J. Southern New England/Mid-Atlantic winter flounder
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Additional details and supporting information can be found in the Appendix of the GARM-III Report (NEFSC 2008).

1.0 Background

The current assessment of the Southern New England/Mid-Atlantic (SNE/MA) stock complex of winter flounder (Figure J1) is an update of the previous assessment completed in 2005 at GARM2 (NEFSC 2005). The GARM2 assessment included catch through 2004, research survey abundance indices through 2005, and catch at age analyzed by Virtual Population Analysis (VPA) for 1981-2004. Current biological reference points are based on stock-recruitment modeling conducted by the 2002 Working Group on Re-estimation of Biological Reference points for New England Groundfish (NEFSC 2002), which indicated that F_{MSY} = 0.32, SSB_{MSY} = 30,100 mt, and MSY = 10,600 mt. The GARM2 assessment concluded that the stock complex was overfished and that overfishing was occurring. Spawning stock biomass (SSB) in 2004 was estimated to be 3,938 mt, about 13% of SSB_{MSY} = 30,100 mt. The fully recruited fishing mortality rate in 2004 was estimated to be F = 0.38, about 19% above F_{MSY} = 0.32. The current assessment updates fishery catch estimates, research survey abundance indices, and analytical models through 2007/08.

2.0 Fishery

After reaching an historical peak of 11,977 metric tons (mt) in 1966, then declining through the 1970s, total U.S. commercial landings again peaked at 11,176 mt in 1981, and then steadily declined to 2,128 mt in 1994. Commercial landings then increased to 4,556 mt in 2001 before falling to a record low of 1,320 mt in 2005; commercial landings were 1,622 mt in 2007 (Table J1, Figure J2). The primary gear in the fishery is the otter trawl which accounts for an average of 98% of landings since 1989. Scallop dredges, handlines, pound nets, fyke nets, and gill nets account for the remaining 2% of total landings. Recreational landings reached a peak in 1984 of 5,510 mt but declined substantially thereafter (Table J2, Figure J2). Landings have been less than 1,000 mt since 1991, with record low estimated landings in 2007 of 116 mt. The principal mode of fishing is private/rental boats, with most recreational landings occurring during January to June.

Length samples of winter flounder are available from both the commercial and recreational landings. In the commercial fishery, annual sampling intensity varied from 15 to 251 mt landed per 100 lengths measured during 1981-2007 (Table J3). Port sampling has generally been adequate to develop the commercial fishery landings at age on a half-year, market category basis. In the recreational fishery, annual sampling intensity varied from 28 to 270 mt landed per 100 lengths measured during 1981-2007 (Table J4). Ages were determined using NEFSC survey spring and fall age-length keys.

Prior to 1994, NEFSC trawl survey length frequencies and commercial trawl fishery mesh selection data were used to estimate the magnitude and characterize the length frequency of the commercial fishery discard. For 1994-2007, NEFSC Fishery Observer trawl and scallop fishery discards to landings ratio estimates were applied to corresponding commercial fishery landings to estimate discards in weight (Table J5, Figure J2). The NEFSC Fishery Observer length frequency samples (Table J6) were used to characterize the proportion discarded at length for 1994-2007. Commercial fishery discard length samples were applied on a semi- annual basis and ages were determined using NEFSC survey spring and fall age-length keys. A discard mortality rate of 50% (Howell et al., 1992) was applied to commercial fishery live discards.

Recreational fishery discard losses peaked in 1984-1985 at 0.7 million fish. Discards have since declined and reached a low in 2007 of 11,000 fish (Table J7). Since 1997, irregular sampling of the recreational fisheries by state fisheries agencies has indicated that the discard is usually of fish below the minimum landing size of 12 inches (30 cm). For 2002-2007, discard length samples from the NYDEC sampling of the recreational party-boat fishery and from the CTDEP Volunteer Angling Survey (VAS) have been used to better characterize the recreational fishery discard. Ages were determined using NEFSC survey spring and fall age-length keys. A discard mortality rate of 15% was applied to recreational live discard estimates (B2 category from MRFSS data), as assumed in Howell et al. (1992).

Total fishery catches are summarized in Table J7.

3.0 Research vessel surveys

Mean weight per tow and number per tow indices for the NEFSC spring, fall, and winter time series are presented in Table J8. Indices declined from the beginning of the time series in the 1960s to a low point in the early to mid-1970s, then increased to a peak by the early 1980s. Following several years of high indices, abundance once again declined to below the low levels of the 1970s. NEFSC survey indices reached near- or record low levels for the time series in the late 1980s-1990s. Indices from the three survey series generally increased during 1993-1998/1999, but have since declined again (Figure J3).

Several state survey indices were available to characterize the abundance of SNE/MA winter flounder. The Massachusetts Division of Marine Fisheries (MADMF) spring and fall survey, Rhode Island Division of Fish and Wildlife (RIDFW) spring and fall survey, Connecticut Department of Environmental Protection (CTDEP) Long Island Sound Trawl Survey, and the New Jersey Division of Fish, Game and Wildlife (NJDFW) ocean survey trends are summarized in Tables J9-J10 and Figure J3. The numerous state recruitment surveys (MADMF, RIDFW, CTDEP, New York Department of Environmental Conservation (NYDEC), NJDFW, Delaware Division of Fish and Wildlife (DEDFW)) are summarized in Table J11 and Figure J3.

4.0 Assessment

Input data and model formulation

The 2008 GARM3 VPA was calibrated using the NOAA Fisheries Toolbox (NFT) ADAPT VPA version 2.8.0. Commercial and recreational fishery landings and discards estimates at age, the total fishery catch at age, and the total fishery mean weights at age used as input to the VPA are presented in Tables J12-J17. The following NEFSC and state agency trawl survey abundance indices at age were used in the ADAPT VPA calibration: NEFSC spring trawl ages 1-7+ (Figure J5), NEFSC fall trawl ages 1-5 (advanced to calibrate January 1 abundance of ages 2-6), NEFSC winter trawl ages 1-5, Massachusetts spring trawl ages 1-7+, Rhode Island fall seine age 0 (advanced to age-1), Rhode Island spring trawl ages 1-7+, Connecticut spring trawl ages 1-7+, New York trawl age 0 (advanced to age-1) and age-1, Massachusetts summer seine index of age-0 (advanced to age-1), Delaware juvenile trawl age-0 (advanced to age-1), New Jersey Ocean trawl ages 1-7+, and New Jersey River trawl ages 1-7+ (Tables J18-J26). Survey indices were selected for inclusion in VPA calibration based on consideration of the partial variance in an initial VPA trial run including all indices, the precision of the survey series, residual error patterns from the various trail runs, and on the significance of the correlation among indices and with VPA abundance estimates from the initial trial run including all potential calibration indices. A conditional non-parametric bootstrap procedure (Efron 1982) was used to evaluate the precision of fishing mortality and SSB. A retrospective analysis was performed for terminal year fishing mortality (F), SSB and age-1 recruitment.

Model selection process

The GARM3 Assessment Methodology Review Panel (March 2008) reviewed the 2005 GARM2 VPA with catch through 2004 and a version of the assessment implemented in ASAP v2.0.9. The two models provided similar results, and both exhibited a strong retrospective pattern through the late 1990s and into 2001. The Panel concluded that the data appeared sufficient for an age-structured model and that negligible error in the catch-at-age could be assumed. The Panel noted that the strong retrospective pattern appeared to be transitory as it was not as evident in terminal years 2002 and 2003. The Panel advised that model results should be checked for the retrospective pattern when the 2005-2006 catch data were added and that if pattern reappeared, then "consideration should be given to splitting the survey time series pre and post 1994." Splitting the survey series used in calibration acts as a proxy for fishery and biological factors that could have changed in the mid-1990s, resulting in the observed retrospective pattern.

The same set of survey calibration indices as used in the SAW 36 assessment (NEFSC 2003) and the 2005 GARM2 assessment (NEFSC 2005) was retained in the 2008 GARM3 VPA BASE case. The BASE case continued to exhibit a strong retrospective pattern, although it was less severe in recent years than in the 2005 GARM2 assessment. Given the persistence of the retrospective pattern in the BASE configuration, all survey series were split "pre and post 1994" (i.e., split between 1993 and 1994, given the change in commercial discard estimation and commercial landings reporting methods between these years) as per the GARM3 Modeling Panel recommendation, except for the NEFSC Winter, NJDFW Ocean, and NJDFW River survey series, which began in 1992, 1993, and 1995, respectively. Under this SPLIT run configuration, the retrospective pattern was somewhat reduced. No significant problems in residual patterns developed as a result of splitting the survey series, and the pattern for the NEFSC Fall survey appeared to be somewhat improved (less of a trend/blocking from negative residuals in the 1980s to positive residuals in the 1990s-2000s, likely corresponding to the change in retrospective patterns; compare Appendix Figures 2 and 11; NEFSC 2008). There was not much change in the pattern of the CTDEP Spring residuals, which continue to show a trend/ blocking in both the BASE and SPLIT run configurations (compare Appendix Figures 6 and 15; NEFSC 2008). The precision of the SPLIT run terminal year estimates was comparable to the BASE run estimates.

The BASE and SPLIT runs were again considered by the GARM3 Biological Reference Point Review Panel (June 2008) and the GARM3 Final Review Panel (August 2008), and those reviews recommended the SPLIT configuration as the preferred run configuration. Subsequent to the GARM3 Biological Reference Point Meeting, the assessment was updated with 2007 fishery catch data and NEFSC 2008 spring survey indices. The BASE run retrospective analyses continue to show a substantial pattern in both F and SSB during 1996-2001 terminal years, with a reduced pattern thereafter (Figures J6-J7). Under the SPLIT run configuration, the retrospective patterns are reduced, with a shift from underestimation of F during 1996-199 terminal years, and lack of a long-term pattern thereafter (Figures J8-J10). The Mohn's rho statistic calculated for the BASE and SPLIT runs ([retrospective year – terminal year]/terminal year), either summed or averaged over the last seven retrospective years (peels), is comparable in absolute magnitude but opposite in sign for F. The absolute value of the Mohn's rho for SSB is about 85% smaller for the SPLIT run; the value for recruitment at age 1 is about 30% smaller (Table J27).

Catchability coefficients (qs) from the BASE and SPLIT runs are compared in Table J28. As noted above, times series were sufficiently long to be split at 1993/1994 for the NEFSC Spring, NEFSC Fall, MADMF Spring, RIDFW Spring, and CTDEP Spring full age-matrix series. The NEFSC Winter and NJDFW Ocean and River survey series were not split. The qs for the split series generally decreased before 1994, with average decreases (when compared to the BASE run qs) ranging from about 50% for the NEFSC Fall survey to 5% for the CTDEP Spring survey. The qs for the split series generally increased after 1993, with average increases ranging from about 213% for the NEFSC Fall survey to 17% for the CTDEP Spring survey. For the unsplit series in the SPLIT run, qs generally increased by 1% to 7% compared to the BASE values.

For the NEFSC Spring, NEFSC Fall, NEFSC Winter and MADMF Spring survey series, estimates of survey trawl effective swept area were available to allow calculation of swept area absolute abundance indices (assuming 100% trawl efficiency). These swept area indices were then used as calibration indices in the BASE and SPLIT run configurations to investigate the implication of the changes in survey catchability (q) of these four survey series in the SPLIT runs (i.e., are the resulting swept area qs feasible given the biological and behavioral characteristics of the stock). In the BASE case (1981-2007), the swept area qs are always 0.60 or less; in the SPLIT case (1981-1993, 1994-2007), the magnitude and pattern of increases is as indicated in Table J28, and the largest q is for the NEFSC Fall age 4 index, at about 0.9 (Figure J11). These results indicate that the SPLIT run configuration provides a realistic model of the population dynamics of SNE/MA winter flounder. However, the causes for the increases in qs in the SPLIT configuration are unclear, and may alias multiple changes in the relationship between the research survey catch data, fishery catch data, and biological characteristics (e.g., M or growth) of the stock.

Based on the GARM3 Panel recommendations and subsequent work, the ADAPT VPA SPLIT run was carried forward as the basis for final estimates, biological reference point calculations, and status determination. Detailed results discussed below refer to the SPLIT run.

Assessment Results

The 2008 GARM3 SPLIT run adopted as the FINAL model indicated that during 1981-1993, fishing mortality (fully recruited F, ages 4-5) varied between 0.4 (1982) and 1.4 (1988) and then declined to 0.7 by 1999. Fishing mortality has been in the range of 0.6-0.7 during 2004-2007 (Figure J12). SSB declined from 14,714 mt in 1983 to a record low of 2,098 mt in 2005, before increasing to 3,368 mt in 2007 (Table J29, Figure J12). Recruitment at age 1 declined nearly continuously from 62.5 million age-1 fish in 1981 to 4.4 million in 2003. The 2006 year class of 3.6 million (age 1 in 2007) is estimated to be the smallest on record; the 2007 year class (age 1 in 2008) is estimated to be 8.8 million fish (Table J29, Figure J13).

The precision of the 2008 stock size at age, F at age in 2007, and SSB in 2007 from the GARM3 SPLIT run was evaluated using bootstrap techniques (Efron 1982). One thousand bootstrap iterations were realized in which errors (differences between predicted and observed survey values) were resampled. Bootstrap estimates of stock size at age indicate low bias (<10%) for ages 2-6; bias was estimated to be greater than 15% for ages 1 and 7+. Bootstrap standard errors provide stock size CVs ranging from 17% at age 3 to 121% at age 7+. Bootstrapped estimates of SSB indicate a CV of 11%, with relatively low bias (bootstrap mean estimate of SSB of 3,390 mt compared with NLLS estimate of 3,368 mt). There is an 80% probability that SSB in 2007 was between 2,936 mt and 3,825 mt (Table J29, Figure J14). The bootstrap estimates of standard error associated with fishing mortality rates at age indicate moderate precision. Coefficients of variation for F estimates ranged from 17% at age 3 to 30% at age 1. There is an 80% probability that fully recruited F for ages 4-5 in 2007 was between 0.522 and 0.861 (Table J29, Figure J15).

5.0 Biological reference points

The Working Group on Re-Evaluation of Biological Reference Points for New England Groundfish (NEFSC 2002) estimated the biological reference points for SNE/MA winter flounder using yield and SSB per recruit analyses (Thompson and Bell 1934) and Beverton-Holt stock-recruitment models (Beverton and Holt 1957, Brodziak et al. 2001, Mace and Doonan 1988) based on the SARC 28 assessment (NEFSC 1999). A Beverton-Holt function fit with a prior on unfished recruitment (R_0) equal to the average of the five largest year classes (1981-1985) in the VPA time series was selected as the best stock-recruitment model. The yield per recruit (YPR) and SSB per recruit (SSBR) analyses indicated that $F_{40\%}$ = 0.21 and $F_{0.1}$ = 0.25. The stock-recruitment model indicated that MSY = 10,600 mt, F_{MSY} = 0.32, and B_{MSY} = 30,100 mt.

Both the parametric Beverton-Holt stock-recruitment model and the non-parametric empirical approach (YPR and SSBR model combined with VPA recruitment estimates and long-term projections) were considered in the current assessment to estimate biological reference points for SNE/MA winter flounder, based on the GARM3 BASE and SPLIT VPA results. Stock-recruitment data were modeled for the 1981-2007 year classes (1981-2007 SSB; 1982-2008 recruitment at age 1). In the non-parametric empirical approach, a long-term (100 year) stochastic projection using the cumulative distribution function of the year classes produced when SSB exceeded 5,700 mt was used to estimate MSY and SSB_{MSY}.

Fishery catch and NEFSC Spring survey mean weights at age do not exhibit any significant long-term trends (Figures J16-J17). The time series pattern in female maturity at age is stable (Figure J18). Table J30 presents the input values for the YPR, SSBR, and stock-recruitment analyses using average values for 2003-2007 from the GARM3 SPLIT run. As in the NEFSC (2002) analyses, maturity at age 2 was rounded to 0.00 due to the low and likely imprecise estimate of the maturity of those fish.

The GARM3 Biological Reference Point Review Panel concluded that the prior on unfished recruitment used to fit the parametric Beverton-Holt stock-recruitment model was inappropriate. The Beverton-Holt stock-recruitment model fit without the prior did not provide feasible results. The Panel recommended the non-parametric empirical approach (YPR and SSBR model combined with VPA recruitment estimates and long-term projections) be used to estimate biological reference points for SNE/MA winter flounder based on a) the GARM3

SPLIT VPA results, b) the estimate of F40% as a proxy for F_{MSY}, and c) a long-term (100 year) stochastic projection using the cumulative distribution function of the year classes produced when SSB exceeded 5,700 mt (1981-1988 year classes; mean R = 35.239 million fish at age 1; Figure J19) of the SPLIT VPA series to estimate MSY and SSB_{MSY}. Table J31 summarizes the BRPs for SNE/MA winter flounder.

6.0 Projections

Projections of future stock status to the rebuilding deadline of 2014 were conducted with a stochastic model for recruitment based on the GARM3 SPLIT VPA results and corresponding non-parametric BRPs (Tables J29 & J31). Mean weights and partial recruitment patterns estimated for the most recent 5 years in the assessment (2003-2007) were used in projections to reflect current conditions in the stock and fishery (Table J30). Female maturity at age was based on the MADMF Spring survey 1982-2007 time series (Table J30). Projections assumed total catch in 2008 = total catch in 2007 = 1,857 mt, resulting in a forecast F in 2008 = 0.481. For projections to the rebuilding deadline of 2014, the GARM Final Review Panel (August 2008) recommended a two-stanza recruitment model (Model 15 in the AGEPRO projection software) for SSB levels above and below 5,700 mt of SSB. Recruitment below 5,700 mt averages 11 million age-1 fish; recruitment above 5,700 mt averages 35 million age-1 fish.

Projections at F in 2009-2014 = F40% = 0.248 indicate a <1% chance that the stock will rebuild to SSB_{MSY} = 38,761 mt by 2014 (Table J32; Figure J20). Projections further indicate that fishing at F = 0.000 during 2009-2014 will provide only a 1% chance to rebuild the stock to SSB_{MSY} = 38,761 by 2014 (Table J32; Figure J20).

7.0 Summary

The Southern New England/Mid-Atlantic (SNE/MA) winter flounder stock complex is overfished and overfishing is occurring (Figure J21; SPLIT run used as FINAL model). Fishing mortality (F) in 2007 was estimated to be 0.649, over twice the F_{MSY} proxy = F40% = 0.248 (Table J32). There is an 80% chance that the F in 2007 was between 0.522 and 0.861. SSB in 2007 was estimated to be 3,368 mt, about 9% of SSB_{MSY} = 38,761 mt (Table J32). There is an 80% probability that SSB in 2007 was between 2,936 mt and 3,825 mt. The 2006 year class of 3.6 million (age 1 in 2007) is estimated to be the smallest on record; the 2007 year class (age 1 in 2008) is estimated to be 8.8 million fish.

The 2008 GARM3 BASE run estimates of 2007 F = 0.438 and 2007 SSB = 4,565 mt (and associated 80% confidence intervals) are provided in Figure J21 to illustrate the change in these quantities due to the adjustment provided by the SPLIT run configuration that was adopted as the FINAL model for status determination. The BASE run results also indicate that the SNE/MA winter flounder stock complex is overfished and overfishing is occurring. An adjustment to the BASE model results using the average Mohn's rho retrospective change in F and SSB shifts the BASE results toward the FINAL model results.

8.0 Panel Discussion/Comments

Conclusions

The Base VPA for this stock exhibited such a large retrospective pattern that the Panel concluded it required an adjustment. The VPA with the survey time series split in 1993/1994 appeared to reduce the retrospective pattern and was consistent with the GARM III 'models' review. This adjustment was undertaken consistent with the GARM III ‘models’ review. Though the underlying causes for the retrospective pattern remain unknown, the Panel accepted the VPA with the survey time series split as Final and the best available estimate of stock status and a sufficient basis for management advice.

The Panel expressed concern about the uncertainties with the Final run. In particular, the declining rate of sampling of the recreational fishery and the persistent retrospective pattern that was not completely resolved by using the split in the survey time series.

The Panel noted that current biomass is extremely low and could remain so until recruitment improves. For this reason, it recommended that the stock and rebuilding plan projections be undertaken consistent with the GARM III ‘BRP’ review but including sampling from the VPA time series of recruitment guided by the 5,700 mt SSB breakpoint used in BRP determination.

Research Recommendations

The Panel had no specific research recommendations for this stock.

9.0 References

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10.0 Tables and Figures

Table J1. Winter flounder commercial landings (metric tons) for Southern New England/Mid-Atlantic stock complex area (U.S. statistical reporting areas 521, 526, divisions 53, 61-63) as reported by NEFSC weighout, dealer, state bulletin and general canvas data.

Year	Metric tons
1964	7,474
1965	8,678
1966	11,977
1967	9,478
1968	7,070
1969	8,107
1970	8,603
1971	7,367
1972	5,190
1973	5,573
1974	4,259
1975	3,982
1976	3,265
1977	4,413
1978	6,327
1979	6,543
1980	10,627
1981	11,176
1982	9,438
1983	8,659
1984	8,882
1985	7,052
1986	4,929
1987	5,172
1988	4,312
1989	3,670
1990	4,232
1991	4,823
1992	3,816
1993	3,010
1994	2,128
1995	2,593
1996	2,783
1997	3,548
1998	3,137
1999	3,349

Table J1 continued.

Year	Metric tons
2000	3,704
2001	4,556
2002	3,084
2003	2,308
2004	1,636
2005	1,320
2006	1,720
2007	1,622

Table J2. Estimated number (000's) and weight (mt) of winter flounder caught, landed, and discarded in the recreational fishery, Southern New England/Mid-Atlantic stock complex.

