

Update of the Southern New England/Mid-Atlantic Winter Flounder Resource New Base Case SCAA using updated data

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Introduction

This paper presents an update of the SCAA "New Base Case" for the Southern New England/Mid-Atlantic winter flounder resource of Rademeyer and Butterworth (2011) using the most recent data available (Terceiro, 2011).

Data and Methodology

The data tables, which have been updated from those used in Rademeyer and Butterworth (2011), are given in Appendix A with the updated data shown in bold. Although the units of NEFSC surveys have changed (given here as stratified mean number per tow instead of mean total number), only the 2010 values are new (i.e. changed).

The methodology is as described in Appendix B of Rademeyer and Butterworth (2011), with the New Base Case specifications.

Results and Discussion

The results for the "New Base Case" and "New Base Case with updated data" are compared in Table 1. Retrospective patterns for spawning biomass and recruitment trajectories are shown in Fig. 1 for the "New Base Case with updated data" and the estimated spawning biomass and recruitment trends are shown in Fig. 2. These show very little change in moving from the original to the new data.

References

- Rademeyer R.A. and Butterworth D.S. 2011. Initial applications of statistical catch-at-age methodology to the Southern New England/Mid-Atlantic winter flounder resource. Document to this workshop.
- Terceiro M. 2008. J. Southern New England/Mid-Atlantic winter flounder. Appendix to the Report of the 3rd Groundfish Assessment Review Meeting (GARM III): Assessment of 19 Northeast Groundfish Stocks through 2007, Northeast Fisheries Science Center, Woods Hole, Massachusetts, August 4-8, 2008
<http://www.nefsc.noaa.gov/publications/crd/crd0816/pdfs/garm3j.pdf>

Table 1: Results for the New Base Case as in Rademeyer and Butterworth (2011) and now with the updated data. Biomass units are '000t. The two recruitment values refer to the two recruitment periods, i.e. 1989-2010 and 1981-1988 respectively. MSY and related quantities have been computed for each of these recruitment levels, assuming the natural mortality in recent years.

| | New Base Case | | | | New Base Case - Updated data | | | |
|----------------------------------|--------------------|-----------------|----------------|--------|------------------------------|-----------------|----------------|--------|
| ¹ -lnL:overall | -864.1 | | | | -848.9 | | | |
| ¹ -lnL:Survey | -49.8 | | | | -42.3 | | | |
| ¹ -lnL:CAA | -91.7 | | | | -95.8 | | | |
| ¹ -lnL:CAAsurv | -701.7 | | | | -690.3 | | | |
| ¹ -lnL:RecRes | -21.9 | | | | -21.7 | | | |
| ¹ -lnL:SelSmoothing | 0.9 | | | | 1.3 | | | |
| Mohn's rho: SSB | -0.03 | | | | -0.03 | | | |
| Mohn's rho: rec. | 0.16 | | | | 0.16 | | | |
| Phi | 0.83 | | | | 0.81 | | | |
| Bsp(1981) | 20.8 | | | | 21.1 | | | |
| Bsp(2010) | 4.1 | | | | 4.1 | | | |
| Bsp(2010)/Bsp(1981) | 0.20 | | | | 0.20 | | | |
| M | 0.3-0.6 | | | | 0.3-0.6 | | | |
| Recruitment | 25.7 | 52.8 | | | 25.5 | 52.9 | | |
| Bsp(MSY) | 2.0 | 4.1 | | | 1.7 | 3.5 | | |
| MSY | 2.4 | 5.0 | | | 2.6 | 5.3 | | |
| σ_{comCAA} | 0.10 | | | | 0.10 | | | |
| Survey | q x10 ⁶ | σ_{surv} | σ_{CAA} | ρ | q x10 ⁶ | σ_{surv} | σ_{CAA} | ρ |
| NEFSCspr | 285.2 | 0.31 | 0.10 | 0.06 | 0.10 | 0.31 | 0.11 | 0.03 |
| NEFSCfall | 936.6 | 0.47 | 0.15 | 0.67 | 0.17 | 0.50 | 0.13 | 0.69 |
| NEFSCwinter | 233.5 | 0.30 | 0.19 | 0.21 | 0.14 | 0.30 | 0.19 | 0.18 |
| MADFM | 3.31 | 0.41 | 0.15 | 0.51 | 2.61 | 0.42 | 0.15 | 0.52 |
| RIDFW | 0.57 | 0.51 | 0.16 | 0.20 | 0.52 | 0.51 | 0.16 | 0.19 |
| CTDEP | 3.13 | 0.51 | 0.12 | 0.68 | 2.30 | 0.50 | 0.12 | 0.68 |
| NY | 0.11 | 0.92 | 0.20 | 0.28 | 0.11 | 0.92 | 0.20 | 0.29 |
| NJDFW Ocean | 4.13 | 0.42 | 0.16 | -0.03 | 2.80 | 0.43 | 0.16 | -0.03 |
| NJDFW River | 0.39 | 0.27 | 0.18 | 0.58 | 0.28 | 0.28 | 0.18 | 0.67 |
| MADFM YOY | 0.01 | 0.44 | - | 0.50 | 0.01 | 0.44 | - | 0.45 |
| CTDEP YOY | 0.24 | 0.65 | - | 0.26 | 0.21 | 0.72 | - | 0.33 |
| RIDFW YOY | 0.48 | 0.71 | - | 0.52 | 0.43 | 0.91 | - | 0.33 |
| NY YOY | 0.14 | 1.33 | - | 0.60 | 0.14 | 1.33 | - | 0.60 |
| DEDFW YOY | 0.00 | 1.00 | - | -0.23 | 0.00 | 1.00 | - | -0.18 |
| URIGSO | 0.53 | 0.51 | 0.13 | 0.31 | 0.55 | 0.44 | 0.13 | 0.20 |
| σ_{R_out} (81-88, 89-10) | 0.27 | 0.26 | | | 0.27 | 0.27 | | |

