# 4/24 : 1-B-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
B: West - Current SSB is 75% of best estimate, East - Current SSB is 50% of best estimate
I: West - younger spawning, East - younger spawning

**Area definitions for operating model:**

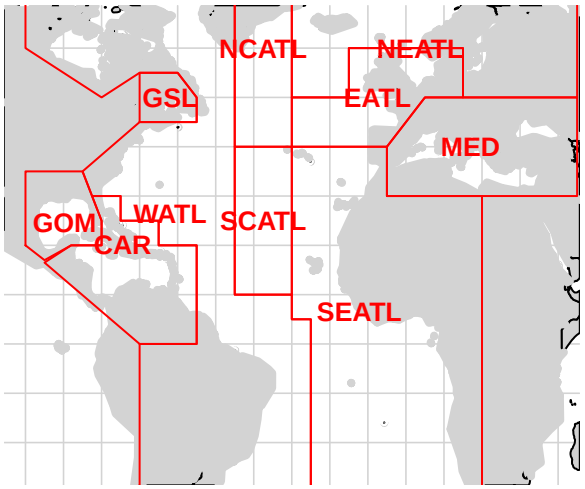



Figure 1. Area definitions for operating model

**Fits to CPUE indices of relative abundance**

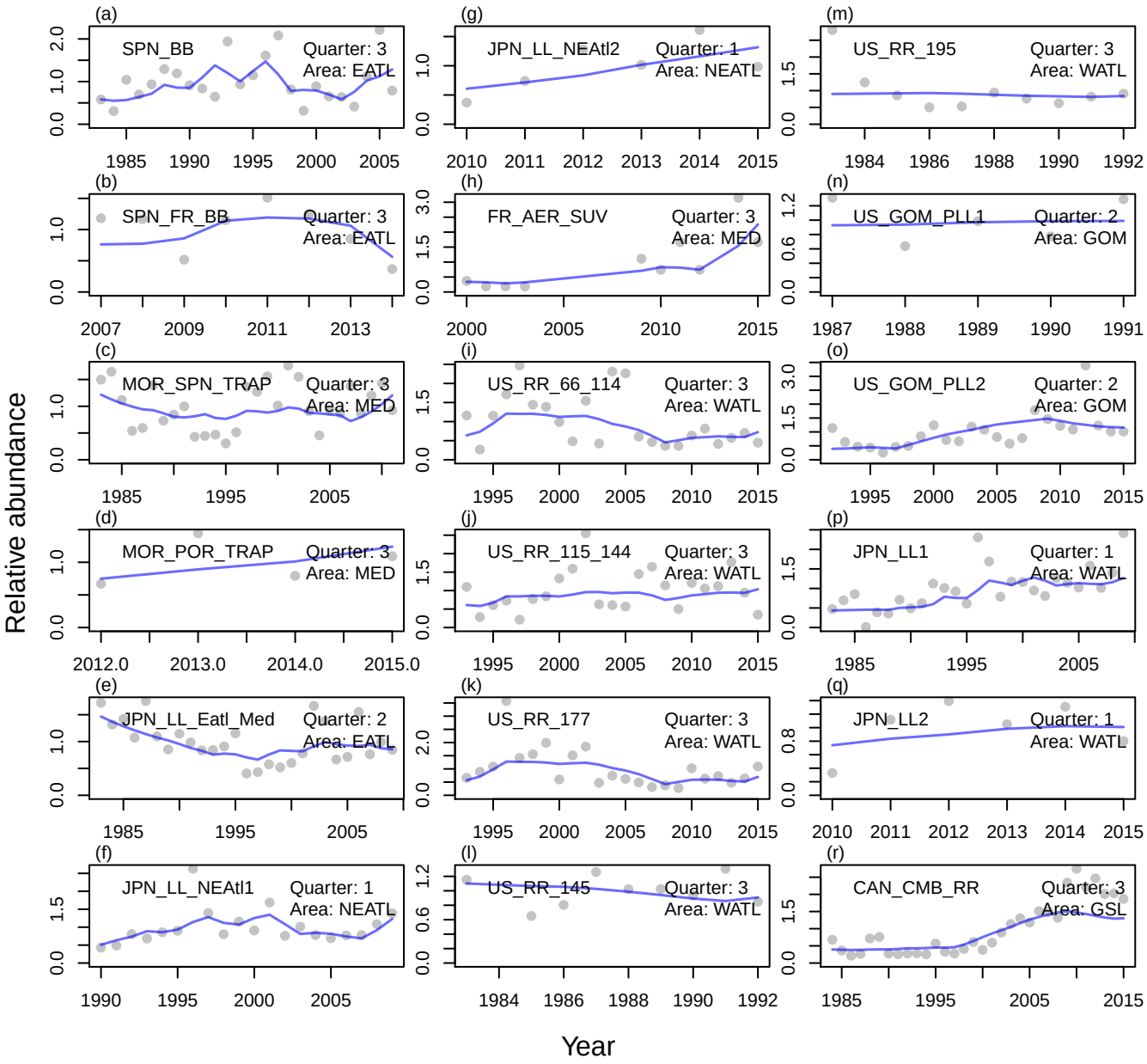



Figure 2. Assessment CPUE index fits (blue line = predicted, grey dots = index)

