

## WHAM output tables

Table 1. Parameter estimates, standard errors, and confidence intervals. Rounded to 3 decimal places.

|                                  | Estimate     | Std. Error   | 95% CI lower | 95% CI upper |
|----------------------------------|--------------|--------------|--------------|--------------|
| Mean Recruitment                 | 4.629826e+11 | 7.156956e+12 | 0.032        | 6.664268e+24 |
| NAA $\sigma$ (age 1)             | 5.320000e-01 | 2.070000e-01 | 0.248        | 1.142000e+00 |
| NAA $\sigma$ (age 2-10+)         | 3.900000e-02 | 1.600000e-02 | 0.018        | 8.900000e-02 |
| NAA residual AR1 $\rho$ age      | 8.950000e-01 | 8.800000e-02 | 0.525        | 9.800000e-01 |
| NAA residual AR1 $\rho$ year     | 9.840000e-01 | 1.200000e-02 | 0.928        | 9.970000e-01 |
| Index 1 fully selected q         | 2.000000e-03 | 1.000000e-03 | 0.001        | 5.000000e-03 |
| Index 2 fully selected q         | 0.000000e+00 | 0.000000e+00 | 0.000        | 0.000000e+00 |
| Index 3 fully selected q         | 0.000000e+00 | 0.000000e+00 | 0.000        | 0.000000e+00 |
| Block 1: Selectivity for age 1   | 4.830000e-01 | 1.310000e-01 | 0.250        | 7.230000e-01 |
| Block 1: Selectivity for age 2   | 9.170000e-01 | 1.370000e-01 | 0.247        | 9.970000e-01 |
| Block 1: Selectivity for age 3   | 1.000000e+00 | 0.000000e+00 | 0.000        | 1.000000e+00 |
| Block 1: Selectivity for age 4   | 1.000000e+00 | —            | —            | —            |
| Block 1: Selectivity for age 5   | 1.000000e+00 | —            | —            | —            |
| Block 1: Selectivity for age 6   | 1.000000e+00 | —            | —            | —            |
| Block 1: Selectivity for age 7   | 1.000000e+00 | —            | —            | —            |
| Block 1: Selectivity for age 8   | 1.000000e+00 | —            | —            | —            |
| Block 1: Selectivity for age 9   | 1.000000e+00 | —            | —            | —            |
| Block 1: Selectivity for age 10+ | 1.000000e+00 | —            | —            | —            |
| Block 2: Selectivity for age 1   | 1.000000e+00 | —            | —            | —            |
| Block 2: Selectivity for age 2   | 1.000000e+00 | —            | —            | —            |
| Block 2: Selectivity for age 3   | 1.000000e+00 | —            | —            | —            |
| Block 2: Selectivity for age 4   | 1.000000e+00 | —            | —            | —            |

Table 1. Parameter estimates, standard errors, and confidence intervals. Rounded to 3 decimal places. *(continued)*

|                                  | Estimate     | Std. Error   | 95% CI lower | 95% CI upper |
|----------------------------------|--------------|--------------|--------------|--------------|
| Block 2: Selectivity for age 5   | 1.000000e+00 | —            | —            | —            |
| Block 2: Selectivity for age 6   | 1.000000e+00 | —            | —            | —            |
| Block 2: Selectivity for age 7   | 1.000000e+00 | —            | —            | —            |
| Block 2: Selectivity for age 8   | 1.000000e+00 | —            | —            | —            |
| Block 2: Selectivity for age 9   | 1.000000e+00 | —            | —            | —            |
| Block 2: Selectivity for age 10+ | 1.000000e+00 | —            | —            | —            |
| Block 3: Selectivity for age 1   | 0.000000e+00 | —            | —            | —            |
| Block 3: Selectivity for age 2   | 0.000000e+00 | —            | —            | —            |
| Block 3: Selectivity for age 3   | 1.000000e+00 | —            | —            | —            |
| Block 3: Selectivity for age 4   | 3.960000e-01 | 1.260000e-01 | 0.189        | 6.480000e-01 |
| Block 3: Selectivity for age 5   | 1.830000e-01 | 7.600000e-02 | 0.077        | 3.780000e-01 |
| Block 3: Selectivity for age 6   | 1.610000e-01 | 6.600000e-02 | 0.069        | 3.320000e-01 |
| Block 3: Selectivity for age 7   | 0.000000e+00 | —            | —            | —            |
| Block 3: Selectivity for age 8   | 0.000000e+00 | —            | —            | —            |
| Block 3: Selectivity for age 9   | 0.000000e+00 | —            | —            | —            |
| Block 3: Selectivity for age 10+ | 0.000000e+00 | —            | —            | —            |
| Block 4: Selectivity for age 1   | 0.000000e+00 | —            | —            | —            |
| Block 4: Selectivity for age 2   | 0.000000e+00 | —            | —            | —            |
| Block 4: Selectivity for age 3   | 1.000000e+00 | —            | —            | —            |
| Block 4: Selectivity for age 4   | 5.740000e-01 | 1.050000e-01 | 0.367        | 7.580000e-01 |
| Block 4: Selectivity for age 5   | 4.220000e-01 | 1.010000e-01 | 0.245        | 6.210000e-01 |
| Block 4: Selectivity for age 6   | 3.300000e-01 | 9.200000e-02 | 0.180        | 5.260000e-01 |