Year	Catch A+B1+B2 (N; >000)	Landed A+B1 (N; >000)	Landed A+B1 (mt)	Released B2 (N; >000)	15% Release Mortality (N; >000)	15% Release Mortality (mt)
1981	11259	8253	3154	3007	451	91
1982	10379	8216	3493	2163	324	63
1983	10994	8295	3485	2699	405	127
1984	17410	12441	5510	4968	745	148
1985	17871	13086	5075	4785	718	230
1986	9338	7001	2949	2337	351	66
1987	9200	6857	3169	2342	351	61
1988	10166	7354	3510	2811	422	69
1989	6097	3799	1792	2297	345	49
1990	3845	2487	1063	1359	204	31
1991	4347	2808	1184	1539	231	51
1992	1358	809	387	550	83	15
1993	3184	1879	813	1305	155	31
1994	2067	1203	594	864	80	29
1995	2140	1348	650	792	119	32
1996	2655	1607	714	1049	157	30
1997	1921	1220	627	701	105	31
1998	1008	584	290	425	64	13
1999	1071	658	320	412	62	14
2000	2128	1401	870	727	109	32
2001	1421	892	549	528	79	14
2002	707	408	223	299	45	12
2003	761	572	323	189	28	11
2004	442	344	214	98	15	8
2005	484	215	124	269	40	14
2006	591	273	136	318	48	16
2007	289	215	116	74	11	5

Table J3. The total number of commercial lengths sampled by market category for Southern New England/Mid-Atlantic winter flounder. The landings (metric tons) and metric tons per 100 lengths are also shown.

	Market Category						
Year	Unclass	Large	Medium	Small	Total	Landings (mt)	Metric tons per 100 lengths
1981	1,904	918	0	1,638	4,460	11,176	251
1982	784	2,932	978	3,348	8,042	9,438	117
1983	927	2,044	1,044	1,921	5,936	8,659	146
1984	551	1,338	637	1,439	3,965	8,882	224
1985	716	1,396	1,663	2,632	6,407	7,052	110
1986	799	1,091	1,024	2,206	5,120	4,929	96
1987	99	1,978	670	2,524	5,271	5,172	98
1988	269	1,250	958	1,731	4,208	4,312	102
1989	106	975	1,220	1,224	3,525	3,670	104
1990	102	1,333	1,180	1,473	4,088	4,232	104
1991	0	917	921	1,220	3,058	4,823	158
1992	402	1,159	1,259	1,343	4,163	3,816	92
1993	62	642	401	1,249	2,354	3,010	128
1994	327	600	644	912	2,483	2,128	86
1995	589	758	225	1,295	2,867	2,593	90
1996	580	764	324	1,027	2,695	2,783	103
1997	201	1,140	1,097	1,614	4,052	3,548	88
1998	942	415	1,325	734	3,416	3,138	92
1999	2,381	700	607	682	4,370	3,349	77
2000	1,553	1,075	942	2,580	6,150	3,704	60
2001	658	2,384	2,222	1,129	6,393	4,556	71
2002	716	1,608	1,099	1,983	5,406	3,084	57
2003	1,037	1,626	692	1,115	4,470	2,308	52
2004	373	1,974	652	1,822	4,821	1,636	34
2005	239	2,283	721	627	4,294	1,320	31
2006	1,614	2,661	1,805	1,408	7,488	1,720	23
2007	3,061	4,319	1,661	1,463	10,504	1,622	15

Table J4. The total number of lengths sampled from the recreational fishery for Southern New England/Mid-Atlantic winter flounder. The landings (metric tons) and metric tons per 100 lengths are also shown.

Year	Landings	Lengths	Metric tons per 100 lengths
1981	3,154	1,725	183
1982	3,493	1,971	177
1983	3,485	2,587	135
1984	5,510	3,123	176
1985	5,075	2,357	215
1986	2,949	2,237	132
1987	3,169	1,360	233
1988	3,510	1,944	181
1989	1,792	2,810	64
1990	1,063	2,548	42
1991	1,184	1,755	67
1992	387	1,083	36
1993	813	1,288	63
1994	594	948	63
1995	650	767	85
1996	714	936	76
1997	627	752	83
1998	290	1030	28
1999	320	643	50
2000	870	360	242
2001	549	922	60
2002	223	657	34
2003	323	355	91
2004	214	449	48
2005	124	134	93
2006	136	101	135
2007	116	43	270

Table J5. NEFSC Fishery Observer Program observed trips in the trawl and scallop dredge fisheries (in SNE/MA winter flounder stock areas) and precision (%) of live discard estimates (metric tons) .

Year	Fishery	N Trips	Discards (Live mt)	CV (%)
1994	Trawl	111	650	35
	Scallop	56	31	31
1995	Trawl	248	261	33
	Scallop	65	57	16
1996	Trawl	216	138	50
	Scallop	86	211	15
1997	Trawl	159	105	32
	Scallop	63	449	16
1998	Trawl	98	230	41
	Scallop	45	115	15
1999	Trawl	123	38	43
	Scallop	26	86	20
2000	Trawl	186	137	31
	Scallop	140	159	27
2001	Trawl	244	39	35
	Scallop	161	17	16
2002	Trawl	248	108	23
	Scallop	187	78	51
2003	Trawl	383	69	27
	Scallop	138	201	31
2004	Trawl	854	137	20
	Scallop	458	31	36
2005	Trawl	1220	126	27
	Scallop	406	83	27
2006	Trawl	612	198	21
	Scallop	257	103	17
2007	Trawl	902	151	18
	Scallop	457	77	16

Table J6. The total number of lengths sampled from the commercial fishery discards for Southern New England/Mid-Atlantic winter flounder. The discards before the 50% mortality rate is applied (metric tons) and metric tons per 100 lengths are also shown.

Year	Discards (before mortality)	Lengths	Metric tons per 100 lengths
1994	682	307	222
1995	318	719	44
1996	350	603	58
1997	554	968	57
1998	346	774	45
1999	124	367	34
2000	296	481	62
2001	56	307	18
2002	186	942	20
2003	370	1,185	31
2004	168	2,889	6
2005	210	3,318	6
2006	302	3,942	8
2007	228	4,093	6

Table J7. Total winter flounder recreational and commercial catch for the Southern New England/Mid-Atlantic stock complex in weight (metric tons; mt) and in numbers (000s).

Year	Commercial Landings		Commercial Discards		Recreational Landings		Recreational Discards		Total Catch	
	mt	000s	Mt	000s	Mt	000s	mt	000s	mt	000s
1981	11,176	20,705	1,343	5,123	3,154	8,253	91	451	15,764	34,532
1982	9,438	19,026	1,149	4,271	3,493	8,216	63	324	14,143	31,837
1983	8,659	16,312	1,311	5,251	3,485	8,295	127	405	13,582	30,263
1984	8,882	17,116	986	3,936	5,510	12,441	148	745	15,526	34,238
1985	7,052	14,210	1,534	4,531	5,075	13,086	230	718	13,891	32,545
1986	4,929	9,460	1,273	4,902	2,949	7,001	66	351	9,217	21,714
1987	5,172	10,523	950	3,545	3,169	6,857	61	351	9,352	21,276
1988	4,312	8,378	904	3,729	3,510	7,354	69	422	8,795	19,882
1989	3,670	7,888	1,404	5,761	1,792	3,799	49	345	6,915	17,793
1990	4,232	7,203	673	2,567	1,063	2,487	31	204	5,999	12,461
1991	4,823	9,062	784	2,700	1,184	2,808	51	231	6,842	14,801
1992	3,816	6,758	511	1,812	387	809	15	83	4,729	9,462
1993	3,010	5,335	457	1,580	813	1,879	31	155	4,311	8,949
1994	2,128	4,305	341	1,362	594	1,203	29	80	3,092	6,956
1995	2,593	4,639	159	561	650	1,348	32	119	3,434	6,667
1996	2,783	5,235	175	418	714	1,607	30	157	3,702	7,417
1997	3,548	6,411	277	651	627	1,220	31	105	4,483	8,388
1998	3,138	5,924	173	462	290	584	13	64	3,614	7,033
1999	3,349	7,386	62	158	320	658	14	62	3,745	8,265
2000	3,704	6,465	148	354	870	1,401	32	109	4,754	8,328
2001	4,556	7,667	28	102	549	892	14	79	5,147	8,740
2002	3,084	4,908	93	221	223	408	12	45	3,412	5,583
2003	2,308	3,554	185	219	323	572	11	28	2,827	4,374
2004	1,636	2,420	84	214	214	344	8	15	1,942	2,992
2005	1,320	2,014	105	243	124	215	14	40	1,563	2,512
2006	1,720	2,936	151	342	136	273	16	48	2,023	3,601
2007	1,622	2,794	114	254	116	215	5	11	1,857	3,274

Table J8. Winter flounder NEFSC survey index stratified mean number and mean weight (kg) per tow for the Southern New England- Mid-Atlantic stock complex. Spring and fall strata set (offshore 1-12, 25, 69-76; inshore 1-29, 45-56); winter strata set (offshore 1-2, 5-6, 9-10, 69, 73). Indices include door and gear conversion factors.

	Spring					Fall			
Year	Number	N(CV)	Weight	W(CV)		Number	N(CV)	Weight	W(CV)
1963						9.175	33.2	3.874	41.4
1964						13.673	22.1	4.897	19.4
1965						15.537	32.5	4.463	28.7
1966						9.852	31.5	3.310	27.3
1967						9.109	20.6	2.811	18.7
1968	2.444	26.7	0.748	37.2		8.099	21.0	2.218	18.7
1969	5.640	34.3	3.414	53.7		7.065	34.9	2.009	29.7
1970	2.729	30.9	1.326	35.6		5.159	36.1	2.467	47.8
1971	2.035	32.9	0.756	36.2		3.861	17.5	1.231	19.1
1972	1.865	28.1	0.656	32.1		7.687	39.4	3.053	44.6
1973	6.233	19.9	1.688	20.6		2.691	26.9	0.775	25.8
1974	2.439	21.9	0.822	19.3		2.032	31.1	0.822	29.4
1975	0.683	22.6	0.218	20.8		2.196	20.3	0.688	22.1
1976	1.527	16.3	0.432	17.2		2.376	32.2	1.251	42.9
1977	2.084	17.2	0.639	18.6		4.722	22.5	1.735	25.2
1978	3.315	11.1	0.945	13.3		3.743	17.6	1.430	22.6
1979	1.468	16.8	0.575	25.0		10.059	18.4	2.606	15.4
1980	7.550	17.5	1.900	13.6		9.964	31.0	3.216	29.5
1981	9.027	20.9	2.560	16.9		10.206	20.3	3.110	19.9
1982	6.986	20.1	1.918	15.8		4.927	22.8	1.683	25.9
1983	6.262	18.4	2.469	28.0		8.757	37.6	2.690	31.7
1984	5.524	19.0	2.072	28.4		2.681	21.1	0.887	21.0
1985	5.360	17.4	1.983	16.5		2.727	21.5	0.991	21.5
1986	2.266	23.9	0.766	23.4		1.538	21.9	0.487	19.1
1987	1.763	21.3	0.568	17.9		1.167	28.9	0.419	37.8
1988	2.126	19.6	0.730	19.3		1.246	22.4	0.530	27.5
1989	2.485	33.5	0.582	29.6		1.435	40.7	0.341	30.4
1990	1.992	36.8	0.472	33.1		1.979	29.6	0.546	25.8
1991	2.473	15.6	0.692	14.7		1.950	23.6	0.708	25.6

Table J8 continued.

	Spring				Fall				Winter			
Year	Number	N(CV)	Weight	W(CV)	Number	N(CV)	Weight	W(CV)	Number	N(CV)	Weight	W(CV)
1992	1.579	23.4	0.435	22.1	2.963	32.4	0.829	31.8	3.680	27.3	0.928	26.0
1993	0.961	19.1	0.219	14.8	1.328	25.0	0.382	25.9	2.590	29.4	0.456	21.5
1994	1.510	26.4	0.329	21.9	4.134	24.8	1.482	27.3	3.797	30.8	1.183	35.5
1995	2.097	23.4	0.592	19.1	2.253	20.7	0.626	17.3	2.221	26.1	0.697	29.1
1996	1.517	14.3	0.428	15.2	3.186	39.8	1.063	45.3	3.778	28.4	0.734	25.2
1997	1.436	22.1	0.399	20.0	7.893	32.6	2.583	26.7	3.906	19.7	1.043	21.6
1998	2.774	20.6	0.845	22.1	6.597	13.6	2.232	9.9	7.169	21.6	1.830	24.1
1999	4.171	16.2	1.245	16.4	3.596	17.0	1.549	16.5	10.328	31.8	3.100	32.3
2000	3.172	26.6	1.123	31.9	6.168	25.5	2.143	26.2	5.571	32.9	1.525	29.5
2001	1.568	14.3	0.581	13.3	4.877	28.1	2.029	28.5	3.096	31.6	0.873	29.0
2002	2.043	15.7	0.782	16.3	8.858	18.9	3.634	19.8	2.901	27.7	1.188	38.3
2003	0.767	11.8	0.267	11.1	3.209	24.2	1.568	27.5	2.199	42.1	0.782	42.0
2004	1.243	27.1	0.442	30.6	3.357	27.6	0.879	27.0	4.336	35.2	0.881	44.4
2005	0.928	28.8	0.306	30.0	3.707	29.4	1.326	32.3	4.045	30.4	1.143	26.0
2006	1.810	20.4	0.465	17.5	2.952	28.7	1.043	29.0	5.082	48.4	1.497	36.2
2007	0.934	18.3	0.350	20.2	3.483	31.9	1.153	30.7	2.794	40.1	1.075	39.7
2008	1.808	18.9	0.642	19.0								

NOTE: 1968-1972 spring index does not include inshore strata; 1963-1971 fall index does not include inshore strata. All indices calculated with trawl door and trawl gear conversion factors where appropriate. Winter trawl survey began in 1992 and ended in 2007.

Table J9. SNE/MAB winter flounder mean weight per tow for annual state surveys.

Year	MADM	RIDFW	RIDFW	CTDEP
1978	18.24			
1979	18.42	7.72	7.24	
1980	15.13	13.57	4.88	
1981	16.20	12.13	2.12	
1982	15.18	5.23	1.30	
1983	20.01	9.52	2.28	
1984	14.80	8.43	3.38	15.68
1985	11.79	5.93	3.01	13.91
1986	10.50	6.47	3.12	10.33
1987	9.85	8.14	2.25	11.76
1988	6.73	6.02	1.45	18.28
1989	8.92	3.09	0.79	22.62
1990	5.68	3.07	0.71	29.01
1991	3.01	7.38	0.18	24.59
1992	8.05	0.95	0.42	12.29
1993	8.42	0.22	0.50	10.26
1994	12.93	1.67	0.33	12.20
1995	7.85	6.04	0.89	7.72
1996	9.92	4.45	0.91	20.41
1997	9.89	4.57	0.64	15.53
1998	8.15	5.00	0.32	14.66
1999	4.61	3.66	0.57	10.29
2000	6.26	4.52	0.56	12.63
2001	3.69	3.56	0.28	14.02
2002	1.91	3.29	0.28	10.83
2003	5.00	1.56	0.68	8.87
2004	2.97	1.85	0.53	6.11
2005	4.14	2.05	1.08	3.37
2006	3.80	3.45	0.44	1.82
2007	3.82			7.02

Table J10. Winter flounder mean number per tow for annual state surveys.

Year	MADMF	RIDFW Spring	RIDFW Fall	CTDEP	NYDEC	NJDFW Ocean	NJDFW Rivers
1978	52.00						
1979	54.87	83.76					
1980	39.35	63.10					
1981	47.80	87.97	25.21				
1982	41.46	31.39	18.55				
1983	58.14	58.97	17.29				
1984	38.02	41.64	19.02	111.96			
1985	39.49	34.97	21.44	83.58	4.87		
1986	36.78	41.02	31.28	63.65			
1987	39.16	56.21	20.90	79.92	6.07		
1988	28.36	34.44	10.64	137.59	4.31		
1989	27.38	20.88	7.17	148.19	17.02		
1990	27.72	20.33	8.83	223.09	12.22		
1991	11.02	41.95	1.77	150.20	21.50		
1992	28.96	4.40	10.60	61.39	79.11		
1993	50.40	2.92	6.65	63.60	31.20	19.17	
1994	50.84	10.25	2.21	84.44	22.09	14.06	
1995	37.37	32.19	7.00	50.12	8.15	30.41	2.82
1996	30.92	20.67	7.79	110.62	19.24	9.40	3.05
1997	38.51	22.28	5.48	71.31	10.99	36.02	3.35
1998	35.88	19.22	2.02	72.91	7.20	18.20	4.25
1999	25.98	13.45	2.80	41.35	10.96	17.79	3.23
2000	24.64	16.32	2.58	45.41	2.61	10.12	2.11
2001	15.79	12.49	2.10	54.50	7.99	13.83	2.84
2002	6.70	11.56	1.45	43.71	0.43	22.58	2.80
2003	17.73	5.56	5.21	27.84	1.40	12.52	1.57
2004	11.14	11.16	4.40	20.46	5.99	14.21	1.27
2005	27.02	15.74	10.38	16.10		25.67	0.99
2006	17.63	15.36	2.33	5.59		18.13	
2007	16.68			28.68		18.57	

Table J11. State survey indices (stratified mean number per tow or haul) for young-of-year winter flounder in Southern New England/Mid-Atlantic stock complex.

Year	CTDEP	RIDFW	DEDFW	MADMF	NYDEC
1976				0.344	
1977				0.641	
1978				0.366	
1979				0.507	
1980				0.432	
1981				0.340	
1982				0.370	
1983				0.231	
1984				0.323	
1985				0.335	1.52
1986		29.00	0.17	0.325	
1987		11.60	0.09	0.274	2.65
1988	15.50	8.90	0.02	0.184	1.45
1989	1.90	18.90	0.29	0.421	11.15
1990	3.10	21.50	0.63	0.325	8.53
1991	5.80	12.30	0.03	0.267	14.60
1992	13.70	33.30	0.27	0.294	76.87
1993	6.00	5.30	0.04	0.067	16.99
1994	16.60	2.50	0.31	0.148	14.84
1995	12.50	5.60	0.10	0.154	4.04
1996	19.20	6.20	0.04	0.221	16.25
1997	7.47	4.70	0.10	0.392	4.42
1998	9.38	2.60	0.13	0.165	3.11
1999	8.70	15.00	0.07	0.201	7.49
2000	4.30	53.00	0.08	0.347	0.90
2001	1.30	13.70	0.06	0.214	2.31
2002	3.06	18.10	0.01	0.100	0.07
2003	8.10	31.20	0.28	0.197	0.86
2004	10.96	18.70	0.20	0.095	0.50
2005	5.63	5.30	0.02	0.075	
2006	0.93	12.80	0.15	0.168	
2007	4.73	17.04		0.168	

Table J12. Commercial fishery landings at age for the Southern New England/Mid-Atlantic winter flounder stock complex.

Commercial Landings at Age

	Age														
Year	1	2	3	4	5	6	7	8	9	10	11	12	13	Total	7+
1981	194	7,154	9,740	2,750	606	178	42	32	0	0	9	0	0	20,705	83
1982	54	6,897	8,496	2,715	488	187	78	59	21	17	7	7	0	19,026	189
1983	6	2,795	7,114	3,957	1,322	584	269	91	34	70	6	29	35	16,312	534
1984	0	4,518	6,367	3,197	1,503	768	355	158	67	86	27	33	37	17,116	763
1985	27	3,936	5,688	3,052	1,014	326	104	32	17	7	5	2	0	14,210	167
1986	0	2,122	4,187	2,206	551	271	84	27	6	3	1	2	0	9,460	123
1987	0	2,488	5,465	1,895	465	122	40	20	14	12	2	0	0	10,523	88
1988	0	2,241	3,929	1,607	412	122	37	24	3	2	1	0	0	8,378	67
1989	0	1,542	4,057	1,747	431	58	34	13	5	1	0	0	0	7,888	53
1990	0	1,003	3,977	1,757	315	95	37	16	0	3	0	0	0	7,203	56
1991	0	1,406	4,756	2,239	447	143	48	16	5	1	1	0	0	9,062	71
1992	0	484	3,416	2,127	574	111	32	11	3	0	0	0	0	6,758	46
1993	13	885	2,516	1,377	361	102	71	7	0	0	2	0	1	5,335	81
1994	2	1,281	1,681	995	261	59	21	3	1	1	0	0	0	4,305	26
1995	0	116	2,067	1,935	424	77	13	6	1	0	0	0	0	4,639	20
1996	108	564	2,283	1,676	445	119	22	18	0	0	0	0	0	5,235	40
1997	1	1,485	2,705	1,734	387	60	23	12	3	1	0	0	0	6,411	39
1998	0	975	2,691	1,515	492	178	63	3	7	0	0	0	0	5,924	73
1999	0	1,962	3,658	1,380	311	59	12	4	0	0	0	0	0	7,386	16
2000	0	1,066	2,804	1,934	518	91	42	10	0	0	0	0	0	6,465	52
2001	0	1,524	3,186	1,963	717	169	65	30	10	2	1	0	0	7,667	108
2002	0	292	1,693	1,688	839	293	75	23	4	1	0	0	0	4,908	103
2003	0	342	1,469	1,068	432	152	56	31	4	0	0	0	0	3,554	91
2004	0	240	861	699	280	194	94	32	17	3	0	0	0	2,420	146
2005	0	239	648	667	286	108	35	22	6	3	0	0	0	2,014	66
2006	1	555	1,339	590	232	119	66	26	7	1	0	0	0	2,936	100
2007	0	267	1,311	871	261	64	15	3	1	1	0	0	0	2,794	20

Table J13. Recreational fishery landings at age for the Southern New England/Mid-Atlantic winter flounder stock complex.

