South Pacific albacore Operating Models

MI-WP-04

Scientific Committee Meeting
Manila, Philippines
14-21 August 2024

SPC-OFP

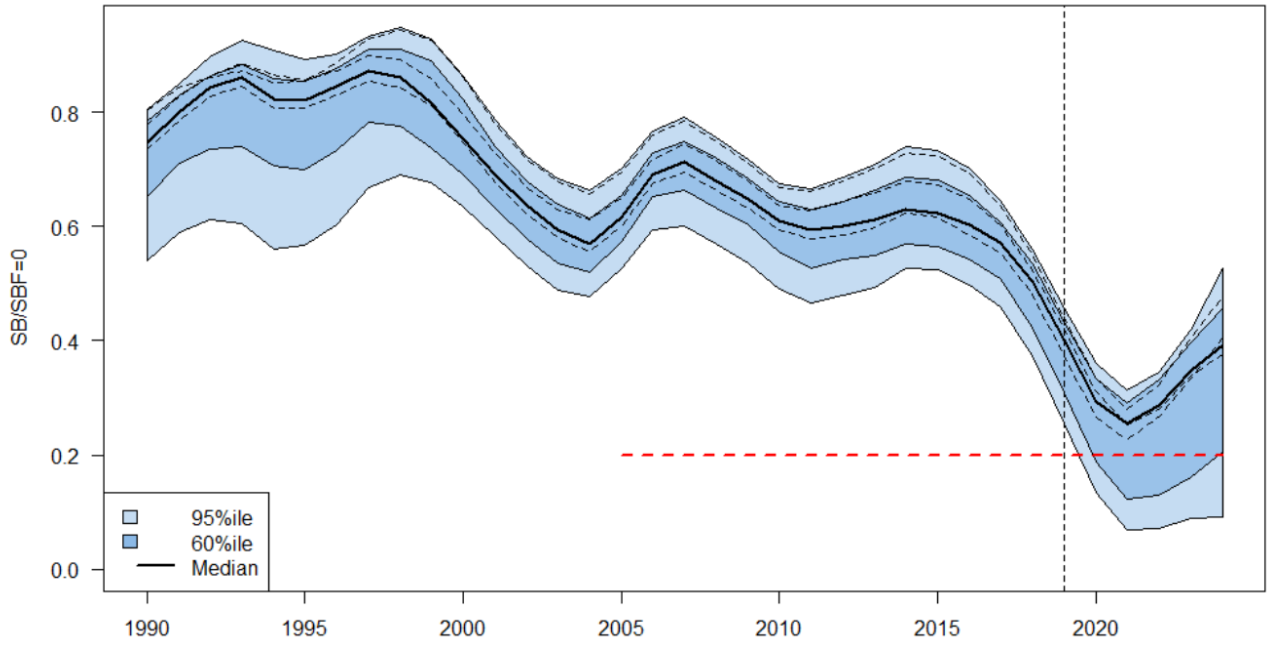
Testing management procedures

- Under the harvest strategy approach, management action is determined by an agreed Management Procedure.
- Need to test MPs beforehand to ensure they are likely to achieve objectives.
- Operating Models – uncertainties against which management procedures tested

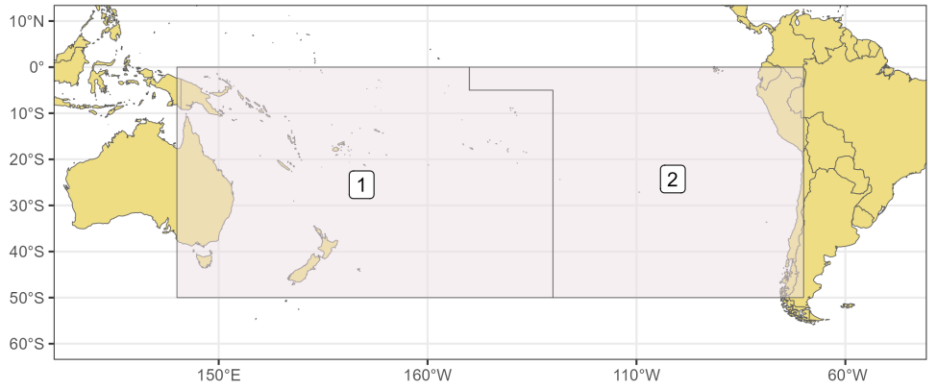
South Pacific albacore – Operating Models

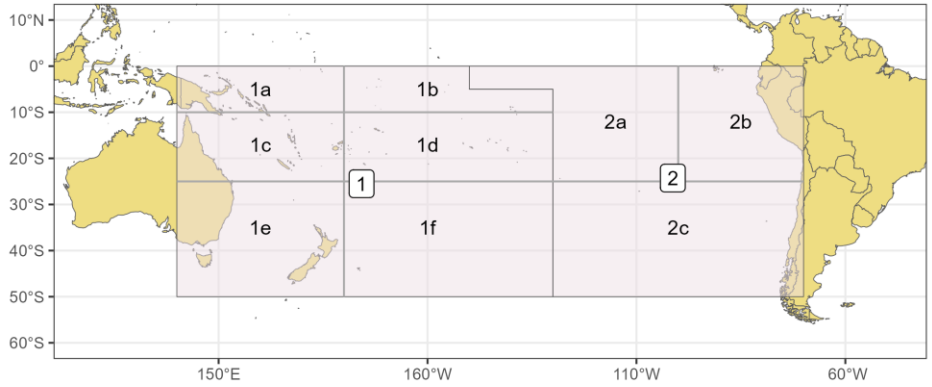
- Re-developing OMs based on 2024 assessment
  - given discomfort with the original 2021 OMs and the ‘big dipper’

- 2024 assessment
  - Catch conditioned model
  - 2 regions – fisheries as areas
  - Similar fishery definitions
  - Revised CPUE indices
  - Updated biological assumptions



