Western and Central Pacific Fisheries Commission

Pacific Community
Communauté du Pacifique

Evaluation of candidate management procedures for South Pacific albacore

SPAMWS01-WP-01

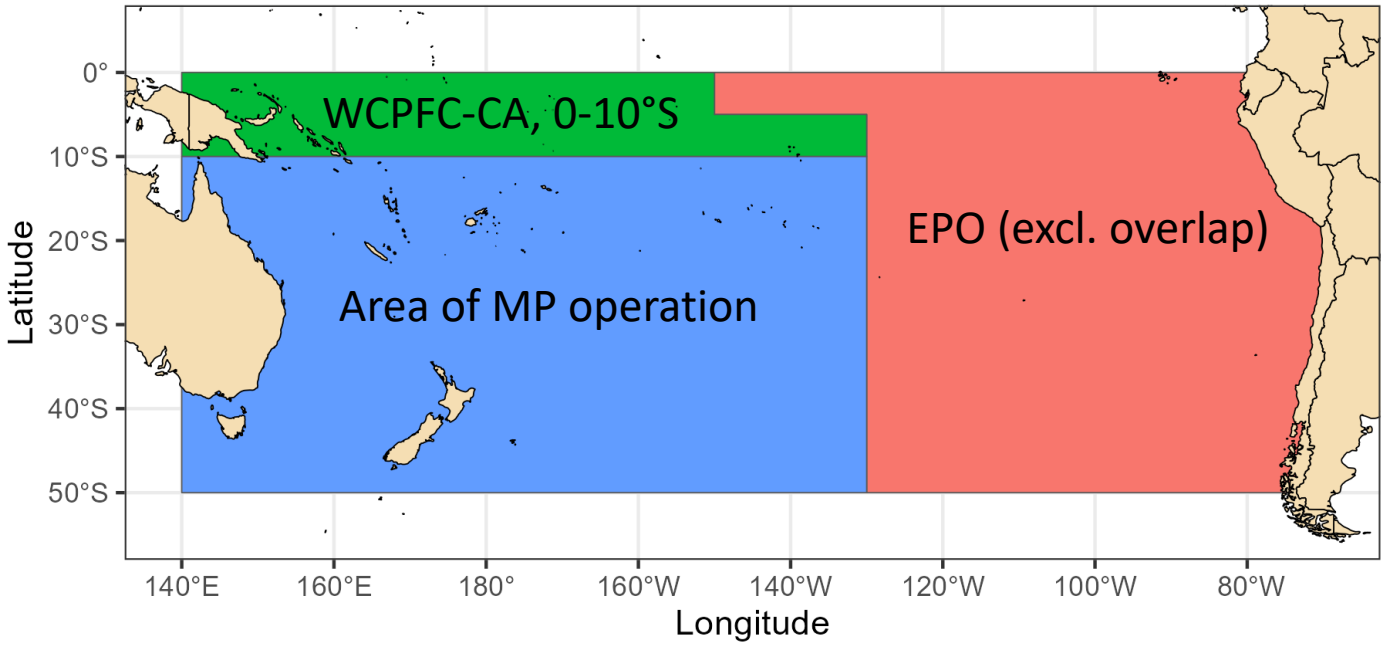
South Pacific Albacore Management Workshop
First Session
Electronic Meeting
11–12 September 2025

Introduction

- Overview of MSE framework and main assumptions
- Candidate MPs
- Results
- Sensitivity tests
- Additional MPs requested by SC21

