Blue whiting HCR Evaluation

Operating Model Conditioning

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12 August, 2019

Note

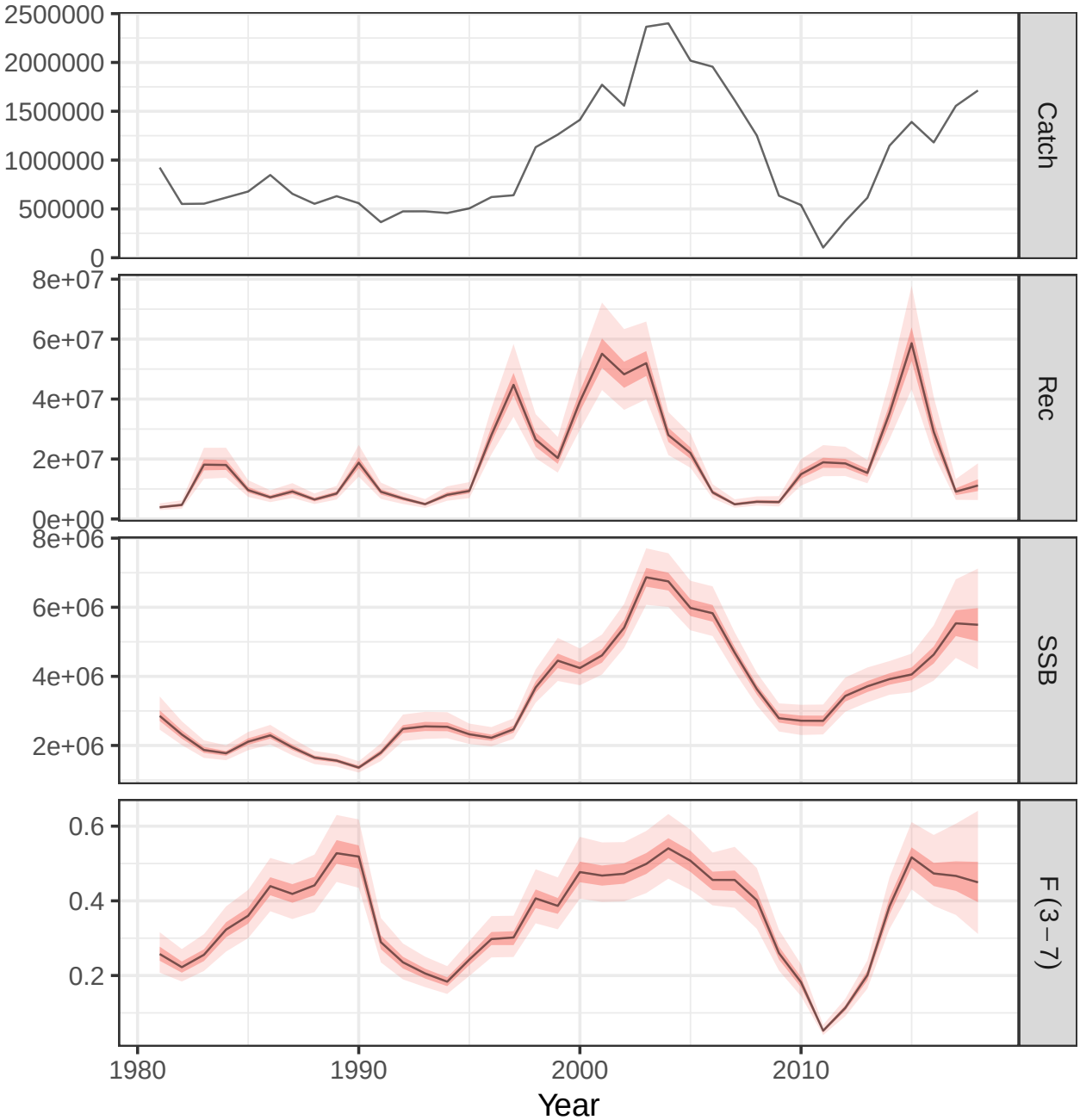

Figure 5 Time series estimates of catch, recruitment, spawning stock biomass and fishing mortality from the 2018 stock assessment; shown with median with 10th, 33th, 66th and 90th percentiles.

