12.0 Figures

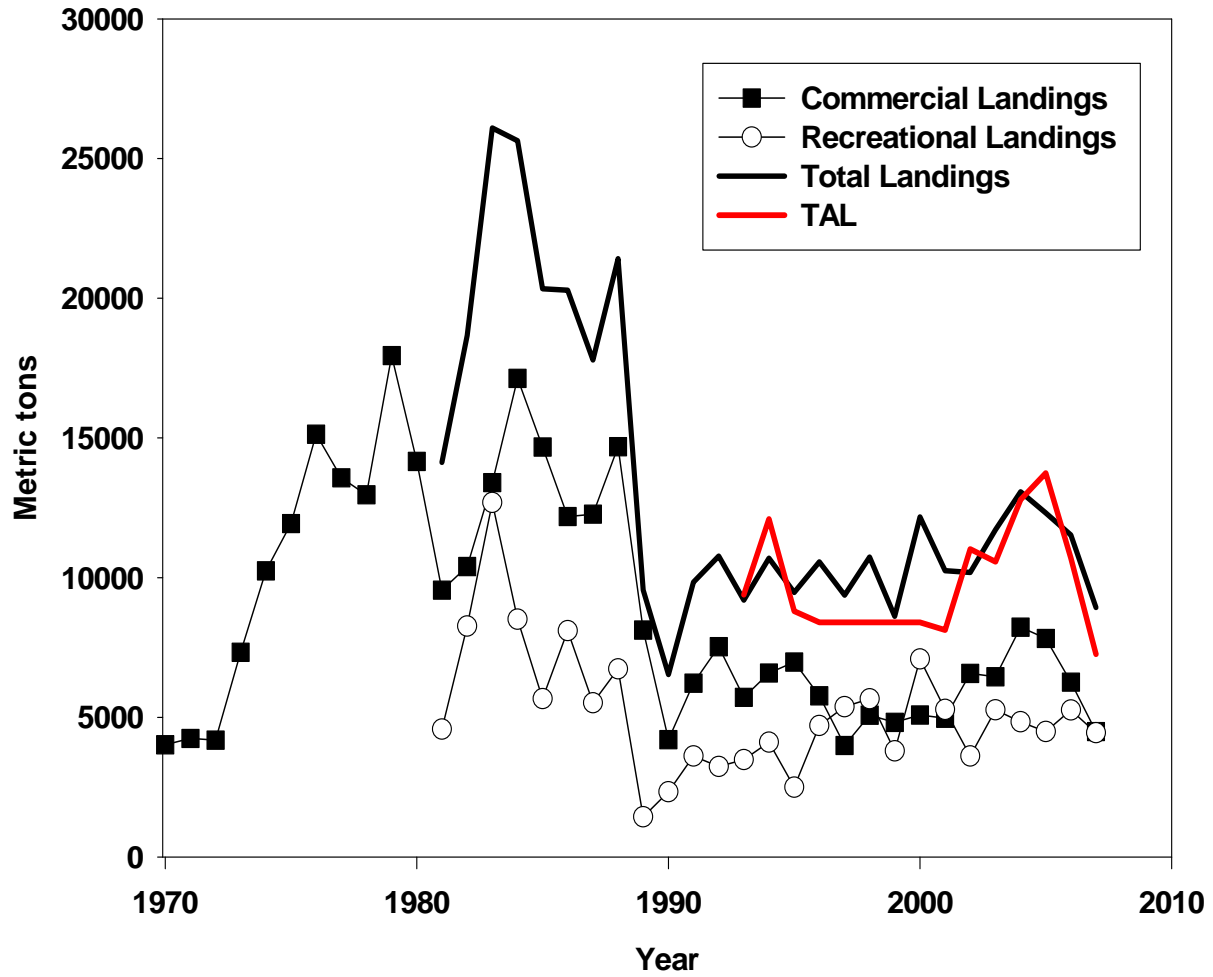## Summer flounder recent landings history

Figure 1. Summer flounder recent commercial (1970-2007), recreational (1981-2007), total fishery (1981-2007) landings, and the corresponding fishery Total Allowable Landings (TAL).

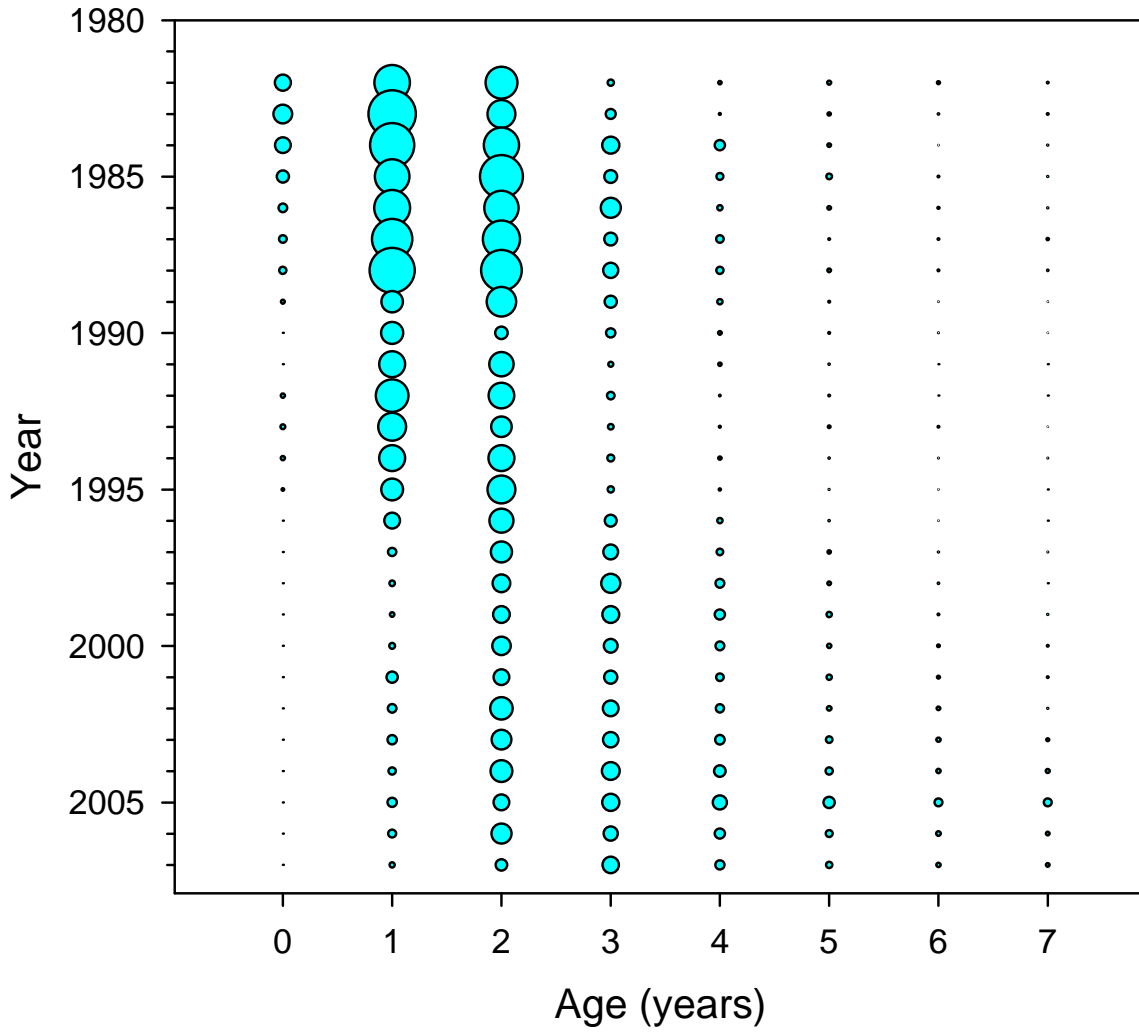# Summer flounder ME-VA Commercial Fishery Landings by Age

Figure 2. Age composition of NER (ME-VA) commercial landings.

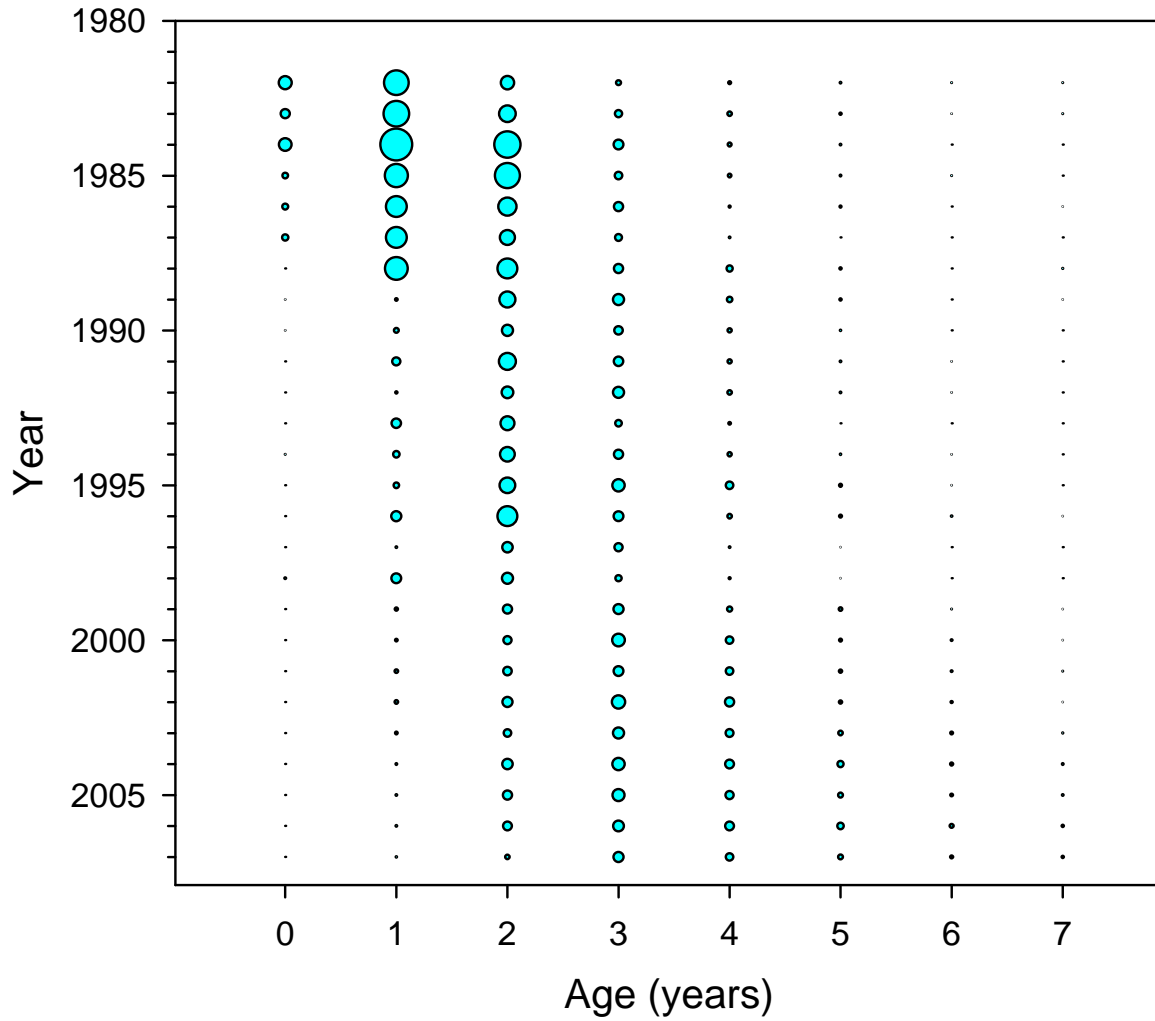# Summer flounder NC Commercial Fishery Landings by Age

Figure 3. Age composition of North Carolina (NC) commercial landings.

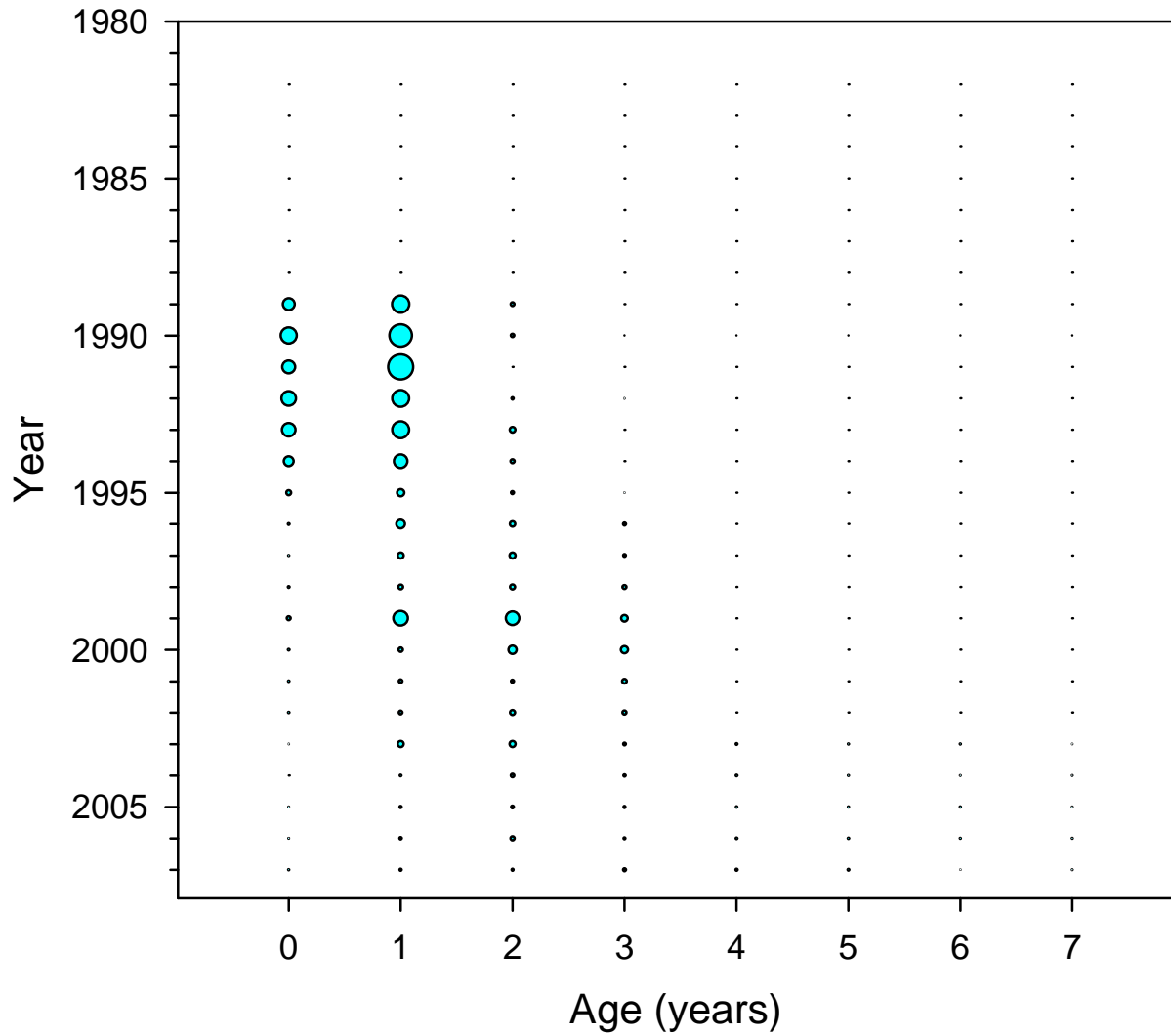# Summer flounder Commercial Trawl Discards by Age

Figure 4. Age composition of commercial trawl discards.

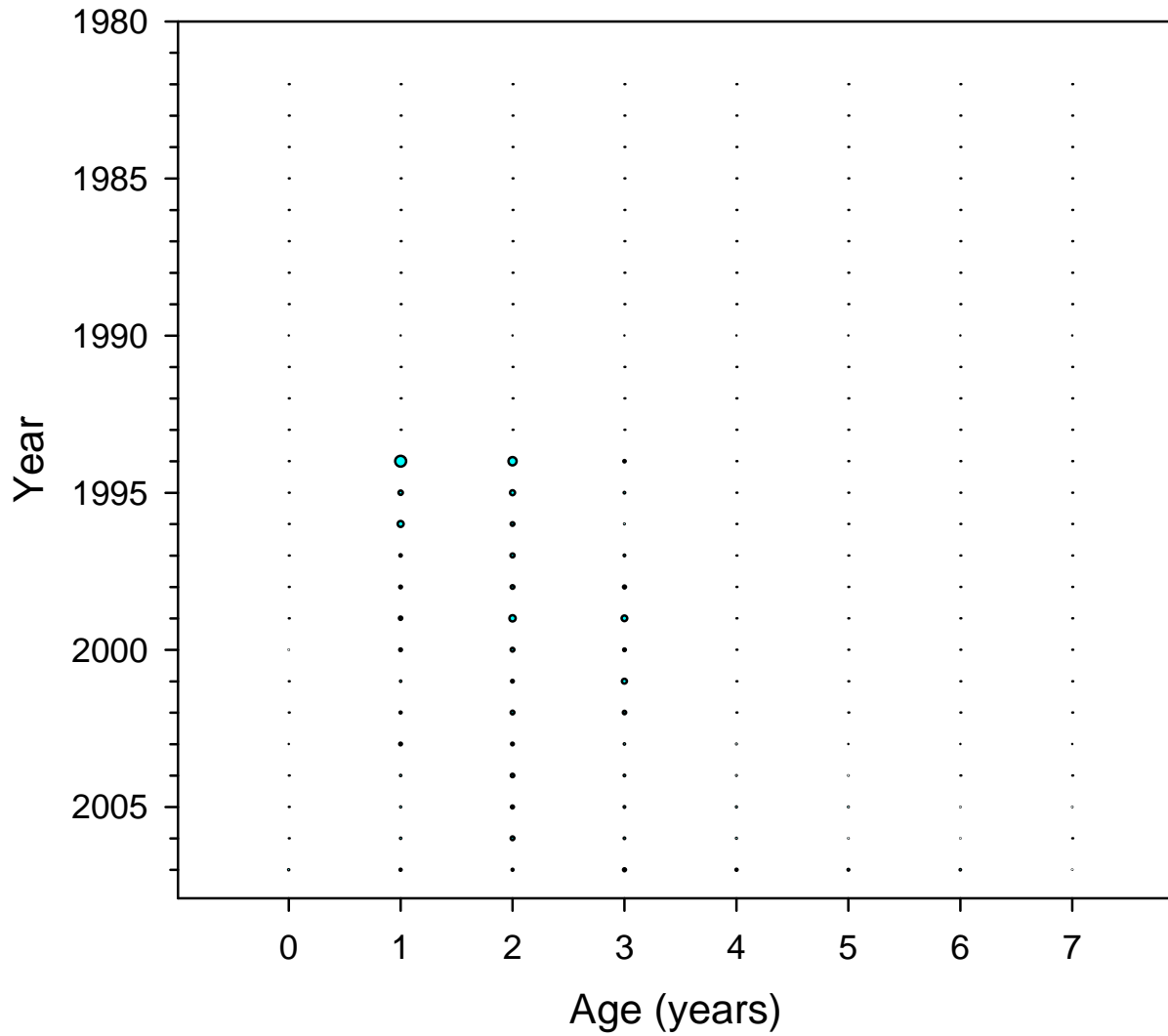# Summer flounder Scallop Dredge Discards by Age

Figure 5. Age composition of commercial scallop dredge discards.

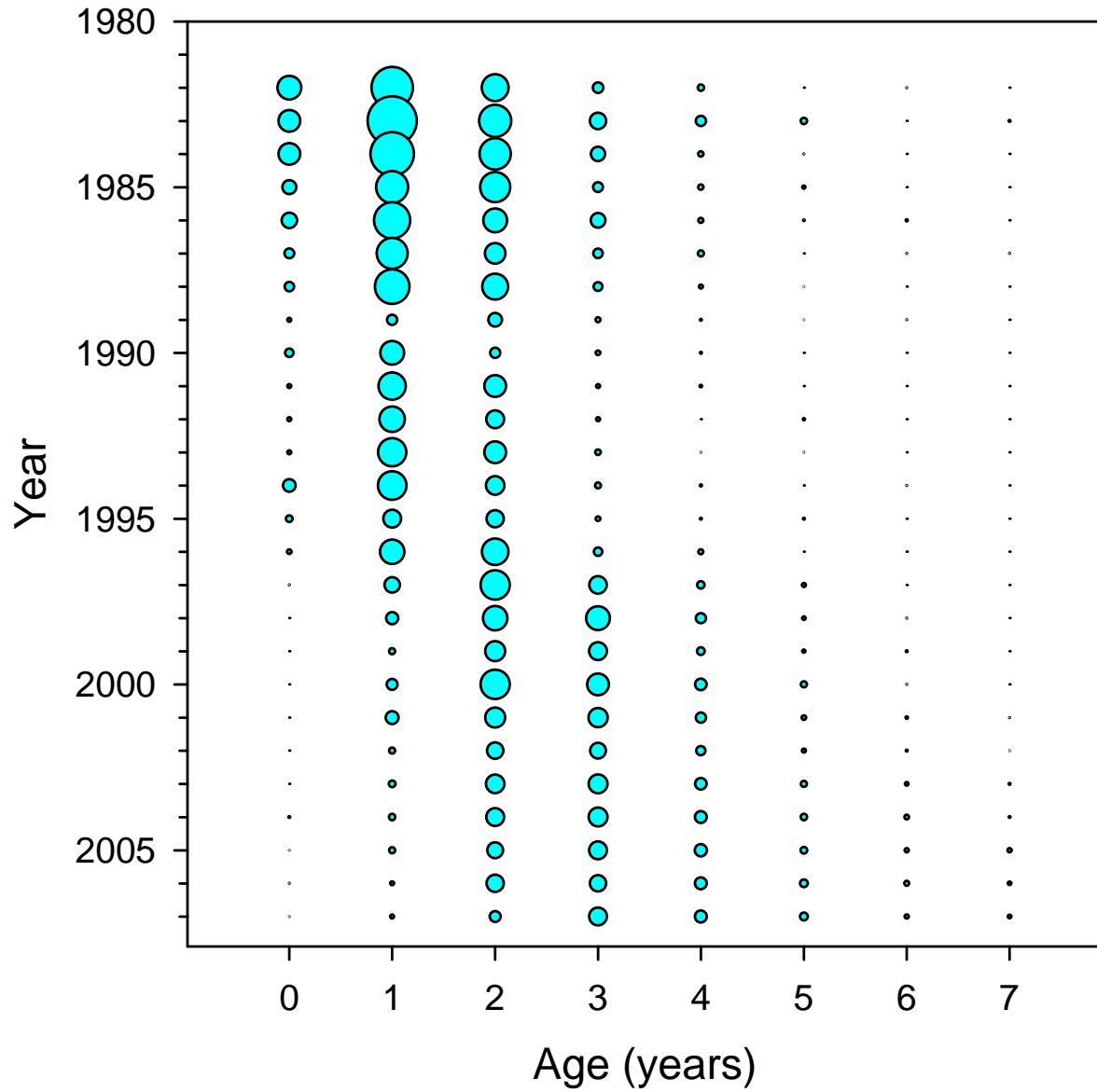# Summer flounder Recreational Landings by Age

Figure 6. Age composition of recreational landings.

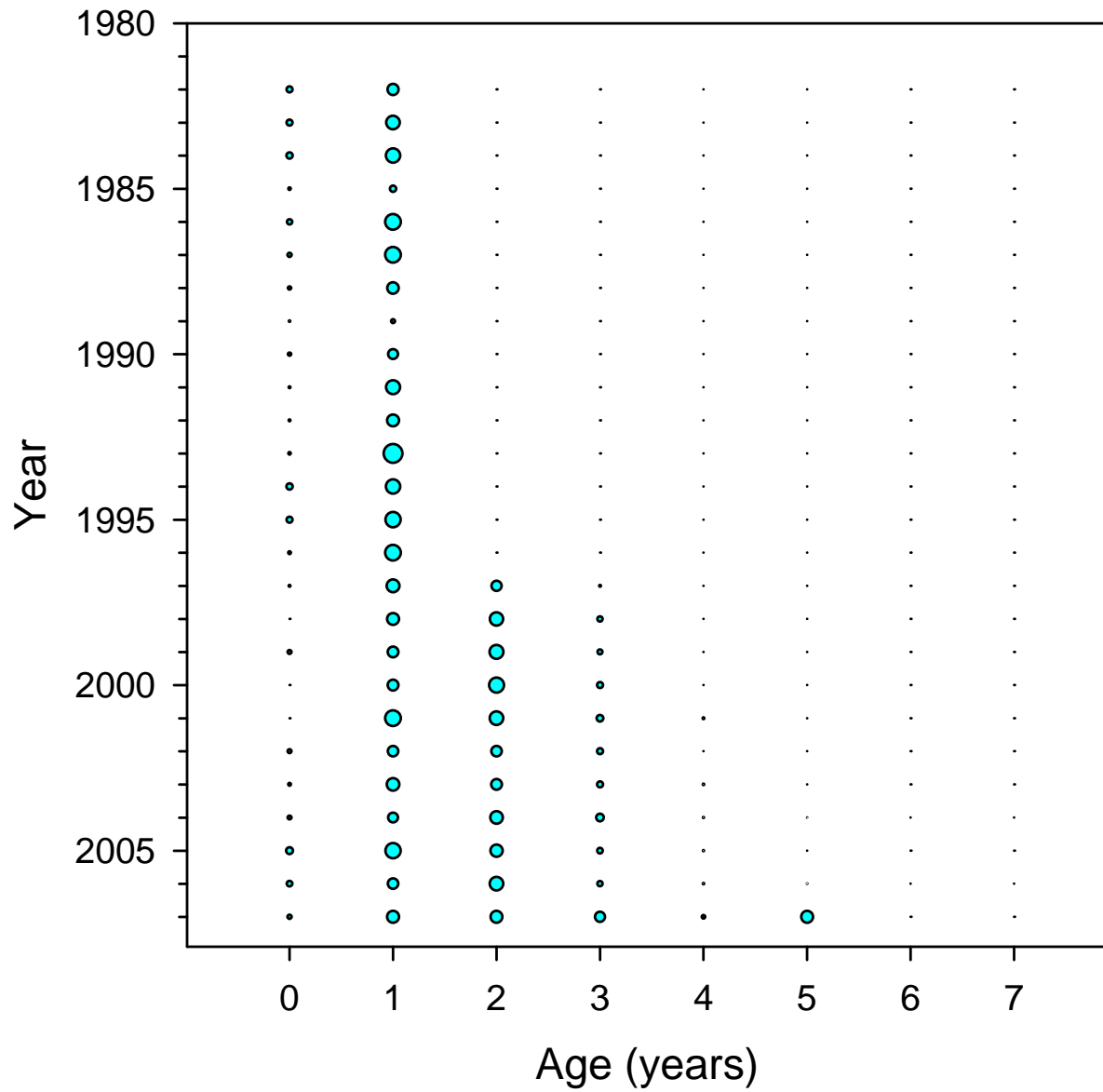# Summer flounder Recreational Discards by Age

Figure 7. Age composition of recreational discards.

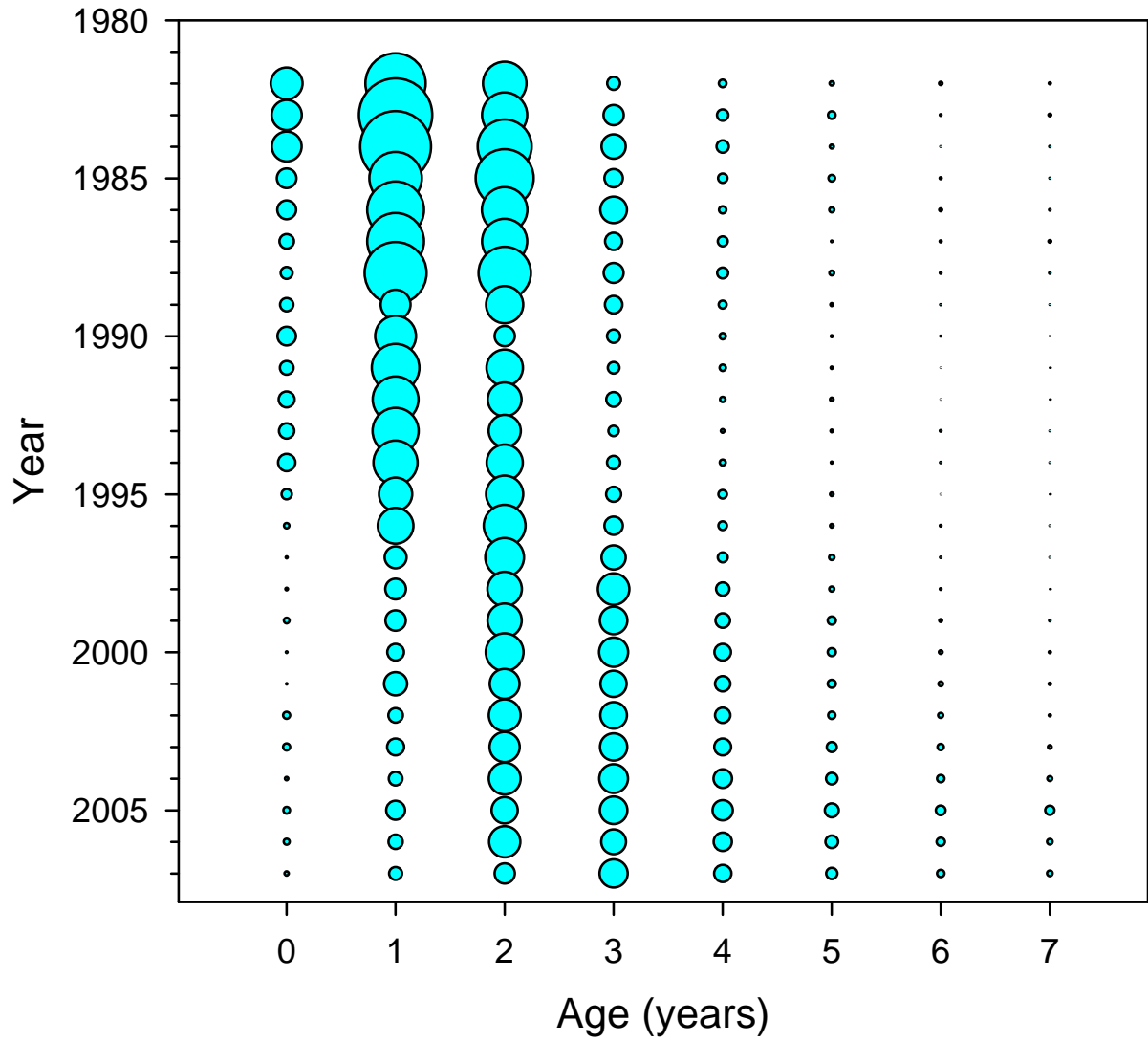# Summer flounder Total Fishery Catch by Age

Figure 8. Age composition of total fishery catch.

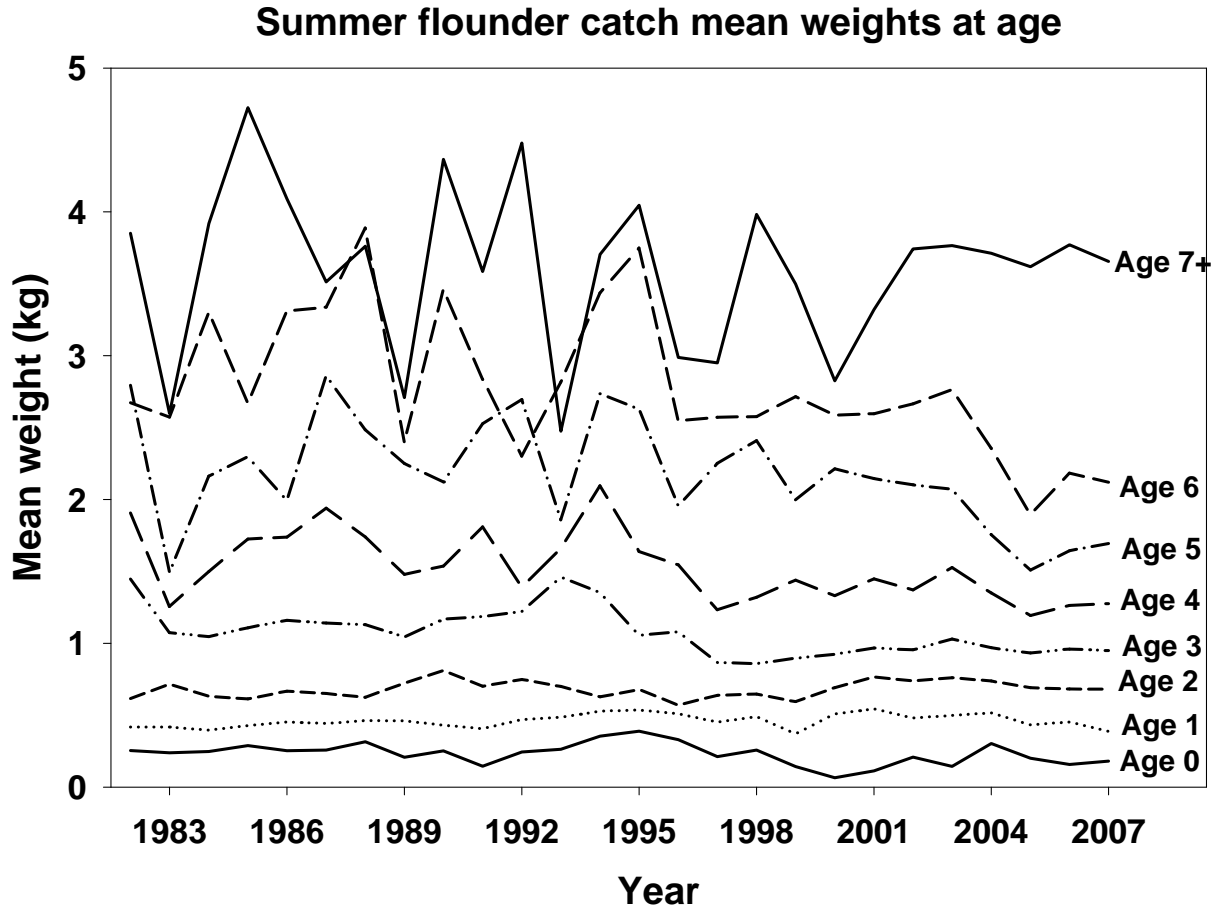## Summer flounder catch mean weights at age

Figure 9. Trends in mean weight at age in the total catch of summer flounder.

