Food and Agriculture Organization of the United Nations

Indian Ocean Tuna Commission
Commission des Thons de l'Océan Indien
iotc ctoi

28TH SESSION OF THE IOTC WORKING PARTY ON TROPICAL TUNAS (DATA PREP)

ONLINE: 10-12 JUNE 2026

STOCK ASSESSMENT OF SKIPJACK TUNA (*KATSUWONUS PELAMIS*)

SS3 – IOTC SECRETARIAT

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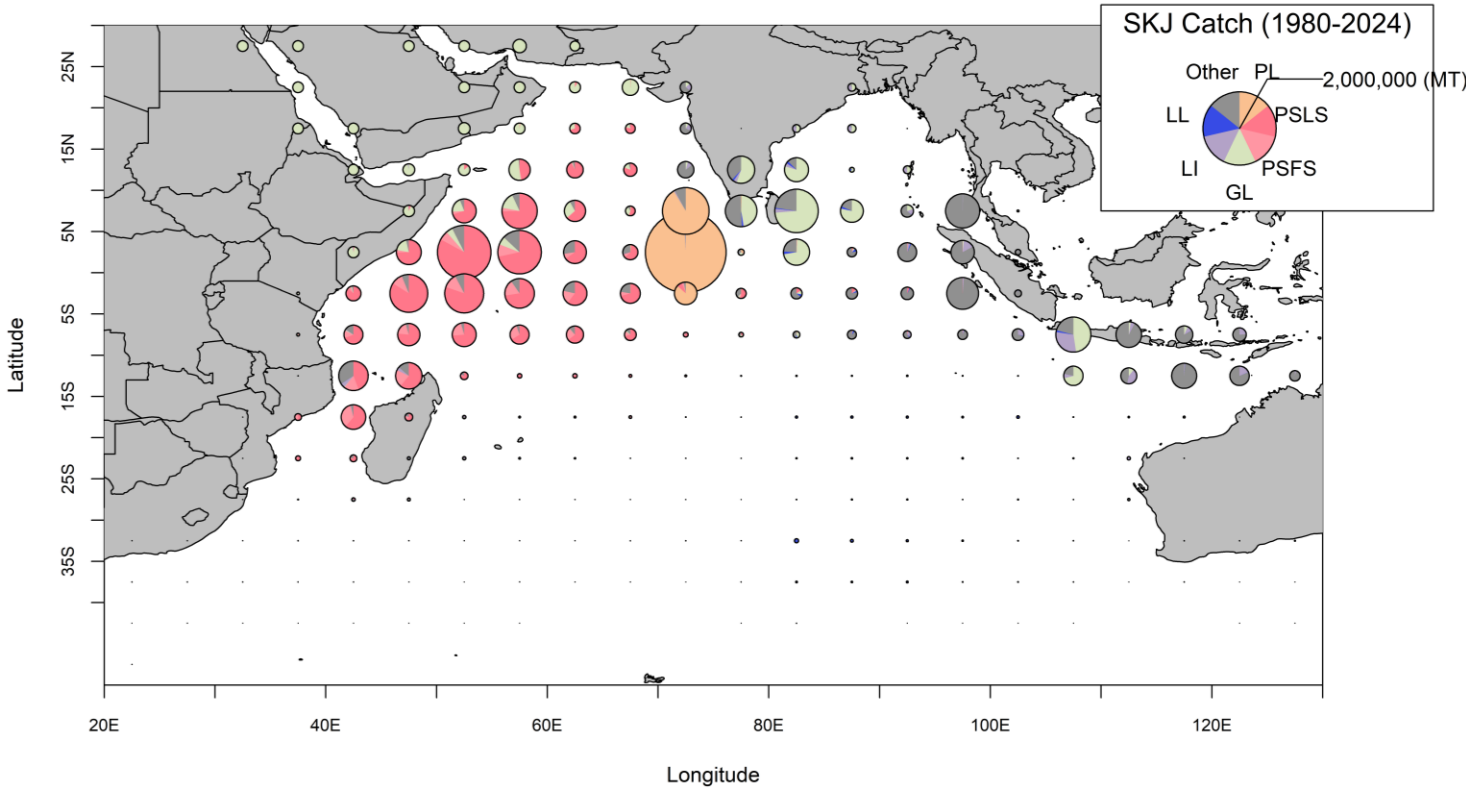
MODEL – SS3.30.24.2 (MARCH 2026)