**Predicted seasonal and spatial biomass of Atlantic bluefin tuna**

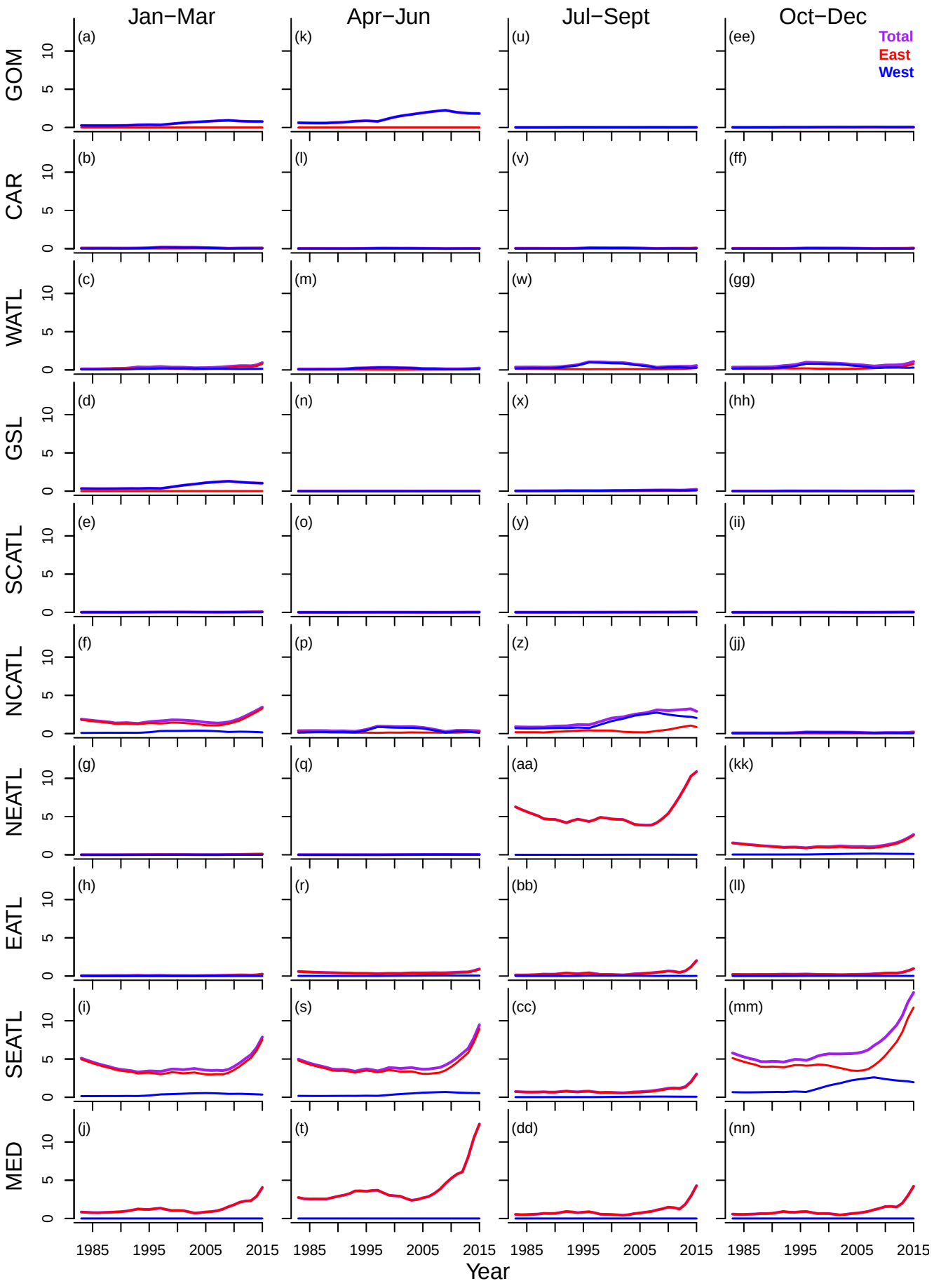



Figure 3. Predicted seasonal and spatial biomass of Atlantic bluefin tuna (Recent period).

**Historical Spawning biomass**

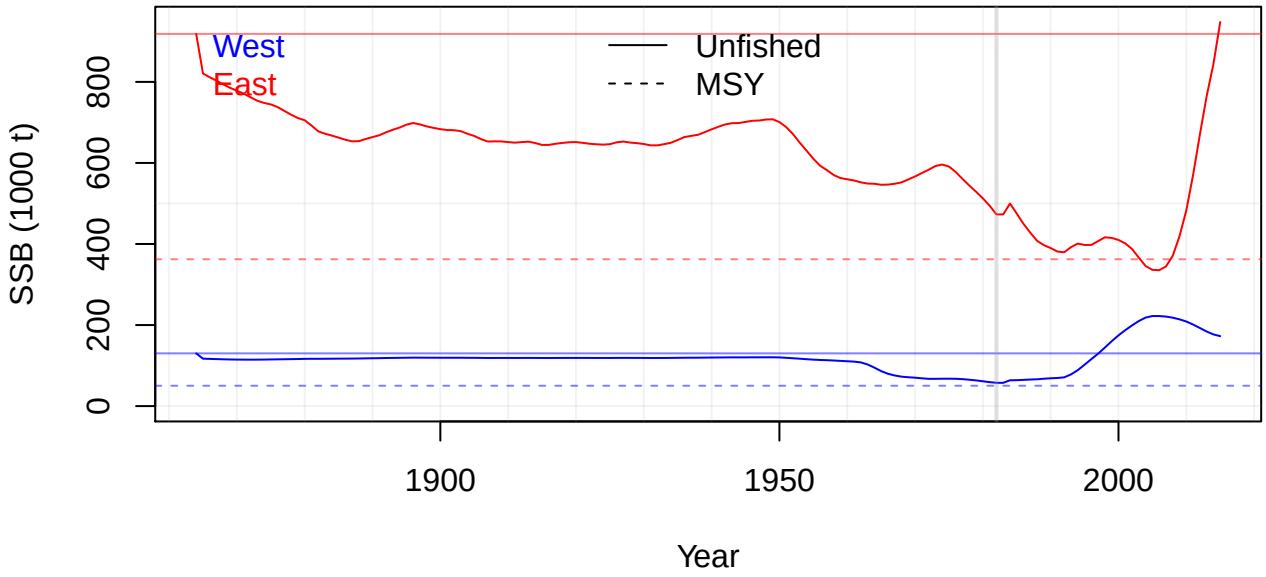



Figure 4. Predicted seasonal and spatial biomass of Atlantic bluefin tuna (Recent period).

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

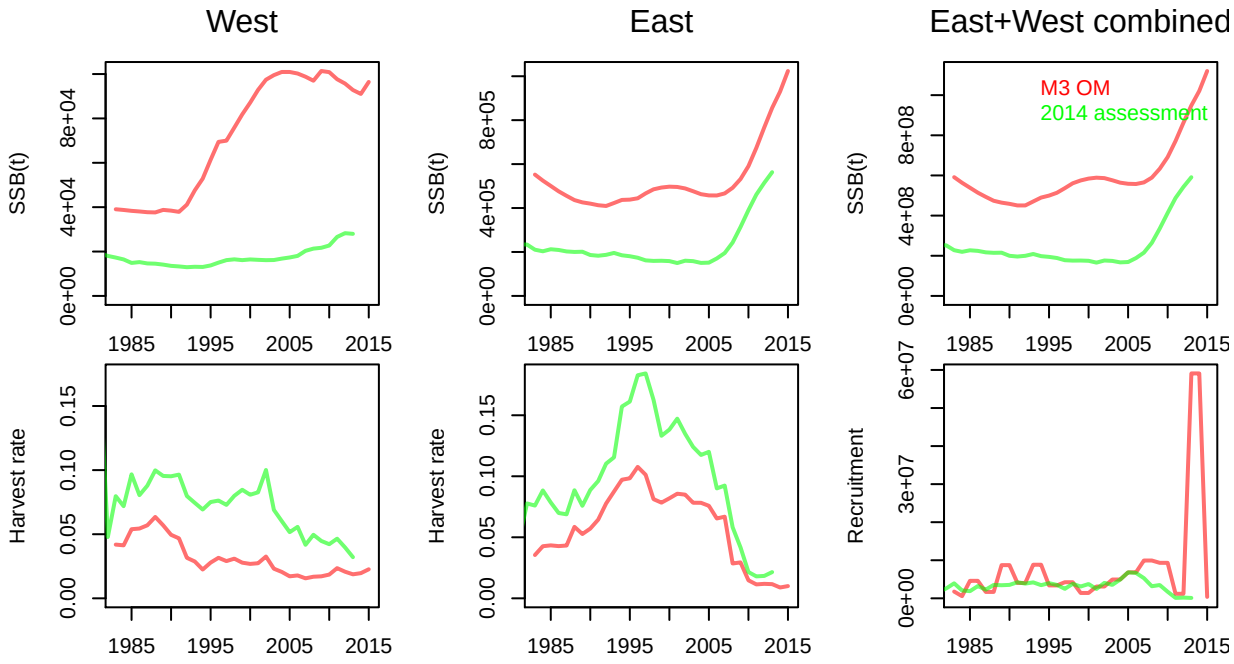



Figure 3.Regional comparisons (45deg W) with 2014 stock assessment. Note that annual estimates from the operating model are calculated from average of the seasonal predictions. Harvest rates from the operating model are based on total stock biomass not vulnerable biomass which is fleet specific (and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

