting
  - Recruitment
  - Effort creep
  - etc.

Modelling Framework

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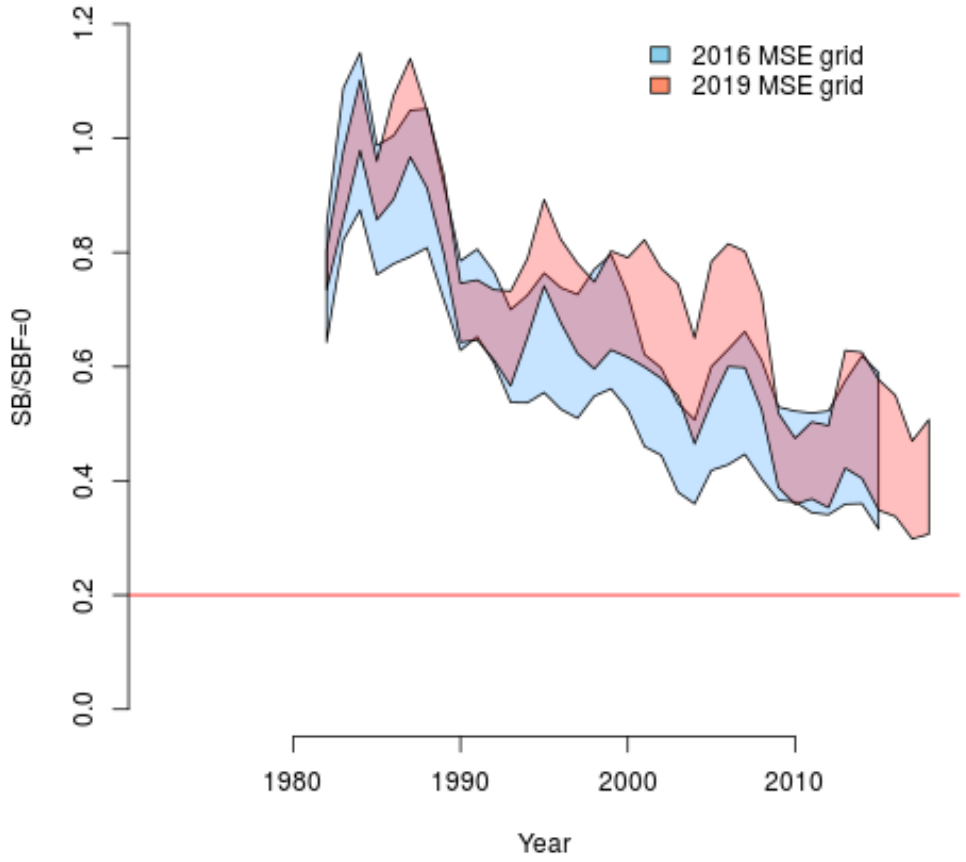

Operating Models

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  - etc.

Skipjack MSE uncertainty grid

Axis	Levels	Options		
	Reference	0	1	2
Recruitment variability	2	1982-2014	2005-2014	
Catch & effort	1	20%		
Size composition	1	Estimated ESS		
Tag recaptures	1	Status quo		
Steepness	3	0.8	0.65	0.95
Mixing period	2	1 qtr	2 qtr	
Growth	2		Low	High
Movement	1	Estimated		
Hyper-stability in CPUE	2	0	-0.5	
Effort creep	2	0%	2%	

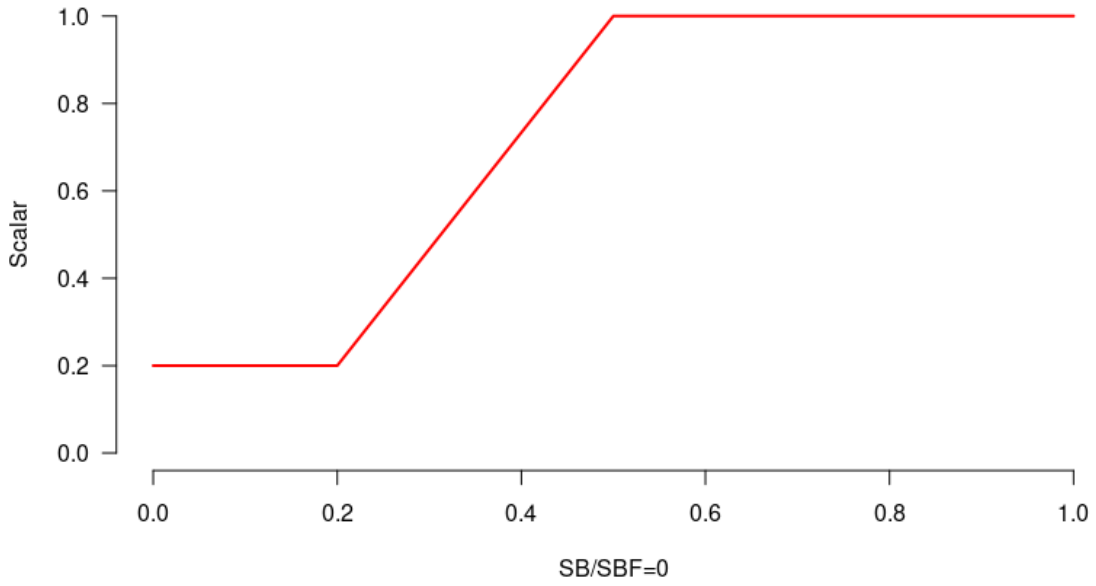
96 scenarios
10 iterations each scenario
960 evaluations for each HCR