- Integrated SS3 model developed in 2011
  - Age-based, spatially aggregated, seasonally structured
- 2023 Assessment
  - An ensemble of 36 models with variation in CPUE indices, catchability (through CPUE indices), steepness (*h*), and growth (L_{inf})
  - $\boldsymbol{SSB_{2022}}$ (80% CI) estimated at **0.53** $\boldsymbol{SSB_{MSY}}$ (0.42-0.68)
  - $\boldsymbol{F_{2022}}$ (80% CI) estimated at **0.49** $\boldsymbol{F_{MSY}}$ (0.32-0.75)
  - The stock was considered **not overfished**, and **not subject to overfishing** in 2022.
- SKJ Management Procedure adopted in 2024 (Res. 24/07) and run in October 2025 for TAC setting.
- 2026 assessment will use data up to 2025, including new CPUE indices – stock status only.

Model Structure

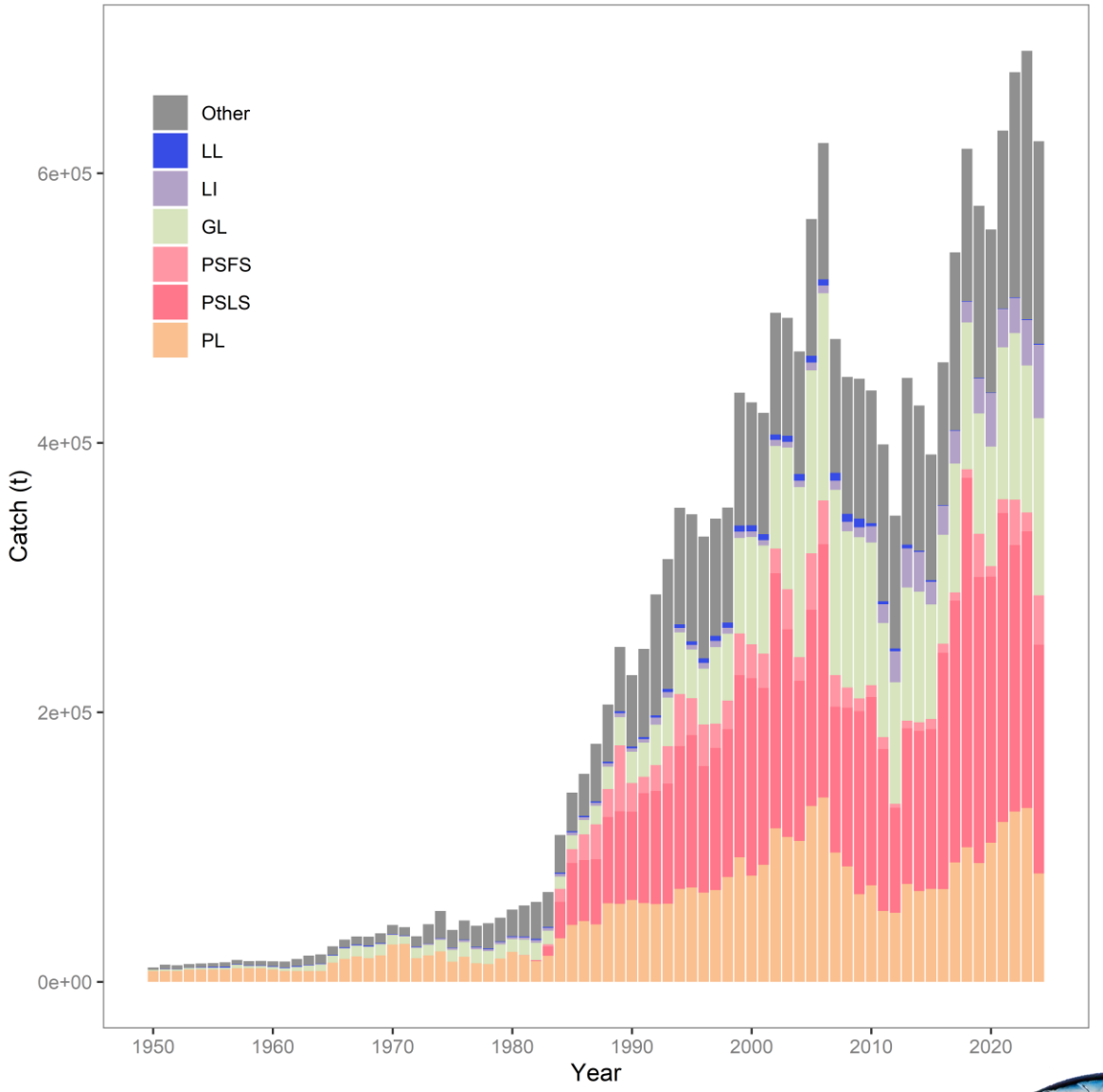
- Model years: 1950-2025
- Annual time step with four seasons
- 8 age classes (0-7)
- One area (fleets-as-areas)
- 7 fishing fleets
  - Fisheries combined based on similarities in fishing gear type (selectivity) and regional stratification (fishing behaviour) – métiers

