

Appendix B: BBRKC Stock Assessment Input Files & Size-Frequency Residual Plots

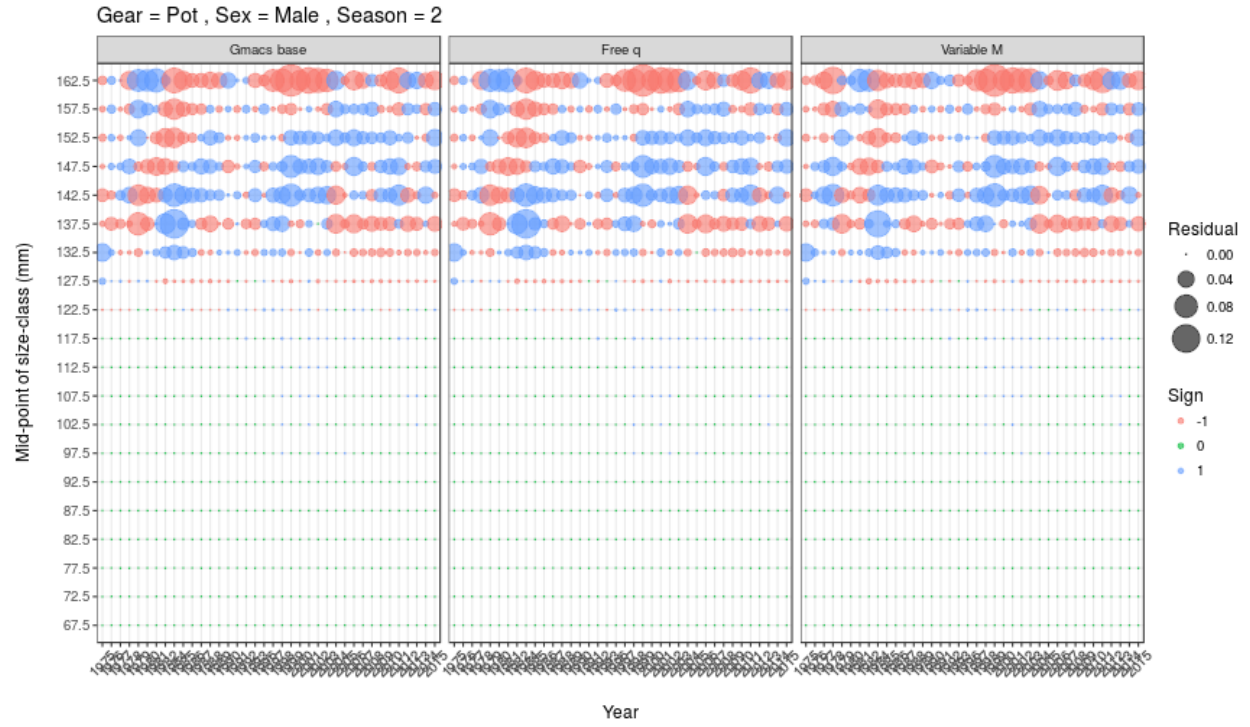


Figure 1: Size-frequency residuals of male BBRKC by year retained in the directed pot fishery for the 2017 model and each of the Gmacs model scenarios.

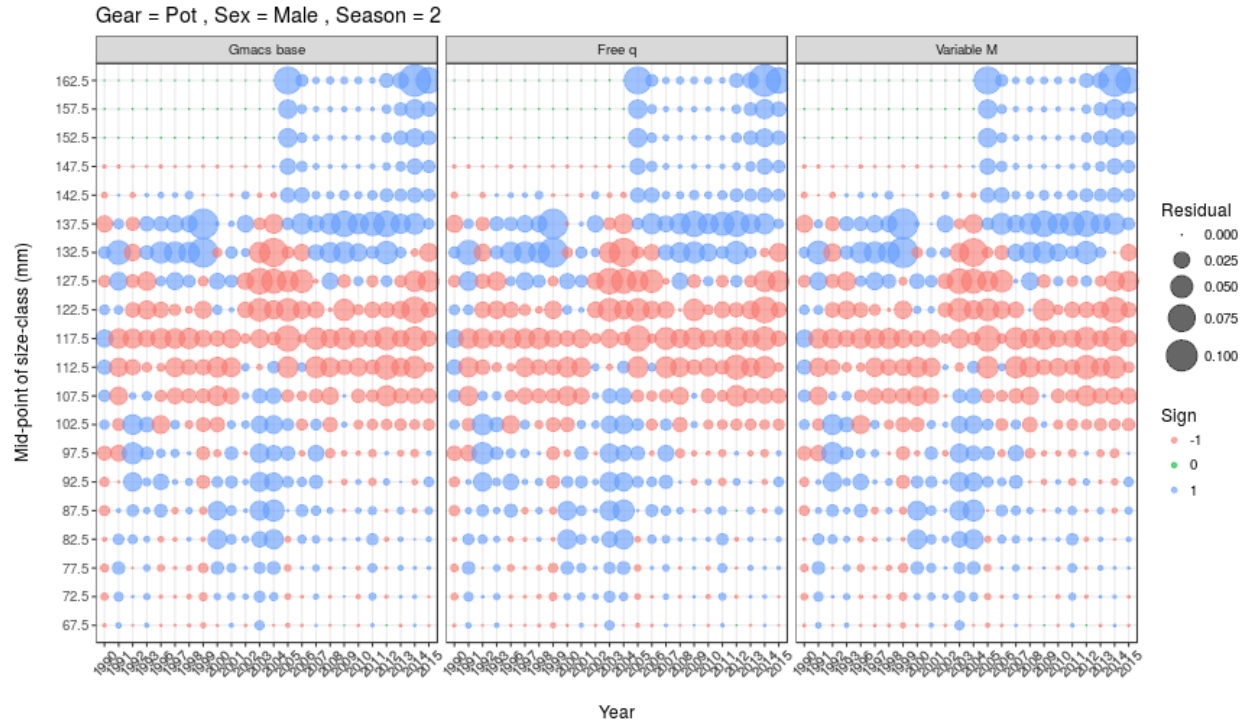


Figure 2: Size-frequency residuals of discarded male BBRKC by year in the directed pot fishery for the 2017 model and each of the Gmacs model scenarios.

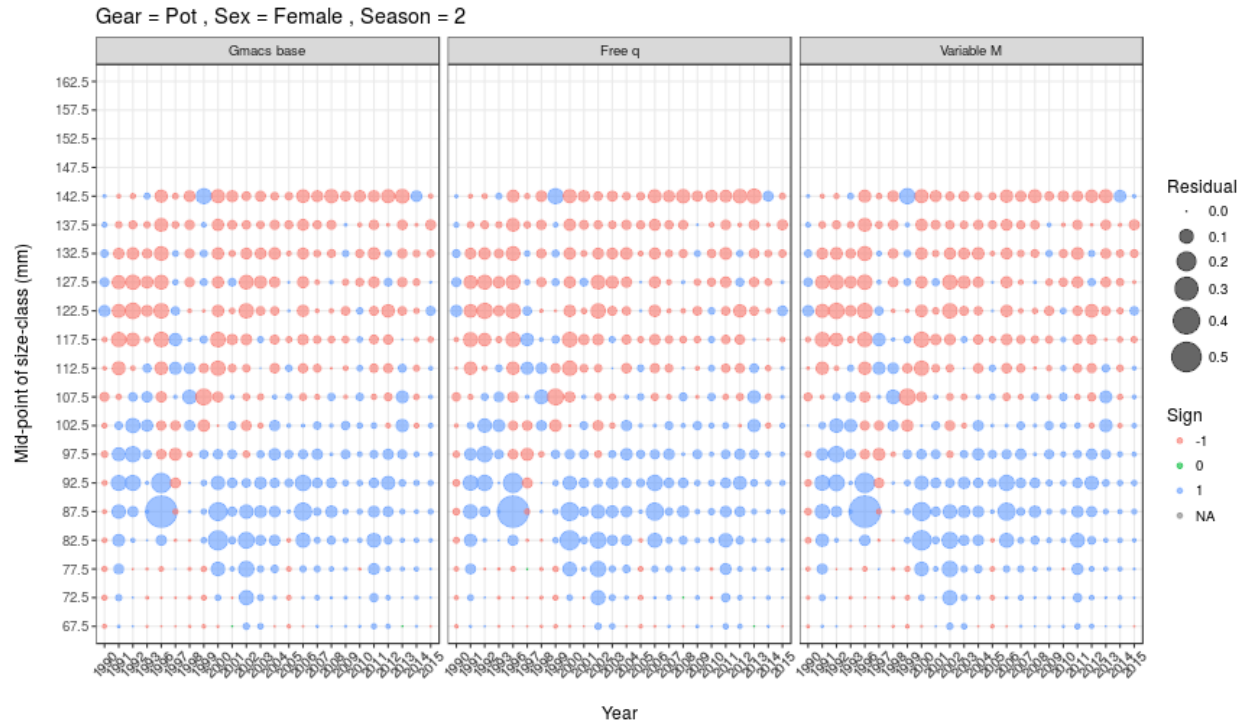


Figure 3: Size-frequency residuals of discarded female BBRKC by year in the directed pot fishery for the 2017 model and each of the Gmacs model scenarios.

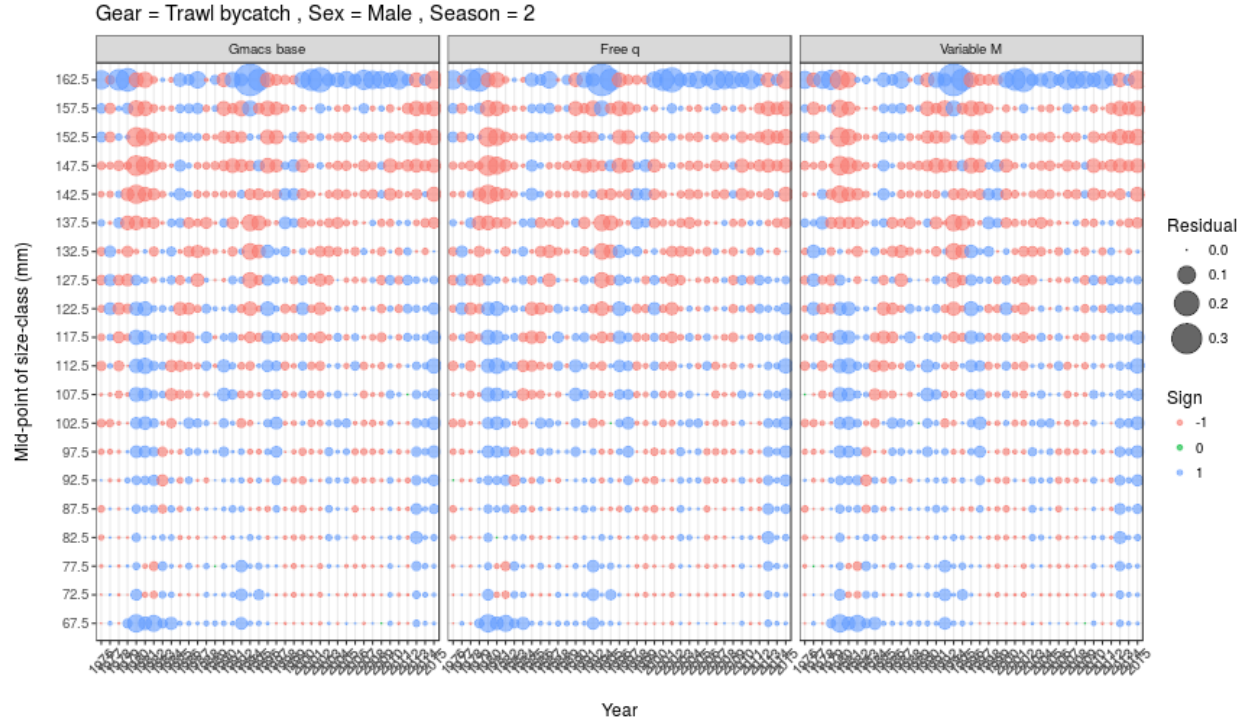


Figure 4: Size-frequency residuals discarded male BBRKC by year in the trawl bycatch fishery for the 2017 model and each of the Gmacs model scenarios.

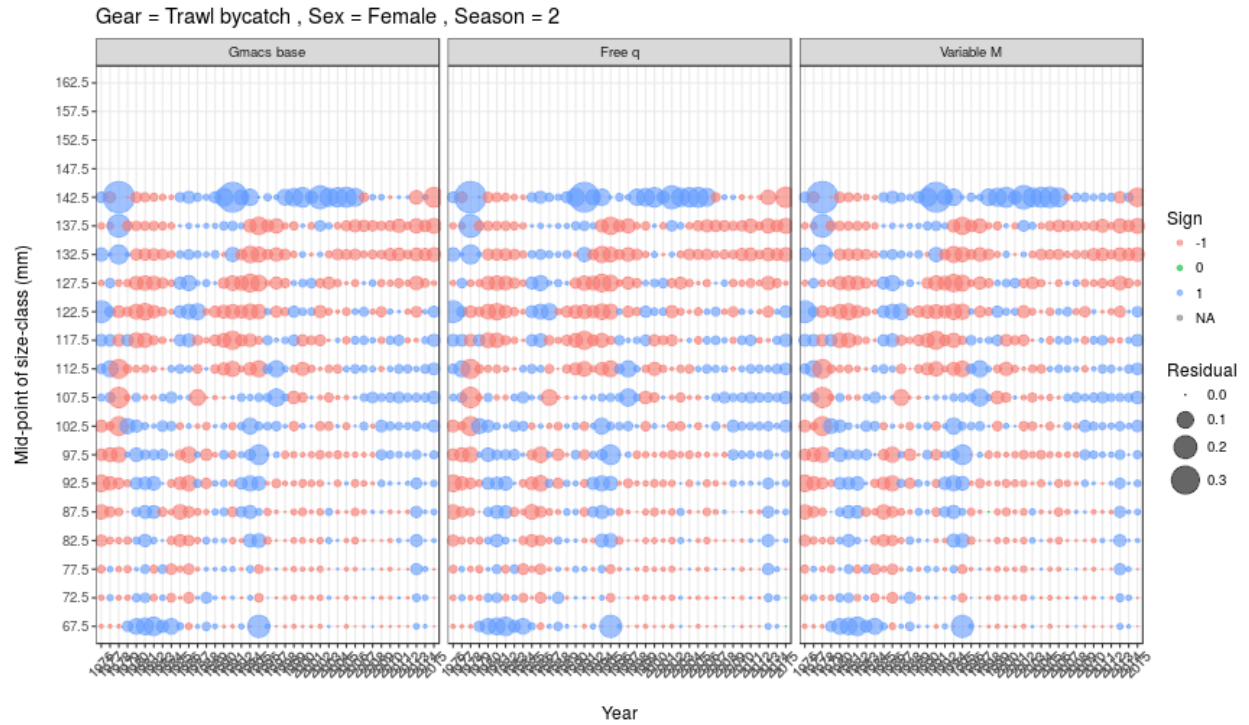


Figure 5: Size-frequency residuals of discarded female BBRKC by year in the trawl bycatch fishery for the 2017 model and each of the Gmacs model scenarios.