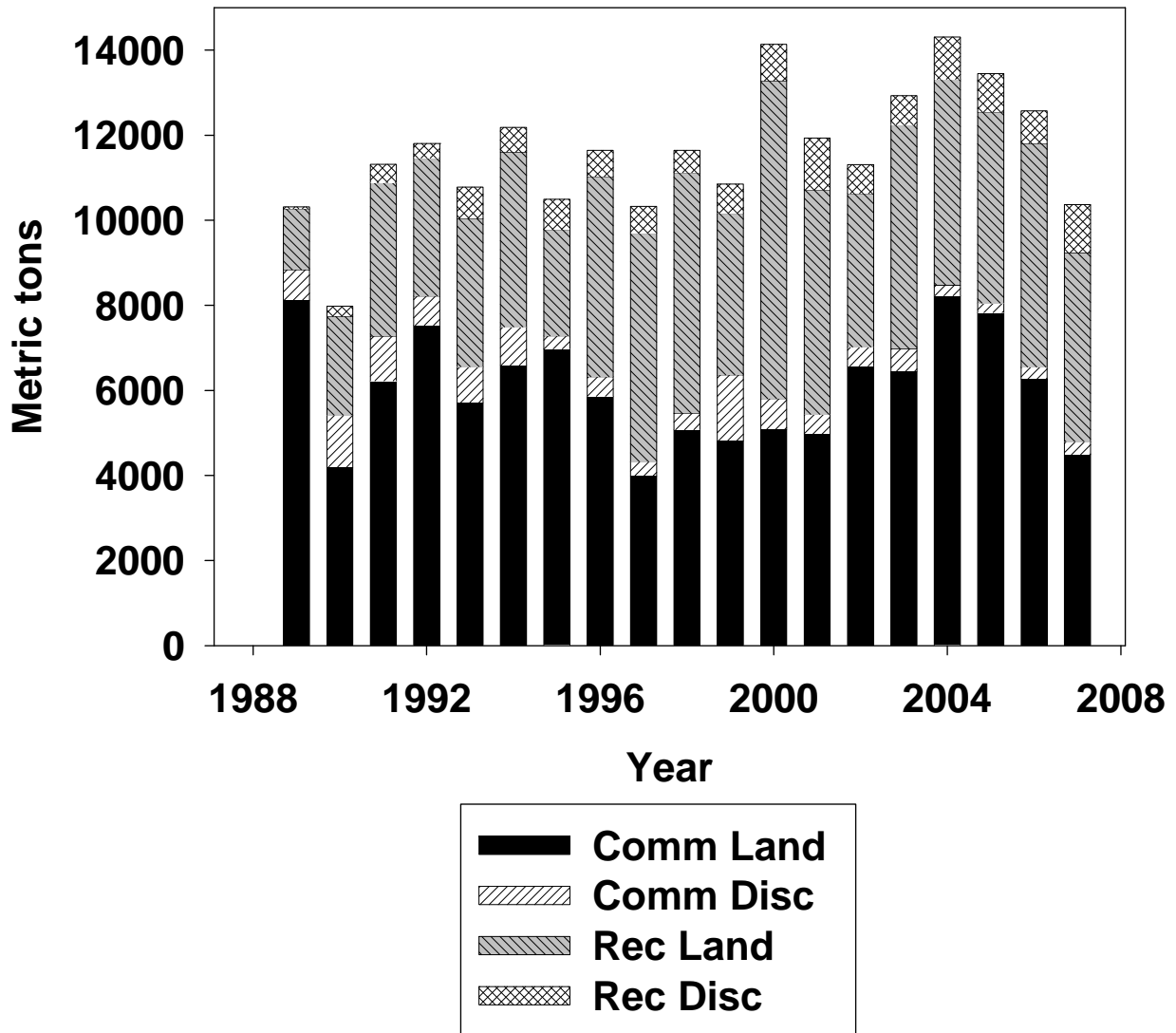# Components of the summer flounder total catch

Figure 10. Components of the summer flounder total catch.
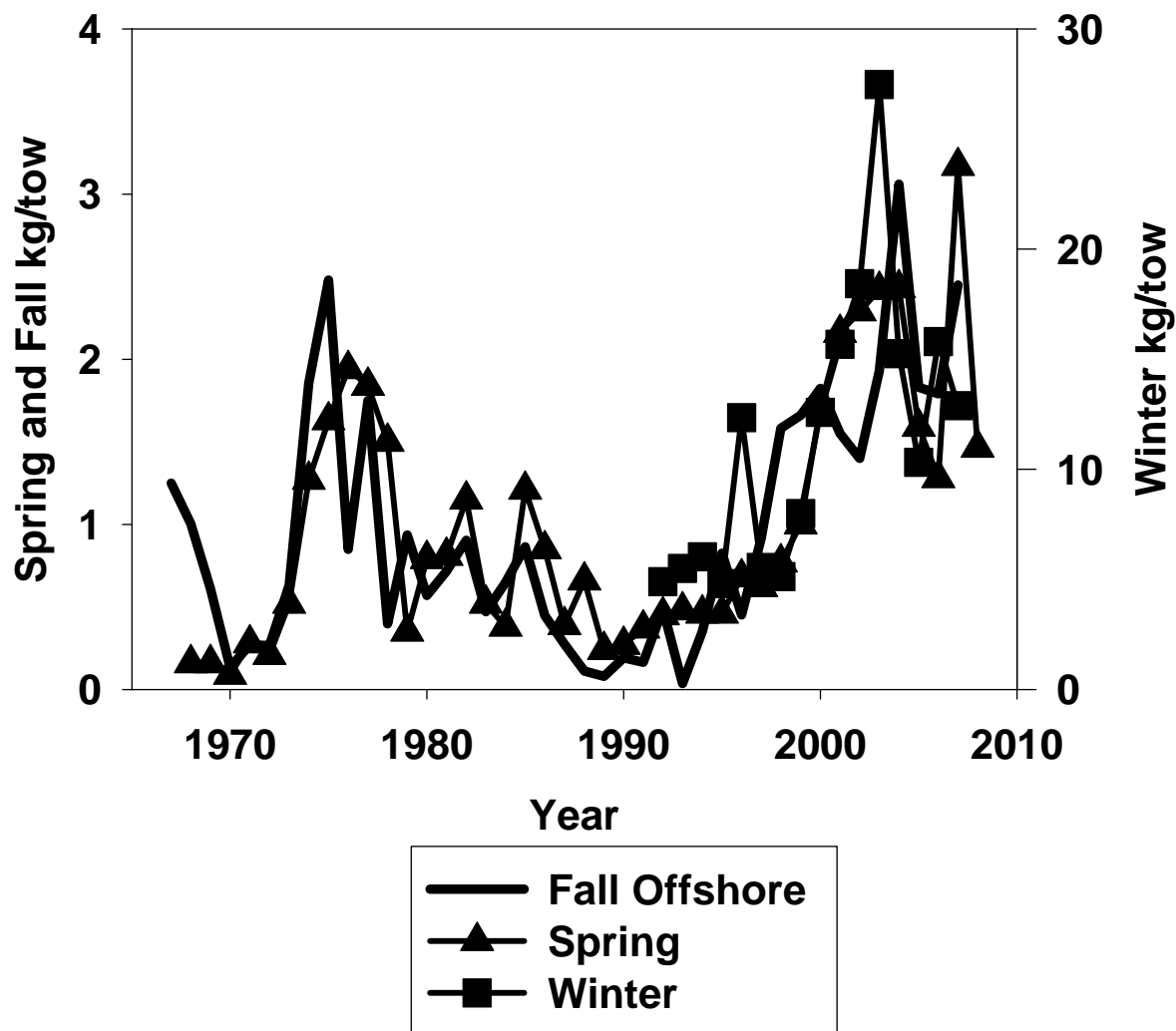
NEFSC Trawl Surveys

Figure 11. Trends in NEFSC trawl survey biomass indices for summer flounder.

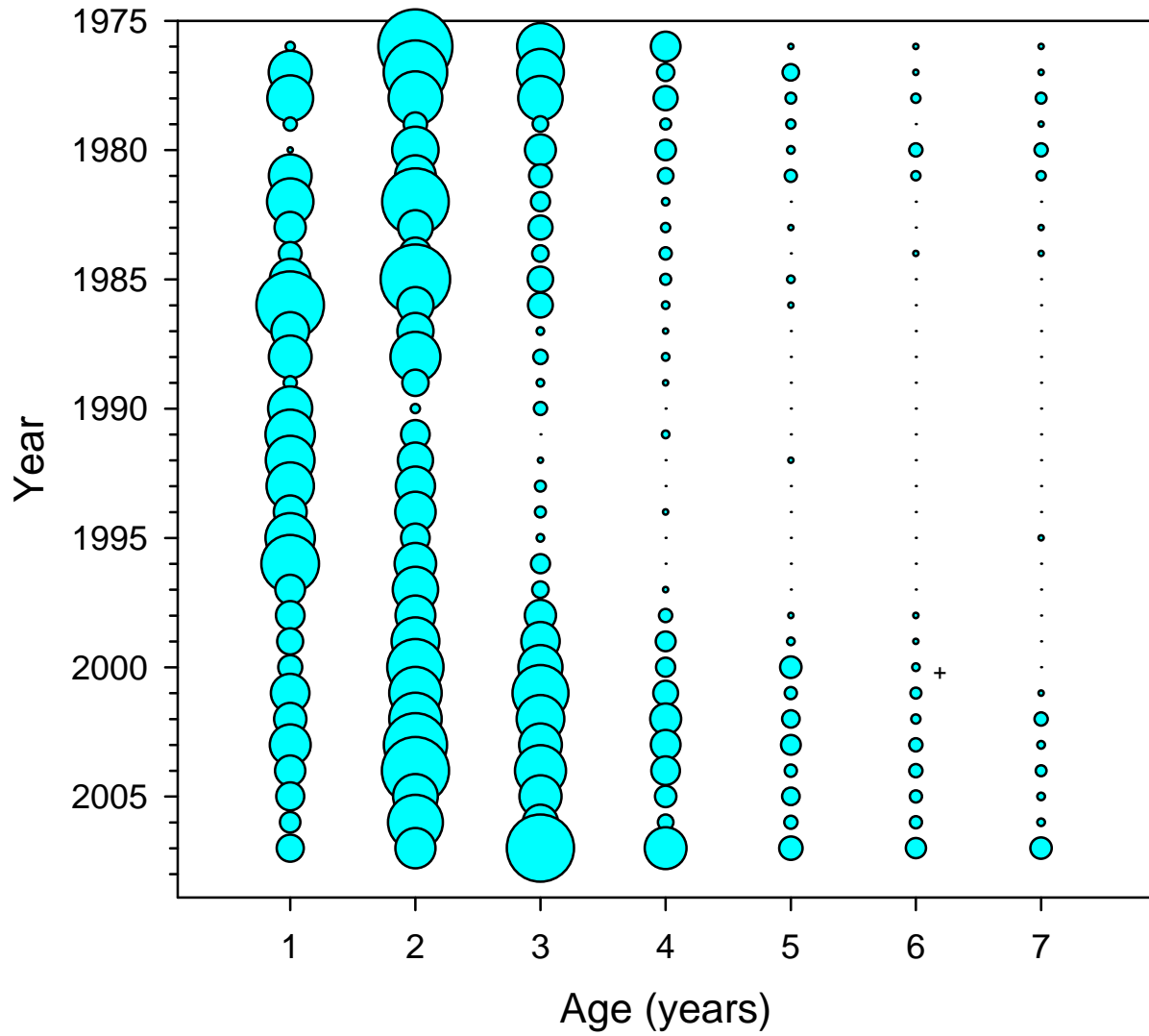# Summer flounder Spring Survey Indices by Age

Figure 12. Age composition of the NEFSC spring trawl survey catch.
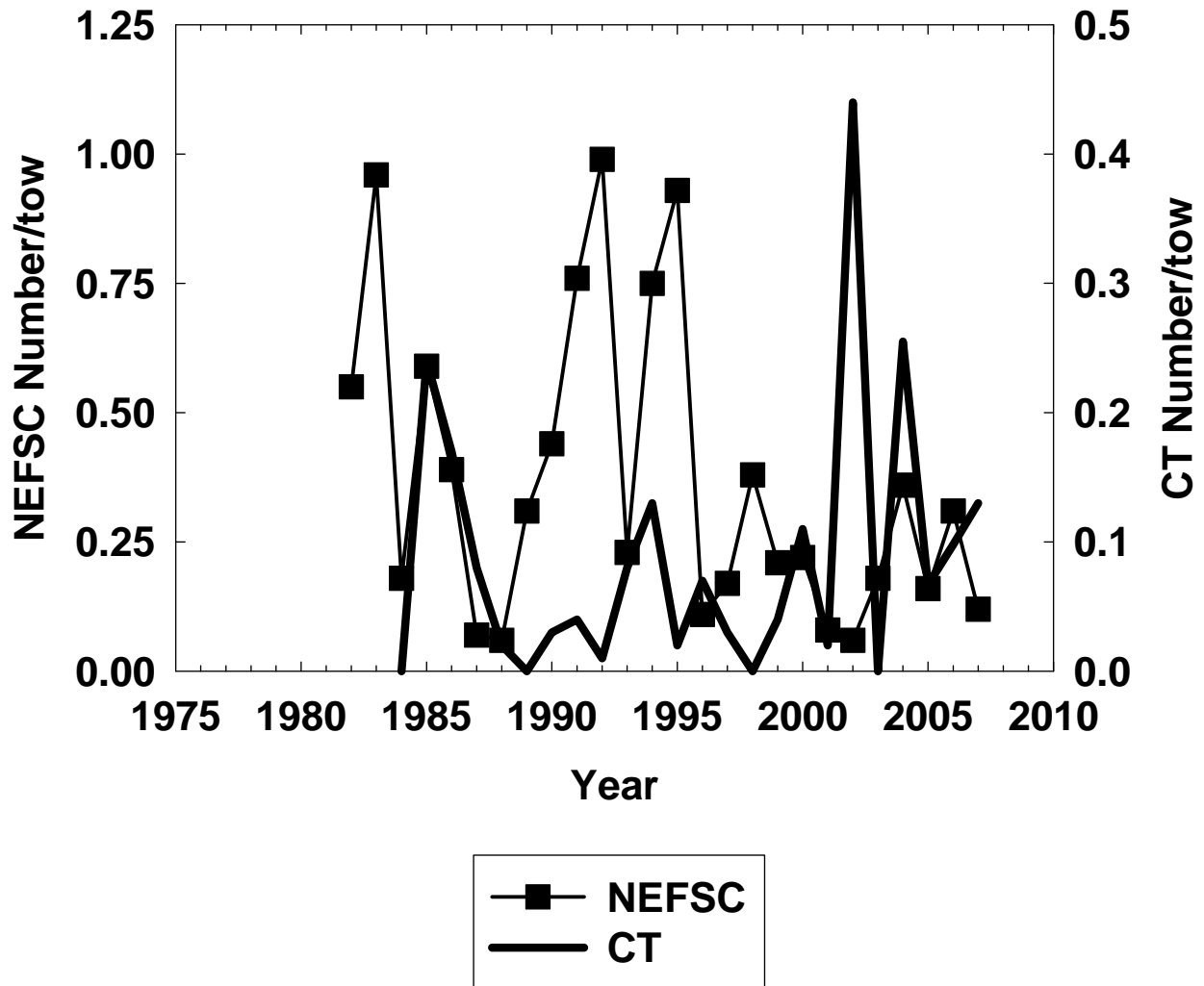
NEFSC and CT YOY Indices

Figure 13. Trends in NEFSC and CT trawl survey recruitment indices for summer flounder.
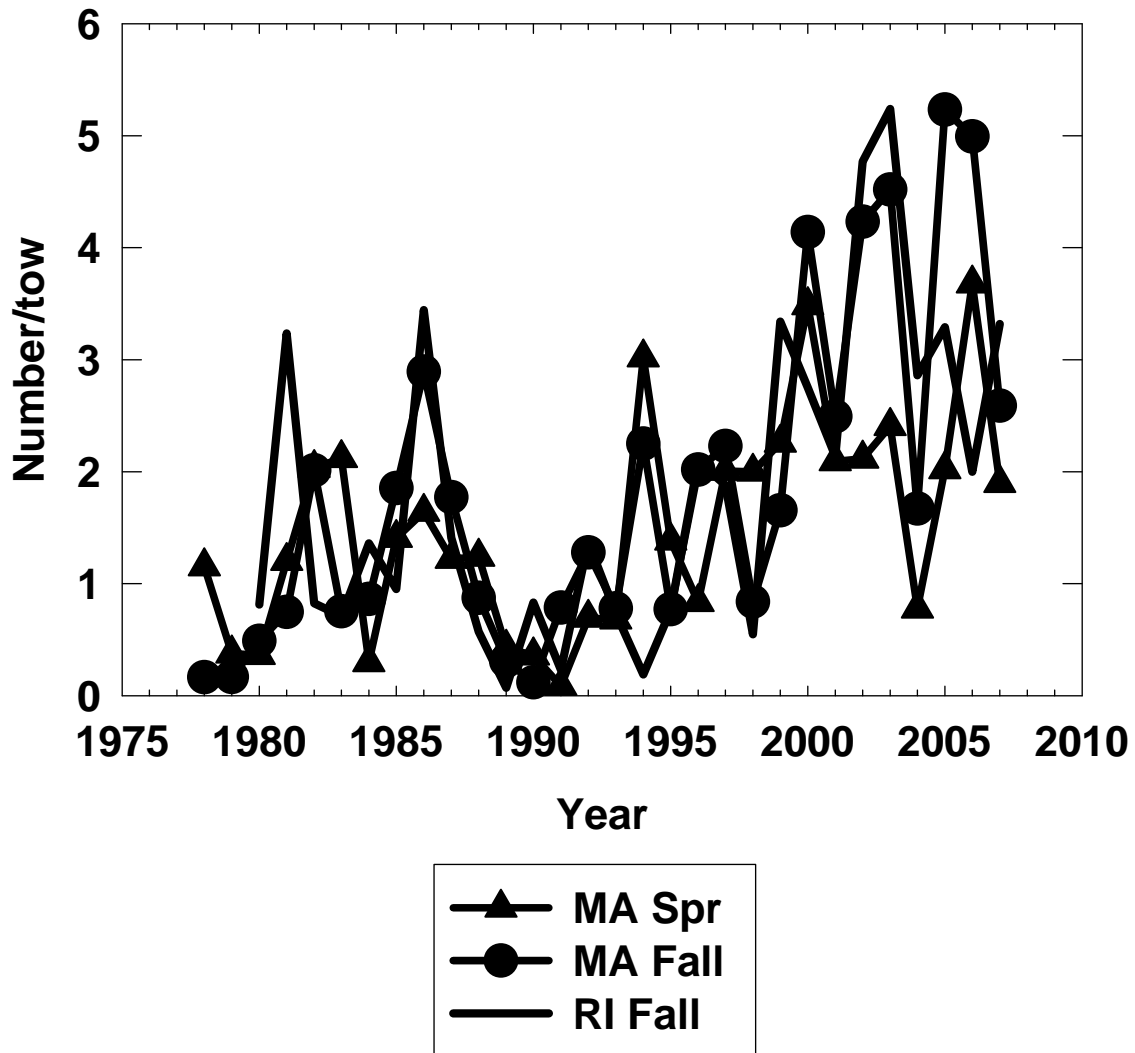
MA and RI State Trawl Surveys

Figure 14. Trends in MA and RI trawl survey abundance indices for summer flounder.
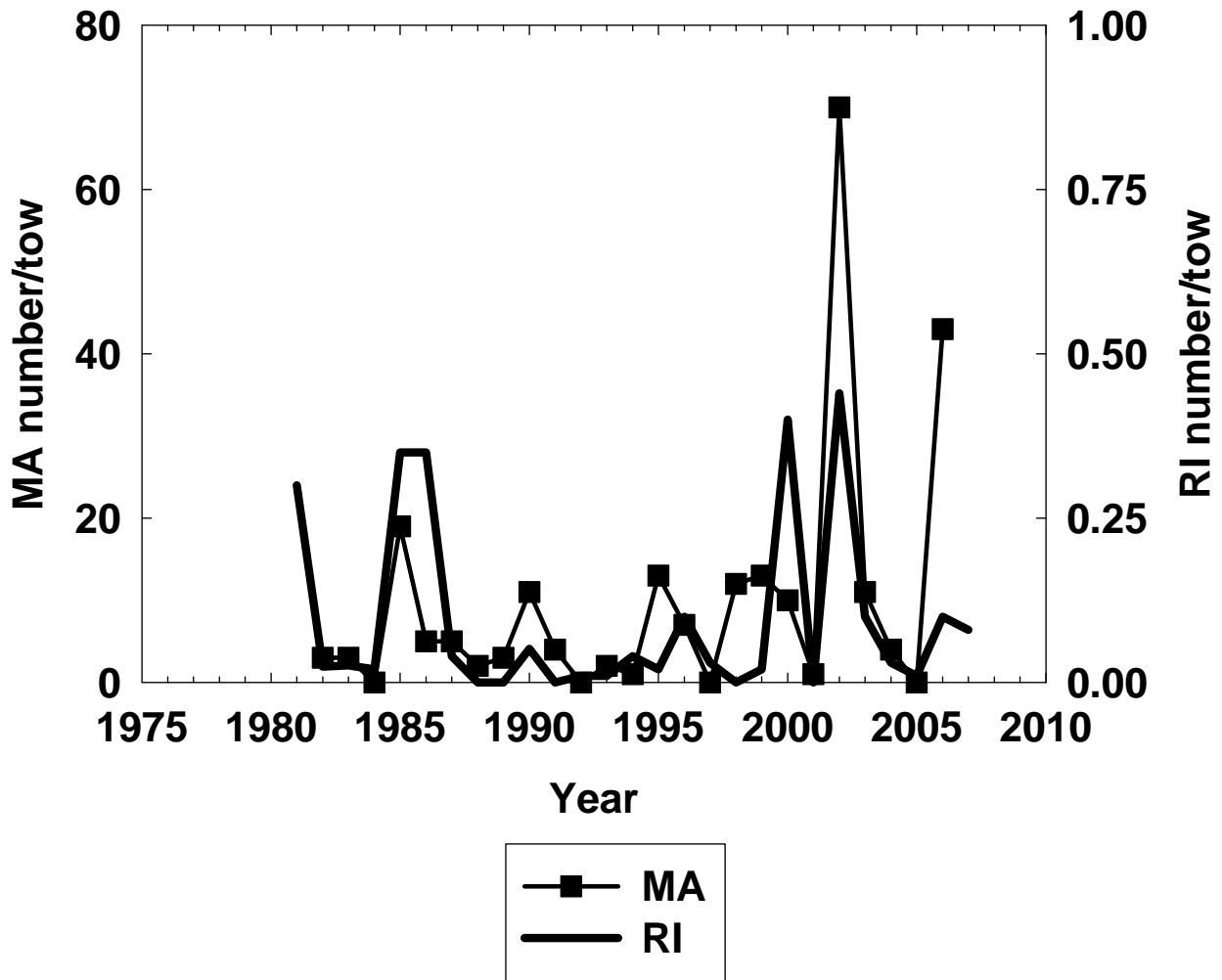
MA and RI YOY Indices

Figure 15. Trends in MA and RI survey recruitment indices for summer flounder.
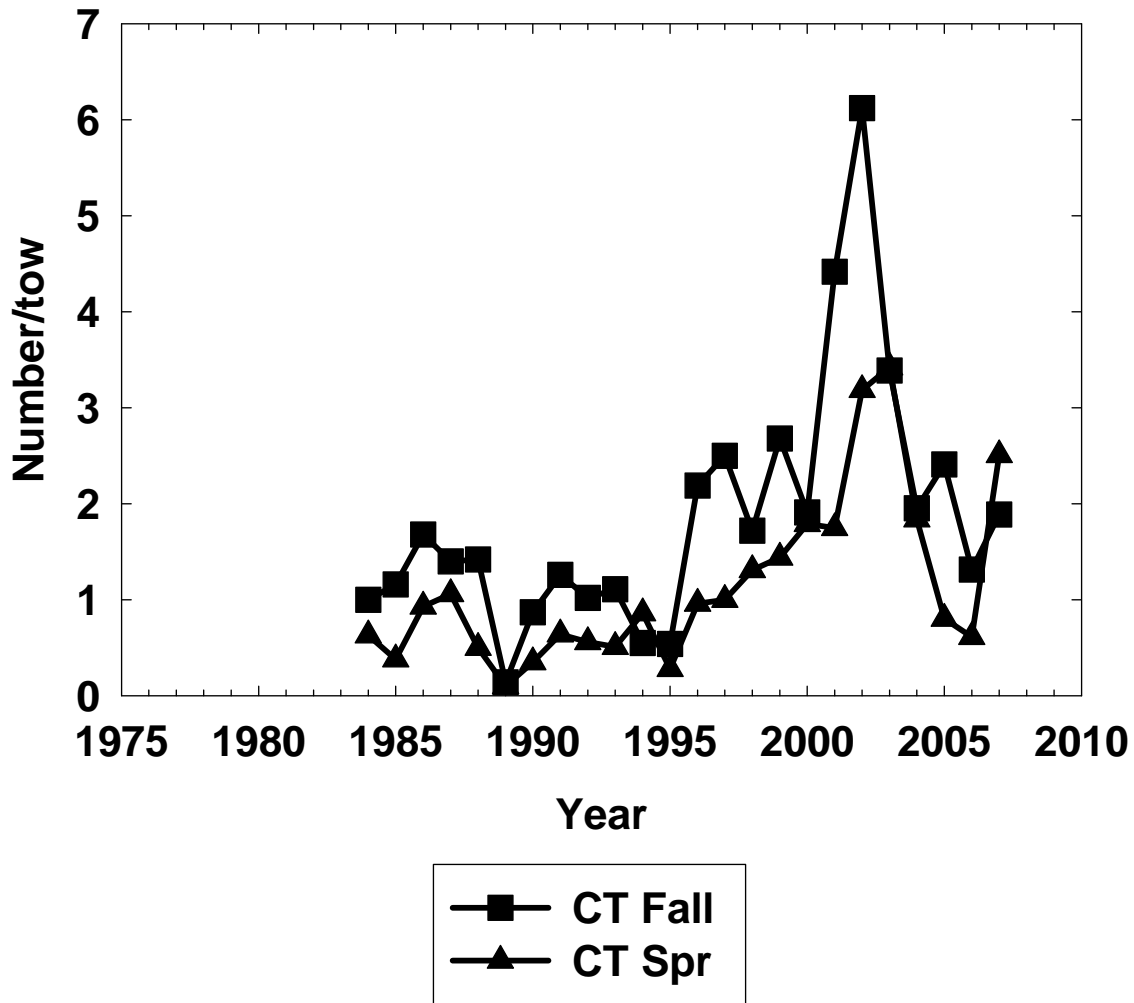
CT State Trawl Surveys

Figure 16. Trends in CT trawl survey abundance indices for summer flounder.
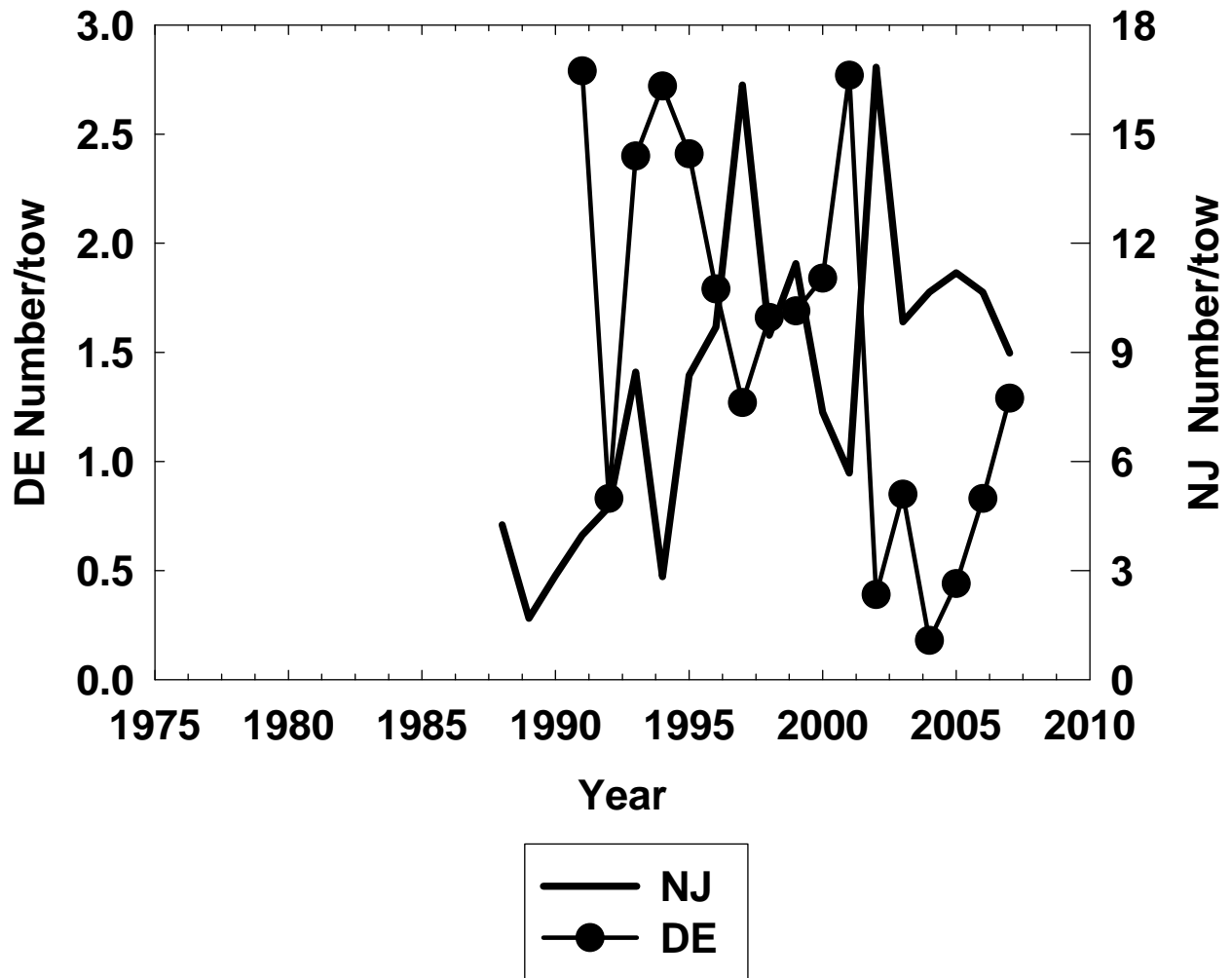
NJ and DE State Trawl Surveys

Figure 17. Trends in NJ and DE trawl survey abundance indices for summer flounder.
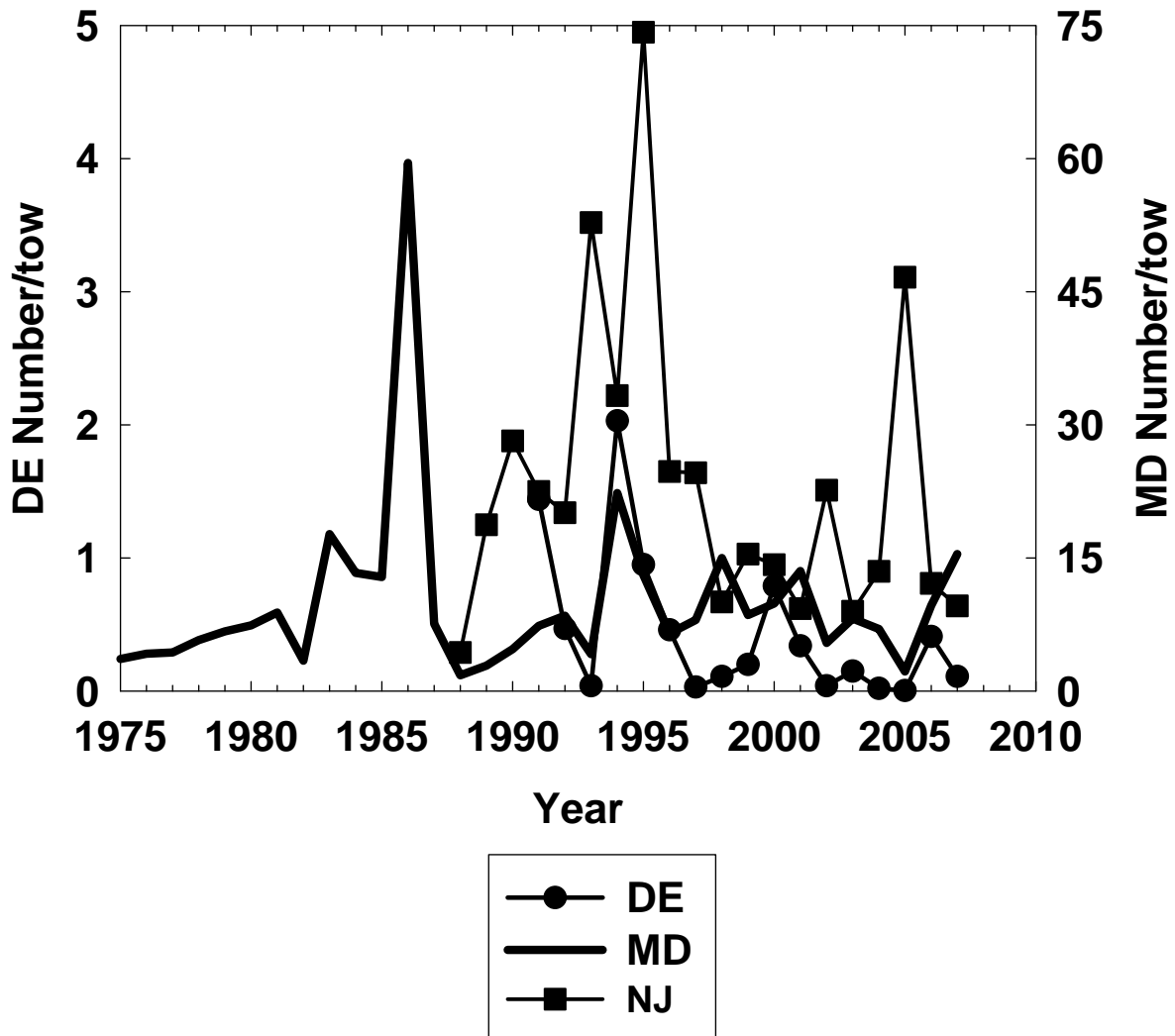
NJ, DE and MD YOY Indices

Figure 18. Trends in NJ, DE and MD survey recruitment indices for summer flounder.
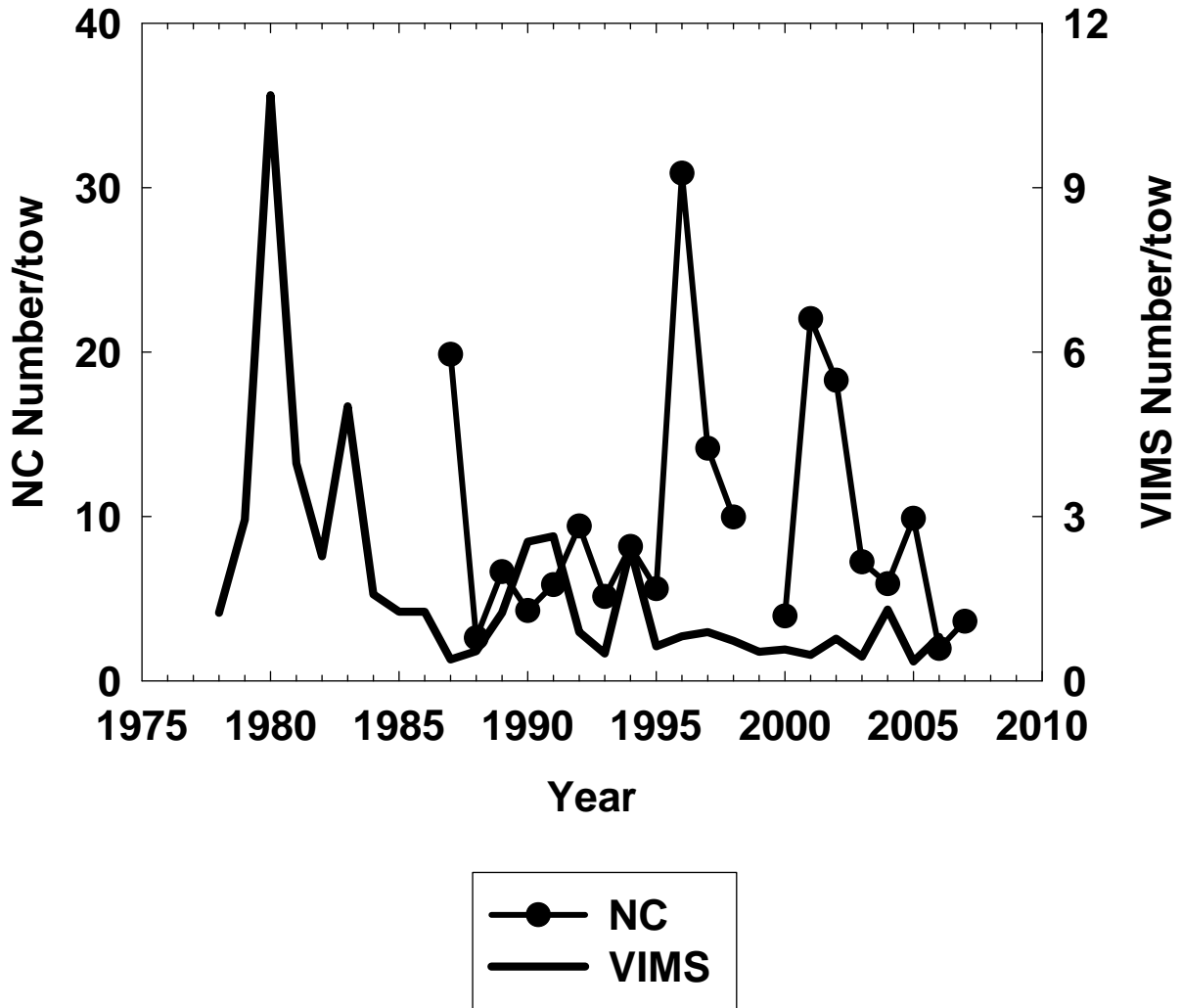
VIMS and NC YOY Indices

