

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

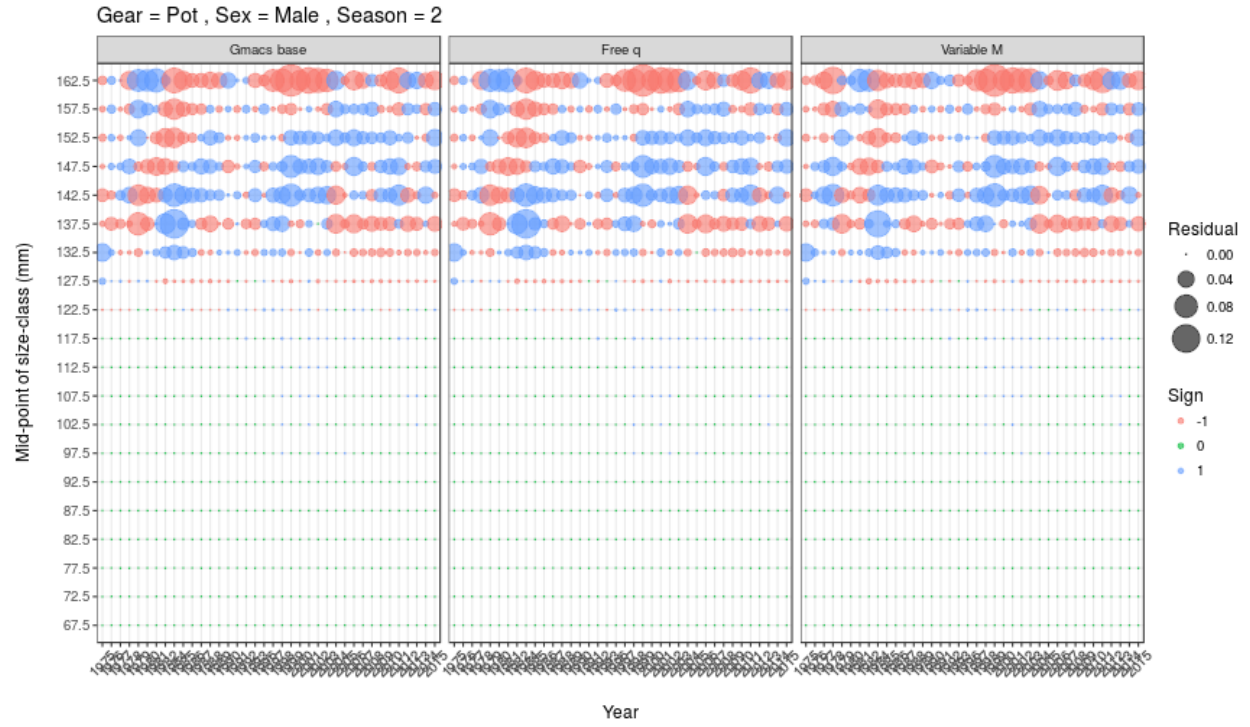


Figure 1: Size-frequency residuals of male BBRKC by year retained in the directed pot fishery for the 2017 model and each of the Gmacs model scenarios.

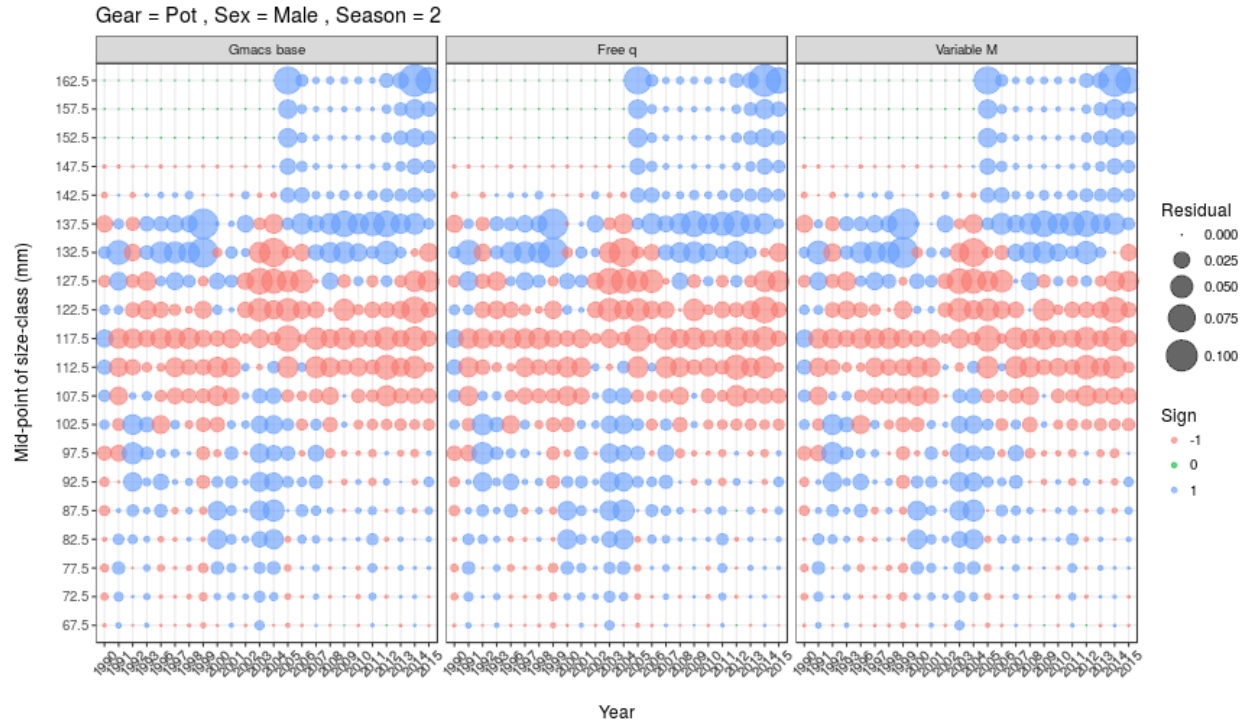


Figure 2: Size-frequency residuals of discarded male BBRKC by year in the directed pot fishery for the 2017 model and each of the Gmacs model scenarios.

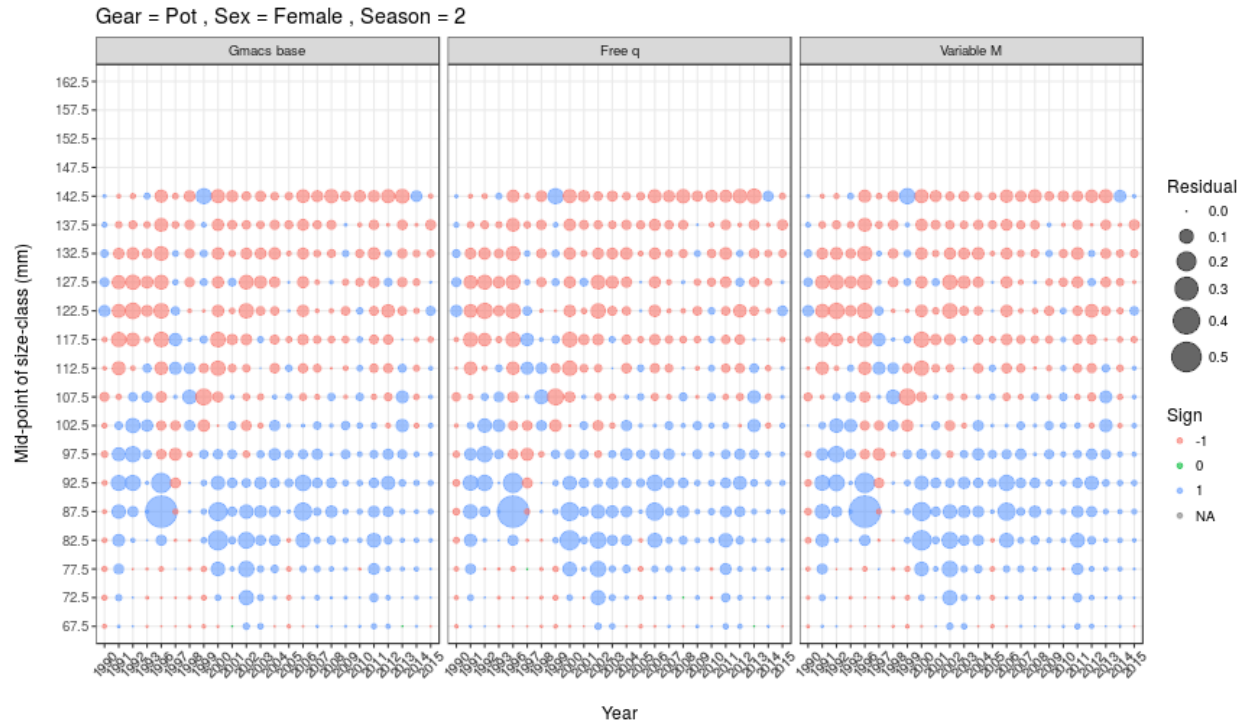


Figure 3: Size-frequency residuals of discarded female BBRKC by year in the directed pot fishery for the 2017 model and each of the Gmacs model scenarios.

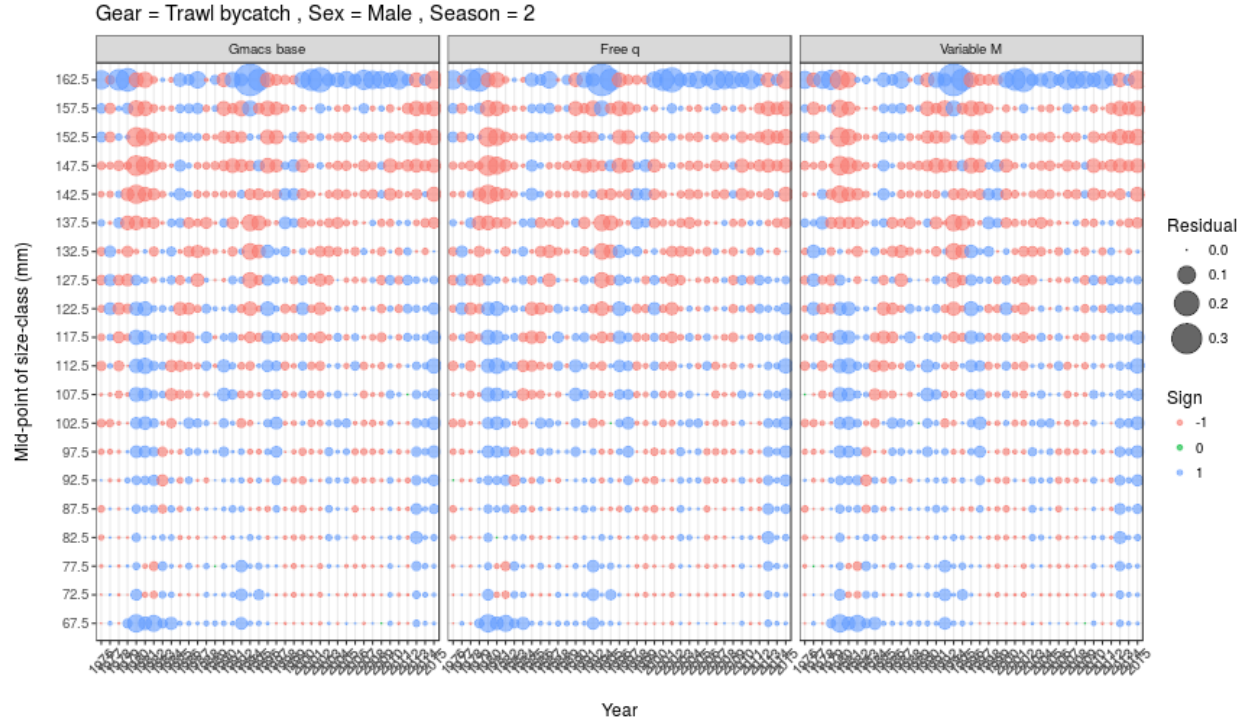


Figure 4: Size-frequency residuals discarded male BBRKC by year in the trawl bycatch fishery for the 2017 model and each of the Gmacs model scenarios.

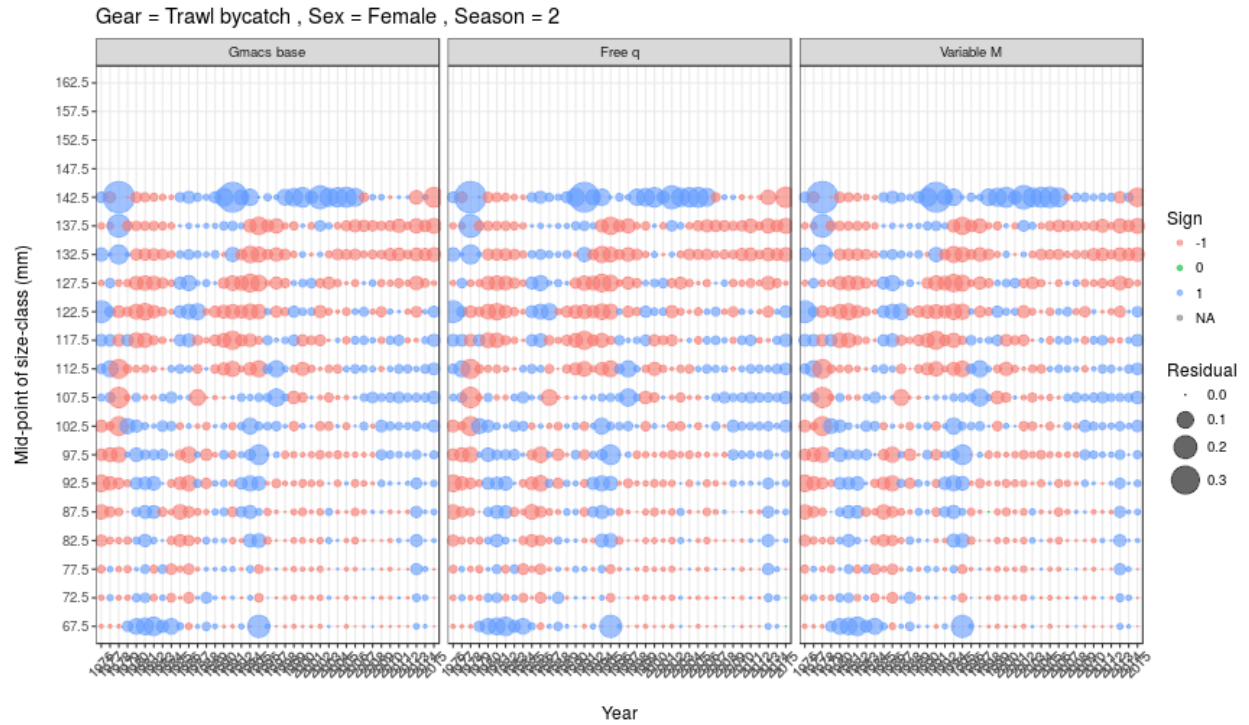


Figure 5: Size-frequency residuals of discarded female BBRKC by year in the trawl bycatch fishery for the 2017 model and each of the Gmacs model scenarios.

