# Hake RC convergence statistics

*A. Ross-Gillespie[[1]](#footnote-1)*

*Email: mlland028@myuct.ac.za*

Information on the admb convergence statistics for the RC OM are provided. The maximum gradient is 7.35E-03 for the *M. paradoxus* ln*K* parameter. 26 parameters are within 5% of the bounds, although in seven of those cases (the age-length key Bi0 and Bipar parameters) this is because the upper bound is actually too large.

Note that the Panel for last year’s IWS recommended that the parameterization of the von Bertalanffy growth curve should be changed from *L*5, ln(κ) and *t*0 to *L*1, *L*5 and ln(κ) to improve convergence. This was done at one stage during the RS development stage, but unfortunately thanks to an oversight these changes were not carried through to the code for the final RS.

|  |
| --- |
| **Table 1:** Parameters of the hake RC OM which are within 5% of the lower or upper bounds. If x is the parameter estimate and the bounds are [a,b], then the position within the bounds is calculated as (x-a)/(b-a), i.e. a value of 0 indicates the parameter estimate is at the lower bound and a value of 1 that the estimate is at the upper bound. Such cases (0’s and 1’s) are highlighted in red in the Table. |
|

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **ParName** | **Value** | **|Gradient|** | **Lower bound** | **Upper bound** | **Position of estimate within bounds** |
| h[2] | 2.000 | 1.55E-05 | 0.5 | 2 | 1.00 |
| sexpar(2) | 9.818 | 4.20E-07 | -10 | 10 | 0.99 |
| SelScaling[3] | 0.084 | 1.10E-05 | 0.05 | 1 | 0.04 |
| SCLLpara\_shift(1) | -20.000 | 1.16E-06 | -20 | 20 | 0.00 |
| cpue\_sig[1] | 0.250 | 2.15E-05 | 0.25 | 1 | 0.00 |
| cpue\_sig[2] | 0.250 | 1.69E-05 | 0.25 | 1 | 0.00 |
| cpue\_sig[3] | 0.150 | 1.11E-04 | 0.15 | 1 | 0.00 |
| cpue\_sig[4] | 0.166 | 6.68E-06 | 0.15 | 1 | 0.02 |
| cpue\_sig[5] | 0.158 | 3.09E-06 | 0.15 | 1 | 0.01 |
| gamma | 0.013 | 9.20E-05 | 0 | 1 | 0.01 |
| qC1\_1 | 0.114 | 5.81E-06 | 0 | 10 | 0.01 |
| qP\_1 | 0.032 | 3.79E-04 | 0 | 10 | 0.00 |
| CR | 0.073 | 4.72E-05 | 0 | 10 | 0.01 |
| Bi0(1,1) | 2.460 | 8.00E-05 | 0.1 | 100 | 0.02 |
| Bi0(1,2) | 0.100 | 2.73E-05 | 0.1 | 100 | 0.00 |
| Bi0(2,1) | 2.344 | 5.04E-07 | 0.1 | 100 | 0.02 |
| Bi0(2,2) | 2.795 | 7.75E-06 | 0.1 | 100 | 0.03 |
| Bipar1(1,1) | 4.571 | 1.75E-03 | 0.01 | 100 | 0.05 |
| Bipar1(1,2) | 4.290 | 1.32E-03 | 0.01 | 100 | 0.04 |
