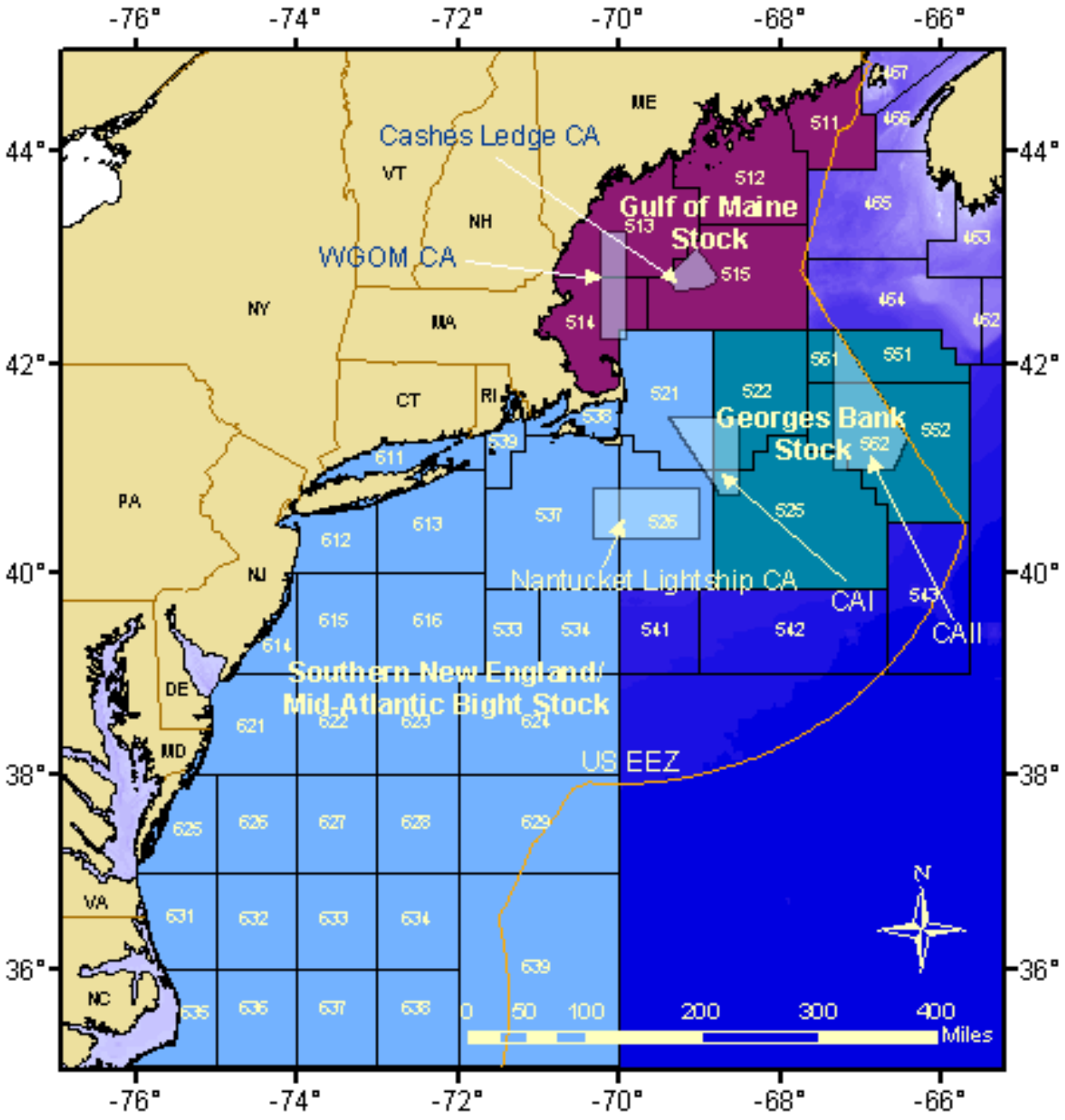


Figure 11.1. Statistical areas used to define the Gulf of Maine, Georges Bank, and Southern New England/Mid-Atlantic Bight winter flounder stocks.

Figure A1. Statistical areas used to define winter flounder stocks. The Southern New England/Mid-Atlantic (SNE/MA) stock complex includes areas 521, 526, 533-539, and 611-639.

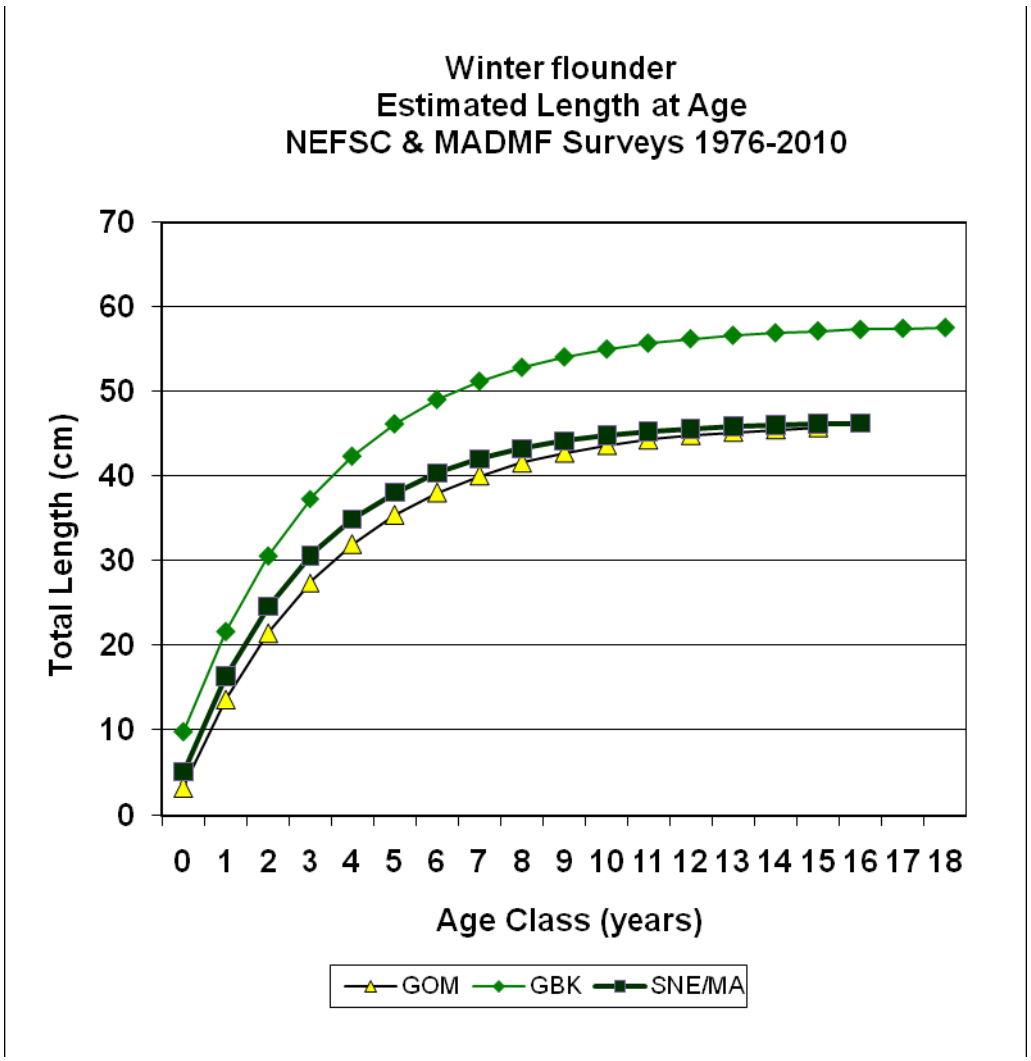


Figure A2. Estimated length at age (von Beertalanffy growth) for winter flounder stocks: NEFSC and MADMF trawl survey age-length data for 1976-2010.

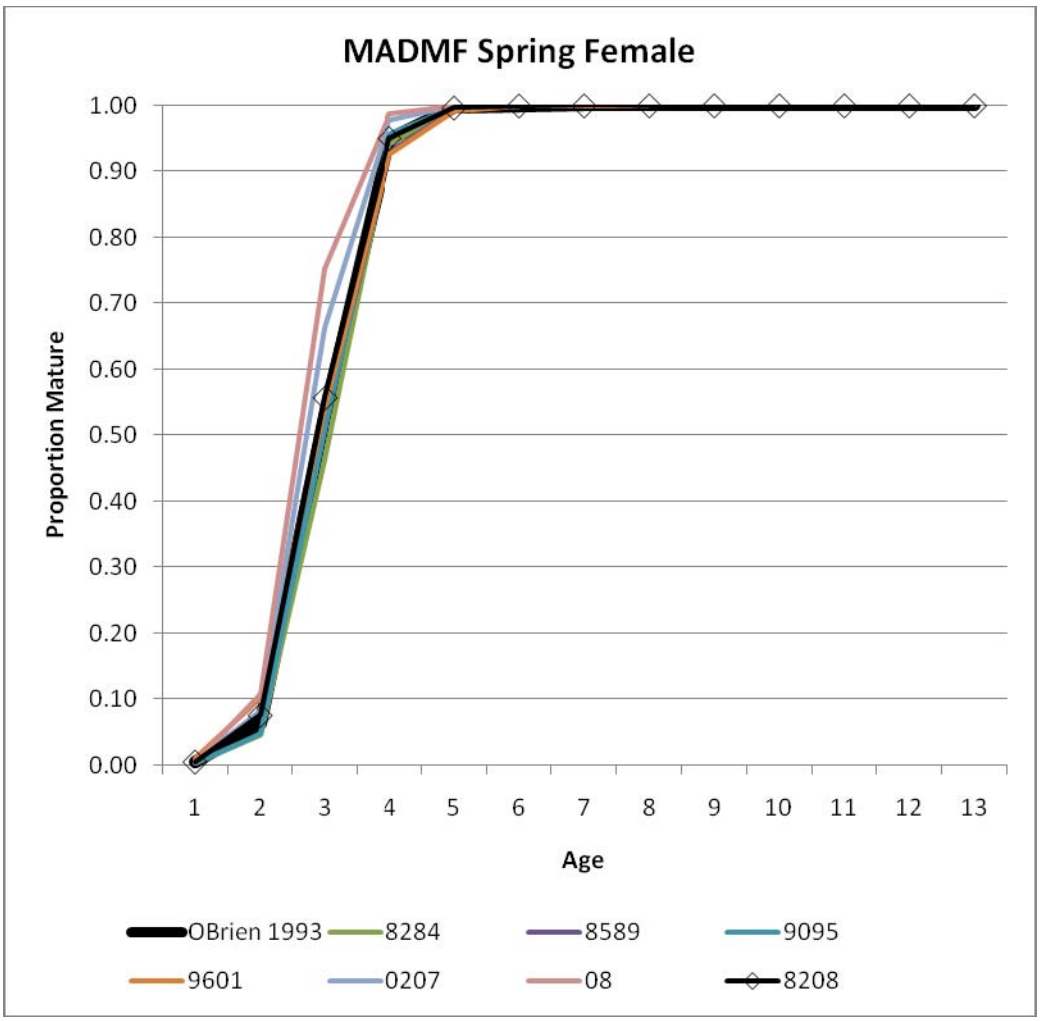


Figure A3. Maturity ogives (probit function) derived from MADMF Spring trawl survey data for SNE/MA winter flounder. The O'Brien et al. (1993) proportions from the MADMF Spring 1985-1989 data have been used in all previous assessments.

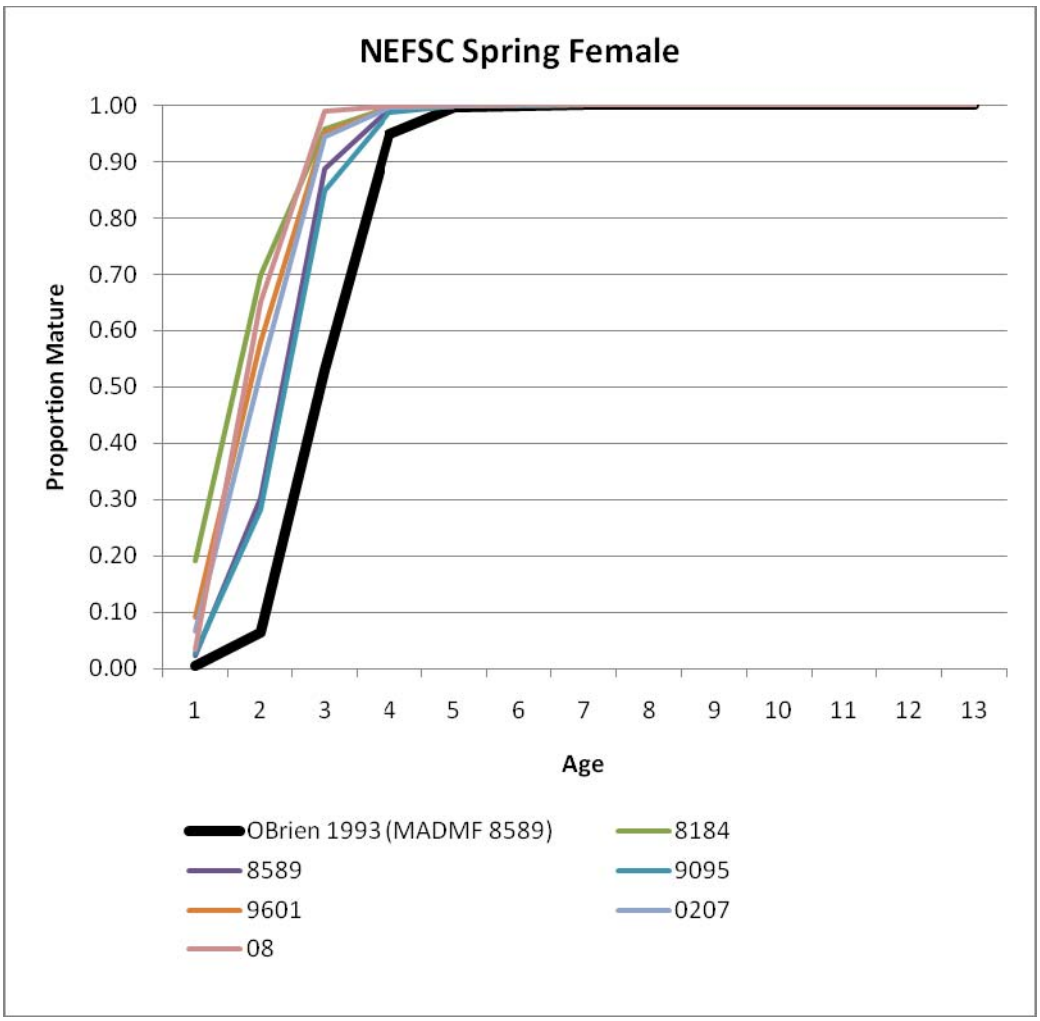


Figure A4. Maturity ogives (probit function) derived from NEFSC Spring trawl survey data for SNE/MA winter flounder. The O'Brien et al. (1993) proportions from the MADMF Spring 1985-1989 data have been used in all previous assessments.

.

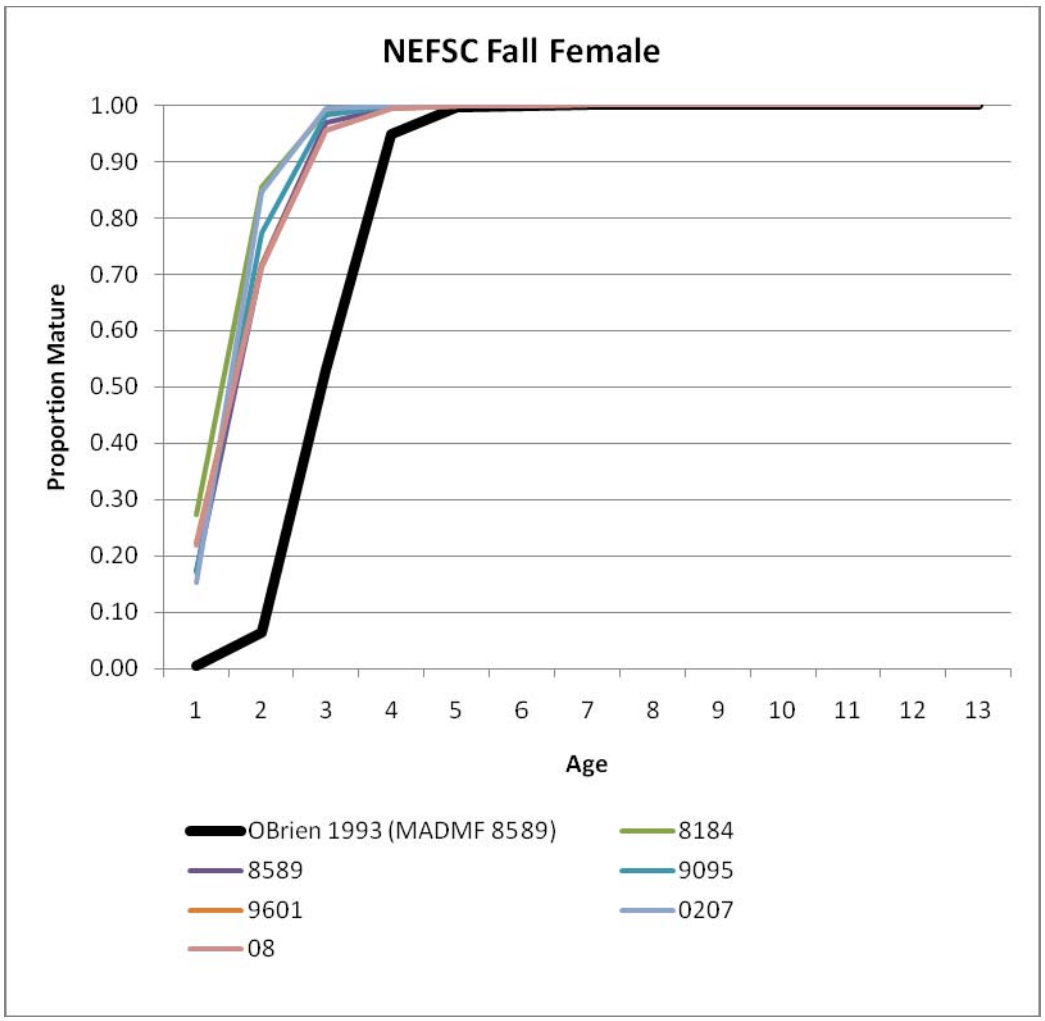


Figure A5. Maturity ogives (probit function) derived from NEFSC Fall trawl survey data for SNE/MA winter flounder. The O'Brien et al. (1993) proportions from the MADMF Spring 1985-1989 data have been used in all previous assessments.

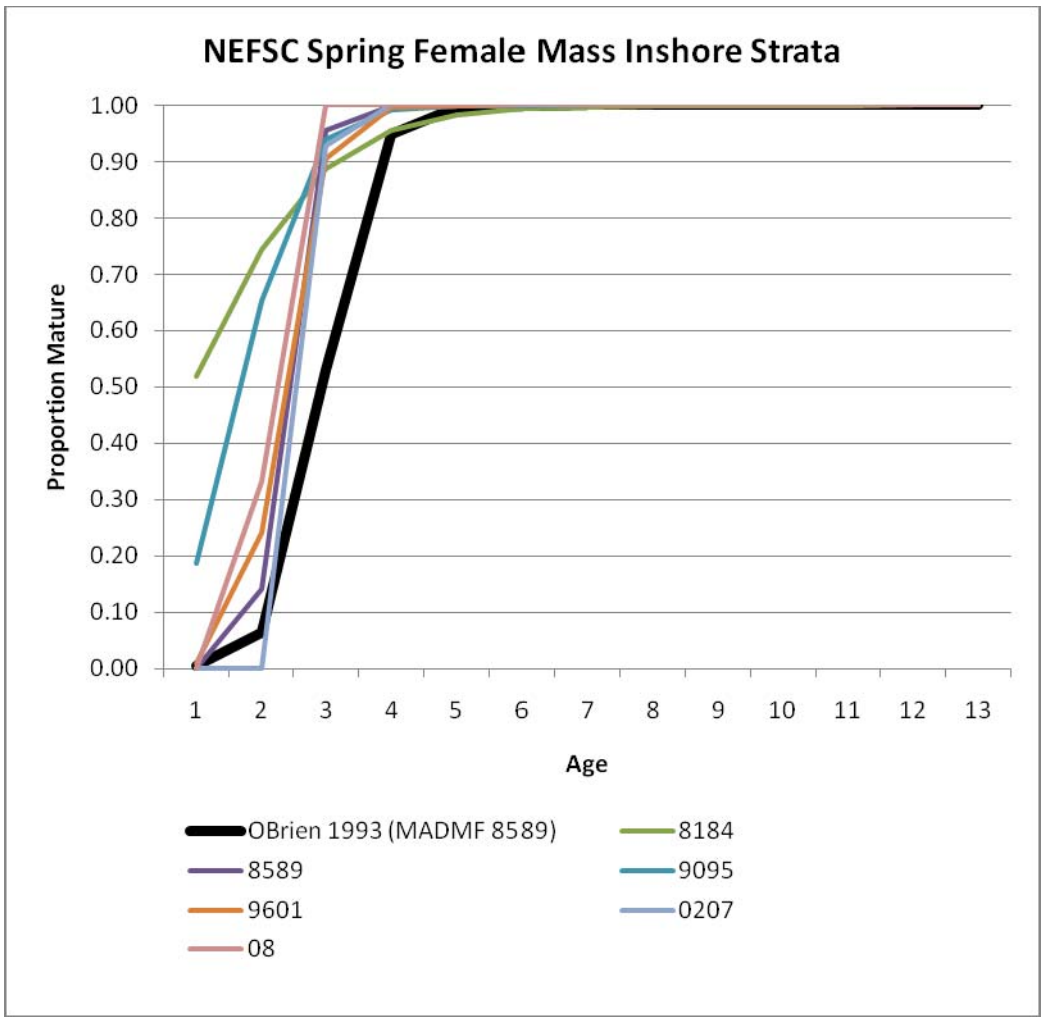


Figure A6. Maturity ogives (probit function) derived from NEFSC Spring trawl survey data for SNE/MA winter flounder, for Massachusetts waters Inshore survey strata. The O'Brien et al. (1993) proportions from the MADMF Spring 1985-1989 data have been used in all previous assessments.

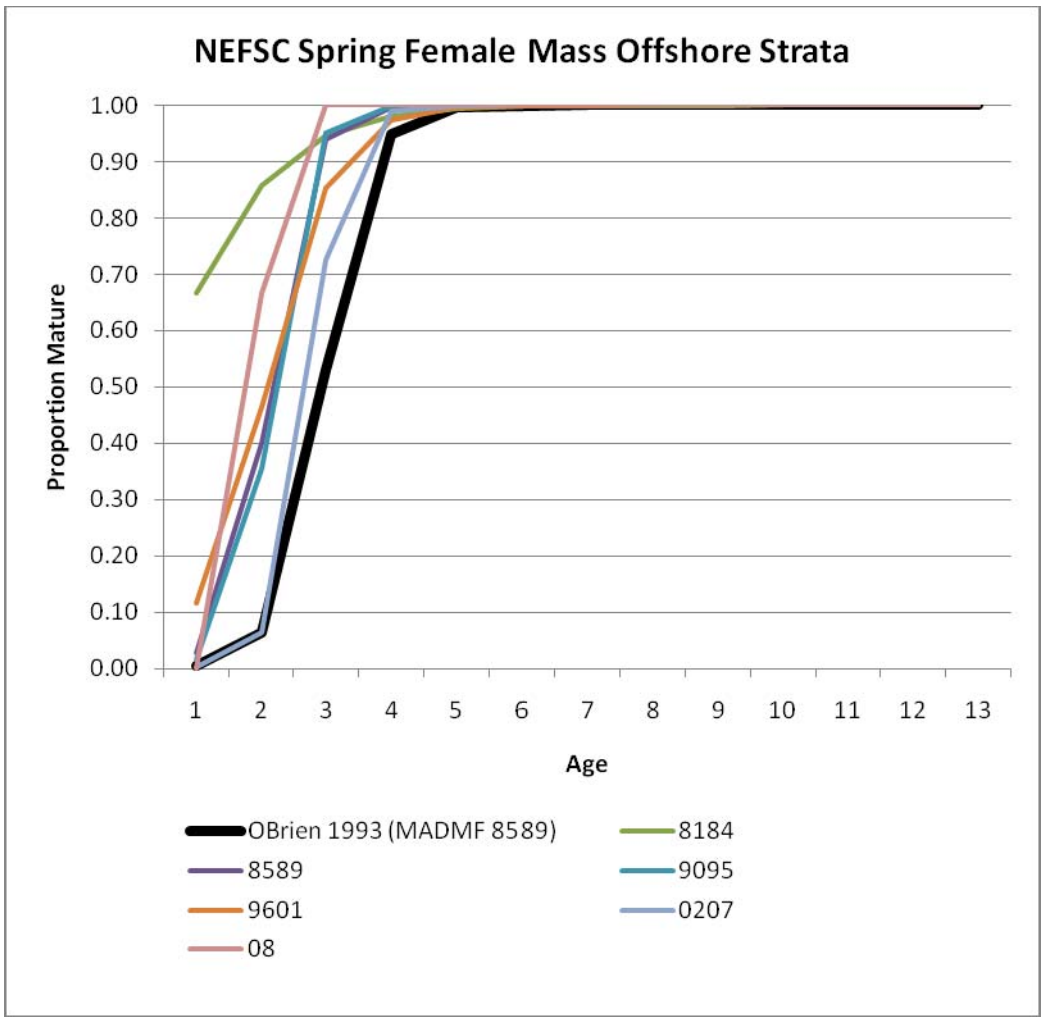


Figure A7. Maturity ogives (probit function) derived from NEFSC Spring trawl survey data for SNE/MA winter flounder, for Massachusetts waters Offshore survey strata. The O'Brien et al. (1993) proportions from the MADMF Spring 1985-1989 data have been used in all previous assessments.

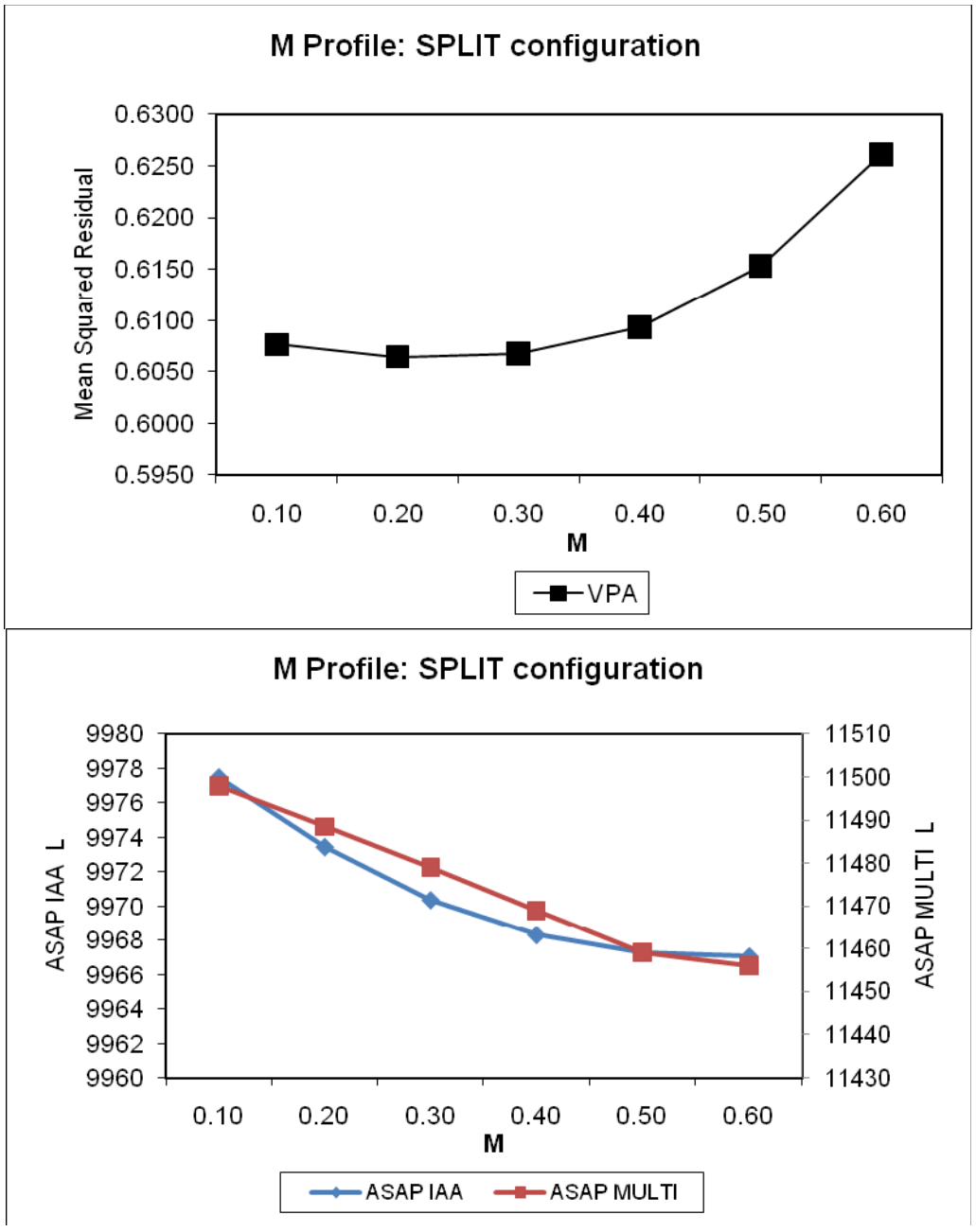


Figure A8. Profiles in mean squared residual for preliminary ADAPT VPA models for M values ranging from 0.1 to 0.6 (top panel). Profiles in likelihood of initial ASAP SCAA model runs (in two different calibration survey configurations) for M values ranging from 0.1 to 0.6 (bottom panel).

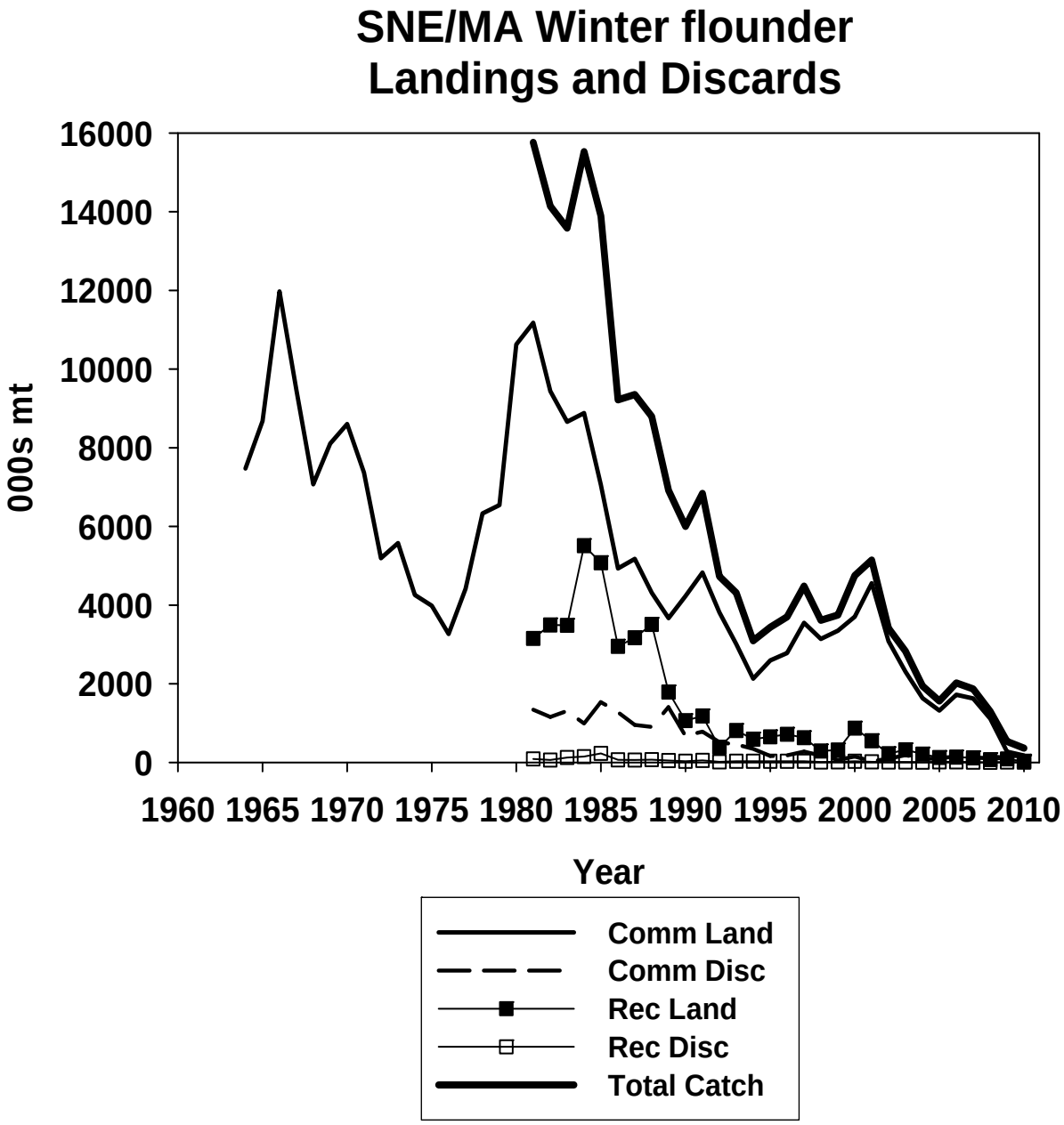


Figure A9. Commercial landings (1964-2010), commercial discards (1981-2010) recreational landings (1981-2010), recreational discards (1981-2010) and total fishery catch (1981-2010) for the SNE/MA winter flounder stock complex.

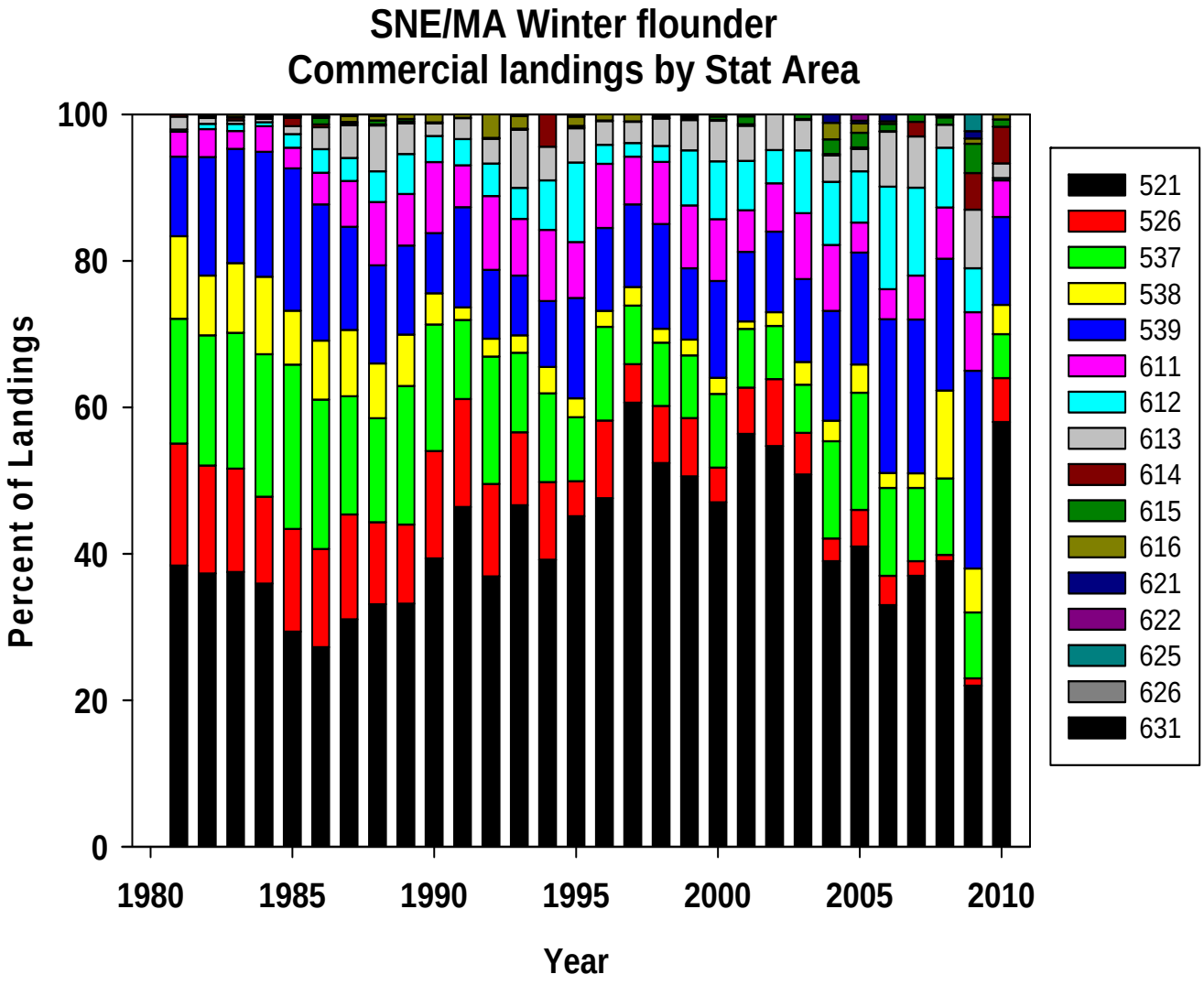


Figure A10. Commercial fishery landings of SNE/MA winter flounder by statistical area.

