Appendix B: SMBKC Stock Assessment Input Files

The data file:

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## #==================================================================================================
## # Gmacs Main  Data  File  Version 1.1:  SM17 example
## # GEAR_INDEX    DESCRIPTION
## #     1          : Pot fishery retained catch.
## #     1          : Pot fishery with discarded catch.
## #     2          : Trawl bycatch
## #     3          : Fixed bycatch
## #     4          : Trawl survey
## #     5          : Pot survey
##
## # Fisheries:  1 Pot Fishery,  2 Pot Discard,  3 Trawl by-catch, 3 Fixed by-catch
## # Surveys:    4 NMFS Trawl Survey, 5 Pot Survey
## #==================================================================================================
##
## 1978  # Start year
## 2017  # End year
## 2018  # Projection year
## 5      # Number of seasons
## 5      # Number of distinct data groups (among fishing fleets and surveys)
## 1      # Number of sexes
## 1      # Number of shell condition types
## 1      # Number of maturity types
## 3      # Number of size-classes in the model
## 5      # Season recruitment occurs
## 5      # Season molting and growth occurs
## 4      # Season to calculate SSB
## 1      # Season for N output
## # size_breaks (a vector giving the break points between size intervals with dimension nclass+1)
## 90   105   120   135
## # weight-at-length input method (1 = allometry i.e. w_l = a*l^b, 2 = vector by sex, 3 = matrix by se:
## 3
## # weight-at-length allometry w_l = a*l^b
## 4.03E-07
## # b (male, female)
## 3.141334
## # Male weight-at-length
## 0.000748427      0.001165731      0.001930510
## 0.000748427      0.001165731      0.001688886
## 0.000748427      0.001165731      0.001922246
## 0.000748427      0.001165731      0.001877957
## 0.000748427      0.001165731      0.001938634
## 0.000748427      0.001165731      0.002076413
## 0.000748427      0.001165731      0.001899330
## 0.000748427      0.001165731      0.002116687
## 0.000748427      0.001165731      0.001938784
## 0.000748427      0.001165731      0.001939764
## 0.000748427      0.001165731      0.001871067
## 0.000748427      0.001165731      0.001998295
## 0.000748427      0.001165731      0.001870418
## 0.000748427      0.001165731      0.001969415
## 0.000748427      0.001165731      0.001926859
## 0.000748427      0.001165731      0.002021492
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## 0.000748427      0.001165731      0.001931318
## 0.000748427      0.001165731      0.002014407
## 0.000748427      0.001165731      0.001977471
## 0.000748427      0.001165731      0.002099246
## 0.000748427      0.001165731      0.001982478
## 0.000748427      0.001165731      0.001930932
## 0.000748427      0.001165731      0.001930932
## 0.000748427      0.001165731      0.001930932
## 0.000748427      0.001165731      0.001930932
## 0.000748427      0.001165731      0.001930932
## 0.000748427      0.001165731      0.001930932
## 0.000748427      0.001165731      0.001930932
## 0.000748427      0.001165731      0.001930932
## 0.000748427      0.001165731      0.001930932
## 0.000748427      0.001165731      0.001930932
## 0.000748427      0.001165731      0.001891628
## 0.000748427      0.001165731      0.001795721
## 0.000748427      0.001165731      0.001823113
## 0.000748427      0.001165731      0.001807433
## 0.000748427      0.001165731      0.001930932
## 0.000748427      0.001165731      0.001894627
## 0.000748427      0.001165731      0.001850611
## 0.000748427      0.001165731      0.001930932
## 0.000748427      0.001165731      0.001930932
## # Male mature weight-at-length (weight * proportion  mature)
## 0 0.001165732 0.001945911
## # Proportion