1/24 : 1-A-I

ABT-MSE Operating model fitting report

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Operating model scenario is:

1: West - Hockey stick, East - '83+ B-H h=0.98
A: West - Current SSB is best estimate, East - Current SSB is best estimate
I: West - younger spawning, East - younger spawning

Area definitions for operating model:

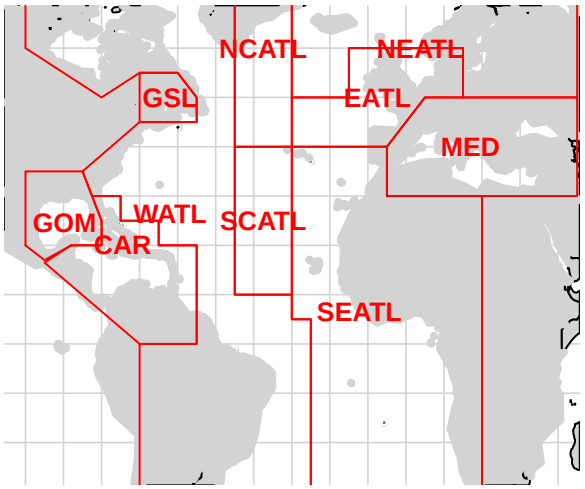


Figure 1. Area definitions for operating model

Fits to CPUE indices of relative abundance

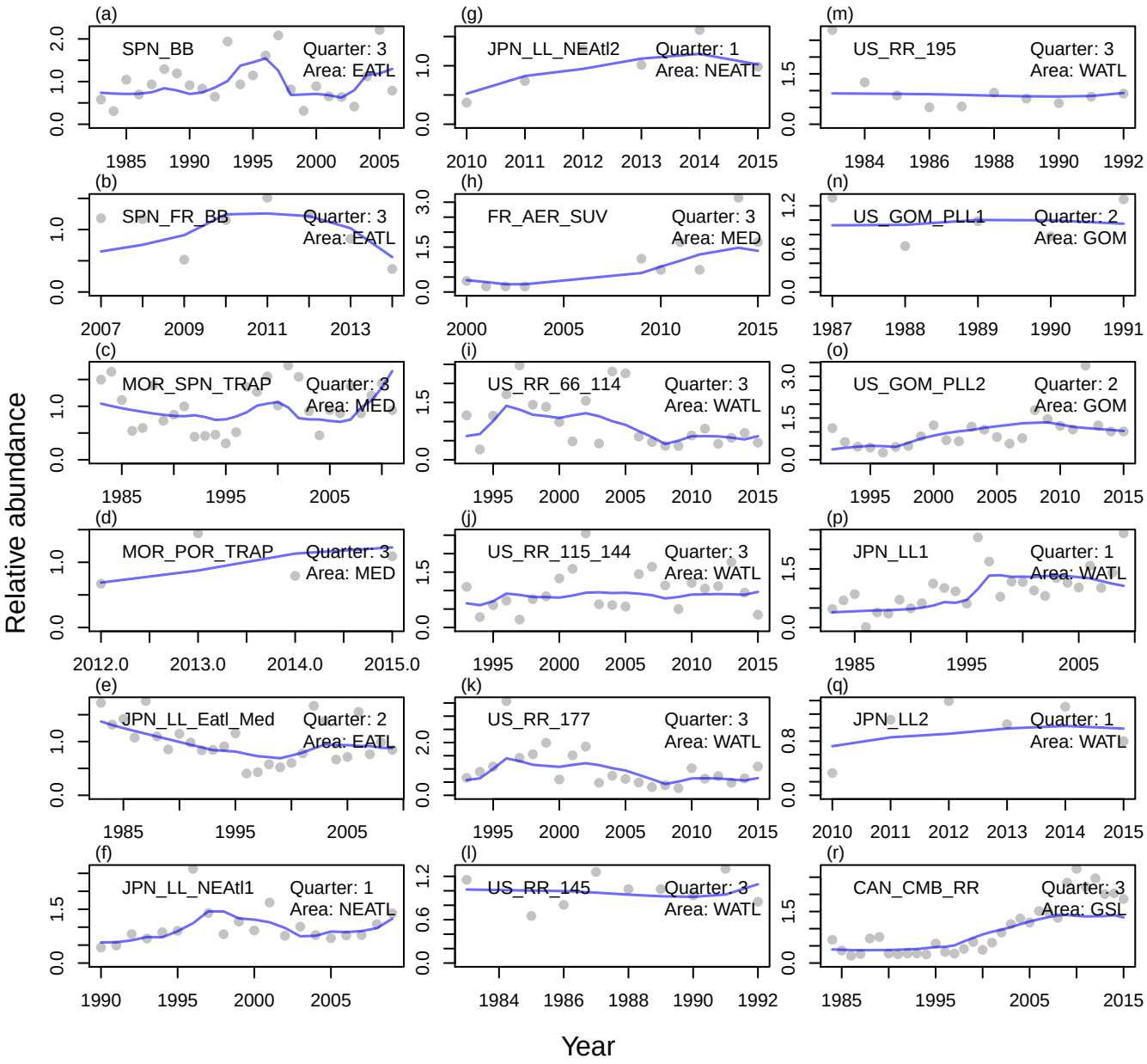


Figure 2. Assessment CPUE index fits (blue line = predicted, grey dots = index)

