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

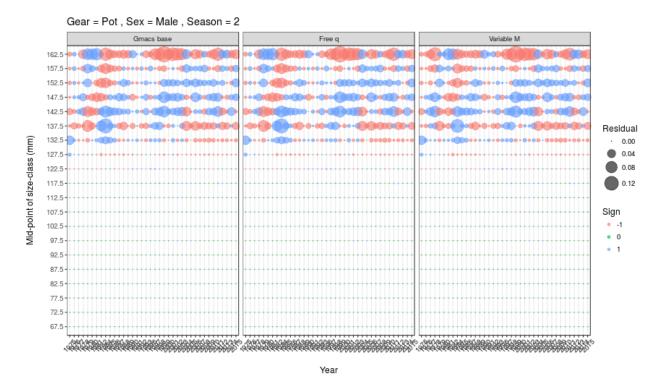


Figure 1: Size-frequency residuals of male BBRKC by year retained in the directed pot fishery for the 2017 model and each of the Gmacs model scenarios.

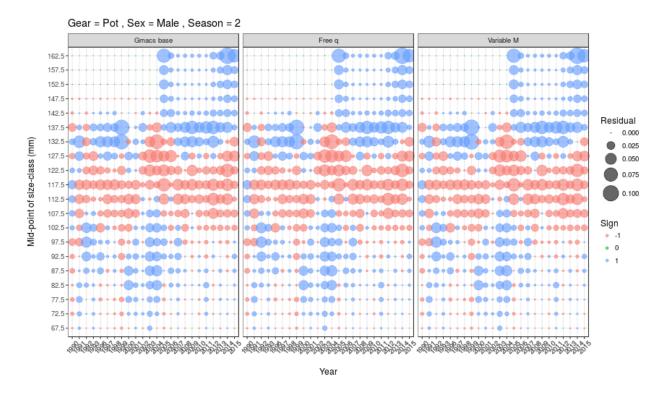


Figure 2: Size-frequency residuals of discarded male BBRKC by year in the directed pot fishery for the 2017 model and each of the Gmacs model scenarios.

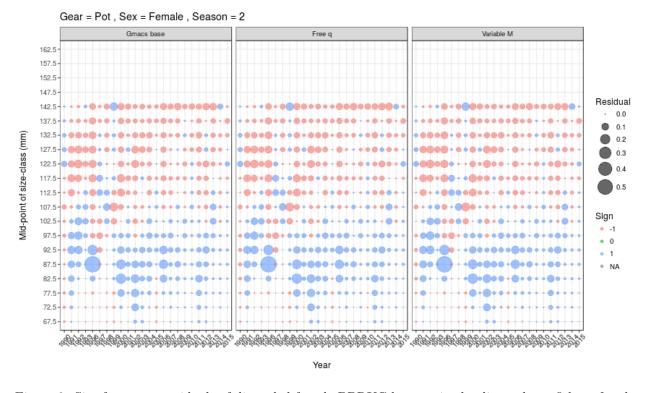


Figure 3: Size-frequency residuals of discarded female BBRKC by year in the directed pot fishery for the 2017 model and each of the Gmacs model scenarios.

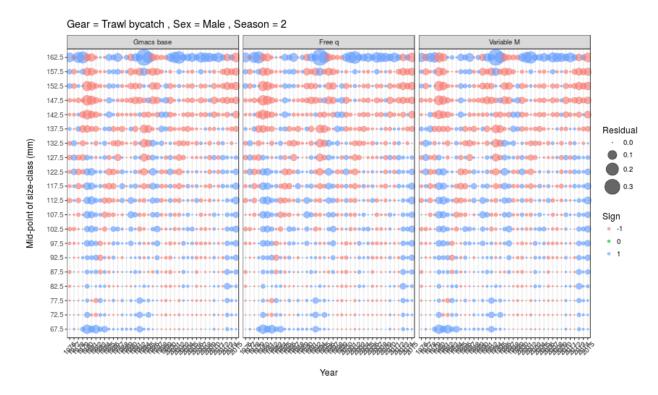


Figure 4: Size-frequency residuals discarded male BBRKC by year in the trawl by catch fishery for the 2017 model and each of the Gmacs model scenarios.

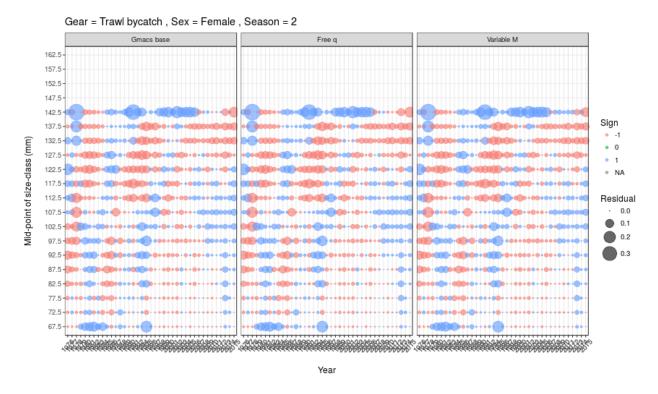


Figure 5: Size-frequency residuals of discarded female BBRKC by year in the trawl by catch fishery for the 2017 model and each of the Gmacs model scenarios.



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

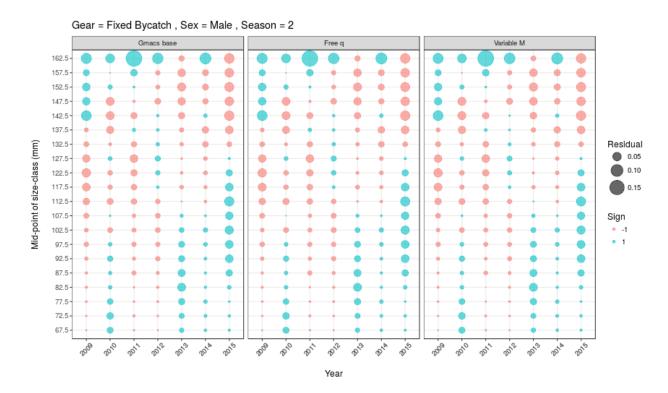


Figure 8: Size-frequency residuals of discarded male BBRKC by year in the fixed bycatch fishery for the 2017 model and each of the Gmacs model scenarios.

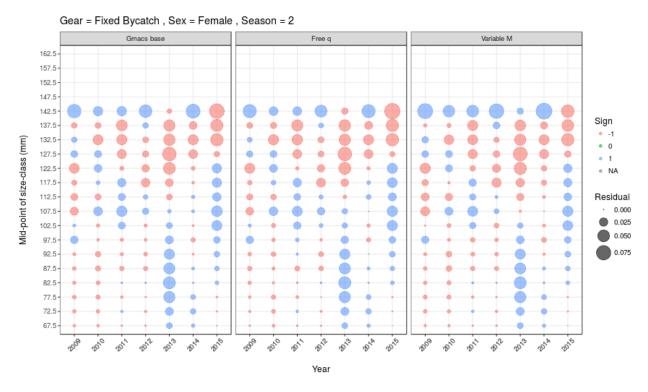


Figure 9: Size-frequency residuals of discarded female BBRKC by year in the fixed by catch fishery for the 2017 model and each of the Gmacs model scenarios.

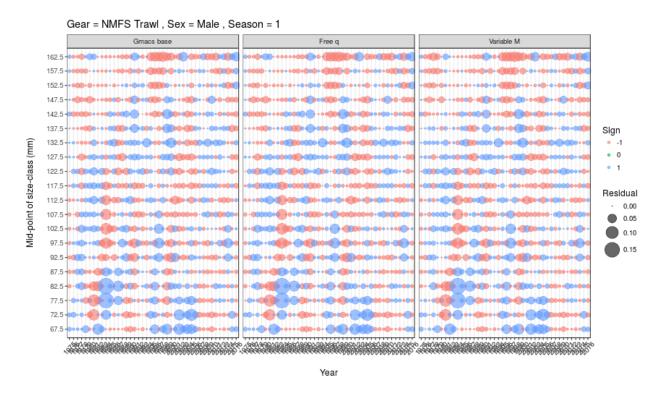


Figure 10: Size-frequency residuals of discarded male BBRKC by year in the NMFS trawl survey for the 2017 model and each of the Gmacs model scenarios.



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.

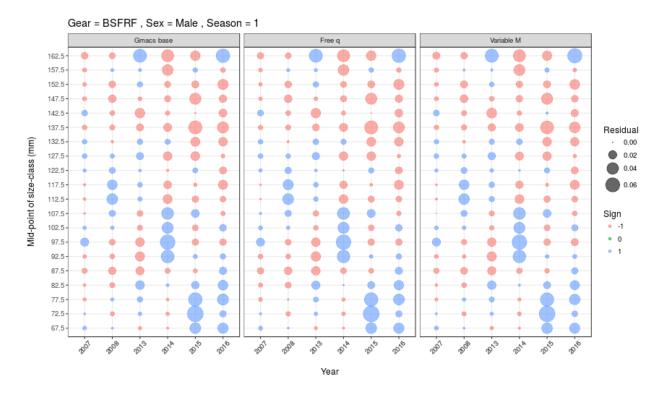


Figure 12: Size-frequency residuals of discarded male BBRKC by year in the BSFRF survey for the 2017 model and each of the Gmacs model scenarios.

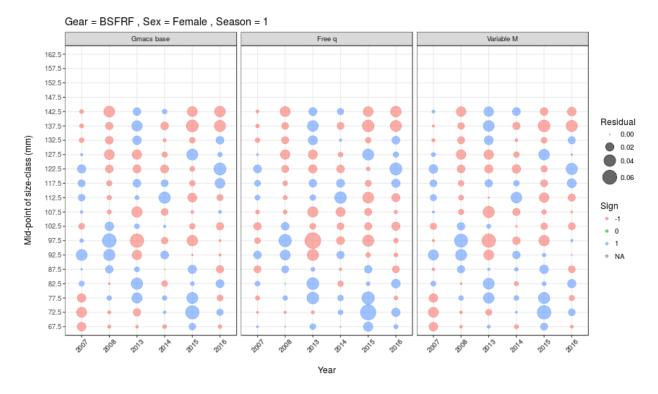


Figure 13: Size-frequency residuals of discarded female BBRKC by year in the BSFRF survey for the 2017 model and each of the Gmacs model scenarios.

