Appendix to Gmacs SMBKC Stock Assessment

The base model data file:

```
## Warning in file(con, "r"): cannot open file '../../examples/smbkc2/model_1/
## sm15.dat': No such file or directory

## Error in file(con, "r"): cannot open the connection
## Error in ts[i]: object of type 'closure' is not subsettable
```

The base model control file:

```
## # Set up to do Stock Reduction Analysis using Catch data and informative priors.
## # Controls for leading parameter vector theta
## # LEGEND FOR PRIOR:
## #
                     0 -> uniform
## #
                     1 -> normal
## #
                     2 -> lognormal
                     3 -> beta
## #
## #
                     4 -> gamma
## # ntheta
    12
##
## # ival
                                          prior
                1b
                          ub
                                                                       # parameter
                                    phz
                                                    p1
                                                            p2
                                                                       # M
##
    0.18
              0.01
                           1
                                    -4
                                             2
                                                 0.18
                                                         0.02
##
    14.3
              -7.0
                          30
                                    -2
                                             0
                                                  -7
                                                           30
                                                                       # log(R0)
                                                                       # log(Rini)
##
    10.0
              -7.0
                          20
                                    -1
                                             1
                                                -10.0
                                                           20.0
##
    13.7222
              -7.0
                          20
                                     1
                                             0
                                                  -7
                                                           30
                                                                       # log(Rbar)
                                                  72.5
##
    80.0
              30.0
                         310
                                    -2
                                             1
                                                          7.25
                                                                       # Recruitment size distribution
##
    0.25
                           7
                                    -4
               0.1
                                             0
                                                  0.1
                                                          9.0
                                                                       # Recruitment size scale (varia
                                                                       # log(sigma_R)
##
    0.2
             -10.0
                        0.75
                                    -4
                                             0 -10.0
                                                         0.75
##
    0.75
              0.20
                        1.00
                                    -2
                                             3
                                                  3.0
                                                         2.00
                                                                       # steepness
    0.01
              0.00
                        1.00
                                    -3
                                             3
                                                  1.01
##
                                                         1.01
                                                                       # recruitment autocorrelation
##
   14.5
              5.00
                       18.00
                                     1
                                             0
                                                  5.00 15.00
                                                                       # logNO vector of initial number
  14.0
              5.00
                       18.00
                                                  5.00 15.00
                                                                       # logNO vector of initial number
##
                                     1
## 13.5
              5.00
                       18.00
                                             0
                                                  5.00 15.00
                                                                       # logNO vector of initial number
                                     1
## ## GROWTH PARAM CONTROLS
                                                                                          ##
## ## Two lines for each parameter if split sex, one line if not
                         ub
## # ival
                1b
                                     phz prior
                                                    p1
                                                            p2
                                                                       # parameter
    14.1
                                     -3
##
              10.0
                        30.0
                                              0
                                                   0.0
                                                         999.0
                                                                       # alpha males or combined
##
     0.0001
               0.0
                         0.01
                                     -3
                                              0
                                                   0.0
                                                         999.0
                                                                       # beta males or combined
##
     0.45
               0.01
                         1.0
                                     -3
                                              0
                                                   0.0
                                                         999.0
                                                                       # gscale males or combined
##
   121.5
              65.0
                       145.0
                                     -4
                                              0
                                                   0.0
                                                         999.0
                                                                       # molt_mu males or combined
                                     -3
                                              0
                                                                       # molt_cv males or combined
##
     0.060
               0.0
                         1.0
                                                   0.0
                                                         999.0
##
## ## ----- ##
## ## SELECTIVITY CONTROLS
                                                                                          ##
         Each gear must have a selectivity and a retention selectivity. If a uniform
                                                                                          ##
## ##
         prior is selected for a parameter then the lb and ub are used (p1 and p2 are
                                                                                          ##
## ##
                                                                                          ##
## ##
         ignored)
## ## LEGEND
                                                                                          ##
## ##
         sel type: 0 = parametric, 1 = coefficients, 2 = logistic, 3 = logistic95,
                                                                                          ##
## ##
                   4 = double normal (NIY)
                                                                                          ##
         gear index: use +ve for selectivity, -ve for retention
## ##
                                                                                          ##
         sex dep: 0 for sex-independent, 1 for sex-dependent
## ##
                                                                                          ##
```

##	:# -																;
		ivecto	r fo	r num	ber	of ye	ar pe	riods (or no	des							-
# #	## POT ## Gear-1					FBycatch		NMFS_S	AD	ADFG_pot							
# #	# G	Gear-1	_	Gear-	2	Gear-	3 (Gear-4	Ge	ar-5							
#	2	2		1		1	:	1	1		#	Seled	ctivit	ty perio	ods		
‡	C)		0		0	(0	0		#	sex s	speci	fic sele	ectivity		
ŧ	C)		3		3	(0	0		#	male	seled	ctivity	type		
‡ #	# G	Gear-1		Gear-	2	Gear-	3 (Gear-4	Ge	ar-5							
ŧ	1	L		1		1	:	1	1		#	Reter	ntion	perioda	3		
ŧ	C)		0		0	(0	0		#	sex s	speci	fic ret	ention		
ŧ	3	3		2		2	:	2	2		#	${\tt male}$	reter	ntion t	ype		
ŧ	1	L		0		0	(0	0		#	${\tt male}$	reter	ntion f	lag (0 -	> no, 1	-> ;
‡ #	# g	gear	par	sel										phz	start 6	end	-
‡ #	# i	index	inde	x par	sez	x iva	1 lb	ub		prior	p1	p2	2	mirror	period p	period	
ŧ #	: Ge	ear-1															
:	1	L	1	1	0	0.4	16198	0.001	2.0	0		0	1	-2	1978	2008	
	1	l	2	2	0	0.6	57528	0.001	2.0	0		0	1	-2	1978	2008	
	1	l	3	3	0	1.0		0.001	2.0	0		0	1	-2	1978	2008	
	1	L	1	1	0	0.3	26889	0.001	2.0	0		0	1	-2	2009	2015	
	1	L	2	2	0	0.8	06548	0.001	2.0	0		0	1	-2	2009	2015	
	1	l	3	3	0	1.0		0.001	2.0	0		0	1	-2	2009	2015	
#	ŧ Ge	ear-2															
	2	2	7	1	0	40		10.0	200	0		10	200	-3	1978	2015	
	2	2	8	2	0	60		10.0	200	0		10	200	-3	1978	2015	
#	: Ge	ear-3															
	3	3	9	1	0	40		10.0	200	0		10	200	-3	1978	2015	
	3	3 1	.0	2	0	60		10.0	200	0		10	200	-3	1978	2015	
#	: Ge	ear-4															
	4	1	8	1	0	0.6	55565	0.001	2.0	0		0	1	-2	1978	2015	
	4	1	9	2	0	0.9	12882	0.001	2.0	0		0	1	-2	1978	2015	
	4	1	10	3	0	1.0		0.001	2.0	0		0	1	-2	1978	2015	
#	ŧ Ge	ear-5															
	5	5	11	1	0	0.3	47014	0.001	2.0	0		0	1	-2	1978	2015	
	5	5	12	2	0			0.001		0		0	1	-2	1978	2015	
	5	5	13	3	0	1.0		0.001	2.0	0		0	1	-2	1978	2015	
#	# R	Retair	ıed														
#	: Ge	ear-1															
	-1	L	14	1	0	120	100	200	C)	1	900	-1	19	78 2015	5	
	-1		15	2	0	123	110	200	C		1	900	-1	19			
#		ear-2															
	-2		16	1	0	595	1	700	C)	1	900	-3	19	78 2019	5	
	-2		17	2	0	10	1	700	C)	1	900	-3	19			
#		ear-3															
	-3		18	1	0	590	1	700	C)	1	900	-3	19	78 2015	5	
	-3	3	19	2	0	10	1	700	C)	1	900	-3	19	78 2015	5	
#	: Ge	ear-4															
	-4		20	1	0	580	1	700	C)	1	900	-3	19	78 2019	5	
	-4	1	21	2	0	20	1	700	C		1	900	-3	19			
#	: Ge	ear-5															
	-5		22	1	0	580	1	700	C)	1	900	-3	19	78 2019	5	
	-5	5	23	2	0	20	1	700	C)	1	900	-3	19			