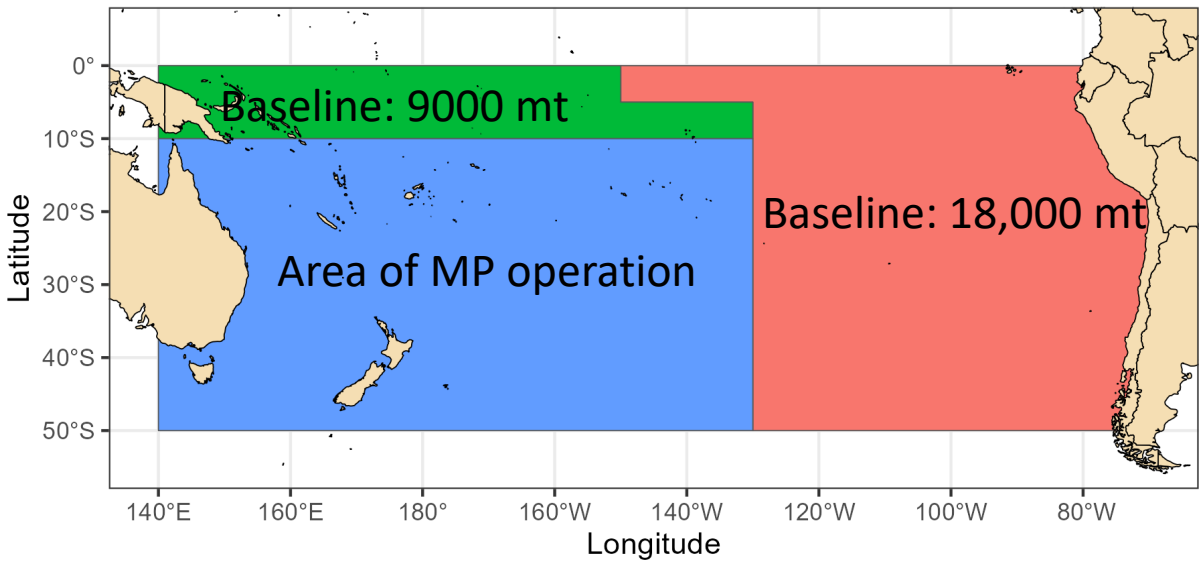
MSE assumptions

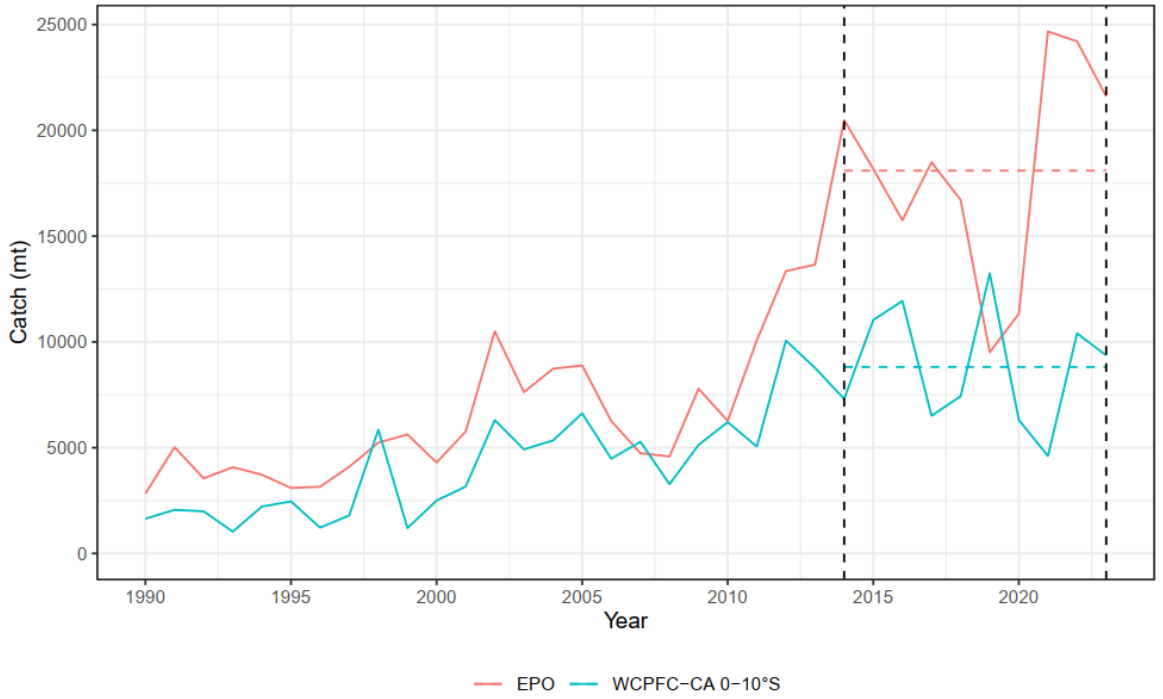
- MP defines the level of fishing by longline and troll fisheries in the WCPFC-CA, south of 10°S.
- MP does not apply to EPO (excl. overlap) or WCPFC-CA 0-10°S.
- Simulations run from 2023 to 2053.
- MP is first run in 2025 and output applied in 2026.
- Three year management period.
  - MP output applied for following three years.
- Data lag of two years.
- Operating models agreed by SC20
- Estimation method outputs $SB/SB_{F=0}$ relative to 2017-2019
  - SC21 recommended continued use



Baseline assumptions for EPO and TLL

- MP applies WPFC-CA, south of 10°S.
- Necessary to assume future fishing levels in EPO (excl. overlap) and WCPFC-CA equator to 10°S (TLL).
- Assume average of 2014-2023 catches: ~18,000 and 9000 mt p.a.
- Sensitivity tests conducted around these assumptions.
- Note that in the future the TLL fishing levels are potentially managed through the bigeye MP.

