

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 | 330746.054 | 92725.878 | 190922.527 | 572970.377 |
| NAA σ (age 1) | 0.914 | 0.097 | 0.742 | 1.126 |
| NAA σ (age 2-10+) | 0.218 | 0.028 | 0.170 | 0.280 |
| NAA residual AR1 ρ age | 0.000 | — | — | — |
| NAA residual AR1 ρ year | 0.480 | 0.098 | 0.267 | 0.649 |
| 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: Selectivity for age 1 | 0.158 | 0.019 | 0.124 | 0.199 |
| Block 1: Selectivity for age 2 | 0.492 | 0.047 | 0.400 | 0.584 |
| Block 1: Selectivity for age 3 | 0.827 | 0.061 | 0.675 | 0.917 |
| Block 1: Selectivity for age 4 | 1.000 | — | — | — |
| 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 | 1.000 | — | — | — |
| Block 1: Selectivity for age 10+ | 1.000 | — | — | — |
| 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 | — | — | — |

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 | 1.000 | — | — | — |
| 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 | — | — | — |
| Block 3: Selectivity for age 4 | 0.511 | 0.158 | 0.233 | 0.783 |
| Block 3: Selectivity for age 5 | 0.267 | 0.108 | 0.110 | 0.517 |
| Block 3: Selectivity for age 6 | 0.238 | 0.095 | 0.101 | 0.467 |
| 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 | 0.736 | 0.128 | 0.433 | 0.910 |
| Block 4: Selectivity for age 5 | 0.577 | 0.130 | 0.325 | 0.794 |
| Block 4: Selectivity for age 6 | 0.455 | 0.119 | 0.246 | 0.680 |

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 | 0.594 | 0.168 | 0.273 | 0.851 |
| Block 4: Selectivity for age 8 | 0.586 | 0.182 | 0.245 | 0.860 |
| Block 4: Selectivity for age 9 | 0.873 | 0.285 | 0.043 | 0.999 |
| Block 4: Selectivity for age 10+ | 0.710 | 0.231 | 0.214 | 0.957 |
| Fleet 1 age comp, logistic-normal: σ | 41.464 | 3.687 | 34.831 | 49.359 |
| Fleet 1 age comp, logistic-normal: ρ | 0.912 | 0.017 | 0.873 | 0.941 |
| Index 2 age comp, logistic-normal: σ | 36.626 | 5.973 | 26.605 | 50.421 |
| Index 2 age comp, logistic-normal: ρ | 0.560 | 0.169 | 0.249 | 0.830 |
| Index 3 age comp, logistic-normal: σ | 36.487 | 3.449 | 30.317 | 43.913 |
| Index 3 age comp, logistic-normal: ρ | 0.680 | 0.068 | 0.534 | 0.797 |

Table 2. Abundance at age (1000s).

