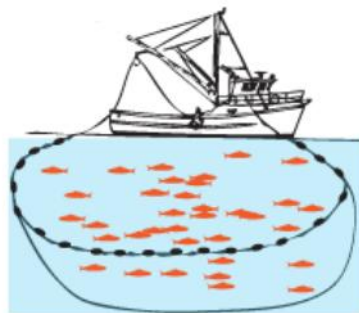


Some issues and questions regarding sardine model fits and associated Markov chains: Document P6

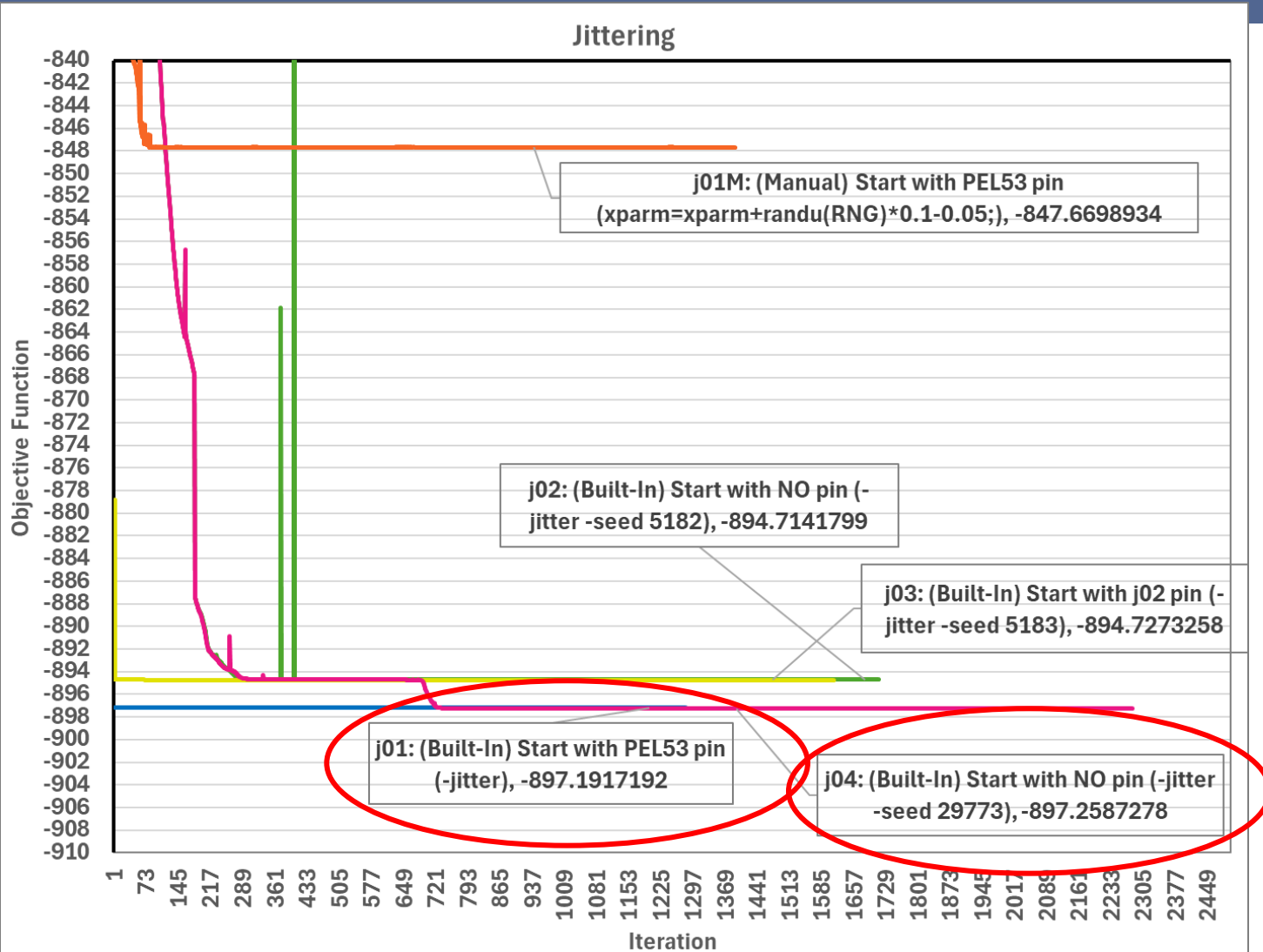
**By Mike Bergh, OLSPS Marine
30 November 2025**