Figure 19. Trends in VIMS and NC trawl survey recruitment indices for summer flounder.
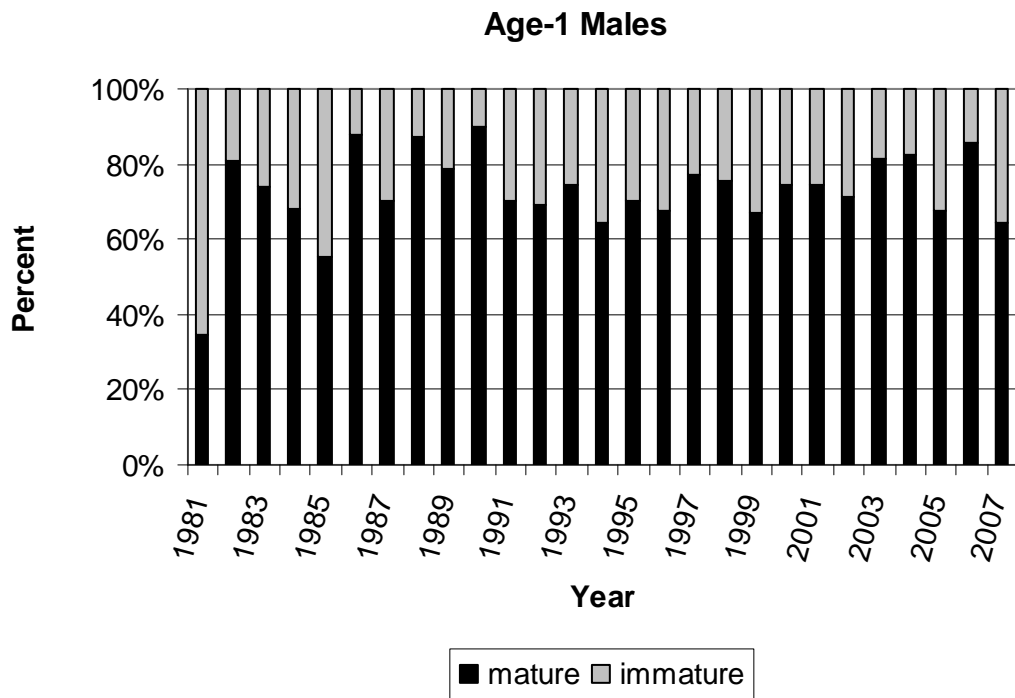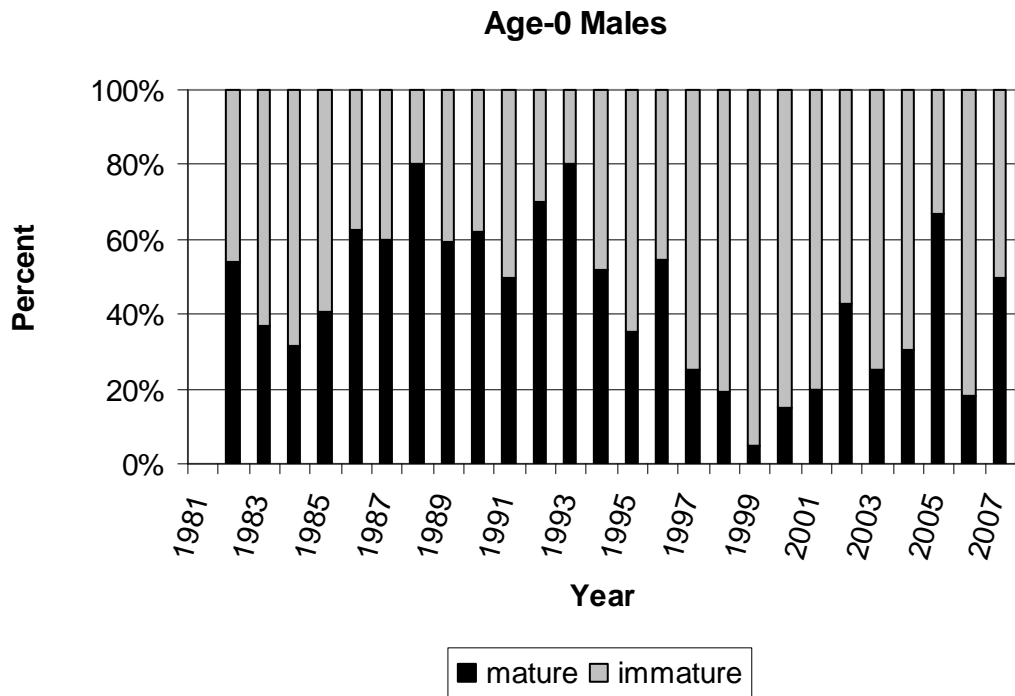
Age-0 Males

Age-1 Males

Figure 20. Summer flounder maturity based on the NEFSC spring, fall, and winter trawl survey data; the proportion mature at age-0 and 1, by sex, 1981-2007.
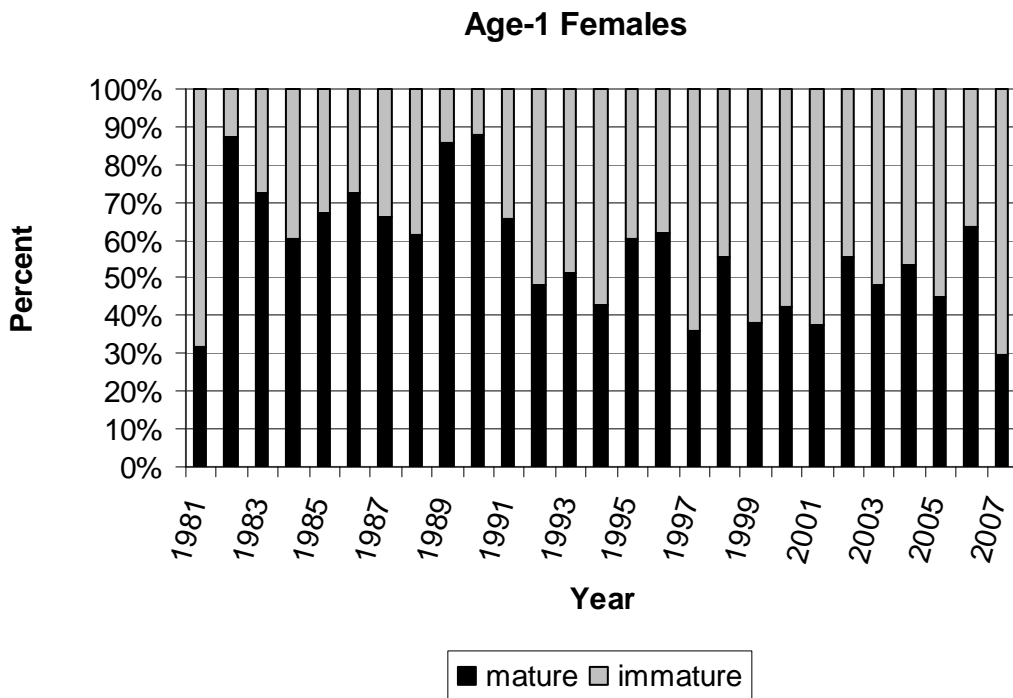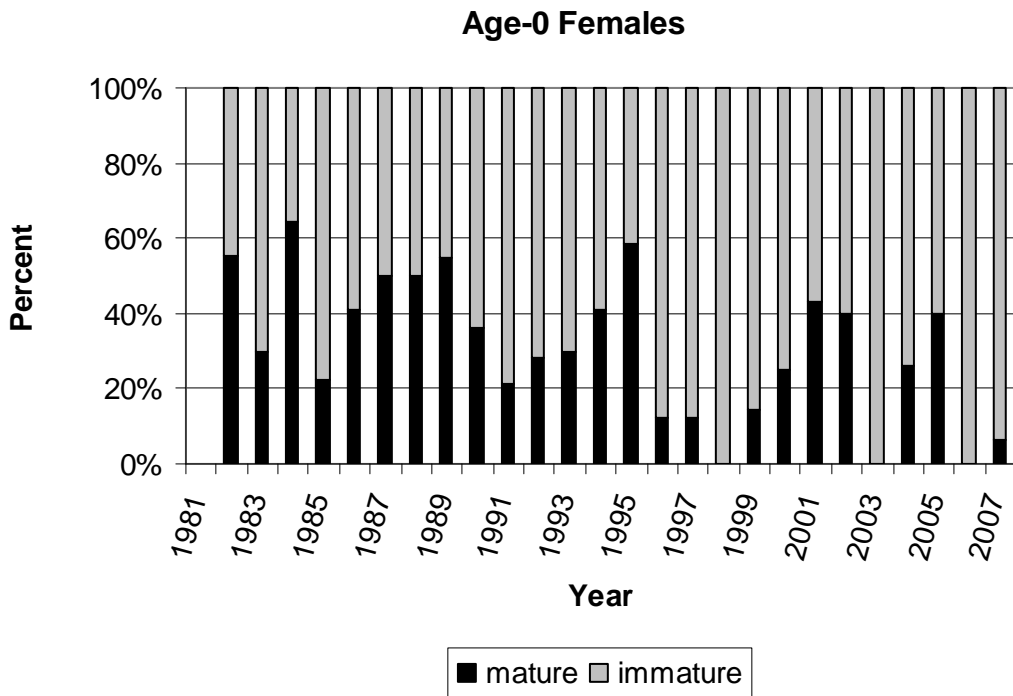
Age-0 Females

Age-1 Females

Figure 20. Continued. Summer flounder maturity based on the NEFSC spring, fall, and winter trawl survey data; the proportion mature at age-0 and 1, by sex, 1981-2007.
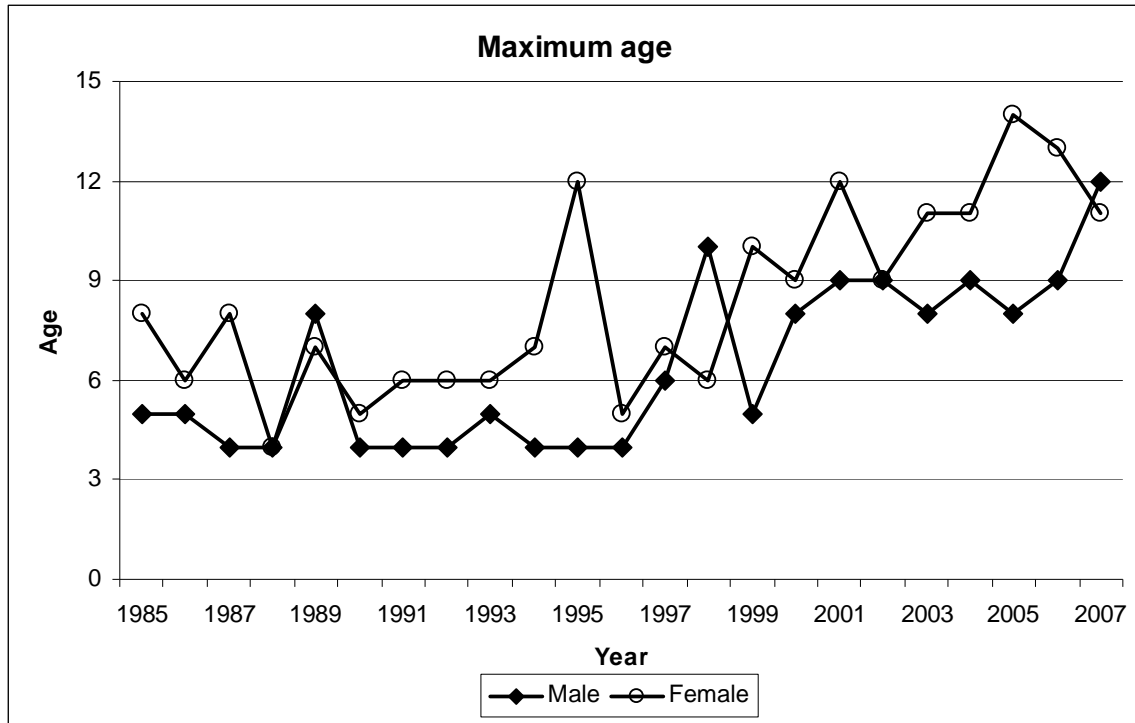
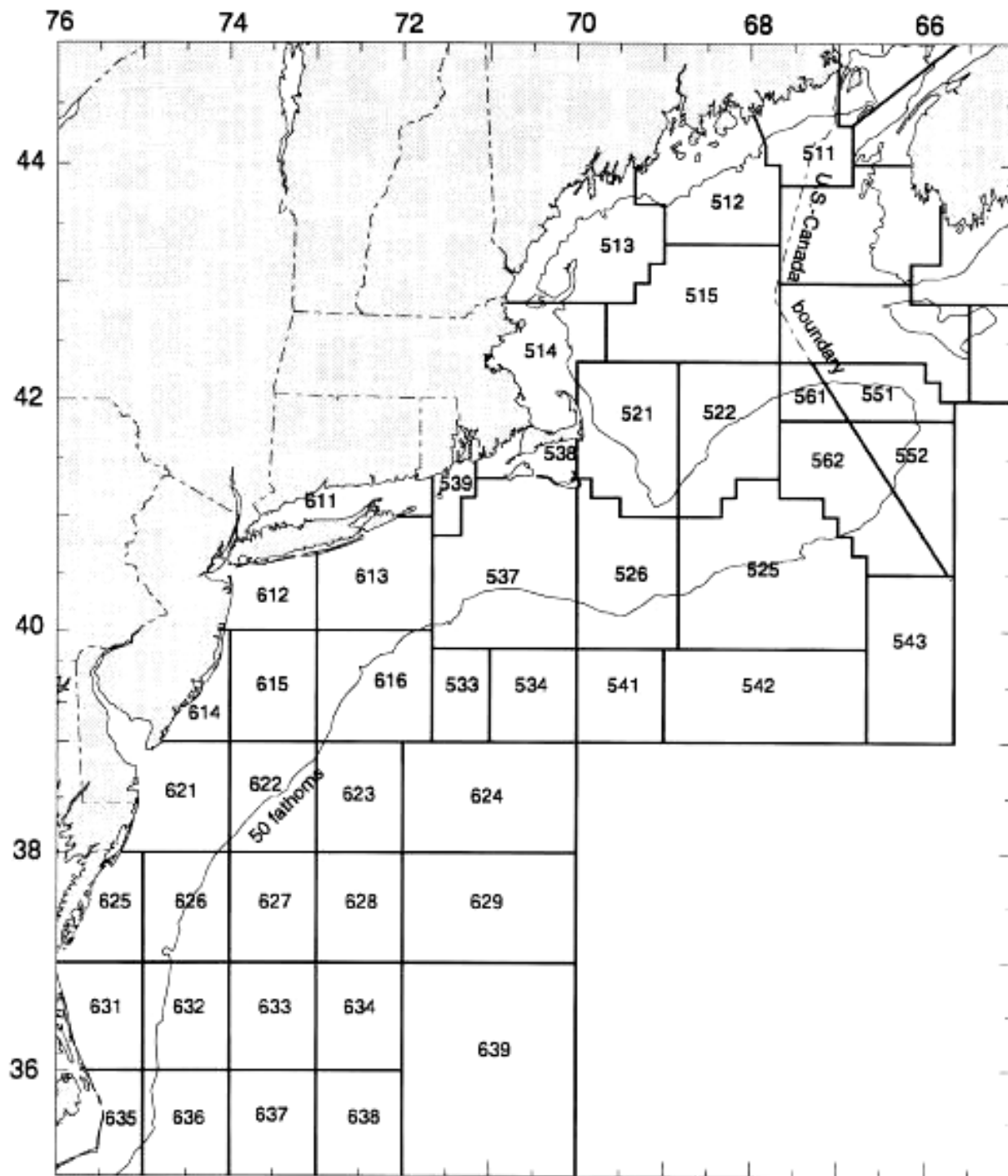Figure 21. Maximum age by sex from the NEFSC spring, winter, and fall survey data, 1985-1995.
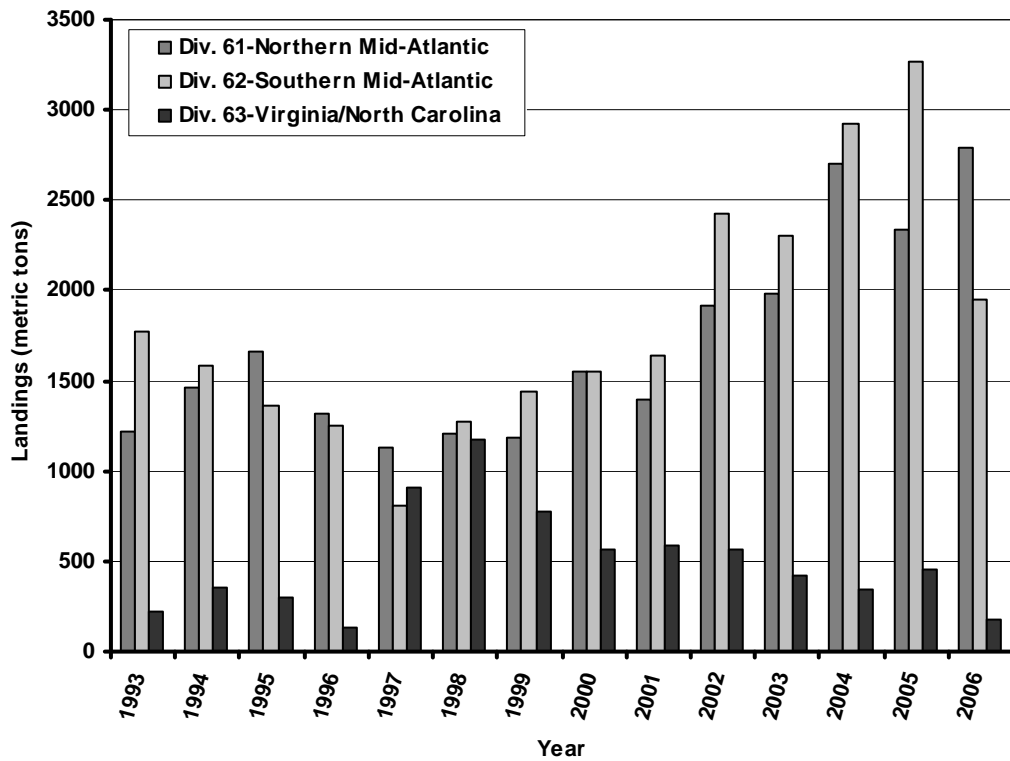
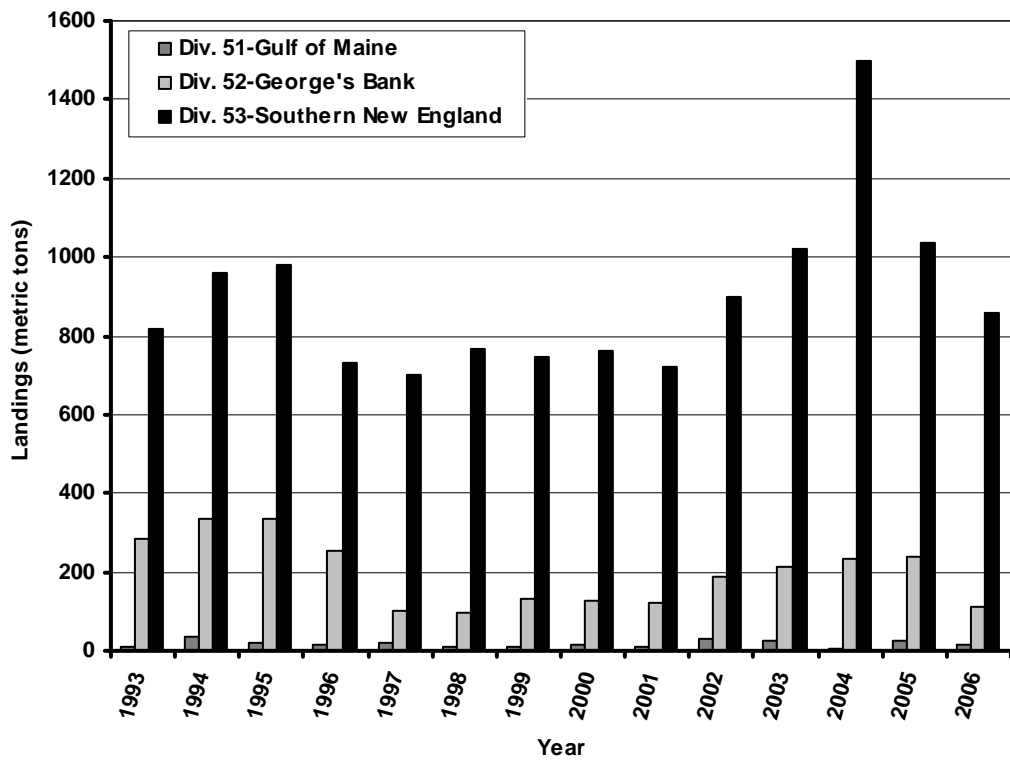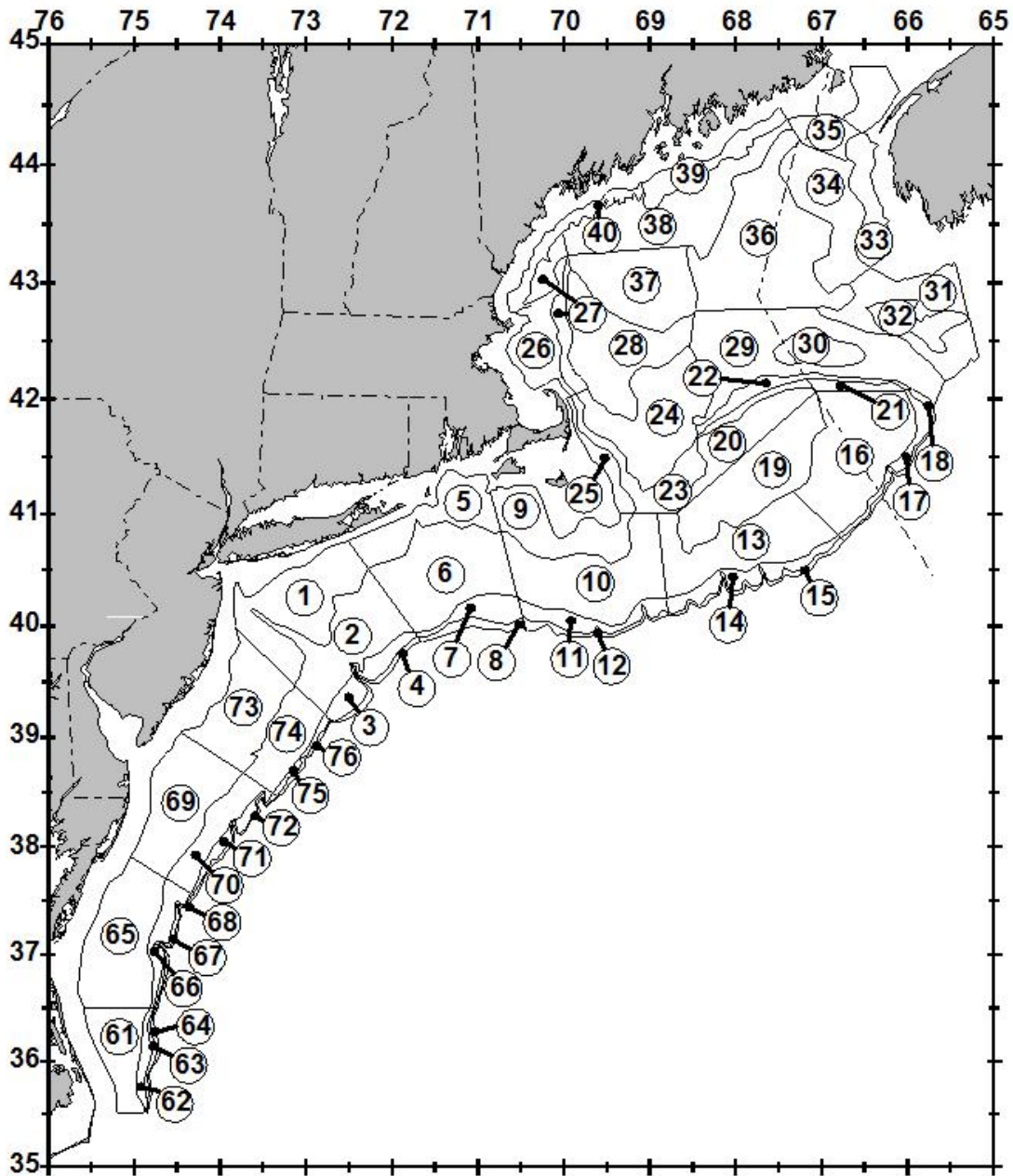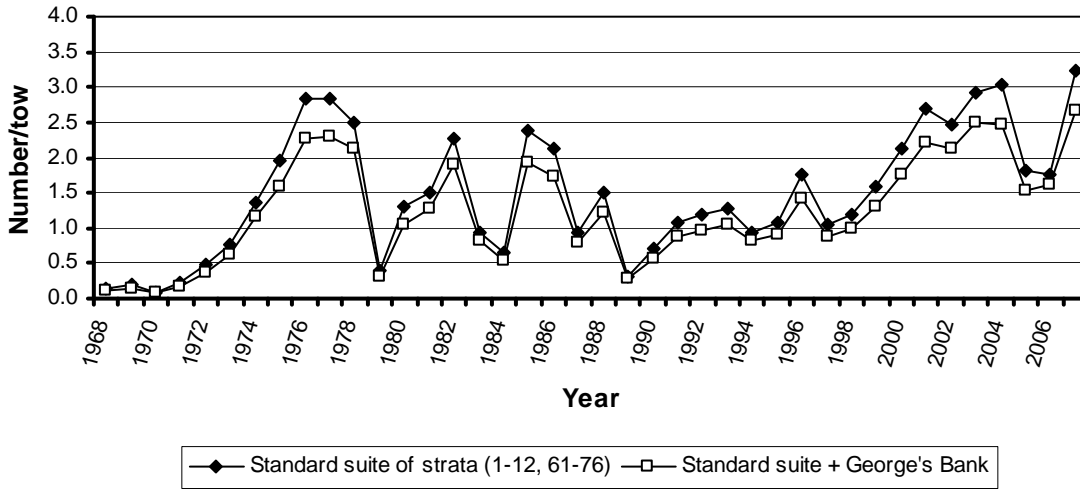Figure 22. Commercial statistical areas.

Figure 23. Commercial Landings (mt) for Divisions 51-53 and 61-63, for 1993-2006.

Strata sampled on NEFSC offshore bottom trawl surveys.
Depths range from 27 to > 200 meters.

Figure 24. NEFSC survey strata.

Summer Flounder - NEFSC Spring Survey
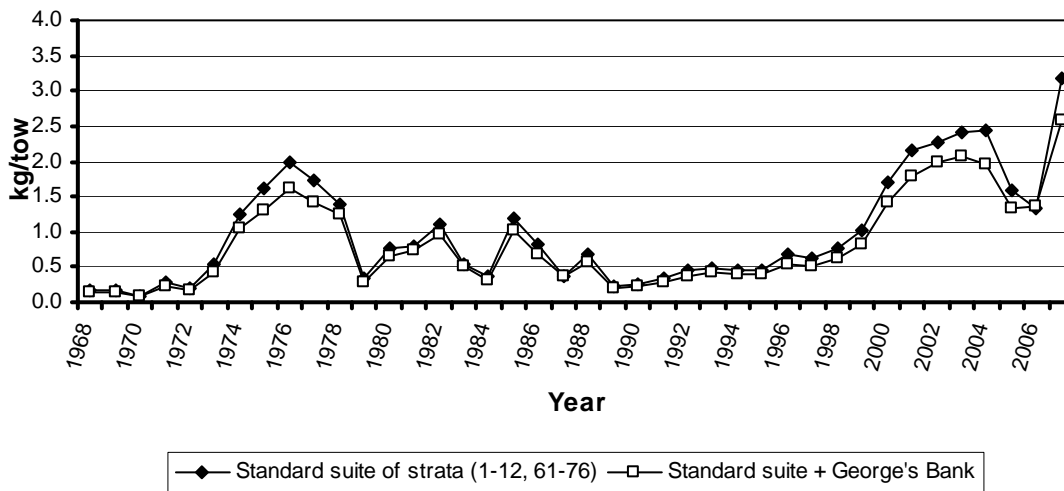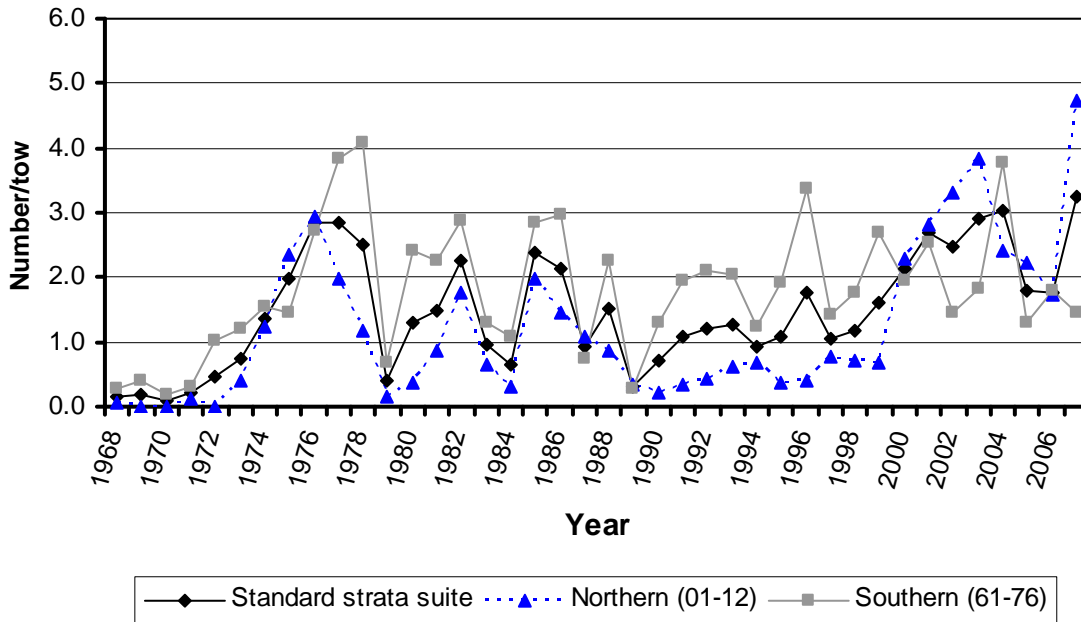

Summer Flounder - NEFSC Spring Survey

Figure 25. NEFSC Spring survey summer flounder indices (no./tow and kg/tow) with and without the George's Bank survey strata, 1968-2007.

Summer Flounder - NEFSC Spring Survey

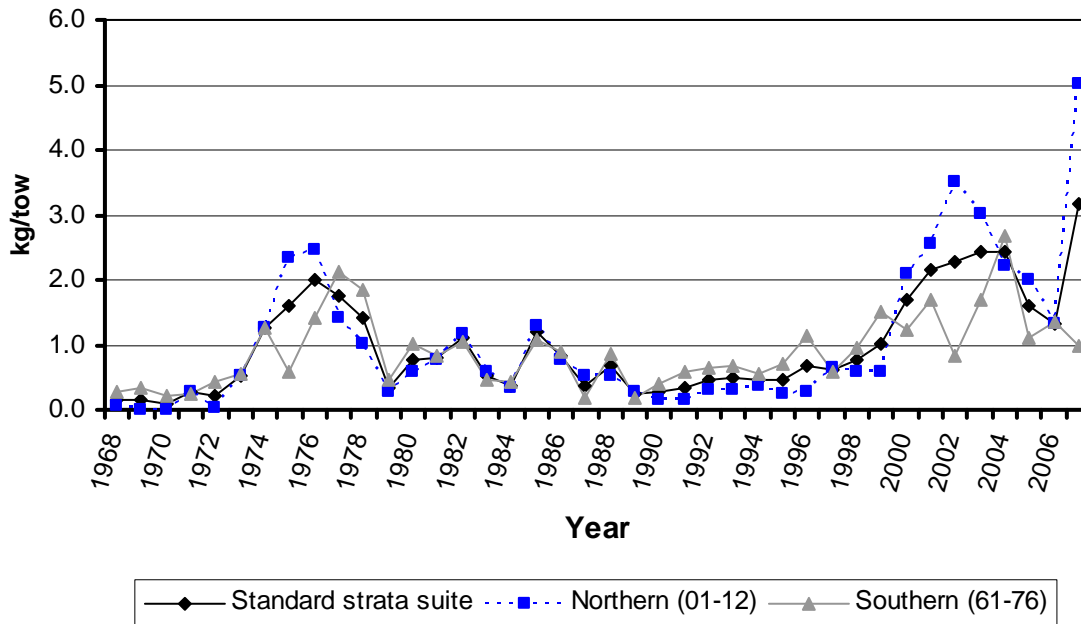**Summer Flounder - NEFSC Spring Survey**

Figure 26. NEFSC Spring survey summer flounder indices (no./tow and kg/tow) with the standard, Northern, and Southern suites of survey strata, 1968-2007.

2002 Summer Flounder Lengths - NEFSC Spring Survey

2003 Summer Flounder Lengths - NEFSC Spring Survey
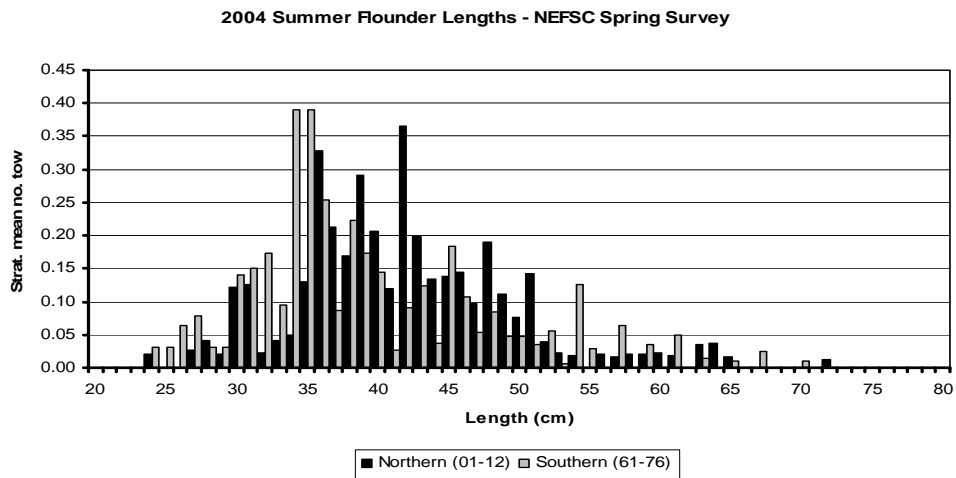
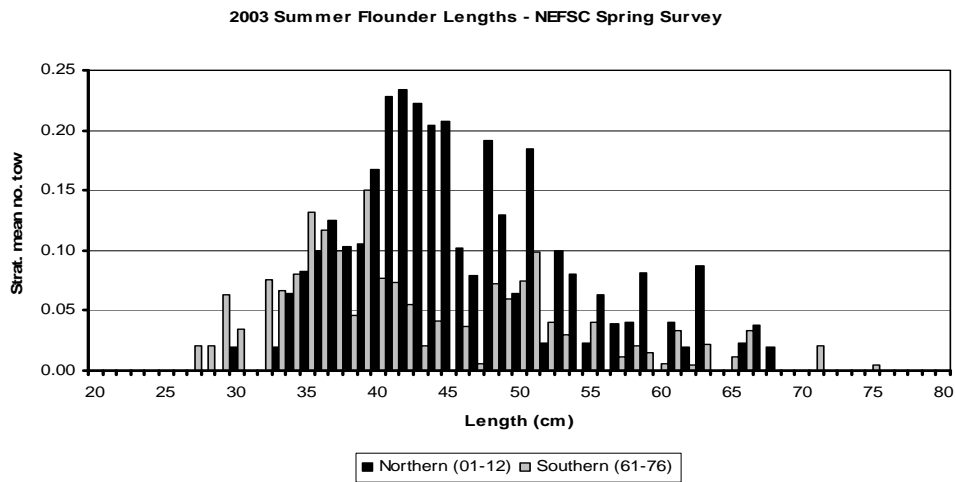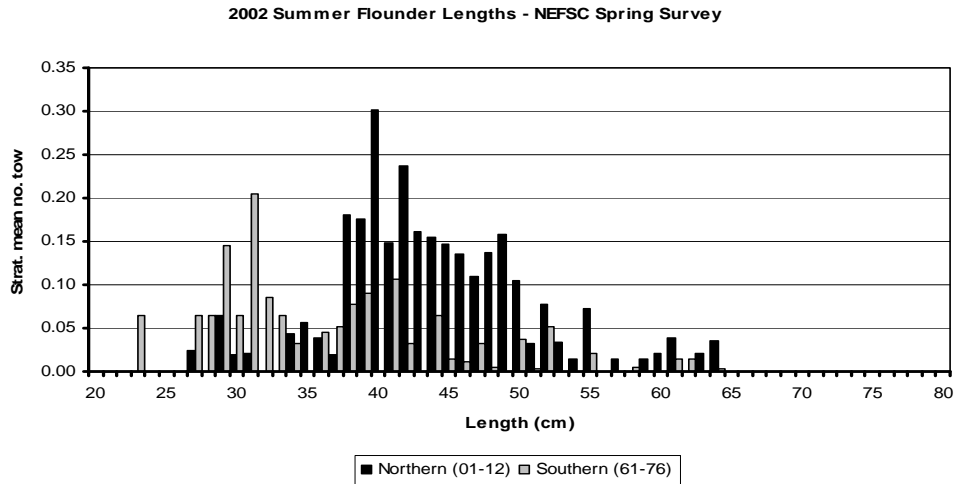**2004 Summer Flounder Lengths - NEFSC Spring Survey**