mature by sex
## 0 1 1
## # Natural mortality per season input type (1 = vector by season, 2 = matrix by season/year)
## 2
## # Proportion of the total natural mortality to be applied each season (each row must add to 1)
## #0  0.0025  0  0.6245  0.373
##     0.0000  0.0700  0.0000  0.5600  0.3700
##     0.0000  0.0600  0.0000  0.5700  0.3700
##     0.0000  0.0700  0.0000  0.5600  0.3700
##     0.0000  0.0500  0.0000  0.5800  0.3700
##     0.0000  0.0700  0.0000  0.5600  0.3700
##     0.0000  0.1200  0.0000  0.5100  0.3700
##     0.0000  0.1000  0.0000  0.5300  0.3700
##     0.0000  0.1400  0.0000  0.4900  0.3700
##     0.0000  0.1400  0.0000  0.4900  0.3700
##     0.0000  0.1400  0.0000  0.4900  0.3700
##     0.0000  0.1400  0.0000  0.4900  0.3700
##     0.0000  0.1400  0.0000  0.4900  0.3700
##     0.0000  0.1400  0.0000  0.4900  0.3700
##     0.0000  0.1800  0.0000  0.4500  0.3700
##     0.0000  0.1400  0.0000  0.4900  0.3700
##     0.0000  0.1800  0.0000  0.4500  0.3700
##     0.0000  0.1800  0.0000  0.4500  0.3700
##     0.0000  0.1800  0.0000  0.4500  0.3700
##     0.0000  0.1800  0.0000  0.4500  0.3700
##     0.0000  0.1800  0.0000  0.4500  0.3700
##     0.0000  0.1800  0.0000  0.4500  0.3700
##     0.0000  0.1800  0.0000  0.4500  0.3700
```

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##     0.0000   0.1800   0.0000   0.4500   0.3700
##     0.0000   0.1800   0.0000   0.4500   0.3700
##     0.0000   0.1800   0.0000   0.4500   0.3700
##     0.0000   0.1800   0.0000   0.4500   0.3700
##     0.0000   0.1800   0.0000   0.4500   0.3700
##     0.0000   0.1800   0.0000   0.4500   0.3700
##     0.0000   0.1800   0.0000   0.4500   0.3700
##     0.0000   0.1800   0.0000   0.4500   0.3700
##     0.0000   0.1800   0.0000   0.4500   0.3700
##     0.0000   0.4400   0.0000   0.1900   0.3700
##     0.0000   0.4400   0.0000   0.1900   0.3700
##     0.0000   0.4400   0.0000   0.1900   0.3700
##     0.0000   0.4400   0.0000   0.1900   0.3700
##     0.0000   0.4400   0.0000   0.1900   0.3700
##     0.0000   0.4400   0.0000   0.1900   0.3700
##     0.0000   0.4400   0.0000   0.1900   0.3700
##     0.0000   0.4400   0.0000   0.1900   0.3700
##     0.0000   0.4400   0.0000   0.1900   0.3700
## # Fishing fleet names (delimited with : no spaces in names)
## Pot_Fishery:Trawl_Bycatch:Fixed_bycatch
## # Survey names (delimited with : no spaces in names)
## NMFS_Trawl:ADFG_Pot
## # Number  of  catch data  frames
## 4
## # Number  of  rows  in  each  data  frame
## 28  16  26  26
## ##  CATCH DATA
## ##  Type of catch: 1 = retained, 2 = discard
## ##  Units of catch: 1 = biomass, 2 = numbers
## ##  for SMBKC Units are in number of crab for landed & 1000 kg for discards.
## ##  Male Retained
## # year  seas    fleet   sex     obs      cv    type   units   mult   effort  discard_mortality
## 1978   2       1       1       436126  0.03   1      2       1      0       0
## 1979   2       1       1       52966   0.03   1      2       1      0       0
## 1980   2       1       1       33162   0.03   1      2       1      0       0
## 1981   2       1       1       1045619 0.03   1      2       1      0       0
## 1982   2       1       1       1935886 0.03   1      2       1      0       0
## 1983   2       1       1       1931990 0.03   1      2       1      0       0
## 1984   2       1       1       841017  0.03   1      2       1      0       0
## 1985   2       1       1       436021  0.03   1      2       1      0       0
## 1986   2       1       1       219548  0.03   1      2       1      0       0
## 1987   2       1       1       227447  0.03   1      2       1      0       0
## 1988   2       1       1       280401  0.03   1      2       1      0       0
## 1989   2       1       