| Bipar1(2,1) | 4.544 | 3.28E-05 | 0.01 | 100 | 0.05 |
| Bipar1(2,2) | 4.881 | 2.19E-05 | 0.01 | 100 | 0.05 |
| lnKappa(1,1) | -19.500 | 8.68E-07 | -20 | 2 | 0.02 |
| lnKappa(1,2) | -19.423 | 1.20E-07 | -20 | 2 | 0.03 |
| lnKappa(2,2) | -19.603 | 1.44E-06 | -20 | 2 | 0.02 |
| t0(1,1) | -0.388 | 4.49E-04 | -10 | 0 | 0.96 |
| t0(1,2) | -0.009 | 1.02E-04 | -10 | 0 | 1.00 |

 |

|  |
| --- |
| **Table 2:** List of the parameters with the biggest gradients (gradients bigger than 1e-4) |
|

|  |  |  |
| --- | --- | --- |
| **ParName** | **Value** | **|Gradient|** |
| lnKpar | 5.763 | 7.35E-03 |
| WCOffpara2(1) | 3.480 | 6.51E-03 |
| WCOffpara3(1) | 3.516 | 5.09E-03 |
| WCLLpara\_F(1) | 4.349 | 3.58E-03 |
| SCLLcap\_F(1) | 4.259 | 3.51E-03 |
| SCOffpara3(1) | 3.537 | 1.84E-03 |
| Bipar1(1,1) | 4.571 | 1.75E-03 |
| SCLLpara\_M(1) | 3.840 | 1.71E-03 |
| Bipar1(1,2) | 4.290 | 1.32E-03 |
| SCInshcap(1) | 3.676 | 1.24E-03 |
| WCLLpara\_M(1) | 4.364 | 1.16E-03 |
| WCOffpara2(2) | 1.356 | 1.13E-03 |
| SCLLpara\_F(1) | 3.944 | 1.01E-03 |
| h[1] | 1.618 | 7.69E-04 |
| WCLLcap\_M(1) | 4.156 | 7.39E-04 |
| L5(1,1) | 52.304 | 7.28E-04 |
| survpar(1) | 3.116 | 7.21E-04 |
| WCLLpara\_M(2) | 2.165 | 7.09E-04 |
| WCOffpara3(2) | 1.215 | 6.99E-04 |
| L5(1,2) | 50.064 | 6.73E-04 |
| Bipar14(1,2) | 12.470 | 6.11E-04 |
| WCLLpara\_F(2) | 2.017 | 6.09E-04 |
| SCLLcap\_F(2) | 2.039 | 6.05E-04 |
| WCLLcap\_F(1) | 4.239 | 5.50E-04 |
| SCLLpara\_M(2) | 1.912 | 4.60E-04 |
| SCOffpara3(2) | 1.179 | 4.59E-04 |
| t0(1,1) | -0.388 | 4.49E-04 |
| SCInshcap(3) | 2.718 | 3.96E-04 |
| qP\_1 | 0.032 | 3.79E-04 |
| WCLLpara\_F(3) | 2.151 | 3.73E-04 |
| SCLLcap\_F(3) | 2.276 | 2.61E-04 |
| survpar(10) | 3.512 | 2.61E-04 |
| WCOffpara3(3) | 3.182 | 2.26E-04 |
| SCLLcap\_M(1) | 4.176 | 2.26E-04 |
| SCLLpara\_F(2) | 2.128 | 2.23E-04 |
| survpar(2) | 1.426 | 2.22E-04 |
| SCInshcap(2) | 1.499 | 2.04E-04 |
| Bipar14(1,1) | 9.687 | 1.99E-04 |
| SCLLpara\_M(3) | 2.059 | 1.84E-04 |
| WCLLpara\_M(3) | 2.096 | 1.83E-04 |
| WCLLcap\_M(2) | 1.999 | 1.82E-04 |
| survpar(7) | 3.475 | 1.76E-04 |
| RecPar1(1995) | 0.272 | 1.53E-04 |
| cpue\_sig[3] | 0.150 | 1.11E-04 |
| RecPar1(1997) | -0.079 | 1.09E-04 |
| t0(1,2) | -0.009 | 1.02E-04 |

 |

**Table 3:** Detailed information on parameter estimates, gradients, bounds, position within bounds and phase in which the parameters were estimated.

