

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) | 0.860 | 0.114 | 0.664 | 1.114 |
| NAA σ (age 2-10+) | 0.511 | 0.030 | 0.456 | 0.573 |
| NAA residual AR1 ρ age | 0.000 | — | — | — |
| NAA residual AR1 ρ year | 0.000 | — | — | — |
| 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 | 0.849 | 0.387 | 0.015 | 1.000 |
| Block 1: Selectivity for age 2 | 0.849 | 0.387 | 0.015 | 1.000 |
| Block 1: Selectivity for age 3 | 0.849 | 0.387 | 0.015 | 1.000 |
| Block 1: Selectivity for age 4 | 0.849 | 0.387 | 0.015 | 1.000 |
| Block 1: Selectivity for age 5 | 0.849 | 0.387 | 0.015 | 1.000 |
| Block 1: Selectivity for age 6 | 1.000 | — | — | — |
| Block 1: Selectivity for age 7 | 0.849 | 0.387 | 0.015 | 1.000 |
| Block 1: Selectivity for age 8 | 0.849 | 0.387 | 0.015 | 1.000 |
| Block 1: Selectivity for age 9 | 0.849 | 0.387 | 0.015 | 1.000 |
| Block 1: Selectivity for age 10+ | 0.849 | 0.387 | 0.015 | 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 | — | — | — |
| Block 2: Selectivity for age 5 | 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 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 | 0.451 | 0.183 | 0.161 | 0.778 |
| Block 3: Selectivity for age 5 | 0.227 | 0.094 | 0.093 | 0.457 |
| Block 3: Selectivity for age 6 | 0.213 | 0.072 | 0.105 | 0.385 |
| 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 | 0.689 | 0.161 | 0.337 | 0.906 |
| Block 4: Selectivity for age 5 | 0.528 | 0.123 | 0.299 | 0.746 |
| Block 4: Selectivity for age 6 | 0.466 | 0.089 | 0.303 | 0.637 |
| Block 4: Selectivity for age 7 | 0.000 | — | — | — |

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 4: Selectivity for age 8 | 0.000 | — | — | — |
| Block 4: Selectivity for age 9 | 0.000 | — | — | — |
| Block 4: Selectivity for age 10+ | 0.000 | — | — | — |
| Block 1: Selectivity RE σ | 1.226 | 0.439 | 0.607 | 2.475 |
| Block 1: Selectivity RE AR1 ρ (age) | 0.928 | 0.102 | 0.205 | 0.996 |
| Fleet 1 age comp, logistic-normal: σ | 17.425 | 1.066 | 15.456 | 19.644 |
| Index 2 age comp, logistic-normal: σ | 33.786 | 5.177 | 25.021 | 45.622 |
| Index 3 age comp, logistic-normal: σ | 29.082 | 3.126 | 23.557 | 35.903 |

Table 2. Abundance at age (1000s).