The data file:

```
Gmacs Main Data File Version 1.1: BBRKC Example GEAR_INDEX DESCRIPTION 1 : Pot fishery retained catch.
                                        Pot :-
Trawl
                                         Pot fishery with \phantom{-} discarded \phantom{-} catch.
## #
## #
                                                            bycatch
                    3 : Trawl survey
Fisheries: 1 Pot Fishery, 2 Pot Discard, 3 Tra
Surveys: 6 NMFS Trawl Survey, 7 BSFRF Survey
                                                                                                                                                              Trawl by-catch, 4 Tanner bycatch 5 fixed gear
## #
                               Start
                                                year
## 2016 #
                             End year
                            Projection year
Number of seaso
Number of disti
## 2017 #
                                                            seasons
distinct data groups (among fishing fleets and surveys)
                            Number of sexes
Number of sexes
Number of shell condition types
Number of maturity types
Number of size-classes in the model
Season recruitment occurs
## 2
## 2
## 20
                            Season molting and growth occurs
Season to calculate SSB
Season for N output
## 4
## # size_breaks (a vector giving the break points between size intervals, d
## 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145 150 155 160 165
## # weight-at-length input method (1 = allometry [w_1 = a*1^b], 2 =
                                                                                                                                                                                                intervals, dim=nclass+1)
                                                                                                                                                                                              a*1^b], 2 = vector by sex)
## # weight-at-length allometry w_l = a*l^b

## #=0.003593,b=2.666076 female > 89mm

## #a=0.000408,b=3.127956 female < 90 new shell

## #a=0.000403, b=3.141334 male new shell
 ## ## a (male, female)
## 4.03E-07 4.08E-07
## # b (male, female)
## 3.141334 3.127956
## ## ## Males
## 0.000224781 0.000281351 0.000346923 0.000422209 0.000507927 0.000604802 0.000713564 0.00083495 0.0009697 0.00111856 0.00128229 0.00146163 0.00165736 0.00187023 0.00210101 0.00235048 0.002619
## #0.2024781 0.2031351 0.346923 0.422209 0.507927 0.604802 0.713564 0.83495 0.9697 1.11856 1.28229 1.46163 1.65736 1.87023 2.10101 2.35048 2.61942 2.90861 3.21882 3.9059
                                       0.00026898 \quad 0.00033137 \quad 0.00040294 \quad 0.00048437 \quad 0.00062711 \quad 0.0007216 \quad 0.00082452 \quad 0.00093615 \quad 0.00105678 \quad 0.00118669 \quad 0.00132613 \quad 0.00147539 \quad 0.00163473 \quad 0.00180441 \quad 0.00218315 \quad 0.00218315 \quad 0.00180411 \quad 0.001804111 \quad 0.00180411 \quad 0.001804111 \quad 0.001804
## 0.0002151
                    Proportion of the total natural mortality to be applied each season
## 0.01 0.2329 0.4511 0.306
## 0.01 0.2795 0.4045 0.306
## 0.01 0.3233 0.3607 0.306
## 0.01 0.2548 0.4292 0.306
## 0.01 0.2493 0.4347
                                                             0.306
 ## 0.01 0.2493 0.4347
                                                             0.306
## 0.01 0.2493 0.4347
## 0.01 0.2356 0.4484
                                                            0.306
## 0.01 0.24
                                       0.444
                                                             0.306
## 0.01 0.2712 0.4128
                                                             0 306
## 0.01 0.2438
## 0.01 0.2521
                                      0.4402 0.4319
                                                             0.306
 ## 0.01 0.2493
                                       0.4347
                                                             0.306
## 0.01 0.2493
## 0.01 0.2438
## 0.01 0.2493
## 0.01 0.3507
                                      0.4402
                                                             0.306
                                       0.3333
                                                             0.306
## 0.01 0.3425 0.3415
                                                             0.306
## 0.01 0.3425 0.3415
## 0.01 0.3452 0.3388
                                                            0.306
 ## 0.01 0.34
## 0.01 0.34
                                     0.344
                                                             0.306
                                                             0.306
## 0.01 0.34
## 0.01 0.34
                                      0.344
## 0.01 0.34
                                        0.344
                                                             0.306
## 0.01 0.3 0.384 0.306
## 0.01 0.3 0.384 0.306
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## 0.01 0.3 0.384
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## 0.01 0.3 0.384
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## 0.01 0.3 0.384
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## 0.01 0.3 0.384
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## 0.01 0.3 0.384
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## 0.01 0.3 0.384
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## 0.01 0.3 0.384
## 0.01 0.3 0.384
                                                  0.306
## # Fishing fleet names (delimited with : no sp
## Pot_Fishery:Travl_Bycatch:Bairdi_Fishery_Bycatch:Fixed_Gea:
## # Survey names (delimited with : no spaces in
## MMFS_Travl:BSFRF
                                                                                                                                             no spaces in names)
                                                                                                                         no spaces in names)
                    Number of catch data frames
                Number of rows in each data frame 24 24 40 24 24 7
                    CATCH DATA
                  Units of catch: 1 = retained, 2 = discard, 3 = Units of catch: 1 = biomass, 2 = numbers for BBRKC Units are in 1000 mt for landed & discards.
```

```
## ##
   ## ## Ma:
## #year
## 1975 2
                         e retained pot fishery (tonnes)
seas fleet sex obs cv type u
1 1 23281.2 0.03 1 1 1 0
              Male
                                                                                          units mult effort discard_mortality
0 0
   ## 1976 2
## 1977 2
                                        28993.6 0.03
                                       31736.9 0.03
39743 0.03
48910 0.03
   ## 1977 2
## 1978 2
## 1979 2
  ## 1979 2
## 1980 2
## 1981 2
## 1982 2
## 1984 2
## 1985 2
                                       58943.6 0.03
                                       15236.8 0.03
1361.3 0.03
1897.1 0.03
                                       1893.7 0.03
   ## 1986 2
## 1987 2
                                       5168.2 0.03
5574.2 0.03
   ## 1988 2
## 1989 2
                                       3351
                                                      0.03
                                        4656
                                                      0.03
                                       9272.8 0.03
7885.2 0.03
3681.8 0.03
   ## 1990 2
## 1991 2
   ## 1992 2
                                       6659.6 0.03
42.2 0.03
36.3 0.03
   ## 1993 2
  ## 1994 2
## 1995 2
                                       3861.9 0.03
   ## 1996 2
                                       4042.1 0.03
6779.4 0.03
5377.8 0.03
   ## 1997 2
   ## 1999 2
                                       3738.1 0.03
3866 0.03
4384.4 0.03
   ## 2000 2
  ## 2000 2
## 2001 2
## 2002 2
                                       7135.5 0.03
7006.6 0.03
8399.6 0.03
7143.2 0.03
   ## 2003 2
   ## 2004 2
  ## 2005 2
## 2006 2
   ## 2007 2
                                       9303.9 0.03
9216.1 0.03
7272.5 0.03
6761.5 0.03
   ## 2008 2
   ## 2009 2
## 2010 2
   ## 2011 2
## 2012 2
## 2013 2
## 2014 2
                                       3607.1
                                                      0.03
                                       3621.7 0.03
3991 0.03
4538.6 0.03
  ## 2014 2 1 1
## 2015 2 1 1
## ## Male d
## #year seas
## 1990 2 1 1
## 1991 2 1 1
                                       4613.7 0.03
                                    scards pot fishery (numbers)
fleet sex obs cv type ui
1718800 0.04 2 2 1 0
1453700 0.04 2 2 1 0
                                                                                          units
0 0.2
0 0.2
                                                                                                                       effort discard_mortality
                                       1453700 0.04
2305600 0.04
2688000 0.04
   ## 1992 2
## 1993 2
                                       595000 0.04
910000 0.04
3173000 0.04
922000 0.04
1393000 0.04
                                                                                                  0.2
0.2
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   ## 1996 2
## 1997 2
   ## 1998 2
## 1999 2
   ## 2000 2
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                                       1623500 0.04
1527000 0.04
3617000 0.04
   ## 2001 2
  ## 2001 2
## 2002 2
## 2003 2
                                                                                                  0.2
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   ## 2002 2
## 2003 2
                                       47600 0.04
2191200 0.04
   ## 2004 2
## 2005 2
## 2006 2
## 2007 2
                                       932000 0.04
                                                                                                  0.2
                                       2038700 0.04
222200 0.04
833890 0.04
666098 0.04
   ## 2008 2
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0.04
   ## 2009 2
                                        332340
  ## 2010 2
## 2011 2
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115860
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   ## 2012 2
                                        49933
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                                       409135
280805
747306
                                                      0.04
0.04
0.04
   ## 2013 2
## 2014 2
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  ## 2015 2 1
## ## Trawl
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                               fishery discards
as fleet sex of
0 384600 0.04
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2
                                                                         type
2
2
2
  ## #year
## 1976 2
## 1977 2
                                                                                          units
0 0.8
0 0.8
                                                      sex obs
                                                                                                                        effort discard_mortality
                                        787700 0.04
  ## 1977 2
## 1978 2
## 1979 2
## 1980 2
## 1981 2
## 1982 2
                                       646500 0.04
736200 0.04
1141300 0.04
                                                                            2 2 2
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                                        267100 0.04
                        2
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2
                                       785400 0.04
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                               0 0 0
                                                                                           0 0 0
  ## 1982 2
## 1983 2
## 1984 2
## 1985 2
                                       492800 0.04
1168200 0.04
                                                                           2 2 2
                                       274700 0.04
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159300 0.04
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## #r s
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   ## 2014 2
                                                                                                                                                                                                                                                                                       0.25
 ## 2014 2 3
## 2015 2 3
## ## Tanner
## 1976 2 3
## 1977 2 3
## 1978 2 3
## 1980 2 3
## 1980 2 3
 ## 1980 2
## 1981 2
## 1982 2
## 1983 2
## 1984 2
## 1987 2
                                                                                                              354224.8379 0.1 2
220557.1208 0.1 2
                                                                                                                                                                                                                    2
                                                                                                           220567.1208 0.1 2
358299.2519 0.1 2
730828.6472 0.1 2
736566.4996 0.1 2
1027297.825 0.1 2
1043696.499 0.1 2
1077005.676 0.1 2
 ## 1987 2
## 1988 2
## 1989 2
## 1990 2
## 1991 2
## 1992 2
## 1993 2
                                                                                                                                                                                                                1077005.676 0.1 2
7017.420455 0.1 2
2693.82743 0.1 2
3367.284287 0.1 2
3367.284287 0.1 2
1346.913715 0.1 2
13469.13715 0.1 2
937256.6431 0.1 2
 ## 1993 2
## 1994 2
## 2006 2
## 2007 2
## 2008 2
## 2009 2
 ## 2009 2 3 2
## 2013 2 3 2
## 2014 2 3 2
## 2015 2 3 2
## ## Fixed gear
## 2010 2 4 0
## 2010 2 4 0
                                                                                                                                                  6431 0.1 2 2 1 fishery discards 0.1 2 2 1 0 0 0.1 2 2 1 0 0 0.1 2 2 1 0 0 0.1 2 2 1 0 0 0.1 2 2 1 0 0 0.1 2 2 1 0 0 0.1 2 2 1 0 0 0.1 2 2 1 0 0 0.1 2 2 1 0 0 0.1 2 2 1 0
                                                                                                            crab
5298
2879
12087
                                                                                                                                                                                                                                                                0.2
                                                             4 4 4
                                                                                                           18737
71086
125003
                                                                                                                                                                                                                                                               0.2
0.2
0.2
   ## 2012 2
 ## 2012 2
## 2013 2
## 2014 2
   ## 2015 2
                                                                                    0
                                                                                                              106041
                                                                                                                                                                                                                                           0
                                                                                                                                                                                                                                                                0.2
   ## ##
                                          RELATIVE ABUNDANCE DATA
Units of Abundance: 1 = biomass, 2 = numbers
TODO: add column for maturity for terminal molt life-histories
for BBRKC Units are in 1000 mt.
   ## ##
   ## ##
                                          Number of relative
                                                                                                                                                                         abundance
   ## ##
                                                                                                                                                                                                                                           indicies
 ## 2
## ##
## 84
                                           Number of rows in each
                                                                                                                    (abundance indices,
                                           Survey data
                                                                                                                                                                                                                                                                                                                                                              mt)
                                                                                                                                                                                                                                                                units
                                                                                                                                                                                                                                                                                                    are 1000
 ## #Year Season Fleet Sex Abundance
## 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
                                                                                                                                                                                                                                     CV Units
```

```
## 1978 1 5
## 1979 1 5
## 1980 1 5
## 1981 1 5
                                    203192.71 0.144 1
                                      203192.71 0.144
103715 0.164 1
168047.18 0.221
69161.2 0.19 1
73232.86 0.251
35368.02 0.214
    ## 1982 1
## 1983 1
    ## 1983 1
## 1984 1
## 1985 1
## 1986 1
## 1987 1
## 1988 1
                                      98281.53 0.
27203.7 0.159
                                                          0.42
                                      41113.63 0.
47410.5 0.209
35852.58 0.
                                      41113.63
    ## 1989 1
## 1990 1
                                      42967.75
                                                           0.232
                                      39271.64
                                                           0.242
    ## 1991 1
## 1992 1
                                      67458.39
25442.52
                                                           0.443
                                      36217.5 0.198 1
23285.54 0.174
     ## 1993 1
## 1994 1
                                      27670.53
27277.48
60719.57
    ## 1995 1
## 1996 1
                                                           0.267
    ## 1997 1
                                                           0.265
    ## 1998 1
                                       46693.73
                                                           0.182
    ## 1999 1
## 2000 1
                                      45126.53
38924.68
                                                           0.204
    ## 2001 1
                                       28367.49
                                                           0.187
     ## 2002 1
                                       45596.97
                                                           0.202
                                       91090.07
    ## 2004 1
                                                           0.321
    ## 2005 1
                                       55471.45
                                                           0.172
    ## 2006 1
## 2007 1
                                      51948.59
59064.23
                                                           0.17
    ## 2008 1
                                       67945.65
                                                           0.225
    ## 2009 1
                                       43692.76
                                                           0.326
    ## 2010 1
## 2011 1
                                      39555.62
27529.87
                                                           0.223
0.211
    ## 2012 1
                                      30830.44
                                                           0.232
     ## 2013 1
                                       39833.23
                                                           0.244
    ## 2014 1
## 2015 1
                                      60859.12
36919.28
                                                          0.191
                                      27302.6 0.194 1
    ## 2016 1
##
    ## 1975 1
## 1976 1
                                      67267.28
71718.04
                                                          0.193
0.144
     ## 1977 1
                                       140249.63
                                                          0.152
                                      146351.82
63911.67
81275.03
                                                          0.144
     ## 1978 1
    ## 1980 1
## 1981 1
                                                           0.221
                                      63507.85
                                                          0.19
                                      70506.74 0.251
13951.7 0.214 1
57029.97 0.606
7330.79 0.159 1
    ## 1982 1
## 1983 1
     ## 1984 1
## 1985 1
                                      7330.79 0.159 1

7044.78 0.42 1

22852.72 0.209

19519.6 0.228 1

12973.56 0.232

21049.25 0.242

17596.54 0.443
    ## 1986 1
## 1987 1
    ## 1988 1
    ## 1989 1
    ## 1990 1
## 1991 1
    ## 1992 1
                                       12244.8 0.175 1
                                      12244.8 0.175 1
17485.53 0.198
9049.36 0.174 1
10725.74 0.267
17371.13 0.203
24557.1 0.265 1
38481.97 0.182
     ## 1993 1
    ## 1995 1
    ## 1996 1
    ## 1997 1
## 1998 1
    ## 1999 1
                                      20477.34
                                                           0.204
    ## 2000 1
                                       29417.67
                                                           0.222
    ## 2000 1
## 2001 1
## 2002 1
                                      24820.57
24188.87
                                                           0.202
    ## 2003 1
                                      41796.11
                                                           0.283
     ## 2004 1
                                       40819.81
                                                           0.321
    ## 2005 1
## 2006 1
                                      51869.83
43727.75
                                                           0.172
     ## 2007 1
