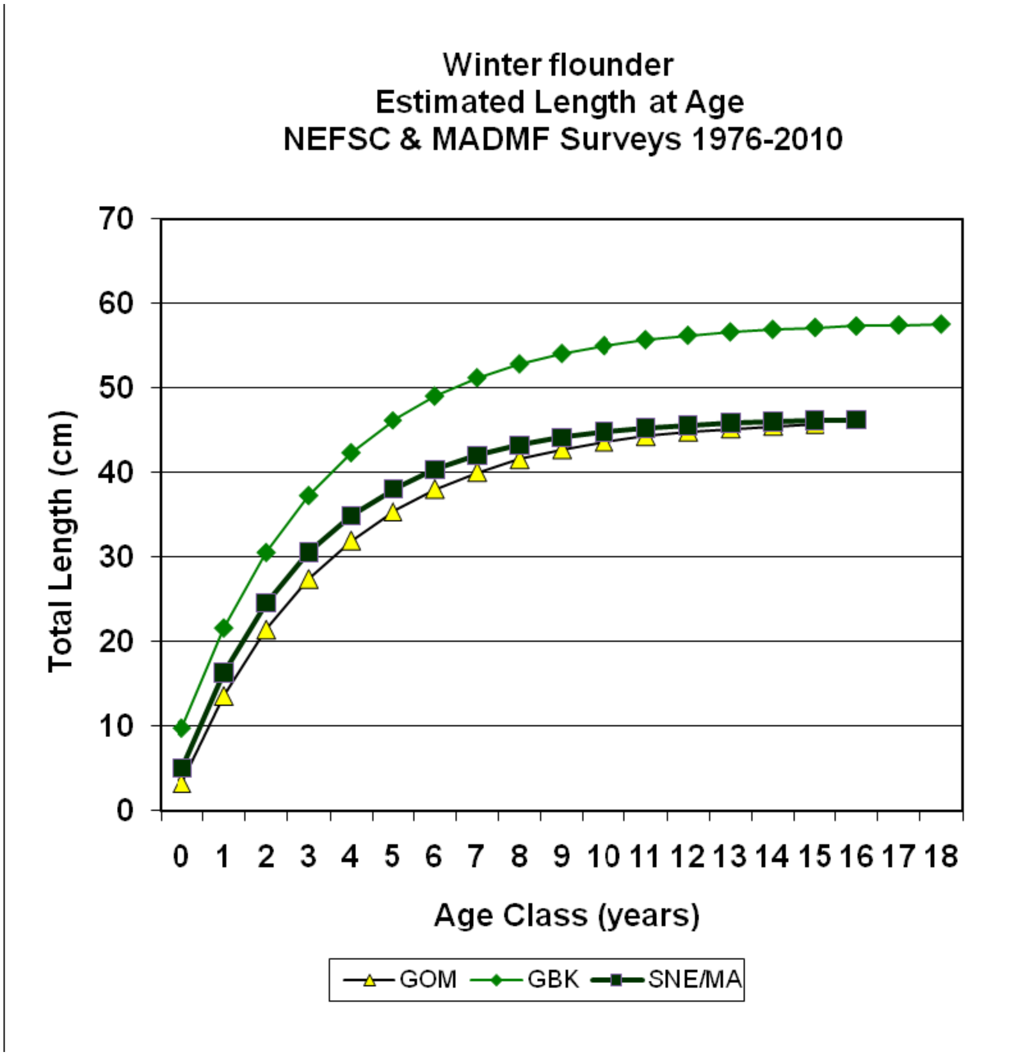


Figure B1. Comparison of estimated growth curves (von Bertalanffy growth) for winter flounder from the SNE/MA and Gulf of Maine stocks (based on MA DMF spring survey data) and the Georges Bank stock (based on NEFSC spring survey data).

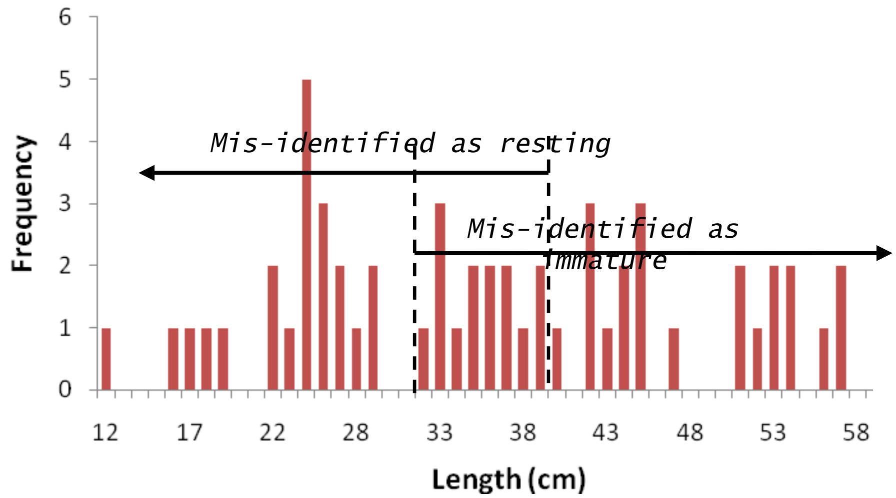


Figure B2. Length composition of Georges Bank winter flounder samples from a histology study which indicated that individuals < 38 cm were mis-identified as resting fish and individuals > 30 cm were mis-identified as immature fish.

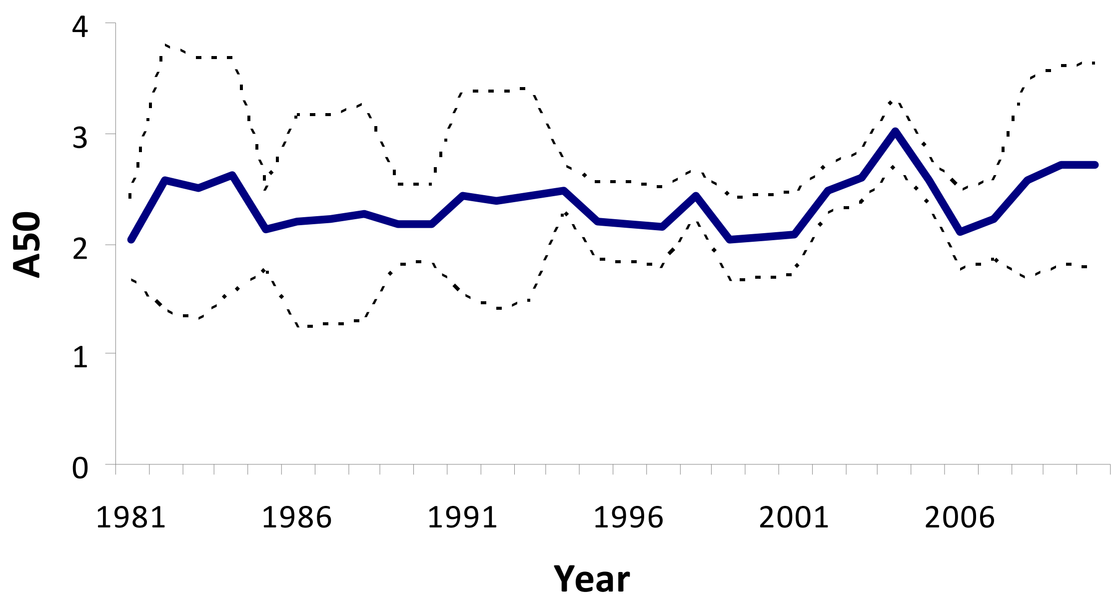


Figure B3. Three-year moving window (NEFSC spring surveys during 1981-2010) of female A50 values (age at 50% maturity) for Georges Bank winter flounder

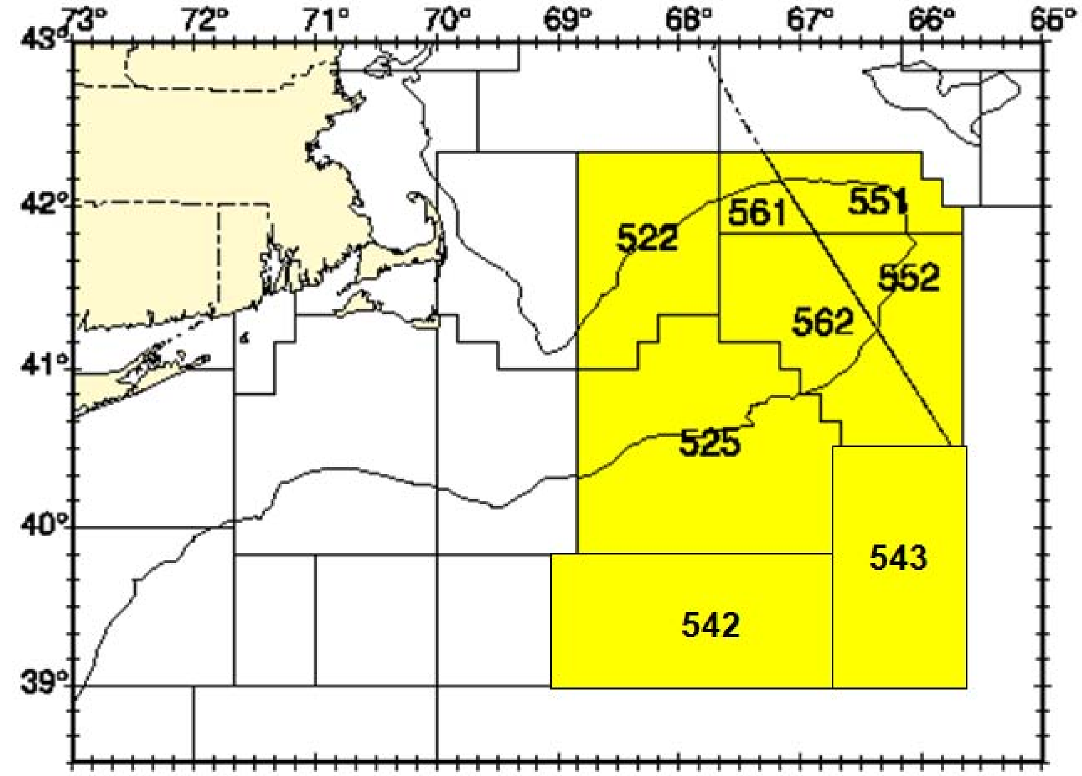


Figure B4. Statistical Areas used for reporting fishery data for the Georges Bank winter flounder stock.

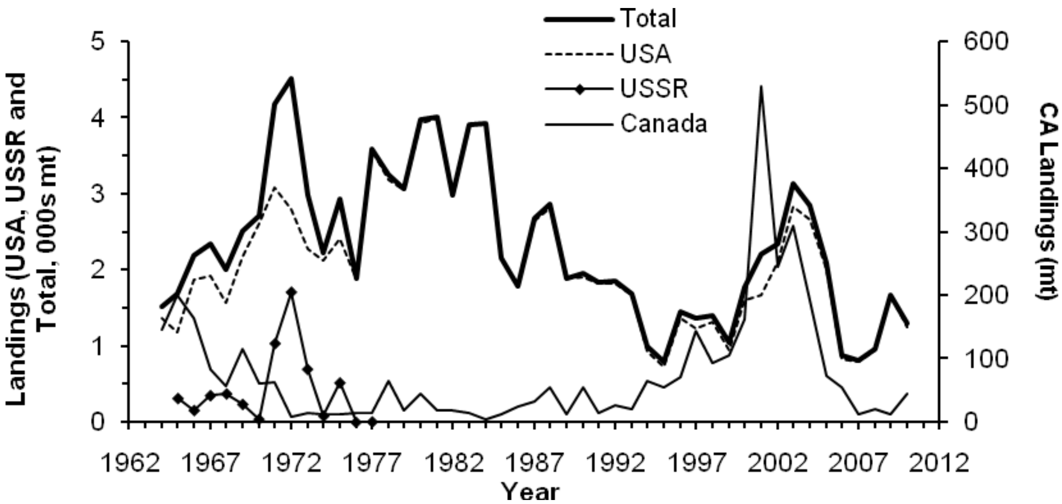


Figure B5. Landings (mt) of Georges Bank winter flounder, by country, during 1964-2010.

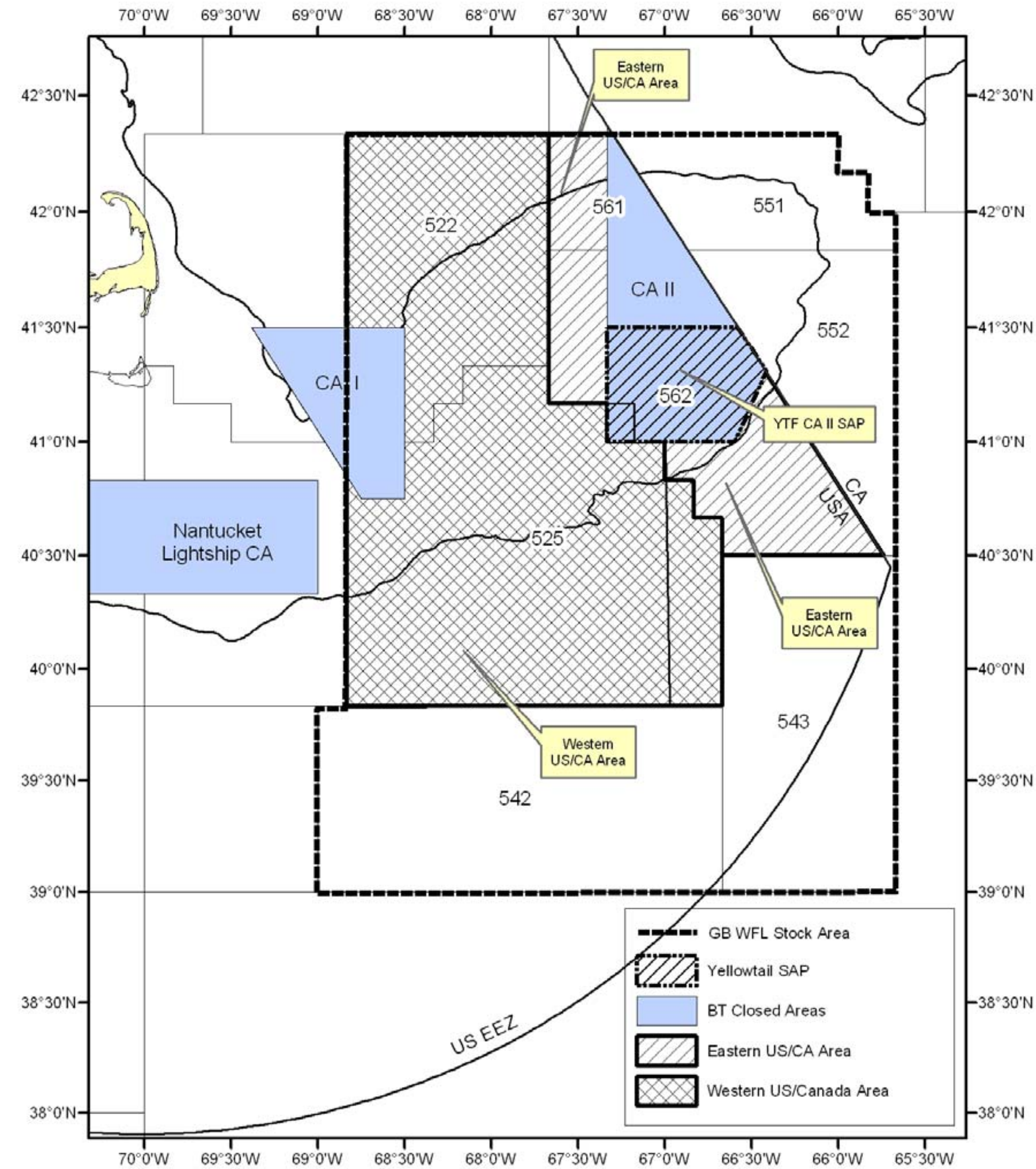


Figure B6. Management areas that impact the Georges Bank winter flounder stock (polygon denoted by a heavy dashed line). Blue polygons have been closed, since 1994, to bottom trawl vessels but have been open to scallop dredge vessels with fishery closures dependent on scallop and yellowtail flounder bycatch limits. The US/CA areas were implemented beginning in May of 2004 and involve jointly managed cod, haddock and yellowtail flounder stocks.

