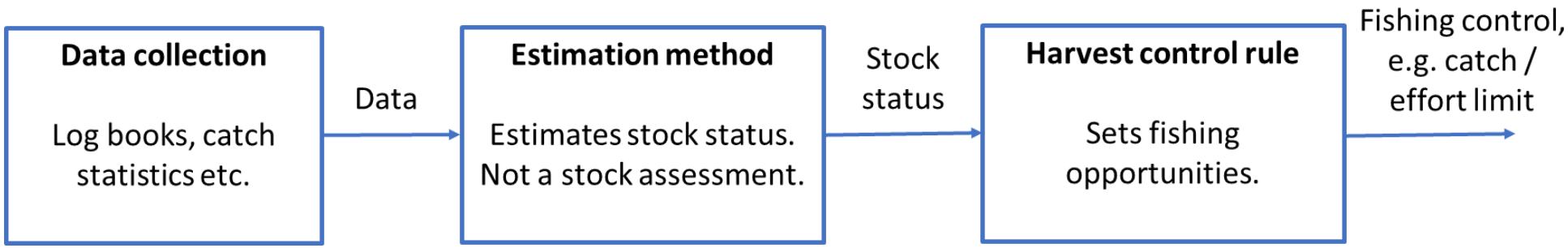
South pacific albacore management procedure evaluations

WCPFC21-2024-30

SPC-OFP

Management procedures

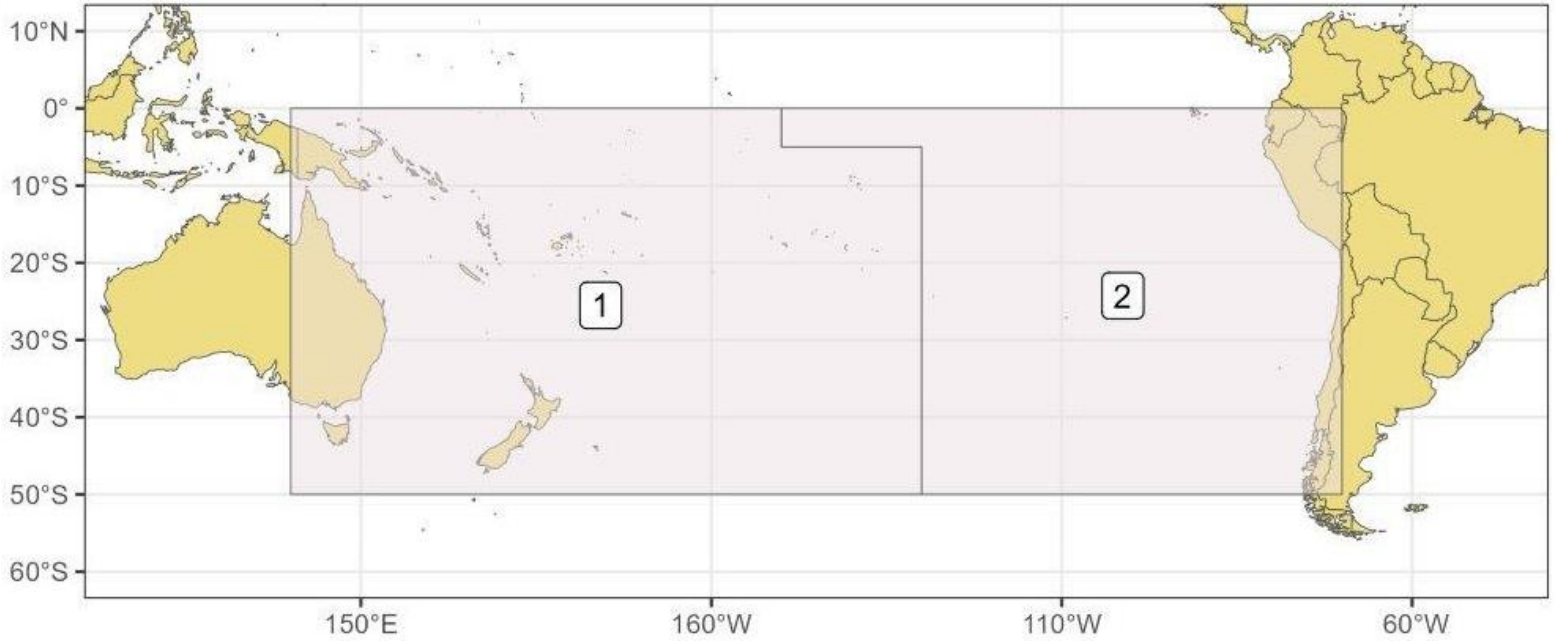
A pre-agreed and tested procedure that determines the management action for a fishery given the status of the resource.



- All three components are agreed together as a package.

- Future data collection assumed to be consistent with current processes.
- Estimation method: Age-structured production model.
  - Stock status is: estimated $SB/SB_{F=0}$ in the last three years relative to estimated $SB/SB_{F=0}$ in 2017-2019.
  - (see WCPFC-SC20-2024/MI-WP-05, SMD02 outcomes and WCPFC21-2024-30 for details)
- Allocation and implementation will be handled through a separate process – not discussed here.