1. More than one set of parameters have positive definite Hessian.
2. Hessian indicates that some parameter estimates are perfectly or almost perfectly correlated (at 'global minimum').
3. Sample $n=60$ from Markov chain does not 'contain' the 'global minimum'.

Document P6:

Two local minima found after jittering

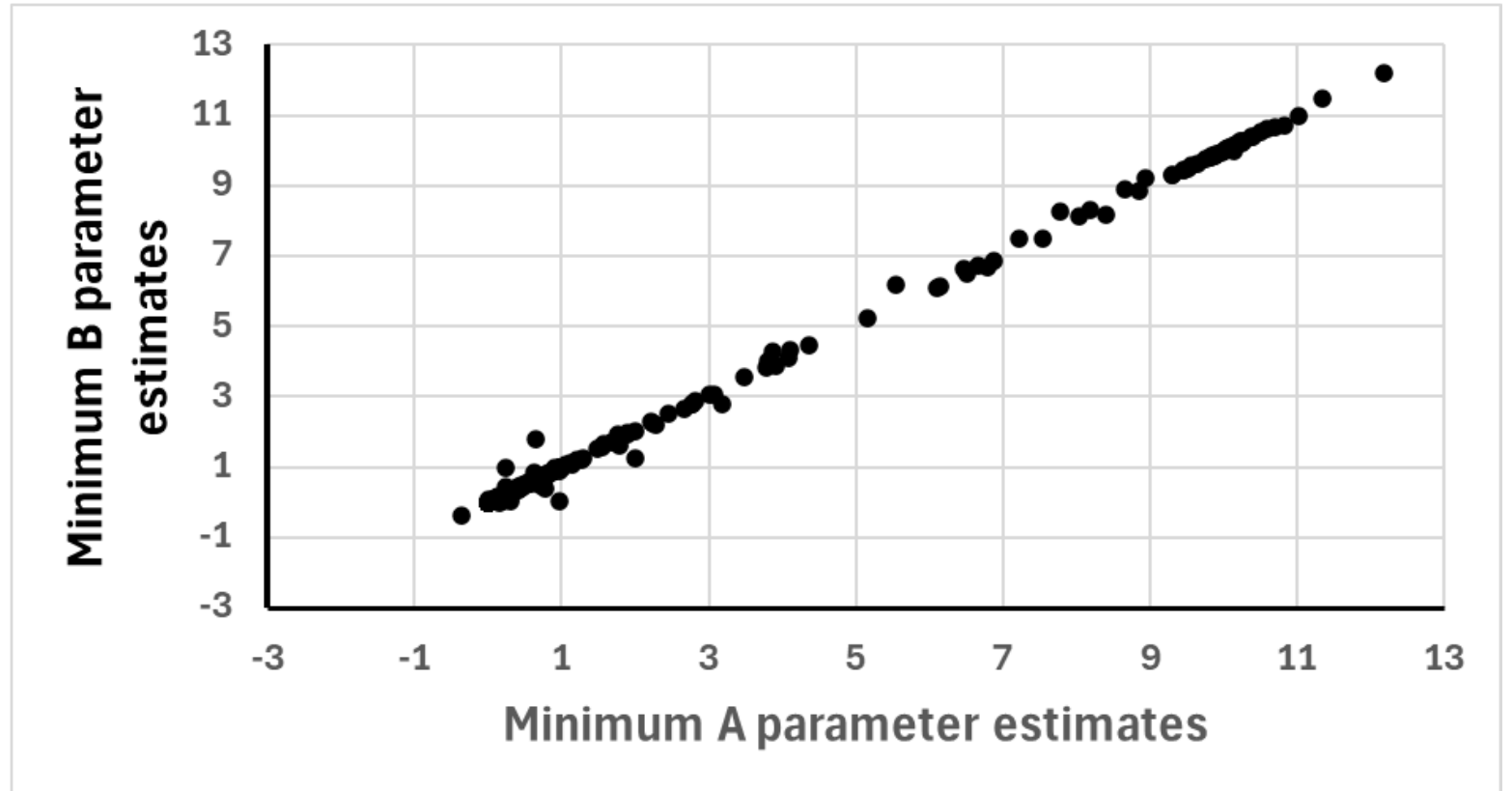
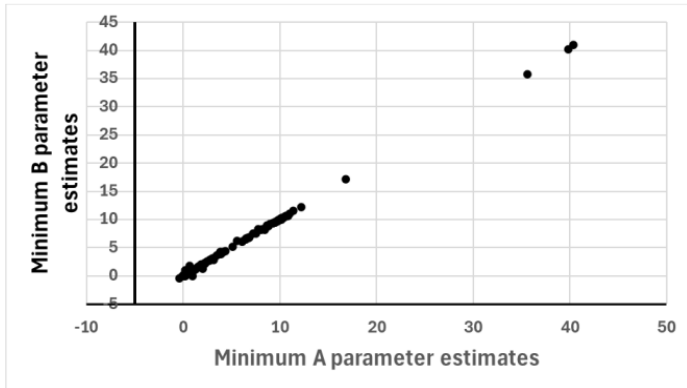


