Appendix G2:

Model Differences for TCSAM02 Models AG1a, AG1b, and AG1d vs. AG1

William Stockhausen 23 April, 2017

Introduction

This document presents results from the comparison of TCSAM02 models AG1, AG1a, AG1b, and AG1d. The following plots show differences between the set of models for a variety of quantities.

Population processes

Natural mortality

natural mortality

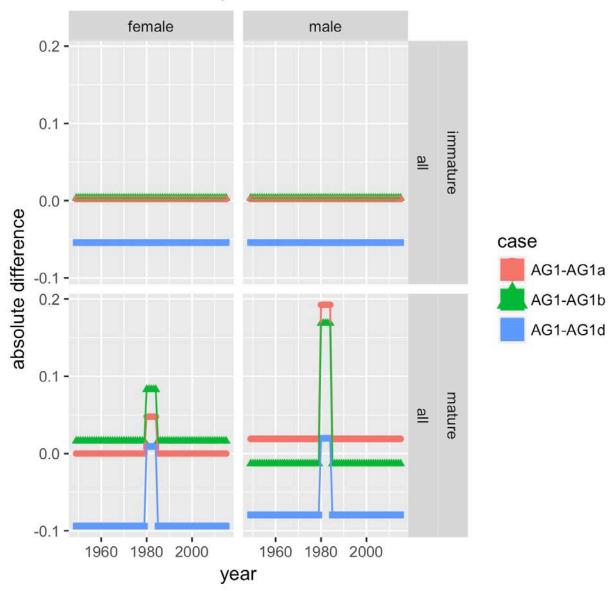


Figure 1. Differences for natural mortality.

Probability of terminal molt

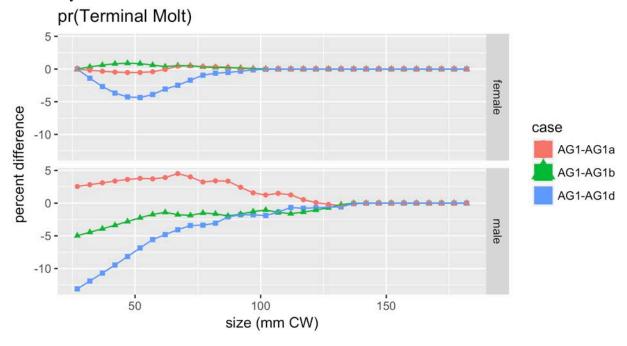


Figure 2. Differences for probability of terminal molt.

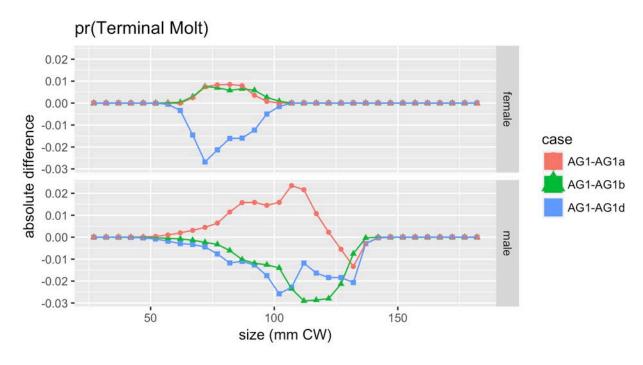


Figure 3. Differences for probability of terminal molt.

Mean growth

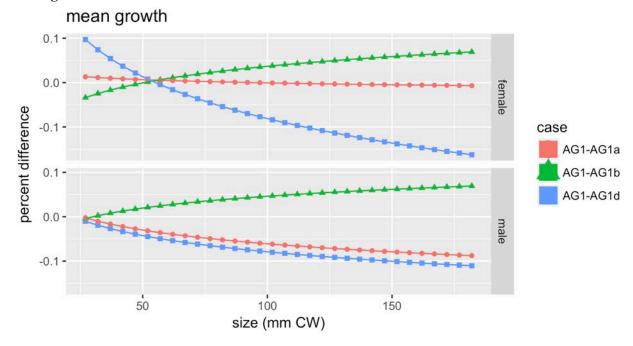


Figure 4. Differences for mean growth.

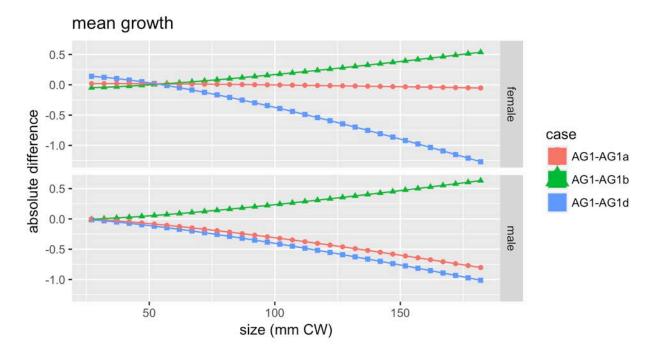


Figure 5. Differences for mean growth.

Growth matrices

plotting growth matrix for female plotting growth matrix for male

growth matrices for female

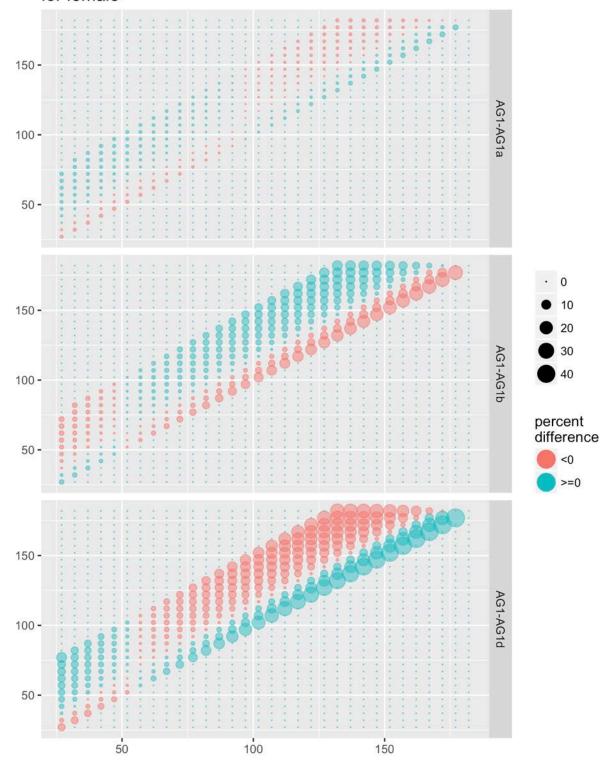


Figure 6. Growth matrix differences for female.

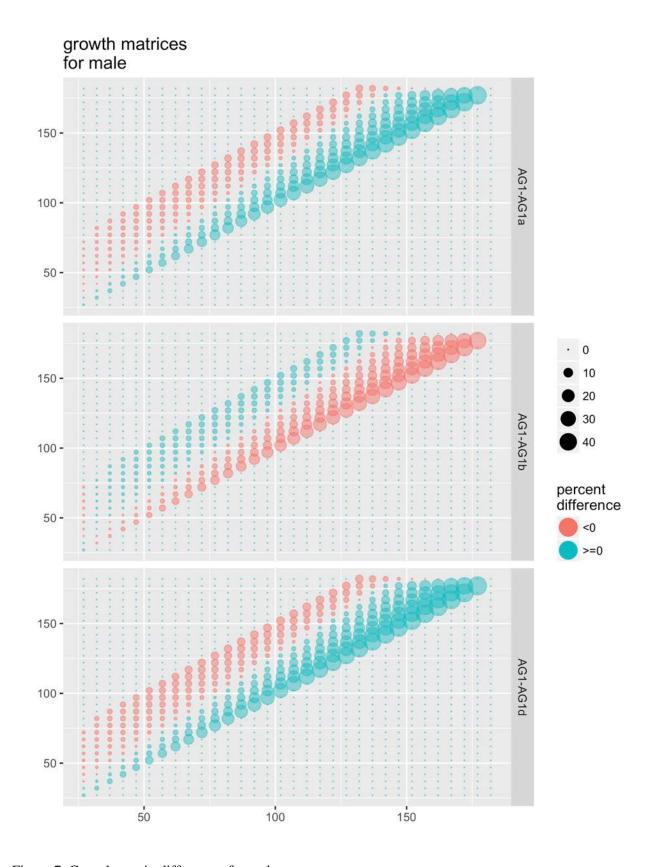
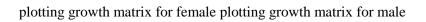


Figure 7. Growth matrix differences for male.



growth matrices for female 150 -AG1-AG1a 100 -50 -. 0.000 0.025 150 -0.050 0.075 AG1-AG1b 0.100 100 -0.125 absolute difference 50 -<0 >=0 150 -AG1-AG1d 100 -50 -100 50 150

Figure 8. Growth matrix differences for female.

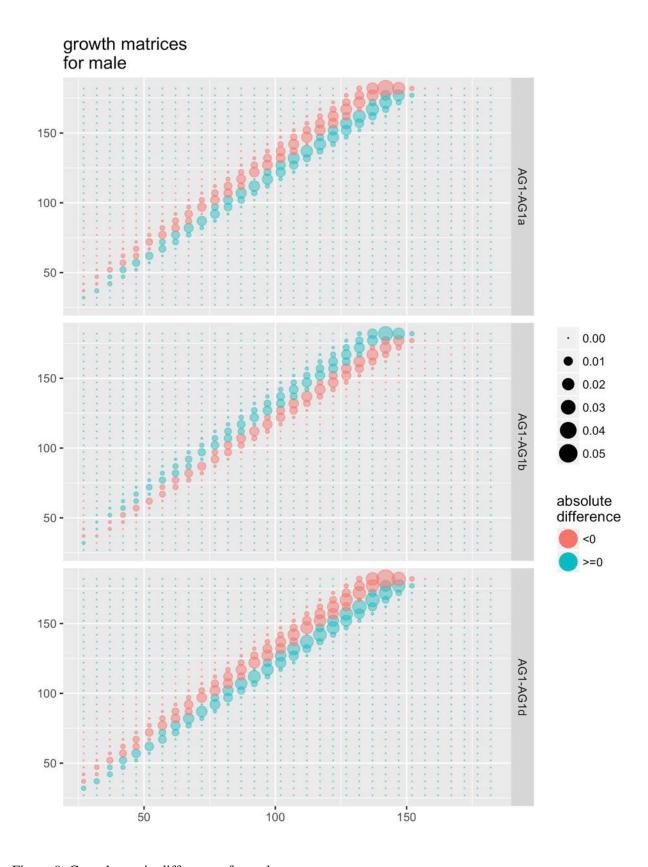


Figure 9. Growth matrix differences for male.

Size distribution for recruits

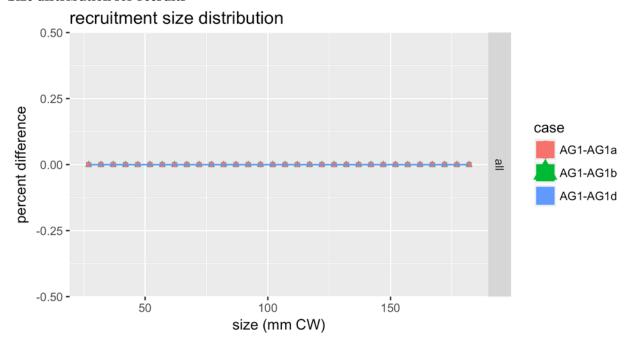


Figure 10. Differences for recruitment size distribution.

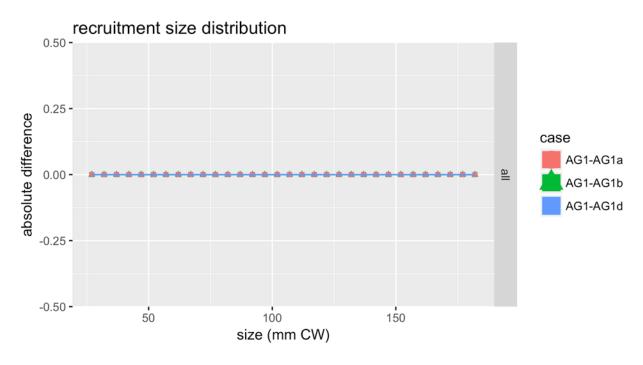


Figure 11. Differences for recruitment size distribution.

Population results

Recruitment



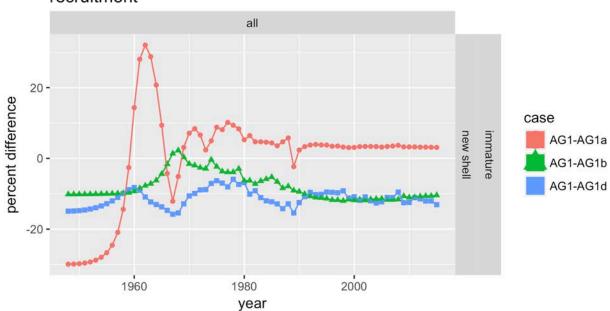


Figure 12. Differences for recruitment.

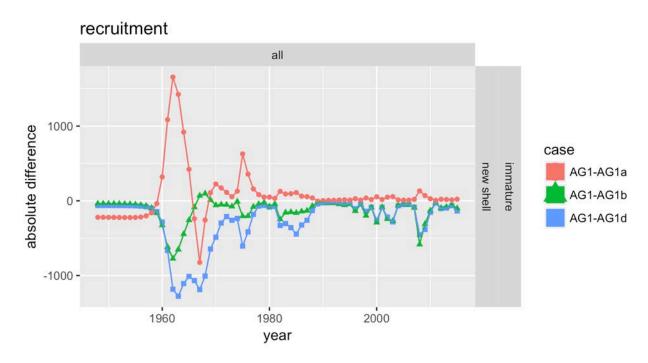


Figure 13. Differences for recruitment.

Population abundance

population abundance

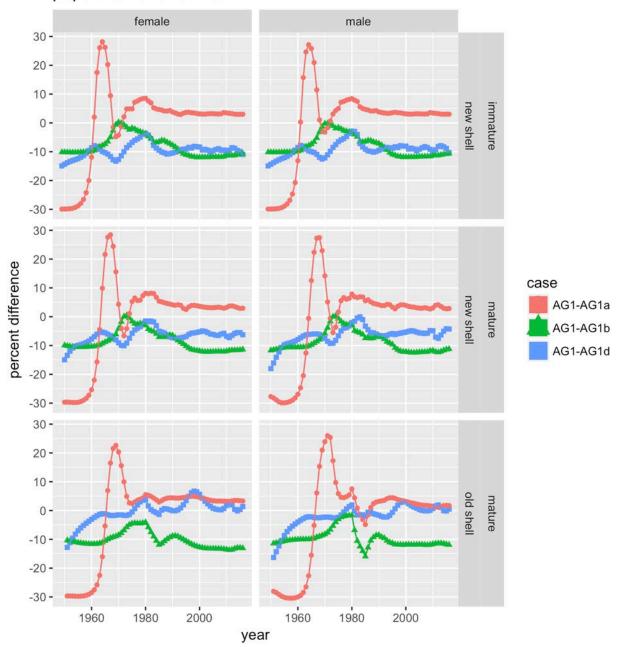


Figure 14. Differences for population abundance.

population abundance female male 1000 new shell -1000 absolute difference 1000 case new shell mature AG1-AG1a AG1-AG1b AG1-AG1d -1000 -1000 old shell mature 0 --1000 -1960 1980 2000 1960 1980 2000

year

Figure 15. Differences for population abundance.

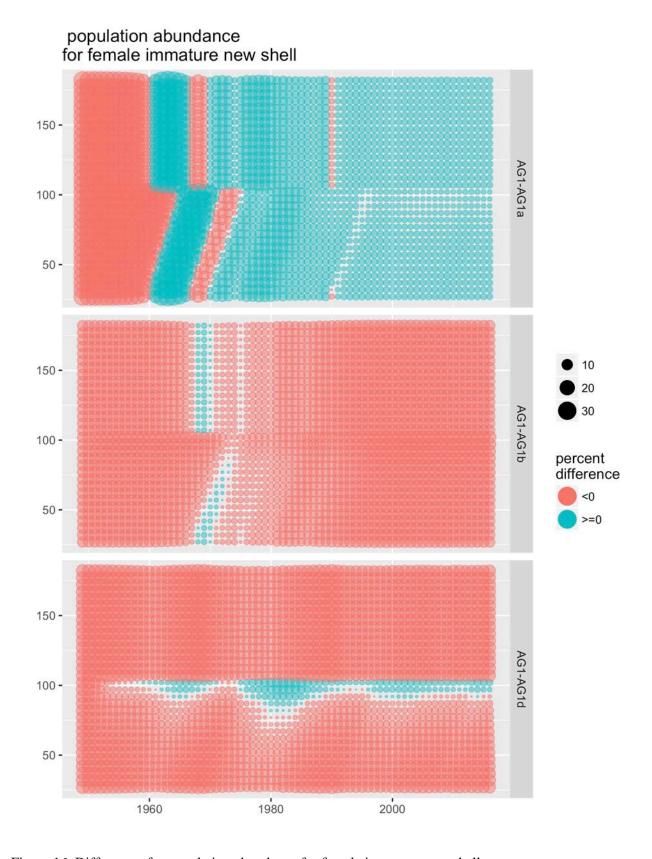


Figure 16. Differences for population abundance for female immature new shell.