| **ParName** | **Value** | **|Gradient|** | **Lower bound** | **Upper bound** | **Position of estimate within bounds** | **Phase** |
| --- | --- | --- | --- | --- | --- | --- |
| lnKpar | 5.763 | 7.35E-03 | 3.5 | 10 | 0.35 | 1 |
| lnKcap | 5.671 | 2.12E-06 | 3.5 | 10 | 0.33 | 1 |
| h[1] | 1.618 | 7.69E-04 | 0.5 | 2 | 0.75 | 1 |
| h[2] | 2.000 | 1.55E-05 | 0.5 | 2 | 1.00 | 1 |
| SRgamma[1] | 0.419 | 3.13E-05 | 0 | 2 | 0.21 | 1 |
| SRgamma[2] | 0.854 | 4.41E-07 | 0 | 2 | 0.43 | 1 |
| Addvar[1] | 0.179 | 1.06E-05 | 0 | 0.5 | 0.36 | 1 |
| Addvar[2] | 0.144 | 3.04E-06 | 0 | 0.5 | 0.29 | 1 |
| Survey qs (old and new gear) |
| lnqold(1) | 0.501 | 8.53E-06 | -5 | 2 | 0.79 | 1 |
| lnqold(2) | 0.126 | 9.95E-06 | -5 | 2 | 0.73 | 1 |
| lnqold(3) | -0.123 | 6.44E-06 | -5 | 2 | 0.70 | 1 |
| lnqold(4) | -0.031 | 1.09E-05 | -5 | 2 | 0.71 | 1 |
| lnqold(5) | 0.031 | 1.68E-05 | -5 | 2 | 0.72 | 1 |
| lnqold(6) | 0.101 | 4.30E-06 | -5 | 2 | 0.73 | 1 |
| lnqold(7) | -0.098 | 2.73E-06 | -5 | 2 | 0.70 | 1 |
| lnqold(8) | 0.158 | 6.67E-07 | -5 | 2 | 0.74 | 1 |
| lnqnew(1) | 0.381 | 6.31E-06 | -2 | 2 | 0.60 | 1 |
| lnqnew(2) | -0.207 | 7.07E-06 | -2 | 2 | 0.45 | 1 |
| lnqnew(3) | -0.189 | 9.87E-07 | -2 | 2 | 0.45 | 1 |
| lnqnew(4) | -0.374 | 3.21E-06 | -2 | 2 | 0.41 | 1 |
| lnqnew(5) | -0.500 | 2.77E-07 | -2 | 2 | 0.38 | 1 |
| lnqnew(6) | -0.261 | 8.49E-06 | -2 | 2 | 0.43 | 1 |
| Recruitment residuals |
| RecPar1(1985) | -0.446 | 7.86E-05 | -5 | 5 | 0.46 | 2 |
| RecPar1(1986) | -0.144 | 6.66E-05 | -5 | 5 | 0.49 | 2 |
| RecPar1(1987) | 0.269 | 5.72E-05 | -5 | 5 | 0.53 | 2 |
| RecPar1(1988) | 0.016 | 4.89E-05 | -5 | 5 | 0.50 | 2 |
| RecPar1(1989) | 0.091 | 3.51E-05 | -5 | 5 | 0.51 | 2 |
| RecPar1(1990) | 0.059 | 1.62E-05 | -5 | 5 | 0.51 | 2 |
| RecPar1(1991) | 0.073 | 3.46E-05 | -5 | 5 | 0.51 | 2 |
| RecPar1(1992) | -0.139 | 1.18E-05 | -5 | 5 | 0.49 | 2 |
| RecPar1(1993) | 0.270 | 8.48E-05 | -5 | 5 | 0.53 | 2 |
| RecPar1(1994) | 0.183 | 9.53E-05 | -5 | 5 | 0.52 | 2 |