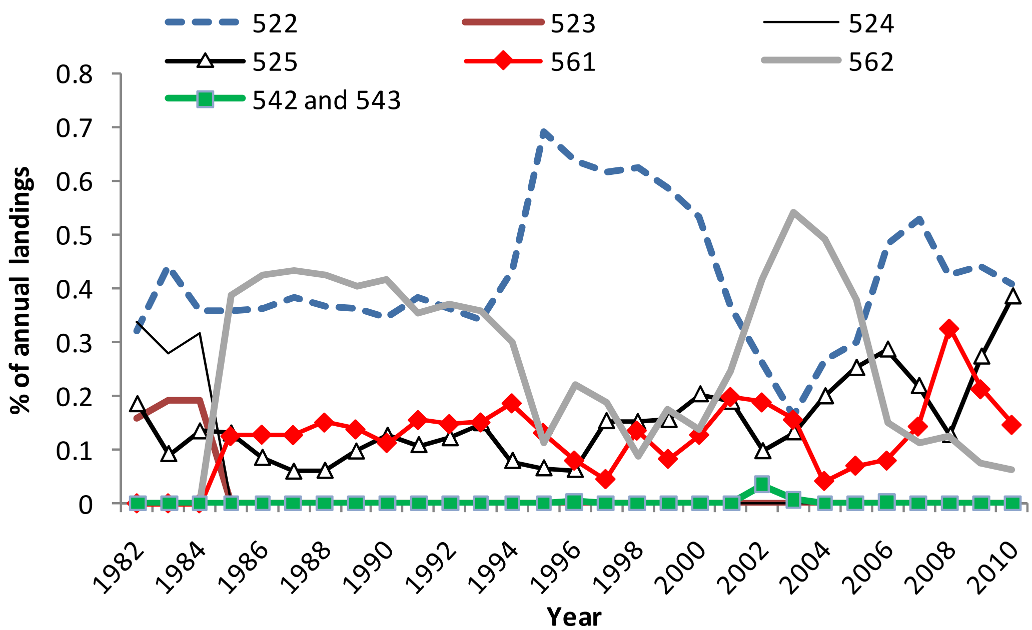


Figure B7. U.S. landings of Georges Bank winter flounder by Statistical Area.

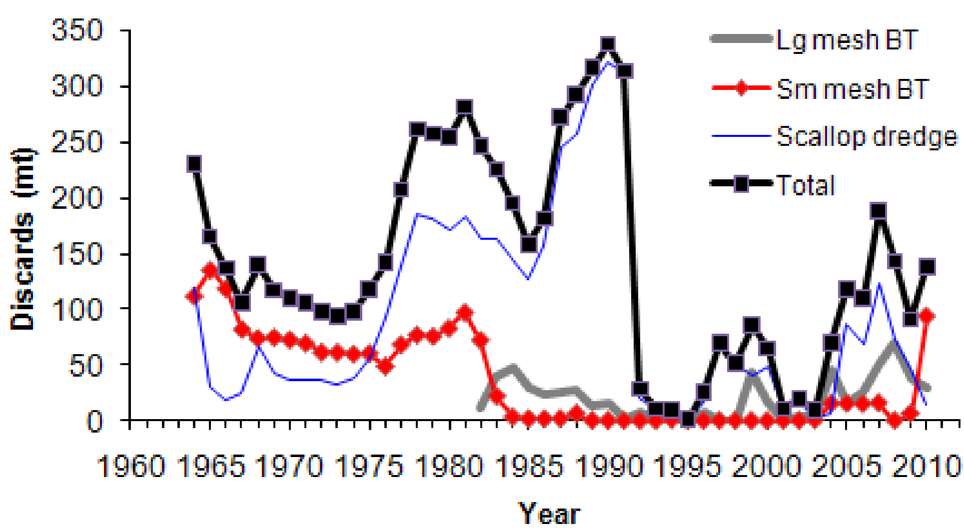


Figure B8. U.S. discards (mt) of Georges Bank winter flounder, by major gear type, during 1964-2010.

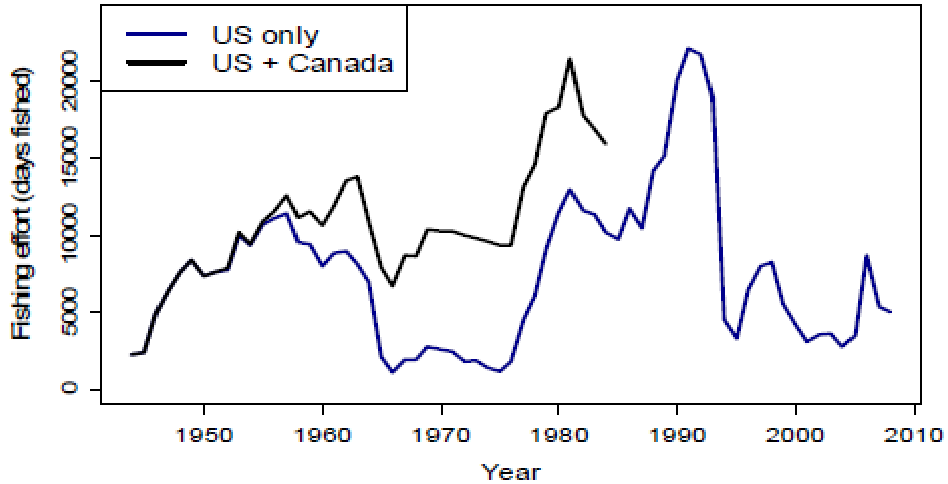


Figure B9. Fishing effort (days fished) in the US and combined US and Canadian sea scallop fisheries operating on Georges Bank, 1945-2009 (excerpted from NEFSC 2010).

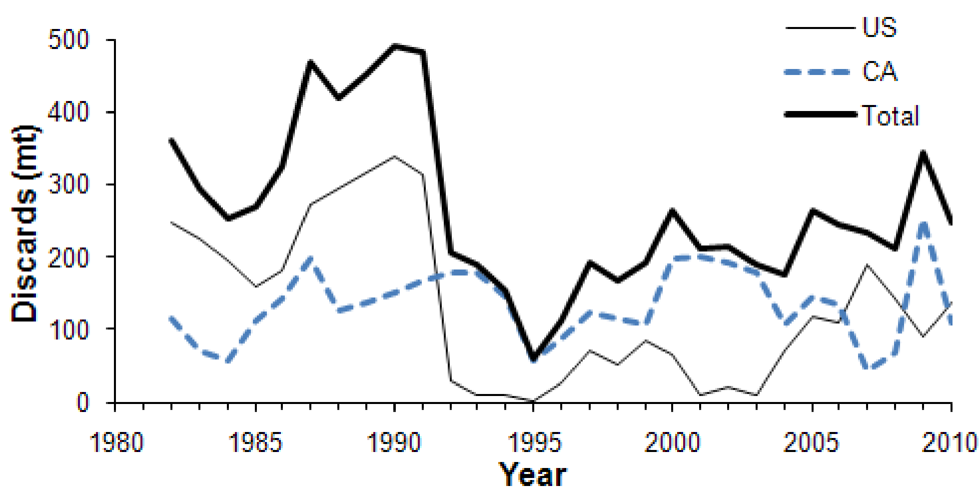


Figure B10. Estimates of total discards (mt) of Georges Bank winter flounder, by country, during 1982-2010.

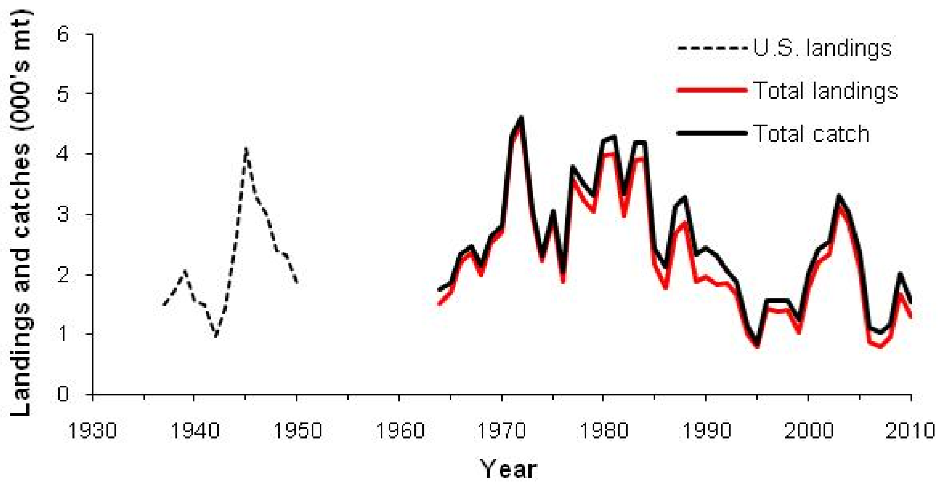


Figure B11. Historical U.S. landings of winter flounder from Georges Bank, during 1937-1950, in relation to total landings and catches during 1964-2010

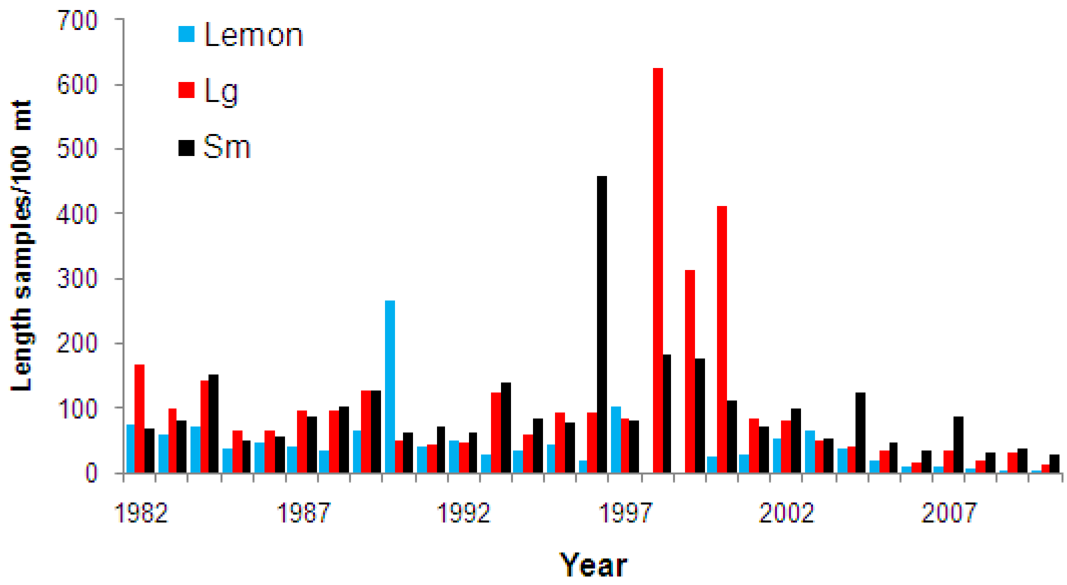


Figure B12. Length samples of Georges Bank winter flounder per 100 mt of landings, by market category group, during 1982-2010.

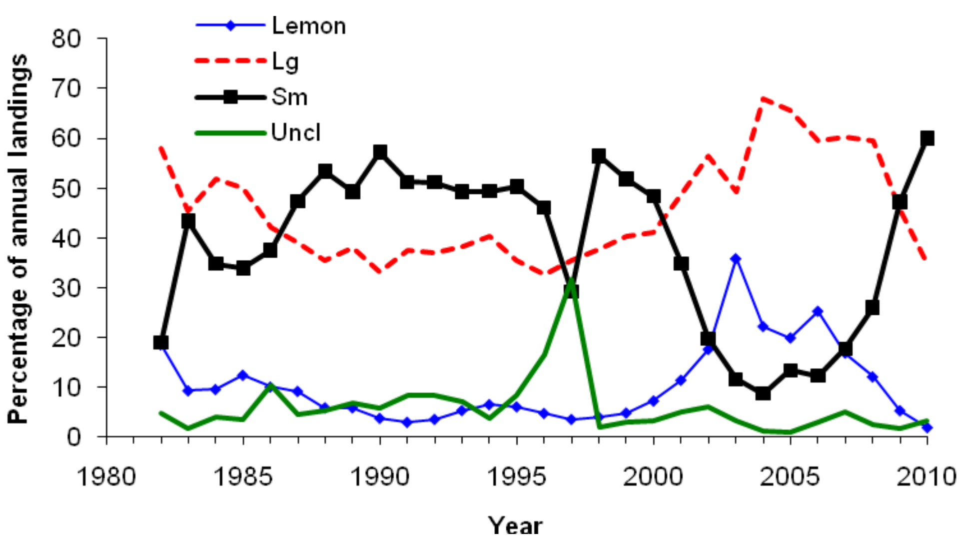


Figure B13. U.S. landings of Georges Bank winter flounder by market category group, 1982-2010.