Recreational Landings at Age

	Age													
Year	1	2	3	4	5	6	7	8	9	10	11	12	13	Total	7+
1981	792	4,136	2,475	757	60	4	28	0	0	0	0	0	0	8,253	28
1982	447	4,146	2,659	806	120	25	13	0	0	0	0	0	0	8,216	13
1983	287	1,616	4,159	1,687	424	111	10	0	0	0	0	0	0	8,295	10
1984	286	4,153	6,071	1,527	261	104	40	0	0	0	0	0	0	12,441	40
1985	216	1,560	4,202	2,517	1,865	1,489	864	0	330	43	0	0	0	13,086	1,237
1986	106	1,766	2,434	1,798	492	171	81	77	51	8	17	0	0	7,001	234
1987	16	920	1,725	1,016	2,215	629	81	114	64	77	0	0	0	6,857	336
1988	21	534	2,856	2,077	774	856	128	51	37	20	0	0	0	7,354	236
1989	102	762	974	1,238	397	166	94	37	17	8	3	1	0	3,799	160
1990	7	189	814	852	439	101	52	20	3	3	0	2	5	2,487	85
1991	13	233	1,128	883	401	108	38	0	1	0	3	0	0	2,808	42
1992	3	124	236	304	85	50	7	0	0	0	0	0	0	809	7
1993	49	370	511	459	347	86	32	16	6	3	0	0	0	1,879	57
1994	10	411	424	233	73	38	13	0	0	0	0	0	0	1,203	13
1995	2	243	779	238	80	6	0	0	0	0	0	0	0	1,348	0
1996	6	306	771	423	90	9	0	0	0	0	0	0	0	1,607	0
1997	1	83	504	416	181	36	0	0	0	0	0	0	0	1,220	0
1998	2	89	191	235	58	7	1	0	0	0	0	0	0	584	1
1999	1	101	340	151	49	16	0	0	0	0	0	0	0	658	0
2000	0	117	458	491	272	46	15	0	0	0	0	0	0	1,401	15
2001	1	83	265	299	165	62	16	0	0	0	0	0	0	892	16
2002	1	85	136	103	59	19	5	0	0	0	0	0	0	408	5
2003	1	100	257	103	51	36	25	0	0	0	0	0	0	572	25
2004	2	57	92	120	37	21	14	0	0	0	0	0	0	344	14
2005	0	54	67	55	22	11	6	0	0	0	0	0	0	215	6
2006	0	51	138	57	23	3	1	0	0	0	0	0	0	273	1
2007	0	1	82	100	16	10	8	0	0	0	0	0	0	215	8

Table J14. Commercial fishery discards at age for the Southern New England/Mid-Atlantic winter flounder stock complex.

Commercial Discards at Age

	Age														
Year	1	2	3	4	5	6	7	8	9	10	11	12	13	Total	7+
1981	322	2,514	2,186	101	0	0	0	0	0	0	0	0	0	5,123	0
1982	43	2,817	1,219	192	0	0	0	0	0	0	0	0	0	4,271	0
1983	260	2,479	2,000	467	45	0	0	0	0	0	0	0	0	5,251	0
1984	159	2,102	1,502	166	6	1	0	0	0	0	0	0	0	3,936	0
1985	22	1,504	2,516	442	43	4	0	0	0	0	0	0	0	4,531	0
1986	78	2,220	2,389	205	10	0	0	0	0	0	0	0	0	4,902	0
1987	11	1,600	1,755	170	9	0	0	0	0	0	0	0	0	3,545	0
1988	6	887	2,540	276	20	0	0	0	0	0	0	0	0	3,729	0
1989	315	2,724	2,131	555	33	2	1	0	0	0	0	0	0	5,761	1
1990	16	781	1,433	322	14	0	1	0	0	0	0	0	0	2,567	1
1991	17	1,238	1,205	227	12	1	0	0	0	0	0	0	0	2,700	0
1992	15	845	787	150	14	1	0	0	0	0	0	0	0	1,812	0
1993	201	849	467	57	6	0	0	0	0	0	0	0	0	1,580	0
1994	233	914	186	28	1	0	0	0	0	0	0	0	0	1,362	0
1995	86	254	193	25	3	0	0	0	0	0	0	0	0	561	0
1996	16	117	181	82	21	1	0	0	0	0	0	0	0	418	0
1997	73	205	256	102	16	0	0	0	0	0	0	0	0	651	0
1998	10	257	153	37	5	0	0	0	0	0	0	0	0	462	0
1999	2	30	57	45	16	7	2	0	0	0	0	0	0	158	2
2000	42	113	111	41	32	9	5	0	0	0	0	0	0	354	5
2001	12	44	35	11	1	0	0	0	0	0	0	0	0	102	0
2002	10	74	58	36	25	11	6	0	0	0	0	0	0	221	6
2003	8	47	68	26	16	35	19	0	0	0	0	0	0	219	19
2004	31	76	45	37	12	7	5	0	0	0	0	0	0	214	5
2005	22	107	47	30	17	12	8	0	0	0	0	0	0	243	8
2006	36	131	102	37	21	9	6	0	0	0	0	0	0	342	6
2007	9	60	100	57	15	8	4	0	0	0	0	0	0	254	4

Table J15. Recreational fishery discards at age for the Southern New England/Mid-Atlantic winter flounder stock complex.

Recreational Discards at Age

	Age														
Year	1	2	3	4	5	6	7	8	9	10	11	12	13	Total	7+
1981	72	379	0	0	0	0	0	0	0	0	0	0	0	451	0
1982	31	293	0	0	0	0	0	0	0	0	0	0	0	324	0
1983	63	342	0	0	0	0	0	0	0	0	0	0	0	405	0
1984	48	697	0	0	0	0	0	0	0	0	0	0	0	745	0
1985	9	342	365	2	0	0	0	0	0	0	0	0	0	718	0
1986	32	219	91	9	0	0	0	0	0	0	0	0	0	351	0
1987	47	257	43	3	1	0	0	0	0	0	0	0	0	351	0
1988	58	284	76	3	0	0	0	0	0	0	0	0	0	421	0
1989	51	247	46	1	0	0	0	0	0	0	0	0	0	345	0
1990	13	137	52	2	0	0	0	0	0	0	0	0	0	204	0
1991	22	152	57	0	0	0	0	0	0	0	0	0	0	231	0
1992	7	54	21	1	0	0	0	0	0	0	0	0	0	83	0
1993	29	96	26	4	0	0	0	0	0	0	0	0	0	155	0
1994	6	48	24	2	0	0	0	0	0	0	0	0	0	80	0
1995	1	41	73	4	0	0	0	0	0	0	0	0	0	119	0
1996	41	62	54	0	0	0	0	0	0	0	0	0	0	157	0
1997	14	68	23	0	0	0	0	0	0	0	0	0	0	105	0
1998	5	49	8	1	0	0	0	0	0	0	0	0	0	64	0
1999	2	53	6	1	0	0	0	0	0	0	0	0	0	62	0
2000	0	40	62	7	0	0	0	0	0	0	0	0	0	109	0
2001	22	39	17	1	0	0	0	0	0	0	0	0	0	79	0
2002	3	28	9	3	2	0	1	0	0	0	0	0	0	45	1
2003	6	9	7	2	2	0	1	0	0	0	0	0	0	28	1
2004	2	5	1	2	1	2	1	0	0	0	0	0	0	15	1
2005	10	17	3	4	3	3	0	0	0	0	0	0	0	40	0
2006	2	21	19	2	1	1	1	0	0	0	0	0	0	48	1
2007	0	1	5	5	1	0	0	0	0	0	0	0	0	11	0

Table J16. Total fishery catch at age for the Southern New England/Mid-Atlantic winter flounder stock complex.

Total Catch at Age

	Age														
Year	1	2	3	4	5	6	7	8	9	10	11	12	13	Total	7+
1981	1380	14183	14401	3608	666	182	70	32	0	0	9	0	0	34532	111
1982	575	14153	12374	3713	608	212	91	59	21	17	7	7	0	31837	202
1983	616	7232	13273	6111	1791	695	279	91	34	70	6	29	35	30263	544
1984	493	11470	13940	4890	1770	873	395	158	67	86	27	33	37	34238	803
1985	274	7342	12771	6013	2922	1819	968	32	347	50	5	2	0	32545	1404
1986	216	6327	9101	4218	1053	442	165	104	57	11	18	2	0	21714	357
1987	74	5265	8988	3084	2690	751	121	134	78	89	2	0	0	21276	424
1988	85	3946	9401	3963	1206	978	165	75	40	22	1	0	0	19882	303
1989	468	5275	7208	3541	861	226	129	50	22	9	3	1	0	17793	214
1990	36	2110	6276	2933	768	196	90	36	3	6	0	2	5	12461	142
1991	52	3029	7146	3349	860	252	86	16	6	1	4	0	0	14801	113
1992	25	1507	4460	2582	673	162	39	11	3	0	0	0	0	9462	53
1993	292	2200	3520	1897	714	188	103	23	6	3	2	0	1	8949	138
1994	251	2612	2339	1280	337	97	34	3	1	1	0	0	0	6956	39
1995	88	654	3112	2202	506	83	13	6	1	0	0	0	0	6667	20
1996	171	1050	3289	2181	556	129	22	18	0	0	0	0	0	7417	40
1997	88	1841	3488	2252	584	96	23	12	3	1	0	0	0	8388	39
1998	16	1371	3043	1788	555	185	64	3	7	0	0	0	0	7033	74
1999	5	2146	4062	1577	375	82	14	4	0	0	0	0	0	8265	18
2000	43	1336	3436	2473	822	146	62	10	0	0	0	0	0	8328	72
2001	35	1689	3503	2274	883	231	81	30	10	2	1	0	0	8740	124
2002	14	478	1897	1830	925	324	87	23	4	1	0	0	0	5583	115
2003	15	498	1802	1199	501	223	101	31	4	0	0	0	0	4374	136
2004	36	378	999	858	331	223	115	32	17	3	0	0	0	2992	167
2005	32	417	765	755	328	134	50	22	6	3	0	0	0	2512	81
2006	39	758	1598	686	277	133	74	26	7	1	0	0	0	3598	108
2007	9	328	1498	1033	293	82	27	3	1	1	0	0	0	3275	32

Table J17. Total fishery mean weight at age for the Southern New England/Mid-Atlantic winter flounder stock complex.

Total Catch Mean Weights at Age

	Age						
Year	1	2	3	4	5	6	7+
1981	0.130	0.276	0.478	0.802	1.065	1.243	1.202
1982	0.090	0.261	0.438	0.694	1.048	1.253	1.837
1983	0.195	0.237	0.353	0.516	0.774	1.046	1.552
1984	0.146	0.258	0.366	0.542	0.693	0.913	1.282
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	0.311	0.430	0.473	0.564	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	1.259
2006	0.118	0.379	0.468	0.652	0.872	1.065	1.229
2007	0.069	0.379	0.468	0.624	0.849	1.116	1.363

Table J18. NEFSC Spring survey: stratified mean number per tow at age for winter flounder in the Southern New England/Mid-Atlantic stock complex (strata set: offshore 1-12, 25, 69-76; inshore 1-29, 45-56).

Year	1	2	3	4	5	6	7	8	9+	Total
1980	1.09	4.06	2.05	0.25	0.06	0.03	0.01			7.55
1981	0.99	4.00	3.41	0.47	0.13	0.01	0.01			9.02
1982	1.16	3.20	1.56	0.74	0.21	0.09	0.02	0.01		6.99
1983	0.58	0.97	2.14	1.23	0.81	0.37	0.08	0.08		6.26
1984	0.22	1.36	2.18	0.85	0.46	0.29	0.07	0.06	0.03	5.52
1985	0.41	1.21	2.16	0.72	0.51	0.20	0.14	0.01		5.36
1986	0.10	0.49	1.16	0.31	0.15	0.05	0.01			2.27
1987	0.14	0.54	0.70	0.28	0.06	0.02		0.01	0.01	1.76
1988	0.09	0.48	0.99	0.37	0.16	0.02	0.02			2.13
1989	0.14	0.95	0.90	0.34	0.11	0.02	0.02	0.01		2.49
1990	0.23	0.49	0.89	0.28	0.05	0.04	0.01			1.99
1991	0.14	0.60	1.22	0.41	0.05	0.02	0.02	0.01		2.47
1992	0.14	0.39	0.62	0.36	0.05	0.02				1.58
1993	0.14	0.35	0.26	0.12	0.07	0.01	0.01			0.96
1994	0.16	0.74	0.43	0.11	0.04	0.02	0.01			1.51
1995	0.22	0.75	0.87	0.22	0.03		0.01			2.10
1996	0.07	0.54	0.66	0.17	0.06	0.01	0.01			1.52
1997	0.13	0.50	0.56	0.18	0.06	0.01				1.44
1998	0.33	1.21	0.72	0.37	0.13	0.01				2.77
1999	0.41	1.89	1.35	0.36	0.11	0.04	0.01			4.17
2000	0.28	0.70	1.19	0.65	0.27	0.07	0.01			3.17
2001	0.17	0.26	0.47	0.44	0.20	0.02	0.01			1.57
2002	0.11	0.60	0.56	0.38	0.23	0.11	0.04		0.01	2.04
2003	0.12	0.11	0.33	0.10	0.05	0.04	0.02			0.77
2004	0.30	0.19	0.29	0.26	0.11	0.05	0.03	0.01		1.24
2005	0.10	0.45	0.11	0.16	0.07	0.03	0.01			0.93
2006	0.30	0.62	0.62	0.16	0.08	0.02	0.01			1.81
2007	0.11	0.14	0.36	0.26	0.04	0.01	0.01	0.01		0.94
2008	0.17	0.61	0.48	0.41	0.12	0.01	0.01			1.81

Table J19. NEFSC Fall survey: stratified mean number per tow at age for winter flounder in the Southern New England/Mid-Atlantic stock complex (strata set: offshore 1-12, 25, 69-76; inshore 1-29, 45-56).

Year	0	1	2	3	4	5	6	7	8+	Total
1980	0.40	1.76	4.62	2.74	0.43	0.01				9.96
1981	0.04	2.13	5.03	2.49	0.30	0.10	0.09	0.02	0.01	10.21
1982	0.01	0.76	2.21	1.34	0.47	0.12	0.02			4.93
1983		1.63	3.82	2.06	0.62	0.35	0.11	0.07	0.10	8.76
1984		0.17	1.04	1.17	0.26	0.03	0.01			2.68
1985		0.16	1.18	0.99	0.30	0.09	0.01			2.73
1986		0.23	0.90	0.36	0.03	0.01		0.01		1.54
1987		0.03	0.64	0.36	0.12	0.02				1.17
1988		0.03	0.30	0.64	0.22	0.04	0.01	0.01		1.25
1989		0.28	0.83	0.26	0.05	0.01	0.01			1.44
1990		0.08	0.89	0.85	0.15	0.01				1.98
1991		0.07	1.02	0.73	0.12	0.01				1.95
1992		0.13	1.74	0.79	0.26	0.03	0.01			2.96
1993		0.43	0.52	0.35	0.08					1.38
1994		0.45	2.23	1.08	0.30	0.04	0.03			4.13
1995		0.58	0.93	0.63	0.09	0.01	0.01			2.25
1996		0.61	1.40	0.80	0.31	0.06	0.01			3.19
1997		1.48	3.58	2.20	0.55	0.08				7.89
1998		1.39	2.83	1.91	0.41	0.05	0.01			6.60
1999		0.43	0.95	1.46	0.54	0.18	0.04			3.60
2000		0.90	2.30	2.02	0.71	0.22	0.01	0.01		6.17
2001		0.49	1.79	1.61	0.63	0.30	0.02	0.04		4.88
2002	0.05	0.52	4.01	2.35	1.14	0.59	0.18	0.01	0.01	8.86
2003		0.40	1.06	1.15	0.46	0.10	0.03	0.01		3.21
2004		1.89	0.79	0.28	0.28	0.06	0.04	0.02		3.36
2005		0.72	1.83	0.73	0.21	0.13	0.08	0.01		3.71
2006		0.47	1.39	0.79	0.22	0.06	0.02			2.95
2007	0.01	0.60	1.64	1.03	0.16	0.02	0.03			3.48

Table J20. NEFSC Winter survey: stratified mean number per tow at age for winter flounder in the Southern New England/Mid-Atlantic stock complex (strata set: offshore 1-2, 5-6, 9-10, 69, 73). The Winter survey ended in 2007. Lengths converted to age using NEFSC spring survey ALKs.

Year	0	1	2	3	4	5	6	7	8+	Total
1992		0.73	0.86	1.09	0.73	0.24	0.02	0.02		3.68
1993		0.56	1.16	0.54	0.18	0.12	0.02	0.01		2.59
1994		0.36	1.16	1.76	0.25	0.28				3.80
1995		0.04	0.75	1.26	0.17					2.22
1996		1.01	0.87	1.55	0.32	0.02				3.78
1997		0.43	1.49	1.32	0.54	0.13				3.91
1998		0.42	3.52	1.95	0.96	0.32				7.17
1999		0.84	5.94	2.23	0.96	0.20	0.16			10.33
2000		0.23	2.82	2.12	0.24	0.16				5.57
2001		1.04	0.55	0.70	0.54	0.22	0.05			3.10
2002		0.08	1.34	0.74	0.15	0.21	0.06	0.21	0.11	2.90
2003		0.09	0.57	1.04	0.25	0.22			0.03	2.20
2004		2.17	1.02	0.43	0.36	0.22	0.09	0.03	0.02	4.34
2005		0.39	2.56	0.36	0.43	0.27	0.04			4.05
2006		0	2.40	1.73	0.51	0.27	0.08	0.07	0.02	5.08
2007		0.02	0.56	1.03	1.03	0.13	0.02			2.79

Table J21. MADMF spring trawl survey mean number per tow at age for winter flounder in the Southern New England/Mid-Atlantic stock complex.

Year	1	2	3	4	5	6	7	8	9+	Total
1978	10.00	9.80	15.86	9.40	3.17	1.10	1.34	0.51	0.82	52.00
1979	4.72	13.18	21.58	9.08	2.99	1.02	0.97	0.47	0.86	54.87
1980	1.65	8.30	14.66	9.23	3.04	0.97	0.80	0.28	0.43	39.36
1981	8.65	9.07	13.66	9.72	3.81	1.20	0.78	0.33	0.58	47.80
1982	3.06	11.88	12.72	8.80	2.66	1.07	0.69	0.18	0.40	41.46
1983	1.71	15.32	17.85	14.11	4.14	2.34	1.12	0.64	0.90	58.14
1984	1.28	9.59	11.82	10.18	3.35	1.22	0.46	0.01	0.12	38.02
1985	3.13	9.98	16.48	6.35	2.48	0.75	0.15	0.07	0.11	39.49
1986	3.27	7.07	19.36	5.69	0.83	0.13	0.19	0.16	0.08	36.78
1987	9.44	7.74	12.35	6.59	2.21	0.22	0.38	0.12	0.11	39.16
1988	3.61	7.02	14.66	2.45	0.35	0.07	0.18	0.00	0.02	28.36
1989	2.26	6.08	12.30	4.68	1.01	0.29	0.28	0.09	0.41	27.38
1990	4.43	11.73	8.03	2.99	0.40	0.02	0.10	0.00	0.02	27.72
1991	1.65	2.88	4.90	1.18	0.24	0.13	0.02	0.00	0.02	11.02
1992	8.06	7.40	6.73	4.21	1.67	0.60	0.07	0.08	0.14	28.96
1993	16.03	18.75	12.02	2.76	0.65	0.14	0.02	0.04	0.00	50.40
1994	12.15	17.35	14.96	4.72	0.62	0.59	0.37	0.05	0.02	50.84
1995	14.31	11.14	8.10	1.93	0.61	0.80	0.28	0.14	0.06	37.37
1996	4.98	10.12	7.72	2.86	2.00	1.46	0.85	0.29	0.64	30.92
1997	10.43	9.30	10.27	4.26	1.32	1.00	0.49	0.75	0.69	38.51
1998	8.62	13.09	7.21	3.51	1.47	1.22	0.41	0.31	0.03	35.88
1999	9.66	8.00	5.81	1.89	0.21	0.25	0.13	0.04	0.00	25.98
2000	6.41	7.78	6.68	1.74	1.09	0.46	0.15	0.23	0.10	24.64
2001	5.47	4.73	2.39	2.02	0.66	0.20	0.13	0.16	0.04	15.79
2002	0.94	3.00	1.55	0.82	0.29	0.08	0.01	0.00	0.00	6.70
2003	4.12	3.78	6.15	2.25	1.14	0.24	0.03	0.01	0.00	17.73
2004	3.46	3.15	1.97	1.67	0.56	0.21	0.09	0.03	0.00	11.14
2005	14.05	8.42	2.68	1.07	0.59	0.11	0.02	0.06	0.00	27.02
2006	3.19	9.61	2.98	1.12	0.32	0.20	0.12	0.06	0.02	17.63
2007	3.69	5.59	5.32	1.63	0.35	0.09	0.02	0.00	0.00	16.68

Table J22. CTDEP spring survey for winter flounder in the Southern New England-Mid Atlantic stock complex.

