

Operating Models for Bigeye Tuna in the WCPO

WCPFC-SC21-2025/MI-WP-05

Agenda item 5.1.3.1 bigeye tuna operating models

Nuku'alofa, Tonga
13-21 August 2025

Bigeye Tuna OMs

Alternative Modelling Framework

Project Tandoori

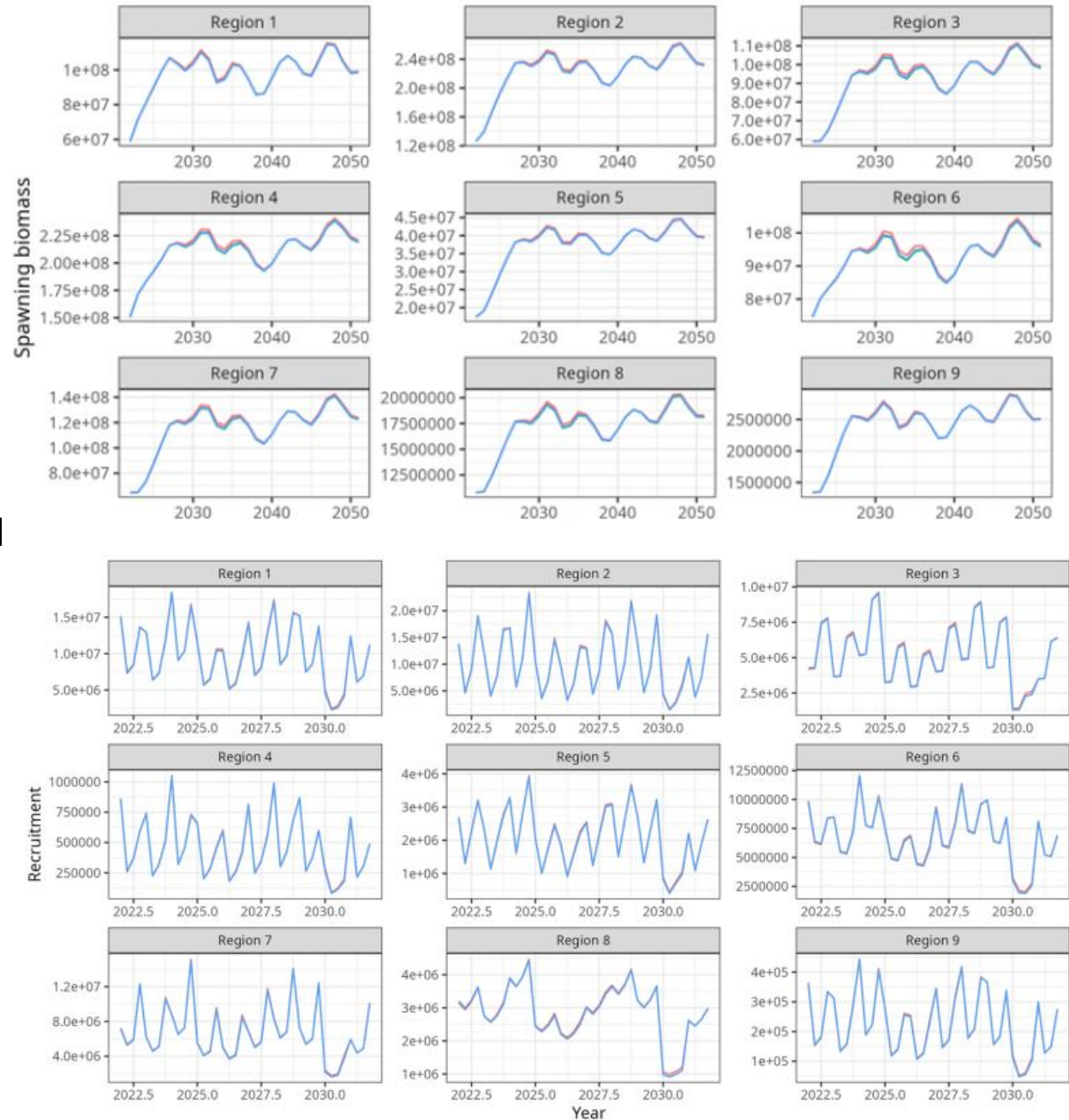
Spatially disaggregated age-structured population model

Replicates exactly the population dynamics from MFCL

Catch and effort constrained projections

Provides greater flexibility for modelling spatial and time-varying processes.