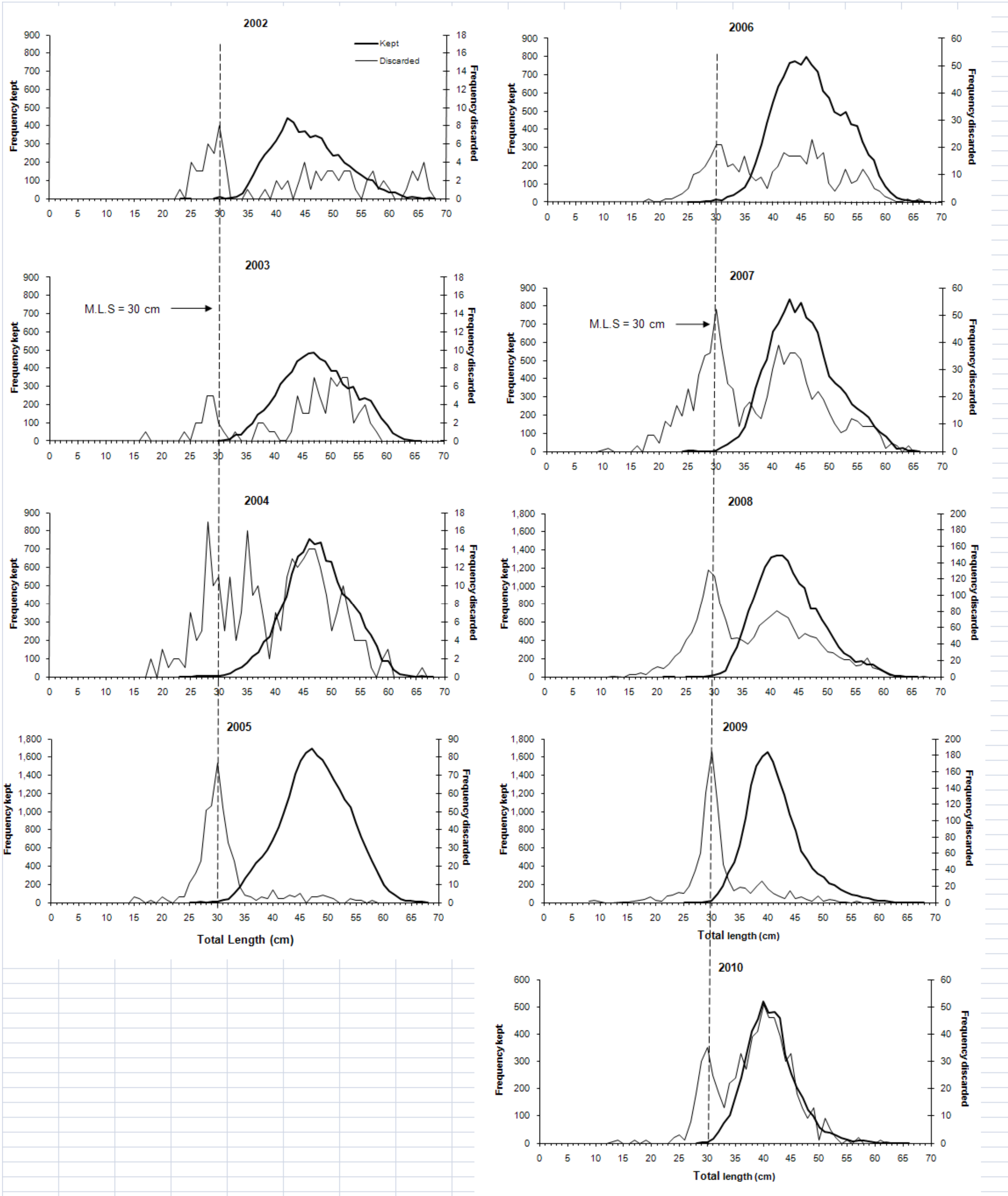


Figure B14. Length frequency distributions of Georges Bank winter flounder kept and discarded portions of bottom trawl catches sampled by fishery observers during 2002-2010.Dashed lines represent the minimum landings size limit.

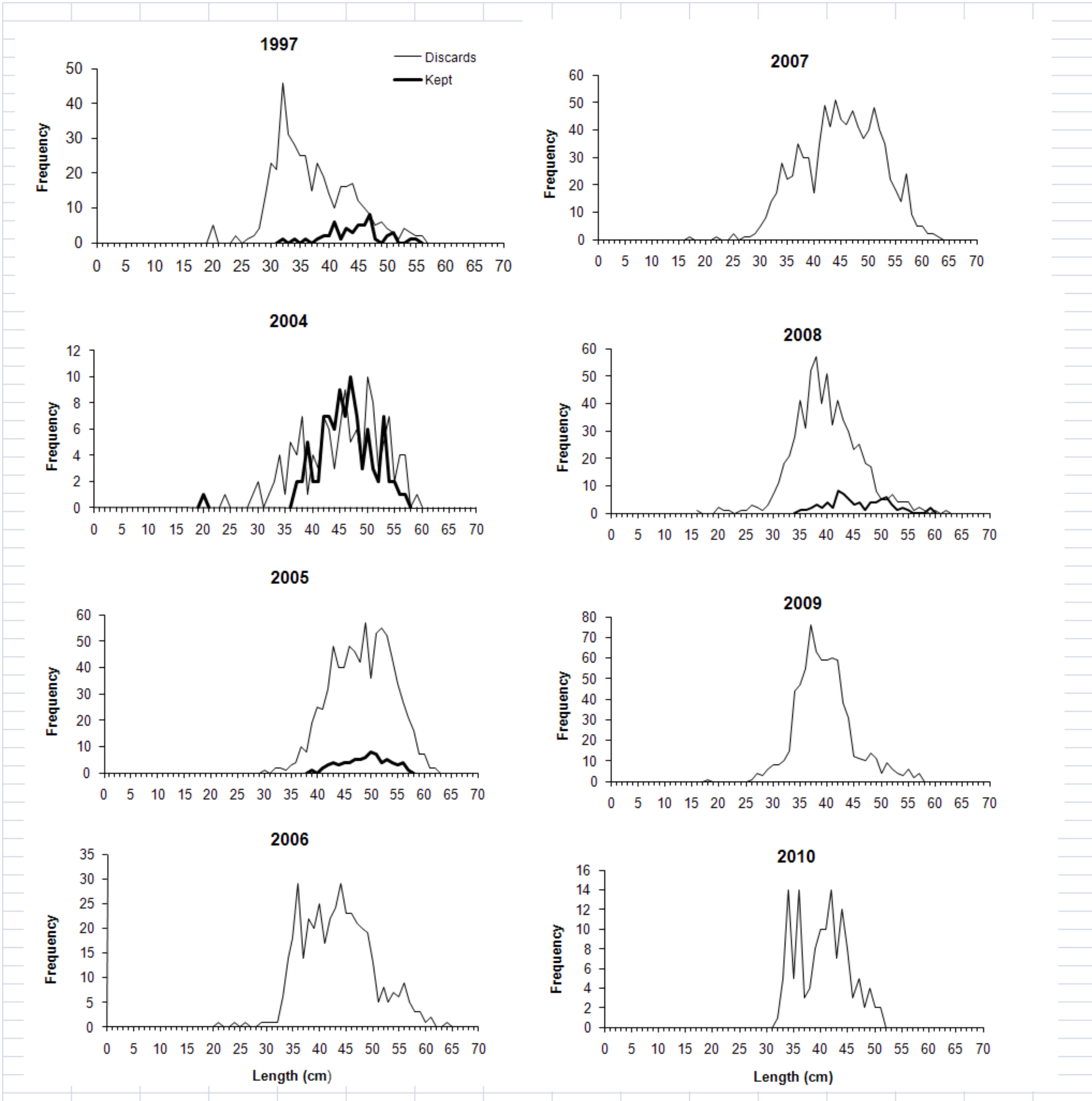


Figure B15. Length frequency distributions of Georges Bank winter flounder kept and discarded portions of scallop dredge catches sampled by fishery observers during 1997 and 2004-2010. Dashed lines represent the minimum landings size limit

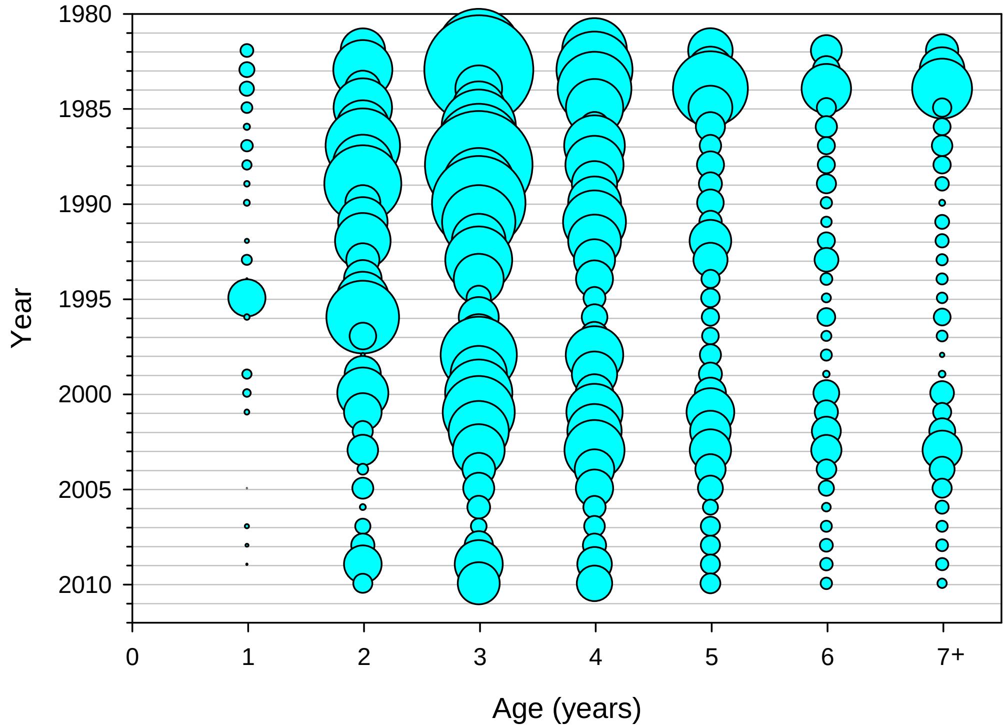


Figure B16. Georges Bank winter flounder catch-at-age during 1982-2010. Catches increase with circle size.

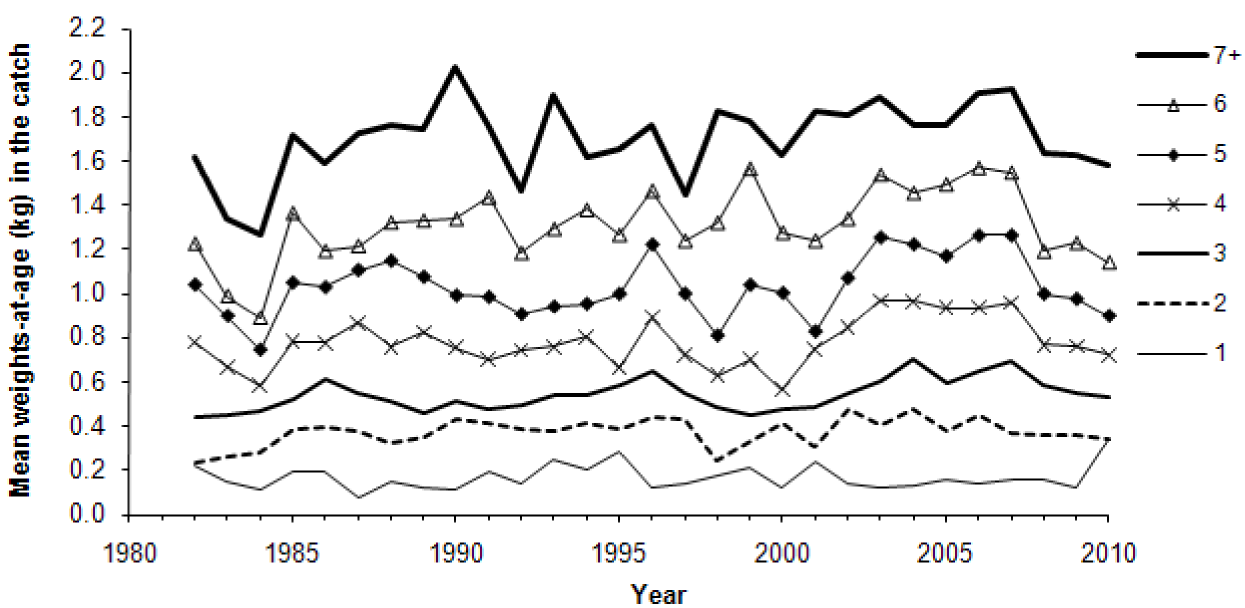


Figure B17. Trends in mean weights-at-age (kg) in the catches of GB winter flounder, 1982-2010.

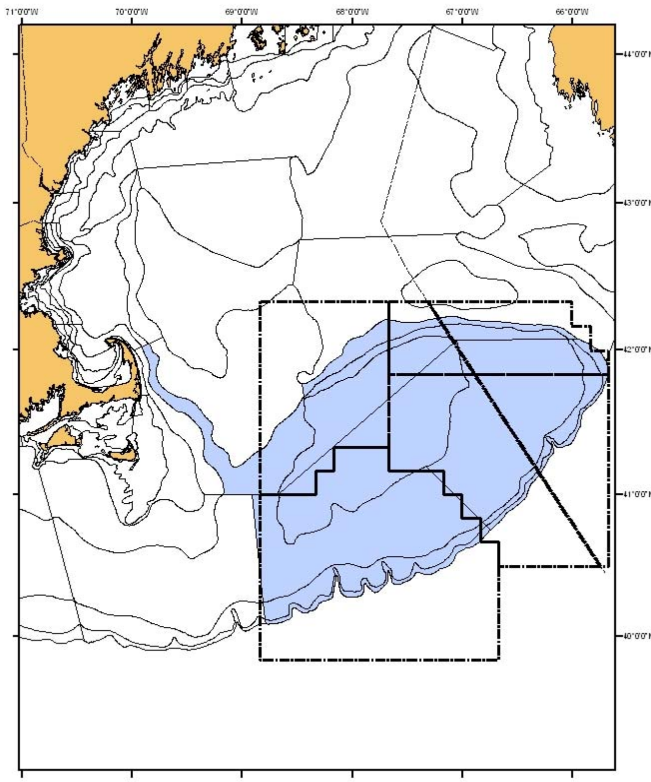


Figure B18. NEFSC survey strata (13-23) included in the assessment of Georges Bank winter flounder in relation to fishery Statistical Areas for the stock.