2024 SPA stock assessment





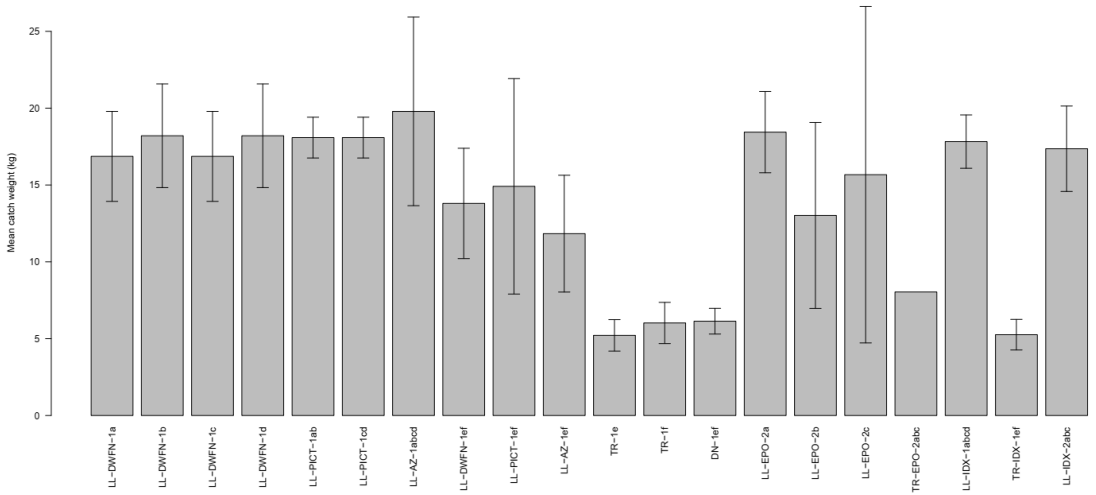
2 region model
17 extraction fisheries – fleets as areas
3 index fisheries

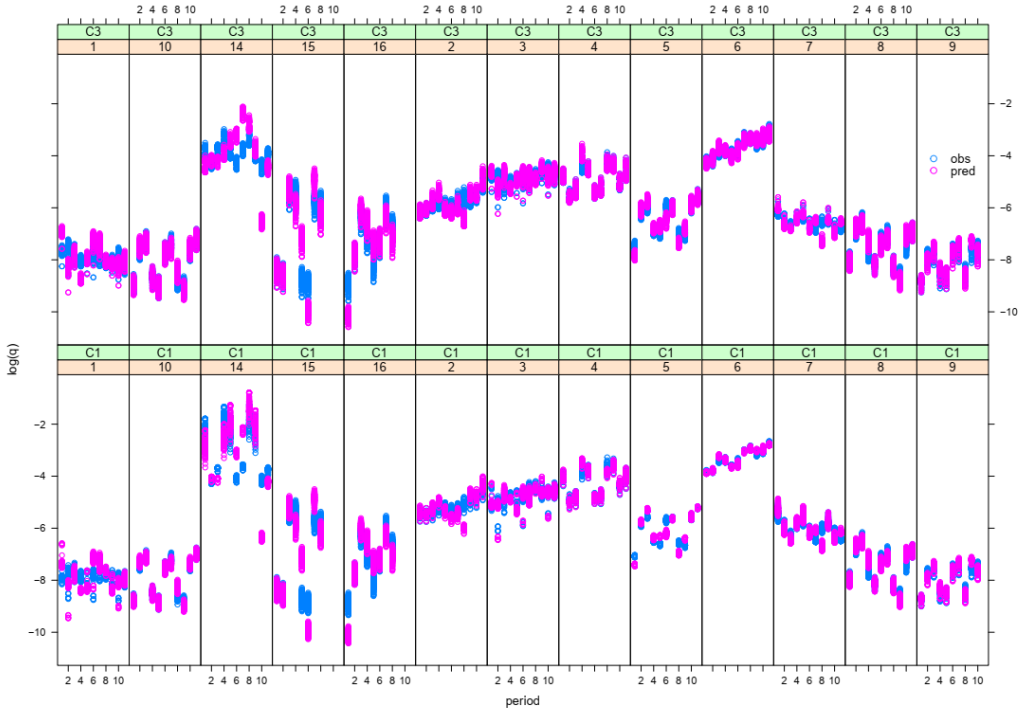
Movement rates determined from SEAPODYM
Recruitment distribution from SEAPODYM

Estimated growth model
Fixed maturity at length (mat at age varies with growth model)
Sampled natural mortality
Sampled steepness

OM conversion

- Catch in weight instead of catch in numbers
- Quarterly time step assumed for all fisheries
- Estimation of terminal catchability