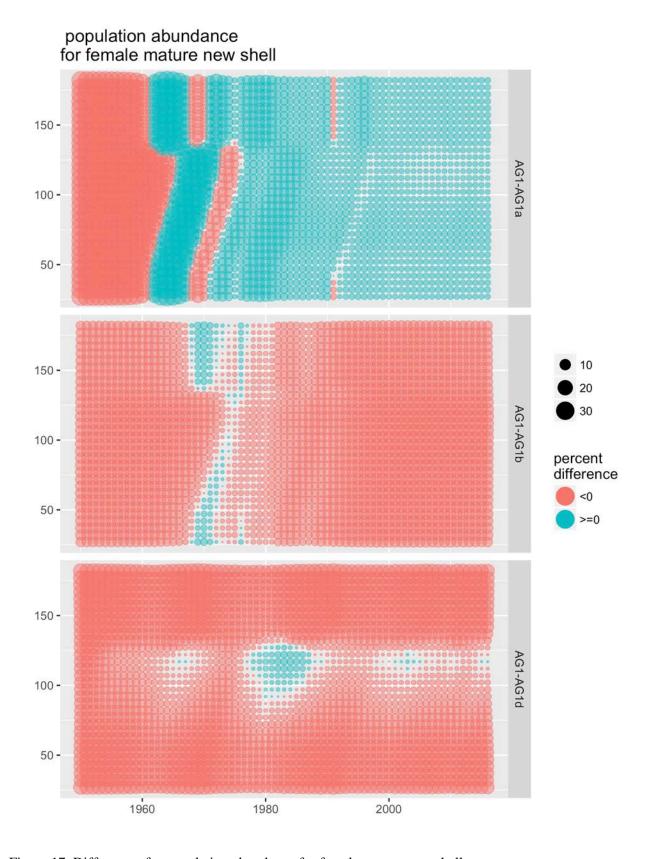


Figure 17. Differences for population abundance for female mature new shell.

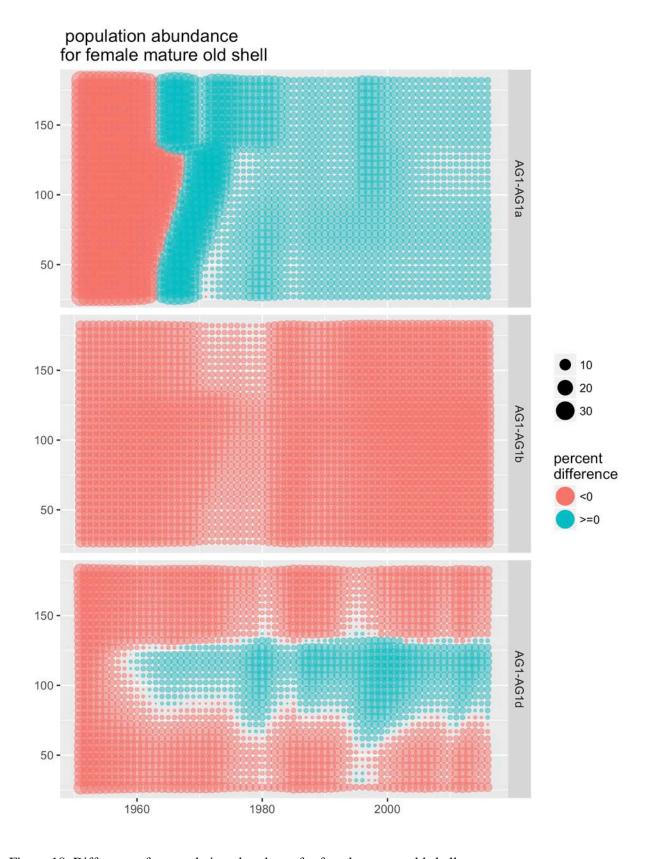


Figure 18. Differences for population abundance for female mature old shell.

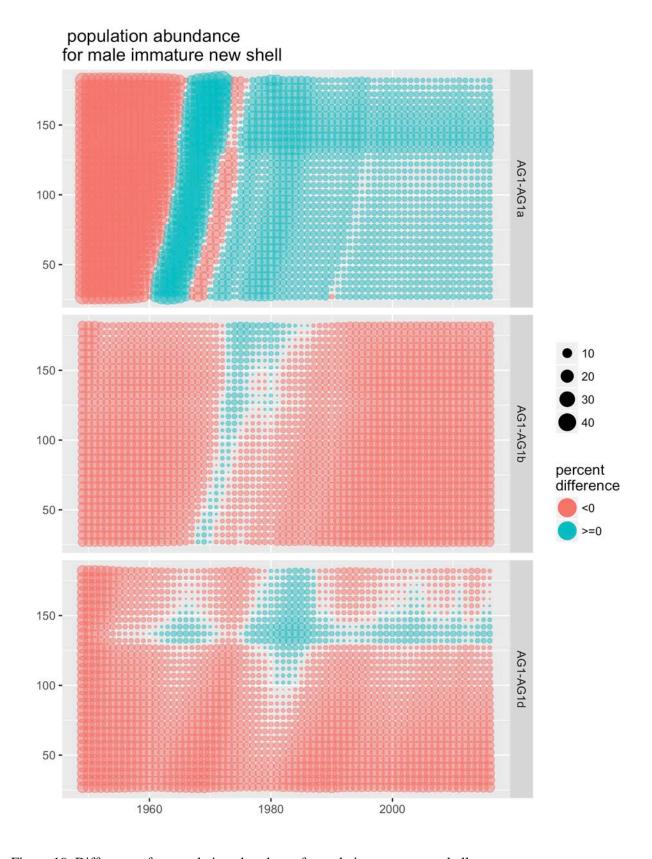


Figure 19. Differences for population abundance for male immature new shell.

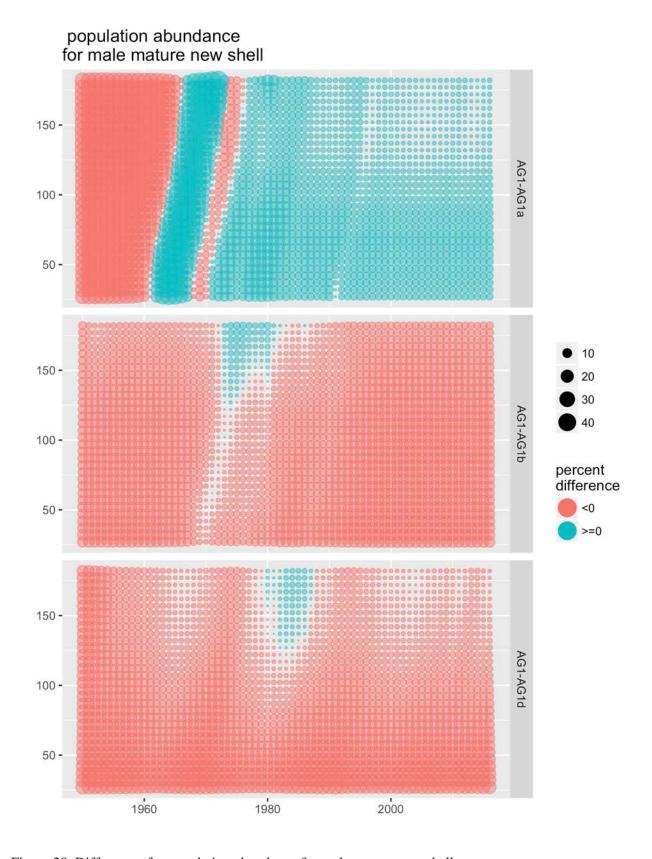


Figure 20. Differences for population abundance for male mature new shell.

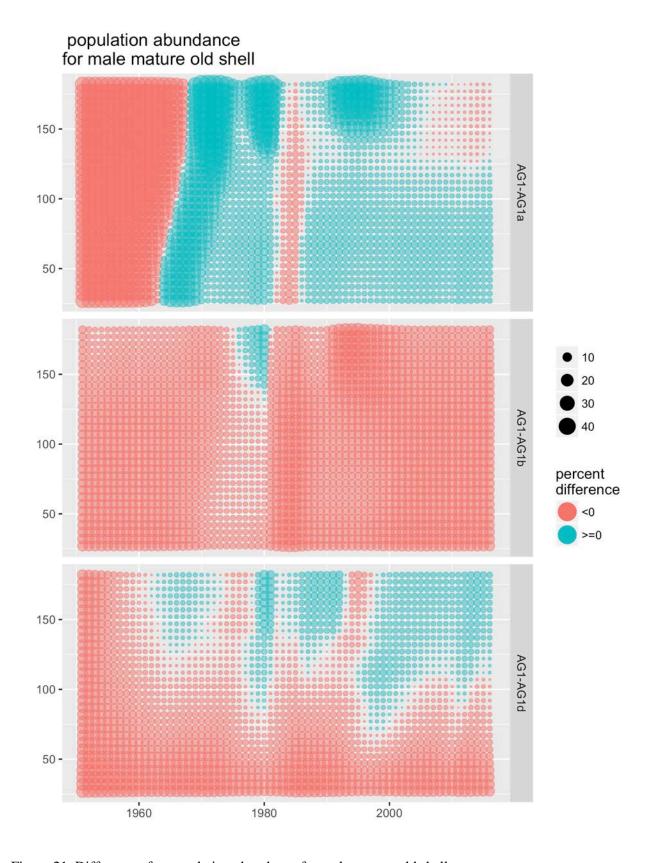


Figure 21. Differences for population abundance for male mature old shell.

population abundance for female immature new shell 150 -AG1-AG1a 100 -50 -100 150 -200 300 AG1-AG1b 100 absolute difference <0 50 ->=0 150 -100 -50 -1960 2000 1980

Figure 22. Differences for population abundance for female immature new shell.

population abundance for female mature new shell 150 -100 -50 -10 150 -30 40 50 100 absolute difference 50 -<0 >=0 150 -100 -50 -1960 2000 1980

Figure 23. Differences for population abundance for female mature new shell.

population abundance for female mature old shell 150 -100 -50 -150 -50 AG1-AG1b 75 100 absolute difference <0 50 ->=0 150 -100 -50 -1980 2000 1960

Figure 24. Differences for population abundance for female mature old shell.

population abundance for male immature new shell 150 -AG1-AG1a 100 -50 -100 150 -200 300 AG1-AG1b 100 absolute difference <0 50 ->=0 150 -100 -50 -1960 2000 1980

Figure 25. Differences for population abundance for male immature new shell.

population abundance for male mature new shell 150 -100 -50 -150 -AG1-AG1b 15 100 absolute difference <0 50 ->=0 150 -100 -50 -1960 2000 1980

Figure 26. Differences for population abundance for male mature new shell.

population abundance for male mature old shell 150 -100 -50 -10 150 -30 AG1-AG1b 40 100 absolute difference <0 50 ->=0 150 -100 -50 -1960 1980 2000

Figure 27. Differences for population abundance for male mature old shell.

Biomass

population biomass

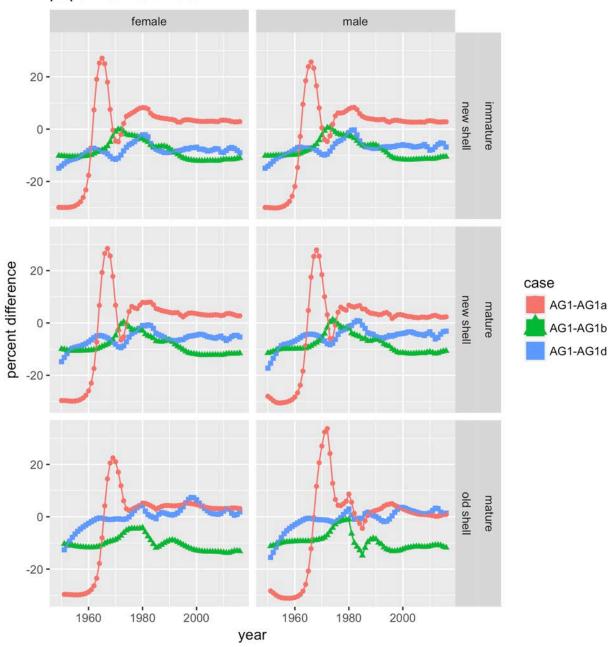


Figure 28. Differences for population biomass.

population biomass

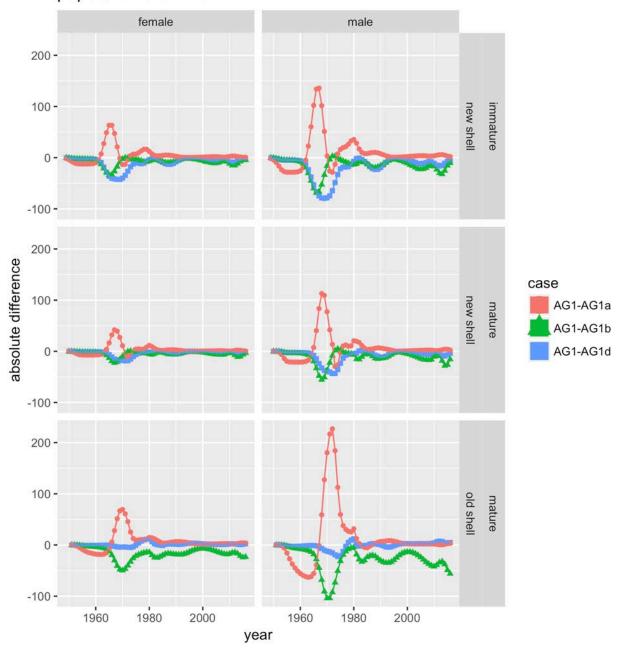


Figure 29. Differences for population biomass.

Surveys

Survey catchability

NMFS trawl survey: survey catchability

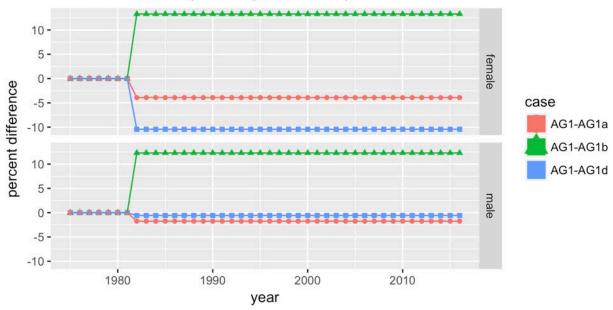


Figure 30. Differences for NMFS trawl survey: survey catchability.

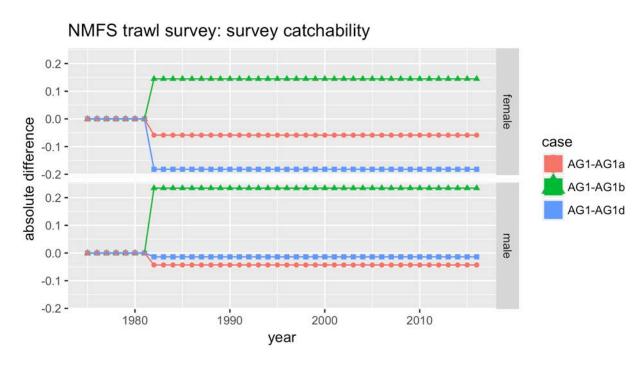


Figure 31. Differences for NMFS trawl survey: survey catchability.

Survey selectivity functions

NMFS trawl survey survey selectivity for female all maturity all shell

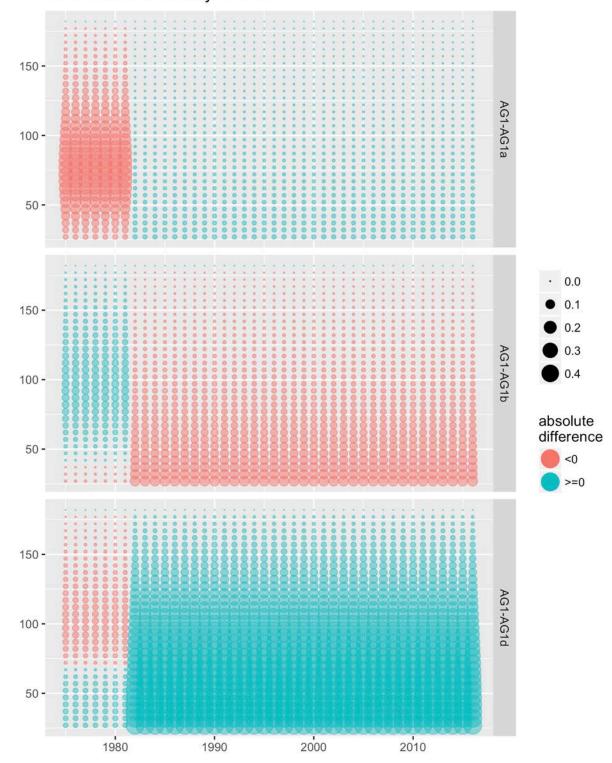


Figure 32. Differences for NMFS trawl survey survey selectivity for female all maturity all shell.