## 2008 1
                                      45777.06
                                                           0.21
                                      46484 48
                                                           0 225
    ## 2000 1
## 2009 1
## 2010 1
                                      47979.95
42086.47
                                                           0.326
0.223
    ## 2011 1
## 2012 1
## 2013 1
                                      39523.28
                                                           0.211
                                                          0.232
                                       30417.78
                                      22576.58
53243.87
     ## 2014 1
                                                          0.191
     ## 2015 1
                                      27320.77
                                                          0.208
    ## 2016 1
## # BSFRF
                                       33928.4 0.194
    ## # BSFRF
## 2007 1 6
## 2008 1 6
## 2013 1 6
## 2014 1 6
130352.8 0.2164 1
                              0
                71 6 0 130352.8 0.2164

81 6 0 106040.9 0.1939

81 6 0 95016.7 0.1939 1

11 6 0 111740.4 0.1939

51 6 0 98952.5 0.1939 1

51 6 0 87725.1 0.1939 1

Number of length frequency
                 Number of rows in each matrix
24 24 39 39 66 6 7 7 42 42 6 6
Number of bins in each matrix (columns
20 16 20 16 20 16 20 16 20 16 20 16 20 16 20 16
SIZE COMPOSITION DATA FOR ALL FLEETS
    ## 38
## ##
## 20
    ## ##
                 sexes combined
                                                                                            = both
    ## ##
                                                                                                 2 = discard, 0 = total compos
mature, 0 = both states combined
old shell, 0 = both shell types
    ## ##
                                                                                                                                                 total composition
     ## #Retained
                              males
                                                   Sex Type
0 100 0
0 100 0
                                                                      Shell Maturity Nsamp
0 0 0 0 0 0 0 0
0 0 0 0 0 0
                                                                                                                       DataVec 0 0 0 0 0 0
                                                                                                                                                 0.0071 0.0741 0.1721 0.2239 0.2122 0.1464 0.0858 0.0785
0.0016 0.029 0.1418 0.2316 0.2199 0.1635 0.1071 0.1055
                                                                                                                                          0
```

```
## 1977 2 1 1 1
## 1978 2 1 1 1
## 1979 2 1 1 1
                                                                                                        100 0 0 0 0 0
100 0 0 0 0 0
                                                                                                                                                                                        0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
0 0 0 0 0 0 0

        0.0017
        0.0192
        0.1382
        0.2442
        0.2226
        0.1605
        0.104
        0.1096

        0.0012
        0.0209
        0.1441
        0.2588
        0.2401
        0.1673
        0.0966
        0.0711

        0.0013
        0.0194
        0.1649
        0.1998
        0.2004
        0.1566
        0.1914

        0.0008
        0.0138
        0.0919
        0.1771
        0.195
        0.1792
        0.1404
        0.2019

                                                                                                             100 0
100 0
100 0
 ## 1981 2
                                                                                                              100 0
                                                                                                                                                                                                                                                                              0
                                                                                                                                                                                                                                                                                            0.0006
                                                                                                                                                                                                                                                                                                                      0.0225 0.1164 0.1743 0.1711 0.1584
                                                                                                                                                                                                                                                                                                                                                                                                                                                             0.1284
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        0.2283
                                                                                                                                                                                                                                                                              0 0 0 0.0544 0.2576 0.2802 0.1667 0.0837 0.0508 0.1067 0.0837 0.0508 0.0064 0.0508 0.311 0.3135 0.1763 0.0846 0.0321 0.0145 0.0005 0.0044 0.079 0.2869 0.3098 0.1898 0.086 0.0306 0.0129
 ## 1982 2
                                                                                                              100 0
                                                                                                              100 0
                                                                                                                                                                                                                                                                                        0.0016 0.0531 0.2613 0.3289 0.2084 0.0978 0.0352 0.0137 
0.0013 0.0284 0.1895 0.3045 0.2522 0.1421 0.0565 0.0255
 ## 1986 2
                                                                                                              100 0
                                                                                                                                                                                                                                                                0
                                                                                                                                                                                                                                                                              0
 ## 1987 2
                                                                                                              100 0
                                                                                                                                                                                                                                                                                           0.0005 0.0187 0.1211 0.2209 0.219 0.1908 0.1197 0.1094
003 0 0.0146 0.0887 0.1801 0.1707 0.1728 0.1431 0.2297
 ## 1989 2
                                                                                                             100 0
 ## 1990 2
                                                                                                             100 0
                                                                                                                                                                                                                                                               0 0.0003 0
                                                                                                                                                                                                                                                                0 0.0001 0.0005 0.0141 0.0848 0.1651 0.1719 0.1739 0.1739 0.1432 0.2392 0.0003 0.0002 0.0005 0.0095 0.0638 0.1317 0.1673 0.1747 0.1636 0.2886 0 0 0 0.0014 0.0138 0.094 0.1789 0.1739 0.1596 0.1331 0.2453
                                                                                                             100 0
100 0
                                                                                                                                                                                                                                                              0 0.0004 0.0138 0.094 0.1789 0.1739 0.1596 0.1331 0.2453 0 0.0006 0.0006 0.0129 0.0779 0.1407 0.162 0.1771 0.1671 0.2612 0 0.0004 0.0003 0.0138 0.0899 0.1486 0.1603 0.1699 0.1586 0.258 0.0001 0.0001 0.0004 0.0002 0.0008 0.0225 0.1187 0.1596 0.149 0.1
 ## 1993 2
                                                                                                             100 0
 ## 1996 2
                                                                                                              100 0
                                                                                                             100 0
100 0
                                                                                                                                                                                                                                     0 0
0.0001
                                                                                                                                                                                                                                   0.0001 0.0001 0.0001 0.0004 0.0002 0.0008 0.0225 0.1187 0.1596 0.149 0.1432 0.1
0 0 0.0001 0 0.0001 0 0.0001 0.1047 0.1313 0.2575 0.2229 0.1624 0.0561 0.1637
0.0001 0.0001 0 0.0001 0.0003 0.0111 0.0931 0.1945 0.2111 0.1822 0.1247 0.1826
001 0.0001 0.0001 0.0002 0.0002 0.0012 0.0181 0.0836 0.1681 0.1986 0.1953 0.1530
0 0.0001 0.0001 0.0001 0.0002 0.0002 0.0161 0.108 0.1884 0.1915 0.1683 0.1334 0.1
0 0.0001 0.0001 0.0002 0.0009 0.0243 0.1464 0.232 0.1871 0.1497 0.0994 0.1597
0 0 0 0.0002 0.0004 0.0514 0.1302 0.1702 0.1971 0.1632 0.2812
0 0 0 0.0001 0.0001 0.0008 0.015 0.0859 0.1543 0.1661 0.1783 0.1516 0.2475
 ## 1999 2
                                                                                                              100 0
                                                                                                                                                                                                           0 0
0 0
 ## 2000 2
                                                                                                              100 0
                                                                                                                                                                                                            0.0001
 ## 2002 2
                                                                                                              100 0
 ## 2003 2
                                                                                                             100 0
                                                                                                                                                                                                           0
                                                                                                                                                                                                                    0
 ## 2004 2
                                                                                                              100 0
 ## 2006 2
                                                                                                              100 0
                                                                                                                                                                                                                                                                          0.0002 0.0003 0.0067 0.0871 0.1833 0.1934 0.1846 0.1472 0.1973 0.0001 0.0002 0.01 0.0746 0.1457 0.1619 0.179 0.1625 0.2659 0 0.0002 0.0108 0.1152 0.2215 0.1968 0.1588 0.1084 0.1882 0 0.0003 0.0091 0.0986 0.2244 0.2238 0.1861 0.1144 0.1433
 ## 2007 2
                                                                                                              100 0
                                                                                                                                                                                                          0
                                                                                                             100 0
100 0
 ## 2010 2
                                                                                                             100 0
 ## 2011 2
                                                                                                              100 0
                                                                                                                                                                                                                                                                0.0003 0.0001 0.0003 0.0114 0.118
                                                                                                                                                                                                                                                                                                                                                                                                   0.2436 0.2292 0.1725 0.1077 0.1169
                                                                                                                                                                             0 0 0
                                                                                                            100 0
100 0
                                                                                                                                                                                                        0 0 0.0001 0 0.0001 0 0 0.004 0.0499 0.1249 0.173 0.1886 0.1854 0.2937
0 0.0001 0.0001 0 0 0.0001 0.0001 0.0054 0.0525 0.1271 0.1484 0.1657 0.1632 0.3374
                                                                                                                                       0
 ## 2014 2
                                                                                 0
                                                                                                              100 0
                                                                                                                                    0 0
                                                                                                                                                                0
                                                                                                                                                                                           0
                                                                                                                                                                                                       0 0
                                                                                                                                                                                                                                   0 0 0 0 0.0004 0.0117 0.0964 0.1831 0.1696 0.1454 0.1246 0.2689
0 0 0 0.0001 0.0003 0.0067 0.0616 0.1473 0.1864 0.1947 0.1634 0.2397
 ## 2015 2
                                                                                                             100 0
                                                                                                                                                                                        0
 ## #Discarded
                                                                                                           Type Shell Maturity Nsamp DataVec 87.3 0.0011 0 0.0011 0.008 0.0046 0.0126 0.0069 0.0378 0.0504 0.0767 0.1226 0.1523 0.1867 0.244 0.0859 0.0092 0 100 0.0033 0.0101 0.0197 0.0214 0.0224 0.0394 0.0326 0.063 0.0624 0.0692 0.0641 0.1125 0.1586 0.2154 0.0939 0.0101 0 0 0.0009 0.0012 0.0111 0.0222 0.0549 0.0869 0.1143 0.1183 0.123 0.118 0.1251 0.1112 0.0807 0.0293 0.0028 0 100 0.0009 0.0012 0.0015 0.0055 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052 0.0052
                                                                                             Sex Type
0 87.3
## #Year Season
## 1990 2 1 1
                                        Season Fleet
 ## 1991 2
 ## 1993 2
                                                                                                           23 0 0 0 0.0131 0.0524 0.083 0.0742 0.0306 0.048 0.0699 0.0611 0.1040 0.1485 0.1099 0.1048 0.0131 0 0 0 0 100 0 0.0002 0.0005 0.0007 0.0015 0.0197 0.0555 0.109 0.1268 0.1304 0.1031 0.1002 0.1275 0.1424 0.0751 0.0076 0 0 0 0 0.0002 0.0005 0.0007 0.0015 0.0197 0.0555 0.109 0.1268 0.1304 0.1031 0.1002 0.1275 0.1424 0.0751 0.0076 0 0 0 0 0.0005 0.0008 0.0044 0.007 0.01 0.0104 0.0175 0.0391 0.097 0.4020 0.2026 0.2047 0.1811 0.0714 0.0097 100 0 0 0 0.0005 0.0086 0.0086 0.0029 0.0076 0.0086 0.0143 0.0286 0.063 0.126 0.2118 0.3244 0.188 0.0076 0 0 0 100 0.0003 0.0051 0.0192 0.0483 0.0613 0.0576 0.0595 0.0585 0.0585 0.0712 0.1599 0.1497 0.1554 0.0895 0.0086 100 0.0016 0.0577 0.0093 0.0115 0.0155 0.0595 0.0586 0.0866 0.0109 0.1196 0.1239 0.1411 0.1319 0.1128 0.0481 0.0045 100 0.0012 0.0061 0.0067 0.0091 0.0065 0.0091 0.0055 0.0091 0.0055 0.0091 0.0055 0.0091 0.0055 0.0091 0.0055 0.0091 0.0055 0.0091 0.0055 0.0055 0.0055 0.0586 0.0586 0.0586 0.0586 0.126 0.1239 0.1411 0.1319 0.1128 0.0481 0.0045 100 0.0012 0.0061 0.006 0.0091 0.0065 0.0091 0.0065 0.0068 0.0068 0.0630 0.0091 0.0055 0.0586 0.0586 0.0712 0.0559 0.0558 0.0558 0.0712 0.0559 0.0555 0.0555 0.0555 0.0555 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 0.0055 
 ## 1996 2
 ## 1997 2
 ## 1999 2
 ## 2000 2
                                                                                 0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              0.0097
 ## 2000 2
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              0.0045
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              0.0093
 ## 2003 2
                                                                                                             100 0.0081 0.0119
                                                                                                                                                                               0.0146 0.0317
                                                                                                                                                                                                                                     0.0552 0.0666 0.072
                                                                                                                                                                                                                                                                                                                      0.067
                                                                                                                                                                                                                                                                                                                                                0.0642 0.0599 0.0655 0.0958
                                                                                                                                                                                                                                                                                                                                                                                                                                                             0.1322 0.1708 0.0781
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              0.0064
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ٥
 ## 2004 2
                                                                                                             100 0 0004 0 0074
                                                                                                                                                                               0 0177 0 0403 0 051 0 0483 0 0615
                                                                                                                                                                                                                                                                                                                      0 1087 0 1384 0 1452 0 1102 0 0849
                                                                                                                                                                                                                                                                                                                                                                                                                                                             0.07
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         0.0688 0.0404
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              0.0059
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        0 0008
                                                                                                             100 0.0004
100 0.0002
100 0.0003
                                                                                                                                                  0.0008
                                                                                                                                                                               0.0017
0.0015
0.0044
                                                                                                                                                                                                        0.0029
                                                                                                                                                                                                                                     0.0076 0.022 0.0343
0.0312 0.0377 0.0368