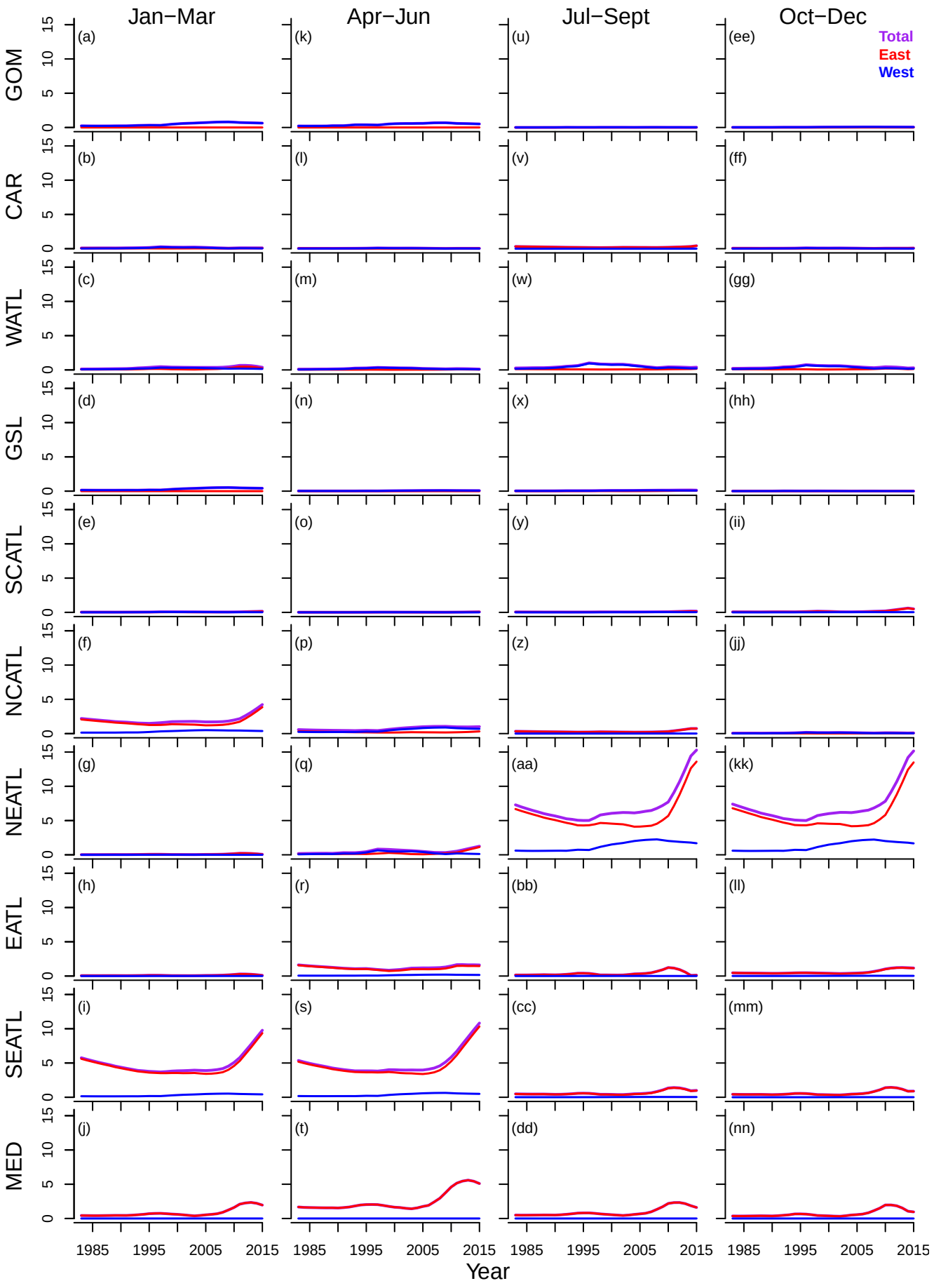


Figure 3. Predicted seasonal and spatial biomass of Atlantic bluefin tuna (Recent period).

Historical Spawning biomass

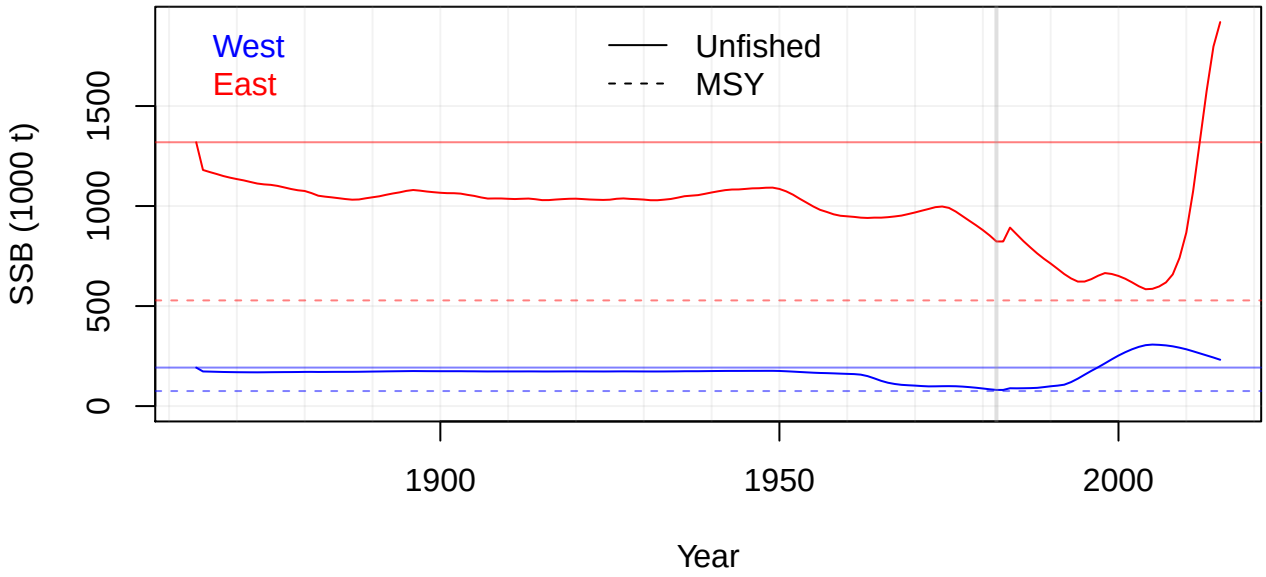


Figure 4. Predicted seasonal and spatial biomass of Atlantic bluefin tuna (Recent period).

SSB, recruitment and F comparison with 2014 assessment (by East/West area, not East/West stock)

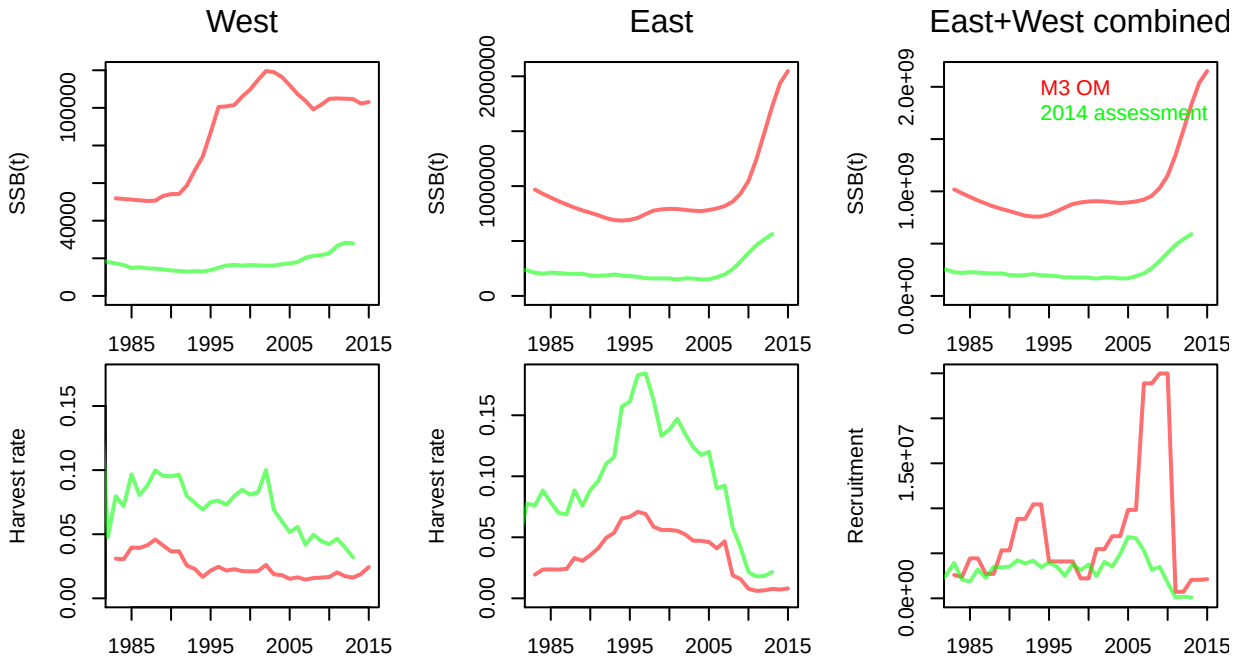


Figure 3.Regional comparisons (45deg W) with 2014 stock assessment. Note that annual estimates from the operating model are calculated from average of the seasonal predictions. Harvest rates from the operating model are based on total stock biomass not vulnerable biomass which is fleet specific (and hence may not be comparable with assessments).