1       247641  0.03   1      2       1      0       0
## 1990   2       1       1       391405  0.03   1      2       1      0       0
## 1991   2       1       1       726519  0.03   1      2       1      0       0
## 1992   2       1       1       545222  0.03   1      2       1      0       0
## 1993   2       1       1       630353  0.03   1      2       1      0       0
## 1994   2       1       1       827015  0.03   1      2       1      0       0
## 1995   2       1       1       666905  0.03   1      2       1      0       0
## 1996   2       1       1       660665  0.03   1      2       1      0       0
## 1997   2       1       1       939822  0.03   1      2       1      0       0
## 1998   2       1       1       635370  0.03   1      2       1      0       0
## 2009   2       1       1       103376  0.03   1      2       1      0       0
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## 2010    2    1    1     298669   0.03   1     2     1     0     0
## 2011    2    1    1     437862   0.03   1     2     1     0     0
## 2012    2    1    1     379386   0.03   1     2     1     0     0
## 2014    2    1    1     69109    0.03   1     2     1     0     0
## 2015    2    1    1     24407    0.03   1     2     1     0     0
## 2016    2    1    1     24.407   0.03   1     2     1     0     0
## # Male   discards  Pot fishery
## 1990    2    1    1     254.9787861    0.6   2    1    1    0    0.2
## 1991    2    1    1     531.4483252    0.6   2    1    1    0    0.2
## 1992    2    1    1     1050.387026    0.6   2    1    1    0    0.2
## 1993    2    1    1     951.4626128    0.6   2    1    1    0    0.2
## 1994    2    1    1     1210.764588    0.6   2    1    1    0    0.2
## 1995    2    1    1     363.112032     0.6   2    1    1    0    0.2
## 1996    2    1    1     528.5244687    0.6   2    1    1    0    0.2
## 1997    2    1    1     1382.825328    0.6   2    1    1    0    0.2
## 1998    2    1    1     781.1032977    0.6   2    1    1    0    0.2
## 2009    2    1    1     123.3712279    0.2   2    1    1    0    0.2
## 2010    2    1    1     304.6562225    0.2   2    1    1    0    0.2
## 2011    2    1    1     481.3572126    0.2   2    1    1    0    0.2
## 2012    2    1    1     437.3360731    0.2   2    1    1    0    0.2
## 2014    2    1    1     45.4839749     0.2   2    1    1    0    0.2
## 2015    2    1    1     21.19378597    0.2   2    1    1    0    0.2
## 2016    2    1    1     0.021193786    0.2   2    1    1    0    0.2
## # Trawl fishery discards
## 1991    2    2    1     3.538    0.31   2     1     1     0     0.8
## 1992    2    2    1     1.996    0.31   2     1     1     0     0.8
## 1993    2    2    1     1.542    0.31   2     1     1     0     0.8
## 1994    2    2    1     0.318    0.31   2     1     1     0     0.8
## 1995    2    2    1     0.635    0.31   2     1     1     0     0.8
## 1996    2    2    1     0.500    0.31   2     1     1     0     0.8
## 1997    2    2    1     0.500    0.31   2     1     1     0     0.8
## 1998    2    2    1     0.500    0.31   2     1     1     0     0.8
## 1999    2    2    1     0.500    0.31   2     1     1     0     0.8
## 2000    2    2    1     0.500    0.31   2     1     1     0     0.8
## 2001    2    2    1     0.500    0.31   2     1     1     0     0.8
## 2002    2    2    1     0.726    0.31   2     1     1     0     0.8
## 2003    2    2    1     0.998    0.31   2     1     1     0     0.8
## 2004    2    2    1     0.091    0.31   2     1     1     0     0.8
## 2005    2    2    1     0.500    0.31   2     1     1     0     0.8
## 2006    2    2    1     2.812    0.31   2     1     1     0     0.8
## 2007    2    2    1     0.045    0.31   2     1     1     