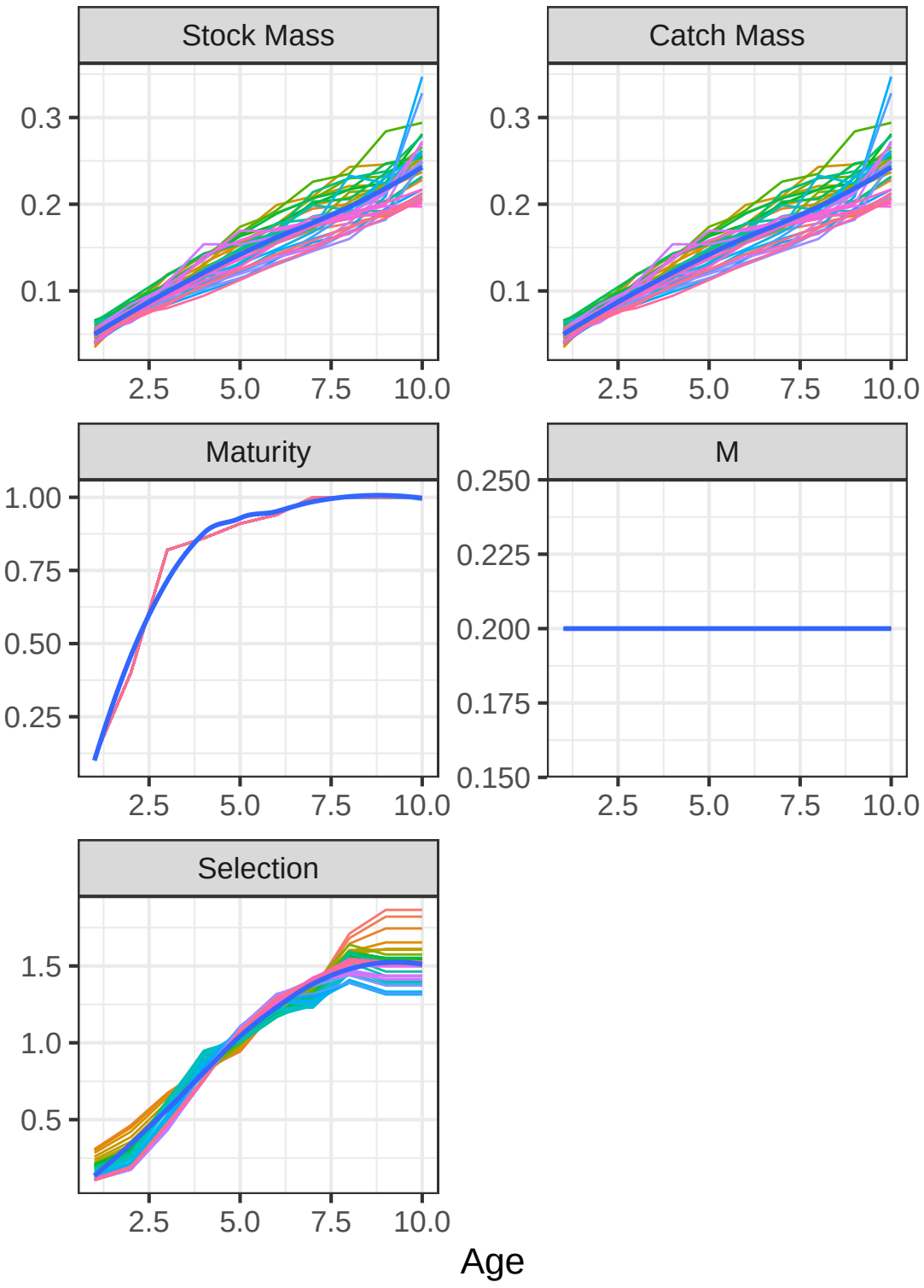

Figure 6

Stock mass, catch mass, maturity, natural mortality and selection pattern at-age

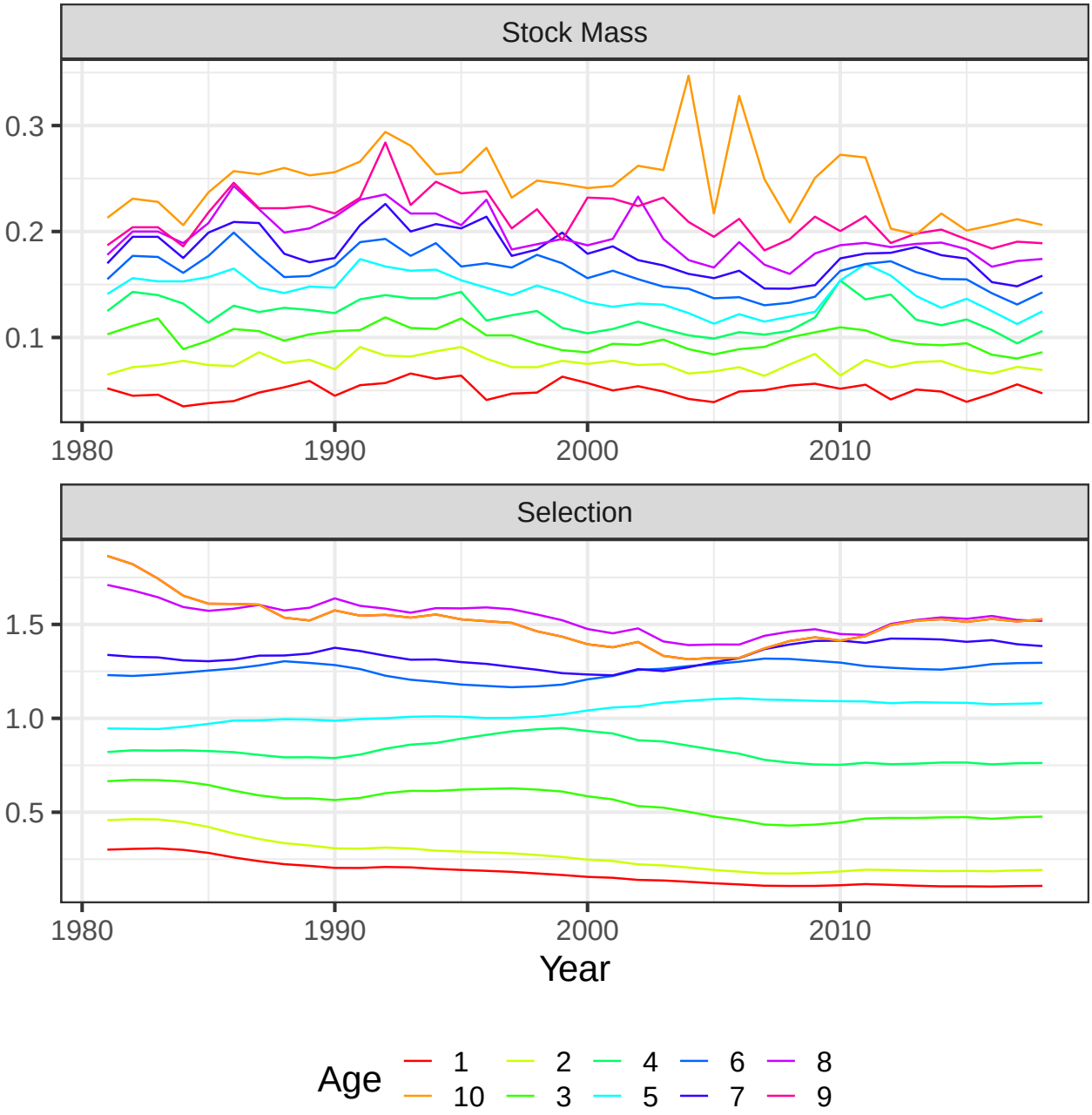

Figure 7 Stock mass, catch mass, maturity, natural mortality and selection pattern at-age

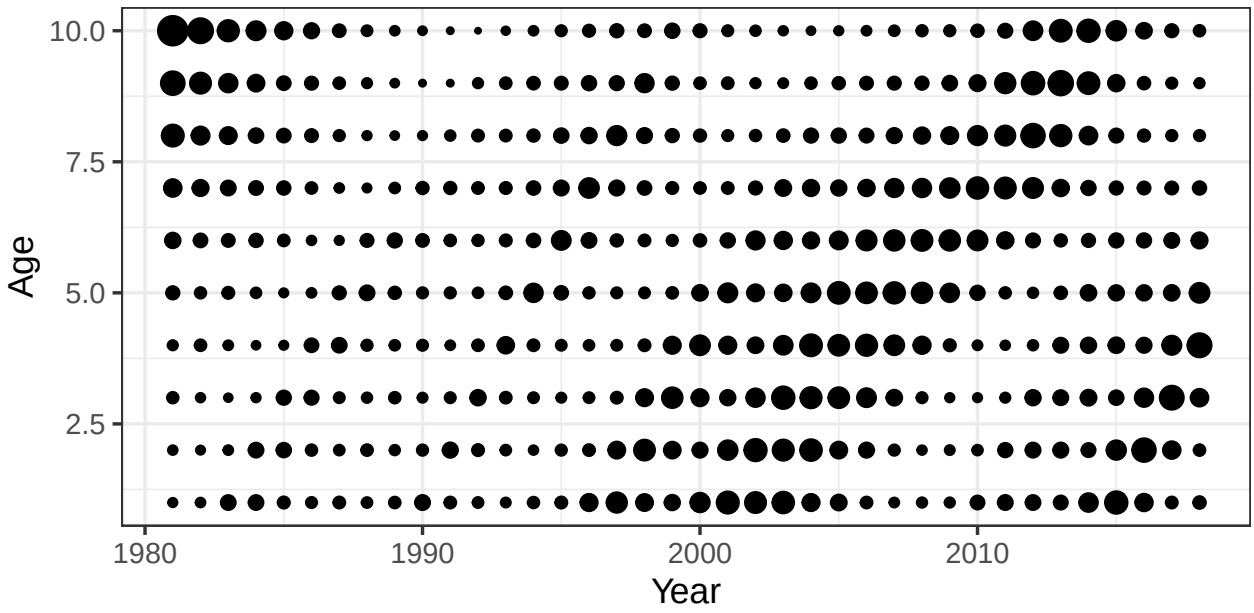

Figure 8 Relative stock numbers-at-age, i.e. numbers at an age scaled by mean numbers

Figure 9 Relative catch numbers-at-age, i.e. numbers at an age scaled by mean numbers

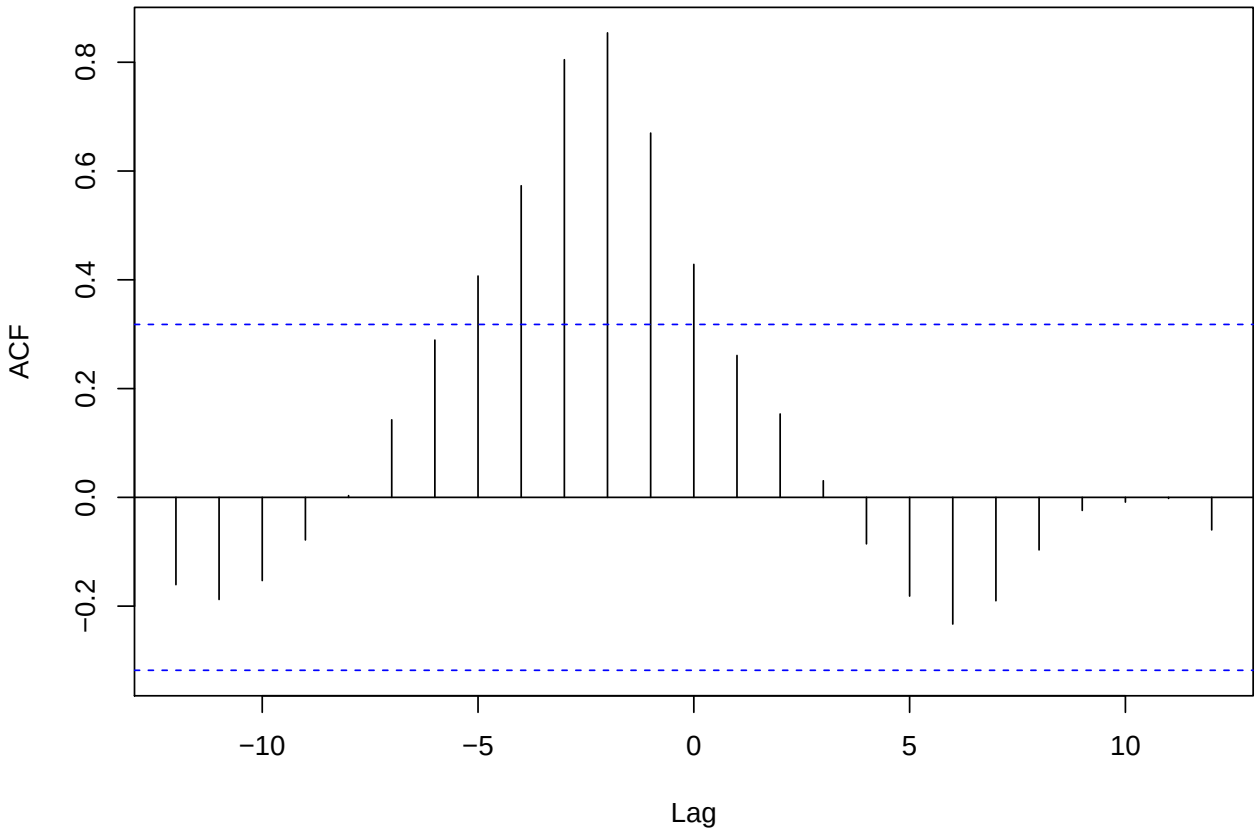

Figure 10 Cross correlations between SSB and recruitment at age 1, a positive lag of 1 would indicate the prescence of a stock recruitment relationship, while a negative lag indicates that SSB is determined by past recruitment

