

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 |
|----------------------------------|----------|------------|--------------|--------------|
| NAA σ (age 1) | 1.263 | 0.094 | 1.091 | 1.461 |
| NAA σ (age 2-10+) | 0.665 | 0.022 | 0.623 | 0.710 |
| NAA residual AR1 ρ age | 0.352 | 0.051 | 0.248 | 0.448 |
| NAA residual AR1 ρ year | -0.008 | 0.050 | -0.106 | 0.089 |
| Index 1 fully selected q | 0.003 | 0.000 | 0.002 | 0.004 |
| Index 2 fully selected q | 0.000 | 0.000 | 0.000 | 0.000 |
| Index 3 fully selected q | 0.000 | 0.000 | 0.000 | 0.000 |
| Block 1: a_{50} | 2.436 | — | — | — |
| Block 1: 1/slope (increasing) | 0.698 | — | — | — |
| Block 2: Selectivity for age 1 | 1.000 | — | — | — |
| Block 2: Selectivity for age 2 | 1.000 | — | — | — |
| Block 2: Selectivity for age 3 | 1.000 | — | — | — |
| Block 2: Selectivity for age 4 | 1.000 | — | — | — |
| Block 2: Selectivity for age 5 | 1.000 | — | — | — |
| Block 2: Selectivity for age 6 | 1.000 | — | — | — |
| Block 2: Selectivity for age 7 | 1.000 | — | — | — |
| Block 2: Selectivity for age 8 | 1.000 | — | — | — |
| Block 2: Selectivity for age 9 | 1.000 | — | — | — |
| Block 2: Selectivity for age 10+ | 1.000 | — | — | — |
| Block 3: Selectivity for age 1 | 0.000 | — | — | — |
| Block 3: Selectivity for age 2 | 0.000 | — | — | — |
| Block 3: Selectivity for age 3 | 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 3: Selectivity for age 4 | 0.522 | 0.235 | 0.146 | 0.874 |
| Block 3: Selectivity for age 5 | 0.248 | 0.110 | 0.095 | 0.511 |
| Block 3: Selectivity for age 6 | 0.177 | 0.061 | 0.087 | 0.328 |
| Block 3: Selectivity for age 7 | 0.000 | — | — | — |
| Block 3: Selectivity for age 8 | 0.000 | — | — | — |
| Block 3: Selectivity for age 9 | 0.000 | — | — | — |
| Block 3: Selectivity for age 10+ | 0.000 | — | — | — |
| Block 4: Selectivity for age 1 | 0.000 | — | — | — |
| Block 4: Selectivity for age 2 | 0.000 | — | — | — |
| Block 4: Selectivity for age 3 | 1.000 | — | — | — |
| Block 4: Selectivity for age 4 | 0.999 | — | — | — |
| Block 4: Selectivity for age 5 | 0.626 | 0.145 | 0.332 | 0.849 |
| Block 4: Selectivity for age 6 | 0.477 | 0.072 | 0.341 | 0.617 |
| Block 4: Selectivity for age 7 | 0.000 | — | — | — |
| Block 4: Selectivity for age 8 | 0.000 | — | — | — |
| Block 4: Selectivity for age 9 | 0.000 | — | — | — |
| Block 4: Selectivity for age 10+ | 0.000 | — | — | — |
| Fleet 1 age comp, logistic-normal: σ | 0.000 | — | — | — |
| Index 2 age comp, logistic-normal: σ | 39.372 | 4.709 | 31.143 | 49.773 |
| Index 3 age comp, logistic-normal: σ | 37.071 | 2.814 | 31.946 | 43.018 |

Table 2. Abundance at age (1000s).