NMFS trawl survey survey selectivity for male all maturity all shell 150 **-**AG1-AG1a 100 -50 -0.0 0.1 150 -0.2 0.3 AG1-AG1b 0.4 100 -0.5 absolute 50 difference <0 >=0 150 -AG1-AG1d 100 -50 -

Figure 33. Differences for NMFS trawl survey survey selectivity for male all maturity all shell.

2000

1990

1980

2010

NMFS trawl survey females: survey selectivity 1978 1975 1976 1977 1979 0.50 -0.25 -0.00 -0.25 1980 1981 1982 1983 1984 0.50 -0.25 -0.00 -0.25 -1985 1986 1987 1988 1989 0.50 -0.25 -0.00 -0.25 -1990 1991 1992 1993 1994 0.50 -0.25 -0.00 --0.25 absolute difference 1995 1996 1997 1998 1999 case 0.50 AG1-AG1a 0.25 -0.00 AG1-AG1b -0.25 AG1-AG1d 2000 2001 2002 2003 2004 0.50 -0.25 -0.00 --0.25 -2005 2006 2007 2008 2009 0.50 -0.25 -0.00 --0.25 2010 2011 2012 2013 2014 0.50 -0.25 -0.00 --0.25 **-**50 100 150 50 100 150 50 100 150 2016 2015 0.50 -0.25 -0.00 --0.25 **-**50 100 150 50 100 150 size (mm CW)

Figure 34. Differences for NMFS trawl survey females: survey selectivity.

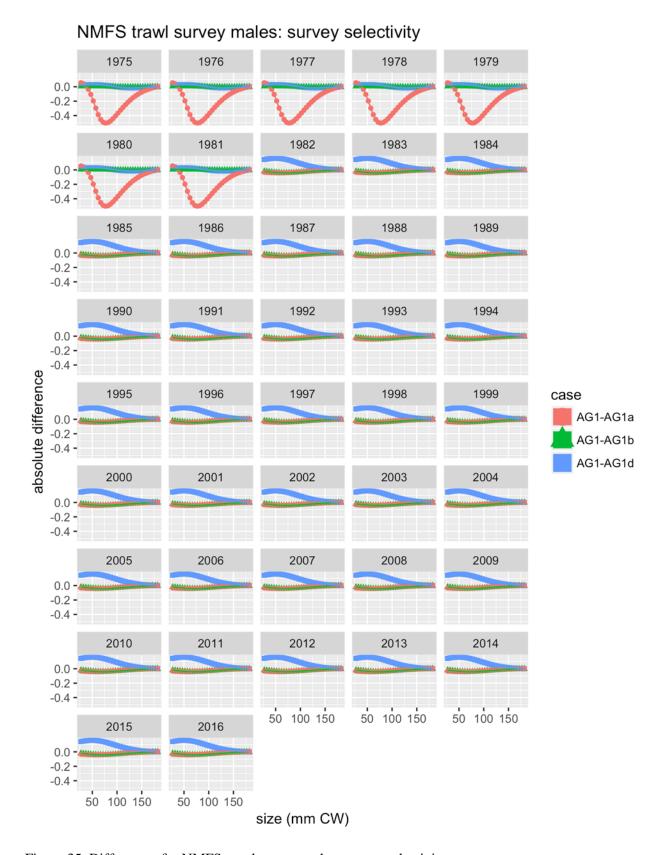


Figure 35. Differences for NMFS trawl survey males: survey selectivity.

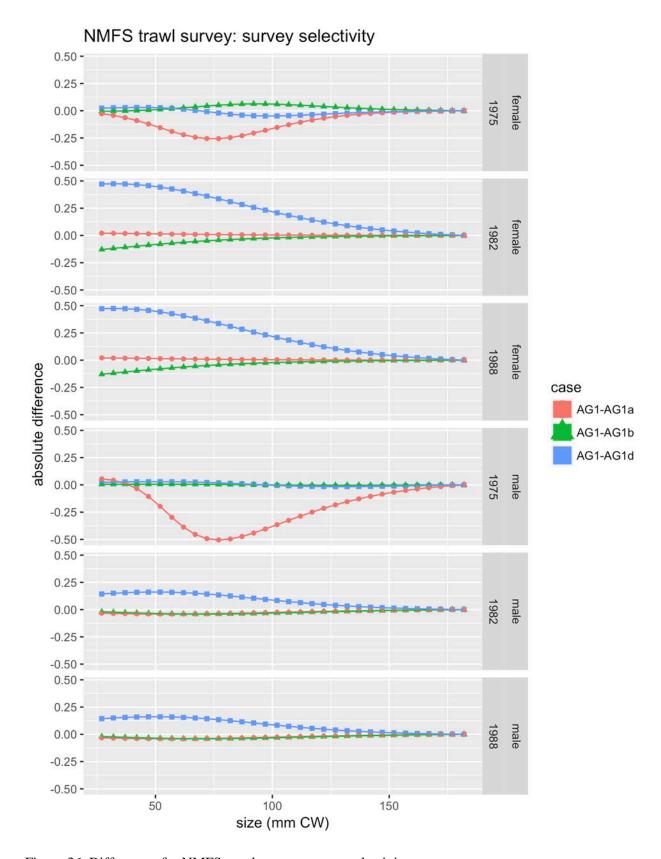


Figure 36. Differences for NMFS trawl survey: survey selectivity.

Survey abundance

NMFS trawl survey: survey abundance

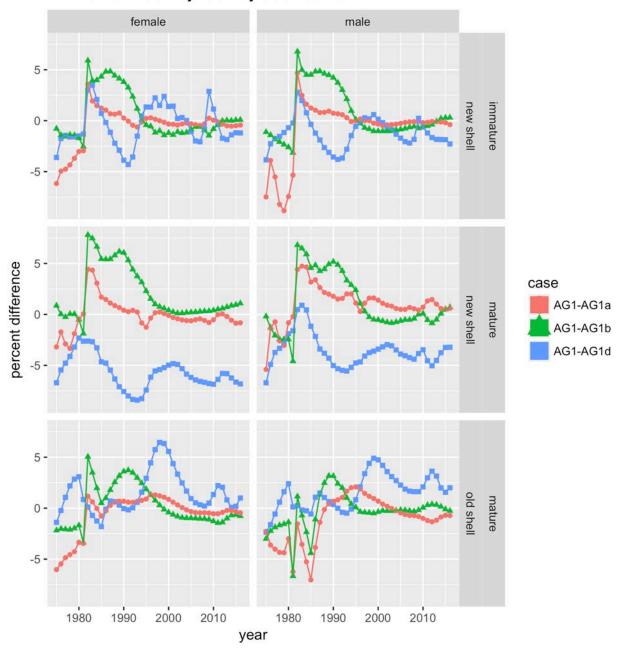


Figure 37. Differences for NMFS trawl survey: survey abundance.

NMFS trawl survey: survey abundance

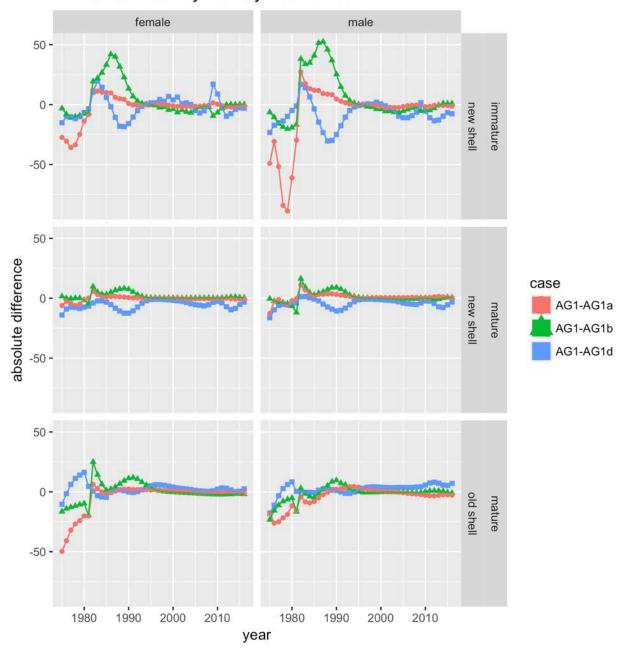


Figure 38. Differences for NMFS trawl survey: survey abundance.

NMFS trawl survey survey abundance for female immature new shell 150 -AG1-AG1a 100 -50 -150 -15 AG1-AG1b 20 100 percent difference <0 50 ->=0 150 -AG1-AG1d 100 -50 -1990 2000 2010 1980

Figure 39. Differences for NMFS trawl survey survey abundance for female immature new shell.

NMFS trawl survey survey abundance for female mature new shell 150 -AG1-AG1a 100 -50 -150 -10 AG1-AG1b 100 percent difference <0 >=0 50 -150 -AG1-AG1d 100 -50 -1980 1990 2000 2010

Figure 40. Differences for NMFS trawl survey survey abundance for female mature new shell.

NMFS trawl survey survey abundance for female mature old shell 150 -AG1-AG1a 100 -50 -150 -10 15 AG1-AG1b 20 100 percent difference <0 50 ->=0 150 -AG1-AG1d 100 -50 -1980 2000 2010 1990

Figure 41. Differences for NMFS trawl survey survey abundance for female mature old shell.

NMFS trawl survey survey abundance for male immature new shell 150 -AG1-AG1a 100 -50 -150 -15 20 AG1-AG1b 25 100 percent difference 50 -<0 >=0 150 -AG1-AG1d 100 -50 -1990 1980 2000 2010

Figure 42. Differences for NMFS trawl survey survey abundance for male immature new shell.

NMFS trawl survey survey abundance for male mature new shell 150 -AG1-AG1a 100 -50 -150 -10 20 AG1-AG1b 100 percent difference <0 >=0 50 -150 -AG1-AG1d 100 -50 -2010 1980 1990 2000

Figure 43. Differences for NMFS trawl survey survey abundance for male mature new shell.

NMFS trawl survey survey abundance for male mature old shell 150 -AG1-AG1a 100 -50 -10 150 -20 30 AG1-AG1b 40 100 percent difference <0 50 ->=0 150 -AG1-AG1d 100 -50 -2010 1980 1990 2000

Figure 44. Differences for NMFS trawl survey survey abundance for male mature old shell.

NMFS trawl survey survey abundance for female immature new shell 150 -AG1-AG1a 100 -50 -150 -AG1-AG1b 100 absolute difference <0 50 ->=0 150 -AG1-AG1d 100 -50 -2010 1980 1990 2000

Figure 45. Differences for NMFS trawl survey survey abundance for female immature new shell.

NMFS trawl survey survey abundance for female mature new shell 150 -AG1-AG1a 100 -50 -0.5 1.0 150 -1.5 2.0 AG1-AG1b 2.5 100 absolute difference 50 -<0 >=0 150 -AG1-AG1d 100 -50 -2000 2010 1980 1990

Figure 46. Differences for NMFS trawl survey survey abundance for female mature new shell.

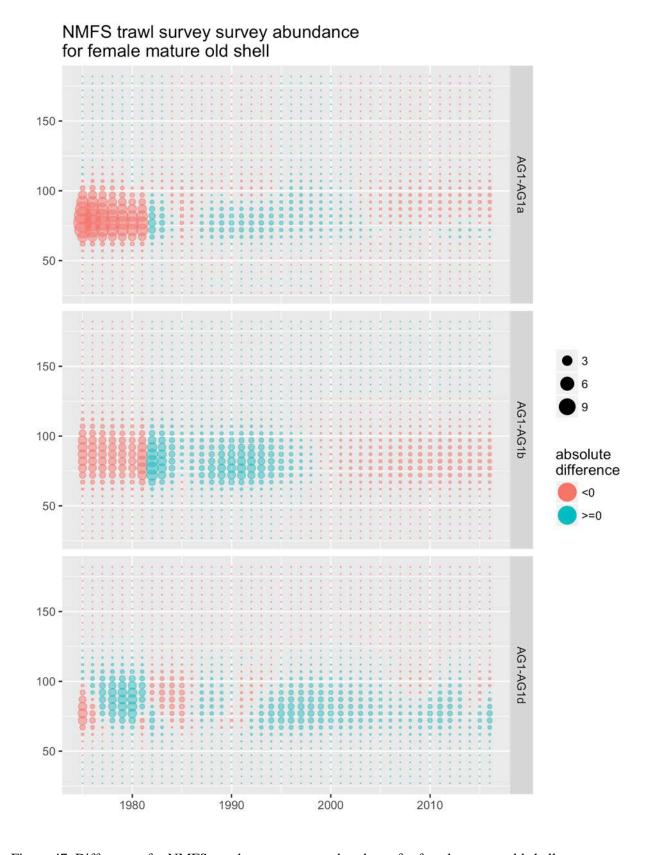


Figure 47. Differences for NMFS trawl survey survey abundance for female mature old shell.

NMFS trawl survey survey abundance for male immature new shell 150 -AG1-AG1a 100 -50 -150 -AG1-AG1b 100 absolute difference <0 >=0 50 -150 -AG1-AG1d 100 -50 -1980 1990 2000 2010

Figure 48. Differences for NMFS trawl survey survey abundance for male immature new shell.

NMFS trawl survey survey abundance for male mature new shell 150 -100 -50 -0.5 150 -1.0 1.5 AG1-AG1b 100 absolute difference <0 50 ->=0 150 -100 -50 -1990 1980 2000 2010

Figure 49. Differences for NMFS trawl survey survey abundance for male mature new shell.

NMFS trawl survey survey abundance for male mature old shell 150 -AG1-AG1a 100 -50 -150 -AG1-AG1b 100 absolute difference <0 50 ->=0 150 -AG1-AG1d 100 -50 -1980 1990 2000 2010

Figure 50. Differences for NMFS trawl survey survey abundance for male mature old shell.

Survey biomass

NMFS trawl survey: survey biomass

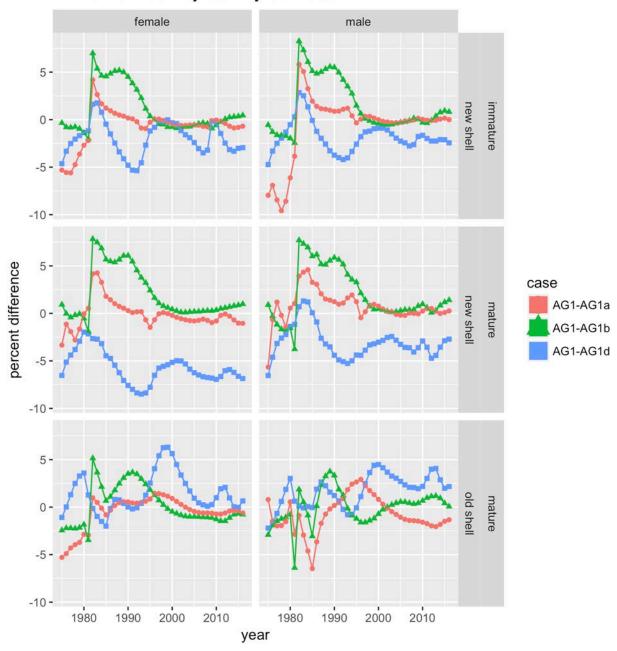


Figure 51. Differences for NMFS trawl survey: survey biomass.

NMFS trawl survey: survey biomass

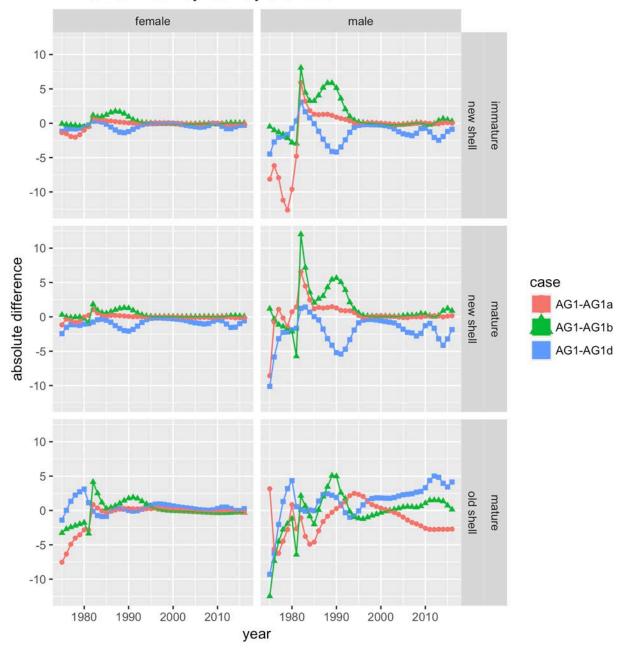


Figure 52. Differences for NMFS trawl survey: survey biomass.

