Appendix F3a: Model Comparisons for AG1, AG2a, AG2b and AG3

William Stockhausen

Population processes

Natural mortality
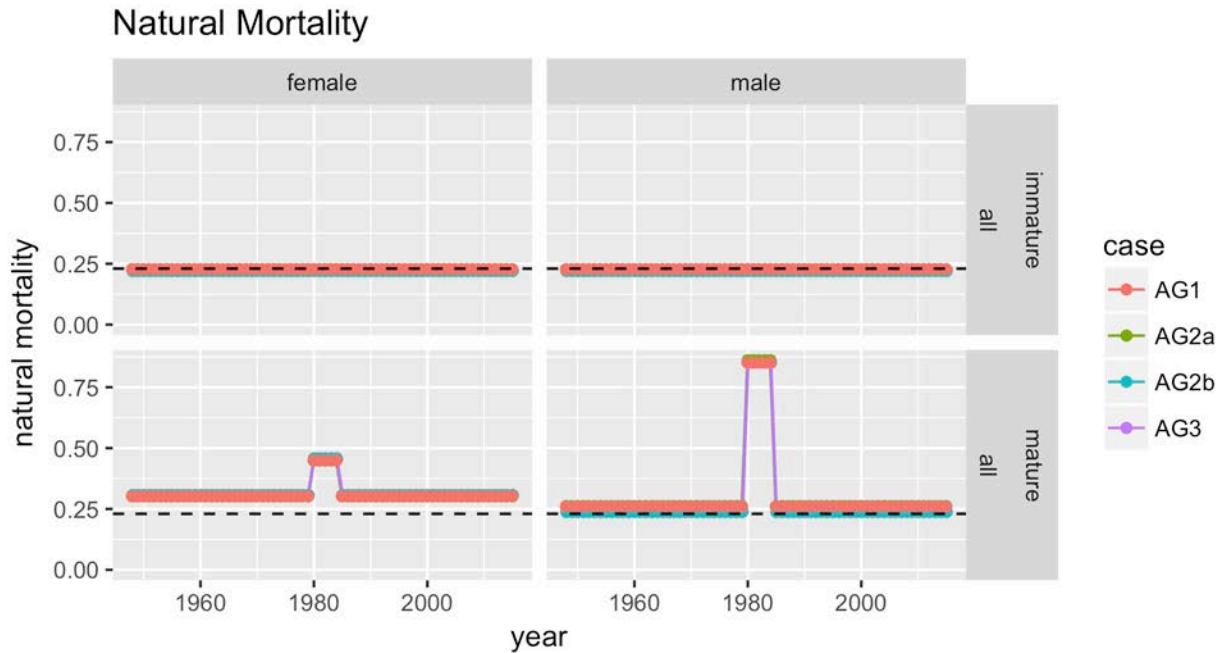

Figure 1. Estimated natural mortality rates, by year.

Probability of terminal molt
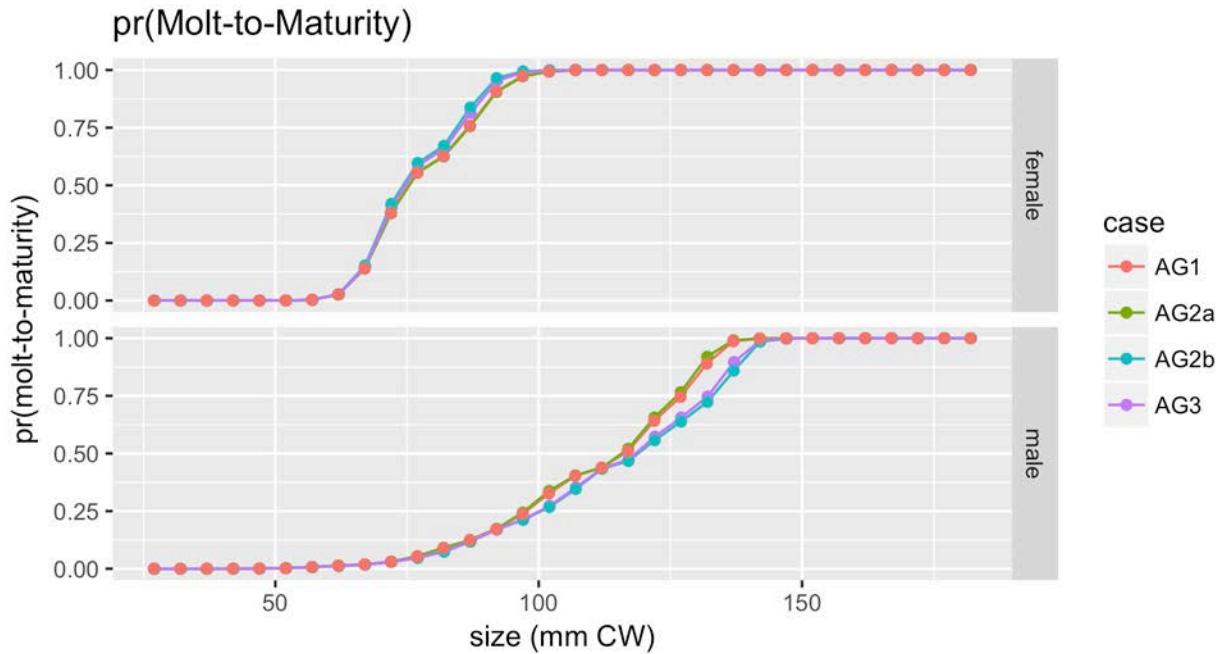
Figure 2. Probability of terminal molt.

Mean growth
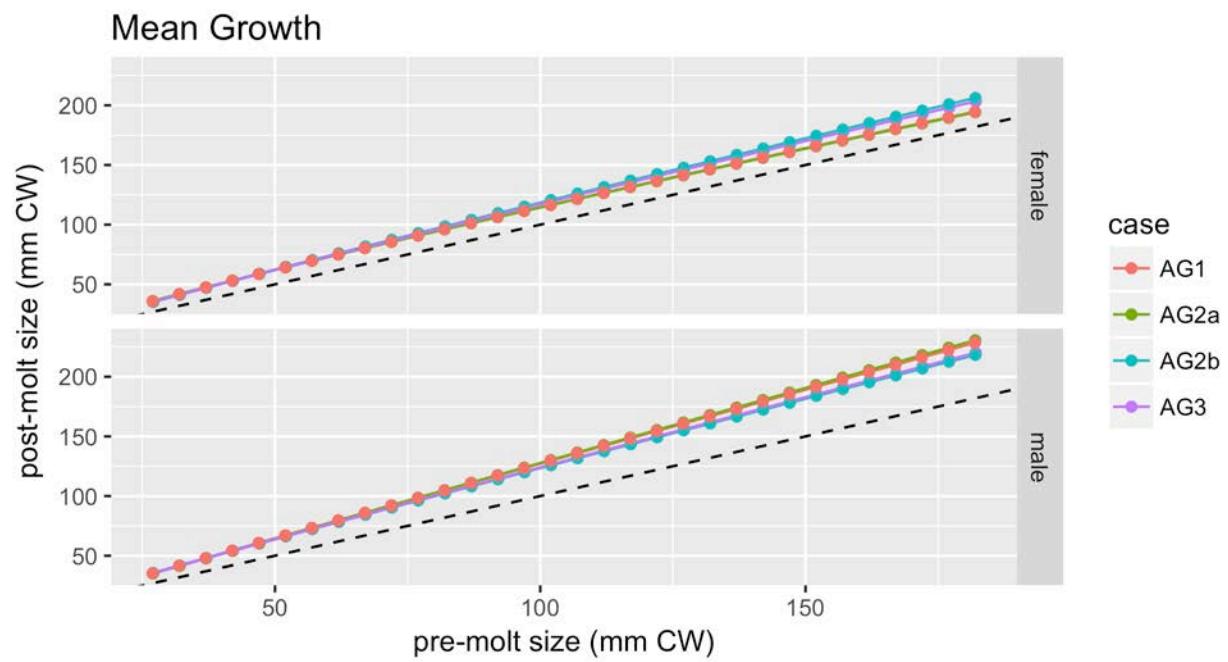
Figure 3. Mean growth.

Growth matrices
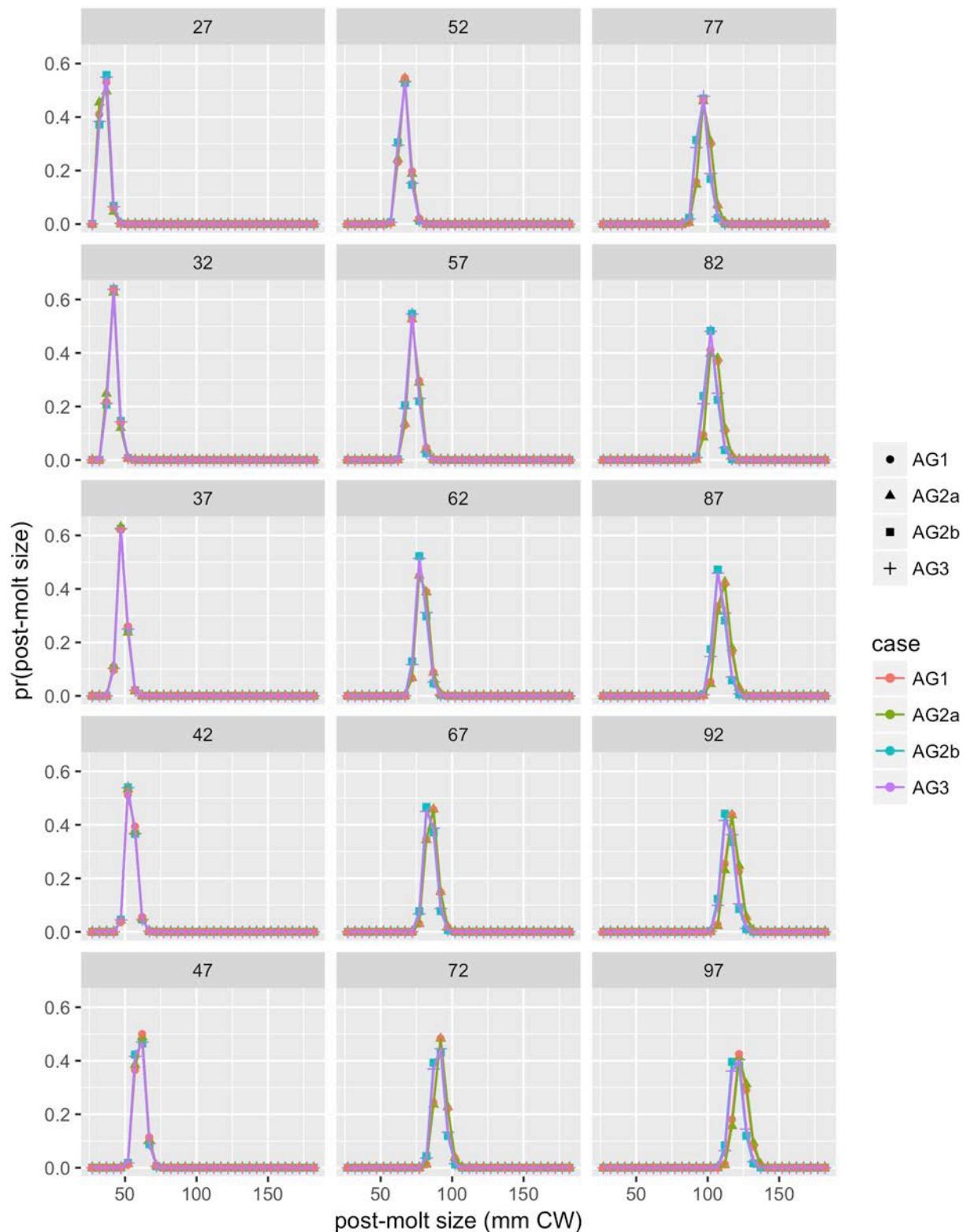
Figure 4. Growth matrices for males during 1948-2015, page 1.

male growth: 1948-2015
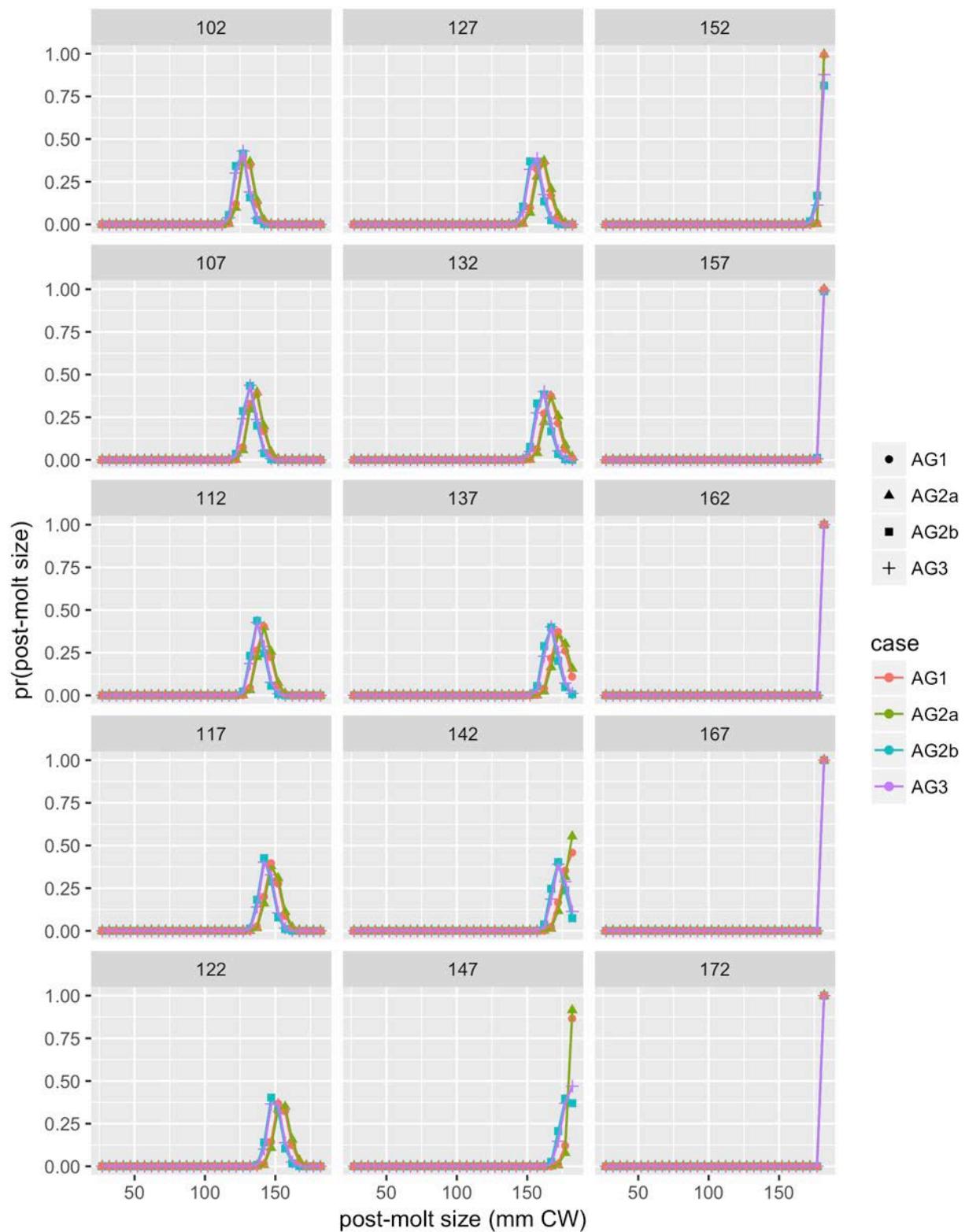
Figure 5. Growth matrices for males during 1948-2015, page 2.

male growth: 1948-2015
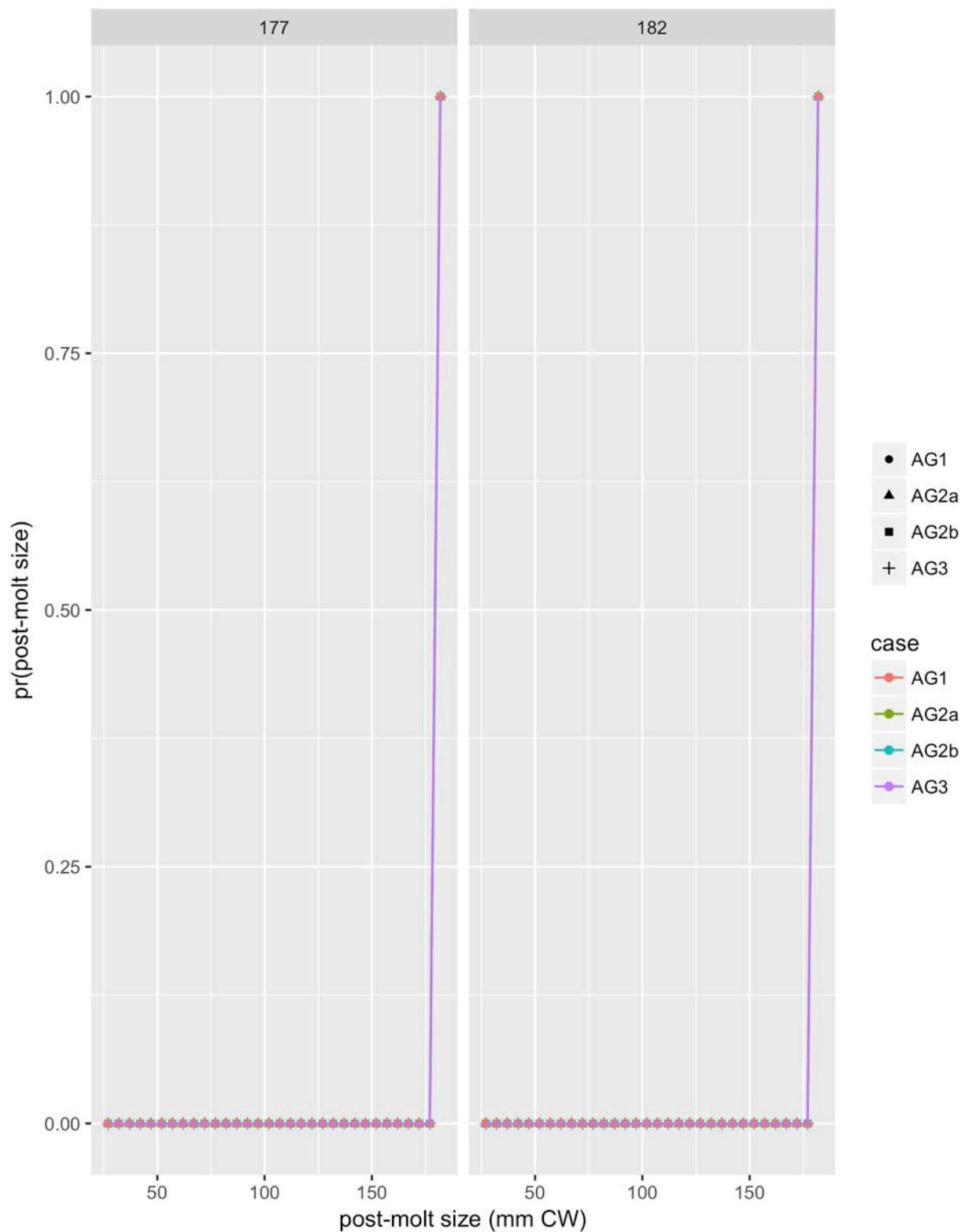
Figure 6. Growth matrices for males during 1948-2015, page 3.
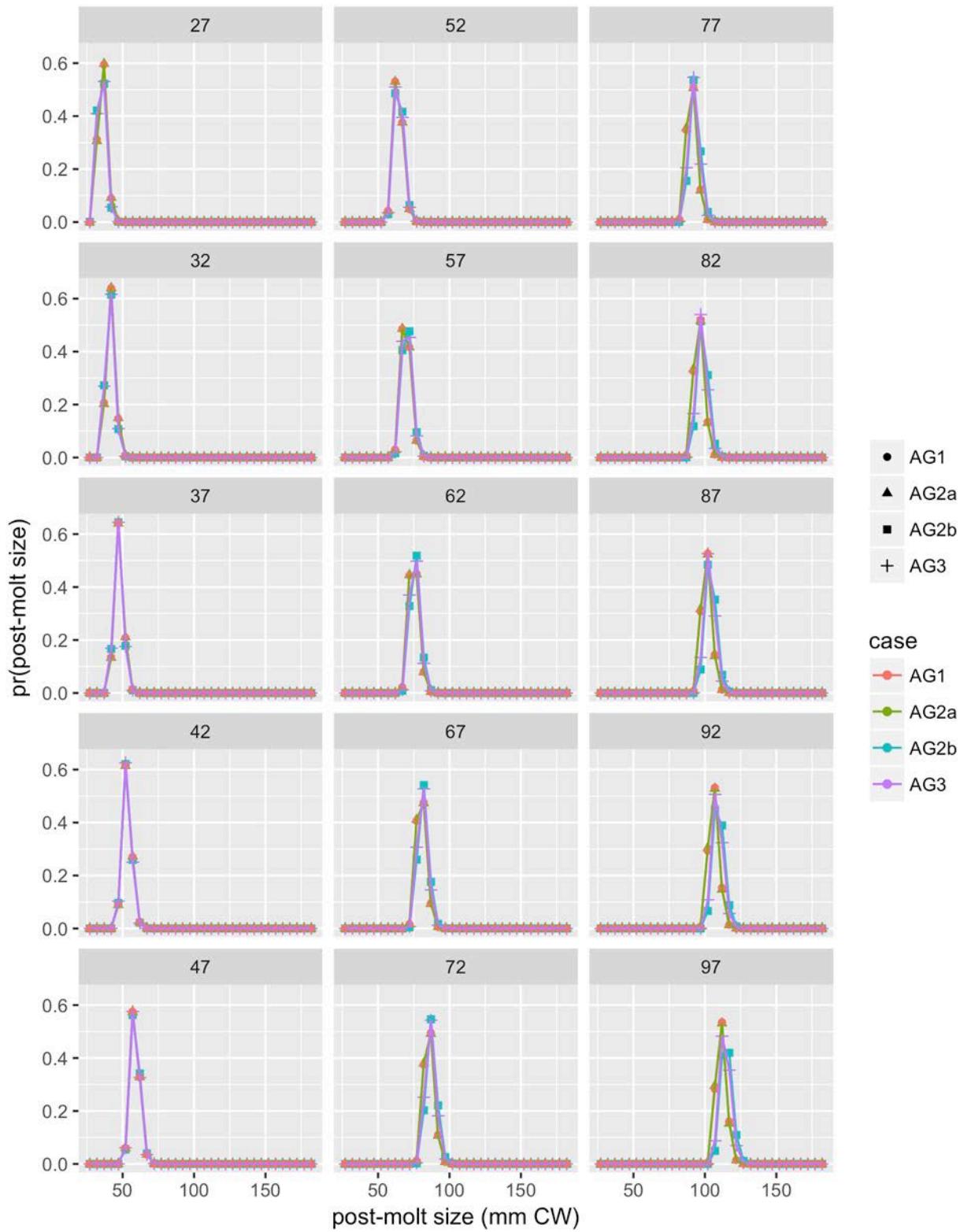
Figure 7. Growth matrices for females during 1948-2015, page 1.
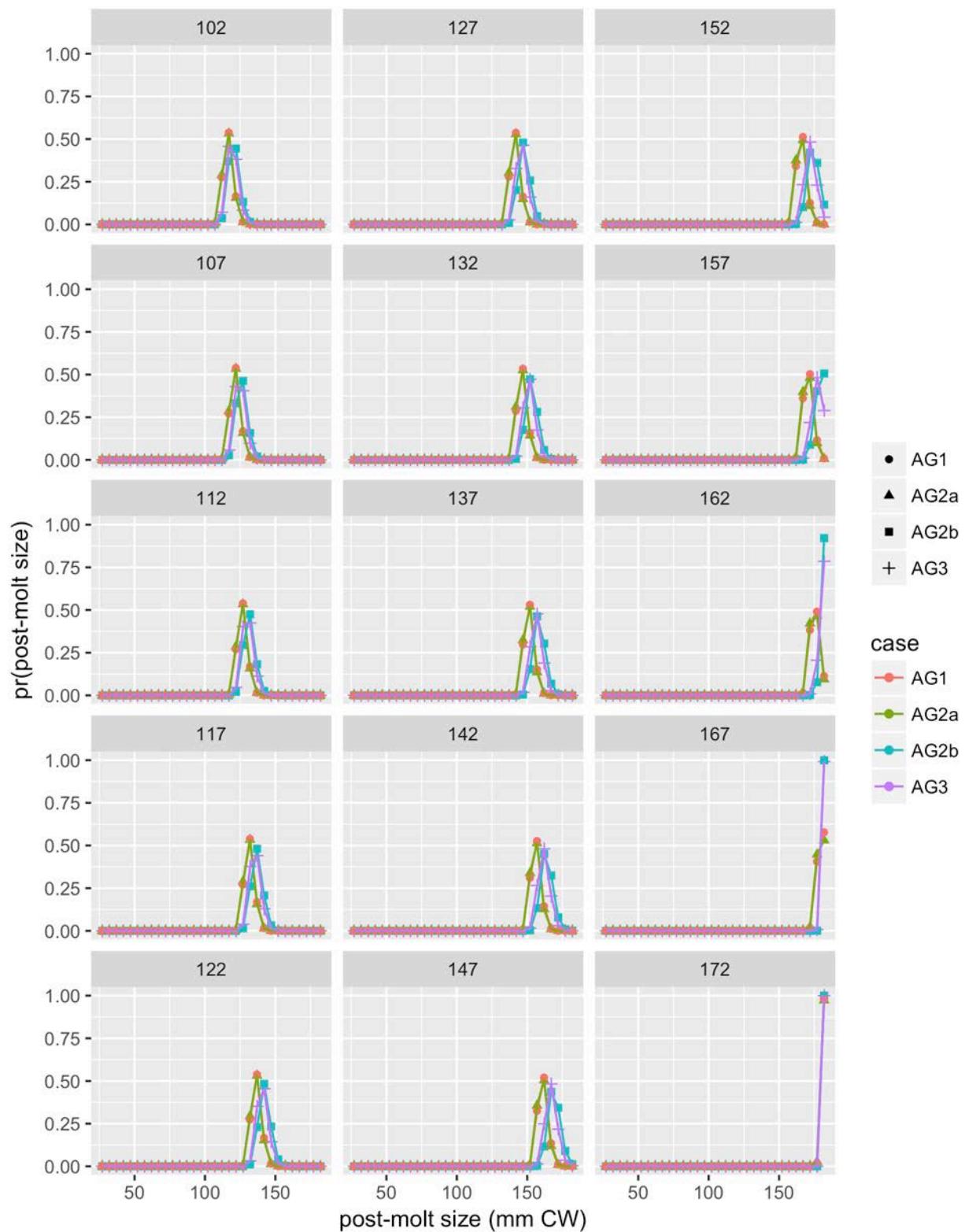
Figure 8. Growth matrices for females during 1948-2015, page 2.
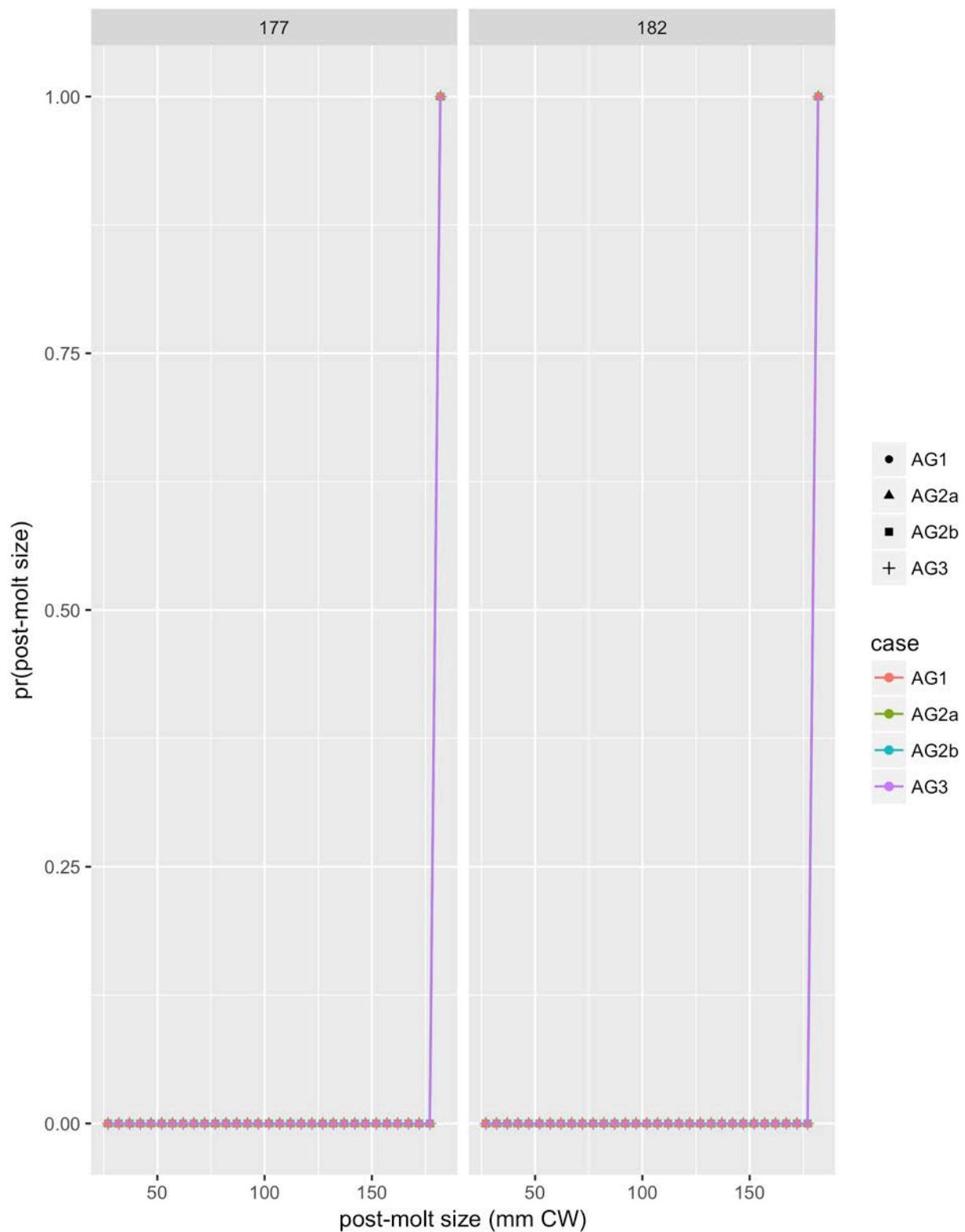
Figure 9. Growth matrices for females during 1948-2015, page 3.

Size distribution for recruits
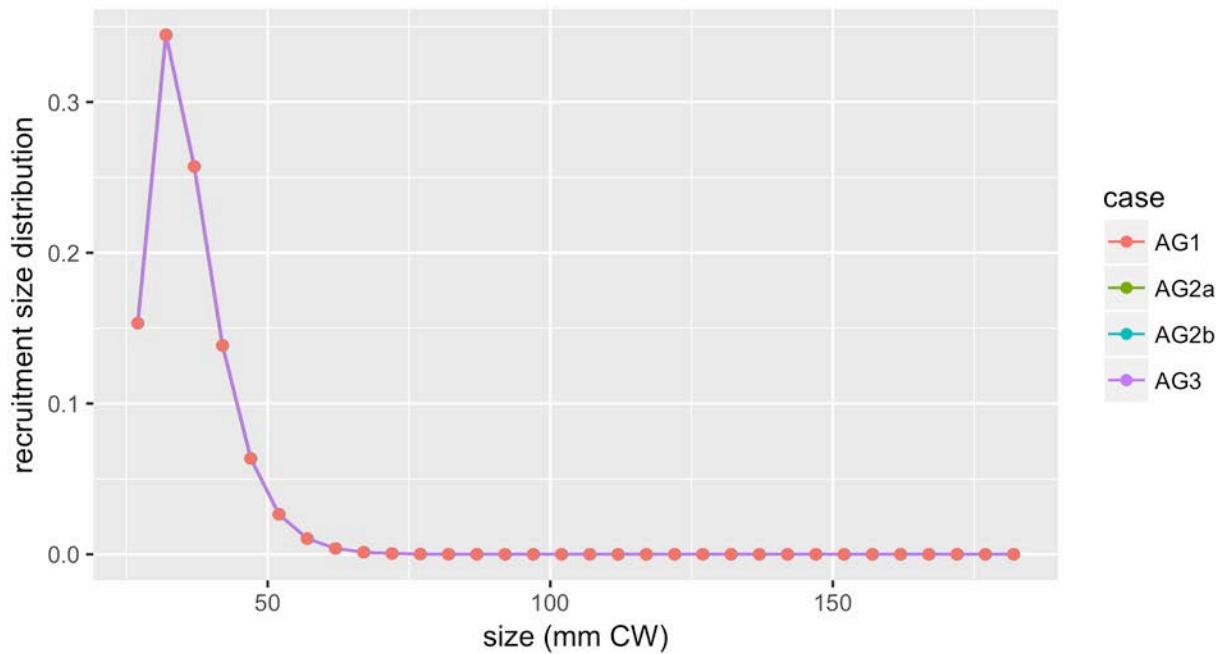
Figure 10. Size distribution for recruits.

Population results

Recruitment
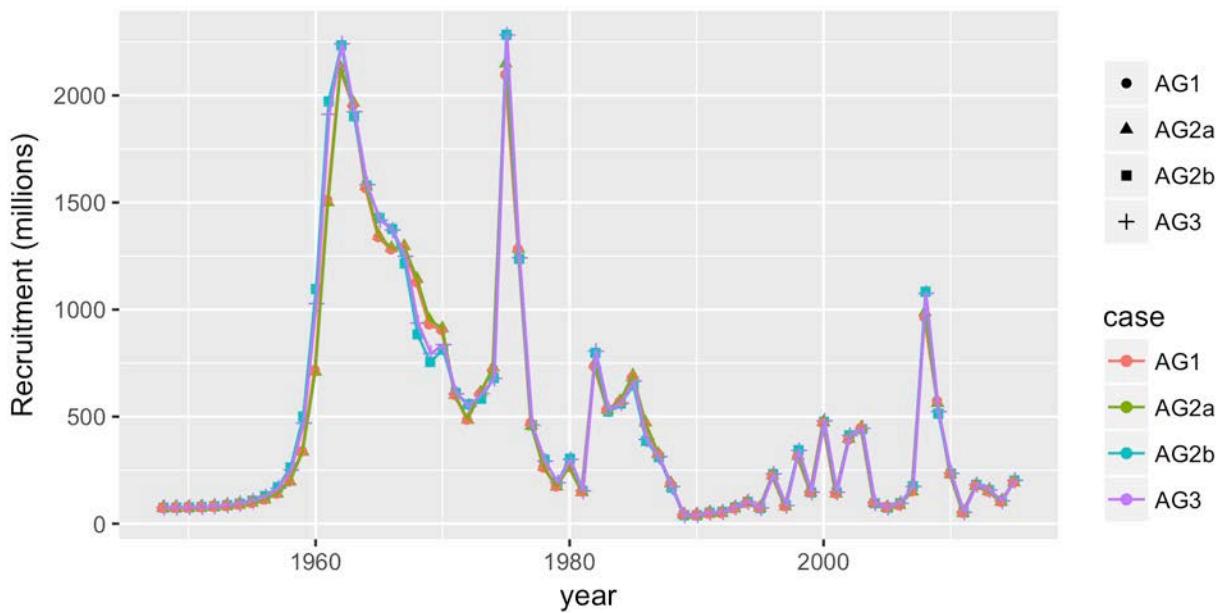
Figure 11. Estimated annual recruitment.
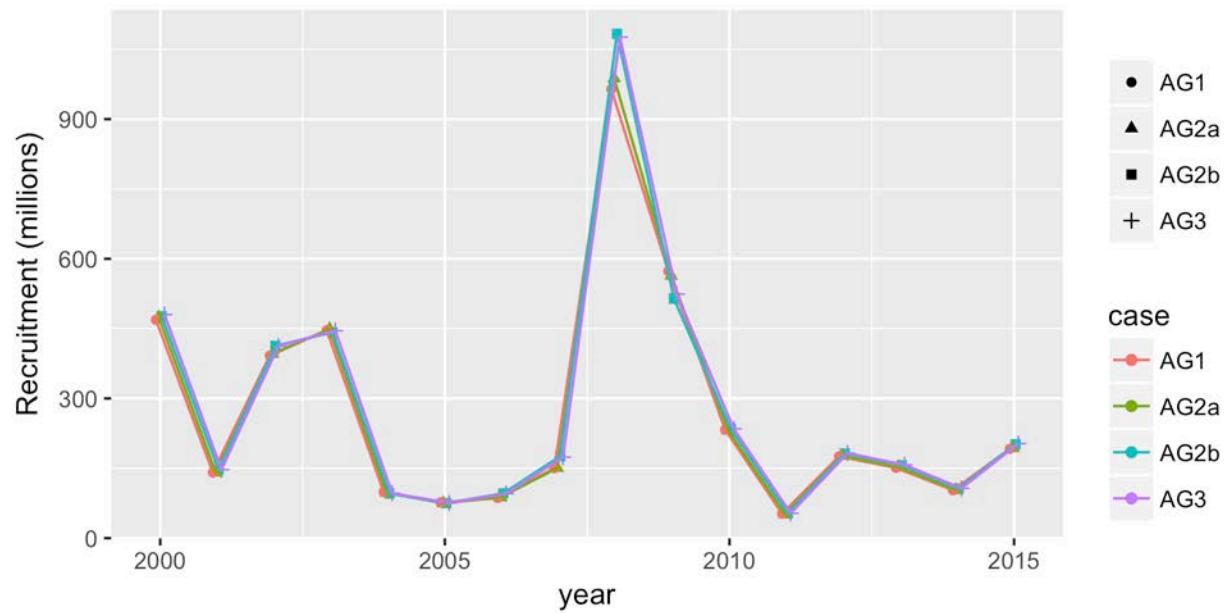
Figure 12. Estimated recent recruitment.
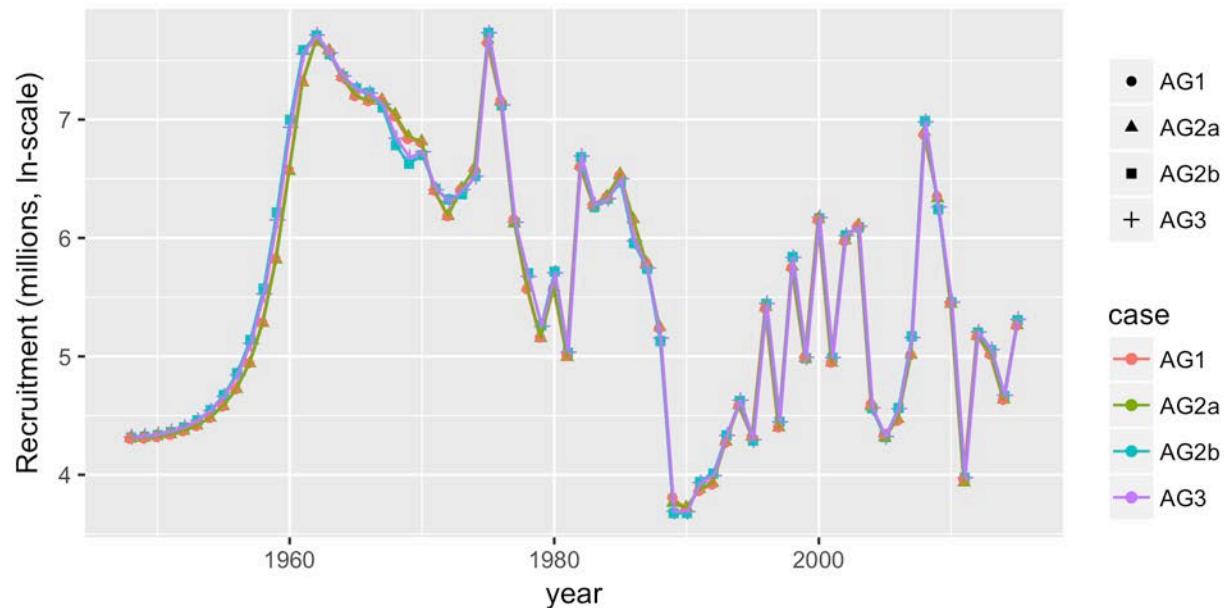
Figure 13. Estimated annual recruitment, on ln-scale.
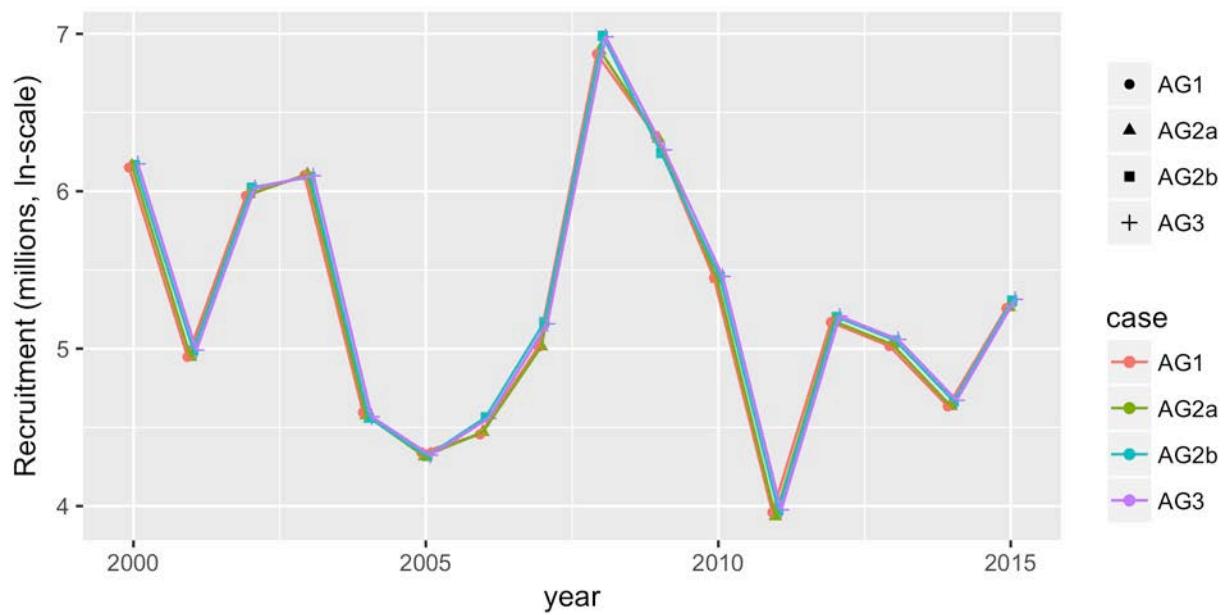
Figure 14. Estimated recent recruitment, on ln-scale.

Mature biomass
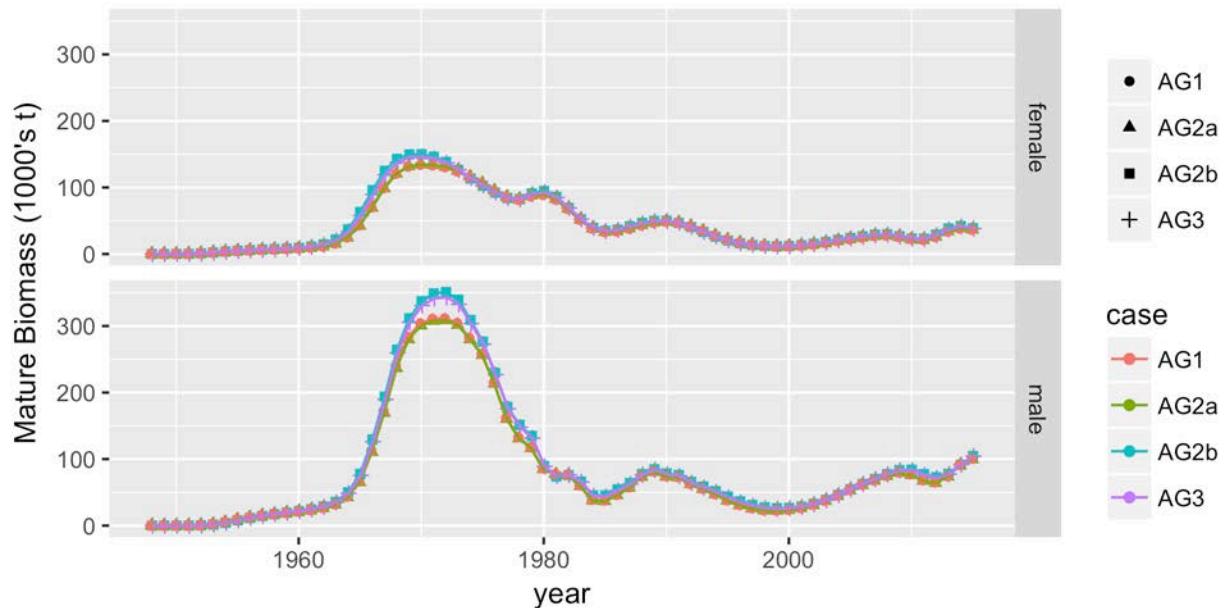
Figure 15. Estimated annual mature biomass.
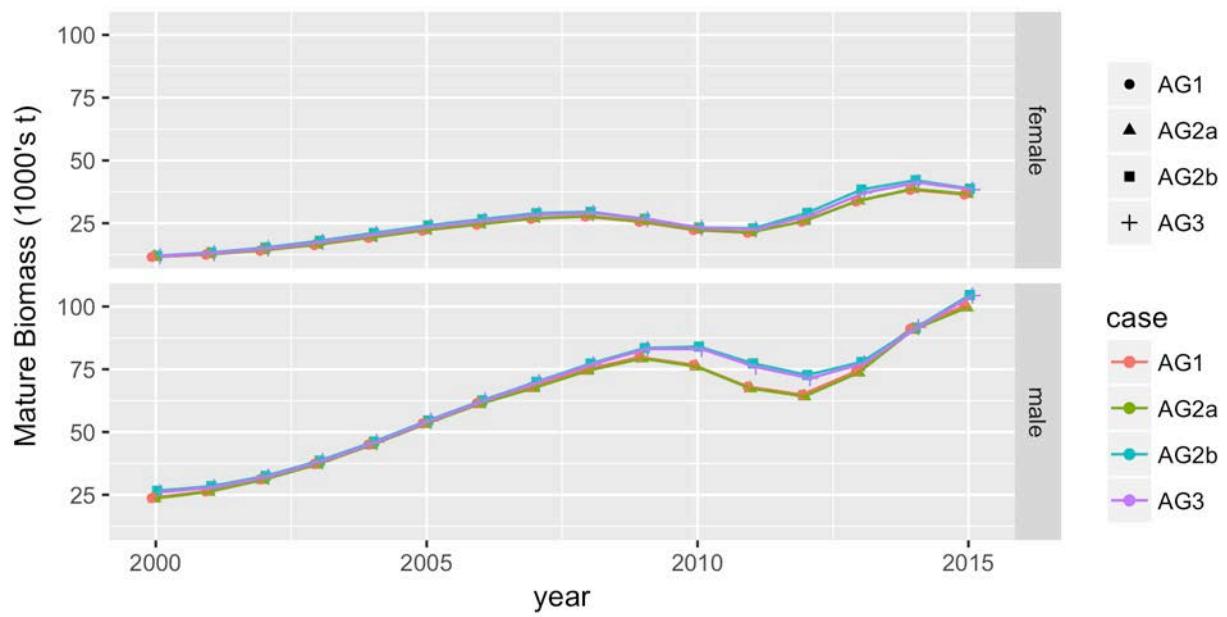
Figure 16. Estimated recent mature biomass.
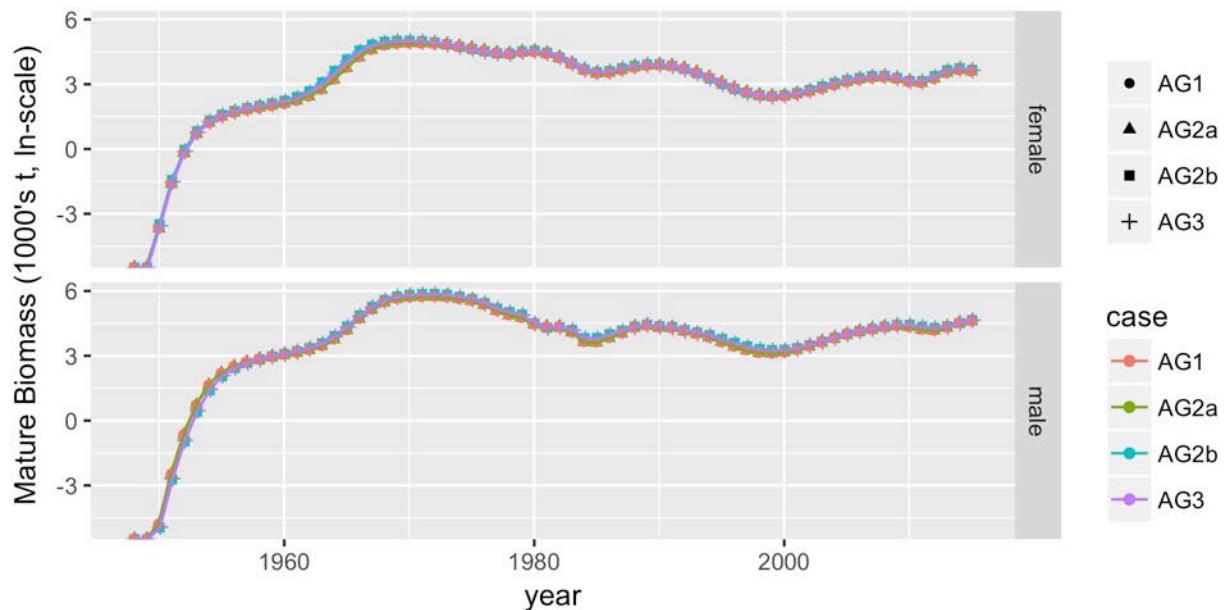
Figure 17. Estimated annual mature biomass, on ln-scale.
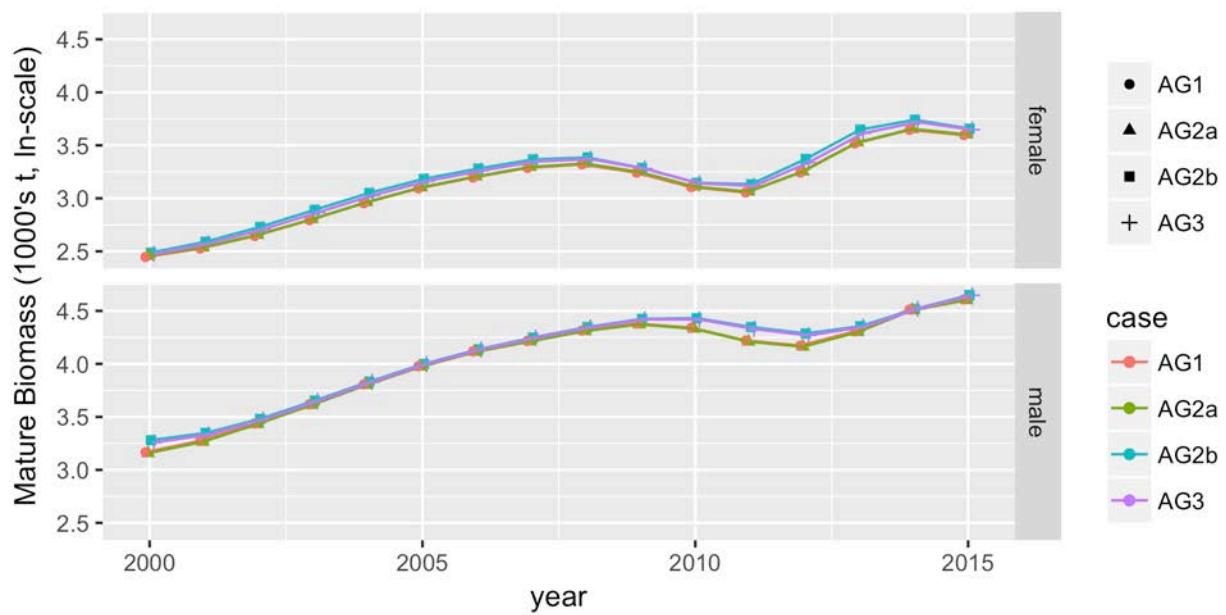
Figure 18. Estimated recent mature biomass, on ln-scale.