Stock-recruitment relationships (R0 is unfished mean recruitment)

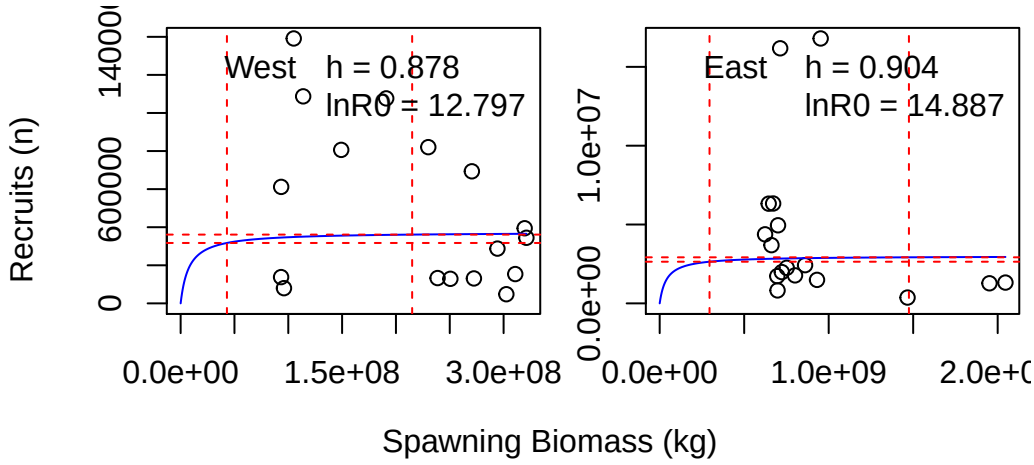


Figure 4. Model predicted pairs of SSB and recruitment(with a fitted Bev Holt for illustration)

MSY reference points (2013 for comparison with previous assessment)

Table 1. Reference points by stock.

	MSY	FMSYap	UMSY	BMSY	SSBMSY	BMSY_B0	SSBMSY_SSB0	RMSY_R0	F_FMSY	SSB_SSB0
East	52214	0.275	0.146	357005	314265	0.457	0.401	0.962	0.112	1.195
West	7512	0.265	0.161	46594	42938	0.434	0.391	0.949	0.116	1.315

2014 Assessment MSY reference points (by East/West area)

Table 2. Where available, reference points from most recent assessments

	MSY	FMSYap	UMSY	BMSY	SSBMSY	BMSY_B0	SSBMSY_SSB0	RMSY_R0	F_FMSY	SSB_SSB0
East	-	-	-	-	-	-	-	-	0.75	0.45
West	3056	0.23	-	-	13268	-	-	-	0.47-0.85	0.35-2.1

Current annual mean F-at-age profile, all fleets, seasons, areas

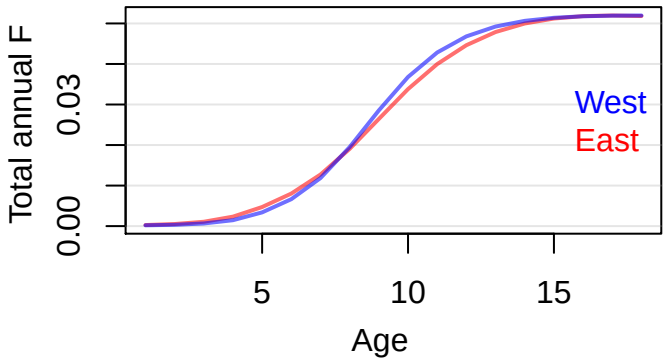


Figure 5. The current profile of F at age summed over all fleets.

Estimated size selectivity by fleet

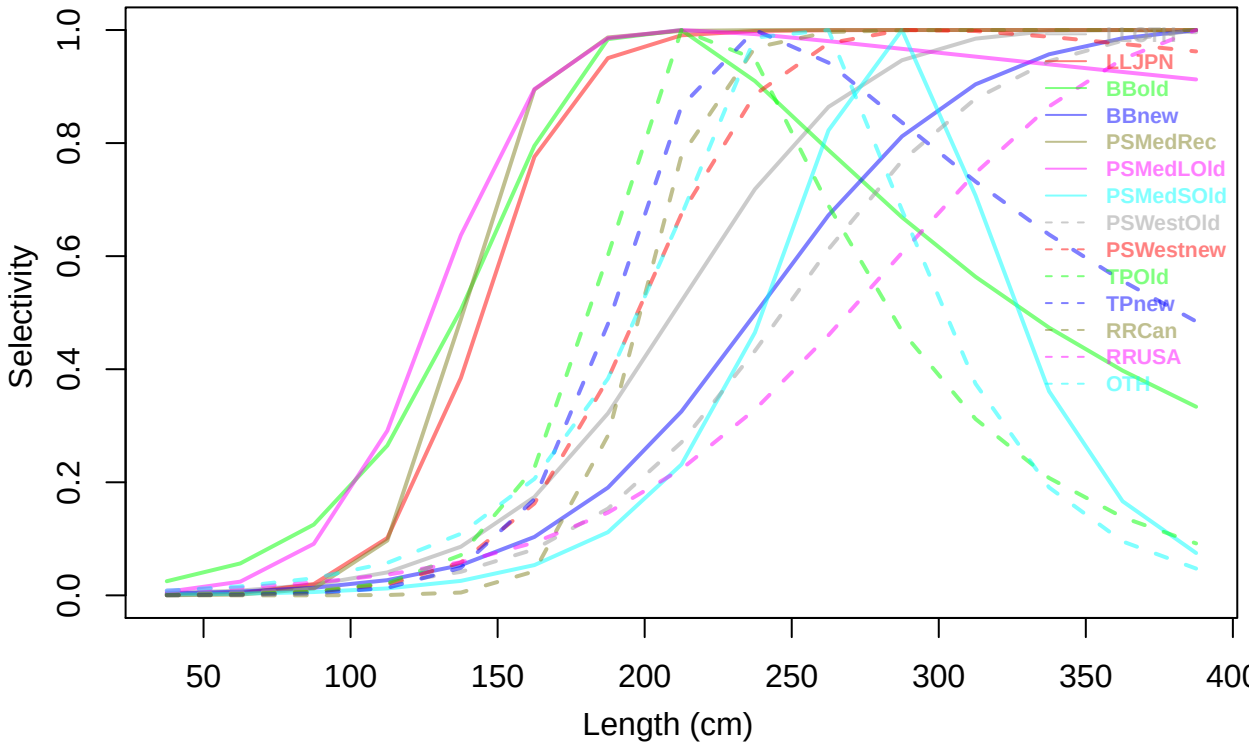


Figure 6.