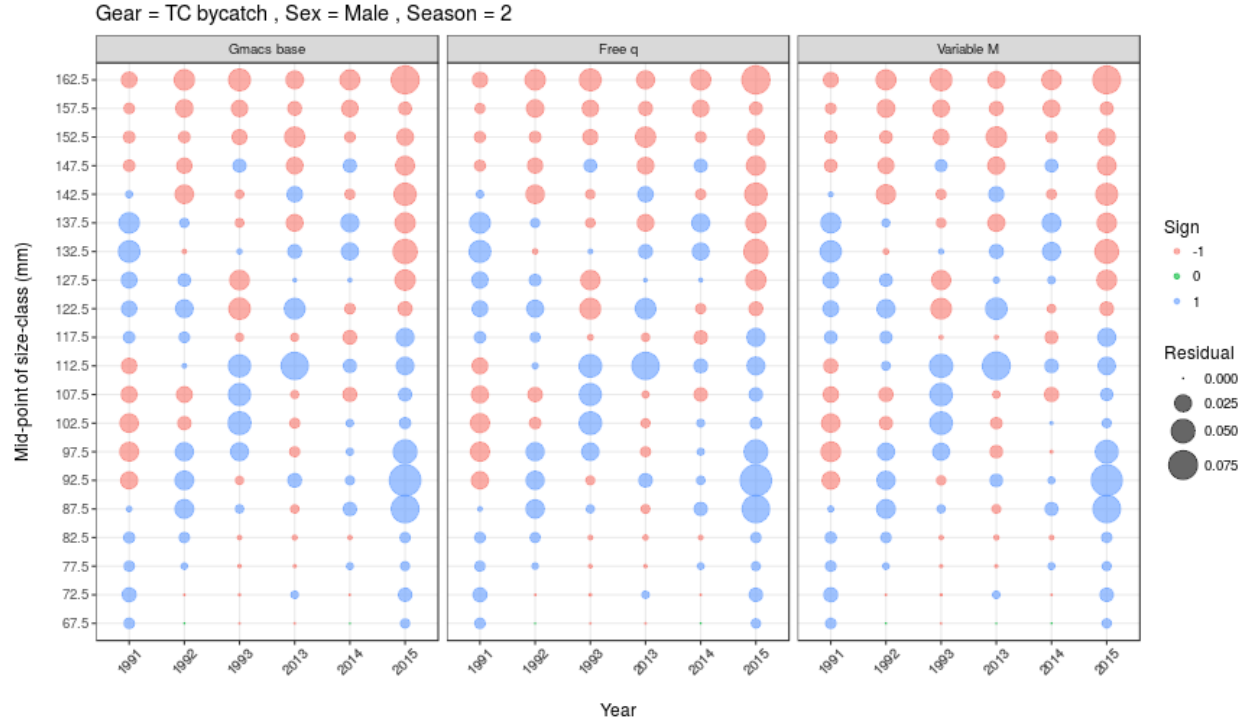


Figure 6: Size-frequency residuals of discarded male BBRKC by year in the tanner crab bycatch fishery for the 2017 model and each of the Gmacs model scenarios.

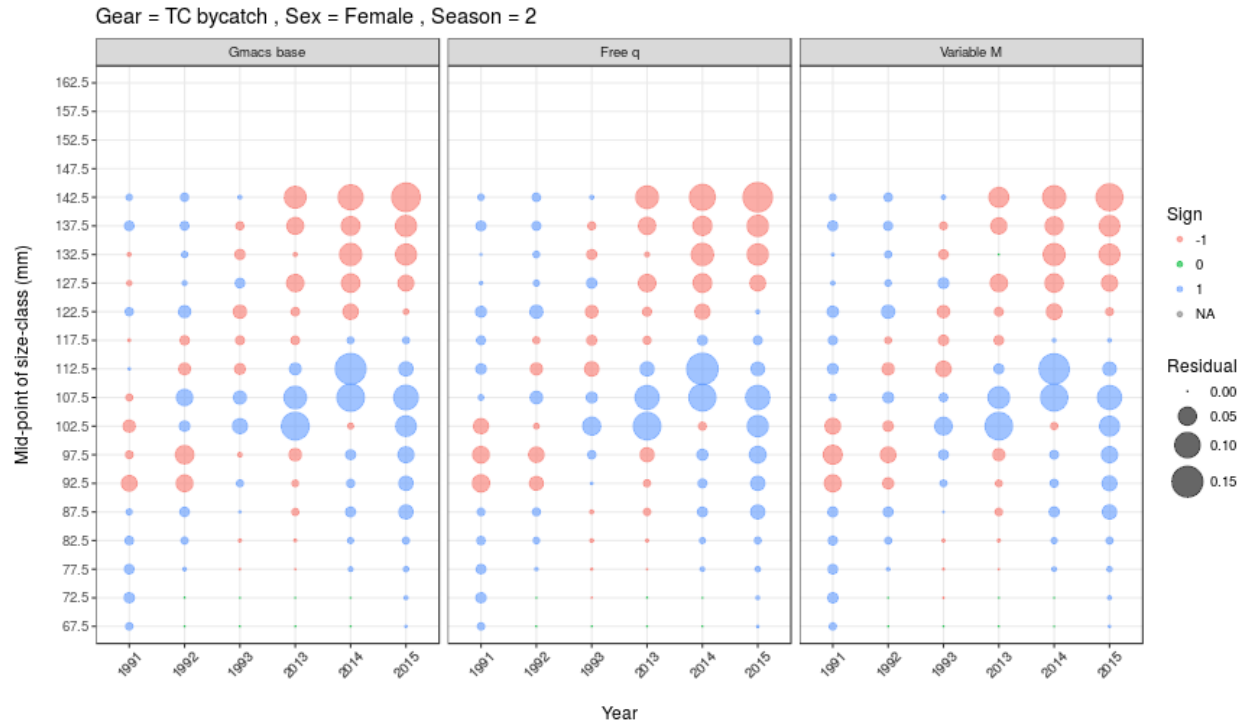


Figure 7: Size-frequency residuals of discarded female BBRKC by year in the tanner crab bycatch fishery for the 2017 model and each of the Gmacs model scenarios.

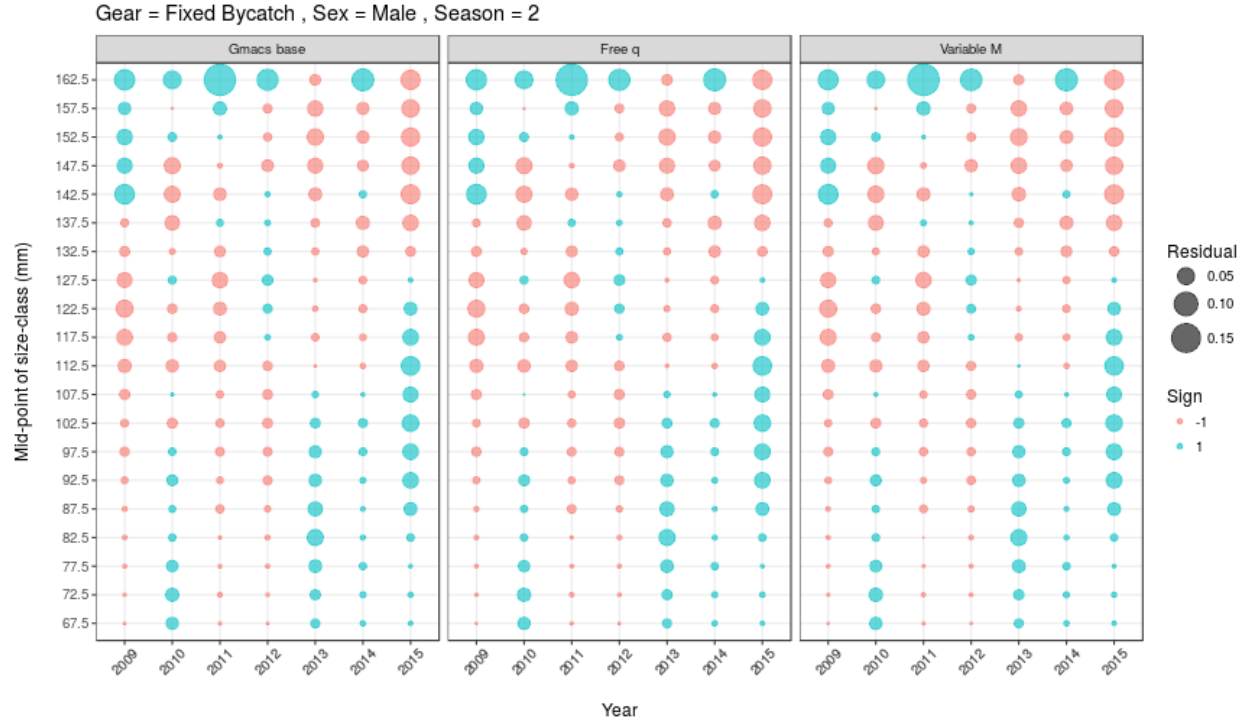


Figure 8: Size-frequency residuals of discarded male BBRKC by year in the fixed bycatch fishery for the 2017 model and each of the Gmacs model scenarios.

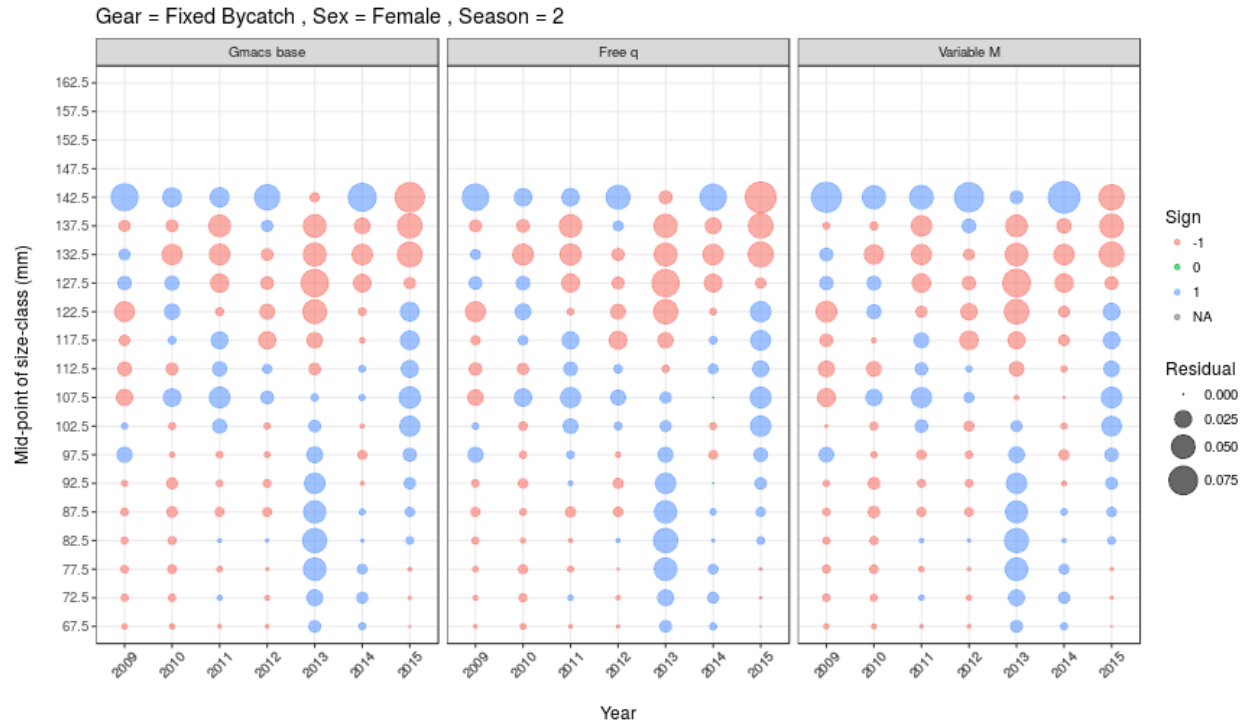


Figure 9: Size-frequency residuals of discarded female BBRKC by year in the fixed bycatch fishery for the 2017 model and each of the Gmacs model scenarios.

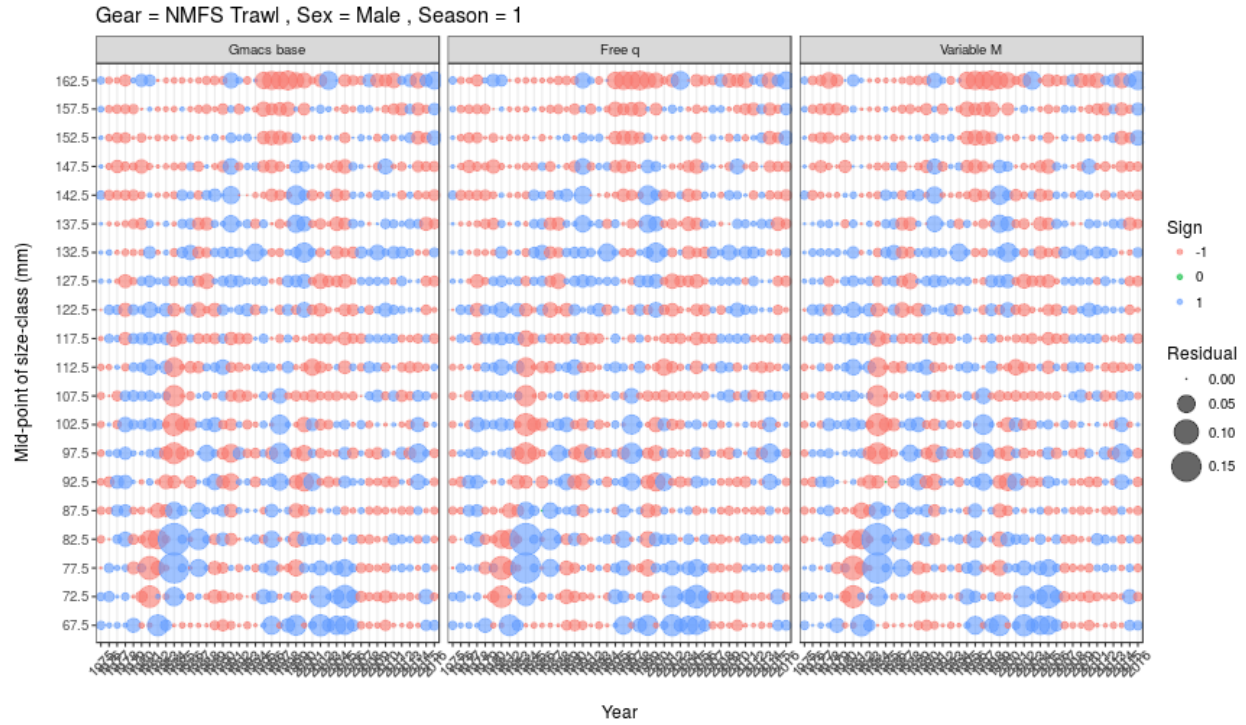


Figure 10: Size-frequency residuals of discarded male BBRKC by year in the NMFS trawl survey for the 2017 model and each of the Gmacs model scenarios.

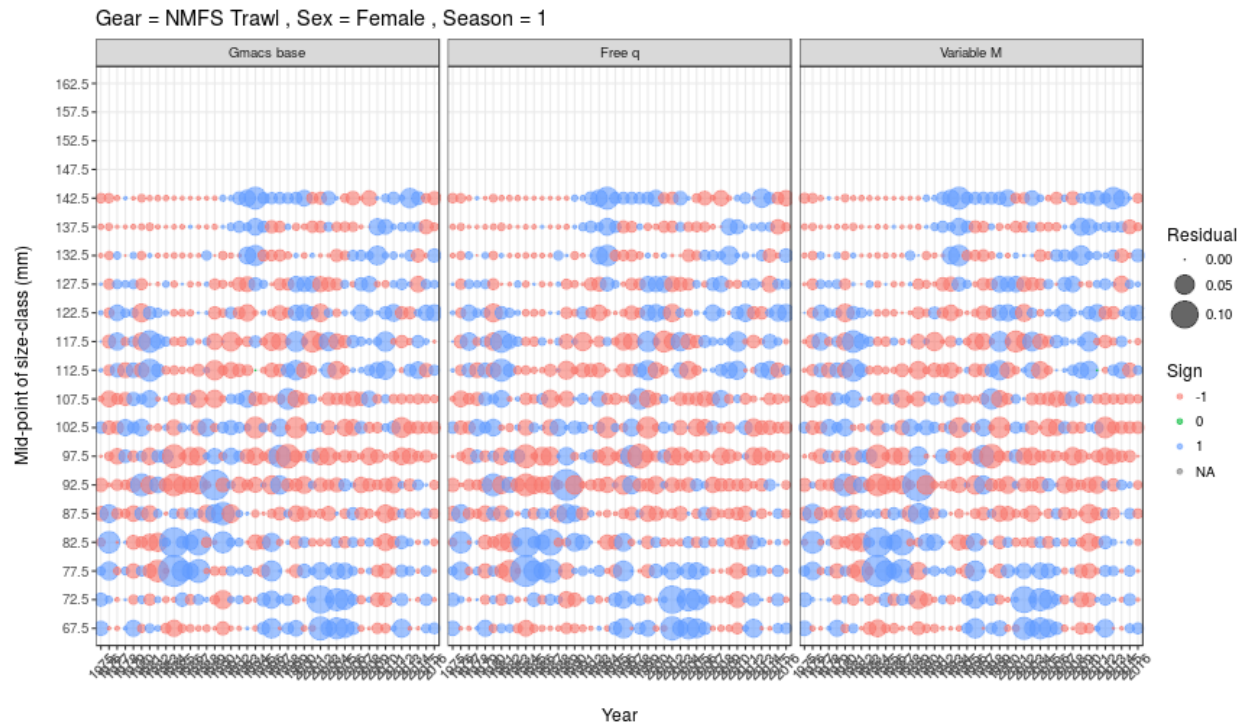


Figure 11: Size-frequency residuals of discarded female BBRKC by year in the NMFS trawl survey for the 2017 model and each of the Gmacs model scenarios.