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10+ |
|------|---------|---------|---------|---------|---------|--------|--------|--------|--------|-------|
| 1968 | 3810237 | 2823411 | 1666991 | 794577 | 345279 | 139750 | 45505 | 15973 | 5321 | 2624 |
| 1969 | 1376552 | 4336159 | 1988508 | 708770 | 149848 | 73160 | 48541 | 35079 | 12470 | 83846 |
| 1970 | 3943227 | 1005399 | 3783344 | 1257613 | 287731 | 62780 | 38472 | 38541 | 36927 | 42559 |
| 1971 | 1851027 | 2564236 | 843233 | 2537216 | 737108 | 149923 | 35087 | 22154 | 19686 | 61515 |
| 1972 | 1130237 | 1032171 | 1466706 | 714769 | 1373416 | 317744 | 76295 | 17060 | 15494 | 37606 |
| 1973 | 1794666 | 1007532 | 723378 | 827281 | 503355 | 620368 | 130211 | 33466 | 9109 | 14455 |
| 1974 | 1814800 | 968856 | 503616 | 301586 | 427186 | 264472 | 256510 | 65189 | 13313 | 8929 |
| 1975 | 1892314 | 1469142 | 352084 | 242983 | 121165 | 187928 | 118501 | 98104 | 31207 | 6640 |
| 1976 | 270279 | 1130948 | 678523 | 159845 | 97233 | 49841 | 68460 | 51517 | 30054 | 22123 |
| 1977 | 101166 | 200588 | 429451 | 215005 | 54552 | 31558 | 16015 | 22961 | 17063 | 10674 |
| 1978 | 42610 | 44914 | 98961 | 209424 | 105924 | 33195 | 15729 | 7946 | 14632 | 31504 |
| 1979 | 156575 | 53559 | 19790 | 54511 | 137724 | 75124 | 22997 | 9575 | 5832 | 22131 |
| 1980 | 83563 | 140755 | 28306 | 15871 | 39735 | 105700 | 36344 | 13292 | 5925 | 17553 |
| 1981 | 371895 | 47895 | 104354 | 16961 | 16698 | 36227 | 61388 | 20813 | 9253 | 9549 |
| 1982 | 706608 | 184490 | 17167 | 54212 | 7291 | 14984 | 23441 | 41986 | 12476 | 19761 |
| 1983 | 1474944 | 517399 | 112254 | 13269 | 26874 | 3532 | 4809 | 17471 | 30314 | 22653 |
| 1984 | 112958 | 1188649 | 320123 | 57329 | 8882 | 11042 | 2570 | 2891 | 12206 | 80181 |
| 1985 | 444558 | 61945 | 1175130 | 202008 | 24319 | 4374 | 12659 | 1688 | 1756 | 51787 |
| 1986 | 199835 | 274030 | 59784 | 956458 | 143106 | 13442 | 2730 | 11458 | 950 | 27140 |
| 1987 | 192137 | 134554 | 123574 | 46115 | 773633 | 90182 | 9879 | 1919 | 8030 | 14111 |
| 1988 | 397069 | 110870 | 59306 | 51736 | 29867 | 514214 | 48268 | 6024 | 1722 | 13885 |
| 1989 | 362413 | 284052 | 68715 | 39593 | 30646 | 12932 | 366560 | 21182 | 3193 | 9823 |
| 1990 | 187737 | 377645 | 224660 | 43199 | 28440 | 22708 | 6707 | 243686 | 10158 | 4839 |
| 1991 | 150734 | 135138 | 354625 | 147271 | 21241 | 17602 | 13124 | 4569 | 123102 | 4736 |
| 1992 | 186037 | 132610 | 71157 | 218399 | 93736 | 11672 | 7883 | 7211 | 3096 | 66842 |
| 1993 | 145558 | 138579 | 94382 | 44251 | 135332 | 50597 | 7340 | 4057 | 5140 | 33314 |
| 1994 | 298681 | 62690 | 137486 | 86928 | 27051 | 82763 | 25080 | 3694 | 1847 | 12318 |
| 1995 | 323707 | 191249 | 26604 | 91578 | 67421 | 15326 | 45320 | 13514 | 1777 | 4187 |
| 1996 | 249919 | 204877 | 116429 | 11531 | 51752 | 53998 | 8963 | 25781 | 6931 | 1929 |
| 1997 | 214063 | 153419 | 101774 | 50456 | 6396 | 19783 | 20748 | 4613 | 11604 | 3502 |
| 1998 | 91853 | 164402 | 82427 | 46813 | 16438 | 3461 | 9304 | 8895 | 1742 | 4390 |

