

USA Redfish Landings from the Northwest Atlantic through 2000

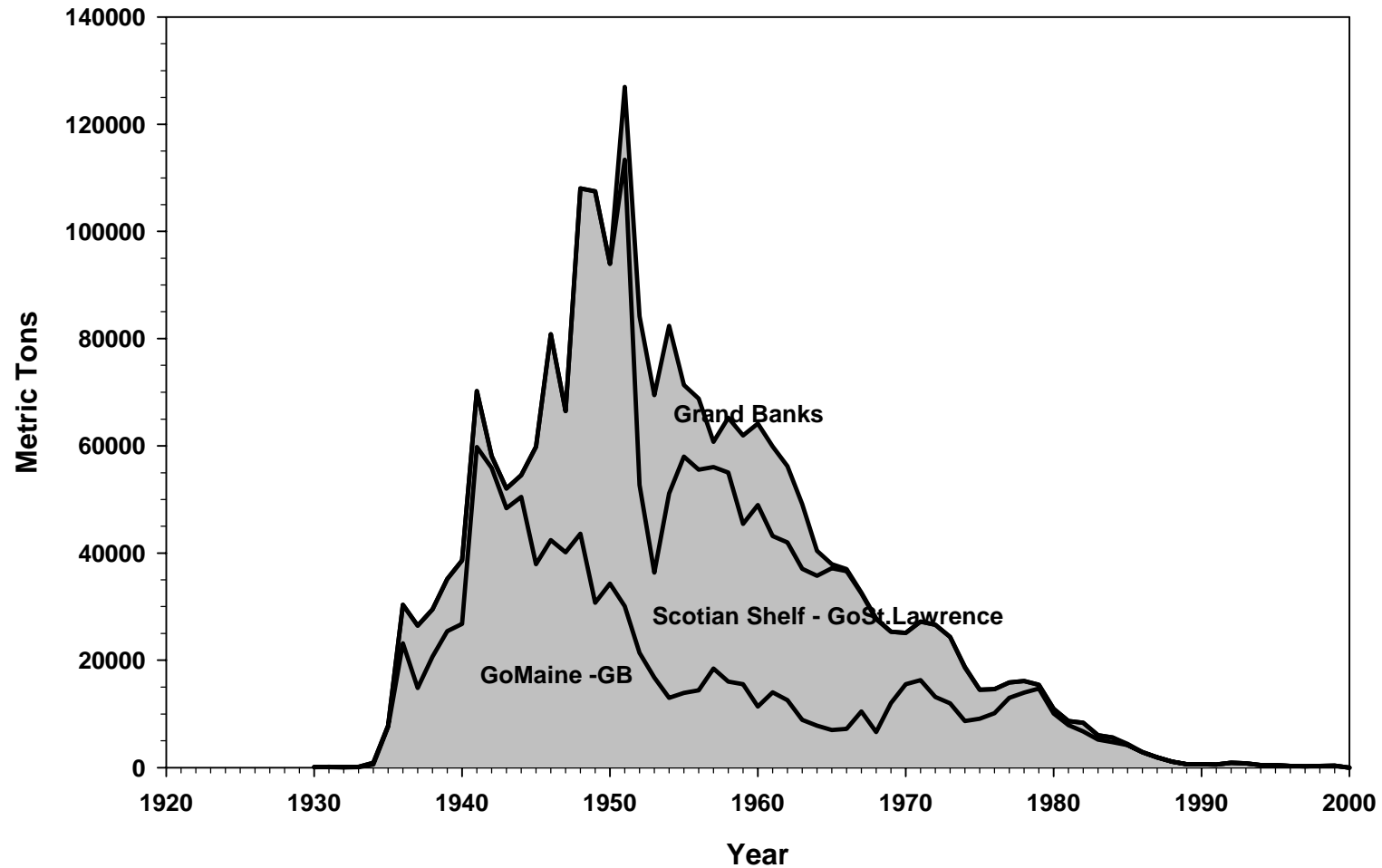


Figure C1. USA landings (metric tons, live weight) of redfish from NAFO Subarea 3 (Grand Banks and Flemish Cap), Subarea 4 (Gulf of St. Lawrence and Scotian Shelf), and Subarea 5 (Gulf of Maine and Georges Bank).

Subarea 5 Redfish Trends in CPUE and Fishing Effort

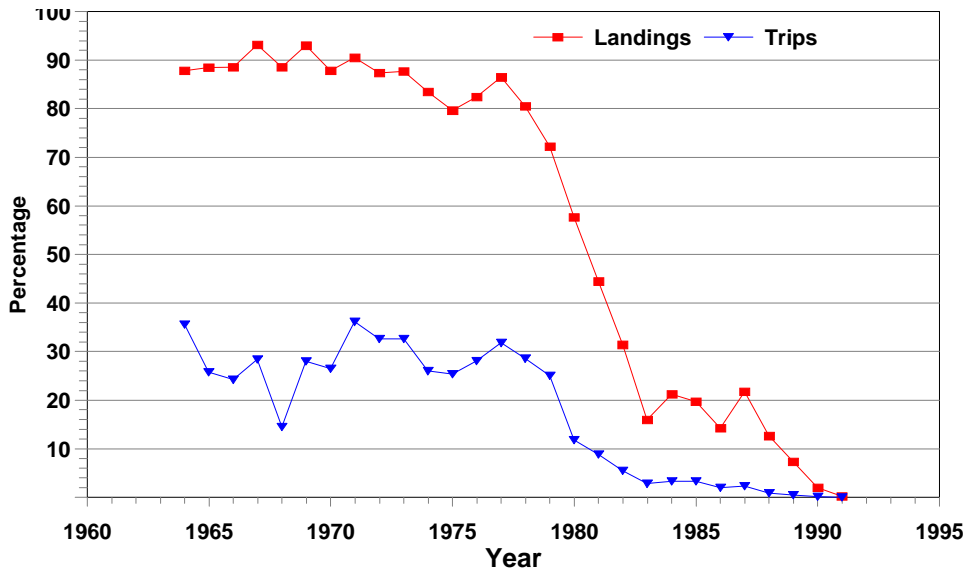
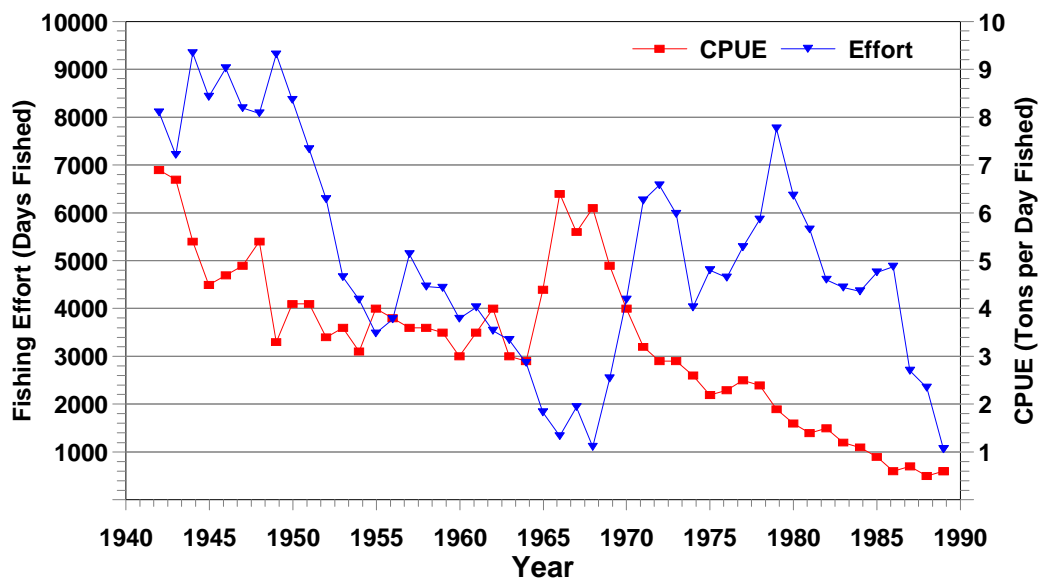


Figure C2. (a) Trends in CPUE and Effort and
(b) Percentage of directed Redfish Trips

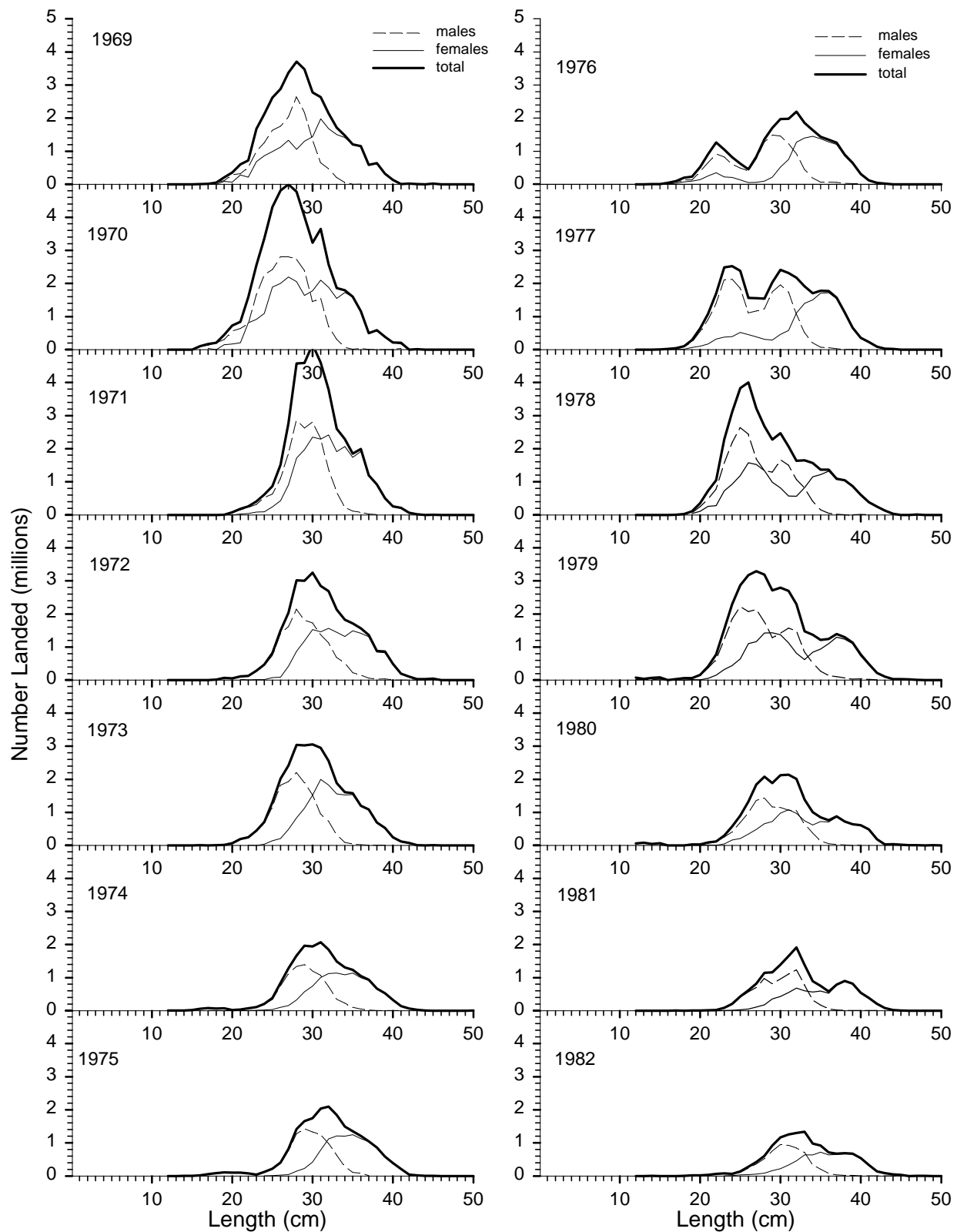


Figure C3. Length composition of redfish in the commercial landings.

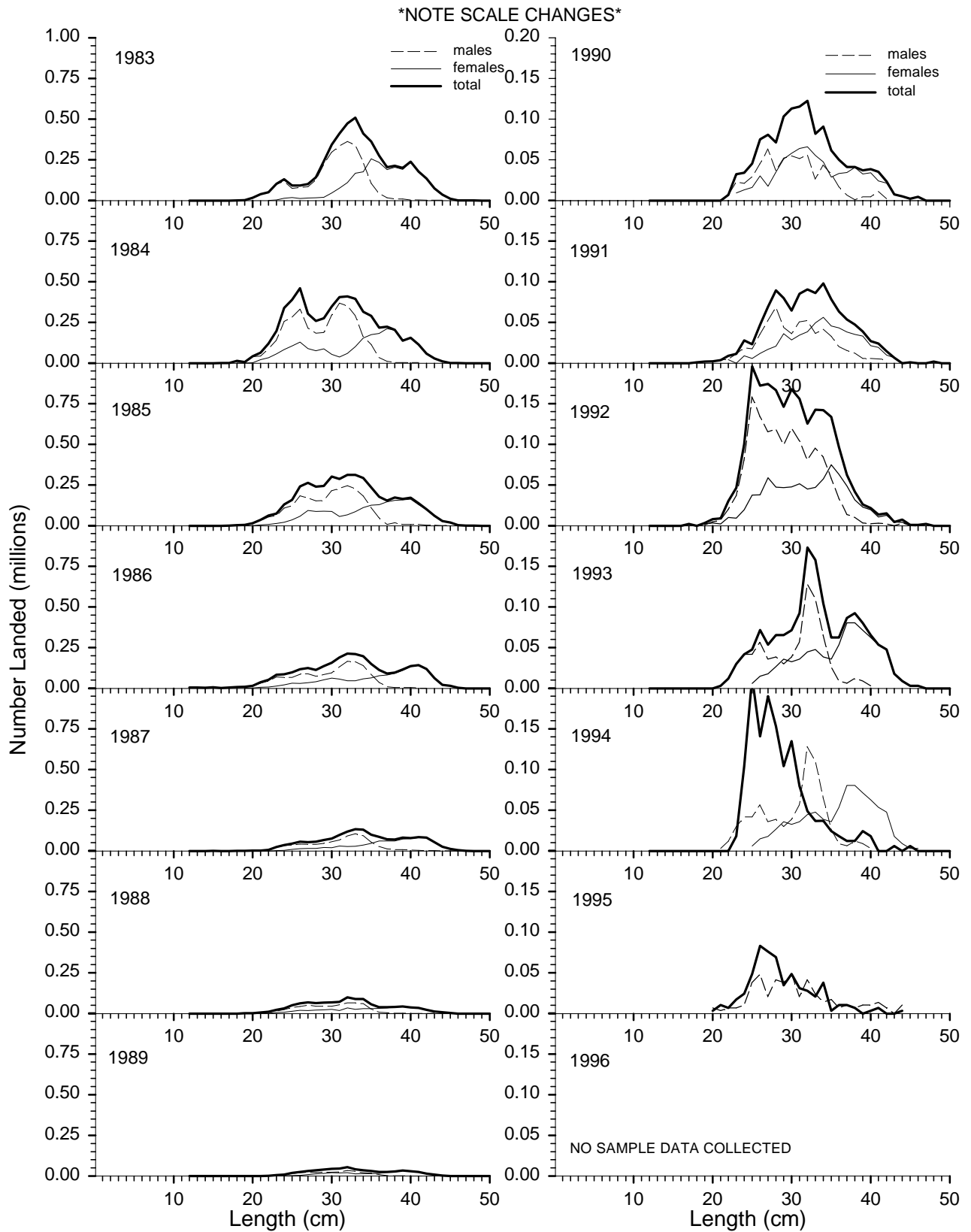


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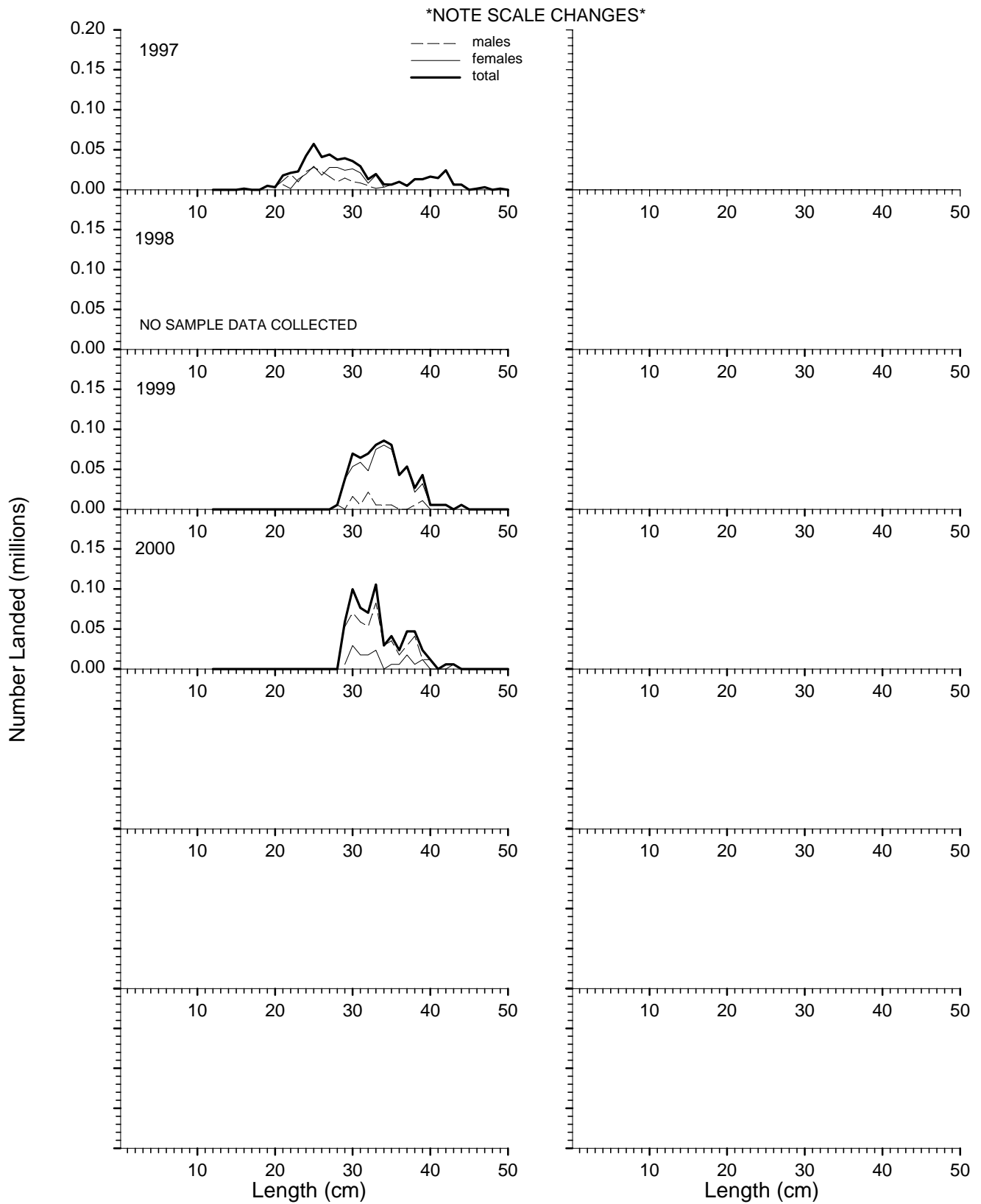


Figure C3 (Continued).

SA 5 Redfish
Trends in Mean Length in the Commercial Landings
1942 - 2000

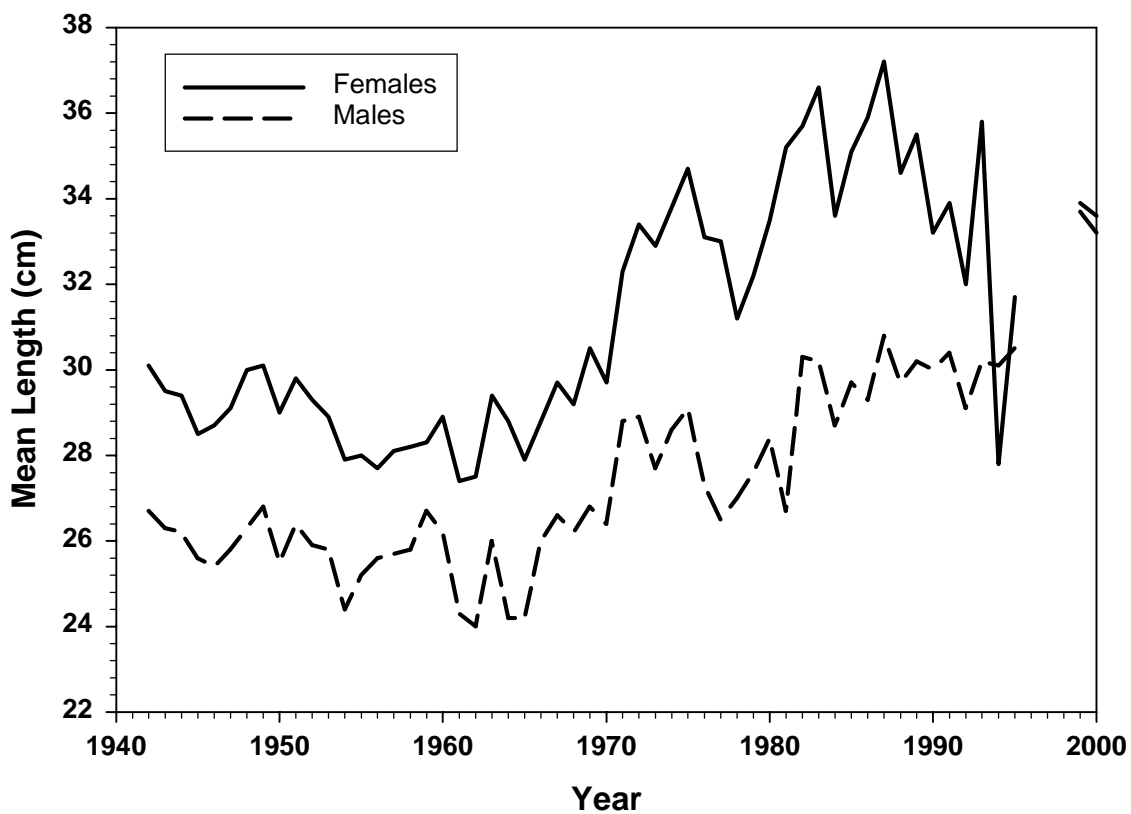


Figure C4. Trends in mean length (cm) of redfish in the commercial landings.

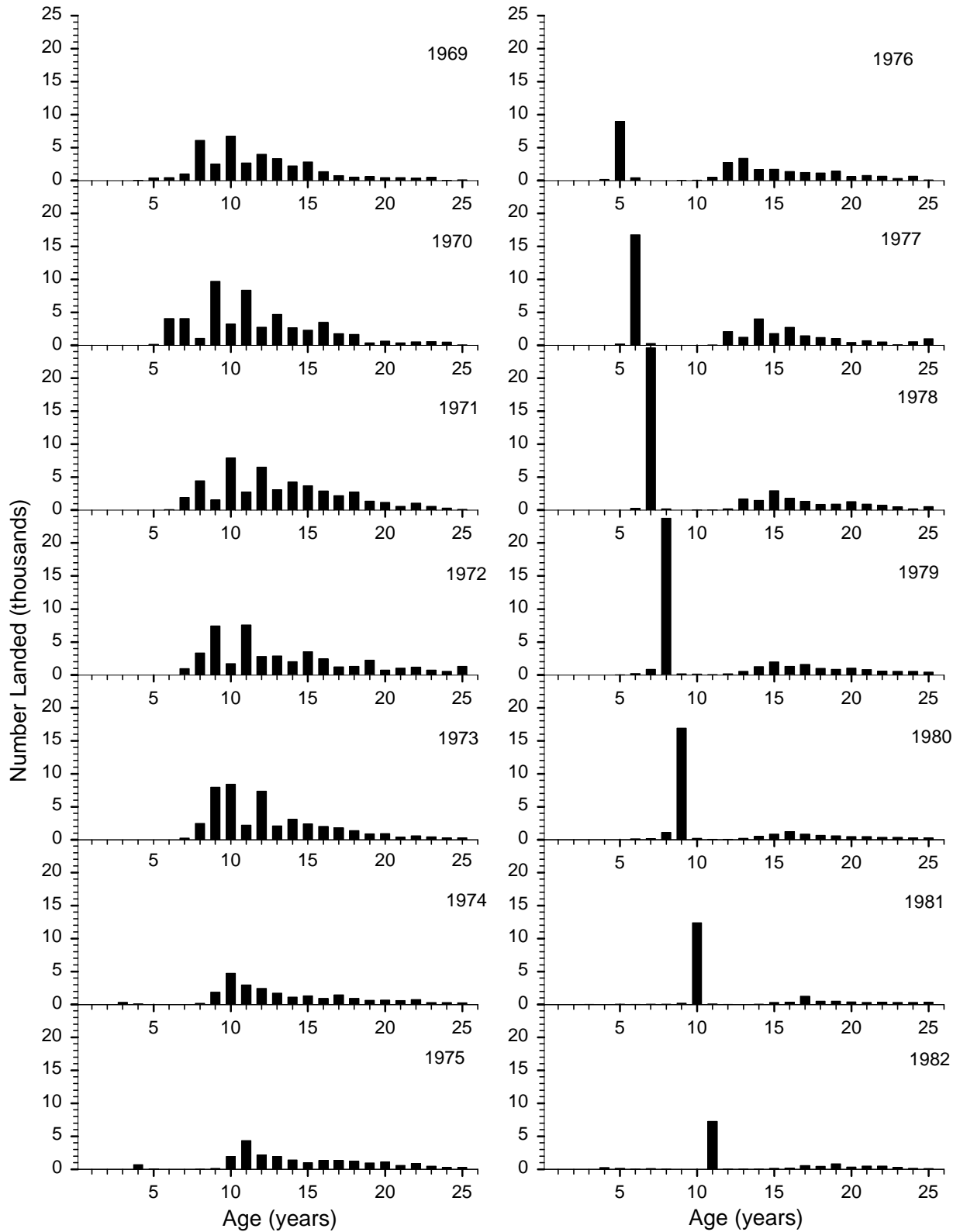


Figure C5. Age composition of redfish in commercial landings.