Table 1. Parameter estimates, standard errors, and confidence intervals. Rounded to 3 decimal places. *(continued)*

|   | Estimate     | Std. Error   | 95% CI lower | 95% CI upper |
|---|--------------|--------------|--------------|--------------|
| Block 4: Selectivity for age 7              | 4.480000e-01 | 1.340000e-01 | 0.219        | 7.020000e-01 |
| Block 4: Selectivity for age 8              | 4.450000e-01 | 1.460000e-01 | 0.201        | 7.190000e-01 |
| Block 4: Selectivity for age 9              | 7.350000e-01 | 2.500000e-01 | 0.183        | 9.720000e-01 |
| Block 4: Selectivity for age 10+            | 6.440000e-01 | 2.140000e-01 | 0.226        | 9.180000e-01 |
| Fleet 1 age comp, logistic-normal: $\sigma$ | 4.430200e+01 | 3.535000e+00 | 37.888       | 5.180100e+01 |
| Fleet 1 age comp, logistic-normal: $\rho$   | 8.960000e-01 | 1.800000e-02 | 0.856        | 9.260000e-01 |
| Index 2 age comp, logistic-normal: $\sigma$ | 3.649700e+01 | 5.713000e+00 | 26.855       | 4.960200e+01 |
| Index 2 age comp, logistic-normal: $\rho$   | 5.430000e-01 | 1.720000e-01 | 0.234        | 8.210000e-01 |
| Index 3 age comp, logistic-normal: $\sigma$ | 3.639900e+01 | 3.108000e+00 | 30.790       | 4.303100e+01 |
| Index 3 age comp, logistic-normal: $\rho$   | 6.730000e-01 | 6.300000e-02 | 0.541        | 7.830000e-01 |

Table 2. Abundance at age (1000s).