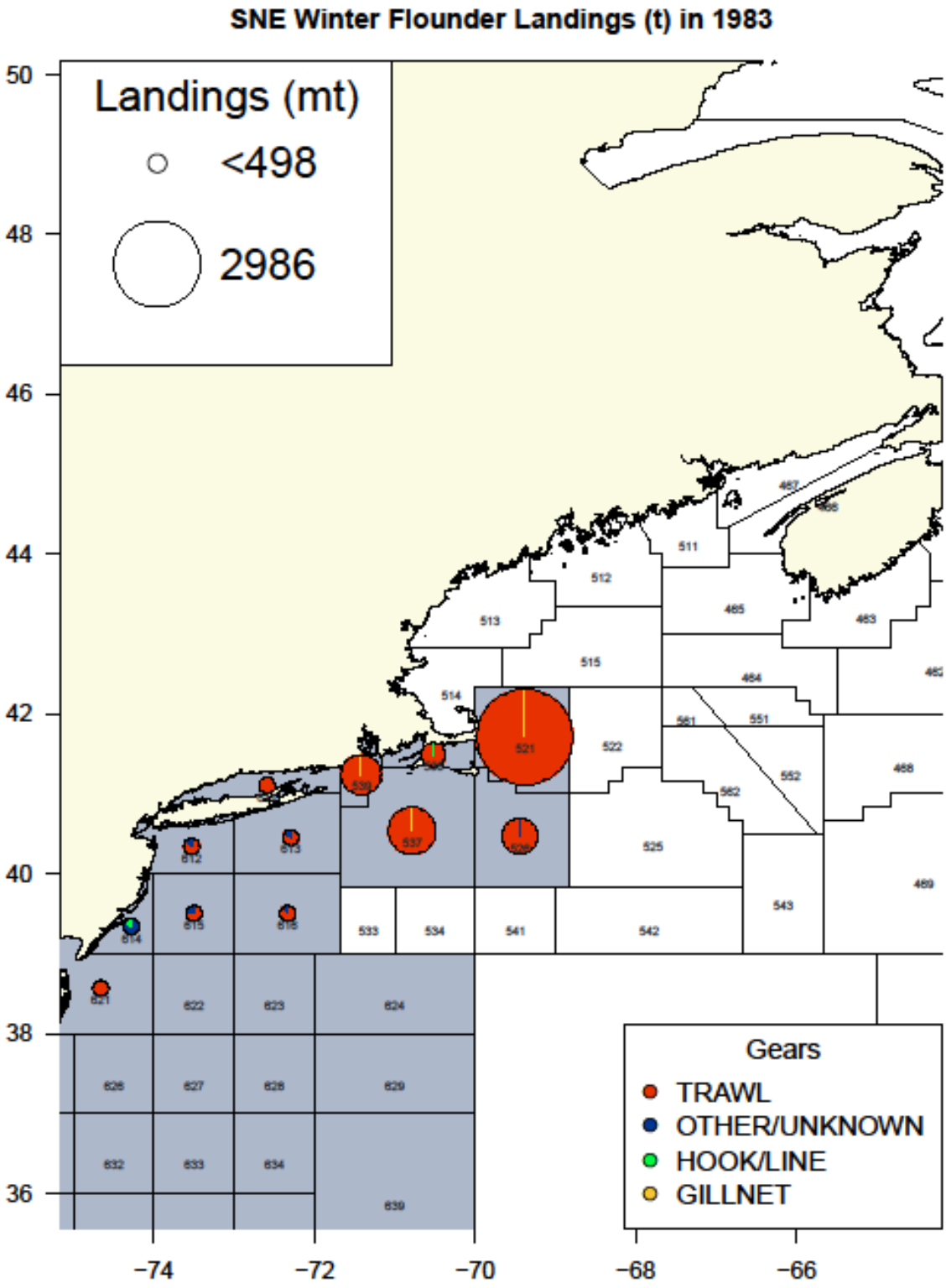


Figure A11. Commercial fishery landings of SNE/MA winter flounder in 1983 by statistical area.

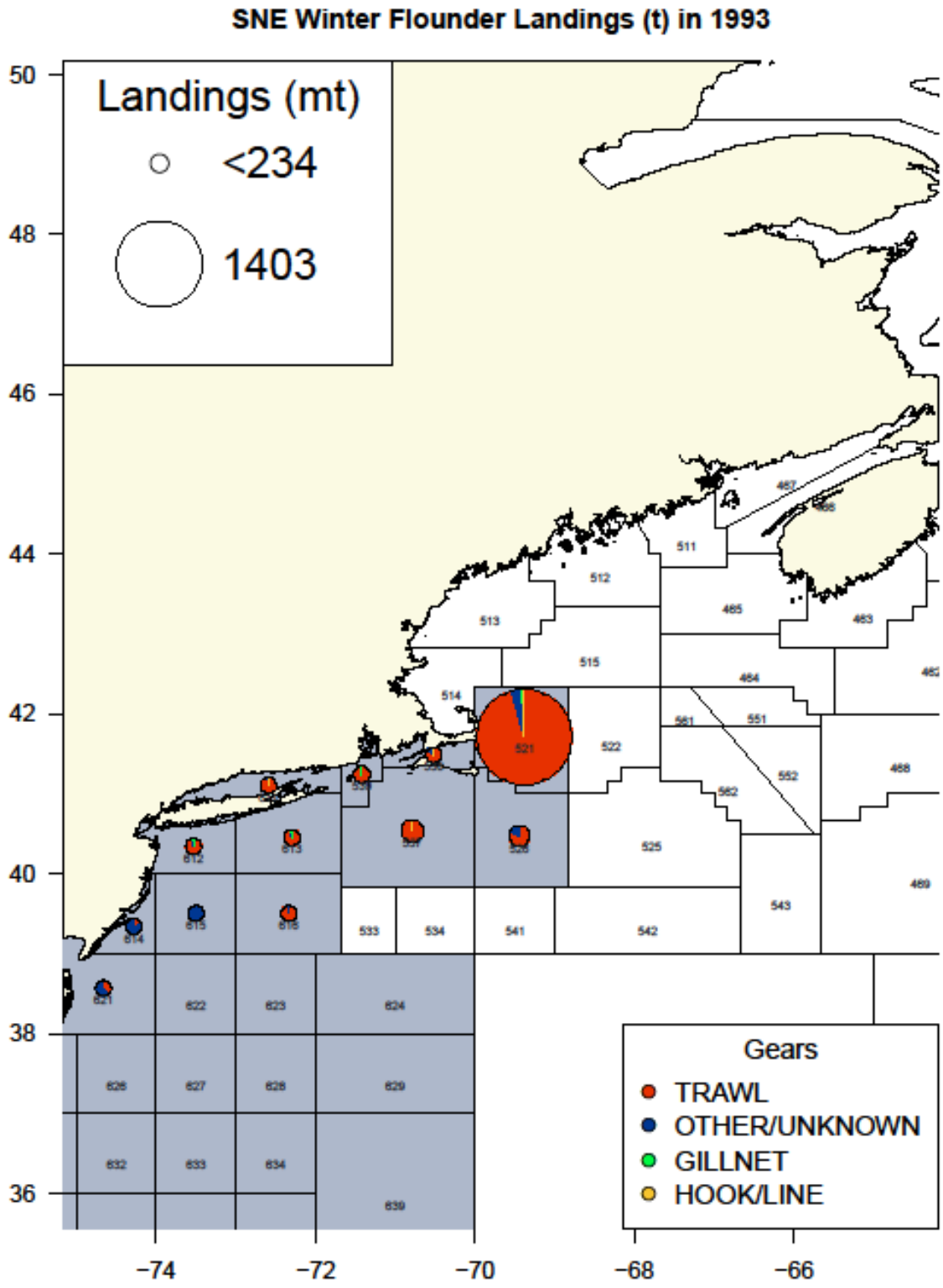


Figure A12. Commercial fishery landings of SNE/MA winter flounder in 1993 by statistical area.

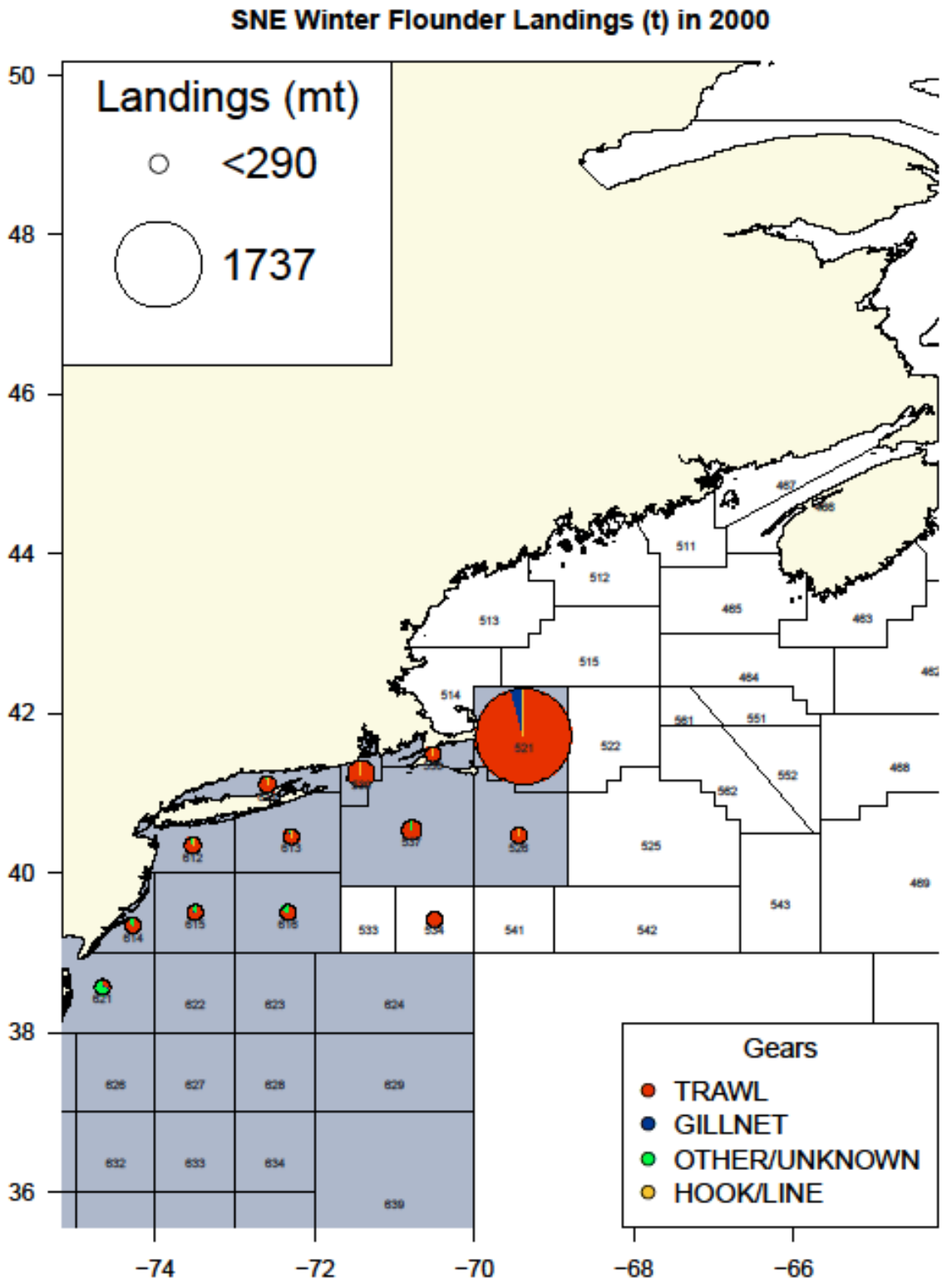


Figure A13. Commercial fishery landings of SNE/MA winter flounder in 2000 by statistical area.

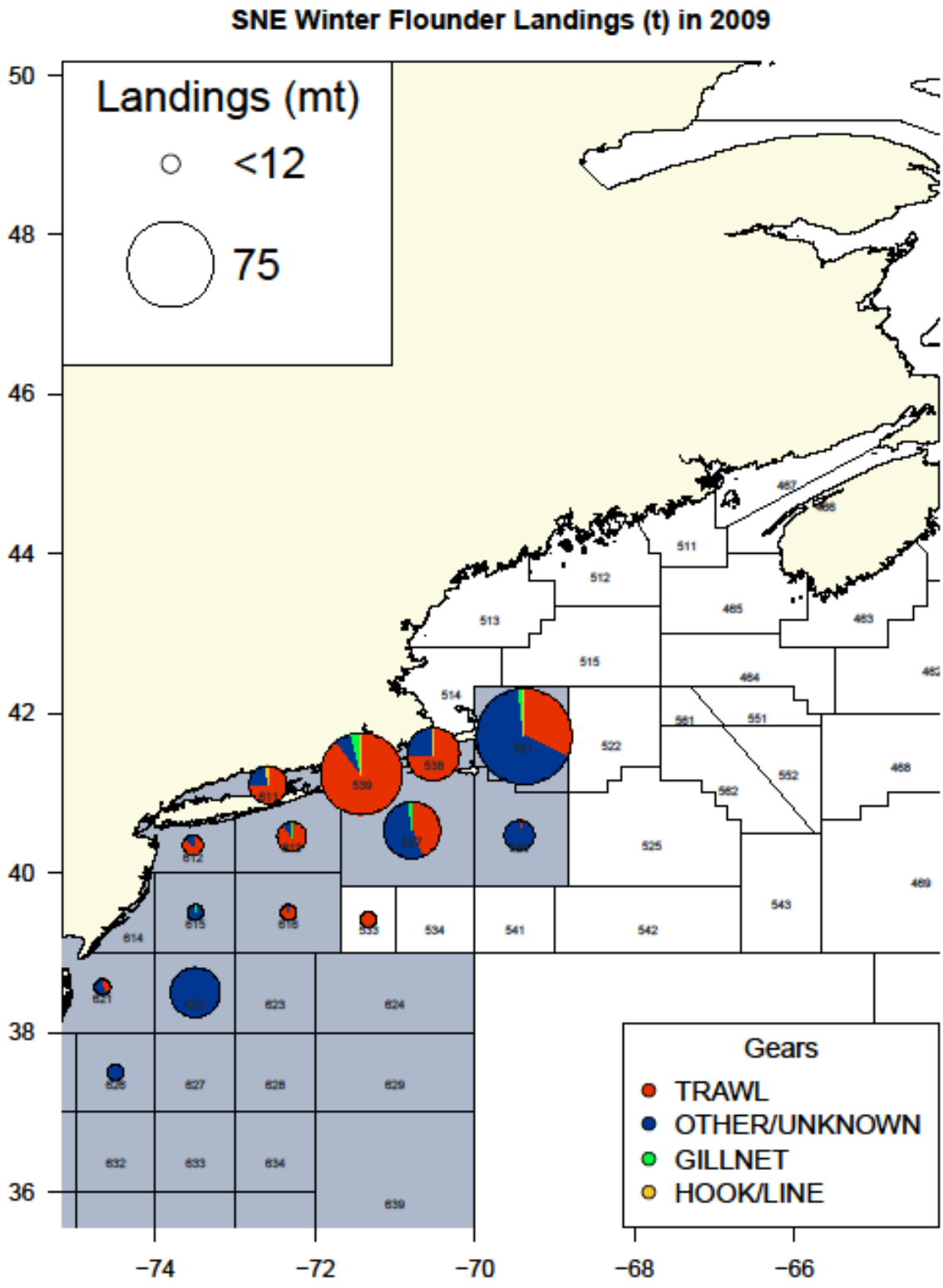


Figure A14. Commercial fishery landings of SNE/MA winter flounder in 2009 by statistical area.

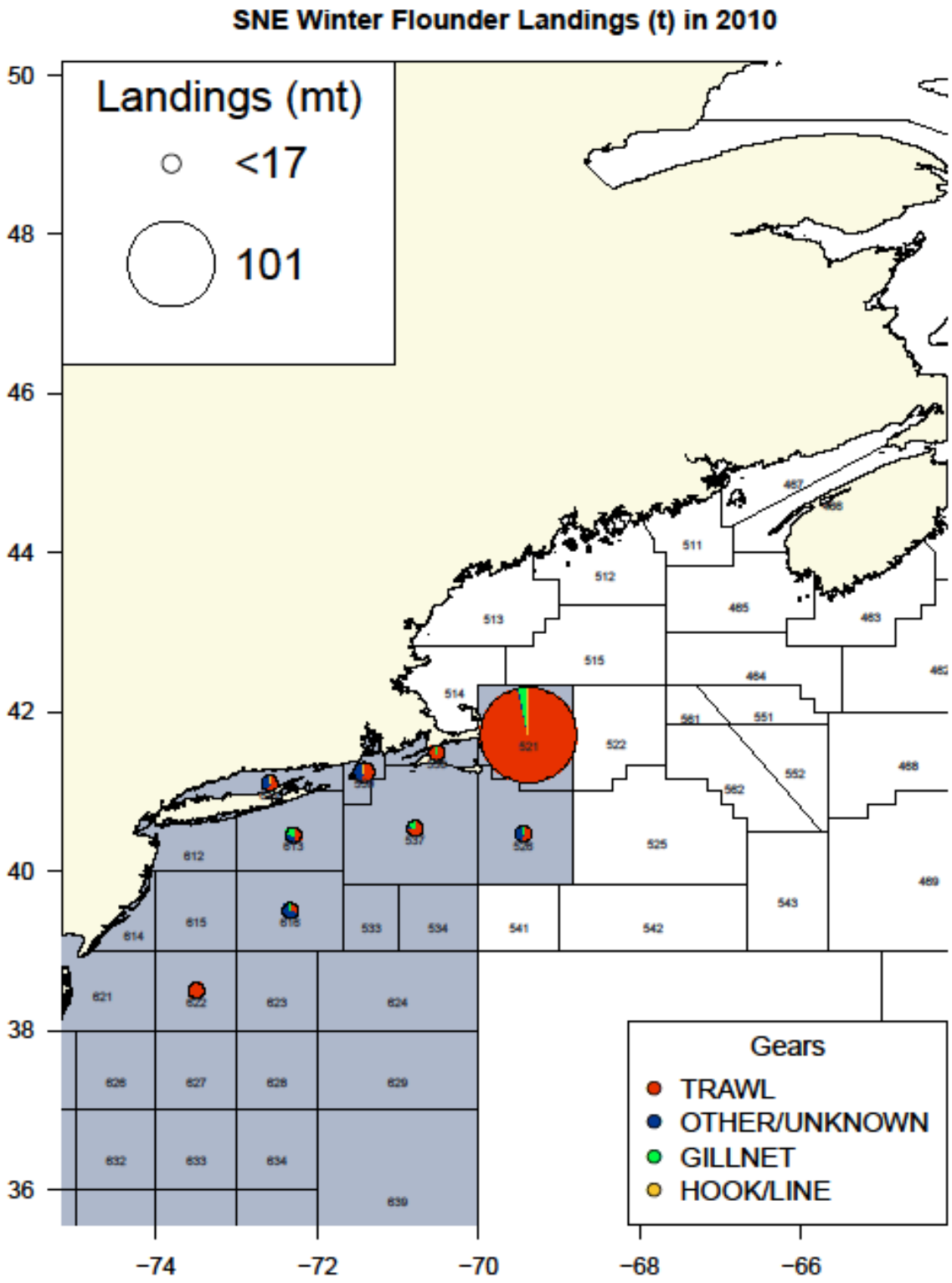


Figure A15. Commercial fishery landings of SNE/MA winter flounder in 2010 by statistical area.

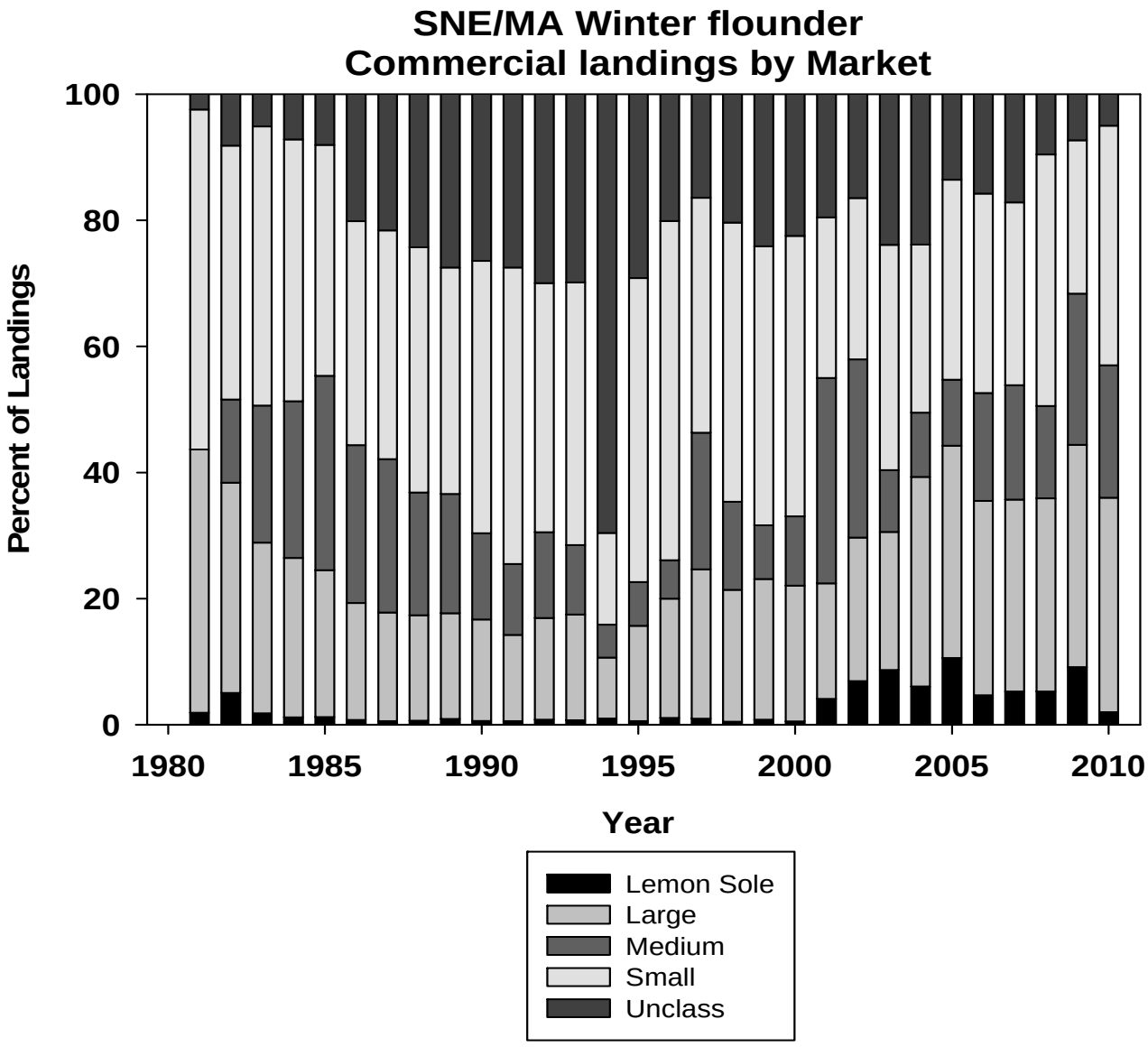


Figure A16. Commercial fishery landings of SNE/MA winter flounder by market category.

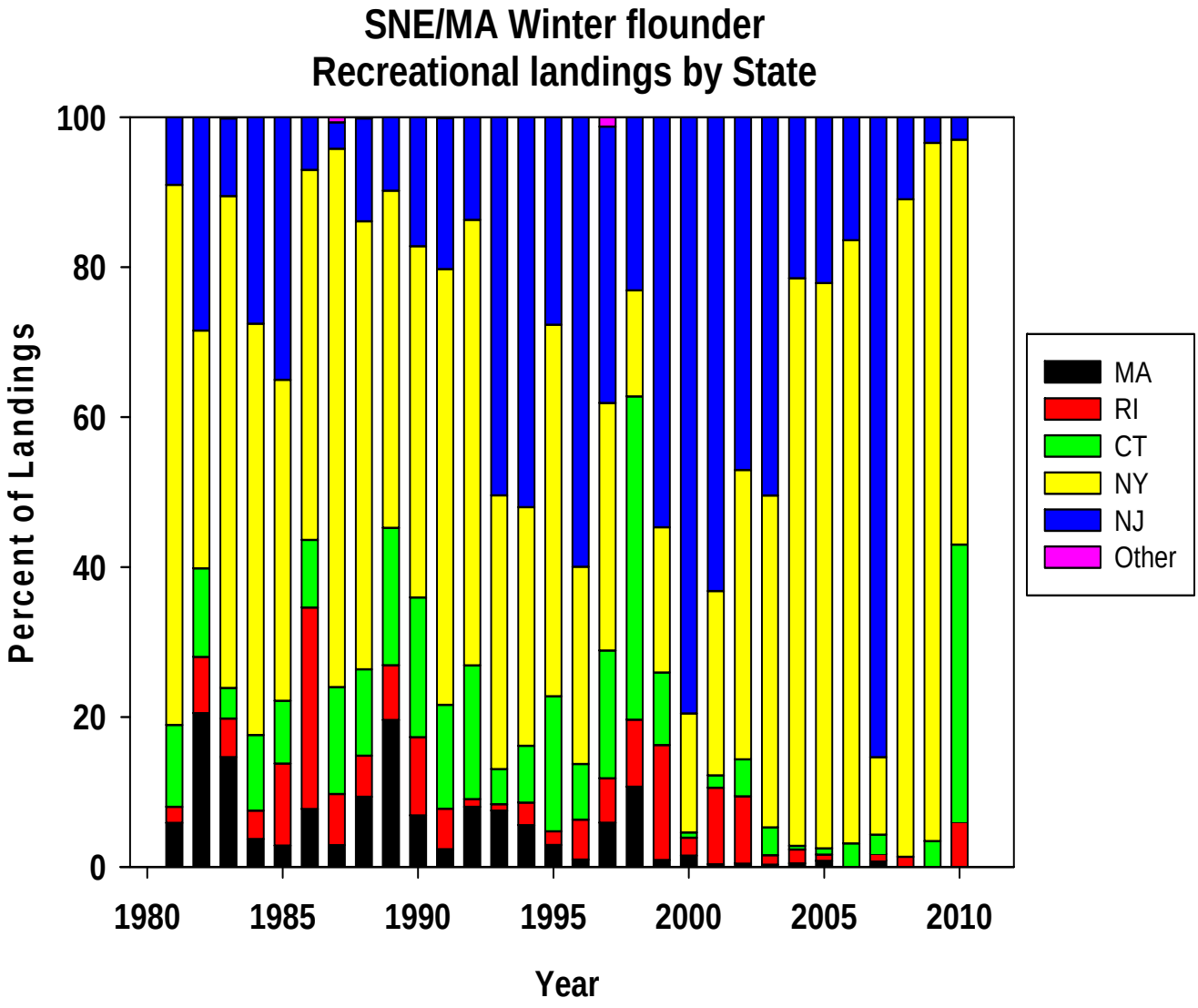


Figure A17. Recreational fishery landings of SNE/MA winter flounder by state.

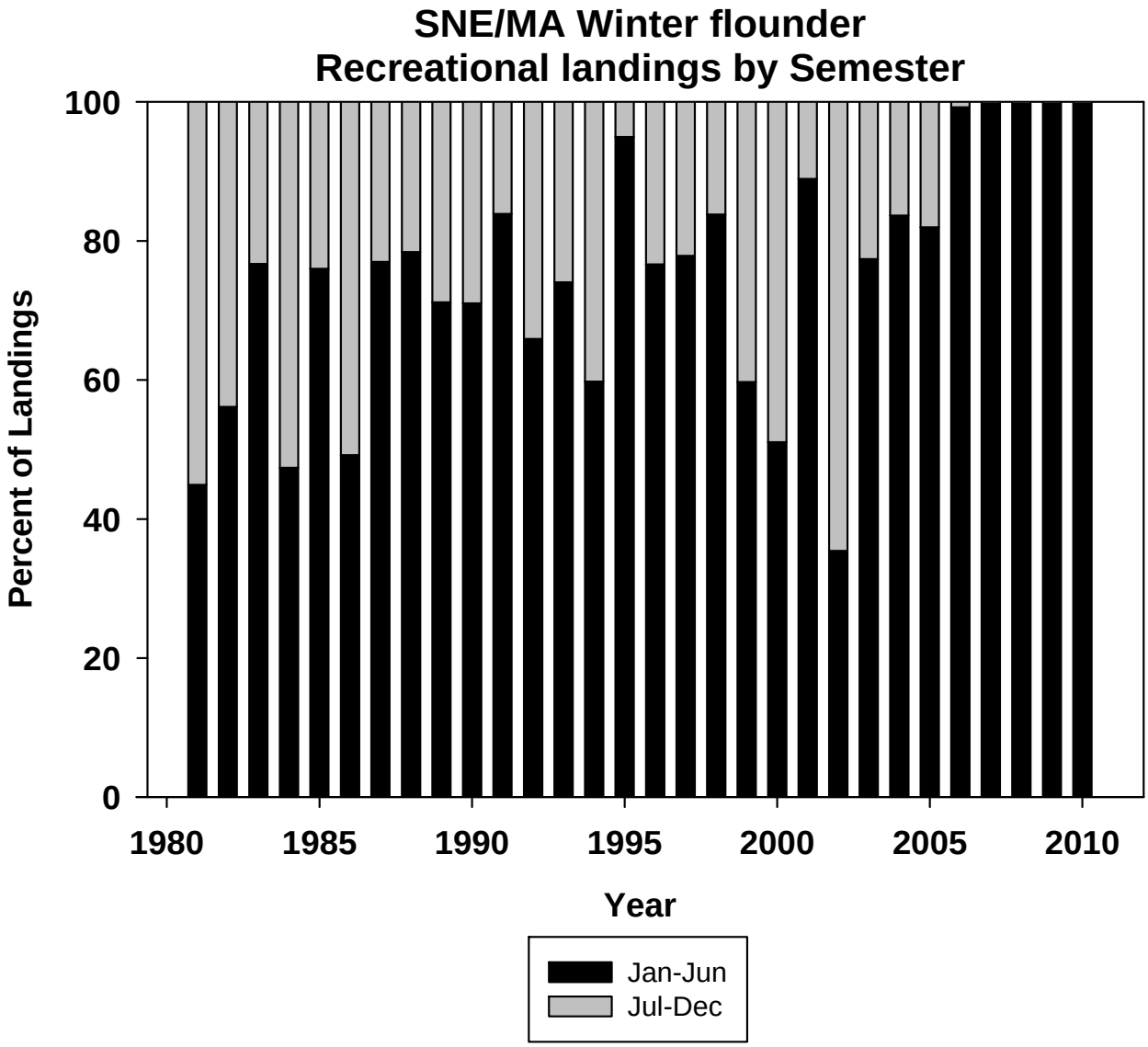


Figure A18. Recreational fishery landings of SNE/MA winter flounder by semester (half-year period).

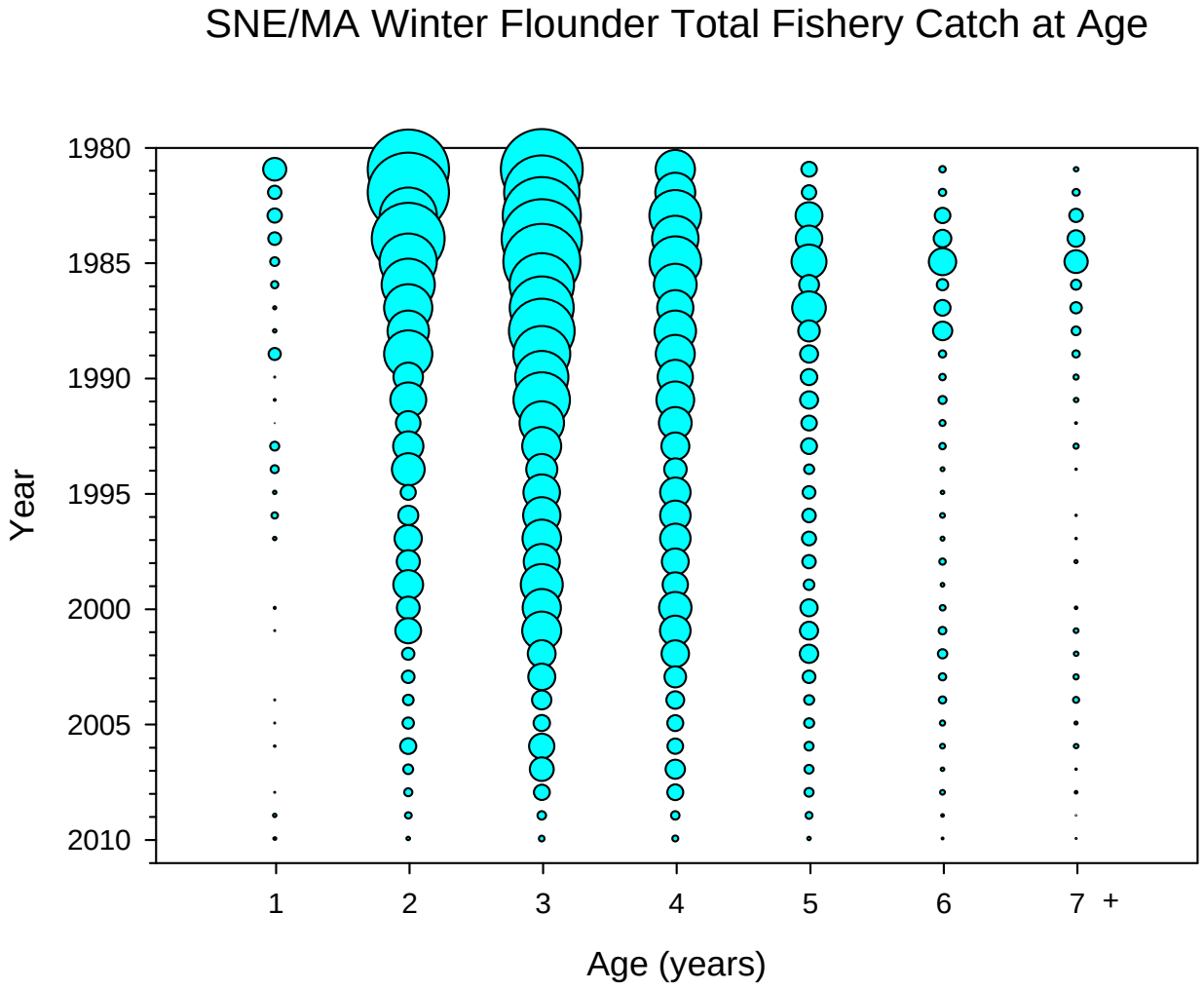


Figure A19. Age structure of the SNE/MA winter flounder catch.

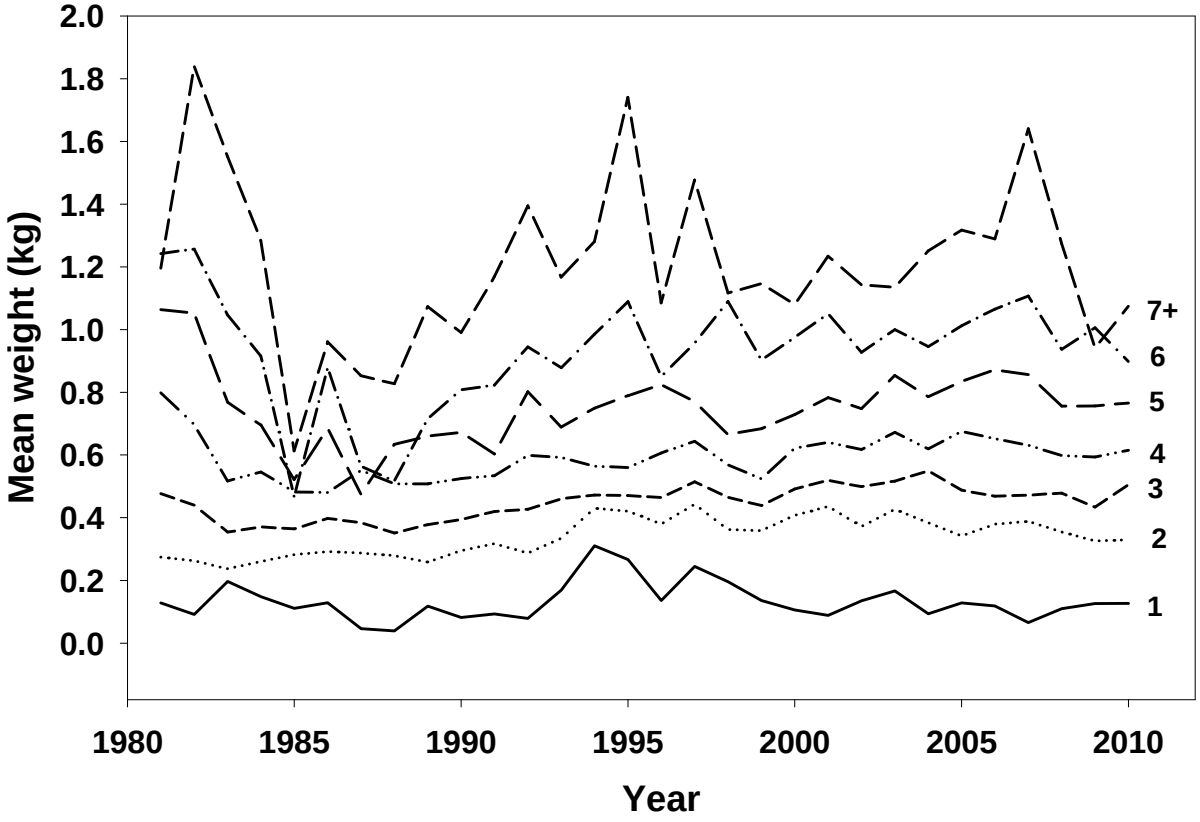


Figure A20. Trends in mean weight at age in the total catch of SNE/MA winter flounder.

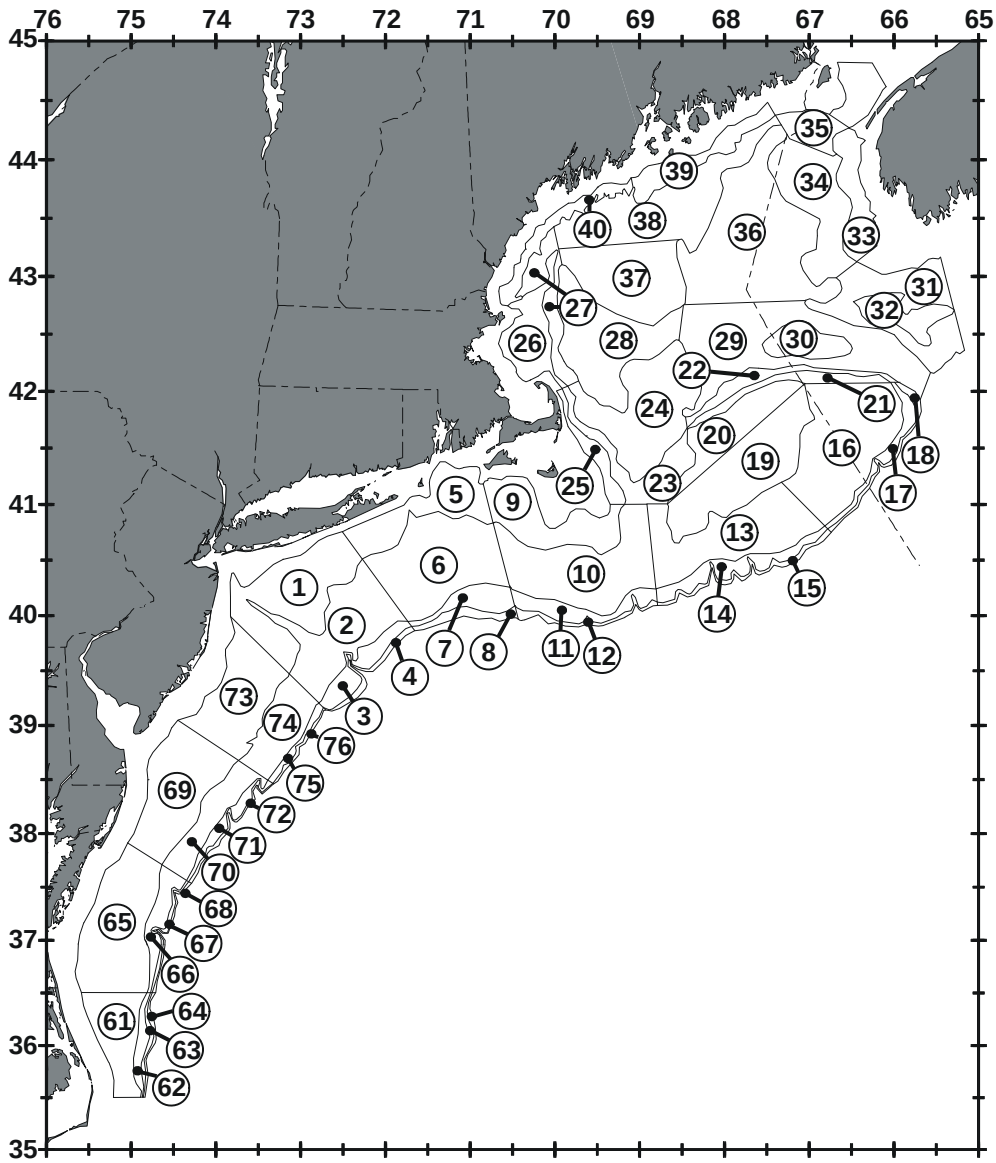


Figure A21. Offshore depth strata sampled during Northeast Fisheries Science Center bottom trawl research surveys.