Fisheries

Fishery catchability

TCF: fishery catchability

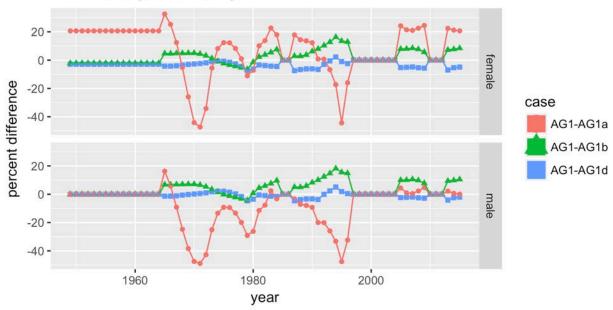


Figure 53. Differences for TCF: fishery catchability.

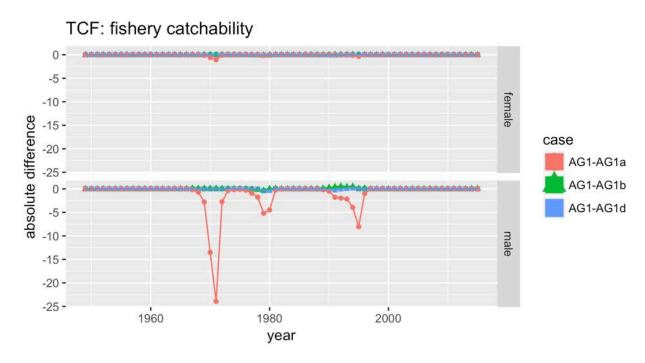


Figure 54. Differences for TCF: fishery catchability.

SCF: fishery catchability 30 -20 female 10percent difference case 0 -AG1-AG1a -10 -AG1-AG1b 30 -AG1-AG1d 20 -10 -0 --10 -1960 1980 2000

year

Figure 55. Differences for SCF: fishery catchability.

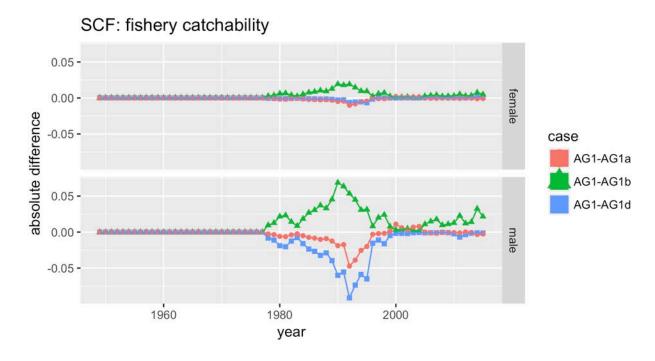


Figure 56. Differences for SCF: fishery catchability.

GTF: fishery catchability

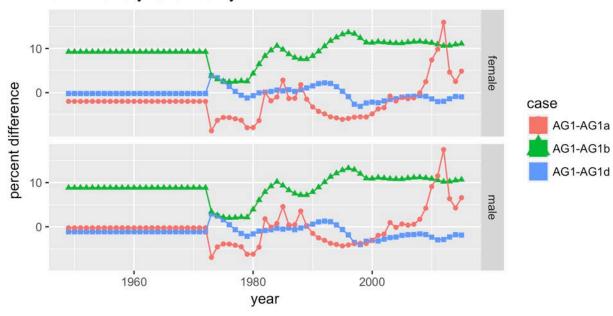


Figure 57. Differences for GTF: fishery catchability.

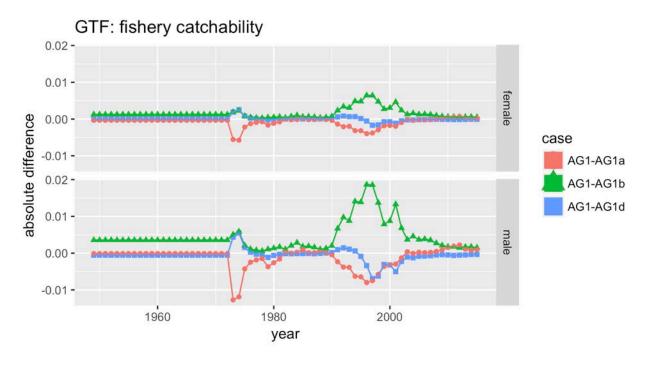


Figure 58. Differences for GTF: fishery catchability.

RKF: fishery catchability 50 -25 female percent difference 0 case AG1-AG1a -25 **-**AG1-AG1b 50 -AG1-AG1d 25 -0 --25 **-**2000 1960 1980 year

Figure 59. Differences for RKF: fishery catchability.

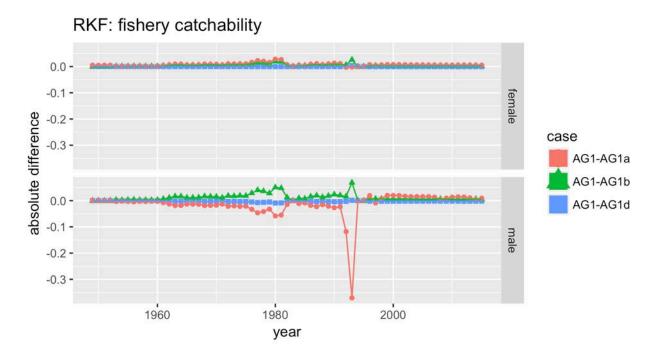


Figure 60. Differences for RKF: fishery catchability.

Total selectivity functions

TCF fishery selectivity for female all maturity all shell

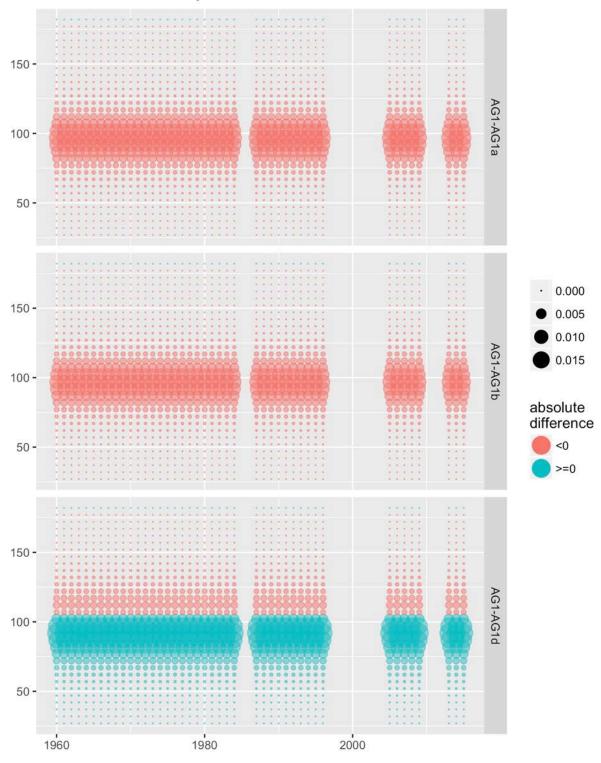


Figure 61. Differences for TCF fishery selectivity for female all maturity all shell.

TCF fishery selectivity for male all maturity all shell 150 -100 -50 -0.0 0.2 150 -0.4 0.6 AG1-AG1b 0.8 100 absolute difference 50 -<0 >=0 150 -100 -50 -1960 1980 2000

Figure 62. Differences for TCF fishery selectivity for male all maturity all shell.

TCF females: fishery selectivity 1960 1961 1962 1963 1964 0.02 -0.01 --0.01 -1965 1966 1967 1968 1969 0.02 -0.01 -0.00 -0.01 -1970 1971 1972 1973 1974 0.02 -0.01 -0.00 --0.01 -1975 1976 1977 1978 1979 0.02 -0.01 -0.00 --0.01 absolute difference 1981 1982 1984 1980 1983 case 0.02 -AG1-AG1a 0.01 -0.00 -AG1-AG1b -0.01 **-**AG1-AG1d 1988 1987 1989 1990 1991 0.02 -0.01 -0.00 -4 -0.01 -1993 1992 1994 1995 1996 0.02 -0.01 -0.00 -2006 2008 2009 2005 2007 0.02 -0.01 -0.00 --0.01 -50 100 150 50 100 150 2013 2014 2015 0.02 -0.01 -0.00 -0.01 -50 100 150 50 100 150 50 100 150 size (mm CW)

Figure 63. Differences for TCF females: fishery selectivity.

TCF males: fishery selectivity 1960 1961 1962 1963 1964 0.75 **-**0.50 **-**0.25 **-**0.00 -1965 1966 1967 1968 1969 0.75 **-** 0.50 **-**0.25 -0.00 -4 1970 1974 1971 1972 1973 0.75 -0.50 -0.25 **-** 0.00 **-**1975 1976 1977 1978 1979 0.75 **-**0.50 **-**0.25 **-**0.00 absolute difference 1980 1981 1982 1983 1984 case 0.75 **-** 0.50 **-** 0.25 **-** 0.00 **-**AG1-AG1a AG1-AG1b AG1-AG1d 1987 1988 1989 1990 1991 0.75 -0.50 -0.25 -0.00 -1992 1993 1994 1995 1996 0.75 -0.50 -0.25 -0.00 -2005 2006 2007 2008 2009 0.75 -0.50 -0.25 -0.00 -50 100 150 50 100 150 2013 2014 2015 0.75 -0.50 **-** 0.25 **-**0.00 -4 50 100 150 50 100 150 50 100 150 size (mm CW)

Figure 64. Differences for TCF males: fishery selectivity.

SCF fishery selectivity for female all maturity all shell

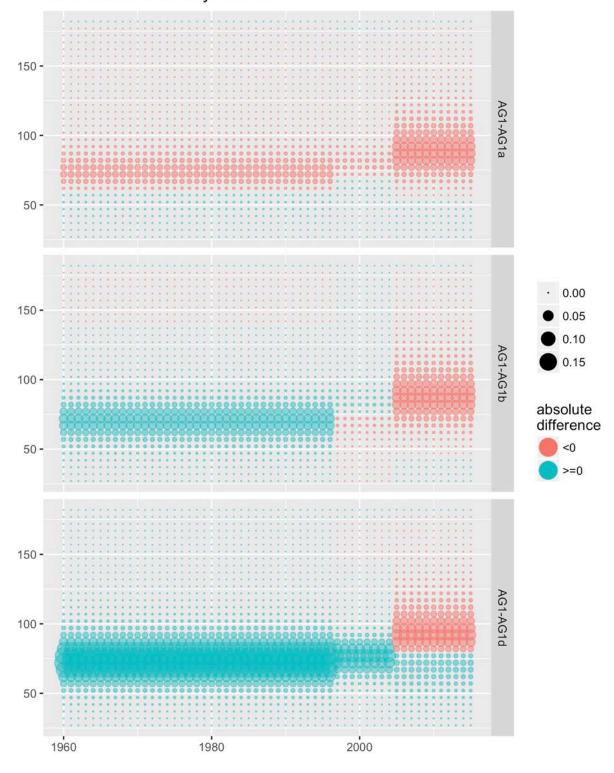


Figure 65. Differences for SCF fishery selectivity for female all maturity all shell.

SCF fishery selectivity for male all maturity all shell 150 **-**AG1-AG1a 100 -50 -0.1 0.2 150 -0.3 0.4 AG1-AG1b 0.5 100 absolute difference 50 -<0 >=0 150 -100 -50 -

2000

Figure 66. Differences for SCF fishery selectivity for male all maturity all shell.

1980

1960

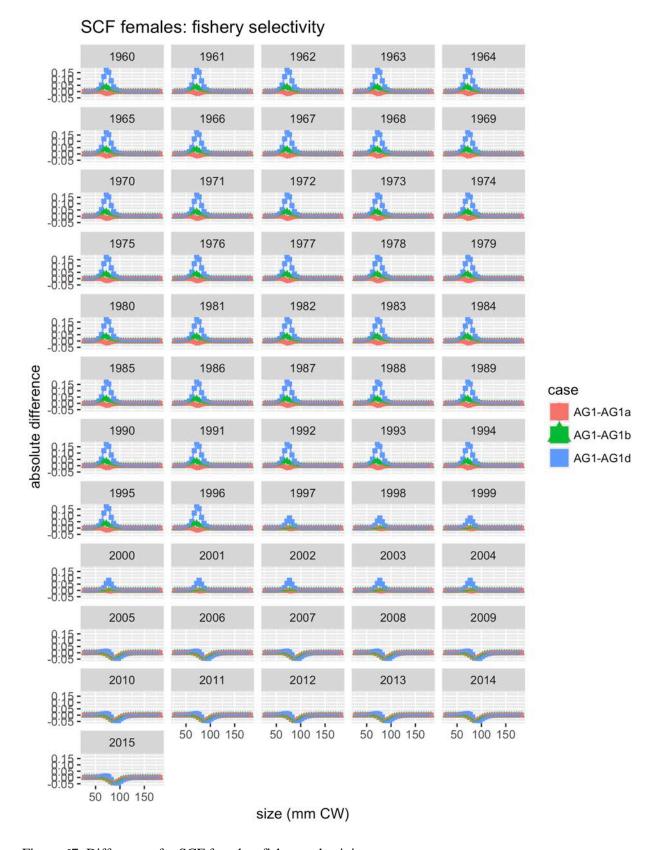


Figure 67. Differences for SCF females: fishery selectivity.

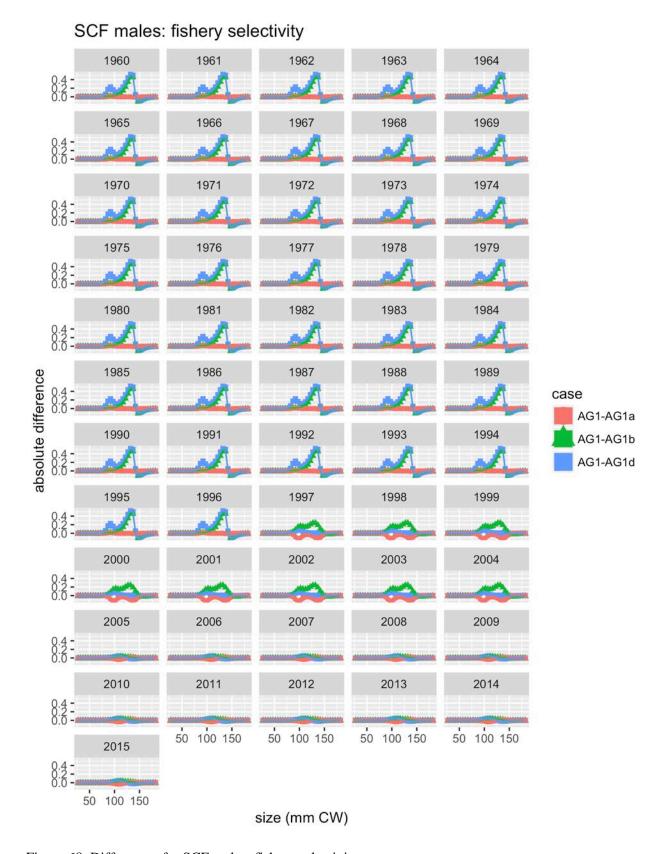


Figure 68. Differences for SCF males: fishery selectivity.

GTF fishery selectivity for female all maturity all shell

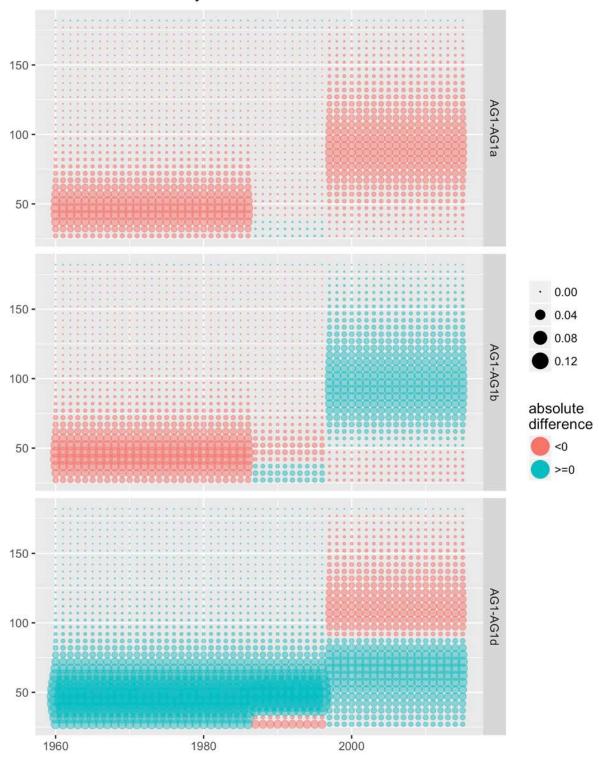


Figure 69. Differences for GTF fishery selectivity for female all maturity all shell.