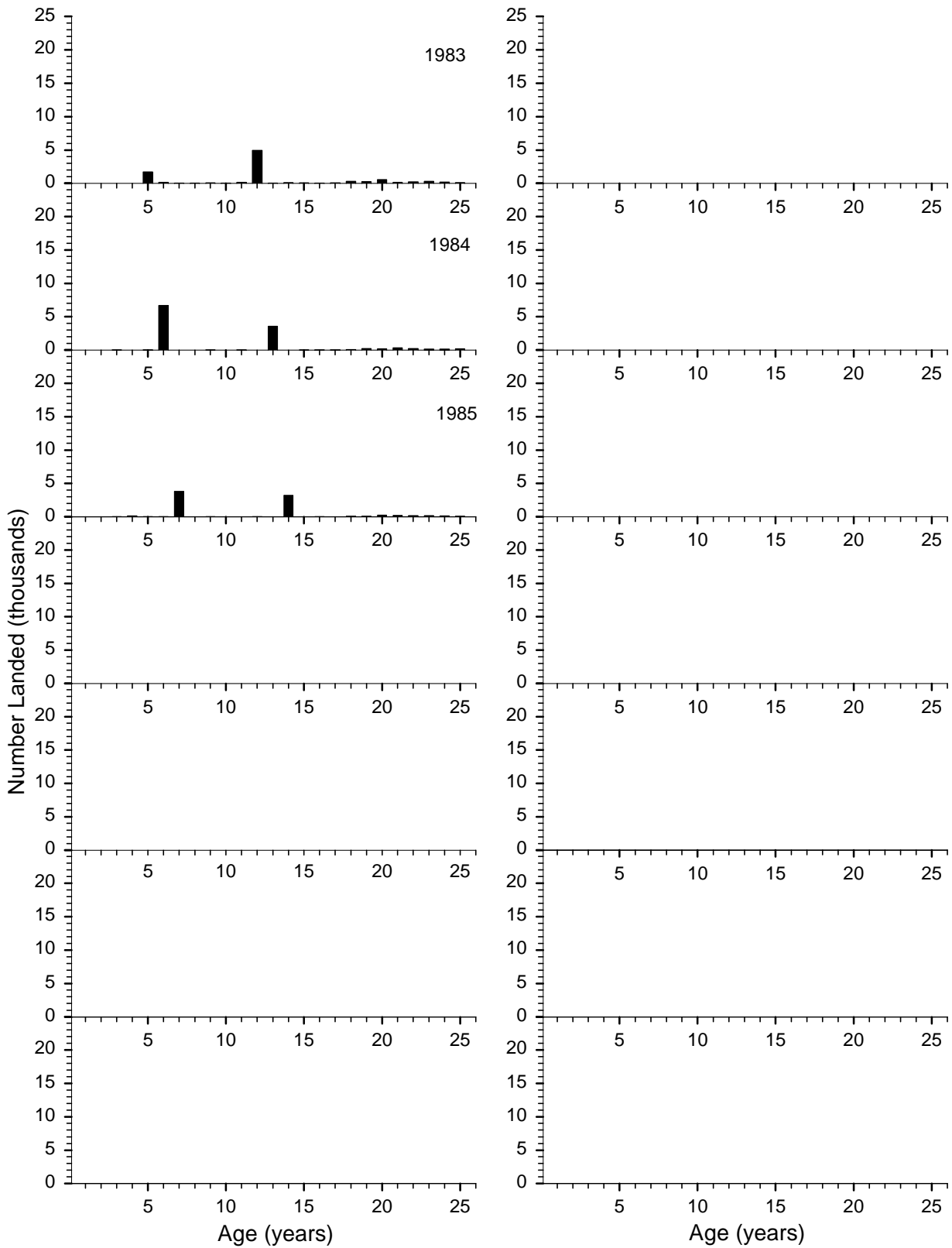
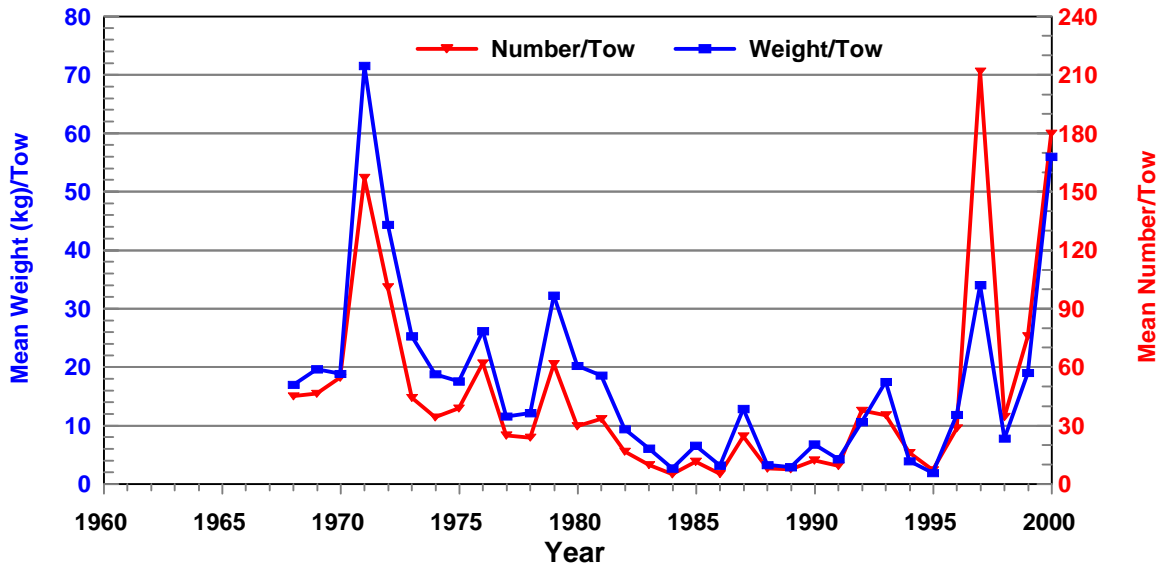


Figure C5 (Continued).

SA 5 Redfish NEFSC Spring Surveys



SA 5 Redfish NEFSC Autumn Surveys

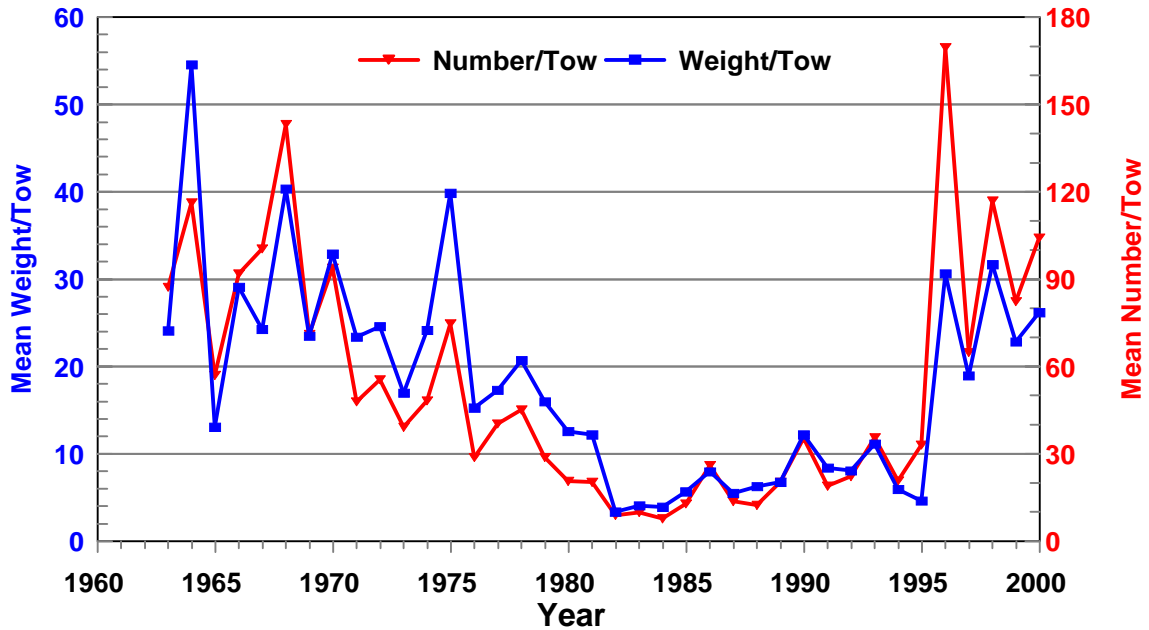
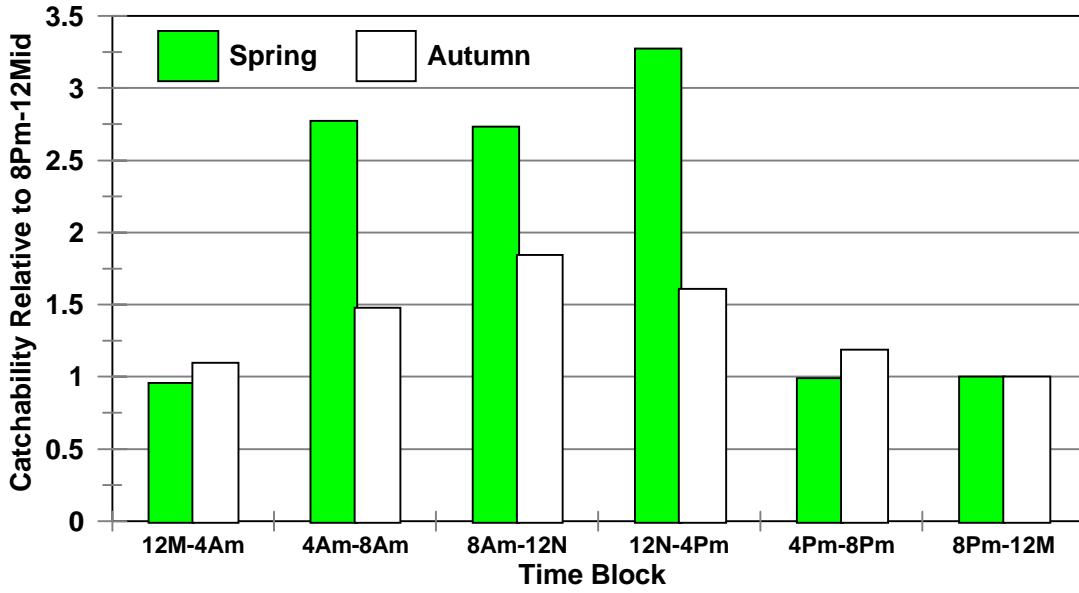


Figure C6 (a) Stratified mean number and weight (kg) per tow of redfish in NEFSC spring surveys, (b) Stratified mean number and weight (kg) per tow of redfish in NEFSC autumn surveys.

SA 5 Redfish Relative Catchability by 4-Hr Block



SA 5 Redfish Relative Catchability by 4-Hr Block

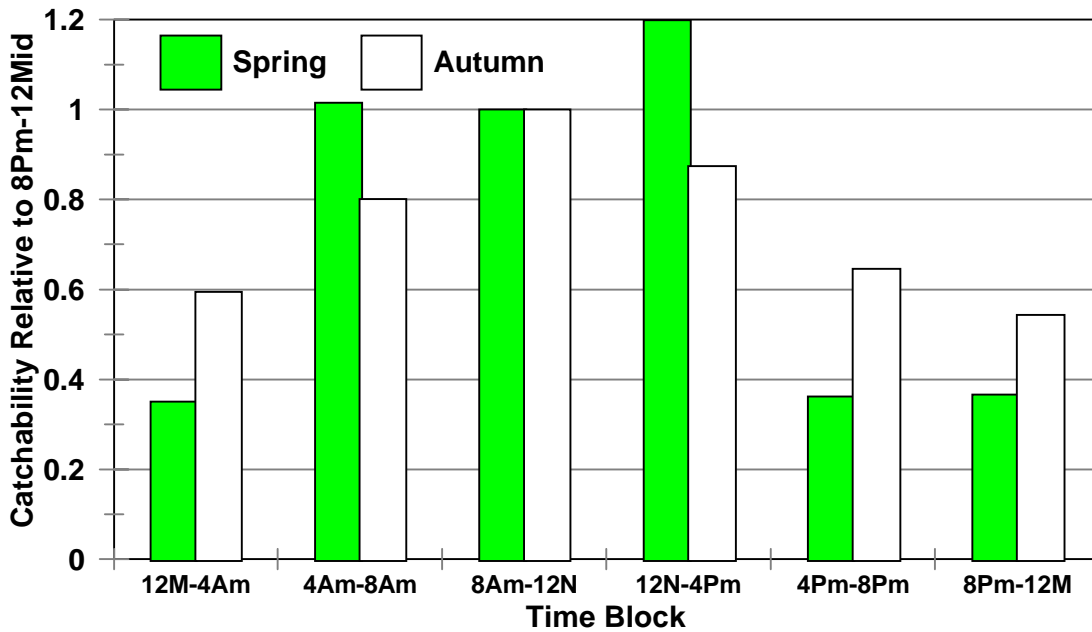
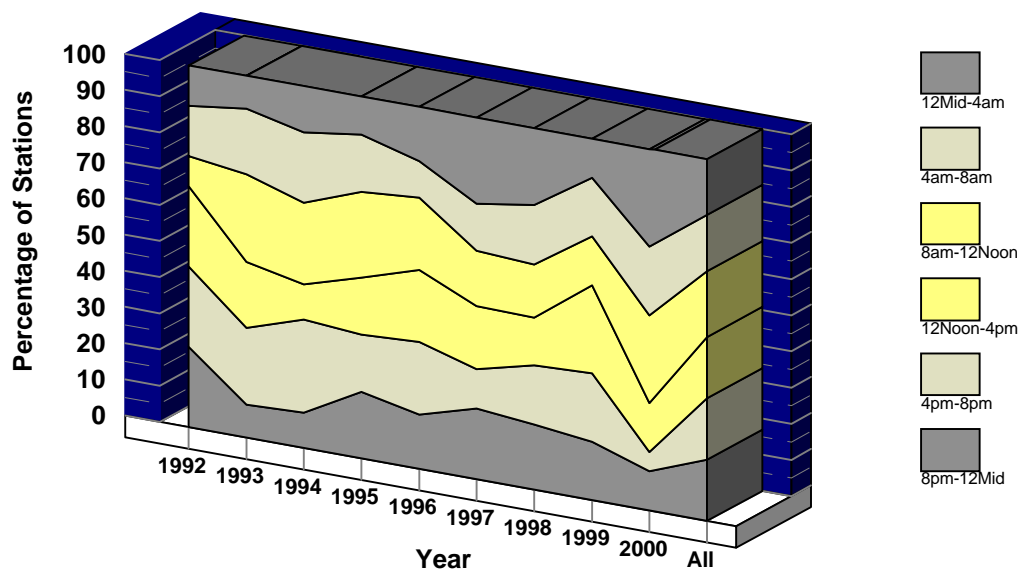


Figure C7. Relative catchability of redfish in NEFSC spring and autumn bottom trawl surveys.

SA 5 Redfish - Spring Surveys
Percentage of Stations by Time Block



SA 5 Redfish - Autumn Surveys
Percentage of Stations by Time Block

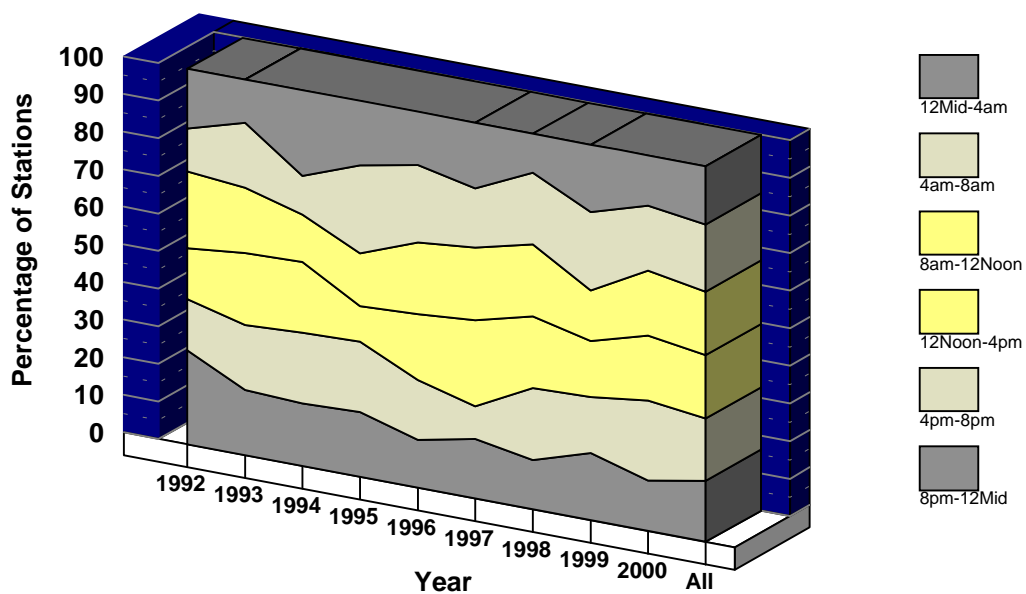
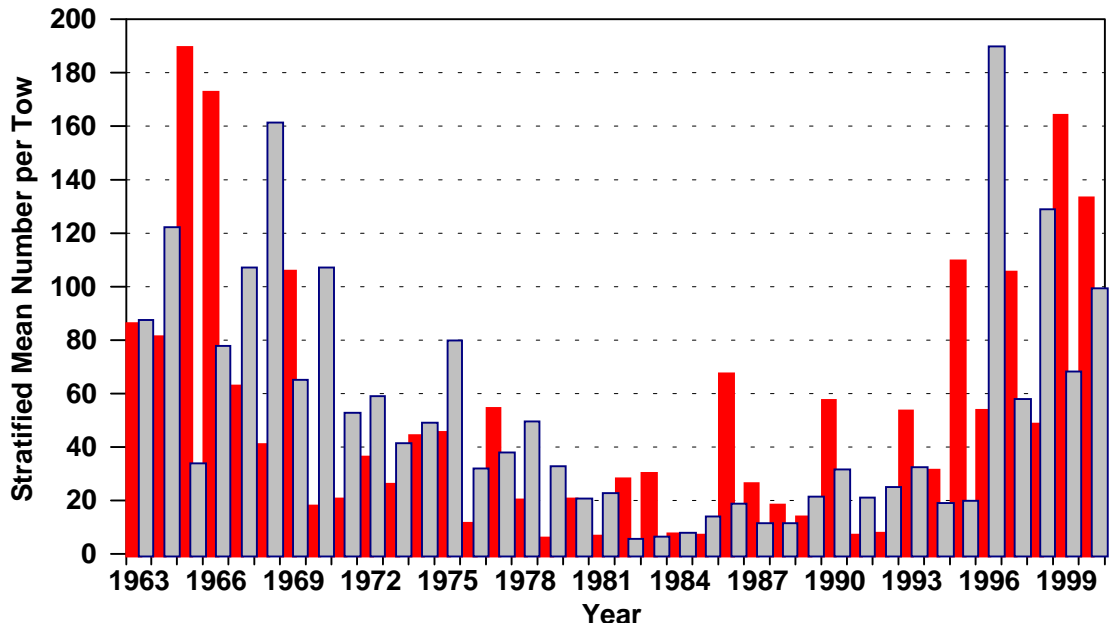
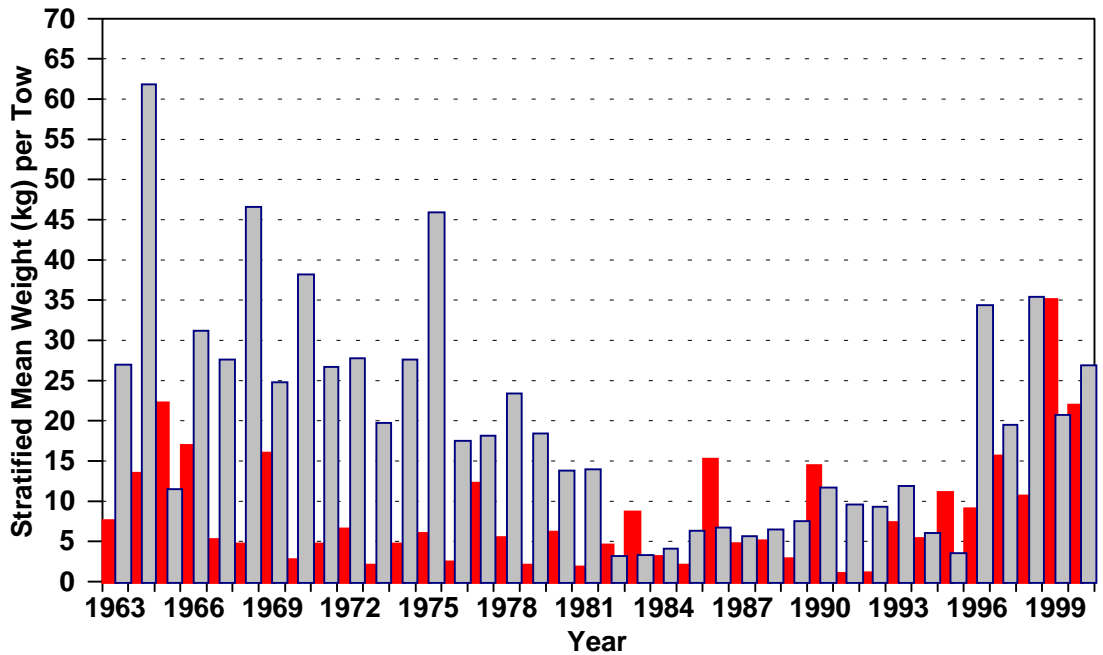


Figure C8 (a) Station coverage percentages by 4-hour time block, NEFSC spring surveys.
 (b) Station coverage percentages by 4-hour time block; NEFSC autumn surveys.

Gulf of Maine - Georges Bank Redfish NEFSC Autumn Bottom Trawl Surveys



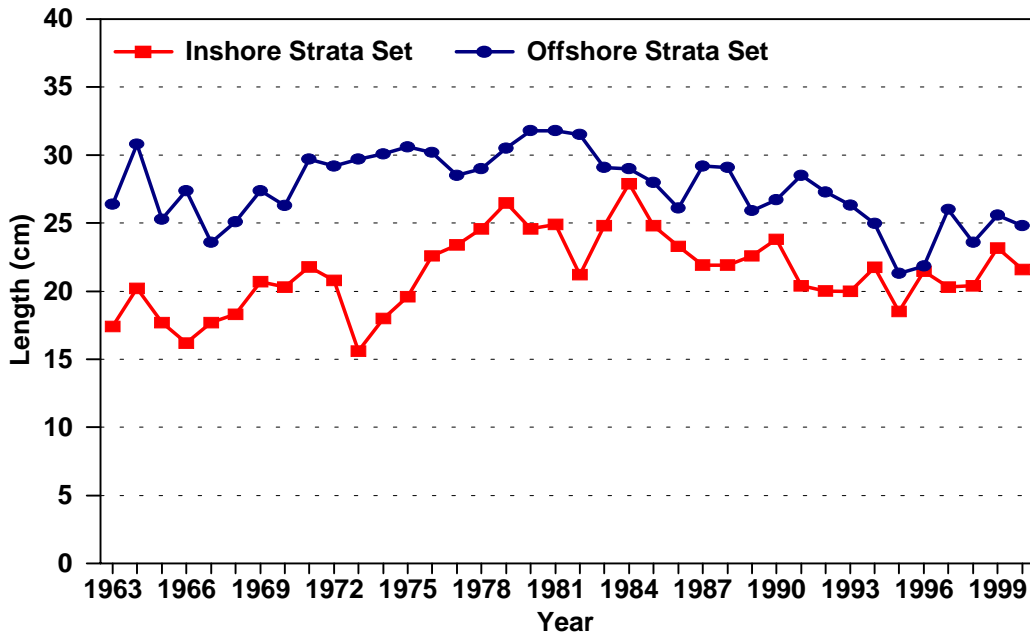
Gulf of Maine - Georges Bank Redfish NEFSC Autumn Bottom Trawl Surveys



■ Inshore Strata Set ■ Offshore Strata Set

Figure C9 (a) Density indices (number per tow) for redfish in NEFSC autumn inshore and offshore strata sets. (b) Density indices (weight per tow) for redfish in NEFSC autumn inshore and offshore strata sets.