| RecPar1(1995) | 0.272 | 1.53E-04 | -5 | 5 | 0.53 | 2 |
| RecPar1(1996) | -0.231 | 8.51E-05 | -5 | 5 | 0.48 | 2 |
| RecPar1(1997) | -0.079 | 1.09E-04 | -5 | 5 | 0.49 | 2 |
| RecPar1(1998) | -0.229 | 9.17E-05 | -5 | 5 | 0.48 | 2 |
| RecPar1(1999) | -0.293 | 8.28E-05 | -5 | 5 | 0.47 | 2 |
| RecPar1(2000) | 0.048 | 4.71E-05 | -5 | 5 | 0.50 | 2 |
| RecPar1(2001) | 0.128 | 7.71E-05 | -5 | 5 | 0.51 | 2 |
| RecPar1(2002) | -0.352 | 1.48E-05 | -5 | 5 | 0.46 | 2 |
| RecPar1(2003) | -0.129 | 1.54E-05 | -5 | 5 | 0.49 | 2 |
| RecPar1(2004) | 0.292 | 2.70E-05 | -5 | 5 | 0.53 | 2 |
| RecPar1(2005) | 0.169 | 2.54E-05 | -5 | 5 | 0.52 | 2 |
| RecPar1(2006) | -0.104 | 2.22E-05 | -5 | 5 | 0.49 | 2 |
| RecPar1(2007) | -0.034 | 5.07E-05 | -5 | 5 | 0.50 | 2 |
| RecPar1(2008) | 0.168 | 2.95E-05 | -5 | 5 | 0.52 | 2 |
| RecPar1(2009) | -0.174 | 1.55E-05 | -5 | 5 | 0.48 | 2 |
| RecPar1(2010) | 0.003 | 2.77E-05 | -5 | 5 | 0.50 | 2 |
| RecPar1(2011) | -0.191 | 4.88E-05 | -5 | 5 | 0.48 | 2 |
| RecPar1(2012) | 0.113 | 1.36E-05 | -5 | 5 | 0.51 | 2 |
| RecPar1(2013) | 0.191 | 3.20E-05 | -5 | 5 | 0.52 | 2 |
| RecPar1(2014) | 0.248 | 5.58E-05 | -5 | 5 | 0.52 | 2 |
| RecPar1(2015) | 0.007 | 6.24E-05 | -5 | 5 | 0.50 | 2 |
| RecPar1(2016) | -0.034 | 6.53E-05 | -5 | 5 | 0.50 | 2 |
| RecPar1(2017) | -0.018 | 6.34E-05 | -5 | 5 | 0.50 | 2 |
| RecPar2(1985) | -0.065 | 5.89E-06 | -5 | 5 | 0.49 | 2 |
| RecPar2(1986) | 0.187 | 5.53E-08 | -5 | 5 | 0.52 | 2 |
| RecPar2(1987) | 0.527 | 6.51E-06 | -5 | 5 | 0.55 | 2 |
| RecPar2(1988) | 0.564 | 8.53E-06 | -5 | 5 | 0.56 | 2 |
| RecPar2(1989) | 0.551 | 2.12E-05 | -5 | 5 | 0.56 | 2 |
| RecPar2(1990) | 0.376 | 2.89E-05 | -5 | 5 | 0.54 | 2 |
| RecPar2(1991) | 0.186 | 1.87E-05 | -5 | 5 | 0.52 | 2 |
| RecPar2(1992) | 0.041 | 1.26E-05 | -5 | 5 | 0.50 | 2 |
| RecPar2(1993) | 0.280 | 8.23E-06 | -5 | 5 | 0.53 | 2 |
| RecPar2(1994) | 0.196 | 8.03E-06 | -5 | 5 | 0.52 | 2 |
| RecPar2(1995) | -0.023 | 1.33E-07 | -5 | 5 | 0.50 | 2 |
| RecPar2(1996) | 0.124 | 1.22E-05 | -5 | 5 | 0.51 | 2 |