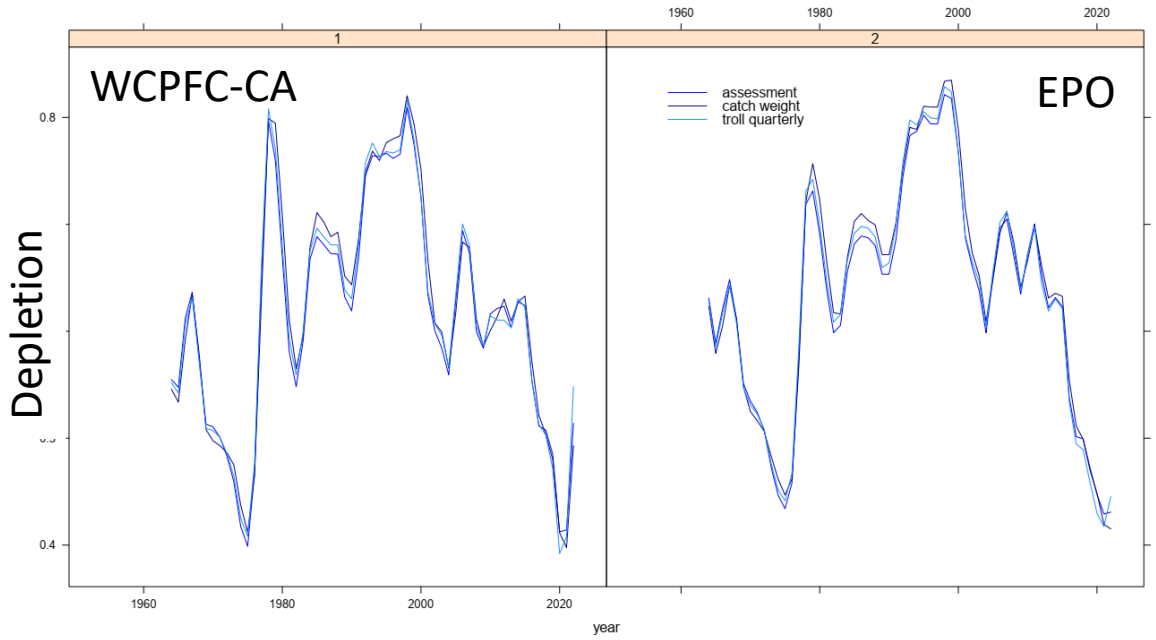


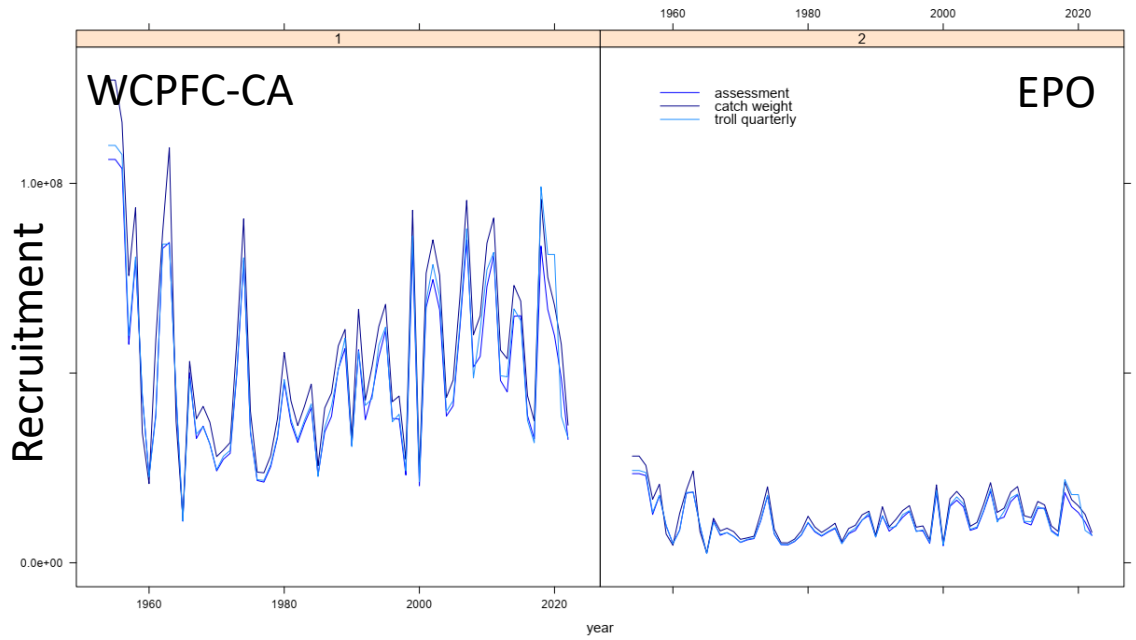


OM conversion

Catch in weight instead of catch in numbers
Quarterly time step assumed for all fisheries
fm regression pars estimated – terminal catchability

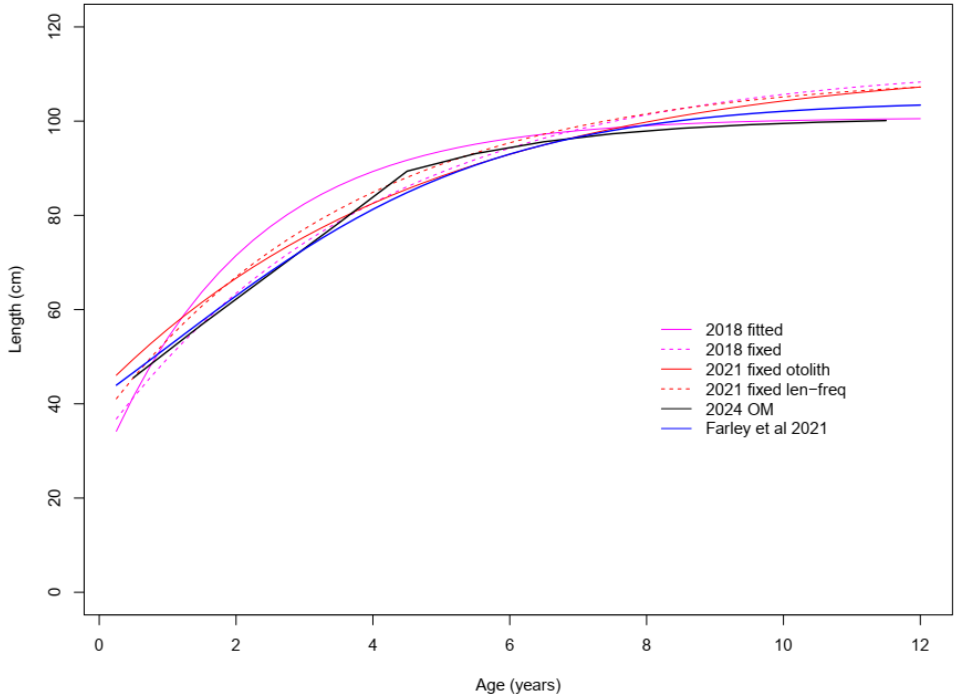
Stepwise approach – small changes in model outputs



