

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 | 9475.216 | 5701.070 | 2913.642 | 30813.570 |
| NAA σ (age 1) | 1.059 | 0.124 | 0.842 | 1.332 |
| NAA σ (age 2-9+) | 0.346 | 0.033 | 0.287 | 0.417 |
| NAA residual AR1 ρ age | 0.320 | 0.111 | 0.090 | 0.518 |
| NAA residual AR1 ρ year | 0.523 | 0.082 | 0.345 | 0.665 |
| Index 1 fully selected q | 0.159 | 0.057 | 0.079 | 0.321 |
| Index 2 fully selected q | 0.369 | 0.142 | 0.174 | 0.784 |
| Block 1: Selectivity for age 1 | 0.012 | 0.005 | 0.005 | 0.029 |
| Block 1: Selectivity for age 2 | 0.248 | 0.062 | 0.147 | 0.388 |
| Block 1: Selectivity for age 3 | 0.525 | 0.102 | 0.332 | 0.711 |
| Block 1: Selectivity for age 4 | 0.918 | 0.132 | 0.263 | 0.997 |
| Block 1: Selectivity for age 5 | 1.000 | — | — | — |
| Block 1: Selectivity for age 6 | 1.000 | — | — | — |
| Block 1: Selectivity for age 7 | 1.000 | — | — | — |
| Block 1: Selectivity for age 8 | 1.000 | — | — | — |
| Block 1: Selectivity for age 9+ | 0.436 | 0.134 | 0.211 | 0.692 |
| Block 2: Selectivity for age 1 | 0.012 | 0.004 | 0.006 | 0.023 |
| Block 2: Selectivity for age 2 | 0.099 | 0.026 | 0.058 | 0.163 |
| Block 2: Selectivity for age 3 | 0.489 | 0.100 | 0.305 | 0.677 |
| Block 2: Selectivity for age 4 | 0.726 | 0.120 | 0.449 | 0.896 |
| Block 2: Selectivity for age 5 | 0.908 | 0.129 | 0.323 | 0.995 |
| Block 2: Selectivity for age 6 | 1.000 | — | — | — |

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 7 | 1.000 | — | — | — |
| Block 2: Selectivity for age 8 | 0.755 | 0.170 | 0.338 | 0.949 |
| Block 2: Selectivity for age 9+ | 0.516 | 0.192 | 0.191 | 0.829 |
| Block 3: Selectivity for age 1 | 0.018 | 0.006 | 0.009 | 0.036 |
| Block 3: Selectivity for age 2 | 0.103 | 0.026 | 0.062 | 0.167 |
| Block 3: Selectivity for age 3 | 0.308 | 0.061 | 0.202 | 0.438 |
| Block 3: Selectivity for age 4 | 0.581 | 0.087 | 0.407 | 0.737 |
| Block 3: Selectivity for age 5 | 0.759 | 0.100 | 0.518 | 0.902 |
| Block 3: Selectivity for age 6 | 1.000 | — | — | — |
| Block 3: Selectivity for age 7 | 1.000 | — | — | — |
| Block 3: Selectivity for age 8 | 1.000 | — | — | — |
| Block 3: Selectivity for age 9+ | 1.000 | — | — | — |
| Block 4: Selectivity for age 1 | 0.475 | 0.125 | 0.253 | 0.707 |
| Block 4: Selectivity for age 2 | 0.540 | 0.115 | 0.321 | 0.744 |
| Block 4: Selectivity for age 3 | 0.827 | 0.131 | 0.442 | 0.967 |
| Block 4: Selectivity for age 4 | 1.000 | — | — | — |
| Block 4: Selectivity for age 5 | 1.000 | — | — | — |
| Block 4: Selectivity for age 6 | 1.000 | — | — | — |
| Block 4: Selectivity for age 7 | 1.000 | — | — | — |
| Block 4: Selectivity for age 8 | 1.000 | — | — | — |
| Block 4: Selectivity for age 9+ | 1.000 | — | — | — |
| Block 5: Selectivity for age 1 | 0.387 | 0.106 | 0.207 | 0.603 |

