|  | **Catch (t)** | | | | | **Percent retained (%)** | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Year** | **Longline** | **Pot** | **Trawl** | **Other** | **Total** | **Longline** | **Pot** | **Trawl** | **Other** |
| 1991 | 77,506 | 3,342 | 129,394 | 0 | 210,242 | 98 | 100 | 88 | 0 |
| 1992 | 79,404 | 7,510 | 77,291 | 1 | 164,206 | 98 | 99 | 72 | 100 |
| 1993 | 49,297 | 2,094 | 81,793 | 2 | 133,186 | 95 | 99 | 65 | 100 |
| 1994 | 78,557 | 8,036 | 84,934 | 730 | 172,257 | 96 | 98 | 69 | 100 |
| 1995 | 97,664 | 19,277 | 110,954 | 600 | 228,495 | 96 | 99 | 68 | 100 |
| 1996 | 88,881 | 28,003 | 91,912 | 266 | 209,062 | 97 | 99 | 76 | 100 |
| 1997 | 117,010 | 21,490 | 93,924 | 171 | 232,595 | 97 | 100 | 82 | 96 |
| 1998 | 84,328 | 13,229 | 60,775 | 193 | 158,525 | 97 | 100 | 98 | 100 |
| 1999 | 81,470 | 12,397 | 51,897 | 100 | 145,864 | 98 | 100 | 97 | 100 |
| 2000 | 81,643 | 15,849 | 53,847 | 39 | 151,378 | 97 | 100 | 98 | 100 |
| 2001 | 90,365 | 16,472 | 35,649 | 53 | 142,539 | 98 | 100 | 98 | 100 |
| 2002 | 100,272 | 15,050 | 51,064 | 165 | 166,551 | 98 | 99 | 97 | 100 |
| 2003 | 108,670 | 19,936 | 46,673 | 155 | 175,434 | 98 | 99 | 98 | 100 |
| 2004 | 108,474 | 17,242 | 57,793 | 231 | 183,740 | 98 | 100 | 99 | 100 |
| 2005 | 113,127 | 17,096 | 52,600 | 104 | 182,927 | 98 | 100 | 99 | 100 |
| 2006 | 96,567 | 18,960 | 53,213 | 83 | 168,823 | 98 | 100 | 98 | 100 |
| 2007 | 77,136 | 17,237 | 45,672 | 82 | 140,127 | 98 | 100 | 99 | 100 |
| 2008 | 88,918 | 17,367 | 33,490 | 20 | 139,795 | 98 | 99 | 99 | 100 |
| 2009 | 96,595 | 13,611 | 36,954 | 12 | 147,172 | 98 | 100 | 99 | 100 |
| 2010 | 81,616 | 19,678 | 41,201 | 344 | 142,839 | 98 | 100 | 97 | 100 |
| 2011 | 116,762 | 27,995 | 63,926 | 506 | 209,189 | 98 | 100 | 99 | 100 |
| 2012 | 128,300 | 28,725 | 75,505 | 86 | 232,616 | 99 | 100 | 99 | 100 |
| 2013 | 124,814 | 30,249 | 81,614 | 14 | 236,691 | 97 | 100 | 98 | 100 |
| 2014 | 127,256 | 39,196 | 72,261 | 2 | 238,715 | 98 | 100 | 99 | 100 |
| 2015 | 128,191 | 37,937 | 66,665 | 28 | 232,821 | 98 | 100 | 99 | 100 |
| 2016 | 127,917 | 47,078 | 72,574 | 48 | 247,617 | 98 | 100 | 99 | 100 |
| 2017 | 122,774 | 46,182 | 68,876 | 13 | 237,845 | 98 | 100 | 99 | 100 |
| 2018 | 100,209 | 39,684 | 59,958 | 0 | 199,851 | 98 | 100 | 99 | 0 |
| 2019 | 88,780 | 41,056 | 49,018 | 49 | 178,903 | 98 | 100 | 99 | 100 |
| 2020 | 72,088 | 32,967 | 50,564 | 38 | 155,657 | 98 | 100 | 98 | 100 |
| 2021 | 57,256 | 25,693 | 38,765 | 20 | 121,734 | 98 | 100 | 95 | 100 |
| 2022 | 63,513 | 36,301 | 41,013 | 28 | 140,855 | 98 | 100 | 98 | 100 |

| **YEAR** | **Catch** | **TAC** | **ABC** | **OFL** |
| --- | --- | --- | --- | --- |
| 1977 | 35,597 | 58,000 |  |  |
| 1978 | 45,838 | 70,500 |  |  |
| 1979 | 39,354 | 70,500 |  |  |
| 1980 | 51,649 | 70,500 | 148,000 |  |
| 1981 | 63,941 | 78,700 | 160,000 |  |
| 1982 | 69,501 | 78,700 | 168,000 |  |
| 1983 | 103,231 | 120,000 | 298,000 |  |
| 1984 | 133,084 | 210,000 | 291,000 |  |
| 1985 | 150,384 | 220,000 | 347,000 |  |
| 1986 | 142,511 | 229,000 | 249,000 |  |
| 1987 | 163,110 | 280,000 | 400,000 |  |
| 1988 | 208,236 | 200,000 | 385,300 |  |
| 1989 | 182,865 | 230,681 | 370,600 |  |
| 1990 | 179,608 | 227,000 | 417,000 |  |
| 1991 | 210,242 | 229,000 | 229,000 |  |
| 1992 | 164,206 | 182,000 | 182,000 | 188,000 |
| 1993 | 133,186 | 164,500 | 164,500 | 192,000 |
| 1994 | 172,257 | 191,000 | 191,000 | 228,000 |
| 1995 | 228,495 | 250,000 | 328,000 | 390,000 |
| 1996 | 209,062 | 270,000 | 305,000 | 420,000 |
| 1997 | 232,595 | 270,000 | 306,000 | 418,000 |
| 1998 | 158,525 | 210,000 | 210,000 | 336,000 |
| 1999 | 145,864 | 177,000 | 177,000 | 264,000 |
| 2000 | 151,378 | 193,000 | 193,000 | 240,000 |
| 2001 | 142,539 | 188,000 | 188,000 | 248,000 |
| 2002 | 166,551 | 200,000 | 223,000 | 294,000 |
| 2003 | 175,434 | 207,500 | 223,000 | 324,000 |
| 2004 | 183,740 | 215,500 | 223,000 | 350,000 |
| 2005 | 182,927 | 206,000 | 206,000 | 265,000 |
| 2006 | 168,823 | 189,768 | 194,000 | 230,000 |
| 2007 | 140,127 | 170,720 | 176,000 | 207,000 |
| 2008 | 139,795 | 170,720 | 176,000 | 207,000 |
| 2009 | 147,172 | 176,540 | 182,000 | 212,000 |
| 2010 | 142,839 | 168,780 | 174,000 | 205,000 |
| 2011 | 209,189 | 227,950 | 235,000 | 272,000 |
| 2012 | 232,616 | 261,000 | 314,000 | 369,000 |
| 2013 | 236,691 | 260,000 | 307,000 | 359,000 |
| 2014 | 238,715 | 246,897 | 255,000 | 299,000 |
| 2015 | 232,821 | 240,000 | 255,000 | 346,000 |
| 2016 | 247,617 | 238,680 | 255,000 | 390,000 |
| 2017 | 237,845 | 223,704 | 239,000 | 284,000 |
| 2018 | 199,851 | 188,136 | 201,000 | 238,000 |
| 2019 | 178,903 | 166,475 | 181,000 | 216,000 |
| 2020 | 155,657 | 141,799 | 155,873 | 191,386 |
| 2021 | 121,734 | 111,380 | 123,805 | 147,949 |
| 2022 | 140,855 | 136,466 | 153,383 | 183,012 |

Table2.xx Number of haul sampled by bottom trawl survey and fishery.