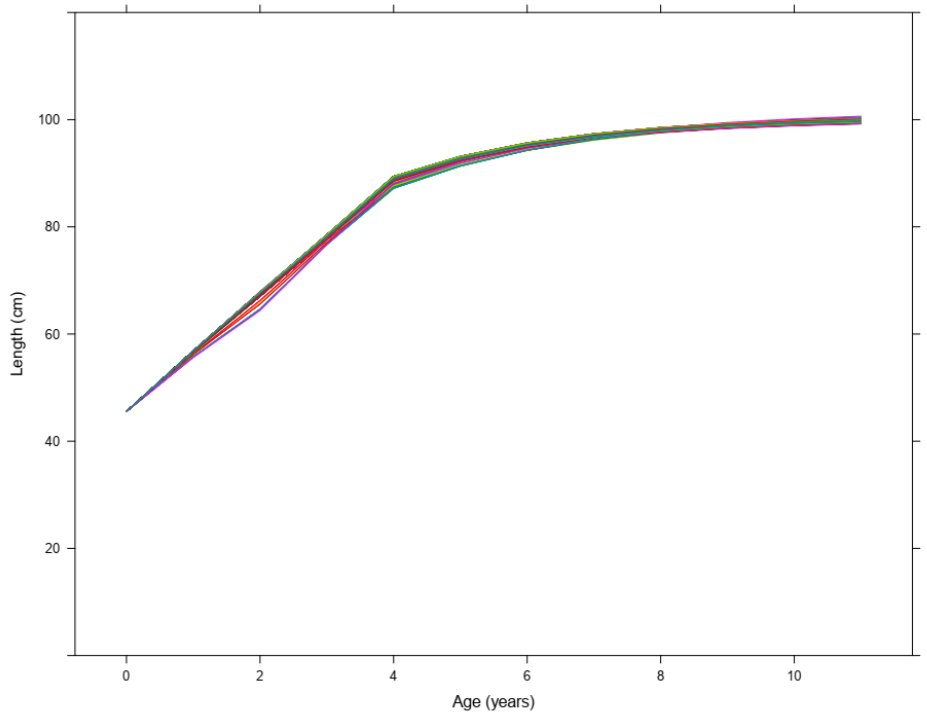


Growth – length at age

Fitted growth models for 2024 and previous assessments

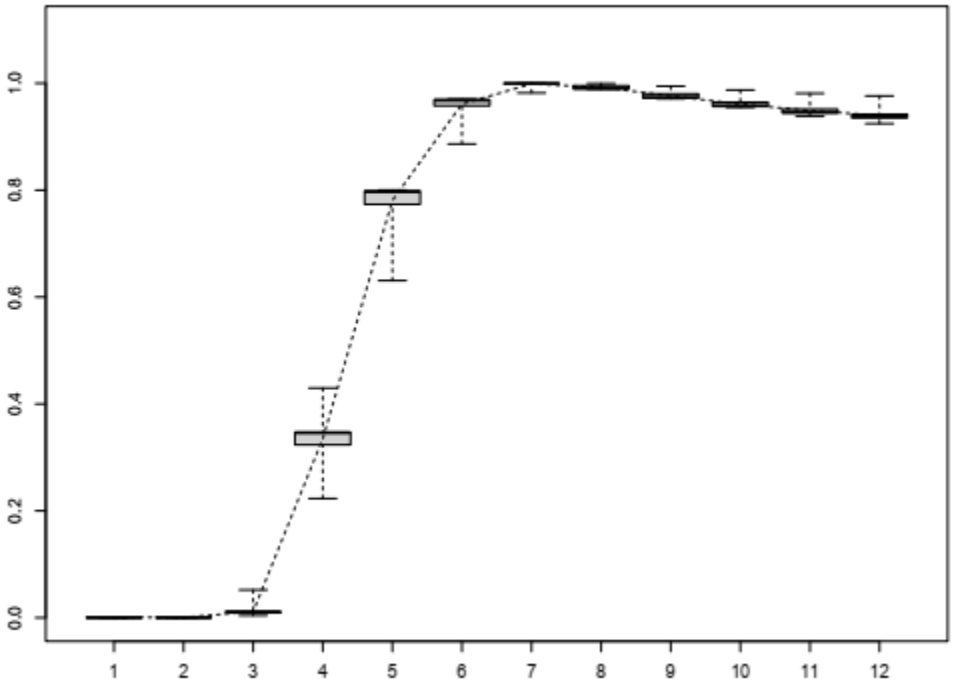


Fitted growth – OM grid

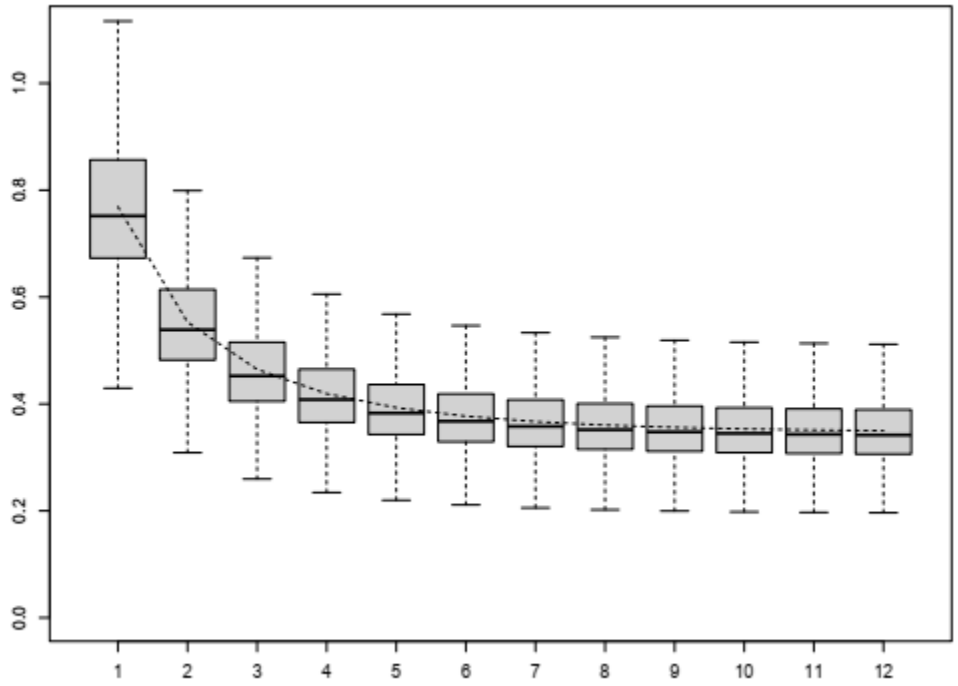


Maturity and natural mortality at age

Reproductive potential
Maturity at length fixed
Dynamically converted maturity at age