                                                                                                                                                                                                                                                                                                                      0.0418
0.0346
                                                                                                                                                                                                                                                                                                                                                0.0454
0.0452
                                                                                                                                                                                                                                                                                                                                                                            0.0658
0.0766
                                                                                                                                                                                                                                                                                                                                                                                                      0.0956
0.0929
                                                                                                                                                                                                                                                                                                                                                                                                                                   0.1376
0.1144
                                                                                                                                                                                                                                                                                                                                                                                                                                                             0.1381 0.1385
0.1377 0.1764
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    0.0729
0.1275
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              0.0262
0.0284
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         0.0246
0.0105
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     0.0349
0.0085
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               0.0345
0.0075
                                                                                                                                                                               0.0068 0.0098
 ## 2007 2
                                                                                                             100 0.0012 0.0042
                                                                                                                                                                                                                                     0.0171 0.0366 0.0658
                                                                                                                                                                                                                                                                                                                       0.085
                                                                                                                                                                                                                                                                                                                                                  0.0928 0.0857
                                                                                                                                                                                                                                                                                                                                                                                                      0.0819
                                                                                                                                                                                                                                                                                                                                                                                                                                 0.0987
                                                                                                                                                                                                                                                                                                                                                                                                                                                             0.1291 0.1651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   0.0956
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              0.0126
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         0.0032
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     0.0028
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                0.0022
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          0.0037
 ## 2008 2
                                                                                                              100 0.0001 0.0003
                                                                                                                                                                               0.0012 0.0046
                                                                                                                                                                                                                                     0.0108 0.0141 0.0159
                                                                                                                                                                                                                                                                                                                       0.0214
                                                                                                                                                                                                                                                                                                                                                0.0441
                                                                                                                                                                                                                                                                                                                                                                            0.0808
                                                                                                                                                                                                                                                                                                                                                                                                      0.1269
                                                                                                                                                                                                                                                                                                                                                                                                                                 0.1793
                                                                                                                                                                                                                                                                                                                                                                                                                                                             0.1988
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        0.1838
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    0.0983
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0.0011
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0.0018 0.0032
0.0025 0.0055
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0.0218
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0.1517
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 ## 2010 2
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 ## 2011 2
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 ## 2012 2
                                                                                                              100 0.0006 0.0008
                                                                                                                                                                              0.0024 0.0042 0.0111 0.0262 0.0416
0.004 0.0052 0.011 0.0137 0.0227
0.0017 0.0025 0.0038 0.0082 0.0139
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0.0353
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0.0871
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100 0.0006 0.0014
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0.0249 0.0347
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0.1525 0.1845
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 ## 2014 2
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 ## 2015 2
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                                                                                                            100 0.0002 0.0006 0.0021 0.004
                                                                                                                                                                                                                                     0.0082 0.0156 0.0169 0.019
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                                                                                                          Type Shell Maturity Nsamp DataVec
50 0 0.0014 0.0029 0.0029 0.0057 0.0072 0.0143 0.0672 0.1016 0.1731 0.1688 0.2132 0.1359 0.0715 0.0243 0.01
37.5 0.0054 0.0239 0.0612 0.0957 0.133 0.1596 0.1223 0.0718 0.0691 0.0559 0.0691 0.0798 0.0346 0.0106 0.0053 0.0027
50 0.0008 0.0013 0.0029 0.0176 0.0799 0.1757 0.1914 0.1694 0.0958 0.0816 0.0577 0.0406 0.0406 0.0406 0.0259 0.0117 0.0046
50 0.0015 0.0024 0.0044 0.0059 0.013 0.0326 0.1011 0.1597 0.1444 0.1137 0.0905 0.0853 0.0835 0.074 0.0434 0.0446
51 0.0015 0.0024 0.0044 0.0059 0.013 0.0326 0.1011 0.1597 0.1444 0.1137 0.0905 0.0853 0.0835 0.074 0.0434 0.0446
50 0.0015 0.0024 0.0004 0.001 0.0019 0.0364 0.0277 0 0 0 0 0 0 0 0 0
50 0 0 0.0011 0.0011 0.0019 0.0265 0.0364 0.0464 0.0695 0.1391 0.1667 0.1435 0.117 0.1082 0.0607 0.074
50 0.0002 0.0004 0.001 0.0026 0.0064 0.018 0.057 0.1813 0.2307 0.1527 0.0282 0.0855 0.0578 0.0578 0.0514 0.0337 0.0386
3.6 0 0 0 0.00275 0.0278 0.0278 0.0278 0.0565 0 0 0.1111 0.1389 0.0833 0.1111 0.1111 0.833 0.2222
50 0 0.0175 0.1036 0.2234 0.2093 0.1319 0.0774 0.0323 0.0209 0.0316 0.0451 0.0518 0.0229 0.0141 0.0047 0.0135
## #Year
## 1990 2
                                                                   Fleet
                                                                                              Sex Type
                                        Season
                                                   2
                                                                    2
 ## 1991 2
 ## 1993 2
 ## 1996 2
                                                                                 0
 ## 1997 2
 ## 1998 2
                                                                                                          3.6 0 0 0 0 0 0.0276 0.036 0.234 0.293 0.1319 0.0774 0.0323 0.0209 0.0316 0.0451 0.0518 0.0229 0.0141 0.0047 0.0135 0 0.0047 0.0135 0.0047 0.0135 0.0047 0.0135 0.0047 0.0135 0.0047 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0051 0.0
 ## 2000 2
 ## 2001 2
 ## 2003 2
 ## 2004 2
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 ## 2005 2
 ## 2007 2
 ## 2008 2
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0.0199 0.0276 0.029 0.0271
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0.1138
  ## 2009 2
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 ## 2011 2
                                                                                                            50 0.0132 0.0373
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                                                                                                            50 0.0089 0.0107 0.0125 0.0339 0.0606 0.1159 0.0945 0.0392 0.0178 0.0125 0.041 0.0392 50 0.0005 0.0017 0.0083 0.0109 0.0187 0.0369 0.0714 0.1329 0.1424 0.0972 0.0718 0.0635 50 0.0015 0.0062 0.0082 0.0108 0.0113 0.0236 0.0318 0.0297 0.0528 0.0672 0.0754 0.0764
 ## 2012 2
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0.0928 0.1123
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                                                                                                                                  0.0014 0.002 0.0059 0.0138 0.0182 0.0204 0.0367 0.0567 0.0885 0.0881 0.1428 0.1078 0.1019 0.0817 0.2342
 ## 2015 2
                                                                                 0
                                                                                             0
                                                                                                            50 0
 ## #Trawl
                                          bycatch male
                                                                                             Sex Type Shell Maturity Nsamp DataVec
0 50 0 0 0 0 0 0 0.013 0.0087 0.0043 0.0216 0.0087 0.026 0.039 0.0433 0.0649 0.0996 0.0866 0.0736 0.0909 0.0649 0.1299
0 50 0.0036 0.0009 0.0009 0.0009 0.0026 0.0035 0.0079 0.0037 0.0317 0.0485 0.0599 0.0996 0.1084 0.1251 0.104 0.1057 0.1004 0.00
0 50 0 0 0 0 0 0 0 0 0.0025 0.0012 0.0025 0.0124 0.0021 0.0511 0.0687 0.0872 0.1245 0.1158 0.0797 0.0984 0.0672 0.188
0 50 0.0178 0.0013 0.0025 0.0013 0.0025 0.0013 0.0025 0.0038 0.0025 0.0013 0.0083 0.0083 0.0083 0.0083 0.0087 0.0144 0.0228 0.0586 0.0856 0.0852 0.0708 0.0898 0.0
0 50 0.0531 0.0207 0.0096 0.0135 0.0142 0.0163 0.0274 0.0263 0.038 0.0375 0.0422 0.0394 0.0368 0.0377 0.0313 0.0231 0.0207 0.0299
## #Year
## 1976 2
 ## 1977 2
                                                                    0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              0.1057 0.1004 0.0634 0.0326 0.0441
 ## 1978 2
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     0.0142
 ## 1980 2
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                0.0131
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                                                                                                                       0.0262 0.0028 0.0024 0.0366 0.0112 0.0175 0.0279 0.0349 0.0366 0.0503 0.0475 0.0472 0.0475 0.0475 0.0475 0.0475 0.0476 0.0112 0.0175 0.0279 0.0495 0.0349 0.0386 0.0504 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.0475 0.
 ## 1981 2
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 ## 1984 2
                                                                                                              50
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 ## 1985 2
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                                                                                                           50 0.002 0.001 0.002 0.005 0.008 0.0029 0.005 0.008 0.019 0.0271 0.017 0.022 0.0441 0.0491 0.0401 0.0581 0.0827 0.0812 0.0671 0.0611 0.0511 0.0542 0.0324 0.0324 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.
 ## 1989 2
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  ## 1999 2
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  ## 2002 2
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  ## 2009 2
  ## 2010 2
  ## 2013 2
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  ## 2014 2
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  ## #Trawl
                                              bycatch female
  ## #Year
                                            Season Fleet
                                                                                                        Sex Type
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                                                                                                                                                                                                                    0 0.013 0.0087 0.0216 0.026 0.0303 0.0563 0.013 0.026
0 0 0.0009 0.0026 0.0053 0.007 0.0088 0.0062 0.0053 0.0
0 0 0 0 0 0 0.0075 0.005 0.0075 0.0262 0.0324 0.061
  ## 1976 2
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  ## 1978 2
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  ## 1979 2
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0.0312 0.0267 0.024 0.0158 0.0093 0.0080
  ## 1980 2
  ## 1981 2
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  ## 1982 2
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  ## 1983 2
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  ## 1986 2
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  ## 1987 2
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                                                                                                                      19.4 0.0028 0.0023 0.0025 0.0047 0.0081 0.0123 0.0212 0.0428 0.0498 0.0477 0.0432 0.0297 0.0252 0.017 0.0064 0.0

50 0.0017 0.0035 0.0069 0.0112 0.0112 0.019 0.0268 0.0424 0.036 0.0372 0.0346 0.0251 0.0173 0.0147 0.0449

39.6 0 0.0032 0.0063 0.0032 0.0063 0.0032 0.0063 0.0052 0.0063 0.0252 0.0159 0.0159 0.0349 0.0222 0.054 0.0221 0.1206

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24.7 0 0.0035 0.0087 0.0295 0.0329 0.0433 0.0295 0.0659 0.0451 0.0173 0.0139 0.0121 0.0139 0.0225 0.0208 0.0693

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48.3 0 0 0.0006 0.0006 0.0042 0.011 0.0225 0.0297 0.0489 0.0439 0.0243 0.0184 0.0178 0.0136 0.0101 0.038

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50 0 0 0.0004 0.0005 0.0005 0.0003 0.0007 0.0131 0.0389 0.0416 0.0336 0.0349 0.0245 0.0245 0.0256 0.0319 0.0388

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  ## 1990 2
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  ## 1991 2
  ## 1994 2
  ## 1995 2
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  ## 1996 2
  ## 1998 2
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  ## 2000 2
  ## 2002 2
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  ## 2003 2
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  ## 2006 2
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  ## 2007 2
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0.0004 0.0004 0.0004 0.0013 0.0009 0.0021 0.0089 0.02 0.0327 0.0327 0.0327 0.0272 0.0293 0.0315 0.0442 0.0378 0.0389

0.0007 0.0007 0.0007 0.0007 0.002 0.004 0.0087 0.0188 0.0268 0.0436 0.0503 0.0698 0.0698 0.0691 0.049 0.0456
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  ## 2009 2
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  ## 2010 2
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                                                                                                                         50 0.0007
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                                                                                                                       50 0 .00018 0.0018 0.0086 0.0085 0.0087 0.0027 0.00747 0.0036 0.0087 0.0087 0.0088 0.0086 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0846 0.0
  ## 2011 2
  ## 2013 2
  ## 2014 2
                                                                                         0
  ## 2015 2
  ## #Tanner
                                           crab
                                                                             bycatch Male
  ## #Year
                                           Season
                                                                            Fleet
                                                                                                        Sex Type
                                                                                                                                                        Shell
                                                                                                                                                                                      Maturity
                                                                                                                                                                                                                                    Nsamp
                                                                                                                                                                                                                                                                 DataVec
                                                                                                                      ## 1991 2 3
                                                                                           0
                                                                                                        0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       0.0587 0.0869
                                                                            0
0
0
  ## 1993 2
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          0.0474
  ## 2013 2
                                                                                         0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          0.1009
  ## 2014 2
                                                                                         0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         0.1055
                                                                                                                                                                                                                                                                0.0716 0.0978 0.0702 0.0455 0.0606 0.0799 0.0854 0.0468 0.0344 0.0262 0.0482 0.0413 0.0537 0.0565 0.0592 0.084
  ## 2015 2
                                                                                                                       50 0.0069 0.0152 0.0069 0.0096
  ## #Tanner
                                            crab
                                                                             bycatch female
                                                                          Fleet Sex Type