**Population abundance**
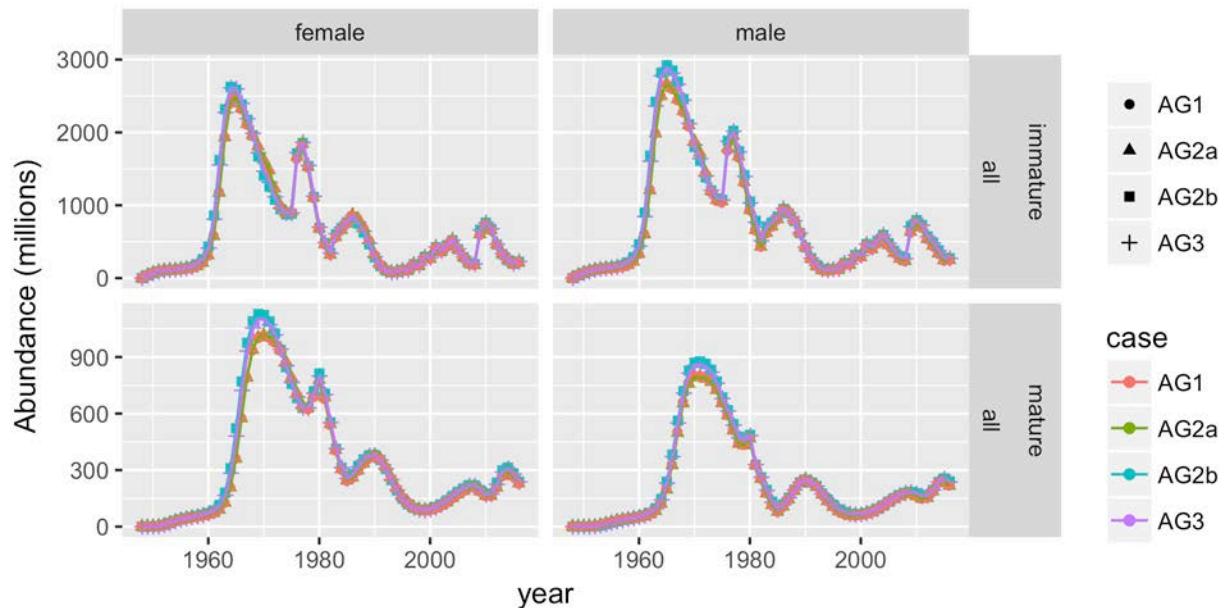
Figure 19. Population abundance trends.
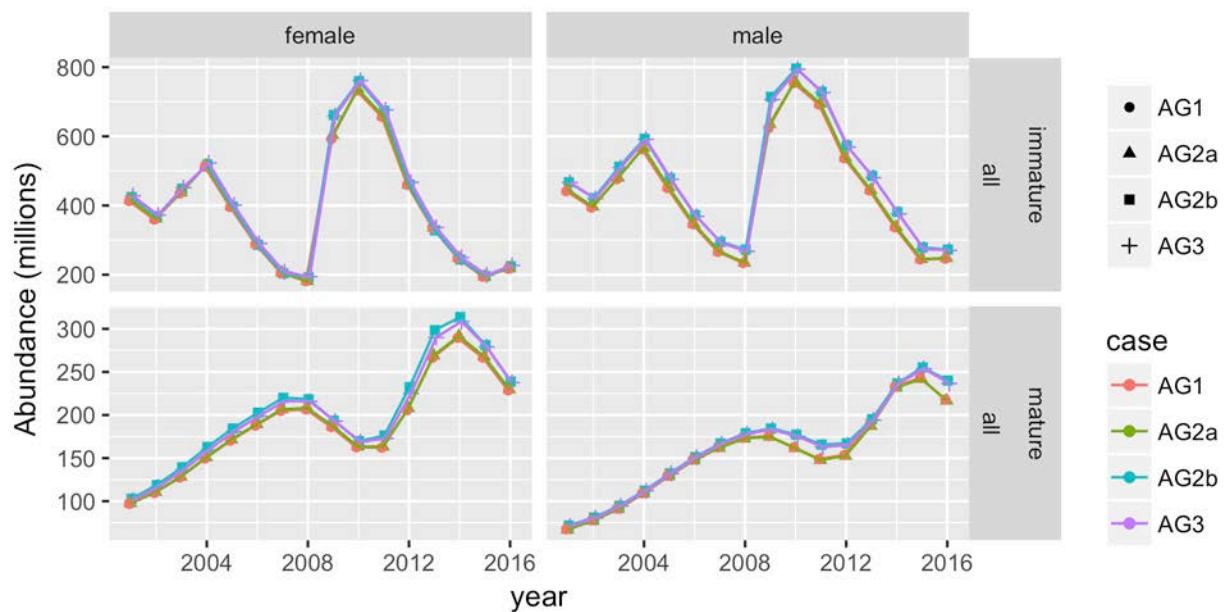
Figure 20. Recent population abundance trends.
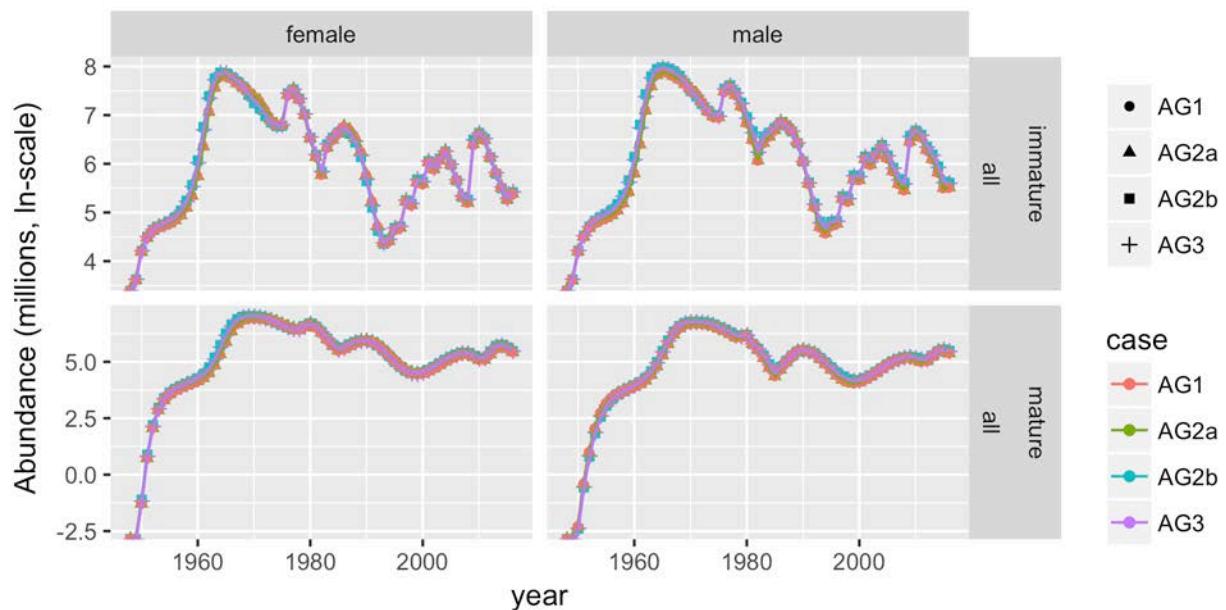
Figure 21. Ln-scale population abundance trends.
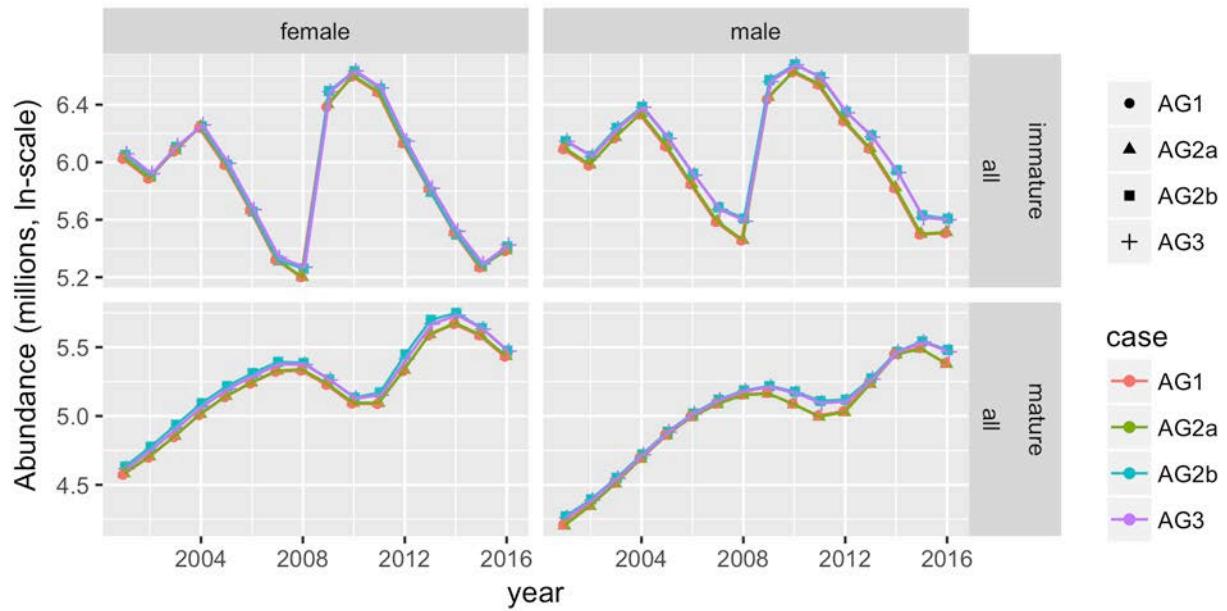
Figure 22. Recent ln-scale population abundance trends.

Biomass
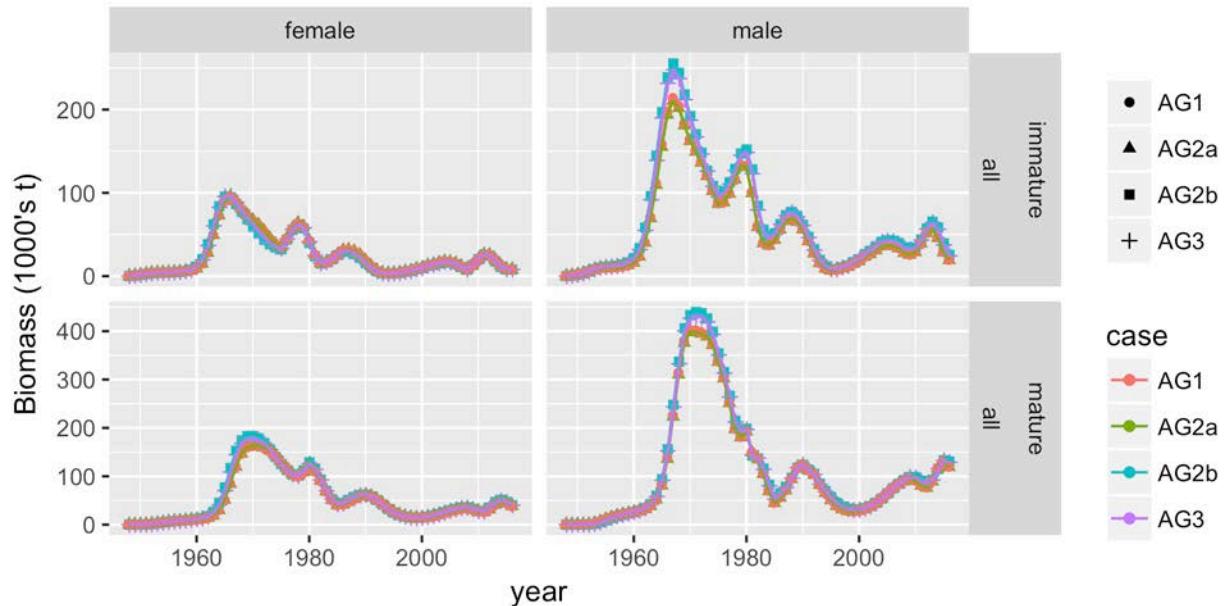
Figure 23. Population biomass trends.
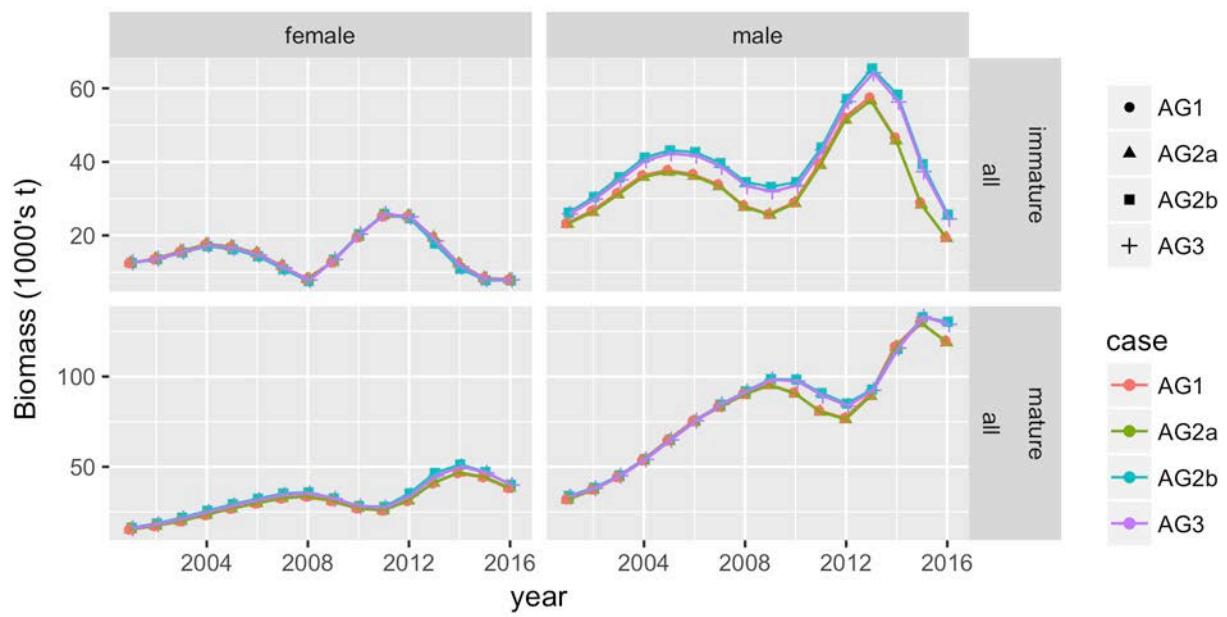
Figure 24. Recent population biomass trends.
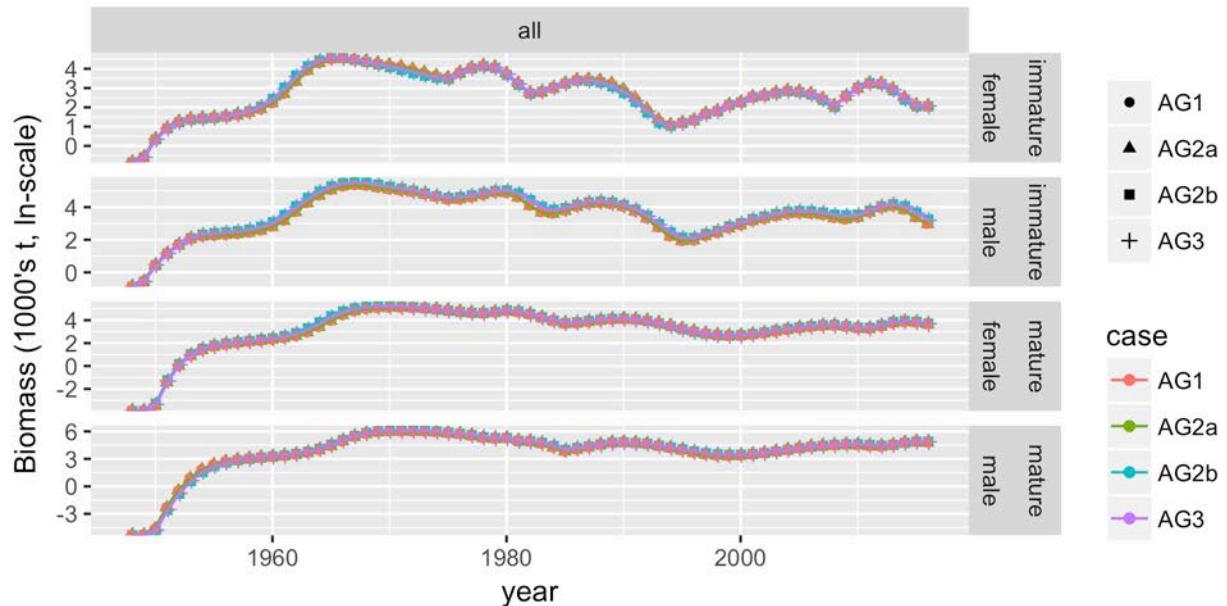
Figure 25. Ln-scale population biomass trends.
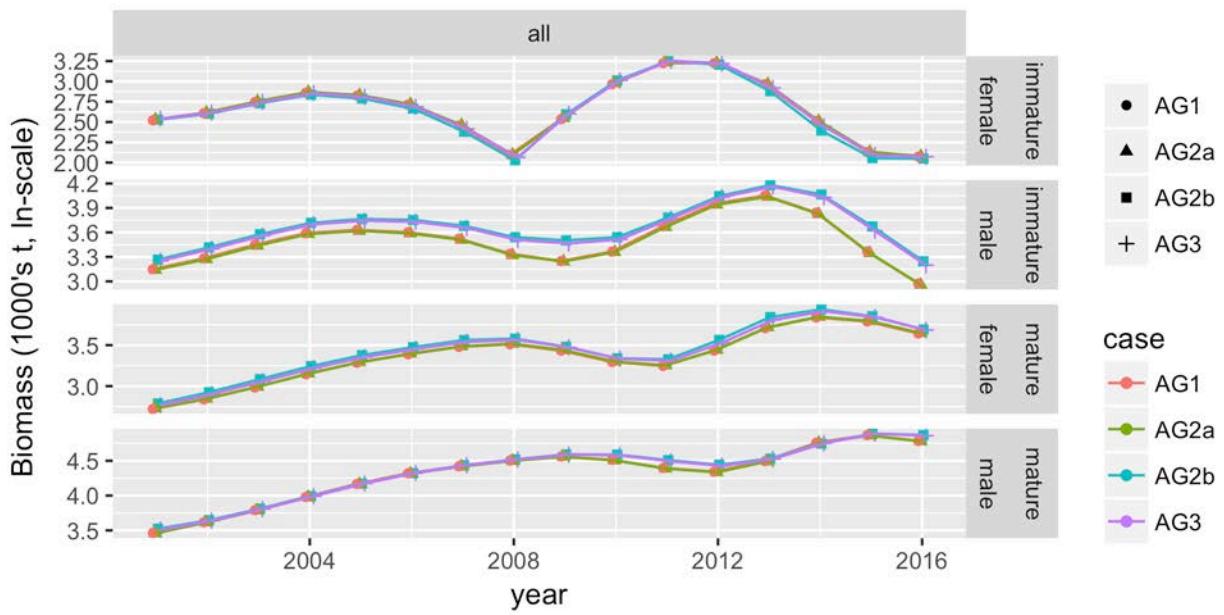
Figure 26. Recent ln-scale population biomass trends.

Surveys

Survey catchability
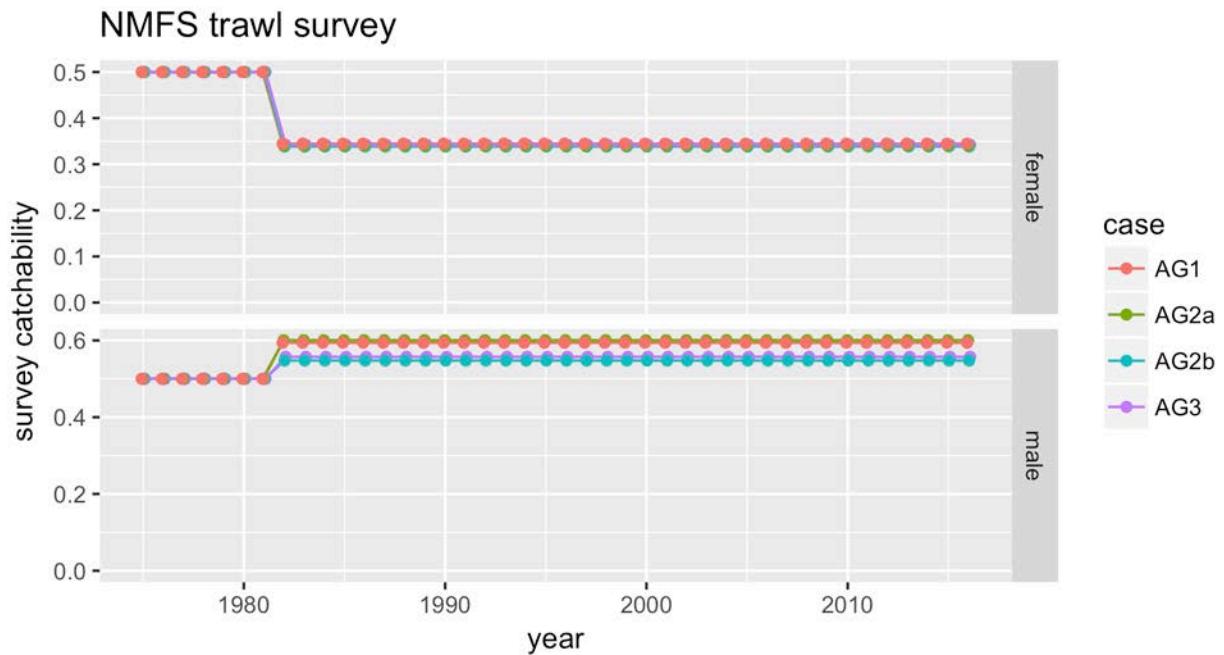
Figure 27. Survey catchabilities for NMFS trawl survey.

Survey selectivity functions
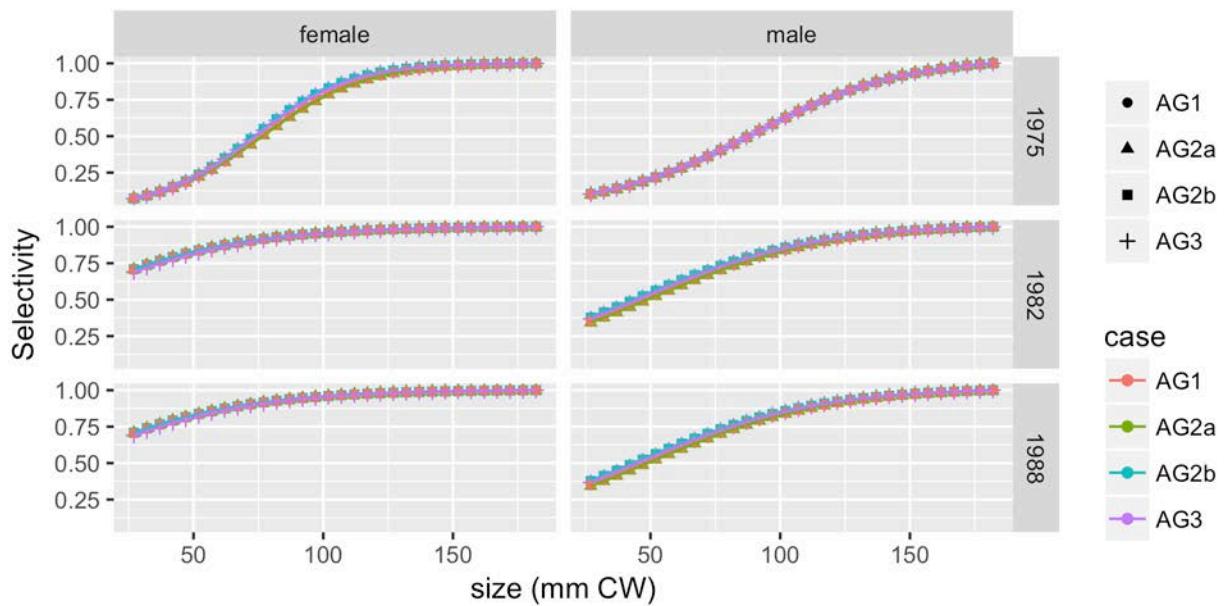
NMFS trawl survey.1

Survey abundance
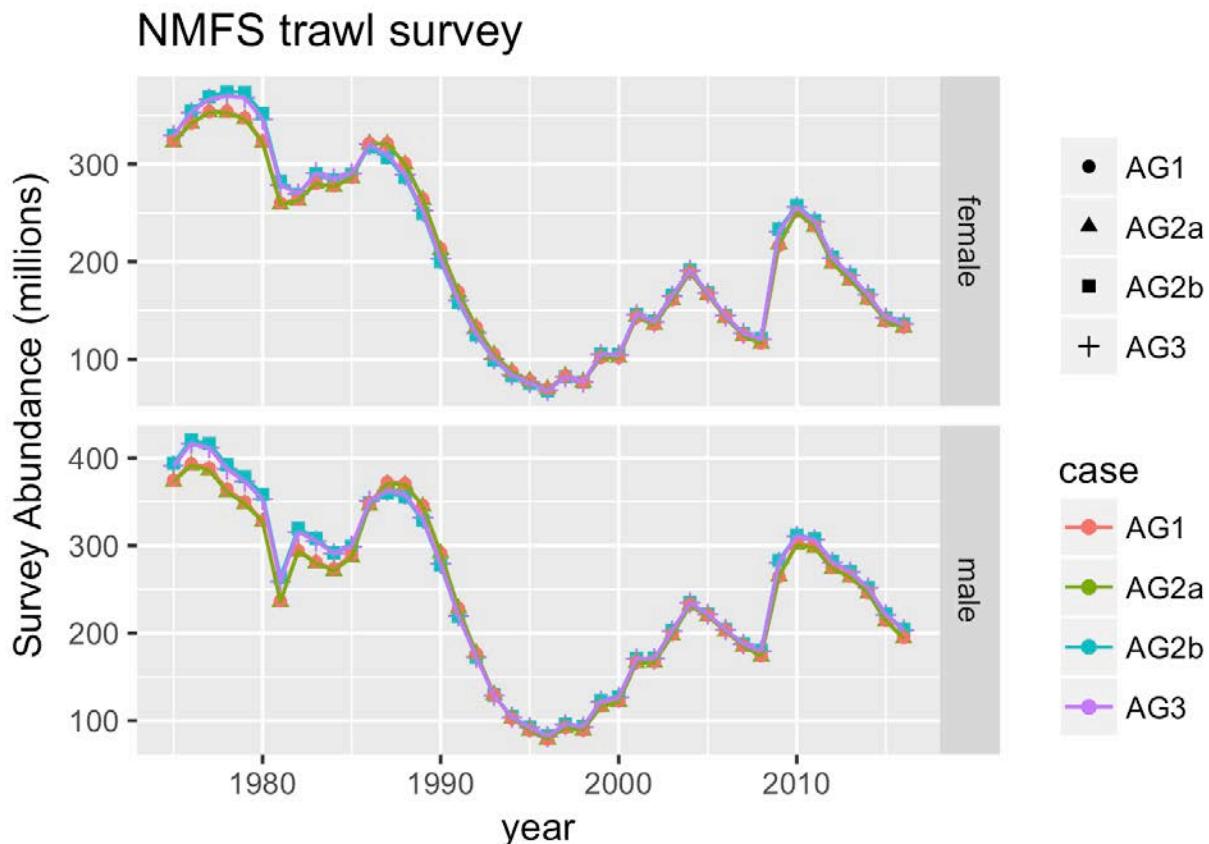

Figure 29. NMFS trawl survey catch abundance.

Survey biomass
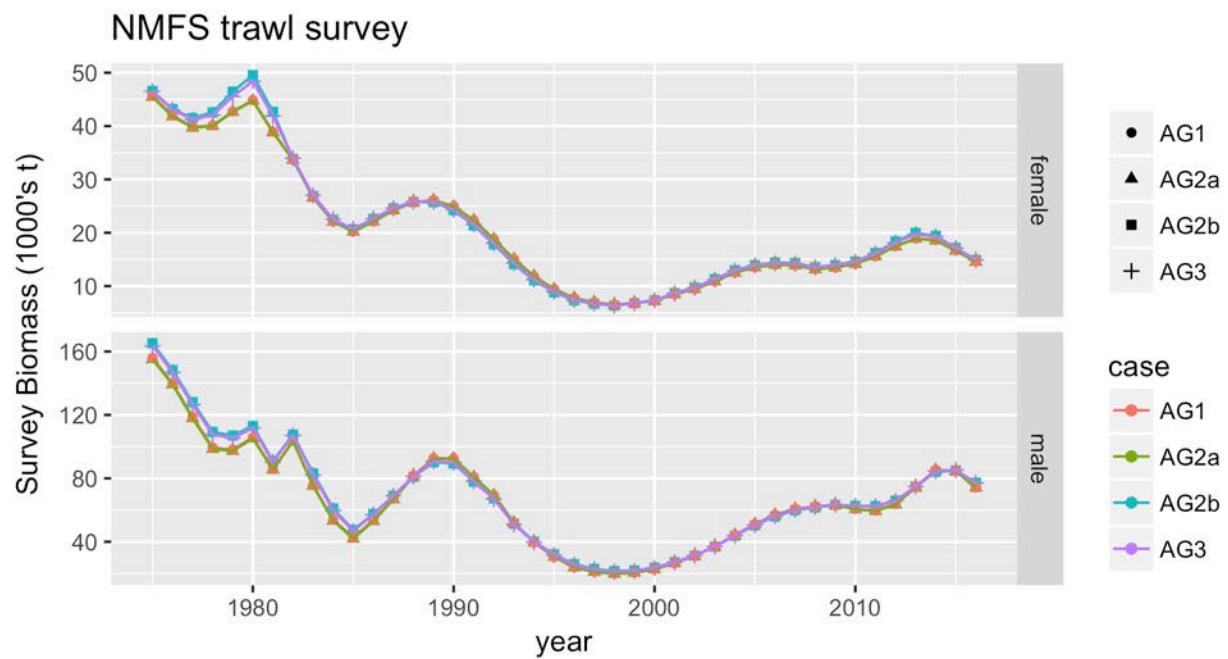
Figure 30. NMFS trawl survey catch biomass.

Survey size compositions
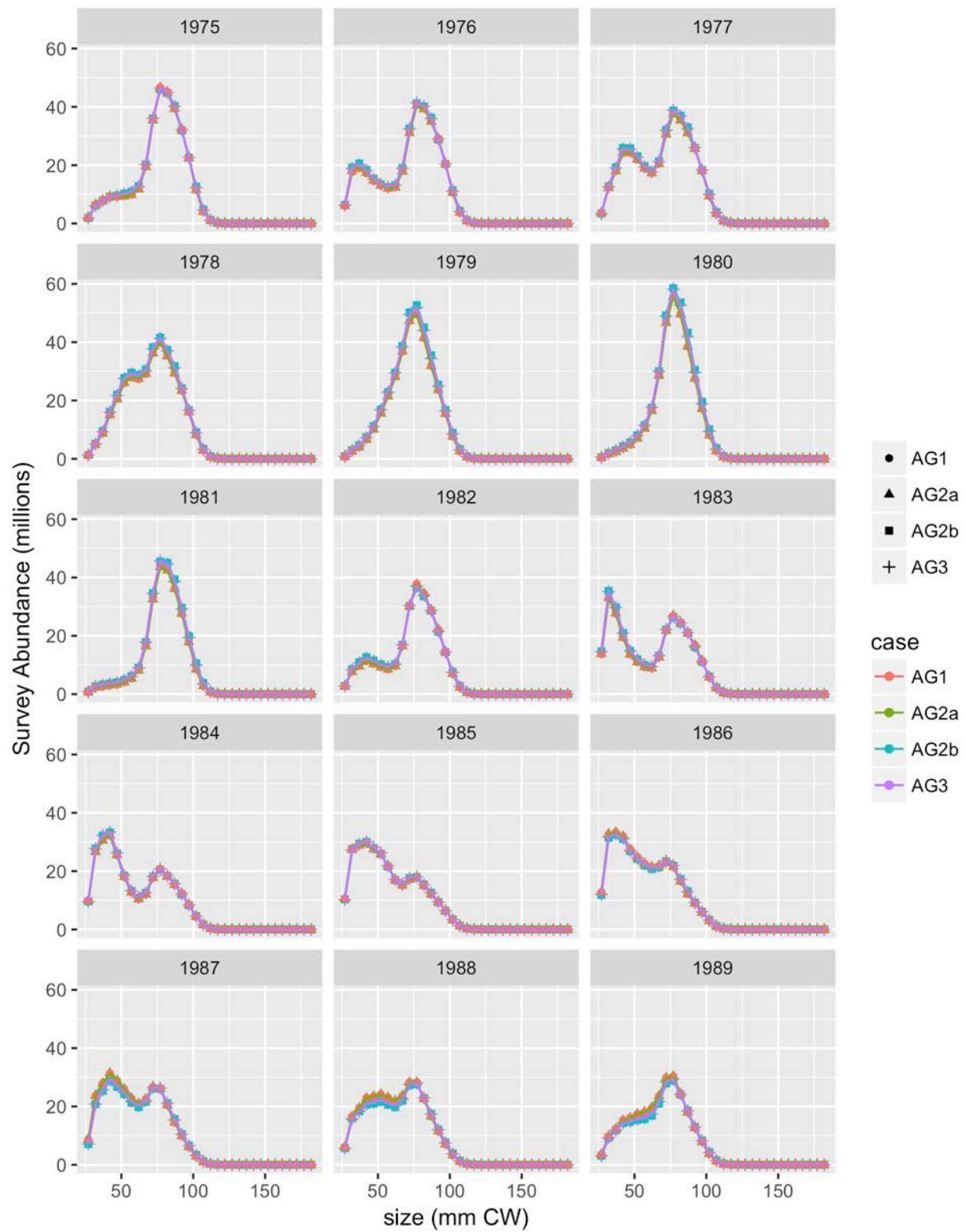
Figure 31. NMFS trawl survey catch abundance for female all all, (1 of 3).
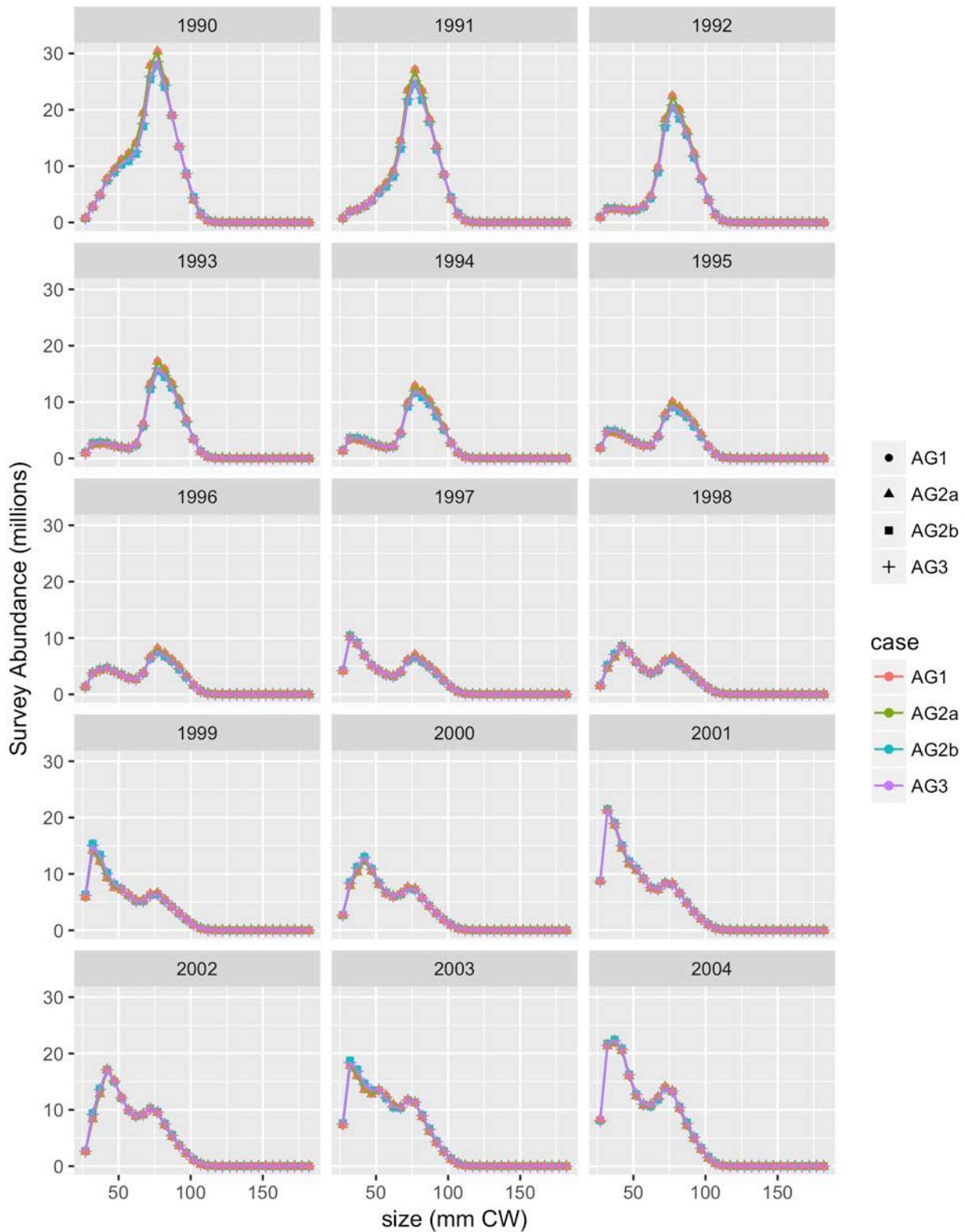
Figure 32. NMFS trawl survey catch abundance for female all all, (2 of 3).
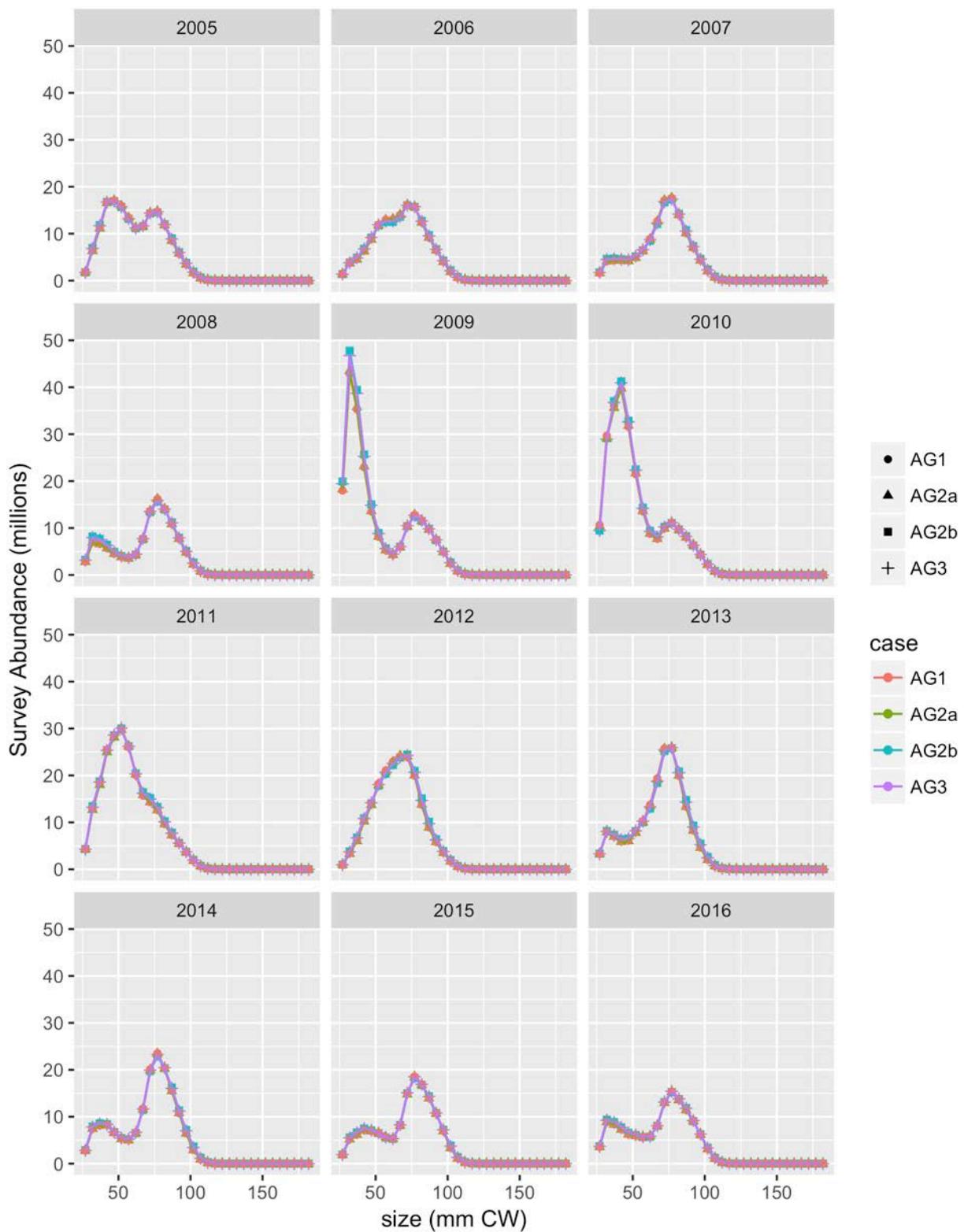
Figure 33. NMFS trawl survey catch abundance for female all all, (3 of 3).
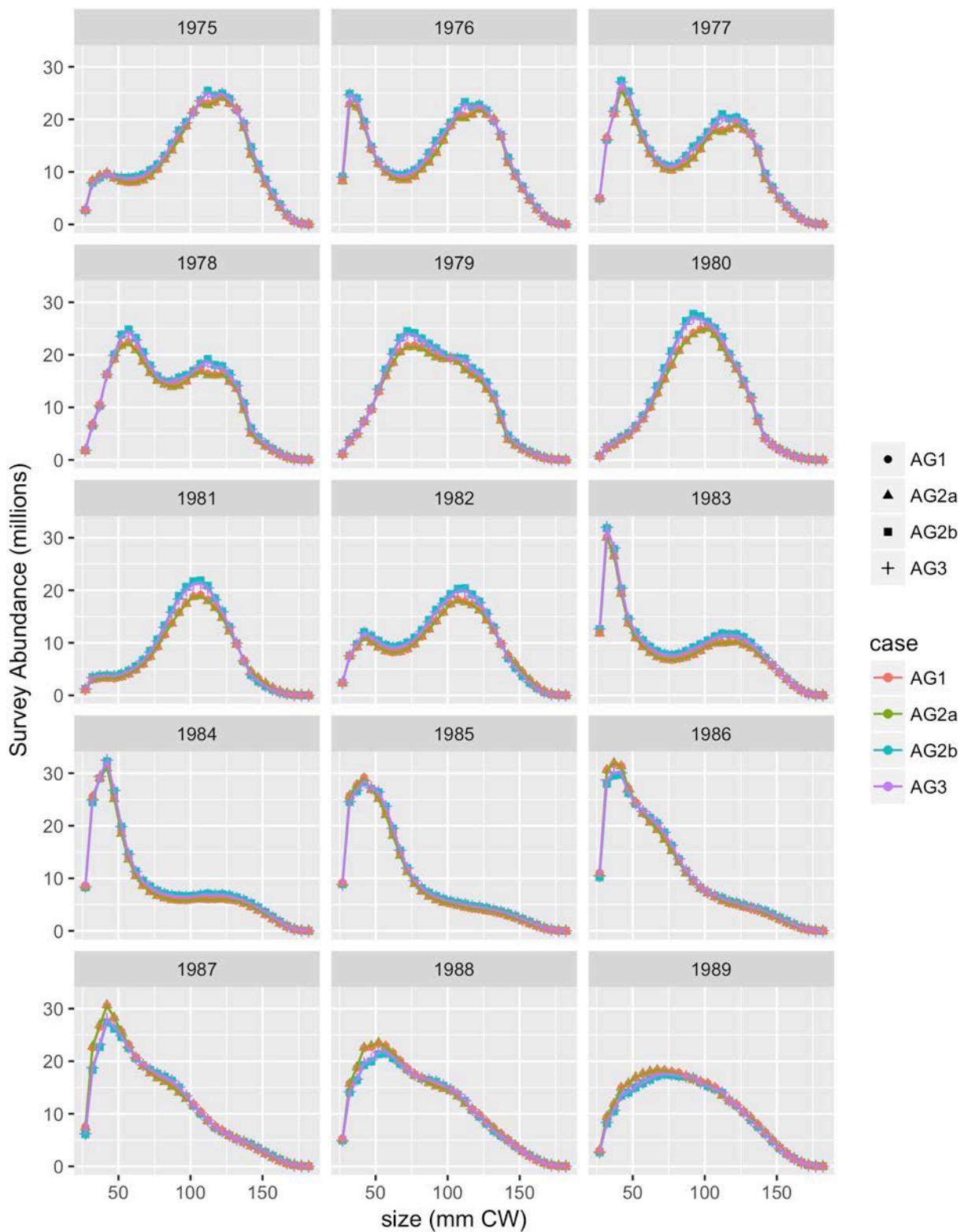
Figure 34. NMFS trawl survey catch abundance for male all all, (1 of 3).
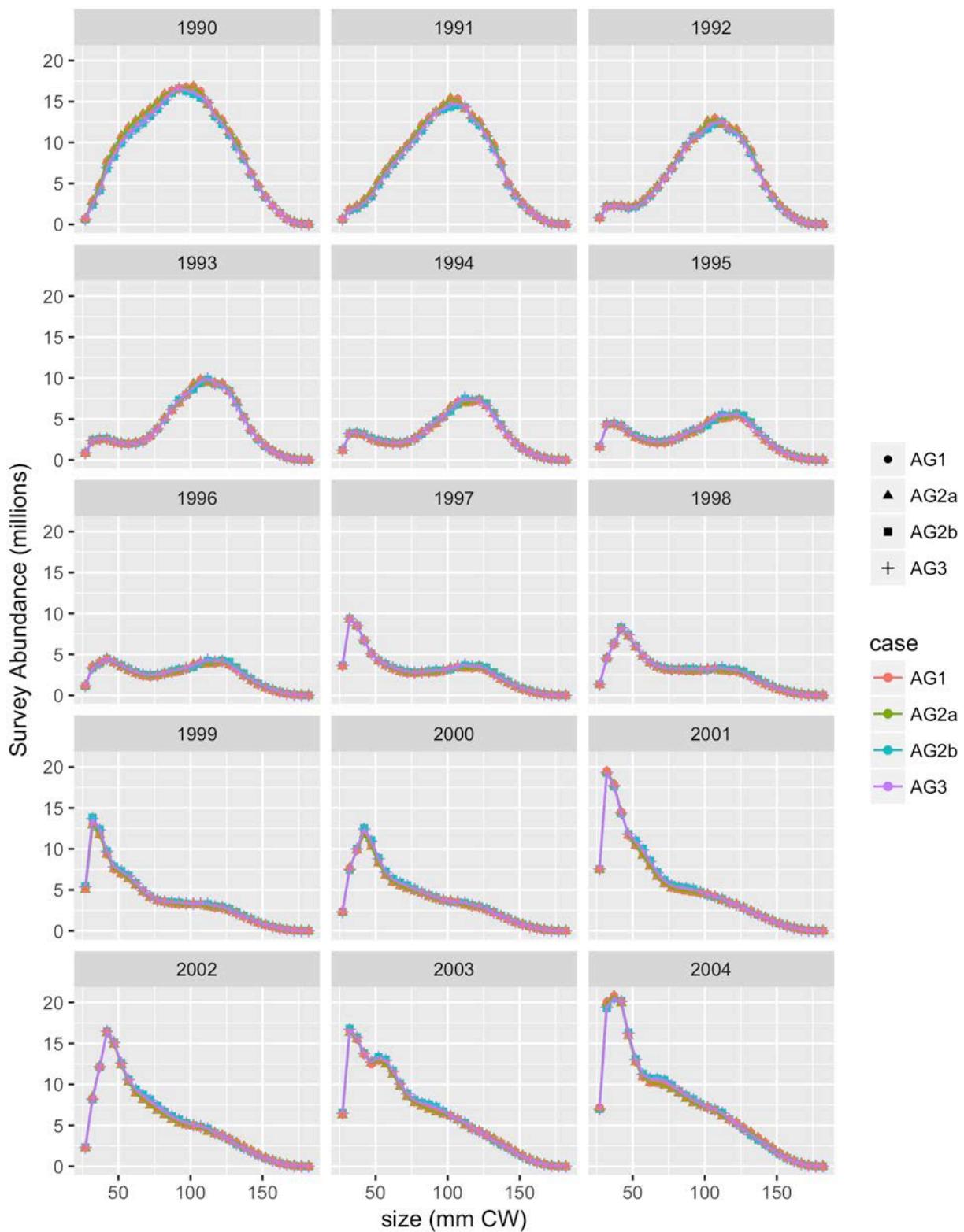
Figure 35. NMFS trawl survey catch abundance for male all all, (2 of 3).
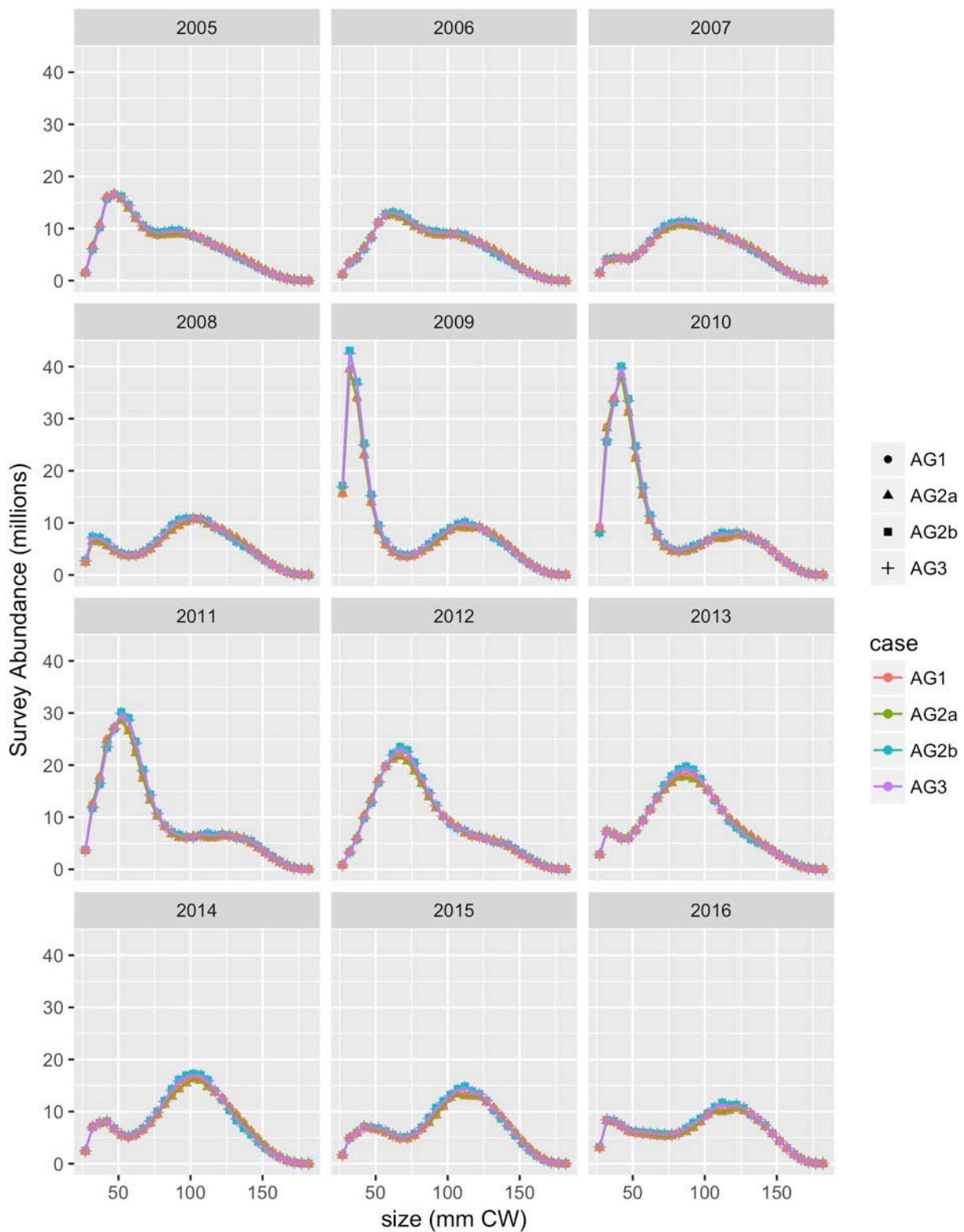
Figure 36. NMFS trawl survey catch abundance for male all all, (3 of 3).

Fishery catchability
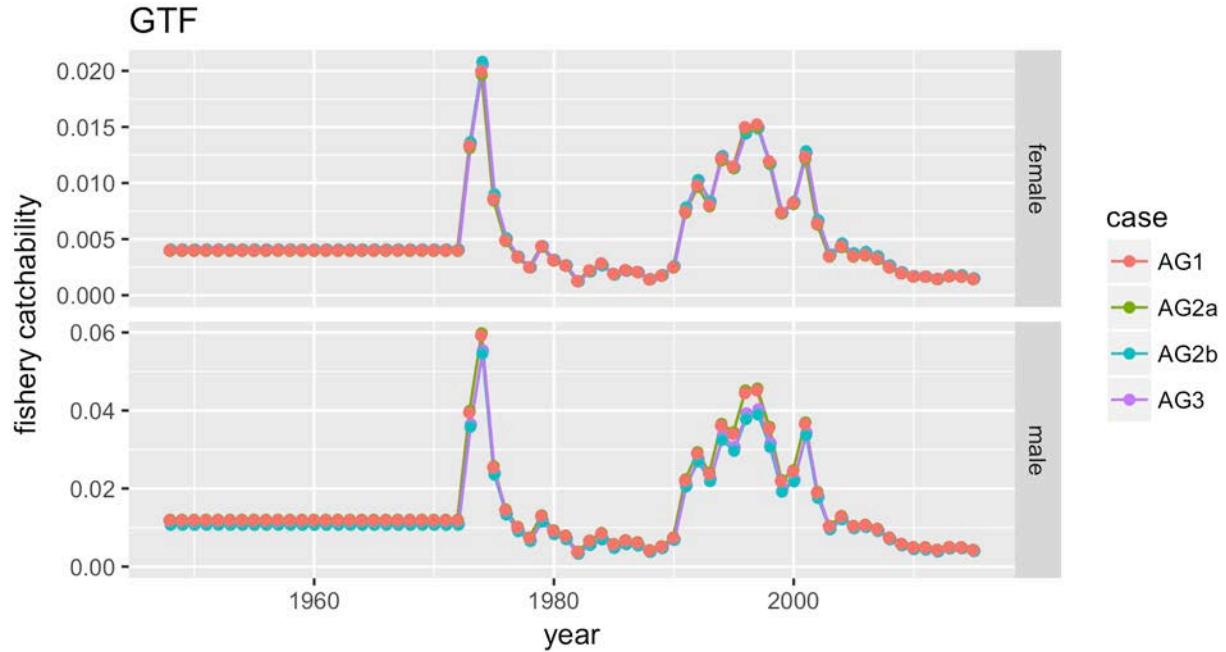
Figure 37. Fishery catchabilities for GTF.
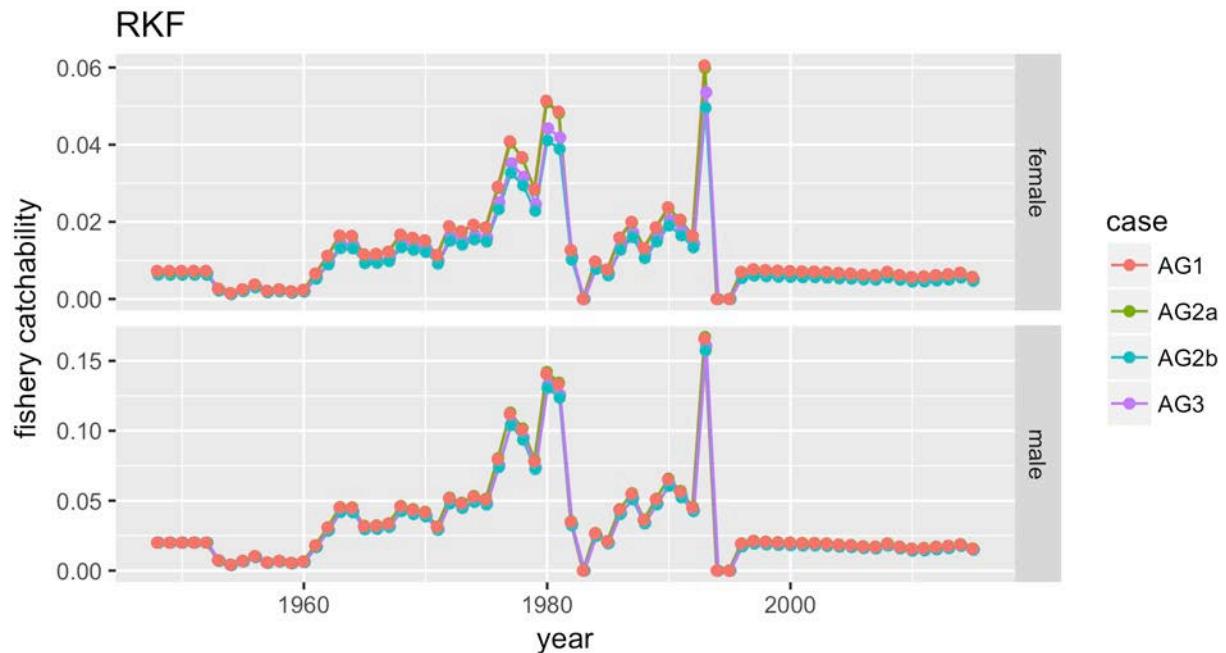
Figure 38. Fishery catchabilities for RKF.
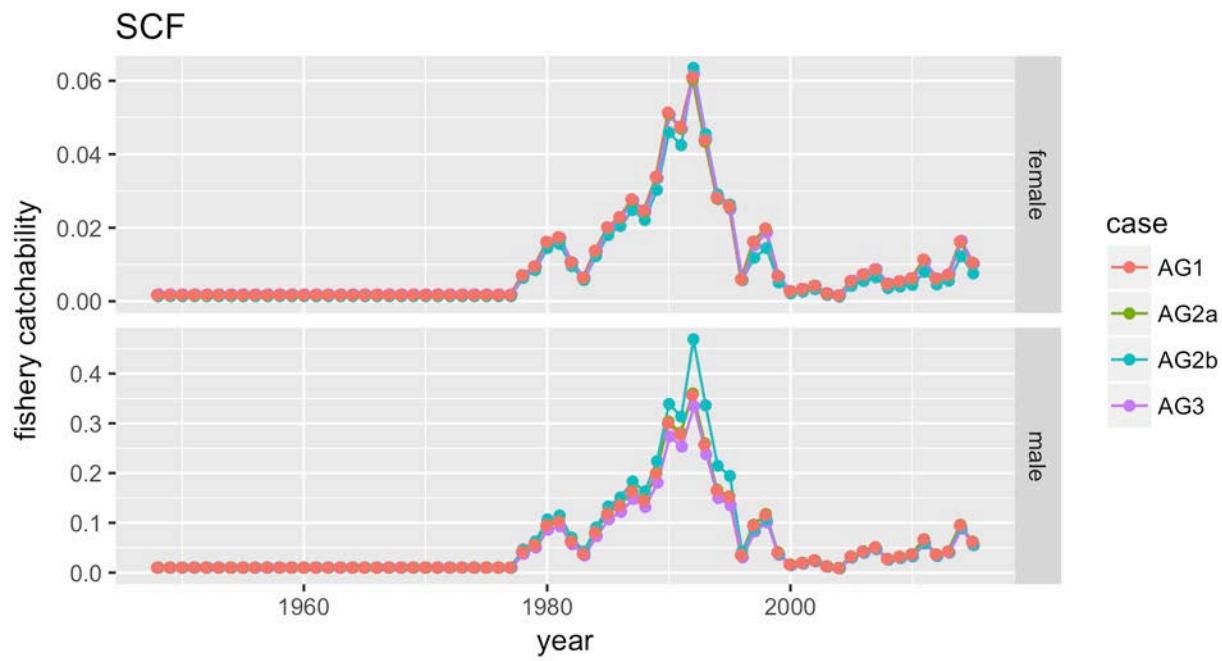
Figure 39. Fishery catchabilities for SCF.
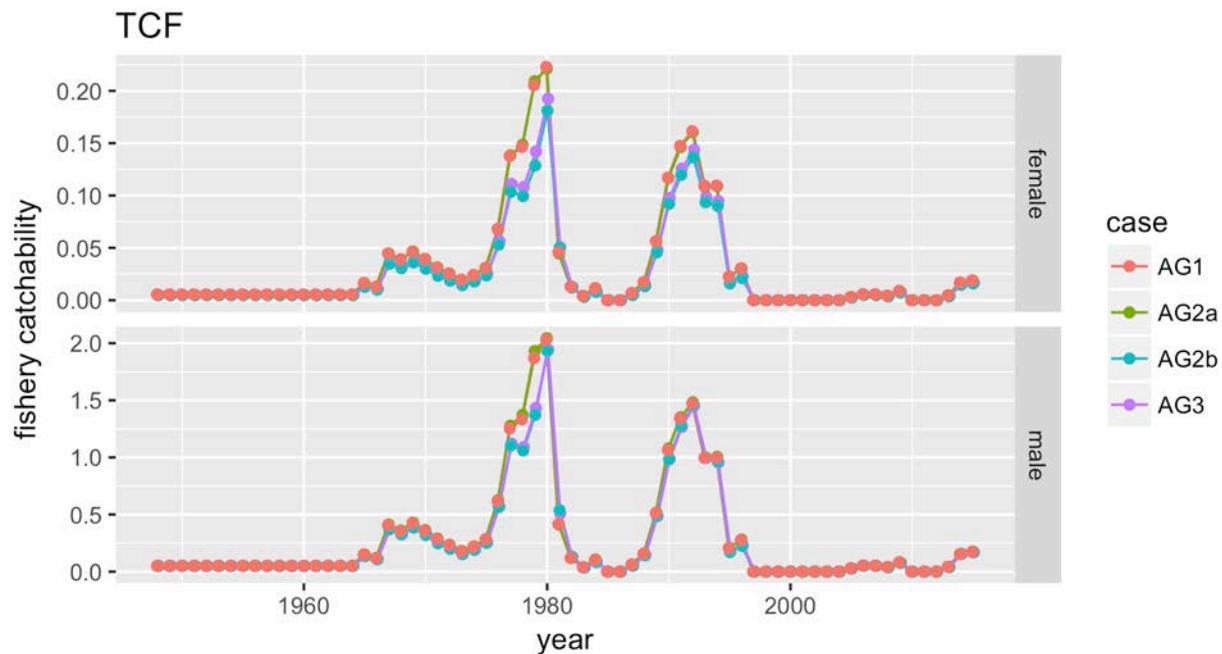
Figure 40. Fishery catchabilities for TCF.