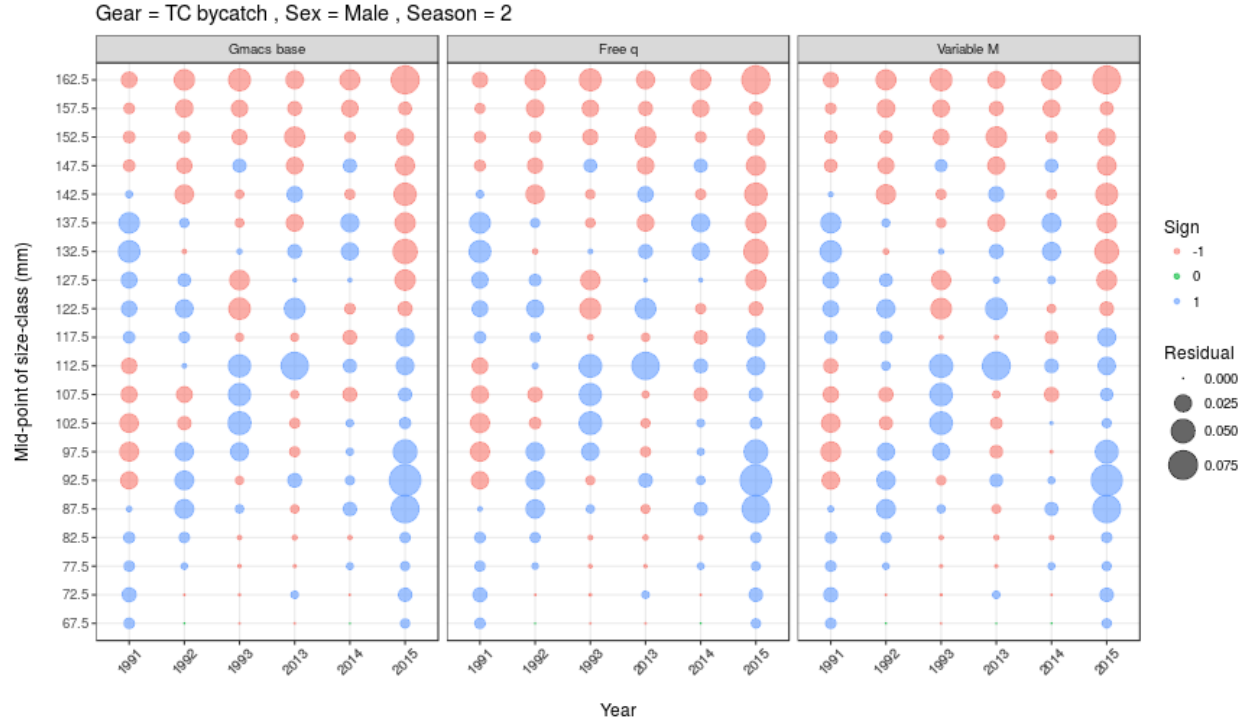


Figure 6: Size-frequency residuals of discarded male BBRKC by year in the tanner crab bycatch fishery for the 2017 model and each of the Gmacs model scenarios.

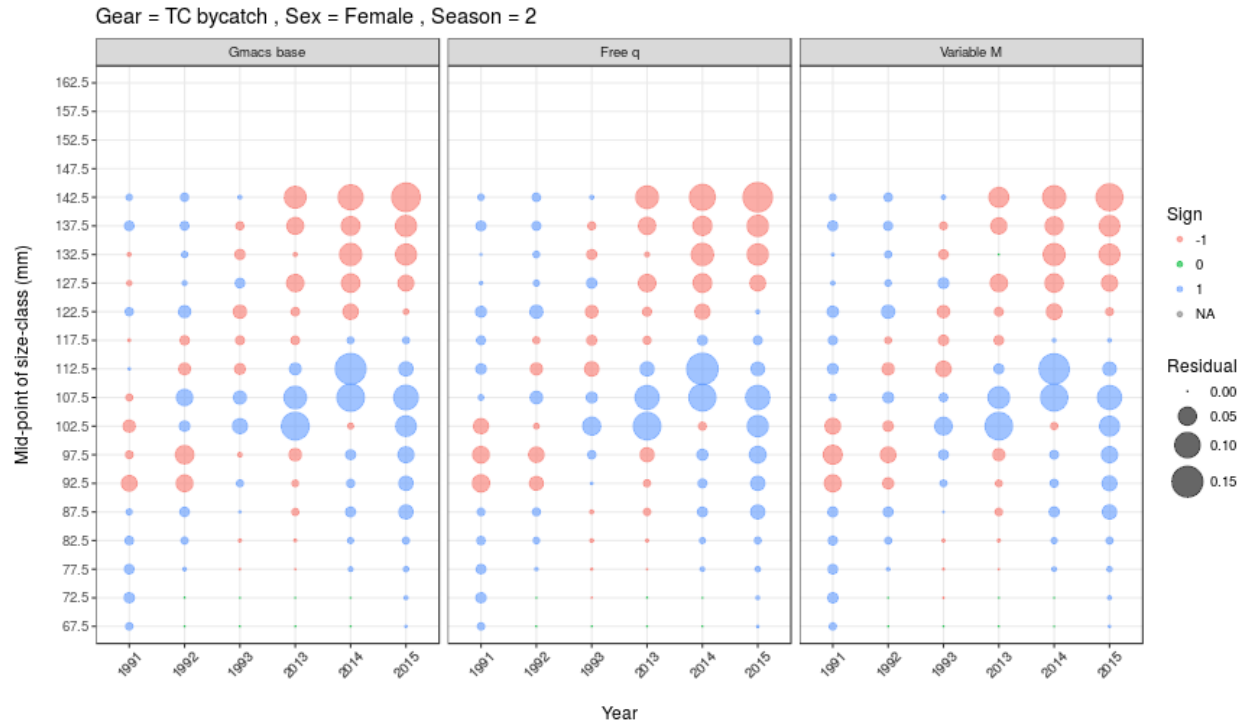


Figure 7: Size-frequency residuals of discarded female BBRKC by year in the tanner crab bycatch fishery for the 2017 model and each of the Gmacs model scenarios.

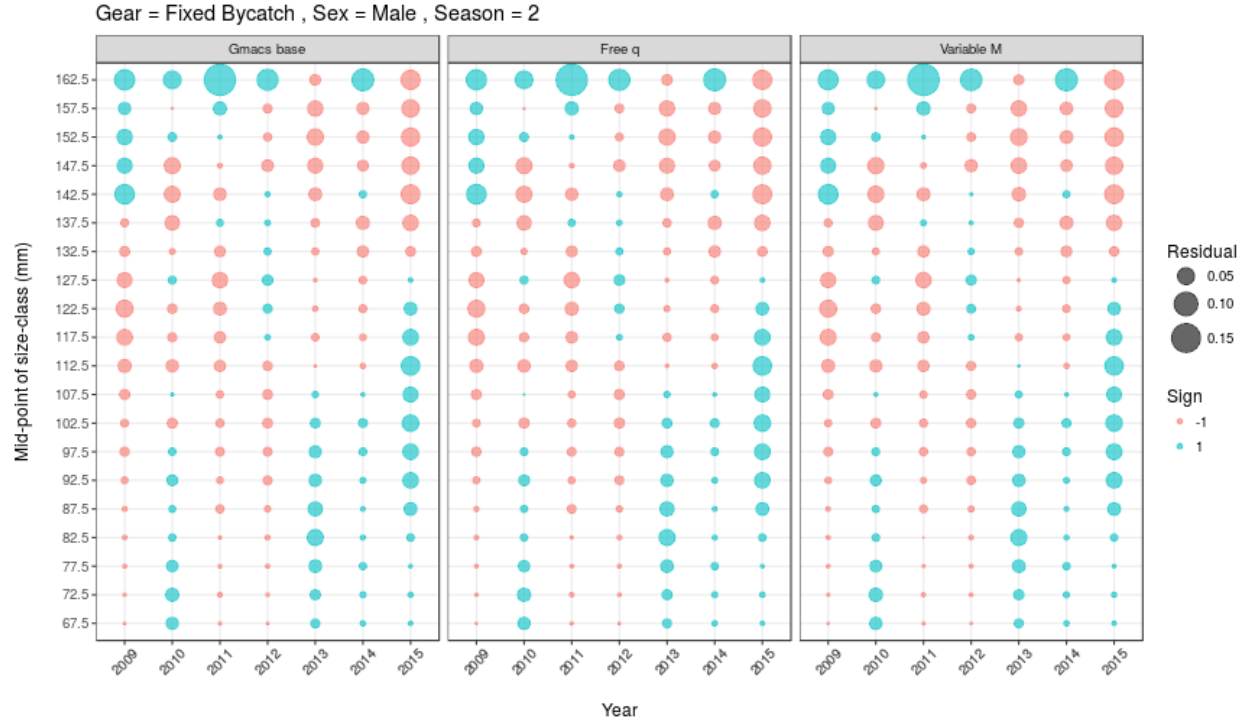


Figure 8: Size-frequency residuals of discarded male BBRKC by year in the fixed bycatch fishery for the 2017 model and each of the Gmacs model scenarios.

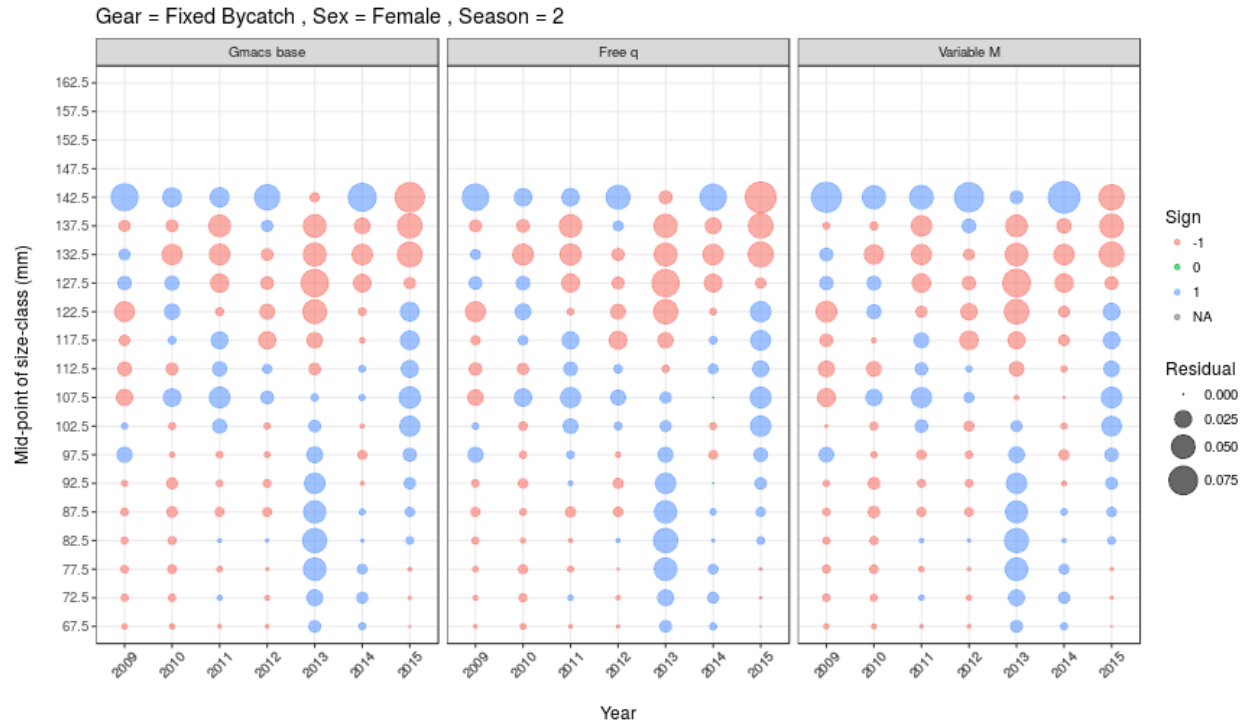


Figure 9: Size-frequency residuals of discarded female BBRKC by year in the fixed bycatch fishery for the 2017 model and each of the Gmacs model scenarios.

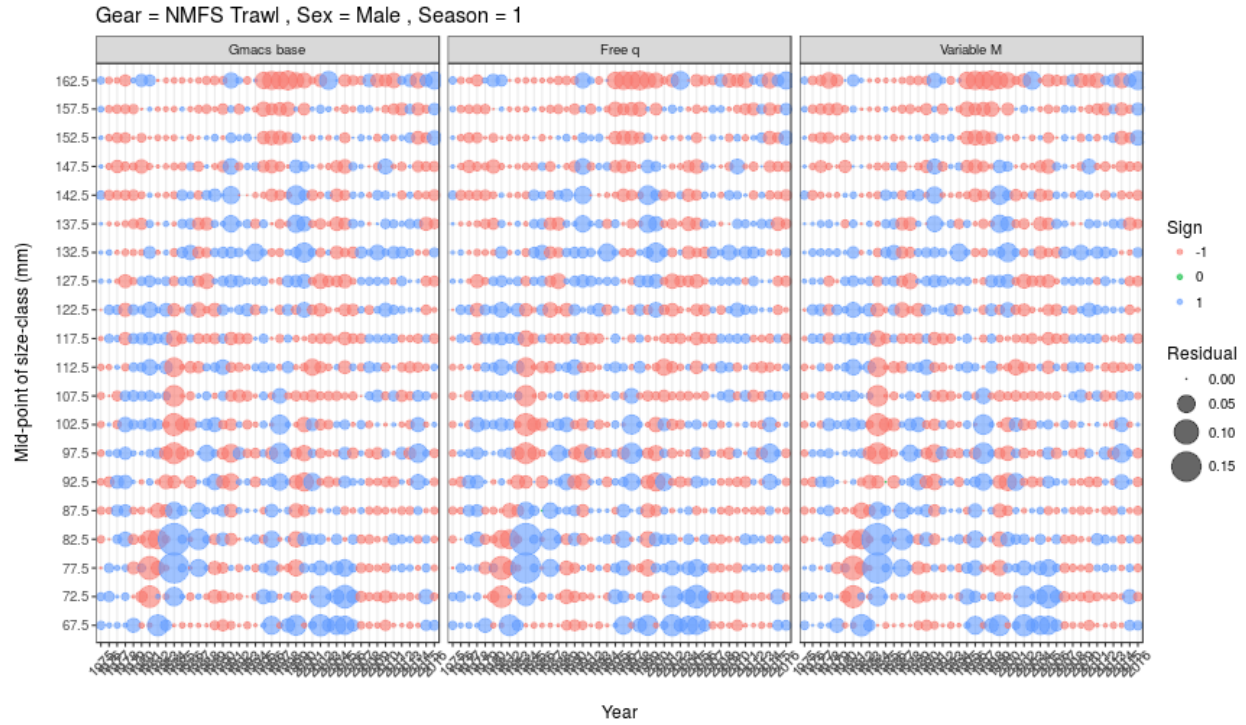


Figure 10: Size-frequency residuals of discarded male BBRKC by year in the NMFS trawl survey for the 2017 model and each of the Gmacs model scenarios.