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10+ |
|------|----------|----------|---------|---------|---------|--------|--------|--------|--------|--------|
| 1968 | 18816968 | 2478591 | 1252615 | 626223 | 218718 | 99424 | 14186 | 24252 | 149863 | 1983 |
| 1969 | 1032959 | 10447090 | 3281254 | 1012486 | 84575 | 45177 | 32095 | 44653 | 32274 | 153365 |
| 1970 | 10743325 | 992884 | 4924634 | 1191158 | 190003 | 47048 | 35608 | 67748 | 68501 | 50595 |
| 1971 | 2778316 | 3569390 | 809131 | 2842074 | 957424 | 160889 | 44319 | 19033 | 22829 | 79157 |
| 1972 | 686895 | 897241 | 1428746 | 806534 | 1629167 | 357767 | 102226 | 16950 | 33519 | 45228 |
| 1973 | 2809426 | 1715055 | 936691 | 621602 | 489884 | 503478 | 84490 | 29592 | 10818 | 14781 |
| 1974 | 1371426 | 1225183 | 753018 | 242186 | 253300 | 244590 | 240446 | 57530 | 15223 | 8952 |
| 1975 | 4394965 | 1822657 | 283393 | 206925 | 114531 | 130119 | 98957 | 94659 | 23265 | 6548 |
| 1976 | 162212 | 1334525 | 590867 | 148710 | 86704 | 44886 | 66095 | 55823 | 36102 | 23925 |
| 1977 | 137532 | 272740 | 458935 | 174285 | 32205 | 26075 | 16705 | 17254 | 10352 | 9421 |
| 1978 | 9399 | 49720 | 117925 | 202207 | 81625 | 28428 | 17348 | 7045 | 24311 | 33743 |
| 1979 | 251621 | 138975 | 12730 | 39667 | 94911 | 57882 | 24816 | 8684 | 7257 | 23155 |
| 1980 | 46898 | 188173 | 51727 | 15463 | 32605 | 65015 | 32926 | 12075 | 7953 | 19147 |
| 1981 | 839815 | 86758 | 89587 | 24788 | 15945 | 32475 | 48172 | 19621 | 8444 | 10505 |
| 1982 | 736484 | 163915 | 22398 | 53150 | 6493 | 15476 | 22548 | 45075 | 14179 | 23105 |
| 1983 | 5065067 | 652268 | 119492 | 12830 | 28178 | 2252 | 2379 | 19521 | 21779 | 23874 |
| 1984 | 32982 | 1058011 | 322436 | 27154 | 5933 | 30706 | 3301 | 3331 | 17324 | 90402 |
| 1985 | 1368697 | 34127 | 1301033 | 199821 | 14758 | 3254 | 16110 | 2000 | 1950 | 57208 |
| 1986 | 200963 | 482029 | 96573 | 849513 | 161425 | 12616 | 3152 | 20553 | 1280 | 36211 |
| 1987 | 235481 | 285400 | 175269 | 56106 | 753254 | 102945 | 15197 | 1818 | 12865 | 19128 |
| 1988 | 746754 | 137708 | 56925 | 43285 | 44657 | 402824 | 81393 | 9535 | 4262 | 19932 |
| 1989 | 344510 | 290807 | 81256 | 41084 | 34444 | 12226 | 431543 | 22081 | 4257 | 11942 |
| 1990 | 175890 | 447788 | 337139 | 49776 | 37367 | 24182 | 4928 | 291493 | 14535 | 5673 |
| 1991 | 133469 | 257934 | 448591 | 152496 | 37973 | 24590 | 20638 | 6744 | 167419 | 6527 |
| 1992 | 350282 | 279320 | 84450 | 244834 | 129032 | 17570 | 11784 | 9365 | 7228 | 111173 |
| 1993 | 327866 | 183188 | 101746 | 59615 | 178011 | 83622 | 16799 | 8302 | 14152 | 62336 |
| 1994 | 860520 | 120397 | 234920 | 164086 | 41303 | 143976 | 40495 | 6821 | 3197 | 23638 |
| 1995 | 876855 | 420588 | 42408 | 152978 | 95367 | 26765 | 95435 | 31128 | 4099 | 8488 |
| 1996 | 535102 | 497973 | 264516 | 14319 | 96018 | 71375 | 15618 | 52125 | 13695 | 3481 |
| 1997 | 442039 | 289333 | 160864 | 64148 | 6270 | 34239 | 26234 | 8901 | 24933 | 5734 |
| 1998 | 94500 | 317953 | 105945 | 71508 | 26537 | 4149 | 17844 | 17498 | 2553 | 6611 |