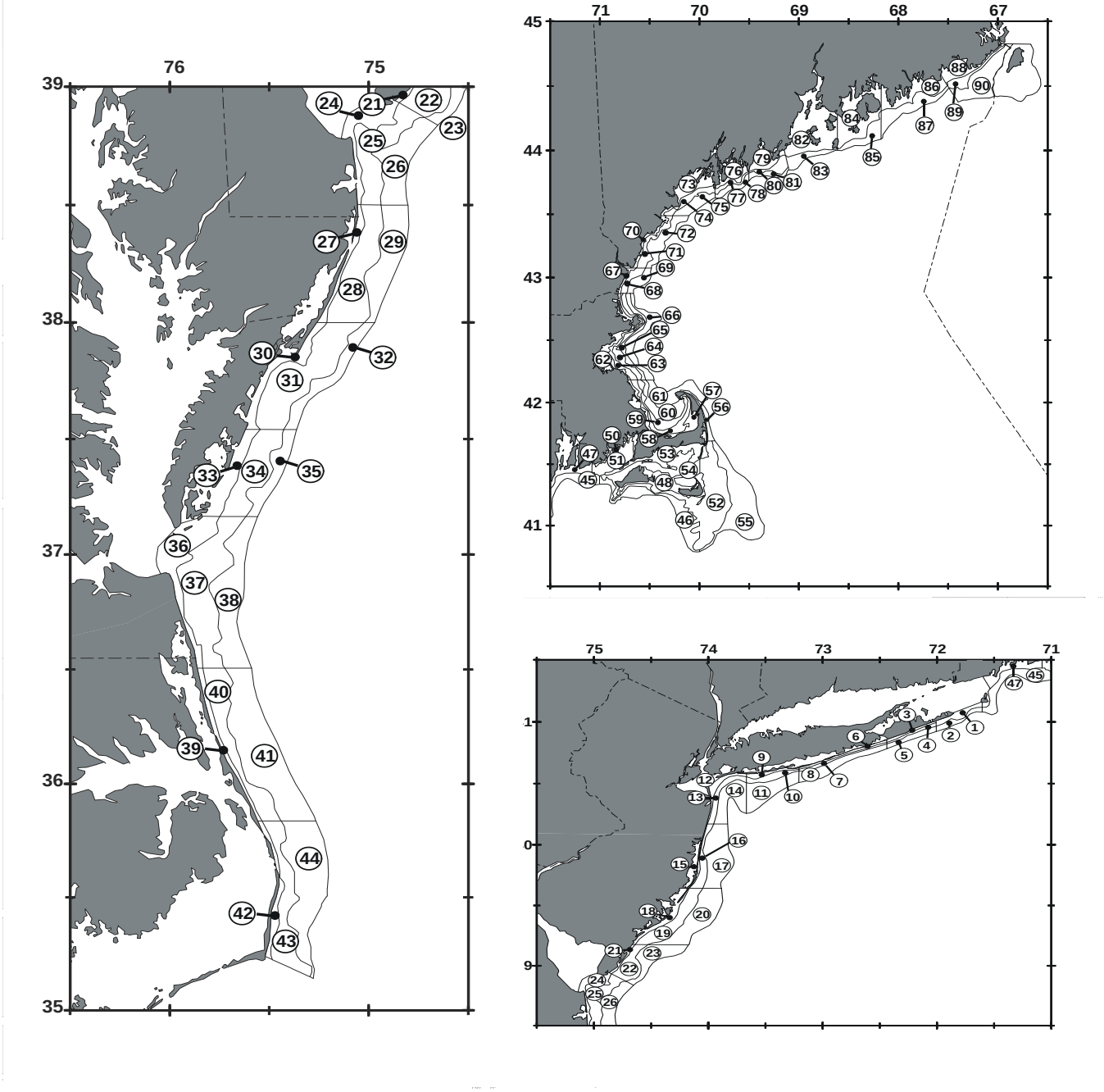


Figure A22. Inshore depth strata sampled during Northeast Fisheries Science Center bottom trawl research surveys.

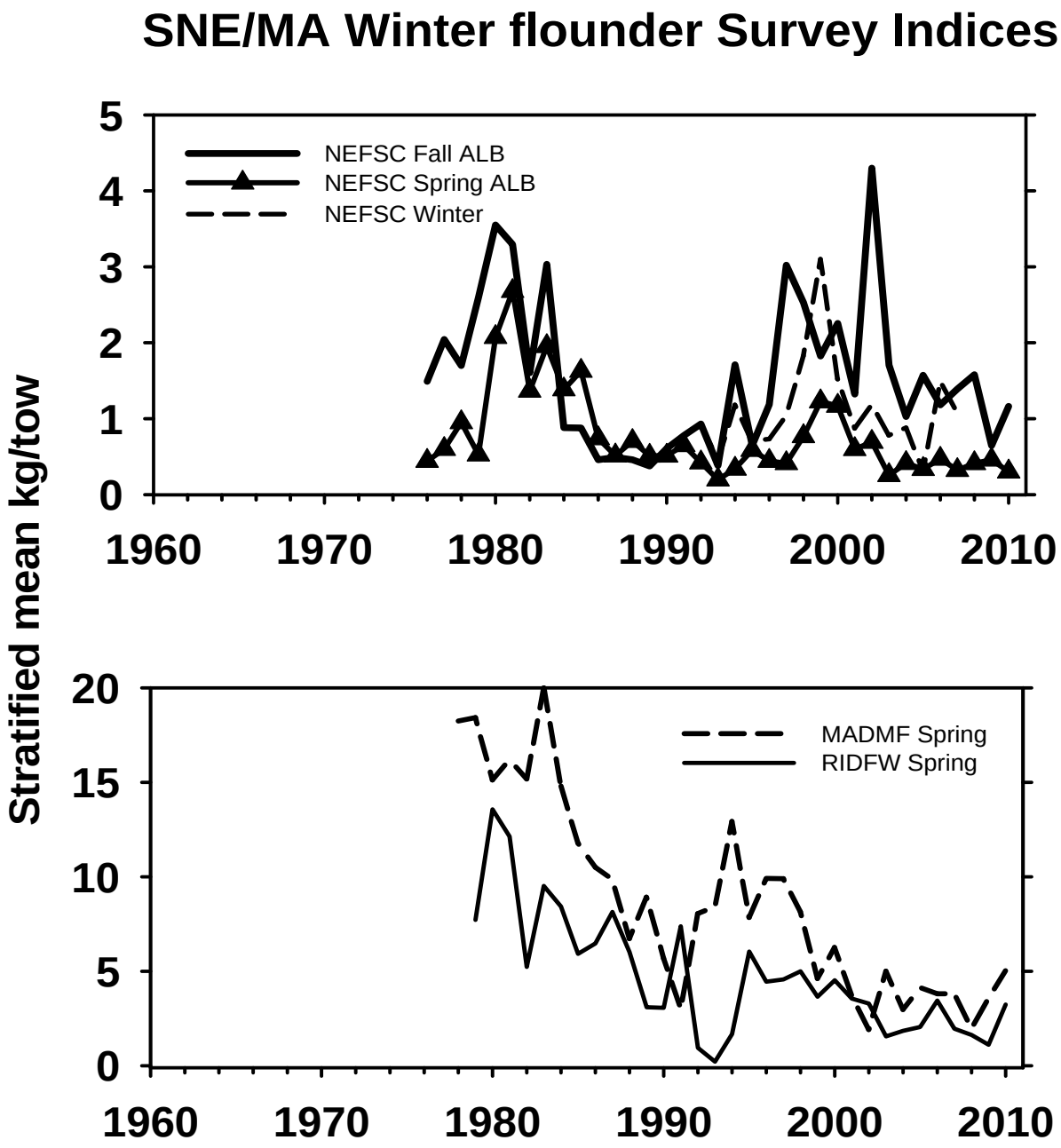


Figure A23. Trends in research survey indices for SNE/MA winter flounder.

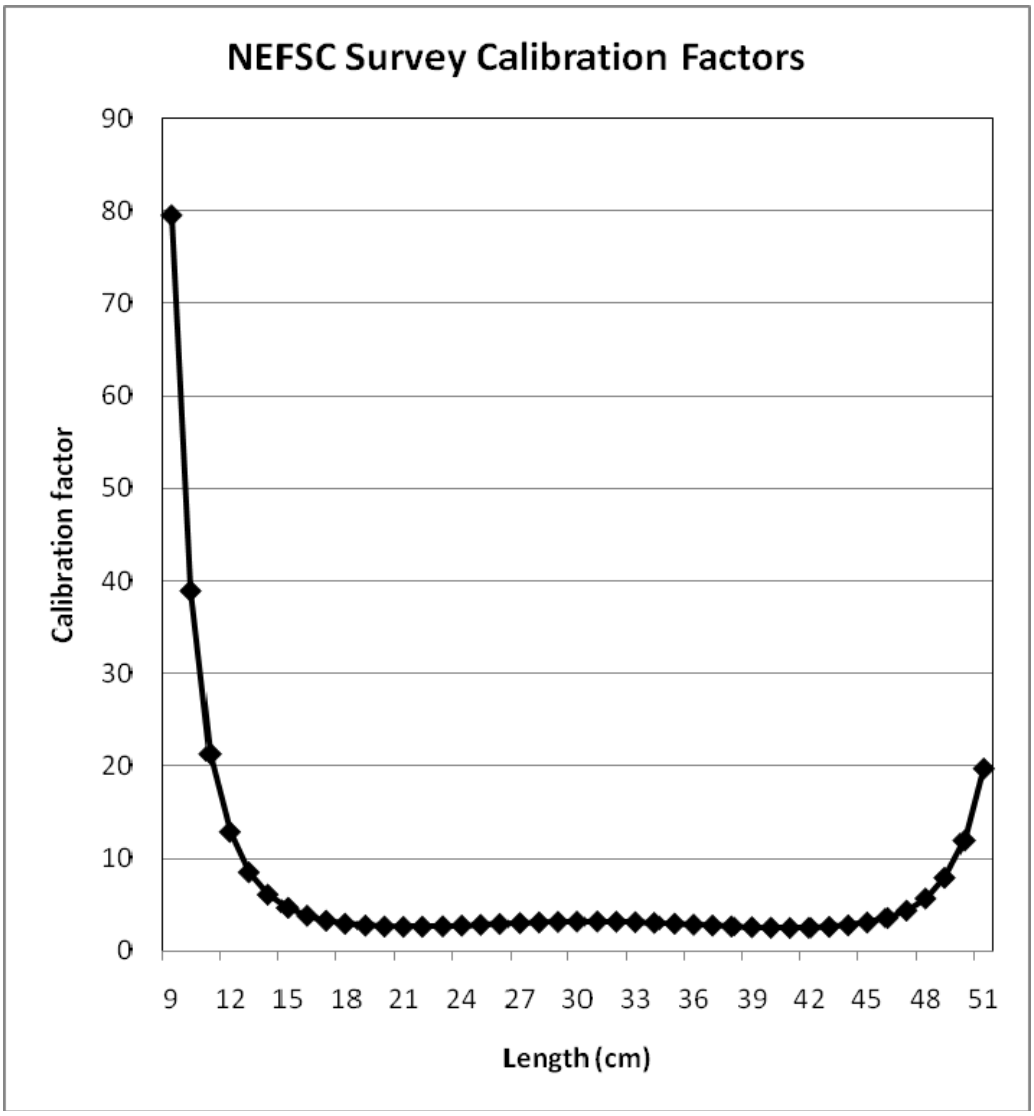


Figure A24. NEFSC trawl survey calibration factors at length for SNE/MA winter flounder.

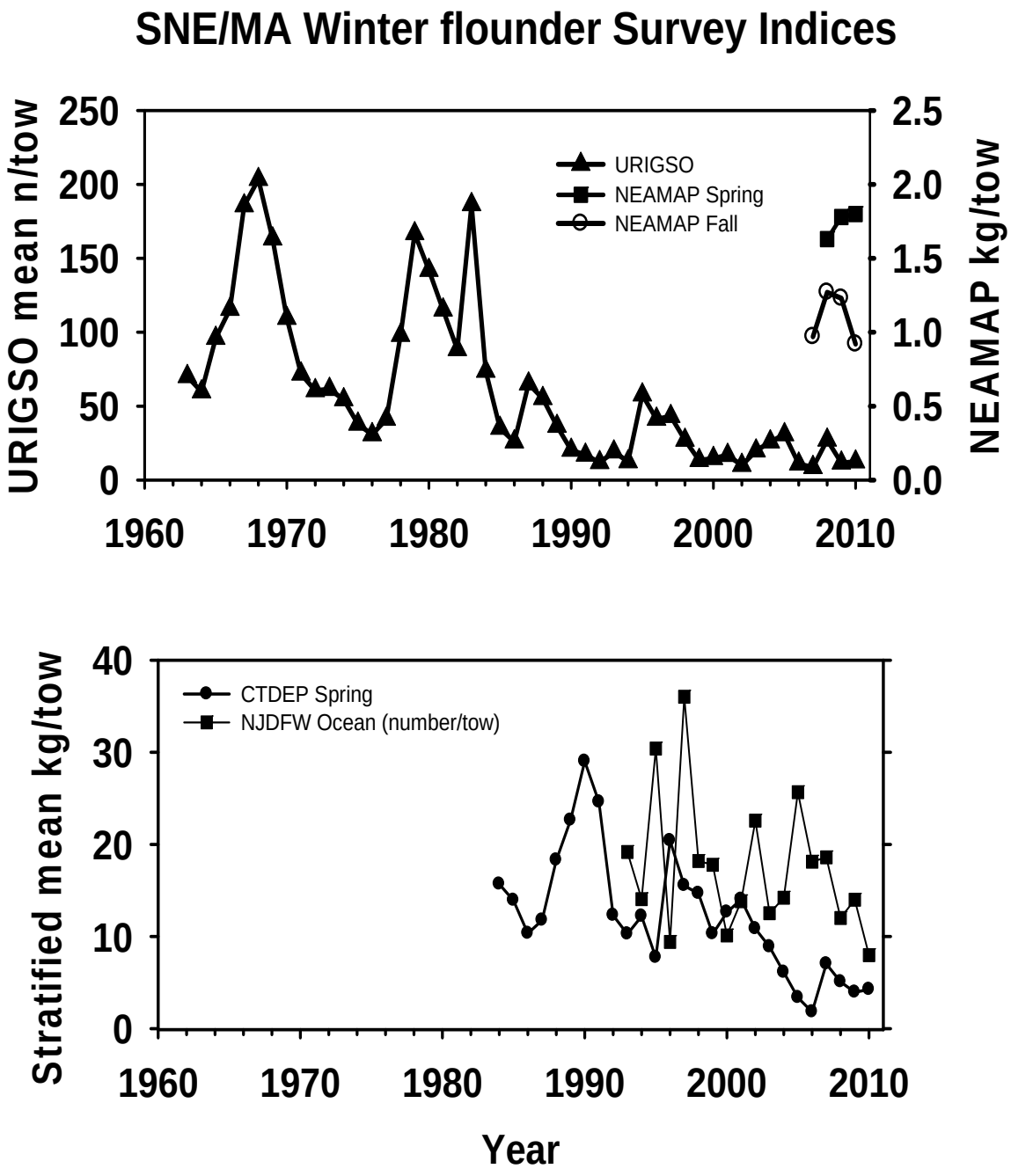


Figure A25. Trends in research survey indices for SNE/MA winter flounder.

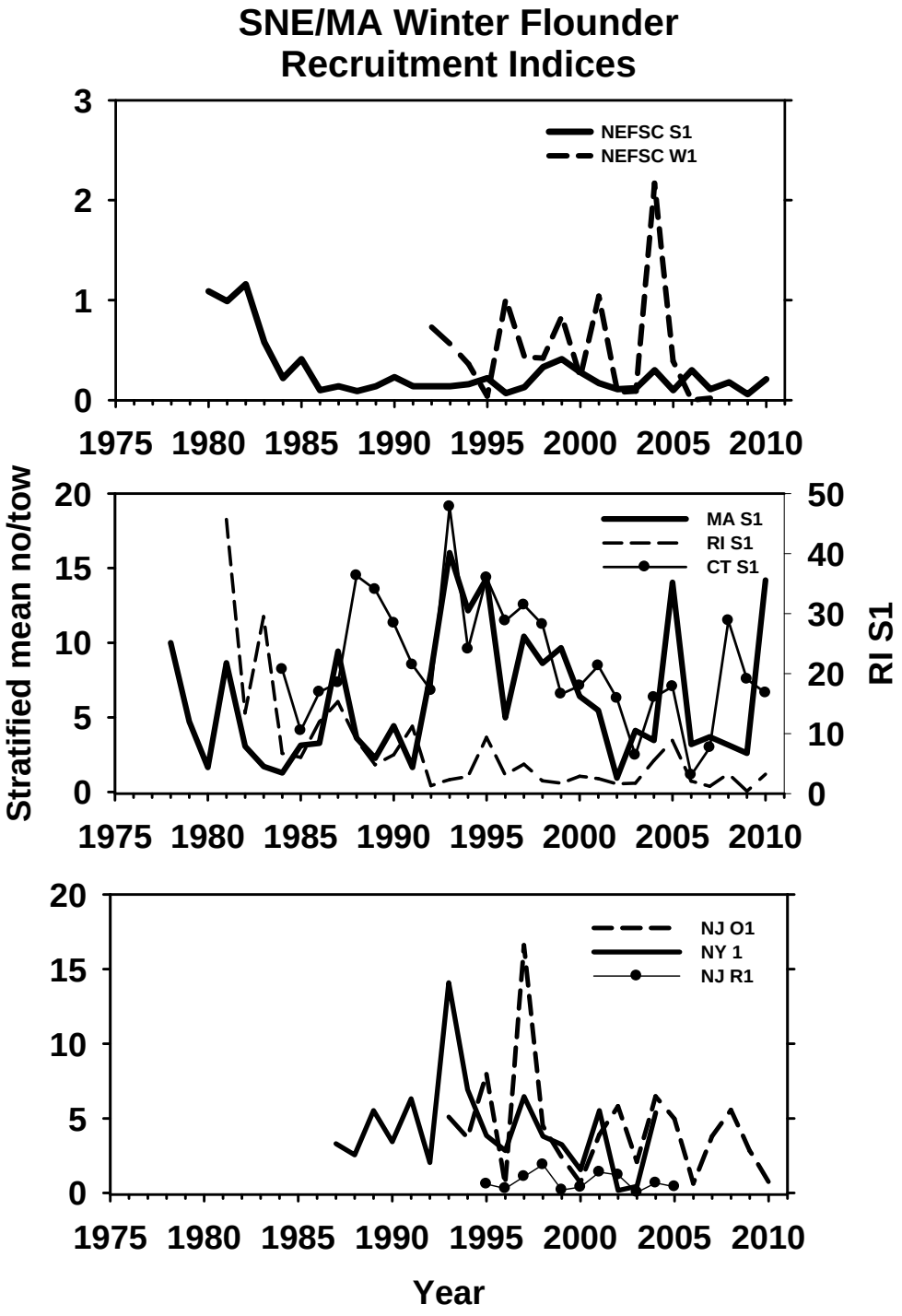


Figure A26. Trends in research survey recruitment indices for SNE/MA winter flounder.

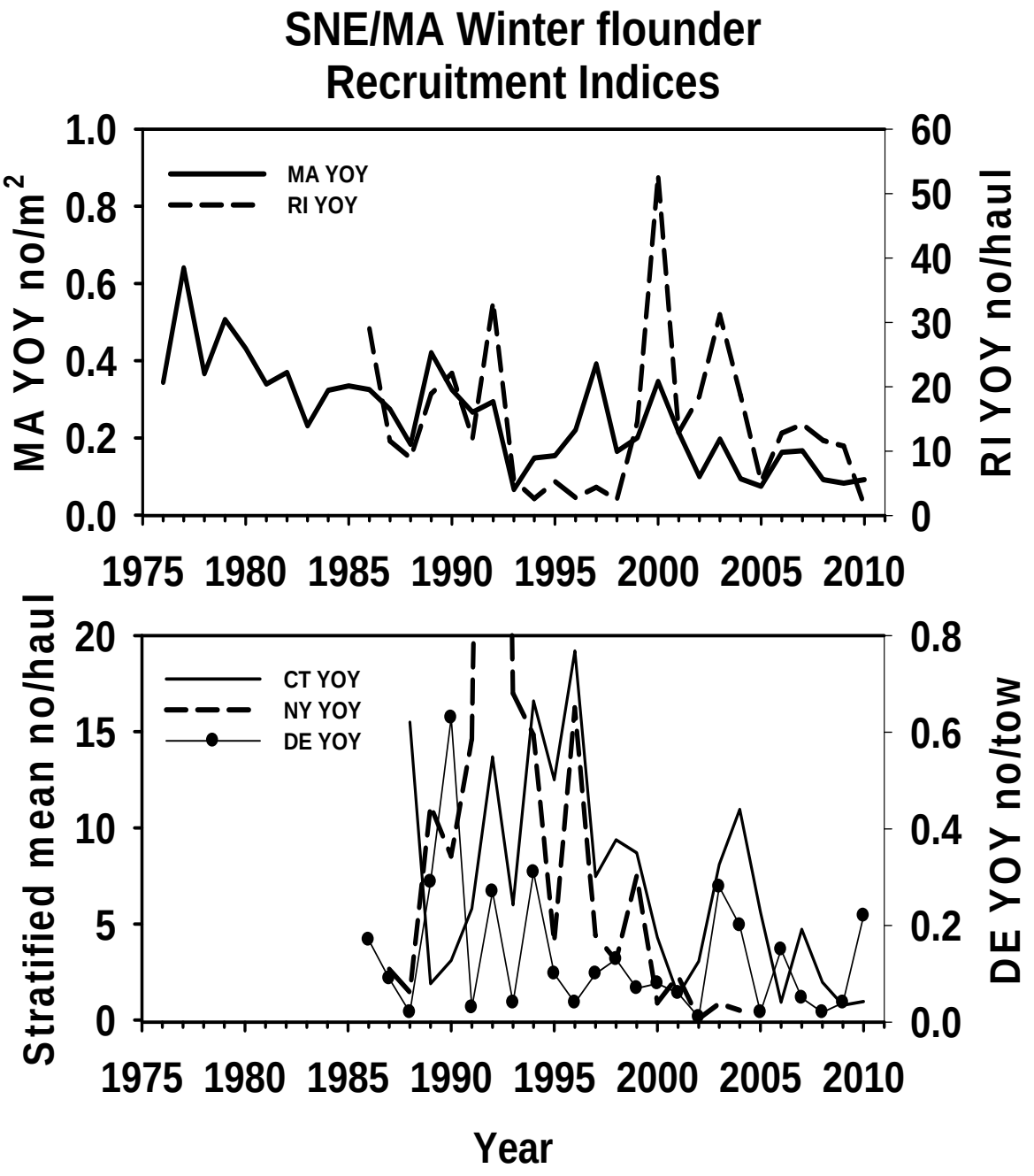


Figure A27. Trends in research survey recruitment indices for SNE/MA winter flounder.

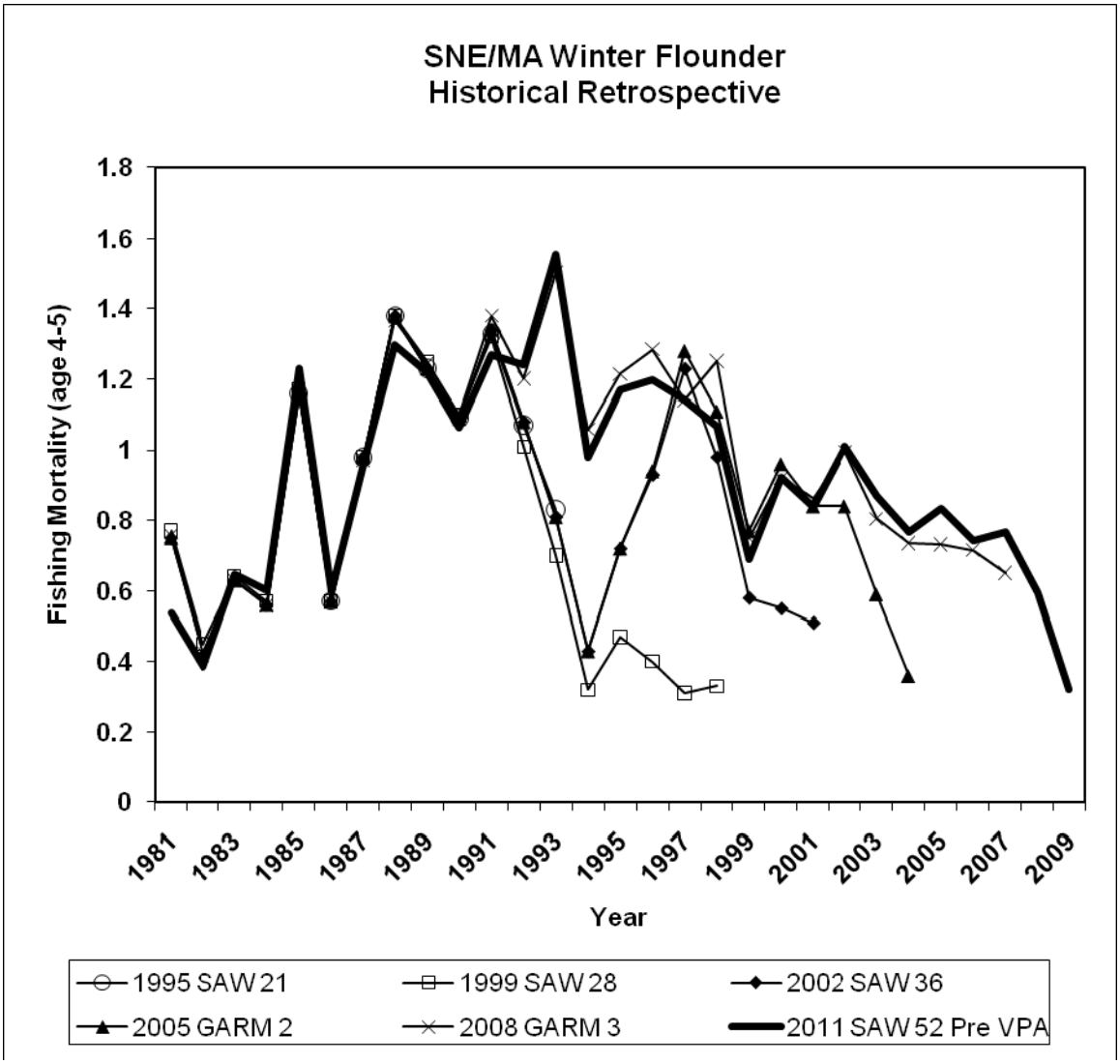


Figure A28. Comparison of estimates of Fishing Mortality (age 4-5) from previous SNE/MA stock assessments with estimates from a Preliminary ADAPT VPA model with M = 0.2.

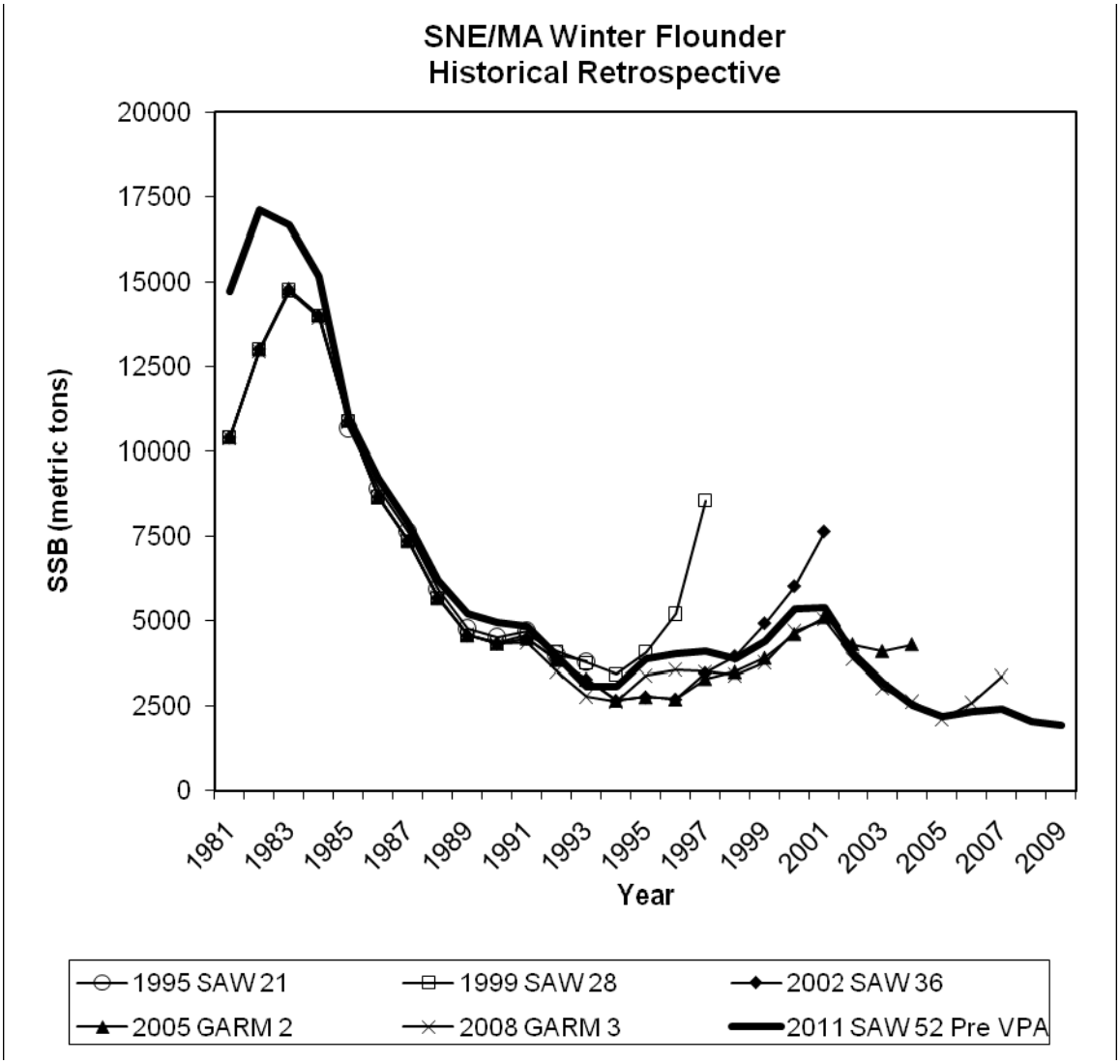


Figure A29. Comparison of estimates of Spawning Stock Biomass (SSB; metric tons) from previous SNE/MA stock assessments with estimates from a Preliminary ADAPT VPA model with M = 0.2.

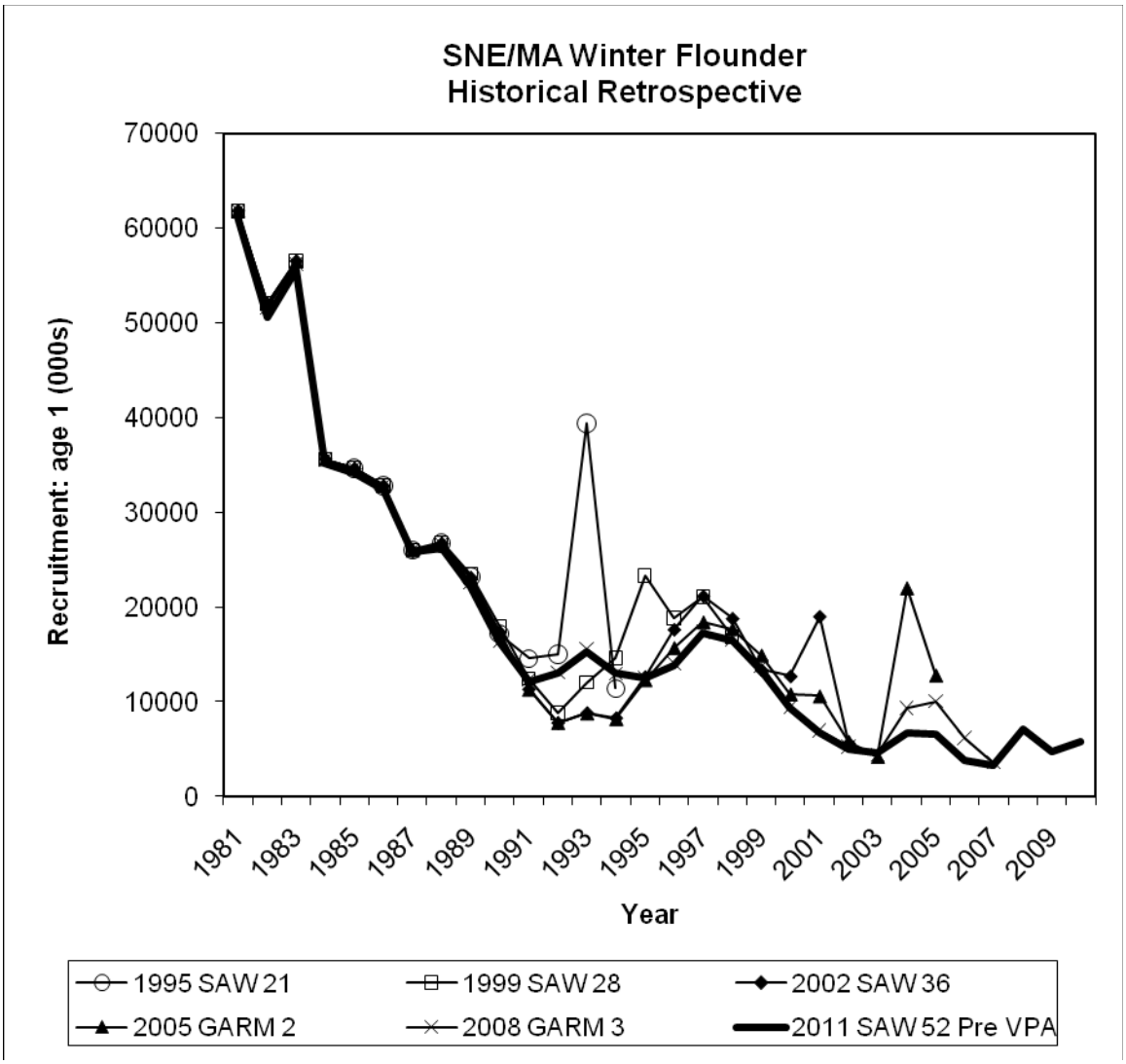


Figure A30. Comparison of estimates of Recruitment at age 1 (000s) from previous SNE/MA stock assessments with estimates from a Preliminary ADAPT VPA model with M = 0.2.

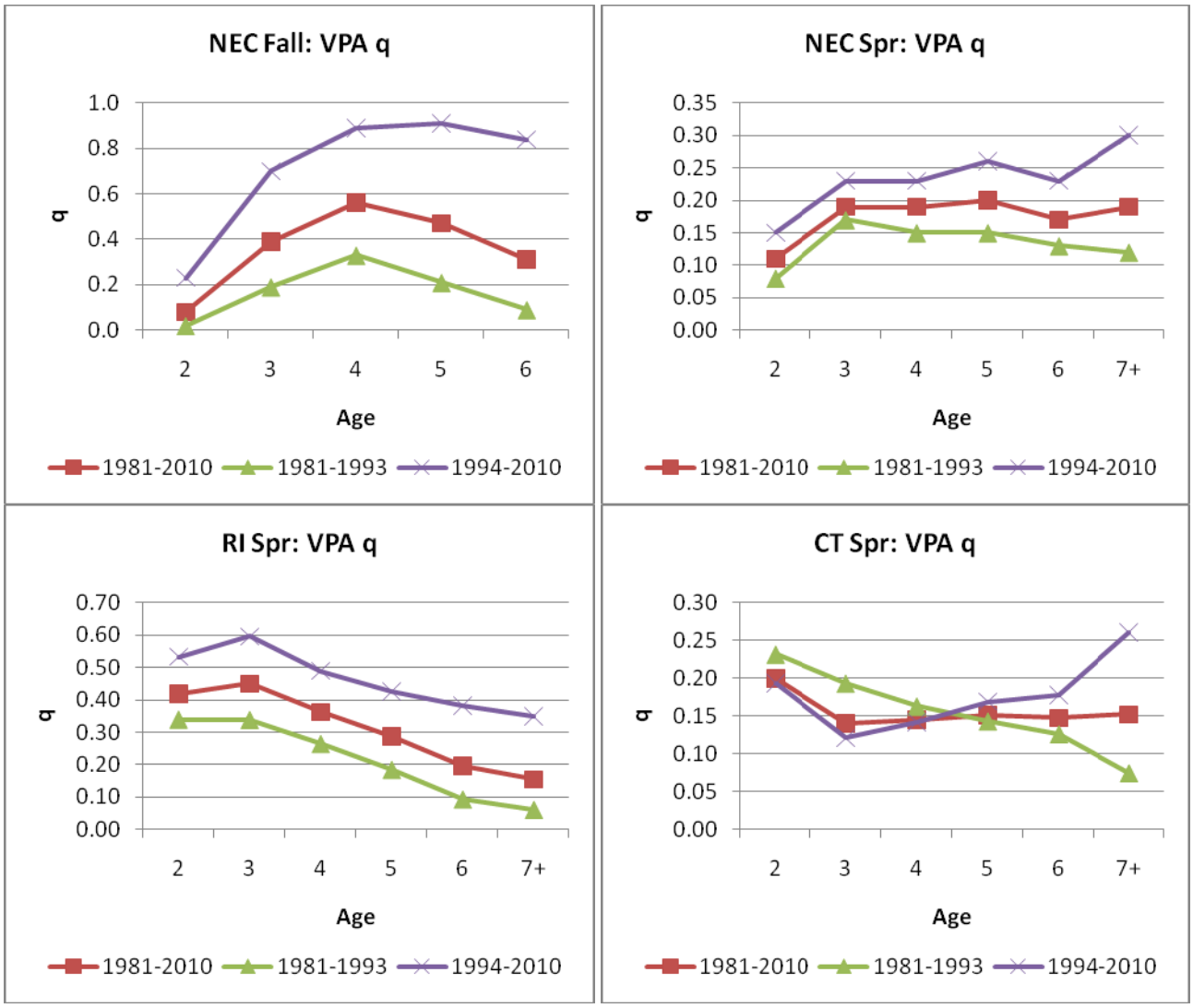


Figure A31. Patterns in survey catchability at age (*q*) from Preliminary SNE/MA winter flounder ADAPT BASE (1981-2010) and SPLIT (1981-1993; 1994-2010) model runs with M = 0.2.