0     0.8
## 2008    2    2    1     0.272    0.31   2     1     1     0     0.8
## 2009    2    2    1     0.635    0.31   2     1     1     0     0.8
## 2010    2    2    1     0.363    0.31   2     1     1     0     0.8
## 2011    2    2    1     0.181    0.31   2     1     1     0     0.8
## 2012    2    2    1     0.100    0.31   2     1     1     0     0.8
## 2013    2    2    1     0.400    0.31   2     1     1     0     0.8
## 2014    2    2    1     0.100    0.31   2     1     1     0     0.8
## 2015    2    2    1     0.100    0.31   2     1     1     0     0.8
## 2016    2    2    1     0.100    0.31   2     1     1     0     0.8
## # Fixed fishery discards
## 1991    2    3    1     0.045    0.31   2     1     1     0     0.5
## 1992    2    3    1     2.268    0.31   2     1     1     0     0.5
## 1993    2    3    1     0.500    0.31   2     1     1     0     0.5
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## 1994    2       3       1       0.091   0.31    2       1       1       0       0.5
## 1995    2       3       1       0.136   0.31    2       1       1       0       0.5
## 1996    2       3       1       0.045   0.31    2       1       1       0       0.5
## 1997    2       3       1       0.181   0.31    2       1       1       0       0.5
## 1998    2       3       1       0.907   0.31    2       1       1       0       0.5
## 1999    2       3       1       1.361   0.31    2       1       1       0       0.5
## 2000    2       3       1       0.500   0.31    2       1       1       0       0.5
## 2001    2       3       1       0.862   0.31    2       1       1       0       0.5
## 2002    2       3       1       0.408   0.31    2       1       1       0       0.5
## 2003    2       3       1       1.134   0.31    2       1       1       0       0.5
## 2004    2       3       1       0.635   0.31    2       1       1       0       0.5
## 2005    2       3       1       0.590   0.31    2       1       1       0       0.5
## 2006    2       3       1       1.451   0.31    2       1       1       0       0.5
## 2007    2       3       1       69.717  0.31    2       1       1       0       0.5
## 2008    2       3       1       6.622   0.31    2       1       1       0       0.5
## 2009    2       3       1       7.530   0.31    2       1       1       0       0.5
## 2010    2       3       1       9.571   0.31    2       1       1       0       0.5
## 2011    2       3       1       1.800   0.31    2       1       1       0       0.5
## 2012    2       3       1       1.600   0.31    2       1       1       0       0.5
## 2013    2       3       1       0.8     0.31    2       1       1       0       0.5
## 2014    2       3       1       1.1     0.31    2       1       1       0       0.5
## 2015    2       3       1       1.600   0.31    2       1       1       0       0.5
## 2016    2       3       1       3.600   0.31    2       1       1       0       0.5
## ##   RELATIVE   ABUNDANCE DATA
## ##   Units of abundance: 1 = biomass, 2 = numbers
## ##   for SMBKC Units are in  crabs for Abundance.
## ##   Number  of  relative  abundance indicies
## 2
## ##   Number  of  rows  in  each  index
## 40   9
## # Survey data (abundance indices, units are mt for trawl survey and crab/potlift for pot survey)
## # Year, Seas, Fleet,  Sex,  Abundance,  CV      units
## 1978   1 4 1 6832.819  0.394 1
## 1979   1 4 1 7989.881  0.463 1
## 1980   1 4 1 9986.830  0.507 1
## 1981   1 4 1 6551.132  0.402 1
## 1982   1 4 1 16221.933 0.344 1
## 1983   1 4 1 9634.250  0.298 1
## 1984   1 4 1 4071.218  0.179 1
## 1985   1 4 1 3110.541  0.210 1
## 1986   1 4 1 1416.849  0.388 1
## 1987   1 4 1 2278.917  0.291 1
## 1988   1 4 1 3158.169  0.252 1
## 1989   1 4 1 6338.622  0.271 1
## 1990   1 4 1 6730.130  0.274 1
## 1991   1 4 1 6948.184  0.248 1
## 1992   1 4 1 7093.272  0.201 1
## 1993   1 4 1 9548.459  0.169 1
## 1994   1 4 1 6539.133  0.176 1
## 1995   1 4 1 5703.591  0.178 1
## 1996   1 4 1 9410.403  0.241 1
## 1997   1 4 1 10924.107 0.337 1
## 1998   1 4 1 7976.839  0.355 1
## 1999   1 4 1 1594.546  0.182 1
```