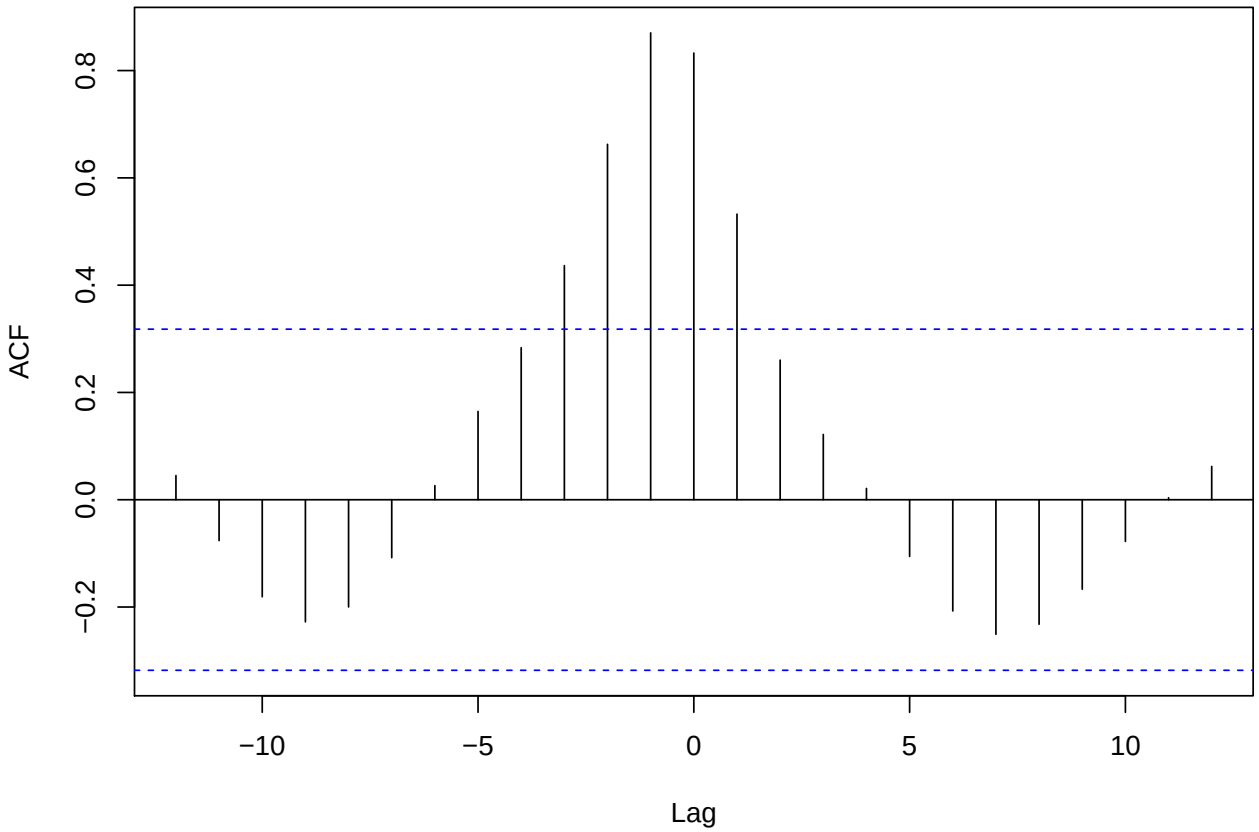

Figure 11 Cross correlations between exploitable biomass and recruitment at age 1, a positive lag of 1 would indicate the prescence of a stock recruitment relationship, while a negative lag indicates that SSB is determined by past recruitment

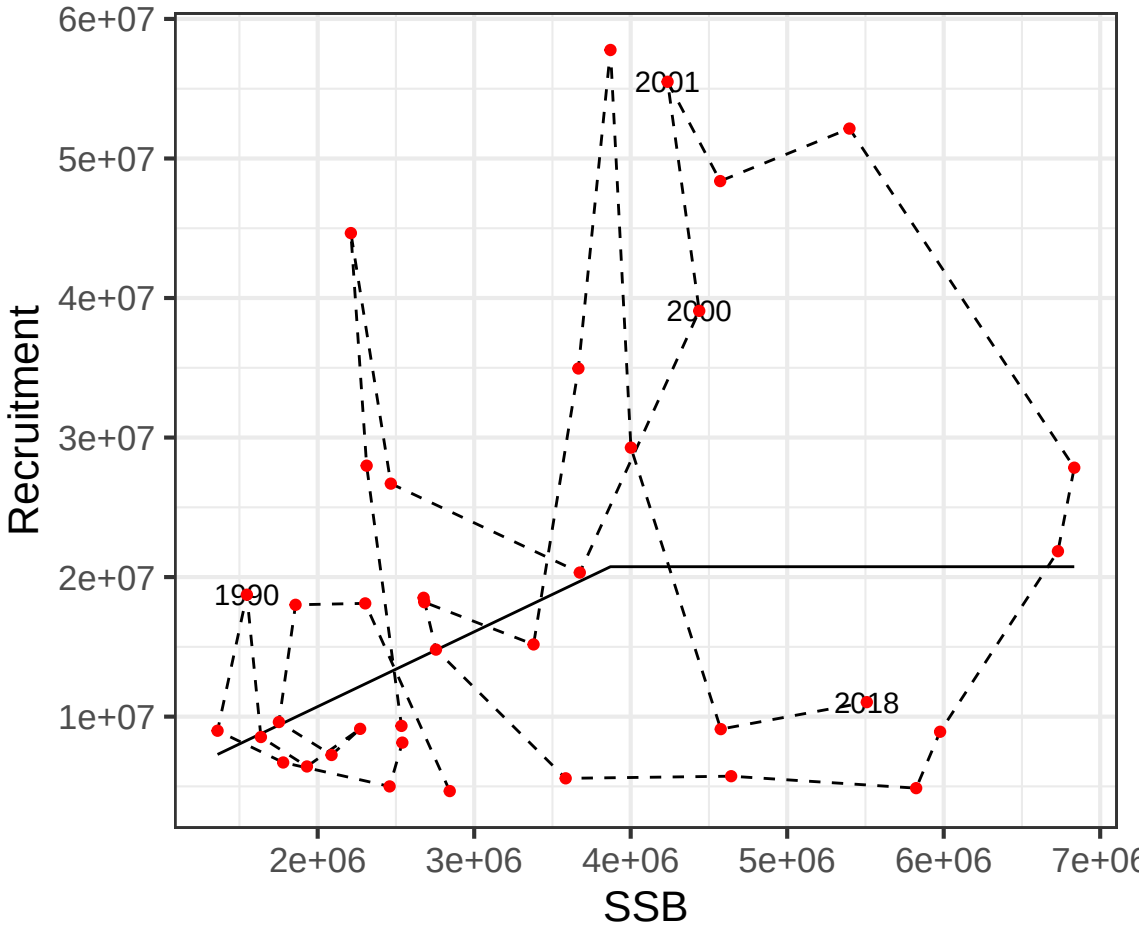

Figure 12 Estimates of SSB and recruitment with fitted segmented regression stock recruitment relationship