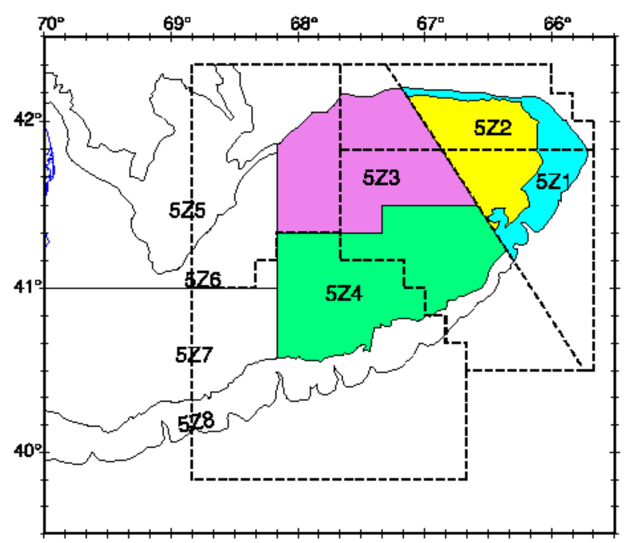


Figure B19. Strata (5Z1-5Z4) from the Canadian spring survey included in the assessment of Georges Bank winter flounder in relation to fishery Statistical Areas for the stock.

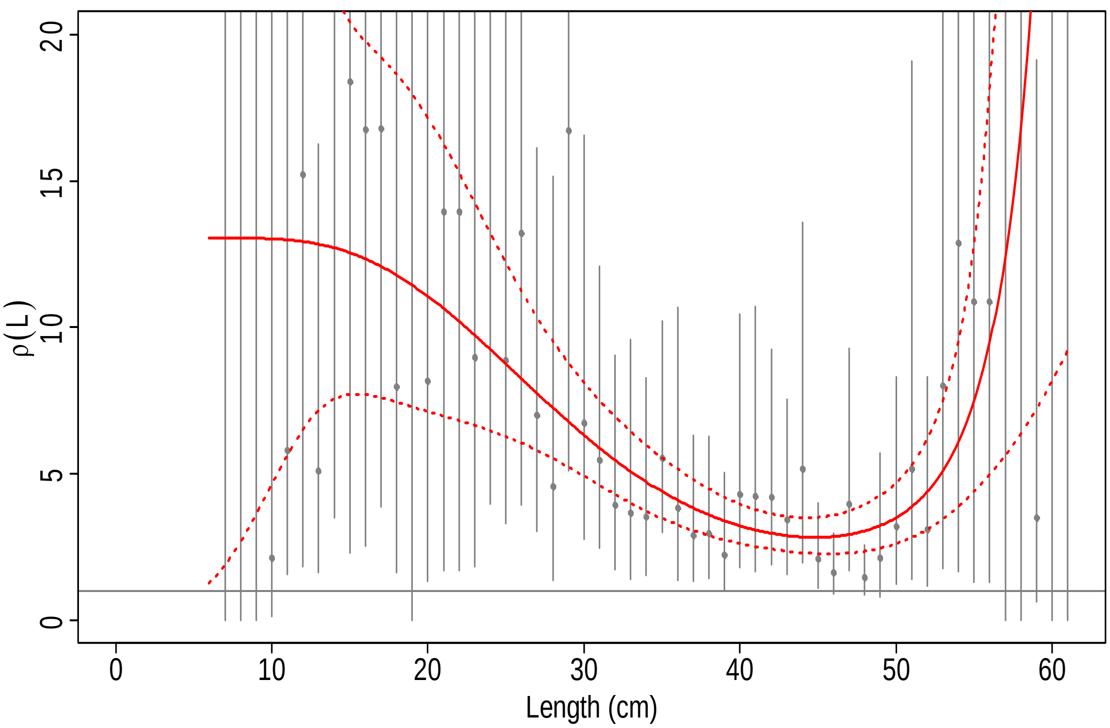
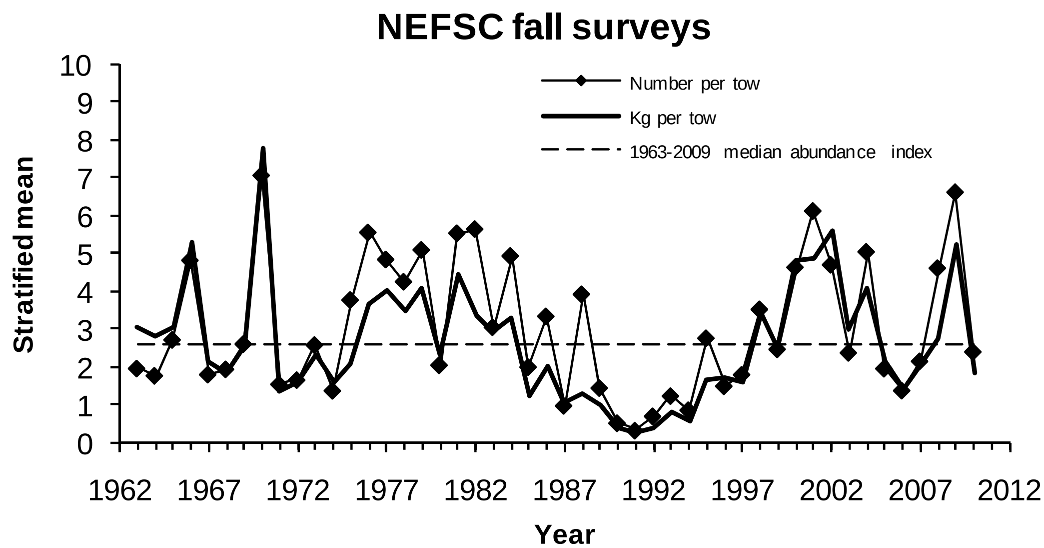


Figure B20. Relative catch efficiency of Georges Bank winter flounder from a beta-binomial model where relative catch efficiency was modeled as an orthogonal polynomial smoother of length (solid red line) and from separate models fit to catch data in each length class (gray points). The dashed red lines and vertical gray lines represent approximate 95% confidence intervals. The horizontal gray line represents equal efficiency of the SRVs *Henry B. Bigelow* and *Albatross IV*.



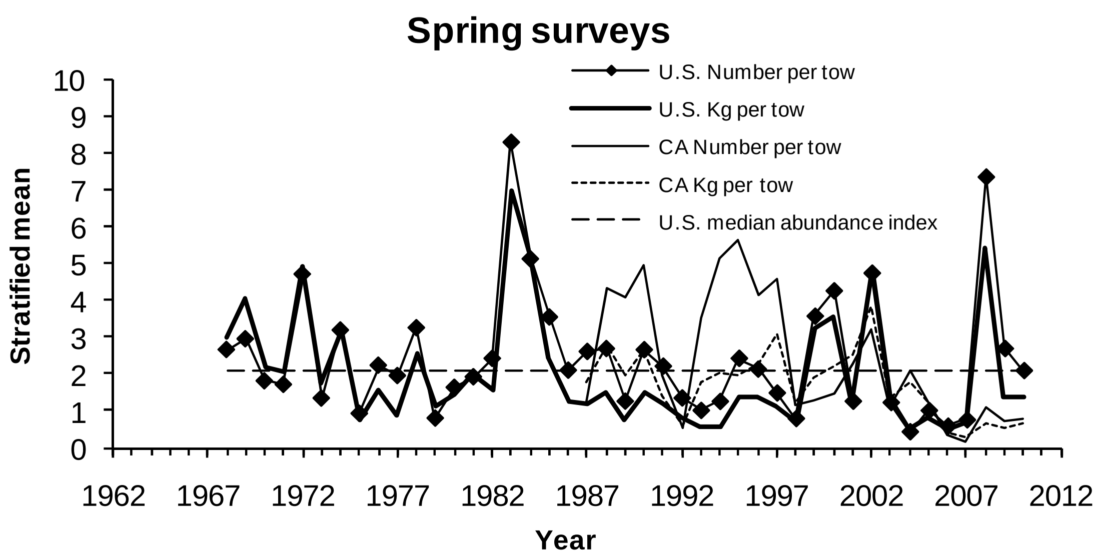


Figure B21. Relative biomass (stratified mean kg per tow) and abundance (stratified mean numbers per tow) indices for Georges Bank winter flounder caught during (top) NEFSC fall (1963-2010) bottom trawl surveys and (bottom) NEFSC spring (1968-2010) and Canadian spring (1987-2010 strata 5Z1-5Z4) bottom trawl surveys. NEFSC survey indices include strata 13-23 and were standardized for gear changes (weight = 1.86 and numbers = 2.02) and trawl door changes (weight = 1.39 and numbers = 1.46) prior to 1985. NEFSC indices for the SRV *H.B. Bigelow*, from 2009 onward, were converted to SRV *Albatross* equivalents using length-based conversion factors.

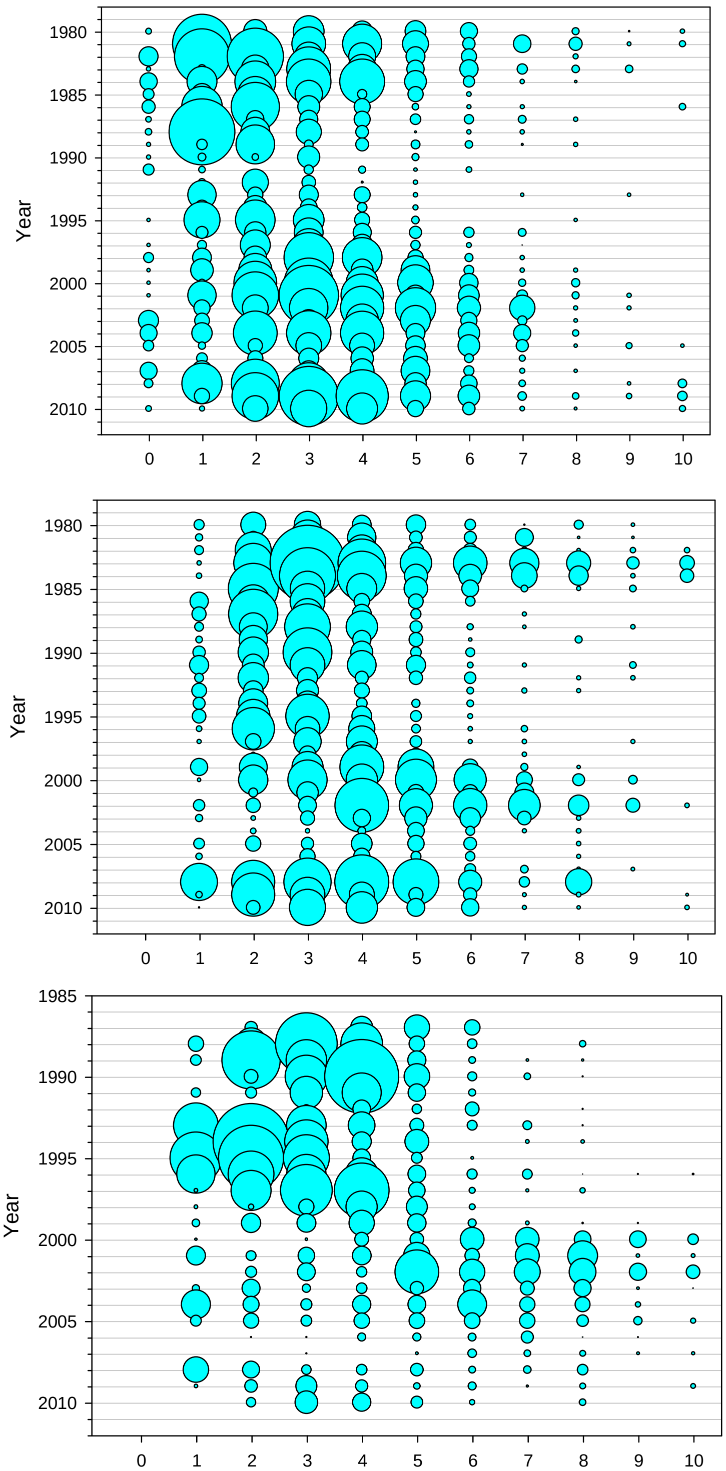


Figure B22. Stratified mean number per tow-at-age indices for (top) NEFSC fall bottom trawl surveys (1963-2010), (middle) NEFSC spring surveys (1968-2010) and (bottom) CA spring surveys (1987-2010). Relative abundance increases with circle size.