Gulf of Maine - Georges Bank Redfish
NEFSC Autumn Bottom Trawl Surveys



NEFSC Autumn Bottom Trawl Surveys

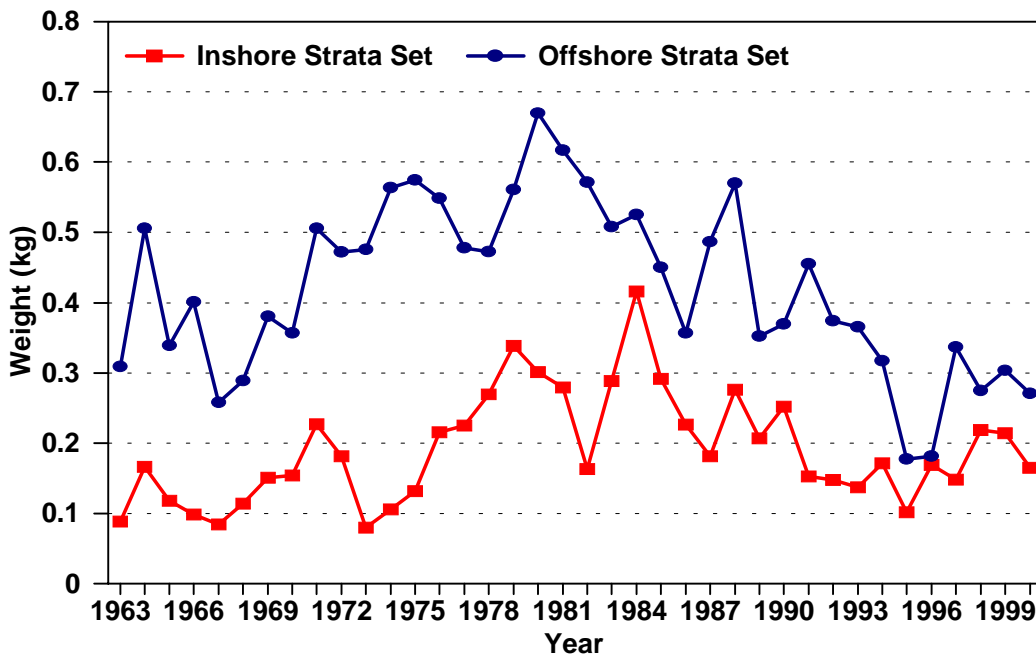
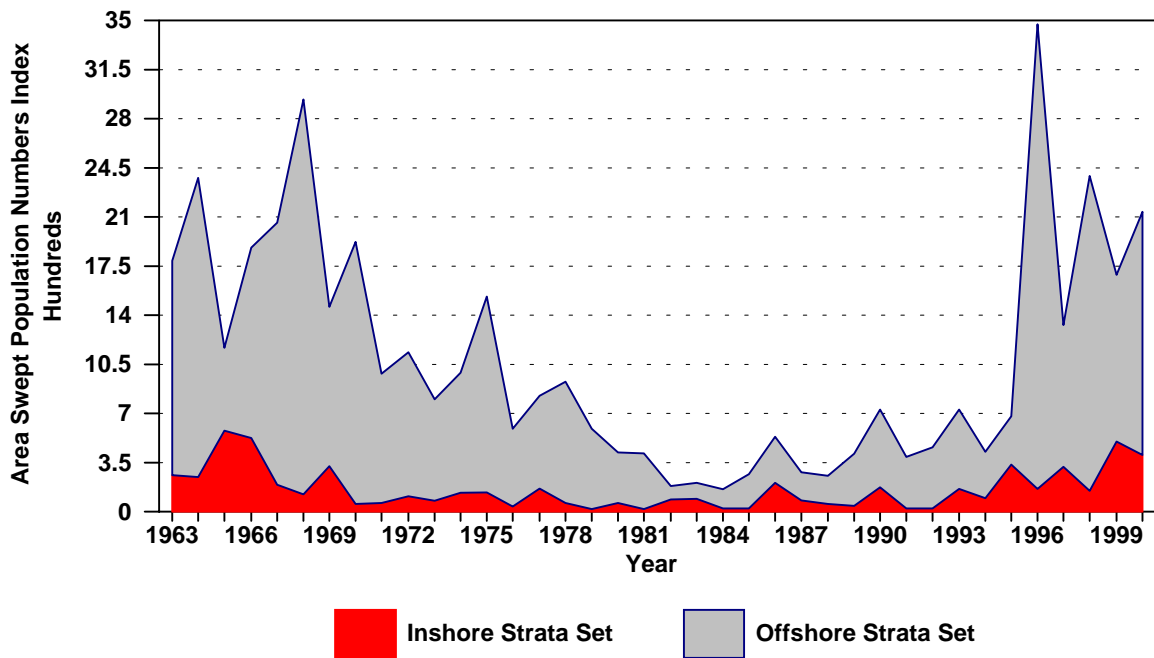


Figure C10 (a) Mean length (cm) of redfish in NEFSC autumn survey inshore and offshore strata sets.
(b) Mean weight (kg) of redfish in NEFSC autumn survey inshore and offshore strata sets.

**Gulf of Maine - Georges Bank Redfish
NEFSC Autumn Bottom Trawl Surveys**



**Gulf of Maine - Georges Bank Redfish
NEFSC Autumn Bottom Trawl Surveys**

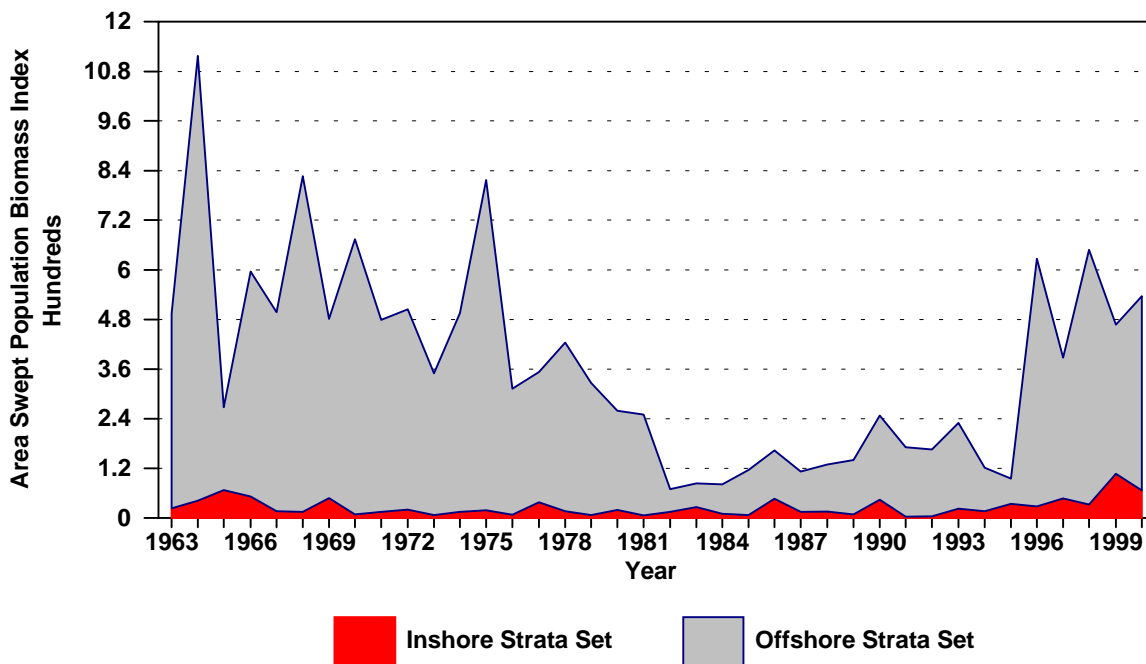


Figure C11 (a) Index of area swept abundance of redfish in NEFSC autumn inshore and offshore strata sets. (b) Index of swept area biomass of redfish in NEFSC autumn inshore and offshore strata sets.

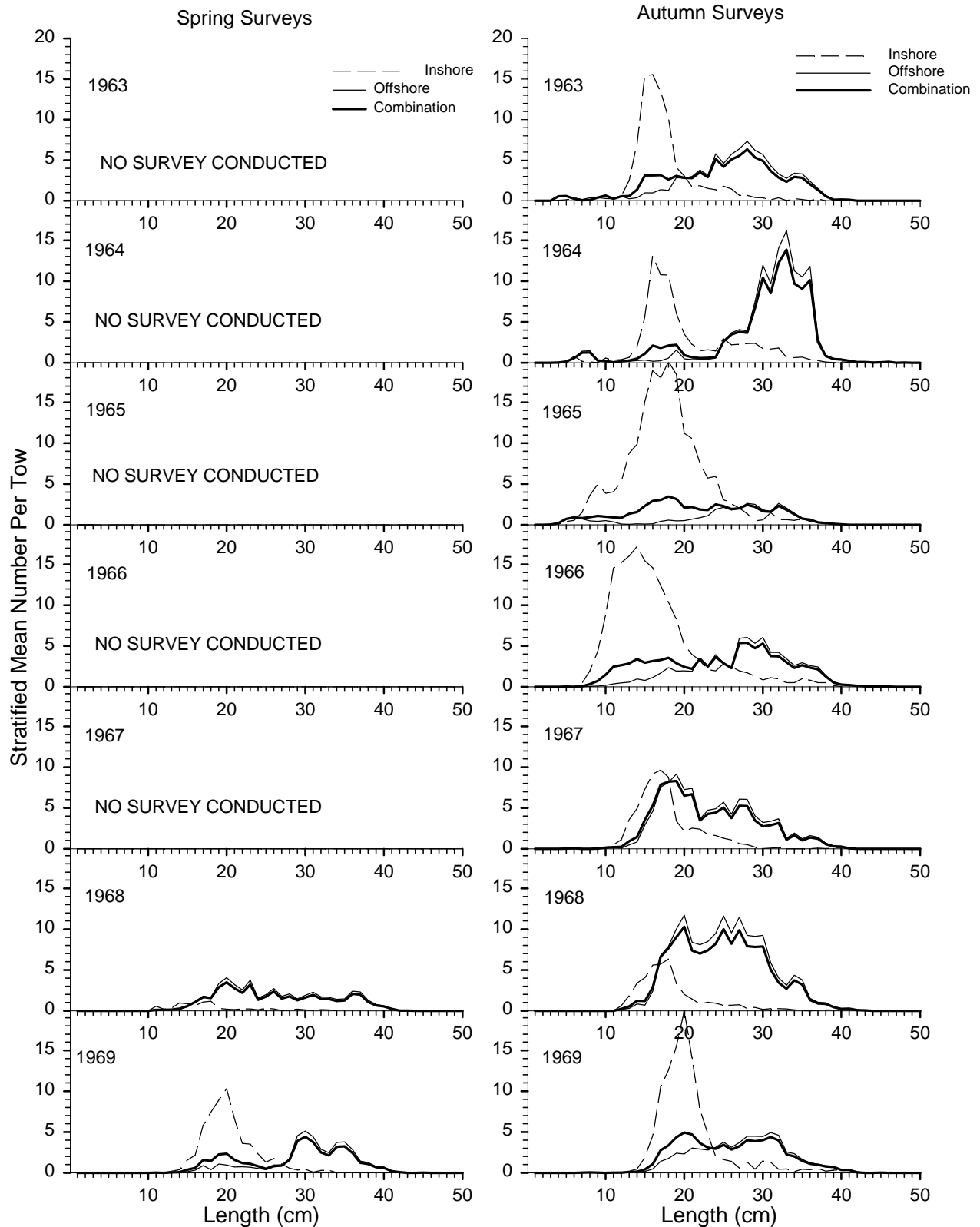


Figure C12. Length composition of redfish in NEFSC spring and autumn surveys.

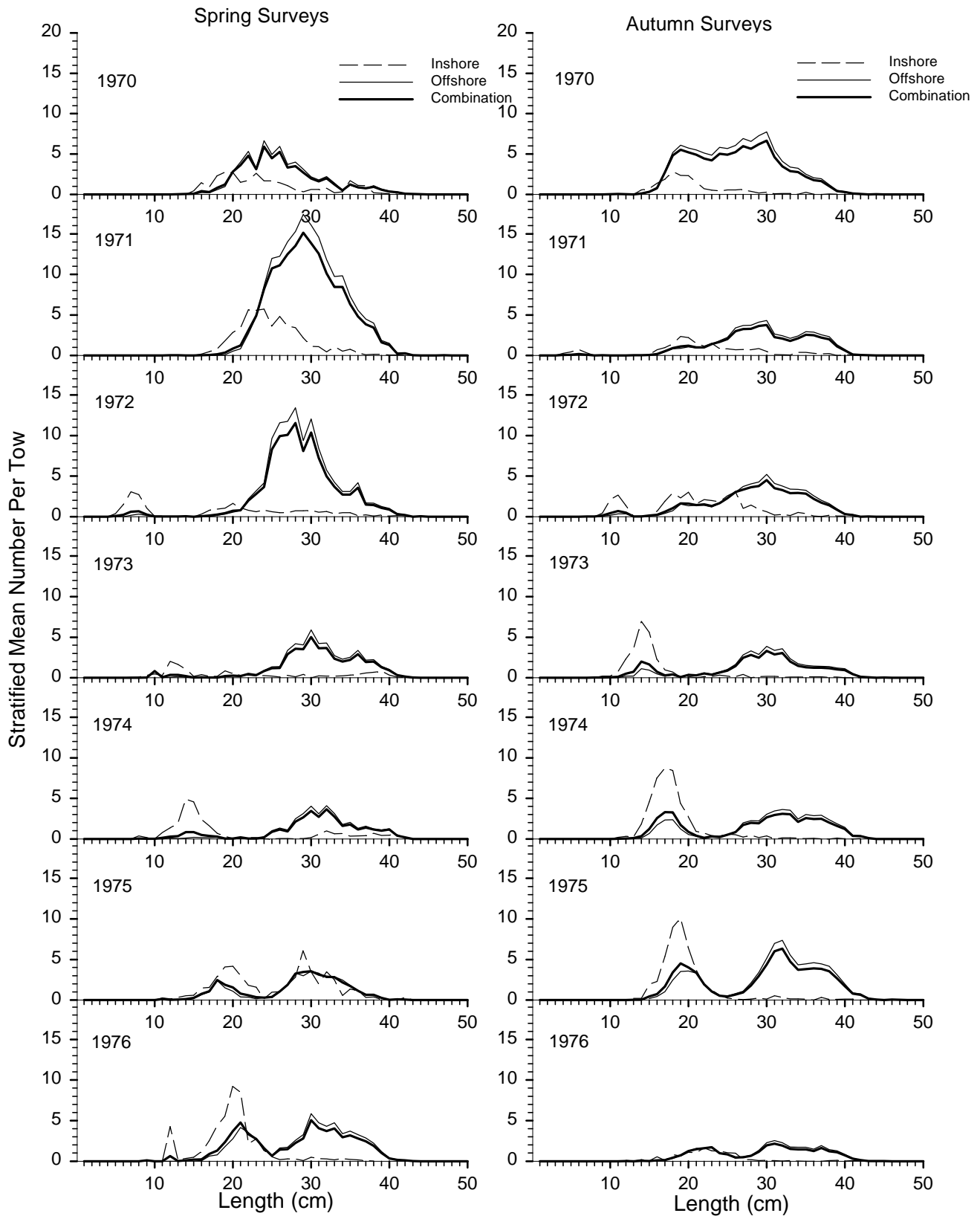


Figure C12 (Continued).

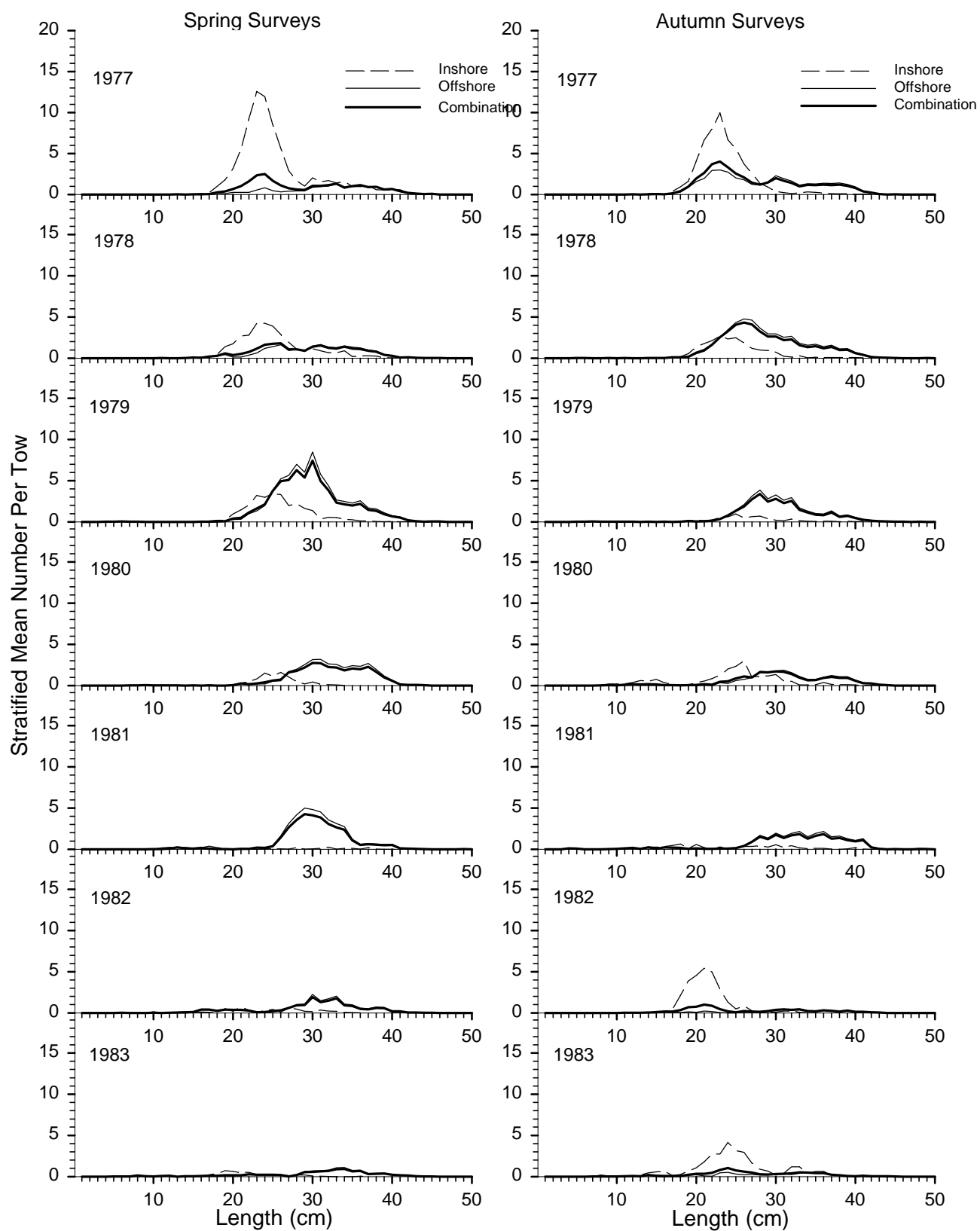


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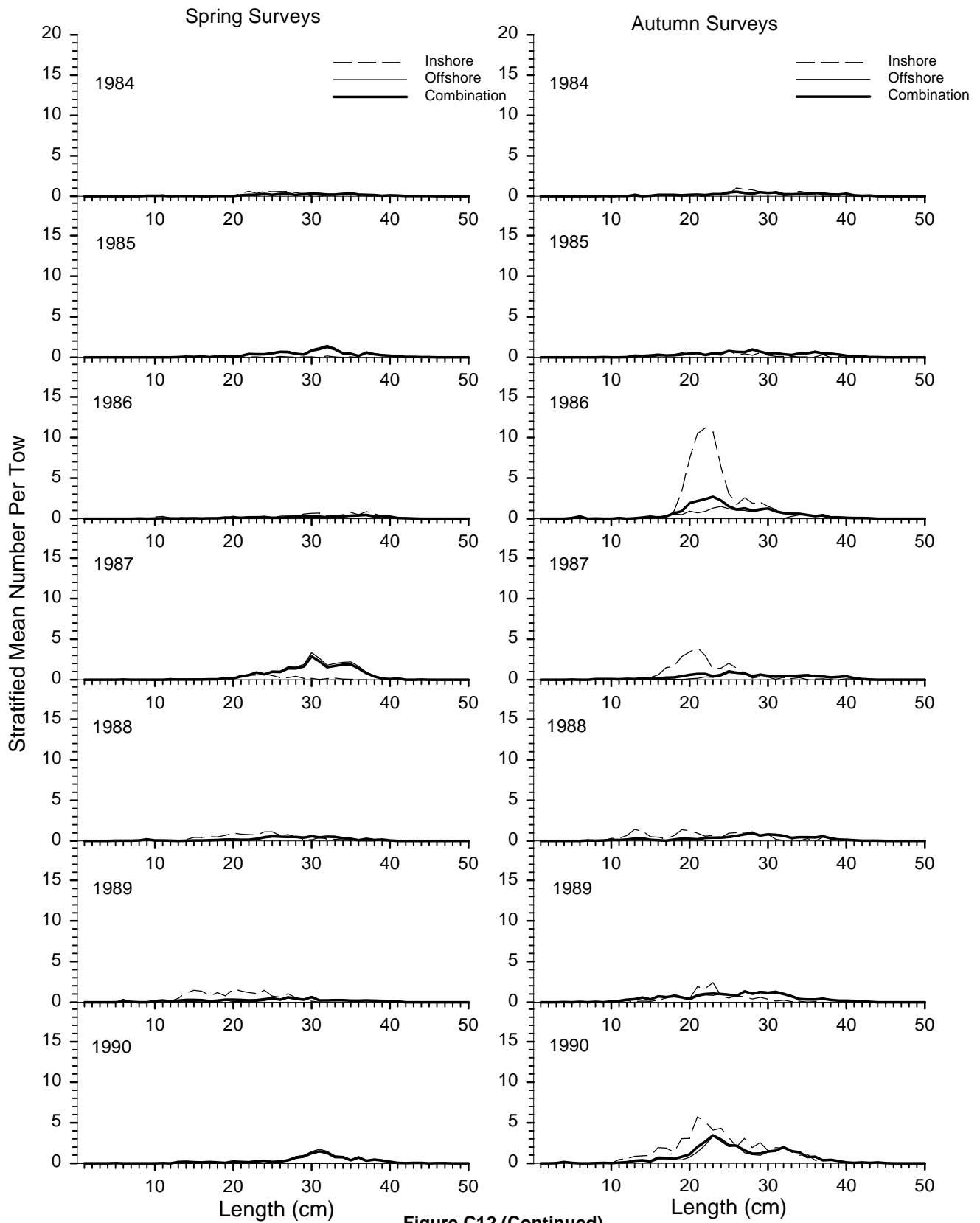


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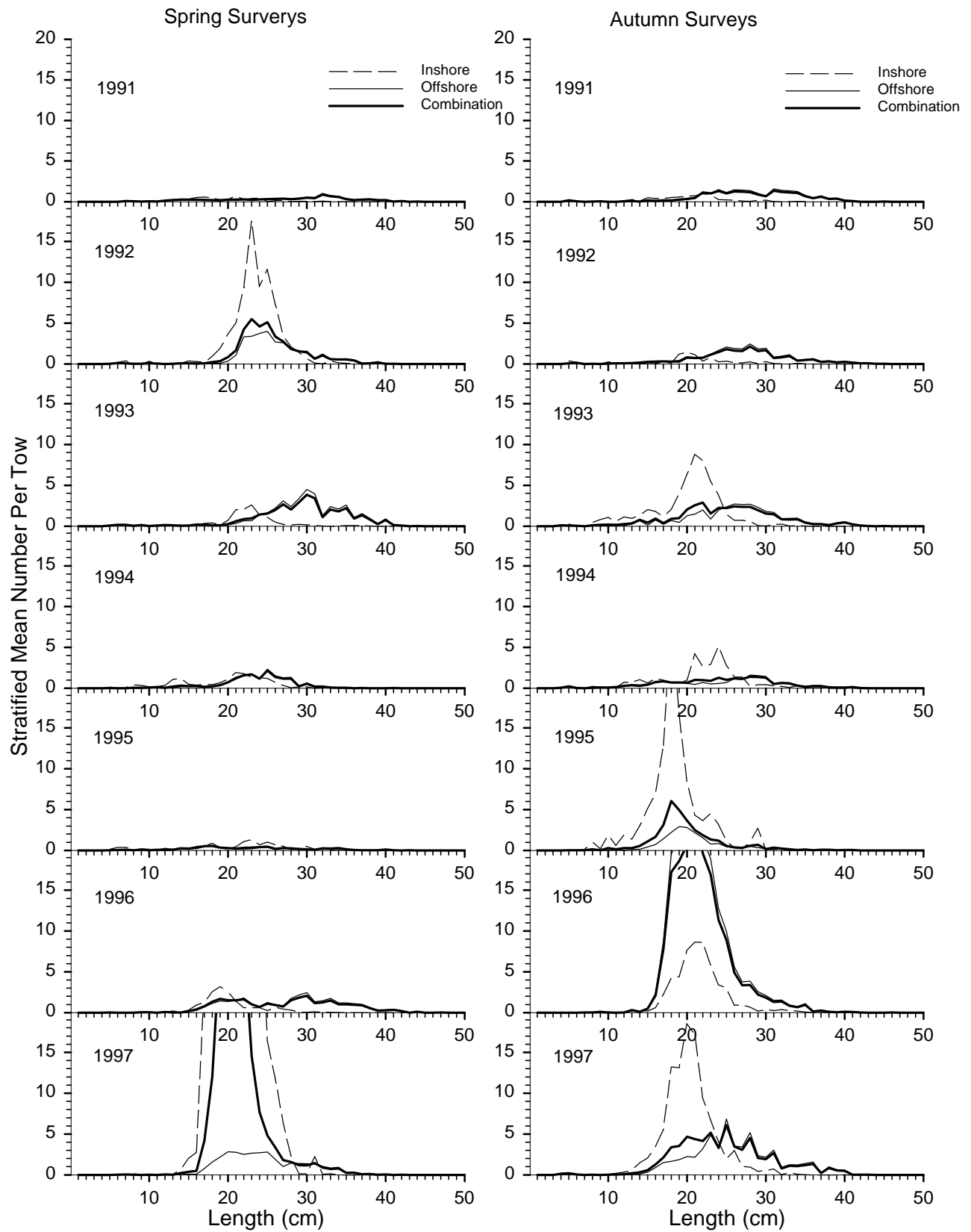