Estimated unfished movement and spatial distribution

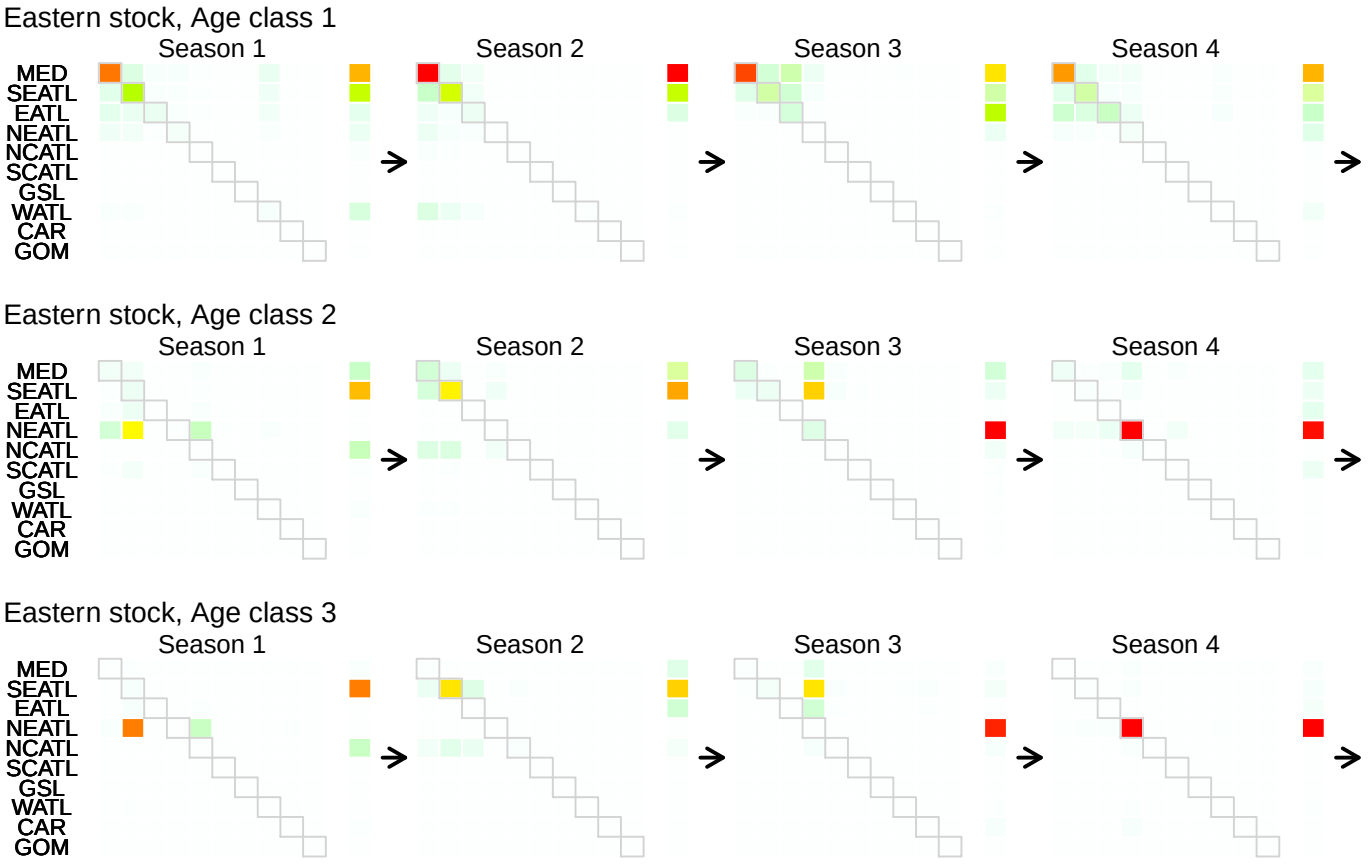


Figure 7. The implied asymptotic distribution of fish under unfished conditions (red-orange-green-white, more to less)

Fit to aggregate catches

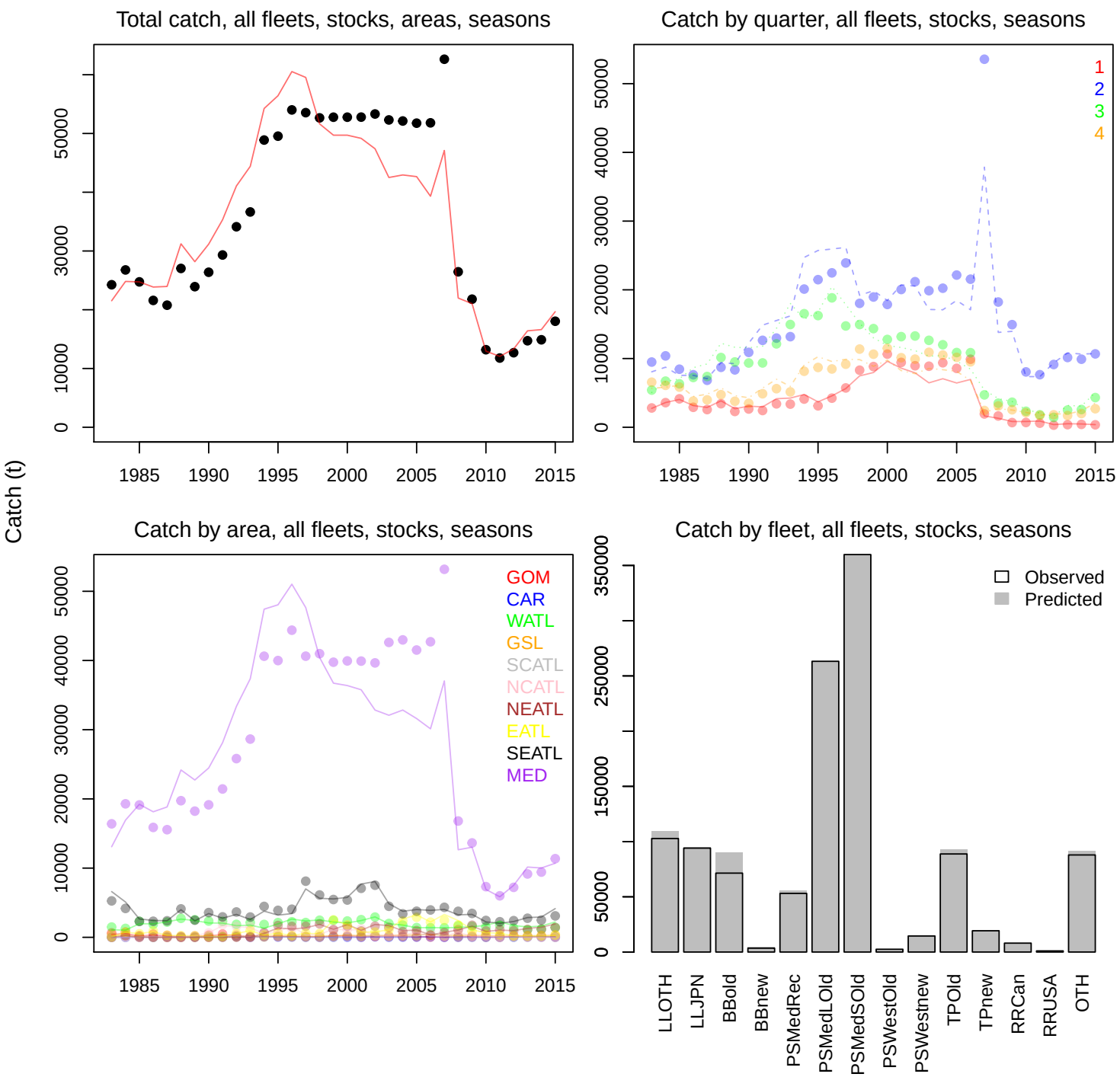


Figure 8. Fit to a observed total catches aggregated over various axes (lines = predicted, points = observed)