Year	0	1	2	3	4	5	6	7	8	9	10	11	12+	Total
1984	0.00	8.21	44.01	31.83	20.96	4.23	1.23	0.67	0.74	0.04	0.01	0.03	0.00	111.96
1985	0.00	4.11	28.46	32.88	14.17	2.33	0.82	0.45	0.19	0.11	0.04	0.02	0.00	83.58
1986	0.00	6.69	26.00	15.53	12.26	2.05	0.50	0.24	0.24	0.10	0.01	0.03	0.00	63.65
1987	0.00	7.32	44.69	14.56	5.05	6.55	1.28	0.11	0.24	0.13	0.00	0.00	0.00	79.93
1988	15.50	14.49	71.87	39.10	8.59	1.83	1.46	0.16	0.04	0.02	0.02	0.00	0.00	153.08
1989	1.90	13.56	78.43	41.23	10.85	2.84	0.98	0.14	0.09	0.06	0.01	0.00	0.00	150.09
1990	3.10	11.31	131.52	64.97	8.97	4.09	1.96	0.19	0.05	0.00	0.02	0.00	0.00	226.18
1991	5.80	8.52	66.99	60.39	9.31	4.05	0.80	0.14	0.00	0.00	0.00	0.01	0.00	156.01
1992	13.70	6.80	31.32	12.78	8.97	1.10	0.36	0.05	0.00	0.00	0.00	0.00	0.00	75.08
1993	6.00	19.11	19.87	15.46	4.81	3.24	0.80	0.15	0.11	0.04	0.01	0.00	0.00	69.60
1994	16.60	9.57	64.14	5.86	3.01	1.14	0.49	0.17	0.05	0.01	0.01	0.00	0.00	101.05
1995	12.50	14.35	23.69	9.77	1.36	0.63	0.20	0.08	0.02	0.02	0.00	0.00	0.00	62.62
1996	19.20	11.46	59.07	24.17	14.41	0.97	0.28	0.14	0.06	0.04	0.01	0.00	0.00	129.81
1997	7.47	12.53	25.53	19.41	9.45	3.76	0.51	0.07	0.03	0.01	0.01	0.01	0.00	78.79
1998	9.28	11.22	32.40	12.23	12.67	3.15	0.99	0.14	0.02	0.07	0.00	0.00	0.00	82.17
1999	8.70	6.56	12.42	11.27	6.09	3.20	1.14	0.61	0.04	0.01	0.02	0.00	0.00	50.06
2000	4.30	7.11	16.66	8.40	7.70	3.42	1.53	0.31	0.26	0.01	0.01	0.00	0.01	49.72
2001	1.30	8.45	19.60	10.85	8.06	5.46	1.28	0.68	0.05	0.08	0.00	0.00	0.00	55.81
2002	3.06	6.27	19.90	9.56	4.43	1.95	1.02	0.35	0.11	0.03	0.10	0.00	0.00	46.78
2003	8.10	2.47	7.83	8.71	4.79	1.95	0.77	0.82	0.29	0.07	0.14	0.00	0.00	35.94
2004	10.96	6.34	3.84	3.49	3.88	1.91	0.64	0.21	0.11	0.03	0.01	0.00	0.01	31.43
2005	5.63	7.06	6.18	0.84	0.81	0.67	0.21	0.16	0.10	0.05	0.01	0.01	0	16.10
2006	0.93	1.14	2.60	1.10	0.19	0.14	0.17	0.09	0.01	0.09	0.03	0.02	0	5.59
2007	4.73	2.98	10.83	10.70	3.10	0.61	0.15	0.11	0.12	0.04	0.01	0.01	0	28.68

Table J23. RIDFW spring survey for winter flounder in the Southern New England-Mid Atlantic stock complex.

	Age						
Year	1	2	3	4	5	6	7+
1981	45.67	27.88	12.86	1.27	0.23	0.05	0.02
1982	13.42	9.74	5.02	2.31	0.33	0.11	0.02
1983	29.49	9.79	10.98	6.00	2.13	0.56	0.00
1984	6.67	16.79	13.94	2.96	0.83	0.35	0.10
1985	6.01	15.69	10.35	2.24	0.60	0.08	0.01
1986	11.94	15.63	9.59	2.63	1.14	0.09	0.00
1987	15.30	24.59	13.14	2.66	0.41	0.08	0.04
1988	8.93	12.37	9.53	2.92	0.68	0.01	0.00
1989	4.79	8.20	4.95	2.33	0.51	0.07	0.03
1990	6.46	6.36	4.88	2.16	0.48	0.04	0.06
1991	11.21	14.36	12.00	2.78	0.41	0.10	0.11
1992	1.30	0.95	1.17	0.75	0.20	0.04	0.00
1993	2.32	0.35	0.17	0.06	0.02	0.00	0.00
1994	2.84	4.56	1.97	0.63	0.19	0.04	0.03
1995	9.36	11.36	9.87	1.47	0.13	0.00	0.00
1996	3.11	8.36	7.47	1.56	0.15	0.03	0.00
1997	4.90	8.77	6.86	1.48	0.26	0.00	0.00
1998	2.11	9.47	5.90	1.60	0.13	0.01	0.00
1999	1.71	6.52	4.26	0.82	0.09	0.06	0.00
2000	2.88	4.98	5.51	2.19	0.66	0.10	0.00
2001	2.46	3.47	3.67	2.23	0.63	0.02	0.01
2002	1.60	4.76	3.21	1.24	0.54	0.15	0.06
2003	1.72	0.86	1.76	0.50	0.30	0.28	0.14
2004	5.47	3.97	1.03	0.44	0.12	0.09	0.04
2005	8.86	2.41	1.73	1.38	0.79	0.43	0.14
2006	2.07	4.72	5.24	2.24	0.74	0.30	0.05

Table J24. NYDEC Peconic Bay Small Mesh Trawl Survey for winter flounder in the Southern New England-Mid Atlantic stock complex. No sampling in 1986; the survey ended in 2004.

	AGE			
Year	0	1	2+	Total
1985	1.52	3.05	0.30	4.87
1987	2.65	3.30	0.12	6.07
1988	1.45	2.55	0.31	4.31
1989	11.15	5.52	0.35	17.02
1990	8.53	3.43	0.26	12.22
1991	14.60	6.32	0.58	21.50
1992	76.87	2.04	0.20	79.11
1993	16.99	14.09	0.12	31.20
1994	14.84	6.93	0.32	22.09
1995	4.04	3.84	0.27	8.15
1996	16.25	2.84	0.15	19.24
1997	4.42	6.46	0.11	10.99
1998	3.11	3.80	0.29	7.20
1999	7.49	3.25	0.22	10.96
2000	0.90	1.56	0.15	2.61
2001	2.31	5.52	0.16	7.99
2002	0.07	0.17	0.19	0.43
2003	0.86	0.45	0.09	1.40
2004	0.50	5.38	0.11	5.99

Table J25. NJDFW Ocean survey (April) for winter flounder in the Southern New England-Mid Atlantic stock complex.

	AGE							
Year	1	2	3	4	5	6	7+	Total
1993	5.10	6.50	2.50	2.40	1.70	0.40	0.57	19.17
1994	3.70	4.20	3.90	1.40	0.40	0.30	0.16	14.06
1995	8.00	10.10	8.60	2.40	0.90	0.30	0.11	30.41
1996	0.60	2.90	2.60	1.90	0.90	0.30	0.20	9.40
1997	16.60	5.40	6.10	6.00	1.50	0.30	0.12	36.02
1998	4.50	3.90	4.80	3.30	1.20	0.40	0.10	18.20
1999	2.40	2.20	5.90	3.10	2.90	0.70	0.59	17.79
2000	0.70	0.30	2.10	3.30	2.00	0.90	0.82	10.12
2001	3.90	0.60	1.30	2.70	3.80	0.70	0.83	13.83
2002	5.81	3.21	4.55	2.22	2.80	2.16	1.83	22.58
2003	2.08	1.10	4.79	1.24	1.09	0.87	1.35	12.52
2004	6.48	0.72	1.42	2.08	0.56	1.38	1.57	14.21
2005	4.97	10.04	2.55	2.76	2.61	1.32	1.42	25.67
2006	0.64	2.49	9.43	3.23	0.62	0.75	0.97	18.13
2007	3.80	0.67	4.33	6.09	1.51	0.62	1.56	18.58

Table J26. NJDFW Rivers survey (March-May) for winter flounder in the Southern New England-Mid Atlantic stock complex. The Rivers Survey ended in 2005.

	AGE							
Year	1	2	3	4	5	6	7+	Total
1995	0.60	0.30	1.40	0.40	0.10	0.01	0.01	2.82
1996	0.30	0.90	0.70	0.70	0.20	0.10	0.15	3.05
1997	1.10	0.40	0.90	0.40	0.40	0.10	0.05	3.35
1998	1.90	0.90	0.40	0.70	0.20	0.10	0.05	4.25
1999	0.20	0.50	1.40	0.50	0.40	0.10	0.13	3.23
2000	0.40	0.20	0.40	0.80	0.20	0.10	0.01	2.11
2001	1.40	0.30	0.20	0.40	0.40	0.10	0.04	2.84
2002	1.21	0.48	0.49	0.18	0.27	0.13	0.04	2.80
2003	0.05	0.22	0.90	0.18	0.03	0.10	0.09	1.57
2004	0.67	0.02	0.10	0.29	0.05	0.00	0.14	1.27
2005	0.42	0.24	0.17	0.02	0.09	0.02	0.03	0.99

Table J27. Mohn's rho statistic for the BASE and SPLIT ADAPT VPA configurations for F (ages 4-5, unweighted), SSB, and recruitment (R) at age 1.

F

Year	BASE	Split
2000	-0.4477	-0.0495
2001	-0.3403	0.0324
2002	-0.0616	0.3145
2003	-0.1108	0.1954
2004	-0.2883	-0.0461
2005	-0.1145	0.1513
2006	0.3166	0.4141
Total	-1.0466	1.0121
Average	-0.1495	0.1446

SSB

Year	BASE	Split
2000	0.5172	0.0288
2001	0.2369	-0.1198
2002	0.0674	-0.1518
2003	0.3294	0.0724
2004	0.3444	0.0727
2005	0.079	-0.1058
2006	-0.0195	-0.0231
Total	1.5548	-0.2266
Average	0.2221	-0.0324

R age 1

Year	BASE	Split
2000	0.4547	0.1691
2001	1.7625	1.2171
2002	-0.1101	-0.0546
2003	-0.1106	-0.1983
2004	0.8004	0.8576
2005	0.0303	0.0468
2006	-0.1203	-0.0580
2007	-0.5070	-0.4286
Total	2.1999	1.5511
Average	0.2750	0.1939

Table J28. Catchability coefficients (q) estimated in the BASE and SPLIT run configurations.

Catchability Coefficients: BASE vs SPLIT

Survey	BASE	SPLIT-1	SPLIT-1/BASE	SPLIT-2	SPLIT-2/BASE
NEFSC	(split)				
Spring 1	1.25E-05	8.66E-06	0.69	1.92E-05	1.54
Spring 2	4.50E-05	3.39E-05	0.75	6.29E-05	1.40
Spring 3	7.46E-05	6.73E-05	0.90	8.70E-05	1.17
Spring 4	7.20E-05	6.34E-05	0.88	8.54E-05	1.19
Spring 5	7.61E-05	6.41E-05	0.84	9.43E-05	1.24
Spring 6	7.04E-05	5.92E-05	0.84	8.96E-05	1.27
Spring 7	8.00E-05	5.57E-05	0.70	1.21E-04	1.51
NEFSC	(split)				
Fall 2	2.93E-05	9.35E-06	0.32	8.61E-05	2.94
Fall 3	1.46E-04	7.92E-05	0.54	2.65E-04	1.81
Fall 4	2.20E-04	1.34E-04	0.61	3.59E-04	1.63
MADMF	(split)				
Spring 2	5.49E-04	3.54E-04	0.64	8.80E-04	1.60
Spring 3	7.29E-04	6.85E-04	0.94	8.08E-04	1.11
Spring 4	7.11E-04	7.56E-04	1.06	7.00E-04	0.99
Spring 5	6.54E-04	5.88E-04	0.90	7.51E-04	1.15
RIDFW	(split)				
Spring 1	3.05E-04	3.12E-04	1.02	3.19E-04	1.05
Spring 2	4.24E-04	3.34E-04	0.79	5.62E-04	1.33
Spring 3	4.44E-04	3.33E-04	0.75	6.09E-04	1.37
Spring 4	3.32E-04	2.63E-04	0.79	4.30E-04	1.29
CTDEP	(split)				
Spring 1	5.35E-04	4.16E-04	0.78	7.03E-04	1.31
Spring 2	1.93E-03	2.28E-03	1.18	1.83E-03	0.95
Spring 3	1.40E-03	1.90E-03	1.36	1.18E-03	0.84
Spring 4	1.39E-03	1.60E-03	1.15	1.31E-03	0.94
Spring 5	1.52E-03	1.41E-03	0.93	1.67E-03	1.10
Spring 6	1.59E-03	1.29E-03	0.81	1.92E-03	1.21
Spring 7	1.68E-03	7.61E-04	0.45	3.09E-03	1.84

Table J28 continued.

Catchability Coefficients: BASE vs SPLIT

Survey	BASE	SPLIT-1	SPLIT-1/BASE	SPLIT-2	SPLIT-2/BASE
NEFSC	(not split)				
Winter 1	2.94E-05	3.14E-05	1.07	3.14E-05	1.07
Winter 2	1.48E-04	1.57E-04	1.06	1.57E-04	1.06
Winter 3	1.66E-04	1.73E-04	1.04	1.73E-04	1.04
Winter 4	1.31E-04	1.36E-04	1.04	1.36E-04	1.04
Winter 5	1.88E-04	1.95E-04	1.04	1.95E-04	1.04
NJ-Ocean	(not split)				
Spring 3	5.76E-04	6.01E-04	1.04	6.01E-04	1.04
Spring 4	9.07E-04	9.43E-04	1.04	9.43E-04	1.04
Spring 5	1.48E-03	1.53E-03	1.04	1.53E-03	1.04
Spring 6	2.27E-03	2.35E-03	1.04	2.35E-03	1.04
Spring 7	4.35E-03	4.53E-03	1.04	4.53E-03	1.04
NJ-River	(not split)				
Spring 1	4.91E-05	5.18E-05	1.05	5.18E-05	1.05
Spring 2	3.43E-05	3.55E-05	1.03	3.55E-05	1.03
Spring 3	7.73E-05	7.85E-05	1.02	7.85E-05	1.02
Spring 4	1.24E-04	1.25E-04	1.01	1.25E-04	1.01
Spring 5	1.62E-04	1.64E-04	1.01	1.64E-04	1.01

Table J29. SNE/MA winter flounder GARM3 SPLIT VPA results.

JAN-1 Population Numbers

AGE	1981	1982	1983	1984	1985
1	62523.	51649.	56232.	35570.	34617.
2	52498.	49941.	41766.	45482.	28676.
3	27775.	30148.	28082.	27652.	26859.
4	7151.	9710.	13487.	10982.	10026.
5	1466.	2590.	4590.	5513.	4566.
6	362.	598.	1570.	2138.	2912.
7	221.	569.	1229.	1966.	2248.
Total	151995.	145205.	146957.	129301.	109904.

AGE	1986	1987	1988	1989	1990
1	32860.	25995.	26675.	22572.	16474.
2	28094.	26708.	21216.	21763.	18057.
3	16835.	17277.	17103.	13799.	13045.
4	10434.	5548.	6012.	5496.	4776.
5	2768.	4726.	1752.	1337.	1296.
6	1095.	1313.	1436.	343.	315.
7	884.	741.	445.	325.	228.
Total	92970.	82308.	74638.	65635.	54192.

AGE	1991	1992	1993	1994	1995
1	12273.	13061.	15589.	12962.	12525.
2	13456.	10001.	10671.	12499.	10385.
3	12875.	8276.	6825.	6746.	7870.
4	5001.	4075.	2740.	2402.	3406.
5	1256.	1065.	1000.	527.	809.
6	366.	250.	263.	173.	126.
7	164.	82.	193.	69.	30.
Total	45391.	36809.	37279.	35378.	35152.

AGE	1996	1997	1998	1999	2000
1	14078.	17348.	16597.	13768.	9446.
2	10175.	11371.	14124.	13574.	11267.
3	7911.	7381.	7644.	10323.	9172.
4	3627.	3501.	2887.	3505.	4777.
5	797.	996.	829.	746.	1443.
6	204.	149.	287.	176.	271.
7	63.	61.	115.	39.	134.
Total	36855.	40807.	42483.	42131.	36510.

Table 29 continued.

AGE	2001	2002	2003	2004	2005
1	6950.	5241.	4398.	9355.	10057.
2	7695.	5659.	4278.	3587.	7627.
3	8016.	4772.	4201.	3052.	2595.
4	4400.	3393.	2191.	1809.	1595.
5	1673.	1545.	1122.	709.	704.
6	437.	571.	428.	466.	281.
7	235.	203.	261.	349.	170.
Total	29407.	21383.	16879.	19326.	23027.

AGE	2006	2007	2008
1	6159.	3600.	8837.
2	8205.	5008.	2939.
3	5867.	6032.	3803.
4	1432.	3357.	3583.
5	623.	552.	1814.
6	280.	259.	187.
7	227.	73.	83.
Total	22793.	18881.	21246.

Table 29 Continued.

Fishing Mortality Calculated

AGE	1981	1982	1983	1984	1985
1	0.0247	0.0124	0.0122	0.0154	0.0088
2	0.3546	0.3757	0.2124	0.3267	0.3326
3	0.8510	0.6044	0.7389	0.8145	0.7455
4	0.8156	0.5492	0.6947	0.6775	1.0872
5	0.6974	0.3004	0.5643	0.4383	1.2283
6	0.7945	0.4914	0.6599	0.5910	1.1292
7	0.7945	0.4914	0.6599	0.5910	1.1292

AGE	1986	1987	1988	1989	1990
1	0.0073	0.0032	0.0035	0.0232	0.0024
2	0.2862	0.2457	0.2301	0.3118	0.1383
3	0.9100	0.8556	0.9352	0.8610	0.7587
4	0.5920	0.9527	1.3037	1.2449	1.1354
5	0.5456	0.9916	1.4301	1.2446	1.0643
6	0.5820	0.9704	1.3309	1.2449	1.1198
7	0.5820	0.9704	1.3309	1.2449	1.1198

AGE	1991	1992	1993	1994	1995
1	0.0047	0.0021	0.0209	0.0216	0.0078
2	0.2861	0.1822	0.2586	0.2626	0.0721
3	0.9504	0.9054	0.8440	0.4832	0.5745
4	1.3472	1.2048	1.4488	0.8887	1.2531
5	1.4127	1.1997	1.5560	1.2273	1.1759
6	1.3600	1.2037	1.4763	0.9418	1.2379
7	1.3600	1.2037	1.4763	0.9418	1.2379

AGE	1996	1997	1998	1999	2000
1	0.0135	0.0056	0.0011	0.0004	0.0050
2	0.1211	0.1971	0.1135	0.1920	0.1405
3	0.6152	0.7387	0.5797	0.5707	0.5345
4	1.0922	1.2411	1.1536	0.6876	0.8491
5	1.4759	1.0436	1.3481	0.8115	0.9933
6	1.1513	1.1938	1.1938	0.7083	0.8807
7	1.1513	1.1938	1.1938	0.7083	0.8807

AGE	2001	2002	2003	2004	2005
1	0.0056	0.0030	0.0038	0.0043	0.0035
2	0.2778	0.0980	0.1377	0.1238	0.0623
3	0.6596	0.5786	0.6427	0.4490	0.3942
4	0.8466	0.9063	0.9287	0.7429	0.7407
5	0.8754	1.0838	0.6798	0.7263	0.7228
6	0.8545	0.9586	0.8373	0.7382	0.7352
7	0.8545	0.9586	0.8373	0.7382	0.7352

Table 29 Continued.

AGE	2006	2007
1	0.0070	0.0028
2	0.1077	0.0751
3	0.3581	0.3209
4	0.7535	0.4156
5	0.6768	0.8833
6	0.7296	0.6495
7	0.7296	0.6495

Average Fishing Mortality For Ages 4- 5

Year	Average F	N Weighted	Biomass Wtd	Catch Wtd
1981	0.7565	0.7955	0.7893	0.7972
1982	0.4248	0.4968	0.4751	0.5142
1983	0.6295	0.6615	0.6498	0.6651
1984	0.5579	0.5976	0.5801	0.6139
1985	1.1577	1.1313	1.1388	1.1333
1986	0.5688	0.5822	0.5796	0.5827
1987	0.9721	0.9706	0.9708	0.9708
1988	1.3669	1.3322	1.3392	1.3332
1989	1.2447	1.2449	1.2448	1.2449
1990	1.0999	1.1202	1.1167	1.1206
1991	1.3800	1.3604	1.3626	1.3606
1992	1.2022	1.2037	1.2035	1.2037
1993	1.5024	1.4774	1.4829	1.4781
1994	1.0580	0.9496	0.9642	0.9593
1995	1.2145	1.2383	1.2350	1.2387
1996	1.2840	1.1613	1.1759	1.1701
1997	1.1423	1.1973	1.1892	1.2004
1998	1.2509	1.1970	1.2038	1.1997
1999	0.7496	0.7094	0.7139	0.7114
2000	0.9212	0.8825	0.8870	0.8851
2001	0.8610	0.8546	0.8559	0.8547
2002	0.9951	0.9619	0.9698	0.9659
2003	0.8043	0.8444	0.8314	0.8554
2004	0.7346	0.7382	0.7374	0.7383
2005	0.7317	0.7352	0.7345	0.7352
2006	0.7151	0.7303	0.7250	0.7314
2007	0.6495	0.4816	0.5019	0.5189

Table 29 Continued.

Back Calculated Partial Recruitment

AGE	1981	1982	1983	1984	1985
1	0.0290	0.0205	0.0165	0.0190	0.0072
2	0.4167	0.6216	0.2875	0.4011	0.2708
3	1.0000	1.0000	1.0000	1.0000	0.6069
4	0.9585	0.9087	0.9401	0.8318	0.8851
5	0.8195	0.4970	0.7636	0.5381	1.0000
6	0.9336	0.8131	0.8931	0.7256	0.9193
7	0.9336	0.8131	0.8931	0.7256	0.9193

AGE	1986	1987	1988	1989	1990
1	0.0080	0.0032	0.0025	0.0186	0.0021
2	0.3145	0.2478	0.1609	0.2505	0.1218
3	1.0000	0.8628	0.6539	0.6916	0.6682
4	0.6505	0.9608	0.9116	1.0000	1.0000
5	0.5995	1.0000	1.0000	0.9997	0.9374
6	0.6396	0.9786	0.9306	0.9999	0.9863
7	0.6396	0.9786	0.9306	0.9999	0.9863

AGE	1991	1992	1993	1994	1995
1	0.0033	0.0018	0.0134	0.0176	0.0062
2	0.2025	0.1512	0.1662	0.2140	0.0576
3	0.6727	0.7515	0.5424	0.3937	0.4585
4	0.9536	1.0000	0.9311	0.7242	1.0000
5	1.0000	0.9958	1.0000	1.0000	0.9383
6	0.9627	0.9991	0.9488	0.7674	0.9878
7	0.9627	0.9991	0.9488	0.7674	0.9878

AGE	1996	1997	1998	1999	2000
1	0.0092	0.0045	0.0008	0.0005	0.0051
2	0.0820	0.1589	0.0842	0.2366	0.1414
3	0.4169	0.5952	0.4300	0.7033	0.5381
4	0.7400	1.0000	0.8558	0.8474	0.8548
5	1.0000	0.8409	1.0000	1.0000	1.0000
6	0.7801	0.9619	0.8856	0.8728	0.8867
7	0.7801	0.9619	0.8856	0.8728	0.8867

Table 29 Continued.