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10+ |
|------|---------|---------|---------|---------|---------|--------|--------|--------|-------|-------|
| 1968 | 1962213 | 1473030 | 920451 | 478332 | 226082 | 106856 | 50505 | 23871 | 11283 | 10112 |
| 1969 | 497195 | 2349696 | 1356019 | 709020 | 210179 | 115677 | 66315 | 41907 | 18919 | 16453 |
| 1970 | 1849900 | 522414 | 2439793 | 1108105 | 363731 | 104624 | 63516 | 50535 | 33506 | 25200 |
| 1971 | 988460 | 1515728 | 576108 | 1988961 | 667790 | 188297 | 54716 | 38187 | 36142 | 37163 |
| 1972 | 852949 | 786361 | 1103508 | 524830 | 1231618 | 327840 | 97677 | 25437 | 24794 | 38526 |
| 1973 | 837217 | 708591 | 535671 | 674118 | 420319 | 669969 | 165520 | 48431 | 15076 | 31126 |
| 1974 | 1114193 | 631641 | 447065 | 263057 | 362223 | 246991 | 297062 | 75238 | 22660 | 19456 |
| 1975 | 1195599 | 890881 | 318878 | 225661 | 116381 | 178815 | 118680 | 124600 | 32733 | 17054 |
| 1976 | 195122 | 885891 | 431646 | 138253 | 87384 | 47369 | 71646 | 48634 | 46898 | 19431 |
| 1977 | 56634 | 148159 | 335002 | 142728 | 41778 | 28108 | 14214 | 21807 | 15041 | 21481 |
| 1978 | 41700 | 44803 | 81117 | 177444 | 76108 | 26112 | 15411 | 7014 | 13290 | 21913 |
| 1979 | 114207 | 42100 | 22274 | 57268 | 127997 | 57263 | 18932 | 10732 | 5533 | 26896 |
| 1980 | 34415 | 104238 | 23295 | 15433 | 40955 | 94279 | 36433 | 12723 | 8341 | 22004 |
| 1981 | 146566 | 25841 | 70730 | 14768 | 11895 | 32151 | 64030 | 27126 | 9380 | 22035 |
| 1982 | 415623 | 99400 | 15723 | 55704 | 8419 | 9416 | 20697 | 46538 | 18637 | 21242 |
| 1983 | 1474178 | 299427 | 63716 | 11041 | 37772 | 5921 | 5704 | 17472 | 29953 | 27864 |
| 1984 | 60865 | 1108392 | 231098 | 38118 | 7298 | 26372 | 4471 | 4287 | 11063 | 41218 |
| 1985 | 284872 | 41479 | 972751 | 159933 | 23920 | 4829 | 23699 | 3521 | 2840 | 35874 |
| 1986 | 137011 | 174290 | 38423 | 698962 | 110505 | 14280 | 3433 | 18955 | 2114 | 23909 |
| 1987 | 122132 | 103717 | 103452 | 30258 | 539976 | 65207 | 10040 | 2264 | 13347 | 16031 |
| 1988 | 403542 | 95143 | 64472 | 56393 | 22038 | 313130 | 39251 | 5331 | 1527 | 18187 |
| 1989 | 476153 | 319949 | 61003 | 34952 | 33005 | 10041 | 194545 | 17638 | 2925 | 10970 |
| 1990 | 145385 | 404555 | 227510 | 33018 | 21012 | 18331 | 5196 | 117292 | 9009 | 7313 |
| 1991 | 146549 | 113355 | 282183 | 116832 | 16371 | 10427 | 8351 | 2722 | 57263 | 7271 |
| 1992 | 161976 | 124558 | 66676 | 171704 | 66722 | 9041 | 5197 | 4289 | 1659 | 31193 |
| 1993 | 62369 | 120747 | 91821 | 41291 | 111283 | 38456 | 5618 | 2608 | 2809 | 17060 |
| 1994 | 207400 | 36006 | 94189 | 67441 | 23379 | 69721 | 21610 | 3212 | 1411 | 9528 |
| 1995 | 205751 | 135699 | 19881 | 60704 | 43091 | 12241 | 37283 | 11219 | 1617 | 4586 |
| 1996 | 166214 | 143479 | 86722 | 10124 | 39976 | 27814 | 6780 | 19228 | 6309 | 2804 |
| 1997 | 200326 | 122749 | 83037 | 36944 | 4598 | 18779 | 13357 | 2681 | 8186 | 3453 |
| 1998 | 79530 | 160267 | 71883 | 39046 | 13372 | 1994 | 8097 | 5420 | 1032 | 3801 |