- 1) PL (MDV)
- 2) PSLS (EU/SEY)
- 3) PSFS (EU/SEY)
- 4) Gillnet – Sri Lanka, Iran, Indonesia, Pakistan
- 5) Line – coastal / handline – Yemen, Sri Lanka, MDV, Madagascar
- 6) Longline – distant water LL fishing fleets
- 7) Other – all others, primarily non-EU/SEY PS fleets, trolling and small coastal fleets (e.g. ring nets)



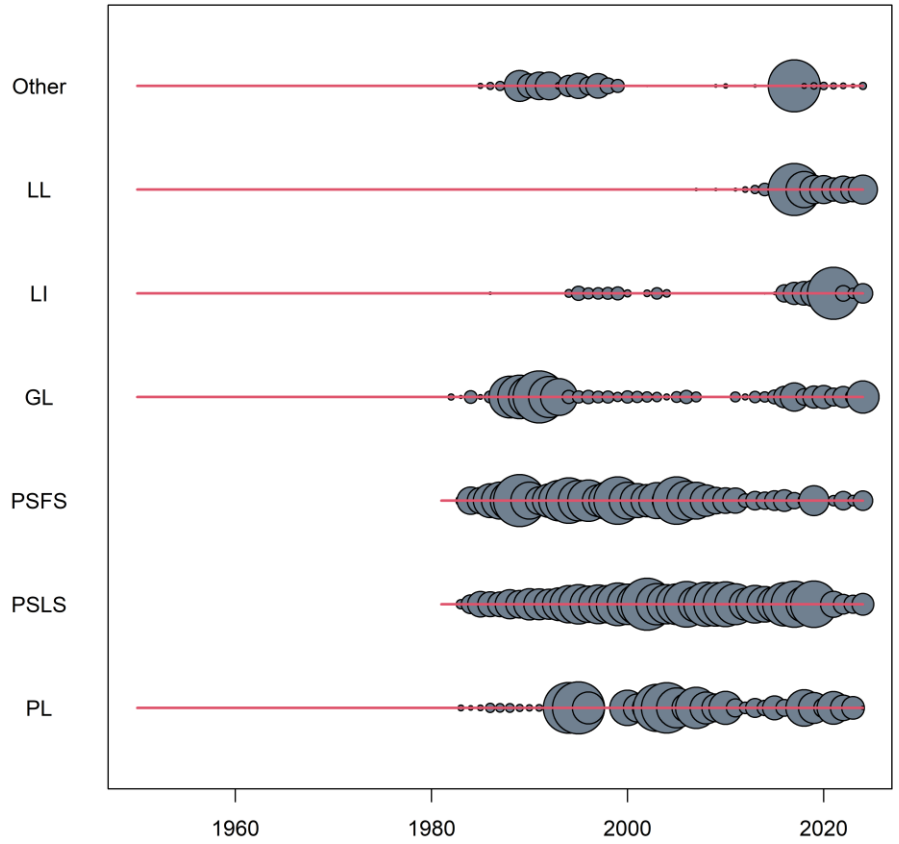
DATA

- Catch: total annual catch by fishing gear from 1950-2025.
- CPUE
  - Maldives PL 1995-2025
  - PSLS 1991-2025 (Correa et al., 2026)
  - Index based on associative dynamics and acoustic data 2013-2025 (ABBI)
  - Index of juvenile SKJ from echo-sounder buoy data (BAI)
- RTTP-IO Tagging Data
- Size: Length composition data
  - Length-frequency year/season for each fishery