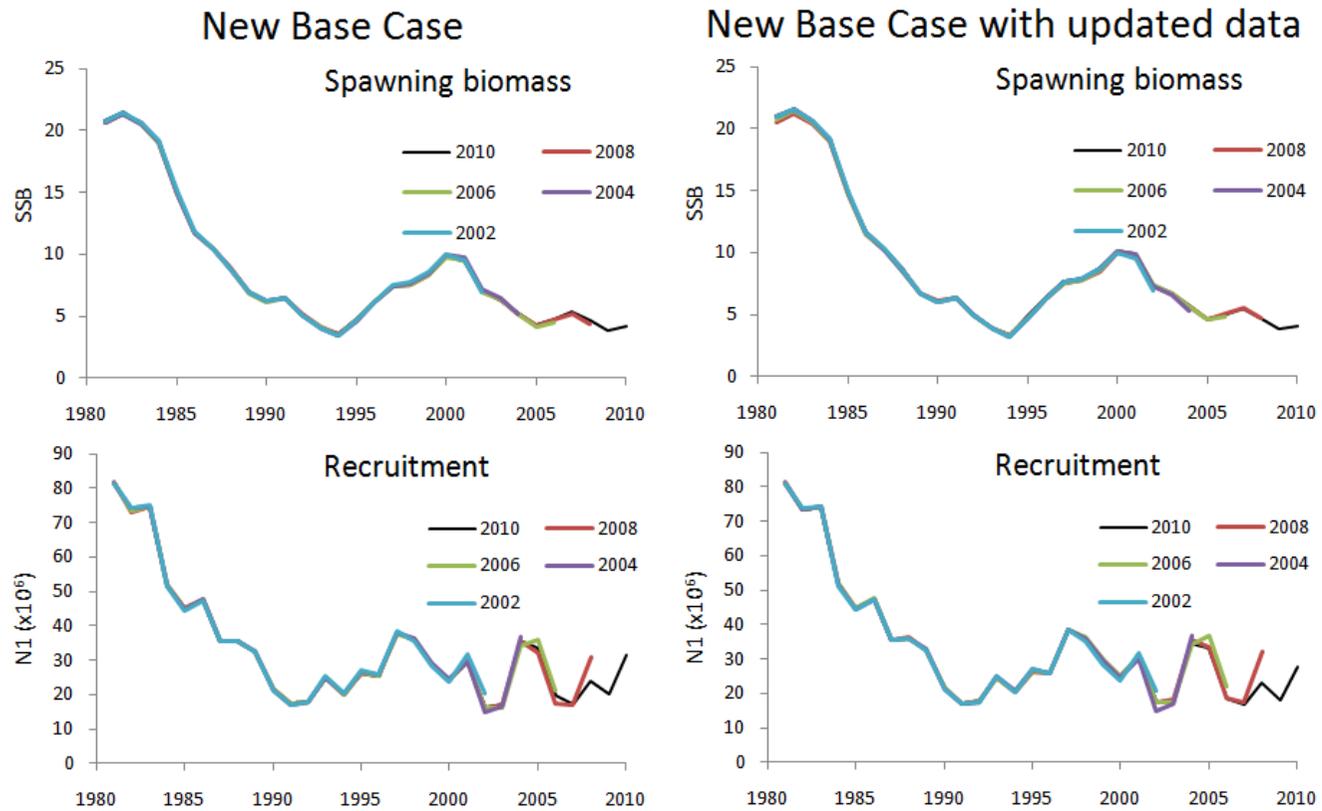


Fig. 1: Retrospective analysis of spawning biomass and recruitment for the two cases.

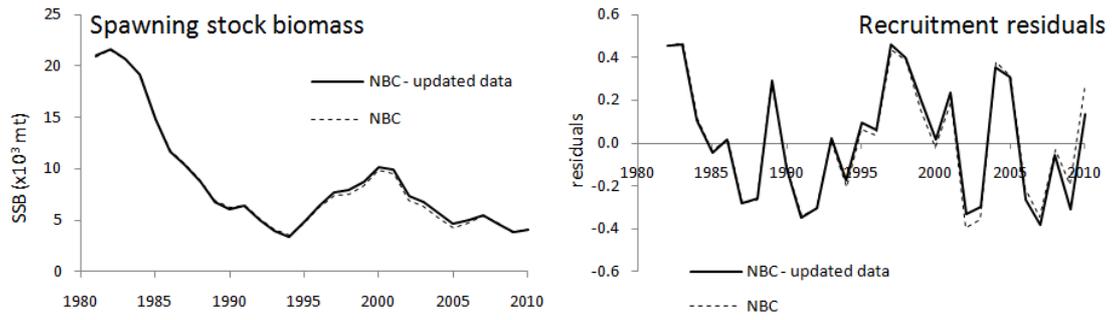


Fig. 2: Spawning stock biomass and recruitment trajectories for the New Base Case and New Base Case with updated data.