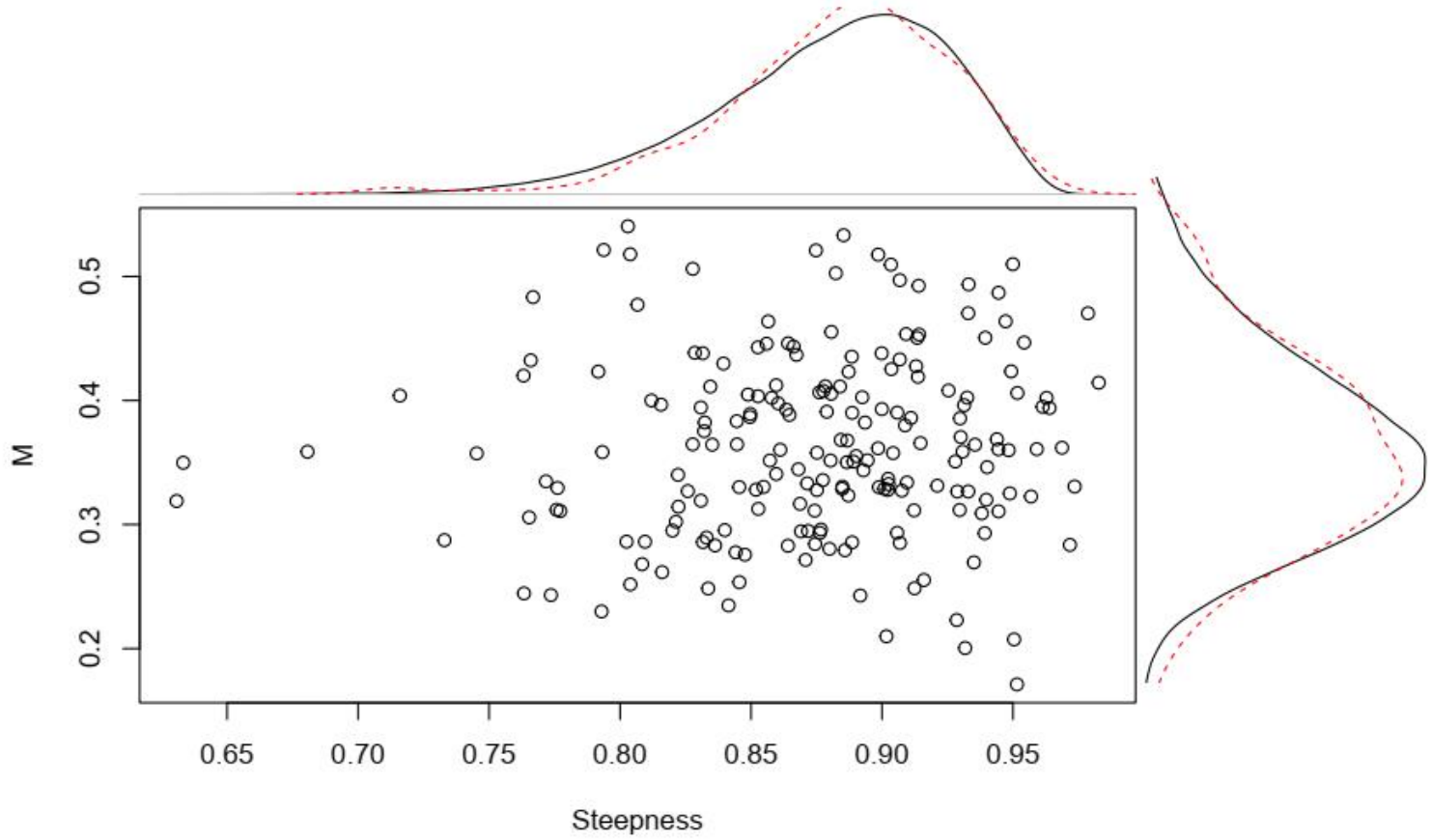


Natural mortality
Lorenzen (ages 4-12)



Natural mortality and steepness

200 samples of natural mortality and steepness (pairs) drawn from assumed distributions.