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 5: Selectivity for age 2 | 0.582 | 0.132 | 0.325 | 0.802 |
| Block 5: Selectivity for age 3 | 0.747 | 0.131 | 0.431 | 0.920 |
| Block 5: Selectivity for age 4 | 0.821 | 0.102 | 0.540 | 0.947 |
| Block 5: Selectivity for age 5 | 1.000 | — | — | — |
| Block 5: Selectivity for age 6 | 1.000 | — | — | — |
| Block 5: Selectivity for age 7 | 1.000 | — | — | — |
| Block 5: Selectivity for age 8 | 1.000 | — | — | — |
| Block 5: Selectivity for age 9+ | 1.000 | — | — | — |
| Fleet 1 age comp, Dirichlet: dispersion (ϕ) | 78.668 | 11.247 | 59.443 | 104.110 |
| Index 1 age comp, Dirichlet: dispersion (ϕ) | 21.969 | 2.263 | 17.952 | 26.885 |
| Index 2 age comp, Dirichlet: dispersion (ϕ) | 25.537 | 2.509 | 21.064 | 30.960 |

Table 2. Abundance at age (1000s).

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9+ |
|------|-------|-------|-------|-------|-------|------|------|------|------|
| 1977 | 25290 | 43404 | 1826 | 3727 | 1945 | 1278 | 1 | 5 | 455 |
| 1978 | 3751 | 13797 | 22798 | 1612 | 2744 | 1261 | 491 | 1 | 366 |
| 1979 | 7844 | 2258 | 7240 | 11638 | 1276 | 1367 | 514 | 259 | 280 |
| 1980 | 26758 | 6762 | 1456 | 3432 | 5075 | 731 | 701 | 311 | 397 |
| 1981 | 11851 | 16614 | 4624 | 963 | 1609 | 2210 | 433 | 483 | 487 |
| 1982 | 2261 | 6678 | 7609 | 2765 | 613 | 1061 | 1543 | 347 | 688 |
| 1983 | 7141 | 1067 | 4745 | 3371 | 2266 | 567 | 781 | 1162 | 702 |
| 1984 | 1862 | 3870 | 861 | 2652 | 1464 | 1654 | 376 | 424 | 999 |
| 1985 | 786 | 1397 | 4505 | 607 | 1364 | 788 | 1037 | 208 | 598 |
| 1986 | 759 | 413 | 1200 | 1860 | 322 | 566 | 413 | 440 | 275 |
| 1987 | 213 | 362 | 257 | 549 | 426 | 175 | 311 | 175 | 215 |
| 1988 | 639 | 84 | 210 | 138 | 329 | 305 | 77 | 122 | 92 |
| 1989 | 313 | 467 | 66 | 164 | 110 | 147 | 91 | 19 | 39 |
| 1990 | 338 | 160 | 443 | 36 | 96 | 56 | 67 | 30 | 18 |
| 1991 | 323 | 247 | 150 | 200 | 30 | 54 | 26 | 24 | 18 |
| 1992 | 1045 | 338 | 344 | 144 | 92 | 15 | 19 | 10 | 20 |
| 1993 | 2098 | 1003 | 318 | 168 | 67 | 67 | 12 | 14 | 23 |
| 1994 | 1531 | 1713 | 705 | 170 | 67 | 58 | 70 | 12 | 40 |
| 1995 | 2186 | 2955 | 1211 | 468 | 93 | 61 | 59 | 65 | 49 |
| 1996 | 1329 | 1781 | 2750 | 1040 | 254 | 84 | 70 | 60 | 91 |
| 1997 | 7055 | 984 | 2153 | 2698 | 690 | 233 | 101 | 75 | 127 |
| 1998 | 4622 | 3094 | 875 | 2141 | 1695 | 607 | 265 | 120 | 200 |
| 1999 | 33120 | 3265 | 2609 | 1463 | 2417 | 1688 | 796 | 331 | 362 |
| 2000 | 10265 | 23931 | 3693 | 3312 | 1671 | 2407 | 1631 | 832 | 717 |
| 2001 | 3533 | 5822 | 14784 | 3853 | 2851 | 1607 | 1877 | 1403 | 1194 |
| 2002 | 7000 | 1818 | 2757 | 11576 | 2742 | 1937 | 948 | 1474 | 1741 |
| 2003 | 1660 | 3005 | 959 | 1936 | 11156 | 1884 | 1102 | 625 | 1585 |
| 2004 | 6523 | 928 | 1656 | 894 | 1973 | 9302 | 1041 | 708 | 1026 |
| 2005 | 1216 | 6369 | 599 | 1206 | 1011 | 1712 | 5381 | 650 | 804 |
| 2006 | 3275 | 1058 | 6892 | 402 | 951 | 745 | 1150 | 4172 | 778 |
| 2007 | 5541 | 2820 | 817 | 5284 | 266 | 594 | 553 | 832 | 3014 |