**Total selectivity functions**
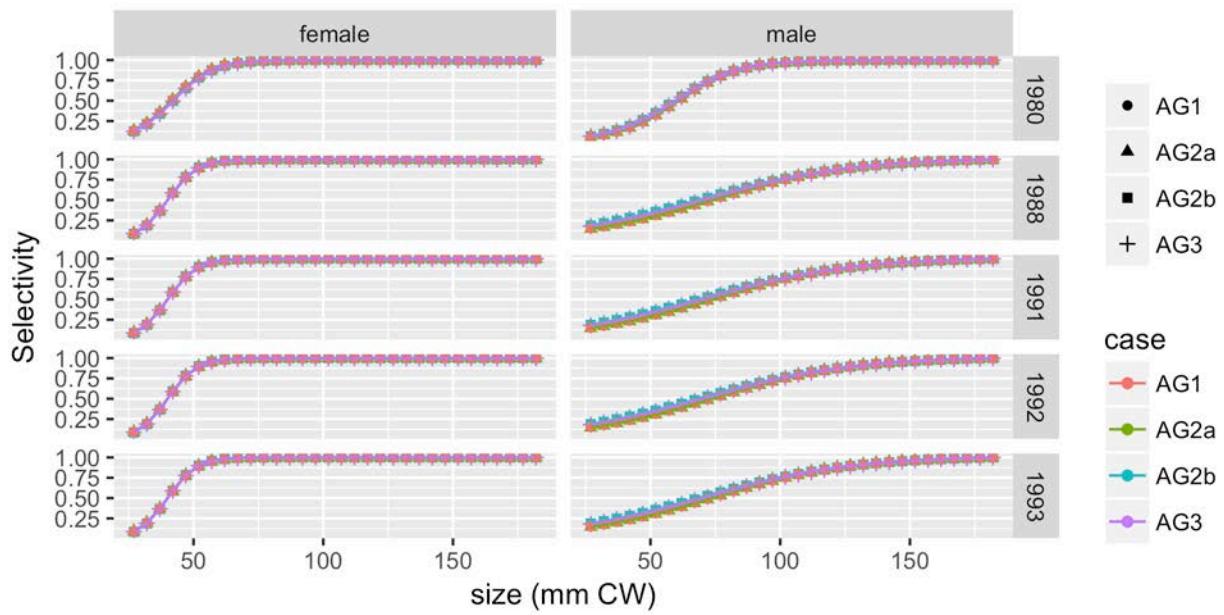
Figure 41. Selectivity functions for GTF(1 of 6).
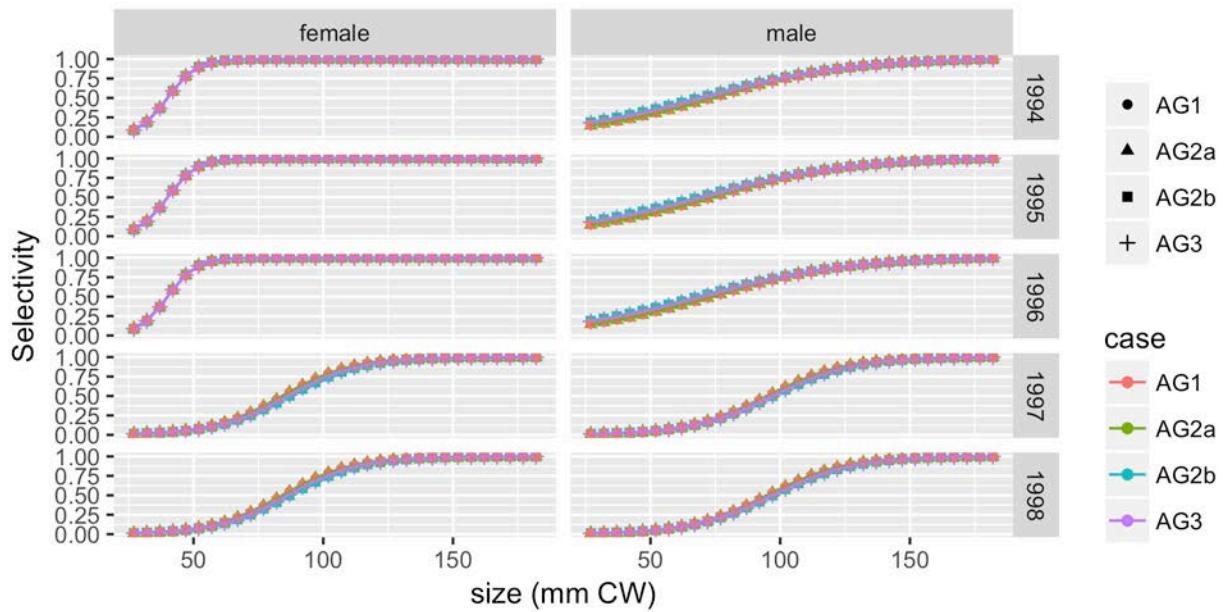
Figure 42. Selectivity functions for GTF(2 of 6).
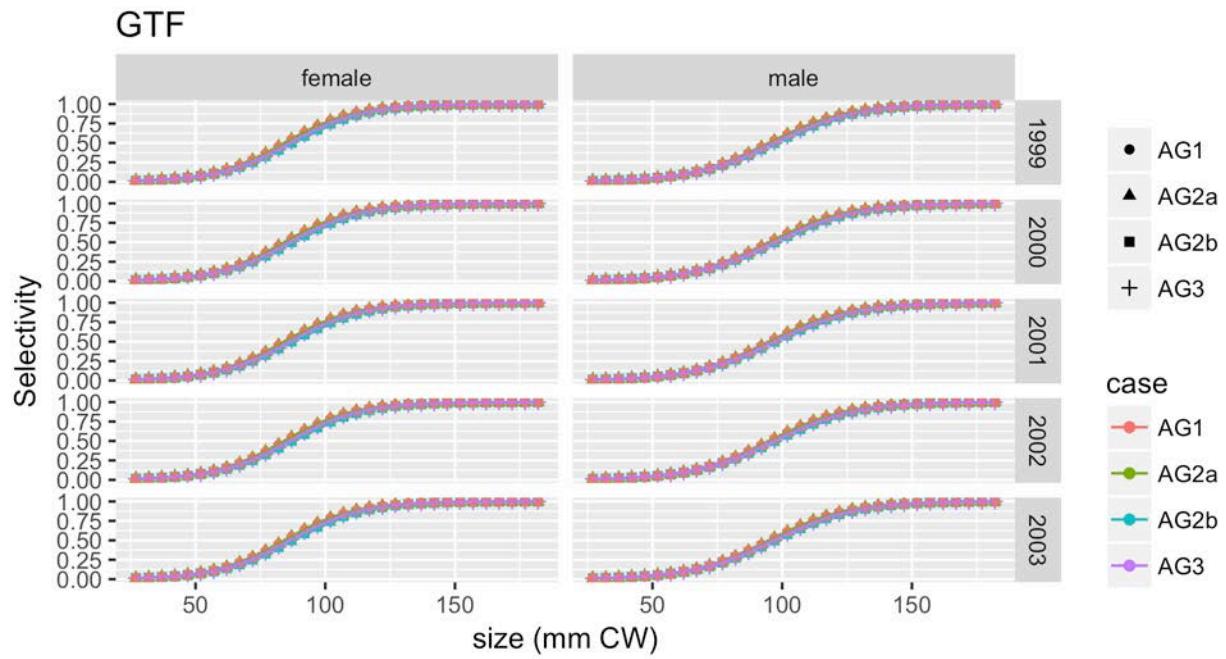
Figure 43. Selectivity functions for GTF(3 of 6).
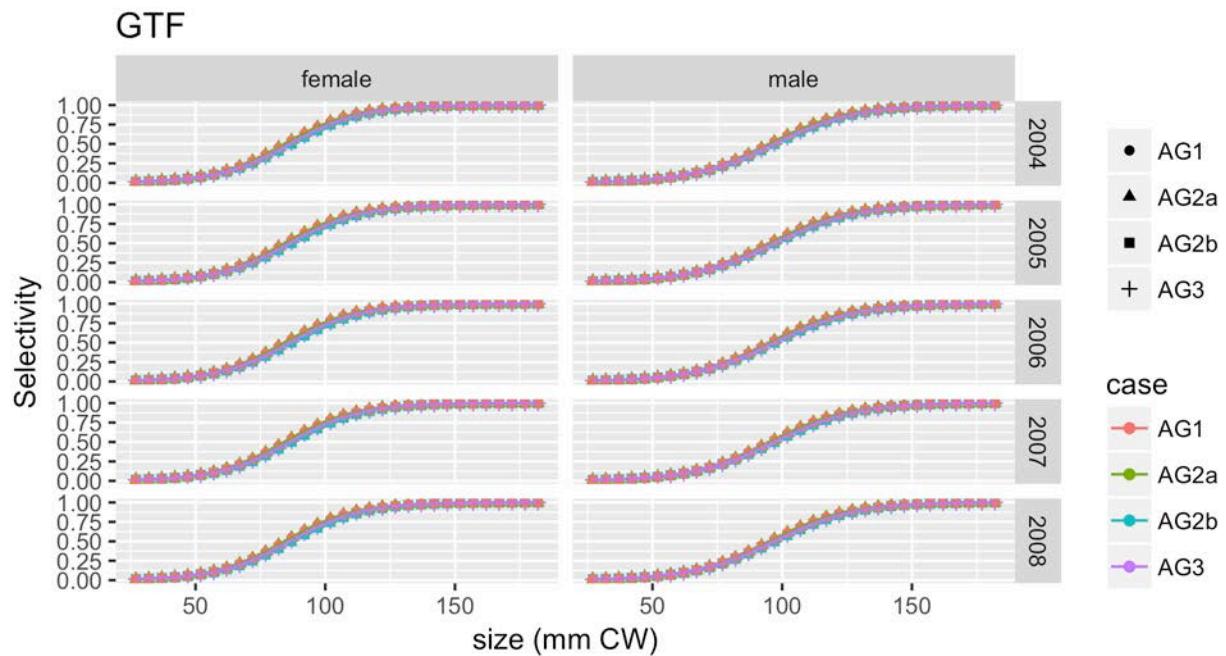
Figure 44. Selectivity functions for GTF(4 of 6).
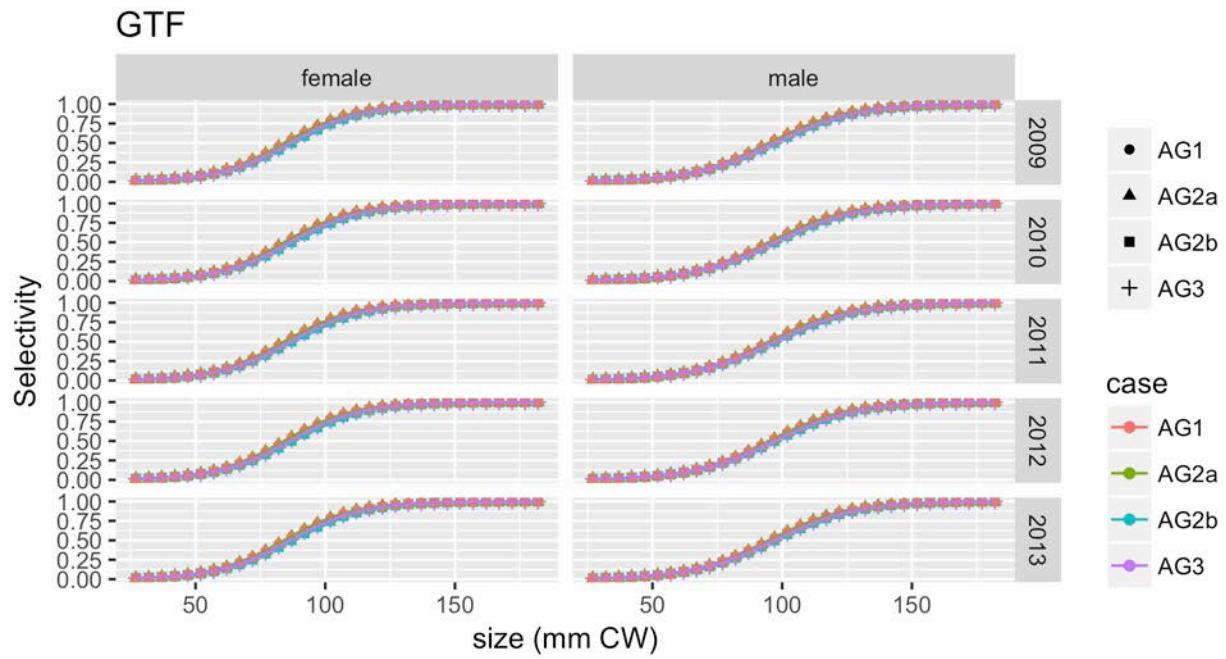
Figure 45. Selectivity functions for GTF(5 of 6).
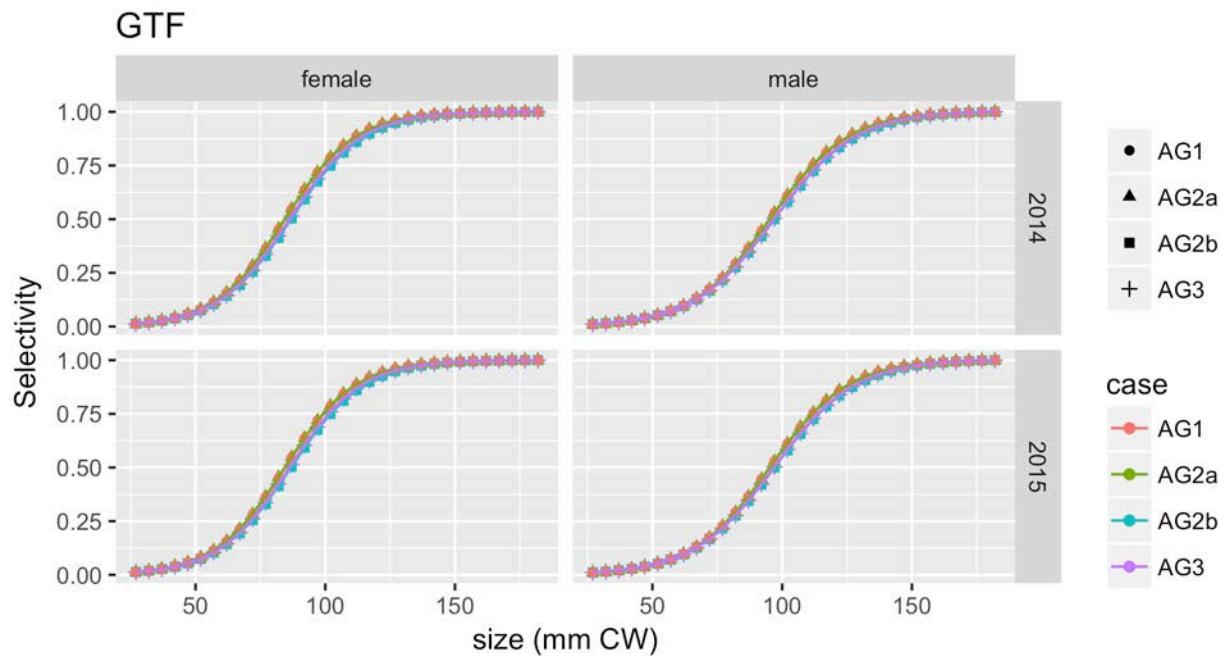
Figure 46. Selectivity functions for GTF(6 of 6).
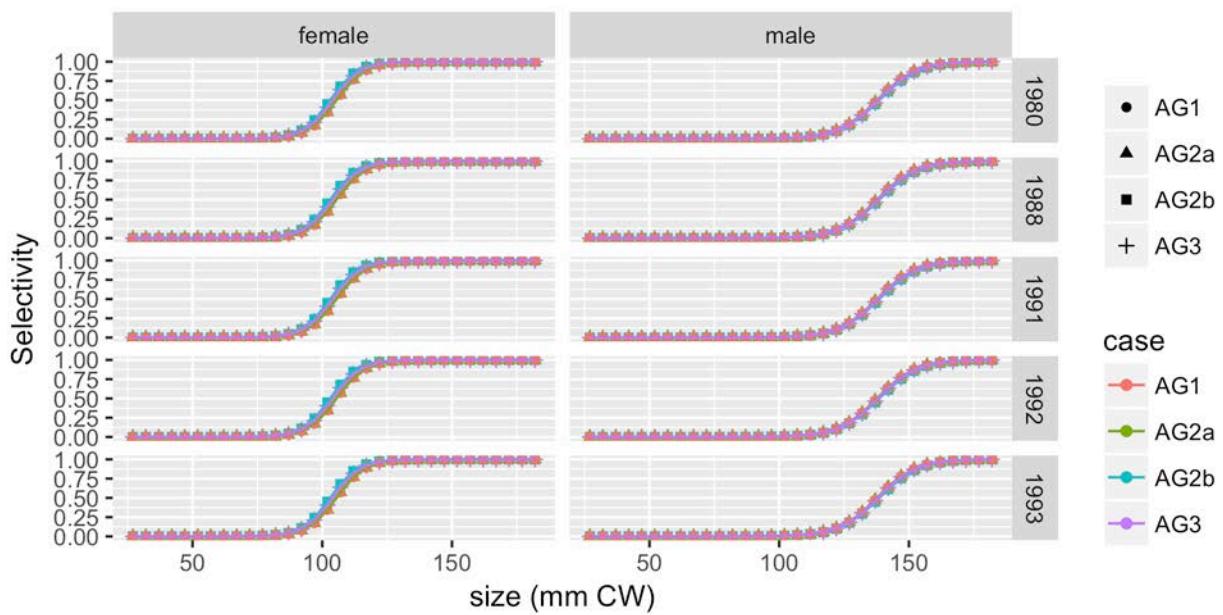
Figure 47. Selectivity functions for RKF(1 of 5).
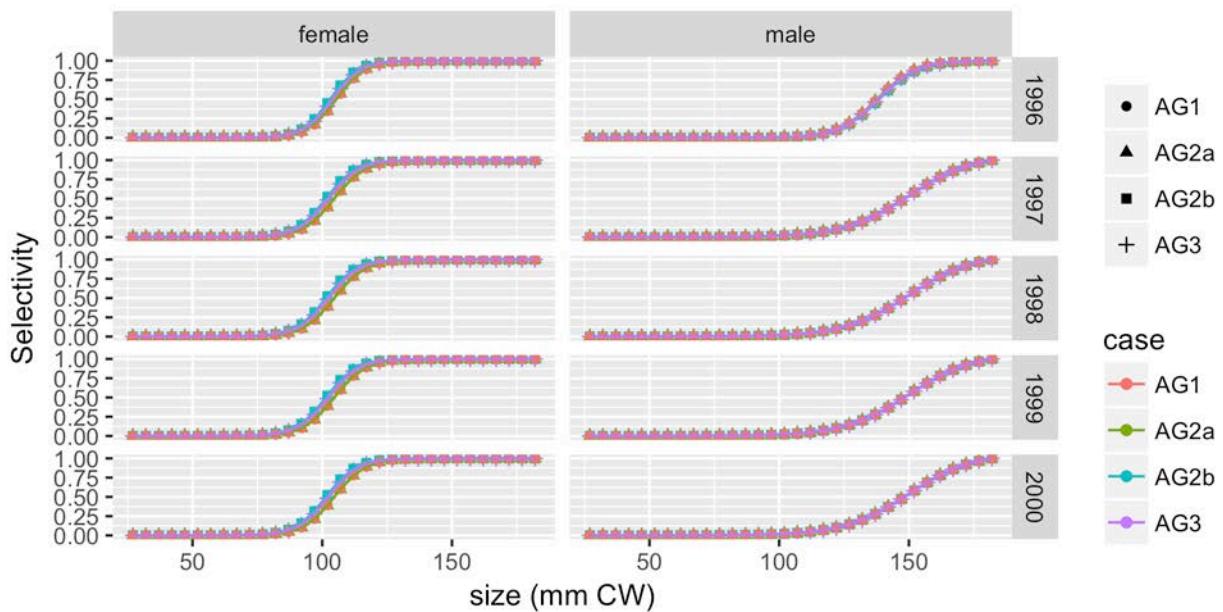
Figure 48. Selectivity functions for RKF(2 of 5).
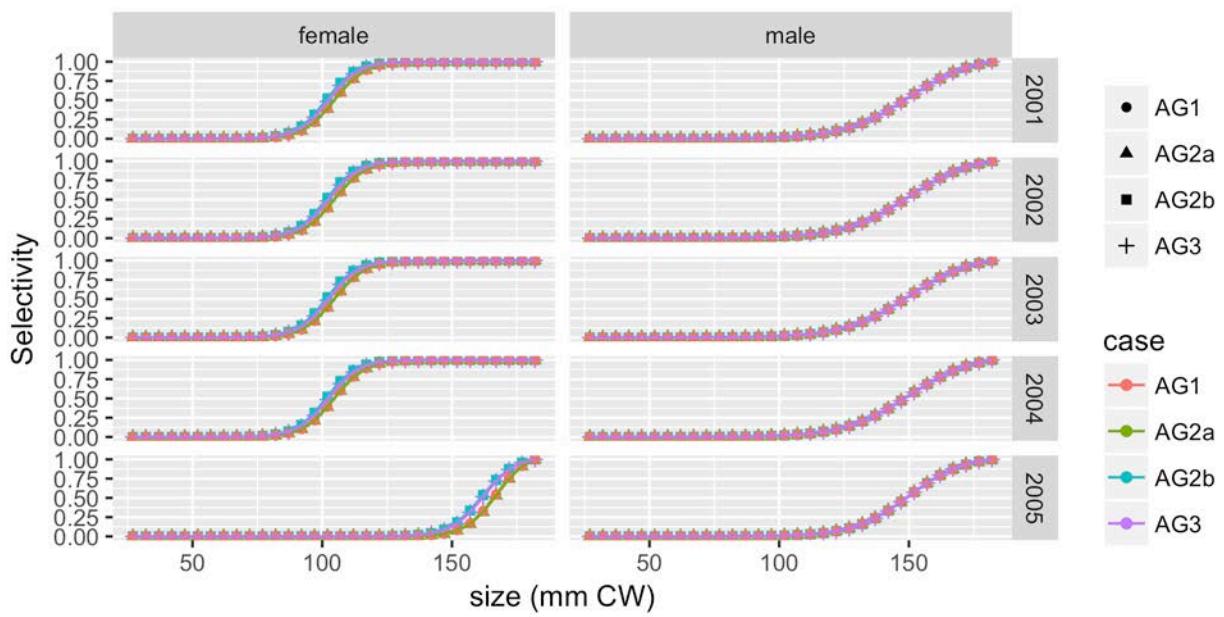
Figure 49. Selectivity functions for RKF(3 of 5).
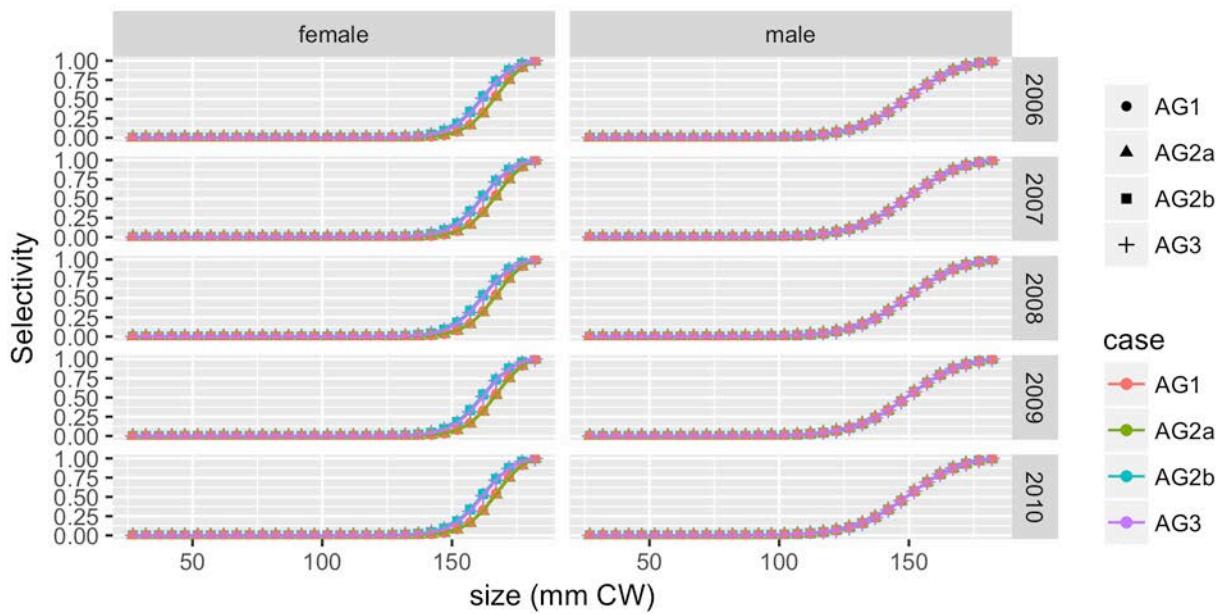
Figure 50. Selectivity functions for RKF(4 of 5).
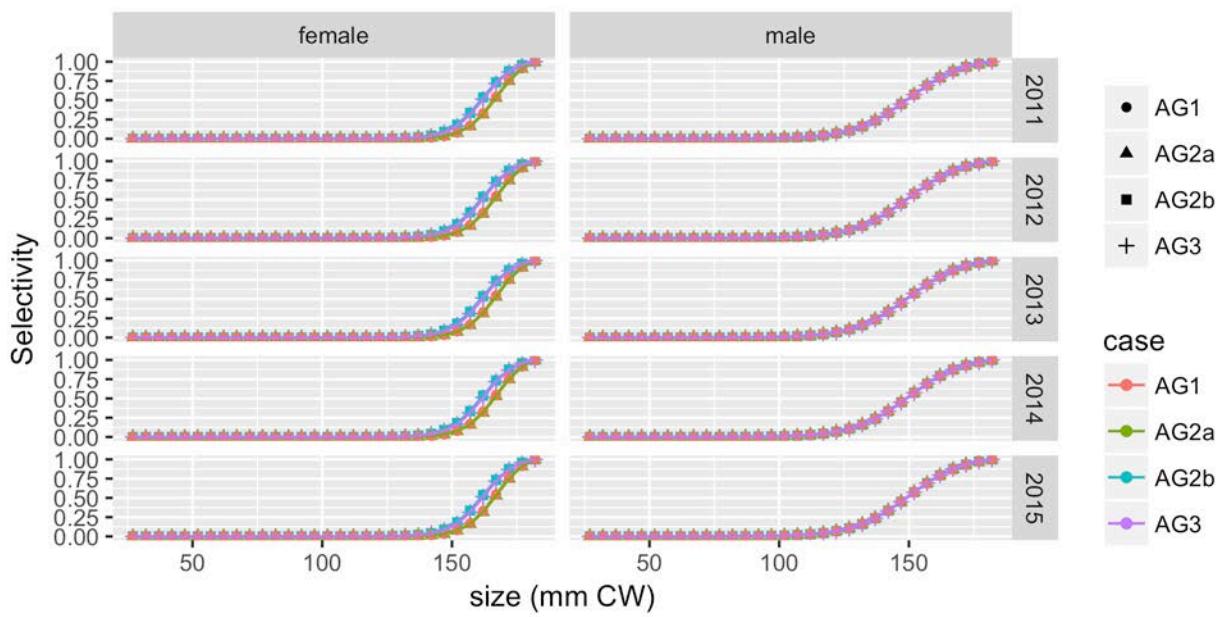
Figure 51. Selectivity functions for RKF(5 of 5).
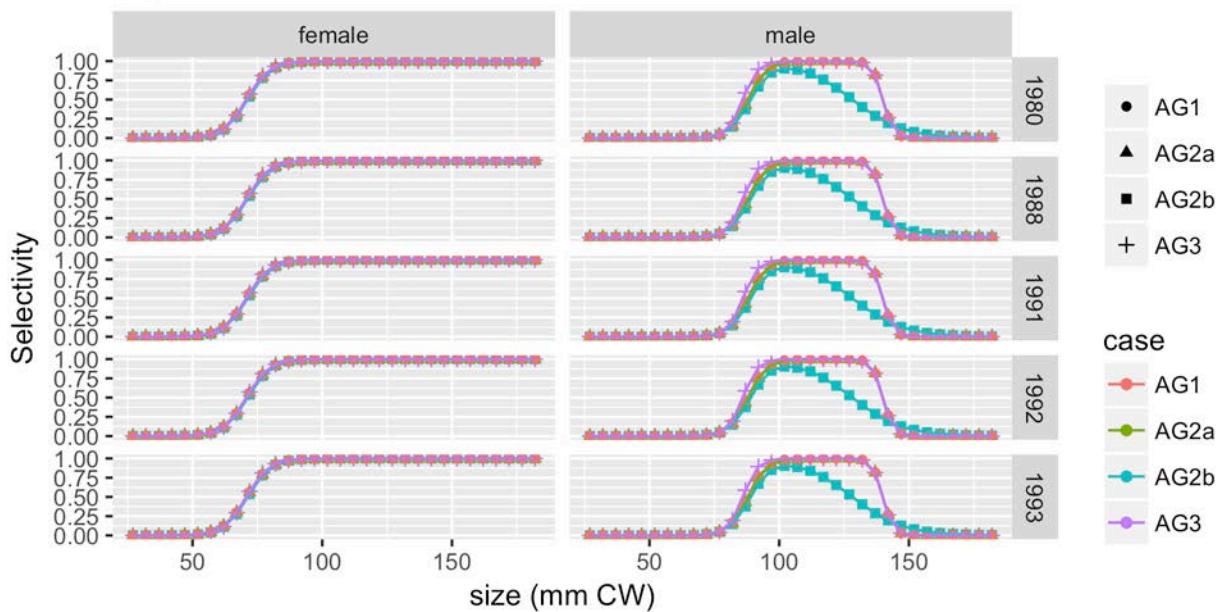
Figure 52. Selectivity functions for SCF(1 of 6).
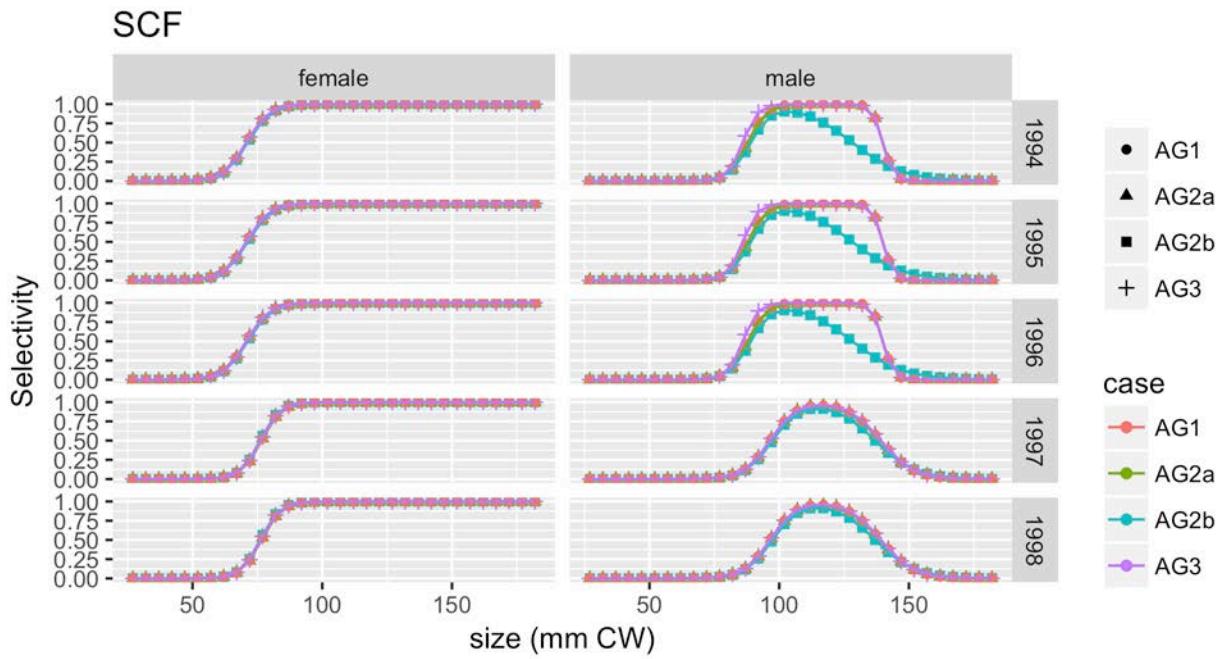
Figure 53. Selectivity functions for SCF(2 of 6).
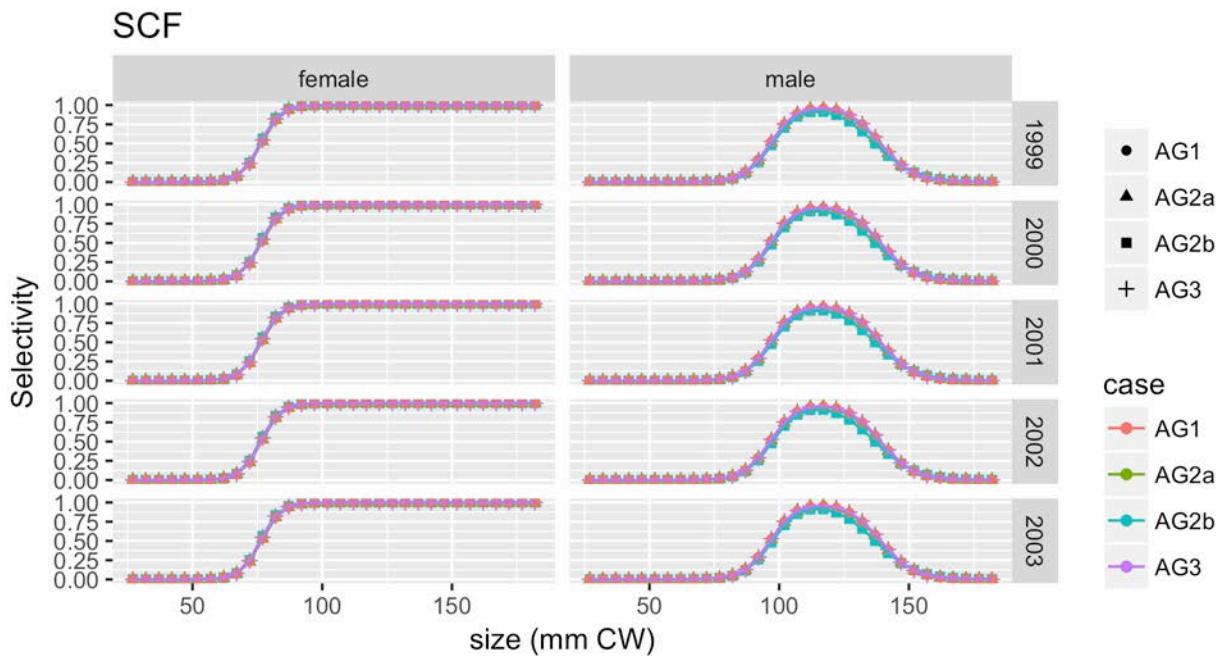
Figure 54. Selectivity functions for SCF(3 of 6).
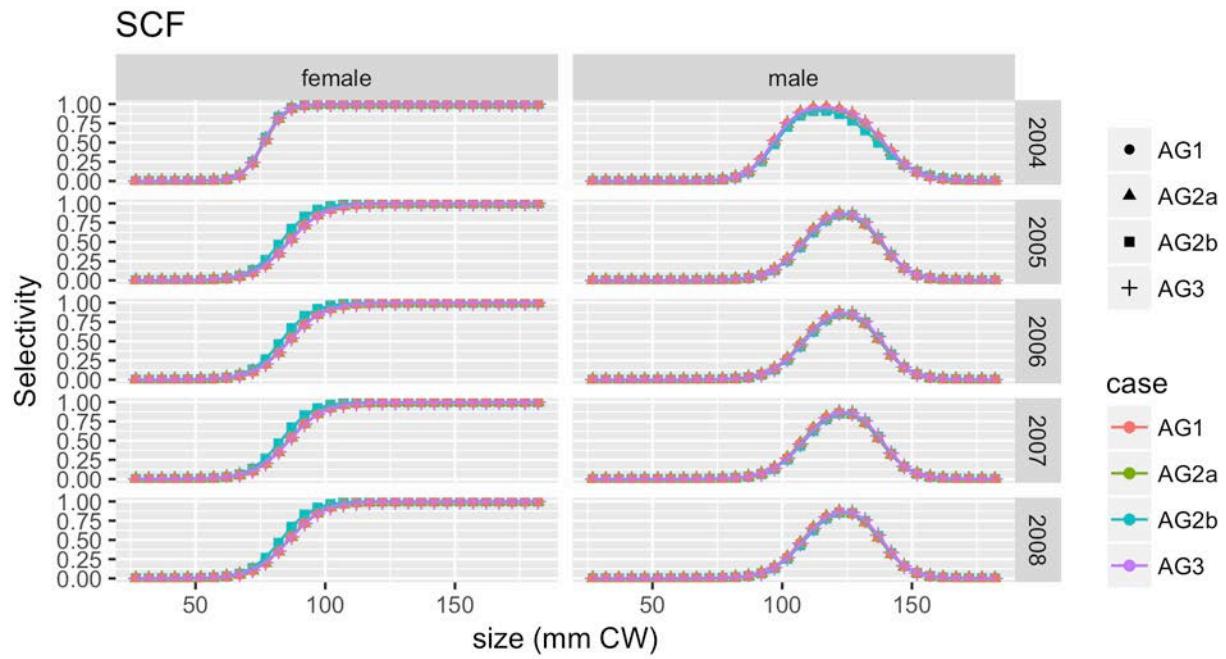
Figure 55. Selectivity functions for SCF(4 of 6).
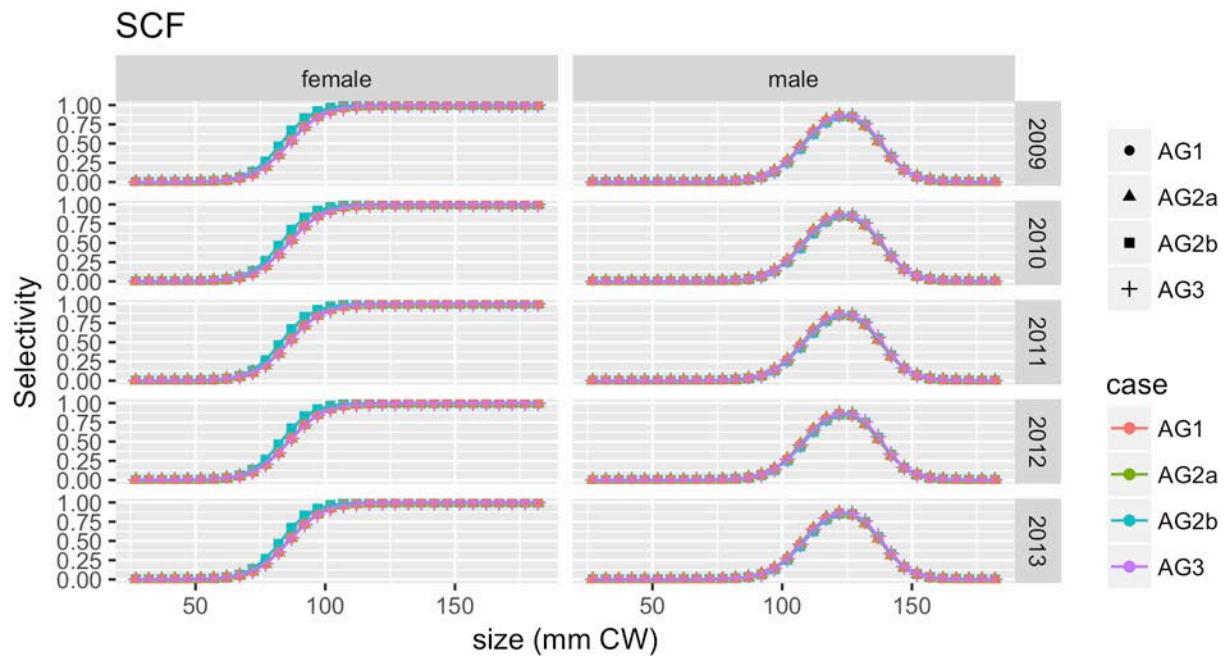
Figure 56. Selectivity functions for SCF(5 of 6).
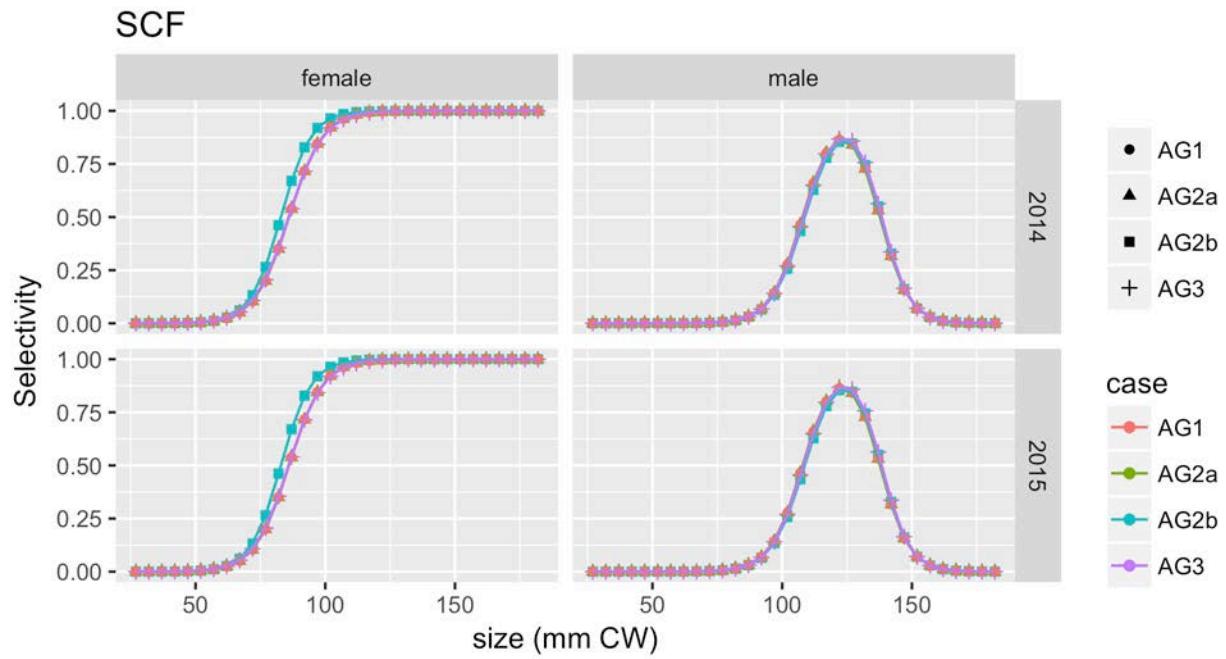
Figure 57. Selectivity functions for SCF(6 of 6).
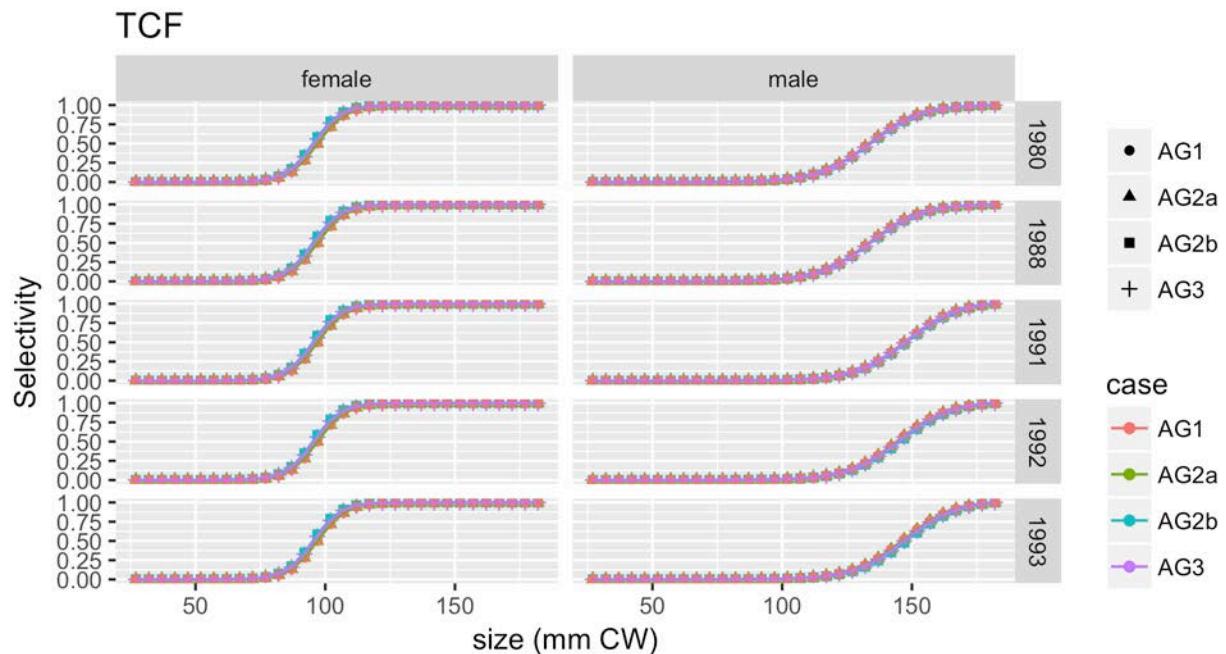
Figure 58. Selectivity functions for TCF(1 of 4).
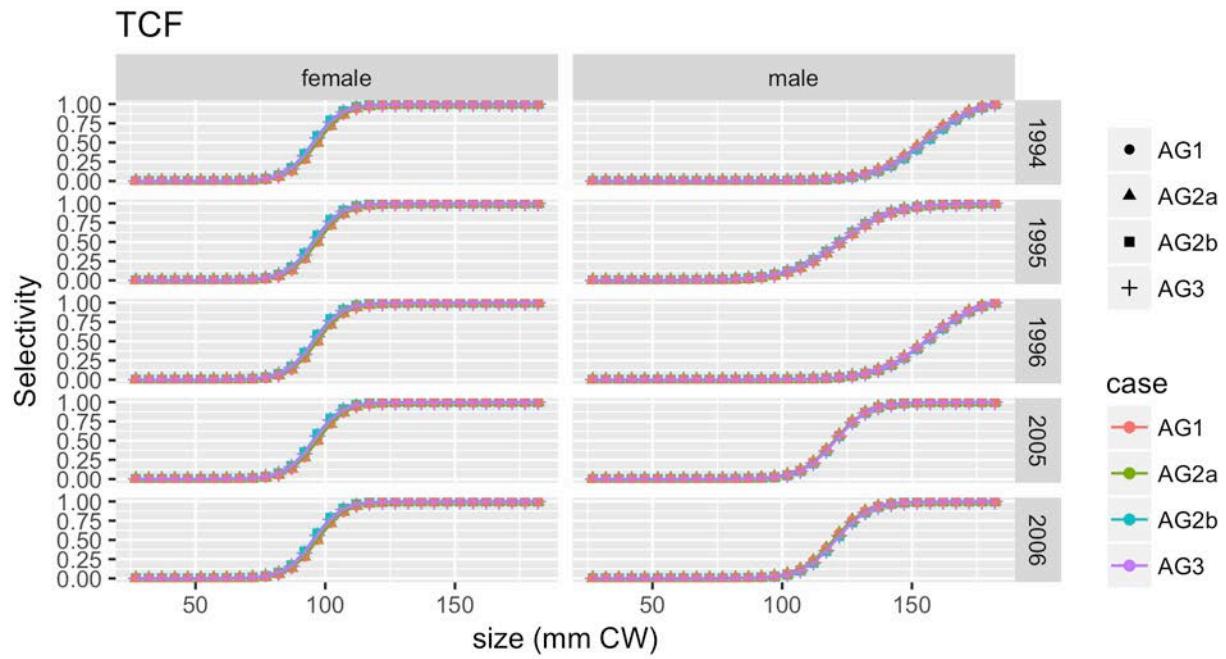
Figure 59. Selectivity functions for TCF(2 of 4).
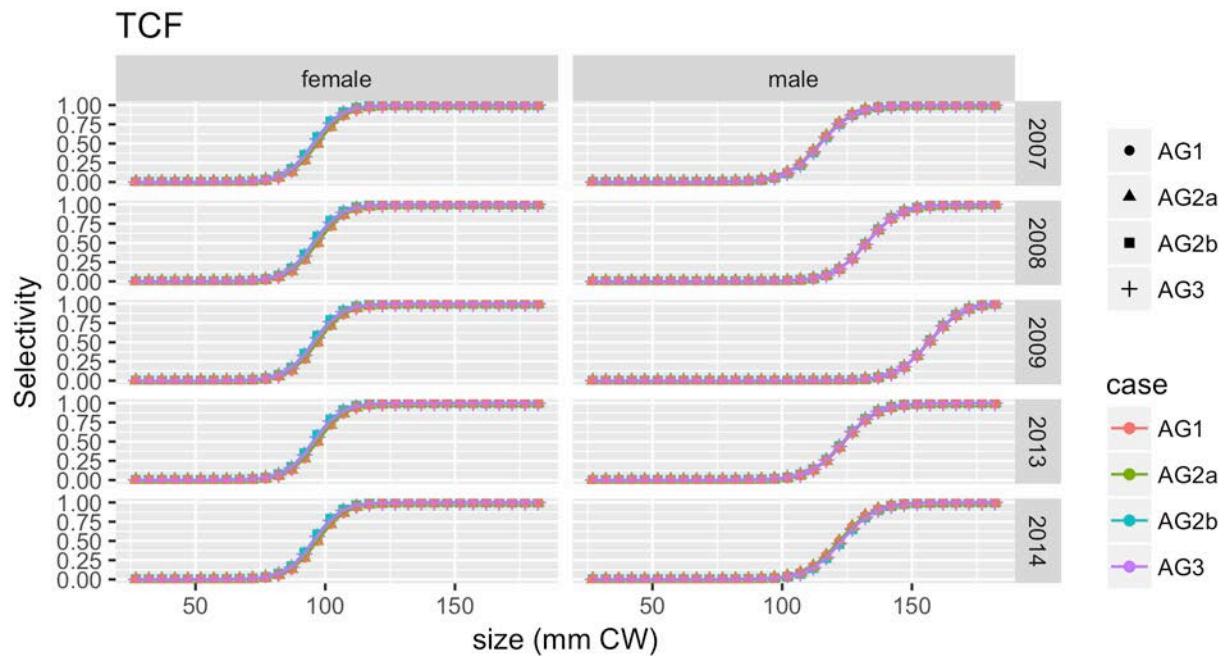
Figure 60. Selectivity functions for TCF(3 of 4).
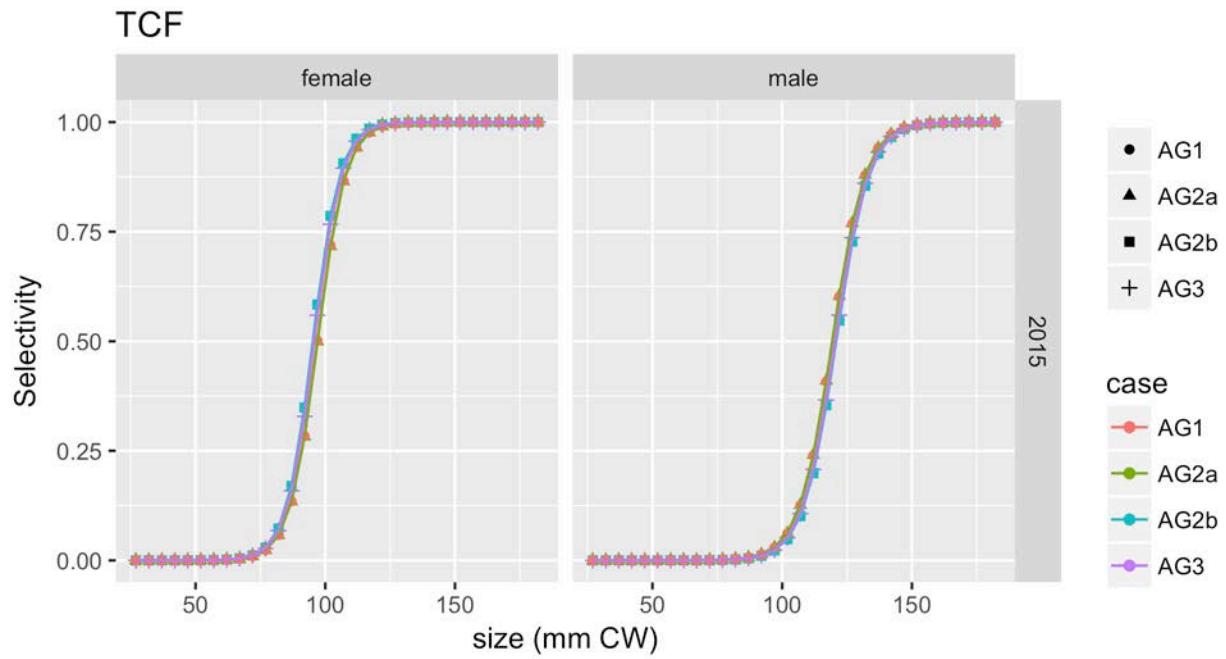
Figure 61. Selectivity functions for TCF(4 of 4).