Figure 27. NEFSC Spring survey summer flounder lengths (stratified mean no./tow) for the Northern and Southern suites of survey strata, 2002-2004.
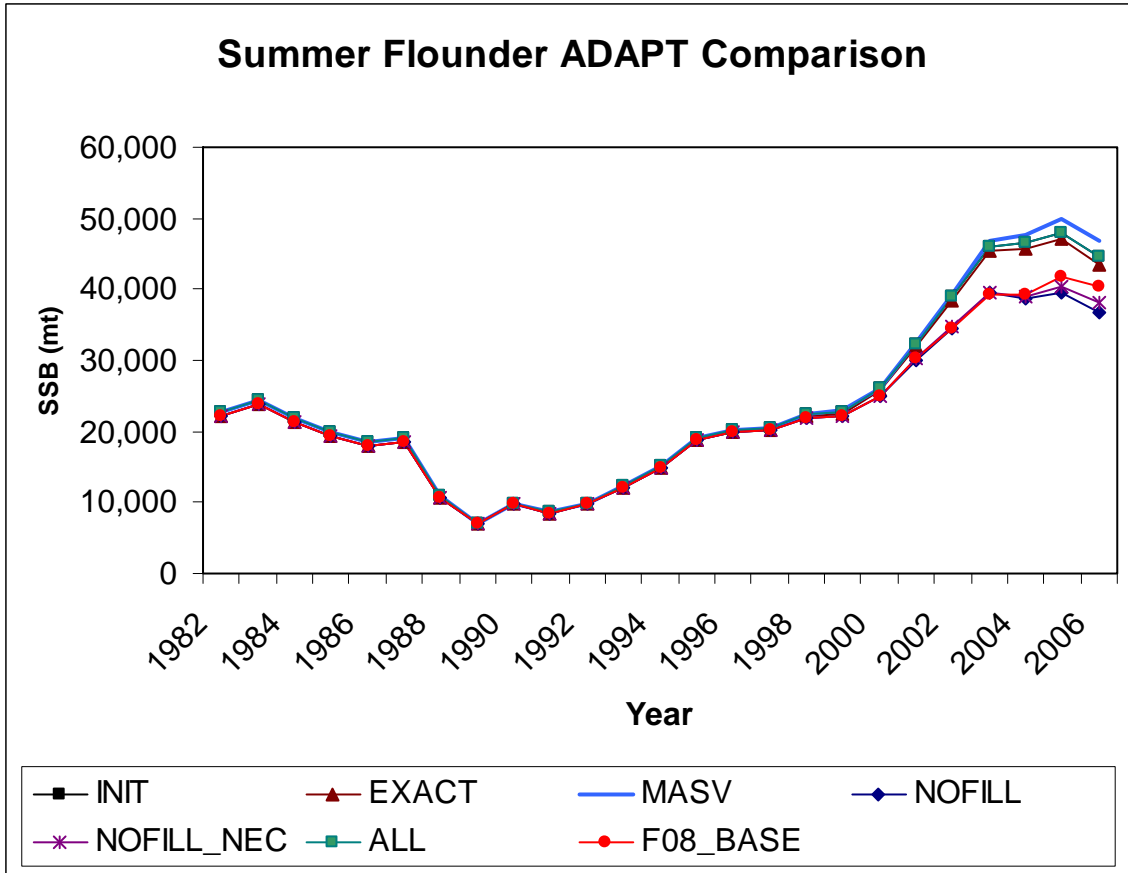
Figure 28. Spawning Stock Biomass (SSB) estimates for alternative ADAPT VPA model configurations. F08_BASE is the final run configuration with catch data through 2006.
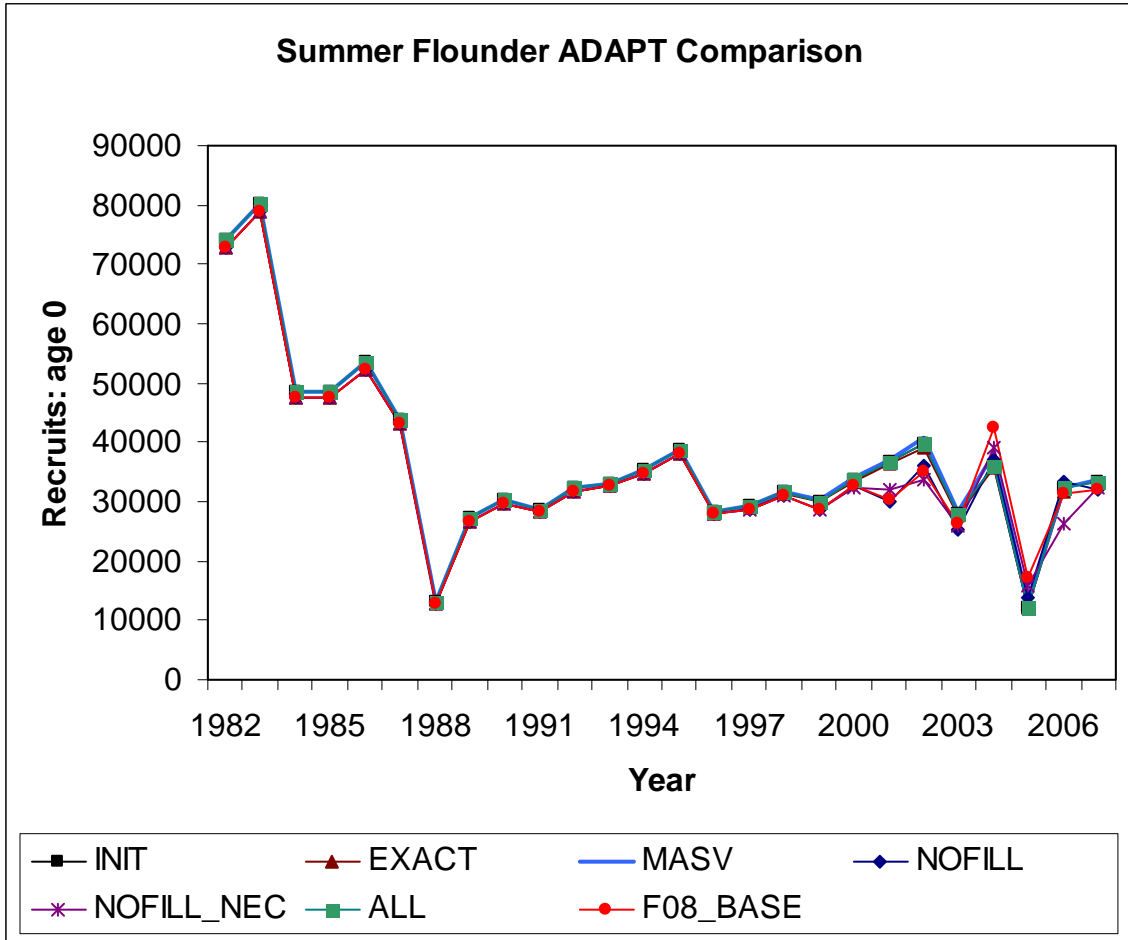
Figure 29. Recruitment at age 0 (R) estimates for alternative ADAPT VPA model configurations. F08_BASE is the final run configuration with catch data through 2006.
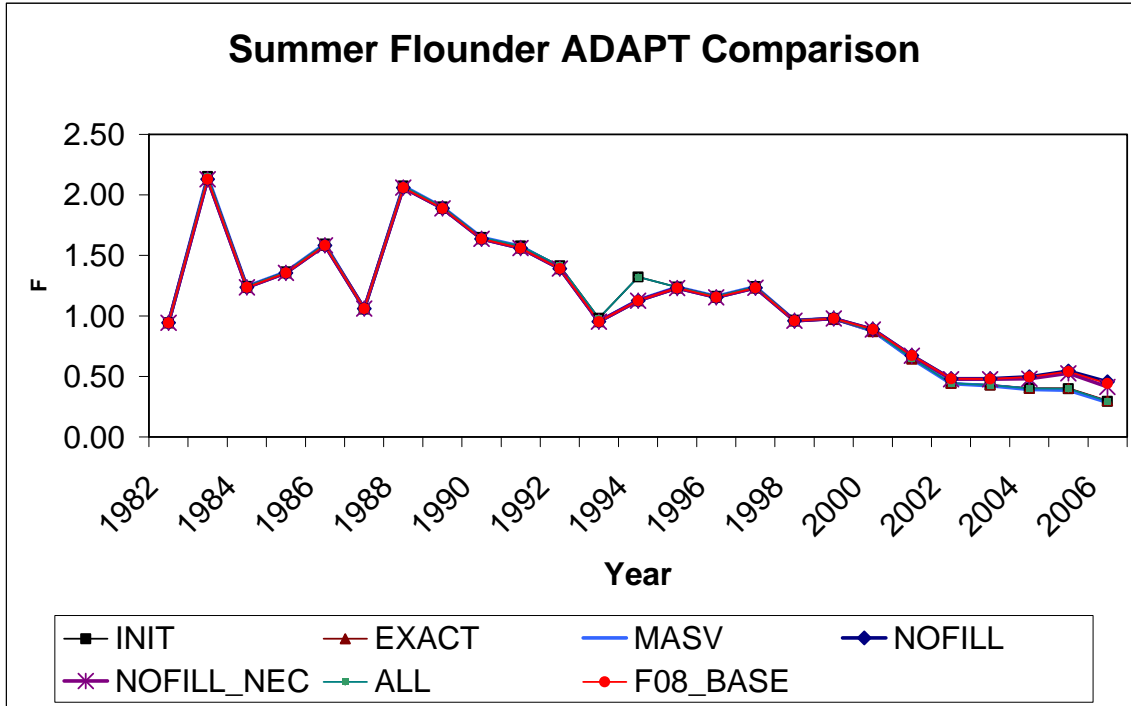
Figure 30. Fishing mortality rate (F, ages 3-5) estimates for alternative ADAPT VPA model configurations. F08_BASE is the final run configuration with catch data through 2006.
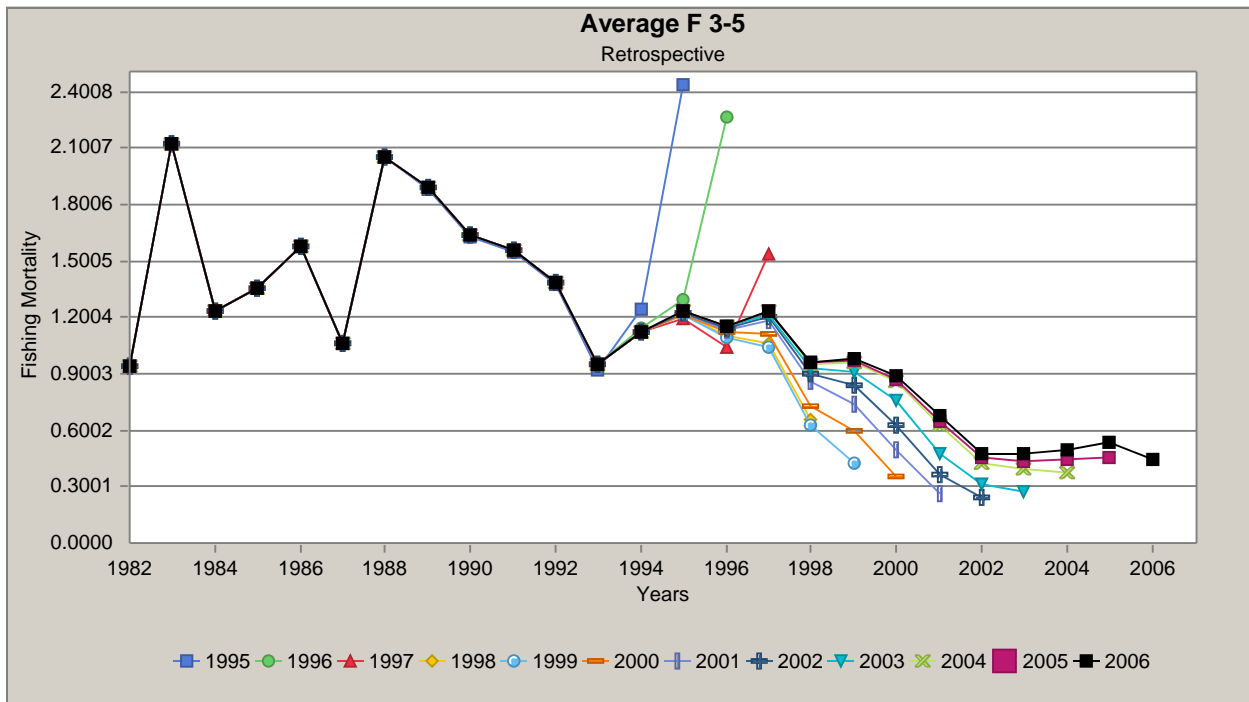

Figure 31. Retrospective analysis of Fishing Mortality (F, ages 3-5) for ADAPT VPA F08_BASE run.
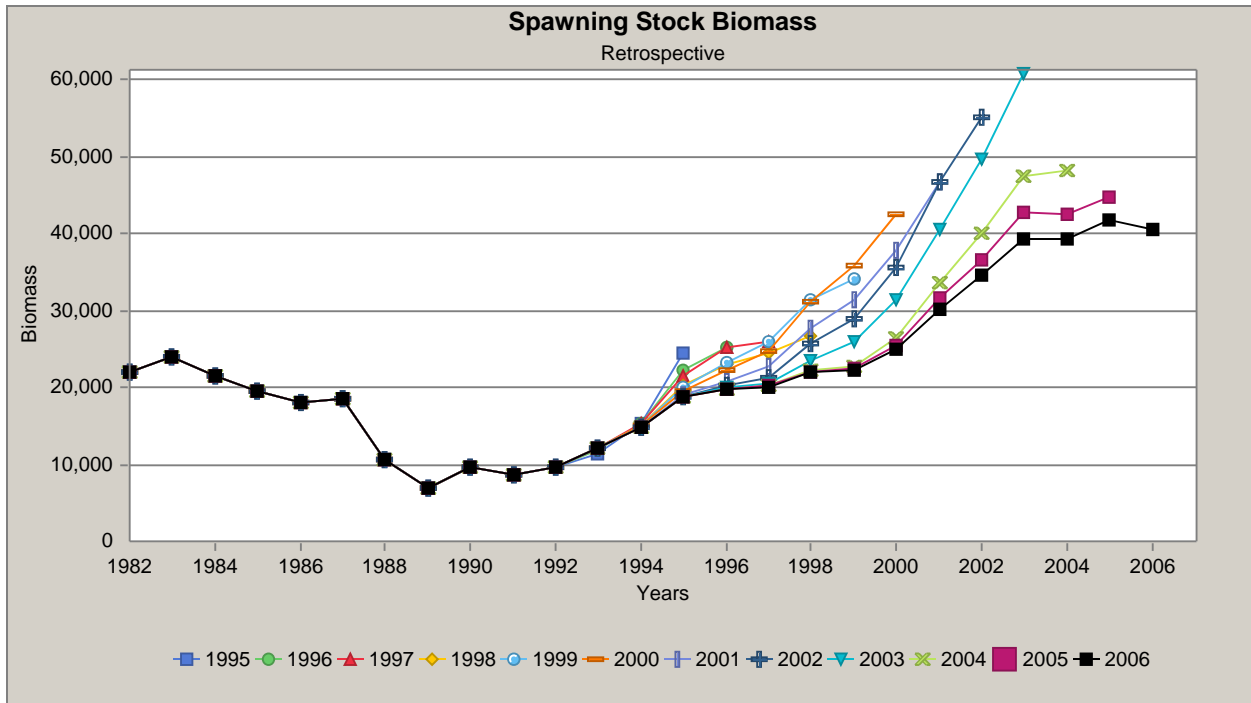
Figure 32. Retrospective analysis of Spawning Stock Biomass (SSB) for ADAPT VPA F08_BASE run.
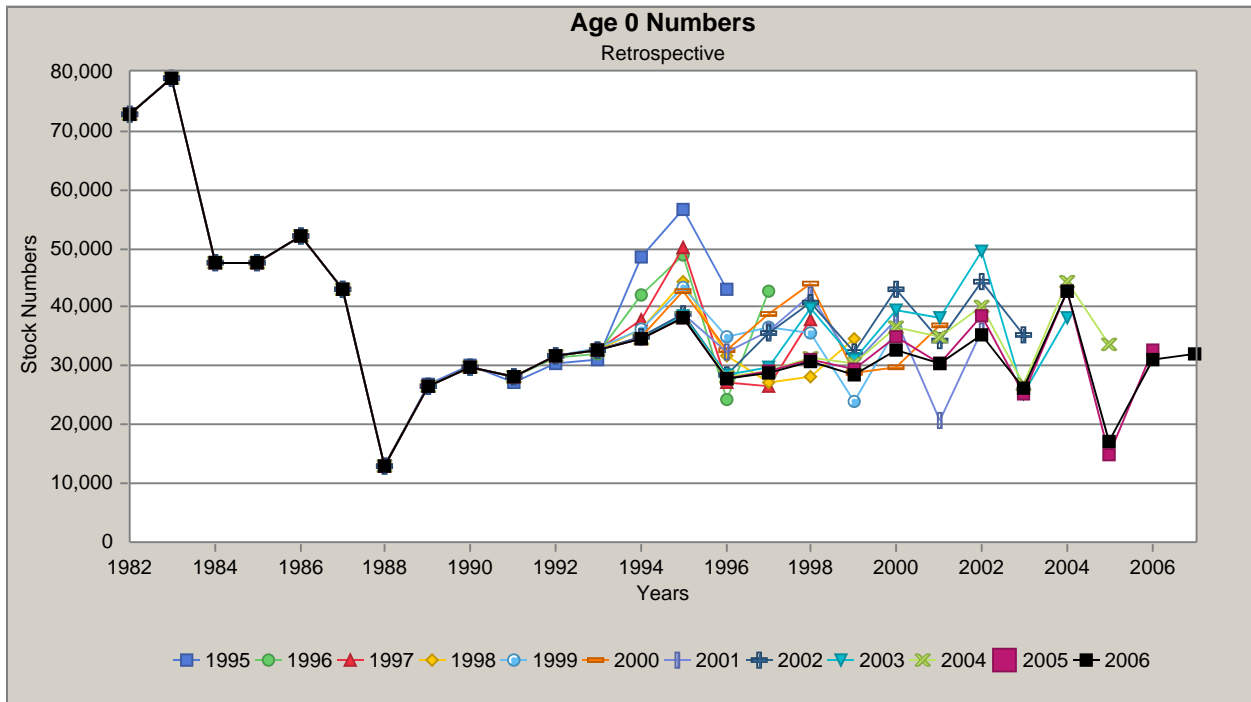

Figure 33. Retrospective analysis of Recruitment at age 0 (R) for ADAPT VPA F08_BASE run.
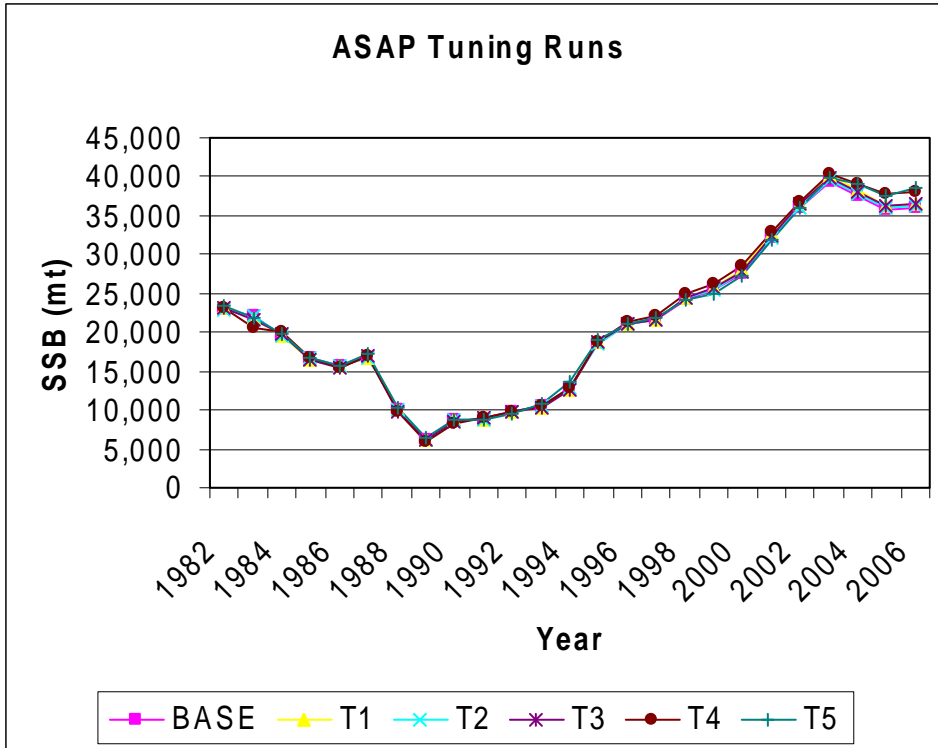
Figure 34. Spawning Stock Biomass (SSB) estimates for ASAP model tuning configurations. F08_BASE_T5 is the final run configuration with catch data through 2006.
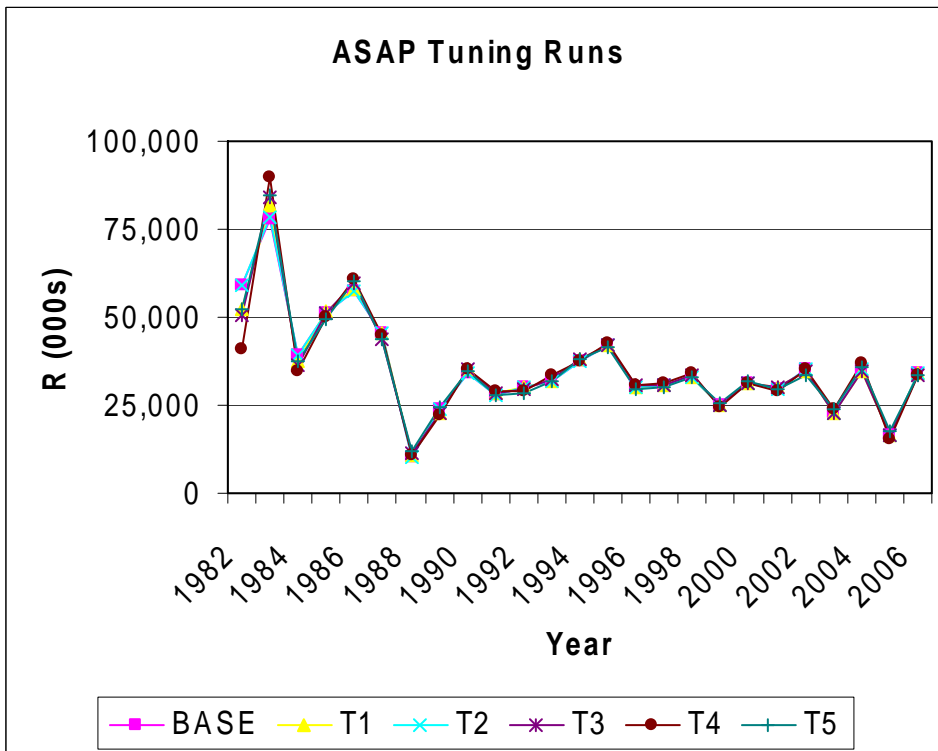

Figure 35. Recruitment at age 0 (R) estimates for alternative ASAP model configurations. F08_BASE_T5 is the final run configuration with catch data through 2006.
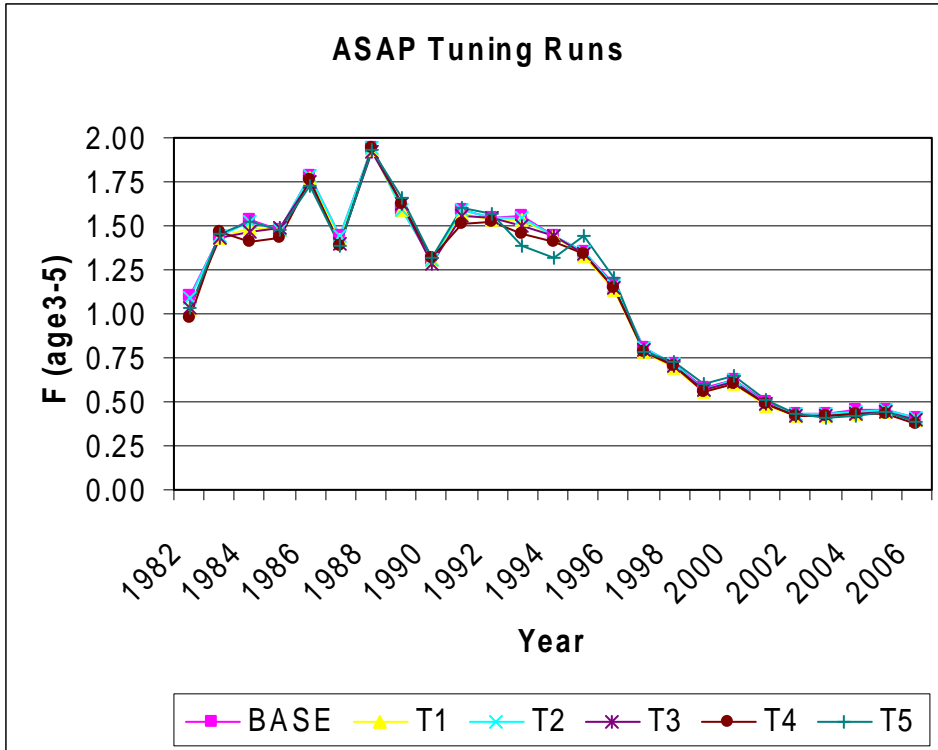
Figure 36. Fishing mortality rate (F, ages 3-5) estimates for alternative ASAP model configurations. F08_BASE_T5 is the final run configuration with catch data through 2006.
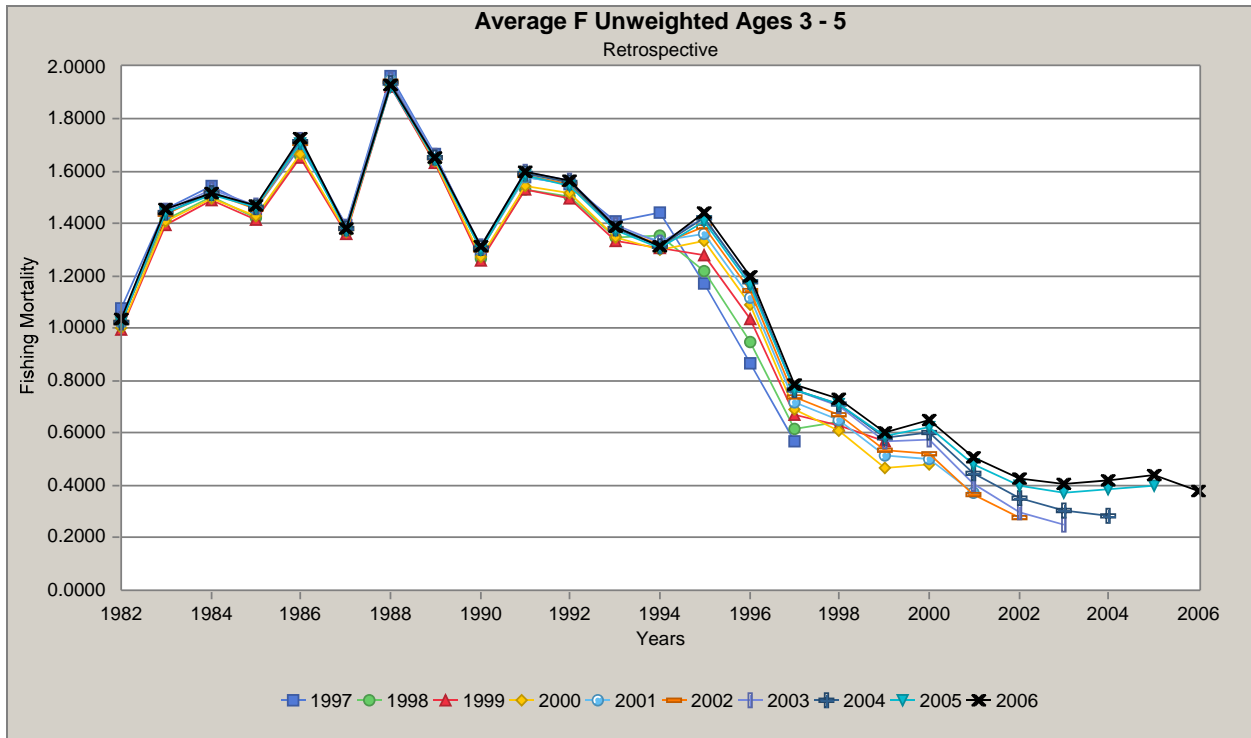
Figure 37. Retrospective analysis of Fishing Mortality (F, ages 3-5) for ASAP F08_BASE_T5 run.
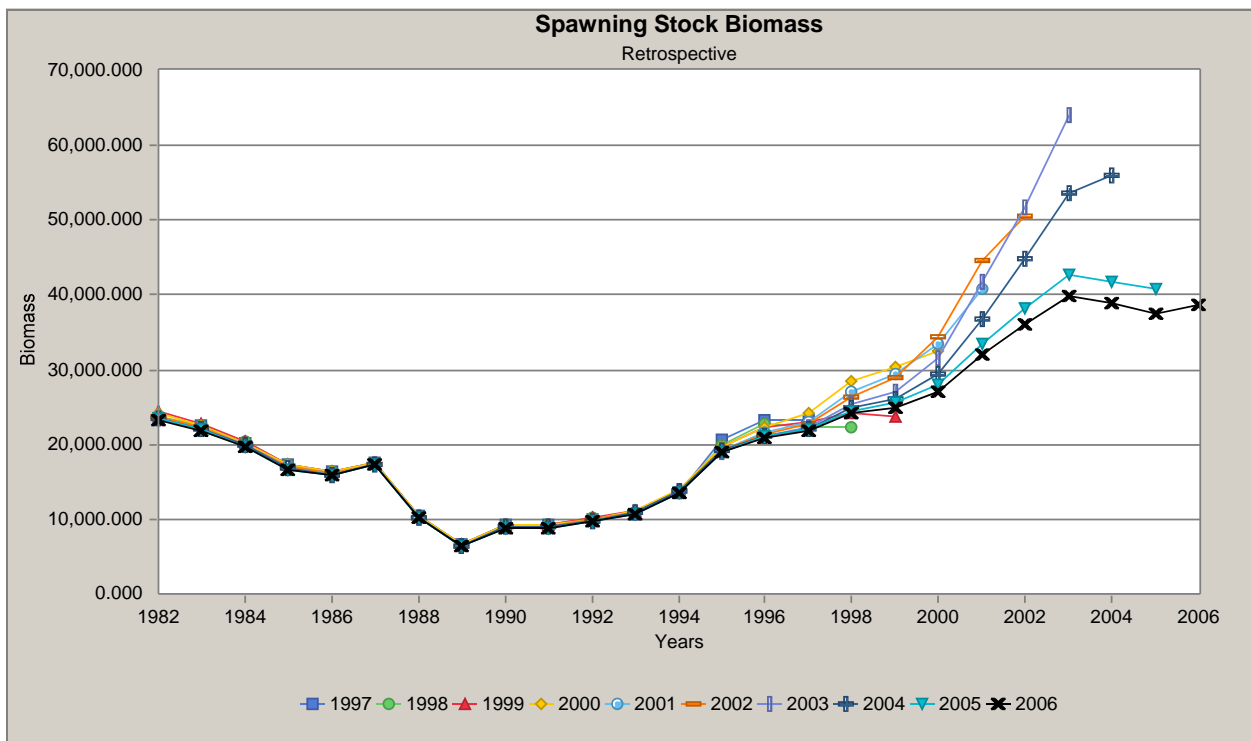

Figure 38. Retrospective analysis of Spawning Stock Biomass (SSB) for ASAP F08_BASE_T5 run.
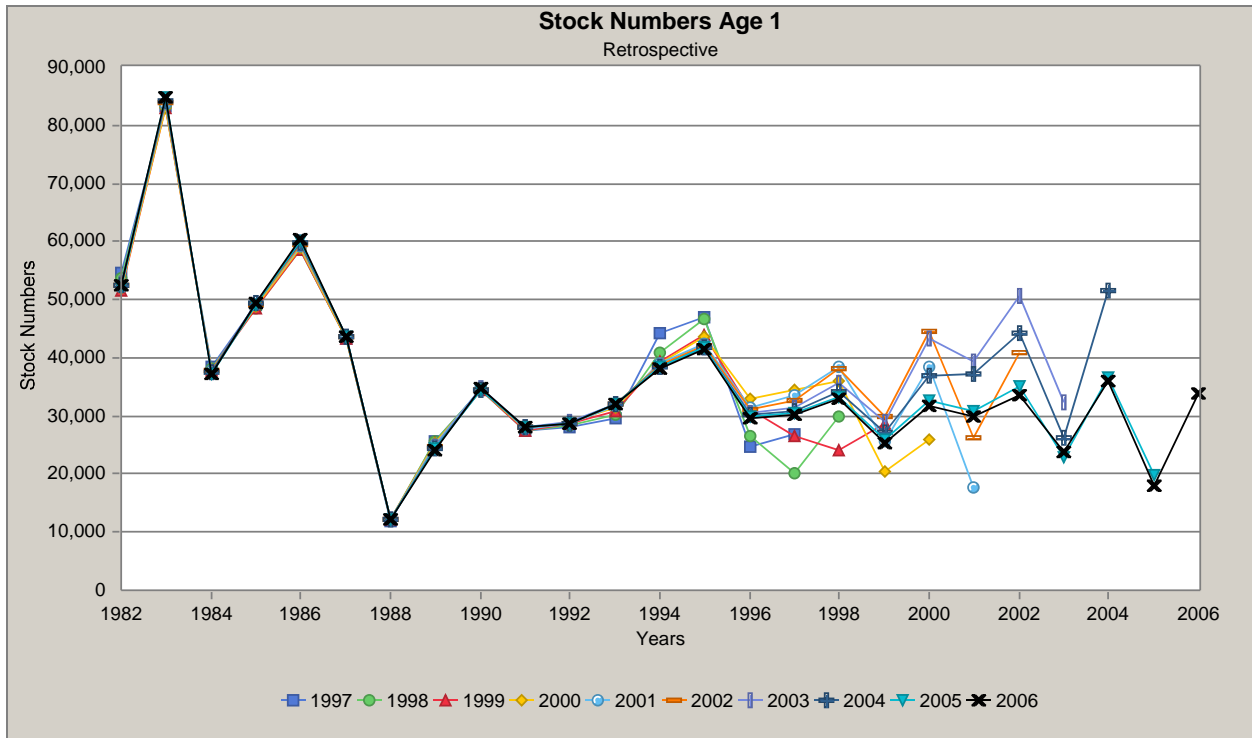
Figure 39. Retrospective analysis of Recruitment at age 0 (R) for ASAP F08_BASE_T5 run. Note that ASAP age 1 is true age 0.
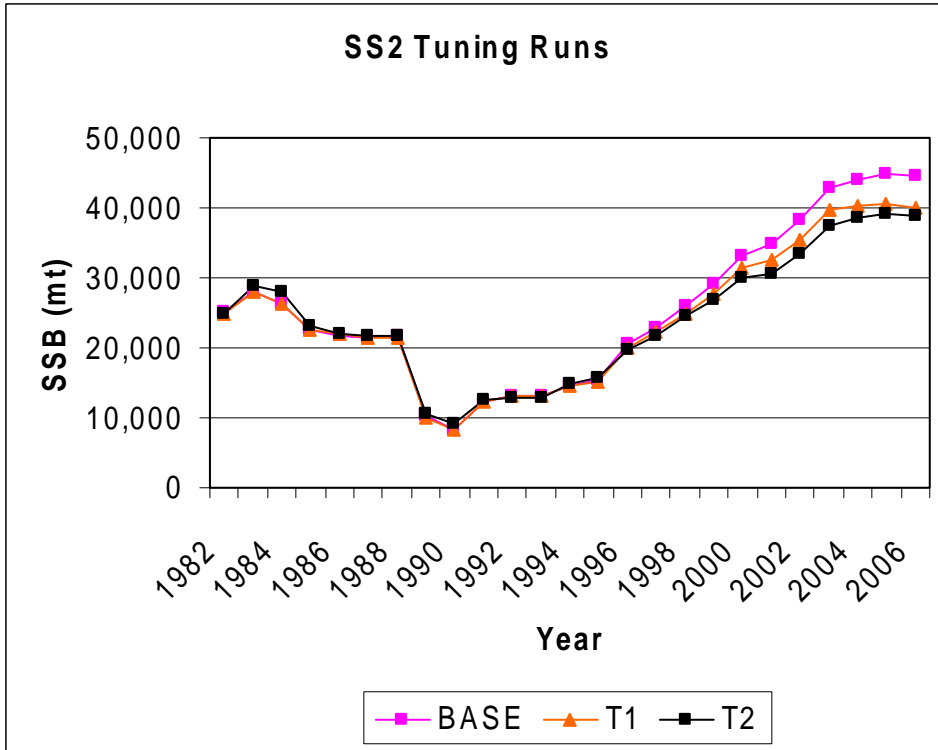
Figure 40. Spawning Stock Biomass (SSB) estimates for SS2 model tuning configurations. F08_BASE_T2 is the final run configuration with catch data through 2006.
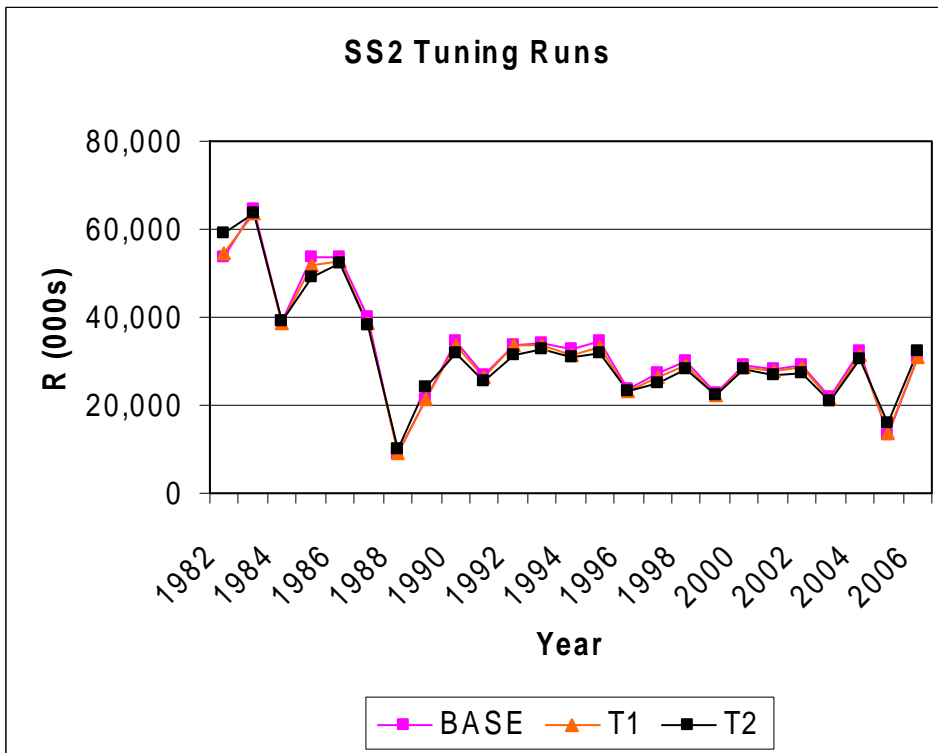