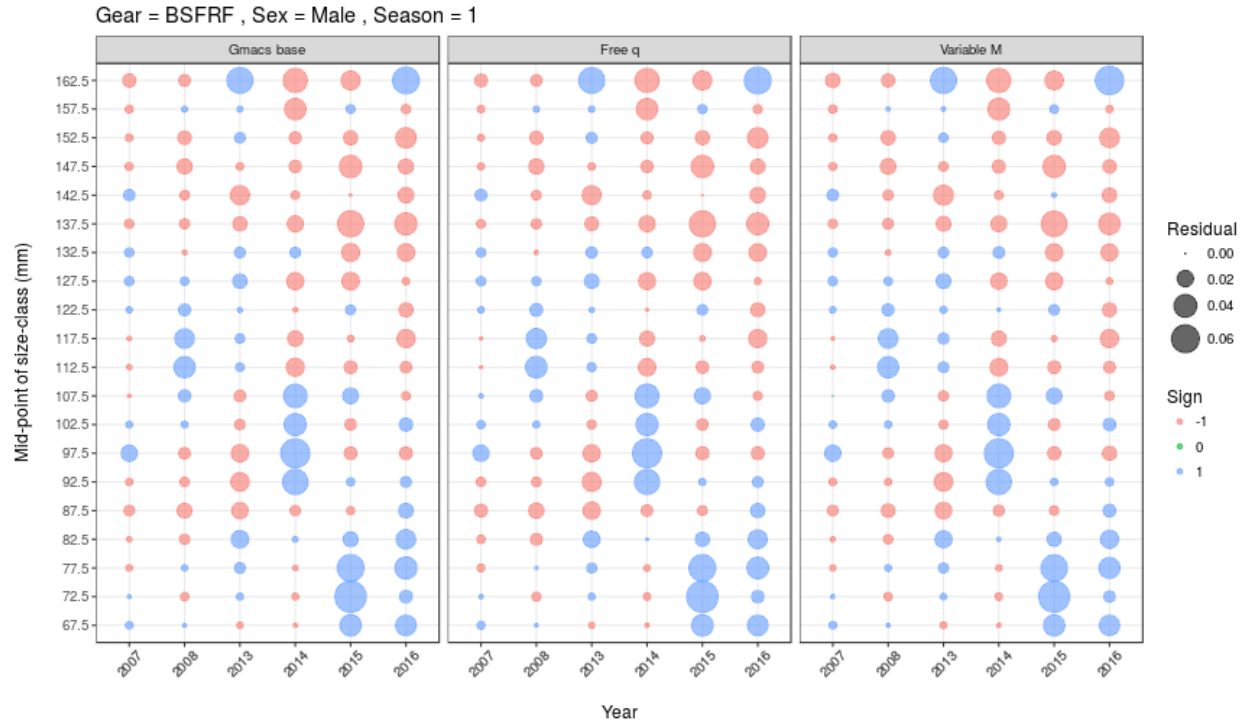


Figure 12: Size-frequency residuals of discarded male BBRKC by year in the BSFRF survey for the 2017 model and each of the Gmacs model scenarios.

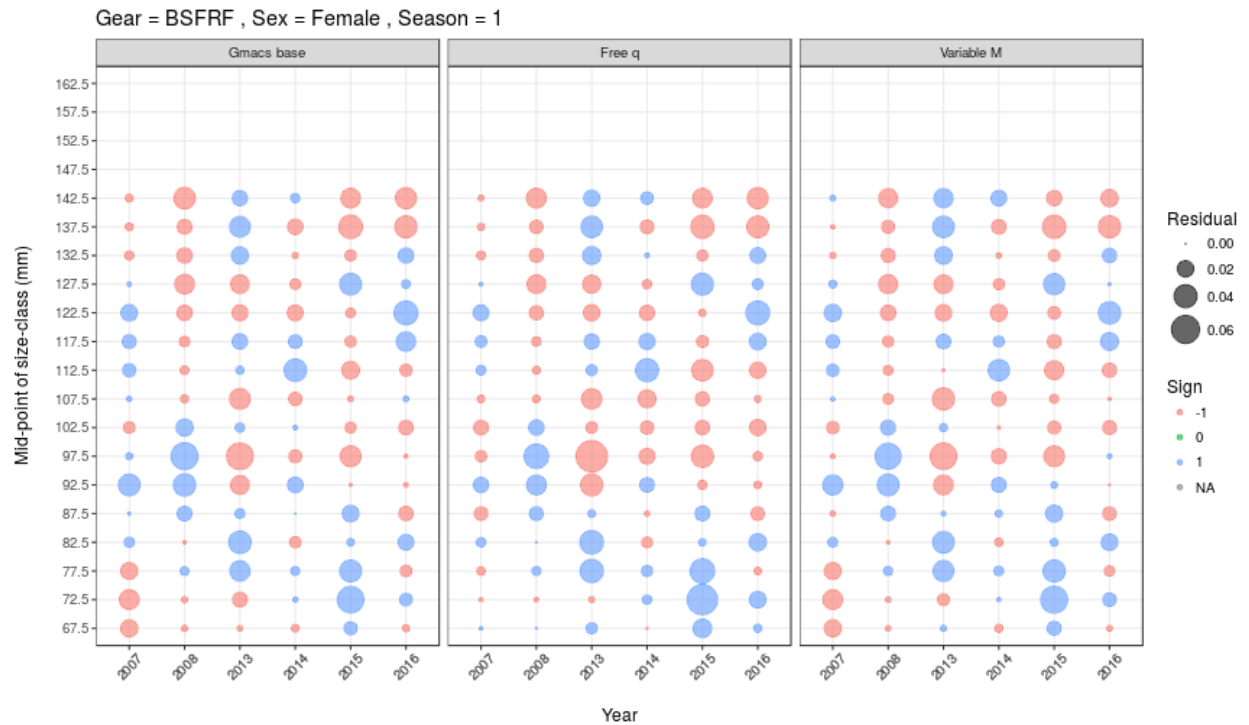


Figure 13: Size-frequency residuals of discarded female BBRKC by year in the BSFRF survey for the 2017 model and each of the Gmacs model scenarios.

The data file:

```
## #=====
## # Gmacs Main Data File Version 1.1: BBRKC Example
## # GEAR_INDEX DESCRIPTION
## # 1 : Pot fishery retained catch.
## # 1 : Pot fishery with discarded catch.
## # 2 : Trawl bycatch
## # 3 : Trawl survey
## # Fisheries: 1 Pot Fishery, 2 Pot Discard, 3 Trawl by-catch, 4 Tanner bycatch 5 fixed gear
## # Surveys: 6 NMFS Trawl Survey, 7 BSFRF Survey
## #=====
## 1975 # Start year
## 2016 # End year
## 2017 # Projection year
## 4 # Number of seasons
## 6 # Number of distinct data groups (among fishing fleets and surveys)
## 2 # Number of sexes
## 2 # Number of shell condition types
## 1 # Number of maturity types
## 20 # Number of size-classes in the model
## 4 # Season recruitment occurs
## 4 # Season molting and growth occurs
## 4 # Season to calculate SSB
## 1 # Season for N output
## # size_breaks (a vector giving the break points between size intervals, dim=nclass+1)
## 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_l = a*l^b], 2 = vector by sex)
## 2
## # weight-at-length allometry w_l = a*l^b
## #a=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 0.0011856 0.00128229 0.00146163 0.00165736 0.00187023 0.00210101 0.00235048 0.002619
## # Females
## 0.0002151 0.00026898 0.00033137 0.00040294 0.00048437 0.00062711 0.0007216 0.00082452 0.00093615 0.00105678 0.00118669 0.00132613 0.00147539 0.00163473 0.00180441 0.00218315 0.002183
## # Male mature weight-at-length (weight * proportion mature) - NO LONGER IN USE
## 0 0 0 0 0 0 0 0 0 1.46163 1.65736 1.87023 2.10101 2.35048 2.61942 2.90861 3.21882 3.9059
## # Proportion mature by sex
## 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1
## 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1
## # Natural mortality per season input type (1 = vector by season, 2 = matrix by season/year)
## 2
## # Proportion of the total natural mortality to be applied each season
## 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 0.306
## 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 0.4402 0.306
## 0.01 0.2521 0.4319 0.306
## 0.01 0.2493 0.4347 0.306
## 0.01 0.2438 0.4402 0.306
## 0.01 0.2493 0.4347 0.306
## 0.01 0.3507 0.3333 0.306
## 0.01 0.3425 0.3415 0.306
## 0.01 0.3425 0.3415 0.306
## 0.01 0.3452 0.3388 0.306
## 0.01 0.34 0.344 0.306
## 0.01 0.34 0.344 0.306
## 0.01 0.34 0.344 0.306
## 0.01 0.34 0.344 0.306
## 0.01 0.34 0.344 0.306
## 0.01 0.3 0.384 0.306
## 0.01 0.3 0.384 0.306
## 0.01 0.3 0.384 0.306
## 0.01 0.3 0.384 0.306
## 0.01 0.3 0.384 0.306
## 0.01 0.3 0.384 0.306
## 0.01 0.3 0.384 0.306
## 0.01 0.3 0.384 0.306
## 0.01 0.3 0.384 0.306
## 0.01 0.3 0.384 0.306
## 0.01 0.3 0.384 0.306
## 0.01 0.3 0.384 0.306
## 0.01 0.3 0.384 0.306
## 0.01 0.3 0.384 0.306
## 0.01 0.3 0.384 0.306
## 0.01 0.3 0.384 0.306
## # Fishing fleet names (delimited with : no spaces in names)
## Pot_Fishery:Trawl_Bycatch:Bairdi_Fishery_Bycatch:Fixed_Gear
## # Survey names (delimited with : no spaces in names)
## NMFS_Trawl:BSFRF
## # Number of catch data frames
## 7
## # Number of rows in each data frame
## 40 24 24 40 24 24 7
## #-----##
## # CATCH DATA
## # Type of catch: 1 = retained, 2 = discard, 3 =
## # Units of catch: 1 = biomass, 2 = numbers
## # for BBRKC Units are in 1000 mt for landed & discards.
## #-----##
## # Male retained pot fishery (tonnes)
```