0 0 0 50 0
0 0 50 0
                                                                                                                                                        Shell
                                                                                                                                                                                     Maturity
  ## #Year
                                           Season
                                                                                                                                                                                                                              Nsamp
                                                                                                                                                                                                                                                                 DataVec
                                                                                                                         | Siel | Naturity | Samp | DataFet | O.0464 | O.0795 | O.065 | O.1177 | O.1627 | O.1591 | O.1341 | O.0768 | O.0377 | O.0264 | O.015 | O.065 | O.0759 | O.0595 | O.065 | O.1975 | O.1691 | O.1841 | O.0768 | O.0377 | O.0264 | O.015 | O.0675 | O.0675 | O.0675 | O.0759 
  ## 1991 2
                                                        2
                                                                                                                       50 0
50 0
  ## 1993 2
  ## 2013 2
                                                                                                                          50 0 0 0 0.0026 0.0052 0.0184 0.0367 0.0787 0.0919 0.2388 0.2561 0.0971 0.0446 0.0367 0.0184 0.0289 0.0367

50 0.0005 0.0018 0.0037 0.0069 0.0319 0.0462 0.0851 0.1378 0.1923 0.1489 0.123 0.092 0.0499 0.0268 0.0227 0.0305
  ## 2014 2
                                                                                                                         50 0
  ## # Fixed gear crab
                                                                                           bycatch Male
                                                                                                        Sex Type Shell Maturity Nsamp
0 50 0 0 0 0 0.0009 0.0009
0 50 0.0073 0.0091 0.0073 0.0036
  ## #Year
                                               .
Season Fleet
                                                                                                                                                                                                                                                                 DataVec
                                                                                                                                                                                                                                            0009 0.0009 0.0101 0.0129 0.0129 0.0129 0.0202 0.0395 0.0606 0.0634 0.1093 0.0817 0.0735 0.0642 0.1166
0036 0.0036 0.0073 0.0055 0 0.0073 0.0036 0.0109 0.0146 0.0255 0.0255 0.0201 0.0182 0.0164 0.0274 0.0182 0.0456
0.0025 0.0017 0.0025 0.0042 0.0025 0.005 0.0067 0.0076 0.0185 0.0302 0.0235 0.0302 0.0285 0.0302 0.0865
  ## 2009 2 4
                                                                                                                      50 0.0073 0.0091 0.0017 0.0025 0.0017 0.0025 0.0017 0.0025 0.0042 0.0025 0.005 0.0067 0.0076 0.0185 0.0302 0.0235 0.0302 0.0235 0.0302 0.0285 0.0302 0.0285 0.0302 0.0285 0.0302 0.0285 0.0302 0.0285 0.0302 0.0285 0.0302 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 0.0303 
  ## 2011 2
  ## 2012 2
  ## 2012 2
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   0.0798
                                                                                           0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       0.1102
                                                                                                        0
  ## 2015 2
                                                                            0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     0.0262
                                                                                       ## # Fixed gear crab
                                                                         Fleet
0 0
 ## #Year
## 2009 2
  ## 2010 2
                                                                            0
  ## 2011 2
  ## 2013 2
  ## 2014 2
  ## 2015 2
                                                                                                                         50 0.0002 0.0002 0.0002 0.0045 0.0072 0.0132 0.0228 0.0512 0.0745 0.0879 0.1082 0.1064 0.0767 0.0557 0.0586 0.1216
  ## #NMFS
                                              males
                                                                             combined
                                                                                                        Sex Type
                                                                                                                                                       Shell
  ## #Year
                                              Season
                                                                            Fleet
                                                                                                                                                                                      Maturity
                                                                                                                                                                                                                                    Nsamp
                                                                                                                                                                                                                                                                 DataVec
                                                                                                                         1796 Shell Naturity Namp Datavec 200 0.0222 0.0411 0.02989 0.03787 0.0342 0.0294 0.03088 0.02457 0.02643 0.03137 0.02677 0.0292 0.02836 0.02734 0.02444 0.02701 0.01831 0.0134 0.00972 0.01126 200 0.00254 0.01272 0.02684 0.05025 0.05223 0.0523 0.05591 0.04486 0.03916 0.0329 0.04085 0.04379 0.03693 0.03915 0.03351 0.02212 0.02358 0.01543 0.00699 0.0077 200 0.00401 0.00427 0.00653 0.01018 0.01985 0.03762 0.04525 0.04405 0.04137 0.04496 0.04091 0.04094 0.03108 0.03237 0.03221 0.02589 0.01664 0.01399 0.00839 0.01207
  ## 1975 1
  ## 1978 1
                                                                                                                          200 0.00429 0.01195 0.01361 0.02401 0.01724 0.01906 0.01783 0.0279 0.02956 0.02974 0.03003 0.03035 0.02906 0.03665 0.03463 0.02826 0.02601 0.01728 0.01084 0.0091
  ## 1979 1
                                                                          0
                                                                                        0
                                                                                                                         200 0.02058 0.01543 0.01033 0.01232 0.0144 0.01627 0.01369 0.01548 0.01636 0.01566 0.02351 0.03377 0.03325 0.04324 0.04149 0.03777 0.03592 0.02977 0.0136 0.02353
                                                                                                                         200 0.00673 0.01333 0.03758 0.02873 0.02951 0.02964 0.02645 0.02622 0.02244 0.01916 0.02962 0.01647 0.02307 0.0251 0.02637 0.03761 0.02664 0.02667 0.02637 0.0376 0.02551 0.02664 0.02662 0.02645 0.02662 0.02244 0.01916 0.02082 0.01647 0.02307 0.0251 0.02657 0.03761 0.02664 0.02667 0.02678 0.02163 0.03565 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.03665 0.036
  ## 1982 1
```

```
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
## 1983 1
                                        5
                                                        1 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 0.00699 0.0001 0.0003  
200 0.00261 0.01279 0.02442 0.03954 0.0589 0.05817 0.04235 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  
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 0.0293 0.0232
                                                                                                                                                                                                                                                                                                                                                                                         0.03095 0.02534 0.0332 0.02702 0.03627 0.03448 0.02896 0.0284 0.01826 0.01539 0.0038 0.00394
 ## 1987 1
                                                                                                                         200 0.00124 0.00707 0.03402 0.05458 0.04693 0.03171 0.02904 0.0291
                                                                                                                         200 0.00132 0.00131 0.00661 0.01098 0.01329 0.02154 0.04667 0.04304 0.04045 0.03373 0.02619 0.03082 0.02037 0.03305 0.04535 0.03683 0.02567 0.00944 0.00926 0.00150 0.00089 0.0024 0.01493 0.03477 0.01836 0.03764 0.02324 0.04118 0.02877 0.02534 0.04499 0.05229 0.0555 0.06652 0.04626 0.04626 0.02825 0.0278 0.00127 0.01061 0.01509 0.03475 0.03249 0.00938 0.00797 0.0084 0.0182 0.02957 0.02958 0.02958 0.02470 0.04012 0.03692 0.03824 0.02968 0.02339 0.01975 0.03475 0.03475 0.02658 0.04692 0.03425 0.03425 0.03425 0.03425 0.00155 0.00855 0.02535 0.04652 0.04662 0.03425 0.03425 0.03425 0.03425 0.00155 0.00155 0.00855 0.02535 0.04575 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558 0.02558
 ## 1988 1
 ## 1990 1
 ## 1991 1
                                                                                                                        200 0.0016 0.00399 0.02230 0.01271 0.0252 0.0355 0.0552 0.0552 0.05527 0.03818 0.03999 0.03781 0.03990 0.03781 0.03830 0.02333 0.02188 0.03985 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885 0.01885
 ## 1992 1
 ## 1994 1
                                                                                                                        ## 1995 1
  ## 1996 1
 ## 1998 1
                                                                                                                        ## 1999 1
 ## 2002 1
 ## 2003 1
 ## 2005 1
                                                                                                                         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 200 0.00173 0.00247 0.00532 0.00836 0.01864 0.02711 0.03454 0.04364 0.03857 0.02876 0.01874 0.0233 0.02355 0.03147 0.02728 0.02875 0.02769 0.0262 0.0299 0.02895 0.0008 0.00399 0.06785 0.01489 0.01878 0.01944 0.02333 0.03722 0.04701 0.03854 0.038168 0.02488 0.02263 0.02263 0.02219 0.04671 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 0.0163 0.01483 0.01688
 ## 2006 1
 ## 2007 1
 ## 2009 1
 ## 2010 1
                                                                                                                          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
## 2010 1
## 2011 1
## 2012 1
                                                                                                                         200 0.00364 0.00437 0.01248 0.02043 0.01868 0.0138 0.01677 0.01505 0.01821 0.0132 0.01805 0.02026 0.01612 0.02952 0.02754 0.02573 0.02416 0.02042 0.01154 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01646 0.01
 ## 2013 1
                                                                                                                        200 0 0.00046 0.000259 0.003 0.01598 0.03132 0.04368 0.03479 0.03127 0.0192 0.02307 0.03256 0.03357 0.03086 0.03724 0.0258 0.02237 0.01888 0.01799 0.04393 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 200 0.00664 0.00092 0.00263 0.00322 0.00414 0.00426 0.00337 0.00883 0.01293 0.00853 0.01452 0.01273 0.02535 0.01953 0.02134 0.02405 0.0389 0.03242 0.07093
 ## 2014 1
 ## 2016 1
 ## #NMFS
                                             female
                                                                                                                     Type Shell Maturity Nsamp DataVec 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 200 0.00292 0.03134 0.05633 0.0688 0.06279 0.04944 0.02692 0.01213 0.01368 0.00663 0.0049 0.00231 0.00151 0.00028 0.00109 200 0.000256 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 0.00488 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
 ## #Year
                                             Season Fleet
                                                                                                         Sex
 ## 1975 1
 ## 1977 1
 ## 1978 1
                                                                                                                         200 0.02855 0.01536 0.01209 0.01473 0.01478 0.02297 0.03813 0.0734 0.02919 0.08763 0.0565 0.03363 0.02145 0.01228 0.00425 0.00472 0.00571 0.00479 0.02191 0.03221 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
 ## 1980 1
                                                                                                                         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
 ## 1981 1
                                                                           0
                                                                                          0
                                                                                                                       200 0.01521 0.01126 0.01150 0.01897 0.03662 0.04522 0.04427 0.04722 0.05995 0.07744 0.08035 0.05095 0.02524 0.01431 0.0028 0.00415 00 0.05537 0.09537 0.09537 0.06029 0.03784 0.04226 0.04818 0.03978 0.03231 0.01896 0.02571 0.02813 0.02207 0.01141 0.00625 0.00238 0.00086 200 0.01741 0.0383 0.04749 0.06292 0.06466 0.03981 0.03406 0.01518 0.01668 0.00422 0.00904 0.00563 0.00665 0.00625 0.00129 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 0 200 0.00086 0.01548 0.03765 0.05212 0.06439 0.05553 0.05165 0.05553 0.05165 0.03973 0.01606 0.00681 0 0 0.00041 0.0001 0.0002 0.00009 0 200 0.00086 0.01548 0.03765 0.05212 0.06439 0.05553 0.05165 0.03973 0.01606 0.00681 0 0 0.00141 0.0001 0 0 0 200 0.00086 0 0.00376 0.05212 0.06439 0.05553 0.05165 0.03973 0.01606 0.00681 0 0 0.00152 0.00079 0 0 0.00076 0 200 0.00059 0.00764 0.00671 0.0161 0.04624 0.04448 0.05692 0.04138 0.0274 0.01125 0.00715 0.00079 0 0 0.00076 0 200 0.00059 0.00764 0.00674 0.00671 0.01394 0.06945 0.03913 0.09785 0.06971 0.06 0 0.04068 0.01837 0.0077 0.00766 0 0 200 0.00165 0 0.00171 0.00818 0.03103 0.07404 0.06458 0.06919 0.06 0.00512 0.03764 0.03146 0.01943 0.00643 0.00413 0 0 200 0.00055 0 0.00152 0.00515 0.0513 0.05151 0.00709 0.0256 0.05061 0.0565 0.05633 0.04095 0.02511 0.00616 0.00369 0.0037 0.00415 0.0115 0.01556 0.03195 0.0218 0.03443 0.03426 0.03050 0.03650 0.03394 0.02580 0.0431 0.02323 0.01104 0.00669 0.00259 180 0 0.00534 0.00777 0.01774 0.03642 0.0443 0.03426 0.03429 0.03629 0.02733 0.04668 0.02651 0.04481 0.03529 0.02733 0.04668 0.02966 0.02651 0.04481 0.03549 0.03780 0.00978 0.00976 0.04488 0.01774 0.01344 0.00649 0.01774 0.00649 0.01774 0.00649 0.01774 0.00649 0.01774 0.00649 0.01774 0.00649 0.01774 0.00649 0.01774 0.00649 0.01774 0.00649 0.01774 0.00649 0.01774 0.00649 0.01774 0.00649 0.01774 0.00649 0.01774 0.00649 0.01774 0.00649 0.01774 0.00649 0.01774 0.00649 0.01774 0.00649 0.01774 0.00649 0.01774 0.00649 0.01774 0.00649 0.01774 0.00649 0.01774 0.00649 0.01774 0.00649
 ## 1982 1
 ## 1984 1
 ## 1985 1
 ## 1986 1
 ## 1988 1
 ## 1989 1
 ## 1992 1
                                                                                                                         200 0.00655 0.008 0.01751 0.00849 0.01309 0.02482 0.04371 0.06474 0.06388 0.02968 0.02996 0.02676 0.02709 0.04448 0.01754 0.02194 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 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
 ## 1993 1
 ## 1995 1
                                                                                                                         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 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 0.00336 0.02077 0.001016 0.03676 0.0105 0.0161 0.0161 0.03290 0.10399 0.01390 0.03182 0.02635 0.02535 0.02319 0.03361 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
 ## 1996 1
 ## 1997 1
 ## 1999 1
 ## 2000 1
                                                                                                                          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
                                                                                                                        200 0.0056 0.01683 0.01581 0.01581 0.02581 0.02583 0.02583 0.05283 0.05283 0.05285 0.06757 0.06028 0.04188 0.02084 0.0167 0.04334 00 0.0056 0.01683 0.01683 0.01581 0.02585 0.05984 0.07787 0.05792 0.03945 0.03981 0.02990 0.06914 0.056 0.02621 0.01028 0.02048 0.00263 0.00583 0.07685 0.04852 0.02621 0.01671 0.02247 0.05199 0.0399 0.03984 0.0163 0.02059 0.02059 0.02046 0.02206 0.02015 0.01386 0.01683 0.05685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.03685 0.0368
## 2001 1
 ## 2002 1
 ## 2003 1
 ## 2004 1
 ## 2006 1
 ## 2007 1
                                                                                          0
                                                                                                                          200 0.00152 0.00227 0.00641 0.00782 0.01546 0.03563 0.05737 0.05603 0.0325 0.05699 0.06137 0.06413 0.04591 0.03429 0.02104 0.0323
 ## 2008 1
                                                                                                                         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
                                                                                                                        200 0.0046 0.0188 0.00533 0.00549 0.00140 0.01218 0.02570 0.05696 0.07237 0.05693 0.055646 0.05617 0.05754 0.03547 0.02343 0.02157 0.04697 0.00160 0.00189 0.00503 0.00549 0.00140 0.01218 0.02057 0.04661 0.056589 0.08464 0.060282 0.05226 0.0705 0.075137 0.04687 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0.00187 0
 ## 2009 1
 ## 2011 1
                                                                           0
                                                                                          0
 ## 2012 1
 ## 2014 1
 ## 2015 1
                                                                          0
                                                                                          0
 ## 2016 1
                                                                                                                         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
                                                                                                                      Season Fleet
 ## #Year
                                                                                                        Sex Type
 ## 2007 1
                                            6 1
                                                                           0
                                                                                                        0
 ## 2008 1
          2013 1
 ## 2014 1
                                                                           0
                                                                                         0
 ## 2015 1
                                                                           0
 ## 2016 1
 ## #BSFRF
                                             females
                                             Season Fleet
 ## #Year
                                                                                                         Sex Type
                                                                                                                                                       Shell
                                                                                                                                                                                     Maturity
                                                                                                                                                                                                                                   Nsamp
                                                                                                                                                                                                                                                                 DataVec
                                                                                                                        ## 1796 0.004 0.015 0.0044 0.0158 0.0302 0.0705 0.0563 0.0345 0.0364 0.0493 0.0501 0.0448 0.0272 0.0183 0.0152 0.0243 ## 1796 0.0004 0.0013 0.0088 0.0142 0.0286 0.0483 0.0754 0.0687 0.0463 0.0386 0.0411 0.0357 0.021 0.0179 0.0126 0.015 ## 113 0.0035 0 0.0191 0.0258 0.0176 0.0105 0.0094 0.0407 0.024 0.0291 0.0308 0.0216 0.0232 0.0403 0.0392 0.0483 ## 0 0.0056 0.0037 0.0071 0.0037 0.014 0.031 0.0238 0.0415 0.0457 0.0567 0.0567 0.0568 0.0481 0.0279 0.0385 0.0448 0.0324 0.0707 ## 0
 ## 2007 1
                                                                           0
0
0
 ## 2013 1
 ## 2014 1
                                             6 2
                                                                          0
                                                                                         0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           0
                                                                                                                        183 0.0116 0.0324 0.0231 0.0069 0.0153 0.0112 0.0042 0.0231 0.0368 0.0427 0.0364 0.0528 0.0366 0.0208 0.0575 #0 0 232 0.0034 0.0156 0.0034 0.026 0.0057 0.0137 0.017 0.017 0.043 0.0509 0.0904 0.1004 0.066 0.0725 0.0376 0.1008 #0 0
 ## 2015 1
 ## 2016 1
 ## ## Growth data
                                                                                         (increment)
 ## #
                             nobs_growth
                                                                                                       loewss regression for males BBRKC data to interpolate 3 sets of female BBRKC data
                              and cubic
 ## ##
                                                                           spine
                             MidPoint S
2 14.766667
 ## #
                                                                           Sex Increment
 ## 72.5 2
                                              13.333333
 ## 77.5 2
                                             11.866667
                                                                                          0.2
 ## 82.5 2
                                            10.233333
                                                                                         0.2
                                                         0.2
```