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
## ##
                                                                   ##
## ## ----- ##
## ## LAMBDA: Arbitrary relative weights for each series, 0 = do not fit.
## ## SURVEYS/INDICES ONLY
## ## ival
         1b
                пþ
                     phz
                         prior p1
                                      p2
                                           Analytic?
##
    1.0
         0
                2
                     -1
                         0
                               0
                                      9.0
                                           0
                                                   1
                                                         # NMFS trawl
                               0
## 3.98688533089e-06 0 5
                     1
                         0
                                      9.0
                                           0
                                                   1
                                                         # ADF&G pot
##
## ## -----
## ## 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
                                                                   ##
       prior: 0 = uniform, 1 = normal, 2 = lognormal, 3 = beta, 4 = gamma
                                                                   ##
## ## ------ ##
                                      p1
                                            p2
                ub
                           phz prior
##
    0.00001
             0.000001 10.0
                            -4
                                 4
                                        1.0
                                             100
                                                   # NMFS
             0.000001
                     10.0
                                         1.0
                                               100
                                                   # ADF&G
##
## ## ----- ##
  ## PENALTIES FOR AVERAGE FISHING MORTALITY RATE FOR EACH GEAR
##
  ## Mean_F STD_PHZ1 STD_PHZ2
                          PHZ
                         1 # Pot
          0.05
                50.0
##
    0.3
##
    0.001
          0.05
                50.0
                         1 # Trawl
          0.05
                50.0
##
    0.001
                         1 # Fixed
##
    0.00
          2.00
                20.00
                         -1 # NMFS
##
    0.00
          2.00
                  20.00
                         -1 # ADF&G
## ## -----
##
## ## ---------- ##
## ## OPTIONS FOR SIZE COMPOSTION DATA (COLUMN FOR EACH MATRIX)
## ## LIKELIHOOD OPTIONS
## ##
     -1) Multinomial with estimated/fixed sample size
     -2) Robust approximation to multinomial
     -3) logistic normal (NIY)
## ##
     -4) multivariate-t (NIY)
## ##
     -5) Dirichlet
## ## AUTOTAIL COMPRESSION
     pmin is the cumulative proportion used in tail compression.
 ## ------ ##
      1
         1 # Type of likelihood
   2
      2
         2 # Type of likelihood
## # 5
      5
         5
           # Type of likelihood
##
        0 # Auto tail compression (pmin)
            # Initial value for effective sample size multiplier
##
            # Phz for estimating effective sample size (if appl.)
##
        3
            # Composition aggregator
```

```
##
## ## ------ ##
                                                                     ##
## ## TIME VARYING NATURAL MORTALIIY RATES
## ## TYPE:
      0 = constant natural mortality
        1 = Random walk (deviates constrained by variance in M)
        2 = Cubic Spline (deviates constrained by nodes & node-placement)
        3 = Blocked changes (deviates constrained by variance at specific knots)
        4 = Time blocks
## ## ------ ##
## ## Type
## 3
## ## Phase of estimation
## ## STDEV in m_dev for Random walk
## ## 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)
## ## ----- ##
## ## ----- ##
## ## OTHER CONTROLS
## ## ----- ##
##
         # Estimated rec_dev phase
         # VERBOSE FLAG (0 = off, 1 = on, 2 = objective func)
##
##
         # Initial conditions (0 = Unfished, 1 = Steady-state fished, 2 = Free parameters)
##
   1978
         # First year for average recruitment for Bspr calculation
##
   2015
         # Last year for average recruitment for Bspr calculation
##
   0.35
         # Target SPR ratio for Bmsy 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)
## ## EOF
## 9999
```

The selex model control file:

```
## # Set up to do Stock Reduction Analysis using Catch data and informative priors.
## # Controls for leading parameter vector theta
## # LEGEND FOR PRIOR:
## #
                      0 -> uniform
## #
                      1 -> normal
## #
                     2 -> lognormal
## #
                     3 -> beta
## #
                      4 -> gamma
## # ntheta
##
     12
## # ival
                                     phz
                lb
                                                                        # parameter
                          пþ
                                           prior
                                                   р1
                                                             p2
    0.18
##
               0.01
                           1
                                     -4
                                              2
                                                  0.18
                                                          0.02
                                                                        # M
               -7.0
                                     -2
##
     14.3
                           30
                                              0
                                                   -7
                                                            30
                                                                        # log(R0)
     10.0
               -7.0
                           20
                                     -1
                                                  -10.0
                                                            20.0
                                                                        # log(Rini)
##
                                              1
              -7.0
                                                  -7
##
    13.7222
                          20
                                     1
                                              0
                                                            30
                                                                        # log(Rbar)
                                                           7.25
##
    80.0
              30.0
                         310
                                     -2
                                              1
                                                  72.5
                                                                        # Recruitment size distribution
##
     0.25
               0.1
                           7
                                     -4
                                              0
                                                   0.1
                                                           9.0
                                                                        # Recruitment size scale (varia
##
     0.2
              -10.0
                        0.75
                                     -4
                                              0 -10.0
                                                          0.75
                                                                        # log(sigma_R)
##
    0.75
              0.20
                        1.00
                                     -2
                                              3
                                                  3.0
                                                          2.00
                                                                        # steepness
##
    0.01
              0.00
                        1.00
                                     -3
                                              3
                                                  1.01
                                                          1.01
                                                                        # recruitment autocorrelation
##
   14.5
               5.00
                                                   5.00
                                                         15.00
                                                                        # logNO vector of initial number
                        18.00
                                     1
                                              0
##
   14.0
               5.00
                        18.00
                                      1
                                              0
                                                   5.00
                                                         15.00
                                                                        # logNO vector of initial number
##
   13.5
               5.00
                        18.00
                                      1
                                                   5.00
                                                         15.00
                                                                        # logNO vector of initial number
## ## GROWTH PARAM CONTROLS
                                                                                           ##
                                                                                           ##
## ## Two lines for each parameter if split sex, one line if not
## # ival
                1b
                          ub
                                      phz prior
                                                             p2
                                                                        # parameter
                                                    р1
##
     14.1
              10.0
                         30.0
                                      -3
                                                    0.0
                                                          999.0
                                                                        # alpha males or combined
##
                         0.01
                                      -3
                                                                        # beta males or combined
     0.0001
               0.0
                                               0
                                                    0.0
                                                          999.0
##
      0.45
               0.01
                         1.0
                                      -3
                                               0
                                                    0.0
                                                          999.0
                                                                        # gscale males or combined
##
   121.5
               65.0
                        145.0
                                      -4
                                               0
                                                    0.0
                                                          999.0
                                                                        # molt_mu males or combined
##
                         1.0
                                      -3
                                               0
                                                    0.0
                                                          999.0
                                                                        # molt_cv males or combined
      0.060
               0.0
##
## ## -----
## ## SELECTIVITY CONTROLS
                                                                                           ##
         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, 2 = logistic, 3 = logistic95,
                                                                                           ##
                    4 = double normal (NIY)
## ##
                                                                                           ##
## ##
          gear index: use +ve for selectivity, -ve for retention
                                                                                           ##
          sex dep: 0 for sex-independent, 1 for sex-dependent
                                                                                           ##
## ##
                                                                                           ##
## ## ivector for number of year periods or nodes
                                                                                           ##
## ## POT
                TBycatch FBycatch NMFS_S
                                            ADFG pot
## ## Gear-1
                Gear-2
                        Gear-3
                                   Gear-4
                                            Gear-5
##
      2
                                            1
                                                      # Selectivity periods
                1
                         1
##
                0
                         0
                                            0
                                                      # sex specific selectivity
##
                3
                         3
                                   0
                                            0
                                                      # male selectivity type
## ## Gear-1
                Gear-2
                        Gear-3
                                  Gear-4
                                            Gear-5
##
                                                      # Retention periods
      1
                1
                         1
                                   1
                                            1
##
                         0
                                                      # sex specific retention
```

```
##
                2
                         2
                                    2
                                             2
                                                       # male retention type
##
      1
                0
                         0
                                    0
                                             0
                                                       # male retention flag (0 -> no, 1 -> yes)
  ## gear par
                                                                    phz
                                                                           start end
                  sel
                                                                                              ##
  ## index index par sex ival lb
                                               prior p1
                                                                    mirror period period
                                        ub
                                                             p2
##
   # Gear-1
      1
                      0
                           0.416198 0.001 2.0
                                                           0
                                                                        2
                                                                              1978
                                                                                      2008
##
            1
                                                  0
                                                                  1
                  1
      1
            2
                           0.657528 0.001 2.0
                                                                        2
##
                  2
                      0
                                                  0
                                                           0
                                                                  1
                                                                              1978
                                                                                      2008
                                                                       -2
##
      1
            3
                  3
                      0
                           1.0
                                     0.001 2.0
                                                  0
                                                           0
                                                                  1
                                                                              1978
                                                                                      2008
##
      1
            1
                  1
                      0
                           0.326889 0.001 2.0
                                                  0
                                                           0
                                                                  1
                                                                        2
                                                                              2009
                                                                                      2015
            2
                                                           0
##
      1
                  2
                      0
                           0.806548 0.001 2.0
                                                  0
                                                                  1
                                                                        2
                                                                              2009
                                                                                      2015
##
      1
            3
                  3
                      0
                           1.0
                                     0.001 2.0
                                                  0
                                                           0
                                                                  1
                                                                       -2
                                                                              2009
                                                                                      2015
##
  # Gear-2
            7
                                                                200
                                                                       -3
##
      2
                      0
                           40
                                     10.0
                                           200
                                                  0
                                                          10
                                                                              1978
                                                                                      2015
                  1
      2
                                     10.0
##
            8
                  2
                      0
                           60
                                           200
                                                  0
                                                          10
                                                                200
                                                                       -3
                                                                              1978
                                                                                      2015
##
  # Gear-3
##
      3
            9
                  1
                      0
                           40
                                     10.0
                                           200
                                                  0
                                                          10
                                                                200
                                                                       -3
                                                                              1978
                                                                                      2015
      3
                                           200
                                                                200
                                                                              1978
##
           10
                  2
                      0
                           60
                                     10.0
                                                  0
                                                          10
                                                                       -3
                                                                                      2015
##
   # Gear-4
                      0
                           0.655565 0.001 2.0
                                                           0
                                                                        2
##
      4
            8
                                                  0
                                                                              1978
                                                                                      2015
                  1
                                                                  1
                                                                        2
##
      4
            9
                  2
                      0
                           0.912882 0.001 2.0
                                                  0
                                                           0
                                                                  1
                                                                              1978
                                                                                      2015
##
      4
            10
                  3
                      0
                           1.0
                                     0.001 2.0
                                                  0
                                                           0
                                                                  1
                                                                       -2
                                                                              1978
                                                                                      2015
  # Gear-5
##
##
      5
                      0
                           0.347014 0.001 2.0
                                                           0
                                                                        2
                                                  0
                                                                              1978
                                                                                      2015
            11
                  1
                                                                  1
      5
                  2
                      0
                           0.720493 0.001 2.0
                                                                        2
                                                                              1978
##
            12
                                                  0
                                                           0
                                                                  1
                                                                                      2015
                           1.0
                                                                       -2
##
      5
            13
                  3
                      0
                                     0.001 2.0
                                                  0
                                                           0
                                                                  1
                                                                              1978
                                                                                      2015
## ## Retained
##
  # Gear-1
                           120
                                 100
                                       200
                                                           900
                                                                        1978
                                                                               2015
##
     -1
            14
                      0
                                              0
                                                     1
                                                                 -1
                  1
                           123
##
     -1
                  2
                      0
                                 110
                                       200
                                              0
                                                           900
                                                                        1978
                                                                               2015
            15
                                                      1
                                                                 -1
##
  # Gear-2
##
     -2
            16
                  1
                      0
                           595
                                  1
                                       700
                                              0
                                                      1
                                                           900
                                                                 -3
                                                                        1978
                                                                                2015
##
     -2
            17
                  2
                      0
                           10
                                  1
                                       700
                                              0
                                                      1
                                                           900
                                                                 -3
                                                                        1978
                                                                               2015
##
   # Gear-3
##
     -3
                      0
                           590
                                       700
                                                           900
                                                                 -3
                                                                        1978
            18
                                              0
                                                     1
                                                                               2015
                  1
                                  1
##
     -3
            19
                  2
                      0
                           10
                                       700
                                              0
                                                           900
                                                                 -3
                                                                        1978
                                                                               2015
                                  1
                                                     1
## # Gear-4
##
     -4
            20
                      0
                           580
                                       700
                                              0
                                                           900
                                                                 -3
                                                                        1978
                                                                               2015
##
     -4
            21
                      0
                           20
                                       700
                                                           900
                                                                 -3
                                                                        1978
                                                                               2015
                  2
                                  1
                                              0
                                                      1
  # Gear-5
##
##
     -5
                           580
                                       700
                                                           900
                                                                 -3
            22
                      0
                                              0
                                                                        1978
                                                                               2015
                  1
                                  1
                                                     1
                                       700
                                                           900
##
     -5
            23
                  2
                      0
                           20
                                  1
                                              0
                                                     1
                                                                 -3
                                                                        1978
                                                                               2015
##
  ## ----- ##
##
   ## 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
##
                                                                                              ##
         ----- ##
      LAMBDA: Arbitrary relative weights for each series, 0 = do not fit.
  ## SURVEYS/INDICES ONLY
                                    prior
  ## ival
              1b
                       ub
                             phz
                                            р1
                                                     p2
                                                            Analytic?
                                                                        LAMBDA
##
      1.0
              0
                       2
                              -1
                                    0
                                            0
                                                     9.0
                                                            0
                                                                        1
                                                                                # NMFS trawl
## 3.98688533089e-06 0 5
                               1
                                    0
                                            0
                                                     9.0
                                                            0
                                                                        1
                                                                                # ADF&G pot
```