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## 2000  1 4 1 2096.795  0.310 1
## 2001  1 4 1 2831.440  0.245 1
## 2002  1 4 1 1732.599  0.320 1
## 2003  1 4 1 1566.675  0.336 1
## 2004  1 4 1 1523.869  0.305 1
## 2005  1 4 1 1642.017  0.371 1
## 2006  1 4 1 3893.875  0.334 1
## 2007  1 4 1 6470.773  0.385 1
## 2008  1 4 1 4654.473  0.284 1
## 2009  1 4 1 6301.470  0.256 1
## 2010  1 4 1 11130.898 0.466 1
## 2011  1 4 1 10931.232 0.558 1
## 2012  1 4 1 6200.219  0.339 1
## 2013  1 4 1 2287.557  0.217 1
## 2014  1 4 1 6029.220  0.449 1
## 2015  1 4 1 5877.433  0.770 1
## 2016  1 4 1 3485.909  0.393 1
## 2017  1 4 1 1793.760  0.599 1
## 1995  1 5 1 12042.000 0.130 2
## 1998  1 5 1 12531.000 0.060 2
## 2001  1 5 1 8477.000  0.080 2
## 2004  1 5 1 1667.000  0.150 2
## 2007  1 5 1 8643.000  0.090 2
## 2010  1 5 1 10209.000 0.130 2
## 2013  1 5 1 5643.000  0.190 2
## 2015  1 5 1 2805.000  0.180 2
## 2016  1 5 1 2378.000  0.186 2
## ##  Number  of  length  frequency matrices
## 3
## ##  Number  of  rows  in  each  matrix
## 15  40  9
## ##  Number  of  bins  in  each  matrix  (columns  of  size  data)
## 3  3  3
## ##  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
## ##length  proportions of  pot discarded males
## ##Year, Seas, Fleet,  Sex,  Type, Shell,  Maturity, Nsamp,  DataVec
##   1990  2 1 1 0 0 0 15  0.1133  0.3933  0.4933
##   1991  2 1 1 0 0 0 25  0.1329  0.1768  0.6902
##   1992  2 1 1 0 0 0 25  0.1905  0.2677  0.5417
##   1993  2 1 1 0 0 0 25  0.2807  0.2097  0.5096
##   1994  2 1 1 0 0 0 25  0.2942  0.2714  0.4344
##   1995  2 1 1 0 0 0 25  0.1478  0.2127  0.6395
##   1996  2 1 1 0 0 0 25  0.1595  0.2229  0.6176
##   1997  2 1 1 0 0 0 25  0.1818  0.2053  0.6128
##   1998  2 1 1 0 0 0 25  0.1927  0.2162  0.5911
##   2009  2 1 1 0 0 0 50  0.1413  0.3235  0.5352
##   2010  2 1 1 0 0 0 50  0.1314  0.3152  0.5534
##   2011  2 1 1 0 0 0 50  0.1314  0.3051  0.5636
##   2012  2 1 1 0 0 0 50  0.1417  0.3178  0.5406
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##    2014   2 1 1 0 0 0 50   0.0939   0.2275   0.6786
##    2015   2 1 1 0 0 0 50   0.1148   0.2518   0.6333
## ##length  proportions of  trawl survey  males
## ##Year, Seas, Fleet,  Sex,  Type,  Shell,  Maturity, Nsamp,  DataVec
##    1978   1 4 1 0 0 0 50    0.3865   0.3478   0.2657
##    1979   1 4 1 0 0 0 50    0.4281   0.3190   0.2529
##    1980   1 4 1 0 0 0 50    0.3588   0.3220   0.3192
##    1981   1 4 1 0 0 0 50    0.1219   0.3065   0.5716
##    1982   1 4 1 0 0 0 50    0.1671   0.2435   0.5893
##    1983   1 4 1 0 0 0 50    0.1752   0.2726   0.5522
##    1984   1 4 1 0 0 0 50    0.1823   0.2085   0.6092
##    1985   1 4 1 0 0 0 46.5 0.2023   0.2010   0.5967
##    1986   1 4 1 0 0 0 23    0.1984   0.4364   0.3652
##    1987   1 4 1 0 0 0 35.5 0.1944   0.3779   0.4277
##    1988   1 4 1 0 0 0 40.5 0.1879   0.3737   0.4384
##    1989   1 4 1 0 0 0 50    0.4246   0.2259   0.3496
##    1990   1 4 1 0 0 0 50    0.2380   0.2332   0.5288
##    1991   1 4 1 0 0 0 50    0.2274   0.3300   0.4426
##    1992   1 4 1 0 0 0 50    0.2263   0.2911   0.4826
##    1993   1 4 1 0 0 0 50    0.2296   0.2759   0.4945
##    1994   1 4 1 0 0 0 50    0.1989   0.2926   0.5085
##    1995   1 4 1 0 0 0 50    0.2593   0.3005   0.4403
##    1996   1 4 1 0 0 0 50    0.1998   0.3054   0.4948
##    1997   1 4 1 0 0 0 50    0.1622   0.3102   0.5275
##    1998   1 4 1 0 0 0 50    