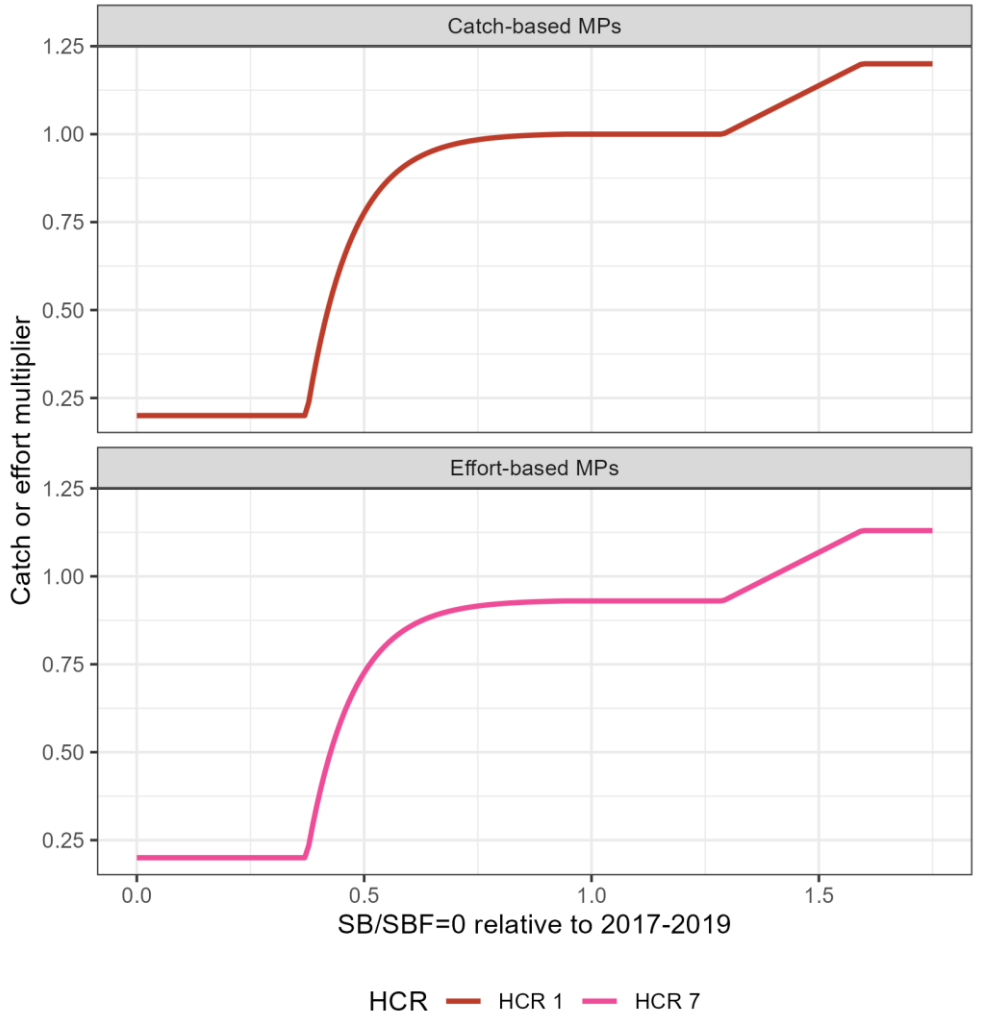
Assumed operation of MP



- Management period is three years.
  - I.e. the catch or effort limits set by the MP are applied for the following three years.
- MP is first run in 2025.
- Output of the MP is applied in the following year for the remainder of that management period.
  - E.g. when evaluating the MP in 2025, the output fishing levels are applied in 2026-2028.
- MP output applied equally to longline and troll fisheries operating within the WCPFC-CA south of the equator.
- MP does not apply to fisheries operating in the EPO model region (area 2 above).
- Total catches of fisheries operating in the EPO model region are fixed at 22,500 mt per annum.

Management procedure assumptions

- Data lag of two years.
  - E.g. when MP is run in 2025, data up to 2023 is available.
- MP output is either catch limit or effort limit.
  - Actual allocation and implementation of MP output is external to MP.
- HCR outputs a scaler applied to baseline catch or effort.
- Baseline is average catch or effort in 2020-2022.
  - E.g. output scaler of 1 sets the catch or effort limit for the next management period to the average of 2020-2022.
- HCRs have same basic shape – similar to SKJ HCR.
- Catch-based MPs have different HCR shapes to achieve same objective as effort-based MPs.
- 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.



Performance indicators

Performance indicator	Notes
$SB/SB_{F=0}$	Stock status - compare to TRP
Probability of being above LRP	Stock sustainability - WCPFC requires a probability of at least 0.8
Vulnerable biomass (longline)	Proxy for catch rate Presented as relative to 2020-2022
Catch in the WCPFC-CA (all gears)	
Catch variability	Average annual change in catch
Effort variability	Average annual change in effort

Candidate MPs

19 candidate MPs, differing by:

- Shape of HCR.
- Management output (catch or effort limit).
- Constraint on how much output can change between management period.

How to select preferred MPs?

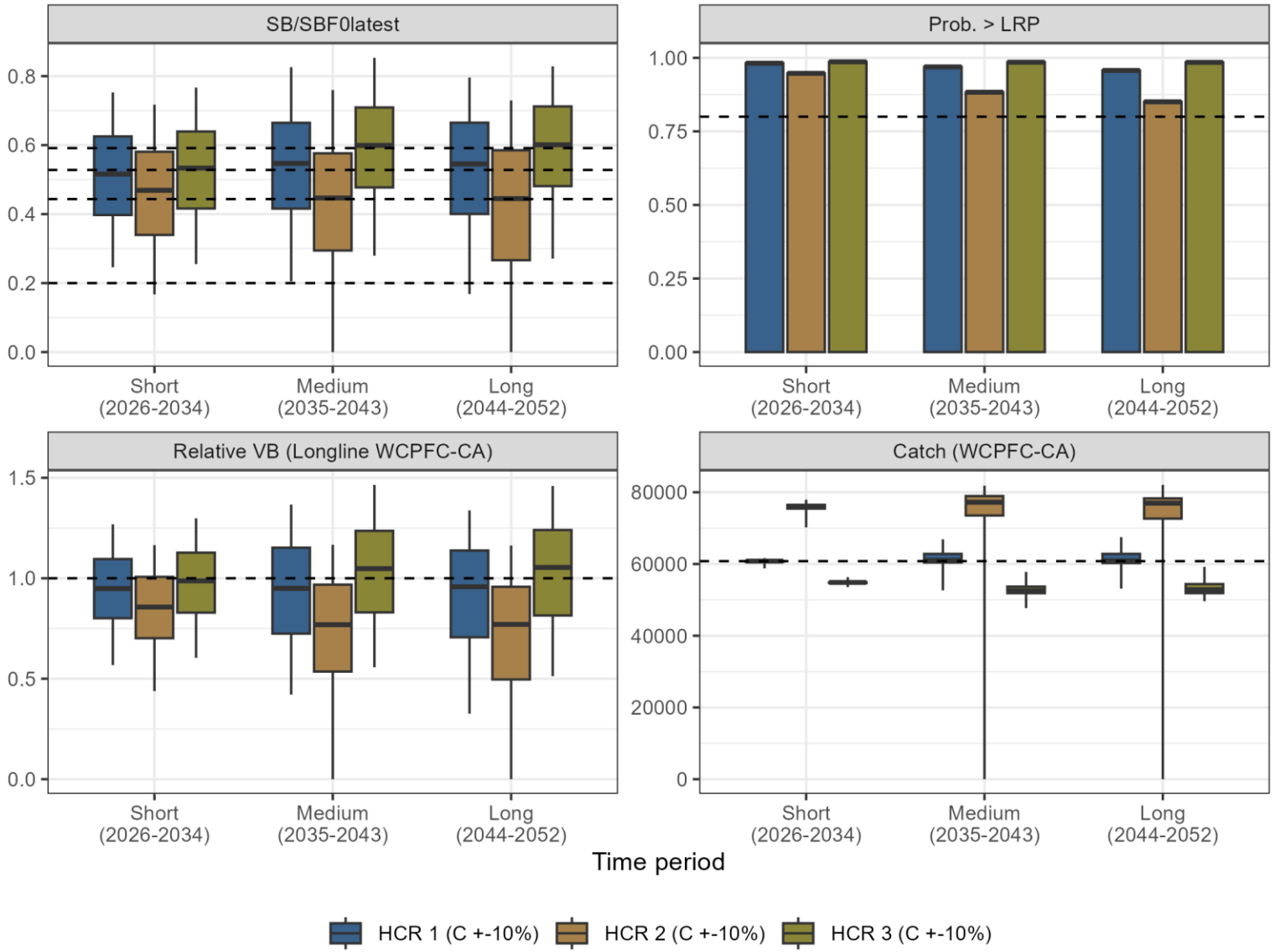
- Long-term $SB/SB_{F=0}$ affected by HCR shape.
  - Linked to choice of TRP, i.e. some HCRs get $SB/SB_{F=0}$ close to iTRP, upper or lower TRP range etc.
- Management output mainly affects catch and effort variability.
- Constraint mainly affects variability and uncertainty of performance indicators.