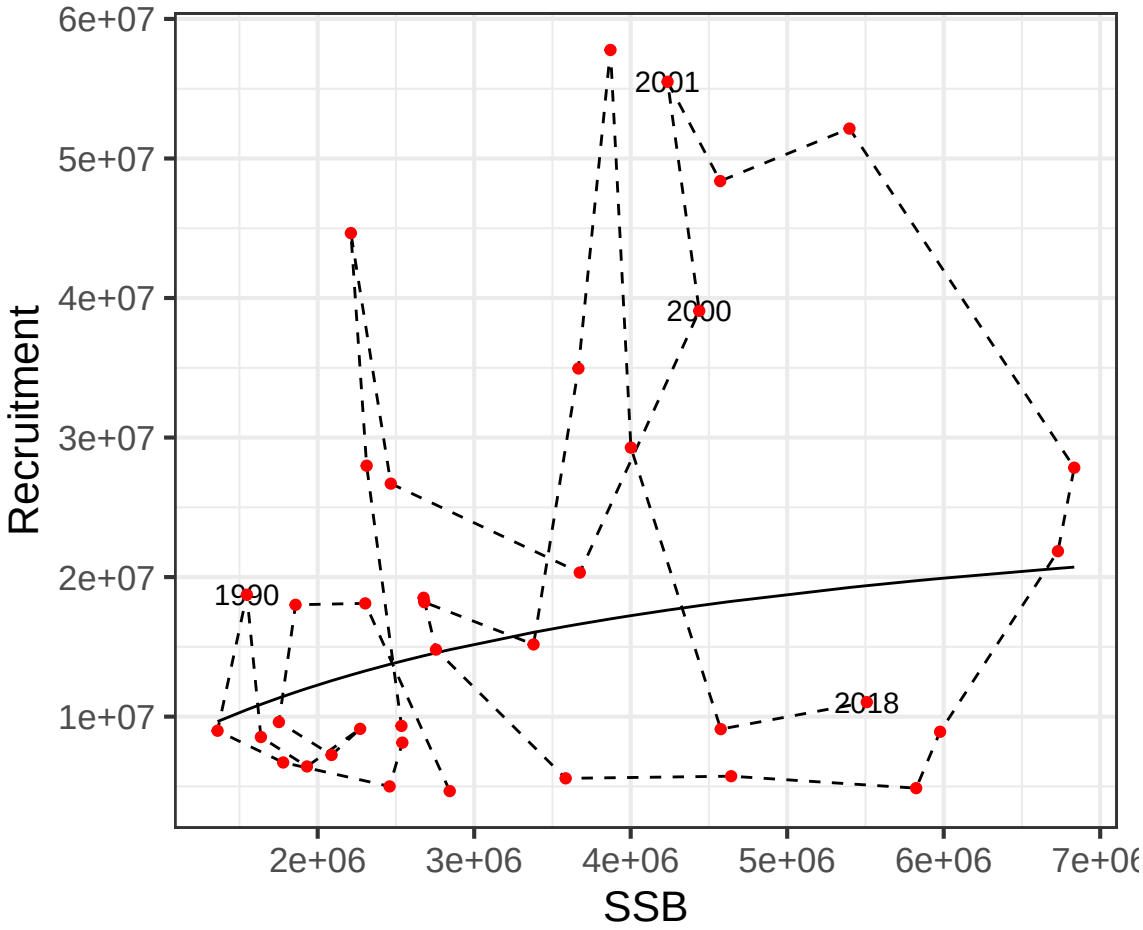

Figure 13 Estimates of SSB and recruitment with fitted Beverton and Holt stock recruitment relationship.

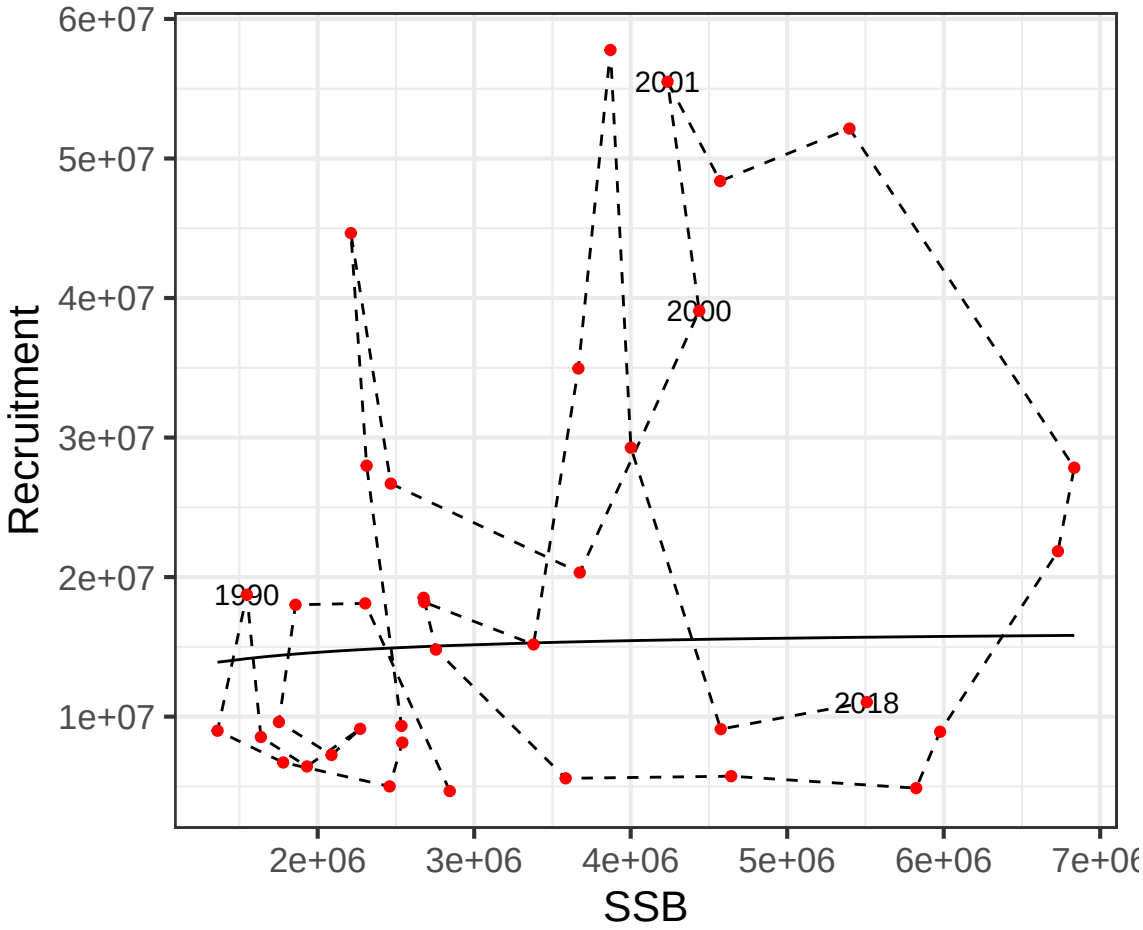

Figure 14 Estimates of SSB and recruitment with fitted Beverton and Holt stock recruitment relationship with a fixed steepness of 0.9

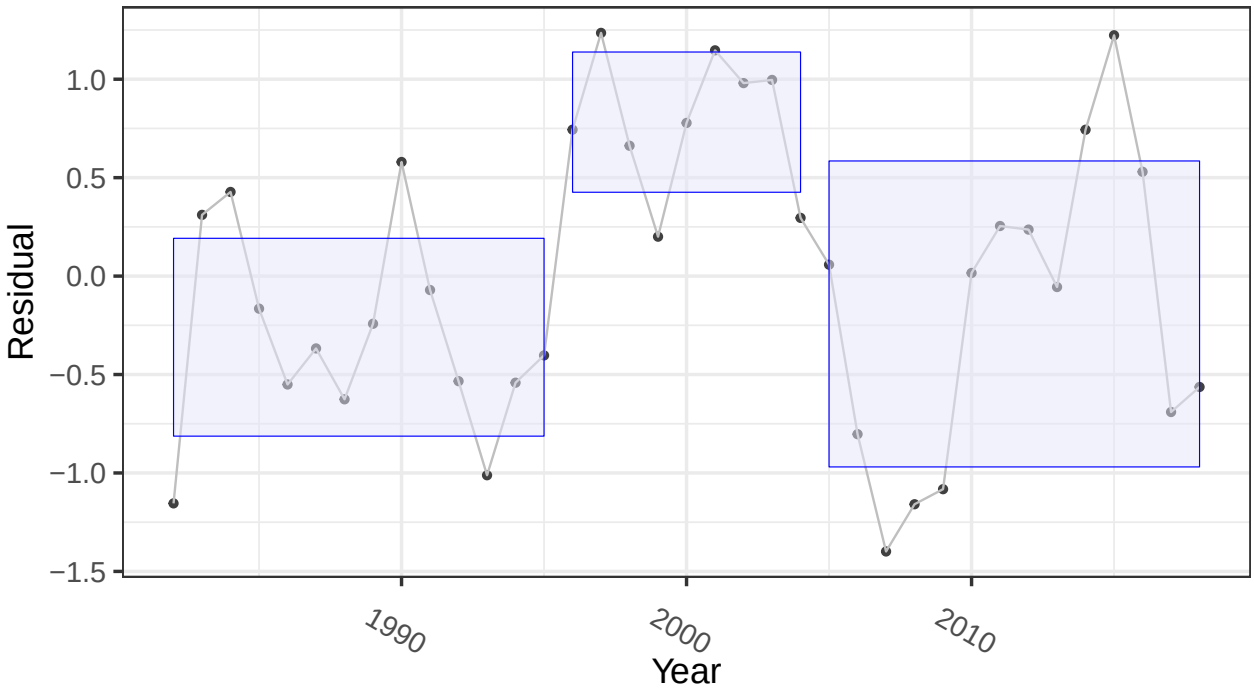

Figure 15 Recruitment deviates for Beverton and Holt stock recruitment relationship, with regimes estimated by STARS algorithm showing changes in mean and variance.

