

# Tanner Crab Assessment 2022 Appendix E: Comparison Figures–All Models

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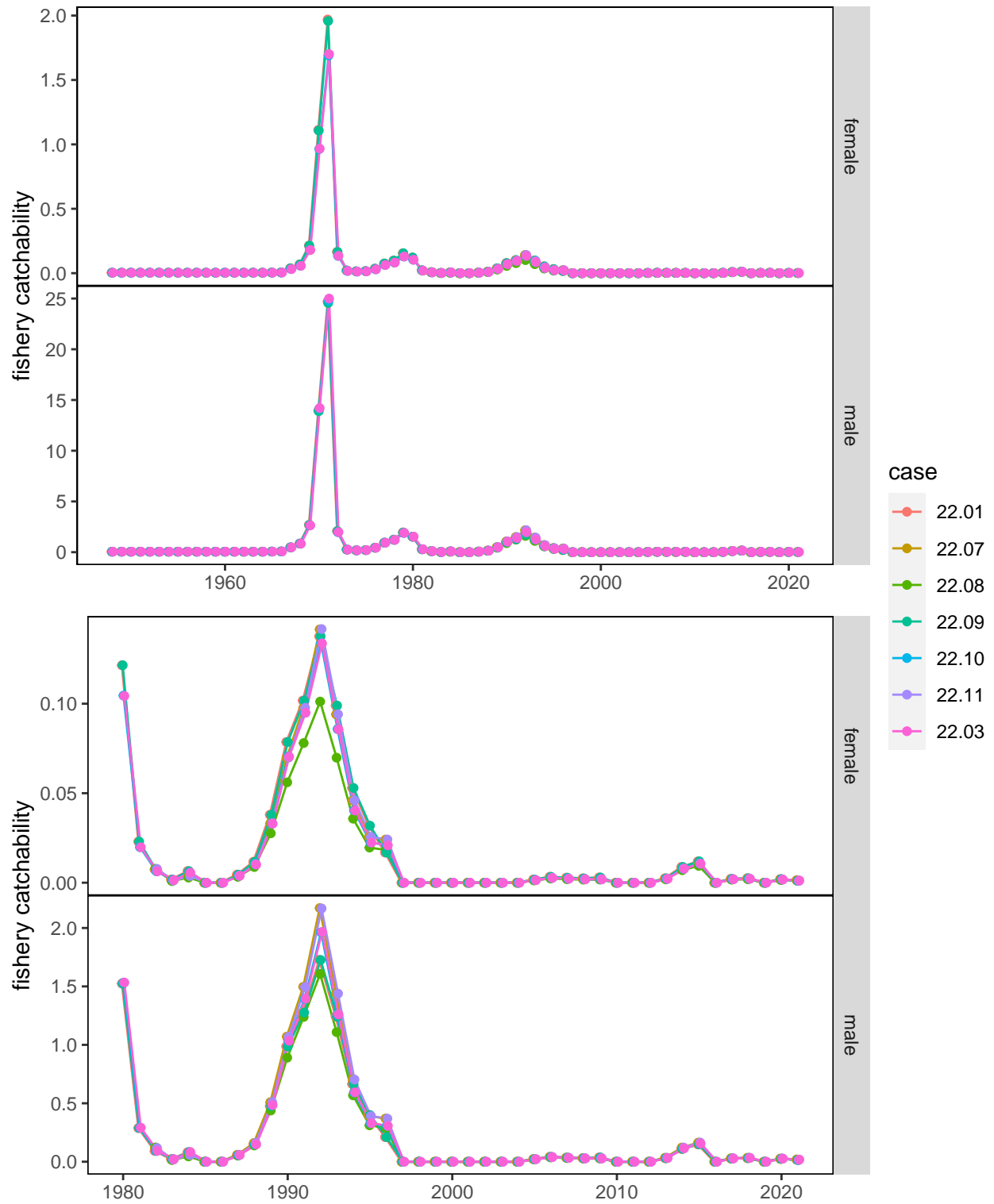


Figure 1: Estimated fully-selected capture rates (not mortality) in the directed fishery. The lower pair of plots show the estimated time series since 1980. Preferred model is 22.03.

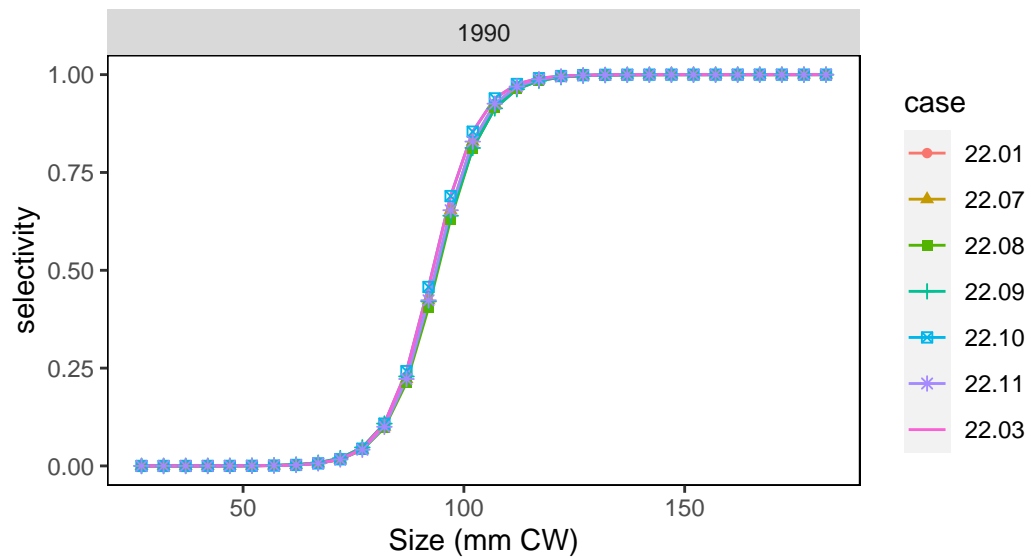


Figure 2: Estimated selectivity for females in the directed fishery for all years. Preferred model is 22.03.

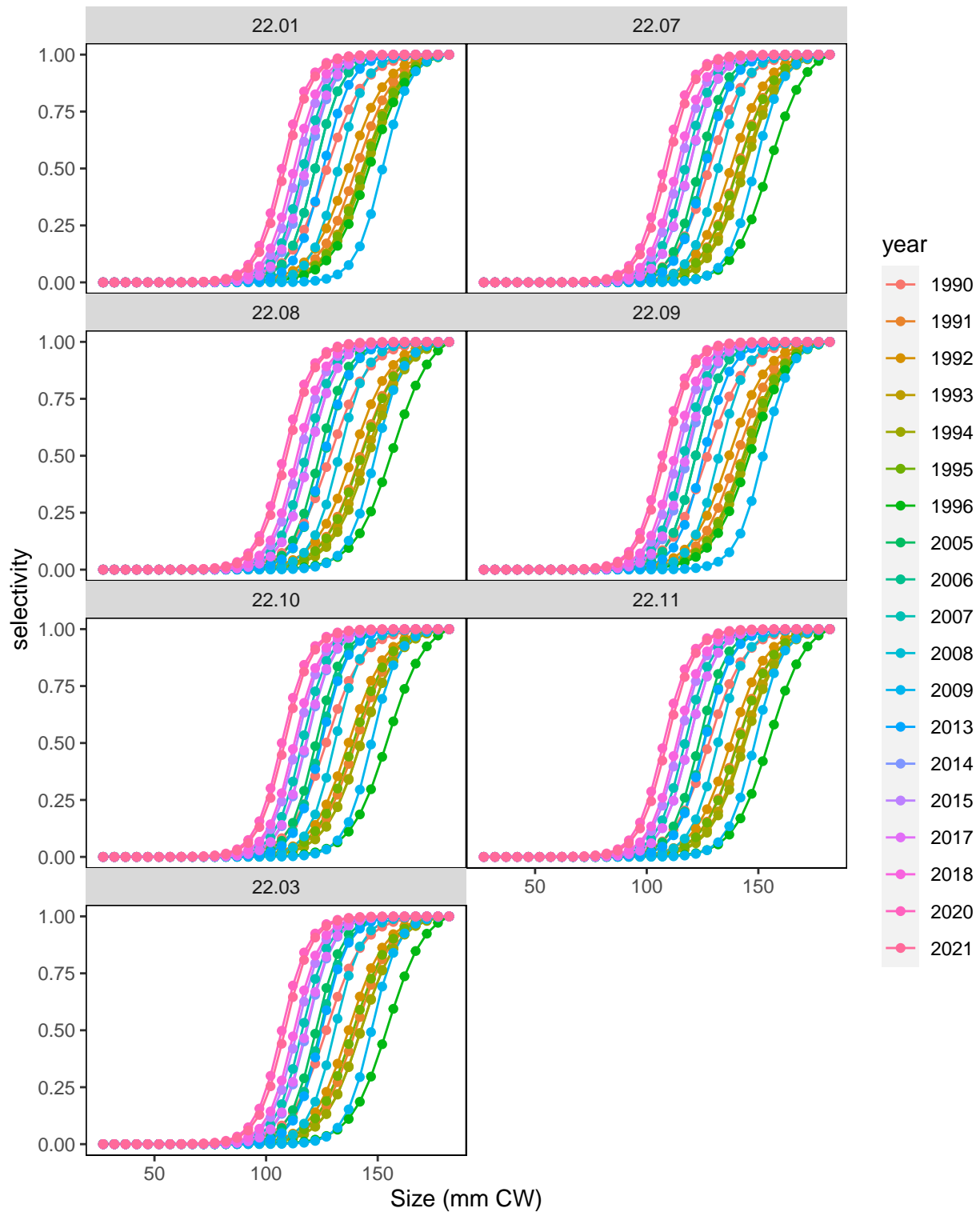


Figure 3: Estimated selectivity curves for males in the directed fishery, faceted by model scenario. Curves labelled 1990 applies to all years before 1991. Others apply in the year indicated in the legend. Preferred model is 22.03.

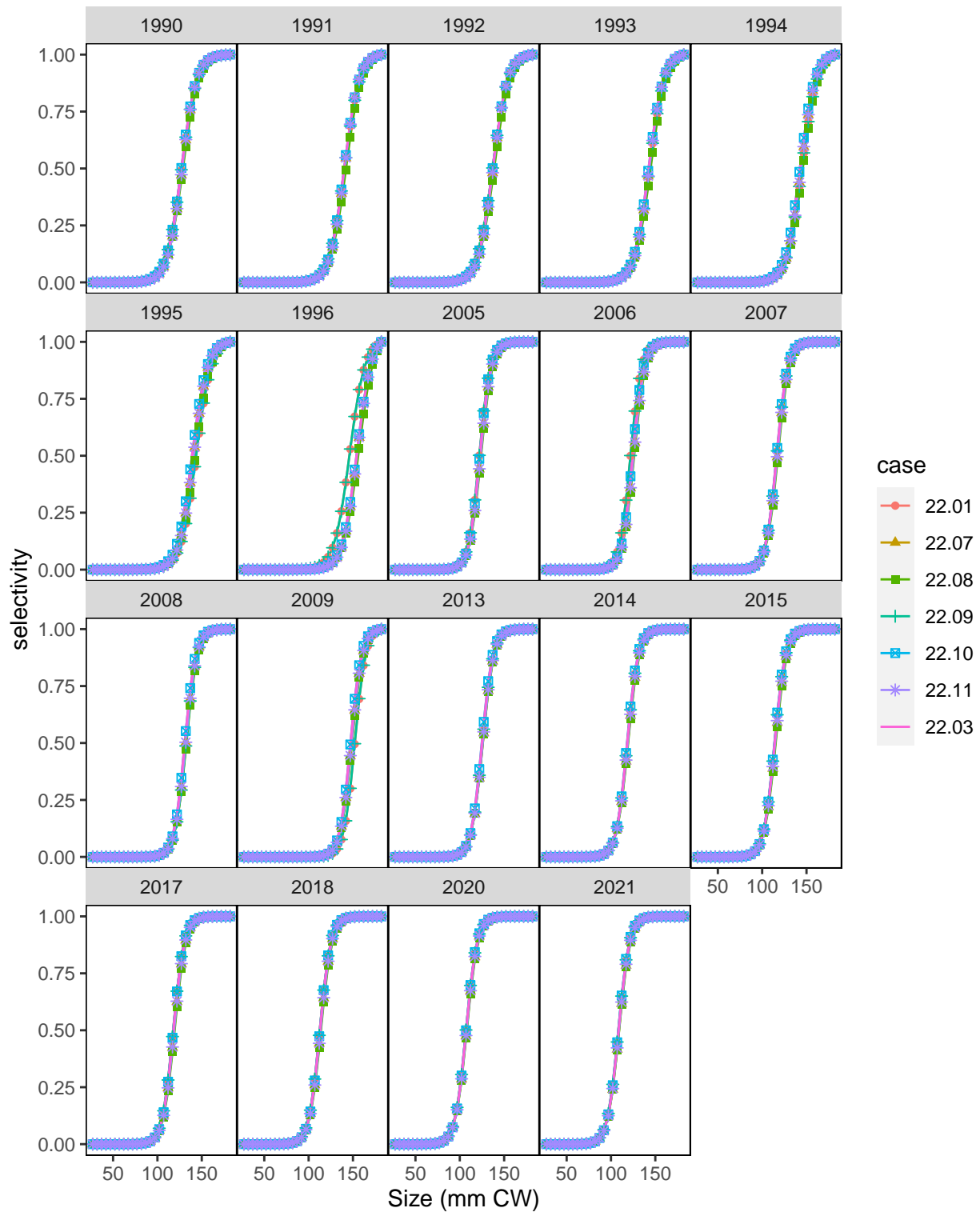


Figure 4: Estimated selectivity curves for males in the directed fishery by year. Curve labelled 1990 applies to all years before 1991. Others apply in the year indicated in the panel. Preferred model is 22.03.

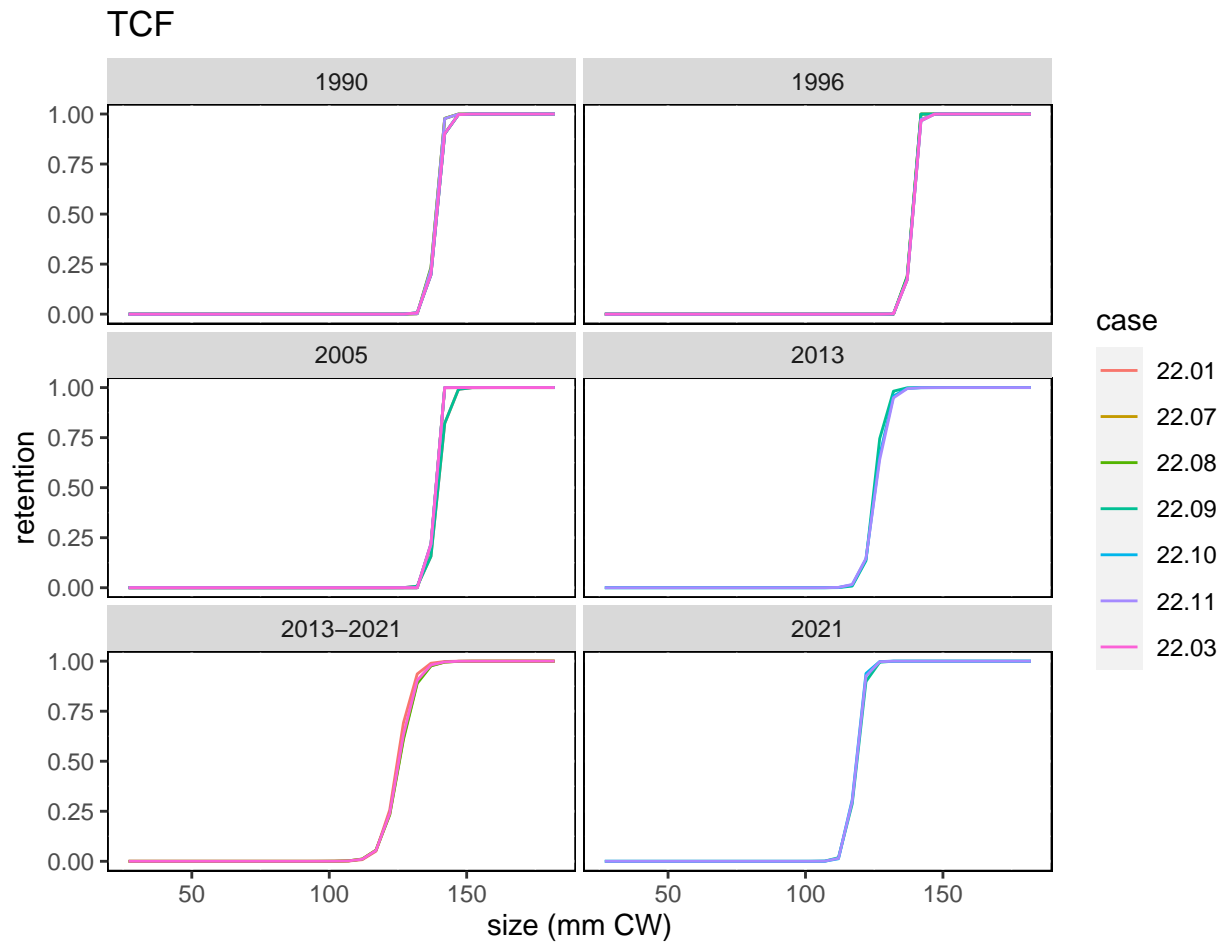


Figure 5: Estimated retention curves for males in the directed fishery by time block. Curve labelled: '1990' - applies to all years before 1991; '1996' - applies to 1991-2006; 2005 - applies to 2005-2009; '2013' - applies to 2013-2020 (models 22.09, 22.10, 22.11 only); '2013-2021' - applies to 2013-2021 (models 22.01, 22.03, 22.07 only); '2021' - applies to 2021 (models 22.09, 22.10, 22.11 only). Preferred model is 22.03.



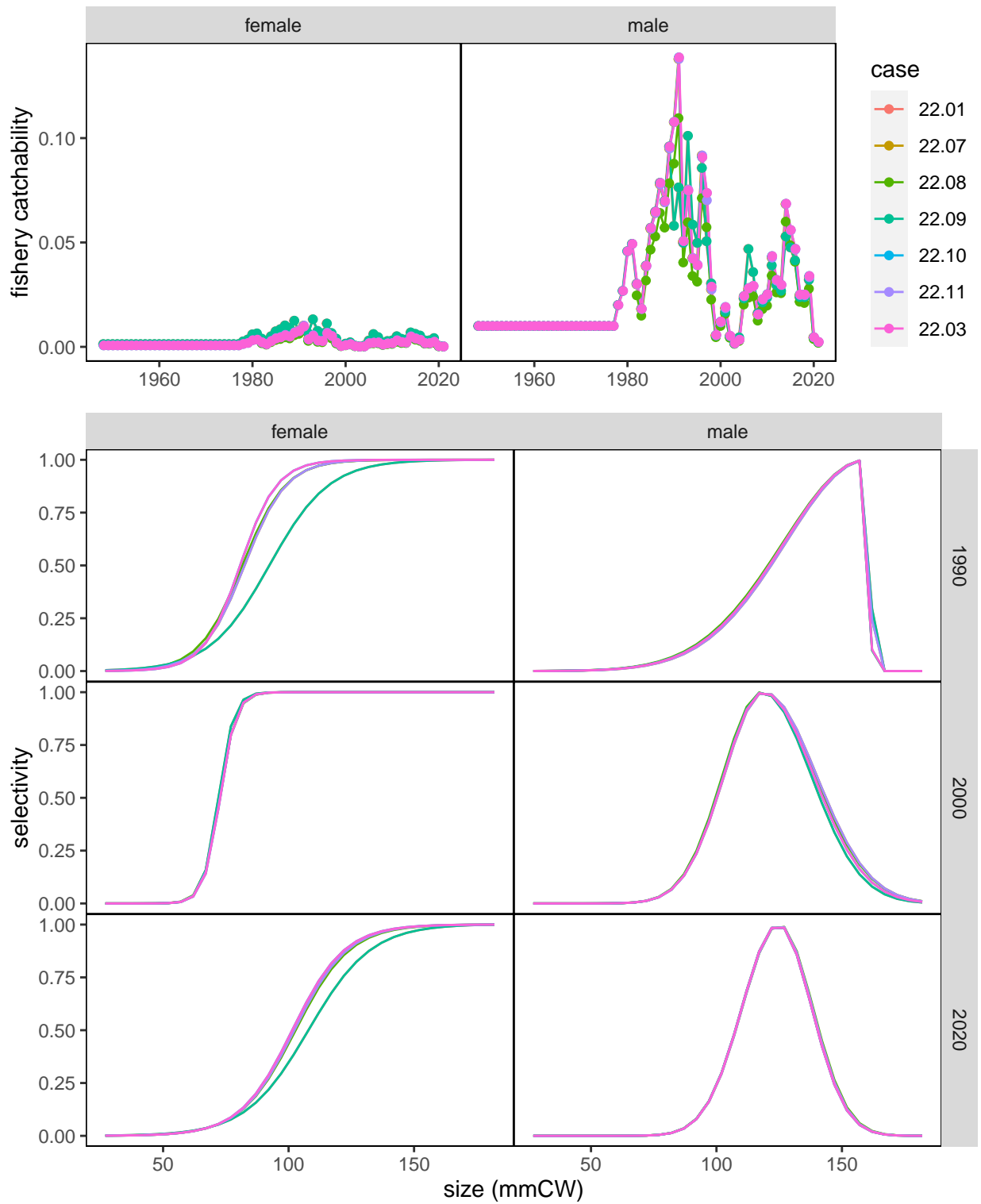


Figure 6: Estimated fully-selected bycatch capture rates (not mortality) and selectivity functions in the snow crab fishery (SCF). Time blocks for selectivity functions are labelled: 1990) before 1997; 2000) 1997-2004; 2020) 2005-present. Preferred model is 22.03.

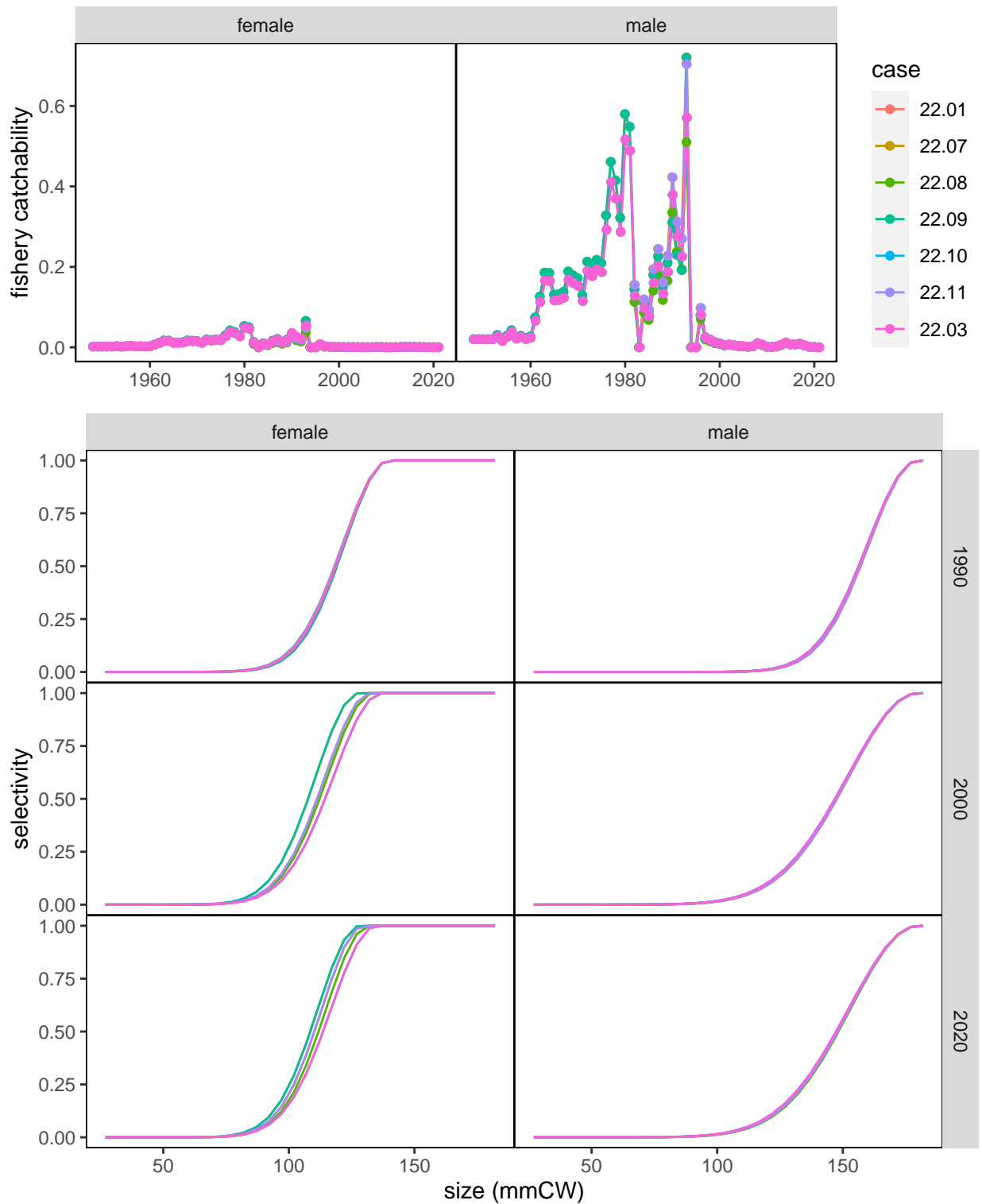


Figure 7: Estimated fully-selected bycatch capture rates (not mortality) and selectivity functions in the BBRKC fishery (RKF). Time blocks for selectivity functions are labelled: 1990) before 1997; 2000) 1997-2004; 2020) 2005-present. Preferred model is 22.03.

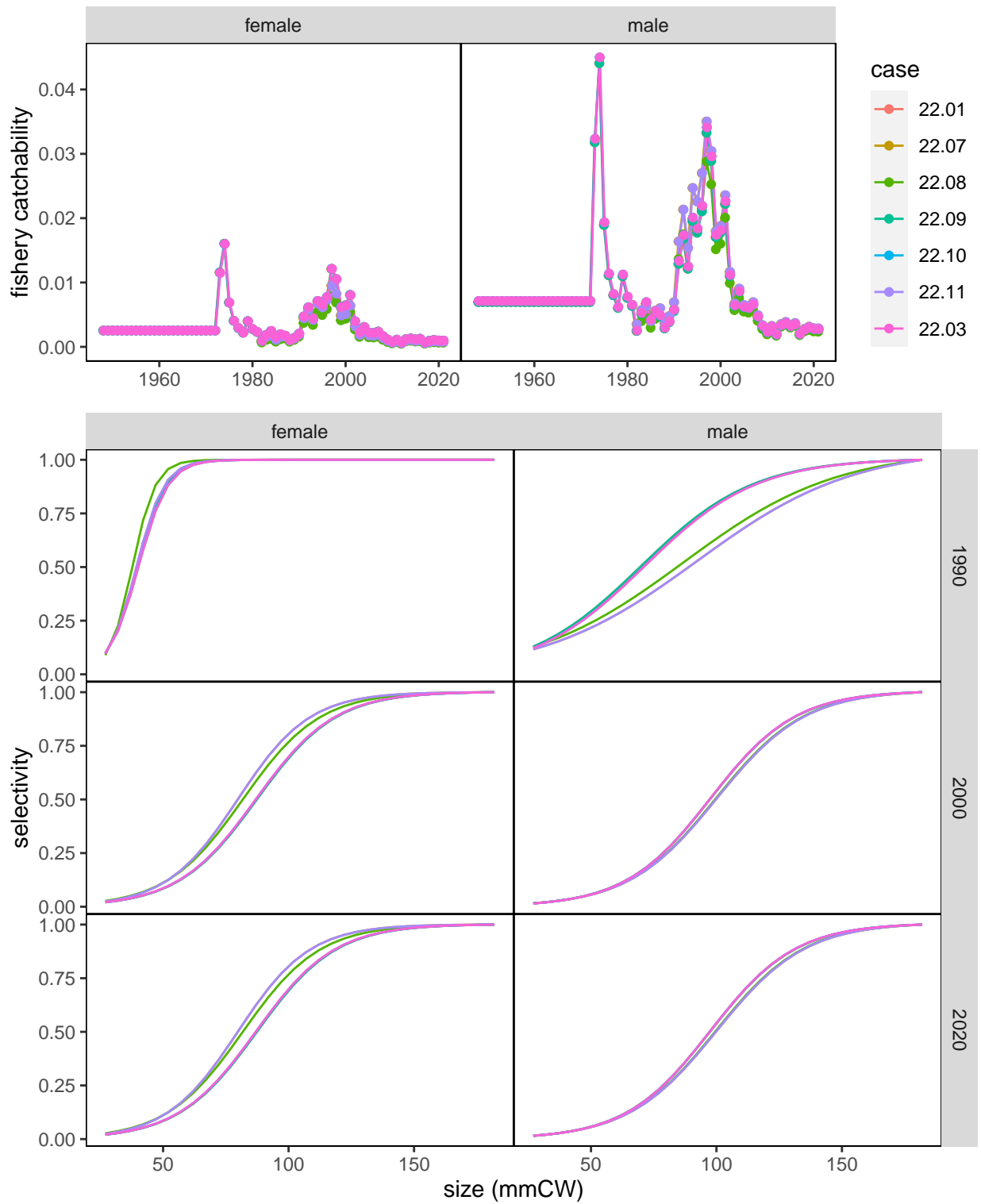


Figure 8: Estimated fully-selected bycatch capture rates (not mortality) and selectivity functions in the groundfish fisheries (GF All). Time blocks for selectivity functions are labelled: 1980) before 1988; 1990) 1987-1996; 2020) 1997-present. Preferred model is 22.03.

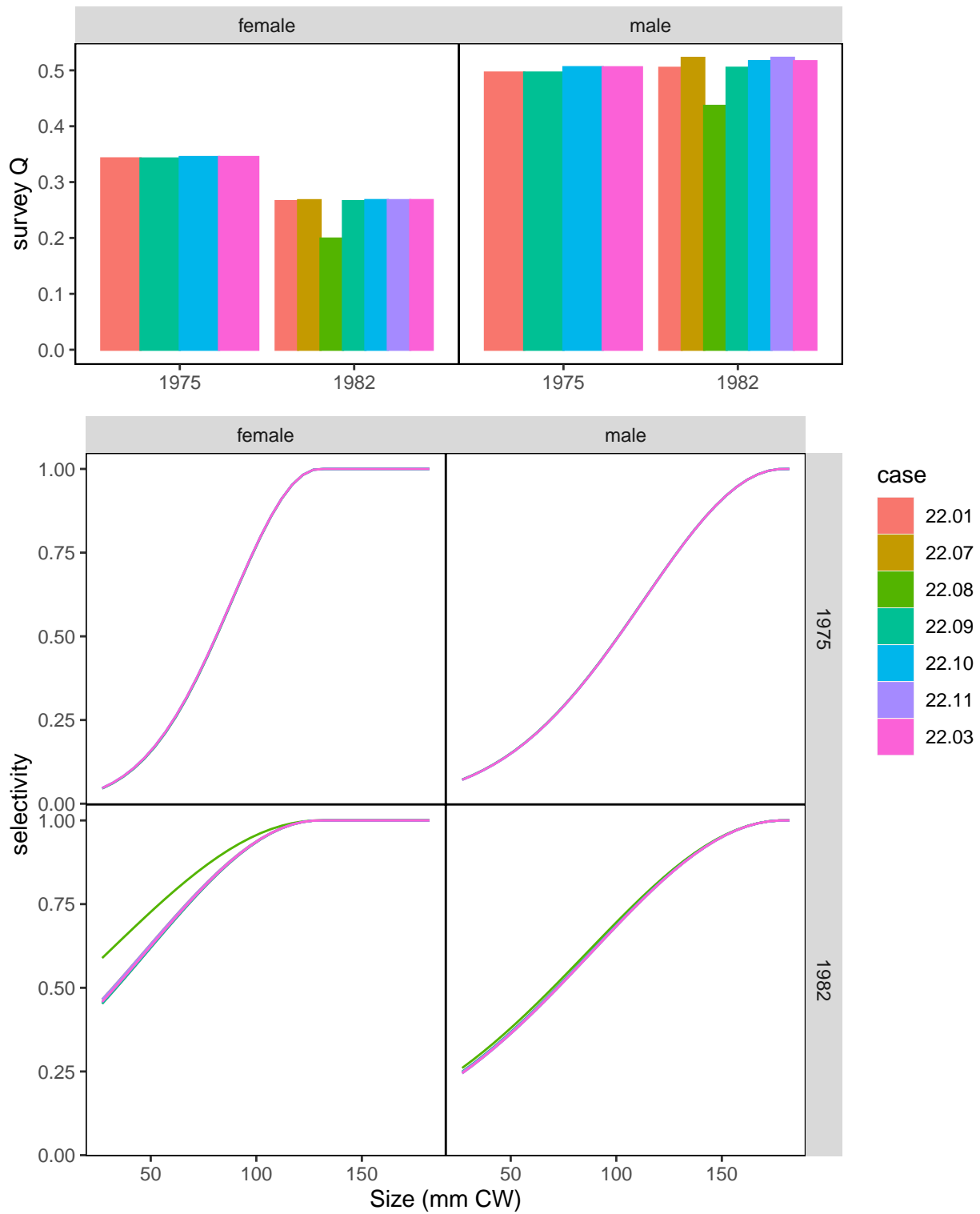


Figure 9: Estimated NMFS EBS Survey fully-selected catchability (survey Q's) and selectivity functions by sex for different time periods. 1975: 1975-1981; 1982: 1982-current. Preferred model is 22.03.

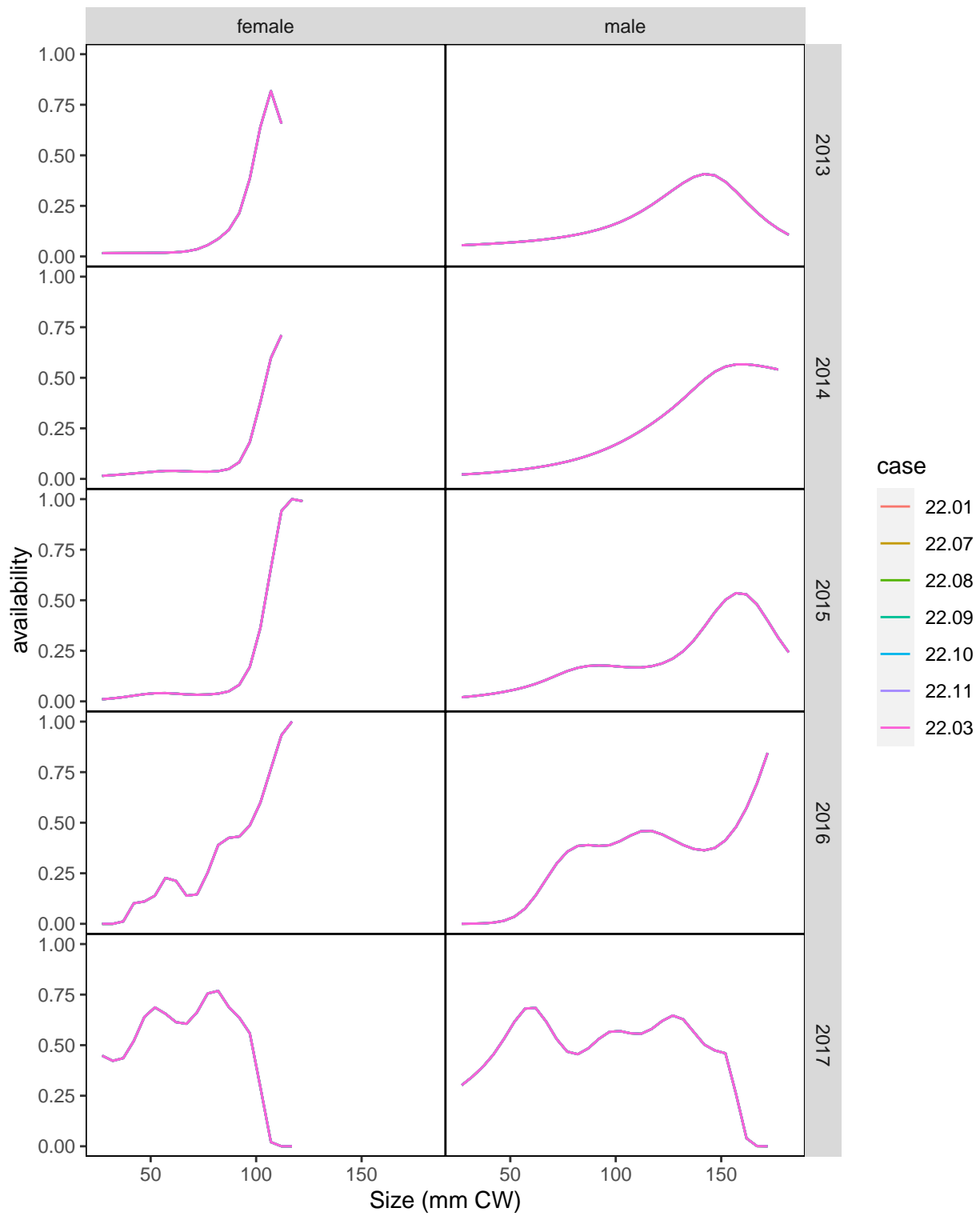


Figure 10: Annual sex-specific availability curves assumed for the BSFRF side-by-side (SBS) data. These were estimated outside the model. Preferred model is 22.03.

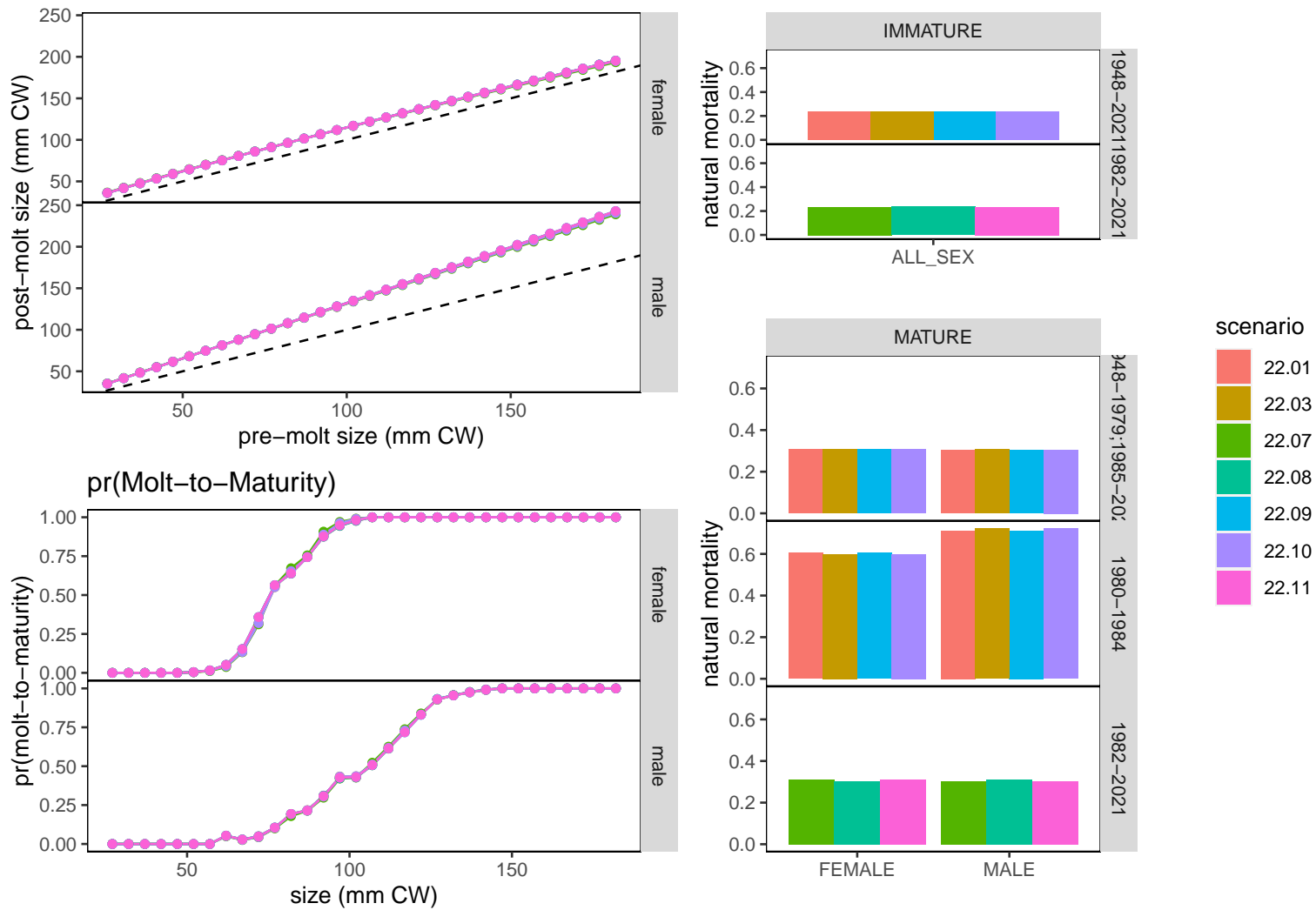


Figure 11: Estimated population processes. Plots in upper lefthand quadrant: sex-specific mean growth; plots in lower lefthand quadrant: sex-specific probability of the molt-to-maturity (i.e., terminal molt)); plots in righthand column: natural mortality rates, by maturity state and sex. Preferred model is 22.03.

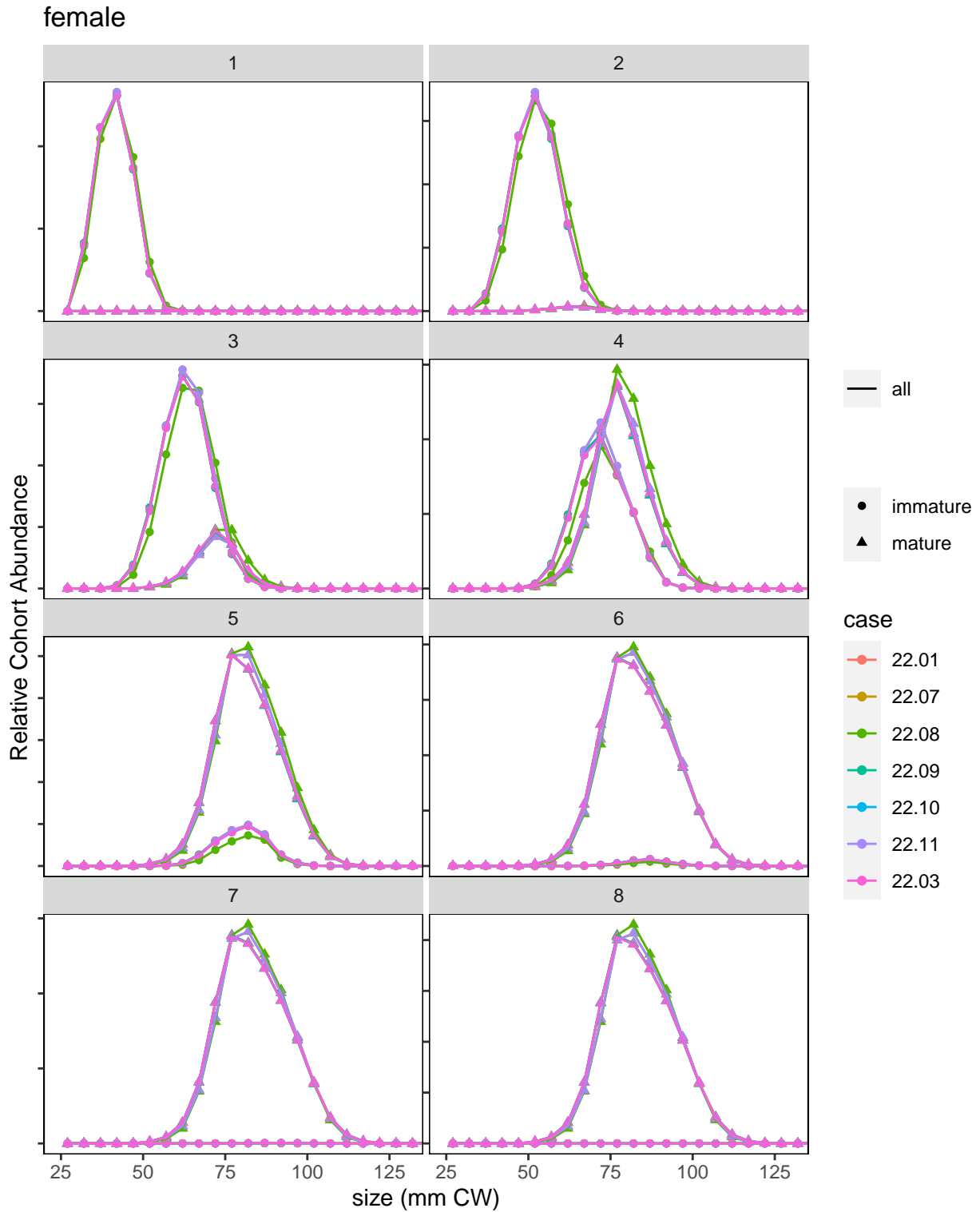


Figure 12: Estimated annual cohort progression for female crab (by year; individual scales are relative). Preferred model is 22.03.

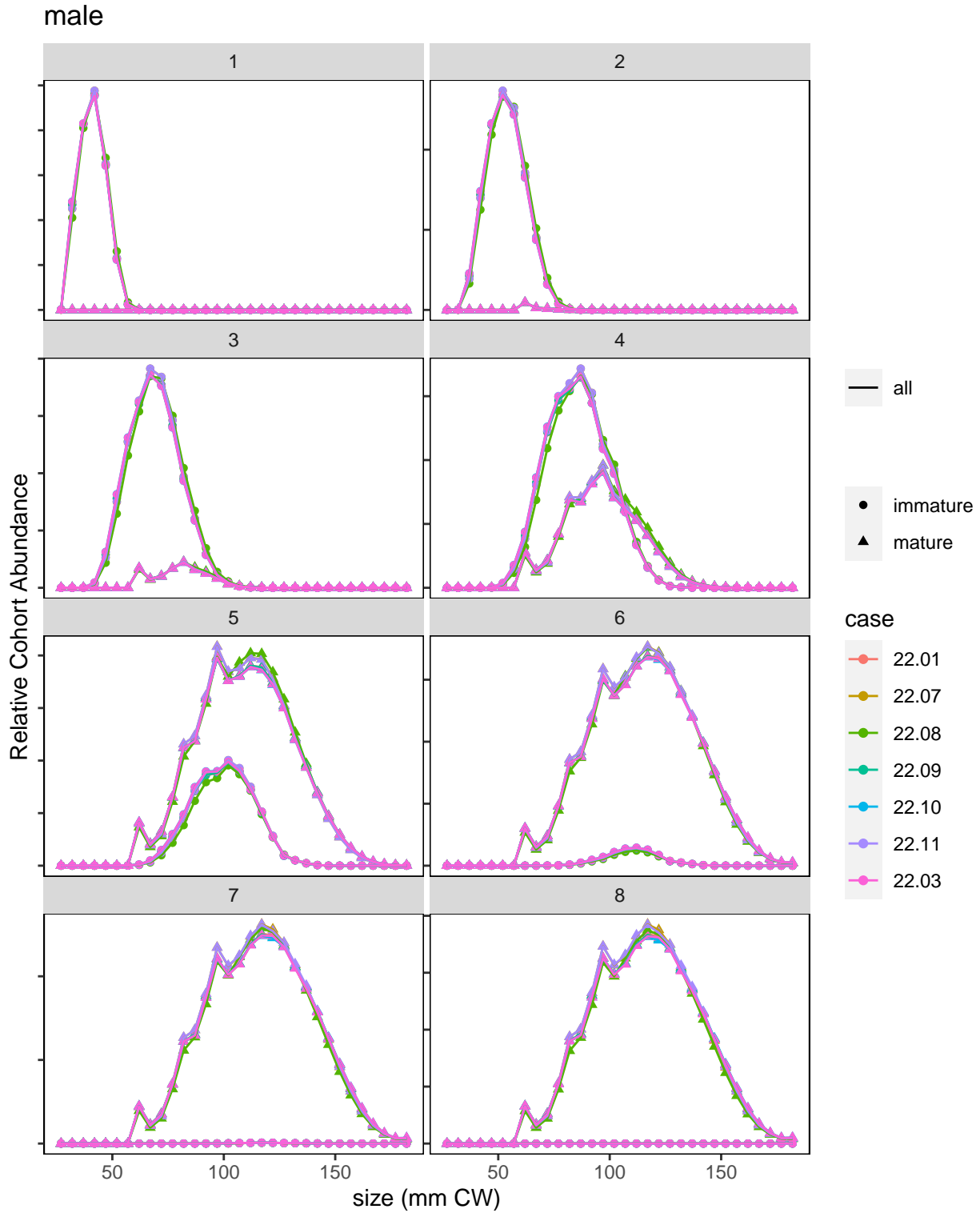


Figure 13: Estimated annual cohort progression for male crab (by year; individual scales are relative). Preferred model is 22.03.



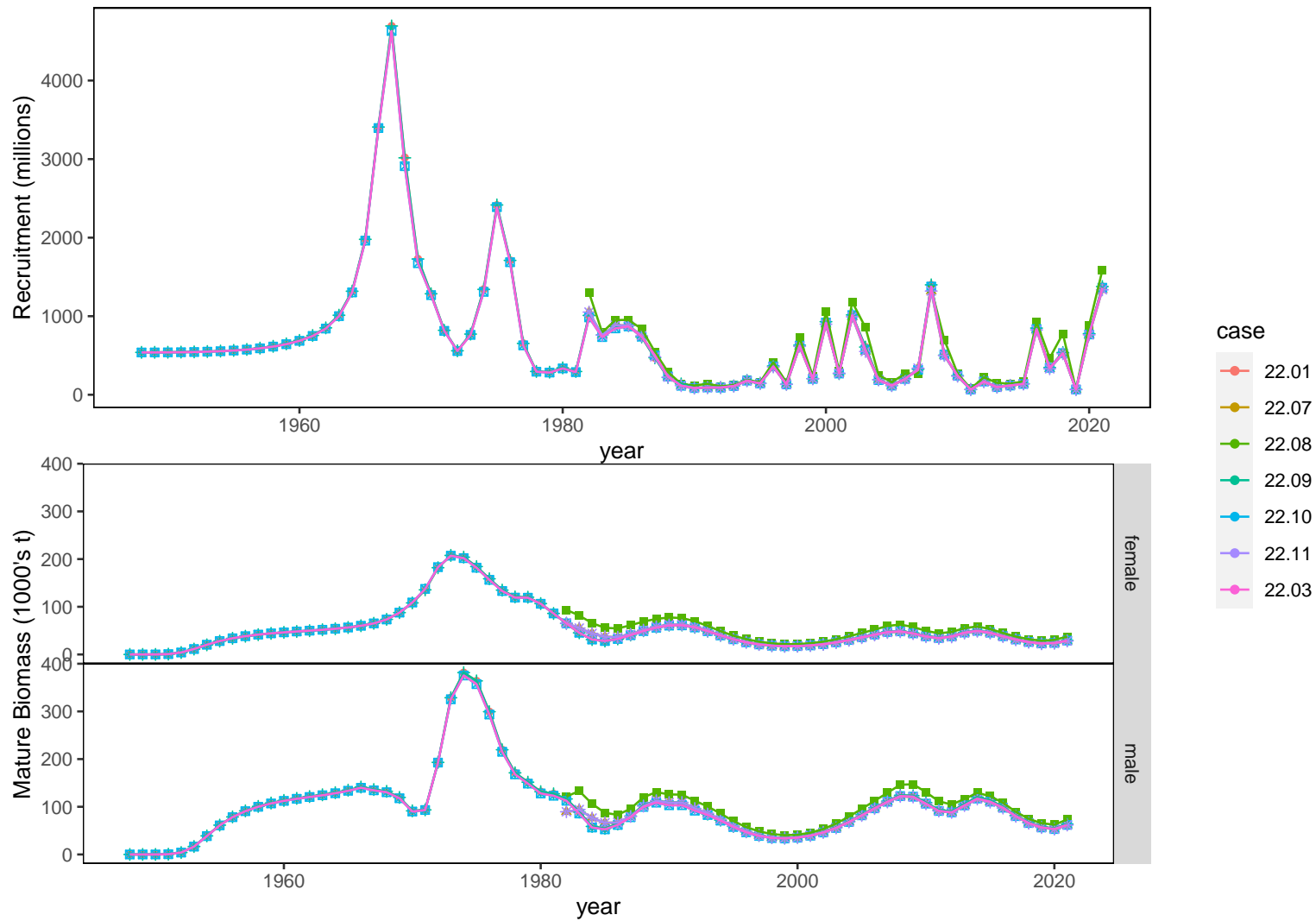


Figure 14: Estimated recruitment and mature biomass time series (all years). Upper plot: recruitment; lower plots: sex-specific mature biomass-at-mating. Preferred model is 22.03.

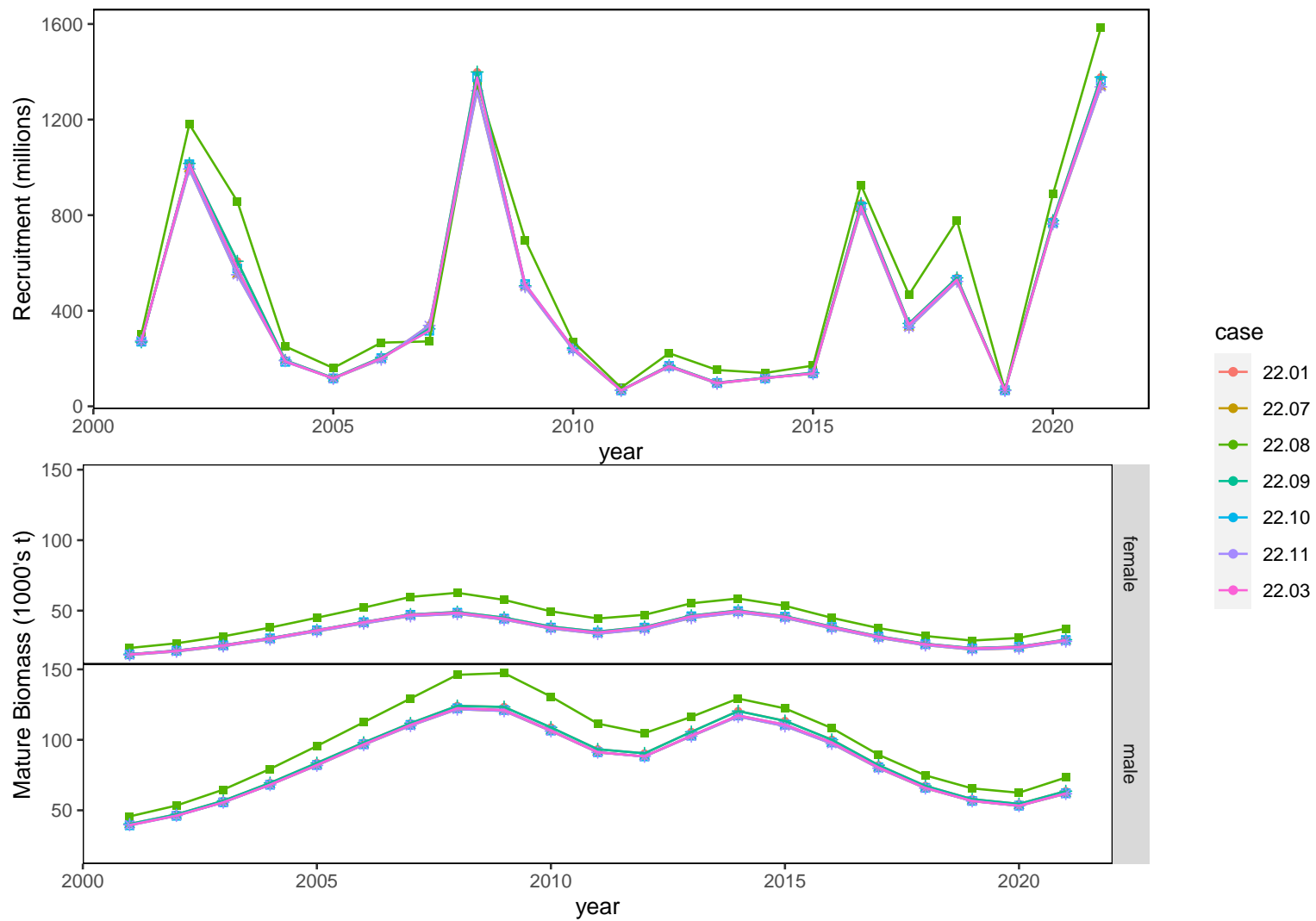


Figure 15: Estimated recruitment and mature biomass time series (recent years). Upper plot: recruitment; lower plots: sex-specific mature biomass-at-mating. Preferred model is 22.03.

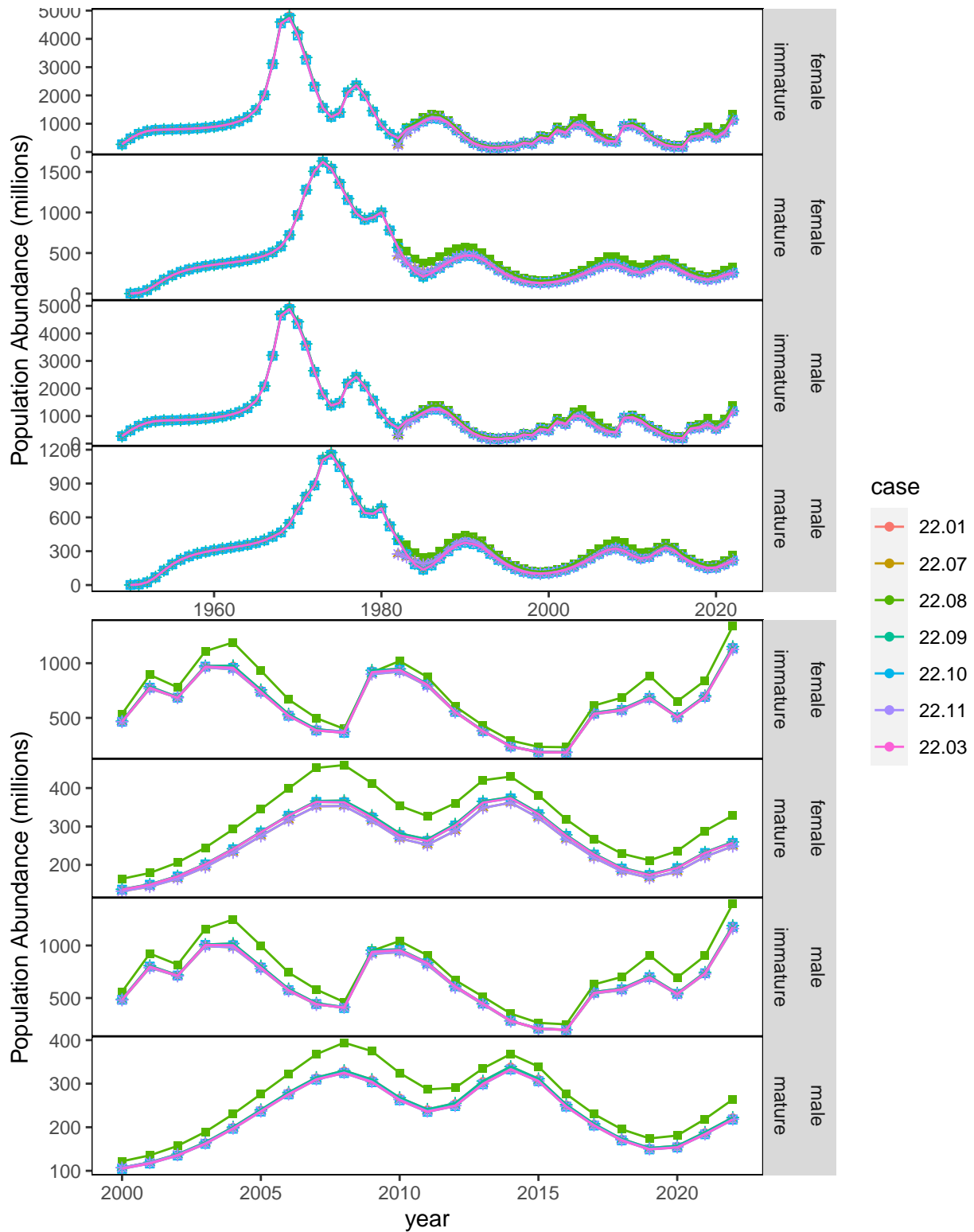


Figure 16: Estimated population abundance trends, by sex and maturity state. Upper plots: all years; lower plots: recent years. Preferred model is 22.03.

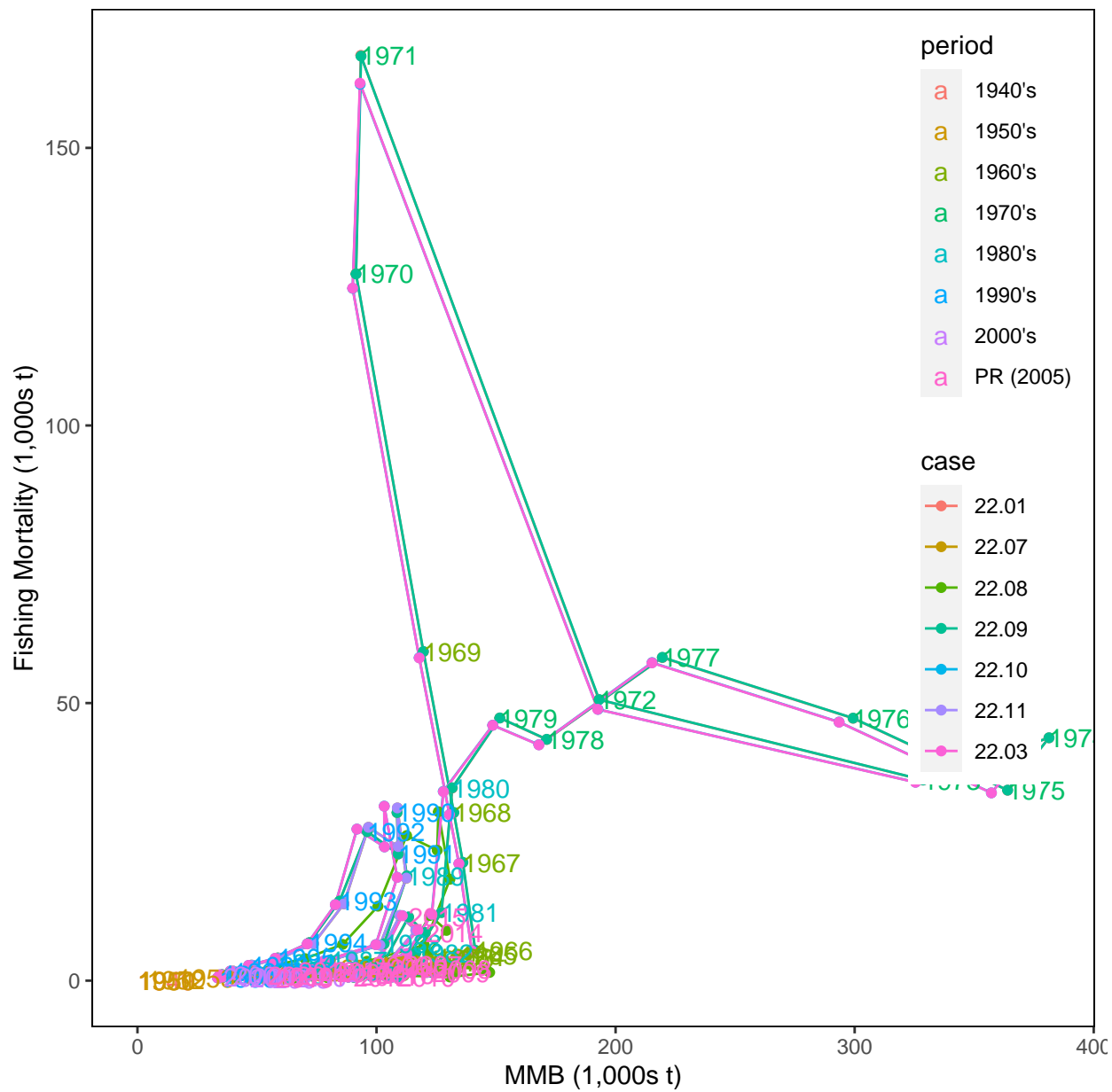


Figure 17: Total estimated fishing mortality vs. MMB. Preferred model is 22.03.

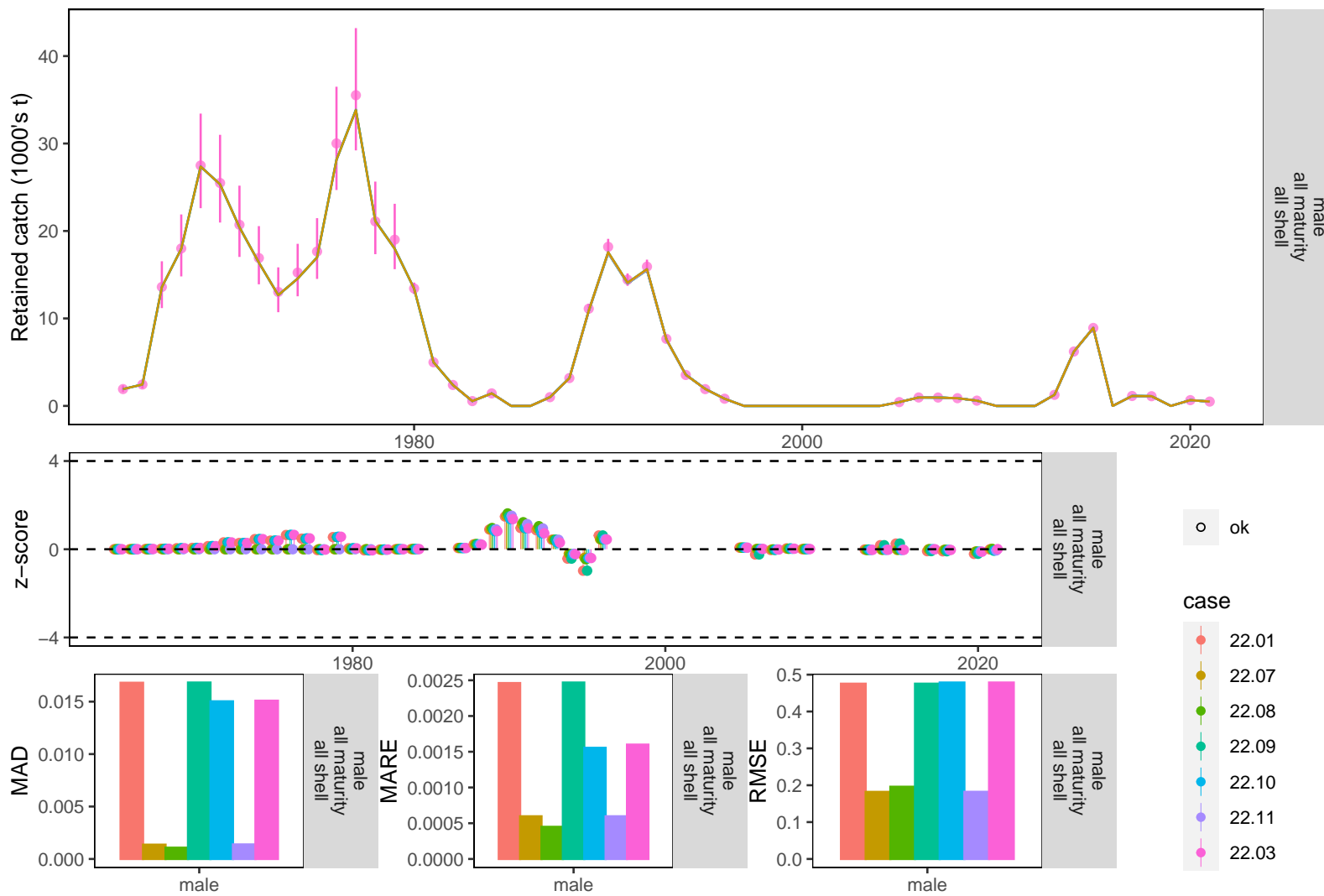


Figure 18: Fits to retained catch biomass in the directed fishery (upper two rows) and residuals analysis plots (lower two rows). Confidence intervals are 95%.

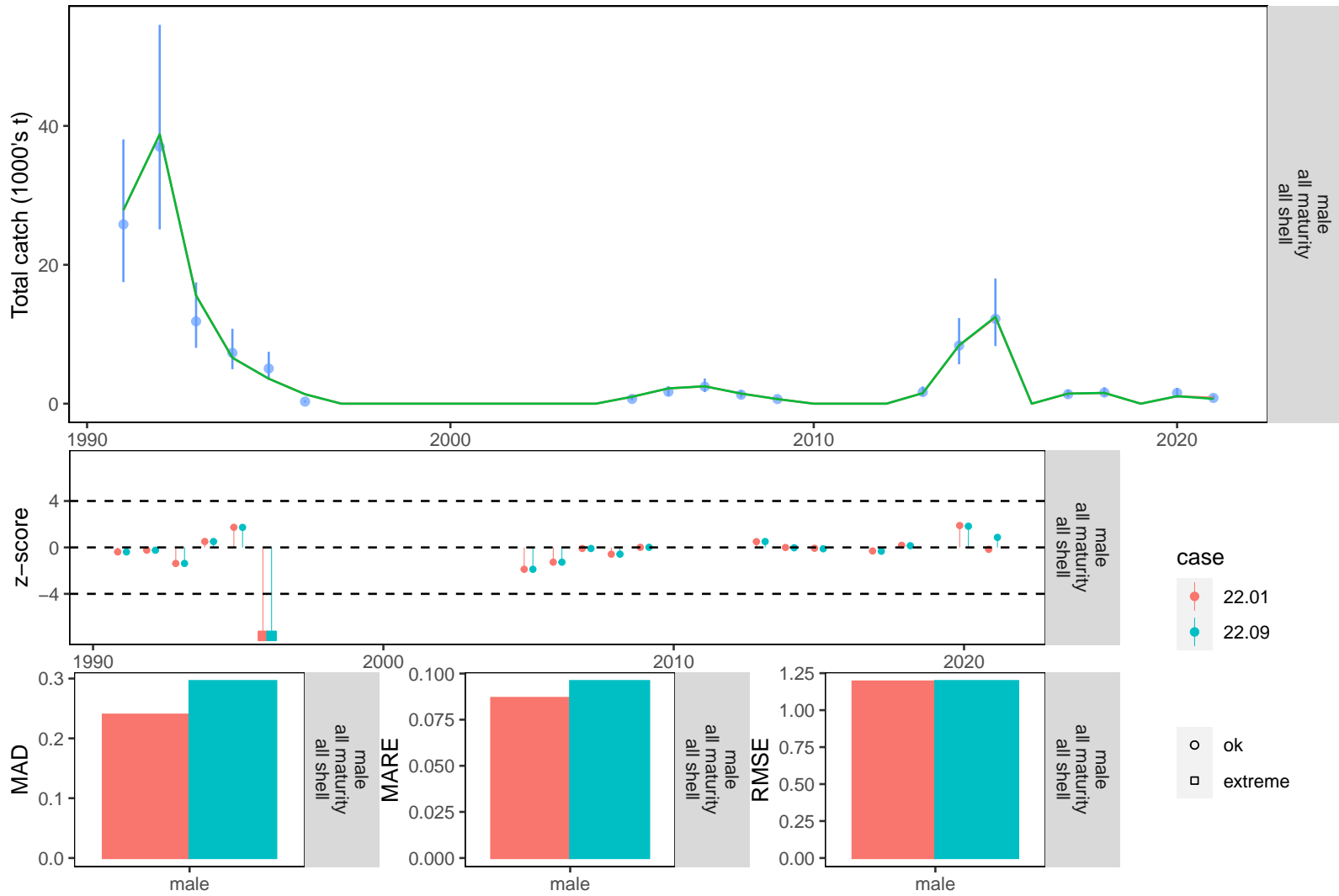


Figure 19: Fits to total catch biomass for male crab in the TCF fishery (upper row) and residuals analysis plots (lower two rows). Confidence intervals are 95%.