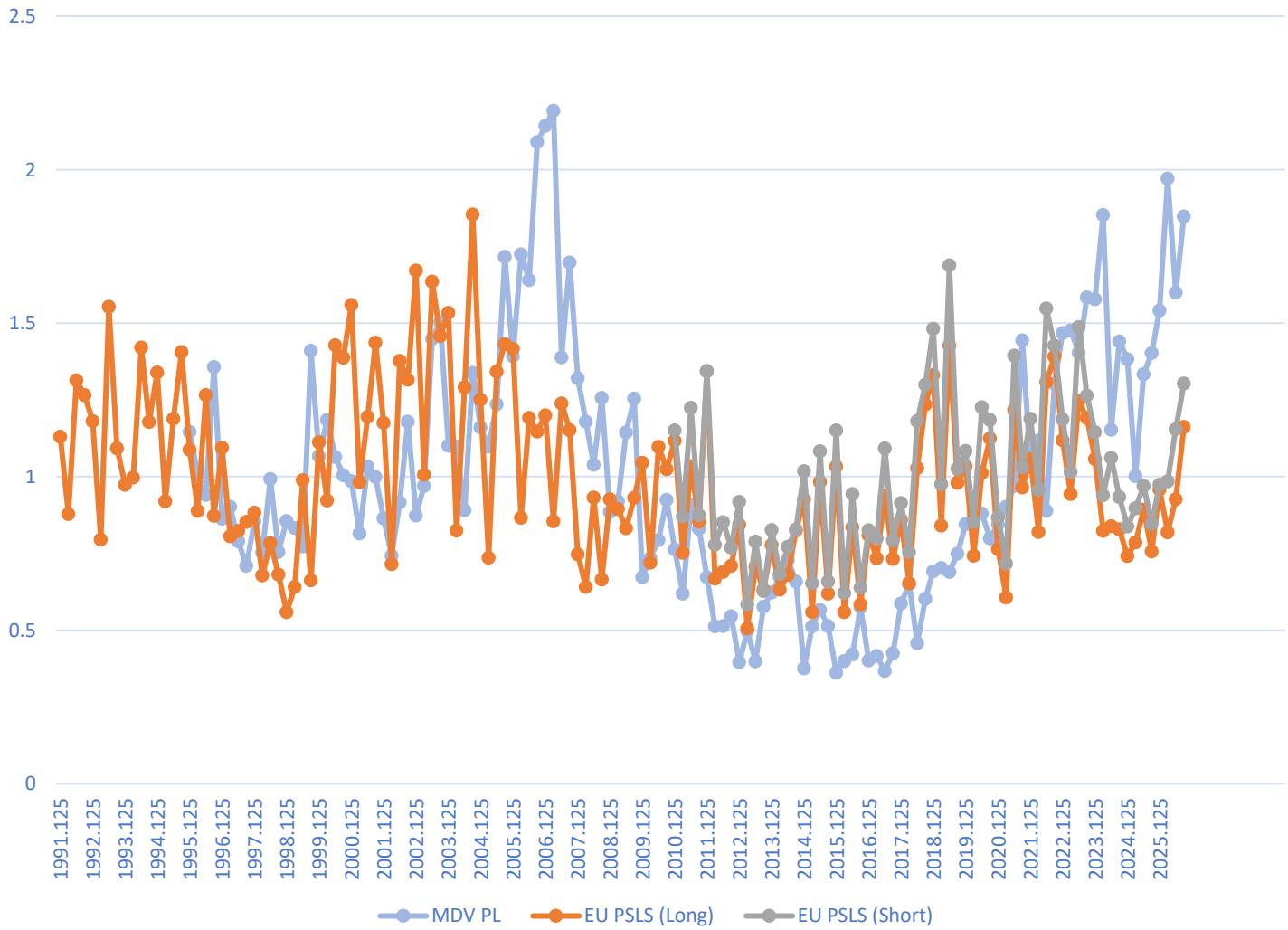
SIZE DATA

- Each fleet-season. Variable sampling quality, and temporal coverage from 1980s. Compiled into 4 cm size classes.
- Long time series for PSFS + PSLS + PL
- Poor sampling for LI + LL + Other
- Problematic strata identified and removed
- Sample size proportional to number of fish, capped at 10 (or 1)
    - $ESS_{PSLS, PSFS, PL}$ = <=10
    - ESS_{LL} = 1