|  |  |  |  |
| --- | --- | --- | --- |
| **Year** | **Survey hauls** | **Fishery hauls** | **Fishery input** |
| 1977 |  | 92 | 6 |
| 1978 |  | 147 | 10 |
| 1979 |  | 181 | 12 |
| 1980 |  | 187 | 12 |
| 1981 |  | 212 | 14 |
| 1982 | 313 | 106 | 7 |
| 1983 | 255 | 393 | 26 |
| 1984 | 264 | 471 | 31 |
| 1985 | 369 | 710 | 46 |
| 1986 | 349 | 725 | 47 |
| 1987 | 339 | 1,328 | 87 |
| 1988 | 370 | 1,353 | 88 |
| 1989 | 293 | 626 | 41 |
| 1990 | 329 | 643 | 42 |
| 1991 | 330 | 5,267 | 344 |
| 1992 | 332 | 5,195 | 339 |
| 1993 | 363 | 3,080 | 201 |
| 1994 | 364 | 4,839 | 316 |
| 1995 | 347 | 5,258 | 344 |
| 1996 | 359 | 6,797 | 444 |
| 1997 | 369 | 7,216 | 471 |
| 1998 | 362 | 6,898 | 451 |
| 1999 | 336 | 9,171 | 599 |
| 2000 | 355 | 9,966 | 651 |
| 2001 | 366 | 10,581 | 691 |
| 2002 | 402 | 11,607 | 758 |
| 2003 | 363 | 14,477 | 946 |
| 2004 | 422 | 12,144 | 793 |
| 2005 | 360 | 11,641 | 761 |
| 2006 | 354 | 9,078 | 593 |
| 2007 | 368 | 7,119 | 465 |
| 2008 | 381 | 8,429 | 551 |
| 2009 | 360 | 7,465 | 488 |
| 2010 | 451 | 6,652 | 435 |
| 2011 | 368 | 8,739 | 571 |
| 2012 | 400 | 9,342 | 610 |
| 2013 | 354 | 11,094 | 725 |
| 2014 | 373 | 12,129 | 792 |
| 2015 | 354 | 11,200 | 732 |
| 2016 | 412 | 9,498 | 621 |
| 2017 | 481 | 8,317 | 543 |
| 2018 | 364 | 6,390 | 418 |
| 2019 | 479 | 4,605 | 301 |
| 2020 |  | 3,526 | 230 |
| 2021 | 476 | 2,894 | 189 |
| 2022 | 481 | 2,123 | 139 |

Table 2.xx VAST estimates of bottom trawl survey population estimates, VAST winter longline CPUE index, and designed-based bottom trawl survey population number estimates.

|  | **VAST** | | | | **Design-based** | |
| --- | --- | --- | --- | --- | --- | --- |
| **Year** | **Survey population** | **Survey sigma** | **CPUE Index** | **CPUE sigma** | **Survey population** | **Survey sigma** |
| 1987 | 827,910,820 | 0.058 |  |  | 698,609,300 | 0.064 |
| 1988 | 547,101,763 | 0.044 |  |  | 512,360,645 | 0.070 |
| 1989 | 360,136,669 | 0.058 |  |  | 301,283,394 | 0.066 |
| 1990 | 473,699,475 | 0.052 |  |  | 439,009,229 | 0.084 |
| 1991 | 514,740,296 | 0.052 |  |  | 498,850,467 | 0.103 |
| 1992 | 558,668,040 | 0.057 |  |  | 587,304,176 | 0.117 |
| 1993 | 828,313,265 | 0.057 |  |  | 817,857,214 | 0.122 |
| 1994 | 1,176,240,822 | 0.050 |  |  | 1,260,690,441 | 0.122 |
| 1995 | 722,896,871 | 0.049 |  |  | 764,228,127 | 0.099 |
| 1996 | 613,729,432 | 0.060 | 61,555 | 0.044 | 615,809,466 | 0.143 |
| 1997 | 523,444,143 | 0.056 | 66,186 | 0.051 | 494,486,664 | 0.143 |
| 1998 | 619,360,780 | 0.072 | 54,007 | 0.044 | 524,149,999 | 0.090 |
| 1999 | 524,679,967 | 0.055 | 47,852 | 0.040 | 542,810,224 | 0.100 |
| 2000 | 520,732,683 | 0.057 | 57,484 | 0.045 | 489,723,433 | 0.090 |
| 2001 | 1,012,604,304 | 0.056 | 42,951 | 0.044 | 977,116,905 | 0.094 |
| 2002 | 632,552,438 | 0.071 | 57,874 | 0.049 | 545,304,209 | 0.099 |
| 2003 | 626,822,759 | 0.080 | 44,034 | 0.029 | 517,535,040 | 0.120 |
| 2004 | 494,053,564 | 0.083 | 44,302 | 0.028 | 405,251,779 | 0.085 |
| 2005 | 506,513,065 | 0.073 | 42,042 | 0.028 | 465,249,132 | 0.137 |
| 2006 | 441,760,136 | 0.047 | 48,206 | 0.042 | 407,949,965 | 0.059 |
| 2007 | 597,084,961 | 0.052 | 49,488 | 0.034 | 758,497,682 | 0.261 |
| 2008 | 484,226,694 | 0.051 | 49,345 | 0.034 | 494,359,348 | 0.101 |
| 2009 | 714,576,551 | 0.046 | 50,719 | 0.039 | 724,773,831 | 0.087 |
| 2010 | 752,333,289 | 0.049 | 57,249 | 0.037 | 908,910,258 | 0.130 |
| 2011 | 862,264,620 | 0.048 | 56,278 | 0.044 | 847,967,416 | 0.094 |
| 2012 | 1,051,417,095 | 0.059 | 57,626 | 0.042 | 996,959,215 | 0.092 |
| 2013 | 760,764,997 | 0.056 | 55,745 | 0.038 | 764,239,270 | 0.165 |
| 2014 | 1,231,901,647 | 0.068 | 44,066 | 0.038 | 1,134,482,392 | 0.127 |
| 2015 | 1,083,986,346 | 0.067 | 43,285 | 0.041 | 989,903,729 | 0.115 |
| 2016 | 944,269,500 | 0.094 | 52,806 | 0.035 | 662,134,411 | 0.093 |
| 2017 | 520,888,531 | 0.044 | 46,191 | 0.028 | 500,634,050 | 0.073 |
| 2018 | 528,569,516 | 0.063 | 56,880 | 0.035 | 249,081,430 | 0.071 |
| 2019 | 762,871,107 | 0.051 | 48,238 | 0.048 | 730,701,587 | 0.092 |
| 2021 | 608,971,280 | 0.056 | 42,389 | 0.048 | 551,453,352 | 0.072 |
| 2022 | 554,472,678 | 0.049 | 48,827 | 0.051 | 511,194,737 | 0.064 |

Table 2.xx Designed-based biomass estimate for the AFSC bottom trawl survey.

|  | **EBS** | | **NBS** | | **Total** | |
| --- | --- | --- | --- | --- | --- | --- |
| **Year** | **Biomass (t)** | **sigma** | **Biomass (t)** | **sigma** | **Biomass (t)** | **sigma** |
| 1987 | 1,064,504 | 0.060 |  |  | 1,064,504 | 0.060 |
| 1988 | 975,197 | 0.079 |  |  | 975,197 | 0.079 |
| 1989 | 866,777 | 0.072 |  |  | 866,777 | 0.072 |
| 1990 | 727,806 | 0.072 |  |  | 727,806 | 0.072 |
| 1991 | 530,731 | 0.073 |  |  | 530,731 | 0.073 |
| 1992 | 539,064 | 0.083 |  |  | 539,064 | 0.083 |
| 1993 | 670,773 | 0.080 |  |  | 670,773 | 0.080 |
| 1994 | 1,379,428 | 0.179 |  |  | 1,379,428 | 0.179 |
| 1995 | 1,010,002 | 0.091 |  |  | 1,010,002 | 0.091 |
| 1996 | 910,374 | 0.096 |  |  | 910,374 | 0.096 |
| 1997 | 627,118 | 0.109 |  |  | 627,118 | 0.109 |
| 1998 | 551,408 | 0.078 |  |  | 551,408 | 0.078 |
| 1999 | 618,730 | 0.091 |  |  | 618,730 | 0.091 |
| 2000 | 537,449 | 0.080 |  |  | 537,449 | 0.080 |
| 2001 | 827,408 | 0.088 |  |  | 827,408 | 0.088 |
| 2002 | 597,450 | 0.106 |  |  | 597,450 | 0.106 |
| 2003 | 625,549 | 0.099 |  |  | 625,549 | 0.099 |
| 2004 | 578,018 | 0.058 |  |  | 578,018 | 0.058 |
| 2005 | 638,154 | 0.068 |  |  | 638,154 | 0.068 |
| 2006 | 543,533 | 0.053 |  |  | 543,533 | 0.053 |
| 2007 | 450,305 | 0.078 |  |  | 450,305 | 0.078 |
| 2008 | 427,423 | 0.065 |  |  | 427,423 | 0.065 |
| 2009 | 430,461 | 0.082 |  |  | 430,461 | 0.082 |
| 2010 | 872,777 | 0.118 | 29,126 | 0.226 | 901,904 | 0.114 |
| 2011 | 913,952 | 0.073 |  |  | 913,952 | 0.073 |
| 2012 | 899,909 | 0.113 |  |  | 899,909 | 0.113 |
| 2013 | 813,804 | 0.092 |  |  | 813,804 | 0.092 |
| 2014 | 1,098,193 | 0.140 |  |  | 1,098,193 | 0.140 |
| 2015 | 1,111,980 | 0.135 |  |  | 1,111,980 | 0.135 |
| 2016 | 986,239 | 0.078 |  |  | 986,239 | 0.078 |
| 2017 | 644,508 | 0.078 | 287,551 | 0.127 | 932,060 | 0.066 |
| 2018 | 507,316 | 0.058 |  |  | 507,316 | 0.058 |
| 2019 | 517,141 | 0.044 | 365,005 | 0.147 | 882,146 | 0.066 |
| 2021 | 616,380 | 0.049 | 227,582 | 0.178 | 843,962 | 0.060 |
| 2022 | 647,400 | 0.065 | 153,735 | 0.130 | 801,135 | 0.058 |