|      | 1       | 2       | 3       | 4       | 5       | 6      | 7      | 8      | 9      | 10+   |
|------|---------|---------|---------|---------|---------|--------|--------|--------|--------|-------|
| 1968 | 989474  | 659016  | 364621  | 194695  | 103961  | 55512  | 29641  | 15827  | 8451   | 9683  |
| 1969 | 371395  | 1502997 | 802656  | 349315  | 133199  | 64672  | 35611  | 21588  | 12309  | 13390 |
| 1970 | 575159  | 586560  | 1916265 | 806155  | 251809  | 86458  | 42843  | 26612  | 17183  | 19344 |
| 1971 | 272586  | 836816  | 677656  | 1756093 | 539414  | 152103 | 52727  | 29196  | 19289  | 25021 |
| 1972 | 328390  | 376370  | 864914  | 558668  | 1074179 | 298212 | 84079  | 32016  | 18711  | 26705 |
| 1973 | 306691  | 444361  | 375251  | 690885  | 341173  | 597435 | 164680 | 50426  | 20035  | 26612 |
| 1974 | 492704  | 388606  | 379349  | 252815  | 361595  | 165557 | 286410 | 84742  | 26755  | 23048 |
| 1975 | 588364  | 603456  | 306866  | 236023  | 123698  | 165817 | 75547  | 139153 | 42090  | 22955 |
| 1976 | 109849  | 624255  | 406189  | 164227  | 101791  | 50755  | 68370  | 33419  | 62891  | 27384 |
| 1977 | 20935   | 95613   | 322314  | 166410  | 55447   | 33196  | 16726  | 24250  | 12152  | 30704 |
| 1978 | 15779   | 23615   | 82629   | 232664  | 100214  | 32466  | 19642  | 10588  | 15682  | 25905 |
| 1979 | 65018   | 21813   | 27324   | 80786   | 189927  | 79111  | 25720  | 16479  | 8949   | 32632 |
| 1980 | 11216   | 78695   | 22178   | 23595   | 59213   | 135833 | 57011  | 19641  | 12647  | 29698 |
| 1981 | 38146   | 14775   | 87752   | 20750   | 18729   | 45679  | 104901 | 46100  | 15724  | 31387 |
| 1982 | 159997  | 53955   | 17288   | 85018   | 16909   | 14757  | 35814  | 85026  | 36459  | 34286 |
| 1983 | 1004092 | 255452  | 70573   | 18348   | 75579   | 14349  | 12382  | 30686  | 69951  | 53221 |
| 1984 | 38296   | 1297095 | 278889  | 63007   | 13994   | 55979  | 10688  | 9460   | 22617  | 83848 |
| 1985 | 92722   | 52702   | 1518257 | 263199  | 50302   | 10742  | 43205  | 8372   | 7086   | 73391 |
| 1986 | 61916   | 121425  | 58010   | 1339331 | 196422  | 35687  | 7626   | 31092  | 5751   | 51014 |
| 1987 | 64926   | 80908   | 132115  | 50306   | 986350  | 136234 | 24538  | 5276   | 20615  | 34848 |
| 1988 | 277753  | 90829   | 90750   | 114672  | 36898   | 675571 | 91129  | 16268  | 3339   | 32559 |
| 1989 | 486332  | 397419  | 102261  | 77581   | 82145   | 24537  | 436655 | 57574  | 9738   | 19964 |
| 1990 | 108655  | 638650  | 419981  | 82171   | 52548   | 51838  | 15034  | 261887 | 32564  | 15669 |
| 1991 | 214934  | 146138  | 677891  | 333719  | 54646   | 32306  | 30606  | 8601   | 140532 | 24076 |
| 1992 | 203916  | 294988  | 161688  | 561125  | 230665  | 34748  | 19539  | 17738  | 4661   | 83106 |
| 1993 | 33631   | 251808  | 303104  | 124431  | 363549  | 137906 | 19773  | 10572  | 8960   | 41610 |
| 1994 | 115951  | 44482   | 273612  | 242601  | 82578   | 220643 | 78491  | 10538  | 5171   | 23146 |
| 1995 | 155564  | 152776  | 46817   | 208873  | 153551  | 47361  | 118026 | 38912  | 4757   | 11967 |
| 1996 | 157575  | 204167  | 158485  | 34397   | 126969  | 84786  | 24210  | 55563  | 16621  | 6716  |
| 1997 | 201625  | 201240  | 196503  | 104526  | 18481   | 61852  | 38269  | 9981   | 20702  | 8227  |
| 1998 | 93253   | 242665  | 181138  | 119272  | 50951   | 8134   | 25291  | 14321  | 3364   | 9300  |