APPENDIX A – Data

In the Tables below, the data that are new or have been updated compared to those used in Rademeyer and Butterworth (2011) are shown in bold. The data tables used in Rademeyer and Butterworth (2011) that have not been updated at all are not repeated here.

Table A1: Total catch (metric tons) for SNE/MA winter flounder (Terceiro, 2011). Pre-1981, only the commercial landings are available; to compute the total catches, the average 1981-1985 ratio of commercial landings (0.62), commercial discards (0.09), recreational landings (0.28) and recreational discards (0.01) is assumed to apply over the pre-1981 period.

| Year | Total catch (mt) | Year | Total catch (mt) | Year | Total catch (mt) |
|------|------------------|------|------------------|------|------------------|
| 1964 | 12053 | 1980 | 17138 | 1996 | 3702 |
| 1965 | 13995 | 1981 | 15764 | 1997 | 4483 |
| 1966 | 19315 | 1982 | 14143 | 1998 | 3614 |
| 1967 | 15285 | 1983 | 13582 | 1999 | 3745 |
| 1968 | 11402 | 1984 | 15526 | 2000 | 4754 |
| 1969 | 13074 | 1985 | 13891 | 2001 | 5147 |
| 1970 | 13874 | 1986 | 9217 | 2002 | 3412 |
| 1971 | 11881 | 1987 | 9352 | 2003 | 2827 |
| 1972 | 8370 | 1988 | 8795 | 2004 | 1942 |
| 1973 | 8988 | 1989 | 6915 | 2005 | 1563 |
| 1974 | 6869 | 1990 | 5999 | 2006 | 2023 |
| 1975 | 6422 | 1991 | 6842 | 2007 | 1883 |
| 1976 | 5266 | 1992 | 4729 | 2008 | 1432 |
| 1977 | 7117 | 1993 | 4311 | 2009 | 639 |
| 1978 | 10204 | 1994 | 3092 | 2010 | 400 |
| 1979 | 10552 | 1995 | 3434 | | |

Table A2. Catch at age matrix (000s) for SNE/MA winter flounder (Terceiro, 2011).

| | 1 | 2 | 3 | 4 | 5 | 6 | 7+ |
|------|-----------|------------|-------------|-------------|------------|------------|-----------|
| 1981 | 1380 | 14183 | 14401 | 3608 | 666 | 182 | 111 |
| 1982 | 575 | 14153 | 12374 | 3713 | 608 | 212 | 202 |
| 1983 | 616 | 7232 | 13273 | 6111 | 1791 | 695 | 544 |
| 1984 | 493 | 11470 | 13940 | 4890 | 1770 | 873 | 803 |
| 1985 | 274 | 7342 | 12771 | 6013 | 2922 | 1819 | 1404 |
| 1986 | 216 | 6327 | 9101 | 4218 | 1053 | 442 | 357 |
| 1987 | 74 | 5265 | 8988 | 3084 | 2690 | 751 | 424 |
| 1988 | 85 | 3946 | 9401 | 3963 | 1206 | 978 | 303 |
| 1989 | 468 | 5275 | 7208 | 3541 | 861 | 226 | 214 |
| 1990 | 36 | 2110 | 6276 | 2933 | 768 | 196 | 142 |
| 1991 | 52 | 3029 | 7146 | 3349 | 860 | 252 | 113 |
| 1992 | 25 | 1507 | 4460 | 2582 | 673 | 162 | 53 |
| 1993 | 292 | 2200 | 3520 | 1897 | 714 | 188 | 138 |
| 1994 | 251 | 2612 | 2339 | 1280 | 337 | 97 | 39 |
| 1995 | 88 | 654 | 3112 | 2202 | 506 | 83 | 20 |
| 1996 | 171 | 1050 | 3289 | 2181 | 556 | 129 | 40 |
| 1997 | 88 | 1841 | 3488 | 2252 | 584 | 96 | 39 |
| 1998 | 16 | 1371 | 3043 | 1788 | 555 | 185 | 74 |
| 1999 | 5 | 2146 | 4062 | 1577 | 375 | 82 | 18 |
| 2000 | 43 | 1336 | 3436 | 2473 | 822 | 146 | 72 |
| 2001 | 35 | 1689 | 3503 | 2274 | 883 | 231 | 124 |
| 2002 | 14 | 478 | 1897 | 1830 | 925 | 324 | 115 |
| 2003 | 15 | 498 | 1802 | 1199 | 501 | 223 | 136 |
| 2004 | 36 | 378 | 999 | 858 | 331 | 223 | 167 |
| 2005 | 32 | 417 | 765 | 755 | 328 | 134 | 81 |
| 2006 | 39 | 758 | 1598 | 686 | 277 | 133 | 108 |
| 2007 | 7 | 335 | 1460 | 1010 | 290 | 84 | 42 |
| 2008 | 34 | 243 | 699 | 725 | 278 | 126 | 66 |
| 2009 | 83 | 195 | 271 | 268 | 211 | 66 | 30 |
| 2010 | 67 | 87 | 150 | 159 | 87 | 52 | 35 |