##	#year	seas	fleet	sex	obs	cv	type	units	mult	effort	discard_mortality
##	1975	2	1	1	23281.2	0.03	1	1	1	0	0
##	1976	2	1	1	28993.6	0.03	1	1	1	0	0
##	1977	2	1	1	31736.9	0.03	1	1	1	0	0
##	1978	2	1	1	39743	0.03	1	1	1	0	0
##	1979	2	1	1	48910	0.03	1	1	1	0	0
##	1980	2	1	1	58943.6	0.03	1	1	1	0	0
##	1981	2	1	1	15236.8	0.03	1	1	1	0	0
##	1982	2	1	1	1361.3	0.03	1	1	1	0	0
##	1984	2	1	1	1897.1	0.03	1	1	1	0	0
##	1985	2	1	1	1893.7	0.03	1	1	1	0	0
##	1986	2	1	1	5168.2	0.03	1	1	1	0	0
##	1987	2	1	1	5574.2	0.03	1	1	1	0	0
##	1988	2	1	1	3351	0.03	1	1	1	0	0
##	1989	2	1	1	4656	0.03	1	1	1	0	0
##	1990	2	1	1	9272.8	0.03	1	1	1	0	0
##	1991	2	1	1	7885.2	0.03	1	1	1	0	0
##	1992	2	1	1	3681.8	0.03	1	1	1	0	0
##	1993	2	1	1	6659.6	0.03	1	1	1	0	0
##	1994	2	1	1	42.2	0.03	1	1	1	0	0
##	1995	2	1	1	36.3	0.03	1	1	1	0	0
##	1996	2	1	1	3861.9	0.03	1	1	1	0	0
##	1997	2	1	1	4042.1	0.03	1	1	1	0	0
##	1998	2	1	1	6779.4	0.03	1	1	1	0	0
##	1999	2	1	1	5377.8	0.03	1	1	1	0	0
##	2000	2	1	1	3738.1	0.03	1	1	1	0	0
##	2001	2	1	1	3866	0.03	1	1	1	0	0
##	2002	2	1	1	4384.4	0.03	1	1	1	0	0
##	2003	2	1	1	7135.5	0.03	1	1	1	0	0
##	2004	2	1	1	7006.6	0.03	1	1	1	0	0
##	2005	2	1	1	8399.6	0.03	1	1	1	0	0
##	2006	2	1	1	7143.2	0.03	1	1	1	0	0
##	2007	2	1	1	9303.9	0.03	1	1	1	0	0
##	2008	2	1	1	9216.1	0.03	1	1	1	0	0
##	2009	2	1	1	7272.5	0.03	1	1	1	0	0
##	2010	2	1	1	6761.5	0.03	1	1	1	0	0
##	2011	2	1	1	3607.1	0.03	1	1	1	0	0
##	2012	2	1	1	3621.7	0.03	1	1	1	0	0
##	2013	2	1	1	3991	0.03	1	1	1	0	0
##	2014	2	1	1	4538.6	0.03	1	1	1	0	0
##	2015	2	1	1	4613.7	0.03	1	1	1	0	0
##	##	Male	discards								
##	#year	seas	fleet	sex	obs	cv	type	units	mult	effort	discard_mortality
##	1990	2	1	1	1718800	0.04	2	2	1	0	0.2
##	1991	2	1	1	1453700	0.04	2	2	1	0	0.2
##	1992	2	1	1	2305600	0.04	2	2	1	0	0.2
##	1993	2	1	1	2688000	0.04	2	2	1	0	0.2
##	1996	2	1	1	595000	0.04	2	2	1	0	0.2
##	1997	2	1	1	910000	0.04	2	2	1	0	0.2
##	1998	2	1	1	3173000	0.04	2	2	1	0	0.2
##	1999	2	1	1	922000	0.04	2	2	1	0	0.2
##	2000	2	1	1	1393000	0.04	2	2	1	0	0.2
##	2001	2	1	1	1623500	0.04	2	2	1	0	0.2
##	2002	2	1	1	1527000	0.04	2	2	1	0	0.2
##	2003	2	1	1	3617000	0.04	2	2	1	0	0.2
##	2004	2	1	1	1539000	0.04	2	2	1	0	0.2
##	2005	2	1	1	3792300	0.04	2	2	1	0	0.2
##	2006	2	1	1	1832000	0.04	2	2	1	0	0.2
##	2007	2	1	1	3619800	0.04	2	2	1	0	0.2
##	2008	2	1	1	3786757	0.04	2	2	1	0	0.2
##	2009	2	1	1	2782675	0.04	2	2	1	0	0.2
##	2010	2	1	1	2480059	0.04	2	2	1	0	0.2
##	2011	2	1	1	1279960	0.04	2	2	1	0	0.2
##	2012	2	1	1	640960	0.04	2	2	1	0	0.2
##	2013	2	1	1	967328	0.04	2	2	1	0	0.2
##	2014	2	1	1	1480673	0.04	2	2	1	0	0.2
##	2015	2	1	1	745056	0.04	2	2	1	0	0.2
##	##	Female	discards								
##	#year	seas	fleet	sex	obs	cv	type	units	mult	effort	discard_mortality
##	1990	2	1	2	2670800	0.04	2	2	1	0	0.2
##	1991	2	1	2	484600	0.04	2	2	1	0	0.2
##	1992	2	1	2	2408600	0.04	2	2	1	0	0.2
##	1993	2	1	2	2814500	0.04	2	2	1	0	0.2
##	1996	2	1	2	10000	0.04	2	2	1	0	0.2
##	1997	2	1	2	75000	0.04	2	2	1	0	0.2
##	1998	2	1	2	3896500	0.04	2	2	1	0	0.2
##	1999	2	1	2	30300	0.04	2	2	1	0	0.2
##	2000	2	1	2	304000	0.04	2	2	1	0	0.2
##	2001	2	1	2	786100	0.04	2	2	1	0	0.2
##	2002	2	1	2	47600	0.04	2	2	1	0	0.2
##	2003	2	1	2	2191200	0.04	2	2	1	0	0.2
##	2004	2	1	2	932000	0.04	2	2	1	0	0.2
##	2005	2	1	2	2038700	0.04	2	2	1	0	0.2
##	2006	2	1	2	222200	0.04	2	2	1	0	0.2
##	2007	2	1	2	833890	0.04	2	2	1	0	0.2
##	2008	2	1	2	666098	0.04	2	2	1	0	0.2
##	2009	2	1	2	332340	0.04	2	2	1	0	0.2
##	2010	2	1	2	477993	0.04	2	2	1	0	0.2
##	2011	2	1	2	115860	0.04	2	2	1	0	0.2
##	2012	2	1	2	49933	0.04	2	2	1	0	0.2
##	2013	2	1	2	409135	0.04	2	2	1	0	0.2
##	2014	2	1	2	280805	0.04	2	2	1	0	0.2
##	2015	2	1	2	747306	0.04	2	2	1	0	0.2
##	##	Trawl	fishery discards								
##	#year	seas	fleet	sex	obs	cv	type	units	mult	effort	discard_mortality
##	1976	2	2	0	384600	0.04	2	2	1	0	0.8
##	1977	2	2	0	787700	0.04	2	2	1	0	0.8
##	1978	2	2	0	646500	0.04	2	2	1	0	0.8
##	1979	2	2	0	736200	0.04	2	2	1	0	0.8
##	1980	2	2	0	1141300	0.04	2	2	1	0	0.8
##	1981	2	2	0	267100	0.04	2	2	1	0	0.8
##	1982	2	2	0	785400	0.04	2	2	1	0	0.8
##	1983	2	2	0	492800	0.04	2	2	1	0	0.8
##	1984	2	2	0	1168200	0.04	2	2	1	0	0.8
##	1985	2	2	0	274700	0.04	2	2	1	0	0.8
##	1986	2	2	0	159300	0.04	2	2	1	0	0.8
##	1987	2	2	0	124500	0.04	2	2	1	0	0.8

```

## 1988 2 2 0 430300 0.04 2 2 1 0 0.8
## 1989 2 2 0 109200 0.04 2 2 1 0 0.8
## 1990 2 2 0 171800 0.04 2 2 1 0 0.8
## 1991 2 2 0 183500 0.04 2 2 1 0 0.8
## 1992 2 2 0 248100 0.04 2 2 1 0 0.8
## 1993 2 2 0 281000 0.04 2 2 1 0 0.8
## 1994 2 2 0 48200 0.04 2 2 1 0 0.8
## 1995 2 2 0 106600 0.04 2 2 1 0 0.8
## 1996 2 2 0 76300 0.04 2 2 1 0 0.8
## 1997 2 2 0 49000 0.04 2 2 1 0 0.8
## 1998 2 2 0 93700 0.04 2 2 1 0 0.8
## 1999 2 2 0 110500 0.04 2 2 1 0 0.8
## 2000 2 2 0 58600 0.04 2 2 1 0 0.8
## 2001 2 2 0 89955 0.04 2 2 1 0 0.8
## 2002 2 2 0 76302 0.04 2 2 1 0 0.8
## 2003 2 2 0 105493 0.04 2 2 1 0 0.8
## 2004 2 2 0 75107 0.04 2 2 1 0 0.8
## 2005 2 2 0 96834 0.04 2 2 1 0 0.8
## 2006 2 2 0 75290 0.04 2 2 1 0 0.8
## 2007 2 2 0 86417 0.04 2 2 1 0 0.8
## 2008 2 2 0 93077 0.04 2 2 1 0 0.8
## 2009 2 2 0 59585 0.04 2 2 1 0 0.8
## 2010 2 2 0 58219 0.04 2 2 1 0 0.8
## 2011 2 2 0 45916 0.04 2 2 1 0 0.8
## 2012 2 2 0 38541 0.04 2 2 1 0 0.8
## 2013 2 2 0 106439 0.04 2 2 1 0 0.8
## 2014 2 2 0 144340 0.04 2 2 1 0 0.8
## 2015 2 2 0 125850 0.04 2 2 1 0 0.8
## ## Tanner crab fishery discards males
## #y s f s obs cv t u m e d
## #e l e obs cv y n u f m
## #a a e x obs cv p i l f r
## #r s e obs cv e t t o disc
## 1976 2 3 1 59772.50508 0.1 2 2 1 0 0.25
## 1977 2 3 1 358727.6778 0.1 2 2 1 0 0.25
## 1978 2 3 1 264460.4601 0.1 2 2 1 0 0.25
## 1979 2 3 1 331704.5283 0.1 2 2 1 0 0.25
## 1980 2 3 1 798423.191 0.1 2 2 1 0 0.25
## 1981 2 3 1 262852.5797 0.1 2 2 1 0 0.25
## 1982 2 3 1 307789.549 0.1 2 2 1 0 0.25
## 1983 2 3 1 48532.2855 0.1 2 2 1 0 0.25
## 1984 2 3 1 157195.7111 0.1 2 2 1 0 0.25
## 1987 2 3 1 97877.47706 0.1 2 2 1 0 0.25
## 1988 2 3 1 159003.8294 0.1 2 2 1 0 0.25
## 1989 2 3 1 324322.6239 0.1 2 2 1 0 0.25
## 1990 2 3 1 326868.9326 0.1 2 2 1 0 0.25
## 1991 2 3 1 455887.8848 0.1 2 2 1 0 0.25
## 1992 2 3 1 463165.1873 0.1 2 2 1 0 0.25
## 1993 2 3 1 477946.9278 0.1 2 2 1 0 0.25
## 1994 2 3 1 3114.147514 0.1 2 2 1 0 0.25
## 2006 2 3 1 1195.450102 0.1 2 2 1 0 0.25
## 2007 2 3 1 1494.312627 0.1 2 2 1 0 0.25
## 2008 2 3 1 1494.312627 0.1 2 2 1 0 0.25
## 2009 2 3 1 597.725051 0.1 2 2 1 0 0.25
## 2013 2 3 1 5977.250508 0.1 2 2 1 0 0.25
## 2014 2 3 1 5977.250508 0.1 2 2 1 0 0.25
## 2015 2 3 1 415929.9652 0.1 2 2 1 0 0.25
## ## Tanner crab fishery discards females
## 1976 2 3 2 134691.3715 0.1 2 2 1 0 0.25
## 1977 2 3 2 808357.0006 0.1 2 2 1 0 0.25
## 1978 2 3 2 595935.2386 0.1 2 2 1 0 0.25
## 1979 2 3 2 747463.0315 0.1 2 2 1 0 0.25
## 1980 2 3 2 1799166.933 0.1 2 2 1 0 0.25
## 1981 2 3 2 592312.0407 0.1 2 2 1 0 0.25
## 1982 2 3 2 693573.0138 0.1 2 2 1 0 0.25
## 1983 2 3 2 109362.6591 0.1 2 2 1 0 0.25
## 1984 2 3 2 354224.8379 0.1 2 2 1 0 0.25
## 1987 2 3 2 220557.1208 0.1 2 2 1 0 0.25
## 1988 2 3 2 358299.2519 0.1 2 2 1 0 0.25
## 1989 2 3 2 730828.6472 0.1 2 2 1 0 0.25
## 1990 2 3 2 736566.4996 0.1 2 2 1 0 0.25
## 1991 2 3 2 1027297.825 0.1 2 2 1 0 0.25
## 1992 2 3 2 1043696.499 0.1 2 2 1 0 0.25
## 1993 2 3 2 1077005.676 0.1 2 2 1 0 0.25
## 1994 2 3 2 7017.420455 0.1 2 2 1 0 0.25
## 2006 2 3 2 2693.82743 0.1 2 2 1 0 0.25
## 2007 2 3 2 3367.284287 0.1 2 2 1 0 0.25
## 2008 2 3 2 3367.284287 0.1 2 2 1 0 0.25
## 2009 2 3 2 1346.913715 0.1 2 2 1 0 0.25
## 2013 2 3 2 13469.13715 0.1 2 2 1 0 0.25
## 2014 2 3 2 13469.13715 0.1 2 2 1 0 0.25
## 2015 2 3 2 937256.6431 0.1 2 2 1 0 0.25
## ## Fixed gear crab fishery discards females 1000000
## 2009 2 4 0 5298 0.1 2 2 1 0 0.2
## 2010 2 4 0 2879 0.1 2 2 1 0 0.2
## 2011 2 4 0 12087 0.1 2 2 1 0 0.2
## 2012 2 4 0 18737 0.1 2 2 1 0 0.2
## 2013 2 4 0 71086 0.1 2 2 1 0 0.2
## 2014 2 4 0 125003 0.1 2 2 1 0 0.2
## 2015 2 4 0 106041 0.1 2 2 1 0 0.2
## ##
## ## RELATIVE ABUNDANCE DATA
## ## Units of Abundance: 1 = biomass, 2 = numbers
## ## TODD: add column for maturity for terminal molt life-histories
## ## for EBRKC Units are in 1000 mt.
## ##
## ## Number of relative abundance indices
## 2
## ## Number of rows in each index
## 84 6
## # Survey data (abundance indices, units are 1000 mt)
## #Year Season Fleet Sex Abundance CV Units
## 1975 1 5 1 135463.32 0.193 1
## 1976 1 5 1 260149.49 0.144 1
## 1977 1 5 1 235411.43 0.152 1
## 1978 1 5 1 203192.71 0.144 1
## 1979 1 5 1 103715 0.164 1

```

```

## 1980 1 5 1 168047.18 0.221 1
## 1981 1 5 1 69161.2 0.19 1
## 1982 1 5 1 73232.86 0.251 1
## 1983 1 5 1 35368.02 0.214 1
## 1984 1 5 1 98281.53 0.606 1
## 1985 1 5 1 27203.7 0.159 1
## 1986 1 5 1 41113.63 0.42 1
## 1987 1 5 1 47410.5 0.209 1
## 1988 1 5 1 35852.58 0.228 1
## 1989 1 5 1 42967.75 0.232 1
## 1990 1 5 1 39271.64 0.242 1
## 1991 1 5 1 67458.39 0.443 1
## 1992 1 5 1 25442.52 0.175 1
## 1993 1 5 1 36217.5 0.198 1
## 1994 1 5 1 23285.54 0.174 1
## 1995 1 5 1 27670.53 0.267 1
## 1996 1 5 1 27277.48 0.203 1
## 1997 1 5 1 60719.57 0.265 1
## 1998 1 5 1 46693.73 0.182 1
## 1999 1 5 1 45126.53 0.204 1
## 2000 1 5 1 38924.68 0.222 1
## 2001 1 5 1 28367.49 0.187 1
## 2002 1 5 1 45696.97 0.202 1
## 2003 1 5 1 74997.93 0.283 1
## 2004 1 5 1 91090.07 0.321 1
## 2005 1 5 1 55471.45 0.172 1
## 2006 1 5 1 51948.59 0.17 1
## 2007 1 5 1 59064.23 0.21 1
## 2008 1 5 1 67945.65 0.225 1
## 2009 1 5 1 43692.76 0.326 1
## 2010 1 5 1 39555.62 0.223 1
## 2011 1 5 1 27529.87 0.211 1
## 2012 1 5 1 30830.44 0.232 1
## 2013 1 5 1 39833.23 0.244 1
## 2014 1 5 1 60859.12 0.191 1
## 2015 1 5 1 36919.28 0.208 1
## 2016 1 5 1 27302.6 0.194 1
##
## 1975 1 5 2 67267.28 0.193 1
## 1976 1 5 2 71718.04 0.144 1
## 1977 1 5 2 140249.63 0.152 1
## 1978 1 5 2 146351.82 0.144 1
## 1979 1 5 2 63911.67 0.164 1
## 1980 1 5 2 81275.03 0.221 1
## 1981 1 5 2 63507.85 0.19 1
## 1982 1 5 2 70506.74 0.251 1
## 1983 1 5 2 13951.7 0.214 1
## 1984 1 5 2 57029.97 0.606 1
## 1985 1 5 2 7330.79 0.159 1
## 1986 1 5 2 7044.78 0.42 1
## 1987 1 5 2 22852.72 0.209 1
## 1988 1 5 2 19519.6 0.228 1
## 1989 1 5 2 12973.56 0.232 1
## 1990 1 5 2 21049.25 0.242 1
## 1991 1 5 2 17596.54 0.443 1
## 1992 1 5 2 12244.8 0.175 1
## 1993 1 5 2 17485.53 0.198 1
## 1994 1 5 2 9049.36 0.174 1
## 1995 1 5 2 10725.74 0.267 1
## 1996 1 5 2 17371.13 0.203 1
## 1997 1 5 2 24557.1 0.265 1
## 1998 1 5 2 38481.97 0.182 1
## 1999 1 5 2 20477.34 0.204 1
## 2000 1 5 2 29417.67 0.222 1
## 2001 1 5 2 24820.57 0.187 1
## 2002 1 5 2 24188.87 0.202 1
## 2003 1 5 2 41796.11 0.283 1
## 2004 1 5 2 40819.81 0.321 1
## 2005 1 5 2 51869.83 0.172 1
## 2006 1 5 2 43727.75 0.17 1
## 2007 1 5 2 45777.06 0.21 1
## 2008 1 5 2 46484.48 0.225 1
## 2009 1 5 2 47979.95 0.326 1
## 2010 1 5 2 42086.47 0.223 1
## 2011 1 5 2 39523.28 0.211 1
## 2012 1 5 2 30417.78 0.232 1
## 2013 1 5 2 22576.58 0.244 1
## 2014 1 5 2 53243.87 0.191 1
## 2015 1 5 2 27320.77 0.208 1
## 2016 1 5 2 33928.4 0.194 1
## # BSFRF
## 2007 1 6 0 130352.8 0.2164 1
## 2008 1 6 0 106040.9 0.1939 1
## 2013 1 6 0 95016.7 0.1939 1
## 2014 1 6 0 111740.4 0.1939 1
## 2015 1 6 0 98952.5 0.1939 1
## 2016 1 6 0 87725.1 0.1939 1
## ## Number of length frequency matrices
## 13
## ## Number of rows in each matrix
## 38 24 24 39 39 6 6 7 7 42 42 6 6
## ## Number of bins in each matrix (columns of size data)
## 20 20 16 20 16 20 16 20 16 20 16 20 16
## ## SIZE COMPOSITION DATA FOR ALL FLEETS
## ##
## ## SIZE COMP LEGEND
## ## Sex: 1 = male, 2 = female, 0 = both sexes combined
## ## Type of composition: 1 = retained, 2 = discard, 0 = total composition
## ## Maturity state: 1 = immature, 2 = mature, 0 = both states combined
## ## Shell condition: 1 = new shell, 2 = old shell, 0 = both shell types combined
## ##
## ## Retained males
## #Year Season Fleet Sex Type Shell Maturity Nsamp DataVec
## 1975 2 1 1 1 0 0 100 0 0 0 0 0 0 0 0 0 0 0 0.0071 0.0741 0.1721 0.2239 0.2122 0.1464 0.0858 0.0785
## 1976 2 1 1 1 0 0 100 0 0 0 0 0 0 0 0 0 0 0 0.0016 0.029 0.1418 0.2316 0.2199 0.1635 0.1071 0.1055
## 1977 2 1 1 1 0 0 100 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
## 1978 2 1 1 1 0 0 100 0 0 0 0 0 0 0 0 0 0 0 0.0012 0.0209 0.1441 0.2588 0.2401 0.1673 0.0966 0.0711