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

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10+ |
|------|---------|--------|--------|--------|--------|--------|-------|-------|------|------|
| 1999 | 115380 | 93340 | 124028 | 56986 | 29394 | 9520 | 1095 | 6805 | 5177 | 2863 |
| 2000 | 1216365 | 162091 | 49599 | 54196 | 19819 | 9585 | 2352 | 241 | 1373 | 1020 |
| 2001 | 129091 | 429956 | 88810 | 26856 | 25900 | 5860 | 3584 | 1156 | 445 | 223 |
| 2002 | 292046 | 172359 | 637382 | 41875 | 13097 | 17977 | 4791 | 822 | 117 | 92 |
| 2003 | 338763 | 318558 | 168202 | 573218 | 49048 | 17519 | 18335 | 2576 | 8 | 23 |
| 2004 | 699409 | 329786 | 49026 | 41009 | 211900 | 13807 | 4376 | 4455 | 3797 | 22 |
| 2005 | 175645 | 412293 | 152064 | 29916 | 19313 | 111159 | 5597 | 1763 | 177 | 617 |
| 2006 | 377264 | 108850 | 311209 | 80675 | 14358 | 9800 | 46168 | 1387 | 177 | 66 |
| 2007 | 58088 | 254873 | 99014 | 138236 | 25901 | 3946 | 2972 | 11318 | 255 | 9 |
| 2008 | 330944 | 99225 | 145341 | 31347 | 38836 | 4928 | 835 | 649 | 2483 | 44 |
| 2009 | 333503 | 205706 | 31251 | 58274 | 9046 | 11675 | 537 | 174 | 41 | 698 |
| 2010 | 112113 | 151473 | 61248 | 7320 | 16374 | 1843 | 3168 | 115 | 1 | 71 |
| 2011 | 83450 | 18654 | 24378 | 6818 | 617 | 2635 | 246 | 380 | 25 | 22 |
| 2012 | 65126 | 140344 | 8233 | 7095 | 981 | 90 | 86 | 6 | 3 | 1 |
| 2013 | 55523 | 50735 | 36765 | 1124 | 2625 | 194 | 24 | 7 | 1 | 1 |
| 2014 | 231869 | 68567 | 41850 | 13498 | 191 | 138 | 2 | 2 | 1 | 0 |
| 2015 | 302611 | 113580 | 14622 | 8622 | 2751 | 311 | 29 | 9 | 2 | 0 |
| 2016 | 419528 | 136868 | 23041 | 7023 | 4528 | 1741 | 78 | 2 | 2 | 1 |
| 2017 | 33369 | 264473 | 38983 | 8148 | 2992 | 2140 | 469 | 23 | 1 | 1 |
| 2018 | 114158 | 11198 | 138251 | 31612 | 5720 | 847 | 767 | 23 | 3 | 0 |
| 2019 | 75710 | 81991 | 21774 | 40435 | 4775 | 1371 | 299 | 121 | 6 | 1 |
| 2020 | 90102 | 56641 | 73172 | 9830 | 20712 | 2243 | 501 | 12 | 8 | 1 |
| 2021 | 61469 | 64064 | 23590 | 16218 | 3240 | 2649 | 350 | 91 | 13 | 4 |
| 2022 | 477291 | 107141 | 22977 | 4659 | 1270 | 77 | 953 | 221 | 28 | 4 |

Table 3. Total fishing mortality at age.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10+ |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1968 | 0.009 | 0.028 | 0.056 | 0.073 | 0.079 | 0.080 | 0.081 | 0.081 | 0.081 | 0.081 |
| 1969 | 0.009 | 0.026 | 0.052 | 0.068 | 0.074 | 0.075 | 0.076 | 0.076 | 0.076 | 0.076 |
| 1970 | 0.019 | 0.058 | 0.115 | 0.150 | 0.162 | 0.165 | 0.166 | 0.166 | 0.166 | 0.166 |