**Stock-recruitment relationships (R0 is unfished mean recruitment)**

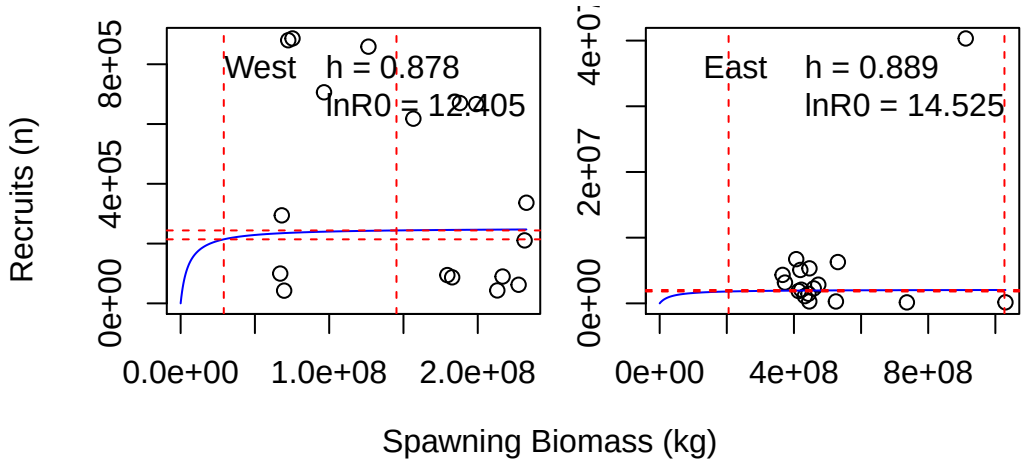



Figure 4. Model predicted pairs of SSB and recruitment(with a fitted Bev Holt for illustration)

**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 | 35428 | 0.237 | 0.144 | 246278 | 216749 | 0.450 | 0.395 | 0.954 | 0.174 | 0.832 |
| West | 5458 | 0.234 | 0.159 | 34421 | 31703 | 0.429 | 0.386 | 0.948 | 0.177 | 1.415 |

**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**

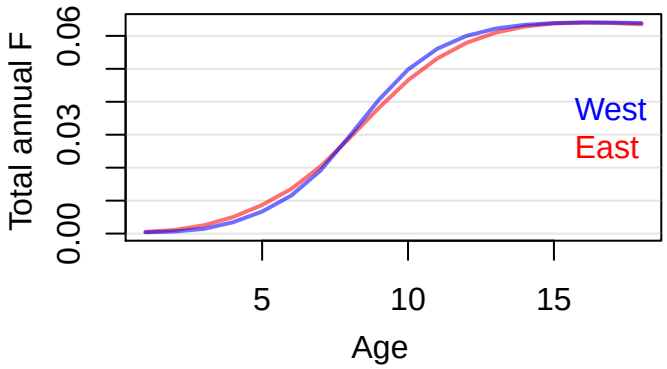



Figure 5. The current profile of F at age summed over all fleets.

**Estimated size selectivity by fleet**

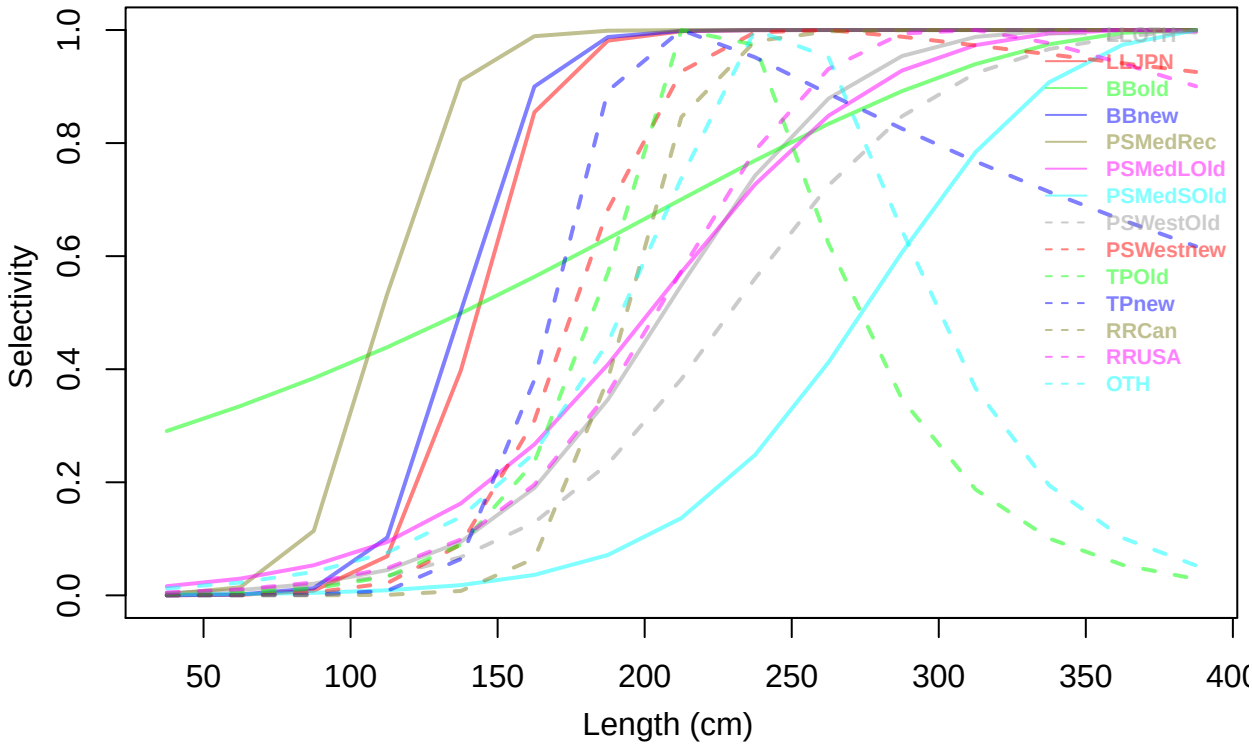



Figure 6.