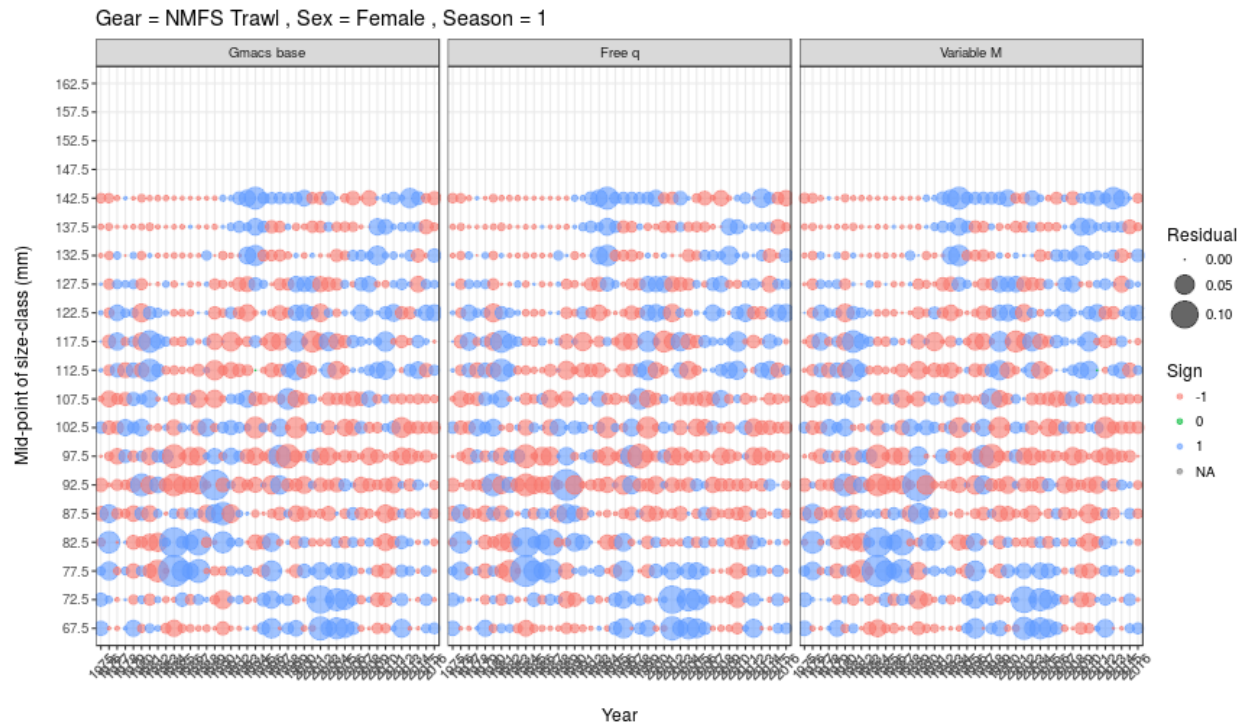


Figure 11: Size-frequency residuals of discarded female BBRKC by year in the NMFS trawl survey for the 2017 model and each of the Gmacs model scenarios.

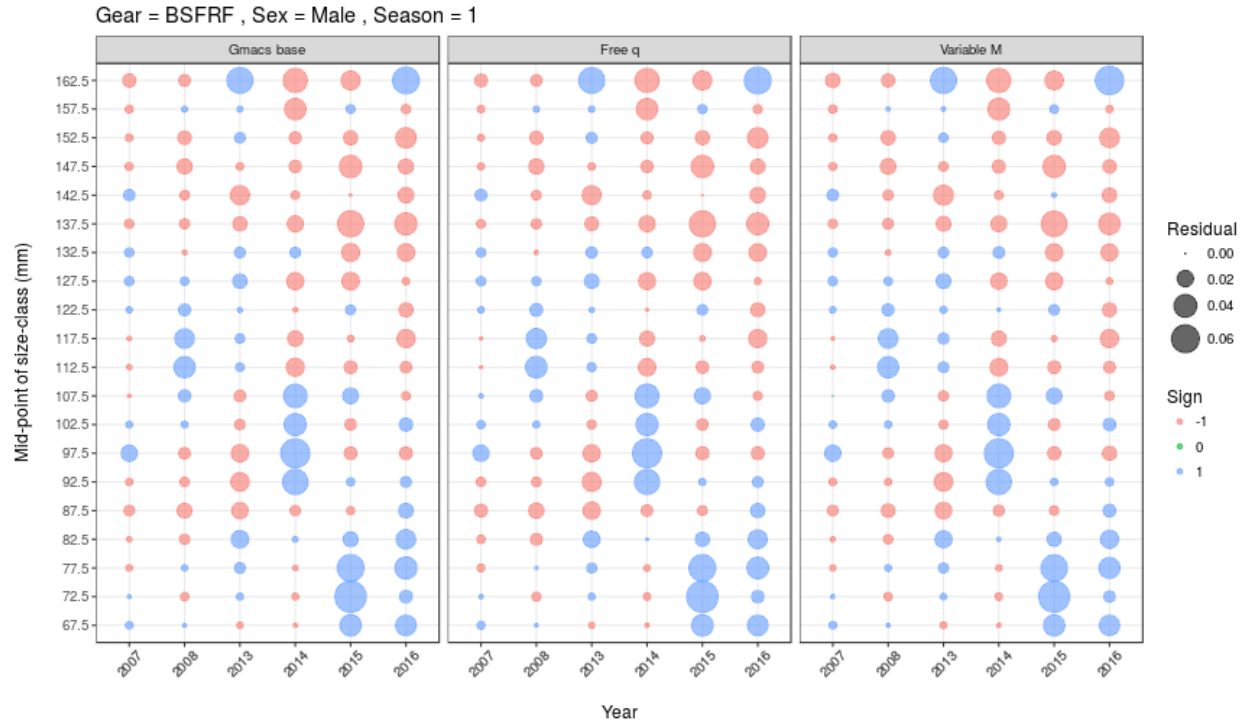


Figure 12: Size-frequency residuals of discarded male BBRKC by year in the BSFRF survey for the 2017 model and each of the Gmacs model scenarios.

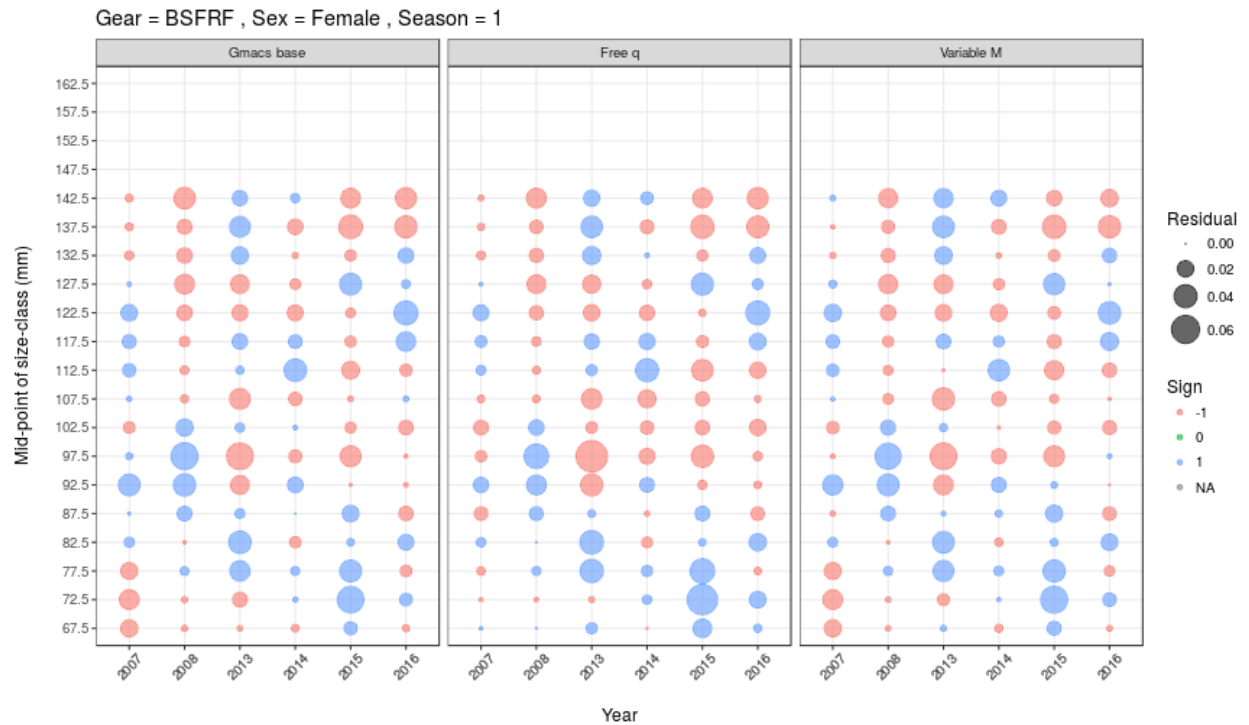


Figure 13: Size-frequency residuals of discarded female BBRKC by year in the BSFRF survey for the 2017 model and each of the Gmacs model scenarios.

[illegible]

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## ## ----- ##
## ## Male retained pot fishery (tonnes)
## #year seas fleet sex obs cv type units mult effort discard_mortality
## 1975 2 1 1 23281.2 0.03 1 1 1 0 0
## 1976 2 1 1 28993.6 0.03 1 1 1 0 0
## 1977 2 1 1 31736.9 0.03 1 1 1 0 0
## 1978 2 1 1 39743 0.03 1 1 1 0 0
## 1979 2 1 1 48910 0.03 1 1 1 0 0
## 1980 2 1 1 58943.6 0.03 1 1 1 0 0
## 1981 2 1 1 15236.8 0.03 1 1 1 0 0
## 1982 2 1 1 1361.3 0.03 1 1 1 0 0
## 1984 2 1 1 1897.1 0.03 1 1 1 0 0
## 1985 2 1 1 1893.7 0.03 1 1 1 0 0
## 1986 2 1 1 5168.2 0.03 1 1 1 0 0
## 1987 2 1 1 5574.2 0.03 1 1 1 0 0
## 1988 2 1 1 3351 0.03 1 1 1 0 0
## 1989 2 1 1 4656 0.03 1 1 1 0 0
## 1990 2 1 1 9272.8 0.03 1 1 1 0 0
## 1991 2 1 1 7885.2 0.03 1 1 1 0 0
## 1992 2 1 1 3681.8 0.03 1 1 1 0 0
## 1993 2 1 1 6659.6 0.03 1 1 1 0 0
## 1994 2 1 1 42.2 0.03 1 1 1 0 0
## 1995 2 1 1 36.3 0.03 1 1 1 0 0
## 1996 2 1 1 3861.9 0.03 1 1 1 0 0
## 1997 2 1 1 4042.1 0.03 1 1 1 0 0
## 1998 2 1 1 6779.4 0.03 1 1 1 0 0
## 1999 2 1 1 5377.8 0.03 1 1 1 0 0
## 2000 2 1 1 3738.1 0.03 1 1 1 0 0
## 2001 2 1 1 3866 0.03 1 1 1 0 0
## 2002 2 1 1 4384.4 0.03 1 1 1 0 0
## 2003 2 1 1 7135.5 0.03 1 1 1 0 0
## 2004 2 1 1 7006.6 0.03 1 1 1 0 0
## 2005 2 1 1 8399.6 0.03 1 1 1 0 0
## 2006 2 1 1 7143.2 0.03 1 1 1 0 0
## 2007 2 1 1 9303.9 0.03 1 1 1 0 0
## 2008 2 1 1 9216.1 0.03 1 1 1 0 0
## 2009 2 1 1 7272.5 0.03 1 1 1 0 0
## 2010 2 1 1 6761.5 0.03 1 1 1 0 0
## 2011 2 1 1 3607.1 0.03 1 1 1 0 0
## 2012 2 1 1 3621.7 0.03 1 1 1 0 0
## 2013 2 1 1 3991 0.03 1 1 1 0 0
## 2014 2 1 1 4538.6 0.03 1 1 1 0 0
## 2015 2 1 1 4613.7 0.03 1 1 1 0 0
## ## Male discards pot fishery (numbers)
## #year seas fleet sex obs cv type units mult effort discard_mortality
## 1990 2 1 1 1718800 0.04 2 2 1 0 0.2
## 1991 2 1 1 1453700 0.04 2 2 1 0 0.2
## 1992 2 1 1 2305600 0.04 2 2 1 0 0.2
## 1993 2 1 1 2688000 0.04 2 2 1 0 0.2
## 1996 2 1 1 595000 0.04 2 2 1 0 0.2
## 1997 2 1 1 910000 0.04 2 2 1 0 0.2
## 1998 2 1 1 3173000 0.04 2 2 1 0 0.2
## 1999 2 1 1 922000 0.04 2 2 1 0 0.2
## 2000 2 1 1 1393000 0.04 2 2 1 0 0.2
## 2001 2 1 1 1623500 0.04 2 2 1 0 0.2
## 2002 2 1 1 1527000 0.04 2 2 1 0 0.2
## 2003 2 1 1 3617000 0.04 2 2 1 0 0.2
## 2004 2 1 1 1539000 0.04 2 2 1 0 0.2
## 2005 2 1 1 3792300 0.04 2 2 1 0 0.2
## 2006 2 1 1 1832000 0.04 2 2 1 0 0.2
## 2007 2 1 1 3619800 0.04 2 2 1 0 0.2
## 2008 2 1 1 3786757 0.04 2 2 1 0 0.2
## 2009 2 1 1 2782675 0.04 2 2 1 0 0.2
## 2010 2 1 1 2480059 0.04 2 2 1 0 0.2
## 2011 2 1 1 1279960 0.04 2 2 1 0 0.2
## 2012 2 1 1 640960 0.04 2 2 1 0 0.2
## 2013 2 1 1 967328 0.04 2 2 1 0 0.2
## 2014 2 1 1 1480673 0.04 2 2 1 0 0.2
## 2015 2 1 1 745056 0.04 2 2 1 0 0.2
## ## Female discards Pot fishery
## #year seas fleet sex obs cv type units mult effort discard_mortality
## 1990 2 1 2 2670800 0.04 2 2 1 0 0.2
## 1991 2 1 2 484600 0.04 2 2 1 0 0.2
## 1992 2 1 2 2408600 0.04 2 2 1 0 0.2
## 1993 2 1 2 2814500 0.04 2 2 1 0 0.2
## 1996 2 1 2 10000 0.04 2 2 1 0 0.2
## 1997 2 1 2 75000 0.04 2 2 1 0 0.2
## 1998 2 1 2 3896500 0.04 2 2 1 0 0.2
## 1999 2 1 2 30300 0.04 2 2 1 0 0.2
## 2000 2 1 2 304000 0.04 2 2 1 0 0.2
## 2001 2 1 2 786100 0.04 2 2 1 0 0.2
## 2002 2 1 2 47600 0.04 2 2 1 0 0.2
## 2003 2 1 2 2191200 0.04 2 2 1 0 0.2
## 2004 2 1 2 932000 0.04 2 2 1 0 0.2
## 2005 2 1 2 2038700 0.04 2 2 1 0 0.2
## 2006 2 1 2 222200 0.04 2 2 1 0 0.2
## 2007 2 1 2 833890 0.04 2 2 1 0 0.2
## 2008 2 1 2 666098 0.04 2 2 1 0 0.2
## 2009 2 1 2 332340 0.04 2 2 1 0 0.2
## 2010 2 1 2 477993 0.04 2 2 1 0 0.2
## 2011 2 1 2 115860 0.04 2 2 1 0 0.2
## 2012 2 1 2 49933 0.04 2 2 1 0 0.2
## 2013 2 1 2 409135 0.04 2 2 1 0 0.2
## 2014 2 1 2 280805 0.04 2 2 1 0 0.2
## 2015 2 1 2 747306 0.04 2 2 1 0 0.2
## ## Trawl fishery discards
## #year seas fleet sex obs cv type units mult effort discard_mortality
## 1976 2 2 0 384600 0.04 2 2 1 0 0.8
## 1977 2 2 0 787700 0.04 2 2 1 0 0.8
## 1978 2 2 0 646500 0.04 2 2 1 0 0.8
## 1979 2 2 0 736200 0.04 2 2 1 0 0.8
## 1980 2 2 0 1141300 0.04 2 2 1 0 0.8
## 1981 2 2 0 267100 0.04 2 2 1 0 0.8
## 1982 2 2 0 785400 0.04 2 2 1 0 0.8
## 1983 2 2 0 492800 0.04 2 2 1 0 0.8
## 1984 2 2 0 1168200 0.04 2 2 1 0 0.8
## 1985 2 2 0 274700 0.04 2 2 1 0 0.8