Retention functions
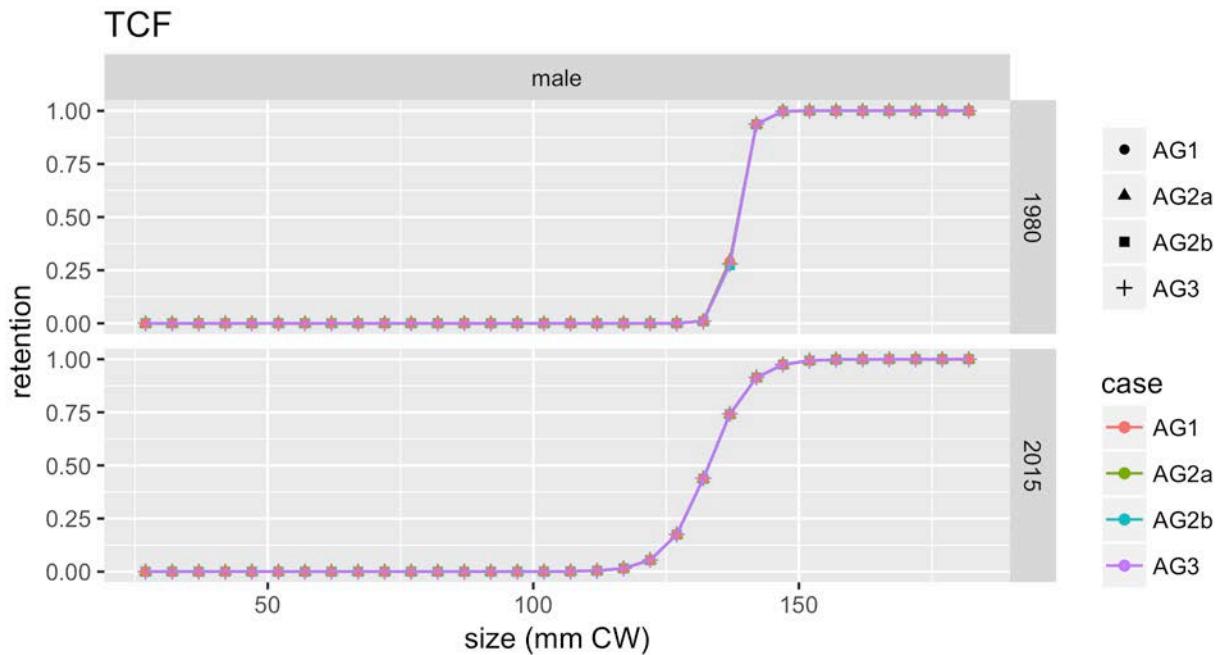
Figure 62. Retention functions for TCF(1 of 1).

Total catch abundance
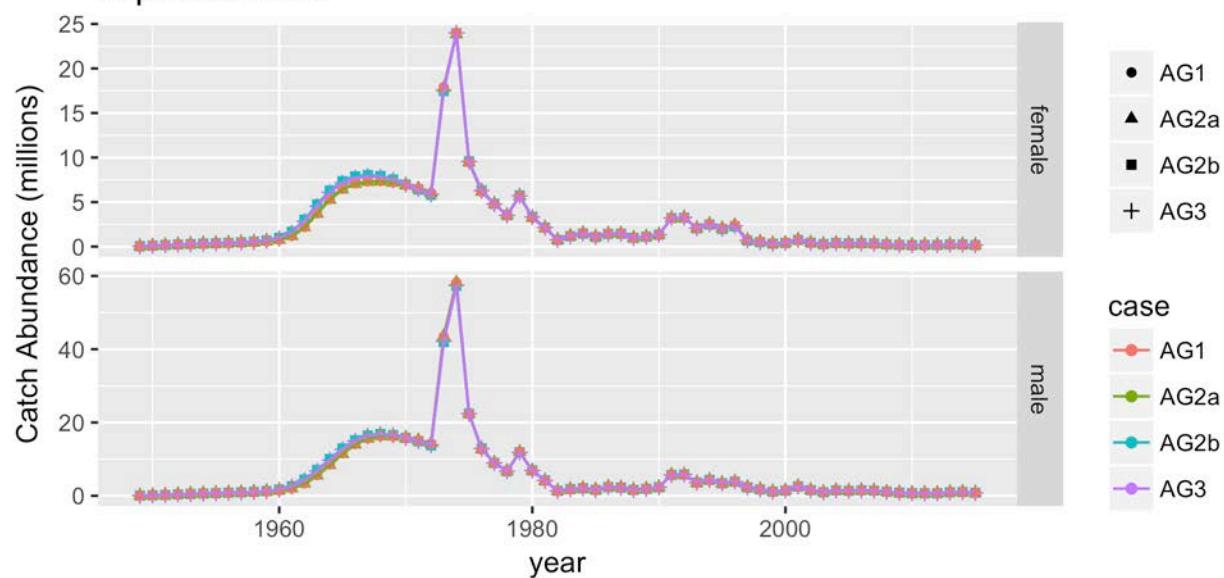
Figure 63. Predicted GTF captured catch abundance.
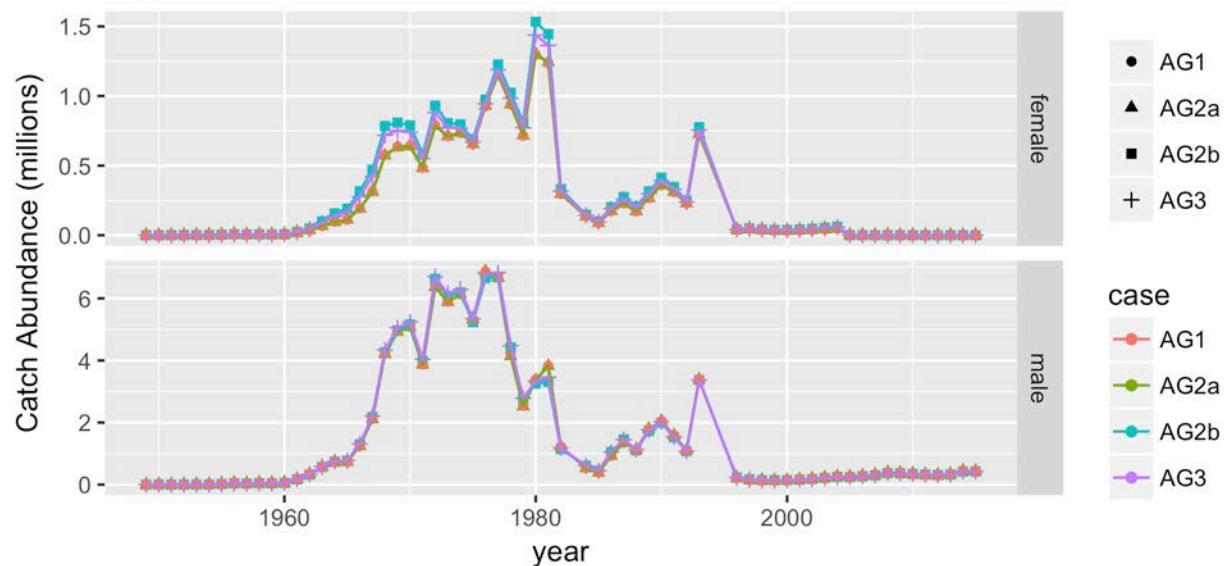
Figure 64. Predicted RKF captured catch abundance.
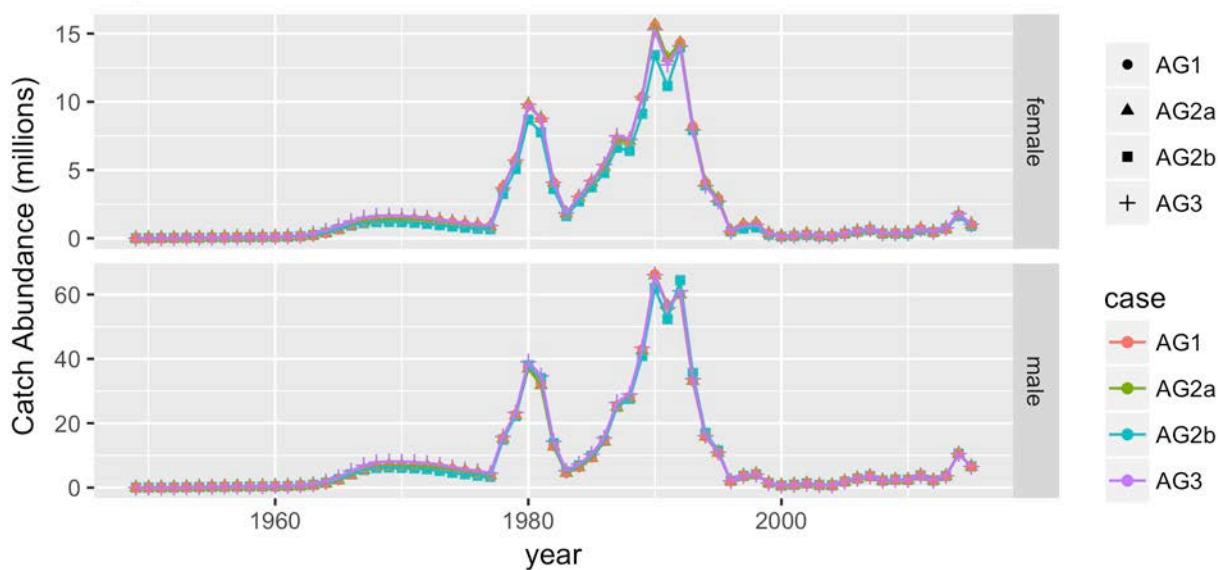
Figure 65. Predicted SCF captured catch abundance.

Figure 66. Predicted TCF captured catch abundance.

Total catch biomass
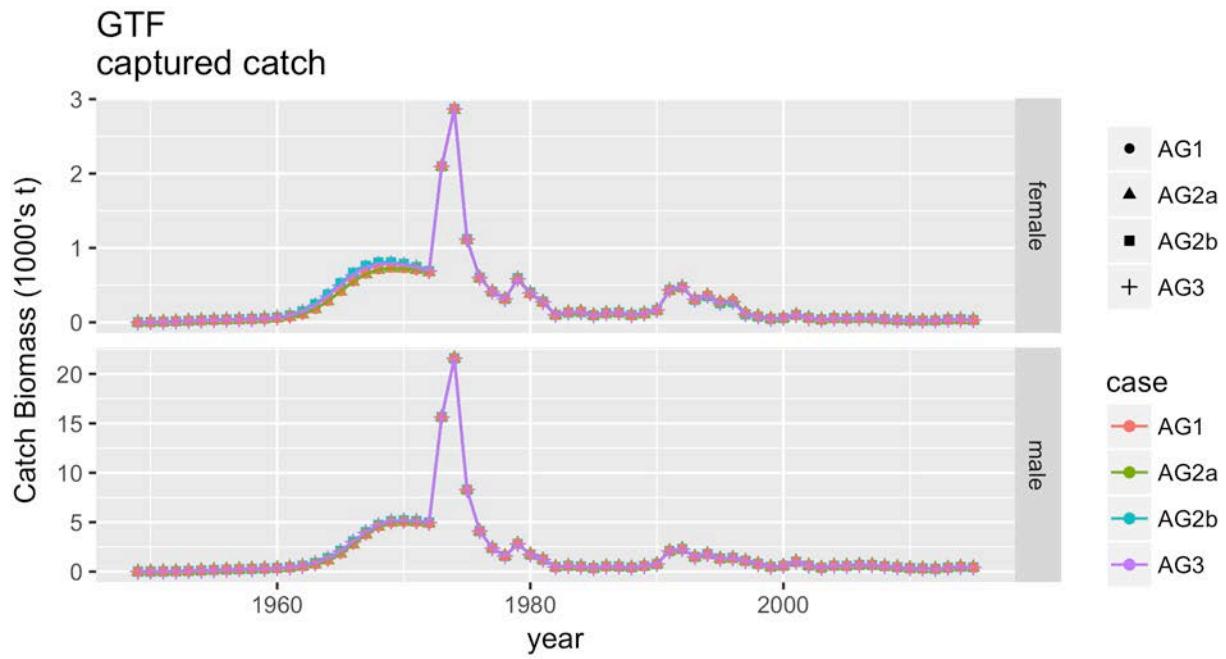
Figure 67. Predicted GTF captured catch biomass.
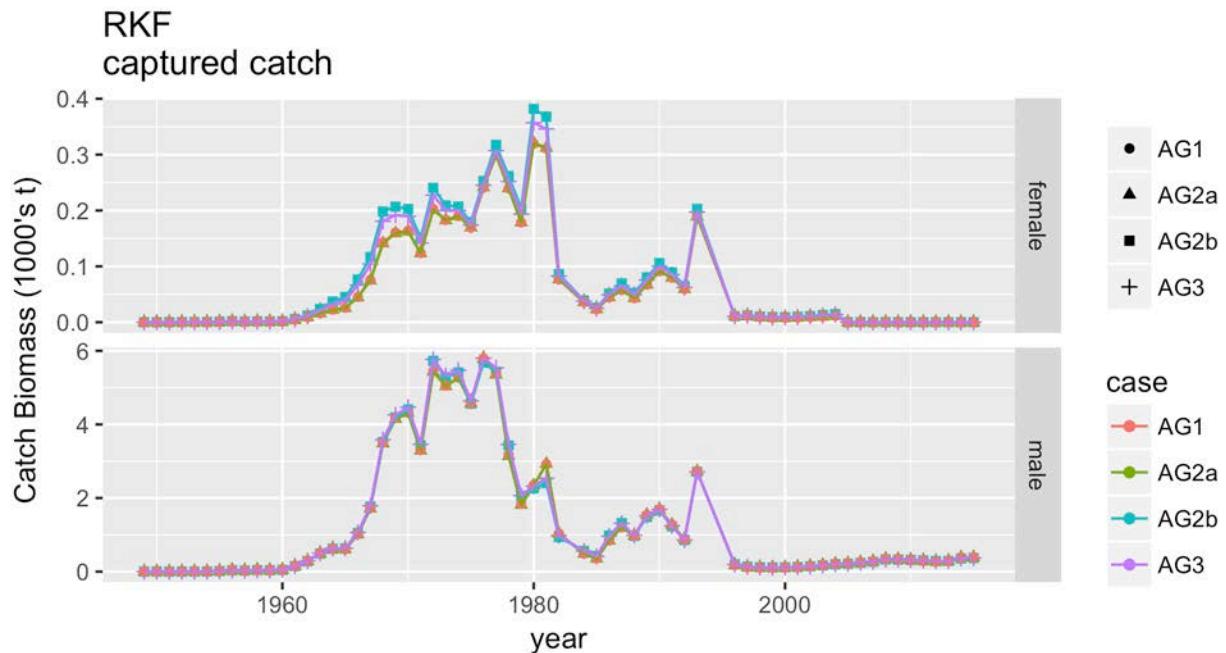
Figure 68. Predicted RKF captured catch biomass.
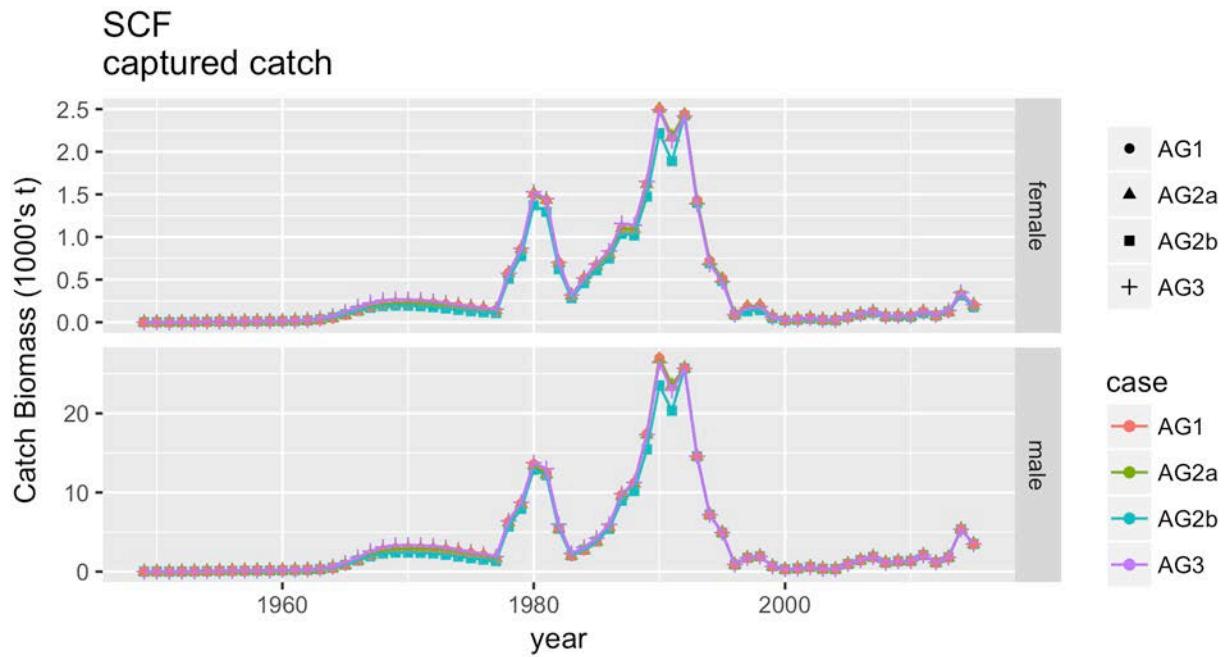
Figure 69. Predicted SCF captured catch biomass.
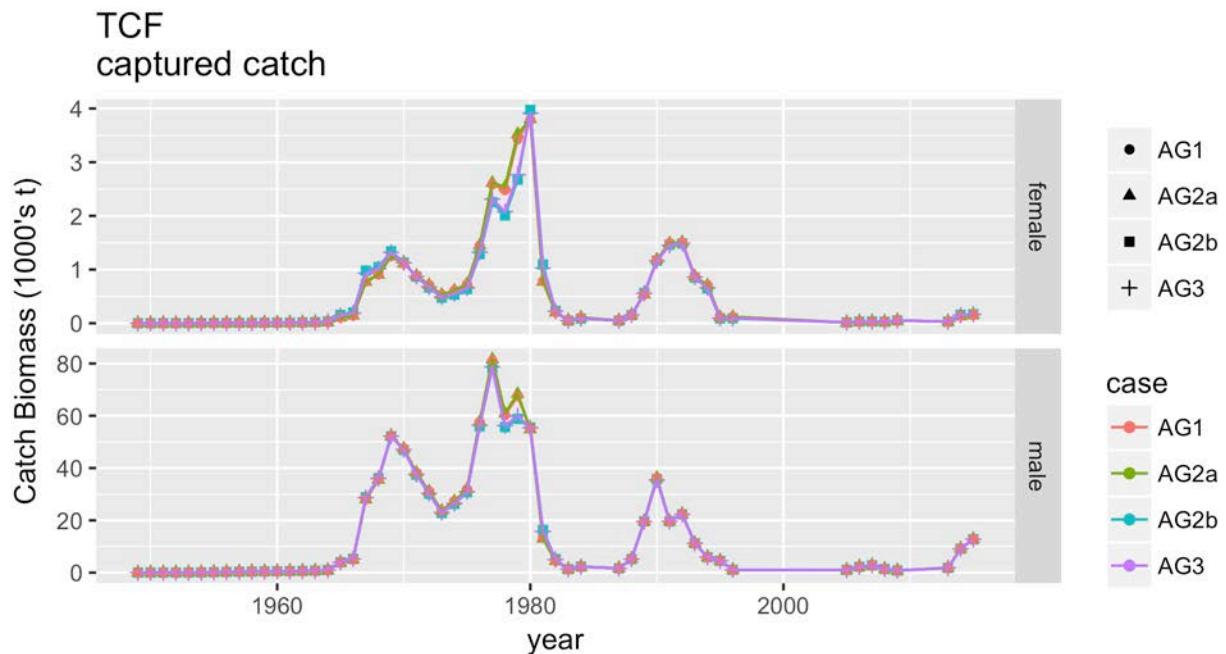
Figure 70. Predicted TCF captured catch biomass.

Retained catch abundance
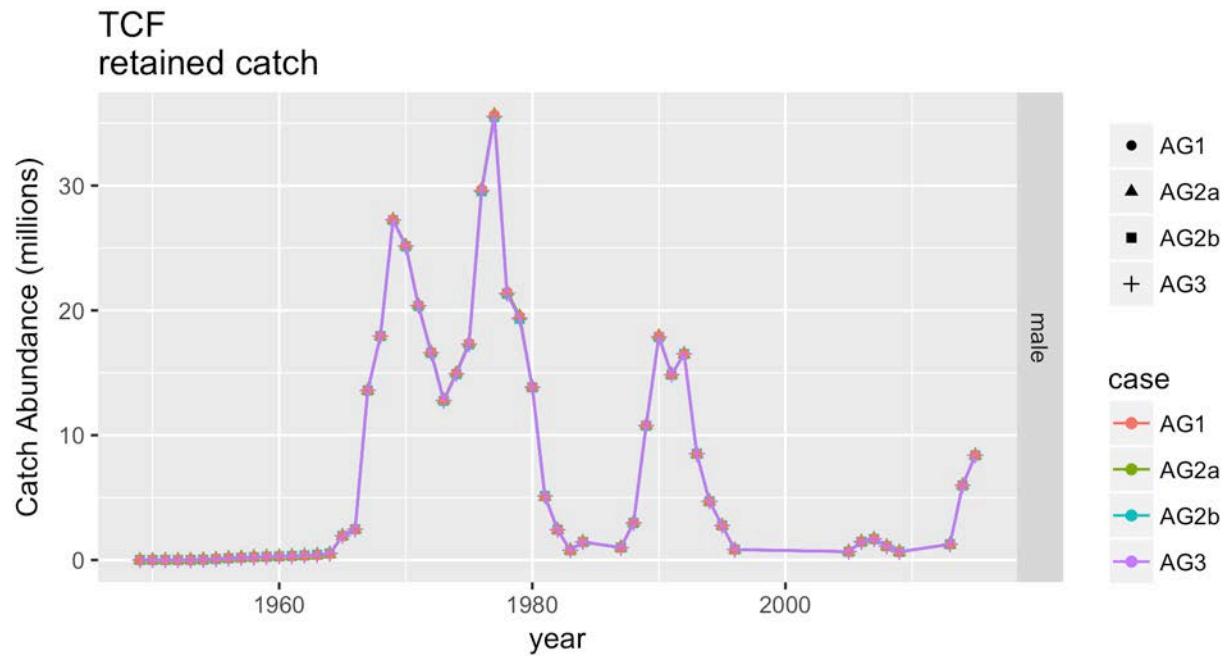
Figure 71. Predicted TCF retained catch abundance.

Retained catch biomass
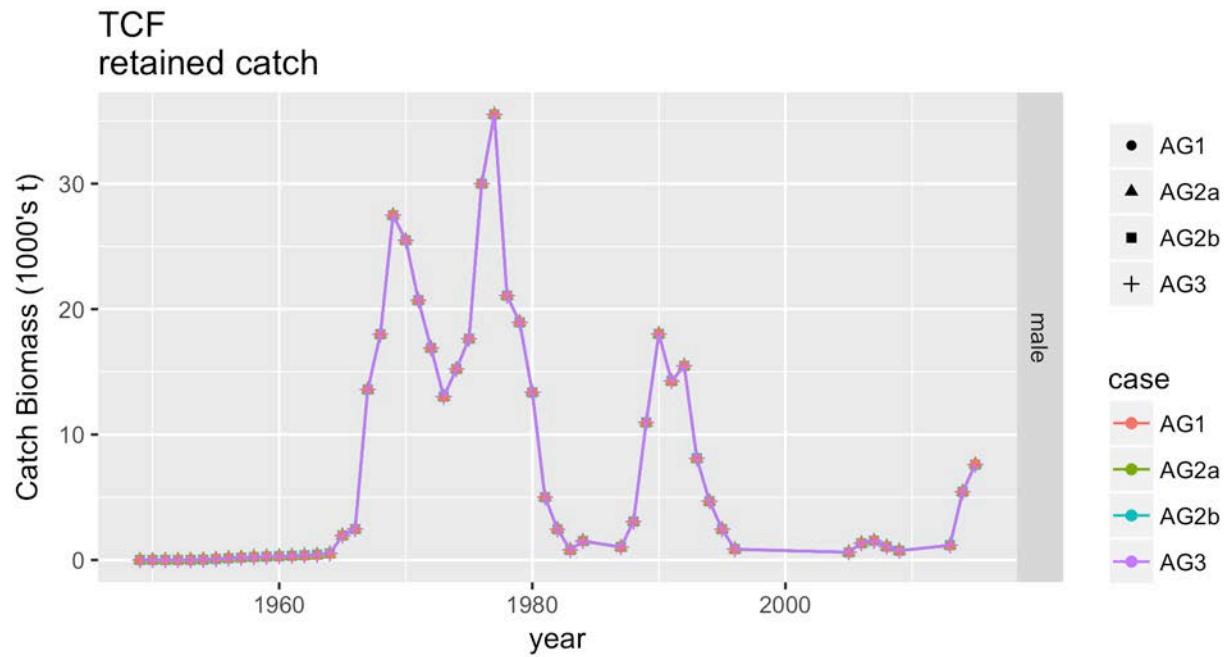
Figure 72. Predicted TCF retained catch biomass.

Total catch size compositions

Figure 73. Predicted GTF captured catch abundance for female all all, (1 of 5).

GTF captured catch for
female all all
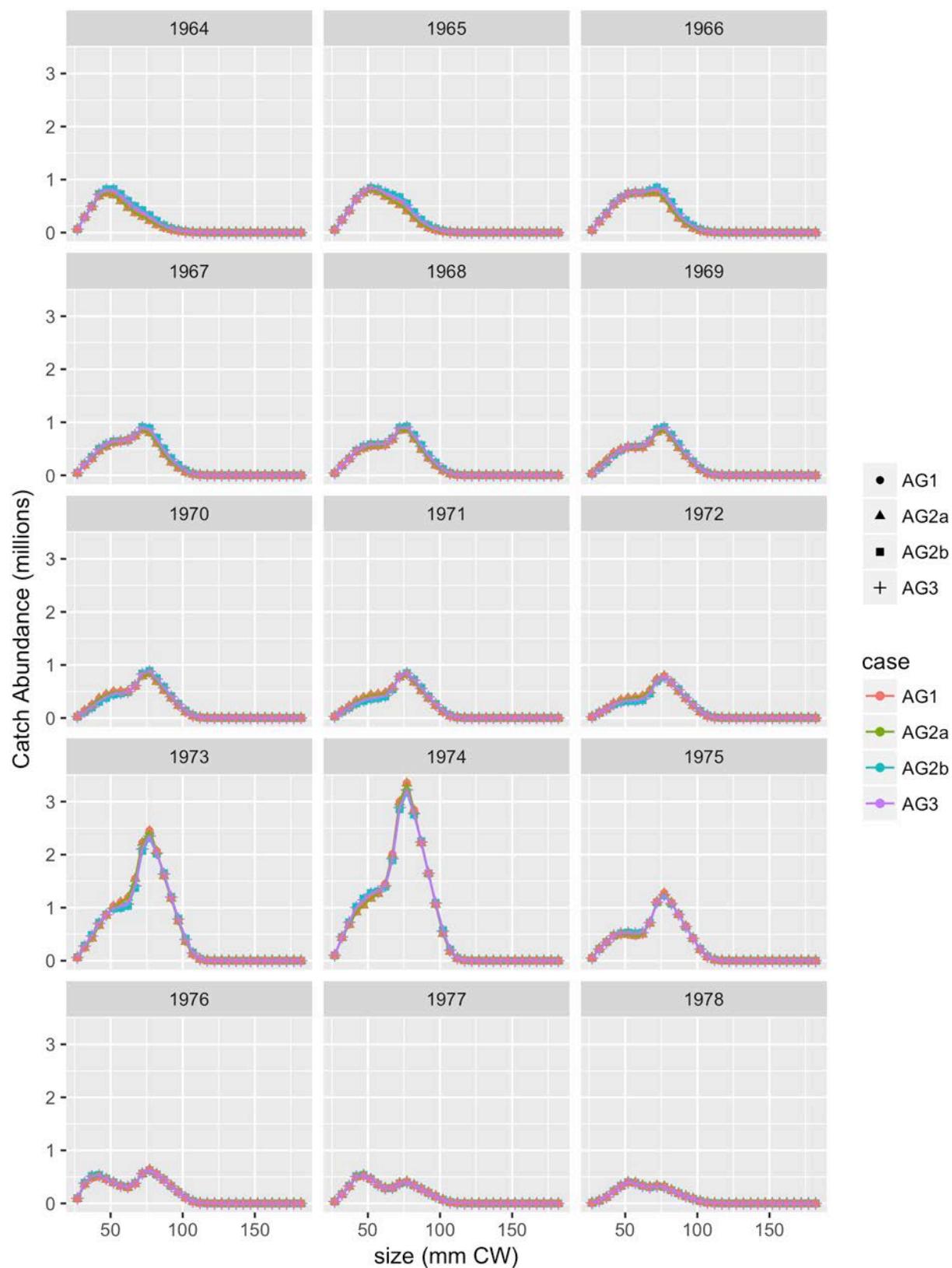
Figure 74. Predicted GTF captured catch abundance for female all all, (2 of 5).
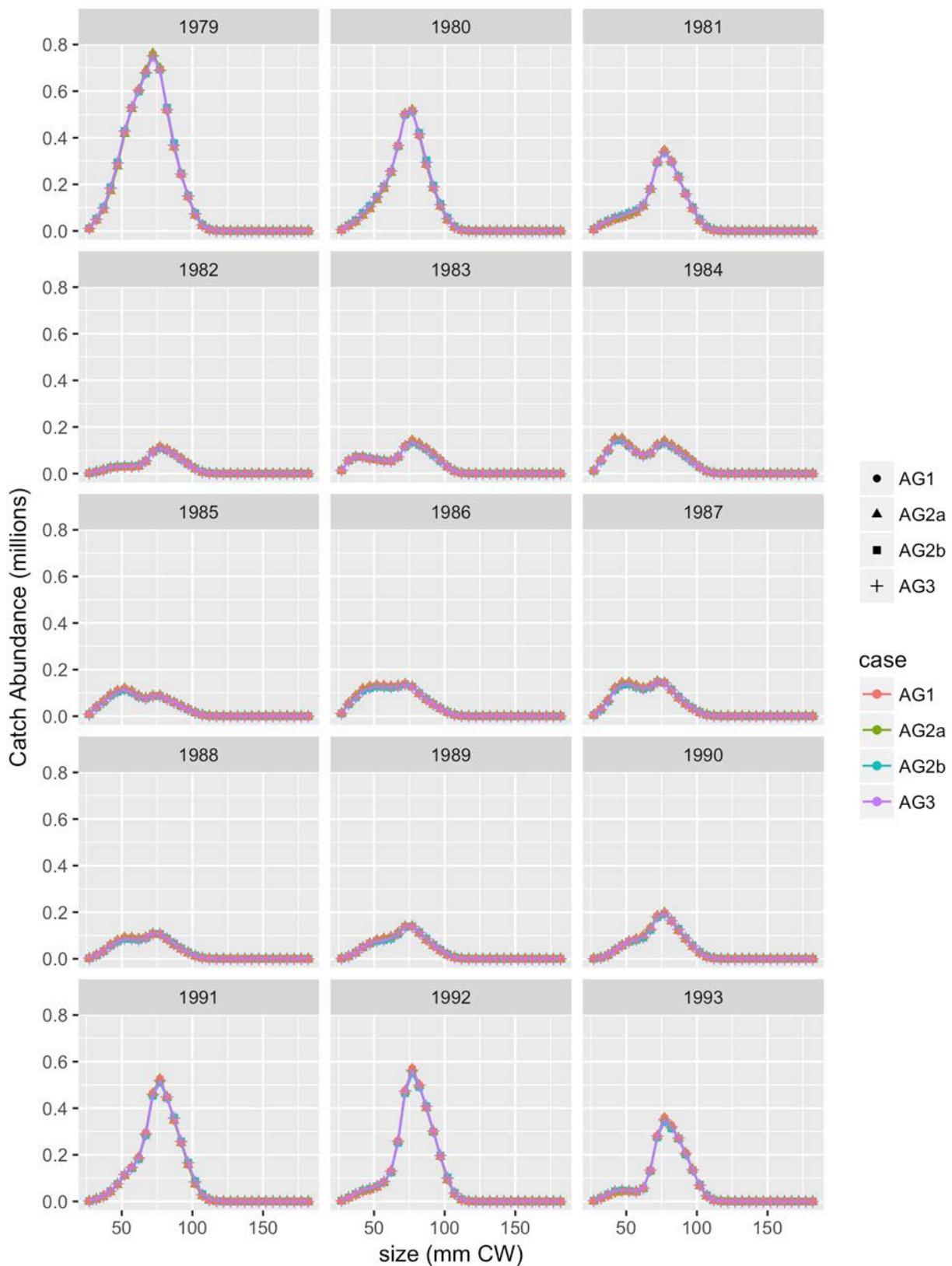
Figure 75. Predicted GTF captured catch abundance for female all all, (3 of 5).
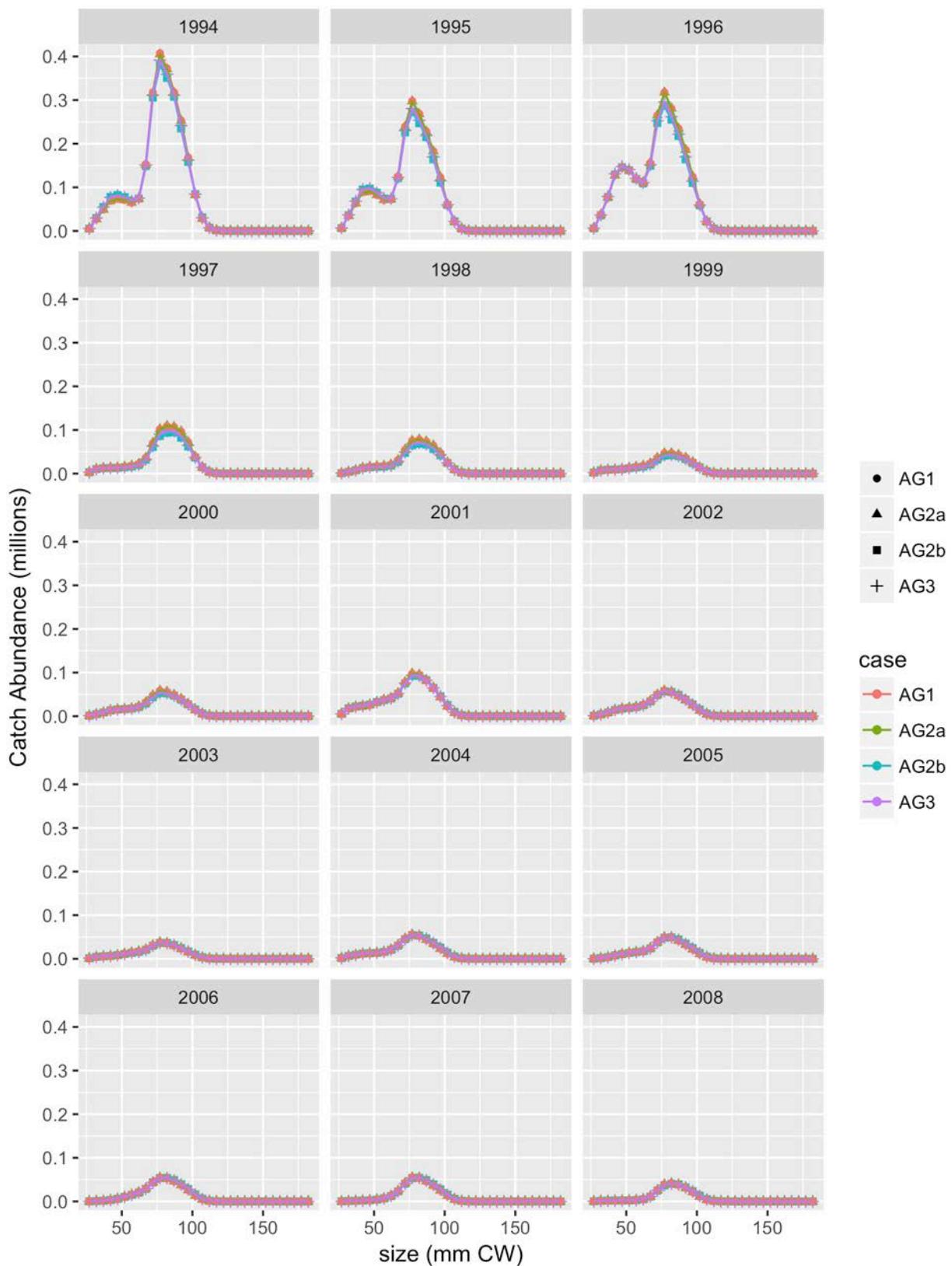
Figure 76. Predicted GTF captured catch abundance for female all all, (4 of 5).
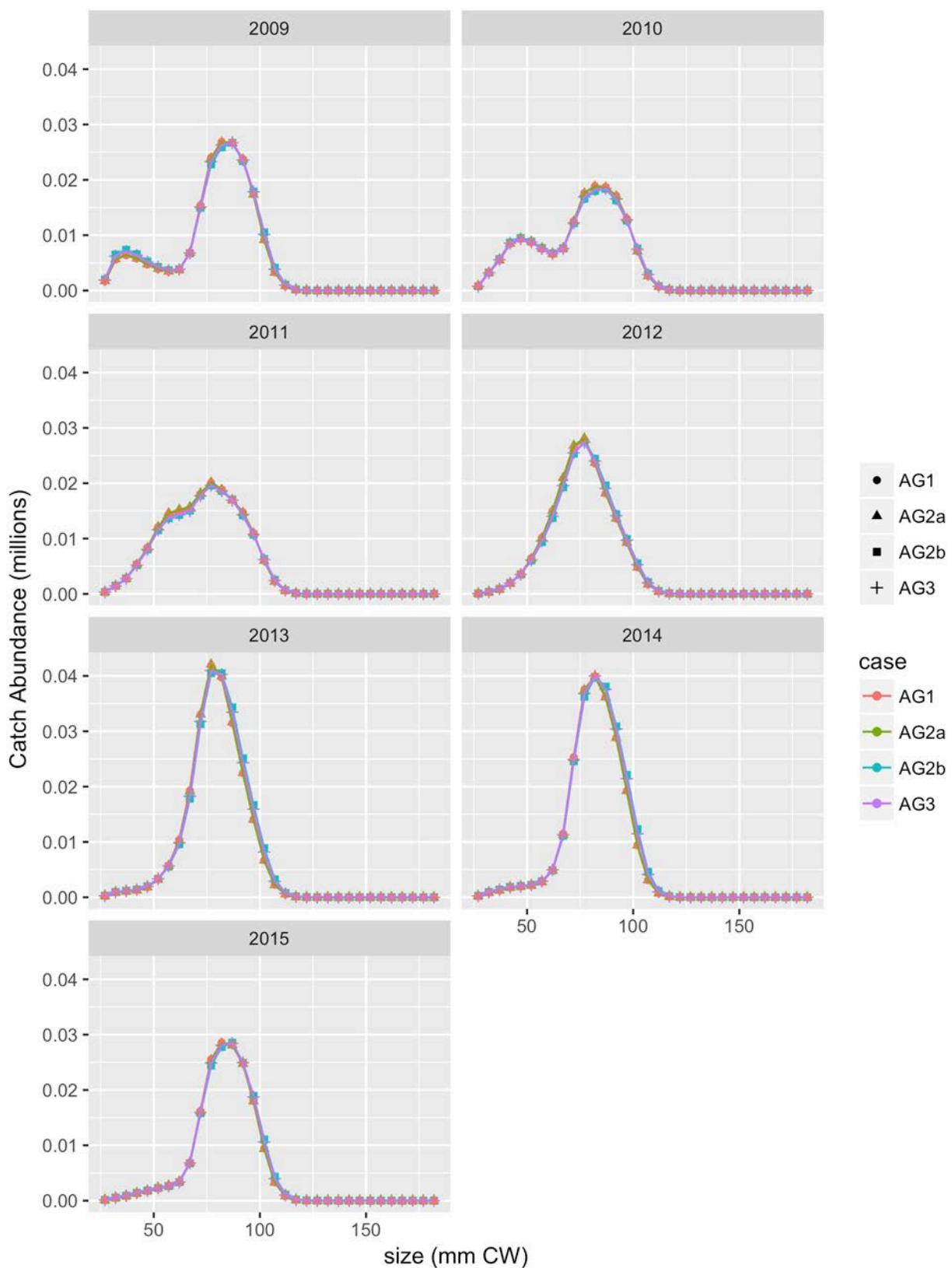
Figure 77. Predicted GTF captured catch abundance for female all all, (5 of 5).
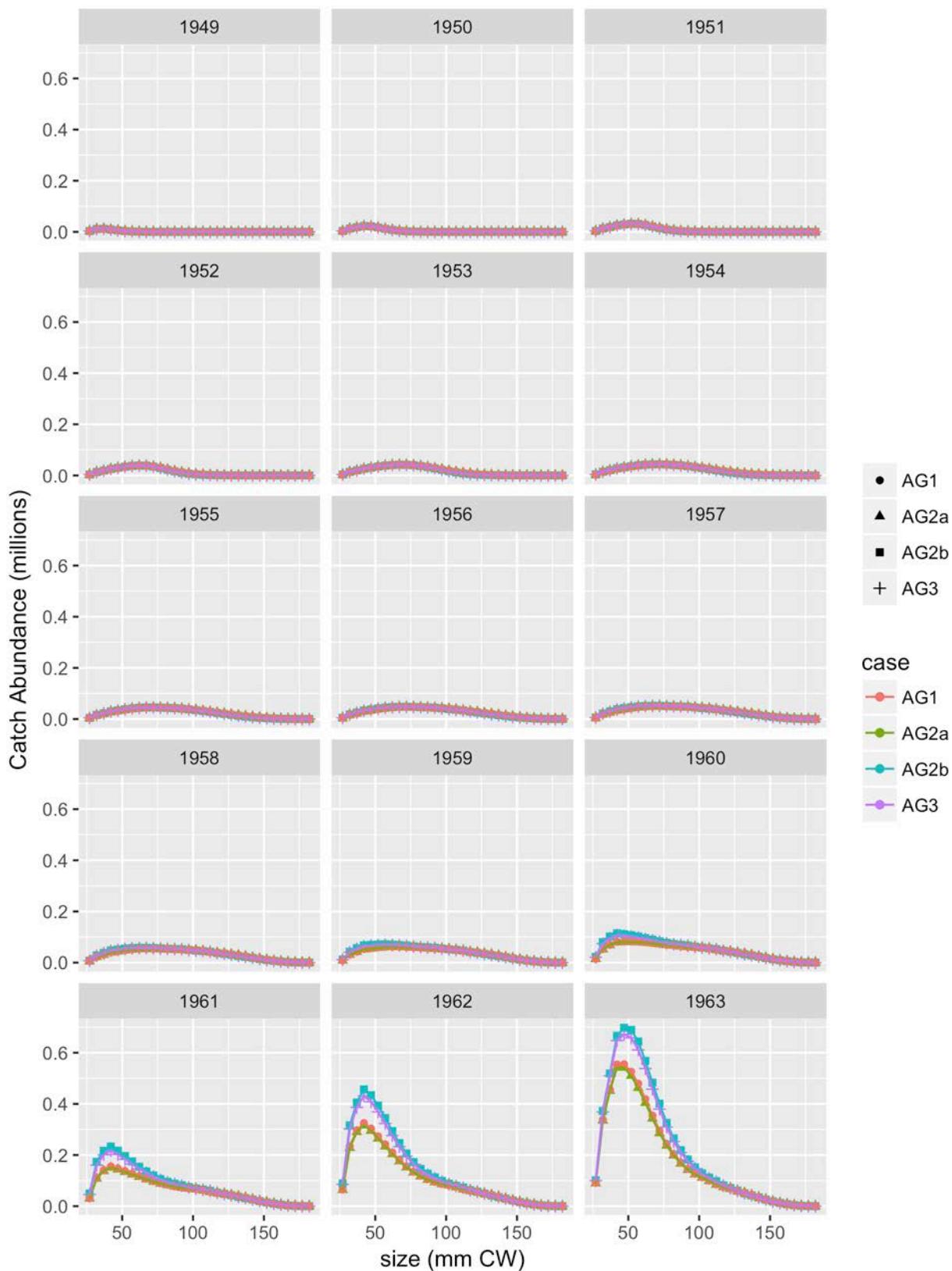
Figure 78. Predicted GTF captured catch abundance for male all all, (1 of 5).
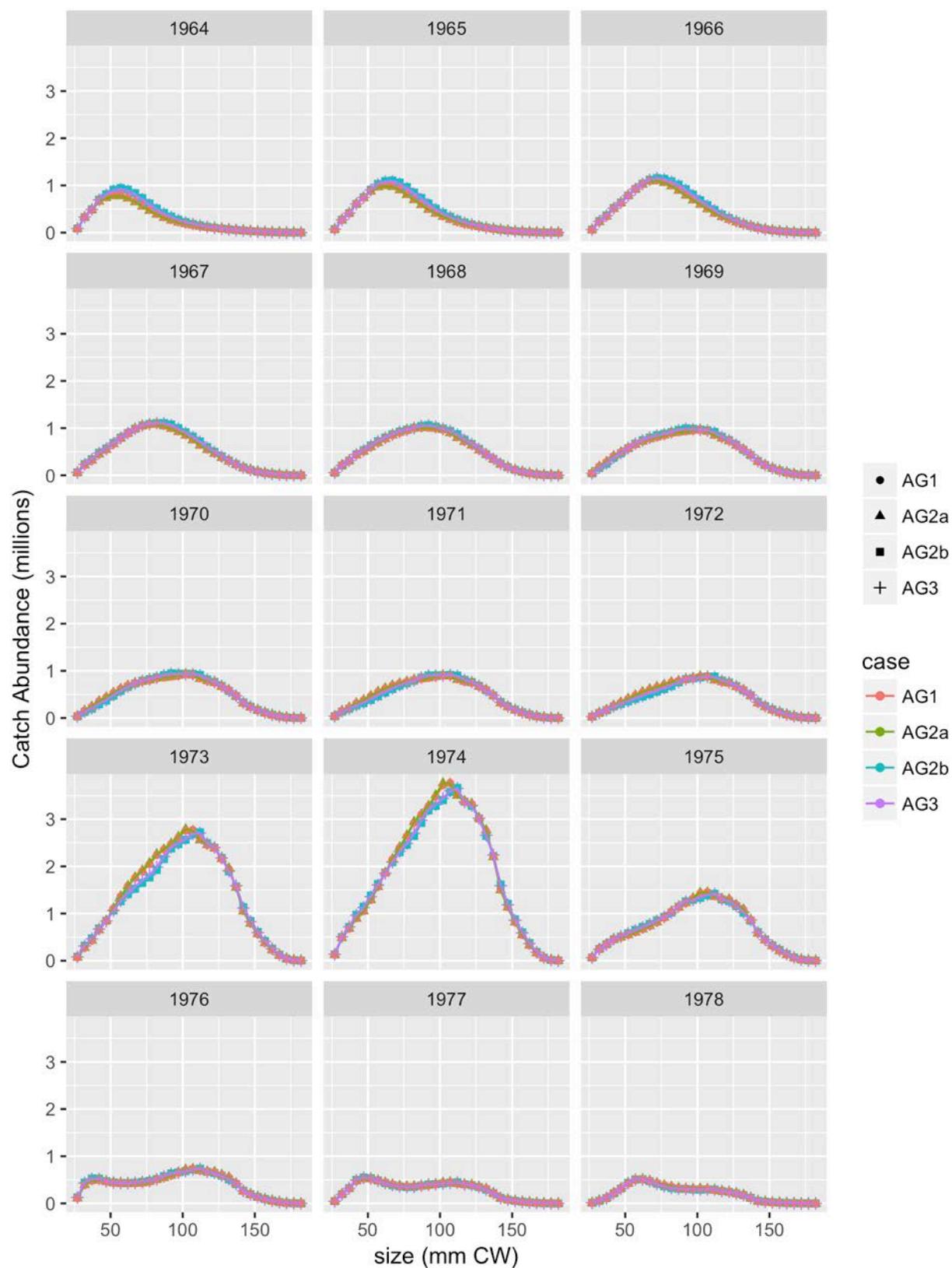
Figure 79. Predicted GTF captured catch abundance for male all all, (2 of 5).

Figure 80. Predicted GTF captured catch abundance for male all all, (3 of 5).

Figure 81. Predicted GTF captured catch abundance for male all all, (4 of 5).

Figure 82. Predicted GTF captured catch abundance for male all all, (5 of 5).

Figure 83. Predicted RKF captured catch abundance for female all all, (1 of 5).

Figure 84. Predicted RKF captured catch abundance for female all all, (2 of 5).

Figure 85. Predicted RKF captured catch abundance for female all all, (3 of 5).

Figure 86. Predicted RKF captured catch abundance for female all all, (4 of 5).