Figure 41. Recruitment at age 0 (R) estimates for alternative SS2 model configurations. F08_BASE_T2 is the final run configuration with catch data through 2006.
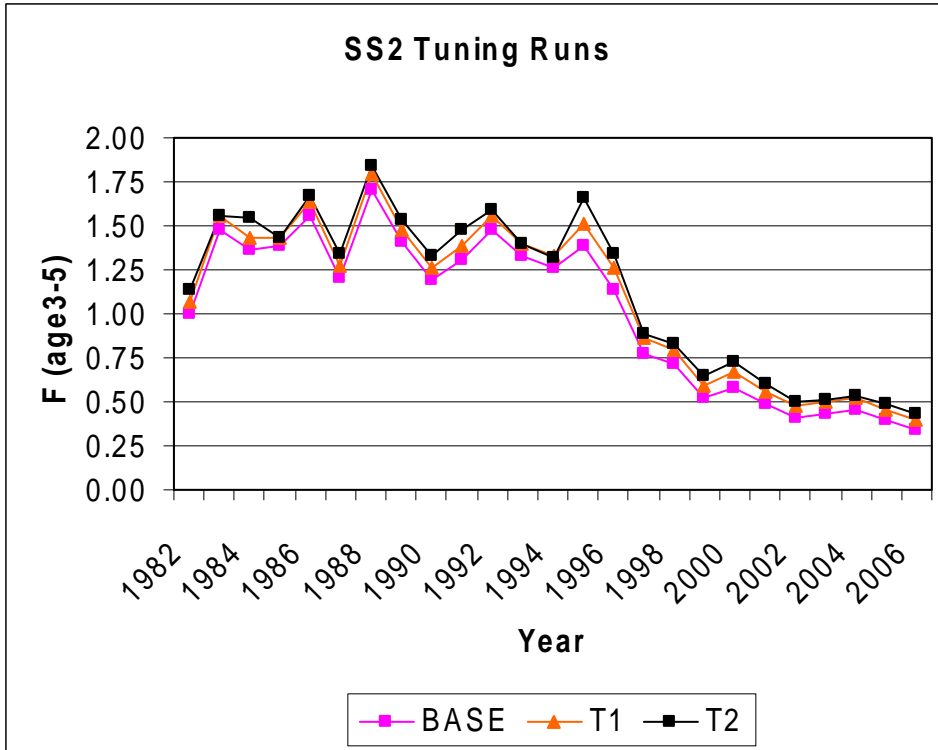
Figure 42. Fishing mortality rate (F, ages 3-5) estimates for alternative SS2 model configurations. F08_BASE_T2 is the final run configuration with catch data through 2006.
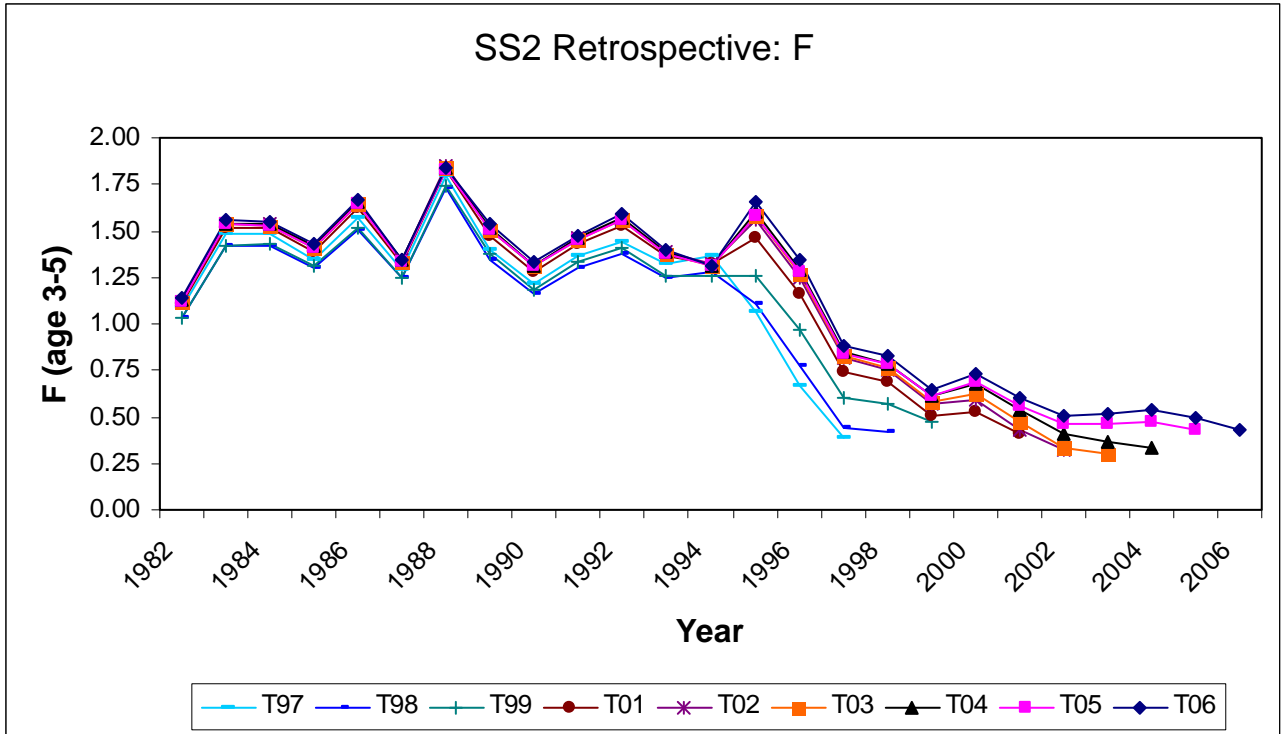
Figure 43. Retrospective analysis of Fishing Mortality (F, ages 3-5) for SS2 F08_BASE_T2 run.
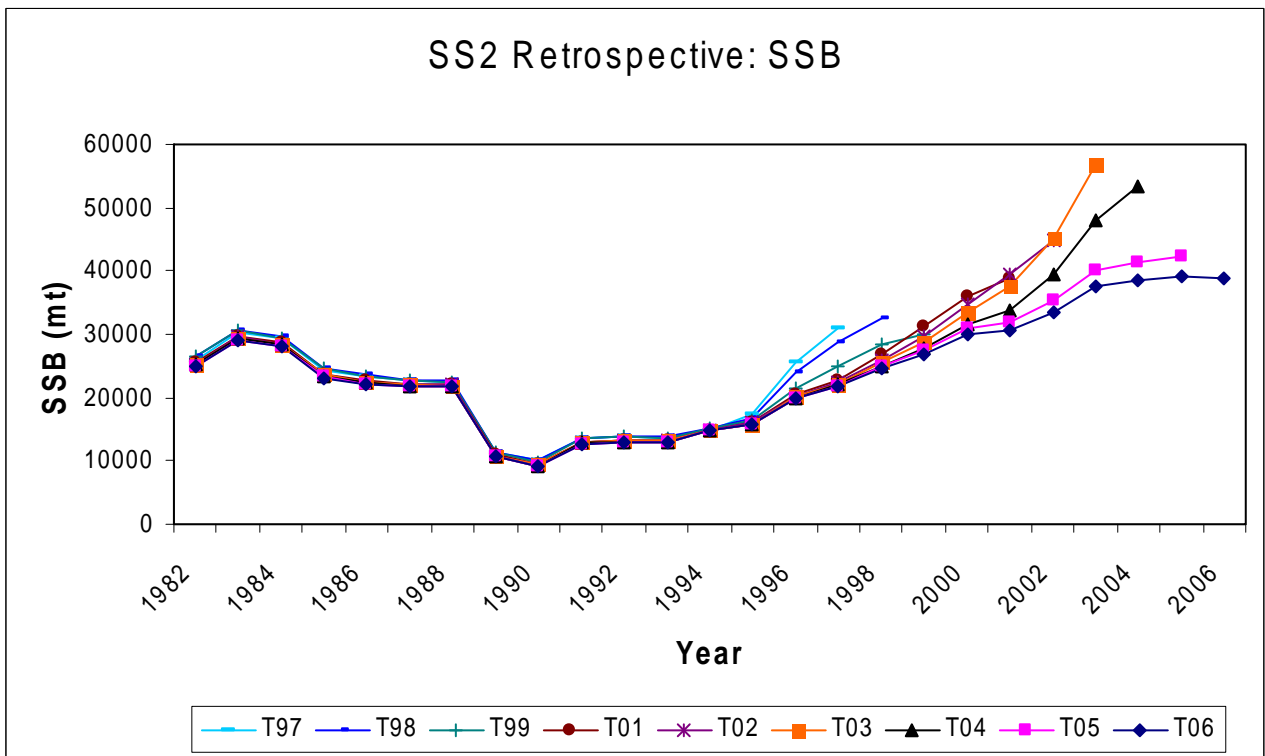

Figure 44. Retrospective analysis of Spawning Stock Biomass (SSB) for SS2 F08_BASE_T2 run.
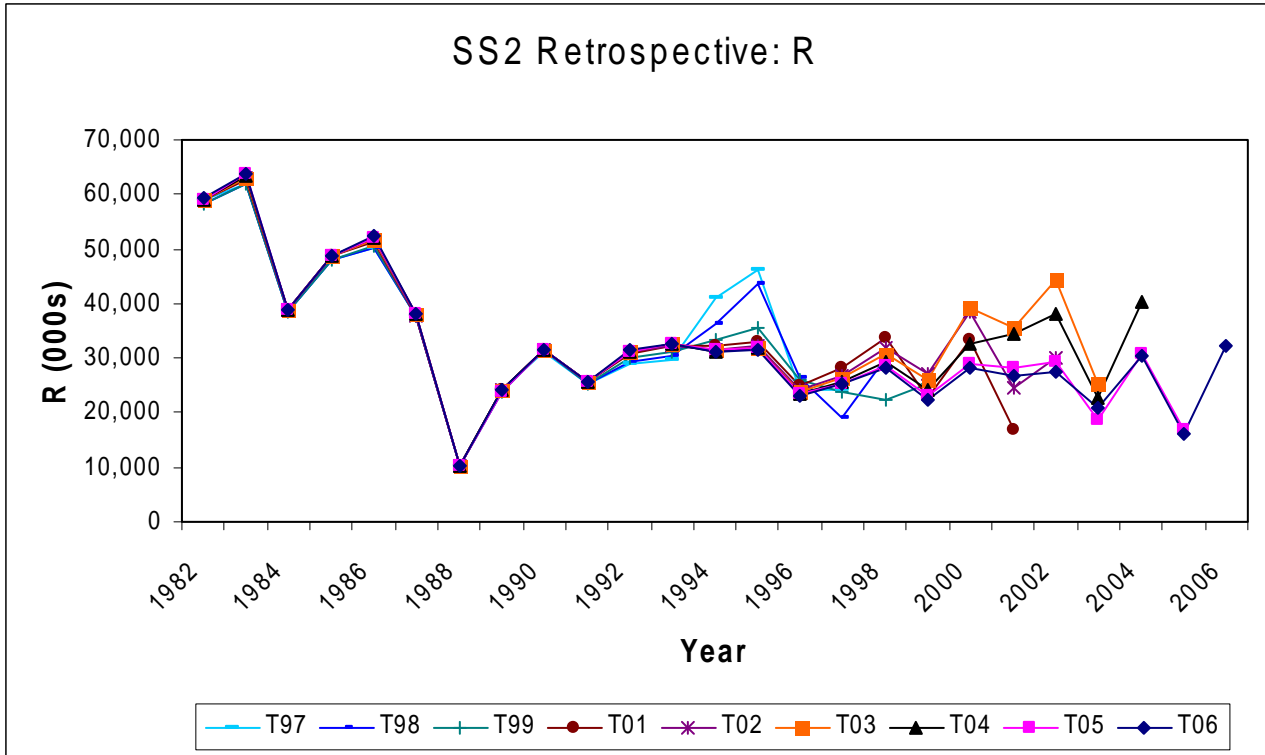
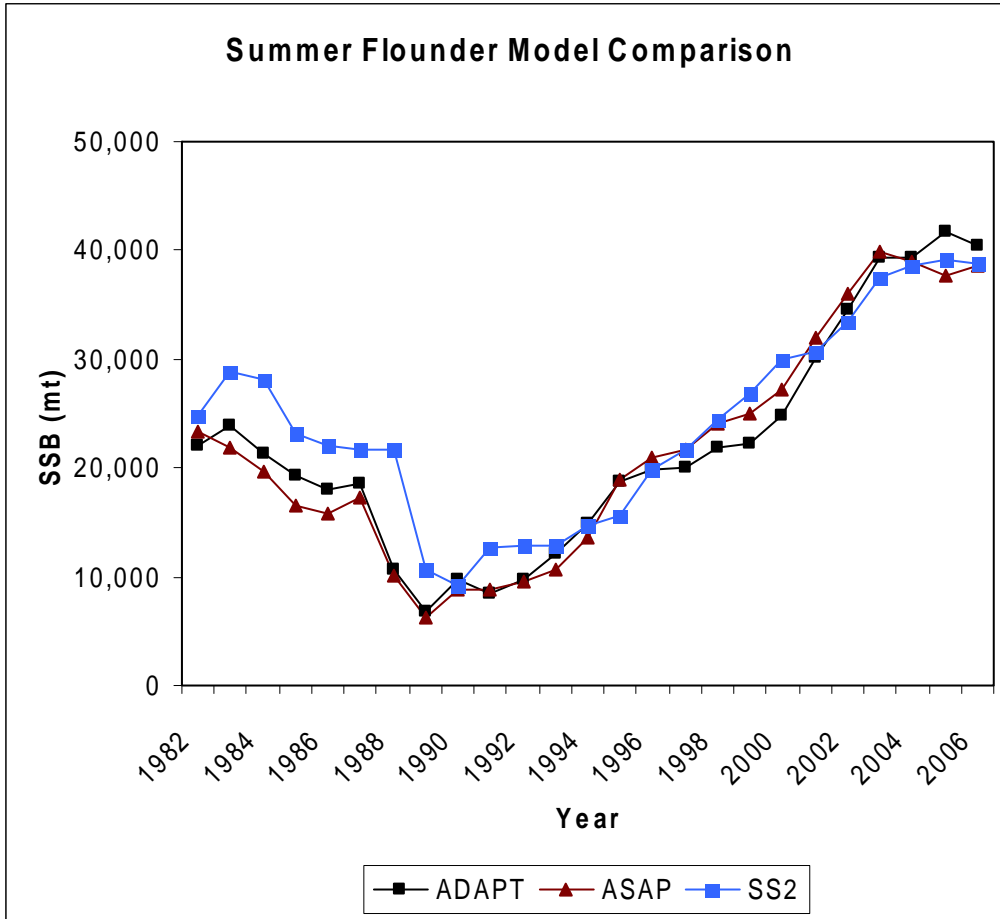Figure 45. Retrospective analysis of Recruitment at age 0 (R) for SS2 F08_BASE_T2 run.

Figure 46. Spawning Stock Biomass (SSB) estimates from ADAPT VPA, ASAP, and SS2 BASE case models.
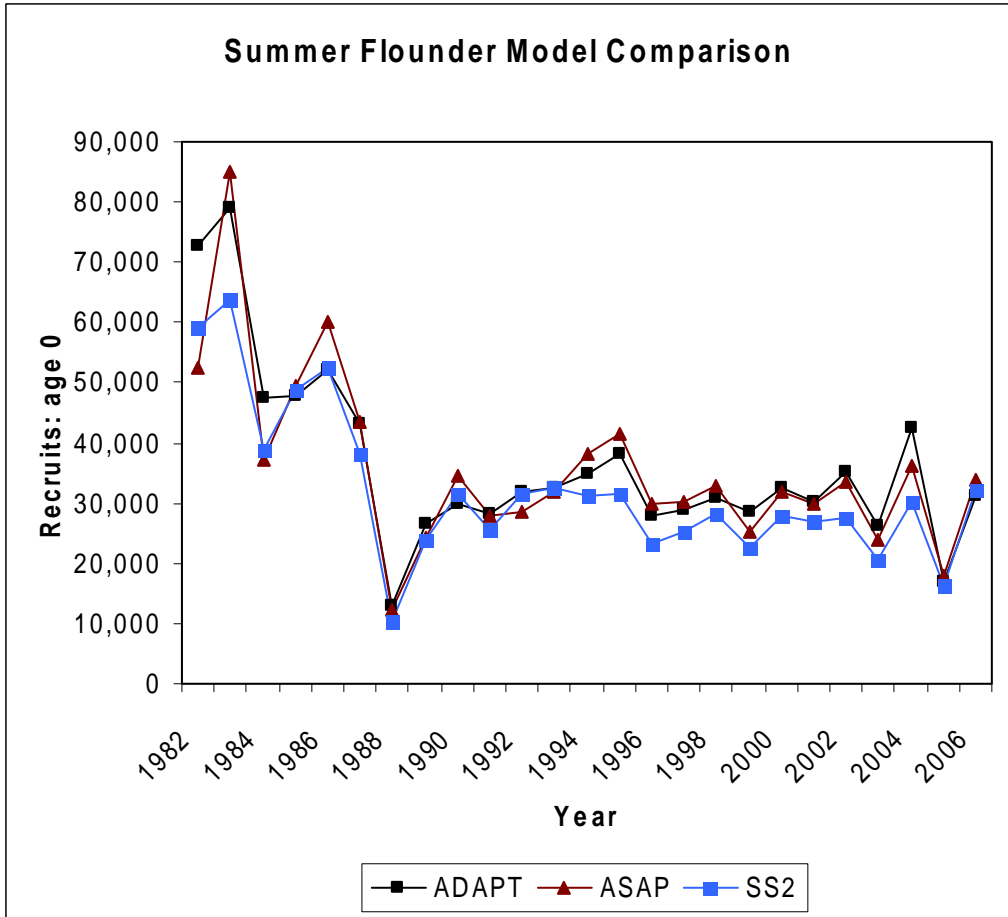
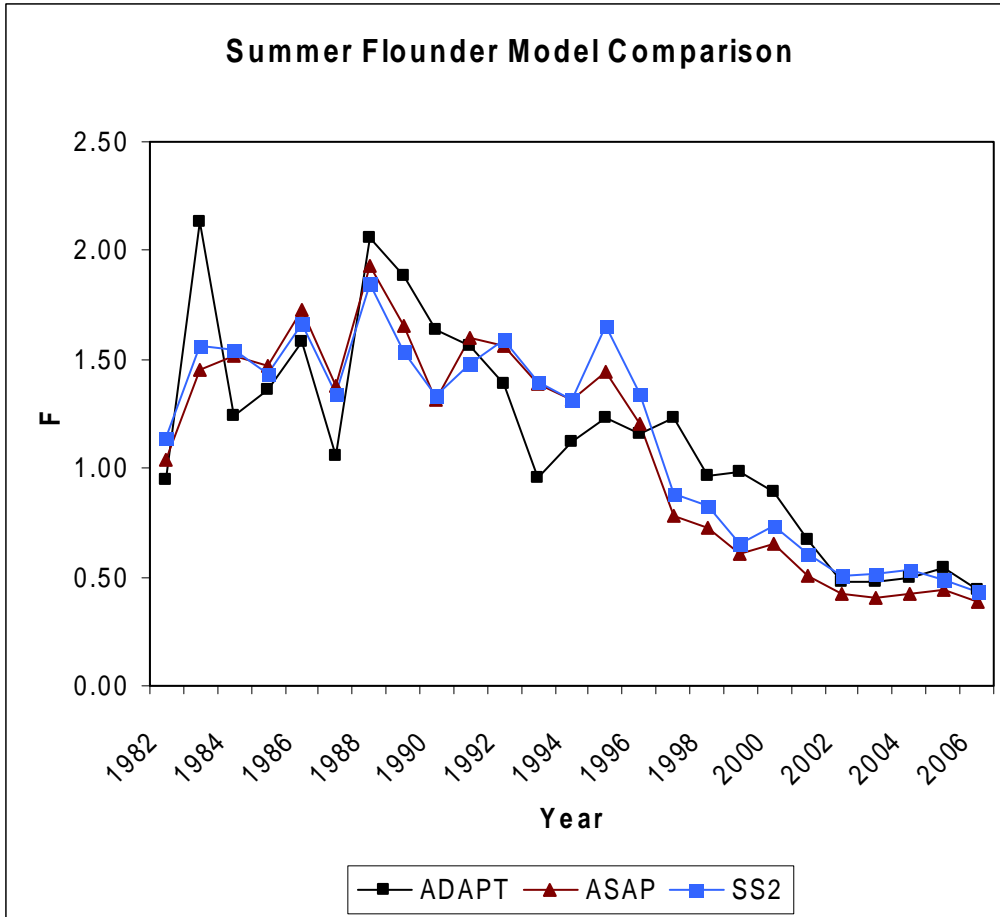Figure 47. Recruitment at age 0 (R) estimates for ADAPT VPA, ASAP, and SS2 BASE case models.

Figure 48. Fishing mortality rate (F, ages 3-5) estimates for ADAPT VPA, ASAP, and SS2
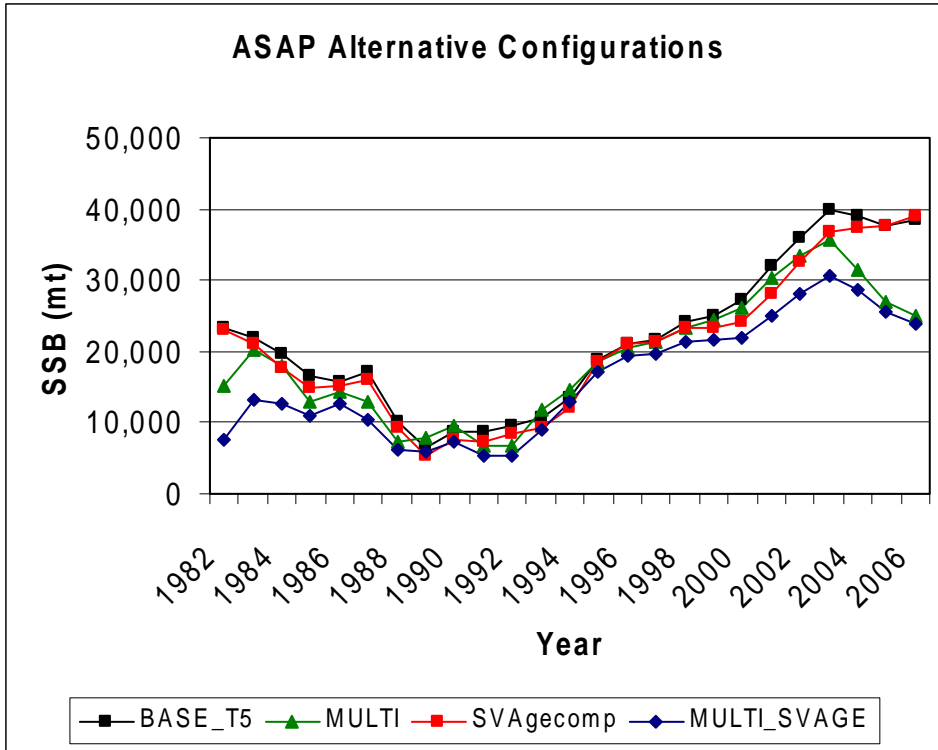BASE case models.

Figure 49. Spawning Stock Biomass (SSB) estimates from the ASAP BASE case and three alternative configuration models.
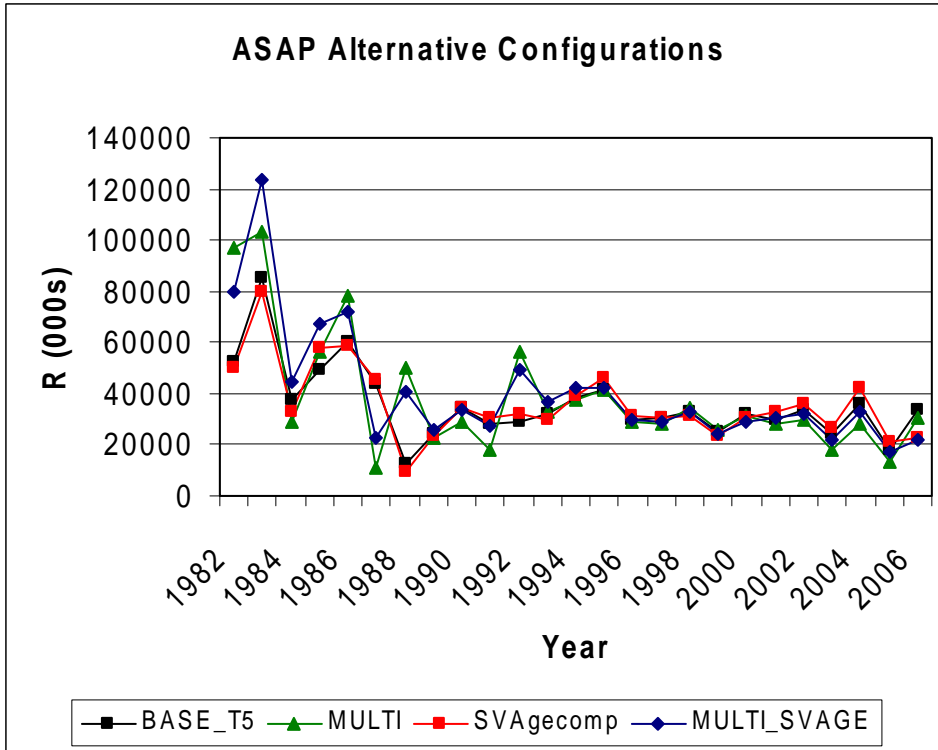
Figure 50. Recruitment at age 0 (R) estimates from the ASAP BASE case and three alternative configuration models.
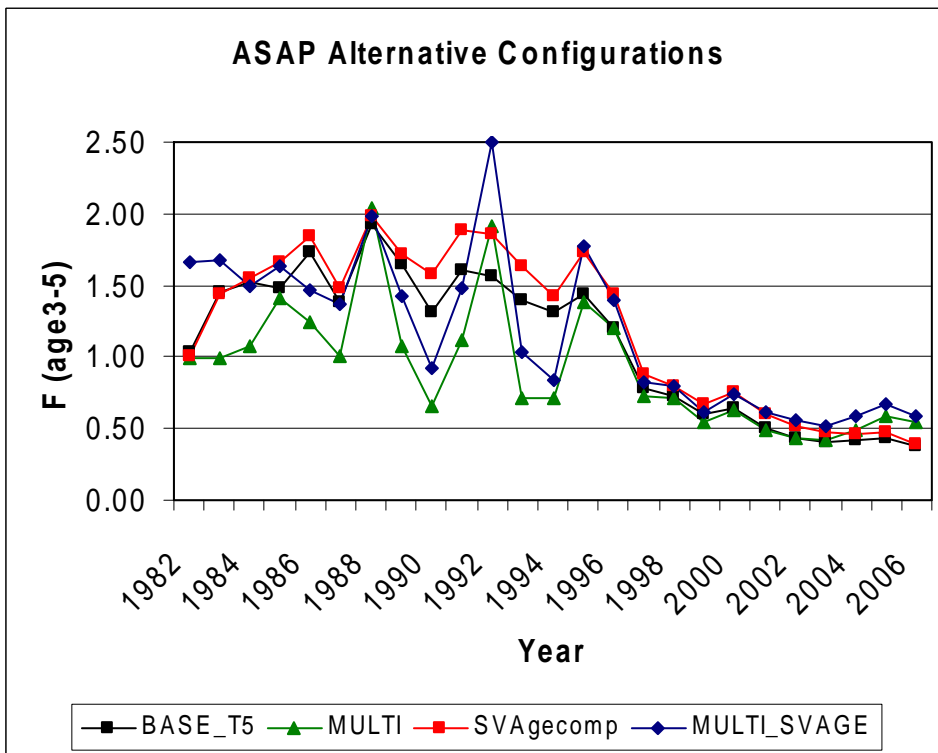

Figure 51. Fishing mortality rate (F, S = 1) estimates from the ASAP BASE case and three alternative configuration models.
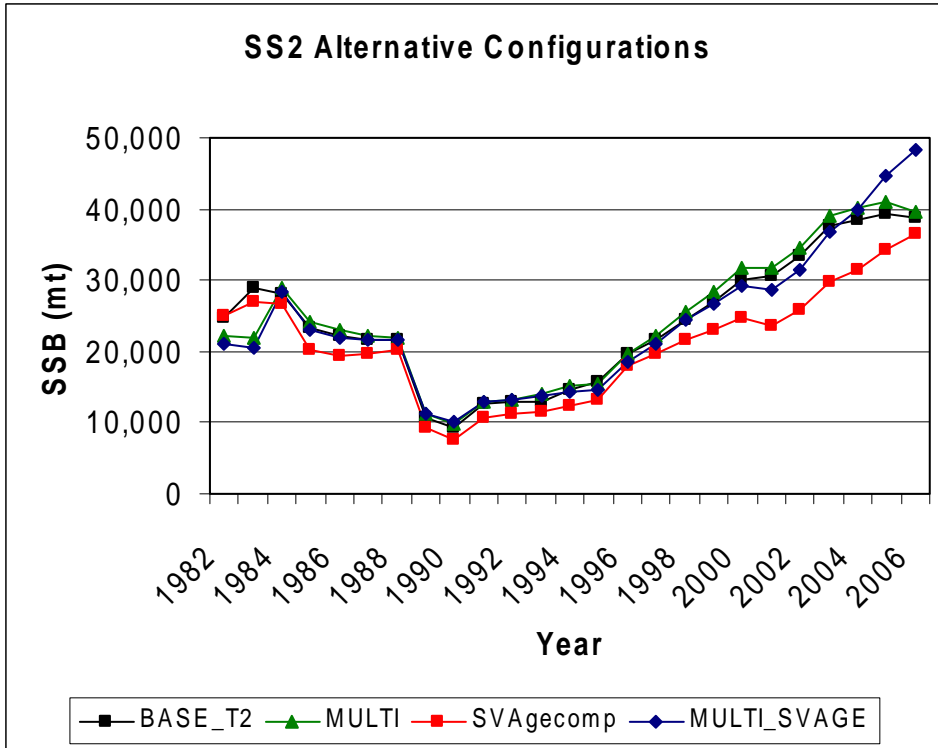
Figure 52. Spawning Stock Biomass (SSB) estimates from the SS2 BASE case and three alternative configuration models.
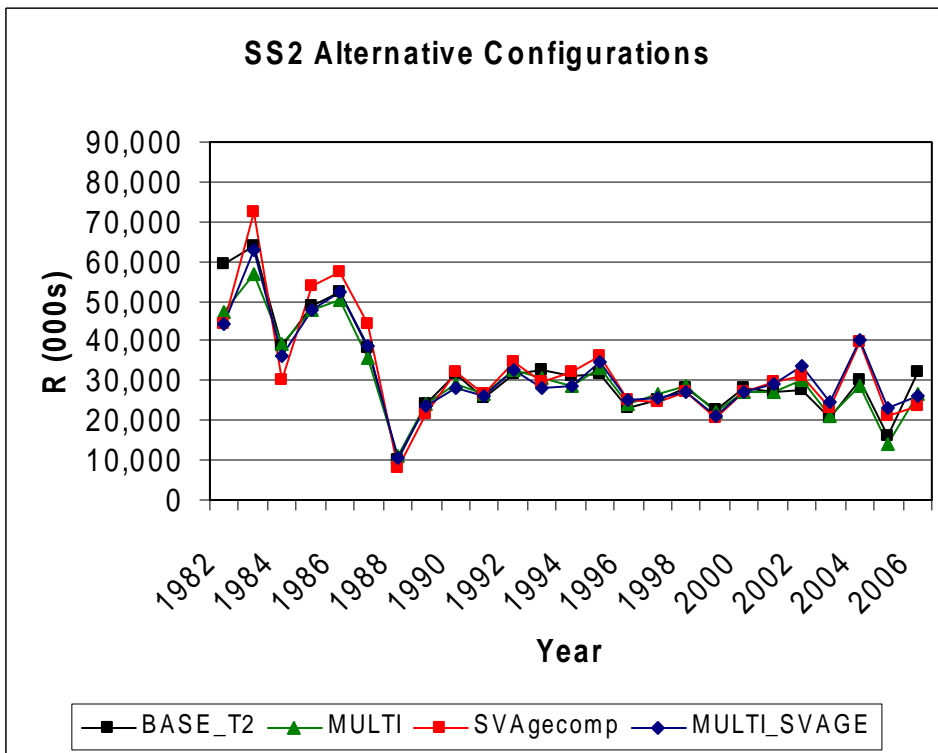