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

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10+ |
|------|--------|--------|--------|--------|--------|-------|-------|------|------|------|
| 1999 | 106837 | 65136 | 94906 | 33555 | 15442 | 4982 | 753 | 3309 | 2028 | 1508 |
| 2000 | 617171 | 86373 | 40788 | 40796 | 12851 | 5494 | 1632 | 277 | 1248 | 974 |
| 2001 | 167233 | 533920 | 66903 | 21705 | 20755 | 5858 | 2393 | 637 | 147 | 826 |
| 2002 | 181769 | 129206 | 517770 | 36143 | 12048 | 9794 | 3043 | 940 | 276 | 409 |
| 2003 | 337477 | 137344 | 93334 | 322240 | 21239 | 5921 | 4747 | 1315 | 364 | 315 |
| 2004 | 634542 | 284537 | 74748 | 46320 | 172232 | 9529 | 2726 | 1668 | 470 | 285 |
| 2005 | 199303 | 509210 | 147356 | 25004 | 13578 | 56357 | 2743 | 767 | 301 | 202 |
| 2006 | 454782 | 143799 | 320600 | 51177 | 6884 | 3932 | 17185 | 755 | 150 | 124 |
| 2007 | 106336 | 320977 | 75202 | 97795 | 11188 | 1408 | 851 | 3885 | 129 | 52 |
| 2008 | 223946 | 72667 | 180153 | 24062 | 28659 | 2824 | 345 | 214 | 875 | 47 |
| 2009 | 208495 | 154236 | 36239 | 67909 | 7115 | 9603 | 782 | 98 | 45 | 306 |
| 2010 | 50762 | 123381 | 52068 | 6775 | 10693 | 1035 | 1445 | 123 | 8 | 57 |
| 2011 | 144679 | 23869 | 27089 | 4555 | 414 | 638 | 55 | 81 | 5 | 4 |
| 2012 | 81973 | 97424 | 7880 | 6452 | 808 | 75 | 95 | 9 | 12 | 2 |
| 2013 | 57355 | 56011 | 39123 | 1769 | 1480 | 140 | 11 | 17 | 2 | 2 |
| 2014 | 92029 | 35624 | 26306 | 11004 | 498 | 352 | 20 | 3 | 4 | 1 |
| 2015 | 136016 | 56590 | 15162 | 8987 | 2793 | 180 | 55 | 5 | 1 | 1 |
| 2016 | 305228 | 89699 | 23091 | 4936 | 2609 | 909 | 40 | 13 | 1 | 0 |
| 2017 | 34080 | 219853 | 43306 | 9020 | 1626 | 963 | 254 | 11 | 4 | 1 |
| 2018 | 116061 | 21700 | 125820 | 17466 | 3449 | 541 | 327 | 70 | 4 | 2 |
| 2019 | 70688 | 72288 | 14078 | 50101 | 5953 | 1372 | 192 | 93 | 23 | 2 |
| 2020 | 85904 | 46100 | 43188 | 6292 | 17693 | 2156 | 621 | 55 | 33 | 9 |
| 2021 | 87001 | 57493 | 22306 | 13507 | 1725 | 4047 | 658 | 149 | 14 | 11 |
| 2022 | 226289 | 62344 | 28387 | 8191 | 4202 | 394 | 1578 | 197 | 46 | 8 |

Table 3. Total fishing mortality at age.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10+ |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1968 | 0.019 | 0.060 | 0.102 | 0.123 | 0.123 | 0.123 | 0.123 | 0.123 | 0.123 | 0.123 |
| 1969 | 0.023 | 0.072 | 0.121 | 0.146 | 0.146 | 0.146 | 0.146 | 0.146 | 0.146 | 0.146 |
| 1970 | 0.036 | 0.112 | 0.189 | 0.228 | 0.228 | 0.228 | 0.228 | 0.228 | 0.228 | 0.228 |