AGE	2001	2002	2003	2004	2005
1	0.0064	0.0027	0.0041	0.0057	0.0048
2	0.3174	0.0904	0.1483	0.1667	0.0842
3	0.7535	0.5339	0.6920	0.6044	0.5323
4	0.9672	0.8363	1.0000	1.0000	1.0000
5	1.0000	1.0000	0.7320	0.9776	0.9758
6	0.9761	0.8845	0.9016	0.9937	0.9925
7	0.9761	0.8845	0.9016	0.9937	0.9925

AGE	2006	2007
1	0.0093	0.0031
2	0.1429	0.0851
3	0.4753	0.3632
4	1.0000	0.4705
5	0.8981	1.0000
6	0.9683	0.7352
7	0.9683	0.7352

Spawning Stock Biomass

AGE	1981	1982	1983	1984	1985
1	0.	0.	0.	0.	0.
2	0.	0.	0.	0.	0.
3	4733.	4730.	3744.	3523.	3611.
4	3890.	4574.	5093.	3829.	3092.
5	1203.	2148.	2887.	2902.	1825.
6	341.	601.	1384.	1534.	1270.
7	217.	911.	1606.	2152.	1056.
Total	10384.	12964.	14714.	13939.	10855.

AGE	1986	1987	1988	1989	1990
1	0.	0.	0.	0.	0.
2	0.	0.	0.	0.	0.
3	2394.	2483.	2293.	1921.	1820.
4	3537.	1960.	1868.	1652.	1548.
5	1370.	1778.	747.	580.	588.
6	634.	646.	524.	173.	177.
7	727.	500.	271.	261.	174.
Total	8661.	7368.	5702.	4586.	4305.

Table 29 Continued.

AGE	1991	1992	1993	1994	1995
1	0.	0.	0.	0.	0.
2	0.	0.	0.	0.	0.
3	1908.	1294.	1066.	1240.	1606.
4	1599.	1466.	941.	935.	1244.
5	512.	527.	452.	264.	410.
6	199.	143.	158.	113.	86.
7	140.	86.	161.	71.	40.
Total	4359.	3515.	2778.	2623.	3386.

AGE	1996	1997	1998	1999	2000
1	0.	0.	0.	0.	0.
2	0.	0.	0.	0.	0.
3	1573.	1434.	1573.	1869.	1764.
4	1421.	1363.	1132.	1376.	1922.
5	387.	531.	398.	380.	702.
6	128.	100.	199.	114.	178.
7	52.	68.	97.	37.	116.
Total	3561.	3496.	3399.	3776.	4683.

AGE	2001	2002	2003	2004	2005
1	0.	0.	0.	0.	0.
2	0.	0.	0.	0.	0.
3	1644.	1009.	825.	687.	529.
4	1902.	1462.	962.	805.	764.
5	942.	826.	683.	428.	421.
6	310.	386.	301.	347.	208.
7	235.	184.	241.	362.	177.
Total	5033.	3867.	3011.	2628.	2098.

Table 29 Continued.

AGE	2006	2007
1	0.	0.
2	0.	0.
3	1113.	1213.
4	634.	1524.
5	401.	331.
6	219.	216.
7	232.	84.
Total	2599.	3368.

Bootstrap Summary Report

Number of Bootstrap Repetitions Requested = 1000
Number of Bootstrap Repetitions Completed = 1000
Bootstrap Output Variable: Stock Estimates (2008)

	NLLS Estimate	Bootstrap Mean	Bootstrap Std Error	C.V. For NLLS Soln.
N 1	8837.	10251.	6192.	0.6040
N 2	2939.	3015.	806.	0.2674
N 3	3803.	3835.	658.	0.1715
N 4	3583.	3631.	670.	0.1845
N 5	1814.	1816.	381.	0.2099
N 6	187.	197.	75.	0.3803
N 7	83.	106.	72.	0.6807

	Bias Estimate	Bias Std. Error	Per Cent Bias	NLLS Estimate Corrected For Bias	C.V. For Corrected Estimate
N 1	1414.	201.	16.0029	7423.	0.8341
N 2	76.	26.	2.5759	2864.	0.2815
N 3	32.	21.	0.8503	3771.	0.1744
N 4	49.	21.	1.3575	3534.	0.1896
N 5	2.	12.	0.1291	1812.	0.2105
N 6	10.	2.	5.2210	177.	0.4222
N 7	23.	2.	27.9950	60.	1.2100

	LOWER 80. % CI	UPPER 80. % CI
N 1	3926.	19130.
N 2	2082.	4103.
N 3	3001.	4690.
N 4	2815.	4478.
N 5	1348.	2317.
N 6	107.	295.
N 7	32.	203.

Table 29 Continued.

Bootstrap Output Variable: Fishing Mortality (2007)

	NLLS Estimate	Bootstrap Mean	Bootstrap Std Error	C.V. For NLLS Soln.
AGE 1	0.0028	0.0029	0.000784	0.2710
AGE 2	0.0751	0.0766	0.012928	0.1687
AGE 3	0.3209	0.3255	0.053652	0.1648
AGE 4	0.4156	0.4277	0.074216	0.1735
AGE 5	0.8833	0.9178	0.250750	0.2732
AGE 6	0.6495	0.6727	0.136016	0.2022
AGE 7	0.6495	0.6727	0.136016	0.2022

	Bias Estimate	Bias Std. Error	Per Cent Bias	NLLS Estimate Corrected For Bias	C.V. For Corrected Estimate
AGE 1	0.000127	0.000025	4.5736	0.0026	0.2969
AGE 2	0.001469	0.000411	1.9554	0.0737	0.1755
AGE 3	0.004627	0.001703	1.4422	0.3162	0.1697
AGE 4	0.012098	0.002378	2.9110	0.4035	0.1839
AGE 5	0.034455	0.008004	3.9006	0.8489	0.2954
AGE 6	0.023277	0.004364	3.5840	0.6262	0.2172
AGE 7	0.023277	0.004364	3.5840	0.6262	0.2172

	LOWER 80. % CI	UPPER 80. % CI
AGE 1	0.001982	0.003899
AGE 2	0.061349	0.094284
AGE 3	0.264199	0.391995
AGE 4	0.338684	0.526526
AGE 5	0.639456	1.244800
AGE 6	0.522168	0.860745
AGE 7	0.522168	0.860745

Table 29 Continued.

Bootstrap Output Variable: Average F (2007) AGES 4 - 5

	NLLS Estimate	Bootstrap Mean	Bootstrap Std Error	C.V. For NLLS Soln.
AVG F	0.6495	0.6727	0.136016	0.2022
N WTD	0.4816	0.4937	0.078975	0.1600
B WTD	0.5019	0.5140	0.081910	0.1593
C WTD	0.5189	0.5360	0.085905	0.1603

	Bias Estimate	Bias Std. Error	Per Cent Bias	NLLS Estimate Corrected For Bias	C.V. For Corrected Estimate
AVG F	0.023277	0.004364	3.5840	0.6262	0.2172
N WTD	0.012027	0.002526	2.4971	0.4696	0.1682
B WTD	0.012116	0.002618	2.4140	0.4898	0.1672
C WTD	0.017038	0.002770	3.2832	0.5019	0.1712

	LOWER 80. % CI	UPPER 80. % CI
AVG F	0.522168	0.860745
N WTD	0.397060	0.596489
B WTD	0.414336	0.620860
C WTD	0.437215	0.650059

Table 29 Continued.

Bootstrap Output Variable: Biomass

JAN-1 Biomass (2008) Mean Biomass & SSB (2007)

	NLLS Estimate	Bootstrap Mean	Bootstrap Std Error	C.V. For NLLS Soln.
JAN-1	6347.	6522.	737.	0.1129
MEAN	6197.	6252.	606.	0.0969
SSB	3368.	3390.	357.	0.1053

	Bias Estimate	Bias Std. Error	Per Cent Bias	NLLS Estimate Corrected For Bias	C.V. For Corrected Estimate
JAN-1	175.	24.	2.7496	6173.	0.1193
MEAN	55.	19.	0.8845	6142.	0.0986
SSB	23.	11.	0.6757	3345.	0.1067

	LOWER 80. % CI	UPPER 80. % CI
JAN-1	5600.	7474.
MEAN	5482.	7043.
SSB	2936.	3825.

Table J30. Input values for SNE/MA winter flounder BRP calculations based on 2003-2007 average values from the GARM3 SPLIT VPA run; mean weights in kilograms.

M = 0.2

Age	PR	Maturity	Mid-Year Catch XW	SSB XW	Jan 1 XW
1	0.01	0.00	0.115	0.065	0.065
2	0.14	0.00	0.382	0.221	0.221
3	0.59	0.55	0.498	0.435	0.435
4	0.97	0.95	0.648	0.572	0.572
5	1.00	1.00	0.839	0.736	0.736
6	1.00	1.00	1.028	0.917	0.917
7+	1.00	1.00	1.247	1.247	1.247

Table J31. Biological reference points for SNE/MA Winter flounder from the non-parametric empirical approach; MSY and SSB_{MSY} in metric tons, R in thousands of age 1 fish.

Parametric BRPs

	BRP2002; GARM 2 SRFIT	GARM3 BASE AGEPRO T2006	GARM3 SPLIT AGEPRO T2006	GARM3 BASE AGEPRO T2007	GARM3 SPLIT AGEPRO T2007
MSY	10606	n/a	n/a	n/a	n/a
FMSY	0.320	n/a	n/a	n/a	n/a
SSB_{MSY}	30144	n/a	n/a	n/a	n/a

Non-Parametric BRPs

	BRP2002; GARM 2	GARM3 BASE AGEPRO T2006	GARM3 SPLIT AGEPRO T2006	GARM3 BASE AGEPRO T2007	GARM3 SPLIT AGEPRO T2007
F40%	0.210	0.260	0.260	0.248	0.248
YPR	0.246	0.274	0.274	0.276	0.276
SSBR	1.106	1.070	1.070	1.098	1.098
Mean R	35920	35239	35239	35239	35239
MSY	10420	9658	9658	9742	9742
SSB_{MSY}	46810	37608	37608	38761	38761

Table J32. Stock status in 2007 and 2009-2014 projection results for SNE/MA winter flounder. Catch and SSB in metric tons.

Status and Projections

	GARM3 SPLIT AGEPRO T2007
FMSY = F40%	0.248
F2007	0.649
F2007/FMSY	2.62
SSB_{MSY}	38761
SSB2007	3368
SSB2007/SSB_{MSY}	0.09
F2009-2014	0.248
Total Catch 2009	1116
SSB2014	14202
SSB_{MSY}	38761
Prob => SSB_{MSY}	<1%
F2009-2014	0.000
Total Catch 2009	0
SSB2014	28663
SSB_{MSY}	38761
Prob => SSB_{MSY}	1%

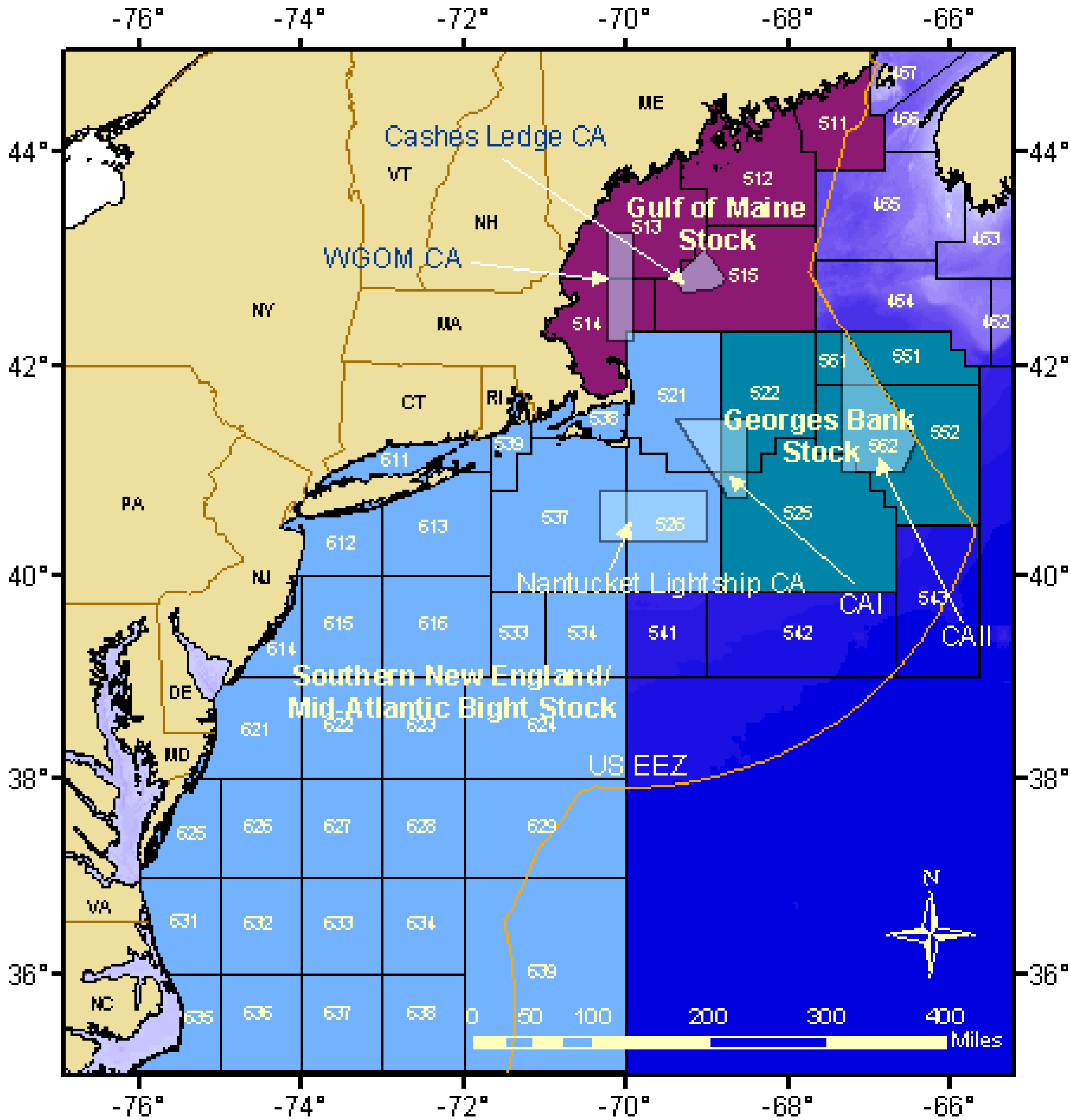


Figure J1. Statistical areas used to define winter flounder stocks. The Southern New England/Mid-Atlantic Bight complex includes areas 521, 526, and 533-639.

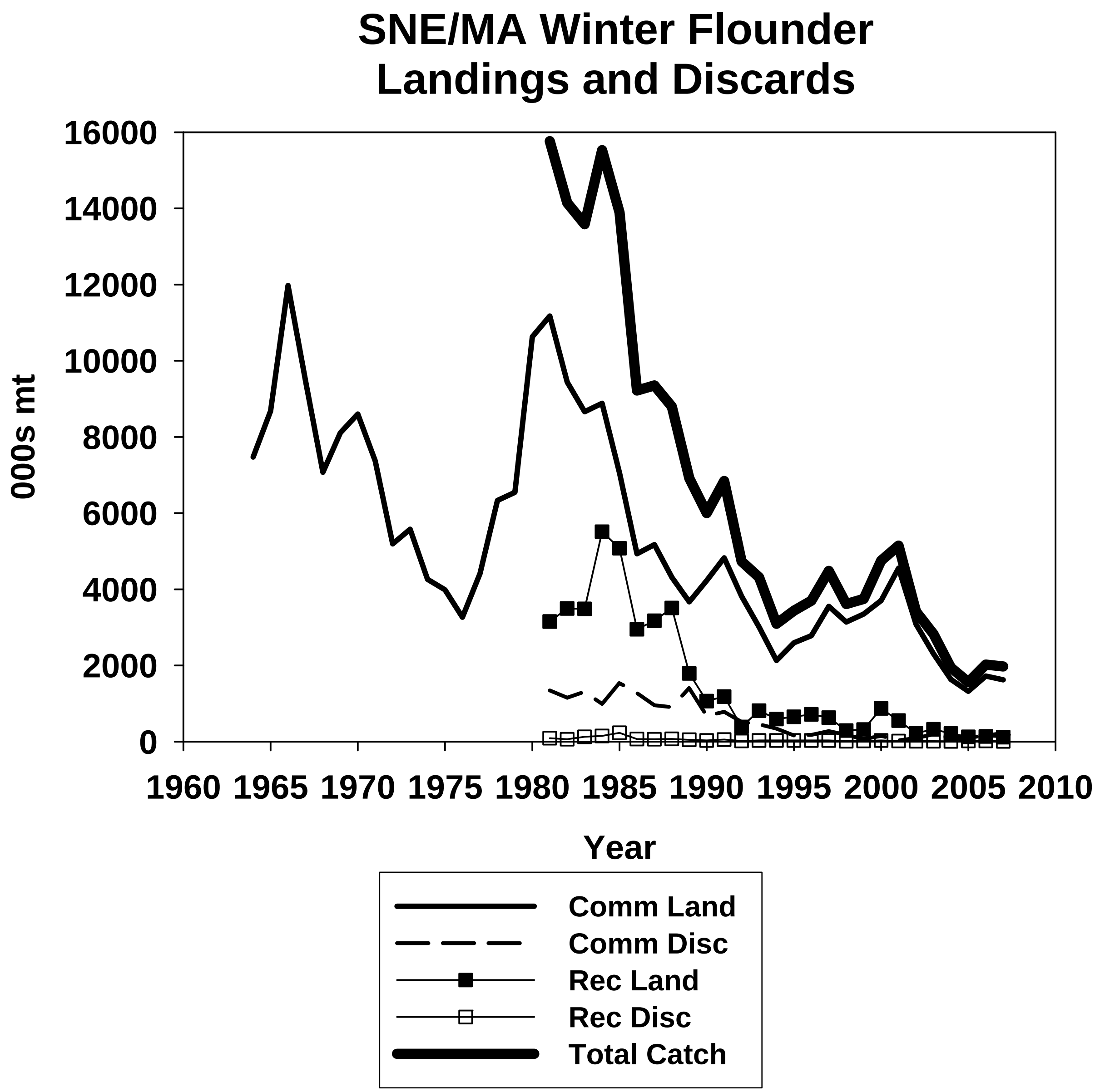


Figure J2. Commercial landings (1964-2007), commercial discards (1981-2007) recreational landings (1981-2007), recreational discards (1981-2007) and total fishery catch (1981-2007) for the SNE/MA winter flounder stock complex.

SNE/MA Winter Flounder Survey Biomass Indices

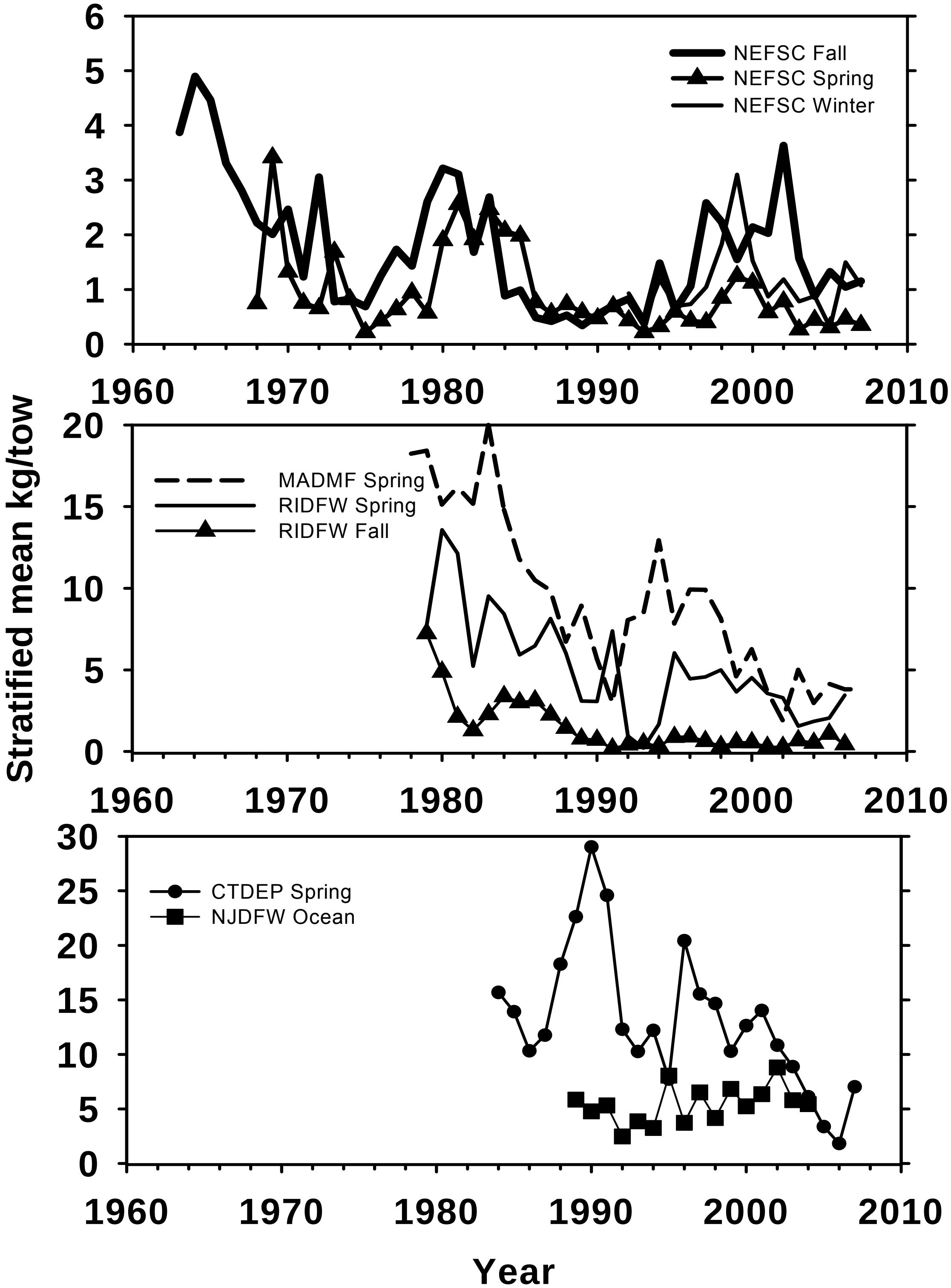


Figure J3. Trends in research survey biomass indices for SNE/MA winter flounder.