HCR shape	Constraint options
Catch-based MPs	
HCR 1	None; +- 5%; +- 10%; +10% - 5%
HCR 2	+- 5%; +- 10%
HCR 3	+- 5%; +- 10%
HCR 5	+- 20%
HCR 6	+- 5%
Effort-based MPs	
HCR 7	None; +- 5%; +- 10%; +10% - 5%
HCR 8	+- 5%; +- 10%
HCR 9	+- 5%; +- 10%
HCR 11	+- 5%

Results

Full results are in SPAMPLE (https://ofp-sam.shinyapps.io/spample/)

Summary: Long-term $SB/SB_{F=0}$

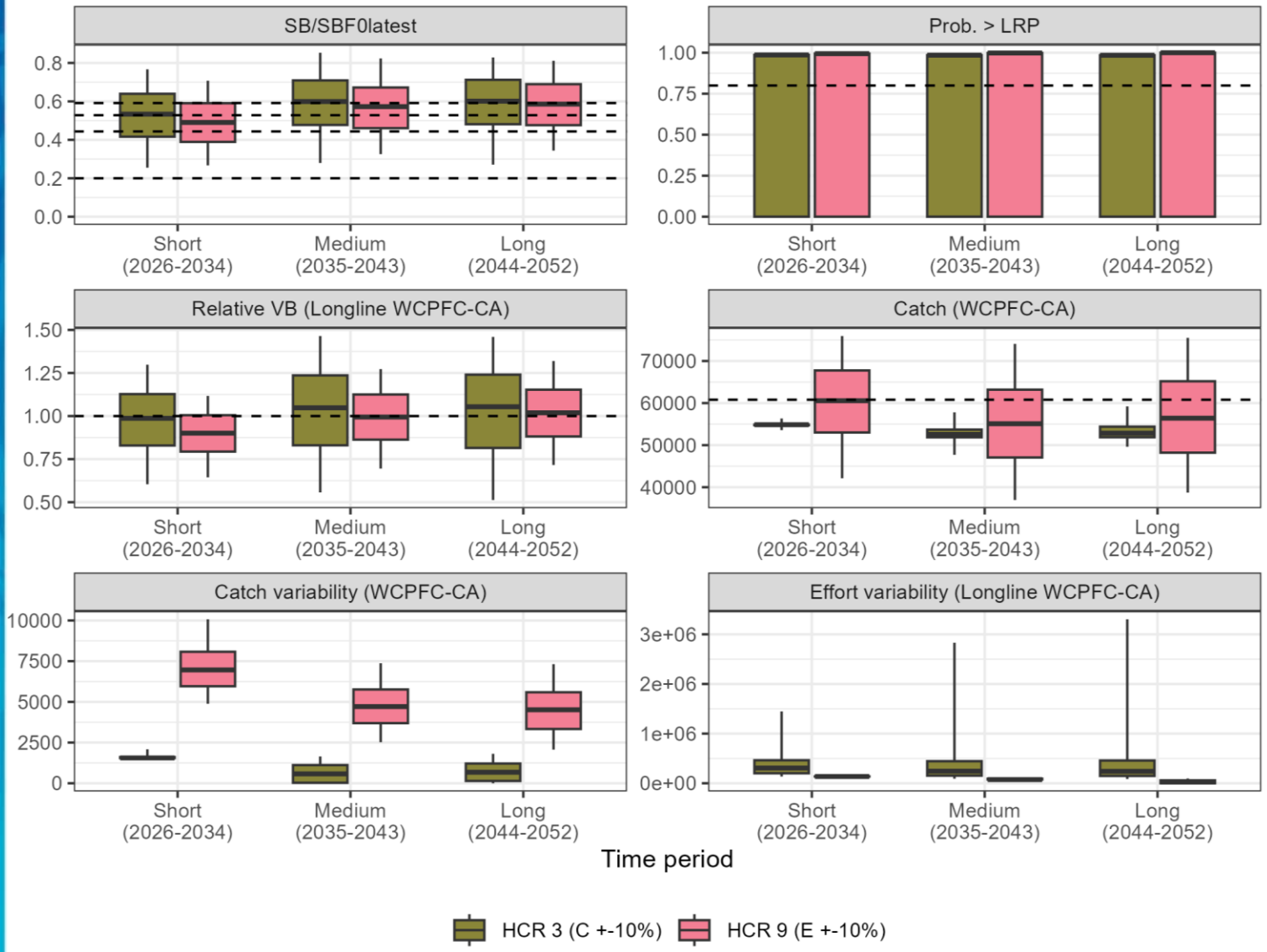


- Long-term $SB/SB_{F=0}$ determined by HCR shape.

HCRs	Long-term $SB/SB_{F=0}$
HCR 1 (C), HCR 7 (E)	iTRP
HCR 2 (C), HCR 8 (E)	Lower TRP
HCR 3 (C), HCR 9 (E)	Upper TRP

- Lower $SB/SB_{F=0}$
  - Increased risk of falling below LRP
  - Lower VB (catch rates)
  - Higher catches
- Higher $SB/SB_{F=0}$
  - Lower risk of falling below LRP
  - Higher VB (catch rates)
  - Lower catches
- Similar for effort-based MPs but less impact on risk of falling below LRP.