Continued reliance on MFCL for conditioning OMs

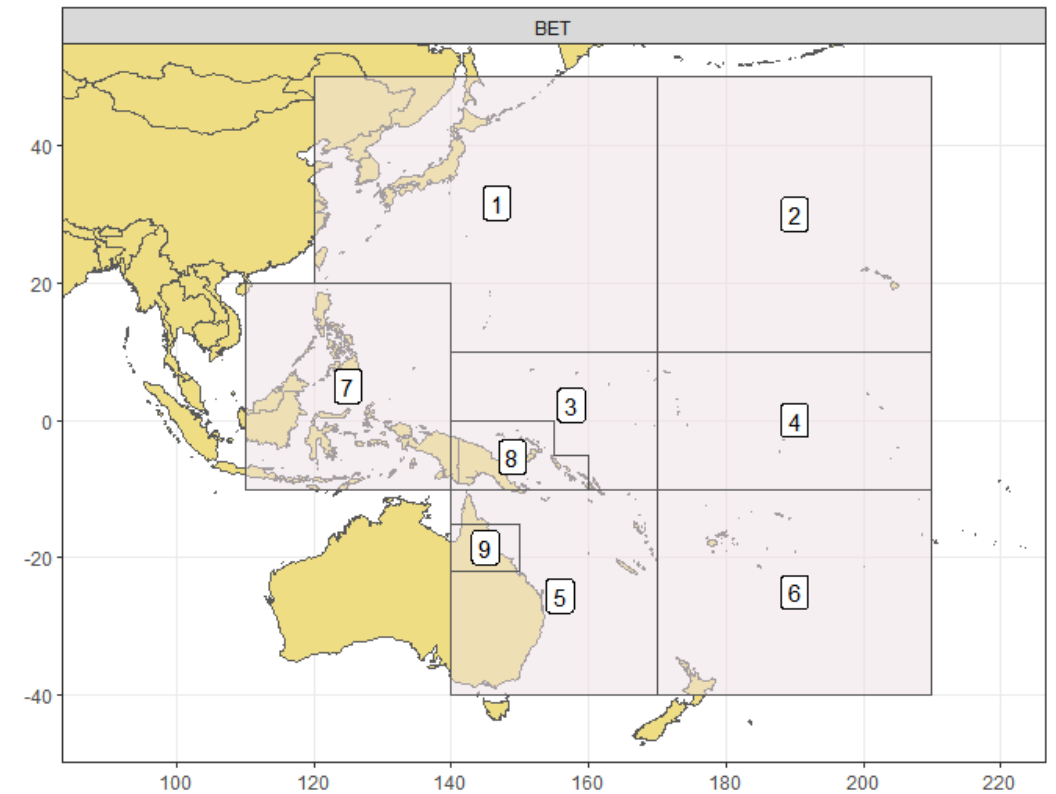


WCPO Bigeye Tuna

Recent assessments: Ducharme-Barth et al, 2020
 Day et al, 2023

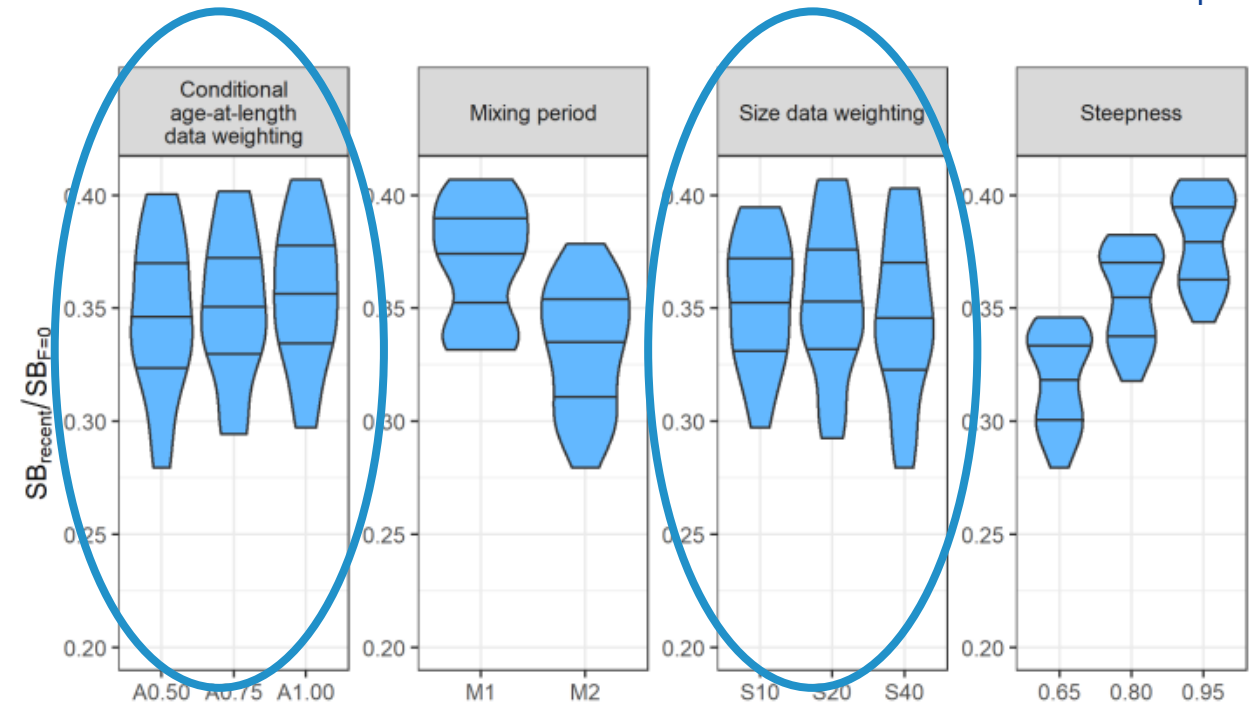
9 region model
32 extraction fisheries
9 index fisheries - long-line CPUE

Axis	Levels	Option 1	Option 2	Option 3
Steepness	3	0.65	0.8	0.95
Tag mixing (# quarters)	2	1	2	
Size data weighting divisor	3	10	20	40
Age data weighting	3	0.5	0.75	1



WCPO Bigeye Tuna

Biological characteristics
Recruitment dynamics
Movement rates
Effort creep
Hyperstability in CPUE
Observation error in catch & effort