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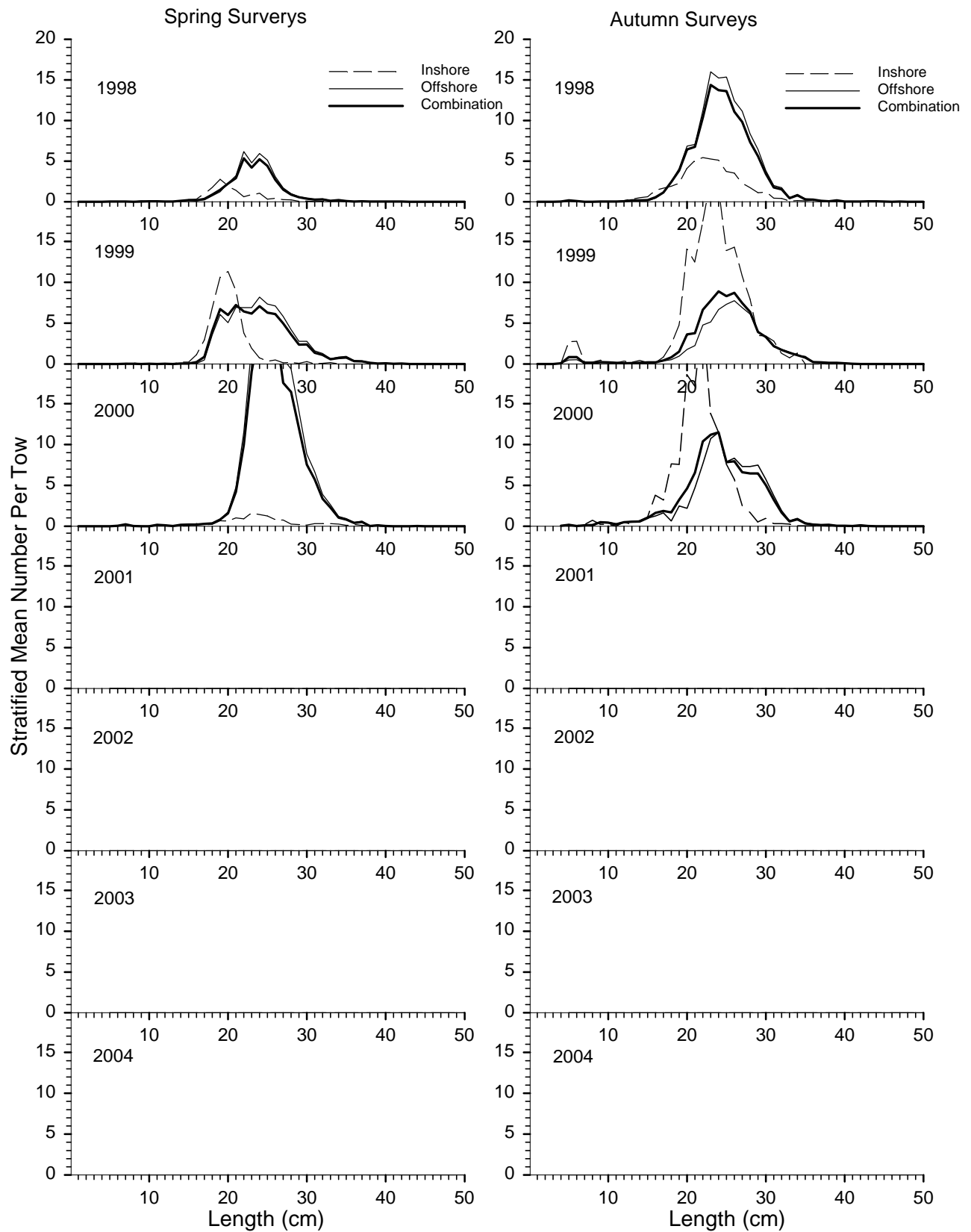


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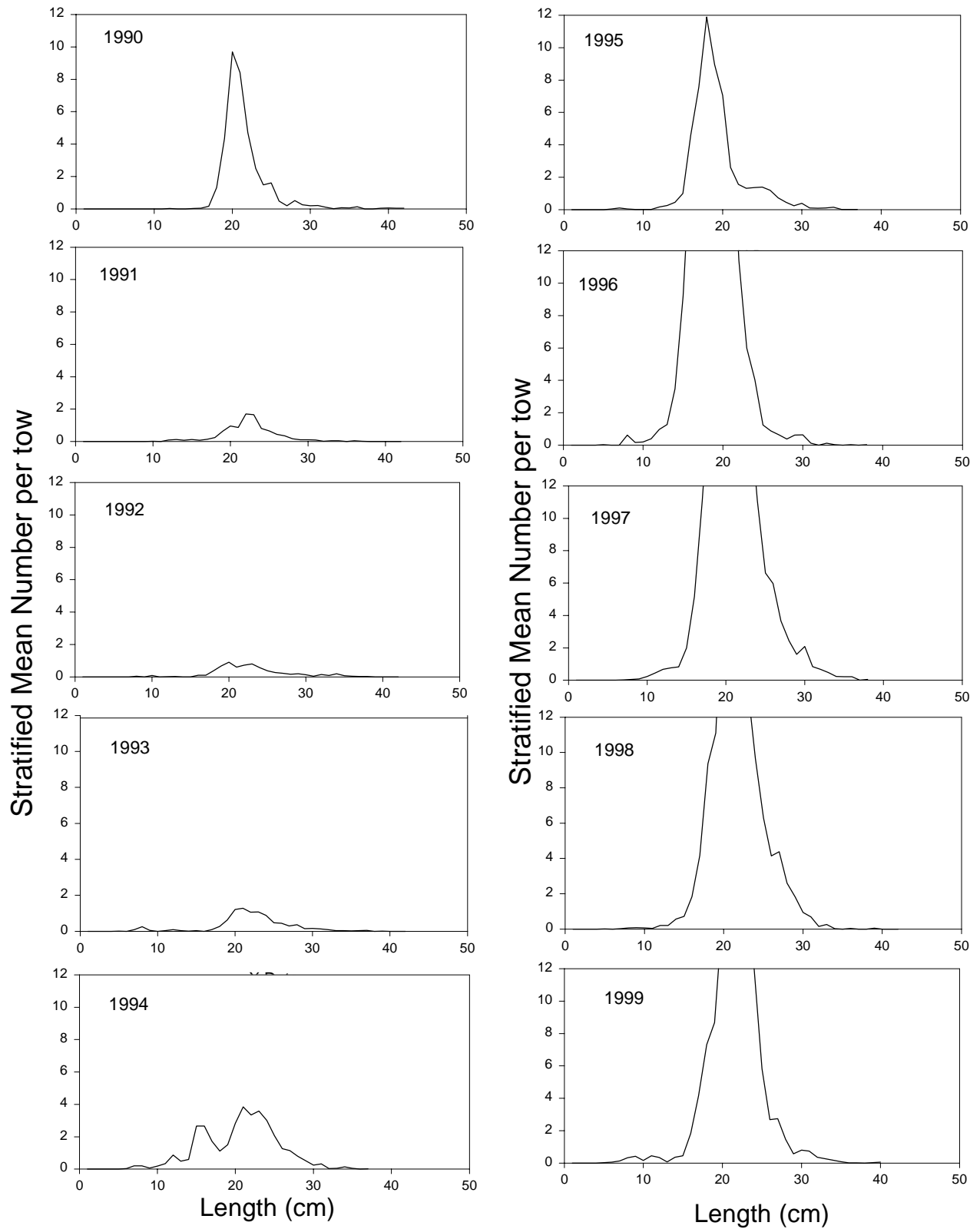


Figure C12a. Length composition of redfish from NEFSC shrimp surveys.

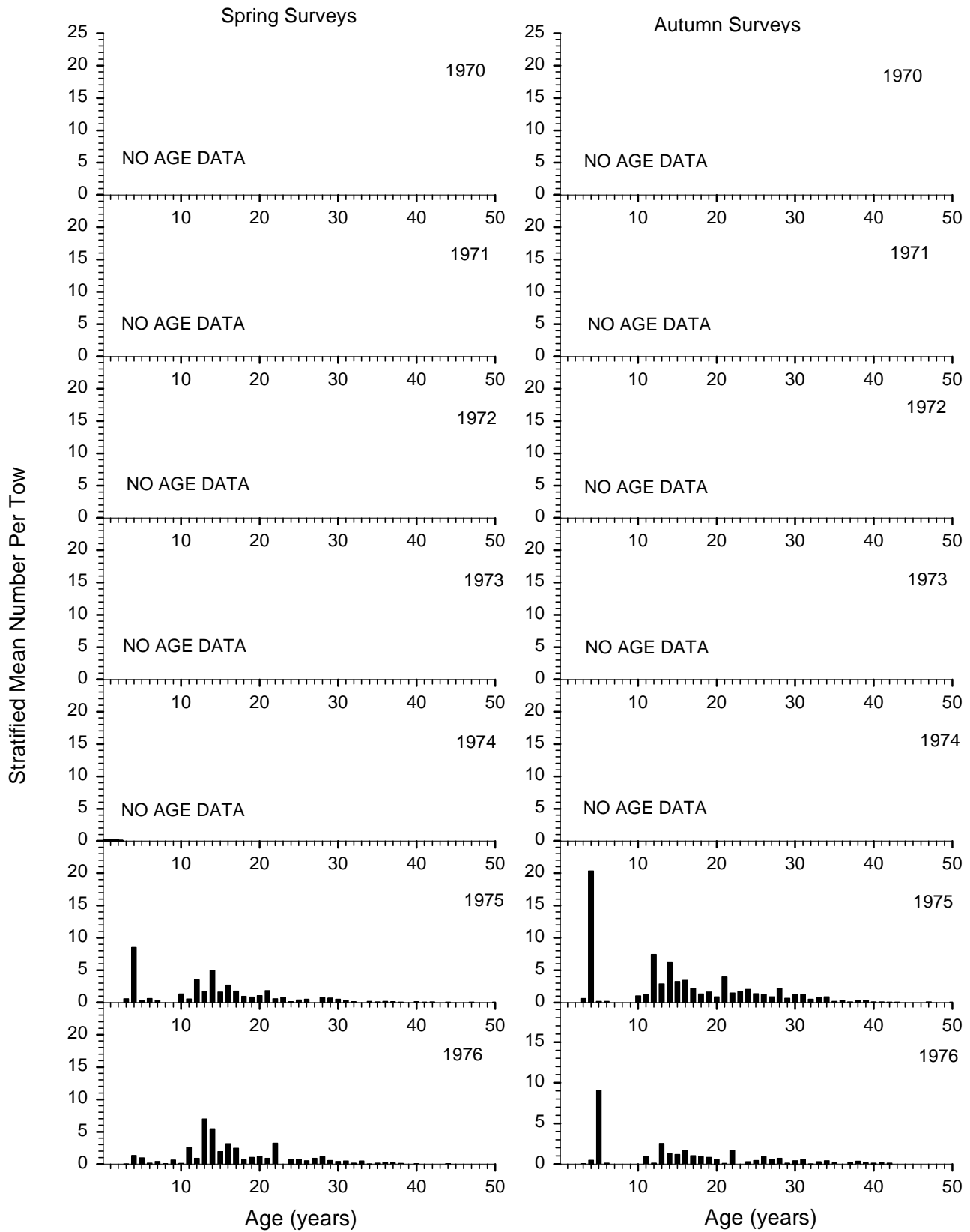


Figure C13. Age composition of redfish in NEFSC spring and autumn surveys.

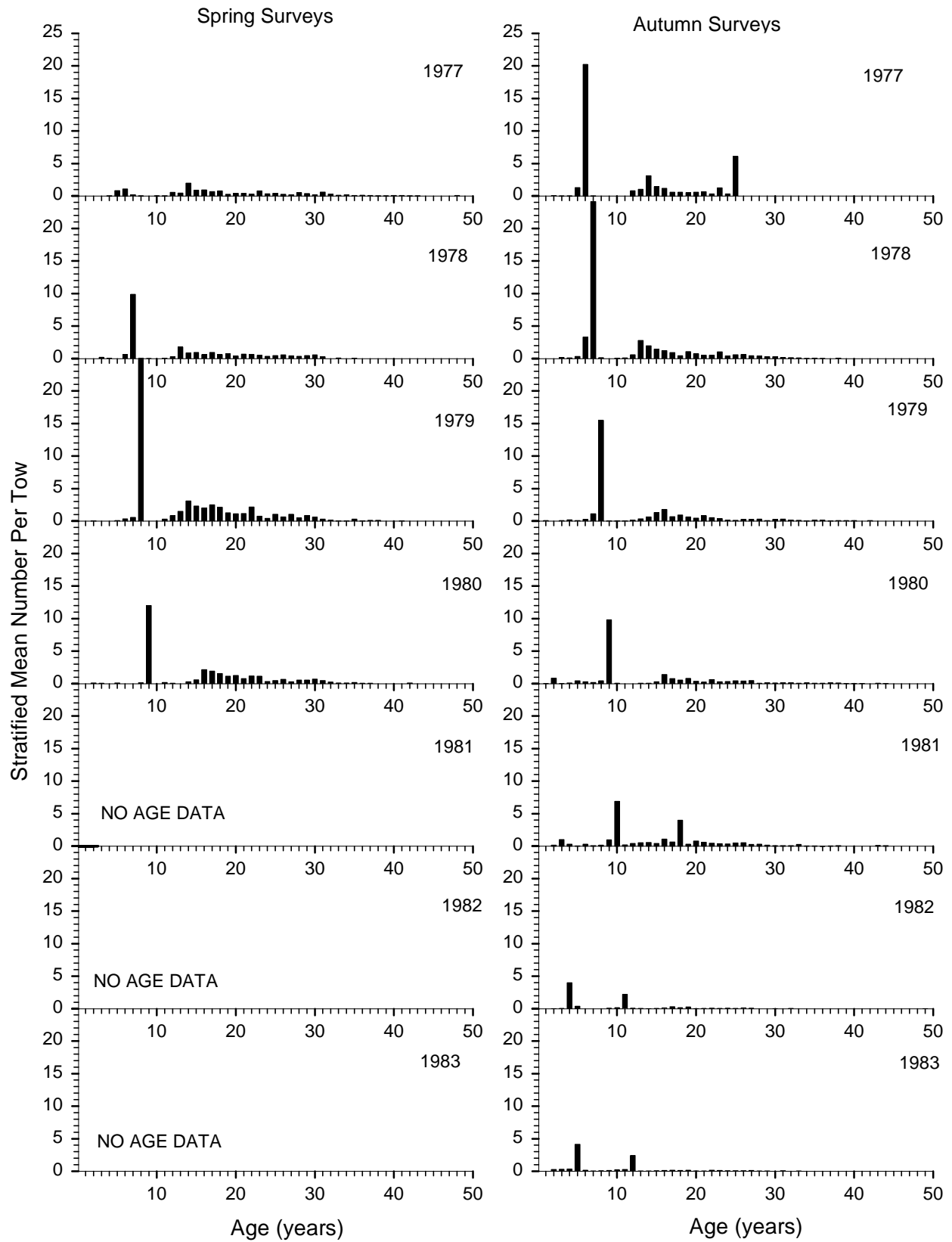


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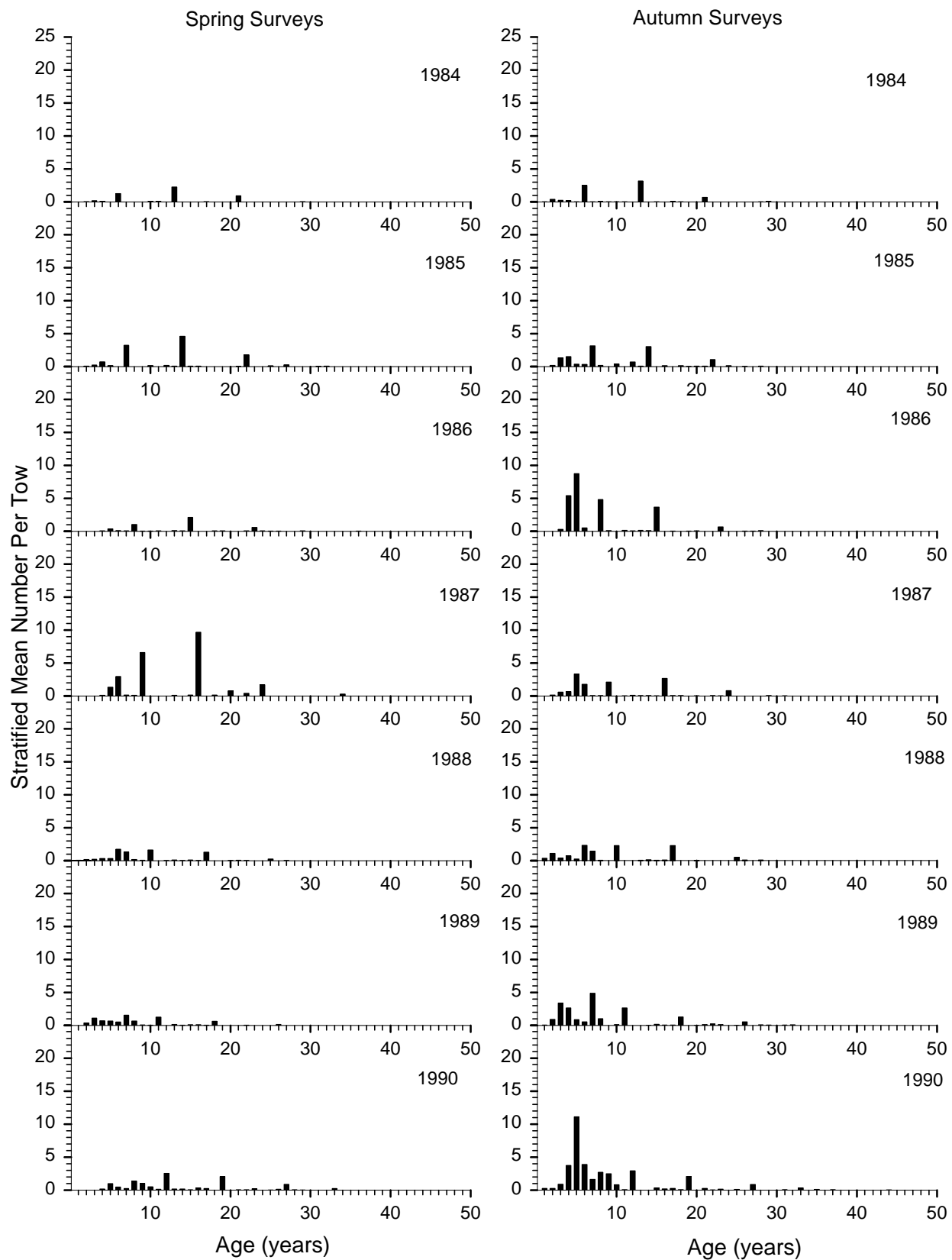


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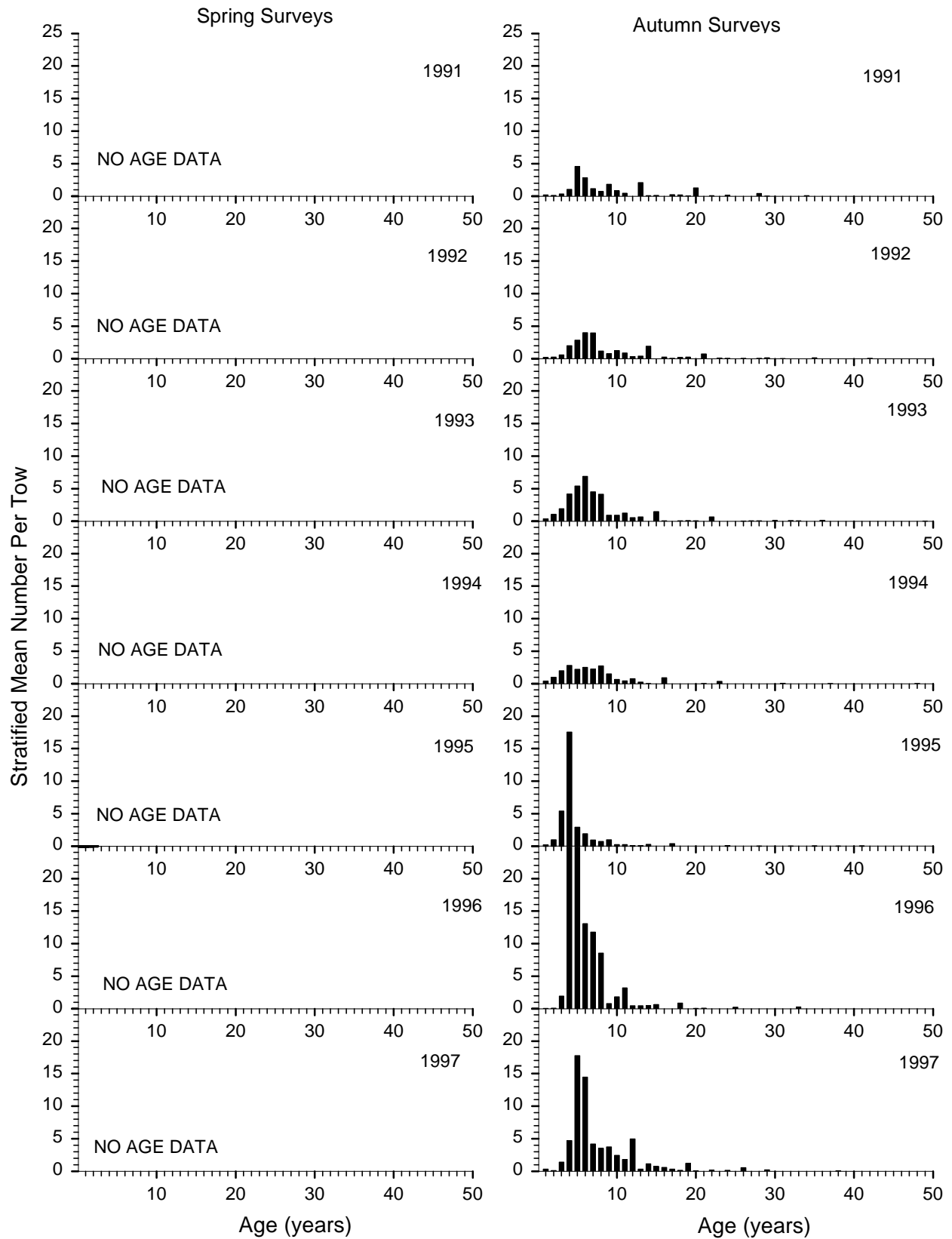


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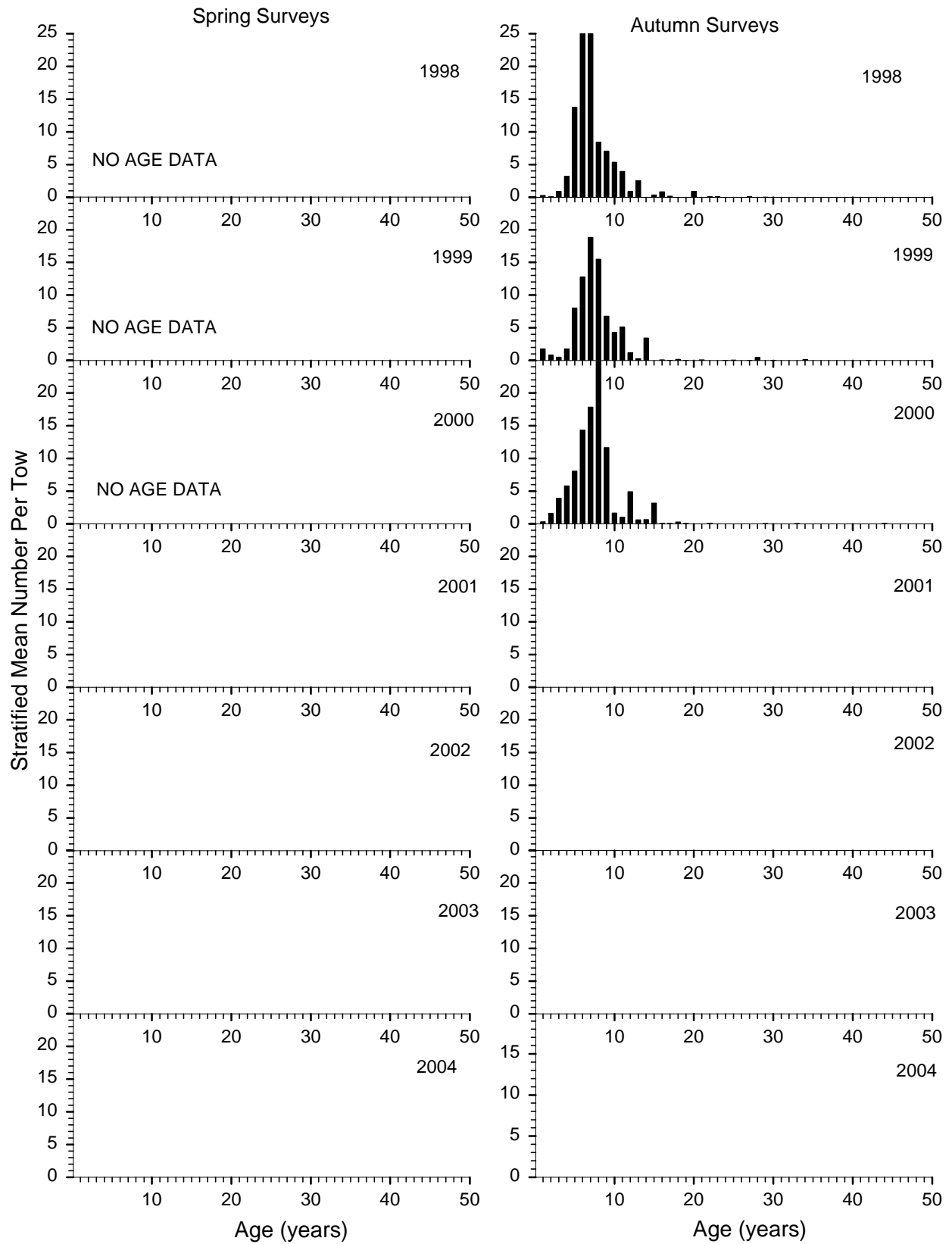


Figure C13 (Continued).