Summary: Impact of management output



- MP outputs total annual catch or effort.
- Allocation of total, and how those allocations are managed in practice, is external to the MP.
  - E.g. through effort if allocation is in terms of catch, or catch if allocation is in terms of effort).
- Evaluations assume that output is perfectly implemented
- Catch-based
  - Greater certainty in catch
  - Less catch variability
- Effort-based
  - Slightly more certainty in SB/SBF=0 and VB
  - Reduced risk of falling LRP
  - Less effort variability

Summary

- Key assumptions of current MP evaluations:
  - MP manages longline and troll fisheries in WCPFC-CA, south of equator.
  - All fisheries affected equally – no allocation process.
  - MP output is catch or effort limit.
  - EPO model region catches fixed at 22,500 mt.
- 19 candidate MPs. Mix of HCR shape, MP output and constraints.
  - Long-term SB/SBF=0 affected by HCR shape – link to TRP.
  - Management output mainly affects catch and effort variability.
  - Constraint mainly affects variability and uncertainty of performance indicators.
- Sensitivity tests in paper. Same MP tested against alternative assumptions for:
  - Troll baseline (2000-2004, 5240 mt vs 2020-2022, 4272 mt). Slightly higher WCPFC-CA catch.
  - EPO baseline catch (13,500 mt vs 22,500 mt). Increase in $SB/SB_{F=0}$, VB and WCPFC-CA catch.
  - Including EPO fisheries in the MP. EPO baseline at 22,500 mt. No real difference in performance.
- Dry-run example. MP run using most recent data, up to 2022.
- Supplementary paper (WCPFC21-2024-30a). EPO catches fixed at 13,500. Alternative MP (HCR 12) to achieve comparable long-term median $SB/SB_{F=0}$ as HCR 1.

Supplementary South pacific albacore management procedure evaluations

WCPFC21-2024-30a

SPC-OFP

EPO catches

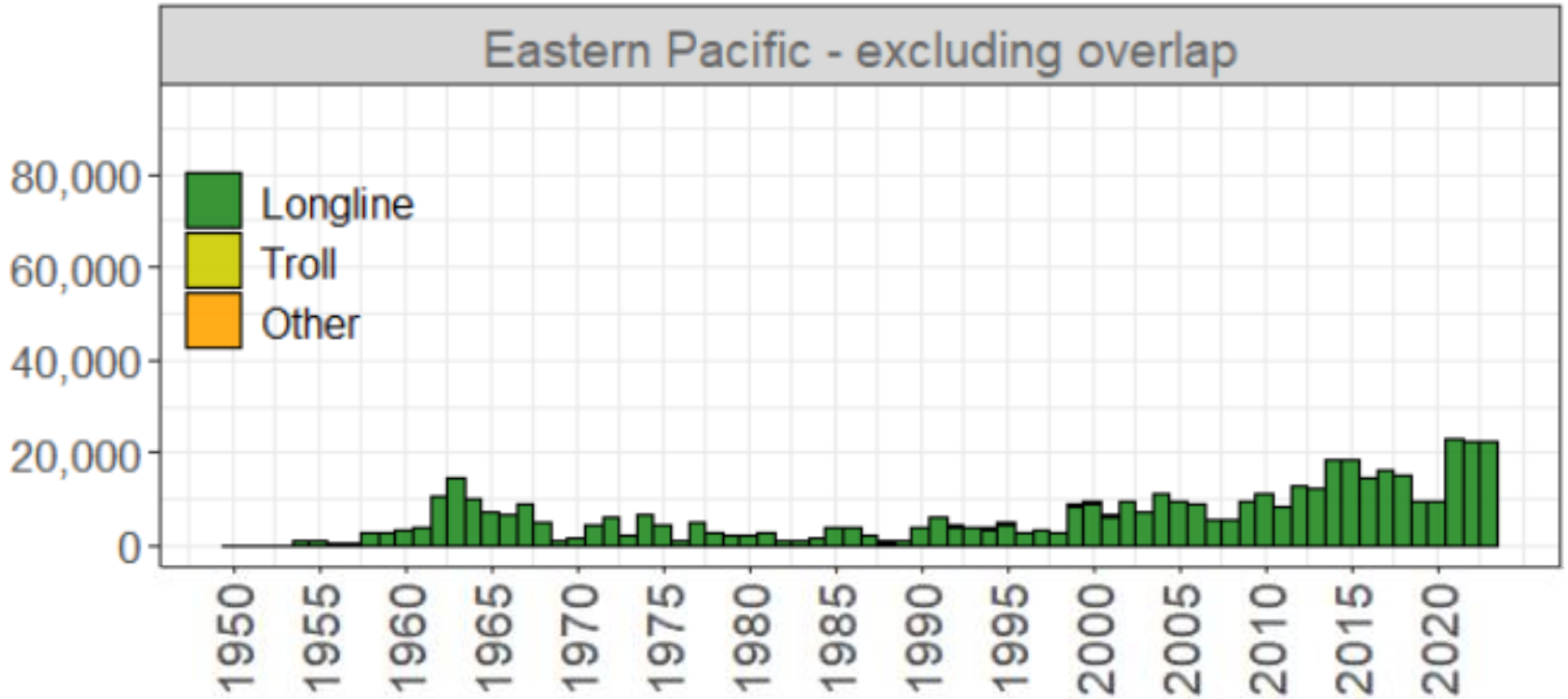
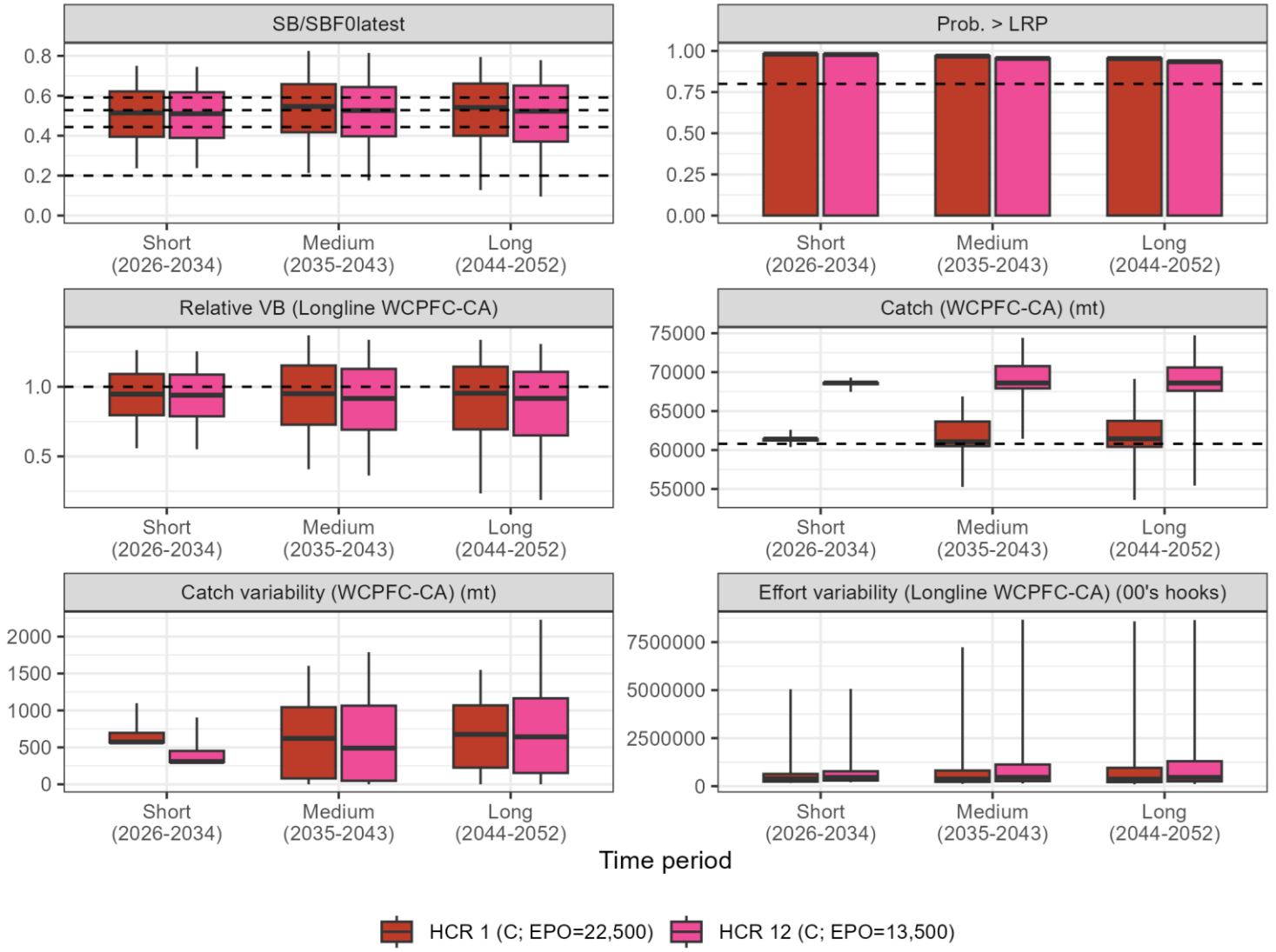
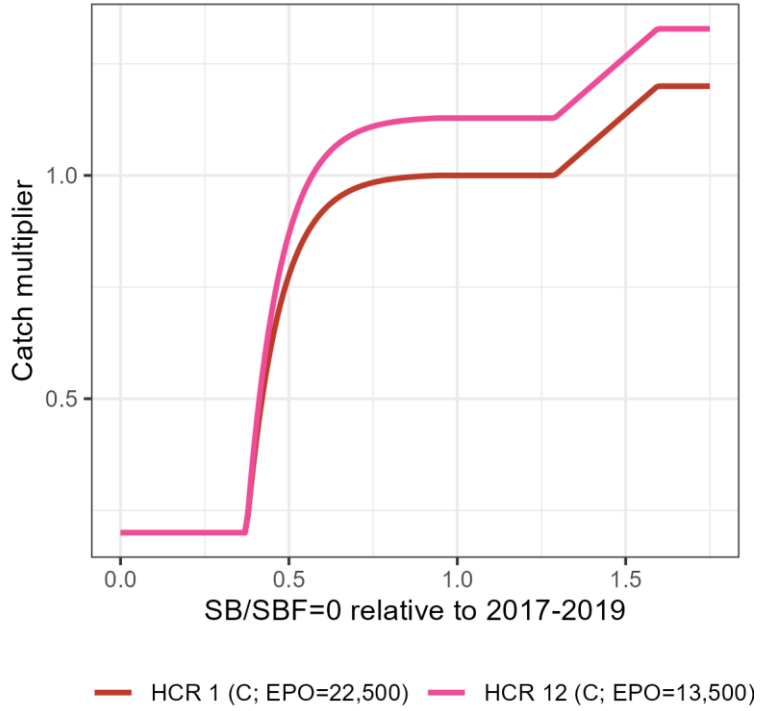