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## 1986 2 2 0 159300 0.04 2 2 1 0 0.8
## 1987 2 2 0 124500 0.04 2 2 1 0 0.8
## 1988 2 2 0 430300 0.04 2 2 1 0 0.8
## 1989 2 2 0 109200 0.04 2 2 1 0 0.8
## 1990 2 2 0 171800 0.04 2 2 1 0 0.8
## 1991 2 2 0 183500 0.04 2 2 1 0 0.8
## 1992 2 2 0 248100 0.04 2 2 1 0 0.8
## 1993 2 2 0 281000 0.04 2 2 1 0 0.8
## 1994 2 2 0 48200 0.04 2 2 1 0 0.8
## 1995 2 2 0 106600 0.04 2 2 1 0 0.8
## 1996 2 2 0 76300 0.04 2 2 1 0 0.8
## 1997 2 2 0 49000 0.04 2 2 1 0 0.8
## 1998 2 2 0 93700 0.04 2 2 1 0 0.8
## 1999 2 2 0 110500 0.04 2 2 1 0 0.8
## 2000 2 2 0 58600 0.04 2 2 1 0 0.8
## 2001 2 2 0 89955 0.04 2 2 1 0 0.8
## 2002 2 2 0 76302 0.04 2 2 1 0 0.8
## 2003 2 2 0 105493 0.04 2 2 1 0 0.8
## 2004 2 2 0 75107 0.04 2 2 1 0 0.8
## 2005 2 2 0 96834 0.04 2 2 1 0 0.8
## 2006 2 2 0 75290 0.04 2 2 1 0 0.8
## 2007 2 2 0 86417 0.04 2 2 1 0 0.8
## 2008 2 2 0 93077 0.04 2 2 1 0 0.8
## 2009 2 2 0 59585 0.04 2 2 1 0 0.8
## 2010 2 2 0 58219 0.04 2 2 1 0 0.8
## 2011 2 2 0 45916 0.04 2 2 1 0 0.8
## 2012 2 2 0 38541 0.04 2 2 1 0 0.8
## 2013 2 2 0 106439 0.04 2 2 1 0 0.8
## 2014 2 2 0 144340 0.04 2 2 1 0 0.8
## 2015 2 2 0 125850 0.04 2 2 1 0 0.8
## ## Tanner crab fishery discards males
## #y s f s obs cv t u m e d
## #e e l e obs cv y n u f m
## #a a e x obs cv p i l f r
## #r s e obs cv e t t o disc
## 1976 2 3 1 59772.50508 0.1 2 2 1 0 0.25
## 1977 2 3 1 358727.6778 0.1 2 2 1 0 0.25
## 1978 2 3 1 264460.4601 0.1 2 2 1 0 0.25
## 1979 2 3 1 331704.5283 0.1 2 2 1 0 0.25
## 1980 2 3 1 798423.191 0.1 2 2 1 0 0.25
## 1981 2 3 1 262852.5797 0.1 2 2 1 0 0.25
## 1982 2 3 1 307789.549 0.1 2 2 1 0 0.25
## 1983 2 3 1 48532.2855 0.1 2 2 1 0 0.25
## 1984 2 3 1 157195.7111 0.1 2 2 1 0 0.25
## 1987 2 3 1 97877.47706 0.1 2 2 1 0 0.25
## 1988 2 3 1 159003.8294 0.1 2 2 1 0 0.25
## 1989 2 3 1 324322.6239 0.1 2 2 1 0 0.25
## 1990 2 3 1 326868.9326 0.1 2 2 1 0 0.25
## 1991 2 3 1 455887.8848 0.1 2 2 1 0 0.25
## 1992 2 3 1 463165.1873 0.1 2 2 1 0 0.25
## 1993 2 3 1 477946.9278 0.1 2 2 1 0 0.25
## 1994 2 3 1 3114.147514 0.1 2 2 1 0 0.25
## 2006 2 3 1 1195.450102 0.1 2 2 1 0 0.25
## 2007 2 3 1 1494.312627 0.1 2 2 1 0 0.25
## 2008 2 3 1 1494.312627 0.1 2 2 1 0 0.25
## 2009 2 3 1 597.725051 0.1 2 2 1 0 0.25
## 2013 2 3 1 5977.250508 0.1 2 2 1 0 0.25
## 2014 2 3 1 5977.250508 0.1 2 2 1 0 0.25
## 2015 2 3 1 415929.9652 0.1 2 2 1 0 0.25
## ## Tanner crab fishery discards females
## 1976 2 3 2 134691.3715 0.1 2 2 1 0 0.25
## 1977 2 3 2 808357.0006 0.1 2 2 1 0 0.25
## 1978 2 3 2 595935.2386 0.1 2 2 1 0 0.25
## 1979 2 3 2 747463.0315 0.1 2 2 1 0 0.25
## 1980 2 3 2 1799166.933 0.1 2 2 1 0 0.25
## 1981 2 3 2 592312.0407 0.1 2 2 1 0 0.25
## 1982 2 3 2 693573.0138 0.1 2 2 1 0 0.25
## 1983 2 3 2 109362.6591 0.1 2 2 1 0 0.25
## 1984 2 3 2 354224.8379 0.1 2 2 1 0 0.25
## 1987 2 3 2 220557.1208 0.1 2 2 1 0 0.25
## 1988 2 3 2 358299.2519 0.1 2 2 1 0 0.25
## 1989 2 3 2 730828.6472 0.1 2 2 1 0 0.25
## 1990 2 3 2 736566.4996 0.1 2 2 1 0 0.25
## 1991 2 3 2 1027297.825 0.1 2 2 1 0 0.25
## 1992 2 3 2 1043696.499 0.1 2 2 1 0 0.25
## 1993 2 3 2 1077005.676 0.1 2 2 1 0 0.25
## 1994 2 3 2 7017.420455 0.1 2 2 1 0 0.25
## 2006 2 3 2 2693.82743 0.1 2 2 1 0 0.25
## 2007 2 3 2 3367.284287 0.1 2 2 1 0 0.25
## 2008 2 3 2 3367.284287 0.1 2 2 1 0 0.25
## 2009 2 3 2 1346.913715 0.1 2 2 1 0 0.25
## 2013 2 3 2 13469.13715 0.1 2 2 1 0 0.25
## 2014 2 3 2 13469.13715 0.1 2 2 1 0 0.25
## 2015 2 3 2 937256.6431 0.1 2 2 1 0 0.25
## ## Fixed gear crab fishery discards females 1000000
## 2009 2 4 0 5298 0.1 2 2 1 0 0.2
## 2010 2 4 0 2879 0.1 2 2 1 0 0.2
## 2011 2 4 0 12087 0.1 2 2 1 0 0.2
## 2012 2 4 0 18737 0.1 2 2 1 0 0.2
## 2013 2 4 0 71086 0.1 2 2 1 0 0.2
## 2014 2 4 0 125003 0.1 2 2 1 0 0.2
## 2015 2 4 0 106041 0.1 2 2 1 0 0.2
## ## ----- ##
## ## RELATIVE ABUNDANCE DATA
## ## Units of Abundance: 1 = biomass, 2 = numbers
## ## TODD: add column for maturity for terminal molt life-histories
## ## for EBRKC Units are in 1000 mt.
## ## ----- ##
## ## Number of relative abundance indices
## 2
## ## Number of rows in each index
## 84
## # Survey data (abundance indices, units are 1000 mt)
## #Year Season Fleet Sex Abundance CV Units
## 1975 1 5 1 135463.32 0.193 1
## 1976 1 5 1 260149.49 0.144 1
## 1977 1 5 1 235411.43 0.152 1

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## 1978 1 5 1 203192.71 0.144 1
## 1979 1 5 1 103715 0.164 1
## 1980 1 5 1 168047.18 0.221 1
## 1981 1 5 1 69161.2 0.19 1
## 1982 1 5 1 73232.86 0.251 1
## 1983 1 5 1 35368.02 0.214 1
## 1984 1 5 1 98281.53 0.606 1
## 1985 1 5 1 27203.7 0.159 1
## 1986 1 5 1 41113.63 0.42 1
## 1987 1 5 1 47410.5 0.209 1
## 1988 1 5 1 35852.58 0.228 1
## 1989 1 5 1 42967.75 0.232 1
## 1990 1 5 1 39271.64 0.242 1
## 1991 1 5 1 67458.39 0.443 1
## 1992 1 5 1 25442.52 0.175 1
## 1993 1 5 1 36217.5 0.198 1
## 1994 1 5 1 23285.54 0.174 1
## 1995 1 5 1 27670.53 0.267 1
## 1996 1 5 1 27277.48 0.203 1
## 1997 1 5 1 60719.57 0.265 1
## 1998 1 5 1 46693.73 0.182 1
## 1999 1 5 1 45126.53 0.204 1
## 2000 1 5 1 38924.68 0.222 1
## 2001 1 5 1 28367.49 0.187 1
## 2002 1 5 1 45596.97 0.202 1
## 2003 1 5 1 74997.93 0.283 1
## 2004 1 5 1 91090.07 0.321 1
## 2005 1 5 1 55471.45 0.172 1
## 2006 1 5 1 51948.59 0.17 1
## 2007 1 5 1 59064.23 0.21 1
## 2008 1 5 1 67945.65 0.225 1
## 2009 1 5 1 43692.76 0.326 1
## 2010 1 5 1 39555.62 0.223 1
## 2011 1 5 1 27529.87 0.211 1
## 2012 1 5 1 30830.44 0.232 1
## 2013 1 5 1 39833.23 0.244 1
## 2014 1 5 1 60859.12 0.191 1
## 2015 1 5 1 36919.28 0.208 1
## 2016 1 5 1 27302.6 0.194 1
##
## 1975 1 5 2 67267.28 0.193 1
## 1976 1 5 2 71718.04 0.144 1
## 1977 1 5 2 140249.63 0.152 1
## 1978 1 5 2 146351.82 0.144 1
## 1979 1 5 2 63911.67 0.164 1
## 1980 1 5 2 81275.03 0.221 1
## 1981 1 5 2 63507.85 0.19 1
## 1982 1 5 2 70506.74 0.251 1
## 1983 1 5 2 13951.7 0.214 1
## 1984 1 5 2 57029.97 0.606 1
## 1985 1 5 2 7330.79 0.159 1
## 1986 1 5 2 7044.78 0.42 1
## 1987 1 5 2 22852.72 0.209 1
## 1988 1 5 2 19519.6 0.228 1
## 1989 1 5 2 12973.56 0.232 1
## 1990 1 5 2 21049.25 0.242 1
## 1991 1 5 2 17596.54 0.443 1
## 1992 1 5 2 12244.8 0.175 1
## 1993 1 5 2 17485.53 0.198 1
## 1994 1 5 2 9049.36 0.174 1
## 1995 1 5 2 10725.74 0.267 1
## 1996 1 5 2 17371.13 0.203 1
## 1997 1 5 2 24557.1 0.265 1
## 1998 1 5 2 38481.97 0.182 1
## 1999 1 5 2 20477.34 0.204 1
## 2000 1 5 2 29417.67 0.222 1
## 2001 1 5 2 24820.57 0.187 1
## 2002 1 5 2 24188.87 0.202 1
## 2003 1 5 2 41796.11 0.283 1
## 2004 1 5 2 40819.81 0.321 1
## 2005 1 5 2 51869.83 0.172 1
## 2006 1 5 2 43727.75 0.17 1
## 2007 1 5 2 45777.06 0.21 1
## 2008 1 5 2 46484.48 0.225 1
## 2009 1 5 2 47979.95 0.326 1
## 2010 1 5 2 42086.47 0.223 1
## 2011 1 5 2 39523.28 0.211 1
## 2012 1 5 2 30417.78 0.232 1
## 2013 1 5 2 22576.58 0.244 1
## 2014 1 5 2 53243.87 0.191 1
## 2015 1 5 2 27320.77 0.208 1
## 2016 1 5 2 33928.4 0.194 1
## # BSFRF
## 2007 1 6 0 130352.8 0.2164 1
## 2008 1 6 0 106040.9 0.1939 1
## 2013 1 6 0 95016.7 0.1939 1
## 2014 1 6 0 111740.4 0.1939 1
## 2015 1 6 0 98952.5 0.1939 1
## 2016 1 6 0 87725.1 0.1939 1
## #
## Number of length frequency matrices
## 13
## #
## Number of rows in each matrix
## 38 24 24 39 39 6 6 7 7 42 42 6 6
## #
## Number of bins in each matrix (columns of size data)
## 20 20 16 20 16 20 16 20 16 20 16 20 16
## #
## SIZE COMPOSITION DATA FOR ALL FLEETS
## #
## #
## SIZE COMP LEGEND
## #
## Sex: 1 = male, 2 = female, 0 = both sexes combined
## #
## Type of composition: 1 = retained, 2 = discard, 0 = total composition
## #
## Maturity state: 1 = immature, 2 = mature, 0 = both states combined
## #
## Shell condition: 1 = new shell, 2 = old shell, 0 = both shell types combined
## #
## #
## #Retained males
## #Year Season Fleet Sex Type Shell Maturity Nsamp DataVec
## 1975 2 1 1 1 0 0 100 0 0 0 0 0 0 0 0 0 0.0071 0.0741 0.1721 0.2239 0.2122 0.1464 0.0858 0.0785
## 1976 2 1 1 1 0 0 100 0 0 0 0 0 0 0 0 0 0.0016 0.029 0.1418 0.2316 0.2199 0.1635 0.1071 0.1055