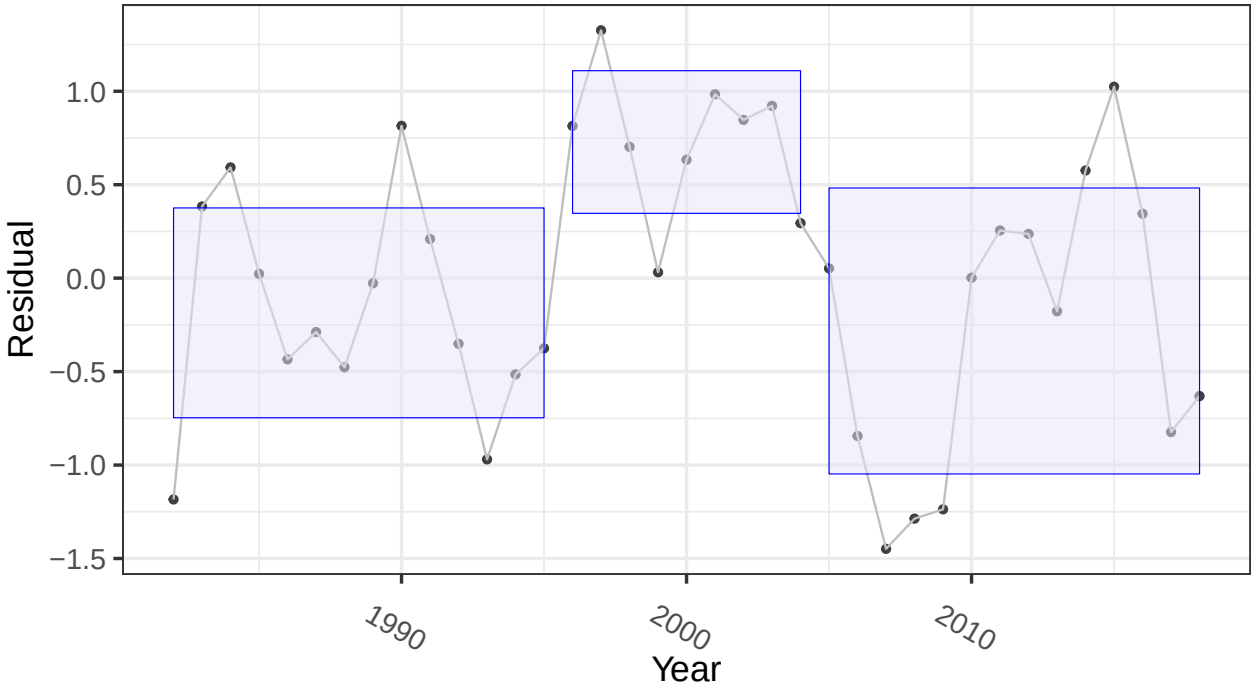

Figure 16 Recruitment deviates for segmented regression stock recruitment relationship, with regimes estimated by STARS algorithm showing changes in mean and variance.

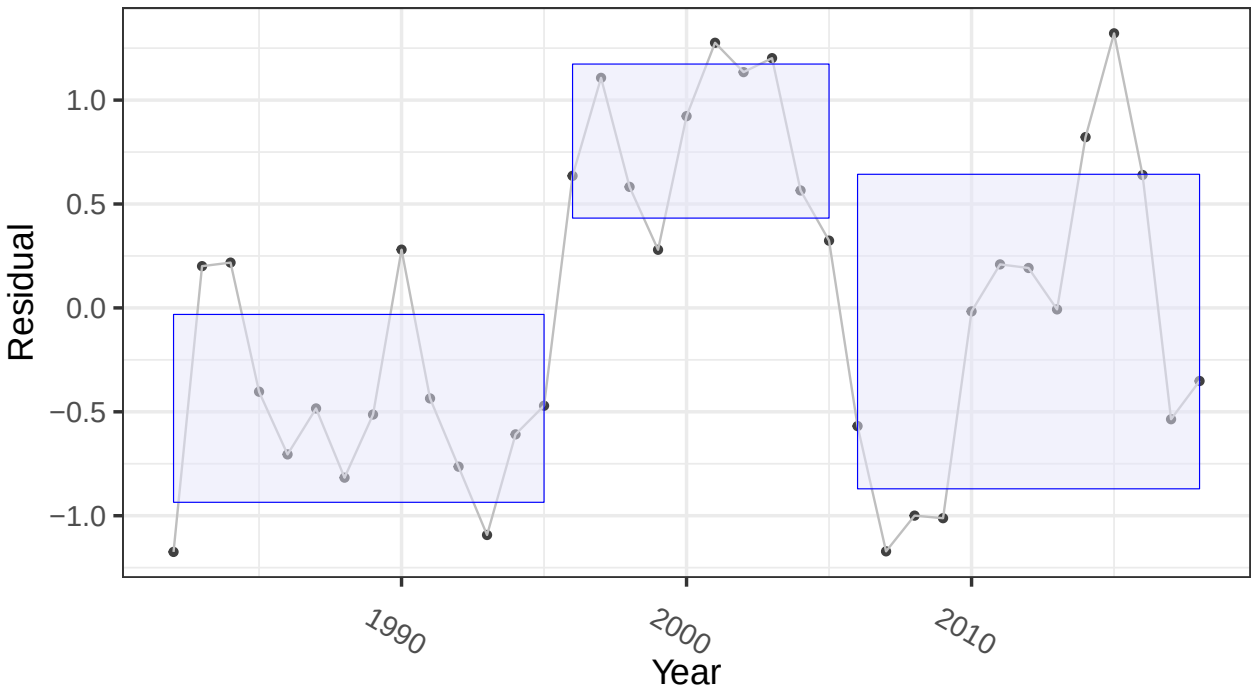

Figure 17 Recruitment deviates for Beverton and Holt stock recruitment relationship with steepness fixed at 0.9, with regimes estimated by STARS algorithm showing changes in mean and variance.

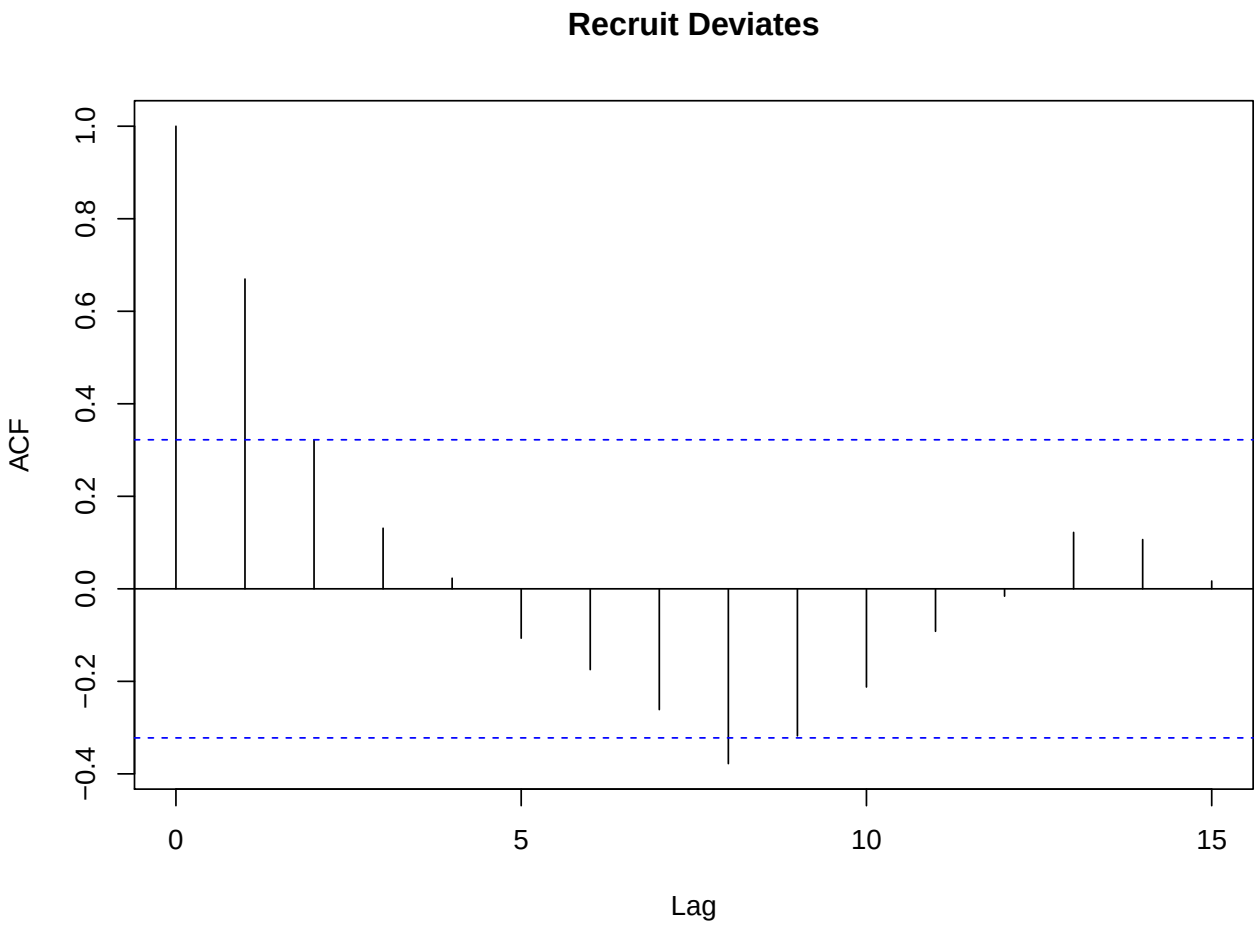

Figure 18 Autocorrelation in recruitment deviates.