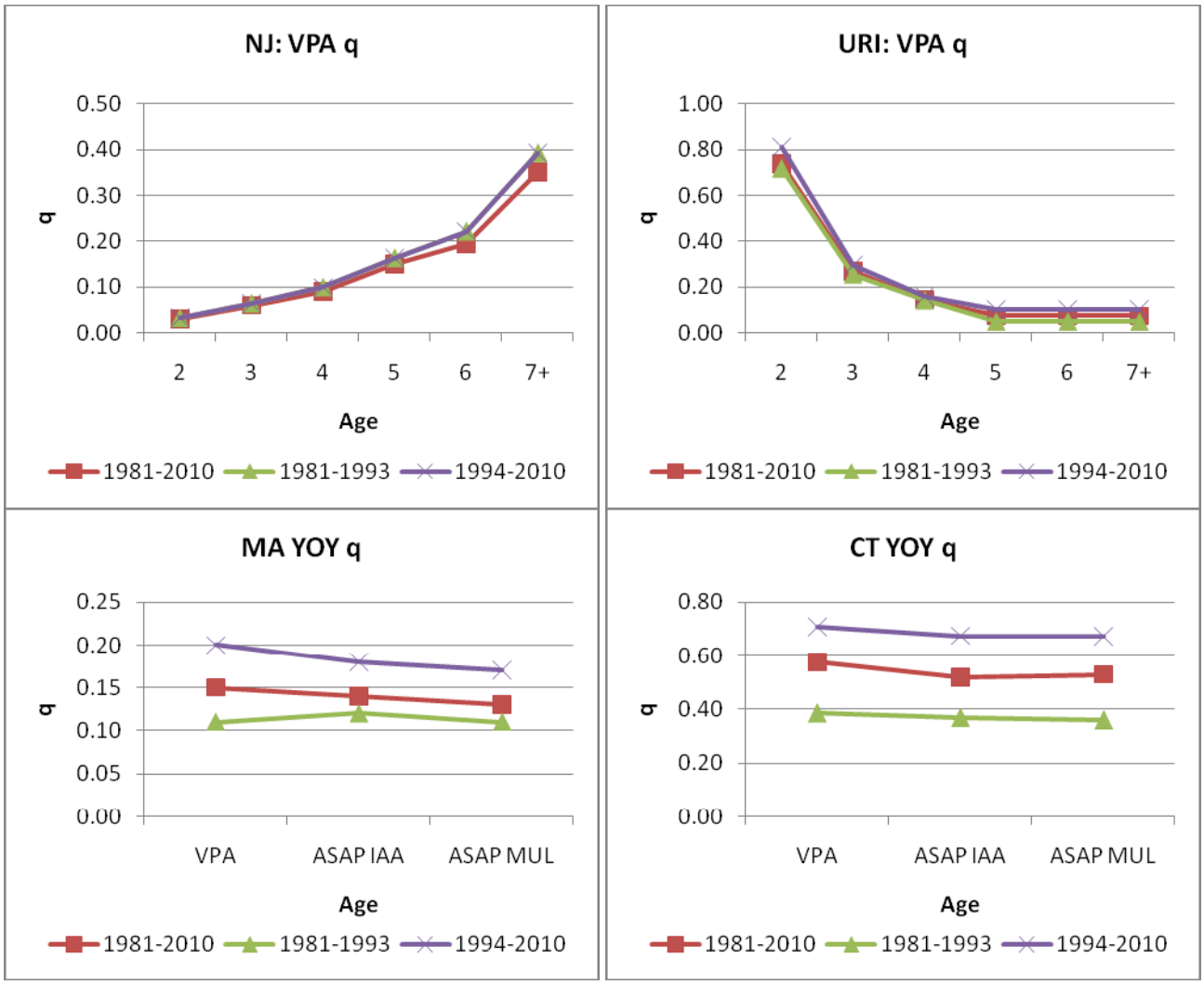


Figure A32. Patterns in survey catchability at age (*q*) from Preliminary SNE/MA winter flounder ADAPT BASE (1981-2010) and SPLIT (1981-1993; 1994-2010) model runs with M = 0.2.

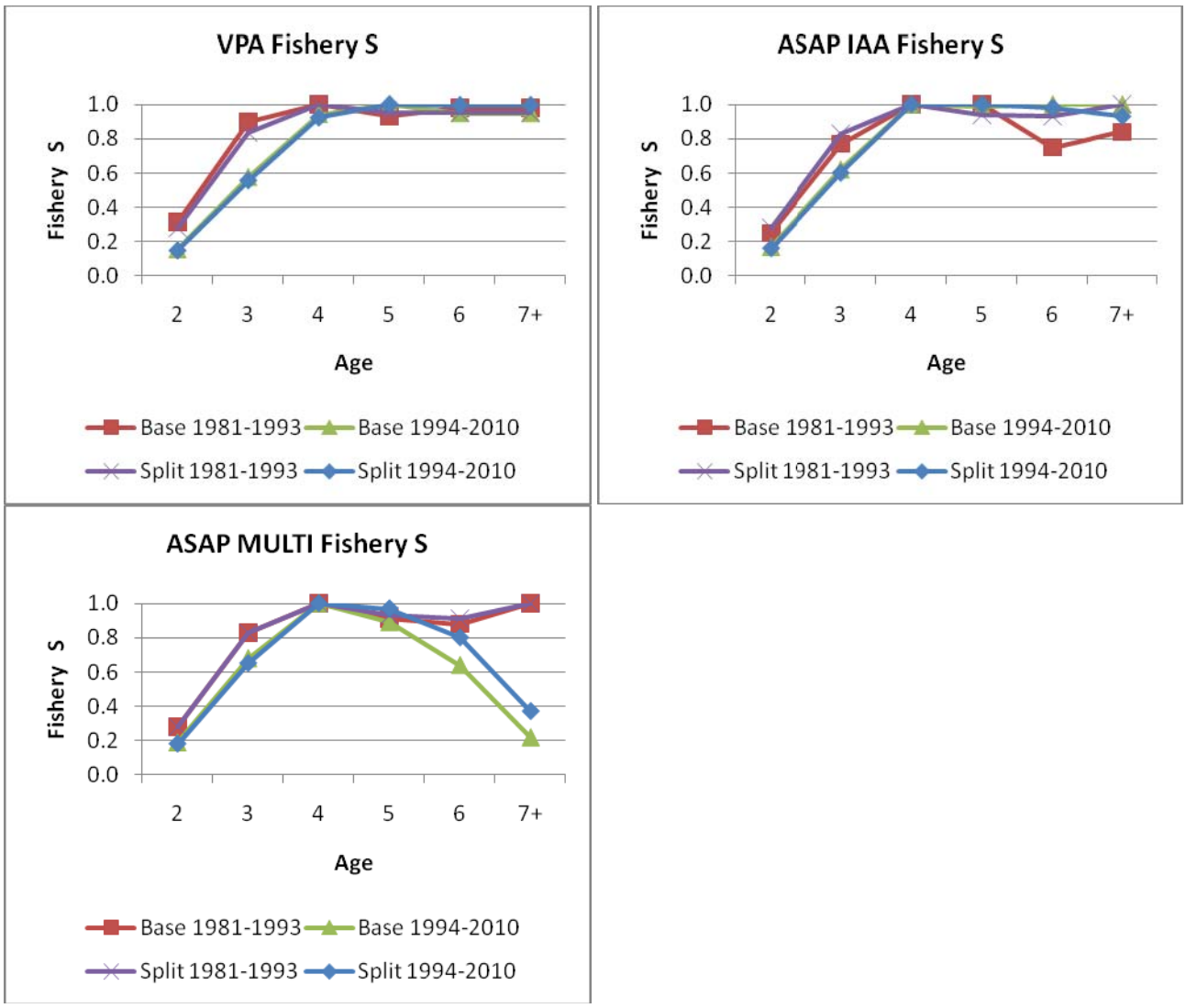


Figure A33. Patterns in fishery selectivity from Preliminary SNE/MA winter flounder ADAPT VPA, ASAP IAA, and ASAP MULTI model runs with M = 0.2.

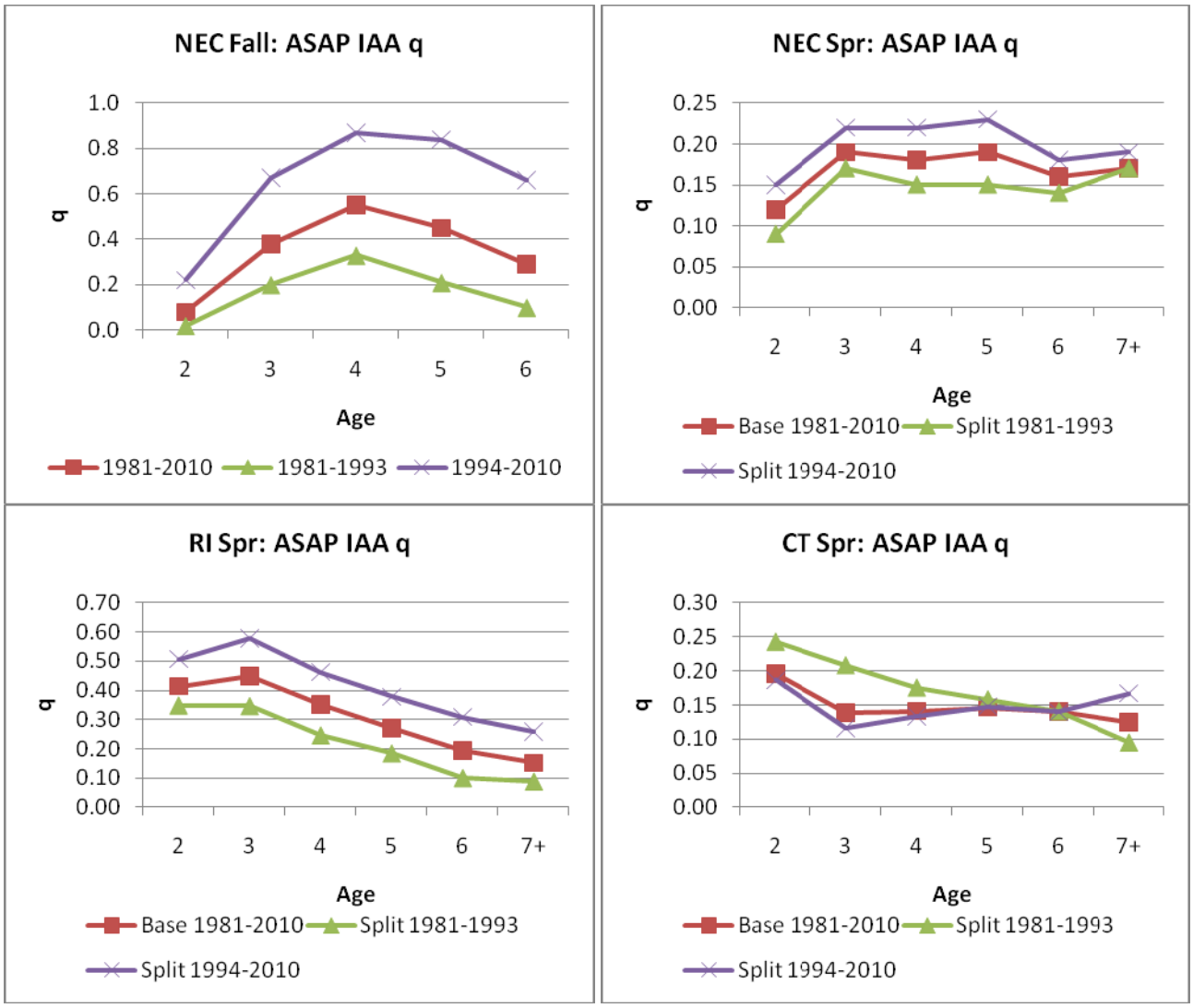


Figure A34. Patterns in survey catchability at age (*q*) from Preliminary SNE/MA winter flounder ASAP IAA BASE and SPLIT model runs with M = 0.2.

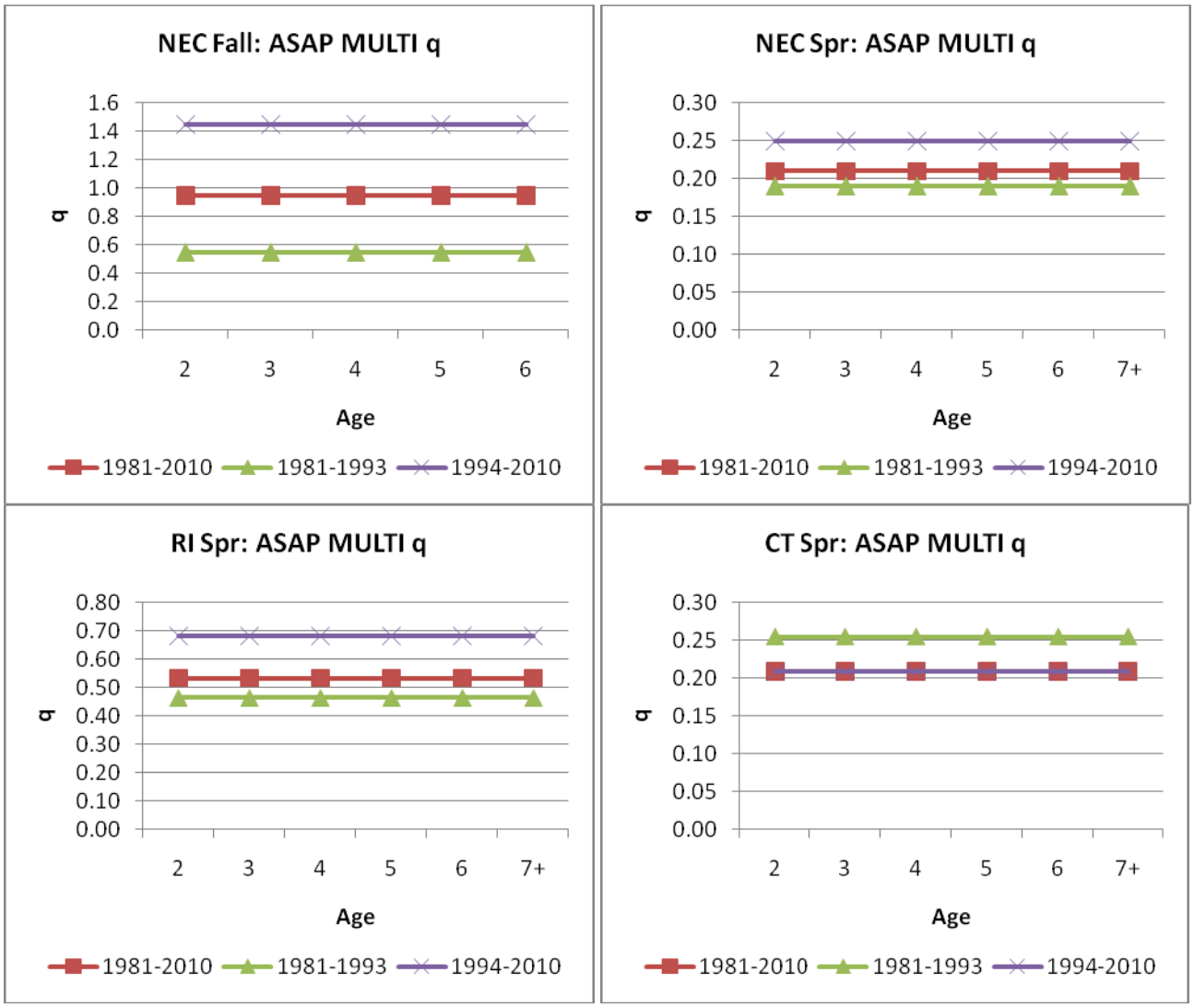


Figure A35. Patterns in aggregate survey catchability (*q*) from Preliminary SNE/MA winter flounder ASAP MULTI BASE and SPLIT model runs with M = 0.2.

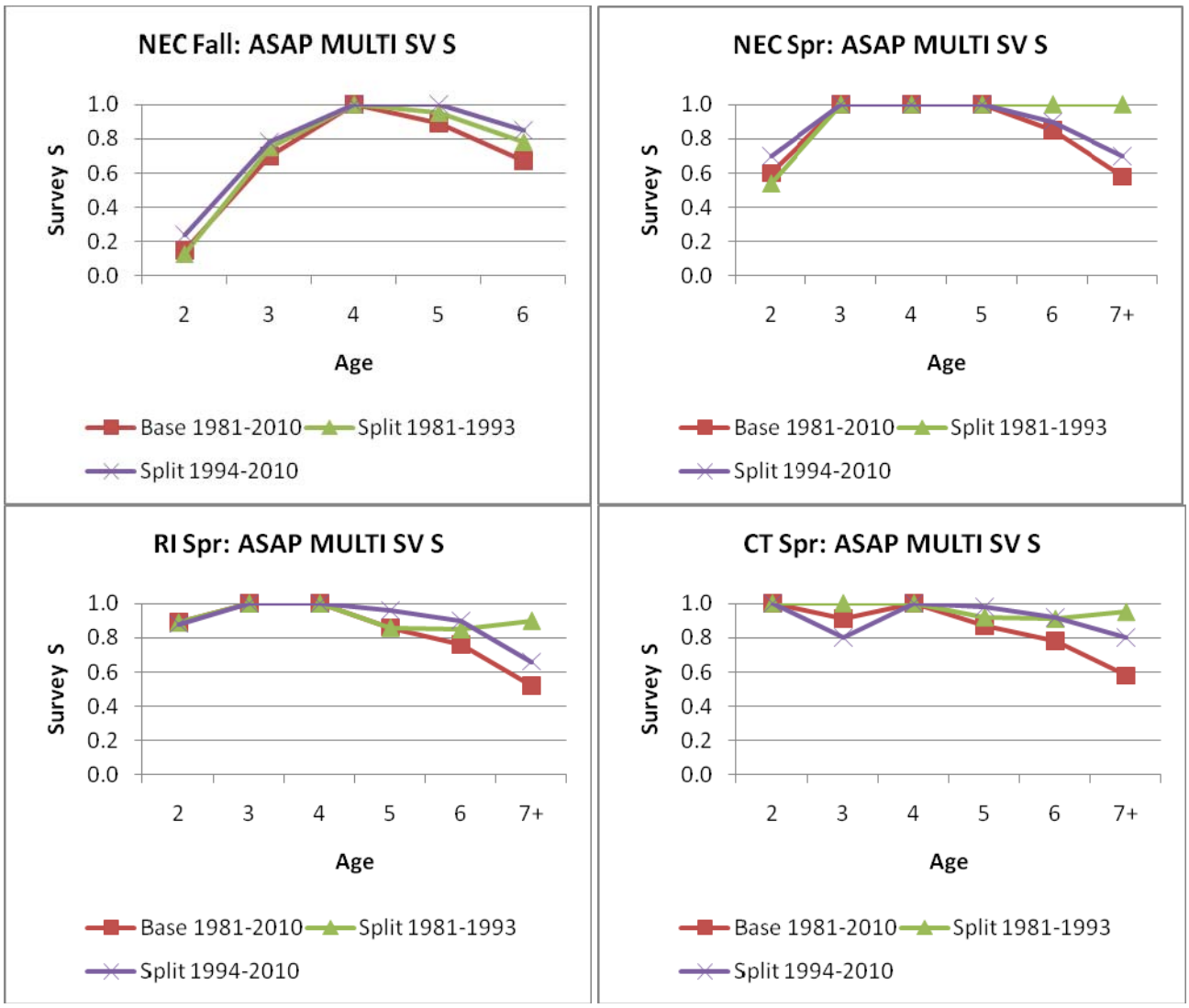


Figure A36. Patterns in survey selectivity from Preliminary SNE/MA winter flounder ASAP MULTI BASE and SPLIT model runs with M = 0.2.

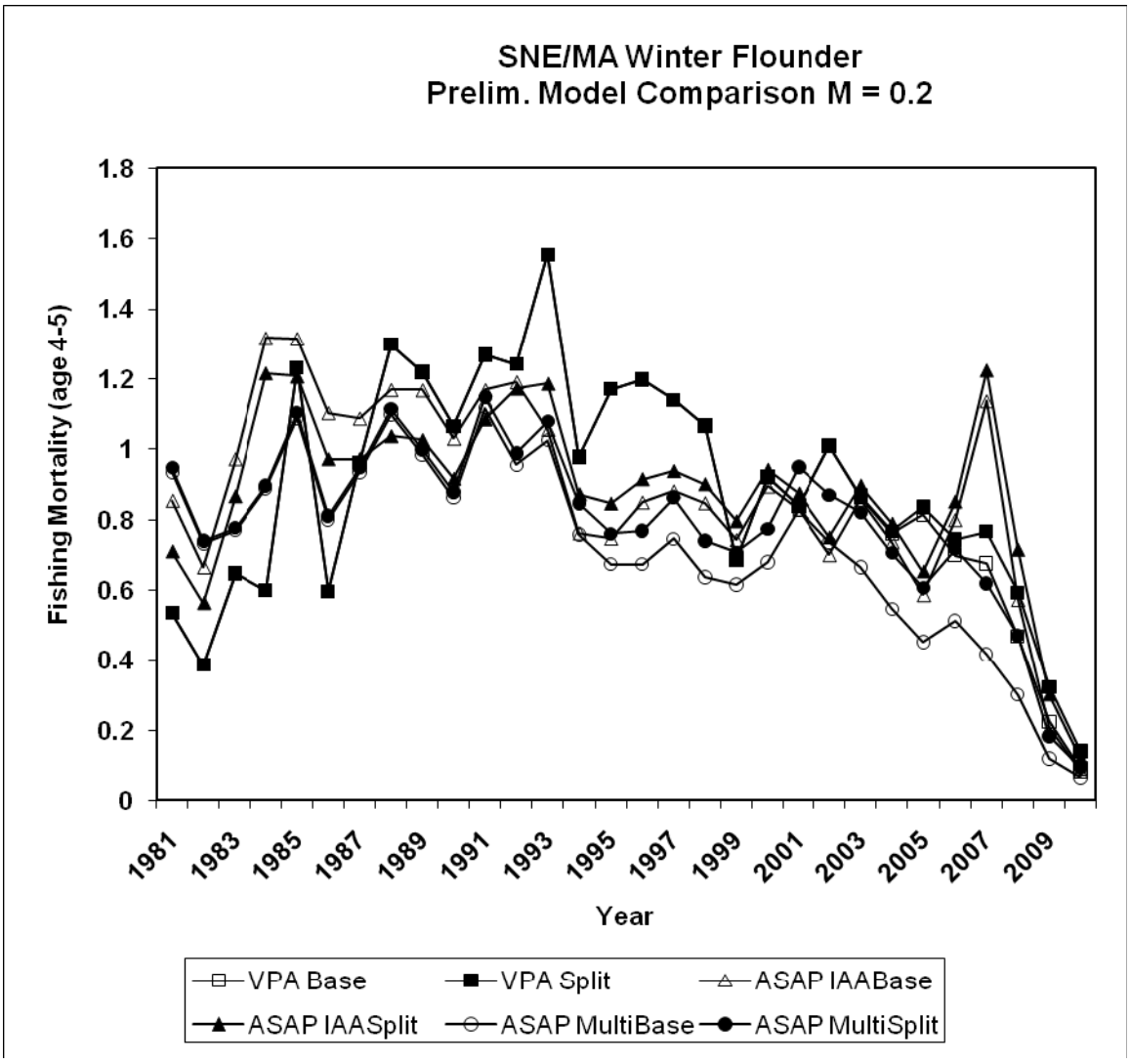


Figure A37. Estimates of Fishing Mortality (age 4-5) from Preliminary VPA and ASAP models with M = 0.2.

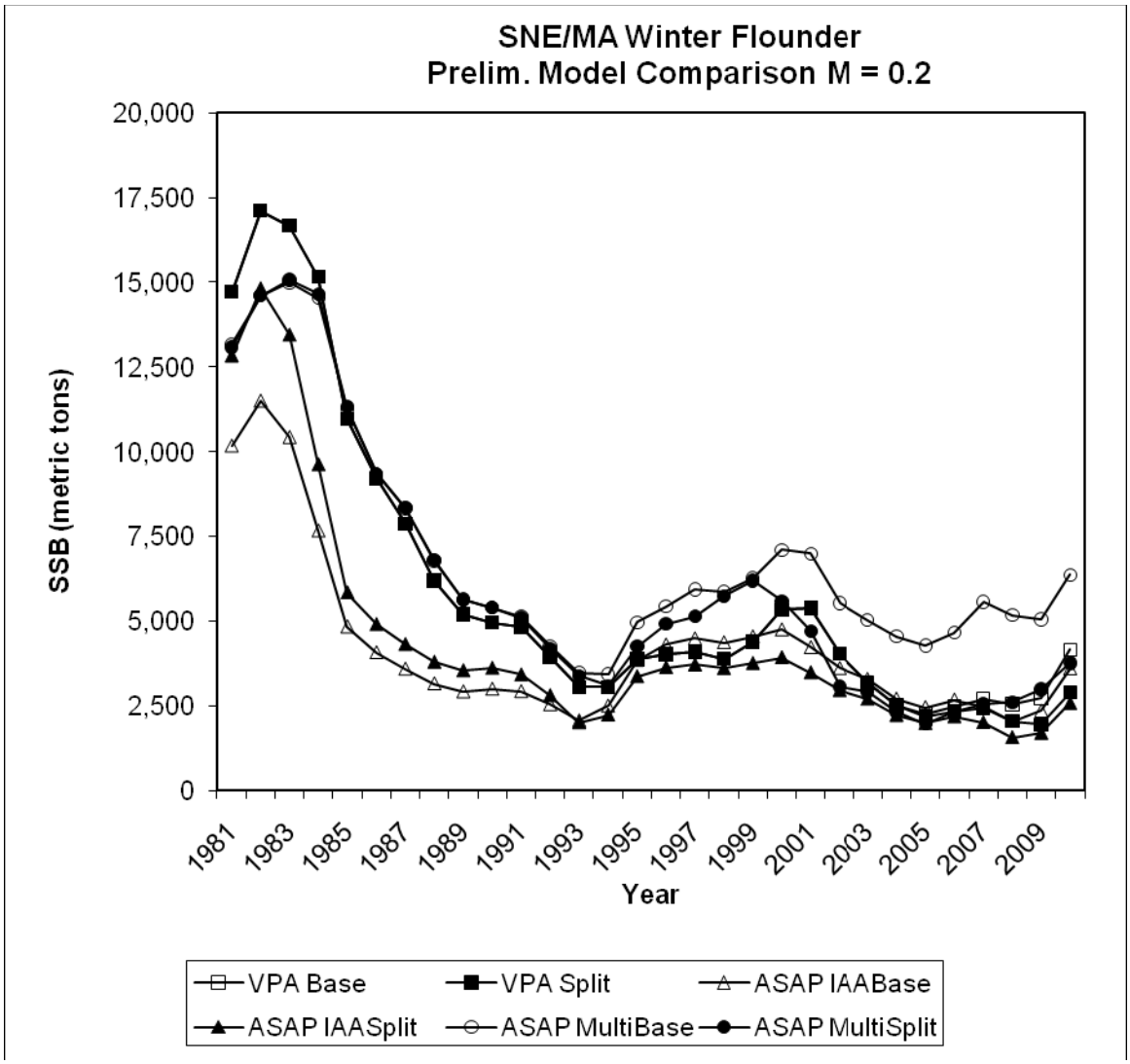


Figure A38. Estimates of Spawning Stock Biomass (SSB) from Preliminary VPA and ASAP models with M = 0.2.

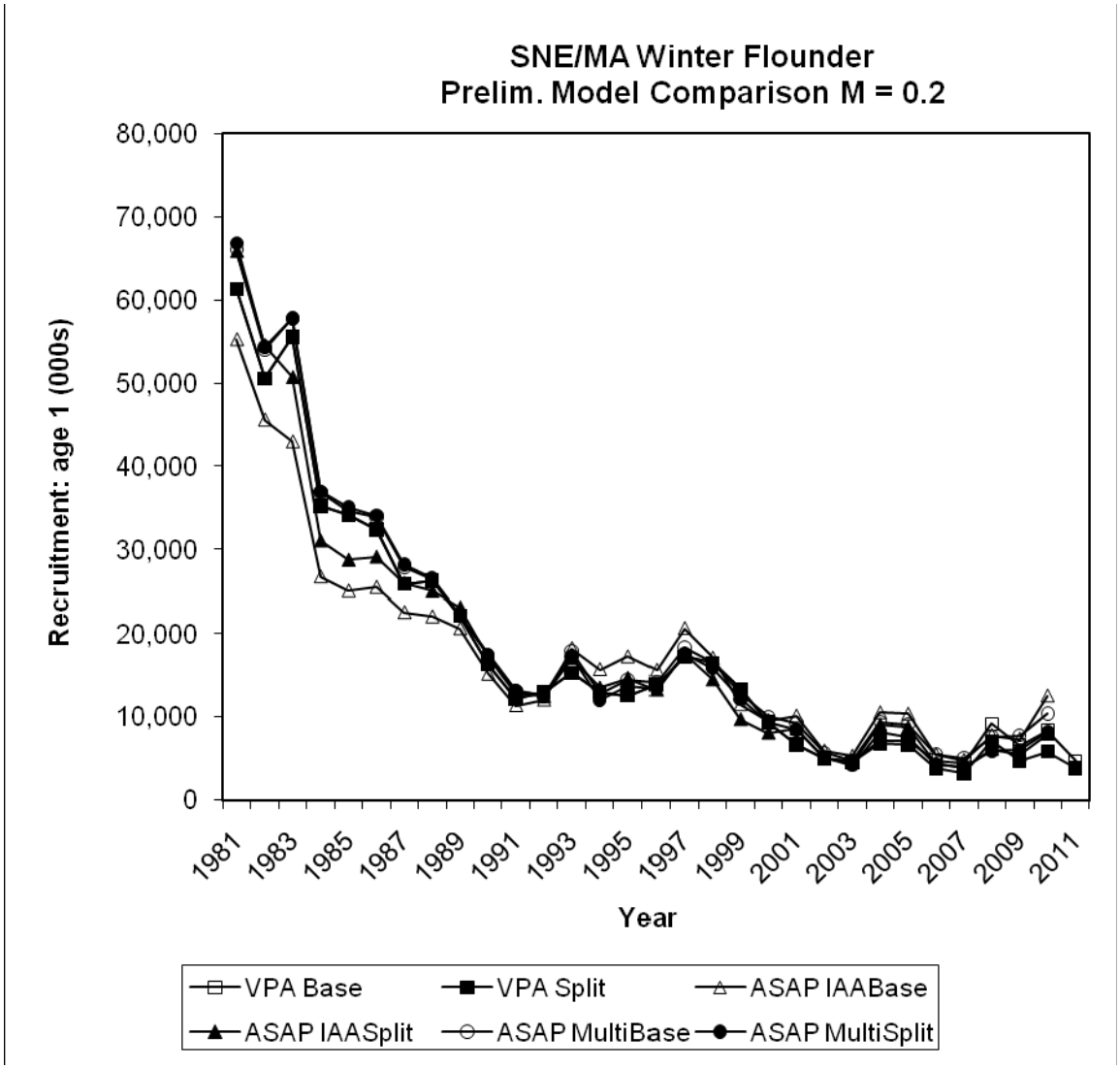


Figure A39. Estimates of Recruitment at age 1 (000s) from Preliminary VPA and ASAP models with M = 0.2.

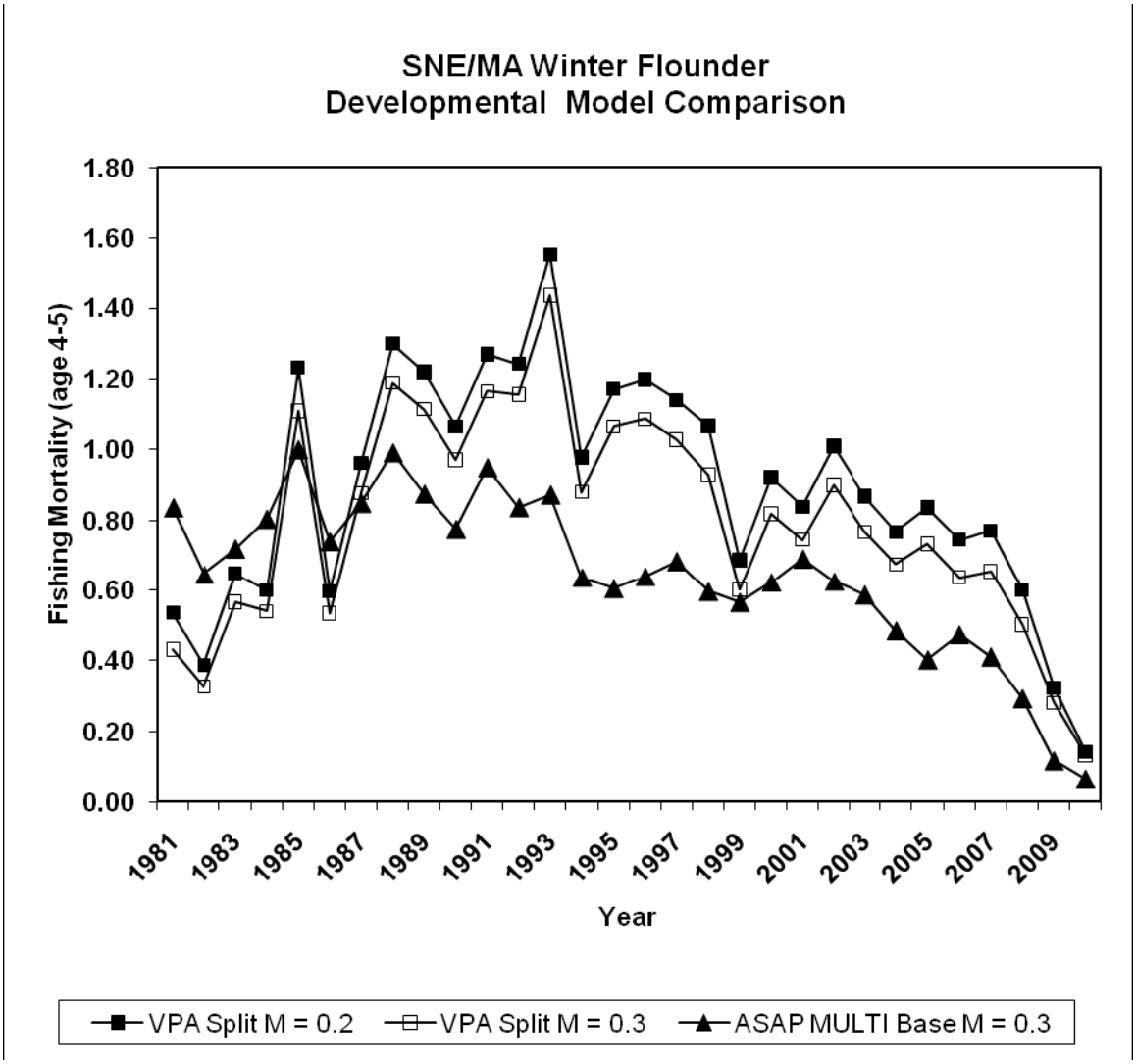


Figure A40. Estimates of Fishing Mortality (age 4-5) from Developmental VPA and ASAP models.

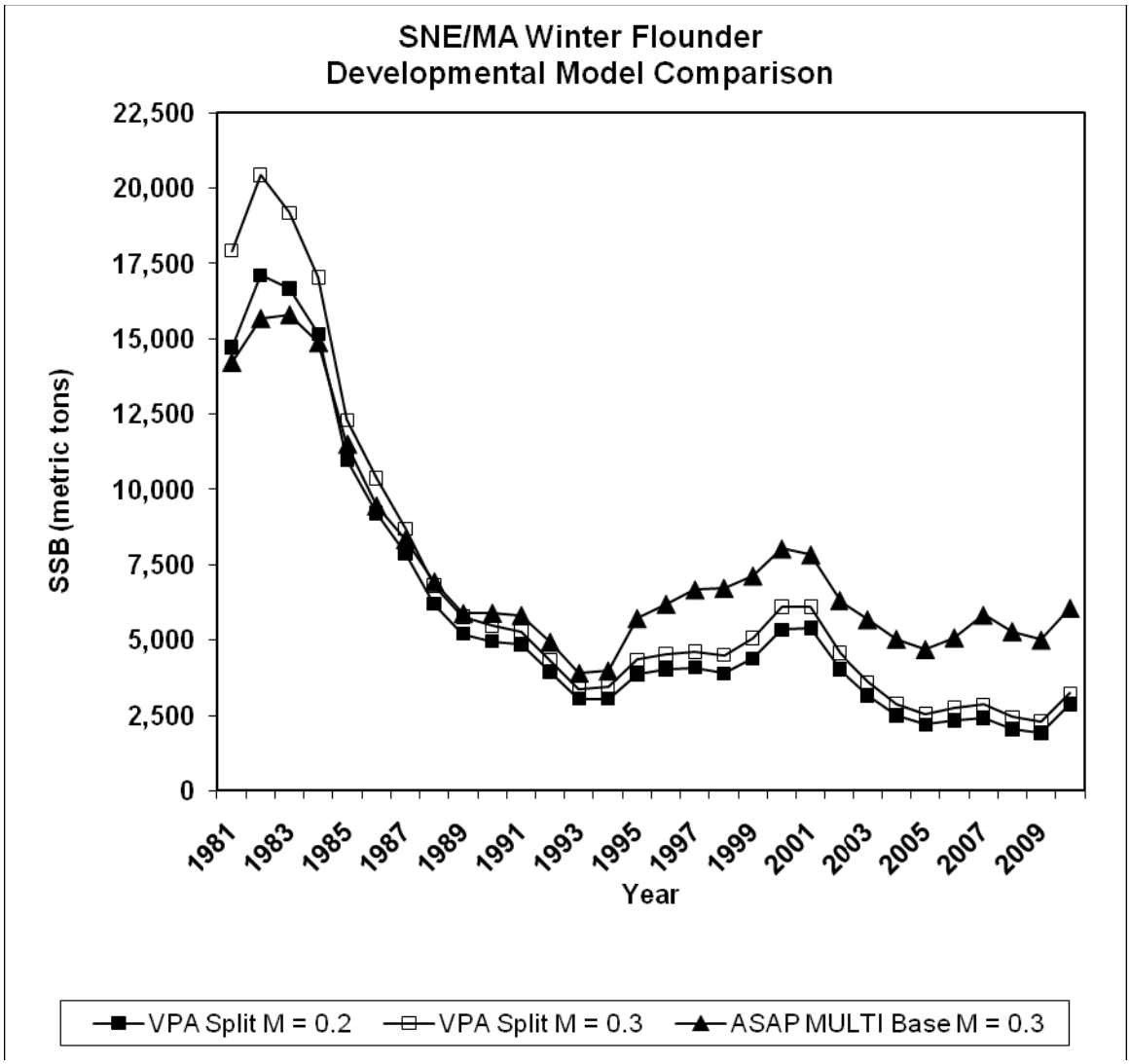


Figure A41. Estimates of Spawning Stock Biomass (SSB) from Developmental VPA and ASAP models.