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## 1983 1 5 1 0 0 0 200 0.03252 0.03556 0.0497 0.06649 0.08005 0.07825 0.05982 0.04681 0.04016 0.03975 0.03202 0.03089 0.01901 0.01192 0.01067 0.00368 0.0025 0.00123 0 0
## 1984 1 5 1 0 0 0 200 0.01605 0.0626 0.12287 0.13271 0.06822 0.03886 0.02064 0.02018 0.02078 0.01535 0.01185 0.00719 0.00632 0.00501 0.00652 0.00209 0.00087 0.00089 0.0001 0.0003
## 1985 1 5 1 0 0 0 200 0.00261 0.01279 0.02442 0.03954 0.0589 0.05817 0.02335 0.04026 0.06015 0.06139 0.05132 0.05231 0.0497 0.04183 0.02794 0.02374 0.00176 0.0051 0.00415 0
## 1986 1 5 1 0 0 0 200 0.01118 0.01788 0.0248 0.0201 0.02318 0.01563 0.04079 0.04 0.05588 0.04852 0.06746 0.07339 0.07 0.07875 0.05634 0.03848 0.02745 0.00733 0.00293 0.00232
## 1987 1 5 1 0 0 0 200 0.00124 0.00707 0.03402 0.05458 0.04693 0.03171 0.02904 0.0291 0.03095 0.02534 0.0332 0.02702 0.03627 0.03448 0.02896 0.0284 0.01826 0.01539 0.0038 0.00394
## 1988 1 5 1 0 0 0 200 0.00132 0.00131 0.00661 0.01098 0.01329 0.02154 0.04687 0.04304 0.04045 0.03737 0.02619 0.03082 0.02097 0.03712 0.03305 0.04953 0.03683 0.02677 0.00944 0.00926
## 1989 1 5 1 0 0 0 200 0.00165 0 0.00089 0.0024 0.01493 0.03477 0.01836 0.03764 0.02324 0.04118 0.02877 0.02534 0.04499 0.05229 0.0535 0.06652 0.04826 0.04662 0.02825 0.0278
## 1990 1 5 1 0 0 0 200 0.00127 0.01061 0.01509 0.03475 0.03294 0.00938 0.00797 0.00084 0.0182 0.02957 0.02192 0.02978 0.03407 0.04012 0.03692 0.03824 0.02986 0.03439 0.01955 0.03424
## 1991 1 5 1 0 0 0 200 0.00105 0.00895 0.02235 0.01675 0.02654 0.02168 0.01373 0.02739 0.02213 0.01724 0.00529 0.01977 0.03468 0.03637 0.05878 0.06743 0.06583 0.04824 0.03692 0.07566
## 1992 1 5 1 0 0 0 200 0.001 0 0.00202 0.01271 0.0252 0.0355 0.0552 0.05277 0.03818 0.03993 0.02909 0.03781 0.03483 0.02803 0.02336 0.02333 0.02188 0.03065 0.01685 0.04963
## 1993 1 5 1 0 0 0 200 0.00209 0.01099 0.01366 0.01049 0.00954 0.01568 0.01418 0.02352 0.03089 0.04425 0.04172 0.06268 0.04792 0.03903 0.03712 0.02688 0.02882 0.02978 0.02424 0.04112
## 1994 1 5 1 0 0 0 200 0.00162 0 0.00309 0.0237 0.02348 0.01516 0.01236 0.01733 0.02131 0.03537 0.04122 0.0403 0.06273 0.09071 0.0474 0.04612 0.0468 0.03273 0.02294 0.0504
## 1995 1 5 1 0 0 0 200 0.02826 0.06829 0.05574 0.02203 0.01101 0.01691 0.02219 0.02553 0.02748 0.03046 0.02626 0.02679 0.03434 0.04021 0.04902 0.04328 0.02328 0.02377 0.01076 0.02615
## 1996 1 5 1 0 0 0 200 0.02781 0.01354 0.0298 0.05291 0.06316 0.05938 0.02756 0.02249 0.0117 0.01786 0.01403 0.01501 0.01394 0.01298 0.02177 0.01647 0.01903 0.01714 0.01827 0.02521
## 1997 1 5 1 0 0 0 200 0 0.00357 0.00221 0.00519 0.0127 0.05636 0.09427 0.10698 0.09097 0.05154 0.03012 0.01617 0.01488 0.01321 0.0142 0.01683 0.02337 0.01681 0.01731 0.04015
## 1998 1 5 1 0 0 0 200 0.02085 0.01739 0.01031 0.01272 0.012 0.01014 0.01345 0.01689 0.02263 0.04666 0.04852 0.05232 0.04513 0.02907 0.01832 0.01525 0.01955 0.01348 0.00795 0.0245
## 1999 1 5 1 0 0 0 200 0.05828 0.02442 0.01336 0.01038 0.01196 0.011 0.01214 0.01479 0.00468 0.01322 0.01815 0.0233 0.05204 0.05362 0.07004 0.06879 0.0435 0.03029 0.02206 0.02521
## 2000 1 5 1 0 0 0 200 0.00176 0.00474 0.01949 0.03958 0.03102 0.01998 0.02277 0.0163 0.02006 0.01468 0.01341 0.02961 0.02941 0.04894 0.04161 0.03597 0.03427 0.02291 0.00849 0.01964
## 2001 1 5 1 0 0 0 200 0.00689 0.00496 0.01061 0.0149 0.0156 0.04209 0.03715 0.05234 0.03461 0.01999 0.02533 0.01664 0.01396 0.02016 0.01317 0.01116 0.02189 0.01912 0.01921 0.03269
## 2002 1 5 1 0 0 0 200 0.05335 0.06381 0.0436 0.02723 0.01193 0.00907 0.0076 0.01062 0.02292 0.02661 0.03474 0.02903 0.02025 0.02516 0.017 0.01934 0.01948 0.02216 0.02415 0.0274
## 2003 1 5 1 0 0 0 200 0.01486 0.00685 0.01419 0.02363 0.0392 0.03203 0.03006 0.01646 0.01123 0.0143 0.01328 0.02506 0.02357 0.03856 0.03481 0.019639 0.02539 0.02164 0.0212 0.06663
## 2004 1 5 1 0 0 0 200 0.03708 0.0289 0.02678 0.01954 0.01866 0.01866 0.03499 0.05351 0.0436 0.04447 0.0293 0.02382 0.01419 0.01504 0.01787 0.02321 0.02404 0.03267 0.02318 0.04471
## 2005 1 5 1 0 0 0 200 0.03525 0.05861 0.04185 0.01599 0.00976 0.02277 0.02344 0.02146 0.01842 0.01713 0.02186 0.02326 0.01588 0.01891 0.01249 0.01583 0.01033 0.01545 0.01437 0.02521
## 2006 1 5 1 0 0 0 200 0.01329 0.01974 0.01728 0.02762 0.02908 0.03689 0.02097 0.02077 0.01289 0.01877 0.01161 0.01284 0.02359 0.0205 0.03294 0.02798 0.02711 0.01995 0.01444 0.02461
## 2007 1 5 1 0 0 0 200 0.00173 0.00247 0.00532 0.00836 0.01964 0.02711 0.03454 0.04364 0.03857 0.02876 0.01874 0.0233 0.02355 0.03147 0.02728 0.02798 0.02769 0.0262 0.0229 0.02895
## 2008 1 5 1 0 0 0 200 0 0.0008 0.00379 0.00678 0.01489 0.01878 0.01944 0.02393 0.03722 0.04701 0.04531 0.03278 0.03824 0.03168 0.02488 0.02263 0.02421 0.02163 0.0258 0.02219 0.04671
## 2009 1 5 1 0 0 0 200 0.00095 0.00048 0.00369 0.00525 0.00531 0.01037 0.00964 0.02253 0.03295 0.03007 0.03151 0.03278 0.03626 0.04786 0.03122 0.03289 0.01979 0.0138 0.01483 0.01688
## 2010 1 5 1 0 0 0 200 0 0.00334 0.00802 0.00943 0.00774 0.00538 0.01608 0.01344 0.01296 0.01527 0.02697 0.0363 0.0302 0.03253 0.03672 0.03475 0.0423 0.02624 0.01454 0.01999
## 2011 1 5 1 0 0 0 200 0.00364 0.00437 0.01248 0.02043 0.01686 0.0138 0.01677 0.01505 0.01821 0.0132 0.01805 0.02026 0.01612 0.02952 0.02745 0.02573 0.02416 0.02042 0.01154 0.01646
## 2012 1 5 1 0 0 0 200 0.00247 0.00398 0.01202 0.01593 0.01281 0.0227 0.03362 0.02474 0.01742 0.01742 0.01532 0.01955 0.02169 0.02644 0.02341 0.02094 0.02315 0.02811 0.01318 0.02521
## 2013 1 5 1 0 0 0 200 0.00082 0.00253 0.01232 0.01451 0.01006 0.01741 0.0131 0.02352 0.02798 0.02607 0.03226 0.03482 0.03028 0.03192 0.03436 0.03244 0.03397 0.04308 0.03945 0.07491
## 2014 1 5 1 0 0 0 200 0 0.00046 0.00259 0.003 0.01598 0.03132 0.04368 0.03479 0.03127 0.0192 0.02307 0.03258 0.03357 0.03086 0.03724 0.0258 0.02237 0.01888 0.01799 0.04393
## 2015 1 5 1 0 0 0 200 0.01049 0.02068 0.01027 0.00933 0.00465 0.01101 0.01577 0.01488 0.02441 0.01865 0.02854 0.02032 0.0235 0.03182 0.02404 0.03383 0.03129 0.02818 0.02777 0.07956
## 2016 1 5 1 0 0 0 200 0.00664 0.00092 0.00263 0.00322 0.00414 0.00426 0.00337 0.00833 0.00688 0.01293 0.00853 0.01452 0.01273 0.02535 0.01953 0.02134 0.02405 0.0389 0.03242 0.07093