Fit to aggregate length composition

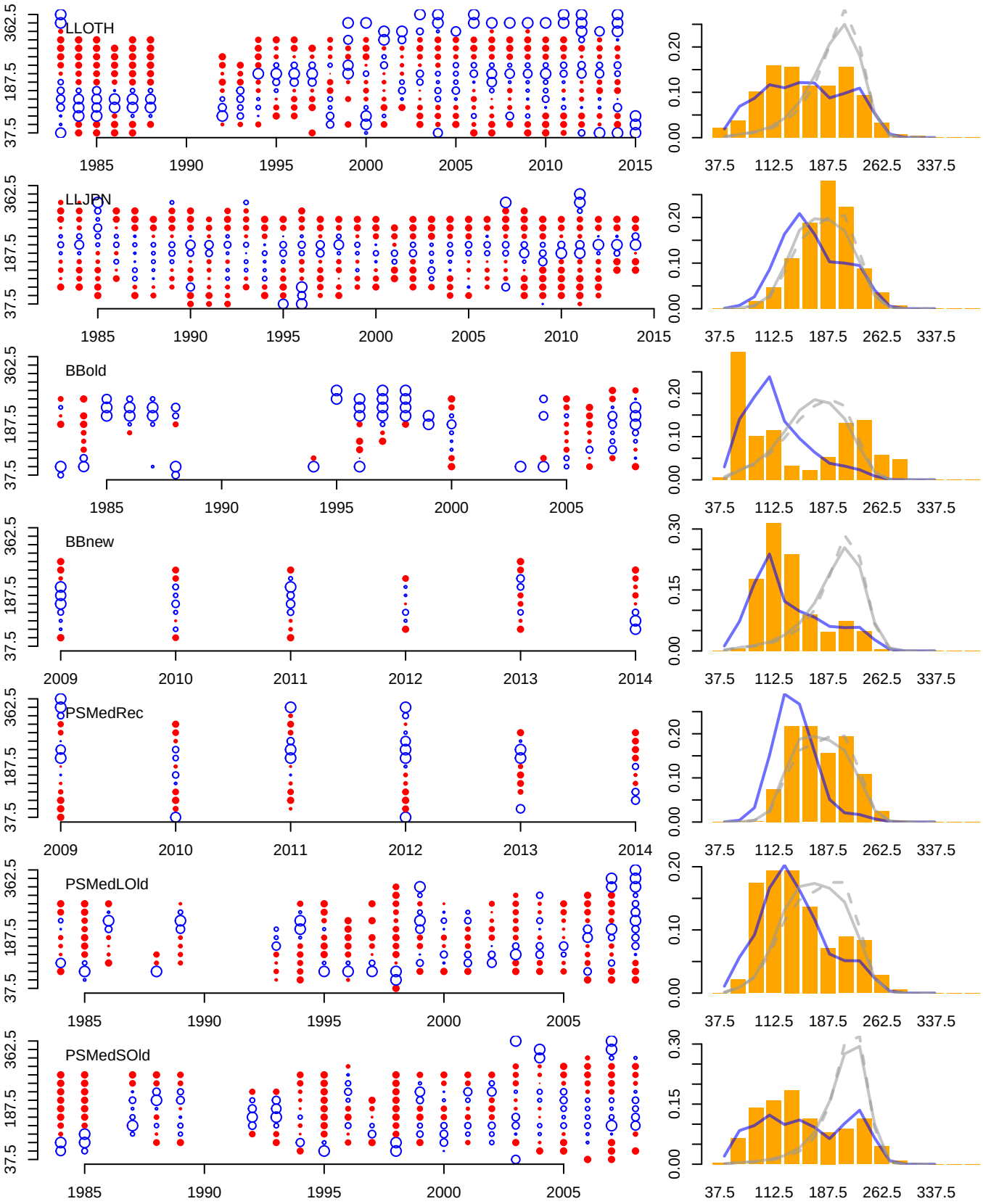


Figure 9a.Length composition residuals. Red points are negative Pearson residuals (predicted is higher than observed), blue circles are positive (predicted is lower than observed). Orange bars are observed, blue lines are model predicttions.

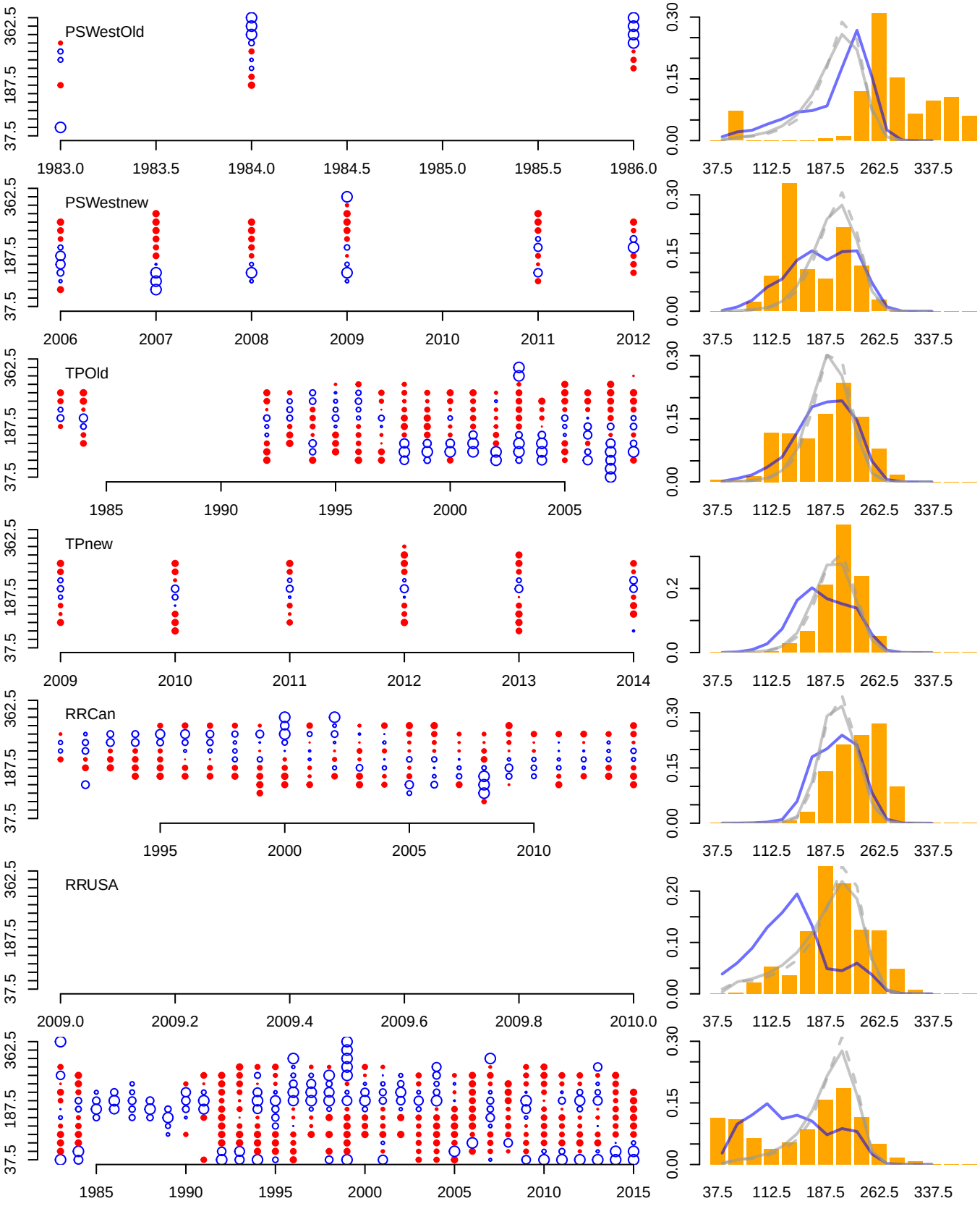
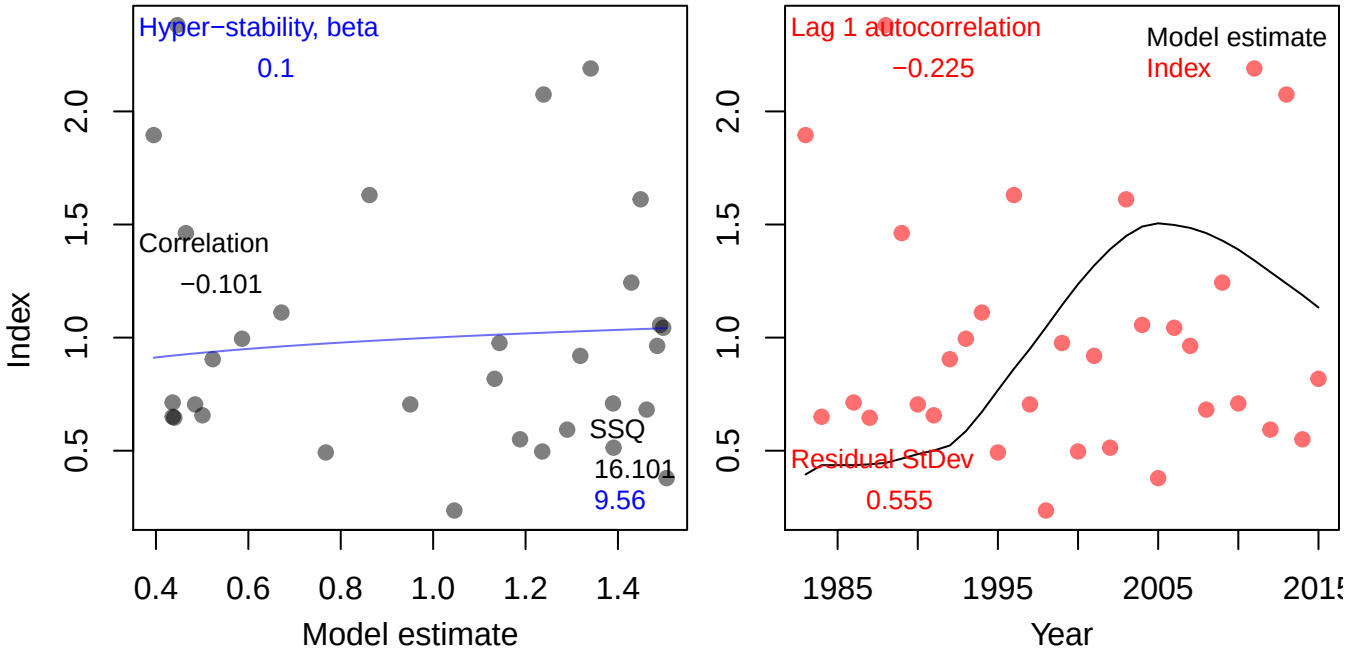