Figure 87. Predicted RKF captured catch abundance for female all all, (5 of 5).
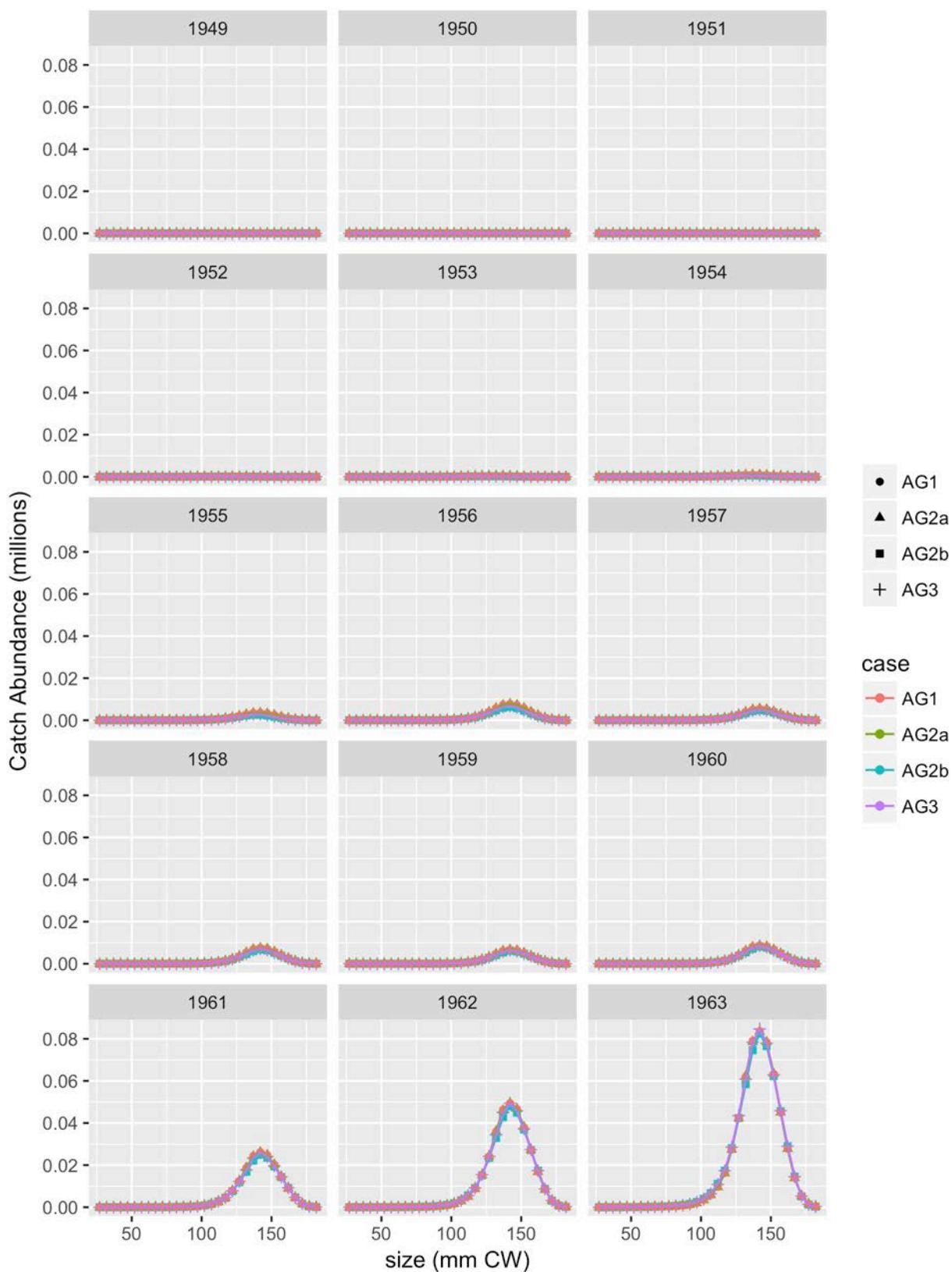
Figure 88. Predicted RKF captured catch abundance for male all all, (1 of 5).
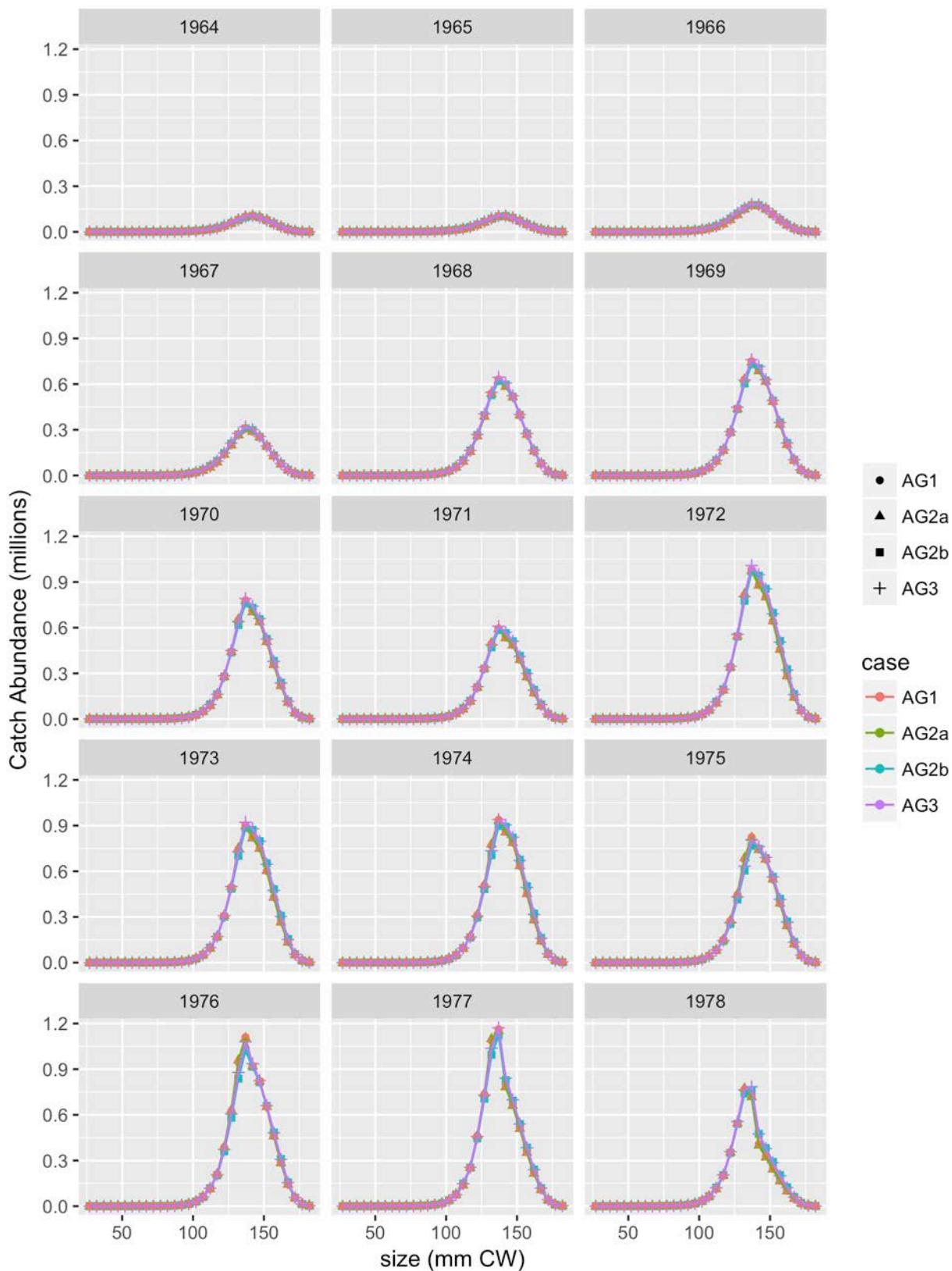
Figure 89. Predicted RKF captured catch abundance for male all all, (2 of 5).
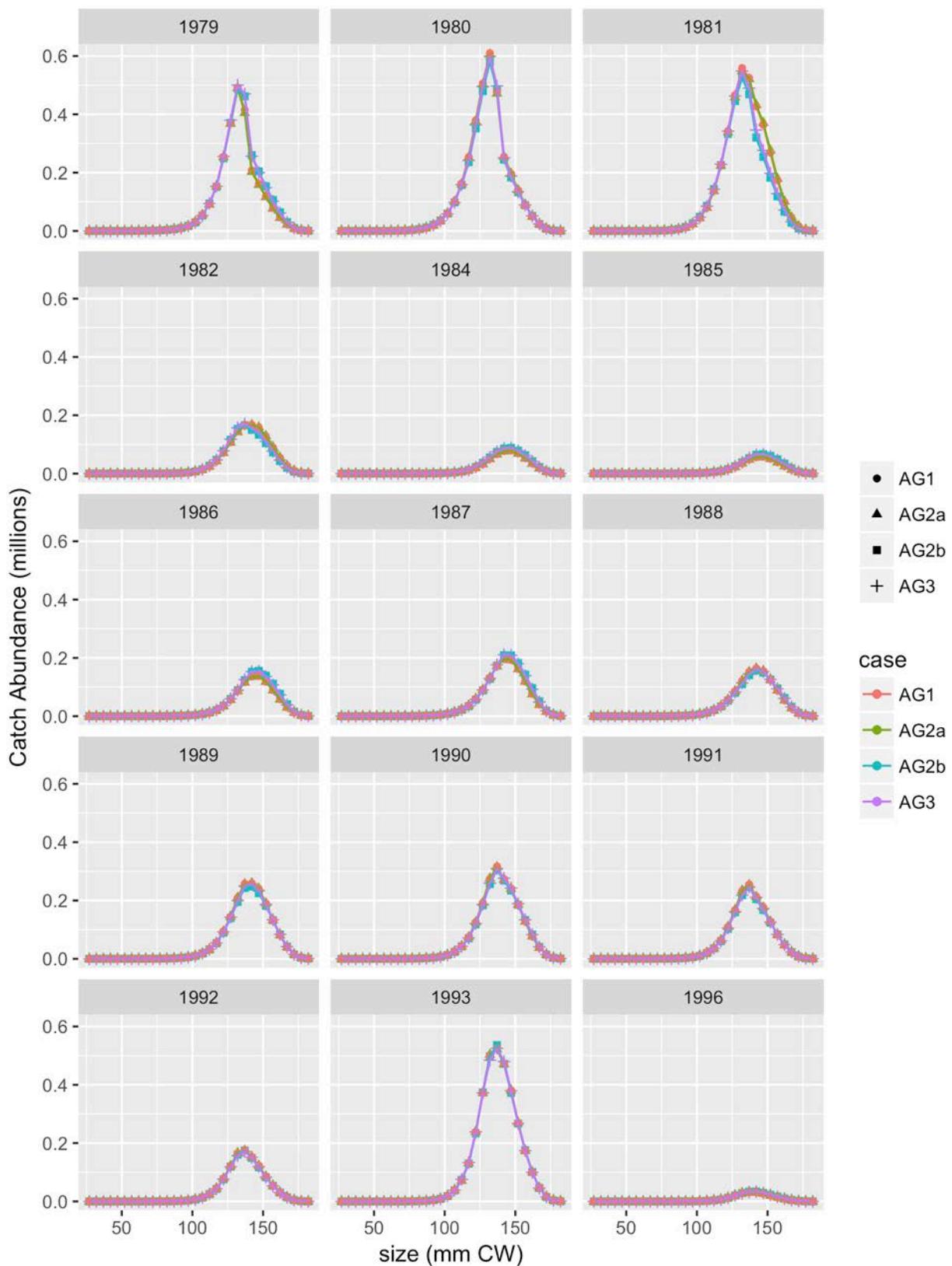
Figure 90. Predicted RKF captured catch abundance for male all all, (3 of 5).
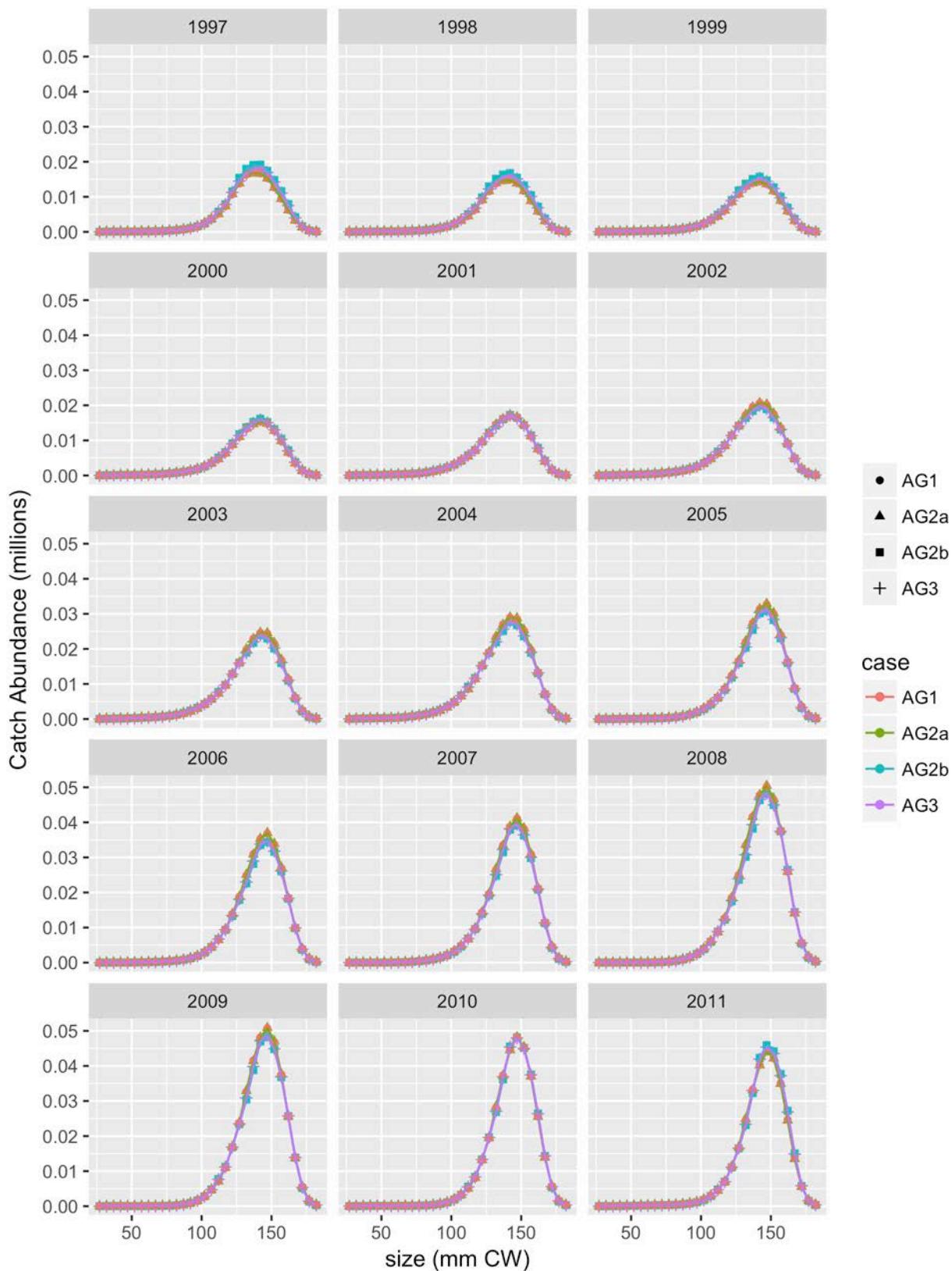
Figure 91. Predicted RKF captured catch abundance for male all all, (4 of 5).
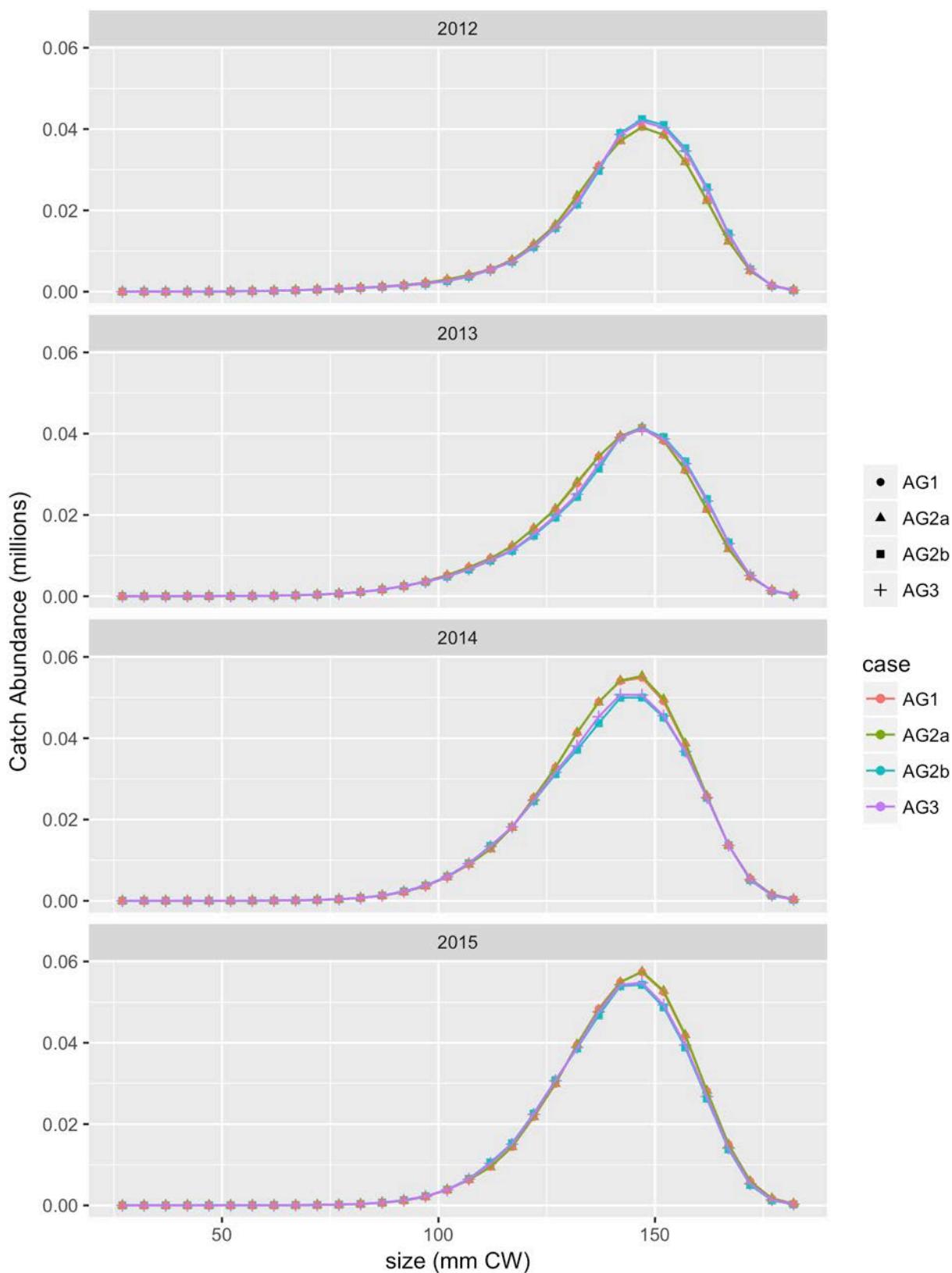
Figure 92. Predicted RKF captured catch abundance for male all all, (5 of 5).

Figure 93. Predicted SCF captured catch abundance for female all all, (1 of 5).

Figure 94. Predicted SCF captured catch abundance for female all all, (2 of 5).

Figure 95. Predicted SCF captured catch abundance for female all all, (3 of 5).

Figure 96. Predicted SCF captured catch abundance for female all all, (4 of 5).

Figure 97. Predicted SCF captured catch abundance for female all all, (5 of 5).

Figure 98. Predicted SCF captured catch abundance for male all all, (1 of 5).

Figure 99. Predicted SCF captured catch abundance for male all all, (2 of 5).

Figure 100. Predicted SCF captured catch abundance for male all all, (3 of 5).

Figure 101. Predicted SCF captured catch abundance for male all all, (4 of 5).

Figure 102. Predicted SCF captured catch abundance for male all all, (5 of 5).

Figure 103. Predicted TCF captured catch abundance for female all all, (1 of 4).

Figure 104. Predicted TCF captured catch abundance for female all all, (2 of 4).

Figure 105. Predicted TCF captured catch abundance for female all all, (3 of 4).

Figure 106. Predicted TCF captured catch abundance for female all all, (4 of 4).

Figure 107. Predicted TCF captured catch abundance for male all all, (1 of 4).

Figure 108. Predicted TCF captured catch abundance for male all all, (2 of 4).

Figure 109. Predicted TCF captured catch abundance for male all all, (3 of 4).

Figure 110. Predicted TCF captured catch abundance for male all all, (4 of 4).

Retained catch size compositions
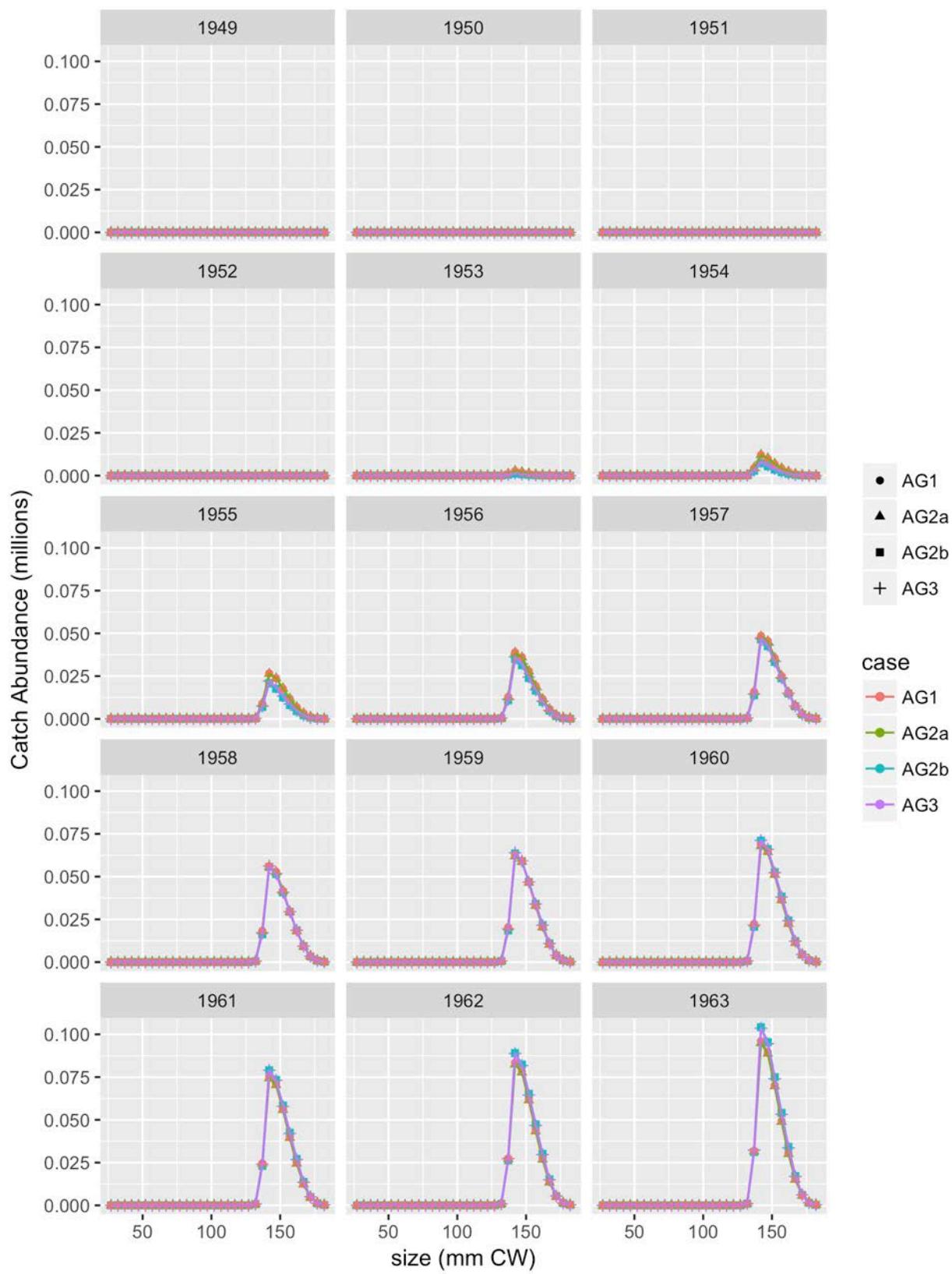
Figure 111. Predicted TCF retained catch abundance for male all all, (1 of 4).
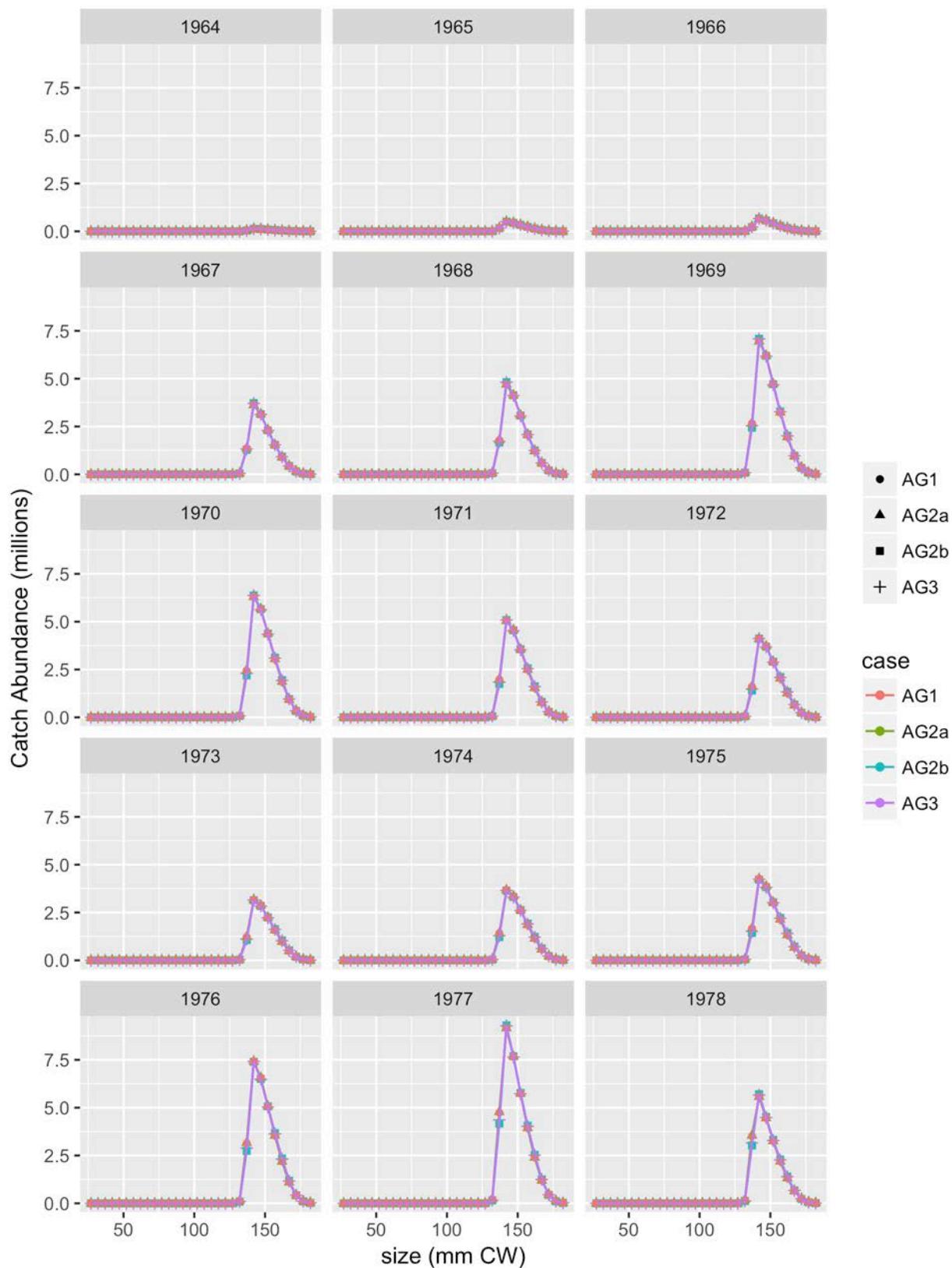
Figure 112. Predicted TCF retained catch abundance for male all all, (2 of 4).
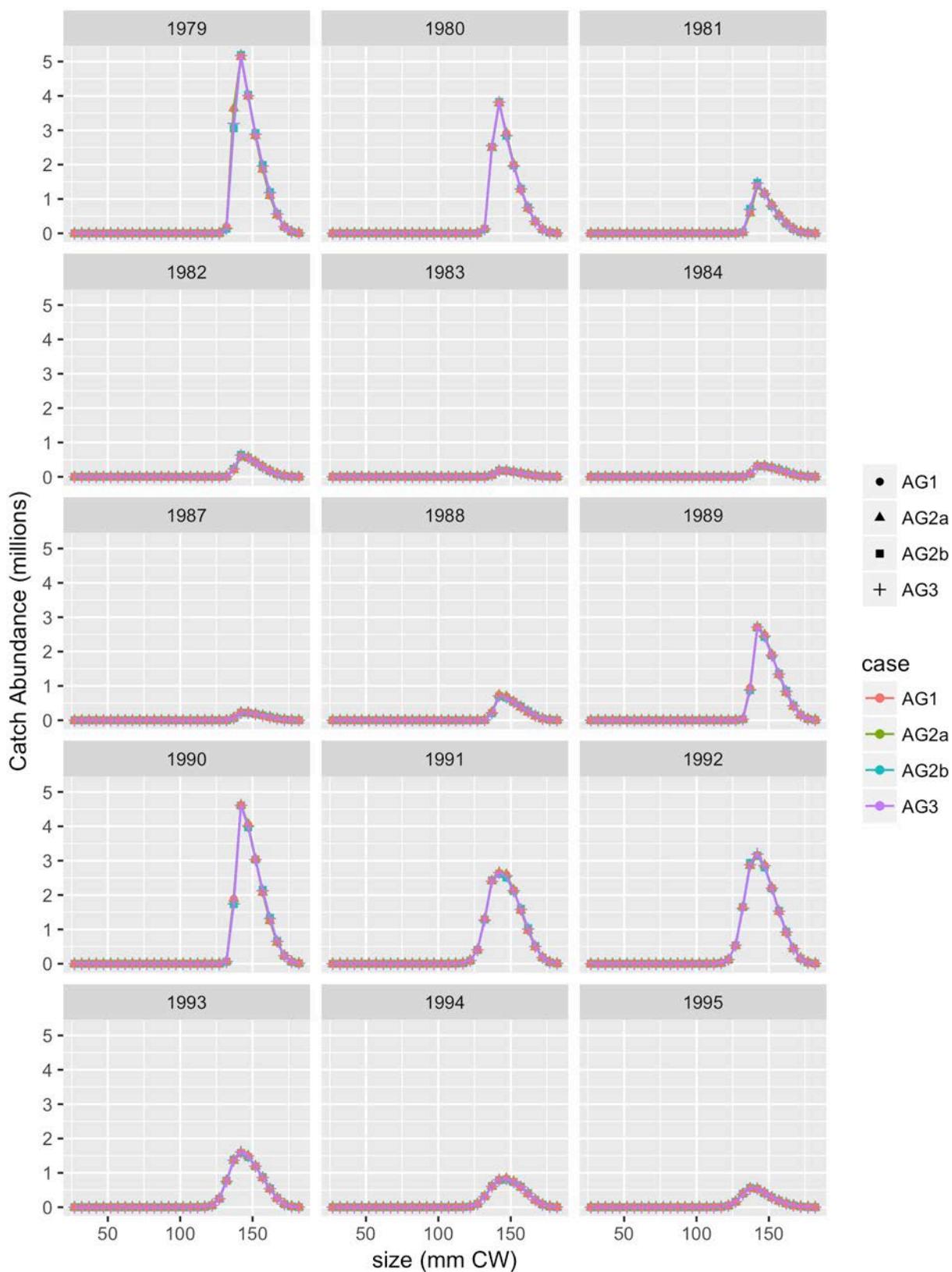
Figure 113. Predicted TCF retained catch abundance for male all all, (3 of 4).
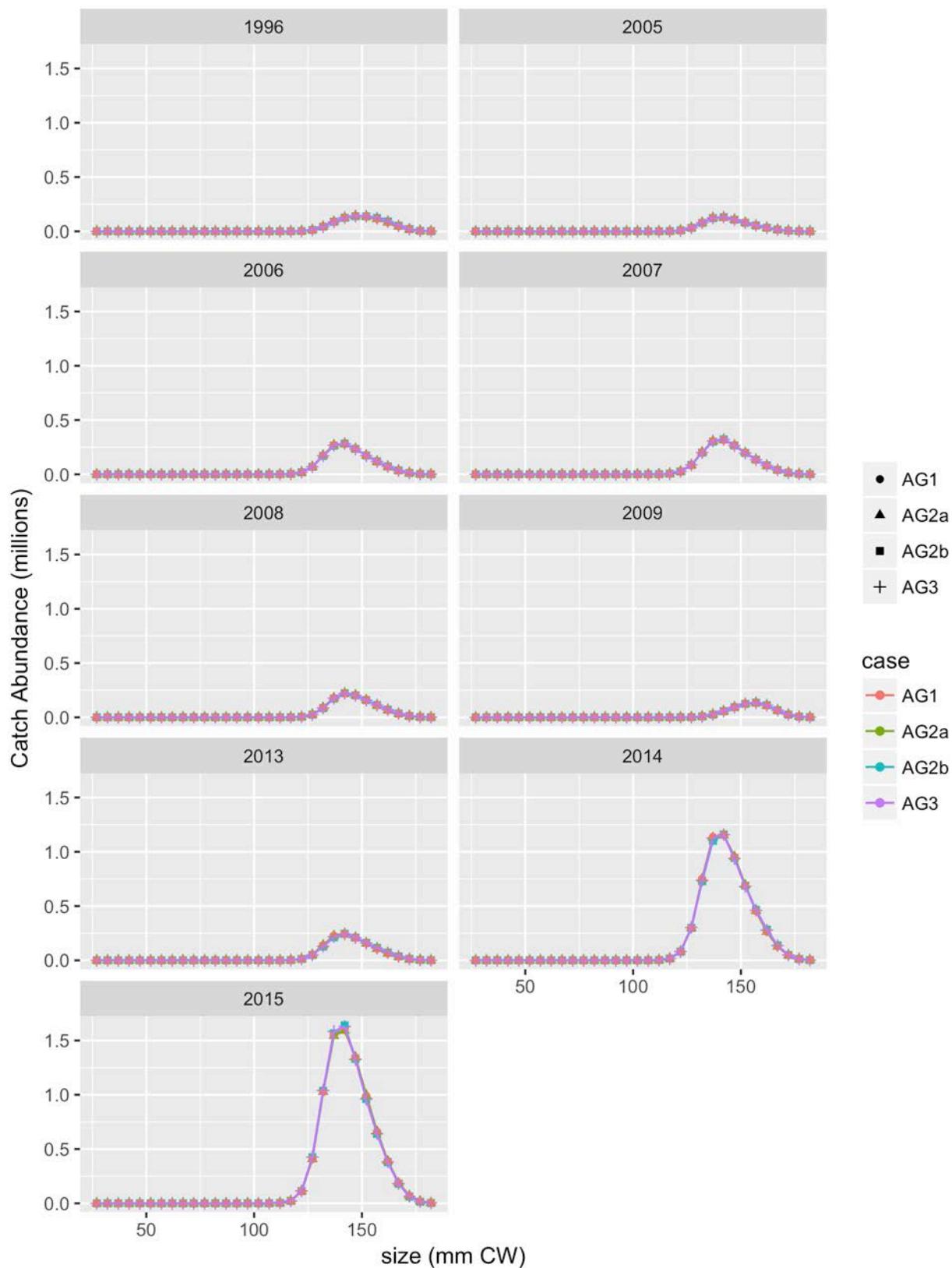
Figure 114. Predicted TCF retained catch abundance for male all all, (4 of 4).

Model fits

Survey biomass
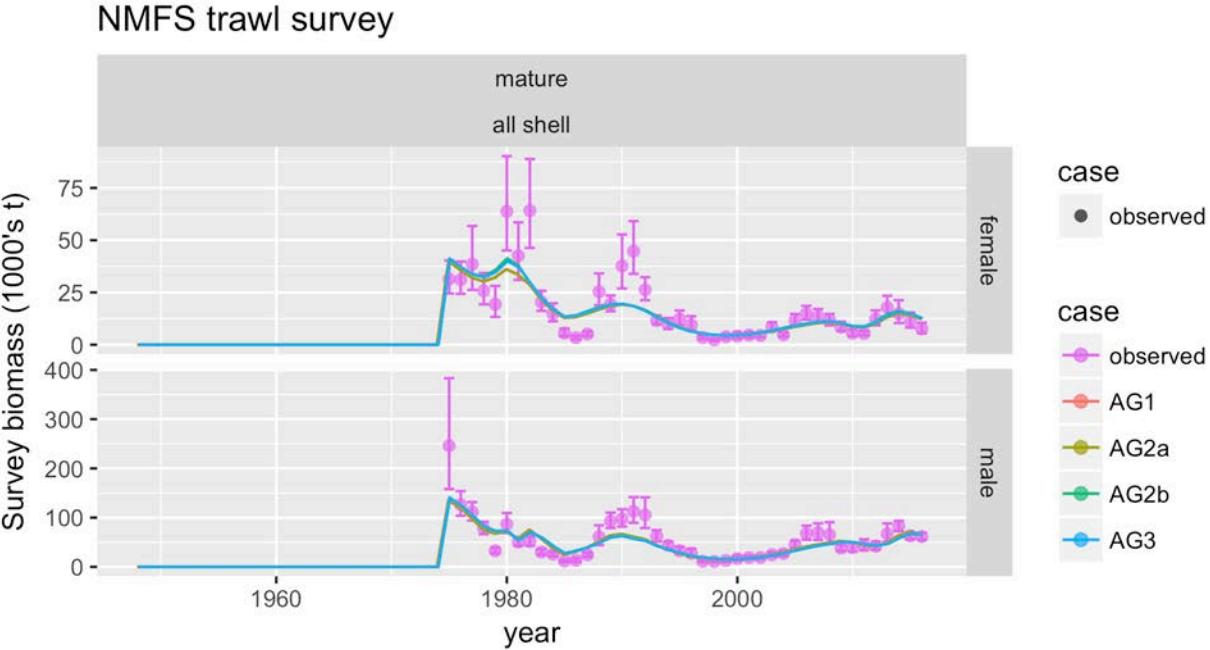
Figure 115. Comparison of observed and predicted survey biomass for NMFS trawl survey.
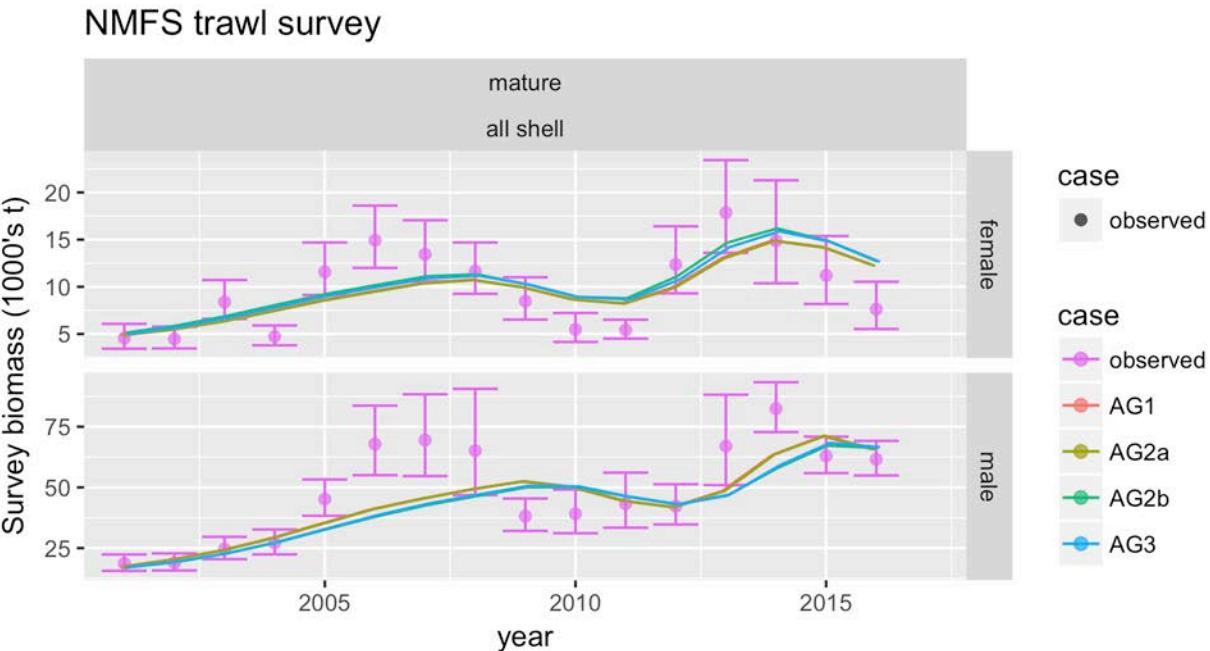
Figure 116. Comparison of observed and predicted survey biomass for NMFS trawl survey. Recent time period.

Mean survey size compositions
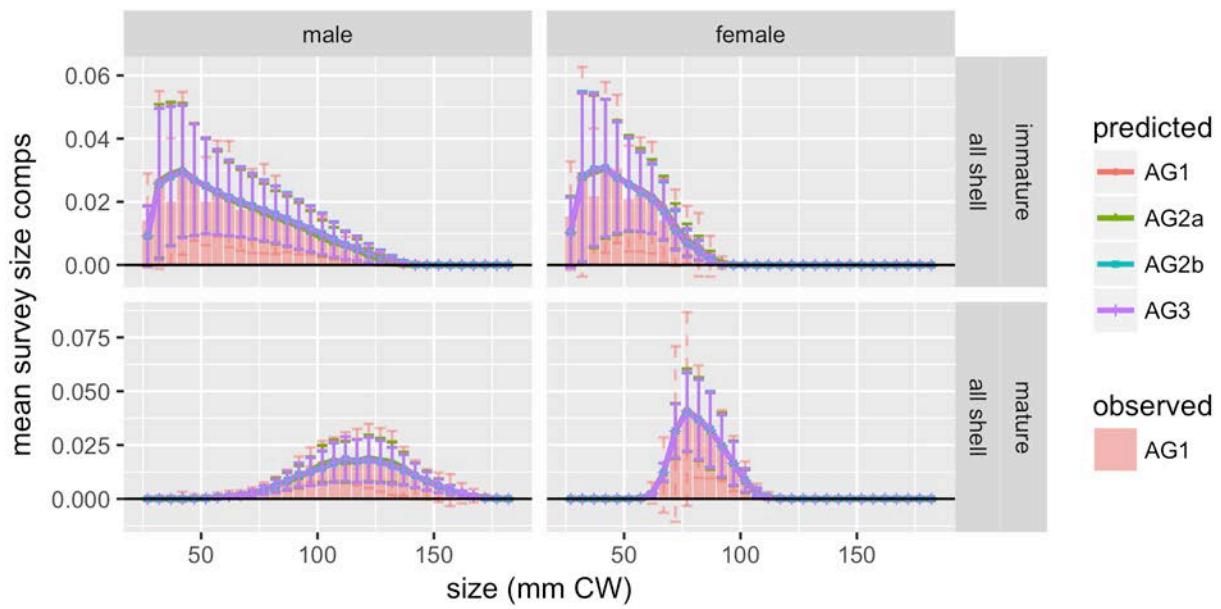
Figure 117. Comparison of observed and predicted &&xms mean survey size comps for NMFS trawl survey.

Survey size compositions
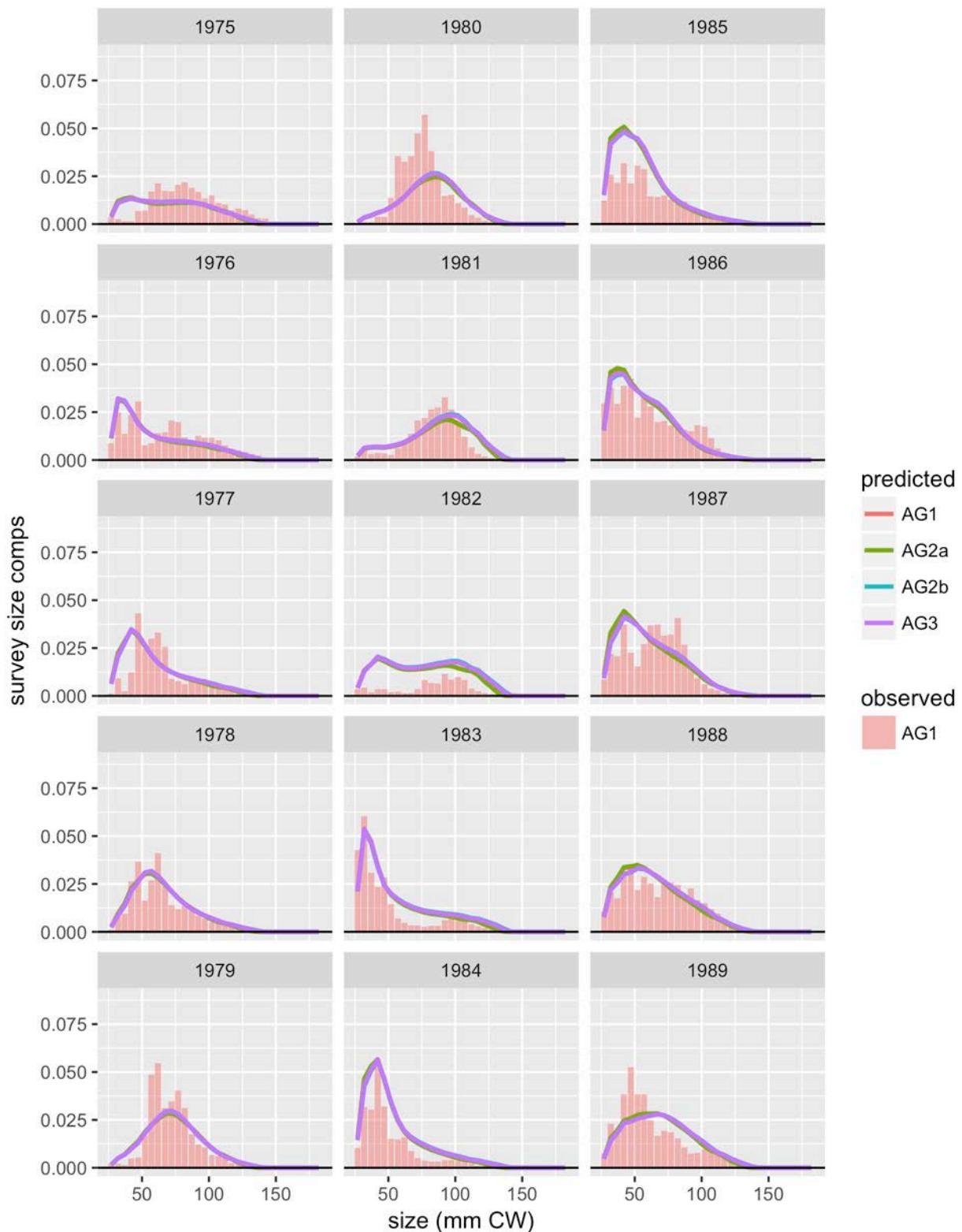
Figure 118. Comparison of observed and predicted male, immature, all shell survey size comps for NMFS trawl survey. Page 1 of 3.

Figure 119. Comparison of observed and predicted male, immature, all shell survey size comps for NMFS trawl survey. Page 2 of 3.

Figure 120. Comparison of observed and predicted male, immature, all shell survey size comps for NMFS trawl survey. Page 3 of 3.

NMFS trawl survey: male, mature, all shell
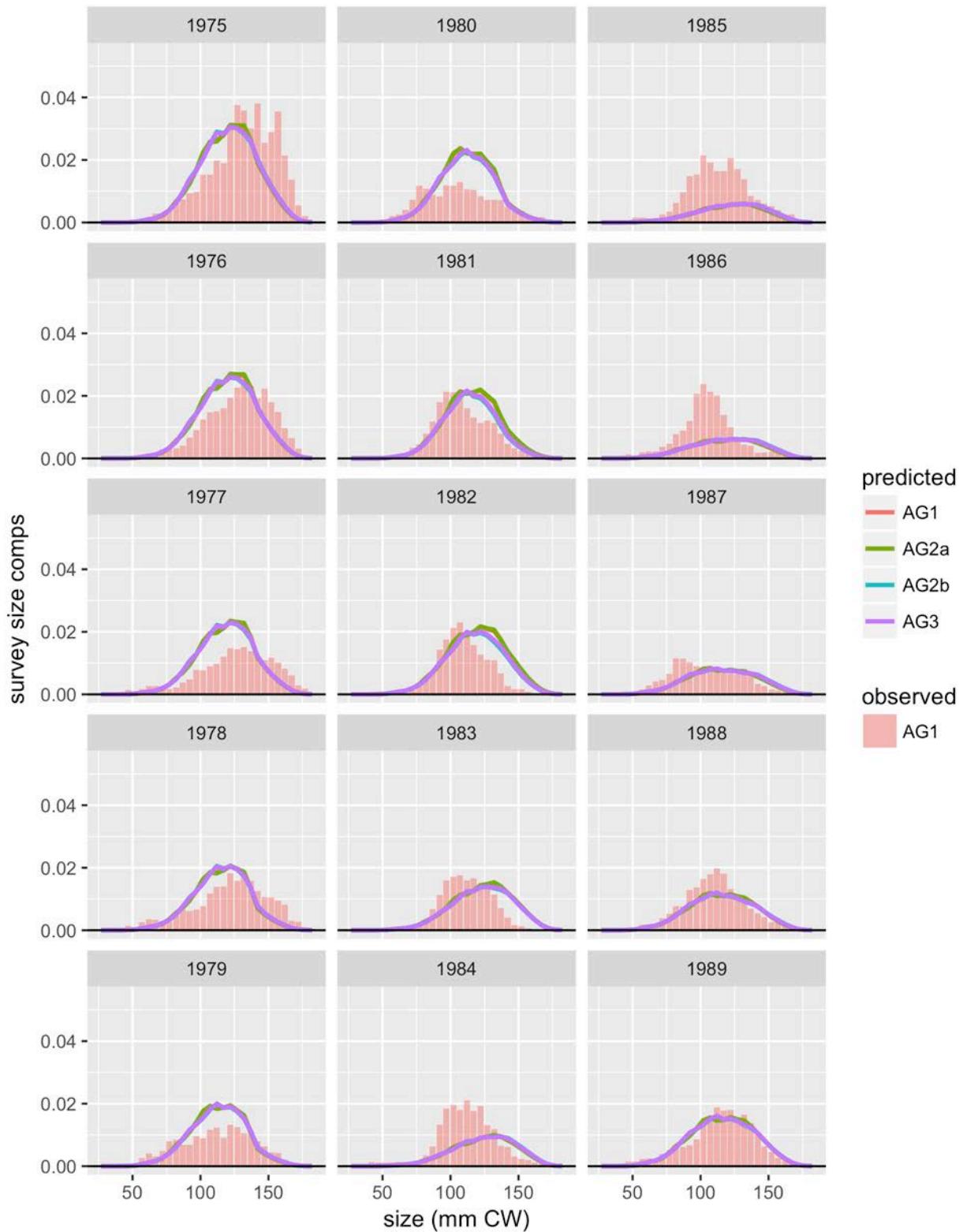
Figure 121. Comparison of observed and predicted male, mature, all shell survey size comps for NMFS trawl survey. Page 1 of 3.
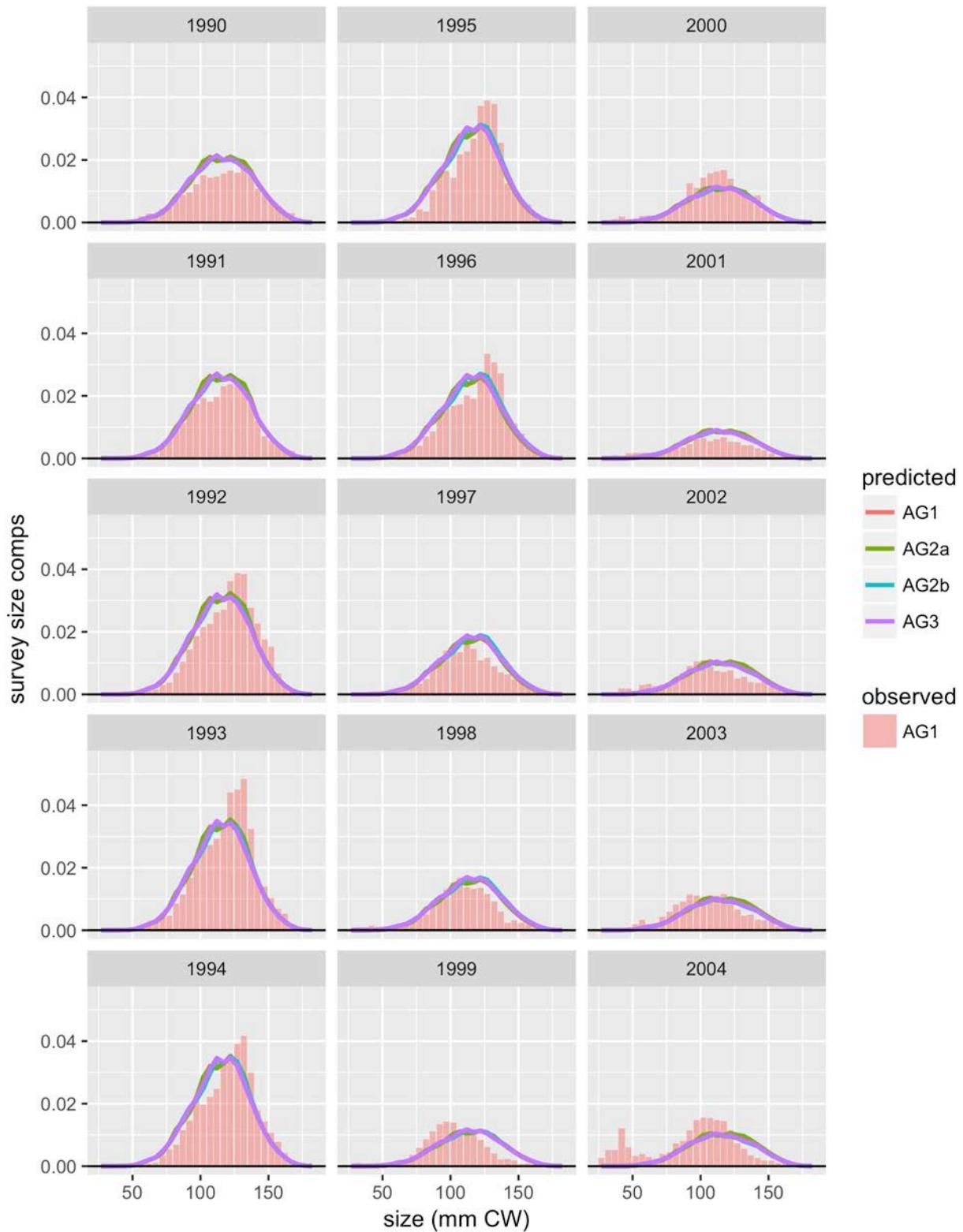
Figure 122. Comparison of observed and predicted male, mature, all shell survey size comps for NMFS trawl survey. Page 2 of 3.
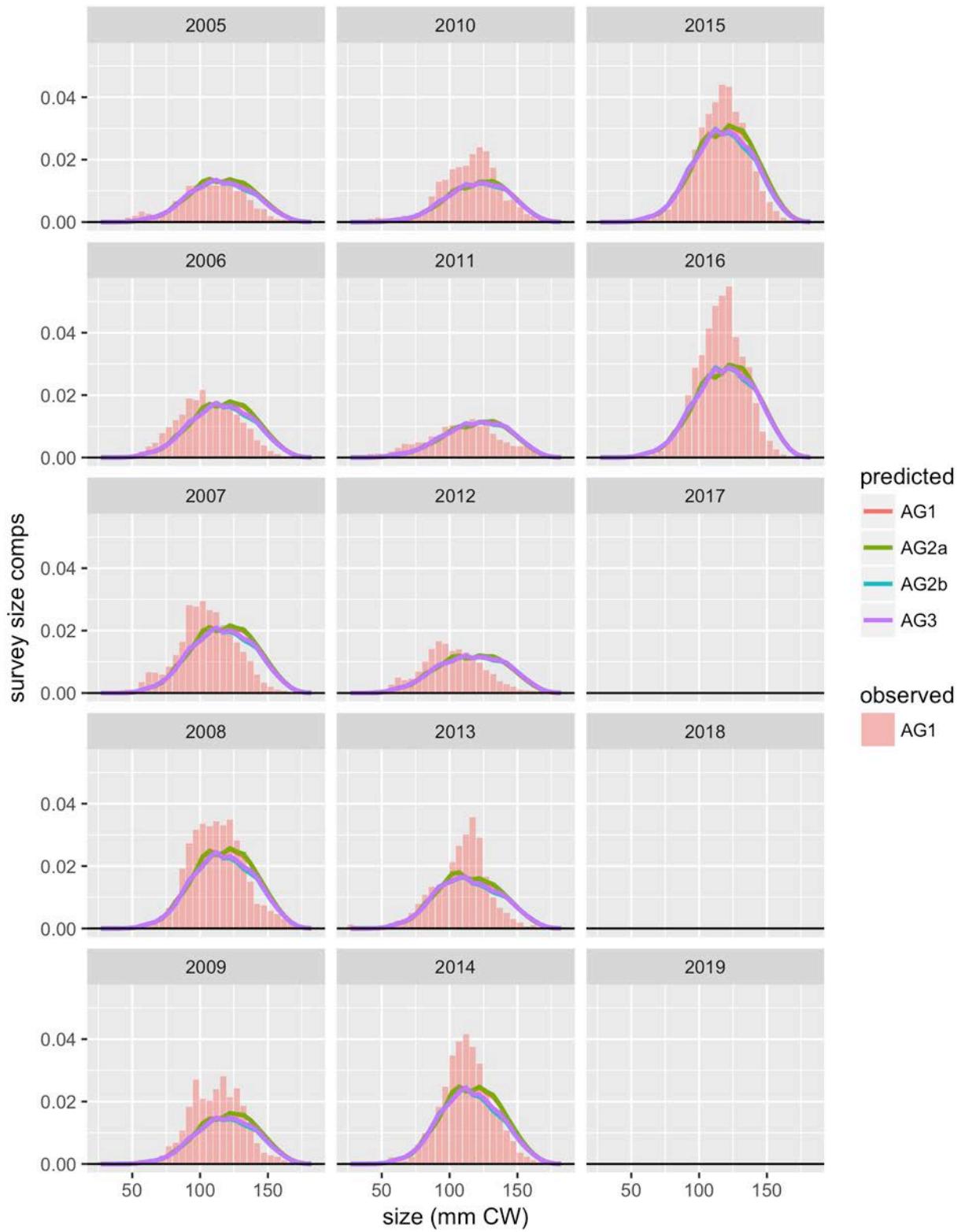
Figure 123. Comparison of observed and predicted male, mature, all shell survey size comps for NMFS trawl survey. Page 3 of 3.
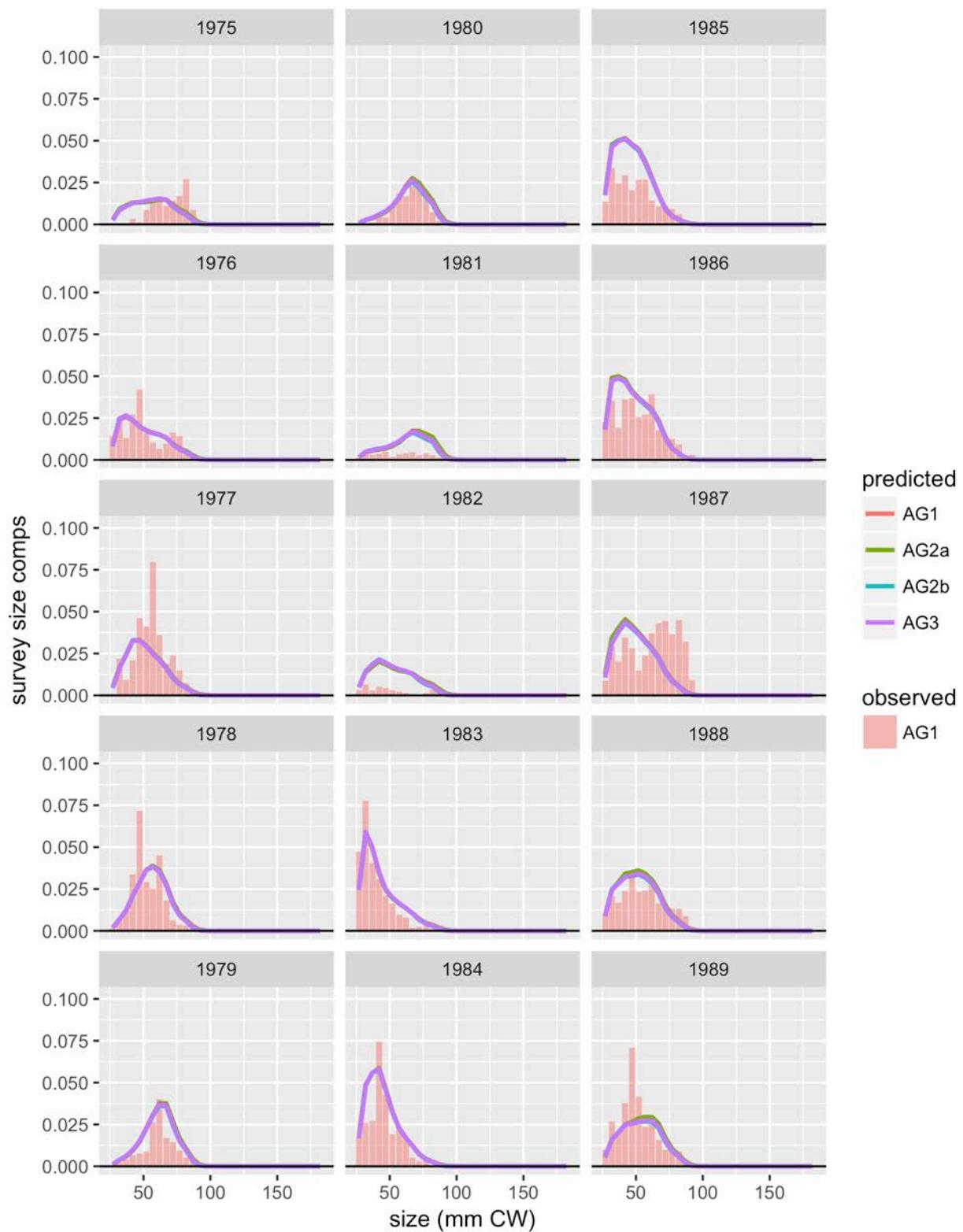
Figure 124. Comparison of observed and predicted female, immature, all shell survey size comps for NMFS trawl survey. Page 1 of 3.
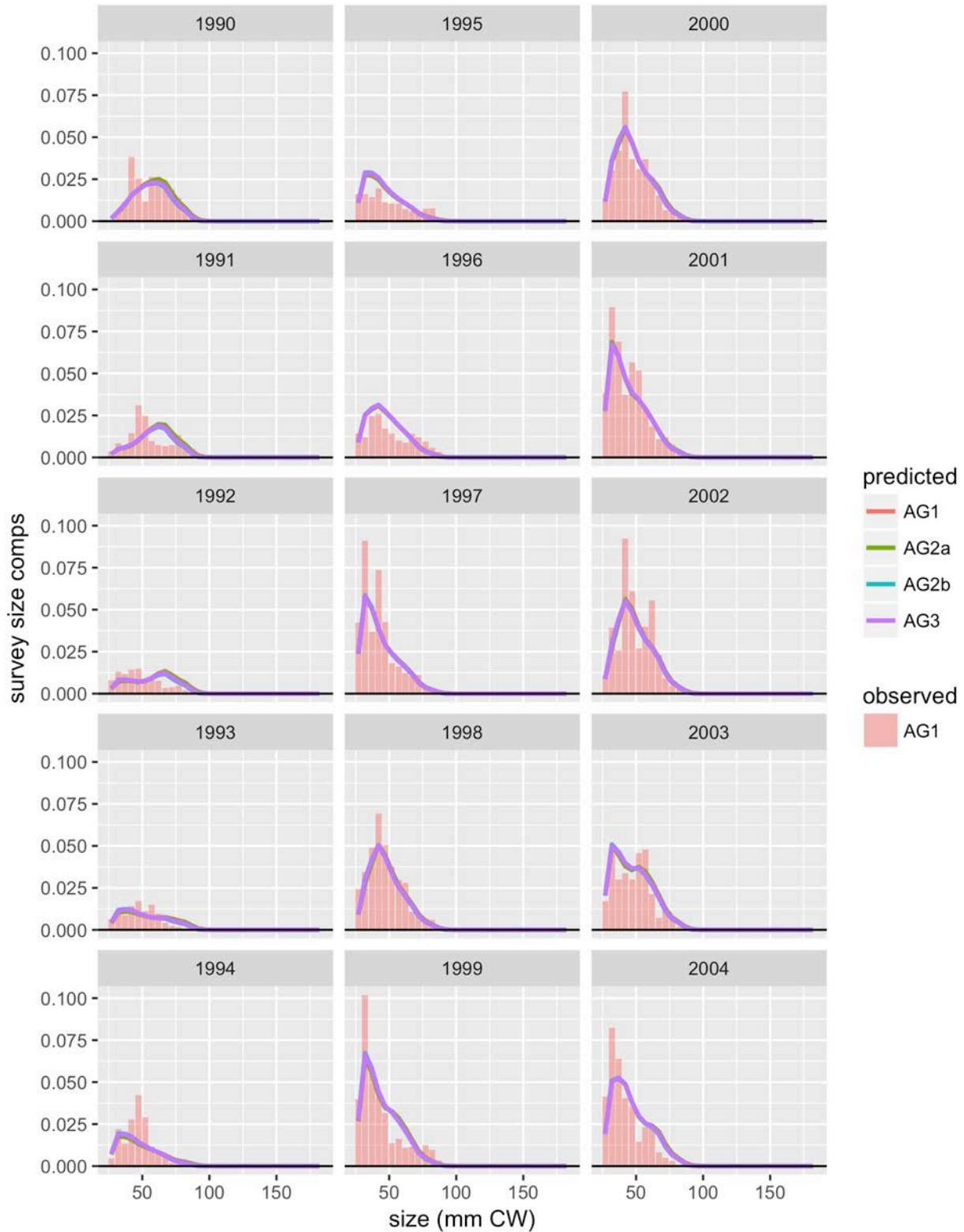
Figure 125. Comparison of observed and predicted female, immature, all shell survey size comps for NMFS trawl survey. Page 2 of 3.
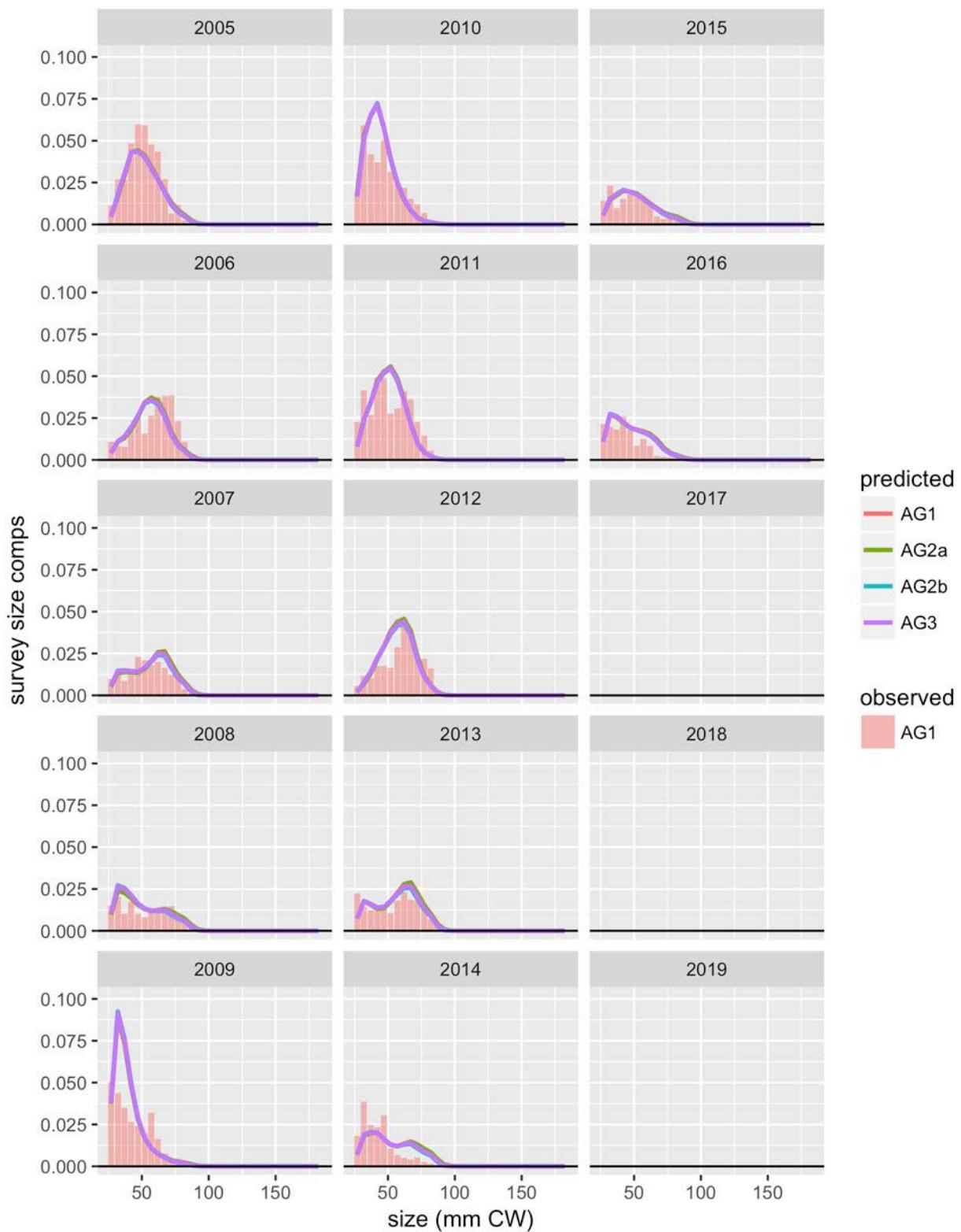
Figure 126. Comparison of observed and predicted female, immature, all shell survey size comps for NMFS trawl survey. Page 3 of 3.