GTF fishery selectivity for male all maturity all shell

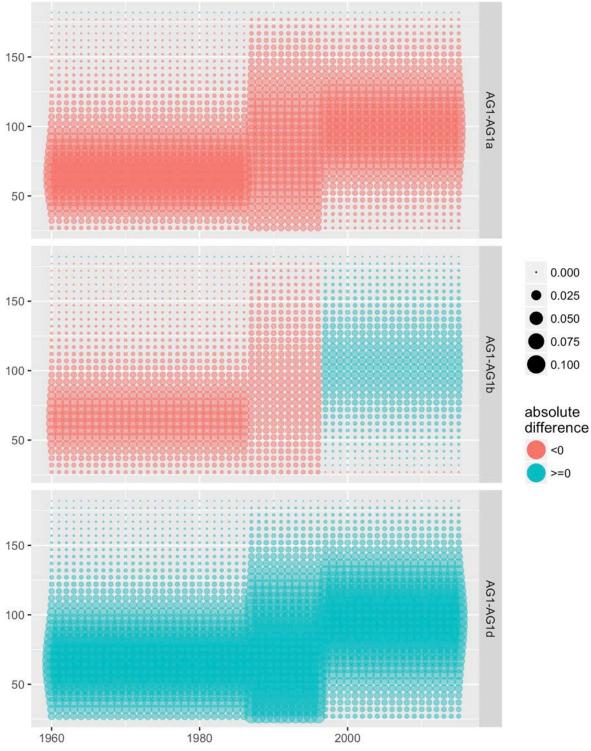


Figure 70. Differences for GTF fishery selectivity for male all maturity all shell.

GTF females: fishery selectivity absolute difference case AG1-AG1a AG1-AG1b AG1-AG1d 50 100 150 50 100 150 50 100 150 50 100 150 50 100 150 size (mm CW)

Figure 71. Differences for GTF females: fishery selectivity.

GTF males: fishery selectivity absolute difference case AG1-AG1a AG1-AG1b AG1-AG1d 50 100 150 50 100 150 50 100 150 50 100 150 50 100 150 size (mm CW)

Figure 72. Differences for GTF males: fishery selectivity.

RKF fishery selectivity for female all maturity all shell 150 **-**AG1-AG1a 100 -50 -0.0 150 -0.1 0.2 AG1-AG1b 100 absolute difference <0 50 ->=0 150 -100 -50 -

2000

Figure 73. Differences for RKF fishery selectivity for female all maturity all shell.

1980

1960

RKF fishery selectivity for male all maturity all shell 150 -AG1-AG1a 100 -50 -0.0 150 -0.1 0.2 AG1-AG1b 0.3 100 absolute difference 50 -<0 >=0 150 -AG1-AG1d 100 -50 -1960 1980 2000

Figure 74. Differences for RKF fishery selectivity for male all maturity all shell.

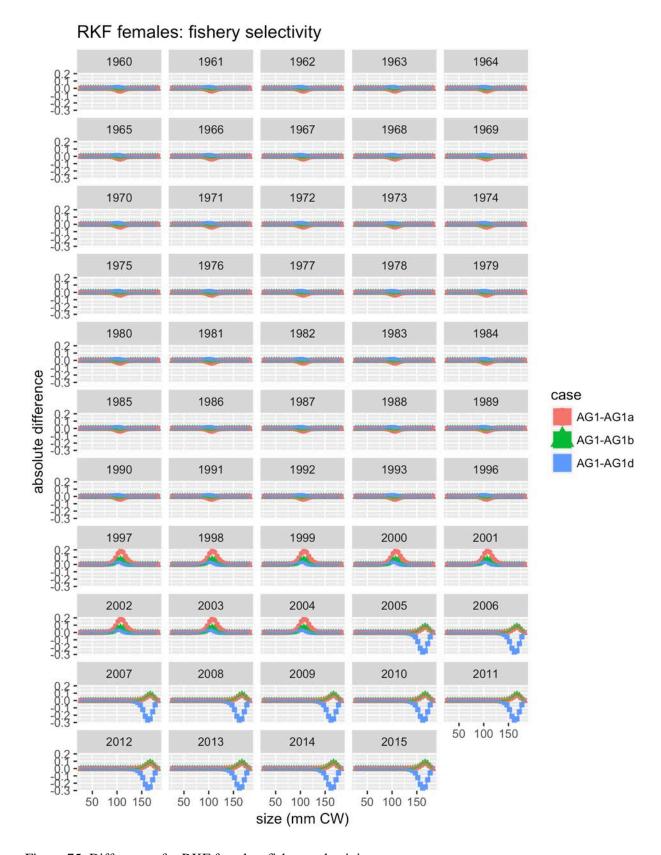


Figure 75. Differences for RKF females: fishery selectivity.

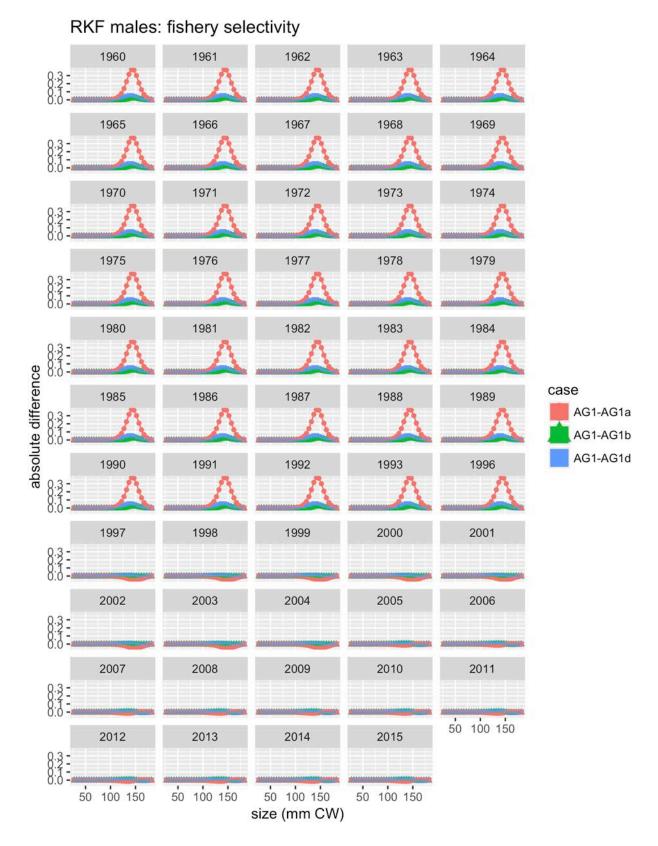


Figure 76. Differences for RKF males: fishery selectivity.

Retention functions

TCF fishery retention for male all maturity all shell

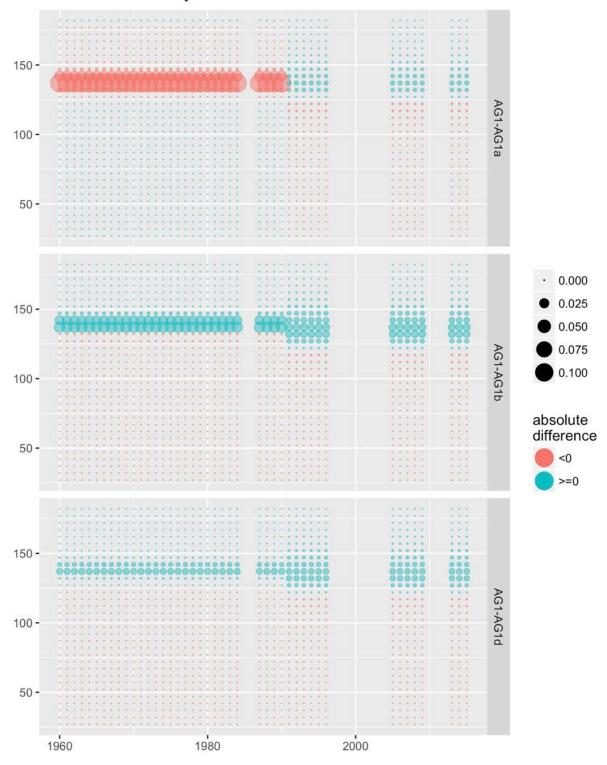


Figure 77. Differences for TCF fishery retention for male all maturity all shell.

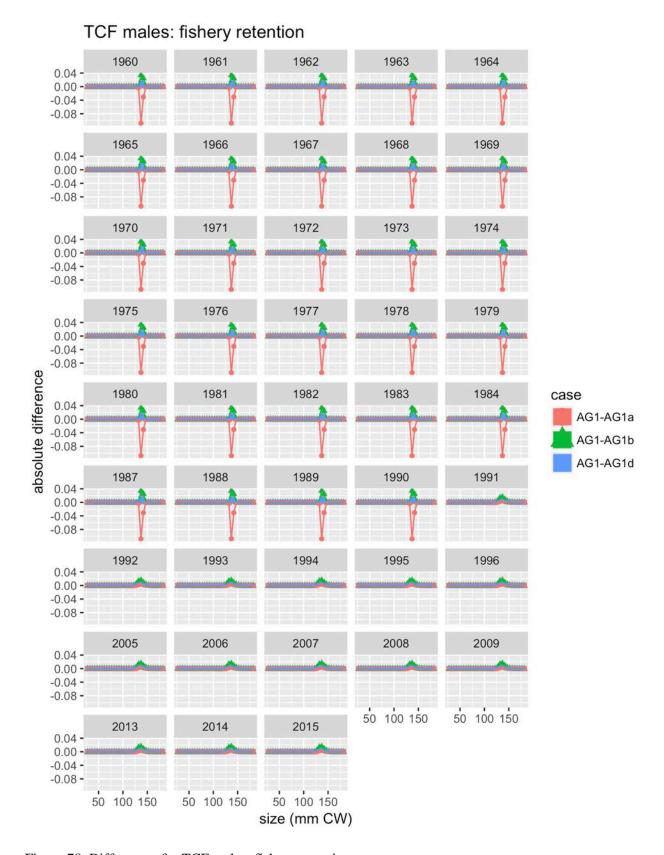


Figure 78. Differences for TCF males: fishery retention.

Total catch abundance

TCF: fishery catch abundance

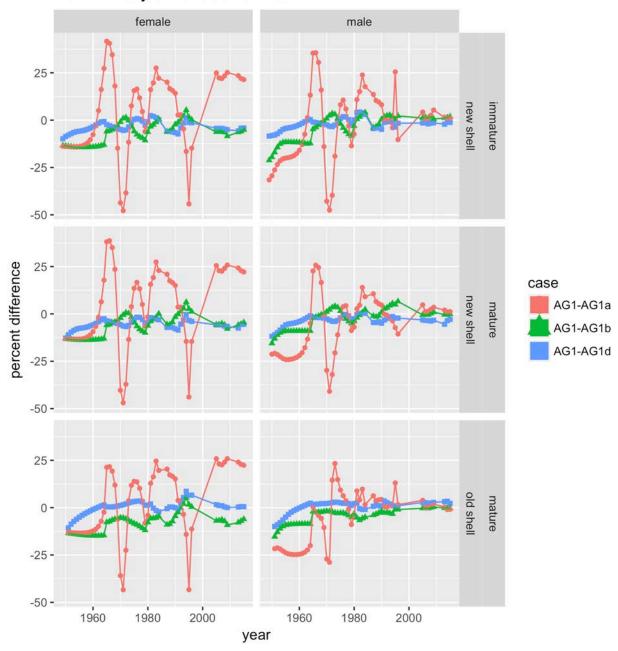


Figure 79. Differences for TCF: fishery catch abundance.

TCF: fishery catch abundance

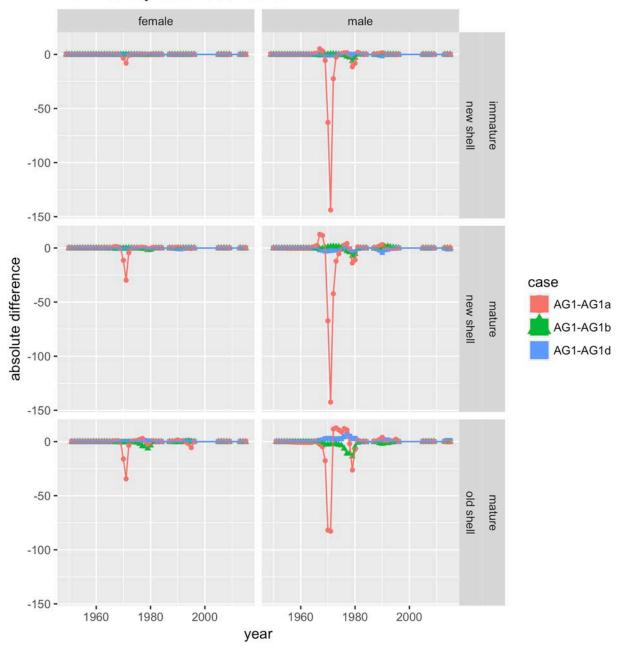


Figure 80. Differences for TCF: fishery catch abundance.

SCF: fishery catch abundance

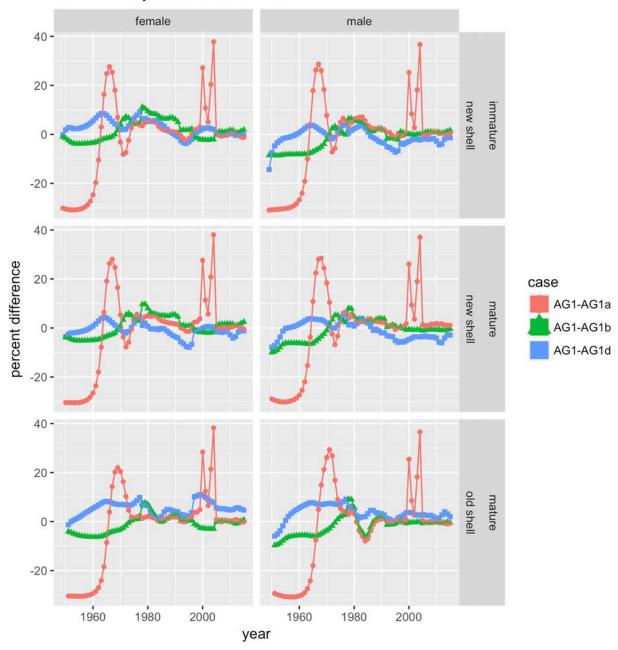


Figure 81. Differences for SCF: fishery catch abundance.

SCF: fishery catch abundance

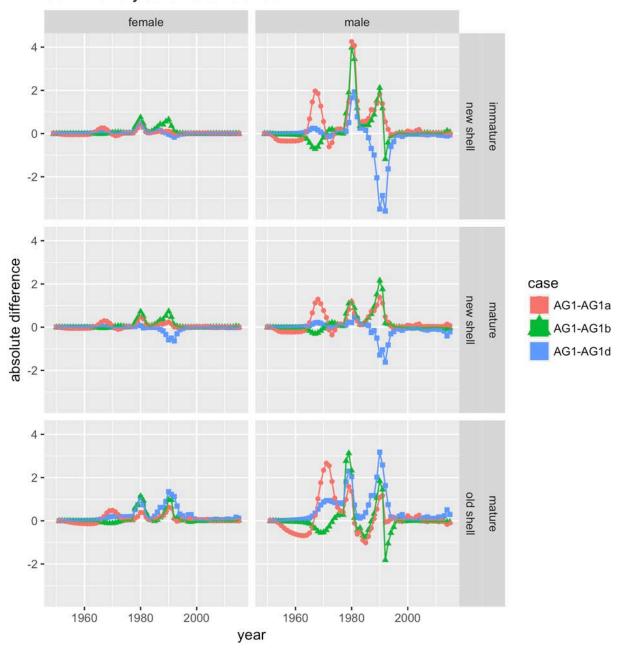


Figure 82. Differences for SCF: fishery catch abundance.