Figure 9b.Length composition residuals. Red points are negative Pearson residuals (predicted is higher than observed), blue circles are positive (predicted is lower than observed).Orange bars are observed, blue lines are model predicttions.

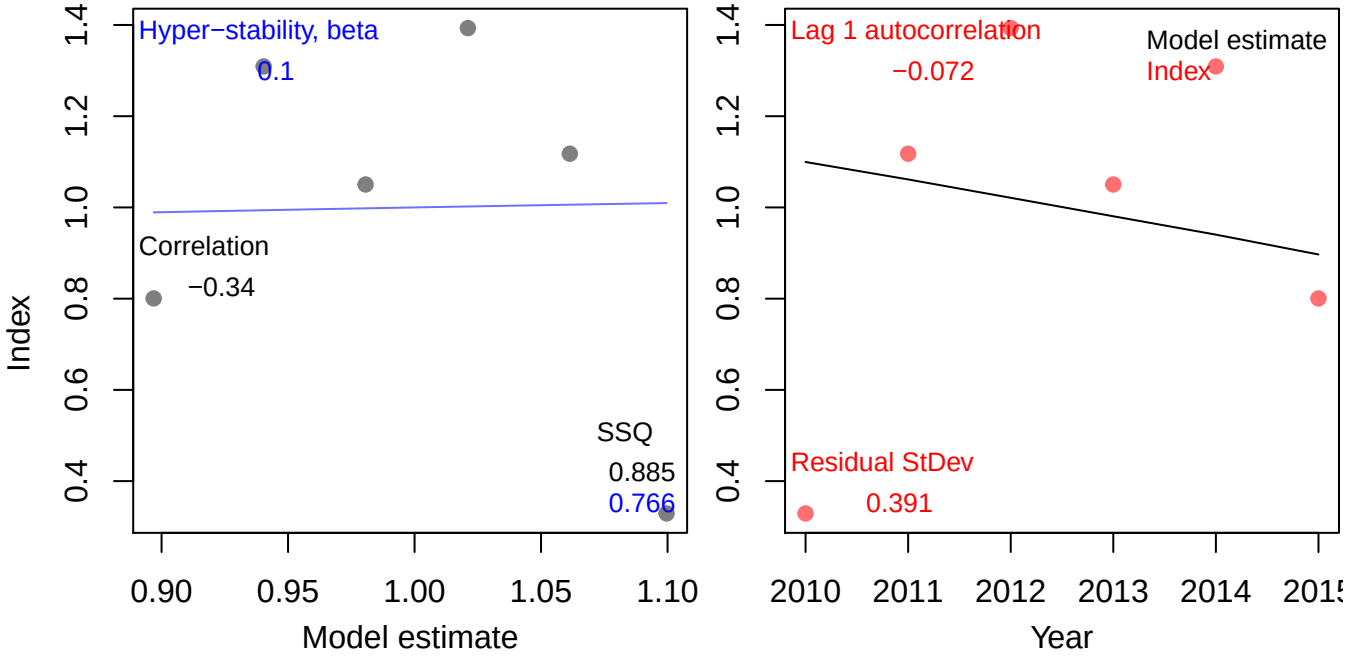
Other model estimates and fits

Statistical properties of indices for use in Management Procedures

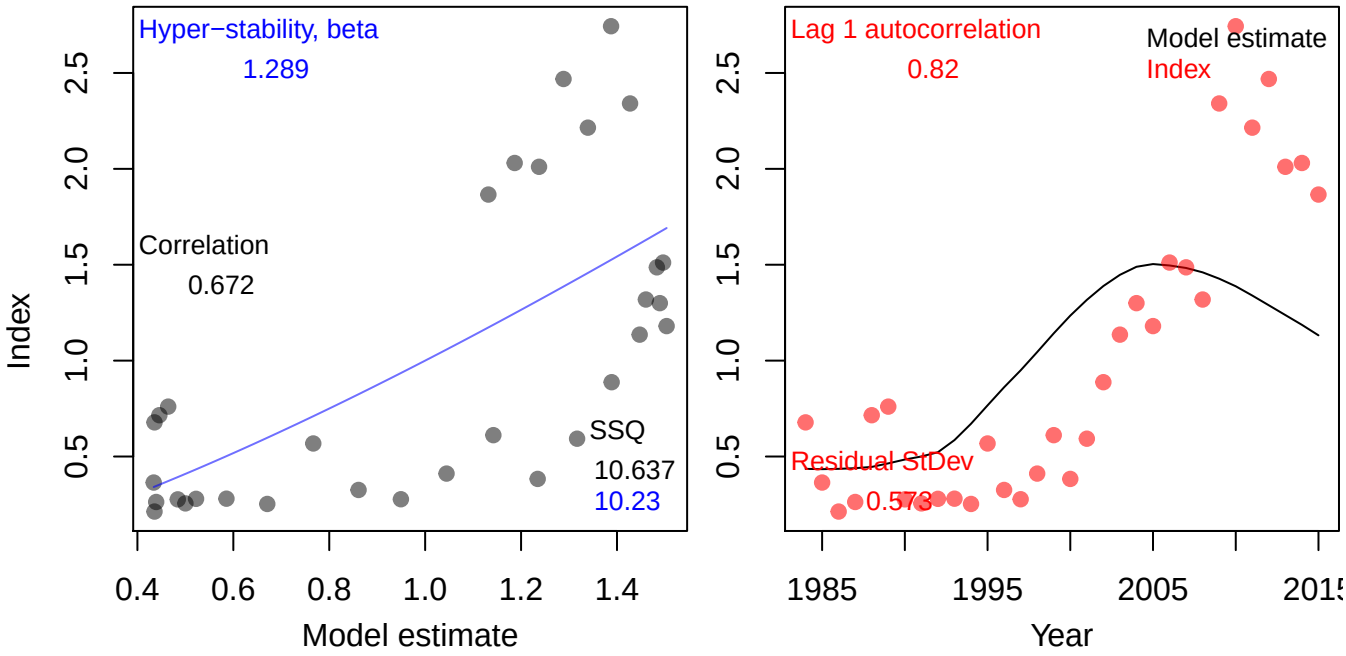
Index fit and statistical properties for GOM_Larval