SA5 Redfish Total Mortality (Z) by Cohort

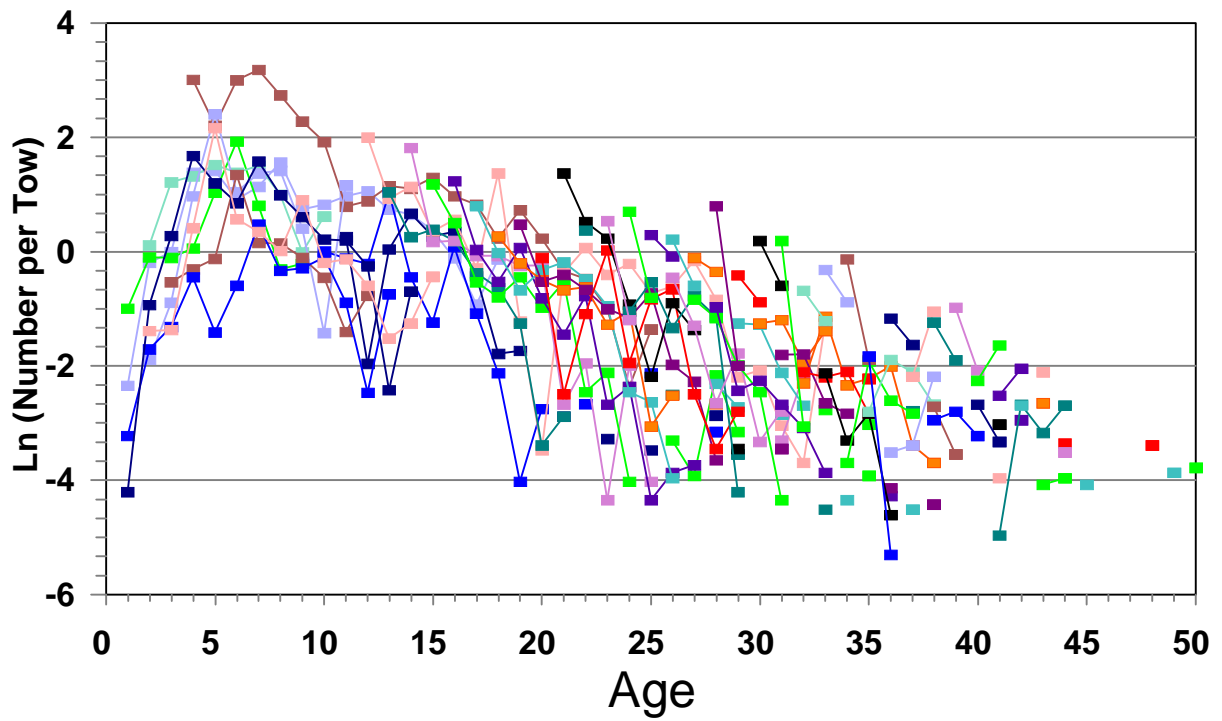
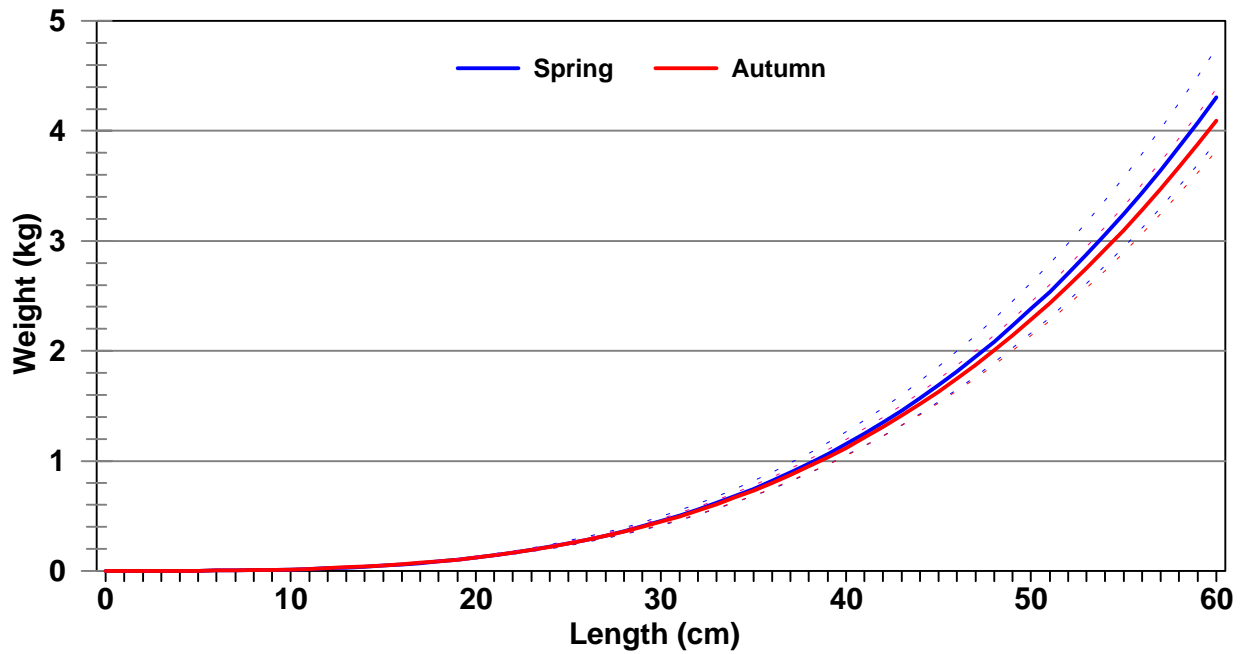


Figure C14. Catch curves based on redfish cohorts from 1925-1995.

SA 5 Redfish Length-Weight Relationships



SA 5 Redfish Length-Weight Relationships

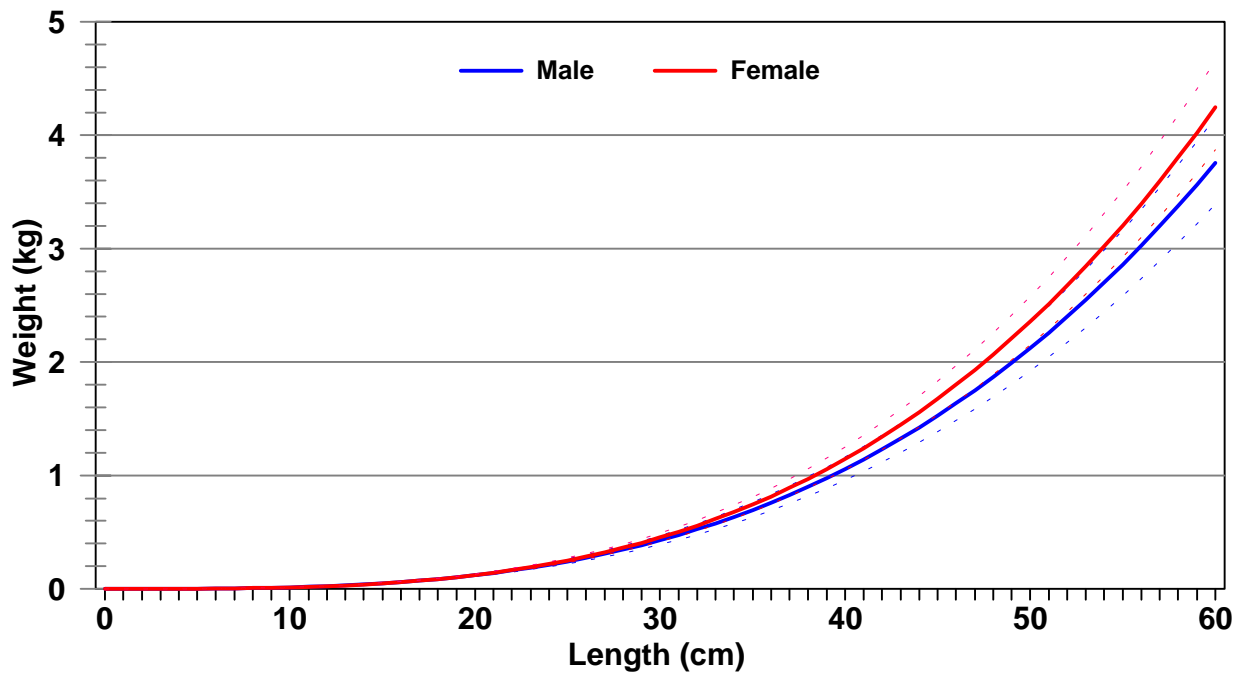
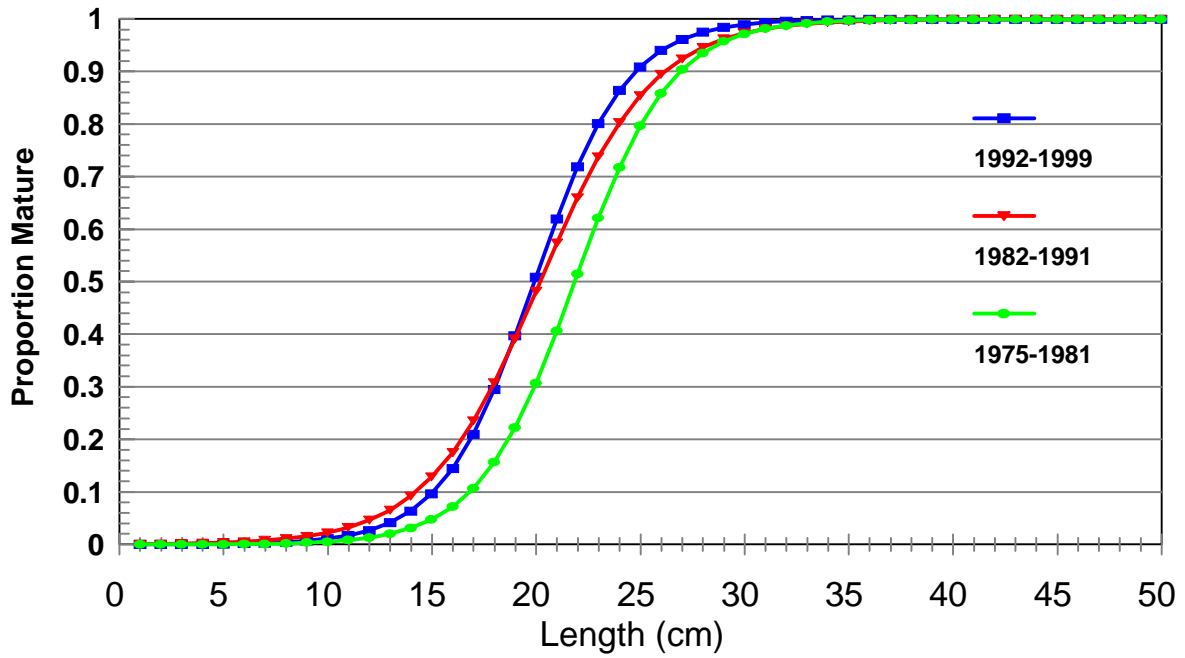


Figure C15. Length-weight relationships for redfish (a) by season and (b) by sex from NEFSC spring and autumn bottom trawl surveys, 1992-2000.

SA 5 Redfish Maturity Schedules - Spring Data



Maturity Schedules - Autumn Data

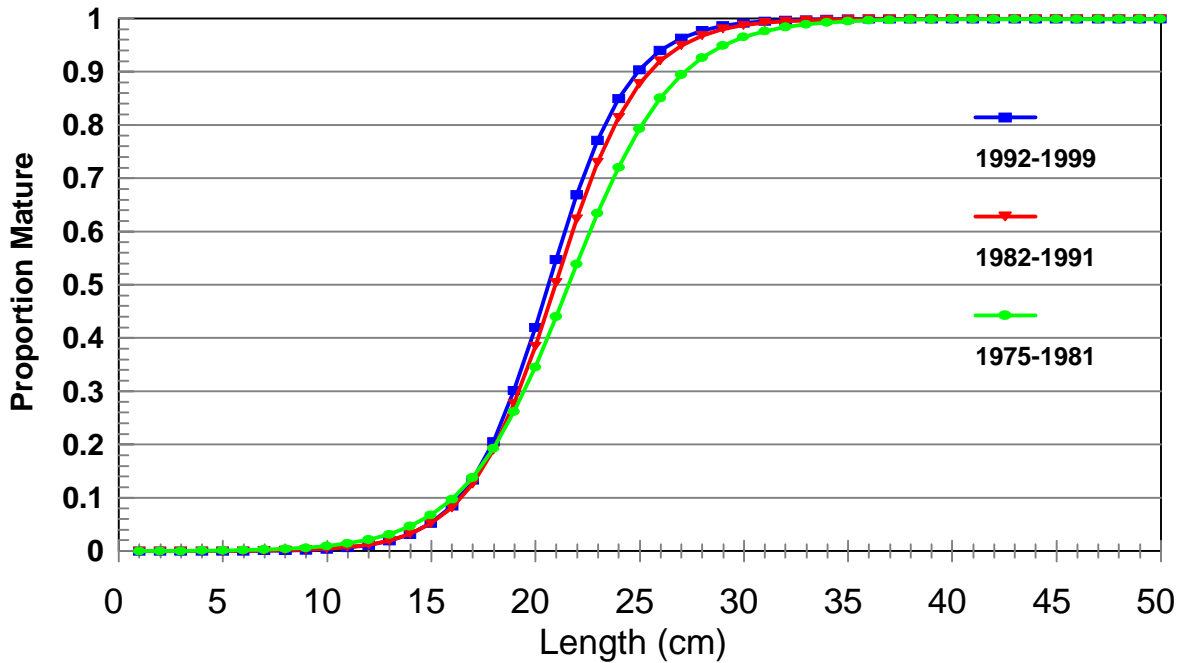


Figure C16. Maturity at length results for redfish (sexes combined) for three time periods from NEFSC (a) spring and (b) autumn bottom trawl surveys, 1975-1999.

SA 5 Redfish Maturity Analyses - L50s

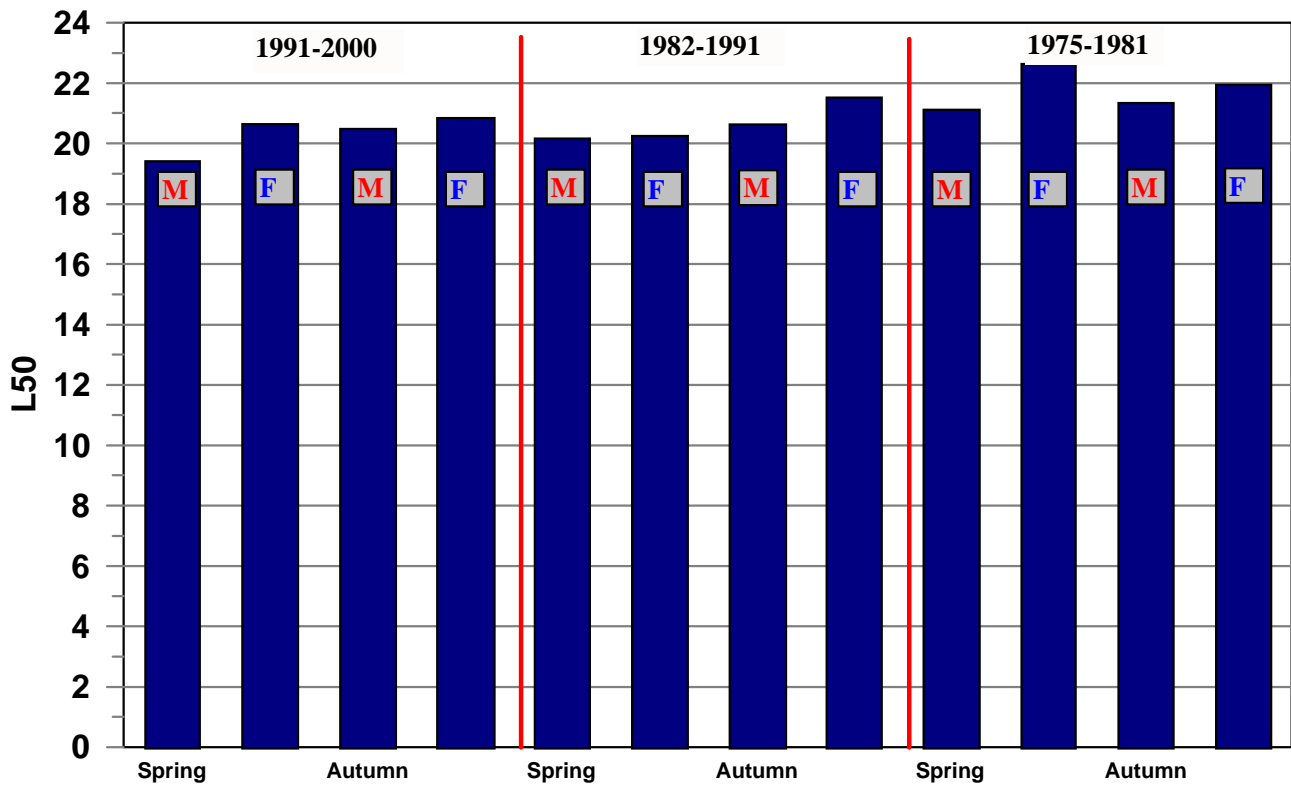


Figure C17. Median length at maturity (L50) by sex for redfish for three time periods from NEFSC spring and autumn bottom trawl surveys.

SA 5 Redfish

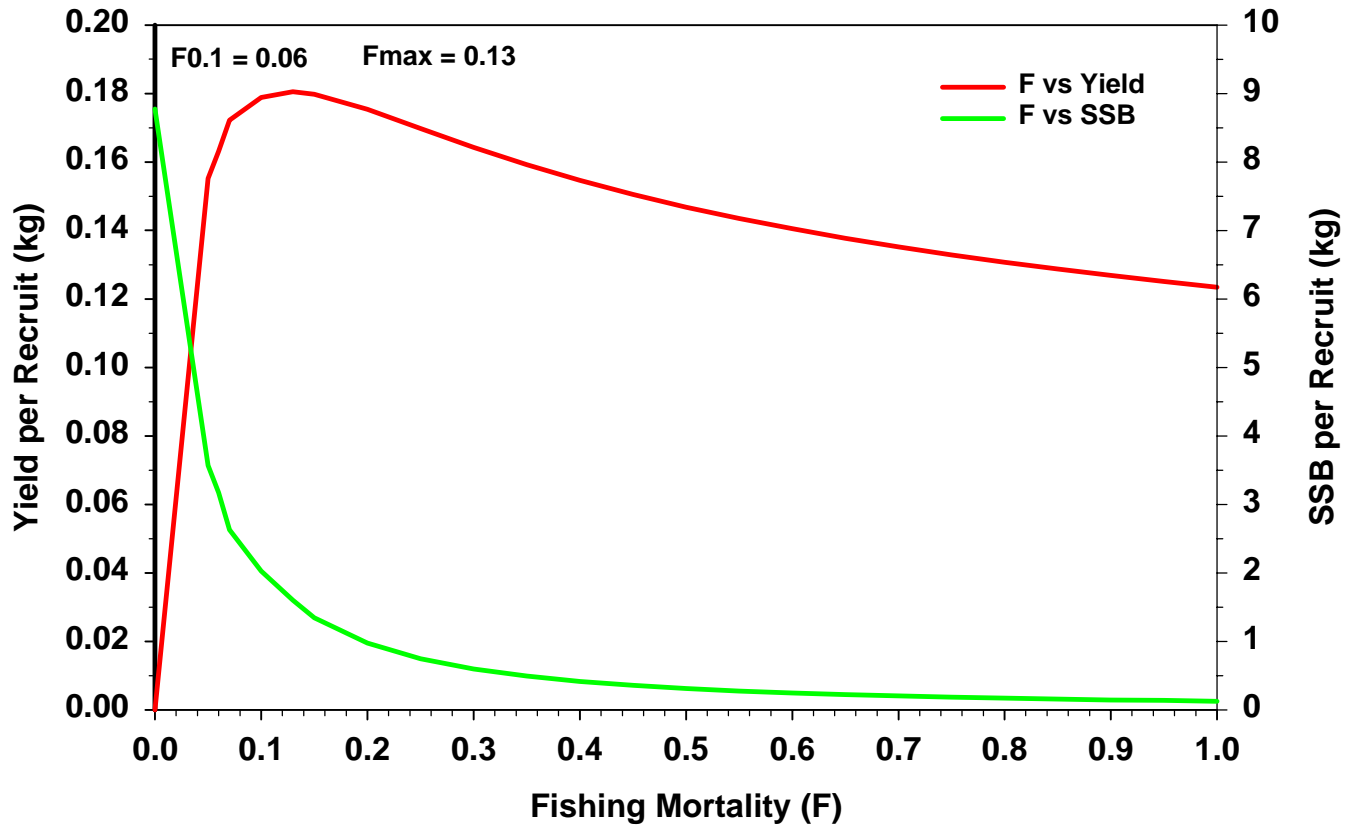
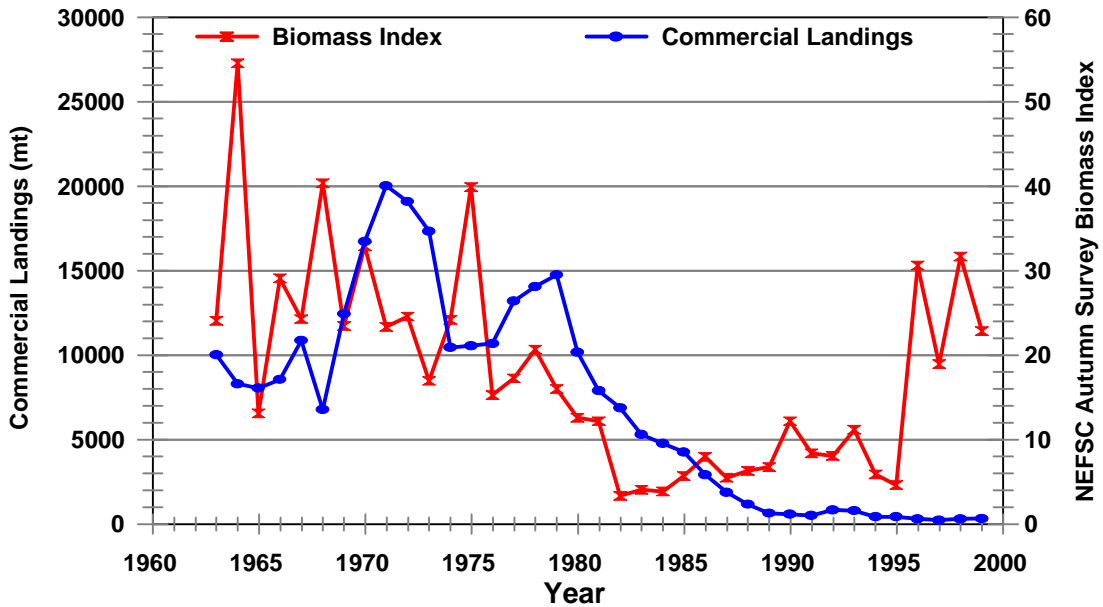


Figure C18 Yield and spawning stock biomass per recruit (kg) for redfish in the Gulf of Maine - Georges Bank region.

Gulf of Maine Redfish Landings and Biomass Index



Gulf of Maine Redfish Landings and Exploitation Ratio

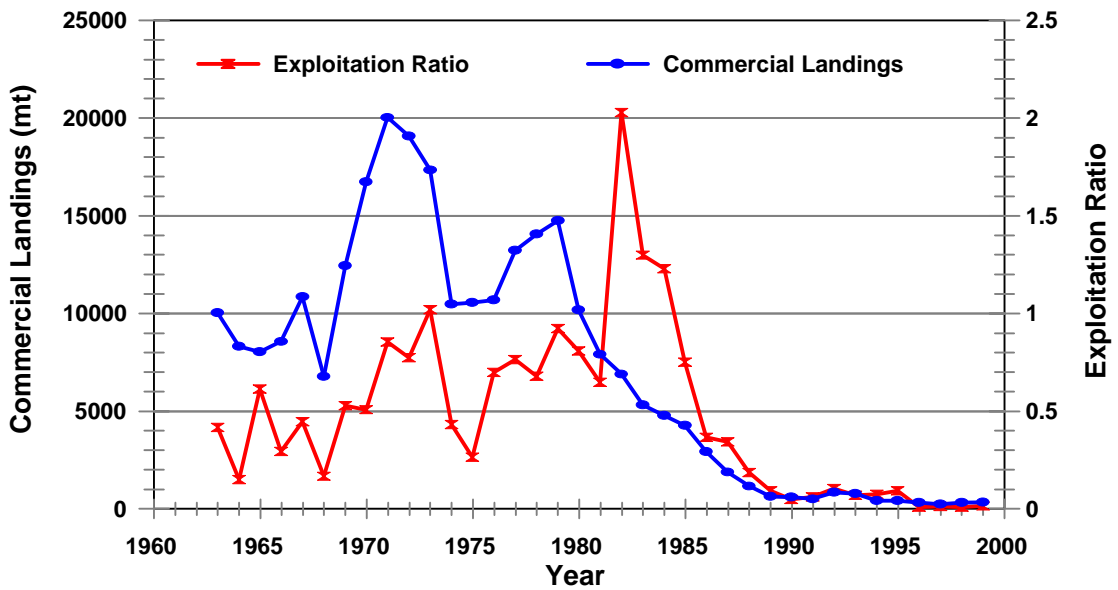


Figure C19 Exploitation index for Gulf of Maine-Georges Bank Redfish expressed as the ratio of NEFSC autumn biomass index to total fishery removals, 1963-2000.

Figure C20. Redfish catch biomass residuals (mt), 1934-2000 including 1999-2000 autumn survey age data.