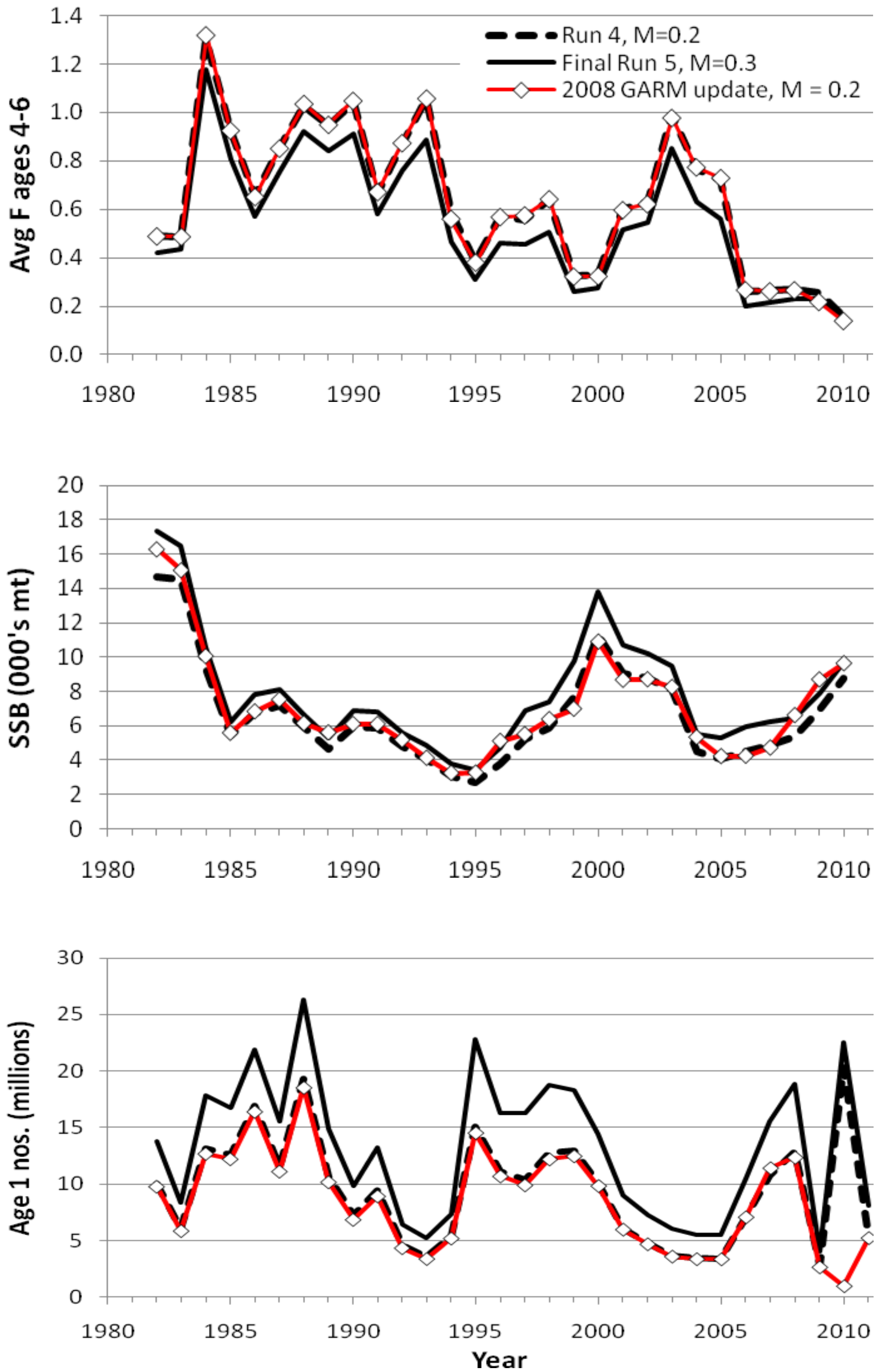


Figure B23. Comparison of trends in average fishing mortality rate (on ages 4-6), spawning stock biomass (SSB, 000's mt), and age 1 recruitment (nos. in millions) for the final VPA model run and Run 4 (same input data as final model run, but M = 0.2), from SARC 52, versus the updated 2008 GARM run.

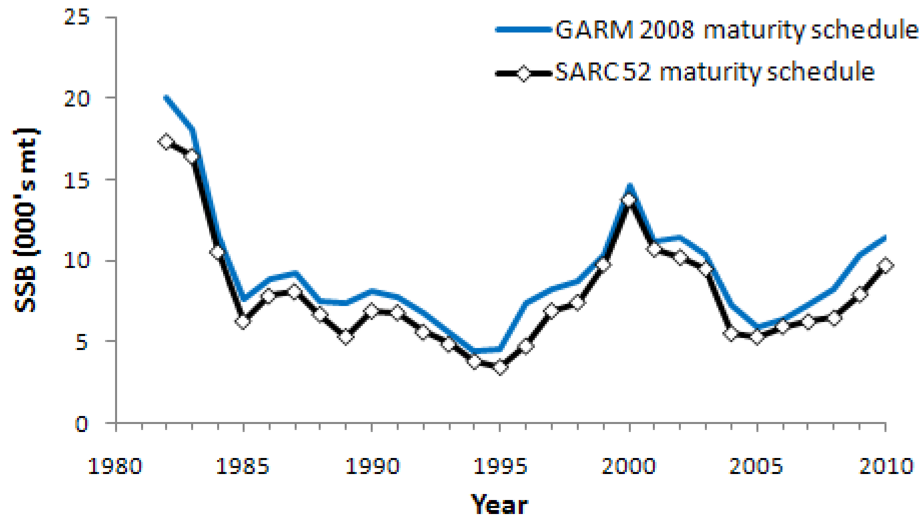


Figure B24. The effect of a change in the maturity-at-age schedule on Georges Bank winter flounder SSB estimates (000's mt) for 1982-2010, from the SARC 52 final VPA run. The SARC 52 final VPA run incorporated a three-year moving window of maturity-at-age for 1981-2010 (corrected for improperly assigned maturity stages based on female gonad histology data) and the VPA run from the 2008 GARM incorporated a constant, average maturity-at-age schedule for 1982-2007. Both runs incorporated an instantaneous natural mortality rate of 0.3.

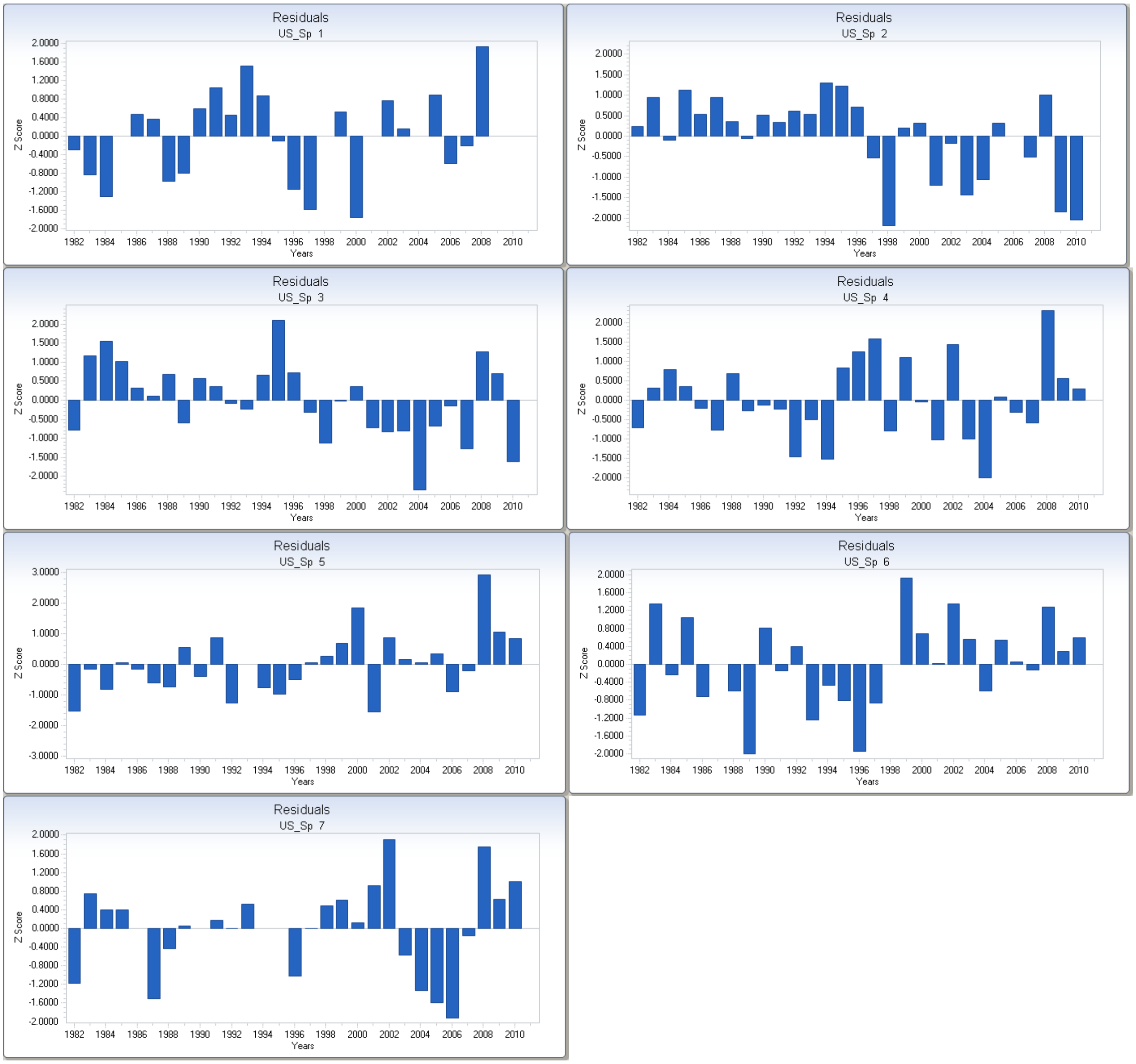


Figure B25. Weighted residuals, plotted as Z scores, from the NEFSC spring bottom trawl survey indices (ages 1-7+, 1982-2010) used to calibrate the VPA model for Georges Bank winter flounder.

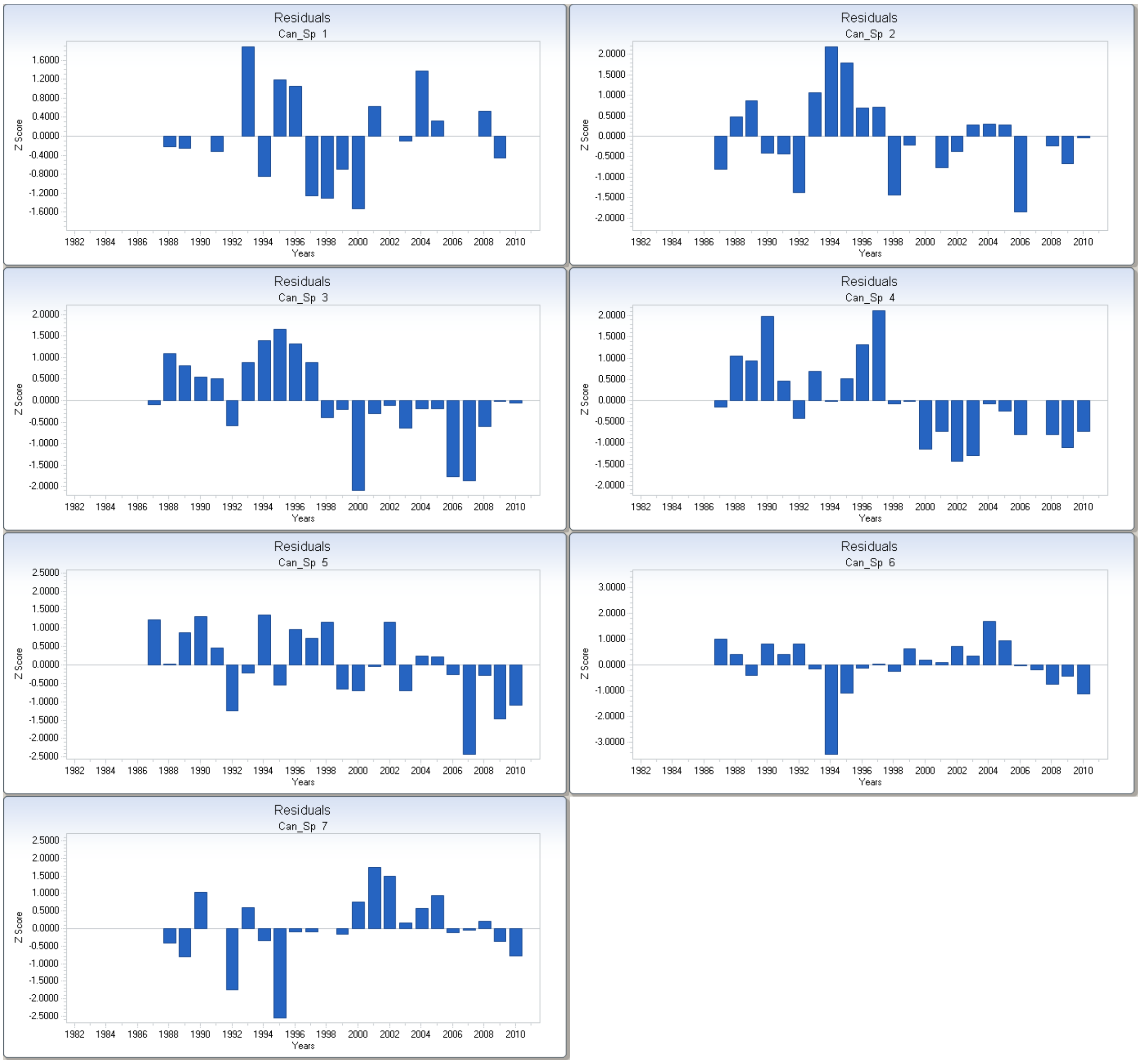


Figure B26. Weighted residuals, plotted as Z scores, from the Canadian spring bottom trawl survey indices (ages 1-7+, 1982-2010) used to calibrate the VPA model for Georges Bank winter flounder.

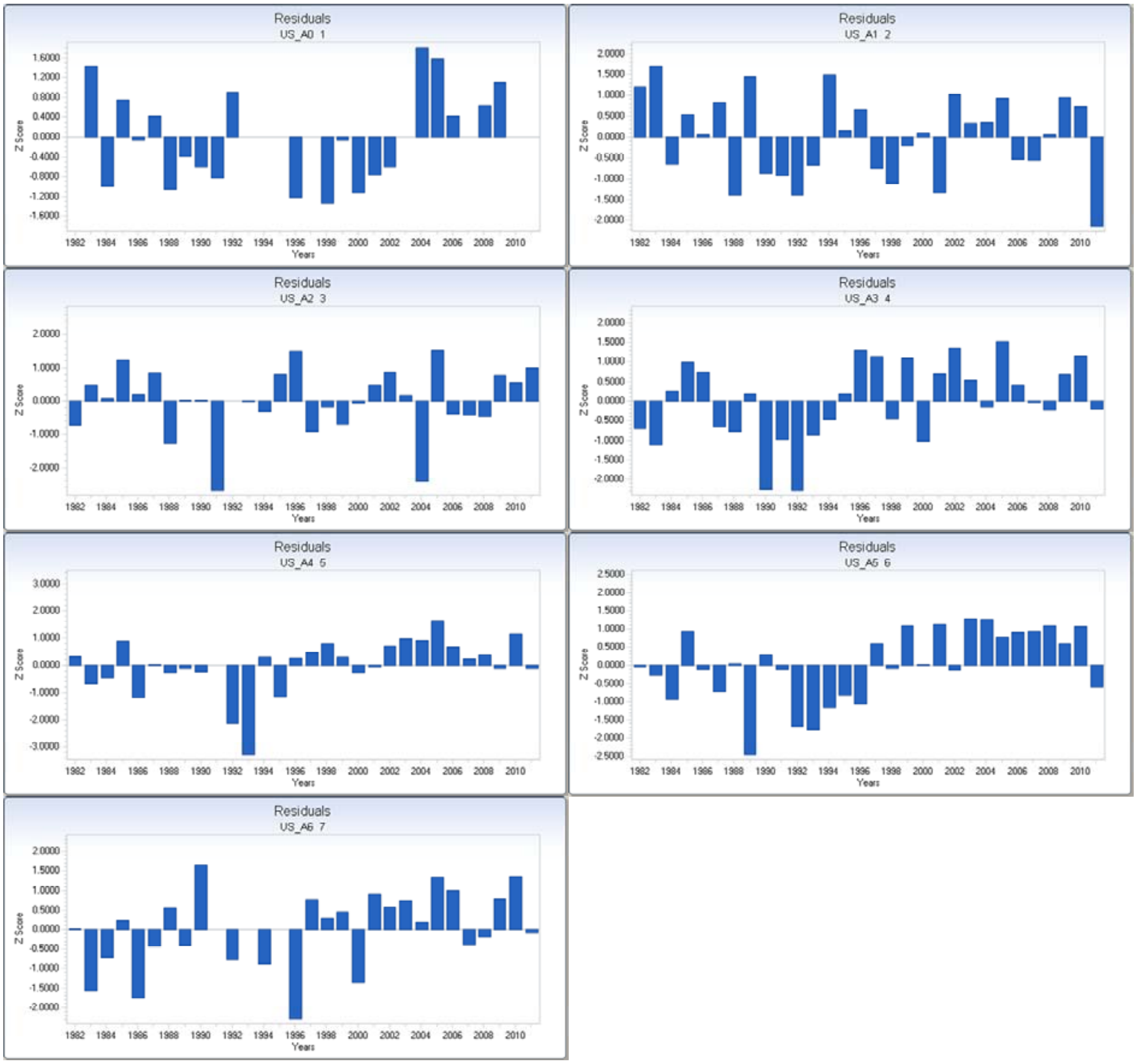


Figure B27. Weighted residuals, plotted as Z scores, from the US fall bottom trawl survey indices (ages 0-6 forwarded one year and age, 1981-2010) used to calibrate the VPA model for Georges Bank winter flounder.