Table 2.xx Number of otoliths collected and aged and length measured in the bottom trawl survey and fishery.

|  | **Otoliths** | | | | **Lengths** | |
| --- | --- | --- | --- | --- | --- | --- |
| **Year** | **Survey Collected** | **Survey Aged** | **Fishery Collected** | **Fishery Aged** | **Survey** | **Fishery** |
| 1977 |  |  |  |  |  | 1,324 |
| 1978 |  |  |  |  |  | 11,683 |
| 1979 |  |  |  |  |  | 17,031 |
| 1980 |  |  |  |  |  | 17,939 |
| 1981 |  |  |  |  |  | 23,955 |
| 1982 |  |  |  |  | 10,863 | 9,658 |
| 1983 |  |  |  |  | 13,143 | 33,200 |
| 1984 | 782 | 316 |  |  | 12,133 | 45,635 |
| 1985 |  |  |  |  | 17,150 | 66,940 |
| 1986 |  |  |  |  | 15,872 | 58,257 |
| 1987 |  |  |  |  | 9,483 | 129,226 |
| 1988 | 639 | 639 |  |  | 6,950 | 111,065 |
| 1989 | 703 | 703 |  |  | 4,246 | 58,625 |
| 1990 | 793 | 793 | 4,500 | 1,073 | 5,428 | 39,698 |
| 1991 | 659 | 659 | 6,085 | 658 | 7,069 | 374,227 |
| 1992 | 717 | 717 | 2,333 | 368 | 10,129 | 344,923 |
| 1993 | 653 | 635 | 1,229 |  | 10,500 | 248,967 |
| 1994 | 731 | 715 | 7,050 |  | 12,931 | 359,147 |
| 1995 | 625 | 571 | 5,500 | 1 | 9,820 | 344,794 |
| 1996 | 733 | 711 | 2,087 |  | 9,348 | 445,217 |
| 1997 | 737 | 719 | 1,818 |  | 9,591 | 474,908 |
| 1998 | 694 | 635 | 1,433 |  | 9,574 | 438,746 |
| 1999 | 878 | 860 | 2,691 |  | 11,183 | 186,233 |
| 2000 | 883 | 860 | 3,797 |  | 12,170 | 199,708 |
| 2001 | 948 | 920 | 3,857 |  | 19,078 | 210,419 |
| 2002 | 889 | 870 | 3,871 |  | 12,365 | 230,802 |
| 2003 | 1,278 | 1,263 | 4,272 |  | 11,835 | 288,854 |
| 2004 | 1,017 | 995 | 3,668 |  | 10,968 | 237,487 |
| 2005 | 1,313 | 1,279 | 3,341 |  | 11,753 | 228,664 |
| 2006 | 1,316 | 1,300 | 3,714 |  | 12,530 | 179,782 |
| 2007 | 1,477 | 1,441 | 2,793 | 964 | 13,441 | 140,663 |
| 2008 | 1,229 | 1,213 | 10,243 | 1,324 | 15,328 | 164,860 |
| 2009 | 1,427 | 1,412 | 4,656 | 1,207 | 23,737 | 147,875 |
| 2010 | 1,475 | 1,467 | 5,501 | 1,176 | 21,223 | 131,514 |
| 2011 | 1,266 | 1,253 | 6,211 | 1,735 | 25,150 | 172,269 |
| 2012 | 1,307 | 1,301 | 15,182 | 983 | 30,177 | 192,273 |
| 2013 | 1,424 | 1,418 | 16,529 | 988 | 19,902 | 211,962 |
| 2014 | 1,441 | 1,420 | 17,758 | 987 | 29,204 | 234,476 |
| 2015 | 1,827 | 1,819 | 16,433 | 994 | 19,880 | 213,888 |
| 2016 | 1,634 | 1,624 | 14,100 | 987 | 19,507 | 182,980 |
| 2017 | 1,764 | 1,744 | 12,271 | 995 | 15,020 | 157,482 |
| 2018 | 1,352 | 1,339 | 9,729 | 985 | 8,806 | 124,004 |
| 2019 | 1,940 | 1,824 | 7,105 |  | 23,408 | 86,800 |
| 2020 |  |  | 5,511 | 414 |  | 65,301 |
| 2021 | 1,810 | 1,757 | 4,244 | 409 | 17,397 | 55,858 |
| 2022 | 1,806 |  | 3,355 |  | 16,677 | 38,644 |

Table 2.xx

| **Year** | **alpha** |  | **beta** |
| --- | --- | --- | --- |
| 1974 | -1.403e-06 |  | 9.851e-02 |
| 1975 | -3.516e-06 |  | 2.986e-01 |
| 1976 | -1.695e-06 |  | 1.191e-01 |
| 1977 | 8.155e-07 |  | -2.048e-02 |
| 1978 | -1.161e-06 |  | 6.185e-02 |
| 1979 | 1.480e-06 |  | -5.229e-02 |
| 1980 | -2.805e-07 |  | 1.378e-02 |
| 1981 | 2.738e-07 |  | -1.025e-02 |
| 1982 | 2.622e-06 |  | -8.279e-02 |
| 1983 | 3.452e-06 |  | -1.176e-01 |
| 1984 | 8.199e-06 |  | -2.275e-01 |
| 1985 | 1.117e-06 |  | -3.885e-02 |
| 1986 | -3.301e-07 |  | 2.198e-02 |
| 1987 | 4.024e-06 |  | -1.302e-01 |
| 1988 | 1.951e-07 |  | -1.466e-03 |
| 1989 | 1.616e-06 |  | -5.541e-02 |
| 1990 | 2.733e-06 |  | -8.389e-02 |
| 1991 | 1.111e-06 |  | -3.875e-02 |
| 1992 | -1.016e-06 |  | 5.417e-02 |
| 1993 | 2.048e-06 |  | -5.301e-02 |
| 1994 | 7.578e-07 |  | -2.348e-02 |
| 1995 | -1.577e-06 |  | 9.325e-02 |
| 1996 | 4.913e-06 |  | -1.423e-01 |
| 1997 | 7.058e-07 |  | -3.085e-02 |
| 1998 | 8.568e-07 |  | -3.700e-02 |
| 1999 | 1.715e-06 |  | -6.286e-02 |
| 2000 | 5.491e-06 |  | -1.650e-01 |
| 2001 | 5.041e-06 |  | -1.552e-01 |
| 2002 | 2.330e-06 |  | -8.454e-02 |
| 2003 | 6.998e-07 |  | -2.975e-02 |
| 2004 | 2.149e-06 |  | -7.903e-02 |
| 2005 | 4.361e-07 |  | -1.611e-02 |
| 2006 | 1.814e-06 |  | -6.845e-02 |
| 2007 | 2.496e-06 |  | -8.899e-02 |
| 2008 | 8.319e-07 |  | -3.673e-02 |
| 2009 | 2.003e-06 |  | -7.992e-02 |
| 2010 | 2.941e-06 |  | -1.127e-01 |
| 2011 | 1.263e-06 |  | -6.023e-02 |
| 2012 | 2.030e-07 |  | -1.750e-02 |
| 2013 | 6.213e-07 |  | -3.281e-02 |
| 2014 | -7.016e-07 |  | 2.557e-02 |
| 2015 | -1.077e-06 |  | 4.114e-02 |
| 2016 | -8.303e-07 |  | 3.164e-02 |
| 2017 | -7.795e-07 |  | 3.057e-02 |
| 2018 | 7.929e-07 |  | -3.826e-02 |
| 2019 | 3.542e-07 |  | -1.468e-02 |
| 2020 | 8.875e-07 |  | -3.899e-02 |
| 2021 | 1.057e-06 |  | -4.635e-02 |
| 2022 | -6.020e-07 |  | 2.316e-02 |