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

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10+ |
|------|--------|--------|--------|--------|--------|-------|-------|------|------|------|
| 1999 | 120885 | 63274 | 102364 | 40634 | 19645 | 5507 | 936 | 3218 | 2601 | 1881 |
| 2000 | 411034 | 97530 | 43508 | 45472 | 15038 | 5949 | 1616 | 285 | 709 | 686 |
| 2001 | 176255 | 364221 | 73288 | 25784 | 22724 | 6056 | 1360 | 594 | 159 | 173 |
| 2002 | 225568 | 143952 | 592674 | 42275 | 13177 | 9658 | 3602 | 157 | 133 | 67 |
| 2003 | 322619 | 156068 | 124419 | 521754 | 31778 | 6118 | 6288 | 2752 | 7 | 81 |
| 2004 | 460002 | 255263 | 65051 | 52508 | 238224 | 11700 | 2975 | 2015 | 2650 | 38 |
| 2005 | 214189 | 400712 | 149194 | 28819 | 18603 | 99764 | 3789 | 782 | 227 | 501 |
| 2006 | 286792 | 134712 | 354159 | 72893 | 10872 | 6105 | 34232 | 1058 | 107 | 56 |
| 2007 | 110396 | 248951 | 88022 | 134028 | 20243 | 2199 | 1573 | 8625 | 185 | 8 |
| 2008 | 223834 | 73263 | 196020 | 28160 | 31879 | 4297 | 458 | 345 | 2140 | 34 |
| 2009 | 228650 | 164397 | 37395 | 76937 | 8178 | 9554 | 807 | 81 | 54 | 628 |
| 2010 | 84975 | 140162 | 54449 | 7987 | 14323 | 1495 | 1591 | 123 | 4 | 76 |
| 2011 | 93374 | 24834 | 30250 | 7787 | 966 | 1090 | 115 | 110 | 11 | 14 |
| 2012 | 84507 | 88219 | 8553 | 7937 | 1445 | 151 | 89 | 10 | 4 | 2 |
| 2013 | 84879 | 54327 | 36563 | 1548 | 1432 | 225 | 17 | 8 | 1 | 1 |
| 2014 | 154808 | 57276 | 27134 | 10828 | 404 | 146 | 13 | 3 | 1 | 0 |
| 2015 | 184865 | 70876 | 22765 | 9670 | 3330 | 225 | 17 | 7 | 1 | 0 |
| 2016 | 232038 | 108056 | 24872 | 7252 | 3751 | 1605 | 65 | 2 | 2 | 0 |
| 2017 | 44065 | 197235 | 45341 | 9836 | 2538 | 1385 | 356 | 17 | 1 | 0 |
| 2018 | 91850 | 20776 | 128566 | 22415 | 4159 | 771 | 388 | 24 | 4 | 0 |
| 2019 | 76311 | 73678 | 14205 | 49808 | 6511 | 1549 | 184 | 71 | 5 | 1 |
| 2020 | 88763 | 50558 | 50240 | 7477 | 16734 | 2430 | 448 | 36 | 9 | 2 |
| 2021 | 100159 | 57023 | 22444 | 15110 | 1948 | 2999 | 558 | 92 | 12 | 2 |
| 2022 | 271210 | 76798 | 26977 | 6478 | 3183 | 219 | 785 | 227 | 20 | 3 |

Table 3. Total fishing mortality at age.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10+ |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1968 | 0.011 | 0.035 | 0.057 | 0.067 | 0.074 | 0.097 | 0.090 | 0.095 | 0.096 | 0.096 |
| 1969 | 0.016 | 0.051 | 0.085 | 0.099 | 0.111 | 0.145 | 0.133 | 0.141 | 0.143 | 0.142 |
| 1970 | 0.026 | 0.085 | 0.140 | 0.164 | 0.182 | 0.239 | 0.219 | 0.233 | 0.235 | 0.234 |