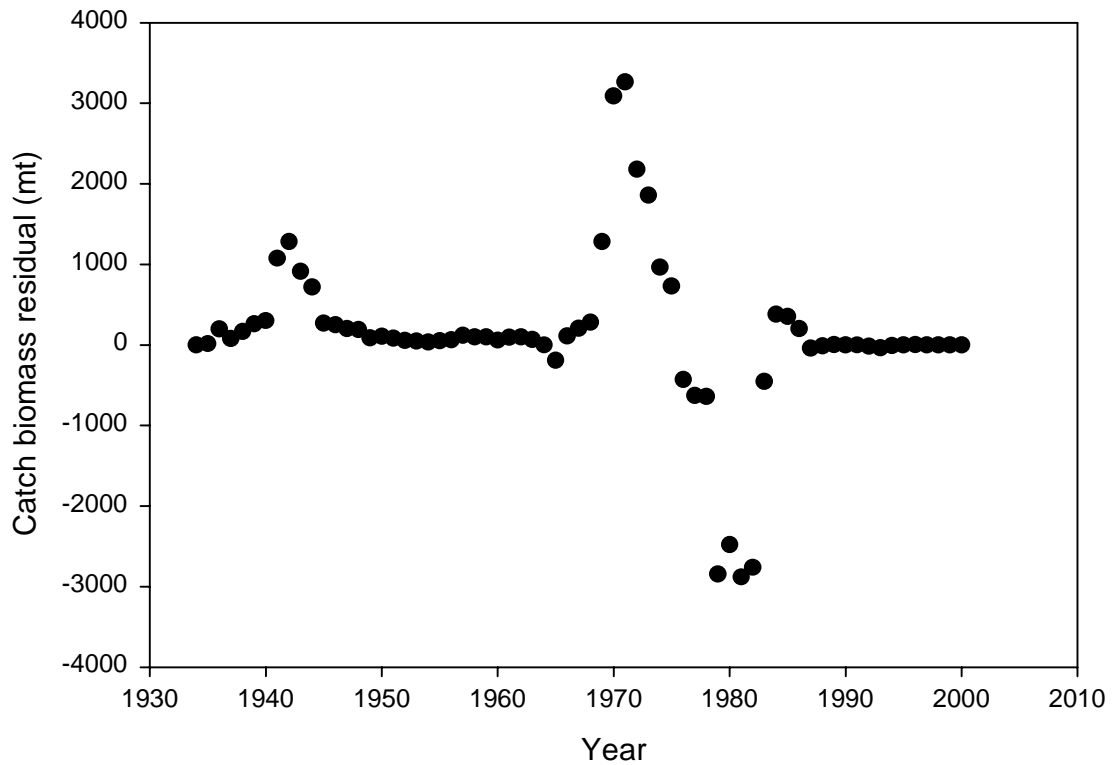
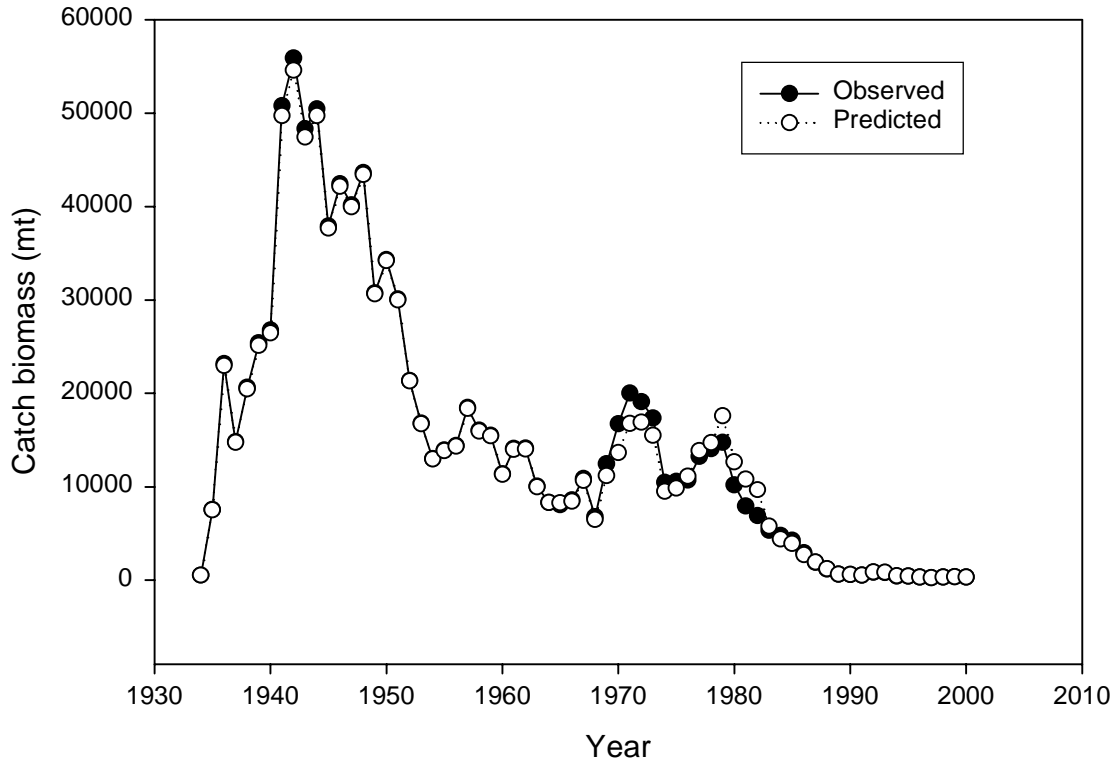


Figure C21. NEFSC autumn survey redfish biomass index residuals, 1963-2000 including 1999-2000 autumn survey age data

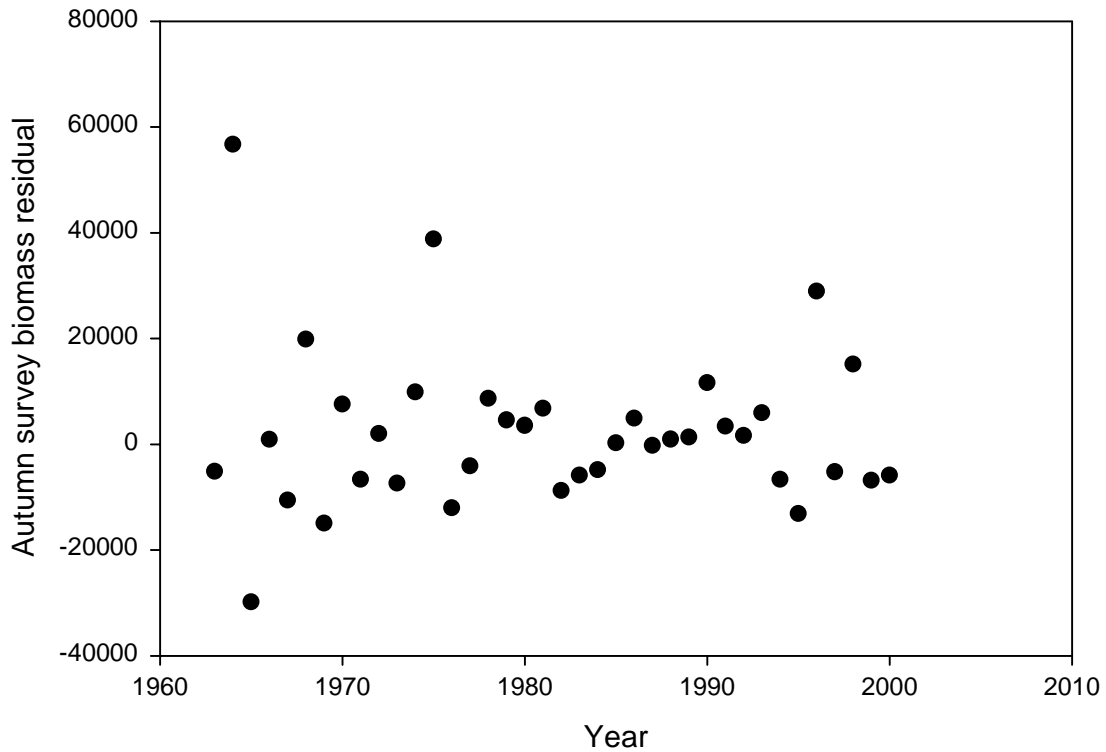
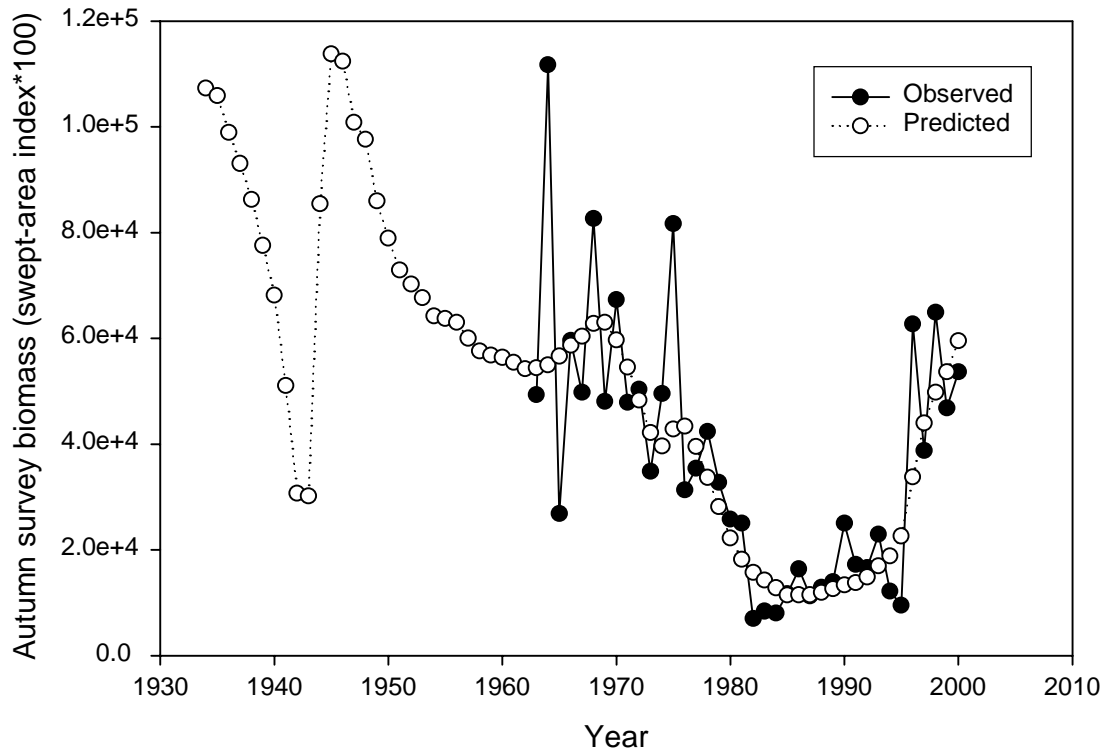


Figure C22. NEFSC spring survey redfish biomass index residuals, 1968-2000 including 1999-2000 autumn survey age data

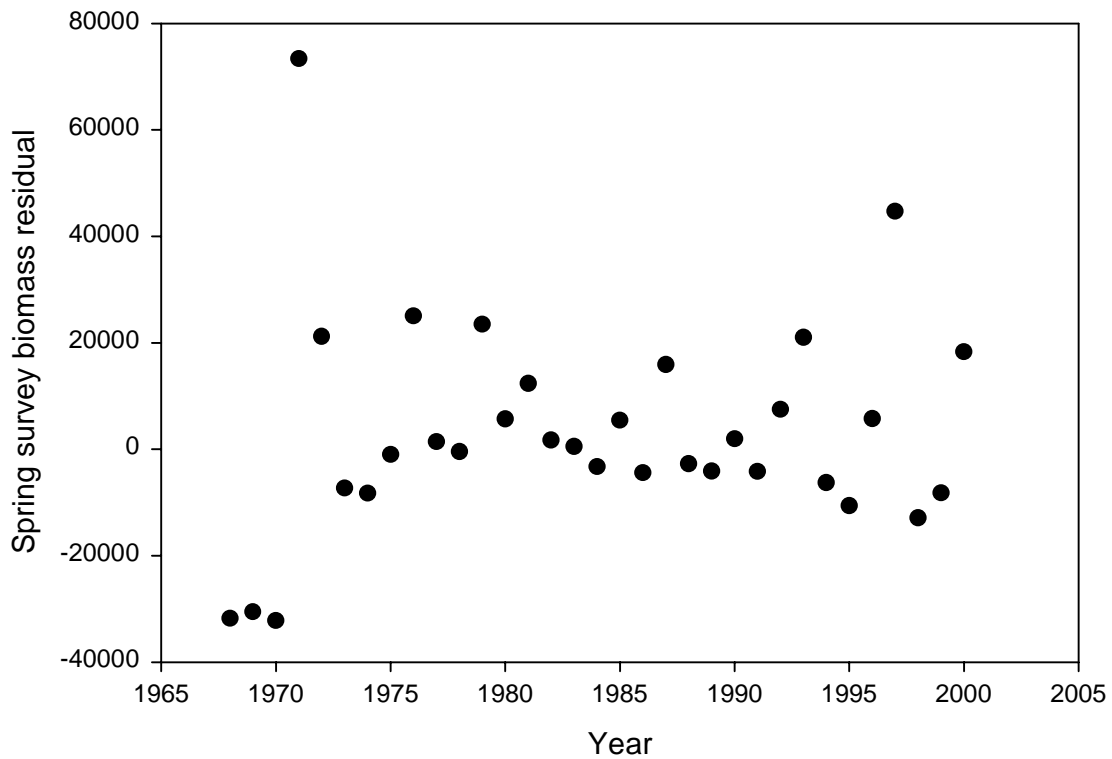
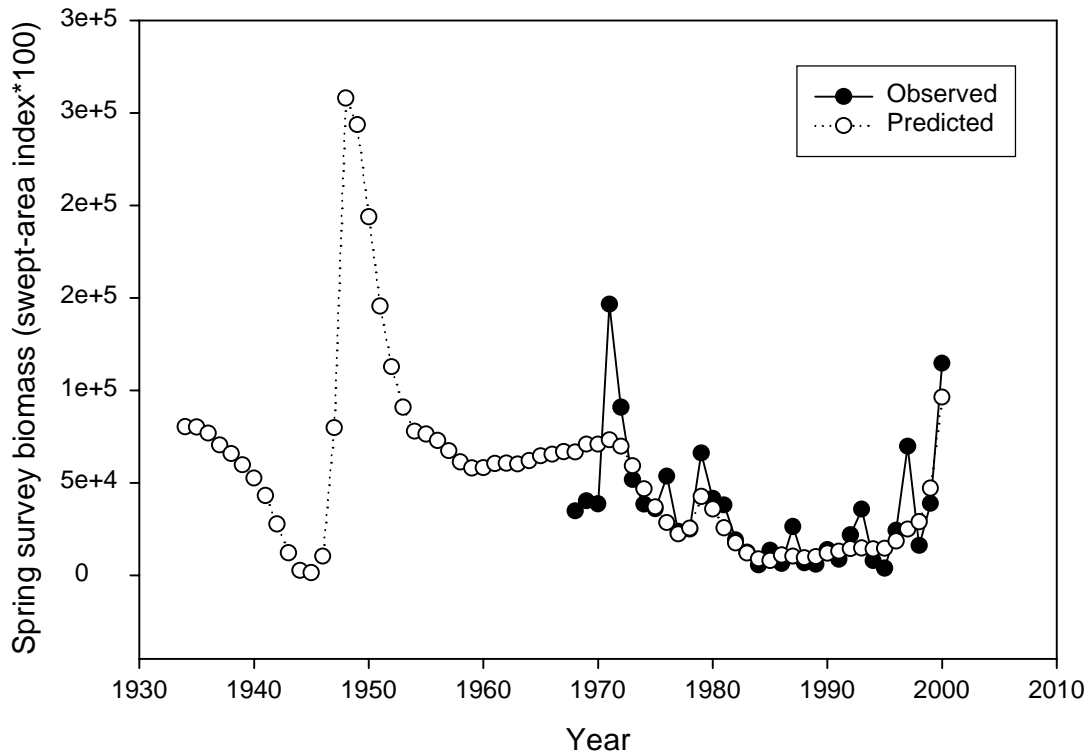


Figure C23. Standardized redfish CPUE index residuals, 1952-1989 including 1999-2000 autumn survey age data

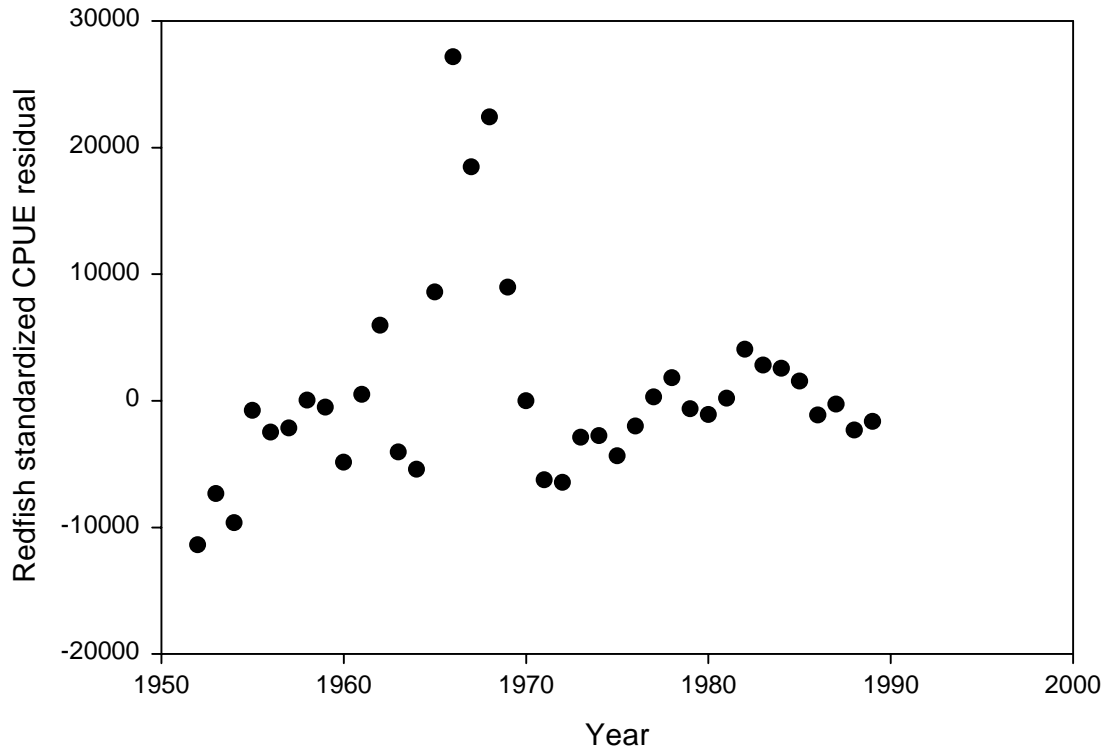
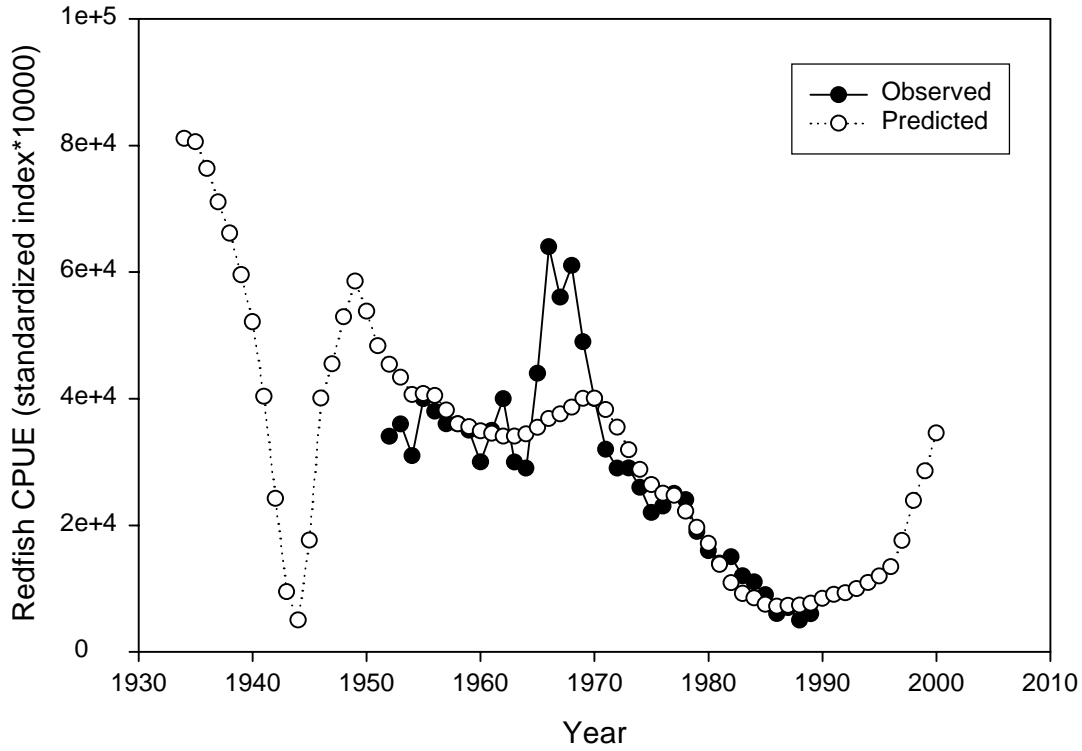


Figure C24. Redfish fishery age composition residuals, 1969-1985 including 1999-2000 autumn survey age data

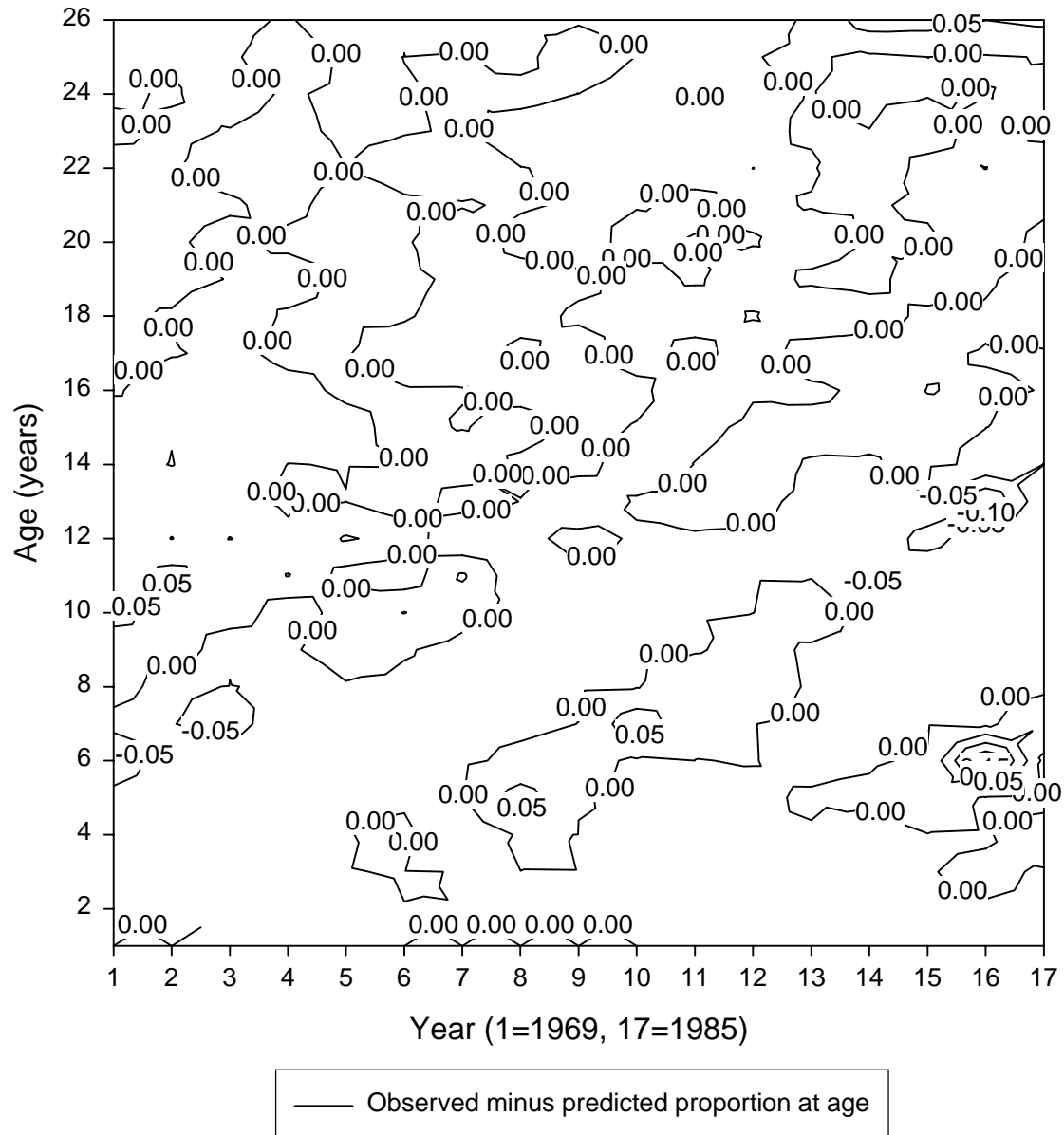


Figure C26. Redfish spring survey age composition residuals, 1975-1990 including 1999-2000 autumn survey age data

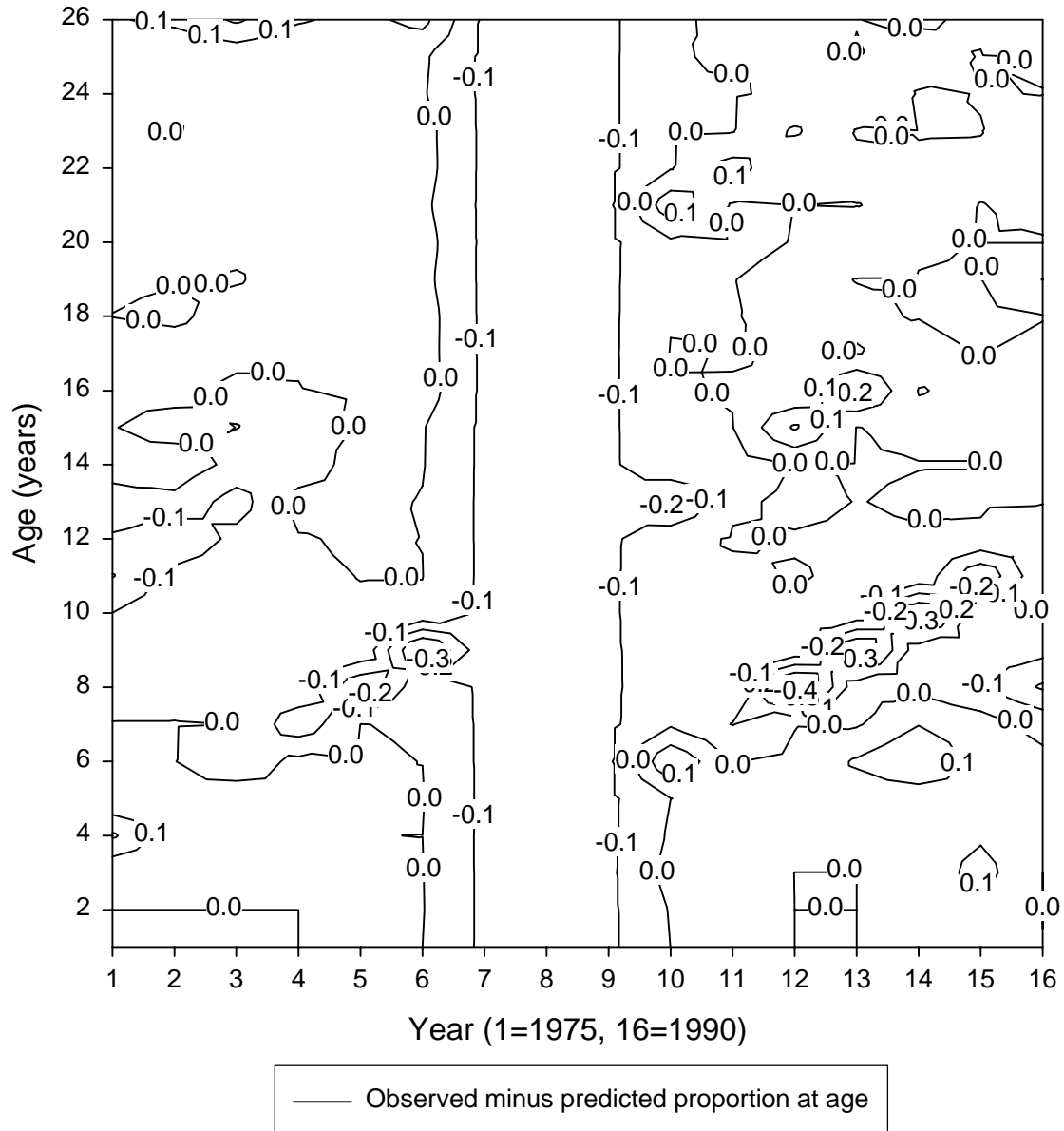


Figure C27. Redfish fishery and survey selectivity at age including 1999-2000 autumn survey age data