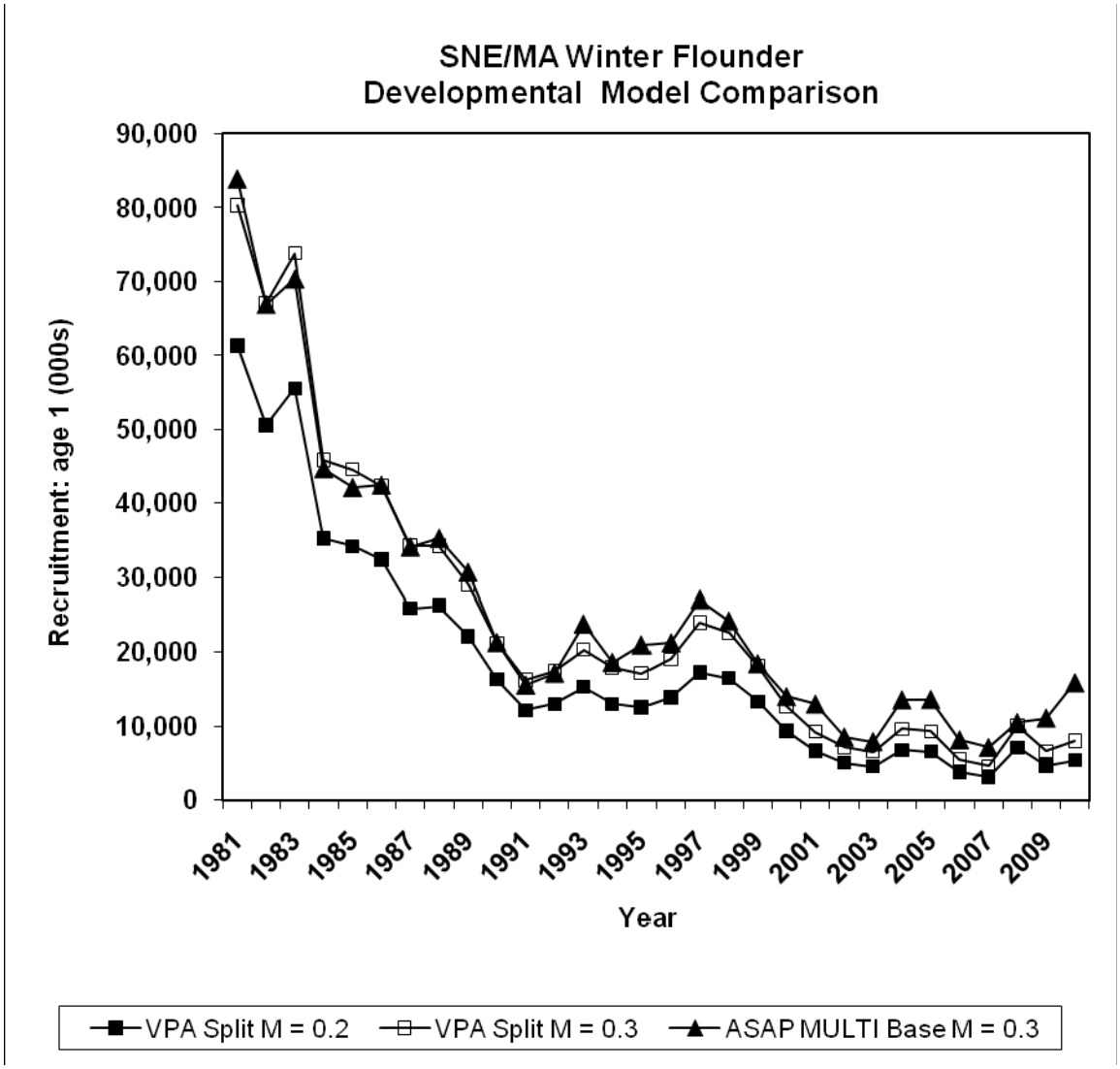


Figure A42. Estimates of Recruitment at age 1 (000s) from Developmental VPA and ASAP models.

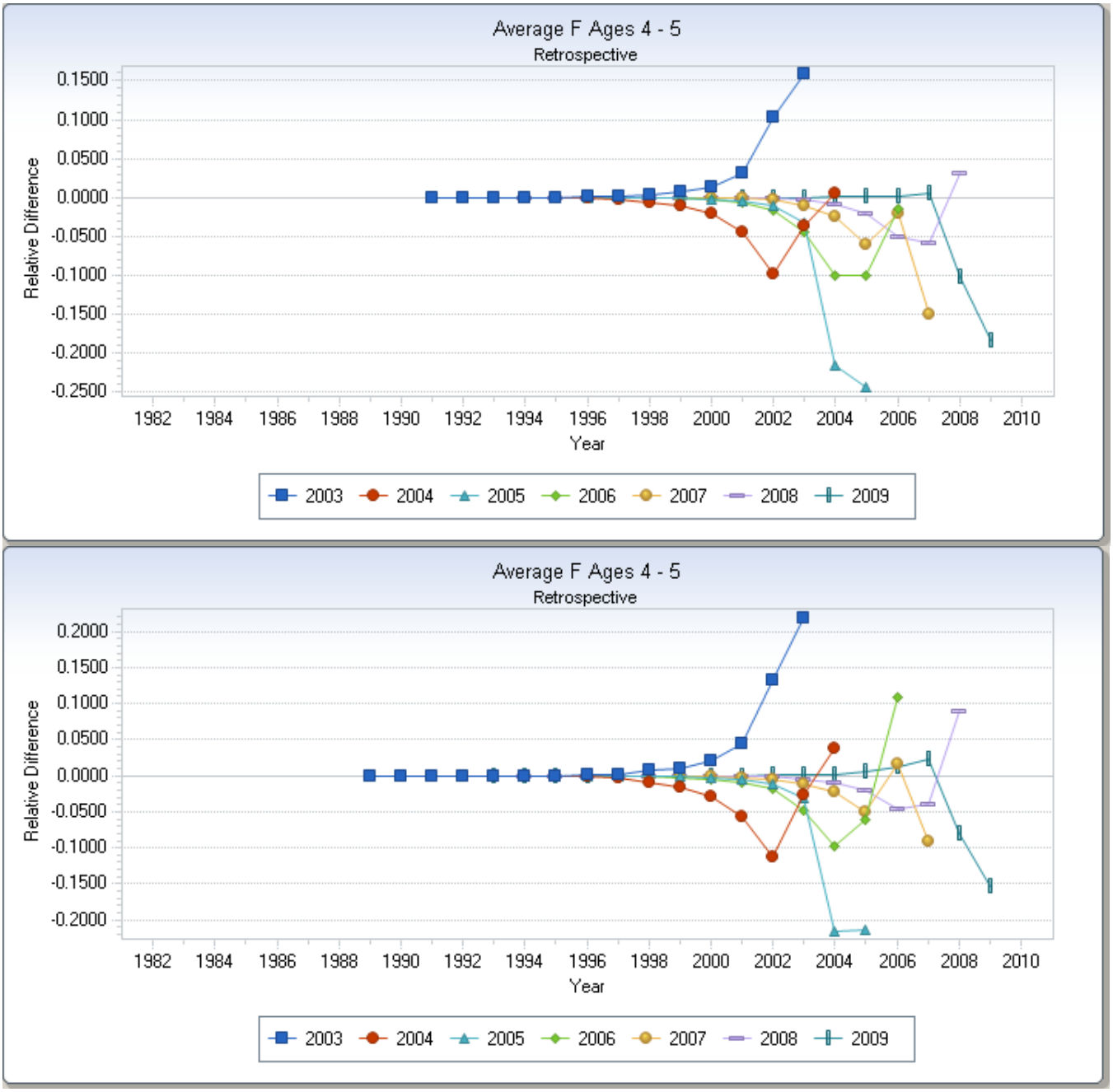


Figure A43. Retrospective patterns (relative difference) in Fishing Mortality (F age 4-5) from Developmental VPA models. Top panel is from the VPA model with M = 0.2; bottom panel is from the VPA model
with M = 0.3.

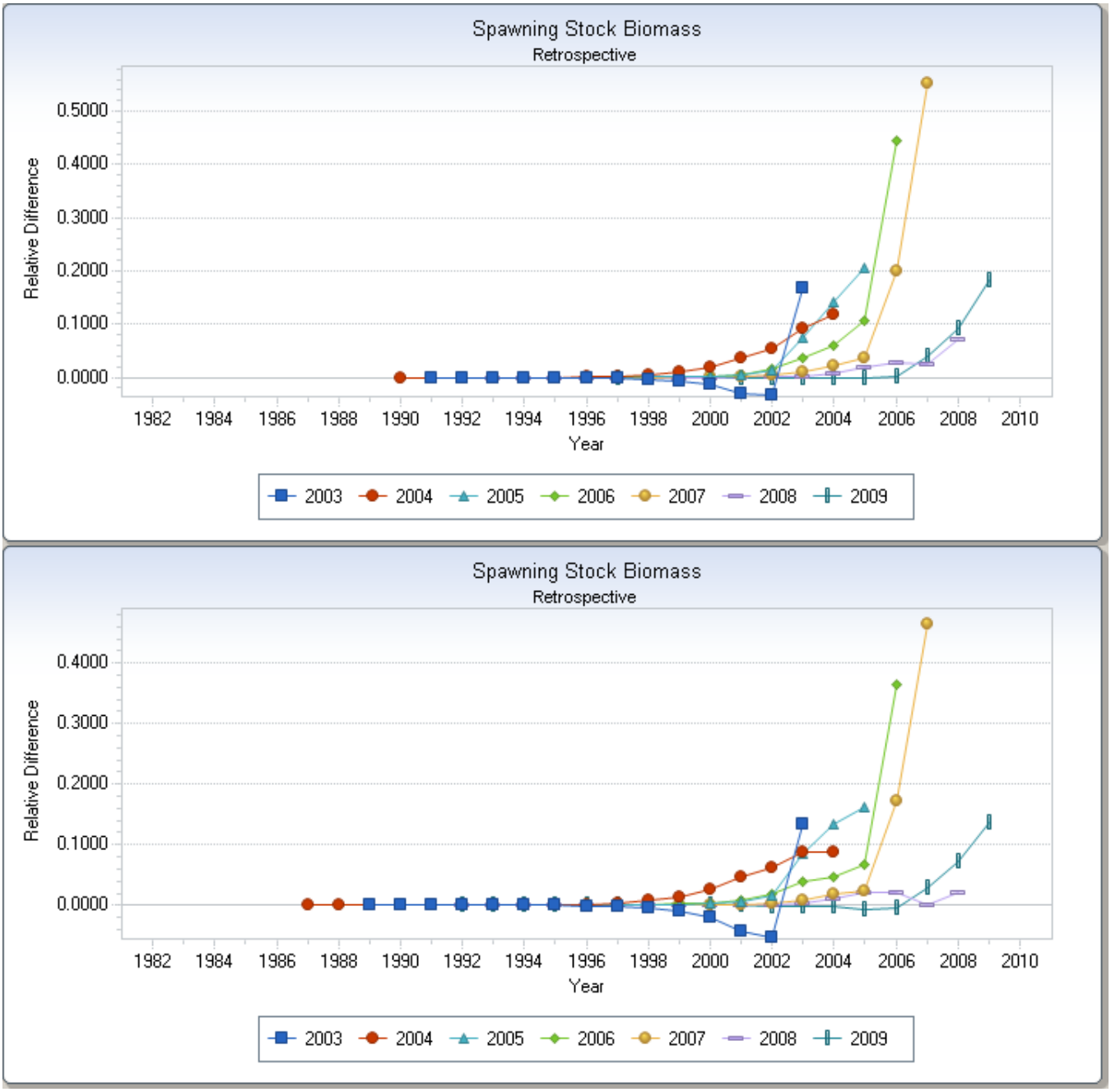


Figure A44. Retrospective patterns (relative difference) in SSB from Developmental VPA models. Top panel is from the VPA model with M = 0.2; bottom panel is from the VPA model with M = 0.3.

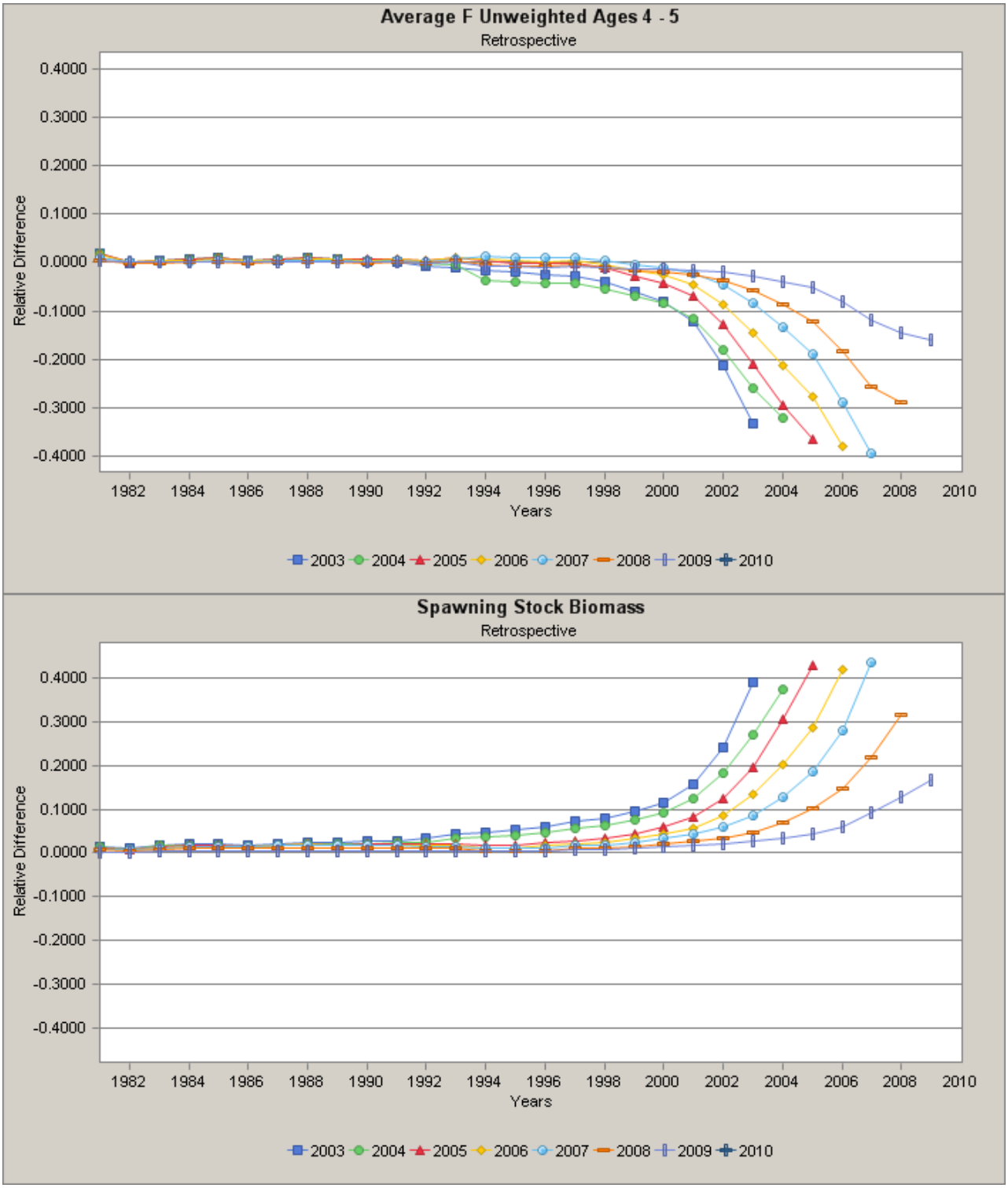


Figure A45. Retrospective patterns (relative difference) in Fishing Mortality and SSB from Developmental ASAP model with M = 0.3.

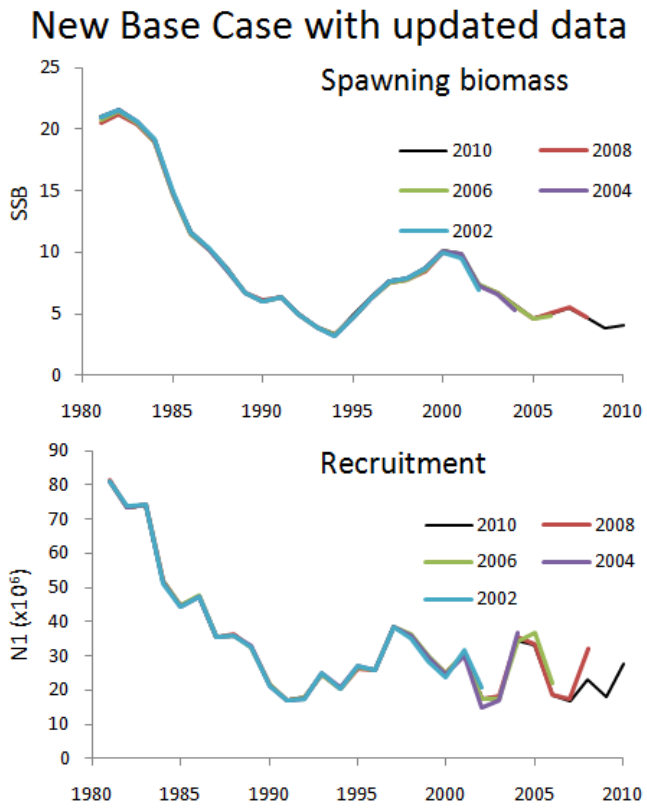


Figure A46. Retrospective patterns (absolute difference) in Spawning Stock Biomass (SSB) and Recruitment (millions of age 1 fish) from the Rademeyer and Butterworth (2011b) ASPM model for SNE/MA winter flounder.

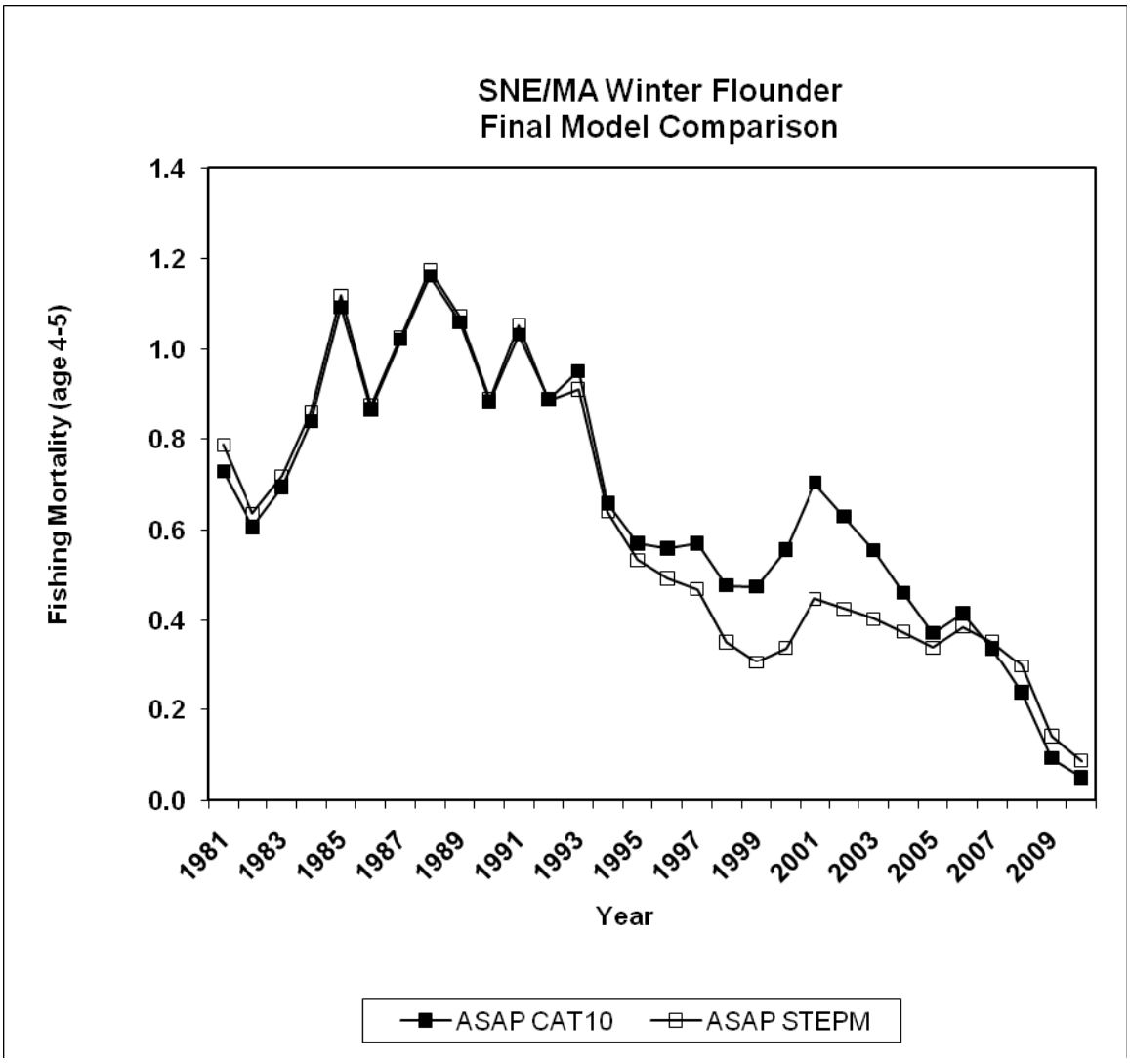


Figure A47. Estimates of Fishing Mortality (age 4-5) from the final ASAP CAT10 and the alternative STEPM model configurations.

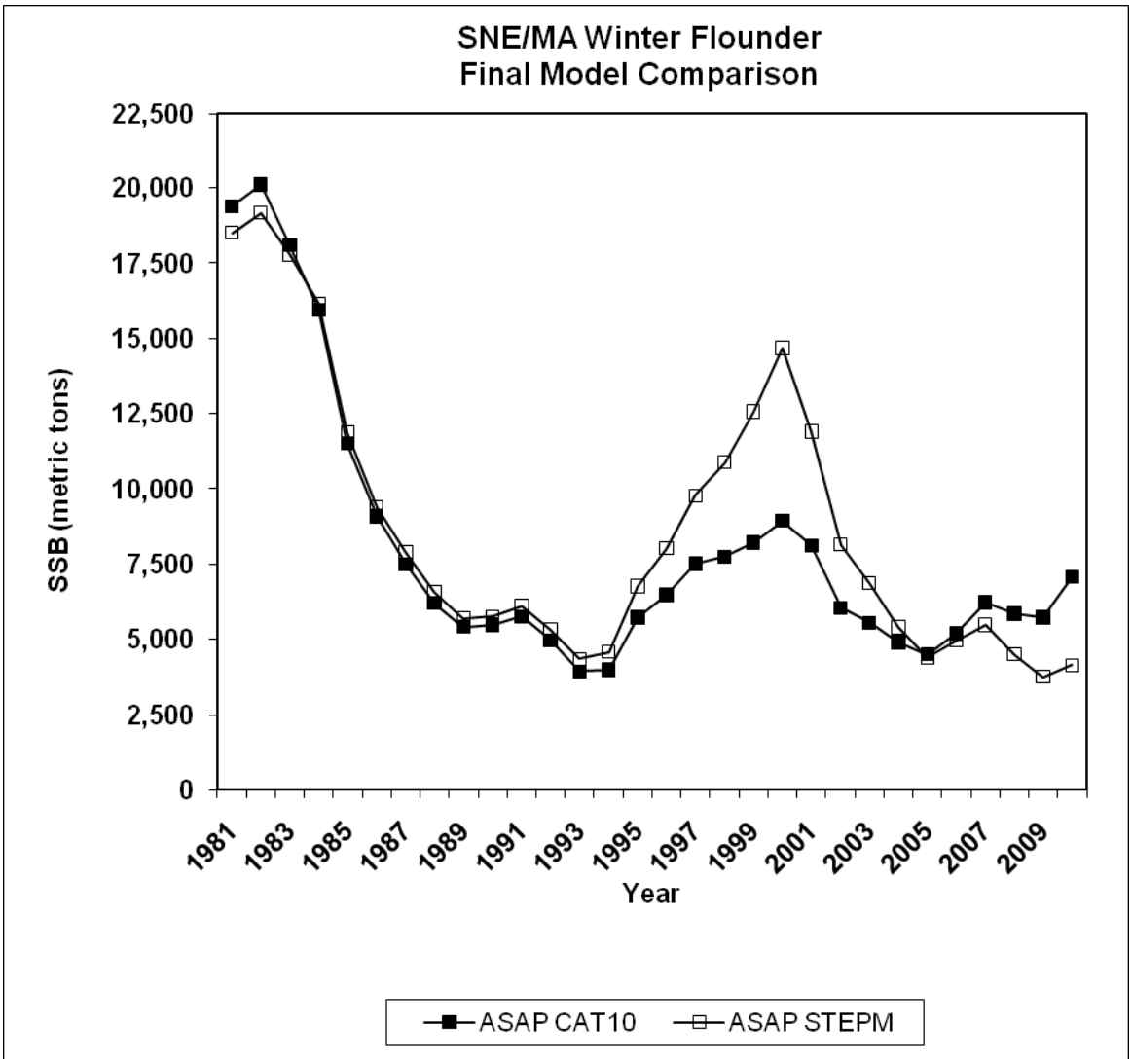


Figure A48. Estimates of Spawning Stock Biomass (SSB) from the final ASAP CAT10 and the alternative STEPM model configurations.

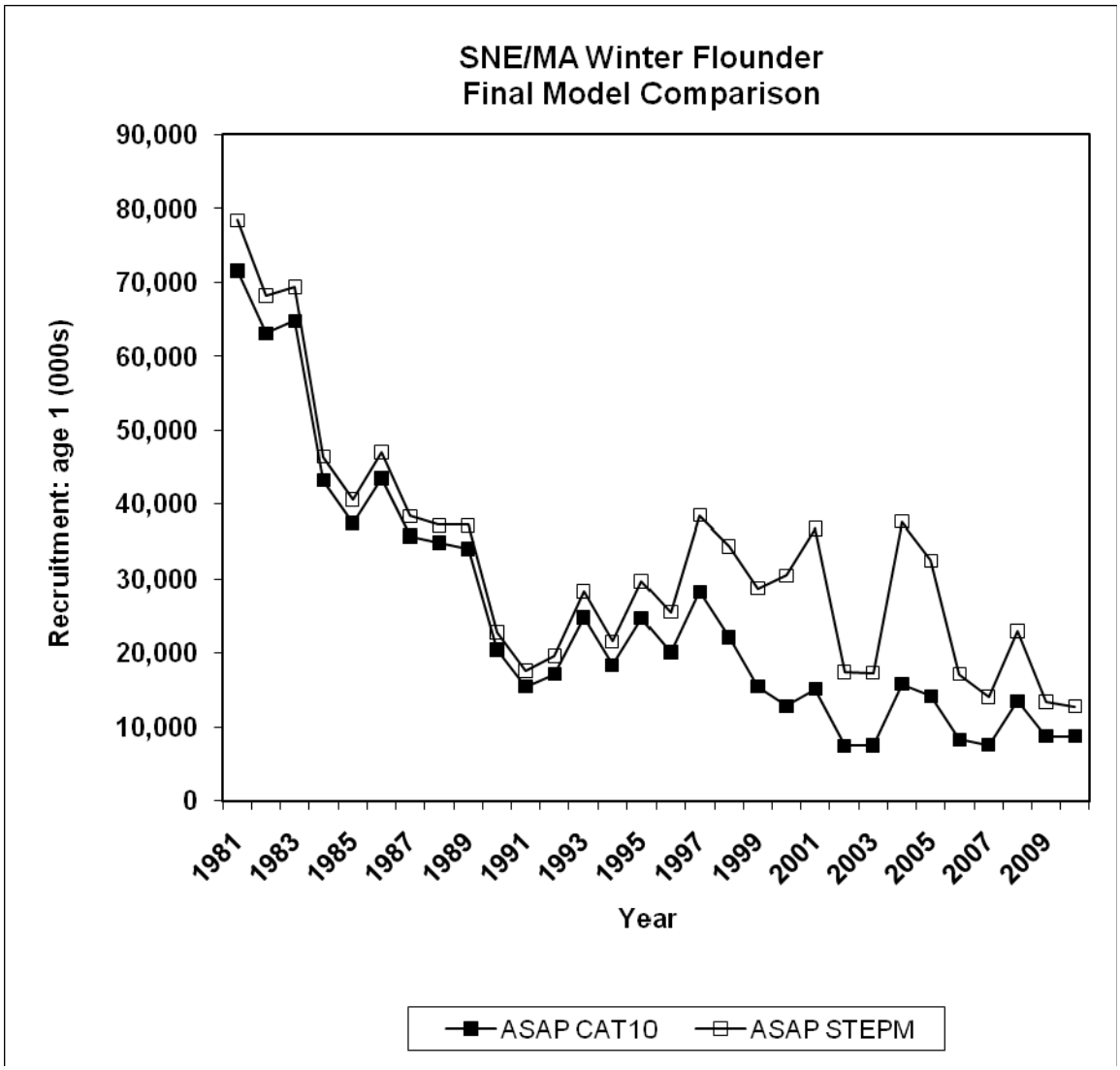


Figure A49. Estimates of Recruitment at age 1 (000s) from the final ASAP CAT10 and the alternative STEPM model configurations.

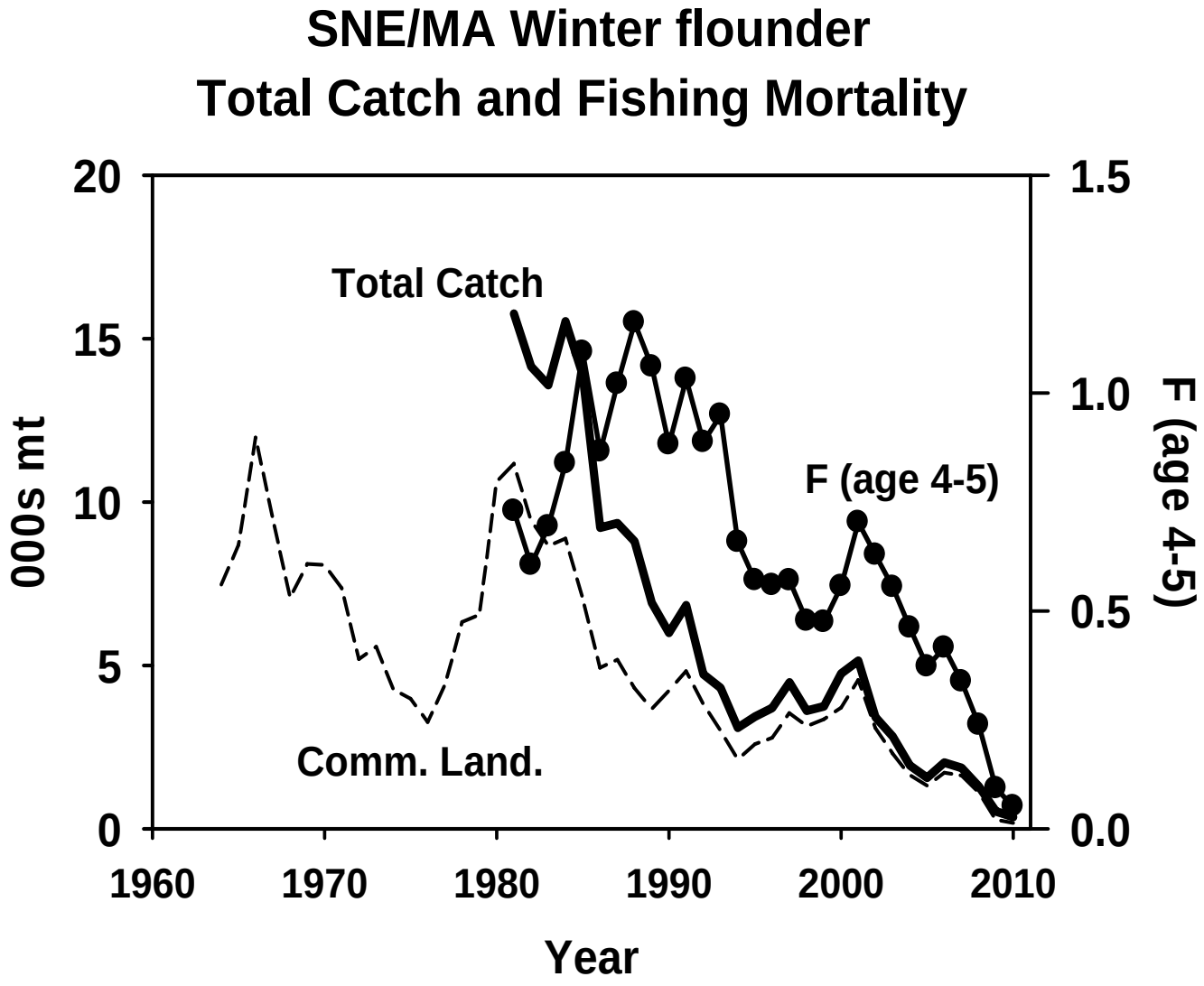


Figure A50. Total catch (landings and discards, 000s mt), commercial landings (000s mt), and fishing mortality rate (F age 4-5) for SNE/MA winter flounder.

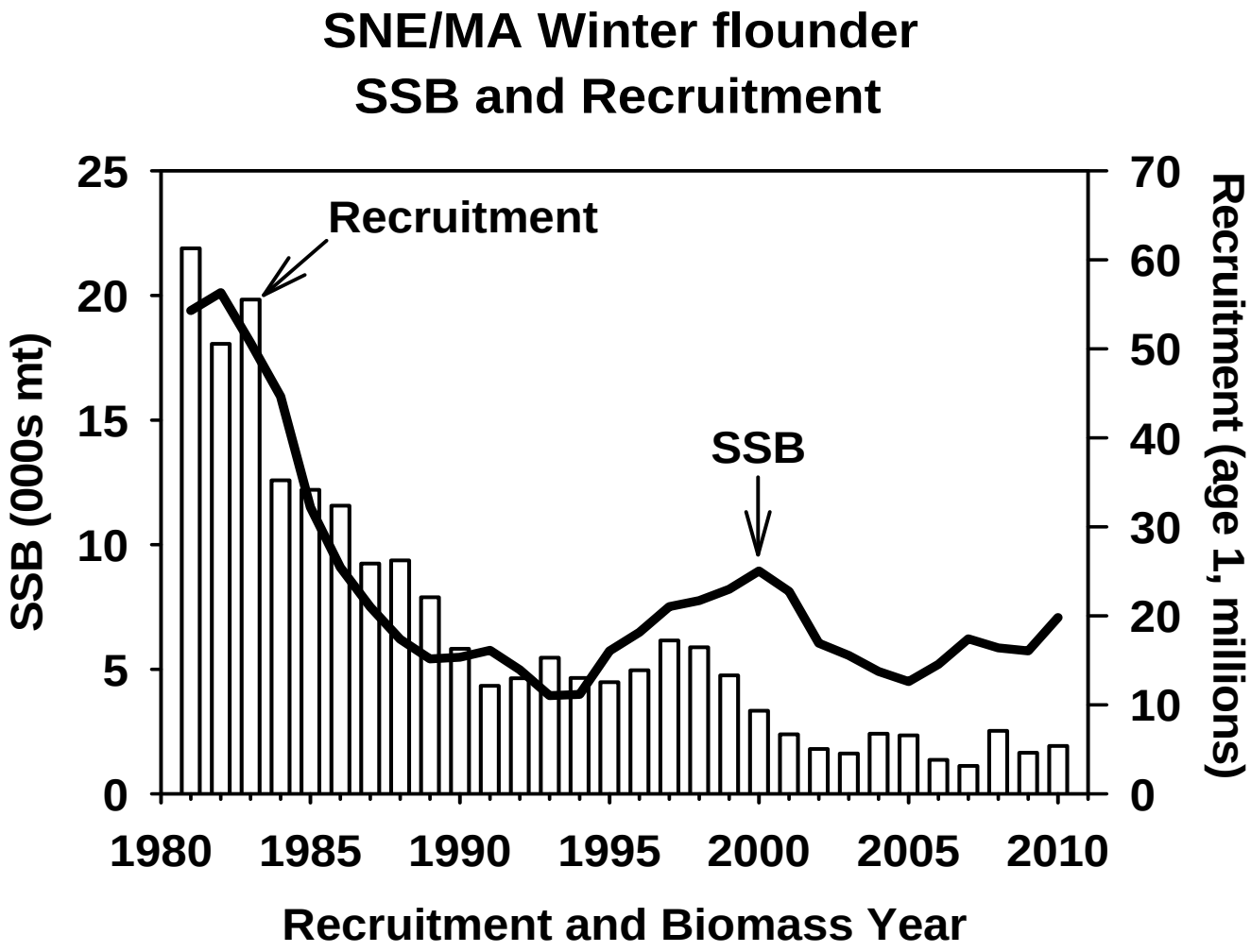


Figure A51. Spawning stock biomass (SSB, 000s mt, solid line) and recruitment (millions of fish at age-1, vertical bars) for SNE/MA winter flounder.

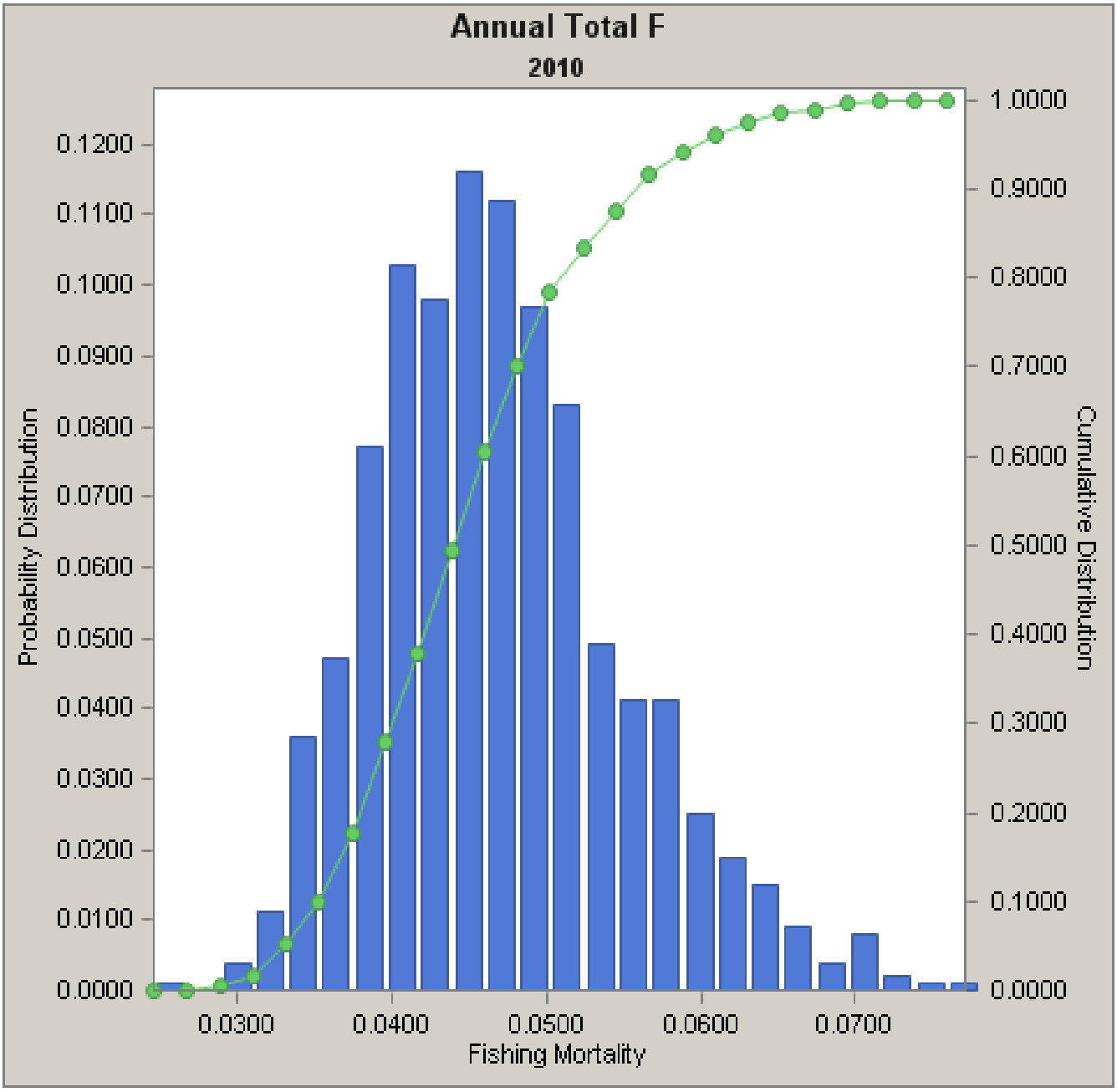


Figure A52. MCMC distribution of the estimate of the 2010 Fishing Mortality of SNE/MA winter flounder.