Data collection

Model uncertainty

Management Procedures

For skipjack: the candidate management procedures differ only in the HCR

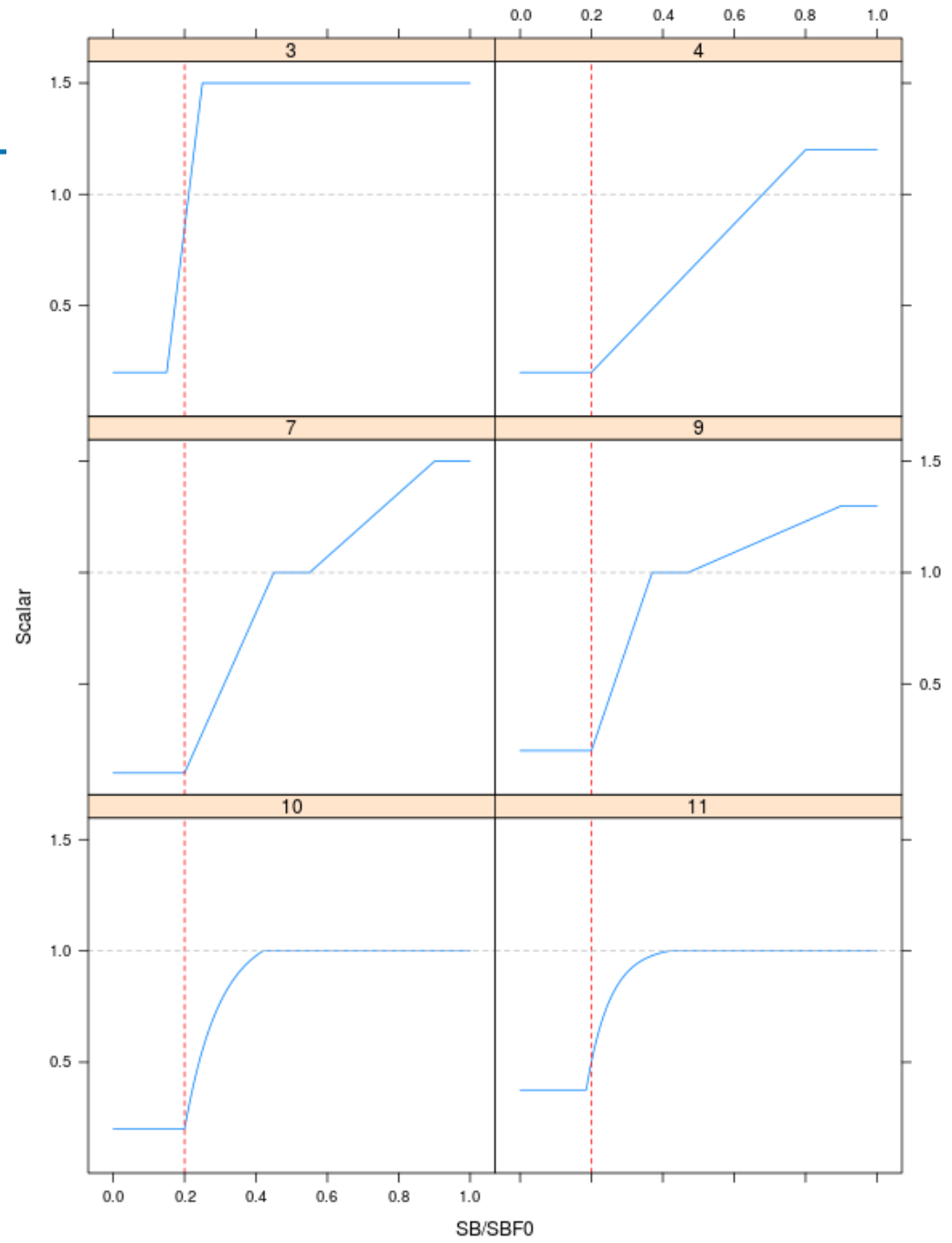


Basis of the management procedure:

- 3 year management period
- All fisheries subject to the management procedure (except archipelagic waters).
- Purse seine controlled by effort; other fisheries controlled by catch
- A scalar of 1.0 = 2012 levels