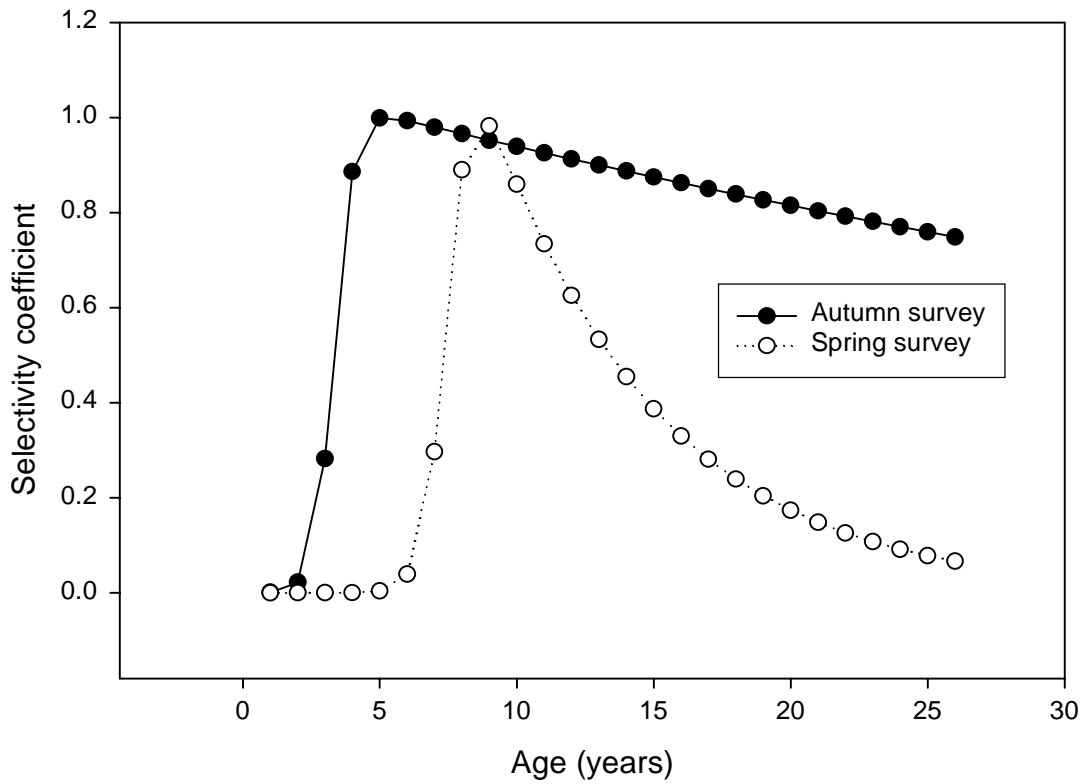
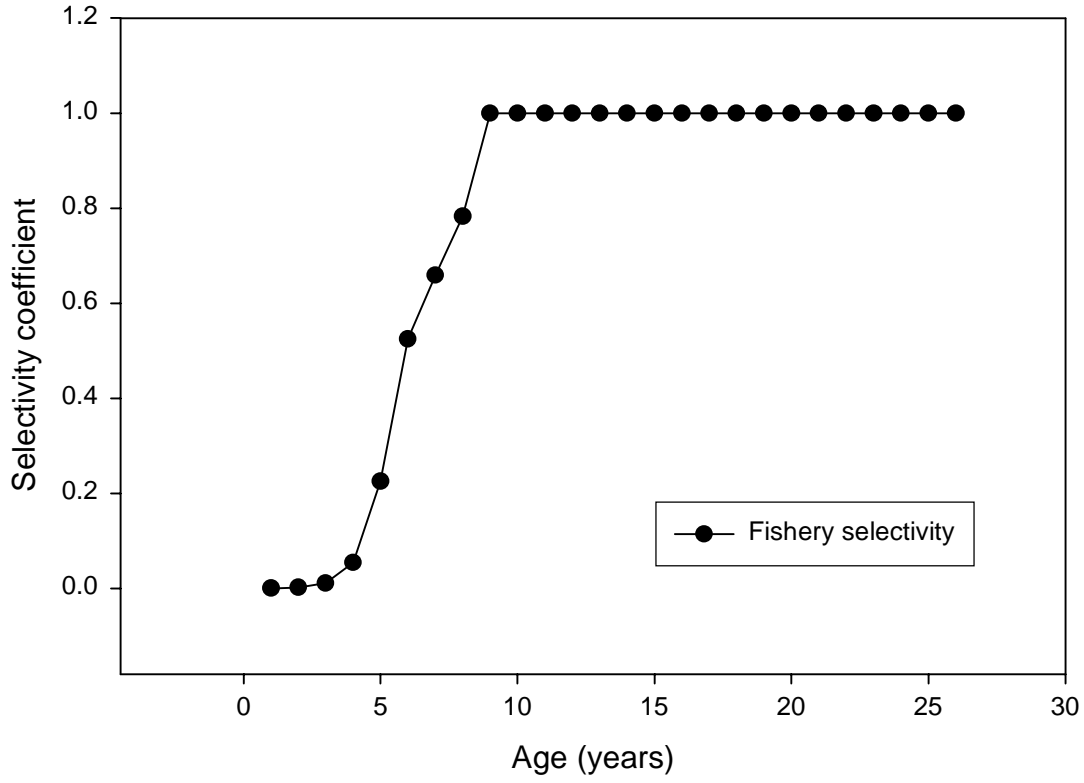
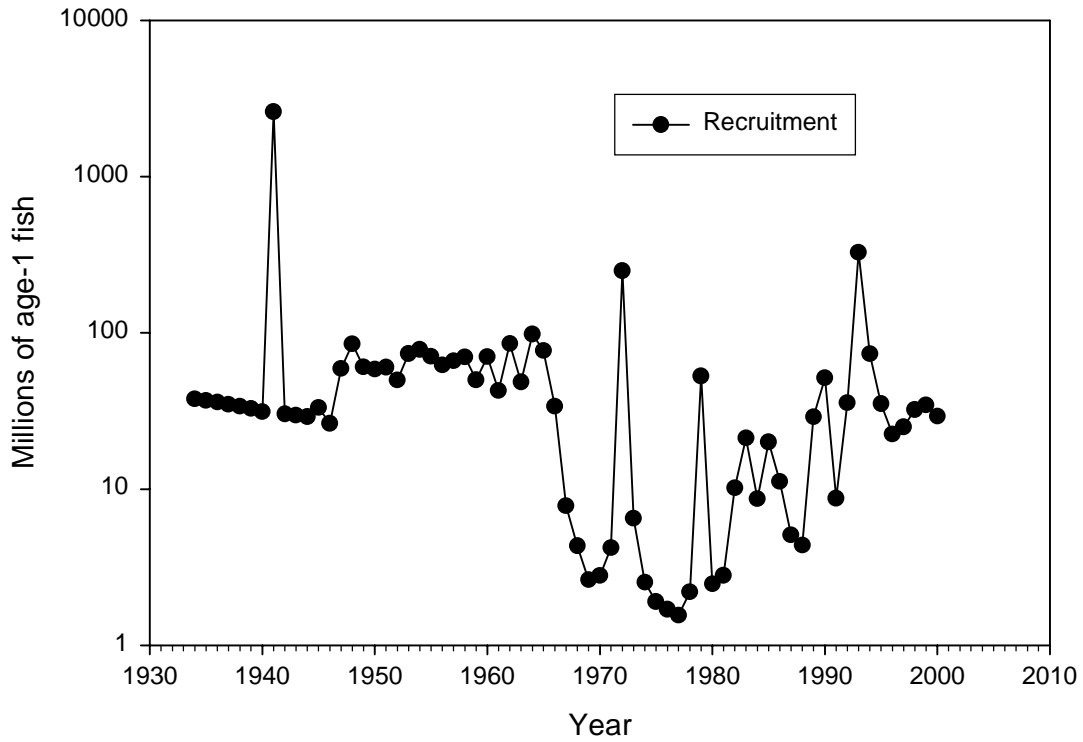


Figure C28. Redfish recruitment, 1934-2000 including 1999-2000 autumn survey age data



Redfish recruitment, 1963-2000 including 1999-2000 autumn survey age data

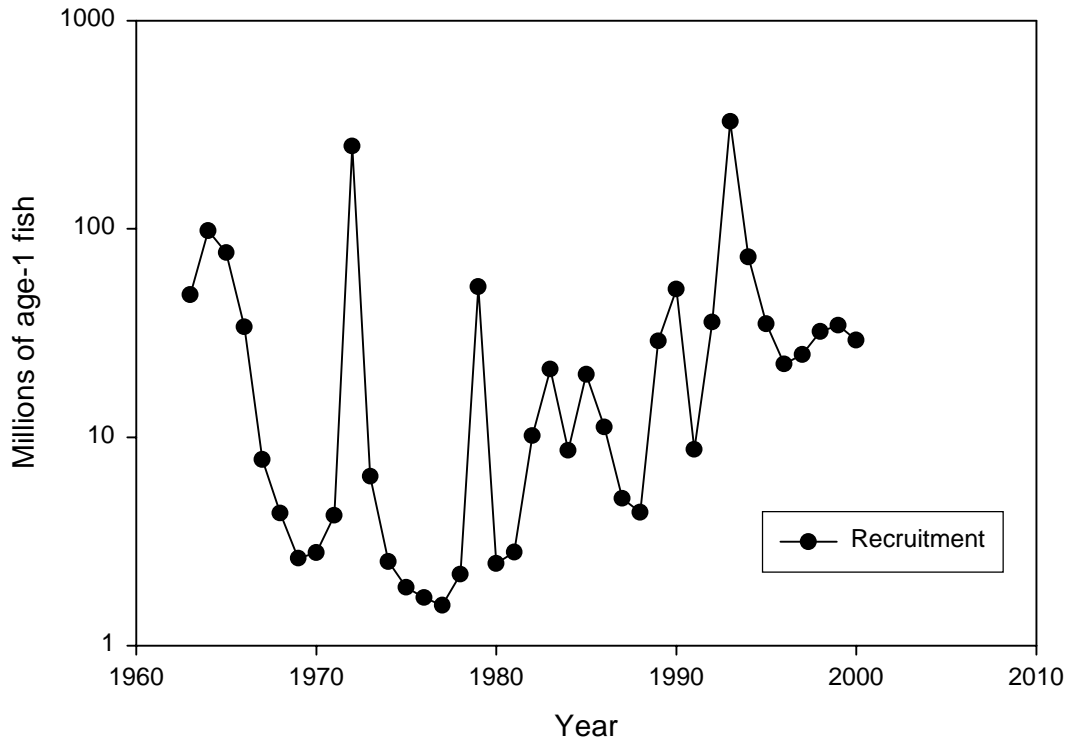
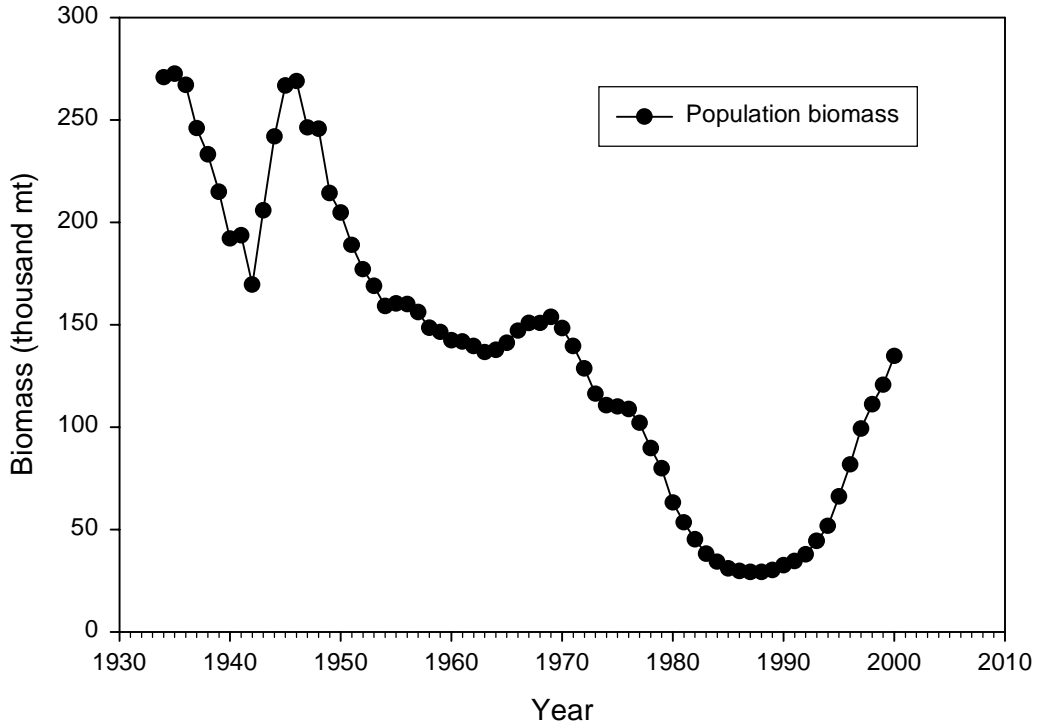


Figure C29. Redfish population biomass (thousand mt), 1934-2000 including 1999-2000 autumn survey age data



Redfish population biomass (thousand mt), 1963-2000 including 1999-2000 autumn survey age data

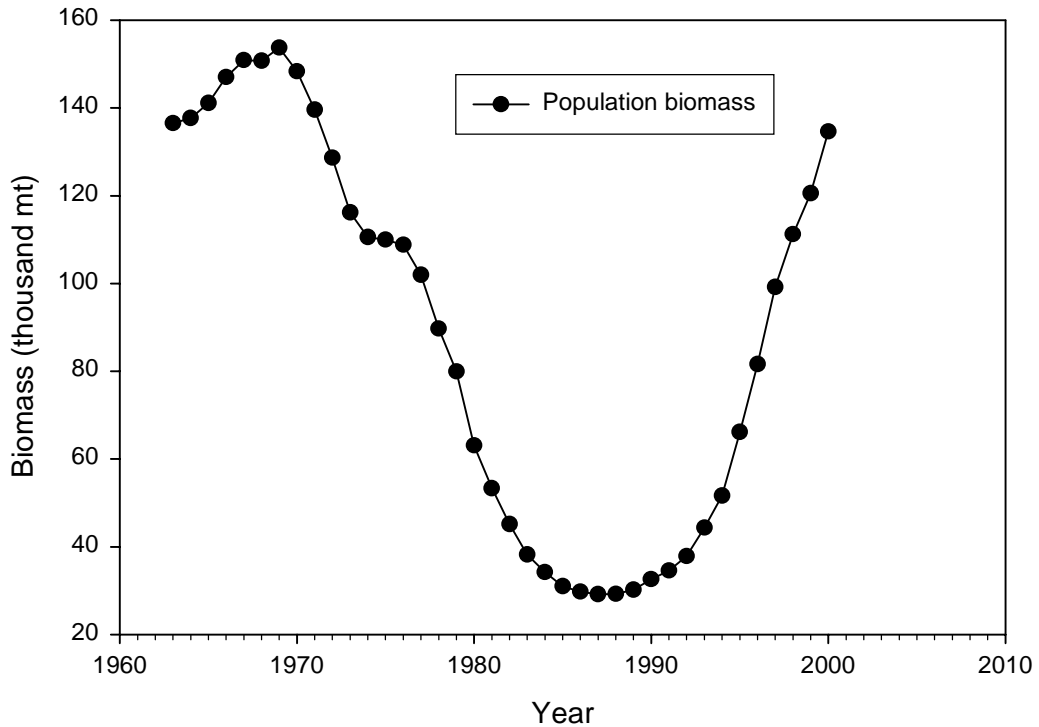
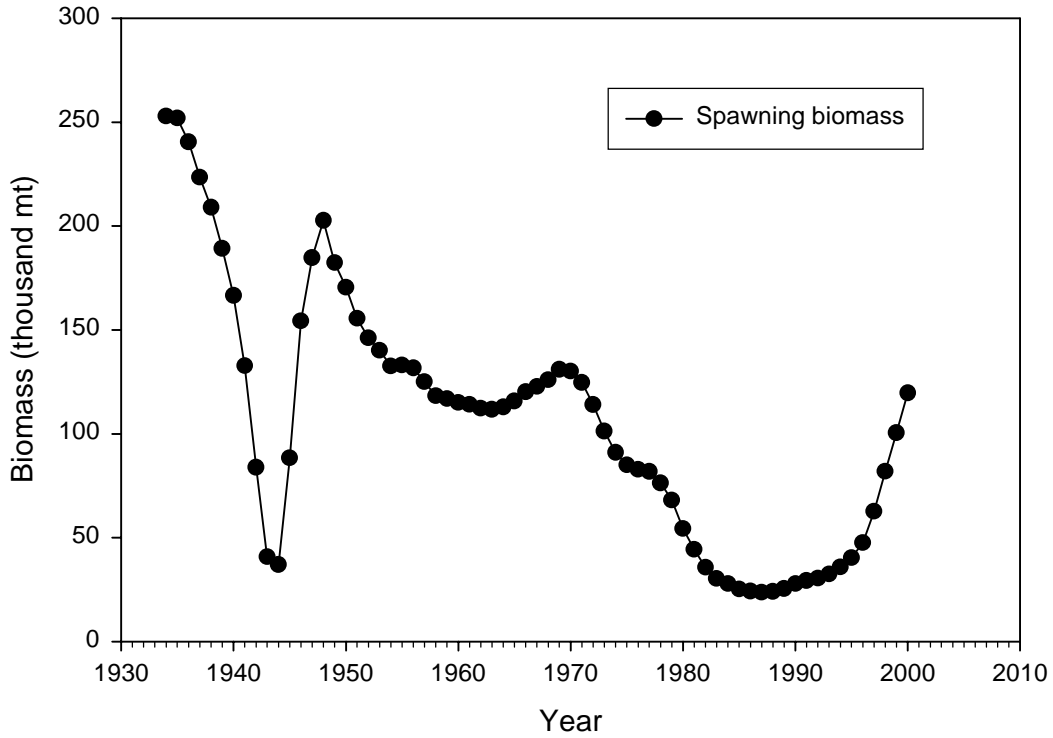


Figure C30. Redfish spawning biomass (thousand mt), 1934-2000 including 1999-2000 autumn survey age data



Redfish spawning biomass (thousand mt), 1963-2000 including 1999-2000 autumn survey age data

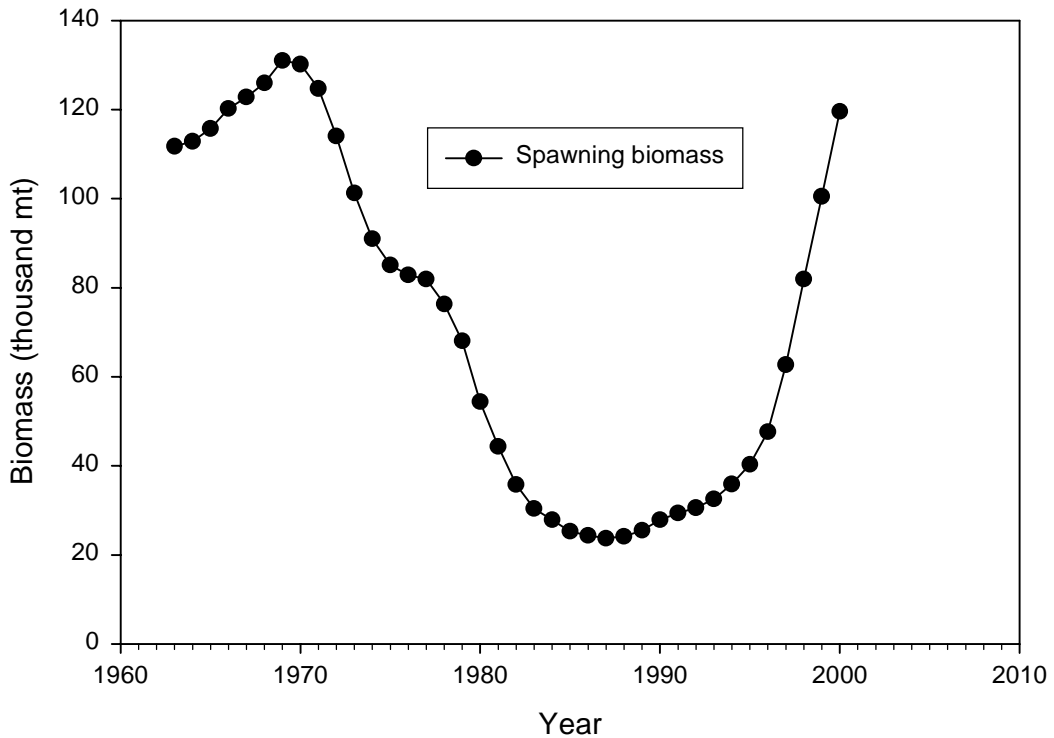
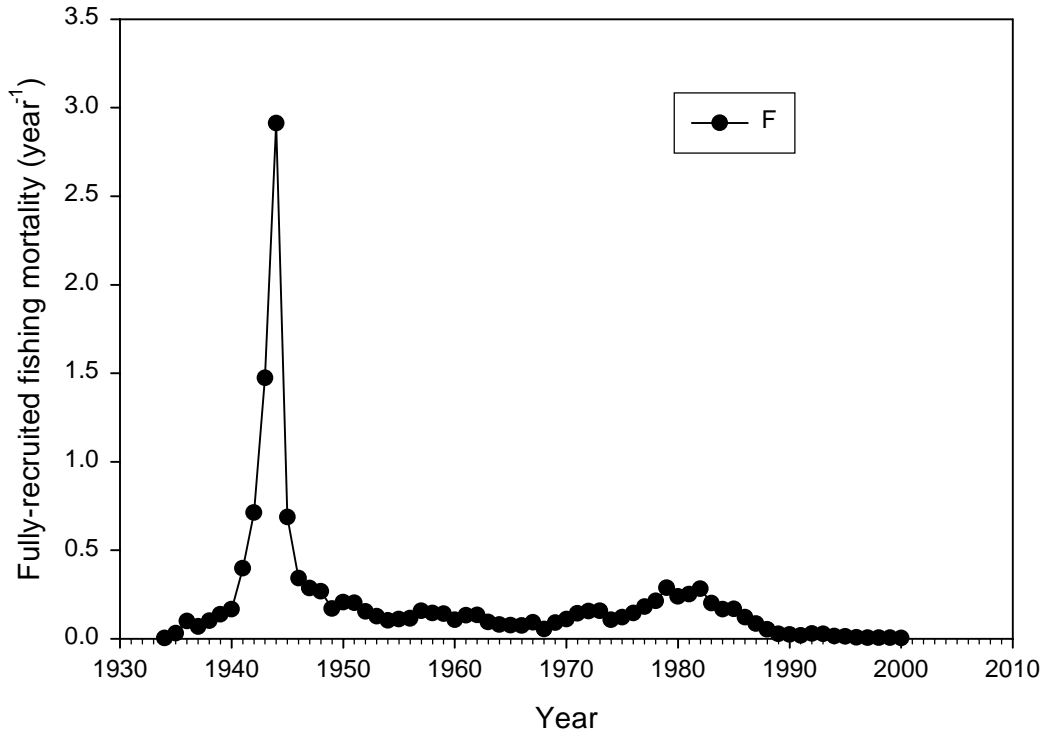


Figure C31. Redfish fishing mortality (F), 1934-2000 including 1999-2000 autumn survey age data



Redfish fishing mortality (F), 1963-2000 including 1999-2000 autumn survey age data