Figure 127. Comparison of observed and predicted female, mature, all shell survey size comps for NMFS trawl survey. Page 1 of 3.
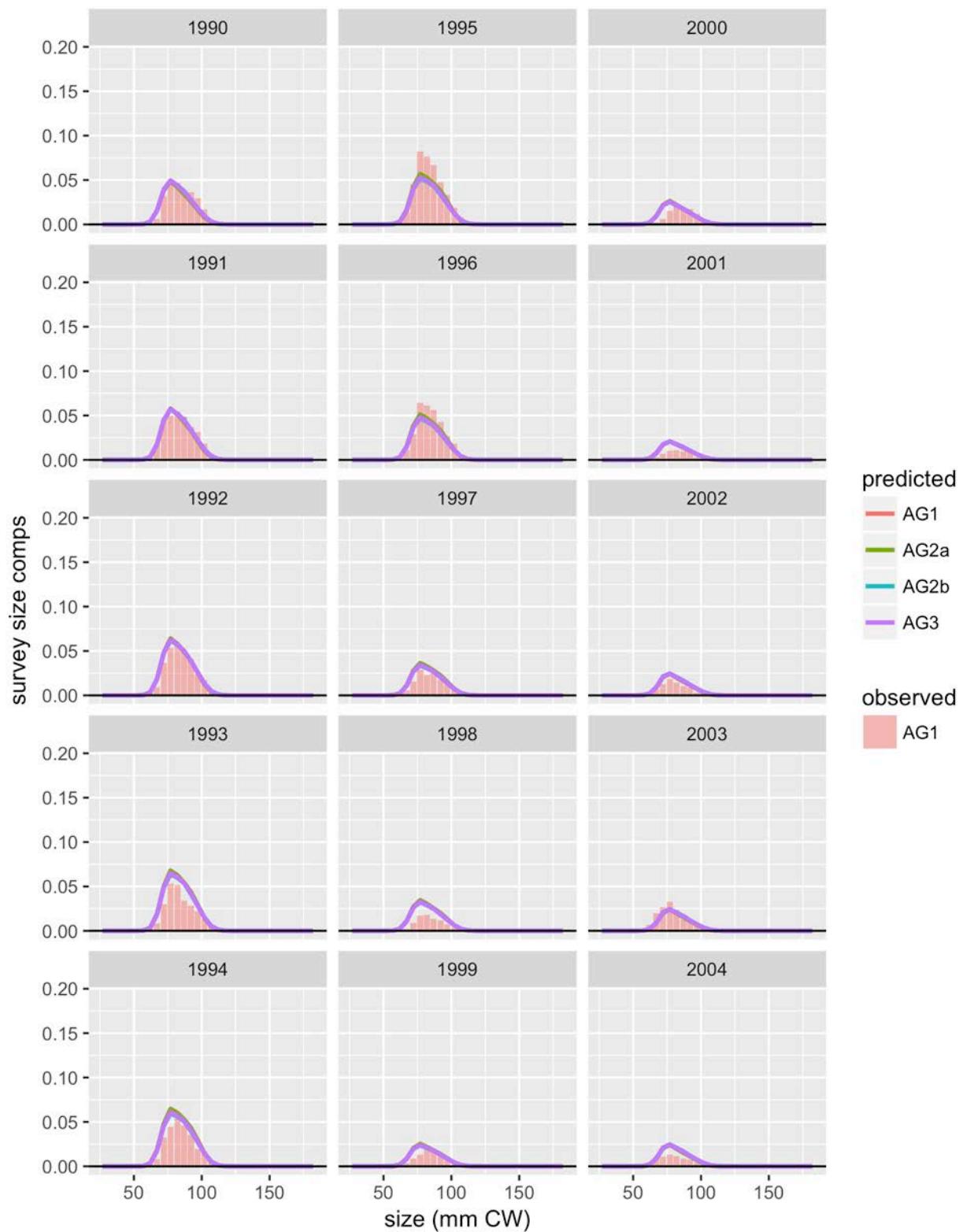
Figure 128. Comparison of observed and predicted female, mature, all shell survey size comps for NMFS trawl survey. Page 2 of 3.
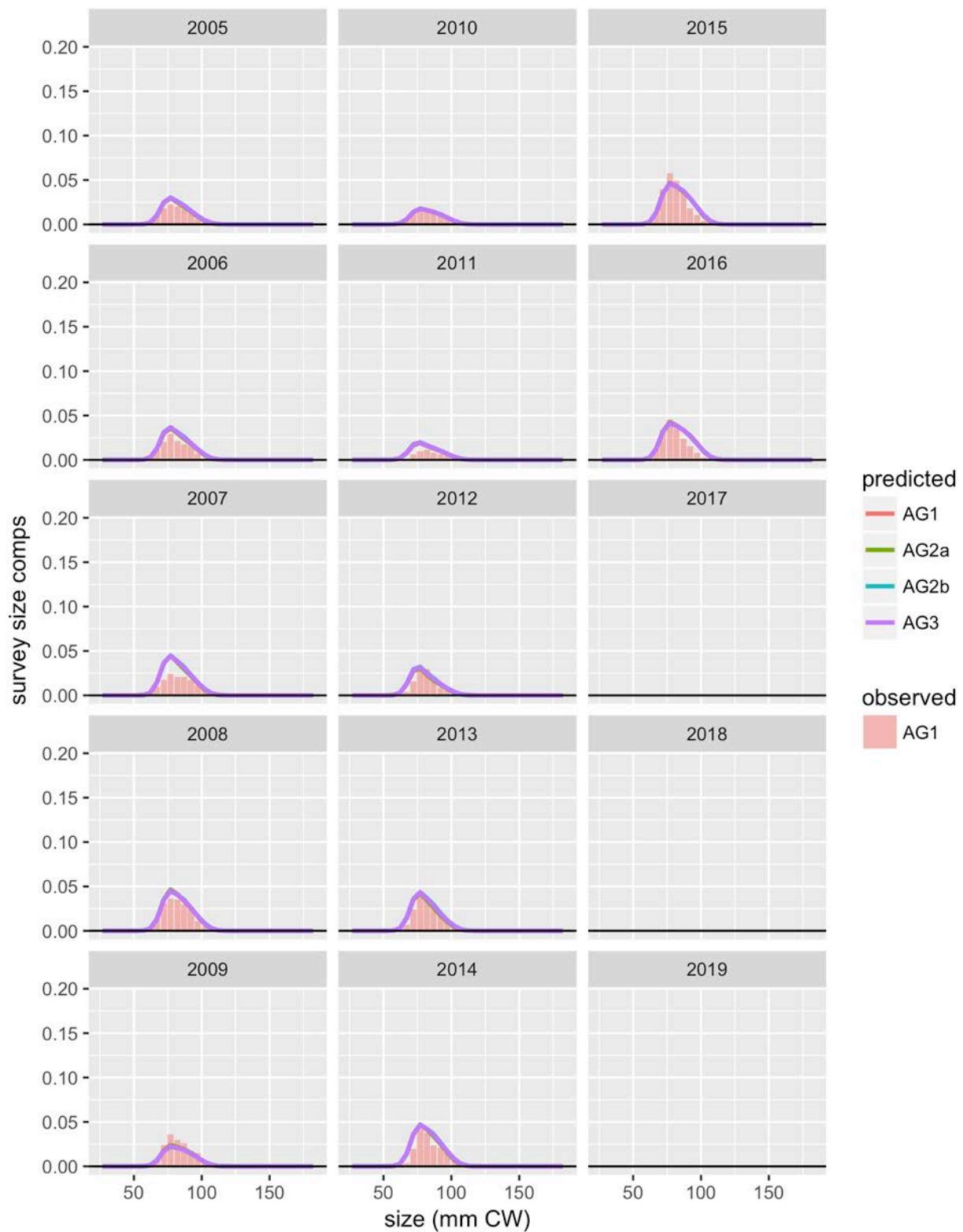
Figure 129. Comparison of observed and predicted female, mature, all shell survey size comps for NMFS trawl survey. Page 3 of 3.

Growth data
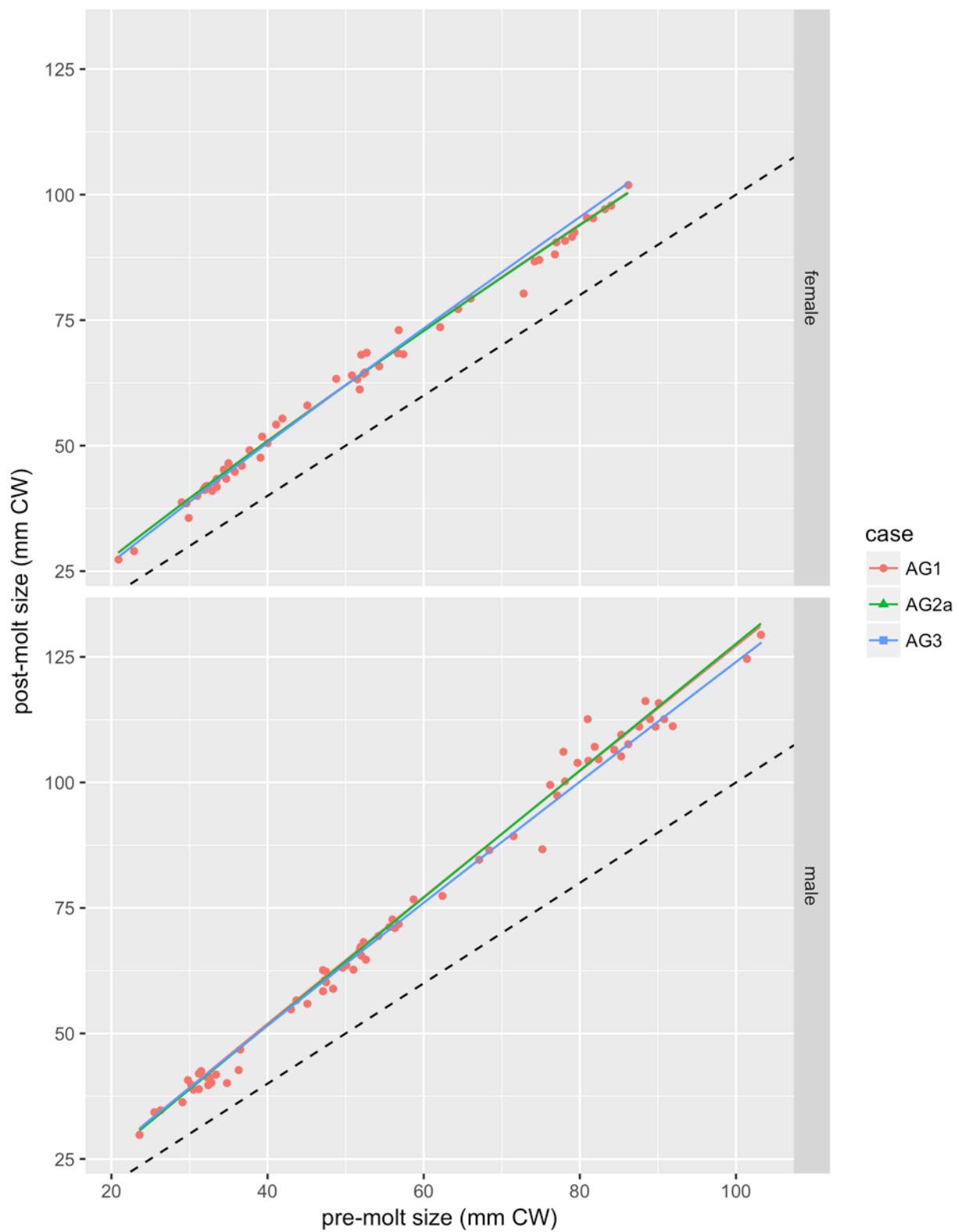
Figure 130. Model fits to GrowthData.1.
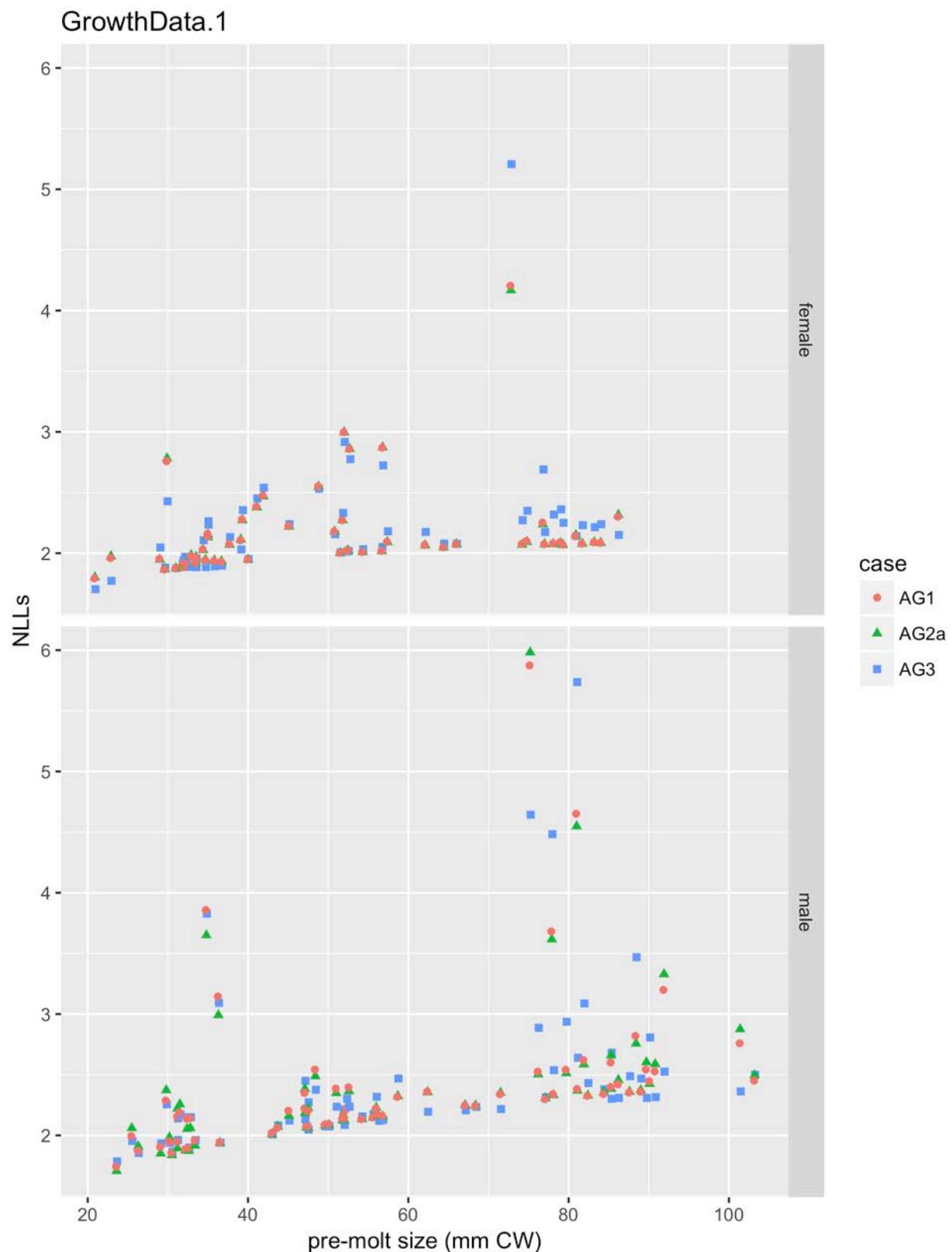
Figure 131. Negative log-likelihood values for fits to GrowthData.1.
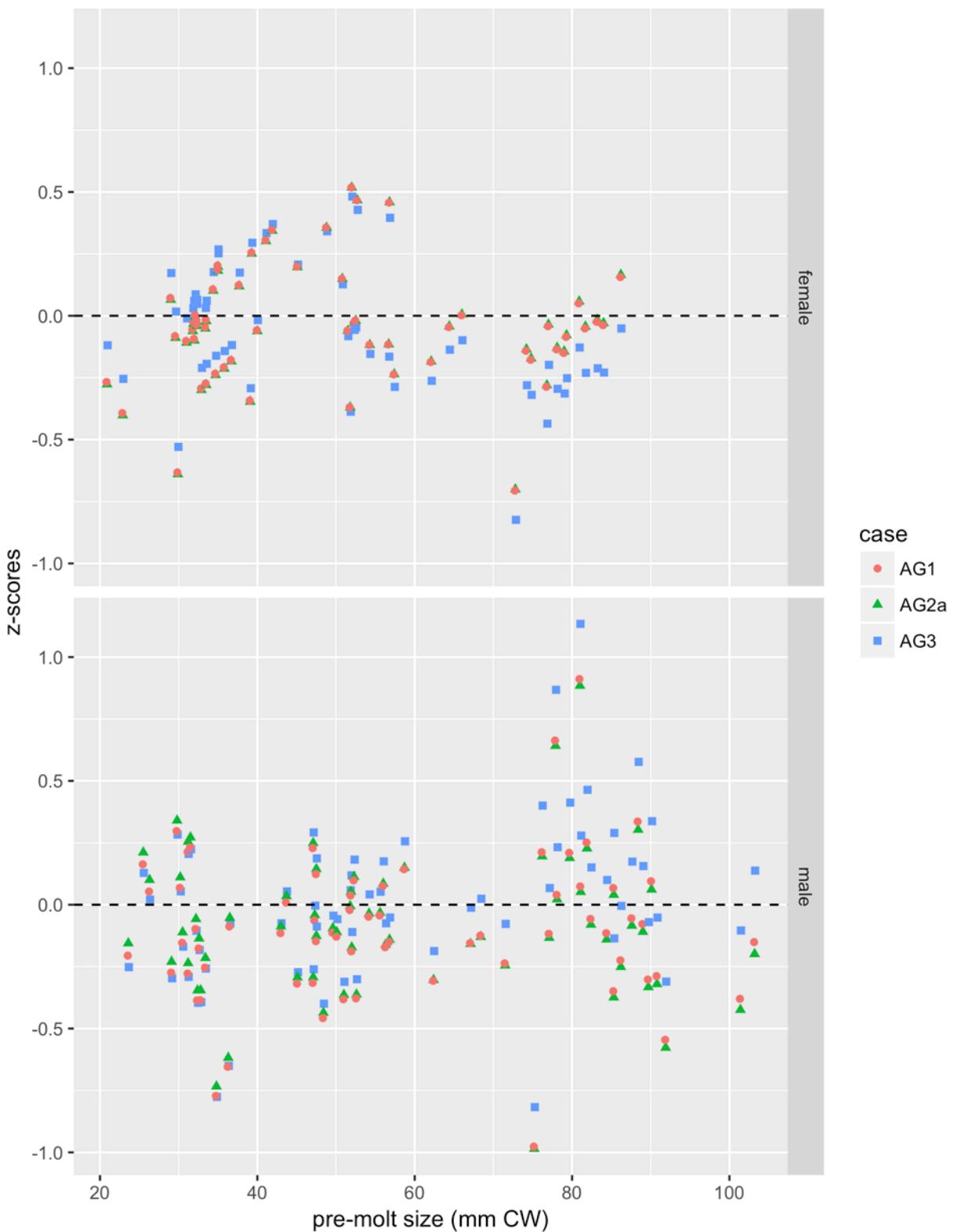
Figure 132.

Z-scores for fits to GrowthData.1.
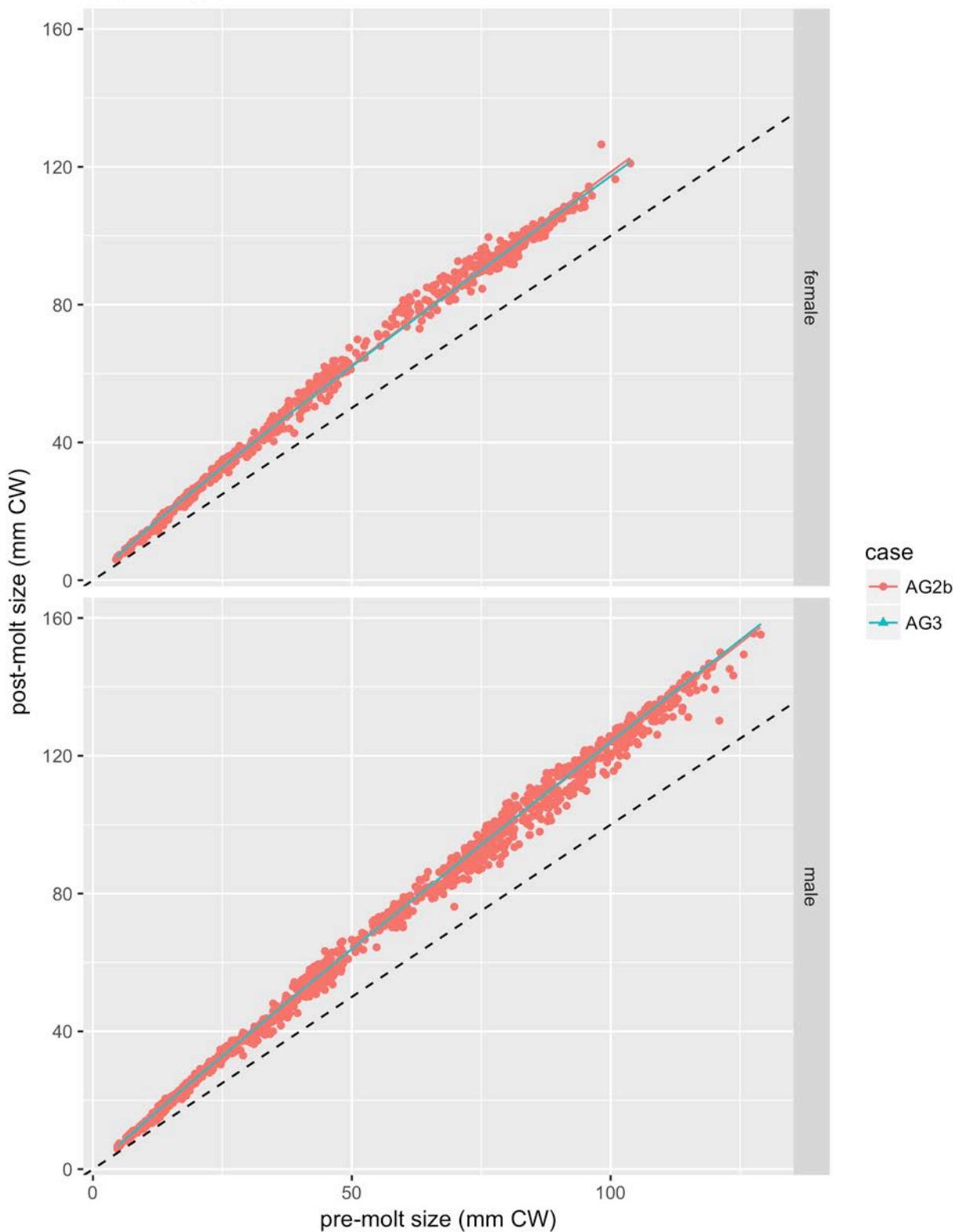
Figure 133. Model fits to GrowthData.2.
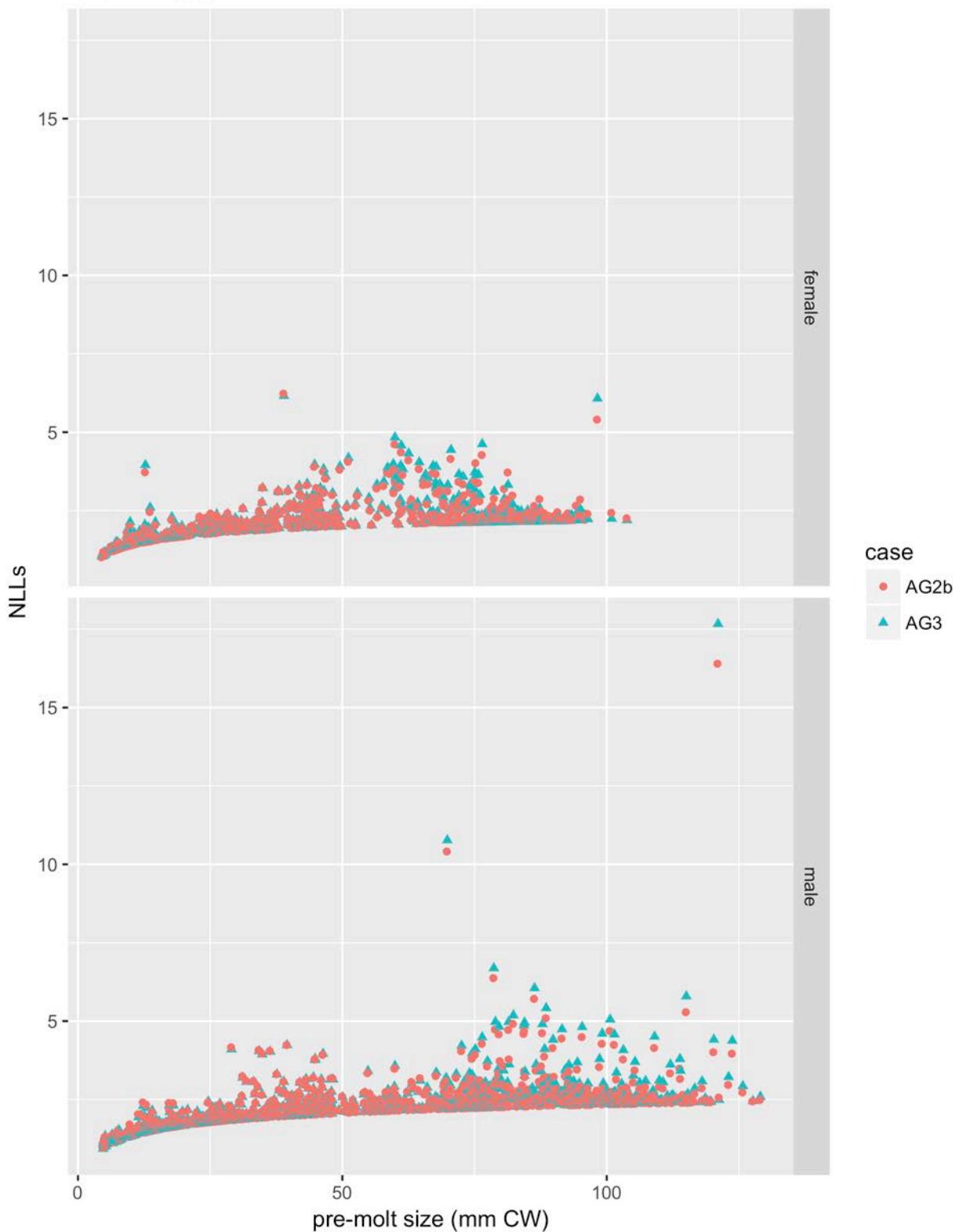
Figure 134. Negative log-likelihood values for fits to GrowthData.2.
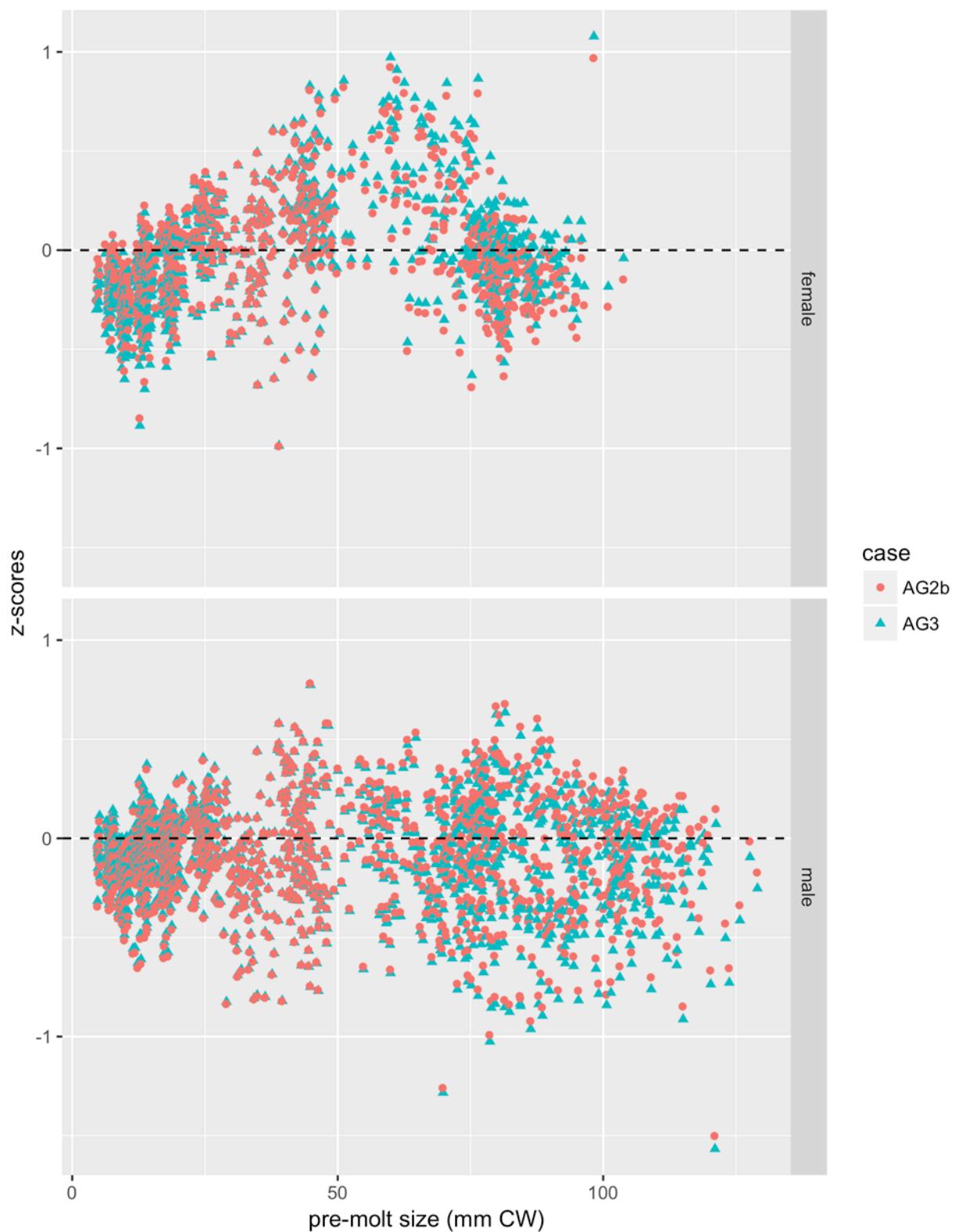
Figure 135.

Z-scores for fits to GrowthData.2.

Total fishery catch biomass

NOTE: Predicted and "observed" catch biomass for TCSAM2013 model results in the following plots always reflect "total catch mortality" biomass (even when "total capture" biomass was fit in the model), while TCSAM02 model results always reflect "total capture" biomass.
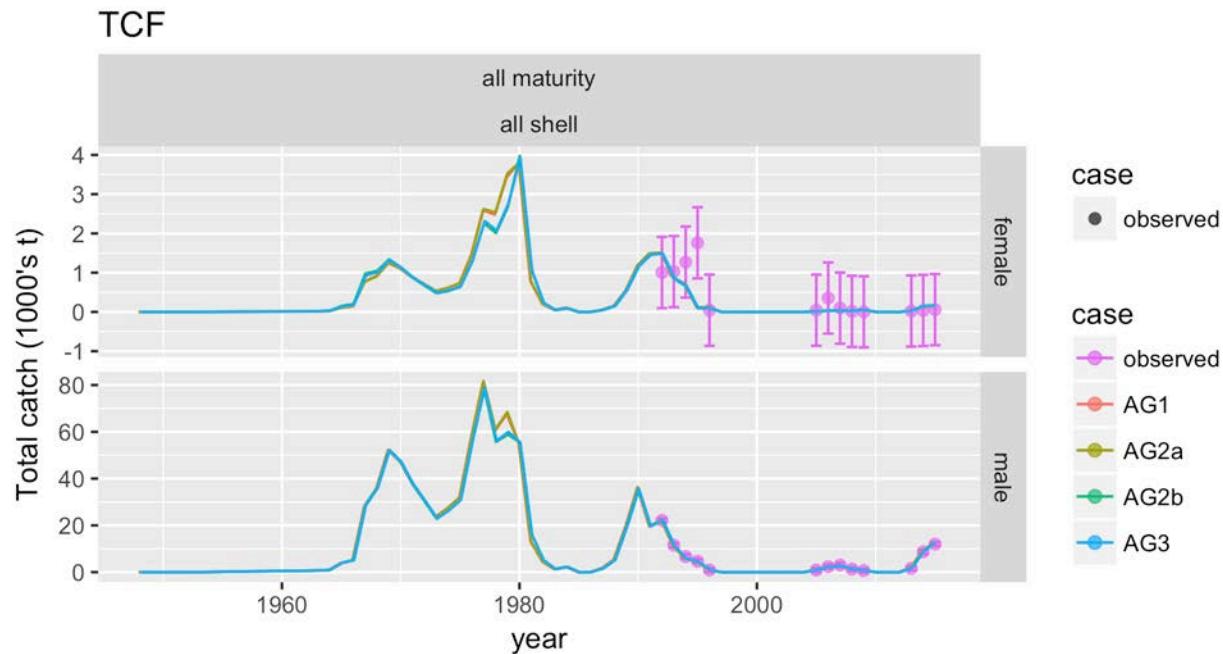
Figure 136. Comparison of observed and predicted total catch for TCF.
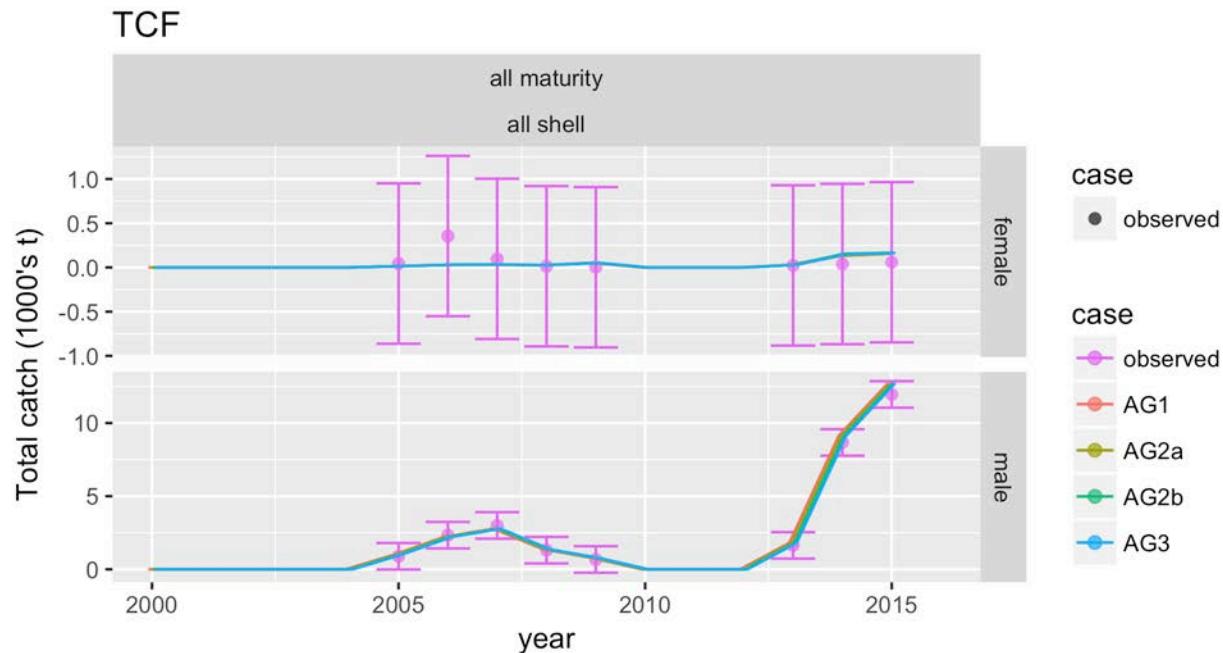
Figure 137. Comparison of observed and predicted total catch for TCF. Recent time period.
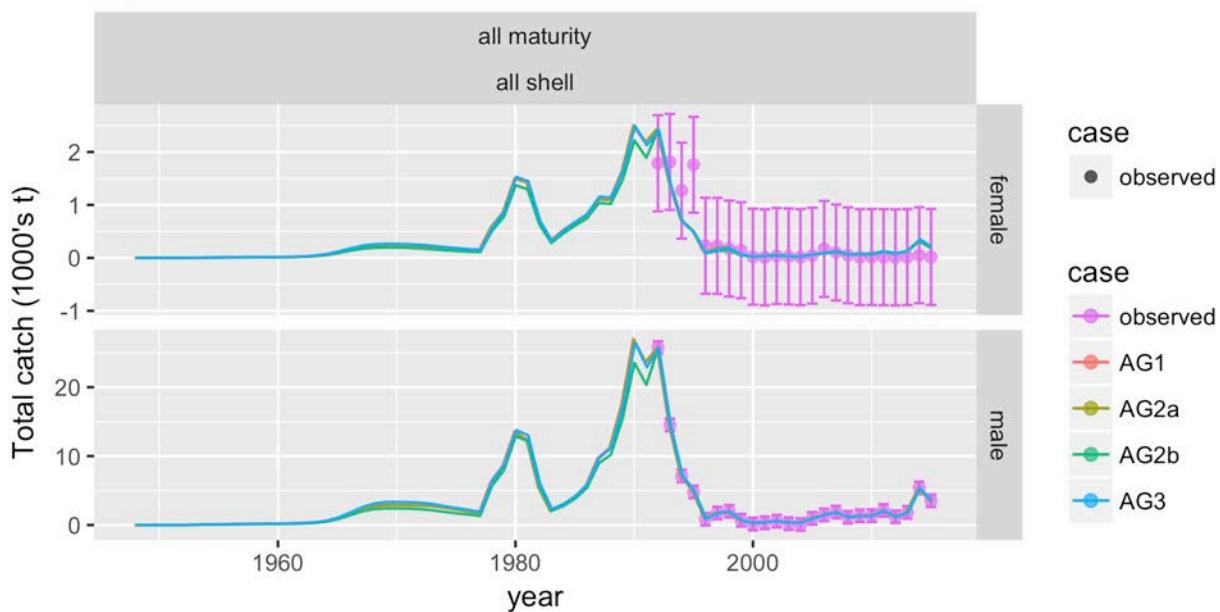
Figure 138. Comparison of observed and predicted total catch for SCF.
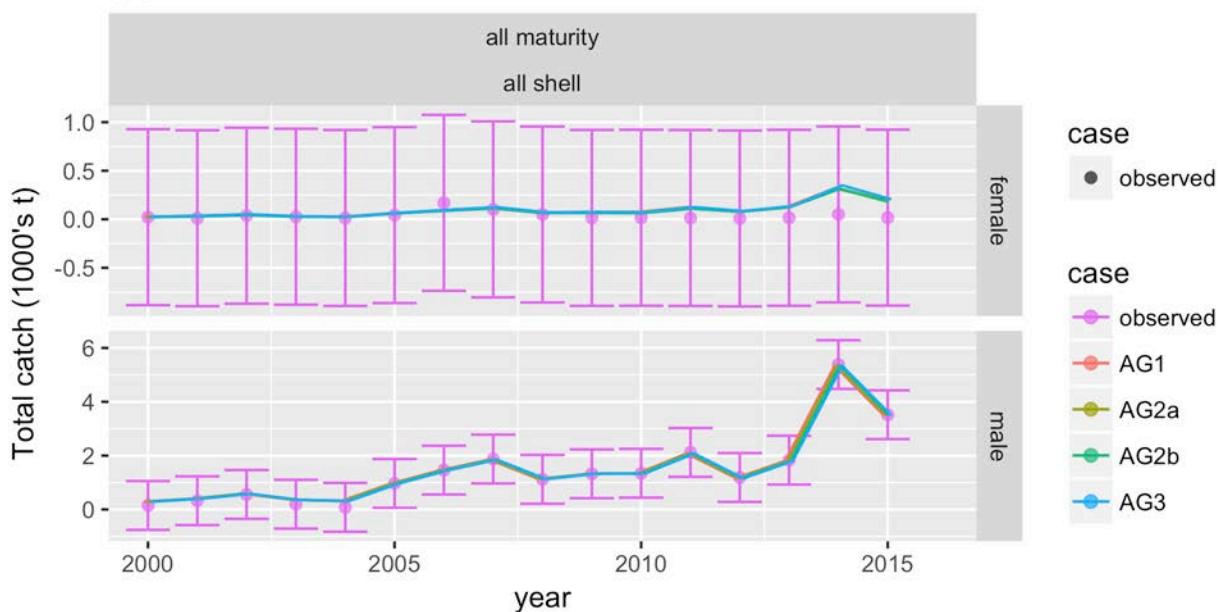
Figure 139. Comparison of observed and predicted total catch for SCF. Recent time period.
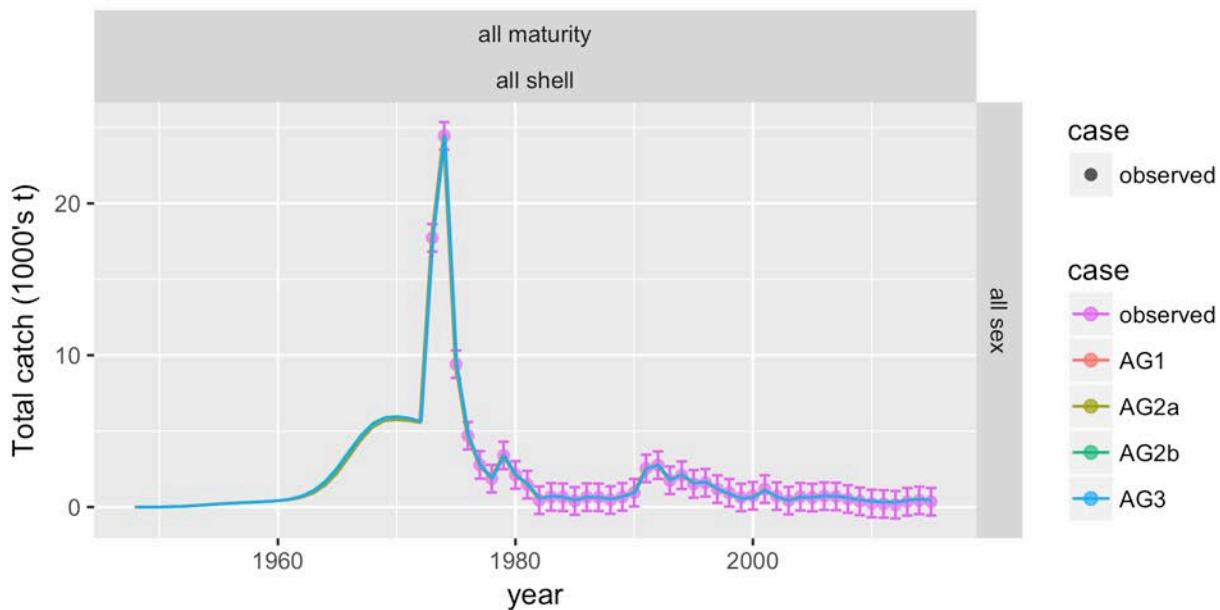
Figure 140. Comparison of observed and predicted total catch for GTF.
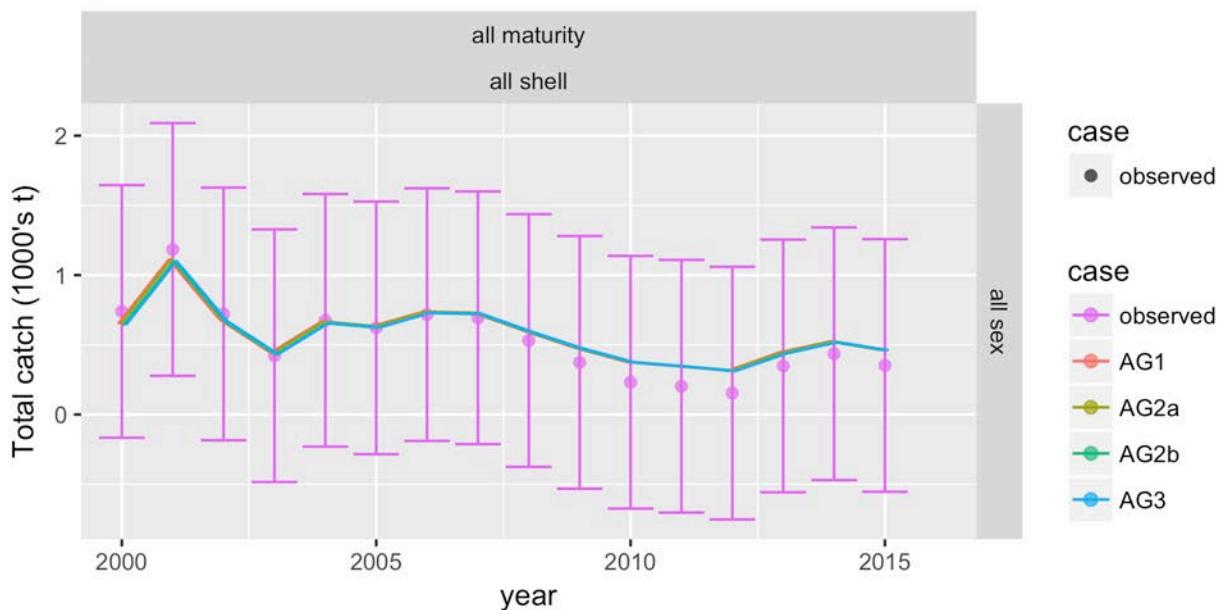
Figure 141. Comparison of observed and predicted total catch for GTF. Recent time period.
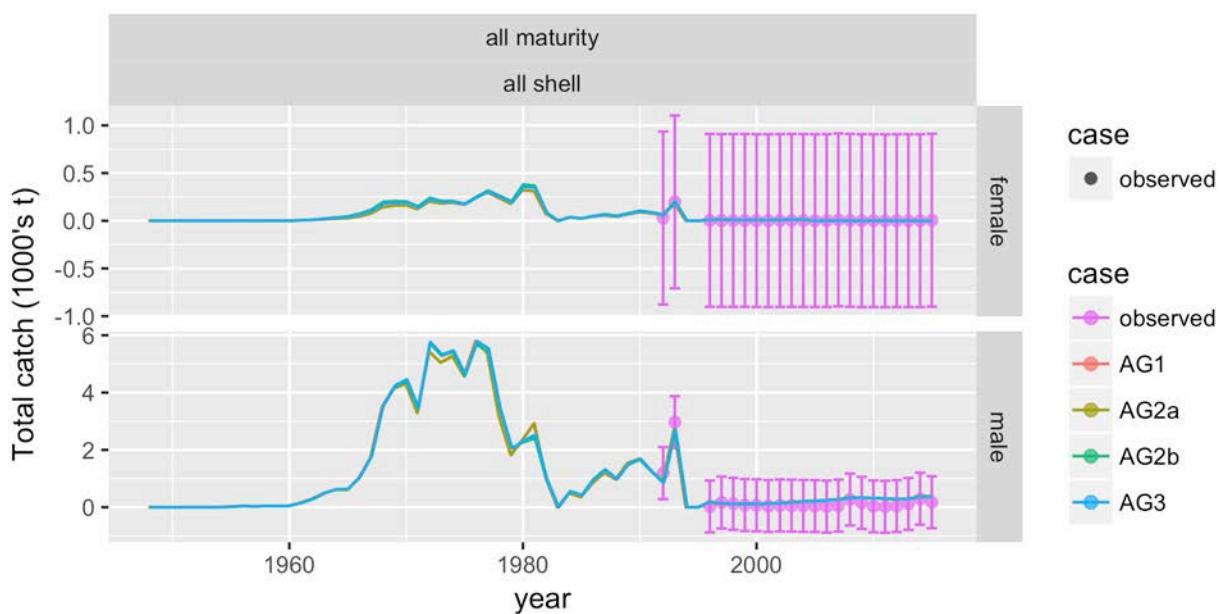
Figure 142. Comparison of observed and predicted total catch for RKF.
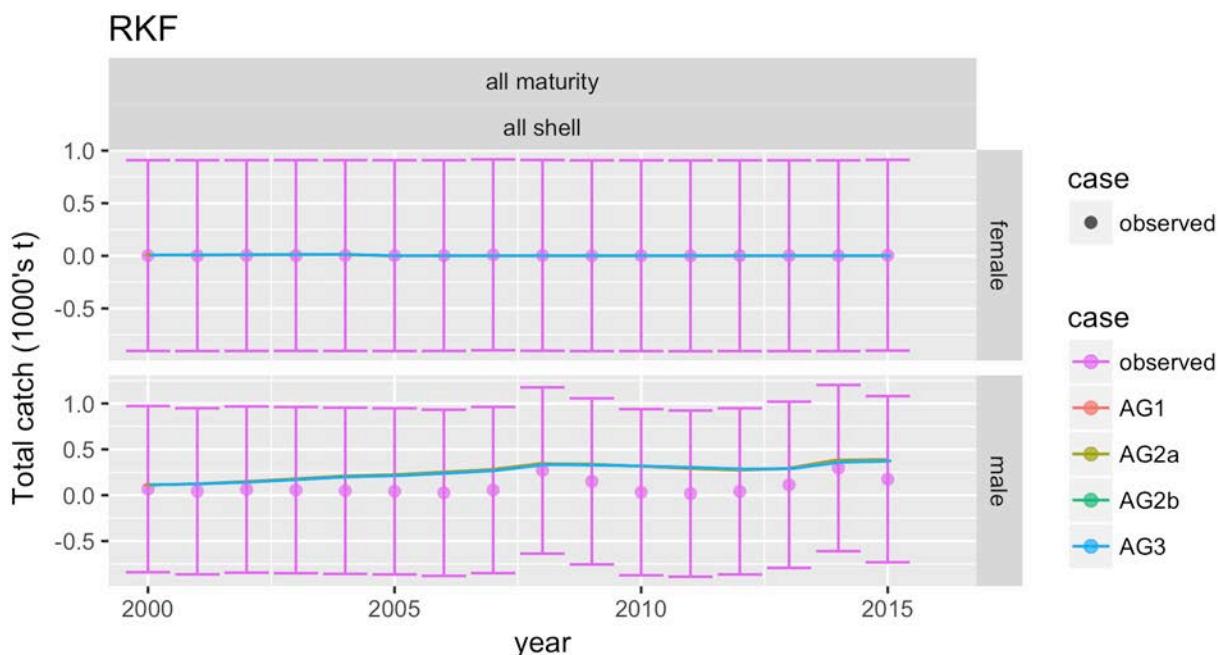

Figure 143. Comparison of observed and predicted total catch for RKF. Recent time period.