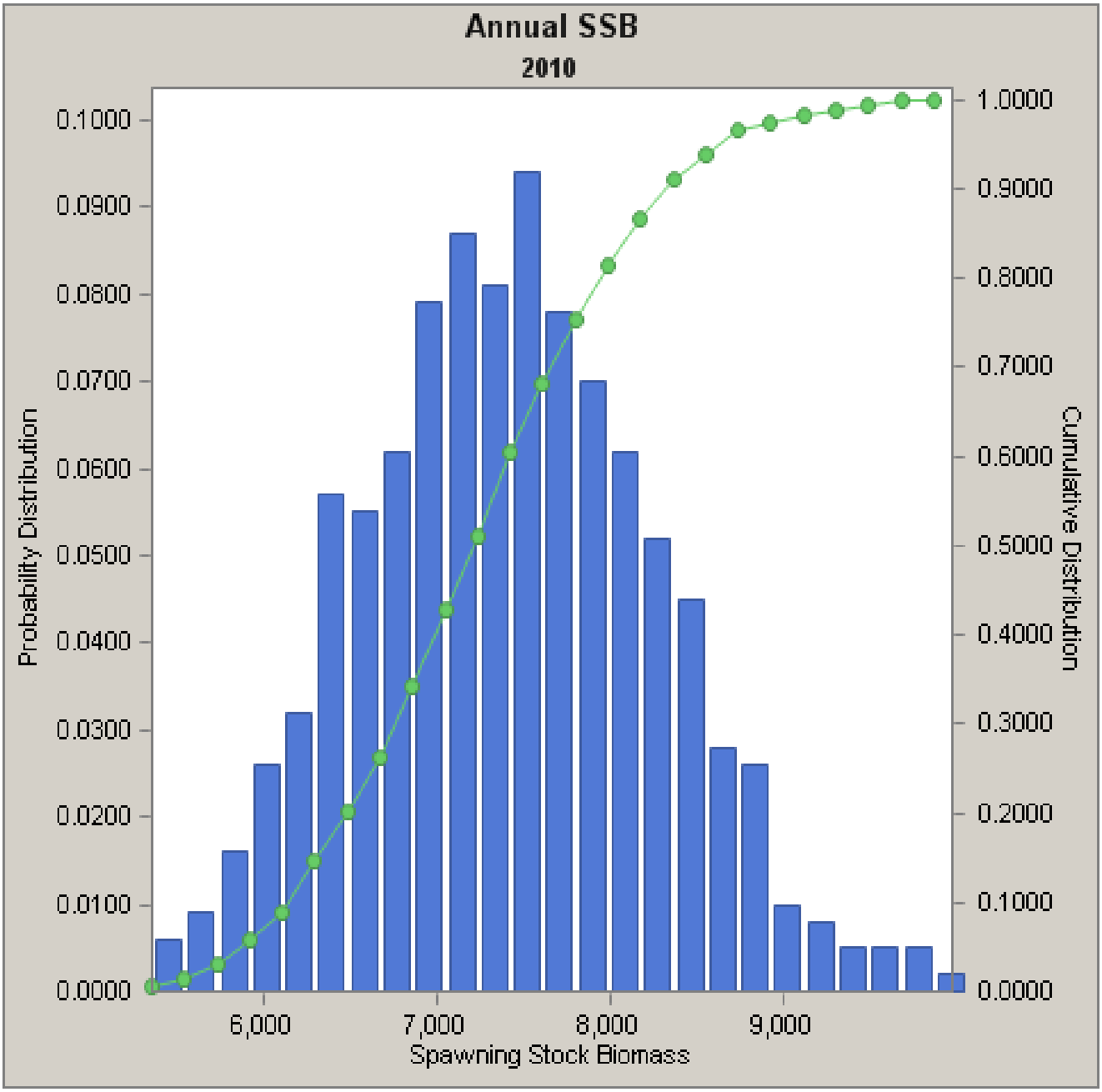


Figure A53. MCMC distribution of the estimate of the 2010 Spawning Stock Biomass (SSB) SNE/MA winter flounder.

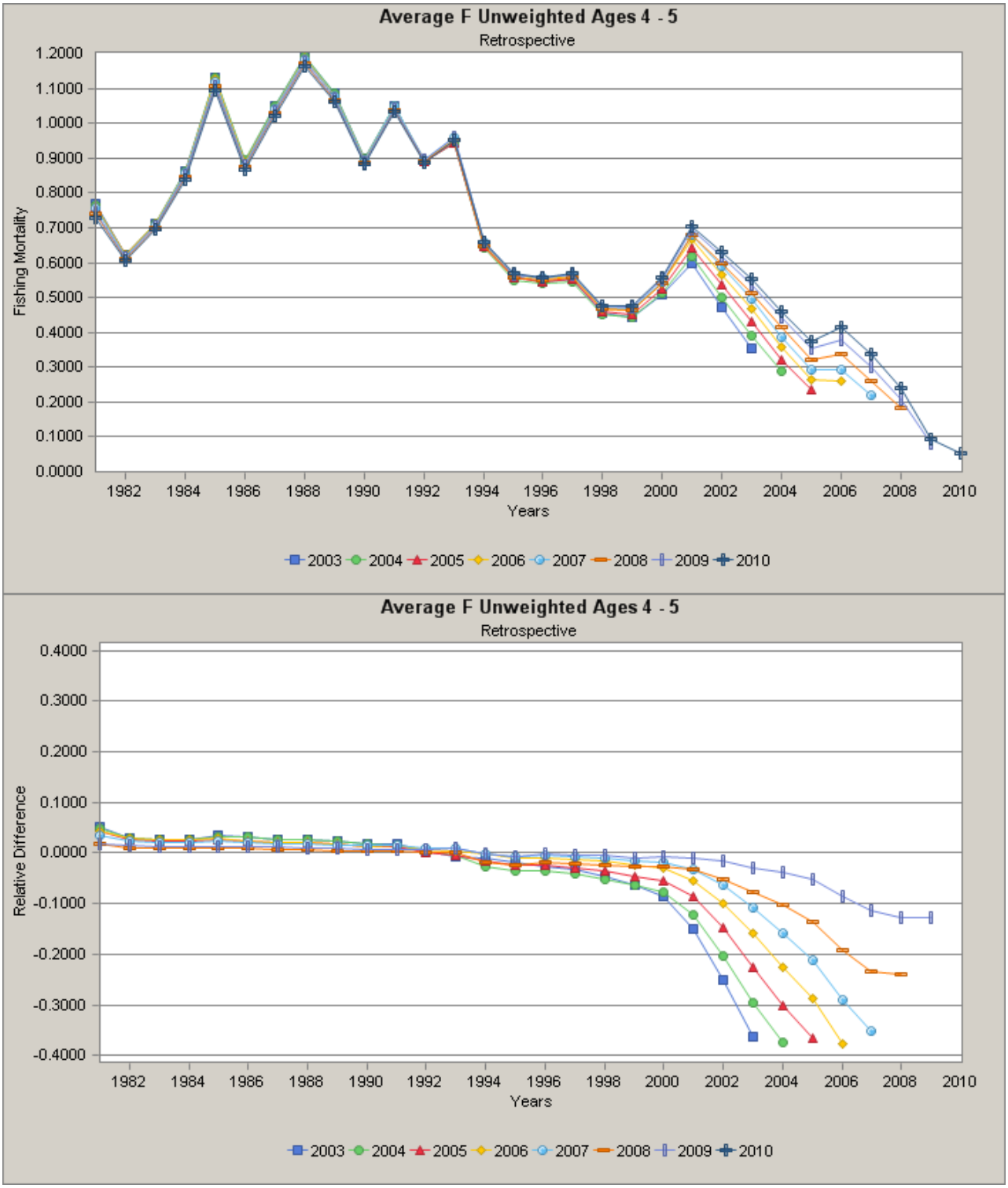


Figure A54. Retrospective errors in estimates of Fishing Mortality (F age 4-5) for SNE/MA winter flounder.

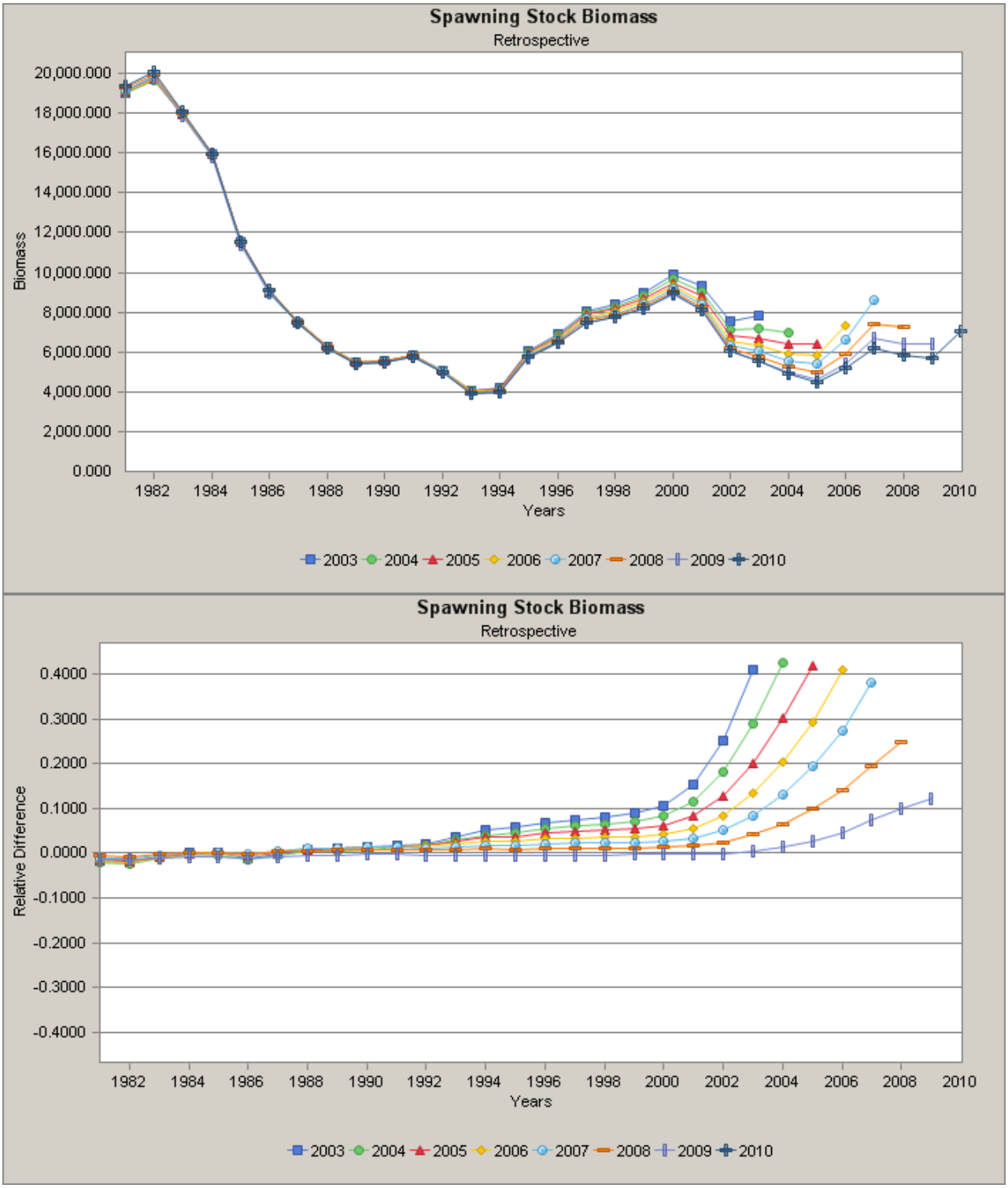


Figure A55. Retrospective errors in estimates of Spawning Stock Biomass for SNE/MA winter flounder.

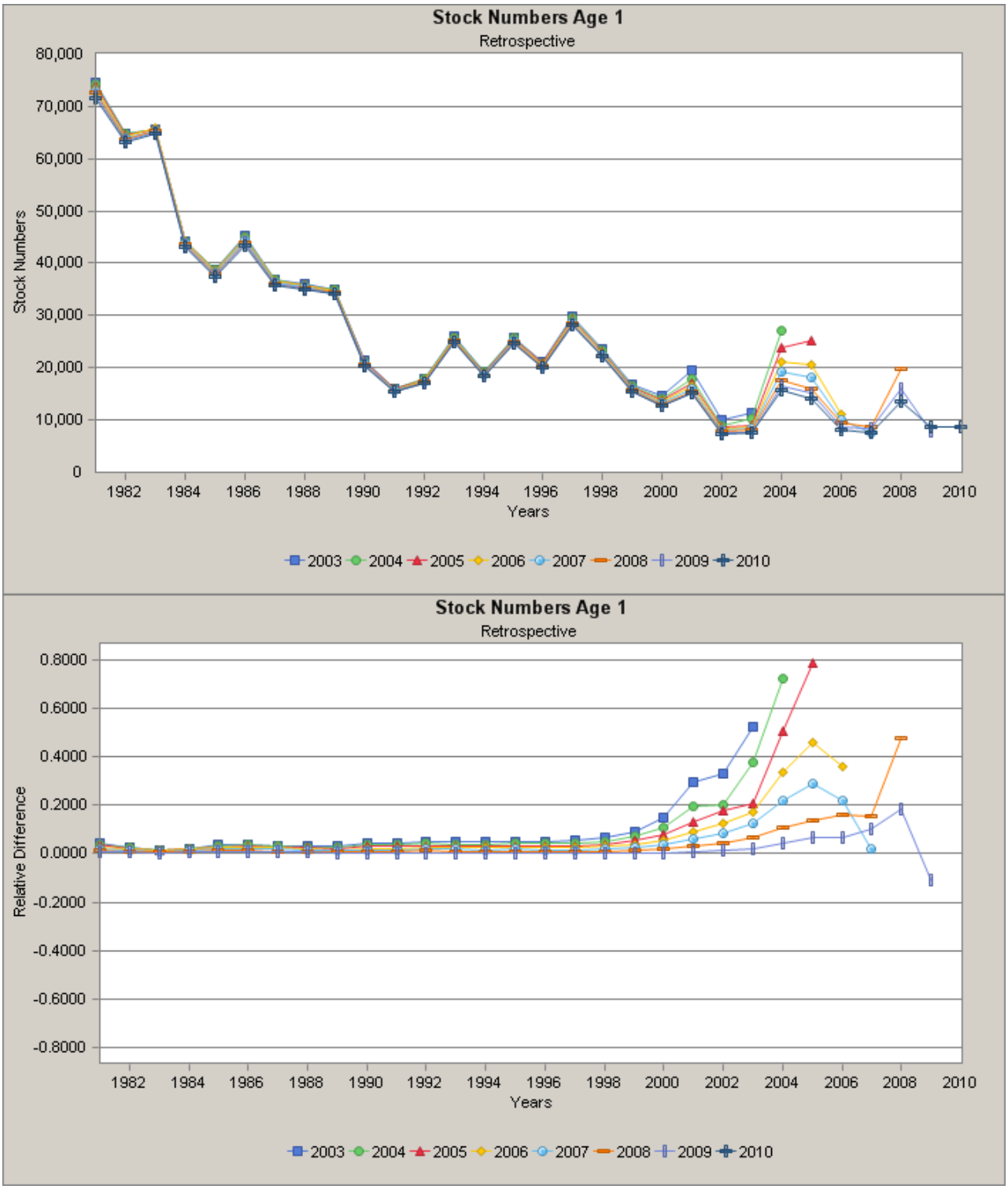


Figure A56. Retrospective errors in estimates of Recruitment at age 1 for SNE/MA winter flounder.

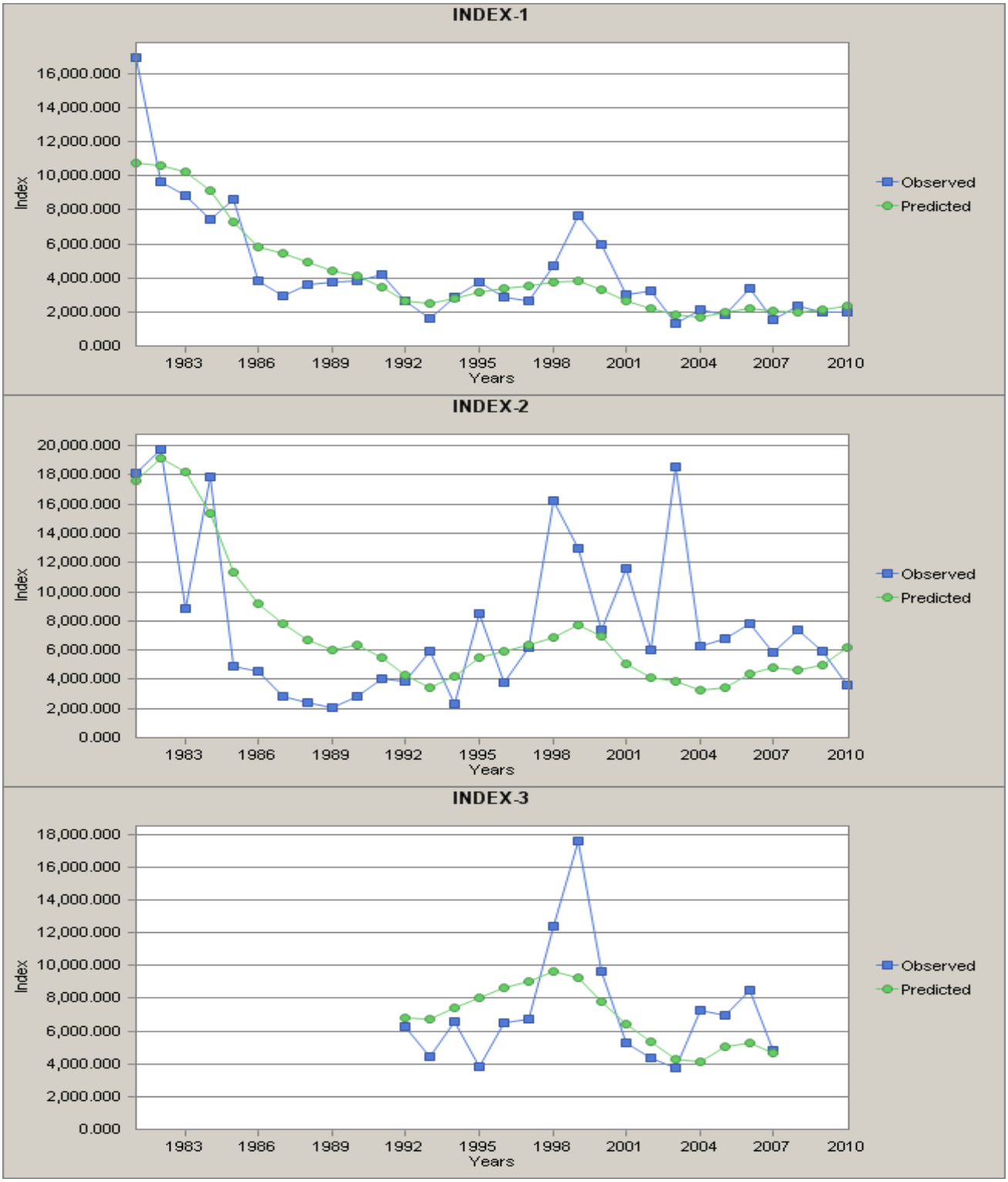


Figure A57. Model fit to the NEFSC Spring (Index 1), Fall (Index 2), and Winter (Index 3) survey aggregate indices of abundance, expressed as absolute swept-area numbers (millions).

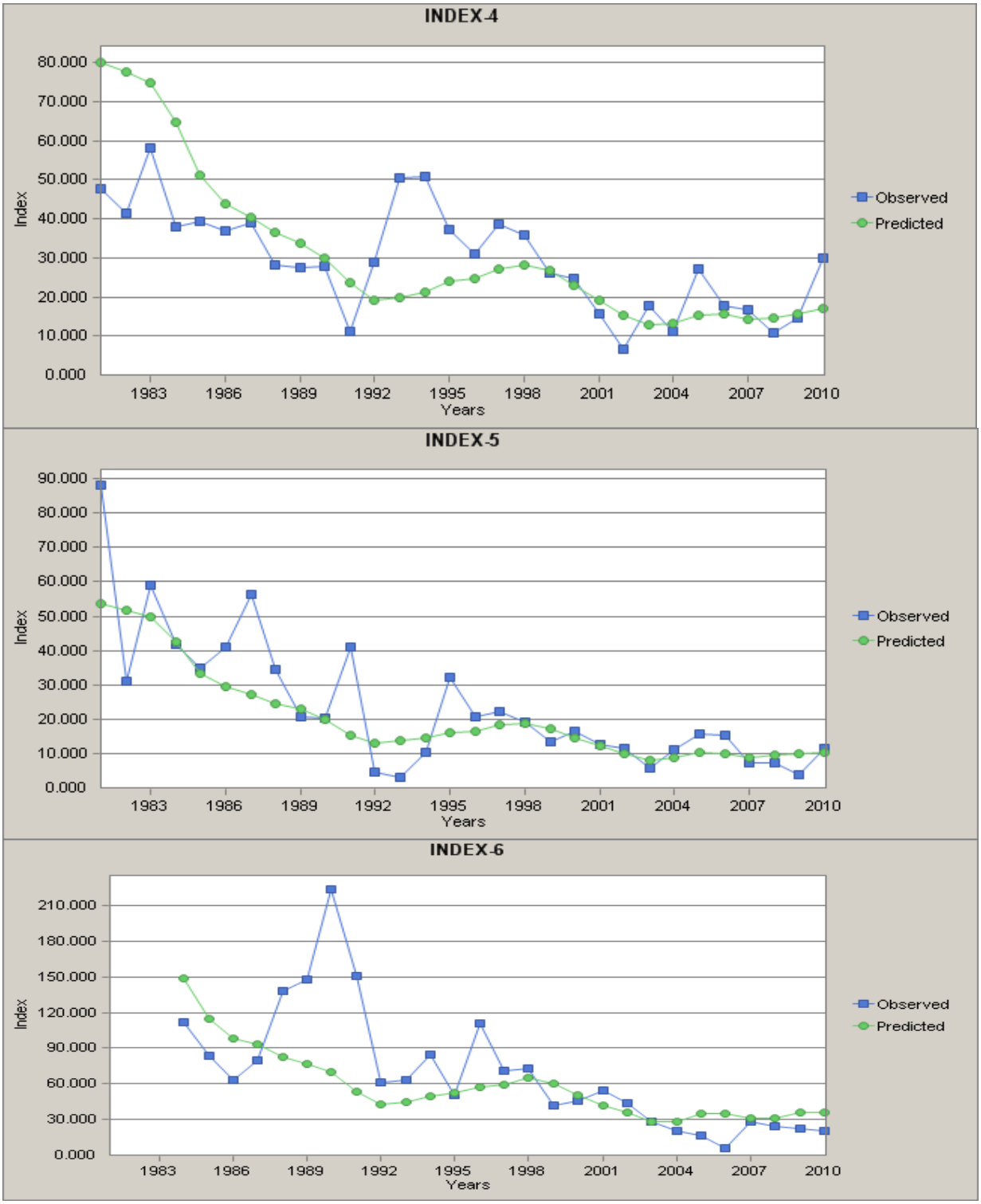


Figure A58. Model fit to the MADMF Spring (Index 4), RIDFW Spring (Index 5), and CTDEP Spring (Index 6) survey aggregate indices of abundance.

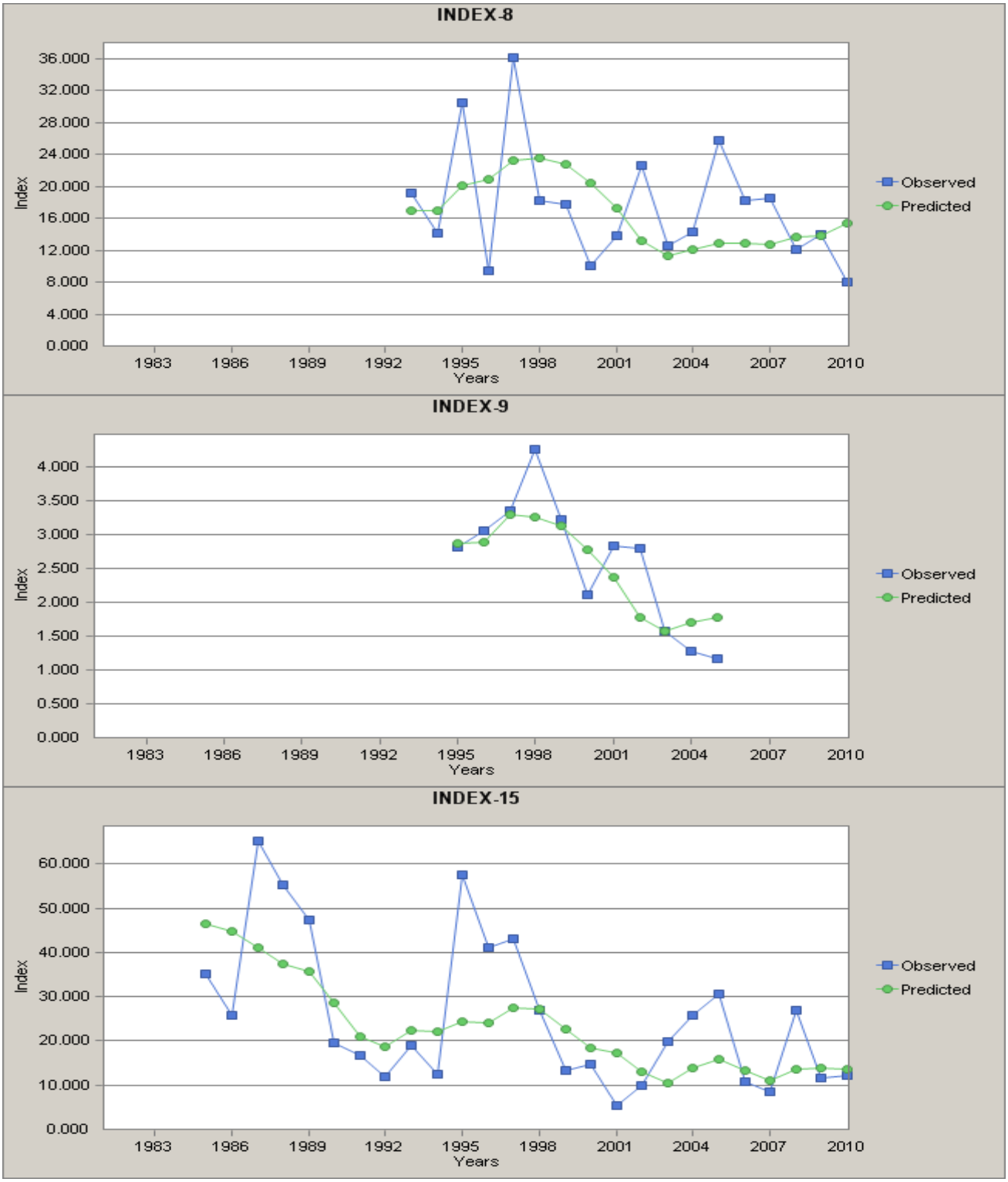


Figure A59. Model fit to the NJDFW Oceans (Index 8), NJDFW Rivers (Index 9), and URIGSO (Index 15) survey aggregate indices of abundance.

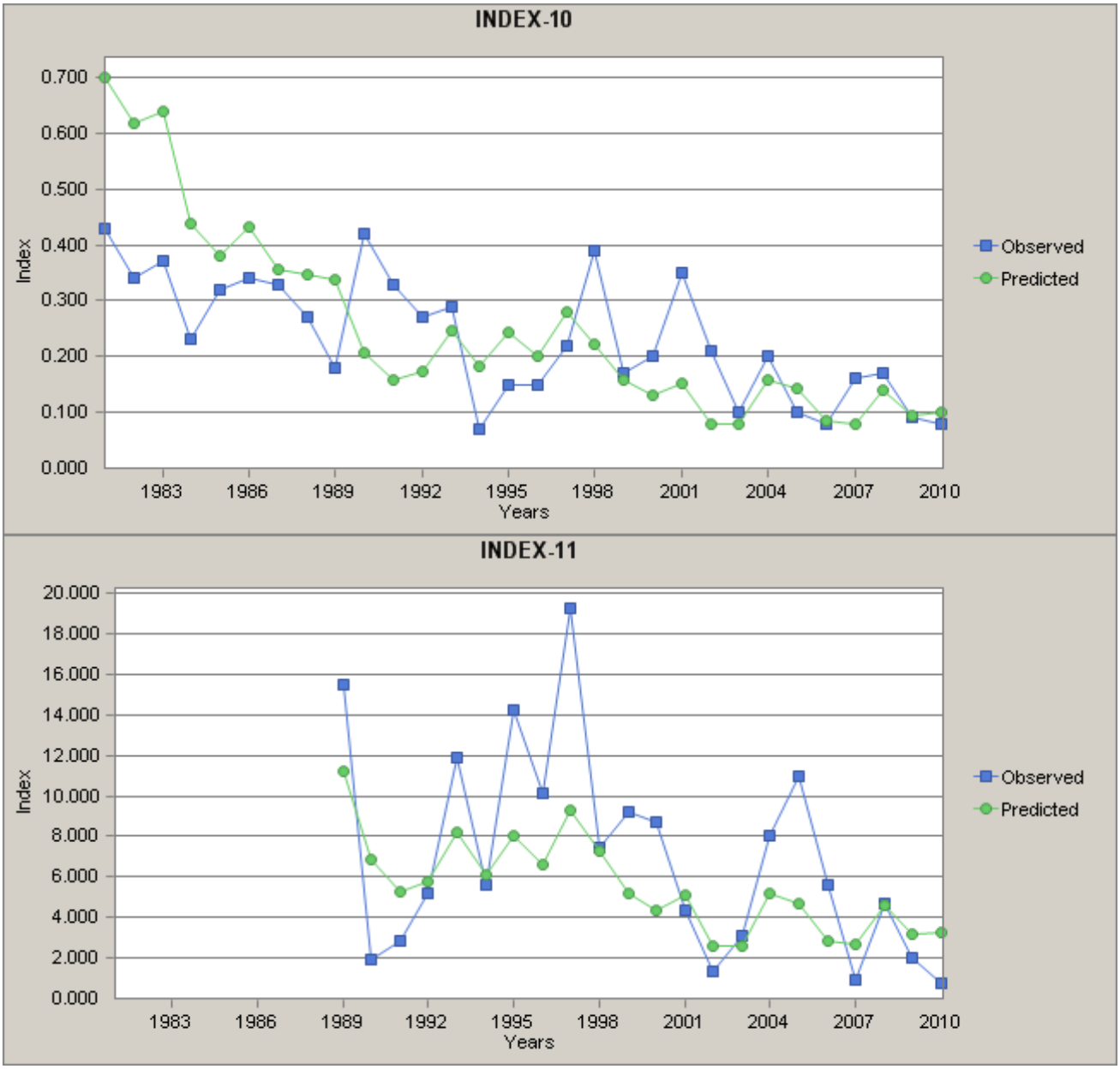


Figure A60. Model fit to the MADMF Seine (Index 10) and CTDEP Seine (Index 11) survey recruitment indices.

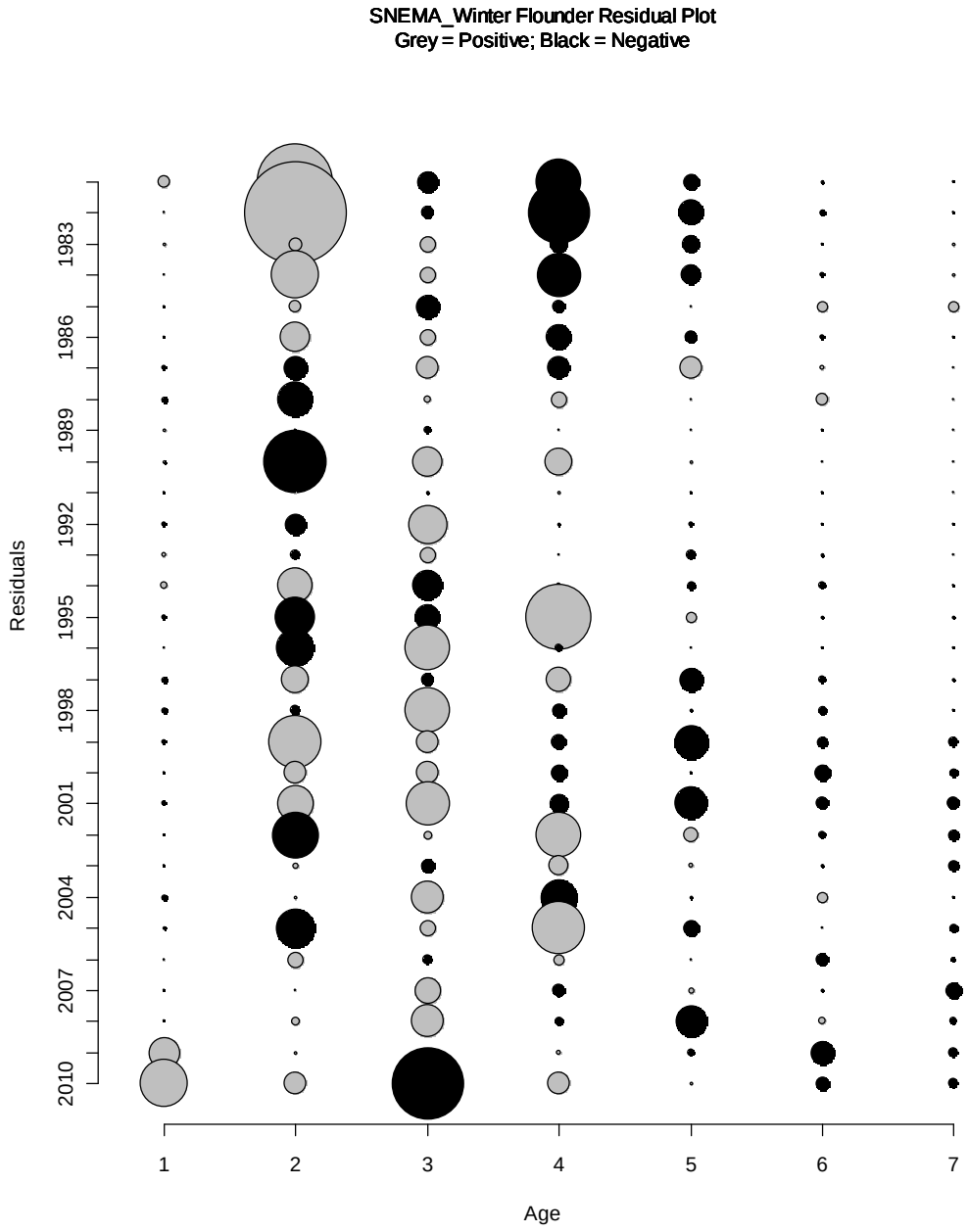


Figure A61. Model fit simple residuals (observed minus predicted proportion at age) for the fishery age compositions for SNE/MA winter flounder.

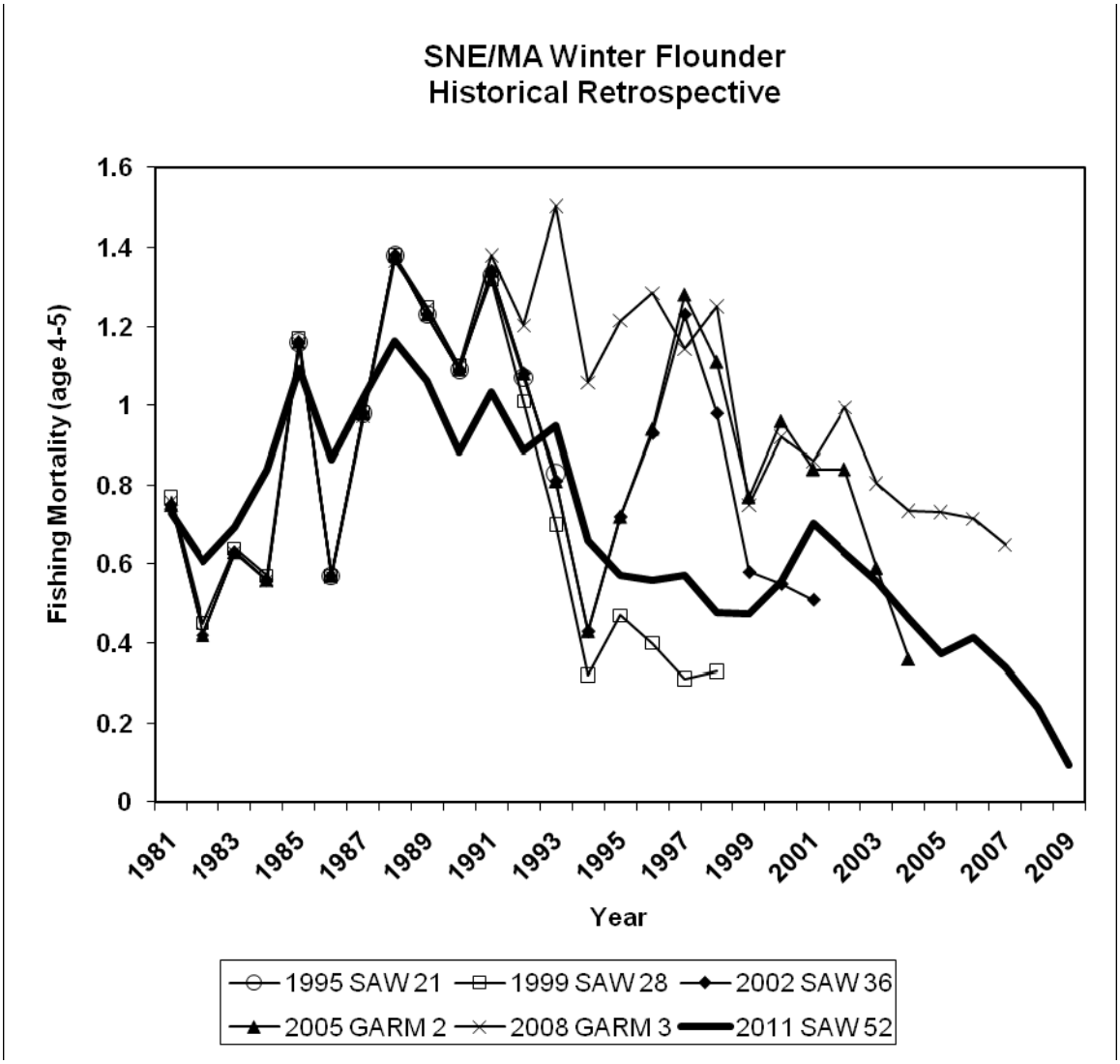


Figure A62. Historical retrospective in estimates of Fishing Mortality (age 4-5) for SNE/MA winter flounder.