Figure 1: South Pacific albacore catch by gear (all Pacific Ocean waters south of the equator, including archipelagic waters).

Alternative EPO assumption



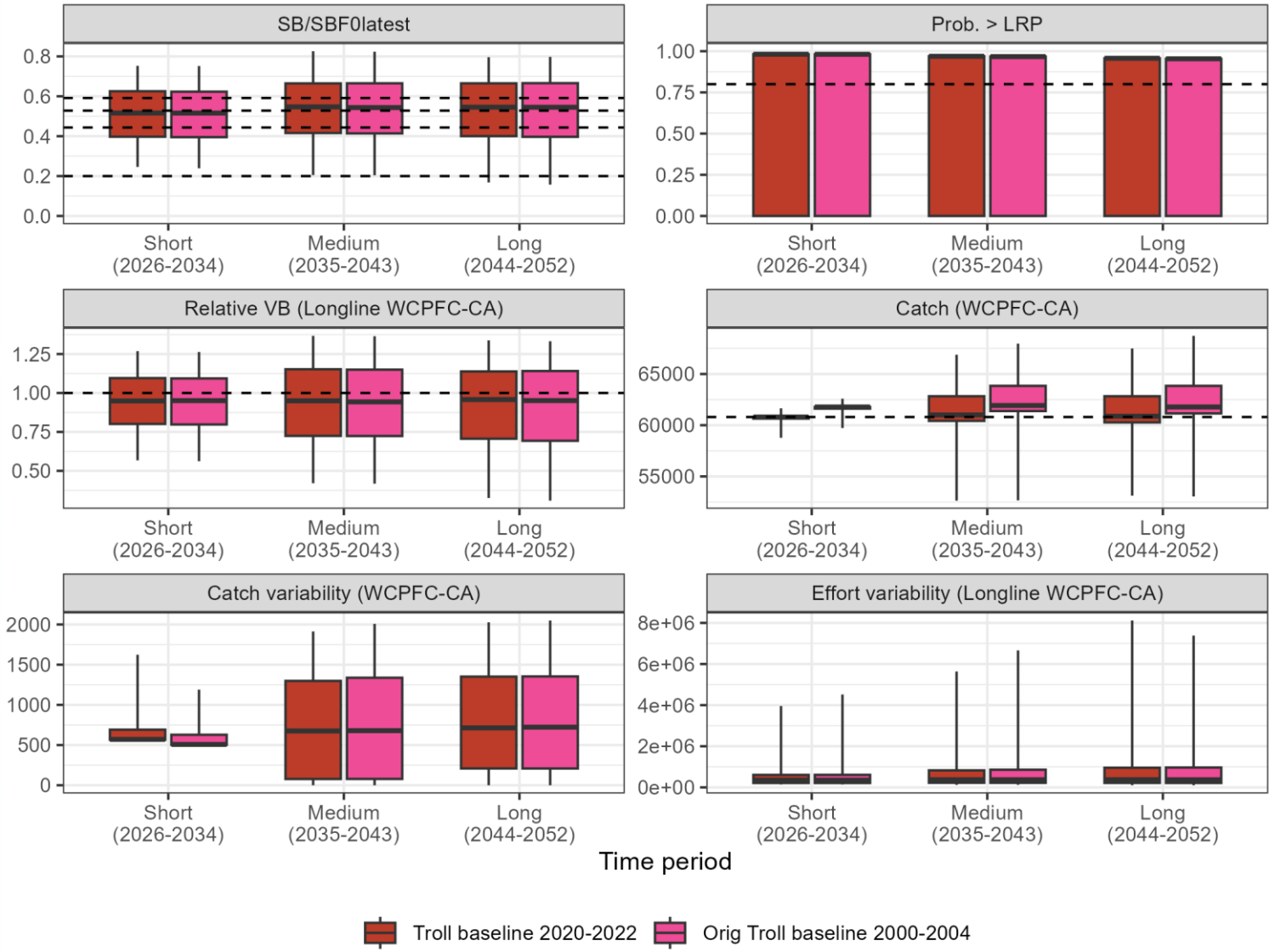
- Two MPs, same objective of long-term $SB/SB_{F=0}$ close to iTRP.
- Both MPs with +10% -5% constraint.
- Different underlying assumption about future EPO catches: 22,500 or 13,500 mt