```

1979 2 1 1 1 0 0 100 0 0 0 0 0 0 0 0 0 0 0 0 0.0013 0.0119 0.0747 0.1649 0.1998 0.2004 0.1556 0.1914
1980 2 1 1 1 0 0 100 0 0 0 0 0 0 0 0 0 0 0 0 0.0008 0.0138 0.0919 0.1771 0.195 0.1792 0.1404 0.2019
1981 2 1 1 1 0 0 100 0 0 0 0 0 0 0 0 0 0 0 0 0.0006 0.0225 0.1164 0.1743 0.1711 0.1584 0.1284 0.2283
1982 2 1 1 1 0 0 100 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0544 0.2576 0.2802 0.1667 0.0837 0.0508 0.1067
1984 2 1 1 1 0 0 100 0 0 0 0 0 0 0 0 0 0 0 0 0.0003 0.0023 0.0654 0.311 0.3135 0.1763 0.0846 0.0321 0.0145
1985 2 1 1 1 0 0 100 0 0 0 0 0 0 0 0 0 0 0 0 0.0005 0.0044 0.079 0.2869 0.3098 0.1898 0.086 0.0306 0.0129
1986 2 1 1 1 0 0 100 0 0 0 0 0 0 0 0 0 0 0 0 0.0016 0.0531 0.2613 0.3289 0.2084 0.0978 0.0352 0.0137
1987 2 1 1 1 0 0 100 0 0 0 0 0 0 0 0 0 0 0 0 0.0013 0.0284 0.1895 0.3045 0.2522 0.1421 0.0565 0.0255
1988 2 1 1 1 0 0 100 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0202 0.1294 0.2646 0.2471 0.1876 0.1033 0.0477
1989 2 1 1 1 0 0 100 0 0 0 0 0 0 0 0 0 0 0 0 0.0005 0.0187 0.1211 0.2209 0.219 0.1908 0.1197 0.1094
1990 2 1 1 1 0 0 100 0 0 0 0 0 0 0 0 0 0 0 0 0.0003 0 0.0146 0.0887 0.1801 0.1707 0.1728 0.1431 0.2297
1991 2 1 1 1 0 0 100 0 0 0 0 0 0 0 0 0 0 0 0.0001 0.0005 0.0141 0.0848 0.1651 0.179 0.1739 0.1432 0.2392
1992 2 1 1 1 0 0 100 0 0 0 0 0 0 0 0 0 0 0.0003 0.0002 0.0005 0.0095 0.0638 0.1317 0.1673 0.1747 0.1636 0.2886
1993 2 1 1 1 0 0 100 0 0 0 0 0 0 0 0 0 0 0 0.0014 0.0138 0.094 0.1789 0.1739 0.1596 0.1331 0.2453
1996 2 1 1 1 0 0 100 0 0 0 0 0 0 0 0 0 0 0.0006 0.0006 0.0129 0.0779 0.1407 0.162 0.1771 0.1671 0.2612
1997 2 1 1 1 0 0 100 0 0 0 0 0 0 0 0 0 0 0.0004 0.0003 0.0138 0.0899 0.1486 0.1603 0.1699 0.1588 0.258
1998 2 1 1 1 0 0 100 0 0 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 0.1394 0.266
1999 2 1 1 1 0 0 100 0 0 0 0 0 0 0 0.0001 0 0.0001 0 0.0001 0.0147 0.1313 0.2575 0.2292 0.1624 0.0961 0.1087
2000 2 1 1 1 0 0 100 0 0 0 0 0 0 0.0001 0.0001 0 0.0001 0.0003 0.0111 0.0931 0.1945 0.2111 0.1822 0.1247 0.1826
2001 2 1 1 1 0 0 100 0 0 0 0 0 0 0.0001 0.0001 0.0001 0.0002 0.0002 0.0012 0.0181 0.0836 0.1681 0.1986 0.1953 0.1506 0.1838
2002 2 1 1 1 0 0 100 0 0 0 0 0 0.0001 0 0.0001 0.0001 0.0001 0 0.0002 0.0151 0.108 0.1884 0.1915 0.1683 0.1334 0.1948
2003 2 1 1 1 0 0 100 0 0 0 0 0 0 0.0001 0.0001 0.0001 0.0002 0.0009 0.0243 0.1464 0.232 0.1871 0.1497 0.0994 0.1597
2004 2 1 1 1 0 0 100 0 0 0 0 0 0 0 0 0.0002 0.0064 0.0514 0.1302 0.1702 0.1971 0.1632 0.2812
2005 2 1 1 1 0 0 100 0 0 0 0 0 0.0001 0 0 0.0001 0.0001 0.0008 0.015 0.0859 0.1543 0.1661 0.1783 0.1516 0.2475
2006 2 1 1 1 0 0 100 0 0 0 0 0 0 0.0001 0.0001 0.0004 0.0102 0.0739 0.1905 0.2203 0.1887 0.137 0.1787
2007 2 1 1 1 0 0 100 0 0 0 0 0 0 0 0.0002 0.0003 0.0067 0.0871 0.1833 0.1934 0.1846 0.1472 0.1973
2008 2 1 1 1 0 0 100 0 0 0 0 0 0 0.0001 0.0002 0.01 0.0746 0.1457 0.1619 0.179 0.1625 0.2659
2009 2 1 1 1 0 0 100 0 0 0 0 0 0 0 0.0002 0.0108 0.1152 0.2215 0.1968 0.1588 0.1084 0.1882
2010 2 1 1 1 0 0 100 0 0 0 0 0 0 0 0.0003 0.0091 0.0986 0.2244 0.2238 0.1861 0.1144 0.1433
2011 2 1 1 1 0 0 100 0 0 0 0 0 0 0.0003 0.0001 0.0003 0.0114 0.118 0.2436 0.2292 0.1725 0.1077 0.1169
2012 2 1 1 1 0 0 100 0 0 0 0 0 0.0001 0 0.0001 0 0.0044 0.0499 0.1249 0.173 0.1886 0.1654 0.2937
2013 2 1 1 1 0 0 100 0 0 0 0 0 0.0001 0.0001 0 0.0001 0.0001 0.0054 0.0525 0.1271 0.1484 0.1657 0.1632 0.3374
2014 2 1 1 1 0 0 100 0 0 0 0 0 0 0 0.0004 0.0117 0.0964 0.1831 0.1696 0.1454 0.1246 0.2689
2015 2 1 1 1 0 0 100 0 0 0 0 0 0 0.0001 0.0003 0.0067 0.0616 0.1473 0.1864 0.1947 0.1634 0.2397
#Discarded males
#Year Season Fleet Sex Type Shell Maturity Nsmp DataVec
1990 2 1 1 2 0 0 87.3 0.0011 0 0.0011 0.0008 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 0 0 0
1991 2 1 1 2 0 0 100 0.0033 0.0101 0.0197 0.0214 0.0242 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 0
1992 2 1 1 2 0 0 100 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 0 0 0
1993 2 1 1 2 0 0 100 0.0019 0.0045 0.0057 0.005 0.0062 0.0122 0.0312 0.0571 0.0778 0.108 0.1334 0.1544 0.1518 0.1705 0.0747 0.0055 0 0 0 0
1996 2 1 1 2 0 0 23 0 0 0 0.0131 0.0524 0.083 0.0742 0.0306 0.048 0.0699 0.0611 0.1004 0.1485 0.2009 0.1048 0.0131 0 0 0 0
1997 2 1 1 2 0 0 100 0 0.0002 0.0005 0.0007 0.0015 0.0197 0.0553 0.109 0.1268 0.1304 0.1031 0.1002 0.1275 0.1424 0.0751 0.0076 0 0 0 0
1998 2 1 1 2 0 0 100 0.0002 0.0005 0.0008 0.0044 0.007 0.01 0.0104 0.0175 0.0391 0.097 0.1402 0.2062 0.2047 0.1811 0.0714 0.0097 0 0 0 0
1999 2 1 1 2 0 0 100 0 0 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 0
2000 2 1 1 2 0 0 100 0.0003 0.0051 0.0192 0.0483 0.0613 0.0576 0.0595 0.0581 0.0532 0.0558 0.0712 0.1059 0.1497 0.1554 0.0895 0.0097 0 0 0 0
2001 2 1 1 2 0 0 100 0.0016 0.0057 0.0093 0.0115 0.0155 0.0302 0.0568 0.0866 0.1009 0.1196 0.1239 0.1411 0.1319 0.1128 0.0481 0.0045 0 0 0 0
2002 2 1 1 2 0 0 100 0.0012 0.0061 0.006 0.0091 0.0065 0.0104 0.0133 0.0335 0.063 0.1142 0.1543 0.1705 0.1642 0.1582 0.0803 0.0093 0 0 0 0
2003 2 1 1 2 0 0 100 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 0 0 0 0
2004 2 1 1 2 0 0 100 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 0 0 0
2005 2 1 1 2 0 0 100 0.0002 0.0008 0.0015 0.0029 0.0076 0.022 0.0343 0.0418 0.0454 0.0658 0.0956 0.1376 0.1381 0.1385 0.0729 0.0262 0.0246 0.0349 0.0345 0.075
2006 2 1 1 2 0 0 100 0.0003 0.0013 0.0044 0.015 0.0312 0.0377 0.0368 0.0346 0.0452 0.0766 0.0929 0.1144 0.1377 0.1764 0.1275 0.0284 0.0105 0.0085 0.0075 0.0132
2007 2 1 1 2 0 0 100 0.0012 0.0042 0.0068 0.0098 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 1 1 2 0 0 100 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 0.0099 0.0014 0.0018 0.0018 0.0045
2009 2 1 1 2 0 0 100 0.0004 0.001 0.0018 0.0032 0.0041 0.0073 0.0178 0.0402 0.0631 0.0705 0.0798 0.118 0.1809 0.2413 0.1455 0.0149 0.0021 0.0016 0.0022 0.0043
2010 2 1 1 2 0 0 100 0.0007 0.0011 0.0025 0.0055 0.0085 0.0119 0.0148 0.0218 0.0341 0.0541 0.0962 0.1517 0.2017 0.2373 0.135 0.0137 0.0017 0.0018 0.0016 0.0043
2011 2 1 1 2 0 0 100 0.0017 0.0066 0.0112 0.0199 0.0204 0.0188 0.0272 0.0309 0.0409 0.056 0.0756 0.1176 0.1698 0.221 0.1565 0.018 0.0026 0.0017 0.0009 0.0025
2012 2 1 1 2 0 0 100 0.0006 0.0008 0.0024 0.0042 0.0111 0.0262 0.0416 0.0563 0.0534 0.057 0.0704 0.106 0.1521 0.2072 0.1468 0.0248 0.0054 0.0085 0.0069 0.0182
2013 2 1 1 2 0 0 100 0.0001 0.0016 0.004 0.0052 0.011 0.0137 0.0237 0.0353 0.06 0.0871 0.1253 0.1381 0.1523 0.1563 0.1001 0.0207 0.0088 0.0177 0.0158 0.0242
2014 2 1 1 2 0 0 100 0.0006 0.0014 0.0017 0.0025 0.0038 0.0082 0.0139 0.0187 0.0347 0.0449 0.0767 0.1027 0.1525 0.1845 0.1225 0.0278 0.0231 0.0319 0.0371 0.1047
2015 2 1 1 2 0 0 100 0.0002 0.0006 0.0021 0.004 0.0082 0.0156 0.0169 0.019 0.0332 0.0769 0.0966 0.1365 0.1533 0.1834 0.1101 0.0238 0.0143 0.0185 0.0203 0.0664
#Discarded females
#Year Season Fleet Sex Type Shell Maturity Nsmp DataVec
1990 2 1 2 2 0 0 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
1991 2 1 2 2 0 0 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
1992 2 1 2 2 0 0 50 0.0008 0.0013 0.0029 0.0176 0.0799 0.1757 0.1941 0.1694 0.0958 0.0816 0.0577 0.0406 0.0406 0.0259 0.0117 0.0046
1993 2 1 2 2 0 0 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
1996 2 1 2 2 0 0 1.1 0 0 0.0909 0.6364 0.2727 0 0 0 0 0 0 0 0 0 0
1997 2 1 2 2 0 0 50 0 0 0.0011 0.0011 0.0099 0.0285 0.0364 0.0464 0.0695 0.1391 0.1667 0.1435 0.117 0.1082 0.0607 0.074
1998 2 1 2 2 0 0 50 0.0002 0.0004 0.001 0.0026 0.0084 0.018 0.057 0.1813 0.2307 0.1527 0.0828 0.0855 0.0578 0.0514 0.0337 0.0386
1999 2 1 2 2 0 0 3.6 0 0 0.0278 0.0278 0.0278 0.0556 0 0 0.1111 0.1389 0.0833 0.1111 0.1111 0.0833 0.2222
2000 2 1 2 2 0 0 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
2001 2 1 2 2 0 0 50 0.0027 0.005 0.0151 0.033 0.0588 0.0866 0.097 0.0866 0.0575 0.0525 0.0874 0.1392 0.1421 0.0649 0.0291 0.0426
2002 2 1 2 2 0 0 30.2 0.0258 0.1194 0.1452 0.1548 0.1161 0.0645 0.0258 0.0226 0.0548 0.0419 0.0355 0.0258 0.0323 0.0355 0.0323 0.0678
2003 2 1 2 2 0 0 50 0.0141 0.0187 0.0255 0.0719 0.1116 0.1157 0.0743 0.0476 0.0661 0.0902 0.1012 0.0628 0.0497 0.0504 0.046 0.054
2004 2 1 2 2 0 0 50 0.0005 0.0075 0.0306 0.0596 0.0754 0.059 0.1425 0.1333 0.0883 0.0484 0.0574 0.0584 0.0511 0.0394 0.0389 0.0788
2005 2 1 2 2 0 0 50 0.0004 0.0013 0.0022 0.005 0.0146 0.0499 0.0788 0.0931 0.1233 0.1211 0.0871 0.1021 0.0958 0.0885 0.0519 0.0648
2006 2 1 2 2 0 0 50 0.0003 0.0044 0.0248 0.1218 0.1937 0.1603 0.072 0.0558 0.0722 0.0778 0.0614 0.0401 0.034 0.0282 0.0199 0.0333
2007 2 1 2 2 0 0 50 0.003 0.0126 0.0214 0.0223 0.0436 0.0854 0.1105 0.0828 0.0558 0.0744 0.102 0.1165 0.0954 0.0684 0.0444 0.0614
2008 2 1 2 2 0 0 50 0.0004 0.0018 0.0097 0.0364 0.0768 0.0661 0.0469 0.0773 0.107 0.0868 0.0954 0.1265 0.1257 0.0672 0.0392 0.0369
2009 2 1 2 2 0 0 50 0.0037 0.008 0.01 0.0144 0.0164 0.0277 0.0647 0.0863 0.0803 0.0913 0.0858 0.09 0.1144 0.1308 0.088 0.0881
2010 2 1 2 2 0 0 50 0.0037 0.0051 0.0051 0.0199 0.0276 0.0229 0.0271 0.0443 0.0882 0.1138 0.1322 0.1427 0.1007 0.0915 0.0879 0.0813
2011 2 1 2 2 0 0 50 0.0132 0.0373 0.0653 0.1089 0.0814 0.0734 0.0619 0.0436 0.0281 0.0373 0.0717 0.0896 0.0748 0.0587 0.061 0.0938
2012 2 1 2 2 0 0 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 0.1658 0.1515 0.0105 0.0856
2013 2 1 2 2 0 0 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 0.0855 0.0904 0.0732 0.0947
2014 2 1 2 2 0 0 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 0.0928 0.1123 0.1241 0.2759
2015 2 1 2 2 0 0 50 0 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
#Trawl
#Year Season Fleet Sex Type Shell Maturity Nsmp DataVec
1976 2 2 1 0 0 0 50 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
1977 2 2 1 0 0 0 50 0.0036 0.0009 0.0009 0.0009 0.0026 0.0035 0.0079 0.0097 0.0317 0.0485 0.0599 0.0996 0.1084 0.1251 0.104 0.1057 0.1004 0.0634 0.0326 0.0441
1978 2 2 1 0 0 0 50 0 0 0 0 0.0025 0.0012 0.0025 0.0149 0.0274 0.0511 0.0872 0.1245 0.1158 0.0797 0.0984 0.0672 0.188
1979 2 2 1 0 0 0 50 0.0178 0.0013 0.0025 0.0013 0.0025 0.0076 0.0038 0.0025 0.0013 0.0063 0.0051 0.0114 0.0228 0.0556 0.0582 0.0708 0.0898 0.086 0.0809 0.1858
1980 2 2 1 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 0.0133 0.0231 0.0207 0.0142 0.0131 0.0265
1981 2 2 1 0 0 0 50 0.0262 0.0028 0.0045 0.0066 0.0112 0.0175 0.0279 0.0349 0.0386 0.0504 0.0434 0.048 0.0287 0.0334 0.0241 0.0212 0.0112 0.0064 0.0051 0.0087
1982 2 2 1 0 0 0 50 0.0701 0.0268 0.0247 0.0326 0.0356 0.0443 0.0409 0.0403 0.0401 0.0475 0.0456 0.0479 0.0405 0.0326 0.0182 0.0153 0.0084 0.0052 0.0038 0.0099
1983 2 2 1 0 0 0 50 0.0231 0.0214 0.0336 0.0344 0.0311 0.0319 0.0377 0.0445 0.0473 0.0471 0.0457 0.0437 0.0409 0.0414 0.0371 0.0283 0.0204 0.0129 0.0096 0.018
1984 2 2 1 0 0 0 50 0.0366 0.0156 0.0147 0.0198 0.027 0.0342 0.0399 0.0407 0.0431 0.0446 0.0511 0.0596 0.0594 0.0563 0.0473 0.0355 0.0264 0.017 0.0109 0.0146
1985 2 2 1 0 0 0 50 0.0051 0.0014 0.0034 0.0059 0.01 0.0164 0.0256 0.0396 0.0357 0.0446 0.0538 0.0636 0.0843 0.0862 0.0883 0.0843 0.0638 0.0455 0.0299 0.0578
1986 2 2 1 0 0 0 50 0.0038 0.0019 0.0085 0.0019 0.0056 0.0136 0.0193 0.0357 0.016 0.0249 0.0221 0.032 0.071 0.0555 0.0527 0.0635 0.0456 0.0362 0.0259 0.0282
1987 2 2 1 0 0 0 50 0.002 0 0.001 0.002 0.005 0.008 0.019 0.0271 0.017 0.022 0.0441 0.0491 0.0401 0.0581 0.0852 0.0812 0.0671 0.0611 0.0842
1988 2 2 1 0 0 0 43.7 0.0048 0.0048 0.0063 0.0016 0.0032 0 0.0095 0.0174 0.0127 0.0396 0.0523 0.0539 0.0571 0.0634 0.065 0.0887 0.0792 0.0586 0.0349 0.0396
1989 2 2 1 0 0 0 50 0.0049 0.0025 0.0019 0.0008 0.0021 0.0049 0.0049 0.004