Total fishery mean size comps
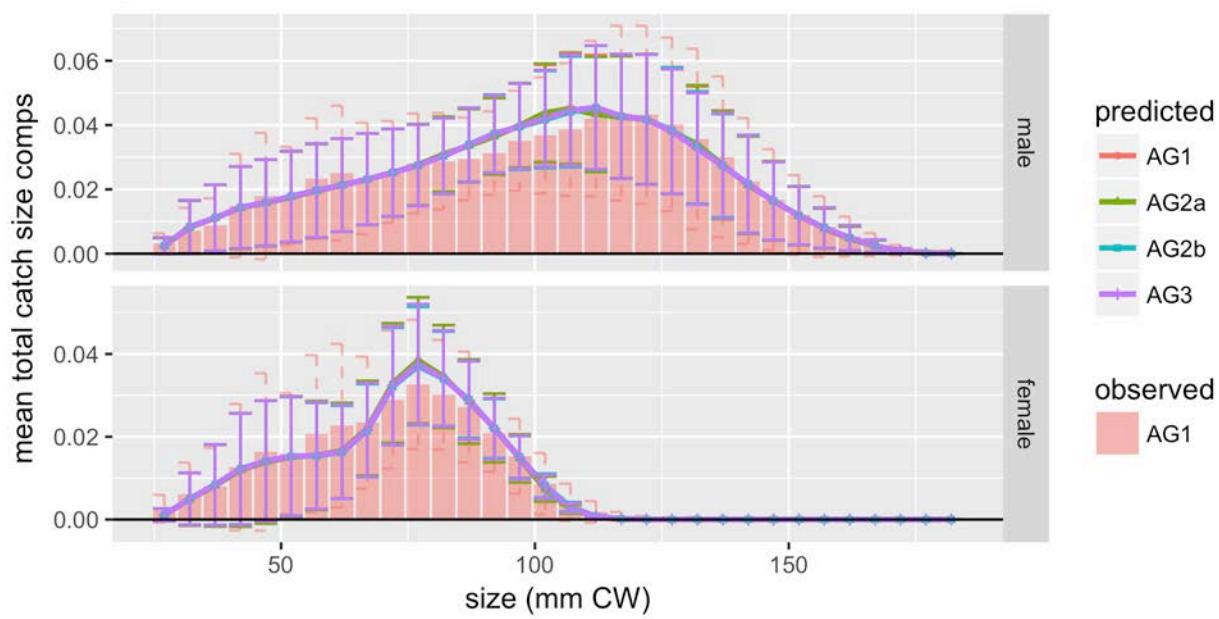
Figure 144. Comparison of observed and predicted &&xms mean total catch size comps for GTF.
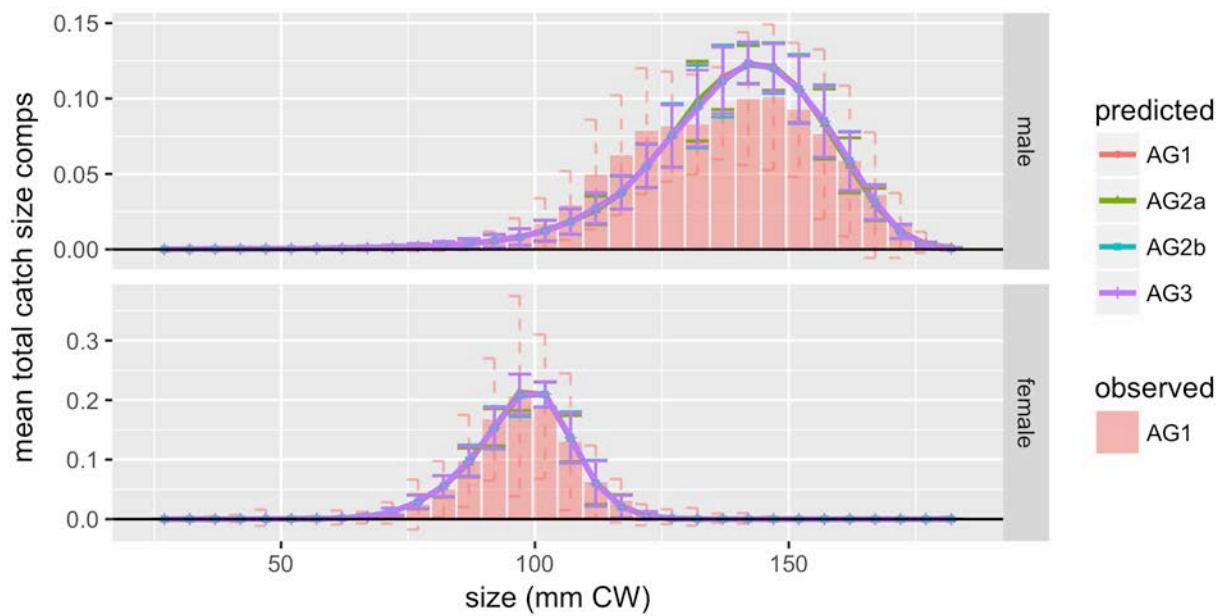
Figure 145. Comparison of observed and predicted &&xms mean total catch size comps for RKF.
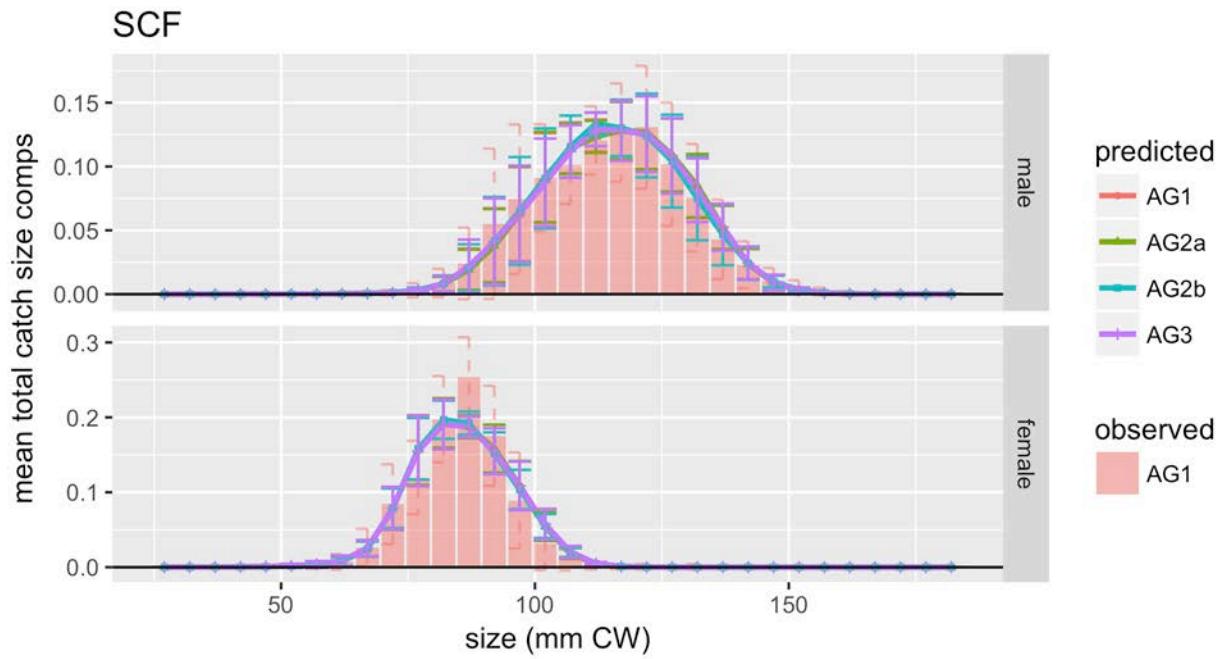
Figure 146. Comparison of observed and predicted &&xms mean total catch size comps for SCF.
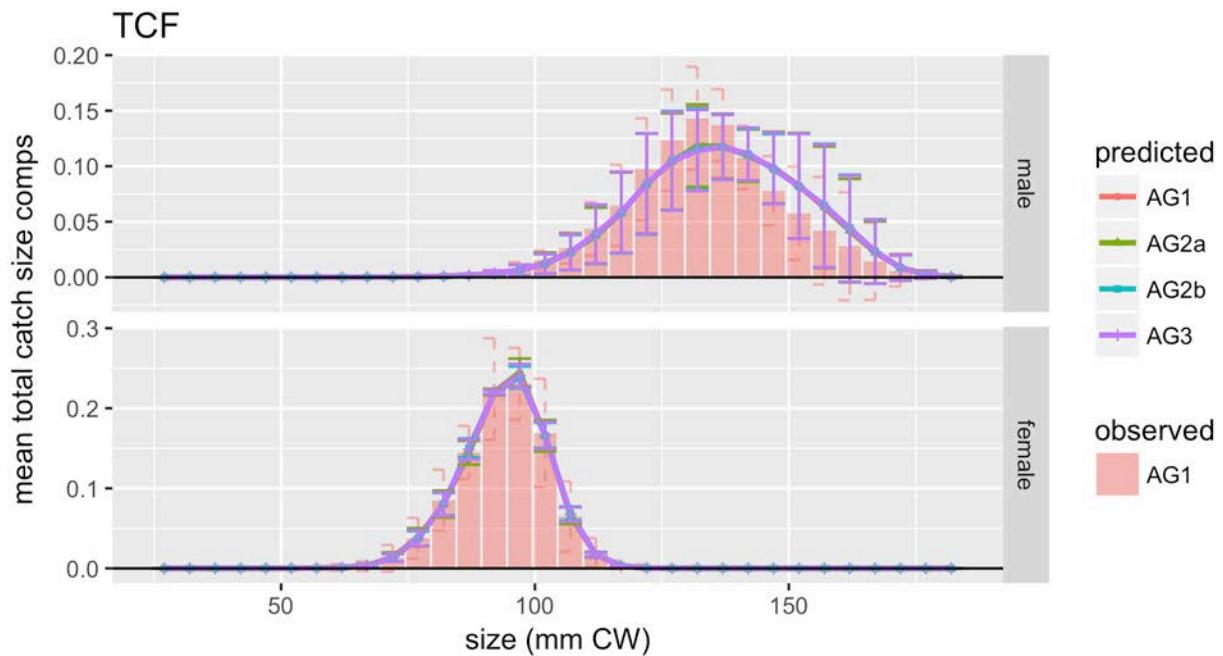
Figure 147. Comparison of observed and predicted &&xms mean total catch size comps for TCF.

Total fishery catch size comps
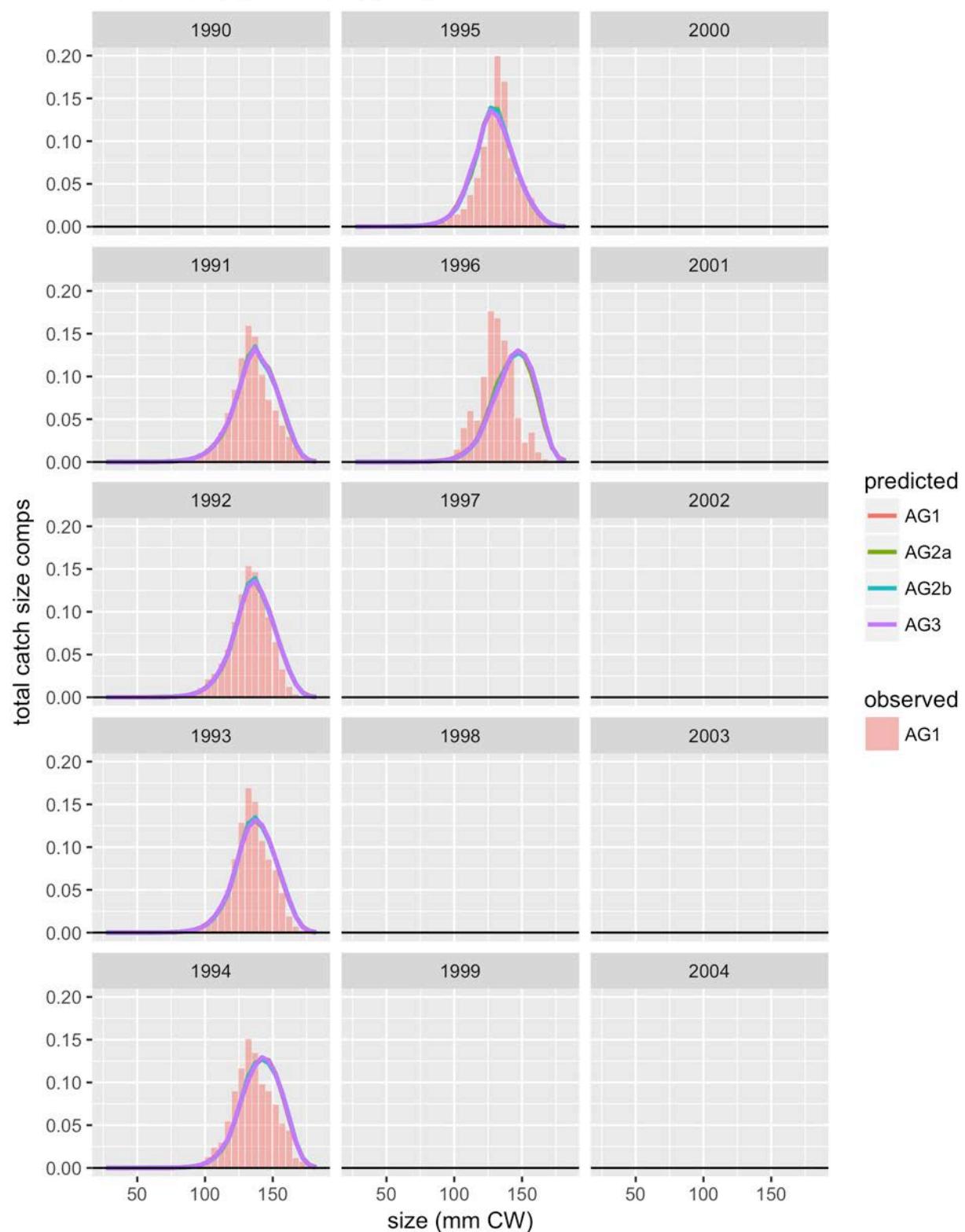
Figure 148. Comparison of observed and predicted male, all maturity, all shell total catch size comps for TCF. Page 1 of 2.
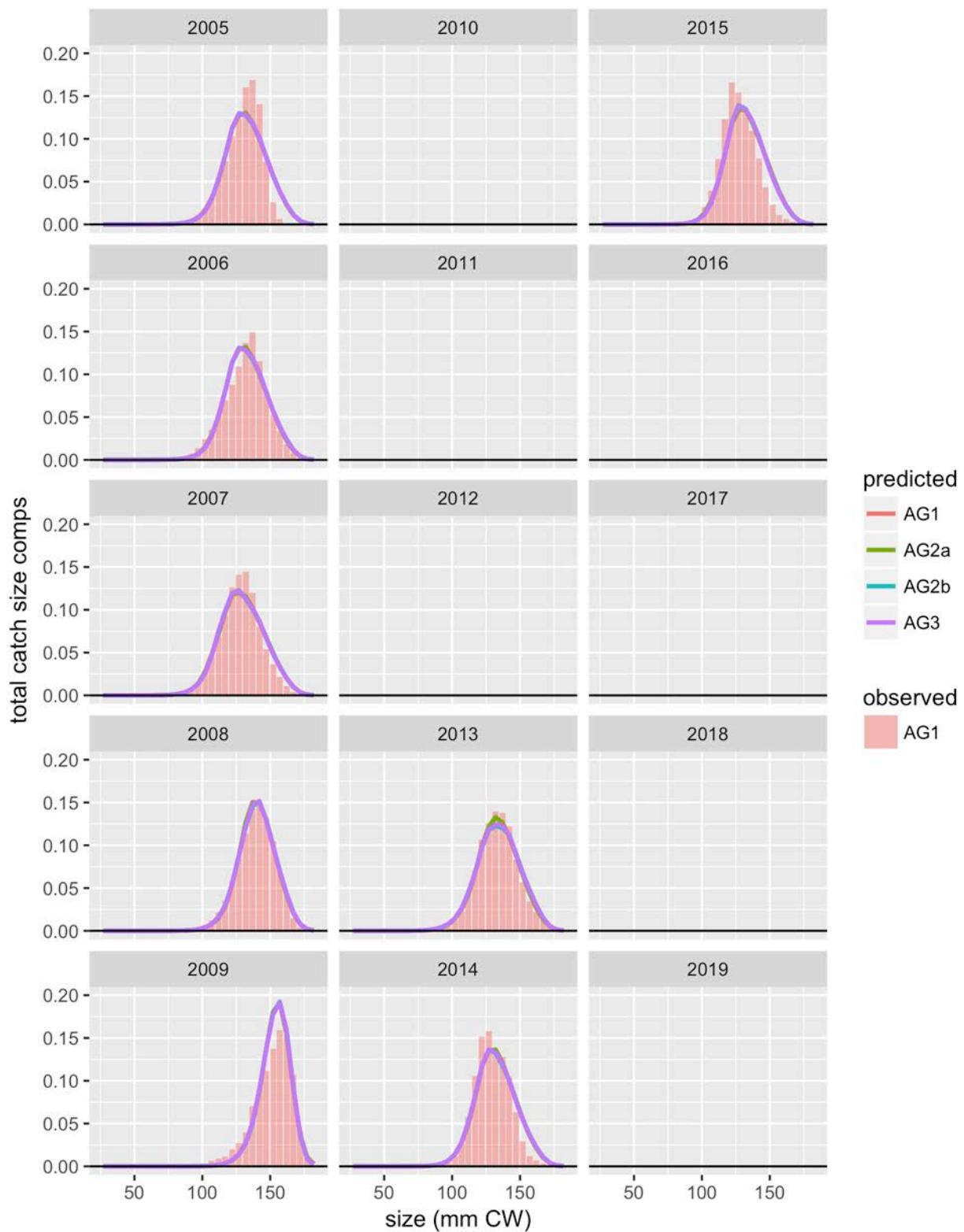
Figure 149. Comparison of observed and predicted male, all maturity, all shell total catch size comps for TCF. Page 2 of 2.
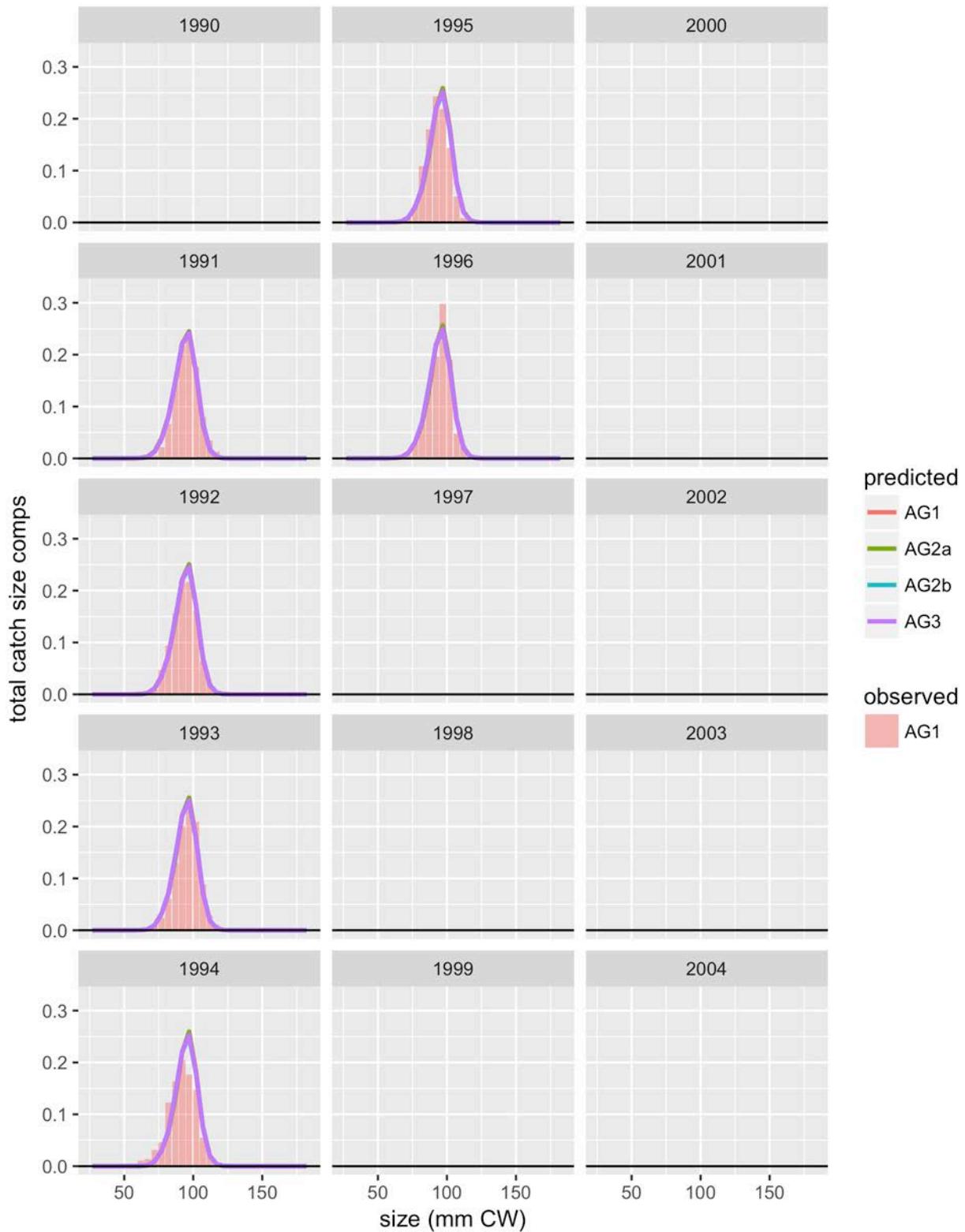
Figure 150. Comparison of observed and predicted female, all maturity, all shell total catch size comps for TCF. Page 1 of 2.
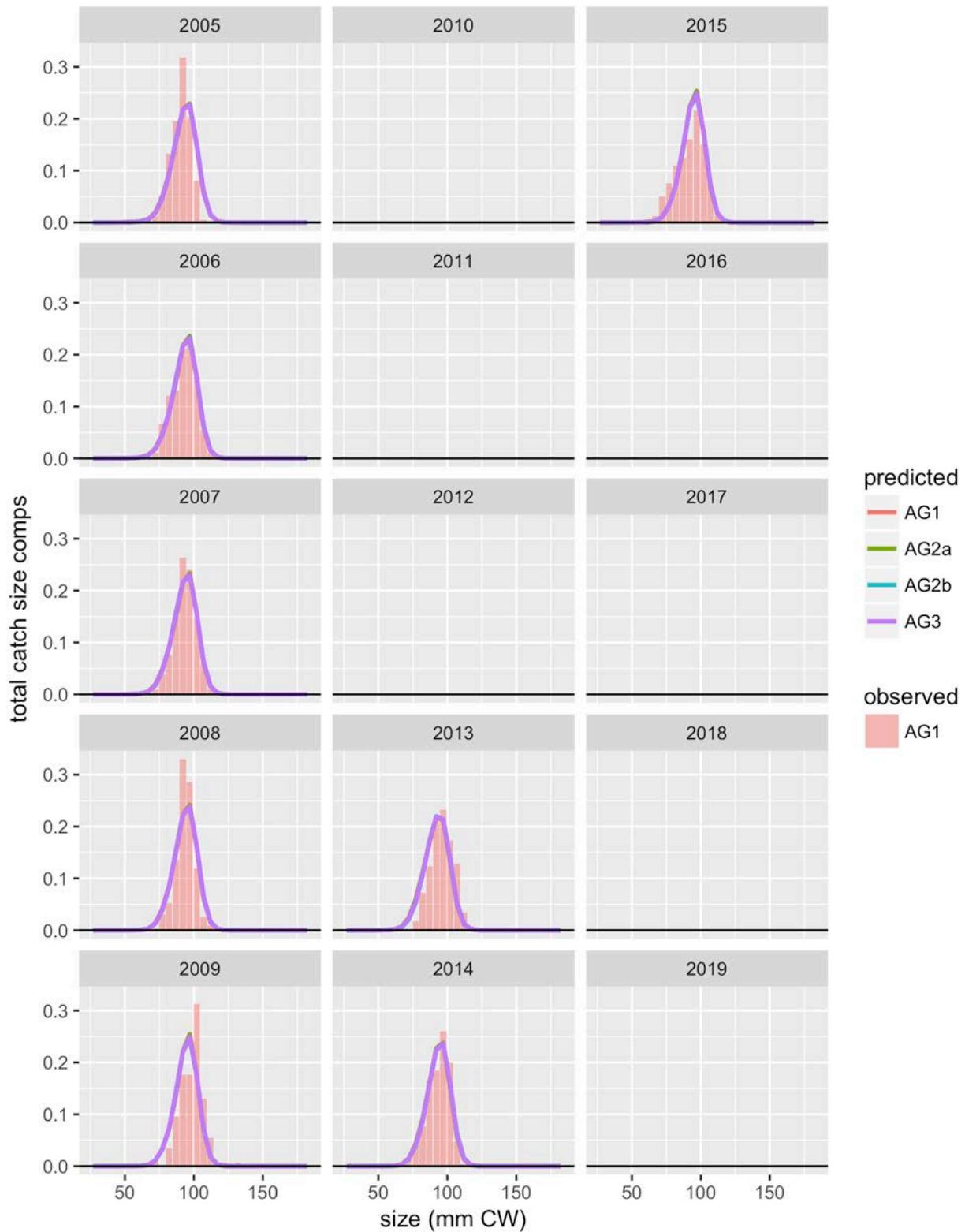
Figure 151. Comparison of observed and predicted female, all maturity, all shell total catch size comps for TCF. Page 2 of 2.
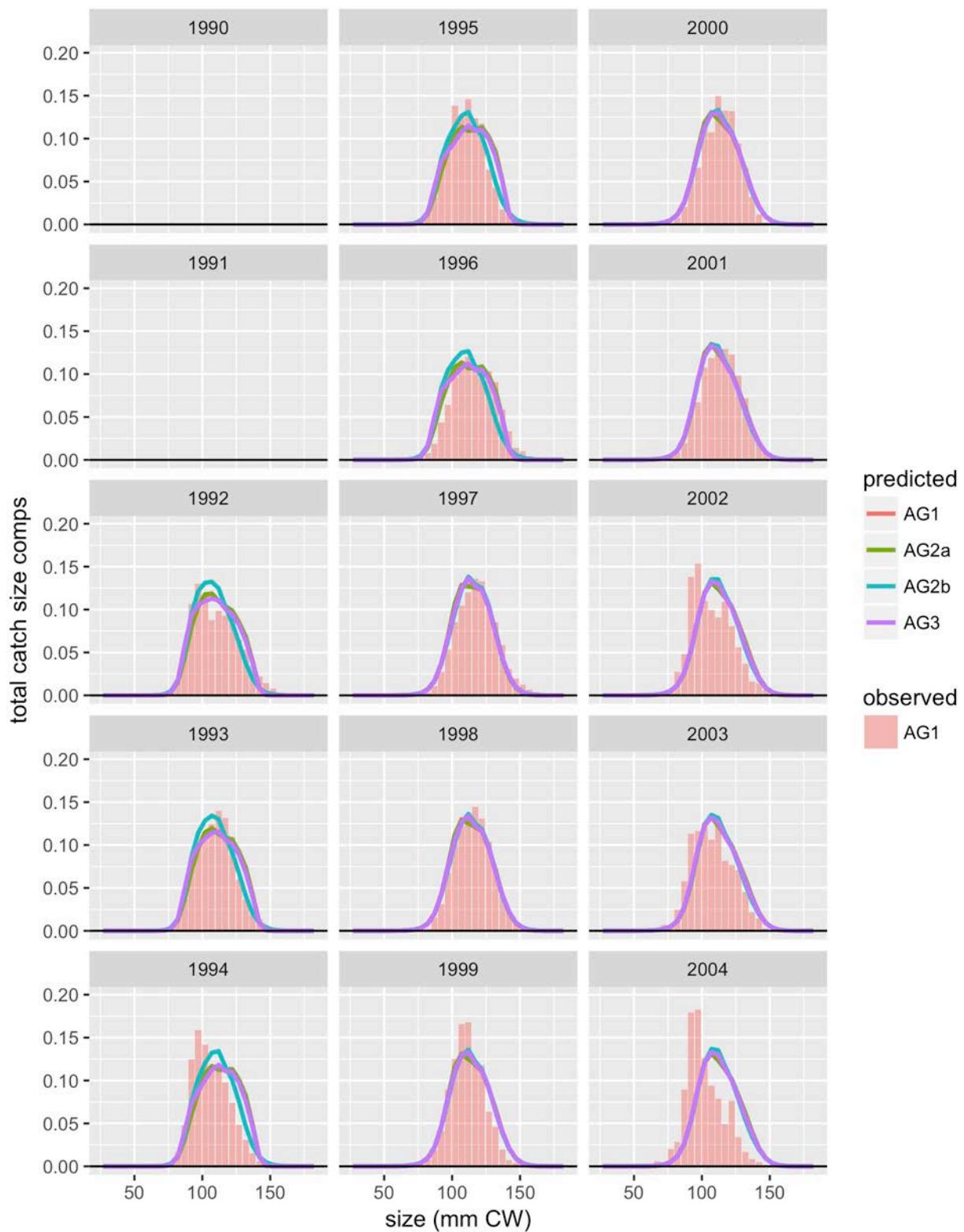
Figure 152. Comparison of observed and predicted male, all maturity, all shell total catch size comps for SCF. Page 1 of 2.
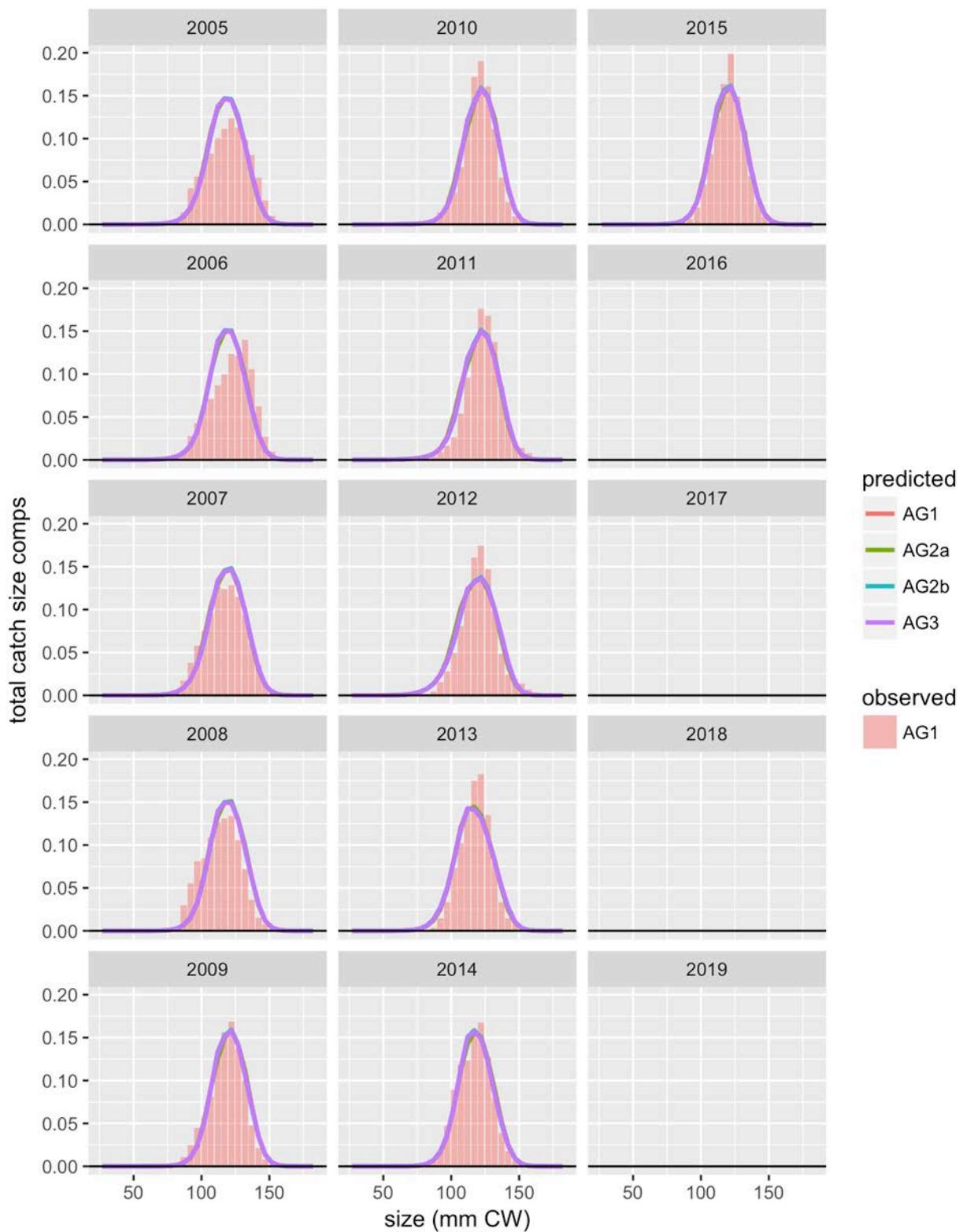
Figure 153. Comparison of observed and predicted male, all maturity, all shell total catch size comps for SCF. Page 2 of 2.
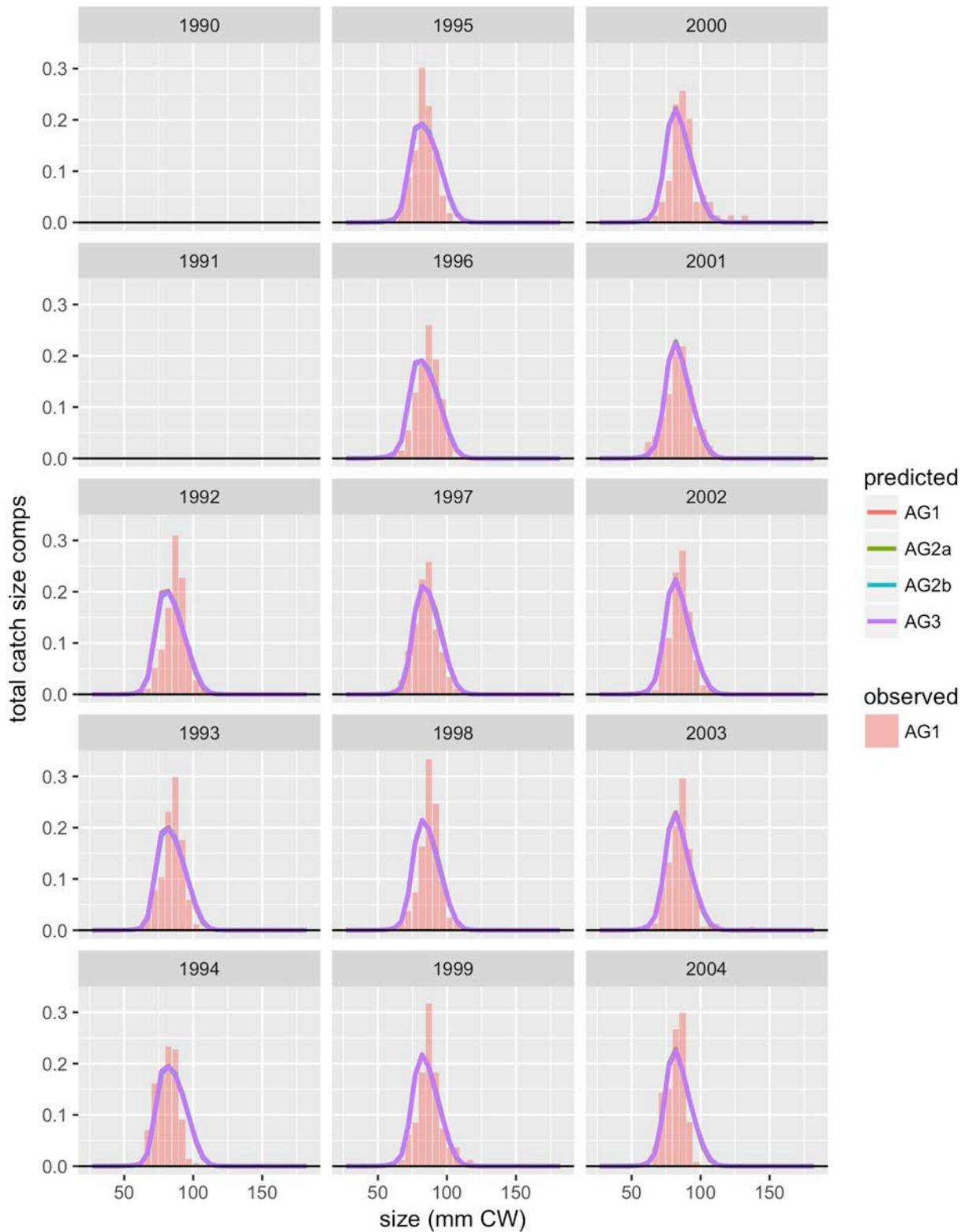
Figure 154. Comparison of observed and predicted female, all maturity, all shell total catch size comps for SCF. Page 1 of 2.
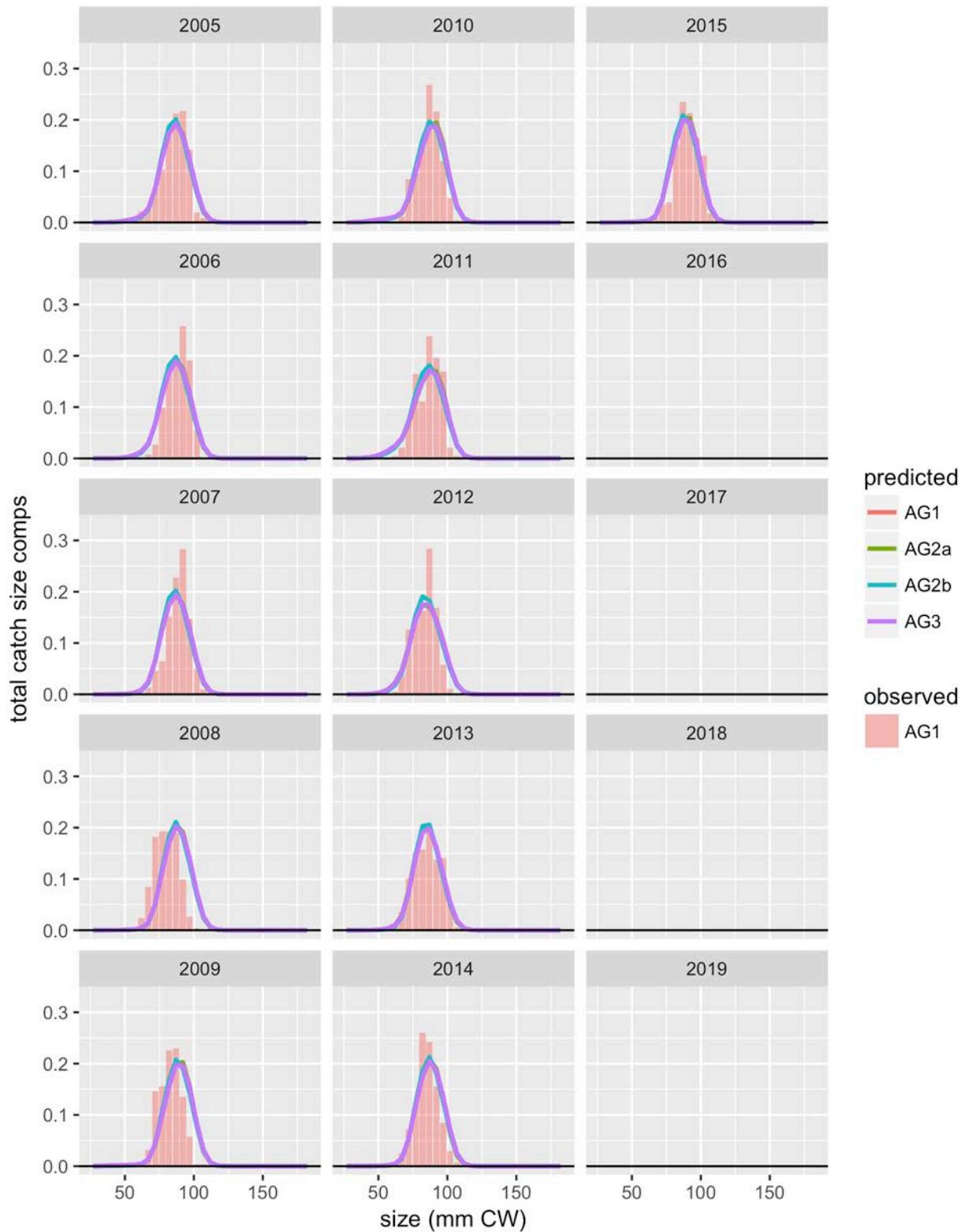
Figure 155. Comparison of observed and predicted female, all maturity, all shell total catch size comps for SCF. Page 2 of 2.
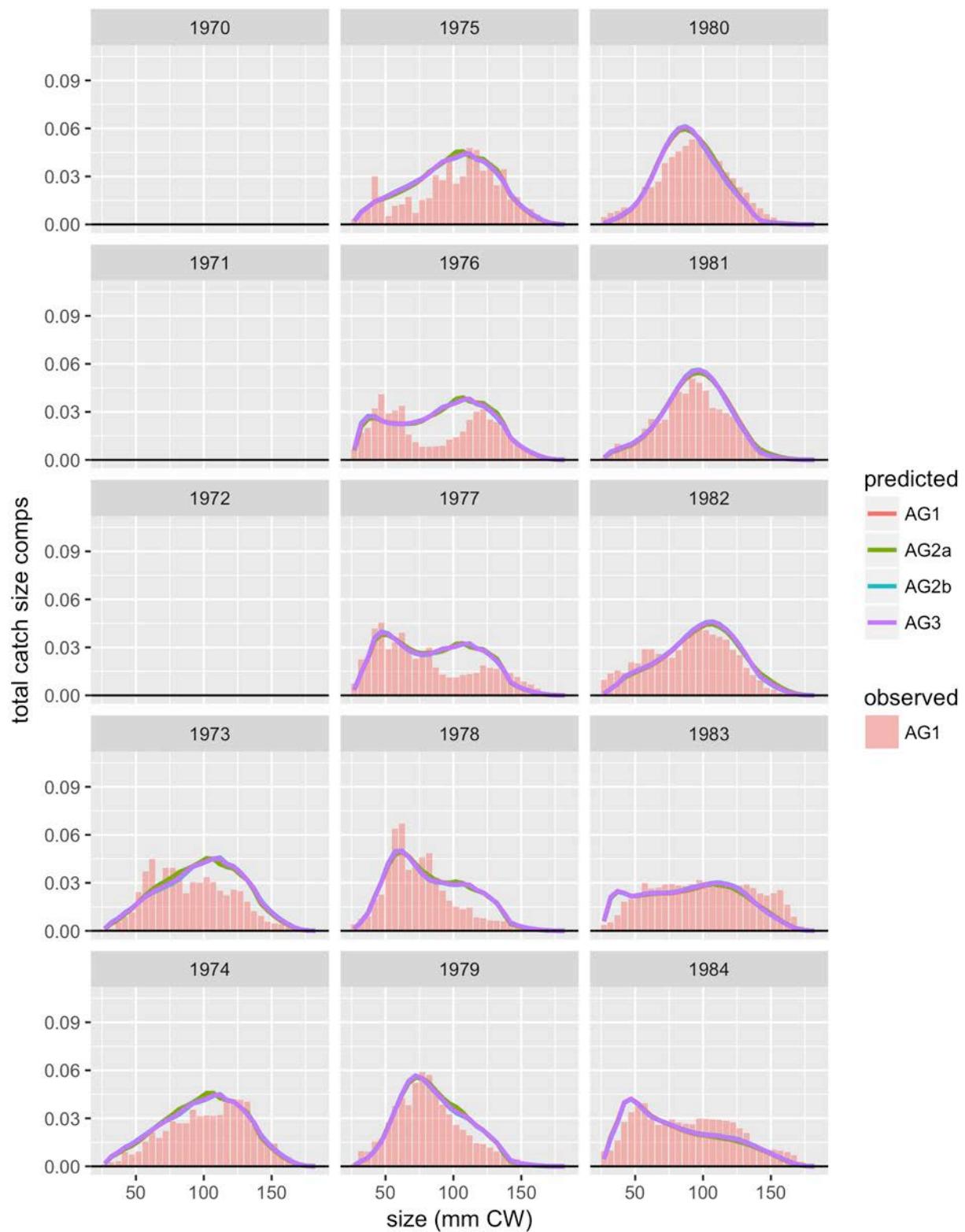
Figure 156. Comparison of observed and predicted male, all maturity, all shell total catch size comps for GTF. Page 1 of 4.
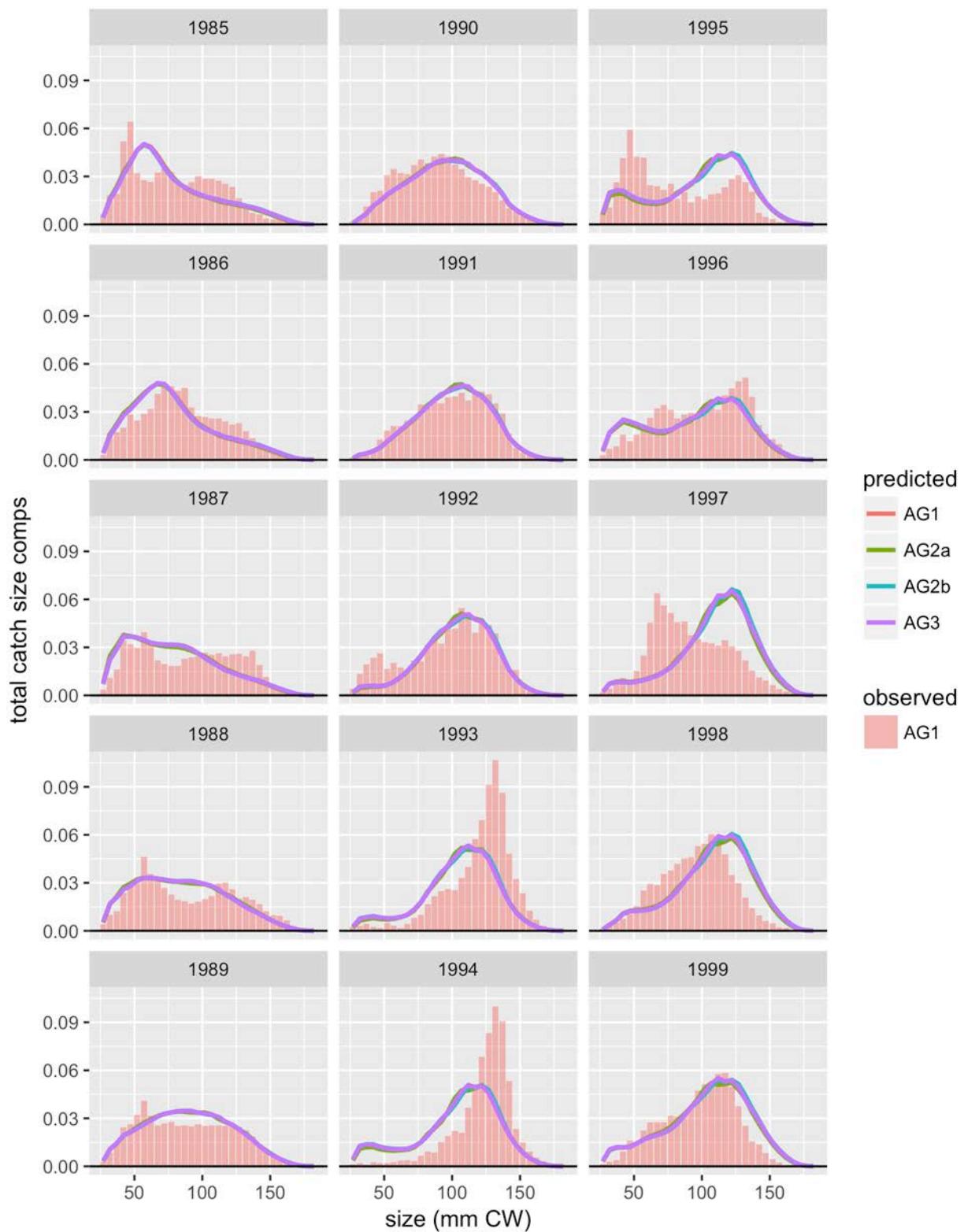
Figure 157. Comparison of observed and predicted male, all maturity, all shell total catch size comps for GTF. Page 2 of 4.
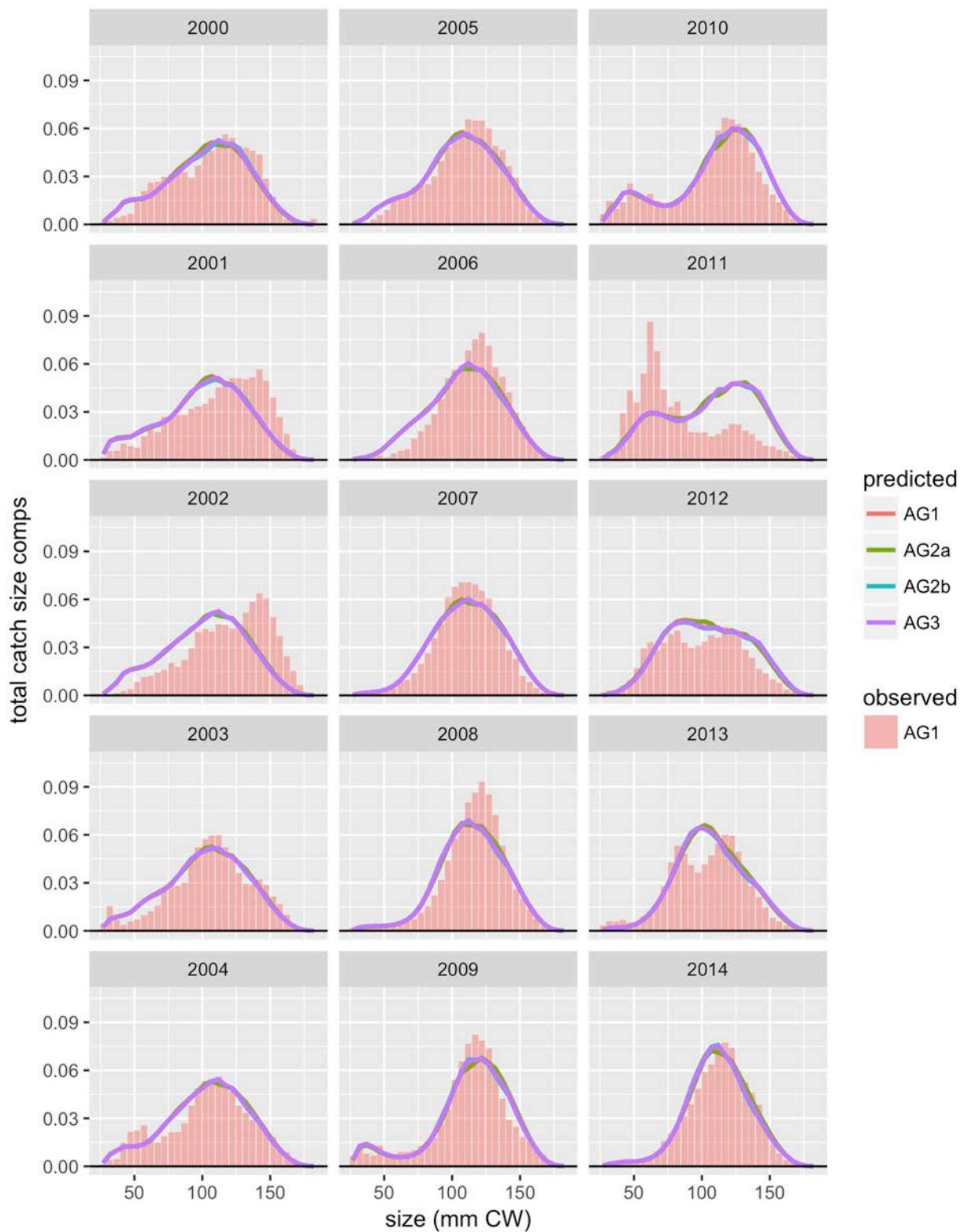
Figure 158. Comparison of observed and predicted male, all maturity, all shell total catch size comps for GTF. Page 3 of 4.
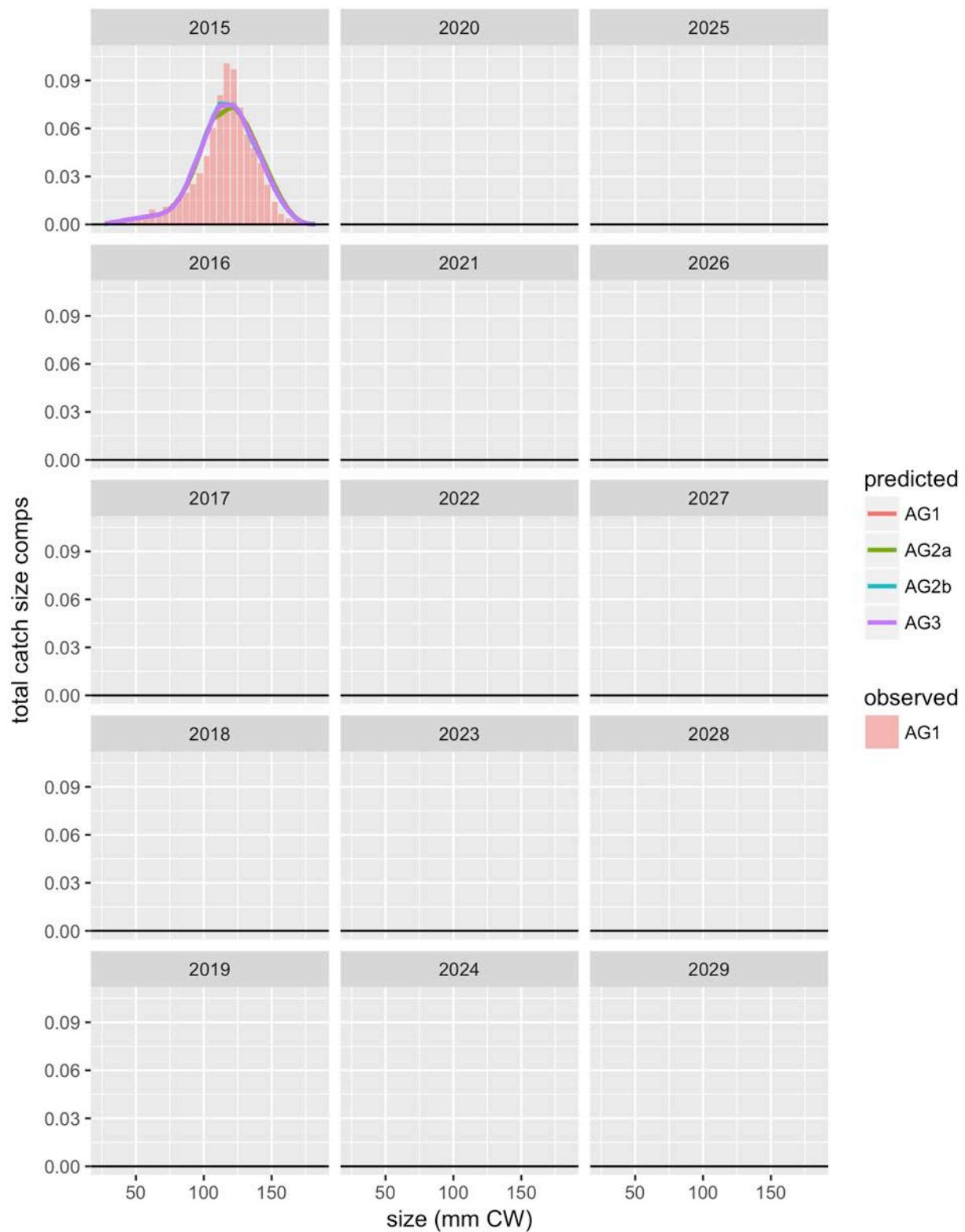
Figure 159. Comparison of observed and predicted male, all maturity, all shell total catch size comps for GTF. Page 4 of 4.
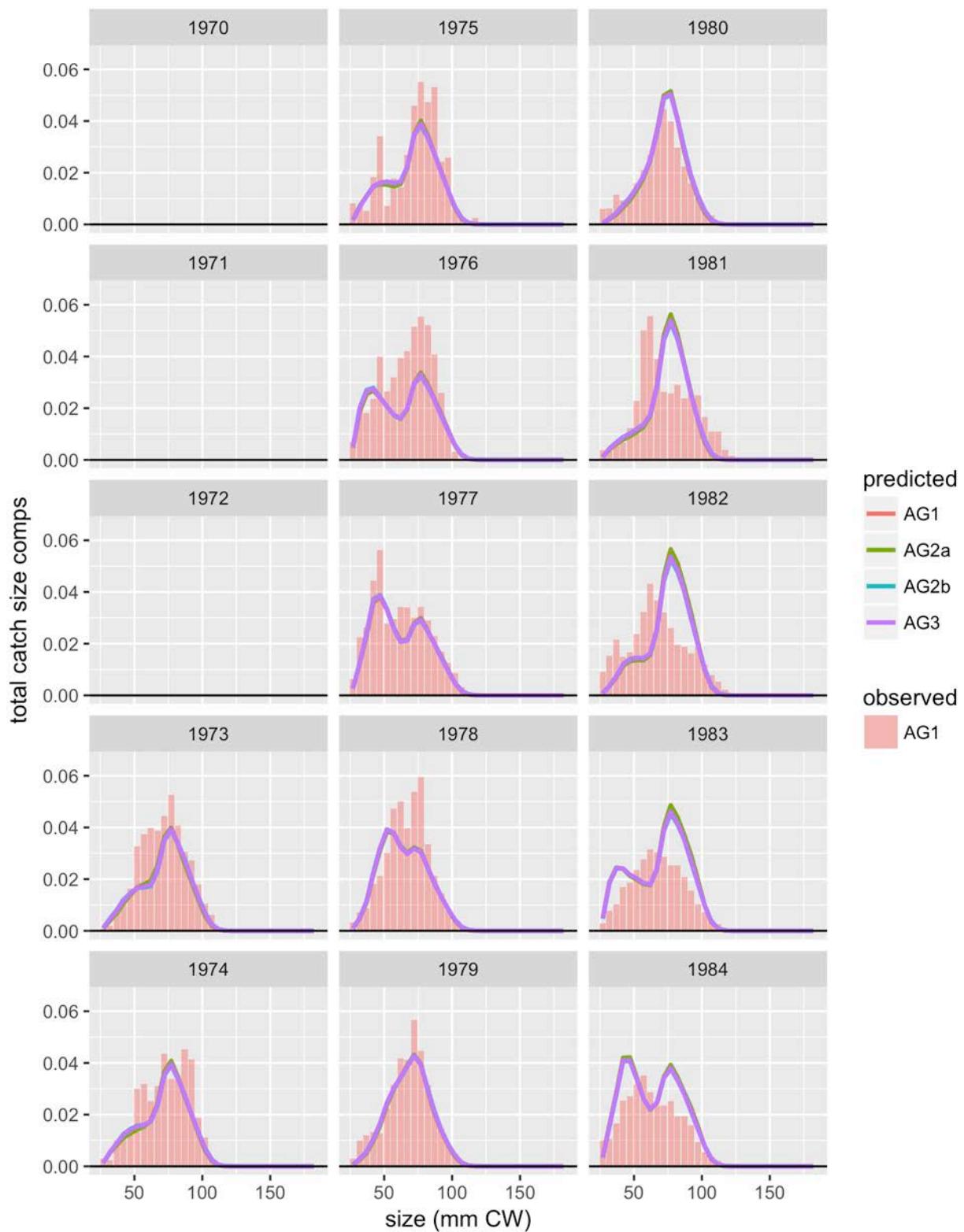
Figure 160. Comparison of observed and predicted female, all maturity, all shell total catch size comps for GTF. Page 1 of 4.
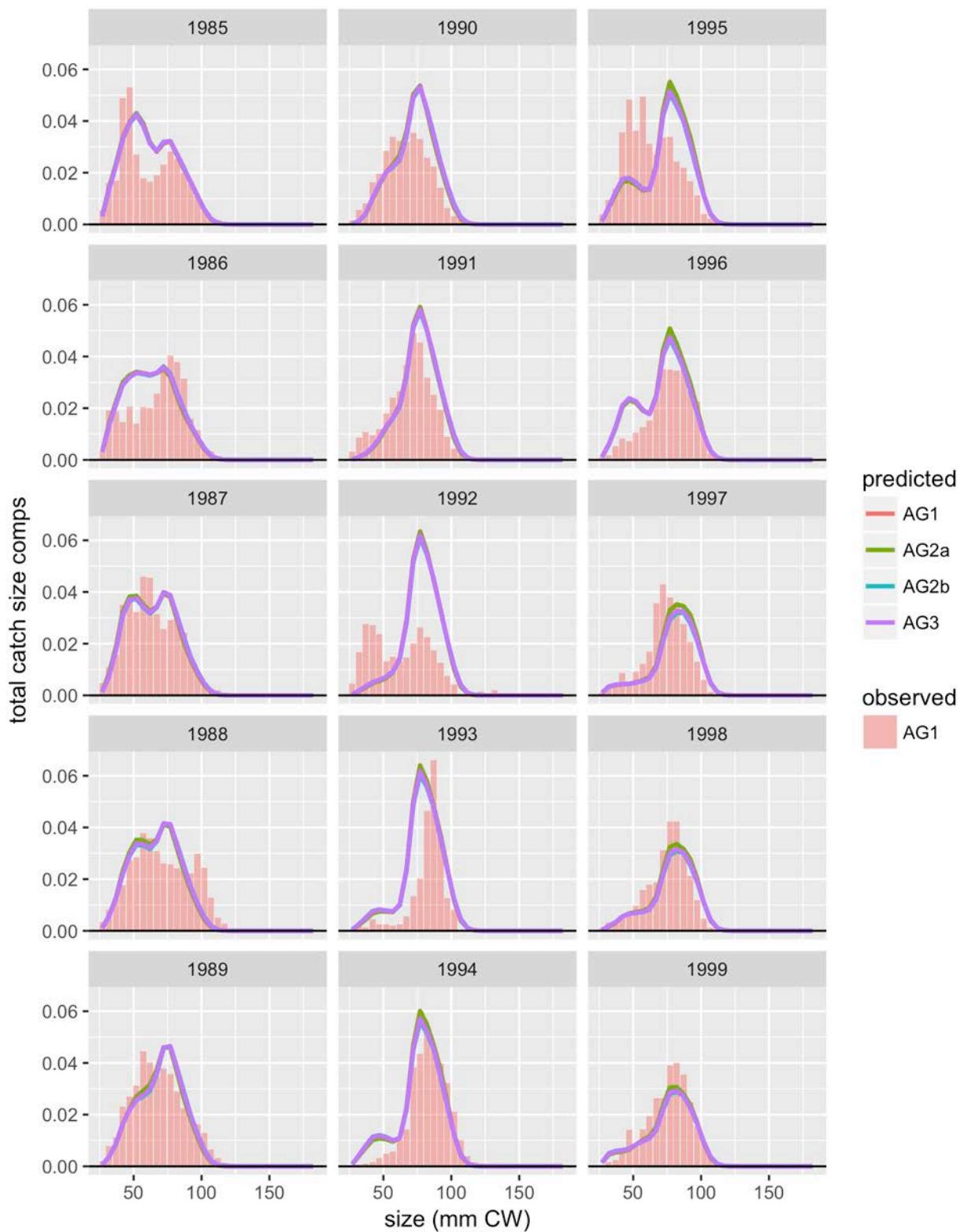
Figure 161. Comparison of observed and predicted female, all maturity, all shell total catch size comps for GTF. Page 2 of 4.
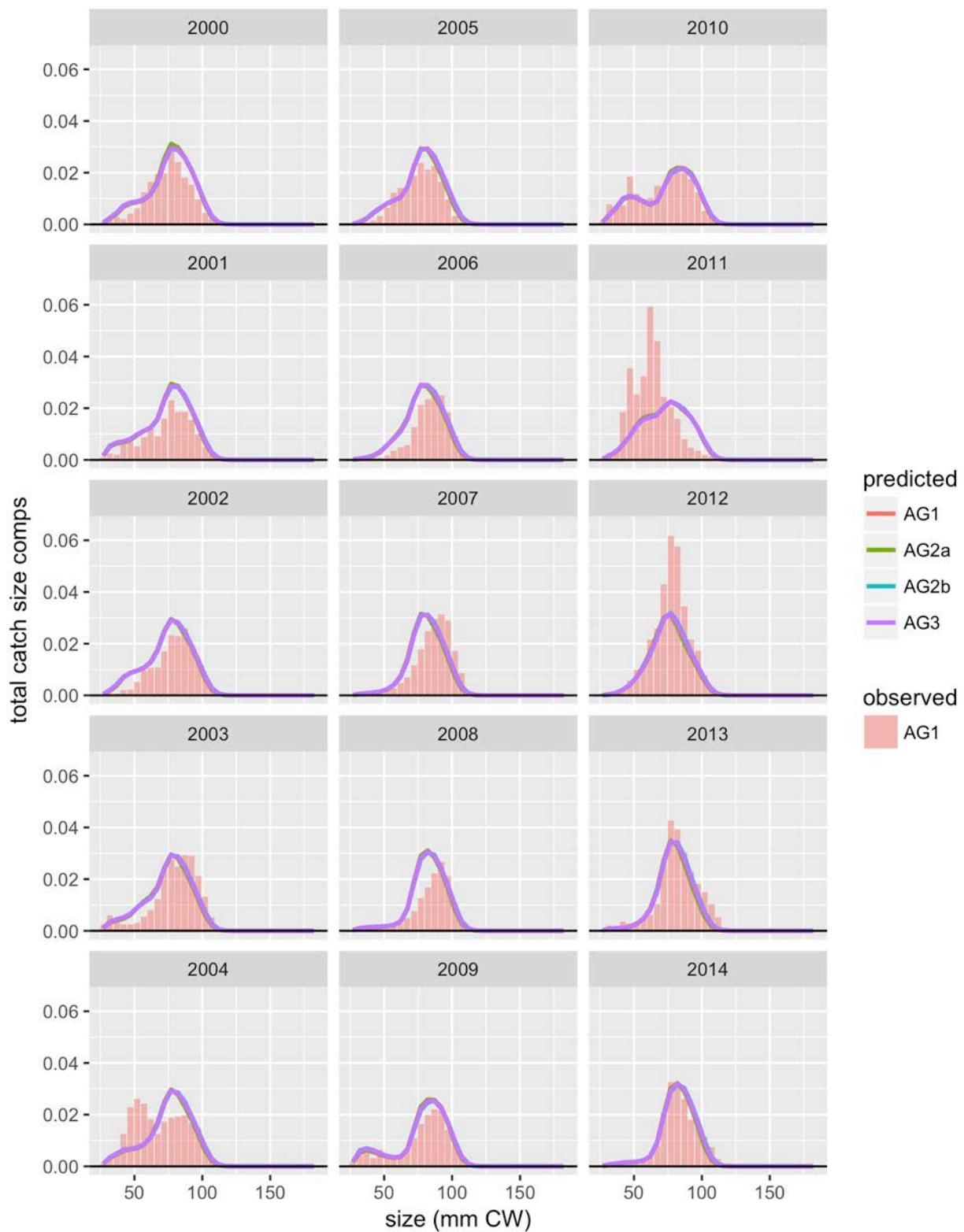
Figure 162. Comparison of observed and predicted female, all maturity, all shell total catch size comps for GTF. Page 3 of 4.
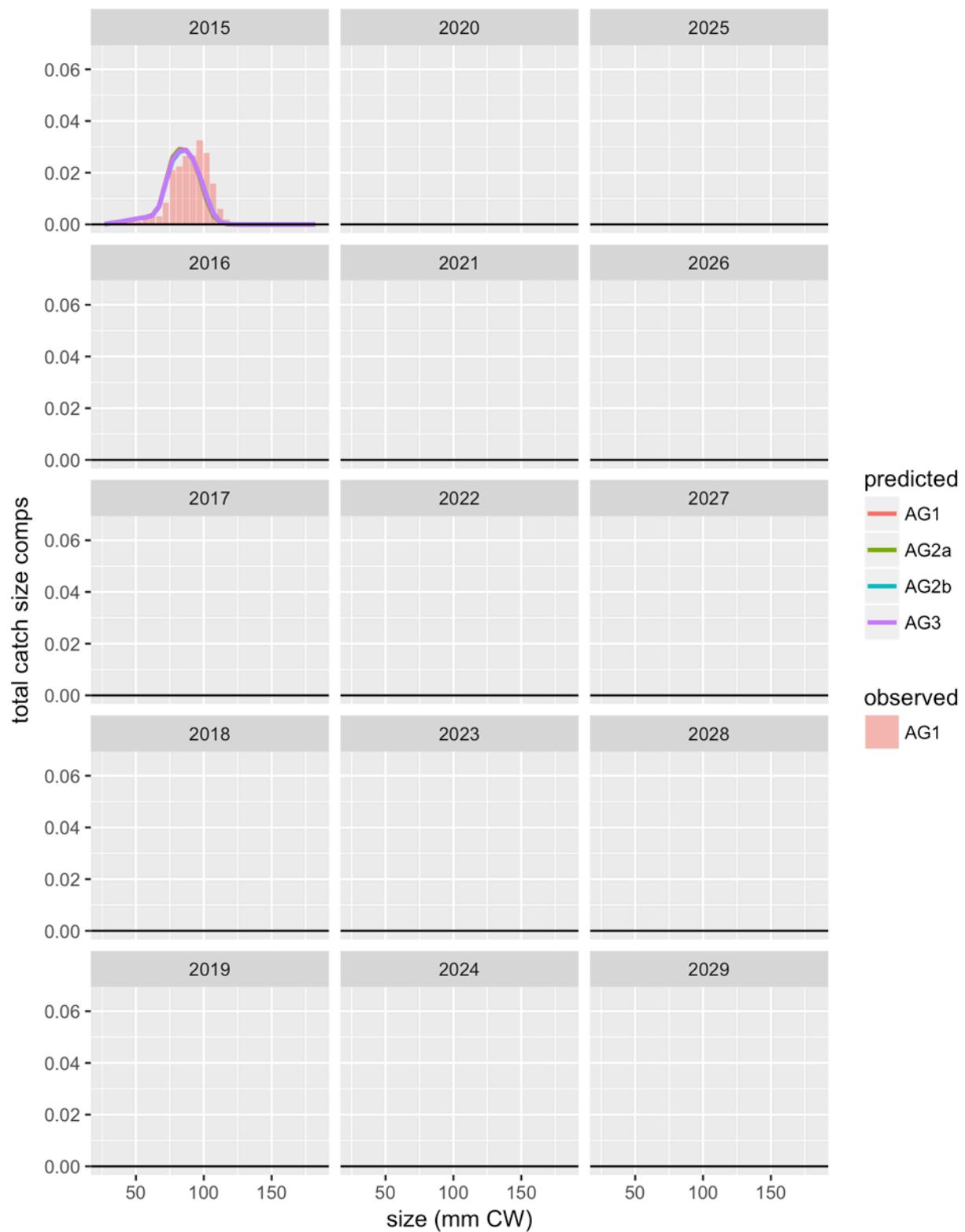
Figure 163. Comparison of observed and predicted female, all maturity, all shell total catch size comps for GTF. Page 4 of 4.
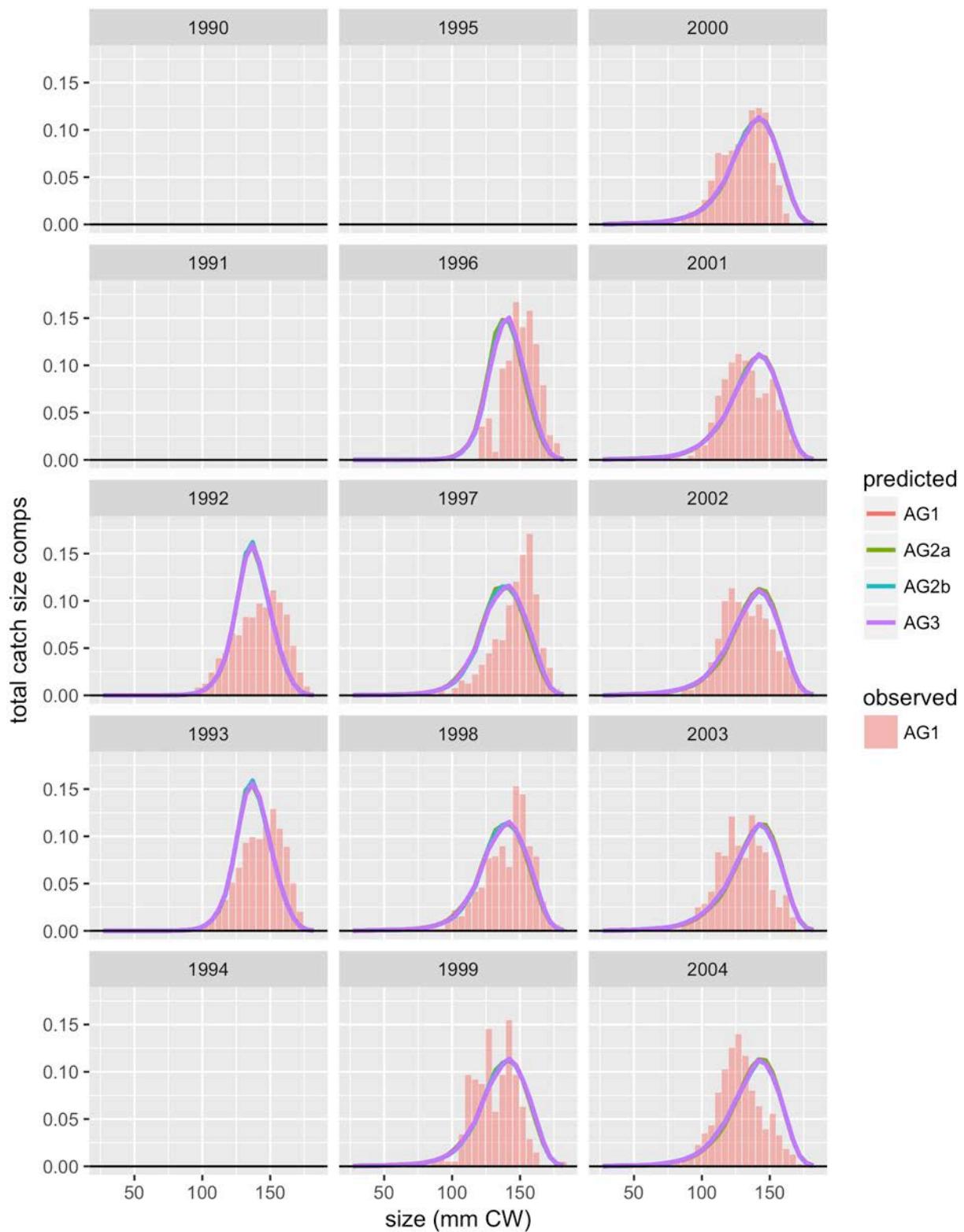
Figure 164. Comparison of observed and predicted male, all maturity, all shell total catch size comps for RKF. Page 1 of 2.
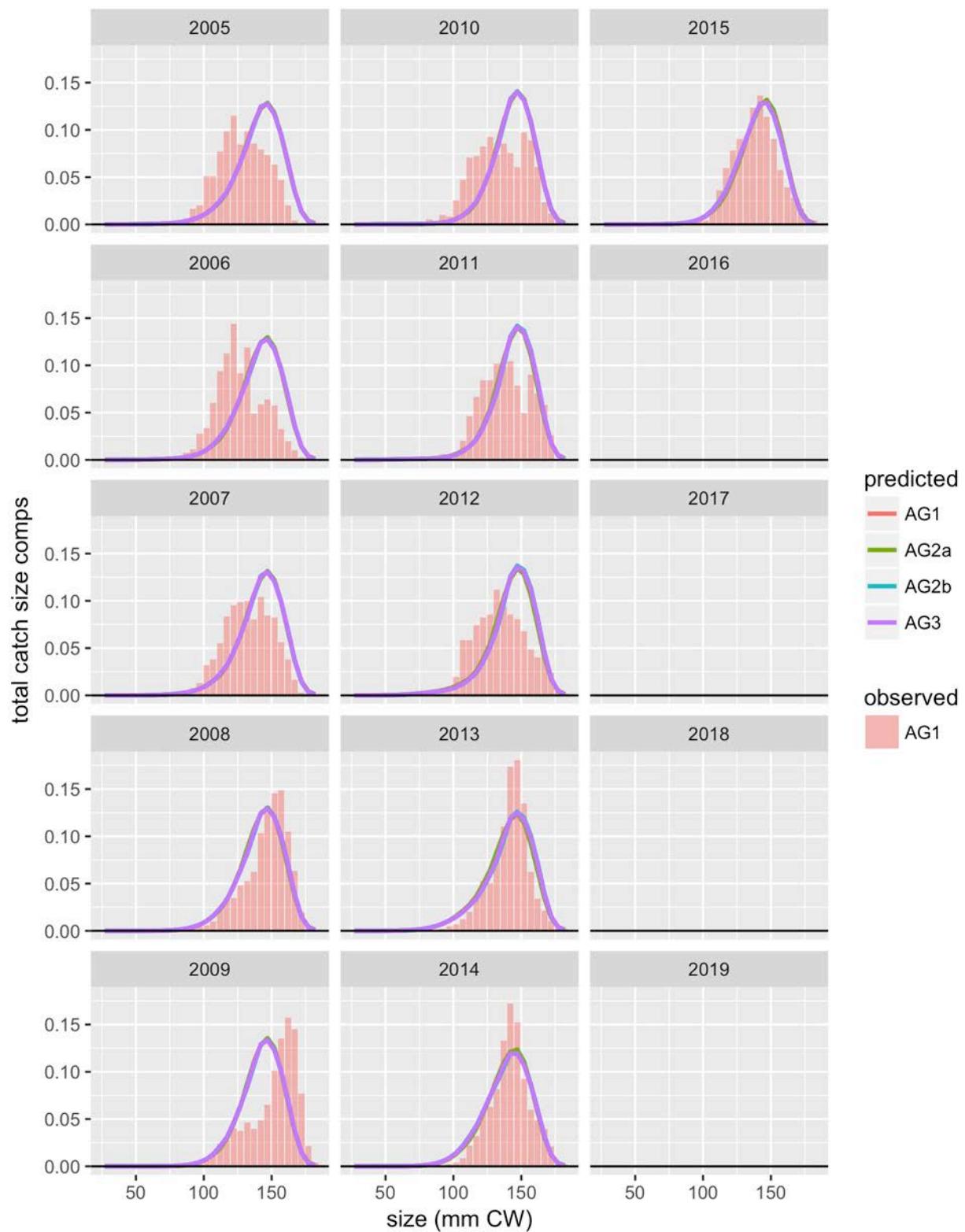
Figure 165. Comparison of observed and predicted male, all maturity, all shell total catch size comps for RKF. Page 2 of 2.
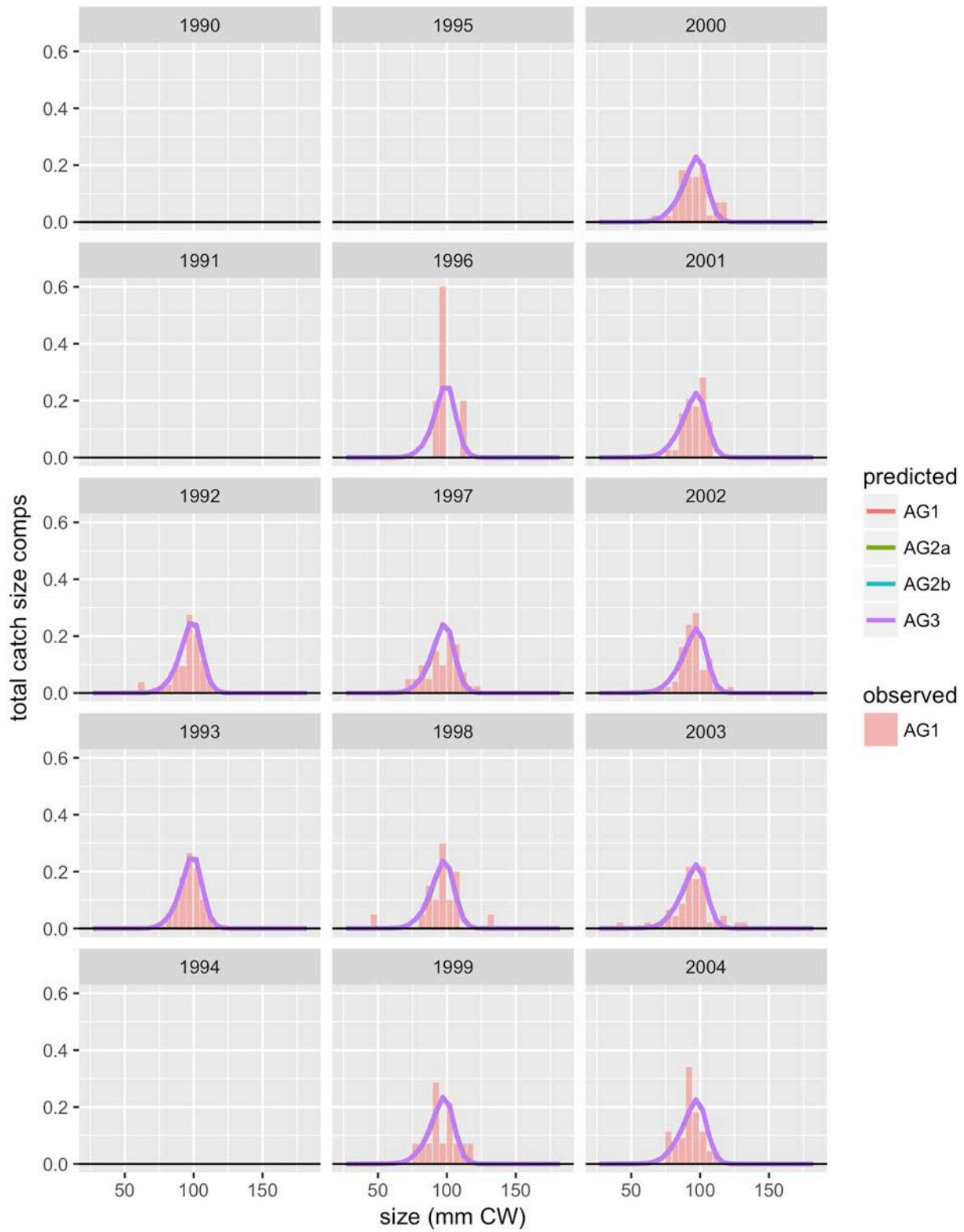
Figure 166. Comparison of observed and predicted female, all maturity, all shell total catch size comps for RKF. Page 1 of 2.
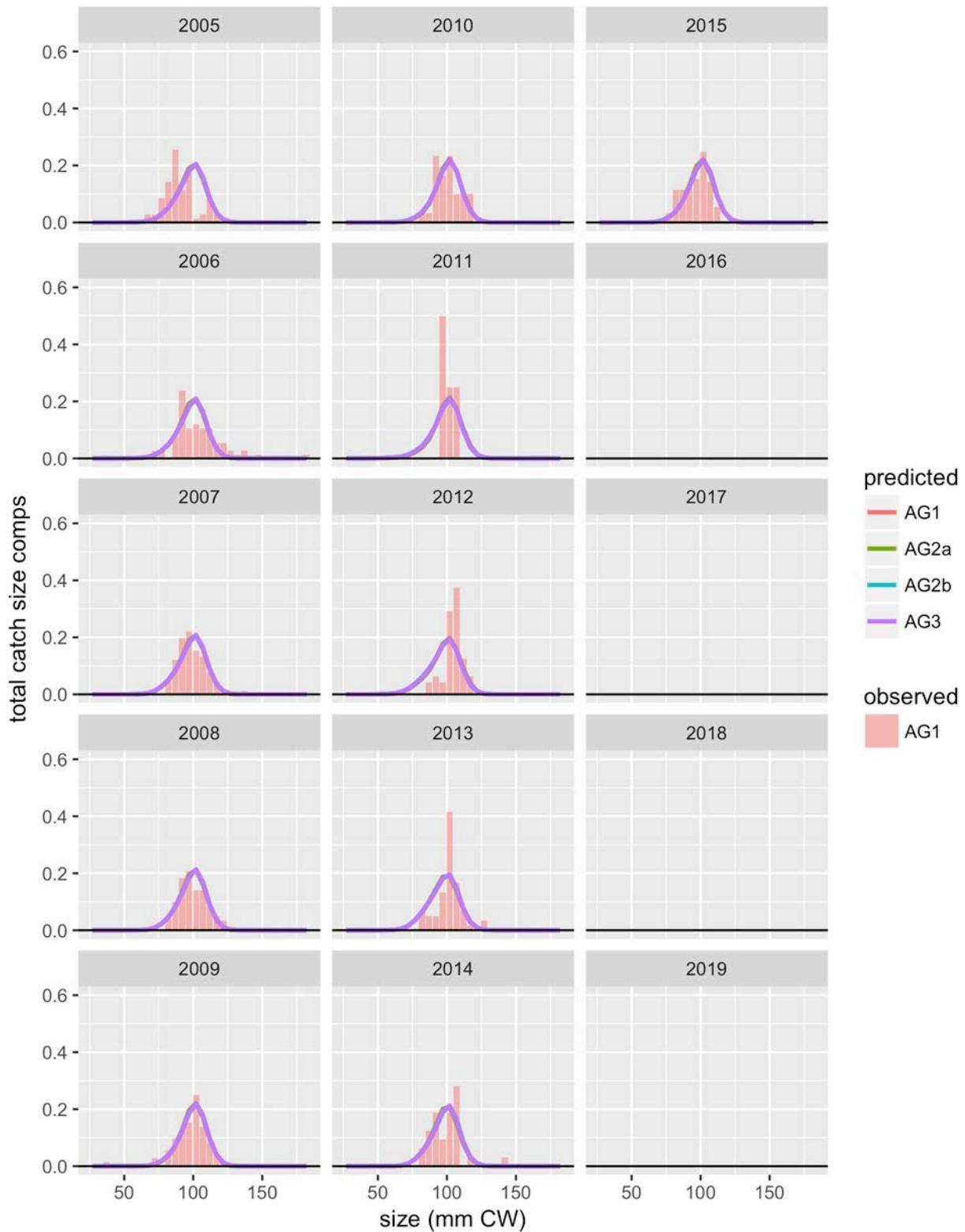
Figure 167. Comparison of observed and predicted female, all maturity, all shell total catch size comps for RKF. Page 2 of 2.