Table A3. Total fishery mean weights-at-age (kg) for SNE/MA winter flounder (M. Terceiro, pers. commn).

| | 1 | 2 | 3 | 4 | 5 | 6 | 7+ |
|-------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 1981 | 0.129 | 0.274 | 0.477 | 0.798 | 1.063 | 1.242 | 1.196 |
| 1982 | 0.092 | 0.263 | 0.440 | 0.697 | 1.052 | 1.257 | 1.840 |
| 1983 | 0.197 | 0.237 | 0.354 | 0.517 | 0.768 | 1.047 | 1.552 |
| 1984 | 0.148 | 0.261 | 0.370 | 0.546 | 0.695 | 0.915 | 1.284 |
| 1985 | 0.111 | 0.282 | 0.364 | 0.482 | 0.522 | 0.467 | 0.613 |
| 1986 | 0.129 | 0.292 | 0.398 | 0.480 | 0.685 | 0.879 | 0.961 |
| 1987 | 0.046 | 0.287 | 0.384 | 0.551 | 0.475 | 0.564 | 0.853 |
| 1988 | 0.039 | 0.279 | 0.351 | 0.508 | 0.634 | 0.517 | 0.827 |
| 1989 | 0.118 | 0.258 | 0.378 | 0.508 | 0.660 | 0.716 | 1.073 |
| 1990 | 0.082 | 0.295 | 0.394 | 0.525 | 0.672 | 0.808 | 0.990 |
| 1991 | 0.093 | 0.317 | 0.420 | 0.534 | 0.603 | 0.823 | 1.168 |
| 1992 | 0.079 | 0.287 | 0.427 | 0.599 | 0.802 | 0.945 | 1.395 |
| 1993 | 0.169 | 0.334 | 0.460 | 0.592 | 0.689 | 0.878 | 1.167 |
| 1994 | 0.162 | 0.311 | 0.429 | 0.550 | 0.750 | 0.985 | 1.281 |
| 1995 | 0.267 | 0.420 | 0.470 | 0.559 | 0.789 | 1.089 | 1.741 |
| 1996 | 0.136 | 0.380 | 0.464 | 0.607 | 0.824 | 0.851 | 1.085 |
| 1997 | 0.245 | 0.443 | 0.515 | 0.644 | 0.771 | 0.957 | 1.477 |
| 1998 | 0.196 | 0.362 | 0.465 | 0.568 | 0.665 | 1.090 | 1.116 |
| 1999 | 0.136 | 0.359 | 0.439 | 0.524 | 0.684 | 0.903 | 1.147 |
| 2000 | 0.106 | 0.407 | 0.492 | 0.622 | 0.729 | 0.975 | 1.079 |
| 2001 | 0.089 | 0.436 | 0.519 | 0.640 | 0.783 | 1.051 | 1.234 |
| 2002 | 0.135 | 0.372 | 0.499 | 0.617 | 0.747 | 0.927 | 1.143 |
| 2003 | 0.167 | 0.426 | 0.517 | 0.672 | 0.854 | 1.000 | 1.135 |
| 2004 | 0.094 | 0.384 | 0.549 | 0.619 | 0.786 | 0.945 | 1.251 |
| 2005 | 0.129 | 0.342 | 0.488 | 0.675 | 0.834 | 1.013 | 1.318 |
| 2006 | 0.118 | 0.379 | 0.468 | 0.652 | 0.872 | 1.065 | 1.289 |
| 2007 | 0.065 | 0.388 | 0.473 | 0.634 | 0.861 | 1.097 | 1.372 |
| 2008 | 0.110 | 0.355 | 0.477 | 0.597 | 0.754 | 0.939 | 1.238 |
| 2009 | 0.126 | 0.326 | 0.434 | 0.594 | 0.757 | 1.006 | 0.941 |
| 2010 | 0.127 | 0.329 | 0.505 | 0.615 | 0.766 | 0.899 | 1.075 |

Table A4: Survey data in terms of total numbers for SNE/MA winter flounder (Terceiro, 2011). The NEFSC survey units have changed (now given as stratified mean number per tow instead of mean total number), but only the 2010 data points are new.