GTF: fishery catch abundance

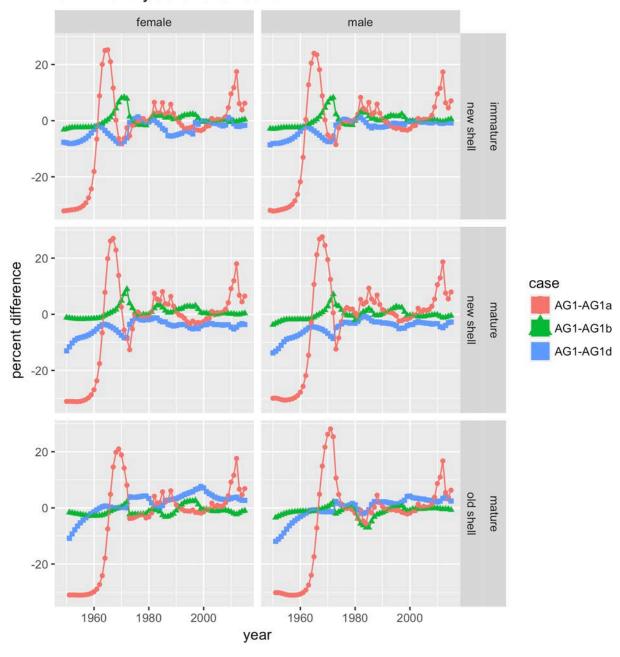


Figure 83. Differences for GTF: fishery catch abundance.

GTF: fishery catch abundance

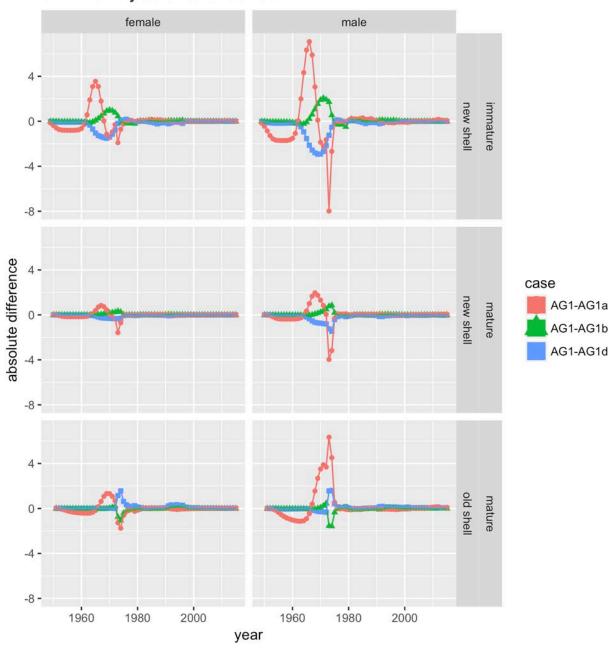


Figure 84. Differences for GTF: fishery catch abundance.

RKF: fishery catch abundance

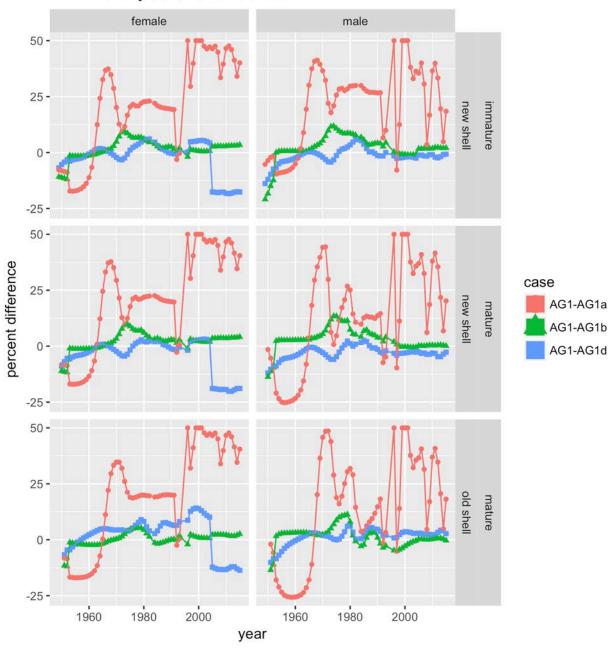


Figure 85. Differences for RKF: fishery catch abundance.

RKF: fishery catch abundance

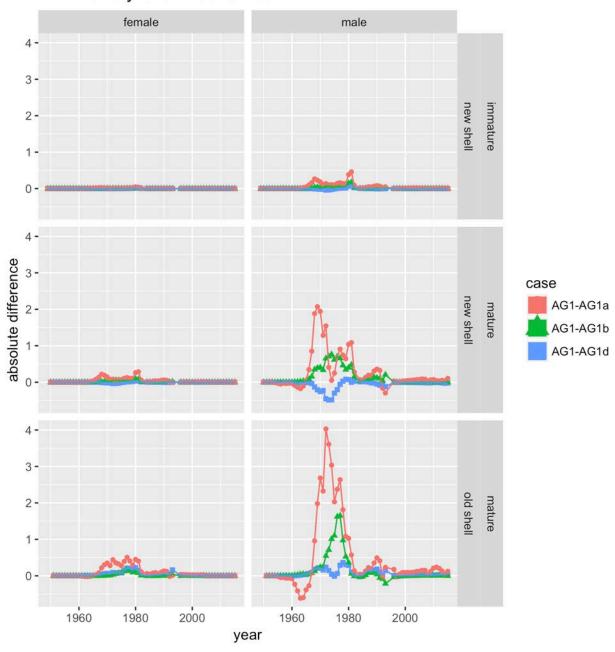


Figure 86. Differences for RKF: fishery catch abundance.

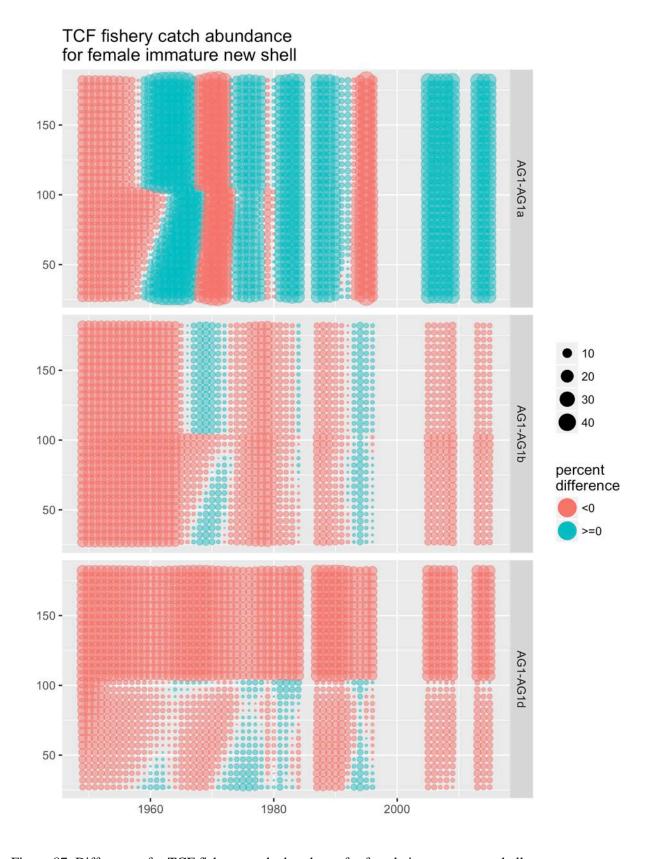


Figure 87. Differences for TCF fishery catch abundance for female immature new shell.

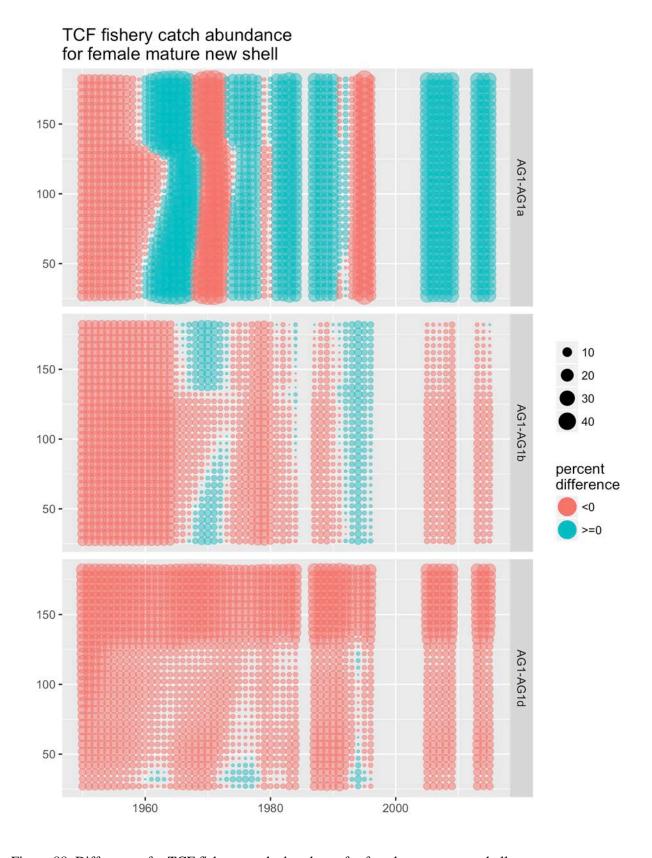


Figure 88. Differences for TCF fishery catch abundance for female mature new shell.

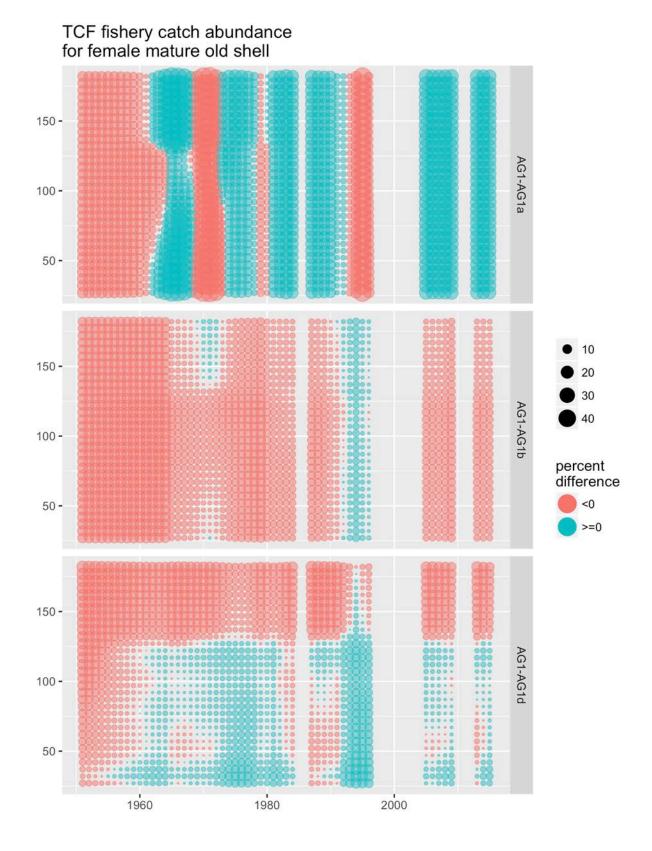


Figure 89. Differences for TCF fishery catch abundance for female mature old shell.

TCF fishery catch abundance for male immature new shell 150 -100 -50 -10 150 -20 30 40 100 percent difference <0 50 ->=0 150 -100 -50 -1960 1980 2000

Figure 90. Differences for TCF fishery catch abundance for male immature new shell.

TCF fishery catch abundance for male mature new shell 150 -100 -50 -10 150 -20 30 40 100 percent difference <0 50 ->=0 150 -100 -50 -1960 1980 2000

Figure 91. Differences for TCF fishery catch abundance for male mature new shell.

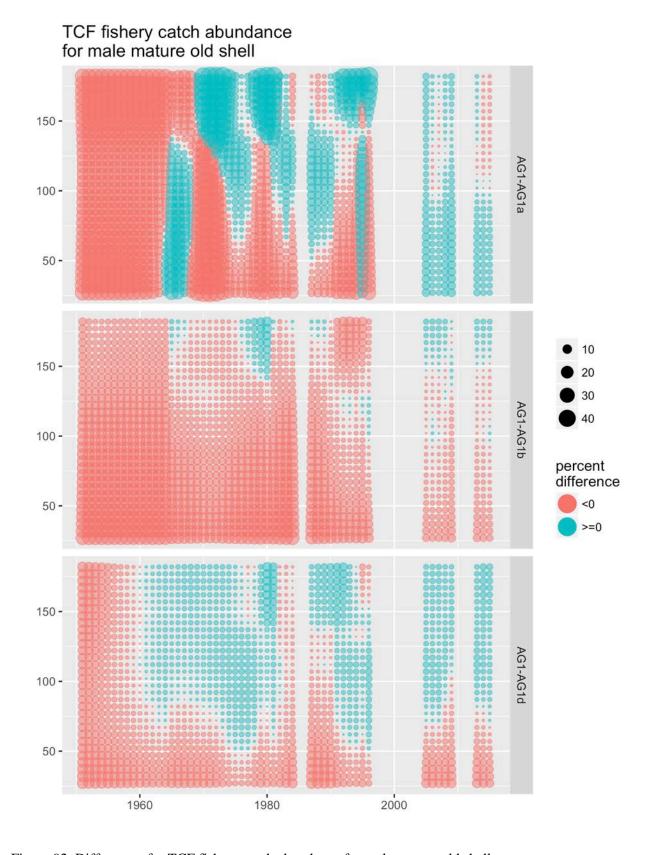


Figure 92. Differences for TCF fishery catch abundance for male mature old shell.

TCF fishery catch abundance for female immature new shell 150 -100 -50 -0.5 150 -1.0 1.5 AG1-AG1b 100 absolute difference <0 50 ->=0 150 -100 -50 -1960 1980 2000

Figure 93. Differences for TCF fishery catch abundance for female immature new shell.

TCF fishery catch abundance for female mature new shell 150 -100 -50 -150 -AG1-AG1b 100 absolute difference <0 50 ->=0 150 -100 -50 -1960 1980 2000

Figure 94. Differences for TCF fishery catch abundance for female mature new shell.

TCF fishery catch abundance for female mature old shell 150 -100 -50 -150 -100 absolute difference <0 50 ->=0 150 -100 -50 -1960 1980 2000

Figure 95. Differences for TCF fishery catch abundance for female mature old shell.

TCF fishery catch abundance for male immature new shell 150 -100 -50 -150 -10 15 AG1-AG1b 100 absolute difference <0 50 ->=0 150 -100 -50 -1960 2000 1980

Figure 96. Differences for TCF fishery catch abundance for male immature new shell.

TCF fishery catch abundance for male mature new shell 150 -100 -50 -150 -10 15 20 100 absolute difference 50 -<0 >=0 150 -100 -50 -1960 1980 2000

Figure 97. Differences for TCF fishery catch abundance for male mature new shell.

TCF fishery catch abundance for male mature old shell 150 -100 -50 -150 -10 15 AG1-AG1b 100 absolute difference <0 50 ->=0 150 -100 -50 -1960 1980 2000

Figure 98. Differences for TCF fishery catch abundance for male mature old shell.

SCF fishery catch abundance for female immature new shell 150 -AG1-AG1a 100 -50 -150 -20 AG1-AG1b 30 100 percent difference <0 50 ->=0 150 -AG1-AG1d 100 -50 -1960 1980 2000

Figure 99. Differences for SCF fishery catch abundance for female immature new shell.

SCF fishery catch abundance for female mature new shell 150 -100 -50 -150 -20 AG1-AG1b 30 100 percent difference <0 50 ->=0 150 -AG1-AG1d 100 -50 -1960 1980 2000

Figure 100. Differences for SCF fishery catch abundance for female mature new shell.

SCF fishery catch abundance for female mature old shell 150 -AG1-AG1a 100 -50 -150 -20 AG1-AG1b 30 100 percent difference <0 50 ->=0 150 -AG1-AG1d 100 -50 -2000 1960 1980

Figure 101. Differences for SCF fishery catch abundance for female mature old shell.

SCF fishery catch abundance for male immature new shell 150 -AG1-AG1a 100 -50 -10 150 -20 30 AG1-AG1b 40 100 percent difference <0 50 ->=0 150 -AG1-AG1d 100 -50 -1960 2000 1980

Figure 102. Differences for SCF fishery catch abundance for male immature new shell.

SCF fishery catch abundance for male mature new shell 150 -AG1-AG1a 100 -50 -10 150 -20 30 AG1-AG1b 40 100 percent difference <0 50 ->=0 150 -AG1-AG1d 100 -50 -2000 1960 1980

Figure 103. Differences for SCF fishery catch abundance for male mature new shell.