**Estimated unfished movement and spatial distribution**

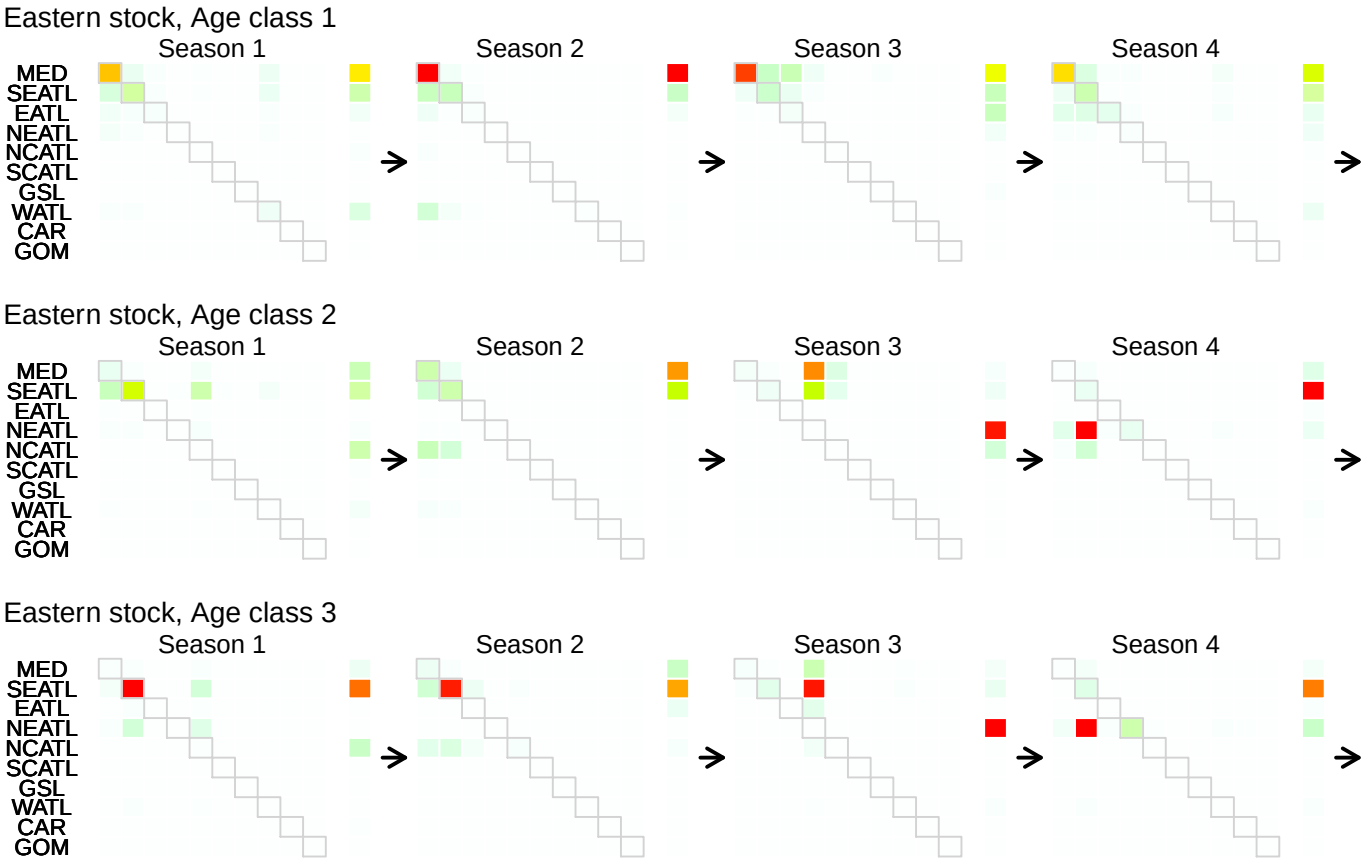



Figure 7. The implied asymptotic distribution of fish under unfished conditions (red-orange-green-white, more to less)

**Fit to aggregate catches**

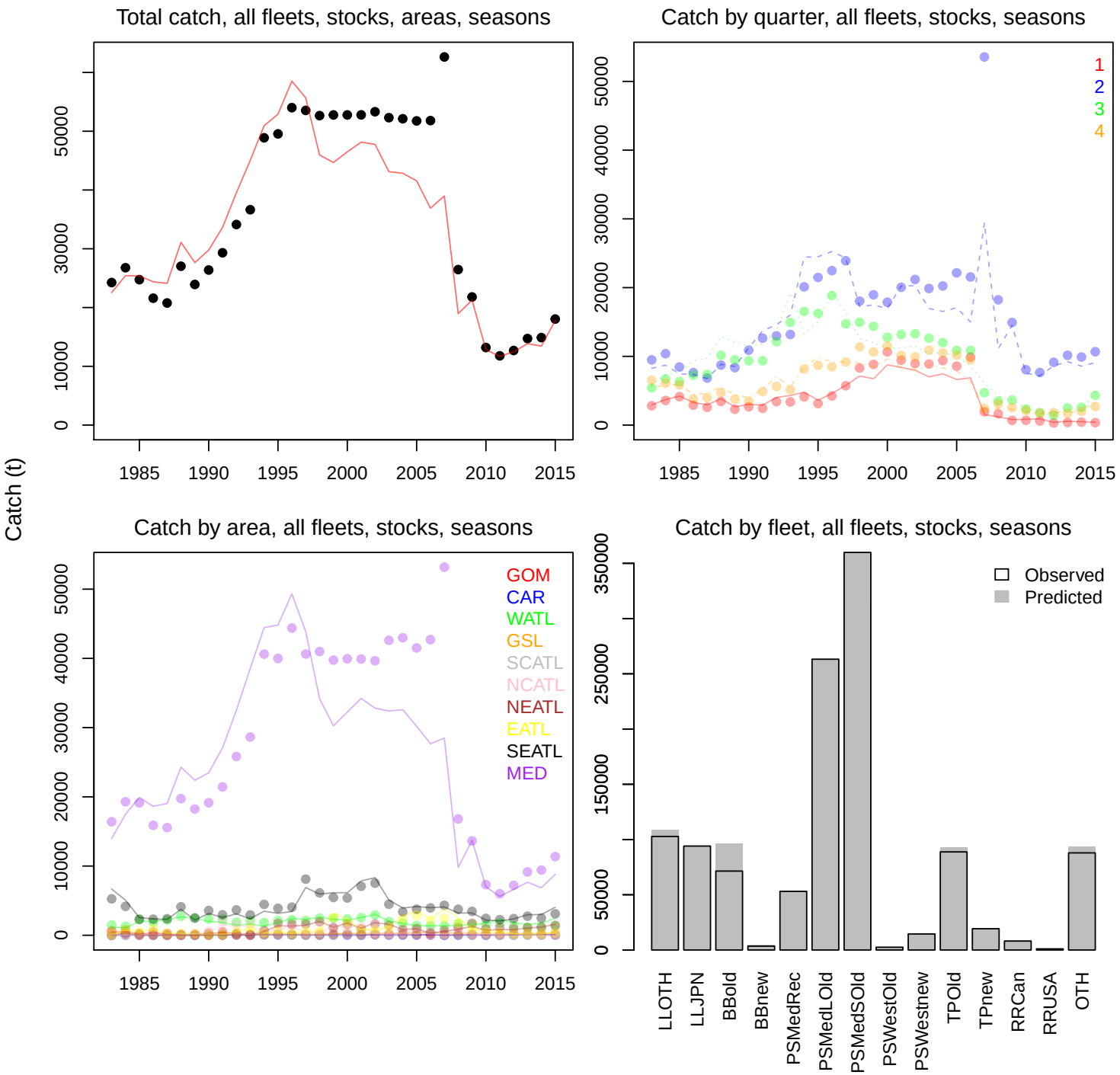



Figure 8. Fit to a observed total catches aggregated over various axes (lines = predicted, points = observed)