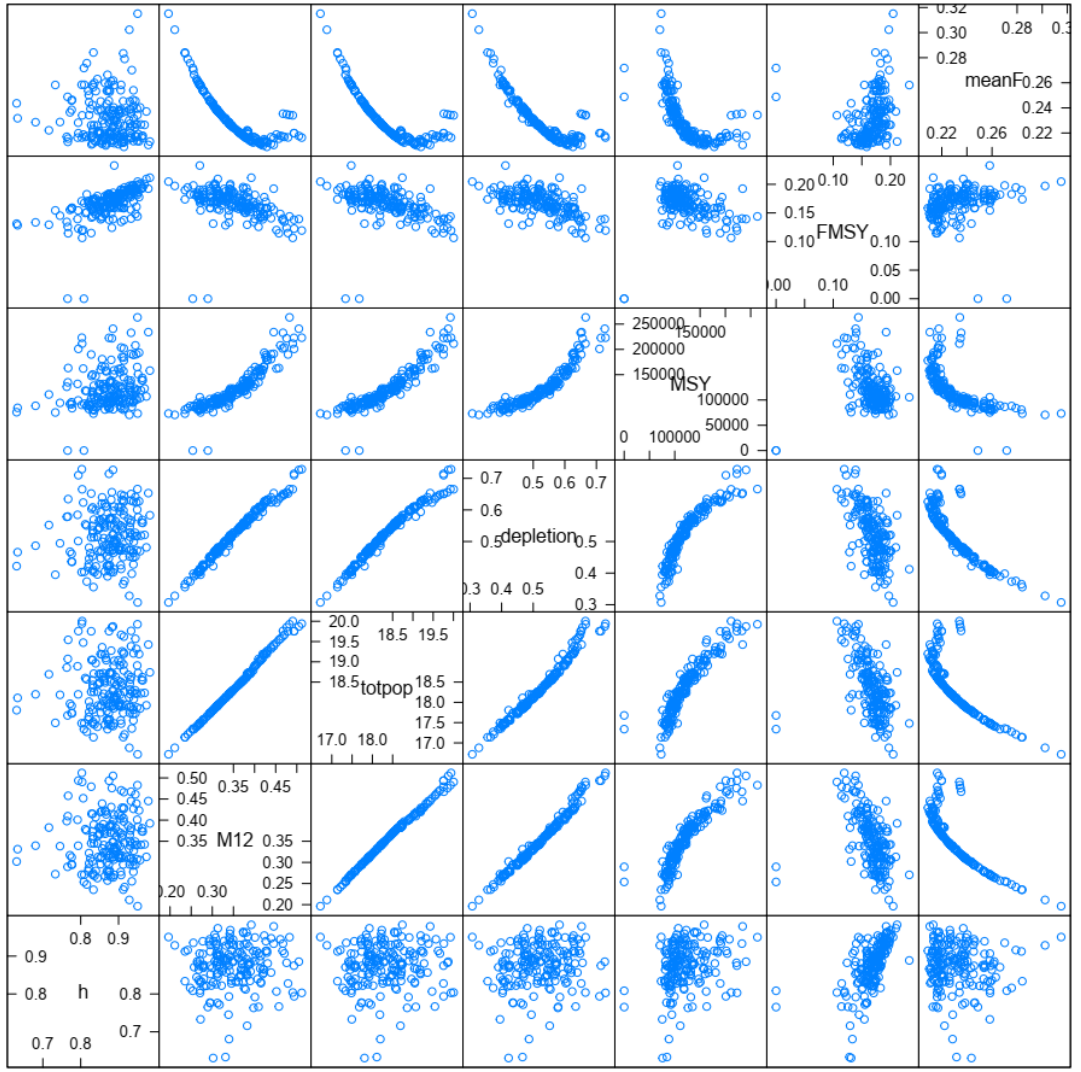


SPLOM

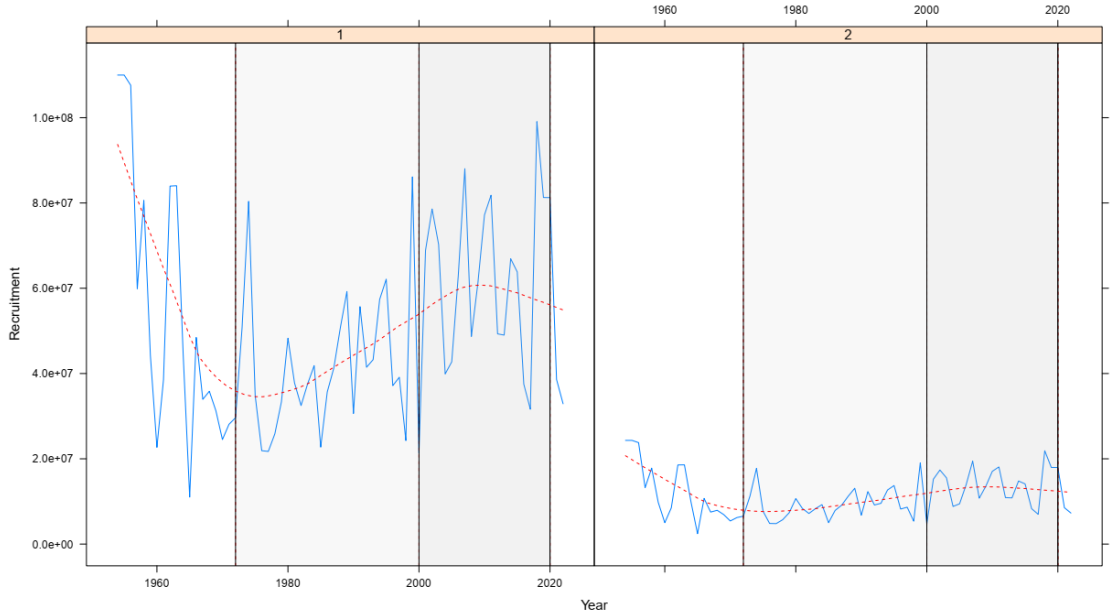
Scatter plot matrix of steepness (h) and natural mortality (M12) inputs and corresponding model estimates of :

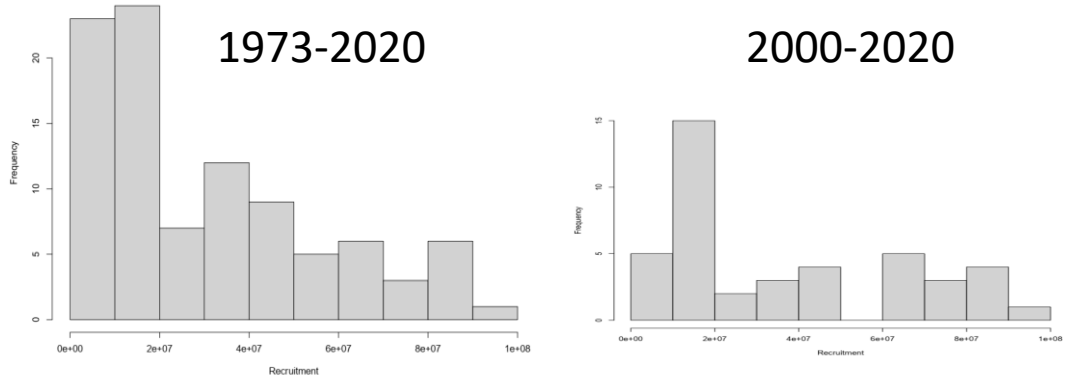
- Total population scaling parameter
- Terminal depletion (SB/SBF=0)
- MSY
- F/FMSY