| | NEFSC spring | NEFSC fall | NEFSC winter | MADMF | RIDFW | CTDEP | NYDEC | NIDFW Ocean | NIDFW Rivers | URIGSO | YOY- MADMF | YOY- CTDEP | YOY- RIDFW | YOY- NYDEC | YOY- DEDFW |
|-------|-----------------|---------------|-----------------|-------|-------|--------------|-------|----------------|-----------------|--------|---------------|---------------|---------------|---------------|---------------|
| Month | 4 | 10 | 3 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 1 | 1 | 1 | 1 | 1 |
| Ages | 1-7+ | 2-6+ | 1-5+ | 1-7+ | 1-7+ | 1-7+ | 1-2+ | 1-7+ | 1-7+ | 1-7+ | 1 | 1 | 1 | 1 | 1 |
| 1981 | 9.02 | 10.21 | - | 47.80 | 87.98 | - | - | - | - | 0.43 | - | - | - | - | - |
| 1982 | 6.99 | 4.93 | - | 41.46 | 30.95 | - | - | - | - | 0.34 | - | - | - | - | - |
| 1983 | 6.26 | 8.76 | - | 58.14 | 58.95 | - | - | - | - | 0.37 | - | - | - | - | - |
| 1984 | 5.52 | 2.68 | - | 38.02 | 41.64 | 111.96 | - | - | - | 0.23 | - | - | - | - | - |
| 1985 | 5.36 | 2.73 | - | 39.49 | 34.98 | 83.57 | 3.35 | - | - | 0.32 | - | - | 1.52 | - | 35.04 |
| 1986 | 2.27 | 1.54 | - | 36.78 | 41.02 | 63.65 | - | - | - | 0.34 | - | 29.00 | - | - | 25.87 |
| 1987 | 1.76 | 1.17 | - | 39.16 | 56.22 | 79.93 | 3.43 | - | - | 0.33 | - | 11.60 | 2.67 | 0.17 | 65.05 |
| 1988 | 2.13 | 1.25 | - | 28.36 | 34.44 | 137.59 | 2.88 | - | - | 0.27 | - | 9.19 | 1.47 | 0.09 | 55.21 |
| 1989 | 2.49 | 1.44 | - | 27.38 | 20.88 | 148.19 | 5.89 | - | - | 0.18 | 15.46 | 18.92 | 11.20 | 0.02 | 36.44 |
| 1990 | 1.99 | 1.98 | - | 27.72 | 20.44 | 223.09 | 3.70 | - | - | 0.42 | 1.90 | 21.48 | 8.73 | 0.29 | 20.12 |
| 1991 | 2.47 | 1.95 | - | 11.02 | 40.97 | 150.21 | 6.94 | - | - | 0.33 | 2.85 | 12.19 | 14.72 | 0.63 | 16.80 |
| 1992 | 1.58 | 2.96 | 3.68 | 28.96 | 4.41 | 61.38 | 2.24 | - | - | 0.27 | 5.23 | 33.33 | 76.87 | 0.03 | 11.89 |
| 1993 | 0.96 | 1.38 | 2.59 | 50.40 | 2.92 | 63.59 | 14.24 | 19.17 | - | 0.29 | 11.90 | 5.29 | 17.10 | 0.27 | 19.06 |
| 1994 | 1.51 | 4.13 | 3.80 | 50.84 | 10.26 | 84.45 | 7.28 | 14.06 | - | 0.07 | 5.61 | 2.52 | 14.93 | 0.04 | 12.44 |
| 1995 | 2.10 | 2.25 | 2.22 | 37.37 | 32.19 | 50.12 | 4.11 | 30.41 | 2.82 | 0.15 | 14.23 | 5.64 | 4.10 | 0.31 | 57.63 |
| 1996 | 1.52 | 3.19 | 3.78 | 30.92 | 20.68 | 110.61 | 2.99 | 9.40 | 3.05 | 0.15 | 10.10 | 6.22 | 16.25 | 0.10 | 41.20 |
| 1997 | 1.44 | 7.89 | 3.91 | 38.51 | 22.27 | 71.31 | 6.56 | 36.02 | 3.35 | 0.22 | 19.22 | 4.70 | 4.42 | 0.04 | 43.05 |
| 1998 | 2.77 | 6.60 | 7.17 | 35.88 | 19.22 | 72.90 | 4.09 | 18.20 | 4.25 | 0.39 | 7.47 | 2.56 | 3.11 | 0.10 | 26.97 |
| 1999 | 4.17 | 3.60 | 10.33 | 25.98 | 13.46 | 41.35 | 3.47 | 17.79 | 3.23 | 0.17 | 9.24 | 14.97 | 7.52 | 0.13 | 13.24 |
| 2000 | 3.17 | 6.17 | 5.57 | 24.64 | 16.32 | 45.42 | 1.71 | 10.10 | 2.11 | 0.20 | 8.70 | 53.00 | 0.90 | 0.07 | 14.64 |
| 2001 | 1.57 | 4.88 | 3.10 | 15.79 | 12.49 | 54.51 | 5.69 | 13.83 | 2.84 | 0.35 | 4.33 | 13.73 | 2.31 | 0.08 | 16.70 |
| 2002 | 2.04 | 8.86 | 2.90 | 6.70 | 11.56 | 43.72 | 0.36 | 22.58 | 2.80 | 0.21 | 1.34 | 18.12 | 0.07 | 0.06 | 9.96 |
| 2003 | 0.77 | 3.21 | 2.20 | 17.73 | 5.56 | 27.84 | 0.54 | 12.52 | 1.57 | 0.10 | 3.06 | 31.22 | 0.86 | 0.01 | 19.71 |
| 2004 | 1.24 | 3.36 | 4.34 | 11.14 | 11.16 | 20.46 | 5.49 | 14.21 | 1.27 | 0.20 | 8.07 | 18.72 | 0.50 | 0.28 | 25.81 |
| 2005 | 0.93 | 3.71 | 4.05 | 27.02 | 15.74 | 16.10 | - | 25.67 | 0.99 | 0.10 | 10.96 | 5.28 | - | 0.20 | 30.75 |
| 2006 | 1.81 | 2.95 | 5.08 | 17.63 | 15.36 | 5.58 | - | 18.13 | - | 0.08 | 5.63 | 12.72 | - | 0.02 | 10.82 |
| 2007 | 0.94 | 3.48 | 2.79 | 16.68 | 7.33 | 28.66 | 0.15 | 18.58 | - | 0.16 | 0.93 | 14.17 | 1.11 | 0.15 | 8.54 |
| 2008 | 1.81 | 2.86 | - | 10.63 | 7.36 | 24.12 | - | 12.01 | - | 0.17 | 4.73 | 11.65 | - | 0.05 | 27.03 |
| 2009 | 0.99 | 1.78 | - | 14.58 | 3.67 | 22.64 | - | 13.98 | - | 0.09 | 1.97 | 10.77 | - | 0.02 | 11.54 |
| 2010 | 0.97 | 2.65 | - | 29.84 | 11.56 | 20.88 | - | 7.99 | - | 0.08 | 0.78 | 1.52 | - | 0.04 | 12.31 |