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

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10+ |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1971 | 0.029 | 0.090 | 0.179 | 0.234 | 0.253 | 0.258 | 0.259 | 0.259 | 0.259 | 0.259 |
| 1972 | 0.036 | 0.109 | 0.217 | 0.284 | 0.306 | 0.312 | 0.313 | 0.314 | 0.314 | 0.314 |
| 1973 | 0.065 | 0.199 | 0.395 | 0.517 | 0.557 | 0.568 | 0.571 | 0.571 | 0.572 | 0.572 |
| 1974 | 0.080 | 0.247 | 0.490 | 0.640 | 0.690 | 0.704 | 0.707 | 0.708 | 0.708 | 0.708 |
| 1975 | 0.091 | 0.279 | 0.553 | 0.722 | 0.779 | 0.794 | 0.798 | 0.799 | 0.799 | 0.799 |
| 1976 | 0.112 | 0.344 | 0.682 | 0.891 | 0.961 | 0.980 | 0.984 | 0.985 | 0.985 | 0.985 |
| 1977 | 0.046 | 0.143 | 0.283 | 0.370 | 0.399 | 0.406 | 0.408 | 0.409 | 0.409 | 0.409 |
| 1978 | 0.016 | 0.049 | 0.098 | 0.127 | 0.138 | 0.140 | 0.141 | 0.141 | 0.141 | 0.141 |
| 1979 | 0.028 | 0.085 | 0.168 | 0.220 | 0.237 | 0.242 | 0.243 | 0.243 | 0.243 | 0.243 |
| 1980 | 0.022 | 0.067 | 0.132 | 0.172 | 0.186 | 0.190 | 0.190 | 0.191 | 0.191 | 0.191 |
| 1981 | 0.025 | 0.078 | 0.155 | 0.202 | 0.218 | 0.222 | 0.223 | 0.224 | 0.224 | 0.224 |
| 1982 | 0.024 | 0.073 | 0.144 | 0.188 | 0.203 | 0.207 | 0.208 | 0.208 | 0.208 | 0.209 |
| 1983 | 0.017 | 0.053 | 0.104 | 0.136 | 0.147 | 0.150 | 0.151 | 0.151 | 0.151 | 0.151 |
| 1984 | 0.018 | 0.056 | 0.112 | 0.146 | 0.157 | 0.160 | 0.161 | 0.161 | 0.161 | 0.161 |
| 1985 | 0.022 | 0.068 | 0.134 | 0.175 | 0.189 | 0.192 | 0.193 | 0.194 | 0.194 | 0.194 |
| 1986 | 0.019 | 0.060 | 0.119 | 0.155 | 0.168 | 0.171 | 0.172 | 0.172 | 0.172 | 0.172 |
| 1987 | 0.023 | 0.071 | 0.141 | 0.184 | 0.199 | 0.203 | 0.203 | 0.204 | 0.204 | 0.204 |
| 1988 | 0.035 | 0.108 | 0.214 | 0.280 | 0.302 | 0.308 | 0.309 | 0.310 | 0.310 | 0.310 |
| 1989 | 0.029 | 0.089 | 0.177 | 0.231 | 0.249 | 0.254 | 0.255 | 0.256 | 0.256 | 0.256 |
| 1990 | 0.036 | 0.111 | 0.221 | 0.289 | 0.311 | 0.317 | 0.319 | 0.319 | 0.319 | 0.319 |
| 1991 | 0.026 | 0.081 | 0.161 | 0.210 | 0.226 | 0.231 | 0.232 | 0.232 | 0.232 | 0.232 |
| 1992 | 0.019 | 0.057 | 0.113 | 0.148 | 0.160 | 0.163 | 0.164 | 0.164 | 0.164 | 0.164 |
| 1993 | 0.019 | 0.059 | 0.117 | 0.153 | 0.165 | 0.168 | 0.169 | 0.169 | 0.169 | 0.169 |
| 1994 | 0.019 | 0.058 | 0.115 | 0.151 | 0.162 | 0.166 | 0.166 | 0.167 | 0.167 | 0.167 |
| 1995 | 0.014 | 0.043 | 0.086 | 0.112 | 0.121 | 0.124 | 0.124 | 0.124 | 0.124 | 0.124 |
| 1996 | 0.022 | 0.066 | 0.132 | 0.172 | 0.186 | 0.190 | 0.190 | 0.191 | 0.191 | 0.191 |
| 1997 | 0.034 | 0.105 | 0.209 | 0.273 | 0.294 | 0.300 | 0.302 | 0.302 | 0.302 | 0.302 |
| 1998 | 0.041 | 0.127 | 0.253 | 0.330 | 0.356 | 0.363 | 0.365 | 0.365 | 0.365 | 0.365 |
| 1999 | 0.055 | 0.170 | 0.338 | 0.441 | 0.476 | 0.486 | 0.488 | 0.488 | 0.488 | 0.488 |
| 2000 | 0.040 | 0.122 | 0.243 | 0.317 | 0.342 | 0.349 | 0.351 | 0.351 | 0.351 | 0.351 |
| 2001 | 0.069 | 0.212 | 0.420 | 0.549 | 0.592 | 0.604 | 0.606 | 0.607 | 0.607 | 0.607 |