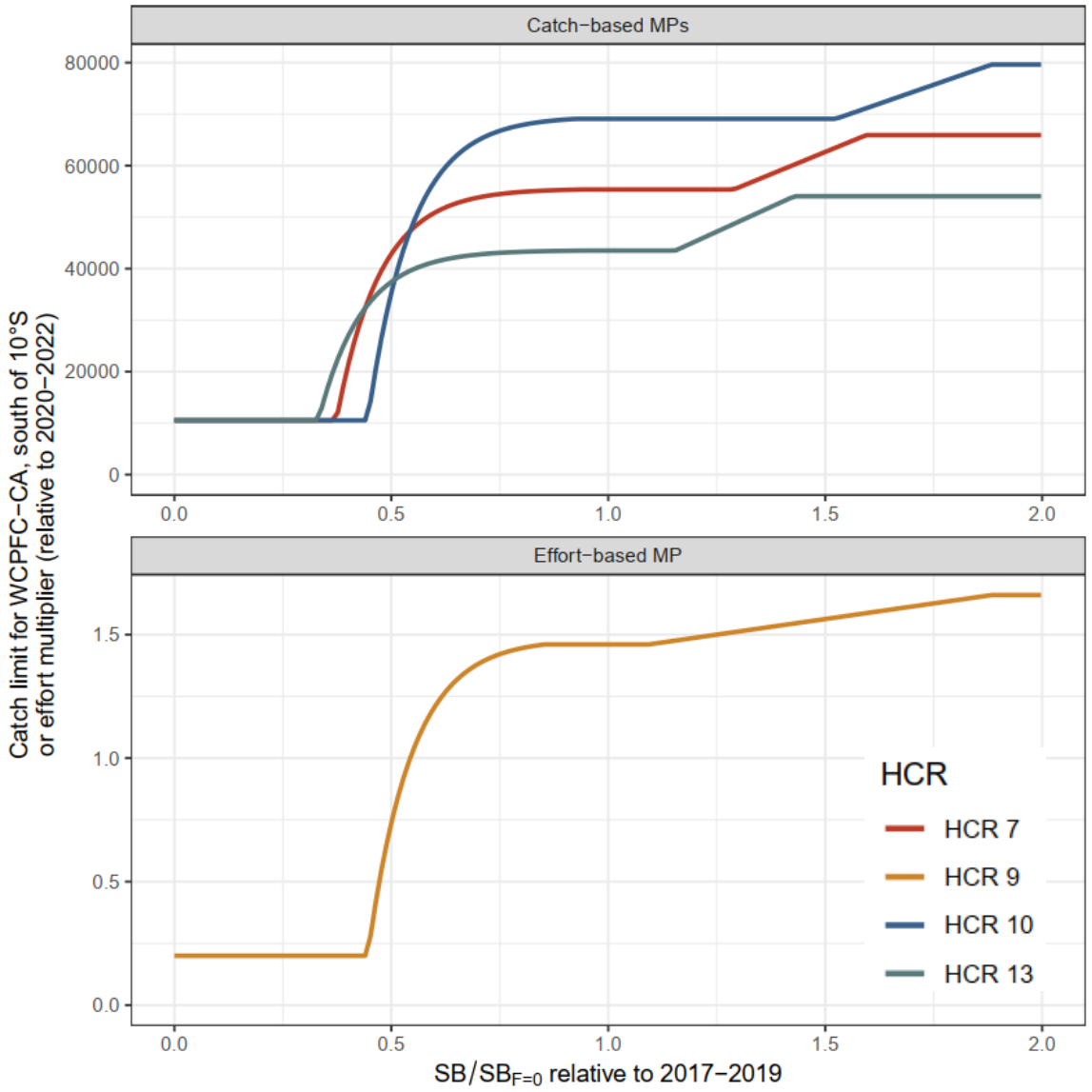




MP assumptions

- All fisheries in the WCPFC-CA, south of 10°S, are managed either through the setting of catch or effort limits, depending on the candidate MP.
  - i.e. all are managed through catch limits, or all are managed through effort limits.
- HCR outputs a scalar that is applied to the baseline catch or effort.
- Baseline is average catch or effort 2020-2022 within the WCPFC-CA, south of 10°S.
  - i.e. an output scalar of 1 sets the catch or effort limit for the next management period to the average of 2020-2022 catches or effort.
- Allocation of that limit, and how those allocations are managed in practice (e.g. through effort if the allocation is in terms of catch, or catch if the allocation is in terms of effort) is external to the MP.
- All fisheries managed by the MP are affected equally.
  - E.g. if the MP specifies a 10% increase in catch, all fisheries managed by the MP have their catch limits increased by 10% relative to the baseline for the next management period.

HCRs



- Same shape as HCR in skipjack interim MP.
- Input is relative SB/SB$_{F=0}$ from EM.
- Designed to achieve long-term objectives.
  - WCPFC20 agreed iTRP: 0.96 x 2017-2019 SB/SB$_{F=0}$.
  - A TRP range of 0.42 to 0.56 was also proposed.
- Initial suite of 4 candidate MPs.
  - Specific constraint option per HCR.
- Additional MPs requested by SC21.

HCR	Constraint	Objective
Catch-based MPs		
HCR 7	+10% -5%	iTRP
HCR 10	+10% -5%	Lower TRP range
HCR 13	+10% -5%	Upper TRP range
Effort-based MPs		
HCR 9	+-5%	Lower TRP range

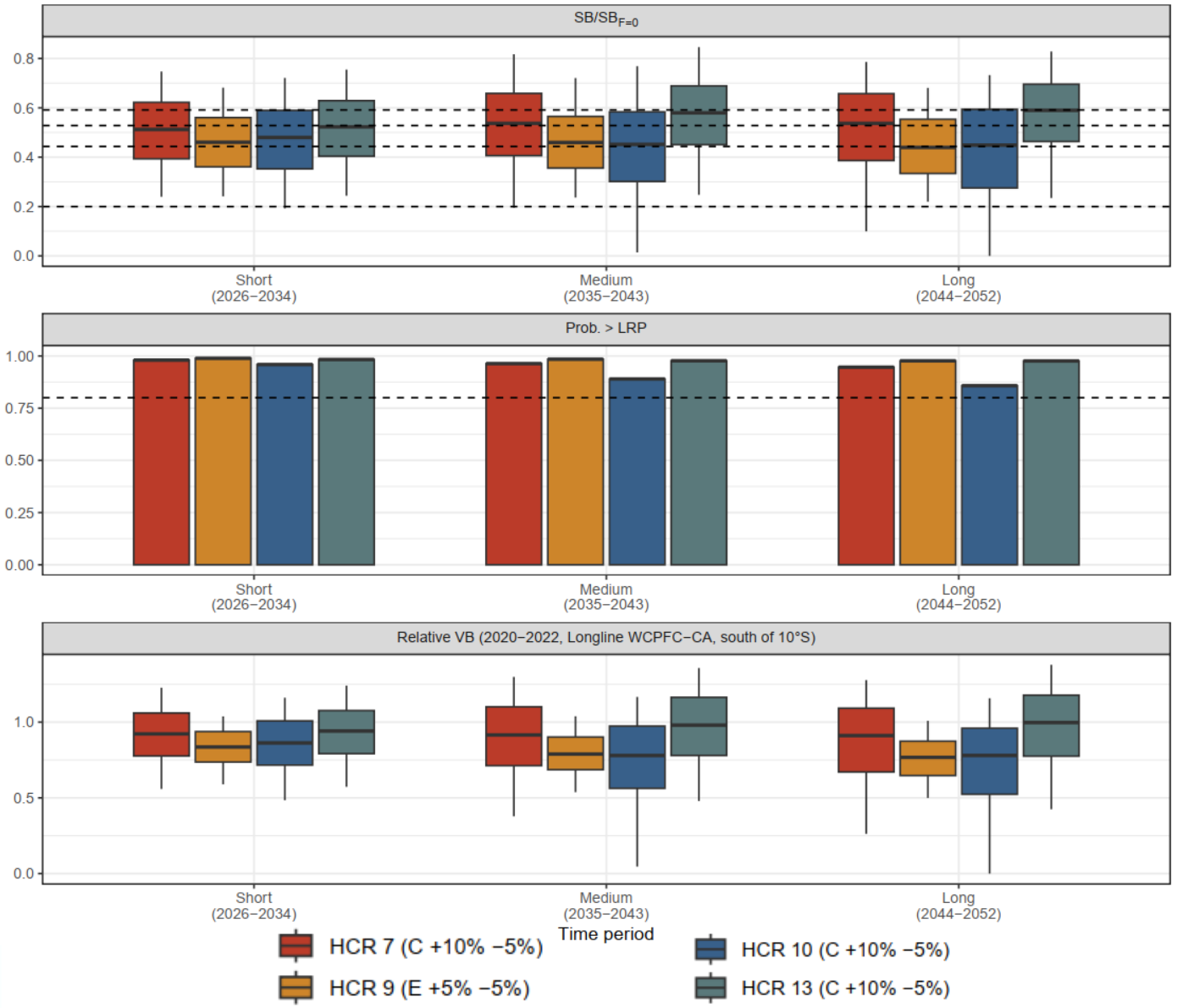
Six performance indicators

Indicator	Notes
$SB/SB_{F=0}$ in the WCPFC-CA	Can be compared to the iTRP
Probability of being above LRP in the WCPFC-CA	WCFPFC requires at least 0.8
Total catch in the (WCPFC-CA, south of 10°S)	Noting that catch in WCPFC-CA, equator to 10°S, is fixed in the evaluations
Vulnerable biomass (WCPFC-CA, south of 10°S longlines)	Relative to VB in 2020-2022
Catch variability (WCPFC-CA, south of 10°S)	Calculated as absolute annual difference
Effort variability (WCPFC-CA, south of 10°S longlines)	Calculated as absolute annual difference

The average values of the PIs are calculated over three time periods:

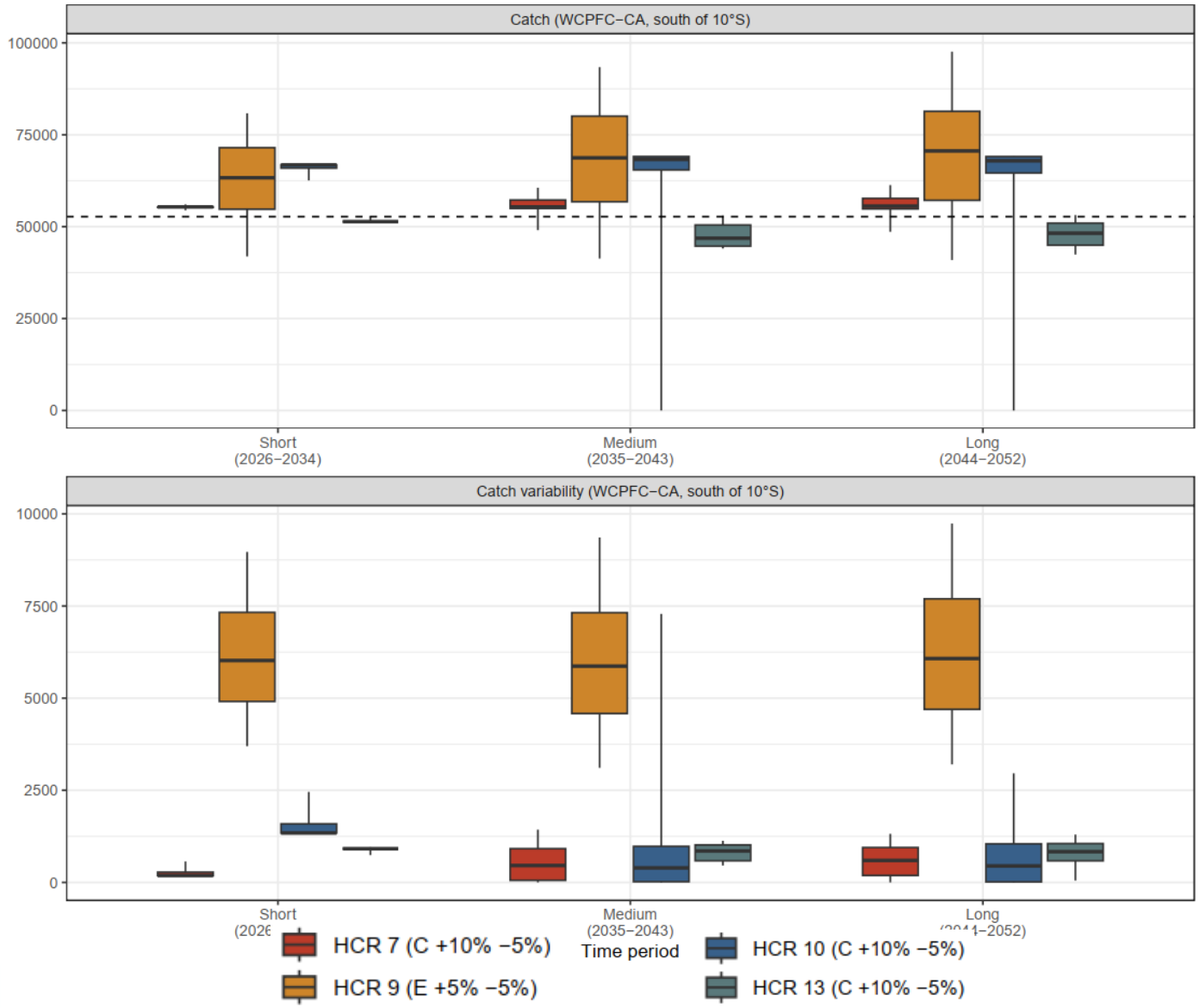
- Short (2026-2034)
- Medium (2035-2043)
- Long (2044-2052)

Results



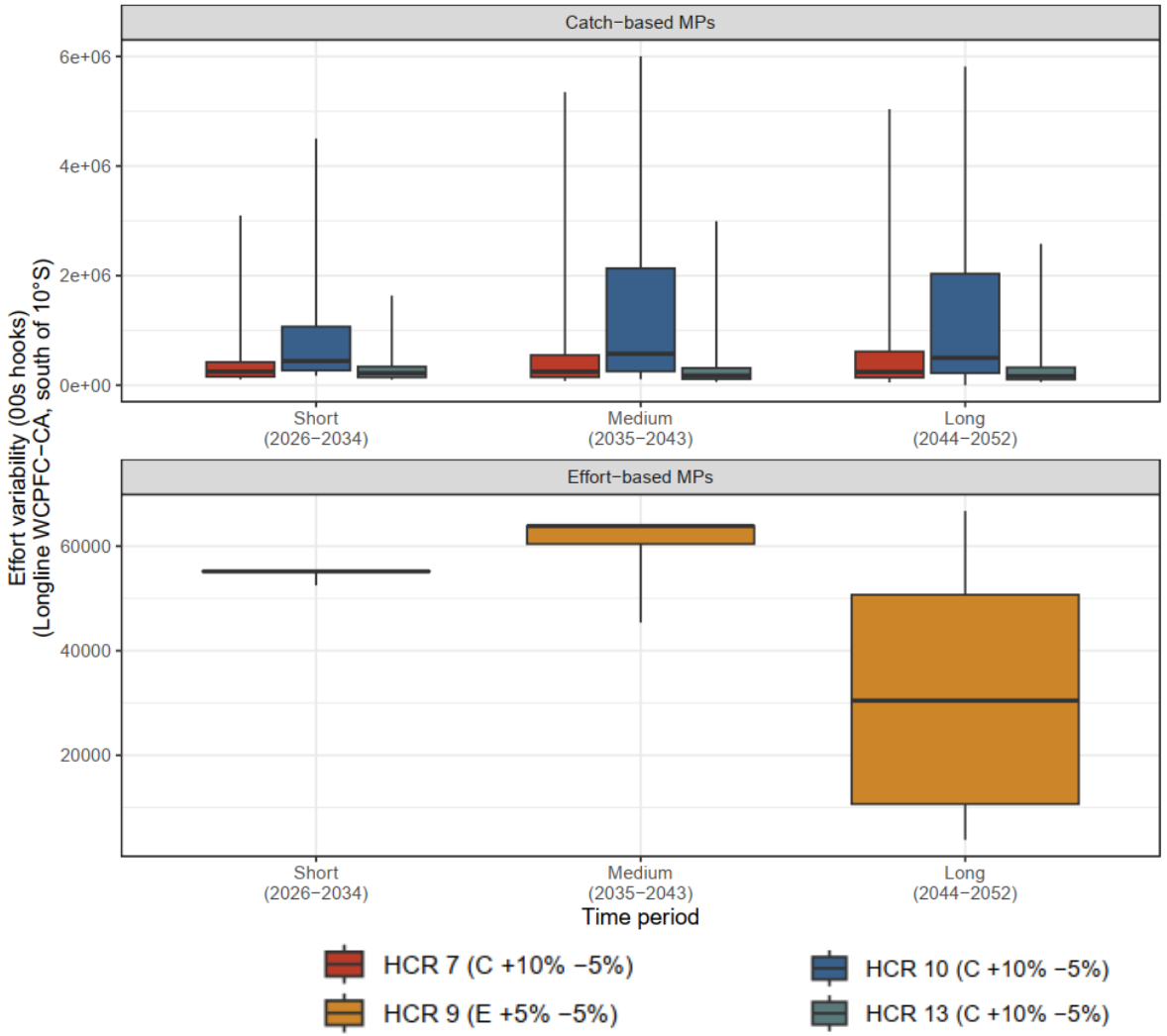
- MPs achieve different long-term $SB/SB_{F=0}$ objectives.
- All MPs have prob. > LRP above 0.8.
- Achieving the higher TRP range results in highest VB (catch rates).