97 5 2

7.066667

0.2

```
## 102.5
                  6.433333
             2
## 107.5
## 112.5
## 117.5
                   5.933333
5.433333
4.933333
## 122.5
                    4.433333
                                  0.2
## 127 5
                    3 933333
                                  0.2
                   3.466667
3.033333
## 137.5
                                  0.2
## 142.5
                    2.533333
                                  0.2
## 147.5
## 152.5
                    2.033333
## 157.5
                   1.033333
                                  0.2
## 162.5
                   0.6 0.2
## 67.5 1
## 72.5 1
              16.510674
16.454438
## 77.5 1
## 82.5 1
               16.398615
                             0.2
               16 343118
                             0.2
              16.287715
16.23213
16.176368
## 87.5 1
## 92.5 1
                             0.2
## 97.5 1
                              0.2
                   16.123732 0.2
16.069744 0.2
16.013906 0.2
## 102.5
## 107.5
## 112.5
## 117.5
                    15.957058
## 122.5
                    15.900084
## 132.5
                    15.786395
                                  0.2
## 137.5
                    15.732966
                                  0.2
## 142.5
## 147.5
                   15.68064
15.628775
                                  0.2
## 152.5
                   15.577259
                                  0.2
## 157.5
                    15.526092
                                  0.2
                    15.475241
         Use custom growth transition matrix (0=no, 1=yes, by sex and size)
## 1
         The growth matrix (if not using just fill with zeros)
                                Males 0.0374249 0.257557 0.369321 0.236624 0.0941279 0.00494521 0 0 0 0 0 0 0 0.0374249 0.257557 0.369321 0.236624 0.0941279 0.00494521 0 0 0 0 0 0 0.0374249 0.257557 0.369321 0.236624 0.0941279 0.00494521 0 0 0 0 0 0 0.0390317 0.262221 0.369126 0.233146 0.0916878 0.00478779 0 0 0 0 0 0 0.0406974 0.266902 0.368829 0.229653 0.0892849 0.00463398 0 0
                             406974 0.266902
0.0406974 0.266
                        Females
         0.0315365
0 0.0715
0 0 0.
              1315355 0.29835 0.415939 0.203388 0.0507866 0 0 0 0 0 0.0715876 0.40062 0.374586 0.133701 0.0195053 0 0 0 0 0.1459 0.478366 0.296233 0.076745 0.0027561 0 0 0 0.0029379 0.2747 0.495812 0.195133 0.0314218 0 0
                                                                                                            0
0
0
                            0
                       0.0106724
0 0.0342
0 0 0.
                                                                                                        0
                                                                                                       0
                                                                                                   0.0133836
                                       0
                                                                                                             0
                                                                              1 0
0 0
0 0
                                                                    0
                                                                         0
                                                                                              0
                                                               0
             0 0
                       0
                                                                         0
                                                                               0
                                                                                    0
                                                                                              0
                        natural mortality (0=no, 1=yes, by
## 0
              stom natural mortality rates (by sex)
0.270878 0.270878 0.270878 0.270878 0.270878 0.986707 0.986707 0.986707 0.986707
0.18 0.18 0.18 0.18 0.18 0.64029 0.64029 0.64029 0.64029 0.64029 0.18 0.18 0.18
         Custom natural mortality rates
                                                                                                                                                                                                                                               0.270878
    0.18
0.18
                                                                                                                                                                    0.270878 0
0.18 0.18
                                                                                                                                                                                                 0.270878
0.18 0.18
                                                                                                                                                                                                                               0.270878 0
0.18 0.18
                                                                                                                                      0.986707
                                                                                                                                                    0.270878
                                                                                                                                                                                  0.270878
                                                                                                                                                                                                                0.270878
                                                                                                                                                0.18
                                                                                                                                      0.18
## ## eof
## 9999
```

The Gmacs base model control file:

```
## ## Controls for leading parameter vector (theta)
## ## LEGEND
## ## prior: 0 = wwff
           prior: 0 = uniform, 1 = normal, 2 = lognormal, 3 = beta, 4 = gamma
 ## ## ntheta
## 9
## ## ---
##
        0.18
                       0.15
                                 0.2
                                                -4
                                                           2
                                                                 0.18
                                                                           0.04
                                  18
20
20
                                                                          20.0
20.0
20.0
                     -10
-10
                                                            0
                                                               -10.0
10.0
                                                                                          # logR0 # logR1, to estimate if NOT initialized at unfished
                                                                10.0
        14.0
                      -10
                                                                                          # logRbar, to estimate if NOT initialized at unfished
# recruitment expected value
       72.5
                      55
                                  100
                                                            1 72.5
                                                                           7.25
```

```
# recruitment scale (variance component) - THIS IS ESTIMATED BY SEX IN JIES MODEL CALLED betar (I FIXED AT MEAN HERE)
##
        0.544
                       0.1
                                                                0.1
                                                                           5.0
                    -10
0.20
0.00
                                   0.75
1.00
1.00
                                                          0 -10.0
3 3.0
3 1.01
                                                                          0.75
2.00
1.01
                                                                                          # ln(sigma_R)
# steepness
# recruitment autocorrelation
       -0.9
0.75
         0.01
## ## GROWTH PARAMETER CONTROLS
## ##
           Two lines for each parameter if split sex, one line if not
## 2
## ## ---
                                                                          p2
       99.9
                                                                                         # alpha males or combined
# alpha
# beta males or combined
# beta
                    1.0
                                                               0.0
##
##
                                90.0
                                              -3
                                                         0
                                                                        999.0
                               90.0
0.9
0.9
       99 9
                     1 0
                                                               0.0
                                                                        999.0
        0.00
                    0.0
                                                               0.0
                                                                        999.0
999.0
         1.365758 0.1
                                                                                          # gscale males or combined
##
                                 3.0
                                               -4
                                                               0.0
                                                                        999.0
##
         1.885541 0.1
                                                               0.0
                                                                         999.0
                                                                                          # gscale
## ## -
## ## Two lines for each parameter if split sex, one line if not
## ## ival
                    1b
                                 пb
                                             phz prior
                                                                р1
                                                                          p2
                                                                                         # parameter
## ## Period 1
     144.170986 1.0
400.0 1.0
##
                              180.0
                                                         0
                                                               0.0
                                                                        999.0
                                                                                         # molt_mu males
                              999.0
1.0
9.0
                                                                        999.0
999.0
                                                                                         # molt_mu females (molt every year)
# molt_cv males
# molt_cv females (molt every year)
##
                                                               0.0
                     0.0001
                                              4
                    0.0001
        0.1
                                                               0.0
                                                                         999.0
## ## Period 2
     140.5
                    1.0
                              195.0
                                                         0
                                                               0.0
                                                                        999.0
                                                                                         # molt mu males
     400.0
                    1.0
                              999.0
                                                               0.0
                                                                        999.0
999.0
                                                                                           molt_mu females (molt every year)
        0.071
                                                                                          # molt_cv males
                                                                                          # molt_cv females (molt every year)
        0.1
                    0.0001
                                 9.0
                                                         0
                                                               0.0
                                                                        999.0
## ## 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 1b 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
                                                                           # selectivity periods
##
                                                                          # sex specific selectivity
# male selectivity type
##
                                                                           # female selectivity type
## ## Gear-1
                  Gear-2
                             Gear-3
                                        Gear-4
                                                   Gear-5
                                                              Gear-6
                                                                           # retention periods
                                                                           # sex specific retention
##
                                                                           # male
                                                                                     retention type
                                                                          # male retention type
# female retention type
# male retention flag (0 = no, 1 = yes)
# female retention flag (0 = no, 1 = yes)
##
## ## ---
                                                                                                         ---- ##
## ## gear par
                     sel
                                                                                        start end
## ## index index par sex ival lb
## # Gear-1
##
##
##
                                 100
                                               136
                                                        0
                                                                        999
                                                                                        1975
                                                                                                2016
                     2 1 2
                          1 2 2
                                 120
84
                                               137
150
                                                                        999
999
                                                                                3 3
                                                                                        1975
1975
                                                                                                2016
2016
                                  95
                                        60
                                               150
                                                        0
                                                                  1
                                                                        999
                                                                                        1975
                                                                                                2016
## # Gear-2
               5
6
                          0
                                 110
                                                                                        1975
                                                185
                                 150
                                                                        999
                                                                                        1975
                                                                                                 2016
## # Gear-3
                     1 2
                                 110
                                                185
                                                        ٥
                                                                  1
                                                                        999
                                                                                3
                                                                                        1975
                                                                                                2016
                                                                                        1975
                      1
                                 110
                                                185
                                                        0
                                                                        999
                                                                                        1975
                                                                                                2016
               10
                     2
                          2
                                 150
                                         5
                                               185
                                                        0
                                                                  1
                                                                        999
                                                                                3
                                                                                        1975
                                                                                                2016
   # Gear-3
               11
                                 110
                                                                        999
                                                                                3
     4
                          0
                                         5
                                                        0
## 4
## # Gear-5
              12
                                 150
                                               185
                                                                        999
                                                                                        1975
                                                                                                2016
               13
                                  74
                                        60
70
                                                 an
                                                                        999
                                                                                        1075
                                                                                                 1981
                                  95
90
                                                                                        1975
                                                                         999
                                                                                                 1981
##
               15
                                        60
                                                 90
                                                                         999
                                                                                        1982
                                                                                                 2016
                                 160
74
95
##
               16
                                        70
60
70
                                                150
                                                        ٥
                                                                         999
                                                                                        1982
                                                                                                 2016
                                                                                        1975
1975
               18
                                                180
                                                                         999
                                                                                                 1981
##
       5
              19
                                  90
                                        60
                                                180
                                                        0
                                                                         999
                                                                                3
                                                                                        1982
                                                                                                 2016
##
               20
                                 160
                                                180
                                                                         999
                                                                                        1982
                                                                                                2016
              21
                                  70
                                                                                        1975
                                                180
                                                                         999
                                                                                                 2016
##
      6
##
              22
                                  90
                                                180
                                                        0
                                                                         999
                                                                                        1975
                                                                                                 2016
                                 110
190
                                                                                        1975
1975
               23
               24
## ## --
## ## Retained
## ## gear par sel
## ## index index par sex
                                ival lb
                                                         prior
                                                                  p1
                                                                        p2
                                                                                        period period
## ## -----
## # Gear-1
                                                                                        1975
                                                        0
                                                                                -3
```