Figure 53. Recruitment at age 0 (R) estimates from the SS2 BASE case and three alternative configuration models.
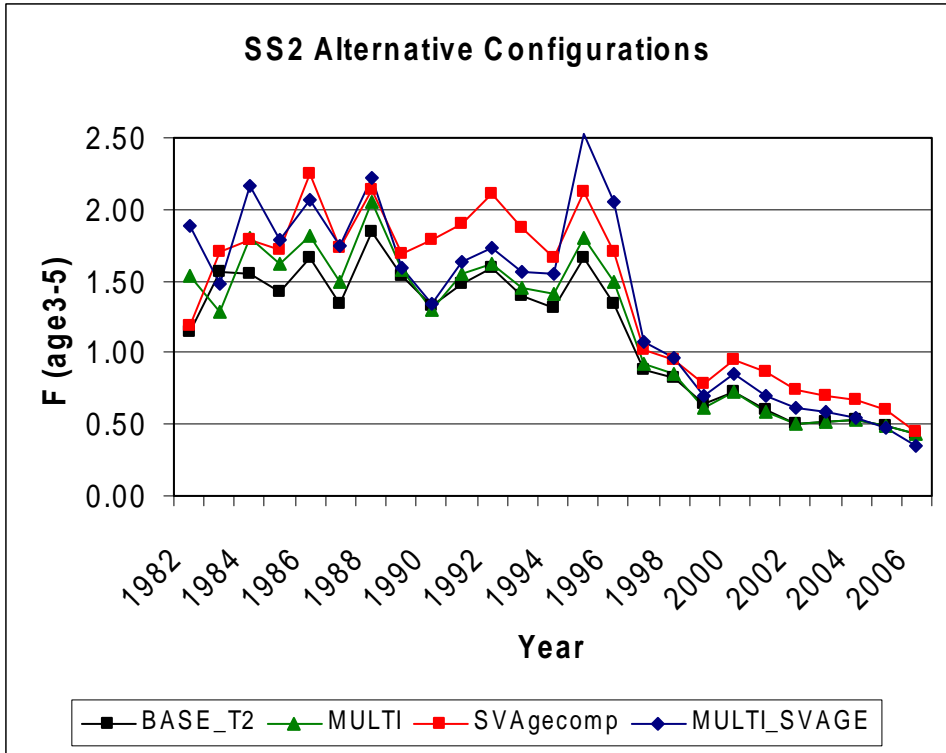
Figure 54. Fishing mortality rate (F, S = 1) estimates from the SS2 BASE case and three alternative configuration models.
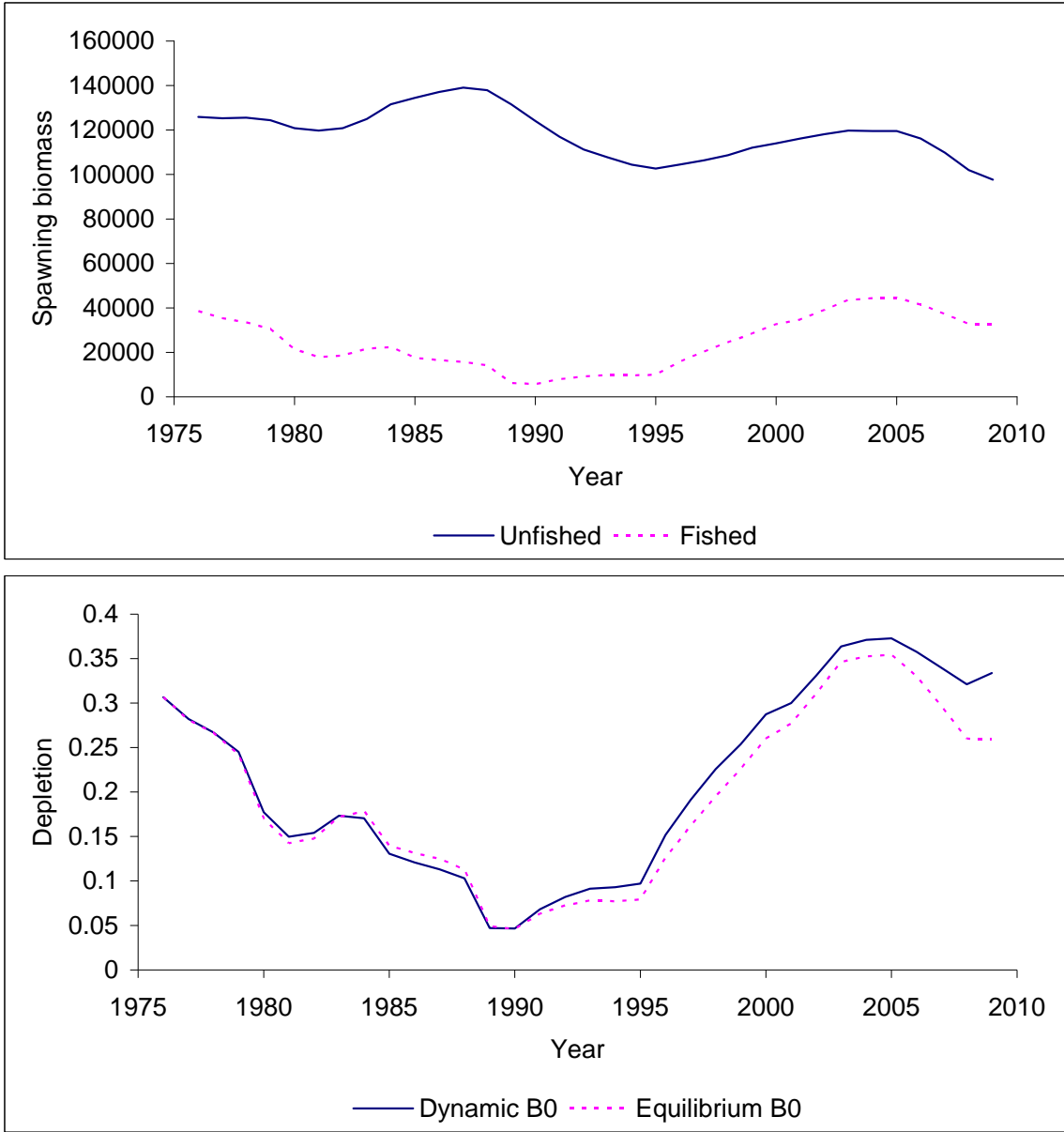
Figure 55. Time series of spawning biomass (top) estimated from the sex-structured stock assessment (fished) compared to the theoretical spawning biomass that would have been present in the absence of fishing (unfished). Time series of depletion levels (bottom) estimated from the sex-structured stock assessment using either the average unfished biomass (Equilibrium B0) or the theoretical spawning biomass that would have been present in the absence of fishing (Dynamic B0).
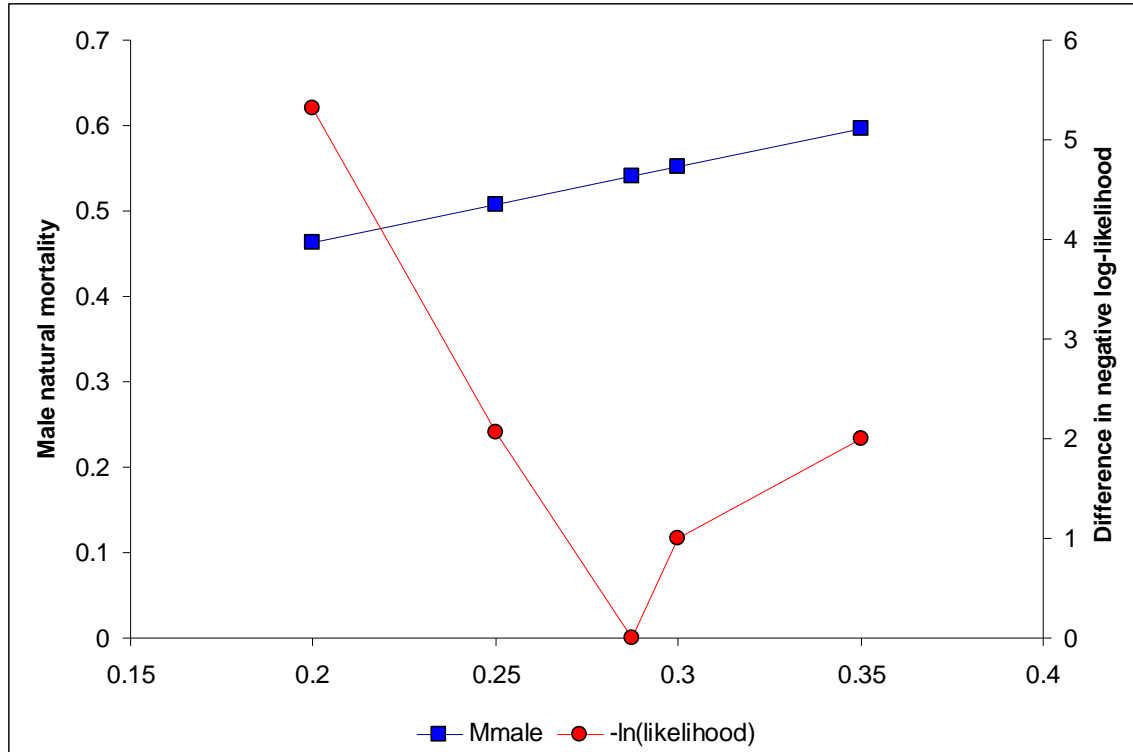
Figure 56. Profile likelihood of female natural mortality (right axis) with the corresponding estimates of male natural mortality (left axis). Female natural mortality is plotted on the x-axis. The SS2 model estimates female natural mortality at 0.28, corresponding to the zero value for the difference in log likelihood.
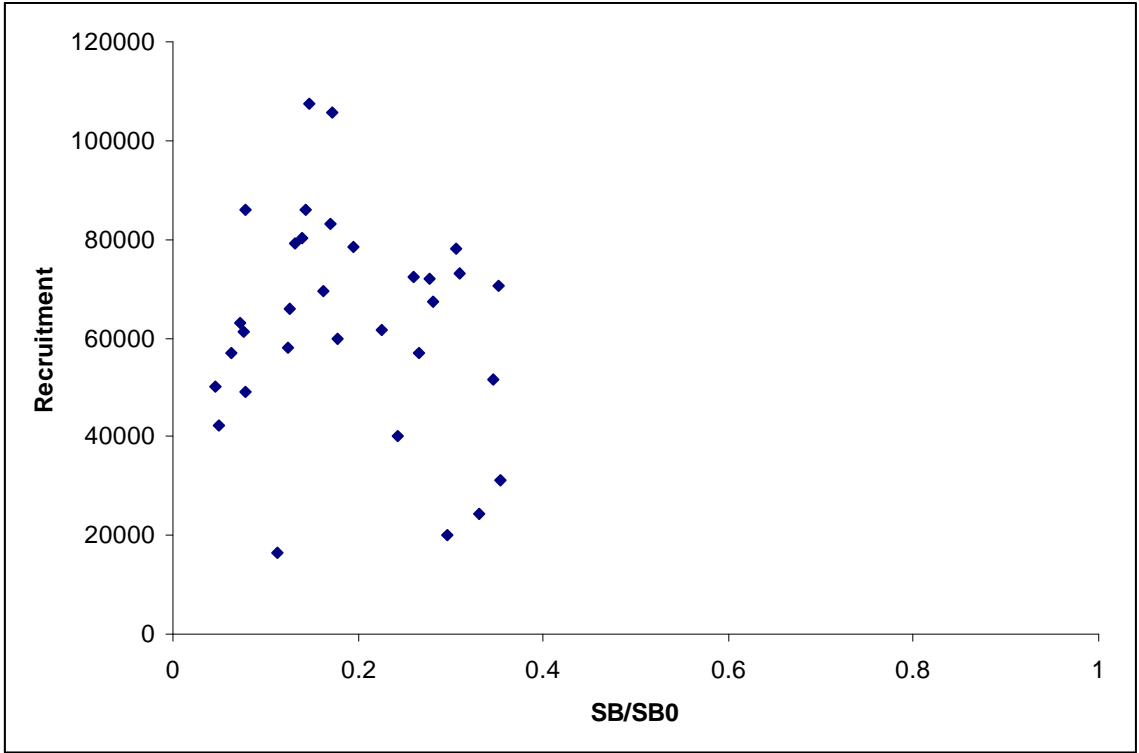
Figure 57. The relationship between recruitment and spawning stock size. Spawning stock size is shown as the spawning stock size relative to the average spawning stock size in the absence of fishing.
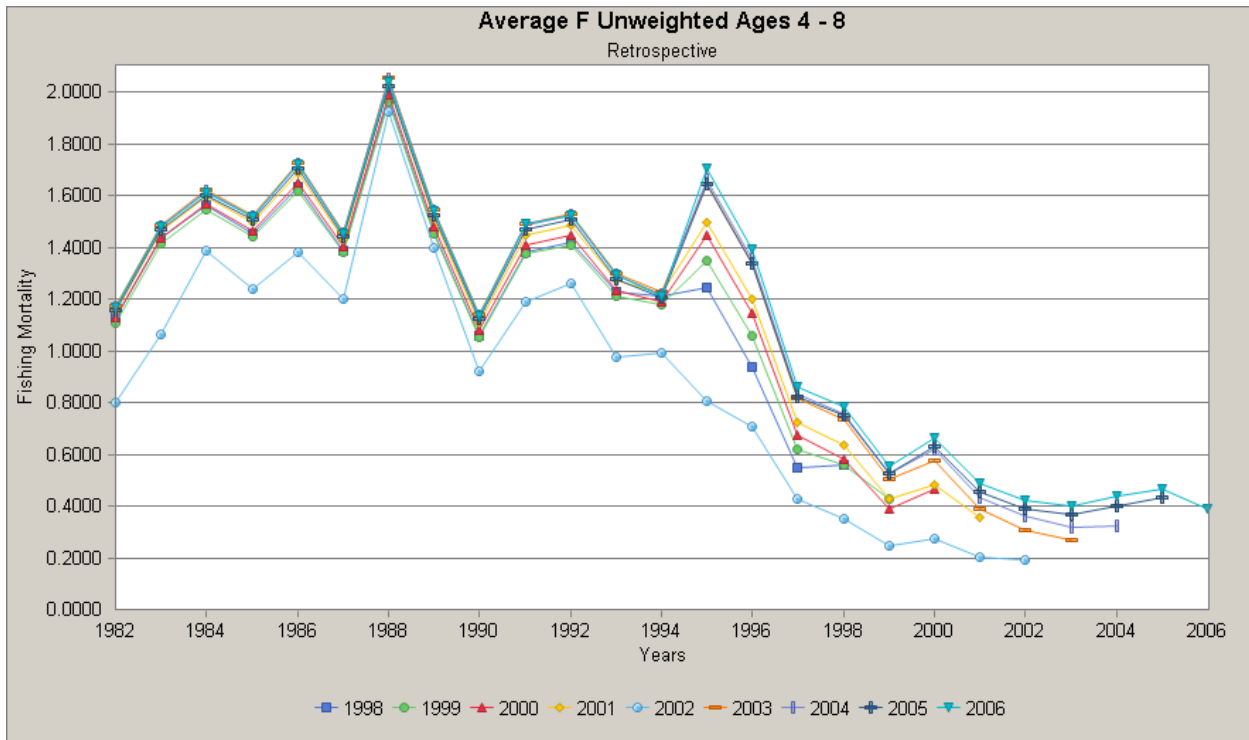
Figure 58. Retrospective analysis of Fishing Mortality (F, ages 3+) for ASAP
F08_FINAL_T2006 run. Note that ASAP ages 4-8 are true ages 3-7+.
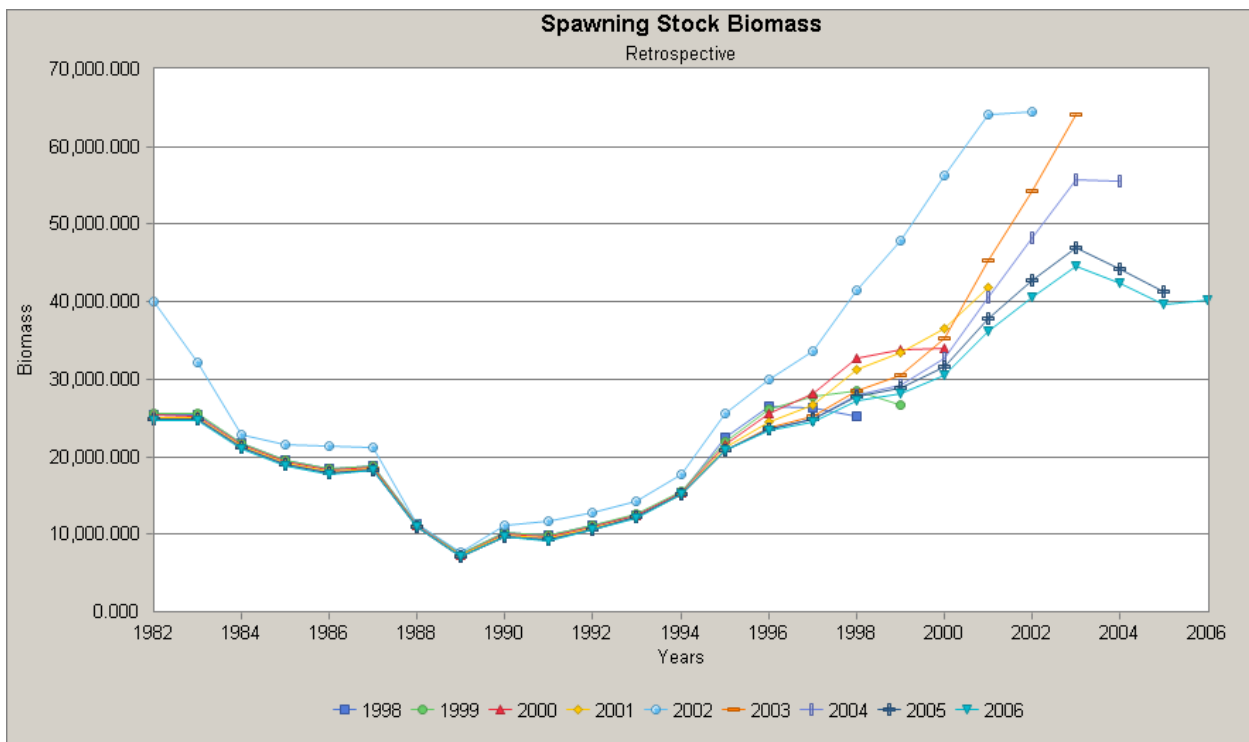

Figure 59. Retrospective analysis of Spawning Stock Biomass (SSB) for ASAP
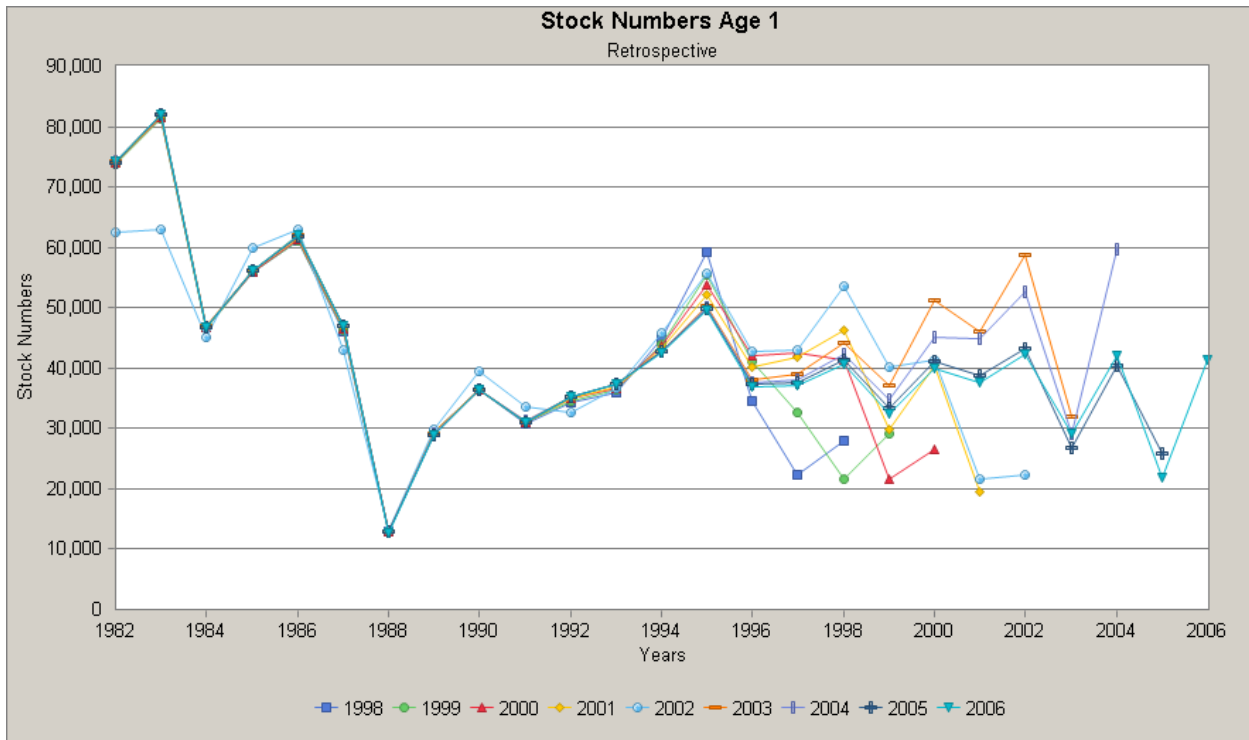F08_FINAL_T2006 run.

Figure 60. Retrospective analysis of Recruitment (R, age 0) for ASAP F08_FINAL_T2006 run. Note that ASAP age 1 is true age 0.
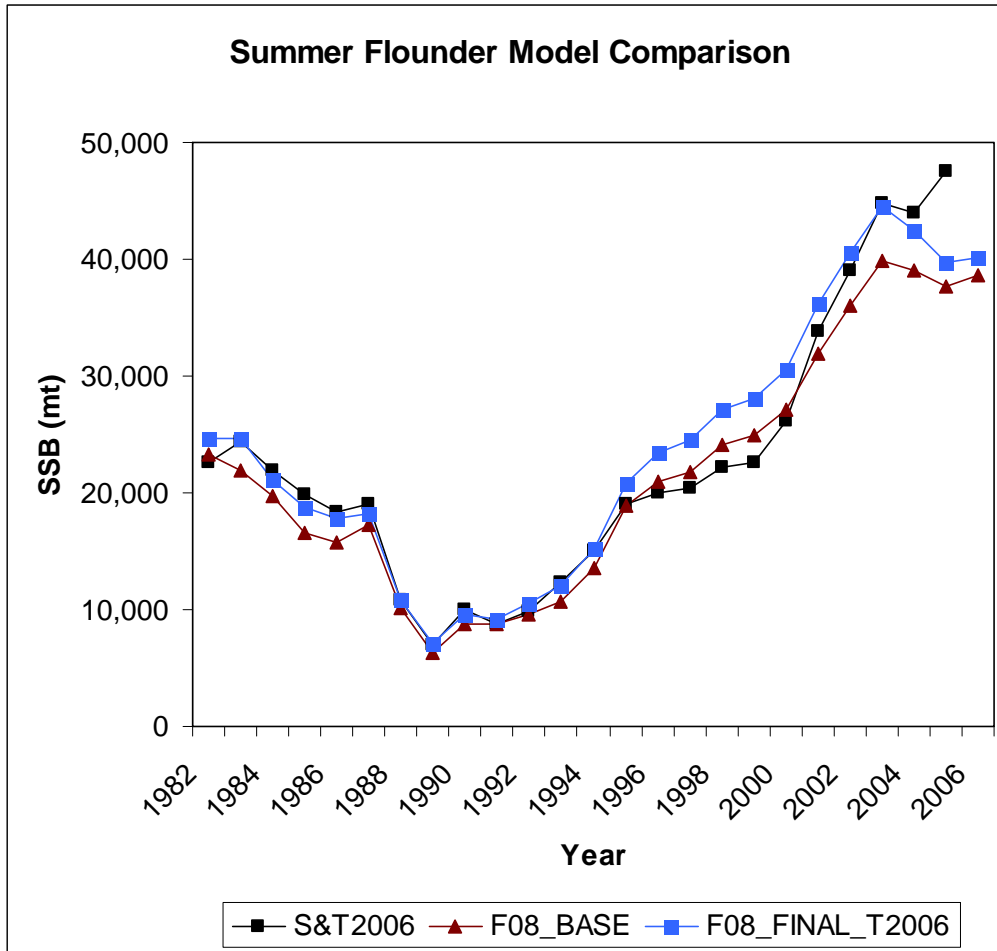
Figure 61. Spawning Stock Biomass (SSB) estimates from the S&T 2006 assessment (ADAPT VPA through 2005), the ASAP F08_BASE run, and the ASAP F08_FINAL_T2006 run.
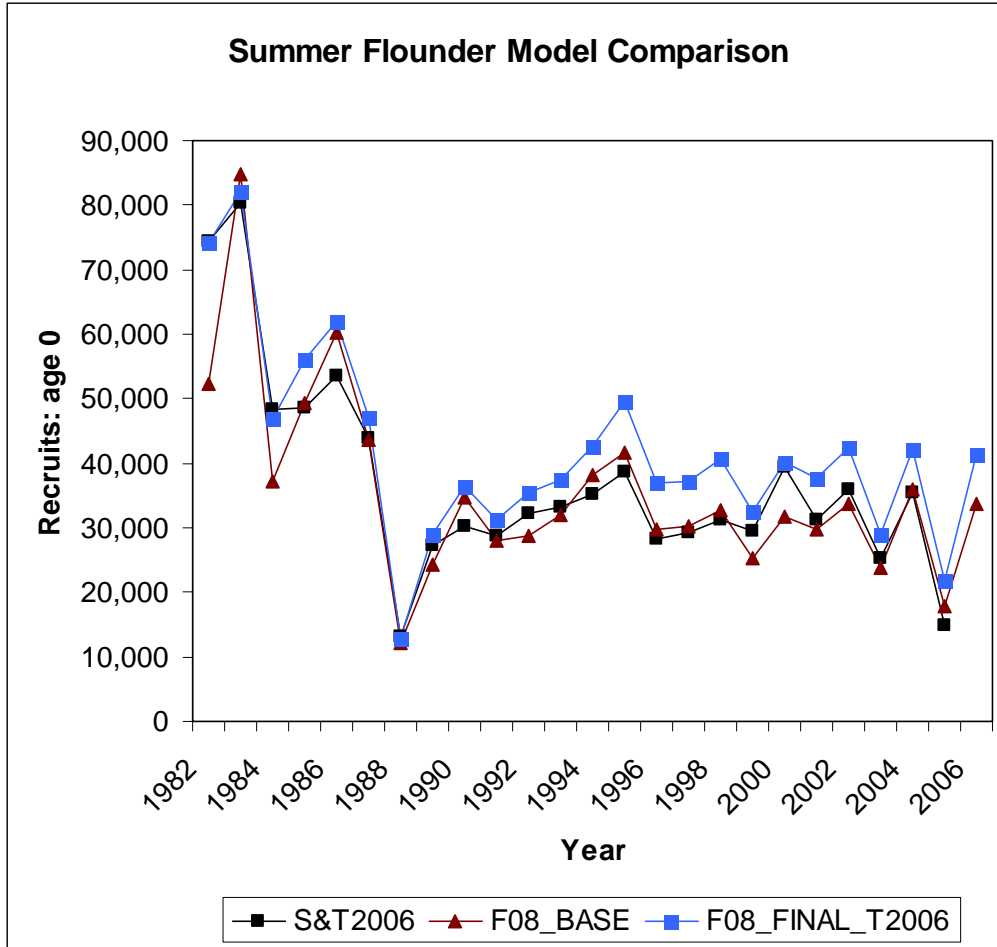
Figure 62. Recruitment (age 0) estimates from the S&T 2006 assessment (ADAPT VPA through 2005), the ASAP F08_BASE run, and the ASAP F08_FINAL_T2006 run.
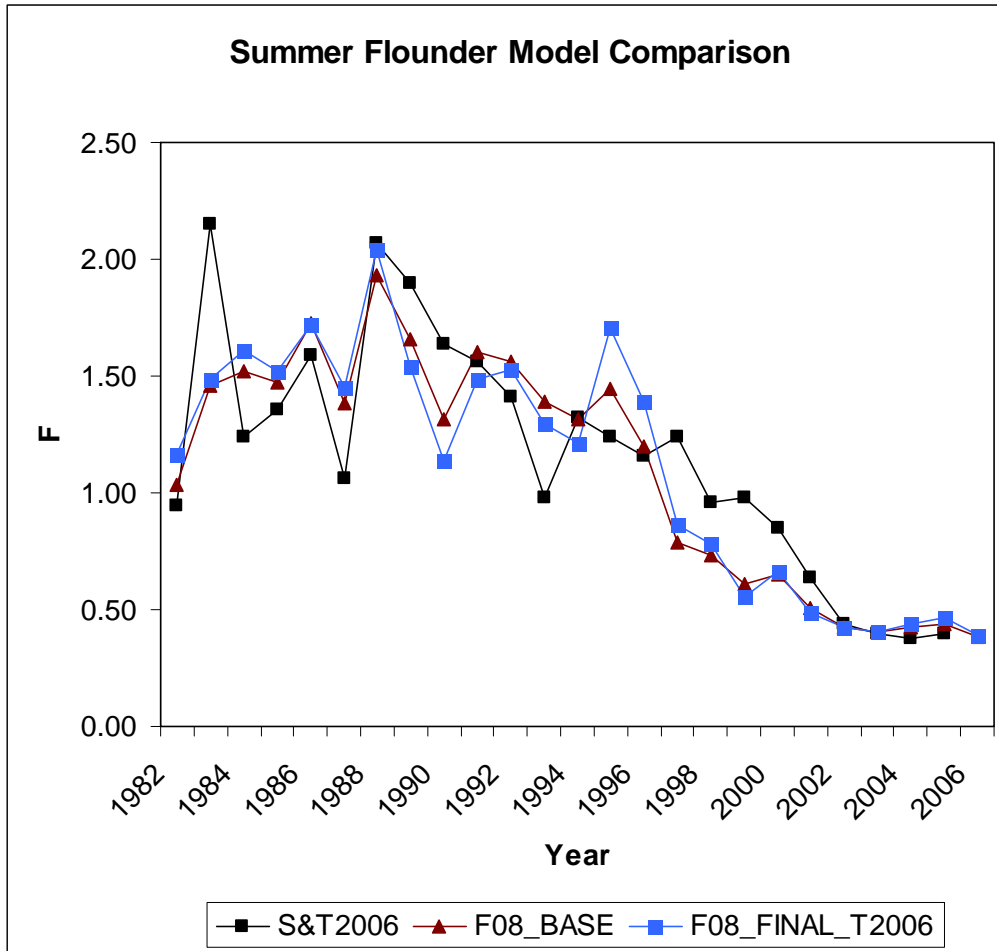
Figure 63. Fishing mortality (F, ages 3+) estimates from the S&T 2006 assessment (ADAPT VPA through 2005), the ASAP F08_BASE run, and the ASAP F08_FINAL_T2006 run.
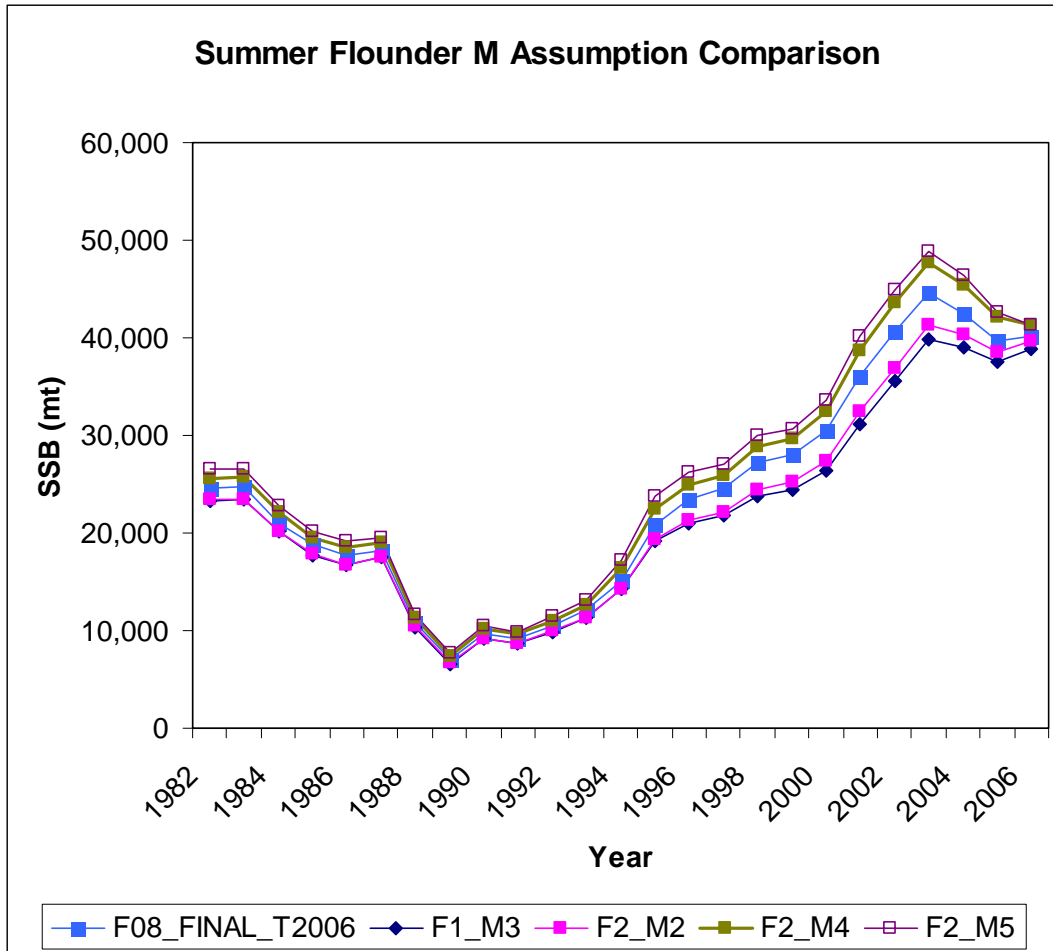
Figure 64. Spawning Stock Biomass (SSB) estimates from the ASAP F08_FINAL_T2006 run and runs with alternative assumptions for natural mortality (M).
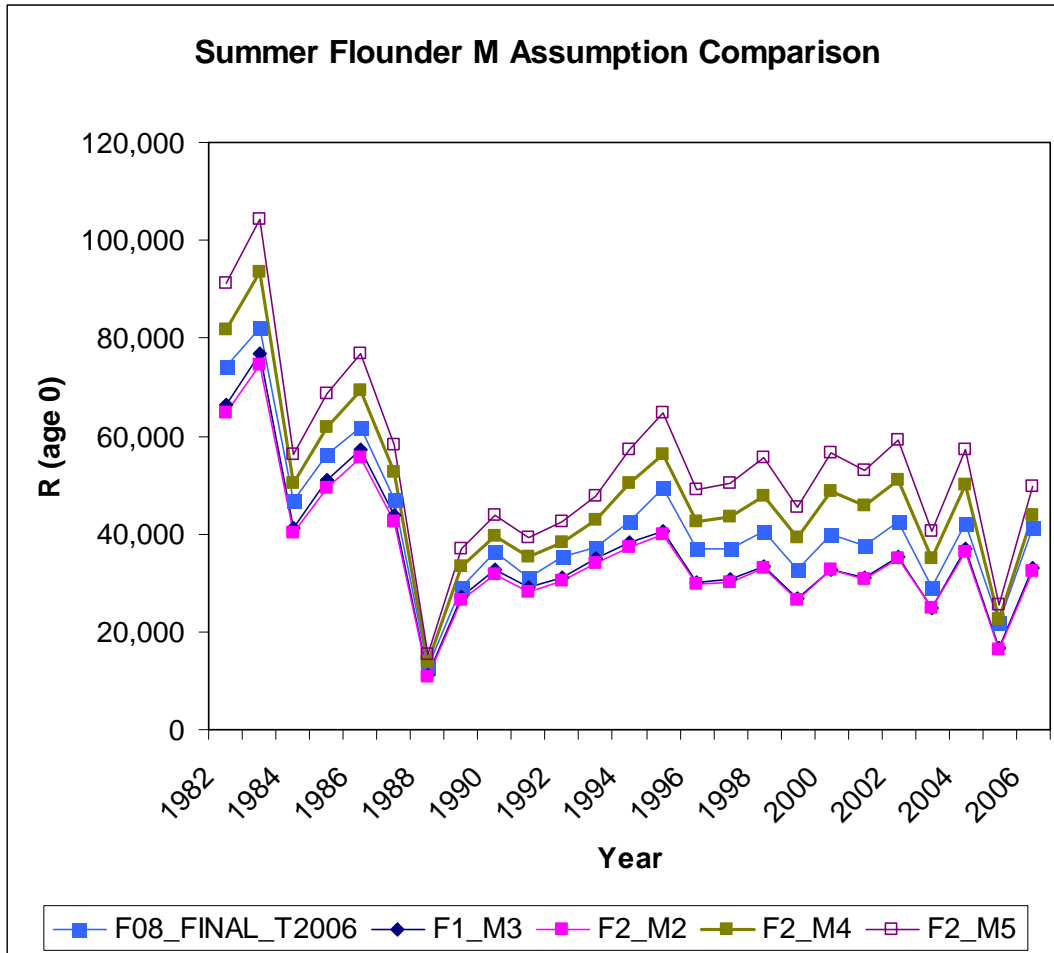
Figure 65. Recruitment (R, age 0) estimates from the ASAP F08_FINAL_T2006 run and runs with alternative assumptions for natural mortality (M).
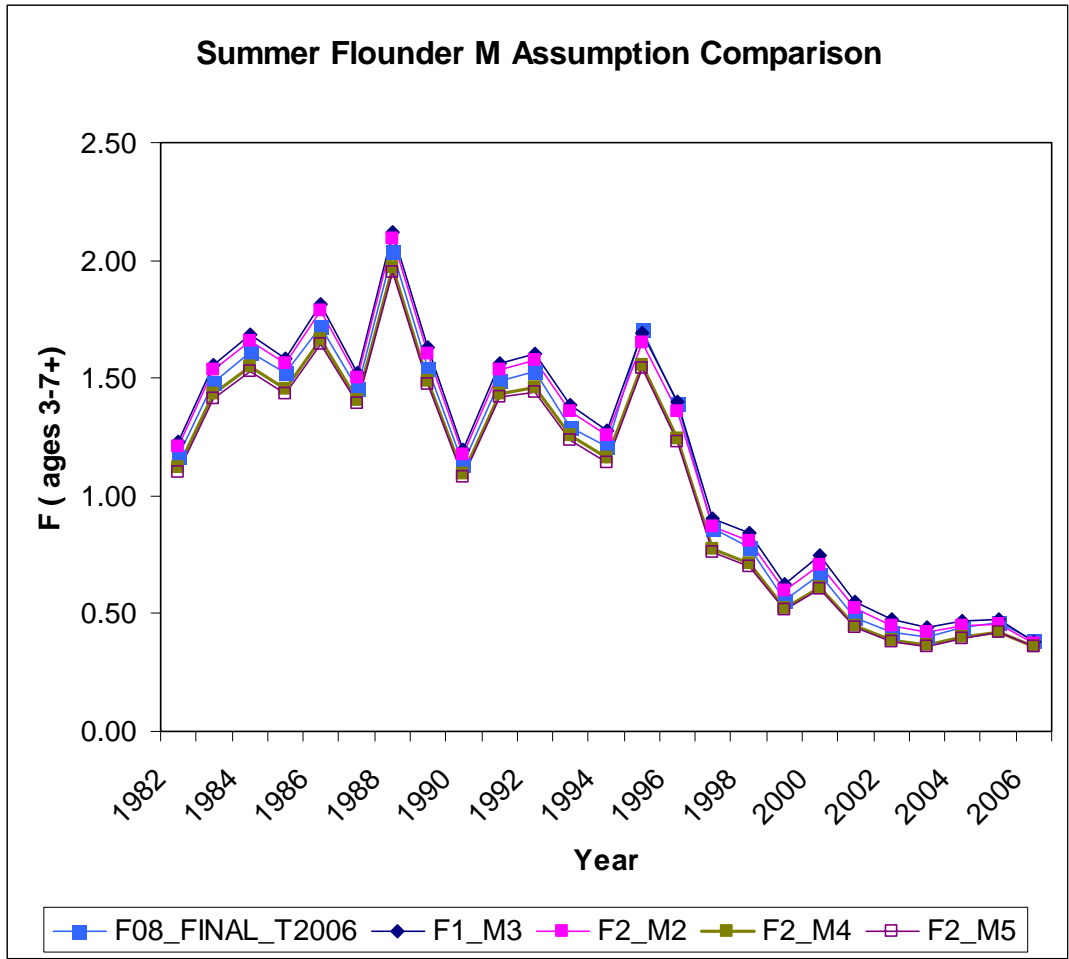
Figure 66. Fishing Mortality (F, ages 3-7+) estimates from the ASAP F08_FINAL_T2006 run and runs with alternative assumptions for natural mortality (M).
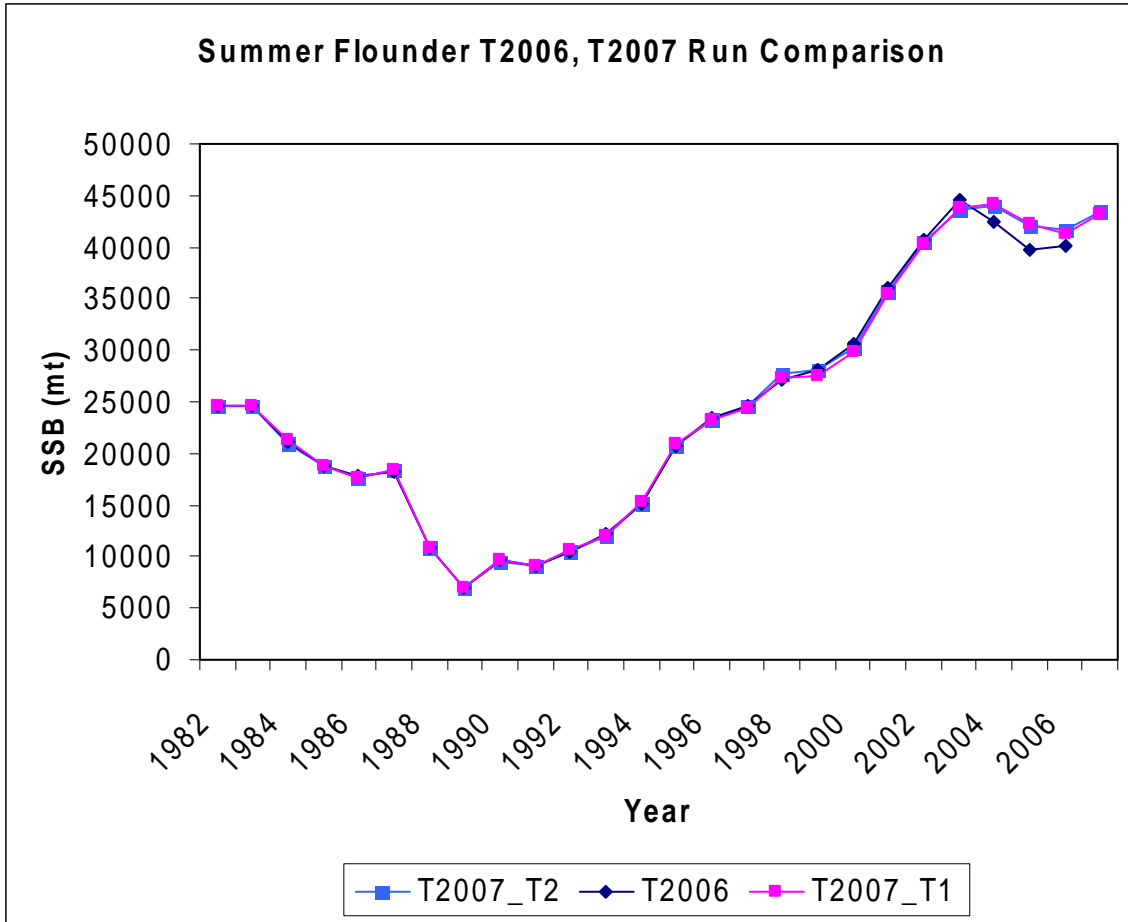
Figure 67. Spawning Stock Biomass (SSB) estimates from the F08_FINAL_T2006, F08_T2007_T1, and F08_T2007_T2 runs.
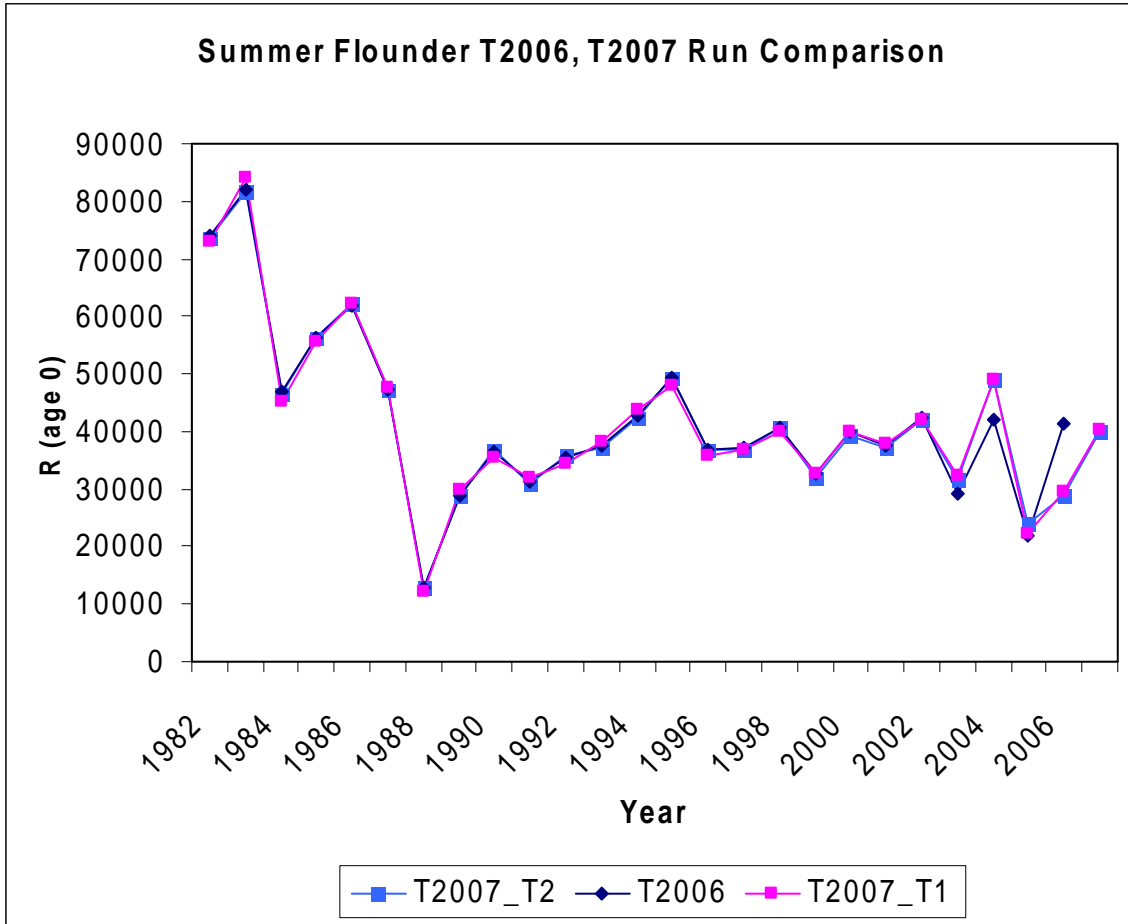
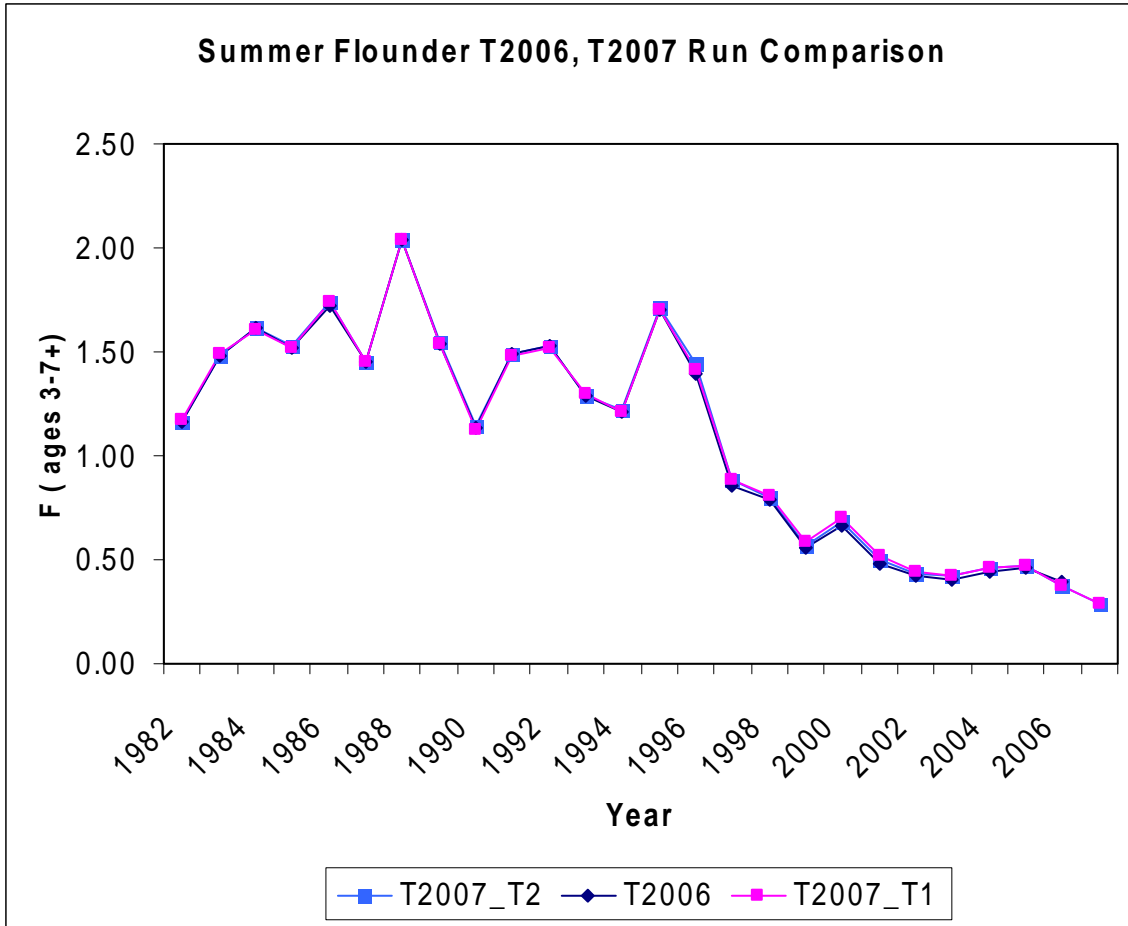Figure 68. Recruitment (R; age 0) estimates from the F08_FINAL_T2006, F08_T2007_T1, and F08_T2007_T2 runs.