```
##
## ## ----- ##
## ## ADDITIONAL CV FOR SURVEYS/INDICES
       If a uniform prior is selected for a parameter then the lb and ub are used (p1
       and p2 are ignored). ival must be > 0
       prior: 0 = uniform, 1 = normal, 2 = lognormal, 3 = beta, 4 = gamma
                                                                       ##
## ## -----
## ## ival lb ub
                             phz prior p1 p2
                             -4 4
    0.00001
             0.000001 10.0
                                         1.0
                                                 100
                                                      # NMFS
           0.000001 10.0
                              -4
                                          1.0
                                   4
                                                  100 # ADF&G
    0.00001
##
## ## PENALTIES FOR AVERAGE FISHING MORTALITY RATE FOR EACH GEAR
  ## Mean_F STD_PHZ1 STD_PHZ2
                            PHZ
                          1 # Pot
          0.05 50.0
##
    0.3
                 50.0
                           1 # Trawl
##
    0.001
           0.05
##
    0.001 0.05 50.0
                           1 # Fixed
   0.00
           2.00 20.00
                          -1 # NMFS
        2.00
                20.00
                        -1 # ADF&G
##
    0.00
##
## ## OPTIONS FOR SIZE COMPOSTION DATA (COLUMN FOR EACH MATRIX)
## ## LIKELIHOOD OPTIONS
      -1) Multinomial with estimated/fixed sample size
      -2) Robust approximation to multinomial
      -3) logistic normal (NIY)
## ##
      -4) multivariate-t (NIY)
## ##
      -5) Dirichlet
## ## AUTOTAIL COMPRESSION
      pmin is the cumulative proportion used in tail compression.
## ## ----- ##
## # 1 1 1 # Type of likelihood
      2 2 # Type of likelihood
## # 5 5 5 # Type of likelihood
     0 0 # Auto tail compression (pmin)
      ## -4 -4 -4 # Phz for estimating effective sample size (if appl.)
      2 3 # Composition aggregator
##
## ## TIME VARYING NATURAL MORTALIIY RATES
## ## TYPE:
## ##
        0 = constant natural mortality
## ##
        1 = Random walk (deviates constrained by variance in M)
        2 = Cubic Spline (deviates constrained by nodes & node-placement)
## ##
        3 = Blocked changes (deviates constrained by variance at specific knots)
```

```
4 = Time blocks
## ## ----- ##
## ## Type
## 3
## ## Phase of estimation
## ## STDEV in m dev for Random walk
## ## 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)
## 1998 1999
##
## ## ----- ##
## ## OTHER CONTROLS
##
          # Estimated rec dev phase
##
           # VERBOSE FLAG (0 = off, 1 = on, 2 = objective func)
           # Initial conditions (0 = Unfished, 1 = Steady-state fished, 2 = Free parameters)
##
##
    1978
          # First year for average recruitment for Bspr calculation
    2015
          # Last year for average recruitment for Bspr calculation
##
          # Target SPR ratio for Bmsy proxy
    0.35
##
           # Gear index for SPR calculations (i.e. directed fishery)
    1
          # 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)
## ## EOF
## 9999
```

The add CV model control file:

```
## # Set up to do Stock Reduction Analysis using Catch data and informative priors.
## # Controls for leading parameter vector theta
## # LEGEND FOR PRIOR:
## #
                      0 -> uniform
## #
                      1 -> normal
## #
                      2 -> lognormal
## #
                     3 -> beta
## #
                      4 -> gamma
## # ntheta
##
     12
## # ival
                                     phz
                lb
                                                                        # parameter
                           пþ
                                           prior
                                                   р1
                                                             p2
    0.18
##
               0.01
                           1
                                     -4
                                              2
                                                  0.18
                                                          0.02
                                                                        # M
               -7.0
                                     -2
##
     14.3
                           30
                                              0
                                                   -7
                                                            30
                                                                        # log(R0)
     10.0
               -7.0
                           20
                                     -1
                                                  -10.0
                                                            20.0
                                                                        # log(Rini)
##
                                              1
              -7.0
                                                   -7
                                                            30
##
     13.7222
                           20
                                      1
                                              0
                                                                        # log(Rbar)
                                                           7.25
##
    80.0
              30.0
                          310
                                     -2
                                              1
                                                   72.5
                                                                        # Recruitment size distribution
##
     0.25
               0.1
                           7
                                     -4
                                              0
                                                   0.1
                                                           9.0
                                                                        # Recruitment size scale (varia
##
     0.2
              -10.0
                        0.75
                                     -4
                                              0 -10.0
                                                          0.75
                                                                        # log(sigma_R)
##
    0.75
              0.20
                        1.00
                                     -2
                                              3
                                                   3.0
                                                          2.00
                                                                        # steepness
##
    0.01
              0.00
                        1.00
                                     -3
                                              3
                                                  1.01
                                                          1.01
                                                                        # recruitment autocorrelation
##
   14.5
               5.00
                                                   5.00
                                                         15.00
                                                                        # logNO vector of initial number
                        18.00
                                      1
                                              0
##
   14.0
               5.00
                        18.00
                                      1
                                              0
                                                   5.00
                                                         15.00
                                                                        # logNO vector of initial number
##
   13.5
               5.00
                        18.00
                                      1
                                                   5.00
                                                         15.00
                                                                        # logNO vector of initial number
## ## GROWTH PARAM CONTROLS
                                                                                           ##
                                                                                           ##
## ## Two lines for each parameter if split sex, one line if not
## # ival
                1b
                           ub
                                      phz prior
                                                             p2
                                                                        # parameter
                                                     р1
##
     14.1
              10.0
                         30.0
                                      -3
                                               0
                                                    0.0
                                                          999.0
                                                                        # alpha males or combined
##
                          0.01
                                      -3
                                                                        # beta males or combined
     0.0001
               0.0
                                               0
                                                    0.0
                                                          999.0
##
      0.45
               0.01
                          1.0
                                      -3
                                               0
                                                    0.0
                                                          999.0
                                                                        # gscale males or combined
##
   121.5
               65.0
                        145.0
                                      -4
                                               0
                                                    0.0
                                                          999.0
                                                                        # molt_mu males or combined
##
                          1.0
                                      -3
                                                    0.0
                                                          999.0
                                                                        # molt_cv males or combined
      0.060
               0.0
##
## ## -----
## ## SELECTIVITY CONTROLS
                                                                                           ##
         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, 2 = logistic, 3 = logistic95,
                                                                                           ##
                    4 = double normal (NIY)
## ##
                                                                                           ##
## ##
          gear index: use +ve for selectivity, -ve for retention
                                                                                           ##
          sex dep: 0 for sex-independent, 1 for sex-dependent
                                                                                           ##
## ##
                                                                                           ##
## ## ivector for number of year periods or nodes
                                                                                           ##
## ## POT
                TBycatch FBycatch NMFS_S
                                            ADFG pot
## ## Gear-1
                Gear-2
                        Gear-3
                                   Gear-4
                                            Gear-5
##
      2
                                            1
                                                      # Selectivity periods
                1
                         1
##
                0
                         0
                                            0
                                                      # sex specific selectivity
##
                3
                         3
                                   0
                                            0
                                                      # male selectivity type
## ## Gear-1
                Gear-2
                        Gear-3
                                  Gear-4
                                            Gear-5
##
                                                      # Retention periods
      1
                1
                         1
                                   1
                                            1
##
                         0
                                                      # sex specific retention
```

```
##
                2
                         2
                                    2
                                             2
                                                       # male retention type
                                                       # male retention flag (0 -> no, 1 -> yes)
##
      1
                0
                         0
                                    0
                                             0
  ## gear par
                                                                    phz
                  sel
                                                                           start end
                                                                                              ##
  ## index index par sex ival lb
                                               prior p1
                                                                    mirror period period
                                        ub
                                                            p2
##
   # Gear-1
      1
                      0
                           0.416198 0.001 2.0
                                                           0
                                                                        2
                                                                              1978
                                                                                      2008
##
            1
                                                  0
                                                                  1
                  1
      1
            2
                           0.657528 0.001 1.0
                                                                        2
##
                  2
                      0
                                                  0
                                                           0
                                                                  1
                                                                              1978
                                                                                      2008
                                                                       -2
##
      1
            3
                  3
                      0
                           1.0
                                     0.001 2.0
                                                  0
                                                           0
                                                                  1
                                                                              1978
                                                                                      2008
##
      1
            1
                  1
                      0
                           0.326889 0.001 2.0
                                                  0
                                                           0
                                                                  1
                                                                        2
                                                                              2009
                                                                                      2015
            2
                           0.806548 0.001 1.0
                                                           0
##
      1
                  2
                      0
                                                  0
                                                                  1
                                                                        2
                                                                              2009
                                                                                      2015
##
      1
            3
                  3
                      0
                           1.0
                                     0.001 2.0
                                                  0
                                                           0
                                                                  1
                                                                       -2
                                                                              2009
                                                                                      2015
##
  # Gear-2
            7
                                                                200
                                                                       -3
##
      2
                      0
                           40
                                     10.0
                                           200
                                                  0
                                                          10
                                                                              1978
                                                                                      2015
                  1
      2
                                     10.0
##
            8
                  2
                      0
                           60
                                           200
                                                  0
                                                          10
                                                                200
                                                                       -3
                                                                              1978
                                                                                      2015
##
  # Gear-3
##
      3
            9
                  1
                      0
                           40
                                     10.0
                                           200
                                                  0
                                                          10
                                                                200
                                                                       -3
                                                                              1978
                                                                                      2015
      3
                                           200
                                                                200
                                                                              1978
##
           10
                  2
                      0
                           60
                                     10.0
                                                  0
                                                          10
                                                                       -3
                                                                                      2015
##
   # Gear-4
                      0
                           0.655565 0.001 2.0
                                                           0
                                                                        2
##
      4
            8
                                                  0
                                                                              1978
                                                                                      2015
                  1
                                                                  1
                                                                        2
##
      4
            9
                  2
                      0
                           0.912882 0.001 1.0
                                                  0
                                                           0
                                                                  1
                                                                              1978
                                                                                      2015
##
      4
            10
                  3
                      0
                           1.0
                                     0.001 2.0
                                                  Λ
                                                           0
                                                                  1
                                                                       -2
                                                                              1978
                                                                                      2015
  # Gear-5
##
##
      5
                      0
                           0.347014 0.001 2.0
                                                           0
                                                                        2
                                                  0
                                                                              1978
                                                                                      2015
            11
                  1
                                                                  1
      5
                  2
                      0
                           0.720493 0.001 2.0
                                                                        2
                                                                              1978
##
            12
                                                  0
                                                           0
                                                                  1
                                                                                      2015
      5
                           1.0
                                                                       -2
##
            13
                  3
                      0
                                     0.001 2.0
                                                  0
                                                           0
                                                                  1
                                                                              1978
                                                                                      2015
## ## Retained
##
  # Gear-1
                           120
                                 100
                                       200
                                                           900
                                                                        1978
                                                                               2015
##
     -1
            14
                      0
                                              0
                                                     1
                                                                 -1
                  1
                           123
##
     -1
                  2
                      0
                                 110
                                       200
                                              0
                                                           900
                                                                        1978
                                                                               2015
            15
                                                      1
                                                                 -1
##
  # Gear-2
##
     -2
            16
                  1
                      0
                           595
                                  1
                                       700
                                              0
                                                      1
                                                           900
                                                                 -3
                                                                        1978
                                                                                2015
##
     -2
            17
                  2
                      0
                           10
                                  1
                                       700
                                              0
                                                      1
                                                           900
                                                                 -3
                                                                        1978
                                                                               2015
##
   # Gear-3
##
     -3
                      0
                           590
                                       700
                                                           900
                                                                 -3
                                                                        1978
            18
                                              0
                                                     1
                                                                               2015
                  1
                                  1
##
     -3
            19
                  2
                      0
                           10
                                       700
                                              0
                                                           900
                                                                 -3
                                                                        1978
                                                                               2015
                                  1
                                                     1
## # Gear-4
##
     -4
            20
                      0
                           580
                                       700
                                              0
                                                           900
                                                                 -3
                                                                        1978
                                                                               2015
##
     -4
            21
                      0
                           20
                                       700
                                                           900
                                                                 -3
                                                                        1978
                                                                               2015
                  2
                                  1
                                              0
                                                      1
  # Gear-5
##
##
     -5
                           580
                                       700
                                                           900
                                                                 -3
            22
                      0
                                              0
                                                     1
                                                                        1978
                                                                               2015
                  1
                                  1
                                       700
                                                           900
##
     -5
            23
                  2
                      0
                           20
                                  1
                                              0
                                                     1
                                                                 -3
                                                                        1978
                                                                               2015
##
  ## ----- ##
##
   ## 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
##
                                                                                              ##
         ----- ##
      LAMBDA: Arbitrary relative weights for each series, 0 = do not fit.
  ## SURVEYS/INDICES ONLY
                                    prior
  ## ival
              1b
                       ub
                             phz
                                            р1
                                                     p2
                                                            Analytic?
                                                                        LAMBDA
##
      1.0
              0
                       2
                              -1
                                    0
                                            0
                                                     9.0
                                                            0
                                                                        1
                                                                                # NMFS trawl
## 3.98688533089e-06 0 5
                               1
                                    0
                                            0
                                                     9.0
                                                            0
                                                                        1
                                                                                # ADF&G pot
```