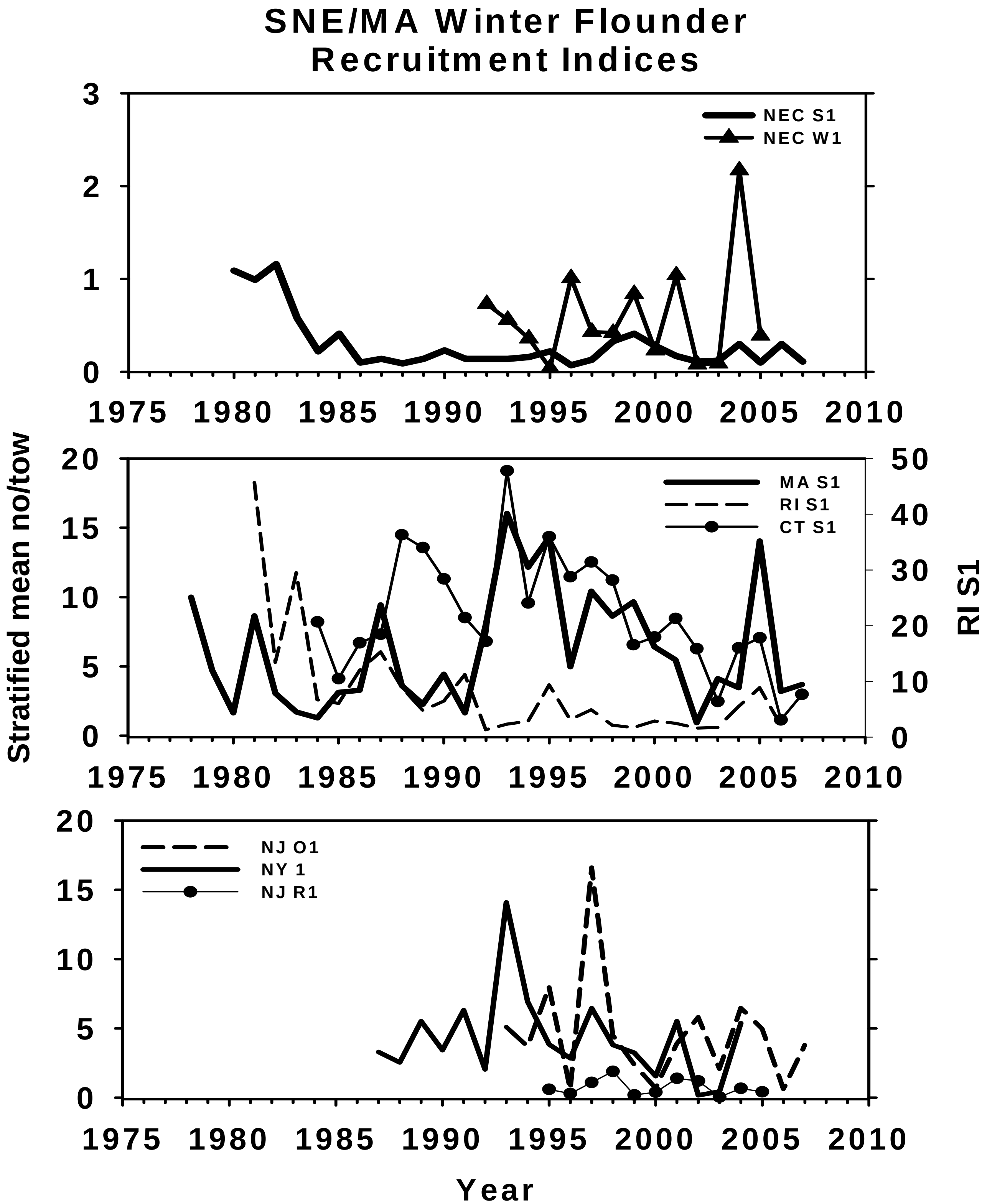


Figure J4. Trends in research survey recruitment indices for SNE/MA winter flounder.

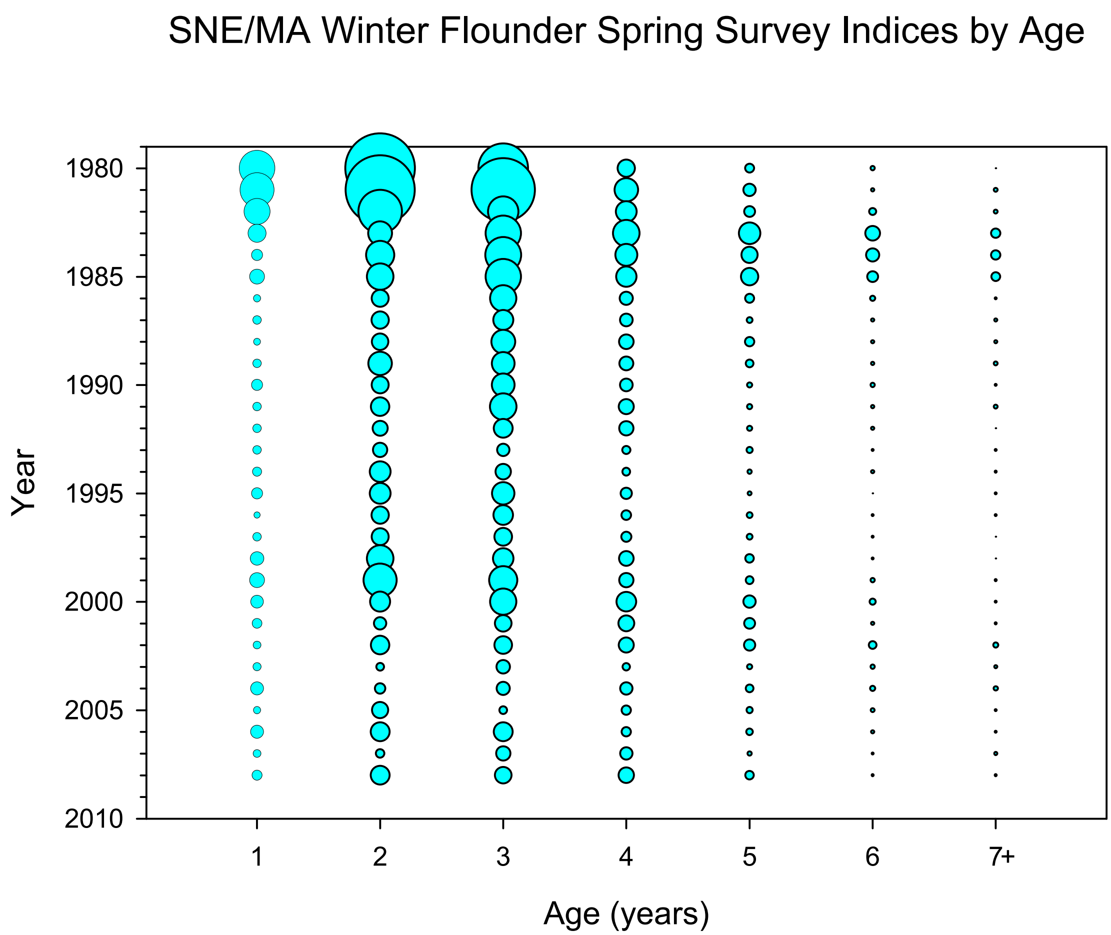


Figure J5. Age 1+ structure of the SNE/MA winter flounder population, 1980-2008.

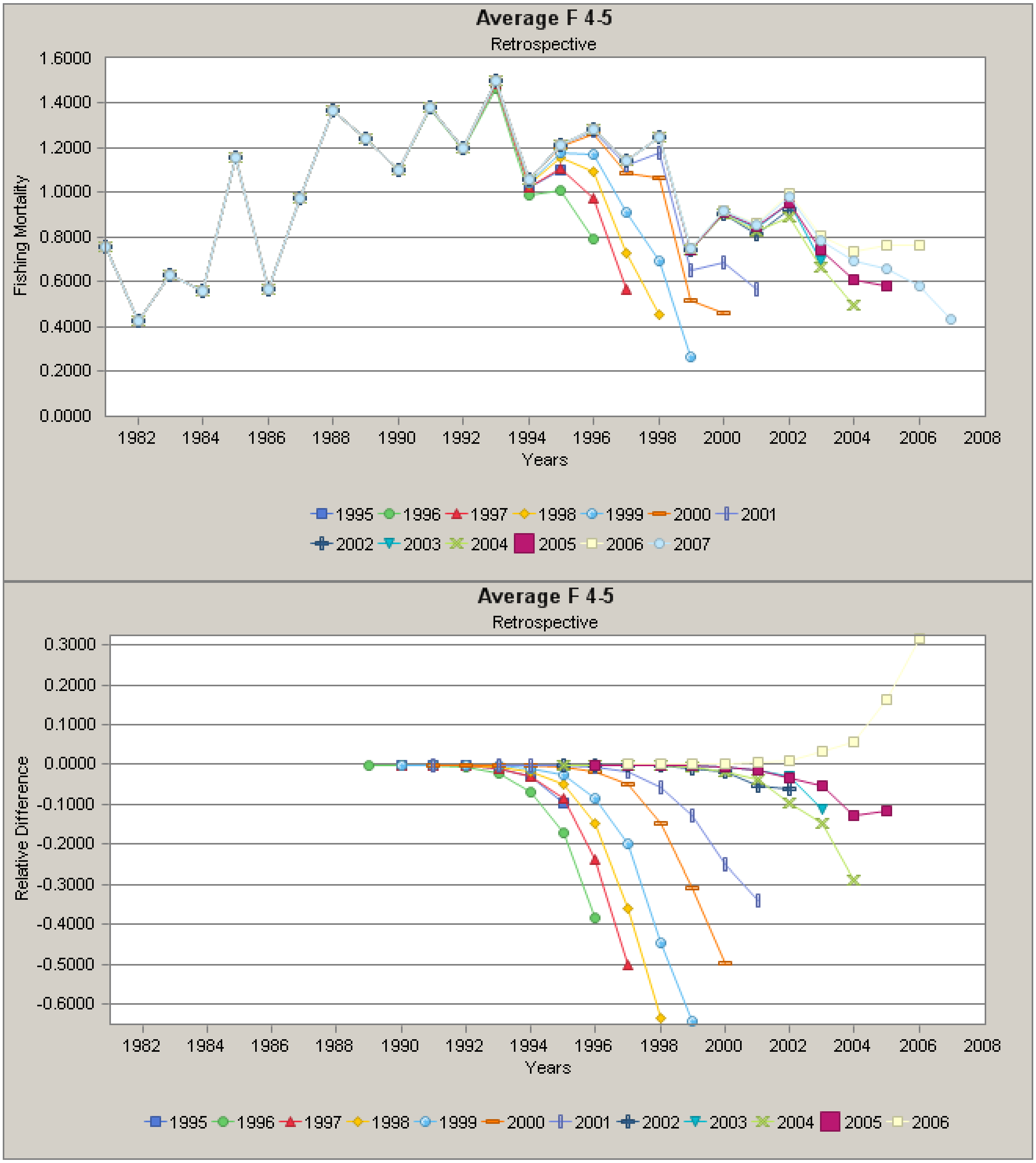


Figure J6. Retrospective analysis of F for the GARM3 BASE run.

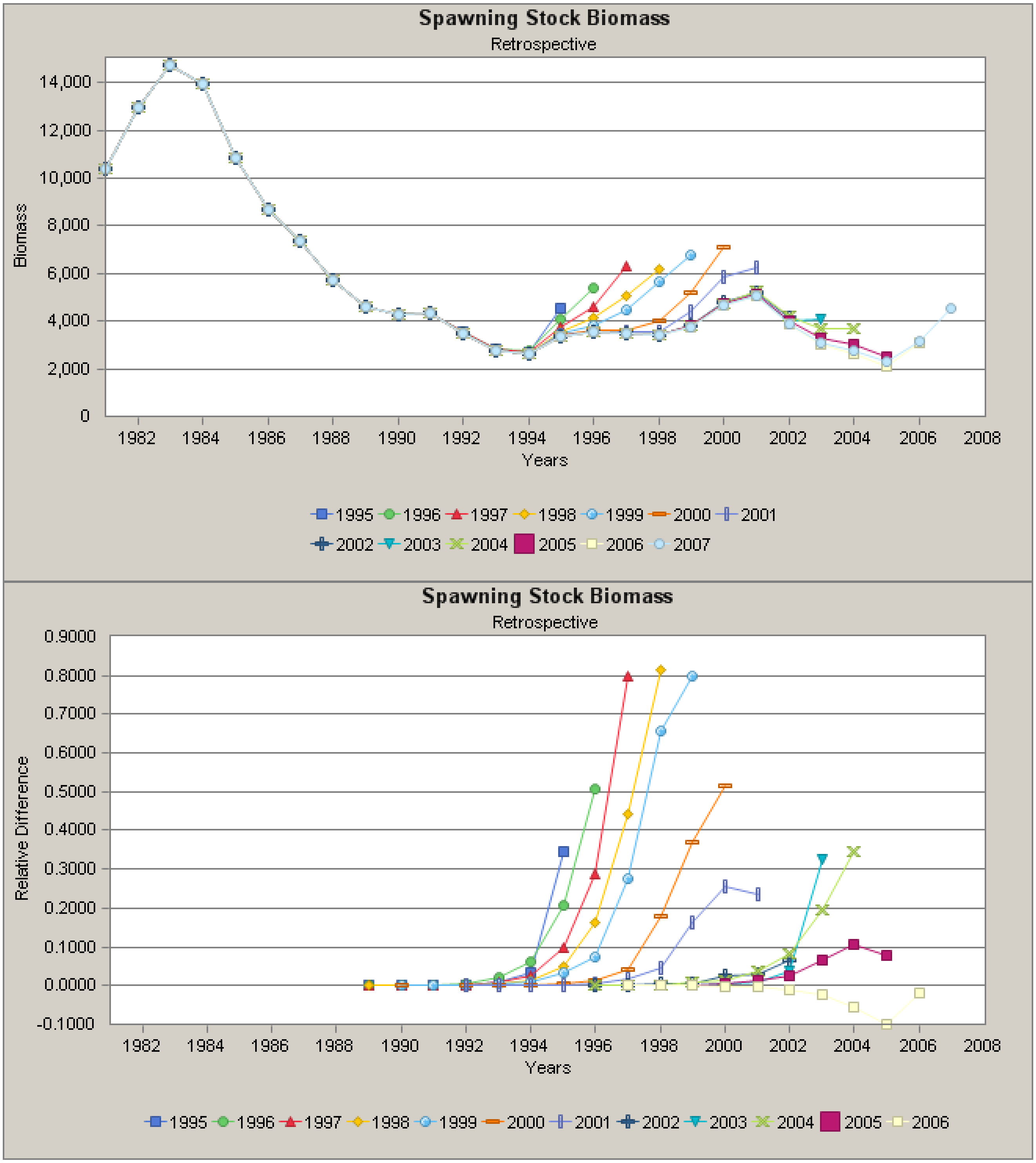


Figure J7. Retrospective analysis of SSB for the GARM3 BASE run.

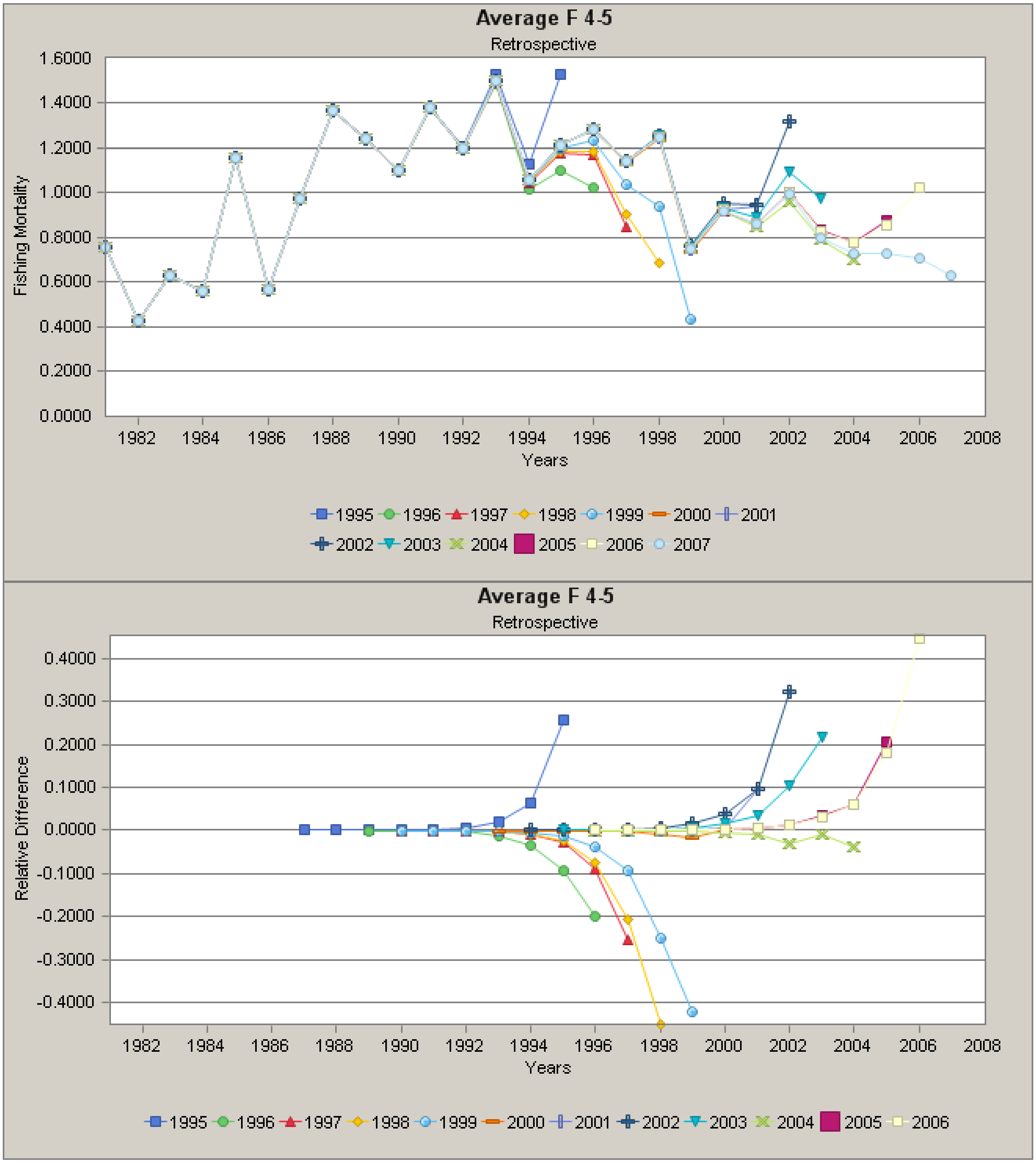


Figure J8. Retrospective analysis of F for the GARM3 SPLIT run.