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

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10+ |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1971 | 0.041 | 0.133 | 0.221 | 0.259 | 0.288 | 0.376 | 0.346 | 0.367 | 0.371 | 0.370 |
| 1972 | 0.046 | 0.150 | 0.248 | 0.291 | 0.323 | 0.423 | 0.389 | 0.413 | 0.417 | 0.416 |
| 1973 | 0.067 | 0.221 | 0.365 | 0.428 | 0.475 | 0.622 | 0.572 | 0.607 | 0.614 | 0.611 |
| 1974 | 0.078 | 0.257 | 0.425 | 0.498 | 0.554 | 0.725 | 0.666 | 0.707 | 0.715 | 0.712 |
| 1975 | 0.092 | 0.301 | 0.497 | 0.582 | 0.648 | 0.848 | 0.779 | 0.827 | 0.836 | 0.833 |
| 1976 | 0.112 | 0.366 | 0.606 | 0.710 | 0.789 | 1.033 | 0.949 | 1.008 | 1.018 | 1.015 |
| 1977 | 0.047 | 0.153 | 0.254 | 0.297 | 0.330 | 0.432 | 0.397 | 0.421 | 0.426 | 0.424 |
| 1978 | 0.018 | 0.058 | 0.097 | 0.113 | 0.126 | 0.165 | 0.152 | 0.161 | 0.163 | 0.162 |
| 1979 | 0.025 | 0.083 | 0.137 | 0.160 | 0.178 | 0.233 | 0.214 | 0.227 | 0.230 | 0.229 |
| 1980 | 0.020 | 0.065 | 0.108 | 0.126 | 0.140 | 0.183 | 0.168 | 0.179 | 0.181 | 0.180 |
| 1981 | 0.026 | 0.086 | 0.142 | 0.167 | 0.185 | 0.242 | 0.223 | 0.236 | 0.239 | 0.238 |
| 1982 | 0.025 | 0.082 | 0.136 | 0.159 | 0.176 | 0.231 | 0.212 | 0.225 | 0.228 | 0.227 |
| 1983 | 0.024 | 0.078 | 0.129 | 0.151 | 0.168 | 0.219 | 0.202 | 0.214 | 0.216 | 0.215 |
| 1984 | 0.018 | 0.061 | 0.100 | 0.117 | 0.131 | 0.171 | 0.157 | 0.167 | 0.168 | 0.168 |
| 1985 | 0.027 | 0.089 | 0.147 | 0.173 | 0.192 | 0.251 | 0.231 | 0.245 | 0.248 | 0.247 |
| 1986 | 0.024 | 0.078 | 0.130 | 0.152 | 0.169 | 0.221 | 0.203 | 0.216 | 0.218 | 0.217 |
| 1987 | 0.029 | 0.095 | 0.157 | 0.184 | 0.205 | 0.268 | 0.246 | 0.262 | 0.265 | 0.264 |
| 1988 | 0.033 | 0.108 | 0.179 | 0.210 | 0.233 | 0.306 | 0.281 | 0.298 | 0.301 | 0.300 |
| 1989 | 0.035 | 0.115 | 0.189 | 0.222 | 0.247 | 0.323 | 0.297 | 0.315 | 0.318 | 0.317 |
| 1990 | 0.047 | 0.156 | 0.257 | 0.301 | 0.335 | 0.439 | 0.403 | 0.428 | 0.433 | 0.431 |
| 1991 | 0.038 | 0.124 | 0.206 | 0.241 | 0.268 | 0.351 | 0.322 | 0.342 | 0.346 | 0.344 |
| 1992 | 0.030 | 0.097 | 0.161 | 0.189 | 0.210 | 0.275 | 0.252 | 0.268 | 0.271 | 0.270 |
| 1993 | 0.033 | 0.107 | 0.177 | 0.207 | 0.230 | 0.301 | 0.277 | 0.294 | 0.297 | 0.296 |
| 1994 | 0.039 | 0.128 | 0.212 | 0.248 | 0.276 | 0.361 | 0.332 | 0.353 | 0.356 | 0.355 |
| 1995 | 0.030 | 0.099 | 0.163 | 0.191 | 0.213 | 0.278 | 0.255 | 0.271 | 0.274 | 0.273 |
| 1996 | 0.047 | 0.155 | 0.257 | 0.301 | 0.335 | 0.438 | 0.403 | 0.428 | 0.432 | 0.431 |
| 1997 | 0.064 | 0.209 | 0.346 | 0.405 | 0.451 | 0.590 | 0.542 | 0.575 | 0.581 | 0.579 |
| 1998 | 0.080 | 0.261 | 0.431 | 0.505 | 0.562 | 0.735 | 0.675 | 0.717 | 0.725 | 0.722 |
| 1999 | 0.096 | 0.314 | 0.520 | 0.609 | 0.677 | 0.886 | 0.814 | 0.864 | 0.873 | 0.870 |
| 2000 | 0.076 | 0.250 | 0.413 | 0.484 | 0.538 | 0.704 | 0.647 | 0.687 | 0.694 | 0.691 |
| 2001 | 0.087 | 0.284 | 0.470 | 0.551 | 0.613 | 0.802 | 0.736 | 0.782 | 0.790 | 0.788 |