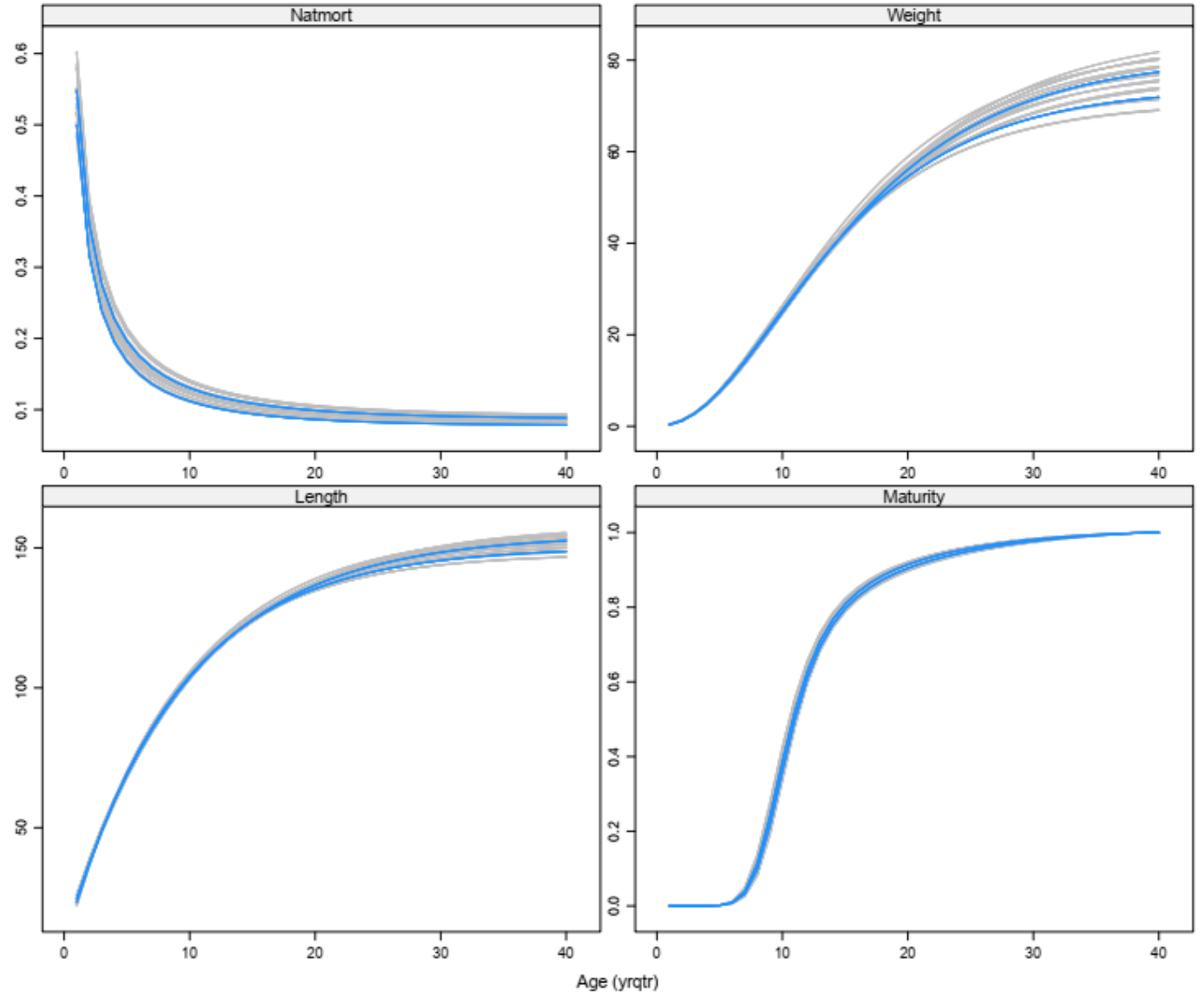
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Biological characteristics

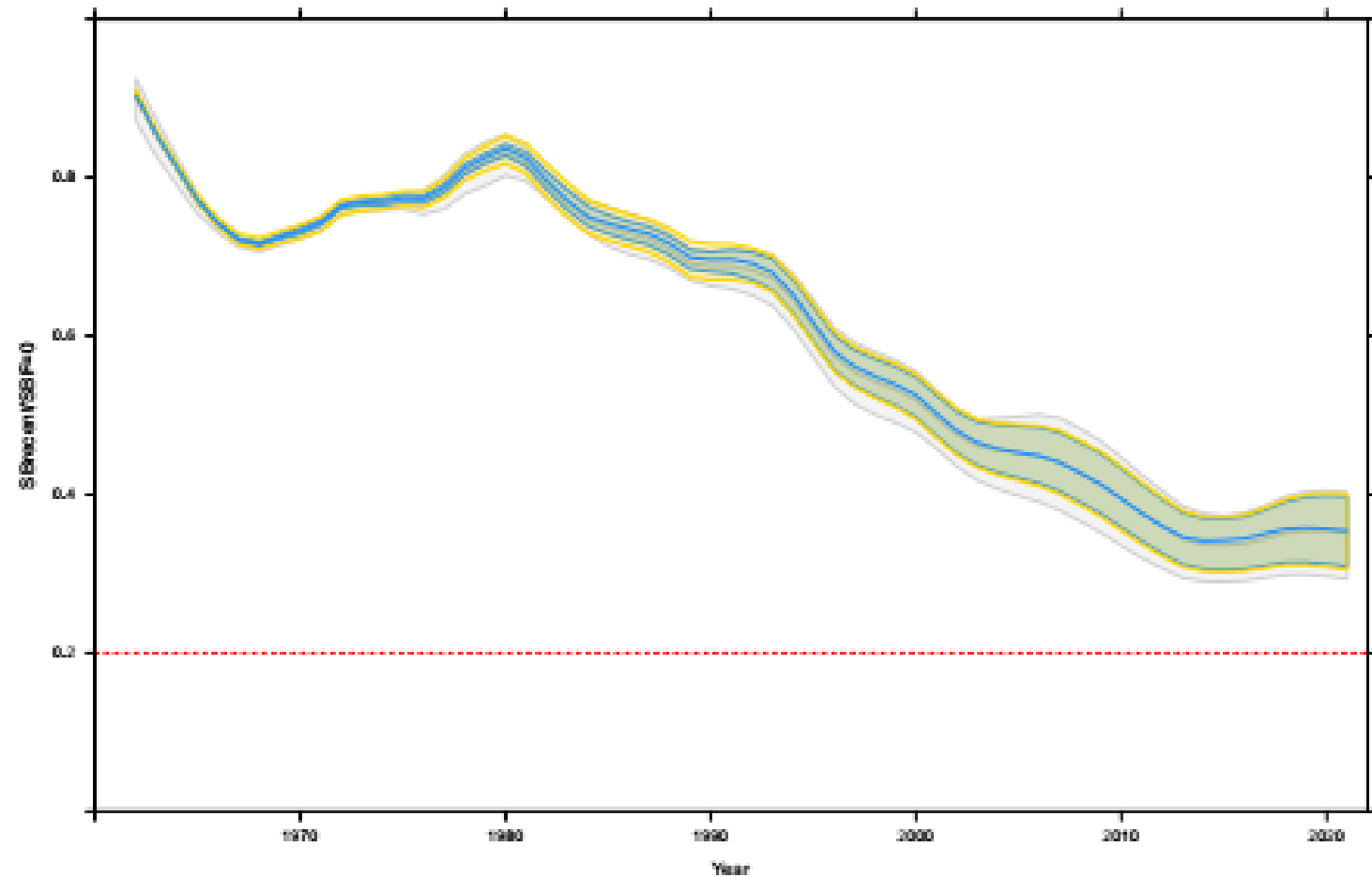
Focus of the 2017 & 2020 assessments
Growth fitted internally
Estimates consistent with previous studies