591

999

999

1975 2016

```
-1
                      2 2
                                                   999
                                                             0
##
               28
                                    11
                                            1
                                                                        1
                                                                              999
                                                                                     -3
                                                                                                1975 2016
## # Gear-2
## -2
## -2
                                                                                                1975
                                                                                                          2016
                30
## # Gear-3
     -3
-3
                31
                             ٥
                                    595
                                                    999
                                                                              999
                                                                                                 1975
                                                                                                          2016
## # Gear-4
##
##
##
               33
     -4
-4
                        1 2
                             0
                                    595
                                                    999
                                                             0
                                                                        1
                                                                              999
                                                                                       -3
                                                                                                1975
                                                                                                          2016
                34
                                     10
                                                    999
                                                                               999
                                                                                                 1975
                                                                                                          2016
               35
                       1
                             0
                                                                        1
     -5
-5
                                    590
                                                    999
                                                                              999
                                                                                                1975
                                                                                                         2016
##
               36
                       2
                             0
                                     10
                                                    999
                                                             0
                                                                        1
                                                                              999
                                                                                      -3
                                                                                                1975
                                                                                                         2016
## # Gear-6
## -6
                                  580
     -6
-6
                38
                             0
                                     20
                                                    999
                                                                               999
                                                                                                1975
                                                                                                          2016
## ## PRIORS FOR CATCHABILITY
## ## If a uniform prior is selected for a parameter then the 1b 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
## ##
## ## ---
                                ub phz prior p1 p2
1 4 1 0.843136 0.03
5 -4 0 0.001 5.00
                                                                               ##
Analytic? LAMEDA
0 1 # NMFS, 0.896 is the magic number * 0.941 (Jies max selex)
0 1 # BSFRF
##
     0.84
                     0
                                                                              0
##
       1.0
                     0
## ##
## ## -
## ## ADDITIONAL CV FOR SURVEYS/INDICES
         If a uniform prior is selected for a parameter then the 1b and ub are used (p1 and p2 are ignored). ival must be > 0
#### prior type: 0 = uniform, 1 = normal, 2 = lognormal, 3 = beta, 4 = gamma #####
                                                                                                                         ##
                                                  phz prior
-4 4
-4 4
## ## ival
                                                                        p1
    0.0001
                        0.00001 10.0
##
                                                                        1.0
                                                                                   100 # NMFS
                       0.00001 10.0
                                                                        1 0
                                                                                   100
                                                                                        # BSFRF
## ## ----
## ## PENALTIES FOR AVERAGE FISHING MORTALITY RATE FOR EACH GEAR
## ## Mean_F
## 0.1
                   STD_PHZ1 STD_PHZ2
                                                 PHZ
                                                     # Pot
# Trawl
# Tanner
# Fixed
# NMFS trawl survey (0 catch)
# BSFRF (0)
                   0.5
0.5
0.5
                                   45.50
       0.005
                                  45.50
45.50
       0.005
                   0.5
                                   45.50
       0 00
                    2 00
                                  20 00
##
## ##
## ## OPTIONS FOR SIZE COMPOSTION DATA
## ## One column for each data mat:
             One column for each data matrix
## ## LEGEND
## ## 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
                                                                                                                          ##
## ## ---
                                  Tanner NMFS
                                                       BSFRF
     2 # Type of likelihood
                                2 2 2 2
0 0 0 0
1 1 1 1
                                                   2 2 2
0 0 0
1 1 1
                                          2 2 2 2 2 # 19pe of likelinoud
0 0 0 0 0 0 # Auto tail compression (pmin)
1 1 1 1 1 1 # Initial value for effective sample size multiplier
-4 -4 -4 -4 -4 -4 # Phz for estimating effective sample size (if appl.)
5 5 6 6 7 7 # Composition aggregator
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
## ## STDEV in m_dev for Random walk
## 0.25
## ## Number of nodes for cubic spline or number of step-changes for option 3
## 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
                  # Estimated rec_ini phase
# VERBOSE FLAG (0 = off, 1 = on, 2 = objective func)
# 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 (O=FALSE, 1=TRUE)
## 0  # Stock-Recruit-Relationship (0 = none, 1 = Beverton-Holt)
## ## 9999
```

The Free q model control file:

90

160

60 90

150

999

1982 2016

1982

15 1 16 2

```
## ## LEADING PARAMETER CONTROLS
## ## Controls for leading parameter vector (theta) ## ## LEGEND
## ## prior: 0 = uniform, 1 = normal, 2 = lognormal, 3 = beta, 4 = gamma ## ## ------
## ## ntheta
## 9
## ## --
                                               phz
                                                                             p2
## ## ival
                      1b
                                  ub
                                                      prior
                                                                   p1
                                                                                           # parameter
                                                                                           # logR0
       16.5
                     -10
                                   18
                                                                -10.0
                                                                           20.0
                                                                                           # logRl, to estimate if NOT initialized at unfished
# logRbar, to estimate if NOT initialized at unfished
# recruitment expected value
       14.0
                     -10
                                   20
                                                 -2
                                                                10.0
                                                                           20.0
                                                                10.0
72.5
                                                                           20.0
                                                                                           # recruitment scale (variance component) - THIS IS ESTIMATED BY SEX IN JIES MODEL CALLED betar (I FIXED AT MEAN HERE)
        0.544
                       0.1
                                                 -3
                                                                 0.1
                                                                            5.0
                                                                                           # ln(sigma_R)
# steepness
       -0.9
                     -10
                                    0.75
                                                               -10 0
                                                                            0.75
                                                                 3.0
                                                                            2.00
                        0.00
                                                                                           # recruitment autocorrelation
        0.01
## ## GROWTH PARAMETER CONTROLS
           Two lines for each parameter if split sex, one line if not
## ## -
       99.9
                                                                                           # alpha males or combined
                     1.0
                                                                          999.0
                                90.0
                                                                0.0
##
                                90.0
0.9
0.9
                                                                                           # alpha
# beta males or combined
##
       99.9
                                                                 0.0
                                                                          999.0
                                                                         999.0
999.0
                     0.0
                                                                0.0
                                                                                           # beta
         0.00
         1.365758 0.1
                                  3.0
                                                                0.0
                                                                          999.0
                                                                                           # gscale males or combined
         1.885541 0.1
## ## OLITING PROBABILITY CONTROLS
## ## Two lines for each parameter if split sex, one line if not
## ## ----
## ## ival
                                  ub
                                              phz prior
                                                                 p1
                                                                                           # parameter
     144.170986 1.0
                                                                         999.0
                                                                                           # molt_mu males
                                                                                           # molt_mu females (molt every year)
# molt_cv males
# molt_cv females (molt every year)
     400.0
                     1.0
                              999.0
                                                                0.0
                                                                         999.0
        0.05
                                                                0.0
                                                                          999.0
999.0
                     0.0001
                     0.0001
## ## Period 2
     140.5
                     1 0
                               195.0
                                                                0 0
                                                                         999 0
                                                                                           # molt mu males
                                                                0.0
                                                                         999.0
999.0
                     1.0
                               999.0
                                                                                             molt_mu females (molt every year)
                                                                                           # molt_cv males
                                                                                          # molt_cv females (molt every year)
        0.1
                     0.0001
                                 9.0
                                                                0.0
                                                                         999.0
## ## 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)
## ## I.EGEND
          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
                                                                            # selectivity periods
                                                                            # sex specific selectivity
# male selectivity type
                                                                            # female selectivity type
## ## Gear-1
                  Gear-2
                           Gear-3 Gear-4
                                                    Gear-5
                                                               Gear-6
                                                                            # retention periods
                                                                            # retention periods
# sex specific retention
# male retention type
# female retention type
# male retention type
# male retention flag (0 = no, 1 = yes)
# female retention flag (0 = no, 1 = yes)
## ## gear par sel
## ## index index par sex ival lb
                                                                                          start end
                                                         prior p1
## # Gear-1
                                  100
                                                136
                                                                         999
                                                                                          1975
                                                                                                  2016
                                                                                  3 3
                                                                                          1975
1975
                                                         0
                                   95
                                         60
                                                150
                                                                         999
                                                                                          1975
                                                                                                  2016
## # Gear-2
                5
6
                                  150
                                                185
                                                                         999
                                                                                          1975
                                                                                                  2016
## # Gear-3
                                  110
                                                 185
                                                                         999
                                                                                          1975
                                                                                                   2016
                                  150
110
                                                                                          1975
1975
                                                 185
                                                                          999
                                                                                                   2016
               10
                                  150
                                                185
                                                                          999
                                                                                          1975
                                                                                                  2016
## # Gear-3
               12
                                  150
                                                185
                                                                          999
                                                                                          1975
                                                                                                  2016
## # Gear-5
                                                                                          1975
                                                                                                   1981
                                                                                          1975
                                                                          999
                                                                                                   1981
               14
```

```
5
               17
                      1
2
1
2
                           2
                                   74
                                          60
                                                 180
                                                                           999
                                                                                            1975
                                                                                                    1981
                                  95
90
160
                                                                                            1975
1982
1982
                                                                                                     1981
2016
2016
                                                  180
180
                                                                           999
999
               20
## # Gear-6
       6
               21
                                   70
                                                  180
                                                                           999
                                                                                            1975
                                                                                                     2016
               22
23
                           1 2
                                  90
110
                                                  180
                                                                           999
                                                                                            1975
                                                                                                     2016
               24
                                  190
                                                  180
                                                          0
                                                                           999
                                                                                            1975
                                                                                                     2016
## ## Retained
## ## gear par sel
## ## index index par sex ival lb
                                                                                            start
                                                                                           period period
                                                 ub
                                                          prior
                                                                    p1
                                                                          p2
## # Gear-1
     -1
-1
               25
                                                 999
                                                                           999
                                                                                            1975
                                                                                                     2016
               26
                                  137
                                                 999
                                                                           999
                                                                                            1975
                                                                                                    2016
                                                                                            1975
1975
                                                                                                     2016
2016
2016
               27
28
                                                                                   -3
-3
                                   11
## # Gear-2
     -2
-2
               29
                                  595
                                                  999
                                                                           999
                                                                                            1975
                                                                                                     2016
               30
                                                                                            1975
## # Gear-3
               31
##
     -3
-3
                           0
                                  595
                                                  999
                                                          0
                                                                    1
                                                                           999
                                                                                   -3
                                                                                            1975
                                                                                                     2016
##
               32
                                    10
                                                  999
                                                                           999
                                                                                            1975
                                                                                                     2016
              33
                      1
                                  595
                                                  999
                                                                           999
                                                                                            1975
     -4
-4
##
               34
                           0
                                   10
                                                  999
                                                          0
                                                                           999
                                                                                  -3
                                                                                            1975
                                                                                                     2016
## # Gear-5
                                  590
                                                                                            1975
                                                                                                     2016
     -5
-5
##
              36
                           0
                                   10
                                                 999
                                                          0
                                                                           999
                                                                                   -3
                                                                                            1975
                                                                                                    2016
## # Gear-6
                          0
    -6
-6
                                  580
                                                                                            1975
                                                                                   -3
-3
                                                                           999
               38
                                   20
                                                  999
                                                                                            1975
                                                                                                     2016
## ## ----
## ## 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
### prior: 0 = uniform, 1 = normal, 2 = lognormal, 3 = beta, 4 = gamma
                1b
0
0

        ub
        phz
        prior
        p1
        p2
        An

        1
        4
        1
        0.843136
        0.03
        0

        5
        4
        0
        0.001
        5.00
        0

                                                                          Analytic? LAMBDA 0 1 # NMFS, 0.896 is the magic number * 0.941 (Jies max selex) 0 1 # BSFRF
## ## ival
## 1.0 0 5 4 0 0.001 5.00 0 1 # BSFRF
## ## ADDITIONAL CV FOR SURVEYS/INDICES
## ## If a uniform prior is selected
## ## If a uniform prior is selected for a parameter then the 1b 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 ## ##
                                                                              p2
100
                                 10.0
     0.0001
                       0.00001
                                                -4 4
-4 4
##
       0.0001
                      0.00001
                                   10.0
                                                                    1.0
                                                                               100
                                                                                     # BSFRF
## ## -----
## ## -
## ## PENALTIES FOR AVERAGE FISHING MORTALITY RATE FOR EACH GEAR
## ## -----
## ## Mean_F
                   STD_PHZ1 STD_PHZ2
                                               1 # Pot
1 # Trawl
1 # Tanner
                  0.5
0.5
0.5
0.5
##
      0.1
                                 45.50
##
       0.005
                                 45.50
       0.005
                                 45.50
                                                    # Fixed
       0.00
                   2.00
                                 20.00
                                             -1 # NMFS trawl survey (0 catch)
-1 # BSFRF (0)
       0.00
                   2.00
                                 20.00
## ## OPTIONS FOR SIZE COMPOSTION DATA
## ## One
             One column for each data matrix
           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
## 2
                      2 2
0 0
## ## ---
##
## ## TIME VARYING NATURAL MORTALIIY RATES
## ## LEGEND
                                                                                                                   ##
## ## LEGEND
## ## 1 Spe: 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
```