0.1276   0.3212   0.5511
##    1999   1 4 1 0 0 0 26    0.2224   0.2214   0.5562
##    2000   1 4 1 0 0 0 30.5 0.2154   0.2180   0.5665
##    2001   1 4 1 0 0 0 45.5 0.2253   0.2699   0.5048
##    2002   1 4 1 0 0 0 19    0.1127   0.2346   0.6527
##    2003   1 4 1 0 0 0 32.5 0.3762   0.2345   0.3893
##    2004   1 4 1 0 0 0 24    0.2488   0.1848   0.5663
##    2005   1 4 1 0 0 0 21    0.2825   0.2744   0.4431
##    2006   1 4 1 0 0 0 50    0.3276   0.2293   0.4431
##    2007   1 4 1 0 0 0 50    0.4394   0.3525   0.2081
##    2008   1 4 1 0 0 0 50    0.3745   0.2219   0.4036
##    2009   1 4 1 0 0 0 50    0.3057   0.4202   0.2741
##    2010   1 4 1 0 0 0 50    0.4081   0.3371   0.2548
##    2011   1 4 1 0 0 0 50    0.2179   0.3940   0.3881
##    2012   1 4 1 0 0 0 50    0.1573   0.4393   0.4034
##    2013   1 4 1 0 0 0 37    0.2100   0.2834   0.5065
##    2014   1 4 1 0 0 0 50    0.1738   0.3912   0.4350
##    2015   1 4 1 0 0 0 50    0.2340   0.2994   0.4666
##    2016   1 4 1 0 0 0 50    0.2255   0.2780   0.4965
##    2017   1 4 1 0 0 0 50    0.0849   0.2994   0.6157
##    ##length  proportions of  pot survey
##    ##Year, Seas, Fleet,  Sex,  Type,  Shell,  Maturity, Nsamp,  DataVec
##    1995   1 5 1 0 0 0 100 0.1594   0.2656   0.5751
##    1998   1 5 1 0 0 0 100  0.0769   0.2205   0.7026
##    2001   1 5 1 0 0 0 100  0.1493   0.2049   0.6457
##    2004   1 5 1 0 0 0 100  0.0672   0.2484   0.6845
##    2007   1 5 1 0 0 0 100  0.1257   0.3148   0.5595
##    2010   1 5 1 0 0 0 100  0.1299   0.3209   0.5492
##    2013   1 5 1 0 0 0 100  0.1556   0.2477   0.5967
##    2015   1 5 1 0 0 0 100  0.0706   0.2431   0.6859
```

```
##    2016  1 5 1 0 0 0 100  0.0832  0.1917  0.7251
## ##  Growth data (increment)
## # nobs_growth
## 3
## # MidPoint Sex Increment CV
##  97.5  1  14.1  0.2197
## 112.5  1  14.1  0.2197
## 127.5  1  14.1  0.2197
## #  97.5  1 13.8 0.2197
## #  112.5  1 14.1 0.2197
## #  127.5  1 14.4 0.2197
## # Use custom transition matrix (0=no, 1=growth matrix, 2=transition matrix, i.e. growth and molting)
## 0
## # The custom growth matrix (if not using just fill with zeros)
## # Alternative TM (loosely) based on Otto and Cummiskey (1990)
## 0.2  0.7  0.1
## 0.0  0.4  0.6
## 0.0  0.0  1.0
## #   Use custom  natural mortality  (0=no,  1=yes,  by  sex and year)
## 0
## 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12
## ## eof
## 9999
##
```

The base model control file:

```
## ## ------------------------------------------------------------------------------------- ##
## ## LEADING PARAMETER CONTROLS                                                             ##
## # Controls for leading parameter vector theta
## # LEGEND FOR PRIOR:
## #                    0 -> uniform #              1 -> normal #              2 -> lognormal
## #                    3 -> beta
## #                    4 -> gamma
## # ntheta
##   12
## ## ------------------------------------------------------------------------------------- ##
## # ival      lb       ub      phz   prior    p1      p2       # parameter          #
##   0.18     0.01       1      -4      2    0.18    0.02      # M
##  14.3     -7.0       30      -2      0    -7       30       # log(R0)
##  10.0     -7.0       20      -1      1   -10.0     20       # log(Rini)
##  14.13979  7.0       16       1      0    7.0     16.       # log(Rbar)
##  80.0     30.0      310      -2      1   72.5     7.25      # Recruitment size distribution
##   0.25     0.1        7      -4      0    0.1      9.0      # Recruitment size scale (varia
##   0.2    -10.0      0.75     -4      0  -10.0     0.75      # log(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
##  14.9     10.00    15.00      3      0    5.00   20.00      # logN0 vector of initial number
##  14.5     10.00    15.00      3      0    5.00   20.00      # logN0 vector of initial number
##  14.3     10.00    15.00      3      0    5.00   20.00      # logN0 vector of initial number
## ## GROWTH PARAM CONTROLS                                                                  ##
## ## Two lines for each parameter if split sex, one line if not                             ##
## ## number of molt periods
```