| RecPar2(1997) | 0.105 | 1.62E-05 | -5 | 5 | 0.51 | 2 |
| RecPar2(1998) | -0.114 | 2.14E-05 | -5 | 5 | 0.49 | 2 |
| RecPar2(1999) | -0.117 | 1.21E-05 | -5 | 5 | 0.49 | 2 |
| RecPar2(2000) | 0.046 | 1.63E-05 | -5 | 5 | 0.50 | 2 |
| RecPar2(2001) | -0.174 | 6.18E-06 | -5 | 5 | 0.48 | 2 |
| RecPar2(2002) | -0.355 | 1.59E-05 | -5 | 5 | 0.46 | 2 |
| RecPar2(2003) | -0.150 | 2.55E-05 | -5 | 5 | 0.49 | 2 |
| RecPar2(2004) | -0.015 | 9.59E-06 | -5 | 5 | 0.50 | 2 |
| RecPar2(2005) | -0.048 | 1.15E-06 | -5 | 5 | 0.50 | 2 |
| RecPar2(2006) | -0.204 | 1.28E-05 | -5 | 5 | 0.48 | 2 |
| RecPar2(2007) | -0.217 | 2.04E-06 | -5 | 5 | 0.48 | 2 |
| RecPar2(2008) | -0.246 | 1.67E-06 | -5 | 5 | 0.48 | 2 |
| RecPar2(2009) | -0.612 | 1.24E-06 | -5 | 5 | 0.44 | 2 |
| RecPar2(2010) | -0.471 | 6.30E-06 | -5 | 5 | 0.45 | 2 |
| RecPar2(2011) | -0.357 | 4.93E-06 | -5 | 5 | 0.46 | 2 |
| RecPar2(2012) | -0.358 | 1.18E-05 | -5 | 5 | 0.46 | 2 |
| RecPar2(2013) | 0.097 | 2.69E-06 | -5 | 5 | 0.51 | 2 |
| RecPar2(2014) | 0.050 | 1.08E-05 | -5 | 5 | 0.51 | 2 |
| RecPar2(2015) | 0.188 | 1.28E-06 | -5 | 5 | 0.52 | 2 |
| RecPar2(2016) | 0.011 | 2.75E-06 | -5 | 5 | 0.50 | 2 |
| RecPar2(2017) | -0.004 | 7.51E-06 | -5 | 5 | 0.50 | 2 |
| Survey selectivity |
| survpar(1) | 3.116 | 7.21E-04 | -10 | 10 | 0.66 | 3 |
| survpar(2) | 1.426 | 2.22E-04 | -10 | 10 | 0.57 | 3 |
| survpar(3) | 2.643 | 5.44E-05 | -10 | 10 | 0.63 | 3 |
| survpar(4) | 3.193 | 8.59E-05 | -10 | 10 | 0.66 | 3 |
| survpar(5) | 1.513 | 7.45E-05 | -10 | 10 | 0.58 | 3 |
| survpar(6) | 3.133 | 2.23E-05 | -10 | 10 | 0.66 | 3 |
| survpar(7) | 3.475 | 1.76E-04 | -10 | 10 | 0.67 | 3 |
| survpar(8) | 1.199 | 1.70E-05 | -10 | 10 | 0.56 | 3 |
| survpar(9) | 1.530 | 1.69E-05 | -10 | 10 | 0.58 | 3 |
| survpar(10) | 3.512 | 2.61E-04 | -10 | 10 | 0.68 | 3 |
| survpar(11) | 1.226 | 8.03E-05 | -10 | 10 | 0.56 | 3 |
| survpar(12) | 1.901 | 1.70E-05 | -10 | 10 | 0.60 | 3 |
| survpar(13) | 2.663 | 2.48E-06 | -10 | 10 | 0.63 | 3 |
| survpar(14) | 0.680 | 5.03E-06 | -10 | 10 | 0.53 | 3 |