## 1996	2	1	0	0	0	50	0.001	0.0015	0.0025	0.003	0.004	0.009	0.014	0.0156	0.0206	0.0276	0.0346	0.0437	0.0341	0.0482	0.0286	0.0447	0.0301	0.0376	0.0286	0.0853	
## 1997	2	1	0	0	0	50	0	0	0.0018	0.0018	0.0107	0.022	0.0386	0.054	0.0516	0.051	0.0427	0.0291	0.0315	0.035	0.0309	0.035	0.0427	0.0475	0.1525		
## 1998	2	1	0	0	0	50	0.0004	0.0004	0.0004	0	0	0.0008	0.0028	0.0035	0.0067	0.013	0.0268	0.0342	0.0547	0.0625	0.0677	0.0673	0.059	0.0504	0.1306		
## 1999	2	1	0	0	0	50	0.002	0.0007	0.001	0.0003	0.0007	0	0.0033	0.0017	0.0023	0.0056	0.0083	0.0212	0.0422	0.0707	0.0953	0.1042	0.0979	0.0803	0.0588	0.1185	
## 2000	2	1	0	0	0	50	0	0	0.0012	0.0006	0.0006	0.003	0.0042	0.0162	0.0222	0.0258	0.0252	0.0426	0.0372	0.0426	0.036	0.0468	0.0414	0.045	0.048	0.158	
## 2001	2	1	0	0	0	50	0	0.0001	0.001	0.0006	0.0023	0.0071	0.008	0.0111	0.0192	0.0208	0.0224	0.0211	0.0234	0.0265	0.0312	0.0432	0.0593	0.0607	0.0612	0.2159	
## 2002	2	1	0	0	0	50	0.0004	0.0004	0.0002	0.0019	0.0012	0.0023	0.0017	0.0025	0.005	0.0105	0.0161	0.0203	0.0287	0.0354	0.0486	0.0536	0.0651	0.0703	0.0753	0.2579	
## 2003	2	1	0	0	0	50	0.0011	0.0008	0.0034	0.0099	0.0145	0.0149	0.0202	0.0122	0.0103	0.0122	0.0118	0.0251	0.0282	0.037	0.0514	0.0564	0.0556	0.051	0.051	0.1303	
## 2004	2	1	0	0	0	50	0	0.0003	0.0016	0.0047	0.0028	0.0072	0.0094	0.0225	0.026	0.0232	0.0282	0.0238	0.0244	0.0235	0.0291	0.0429	0.0495	0.0469	0.0429	0.1199	
## 2005	2	1	0	0	0	50	0.0016	0.0016	0.0016	0.0027	0.003	0.0065	0.0084	0.0155	0.0098	0.013	0.0212	0.0298	0.032	0.0336	0.0331	0.0331	0.0372	0.0388	0.0388	0.131	
## 2006	2	1	0	0	0	50	0.0006	0	0	0.0006	0.0014	0.0023	0.0055	0.0075	0.0179	0.0182	0.0234	0.0254	0.03	0.0413	0.0436	0.043	0.0424	0.0367	0.0878		
## 2007	2	1	0	0	0	50	0	0.0005	0	0.0009	0.0028	0.0019	0.0028	0.0081	0.009	0.0104	0.0171	0.018	0.0194	0.0356	0.0403	0.0403	0.037	0.0403	0.0565	0.1385	
## 2008	2	1	0	0	0	50	0.0007	0	0.0003	0.001	0.0024	0.0014	0.0021	0.0041	0.0145	0.0237	0.0299	0.0478	0.0533	0.0478	0.0571	0.0399	0.0506	0.0489	0.0499	0.1669	
## 2009	2	1	0	0	0	50	0.0004	0.0004	0.0004	0.0017	0.0017	0.0021	0.0021	0.0072	0.0102	0.0111	0.0115	0.0247	0.0353	0.0506	0.0591	0.0778	0.074	0.0604	0.0523	0.1471	
## 2010	2	1	0	0	0	50	0.0027	0.0034	0.004	0.0027	0.0027	0.006	0.004	0.0074	0.0141	0.0121	0.0161	0.0248	0.0396	0.0389	0.0402	0.0342	0.0288	0.0315	0.0302	0.0892	
## 2011	2	1	0	0	0	50	0	0	0.0012	0.0031	0.0018	0.0025	0.0018	0.0037	0.0061	0.0043	0.0055	0.0067	0.0116	0.0208	0.0356	0.0349	0.0386	0.0347	0.0337	0.095	
## 2012	2	1	0	0	0	50	0	0.0003	0.0003	0.0006	0.0012	0.0012	0.0049	0.0074	0.0107	0.0132	0.0218	0.0255	0.0313	0.0328	0.0393	0.0433	0.0387	0.0372	0.0359	0.1114	
## 2013	2	1	0	0	0	50	0.0069	0.0093	0.0145	0.0241	0.02	0.0176	0.02	0.0205	0.0222	0.0255	0.0266	0.0323	0.0347	0.0308	0.0313	0.0278	0.0281	0.027	0.0258	0.0881	
## 2014	2	1	0	0	0	50	0.0018	0.0026	0.0037	0.0026	0.0037	0.0053	0.0084	0.0132	0.011	0.0143	0.0192	0.0234	0.0284	0.0269	0.026	0.0419	0.0295	0.0278	0.0262	0.1155	
## 2015	2	1	0	0	0	50	0.0006	0.001	0.0012	0.0027	0.0062	0.0091	0.011	0.0133	0.0124	0.019	0.0182	0.018	0.0161	0.0166	0.0128	0.0099	0.013	0.0101	0.0097	0.0319	
## #Trawl																											
## #Year	Season	Fleet	Sex	Type	Shell	Maturity	Nsamp	DataVec																			
## 1976	2	2	0	0	0	50	0	0	0	0	0	0.0087	0.0216	0.026	0.0303	0.0563	0.013	0.026	0.0043	0.026							
## 1977	2	2	0	0	0	50	0	0.0009	0.0009	0	0	0.0009	0.0026	0.0053	0.007	0.0088	0.0062	0.0053	0.0044	0.0026	0.0009	0.0009					
## 1978	2	2	0	0	0	50	0	0	0	0	0	0	0	0.0075	0.005	0.0075	0.0262	0.0324	0.061								
## 1979	2	2	0	0	0	50	0.013	0.0013	0	0	0.0063	0.0038	0.0152	0.0468	0.0354	0.0392	0.0544	0.0215	0.0164	0.0177	0.0013	0.0139					
## 1980	2	2	0	0	0	50	0.0433	0.016	0.0096	0.0189	0.0281	0.0409	0.0497	0.0472	0.0489	0.0525	0.0362	0.0265	0.0134	0.0081	0.0039	0.0039	0.004				
## 1981	2	2	0	0	0	50	0.0612	0.0245	0.0245	0.0437	0.054	0.0608	0.0525	0.0425	0.0315	0.0383	0.0312	0.0267	0.024	0.0158	0.0093	0.0086					
## 1982	2	2	0	0	0	50	0.0631	0.0235	0.0237	0.0285	0.0379	0.0413	0.0332	0.0246	0.019	0.0177	0.0156	0.0144	0.0104	0.008	0.0034	0.0049					
## 1983	2	2	0	0	0	50	0.0281	0.0233	0.0351	0.0363	0.0358	0.0407	0.0392	0.0316	0.0222	0.0154	0.01	0.0087	0.0065	0.0042	0.003	0.0041					
## 1984	2	2	0	0	0	50	0.04	0.0156	0.0155	0.0211	0.0298	0.0344	0.0399	0.0359	0.0287	0.0151	0.0085	0.006	0.0042	0.0031	0.0019	0.0029					
## 1985	2	2	0	0	0	50	0.0034	0.0013	0.0024	0.0046	0.0096	0.0171	0.0195	0.0193	0.0163	0.0128	0.0119	0.0111	0.0108	0.0057	0.0025	0.0066					
## 1986	2	2	0	0	0	28.4	0.0038	0.0014	0.0038	0	0.0038	0.0099	0.0329	0.0762	0.063	0.047	0.0494	0.0466	0.0428	0.0202	0.0085	0.0268					
## 1987	2	2	0	0	0	50	0.002	0.002	0.003	0.01	0.018	0.0311	0.0331	0.0401	0.022	0.0311	0.016	0.0391	0.008	0.008	0.003	0.009					
## 1988	2	2	0	0	0	27.5	0.0079	0.0143	0.0032	0.0079	0.0063	0.0127	0.0222	0.0349	0.0475	0.0523	0.0396	0.0222	0.0174	0.0079	0.0048	0.0063					
## 1989	2	2	0	0	0	19.4	0.0028	0.0023	0.0025	0.0047	0.0081	0.0123	0.0212	0.0428	0.0498	0.0477	0.0432	0.0291	0.0252	0.017	0.0064	0.0172					
## 1990	2	2	0	0	0	50	0.0017	0.0035	0.0078	0.0069	0.0112	0.0112	0.019	0.0268	0.0424	0.038	0.0372	0.0346	0.0257	0.0173	0.0147	0.0449					
## 1991	2	2	0	0	0	39.6	0	0.0032	0.0063	0.0032	0	0.0063	0.0032	0.0063	0.0254	0.0159	0.0159	0.0349	0.0222	0.054	0.0222	0.1206					
## 1992	2	2	0	0	0	10.7	0.0045	0	0	0.0023	0.0315	0.0473	0.036	0.036	0.036	0.036	0.0473	0.0608	0.0495	0.0405	0.036	0.0541					
## 1994	2	2	0	0	0	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					
## 1995	2	2	0	0	0	3.5	0.0507	0	0	0.0217	0.0072	0.0217	0.0435	0.0145	0.0217	0	0.0217	0.0072	0.0145	0	0.0217						
## 1996	2	2	0	0	0	50	0.003	0.0005	0.0025	0.007	0.0186	0.0236	0.0181	0.0261	0.0326	0.0482	0.0637	0.0602	0.0487	0.0416	0.0306	0.0607					
## 1997	2	2	0	0	0	48.3	0	0.0006	0.0006	0.0042	0.0101	0.0285	0.0297	0.0469	0.0439	0.0243	0.0184	0.0178	0.0136	0.0101	0.038						
## 1998	2	2	0	0	0	50	0	0.0004	0.0008	0.0012	0.0028	0.0134	0.0389	0.0441	0.033	0.0307	0.024	0.0295	0.0256	0.0319	0.0838						
## 1999	2	2	0	0	0	50	0	0.0007	0.0003	0.0003	0.0007	0.0013	0.0066	0.0166	0.0322	0.0408	0.0365	0.0295	0.0259	0.0206	0.0727						
## 2000	2	2	0	0	0	50	0	0	0.0018	0.0018	0.0042	0.0078	0.0138	0.0114	0.0228	0.0402	0.0547	0.0462	0.0432	0.039	0.1159						
## 2001	2	2	0	0	0	50	0.0003	0.0001	0.0003	0.0014	0.0036	0.0062	0.0126	0.0169	0.0159	0.0189	0.0362	0.0615	0.0554	0.0343	0.027	0.0739					
## 2002	2	2	0	0	0	50	0.0006	0.0008	0.0008	0.0006	0.0008	0.0025	0.0035	0.0087	0.0167	0.0165	0.013	0.0242	0.0349	0.036	0.0378	0.105					
## 2003	2	2	0	0	0	50	0.0008	0.0019	0.0019	0.0118	0.0194	0.0156	0.0107	0.0088	0.0156	0.0225	0.0297	0.0335	0.0339	0.0453	0.0434	0.1078					
## 2004	2	2	0	0	0	50	0.0003	0.0003	0.0016	0.0025	0.0041	0.0106	0.0182	0.0307	0.0285	0.026	0.0444	0.0413	0.0435	0.041	0.0426	0.1358					
## 2005	2	2	0	0	0	50	0.0003	0.0024	0.003	0.0016	0.0033	0.0087	0.0138	0.0269	0.0393	0.0485	0.038	0.0393	0.0499	0.0407	0.0374</						

```
## 1985 1 5 1 0 0 200 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
## 1986 1 5 1 0 0 200 0.01118 0.01788 0.0248 0.0201 0.02318 0.01563 0.04079 0.04 0.05588 0.04852 0.06746 0.07339 0.07 0.07875 0.05634 0.03848 0.02745 0.00733 0.00293 0.00232
## 1987 1 5 1 0 0 200 0.00124 0.00707 0.03402 0.05458 0.04693 0.03171 0.02904 0.0291 0.03095 0.02534 0.0332 0.02702 0.03627 0.03448 0.02896 0.0284 0.01826 0.01539 0.0038 0.00394
## 1988 1 5 1 0 0 200 0.00132 0.00131 0.00661 0.01098 0.01329 0.02154 0.04687 0.04304 0.04045 0.03737 0.02619 0.03082 0.02097 0.03712 0.03305 0.04953 0.03683 0.02677 0.00944 0.00926
## 1989 1 5 1 0 0 200 0.00165 0 0.00089 0.0024 0.01493 0.03477 0.01836 0.03764 0.02324 0.04118 0.02877 0.02534 0.04499 0.05229 0.0535 0.06652 0.04826 0.04662 0.02825 0.0278
## 1990 1 5 1 0 0 200 0.00127 0.01061 0.01509 0.03475 0.03294 0.00938 0.00797 0.0084 0.0182 0.02957 0.02192 0.02978 0.03407 0.04012 0.03692 0.03824 0.02986 0.03439 0.01955 0.03424
## 1991 1 5 1 0 0 200 0.00105 0.00895 0.02235 0.01675 0.02654 0.02168 0.01373 0.02739 0.02213 0.01724 0.00529 0.01977 0.03468 0.03637 0.05878 0.06743 0.06583 0.04824 0.03692 0.07566
## 1992 1 5 1 0 0 200 0.001 0 0.00202 0.01271 0.0252 0.0355 0.0552 0.05277 0.03818 0.03993 0.02909 0.03781 0.03483 0.02803 0.02336 0.02333 0.02188 0.03065 0.01685 0.04963
## 1993 1 5 1 0 0 200 0.00209 0.01099 0.01366 0.01049 0.00954 0.01568 0.01418 0.02352 0.03089 0.04425 0.04172 0.06268 0.04792 0.03903 0.03712 0.02688 0.02882 0.02978 0.02424 0.04112
## 1994 1 5 1 0 0 200 0.00162 0 0.00309 0.0237 0.02348 0.01516 0.01236 0.01733 0.02131 0.03537 0.04122 0.0403 0.06273 0.09071 0.0474 0.04612 0.0468 0.03273 0.02294 0.0504
## 1995 1 5 1 0 0 200 0.02826 0.06829 0.05574 0.02203 0.01101 0.01691 0.02219 0.02553 0.02748 0.03046 0.02626 0.02679 0.03434 0.04021 0.04902 0.04328 0.0323 0.02377 0.01076 0.02615
## 1996 1 5 1 0 0 200 0.02781 0.01354 0.0298 0.05291 0.06316 0.05938 0.02756 0.02249 0.0117 0.01786 0.01403 0.01501 0.01394 0.01298 0.02177 0.01647 0.01903 0.01714 0.01827 0.02521
## 1997 1 5 1 0 0 200 0 0.00357 0.00221 0.00519 0.0127 0.05636 0.09427 0.10698 0.09097 0.05154 0.03012 0.01617 0.01488 0.01321 0.0142 0.01683 0.02337 0.01681 0.01731 0.04015
## 1998 1 5 1 0 0 200 0.02085 0.01739 0.01031 0.01272 0.012 0.01014 0.01345 0.01689 0.02263 0.04666 0.04852 0.05232 0.04513 0.02907 0.01832 0.01525 0.01955 0.01348 0.00795 0.0245
## 1999 1 5 1 0 0 200 0.05828 0.02442 0.01336 0.01038 0.01196 0.011 0.01214 0.01479 0.00468 0.01322 0.01815 0.0233 0.05204 0.05362 0.07004 0.06879 0.0435 0.03029 0.02206 0.02521
## 2000 1 5 1 0 0 200 0.00176 0.00474 0.01949 0.03958 0.03102 0.01998 0.02277 0.0163 0.02006 0.01468 0.01341 0.02961 0.02941 0.04894 0.04161 0.03597 