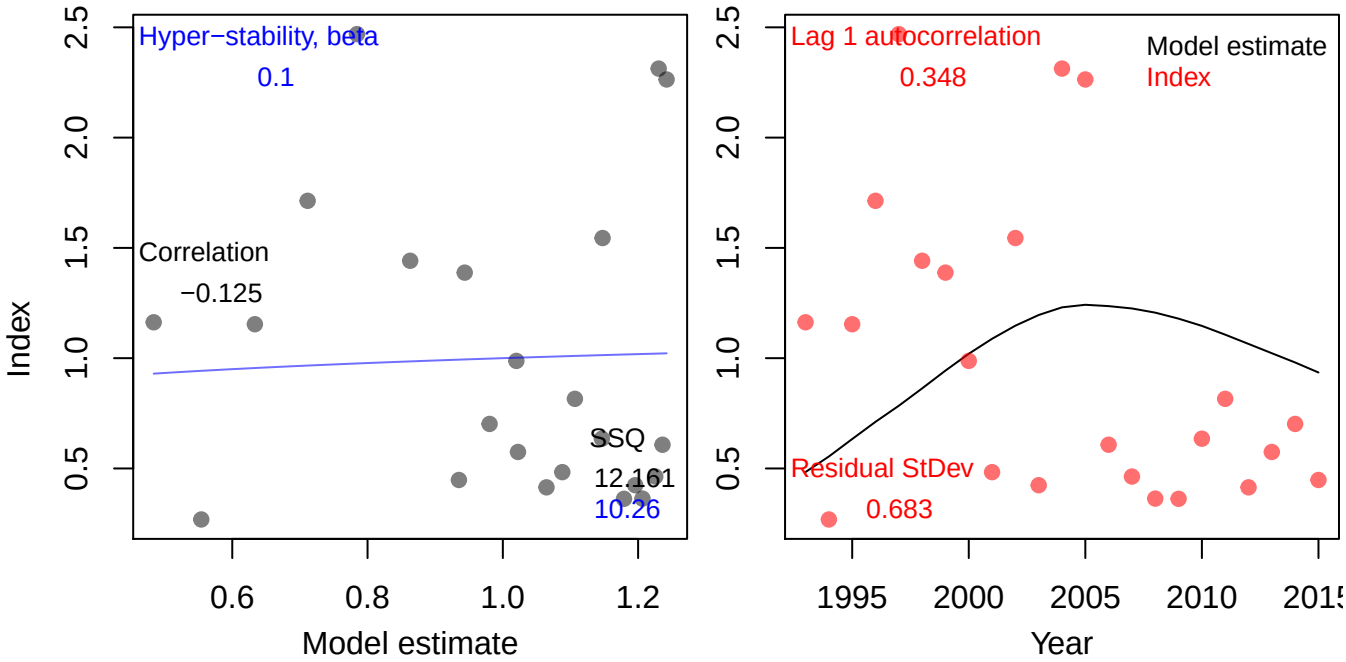
Index fit and statistical properties for JP_LL_W



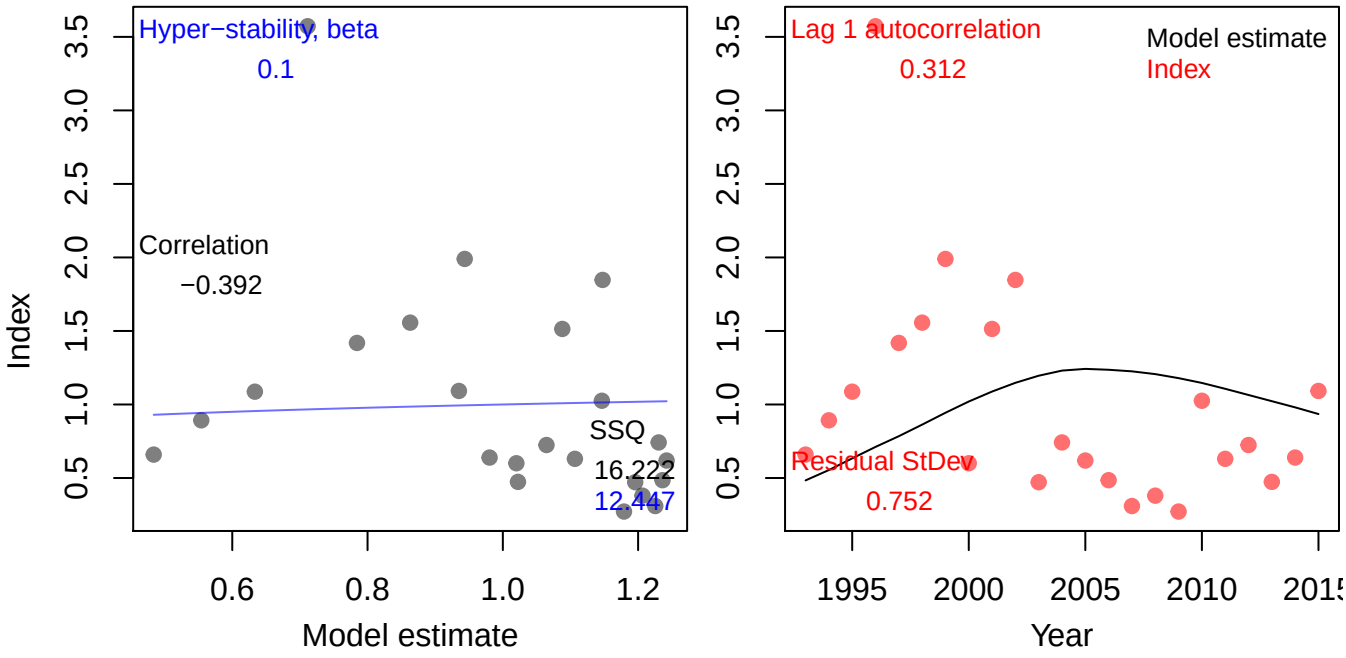
Index fit and statistical properties for CAN-comb-RR