**Fit to aggregate length composition**

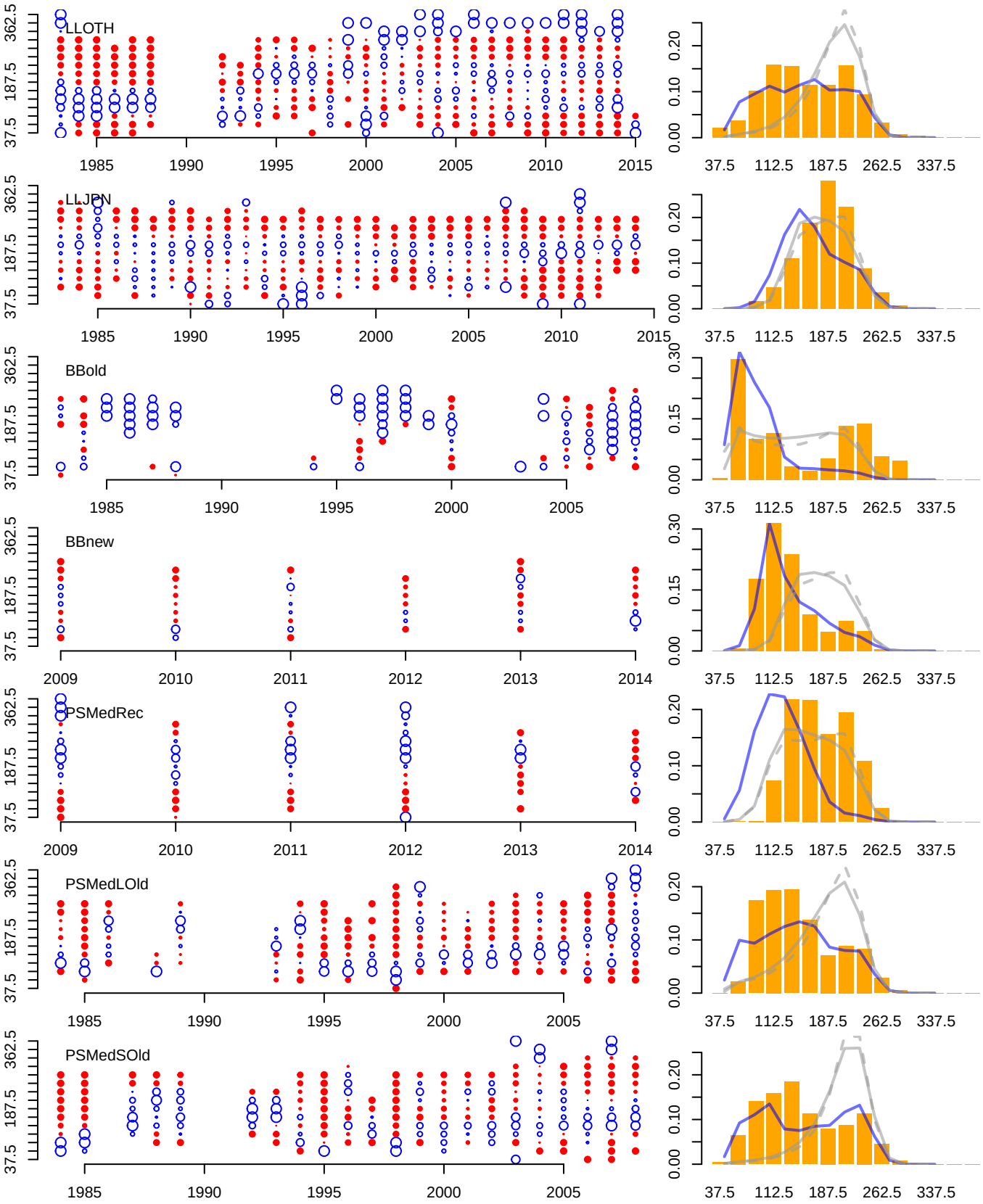



Figure 9a.Length composition residuals. Red points are negative Pearson residuals (predicted is higher than observed), blue circles are positive (predicted is lower than observed). Orange bars are observed, blue lines are model predicttions.

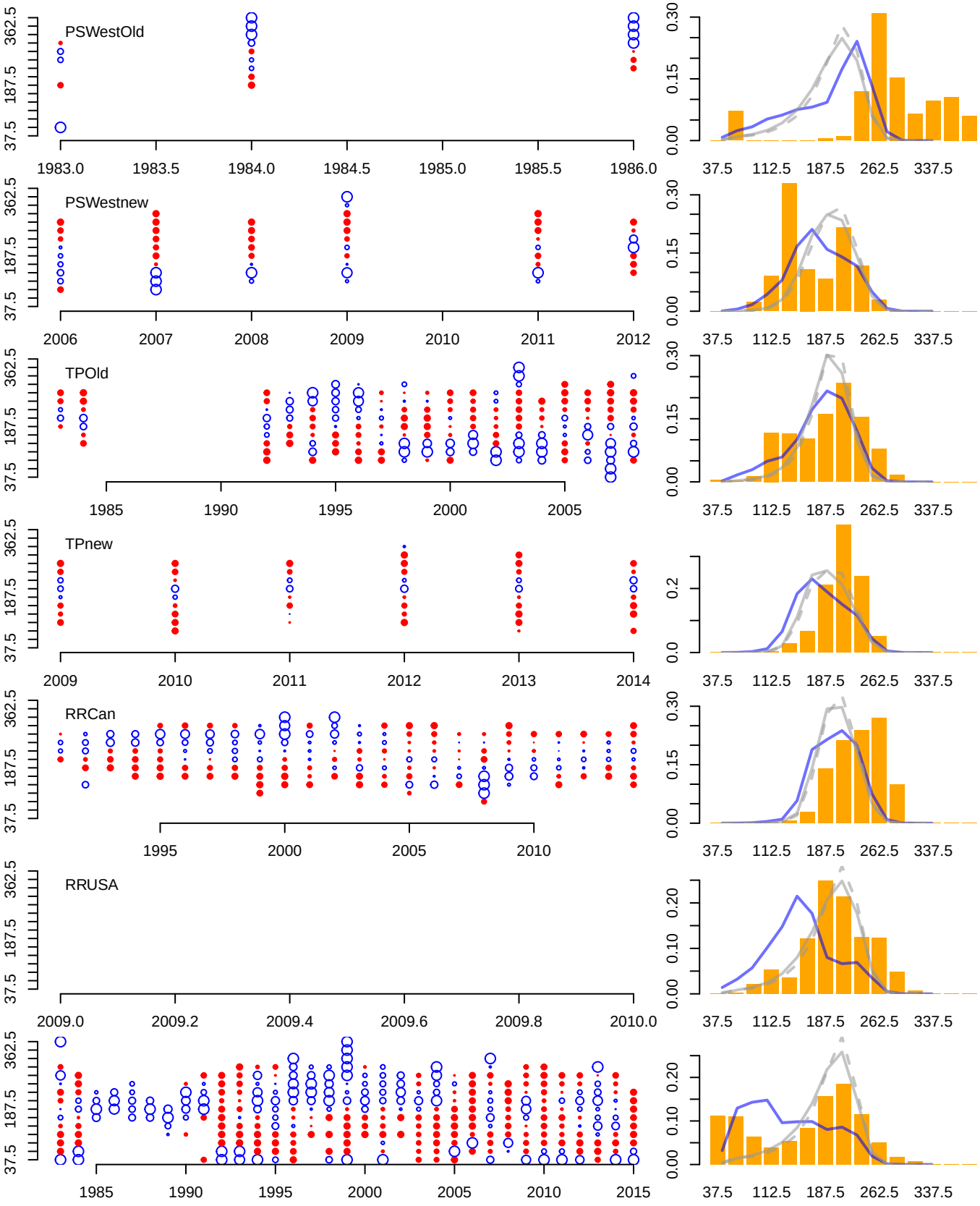
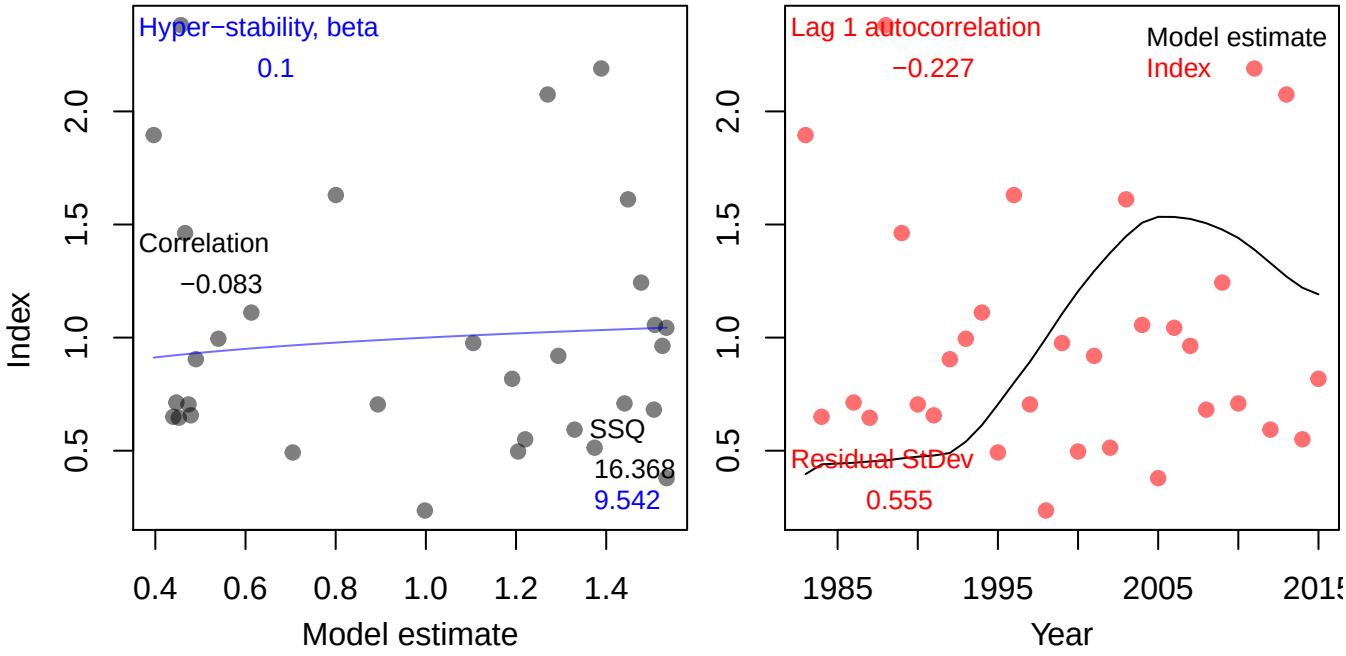