Table 2. Abundance at age (1000s). (*continued*)

|      | 1      | 2       | 3       | 4      | 5      | 6      | 7     | 8    | 9    | 10+  |
|------|--------|---------|---------|--------|--------|--------|-------|------|------|------|
| 1999 | 120379 | 113631  | 219053  | 108229 | 56452  | 21405  | 3150  | 8953 | 4553 | 3866 |
| 2000 | 959223 | 167679  | 115021  | 142710 | 54723  | 24790  | 8479  | 1125 | 2848 | 2576 |
| 2001 | 115404 | 1211337 | 162099  | 72379  | 70074  | 23391  | 9554  | 2938 | 349  | 1648 |
| 2002 | 82559  | 142845  | 1159352 | 100765 | 35143  | 29488  | 8825  | 3206 | 876  | 590  |
| 2003 | 216153 | 106173  | 137824  | 721996 | 48860  | 14697  | 10943 | 2887 | 921  | 421  |
| 2004 | 610921 | 284748  | 99471   | 81692  | 333579 | 19462  | 5170  | 3367 | 775  | 362  |
| 2005 | 137622 | 662300  | 202973  | 44022  | 28299  | 101217 | 5251  | 1228 | 696  | 240  |
| 2006 | 363746 | 157845  | 494027  | 92429  | 15455  | 8640   | 27495 | 1254 | 254  | 199  |
| 2007 | 62843  | 350254  | 94908   | 180854 | 26157  | 3810   | 1906  | 5416 | 217  | 82   |
| 2008 | 136038 | 64910   | 229038  | 37514  | 54957  | 6858   | 884   | 394  | 989  | 57   |
| 2009 | 190509 | 140830  | 41656   | 88216  | 11036  | 13916  | 1522  | 174  | 69   | 195  |
| 2010 | 39819  | 142731  | 54317   | 9350   | 15231  | 1643   | 1823  | 178  | 18   | 30   |
| 2011 | 125555 | 25930   | 39274   | 8317   | 1089   | 1511   | 141   | 139  | 12   | 3    |
| 2012 | 85195  | 115702  | 14159   | 12819  | 2062   | 229    | 273   | 23   | 20   | 2    |
| 2013 | 42062  | 79050   | 67454   | 5018   | 3475   | 471    | 45    | 47   | 4    | 4    |
| 2014 | 72851  | 41890   | 51288   | 26860  | 1529   | 890    | 102   | 9    | 8    | 1    |
| 2015 | 108046 | 75245   | 28530   | 21650  | 8686   | 418    | 205   | 21   | 2    | 2    |
| 2016 | 298821 | 121574  | 56577   | 13306  | 7734   | 2622   | 107   | 45   | 4    | 1    |
| 2017 | 30773  | 302107  | 87082   | 25799  | 4709   | 2350   | 685   | 24   | 9    | 1    |
| 2018 | 93671  | 33265   | 229840  | 41926  | 9609   | 1499   | 646   | 162  | 5    | 2    |
| 2019 | 58708  | 97688   | 24494   | 107480 | 15199  | 3002   | 409   | 152  | 34   | 2    |
| 2020 | 72385  | 62323   | 73530   | 11742  | 39859  | 4857   | 849   | 100  | 33   | 9    |
| 2021 | 68082  | 72217   | 41910   | 31280  | 3872   | 11318  | 1233  | 186  | 20   | 9    |
| 2022 | 148707 | 73576   | 53755   | 19825  | 11434  | 1214   | 3187  | 300  | 41   | 7    |

Table 3. Total fishing mortality at age.

|      | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10+   |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1968 | 0.103 | 0.195 | 0.213 | 0.213 | 0.213 | 0.213 | 0.213 | 0.213 | 0.213 | 0.213 |
| 1969 | 0.096 | 0.182 | 0.199 | 0.199 | 0.199 | 0.199 | 0.199 | 0.199 | 0.199 | 0.199 |
| 1970 | 0.130 | 0.246 | 0.268 | 0.268 | 0.268 | 0.268 | 0.268 | 0.268 | 0.268 | 0.268 |

Table 3. Total fishing mortality at age. (*continued*)