Table A6: Survey catch-at-age data mean numbers for SNE/MA winter flounder (Terceiro, 2011). The NEFSC survey units have changed (now given as stratified mean number per tow instead of mean total number), but only the 2010 data points are new.

| NEFSC spring | | | | | | | | NEFSC fall | | | | | |
|--------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|------------|-------------|-------------|-------------|-------------|-------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7+ | | 2- | 3 | 4 | 5 | 6+ |
| 1981 | 0.99 | 4.00 | 3.41 | 0.47 | 0.13 | 0.01 | 0.01 | 1981 | 7.16 | 2.49 | 0.30 | 0.10 | 0.12 |
| 1982 | 1.16 | 3.20 | 1.56 | 0.74 | 0.21 | 0.09 | 0.03 | 1982 | 2.97 | 1.34 | 0.47 | 0.12 | 0.02 |
| 1983 | 0.58 | 0.97 | 2.14 | 1.23 | 0.81 | 0.37 | 0.16 | 1983 | 5.45 | 2.06 | 0.62 | 0.35 | 0.28 |
| 1984 | 0.22 | 1.36 | 2.18 | 0.85 | 0.46 | 0.29 | 0.16 | 1984 | 1.21 | 1.17 | 0.26 | 0.03 | 0.01 |
| 1985 | 0.41 | 1.21 | 2.16 | 0.72 | 0.51 | 0.20 | 0.15 | 1985 | 1.34 | 0.99 | 0.30 | 0.09 | 0.01 |
| 1986 | 0.10 | 0.49 | 1.16 | 0.31 | 0.15 | 0.05 | 0.01 | 1986 | 1.13 | 0.36 | 0.03 | 0.01 | 0.01 |
| 1987 | 0.14 | 0.54 | 0.70 | 0.28 | 0.06 | 0.02 | 0.02 | 1987 | 0.67 | 0.36 | 0.12 | 0.02 | 0.00 |
| 1988 | 0.09 | 0.48 | 0.99 | 0.37 | 0.16 | 0.02 | 0.02 | 1988 | 0.33 | 0.64 | 0.22 | 0.04 | 0.02 |
| 1989 | 0.14 | 0.95 | 0.90 | 0.34 | 0.11 | 0.02 | 0.03 | 1989 | 1.11 | 0.26 | 0.05 | 0.01 | 0.01 |
| 1990 | 0.23 | 0.49 | 0.89 | 0.28 | 0.05 | 0.04 | 0.01 | 1990 | 0.97 | 0.85 | 0.15 | 0.01 | 0.00 |
| 1991 | 0.14 | 0.60 | 1.22 | 0.41 | 0.05 | 0.02 | 0.03 | 1991 | 1.09 | 0.73 | 0.12 | 0.01 | 0.00 |
| 1992 | 0.14 | 0.39 | 0.62 | 0.36 | 0.05 | 0.02 | 0.00 | 1992 | 1.87 | 0.79 | 0.26 | 0.03 | 0.01 |
| 1993 | 0.14 | 0.35 | 0.26 | 0.12 | 0.07 | 0.01 | 0.01 | 1993 | 0.95 | 0.35 | 0.08 | 0.00 | 0.00 |
| 1994 | 0.16 | 0.74 | 0.43 | 0.11 | 0.04 | 0.02 | 0.01 | 1994 | 2.68 | 1.08 | 0.30 | 0.04 | 0.03 |
| 1995 | 0.22 | 0.75 | 0.87 | 0.22 | 0.03 | 0.00 | 0.01 | 1995 | 1.51 | 0.63 | 0.09 | 0.01 | 0.01 |
| 1996 | 0.07 | 0.54 | 0.66 | 0.17 | 0.06 | 0.01 | 0.01 | 1996 | 2.01 | 0.80 | 0.31 | 0.06 | 0.01 |
| 1997 | 0.13 | 0.50 | 0.56 | 0.18 | 0.06 | 0.01 | 0.00 | 1997 | 5.06 | 2.20 | 0.55 | 0.08 | 0.00 |
| 1998 | 0.33 | 1.21 | 0.72 | 0.37 | 0.13 | 0.01 | 0.00 | 1998 | 4.22 | 1.91 | 0.41 | 0.05 | 0.01 |
| 1999 | 0.41 | 1.89 | 1.35 | 0.36 | 0.11 | 0.04 | 0.01 | 1999 | 1.38 | 1.46 | 0.54 | 0.18 | 0.04 |
| 2000 | 0.28 | 0.70 | 1.19 | 0.65 | 0.27 | 0.07 | 0.01 | 2000 | 3.20 | 2.02 | 0.71 | 0.22 | 0.02 |
| 2001 | 0.17 | 0.26 | 0.47 | 0.44 | 0.20 | 0.02 | 0.01 | 2001 | 2.28 | 1.61 | 0.63 | 0.30 | 0.06 |
| 2002 | 0.11 | 0.60 | 0.56 | 0.38 | 0.23 | 0.11 | 0.05 | 2002 | 4.53 | 2.35 | 1.14 | 0.59 | 0.20 |
| 2003 | 0.12 | 0.11 | 0.33 | 0.10 | 0.05 | 0.04 | 0.02 | 2003 | 1.46 | 1.15 | 0.46 | 0.10 | 0.04 |
| 2004 | 0.30 | 0.19 | 0.29 | 0.26 | 0.11 | 0.05 | 0.04 | 2004 | 2.68 | 0.28 | 0.28 | 0.06 | 0.06 |
| 2005 | 0.10 | 0.45 | 0.11 | 0.16 | 0.07 | 0.03 | 0.01 | 2005 | 2.55 | 0.73 | 0.21 | 0.13 | 0.09 |
| 2006 | 0.30 | 0.62 | 0.62 | 0.16 | 0.08 | 0.02 | 0.01 | 2006 | 1.86 | 0.79 | 0.22 | 0.06 | 0.02 |
| 2007 | 0.11 | 0.14 | 0.36 | 0.26 | 0.04 | 0.01 | 0.02 | 2007 | 2.24 | 1.03 | 0.16 | 0.02 | 0.03 |
| 2008 | 0.18 | 0.61 | 0.48 | 0.41 | 0.11 | 0.01 | 0.01 | 2008 | 1.18 | 0.70 | 0.62 | 0.29 | 0.07 |
| 2009 | 0.06 | 0.22 | 0.30 | 0.16 | 0.18 | 0.05 | 0.02 | 2009 | 1.29 | 0.23 | 0.15 | 0.09 | 0.02 |
| 2010 | 0.21 | 0.24 | 0.30 | 0.14 | 0.07 | 0.01 | 0.00 | 2010 | 1.51 | 0.66 | 0.23 | 0.19 | 0.06 |