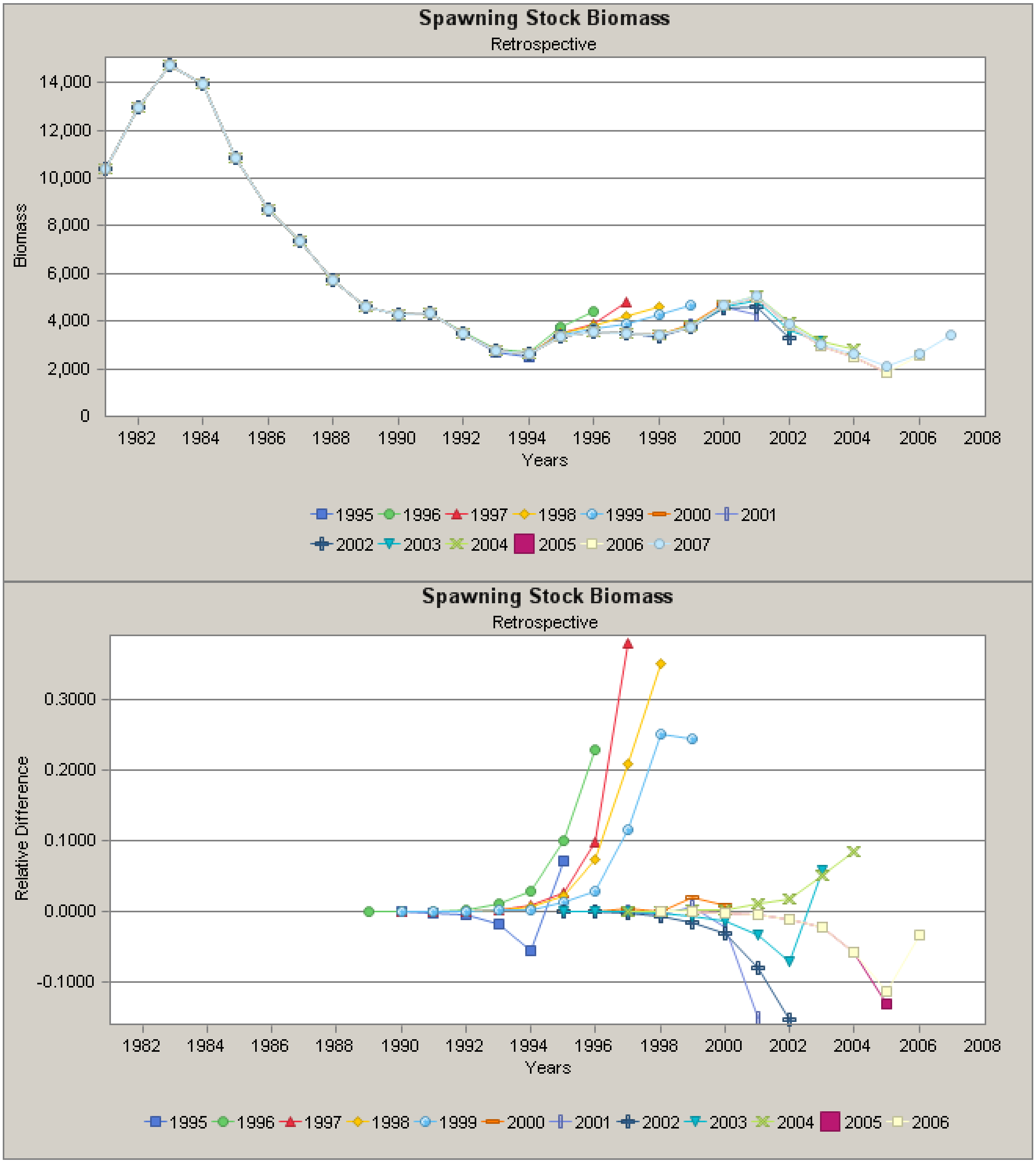


Figure J9. Retrospective analysis of SSB for the GARM3 SPLIT run.

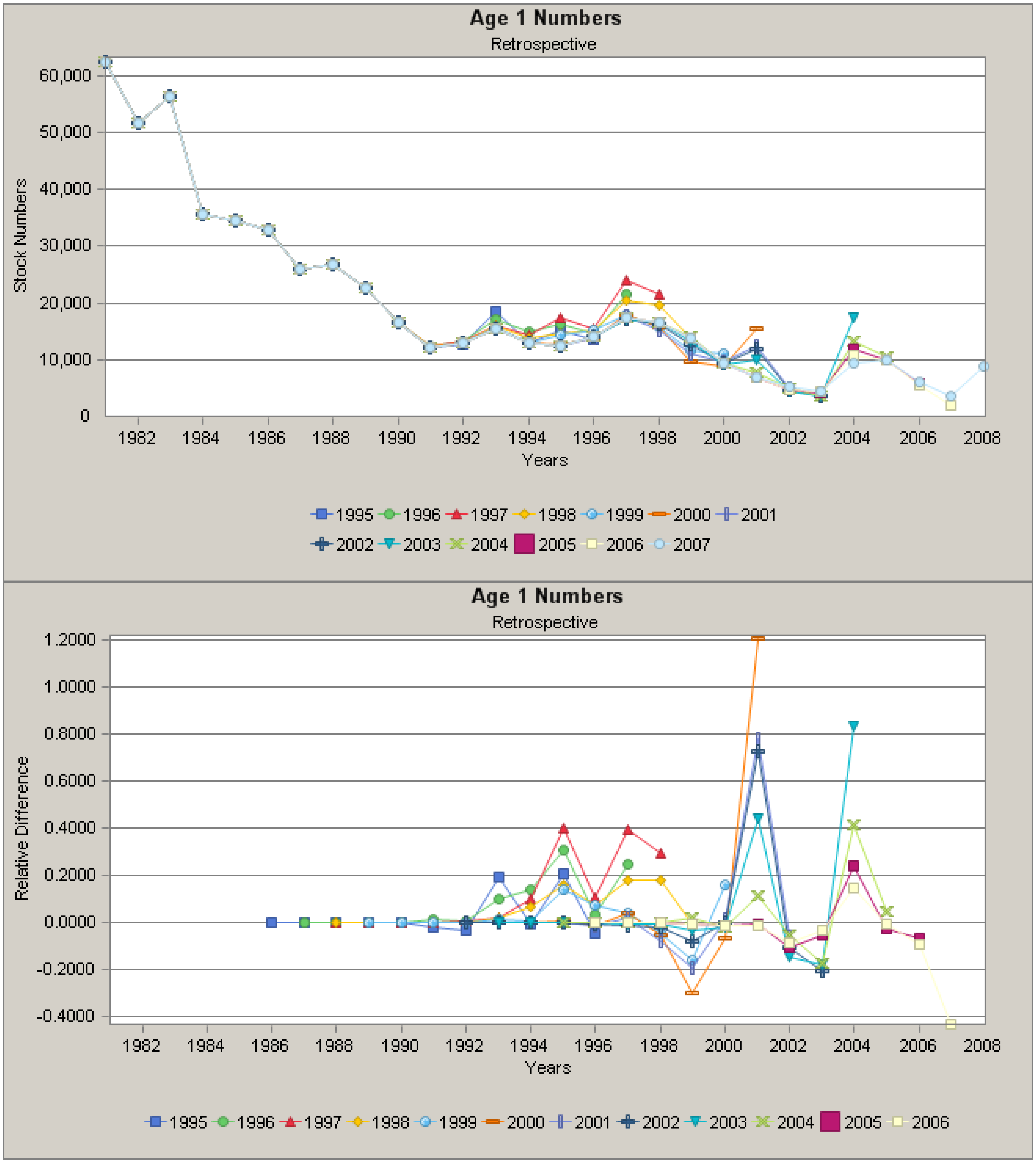


Figure J10. Retrospective analysis of recruitment at age 1 for the GARM3 SPLIT run.

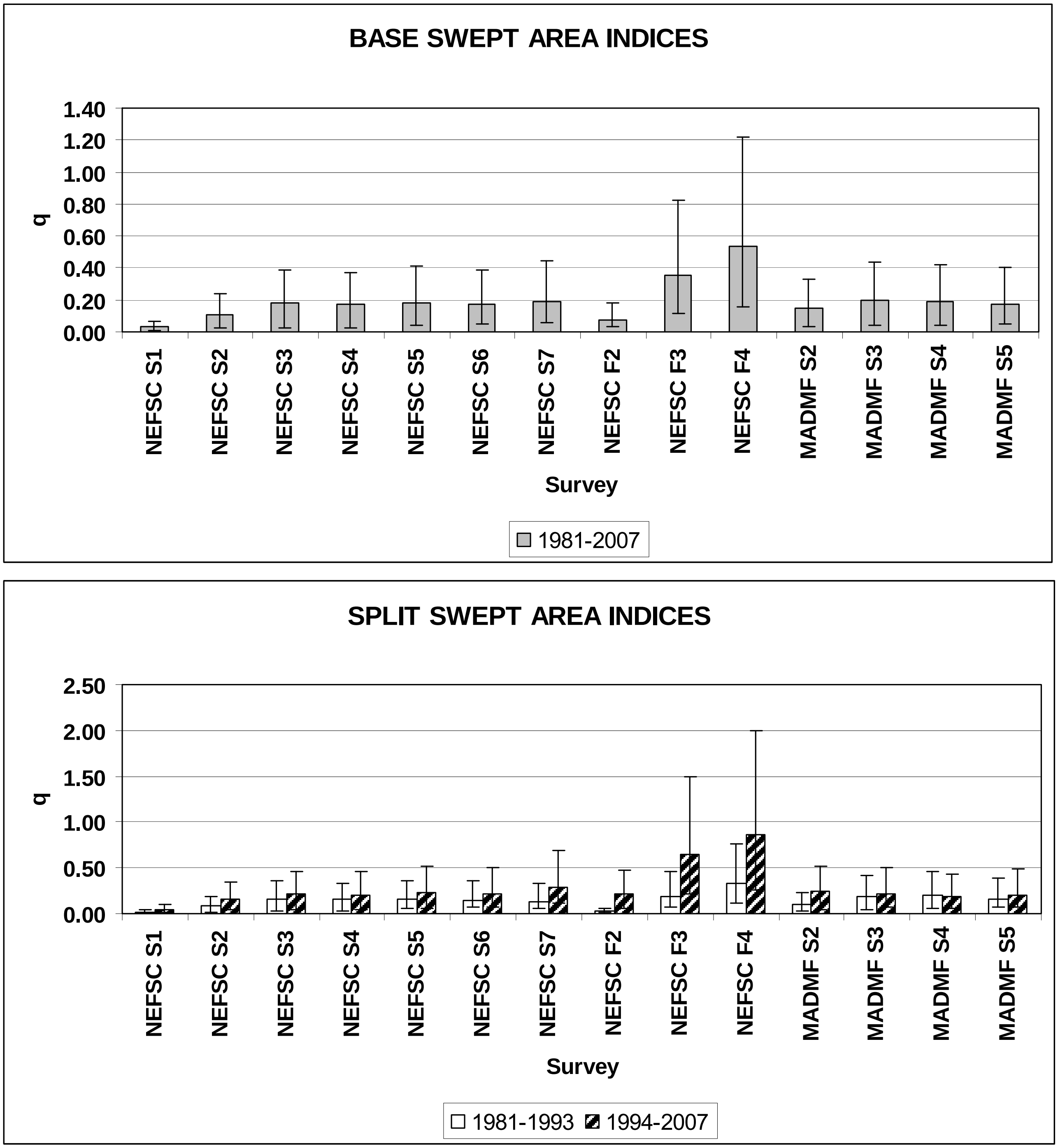


Figure J11. Comparison of swept area (absolute N) survey index catchability coefficents (q) for the BASE and SPLIT VPA run configurations; error bars are +/- 2 standard errors.

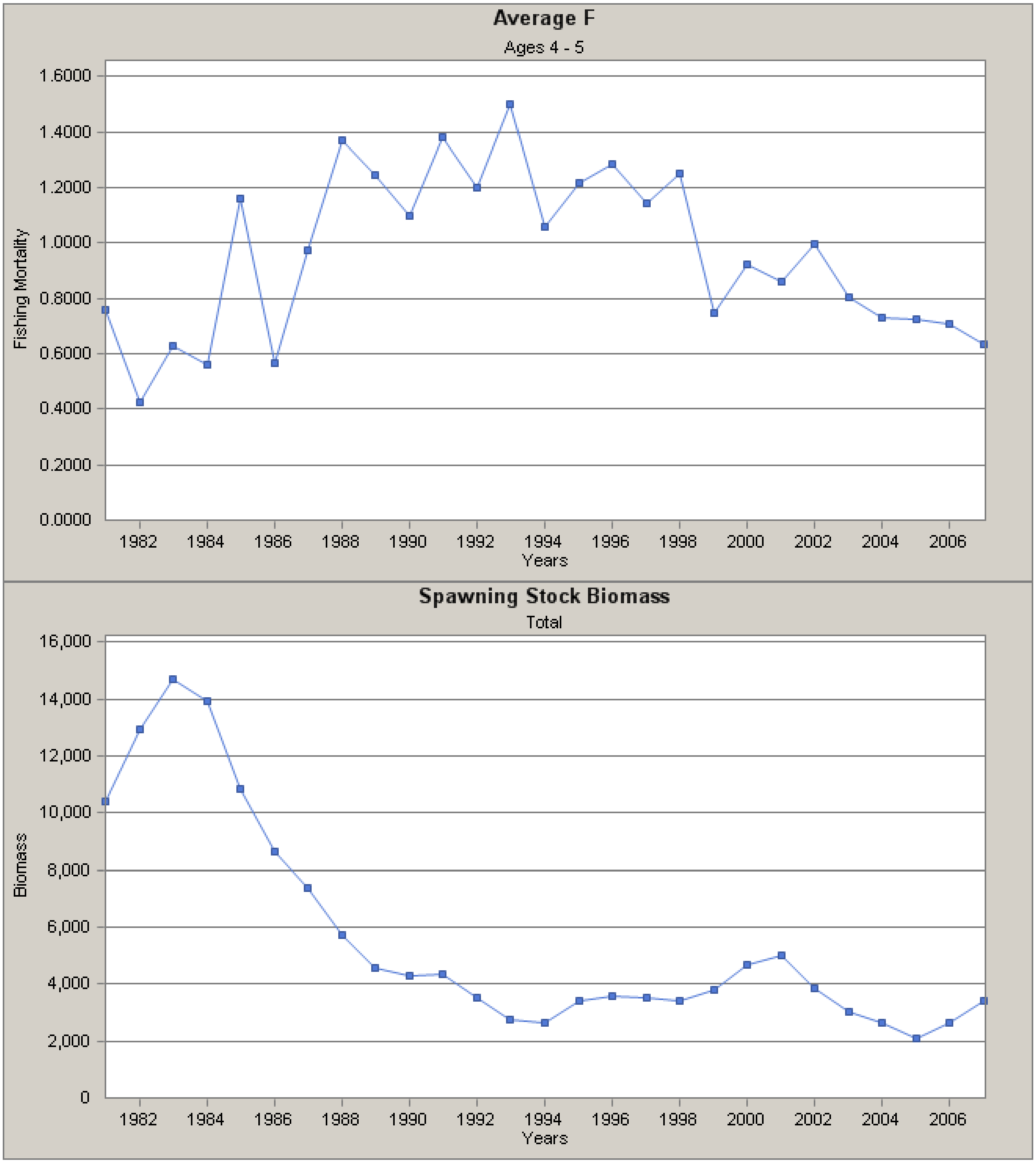


Figure J12. Fishing mortality (F ages 4-5, unweighted) and SSB for the GARM3 SPLIT run.

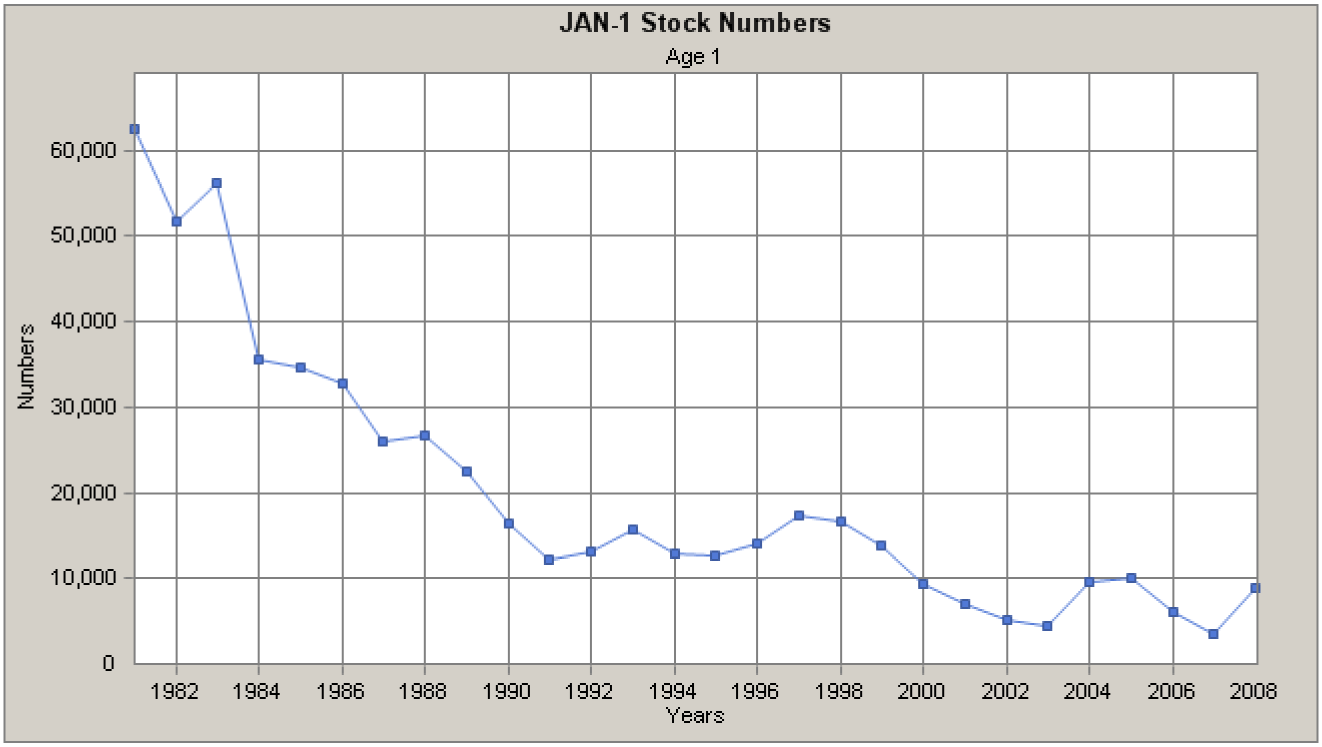


Figure J13. Recruitment at age 1 (000s) for the GARM3 SPLIT run.

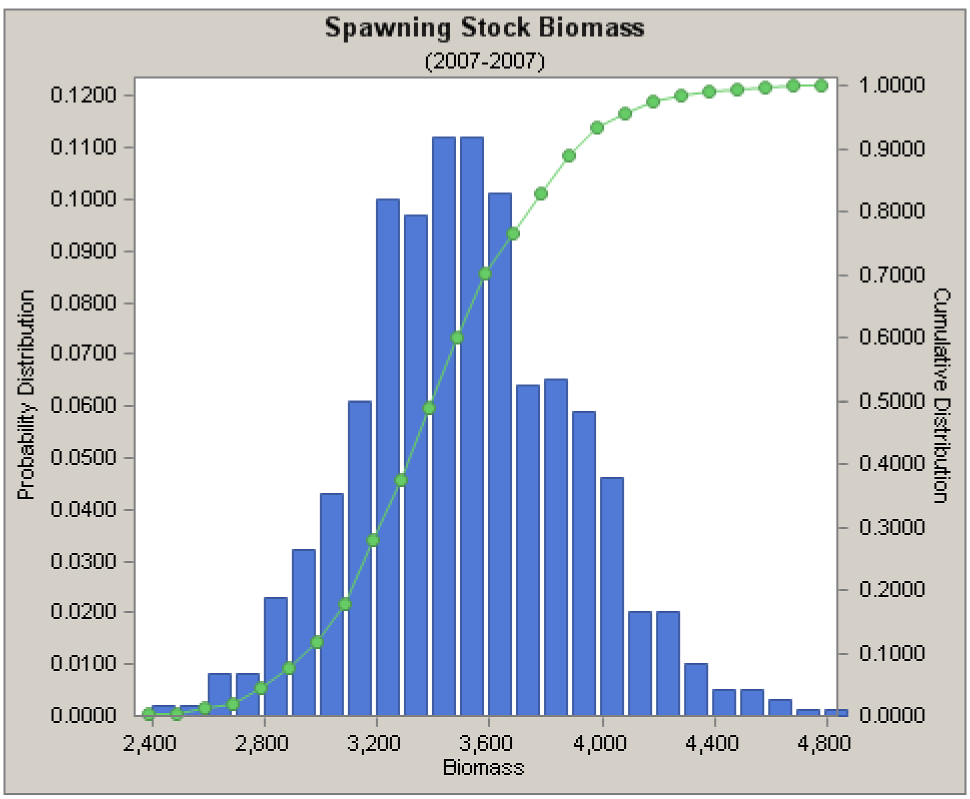


Figure J14. Bootstrap distribution of 2007 Spawning Stock Biomass (SSB, metric tons).

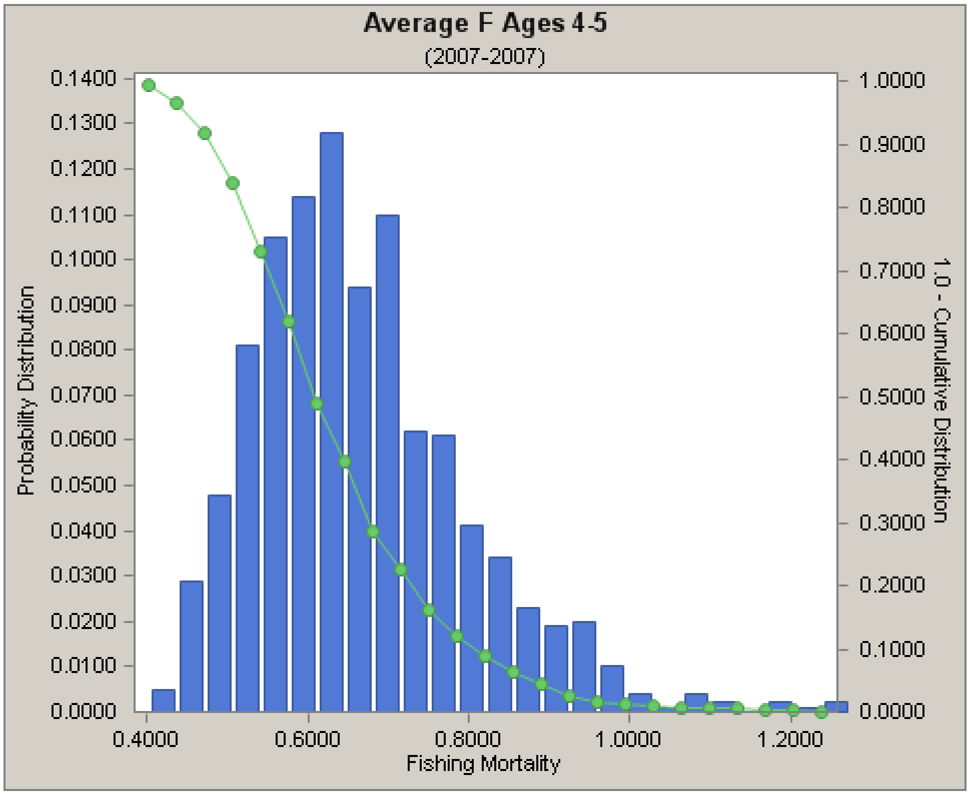


Figure J15. Bootstrap distribution of 2007 Fishing Mortality (F ages 4-5, unweighted).