nLLF comparison

A: -897.192

B: -897.269.

Parameter comparison



Document P6: Correlated parameter estimates

$r < -0.6$

At minimum B

		Ry_CTS												Ry_WTS					
		1984	1990	1991	1995	1996	1997	1998	2006	2007	2011	2022	2023	2024	1984	1991	2000	2014	t0Ss_
Ry_WTS	1984	-0.81																	
	1990		-0.89																
	1991			-0.79															
	1996					-0.64													
	1997						-0.68												
	2006							-0.68											
	2007								-0.80										
	2011									-0.66									
	2022										-0.81								
	2023											-0.99							
	2024												-1.00						
pS	1995				-0.87														
	1998							-0.86											
	2007								-0.70										
	2014																	-0.61	
	2023											-0.99							
	2024													-1.00					
	LS1diffsMw_																		-0.78
	lnkSac_														-0.73		-0.60		
	moveSVwts_1985															-0.78			
	moveSVwts_1992																		

Document P6: Correlated parameter estimates
 $r > 0.6$

At minimum B

[illegible]

Document P6: Correlated parameter estimates

$r > 0.6, r < -0.6$

Ry_CTS , Ry_WTS; Recruitment estimates.

pS; Proportion of WTS recruitment which recruits to the West Coast.

moveSVwts; Proportion of WTS which moves from the West Coast to the South Coast in the middle of the 3rd quarter.

t0Ss and t0Sw; Growth rate parameters for the South and West Coast respectively (age at which the length is zero).

InkSac; Logarithm of the multiplicative bias associated with the hydro-acoustic survey. L

S1diffsMw and kappaSw; Growth rate parameters.

S50Ssur; Length at which survey selectivity is 50%.