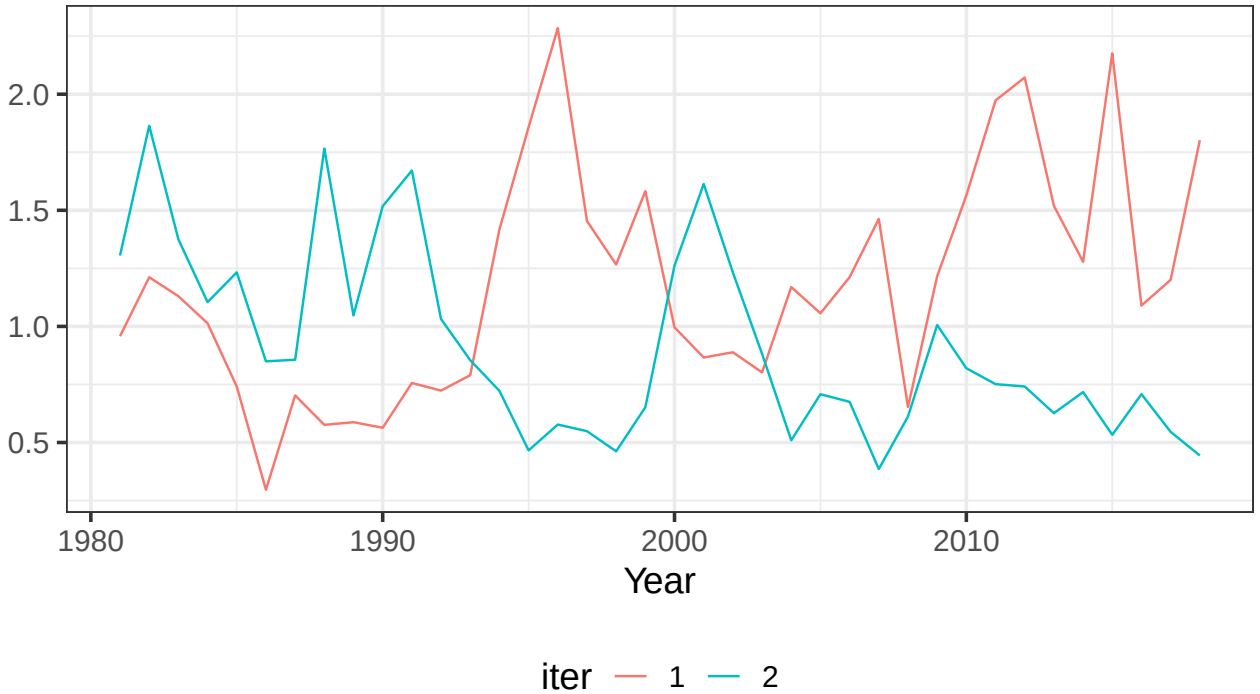

Figure 19 An example of simulated recruitment deviates with autocorrelation.

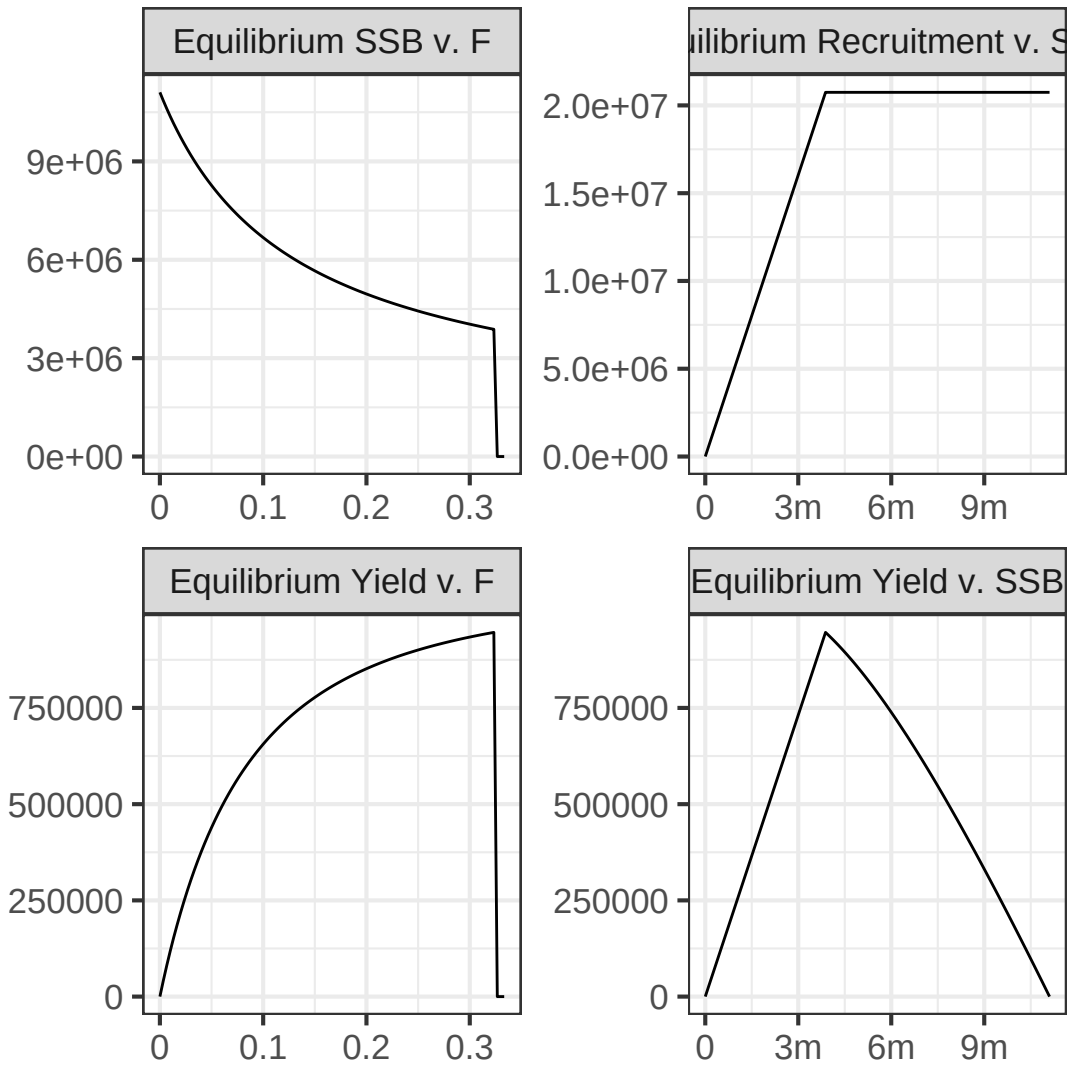

Figure 20 Biological reference points based on the Beverton and Holt stock recruitment relationship.