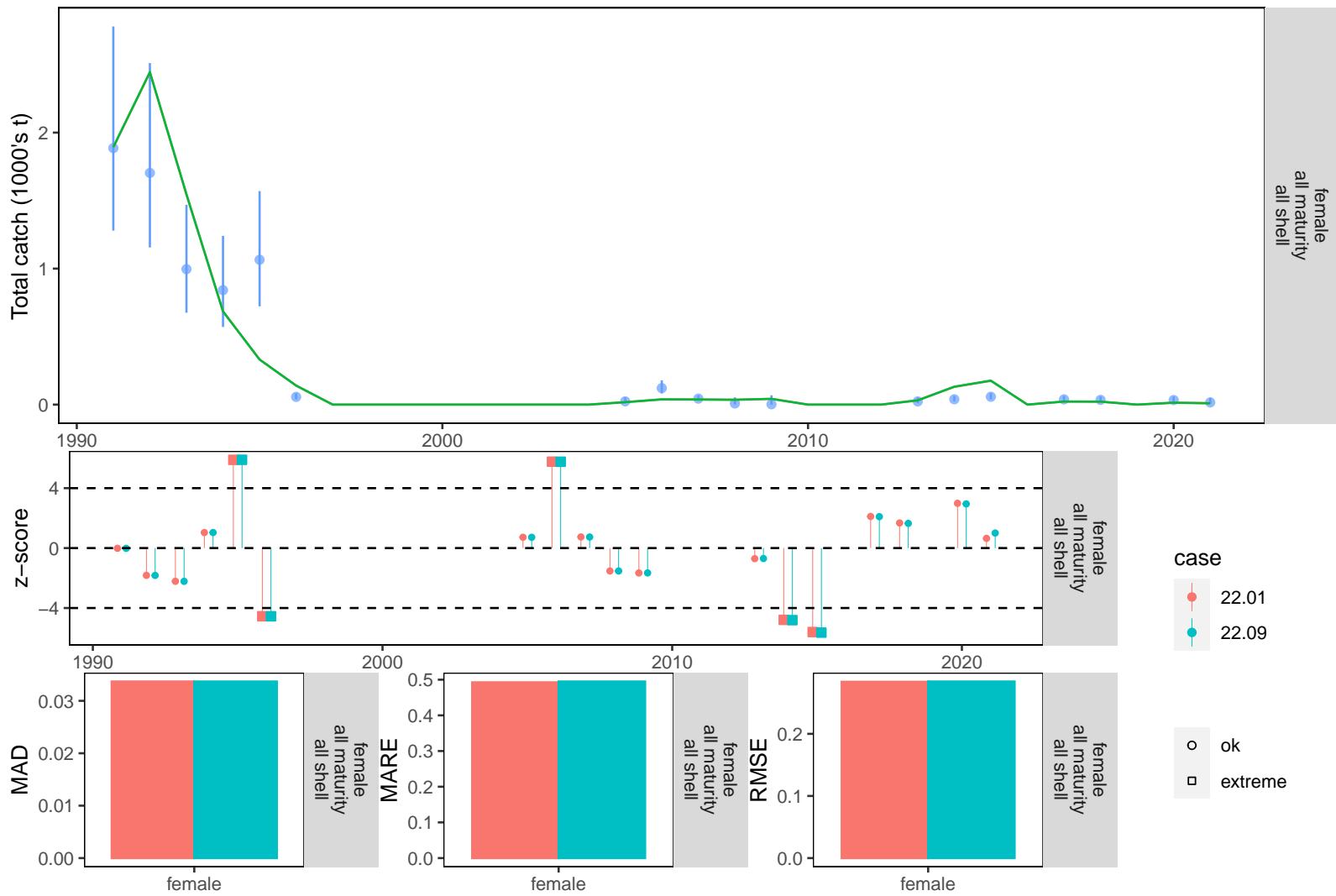


Figure 20: Fits to total catch biomass of female crab in the TCF fishery (upper row) and residuals analysis plots (lower two rows). Confidence intervals are 95%.

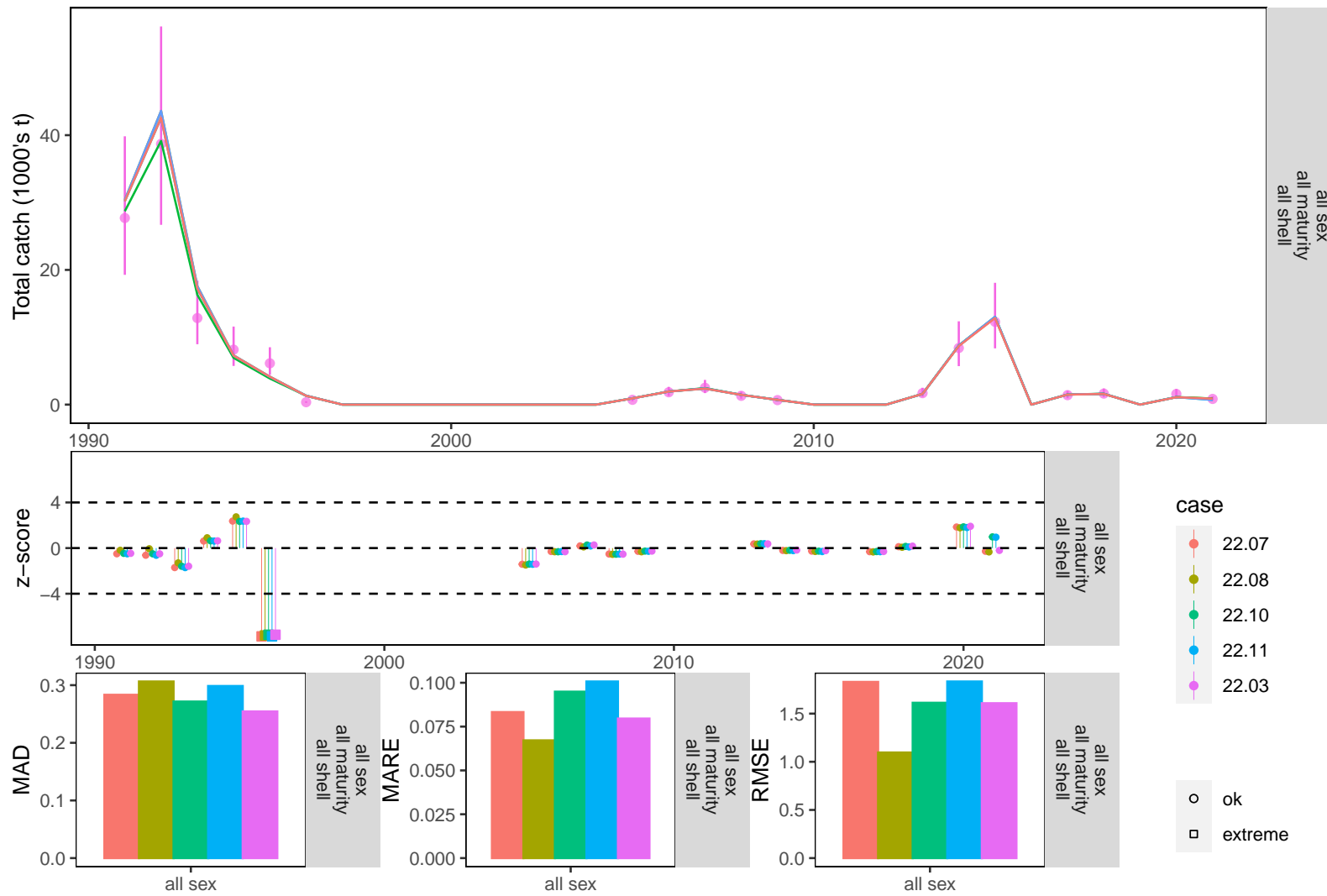


Figure 21: Fits to total catch biomass of all crab in the TCF fishery (upper row) and residuals analysis plots (lower two rows). Confidence intervals are 95%.



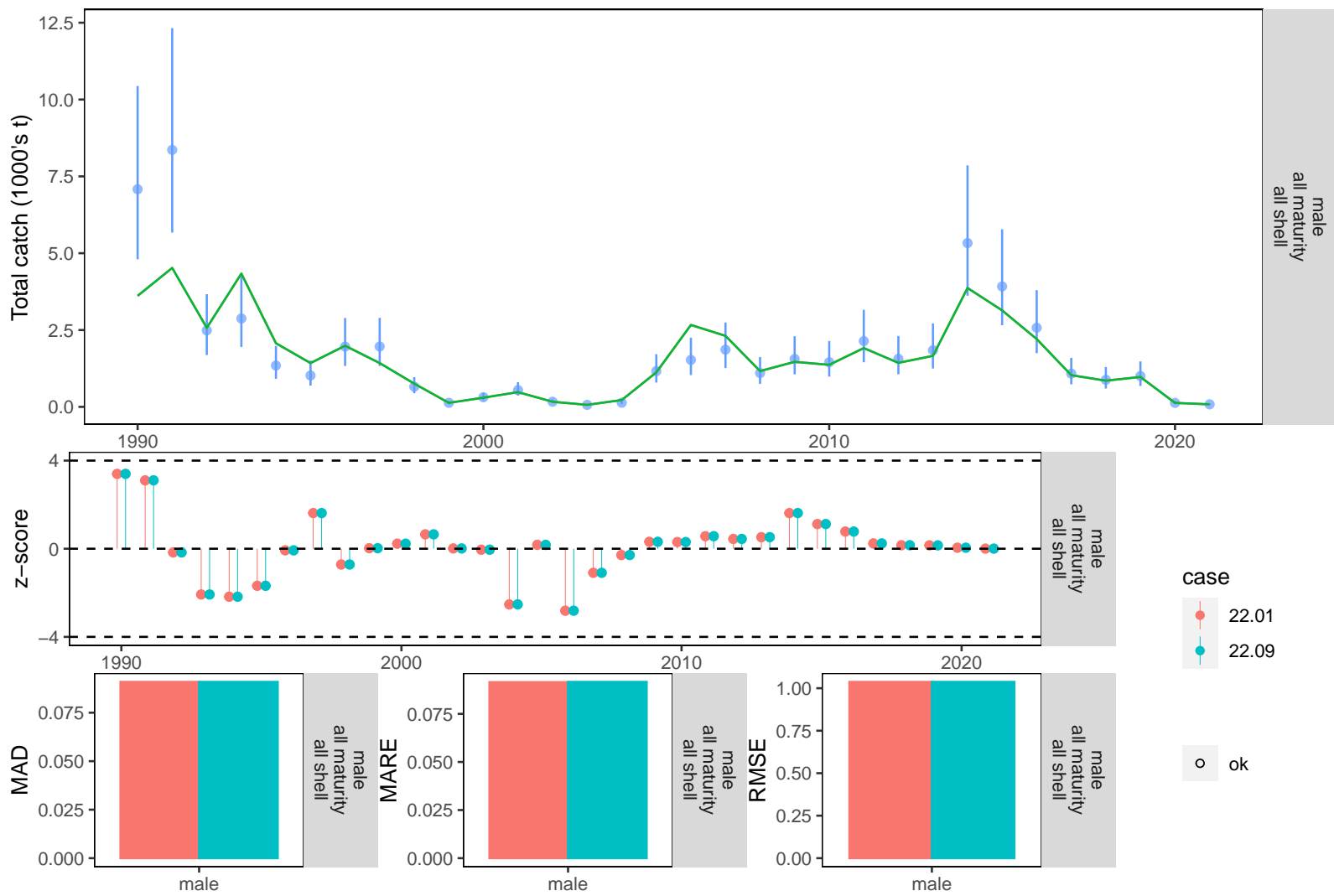


Figure 22: Fits to total catch biomass for male crab in the SCF fishery (upper row) and residuals analysis plots (lower two rows). Confidence intervals are 95%.

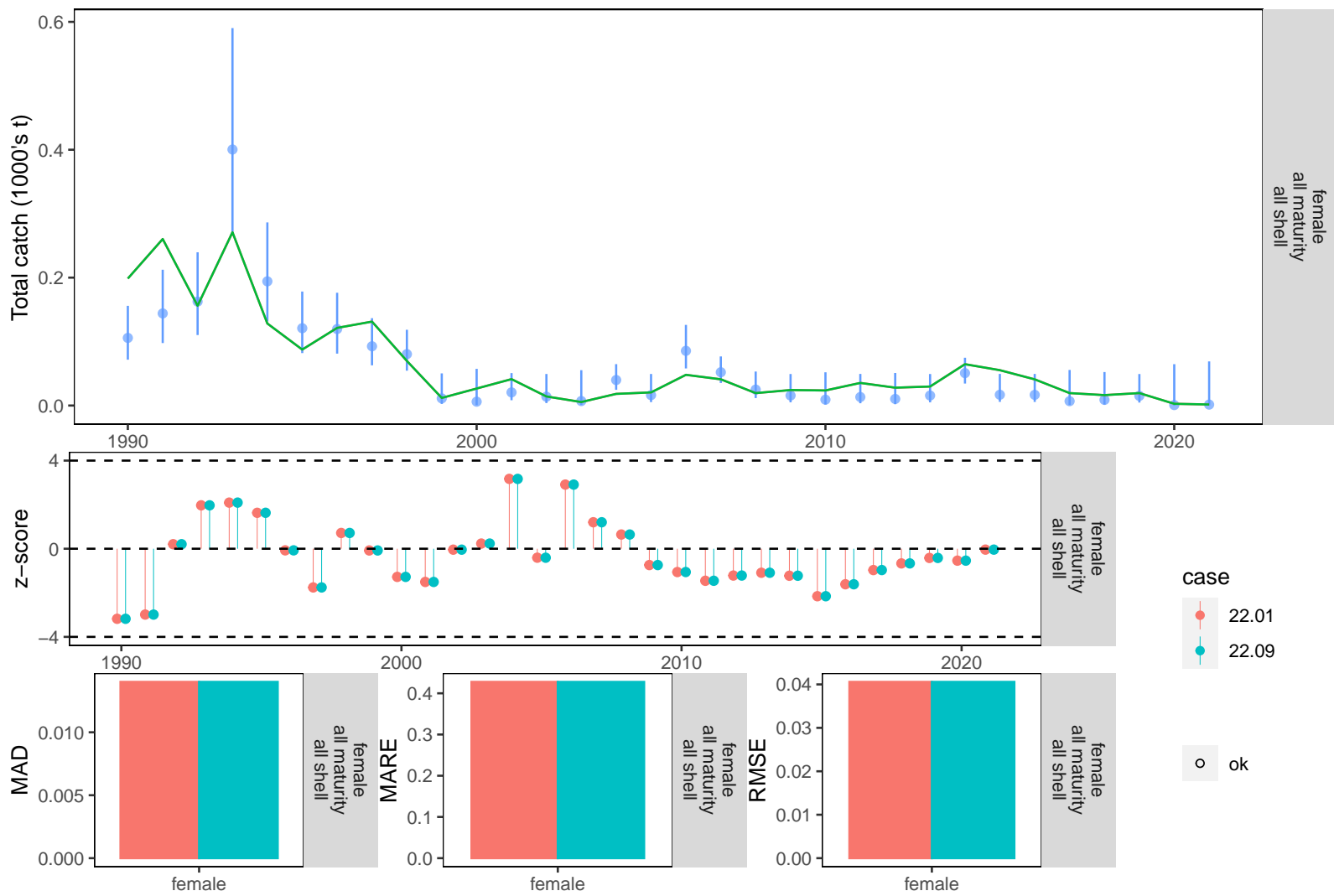


Figure 23: Fits to total catch biomass of female crab in the SCF fishery (upper row) and residuals analysis plots (lower two rows). Confidence intervals are 95%.

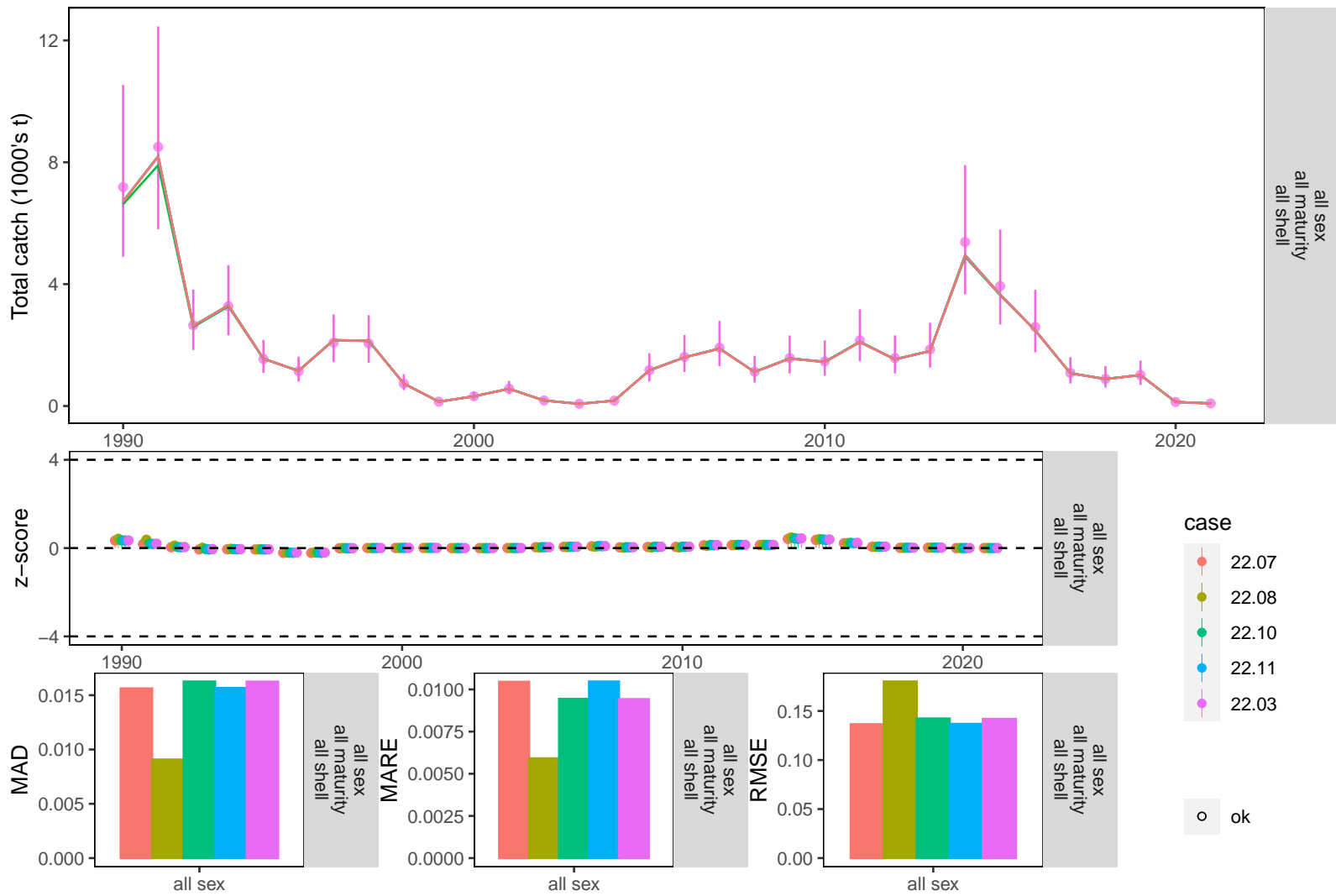


Figure 24: Fits to total catch biomass of all crab in the SCF fishery (upper row) and residuals analysis plots (lower two rows). Confidence intervals are 95%.

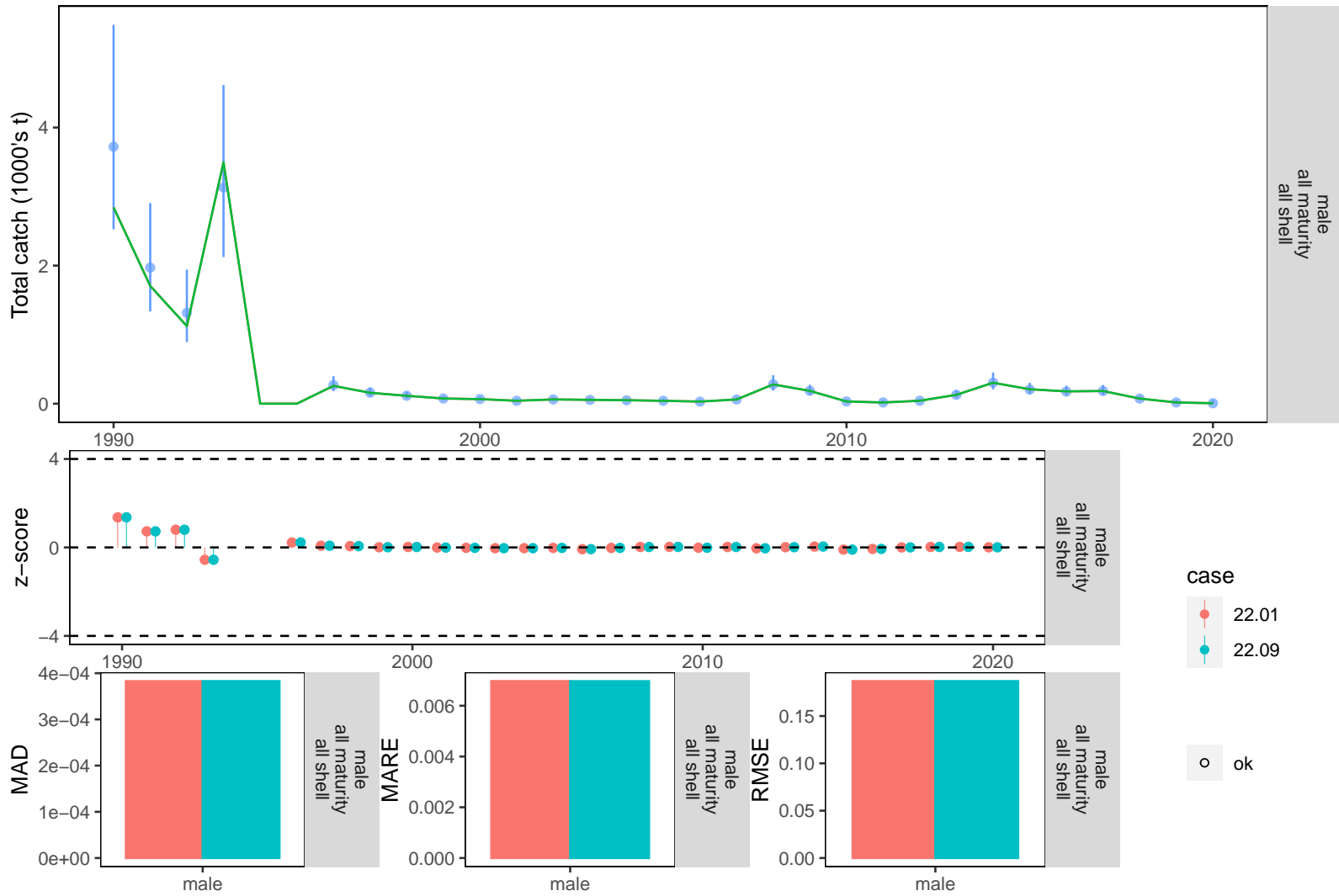


Figure 25: Fits to total catch biomass for male crab in the RKF fishery (upper row) and residuals analysis plots (lower two rows). Confidence intervals are 95%.

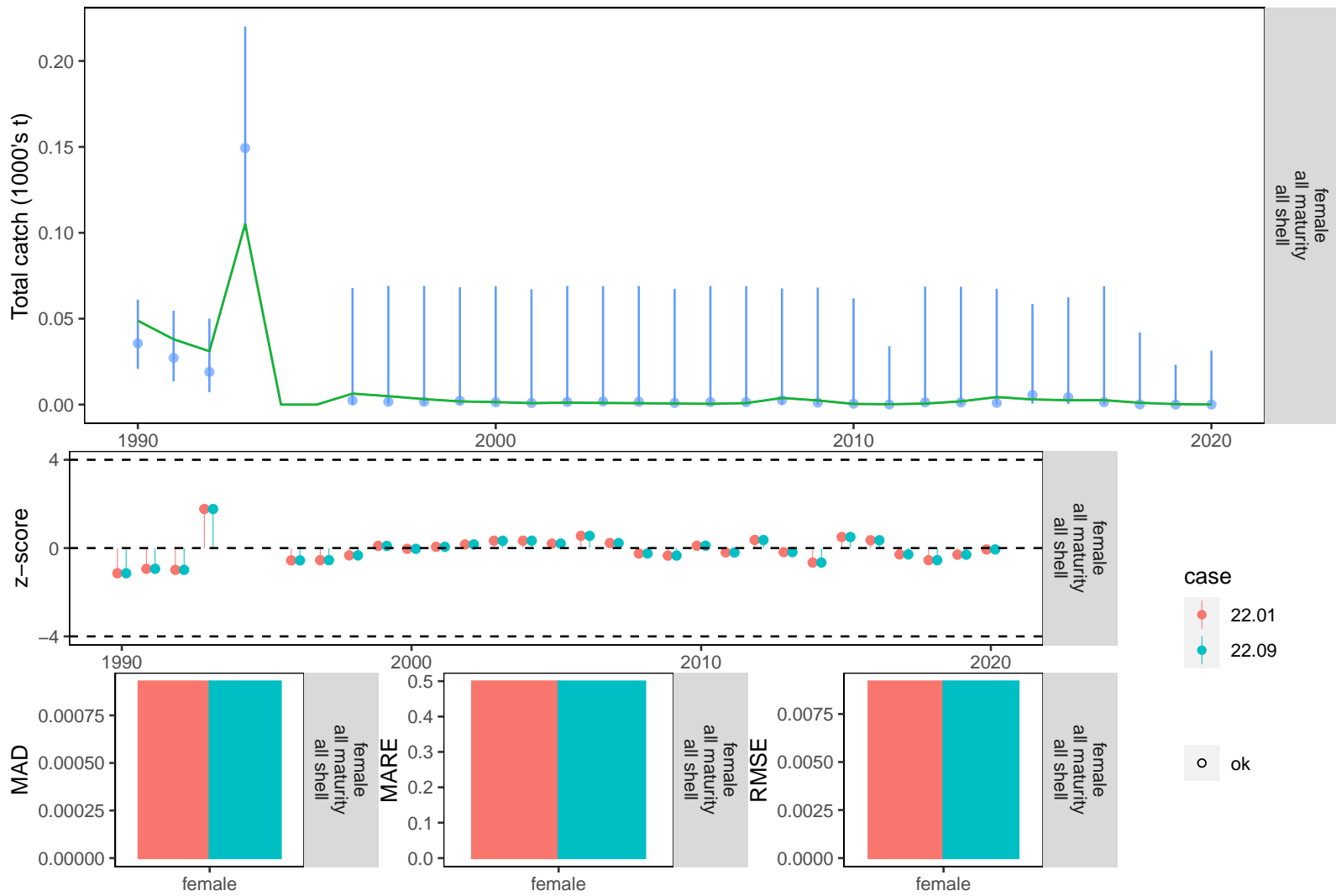


Figure 26: Fits to total catch biomass of female crab in the RKF fishery (upper row) and residuals analysis plots (lower two rows). Confidence intervals are 95%.

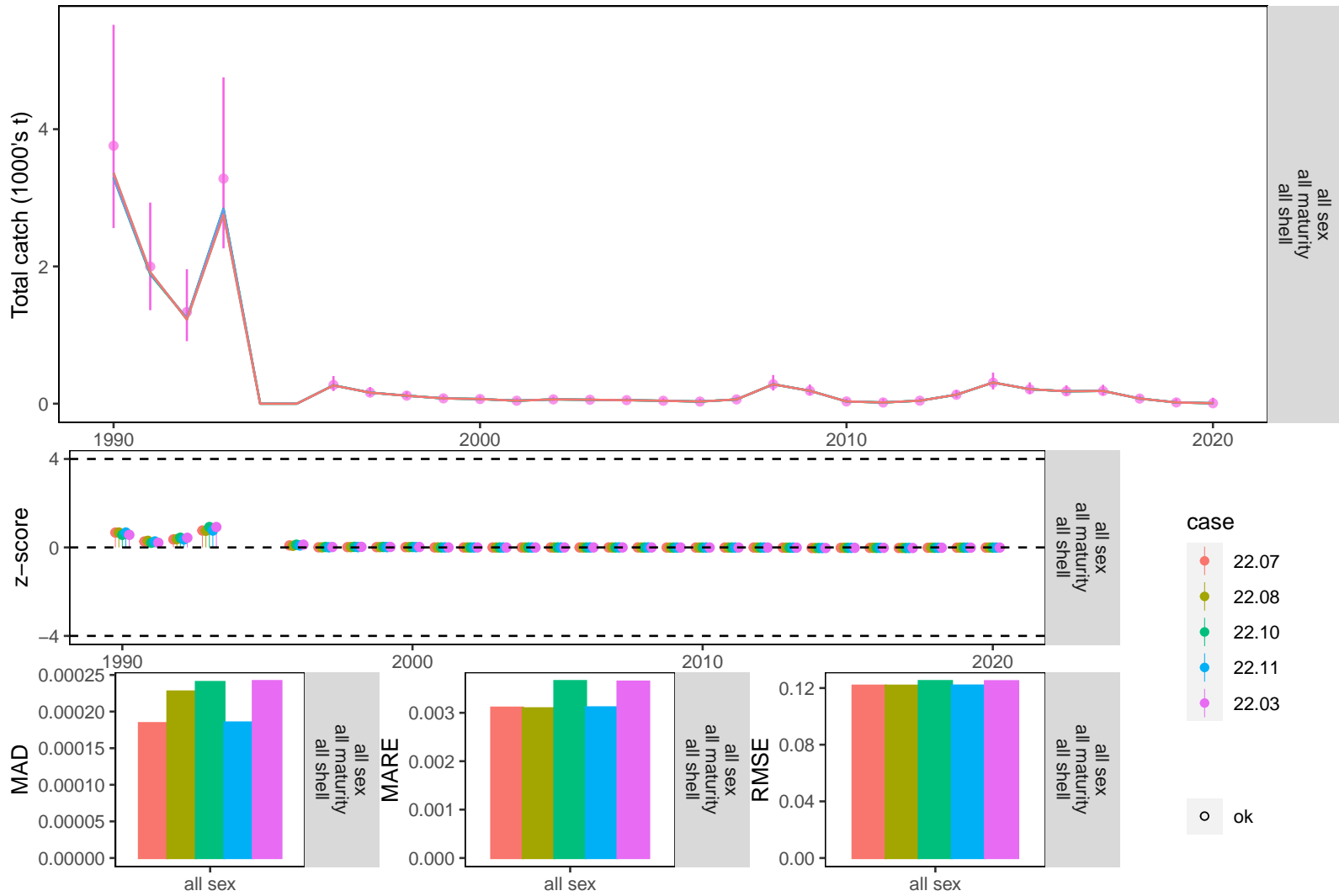


Figure 27: Fits to total catch biomass of all crab in the RKF fishery (upper row) and residuals analysis plots (lower two rows). Confidence intervals are 95%.

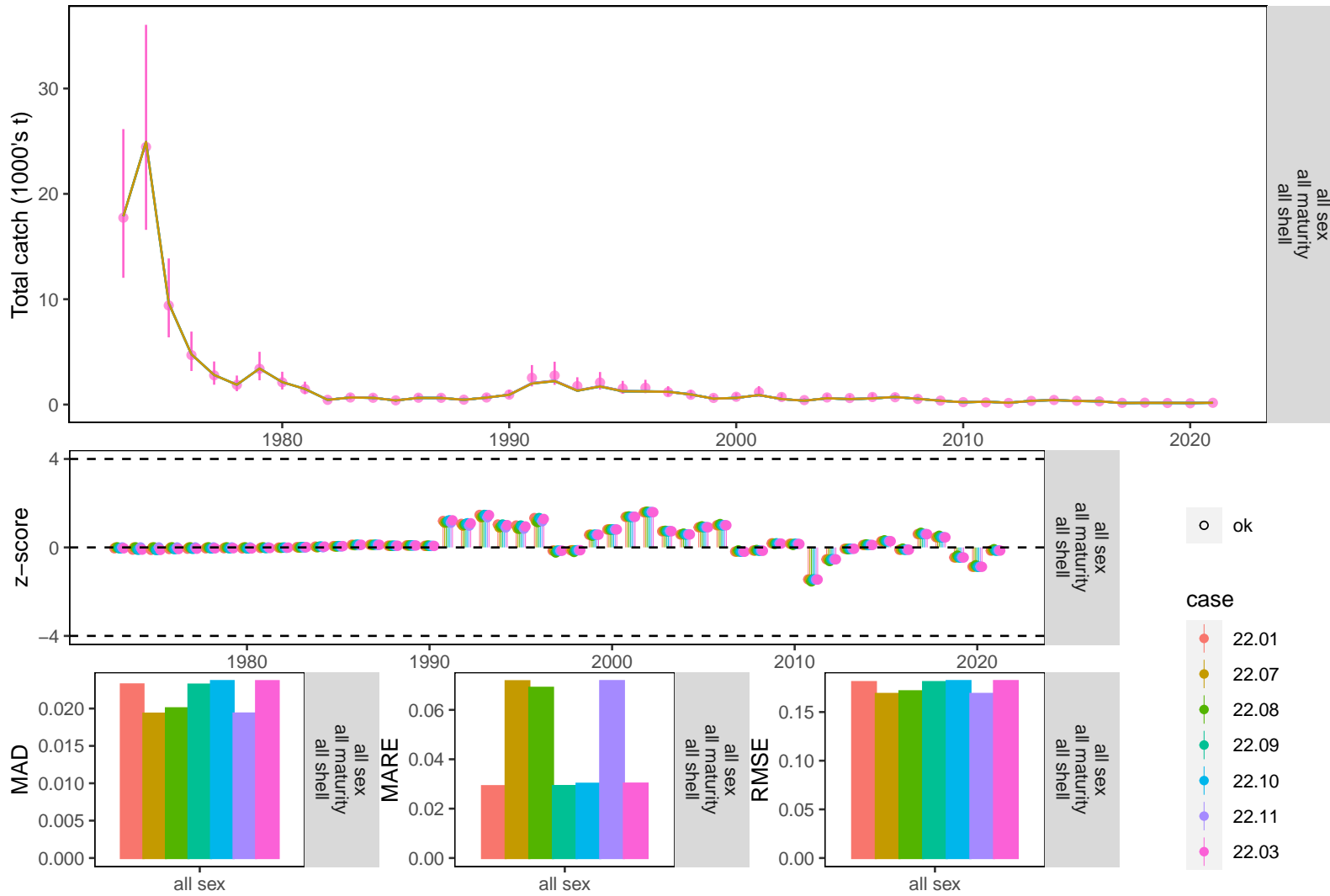


Figure 28: Fits to total catch biomass of all crab in the GF All fishery (upper row) and residuals analysis plots (lower two rows). Confidence intervals are 95%.

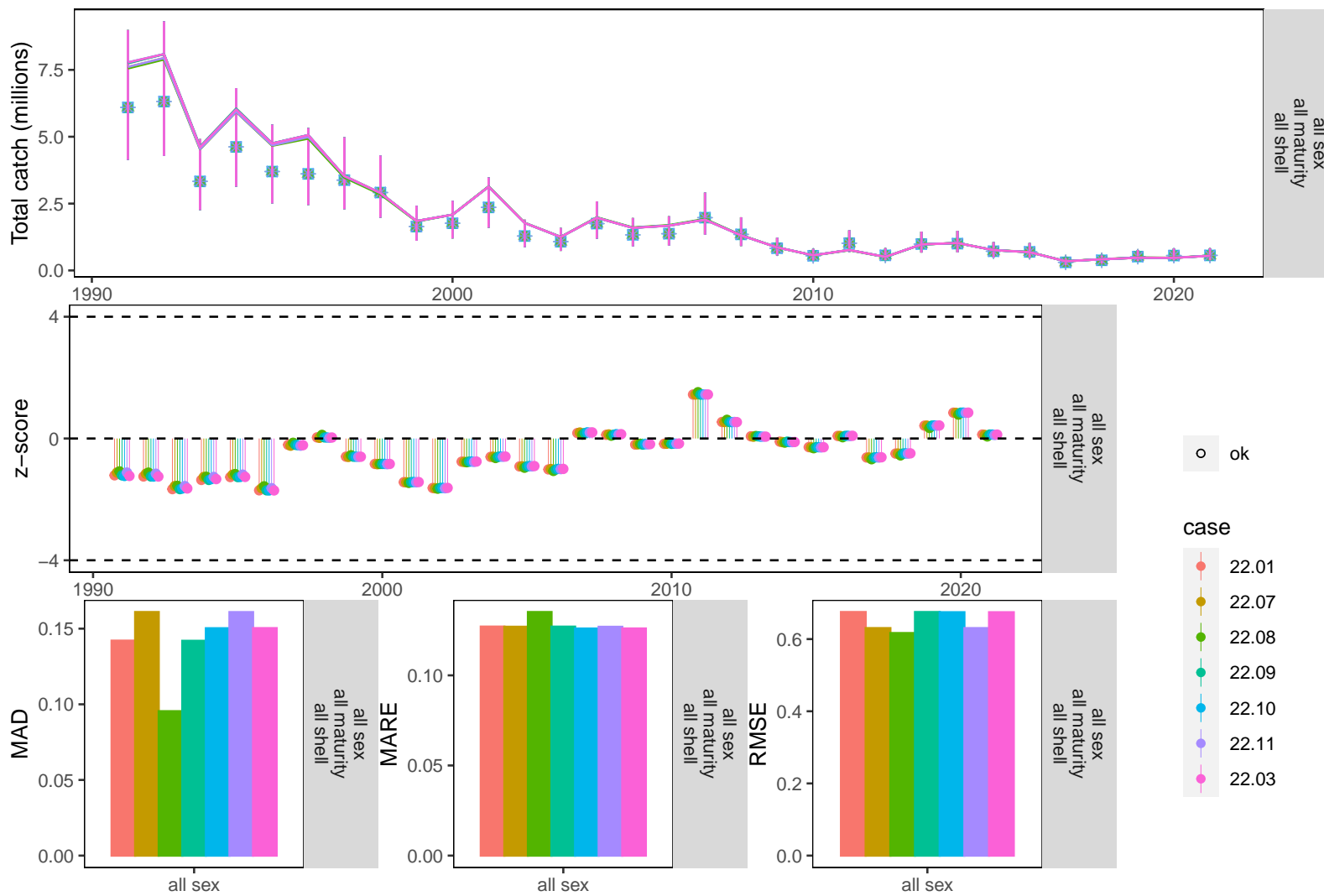


Figure 29: Fits to total catch abundance of all crab in the GF All fishery (upper row) and residuals analysis plots (lower two rows). Confidence intervals are 95%.



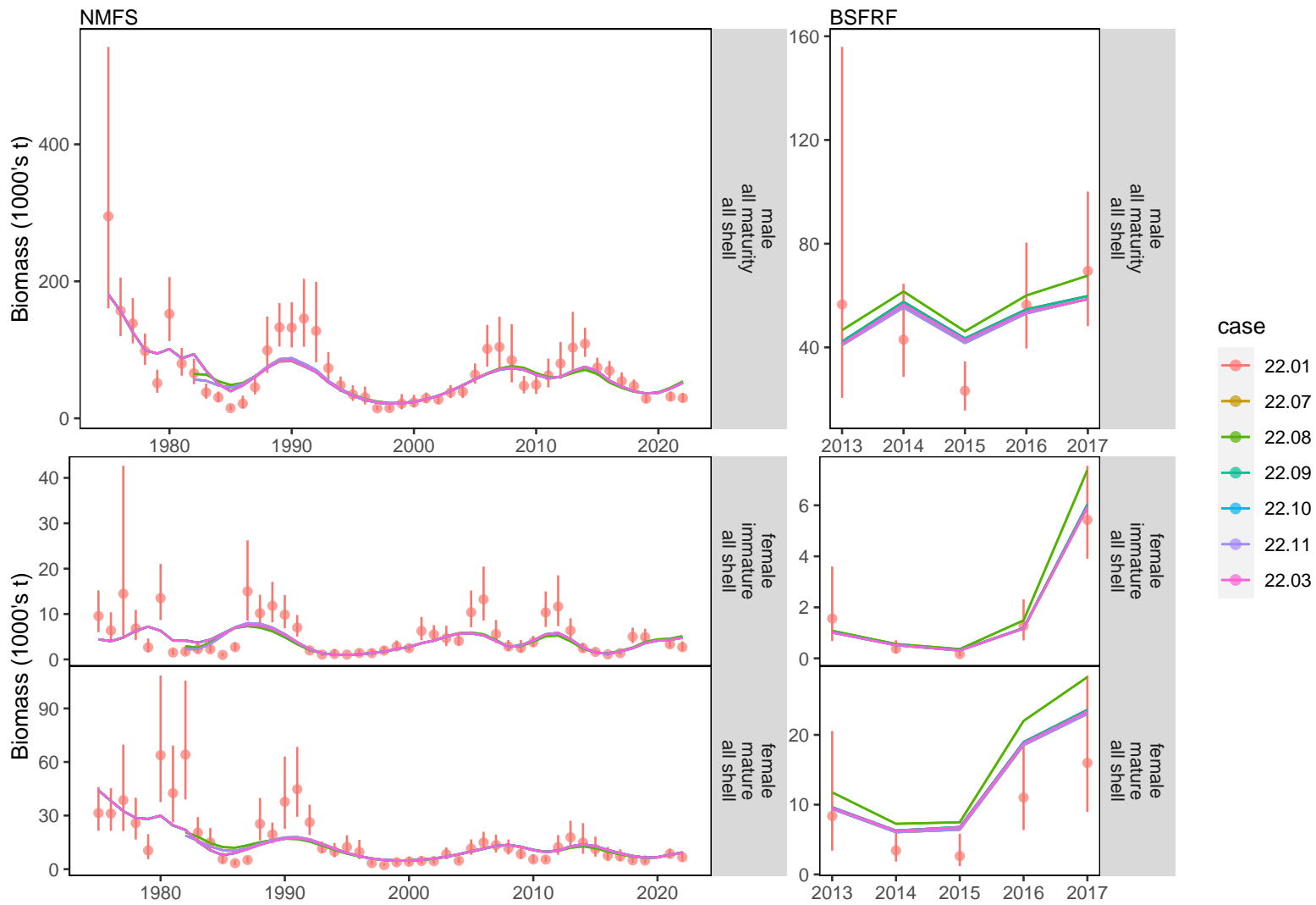


Figure 30: Fits to time series of all male (upper graph), immature female (center graph), and mature female (lower plot) biomass from the NMFS EBS shelf bottom trawl survey (left column) and the BSFRF SBS trawl survey (right column). Confidence intervals are 95%.

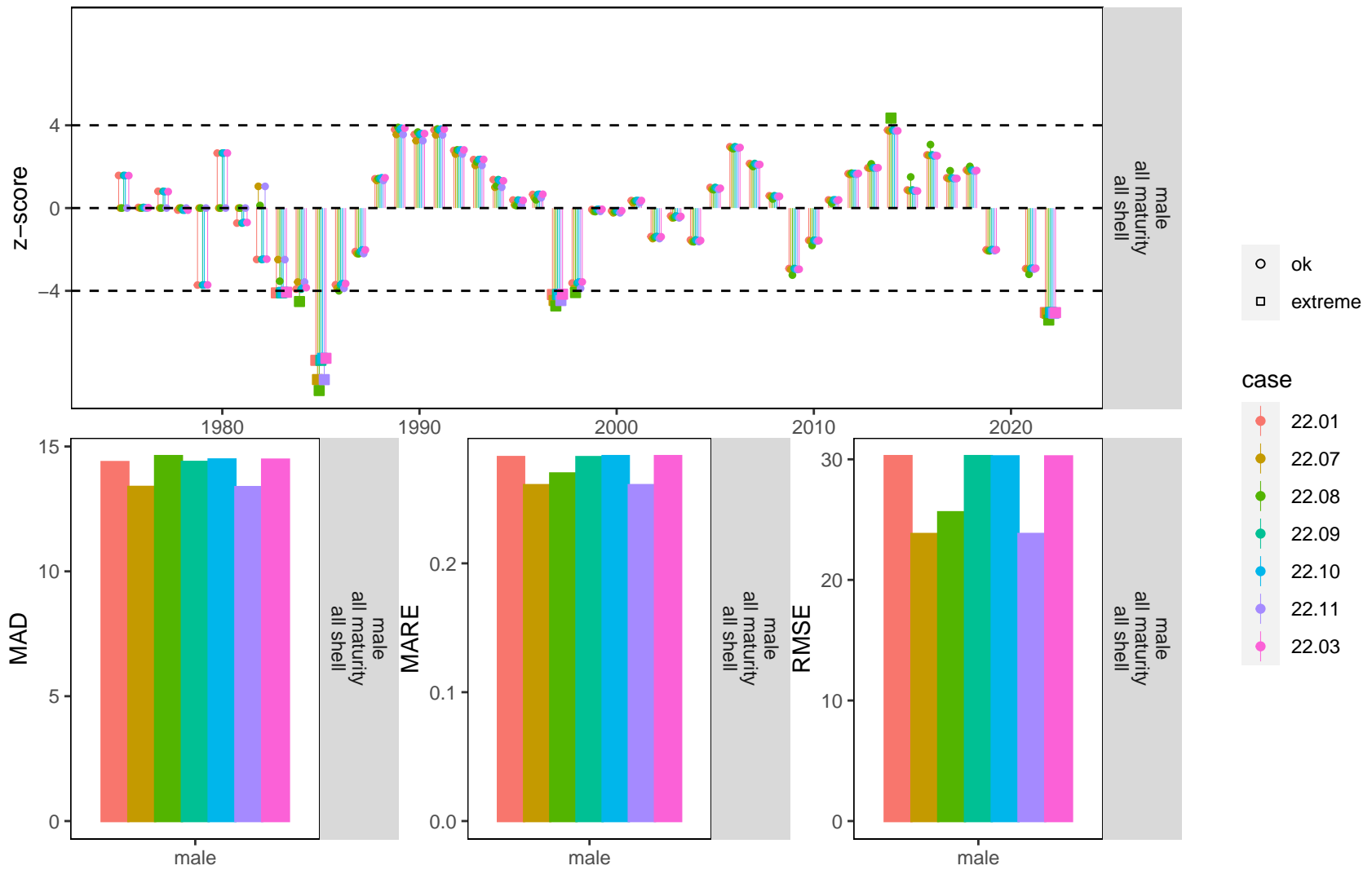


Figure 31: Residuals analysis by model scenario for fits to male biomass in the NMFS EBS bottom trawl survey. Upper row: annual z-scores; bottom row: 1) MAD: median absolute deviations, 2) MARE: median absolute relative error; 3) RMSE: root mean square error.

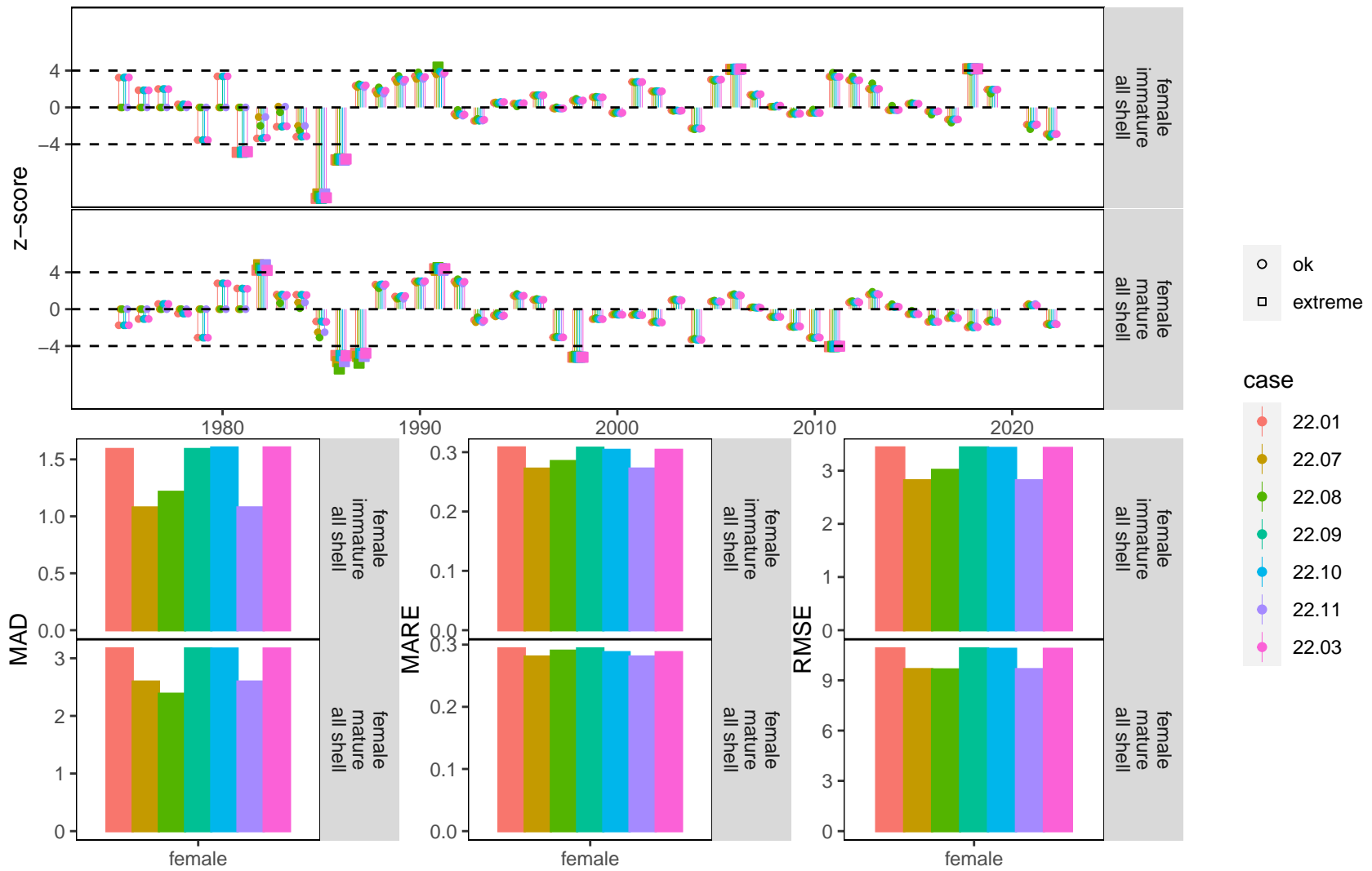


Figure 32: Residuals analysis by model scenario for fits to female biomass in the NMFS EBS bottom trawl survey. Upper row: annual z-scores; bottom row: 1) MAD: median absolute deviations, 2) MARE: median absolute relative error; 3) RMSE: root mean square error.

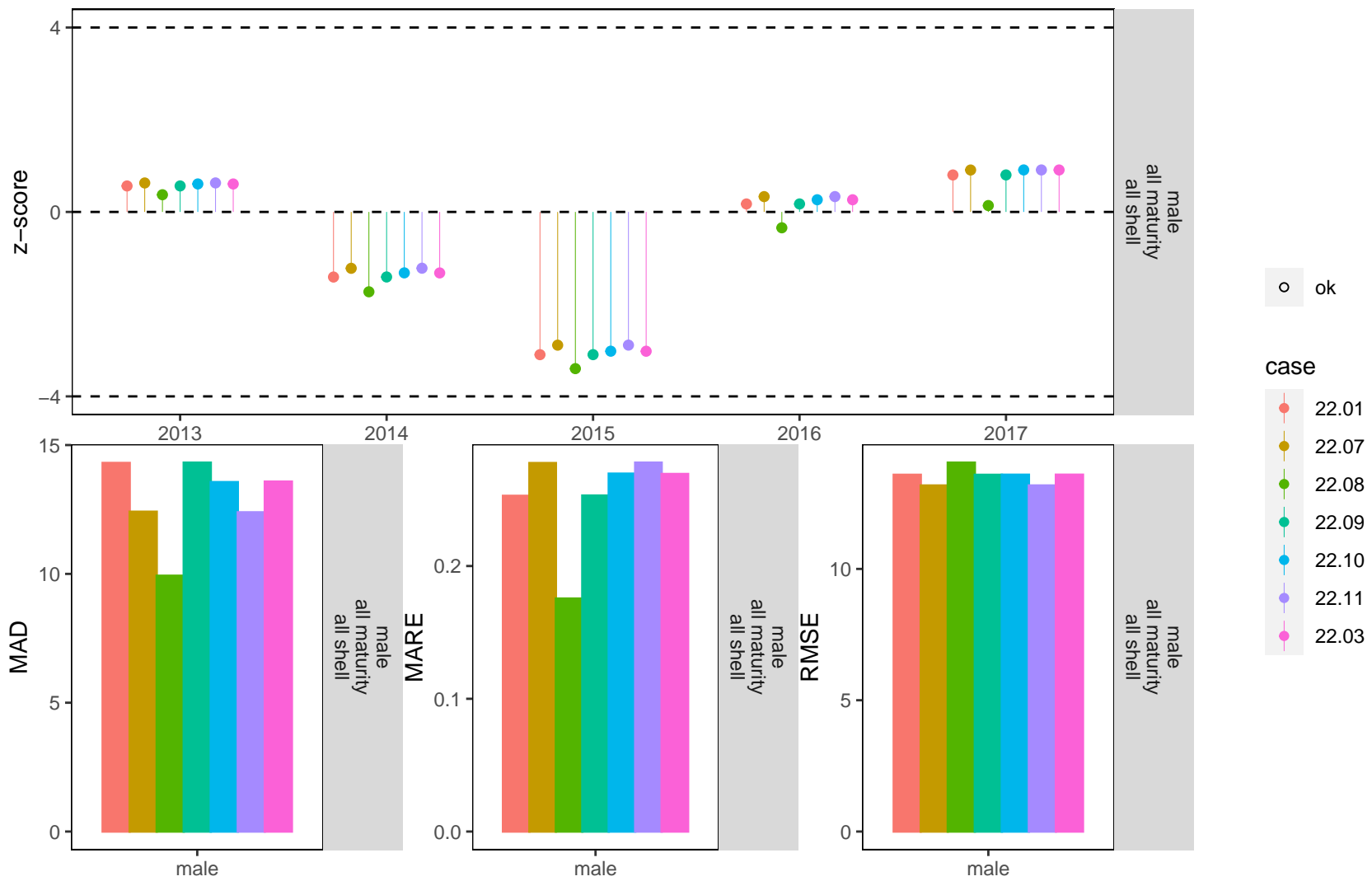


Figure 33: Residuals analysis by model scenario for fits to male biomass in the BSFRF SBS bottom trawl survey. Upper row: annual z-scores; bottom row: 1) MAD: median absolute deviations, 2) MARE: median absolute relative error; 3) RMSE: root mean square error.

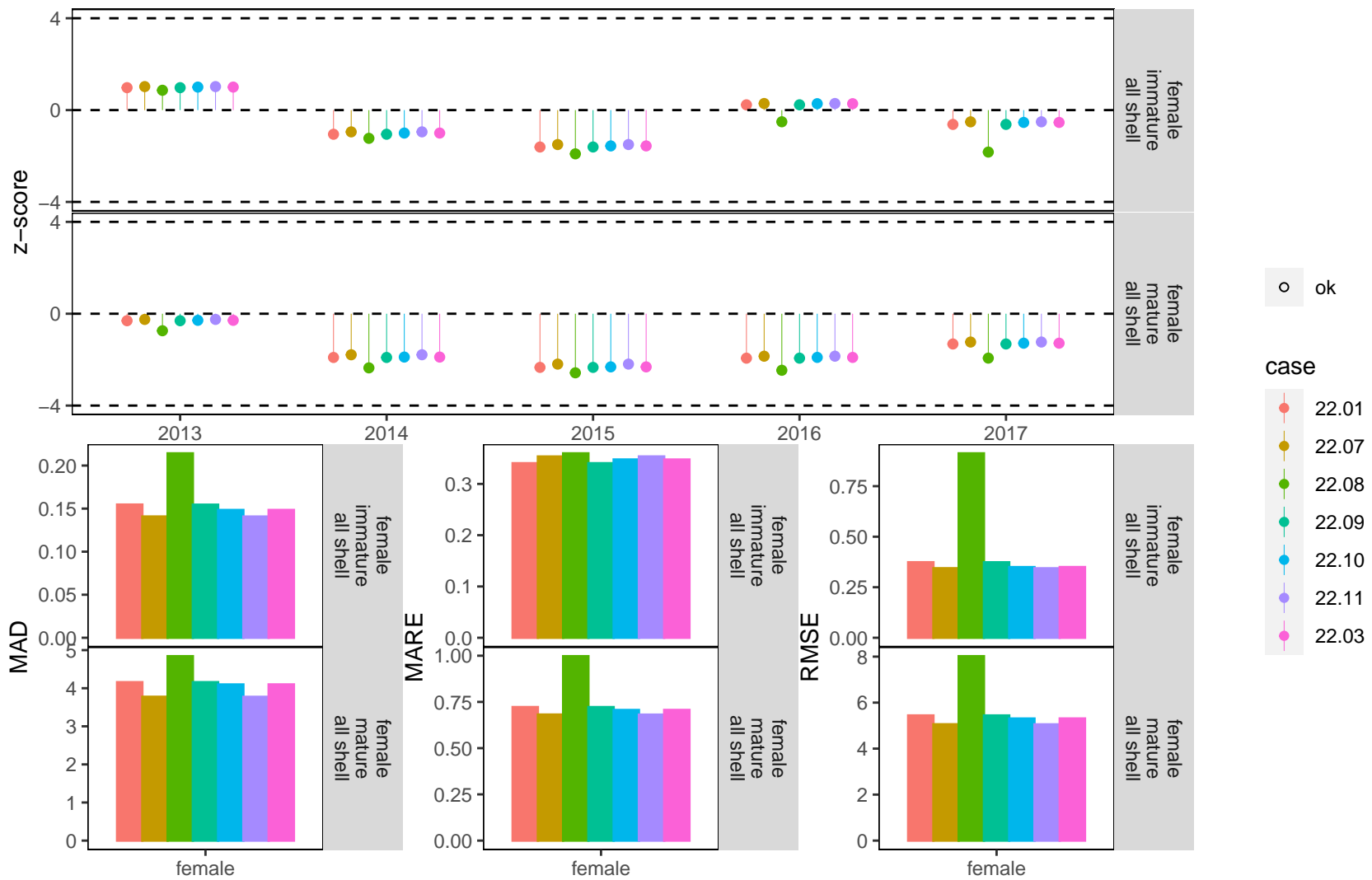


Figure 34: Residuals analysis by model scenario for fits to female biomass in the BSFRF SBS bottom trawl survey. Upper row: annual z-scores; bottom row: 1) MAD: median absolute deviations, 2) MARE: median absolute relative error; 3) RMSE: root mean square error.

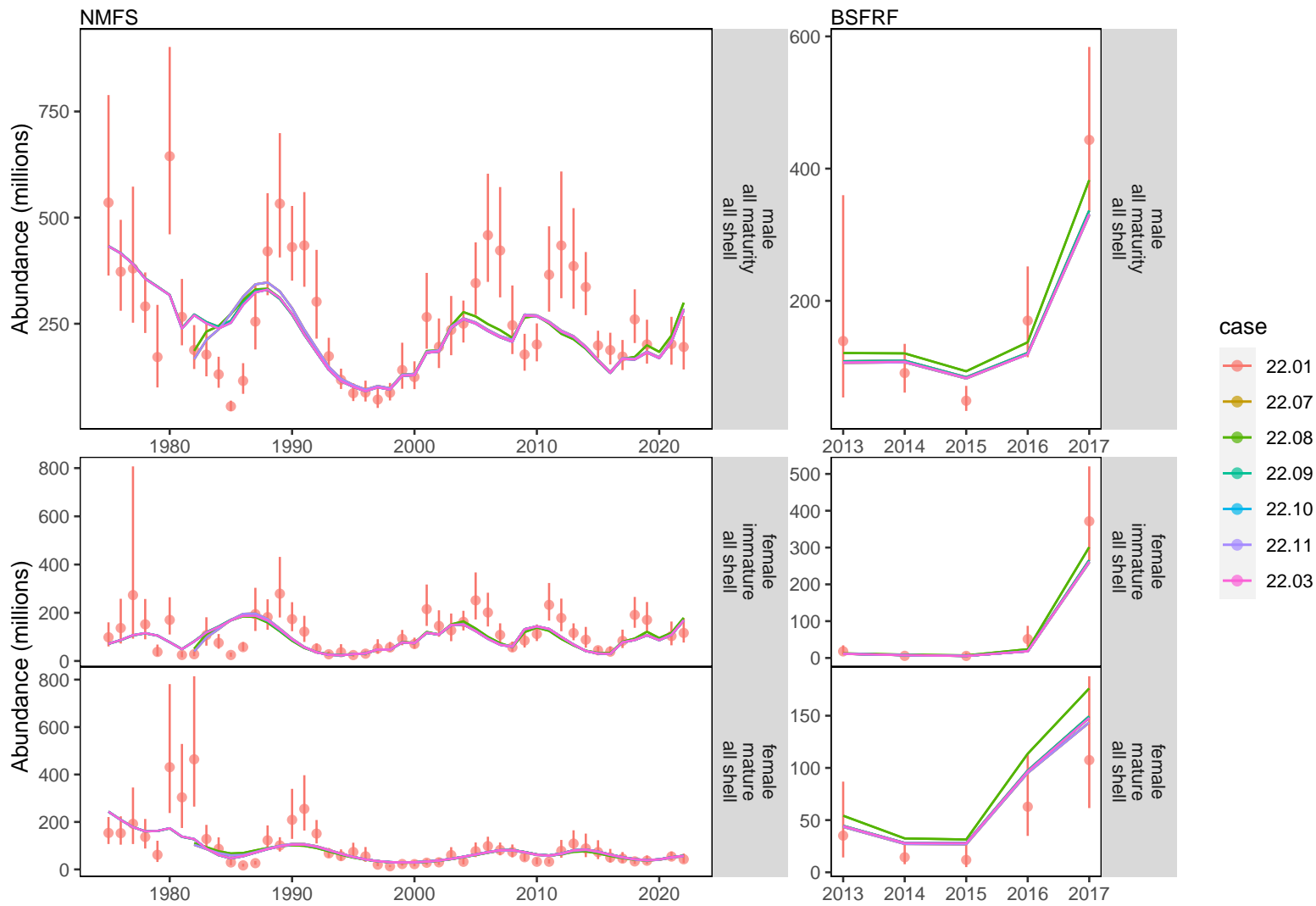


Figure 35: Fits to time series of all male (upper graph), immature female (center graph), and mature female (lower plot) abundance from the NMFS EBS shelf bottom trawl survey (left column) and the BSFRF SBS trawl survey (right column). Note that these fits are not included in the model objective function and simply provide a diagnostic check. Confidence intervals are 95%.

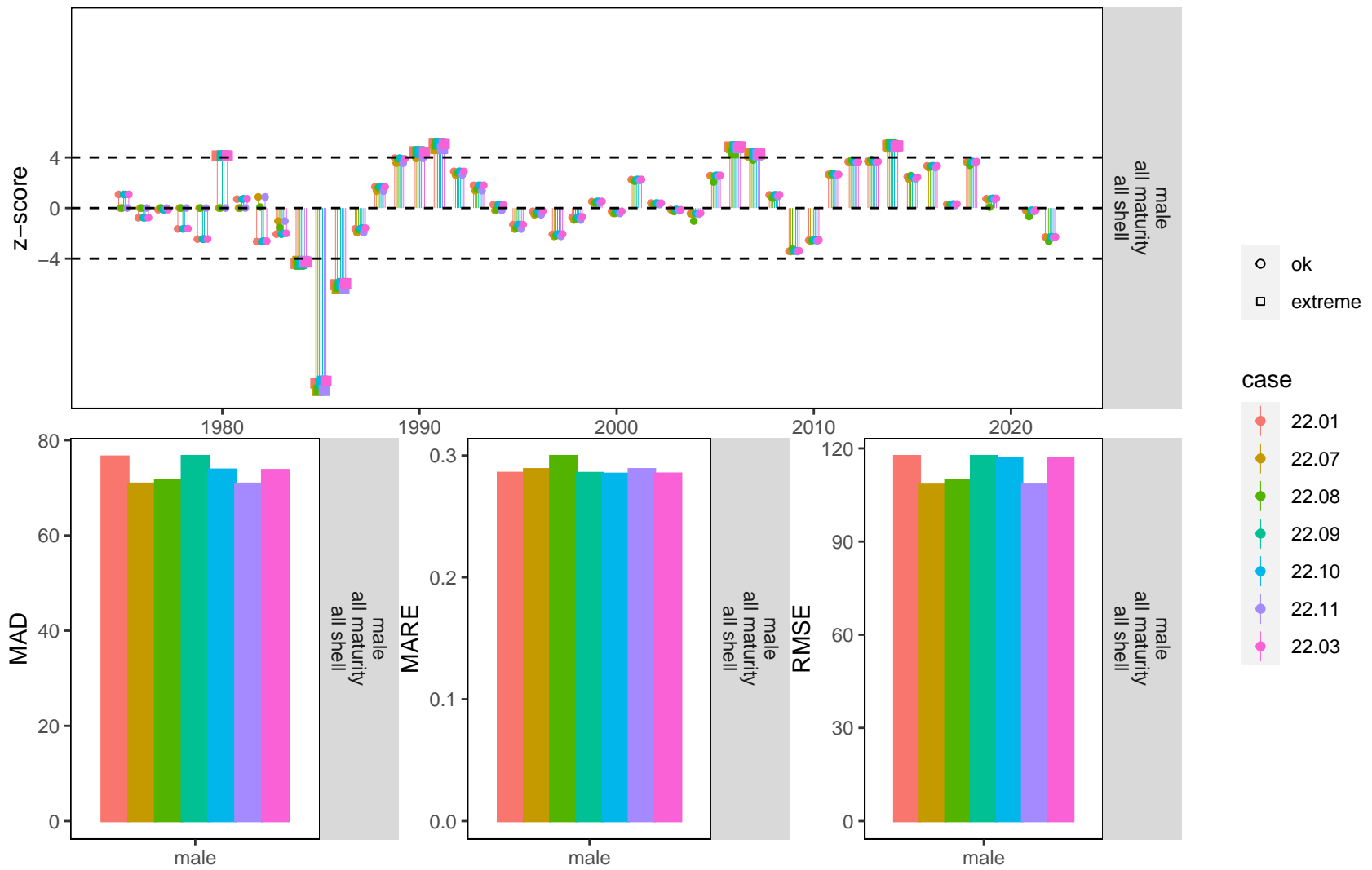


Figure 36: Residuals analysis by model scenario for fits to male abundance in the NMFS EBS bottom trawl survey. Upper row: annual z-scores; bottom row: 1) MAD: median absolute deviations, 2) MARE: median absolute relative error; 3) RMSE: root mean square error.

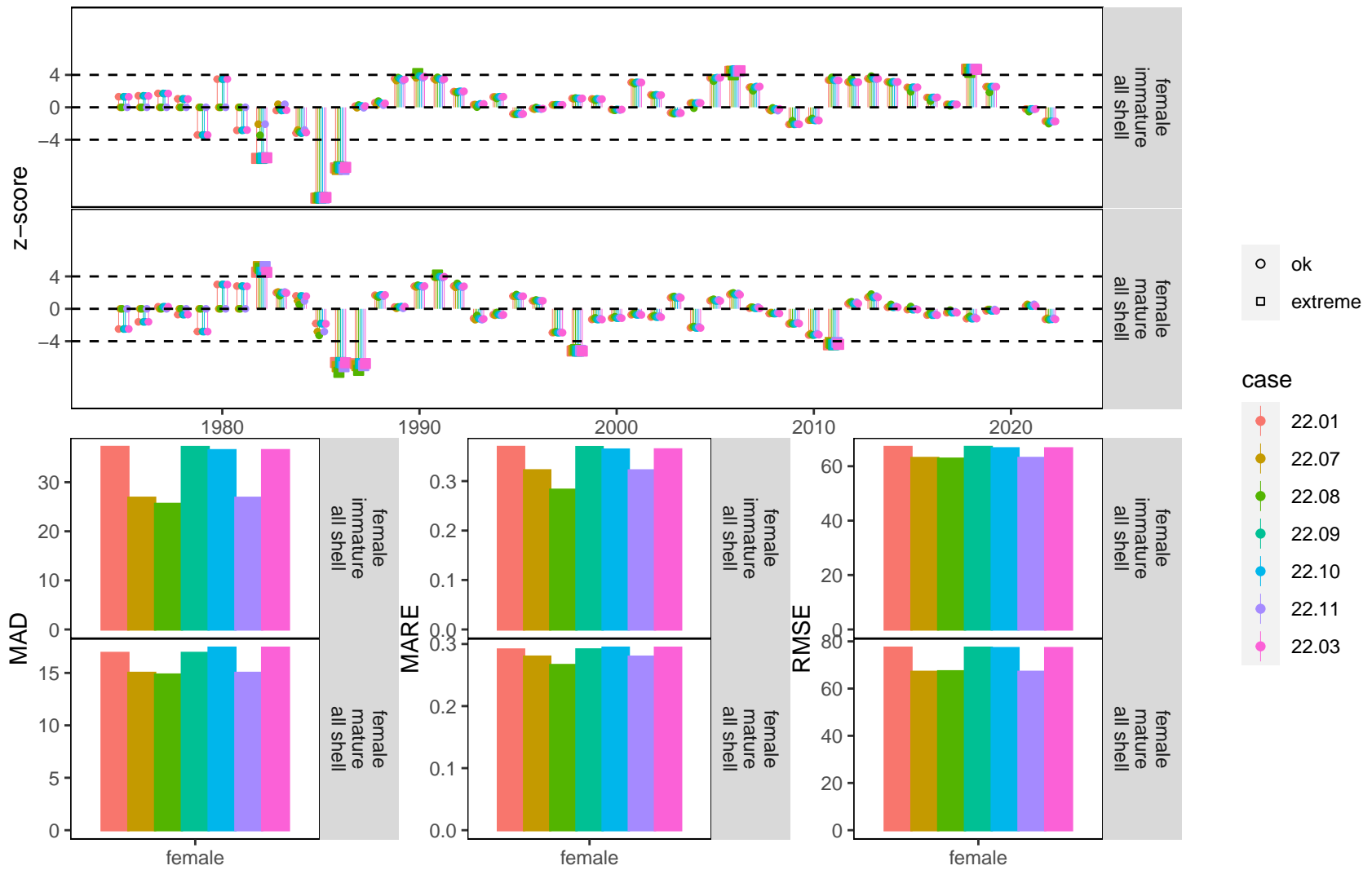


Figure 37: Residuals analysis by model scenario for fits to female abundance in the NMFS EBS bottom trawl survey. Upper row: annual z-scores; bottom row: 1) MAD: median absolute deviations, 2) MARE: median absolute relative error; 3) RMSE: root mean square error.