## #NMFS female
## #Year Season Fleet Sex Type Shell Maturity Nsmp DataVec
## 1975 1 5 2 0 0 0 200 0.0331 0.04013 0.04814 0.04942 0.05635 0.04386 0.04444 0.04537 0.03261 0.02886 0.01624 0.01581 0.01159 0.00351 0.0029 0.00337
## 1976 1 5 2 0 0 0 200 0.00292 0.00922 0.03134 0.05633 0.0688 0.06279 0.00846 0.02692 0.01213 0.01368 0.00663 0.0049 0.00231 0.00151 0.00028 0.00109
## 1977 1 5 2 0 0 0 200 0.00256 0.00677 0.00793 0.01932 0.03367 0.07011 0.08076 0.07146 0.04525 0.04354 0.0415 0.03157 0.0151 0.01004 0.00328 0.00458
## 1978 1 5 2 0 0 0 200 0.00604 0.0111 0.01868 0.02009 0.0233 0.04183 0.09199 0.12124 0.07912 0.04404 0.0301 0.02673 0.01757 0.00889 0.00446 0.00745
## 1979 1 5 2 0 0 0 200 0.02855 0.01536 0.01209 0.01473 0.01478 0.02297 0.03813 0.0734 0.09219 0.08763 0.0565 0.03363 0.02145 0.01228 0.00425 0.00571
## 1980 1 5 2 0 0 0 200 0.00479 0.02191 0.03221 0.02922 0.05972 0.08196 0.04872 0.05811 0.054 0.04236 0.03153 0.01303 0.01096 0.00587 0.00348 0.00201
## 1981 1 5 2 0 0 0 200 0.01521 0.01126 0.01507 0.01897 0.03662 0.04562 0.04427 0.04722 0.05995 0.07744 0.08035 0.05095 0.02524 0.01431 0.0028 0.00415
## 1982 1 5 2 0 0 0 200 0.05357 0.09537 0.06029 0.03784 0.04226 0.04818 0.03978 0.02321 0.01896 0.02571 0.02813 0.02027 0.01141 0.00625 0.00238 0.00086
## 1983 1 5 2 0 0 0 200 0.01741 0.0383 0.04749 0.06292 0.06466 0.03981 0.03046 0.01518 0.01068 0.00422 0.00904 0.00563 0.00605 0.00222 0.00129 0
## 1984 1 5 2 0 0 0 200 0.01741 0.05854 0.12291 0.11051 0.06465 0.03249 0.01589 0.01191 0.00379 0.00166 0 0.00041 0.0001 0.0002 0.00009 0
## 1985 1 5 2 0 0 0 200 0.00086 0.01548 0.03765 0.05212 0.0643 0.05553 0.05156 0.03973 0.01606 0.00681 0 0 0.00149 0 0
## 1986 1 5 2 0 0 0 183.5 0.01237 0.02244 0.03547 0.02742 0.02628 0.03133 0.03617 0.03878 0.0274 0.01125 0.00715 0.00079 0 0 0.00076 0
## 1987 1 5 2 0 0 0 200 0.00132 0.01236 0.0525 0.09184 0.0761 0.04624 0.04448 0.05692 0.04138 0.02915 0.01788 0.00791 0.00183 0.00041 0 0
## 1988 1 5 2 0 0 0 200 0.00059 0.00764 0.00644 0.00617 0.01394 0.06945 0.09103 0.09785 0.06971 0.06 0.04068 0.01837 0.00717 0.00766 0 0
## 1989 1 5 2 0 0 0 200 0.00165 0 0.00171 0.00818 0.03103 0.07404 0.06458 0.06919 0.05312 0.03764 0.03146 0.01943 0.00643 0.00413 0 0
## 1990 1 5 2 0 0 0 200 0.00405 0.00521 0.02352 0.0513 0.05251 0.00709 0.0286 0.06012 0.0732 0.0708 0.06333 0.04095 0.02151 0.00616 0.00369 0.0037
## 1991 1 5 2 0 0 0 200 0.00415 0.0115 0.01956 0.03195 0.0218 0.03443 0.00426 0.03095 0.03663 0.03294 0.02808 0.0431 0.02323 0.01104 0.00689 0.00269
## 1992 1 5 2 0 0 0 180 0 0.00534 0.00737 0.01974 0.03642 0.04139 0.06251 0.04481 0.03529 0.02733 0.04503 0.04068 0.02651 0.02118 0.01619 0.01224
## 1993 1 5 2 0 0 0 200 0.00655 0.008 0.01751 0.00849 0.01309 0.02482 0.04371 0.06474 0.06388 0.02686 0.02996 0.02676 0.02709 0.04448 0.01754 0.02194
## 1994 1 5 2 0 0 0 133 0 0.0016 0.00443 0.00296 0.01685 0.00917 0.0124 0.02131 0.04312 0.0416 0.03619 0.02802 0.03953 0.04689 0.02916 0.03206
## 1995 1 5 2 0 0 0 200 0.02942 0.04821 0.03155 0.01453 0.01391 0.01824 0.01628 0.02535 0.02343 0.03343 0.02724 0.02335 0.02398 0.0145 0.02031 0.01547
## 1996 1 5 2 0 0 0 200 0.02595 0.02186 0.04362 0.0794 0.07958 0.04357 0.02255 0.02176 0.02451 0.02017 0.01611 0.02847 0.02443 0.01563 0.00871 0.02361
## 1997 1 5 2 0 0 0 200 0.00043 0.00367 0.00162 0.00201 0.0146 0.07907 0.09694 0.06164 0.02119 0.01367 0.00948 0.01455 0.01427 0.01092 0.00836 0.02077
## 1998 1 5 2 0 0 0 200 0.0145 0.0196 0.01006 0.00876 0.01105 0.01161 0.03029 0.10399 0.1153 0.05939 0.03029 0.02522 0.0225 0.02353 0.02319 0.03361
## 1999 1 5 2 0 0 0 200 0.02426 0.01691 0.0125 0.01148 0.00435 0.00547 0.00925 0.0164 0.05117 0.07996 0.05828 0.03579 0.03397 0.01988 0.01227 0.02683
## 2000 1 5 2 0 0 0 200 0.00175 0.00672 0.02685 0.04027 0.03573 0.02718 0.02545 0.02263 0.03583 0.05235 0.06757 0.06028 0.04188 0.02084 0.0167 0.04334
## 2001 1 5 2 0 0 0 200 0.0056 0.01683 0.01951 0.01361 0.02585 0.05984 0.07787 0.05792 0.03945 0.03981 0.02909 0.06914 0.056 0.02621 0.01028 0.02048
## 2002 1 5 2 0 0 0 200 0.05063 0.07685 0.04852 0.02466 0.02215 0.01761 0.02247 0.05199 0.0399 0.02964 0.0163 0.02059 0.02046 0.02206 0.00712 0.0136
## 2003 1 5 2 0 0 0 200 0.01634 0.00586 0.01433 0.03142 0.04137 0.04644 0.02385 0.02915 0.03511 0.05333 0.05263 0.0356 0.02189 0.02647 0.02196 0.03492
## 2004 1 5 2 0 0 0 200 0.02787 0.0327 0.01935 0.01322 0.01994 0.03692 0.05771 0.05139 0.03339 0.02035 0.01956 0.0232 0.01836 0.01662 0.01266 0.02251
## 2005 1 5 2 0 0 0 200 0.04054 0.0561 0.04573 0.01155 0.00988 0.0336 0.03861 0.05206 0.05668 0.04675 0.03355 0.03825 0.03468 0.02272 0.01648 0.02455
## 2006 1 5 2 0 0 0 200 0.01429 0.01386 0.01981 0.04248 0.06153 0.04621 0.02542 0.02591 0.04811 0.06555 0.06186 0.04148 0.03012 0.0352 0.01666 0.01864
## 2007 1 5 2 0 0 0 200 0.00152 0.00227 0.00641 0.00782 0.01546 0.05363 0.06737 0.05603 0.0325 0.05699 0.06137 0.06413 0.04591 0.03429 0.02104 0.0323
## 2008 1 5 2 0 0 0 200 0 0.00267 0.00538 0.01359 0.01158 0.01666 0.03027 0.05696 0.07237 0.05603 0.05546 0.05617 0.05754 0.03547 0.02343 0.02157
## 2009 1 5 2 0 0 0 200 0.00046 0.00189 0.00503 0.00549 0.00814 0.01218 0.02057 0.04661 0.06559 0.08662 0.06446 0.06028 0.05226 0.0705 0.05137 0.04697
## 2010 1 5 2 0 0 0 200 0.00184 0.00058 0.00373 0.0048 0.00685 0.01163 0.02131 0.03645 0.05649 0.0927 0.09548 0.07004 0.05089 0.0497 0.05075 0.05452
## 2011 1 5 2 0 0 0 200 0.00577 0.00845 0.0092 0.01412 0.02842 0.03104 0.03835 0.04841 0.02992 0.053 0.06374 0.09051 0.06345 0.05714 0.04303 0.07095
## 2012 1 5 2 0 0 0 200 0.02925 0.01803 0.0191 0.02495 0.02805 0.04611 0.03514 0.02198 0.03313 0.03551 0.03653 0.04609 0.06625 0.05206 0.04621 0.06328
## 2013 1 5 2 0 0 0 200 0.00081 0.00269 0.00929 0.01117 0.00669 0.01248 0.02018 0.03841 0.04287 0.04496 0.03041 0.03016 0.04553 0.04914 0.04049 0.07861
## 2014 1 5 2 0 0 0 200 0 0 0.00122 0.00395 0.00909 0.02582 0.02188 0.03196 0.04992 0.07704 0.05691 0.04559 0.0307 0.03987 0.0516 0.0859
## 2015 1 5 2 0 0 0 200 0.00736 0.01285 0.01098 0.00549 0.01195 0.01136 0.01067 0.02344 0.04079 0.04609 0.06164 0.06684 0.05313 0.05034 0.03618 0.06192
## 2016 1 5 2 0 0 0 200 0.01201 0.00186 0.00358 0.00425 0.00258 0.00511 0.01429 0.01409 0.03897 0.07143 0.07817 0.10231 0.07368 0.0823 0.06165 0.11576

## #BSFRF males
## #Year Season Fleet Sex Type Shell Maturity Nsmp DataVec
## 2007 1 6 1 0 0 0 628 0.0045 0.0074 0.0103 0.0155 0.0198 0.0321 0.0532 0.0491 0.0443 0.0
```

The Gmacs base model control file:

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```

##      0.544      0.1      5      -3      0      0.1      5.0      # recruitment scale (variance component) - THIS IS ESTIMATED BY SEX IN JIES MODEL CALLED betar (I FIXED AT MEAN HERE)
##      -0.9      -10      0.75      -4      0      -10.0      0.75      # ln(sigma_R)
##      0.75      0.20      1.00      -2      3      3.0      2.00      # steepness
##      0.01      0.00      1.00      -3      3      1.01      1.01      # recruitment autocorrelation
## ## ----- ##
## ## ----- ##
## ## GROWTH PARAMETER CONTROLS ##
## ## Two lines for each parameter if split sex, one line if not ##
## ## ----- ##
## ## number of molt periods ##
## ## 2 ##
## ## ----- ##
## ## ival      lb      ub      phz      prior      p1      p2      # parameter ##
## ## ----- ##
## ## 99.9      1.0      90.0      -3      0      0.0      999.0      # alpha males or combined
## ## 99.9      1.0      90.0      -3      0      0.0      999.0      # alpha
## ## 0.00      0.0      0.9      -3      0      0.0      999.0      # beta males or combined
## ## 0.00      0.0      0.9      -3      0      0.0      999.0      # beta
## ## 1.365758      0.1      3.0      -4      0      0.0      999.0      # gscale males or combined
## ## 1.885541      0.1      3.0      -4      0      0.0      999.0      # gscale
## ## ----- ##
## ## ----- ##
## ## MOLTING PROBABILITY CONTROLS ##
## ## Two lines for each parameter if split sex, one line if not ##
## ## ----- ##
## ## ival      lb      ub      phz      prior      p1      p2      # parameter ##
## ## ----- ##
## ## Period 1 ##
## ## 144.170986      1.0      180.0      3      0      0.0      999.0      # molt_mu males
## ## 400.0      1.0      999.0      -4      0      0.0      999.0      # molt_mu females (molt every year)
## ## 0.05      0.0001      1.0      4      0      0.0      999.0      # molt_cv males
## ## 0.1      0.0001      9.0      -4      0      0.0      999.0      # molt_cv females (molt every year)
## ## Period 2 ##
## ## 140.5      1.0      195.0      3      0      0.0      999.0      # molt_mu males
## ## 400.0      1.0      999.0      -4      0      0.0      999.0      # molt_mu females (molt every year)
## ## 0.071      0.0001      9.0      4      0      0.0      999.0      # molt_cv males
## ## 0.1      0.0001      9.0      -4      0      0.0      999.0      # molt_cv females (molt every year)
## ## ----- ##
## ## ----- ##
## ## SELECTIVITY CONTROLS ##
## ## Selectivity P(capture of all sizes). Each gear must have a selectivity and a ##
## ## retention selectivity. If a uniform prior is selected for a parameter then the ##
## ## lb and ub are used (p1 and p2 are ignored) ##
## ## ----- ##
## ## LEGEND ##
## ## sel type: 0 = parametric, 1 = coefficients (NIY), 2 = logistic, 3 = logistic95, ##
## ## 4 = double normal (NIY) ##
## ## gear index: use +ve for selectivity, -ve for retention ##
## ## sex dep: 0 for sex-independent, 1 for sex-dependent ##
## ## ----- ##
## ## Gear-1      Gear-2      Gear-3      Gear-4      Gear-5      Gear-6 ##
## ## 1      1      1      1      2      1      # selectivity periods
## ## 1      0      1      0      1      1      # sex specific selectivity
## ## 3      3      3      3      3      3      # male selectivity type
## ## 3      3      3      3      3      3      # female selectivity type
## ## Gear-1      Gear-2      Gear-3      Gear-4      Gear-5      Gear-6 ##
## ## 1      1      1      1      1      1      # retention periods
## ## 1      0      0      0      0      0      # sex specific retention
## ## 3      2      2      2      2      2      # male retention type
## ## 2      2      2      2      2      2      # female retention type
## ## 1      0      0      0      0      0      # male retention flag (0 = no, 1 = yes)
## ## 0      0      0      0      0      0      # female retention flag (0 = no, 1 = yes)
## ## ----- ##
## ## gear      par      sel ##
## ## index index par sex ival lb ub prior p1 p2 phz start end ##
## ## ----- ##
## ## # Gear-1 ##
## ## 1      1      1      1      100      5      136      0      1      999      3      1975      2016
## ## 1      2      2      1      120      5      137      0      1      999      3      1975      2016
## ## 1      3      1      2      84      60      150      0      1      999      3      1975      2016
## ## 1      4      2      2      95      60      150      0      1      999      3      1975      2016
## ## # Gear-2 ##
## ## 2      5      1      0      110      5      185      0      1      999      3      1975      2016
## ## 2      6      2      0      150      5      185      0      1      999      3      1975      2016
## ## # Gear-3 ##
## ## 3      7      1      1      110      5      185      0      1      999      3      1975      2016
## ## 3      8      2      1      150      5      185      0      1      999      3      1975      2016
## ## 3      9      1      2      110      5      185      0      1      999      3      1975      2016
## ## 3      10      2      2      150      5      185      0      1      999      3      1975      2016
## ## # Gear-3 ##
## ## 4      11      1      0      110      5      185      0      1      999      3      1975      2016
## ## 4      12      2      0      150      5      185      0      1      999      3      1975      2016
## ## # Gear-5 ##
## ## 5      13      1      1      74      60      90      0      1      999      3      1975      1981
## ## 5      14      2      1      95      70      150      0      1      999      3      1975      1981
## ## 5      15      1      1      90      60      90      0      1      999      3      1982      2016
## ## 5      16      2      1      160      70      150      0      1      999      3      1982      2016
## ## 5      17      1      2      74      60      180      0      1      999      3      1975      1981
## ## 5      18      2      2      95      70      180      0      1      999      3      1975      1981
## ## 5      19      1      2      90      60      180      0      1      999      3      1982      2016
## ## 5      20      2      2      160      70      180      0      1      999      3      1982      2016
## ## # Gear-6 ##
## ## 6      21      1      1      70      1      180      0      1      999      4      1975      2016
## ## 6      22      2      1      90      1      180      0      1      999      4      1975      2016
## ## 6      23      1      2      110      1      180      0      1      999      4      1975      2016
## ## 6      24      2      2      190      1      180      0      1      999      4      1975      2016
## ## ----- ##
## ## Retained ##
## ## gear      par      sel ##
## ## index index par sex ival lb ub prior p1 p2 phz start end ##
## ## ----- ##
## ## # Gear-1 ##
## ## -1      25      1      1      136      1      999      0      1      999      4      1975      2016
## ## -1      26      2      1      137      1      999      0      1      999      5      1975      2016
## ## -1      27      1      2      591      1      999      0      1      999      -3      1975      2016

```

```

## -1 28 2 2 11 1 999 0 1 999 -3 1975 2016
## # Gear-2
## -2 29 1 0 595 1 999 0 1 999 -3 1975 2016
## -2 30 2 0 10 1 999 0 1 999 -3 1975 2016
## # Gear-3
## -3 31 1 0 595 1 999 0 1 999 -3 1975 2016
## -3 32 2 0 10 1 999 0 1 999 -3 1975 2016
## # Gear-4
## -4 33 1 0 595 1 999 0 1 999 -3 1975 2016
## -4 34 2 0 10 1 999 0 1 999 -3 1975 2016
## # Gear-5
## -5 35 1 0 590 1 999 0 1 999 -3 1975 2016
## -5 36 2 0 10 1 999 0 1 999 -3 1975 2016
## # Gear-6
## -6 37 1 0 580 1 999 0 1 999 -3 1975 2016
## -6 38 2 0 20 1 999 0 1 999 -3 1975 2016
## ## ----- ##
## ## ----- ##
## ## PRIORS FOR CATCHABILITY
## ## If a uniform prior is selected for a parameter then the lb and ub are used (p1
## ## and p2 are ignored). ival must be > 0
## ## LEGEND
## ## prior: 0 = uniform, 1 = normal, 2 = lognormal, 3 = beta, 4 = gamma
## ## ----- ##
## ## ival lb ub phz prior p1 p2 Analytic? LAMBDA
## ## 0.84 0 1 4 1 0.843136 0.03 0 1 # NMFS, 0.896 is the magic number * 0.941 (Jies max selex)
## ## 1.0 0 5 -4 0 0.001 5.00 0 1 # BSFRF
## ## ----- ##
## ## ----- ##
## ## ADDITIONAL CV FOR SURVEYS/INDICES
## ## If a uniform prior is selected for a parameter then the lb and ub are used (p1
## ## and p2 are ignored). ival must be > 0
## ## LEGEND
## ## prior type: 0 = uniform, 1 = normal, 2 = lognormal, 3 = beta, 4 = gamma
## ## ----- ##
## ## ival lb ub phz prior p1 p2
## ## 0.0001 0.00001 10.0 -4 4 1.0 100 # NMFS
## ## 0.0001 0.00001 10.0 -4 4 1.0 100 # BSFRF
## ## ----- ##
## ## ----- ##
## ## PENALTIES FOR AVERAGE FISHING MORTALITY RATE FOR EACH GEAR
## ## ----- ##
## ## Mean_F STD_PHZ1 STD_PHZ2 PHZ
## ## 0.1 0.5 45.50 1 # Pot
## ## 0.005 0.5 45.50 1 # Trawl
## ## 0.005 0.5 45.50 1 # Tanner
## ## 0.005 0.5 45.50 1 # Fixed
## ## 0.00 2.00 20.00 -1 # NMFS trawl survey (0 catch)
## ## 0.00 2.00 20.00 -1 # BSFRF (0)
## ## ----- ##
## ## ----- ##
## ## OPTIONS FOR SIZE COMPOSITION DATA
## ## One column for each data matrix
## ## LEGEND
## ## Likelihood: 1 = Multinomial with estimated/fixed sample size
## ## 2 = Robust approximation to multinomial
## ## 3 = logistic normal (NIY)
## ## 4 = multivariate-t (NIY)
## ## 5 = Dirichlet
## ## AUTO TAIL COMPRESSION
## ## pmin is the cumulative proportion used in tail compression
## ## ----- ##
## ## Pot Trawl Tanner NMFS BSFRF
## ## 2 2 2 2 2 2 2 2 2 2 2 # Type of likelihood
## ## 0 0 0 0 0 0 0 0 0 0 0 # Auto tail compression (pmin)
## ## 1 1 1 1 1 1 1 1 1 1 1 # Initial value for effective sample size multiplier
## ## -4 -4 -4 -4 -4 -4 -4 -4 -4 -4 -4 # Phz for estimating effective sample size (if appl.)
## ## 1 2 2 3 3 4 4 5 5 6 6 7 7 # Composition aggregator
## ## 1 1 1 1 1 1 1 1 1 1 1 1 1 # LAMBDA
## ## ----- ##
## ## ----- ##
## ## TIME VARYING NATURAL MORTALITY RATES
## ## LEGEND
## ## Type: 0 = constant natural mortality
## ## 1 = Random walk (deviates constrained by variance in M)
## ## 2 = Cubic Spline (deviates constrained by nodes & node-placement)
## ## 3 = Blocked changes (deviates constrained by variance at specific knots)
## ## 4 = Time blocks
## ## ----- ##
## ## Sex-specific? (0=no, 1=yes)
## ## 1
## ## Type
## ## 3
## ## Phase of estimation
## ## 3
## ## STDEV in m_dev for Random walk
## ## 0.25
## ## Number of nodes for cubic spline or number of step-changes for option 3
## ## 2
## ## 4
## ## Year position of the knots (vector must be equal to the number of nodes)
## ## 1980 1985
## ## 1976 1980 1985 1994
## ## ----- ##
## ## ----- ##
## ## OTHER CONTROLS
## ## ----- ##
## ## 3 # Estimated rec_dev phase
## ## -3 # Estimated rec_ini phase
## ## 0 # VERBOSE FLAG (0 = off, 1 = on, 2 = objective func)
## ## 0 # Initial conditions (0 = Unfished, 1 = Steady-state fished, 2 = Free parameters)