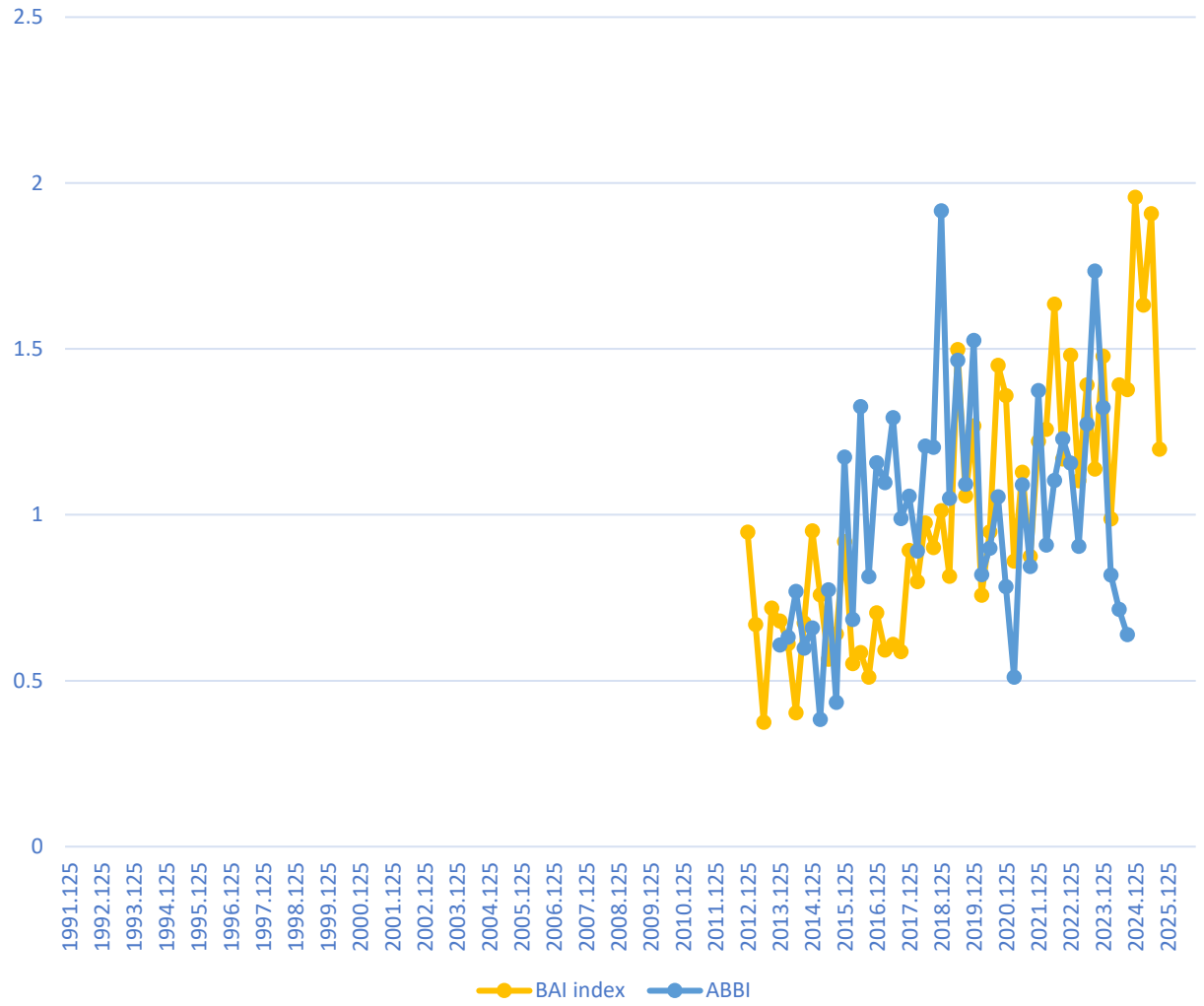
CPUE

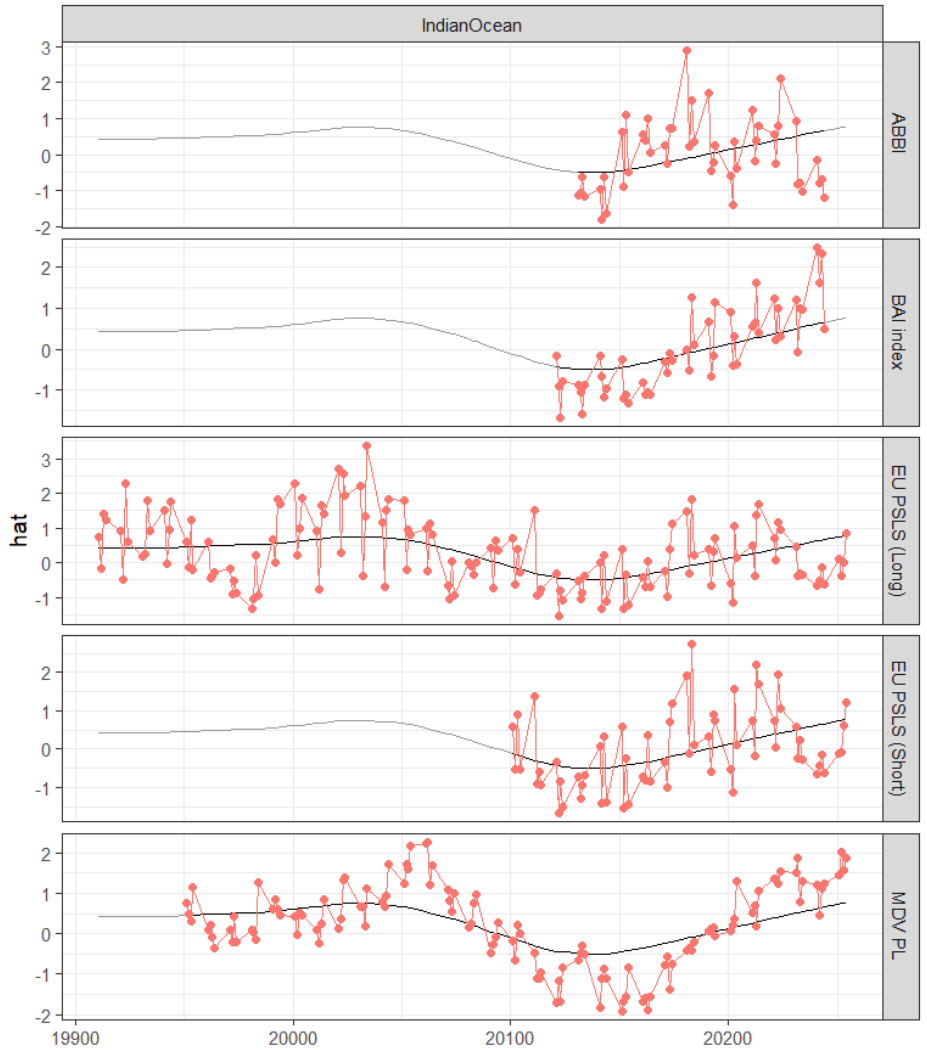
- Broadly consistent between PL and PSLS index
- Increasing MDV PL from 2015 – 2025
- More stable PSLS index, but a decline from 2021-2024, followed by a short increase in 2025