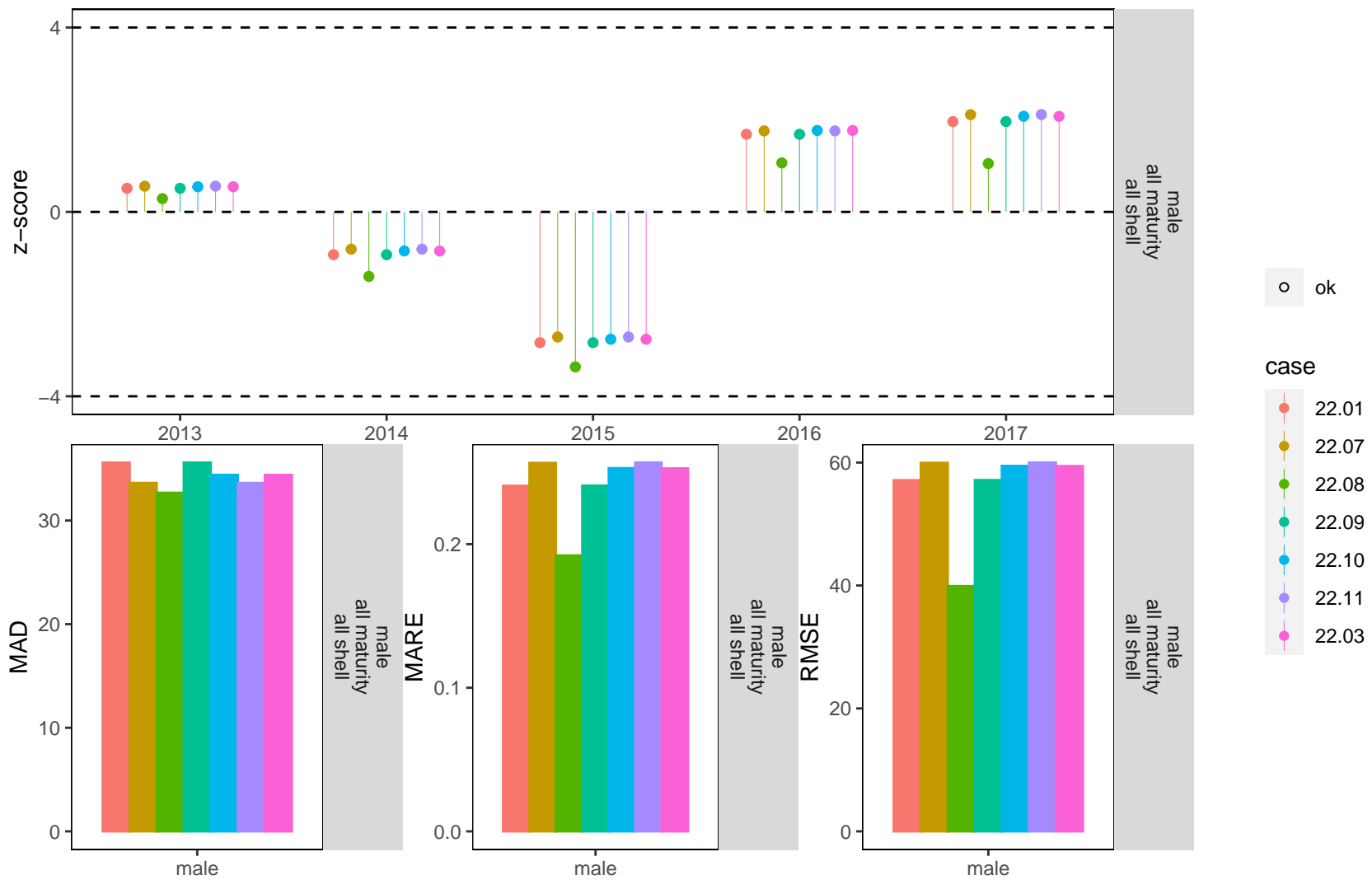


Figure 38: Residuals analysis by model scenario for fits to male abundance in the BSFRF SBS bottom trawl survey. Upper row: annual z-scores; bottom row: 1) MAD: median absolute deviations, 2) MARE: median absolute relative error; 3) RMSE: root mean square error.

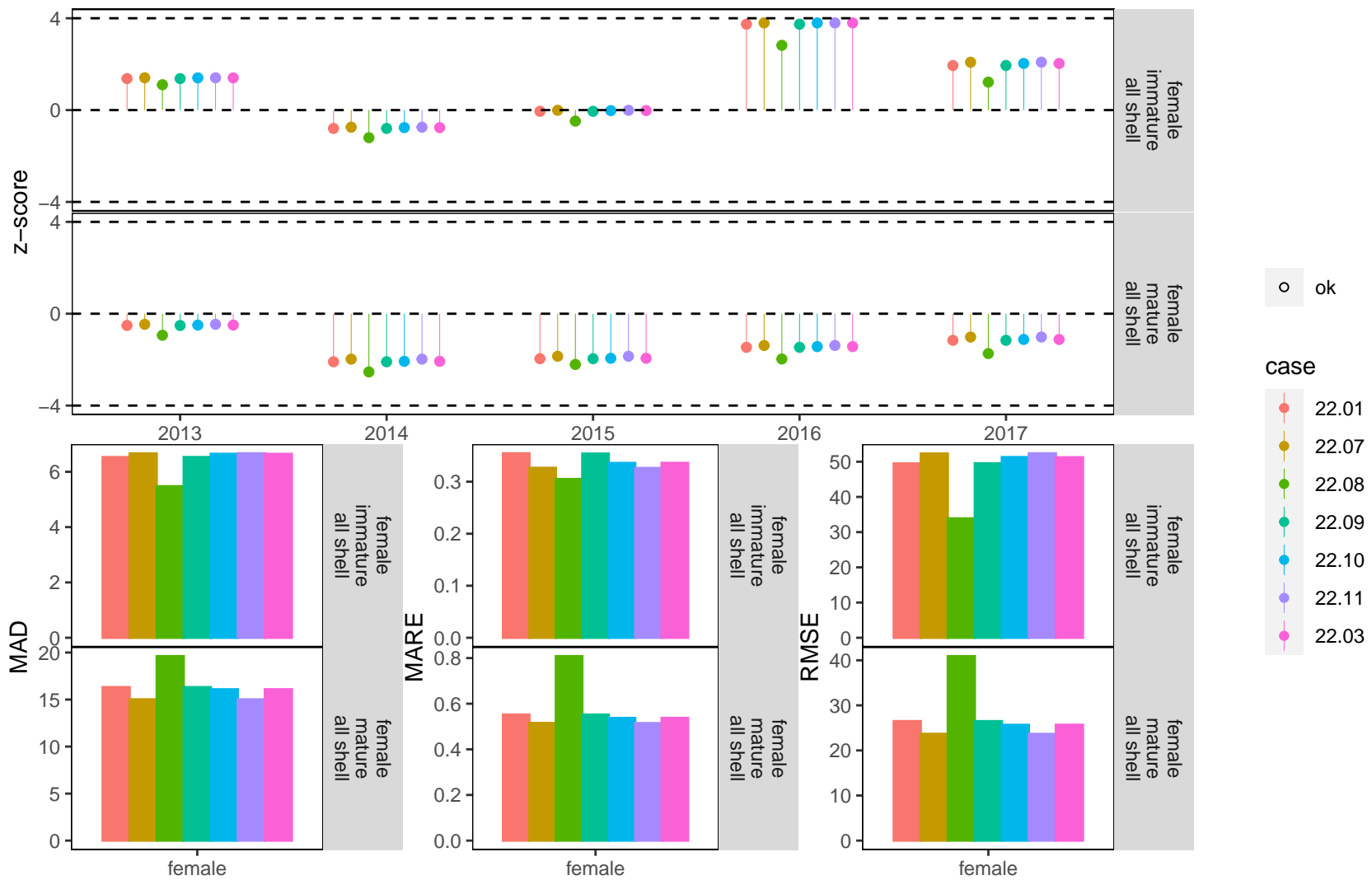


Figure 39: Residuals analysis by model scenario for fits to female abundance in the BSFRF SBS bottom trawl survey. Upper row: annual z-scores; bottom row: 1) MAD: median absolute deviations, 2) MARE: median absolute relative error; 3) RMSE: root mean square error.

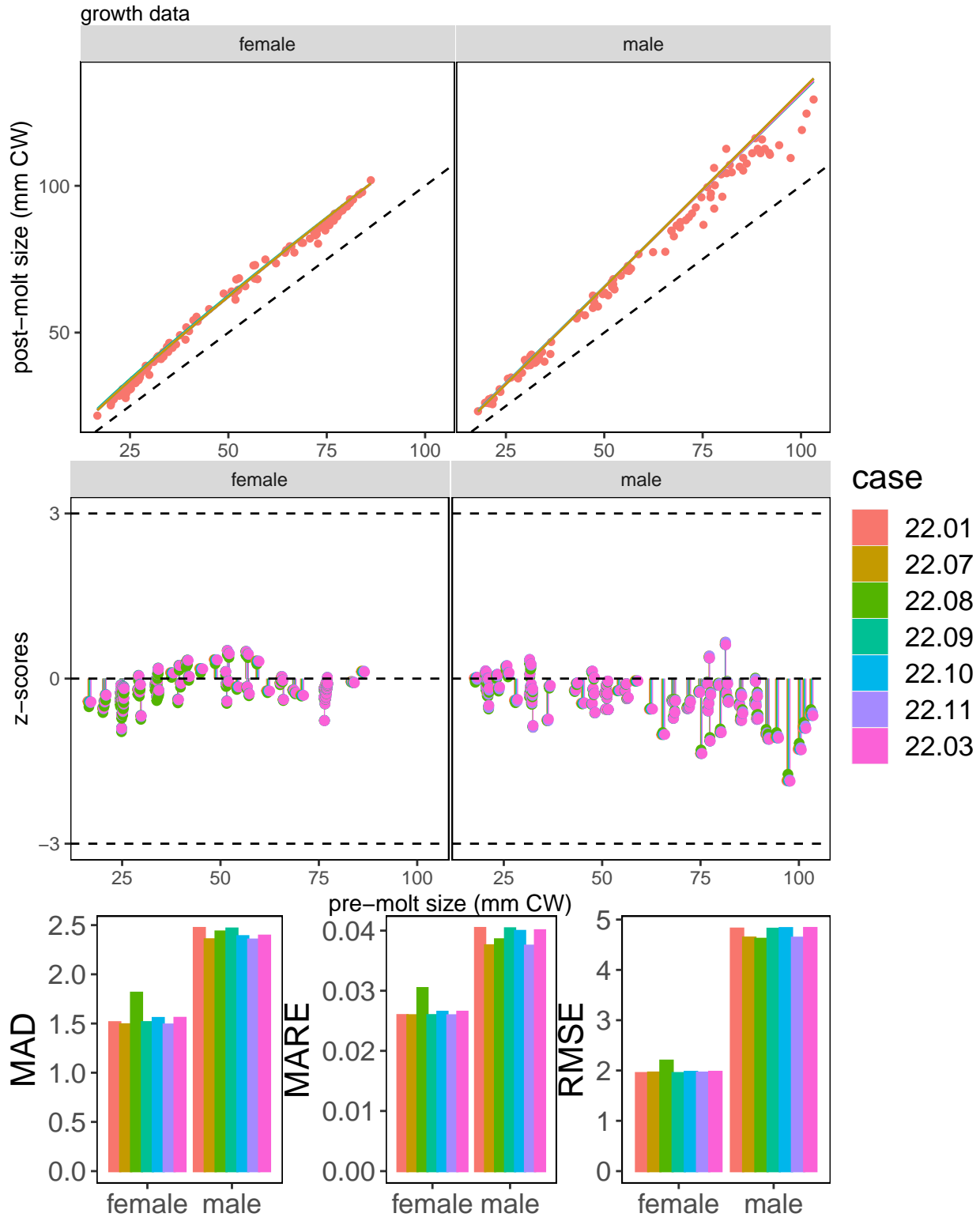


Figure 40: Fits and residuals analysis by model scenario for fits to molt increment data. Upper row: fits to data; center row: annual z-scores; bottom row: 1) MAD: median absolute deviations, 2) MARE: median absolute relative error; 3) RMSE: root mean square error.

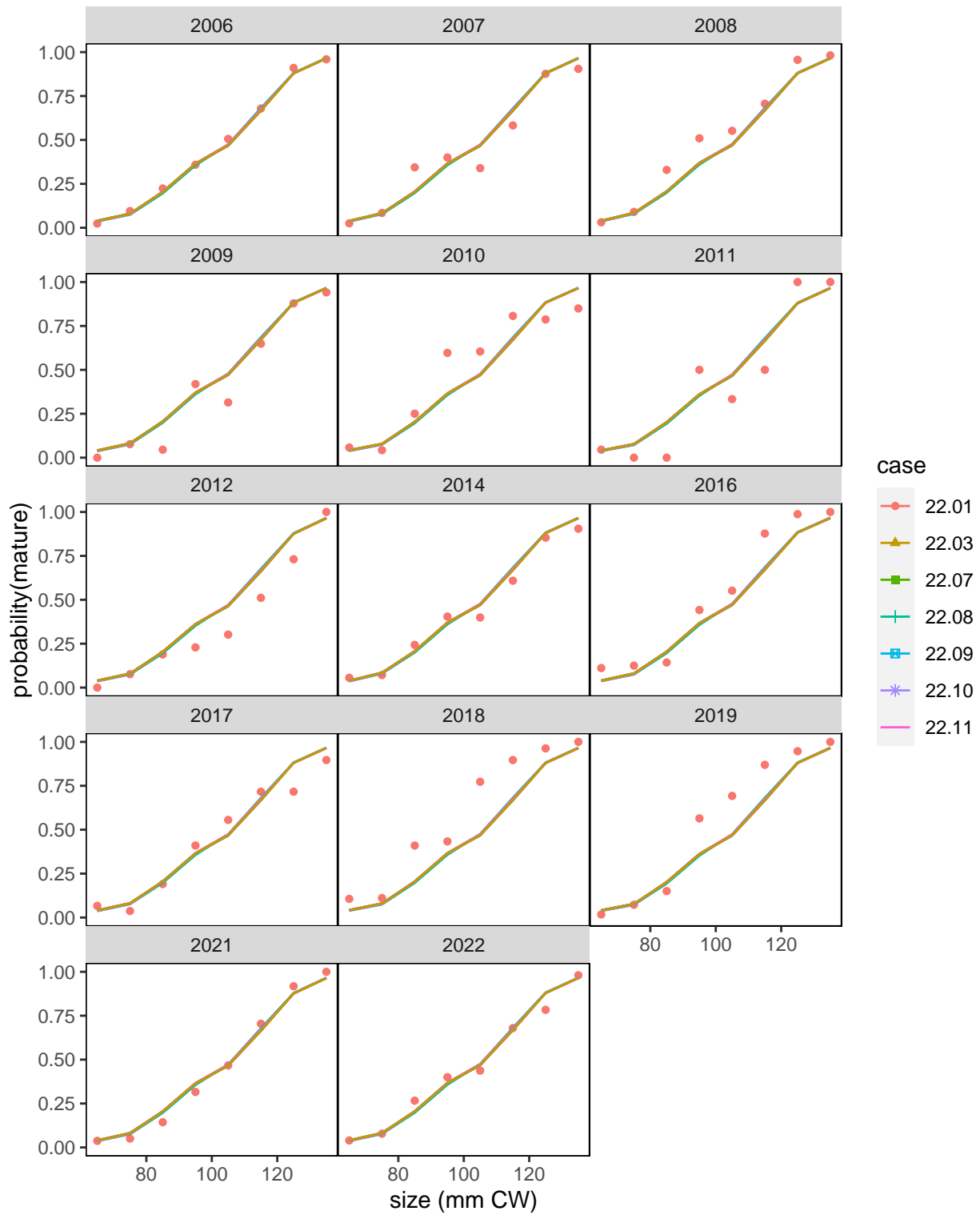


Figure 41: Fits to maturity ogive data by model scenario and year.

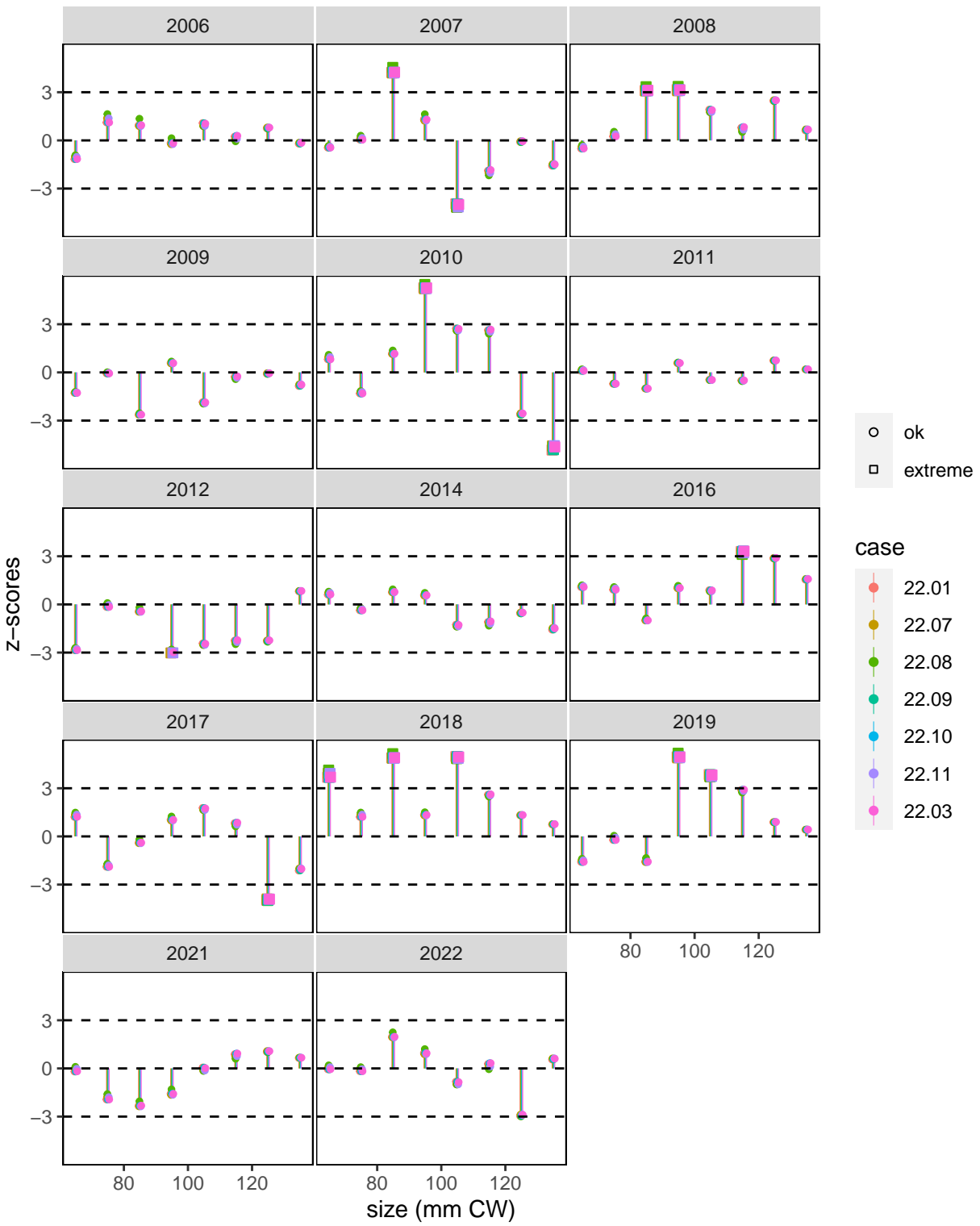


Figure 42: Z-scores for Fits to maturity ogive data, by model scenario and year.

TCF: male, all maturity, all shell

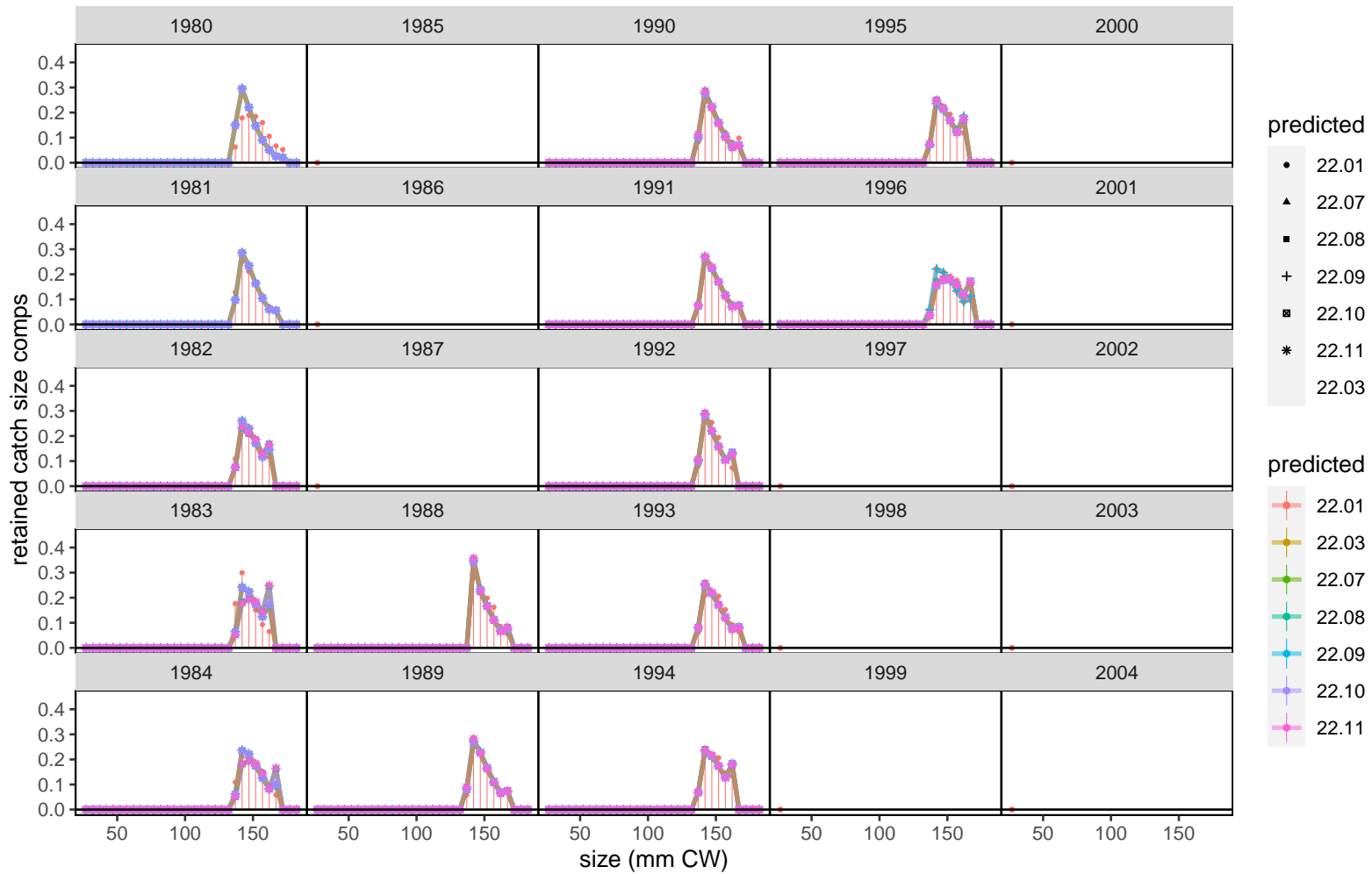


Figure 43: Fits to retained catch size compositions in the directed fishery. Preferred model is 22.03.

TCF: male, all maturity, all shell

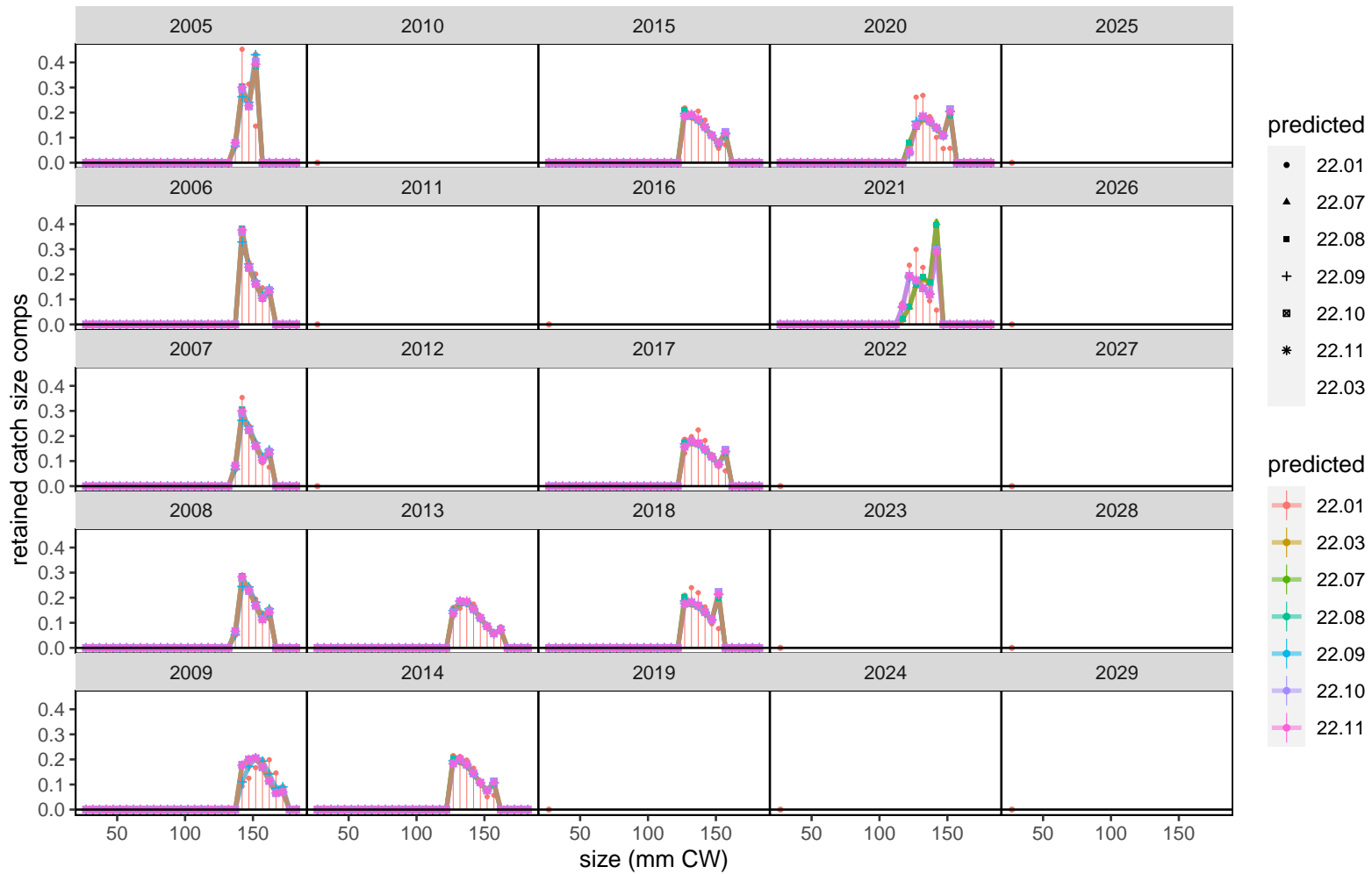


Figure 44: Fits to retained catch size compositions in the directed fishery. Preferred model is 22.03.

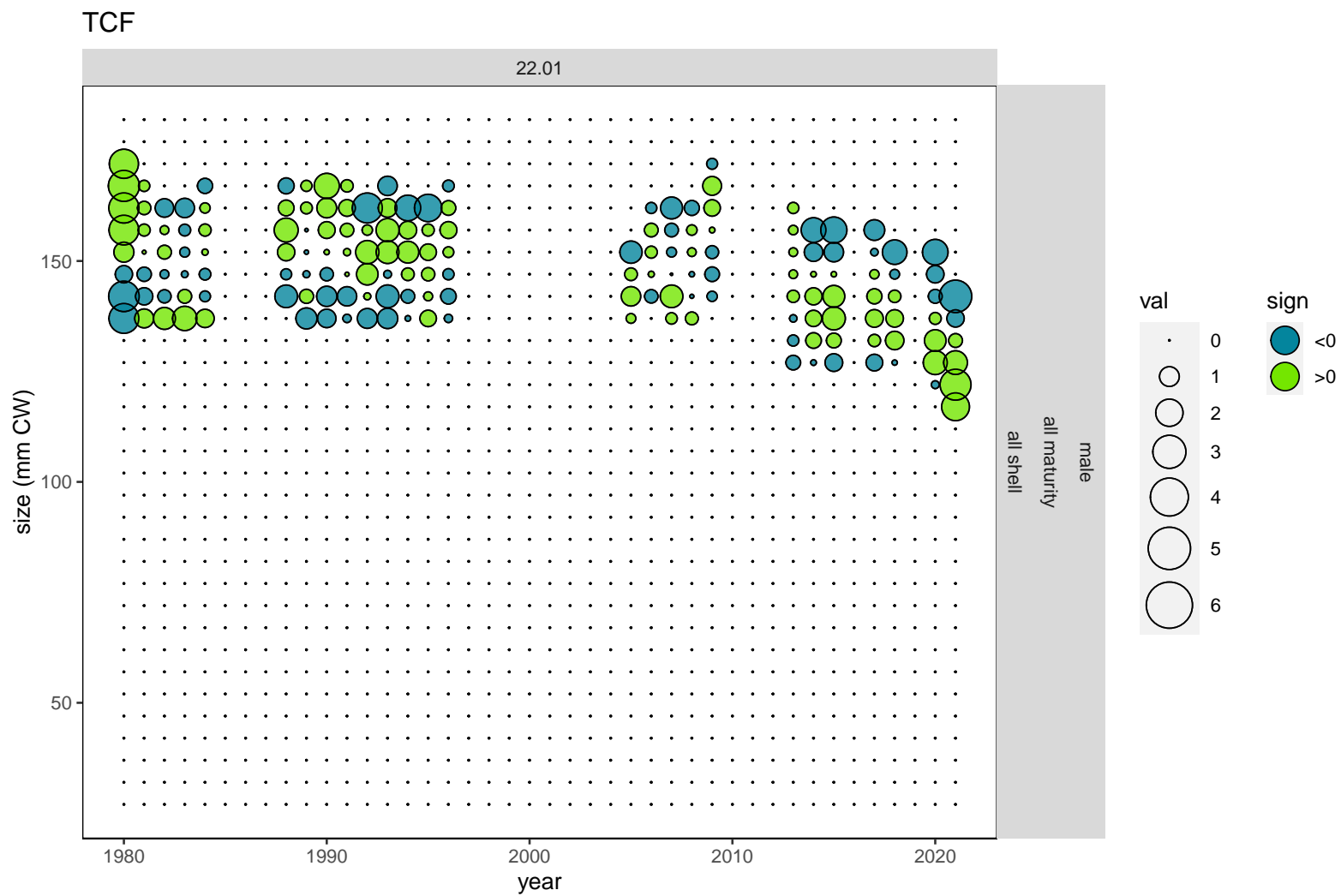


Figure 45: Pearson's residuals for fits to retained catch size composition data. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.



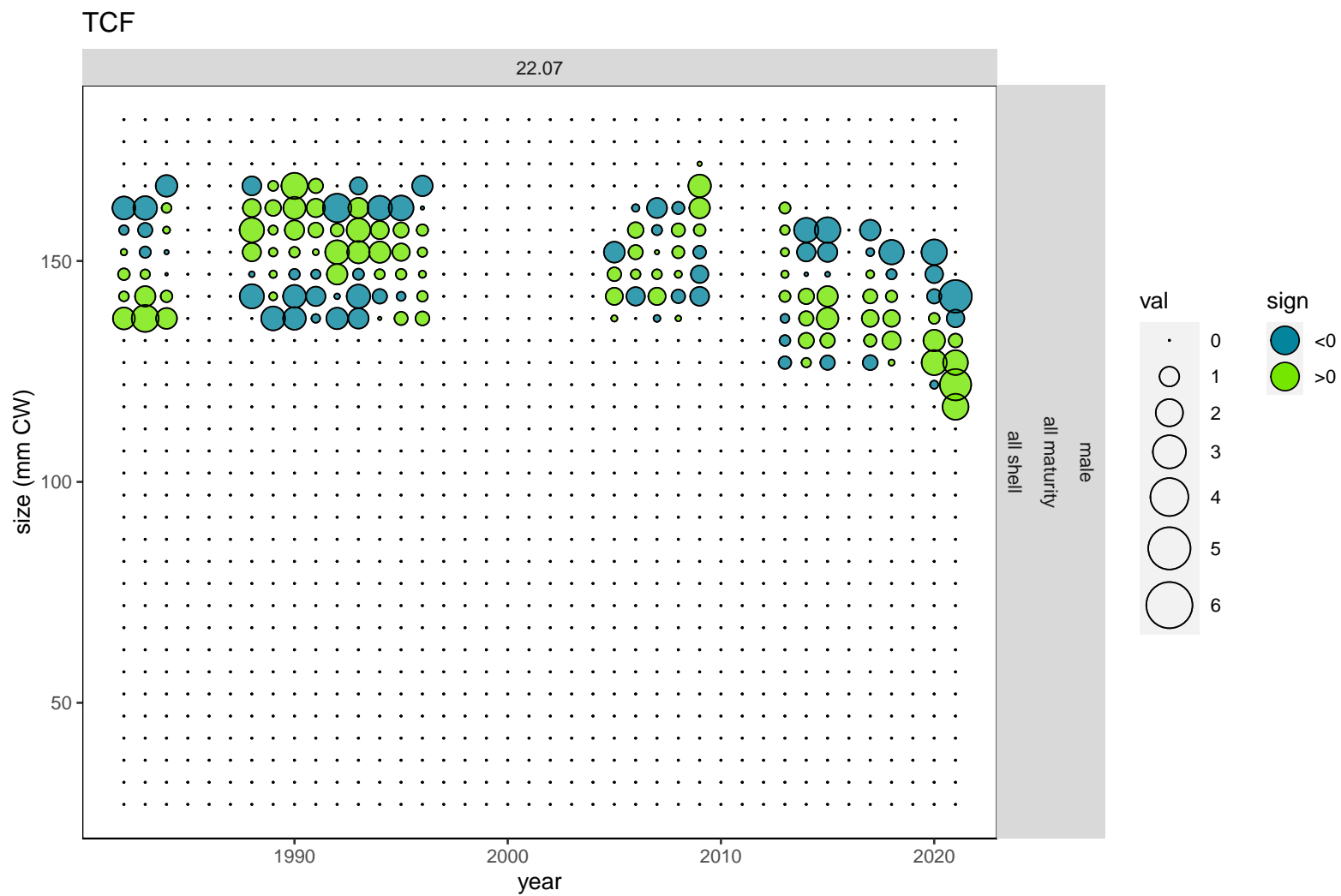


Figure 46: Pearson's residuals for fits to retained catch size composition data. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

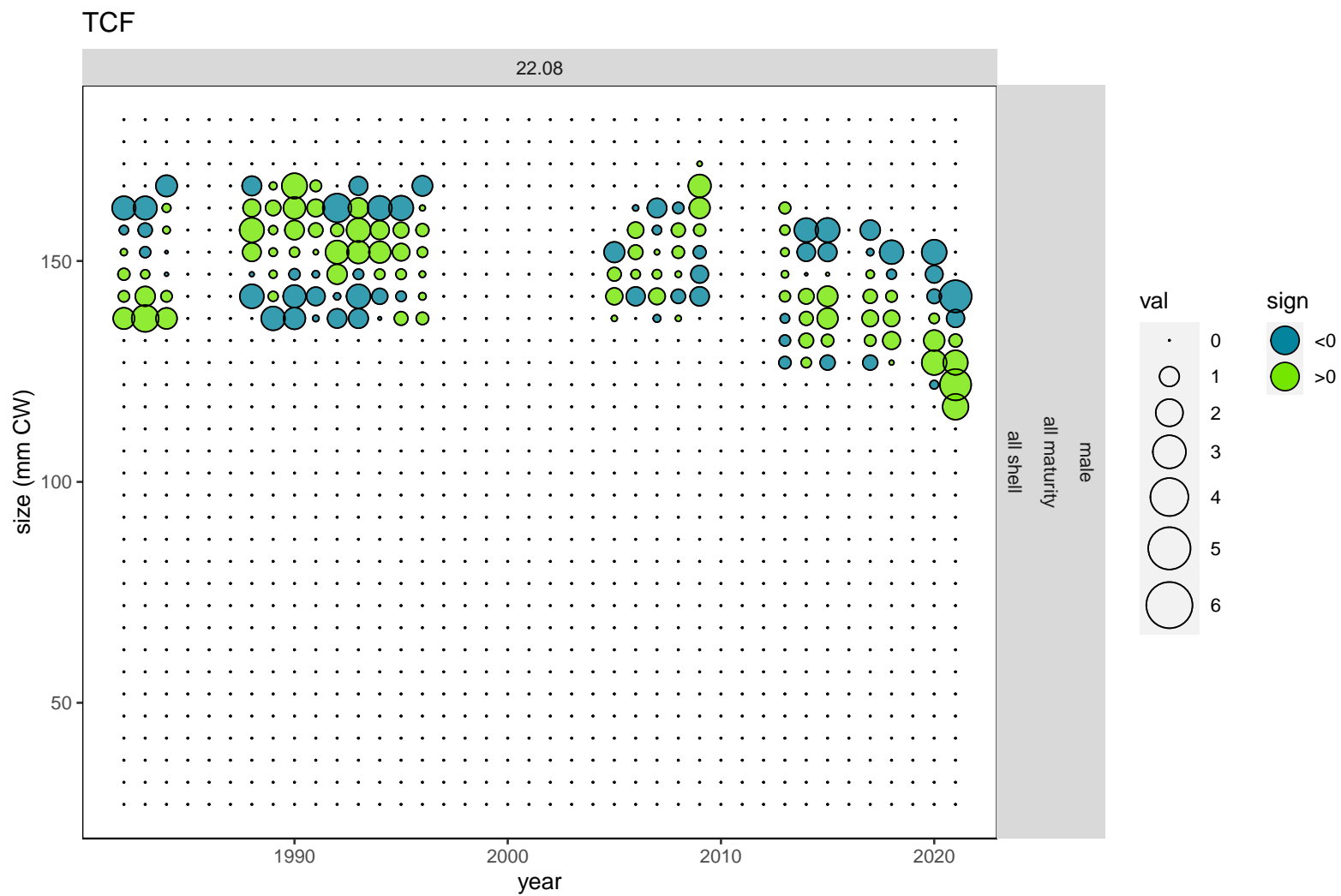


Figure 47: Pearson's residuals for fits to retained catch size composition data. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

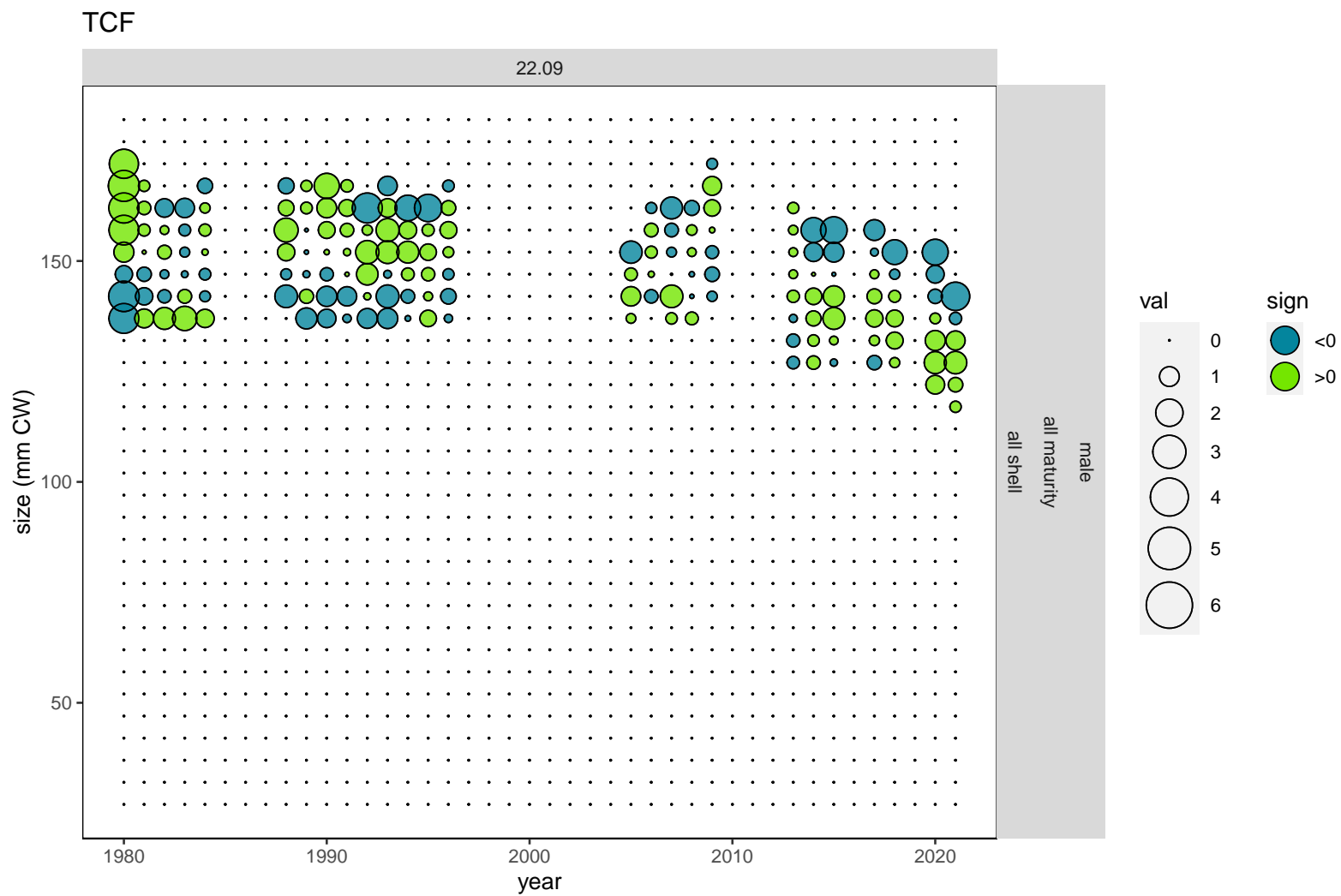


Figure 48: Pearson's residuals for fits to retained catch size composition data. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

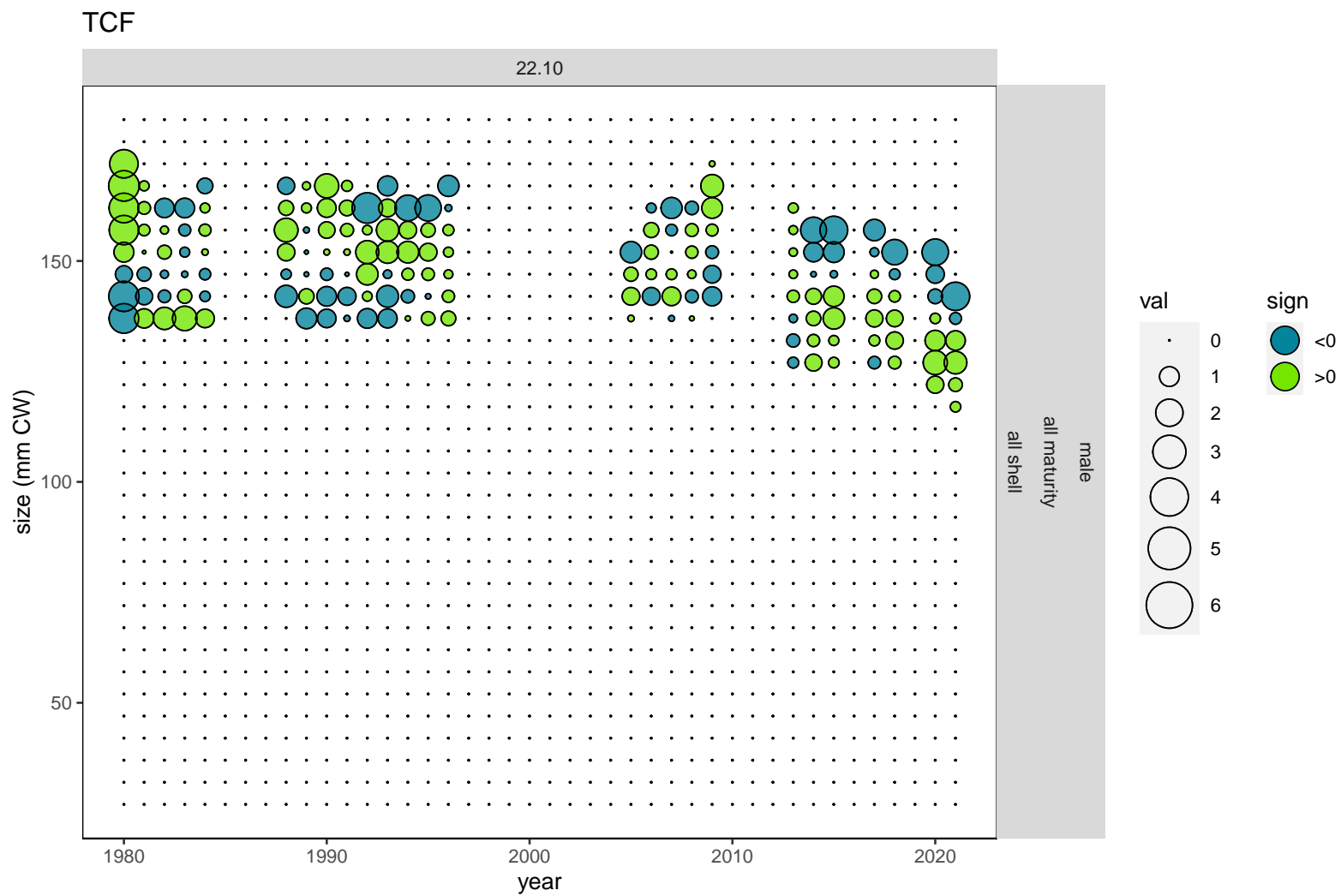


Figure 49: Pearson's residuals for fits to retained catch size composition data. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

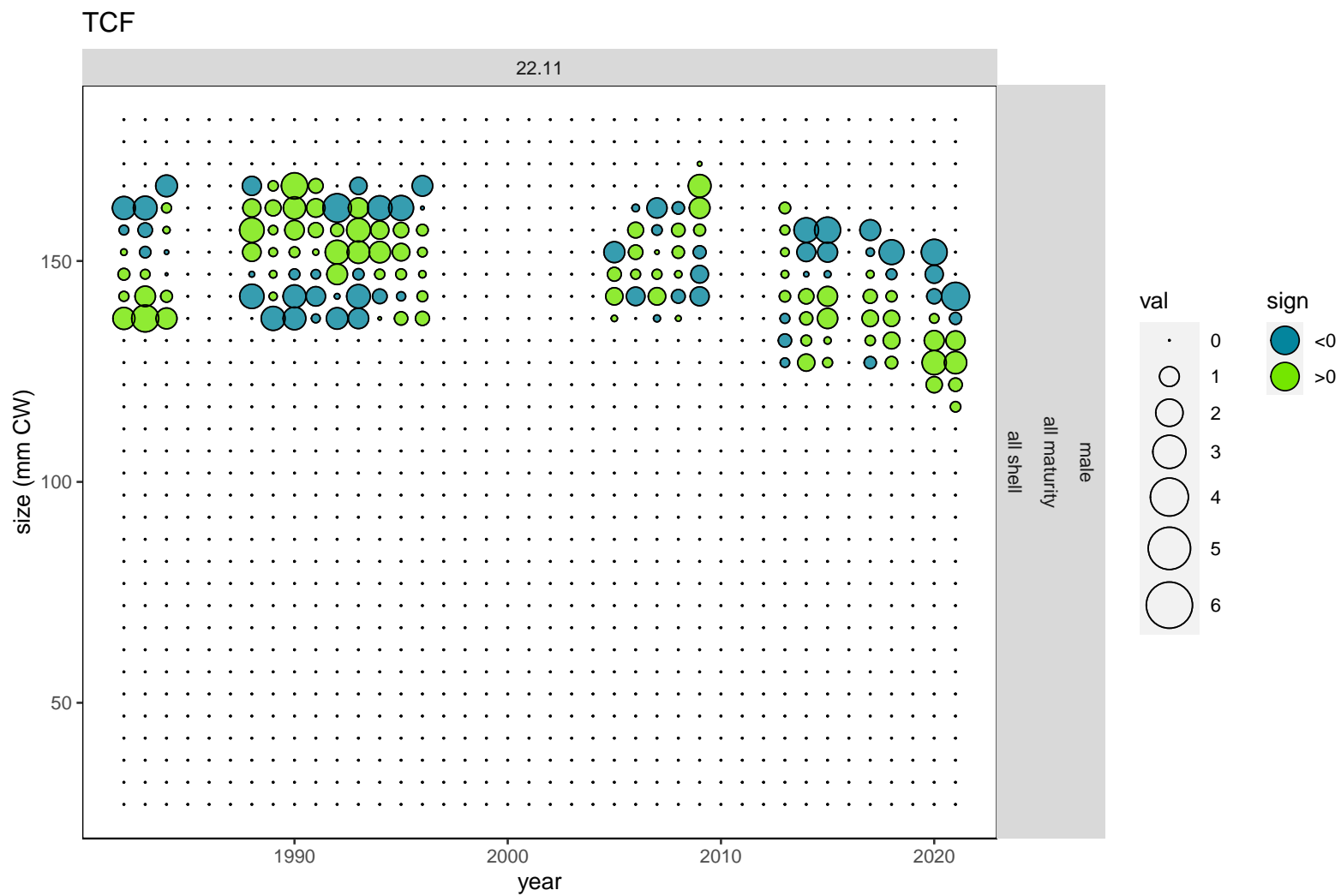


Figure 50: Pearson's residuals for fits to retained catch size composition data. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

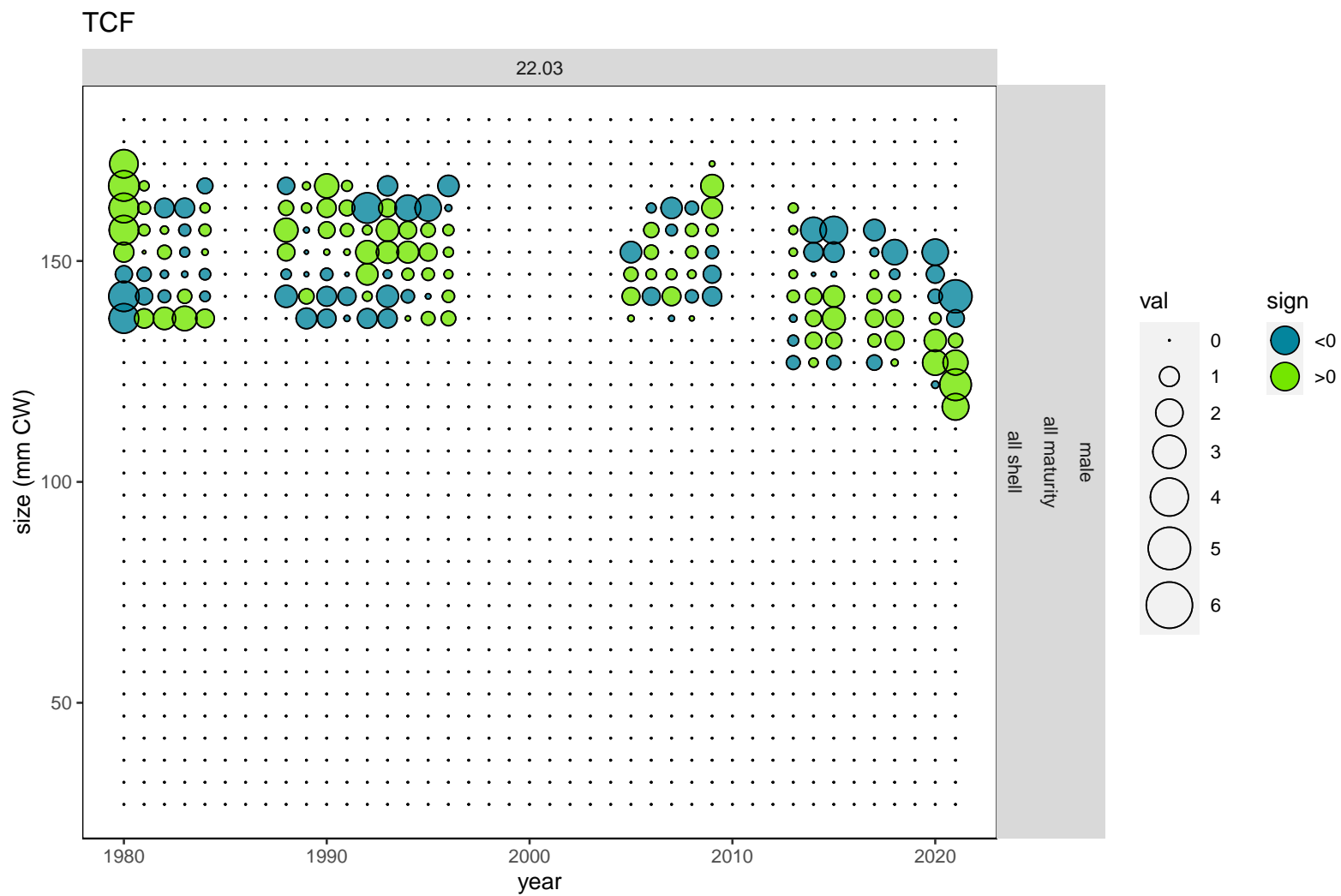


Figure 51: Pearson's residuals for fits to retained catch size composition data. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

TCF: male, all maturity, all shell

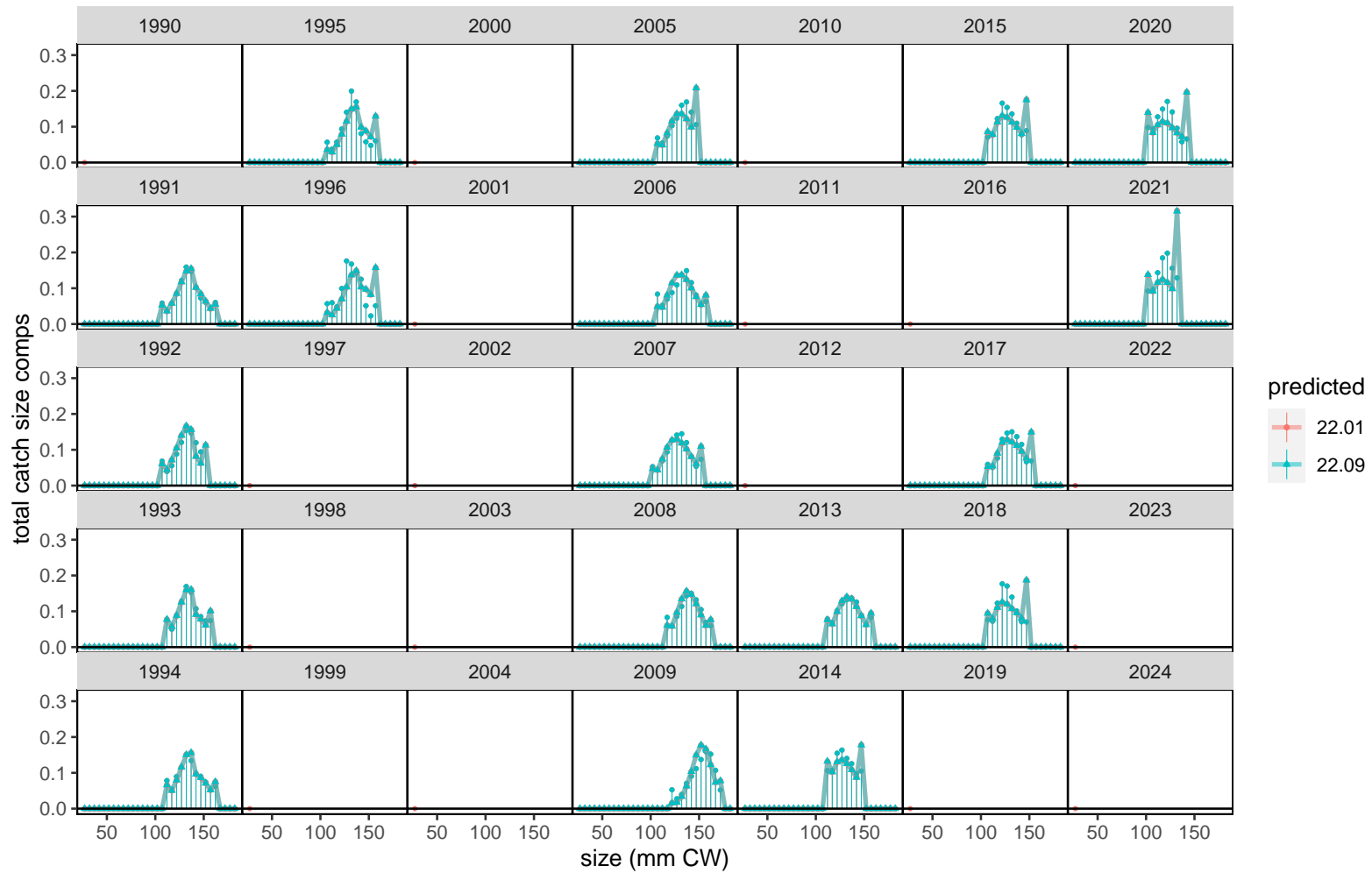


Figure 52: Fits to total catch size compositions in the TCF fishery. Preferred model is 22.03.

TCF: female, all maturity, all shell

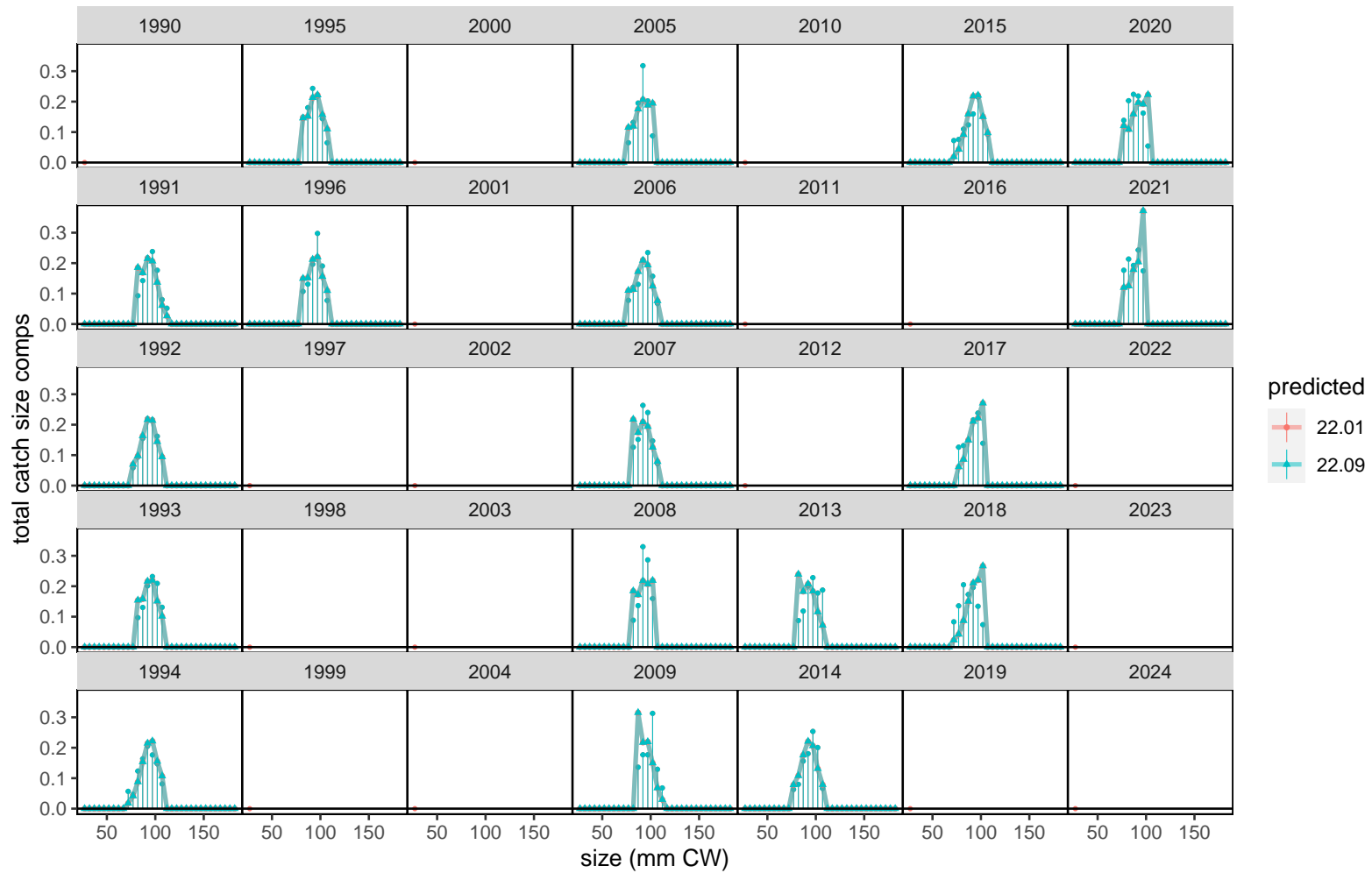


Figure 53: Fits to total catch size compositions in the TCF fishery. Preferred model is 22.03.



TCF: male, all maturity, all shell

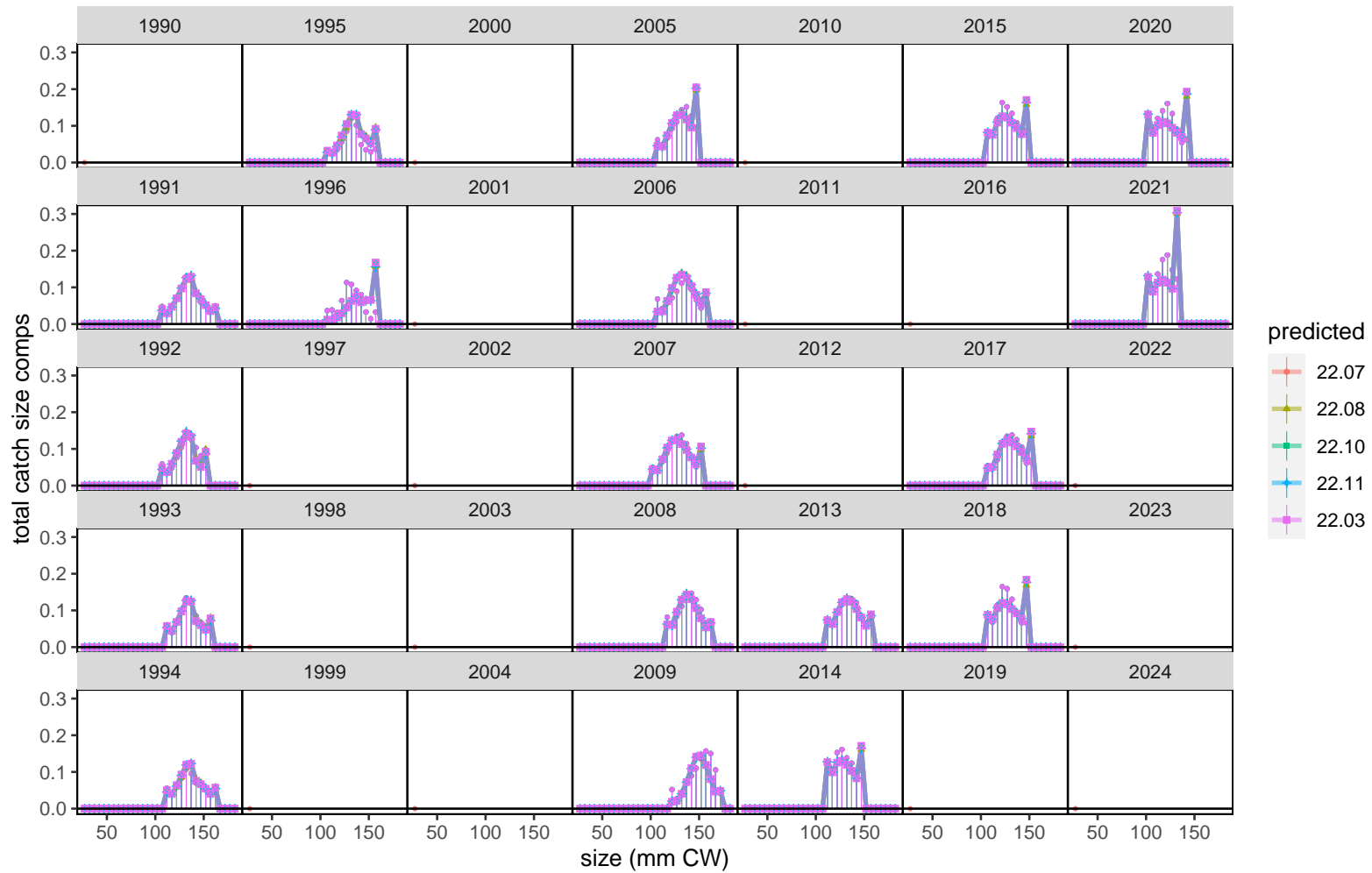


Figure 54: Fits to total catch size compositions in the TCF fishery. Preferred model is 22.03.

TCF: female, all maturity, all shell

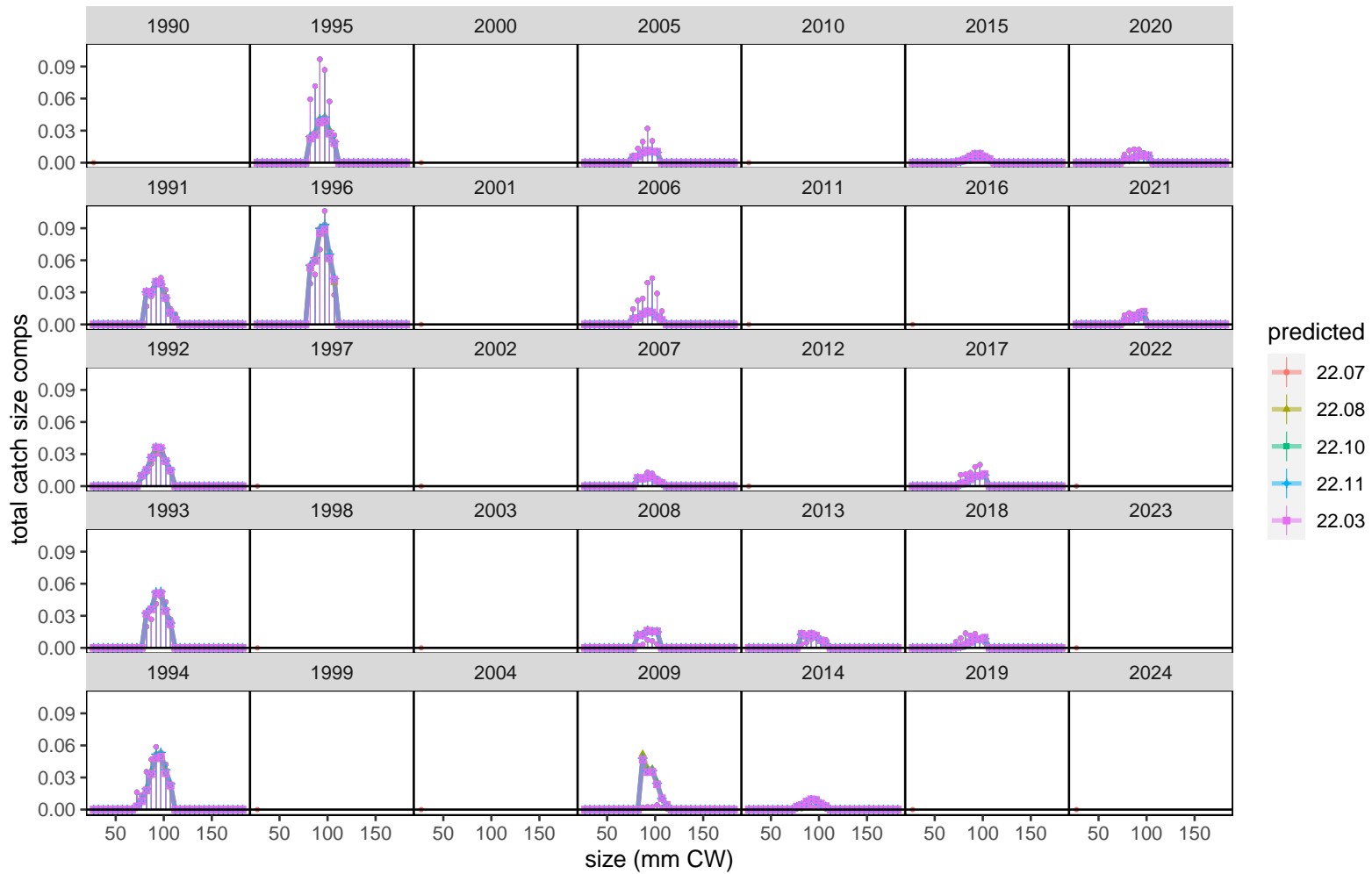


Figure 55: Fits to total catch size compositions in the TCF fishery. Preferred model is 22.03.