```



```

## 1984 # First year for average recruitment for Bspr calculation.
## 2016 # Last year for average recruitment for Bspr calculation.
## 0.35 # Target SPR ratio for Bmsy proxy.
## 1 # Gear index for SPR calculations (i.e., directed fishery).
## 1 # Lambda (proportion of mature male biomass for SPR reference points).
## 1 # Use empirical molt increment data (0=FALSE, 1=TRUE)
## 0 # Stock-Recruit-Relationship (0 = none, 1 = Beverton-Holt)
## ## EOF
## 9999

```

The Free q model control file:

```

## ## ----- ##
## ## LEADING PARAMETER CONTROLS ##
## ## Controls for leading parameter vector (theta) ##
## ## LEGEND ##
## ## prior: 0 = uniform, 1 = normal, 2 = lognormal, 3 = beta, 4 = gamma ##
## ## ----- ##
## ## ntheta ##
## ## 9 ##
## ## ----- ##
## ## ival lb ub phz prior p1 p2 # parameter ##
## ## ----- ##
## ## 0.18 0.15 0.2 -4 2 0.18 0.04 # M ##
## ## 16.5 -10 18 -2 0 -10.0 20.0 # logR0 ##
## ## 14.0 -10 20 -2 0 10.0 20.0 # logR1, to estimate if NOT initialized at unfished ##
## ## 14.0 -10 20 1 0 10.0 20.0 # logRbar, to estimate if NOT initialized at unfished ##
## ## 72.5 55 100 -4 1 72.5 7.25 # recruitment expected value ##
## ## 0.544 0.1 5 -3 0 0.1 5.0 # recruitment scale (variance component) - THIS IS ESTIMATED BY SEX IN JIES MODEL CALLED betar (I FIXED AT MEAN HERE) ##
## ## -0.9 -10 0.75 -4 0 -10.0 0.75 # ln(sigma_R) ##
## ## 0.75 0.20 1.00 -2 3 3.0 2.00 # steepness ##
## ## 0.01 0.00 1.00 -3 3 1.01 1.01 # recruitment autocorrelation ##
## ## ----- ##
## ## ----- ##
## ## GROWTH PARAMETER CONTROLS ##
## ## Two lines for each parameter if split sex, one line if not ##
## ## ----- ##
## ## number of molt periods ##
## ## 2 ##
## ## ----- ##
## ## ival lb ub phz prior p1 p2 # parameter ##
## ## ----- ##
## ## 99.9 1.0 90.0 -3 0 0.0 999.0 # alpha males or combined ##
## ## 99.9 1.0 90.0 -3 0 0.0 999.0 # alpha ##
## ## 0.00 0.0 0.9 -3 0 0.0 999.0 # beta males or combined ##
## ## 0.00 0.0 0.9 -3 0 0.0 999.0 # beta ##
## ## 1.365758 0.1 3.0 -4 0 0.0 999.0 # gscale males or combined ##
## ## 1.885541 0.1 3.0 -4 0 0.0 999.0 # gscale ##
## ## ----- ##
## ## ----- ##
## ## MOLTING PROBABILITY CONTROLS ##
## ## Two lines for each parameter if split sex, one line if not ##
## ## ----- ##
## ## ival lb ub phz prior p1 p2 # parameter ##
## ## ----- ##
## ## Period 1 ##
## ## 144.170986 1.0 180.0 3 0 0.0 999.0 # molt_mu males ##
## ## 400.0 1.0 999.0 -4 0 0.0 999.0 # molt_mu females (molt every year) ##
## ## 0.05 0.0001 1.0 4 0 0.0 999.0 # molt_cv males ##
## ## 0.1 0.0001 9.0 -4 0 0.0 999.0 # molt_cv females (molt every year) ##
## ## Period 2 ##
## ## 140.5 1.0 195.0 3 0 0.0 999.0 # molt_mu males ##
## ## 400.0 1.0 999.0 -4 0 0.0 999.0 # molt_mu females (molt every year) ##
## ## 0.071 0.0001 9.0 4 0 0.0 999.0 # molt_cv males ##
## ## 0.1 0.0001 9.0 -4 0 0.0 999.0 # molt_cv females (molt every year) ##
## ## ----- ##
## ## ----- ##
## ## SELECTIVITY CONTROLS ##
## ## Selectivity P(capture of all sizes). Each gear must have a selectivity and a ##
## ## retention selectivity. If a uniform prior is selected for a parameter then the ##
## ## lb and ub are used (p1 and p2 are ignored) ##
## ## ----- ##
## ## LEGEND ##
## ## sel type: 0 = parametric, 1 = coefficients (NIY), 2 = logistic, 3 = logistic95, ##
## ## 4 = double normal (NIY) ##
## ## gear index: use +ve for selectivity, -ve for retention ##
## ## sex dep: 0 for sex-independent, 1 for sex-dependent ##
## ## ----- ##
## ## Gear-1 Gear-2 Gear-3 Gear-4 Gear-5 Gear-6 ##
## ## 1 1 1 1 2 1 # selectivity periods ##
## ## 1 0 1 0 1 1 # sex specific selectivity ##
## ## 3 3 3 3 3 3 # male selectivity type ##
## ## 3 3 3 3 3 3 # female selectivity type ##
## ## Gear-1 Gear-2 Gear-3 Gear-4 Gear-5 Gear-6 ##
## ## 1 1 1 1 1 1 # retention periods ##
## ## 1 0 0 0 0 0 # sex specific retention ##
## ## 3 2 2 2 2 2 # male retention type ##
## ## 2 2 2 2 2 2 # female retention type ##
## ## 1 0 0 0 0 0 # male retention flag (0 = no, 1 = yes) ##
## ## 0 0 0 0 0 0 # female retention flag (0 = no, 1 = yes) ##
## ## ----- ##
## ## gear par sel ##
## ## index index par sex ival lb ub prior p1 p2 phz start end ##
## ## ----- ##
## ## Gear-1 ##
## ## 1 1 1 1 100 5 136 0 1 999 3 1975 2016 ##
## ## 1 2 2 1 120 5 137 0 1 999 3 1975 2016 ##
## ## 1 3 1 2 84 60 150 0 1 999 3 1975 2016 ##
## ## 1 4 2 2 95 60 150 0 1 999 3 1975 2016 ##
## ## Gear-2 ##
## ## 2 5 1 0 110 5 185 0 1 999 3 1975 2016 ##
## ## 2 6 2 0 150 5 185 0 1 999 3 1975 2016 ##
## ## Gear-3 ##
## ## 3 7 1 1 110 5 185 0 1 999 3 1975 2016 ##
## ## 3 8 2 1 150 5 185 0 1 999 3 1975 2016 ##
## ## 3 9 1 2 110 5 185 0 1 999 3 1975 2016 ##
## ## 3 10 2 2 150 5 185 0 1 999 3 1975 2016 ##
## ## Gear-3 ##
## ## 4 11 1 0 110 5 185 0 1 999 3 1975 2016 ##
## ## 4 12 2 0 150 5 185 0 1 999 3 1975 2016 ##
## ## Gear-5 ##
## ## 5 13 1 1 74 60 90 0 1 999 3 1975 1981 ##
## ## 5 14 2 1 95 70 150 0 1 999 3 1975 1981 ##
## ## 5 15 1 1 90 60 90 0 1 999 3 1982 2016 ##
## ## 5 16 2 1 160 70 150 0 1 999 3 1982 2016 ##

```

```

## 5 17 1 2 74 60 180 0 1 999 3 1975 1981
## 5 18 2 2 95 70 180 0 1 999 3 1975 1981
## 5 19 1 2 90 60 180 0 1 999 3 1982 2016
## 5 20 2 2 160 70 180 0 1 999 3 1982 2016
## # Gear-6
## 6 21 1 1 70 1 180 0 1 999 4 1975 2016
## 6 22 2 1 90 1 180 0 1 999 4 1975 2016
## 6 23 1 2 110 1 180 0 1 999 4 1975 2016
## 6 24 2 2 190 1 180 0 1 999 4 1975 2016
## ## ----- ##
## ## Retained ##
## ## gear par sel ##
## ## index index par sex ival lb ub prior p1 p2 phz start end ##
## ## period period ##
## ## ----- ##
## # Gear-1
## -1 25 1 1 136 1 999 0 1 999 4 1975 2016
## -1 26 2 1 137 1 999 0 1 999 5 1975 2016
## -1 27 1 2 591 1 999 0 1 999 -3 1975 2016
## -1 28 2 2 11 1 999 0 1 999 -3 1975 2016
## # Gear-2
## -2 29 1 0 595 1 999 0 1 999 -3 1975 2016
## -2 30 2 0 10 1 999 0 1 999 -3 1975 2016
## # Gear-3
## -3 31 1 0 595 1 999 0 1 999 -3 1975 2016
## -3 32 2 0 10 1 999 0 1 999 -3 1975 2016
## # Gear-4
## -4 33 1 0 595 1 999 0 1 999 -3 1975 2016
## -4 34 2 0 10 1 999 0 1 999 -3 1975 2016
## # Gear-5
## -5 35 1 0 590 1 999 0 1 999 -3 1975 2016
## -5 36 2 0 10 1 999 0 1 999 -3 1975 2016
## # Gear-6
## -6 37 1 0 580 1 999 0 1 999 -3 1975 2016
## -6 38 2 0 20 1 999 0 1 999 -3 1975 2016
## ## ----- ##
## ## ----- ##
## ## PRIORS FOR CATCHABILITY ##
## ## If a uniform prior is selected for a parameter then the lb and ub are used (p1 ##
## ## and p2 are ignored). ival must be > 0 ##
## ## LEGEND ##
## ## prior: 0 = uniform, 1 = normal, 2 = lognormal, 3 = beta, 4 = gamma ##
## ## ----- ##
## ## ival lb ub phz prior p1 p2 Analytic? LAMBDA ##
## ## 0.84 0 1 4 1 0.843136 0.03 0 1 # NMFS, 0.896 is the magic number * 0.941 (Jies max selex) ##
## ## 1.0 0 5 4 0 0.001 5.00 0 1 # BSFRF ##
## ## ----- ##
## ## ----- ##
## ## ADDITIONAL CV FOR SURVEYS/INDICES ##
## ## If a uniform prior is selected for a parameter then the lb and ub are used (p1 ##
## ## and p2 are ignored). ival must be > 0 ##
## ## LEGEND ##
## ## prior type: 0 = uniform, 1 = normal, 2 = lognormal, 3 = beta, 4 = gamma ##
## ## ----- ##
## ## ival lb ub phz prior p1 p2 ##
## ## 0.0001 0.00001 10.0 -4 4 1.0 100 # NMFS ##
## ## 0.0001 0.00001 10.0 -4 4 1.0 100 # BSFRF ##
## ## ----- ##
## ## ----- ##
## ## PENALTIES FOR AVERAGE FISHING MORTALITY RATE FOR EACH GEAR ##
## ## ----- ##
## ## Mean_F STD_PHZ1 STD_PHZ2 PHZ ##
## ## 0.1 0.5 45.50 1 # Pot ##
## ## 0.005 0.5 45.50 1 # Trawl ##
## ## 0.005 0.5 45.50 1 # Tanner ##
## ## 0.005 0.5 45.50 1 # Fixed ##
## ## 0.00 2.00 20.00 -1 # NMFS trawl survey (0 catch) ##
## ## 0.00 2.00 20.00 -1 # BSFRF (0) ##
## ## ----- ##
## ## ----- ##
## ## OPTIONS FOR SIZE COMPOSITION DATA ##
## ## One column for each data matrix ##
## ## LEGEND ##
## ## Likelihood: 1 = Multinomial with estimated/fixed sample size ##
## ## 2 = Robust approximation to multinomial ##
## ## 3 = logistic normal (NIY) ##
## ## 4 = multivariate-t (NIY) ##
## ## 5 = Dirichlet ##
## ## AUTO TAIL COMPRESSION ##
## ## pmin is the cumulative proportion used in tail compression ##
## ## ----- ##
## ## Pot Trawl Tanner NMFS BSFRF ##
## ## 2 2 2 2 2 2 2 2 2 2 2 # Type of likelihood ##
## ## 0 0 0 0 0 0 0 0 0 0 0 # Auto tail compression (pmin) ##
## ## 1 1 1 1 1 1 1 1 1 1 1 # Initial value for effective sample size multiplier ##
## ## -4 -4 -4 -4 -4 -4 -4 -4 -4 -4 -4 # Phz for estimating effective sample size (if appl.) ##
## ## 1 2 2 3 4 4 5 5 6 6 7 # Composition aggregator ##
## ## 1 1 1 1 1 1 1 1 1 1 1 # LAMBDA ##
## ## ----- ##
## ## ----- ##
## ## TIME VARYING NATURAL MORTALITY RATES ##
## ## LEGEND ##
## ## Type: 0 = constant natural mortality ##
## ## 1 = Random walk (deviates constrained by variance in M) ##
## ## 2 = Cubic Spline (deviates constrained by nodes & node-placement) ##
## ## 3 = Blocked changes (deviates constrained by variance at specific knots) ##
## ## 4 = Time blocks ##
## ## ----- ##
## ## Sex-specific? (0=no, 1=yes) ##
## ## 1 ##
## ## Type ##
## ## 3 ##
## ## Phase of estimation