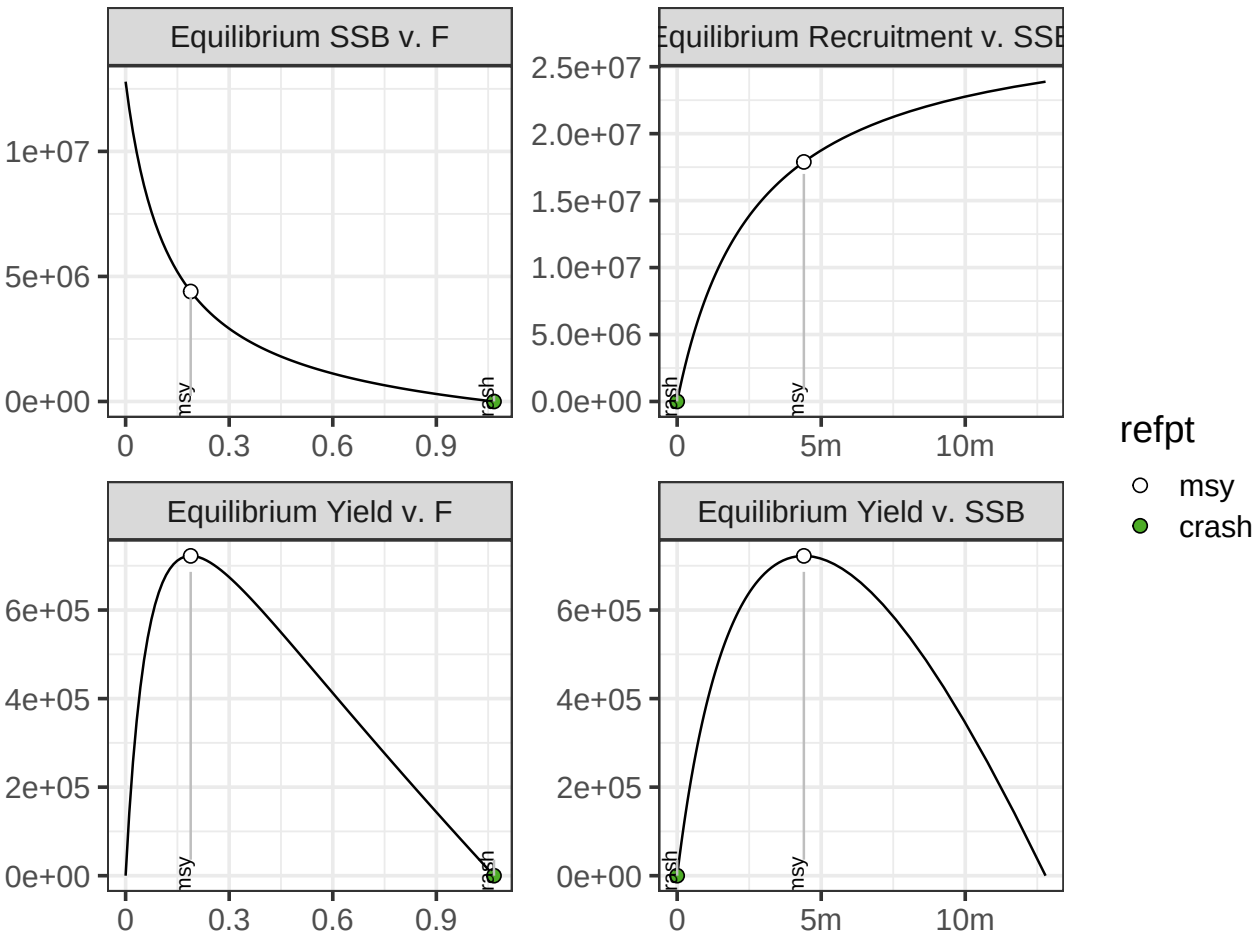

Figure 21 Biological reference points based on the fitted segmented regression stock recruitment relationship.

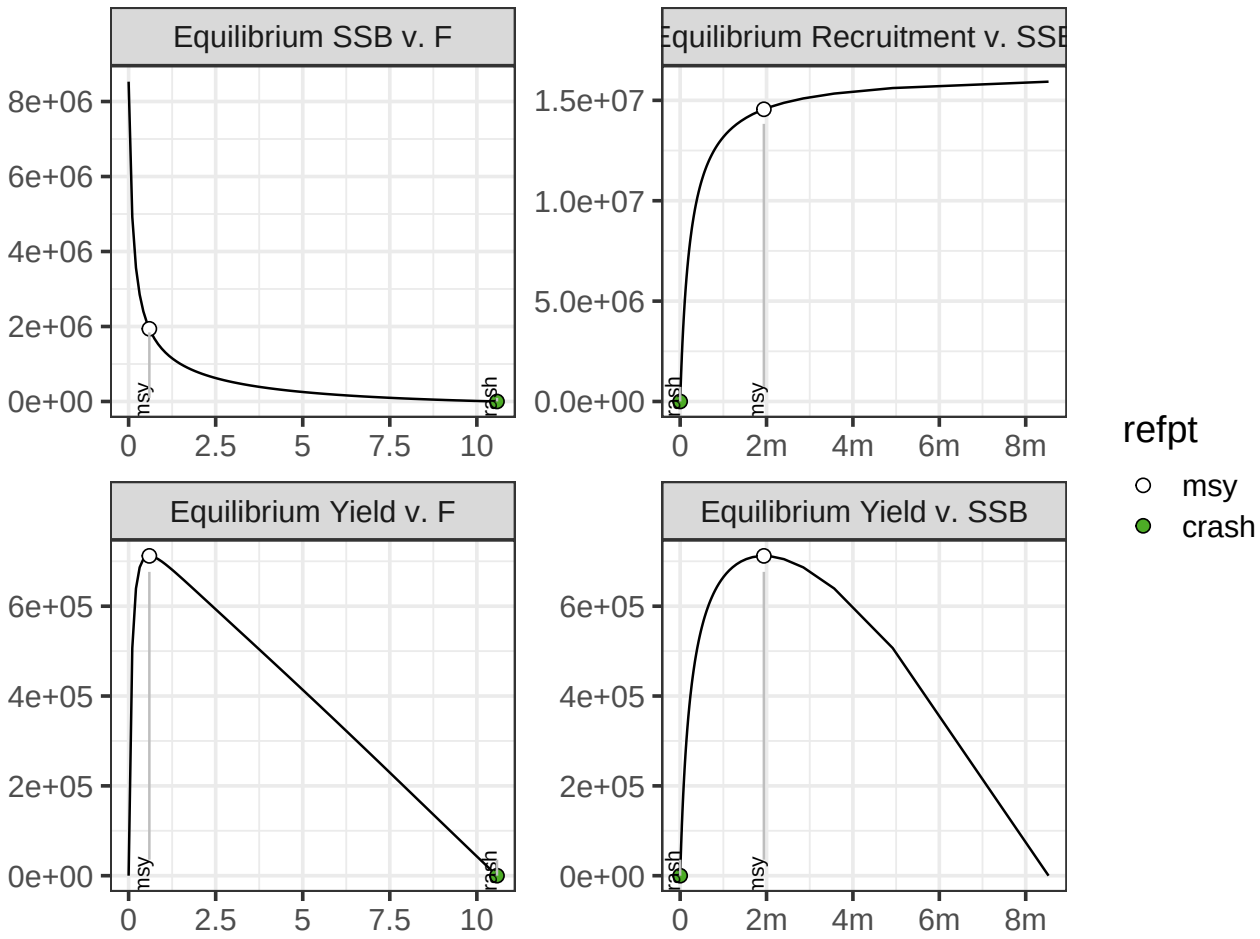

Figure 22 Biological reference points based on the Beverton and Holt stock recruitment relationship with steepness fixed at 0.9.