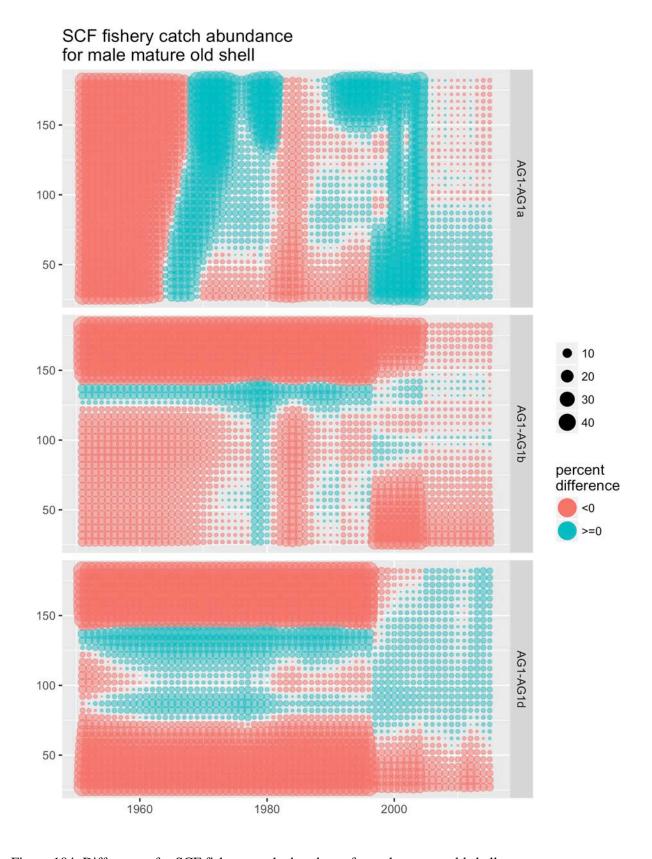


Figure 104. Differences for SCF fishery catch abundance for male mature old shell.

SCF fishery catch abundance for female immature new shell 150 -100 -50 -0.05 150 -0.10 0.15 AG1-AG1b 100 absolute difference <0 50 ->=0 150 -100 -50 -1960 1980 2000

Figure 105. Differences for SCF fishery catch abundance for female immature new shell.

SCF fishery catch abundance for female mature new shell 150 -100 -50 -0.04 150 -0.08 0.12 AG1-AG1b 100 absolute difference <0 50 ->=0 150 -100 -50 -1960 1980 2000

Figure 106. Differences for SCF fishery catch abundance for female mature new shell.

SCF fishery catch abundance for female mature old shell 150 -100 -50 -150 -0.2 0.3 AG1-AG1b 100 absolute difference <0 50 ->=0 150 -100 -50 -2000 1960 1980

Figure 107. Differences for SCF fishery catch abundance for female mature old shell.

SCF fishery catch abundance for male immature new shell 150 -100 -50 -0.25 150 -0.50 0.75 AG1-AG1b 100 absolute difference <0 50 ->=0 150 -100 -50 -1960 1980 2000

Figure 108. Differences for SCF fishery catch abundance for male immature new shell.

SCF fishery catch abundance for male mature new shell 150 -100 -50 -0.2 150 -0.4 0.6 AG1-AG1b 100 absolute difference <0 50 ->=0 150 -100 -50 -1960 1980 2000

Figure 109. Differences for SCF fishery catch abundance for male mature new shell.

SCF fishery catch abundance for male mature old shell 150 -100 -50 -0.3 150 -0.6 0.9 AG1-AG1b 100 absolute difference <0 50 ->=0 150 -100 -50 -1960 1980 2000

Figure 110. Differences for SCF fishery catch abundance for male mature old shell.

GTF fishery catch abundance for female immature new shell 150 -AG1-AG1a 100 -50 -150 -20 AG1-AG1b 30 100 percent difference <0 50 ->=0 150 -AG1-AG1d 100 -50 -1960 2000 1980

Figure 111. Differences for GTF fishery catch abundance for female immature new shell.

GTF fishery catch abundance for female mature new shell 150 -100 -50 -150 -20 AG1-AG1b 30 100 percent difference <0 50 ->=0 150 -AG1-AG1d 100 -50 -1960 1980 2000

Figure 112. Differences for GTF fishery catch abundance for female mature new shell.

GTF fishery catch abundance for female mature old shell 150 -AG1-AG1a 100 -50 -150 -20 AG1-AG1b 30 100 percent difference <0 50 ->=0 150 -AG1-AG1d 100 -50 -1960 1980 2000

Figure 113. Differences for GTF fishery catch abundance for female mature old shell.

GTF fishery catch abundance for male immature new shell 150 -AG1-AG1a 100 -50 -10 150 -20 30 AG1-AG1b 40 100 percent difference <0 50 ->=0 150 -100 -50 -1960 2000 1980

Figure 114. Differences for GTF fishery catch abundance for male immature new shell.

GTF fishery catch abundance for male mature new shell 150 -AG1-AG1a 100 -50 -10 150 -20 30 AG1-AG1b 40 100 percent difference <0 50 ->=0 150 -AG1-AG1d 100 -50 -1960 2000 1980

Figure 115. Differences for GTF fishery catch abundance for male mature new shell.

GTF fishery catch abundance for male mature old shell 150 -AG1-AG1a 100 -50 -10 150 -20 30 AG1-AG1b 40 100 percent difference <0 50 ->=0 150 -AG1-AG1d 100 -50 -1960 1980 2000

Figure 116. Differences for GTF fishery catch abundance for male mature old shell.

GTF fishery catch abundance for female immature new shell 150 -100 -50 -0.1 0.2 150 -0.3 0.4 0.5 100 absolute difference 50 -<0 >=0 150 -100 -50 -1960 1980 2000

Figure 117. Differences for GTF fishery catch abundance for female immature new shell.

GTF fishery catch abundance for female mature new shell 150 -100 -50 -150 -0.1 AG1-AG1b 100 absolute difference <0 >=0 50 -150 -100 -50 -1960 1980 2000

Figure 118. Differences for GTF fishery catch abundance for female mature new shell.

GTF fishery catch abundance for female mature old shell 150 -100 -50 -0.1 150 -0.2 0.3 AG1-AG1b 0.4 100 absolute difference <0 50 ->=0 150 -100 -50 -2000 1960 1980

Figure 119. Differences for GTF fishery catch abundance for female mature old shell.

GTF fishery catch abundance for male immature new shell 150 -100 -50 -0.2 150 -0.4 0.6 AG1-AG1b 100 absolute difference <0 50 ->=0 150 -100 -50 -1960 1980 2000

Figure 120. Differences for GTF fishery catch abundance for male immature new shell.

GTF fishery catch abundance for male mature new shell 150 -100 -50 -0.1 150 -0.2 0.3 AG1-AG1b 0.4 100 absolute difference <0 50 ->=0 150 -100 -50 -1960 1980 2000

Figure 121. Differences for GTF fishery catch abundance for male mature new shell.

GTF fishery catch abundance for male mature old shell 150 -100 -50 -0.25 150 -0.50 0.75 AG1-AG1b 100 absolute difference <0 50 ->=0 150 -100 -50 -1960 1980 2000

Figure 122. Differences for GTF fishery catch abundance for male mature old shell.

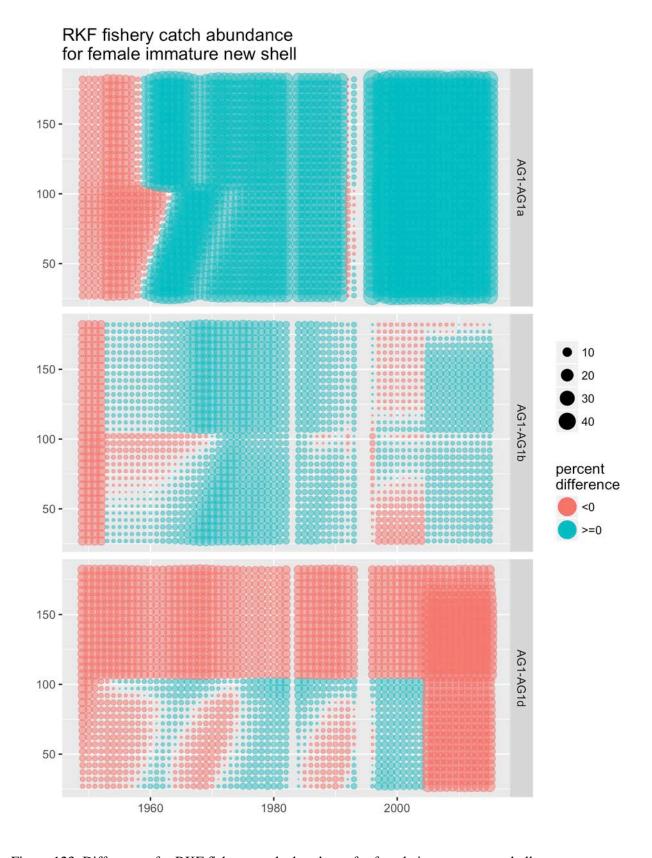


Figure 123. Differences for RKF fishery catch abundance for female immature new shell.

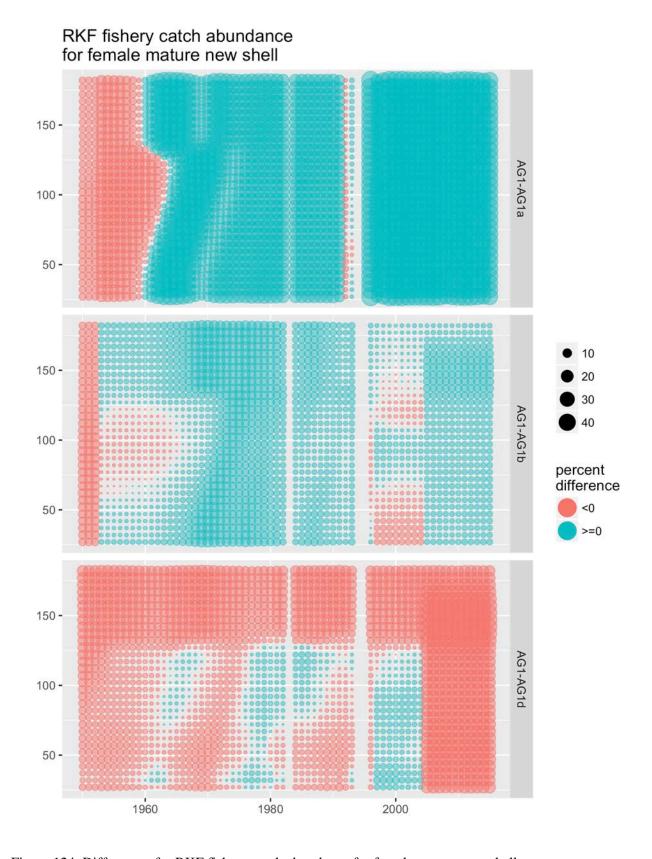


Figure 124. Differences for RKF fishery catch abundance for female mature new shell.

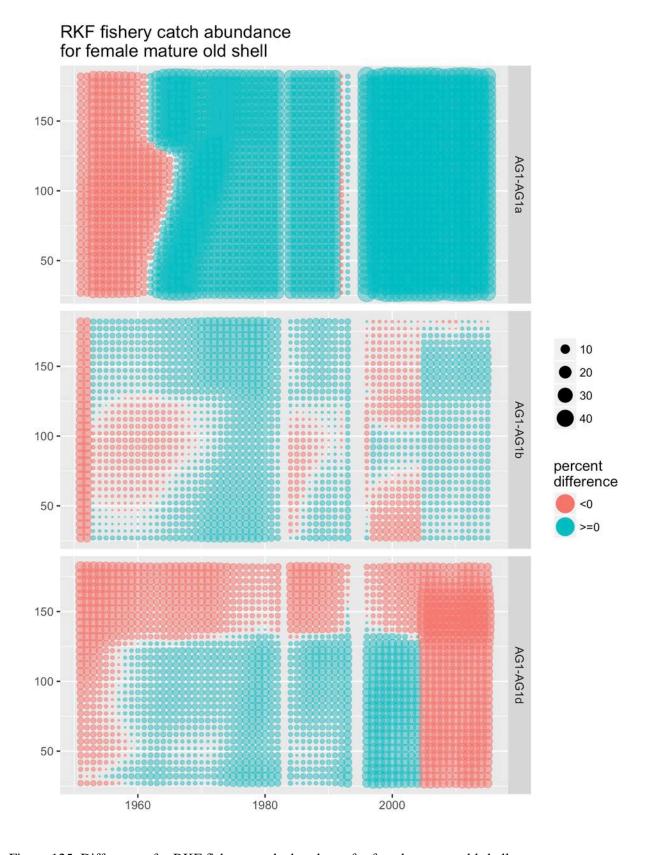


Figure 125. Differences for RKF fishery catch abundance for female mature old shell.

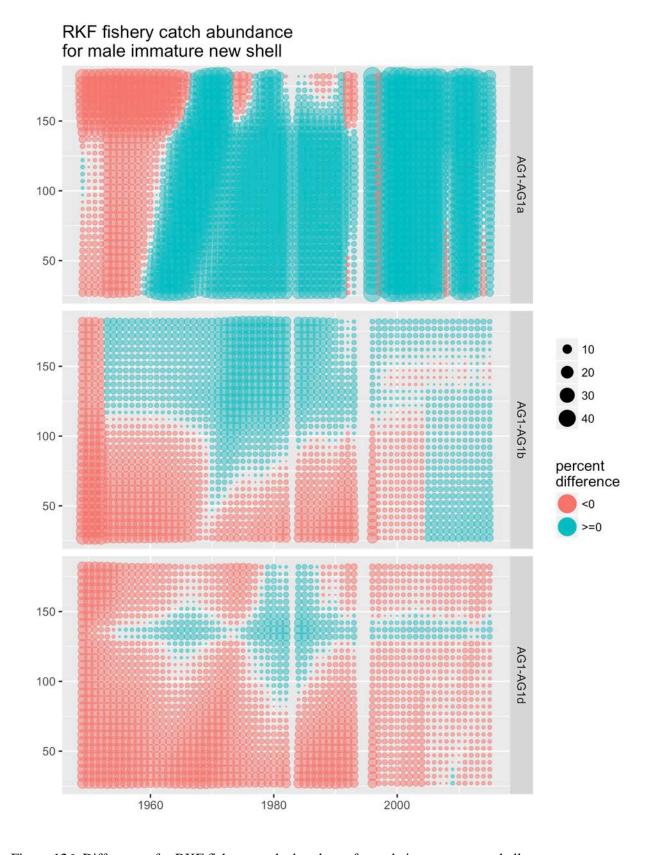


Figure 126. Differences for RKF fishery catch abundance for male immature new shell.

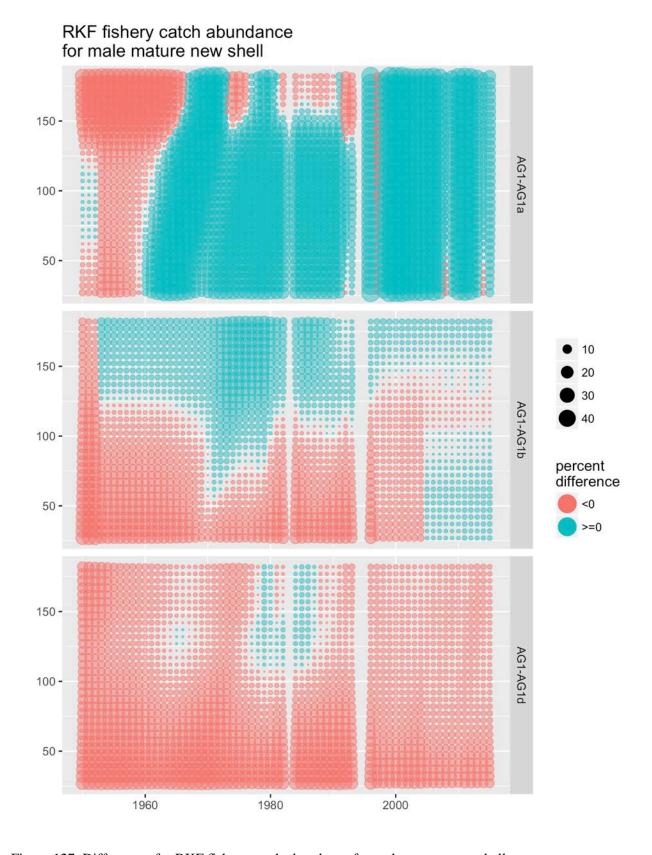


Figure 127. Differences for RKF fishery catch abundance for male mature new shell.