Maturity determined through fixed length
relationship

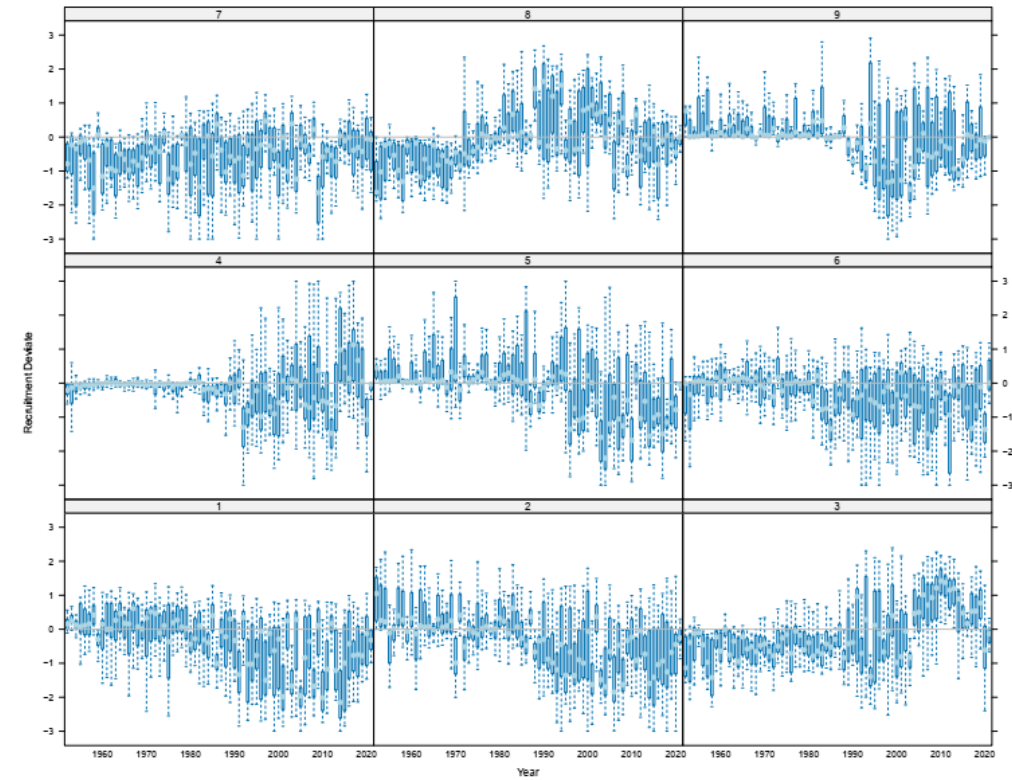
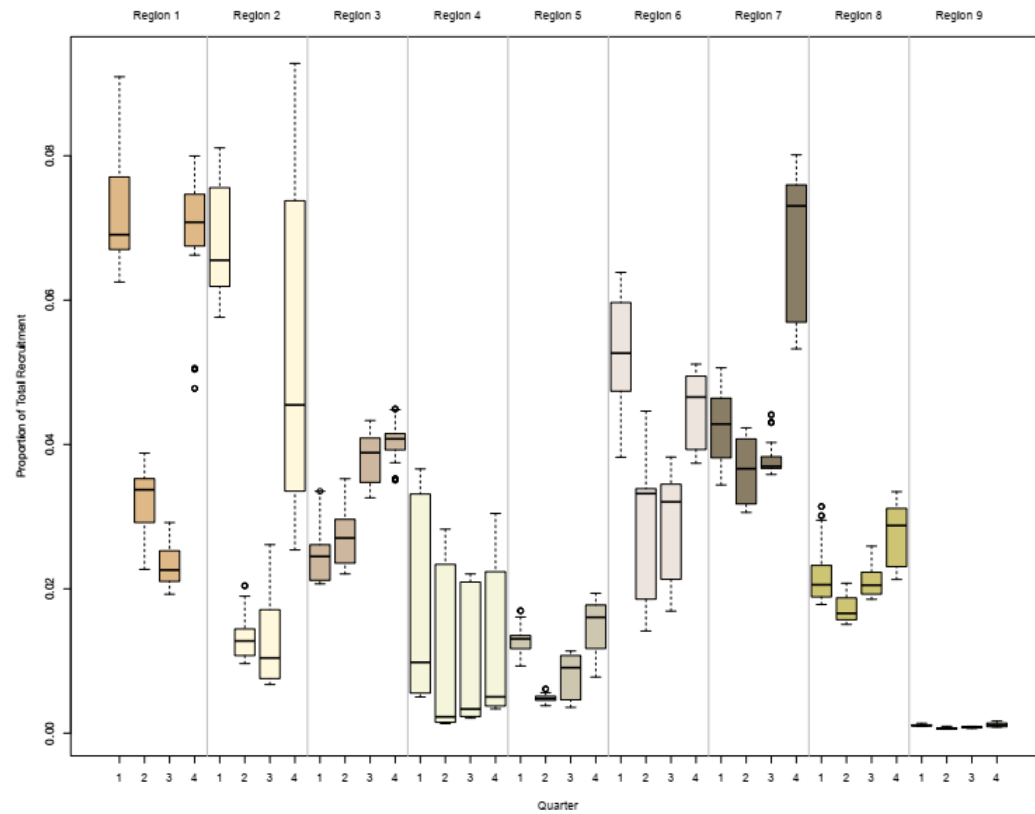
Lorenzen functional form assumed for
natural mortality