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

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9+ |
|------|-------|--------|--------|--------|--------|-------|-------|-------|------|
| 2008 | 1328 | 3619 | 1700 | 487 | 4357 | 158 | 470 | 401 | 2200 |
| 2009 | 1098 | 889 | 2076 | 970 | 405 | 3337 | 125 | 362 | 1628 |
| 2010 | 1760 | 834 | 495 | 1230 | 1004 | 384 | 3337 | 101 | 1581 |
| 2011 | 11378 | 2686 | 632 | 353 | 1155 | 873 | 338 | 2630 | 1238 |
| 2012 | 8130 | 24692 | 2129 | 666 | 372 | 1065 | 741 | 279 | 2432 |
| 2013 | 37408 | 11580 | 23204 | 2258 | 810 | 406 | 1119 | 718 | 1868 |
| 2014 | 95458 | 41742 | 10923 | 25914 | 2203 | 901 | 431 | 1162 | 1976 |
| 2015 | 20260 | 227405 | 42032 | 9958 | 21319 | 2137 | 961 | 403 | 2187 |
| 2016 | 26876 | 25702 | 242346 | 31324 | 8083 | 19263 | 2076 | 902 | 1797 |
| 2017 | 36327 | 24674 | 17624 | 172679 | 20577 | 5652 | 13423 | 1565 | 1530 |
| 2018 | 17016 | 25664 | 14786 | 11719 | 140071 | 12115 | 3274 | 7008 | 1398 |
| 2019 | 7252 | 9622 | 12774 | 8241 | 6371 | 76055 | 5403 | 1416 | 2780 |
| 2020 | 6235 | 4055 | 5542 | 6762 | 3731 | 3162 | 35068 | 2035 | 1169 |
| 2021 | 32365 | 3732 | 2158 | 3095 | 2983 | 2130 | 1742 | 13222 | 1005 |

Table 3. Total fishing mortality at age.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9+ |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1977 | 0.002 | 0.036 | 0.077 | 0.135 | 0.147 | 0.147 | 0.147 | 0.147 | 0.064 |
| 1978 | 0.002 | 0.043 | 0.091 | 0.160 | 0.174 | 0.174 | 0.174 | 0.174 | 0.076 |
| 1979 | 0.002 | 0.039 | 0.083 | 0.145 | 0.158 | 0.158 | 0.158 | 0.158 | 0.069 |
| 1980 | 0.004 | 0.078 | 0.165 | 0.288 | 0.314 | 0.314 | 0.314 | 0.314 | 0.137 |
| 1981 | 0.004 | 0.084 | 0.178 | 0.311 | 0.339 | 0.339 | 0.339 | 0.339 | 0.148 |
| 1982 | 0.004 | 0.090 | 0.192 | 0.335 | 0.365 | 0.365 | 0.365 | 0.365 | 0.159 |
| 1983 | 0.005 | 0.104 | 0.219 | 0.383 | 0.417 | 0.417 | 0.417 | 0.417 | 0.182 |
| 1984 | 0.003 | 0.068 | 0.143 | 0.251 | 0.273 | 0.273 | 0.273 | 0.273 | 0.119 |
| 1985 | 0.003 | 0.064 | 0.136 | 0.238 | 0.259 | 0.259 | 0.259 | 0.259 | 0.113 |
| 1986 | 0.004 | 0.072 | 0.153 | 0.267 | 0.291 | 0.291 | 0.291 | 0.291 | 0.127 |
| 1987 | 0.003 | 0.054 | 0.115 | 0.200 | 0.218 | 0.218 | 0.218 | 0.218 | 0.095 |
| 1988 | 0.002 | 0.046 | 0.097 | 0.169 | 0.184 | 0.184 | 0.184 | 0.184 | 0.080 |
| 1989 | 0.003 | 0.026 | 0.129 | 0.191 | 0.239 | 0.263 | 0.263 | 0.199 | 0.136 |