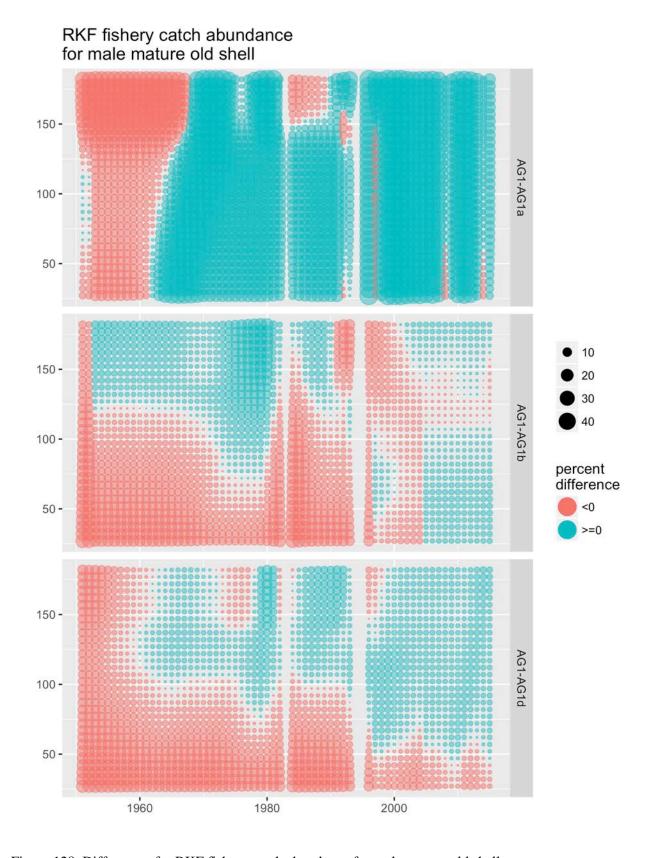


Figure 128. Differences for RKF fishery catch abundance for male mature old shell.

RKF fishery catch abundance for female immature new shell 150 -100 -50 -0.003 150 -0.006 0.009 AG1-AG1b 100 absolute difference <0 50 ->=0 150 -100 -50 -1960 1980 2000

Figure 129. Differences for RKF fishery catch abundance for female immature new shell.

RKF fishery catch abundance for female mature new shell 150 -100 -50 -0.02 150 -0.04 0.06 AG1-AG1b 100 absolute difference <0 50 ->=0 150 -100 -50 -1960 1980 2000

Figure 130. Differences for RKF fishery catch abundance for female mature new shell.

RKF fishery catch abundance for female mature old shell 150 -100 -50 -0.025 150 -0.050 0.075 AG1-AG1b 0.100 100 absolute difference <0 50 ->=0 150 -100 -50 -2000 1960 1980

Figure 131. Differences for RKF fishery catch abundance for female mature old shell.

RKF fishery catch abundance for male immature new shell 150 -AG1-AG1a 100 -50 -0.025 150 -0.050 0.075 AG1-AG1b 100 absolute difference <0 50 ->=0 150 -100 -50 -1960 1980 2000

Figure 132. Differences for RKF fishery catch abundance for male immature new shell.

RKF fishery catch abundance for male mature new shell 150 -AG1-AG1a 100 -50 -150 -0.2 0.3 AG1-AG1b 100 absolute difference <0 50 ->=0 150 -100 -50 -1960 2000 1980

Figure 133. Differences for RKF fishery catch abundance for male mature new shell.

RKF fishery catch abundance for male mature old shell 150 -AG1-AG1a 100 -50 -0.2 150 -0.4 0.6 AG1-AG1b 100 absolute difference <0 50 ->=0 150 -100 -50 -2000 1960 1980

Figure 134. Differences for RKF fishery catch abundance for male mature old shell.

Total catch biomass

TCF: fishery total biomass

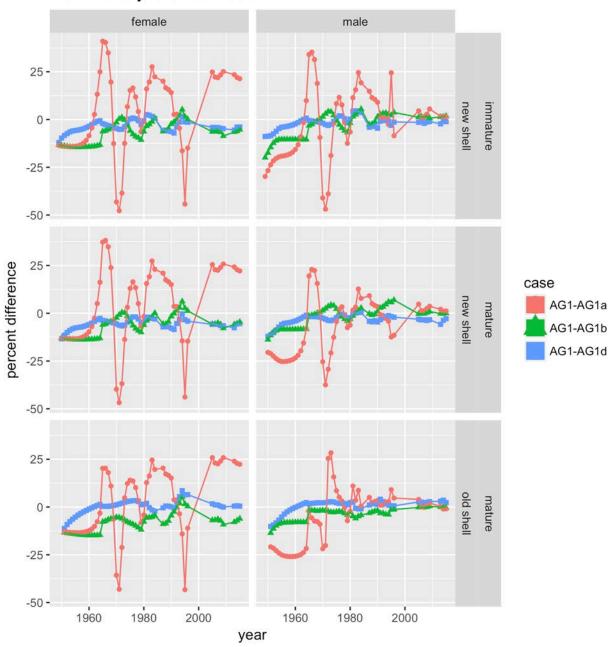


Figure 135. Differences for TCF: fishery total biomass.

TCF: fishery total biomass

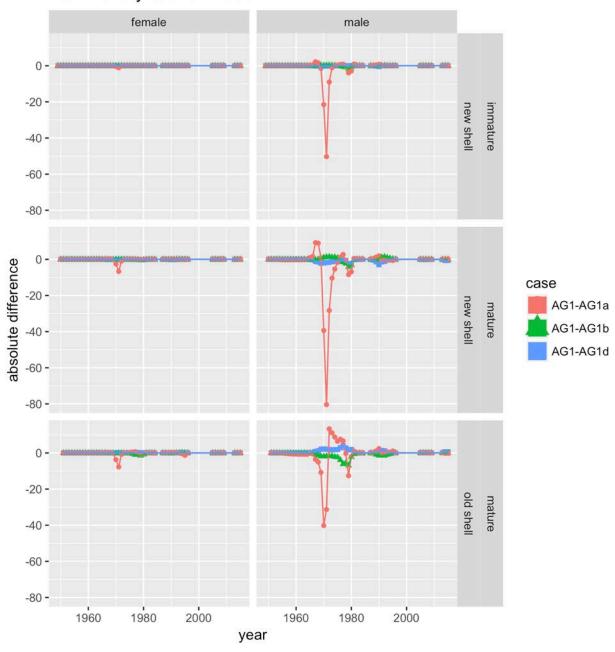


Figure 136. Differences for TCF: fishery total biomass.

SCF: fishery total biomass female male 40 -20 new shell immature 0 -20 -40 percent difference 20 case new shell mature AG1-AG1a AG1-AG1b AG1-AG1d -20 40 -20 old shell mature 0 --20 **-**

1960

year

1980

2000

Figure 137. Differences for SCF: fishery total biomass.

2000

1980

1960

SCF: fishery total biomass

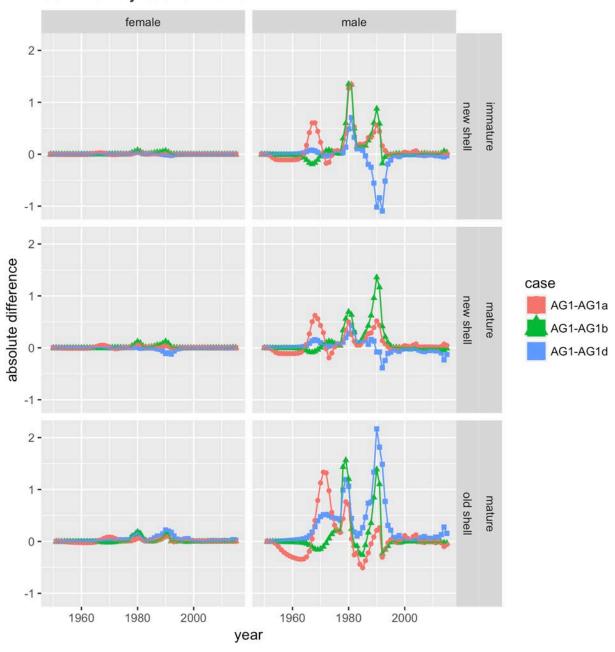


Figure 138. Differences for SCF: fishery total biomass.

GTF: fishery total biomass

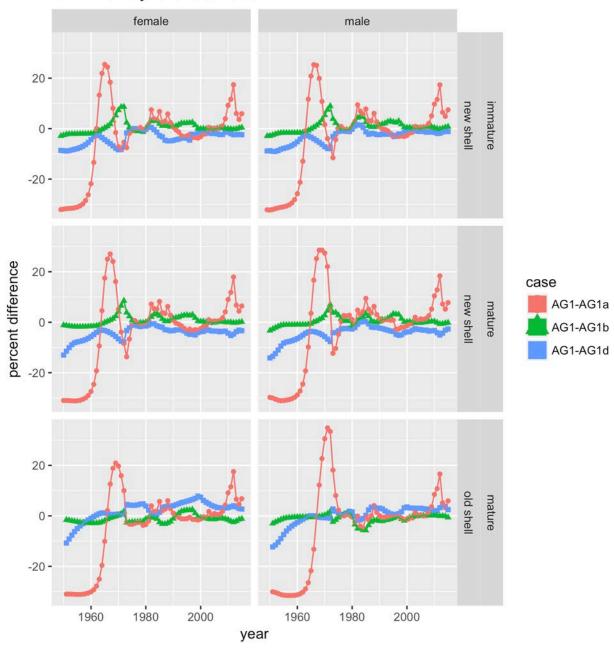


Figure 139. Differences for GTF: fishery total biomass.

GTF: fishery total biomass

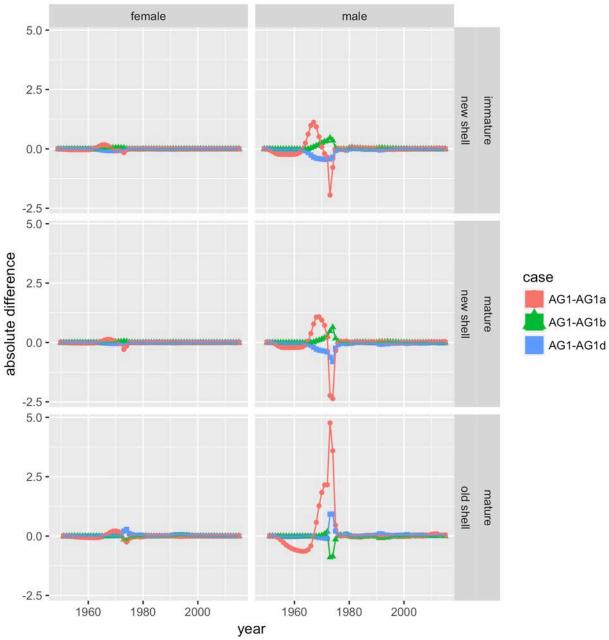


Figure 140. Differences for GTF: fishery total biomass.

RKF: fishery total biomass female male 50 -25 -0 -25 -50 percent difference case 25 new shell mature AG1-AG1a AG1-AG1b AG1-AG1d -25 -50 -25 old shell 0 -

1960

year

1980

2000

Figure 141. Differences for RKF: fishery total biomass.

2000

1980

-25 **-**

1960

RKF: fishery total biomass

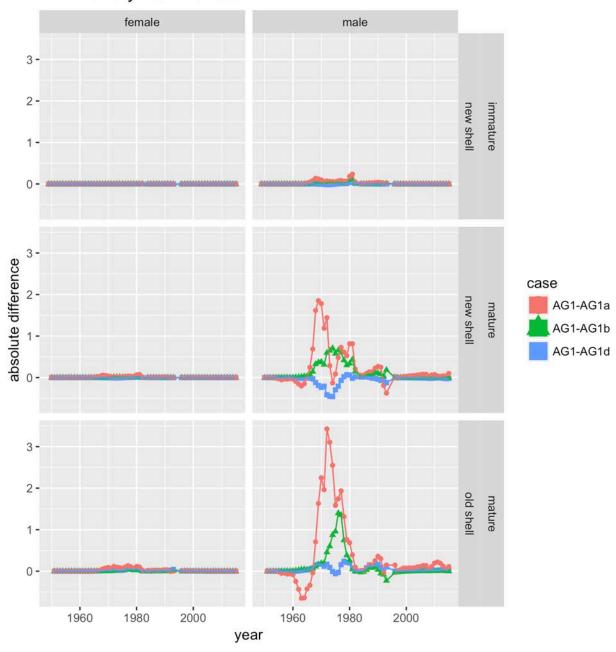


Figure 142. Differences for RKF: fishery total biomass.

Retained catch abundance

TCF: retained catch abundance

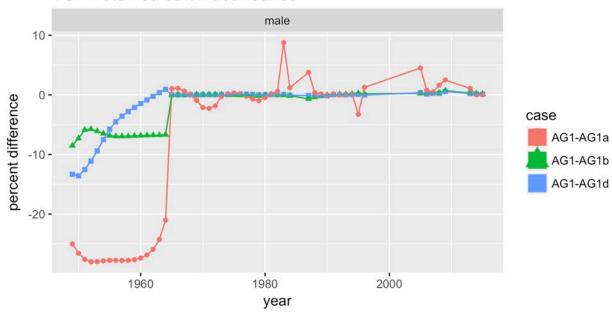
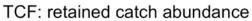


Figure 143. Differences for TCF: retained catch abundance.



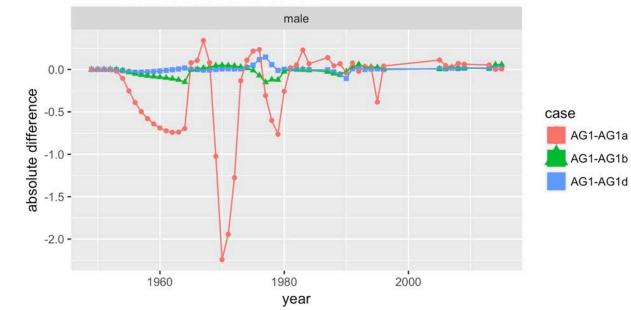


Figure 144. Differences for TCF: retained catch abundance.

TCF retained catch abundance for male all maturity all shell

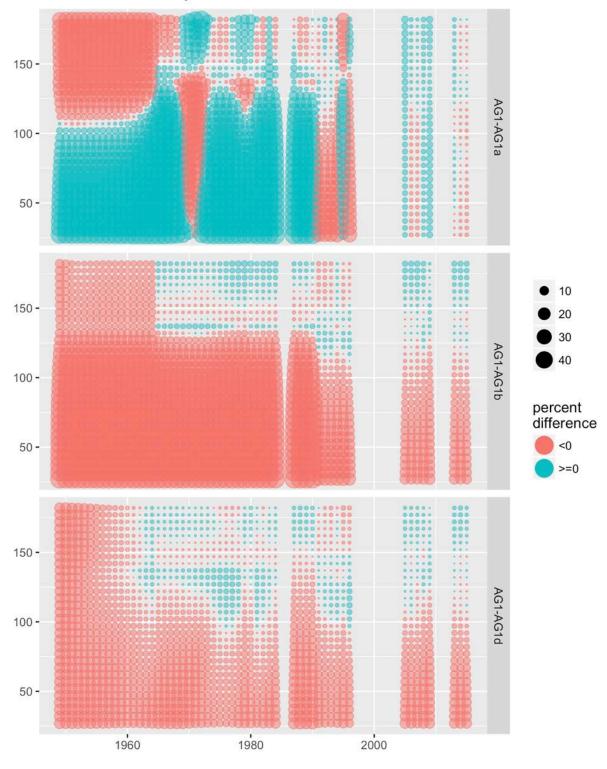


Figure 145. Differences for TCF retained catch abundance for male all maturity all shell.

TCF retained catch abundance for male all maturity all shell 150 -100 -50 -150 -100 absolute difference 50 -<0 >=0 150 -100 -50 -1960 1980 2000

Figure 146. Differences for TCF retained catch abundance for male all maturity all shell.

Retained catch biomass

TCF: retained catch biomass

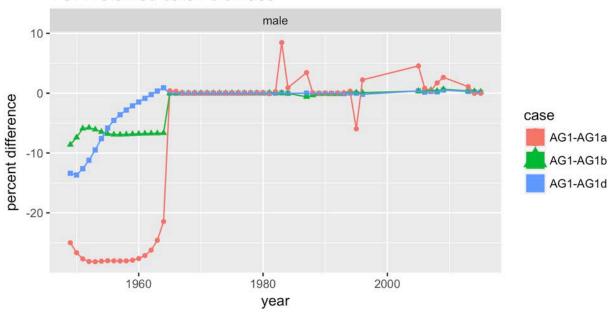


Figure 147. Differences for TCF: retained catch biomass.

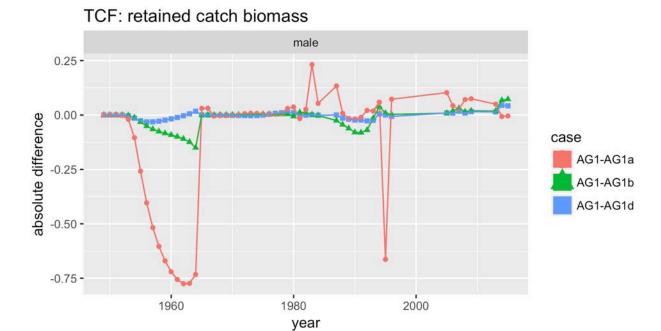


Figure 148. Differences for TCF: retained catch biomass.