Growth



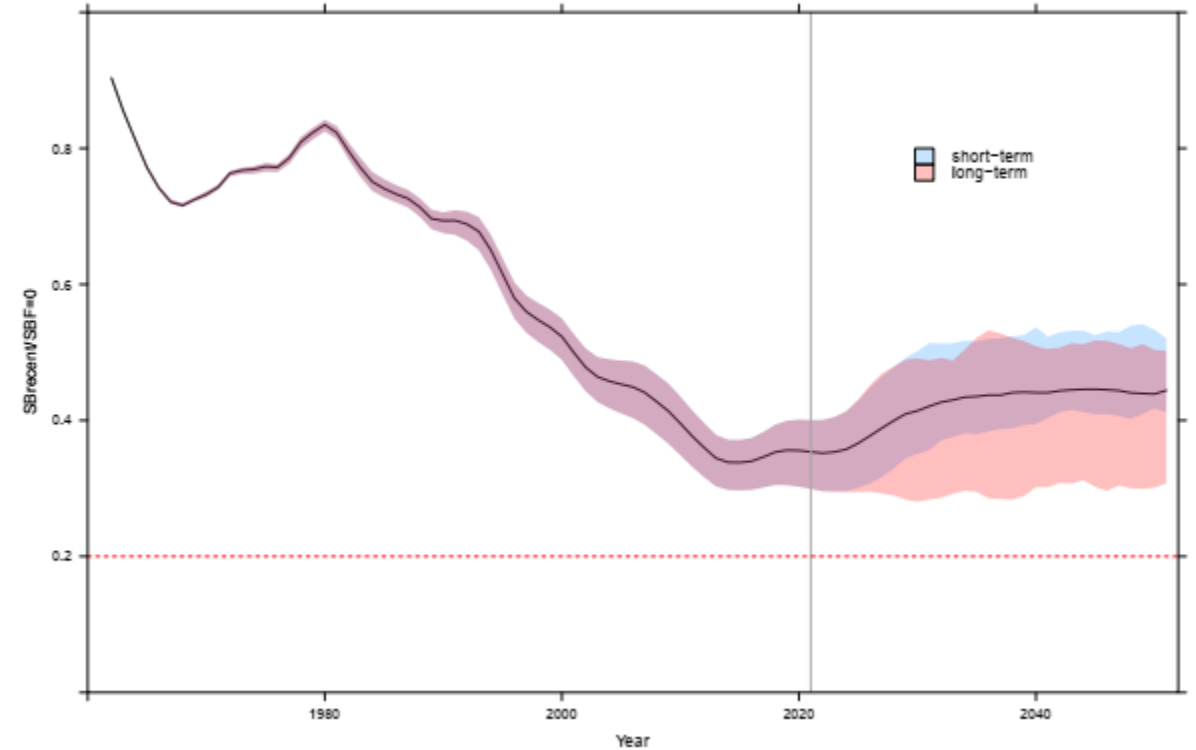
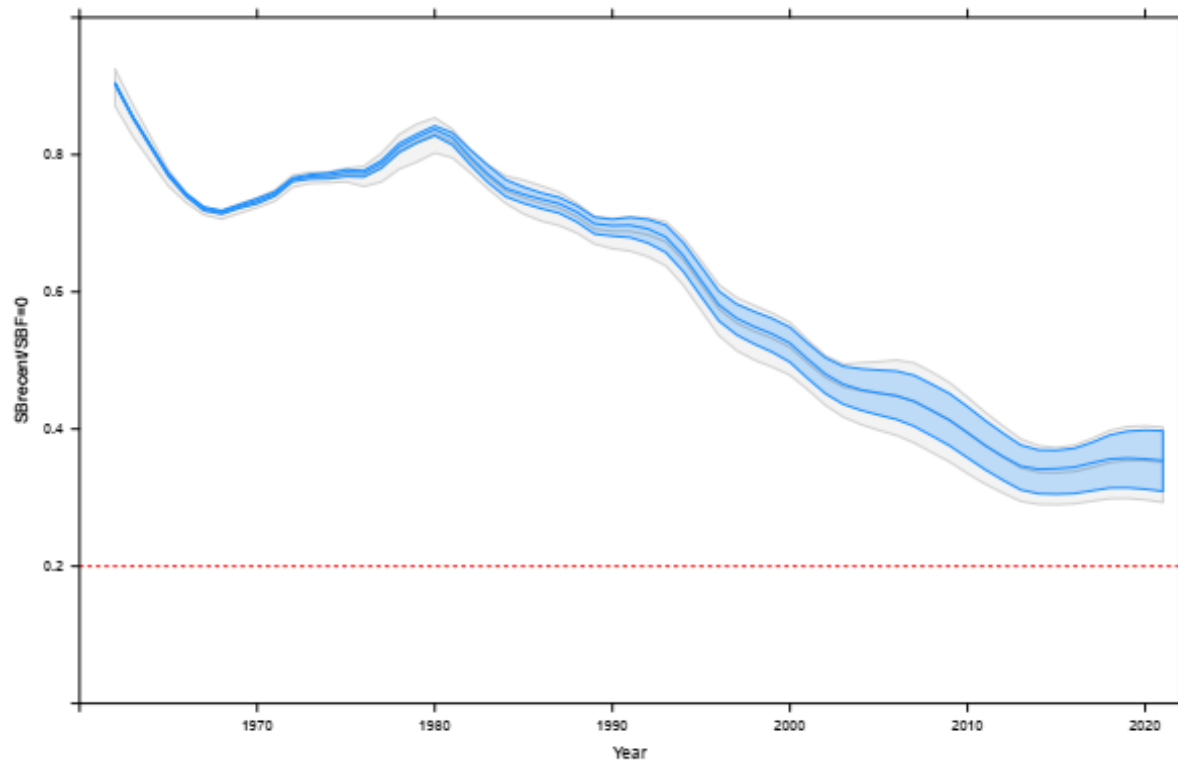
Recruitment dynamics