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

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9+ |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1990 | 0.006 | 0.051 | 0.255 | 0.378 | 0.473 | 0.520 | 0.520 | 0.393 | 0.269 |
| 1991 | 0.007 | 0.061 | 0.302 | 0.448 | 0.560 | 0.617 | 0.617 | 0.465 | 0.318 |
| 1992 | 0.005 | 0.044 | 0.220 | 0.326 | 0.408 | 0.450 | 0.450 | 0.339 | 0.232 |
| 1993 | 0.003 | 0.023 | 0.113 | 0.168 | 0.211 | 0.232 | 0.232 | 0.175 | 0.120 |
| 1994 | 0.001 | 0.013 | 0.064 | 0.094 | 0.118 | 0.130 | 0.130 | 0.098 | 0.067 |
| 1995 | 0.002 | 0.020 | 0.100 | 0.149 | 0.186 | 0.205 | 0.205 | 0.155 | 0.106 |
| 1996 | 0.001 | 0.009 | 0.046 | 0.068 | 0.085 | 0.094 | 0.094 | 0.071 | 0.048 |
| 1997 | 0.002 | 0.015 | 0.076 | 0.112 | 0.141 | 0.155 | 0.155 | 0.117 | 0.080 |
| 1998 | 0.001 | 0.011 | 0.053 | 0.079 | 0.099 | 0.109 | 0.109 | 0.082 | 0.056 |
| 1999 | 0.001 | 0.005 | 0.024 | 0.035 | 0.044 | 0.049 | 0.049 | 0.037 | 0.025 |
| 2000 | 0.001 | 0.006 | 0.029 | 0.043 | 0.054 | 0.060 | 0.060 | 0.045 | 0.031 |
| 2001 | 0.001 | 0.004 | 0.022 | 0.032 | 0.040 | 0.044 | 0.044 | 0.034 | 0.023 |
| 2002 | 0.001 | 0.005 | 0.025 | 0.037 | 0.046 | 0.051 | 0.051 | 0.038 | 0.026 |
| 2003 | 0.001 | 0.006 | 0.029 | 0.044 | 0.054 | 0.060 | 0.060 | 0.045 | 0.031 |
| 2004 | 0.001 | 0.007 | 0.033 | 0.050 | 0.062 | 0.068 | 0.068 | 0.052 | 0.035 |
| 2005 | 0.002 | 0.012 | 0.037 | 0.069 | 0.091 | 0.119 | 0.119 | 0.119 | 0.119 |
| 2006 | 0.002 | 0.009 | 0.027 | 0.051 | 0.067 | 0.088 | 0.088 | 0.088 | 0.088 |
| 2007 | 0.003 | 0.019 | 0.056 | 0.105 | 0.137 | 0.181 | 0.181 | 0.181 | 0.181 |
| 2008 | 0.003 | 0.017 | 0.052 | 0.097 | 0.127 | 0.168 | 0.168 | 0.168 | 0.168 |
| 2009 | 0.003 | 0.015 | 0.045 | 0.085 | 0.111 | 0.146 | 0.146 | 0.146 | 0.146 |
| 2010 | 0.002 | 0.013 | 0.040 | 0.076 | 0.099 | 0.130 | 0.130 | 0.130 | 0.130 |
| 2011 | 0.002 | 0.010 | 0.029 | 0.054 | 0.071 | 0.094 | 0.094 | 0.094 | 0.094 |
| 2012 | 0.002 | 0.012 | 0.035 | 0.066 | 0.086 | 0.113 | 0.113 | 0.113 | 0.113 |
| 2013 | 0.002 | 0.009 | 0.026 | 0.050 | 0.065 | 0.085 | 0.085 | 0.085 | 0.085 |
| 2014 | 0.001 | 0.005 | 0.015 | 0.027 | 0.036 | 0.047 | 0.047 | 0.047 | 0.047 |
| 2015 | 0.001 | 0.003 | 0.009 | 0.017 | 0.022 | 0.029 | 0.029 | 0.029 | 0.029 |
| 2016 | 0.001 | 0.004 | 0.011 | 0.021 | 0.027 | 0.036 | 0.036 | 0.036 | 0.036 |
| 2017 | 0.001 | 0.004 | 0.012 | 0.023 | 0.030 | 0.039 | 0.039 | 0.039 | 0.039 |
| 2018 | 0.001 | 0.003 | 0.009 | 0.017 | 0.022 | 0.029 | 0.029 | 0.029 | 0.029 |
| 2019 | 0.001 | 0.005 | 0.016 | 0.030 | 0.040 | 0.052 | 0.052 | 0.052 | 0.052 |
| 2020 | 0.002 | 0.012 | 0.037 | 0.069 | 0.091 | 0.120 | 0.120 | 0.120 | 0.120 |

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

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9+ |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 2021 | 0.005 | 0.026 | 0.078 | 0.147 | 0.192 | 0.253 | 0.253 | 0.253 | 0.253 |