Figure 69. Fishing mortality (F, ages 3-7+) estimates from the F08_FINAL_T2006, F08_T2007_T1, and F08_T2007_T2 runs.
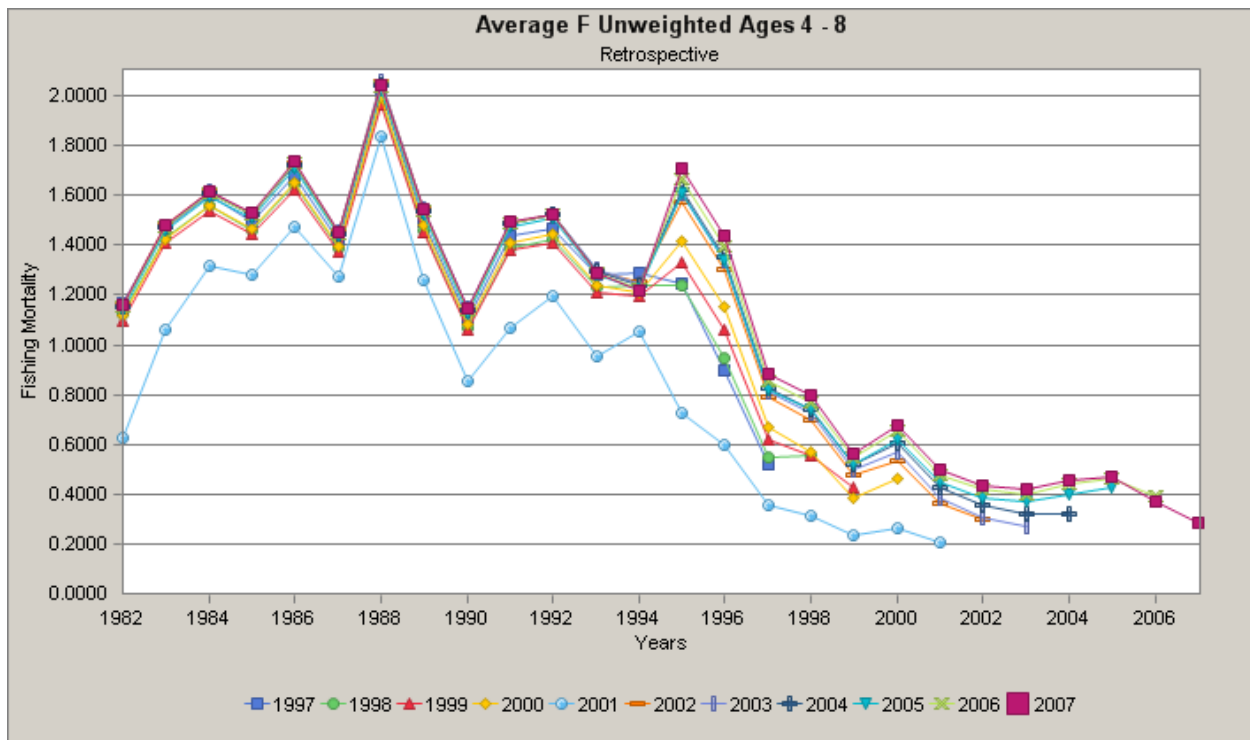
Figure 70. Retrospective analysis of Fishing Mortality (F, ages 3+) for the ASAP F08_T2007_T2 run. Note that ASAP ages 4-8 are true ages 3-7+.
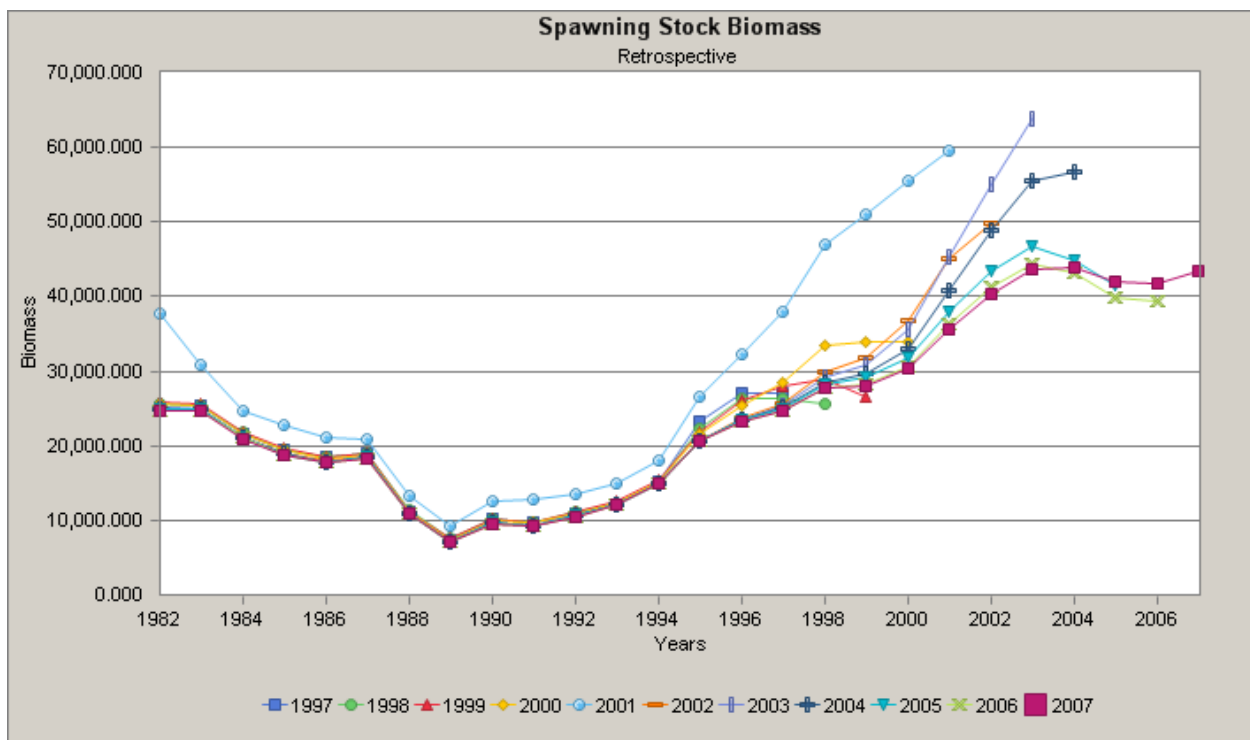

Figure 71. Retrospective analysis of Spawning Stock Biomass (SSB) for the ASAP F08_T2007_T2 run.
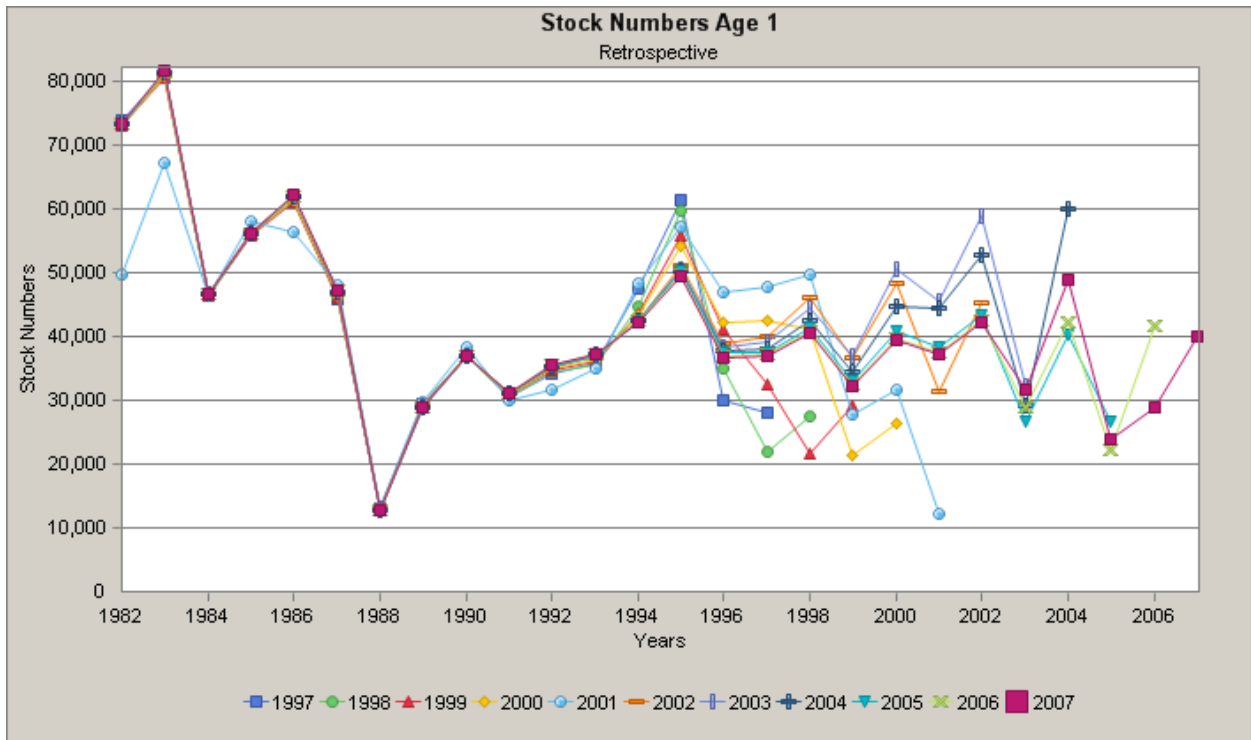
Figure 72. Retrospective analysis of Recruitment (R, age 0) for the ASAP F08_T2007_T2 run. Note that ASAP age 1 is true age 0.
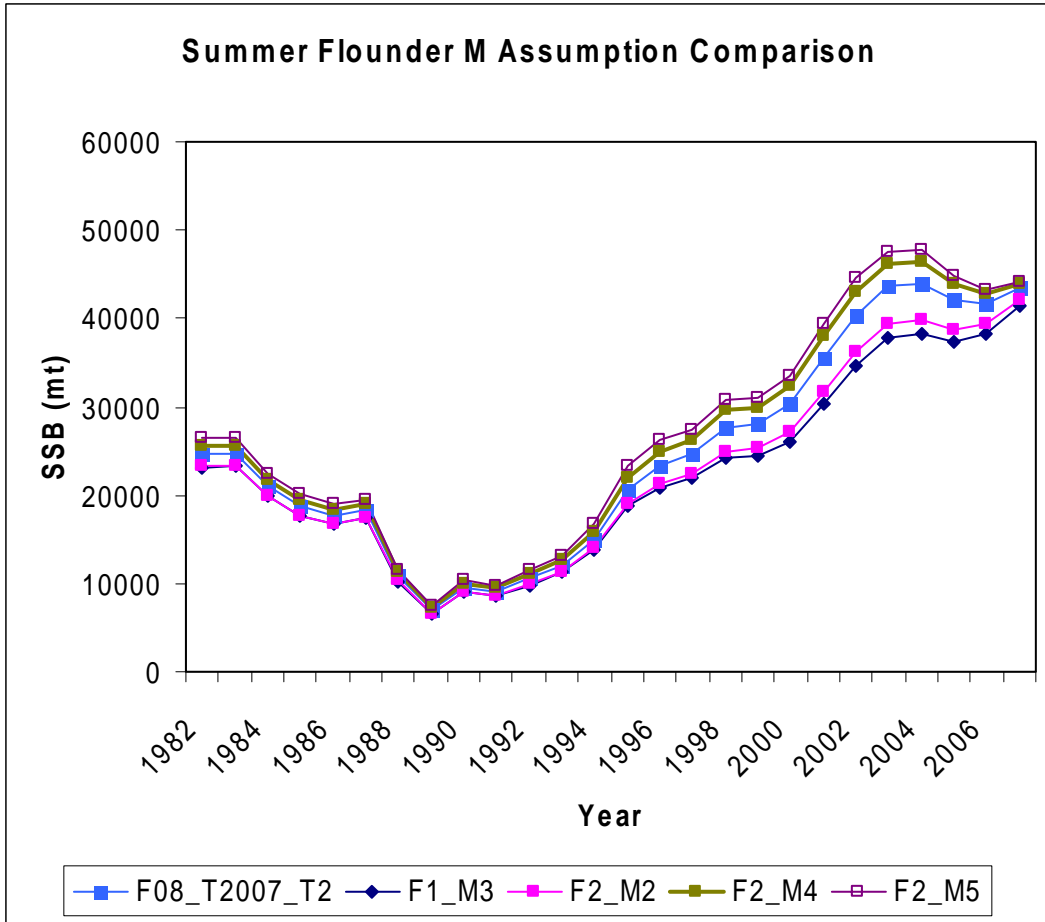
Figure 73. Spawning Stock Biomass (SSB) estimates from the ASAP F08_T2007_T2 run and runs with alternative assumptions for natural mortality (M).
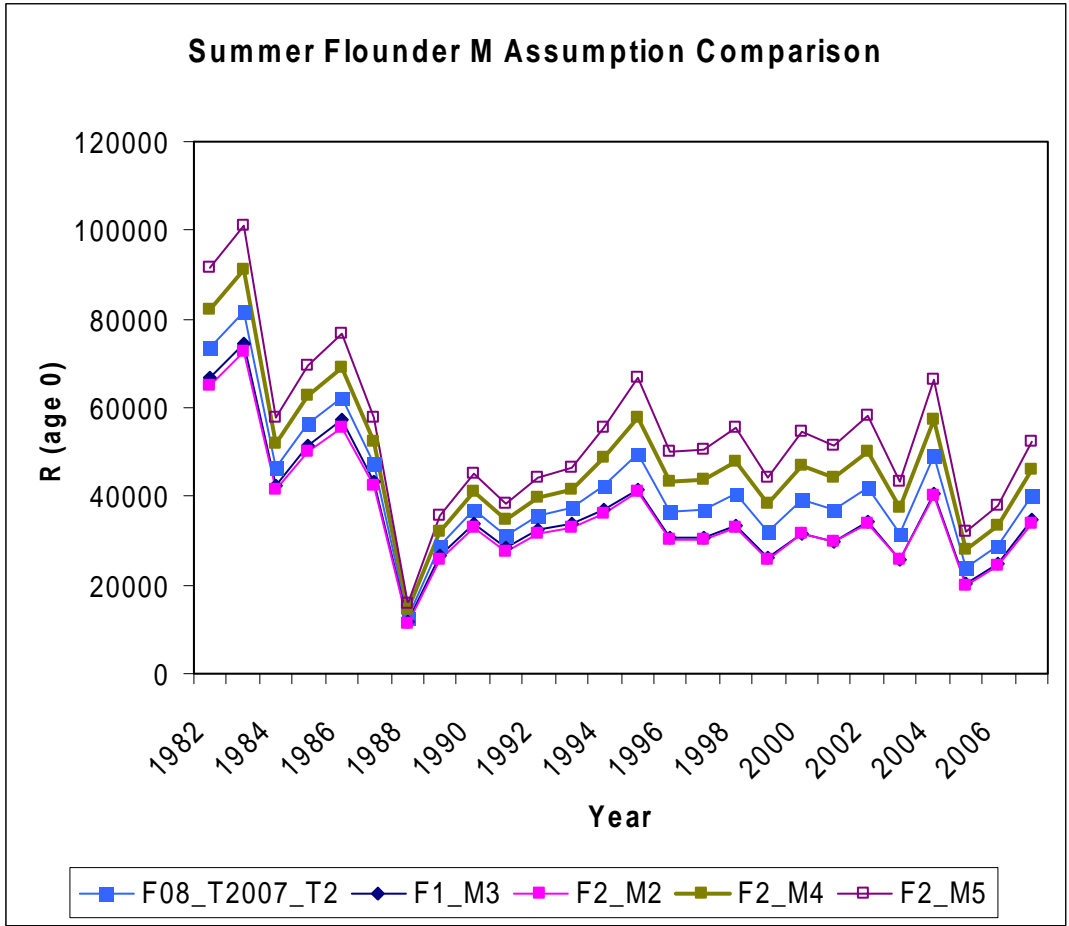
Figure 74. Recruitment (R, age 0) estimates from the ASAP F08_T2007_T2 run and runs with alternative assumptions for natural mortality (M).
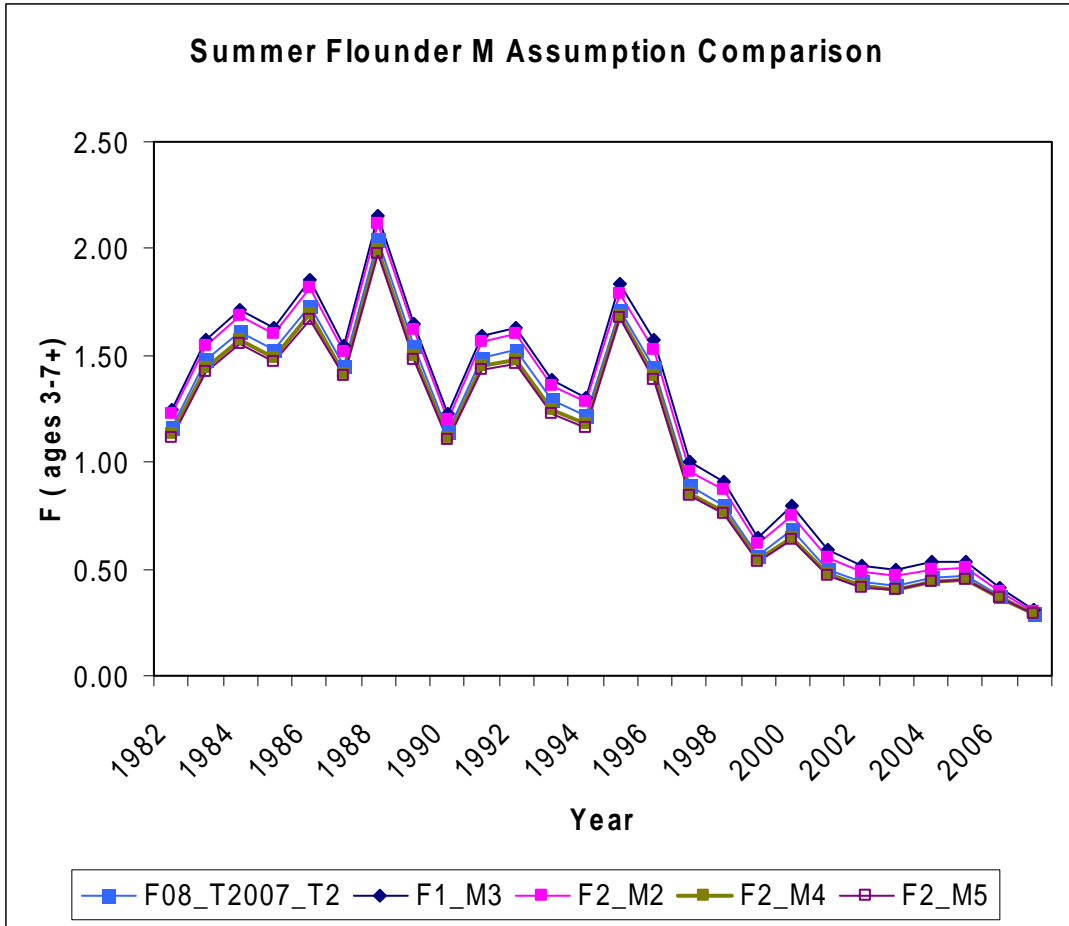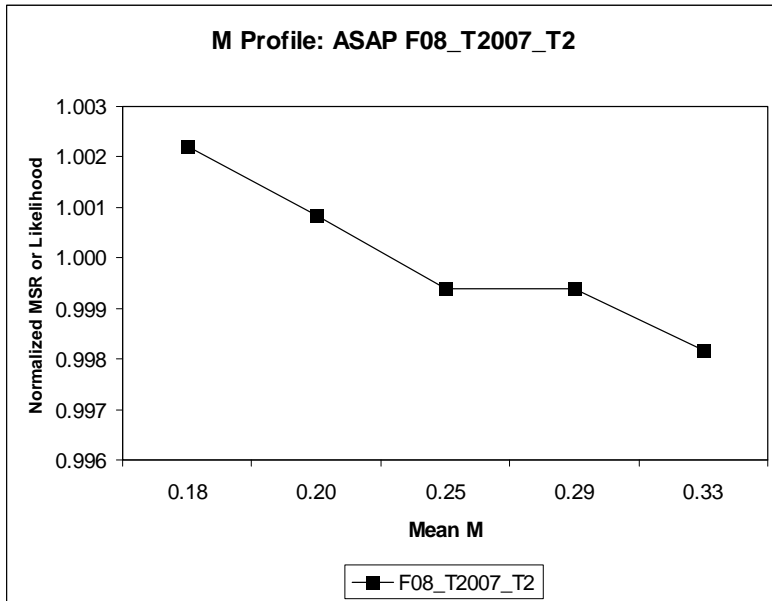
Figure 75. Fishing Mortality (F, ages 3-7+) estimates from the ASAP F08_T2007_T2 run and runs with alternative assumptions for natural mortality (M).
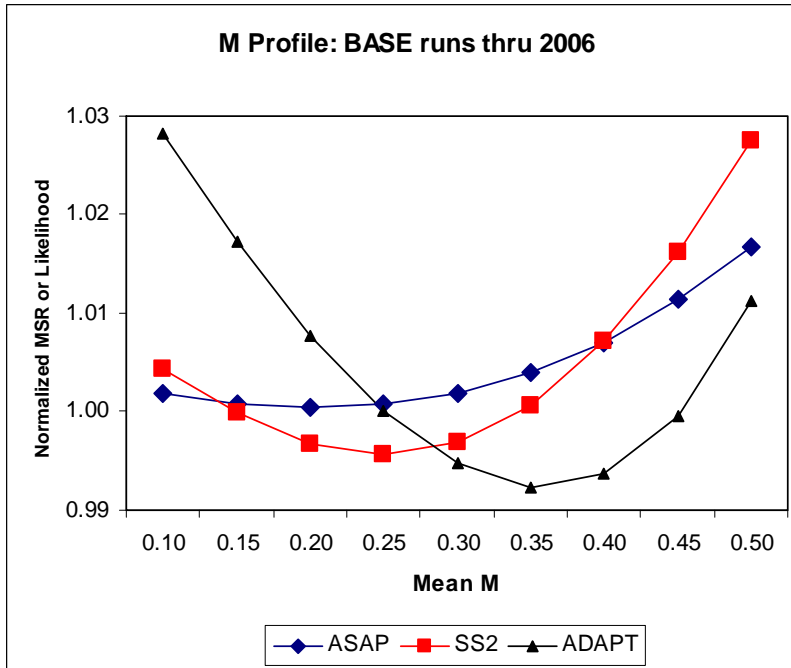
A)

B)