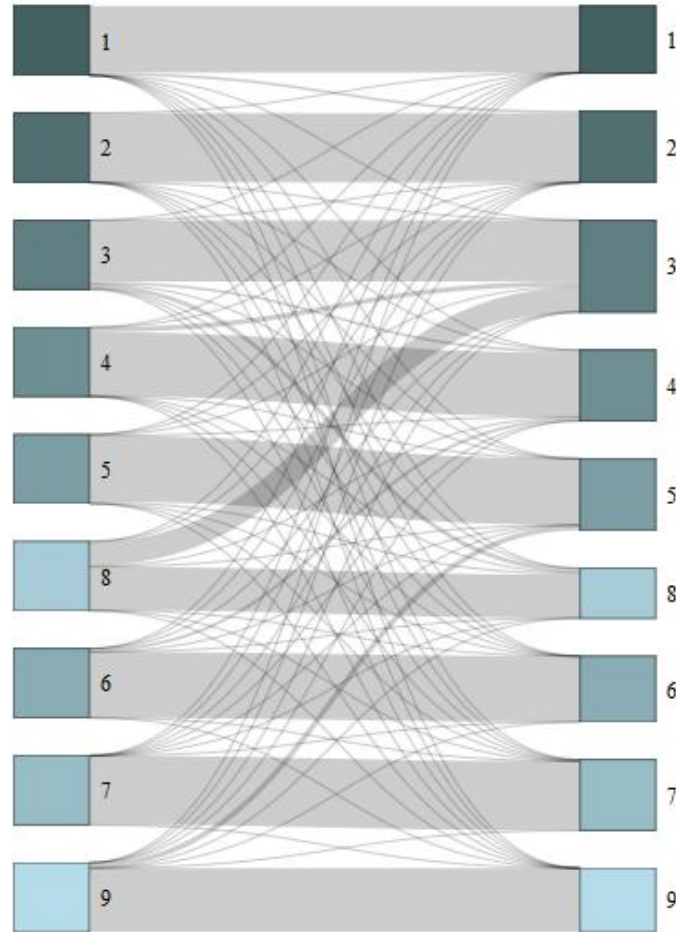
Recruitment period

Long-term
Short-term

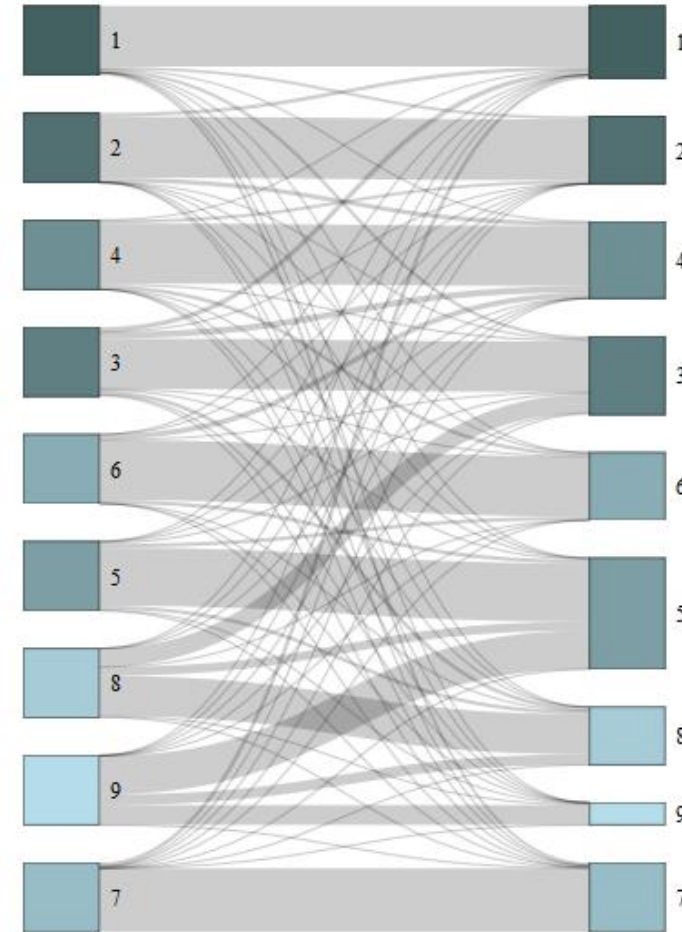
1962-2020
2010-2020



Movement rates

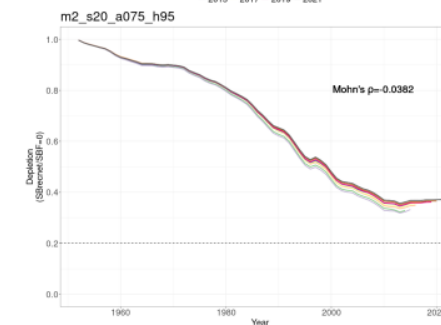
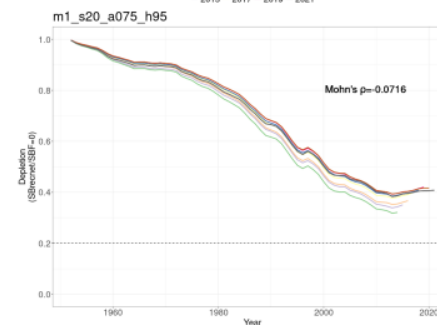
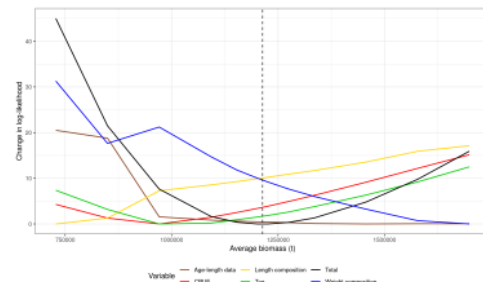
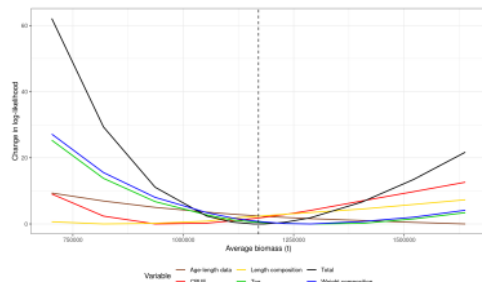