| survpar(15) | 2.993 | 2.19E-06 | -10 | 10 | 0.65 | 3 |
| survpar(16) | 3.083 | 9.22E-06 | -10 | 10 | 0.65 | 3 |
| survpar(17) | 1.055 | 1.14E-05 | -10 | 10 | 0.55 | 3 |
| survpar(18) | 2.727 | 1.67E-05 | -10 | 10 | 0.64 | 3 |
| survpar(19) | 4.017 | 8.07E-06 | -10 | 10 | 0.70 | 3 |
| survpar(20) | 3.112 | 2.24E-05 | -10 | 10 | 0.66 | 3 |
| survpar(21) | 2.347 | 1.28E-05 | -10 | 10 | 0.62 | 3 |
| survpar(22) | 3.885 | 3.81E-05 | -10 | 10 | 0.69 | 3 |
| survpar(23) | 2.706 | 2.73E-05 | -10 | 10 | 0.64 | 3 |
| survpar(24) | 2.537 | 4.85E-06 | -10 | 10 | 0.63 | 3 |
| gearpar(1) | -0.081 | 5.77E-06 | -4 | 4 | 0.49 | 3 |
| gearpar(2) | 0.377 | 4.92E-06 | -4 | 4 | 0.55 | 3 |
| gearpar(3) | 0.071 | 1.51E-06 | -4 | 4 | 0.51 | 3 |
| gearpar(4) | -0.233 | 2.41E-06 | -4 | 4 | 0.47 | 3 |
| sexpar(1) | 0.813 | 3.20E-05 | -10 | 10 | 0.54 | 3 |
| sexpar(2) | 9.818 | 4.20E-07 | -10 | 10 | 0.99 | 3 |
| sexpar(3) | 0.525 | 1.31E-05 | -10 | 10 | 0.53 | 3 |
| sexpar(4) | 0.444 | 1.82E-05 | -10 | 10 | 0.52 | 3 |
| SelScaling[3] | 0.084 | 1.10E-05 | 0.05 | 1 | 0.04 | 3 |
| SelScaling[4] | 0.242 | 1.01E-05 | 0.05 | 1 | 0.20 | 3 |
| Commercial selectivity |
| WCOffpara2(1) | 3.480 | 6.51E-03 | -20 | 20 | 0.59 | 4 |
| WCOffpara2(2) | 1.356 | 1.13E-03 | -20 | 20 | 0.53 | 4 |
| WCOffpara2(3) | 14.252 | 8.95E-08 | -20 | 20 | 0.86 | 4 |
| WCOffpara3(1) | 3.516 | 5.09E-03 | -20 | 20 | 0.59 | 4 |
| WCOffpara3(2) | 1.215 | 6.99E-04 | -20 | 20 | 0.53 | 4 |
| WCOffpara3(3) | 3.182 | 2.26E-04 | -20 | 20 | 0.58 | 4 |
| SCOffpara3(1) | 3.537 | 1.84E-03 | -20 | 20 | 0.59 | 4 |
| SCOffpara3(2) | 1.179 | 4.59E-04 | -20 | 20 | 0.53 | 4 |
| SCOffpara3(3) | 14.564 | 4.69E-09 | -20 | 20 | 0.86 | 4 |
| WCLLpara\_M(1) | 4.364 | 1.16E-03 | -20 | 20 | 0.61 | 4 |
| WCLLpara\_M(2) | 2.165 | 7.09E-04 | -20 | 20 | 0.55 | 4 |
| WCLLpara\_M(3) | 2.096 | 1.83E-04 | -20 | 20 | 0.55 | 4 |
| WCLLpara\_F(1) | 4.349 | 3.58E-03 | -20 | 20 | 0.61 | 4 |
| WCLLpara\_F(2) | 2.017 | 6.09E-04 | -20 | 20 | 0.55 | 4 |