Results



- Dashed line is the average catch in WCPFC-CA, south of 10°S, 2020-2022.
- Trade-off between catch rate (VB) and catch.
- Catch-based MPs have lower uncertainty in catches, and lower catch variability.

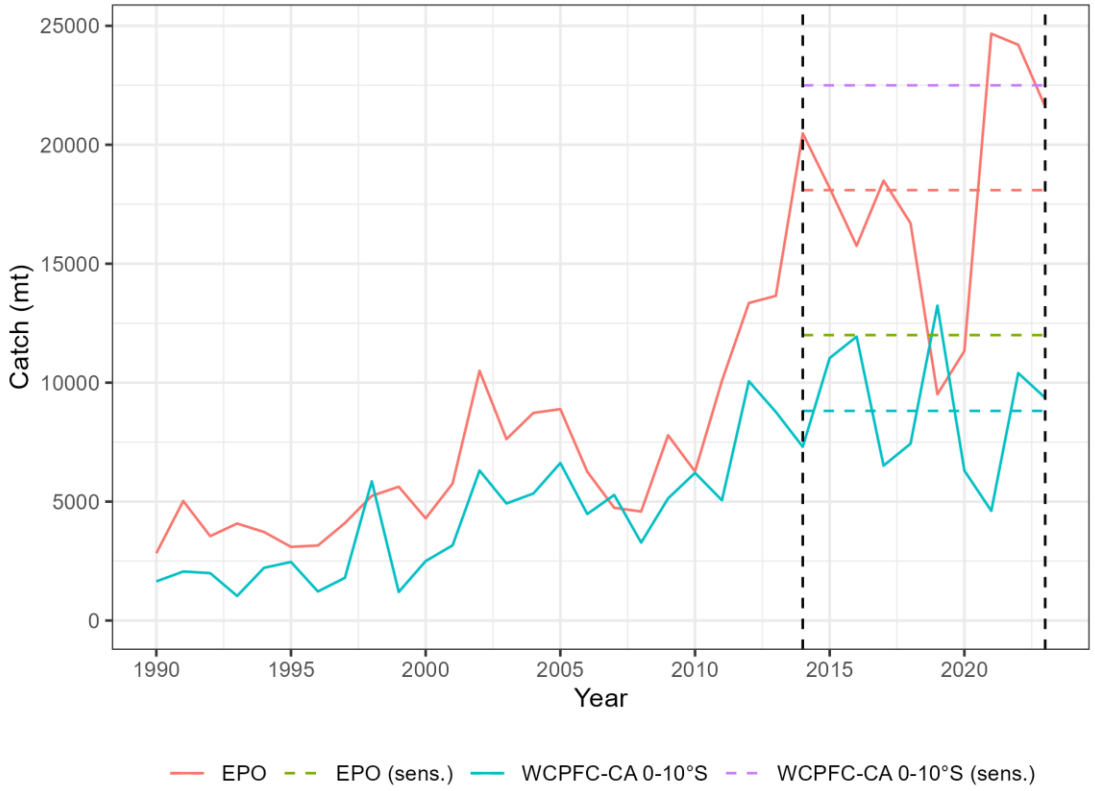
Results



- Catch-based MPs have higher effort variability than effort-based.
- The amount of effort needed to take a catch limit depends on the biomass available to the fishery.
- Biomass levels vary due to natural processes as well as fishing pressure.
- Effort needed to take a catch limit varies over time, resulting in higher effort variability for the catch-based MPs.
- Catch-based MPs assume that catch limit is taken, where possible.
- If the stock is low it can require unrealistically high levels of fishing effort to take the catch limit.
- In reality, maximum effort would be limited, and the realised catches resulting from that effort would be lower than the catch limit set by the MP. This would greatly limit the effort variability.