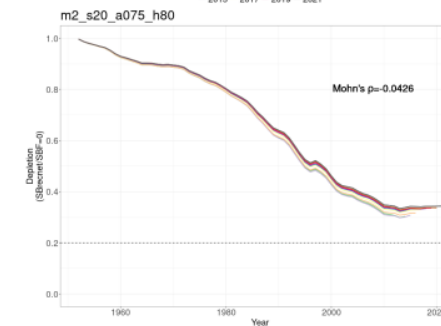
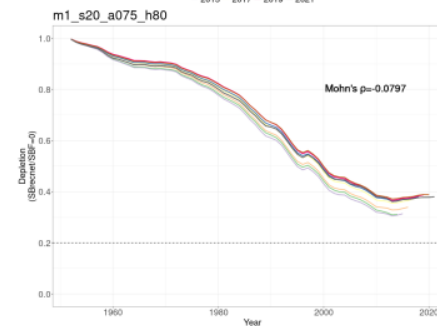
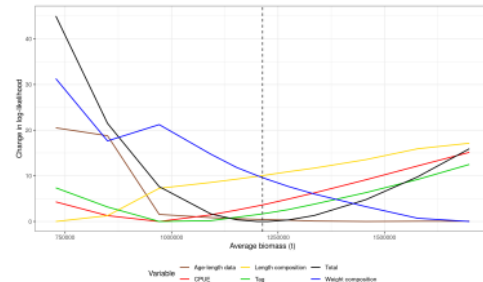
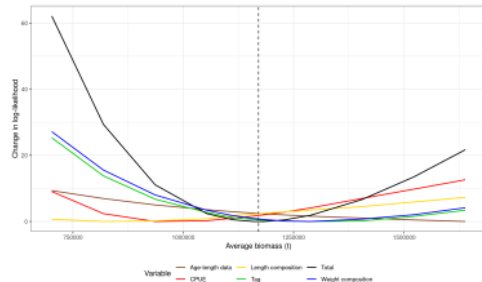
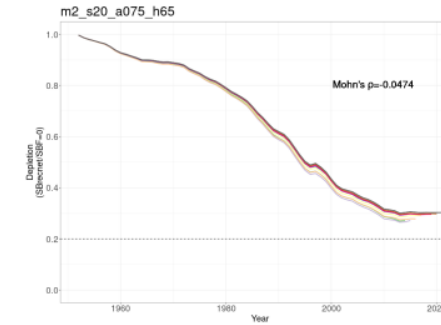
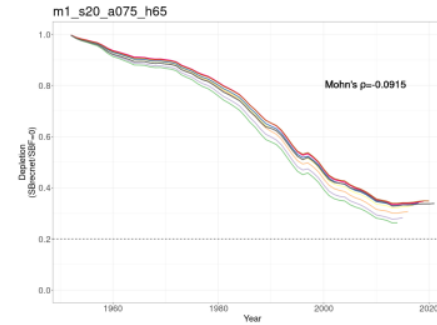
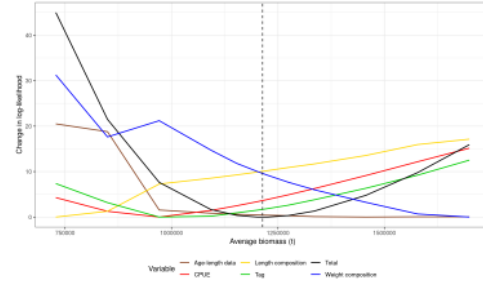
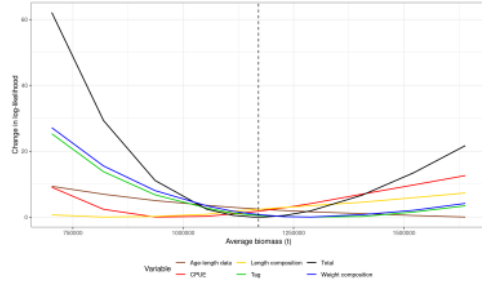