SCF: male, all maturity, all shell

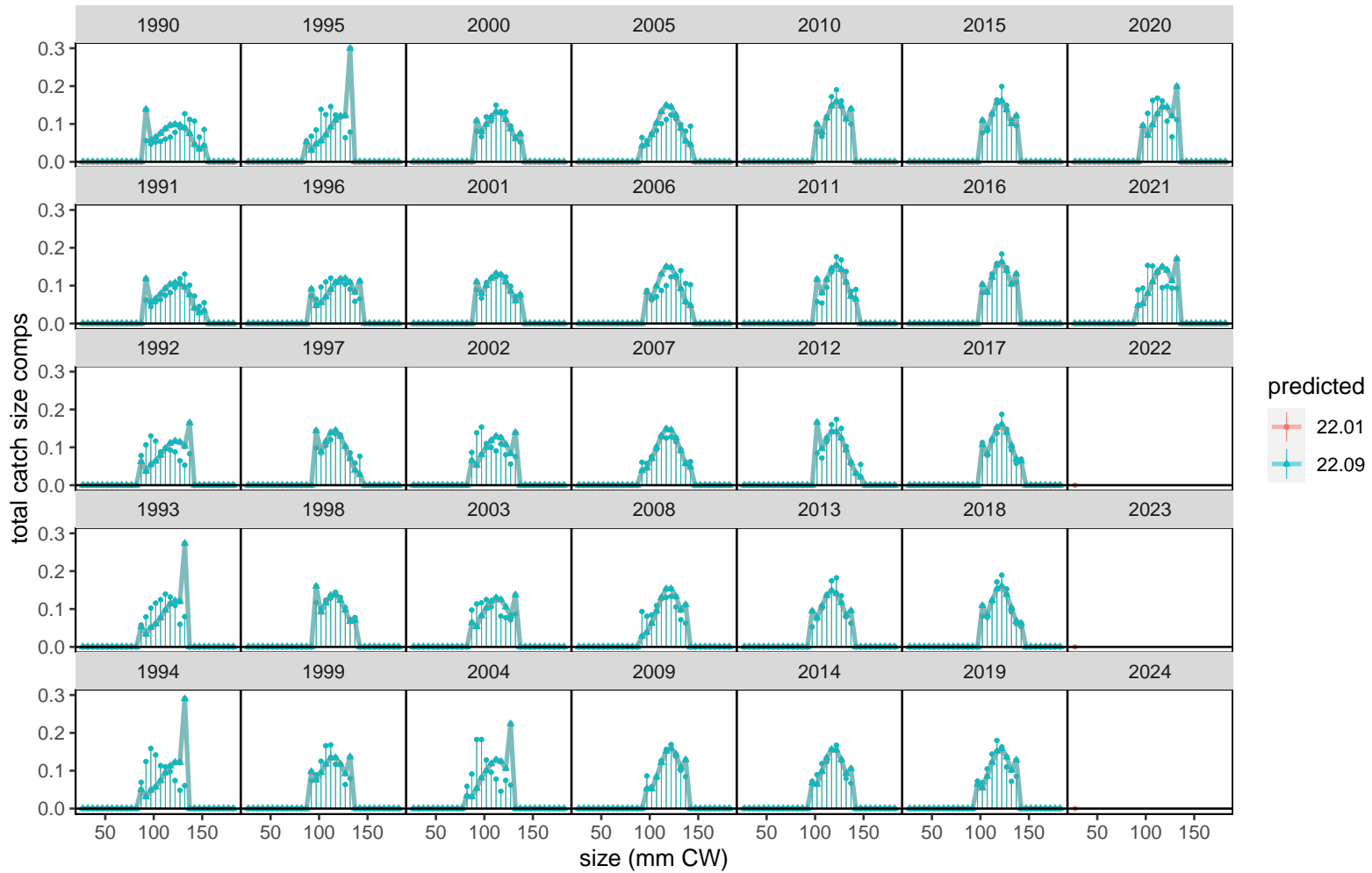


Figure 56: Fits to total catch size compositions in the SCF fishery. Preferred model is 22.03.

SCF: female, all maturity, all shell

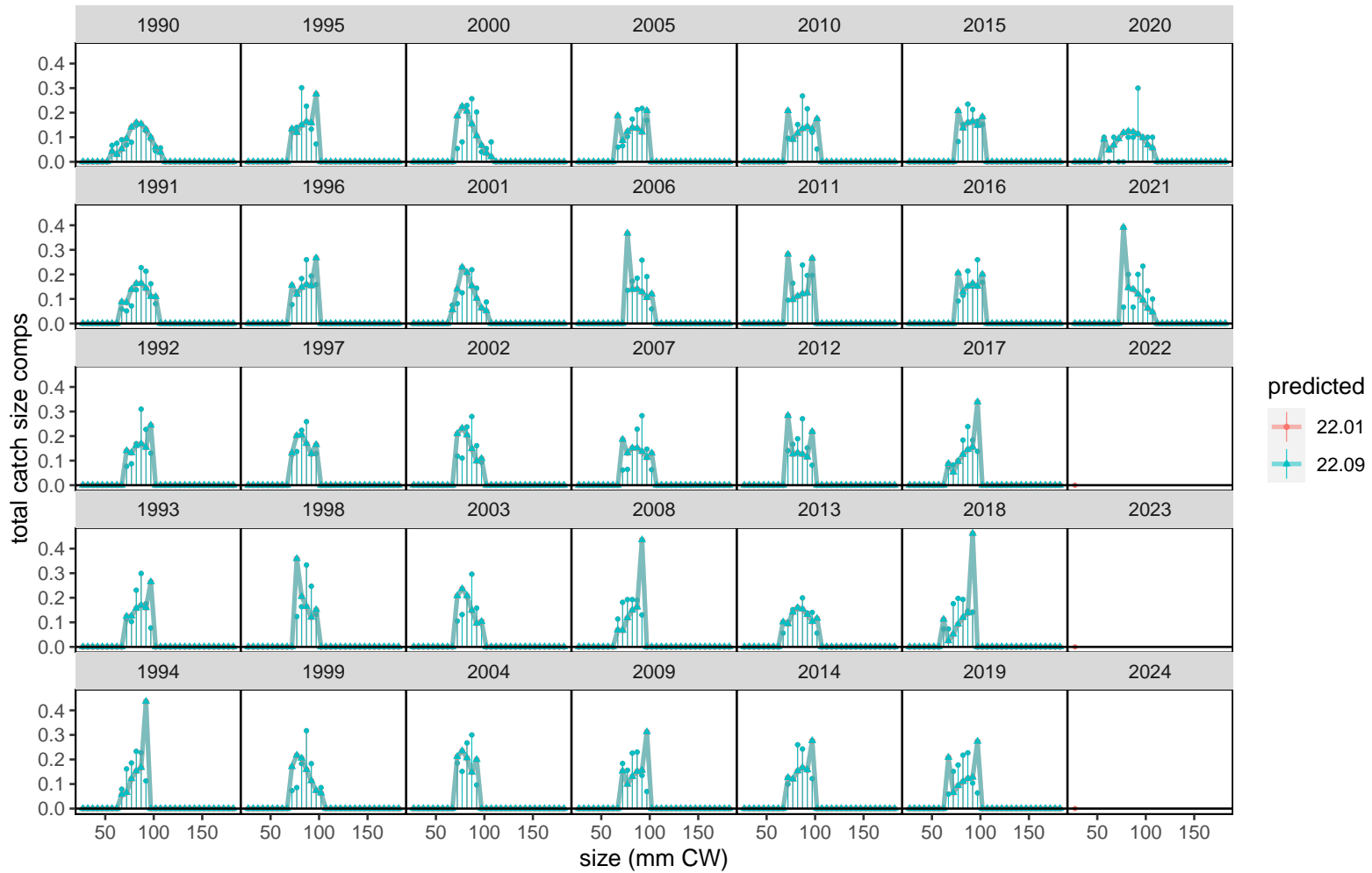


Figure 57: Fits to total catch size compositions in the SCF fishery. Preferred model is 22.03.

SCF: male, all maturity, all shell

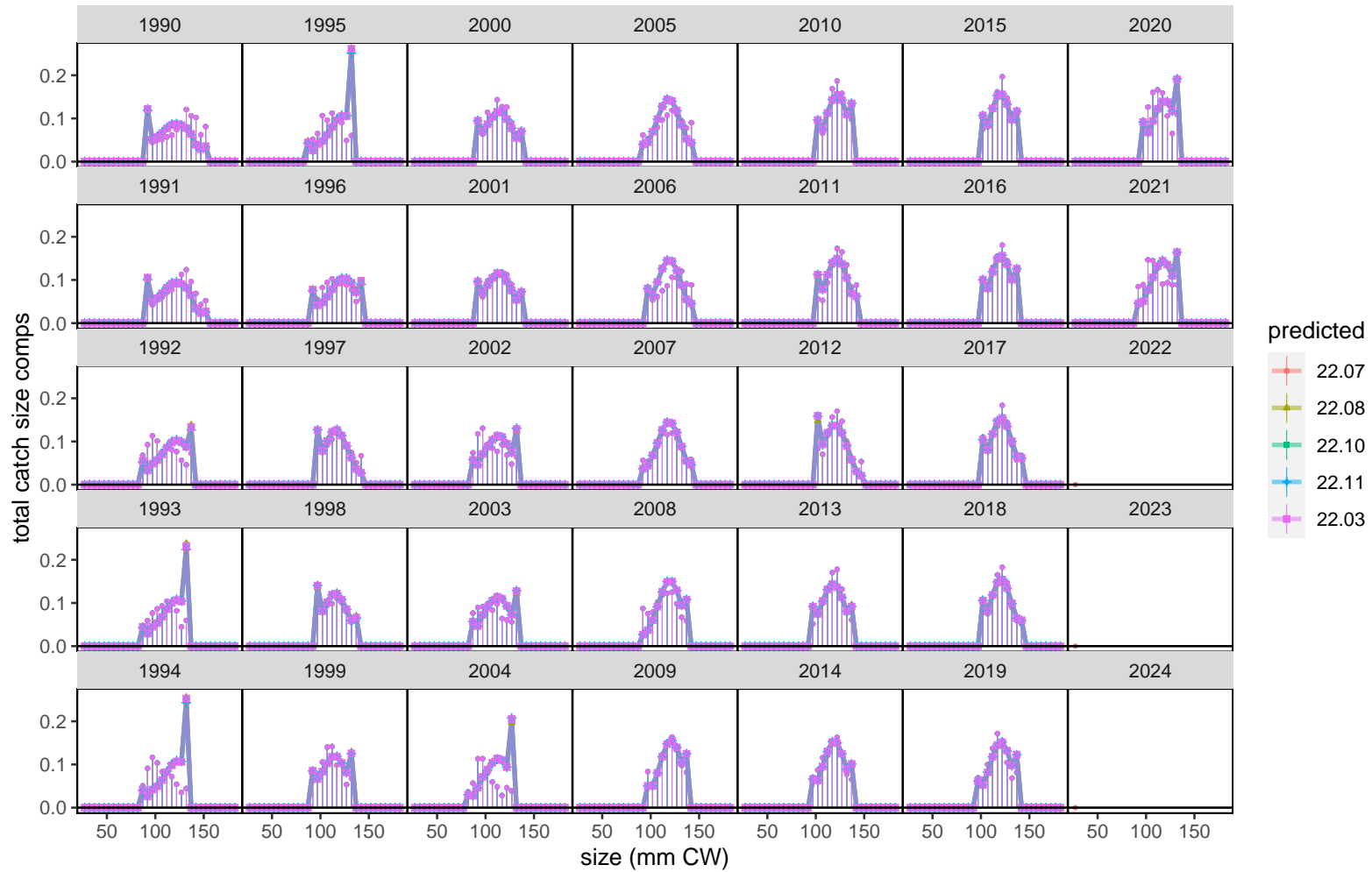


Figure 58: Fits to total catch size compositions in the SCF fishery. Preferred model is 22.03.

SCF: female, all maturity, all shell

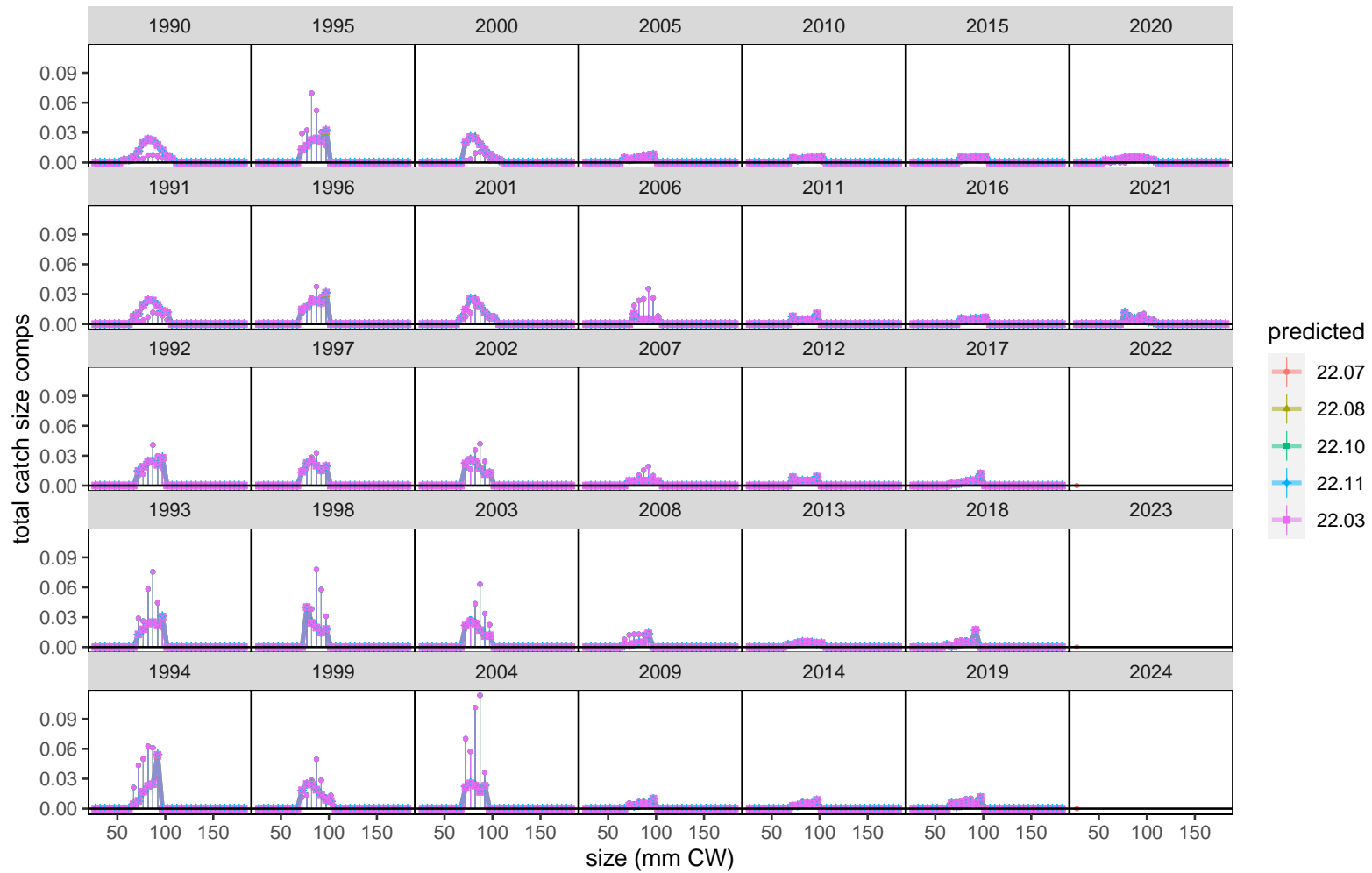


Figure 59: Fits to total catch size compositions in the SCF fishery. Preferred model is 22.03.

RKF: male, all maturity, all shell

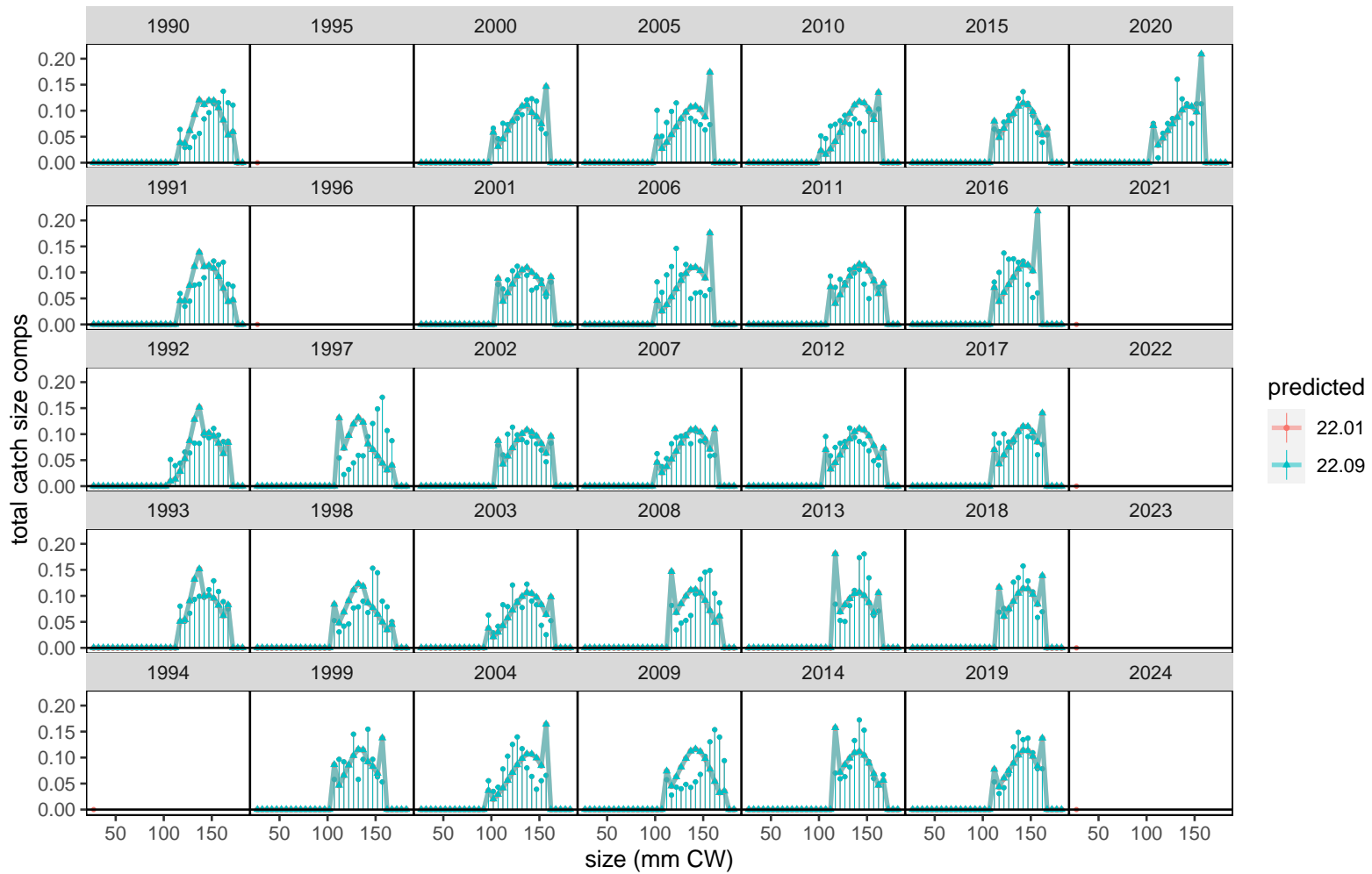


Figure 60: Fits to total catch size compositions in the RKF fishery. Preferred model is 22.03.

RKF: female, all maturity, all shell

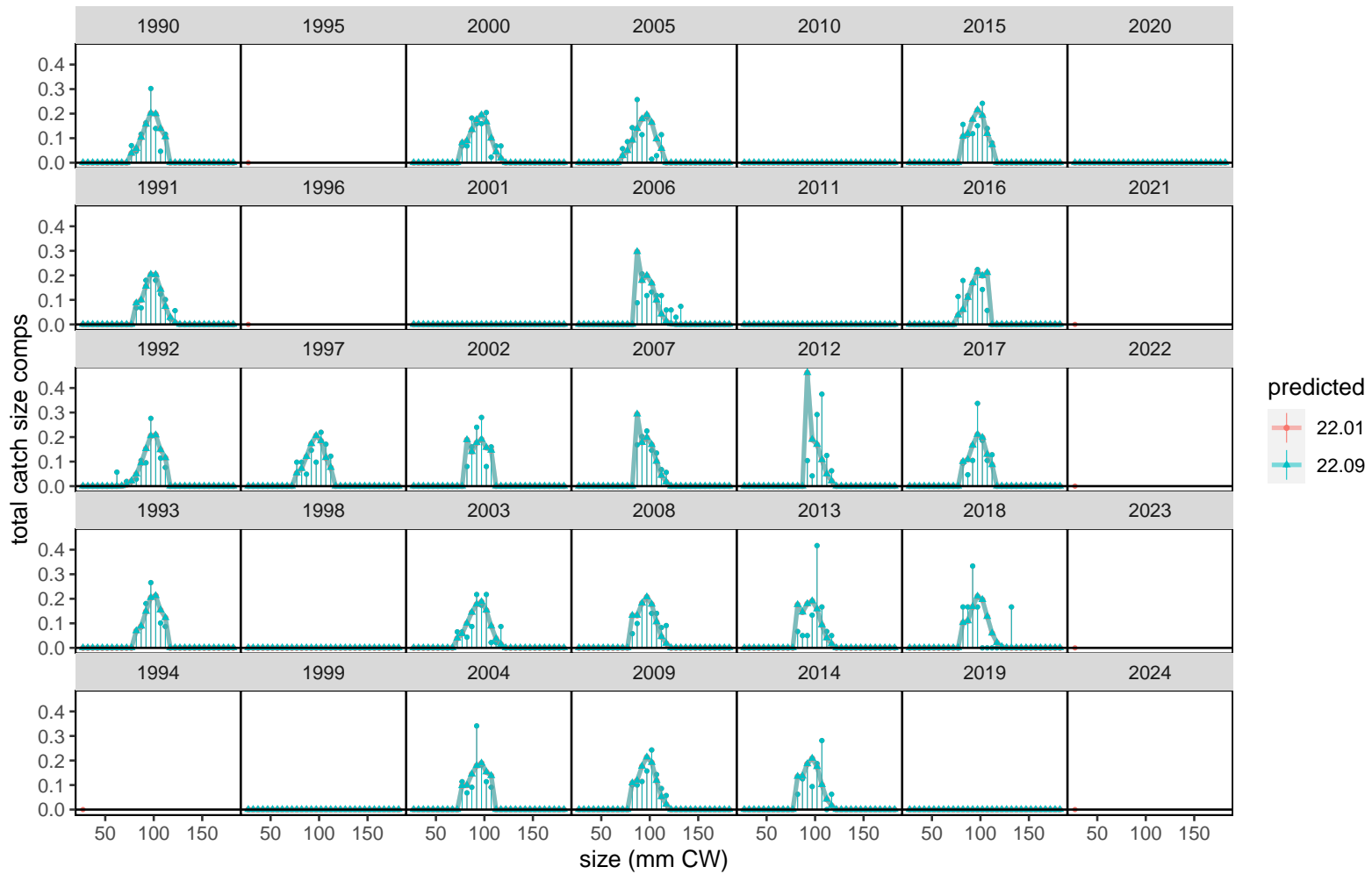


Figure 61: Fits to total catch size compositions in the RKF fishery. Preferred model is 22.03.



RKF: male, all maturity, all shell

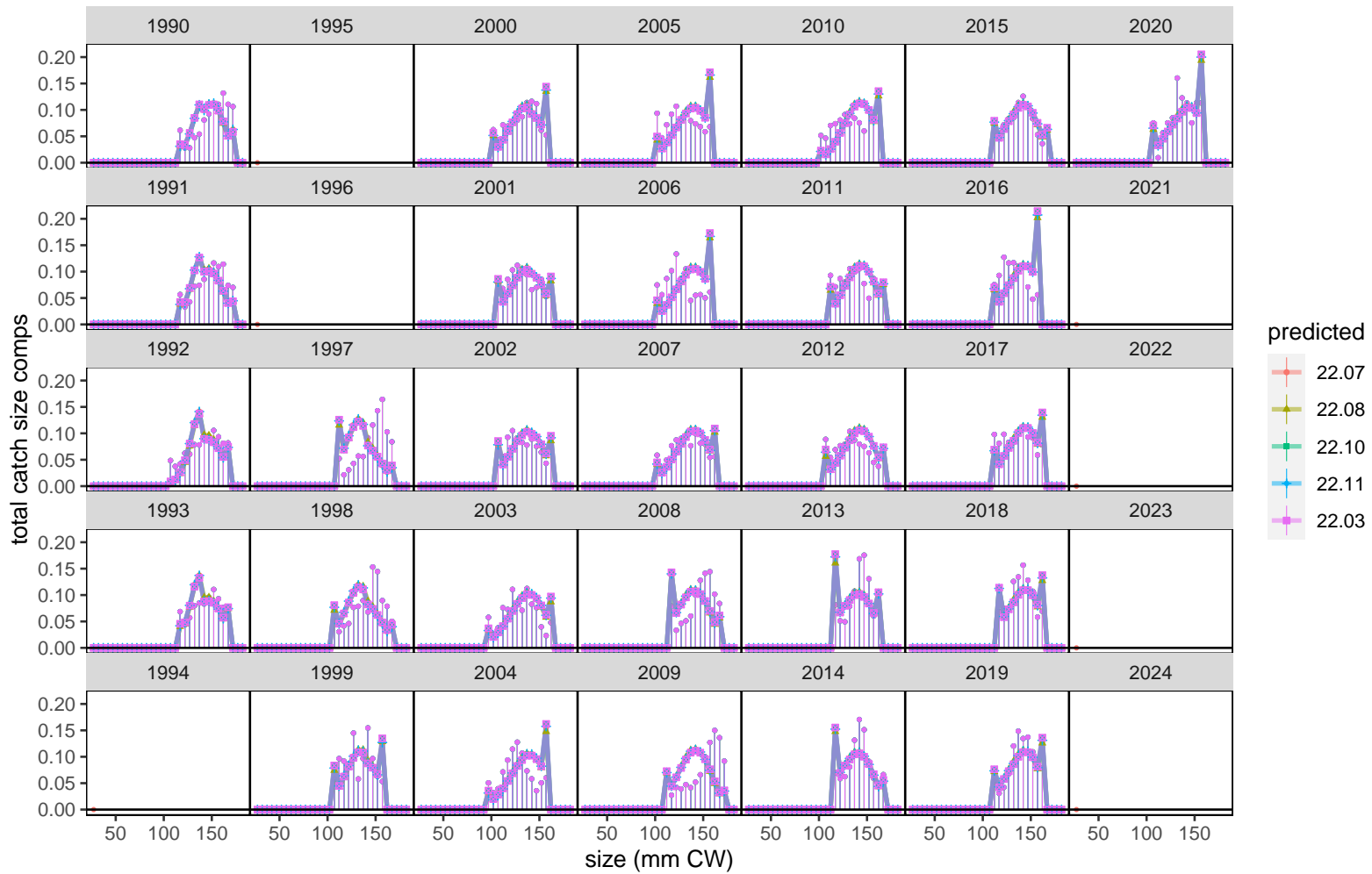


Figure 62: Fits to total catch size compositions in the RKF fishery. Preferred model is 22.03.

RKF: female, all maturity, all shell

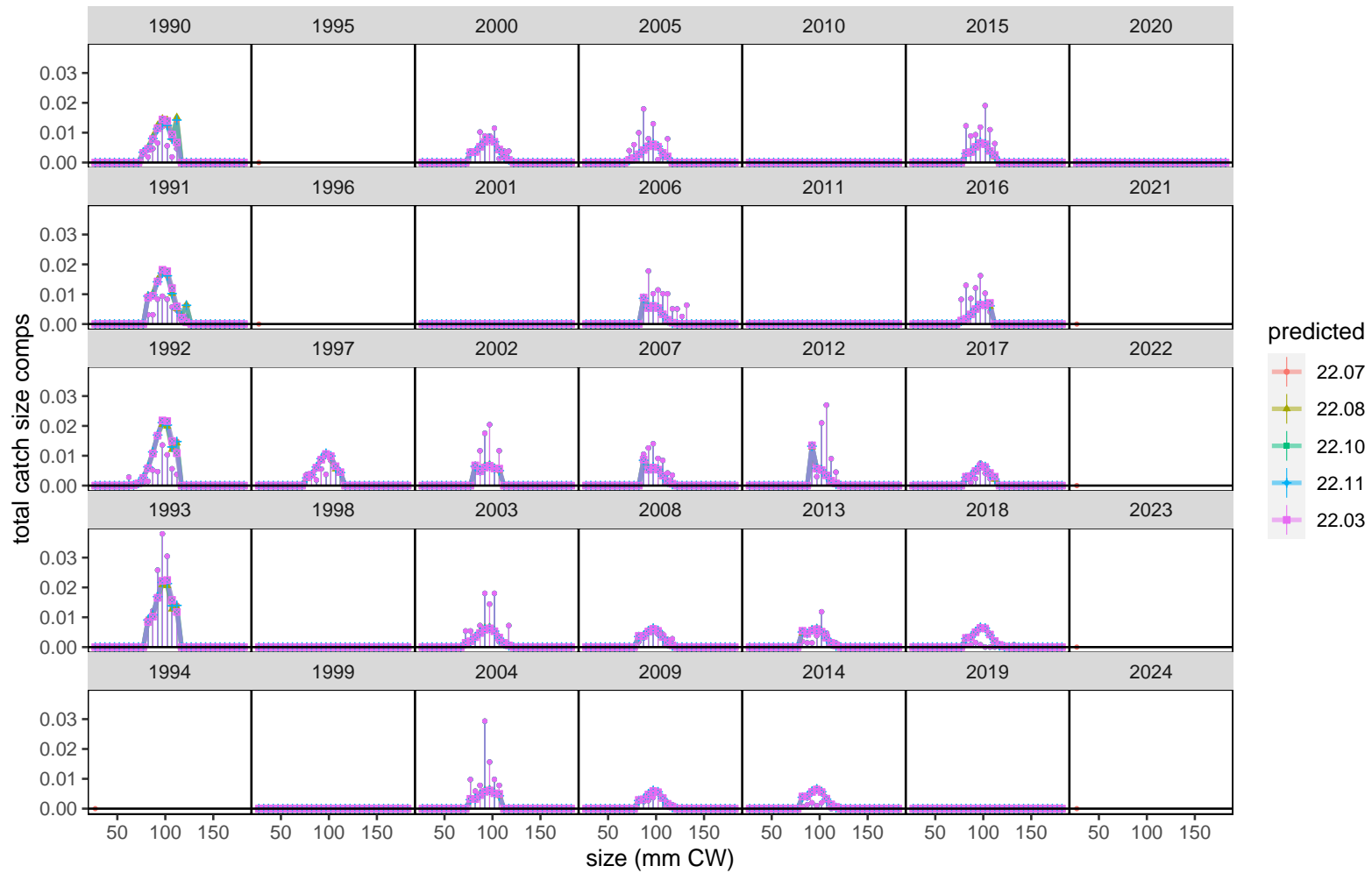


Figure 63: Fits to total catch size compositions in the RKF fishery. Preferred model is 22.03.



Figure 64: Pearson's residuals for fits to total catch size composition data in Model 22.01. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.



Figure 65: Pearson's residuals for fits to total catch size composition data in Model 22.01. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.



Figure 66: Pearson's residuals for fits to total catch size composition data in Model 22.09. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

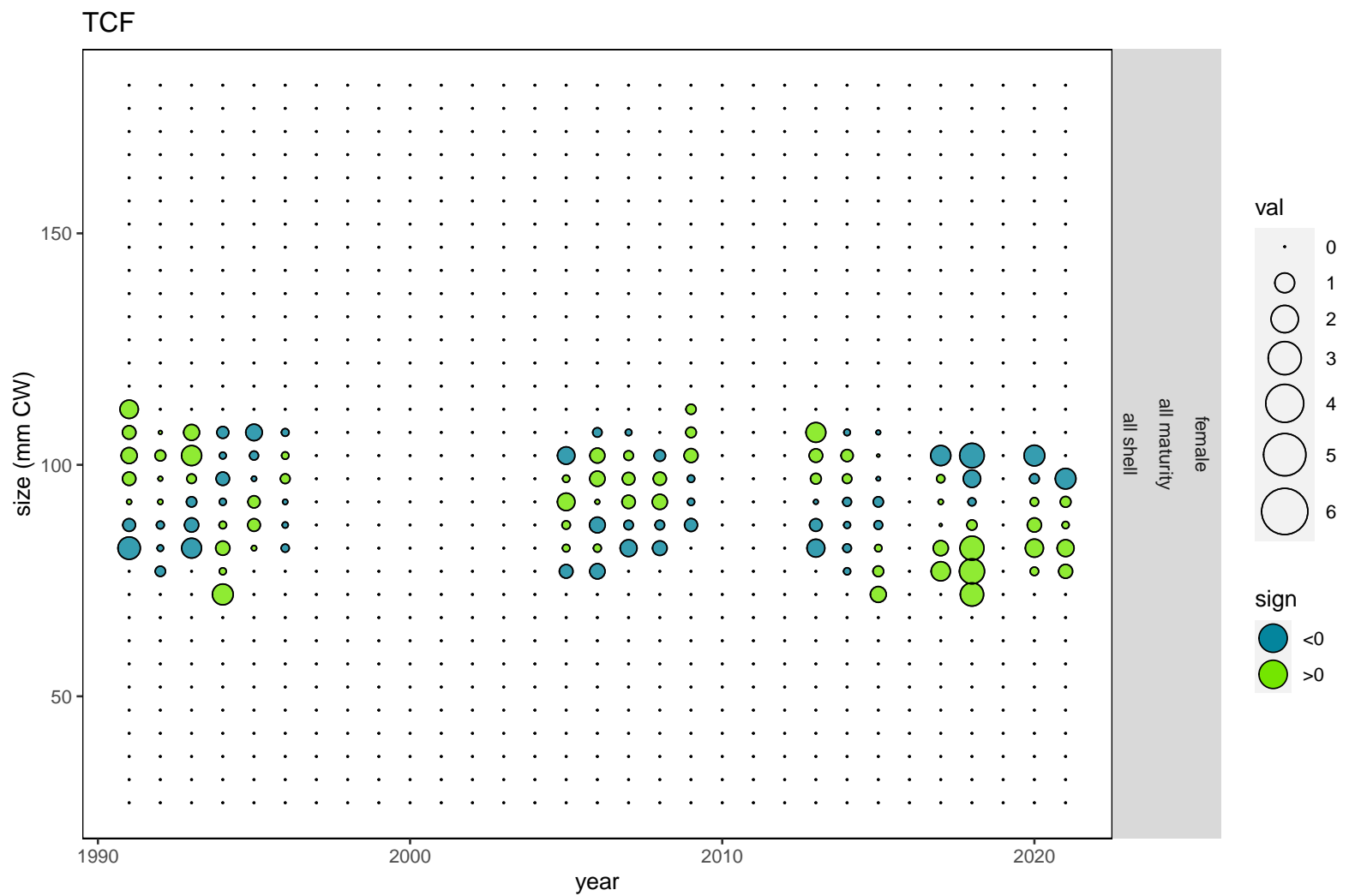


Figure 67: Pearson's residuals for fits to total catch size composition data in Model 22.09. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.



Figure 68: Pearson's residuals for fits to total catch size composition data in Model 22.07. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

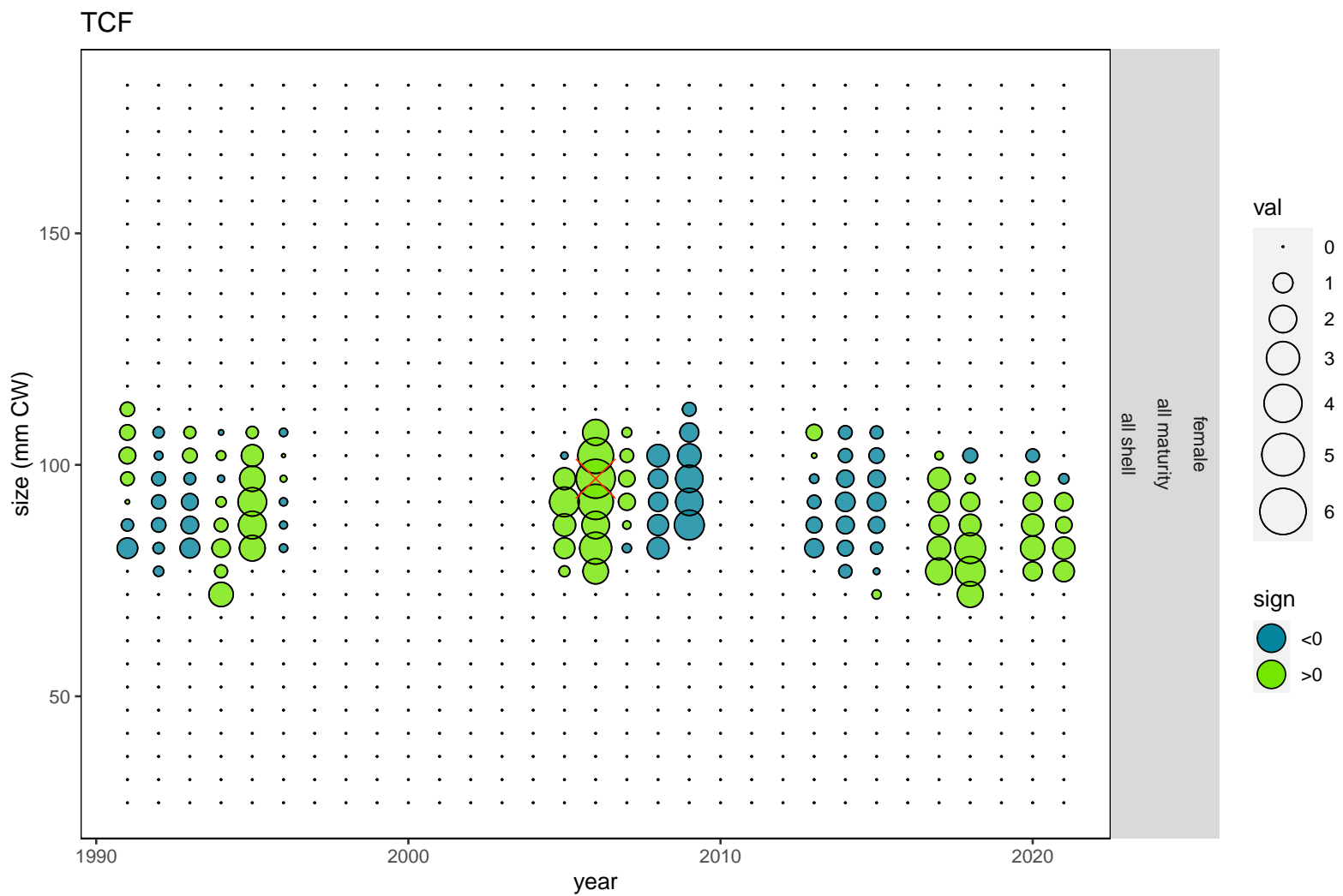


Figure 69: Pearson's residuals for fits to total catch size composition data in Model 22.07. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.





Figure 70: Pearson's residuals for fits to total catch size composition data in Model 22.08. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

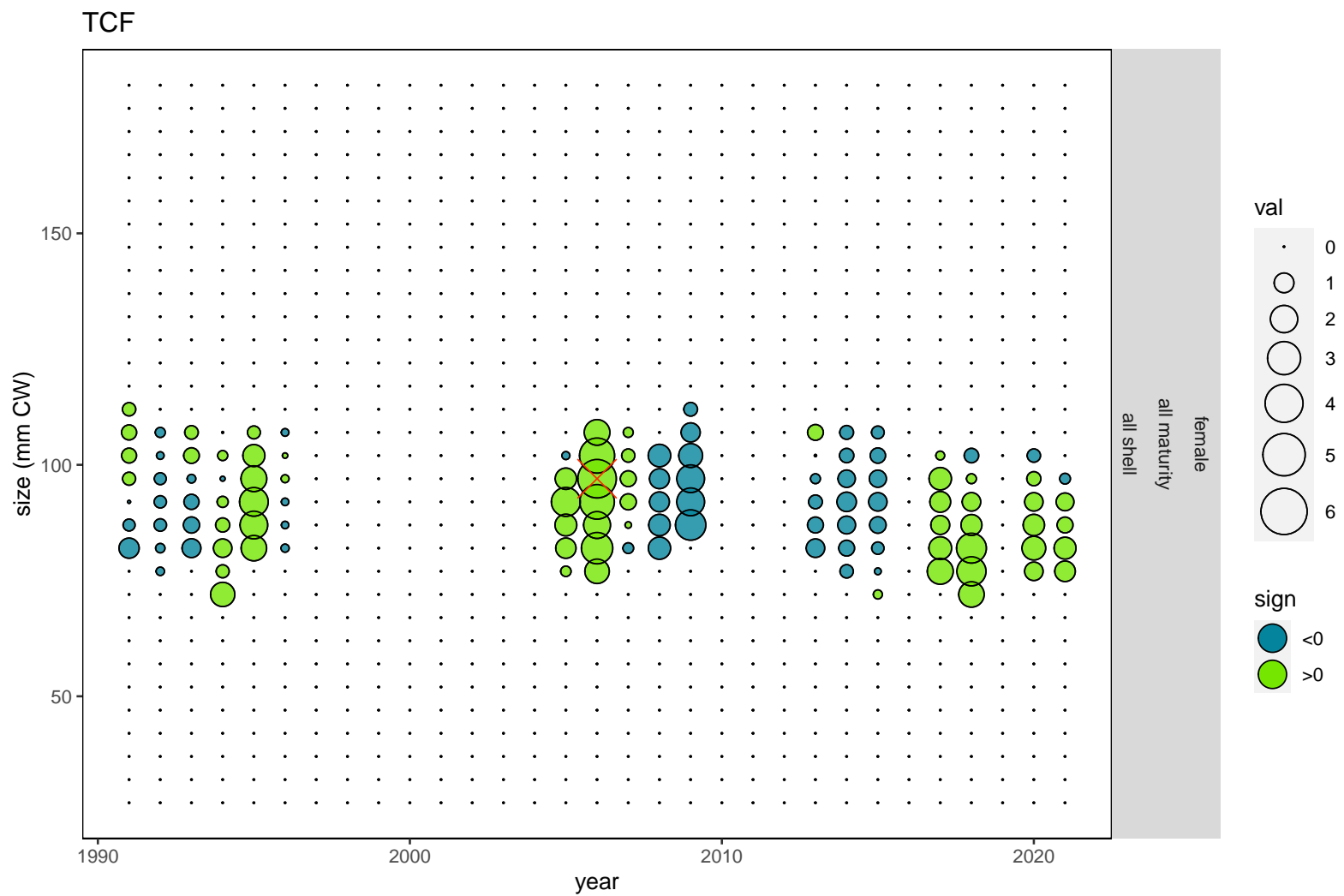


Figure 71: Pearson's residuals for fits to total catch size composition data in Model 22.08. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.



Figure 72: Pearson's residuals for fits to total catch size composition data in Model 22.10. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

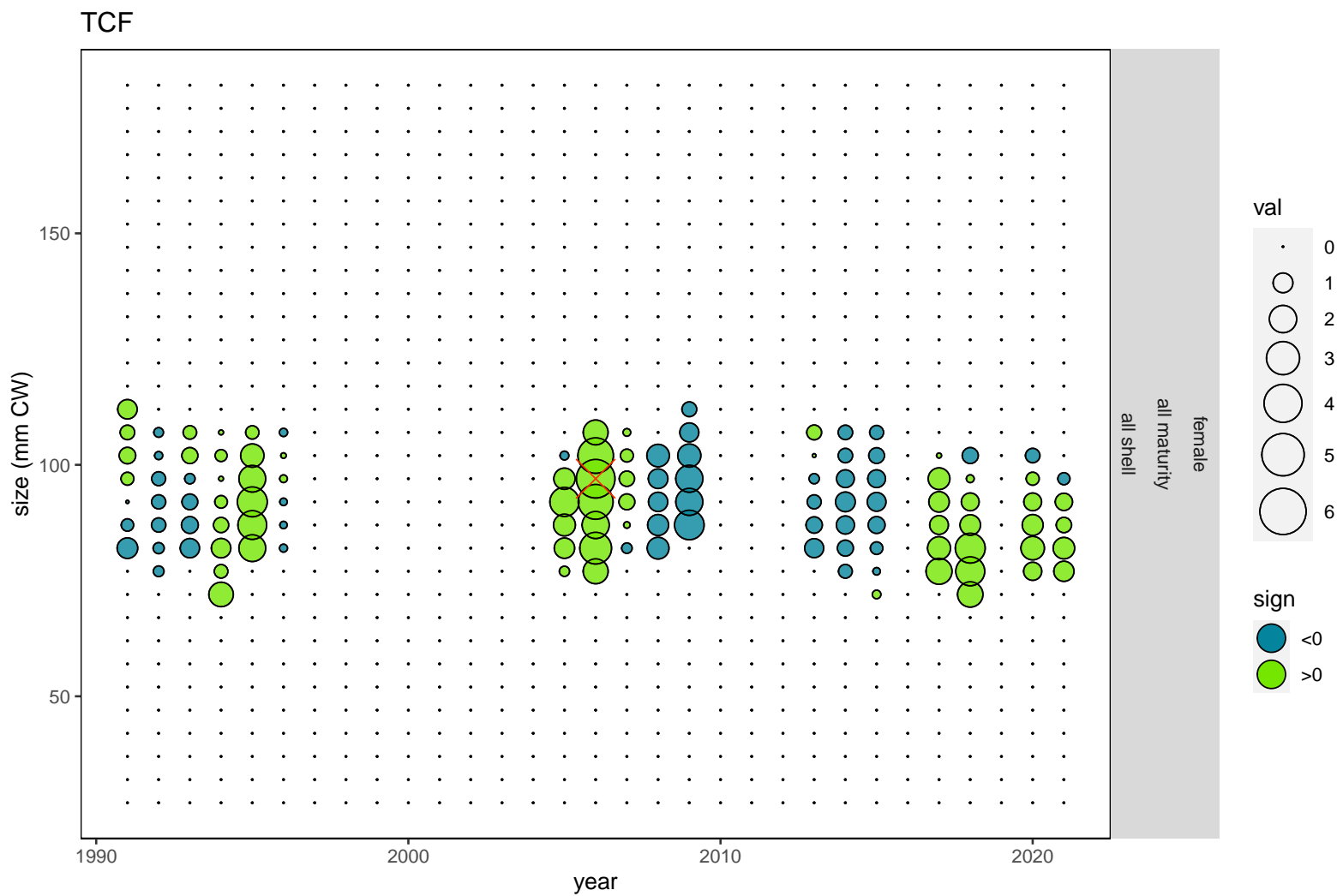


Figure 73: Pearson's residuals for fits to total catch size composition data in Model 22.10. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.



Figure 74: Pearson's residuals for fits to total catch size composition data in Model 22.11. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

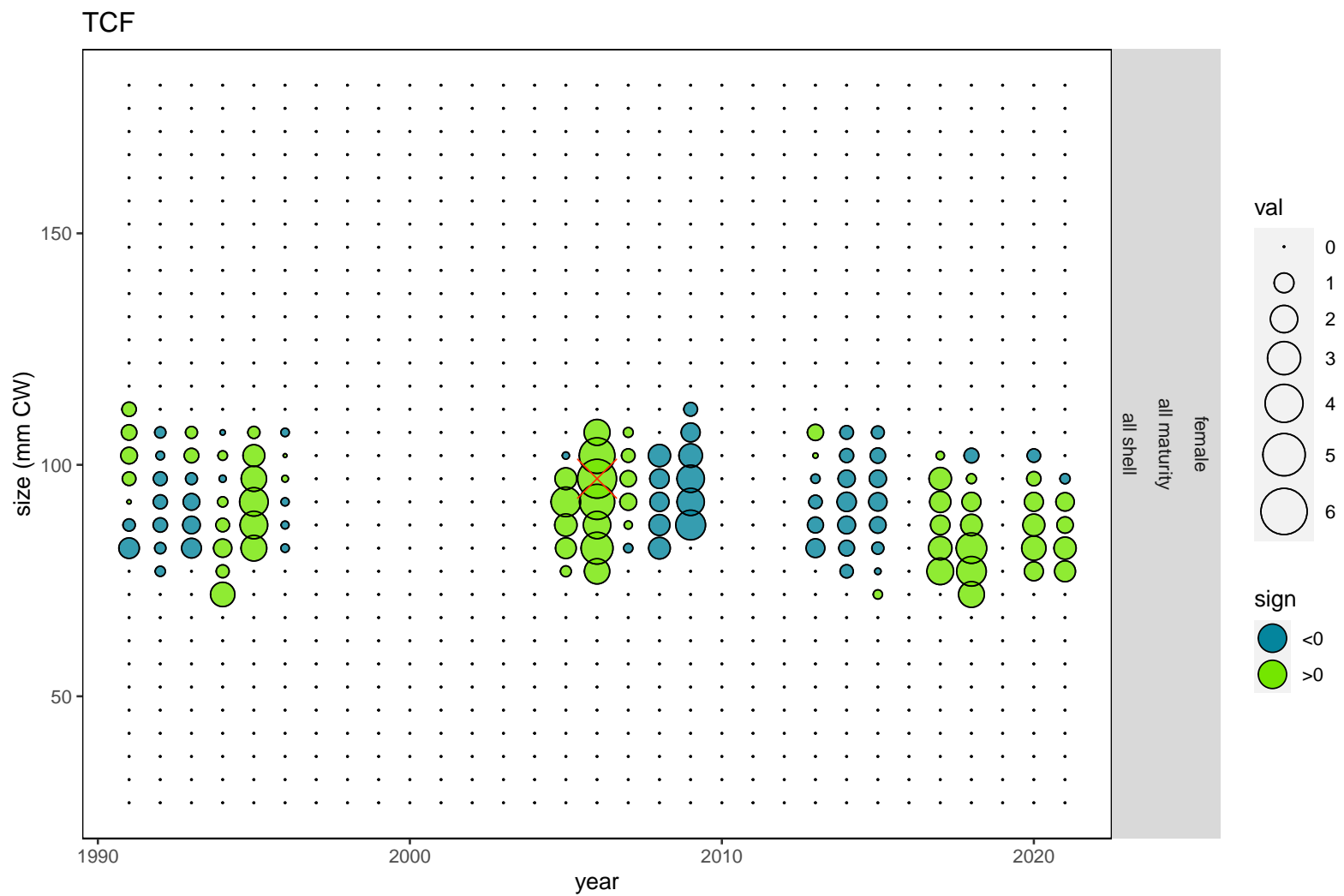


Figure 75: Pearson's residuals for fits to total catch size composition data in Model 22.11. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.



Figure 76: Pearson's residuals for fits to total catch size composition data in Model 22.03. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

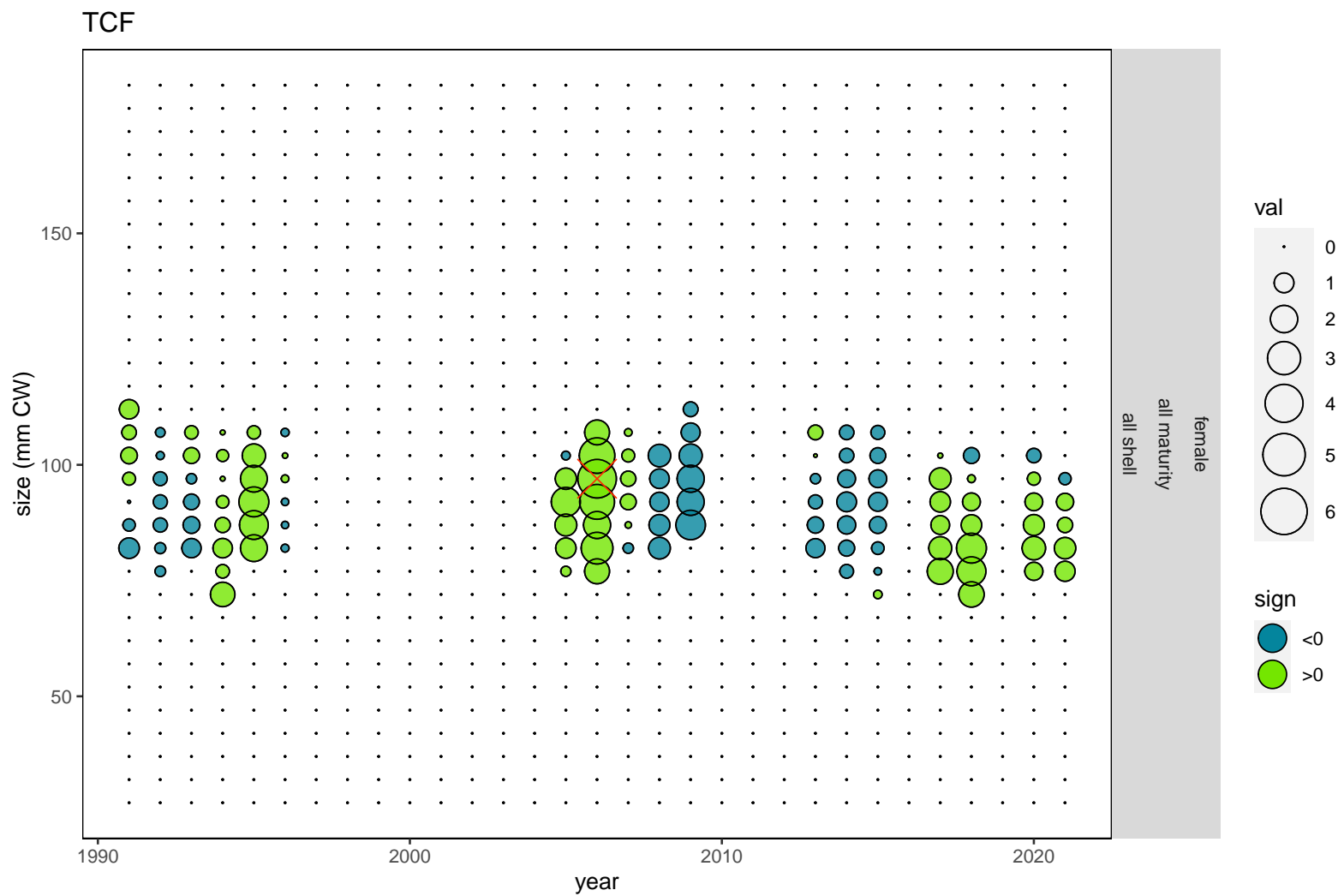


Figure 77: Pearson's residuals for fits to total catch size composition data in Model 22.03. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.



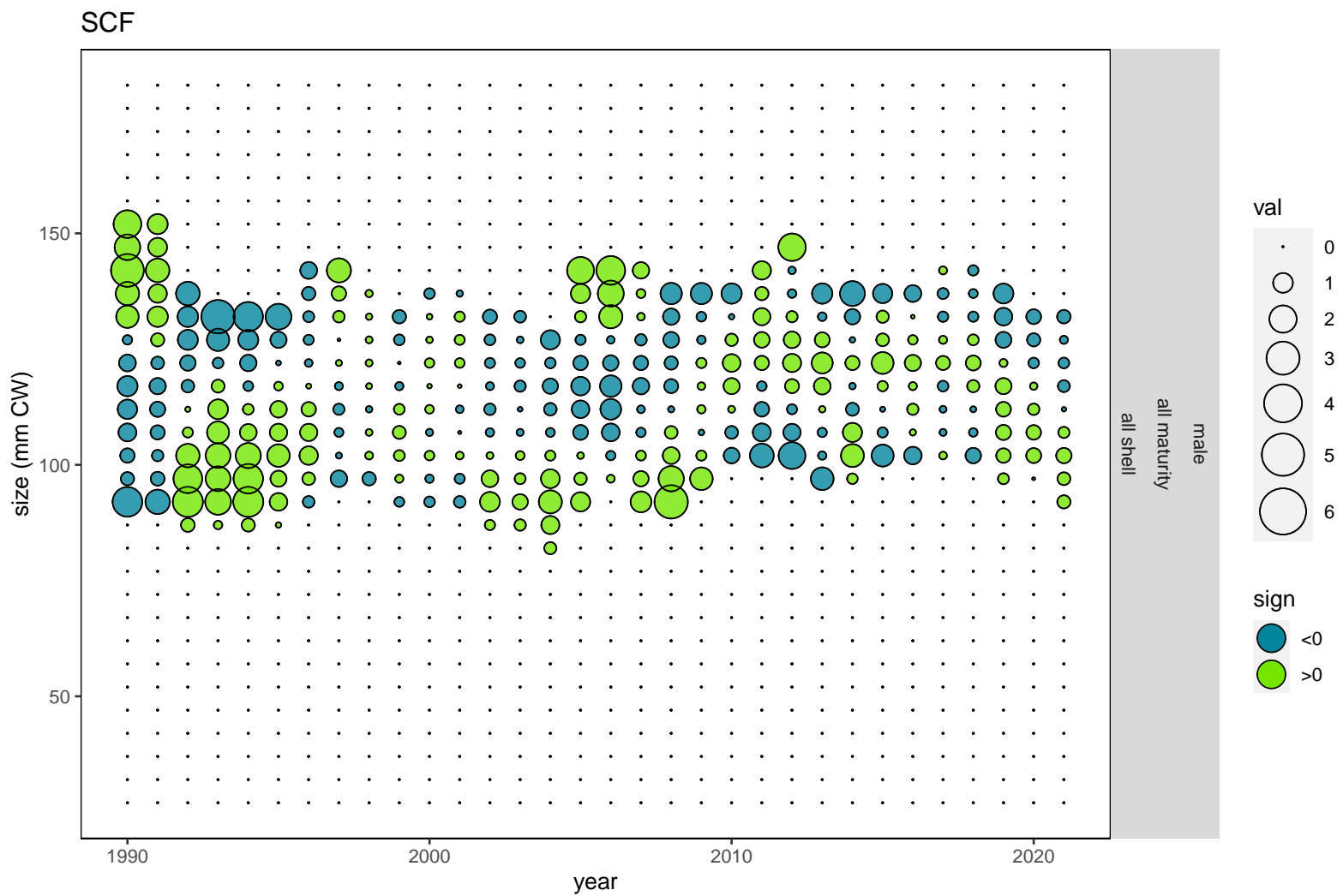


Figure 78: Pearson's residuals for fits to total catch size composition data in Model 22.01. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.



Figure 79: Pearson's residuals for fits to total catch size composition data in Model 22.01. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

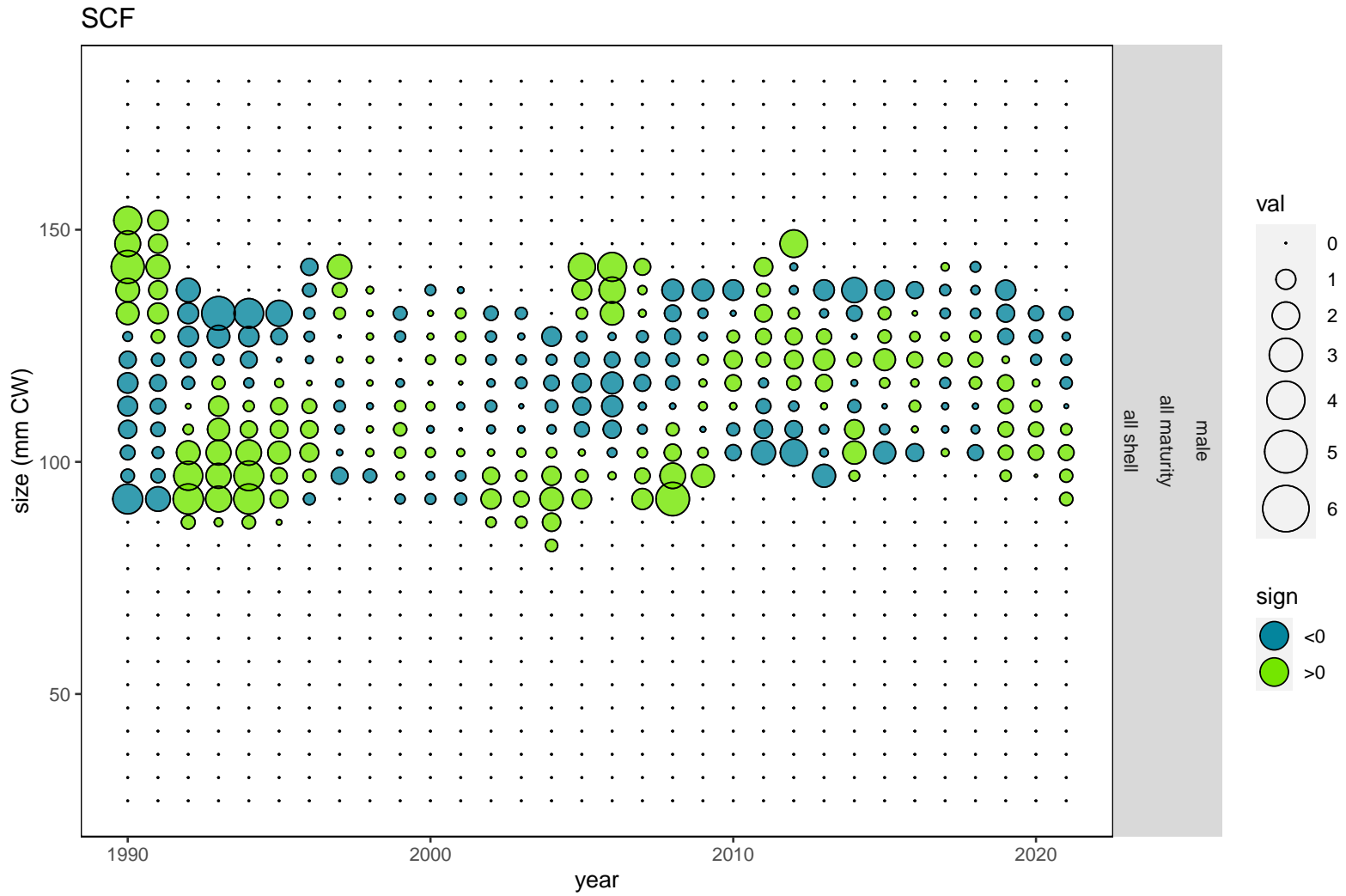


Figure 80: Pearson's residuals for fits to total catch size composition data in Model 22.09. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

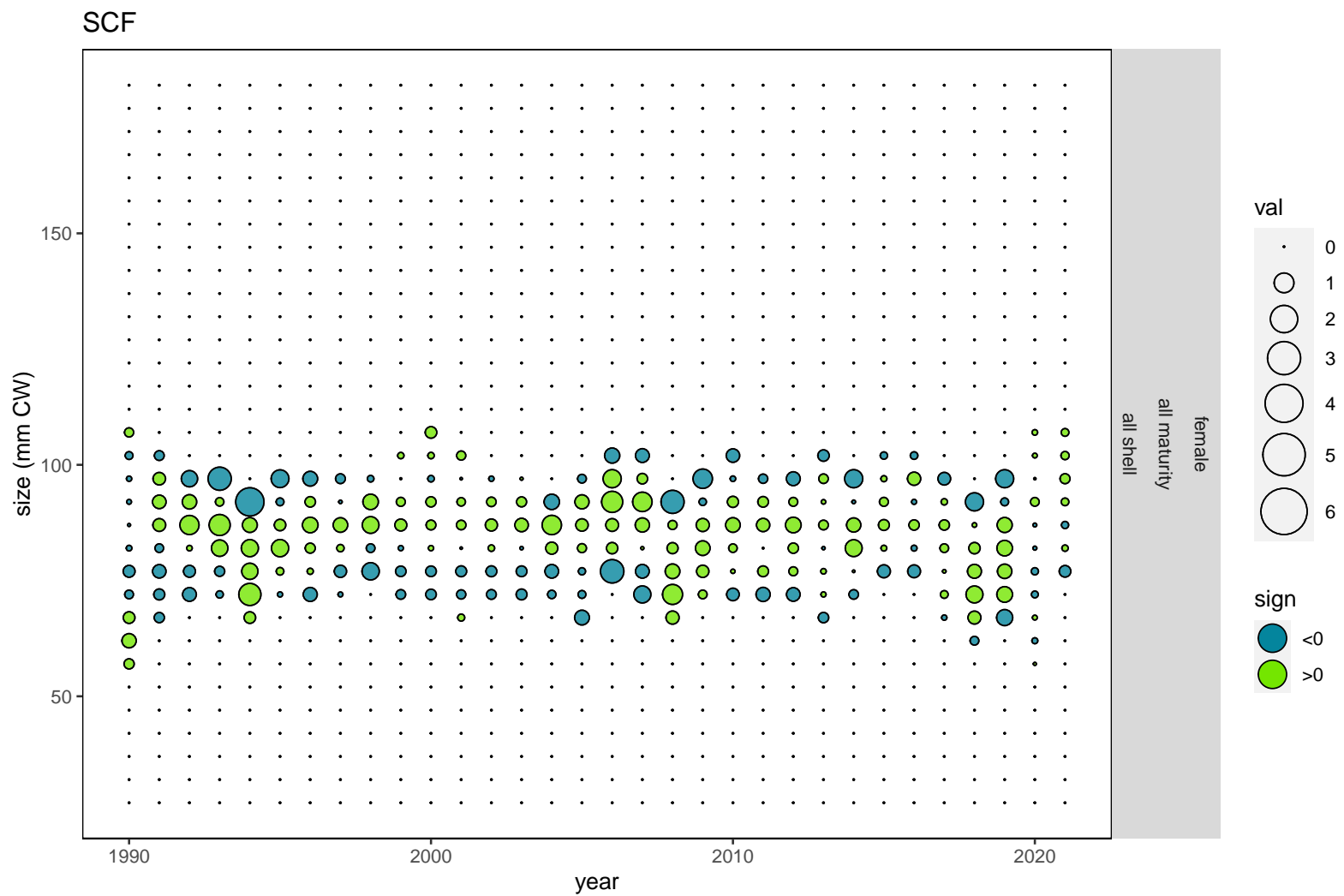


Figure 81: Pearson's residuals for fits to total catch size composition data in Model 22.09. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

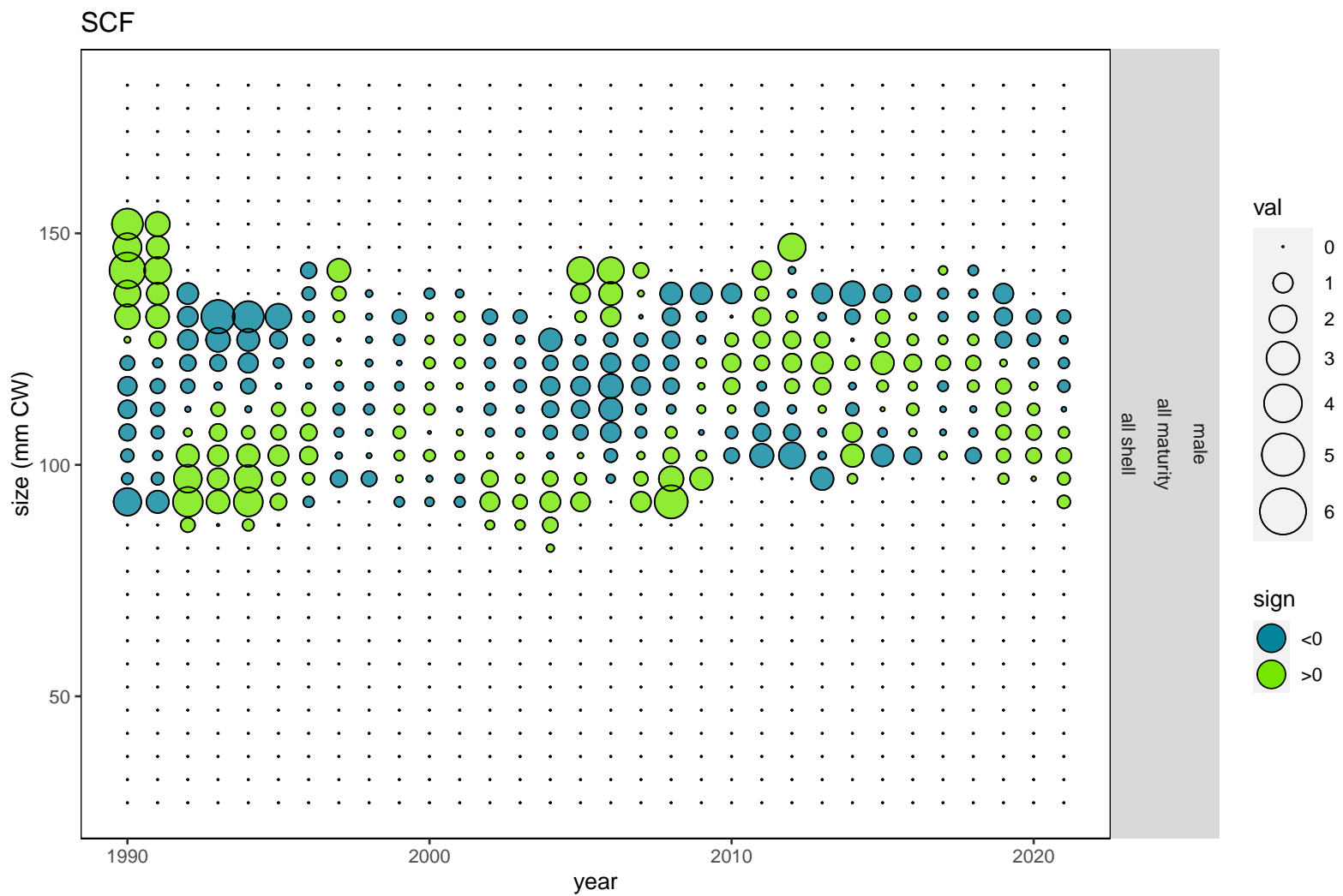


Figure 82: Pearson's residuals for fits to total catch size composition data in Model 22.07. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

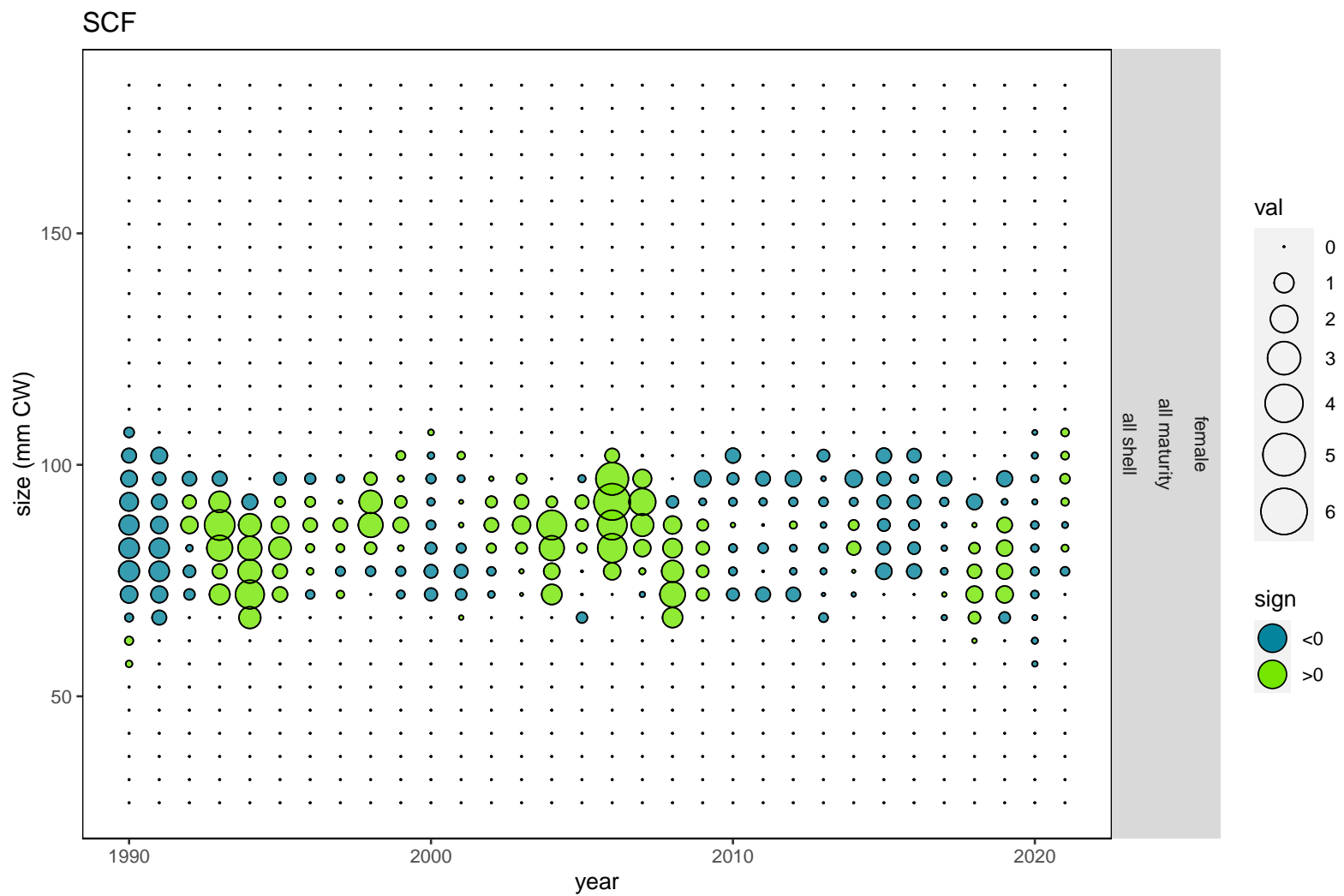


Figure 83: Pearson's residuals for fits to total catch size composition data in Model 22.07. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

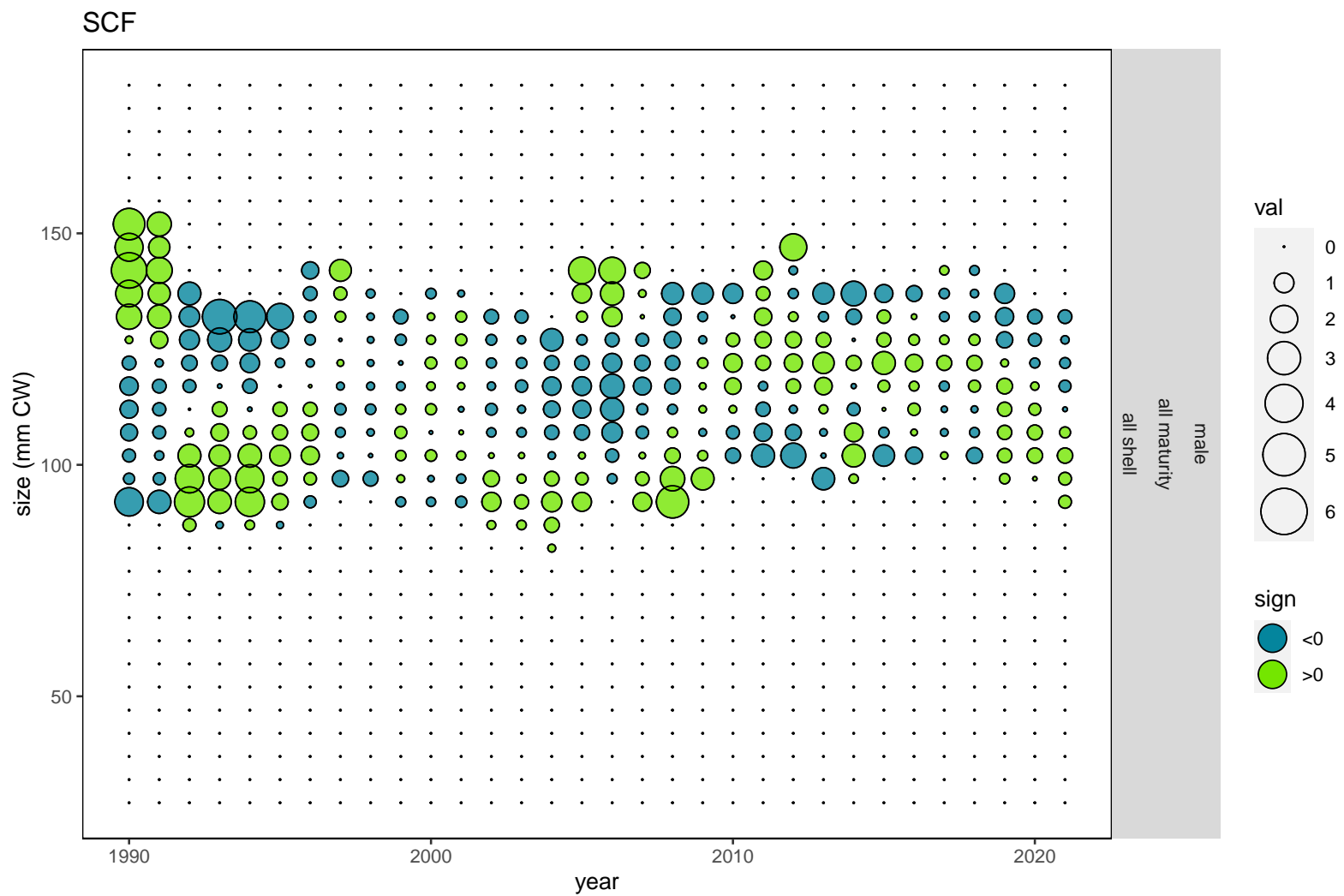


Figure 84: Pearson's residuals for fits to total catch size composition data in Model 22.08. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.