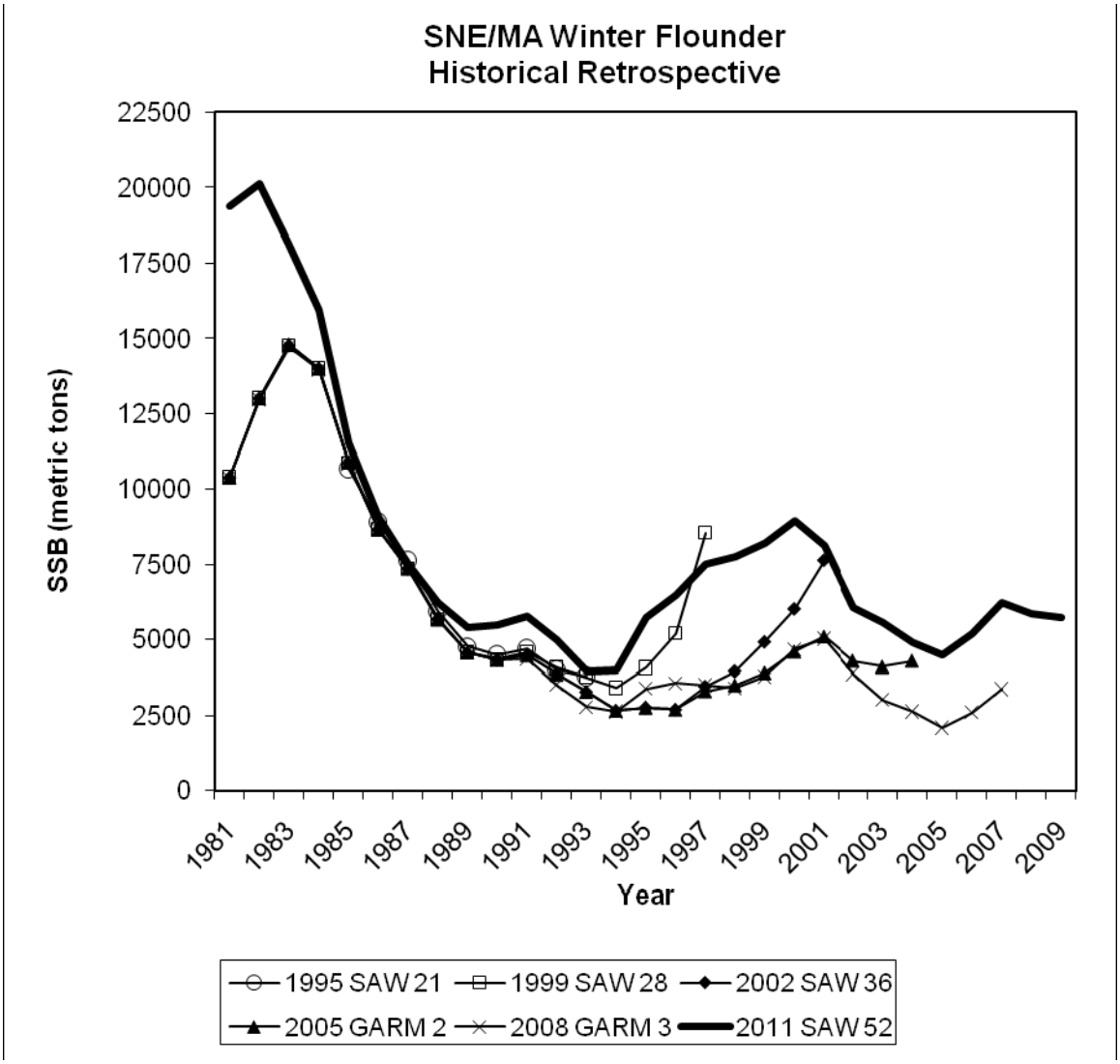


Figure A63. Historical retrospective in estimates of Spawning Stock Biomass (SSB) for SNE/MA winter flounder.

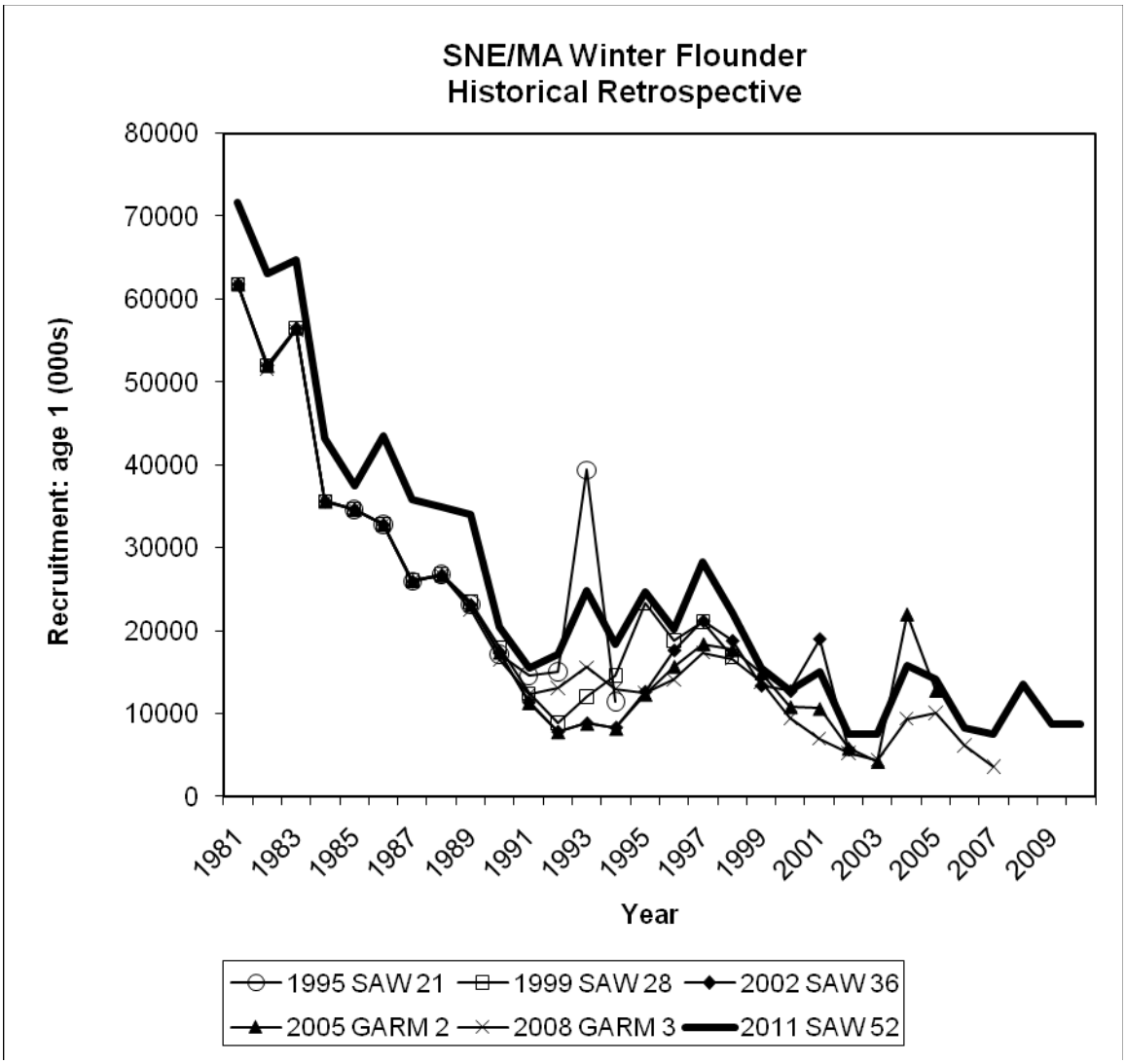


Figure A64. Historical retrospective in estimates of Recruitment at age 1 (000s) for SNE/MA winter flounder.

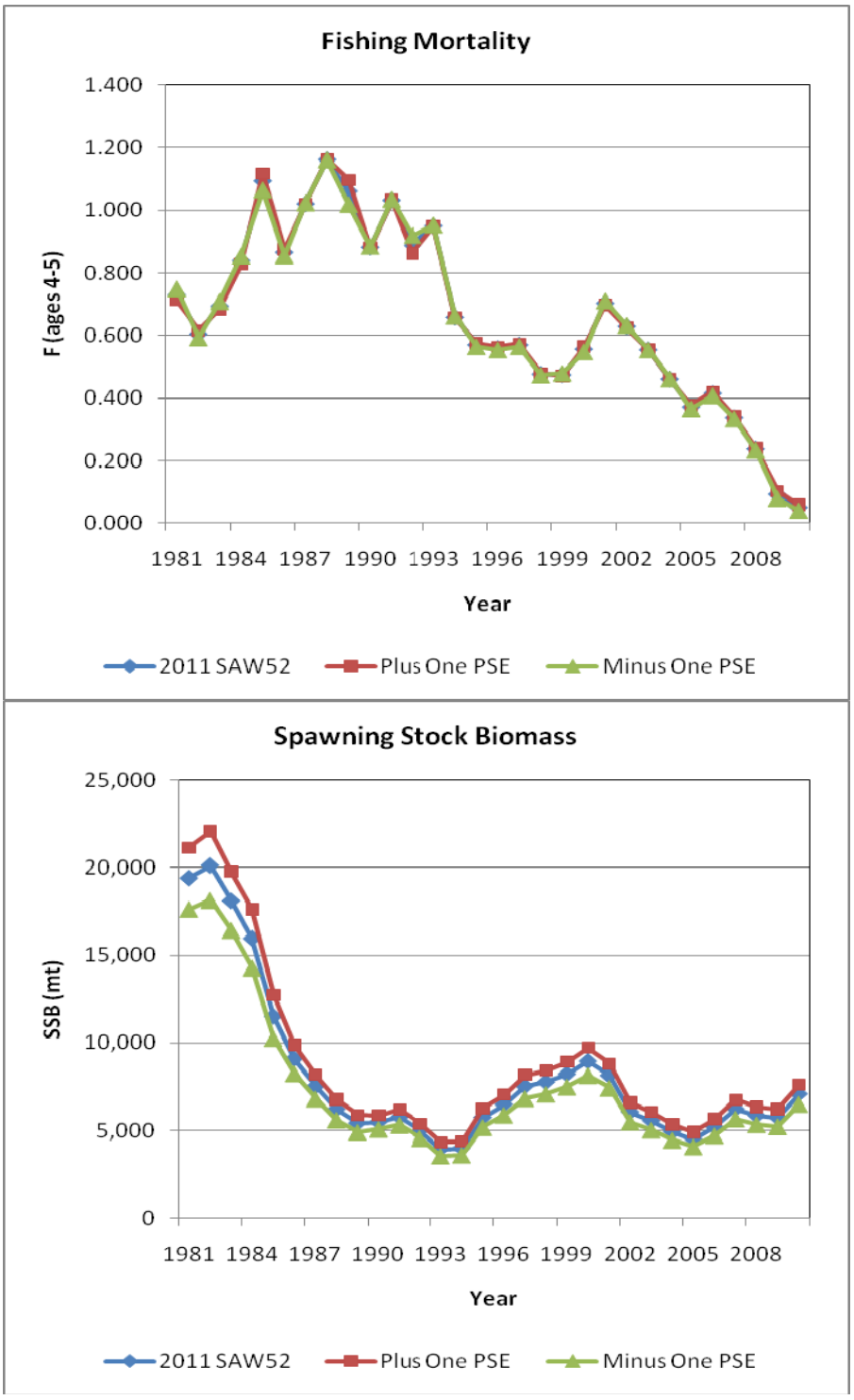


Figure A65. Trends in SNE/MA winter flounder Fishing Mortality (F age 4-5) and Spawning Stock Biomass (SSB) for final models with Plus One Proportional Standard Error (PSE) and Minus One PSE total catch: Response to TOR4.

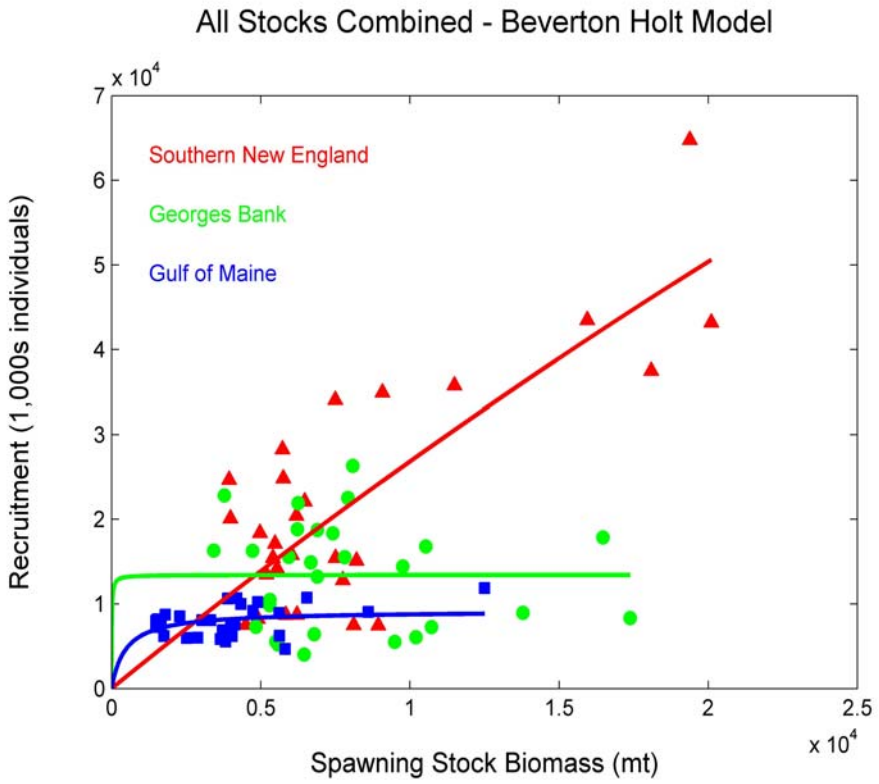


Figure A66. Comparison of stock-recruitment data and standard Beverton-Holt stock-recruitment models for the three U.S. winter flounder stocks.

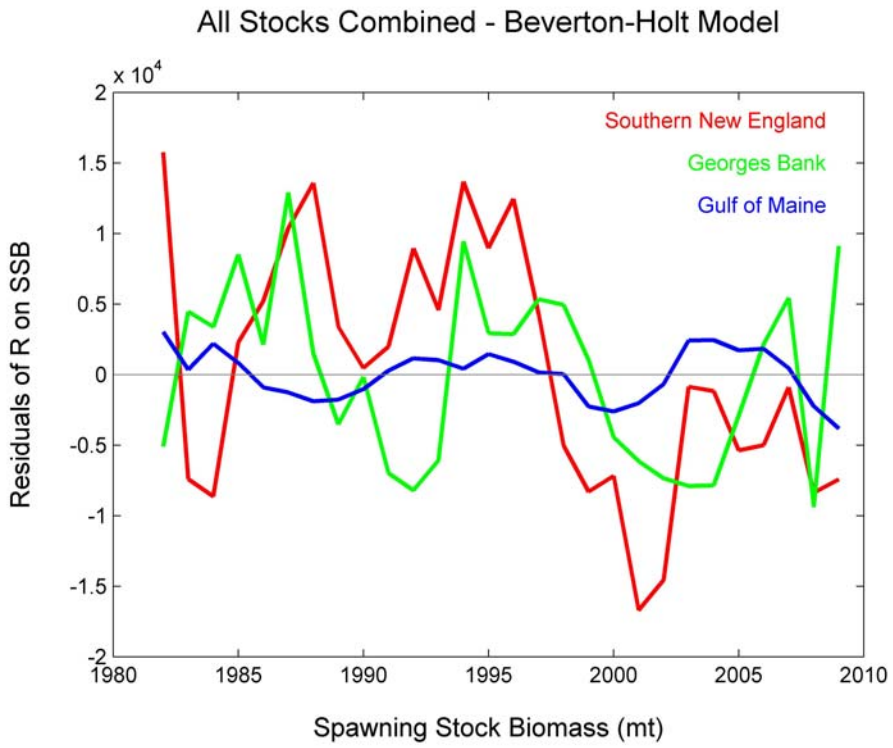


Figure A67. Comparison of the residuals of the stock-recruitment relationships for the three U.S. winter flounder stocks based on the standard Beverton-Holt stock-recruitment model.

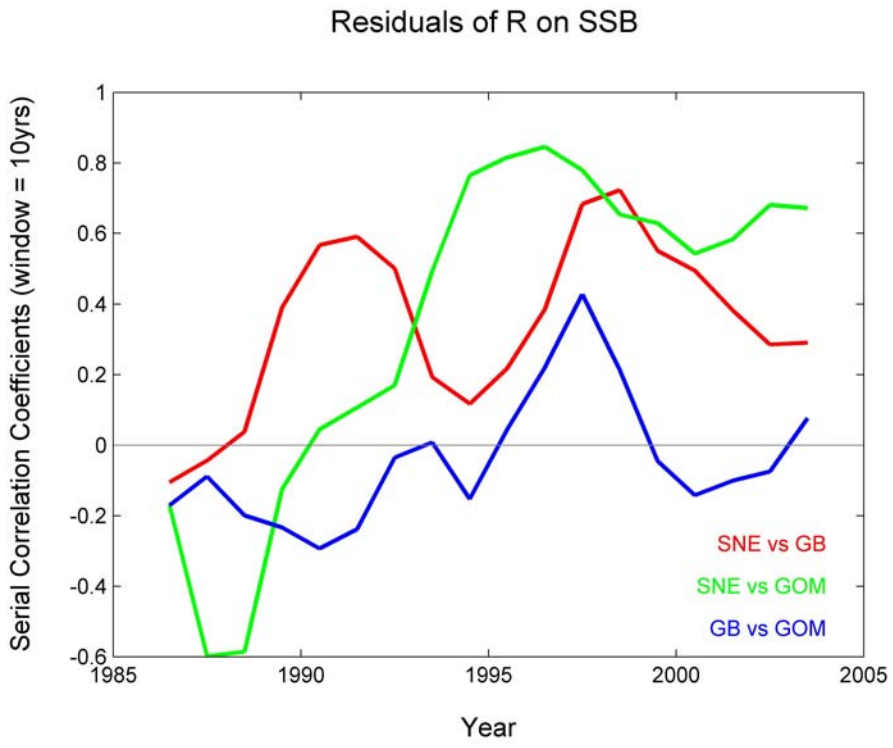


Figure A68. Serial correlation of the residuals of the stock recruitment relationship making the three pairwise comparisons: SNE vs. GB, SNE vs. GOM, and GB vs. GOM. Window for serial correlations set at 10 years.

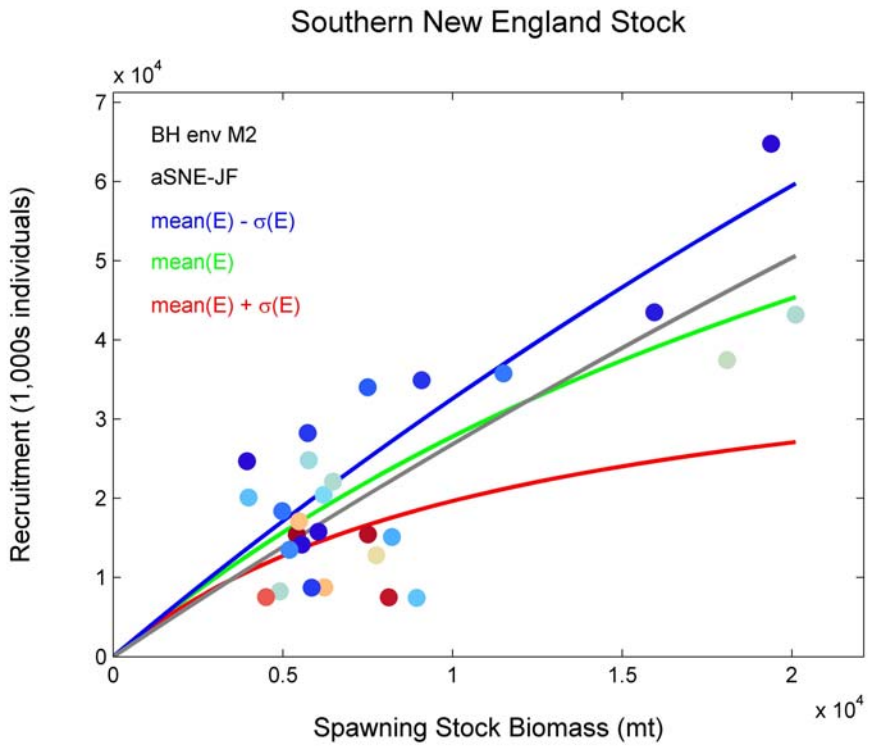


Figure A69. Environmentally-explicit stock recruitment relationships for SNE/MA winter flounder. The best overall environmental model is shown as is the standard model (gray). Symbols are color coded to the value of the environmental variable and model predictions for mean environment and ± 1 standard deviation of the environmental variable are shown. The specific model and environmental variable are noted in the upper left hand corner (see Tables A39-A40; Hare MS 2011).

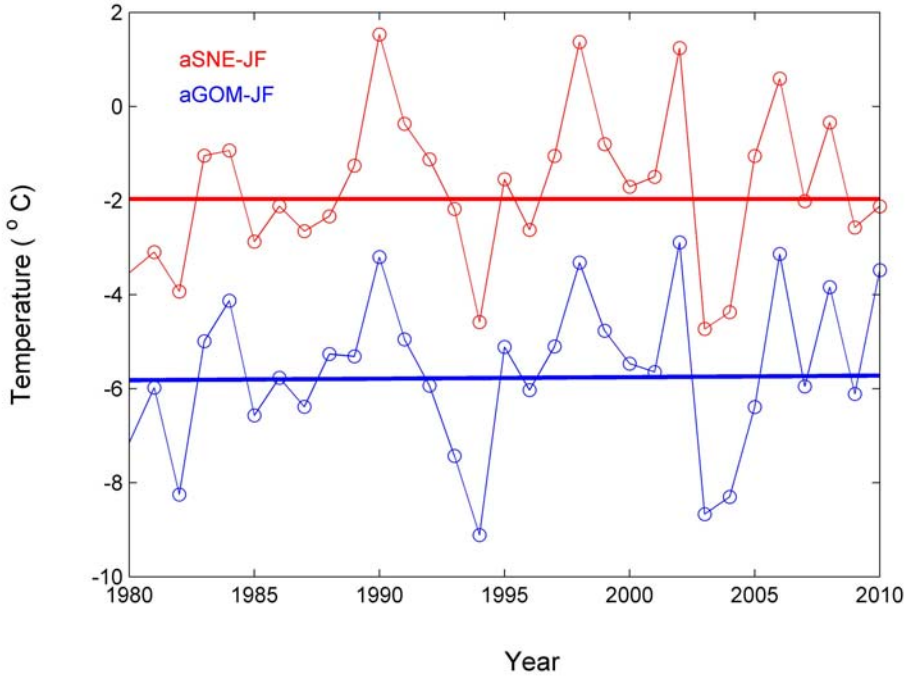
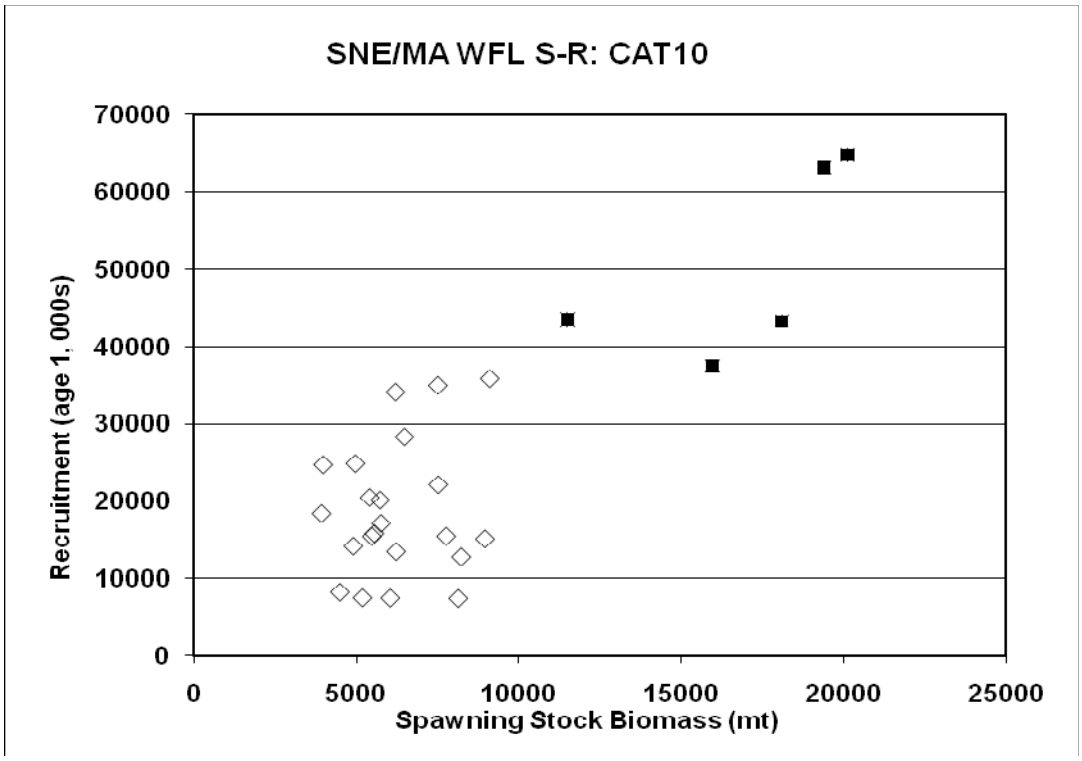


Figure A70. Time series of winter air temperature over Southern New England and the Gulf of Maine for the period of the assessment. The lines represent the linear regression; the slopes of both were not significantly different than zero.



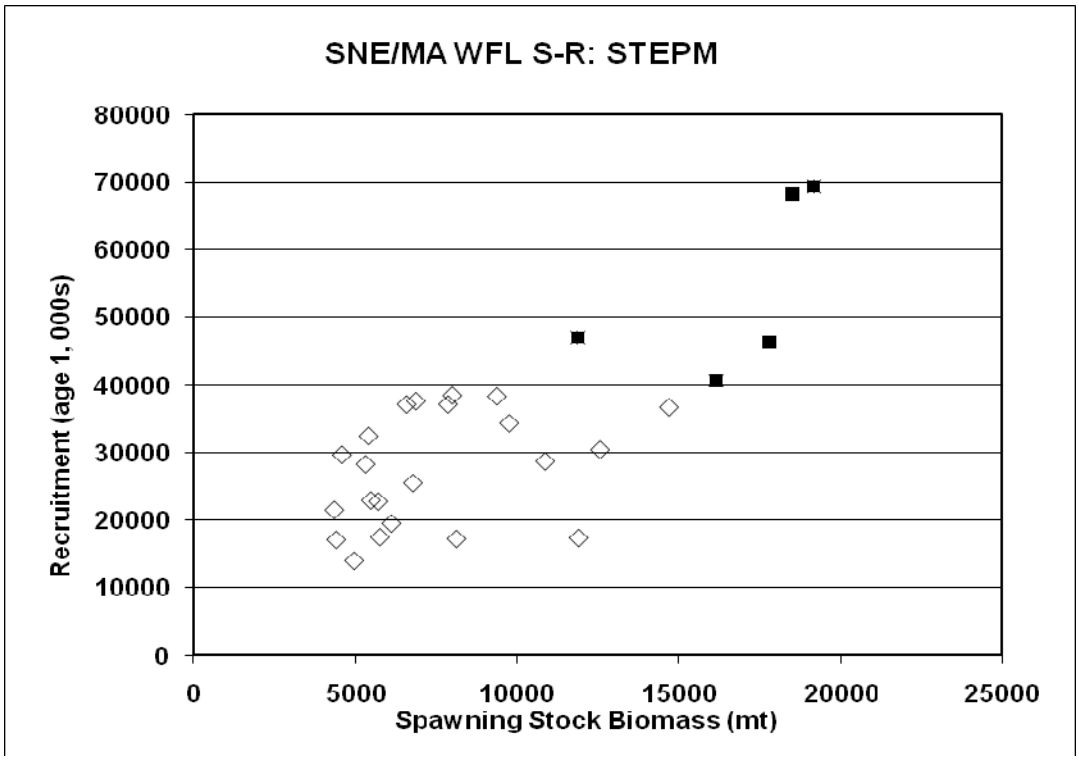


Figure A71. Stock-recruitment estimates from the final ASAP CAT10 model and alternative STEPM model. Five largest year classes (prior for recruitment) plotted in filled boxes.

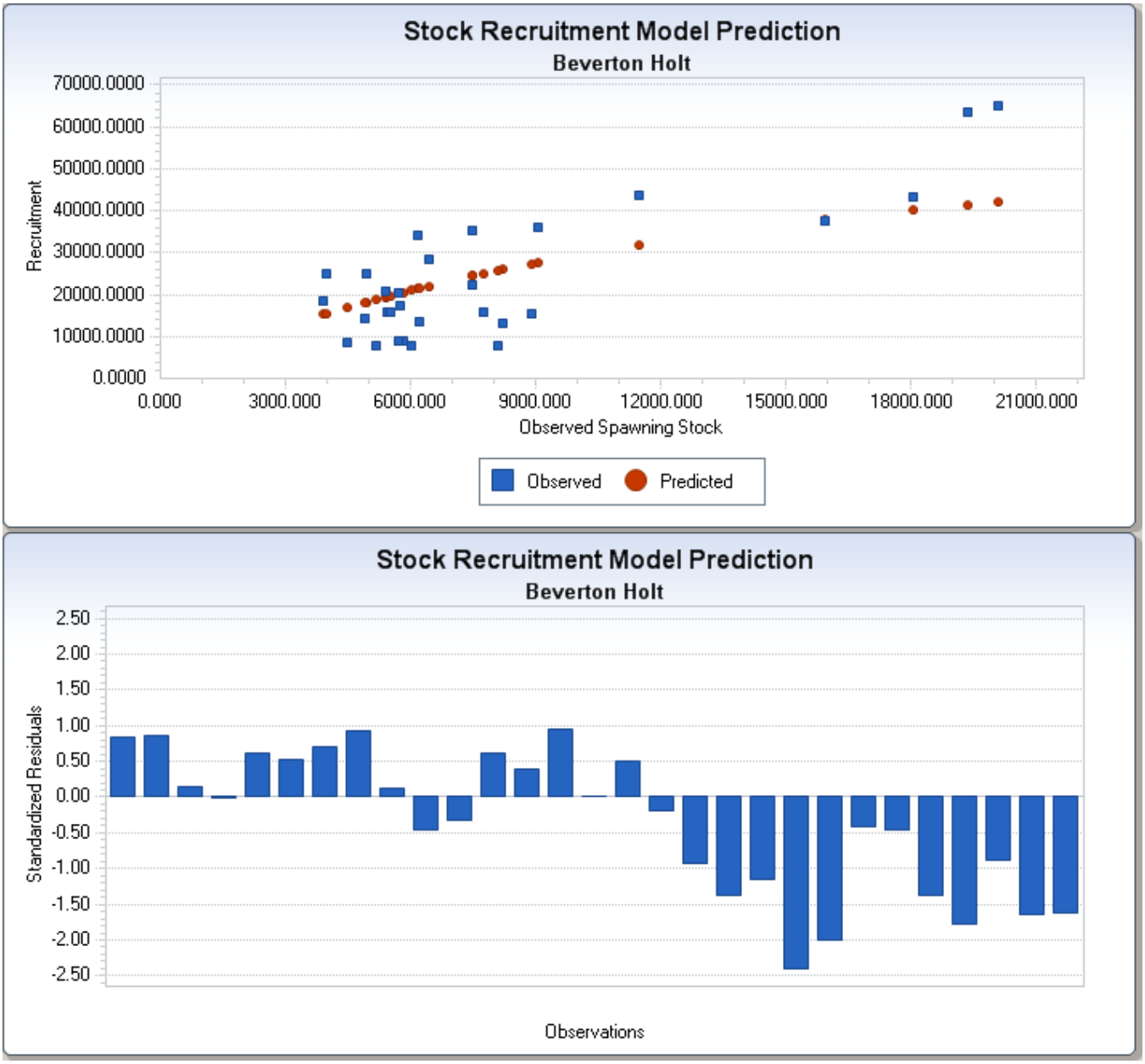


Figure A72. Stock-recruitment model fit with steepness prior (h = 0.8, SE = 0.09) for the ASAP CAT10 model estimates.

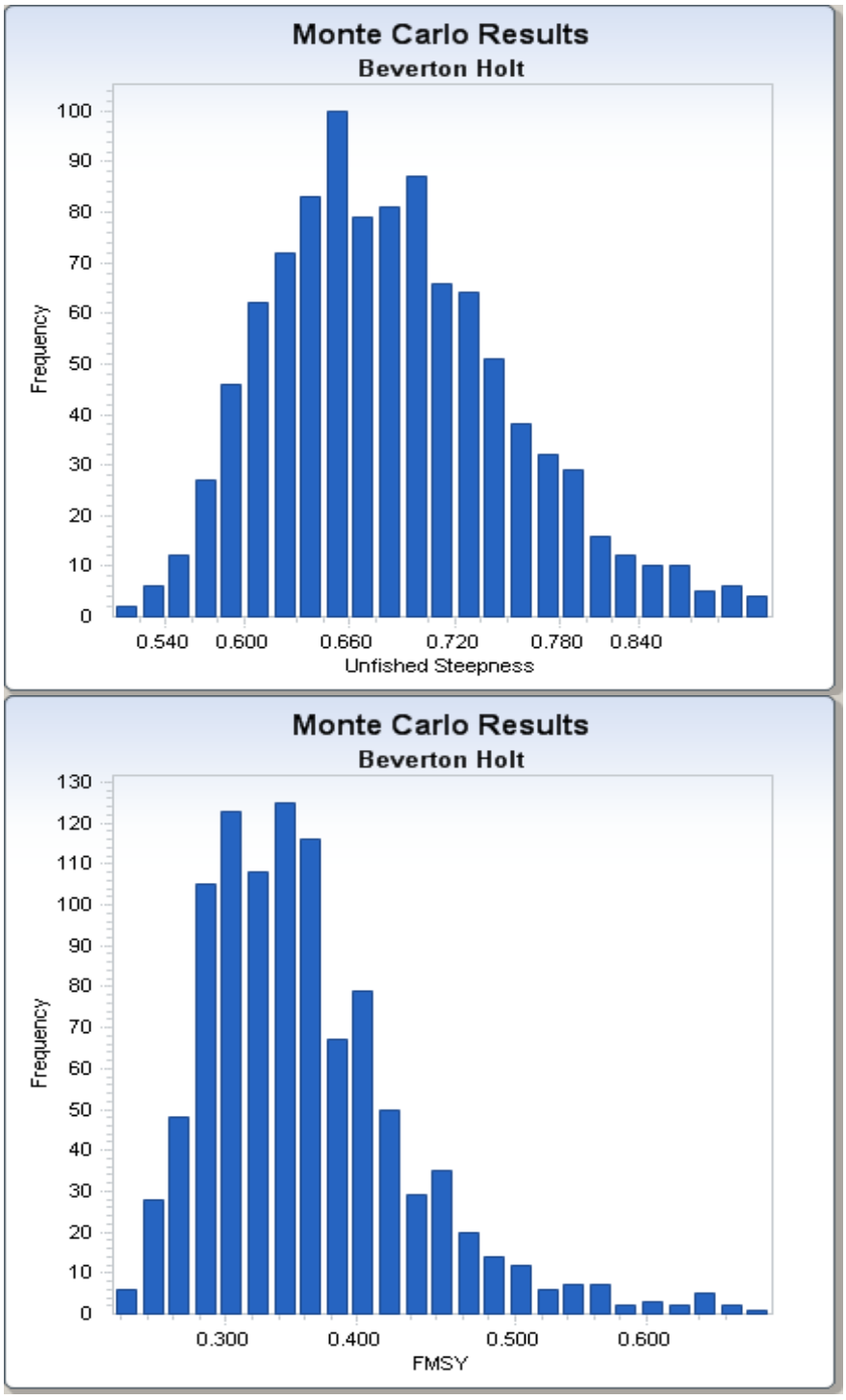


Figure A73. MCMC Results for the ASAP CAT10 stock-recruitment model with prior on steepness (h = 0.8; SE = 0.09).