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

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10+ |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1971 | 0.056 | 0.173 | 0.291 | 0.352 | 0.352 | 0.352 | 0.352 | 0.352 | 0.352 | 0.352 |
| 1972 | 0.059 | 0.185 | 0.311 | 0.376 | 0.376 | 0.376 | 0.376 | 0.376 | 0.376 | 0.376 |
| 1973 | 0.087 | 0.272 | 0.458 | 0.554 | 0.554 | 0.554 | 0.554 | 0.554 | 0.554 | 0.554 |
| 1974 | 0.102 | 0.318 | 0.534 | 0.646 | 0.646 | 0.646 | 0.646 | 0.646 | 0.646 | 0.646 |
| 1975 | 0.124 | 0.385 | 0.648 | 0.783 | 0.783 | 0.783 | 0.783 | 0.783 | 0.783 | 0.783 |
| 1976 | 0.163 | 0.507 | 0.853 | 1.031 | 1.031 | 1.031 | 1.031 | 1.031 | 1.031 | 1.031 |
| 1977 | 0.068 | 0.212 | 0.357 | 0.432 | 0.432 | 0.432 | 0.432 | 0.432 | 0.432 | 0.432 |
| 1978 | 0.025 | 0.079 | 0.133 | 0.161 | 0.161 | 0.161 | 0.161 | 0.161 | 0.161 | 0.161 |
| 1979 | 0.033 | 0.103 | 0.174 | 0.210 | 0.210 | 0.210 | 0.210 | 0.210 | 0.210 | 0.210 |
| 1980 | 0.027 | 0.084 | 0.142 | 0.171 | 0.171 | 0.171 | 0.171 | 0.171 | 0.171 | 0.171 |
| 1981 | 0.035 | 0.110 | 0.186 | 0.225 | 0.225 | 0.225 | 0.225 | 0.225 | 0.225 | 0.225 |
| 1982 | 0.033 | 0.104 | 0.175 | 0.211 | 0.211 | 0.211 | 0.211 | 0.211 | 0.211 | 0.211 |
| 1983 | 0.032 | 0.101 | 0.170 | 0.205 | 0.205 | 0.205 | 0.205 | 0.205 | 0.205 | 0.205 |
| 1984 | 0.026 | 0.081 | 0.135 | 0.164 | 0.164 | 0.164 | 0.164 | 0.164 | 0.164 | 0.164 |
| 1985 | 0.035 | 0.110 | 0.186 | 0.224 | 0.224 | 0.224 | 0.224 | 0.224 | 0.224 | 0.224 |
| 1986 | 0.034 | 0.106 | 0.179 | 0.216 | 0.216 | 0.216 | 0.216 | 0.216 | 0.216 | 0.216 |
| 1987 | 0.048 | 0.148 | 0.249 | 0.301 | 0.301 | 0.301 | 0.301 | 0.301 | 0.301 | 0.301 |
| 1988 | 0.067 | 0.208 | 0.350 | 0.422 | 0.422 | 0.422 | 0.422 | 0.422 | 0.422 | 0.422 |
| 1989 | 0.063 | 0.195 | 0.328 | 0.397 | 0.397 | 0.397 | 0.397 | 0.397 | 0.397 | 0.397 |
| 1990 | 0.083 | 0.257 | 0.433 | 0.523 | 0.523 | 0.523 | 0.523 | 0.523 | 0.523 | 0.523 |
| 1991 | 0.065 | 0.202 | 0.340 | 0.411 | 0.411 | 0.411 | 0.411 | 0.411 | 0.411 | 0.411 |
| 1992 | 0.048 | 0.150 | 0.253 | 0.306 | 0.306 | 0.306 | 0.306 | 0.306 | 0.306 | 0.306 |
| 1993 | 0.050 | 0.155 | 0.261 | 0.316 | 0.316 | 0.316 | 0.316 | 0.316 | 0.316 | 0.316 |
| 1994 | 0.062 | 0.193 | 0.325 | 0.392 | 0.392 | 0.392 | 0.392 | 0.392 | 0.392 | 0.392 |
| 1995 | 0.050 | 0.156 | 0.263 | 0.318 | 0.318 | 0.318 | 0.318 | 0.318 | 0.318 | 0.318 |
| 1996 | 0.087 | 0.271 | 0.456 | 0.551 | 0.551 | 0.551 | 0.551 | 0.551 | 0.551 | 0.551 |
| 1997 | 0.099 | 0.309 | 0.520 | 0.629 | 0.629 | 0.629 | 0.629 | 0.629 | 0.629 | 0.629 |
| 1998 | 0.106 | 0.329 | 0.553 | 0.669 | 0.669 | 0.669 | 0.669 | 0.669 | 0.669 | 0.669 |
| 1999 | 0.117 | 0.363 | 0.611 | 0.739 | 0.739 | 0.739 | 0.739 | 0.739 | 0.739 | 0.739 |
| 2000 | 0.077 | 0.240 | 0.404 | 0.488 | 0.488 | 0.488 | 0.488 | 0.488 | 0.488 | 0.488 |
| 2001 | 0.074 | 0.229 | 0.386 | 0.467 | 0.467 | 0.467 | 0.467 | 0.467 | 0.467 | 0.467 |