Figure 85: Pearson's residuals for fits to total catch size composition data in Model 22.08. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.



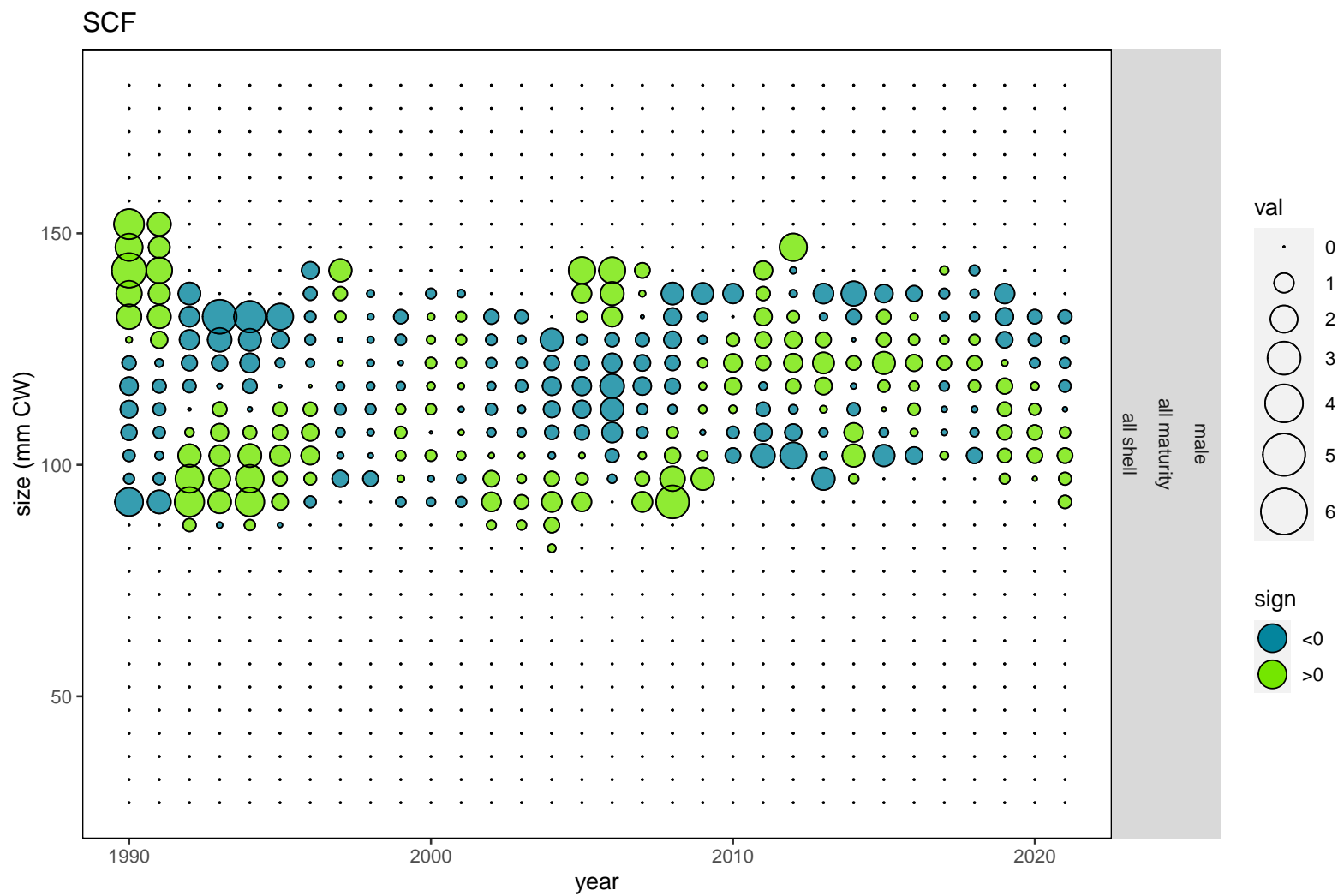


Figure 86: Pearson's residuals for fits to total catch size composition data in Model 22.10. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.



Figure 87: Pearson's residuals for fits to total catch size composition data in Model 22.10. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

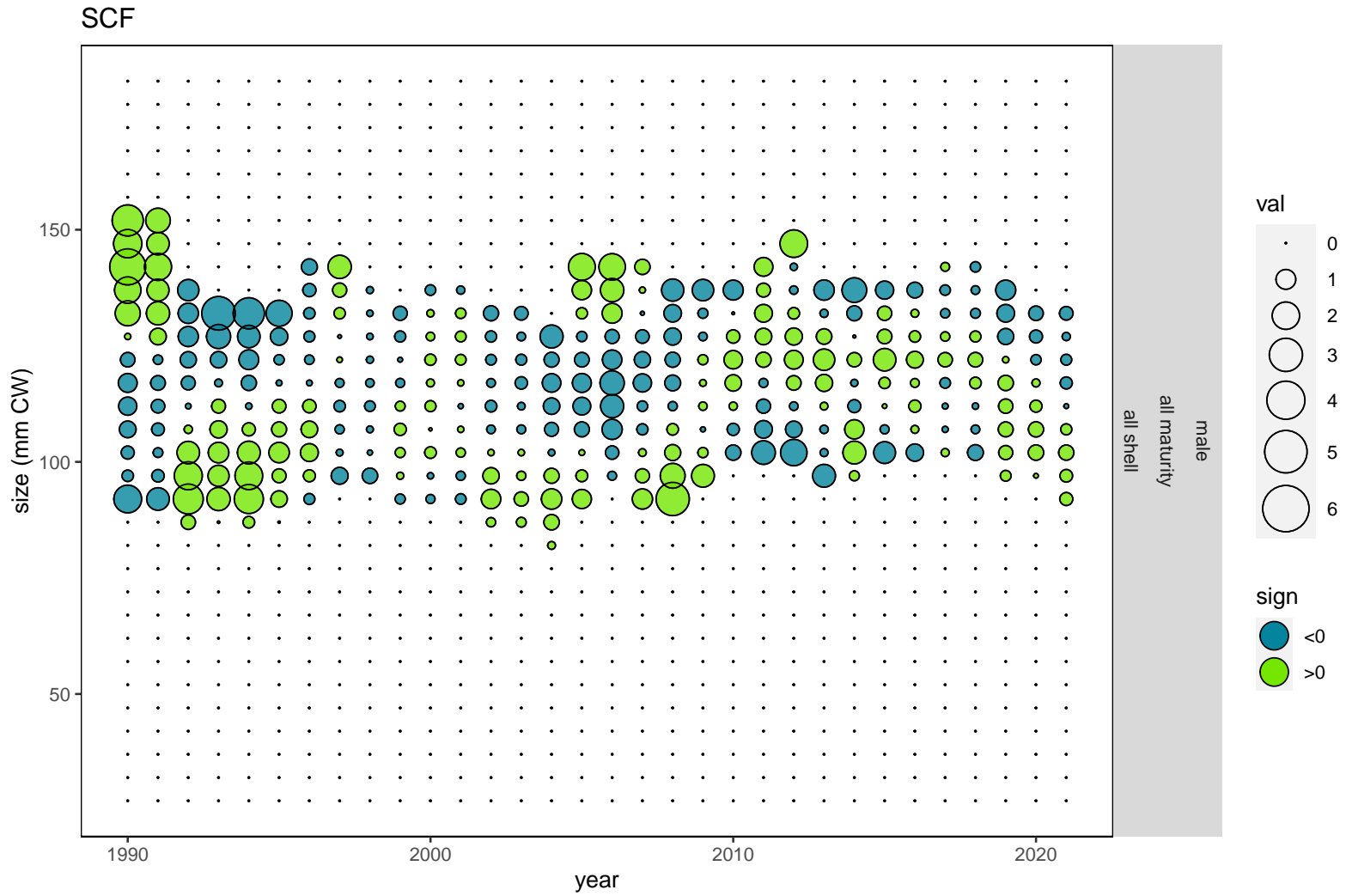


Figure 88: Pearson's residuals for fits to total catch size composition data in Model 22.11. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

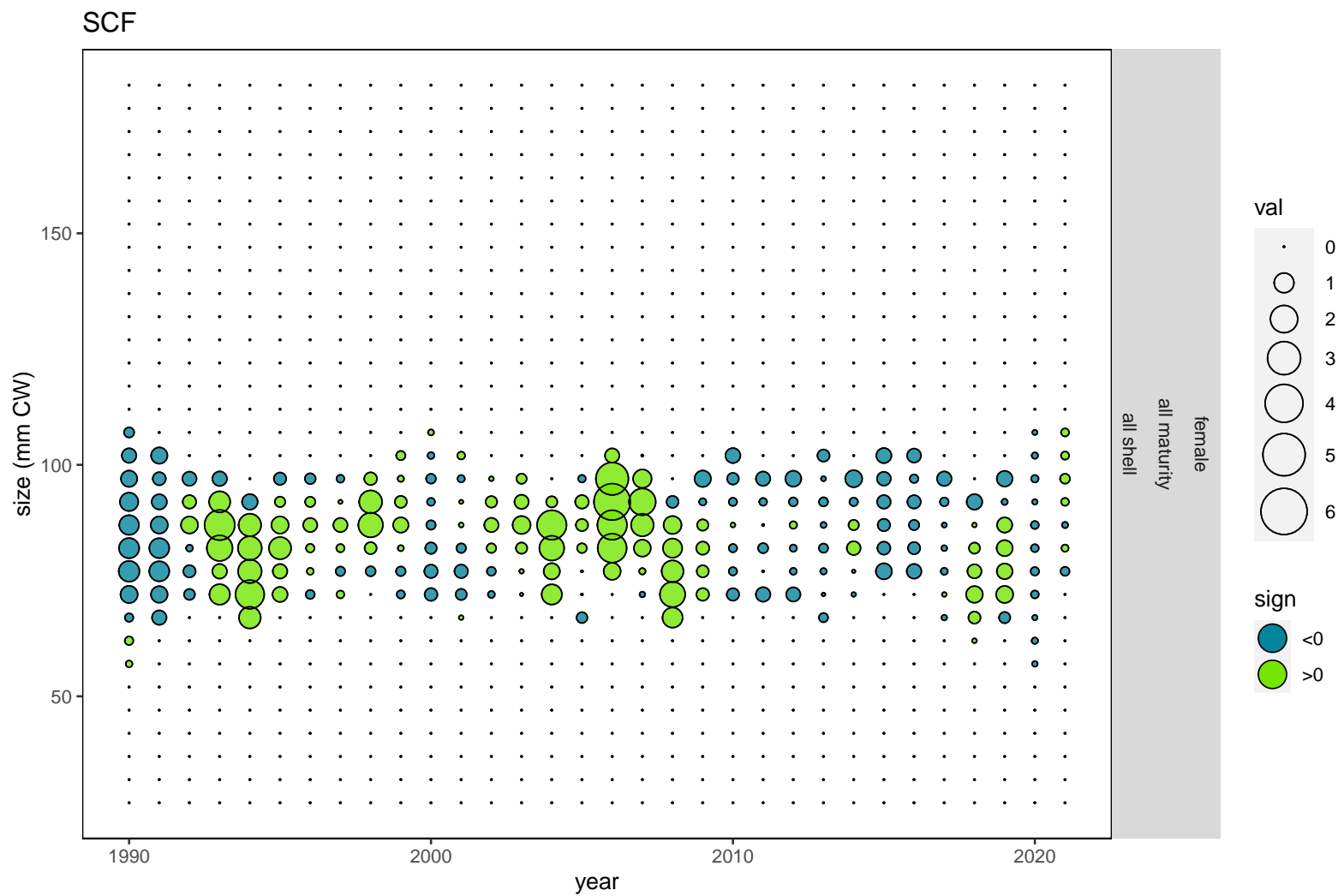


Figure 89: Pearson's residuals for fits to total catch size composition data in Model 22.11. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

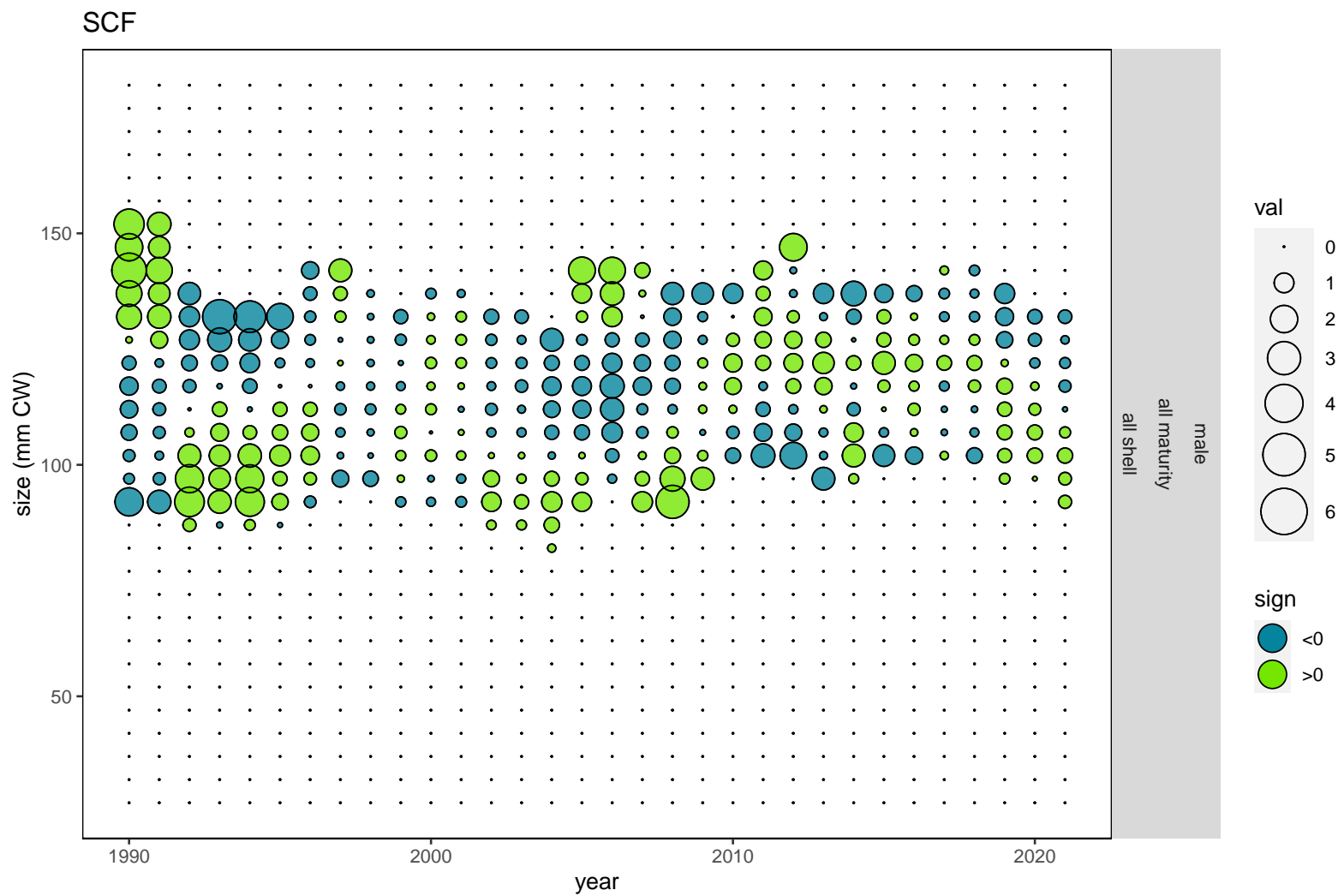


Figure 90: Pearson's residuals for fits to total catch size composition data in Model 22.03. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.



Figure 91: Pearson's residuals for fits to total catch size composition data in Model 22.03. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.



Figure 92: Pearson's residuals for fits to total catch size composition data in Model 22.01. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.



Figure 93: Pearson's residuals for fits to total catch size composition data in Model 22.01. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.





Figure 94: Pearson's residuals for fits to total catch size composition data in Model 22.09. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

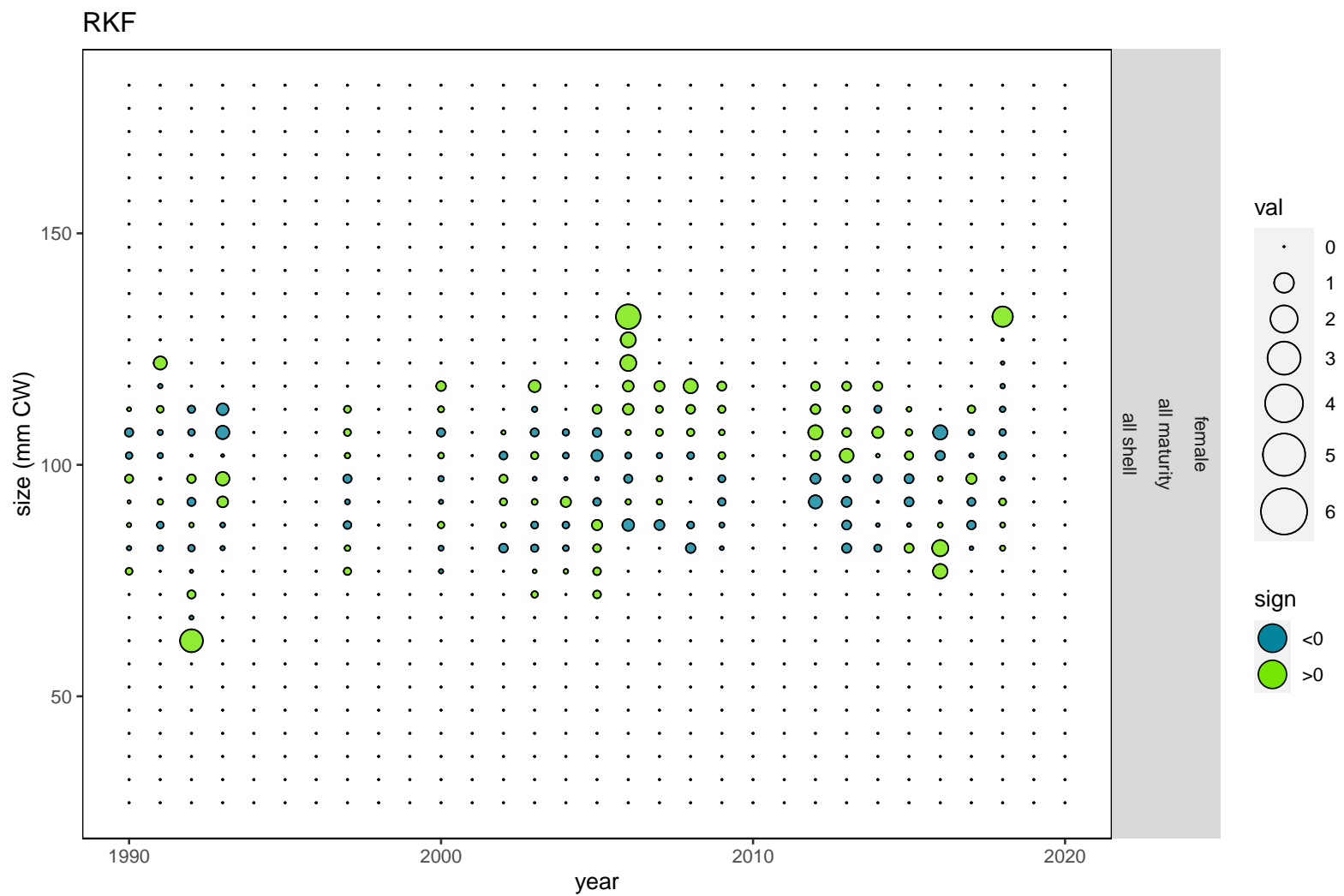


Figure 95: Pearson's residuals for fits to total catch size composition data in Model 22.09. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

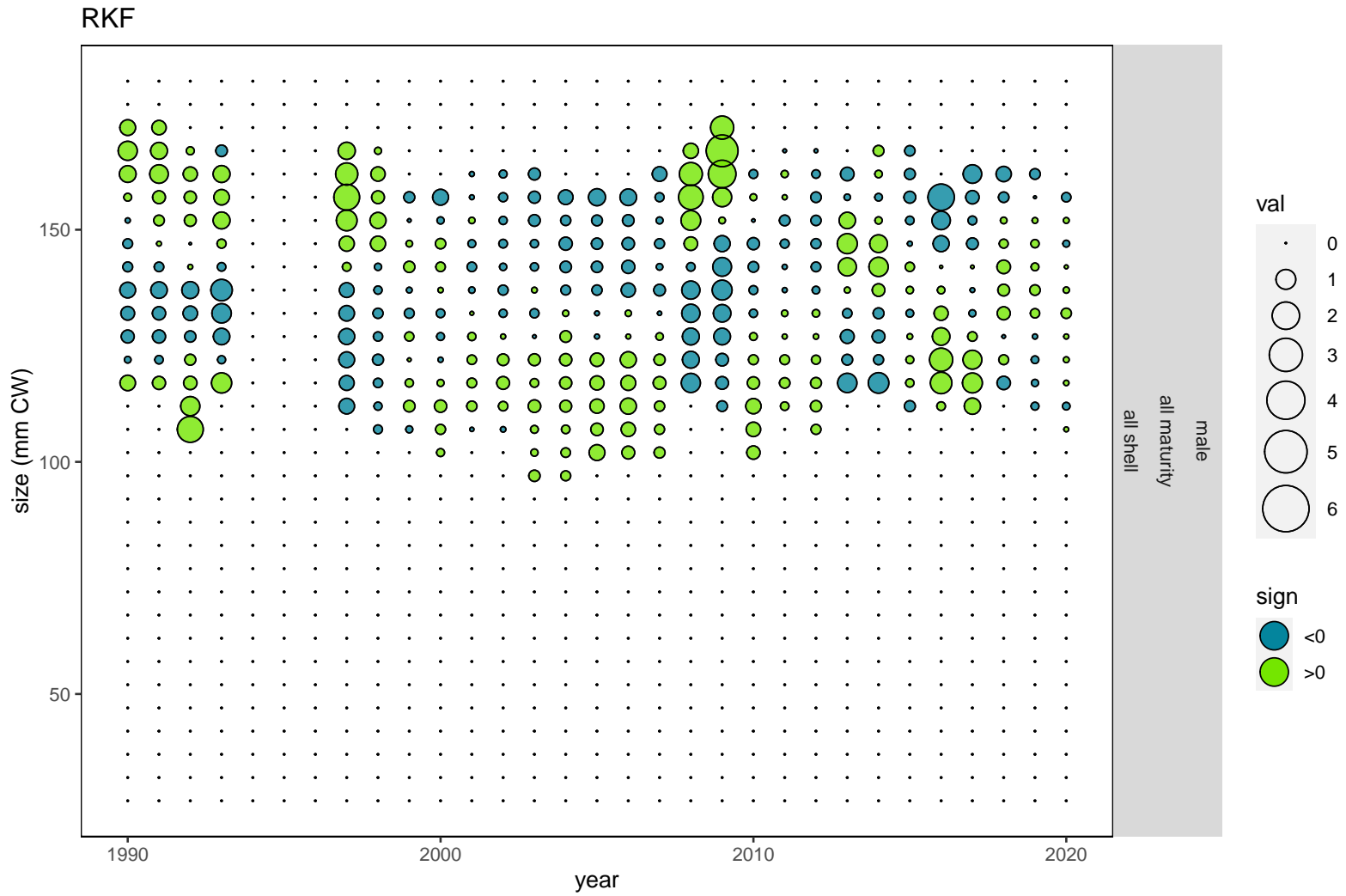


Figure 96: Pearson's residuals for fits to total catch size composition data in Model 22.07. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.



Figure 97: Pearson's residuals for fits to total catch size composition data in Model 22.07. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

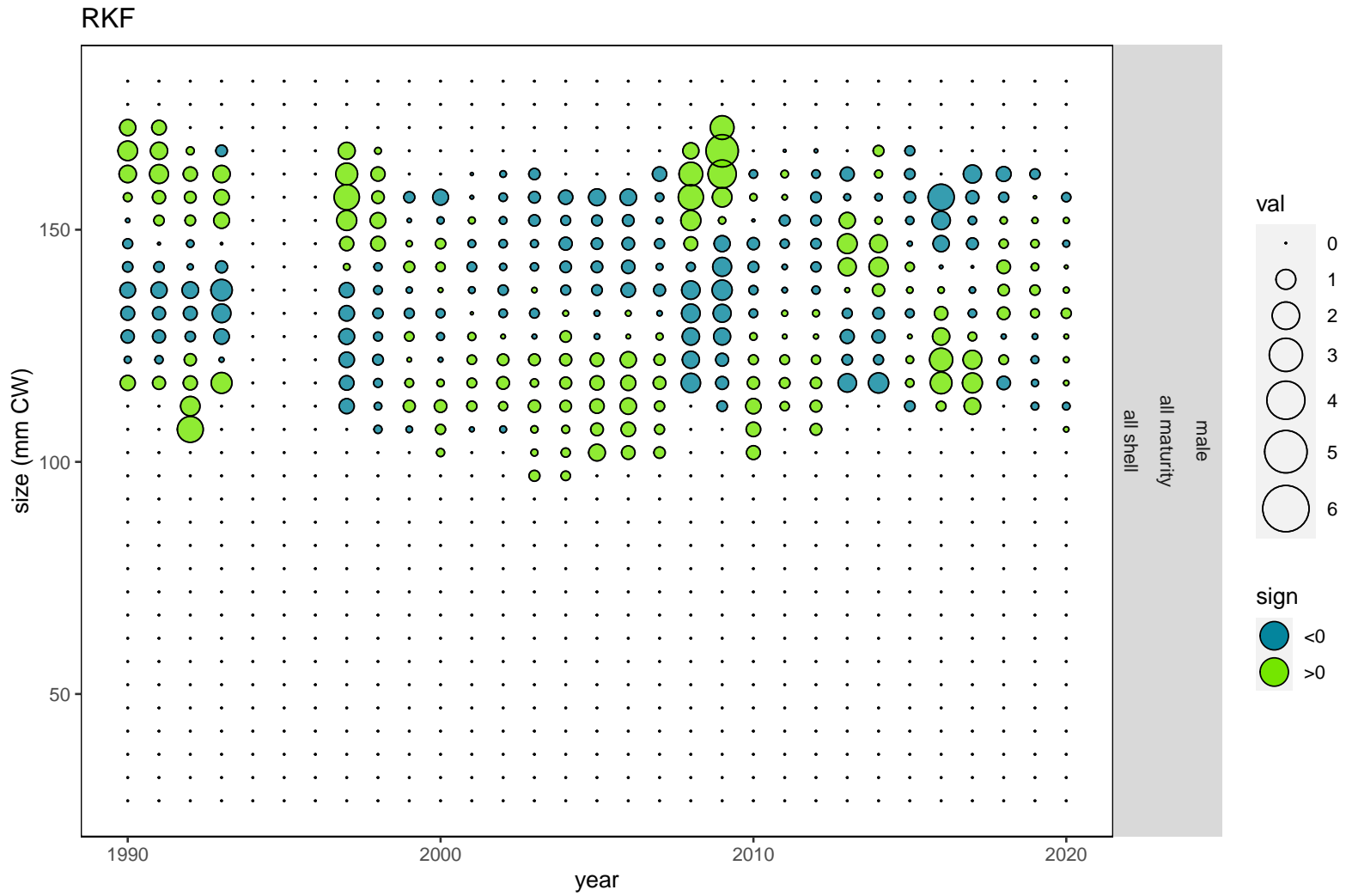


Figure 98: Pearson's residuals for fits to total catch size composition data in Model 22.08. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.



Figure 99: Pearson's residuals for fits to total catch size composition data in Model 22.08. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

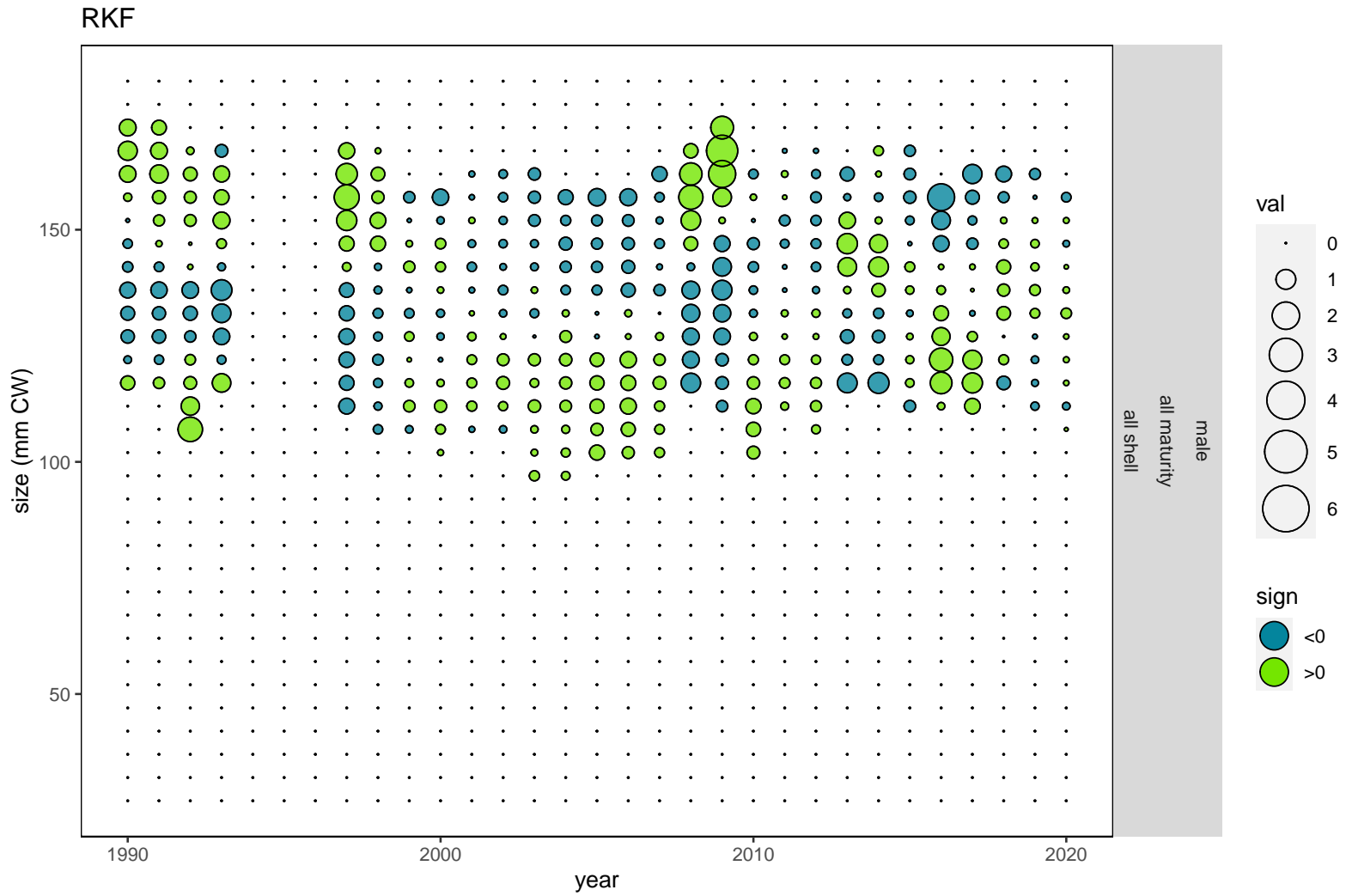


Figure 100: Pearson's residuals for fits to total catch size composition data in Model 22.10. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

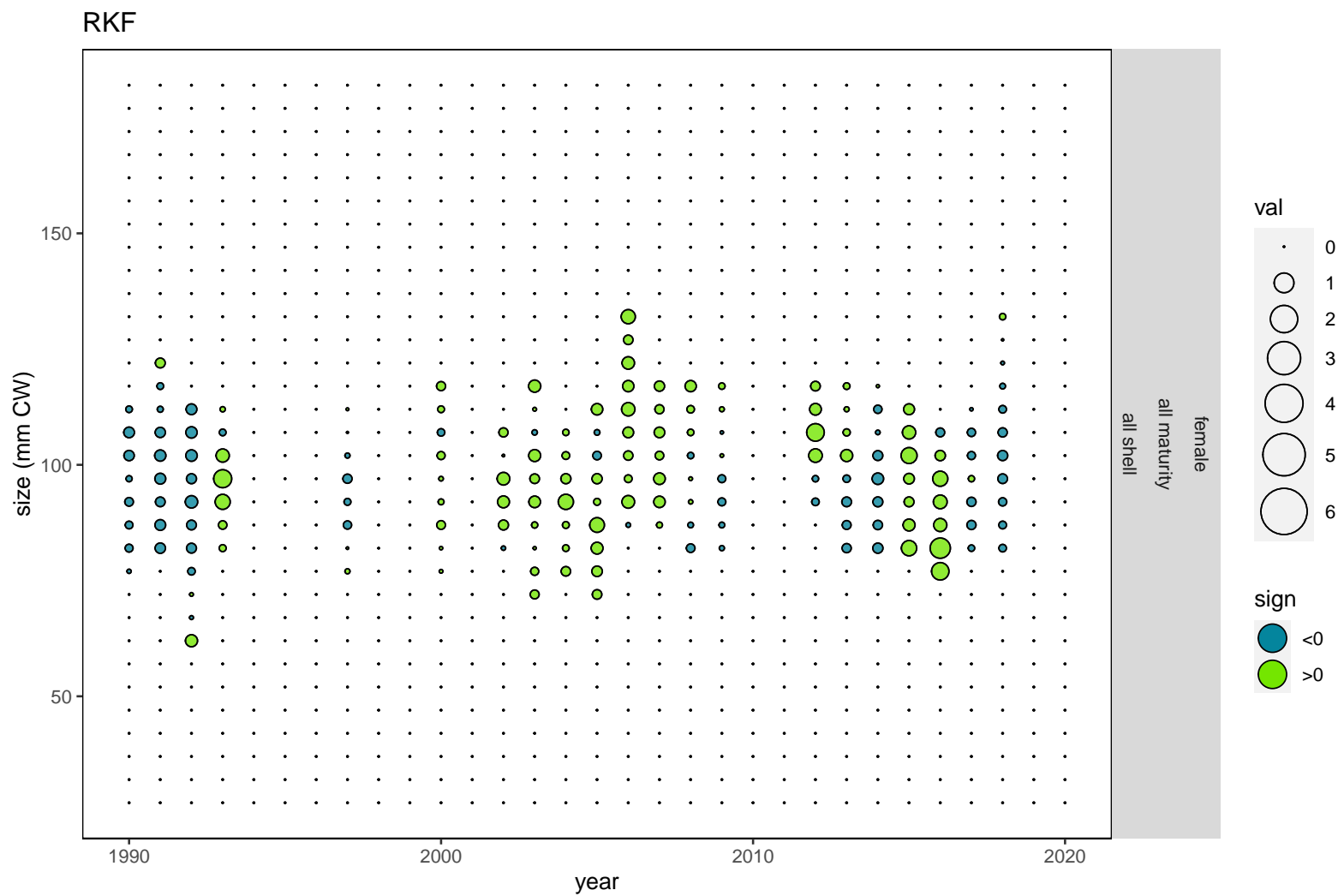


Figure 101: Pearson's residuals for fits to total catch size composition data in Model 22.10. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.





Figure 102: Pearson's residuals for fits to total catch size composition data in Model 22.11. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.



Figure 103: Pearson's residuals for fits to total catch size composition data in Model 22.11. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.



Figure 104: Pearson's residuals for fits to total catch size composition data in Model 22.03. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

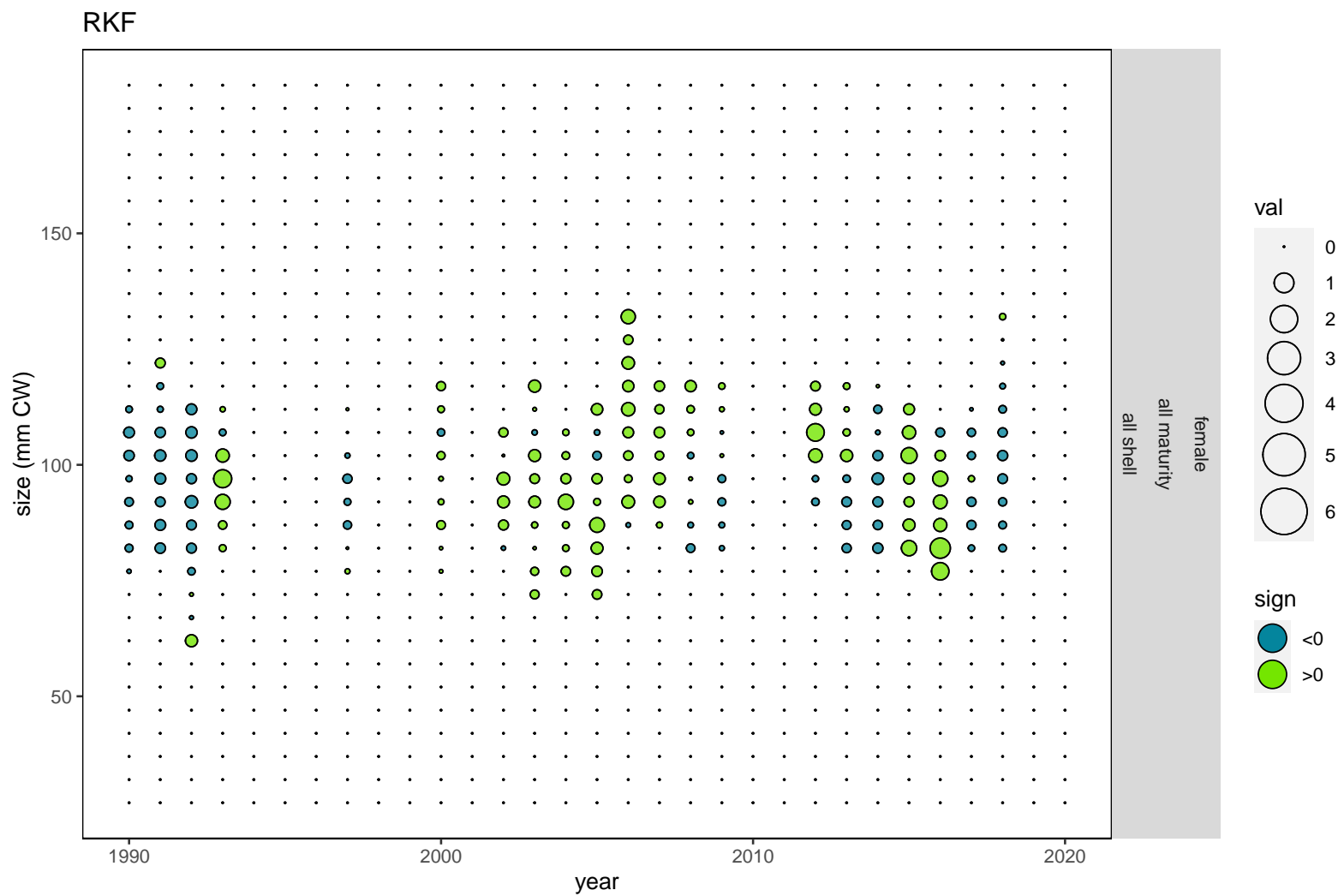


Figure 105: Pearson's residuals for fits to total catch size composition data in Model 22.03. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

GF All: male, all maturity, all shell

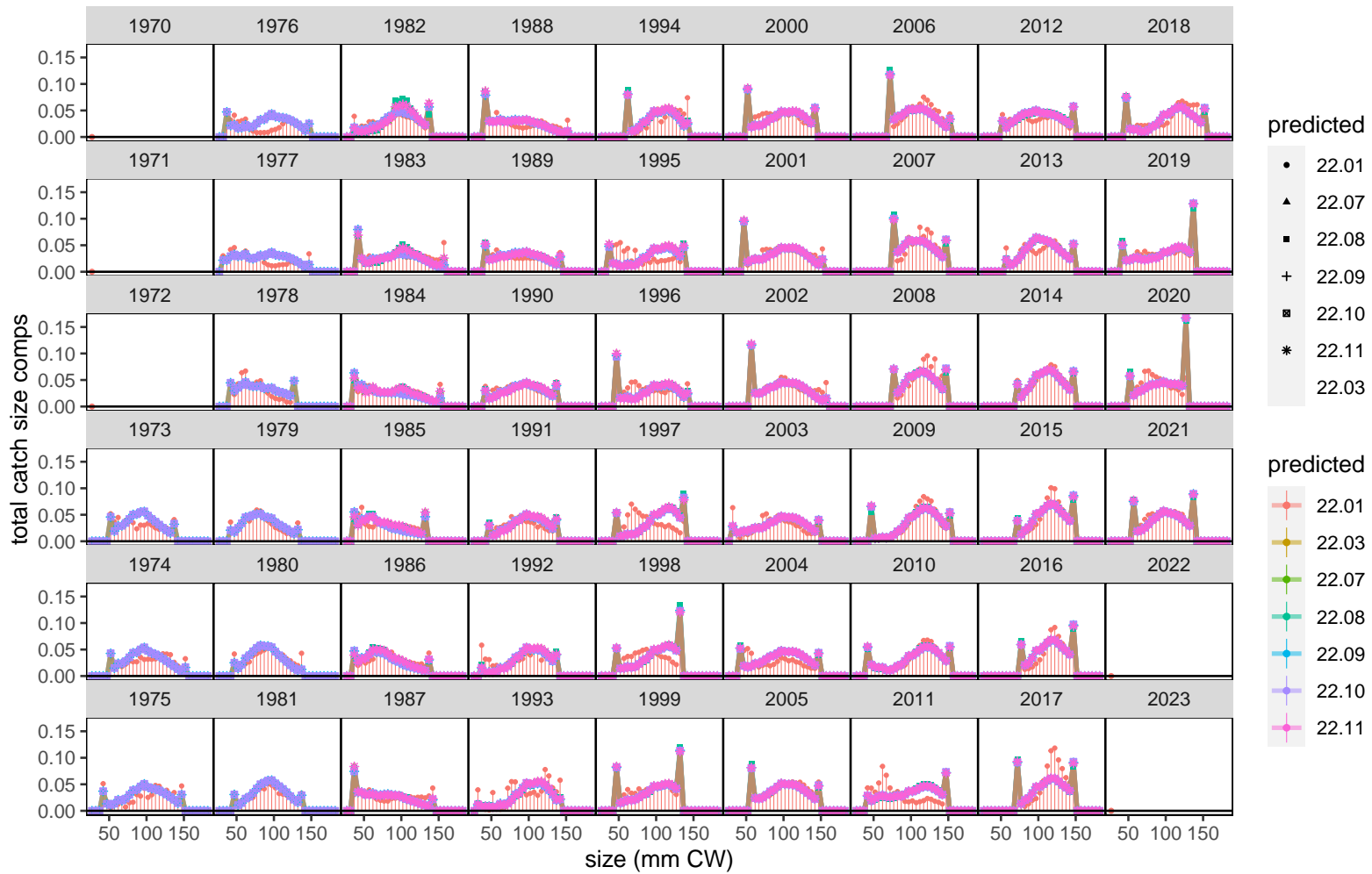


Figure 106: Fits to total catch size compositions in the GF All fishery. Preferred model is 22.03.

GF All: female, all maturity, all shell

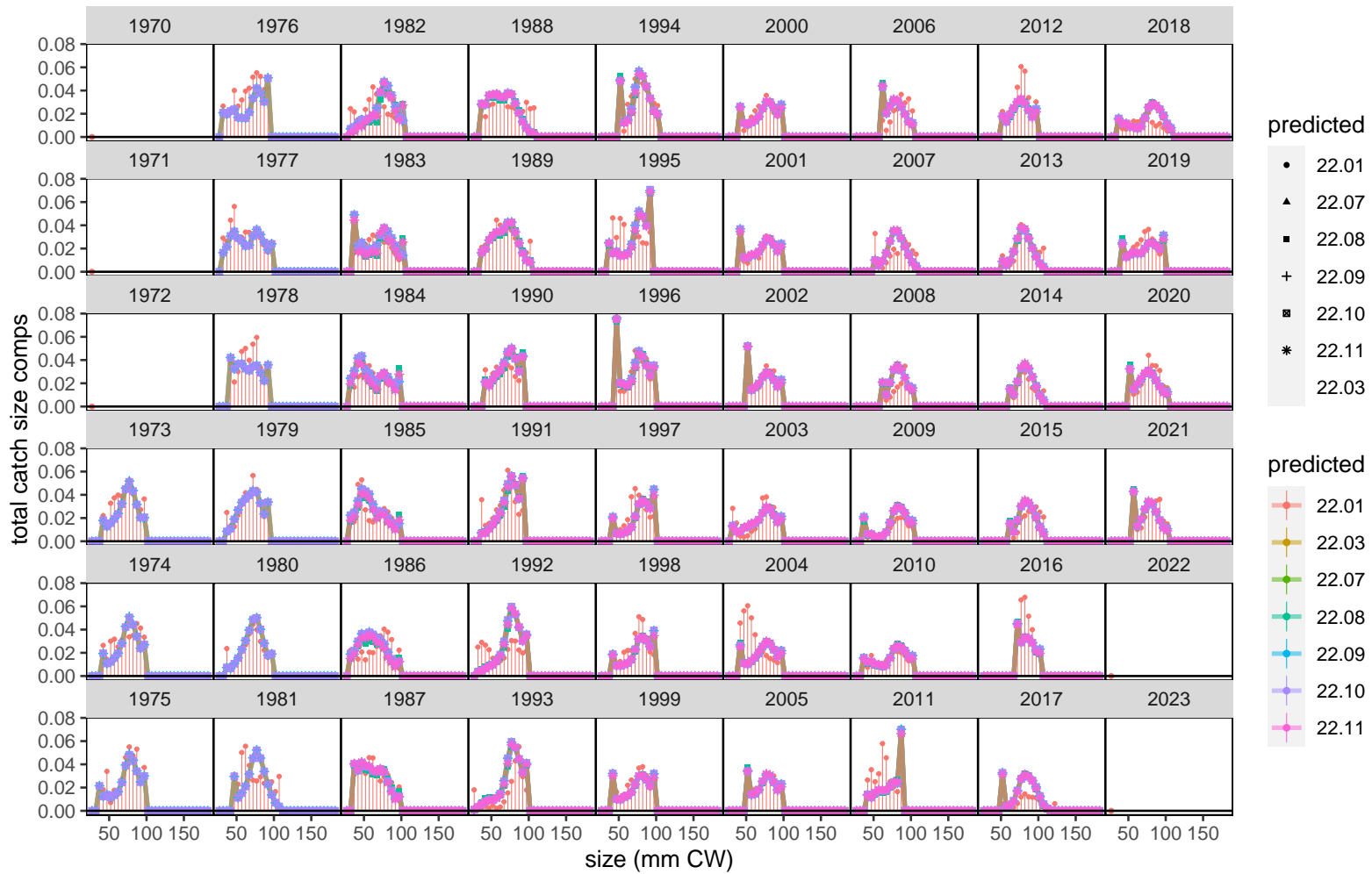


Figure 107: Fits to total catch size compositions in the GF All fishery. Preferred model is 22.03.

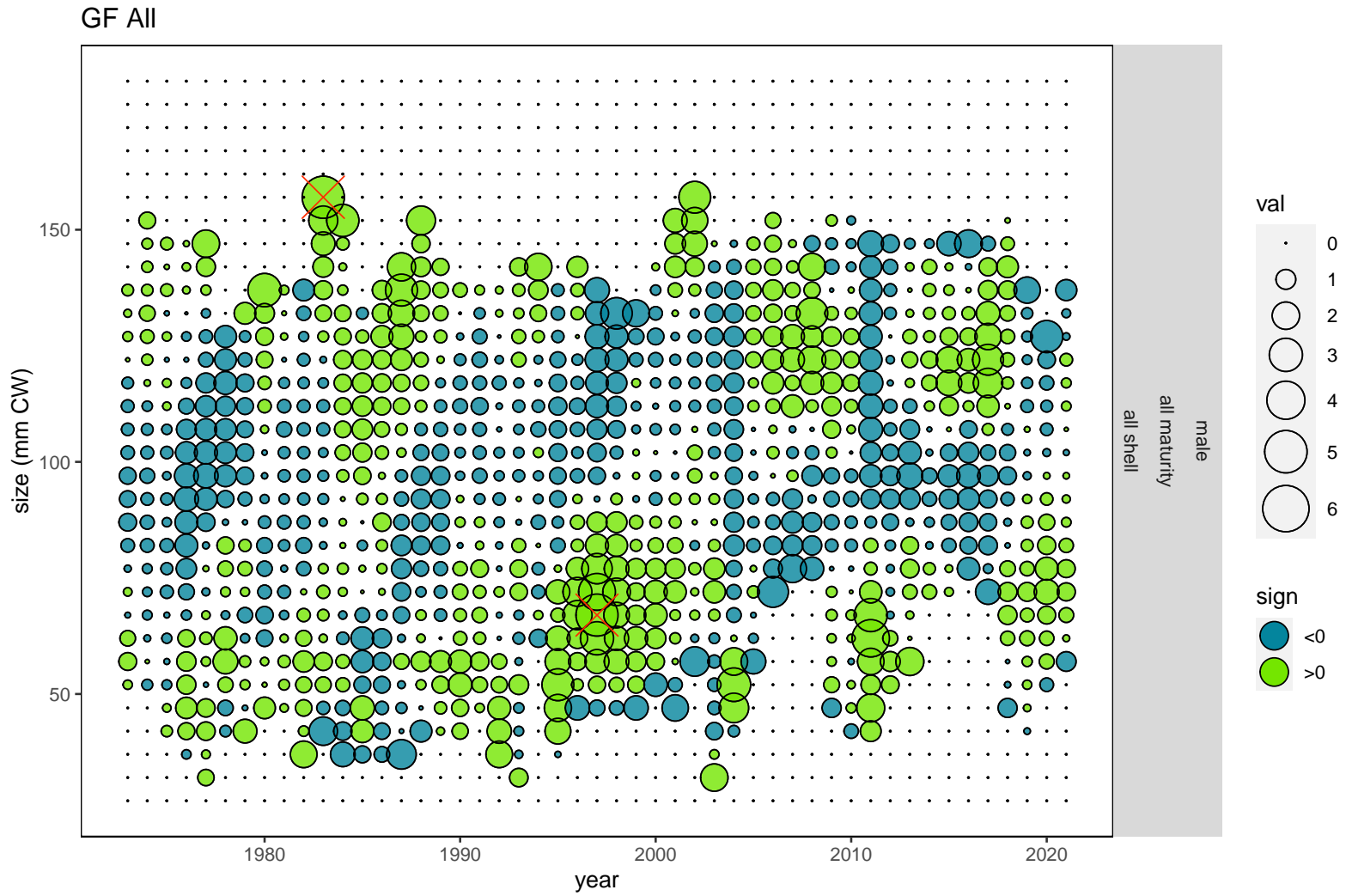


Figure 108: Pearson's residuals for fits to total catch size composition data from Model 22.01. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

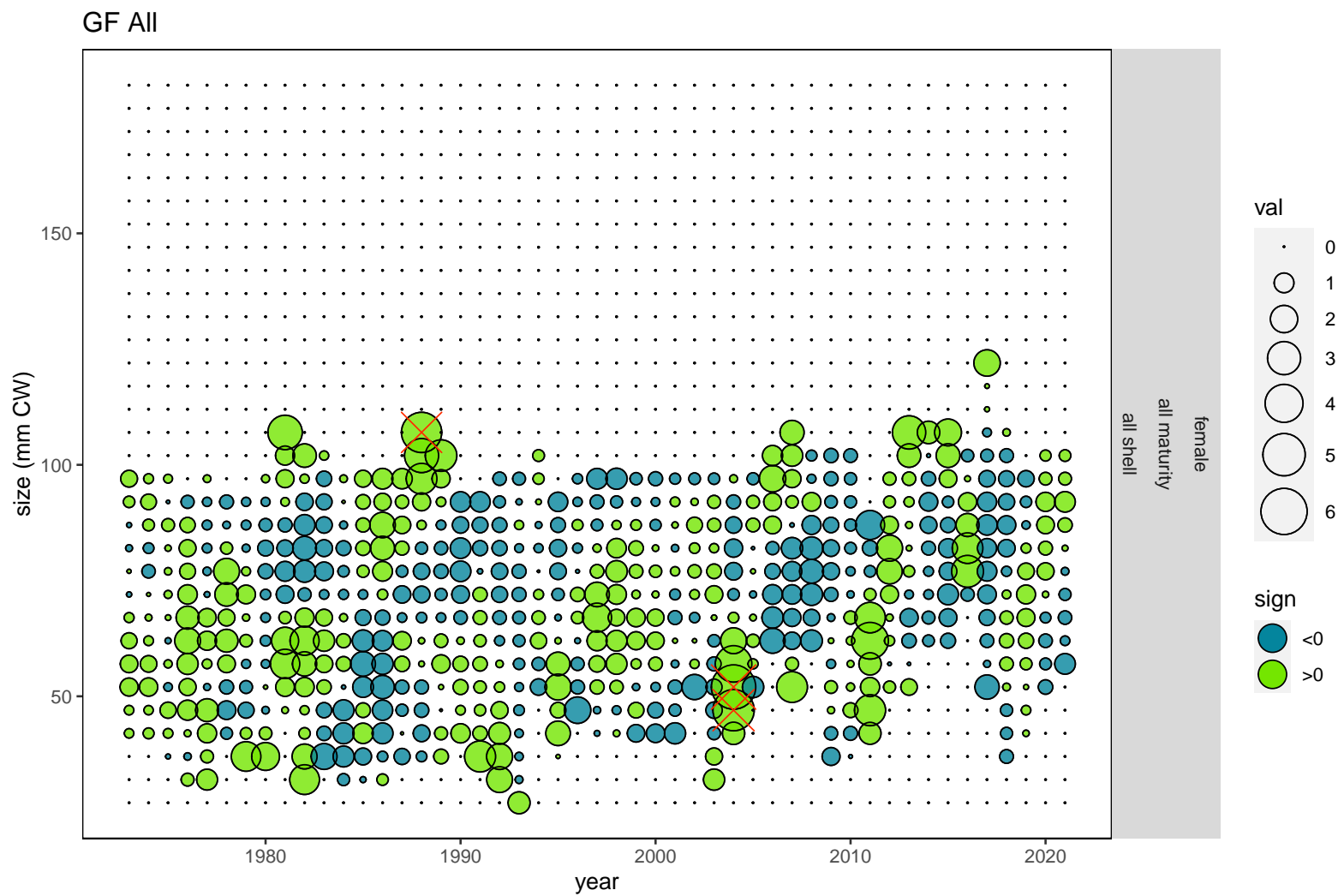


Figure 109: Pearson's residuals for fits to total catch size composition data from Model 22.01. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.