```
##
## ## ------ ##
## ## ADDITIONAL CV FOR SURVEYS/INDICES
       If a uniform prior is selected for a parameter then the lb and ub are used (p1
        and p2 are ignored). ival must be > 0
       prior: 0 = uniform, 1 = normal, 2 = lognormal, 3 = beta, 4 = gamma
                                                                          ##
## ## -----
## ## ival lb ub
                              phz prior p1 p2
                              -4 4
    0.00001
             0.000001 10.0
                                           1.0
                                                   100
                                                        # NMFS
           0.000001 10.0
                               -4
                                            1.0
                                     4
                                                   100 # ADF&G
    0.00001
##
## ## PENALTIES FOR AVERAGE FISHING MORTALITY RATE FOR EACH GEAR
  ## Mean_F STD_PHZ1 STD_PHZ2
                             PHZ
                           1 # Pot
           0.05 50.0
##
    0.3
                 50.0
                            1 # Trawl
##
    0.001
           0.05
##
    0.001 0.05 50.0
                            1 # Fixed
   0.00
           2.00 20.00
                           -1 # NMFS
    0.00 2.00
                 20.00
                         -1 # ADF&G
##
##
## ## OPTIONS FOR SIZE COMPOSTION DATA (COLUMN FOR EACH MATRIX)
## ## LIKELIHOOD OPTIONS
      -1) Multinomial with estimated/fixed sample size
      -2) Robust approximation to multinomial
      -3) logistic normal (NIY)
## ##
      -4) multivariate-t (NIY)
## ##
      -5) Dirichlet
## ## AUTOTAIL COMPRESSION
      pmin is the cumulative proportion used in tail compression.
## ## ----- ##
## # 1 1 1 # Type of likelihood
          2 # Type of likelihood
      5 5 # Type of likelihood
      0 0 # Auto tail compression (pmin)
       1 1
             # Initial value for effective sample size multiplier
      -4 -4 # Phz for estimating effective sample size (if appl.)
       2 3 # Composition aggregator
##
## ## TIME VARYING NATURAL MORTALIIY RATES
## ## TYPE:
## ##
        0 = constant natural mortality
## ##
        1 = Random walk (deviates constrained by variance in M)
        2 = Cubic Spline (deviates constrained by nodes & node-placement)
## ##
        3 = Blocked changes (deviates constrained by variance at specific knots)
```

```
4 = Time blocks
## ## ----- ##
## ## Type
## 3
## ## Phase of estimation
## ## STDEV in m dev for Random walk
## ## 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)
## 1998 1999
##
## ## ----- ##
## ## OTHER CONTROLS
##
          # Estimated rec dev phase
##
           # VERBOSE FLAG (0 = off, 1 = on, 2 = objective func)
           # Initial conditions (0 = Unfished, 1 = Steady-state fished, 2 = Free parameters)
##
##
    1978
           # First year for average recruitment for Bspr calculation
    2015
          # Last year for average recruitment for Bspr calculation
##
          # Target SPR ratio for Bmsy proxy
    0.35
           # Gear index for SPR calculations (i.e. directed fishery)
##
    1
          # 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)
## ## EOF
## 9999
```

The no M_{1998} model control file:

```
## # Set up to do Stock Reduction Analysis using Catch data and informative priors.
## # Controls for leading parameter vector theta
## # LEGEND FOR PRIOR:
## #
                      0 -> uniform
## #
                      1 -> normal
## #
                      2 -> lognormal
## #
                     3 -> beta
## #
                      4 -> gamma
## # ntheta
##
     12
## # ival
                                     phz
                lb
                                                                        # parameter
                          пþ
                                           prior
                                                   р1
                                                             p2
##
    0.18
               0.01
                           1
                                     -4
                                              2
                                                  0.18
                                                          0.02
                                                                        # M
               -7.0
                                     -2
##
     14.3
                           30
                                              0
                                                   -7
                                                            30
                                                                        # log(R0)
     10.0
               -7.0
                           20
                                     -1
                                                  -10.0
                                                            20.0
                                                                        # log(Rini)
##
                                              1
##
                                                  -7
                                                            30
    13.7222
              -7.0
                          20
                                     1
                                              0
                                                                        # log(Rbar)
                                                           7.25
##
    80.0
              30.0
                         310
                                     -2
                                              1
                                                  72.5
                                                                        # Recruitment size distribution
##
     0.25
               0.1
                           7
                                     -4
                                              0
                                                   0.1
                                                           9.0
                                                                        # Recruitment size scale (varia
##
     0.2
              -10.0
                        0.75
                                     -4
                                              0 -10.0
                                                          0.75
                                                                        # log(sigma_R)
##
    0.75
              0.20
                        1.00
                                     -2
                                              3
                                                  3.0
                                                          2.00
                                                                        # steepness
                                     -3
##
    0.01
              0.00
                        1.00
                                              3
                                                  1.01
                                                          1.01
                                                                        # recruitment autocorrelation
##
   14.5
               5.00
                                                   5.00
                                                         15.00
                                                                        # logNO vector of initial number
                        18.00
                                     1
                                              0
##
   14.0
               5.00
                        18.00
                                      1
                                              0
                                                   5.00
                                                         15.00
                                                                        # logNO vector of initial number
##
   13.5
               5.00
                        18.00
                                      1
                                                   5.00
                                                         15.00
                                                                        # logNO vector of initial number
## ## GROWTH PARAM CONTROLS
                                                                                           ##
                                                                                           ##
## ## Two lines for each parameter if split sex, one line if not
## # ival
                1b
                          ub
                                      phz prior
                                                             p2
                                                                        # parameter
                                                    р1
##
     14.1
               10.0
                         30.0
                                      -3
                                                    0.0
                                                          999.0
                                                                        # alpha males or combined
                         0.01
                                      -3
##
     0.0001
               0.0
                                               0
                                                    0.0
                                                          999.0
                                                                        # beta males or combined
##
      0.45
               0.01
                         1.0
                                      -3
                                               0
                                                    0.0
                                                          999.0
                                                                        # gscale males or combined
##
   121.5
               65.0
                        145.0
                                      -4
                                               0
                                                    0.0
                                                          999.0
                                                                        # molt_mu males or combined
##
                         1.0
                                      -3
                                                    0.0
                                                          999.0
                                                                        # molt_cv males or combined
      0.060
               0.0
##
## ## -----
## ## SELECTIVITY CONTROLS
                                                                                           ##
         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, 2 = logistic, 3 = logistic95,
                                                                                           ##
                    4 = double normal (NIY)
## ##
                                                                                           ##
## ##
          gear index: use +ve for selectivity, -ve for retention
                                                                                           ##
          sex dep: 0 for sex-independent, 1 for sex-dependent
                                                                                           ##
## ##
                                                                                           ##
## ## ivector for number of year periods or nodes
                                                                                           ##
## ## POT
                TBycatch FBycatch NMFS_S
                                            ADFG pot
## ## Gear-1
                Gear-2
                        Gear-3
                                   Gear-4
                                            Gear-5
##
      2
                                            1
                                                      # Selectivity periods
                1
                         1
##
                0
                         0
                                            0
                                                      # sex specific selectivity
##
                3
                         3
                                   0
                                           0
                                                      # male selectivity type
## ## Gear-1
                Gear-2
                        Gear-3
                                  Gear-4
                                            Gear-5
##
                                                      # Retention periods
      1
                1
                         1
                                   1
                                            1
##
                         0
                                                      # sex specific retention
```