Table 2.xx Summary statistics and selected results for New models.

| **Label** | **Model 22.1** | **Model 22.2** | **Model 22.3** | **Model 22.4** | **Ensemble** |
| --- | --- | --- | --- | --- | --- |
| # parameters | 346 | 304 | 308 | 305 |  |
| TOTAL\_like | 10,779.7 | 10,875.3 | 10,874.2 | 10,916.6 |  |
| Survey\_like | -95.205 | -5.956 | -5.703 | -41.63 |  |
| Length\_comp\_like | 9,950.94 | 9,990.46 | 9,989.69 | 10,058.5 |  |
| Age\_comp\_like | 809.631 | 817.846 | 817.250 | 818.604 |  |
| Recr\_Virgin\_millions | 460.835 | 516.934 | 508.173 | 554.271 |  |
| SR\_LN(R0) | 13.041 | 13.156 | 13.139 | 13.225 | 13.131 |
| NatM\_uniform\_Fem\_GP\_1 | 0.333 | 0.347 | 0.345 | 0.351 | 0.343 |
| L\_at\_Amax\_Fem\_GP\_1 | 114.768 | 112.387 | 113.007 | 112.786 | 113.274 |
| VonBert\_K\_Fem\_GP\_1 | 0.110 | 0.115 | 0.113 | 0.110 | 0.112 |
| SSB\_Virgin\_thousand\_mt | 1,385 | 1,353 | 1,360 | 1,368 | 1,337 |
| Bratio\_2021 | 0.380 | 0.404 | 0.398 | 0.374 | 0.391 |
| SPRratio\_2020 | 0.583 | 0.556 | 0.562 | 0.564 | 0.566 |
| QBT | 1.030 | 0.960 | 0.971 | 0.892 | -0.031 |
| SSB\_unfished | 1.362 | 1.323 | 1.330 | 1.330 | 1.338 |
| ann\_F\_MSY | 0.304 | 0.326 | 0.322 | 0.335 | 0.320 |
| ForeCatch\_2023 | 127,755 | 152,783 | 147,835 | 154,758 | 144,857 |
| ForeCatch\_2024 | 127,728 | 144,694 | 142,025 | 150,221 | 140,185 |

Table 2.xx Summary statistics and selected results for Thompson models.

| **Label** | **Model 19.12** | **Model 19.12A** | **Model 21.1** | **Model 21.2** | **Ensemble** |
| --- | --- | --- | --- | --- | --- |
| # parameters | 348 | 306 | 310 | 307 |  |
| TOTAL\_like | 10,764.5 | 10,854.4 | 10,858.2 | 10,896.7 |  |
| Survey\_like | -95.134 | -4.742 | -4.104 | -43.204 |  |
| Length\_comp\_like | 9,960.95 | 9,991.01 | 10,010.4 | 10,066.8 |  |
| Age\_comp\_like | 786.738 | 794.939 | 784.932 | 796.359 |  |
| Recr\_Virgin\_millions | 476.228 | 573.673 | 436.589 | 569.663 |  |
| SR\_LN(R0) | 13.074 | 13.260 | 12.987 | 13.253 | 13.142 |
| NatM\_uniform\_Fem\_GP\_1 | 0.342 | 0.363 | 0.324 | 0.359 | 0.347 |
| L\_at\_Amax\_Fem\_GP\_1 | 116.345 | 111.848 | 144.934 | 115.542 | 121.411 |
| VonBert\_K\_Fem\_GP\_1 | 0.107 | 0.118 | 0.064 | 0.103 | 0.100 |
| SSB\_Virgin\_thousand\_mt | 1,400 | 1,375 | 1,722 | 1,408 | 1,358 |
| Bratio\_2021 | 0.374 | 0.415 | 0.349 | 0.368 | 0.380 |
| SPRratio\_2020 | 0.583 | 0.538 | 0.603 | 0.564 | 0.570 |
| Q | 1.033 | 0.917 | 1.067 | 0.890 | 0.978 |
| SSB\_unfished | 1.307 | 1.278 | 1.578 | 1.294 | 1.358 |
| ann\_F\_MSY | 0.301 | 0.349 | 0.278 | 0.353 | 0.320 |
| ForeCatch\_2023 | 127,161 | 169,418 | 116,160 | 154,362 | 142,539 |
| ForeCatch\_2024 | 127,073 | 153,741 | 122,787 | 150,321 | 138,417 |

Table 2.xx Likelihoods by fleet for all models.

| **Label** | **All** | **Fishery** | **Survey** | **Model** |
| --- | --- | --- | --- | --- |
| Age\_like | 786.738 | 0 | 786.738 | Model 19.12 |
| Age\_like | 794.939 | 0 | 794.939 | Model 19.12A |
| Age\_like | 784.932 | 0 | 784.932 | Model 21.1 |
| Age\_like | 796.359 | 0 | 796.359 | Model 21.2 |
| Age\_like | 809.631 | 0 | 809.631 | Model 22.1 |
| Age\_like | 817.846 | 0 | 817.846 | Model 22.2 |
| Age\_like | 817.25 | 0 | 817.250 | Model 22.3 |
| Age\_like | 818.604 | 0 | 818.604 | Model 22.4 |
| Catch\_like | 3.557e-11 | 3.557e-11 | 0 | Model 19.12 |
| Catch\_like | 1.599e-11 | 1.599e-11 | 0 | Model 19.12A |
| Catch\_like | 3.540e-11 | 3.540e-11 | 0 | Model 21.1 |
| Catch\_like | 1.214e-11 | 1.214e-11 | 0 | Model 21.2 |
| Catch\_like | 2.507e-11 | 2.507e-11 | 0 | Model 22.1 |
| Catch\_like | 1.578e-11 | 1.578e-11 | 0 | Model 22.2 |
| Catch\_like | 1.916e-11 | 1.916e-11 | 0 | Model 22.3 |
| Catch\_like | 3.542e-12 | 3.542e-12 | 0 | Model 22.4 |
| Init\_equ\_like | 2.161e-03 | 2.161e-03 | 0 | Model 19.12 |
| Init\_equ\_like | 1.042e-03 | 1.042e-03 | 0 | Model 19.12A |
| Init\_equ\_like | 4.347e-04 | 4.347e-04 | 0 | Model 21.1 |
| Init\_equ\_like | 1.035e-03 | 1.035e-03 | 0 | Model 21.2 |
| Init\_equ\_like | 2.581e-03 | 2.581e-03 | 0 | Model 22.1 |
| Init\_equ\_like | 1.609e-03 | 1.609e-03 | 0 | Model 22.2 |
| Init\_equ\_like | 1.492e-03 | 1.492e-03 | 0 | Model 22.3 |
| Init\_equ\_like | 1.199e-03 | 1.199e-03 | 0 | Model 22.4 |
| Length\_like | 9960.95 | 4500.37 | 5,460.58 | Model 19.12 |
| Length\_like | 9991.01 | 4499.95 | 5,491.07 | Model 19.12A |
| Length\_like | 10010.4 | 4516.47 | 5,493.94 | Model 21.1 |
| Length\_like | 10066.8 | 4552.03 | 5,514.75 | Model 21.2 |
| Length\_like | 9950.94 | 4494.86 | 5,456.08 | Model 22.1 |
| Length\_like | 9990.46 | 4502.49 | 5,487.98 | Model 22.2 |
| Length\_like | 9989.69 | 4501.63 | 5,488.06 | Model 22.3 |
| Length\_like | 10058.5 | 4550.38 | 5,508.16 | Model 22.4 |
| Surv\_like | -95.134 | 0 | -95.134 | Model 19.12 |
| Surv\_like | -4.742 | 0 | -4.742 | Model 19.12A |
| Surv\_like | -4.104 | 0 | -4.104 | Model 21.1 |
| Surv\_like | -43.204 | -53.422 | 10.218 | Model 21.2 |
| Surv\_like | -95.205 | 0 | -95.205 | Model 22.1 |
| Surv\_like | -5.956 | 0 | -5.956 | Model 22.2 |
| Surv\_like | -5.703 | 0 | -5.703 | Model 22.3 |
| Surv\_like | -41.63 | -51.776 | 10.145 | Model 22.4 |