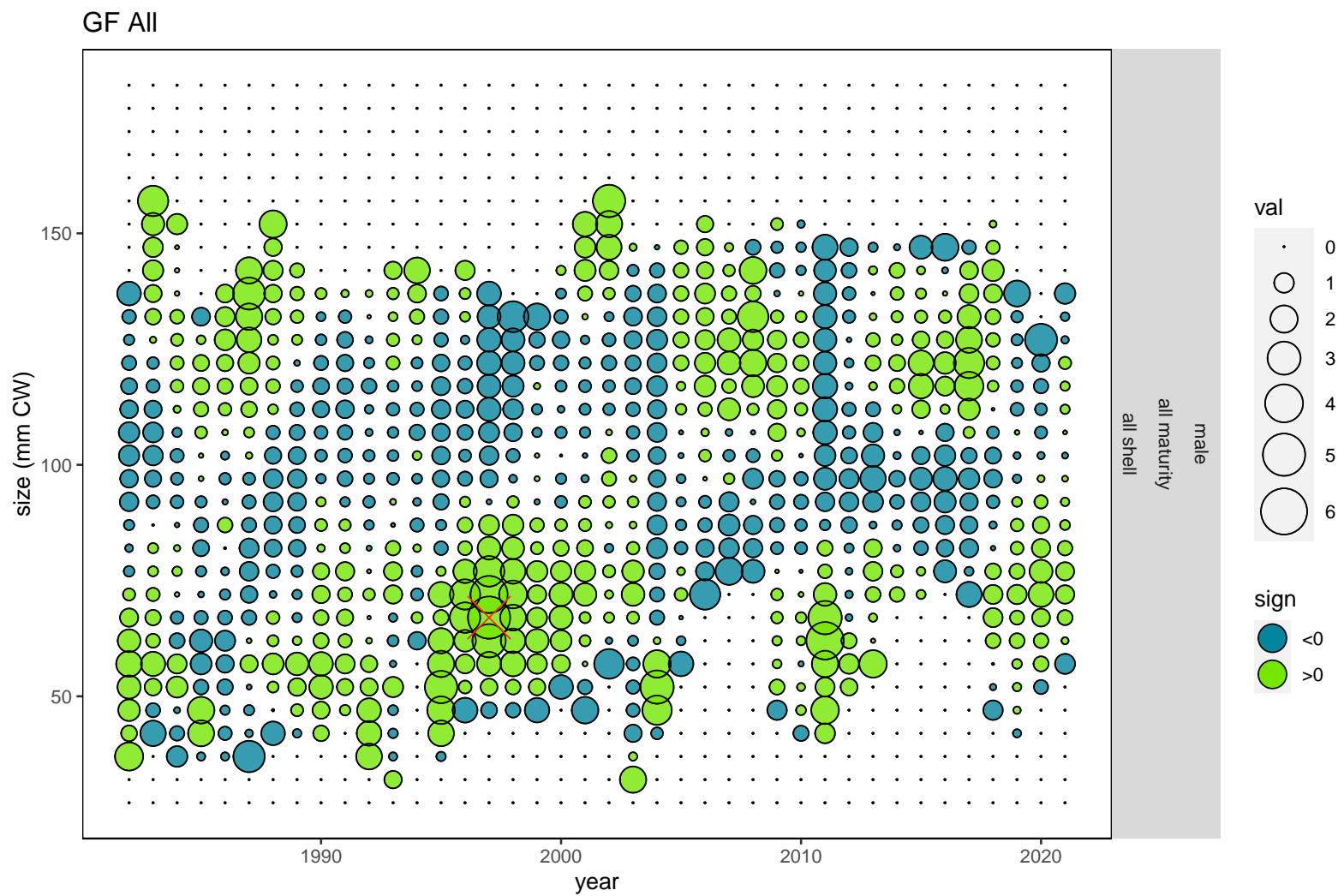


Figure 110: Pearson's residuals for fits to total catch size composition data from Model 22.07. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

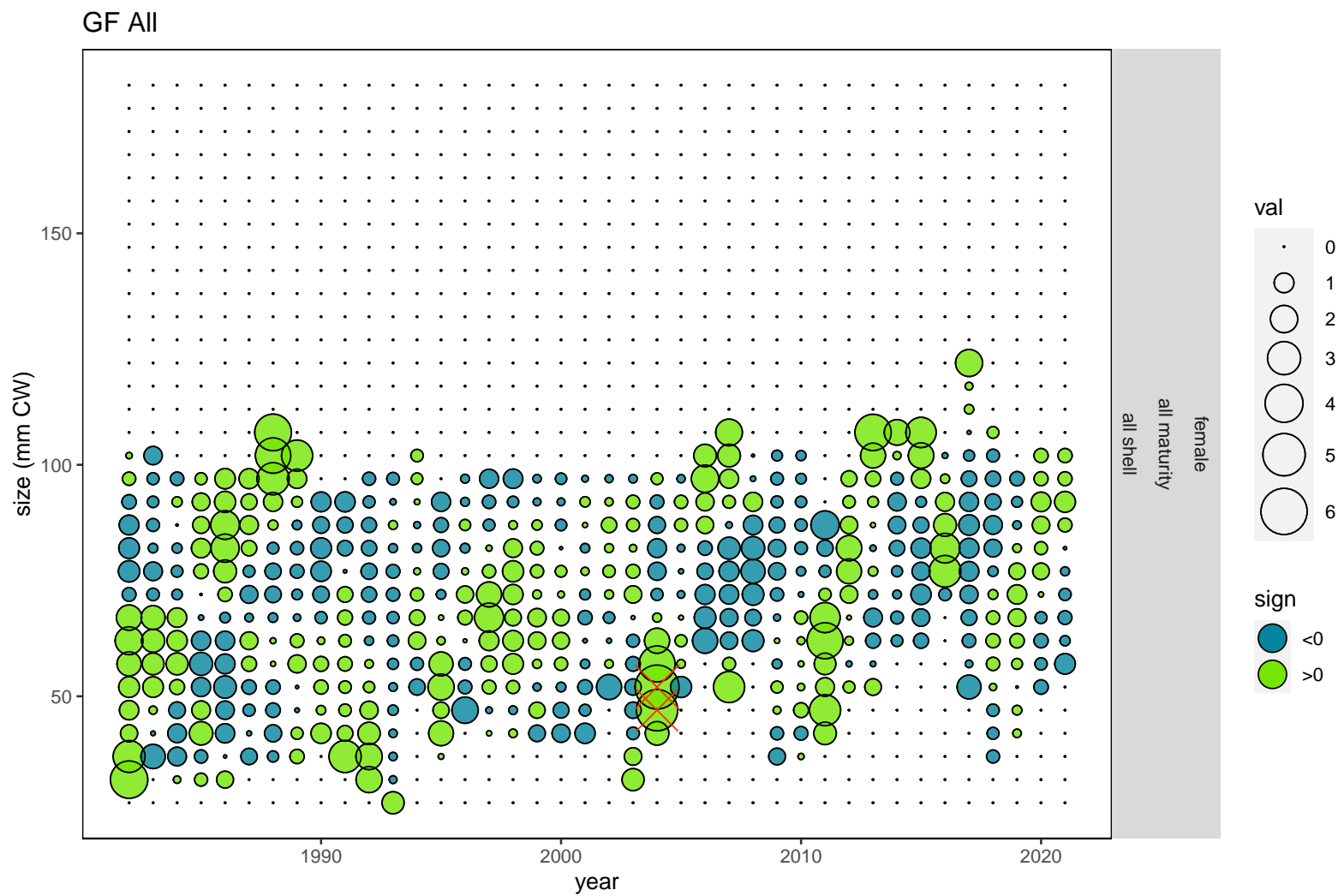


Figure 111: Pearson's residuals for fits to total catch size composition data from Model 22.07. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

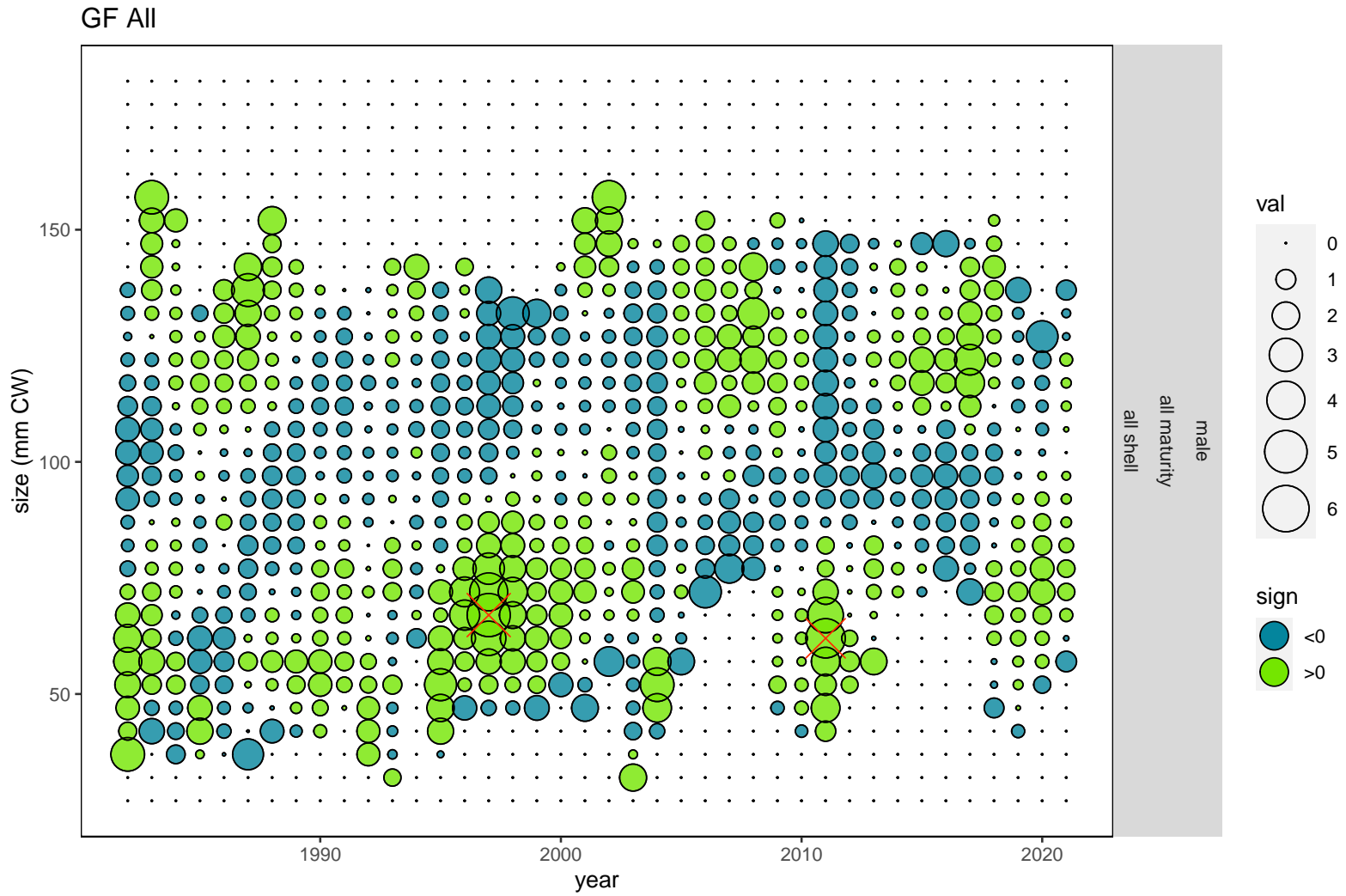


Figure 112: Pearson's residuals for fits to total catch size composition data from Model 22.08. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

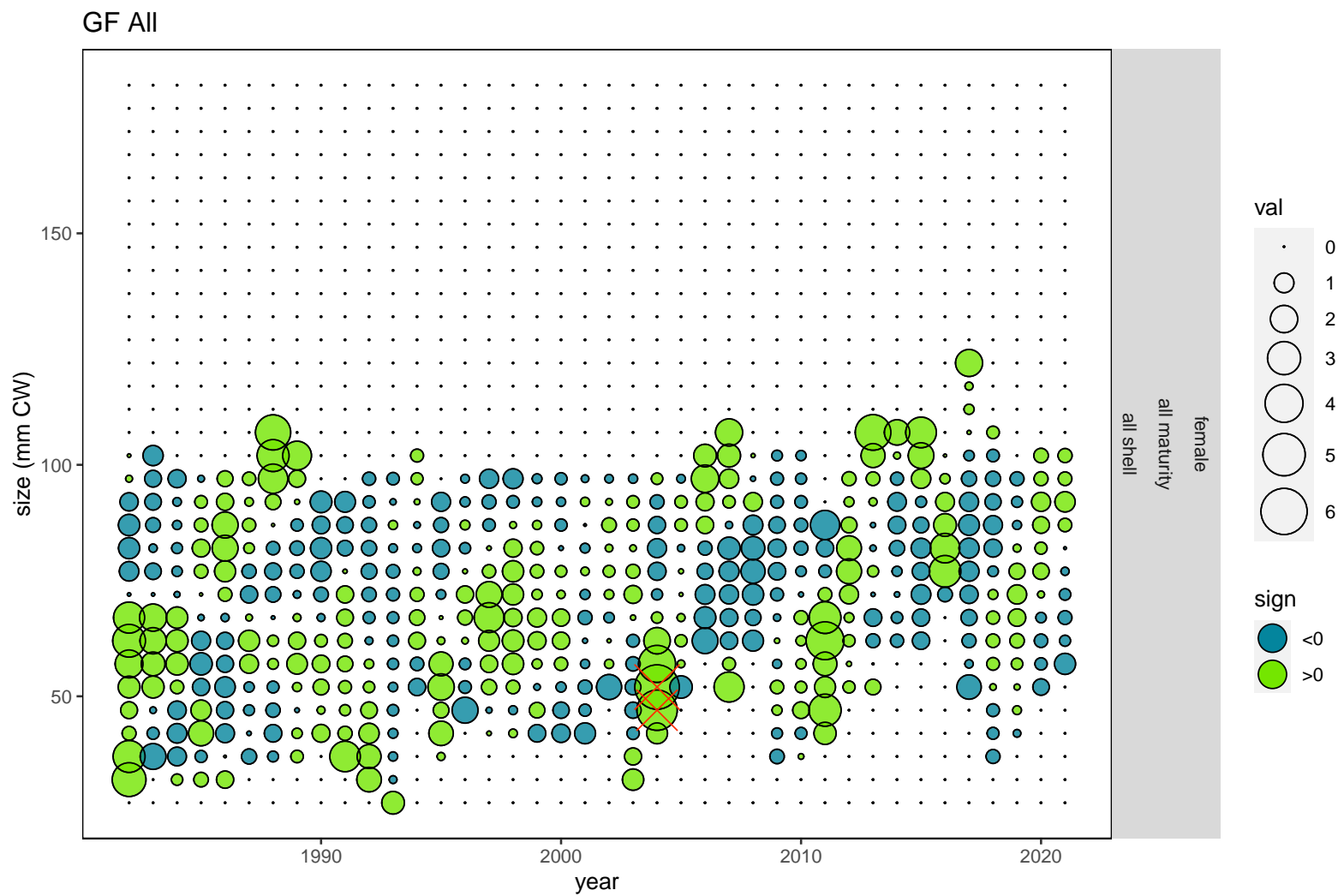


Figure 113: Pearson's residuals for fits to total catch size composition data from Model 22.08. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

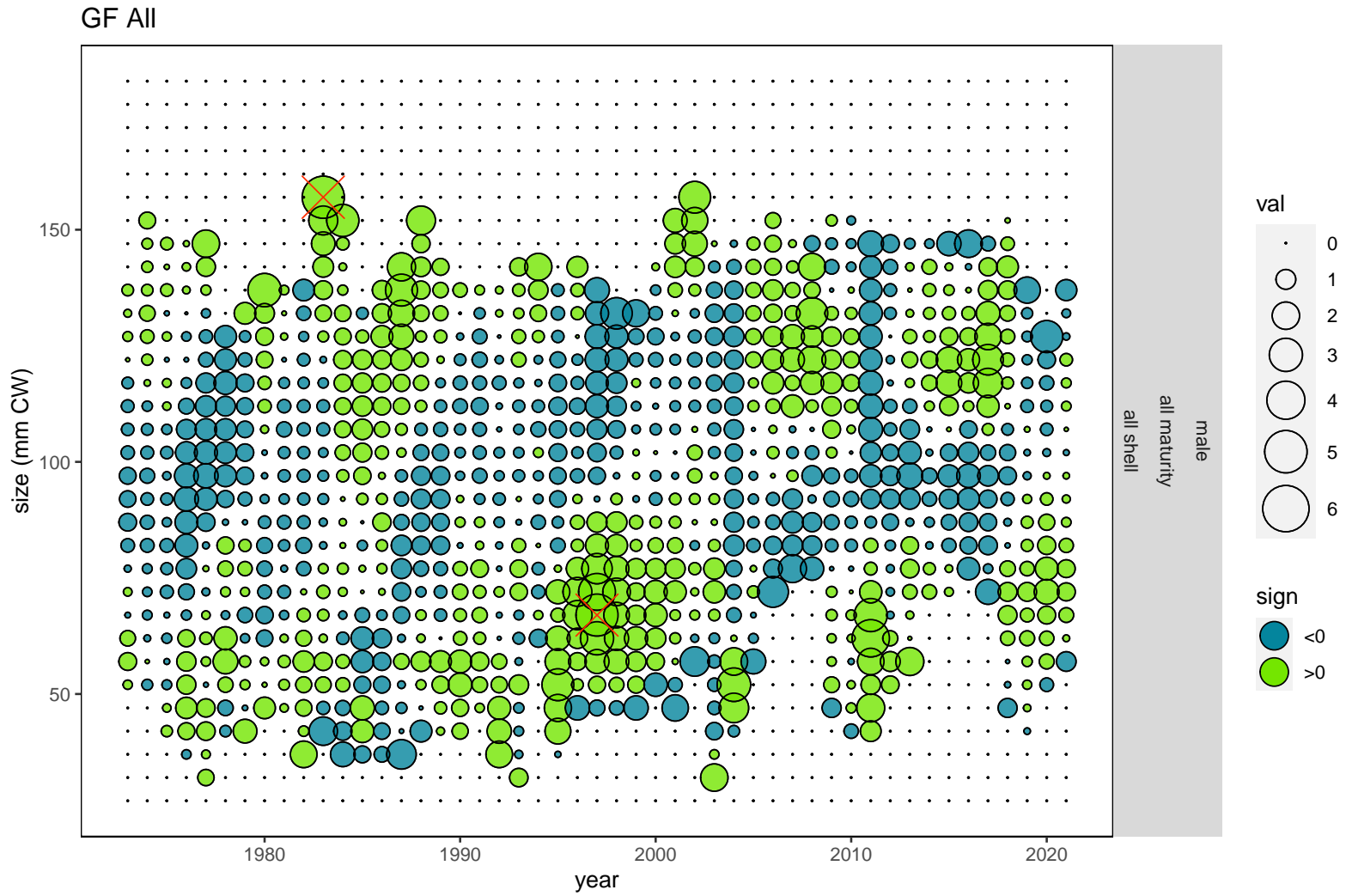


Figure 114: Pearson's residuals for fits to total catch size composition data from Model 22.09. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

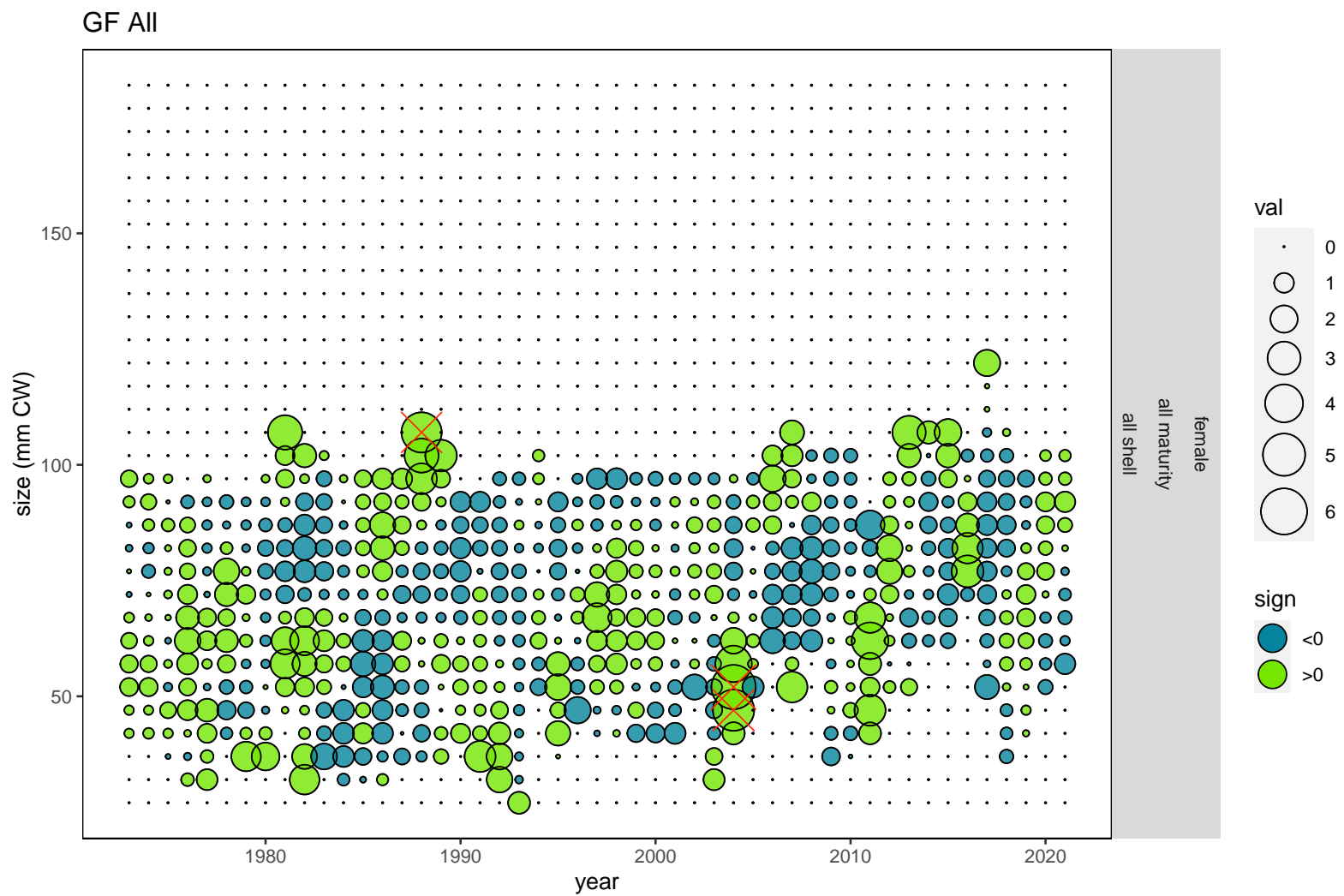


Figure 115: Pearson's residuals for fits to total catch size composition data from Model 22.09. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

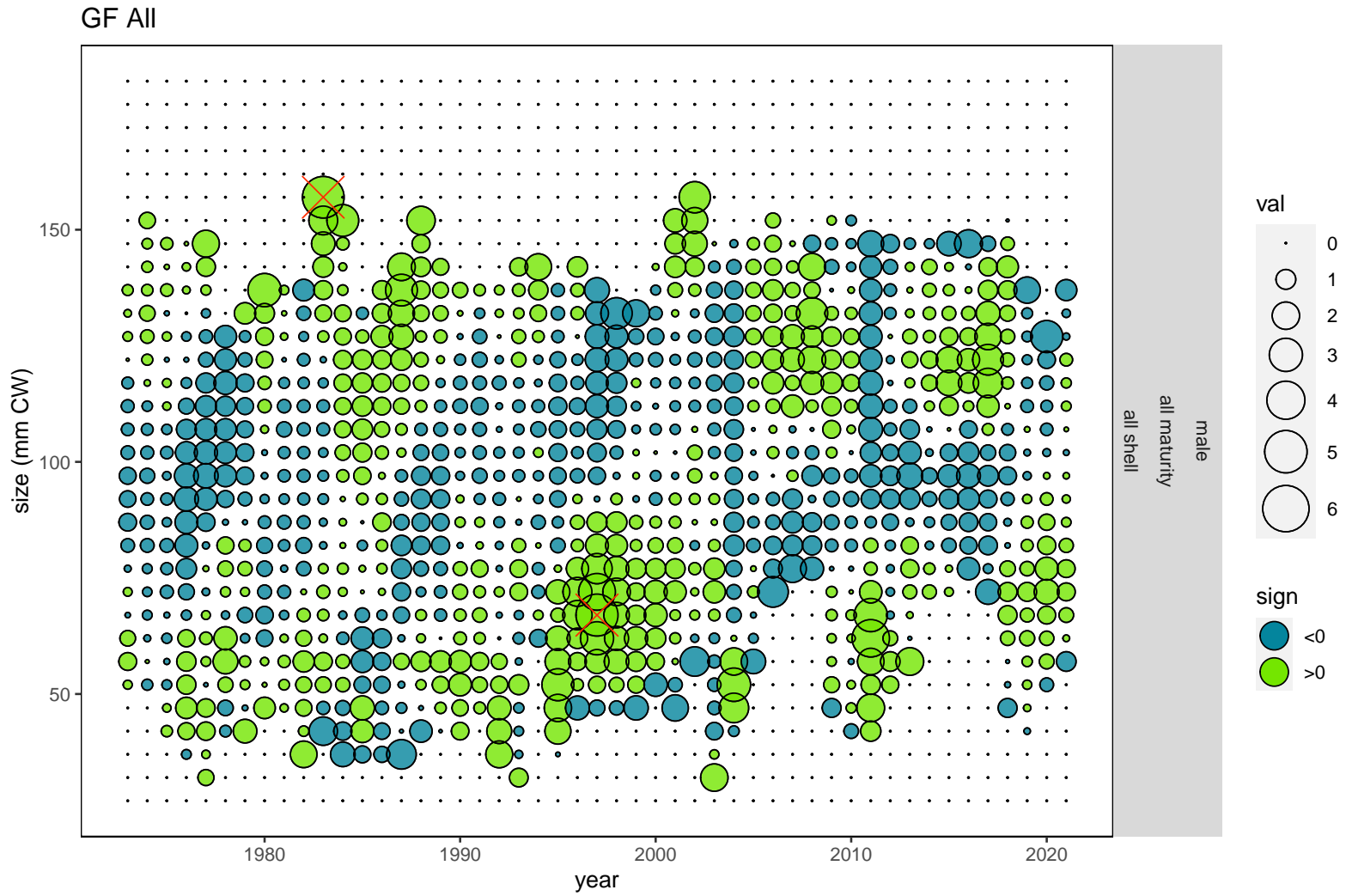


Figure 116: Pearson's residuals for fits to total catch size composition data from Model 22.10. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

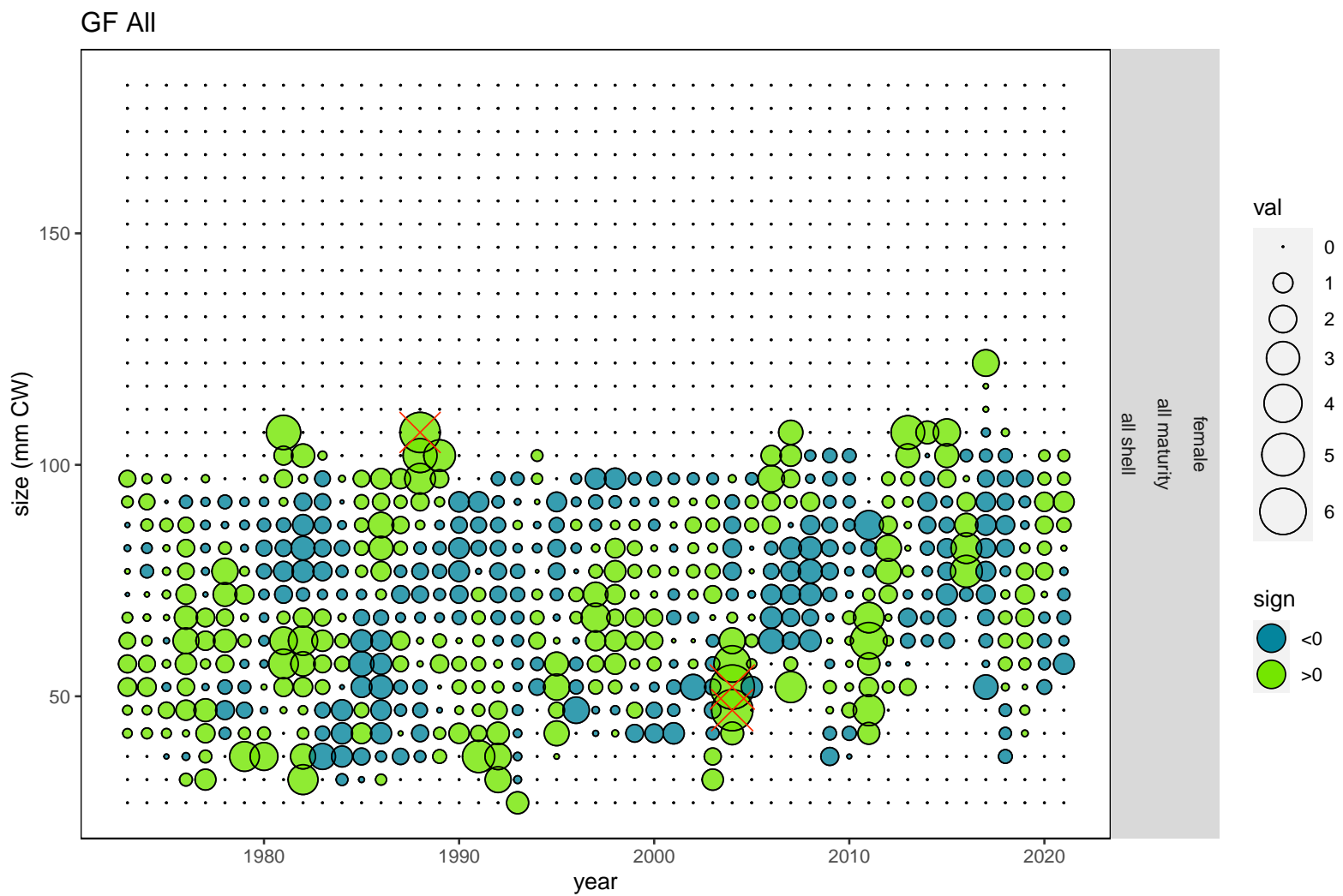


Figure 117: Pearson's residuals for fits to total catch size composition data from Model 22.10. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.



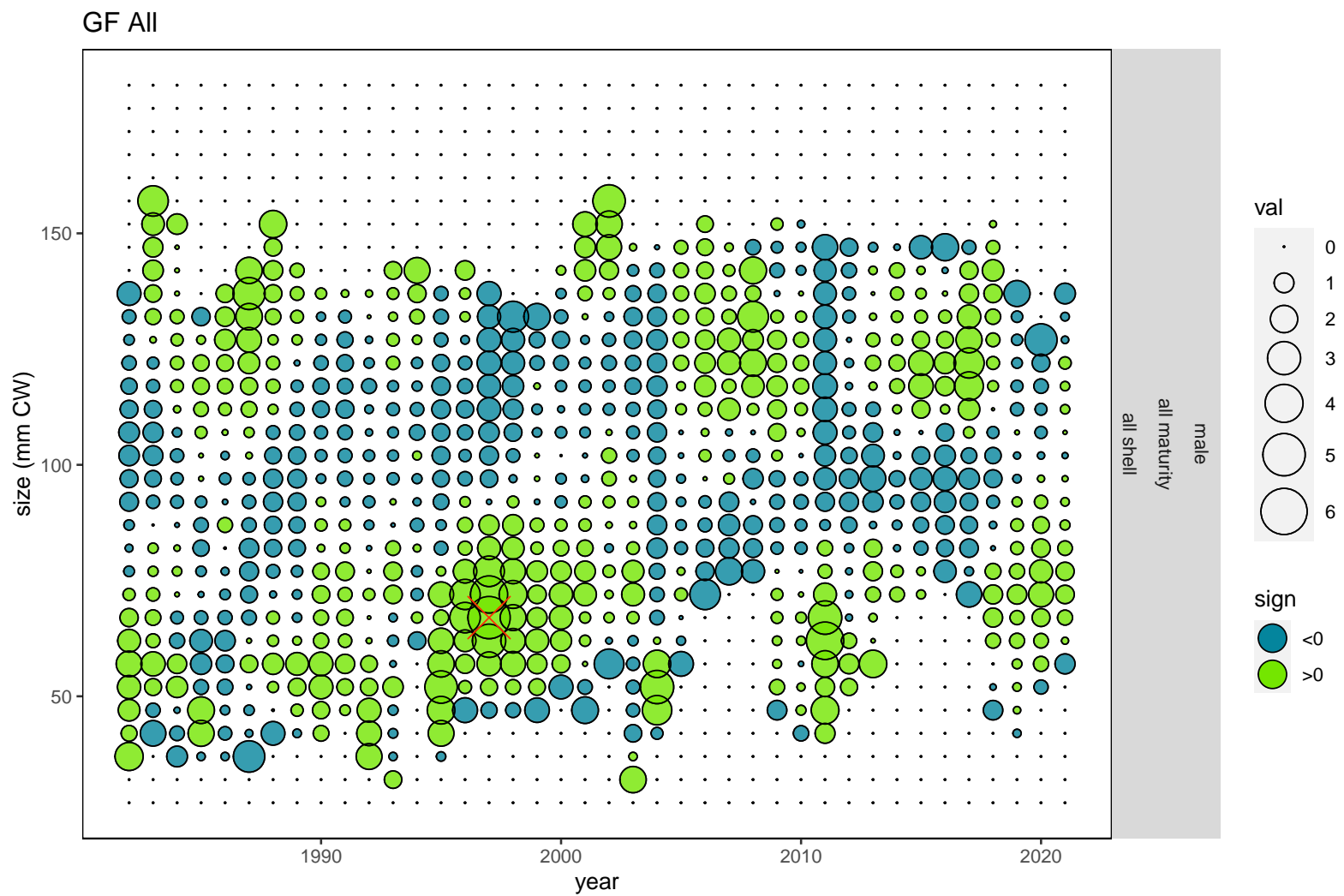


Figure 118: Pearson's residuals for fits to total catch size composition data from Model 22.11. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

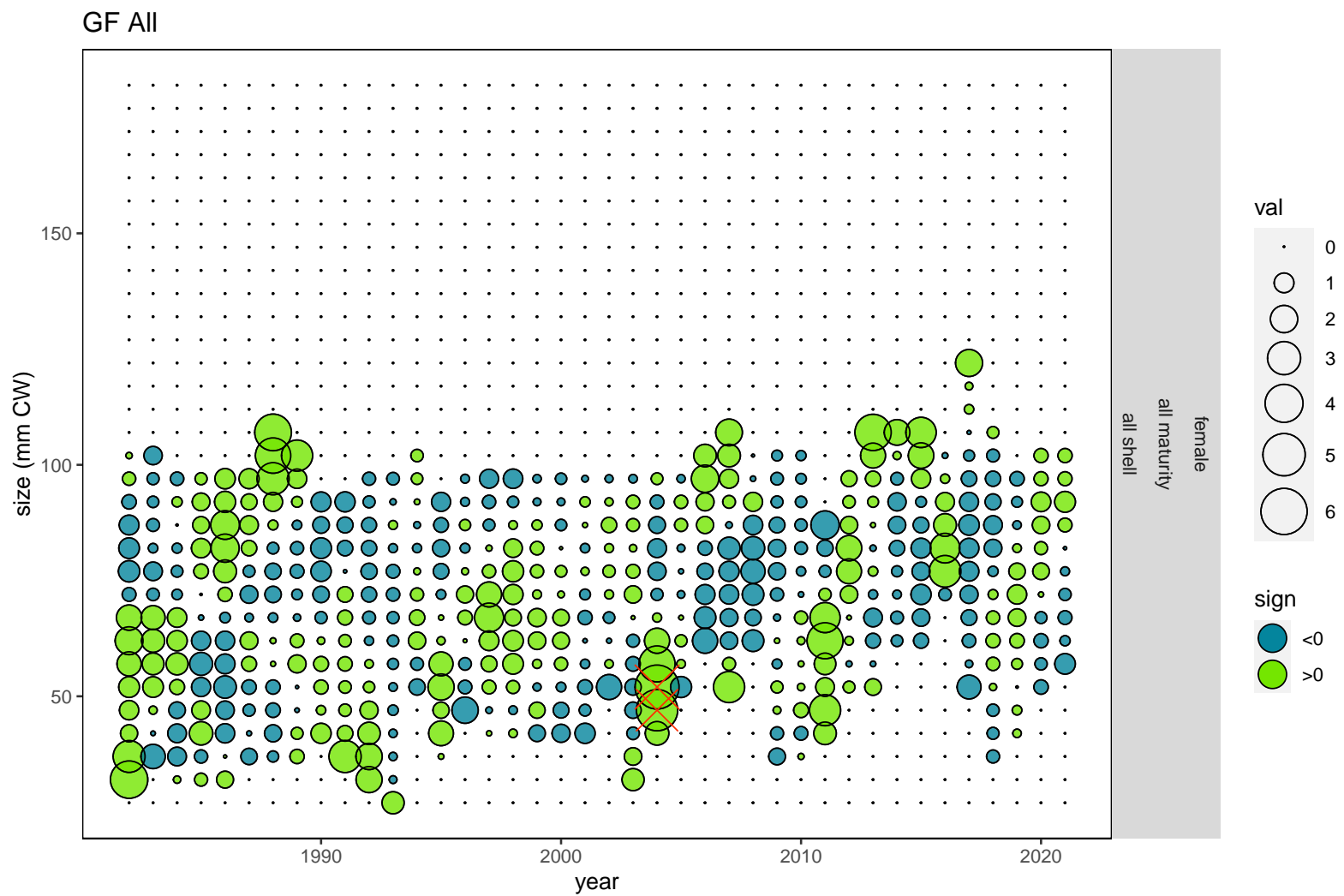


Figure 119: Pearson's residuals for fits to total catch size composition data from Model 22.11. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

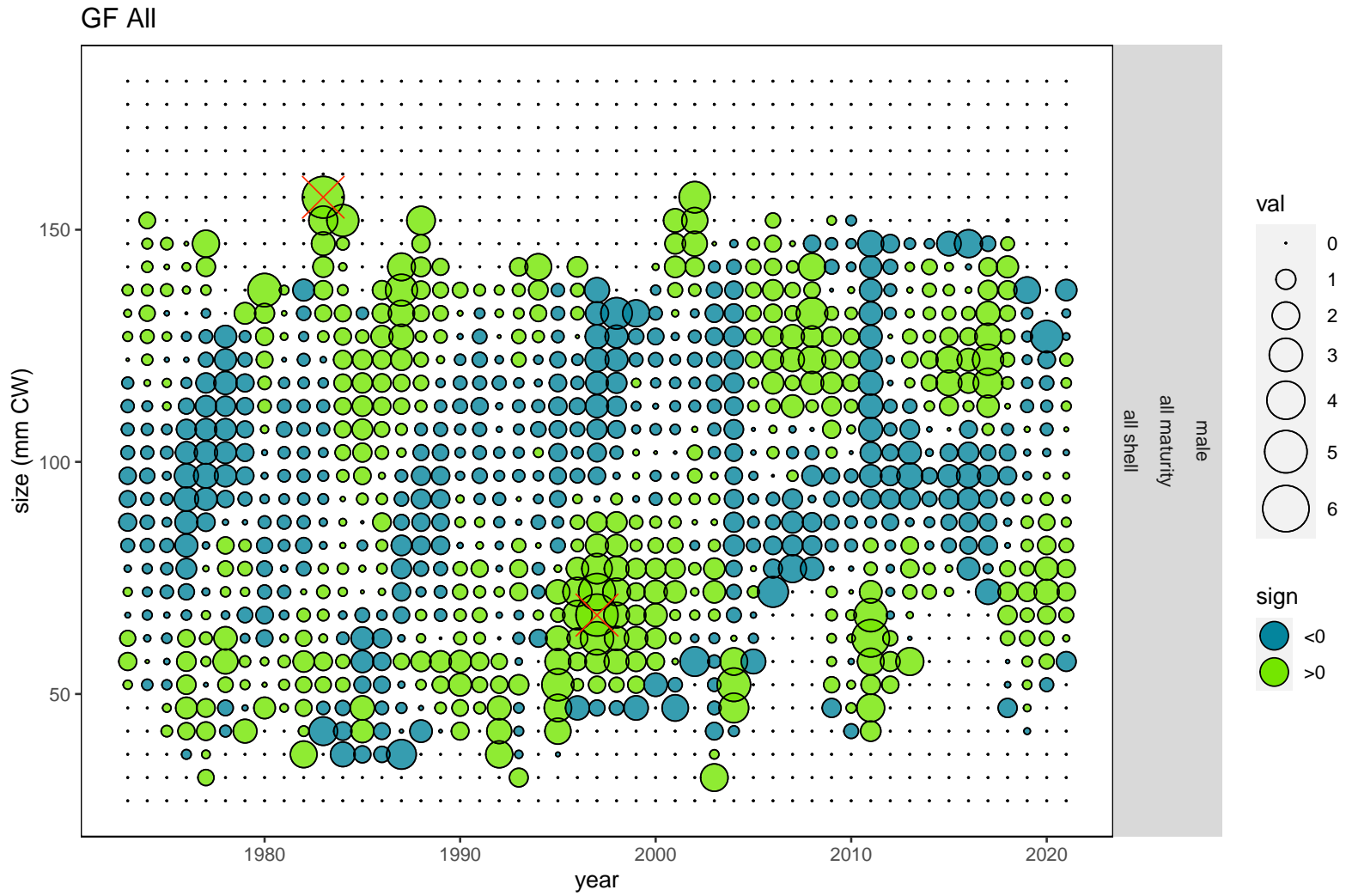


Figure 120: Pearson's residuals for fits to total catch size composition data from Model 22.03. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

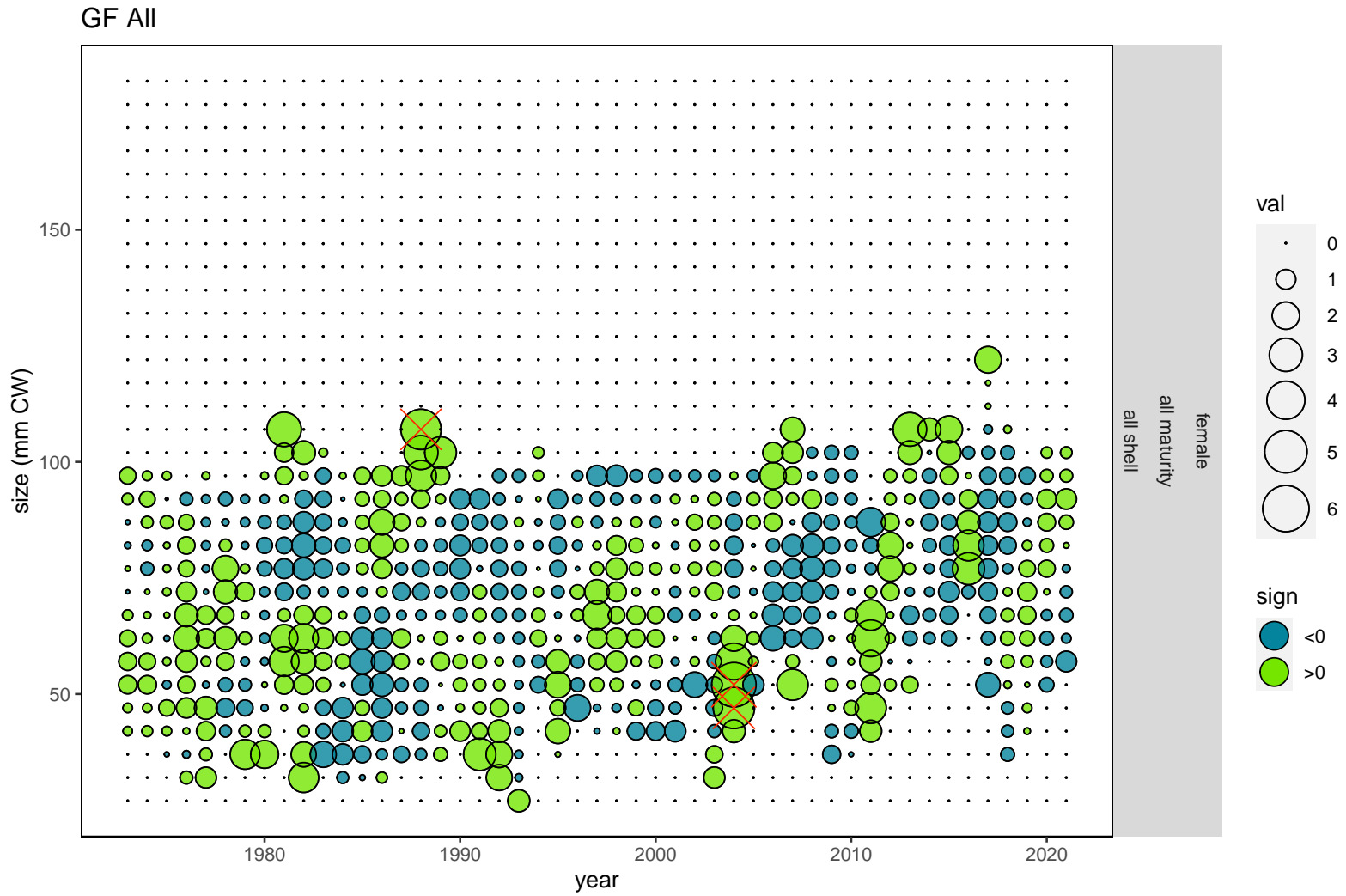


Figure 121: Pearson's residuals for fits to total catch size composition data from Model 22.03. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

NMFS M: male, all maturity, all shell

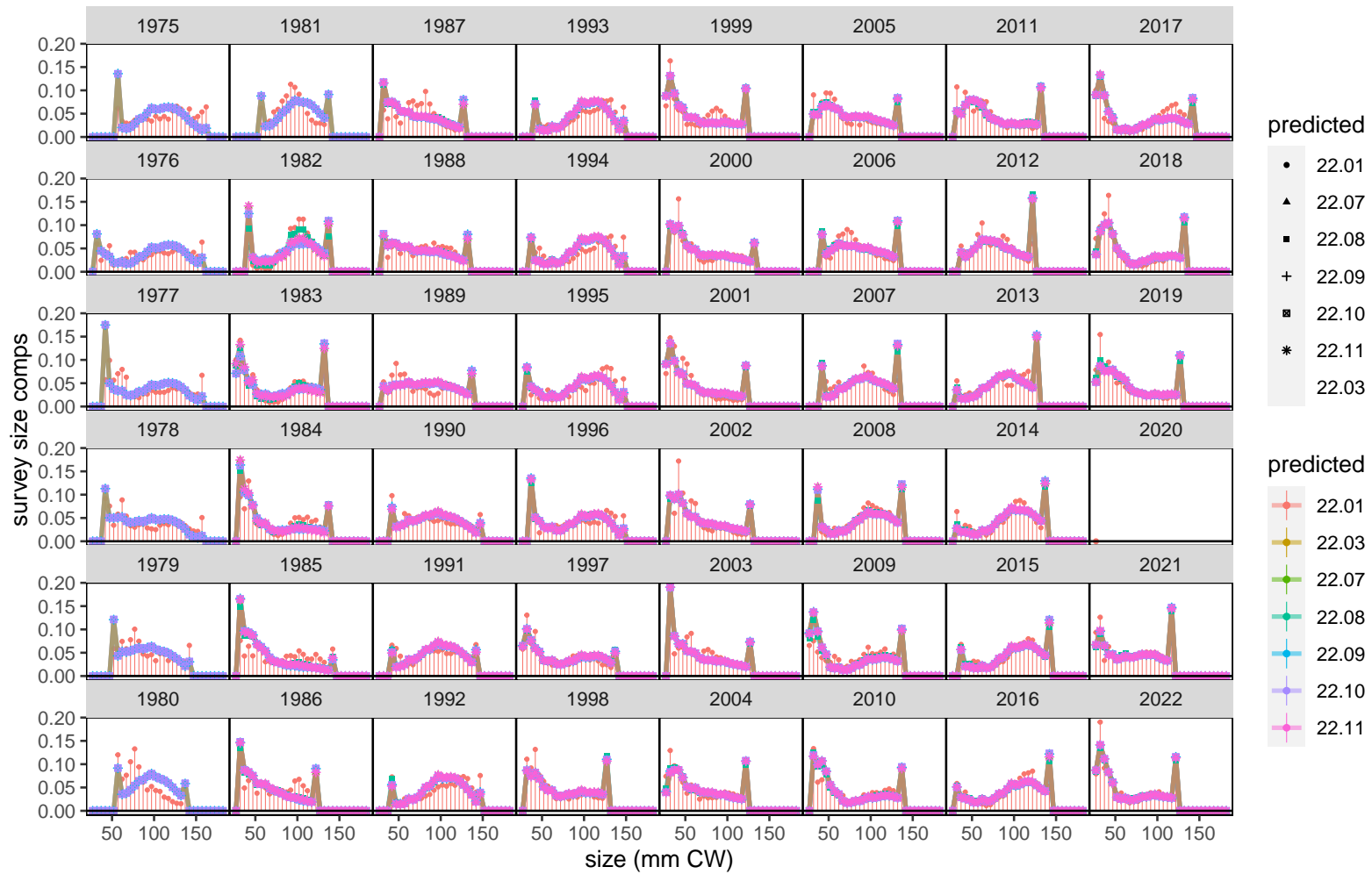


Figure 122: Fits to survey size compositions in the NMFS M survey. Preferred model is 22.03.

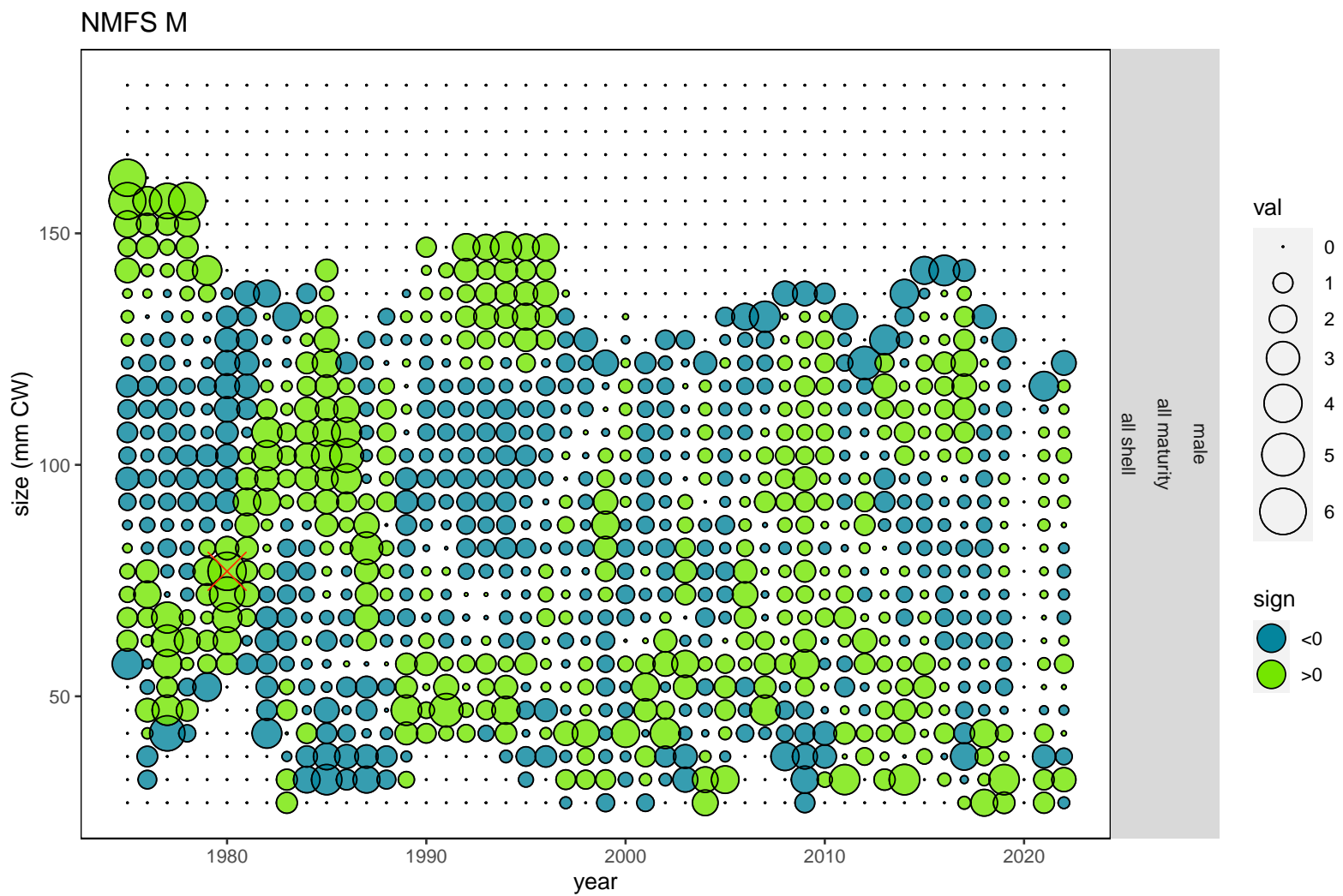


Figure 123: Pearson's residuals for fits to survey size composition data in Model 22.01. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

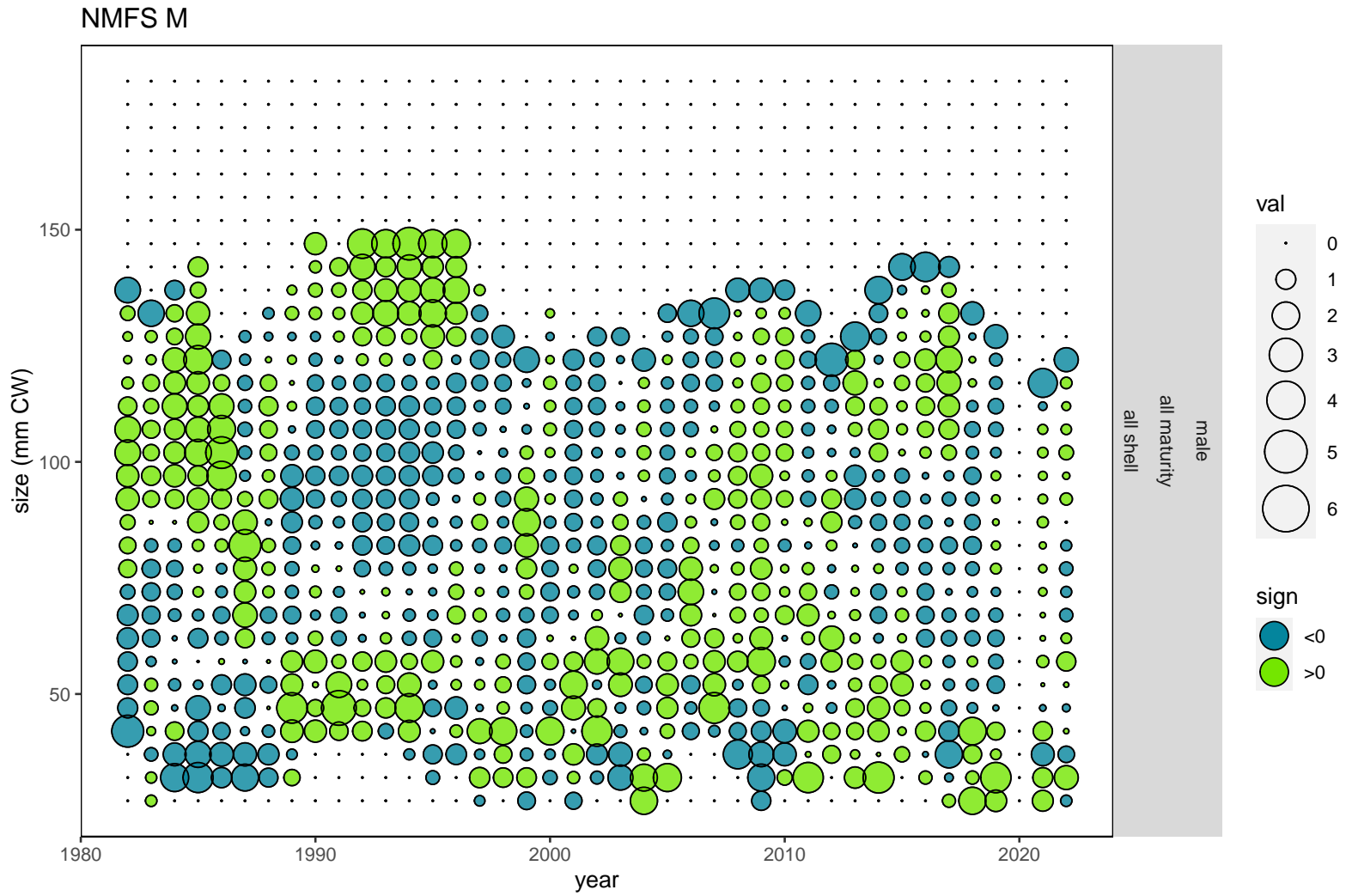


Figure 124: Pearson's residuals for fits to survey size composition data in Model 22.07. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.



Figure 125: Pearson's residuals for fits to survey size composition data in Model 22.08. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.





Figure 126: Pearson's residuals for fits to survey size composition data in Model 22.09. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.



Figure 127: Pearson's residuals for fits to survey size composition data in Model 22.10. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

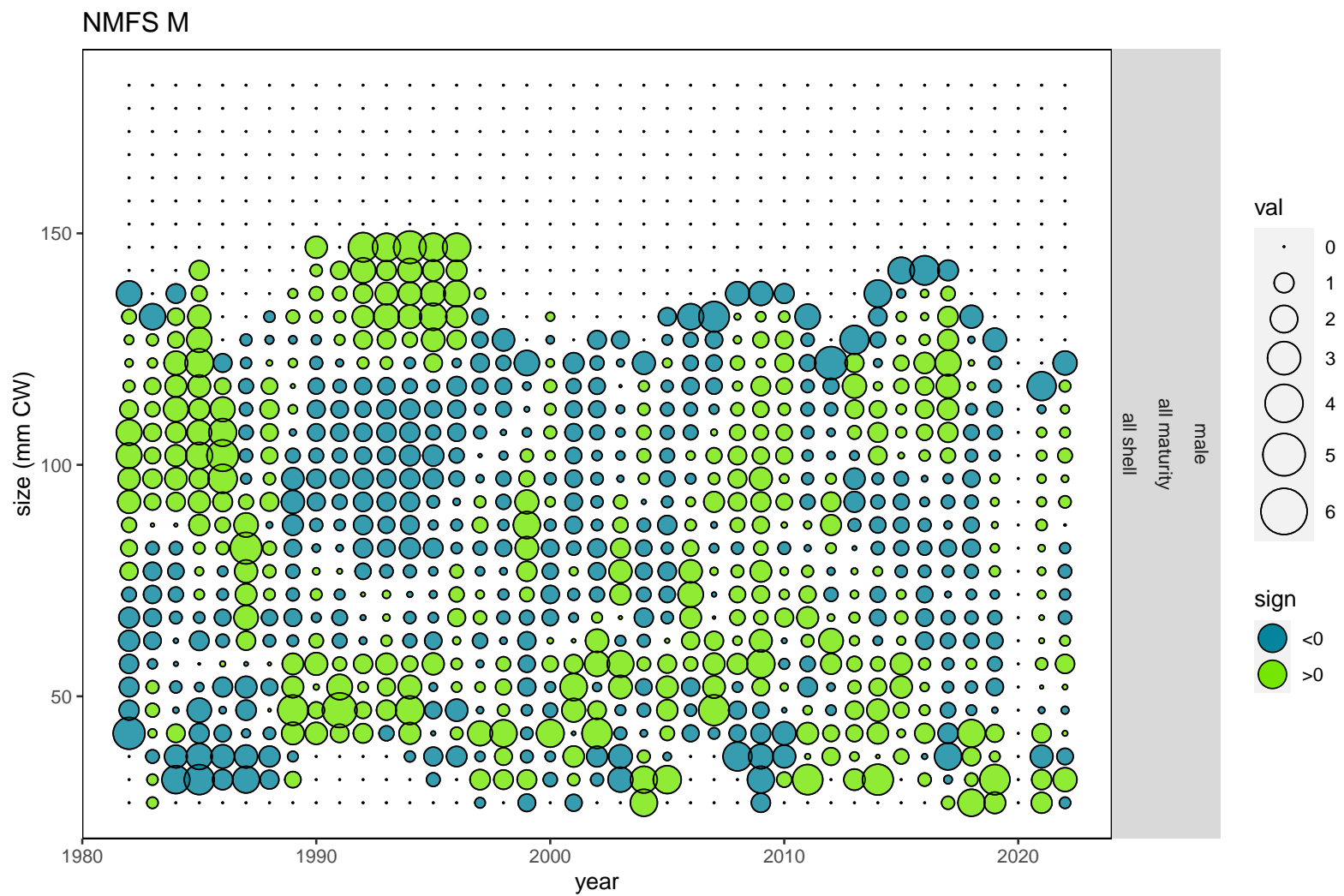


Figure 128: Pearson's residuals for fits to survey size composition data in Model 22.11. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.



Figure 129: Pearson's residuals for fits to survey size composition data in Model 22.03. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

NMFS F: female, immature, all shell

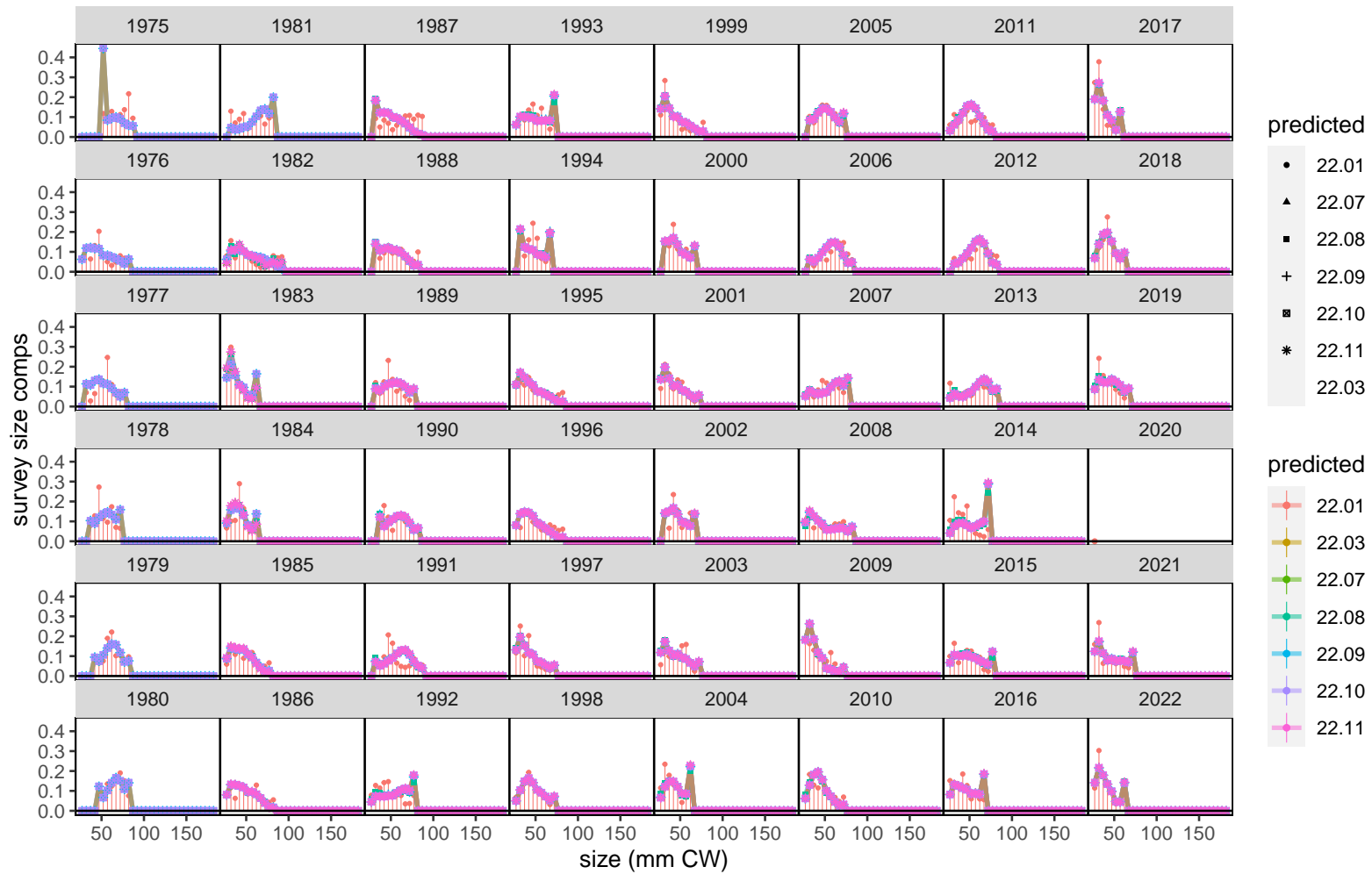


Figure 130: Fits to survey size compositions in the NMFS F survey. Preferred model is 22.03.

NMFS F: female, mature, all shell

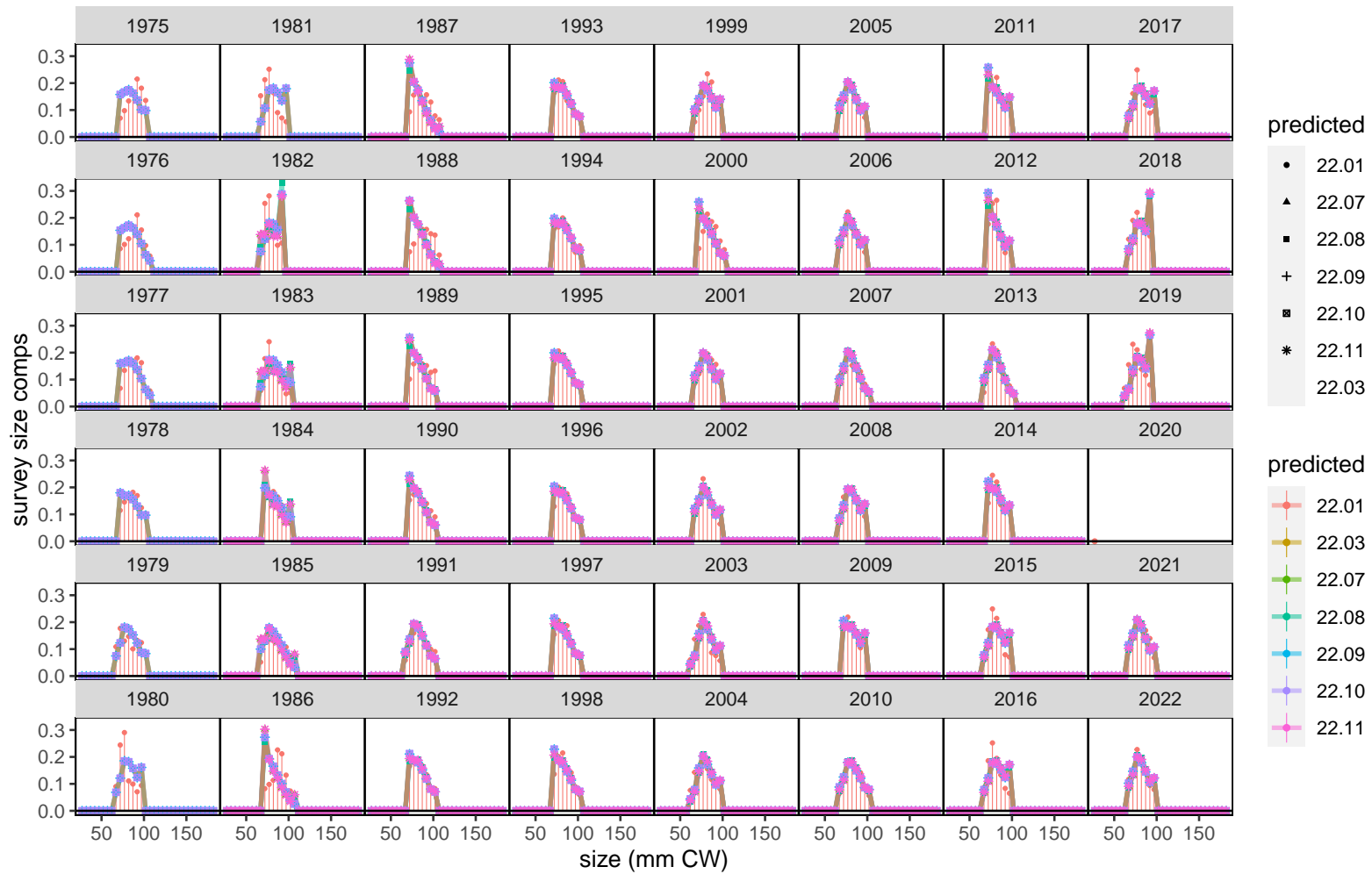


Figure 131: Fits to survey size compositions in the NMFS F survey. Preferred model is 22.03.

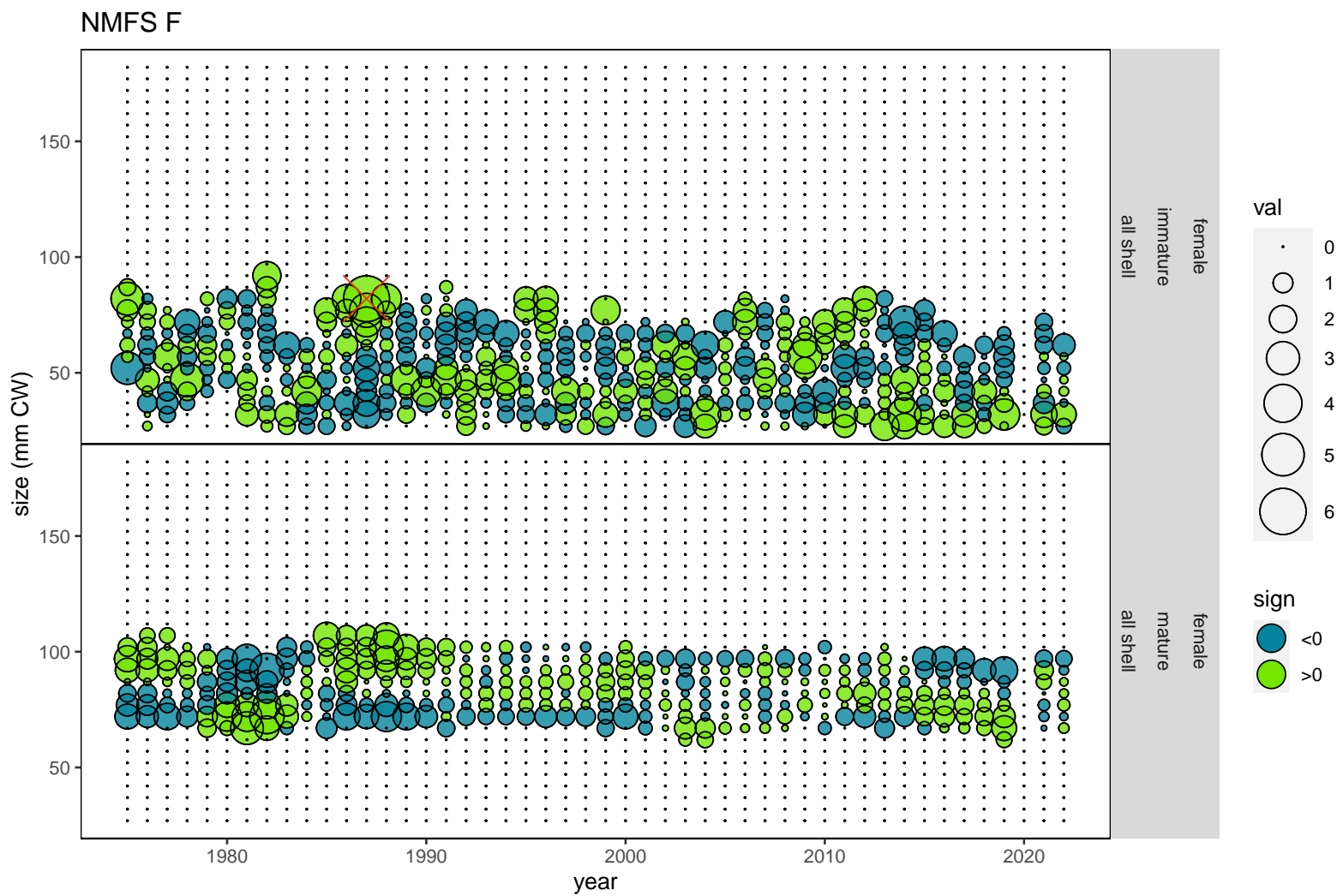


Figure 132: Pearson's residuals for fits to survey size composition data in Model 22.01. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

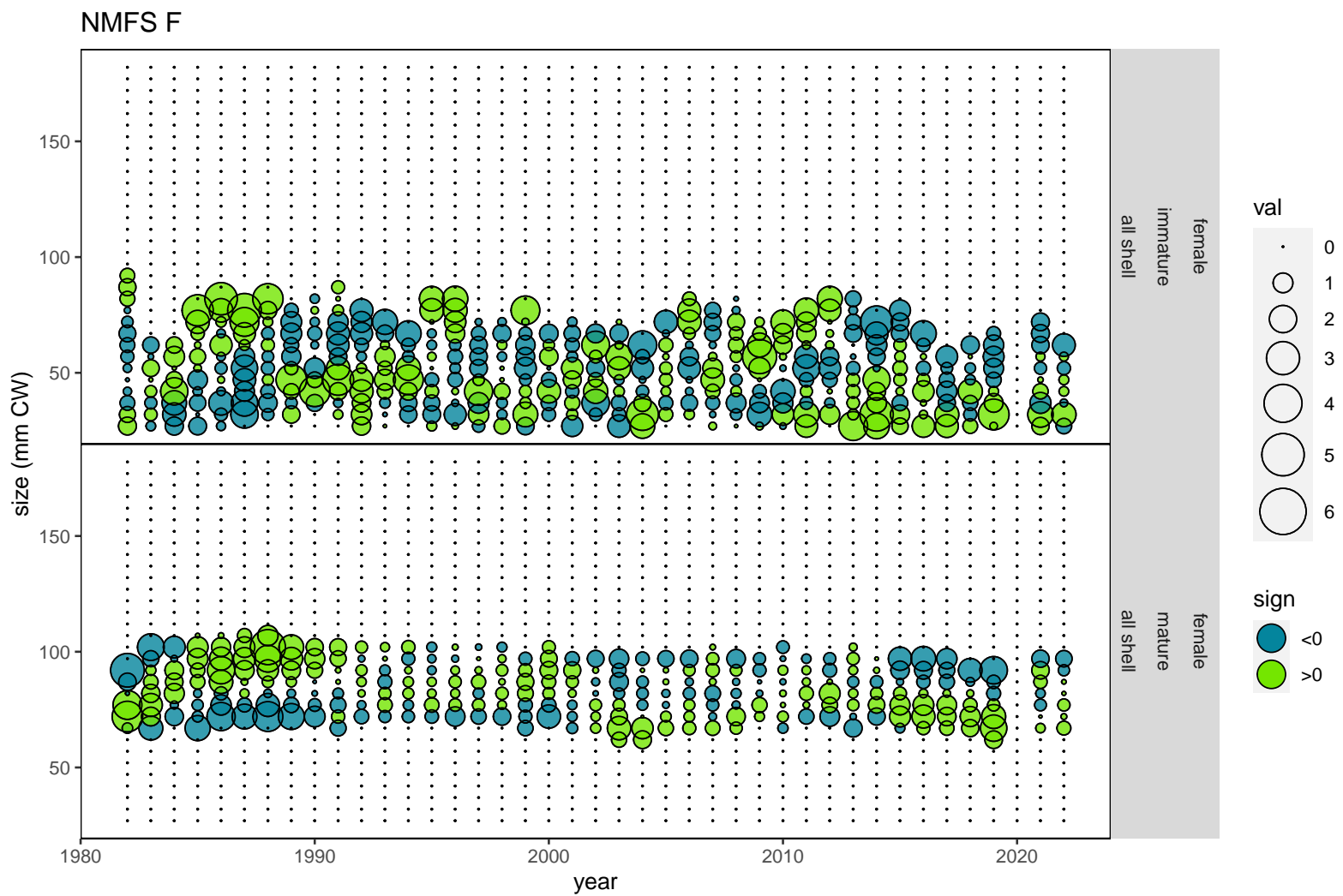


Figure 133: Pearson's residuals for fits to survey size composition data in Model 22.07. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.