| NEFSC winter | | | | | | CTDEP | | | | | | | |
|--------------|------|------|------|------|------|-------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | 1 | 2 | 3 | 4 | 5+ | | 1 | 2 | 3 | 4 | 5 | 6 | 7+ |
| 1992 | 0.73 | 0.86 | 1.09 | 0.73 | 0.28 | 1984 | 8.21 | 44.01 | 31.83 | 20.96 | 4.23 | 1.23 | 1.49 |
| 1993 | 0.56 | 1.16 | 0.54 | 0.18 | 0.15 | 1985 | 4.11 | 28.46 | 32.88 | 14.17 | 2.33 | 0.82 | 0.8 |
| 1994 | 0.36 | 1.16 | 1.76 | 0.25 | 0.28 | 1986 | 6.69 | 26 | 15.53 | 12.26 | 2.05 | 0.5 | 0.62 |
| 1995 | 0.04 | 0.75 | 1.26 | 0.17 | 0.00 | 1987 | 7.32 | 44.69 | 14.56 | 5.05 | 6.55 | 1.28 | 0.48 |
| 1996 | 1.01 | 0.87 | 1.55 | 0.32 | 0.02 | 1988 | 14.49 | 71.87 | 39.1 | 8.59 | 1.83 | 1.46 | 0.25 |
| 1997 | 0.43 | 1.49 | 1.32 | 0.54 | 0.13 | 1989 | 13.56 | 78.43 | 41.23 | 10.85 | 2.84 | 0.98 | 0.3 |
| 1998 | 0.42 | 3.52 | 1.95 | 0.96 | 0.32 | 1990 | 11.31 | 131.52 | 64.97 | 8.97 | 4.09 | 1.96 | 0.27 |
| 1999 | 0.84 | 5.94 | 2.23 | 0.96 | 0.36 | 1991 | 8.52 | 66.99 | 60.39 | 9.31 | 4.05 | 0.8 | 0.15 |
| 2000 | 0.23 | 2.82 | 2.12 | 0.24 | 0.16 | 1992 | 6.8 | 31.32 | 12.78 | 8.97 | 1.1 | 0.36 | 0.05 |
| 2001 | 1.04 | 0.55 | 0.70 | 0.54 | 0.27 | 1993 | 19.11 | 19.87 | 15.46 | 4.81 | 3.24 | 0.8 | 0.3 |
| 2002 | 0.08 | 1.34 | 0.74 | 0.15 | 0.59 | 1994 | 9.57 | 64.14 | 5.86 | 3.01 | 1.14 | 0.49 | 0.24 |
| 2003 | 0.09 | 0.57 | 1.04 | 0.25 | 0.25 | 1995 | 14.35 | 23.69 | 9.77 | 1.36 | 0.63 | 0.2 | 0.12 |
| 2004 | 2.17 | 1.02 | 0.43 | 0.36 | 0.36 | 1996 | 11.46 | 59.07 | 24.17 | 14.41 | 0.97 | 0.28 | 0.25 |
| 2005 | 0.39 | 2.56 | 0.36 | 0.43 | 0.31 | 1997 | 12.53 | 25.53 | 19.41 | 9.45 | 3.76 | 0.51 | 0.12 |
| 2006 | 0.00 | 2.40 | 1.73 | 0.51 | 0.44 | 1998 | 11.22 | 32.4 | 12.23 | 12.67 | 3.15 | 0.99 | 0.24 |
| 2007 | 0.02 | 0.56 | 1.03 | 1.03 | 0.15 | 1999 | 6.56 | 12.42 | 11.27 | 6.09 | 3.2 | 1.14 | 0.67 |
| | | | | | | 2000 | 7.11 | 16.66 | 8.4 | 7.7 | 3.42 | 1.53 | 0.6 |
| | | | | | | 2001 | 8.45 | 19.6 | 10.85 | 8.06 | 5.46 | 1.28 | 0.81 |
| | | | | | | 2002 | 6.27 | 19.9 | 9.56 | 4.43 | 1.95 | 1.02 | 0.59 |
| | | | | | | 2003 | 2.47 | 7.83 | 8.71 | 4.79 | 1.95 | 0.77 | 1.32 |
| | | | | | | 2004 | 6.34 | 3.84 | 3.49 | 3.88 | 1.91 | 0.64 | 0.36 |
| | | | | | | 2005 | 7.06 | 6.18 | 0.84 | 0.81 | 0.67 | 0.21 | 0.33 |
| | | | | | | 2006 | 1.14 | 2.6 | 1.1 | 0.19 | 0.14 | 0.17 | 0.24 |
| | | | | | | 2007 | 2.98 | 10.83 | 10.7 | 3.1 | 0.61 | 0.15 | 0.29 |
| | | | | | | 2008 | 11.48 | 3.48 | 4.19 | 4.12 | 0.65 | 0.12 | 0.08 |
| | | | | | | 2009 | 7.56 | 11.21 | 1.02 | 1.31 | 1.21 | 0.22 | 0.06 |
| | | | | | | 2010 | 6.64 | 8.45 | 3.94 | 0.71 | 0.57 | 0.44 | 0.13 |