Table 2.xx Retrospective analysis for models and ensembles.

| **Value** | **Model** | **Mohn's Rho** | **Series** |
| --- | --- | --- | --- |
| SSB | Model 19.12 | 0.055 | Thompson |
| SSB | Model 19.12A | 0.042 | Thompson |
| SSB | Model 21.1 | 0.018 | Thompson |
| SSB | Model 21.2 | 0.079 | Thompson |
| SSB | Thompson Ensemble | 0.045 | Thompson |
| SSB | Model 22.1 (19.12) | 0.069 | New |
| SSB | Model 22.2 (19.12A) | 0.066 | New |
| SSB | Model 22.3 (21.1) | 0.040 | New |
| SSB | Model 22.4 (21.2) | 0.079 | New |
| SSB | New Ensemble | 0.063 | New |
| R | Model 19.12 | 0.120 | Thompson |
| R | Model 19.12A | 0.099 | Thompson |
| R | Model 21.1 | 0.093 | Thompson |
| R | Model 21.2 | 0.181 | Thompson |
| R | Thompson Ensemble | 0.134 | Thompson |
| R | Model 22.1 (19.12) | 0.145 | New |
| R | Model 22.2 (19.12A) | 0.133 | New |
| R | Model 22.3 (21.1) | 0.098 | New |
| R | Model 22.4 (21.2) | 0.184 | New |
| R | New Ensemble | 0.151 | New |
| F | Model 19.12 | -0.060 | Thompson |
| F | Model 19.12A | -0.045 | Thompson |
| F | Model 21.1 | -0.043 | Thompson |
| F | Model 21.2 | -0.074 | Thompson |
| F | Thompson Ensemble | -0.054 | Thompson |
| F | Model 22.1 (19.12) | -0.071 | New |
| F | Model 22.2 (19.12A) | -0.077 | New |
| F | Model 22.3 (21.1) | -0.050 | New |
| F | Model 22.4 (21.2) | -0.067 | New |
| F | New Ensemble | -0.067 | New |
| B Ratio | Model 19.12 | 0.094 | Thompson |
| B Ratio | Model 19.12A | 0.053 | Thompson |
| B Ratio | Model 21.1 | 0.056 | Thompson |
| B Ratio | Model 21.2 | 0.085 | Thompson |
| B Ratio | Thompson Ensemble | -0.054 | Thompson |
| B Ratio | Model 22.1 (19.12) | 0.108 | New |
| B Ratio | Model 22.2 (19.12A) | 0.083 | New |
| B Ratio | Model 22.3 (21.1) | 0.057 | New |
| B Ratio | Model 22.4 (21.2) | 0.085 | New |
| B Ratio | New Ensemble | 0.084 | New |

Table2.xx MASE

|  | **Index** | | **Lengths** | | | **Age** | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Model** | **Fishery** | **Survey** | | **Fishery** | **Survey** | | **Survey** |
| Model 19.12 |  | 0.19 | | 0.31 | 1.23 | | 0.71 |
| Model 19.12A |  | 0.44 | | 0.33 | 1.22 | | 0.71 |
| Model 21.1 |  | 0.44 | | 0.34 | 1.21 | | 0.68 |
| Model 21.2 | 0.41 | 0.47 | | 0.42 | 1.28 | | 0.71 |
| Model 22.1 (19.12) |  | 0.20 | | 0.31 | 1.22 | | 0.76 |
| Model 22.2 (19.12A) |  | 0.45 | | 0.32 | 1.20 | | 0.76 |
| Model 22.3 (21.1) |  | 0.45 | | 1.40 | 1.19 | | 0.75 |
| Model 22.4 (21.2) | 0.42 | 0.47 | | 0.42 | 1.28 | | 0.77 |

Table 2.xx

|  | | | | **Effective N** | | **Ratios** | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Model** | **Data** | **log(theta)** | **Nave** | **Harmonic mean** | **Dirichlet** | **McAllister-Ianelli** | **Dirichlet** |
| Model 19.12 | Fishery Length | 9.990 | 369 | 609 | 369 | 1.65 | 1.00 |
| Model 19.12A | Fishery Length | 9.989 | 369 | 608 | 369 | 1.65 | 1.00 |
| Model 21.1 | Fishery Length | 9.989 | 369 | 597 | 369 | 1.62 | 1.00 |
| Model 21.2 | Fishery Length | 9.989 | 369 | 607 | 369 | 1.64 | 1.00 |
| Model 22.1 | Fishery Length | 9.990 | 369 | 608 | 369 | 1.65 | 1.00 |
| Model 22.2 | Fishery Length | 9.989 | 369 | 606 | 369 | 1.64 | 1.00 |
| Model 22.3 | Fishery Length | 9.989 | 369 | 613 | 369 | 1.66 | 1.00 |
| Model 22.4 | Fishery Length | 9.989 | 369 | 605 | 369 | 1.64 | 1.00 |
| Model 19.12 | Survey Length | 9.985 | 369 | 631 | 369 | 1.71 | 1.00 |
| Model 19.12A | Survey Length | 9.984 | 369 | 604 | 369 | 1.64 | 1.00 |
| Model 21.1 | Survey Length | 9.985 | 369 | 592 | 369 | 1.60 | 1.00 |
| Model 21.2 | Survey Length | 9.983 | 369 | 577 | 369 | 1.56 | 1.00 |
| Model 22.1 | Survey Length | 9.985 | 369 | 636 | 369 | 1.72 | 1.00 |
| Model 22.2 | Survey Length | 9.984 | 369 | 605 | 369 | 1.64 | 1.00 |
| Model 22.3 | Survey Length | 9.985 | 369 | 604 | 369 | 1.64 | 1.00 |
| Model 22.4 | Survey Length | 9.983 | 369 | 586 | 369 | 1.59 | 1.00 |
| Model 19.12 | Survey Age | 0.021 | 350 | 108 | 178 | 0.31 | 0.51 |
| Model 19.12A | Survey Age | -0.183 | 350 | 101 | 160 | 0.29 | 0.46 |
| Model 21.1 | Survey Age | 0.104 | 350 | 106 | 185 | 0.30 | 0.53 |
| Model 21.2 | Survey Age | -0.385 | 350 | 93 | 143 | 0.27 | 0.41 |
| Model 22.1 | Survey Age | -0.393 | 350 | 79 | 142 | 0.23 | 0.41 |
| Model 22.2 | Survey Age | -0.472 | 350 | 72 | 135 | 0.21 | 0.39 |
| Model 22.3 | Survey Age | -0.453 | 350 | 72 | 137 | 0.21 | 0.39 |
| Model 22.4 | Survey Age | -0.679 | 350 | 69 | 119 | 0.20 | 0.34 |