9

```
## 1
## ## Year(s) molt period changes (blank if no changes)
##
## ## ----------------------------------------------------------------------- ##
## # ival       lb       ub      phz  prior   p1    p2        # parameter        #
##   14.1      10.0     30.0     -3     0    0.0   999.0      # alpha males or combined
##    0.0001    0.0      0.01    -3     0    0.0   999.0      # beta males or combined
##    0.45      0.01     1.0     -3     0    0.0   999.0      # gscale males or combined
##  121.5      65.0    145.0     -4     0    0.0   999.0      # molt_mu males or combined
##    0.060     0.0      1.0     -3     0    0.0   999.0      # molt_cv males or combined
##
## ## ----------------------------------------------------------------------- ##
## ## SELECTIVITY CONTROLS                                                    ##
## ##      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, 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               ##
## ## ----------------------------------------------------------------------- ##
## ## ivector for number of year periods or nodes                            ##
## ## POT       TBycatch FBycatch  NMFS_S   ADFG_pot
## ## Gear-1    Gear-2   Gear-3   Gear-4   Gear-5
##    2         1        1        1        1         # Selectivity periods
##    0         0        0        0        0         # sex specific selectivity
##    0         3        3        0        0         # male selectivity type
## ## Gear-1    Gear-2   Gear-3   Gear-4   Gear-5
##    1         1        1        1        1         # Retention periods
##    0         0        0        0        0         # sex specific retention
##    3         2        2        2        2         # male retention type
##    1         0        0        0        0         # male retention flag (0 -> no, 1 -> yes)
## ## gear   par   sel                                          phz   start   end    ##
## ## index index par sex  ival          lb    ub   prior    p1      p2  mirror period period  ##
## # Gear-1
##    1     1     1   0    0.4    0.001 1.0   0        0       1    3     1978    2008
##    1     2     2   0    0.7    0.001 1.0   0        0       1    3     1978    2008
##    1     3     3   0    1.0    0.001 2.0   0        0       1    -2    1978    2008
##    1     1     1   0    0.4    0.001 1.0   0        0       1    3     2009    2017
##    1     2     2   0    0.4    0.001 1.0   0        0       1    3     2009    2017
##    1     3     3   0    1.0    0.001 2.0   0        0       1    -2    2009    2017
## # Gear-2
##    2     7     1   0    40     10.0  200   0        10     200   -3    1978    2017
##    2     8     2   0    60     10.0  200   0        10     200   -3    1978    2017
## # Gear-3
##    3     9     1   0    40     10.0  200   0        10     200   -3    1978    2017
##    3    10     2   0    60     10.0  200   0        10     200   -3    1978    2017
## # Gear-4
##    4     8     1   0    0.7    0.001 1.0   0        0       1    4     1978    2017
##    4     9     2   0    0.7    0.001 1.0   0        0       1    4     1978    2017
##    4    10     3   0    0.9    0.001 1.0   0        0       1    -2    1978    2017
## # Gear-5
##    5    11     1   0    0.4    0.001 1.0   0        0       1    4     1978    2017
```