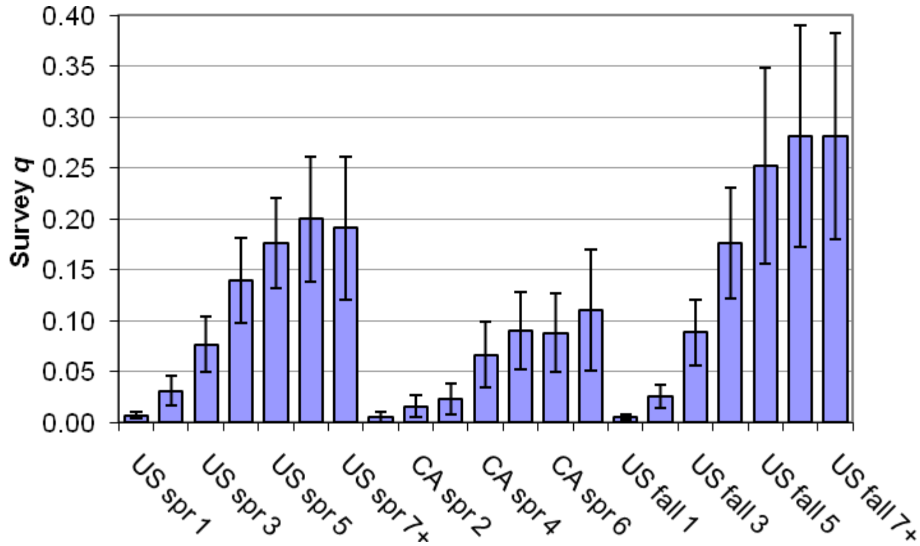


Figure B28. Estimates of survey catchability coefficients (+/- 2 SE) for the final VPA model run, by age, for Georges Bank winter flounder caught during the US spring (1982-2010, ages 1-7+), Canadian spring (1987-2010, ages 1-7+), and US fall (1981-2010, ages 0-6 lagged forward one year and age) bottom trawl surveys.

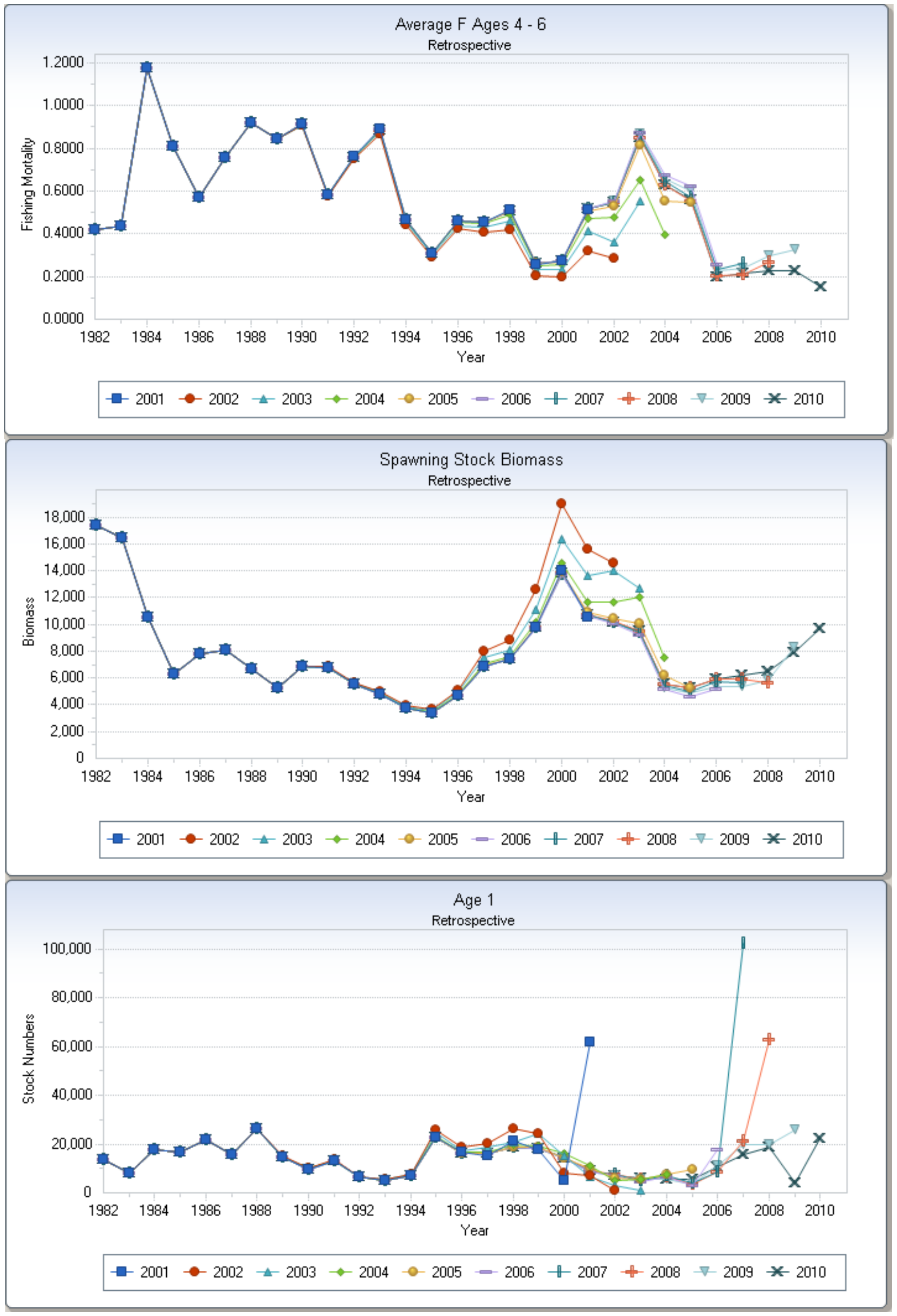


Figure B29. Retrospective trends in terminal years 2001-2009 for average fishing mortality rates (top panel), spawning stock biomass (mt, middle panel), and age 1 recruitment (numbers in thousands, bottom panel) from the Georges Bank winter flounder VPA model (1982-2010).

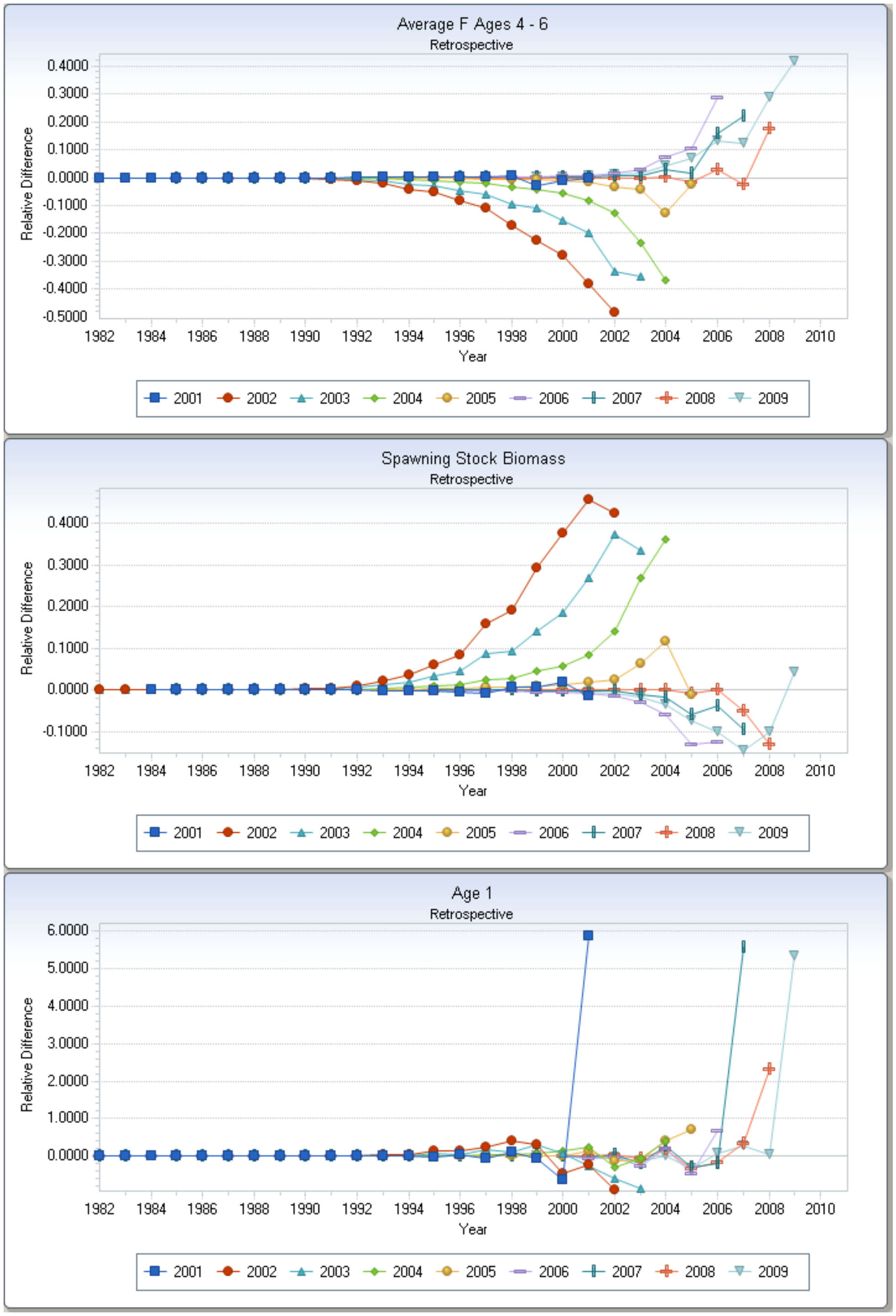


Figure B30. Retrospective trends in relative differences between average F (ages 4-6, top panel), spawning stock biomass (mt, middle panel), and age 1 recruitment estimates (bottom panel), between terminal years 2001-2009 and 2010, from the Georges Bank winter flounder VPA model (1982-2010).

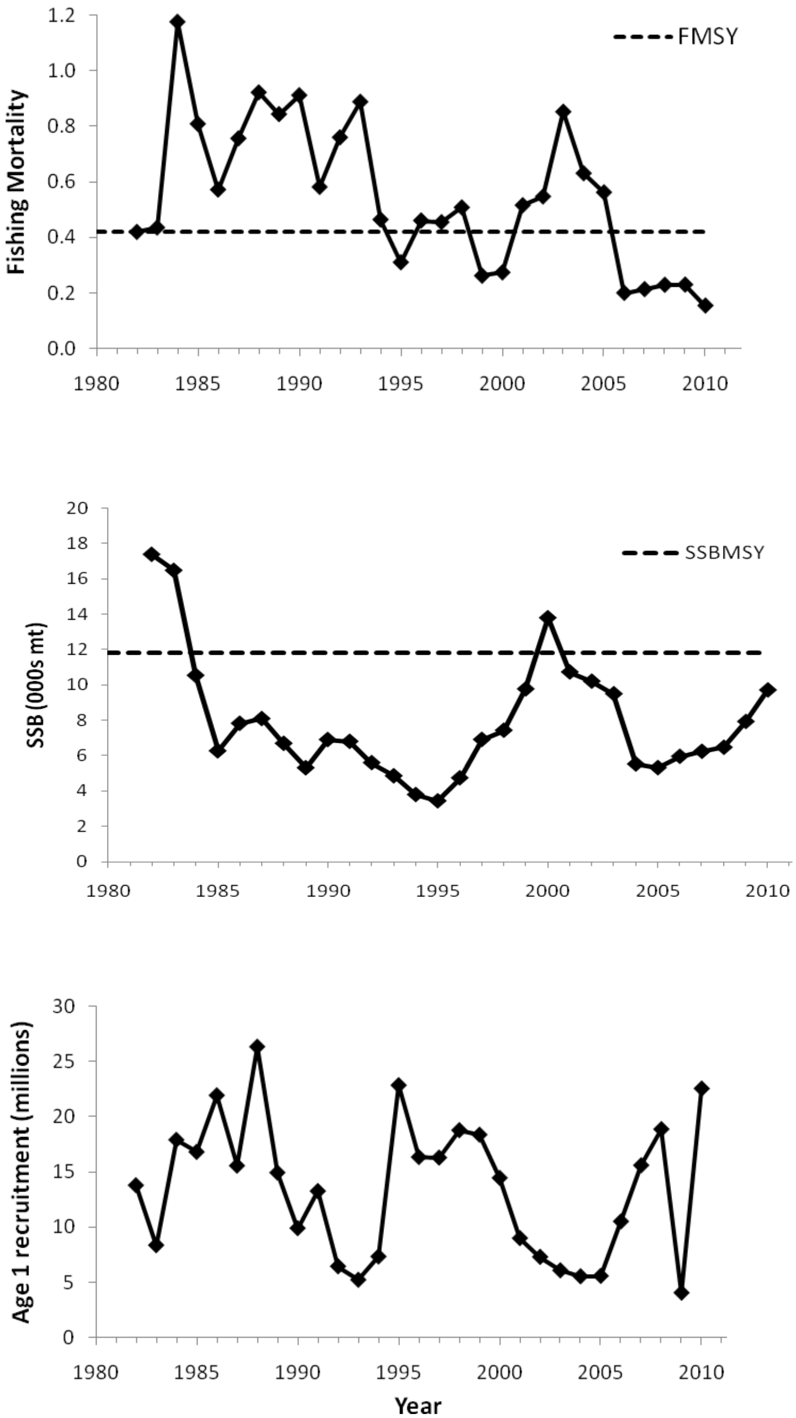


Figure B31. Final VPA model estimates of average fishing mortality rate (ages 4-6, top panel), spawning stock biomass (000's mt, middle panel), during 1982-2010, and age 1 recruitment (numbers in thousands), during 1982-2011 (bottom panel), for the Georges Bank winter flounder stock. The 2011 recruitment estimate is solely based on survey data (2003-2009 geometric mean of recruitment).