|  | **Thompson Ensemble** | | **New Ensemble** | |
| --- | --- | --- | --- | --- |
| **Label** | **Est.** | **Stdev.** | **Est.** | **Stdev.** |
| NatM\_uniform\_Fem\_GP\_1 | 0.347 | 0.020 | 0.343 | 0.014 |
| L\_at\_Amin\_Fem\_GP\_1 | 15.143 | 0.450 | 15.137 | 0.444 |
| L\_at\_Amax\_Fem\_GP\_1 | 121.411 | 15.858 | 113.274 | 3.211 |
| VonBert\_K\_Fem\_GP\_1 | 0.100 | 0.024 | 0.112 | 0.009 |
| Richards\_Fem\_GP\_1 | 1.519 | 0.074 | 1.482 | 0.043 |
| SD\_young\_Fem\_GP\_1 | 3.528 | 0.070 | 3.522 | 0.070 |
| SD\_old\_Fem\_GP\_1 | 10.379 | 1.224 | 9.880 | 0.407 |
| AgeKeyParm2\_BLK2delta\_1977 | 0.346 | 0.017 | 0.347 | 0.019 |
| AgeKeyParm3\_BLK2delta\_1977 | 0.922 | 0.226 | 0.870 | 0.241 |
| SR\_LN(R0) | 13.142 | 0.152 | 13.131 | 0.120 |
| SR\_regime\_BLK1add\_1976 | -0.883 | 0.222 | -0.932 | 0.192 |
| Early\_InitAge\_20 | -0.013 | 0.656 | -0.018 | 0.658 |
| Early\_InitAge\_19 | -0.007 | 0.660 | -0.010 | 0.658 |
| Early\_InitAge\_18 | -0.012 | 0.659 | -0.015 | 0.654 |
| Early\_InitAge\_17 | -0.018 | 0.658 | -0.023 | 0.652 |
| Early\_InitAge\_16 | -0.028 | 0.654 | -0.035 | 0.652 |
| Early\_InitAge\_15 | -0.043 | 0.649 | -0.052 | 0.650 |
| Early\_InitAge\_14 | -0.065 | 0.642 | -0.078 | 0.637 |
| Early\_InitAge\_13 | -0.098 | 0.633 | -0.114 | 0.630 |
| Early\_InitAge\_12 | -0.146 | 0.620 | -0.164 | 0.617 |
| Early\_InitAge\_11 | -0.212 | 0.604 | -0.229 | 0.601 |
| Early\_InitAge\_10 | -0.297 | 0.588 | -0.312 | 0.585 |
| Early\_InitAge\_9 | -0.400 | 0.569 | -0.409 | 0.564 |
| Early\_InitAge\_8 | -0.512 | 0.550 | -0.514 | 0.548 |
| Early\_InitAge\_7 | -0.617 | 0.529 | -0.611 | 0.531 |
| Early\_InitAge\_6 | -0.677 | 0.518 | -0.667 | 0.517 |
| Early\_InitAge\_5 | -0.617 | 0.516 | -0.601 | 0.513 |
| Early\_InitAge\_4 | -0.296 | 0.524 | -0.276 | 0.524 |
| Early\_InitAge\_3 | 0.182 | 0.484 | 0.201 | 0.484 |
| Early\_InitAge\_2 | 0.152 | 0.530 | 0.177 | 0.534 |
| Early\_InitAge\_1 | 0.625 | 0.573 | 0.658 | 0.587 |
| Main\_RecrDev\_1977 | 1.032 | 0.223 | 1.039 | 0.219 |
| Main\_RecrDev\_1978 | 0.582 | 0.236 | 0.556 | 0.242 |
| Main\_RecrDev\_1979 | 0.675 | 0.112 | 0.663 | 0.112 |
| Main\_RecrDev\_1980 | -0.811 | 0.209 | -0.864 | 0.216 |
| Main\_RecrDev\_1981 | -0.742 | 0.143 | -0.741 | 0.144 |
| Main\_RecrDev\_1982 | 0.934 | 0.050 | 0.939 | 0.050 |
| Main\_RecrDev\_1983 | -0.544 | 0.169 | -0.555 | 0.168 |
| Main\_RecrDev\_1984 | 0.842 | 0.054 | 0.852 | 0.054 |
| Main\_RecrDev\_1985 | 0.018 | 0.085 | 0.022 | 0.085 |
| Main\_RecrDev\_1986 | -0.574 | 0.106 | -0.582 | 0.108 |
| Main\_RecrDev\_1987 | -1.712 | 0.216 | -1.718 | 0.219 |
| Main\_RecrDev\_1988 | -0.290 | 0.086 | -0.268 | 0.086 |
| Main\_RecrDev\_1989 | 0.390 | 0.060 | 0.420 | 0.060 |
| Main\_RecrDev\_1990 | 0.385 | 0.066 | 0.403 | 0.067 |
| Main\_RecrDev\_1991 | -0.081 | 0.095 | -0.068 | 0.096 |
| Main\_RecrDev\_1992 | 0.833 | 0.066 | 0.847 | 0.066 |
| Main\_RecrDev\_1993 | -0.155 | 0.076 | -0.187 | 0.080 |
| Main\_RecrDev\_1994 | -0.312 | 0.078 | -0.328 | 0.077 |
| Main\_RecrDev\_1995 | -0.426 | 0.082 | -0.430 | 0.085 |
| Main\_RecrDev\_1996 | 0.775 | 0.047 | 0.789 | 0.043 |
| Main\_RecrDev\_1997 | -0.145 | 0.084 | -0.148 | 0.080 |
| Main\_RecrDev\_1998 | -0.328 | 0.095 | -0.356 | 0.098 |
| Main\_RecrDev\_1999 | 0.545 | 0.049 | 0.535 | 0.051 |
| Main\_RecrDev\_2000 | 0.252 | 0.053 | 0.255 | 0.054 |
| Main\_RecrDev\_2001 | -0.679 | 0.110 | -0.735 | 0.117 |
| Main\_RecrDev\_2002 | -0.112 | 0.088 | -0.096 | 0.087 |
| Main\_RecrDev\_2003 | -0.264 | 0.088 | -0.270 | 0.088 |
| Main\_RecrDev\_2004 | -0.572 | 0.092 | -0.577 | 0.089 |
| Main\_RecrDev\_2005 | -0.313 | 0.091 | -0.259 | 0.087 |
| Main\_RecrDev\_2006 | 0.721 | 0.061 | 0.698 | 0.060 |
| Main\_RecrDev\_2007 | -0.245 | 0.100 | -0.174 | 0.098 |
| Main\_RecrDev\_2008 | 1.110 | 0.053 | 1.063 | 0.054 |
| Main\_RecrDev\_2009 | -0.782 | 0.164 | -0.738 | 0.153 |
| Main\_RecrDev\_2010 | 0.609 | 0.068 | 0.609 | 0.071 |
| Main\_RecrDev\_2011 | 0.933 | 0.060 | 0.908 | 0.064 |
| Main\_RecrDev\_2012 | 0.120 | 0.100 | 0.215 | 0.093 |
| Main\_RecrDev\_2013 | 1.111 | 0.053 | 1.060 | 0.055 |
| Main\_RecrDev\_2014 | -0.626 | 0.132 | -0.657 | 0.130 |
| Main\_RecrDev\_2015 | -0.234 | 0.088 | -0.275 | 0.085 |
| Main\_RecrDev\_2016 | -0.623 | 0.110 | -0.664 | 0.109 |
| Main\_RecrDev\_2017 | -0.973 | 0.177 | -0.802 | 0.174 |
| Main\_RecrDev\_2018 | 0.710 | 0.059 | 0.688 | 0.061 |
| Main\_RecrDev\_2019 | -0.895 | 0.183 | -0.932 | 0.191 |
| Main\_RecrDev\_2020 | -0.140 | 0.119 | -0.137 | 0.119 |
| InitF\_seas\_1\_flt\_1Fishery | 0.110 | 0.037 | 0.125 | 0.039 |
| LnQ\_base\_Survey(2) | -0.023 | 0.097 | -0.031 | 0.081 |
| Size\_DblN\_peak\_Fishery(1) | 74.456 | 1.117 | 74.970 | 0.360 |
| Size\_DblN\_top\_logit\_Fishery(1) | -9.287 |  | -8.602 |  |
| Size\_DblN\_ascend\_se\_Fishery(1) | 6.032 | 0.057 | 6.058 | 0.035 |
| Size\_DblN\_descend\_se\_Fishery(1) | -0.142 |  | -9.192 |  |
| Size\_DblN\_end\_logit\_Fishery(1) | -0.052 | 3.077 | 1.801 | 0.278 |
| Size\_DblN\_peak\_Survey(2) | 20.937 | 0.846 | 21.065 | 0.795 |
| Size\_DblN\_ascend\_se\_Survey(2) | 3.516 | 0.159 | 3.554 | 0.151 |
| ln(DM\_theta)\_Age\_P3 | -0.093 | 0.262 | -0.480 | 0.183 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_1977 | 0.537 | 0.949 | 0.499 | 0.928 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_1978 | -0.003 | 0.945 | 0.014 | 0.948 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_1979 | 0.234 | 0.952 | 0.271 | 0.953 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_1980 | 0.084 | 0.904 | 0.083 | 0.901 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_1981 | -1.097 | 0.376 | -1.105 | 0.374 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_1982 | -1.020 | 0.240 | -1.012 | 0.241 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_1983 | 0.601 | 0.599 | 0.646 | 0.591 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_1984 | 0.029 | 0.212 | 0.053 | 0.208 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_1985 | -1.626 | 0.340 | -1.607 | 0.340 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_1986 | -0.045 | 0.231 | 0.008 | 0.229 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_1987 | -0.617 | 0.387 | -0.567 | 0.379 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_1988 | -0.971 | 0.365 | -0.972 | 0.366 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_1989 | -0.826 | 0.241 | -0.831 | 0.244 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_1990 | -0.259 | 0.278 | -0.218 | 0.273 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_1991 | 0.134 | 0.222 | 0.168 | 0.222 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_1992 | -0.043 | 0.204 | -0.023 | 0.203 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_1993 | 0.369 | 0.313 | 0.399 | 0.312 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_1994 | -0.390 | 0.257 | -0.328 | 0.255 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_1995 | -0.419 | 0.321 | -0.410 | 0.321 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_1996 | -0.250 | 0.240 | -0.198 | 0.237 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_1997 | -0.616 | 0.532 | -0.296 | 0.286 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_1998 | -0.874 | 0.284 | -0.817 | 0.272 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_1999 | -1.276 | 0.233 | -1.249 | 0.233 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_2000 | 0.597 | 0.222 | 0.603 | 0.218 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_2001 | 0.120 | 0.246 | 0.195 | 0.246 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_2002 | 0.453 | 0.215 | 0.479 | 0.216 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_2003 | 0.063 | 0.264 | 0.081 | 0.265 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_2004 | 1.074 | 0.228 | 1.101 | 0.224 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_2005 | -0.318 | 0.249 | -0.385 | 0.248 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_2006 | -0.454 | 0.199 | -0.443 | 0.200 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_2007 | -1.134 | 0.275 | -1.255 | 0.273 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_2008 | -1.124 | 0.223 | -1.088 | 0.220 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_2009 | -0.887 | 0.358 | -0.935 | 0.365 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_2010 | 0.134 | 0.203 | 0.149 | 0.200 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_2011 | -1.205 | 0.244 | -1.186 | 0.247 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_2012 | 0.147 | 0.302 | 0.060 | 0.297 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_2013 | -0.399 | 0.213 | -0.378 | 0.213 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_2014 | 0.038 | 0.374 | -0.062 | 0.388 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_2015 | 1.303 | 0.203 | 1.297 | 0.206 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_2016 | 1.443 | 0.308 | 1.414 | 0.314 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_2017 | 1.391 | 0.254 | 1.303 | 0.254 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_2018 | 2.030 | 0.188 | 2.004 | 0.188 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_2019 | 0.605 | 0.995 | 0.058 | 1.089 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_2020 | 1.189 | 0.226 | 1.179 | 0.223 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_2021 | 0.441 | 0.233 | 0.448 | 0.232 |
| L\_at\_Amin\_Fem\_GP\_1\_DEVmult\_2022 | 2.834 | 0.274 | 2.852 | 0.269 |