0.03427 0.02291 0.00849 0.01964
## 2001 1 5 1 0 0 200 0.00689 0.00496 0.01061 0.0149 0.0156 0.04209 0.03715 0.05234 0.03461 0.01999 0.02533 0.01664 0.01396 0.02016 0.01317 0.01116 0.02189 0.01912 0.01921 0.03269
## 2002 1 5 1 0 0 200 0.05335 0.06381 0.0436 0.02723 0.01193 0.00907 0.0076 0.01062 0.02292 0.02661 0.01374 0.02903 0.02025 0.02516 0.017 0.01934 0.01948 0.02216 0.02415 0.0274
## 2003 1 5 1 0 0 200 0.01486 0.00685 0.01419 0.02363 0.0392 0.03203 0.00306 0.01646 0.01123 0.0143 0.01328 0.02506 0.02357 0.03856 0.01481 0.03639 0.02539 0.02164 0.0212 0.06663
## 2004 1 5 1 0 0 200 0.03708 0.0289 0.02678 0.01954 0.01866 0.01866 0.03499 0.05351 0.0436 0.04447 0.02193 0.02382 0.01419 0.01504 0.01787 0.02321 0.02404 0.03267 0.02318 0.04471
## 2005 1 5 1 0 0 200 0.03525 0.05861 0.04185 0.01599 0.00976 0.02277 0.02344 0.02146 0.01842 0.01713 0.02186 0.02326 0.01588 0.01891 0.01249 0.01583 0.01033 0.01545 0.01437 0.02521
## 2006 1 5 1 0 0 200 0.01329 0.01974 0.01728 0.02762 0.02908 0.03689 0.02097 0.02077 0.01289 0.01877 0.01161 0.01284 0.02359 0.0205 0.03294 0.02798 0.02711 0.01995 0.01444 0.02461
## 2007 1 5 1 0 0 200 0.00173 0.00247 0.00532 0.00836 0.01964 0.02711 0.03454 0.04364 0.03857 0.02876 0.01874 0.0233 0.02355 0.03147 0.02728 0.02798 0.02769 0.0262 0.0229 0.02895
## 2008 1 5 1 0 0 200 0 0.0008 0.00379 0.00678 0.01489 0.01878 0.01944 0.02393 0.03722 0.04701 0.04531 0.03278 0.03824 0.03168 0.02488 0.02263 0.02421 0.02358 0.02219 0.04671
## 2009 1 5 1 0 0 200 0.00095 0.00048 0.00369 0.00525 0.00531 0.01037 0.00964 0.02253 0.03295 0.03007 0.03151 0.03278 0.03626 0.04786 0.03122 0.03289 0.01979 0.0163 0.01483 0.01688
## 2010 1 5 1 0 0 200 0 0.00334 0.00802 0.00943 0.00774 0.00538 0.01608 0.01344 0.01296 0.01527 0.02697 0.0363 0.0302 0.03253 0.03672 0.03475 0.0423 0.02624 0.01454 0.01999
## 2011 1 5 1 0 0 200 0.00364 0.00437 0.01248 0.02043 0.01686 0.0138 0.01677 0.01505 0.01821 0.0132 0.01805 0.02026 0.01612 0.02952 0.02745 0.02573 0.02416 0.02042 0.01154 0.01646
## 2012 1 5 1 0 0 200 0.00247 0.00398 0.01202 0.01593 0.01281 0.0227 0.03362 0.02474 0.01742 0.01742 0.01532 0.01955 0.02169 0.02644 0.02341 0.02094 0.02315 0.02811 0.01318 0.01431
## 2013 1 5 1 0 0 200 0.00082 0.00253 0.01232 0.01451 0.01006 0.01741 0.01341 0.02352 0.02798 0.02607 0.03226 0.03482 0.03028 0.03192 0.03436 0.03244 0.03397 0.04308 0.03945 0.04792
## 2014 1 5 1 0 0 200 0 0.00046 0.00259 0.003 0.01598 0.03132 0.04368 0.03479 0.03127 0.0192 0.02307 0.03258 0.03357 0.03086 0.03724 0.0258 0.02237 0.01888 0.01799 0.04393
## 2015 1 5 1 0 0 200 0.01049 0.02068 0.01027 0.00933 0.00465 0.01101 0.01577 0.01488 0.02441 0.01865 0.02854 0.02032 0.0235 0.03182 0.02404 0.03383 0.03129 0.02818 0.02777 0.07956
## 2016 1 5 1 0 0 200 0.00664 0.00092 0.00263 0.00322 0.00414 0.00426 0.00337 0.00833 0.00688 0.01293 0.00853 0.01452 0.01273 0.02535 0.01953 0.02134 0.02405 0.0389 0.03242 0.07093
## #NMFPS female
## #Year Season Fleet Sex Type Shell Maturity Nsmp DataVec
## 1975 1 5 2 0 0 200 0.0331 0.04013 0.04814 0.04942 0.05635 0.04386 0.04444 0.04537 0.03261 0.02886 0.01624 0.01581 0.01159 0.00351 0.0029 0.00337
## 1976 1 5 2 0 0 200 0.00292 0.00922 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
## 1977 1 5 2 0 0 200 0.00256 0.00677 0.00793 0.01932 0.03367 0.07011 0.08076 0.07146 0.04525 0.04354 0.0415 0.03157 0.0151 0.01004 0.00328 0.00458
## 1978 1 5 2 0 0 200 0.00604 0.0111 0.01868 0.02009 0.0233 0.04183 0.09199 0.12124 0.07912 0.04404 0.0301 0.02673 0.01757 0.00889 0.00446 0.00745
## 1979 1 5 2 0 0 200 0.02855 0.01536 0.01209 0.01473 0.01478 0.02297 0.03813 0.0734 0.09219 0.08763 0.0565 0.03663 0.02145 0.01228 0.00425 0.00571
## 1980 1 5 2 0 0 200 0.00479 0.02191 0.03221 0.02922 0.05972 0.08196 0.04872 0.05811 0.054 0.04236 0.03153 0.01303 0.01096 0.00587 0.00348 0.00201
## 1981 1 5 2 0 0 200 0.01521 0.01126 0.01507 0.01897 0.03662 0.04562 0.04427 0.04722 0.05995 0.07744 0.08035 0.05095 0.02524 0.01431 0.0028 0.00415
## 1982 1 5 2 0 0 200 0.05357 0.09537 0.06029 0.03784 0.04226 0.04818 0.03978 0.02321 0.01896 0.02571 0.02813 0.02027 0.01141 0.00625 0.00238 0.00086
## 1983 1 5 2 0 0 200 0.01741 0.0383 0.04749 0.06292 0.06466 0.03981 0.03406 0.01518 0.01068 0.00422 0.00904 0.00563 0.00605 0.00222 0.00129 0
## 1984 1 5 2 0 0 200 0.01741 0.05854 0.12291 0.11051 0.06465 0.03249 0.01589 0.01191 0.00379 0.00166 0 0.00041 0.0001 0.0002 0.00009 0
## 1985 1 5 2 0 0 200 0.00086 0.01548 0.03765 0.05212 0.0643 0.05553 0.05156 0.03973 0.01606 0.00681 0 0 0.00149 0 0
## 1986 1 5 2 0 0 183.5 0.01237 0.02244 0.03547 0.02742 0.02628 0.03133 0.03617 0.03878 0.0274 0.01125 0.00715 0.00079 0 0 0.00076 0
## 1987 1 5 2 0 0 200 0.00132 0.01236 0.0525 0.09184 0.0761 0.04624 0.04448 0.05692 0.04138 0.02915 0.01788 0.00791 0.00183 0.00041 0 0
## 1988 1 5 2 0 0 200 0.00059 0.00764 0.00644 0.00617 0.01394 0.06945 0.09103 0.09785 0.06971 0.06 0.04068 0.01837 0.0077 0.00766 0 0
## 1989 1 5 2 0 0 200 0.00165 0 0.00171 0.00818 0.03103 0.03704 0.06458 0.06919 0.05312 0.03764 0.03146 0.01943 0.00643 0.00413 0 0
## 1990 1 5 2 0 0 200 0.00405 0.00521 0.02352 0.0513 0.05251 0.00709 0.0286 0.06012 0.0732 0.0708 0.06333 0.04095 0.02151 0.00616 0.00369 0.0037
## 1991 1 5 2 0 0 200 0.00415 0.0115 0.01956 0.03195 0.0218 0.03443 0.04526 0.03095 0.03663 0.03294 0.02808 0.0431 0.02323 0.01104 0.00689 0.00269
## 1992 1 5 2 0 0 180 0 0.00534 0.00737 0.01974 0.03642 0.04139 0.06251 0.04481 0.03529 0.02733 0.04503 0.04068 0.02651 0.02118 0.01619 0.01224
## 1993 1 5 2 0 0 200 0.00655 0.008 0.01751 0.00849 0.01309 0.02482 0.04371 0.06474 0.06388 0.02686 0.02996 0.02676 0.02709 0.04448 0.01754 0.02194
## 1994 1 5 2 0 0 133 0 0.0016 0.00443 0.00296 0.01685 0.00917 0.0124 0.02131 0.04312 0.0416 0.03619 0.02802 0.03953 0.04689 0.02916 0.03206
## 1995 1 5 2 0 0 200 0.02942 0.04821 0.03155 0.01453 0.01391 0.01824 0.01628 0.02535 0.02343 0.03343 0.02724 0.02335 0.02398 0.0145 0.02031 0.01547
## 1996 1 5 2 0 0 200 0.02595 0.02186 0.04362 0.0794 0.07958 0.04357 0.02255 0.02176 0.02451 0.02017 0.01611 0.02847 0.02443 0.01563 0.00871 0.02361
## 1997 1 5 2 0 0 200 0.00043 0.00367 0.00162 0.00201 0.0146 0.07907 0.09694 0.06164 0.02119 0.01367 0.00948 0.01455 0.01427 0.01092 0.00836 0.02077
## 1998 1 5 2 0 0 200 0.0145 0.0196 0.01006 0.00876 0.01105 0.01161 0.03029 0.10399 0.1153 0.05939 0.03029 0.02522 0.0225 0.02353 0.02319 0.03631
## 1999 1 5 2 0 0 200 0.02426 0.01691 0.0125 0.01148 0.00435 0.00547 0.00925 0.0164 0.05117 0.07996 0.05828 0.03579 0.03397 0.01988 0.01227 0.02863
## 2000 1 5 2 0 0 200 0.00175 0.00672 0.02685 0.04027 0.03573 0.02718 0.02545 0.02263 0.03583 0.05235 0.06757 0.06028 0.04188 0.02084 0.0167 0.04334
## 2001 1 5 2 0 0 200 0.0056 0.01683 0.01951 0.01361 0.02585 0.05984 0.07787 0.05792 0.03945 0.03981 0.03945 0.06914 0.056 0.02621 0.01028 0.02048
## 2002 1 5 2 0 0 200 0.05063 0.07685 0.04852 0.02466 0.02215 0.01761 0.02247 0.05199 0.0399 0.02964 0.0163 0.02059 0.02046 0.02206 0.00712 0.0136
## 2003 1 5 2 0 0 200 0.01634 0.00586 0.01433 0.03142 0.04137 0.04644 0.02385 0.02915 0.03511 0.05333 0.05263 0.0356 0.02189 0.02647 0.02196 0.03492
## 2004 1 5 2 0 0 200 0.02787 0.0327 0.01935 0.01322 0.01994 0.03692 0.05771 0.05139 0.03339 0.02035 0.01956 0.0232 0.01836 0.01662 0.01266 0.02251
## 2005 1 5 2 0 0 200 0.04054 0.0561 0.04573 0.01155 0.00988 0.0336 0.03861 0.05206 0.05668 0.04675 0.03355 0.03825 0.03468 0.02272 0.01648 0.02455
## 2006 1 5 2 0 0 200 0.01429 0.01386 0.01981 0.04248 0.06153 0.04621 0.02542 0.02591 0.04811 0.06555 0.06186 0.04148 0.03012 0.0352 0.01666 0.01864
## 2007 1 5 2 0 0 200 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 5 2 0 0 200 0 0.00267 0.00538 0.01359 0.01158 0.01666 0.03027 0.06996 0.07237 0.05603 0.05546 0.05617 0.05754 0.03547 0.02343 0.02157
## 2009 1 5 2 0 0 200 0.00046 0.00189 0.00503 0.00549 0.00814 0.01218 0.02057 0.04661 0.06559 0.08662 0.06446 0.06028 0.05226 0.0705 0.05137 0.04697
## 2010 1 5 2 0 0 200 0.00184 0.00058 0.00373 0.0048 0.00885 0.01163 0.02131 0.03645 0.05649 0.0927 0.09548 0.07004 0.05089 0.0497 0.05075 0.05452
## 2011 1 5 2 0 0 200 0.00577 0.00845 0.0092 0.01412 0.02842 0.03104 0.03835 0.04841 0.02992 0.053 0.06374 0.03951 0.06345 0.05714 0.04303 0.07095
## 2012 1 5 2 0 0 200 0.02925 0.01803 0.0191 0.02495 0.02805 0.04611 0.03514 0.02198 0.03313 0.03551 0.03653 0.04609 0.06625 0.05206 0.04621 0.06328
## 2013 1 5 2 0 0 200 0.00081 0.00269 0.00929 0.01117 0.00669 0.01248 0.02118 0.03841 0.04287 0.04496 0.03041 0.03016 0.04553 0.04914 0.04049 0.07861
## 2014 1 5 2 0 0 200 0 0 0.00122 0.00395 0.00909 0.02582 0.02188 0.03196 0.04992 0.07704 0.05691 0.04559 0.0307 0.03987 0.0516 0.0859
## 2015 1 5 2 0 0 200 0.00736 0.01285 0.01098 0.00549 0.01195 0.01136 0.01067 0.02344 0.04079 0.04609 0.06164 0.06684 0.05313 0.05034 0.03618 0.06192
## 2016 1 5 2 0 0 200 0.01201 0.00186 0.00358 0.00425 0.00258 0.00511 0.01429 0.01409 0.03897 0.07143 0.07817 0.10231 0.07368 0.0823 0.06165 0.11576
## #BSFRF males
## #Year Season Fleet Sex Type Shell Maturity Nsmp DataVec
## 2007 1 6 1 0 0 628 0.0045 0.0074 0.0103 0.0155 0.0198 0.0321 0.0532 0.0491 0.0443 0.0354 0.0268 0.0231 0.0236 0.0256 0.0223 0.032 0.0246 0.0218 0.017 0.0278
## 2008 1 6 1 0 0 907 0.0017 0.001 0.0093 0.0119 0.0175 0.0279 0.0267 0.0348 0.0428 0.0596 0.0581 0.0455 0.0371 0.0284 0.0218 0.0211 0.0156 0.0157 0.0202 0.0294
## 2013 1 6 1 0 0 190 0 0.0073 0.0145 0.0291 0.0102 0.0136 0.0205 0.0341 0.0357 0.0458 0.0448 0.0383 0.0342 0.0348 0.0206 0.0149 0.0337 0.0426 0.0358 0.0986
## 2014 1 6 1 0 0 218 0 0 0.003 0.0101 0.0118 0.0448 0.0546 0.0423 0.047 0.0164 0.0221 0.0321 0.0226 0.0369 0.022 0.0282
```