```
##
                2
                         2
                                    2
                                             2
                                                       # male retention type
                                                       # male retention flag (0 -> no, 1 -> yes)
##
      1
                0
                         0
                                    0
                                             0
  ## gear par
                                                                    phz
                  sel
                                                                           start end
                                                                                              ##
  ## index index par sex ival lb
                                               prior p1
                                                                    mirror period period
                                        ub
                                                             p2
##
   # Gear-1
      1
                      0
                           0.416198 0.001 2.0
                                                           0
                                                                        2
                                                                              1978
                                                                                      2008
##
            1
                                                  0
                                                                  1
                  1
      1
            2
                           0.657528 0.001 1.0
                                                                        2
##
                  2
                      0
                                                  0
                                                           0
                                                                  1
                                                                              1978
                                                                                      2008
                                                                       -2
##
      1
            3
                  3
                      0
                           1.0
                                     0.001 2.0
                                                  0
                                                           0
                                                                  1
                                                                              1978
                                                                                      2008
##
      1
            1
                  1
                      0
                           0.326889 0.001 2.0
                                                  0
                                                           0
                                                                  1
                                                                        2
                                                                              2009
                                                                                      2015
            2
                           0.806548 0.001 1.0
                                                           0
##
      1
                  2
                      0
                                                  0
                                                                  1
                                                                        2
                                                                              2009
                                                                                      2015
##
      1
            3
                  3
                      0
                           1.0
                                     0.001 2.0
                                                  0
                                                           0
                                                                  1
                                                                       -2
                                                                              2009
                                                                                      2015
##
  # Gear-2
            7
                                                                200
                                                                       -3
##
      2
                      0
                           40
                                     10.0
                                           200
                                                  0
                                                          10
                                                                              1978
                                                                                      2015
                  1
      2
                                     10.0
##
            8
                  2
                      0
                           60
                                           200
                                                  0
                                                          10
                                                                200
                                                                       -3
                                                                              1978
                                                                                      2015
##
  # Gear-3
##
      3
            9
                  1
                      0
                           40
                                     10.0
                                           200
                                                  0
                                                          10
                                                                200
                                                                       -3
                                                                              1978
                                                                                      2015
##
      3
                                           200
                                                                200
                                                                              1978
           10
                  2
                      0
                           60
                                     10.0
                                                  0
                                                          10
                                                                       -3
                                                                                      2015
##
   # Gear-4
                      0
                           0.655565 0.001 2.0
                                                           0
                                                                        2
##
      4
            8
                                                  0
                                                                              1978
                                                                                      2015
                  1
                                                                  1
                                                                        2
##
      4
            9
                  2
                      0
                           0.912882 0.001 1.0
                                                  0
                                                           0
                                                                  1
                                                                              1978
                                                                                      2015
##
      4
            10
                  3
                      0
                           1.0
                                     0.001 2.0
                                                  Λ
                                                           0
                                                                  1
                                                                       -2
                                                                              1978
                                                                                      2015
  # Gear-5
##
##
      5
                      0
                           0.347014 0.001 2.0
                                                           0
                                                                        2
                                                  0
                                                                              1978
                                                                                      2015
            11
                  1
                                                                  1
      5
                  2
                      0
                           0.720493 0.001 1.0
                                                                        2
                                                                              1978
##
            12
                                                  0
                                                           0
                                                                  1
                                                                                      2015
      5
                           1.0
                                                                       -2
##
            13
                  3
                      0
                                     0.001 2.0
                                                  0
                                                           0
                                                                  1
                                                                              1978
                                                                                      2015
## ## Retained
##
  # Gear-1
                           120
                                 100
                                       200
                                                           900
                                                                        1978
                                                                               2015
##
     -1
            14
                      0
                                              0
                                                     1
                                                                 -1
                  1
                           123
##
     -1
                  2
                      0
                                 110
                                       200
                                              0
                                                           900
                                                                        1978
                                                                               2015
            15
                                                      1
                                                                 -1
##
  # Gear-2
##
     -2
            16
                  1
                      0
                           595
                                  1
                                       700
                                              0
                                                      1
                                                           900
                                                                 -3
                                                                        1978
                                                                                2015
##
     -2
            17
                  2
                      0
                           10
                                  1
                                       700
                                              0
                                                      1
                                                           900
                                                                 -3
                                                                        1978
                                                                               2015
##
   # Gear-3
##
     -3
                      0
                           590
                                       700
                                                           900
                                                                 -3
                                                                        1978
            18
                                              0
                                                     1
                                                                               2015
                  1
                                  1
##
     -3
            19
                  2
                      0
                           10
                                       700
                                              0
                                                           900
                                                                 -3
                                                                        1978
                                                                               2015
                                  1
                                                     1
## # Gear-4
##
     -4
            20
                      0
                           580
                                       700
                                              0
                                                           900
                                                                 -3
                                                                        1978
                                                                               2015
##
     -4
            21
                      0
                           20
                                       700
                                                           900
                                                                 -3
                                                                        1978
                                                                               2015
                  2
                                  1
                                              0
                                                      1
  # Gear-5
##
##
     -5
                           580
                                       700
                                                           900
                                                                 -3
            22
                      0
                                              0
                                                     1
                                                                        1978
                                                                               2015
                  1
                                  1
                                       700
                                                           900
##
     -5
            23
                  2
                      0
                           20
                                  1
                                              0
                                                     1
                                                                 -3
                                                                        1978
                                                                               2015
##
  ## ----- ##
##
   ## 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
##
                                                                                              ##
         ----- ##
      LAMBDA: Arbitrary relative weights for each series, 0 = do not fit.
  ## SURVEYS/INDICES ONLY
                                    prior
  ## ival
              1b
                       ub
                             phz
                                            р1
                                                     p2
                                                            Analytic?
                                                                        LAMBDA
##
      1.0
              0
                       2
                              -1
                                    0
                                            0
                                                     9.0
                                                            0
                                                                        1
                                                                                # NMFS trawl
## 3.98688533089e-06 0 5
                               1
                                    0
                                            0
                                                     9.0
                                                            0
                                                                        1
                                                                                # ADF&G pot
```

```
##
## ## ------ ##
## ## ADDITIONAL CV FOR SURVEYS/INDICES
       If a uniform prior is selected for a parameter then the lb and ub are used (p1
        and p2 are ignored). ival must be > 0
       prior: 0 = uniform, 1 = normal, 2 = lognormal, 3 = beta, 4 = gamma
                                                                         ##
## ## -----
## ## ival lb ub
                              phz prior p1 p2
    0.00001
             0.000001 10.0
                              4 4
                                           1.0
                                                   100
                                                        # NMFS
           0.000001 10.0
                               4 4
                                            1.0
                                                   100 # ADF&G
    0.00001
##
## ## PENALTIES FOR AVERAGE FISHING MORTALITY RATE FOR EACH GEAR
  ## Mean_F STD_PHZ1 STD_PHZ2
                             PHZ
                           1 # Pot
           0.05 50.0
##
    0.3
                 50.0
                            1 # Trawl
##
    0.001
           0.05
##
    0.001 0.05 50.0
                            1 # Fixed
   0.00
           2.00 20.00
                           -1 # NMFS
    0.00 2.00
                 20.00
                         -1 # ADF&G
##
##
## ## OPTIONS FOR SIZE COMPOSTION DATA (COLUMN FOR EACH MATRIX)
## ## LIKELIHOOD OPTIONS
      -1) Multinomial with estimated/fixed sample size
      -2) Robust approximation to multinomial
      -3) logistic normal (NIY)
## ##
      -4) multivariate-t (NIY)
## ##
      -5) Dirichlet
## ## AUTOTAIL COMPRESSION
      pmin is the cumulative proportion used in tail compression.
## ## ----- ##
## # 1 1 1 # Type of likelihood
          2 # Type of likelihood
      5 5 # Type of likelihood
      0 0 # Auto tail compression (pmin)
       1 1
             # Initial value for effective sample size multiplier
      -4 -4 # Phz for estimating effective sample size (if appl.)
       2 3 # Composition aggregator
##
## ## TIME VARYING NATURAL MORTALIIY RATES
## ## TYPE:
## ##
        0 = constant natural mortality
## ##
        1 = Random walk (deviates constrained by variance in M)
        2 = Cubic Spline (deviates constrained by nodes & node-placement)
## ##
        3 = Blocked changes (deviates constrained by variance at specific knots)
```

```
4 = Time blocks
## ## ----- ##
## ## Type
## 3
## ## Phase of estimation
## ## STDEV in m dev for Random walk
## ## 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)
## 1998 1999
## ## ----- ##
##
## ## ----- ##
## ## OTHER CONTROLS
##
          # Estimated rec dev phase
##
          # VERBOSE FLAG (0 = off, 1 = on, 2 = objective func)
          # Initial conditions (0 = Unfished, 1 = Steady-state fished, 2 = Free parameters)
##
##
   1978
          # First year for average recruitment for Bspr calculation
##
   2015
         # Last year for average recruitment for Bspr calculation
##
         # Target SPR ratio for Bmsy proxy
   0.35
##
          # Gear index for SPR calculations (i.e. directed fishery)
   1
          # 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)
## ## EOF
## 9999
```