| WCLLpara\_F(3) | 2.151 | 3.73E-04 | -20 | 20 | 0.55 | 4 |
| SCLLpara\_M(1) | 3.840 | 1.71E-03 | -20 | 20 | 0.60 | 4 |
| SCLLpara\_M(2) | 1.912 | 4.60E-04 | -20 | 20 | 0.55 | 4 |
| SCLLpara\_M(3) | 2.059 | 1.84E-04 | -20 | 20 | 0.55 | 4 |
| SCLLpara\_F(1) | 3.944 | 1.01E-03 | -20 | 20 | 0.60 | 4 |
| SCLLpara\_F(2) | 2.128 | 2.23E-04 | -20 | 20 | 0.55 | 4 |
| SCLLpara\_F(3) | 1.647 | 8.18E-05 | -20 | 20 | 0.54 | 4 |
| WCLLpara\_shift(1) | 5.451 | 3.11E-05 | -20 | 20 | 0.64 | 4 |
| WCLLpara\_shift(2) | 7.100 | 7.62E-06 | -20 | 20 | 0.68 | 4 |
| SCLLpara\_shift(1) | -20.000 | 1.16E-06 | -20 | 20 | 0.00 | 4 |
| SCLLpara\_shift(2) | -15.805 | 4.20E-06 | -20 | 20 | 0.10 | 4 |
| SCInshcap(1) | 3.676 | 1.24E-03 | -20 | 20 | 0.59 | 4 |
| SCInshcap(2) | 1.499 | 2.04E-04 | -20 | 20 | 0.54 | 4 |
| SCInshcap(3) | 2.718 | 3.96E-04 | -20 | 20 | 0.57 | 4 |
| WCLLcap\_M(1) | 4.156 | 7.39E-04 | -20 | 20 | 0.60 | 4 |
| WCLLcap\_M(2) | 1.999 | 1.82E-04 | -20 | 20 | 0.55 | 4 |
| WCLLcap\_M(3) | 2.326 | 2.57E-05 | -20 | 20 | 0.56 | 4 |
| WCLLcap\_F(1) | 4.239 | 5.50E-04 | -20 | 20 | 0.61 | 4 |
| WCLLcap\_F(2) | 2.093 | 4.07E-06 | -20 | 20 | 0.55 | 4 |
| WCLLcap\_F(3) | 2.234 | 7.80E-05 | -20 | 20 | 0.56 | 4 |
| SCLLcap\_M(1) | 4.176 | 2.26E-04 | -20 | 20 | 0.60 | 4 |
| SCLLcap\_M(2) | 1.853 | 7.18E-05 | -20 | 20 | 0.55 | 4 |
| SCLLcap\_M(3) | 2.243 | 3.08E-05 | -20 | 20 | 0.56 | 4 |
| SCLLcap\_F(1) | 4.259 | 3.51E-03 | -20 | 20 | 0.61 | 4 |
| SCLLcap\_F(2) | 2.039 | 6.05E-04 | -20 | 20 | 0.55 | 4 |
| SCLLcap\_F(3) | 2.276 | 2.61E-04 | -20 | 20 | 0.56 | 4 |
| WCLLcap\_shift(1) | -1.359 | 2.50E-06 | -20 | 20 | 0.47 | 4 |
| WCLLcap\_shift(2) | 0.258 | 1.29E-05 | -20 | 20 | 0.51 | 4 |
| SCLLcap\_shift(1) | 2.383 | 2.94E-05 | -20 | 20 | 0.56 | 4 |
| SCLLcap\_shift(2) | 3.444 | 2.45E-05 | -20 | 20 | 0.59 | 4 |
| CPUE sigmas |
| cpue\_sig[1] | 0.250 | 2.15E-05 | 0.25 | 1 | 0.00 | 1 |
| cpue\_sig[2] | 0.250 | 1.69E-05 | 0.25 | 1 | 0.00 | 1 |
| cpue\_sig[3] | 0.150 | 1.11E-04 | 0.15 | 1 | 0.00 | 1 |