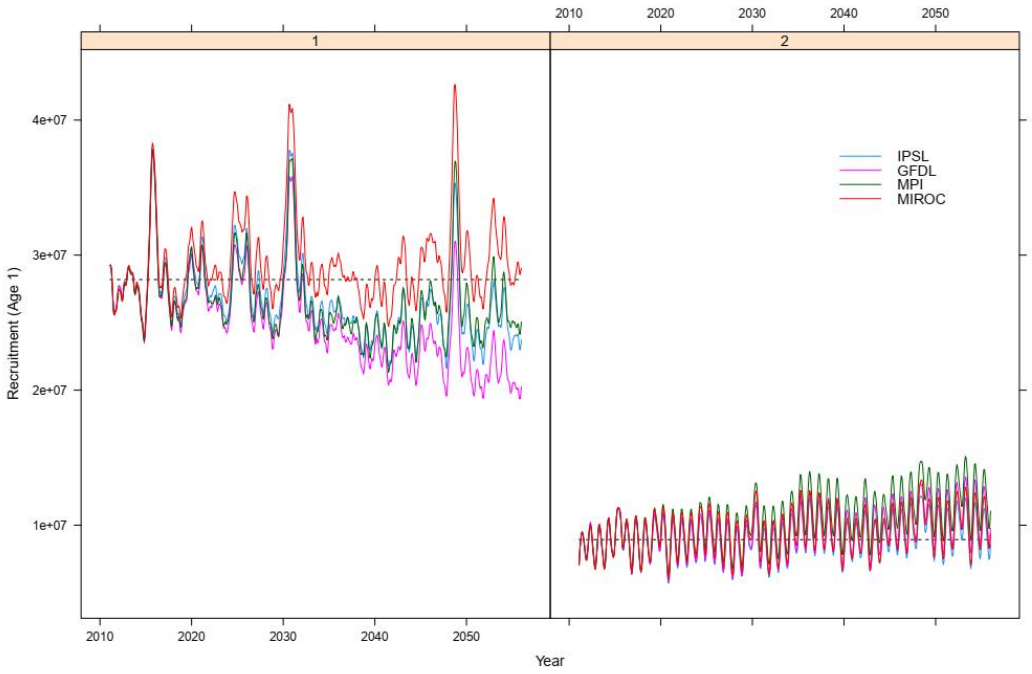
Terminal depletion highly correlated with assumed value of natural mortality.



Future Recruitment







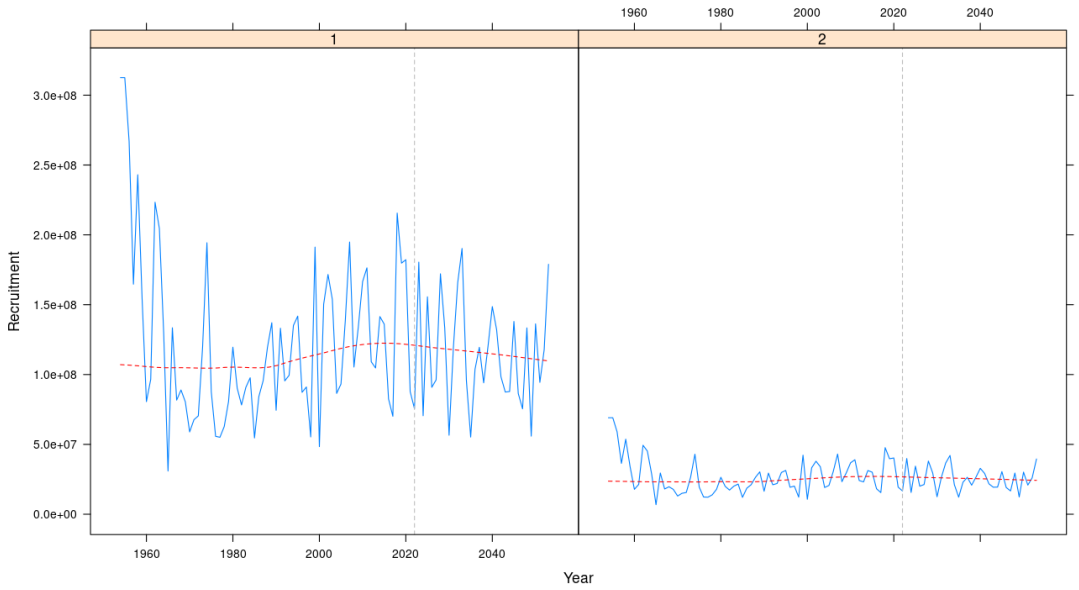
Recent recruitment above average

Unclear whether high recruitment will continue

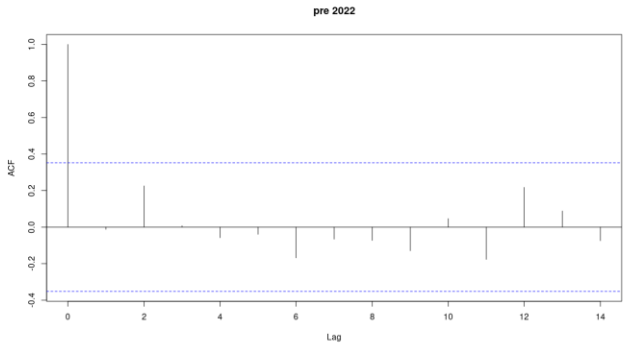
Two recruitment scenarios included

- 1973-2020
- 2000-2020

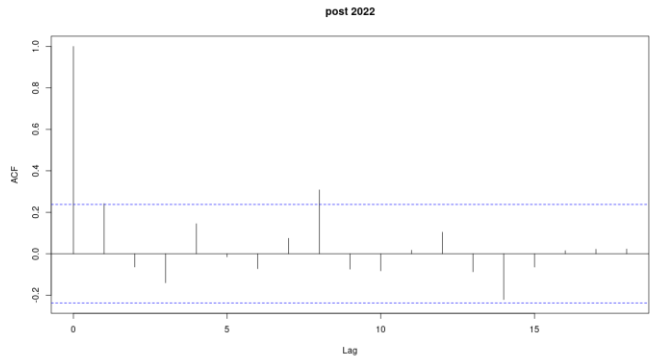
Future Recruitment - autocorrelation



Pre 2022



Post 2022



No indication of significant autocorrelation in the residuals of the de-trended recruitment time series for the WCPO

SPA OM Grid

Axis	Levels	Options	
		1	2
Reference Set			
Process Error			
Recruitment variability	**2**	1973-2020	2000-2020
Observation Error			
Catch and effort c.v.	**1**	20%	
CPUE index c.v.	**1**	30%	
Model Error			
Steepness ‡	**200**	sampled from assumed distbn	
Natural mortality ‡	**200**	sampled from assumed distbn	
Recruitment distbn ‡	**1**	SEAPODYM	
Movement ‡	**1**	SEAPODYM	
Implementation Error			
Effort creep	**2**	0%	1%