Extras

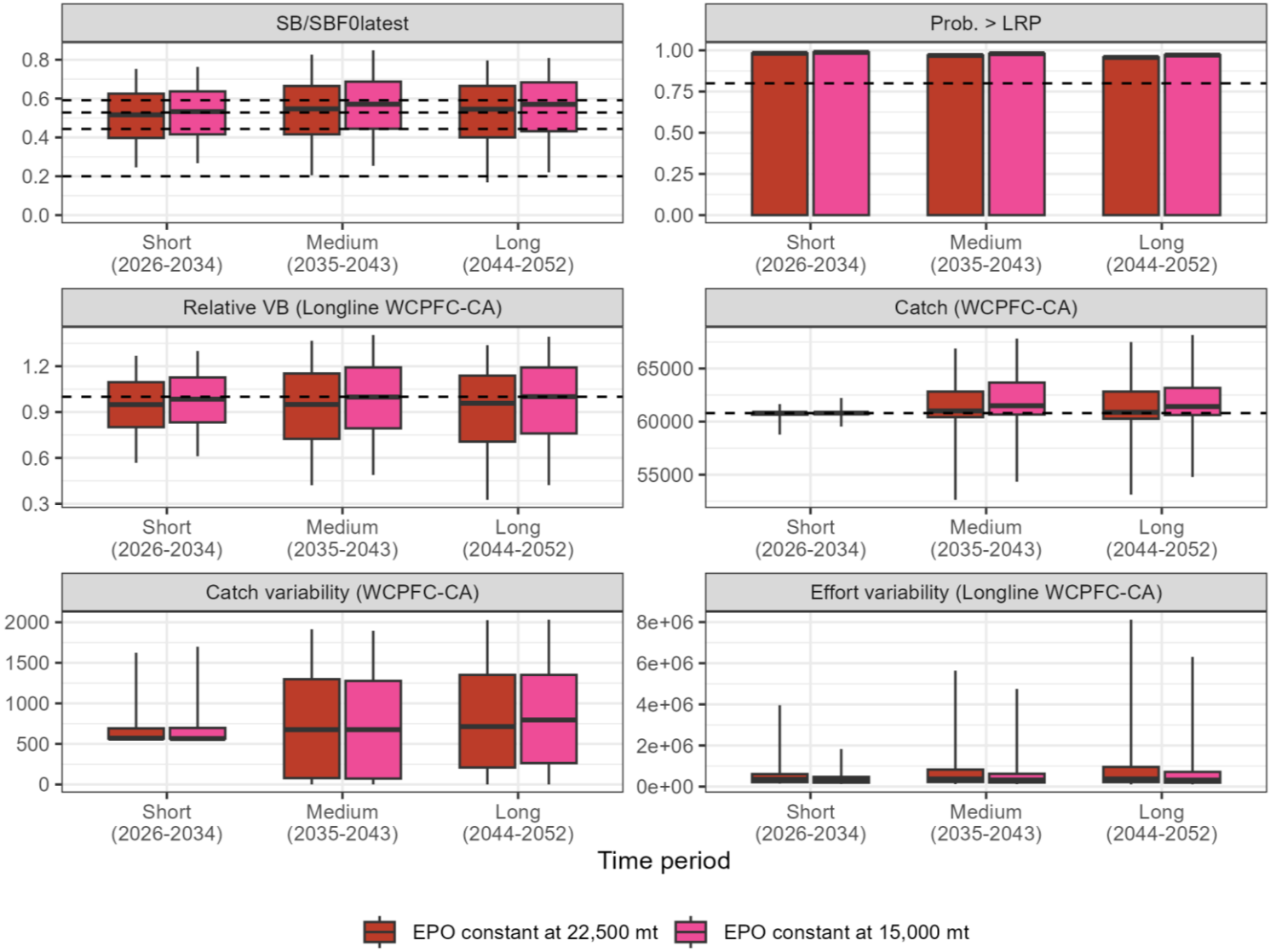
Pacific Community
Communauté du Pacifique