Retained fishery catch biomass
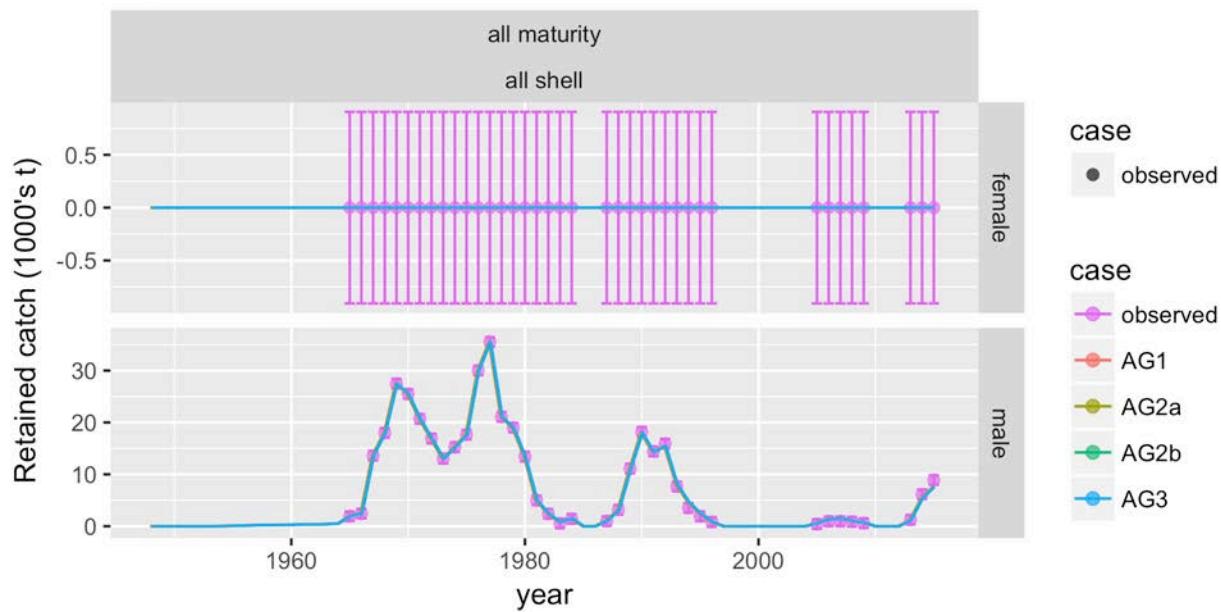
Figure 168. Comparison of observed and predicted retained catch mortality for TCF.
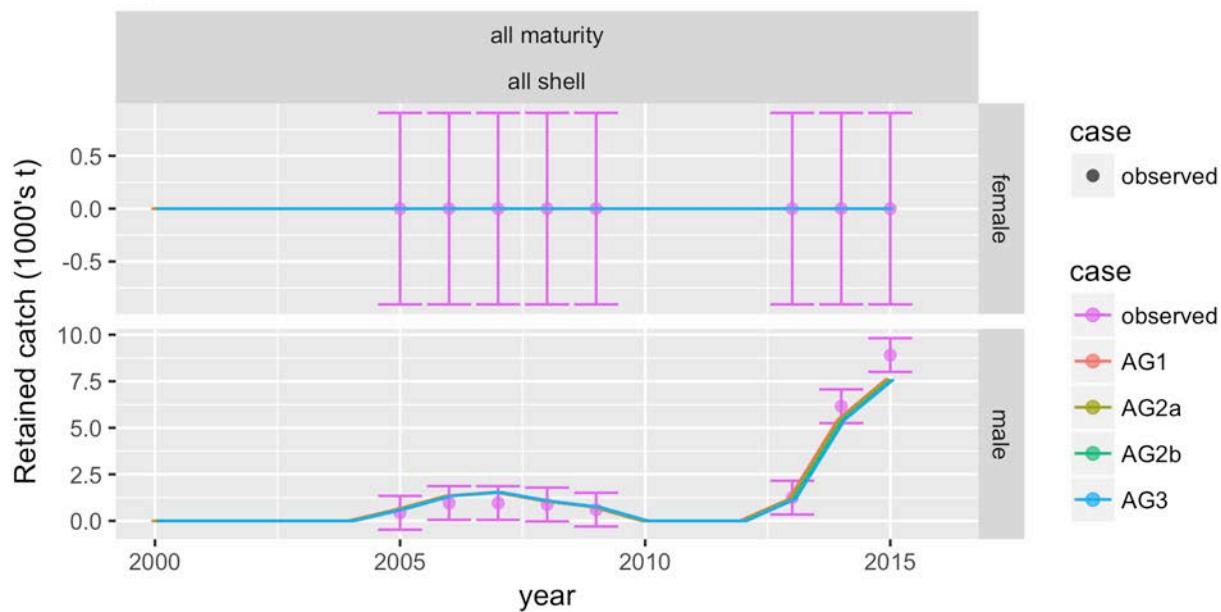
Figure 169. Comparison of observed and predicted retained catch mortality for TCF. Recent time period.

Mean retained fishery size compositions
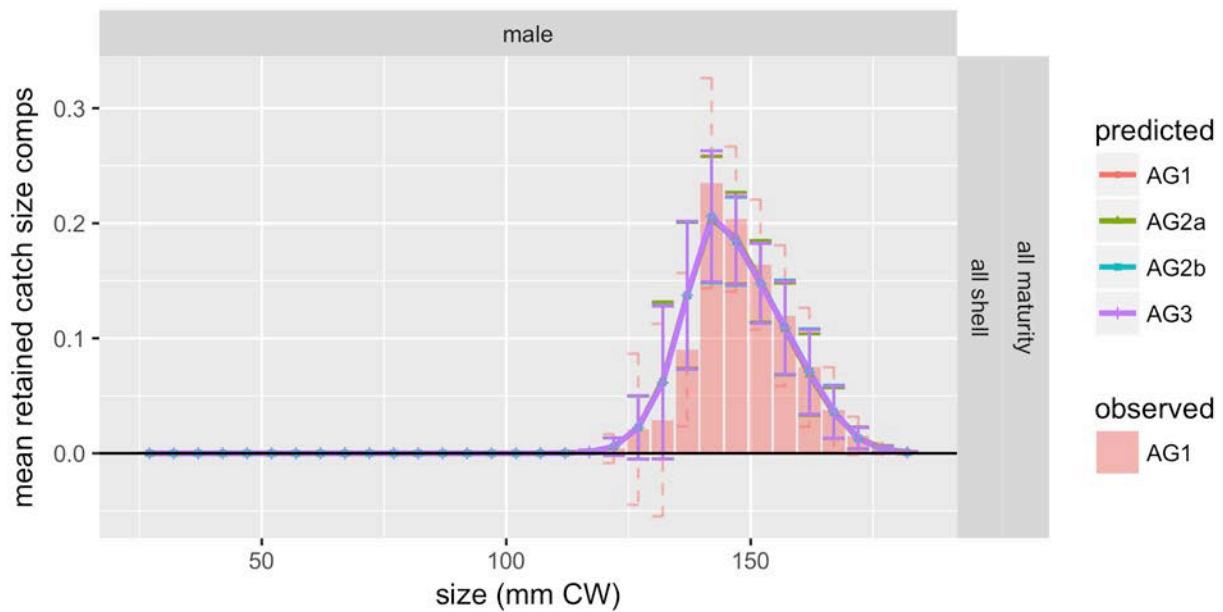
Figure 170. Comparison of observed and predicted &&xms mean retained catch size comps for TCF.

Retained fishery size compositions
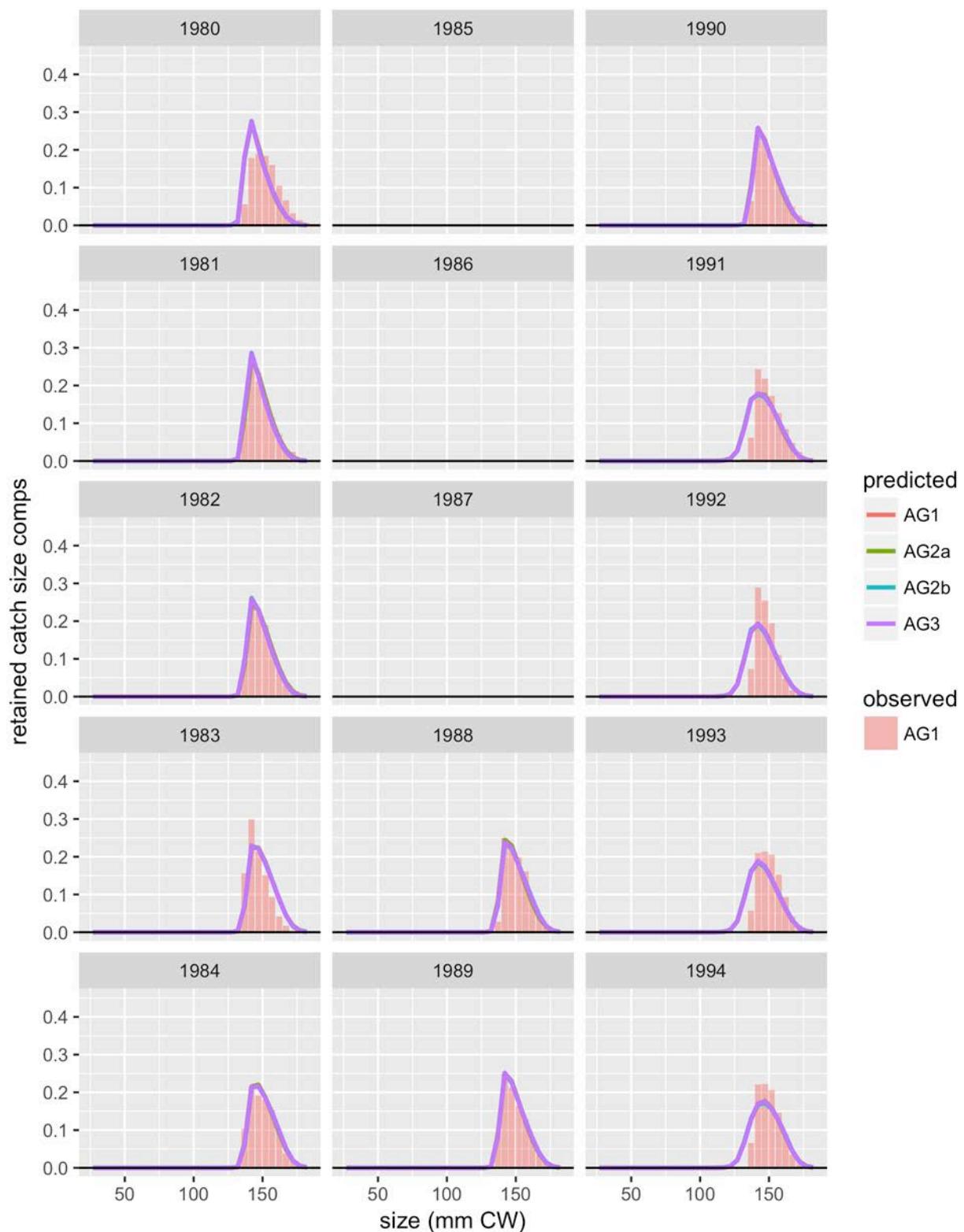
Figure 171. Comparison of observed and predicted male, all maturity, all shell retained catch size comps for TCF. Page 1 of 3.
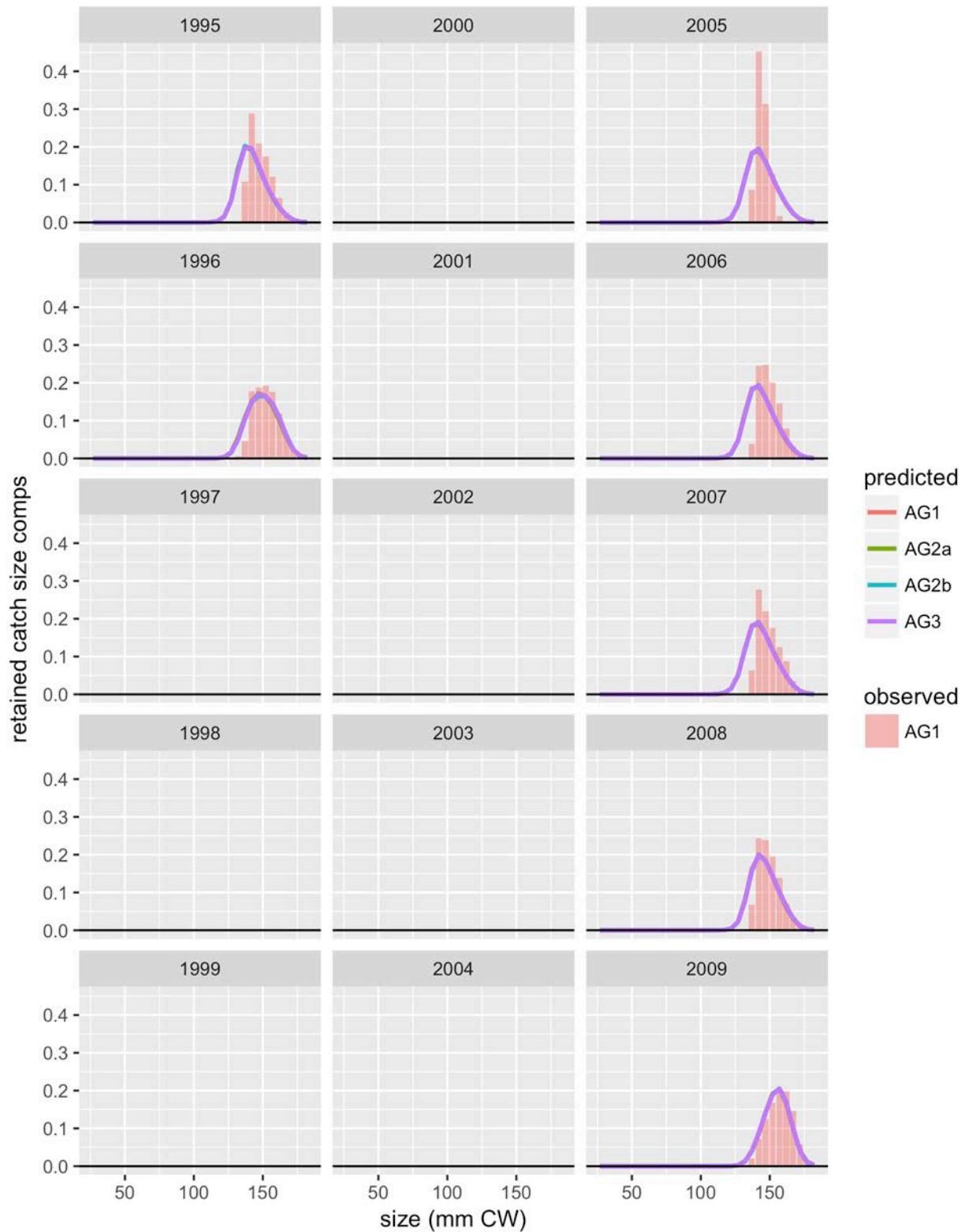
Figure 172. Comparison of observed and predicted male, all maturity, all shell retained catch size comps for TCF. Page 2 of 3.
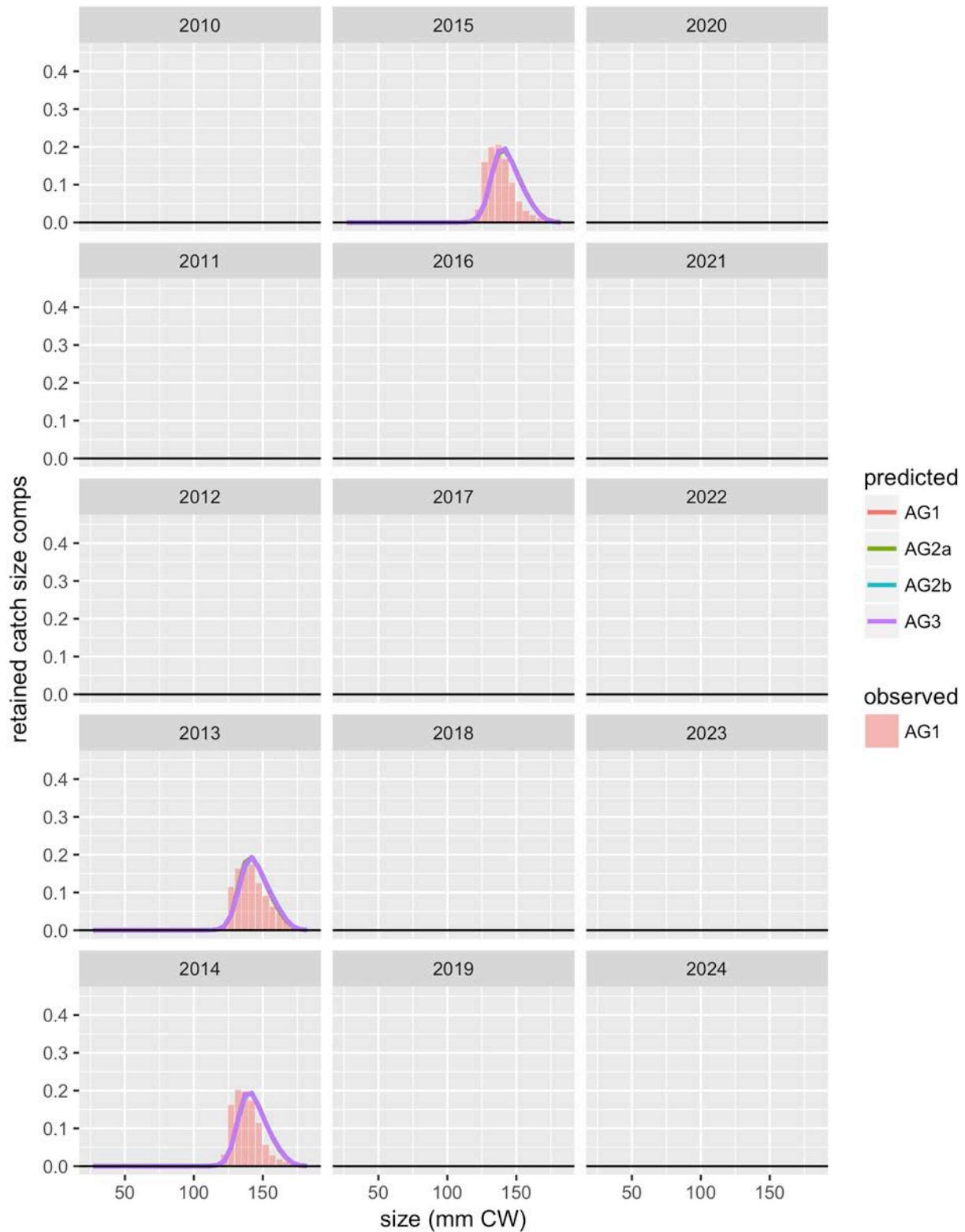
Figure 173. Comparison of observed and predicted male, all maturity, all shell retained catch size comps for TCF. Page 3 of 3.