```

```

## 3
## ## STDEV in m_dev for Random walk
## 0.25
## ## Number of nodes for cubic spline or number of step-changes for option 3
## 2
## 4
## ## Year position of the knots (vector must be equal to the number of nodes)
## 1980 1985
## 1976 1980 1985 1994
## ## ----- ##
## ## ----- ##
## ## OTHER CONTROLS
## ## ----- ##
## 3      # Estimated rec_dev phase
## -3     # Estimated rec_ini phase
## 0      # VERBOSE FLAG (0 = off, 1 = on, 2 = objective func)
## 0      # Initial conditions (0 = Unfished, 1 = Steady-state fished, 2 = Free parameters)
## 1984   # First year for average recruitment for Bspr calculation.
## 2016   # Last year for average recruitment for Bspr calculation.
## 0.35   # Target SPR ratio for Bmsy proxy.
## 1      # Gear index for SPR calculations (i.e., directed fishery).
## 1      # Lambda (proportion of mature male biomass for SPR reference points).
## 1      # Use empirical molt increment data (0=FALSE, 1=TRUE)
## 0      # Stock-Recruit-Relationship (0 = none, 1 = Beverton-Holt)
## ## EOF
## 9999

```

The Variable M model control file:

```

## ## ----- ##
## ## LEADING PARAMETER CONTROLS
## ## Controls for leading parameter vector (theta)
## ## LEGEND
## ## prior: 0 = uniform, 1 = normal, 2 = lognormal, 3 = beta, 4 = gamma
## ## ----- ##
## ## ntheta
## 9
## ## ----- ##
## ## ival      lb      ub      phz  prior  p1      p2      # parameter
## ## ----- ##
## 0.18      0.15      0.2      -4      2      0.18      0.04      # M
## 16.5      -10      18      -2      0      -10.0      20.0      # logR0
## 14.0      -10      20      -2      0      10.0      20.0      # logR1, to estimate if NOT initialized at unfished
## 14.0      -10      20      1      0      10.0      20.0      # logRbar, to estimate if NOT initialized at unfished
## 72.5      55      100      -4      1      72.5      7.25      # recruitment expected value
## 0.544      0.1      5      -3      0      0.1      5.0      # recruitment scale (variance component) - THIS IS ESTIMATED BY SEX IN JIES MODEL CALLED betar (I FIXED AT MEAN HERE)
## -0.9      -10      0.75      -4      0      -10.0      0.75      # ln(sigma_R)
## 0.75      0.20      1.00      -2      3      3.0      2.00      # steepness
## 0.01      0.00      1.00      -3      3      1.01      1.01      # recruitment autocorrelation
## ## ----- ##
## ## ----- ##
## ## GROWTH PARAMETER CONTROLS
## ## Two lines for each parameter if split sex, one line if not
## ## ----- ##
## ## number of molt periods
## 2
## ## ----- ##
## ## ival      lb      ub      phz  prior  p1      p2      # parameter
## ## ----- ##
## 99.9      1.0      90.0      -3      0      0.0      999.0      # alpha males or combined
## 99.9      1.0      90.0      -3      0      0.0      999.0      # alpha
## 0.00      0.0      0.9      -3      0      0.0      999.0      # beta males or combined
## 0.00      0.0      0.9      -3      0      0.0      999.0      # beta
## 1.365758      0.1      3.0      -4      0      0.0      999.0      # gscale males or combined
## 1.885541      0.1      3.0      -4      0      0.0      999.0      # gscale
## ## ----- ##
## ## ----- ##
## ## MOLTING PROBABILITY CONTROLS
## ## Two lines for each parameter if split sex, one line if not
## ## ----- ##
## ## ival      lb      ub      phz  prior  p1      p2      # parameter
## ## ----- ##
## ## Period 1
## 144.170986      1.0      180.0      3      0      0.0      999.0      # molt_mu males
## 400.0      1.0      999.0      -4      0      0.0      999.0      # molt_mu females (molt every year)
## 0.05      0.0001      1.0      4      0      0.0      999.0      # molt_cv males
## 0.1      0.0001      9.0      -4      0      0.0      999.0      # molt_cv females (molt every year)
## ## Period 2
## 140.5      1.0      195.0      3      0      0.0      999.0      # molt_mu males
## 400.0      1.0      999.0      -4      0      0.0      999.0      # molt_mu females (molt every year)
## 0.071      0.0001      9.0      4      0      0.0      999.0      # molt_cv males
## 0.1      0.0001      9.0      -4      0      0.0      999.0      # molt_cv females (molt every year)
## ## ----- ##
## ## ----- ##
## ## SELECTIVITY CONTROLS
## ## Selectivity P(capture of all sizes). Each gear must have a selectivity and a
## ## retention selectivity. If a uniform prior is selected for a parameter then the
## ## lb and ub are used (p1 and p2 are ignored)
## ## LEGEND
## ## sel type: 0 = parametric, 1 = coefficients (NIY), 2 = logistic, 3 = logistic95,
## ## 4 = double normal (NIY)
## ## gear index: use +ve for selectivity, -ve for retention
## ## sex dep: 0 for sex-independent, 1 for sex-dependent
## ## ----- ##
## ## Gear-1      Gear-2      Gear-3      Gear-4      Gear-5      Gear-6
## 1      1      1      1      2      1      # selectivity periods
## 1      0      1      0      1      1      # sex specific selectivity
## 3      3      3      3      3      3      # male selectivity type
## 3      3      3      3      3      3      # female selectivity type
## ## Gear-1      Gear-2      Gear-3      Gear-4      Gear-5      Gear-6

```

```

##      1      1      1      1      1      1      # retention periods
##      1      0      0      0      0      0      # sex specific retention
##      3      2      2      2      2      2      # male retention type
##      2      2      2      2      2      2      # female retention type
##      1      0      0      0      0      0      # male retention flag (0 = no, 1 = yes)
##      0      0      0      0      0      0      # female retention flag (0 = no, 1 = yes)
## ## ----- ##
## ## gear par sel
## ## index index par sex ival lb ub prior p1 p2 phz start end
## ## ----- ##
## ## Gear-1
##      1      1      1      1      100      5      136      0      1      999      3      1975      2016
##      1      2      2      1      120      5      137      0      1      999      3      1975      2016
##      1      3      1      2      84      60      150      0      1      999      3      1975      2016
##      1      4      2      2      95      60      150      0      1      999      3      1975      2016
## ## Gear-2
##      2      5      1      0      110      5      185      0      1      999      3      1975      2016
##      2      6      2      0      150      5      185      0      1      999      3      1975      2016
## ## Gear-3
##      3      7      1      1      110      5      185      0      1      999      3      1975      2016
##      3      8      2      1      150      5      185      0      1      999      3      1975      2016
##      3      9      1      2      110      5      185      0      1      999      3      1975      2016
##      3      10      2      2      150      5      185      0      1      999      3      1975      2016
## ## Gear-3
##      4      11      1      0      110      5      185      0      1      999      3      1975      2016
##      4      12      2      0      150      5      185      0      1      999      3      1975      2016
## ## Gear-5
##      5      13      1      1      74      60      90      0      1      999      3      1975      1981
##      5      14      2      1      95      70      150      0      1      999      3      1975      1981
##      5      15      1      1      90      60      90      0      1      999      3      1982      2016
##      5      16      2      1      160      70      150      0      1      999      3      1982      2016
##      5      17      1      2      74      60      180      0      1      999      3      1975      1981
##      5      18      2      2      95      70      180      0      1      999      3      1975      1981
##      5      19      1      2      90      60      180      0      1      999      3      1982      2016
##      5      20      2      2      160      70      180      0      1      999      3      1982      2016
## ## Gear-6
##      6      21      1      1      70      1      180      0      1      999      4      1975      2016
##      6      22      2      1      90      1      180      0      1      999      4      1975      2016
##      6      23      1      2      110      1      180      0      1      999      4      1975      2016
##      6      24      2      2      190      1      180      0      1      999      4      1975      2016
## ## ----- ##
## ## Retained
## ## gear par sel
## ## index index par sex ival lb ub prior p1 p2 phz start end
## ## ----- ##
## ## Gear-1
##      -1      25      1      1      136      1      999      0      1      999      4      1975      2016
##      -1      26      2      1      137      1      999      0      1      999      5      1975      2016
##      -1      27      1      2      591      1      999      0      1      999      -3      1975      2016
##      -1      28      2      2      11      1      999      0      1      999      -3      1975      2016
## ## Gear-2
##      -2      29      1      0      595      1      999      0      1      999      -3      1975      2016
##      -2      30      2      0      10      1      999      0      1      999      -3      1975      2016
## ## Gear-3
##      -3      31      1      0      595      1      999      0      1      999      -3      1975      2016
##      -3      32      2      0      10      1      999      0      1      999      -3      1975      2016
## ## Gear-4
##      -4      33      1      0      595      1      999      0      1      999      -3      1975      2016
##      -4      34      2      0      10      1      999      0      1      999      -3      1975      2016
## ## Gear-5
##      -5      35      1      0      590      1      999      0      1      999      -3      1975      2016
##      -5      36      2      0      10      1      999      0      1      999      -3      1975      2016
## ## Gear-6
##      -6      37      1      0      580      1      999      0      1      999      -3      1975      2016
##      -6      38      2      0      20      1      999      0      1      999      -3      1975      2016
## ## ----- ##
## ## ----- ##
## ## PRIORS FOR CATCHABILITY
## ## If a uniform prior is selected for a parameter then the lb and ub are used (p1
## ## and p2 are ignored). ival must be > 0
## ## ----- ##
## ## LEGEND
## ## prior: 0 = uniform, 1 = normal, 2 = lognormal, 3 = beta, 4 = gamma
## ## ----- ##
## ## ival lb ub phz prior p1 p2 Analytic? LAMBDA
## ## 0.84 0 1 4 1 0.843136 0.03 0 1 # NMFS, 0.896 is the magic number * 0.941 (Jies max selex)
## ## 1.0 0 5 -4 0 0.001 5.00 0 1 # BSFRF
## ## ----- ##
## ## ----- ##
## ## ADDITIONAL CV FOR SURVEYS/INDICES
## ## If a uniform prior is selected for a parameter then the lb and ub are used (p1
## ## and p2 are ignored). ival must be > 0
## ## ----- ##
## ## LEGEND
## ## prior type: 0 = uniform, 1 = normal, 2 = lognormal, 3 = beta, 4 = gamma
## ## ----- ##
## ## ival lb ub phz prior p1 p2
## ## 0.0001 0.00001 10.0 -4 4 1.0 100 # NMFS
## ## 0.0001 0.00001 10.0 -4 4 1.0 100 # BSFRF
## ## ----- ##
## ## ----- ##
## ## PENALTIES FOR AVERAGE FISHING MORTALITY RATE FOR EACH GEAR
## ## ----- ##
## ## Mean_F STD_PHZ1 STD_PHZ2 PHZ # Pot
## ## 0.1 0.5 45.50 1 # Trawl
## ## 0.005 0.5 45.50 1 # Tanner
## ## 0.005 0.5 45.50 1 # Fixed
## ## 0.005 0.5 45.50 1 # NMFS trawl survey (0 catch)
## ## 0.00 2.00 20.00 -1 # BSFRF (0)
## ## 0.00 2.00 20.00 -1 # BSFRF (0)
## ## ----- ##
## ## ----- ##
## ## OPTIONS FOR SIZE COMPOSTION DATA
## ## One column for each data matrix
## ## ----- ##
## ## LEGEND
## ## ----- ##

```



```

## ## Likelihood: 1 = Multinomial with estimated/fixed sample size ##
## ## 2 = Robust approximation to multinomial ##
## ## 3 = logistic normal (NIY) ##
## ## 4 = multivariate-t (NIY) ##
## ## 5 = Dirichlet ##
## ## AUTO TAIL COMPRESSION ##
## ## pmin is the cumulative proportion used in tail compression ##
## ## ----- ##
## # Pot Trawl Tanner NMFS BSFRF
## 2 2 2 2 2 2 2 2 2 2 2 2 # Type of likelihood
## 0 0 0 0 0 0 0 0 0 0 0 0 # Auto tail compression (pmin)
## 1 1 1 1 1 1 1 1 1 1 1 1 # Initial value for effective sample size multiplier
## -4 -4 -4 -4 -4 -4 -4 -4 -4 -4 -4 -4 # Phz for estimating effective sample size (if appl.)
## 1 2 2 3 3 4 4 5 5 6 6 7 # Composition aggregator
## 1 1 1 1 1 1 1 1 1 1 1 1 # LAMBDA
## ## ----- ##
## ## ----- ##
## ## TIME VARYING NATURAL MORTALITY RATES ##
## ## LEGEND ##
## ## Type: 0 = constant natural mortality ##
## ## 1 = Random walk (deviates constrained by variance in M) ##
## ## 2 = Cubic Spline (deviates constrained by nodes & node-placement) ##
## ## 3 = Blocked changes (deviates constrained by variance at specific knots) ##
## ## 4 = Time blocks ##
## ## ----- ##
## ## Sex-specific? (0=no, 1=yes) ##
## 1
## ## Type
## 1
## ## Phase of estimation
## 3
## ## STDEV in m_dev for Random walk
## 0.25
## ## Number of nodes for cubic spline or number of step-changes for option 3
## 4
## 4
## ## Year position of the knots (vector must be equal to the number of nodes)
## 1980 1985 1990 2000
## 1980 1985 1990 2000
## ## ----- ##
## ## ----- ##
## ## OTHER CONTROLS ##
## ## ----- ##
## 3 # Estimated rec_dev phase
## -3 # Estimated rec_ini phase
## 0 # VERBOSE FLAG (0 = off, 1 = on, 2 = objective func)
## 0 # Initial conditions (0 = Unfished, 1 = Steady-state fished, 2 = Free parameters)
## 1984 # First year for average recruitment for Bspr calculation.
## 2016 # Last year for average recruitment for Bspr calculation.
## 0.35 # Target SPR ratio for Bmsy proxy.
## 1 # Gear index for SPR calculations (i.e., directed fishery).
## 1 # Lambda (proportion of mature male biomass for SPR reference points).
## 1 # Use empirical molt increment data (0=FALSE, 1=TRUE)
## 0 # Stock-Recruit-Relationship (0 = none, 1 = Beverton-Holt)
## ## EDF
## 9999

```