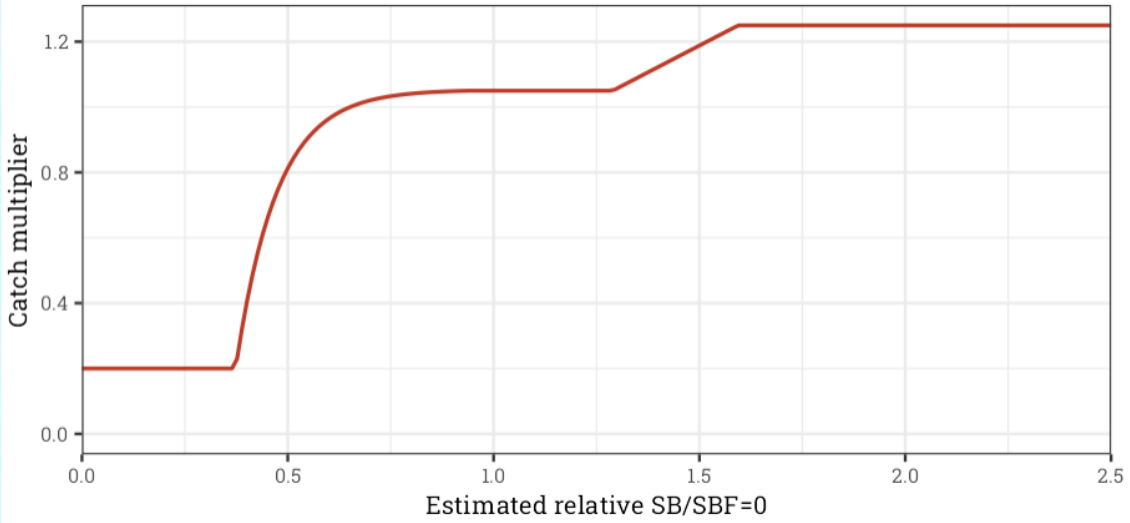
Sensitivity tests

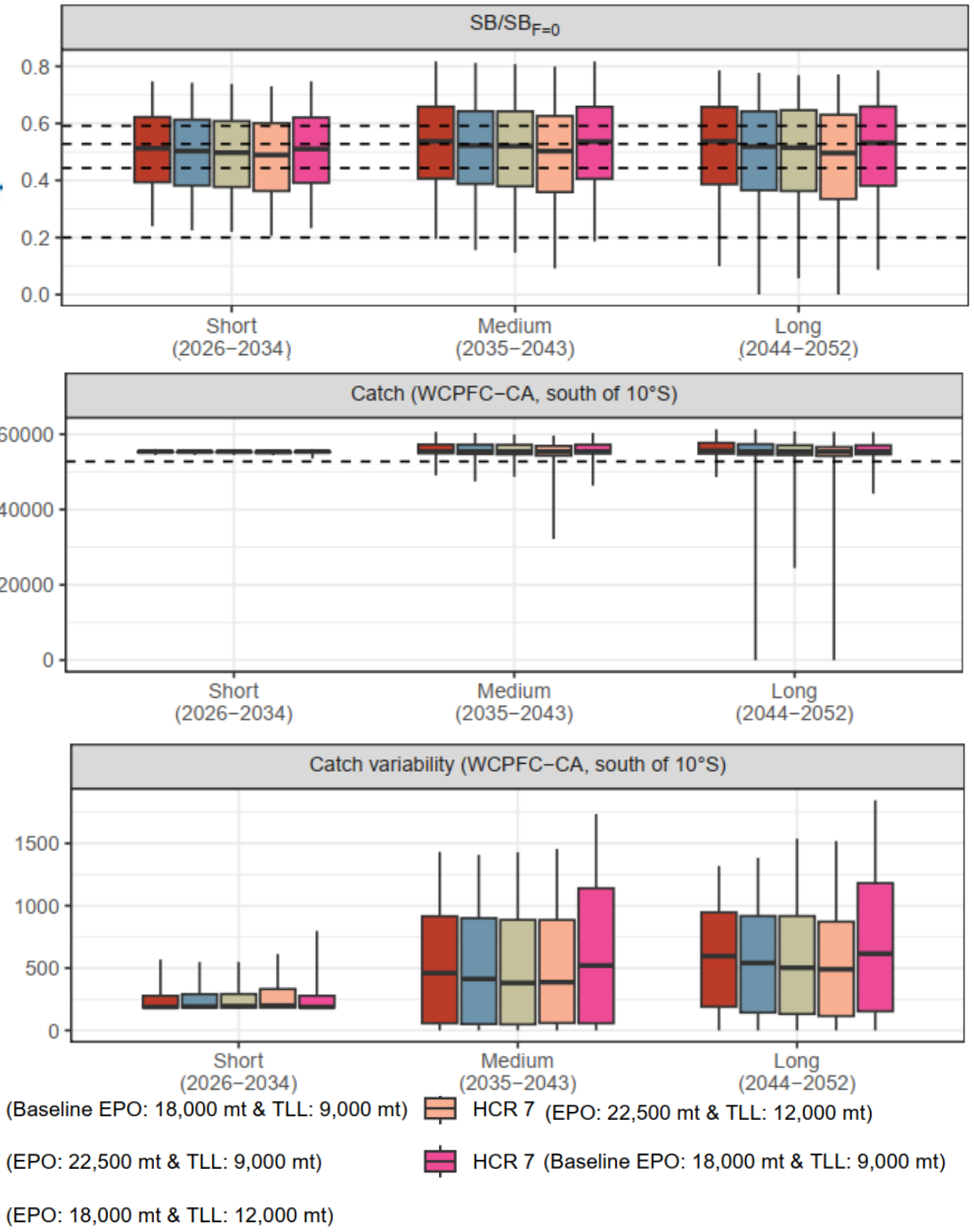
- Use catch-based MP with HCR 7 (baseline: achieves iTRP)
- Alternative assumptions about future catches in the EPO and WCPFC-CA, equator to 10°S
  - EPO: 22,500 mt (baseline: 18,000 mt)
  - TLL: 12,000 mt (baseline: 9000 mt)



Sensitivity tests

- MP fairly robust:
  - Lower $SB/SB_{F=0}$ and VB
  - Prob. > LRP still above 0.8
  - Catches in WCPFC-CA unaffected (catch-based MP)
- Alternative constraint +- 10% (baseline: +10%, -5%)
  - Affected catch variability