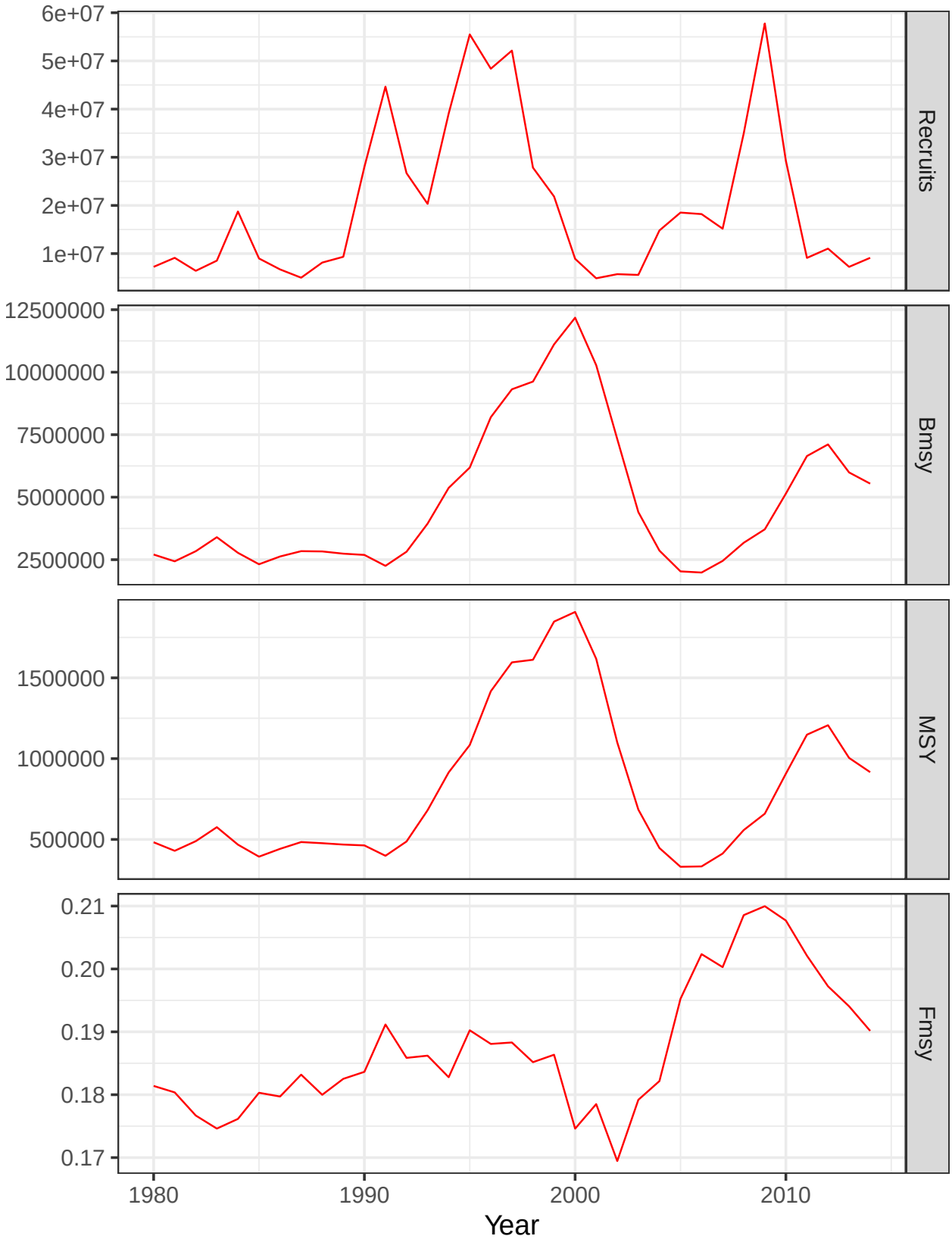

Figure 23 F0.1 reference point calculated with a five year moving window

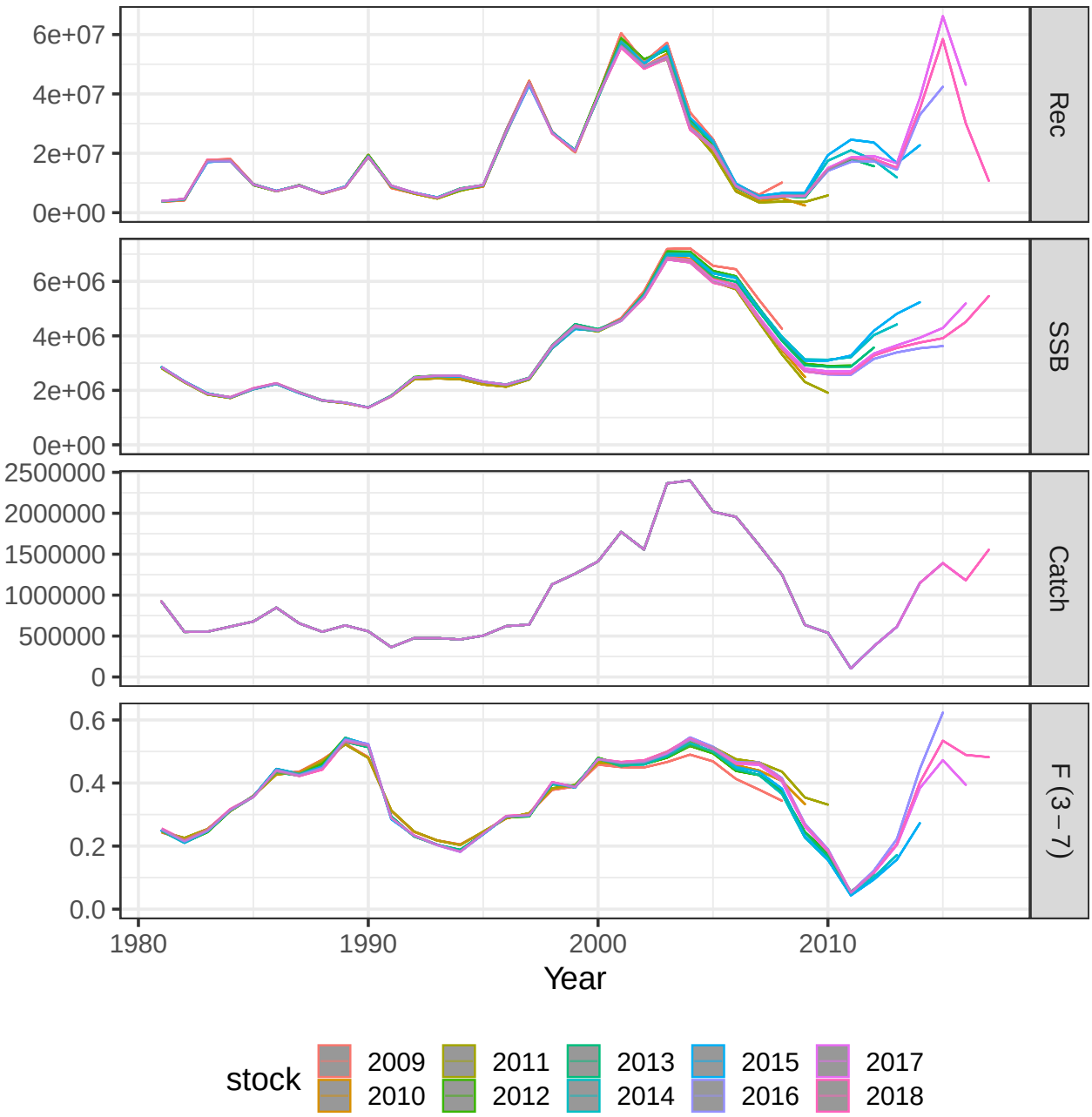

Figure 24 Retrospective estimates of time series of catch, recruitment, spawning stock biomass and fishing mortality from the 2018 stock assessment.

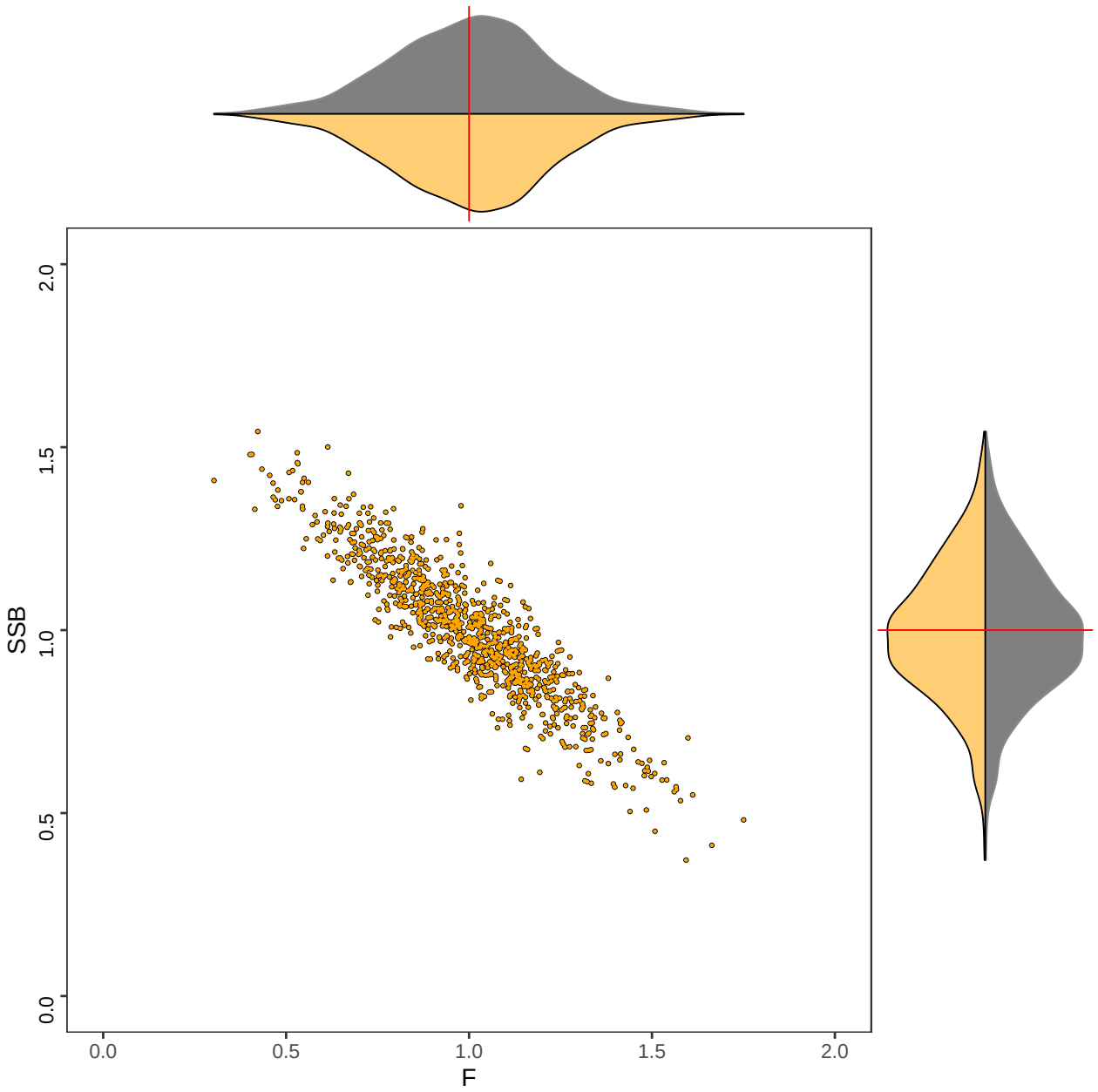

Figure 25 Assessment error in SSB and F derived from the retrospective runs.