The Gmacs base model control file:

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```

##      0.75      0.20      1.00      -2      3      3.0      2.00      # steepness
##      0.01      0.00      1.00      -3      3      1.01      1.01      # recruitment autocorrelation
## ## ----- ##
## ## ----- ##
## ## GROWTH PARAMETER CONTROLS ##
## ## Two lines for each parameter if split sex, one line if not ##
## ## ----- ##
## ## number of molt periods ##
## 2 ##
## ## ----- ##
## ## ival      lb      ub      phz      prior      p1      p2      # parameter ##
## ## ----- ##
## 99.9      1.0      90.0      -3      0      0.0      999.0      # alpha males or combined
## 99.9      1.0      90.0      -3      0      0.0      999.0      # alpha
## 0.00      0.0      0.9      -3      0      0.0      999.0      # beta males or combined
## 0.00      0.0      0.9      -3      0      0.0      999.0      # beta
## 1.365758      0.1      3.0      -4      0      0.0      999.0      # gscale males or combined
## 1.885541      0.1      3.0      -4      0      0.0      999.0      # gscale
## ## ----- ##
## ## ----- ##
## ## MOLTING PROBABILITY CONTROLS ##
## ## Two lines for each parameter if split sex, one line if not ##
## ## ----- ##
## ## ival      lb      ub      phz      prior      p1      p2      # parameter ##
## ## ----- ##
## ## Period 1 ##
## 144.170986      1.0      180.0      3      0      0.0      999.0      # molt_mu males
## 400.0      1.0      999.0      -4      0      0.0      999.0      # molt_mu females (molt every year)
## 0.05      0.0001      1.0      4      0      0.0      999.0      # molt_cv males
## 0.1      0.0001      9.0      -4      0      0.0      999.0      # molt_cv females (molt every year)
## ## Period 2 ##
## 140.5      1.0      195.0      3      0      0.0      999.0      # molt_mu males
## 400.0      1.0      999.0      -4      0      0.0      999.0      # molt_mu females (molt every year)
## 0.071      0.0001      9.0      4      0      0.0      999.0      # molt_cv males
## 0.1      0.0001      9.0      -4      0      0.0      999.0      # molt_cv females (molt every year)
## ## ----- ##
## ## ----- ##
## ## SELECTIVITY CONTROLS ##
## ## Selectivity P(capture of all sizes). Each gear must have a selectivity and a ##
## ## retention selectivity. If a uniform prior is selected for a parameter then the ##
## ## lb and ub are used (p1 and p2 are ignored) ##
## ## ----- ##
## ## LEGEND ##
## ## sel type: 0 = parametric, 1 = coefficients (NIY), 2 = logistic, 3 = logistic95, ##
## ## 4 = double normal (NIY) ##
## ## gear index: use +ve for selectivity, -ve for retention ##
## ## sex dep: 0 for sex-independent, 1 for sex-dependent ##
## ## ----- ##
## ## Gear-1      Gear-2      Gear-3      Gear-4      Gear-5      Gear-6 ##
## 1      1      1      1      2      1      # selectivity periods
## 1      0      1      0      1      1      # sex specific selectivity
## 3      3      3      3      3      3      # male selectivity type
## 3      3      3      3      3      3      # female selectivity type
## ## Gear-1      Gear-2      Gear-3      Gear-4      Gear-5      Gear-6 ##
## 1      1      1      1      1      1      # retention periods
## 1      0      0      0      0      0      # sex specific retention
## 3      2      2      2      2      2      # male retention type
## 2      2      2      2      2      2      # female retention type
## 1      0      0      0      0      0      # male retention flag (0 = no, 1 = yes)
## 0      0      0      0      0      0      # female retention flag (0 = no, 1 = yes)
## ## ----- ##
## ## gear      par      sel ##
## ## index index par sex ival lb ub prior p1 p2 phz start end ##
## ## ----- ##
## ## Gear-1 ##
## 1      1      1      1      100      5      136      0      1      999      3      1975      2016
## 1      2      2      1      120      5      137      0      1      999      3      1975      2016
## 1      3      1      2      84      60      150      0      1      999      3      1975      2016
## 1      4      2      2      95      60      150      0      1      999      3      1975      2016
## ## Gear-2 ##
## 2      5      1      0      110      5      185      0      1      999      3      1975      2016
## 2      6      2      0      150      5      185      0      1      999      3      1975      2016
## ## Gear-3 ##
## 3      7      1      1      110      5      185      0      1      999      3      1975      2016
## 3      8      2      1      150      5      185      0      1      999      3      1975      2016
## 3      9      1      2      110      5      185      0      1      999      3      1975      2016
## 3      10      2      2      150      5      185      0      1      999      3      1975      2016
## ## Gear-3 ##
## 4      11      1      0      110      5      185      0      1      999      3      1975      2016
## 4      12      2      0      150      5      185      0      1      999      3      1975      2016
## ## Gear-5 ##
## 5      13      1      1      74      60      90      0      1      999      3      1975      1981
## 5      14      2      1      95      70      150      0      1      999      3      1975      1981
## 5      15      1      1      90      60      90      0      1      999      3      1982      2016
## 5      16      2      1      160      70      150      0      1      999      3      1982      2016
## 5      17      1      2      74      60      180      0      1      999      3      1975      1981
## 5      18      2      2      95      70      180      0      1      999      3      1975      1981
## 5      19      1      2      90      60      180      0      1      999      3      1982      2016
## 5      20      2      2      160      70      180      0      1      999      3      1982      2016
## ## Gear-6 ##
## 6      21      1      1      70      1      180      0      1      999      4      1975      2016
## 6      22      2      1      90      1      180      0      1      999      4      1975      2016
## 6      23      1      2      110      1      180      0      1      999      4      1975      2016
## 6      24      2      2      190      1      180      0      1      999      4      1975      2016
## ## ----- ##
## ## Retained ##
## ## gear      par      sel ##
## ## index index par sex ival lb ub prior p1 p2 phz start end ##
## ## ----- ##
## ## Gear-1 ##
## -1      25      1      1      136      1      999      0      1      999      4      1975      2016
## -1      26      2      1      137      1      999      0      1      999      5      1975      2016
## -1      27      1      2      591      1      999      0      1      999      -3      1975      2016
## -1      28      2      2      11      1      999      0      1      999      -3      1975      2016
## ## Gear-2 ##

```

```

## -2 29 1 0 595 1 999 0 1 999 -3 1975 2016
## -2 30 2 0 10 1 999 0 1 999 -3 1975 2016
## # Gear-3
## -3 31 1 0 595 1 999 0 1 999 -3 1975 2016
## -3 32 2 0 10 1 999 0 1 999 -3 1975 2016
## # Gear-4
## -4 33 1 0 595 1 999 0 1 999 -3 1975 2016
## -4 34 2 0 10 1 999 0 1 999 -3 1975 2016
## # Gear-5
## -5 35 1 0 590 1 999 0 1 999 -3 1975 2016
## -5 36 2 0 10 1 999 0 1 999 -3 1975 2016
## # Gear-6
## -6 37 1 0 580 1 999 0 1 999 -3 1975 2016
## -6 38 2 0 20 1 999 0 1 999 -3 1975 2016
## ## ----- ##
## ## ----- ##
## ## PRIORS FOR CATCHABILITY
## ## If a uniform prior is selected for a parameter then the lb and ub are used (p1
## ## and p2 are ignored). ival must be > 0
## ## LEGEND
## ## prior: 0 = uniform, 1 = normal, 2 = lognormal, 3 = beta, 4 = gamma
## ## ----- ##
## ## ival lb ub phz prior p1 p2 Analytic? LAMBDA
## ## 0.84 0 1 4 1 0.843136 0.03 0 1 # NMFS, 0.896 is the magic number * 0.941 (Jies max sele)
## ## 1.0 0 5 -4 0 0.001 5.00 0 1 # BSFRF
## ## ----- ##
## ## ----- ##
## ## ADDITIONAL CV FOR SURVEYS/INDICES
## ## If a uniform prior is selected for a parameter then the lb and ub are used (p1
## ## and p2 are ignored). ival must be > 0
## ## LEGEND
## ## prior type: 0 = uniform, 1 = normal, 2 = lognormal, 3 = beta, 4 = gamma
## ## ----- ##
## ## ival lb ub phz prior p1 p2
## ## 0.0001 0.00001 10.0 -4 4 1.0 100 # NMFS
## ## 0.0001 0.00001 10.0 -4 4 1.0 100 # BSFRF
## ## ----- ##
## ## ----- ##
## ## PENALTIES FOR AVERAGE FISHING MORTALITY RATE FOR EACH GEAR
## ## ----- ##
## ## Mean_F STD_PHZ1 STD_PHZ2 PHZ
## ## 0.1 0.5 45.50 1 # Pot
## ## 0.005 0.5 45.50 1 # Trawl
## ## 0.005 0.5 45.50 1 # Tanner
## ## 0.005 0.5 45.50 1 # Fixed
## ## 0.00 2.00 20.00 -1 # NMFS trawl survey (0 catch)
## ## 0.00 2.00 20.00 -1 # BSFRF (0)
## ## ----- ##
## ## ----- ##
## ## OPTIONS FOR SIZE COMPOSITION DATA
## ## One column for each data matrix
## ## LEGEND
## ## Likelihood: 1 = Multinomial with estimated/fixed sample size
## ## 2 = Robust approximation to multinomial
## ## 3 = logistic normal (NIY)
## ## 4 = multivariate-t (NIY)
## ## 5 = Dirichlet
## ## AUTO TAIL COMPRESSION
## ## pmin is the cumulative proportion used in tail compression
## ## ----- ##
## ## Pot Trawl Tanner NMFS BSFRF
## ## 2 2 2 2 2 2 2 2 2 2 2 # Type of likelihood
## ## 0 0 0 0 0 0 0 0 0 0 0 # Auto tail compression (pmin)
## ## 1 1 1 1 1 1 1 1 1 1 1 # Initial value for effective sample size multiplier
## ## -4 -4 -4 -4 -4 -4 -4 -4 -4 -4 -4 # Phz for estimating effective sample size (if appl.)
## ## 1 2 2 3 3 4 4 5 5 6 6 7 7 # Composition aggregator
## ## 1 1 1 1 1 1 1 1 1 1 1 1 1 # LAMBDA
## ## ----- ##
## ## ----- ##
## ## TIME VARYING NATURAL MORTALITY RATES
## ## LEGEND
## ## Type: 0 = constant natural mortality
## ## 1 = Random walk (deviates constrained by variance in M)
## ## 2 = Cubic Spline (deviates constrained by nodes & node-placement)
## ## 3 = Blocked changes (deviates constrained by variance at specific knots)
## ## 4 = Time blocks
## ## ----- ##
## ## Sex-specific? (0=no, 1=yes)
## ## 1
## ## Type
## ## 3
## ## Phase of estimation
## ## 3
## ## STDEV in m_dev for Random walk
## ## 0.25
## ## Number of nodes for cubic spline or number of step-changes for option 3
## ## 2
## ## 4
## ## Year position of the knots (vector must be equal to the number of nodes)
## ## 1980 1985
## ## 1976 1980 1985 1994
## ## ----- ##
## ## ----- ##
## ## OTHER CONTROLS
## ## ----- ##
## ## 3 # Estimated rec_dev phase
## ## -3 # Estimated rec_ini phase
## ## 0 # VERBOSE FLAG (0 = off, 1 = on, 2 = objective func)
## ## 0 # Initial conditions (0 = Unfished, 1 = Steady-state fished, 2 = Free parameters)
## ## 1984 # First year for average recruitment for Bspr calculation.
## ## 2016 # Last year for average recruitment for Bspr calculation.

```



```
## 0.35 # Target SPR ratio for Bmsy proxy.
## 1 # Gear index for SPR calculations (i.e., directed fishery).
## 1 # Lambda (proportion of mature male biomass for SPR reference points).
## 1 # Use empirical molt increment data (0=FALSE, 1=TRUE)
## 0 # Stock-Recruit-Relationship (0 = none, 1 = Beverton-Holt)
## ## EDF
## 9999
```

The Free q model control file:

```

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

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

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

```

The Variable M model control file:

```

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

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

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```

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

```