SPA management procedure – OMs

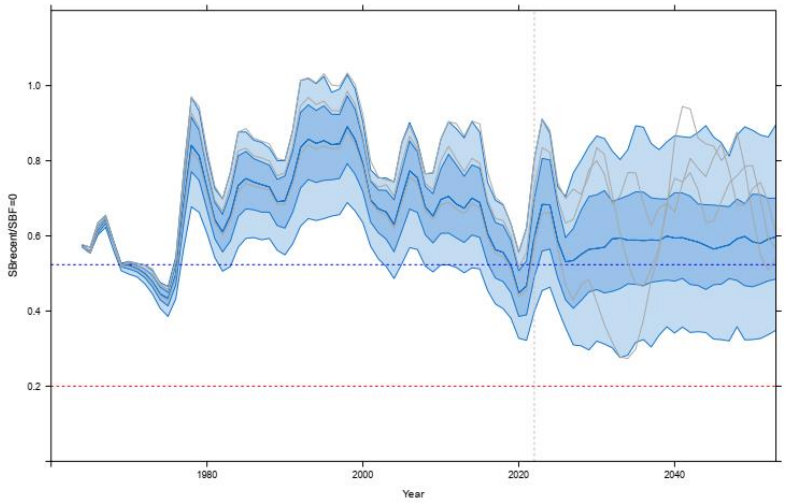
Recruitment assumptions most influential

Impact of catch in weight conversion
- small change to average terminal depletion
- increased risk of falling below LRP.

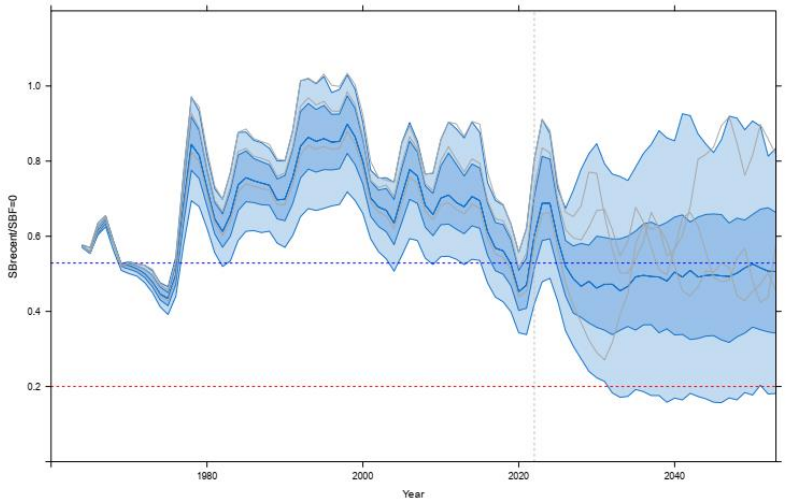
Revised OMs more consistent with the stock assessment.

Updated projections show similar results to TRP analyses.

Slightly higher risk of falling below LRP



(a) Short-term recruitment (2000-2020).

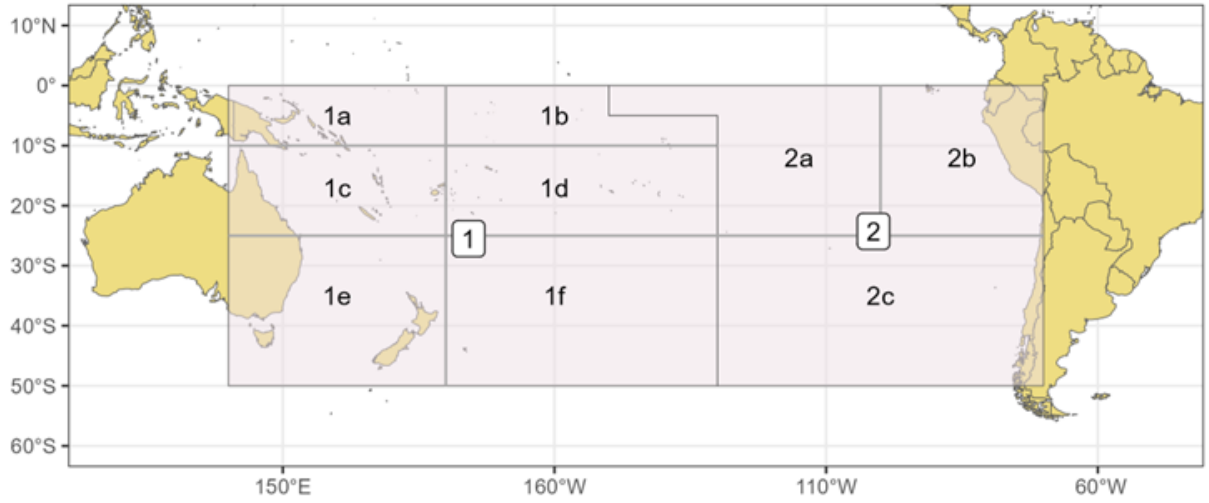


(b) Long-term recruitment (1973-2020).

SPA management procedure - OMs

- Robustness set
  - ‘Low recruitment’ scenario
  - Higher level of effort creep
  - Alternative EPO catch level assumptions

- Ongoing investigations
  - CPUE and hyperstability
  - Climate change scenarios



Recommendations

- advise whether the sources of uncertainty included in the OM grid are sufficient and if any further scenarios should be considered
- advise whether the ranges of parameter values adequately reflect our uncertainty in stock dynamics.
- and to note:
  - OM grid represents range of plausible scenarios against which candidate MPs can be tested.
  - It should not always be necessary to update the suite of operating models each time a new assessment is conducted. Any changes to the OM grid should be considered as part of an agreed monitoring strategy.
  - The grid of models outlined in this report form the basis of the evaluations of candidate MPs for south Pacific albacore detailed in WCPFC-SC20/MI-WP-06