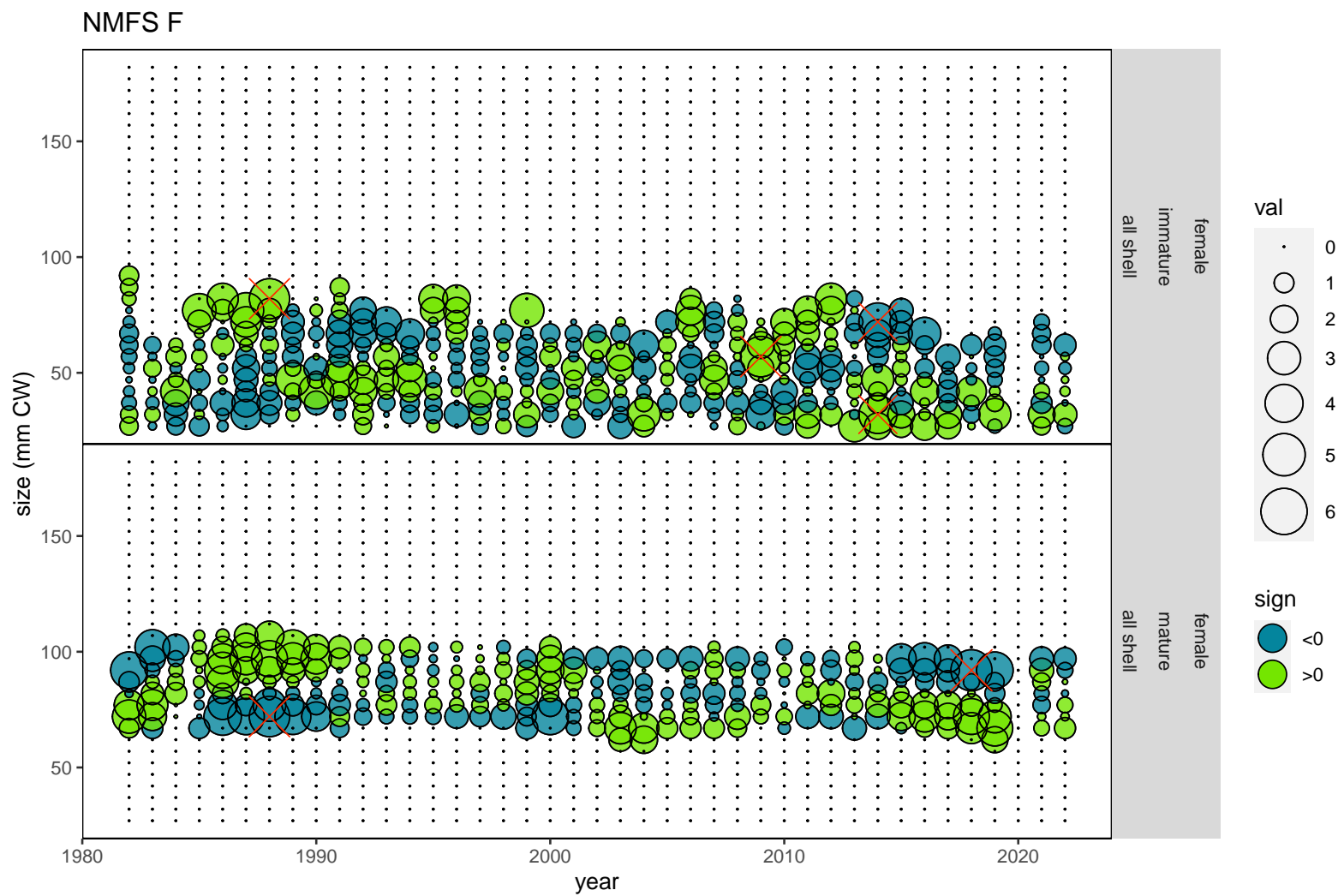


Figure 134: Pearson's residuals for fits to survey size composition data in Model 22.08. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

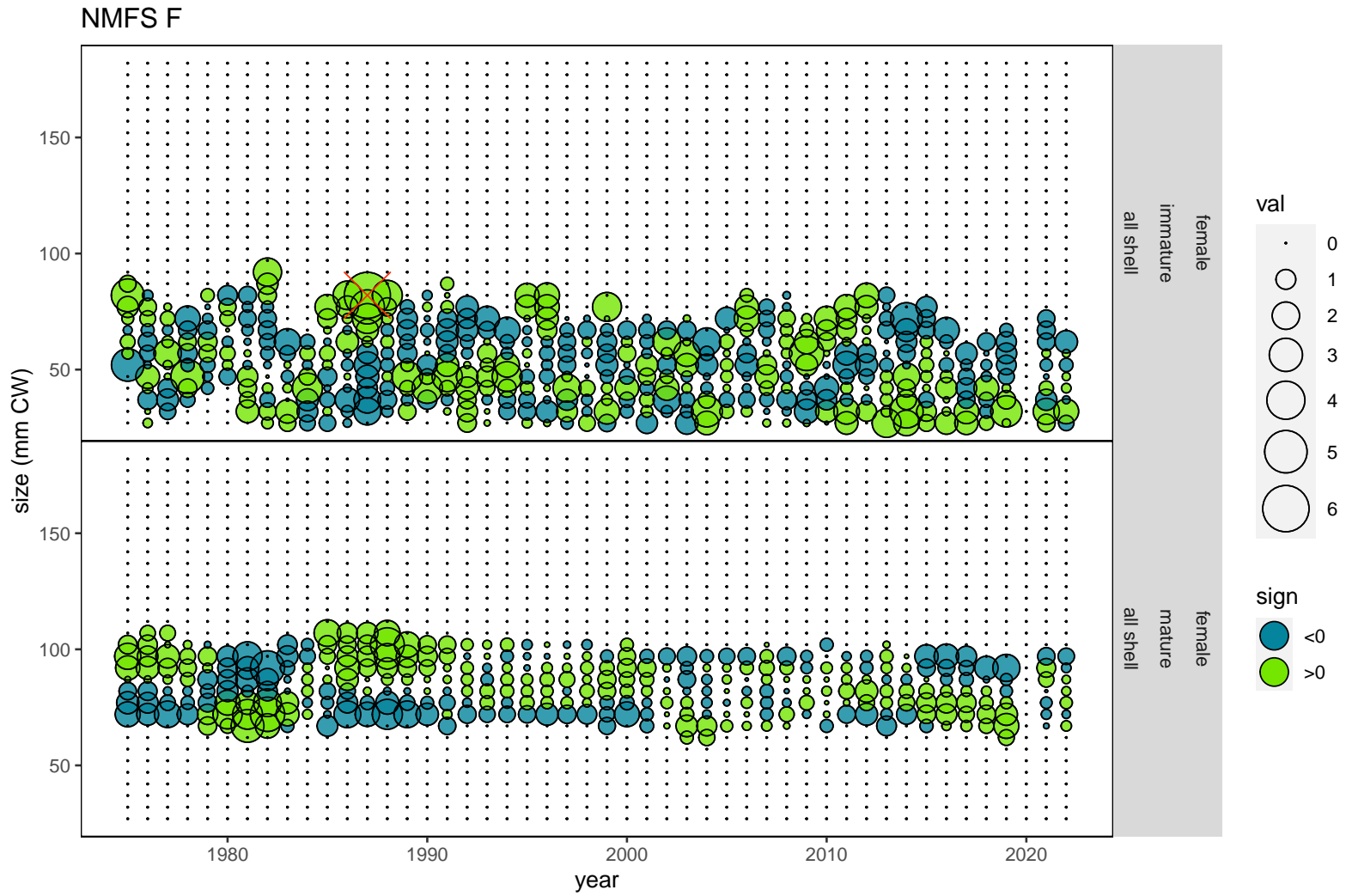


Figure 135: Pearson's residuals for fits to survey size composition data in Model 22.09. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

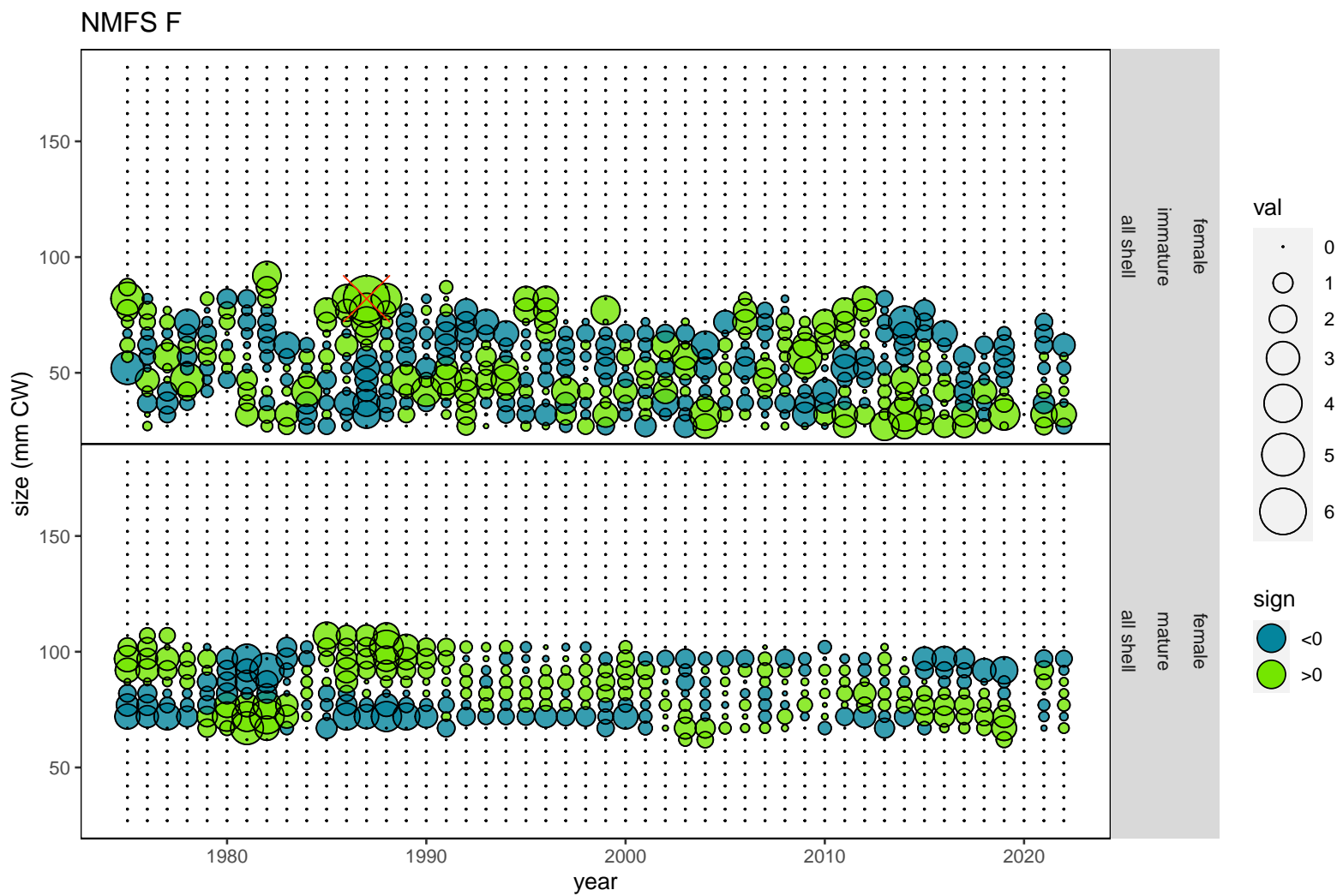


Figure 136: Pearson's residuals for fits to survey size composition data in Model 22.10. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

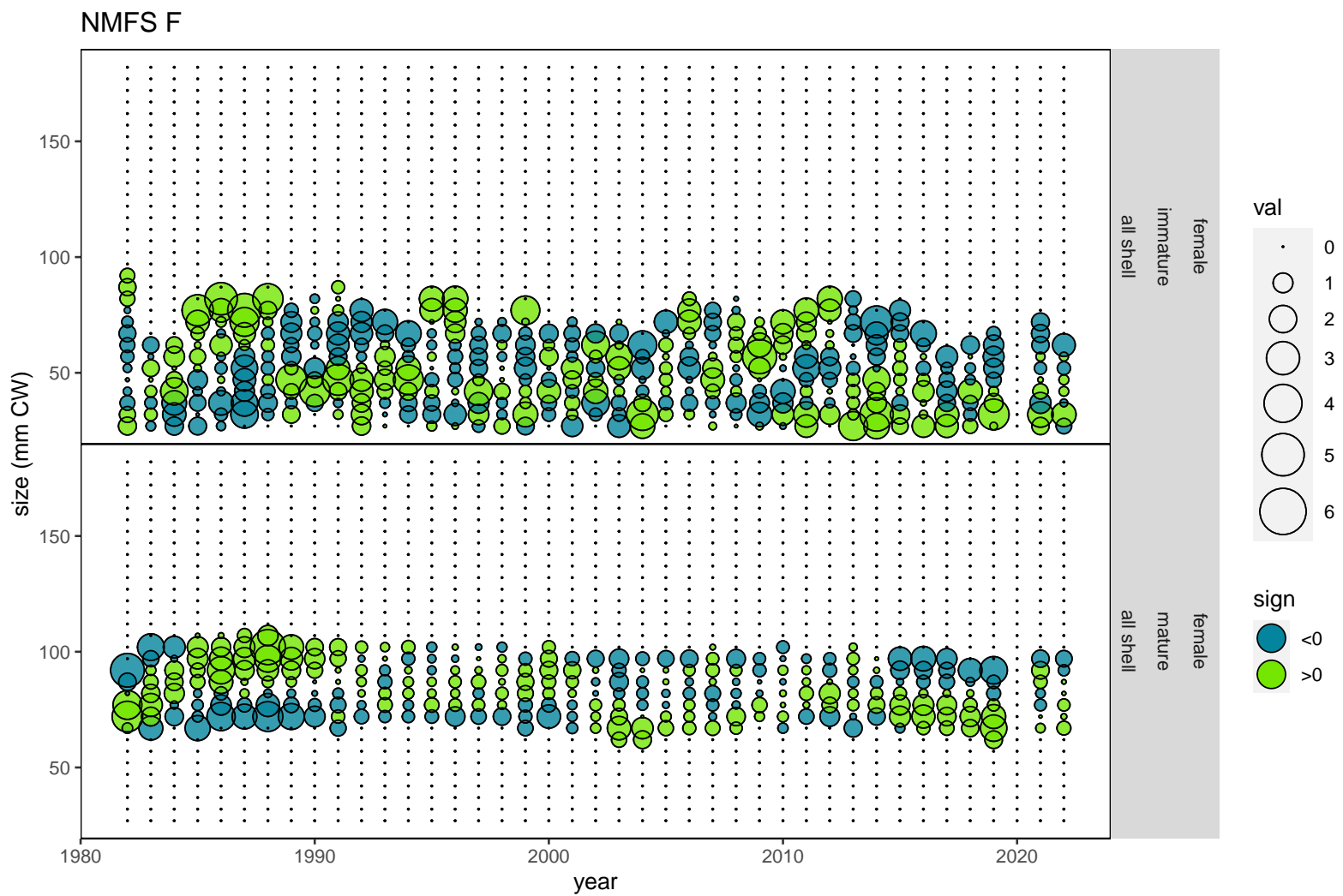


Figure 137: Pearson's residuals for fits to survey size composition data in Model 22.11. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

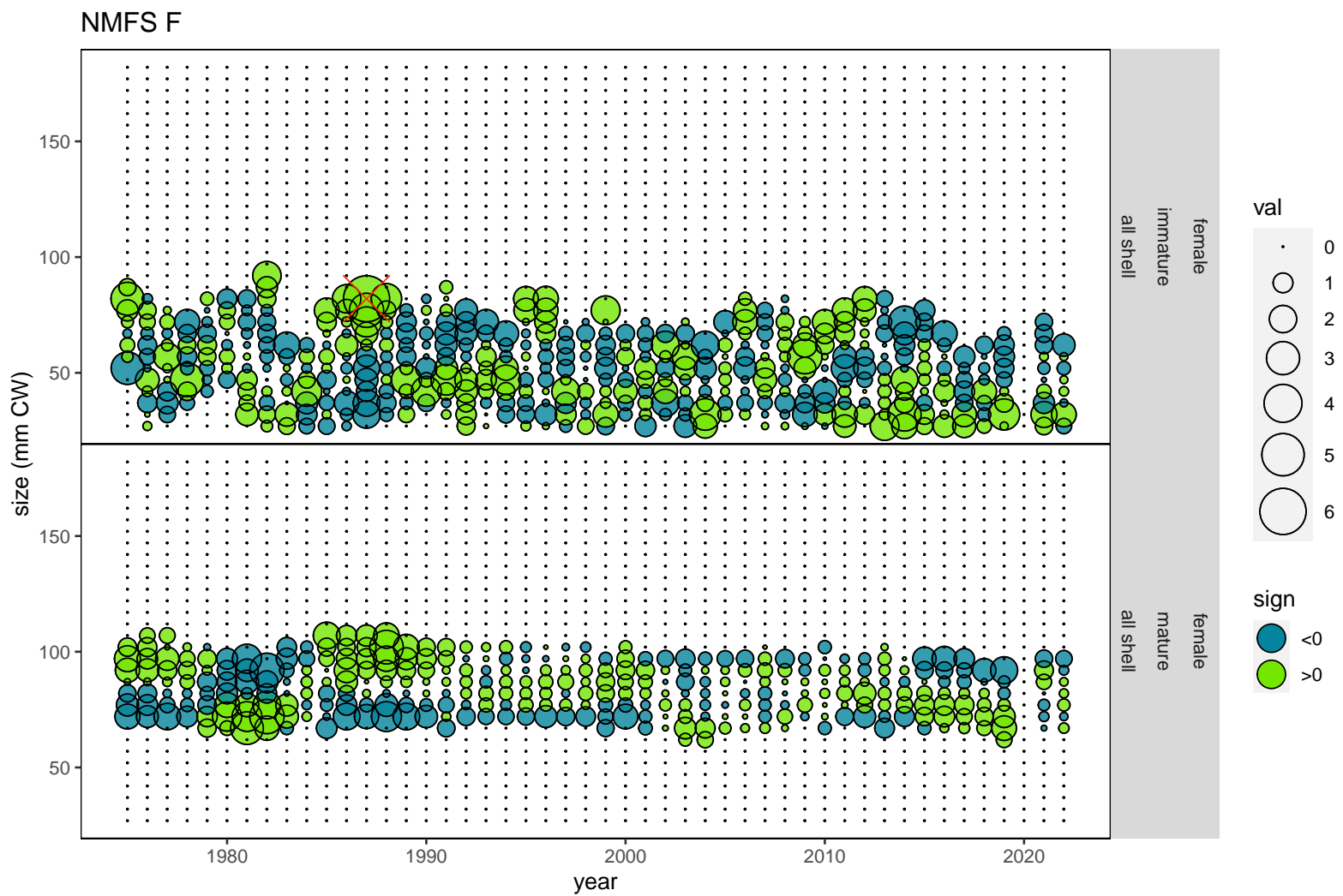


Figure 138: Pearson's residuals for fits to survey size composition data in Model 22.03. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

SBS BSFRF M: male, all maturity, all shell

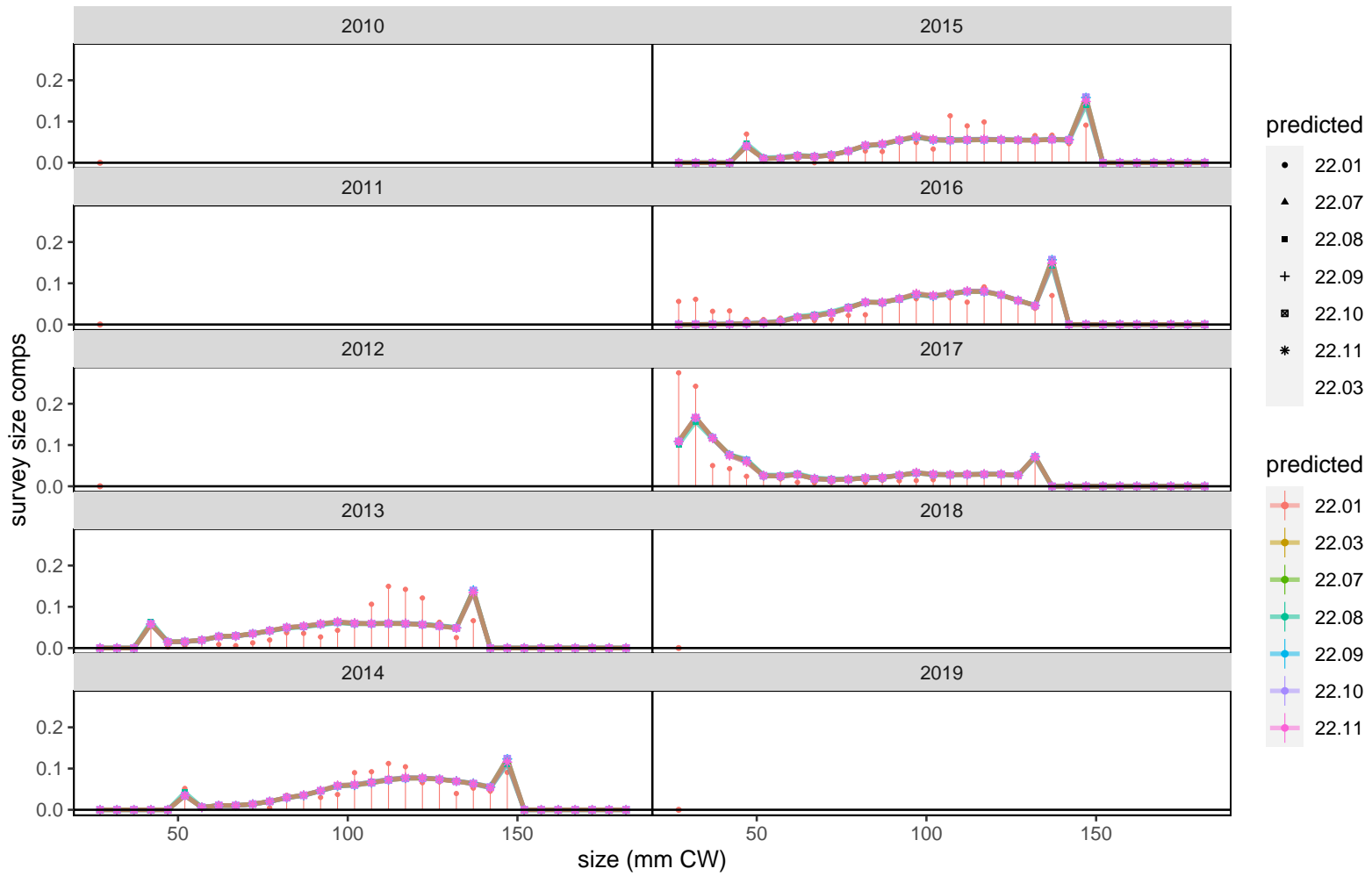


Figure 139: Fits to survey size compositions in the SBS BSFRF M survey. Preferred model is 22.03.

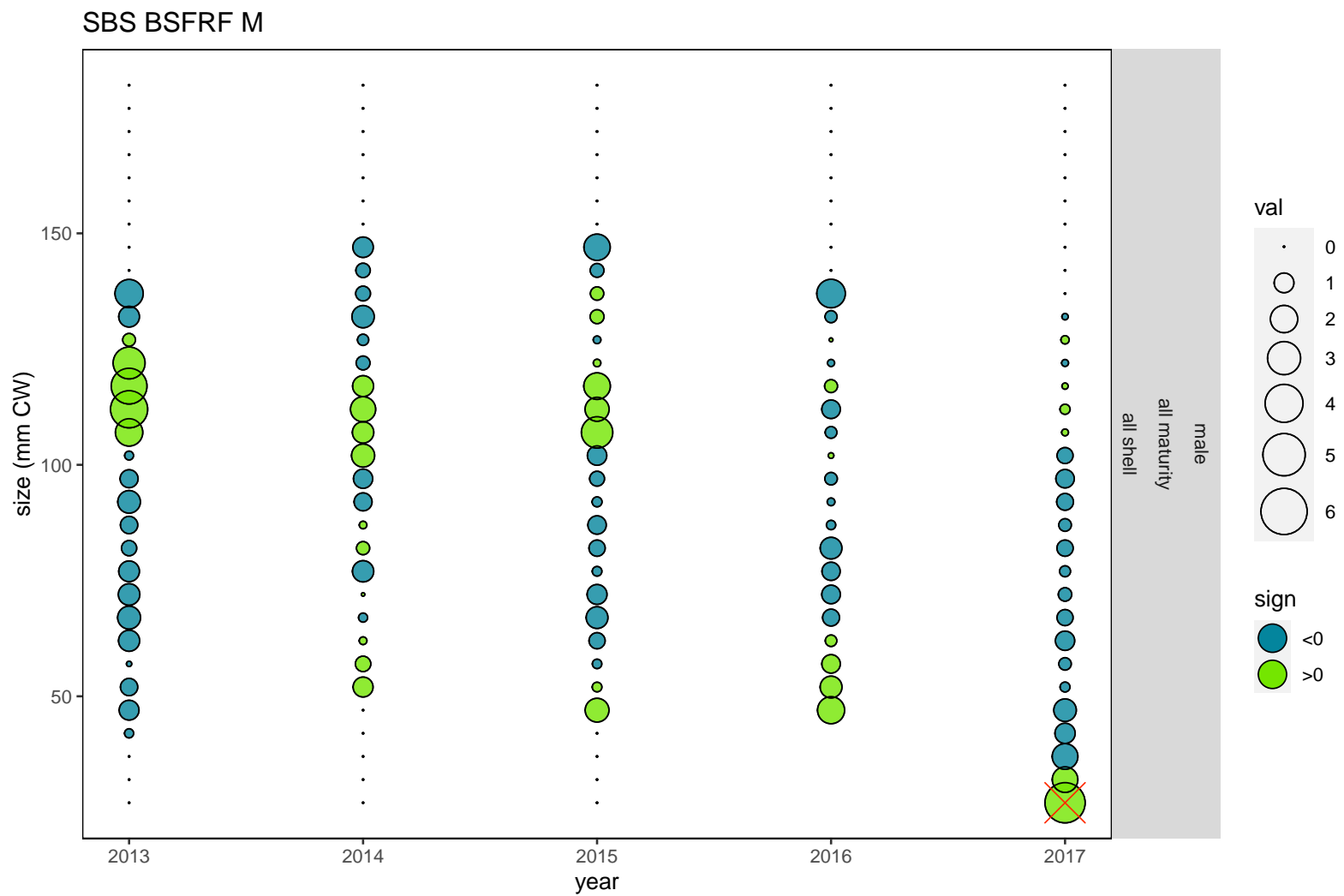


Figure 140: Pearson's residuals for fits to survey size composition data for Model 22.01. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

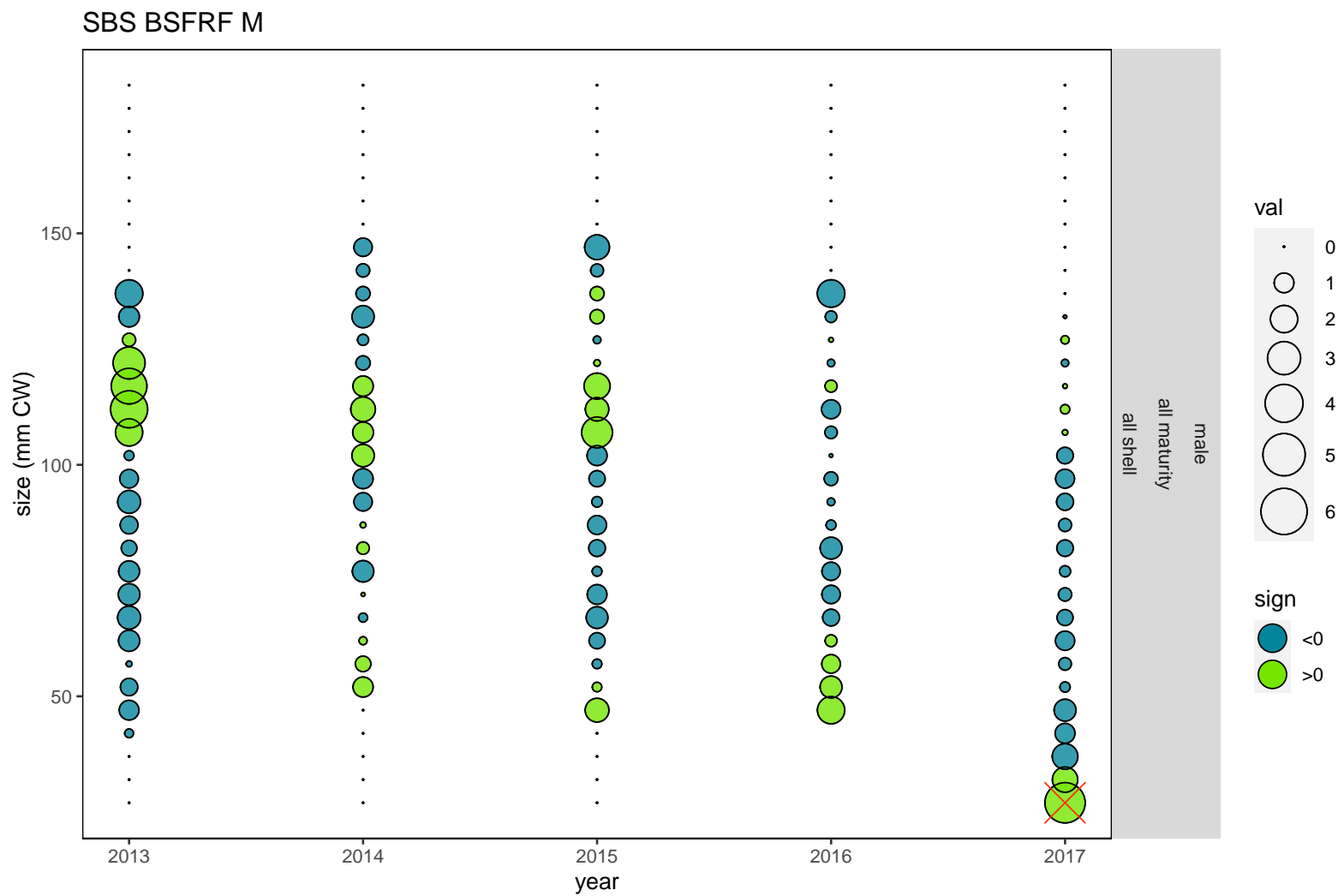


Figure 141: Pearson's residuals for fits to survey size composition data for Model 22.07. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.



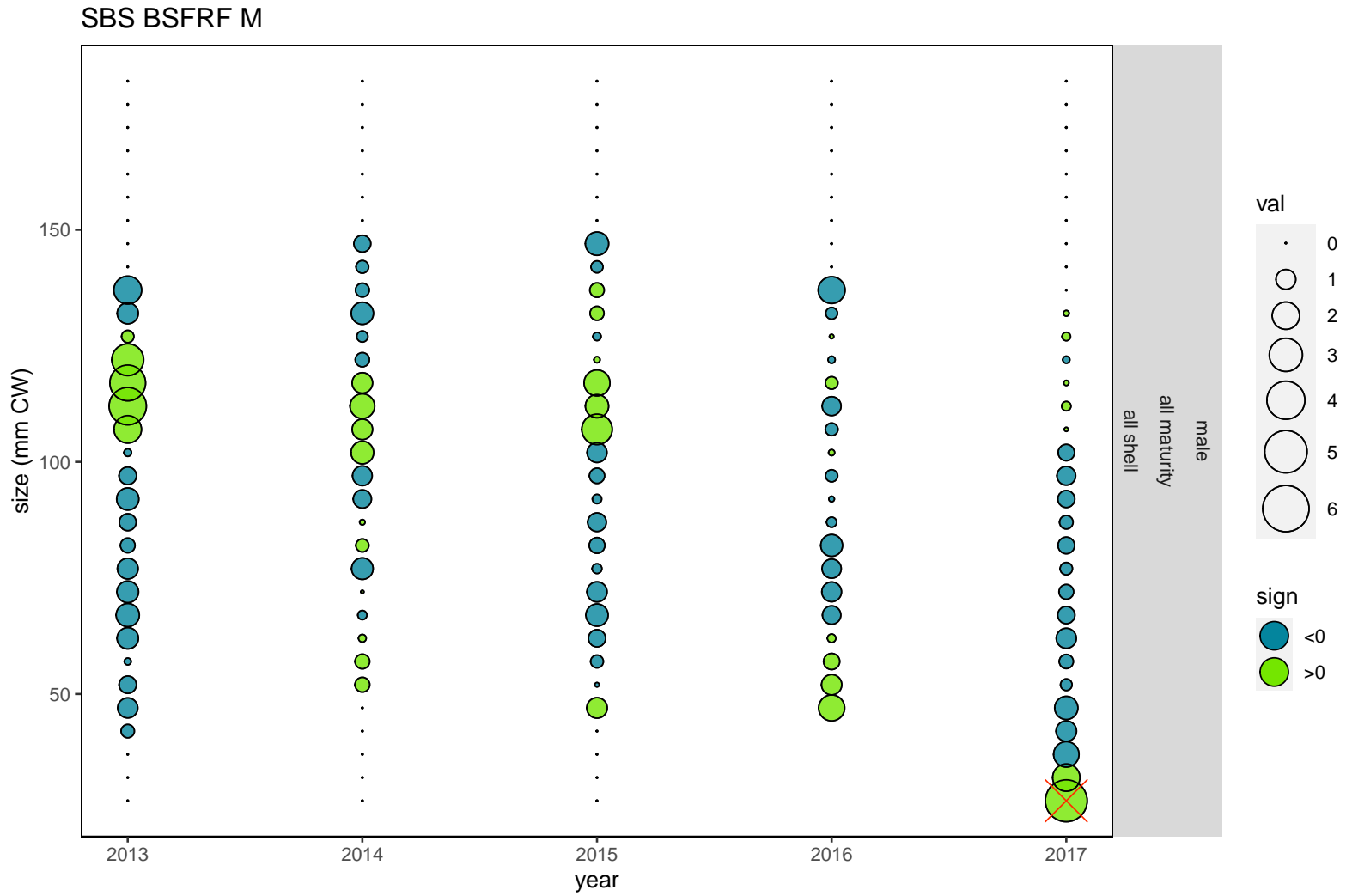


Figure 142: Pearson's residuals for fits to survey size composition data for Model 22.08. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

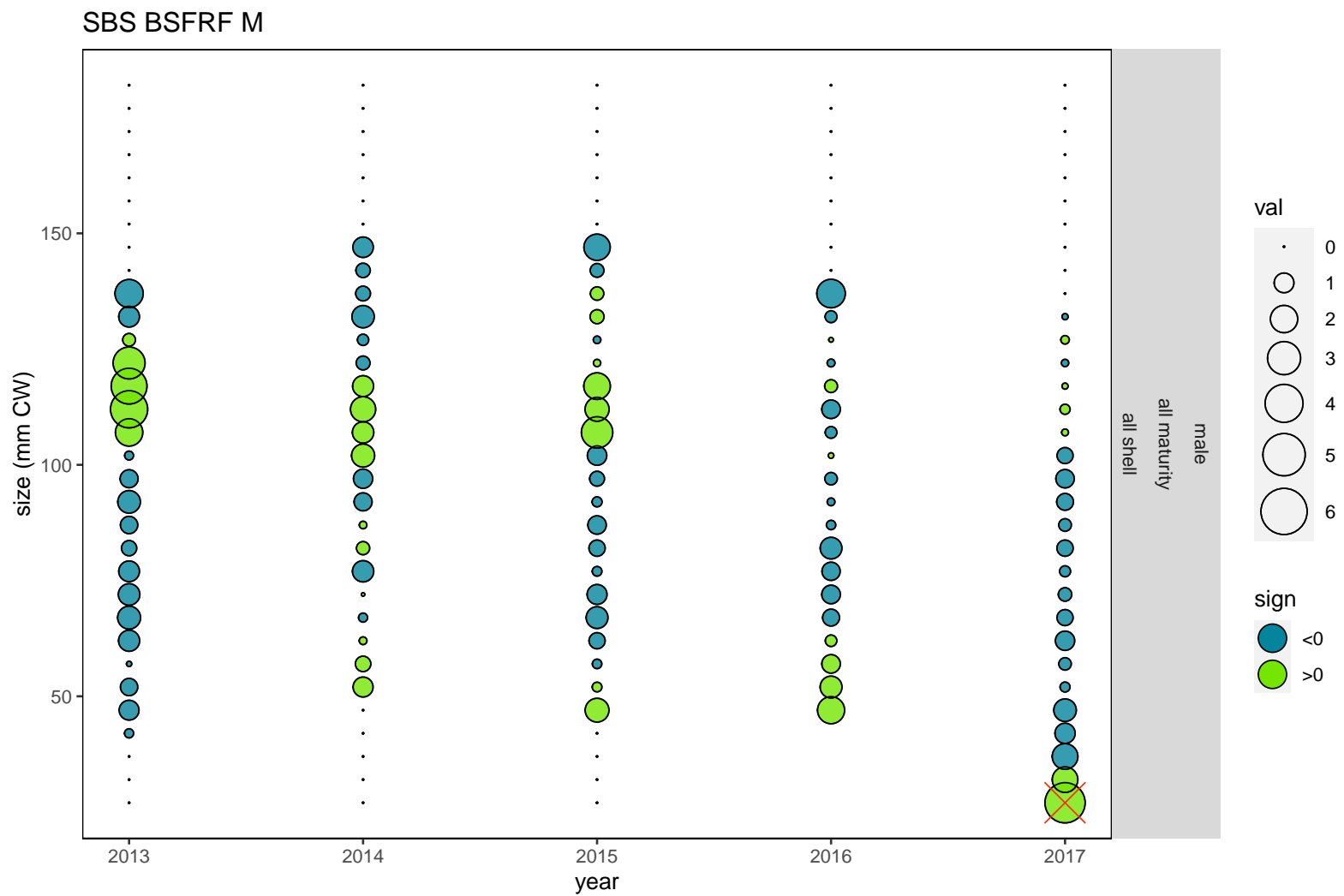


Figure 143: Pearson's residuals for fits to survey size composition data for Model 22.09. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

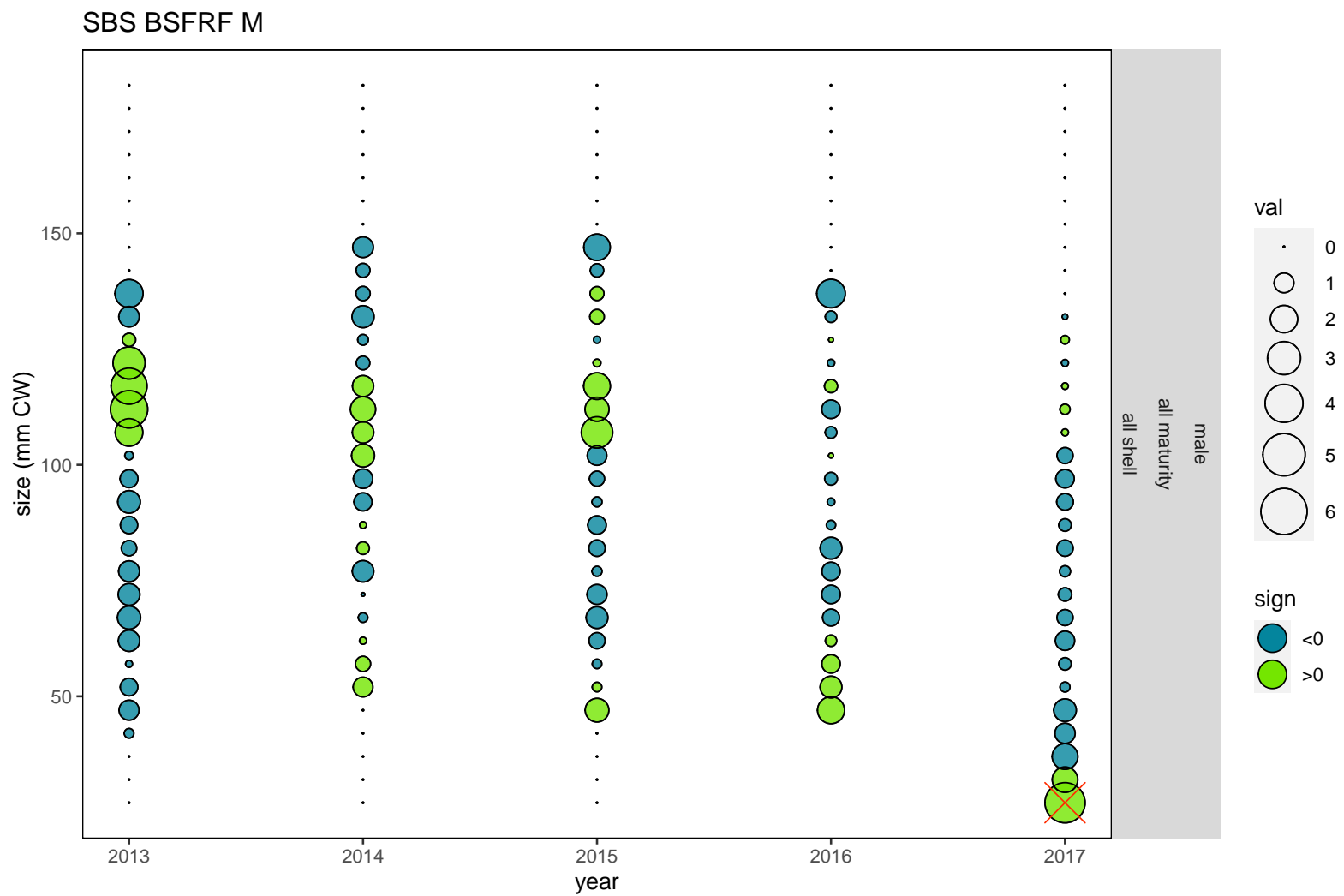


Figure 144: Pearson's residuals for fits to survey size composition data for Model 22.10. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

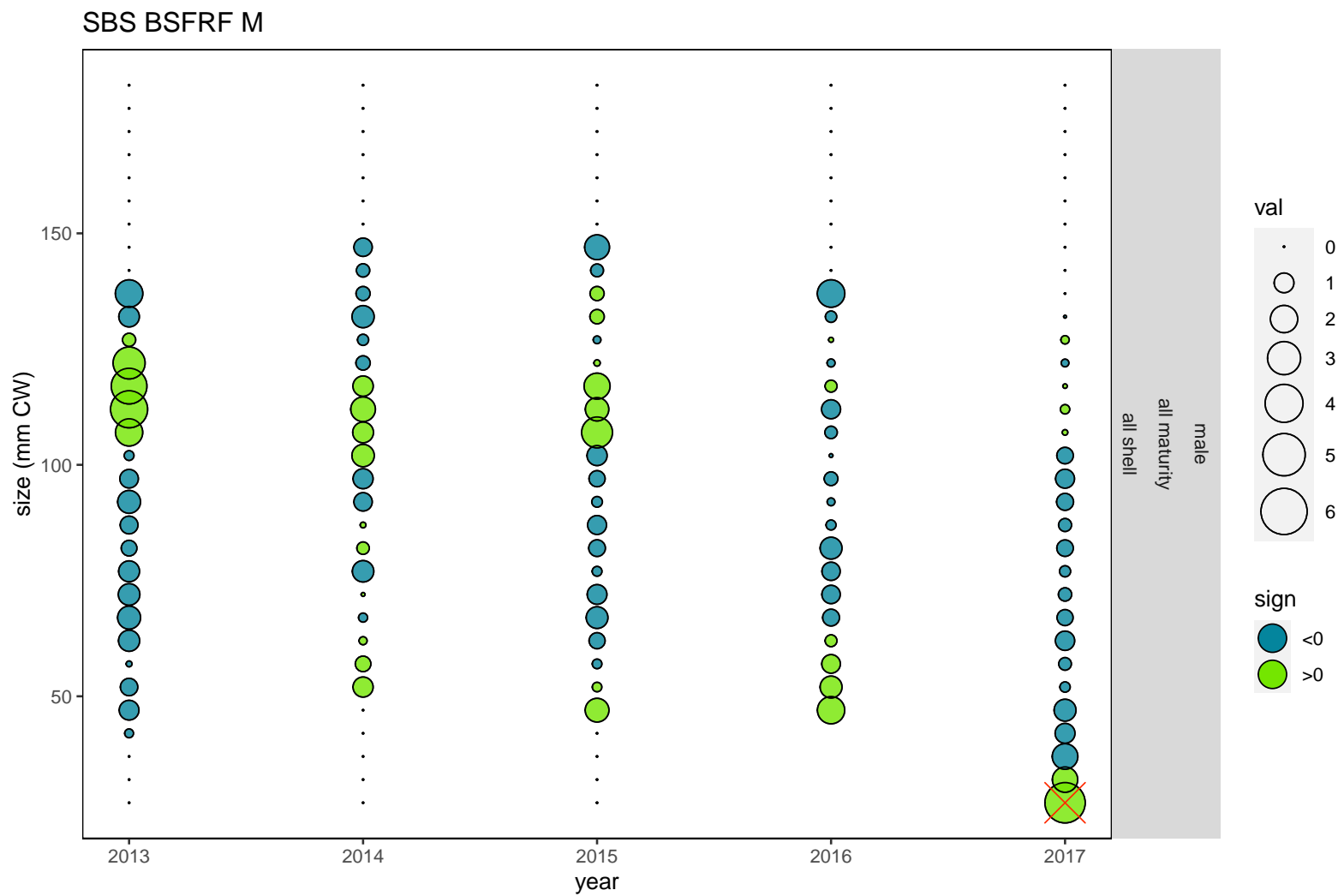


Figure 145: Pearson's residuals for fits to survey size composition data for Model 22.11. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.



Figure 146: Pearson's residuals for fits to survey size composition data for Model 22.03. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

SBS BSFRF F: female, immature, all shell

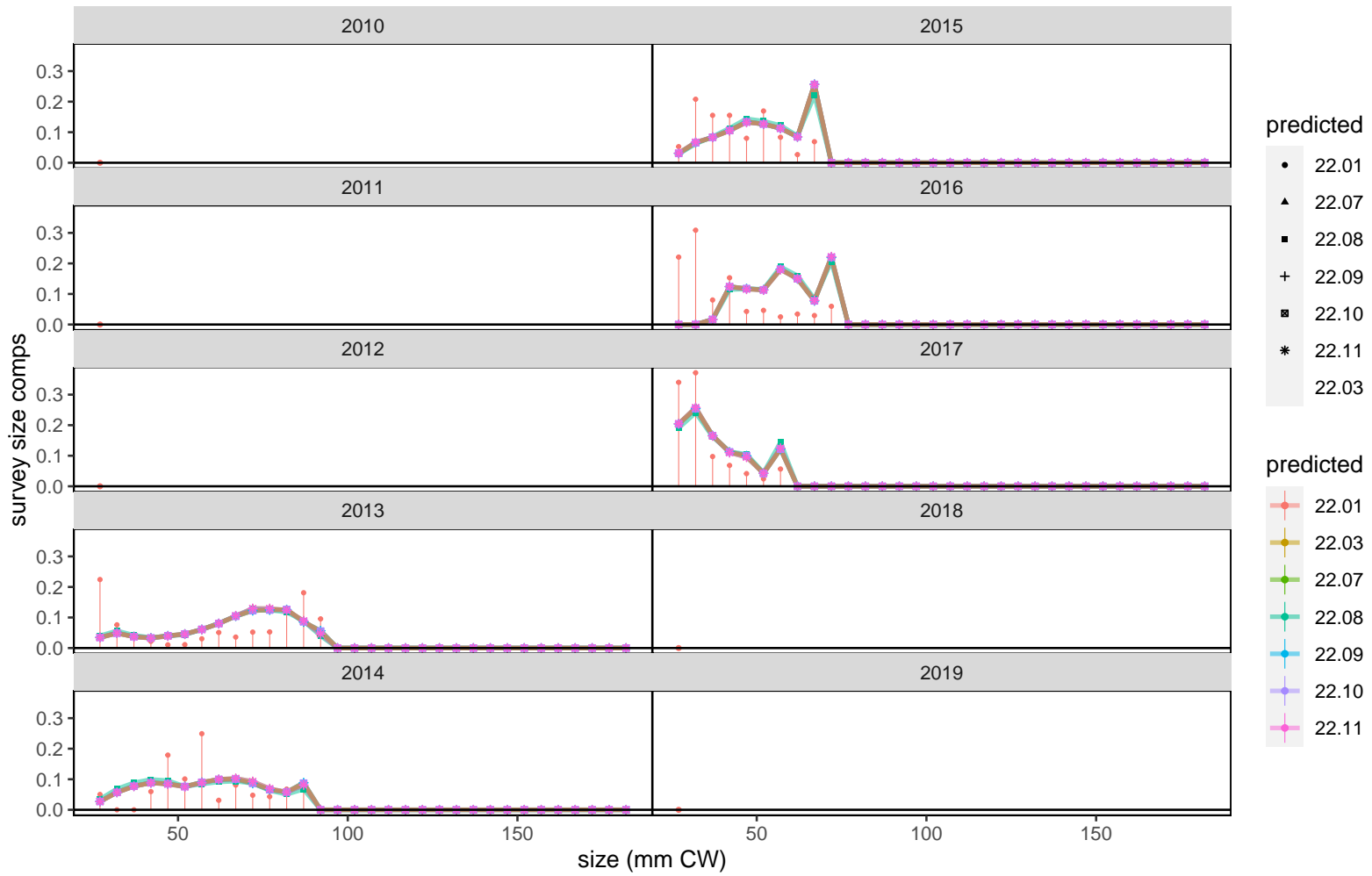


Figure 147: Fits to survey size compositions in the SBS BSFRF F survey. Preferred model is 22.03.

SBS BSFRF F: female, mature, all shell

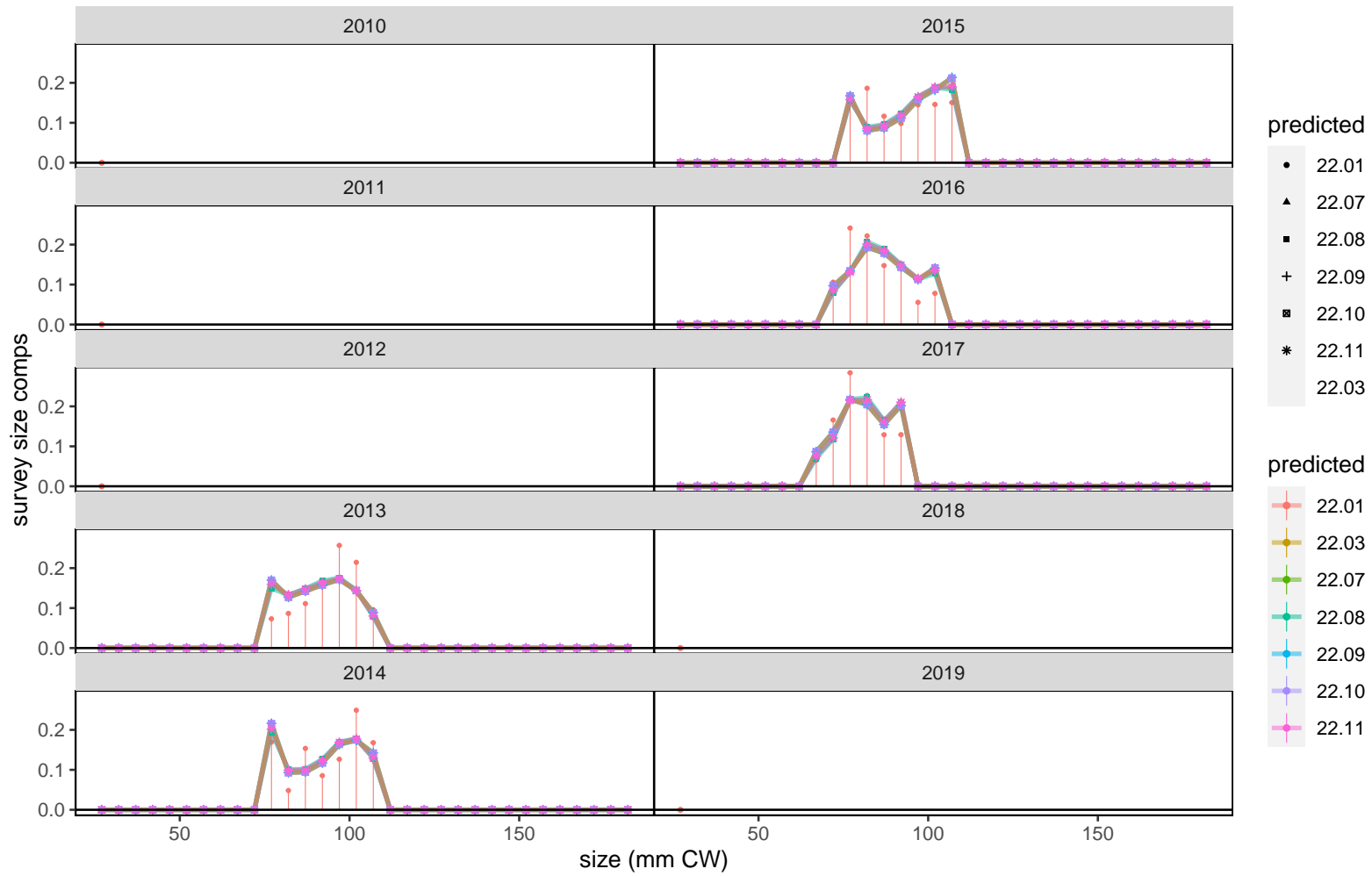


Figure 148: Fits to survey size compositions in the SBS BSFRF F survey. Preferred model is 22.03.

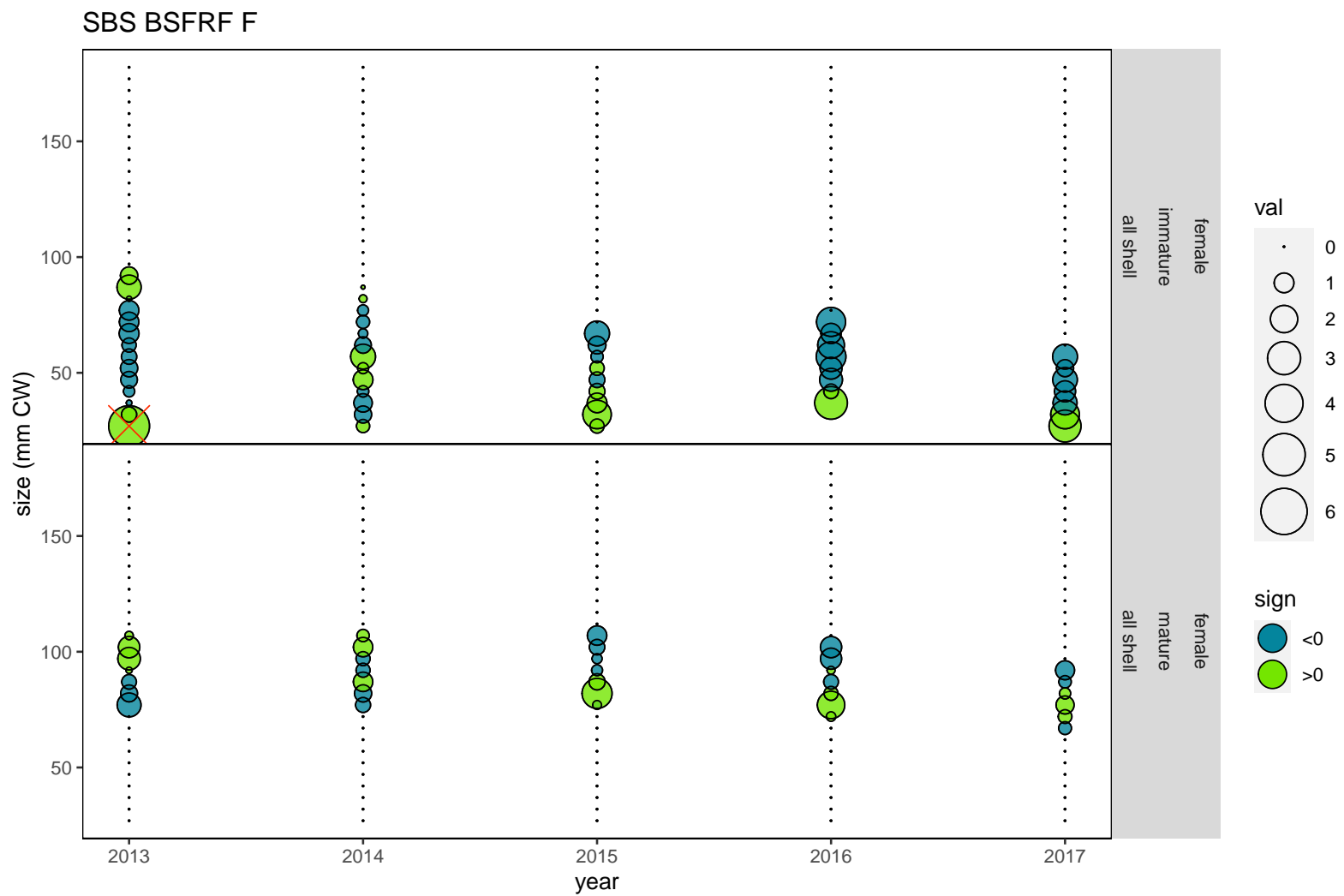


Figure 149: Pearson's residuals for fits to survey size composition data for Model 22.01. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.



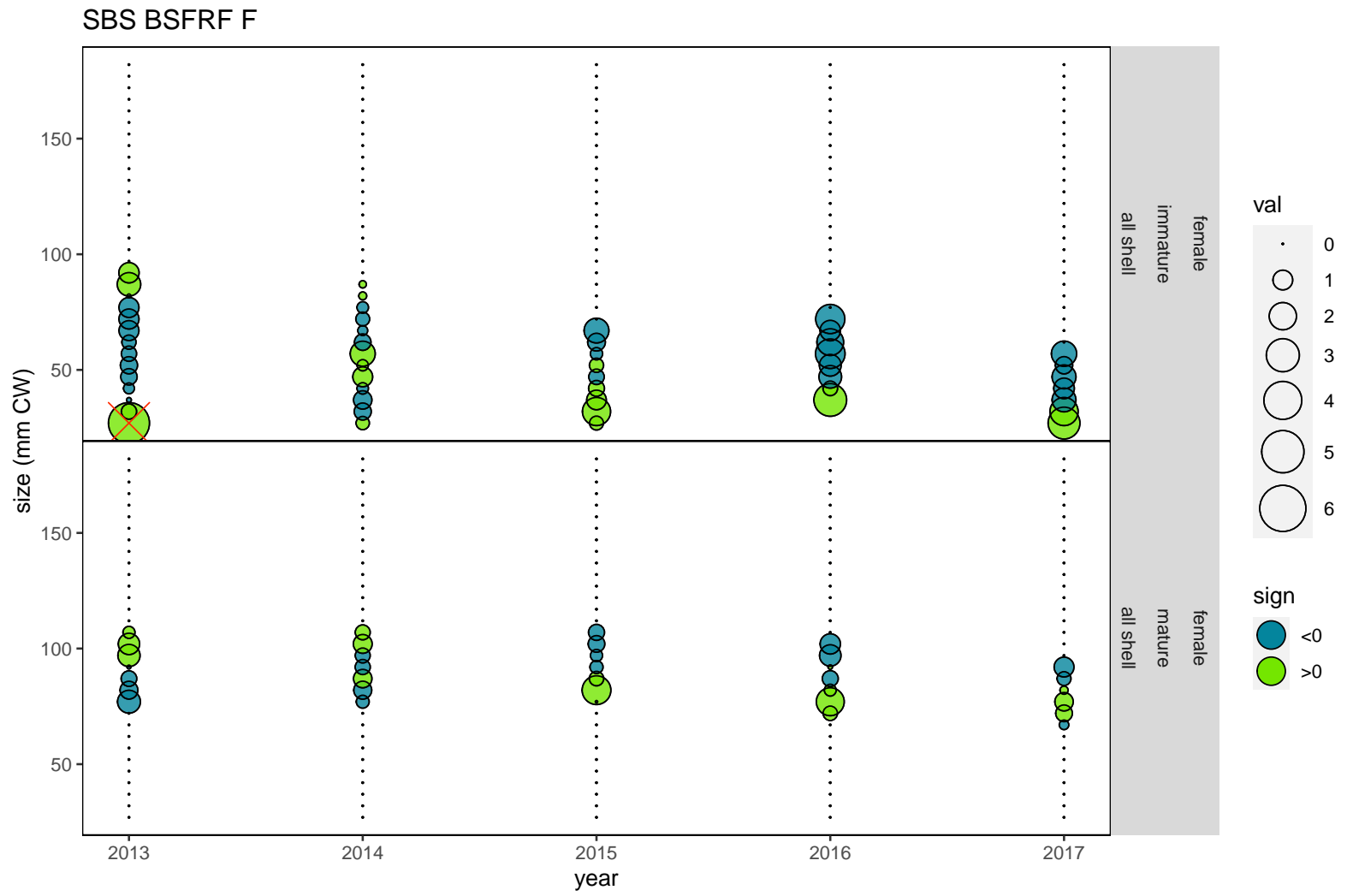


Figure 150: Pearson's residuals for fits to survey size composition data for Model 22.07. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

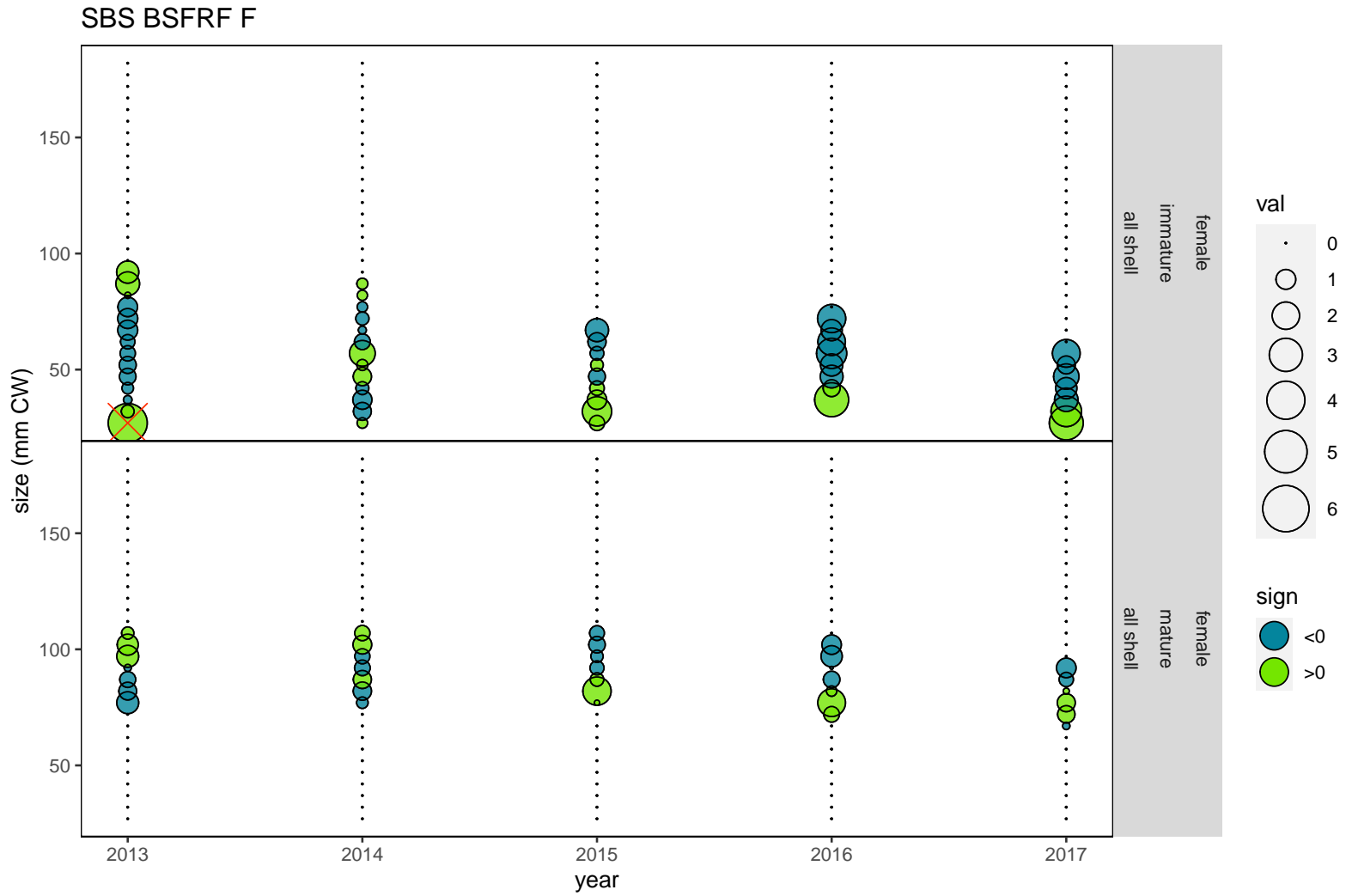


Figure 151: Pearson's residuals for fits to survey size composition data for Model 22.08. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

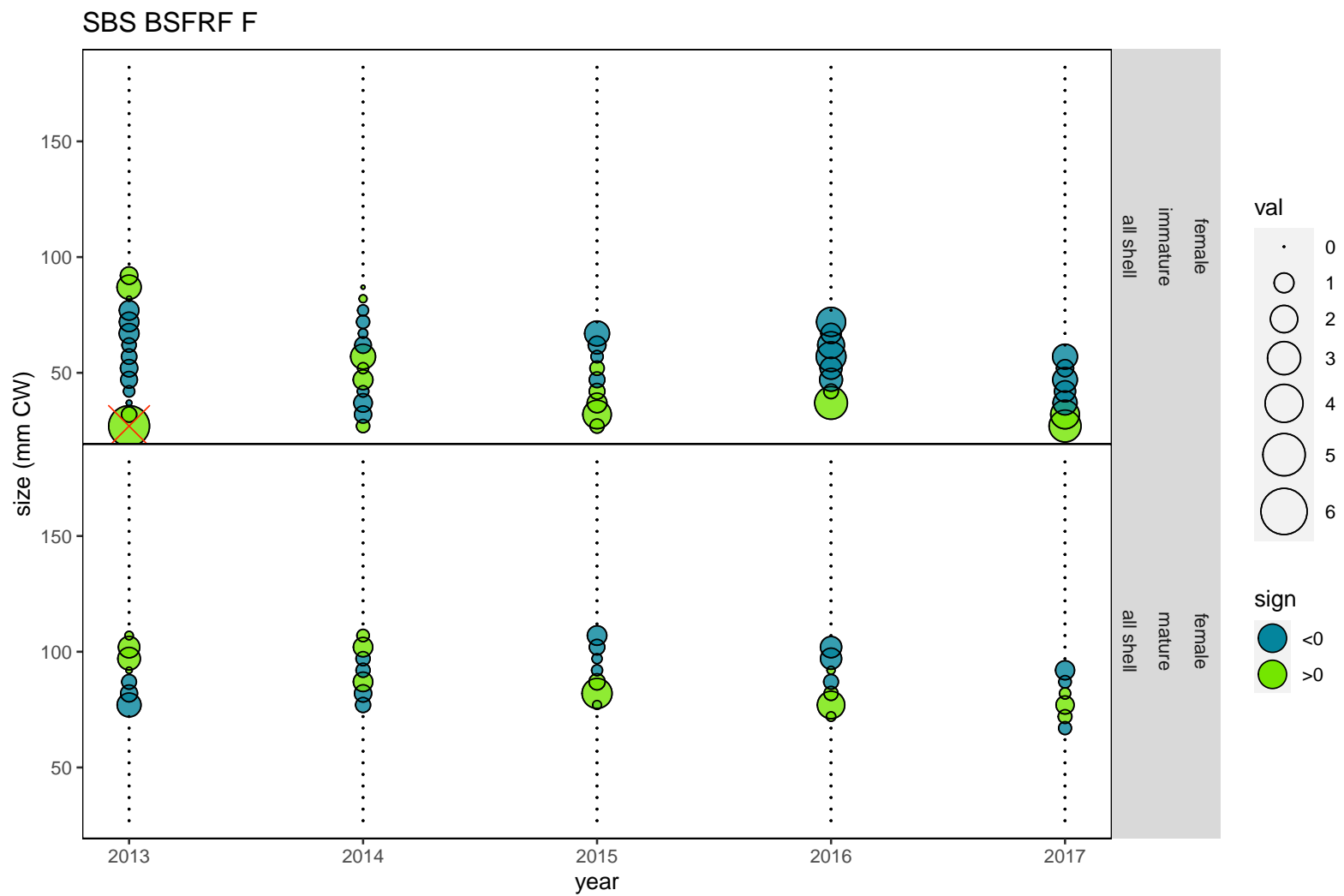


Figure 152: Pearson's residuals for fits to survey size composition data for Model 22.09. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

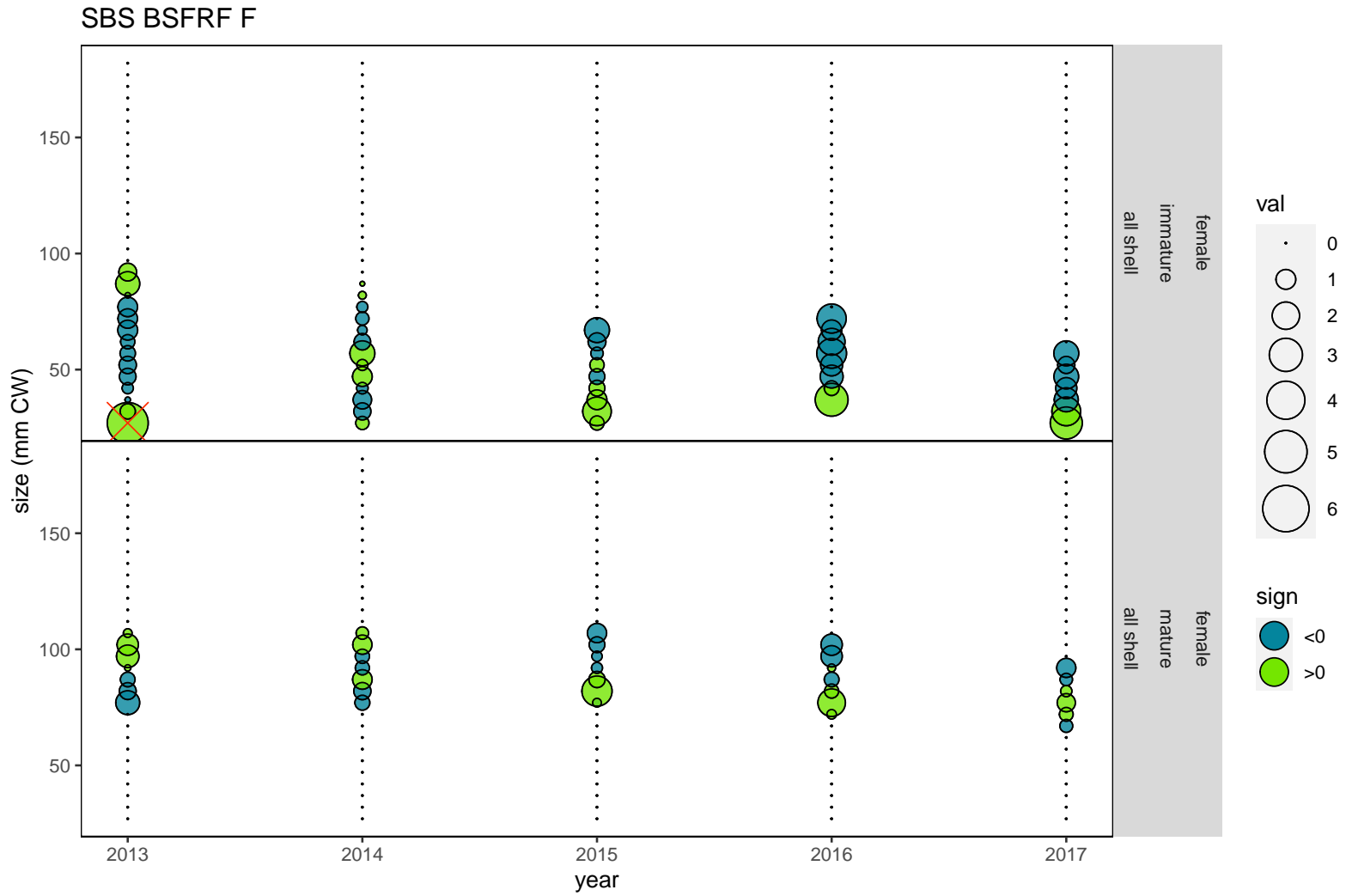


Figure 153: Pearson's residuals for fits to survey size composition data for Model 22.10. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

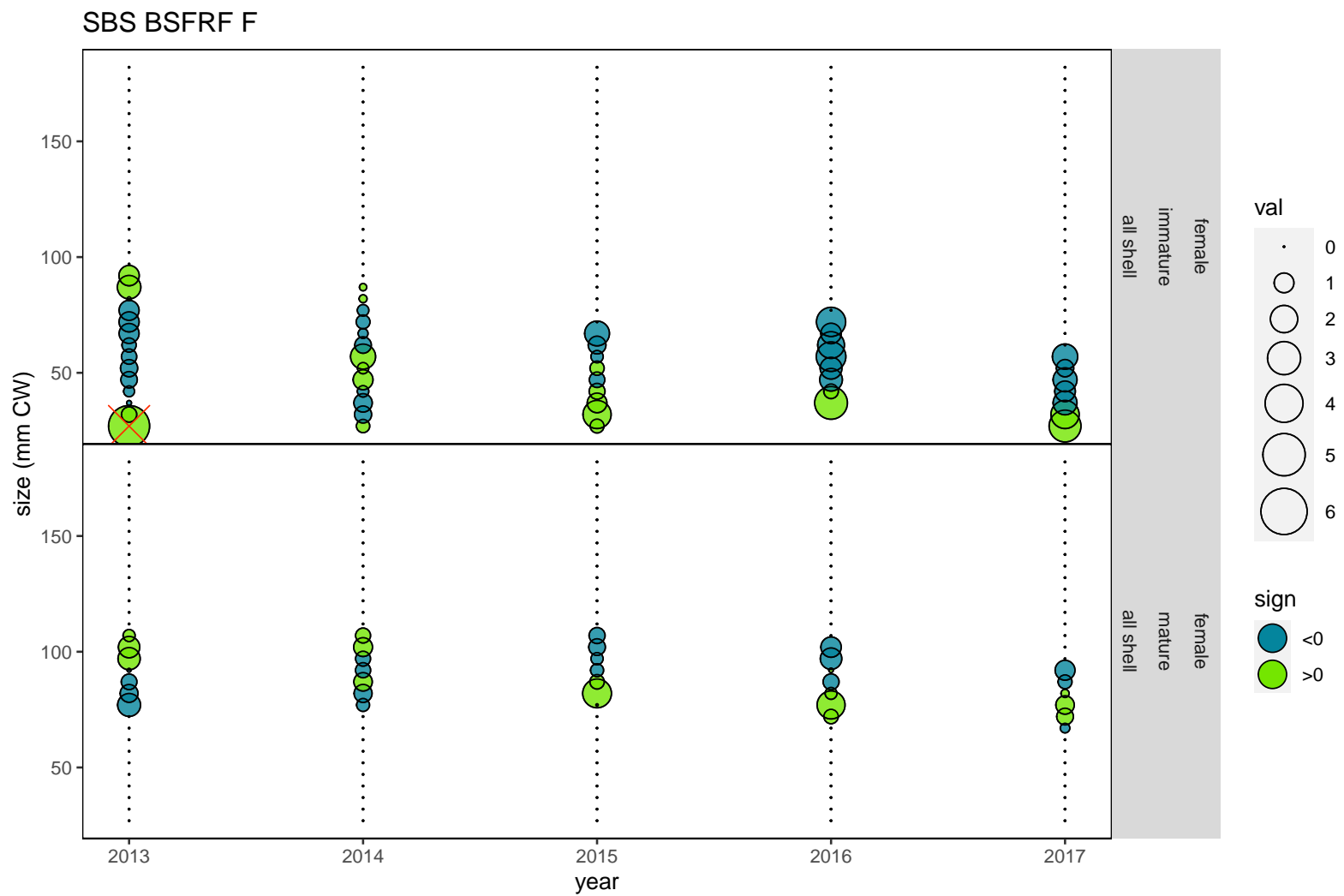


Figure 154: Pearson's residuals for fits to survey size composition data for Model 22.11. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

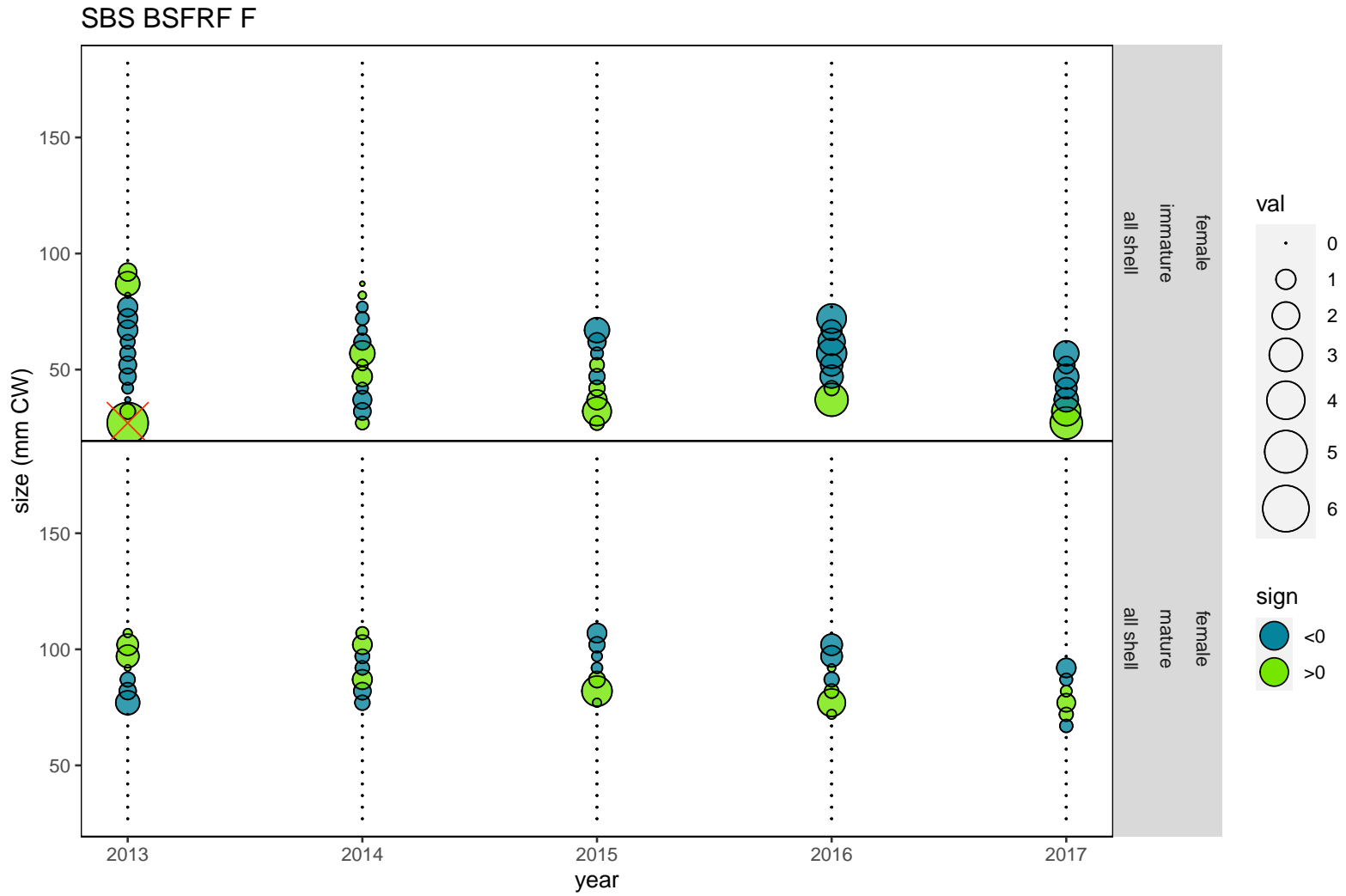


Figure 155: Pearson's residuals for fits to survey size composition data for Model 22.03. Symbol areas reflect the size of each residual, extreme values (residuals larger than 4 in scale) are indicated with a red 'X' to facilitate identification. Preferred model is 22.03.