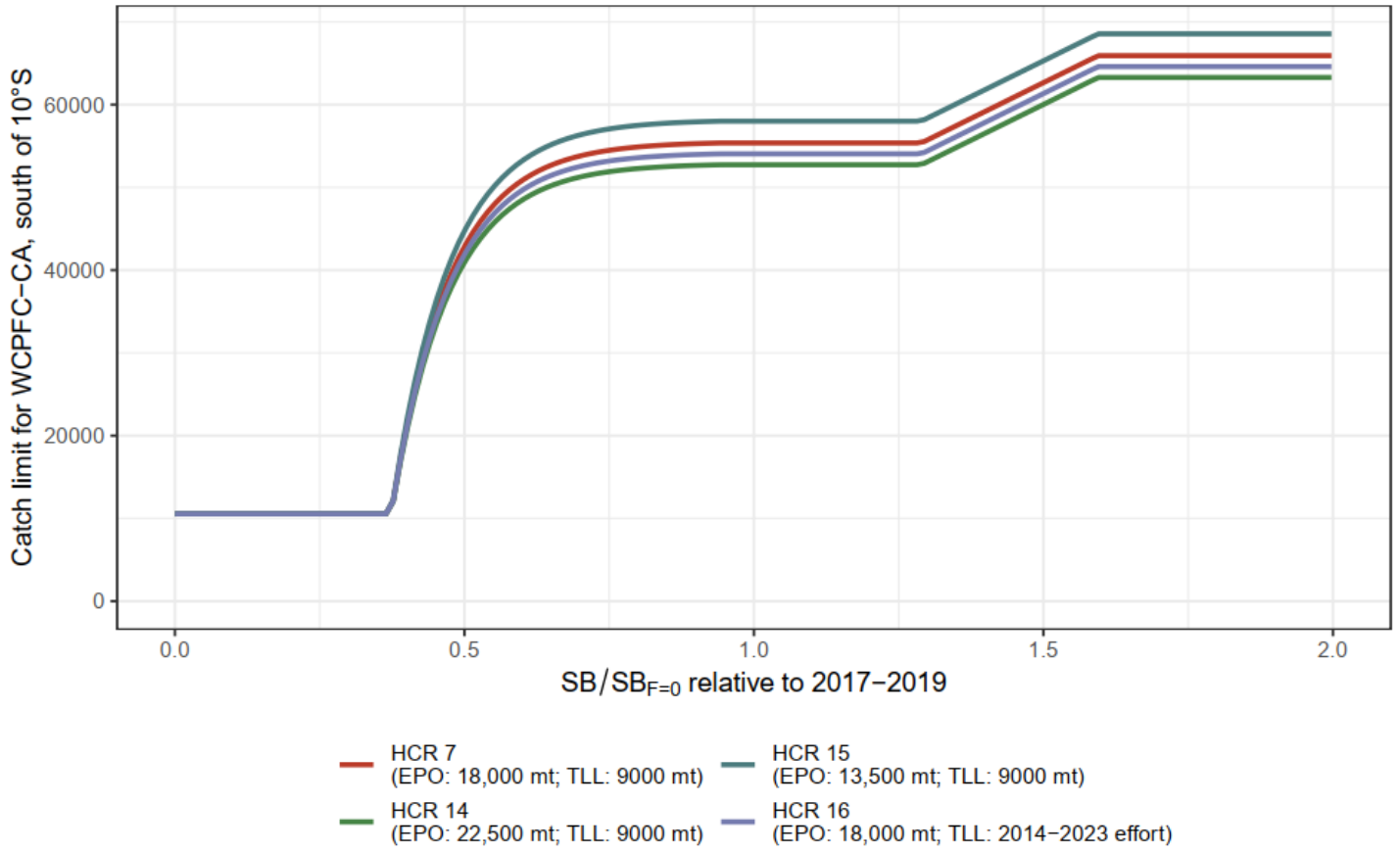


SPAMPLE

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

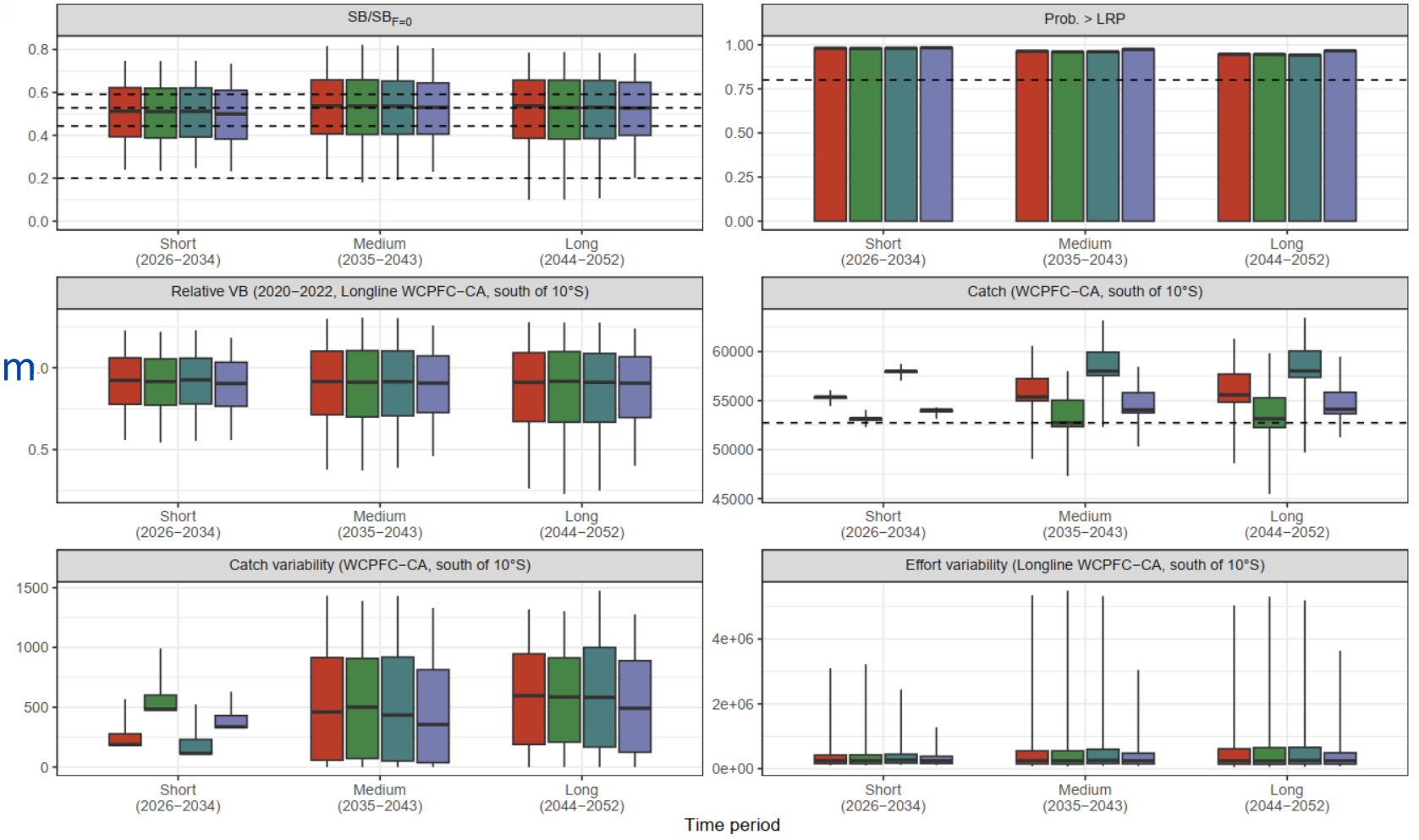
SC21 requested additional MP evaluations