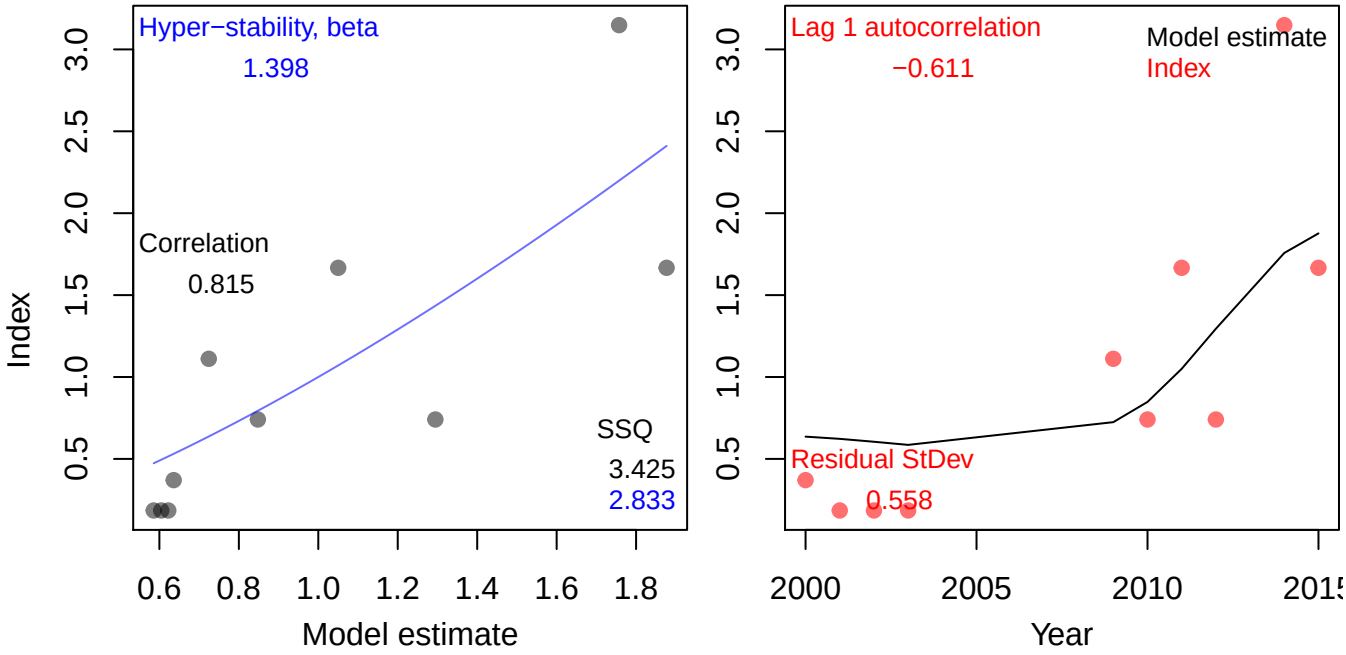
Index fit and statistical properties for US_RR_66_114



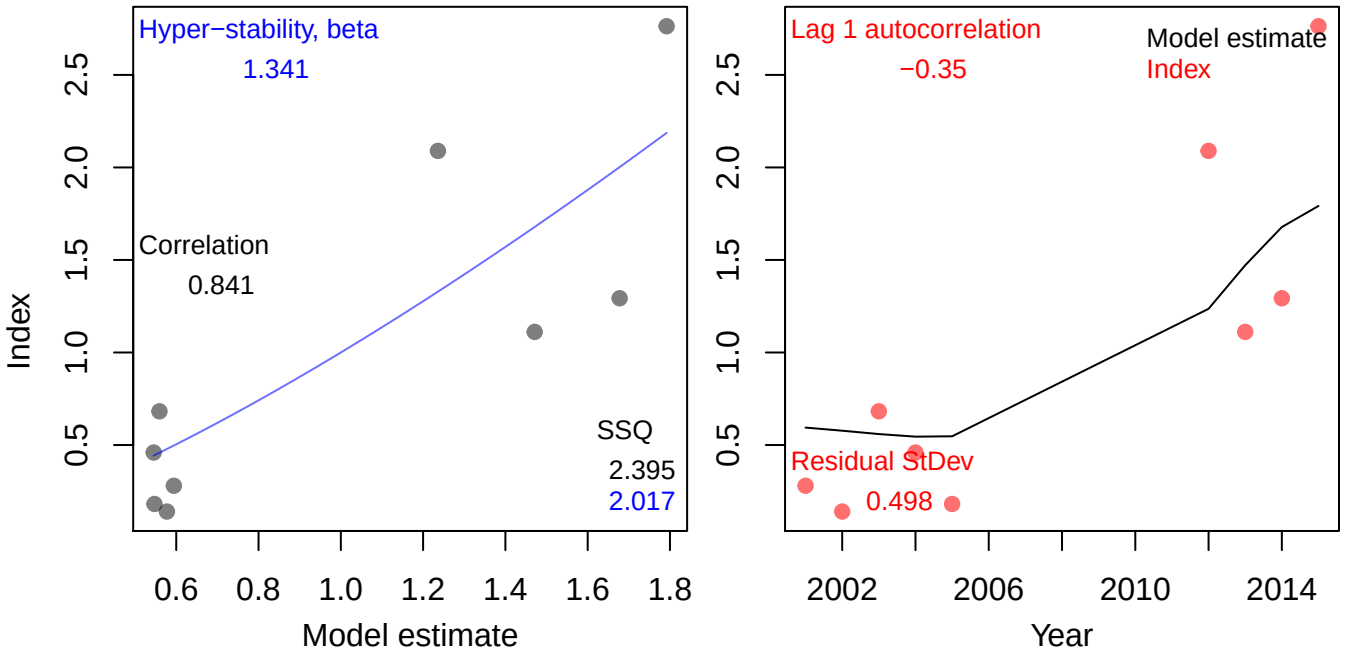
Index fit and statistical properties for US_RR_177



Index fit and statistical properties for FR_Aerial



Index fit and statistical properties for MED_Larval



Index fit and statistical properties for JP_LL_NE

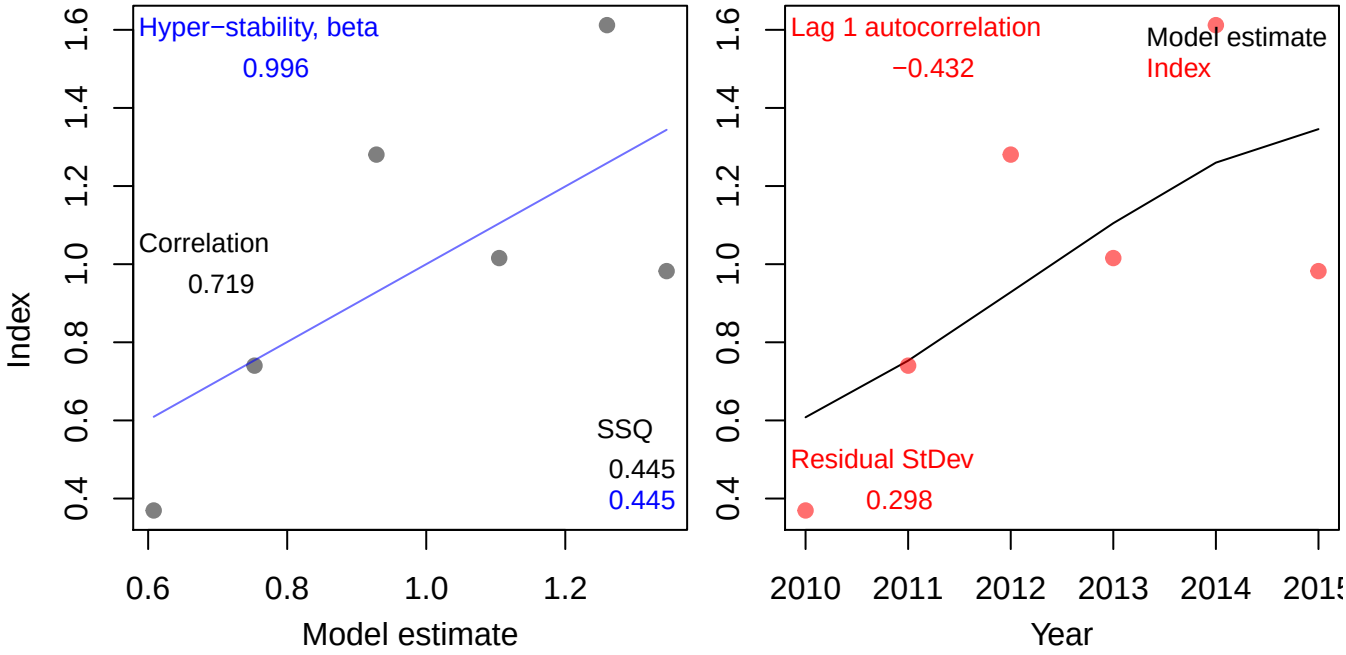


Figure 10.