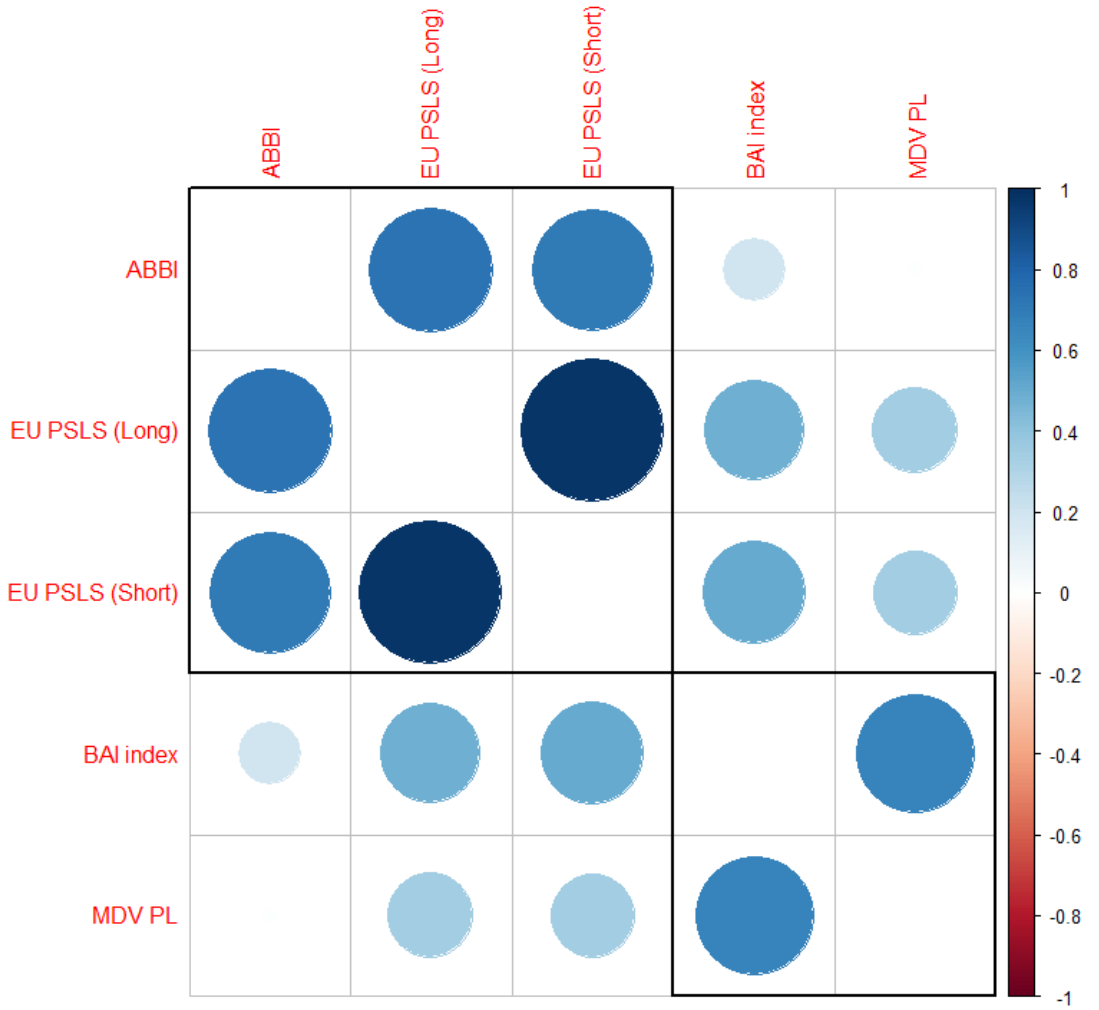


CPUE

- BAI index increasing through time while ABBI index is more variable – decline in 2023-2025 in complete contrast to BAI index.