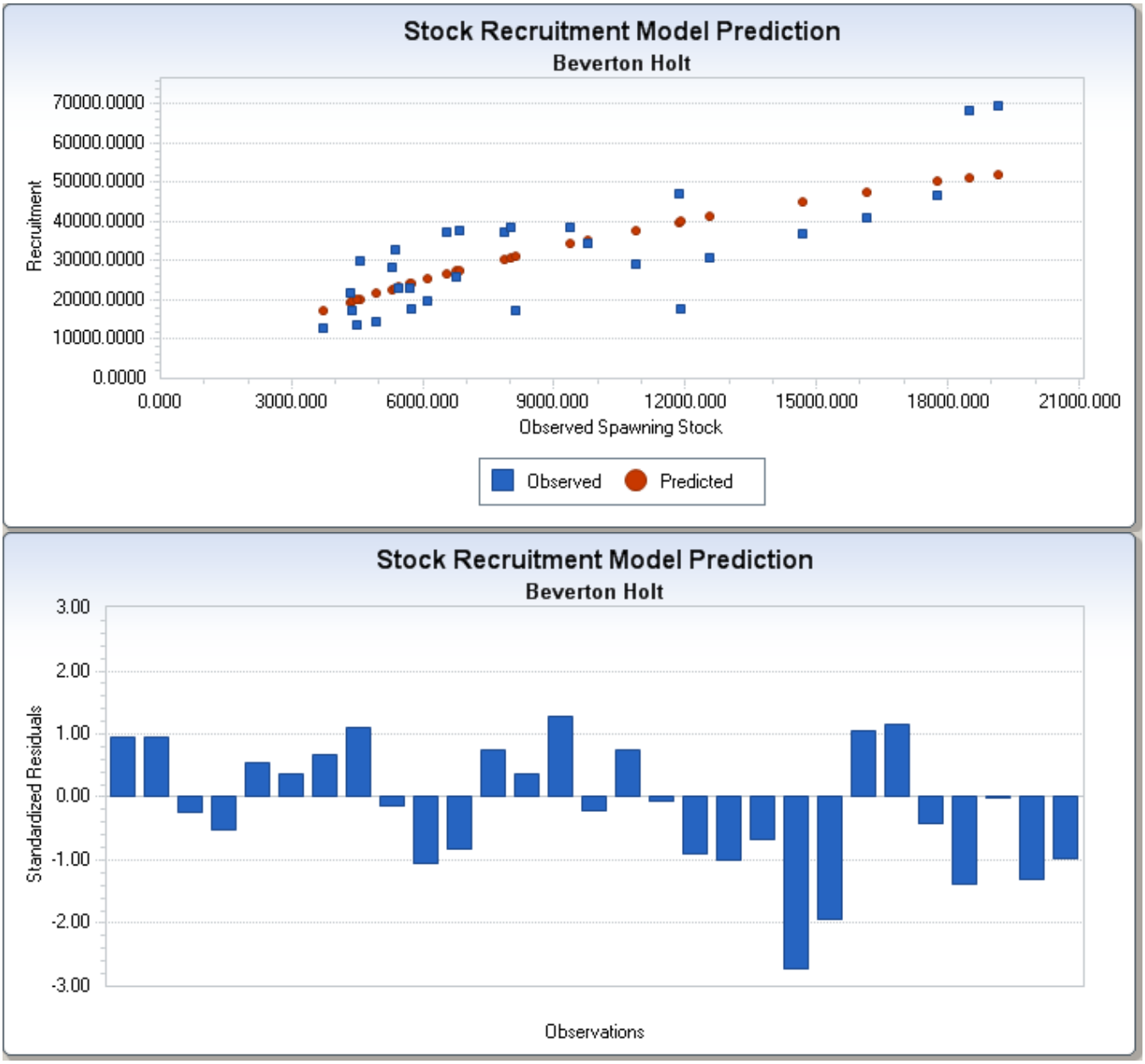


Figure A74. Stock-recruitment model fit with no priors for the ASAP STEPM M=0.3 model estimates.

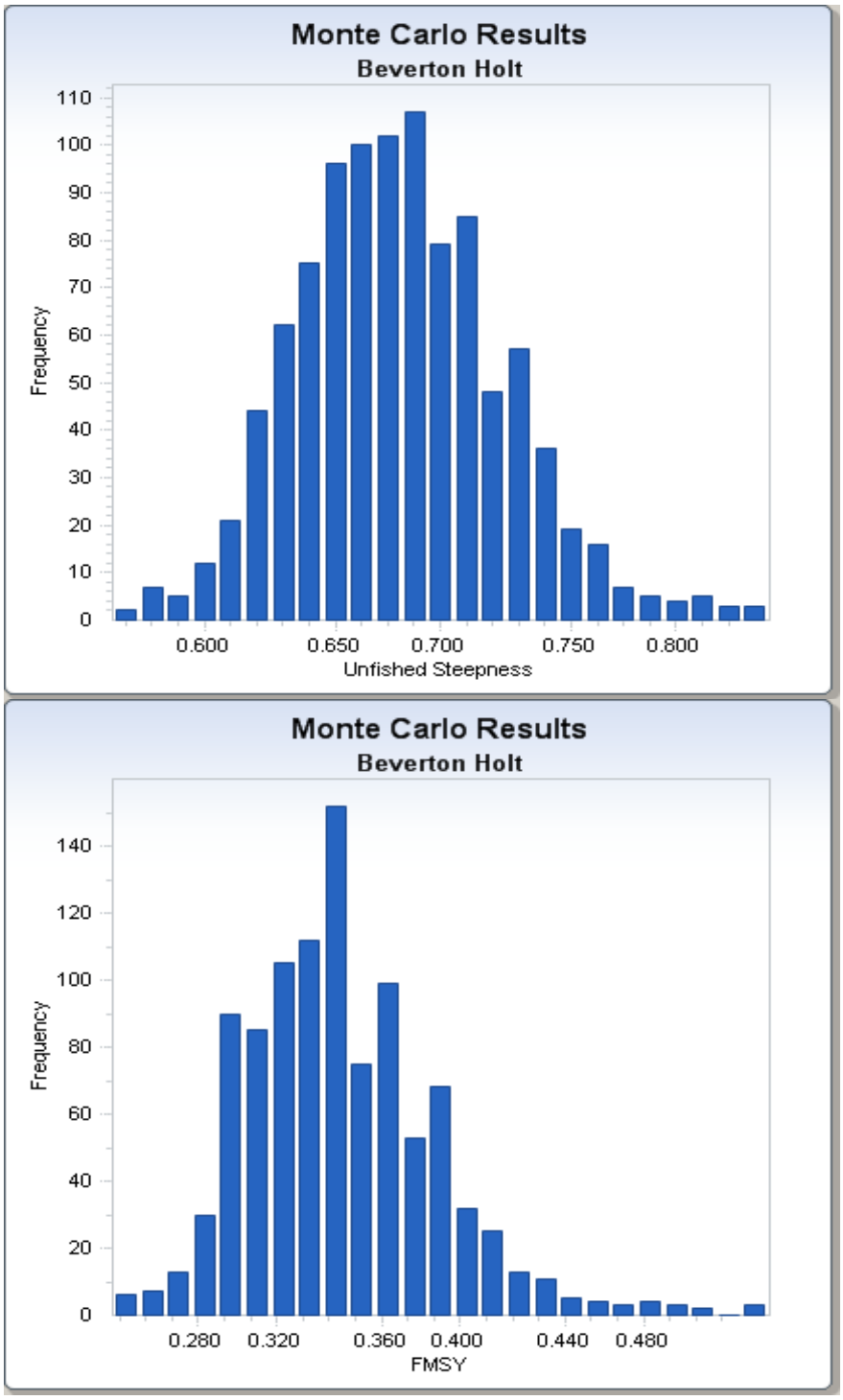


Figure A75. MCMC Results for the ASAP STEPM M = 0.3 stock-recruitment model with no priors.

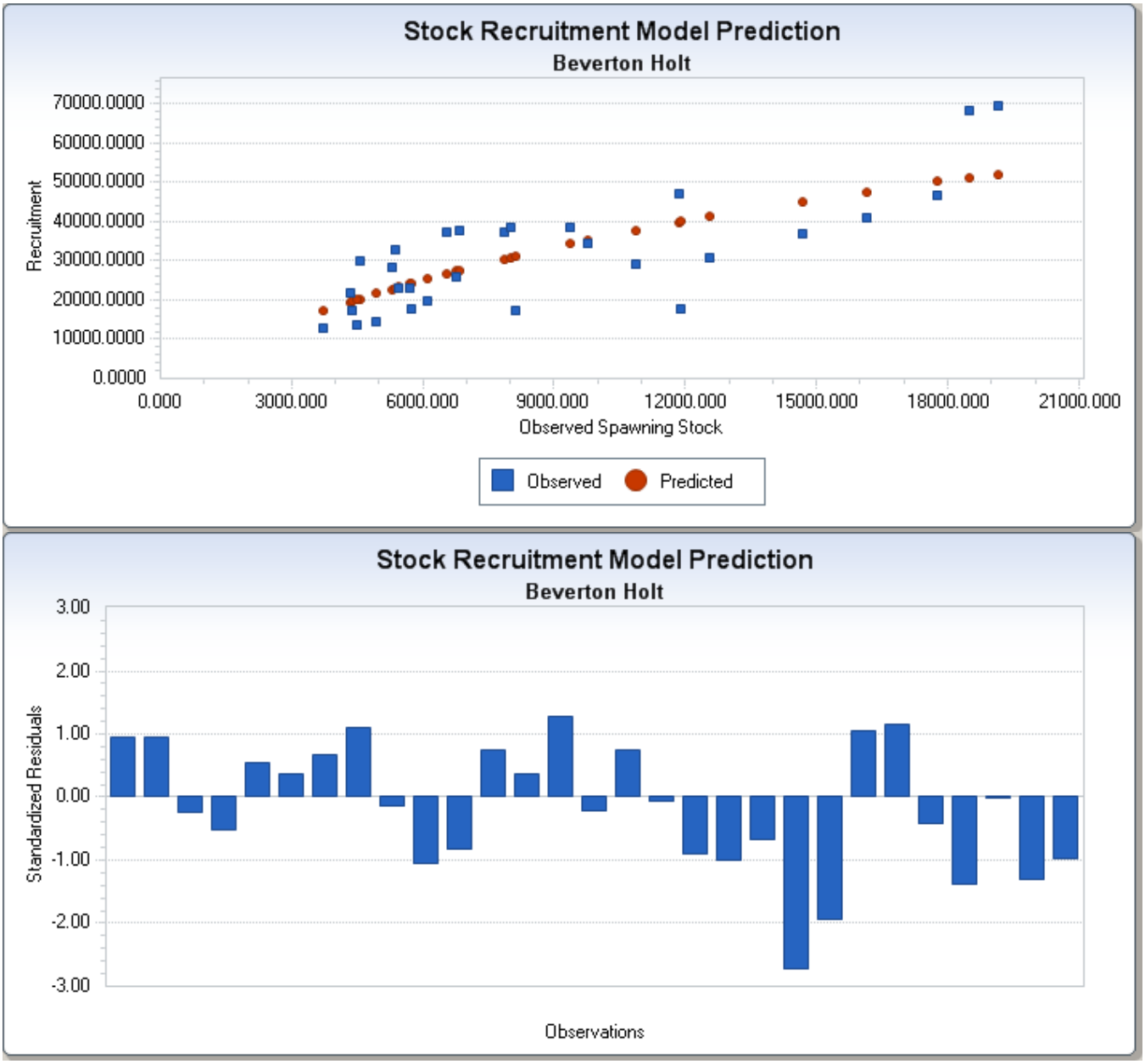


Figure A76. Stock-recruitment model fit with no priors for the ASAP STEPM M = 0.6 model estimates.

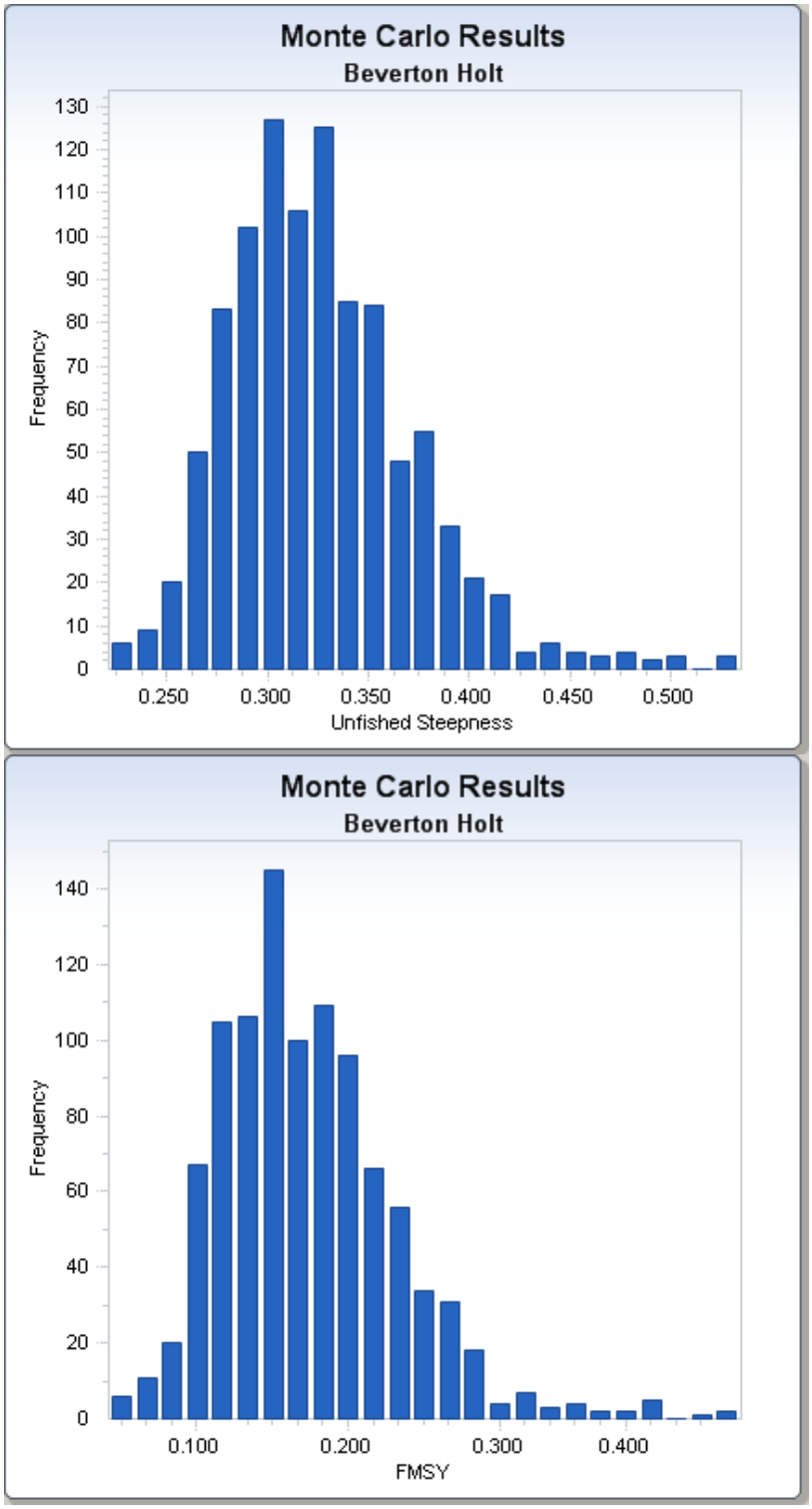


Figure A77. MCMC Results for the ASAP STEPM M=0.6 stock-recruitment model with no priors.

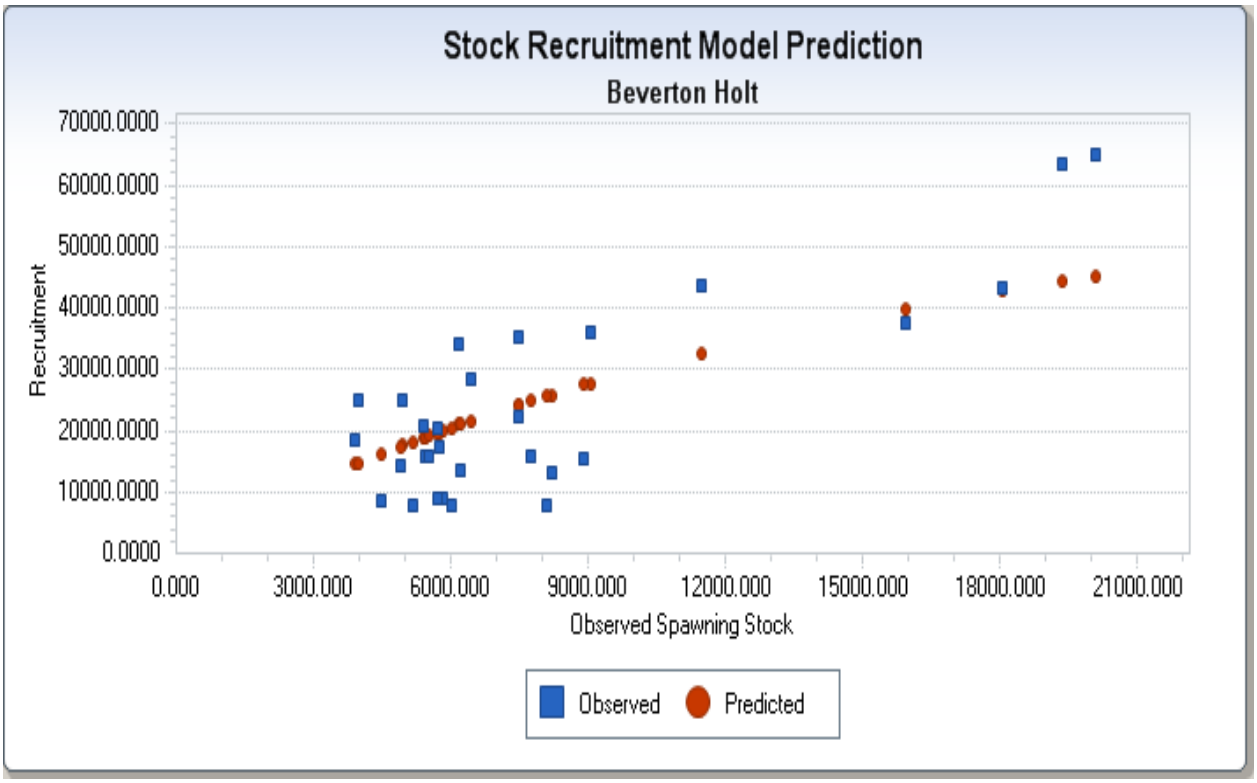


Figure A78. Final stock-recruitment model for SNE/MA winter flounder.

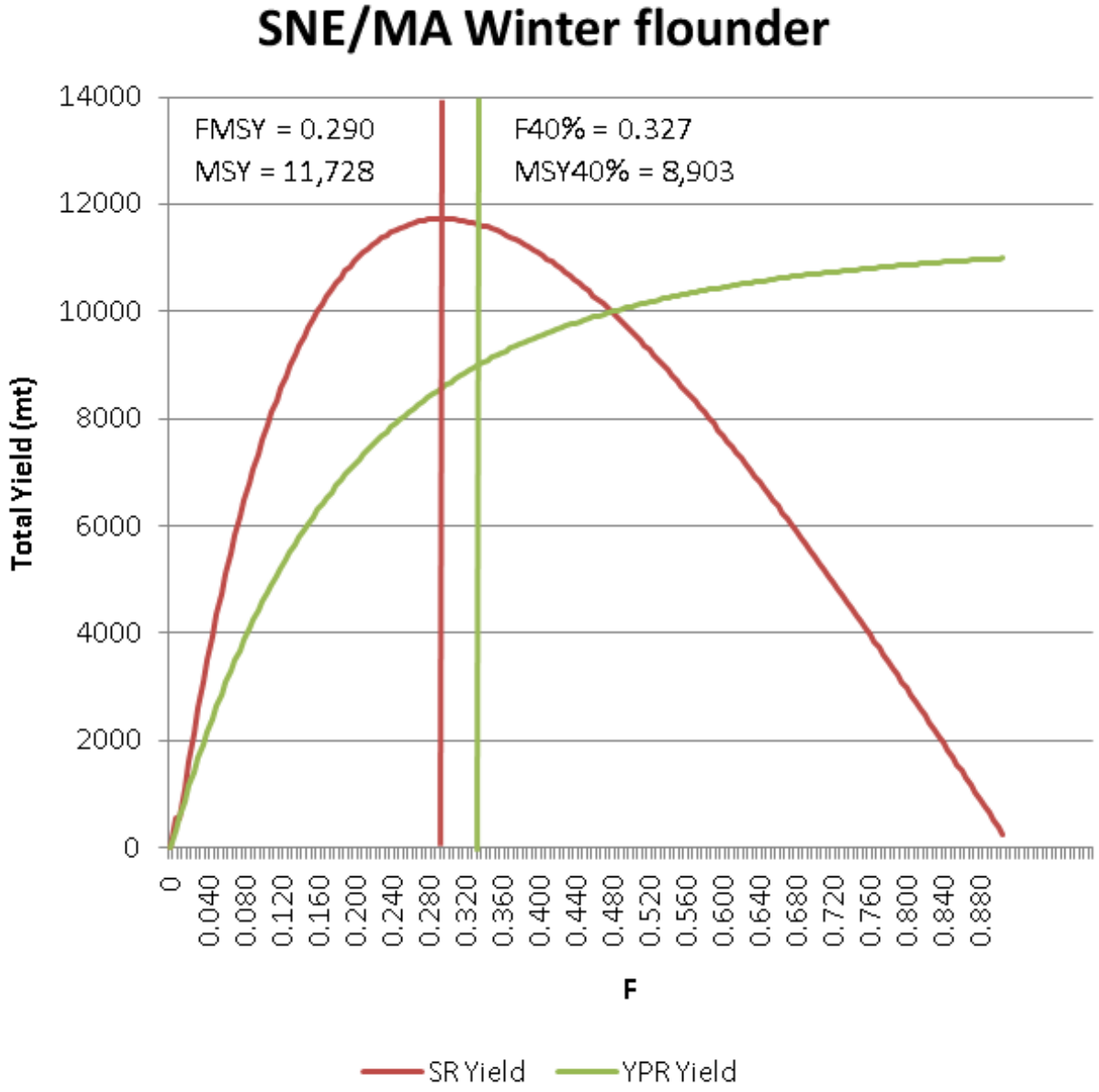


Figure A79. Comparison of fishing mortality versus total yield for stock-recruitment model based BRPs (FMSY, MSY) and yield per recruit model based BRPs (F40%, MSY40%).

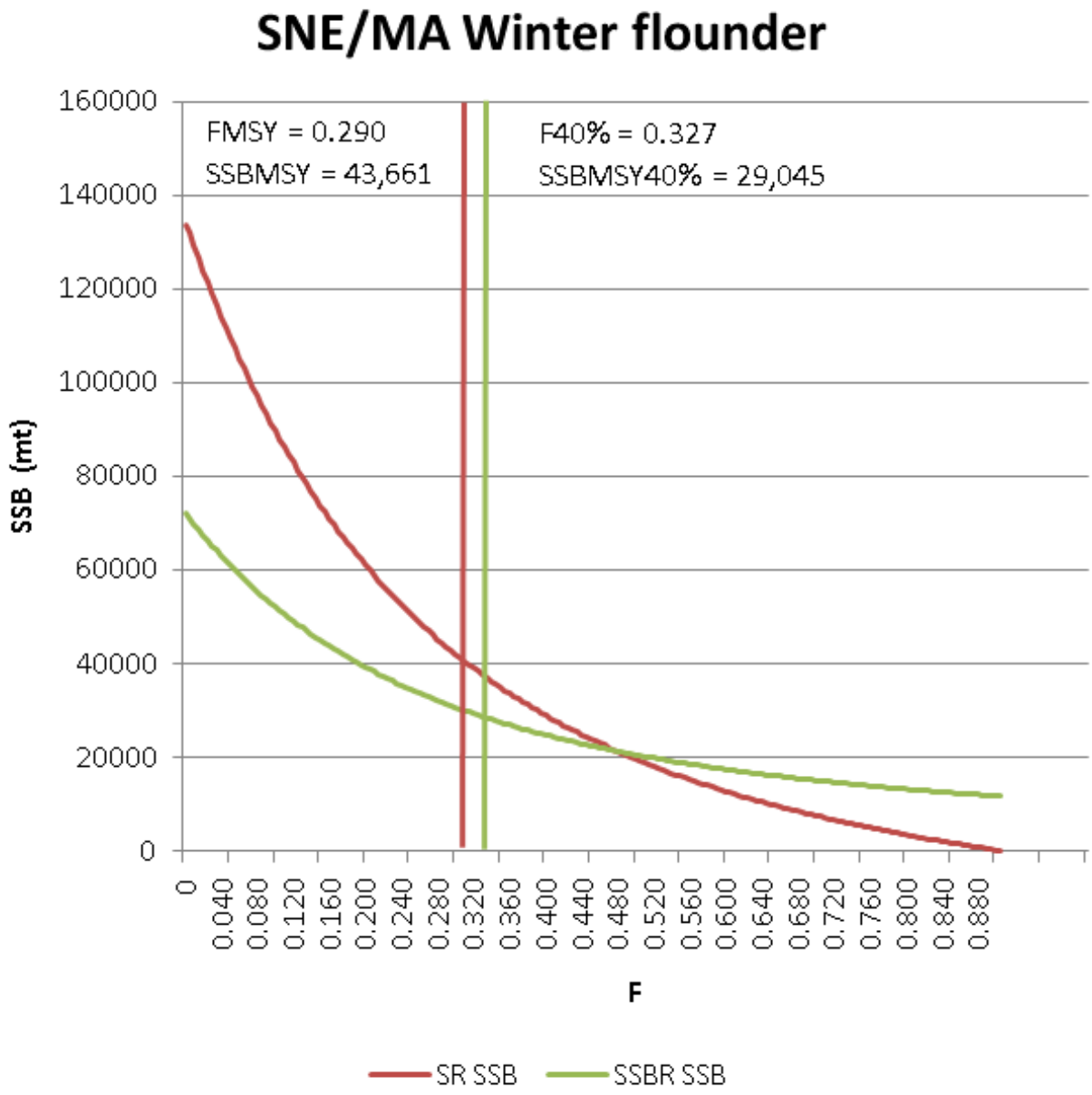


Figure A80. Comparison of fishing mortality versus SSB for stock-recruitment model based BRPs (FMSY, SSBMSY) and yield per recruit model based BRPs (F40%, SSB40%).

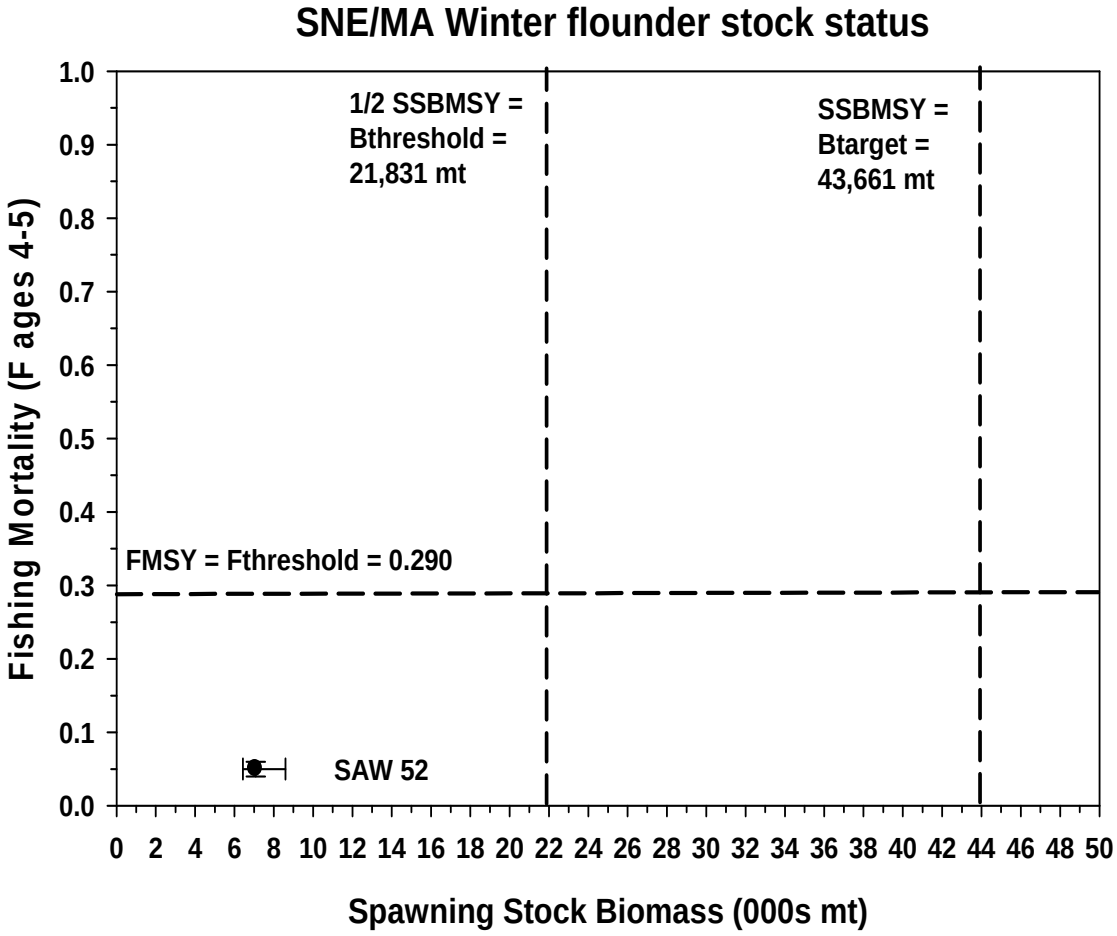


Figure A81. 2011 SAW 52 stock status for 2010 with respect to MSY-based BRPs; error bars are 80% confidence intervals.

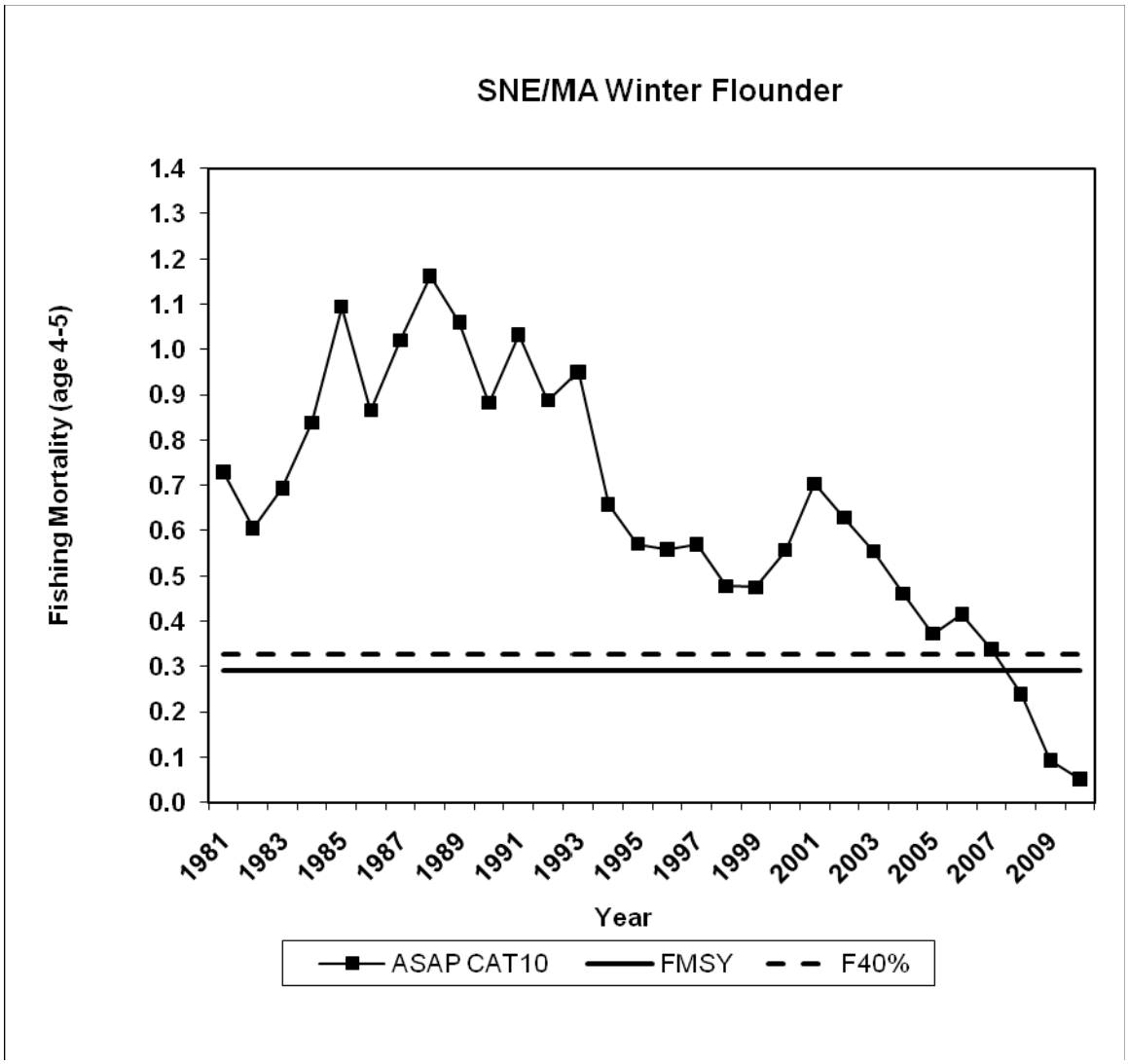


Figure A82. ASAP CAT10 model estimated trend in Fishing Mortality (age 4-5) and associated BRPs for SNE/MA winter flounder.

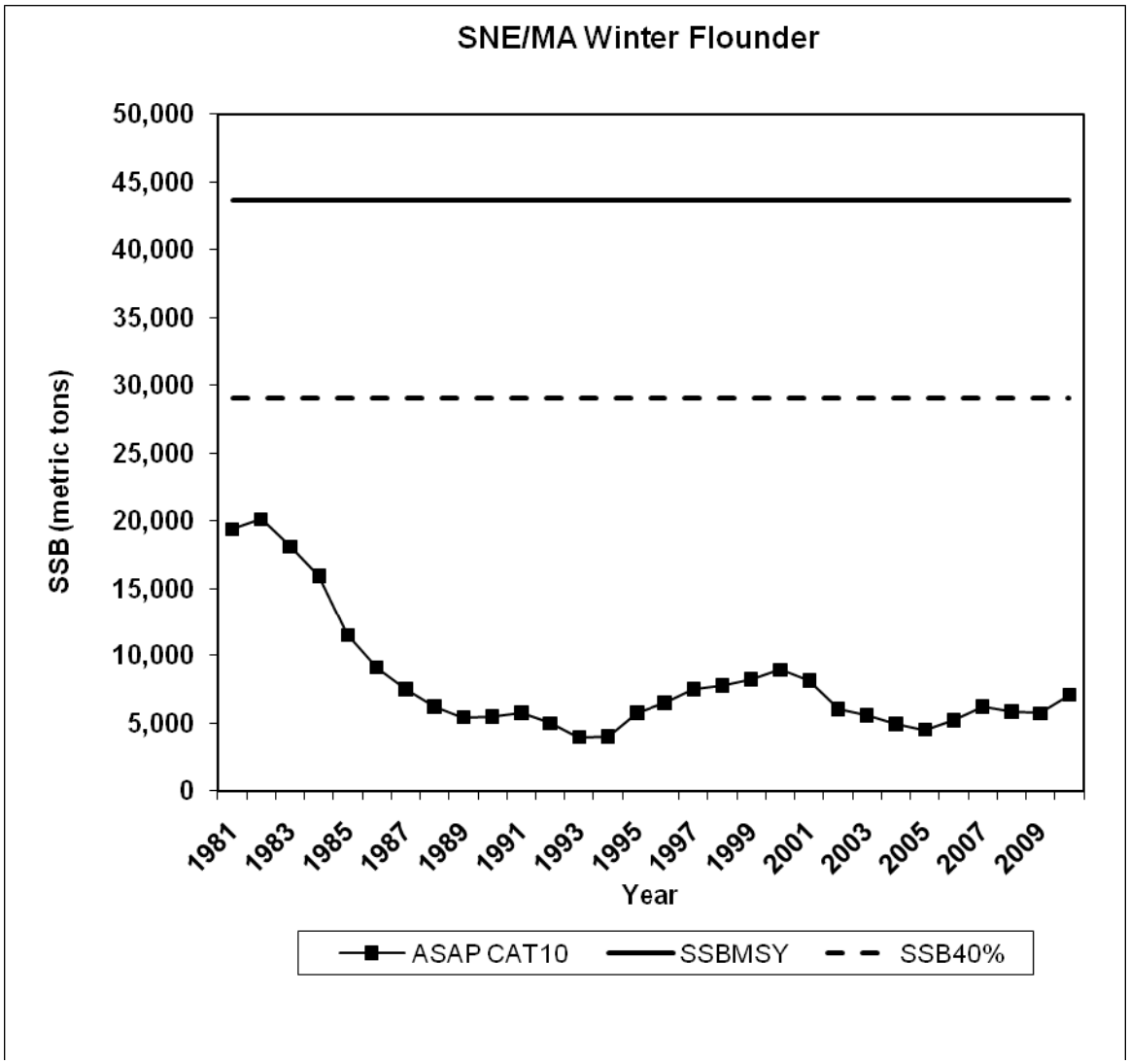


Figure A83. ASAP CAT10 model estimated trend in Spawning Stock Biomass (SSB) and associated BRPs for SNE/MA winter flounder.

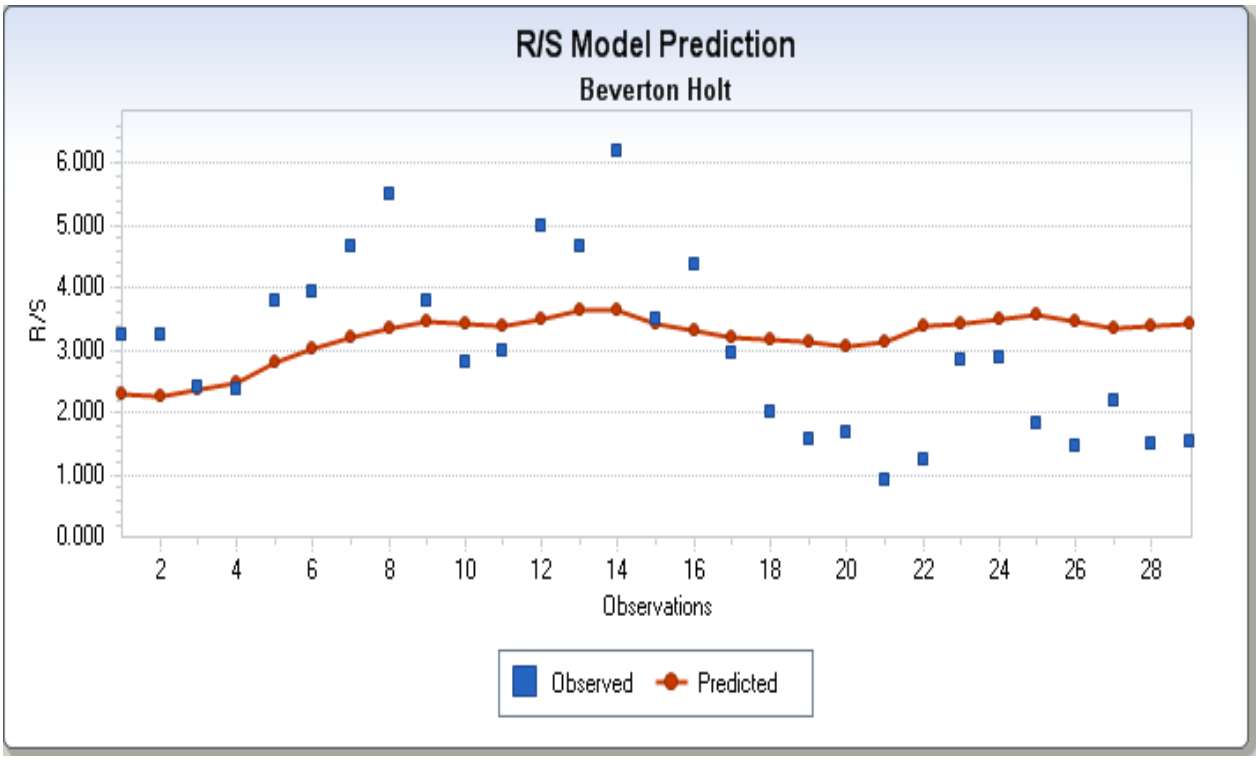


Figure A84. Time series trend in Recruits per Spawner (R/S) for SNE/MA winter flounder; most recent years are on the right side of the plot.