| cpue\_sig[4] | 0.166 | 6.68E-06 | 0.15 | 1 | 0.02 | 1 |
| cpue\_sig[5] | 0.158 | 3.09E-06 | 0.15 | 1 | 0.01 | 1 |
| cpue\_sig[6] | 0.221 | 4.53E-06 | 0.15 | 1 | 0.08 | 1 |
| ICSEAF CPUE |
| gamma | 0.013 | 9.20E-05 | 0 | 1 | 0.01 | 1 |
| qC1\_1 | 0.114 | 5.81E-06 | 0 | 10 | 0.01 | 1 |
| qC2\_1 | 2.975 | 1.82E-05 | 0 | 10 | 0.30 | 1 |
| qP\_1 | 0.032 | 3.79E-04 | 0 | 10 | 0.00 | 1 |
| CR | 0.073 | 4.72E-05 | 0 | 10 | 0.01 | 1 |
| Age-length distribution |
| Bi0(1,1) | 2.460 | 8.00E-05 | 0.1 | 100 | 0.02 | 1 |
| Bi0(1,2) | 0.100 | 2.73E-05 | 0.1 | 100 | 0.00 | 1 |
| Bi0(2,1) | 2.344 | 5.04E-07 | 0.1 | 100 | 0.02 | 1 |
| Bi0(2,2) | 2.795 | 7.75E-06 | 0.1 | 100 | 0.03 | 1 |
| Bipar1(1,1) | 4.571 | 1.75E-03 | 0.01 | 100 | 0.05 | 1 |
| Bipar1(1,2) | 4.290 | 1.32E-03 | 0.01 | 100 | 0.04 | 1 |
| Bipar1(2,1) | 4.544 | 3.28E-05 | 0.01 | 100 | 0.05 | 1 |
| Bipar1(2,2) | 4.881 | 2.19E-05 | 0.01 | 100 | 0.05 | 1 |
| Bipar14(1,1) | 9.687 | 1.99E-04 | 0.01 | 100 | 0.10 | 1 |
| Bipar14(1,2) | 12.470 | 6.11E-04 | 0.01 | 100 | 0.12 | 1 |
| Bipar14(2,1) | 6.707 | 2.31E-05 | 0.01 | 100 | 0.07 | 1 |
| Bipar14(2,2) | 7.343 | 7.55E-06 | 0.01 | 100 | 0.07 | 1 |
| Growth curve |   |   |   |   |   |   |
| L5(1,1) | 52.304 | 7.28E-04 | 30 | 60 | 0.74 | 1 |
| L5(1,2) | 50.064 | 6.73E-04 | 30 | 60 | 0.67 | 1 |
| L5(2,1) | 53.607 | 5.85E-06 | 30 | 60 | 0.79 | 1 |
| L5(2,2) | 54.106 | 7.70E-06 | 30 | 60 | 0.80 | 1 |
| lnKappa(1,1) | -19.500 | 8.68E-07 | -20 | 2 | 0.02 | 1 |
| lnKappa(1,2) | -19.423 | 1.20E-07 | -20 | 2 | 0.03 | 1 |
| lnKappa(2,1) | -18.882 | 1.40E-06 | -20 | 2 | 0.05 | 1 |
| lnKappa(2,2) | -19.603 | 1.44E-06 | -20 | 2 | 0.02 | 1 |
| t0(1,1) | -0.388 | 4.49E-04 | -10 | 0 | 0.96 | 1 |
| t0(1,2) | -0.009 | 1.02E-04 | -10 | 0 | 1.00 | 1 |
| t0(2,1) | -1.122 | 6.36E-06 | -10 | 0 | 0.89 | 1 |
| t0(2,2) | -0.771 | 1.08E-05 | -10 | 0 | 0.92 | 1 |

1. Marine Resource Assessment and Management Group, Department of Mathematics and Applied Mathematics, University of Cape Town, Rondebosch. [↑](#footnote-ref-1)