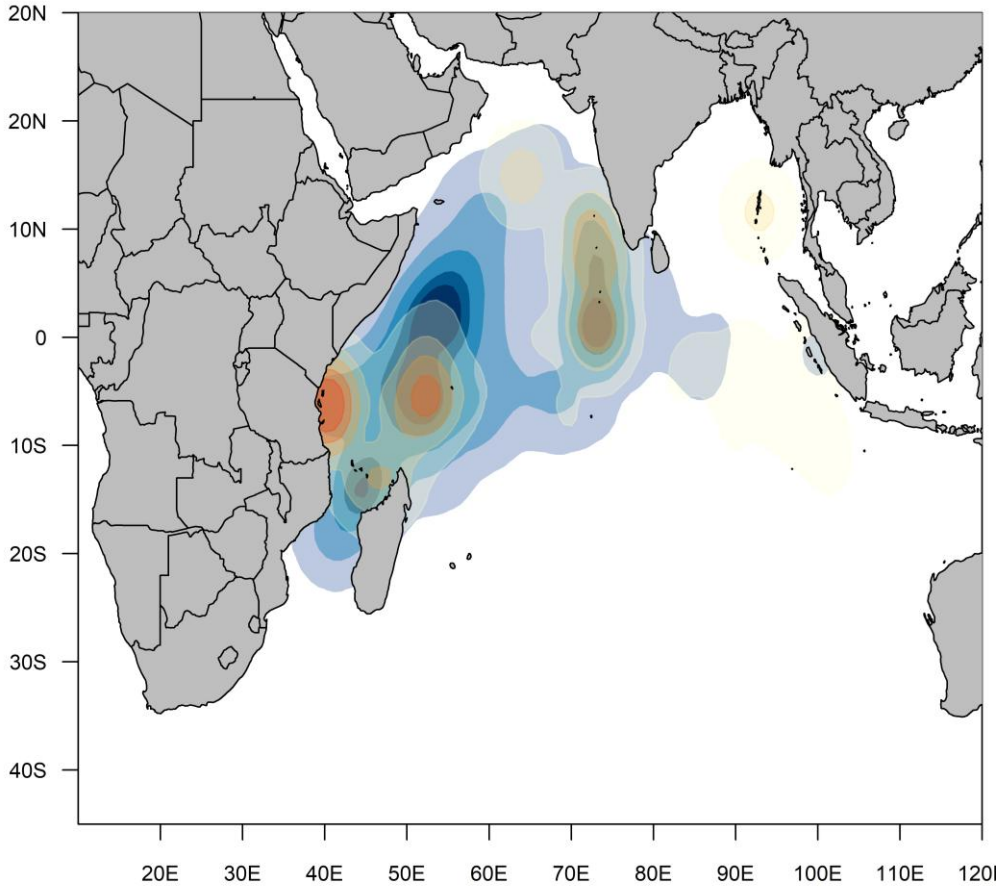



IndianOcean
ABBI
BAI index
EU PSLS (Long)
EU PSLS (Short)
MDV PL
hat
19900
20000
20100
20200


ABBI
EU PSLS (Long)
EU PSLS (Short)
BAI index
MDV PL
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1

TAGGING DATA

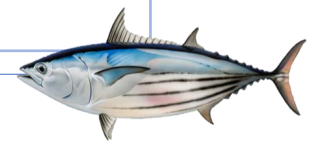
- Releases 2005–2007 (WIO)
- Recoveries primarily from PS (15%)
- Data processing
- Reporting, tag mortality & loss
- Included in the model to inform abundance and fishing mortality



MODEL ASSUMPTIONS + STARTING PARAMETERS

MODEL STRUCTURE

Recruitment	B-H stock-recruitment relationship (h=0.8). Recruitment deviates, 1983–2022 (σ_R = 0.3) Seasonal recruitment Temporal deviates in the seasonal proportion 1983–2022
Initial population	An equilibrium, unexploited state in 1950.
Age and growth	8 age-classes, with a plus group. Richard growth model (Eveson et al., 2012) CV decreasing from 20% at age 0 to 10% at maximum age (8)
Natural mortality	Constant (0.8)
Maturity	Proportion mature at length from Grande et al. 2010: 50% maturity at 38 cm. **--> TO UPDATE TO 39.9 cm Grande et al. (2014)**
CPUE indices	PL index 1995 – 2025; PSLS index 1990 – 2025. CV =0.2; BAI; ABBI **Sequential testing of CPUE indices. Must include either PL and/or PSLS long.**
Tagging data	RTTP tag release, and EU PS tag recoveries ;
Length data	Length samples assigned maximum ESS of 10.



Model options	Description
Steepness	*h70* – Stock-recruitment steepness parameter 0.7
	h80 – Stock-recruitment steepness parameter 0.8
	h90 – Stock-recruitment steepness parameter 0.9
Growth	*L70 – L inf parameter fixed at 70 cm as Eveson et al., 2012*
	Linf – L inf parameter estimated
	CAAL – growth estimated internally using CAAL based on otolith data → NO! data not available for SKJ (post-meeting edit by G Phillips) .
Natural Mortality	*Mfixed – M fixed at 0.80*
	MLorHam6 – Lorenzen-based M: estimated using Hamel & Cope (2022), assuming A_{max} = 8. With minimum (1 yr) and maximum (4 yr) reference ages for average M calculation]
CPUE	*PL – PL 1995 – 2025 index is included*
	PSLS – Only PSLS 1991 – 2025 index is included
	BAI + PSLS 1991 – 2025 index | ***or PL index*** *(update to first two quarters of 2025) and the BAI index*
	ABBI + PSLS 1991 – 2025 index | ***or PL index*** *(update to first two quarters of 2025) and the ABBI index*
Catchability	***q0*** *– no annual catchability change*
	q1*– annual catchability increases of* ***0.5%*** *(both PL and PSLS and ABBI)*

2026 ASSESSMENT – PLAN

- Update the skipjack stock assessment model incorporating catch data through 2025, revised length-frequency data, and new CPUE indices. Prepare both a base case model and a suite of sensitivity runs ahead of the assessment meeting; establish a data cut-off date (proposed: 1 August) for the assessment
- Conduct sensitivity analyses across multiple CPUE indices, including pole-and-line, purse seine, ABBI, and BAI. Designate pole-and-line and purse seine as the primary indices. Explore the implications of including, excluding, or combining indices on model outputs.
- Investigate the application of Lorenzen-based natural mortality within the assessment framework. Seek input on suitable maximum age and reference age parameters to inform this approach.
- Report model results against both MSY-based and 40% SSB_0 reference points. Present statistical estimates only, without assigning stock status; determination of stock status remains the decision of the Scientific Committee.