Sensitivity test: troll baseline



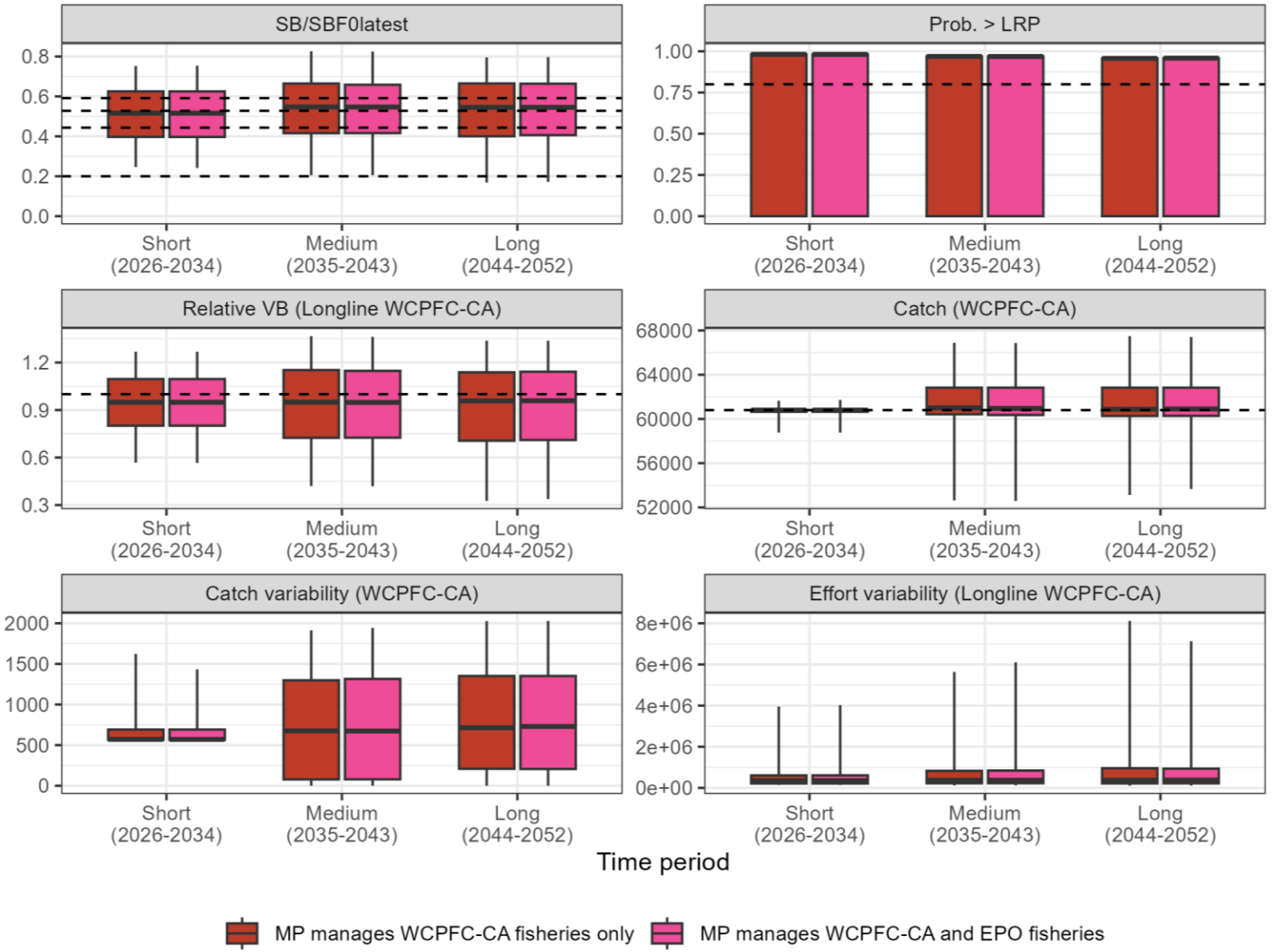
- Troll 2020-2022 baseline is 4271 mt.
- Test troll baseline 2000-2004: 5240 mt.
- MP with HCR 1, catch-based, +-10%

Sensitivity test: EPO baseline



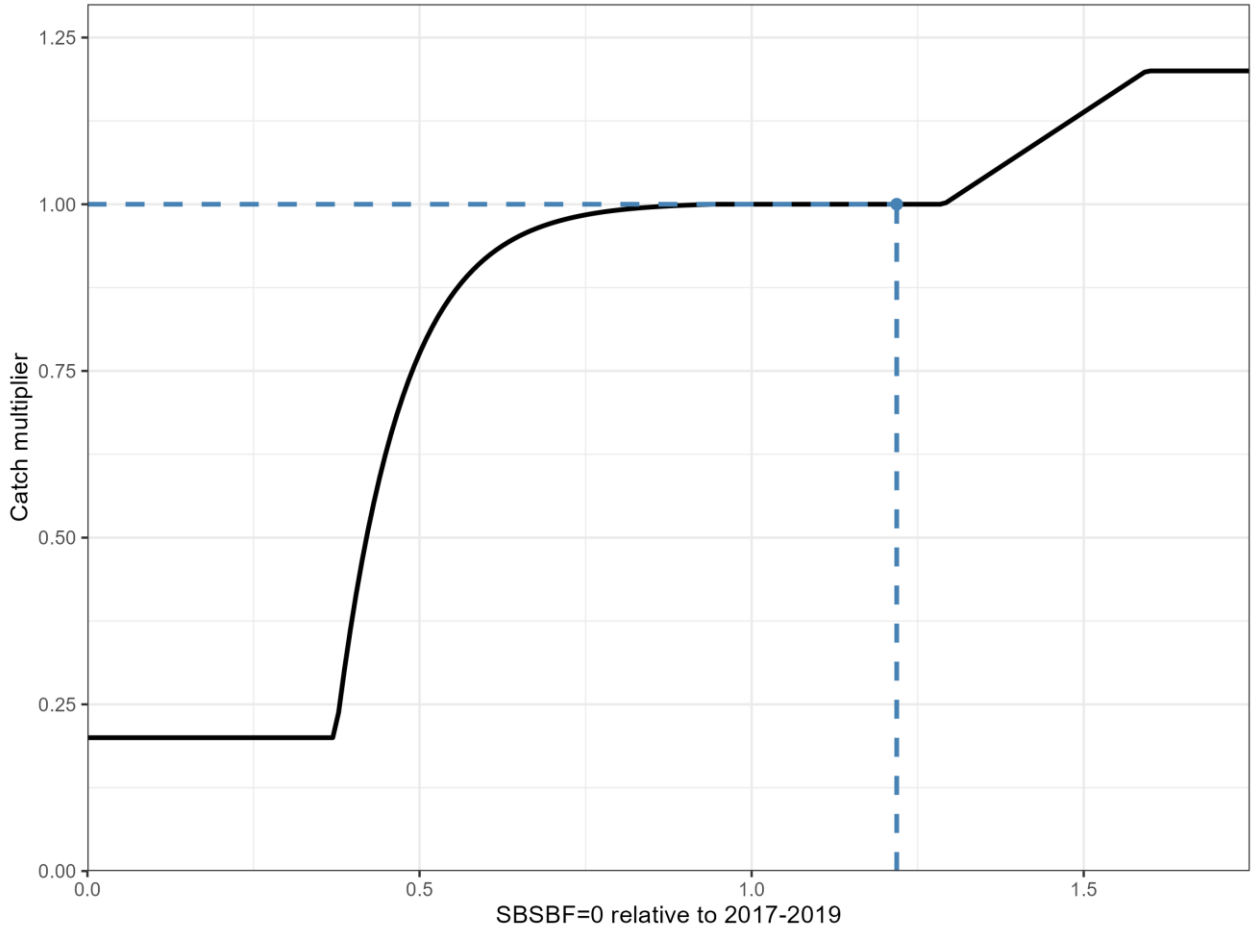
- EPO baseline is 22,500 mt.
- Test EPO baseline 13,500 mt.
- MP with HCR 1, catch-based, +-10%