The Variable M model control file:

Gear-1 Gear-2 Gear-3 Gear-4 Gear-5 Gear-6

```
## ## LEADING PARAMETER CONTROLS
            Controls for leading parameter vector (theta)
## ## prior: 0 = uniform, 1 = normal, 2 = lognormal, 3 = beta, 4 = gamma ## ## ------
## ## LEGEND
## ## ntheta
## 9
## ## -----
## ## ival
                                               phz prior
                                                                                           # parameter
                        0.15
                                                                   0.18
                                                                            0.04
                                                                -10.0
                     -10
       16.5
                                                                           20.0
                                                                                            # logR0
       14.0
                     -10
                                   20
                                                 -2
                                                                 10.0
                                                                            20.0
                                                                                            # logRl, to estimate if NOT initialized at unfished
# logRbar, to estimate if NOT initialized at unfished
# recruitment expected value
                                                                 10.0
72.5
                                                                            20.0
                                                                                            # recruitment scale (variance component) - THIS IS ESTIMATED BY SEX IN JIES MODEL CALLED betar (I FIXED AT MEAN HERE)
        0.544
                       0.1
                                                 -3
-4
                                                                  0.1
                                                                             5.0
       -0.9
                     -10
                                    0.75
                                                            0 -10.0
                                                                             0.75
                                                                                            # ln(sigma_R)
                                                                                            # steepness
# recruitment autocorrelation
        0.01
## ## GROWTH PARAMETER CONTROLS
         Two lines for each parameter if split sex, one line if not
## ## number of molt periods
## 2
## ## ----
## ## ival
       99.9
                     1.0
                                90.0
                                                                 0.0
                                                                          999.0
                                                                                            # alpha males or combined
                                                                                           # alpha
# beta males or combined
# beta
                                90.0
       99.9
                                                                 0.0
                                                                           999.0
                                                                 0.0
                     0.0
                                  0.9
                                                                          999.0
         1.365758 0.1
                                  3.0
                                                                 0.0
                                                                          999.0
                                                                                            # gscale males or combined
                                                                          999.0
## ## MOLTING PROBABILITY CONTROLS
## ## Two lines for each parameter if split sex, one line if not
## ## ival lb
## ## ------
## ## Period 1
## 144.170986 1.0
                                 пb
                                              phz prior p1
                                                                                           # parameter
                                                                          999.0
     400.0
                     1.0
                               999.0
                                                                 0.0
                                                                          999.0
                                                                                            # molt_mu females (molt every year)
                                                                                            # molt_cv males
# molt_cv females (molt every year)
        0.05
                     0 0001
                                                                           999.0
                     0.0001
## ## Period 2
      140.5
400.0
                     1 0
                               195.0
                                                                 0 0
                                                                          999 0
                                                                                            # molt mu males
                                                                 0.0
                                                                          999.0
999.0
        0.071
                     0.0001
                               9.0
                                                                                            # molt_cv males
                                                                                            # molt_cv females (molt every year)
        0.1
                     0.0001
                                  9.0
                                                                 0.0
                                                                          999.0
## ## 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)
## ## lb
## ## LEGEND
           SEND 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
                                                                            # selectivity periods
# sex specific selectivity
# male selectivity type
# female selectivity type
##
##
```

```
##
      1
                                                                      # retention periods
                                                                      # sex specific retention
# male retention type
# female retention type
                                      0
                                                0
                                                                      # male retention flag (0 = no. 1 = ves)
                                                                      # female retention flag (0 = no, 1 = yes)

# female retention flag (0 = no, 1 = yes)

## start end ##
## ## gear
             par sel
## ## index index par sex ival lb
                                            ub
                                                     prior
                                                              p1
                                                                    p2
                                                                            phz
                                                                                  period period
                                             136
                                                                                   1975
##
##
                               100
                                                                    999
                                                                                          2016
                    2
                               120
                                             137
                                                    0
                                                                    999
                                                                                   1975
                                                                                          2016
                                84
95
                                      60
60
                                                                    999
999
                                                                                   1975
1975
                                                                                           2016
## # Gear-2
## 2
              5
                         ٥
    2 2
                               110
                                       5
5
                                             185
                                                    0
                                                              1
                                                                    999
                                                                           3
                                                                                   1975
                                                                                           2016
## 2
## # Gear-3
                    1
                         1
                               110
                                       5
                                             185
                                                    0
                                                                                   1975
                                                                                           2016
##
     3
                                                                    999
                         1 2 2
                               150
110
##
                                             185
                                                     ٥
                                                                    999
                                                                                   1975
                                                                                           2016
                                                                                   1975
1975
                                                                            3
              10
                               150
                                             185
                                                                    999
                                                                                           2016
## # Gear-3
##
    4
             11
                         0
                               110
                                             185
                                                    0
                                                                    999
                                                                           3
                                                                                   1975
                                                                                           2016
              12
                               150
                                                                    999
                                                                                   1975
                                                                                           2016
## # Gear-5
              13
##
     5
5
                    1
2
1
2
                                74
                                              90
                                                                    999
                                                                           3 3 3 3 3 3
                                                                                   1975
                                                                                           1981
                                             150
90
                                                                    999
999
                                                                                   1975
1982
                                                                                           1981
2016
              14
15
                                             150
                                                    0
##
              16
                               160
                                      70
                                                                    999
                                                                                   1982
                                                                                           2016
                                74
95
90
                                      60
70
60
                                             180
180
180
                                                                    999
999
##
                                                     0
                                                                                   1975
                                                                                           1981
                                                                                   1975
1982
              19
                    1 2
                                                                    999
                                                                                           2016
##
              20
                        2
                               160
                                      70
                                             180
                                                    0
                                                                    999
                                                                                   1982
                                                                                          2016
## # Gear-6
                    1 1
2 1
1 2
2 2
             21
                                70
90
                                             180
180
                                                                   999
999
                                                                                   1975
1975
                                                                                           2016
                                                                                           2016
                                                    0
              23
                               110
                                             180
                                                                    999
                                                                                   1975
                                                                                          2016
                               190
                                             180
                                                                    999
                                                                                   1975
                                                                                           2016
## ## -----
## ## Retained
## ## gear par sel
## ## index index par sex ival lb
                                                                                   start
                                                     prior
                                            ub
                                                                    p2
## # Gear-1
## -1
## -1
## -1
    -1
-1
-1
-1
             25
                               136
                                             999
                                                    0
                                                                    999
                                                                                   1975
                                                                                           2016
                    2 1
1 2
2 2
                                                                          5
-3
-3
                               137
591
                                             999
999
                                                                    999
999
                                                                                   1975
1975
                                                                                           2016
2016
             28
                                11
                                             999
                                                    0
                                                              1
                                                                    999
                                                                                   1975
                                                                                           2016
## # Gear-2
             29
30
                               595
10
                                             999
999
                                                                                   1975
1975
                                                                    999
999
                                                                           -3
-3
                                                                                           2016
2016
## # Gear-3
## -3
## -3
## Gear-4
         31
32
                         0
                               595
                                             999
                                                    0
                                                              1
                                                                    999
                                                                                   1975
                                                                                           2016
## -4
## -4
             33
                         0
                               595
                                             999
                                                    0
                                                              1
                                                                    999
                                                                                   1975
                                                                                           2016
              34
                                10
                                             999
                                                                    999
                                                                           -3
                                                                                   1975
                                                                                           2016
## # Gear-5
             35
                    1 2
                               590
                                             999
                                                                                   1975
                                      1
                                                    0
                                                              1
                                                                    999
                                                                           -3
                                                                                           2016
## -5
## -5
             36
                        0
                                10
                                             999
                                                     0
                                                                    999
                                                                           -3
                                                                                   1975
                                                                                           2016
## # Gear-6
## -6 37 1 0
## -6 38 2 0
                                                                          -3
-3
                                20
                                             999
                                                                    999
                                                                                   1975
                                                                                           2016
## ## ----
## ## PRIORS FOR CATCHABILITY
       PRINTED FUR CALCHASILITY

If a uniform prior is selected for a parameter then the 1b and ub are used (p1 and p2 are ignored). ival must be > 0
## ## prior: 0 = uniform, 1 = normal, 2 = lognormal, 3 = beta, 4 = gamma
## ## ADDITIONAL CV FOR SURVEYS/INDICES
           If a uniform prior is selected for a parameter then the 1b and ub are used (p1 and p2 are ignored). ival must be > 0
## ## LEGEND
## ## pri
phz prior
-4 4
-4 4
                                                                      p2
100 # NMFS
100 # BSFRF
                    0.00001 10.0
##
    0.0001
                                                              1.0
##
                    0.00001 10.0
                                                              1.0
## ## -
## ## PENALTIES FOR AVERAGE FISHING MORTALITY RATE FOR EACH GEAR
                 STD_PHZ1 STD_PHZ2
## ## Mean_F
                                          PHZ
                0.5
0.5
0.5
0.5
                              45.50
45.50
45.50
                                               # Pot
# Trawl
# Tanner
##
      0.1
      0.005
##
      0.005
                              45.50
                                               # Fixed
                                        -1 # NMFS trawl survey (0 catch)
-1 # BSFRF (0)
##
      0.00
                 2.00
                              20.00
## ## OPTIONS FOR SIZE COMPOSTION DATA
## ## One column for each data matr
## ## LEGEND
                                                                                                         ##
##
##
           One column for each data matrix
```

```
Likelihood: 1 = Multinomial with estimated/fixed sample size
## ##
## ##
## ##
## ##
                 2 = Robust approximation to multinomial
3 = logistic normal (NIY)
4 = multivariate + (NIY)
5 = Dirichlet
## ## 5 = Di
## ## AUTO TAIL COMPRESSION
## ## -----
## ## TIME VARYING NATURAL MORTALITY RATES
## ## LIME VARIAGE MUNICIPAL NATION AND ALL NATIONAL ## ## 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
## 1
## ## Type
## ## 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
## ## Year position of the knots (vector must be equal to the number of nodes)
## 1980 1985 1990 2000
## 1980 1985 1990 2000
## ## OTHER CONTROLS
                      # Estimated rec_dev phase
##
##
##
       3
-3
                       # Estimated rec_dev phase
# Estimated rec_ini phase
# VERBOSE FLAG (0 = off, 1 = on, 2 = objective func)
# Initial conditions (0 = Unfished, 1 = Steady-state fished, 2 = Free parameters)
# First year for average recruitment for Bspr calculation.
# Last year for average recruitment for Bspr calculation.
# Last year for Bspr proxy.
# Target SPR ratio for Bssy proxy.
# Gear index for SPR calculations (i.e., directed fishery).
# Lambda (proportion of mature male biomass for SPR reference points).
# Use empirical molt increment data (0=FALSE, 1=TRUE)
# Stock-Recruit-Relationship (0 = none, 1 = Beverton-Holt)
          1984
          2016
##
## 0
## ## EOF
## 9999
```