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

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10+ |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 2002 | 0.063 | 0.206 | 0.340 | 0.398 | 0.443 | 0.580 | 0.533 | 0.566 | 0.572 | 0.570 |
| 2003 | 0.056 | 0.184 | 0.305 | 0.357 | 0.398 | 0.520 | 0.478 | 0.507 | 0.513 | 0.511 |
| 2004 | 0.127 | 0.416 | 0.688 | 0.805 | 0.896 | 1.172 | 1.077 | 1.144 | 1.156 | 1.152 |
| 2005 | 0.134 | 0.438 | 0.725 | 0.849 | 0.944 | 1.236 | 1.135 | 1.205 | 1.219 | 1.214 |
| 2006 | 0.167 | 0.547 | 0.905 | 1.060 | 1.178 | 1.542 | 1.416 | 1.504 | 1.520 | 1.515 |
| 2007 | 0.138 | 0.453 | 0.749 | 0.877 | 0.976 | 1.277 | 1.173 | 1.246 | 1.259 | 1.254 |
| 2008 | 0.132 | 0.433 | 0.716 | 0.838 | 0.932 | 1.220 | 1.121 | 1.190 | 1.203 | 1.198 |
| 2009 | 0.217 | 0.713 | 1.180 | 1.381 | 1.536 | 2.010 | 1.847 | 1.961 | 1.982 | 1.975 |
| 2010 | 0.258 | 0.847 | 1.402 | 1.642 | 1.826 | 2.389 | 2.195 | 2.331 | 2.356 | 2.347 |
| 2011 | 0.233 | 0.765 | 1.265 | 1.482 | 1.648 | 2.157 | 1.981 | 2.104 | 2.126 | 2.118 |
| 2012 | 0.216 | 0.708 | 1.172 | 1.373 | 1.527 | 1.998 | 1.835 | 1.949 | 1.970 | 1.962 |
| 2013 | 0.202 | 0.664 | 1.098 | 1.286 | 1.430 | 1.872 | 1.719 | 1.825 | 1.845 | 1.838 |
| 2014 | 0.130 | 0.427 | 0.707 | 0.827 | 0.920 | 1.204 | 1.106 | 1.175 | 1.187 | 1.183 |
| 2015 | 0.114 | 0.373 | 0.617 | 0.722 | 0.803 | 1.051 | 0.966 | 1.025 | 1.036 | 1.032 |
| 2016 | 0.117 | 0.384 | 0.635 | 0.744 | 0.827 | 1.082 | 0.994 | 1.056 | 1.067 | 1.063 |
| 2017 | 0.129 | 0.424 | 0.702 | 0.822 | 0.914 | 1.197 | 1.099 | 1.167 | 1.180 | 1.175 |
| 2018 | 0.118 | 0.386 | 0.639 | 0.748 | 0.832 | 1.089 | 1.000 | 1.062 | 1.074 | 1.070 |
| 2019 | 0.114 | 0.372 | 0.616 | 0.721 | 0.802 | 1.050 | 0.964 | 1.024 | 1.035 | 1.031 |
| 2020 | 0.139 | 0.455 | 0.753 | 0.882 | 0.981 | 1.284 | 1.179 | 1.253 | 1.266 | 1.261 |
| 2021 | 0.134 | 0.440 | 0.729 | 0.853 | 0.949 | 1.242 | 1.141 | 1.212 | 1.225 | 1.220 |
| 2022 | 0.024 | 0.079 | 0.130 | 0.153 | 0.170 | 0.222 | 0.204 | 0.217 | 0.219 | 0.218 |