Skipjack MSE – HCRs

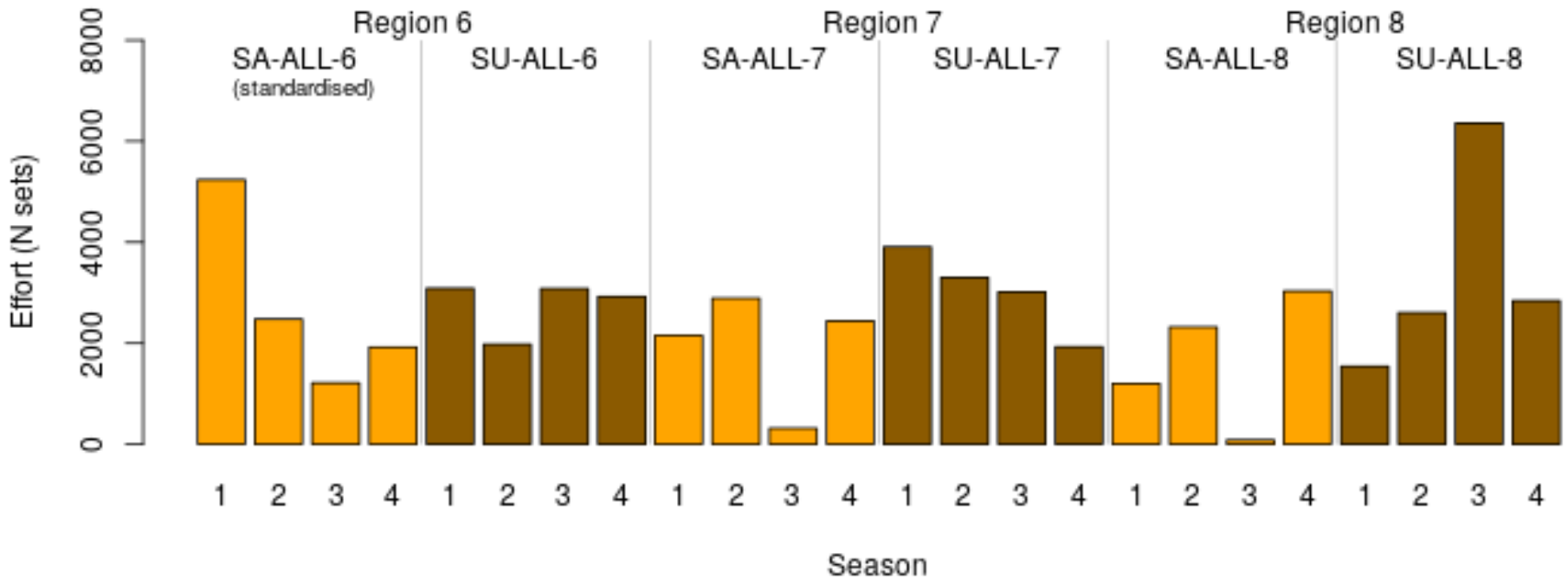
First projection year	2019
First year MP run	2022
First time HCR applies	2023
Interim period (2019-2022)	average 2016-18
Projection period	30 years
Management period	3 years
TRP	$SB/SB_{F=0}$ (2012)
Reference catch/effort year	**2012**
HCR fisheries	**All**
purse seine	**effort**
non-purse seine	**catch**
Archipelagic waters	**fixed at 2012**



Skipjack MSE – BASIS of the HCR

Seasonal pattern of tropical purse seine effort during the reference year : 2012

Conditions consistent with 3 month FAD closure



Assumptions for archipelagic waters

PNG & SB Archipelagic waters

Adjusts the effort scaler to be applied to purse seine fisheries in region 6

Based on the ratio of purse seine fishing effort in 2012 inside vs outside archipelagic waters.

Both free school and associated effort combined SA-ALL-6
SU-ALL-6 (before standardisation)

Assumes that purse seine fishing effort inside archipelagic waters continues at 2012 levels.

Assumptions for archipelagic waters

ID & PH Archipelagic waters

Adjusts the effort scaler to be applied to all fisheries in region 5

Based on catch because effort statistics for region 5 are less reliable.

- All catches from the ID domestic fishery (fishery 11)
- 50% of catches from the combined ID-PH purse seine fishery (fishery 12)
- 50% of catches from the pole and line fishery (fishery 13)

Hoshino et al (2020)

Assumes that purse seine fishing effort inside archipelagic waters continues at 2012 levels.

Skipjack MSE – Performance Indicators

Performance Indicator 1:	Maintain SKJ, YFT, BET biomass at or above levels that provide fishery sustainability throughout their range.
Performance Indicator 3:	Maximise economic yield from the fishery (average expected catch).
Performance Indicator 4:	Maintain acceptable CPUE.
Performance Indicator 6:	Catch stability.
Performance Indicator 7:	Stability and continuity of market supply (effort variation relative to a reference period).
Performance Indicator 8:	Stability and continuity of market supply (probability of and deviation from $SB/SB_{F=0}$ in 2012).

Performance Indicators 5, 9, 10 & 11 continue to be developed