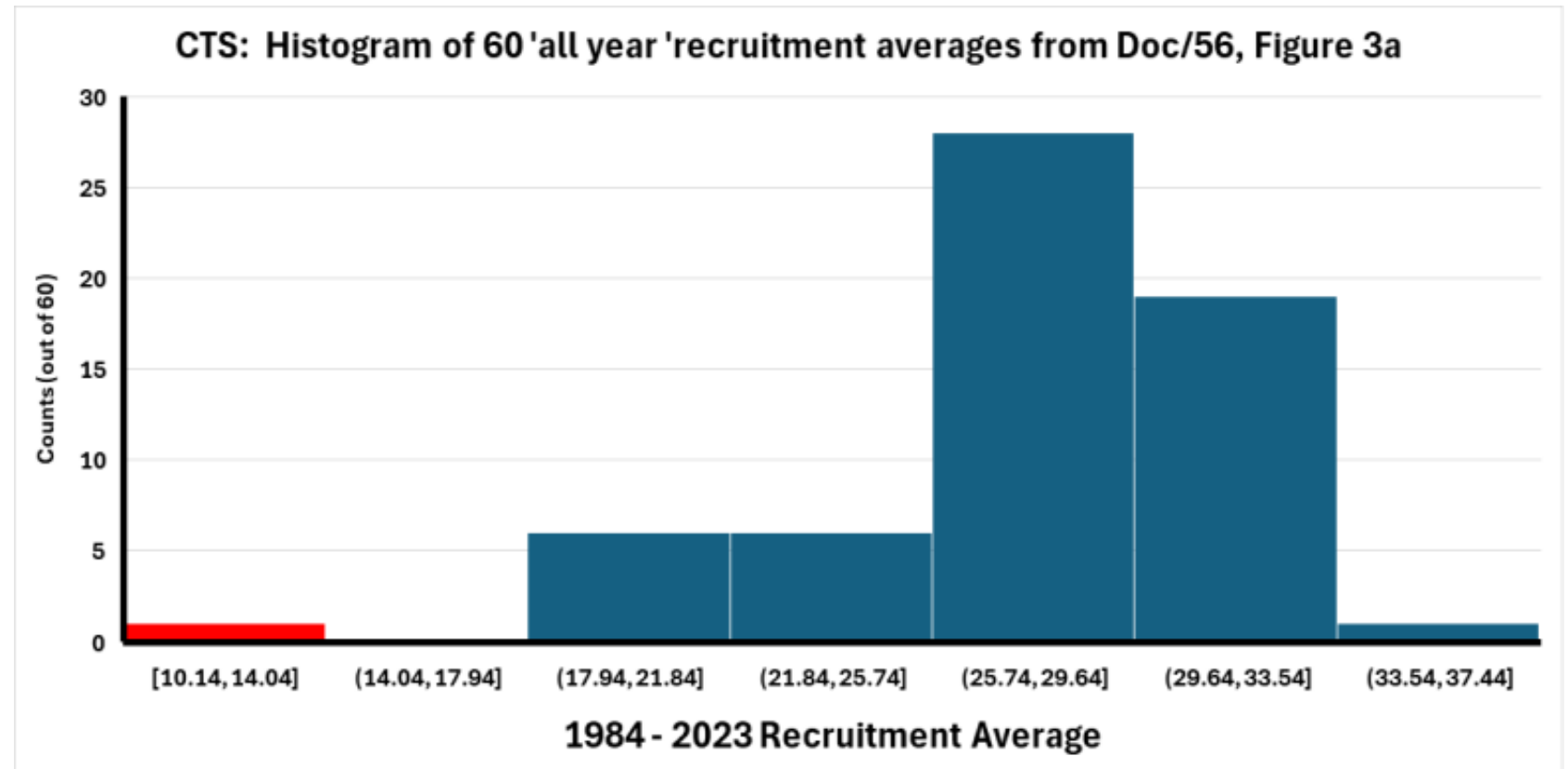
deltaSsur; Inverse of the slope of survey selectivity-at-length ogive when selectivity is 50%.

Document P6: Apparent disconnect between mode of posterior and Markov chain

RED : posterior mode (Minimum B), BLUE: n=60 from Markov chain, Doc/56 2025.

Minimum B: Mean 1984 to 2023 recruitment values : CTS – 10.14 billion

(de Moor pers. comm. Oct 2025: 11.46 billion)



Document P6: Apparent disconnect between mode of posterior and Markov chain

RED : posterior mode (Minimum B), BLUE: n=60 from Markov chain, Doc/56 2025.

Minimum B: Mean 1984 to 2023 recruitment values : WTS – 42.82 billion

(de Moor pers. comm. Oct 2025: 39.90 billion)