Figure 9b.Length composition residuals. Red points are negative Pearson residuals (predicted is higher than observed), blue circles are positive (predicted is lower than observed).Orange bars are observed, blue lines are model predicttions.

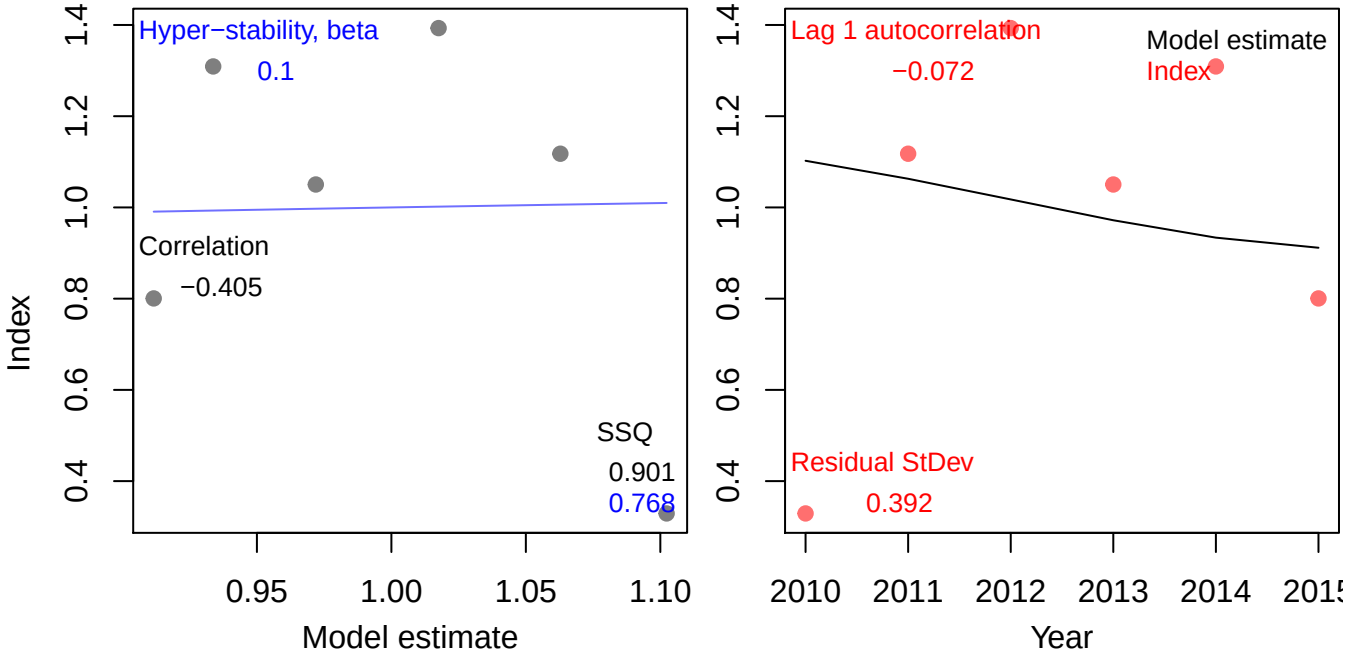
## Other model estimates and fits

### Statistical properties of indices for use in Management Procedures

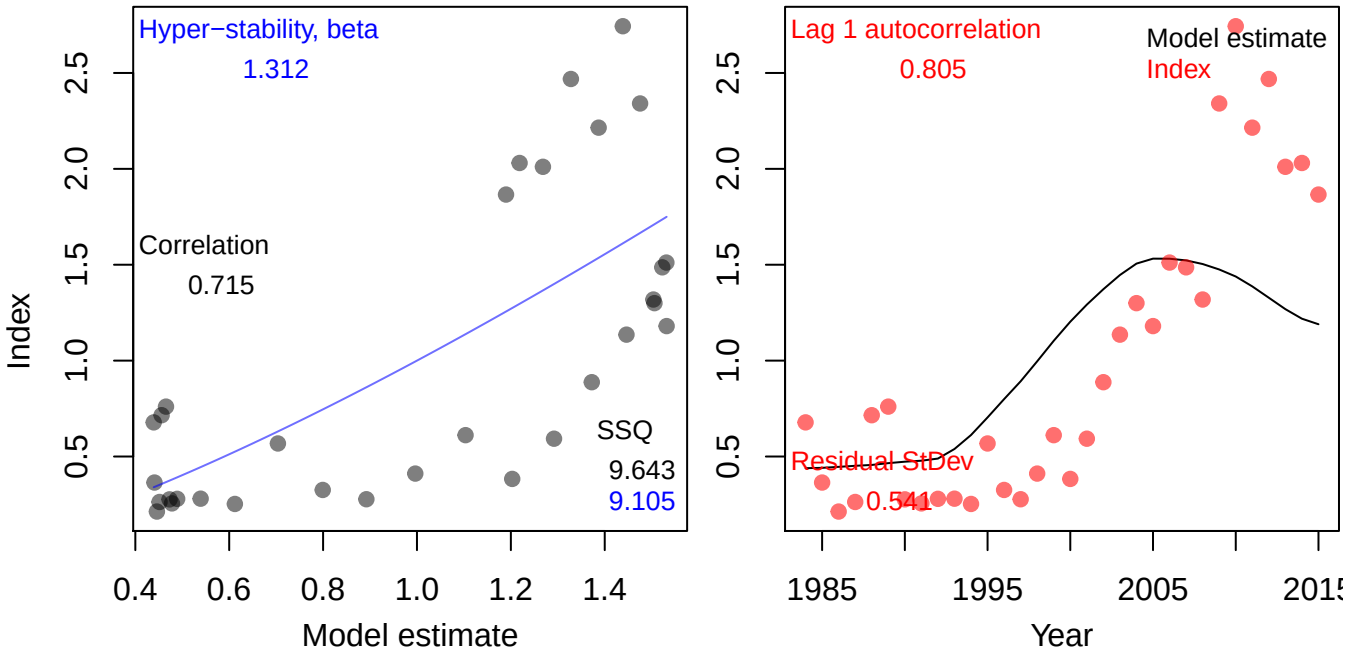
#### Index fit and statistical properties for GOM_Larval