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

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10+ |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 2002 | 0.075 | 0.233 | 0.392 | 0.474 | 0.474 | 0.474 | 0.474 | 0.474 | 0.474 | 0.474 |
| 2003 | 0.096 | 0.300 | 0.504 | 0.609 | 0.609 | 0.609 | 0.609 | 0.609 | 0.609 | 0.609 |
| 2004 | 0.169 | 0.525 | 0.884 | 1.068 | 1.068 | 1.068 | 1.068 | 1.068 | 1.068 | 1.068 |
| 2005 | 0.171 | 0.531 | 0.894 | 1.080 | 1.080 | 1.080 | 1.080 | 1.080 | 1.080 | 1.080 |
| 2006 | 0.210 | 0.653 | 1.099 | 1.328 | 1.328 | 1.328 | 1.328 | 1.328 | 1.328 | 1.328 |
| 2007 | 0.178 | 0.553 | 0.930 | 1.124 | 1.124 | 1.124 | 1.124 | 1.124 | 1.124 | 1.124 |
| 2008 | 0.159 | 0.494 | 0.832 | 1.005 | 1.005 | 1.005 | 1.005 | 1.005 | 1.005 | 1.005 |
| 2009 | 0.275 | 0.857 | 1.442 | 1.743 | 1.743 | 1.743 | 1.743 | 1.743 | 1.743 | 1.743 |
| 2010 | 0.421 | 1.312 | 2.208 | 2.668 | 2.668 | 2.668 | 2.668 | 2.668 | 2.668 | 2.668 |
| 2011 | 0.247 | 0.768 | 1.292 | 1.562 | 1.562 | 1.562 | 1.562 | 1.562 | 1.562 | 1.562 |
| 2012 | 0.231 | 0.721 | 1.213 | 1.466 | 1.466 | 1.466 | 1.466 | 1.466 | 1.466 | 1.466 |
| 2013 | 0.201 | 0.626 | 1.053 | 1.273 | 1.273 | 1.273 | 1.273 | 1.273 | 1.273 | 1.273 |
| 2014 | 0.184 | 0.572 | 0.963 | 1.164 | 1.164 | 1.164 | 1.164 | 1.164 | 1.164 | 1.164 |
| 2015 | 0.169 | 0.527 | 0.886 | 1.071 | 1.071 | 1.071 | 1.071 | 1.071 | 1.071 | 1.071 |
| 2016 | 0.141 | 0.438 | 0.738 | 0.891 | 0.891 | 0.891 | 0.891 | 0.891 | 0.891 | 0.891 |
| 2017 | 0.133 | 0.413 | 0.695 | 0.840 | 0.840 | 0.840 | 0.840 | 0.840 | 0.840 | 0.840 |
| 2018 | 0.127 | 0.396 | 0.667 | 0.806 | 0.806 | 0.806 | 0.806 | 0.806 | 0.806 | 0.806 |
| 2019 | 0.118 | 0.368 | 0.620 | 0.749 | 0.749 | 0.749 | 0.749 | 0.749 | 0.749 | 0.749 |
| 2020 | 0.170 | 0.531 | 0.893 | 1.079 | 1.079 | 1.079 | 1.079 | 1.079 | 1.079 | 1.079 |
| 2021 | 0.147 | 0.458 | 0.771 | 0.931 | 0.931 | 0.931 | 0.931 | 0.931 | 0.931 | 0.931 |
| 2022 | 0.026 | 0.081 | 0.136 | 0.165 | 0.165 | 0.165 | 0.165 | 0.165 | 0.165 | 0.165 |