MULTIFAN-CL

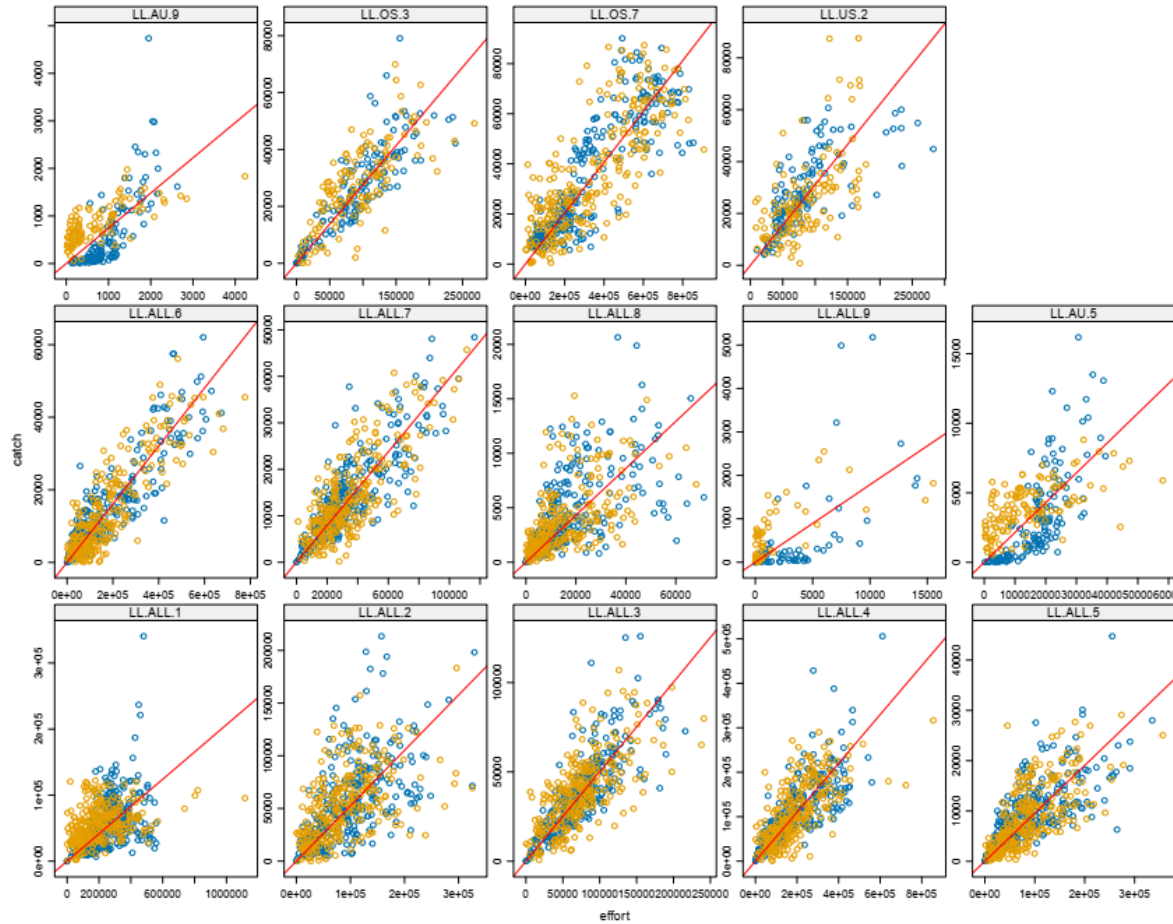


SEAPODYM

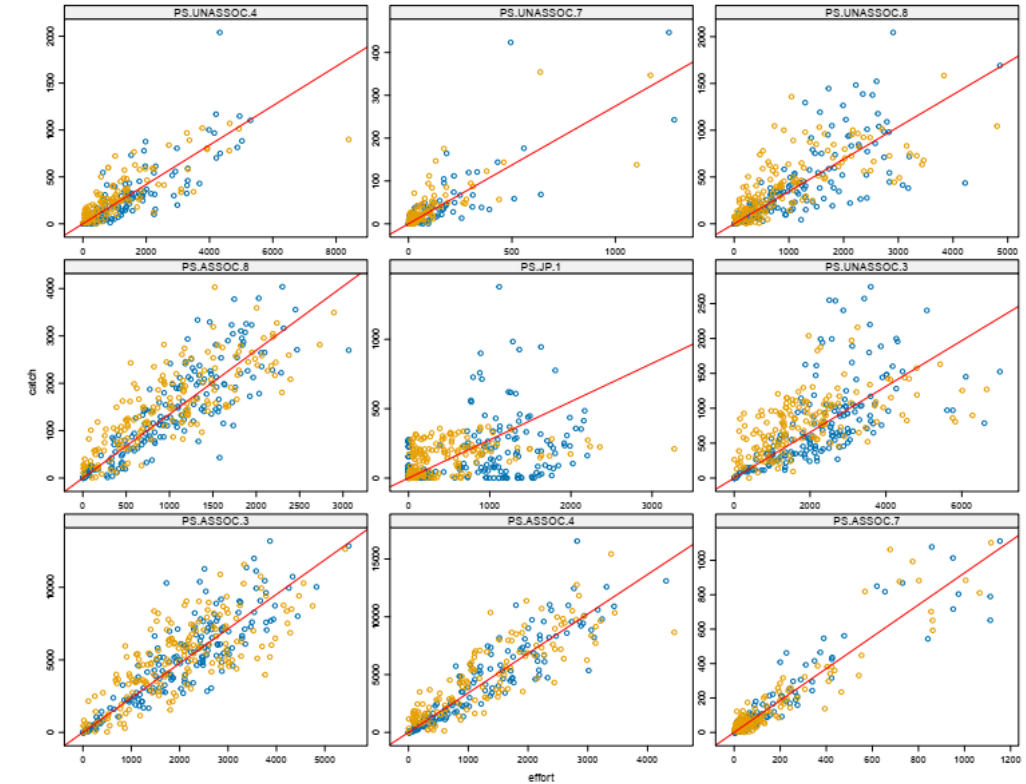
Model diagnostics



Simulated catch and effort data



Longline fisheries



Pole & line fisheries

BET OM grid

Other factors for consideration

- Hyperstability in CPUE
- Movement dynamics
- Growth
- Climate change scenarios
- FAD management
- Archipelagic catches

Axis	Levels	Options		
		0	1	2
Process Error				
Recruitment variability	2	1962-2020	2010-2020	
Observation Error				
Catch and effort	1	20%		
Model Error				
Steepness	3	0.8	0.65	0.95
Mixing period (qtr)	2	1	2	
Growth	1	estimated internally		
Movement	1	estimated internally		
DD catchability (k)				
Implementation Error				
Effort creep	2	0%	PS 2%, LL 1%	

We invite SC2I to:

- note that the reference set of OMs reflects the most important sources of uncertainty and plausible states of nature for WCPO bigeye tuna.
- agree the reference set of OMs as the basis for initial testing of candidate MPs.
- provide guidance on the settings to assume for future FAD closure scenarios.
- note that work will continue in the longer-term to further develop the OMs and this can be managed through an agreed monitoring strategy