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

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10+ |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 2002 | 0.050 | 0.153 | 0.304 | 0.397 | 0.429 | 0.437 | 0.439 | 0.439 | 0.439 | 0.440 |
| 2003 | 0.037 | 0.113 | 0.224 | 0.293 | 0.316 | 0.322 | 0.323 | 0.324 | 0.324 | 0.324 |
| 2004 | 0.118 | 0.363 | 0.720 | 0.940 | 1.015 | 1.034 | 1.039 | 1.040 | 1.040 | 1.041 |
| 2005 | 0.121 | 0.371 | 0.736 | 0.962 | 1.038 | 1.058 | 1.063 | 1.064 | 1.065 | 1.065 |
| 2006 | 0.153 | 0.471 | 0.935 | 1.222 | 1.318 | 1.343 | 1.350 | 1.351 | 1.351 | 1.352 |
| 2007 | 0.115 | 0.353 | 0.700 | 0.914 | 0.987 | 1.006 | 1.010 | 1.011 | 1.012 | 1.012 |
| 2008 | 0.125 | 0.383 | 0.760 | 0.994 | 1.072 | 1.093 | 1.098 | 1.099 | 1.099 | 1.099 |
| 2009 | 0.209 | 0.644 | 1.278 | 1.670 | 1.802 | 1.837 | 1.845 | 1.847 | 1.848 | 1.848 |
| 2010 | 0.216 | 0.663 | 1.316 | 1.719 | 1.855 | 1.891 | 1.900 | 1.902 | 1.902 | 1.902 |
| 2011 | 0.278 | 0.855 | 1.696 | 2.216 | 2.391 | 2.437 | 2.448 | 2.451 | 2.452 | 2.452 |
| 2012 | 0.154 | 0.474 | 0.940 | 1.228 | 1.325 | 1.351 | 1.357 | 1.358 | 1.359 | 1.359 |
| 2013 | 0.213 | 0.657 | 1.302 | 1.702 | 1.836 | 1.871 | 1.880 | 1.882 | 1.883 | 1.883 |
| 2014 | 0.083 | 0.257 | 0.509 | 0.666 | 0.718 | 0.732 | 0.735 | 0.736 | 0.736 | 0.736 |
| 2015 | 0.086 | 0.263 | 0.522 | 0.682 | 0.736 | 0.750 | 0.754 | 0.754 | 0.755 | 0.755 |
| 2016 | 0.087 | 0.269 | 0.533 | 0.696 | 0.751 | 0.766 | 0.769 | 0.770 | 0.770 | 0.770 |
| 2017 | 0.108 | 0.332 | 0.659 | 0.861 | 0.929 | 0.947 | 0.952 | 0.953 | 0.953 | 0.953 |
| 2018 | 0.086 | 0.264 | 0.524 | 0.685 | 0.739 | 0.753 | 0.757 | 0.758 | 0.758 | 0.758 |
| 2019 | 0.106 | 0.326 | 0.646 | 0.844 | 0.910 | 0.928 | 0.932 | 0.933 | 0.933 | 0.933 |
| 2020 | 0.092 | 0.282 | 0.559 | 0.731 | 0.789 | 0.804 | 0.807 | 0.808 | 0.809 | 0.809 |
| 2021 | 0.124 | 0.381 | 0.756 | 0.988 | 1.067 | 1.087 | 1.092 | 1.093 | 1.094 | 1.094 |
| 2022 | 0.019 | 0.058 | 0.114 | 0.150 | 0.161 | 0.164 | 0.165 | 0.165 | 0.165 | 0.165 |