|      | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10+   |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1971 | 0.193 | 0.367 | 0.401 | 0.401 | 0.401 | 0.401 | 0.401 | 0.401 | 0.401 | 0.401 |
| 1972 | 0.208 | 0.395 | 0.431 | 0.431 | 0.431 | 0.431 | 0.431 | 0.431 | 0.431 | 0.431 |
| 1973 | 0.303 | 0.575 | 0.627 | 0.627 | 0.627 | 0.627 | 0.627 | 0.627 | 0.627 | 0.627 |
| 1974 | 0.346 | 0.658 | 0.717 | 0.717 | 0.717 | 0.717 | 0.717 | 0.717 | 0.717 | 0.717 |
| 1975 | 0.376 | 0.714 | 0.778 | 0.778 | 0.778 | 0.778 | 0.778 | 0.778 | 0.778 | 0.778 |
| 1976 | 0.459 | 0.872 | 0.951 | 0.951 | 0.951 | 0.951 | 0.951 | 0.951 | 0.951 | 0.951 |
| 1977 | 0.176 | 0.334 | 0.365 | 0.365 | 0.365 | 0.365 | 0.365 | 0.365 | 0.365 | 0.365 |
| 1978 | 0.061 | 0.115 | 0.126 | 0.126 | 0.126 | 0.126 | 0.126 | 0.126 | 0.126 | 0.126 |
| 1979 | 0.070 | 0.134 | 0.146 | 0.146 | 0.146 | 0.146 | 0.146 | 0.146 | 0.146 | 0.146 |
| 1980 | 0.057 | 0.108 | 0.118 | 0.118 | 0.118 | 0.118 | 0.118 | 0.118 | 0.118 | 0.118 |
| 1981 | 0.070 | 0.133 | 0.145 | 0.145 | 0.145 | 0.145 | 0.145 | 0.145 | 0.145 | 0.145 |
| 1982 | 0.063 | 0.120 | 0.130 | 0.130 | 0.130 | 0.130 | 0.130 | 0.130 | 0.130 | 0.130 |
| 1983 | 0.053 | 0.100 | 0.109 | 0.109 | 0.109 | 0.109 | 0.109 | 0.109 | 0.109 | 0.109 |
| 1984 | 0.040 | 0.077 | 0.084 | 0.084 | 0.084 | 0.084 | 0.084 | 0.084 | 0.084 | 0.084 |
| 1985 | 0.057 | 0.108 | 0.118 | 0.118 | 0.118 | 0.118 | 0.118 | 0.118 | 0.118 | 0.118 |
| 1986 | 0.054 | 0.103 | 0.112 | 0.112 | 0.112 | 0.112 | 0.112 | 0.112 | 0.112 | 0.112 |
| 1987 | 0.076 | 0.144 | 0.157 | 0.157 | 0.157 | 0.157 | 0.157 | 0.157 | 0.157 | 0.157 |
| 1988 | 0.088 | 0.168 | 0.183 | 0.183 | 0.183 | 0.183 | 0.183 | 0.183 | 0.183 | 0.183 |
| 1989 | 0.076 | 0.144 | 0.157 | 0.157 | 0.157 | 0.157 | 0.157 | 0.157 | 0.157 | 0.157 |
| 1990 | 0.093 | 0.177 | 0.193 | 0.193 | 0.193 | 0.193 | 0.193 | 0.193 | 0.193 | 0.193 |
| 1991 | 0.063 | 0.120 | 0.131 | 0.131 | 0.131 | 0.131 | 0.131 | 0.131 | 0.131 | 0.131 |
| 1992 | 0.040 | 0.076 | 0.083 | 0.083 | 0.083 | 0.083 | 0.083 | 0.083 | 0.083 | 0.083 |
| 1993 | 0.041 | 0.077 | 0.084 | 0.084 | 0.084 | 0.084 | 0.084 | 0.084 | 0.084 | 0.084 |
| 1994 | 0.051 | 0.097 | 0.106 | 0.106 | 0.106 | 0.106 | 0.106 | 0.106 | 0.106 | 0.106 |
| 1995 | 0.045 | 0.085 | 0.092 | 0.092 | 0.092 | 0.092 | 0.092 | 0.092 | 0.092 | 0.092 |
| 1996 | 0.080 | 0.151 | 0.165 | 0.165 | 0.165 | 0.165 | 0.165 | 0.165 | 0.165 | 0.165 |
| 1997 | 0.085 | 0.161 | 0.175 | 0.175 | 0.175 | 0.175 | 0.175 | 0.175 | 0.175 | 0.175 |
| 1998 | 0.087 | 0.165 | 0.180 | 0.180 | 0.180 | 0.180 | 0.180 | 0.180 | 0.180 | 0.180 |
| 1999 | 0.091 | 0.173 | 0.188 | 0.188 | 0.188 | 0.188 | 0.188 | 0.188 | 0.188 | 0.188 |
| 2000 | 0.052 | 0.099 | 0.108 | 0.108 | 0.108 | 0.108 | 0.108 | 0.108 | 0.108 | 0.108 |
| 2001 | 0.054 | 0.102 | 0.111 | 0.111 | 0.111 | 0.111 | 0.111 | 0.111 | 0.111 | 0.111 |