Table 2.xx. Female spawning stock biomass (t)

|  | | **Thompson Ensemble** | | **New Ensemble** | |
| --- | --- | --- | --- | --- | --- |
| **Year** | **Last Year Est.** | **Est.** | **Stdev.** | **Est.** | **Stdev.** |
| 1978 | 125,487 | 109,564 | 60,398 | 92,044 | 35,818 |
| 1979 | 127,244 | 112,923 | 55,633 | 97,050 | 35,947 |
| 1980 | 151,143 | 136,885 | 54,430 | 122,928 | 38,789 |
| 1981 | 212,676 | 200,189 | 56,258 | 185,999 | 45,109 |
| 1982 | 320,765 | 302,771 | 65,107 | 275,117 | 54,746 |
| 1983 | 420,010 | 377,676 | 68,442 | 363,545 | 61,548 |
| 1984 | 422,817 | 409,944 | 67,866 | 413,484 | 62,555 |
| 1985 | 476,765 | 441,036 | 72,483 | 418,440 | 58,828 |
| 1986 | 467,389 | 434,887 | 71,103 | 407,576 | 53,792 |
| 1987 | 454,223 | 419,208 | 64,701 | 406,821 | 49,012 |
| 1988 | 479,036 | 432,740 | 65,734 | 407,882 | 44,994 |
| 1989 | 465,941 | 412,344 | 61,653 | 390,624 | 41,220 |
| 1990 | 420,038 | 391,743 | 58,759 | 362,261 | 35,954 |
| 1991 | 339,391 | 329,154 | 53,235 | 310,868 | 30,071 |
| 1992 | 253,190 | 254,793 | 48,092 | 237,377 | 25,489 |
| 1993 | 240,330 | 234,587 | 42,430 | 205,240 | 23,454 |
| 1994 | 236,669 | 230,217 | 35,489 | 214,054 | 23,448 |
| 1995 | 247,259 | 243,826 | 35,574 | 224,322 | 25,534 |
| 1996 | 243,780 | 243,177 | 36,167 | 224,530 | 30,090 |
| 1997 | 237,741 | 235,819 | 38,588 | 228,854 | 34,984 |
| 1998 | 214,034 | 212,756 | 40,107 | 208,245 | 37,189 |
| 1999 | 208,789 | 202,953 | 40,303 | 196,566 | 37,055 |
| 2000 | 219,489 | 202,064 | 38,298 | 197,523 | 35,990 |
| 2001 | 227,593 | 215,182 | 35,564 | 211,132 | 33,728 |
| 2002 | 242,144 | 228,810 | 32,828 | 225,637 | 30,503 |
| 2003 | 247,157 | 234,097 | 30,636 | 231,808 | 27,706 |
| 2004 | 251,658 | 240,290 | 29,157 | 236,729 | 25,723 |
| 2005 | 247,993 | 235,394 | 28,346 | 229,320 | 24,506 |
| 2006 | 223,741 | 210,419 | 26,927 | 206,468 | 24,262 |
| 2007 | 200,913 | 183,319 | 26,735 | 179,467 | 25,566 |
| 2008 | 178,378 | 159,536 | 26,585 | 158,405 | 27,015 |
| 2009 | 160,199 | 139,145 | 26,088 | 140,741 | 28,043 |
| 2010 | 154,528 | 135,038 | 25,160 | 140,093 | 28,612 |
| 2011 | 178,230 | 159,771 | 24,128 | 167,289 | 27,922 |
| 2012 | 204,105 | 187,020 | 22,748 | 195,628 | 25,832 |
| 2013 | 229,364 | 208,834 | 21,728 | 216,628 | 23,466 |
| 2014 | 232,837 | 215,478 | 22,554 | 224,639 | 22,833 |
| 2015 | 238,823 | 225,278 | 25,341 | 239,766 | 25,341 |
| 2016 | 273,517 | 259,729 | 31,224 | 273,885 | 30,026 |
| 2017 | 315,904 | 300,437 | 37,263 | 314,229 | 35,467 |
| 2018 | 345,828 | 327,017 | 40,534 | 338,863 | 38,217 |
| 2019 | 349,927 | 331,289 | 40,822 | 332,967 | 36,835 |
| 2020 | 313,835 | 295,078 | 37,600 | 298,700 | 33,190 |
| 2021 | 251,897 | 257,131 | 34,880 | 260,990 | 29,537 |
| 2022 | 256,927 | 245,485 | 33,137 | 250,144 | 27,033 |
| 2023 | 253,076 | 245,934 | 33,521 | 245,583 | 26,699 |

Table 2.xx Recruitment age-0 numbers.