- 'Tune' HCR to achieve iTRP in the long-term under alternative EPO and TLL assumptions.
  1. Future EPO catches at 22,500 mt (~2021-2022 average catch)
  2. Future EPO catches at 13,500 mt (~2020 catch)
  3. Future TLL effort at 2014-2023 levels (instead of catch)



Additional MP evaluations -results

- Care must be taken when comparing results
- Differences are the results of different EPO and TLL assumptions, as well as HCR shape.
- All MPs achieve iTRP in long-term
- Prob> LRP and VB are similar
- Main difference is catch
  - Different ‘step heights’ of HCRs to compensate for EPO and TLL differences



Planned work between now and WCPFC22

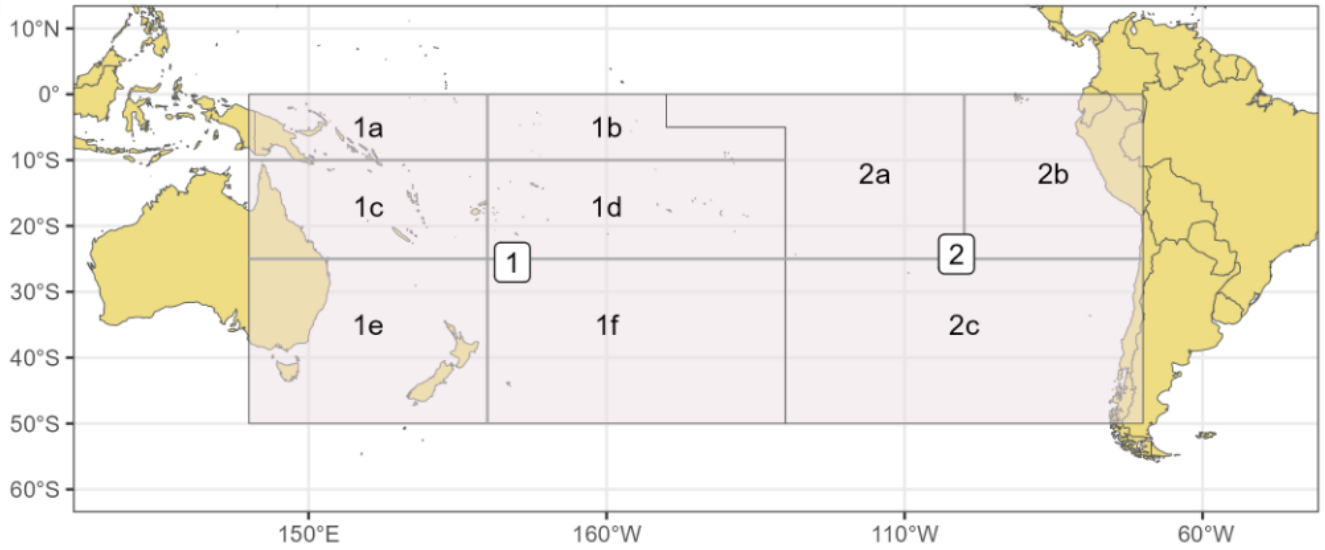
- Robustness set tests
  - EPO and TLL fishing levels outside of historical range.
  - Effort creep.
  - Potentially on a limited subset of MPs.
- SPAMPLE update
- SPA MP paper to WCPFC22
- Run estimation method with data up to 2023 (WCPFC22)
- Agreed prioritised outcomes from SPAM

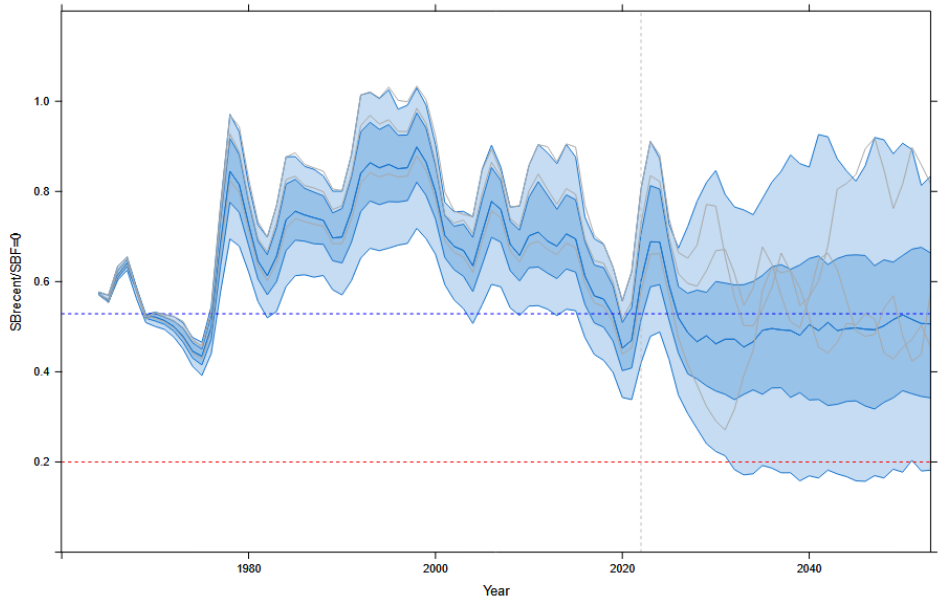
Acknowledgements

We gratefully acknowledge funding for this work from the New Zealand Ministry of Foreign Affairs and Trade (MFAT) funded project "Sustainable Pacific Fisheries.

Operating models

- Developed from 2024 stock assessment.
- Includes the WCPFC-CA and EPO.
- Grid factors include:
  - Recruitment variability
  - Steepness
  - Natural mortality
  - Effort creep
- SC20 adopted the OM grid reference set.
- Future work to develop OM grid to be conducted under the monitoring strategy, noting that a pragmatic approach is needed.





Estimation method

- Age-structured production model, implemented in Multifan-CL (SC20, SMD02).
- Two longline index fisheries in the WCPFC-CA and EPO model regions.
- Updated since SC20: removed reliance on WCPFC-CA troll fishery index to help 'future proof' the MP.
- HCR input is a relative measure of abundance (SMD02). Calculated as estimated $SB/SB_{F=0}$ relative to 2017-2019.
- SC21 recommended its continued use.