Figure 76. A) Likelihood profile of M for the ASAP F08_T2007_T2 run. B) Likelihood profile of M for the ADAPT, ASAP, and SS2 BASE runs (T 2006).
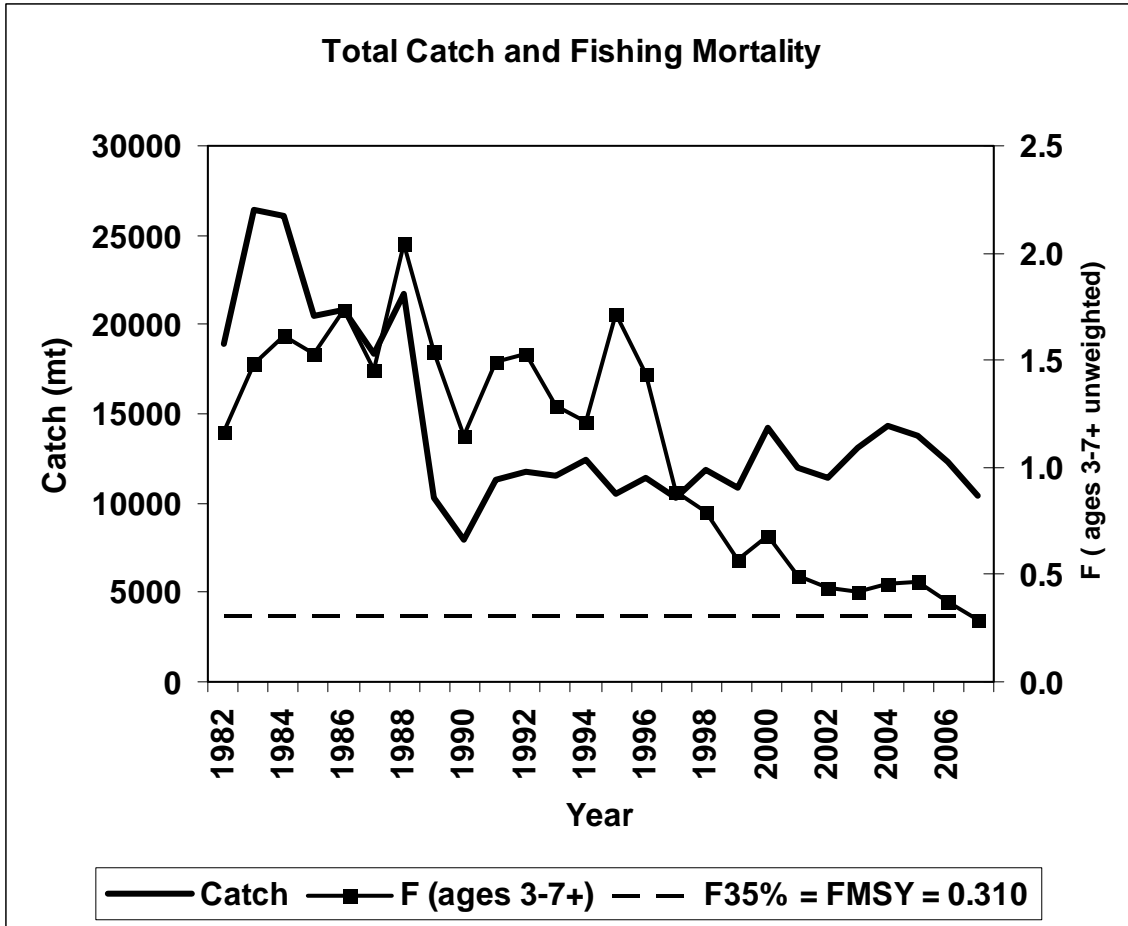
Figure 77. Total catch (landings and discards, metric tons) and fishing mortality rate (F, ages 3-7+) for summer flounder.
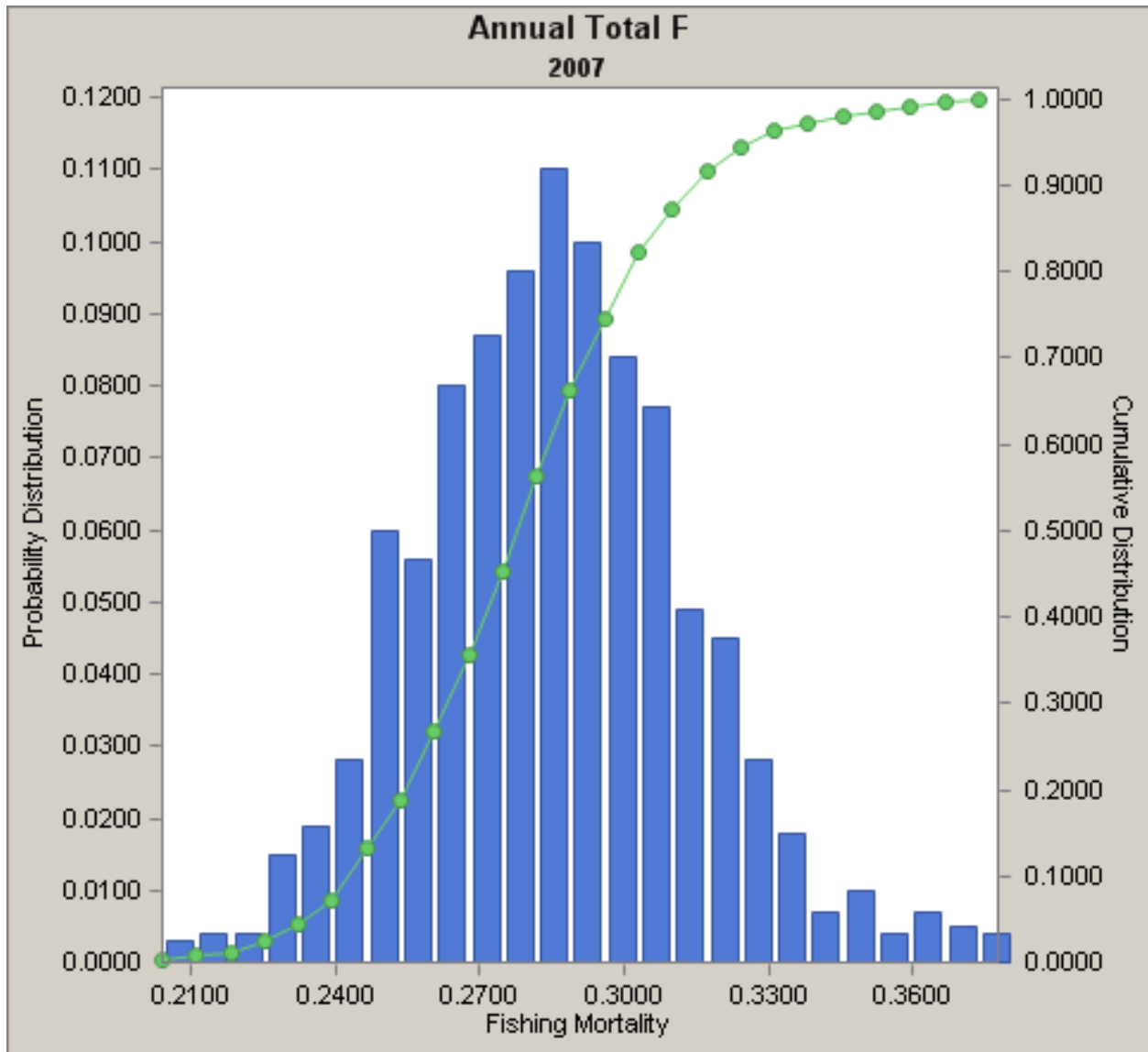
Figure 78. Precision of the 2007 Fishing Mortality estimate from the 2008 assessment final model ASAP F08_T2007_T2 run.
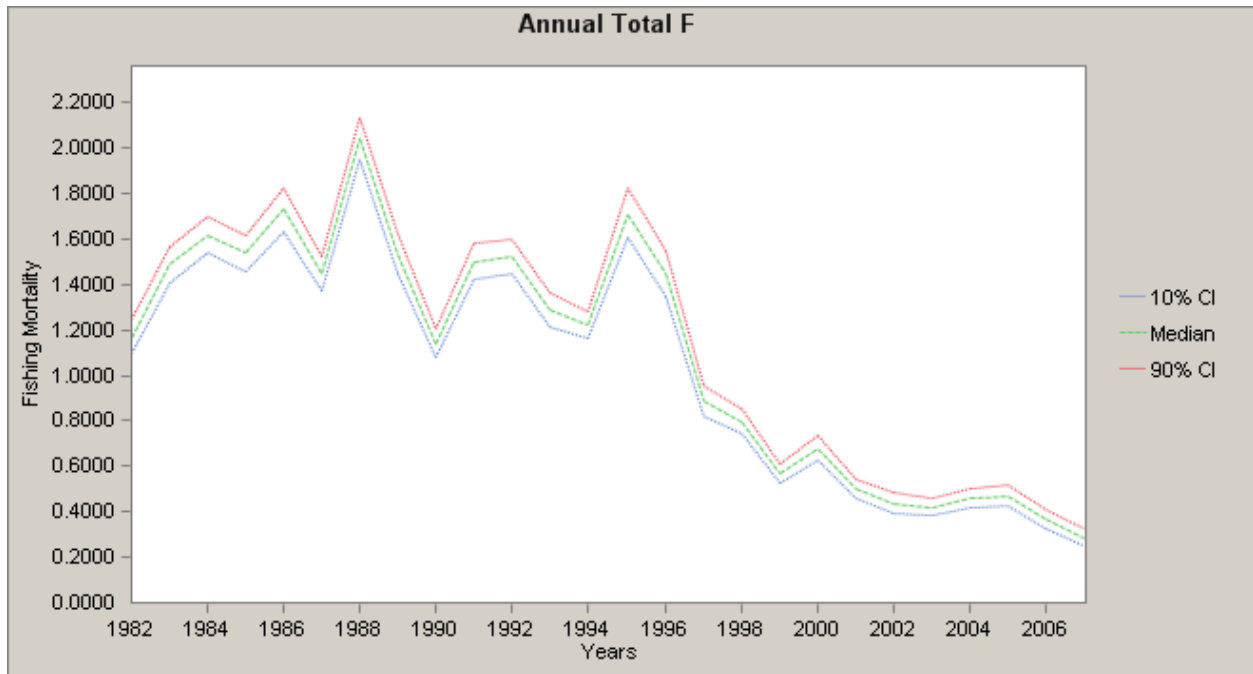
Figure 79. Time series of Fishing Mortality estimates from the 2008 assessment final model ASAP F08_T2007_T2 run with 10% and 90% confidence intervals.
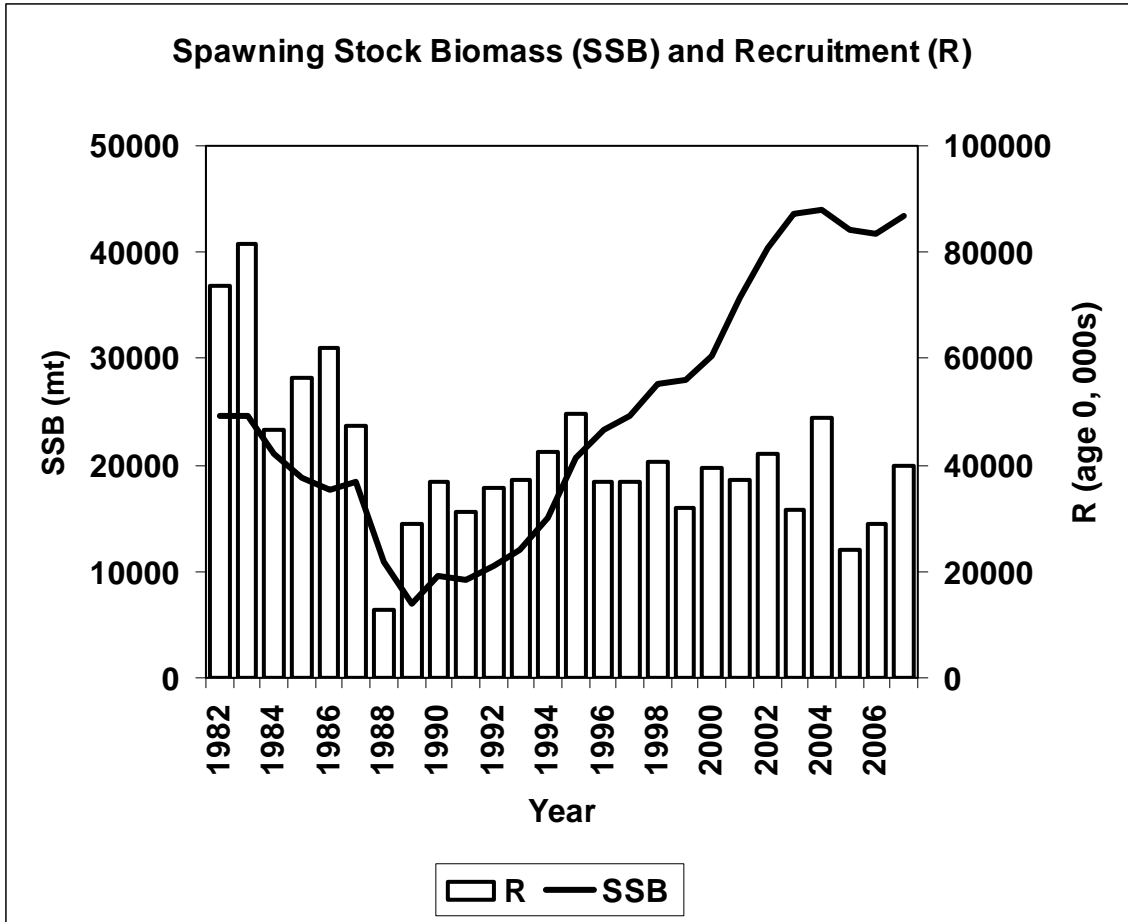
Figure 80. Spawning stock biomass (SSB) and recruitment (age 0) for summer flounder.
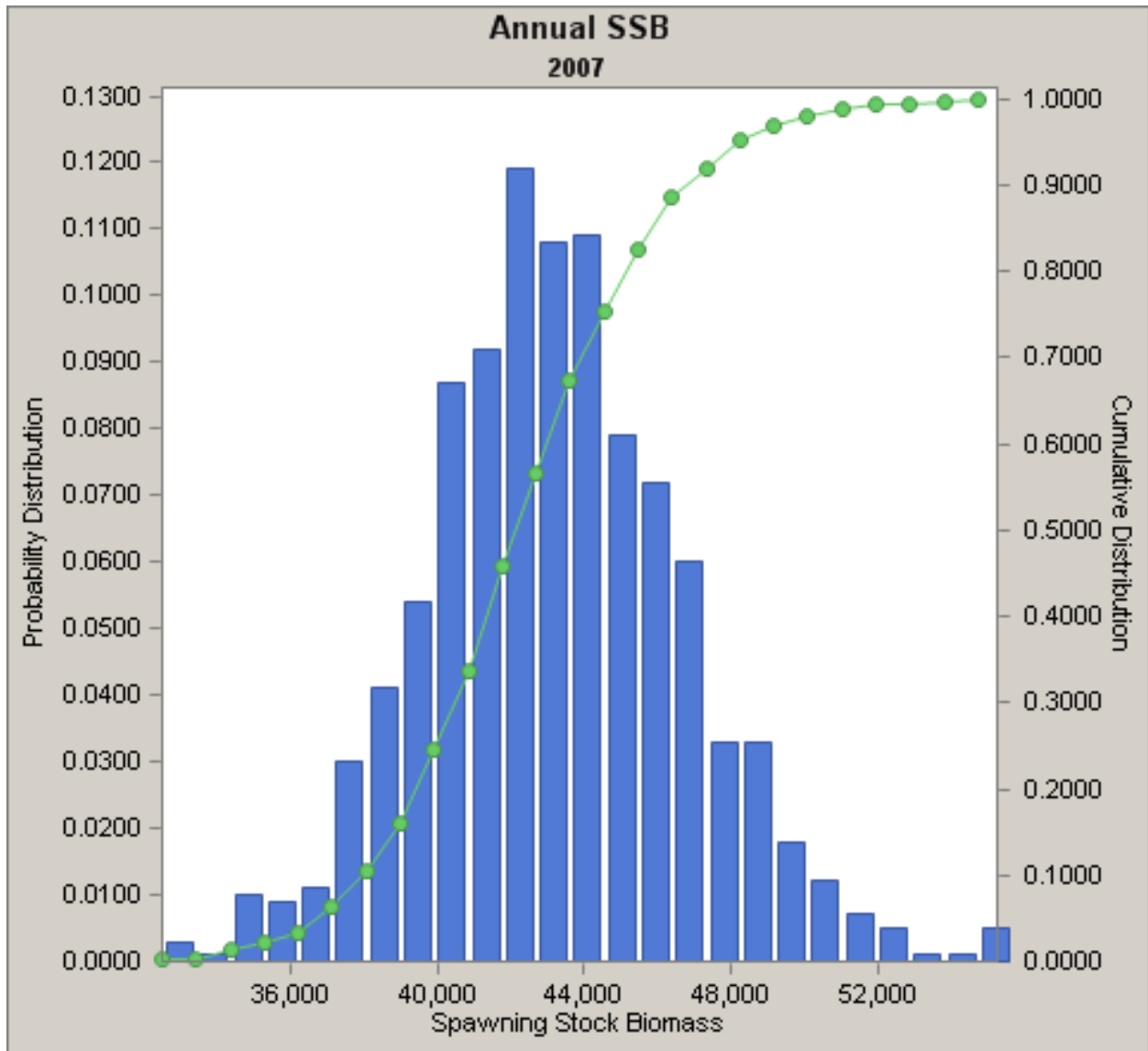
Figure 81. Precision of the 2007 Spawning Stock Biomass (SSB) estimate from the 2008 assessment final model ASAP F08_T2007_T2 run.
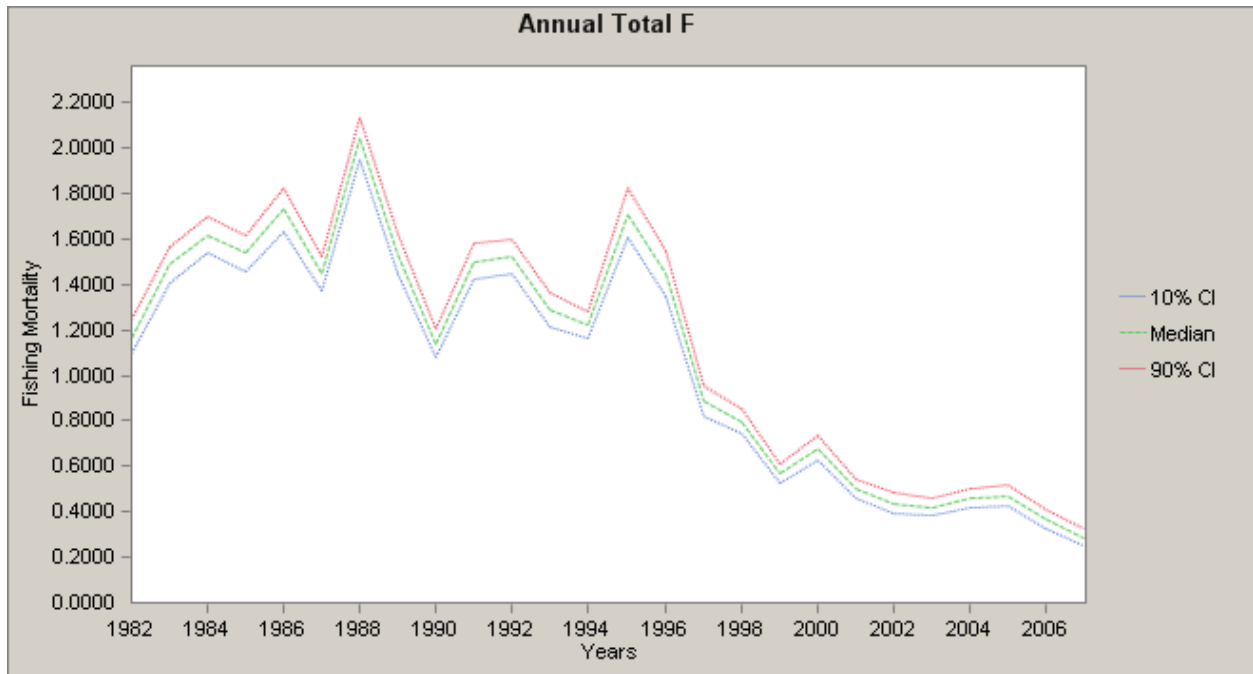
Figure 82. Time series of Spawning Stock Biomass (SSB) estimates from the 2008 assessment final model ASAP F08_T2007_T2 run with 10% and 90% confidence intervals.
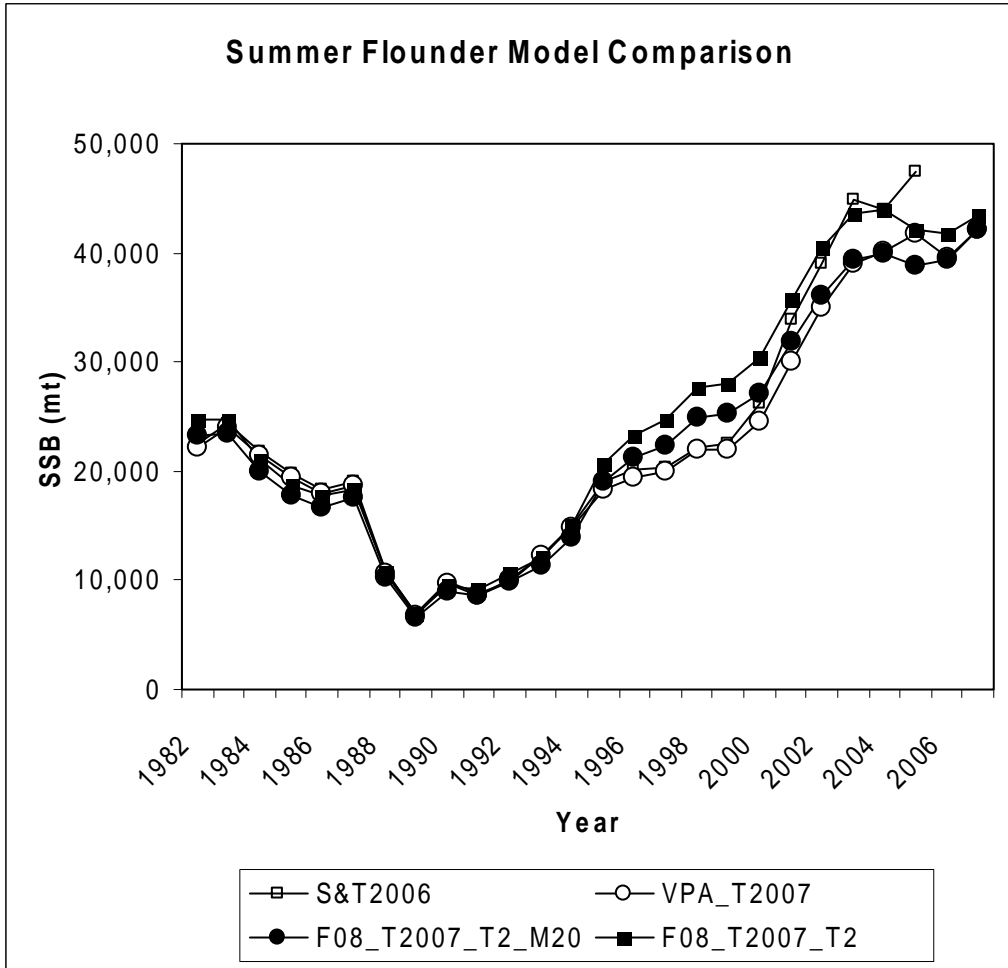
Figure 83. Spawning Stock Biomass (SSB; mt) estimates from the S&T 2006 ADAPT VPA (M = 0.20), VPA_T2007 (M = 0.20), F08_T2007_T2_M20 (M = 0.20) and F08_T2007_T2 runs (Mean M = 0.25).
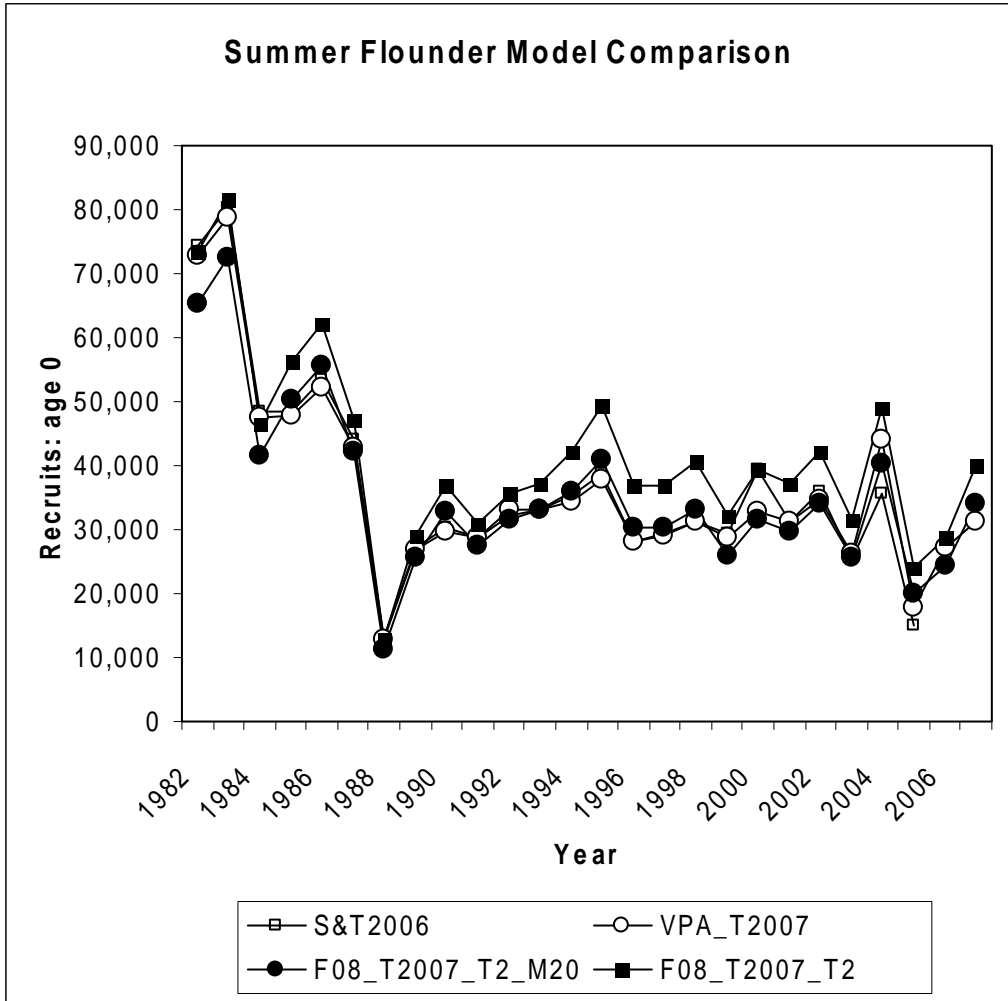
Figure 84. Recruitment (Recruits: age 0) estimates from the S&T 2006 ADAPT VPA (M = 0.20), VPA_T2007 (M = 0.20), F08_T2007_T2_M20 (M = 0.20) and F08_T2007_T2 runs (Mean M = 0.25).
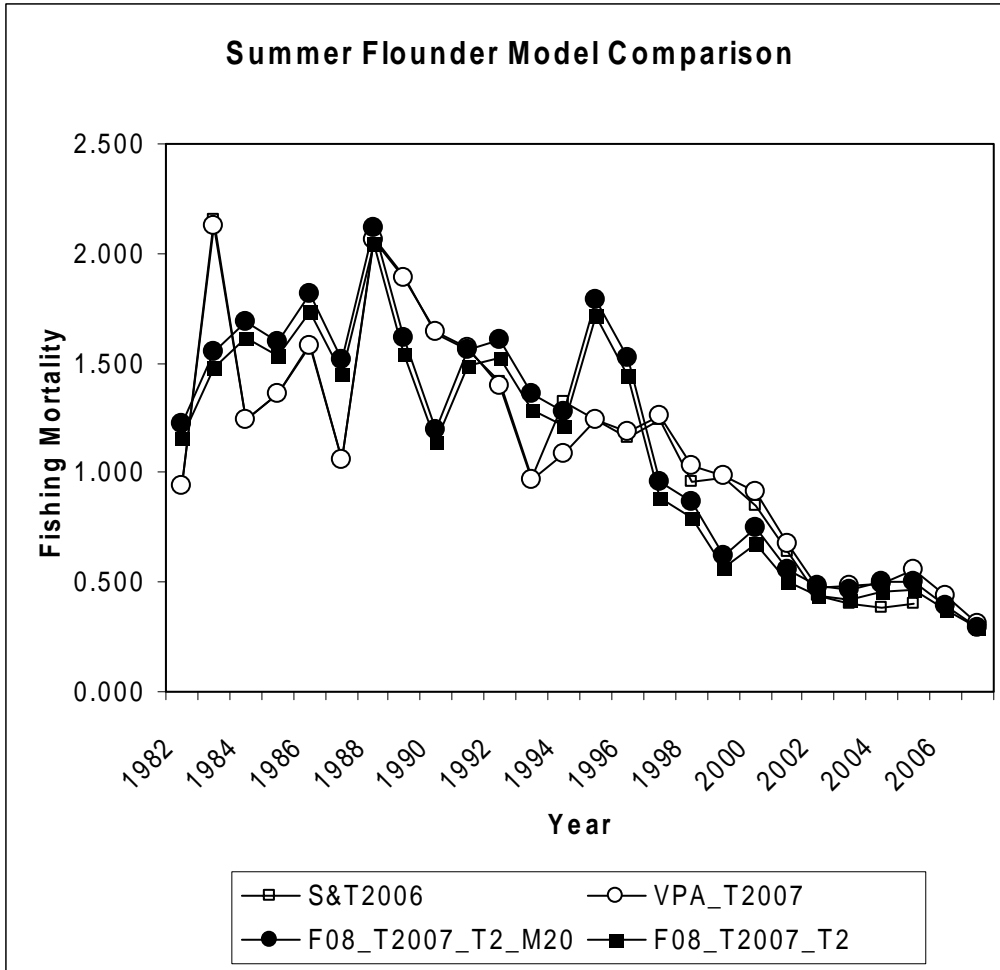
Figure 85. Fishing Mortality estimates from from the S&T 2006 ADAPT VPA (M = 0.20), VPA_T2007 (M = 0.20), F08_T2007_T2_M20 (M = 0.20) and F08_T2007_T2 runs (Mean M = 0.25).
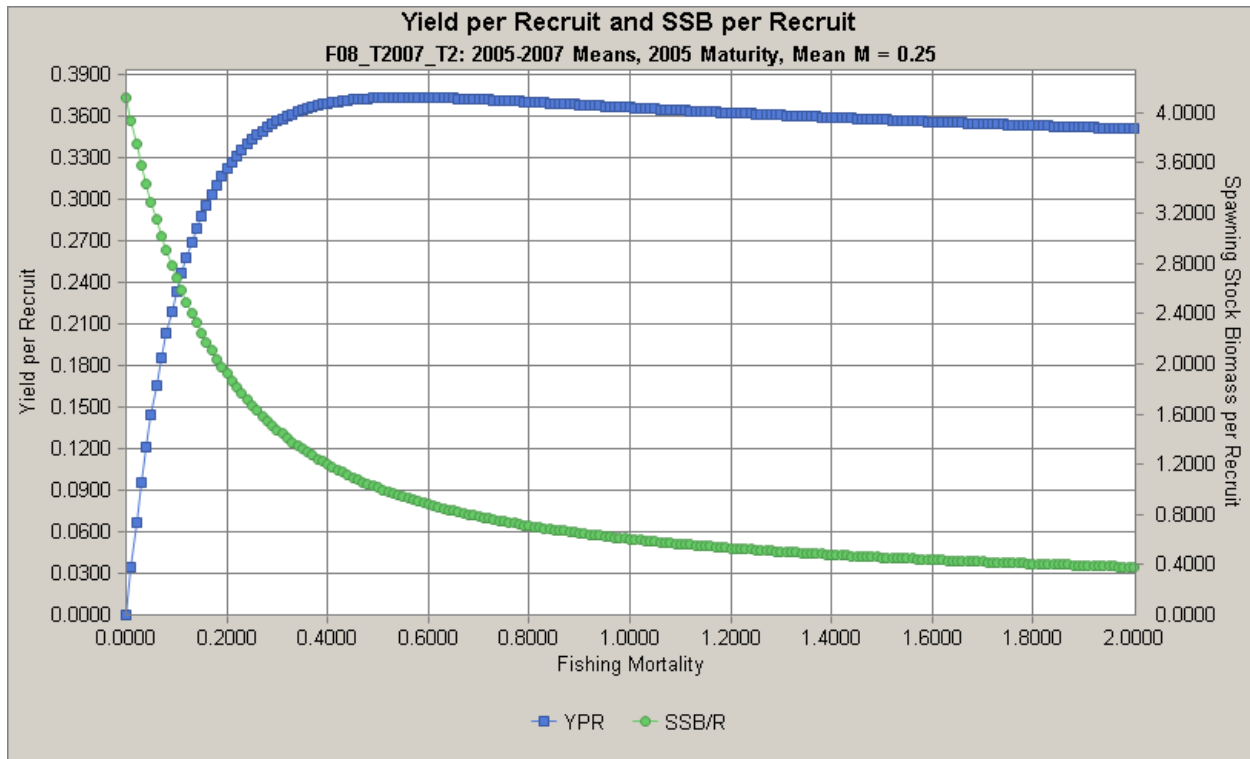
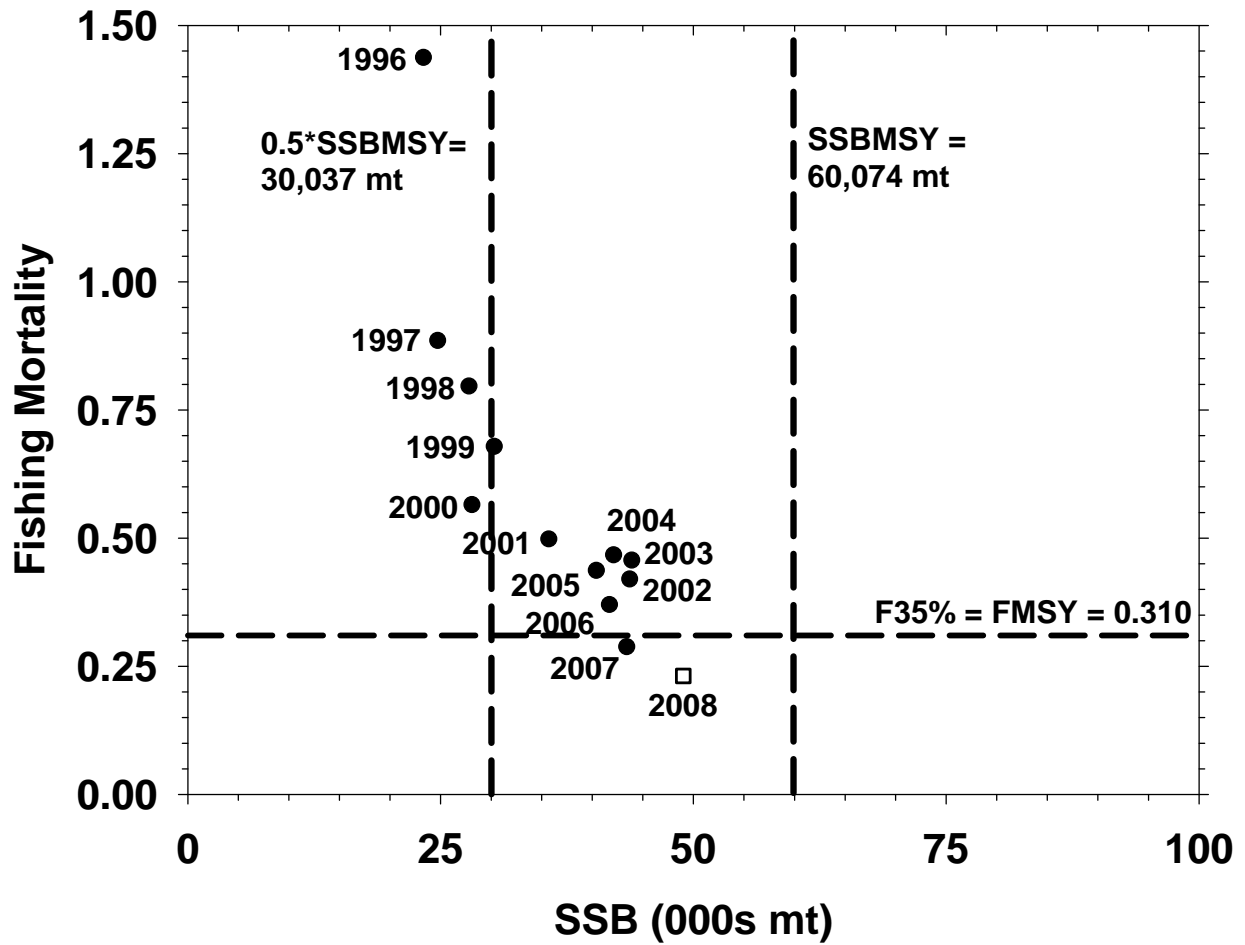Figure 86. 2008 assessment yield per recruit and SSB per recruit plot.

Figure 87. Spawning stock biomass (000s metric tons), fishing mortality, and proposed biological reference points for summer flounder. Forecast SSB and F in 2008 indicated by the open box.
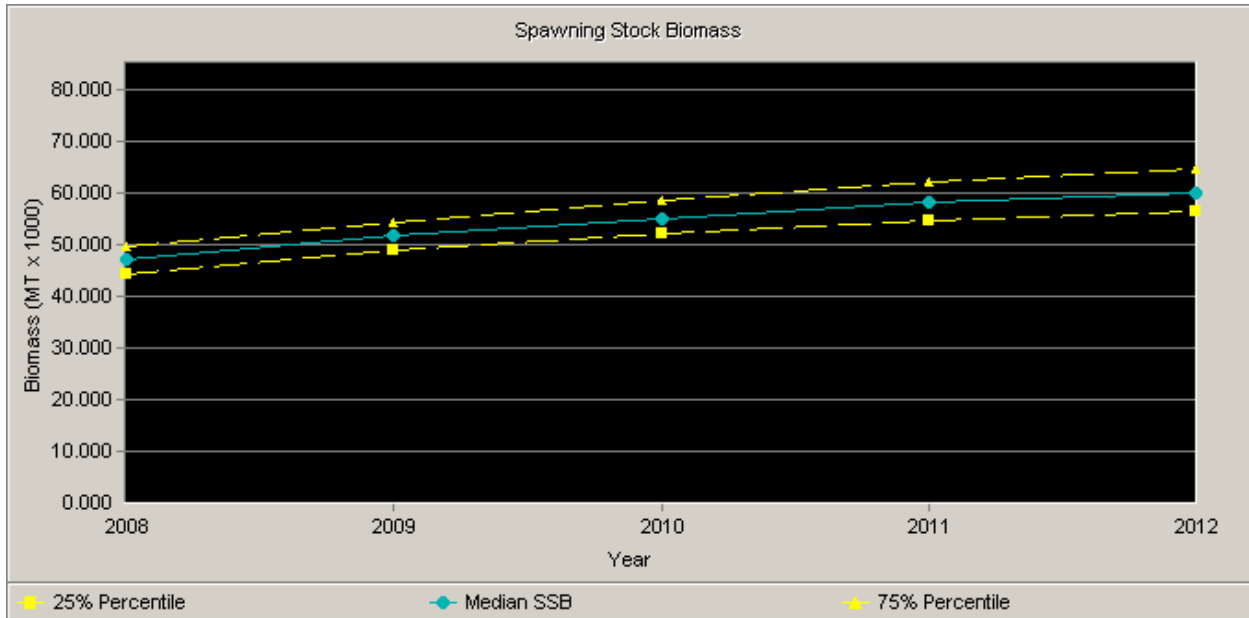
Figure 88. Projection of summer flounder SSB at the proposed Frebuild = 0.274 during 2010-2012.
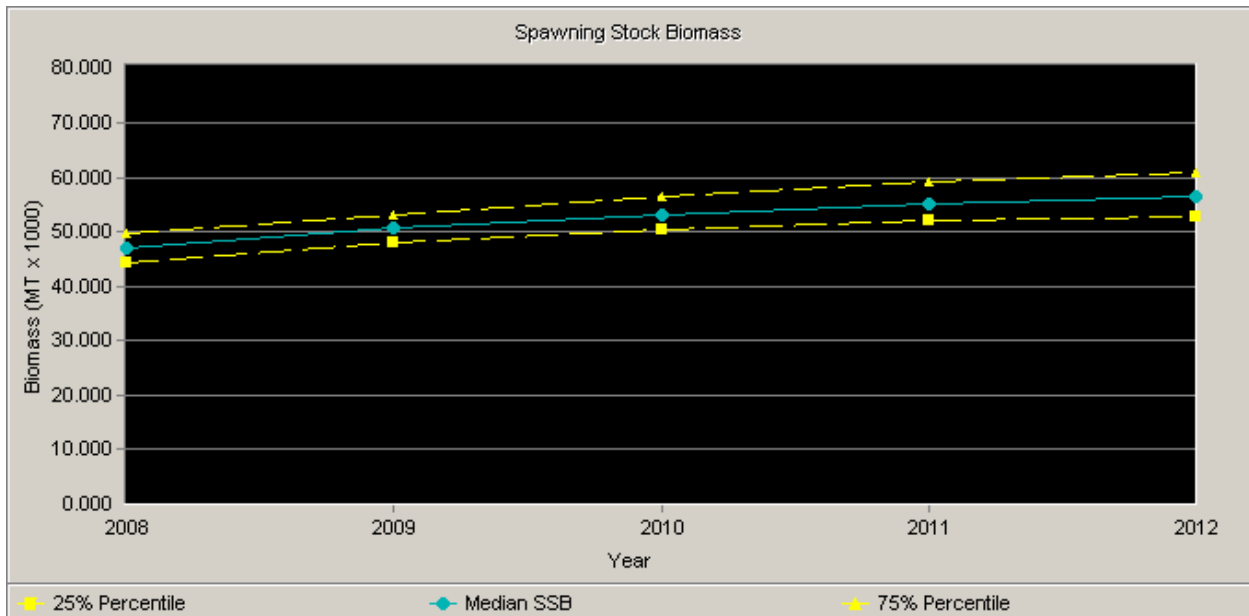

Figure 89. Projection of summer flounder SSB at the proposed FMSY = F35% = 0.310 during 2010-2012.