Sensitivity test: EPO managed through MP



- Test fisheries operating in EPO managed through MP.
- HCR baseline in EPO is 22,500 mt.
- MP with HCR 1, catch-based, +-10%

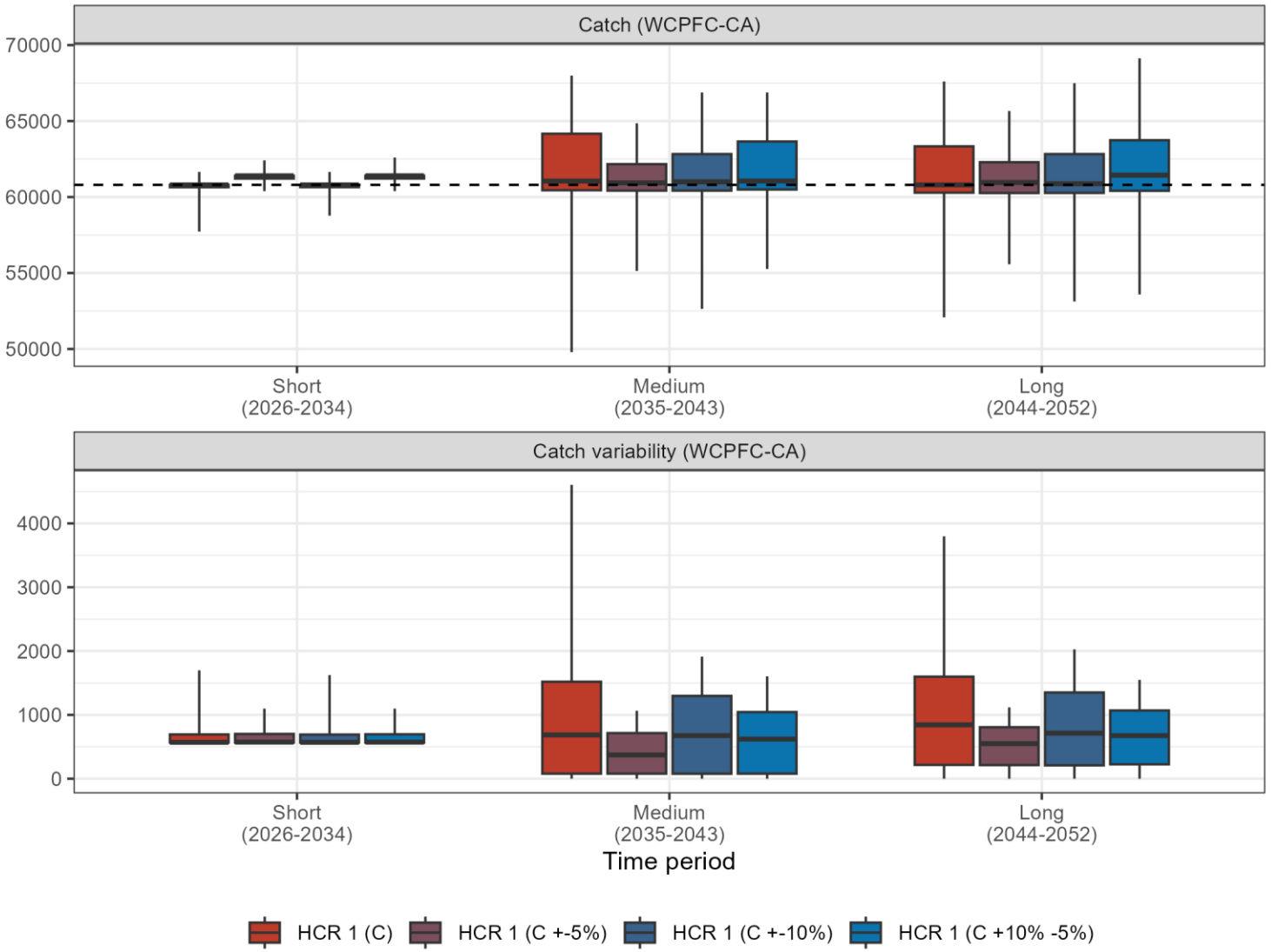
Dry run



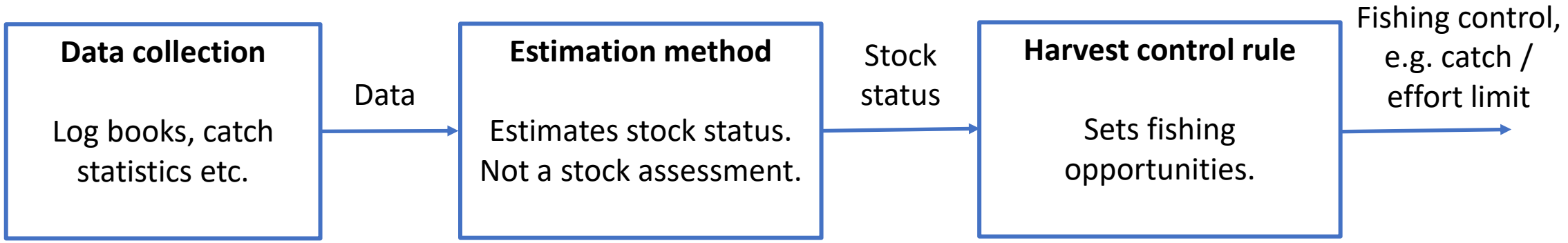
- EM evaluated using data most recently available data (2022) - fitted well
- Estimation method output: 1.22
  - Estimated mean SB/SBF=0 in 2020-2022 in relative to mean SB/SBF=0 in 2017-2019
- Evaluate HCR 1 using input to get new multiplier of 1.0, with no constraint = new catch limit of 60,700 mt
- Apply any constraint to 2022 catch of 67,400 mt

Constraint	New catch limit (mt)
None	60,700
+- 5%	64,000
+- 10%	60,700
+10%, -5%	64,000

Impact of Constraint



- Main impact is on the MP output indicators (either catch or effort).
- Example with catch-based MPs.
- Tighter the constraint.
  - Greater certainty in catch.
  - Less variability in catch.
- For effort-based MPs, tighter the constraint, lower variability in effort.


Data collection
Log books, catch statistics etc.
Data
Estimation method
Estimates stock status. Not a stock assessment.
Stock status
Harvest control rule
Sets fishing opportunities.
Fishing control, e.g. catch / effort limit