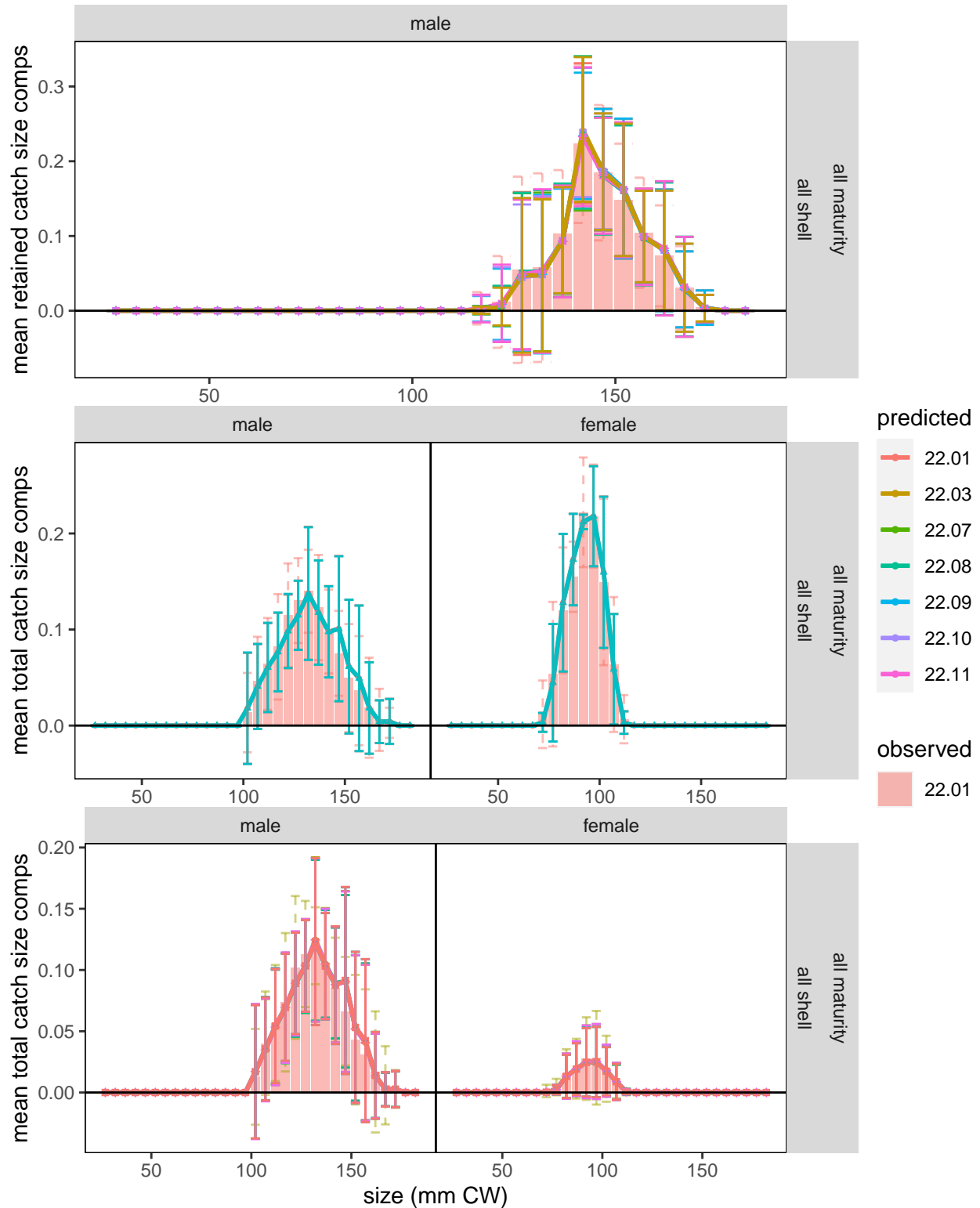


Figure 156: Fits to directed fishery mean size compositions. Upper plot: retained catch; center plot: total catch for scenarios 22.01; lower plot: total catch for 22.03. The total catch size compositions were normalized differently before fitting between 22.01 and 22.03. Model 22.03 is the preferred model.

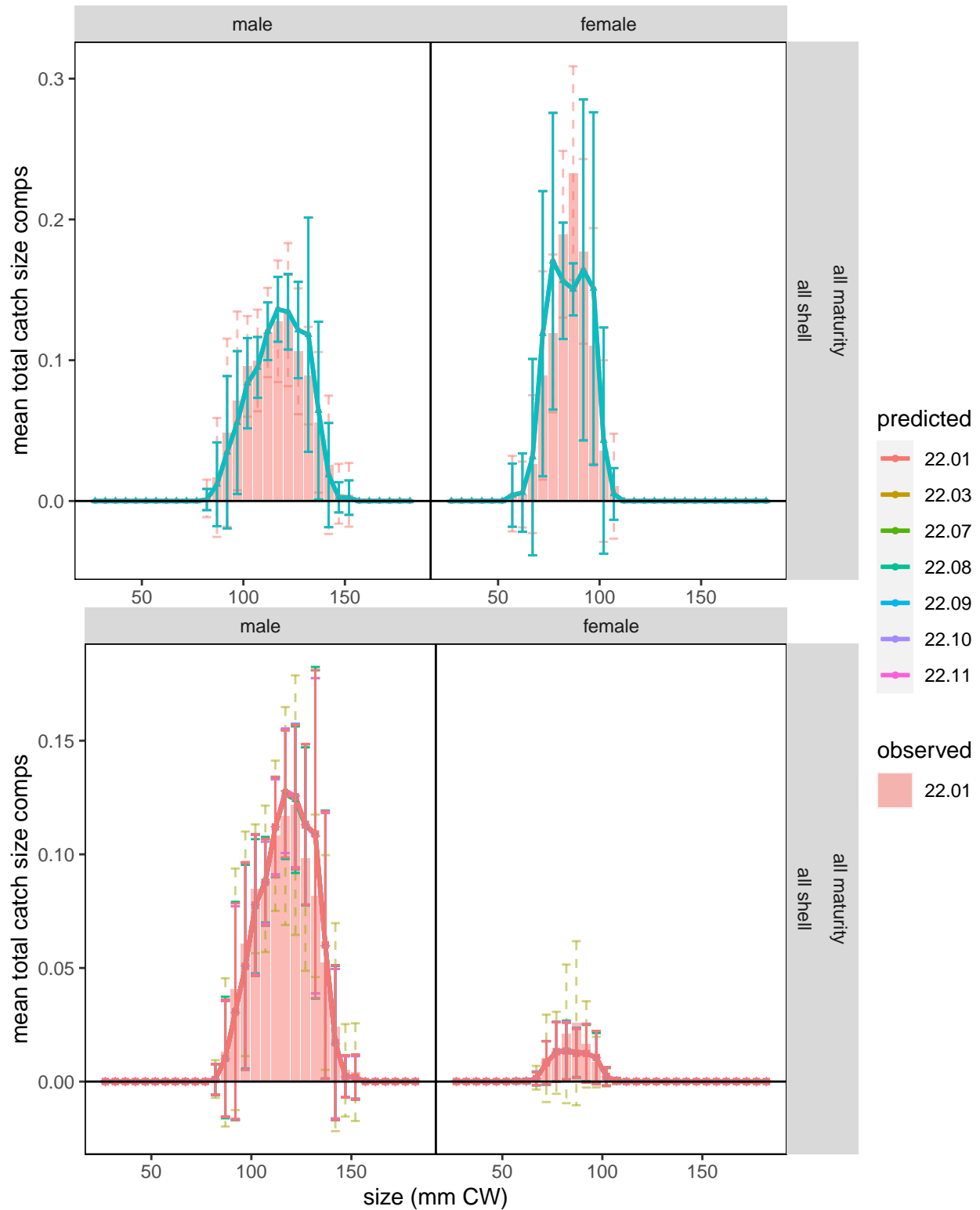


Figure 157: Fits to mean bycatch size compositions from the snow crab fishery. Upper plot: total catch for scenarios 22.01; lower plot: total catch for 22.03. The total catch size compositions were normalized differently before fitting between 22.01 and 22.03.. Model 22.03 is the preferred model.



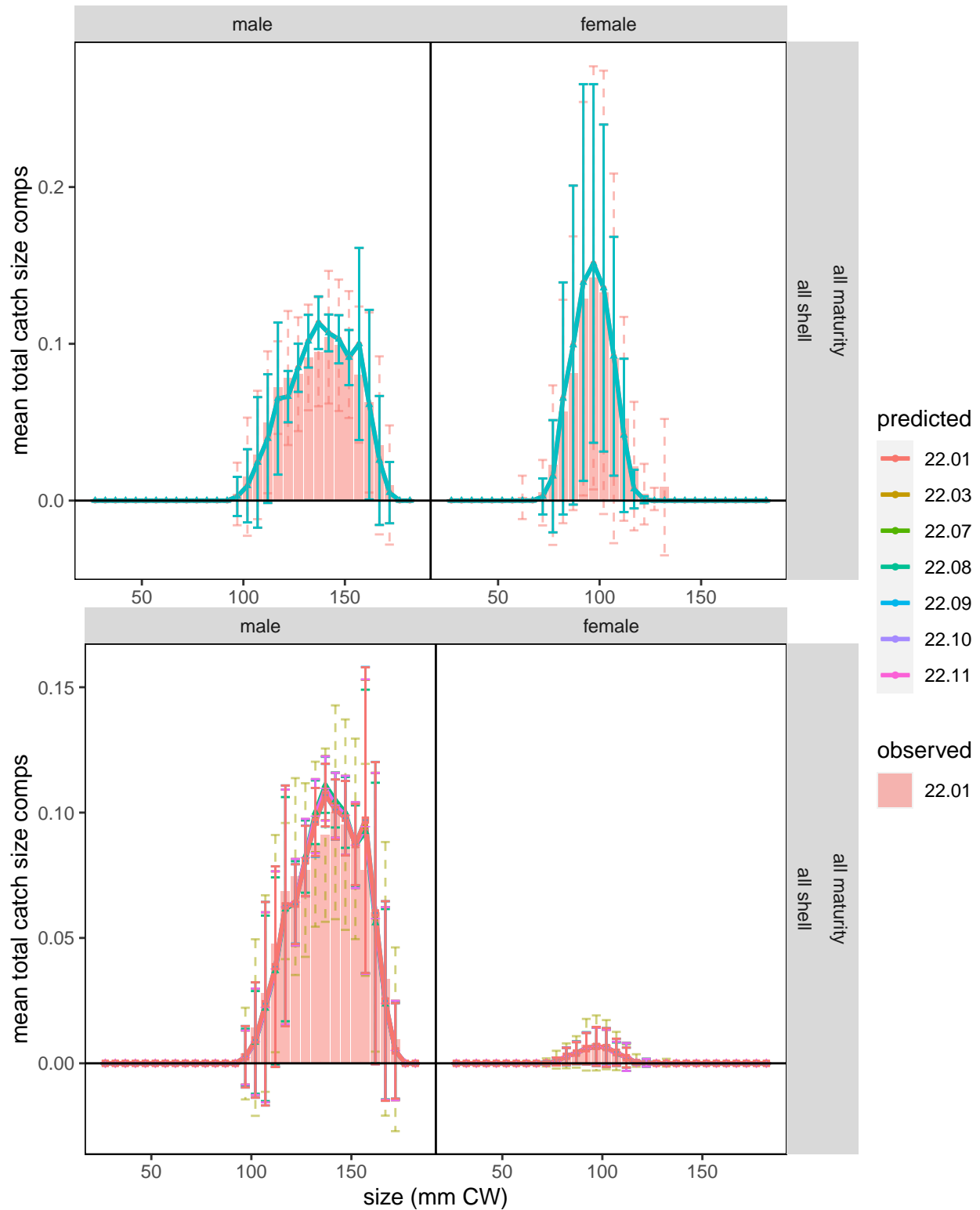


Figure 158: Fits to mean bycatch size compositions from the BBRKC fishery. Upper plot: total catch for scenarios 22.01; lower plot: total catch for 22.03. The total catch size compositions were normalized differently before fitting between 22.01 and 22.03.. Model 22.03 is the preferred model.

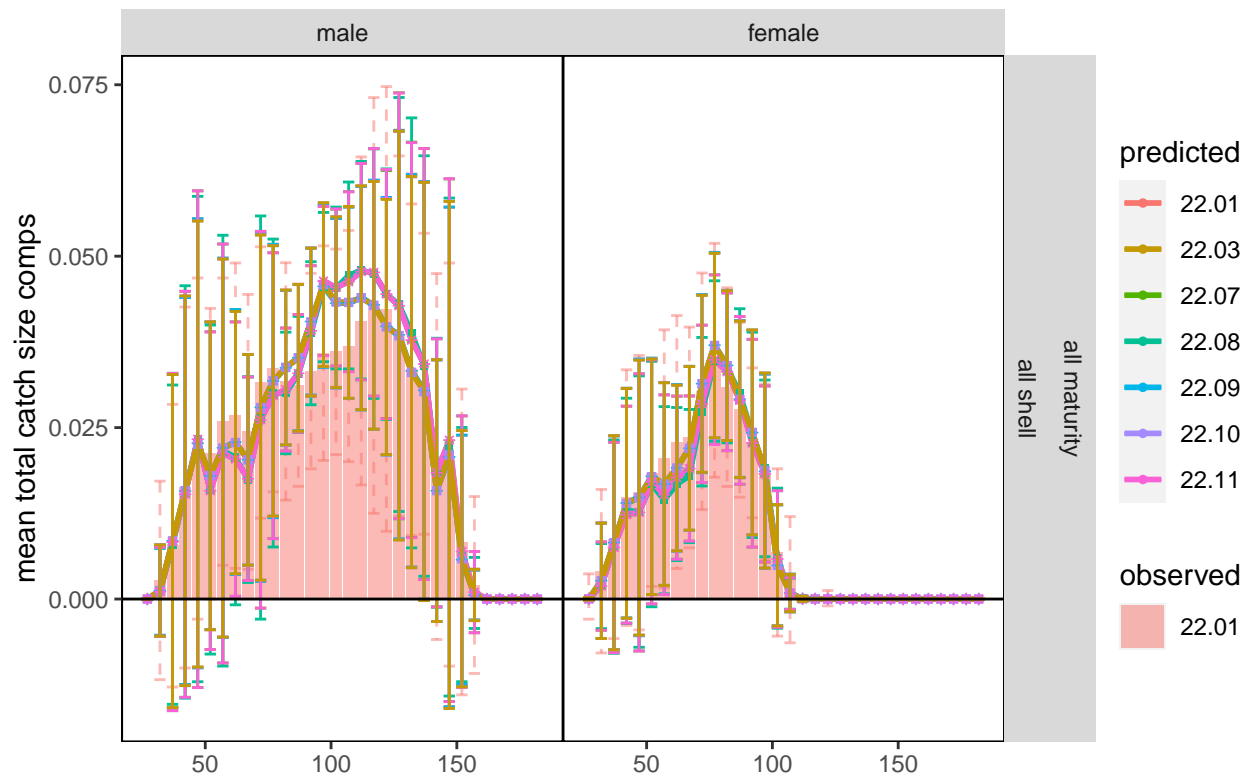


Figure 159: Fits to mean bycatch size compositions from the groundfish fisheries. The total catch size compositions were normalized similarly for all model scenarios. Model 22.03 is the preferred model.

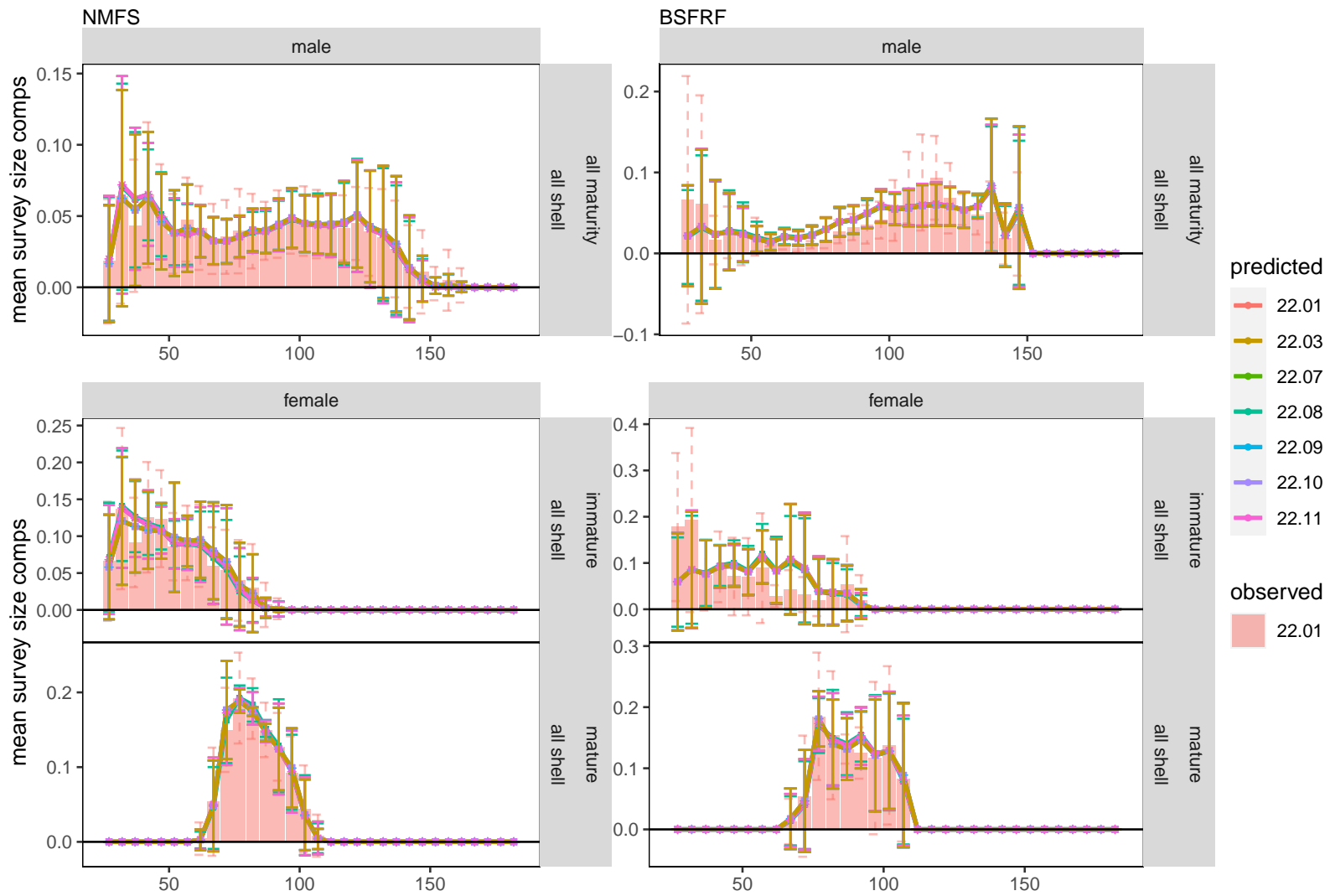


Figure 160: Fits to mean survey size compositions from the NMFS EBS (left column) and BSFRF SBS (right column) surveys. The total catch size compositions were normalized similarly for all model scenarios. Model 22.03 is the preferred model.

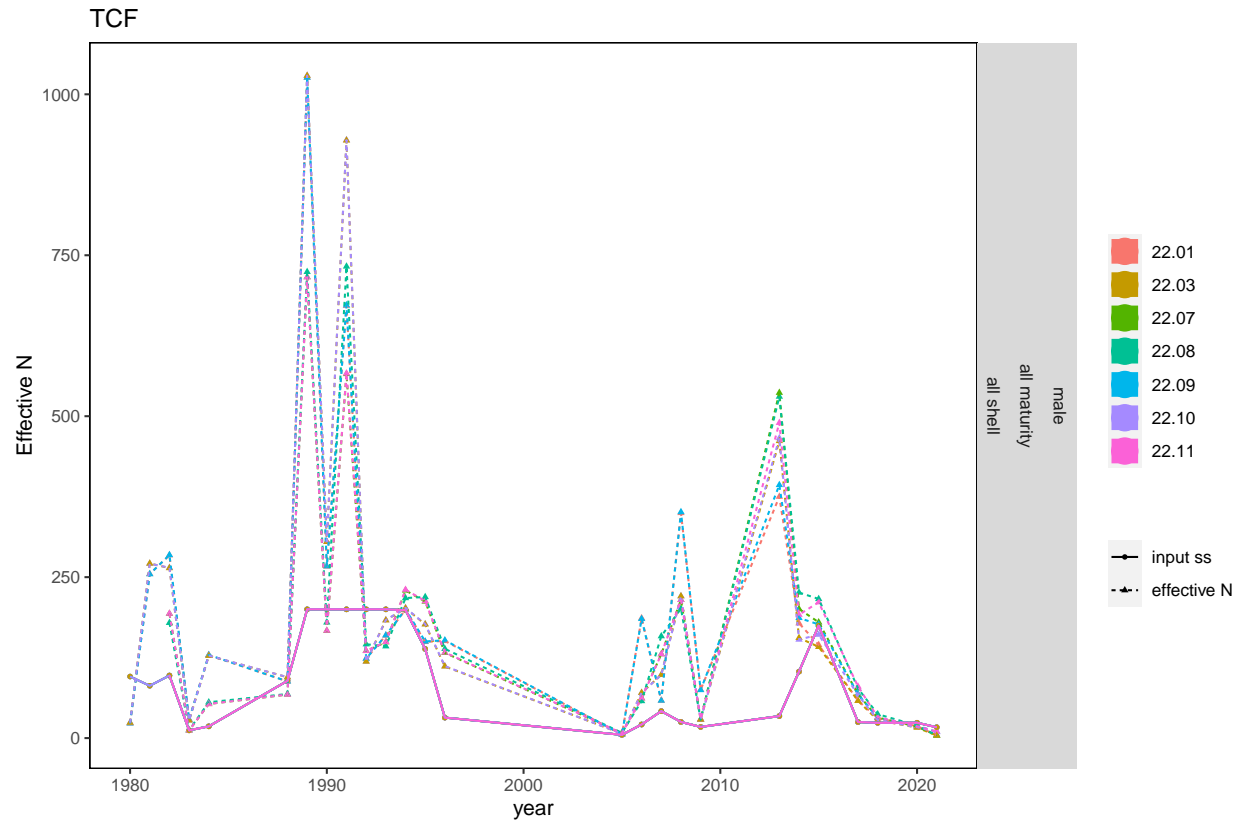


Figure 161: Effective sample sizes compared with input sample sizes for retained catch data. Dotted lines are effective N's, solid lines are input sample sizes. Input sample sizes are constrained to a maximum of 200. Model 22.03 is the preferred model.

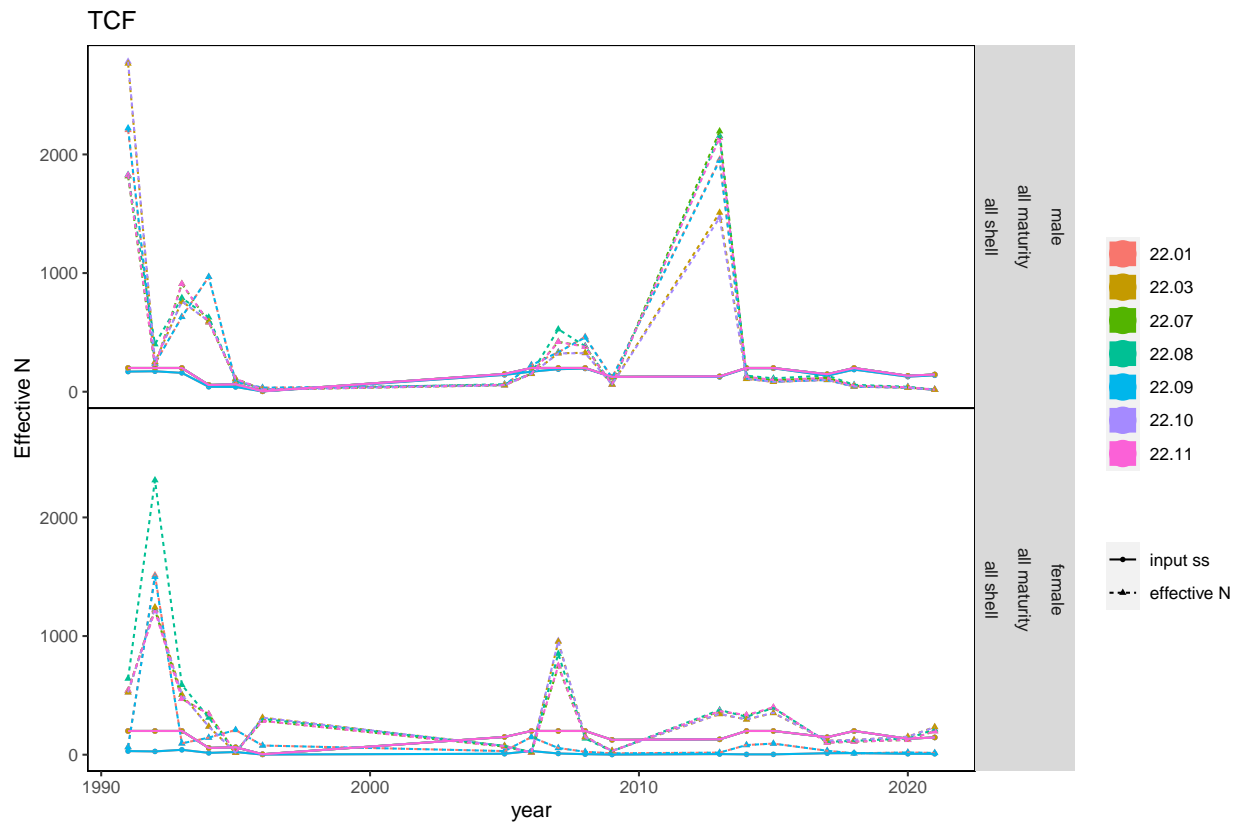


Figure 162: Effective sample sizes compared with input sample sizes for total catch data. from the TCF fishery. Dotted lines are effective N's, solid lines are input sample sizes. Input sample sizes are scaled to sum to 200 in each year across categories. Model 22.03 is the preferred model.

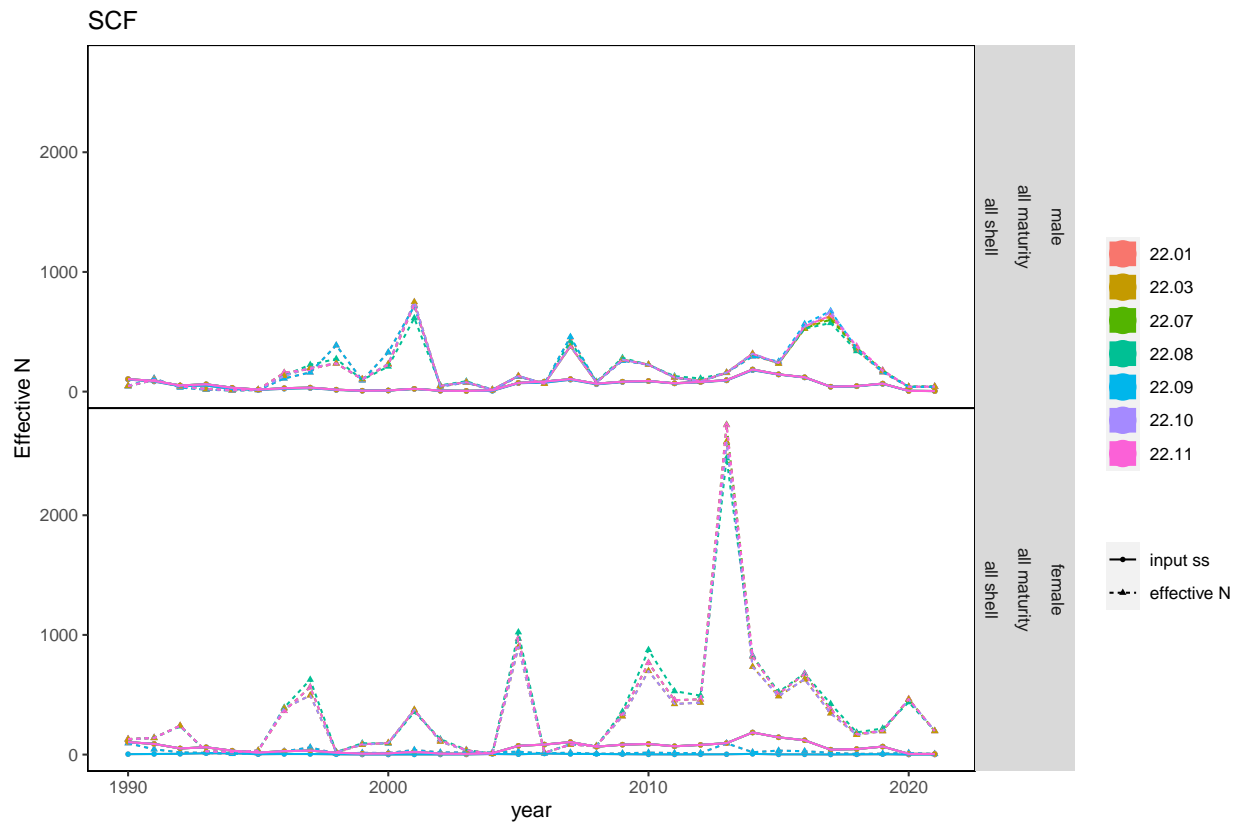


Figure 163: Effective sample sizes compared with input sample sizes for total catch data. from the SCF fishery. Dotted lines are effective N's, solid lines are input sample sizes. Input sample sizes are scaled to sum to 200 in each year across categories. Model 22.03 is the preferred model.

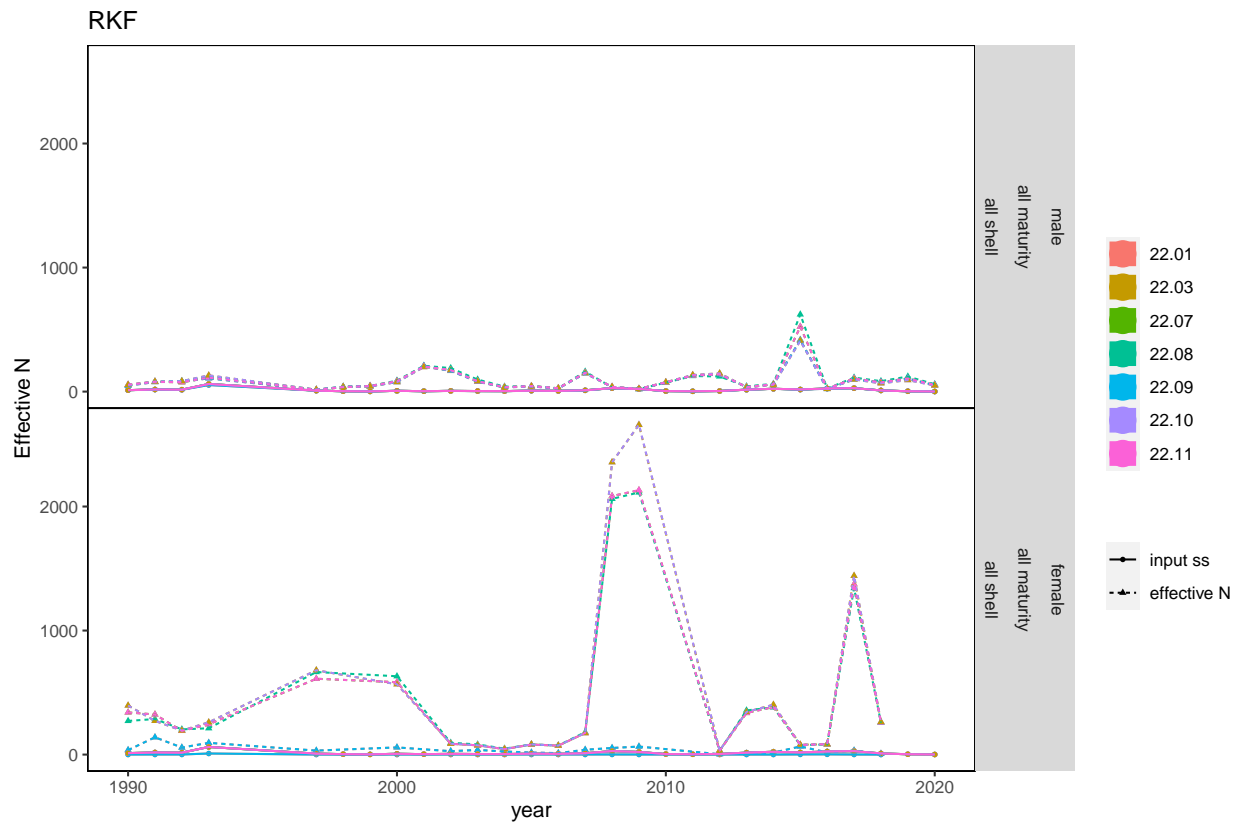


Figure 164: Effective sample sizes compared with input sample sizes for total catch data. from the RKF fishery. Dotted lines are effective N's, solid lines are input sample sizes. Input sample sizes are scaled to sum to 200 in each year across categories. Model 22.03 is the preferred model.

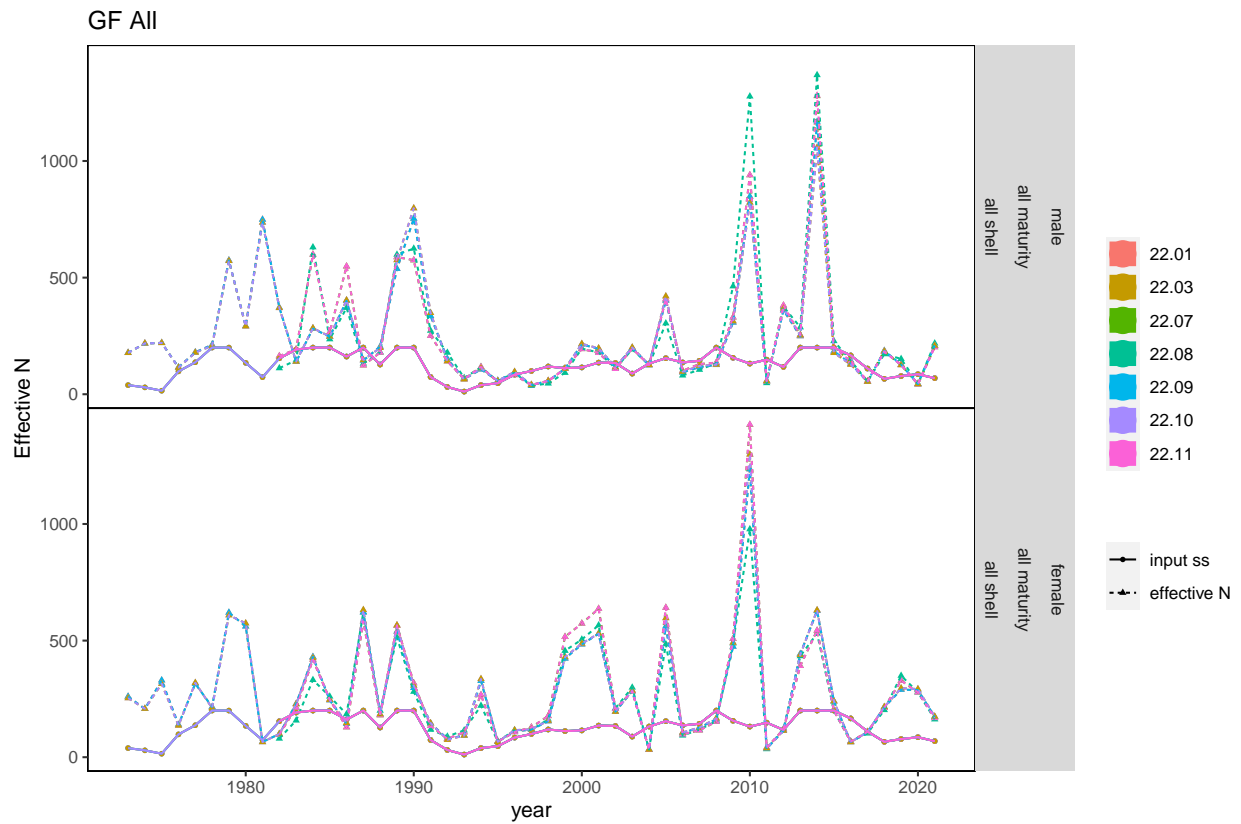


Figure 165: Effective sample sizes compared with input sample sizes for total catch data. from the GF All fishery. Dotted lines are effective N's, solid lines are input sample sizes. Input sample sizes are scaled to sum to 200 in each year across categories. Model 22.03 is the preferred model.



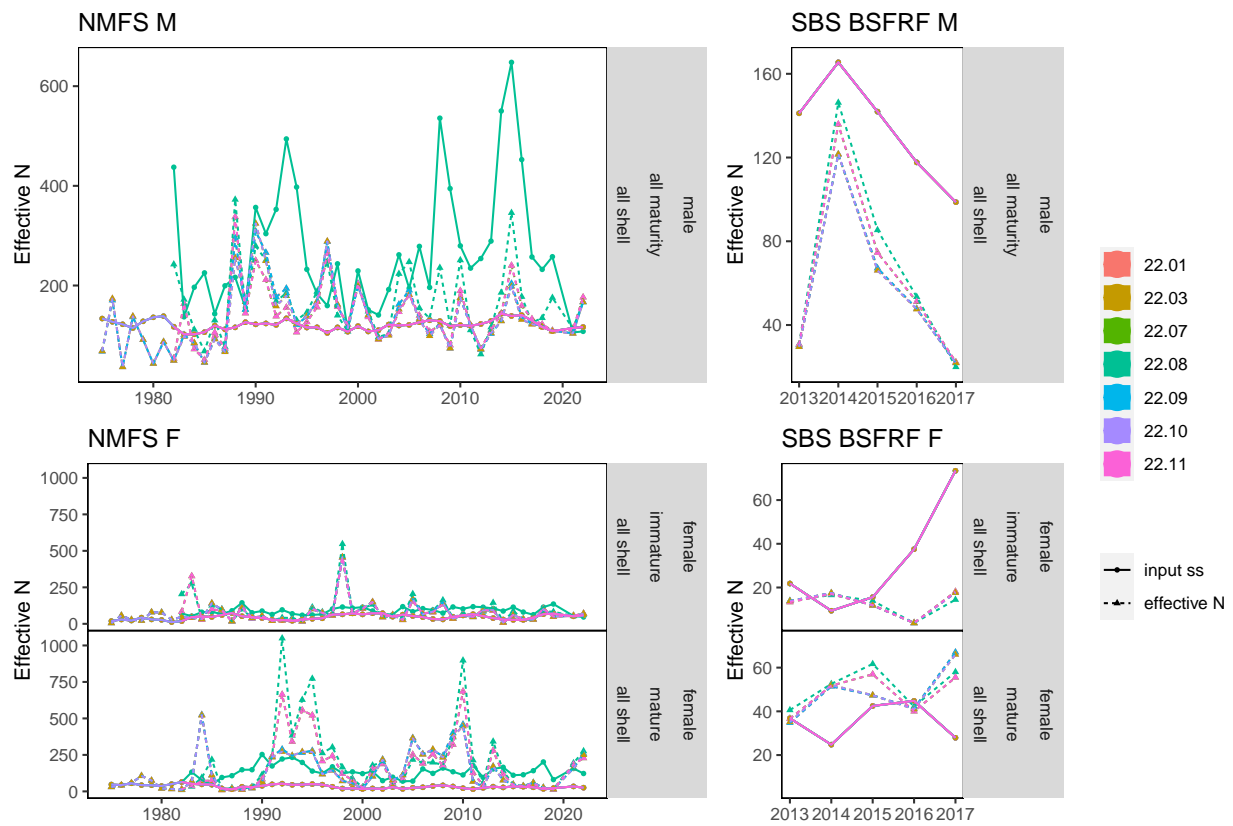


Figure 166: Effective sample sizes compared with input sample sizes for survey data. Dotted lines are effective N's, solid lines are input sample sizes. Input sample sizes are scaled to sum to 200 in each year across categories. Model 22.03 is the preferred model.

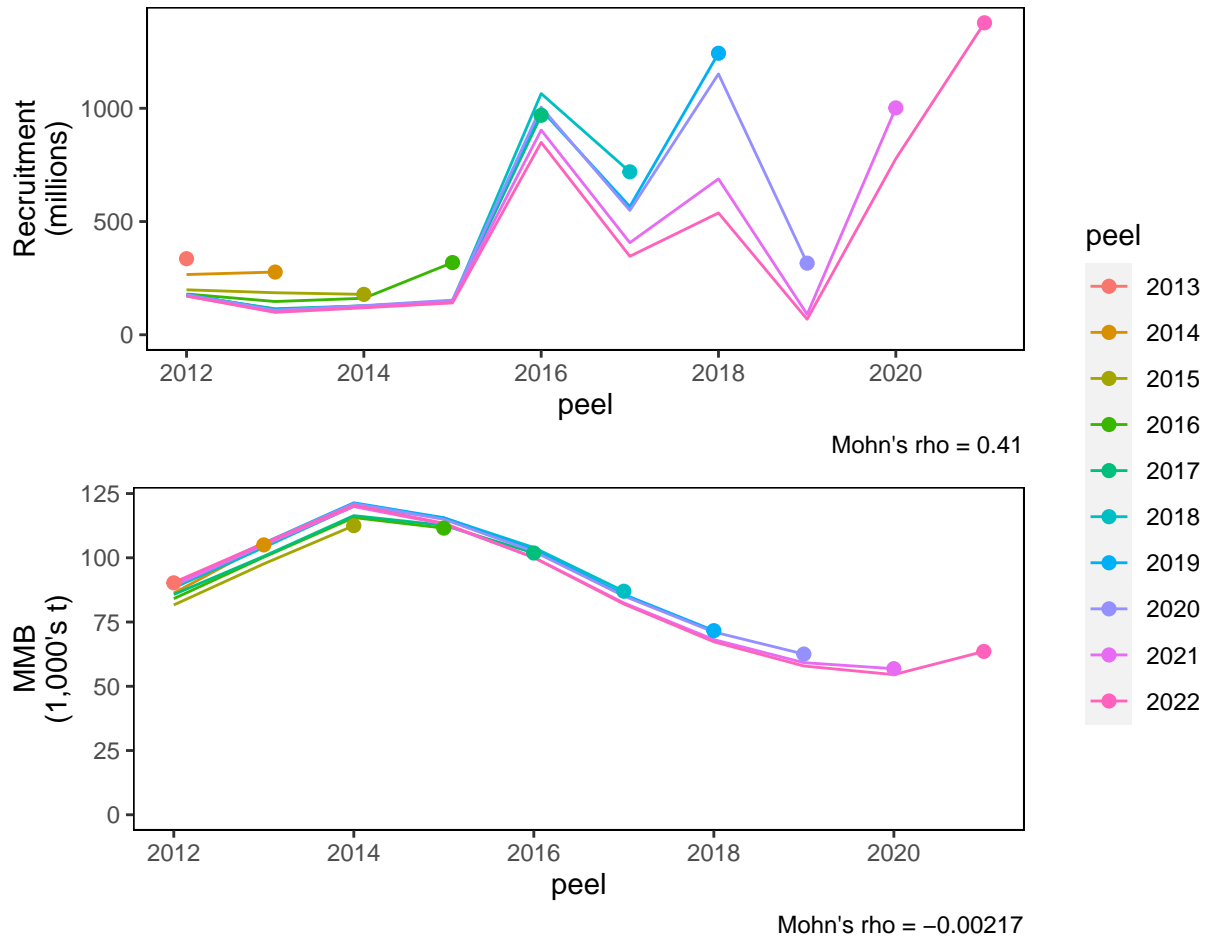


Figure 167: Retrospective analysis for candidate model 22.01. Upper plot: recruitment; lower plot: MMB. The value of Mohn's rho for each time series is given below the respective plot.

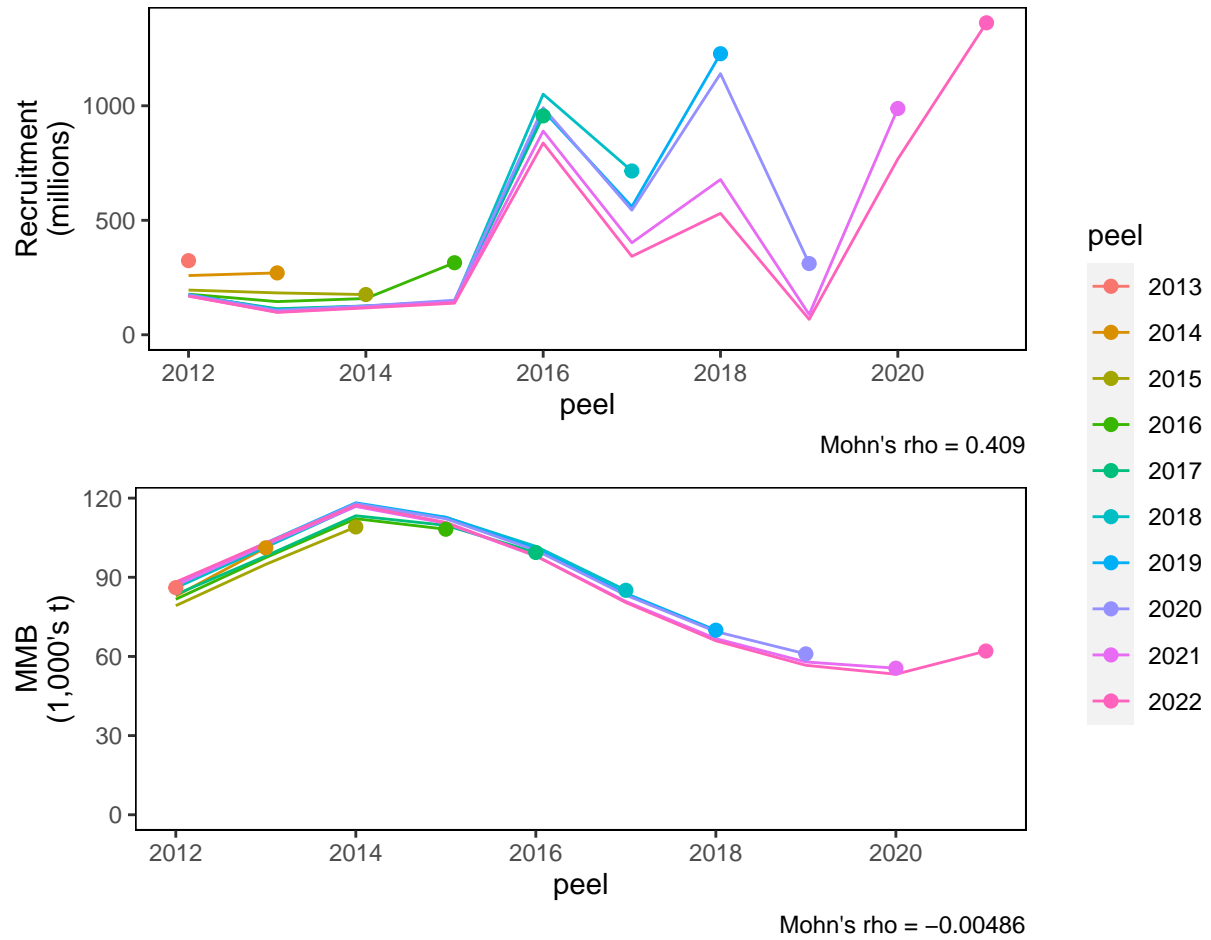


Figure 168: Retrospective analysis for candidate model 22.03. Upper plot: recruitment; lower plot: MMB. The value of Mohn's rho for each time series is given below the respective plot.

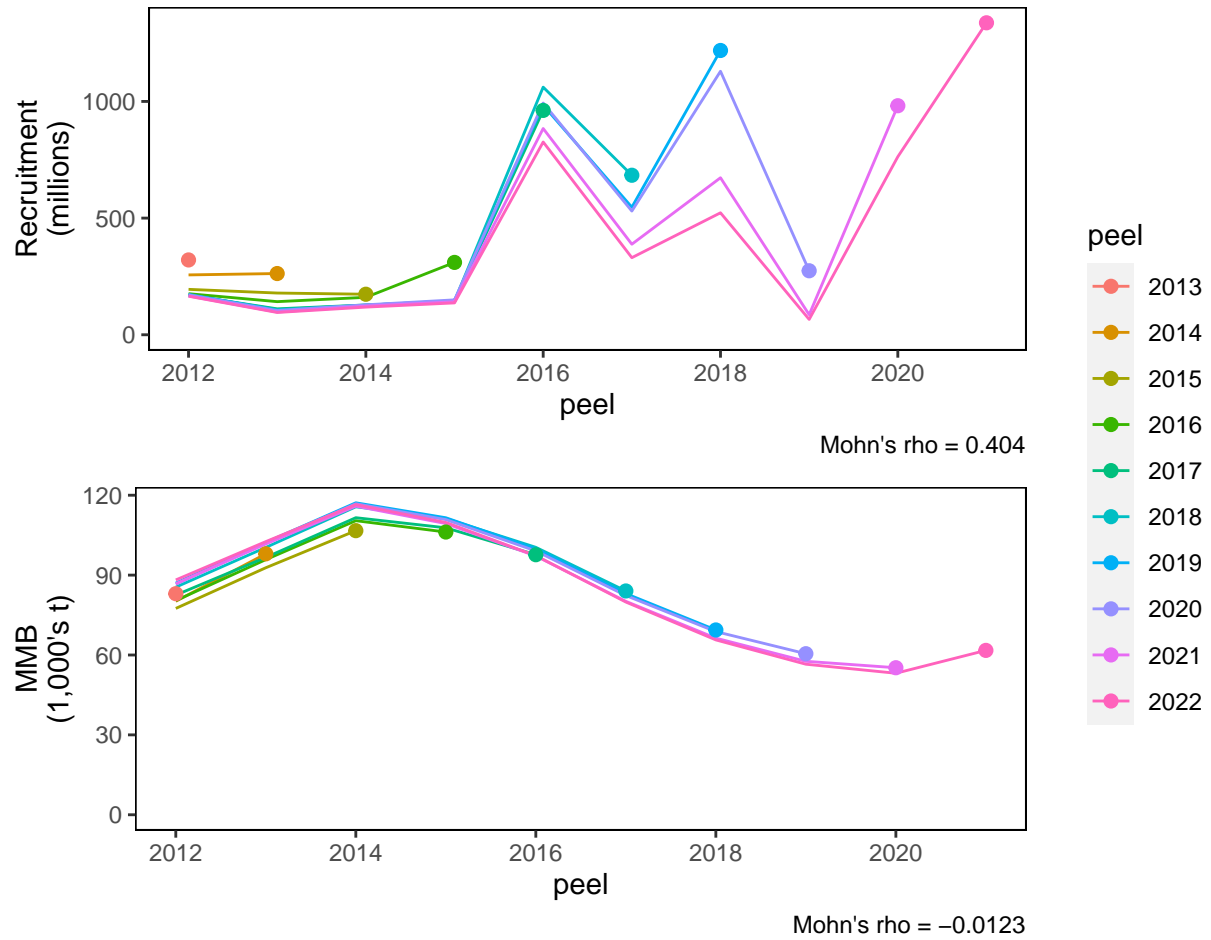


Figure 169: Retrospective analysis for candidate model 22.07. Upper plot: recruitment; lower plot: MMB. The value of Mohn's rho for each time series is given below the respective plot.

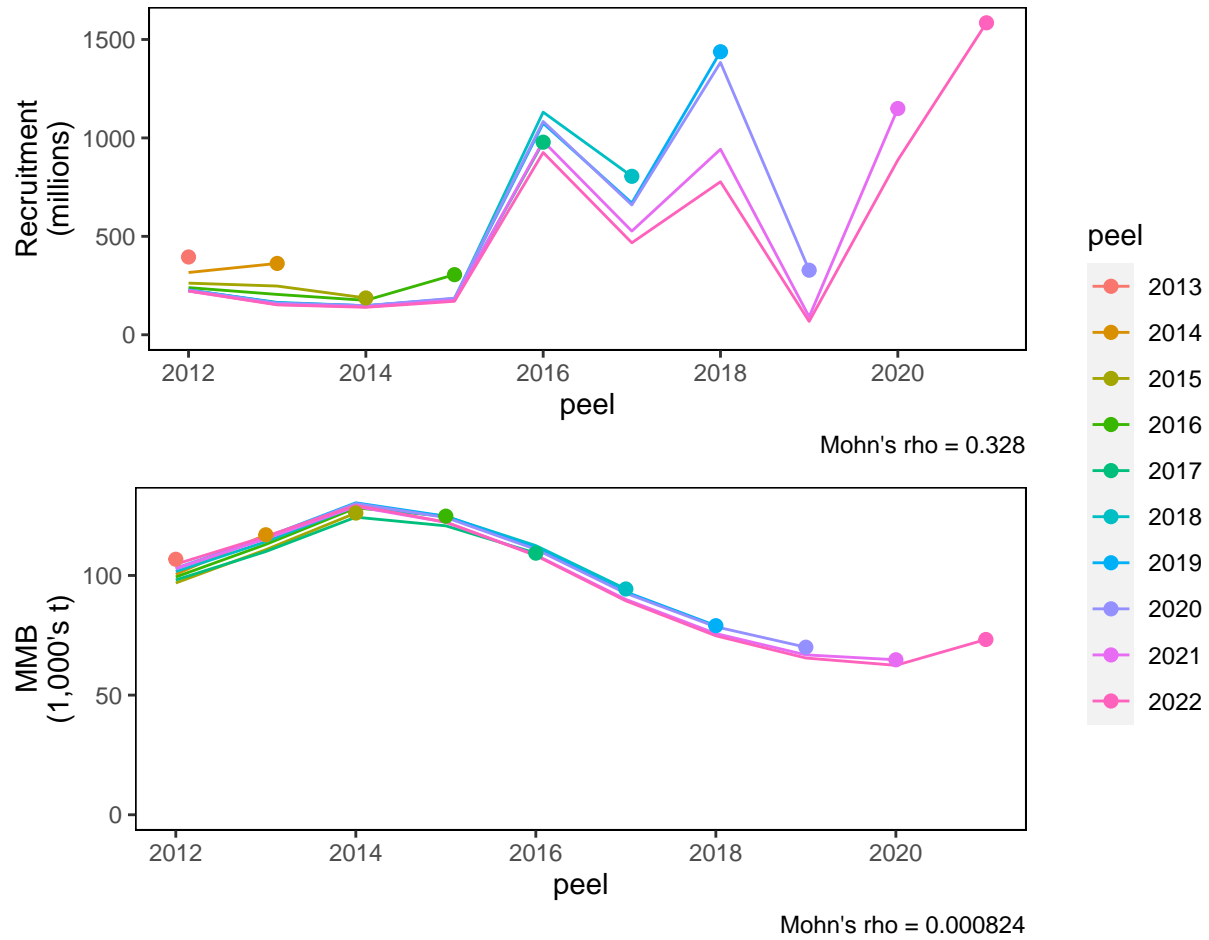


Figure 170: Retrospective analysis for candidate model 22.08. Upper plot: recruitment; lower plot: MMB. The value of Mohn's rho for each time series is given below the respective plot.

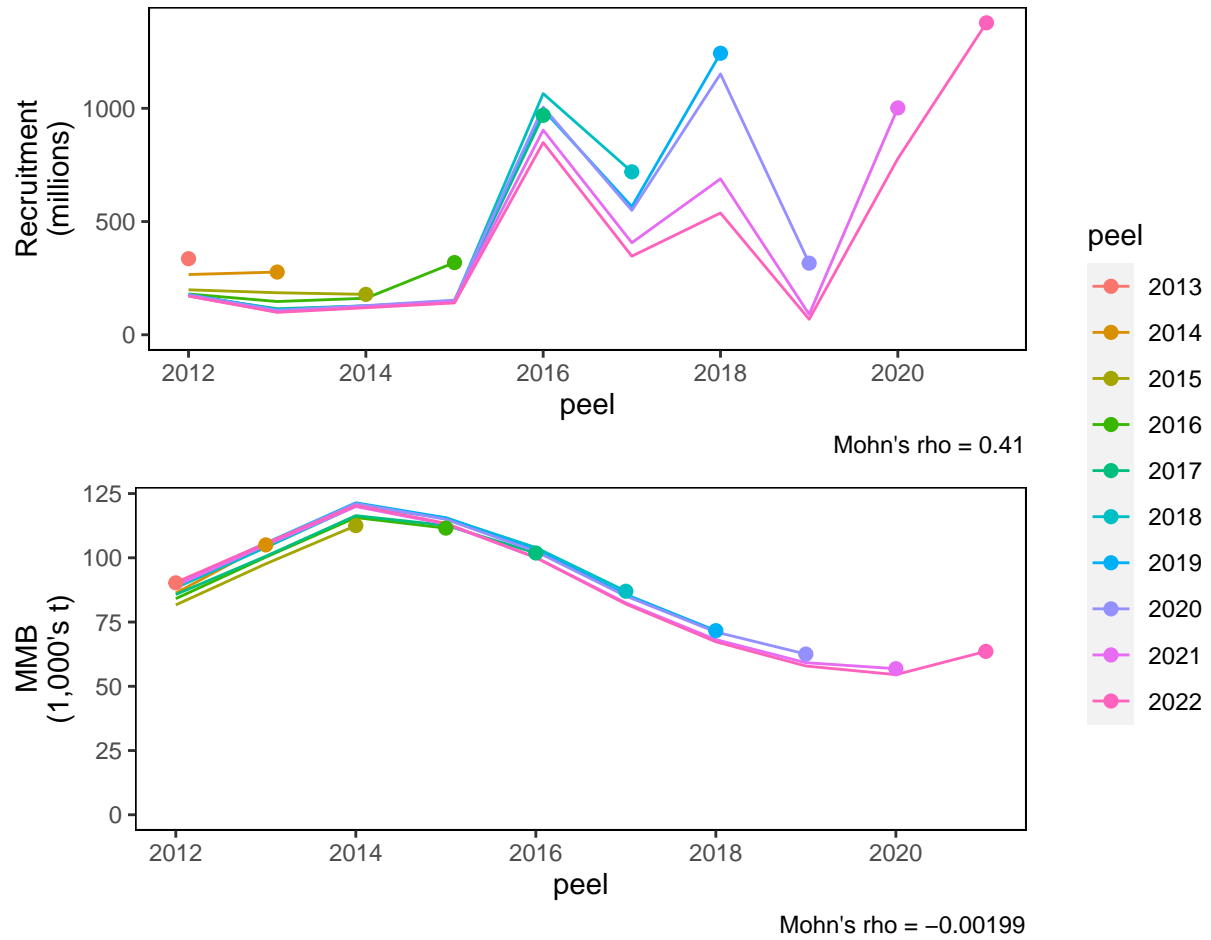


Figure 171: Retrospective analysis for candidate model 22.09. Upper plot: recruitment; lower plot: MMB. The value of Mohn's rho for each time series is given below the respective plot.

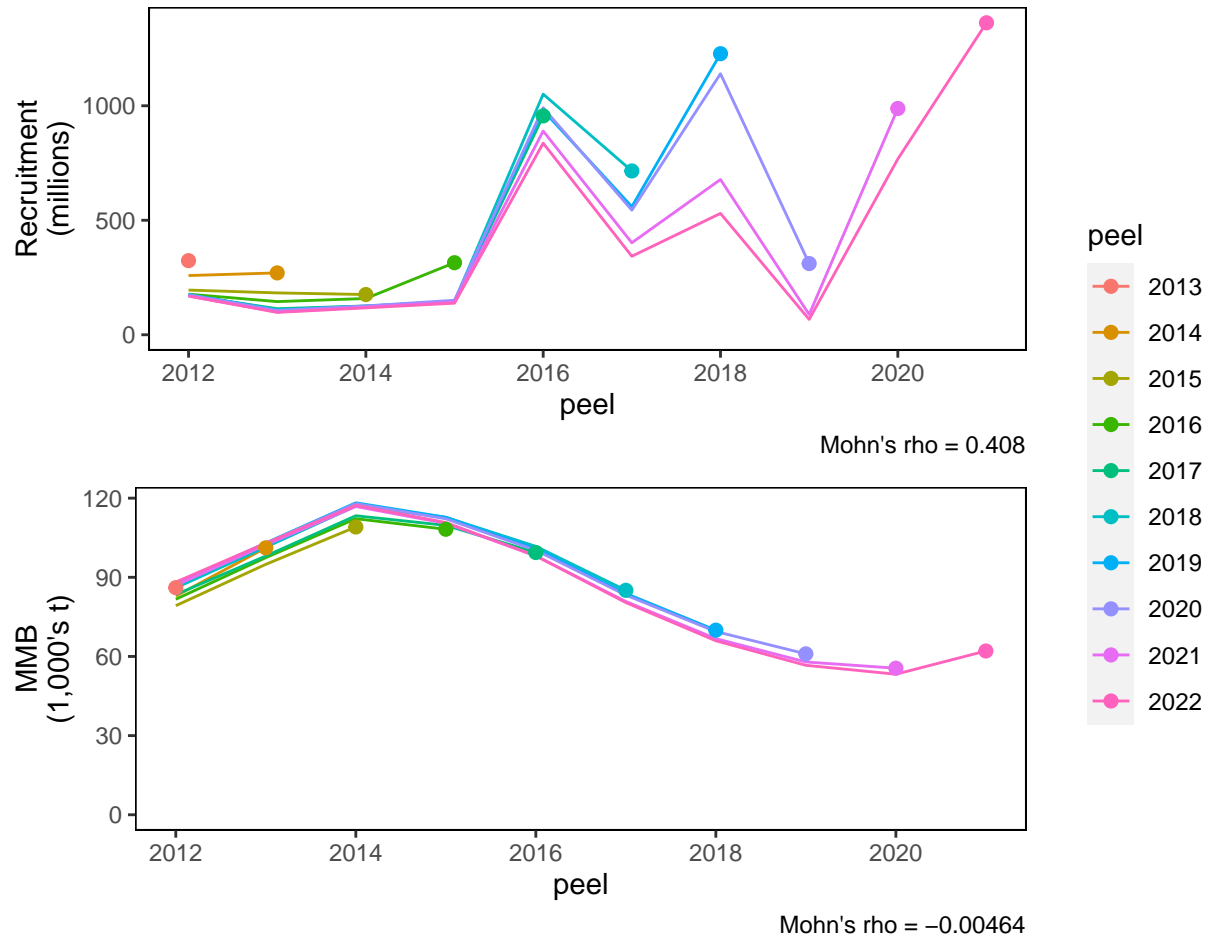


Figure 172: Retrospective analysis for candidate model 22.10. Upper plot: recruitment; lower plot: MMB. The value of Mohn's rho for each time series is given below the respective plot.

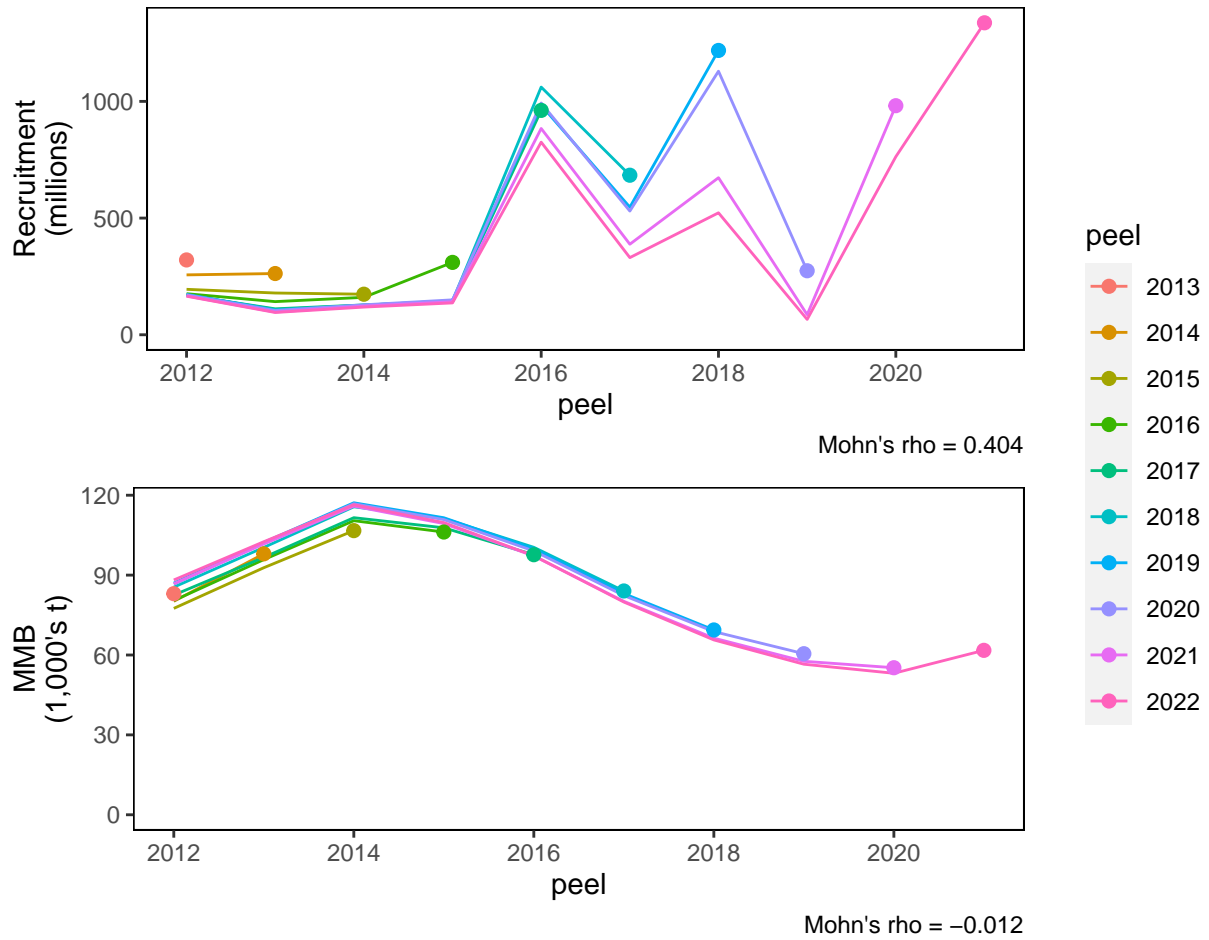


Figure 173: Retrospective analysis for candidate model 22.11. Upper plot: recruitment; lower plot: MMB. The value of Mohn's rho for each time series is given below the respective plot.