Table 3. Total fishing mortality at age. (*continued*)

|      | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10+   |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 2002 | 0.077 | 0.147 | 0.160 | 0.160 | 0.160 | 0.160 | 0.160 | 0.160 | 0.160 | 0.160 |
| 2003 | 0.120 | 0.228 | 0.249 | 0.249 | 0.249 | 0.249 | 0.249 | 0.249 | 0.249 | 0.249 |
| 2004 | 0.217 | 0.412 | 0.450 | 0.450 | 0.450 | 0.450 | 0.450 | 0.450 | 0.450 | 0.450 |
| 2005 | 0.223 | 0.424 | 0.462 | 0.462 | 0.462 | 0.462 | 0.462 | 0.462 | 0.462 | 0.462 |
| 2006 | 0.277 | 0.527 | 0.575 | 0.575 | 0.575 | 0.575 | 0.575 | 0.575 | 0.575 | 0.575 |
| 2007 | 0.251 | 0.476 | 0.519 | 0.519 | 0.519 | 0.519 | 0.519 | 0.519 | 0.519 | 0.519 |
| 2008 | 0.264 | 0.501 | 0.547 | 0.547 | 0.547 | 0.547 | 0.547 | 0.547 | 0.547 | 0.547 |
| 2009 | 0.480 | 0.911 | 0.994 | 0.994 | 0.994 | 0.994 | 0.994 | 0.994 | 0.994 | 0.994 |
| 2010 | 0.692 | 1.313 | 1.432 | 1.432 | 1.432 | 1.432 | 1.432 | 1.432 | 1.432 | 1.432 |
| 2011 | 0.316 | 0.599 | 0.653 | 0.653 | 0.653 | 0.653 | 0.653 | 0.653 | 0.653 | 0.653 |
| 2012 | 0.257 | 0.489 | 0.533 | 0.533 | 0.533 | 0.533 | 0.533 | 0.533 | 0.533 | 0.533 |
| 2013 | 0.218 | 0.413 | 0.451 | 0.451 | 0.451 | 0.451 | 0.451 | 0.451 | 0.451 | 0.451 |
| 2014 | 0.203 | 0.385 | 0.420 | 0.420 | 0.420 | 0.420 | 0.420 | 0.420 | 0.420 | 0.420 |
| 2015 | 0.178 | 0.339 | 0.370 | 0.370 | 0.370 | 0.370 | 0.370 | 0.370 | 0.370 | 0.370 |
| 2016 | 0.134 | 0.254 | 0.277 | 0.277 | 0.277 | 0.277 | 0.277 | 0.277 | 0.277 | 0.277 |
| 2017 | 0.138 | 0.263 | 0.286 | 0.286 | 0.286 | 0.286 | 0.286 | 0.286 | 0.286 | 0.286 |
| 2018 | 0.141 | 0.267 | 0.292 | 0.292 | 0.292 | 0.292 | 0.292 | 0.292 | 0.292 | 0.292 |
| 2019 | 0.134 | 0.254 | 0.277 | 0.277 | 0.277 | 0.277 | 0.277 | 0.277 | 0.277 | 0.277 |
| 2020 | 0.189 | 0.360 | 0.392 | 0.392 | 0.392 | 0.392 | 0.392 | 0.392 | 0.392 | 0.392 |
| 2021 | 0.160 | 0.303 | 0.331 | 0.331 | 0.331 | 0.331 | 0.331 | 0.331 | 0.331 | 0.331 |
| 2022 | 0.035 | 0.066 | 0.073 | 0.073 | 0.073 | 0.073 | 0.073 | 0.073 | 0.073 | 0.073 |