|  | | **Thompson Ensemble** | | **New Ensemble** | |
| --- | --- | --- | --- | --- | --- |
| **Year** | **Last Year Est.** | **Est.** | **Stdev.** | **Est.** | **Stdev.** |
| 1978 | 766,614 | 739,800 | 222,333 | 708,057 | 202,330 |
| 1979 | 759,852 | 812,290 | 170,020 | 788,833 | 143,831 |
| 1980 | 192,718 | 183,931 | 51,003 | 171,766 | 46,091 |
| 1981 | 207,882 | 196,406 | 42,063 | 193,314 | 37,577 |
| 1982 | 975,776 | 1,049,655 | 171,824 | 1,037,885 | 139,643 |
| 1983 | 257,347 | 240,709 | 60,825 | 233,669 | 52,361 |
| 1984 | 896,690 | 958,395 | 158,853 | 951,679 | 128,759 |
| 1985 | 410,976 | 420,459 | 75,973 | 414,720 | 61,054 |
| 1986 | 223,373 | 232,098 | 41,841 | 226,589 | 35,175 |
| 1987 | 76,539 | 74,246 | 18,661 | 72,710 | 17,582 |
| 1988 | 312,274 | 308,456 | 52,722 | 310,358 | 44,323 |
| 1989 | 609,372 | 609,687 | 98,994 | 617,518 | 79,506 |
| 1990 | 594,750 | 606,608 | 103,323 | 607,488 | 83,587 |
| 1991 | 363,549 | 381,991 | 75,286 | 380,663 | 65,356 |
| 1992 | 957,580 | 953,841 | 178,086 | 951,241 | 149,346 |
| 1993 | 358,215 | 353,270 | 59,531 | 336,752 | 48,534 |
| 1994 | 303,156 | 302,236 | 52,907 | 292,741 | 43,593 |
| 1995 | 268,114 | 269,392 | 46,185 | 263,963 | 38,314 |
| 1996 | 852,733 | 896,383 | 147,609 | 893,189 | 110,576 |
| 1997 | 359,952 | 356,588 | 57,836 | 349,429 | 44,907 |
| 1998 | 287,486 | 296,257 | 46,078 | 283,845 | 38,178 |
| 1999 | 688,509 | 711,417 | 108,472 | 692,667 | 85,106 |
| 2000 | 510,746 | 531,110 | 85,166 | 523,811 | 66,839 |
| 2001 | 206,518 | 209,473 | 39,866 | 195,095 | 34,228 |
| 2002 | 364,961 | 370,861 | 72,664 | 370,545 | 62,046 |
| 2003 | 335,736 | 318,168 | 58,994 | 310,860 | 49,978 |
| 2004 | 238,668 | 233,180 | 42,193 | 228,155 | 34,845 |
| 2005 | 285,658 | 301,897 | 51,435 | 313,446 | 44,599 |
| 2006 | 814,597 | 847,684 | 120,003 | 814,900 | 87,582 |
| 2007 | 324,302 | 322,339 | 51,724 | 340,349 | 42,521 |
| 2008 | 1,179,169 | 1,250,607 | 178,845 | 1,173,941 | 133,938 |
| 2009 | 167,007 | 188,396 | 40,026 | 193,918 | 35,557 |
| 2010 | 744,020 | 756,808 | 109,727 | 744,748 | 86,412 |
| 2011 | 957,563 | 1,048,211 | 160,422 | 1,004,635 | 119,649 |
| 2012 | 450,942 | 465,052 | 83,532 | 503,449 | 74,329 |
| 2013 | 1,205,273 | 1,252,542 | 196,255 | 1,170,319 | 145,080 |
| 2014 | 222,115 | 220,133 | 41,397 | 210,153 | 35,169 |
| 2015 | 306,665 | 325,722 | 49,875 | 307,735 | 40,531 |
| 2016 | 217,134 | 221,693 | 44,130 | 209,288 | 35,990 |
| 2017 | 136,750 | 155,833 | 36,435 | 182,075 | 38,592 |
| 2018 | 749,239 | 838,971 | 134,624 | 807,998 | 109,270 |
| 2019 | 225,354 | 169,273 | 42,663 | 160,438 | 38,284 |
| 2020 | 409,968 | 358,465 | 68,097 | 354,043 | 59,431 |
| 2021 | 506,865 | 513,555 | 77,998 | 505,249 | 60,451 |
| 2022 | 506,865 | 513,555 | 77,660 | 505,249 | 60,521 |

Table2.xx Full Selection F

|  | | **Thompson Ensemble** | | **New Ensemble** | |
| --- | --- | --- | --- | --- | --- |
| **Year** | **Last Year Est.** | **Est.** | **Stdev.** | **Est.** | **Stdev.** |
| 1978 | 0.194 | 0.217 | 0.063 | 0.238 | 0.067 |
| 1979 | 0.140 | 0.153 | 0.042 | 0.167 | 0.044 |
| 1980 | 0.146 | 0.108 | 0.024 | 0.115 | 0.025 |
| 1981 | 0.111 | 0.112 | 0.020 | 0.118 | 0.021 |
| 1982 | 0.087 | 0.085 | 0.012 | 0.093 | 0.014 |
| 1983 | 0.105 | 0.112 | 0.013 | 0.116 | 0.014 |
| 1984 | 0.144 | 0.140 | 0.015 | 0.139 | 0.016 |
| 1985 | 0.158 | 0.158 | 0.016 | 0.167 | 0.019 |
| 1986 | 0.151 | 0.152 | 0.016 | 0.162 | 0.019 |
| 1987 | 0.175 | 0.176 | 0.015 | 0.178 | 0.017 |
| 1988 | 0.207 | 0.229 | 0.019 | 0.238 | 0.021 |
| 1989 | 0.193 | 0.221 | 0.017 | 0.227 | 0.020 |
| 1990 | 0.216 | 0.240 | 0.018 | 0.252 | 0.020 |
| 1991 | 0.361 | 0.381 | 0.029 | 0.387 | 0.031 |
| 1992 | 0.392 | 0.380 | 0.032 | 0.392 | 0.037 |
| 1993 | 0.273 | 0.292 | 0.025 | 0.322 | 0.029 |
| 1994 | 0.369 | 0.383 | 0.029 | 0.400 | 0.033 |
| 1995 | 0.464 | 0.463 | 0.038 | 0.492 | 0.044 |
| 1996 | 0.436 | 0.439 | 0.046 | 0.468 | 0.052 |
| 1997 | 0.487 | 0.498 | 0.060 | 0.506 | 0.064 |
| 1998 | 0.390 | 0.389 | 0.052 | 0.393 | 0.055 |
| 1999 | 0.372 | 0.374 | 0.048 | 0.383 | 0.051 |
| 2000 | 0.356 | 0.368 | 0.042 | 0.377 | 0.047 |
| 2001 | 0.331 | 0.339 | 0.030 | 0.347 | 0.030 |
| 2002 | 0.351 | 0.354 | 0.027 | 0.364 | 0.029 |
| 2003 | 0.367 | 0.376 | 0.034 | 0.382 | 0.030 |
| 2004 | 0.377 | 0.378 | 0.034 | 0.388 | 0.030 |
| 2005 | 0.393 | 0.401 | 0.030 | 0.413 | 0.030 |
| 2006 | 0.403 | 0.420 | 0.037 | 0.423 | 0.041 |
| 2007 | 0.374 | 0.392 | 0.042 | 0.396 | 0.048 |
| 2008 | 0.440 | 0.457 | 0.056 | 0.457 | 0.064 |
| 2009 | 0.555 | 0.576 | 0.085 | 0.581 | 0.099 |
| 2010 | 0.534 | 0.515 | 0.068 | 0.500 | 0.076 |
| 2011 | 0.649 | 0.633 | 0.062 | 0.605 | 0.068 |
| 2012 | 0.570 | 0.567 | 0.043 | 0.547 | 0.046 |
| 2013 | 0.525 | 0.528 | 0.039 | 0.519 | 0.038 |
| 2014 | 0.573 | 0.553 | 0.056 | 0.541 | 0.048 |
| 2015 | 0.543 | 0.551 | 0.060 | 0.529 | 0.049 |
| 2016 | 0.488 | 0.505 | 0.051 | 0.485 | 0.044 |
| 2017 | 0.409 | 0.407 | 0.061 | 0.392 | 0.051 |
| 2018 | 0.294 | 0.297 | 0.032 | 0.289 | 0.027 |
| 2019 | 0.278 | 0.277 | 0.029 | 0.281 | 0.026 |
| 2020 | 0.291 | 0.272 | 0.024 | 0.269 | 0.023 |
| 2021 | 0.284 | 0.266 | 0.023 | 0.261 | 0.024 |
| 2022 | 0.303 | 0.336 | 0.030 | 0.325 | 0.030 |

|  | | **Thompson** | **New** |
| --- | --- | --- | --- |
| **Year** | **Quantity** | **Ensemble** | **Ensemble** |
|  | B100% | 679,221 | 668,477 |
|  | B40% | 267,391 | 267,391 |
|  | B35% | 233,967 | 233,967 |
|  | F40% | 0.32 | 0.32 |
|  | F35% | 0.388 | 0.389 |
| 2022 | Female spawning biomass | 245,934 | 245,594 |
| 2022 | Relative spawning biomass | 0.367 | 0.367 |
| 2022 | Pr(B/B100%<0.2) | 0 | 0 |
| 2022 | maxFABC | 0.291 | 0.293 |
| 2022 | maxABC | 142,539 | 144,834 |
| 2022 | Catch | 142,539 | 144,834 |
| 2022 | FOLF | 0.353 | 0.356 |
| 2022 | OFL | 169,477 | 172,495 |
| 2023 | Female spawning biomass | 244,597 | 242,911 |
| 2023 | Relative spawning biomass | 0.363 | 0.363 |
| 2023 | Pr(B/B100%<0.2) | 0 | 0 |
| 2023 | maxFABC | 0.288 | 0.29 |
| 2023 | maxABC | 138,417 | 140,159 |
| 2023 | Catch | 138,417 | 140,159 |
| 2023 | FOLF | 0.349 | 0.352 |
| 2023 | OFL | 164,445 | 166,814 |

let's add a line break