NJDFW Ocean

| | 1 | 2 | 3 | 4 | 5 | 6 | 7+ |
|------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 1993 | 5.1 | 6.5 | 2.5 | 2.4 | 1.7 | 0.4 | 0.57 |
| 1994 | 3.7 | 4.2 | 3.9 | 1.4 | 0.4 | 0.3 | 0.16 |
| 1995 | 8 | 10.1 | 8.6 | 2.4 | 0.9 | 0.3 | 0.11 |
| 1996 | 0.6 | 2.9 | 2.6 | 1.9 | 0.9 | 0.3 | 0.2 |
| 1997 | 16.6 | 5.4 | 6.1 | 6 | 1.5 | 0.3 | 0.12 |
| 1998 | 4.5 | 3.9 | 4.8 | 3.3 | 1.2 | 0.4 | 0.1 |
| 1999 | 2.4 | 2.2 | 5.9 | 3.1 | 2.9 | 0.7 | 0.59 |
| 2000 | 0.7 | 0.3 | 2.1 | 3.3 | 2 | 0.9 | 0.8 |
| 2001 | 3.9 | 0.6 | 1.3 | 2.7 | 3.8 | 0.7 | 0.83 |
| 2002 | 5.81 | 3.21 | 4.55 | 2.22 | 2.8 | 2.16 | 1.83 |
| 2003 | 2.08 | 1.1 | 4.79 | 1.24 | 1.09 | 0.87 | 1.35 |
| 2004 | 6.48 | 0.72 | 1.42 | 2.08 | 0.56 | 1.38 | 1.57 |
| 2005 | 4.97 | 10.04 | 2.55 | 2.76 | 2.61 | 1.32 | 1.42 |
| 2006 | 0.64 | 2.49 | 9.43 | 3.23 | 0.62 | 0.75 | 0.97 |
| 2007 | 3.8 | 0.67 | 4.33 | 6.09 | 1.51 | 0.62 | 1.56 |
| 2008 | 5.57 | 1.59 | 0.83 | 1.75 | 1.69 | 0.21 | 0.37 |
| 2009 | 2.84 | 4.35 | 3.54 | 1.34 | 1.48 | 0.33 | 0.1 |
| 2010 | 0.75 | 1.59 | 2.63 | 1.5 | 0.94 | 0.37 | 0.21 |