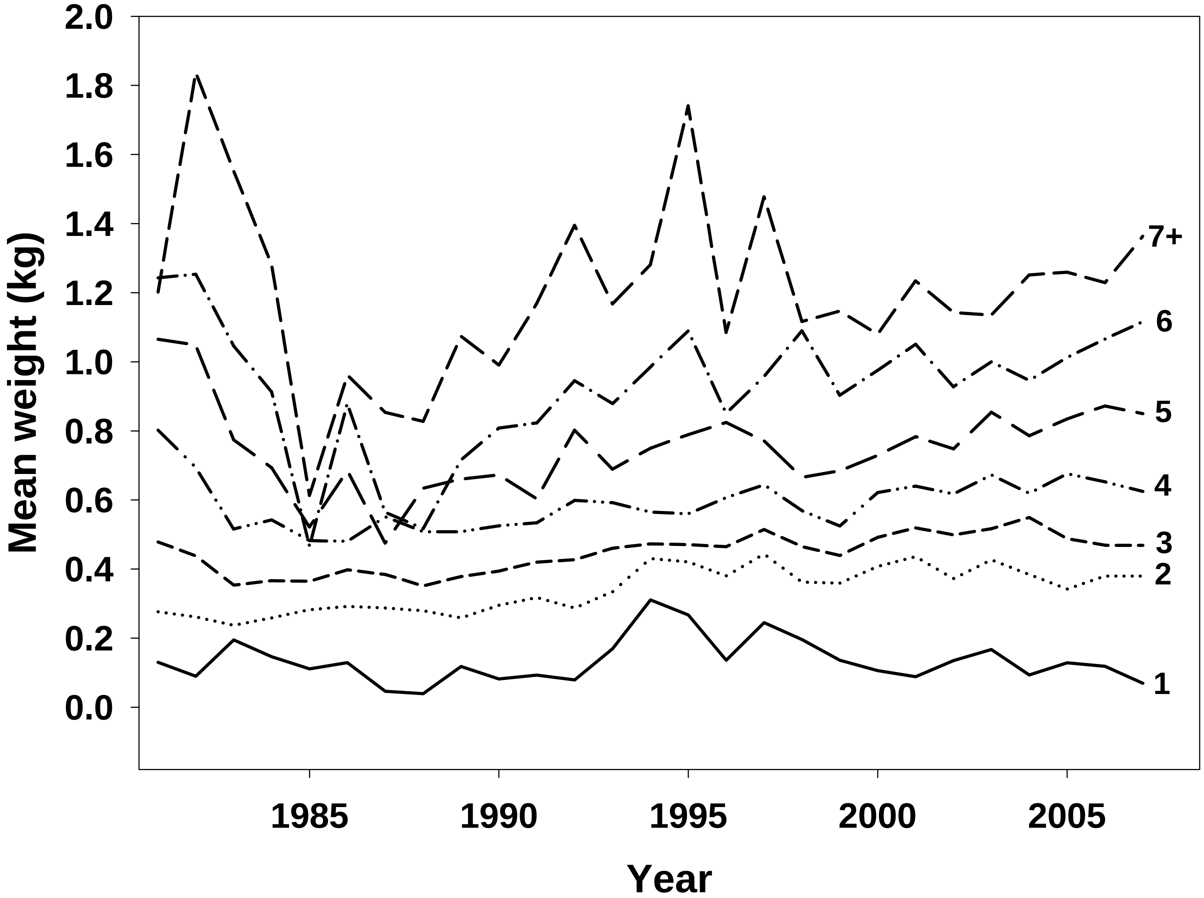


Figure J16. Trends in mean weight at age in the total catch of SNE/MA winter flounder.

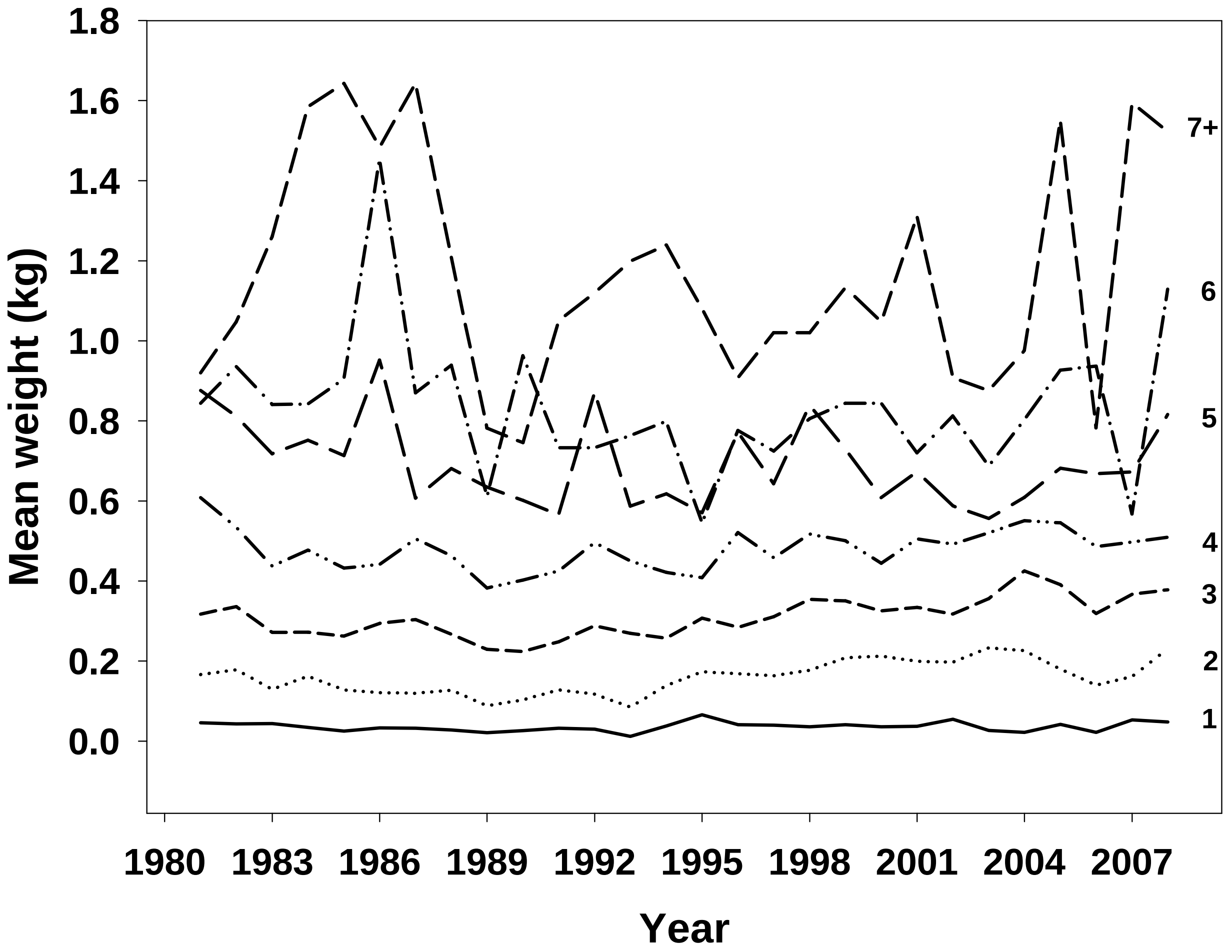
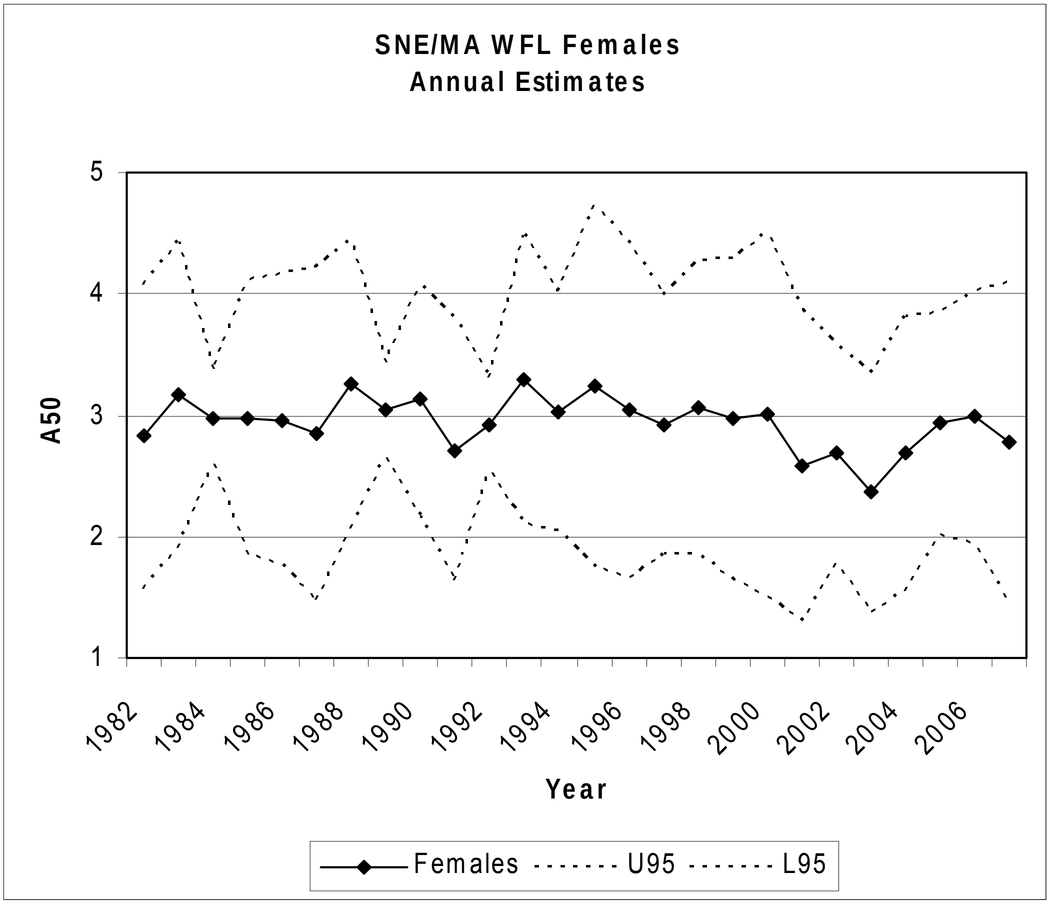


Figure J17. Trends in mean weight at age in the NEFSC Spring survey catch of SNE/MA winter flounder.



	1999 SAW28 BRP2002		2008 GARM 3	
L50	29.00		29.20	
A50	3.00		2.90	
Age				
1	0.00		0.00	
2	0.06	*0.00*	0.07	*0.00*
3	0.53		0.55	
4	0.95		0.95	
5	1.00		1.00	
6	1.00		1.00	
7+	1.00		1.00	

Figure J18. Time series pattern in female age of 50% maturity (A50) and time series estimates of female maturity at age for SNE/MA winter flounder.

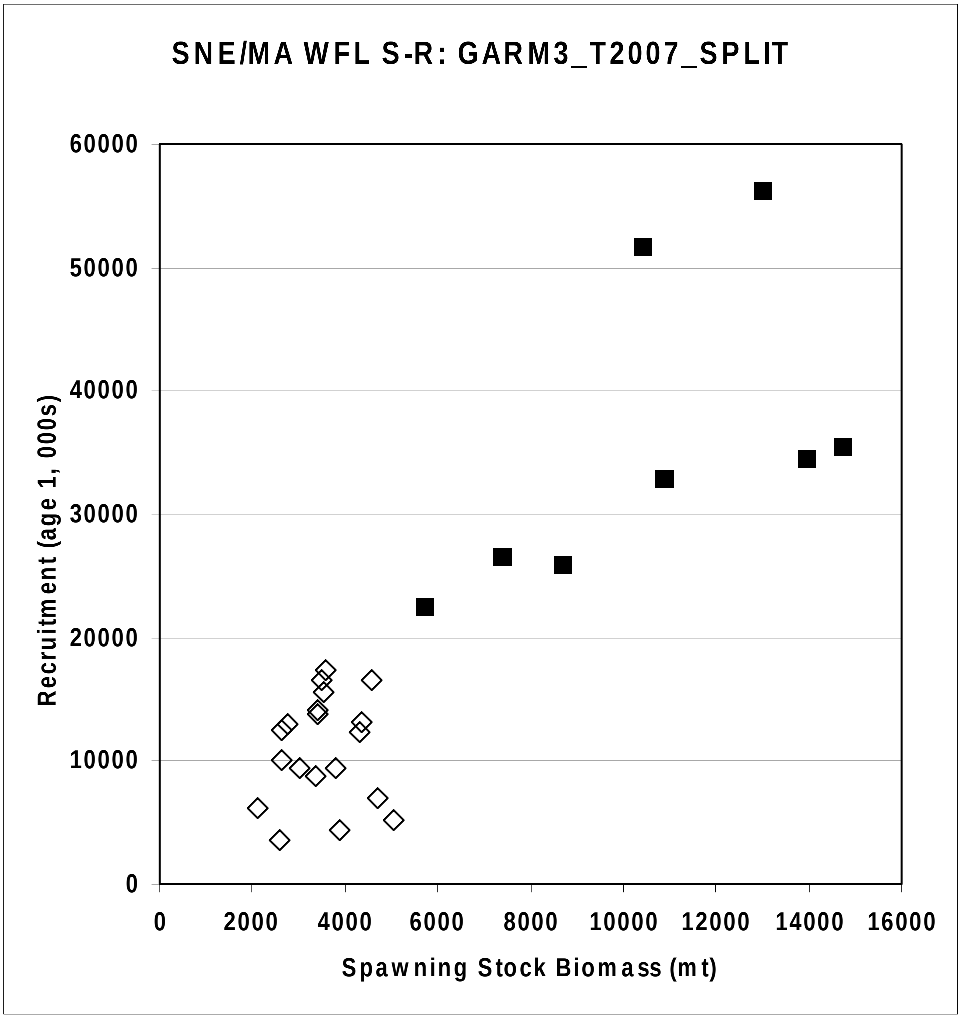


Figure J19. Spawning stock biomass (SSB; mt) and recruitment (age 1, 000s) estimates for SNE/MA winter flounder: GARM3 ADAPT VPA SPLIT run configuration; top 8 year classes used in reference point calculations (SSB > 5,700 mt) in solid square symbols, others in open diamonds.

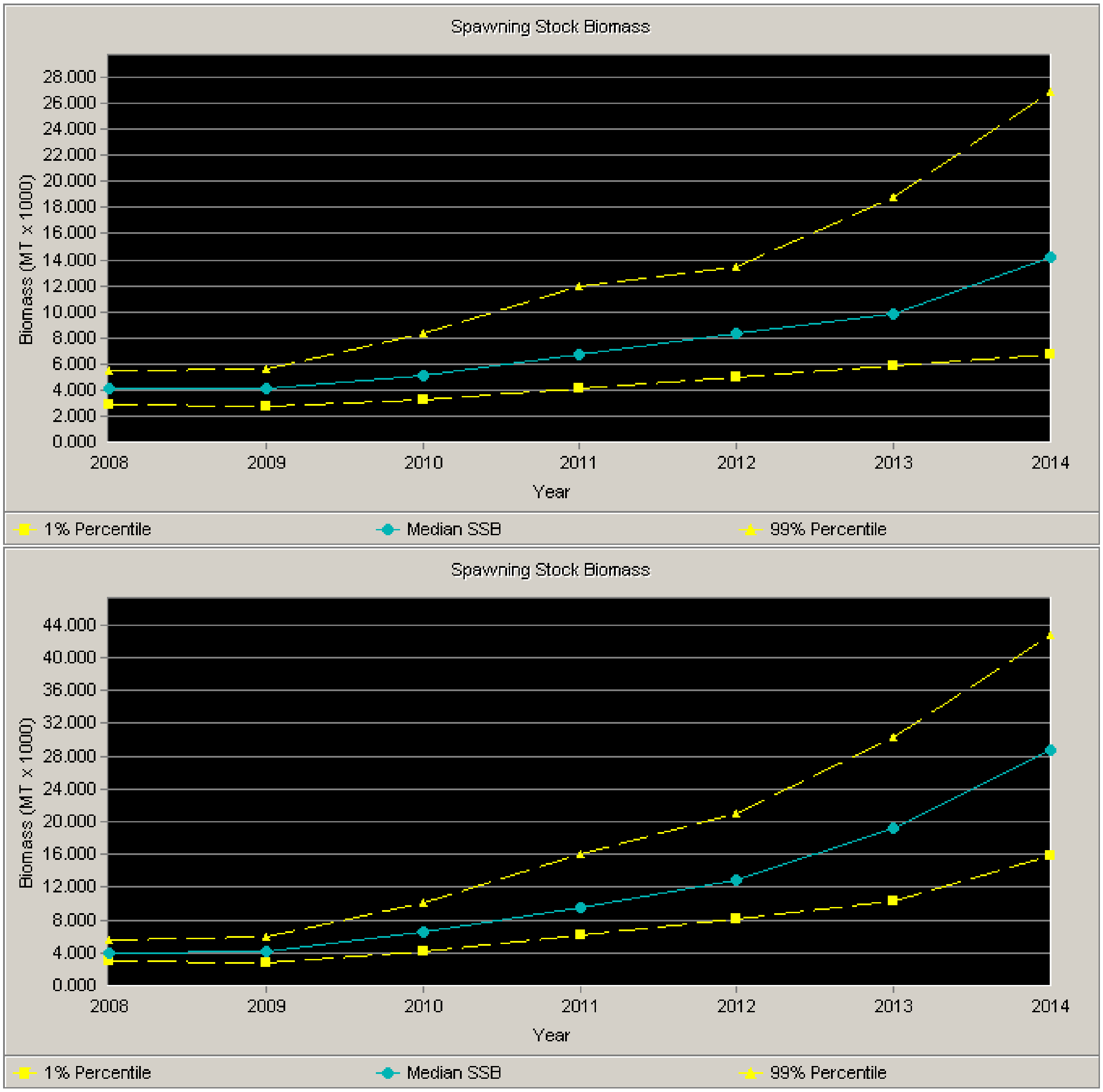


Figure J20. Top panel: projection of SNE/MA winter flounder SSB to 2014 under F_{MSY} = F40% = 0.248 during 2009-2014; median SSB in 2014 = 14,202 mt. Bottom panel: projection of SNE/MA winter flounder SSB to 2014 under F = 0.000 during 2009-2014; median SSB in 2014 = 28,663 mt.

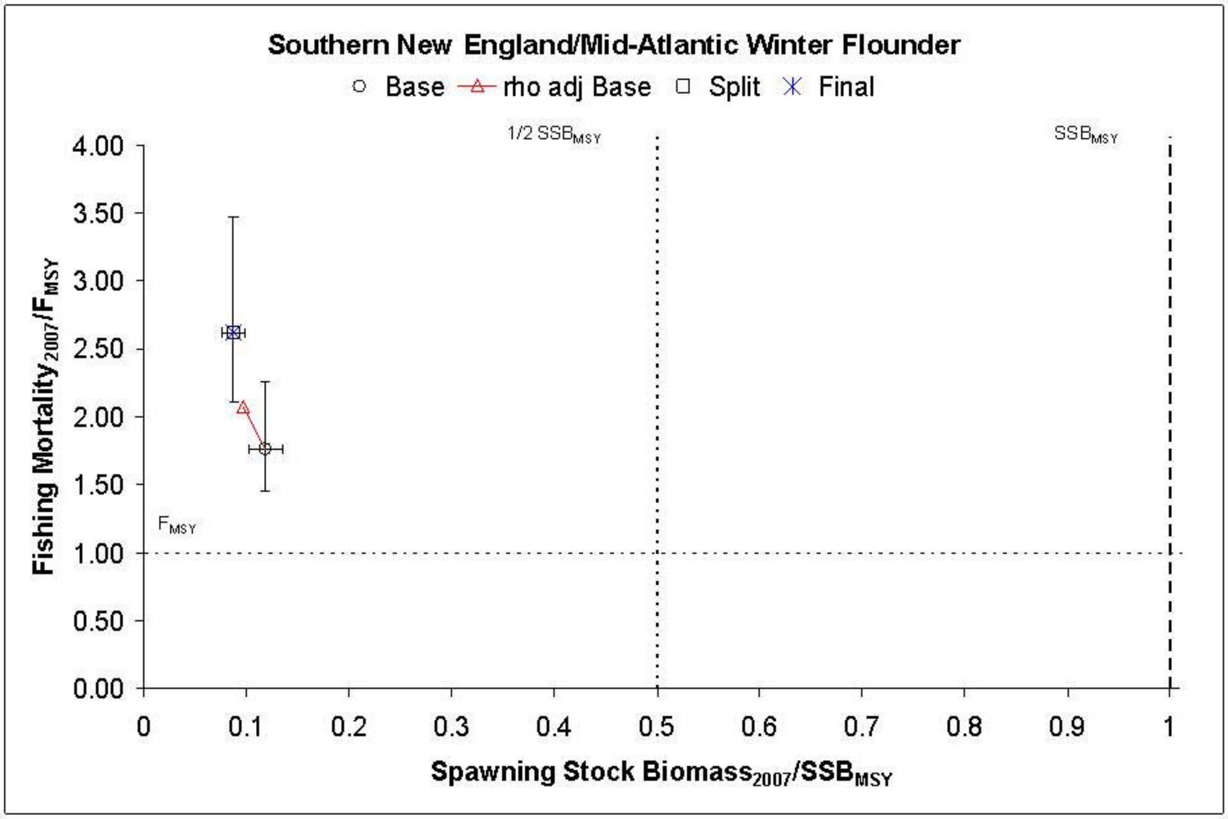


Figure J21. Southern New England/Mid-Atlantic winter flounder stock status in 2007.