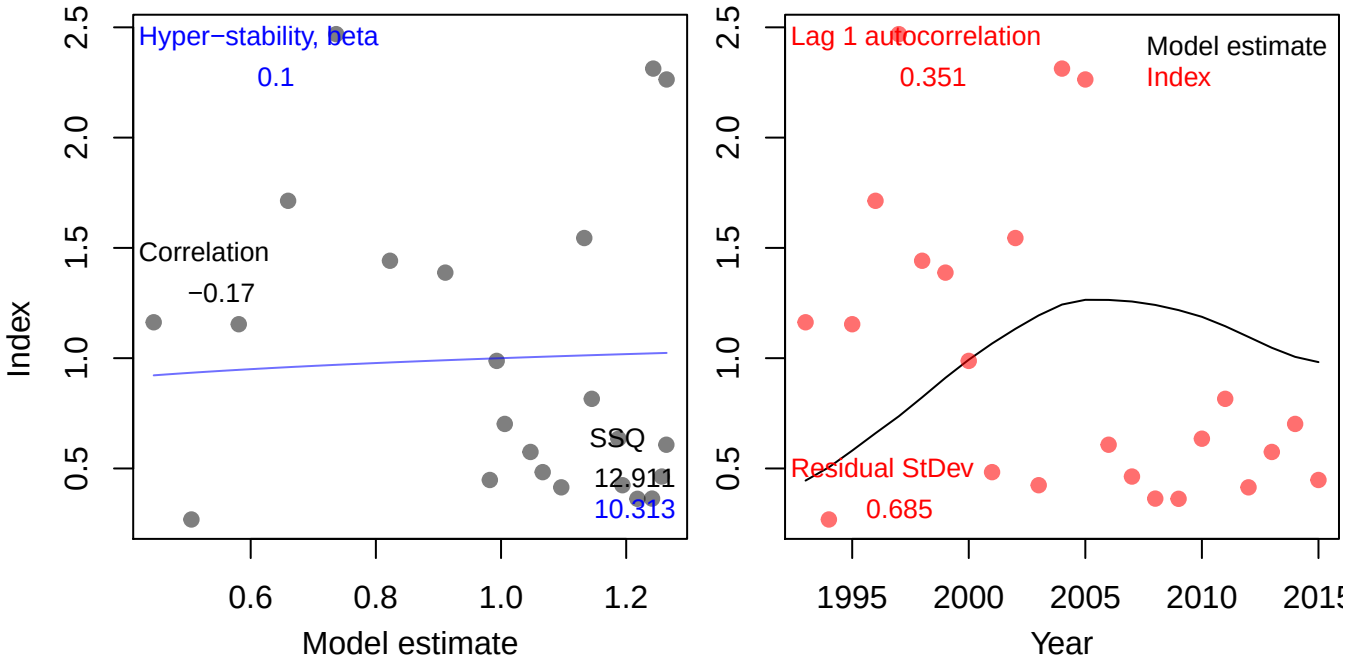

#### Index fit and statistical properties for JP_LL_W



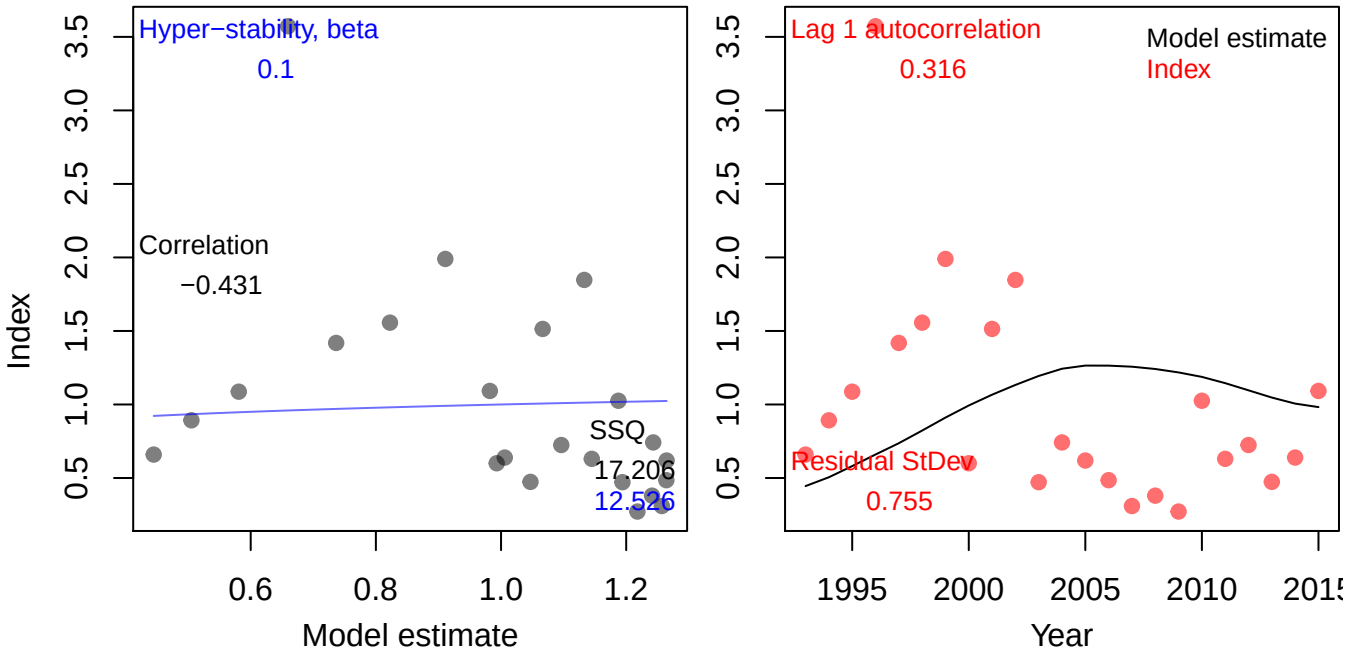
**Index fit and statistical properties for CAN-comb-RR**