```
##      5      12     2   0    0.7        0.001 1.0    0          0        1    4      1978    2017
##      5      13     3   0    1.0        0.001 2.0    0          0        1   -2      1978    2017
## ## Retained
## # Gear-1
##     -1      14     1   0    120        100   200    0          1       900   -1     1978    2017
##     -1      15     2   0    123        110   200    0          1       900   -1     1978    2017
## # Gear-2
##     -2      16     1   0    595        1     700    0          1       900   -3     1978    2017
##     -2      17     2   0    10         1     700    0          1       900   -3     1978    2017
## # Gear-3
##     -3      18     1   0    590        1     700    0          1       900   -3     1978    2017
##     -3      19     2   0    10         1     700    0          1       900   -3     1978    2017
## # Gear-4
##     -4      20     1   0    580        1     700    0          1       900   -3     1978    2017
##     -4      21     2   0    20         1     700    0          1       900   -3     1978    2017
## # Gear-5
##     -5      22     1   0    580        1     700    0          1       900   -3     1978    2017
##     -5      23     2   0    20         1     700    0          1       900   -3     1978    2017
##
## ## ------------------------------------------------------------------------------ ##
## ## 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              ##
## ## ------------------------------------------------------------------------------ ##
## ##  LAMBDA: Arbitrary relative weights for each series, 0 = do not fit.
## ## SURVEYS/INDICES ONLY
## ## ival     lb       ub      phz    prior   p1       p2      Analytic?    LAMBDA
##   1.0       0        2       -1     0       0        9.0     0            1       # NMFS trawl
## 0.00411135867487 0 5         1      0       0        9.0     0            1       # ADF&G pot
## ## ------------------------------------------------------------------------------ ##
##
## ## ------------------------------------------------------------------------------ ##
## ## 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: 0 = uniform, 1 = normal, 2 = lognormal, 3 = beta, 4 = gamma              ##
## ## ------------------------------------------------------------------------------ ##
## ## ival         lb          ub          phz    prior    p1     p2
##   0.0000001     0.00000001  10.0        -4     4        1.0    100    # NMFS
##   0.0000001     0.00000001  10.0        -4     4        1.0    100    # ADF&G
## ## ------------------------------------------------------------------------------ ##
##
## ## ------------------------------------------------------------------------------ ##
## ## PENALTIES FOR AVERAGE FISHING MORTALITY RATE FOR EACH GEAR
## ## ------------------------------------------------------------------------------ ##
## ## Mean_F  STD_PHZ1  STD_PHZ2     PHZ
##   0.2       0.05      50.0         1    # Pot
##   0.001     0.05      50.0         1    # Trawl
##   0.001     0.05      50.0         1    # Fixed
##   0.00      2.00      20.00       -1    # NMFS
##   0.00      2.00      20.00       -1    # ADF&G
```

```
## ## ------------------------------------------------------------------------------- ##
##
## ## ------------------------------------------------------------------------------- ##
## ## OPTIONS FOR SIZE COMPOSTION DATA (COLUMN FOR EACH MATRIX)
## ## ------------------------------------------------------------------------------- ##
## ## LIKELIHOOD OPTIONS
## ##    -1) Multinomial with estimated/fixed sample size
## ##    -2) Robust approximation to multinomial
## ##    -3) logistic normal (NIY)
## ##    -4) multivariate-t (NIY)
## ##    -5) Dirichlet
## ## AUTOTAIL COMPRESSION
## ##    pmin is the cumulative proportion used in tail compression.
## ## ------------------------------------------------------------------------------- ##
## #  1   1   1  # Type of likelihood
##   2   2   2  # Type of likelihood
## #  5   5   5   # Type of likelihood
##   0   0   0  # Auto tail compression (pmin)
##   1   1   1   # Initial value for effective sample size multiplier
##  -4  -4  -4   # Phz for estimating effective sample size (if appl.)
##   1   2   3   # Composition aggregator
##   1   1   1   # LAMBDA
## ## ------------------------------------------------------------------------------- ##
##
## ## ------------------------------------------------------------------------------- ##
## ## TIME VARYING NATURAL MORTALIIY RATES                                            ##
## ## ------------------------------------------------------------------------------- ##
## ## 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)
## 0
## ## Type
## 3
## ## Phase of estimation
## 4
## ## STDEV in m_dev for Random walk
## 10.0
## ## Number of nodes for cubic spline or number of step-changes for option 3
## 2
## 0 # Females (ignored if single sex...)
## ## Year position of the knots (vector must be equal to the number of nodes)
## 1998 1999
## # 1976 1980 1985 1994 # Females (ignored if single sex...)
## ## ------------------------------------------------------------------------------- ##
##
## ## ------------------------------------------------------------------------------- ##
## ## OTHER CONTROLS
## ## ------------------------------------------------------------------------------- ##
##   3       # Estimated rec_dev phase
```

```
##   3         # Estimated rec_ini phase
##   0         # VERBOSE FLAG (0 = off, 1 = on, 2 = objective func)
##   2         # Initial conditions (0 = Unfished, 1 = Steady-state fished, 2 = Free parameters)
##   1978      # 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
```