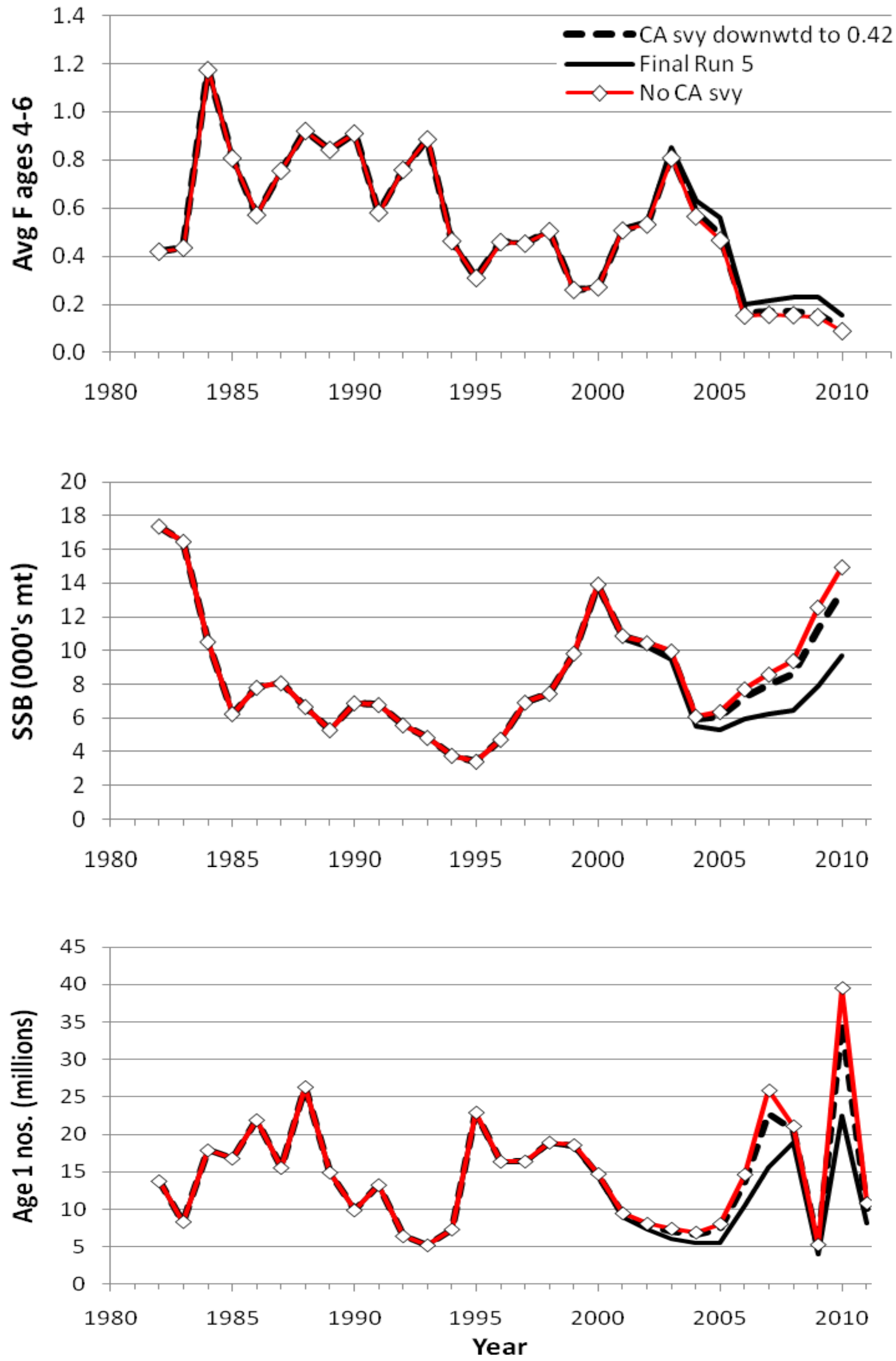


Figure B32. Comparison of trends in average fishing mortality rate (on ages 4-6), spawning stock biomass (SSB, 000's mt), and age 1 recruitment (nos. in millions) for the final VPA model Run 5 versus sensitivity Runs 2 and 3, which include the same input data except with omission of the CA surveys and with the CA survey residuals downweighted by 0.42, respectively.

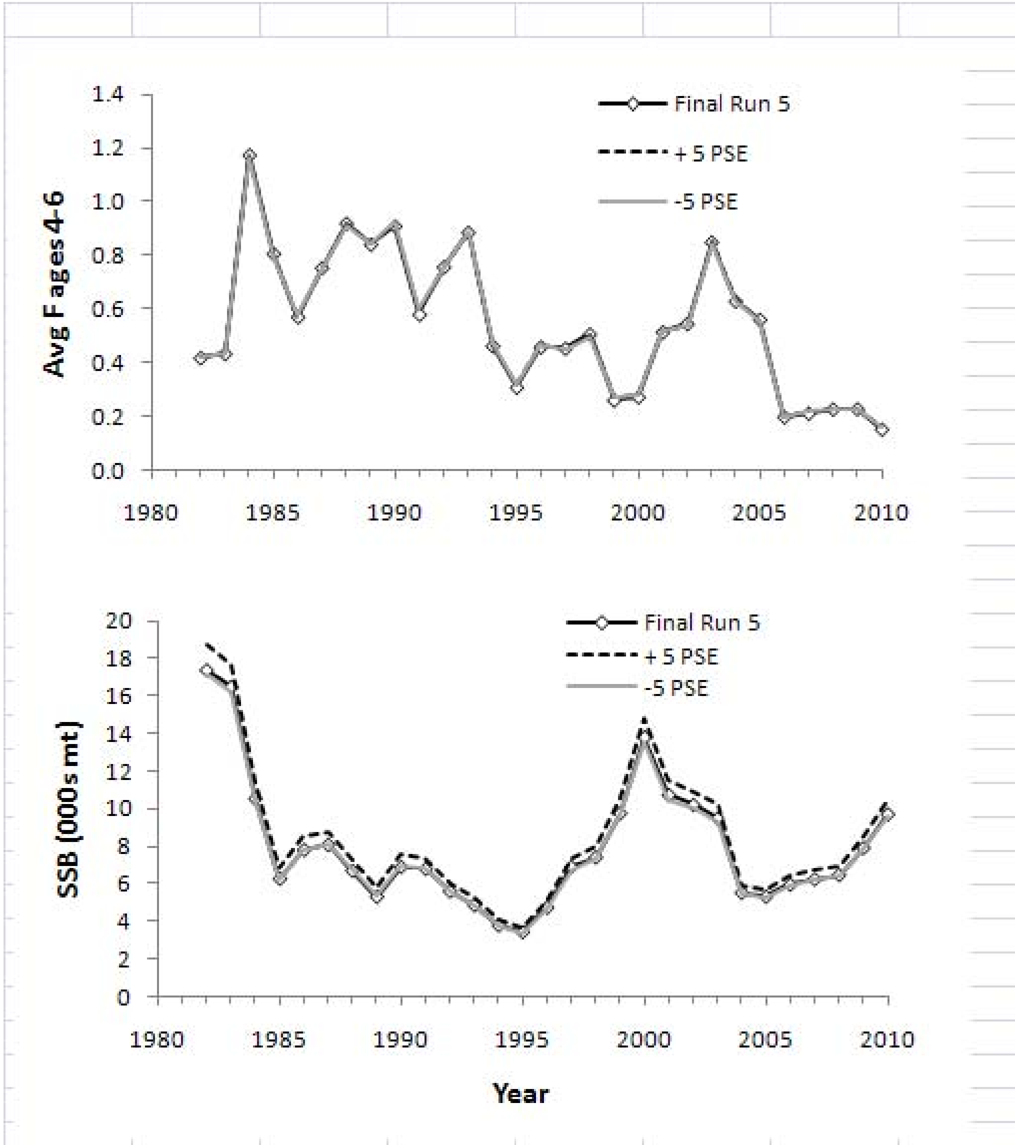


Figure B33. Trends in Georges Bank winter flounder fishing mortality rates (ages 4-6) and spawning stock biomass (SSB, 000’s mt) estimates from the final VPA model (Run 5) and for model runs with +/- 5 proportional standard error (% PSE) for total catch.

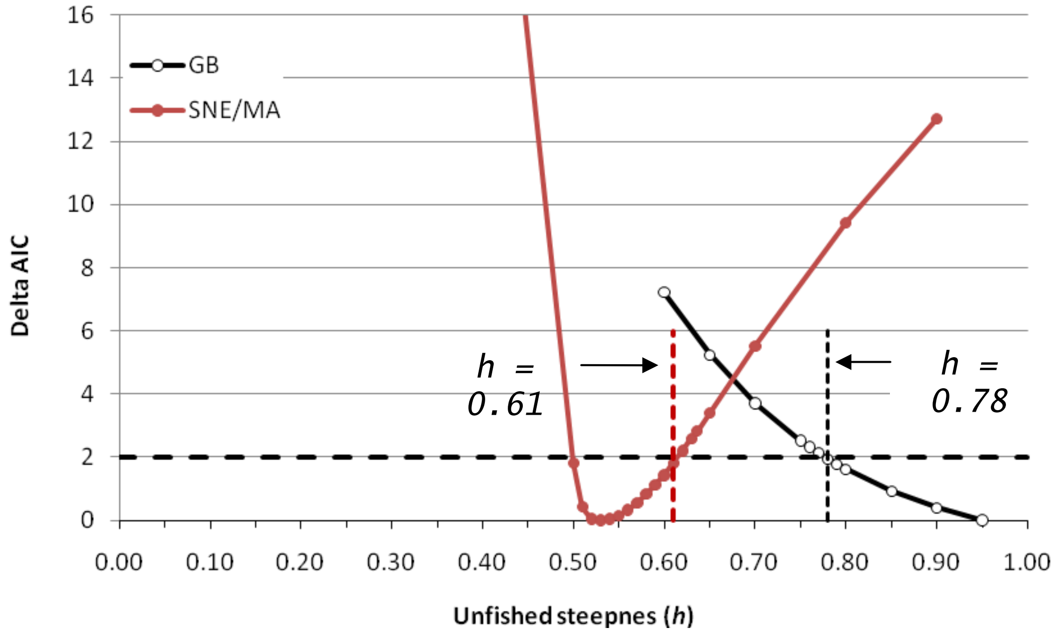


Figure B34. Log-likelihood profiles on unfished steepness parameters from Beverton-Holt stock-recruitment models for the SNE/MA and Georges Bank winter flounder stocks. The vertical dashed lines indicate the fixed steepness values which were used to estimate FMSY reference points. Delta AIC was computed as the difference between the AIC for each steepness value in the profile and the lowest AIC value.

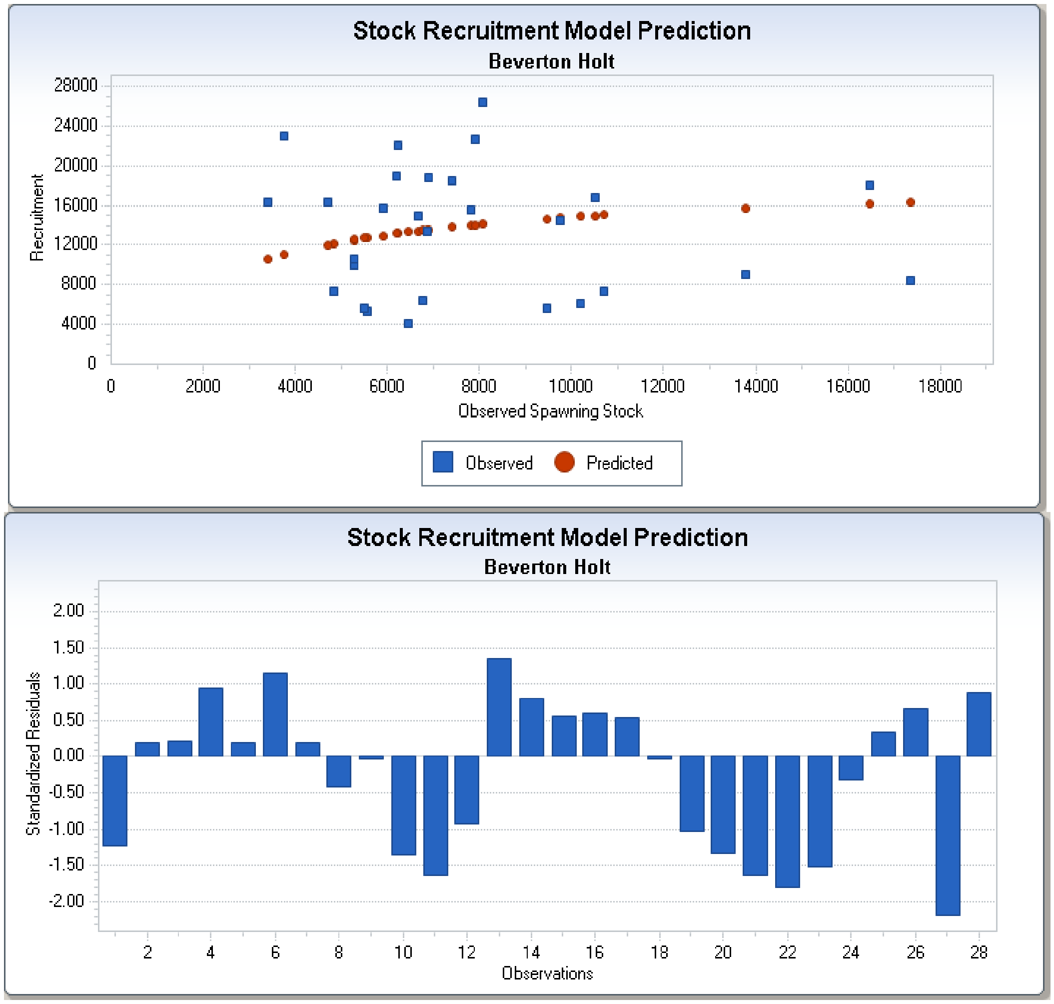


Figure B35. Results from a Beverton-Holt stock recruitment model fit to Georges Bank winter flounder estimates of recruitment (age 1 numbers in thousands, 1982-2009 year classes) and spawning stock biomass (mt) from the final VPA model (top panel). The model was fit assuming a fixed value of 0.78 for unfished steepness (*h*). The bottom panel shows the standardized residuals from the model.