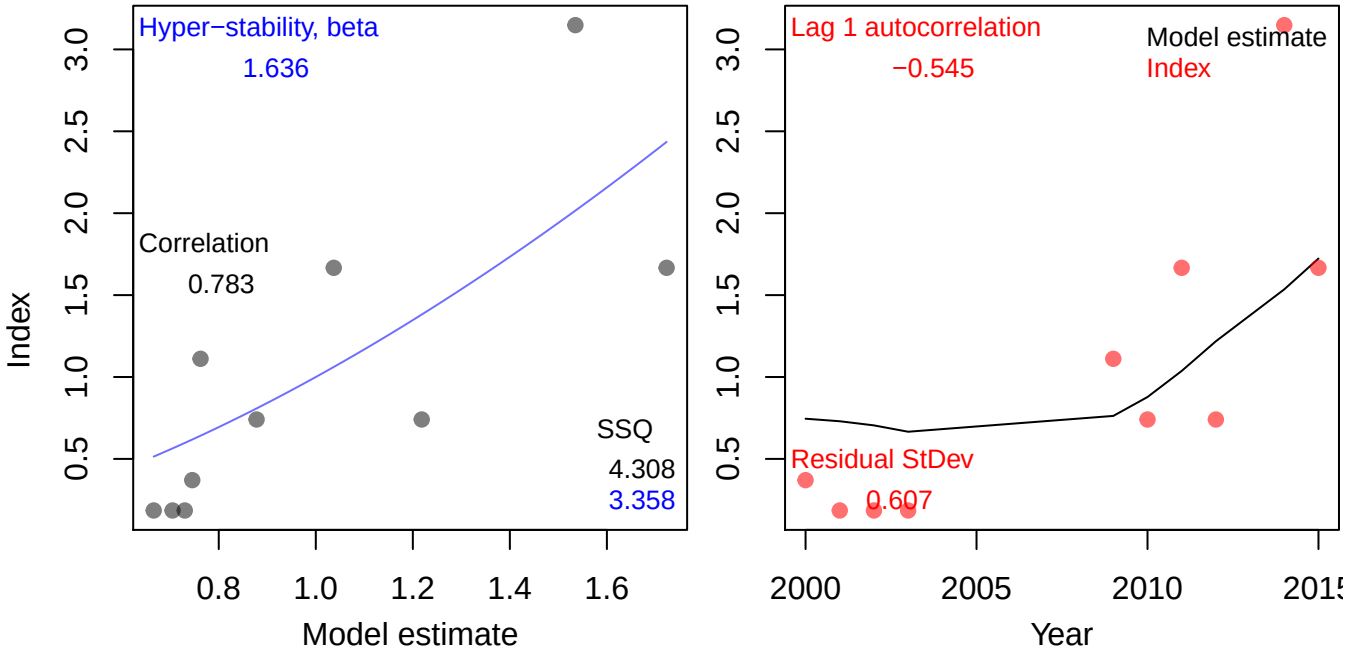

**Index fit and statistical properties for US_RR_66_114**



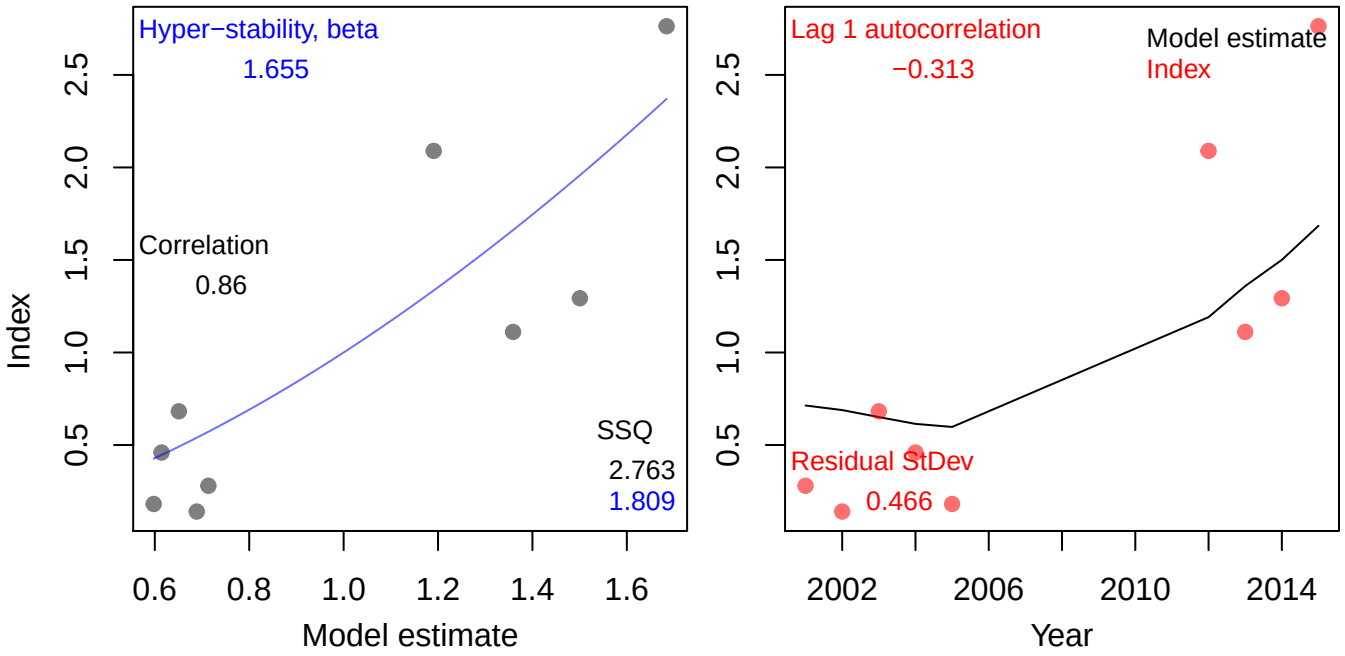
**Index fit and statistical properties for US_RR_177**




**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**

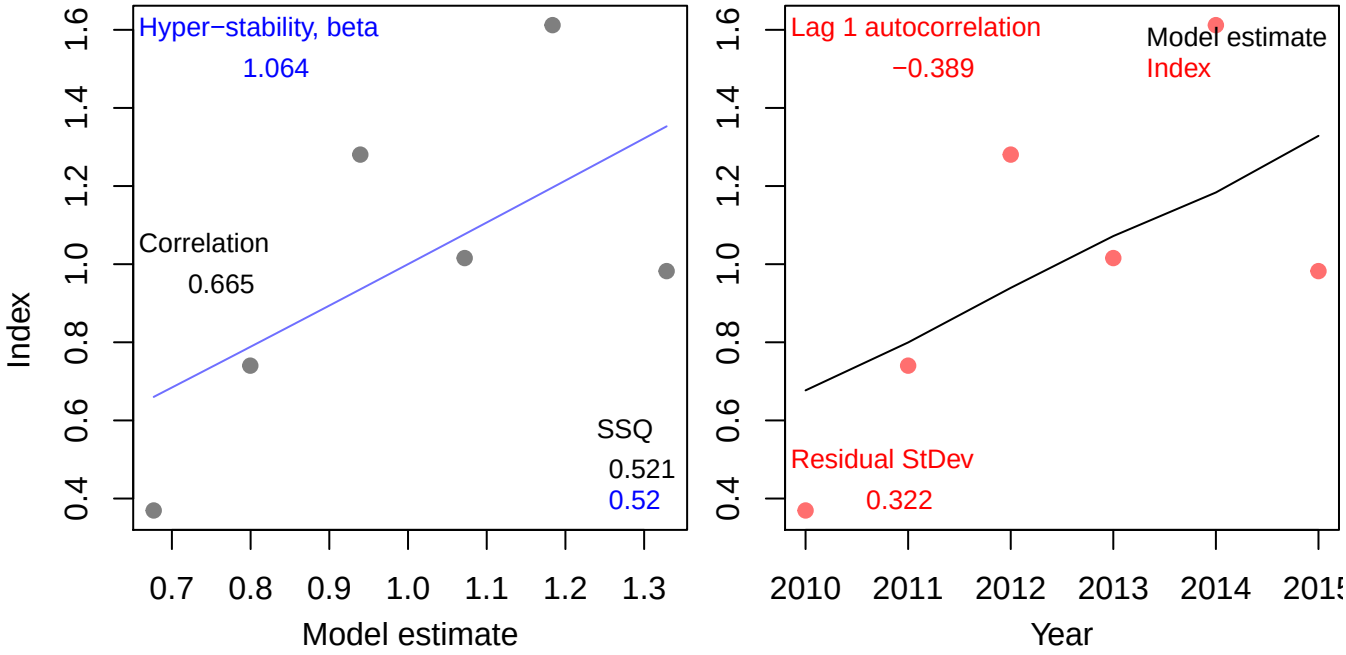



Figure 10.