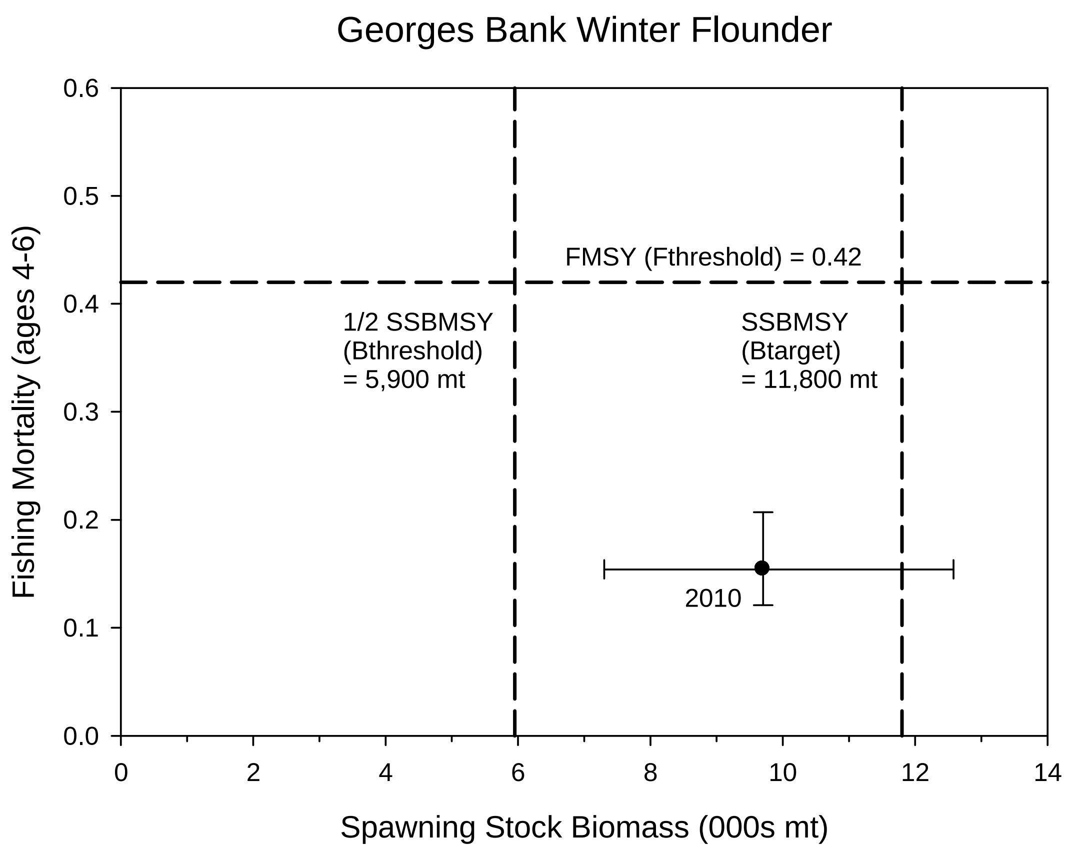


Figure B36. Stock status for Georges Bank winter flounder, during 2010, based on FMSY and SSBMSY reference points.

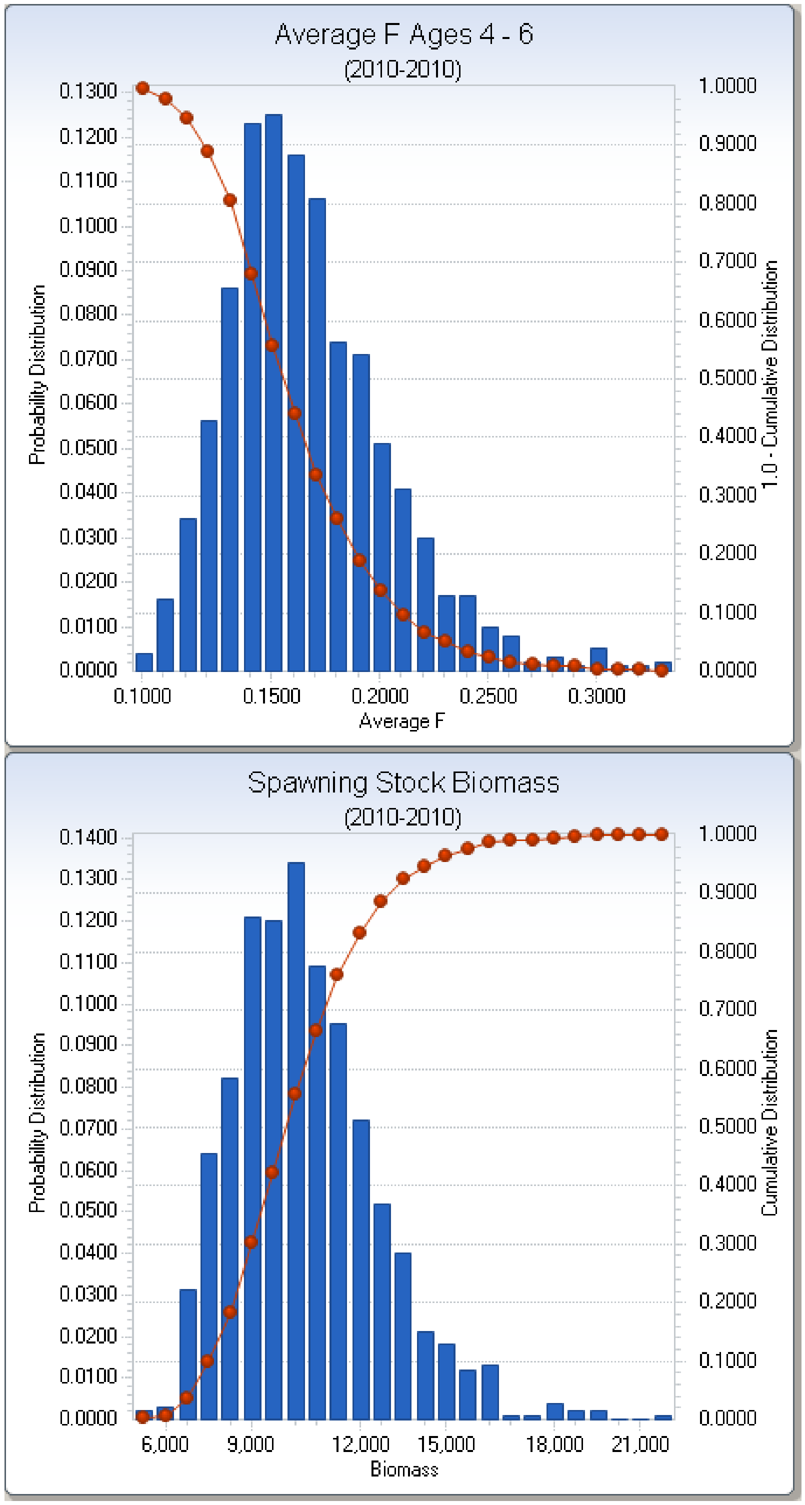


Figure B37. Precision (80% CI) of the 2010 estimates of average fishing mortality rate on ages 4-6 and spawning stock biomass (mt) from the final VPA model for Georges Bank winter flounder.

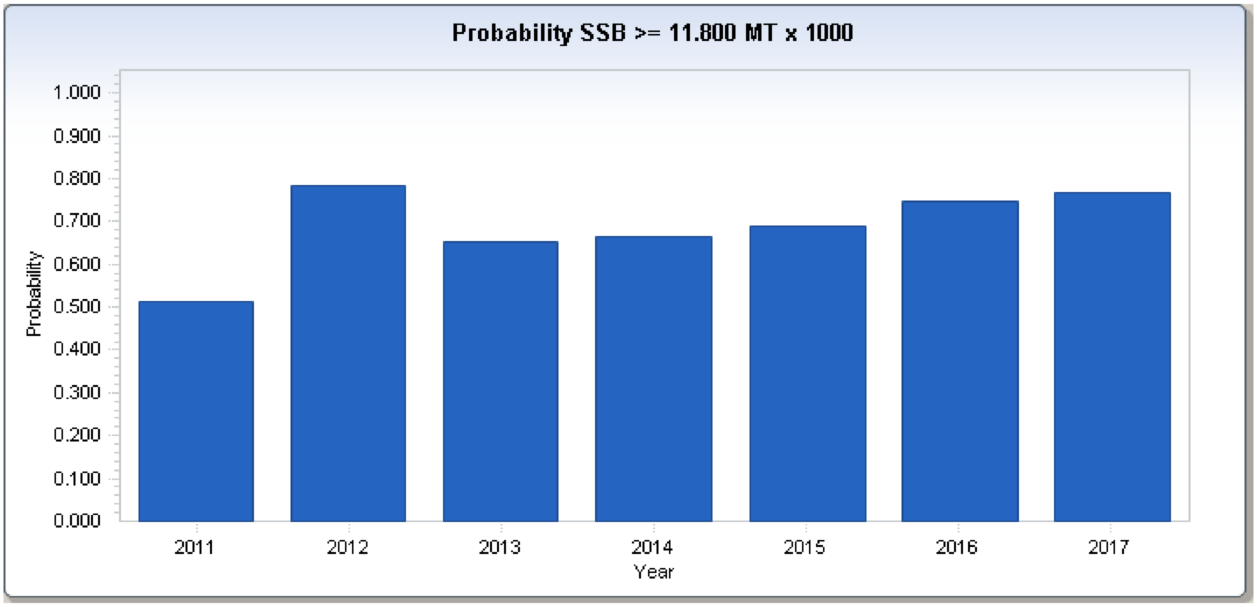


Figure B38. Probability of the Georges Bank winter flounder stock being rebuilt to SSBMSY (= 11,800 mt by 2017 based on a 2011 Annual Catch Limit of 2,118 mt and fishing at 75% of FMSY (= 0.315). The regulations require a probability of being rebuilt of at least 75%.

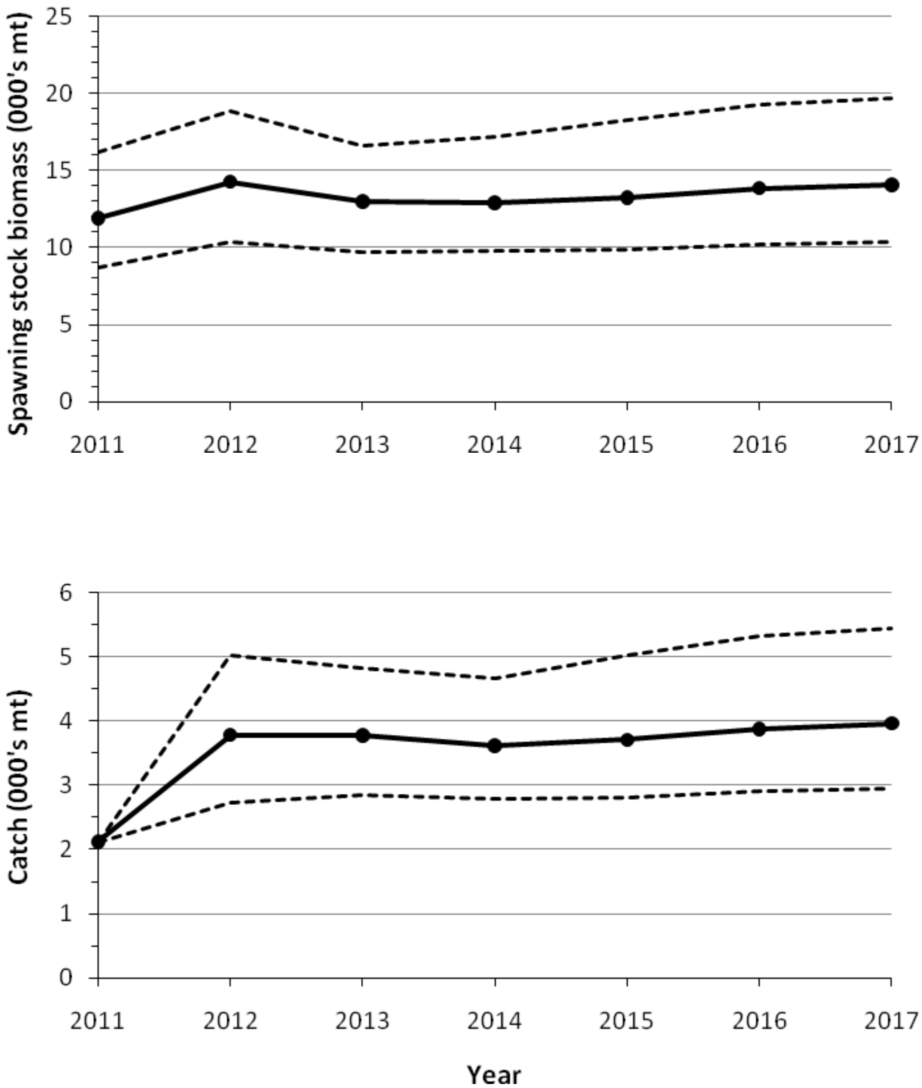


Figure B39. Projected median spawning stock biomass (000's mt, top panel) and catch (000's mt, bottom panel), for Georges Bank winter flounder during 2011-2017 (deadline year for rebuilding), based on a 2011 Annual Catch Limit of 2,118 mt and fishing at 75% of FMSY (= 0.315). SSBMSY = 11,800 mt. The dashed lines represent the 10% and 90% confidence intervals.