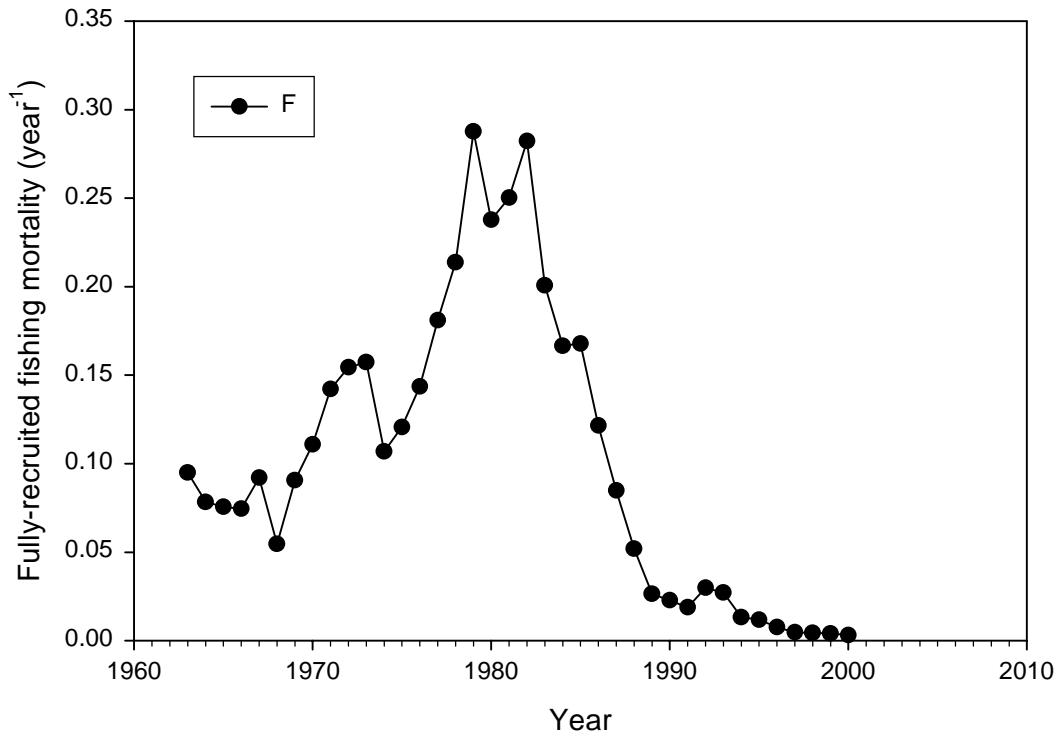


Figure C32. Redfish stock-recruitment data, 1963-2000 including 1999-2000 autumn survey age data

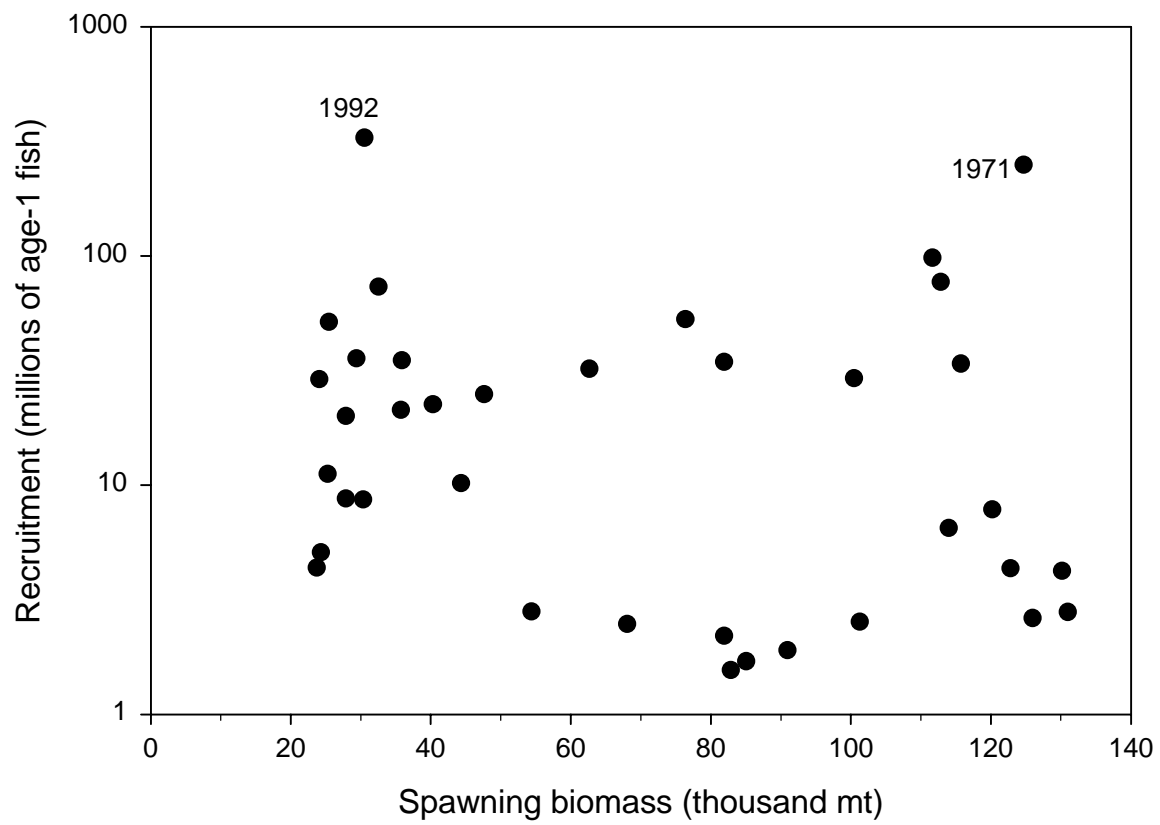
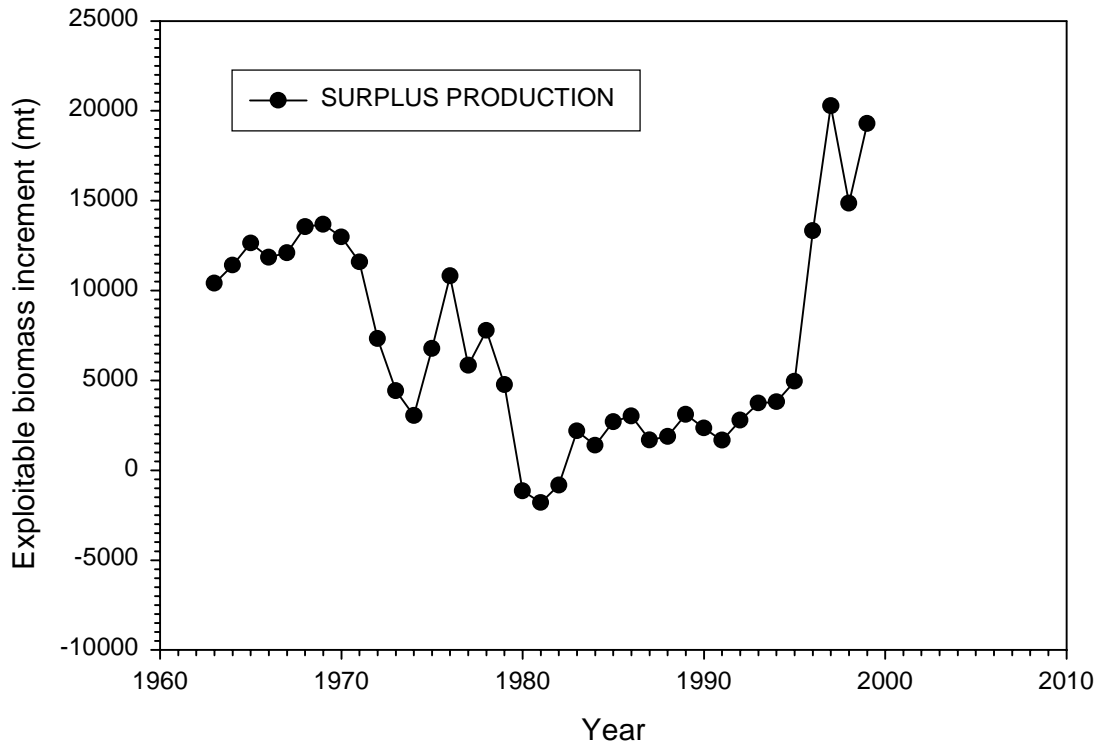


Figure C33. Redfish surplus production, 1963-1999 including 1999-2000 autumn survey age data



Redfish surplus production trajectory, 1934-1999 including 1999-2000 autumn survey age data

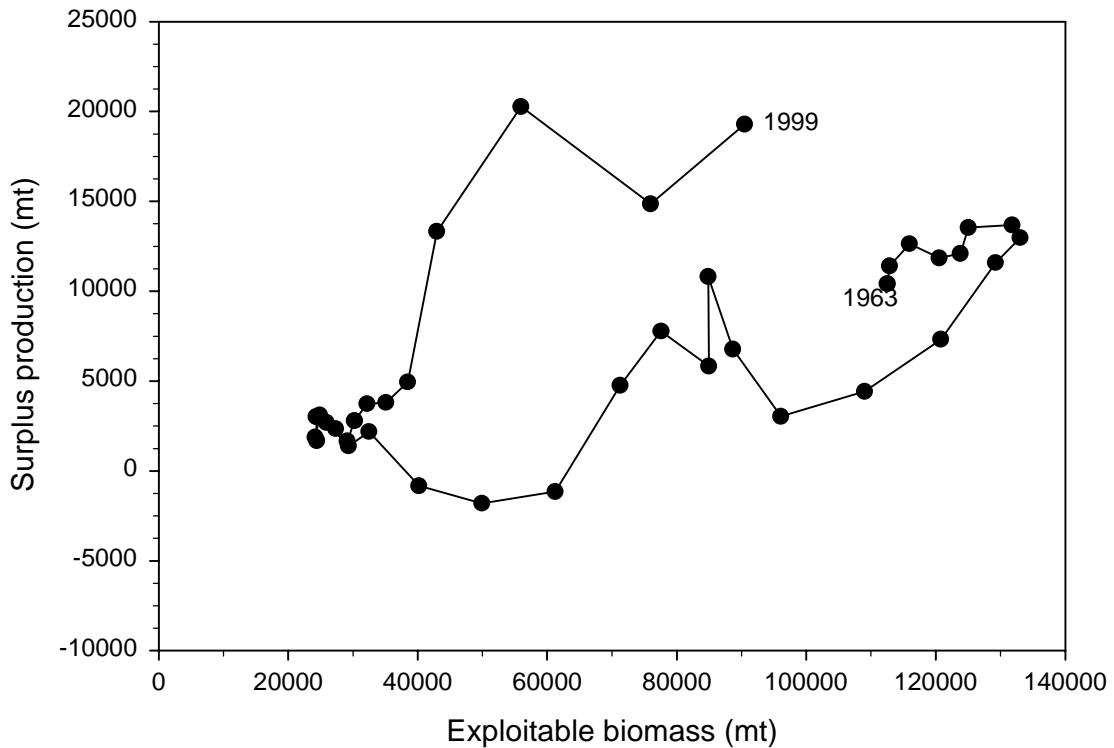
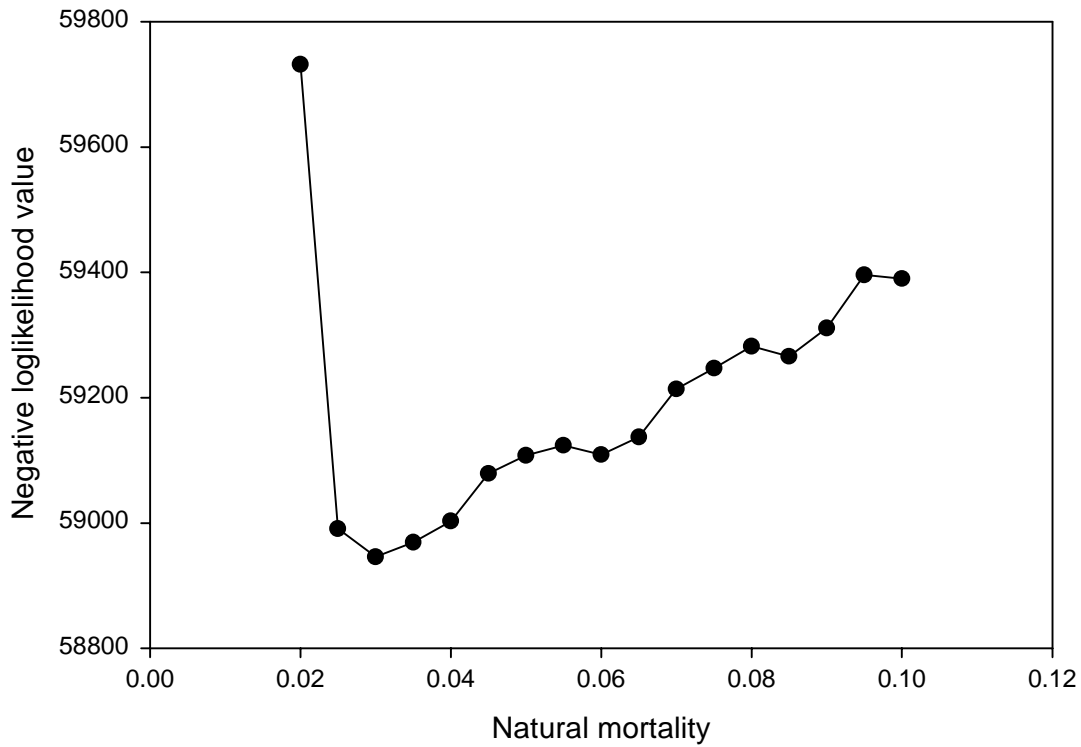


Figure C34. Redfish likelihood profile for natural mortality



Redfish population biomass as a function of natural mortality, 1934-2000

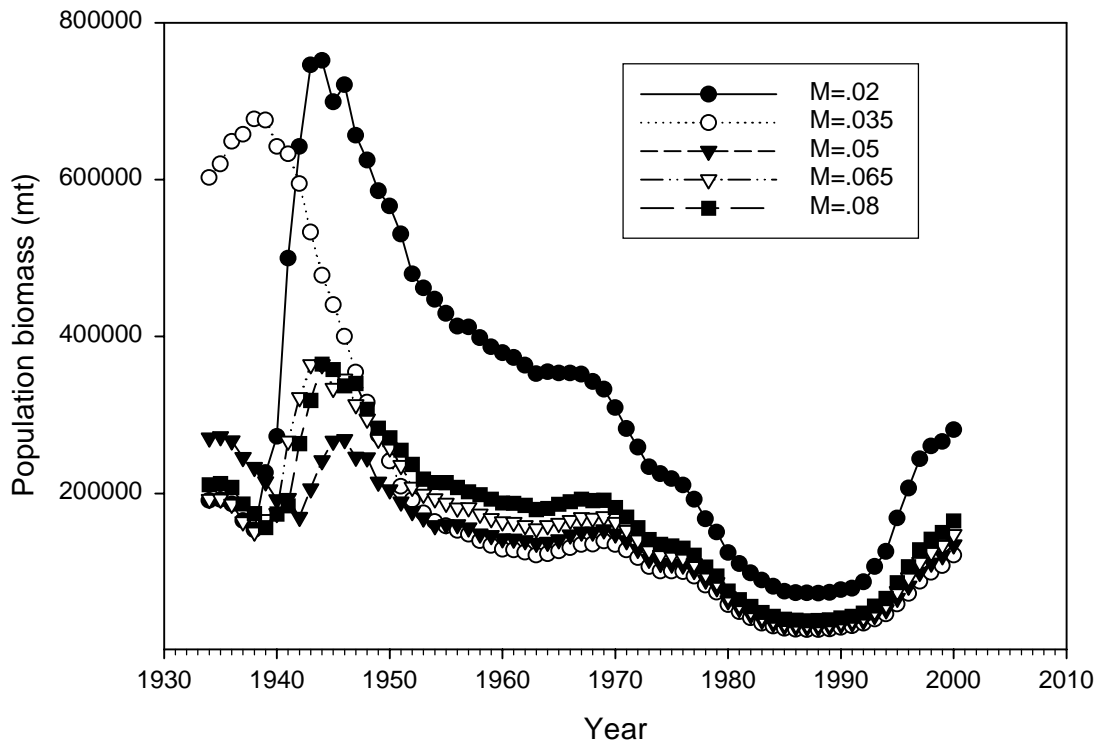
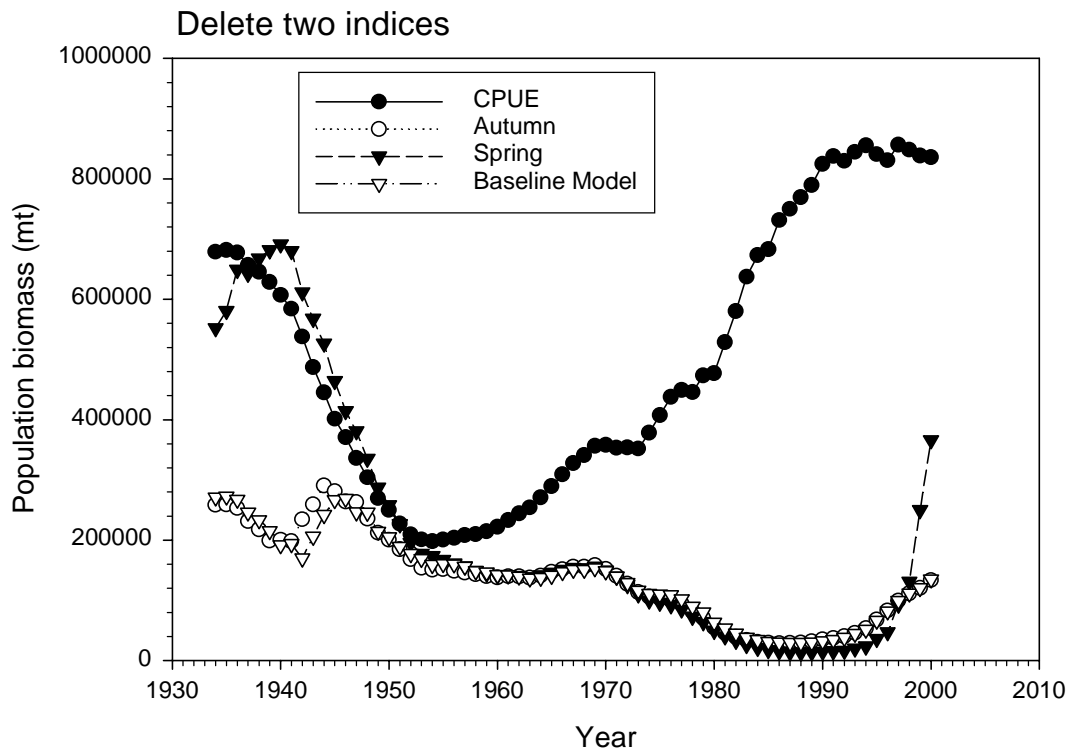
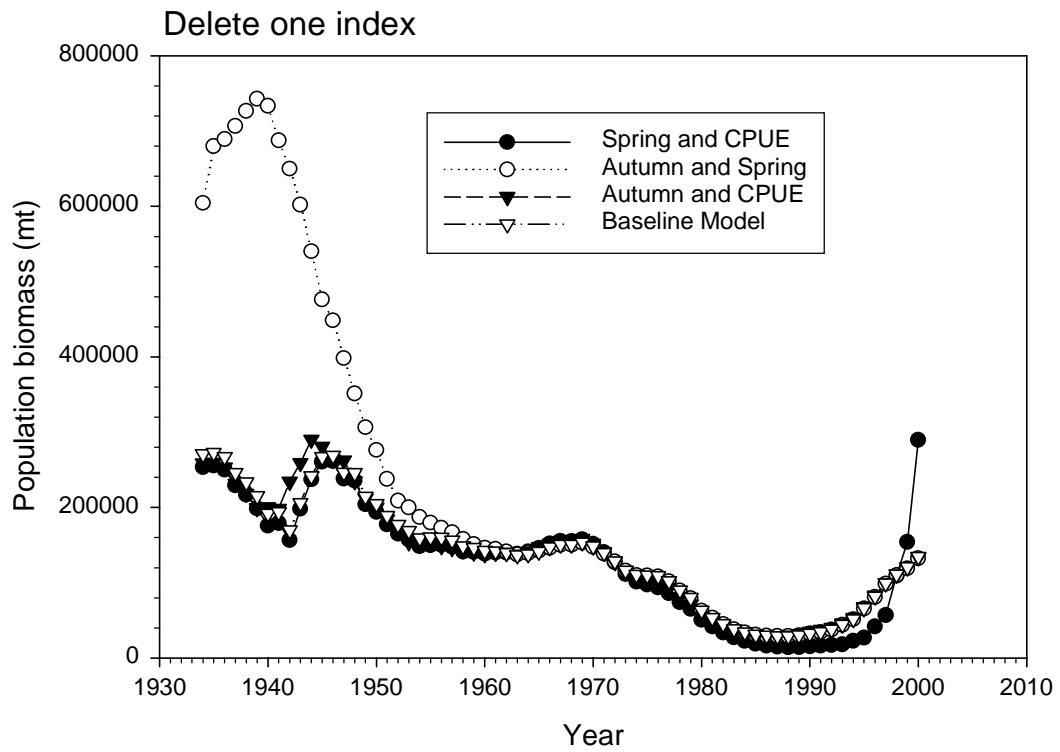


Figure C35. Redfish abundance index sensitivity analyses



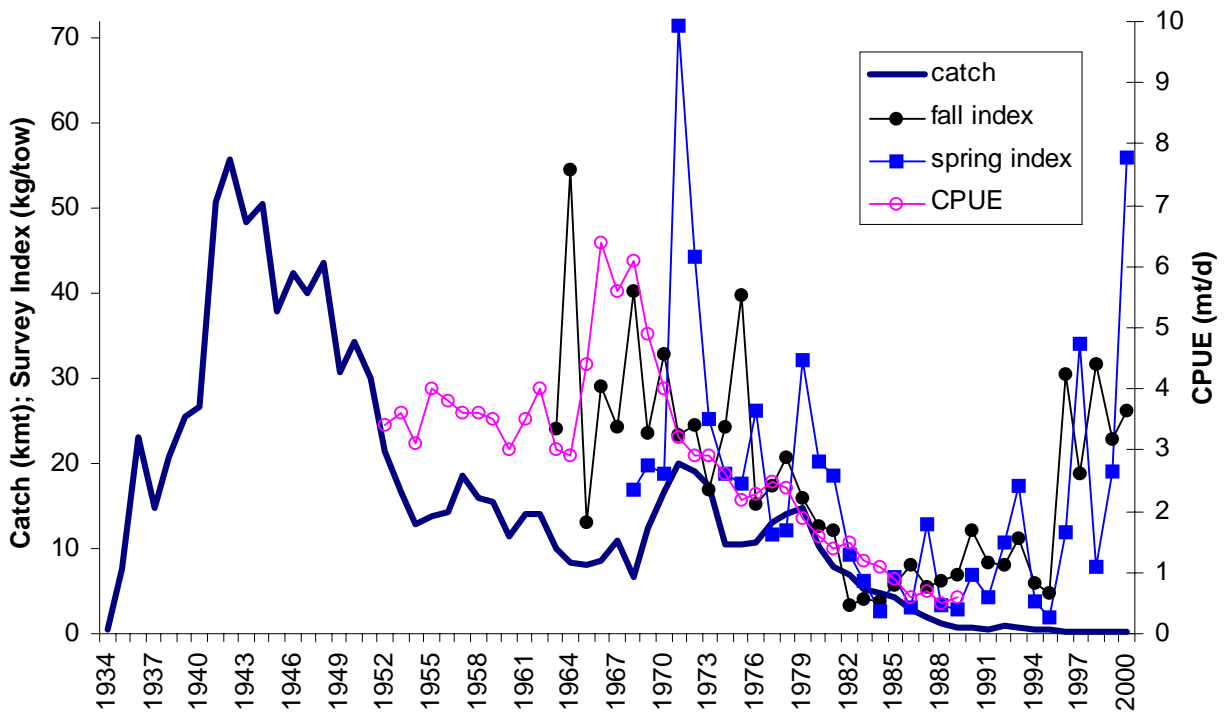


Figure C36. Input data for biomass dynamics analysis.

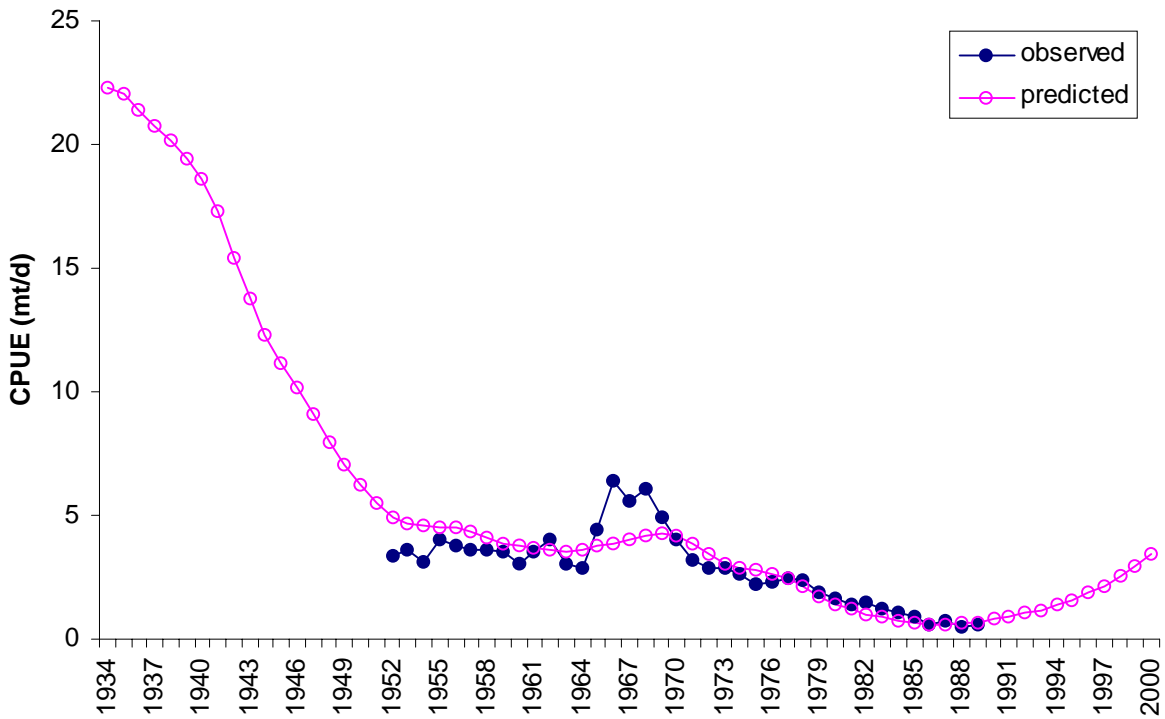


Figure C37. Observed and predicted CPUE from ASPIC.

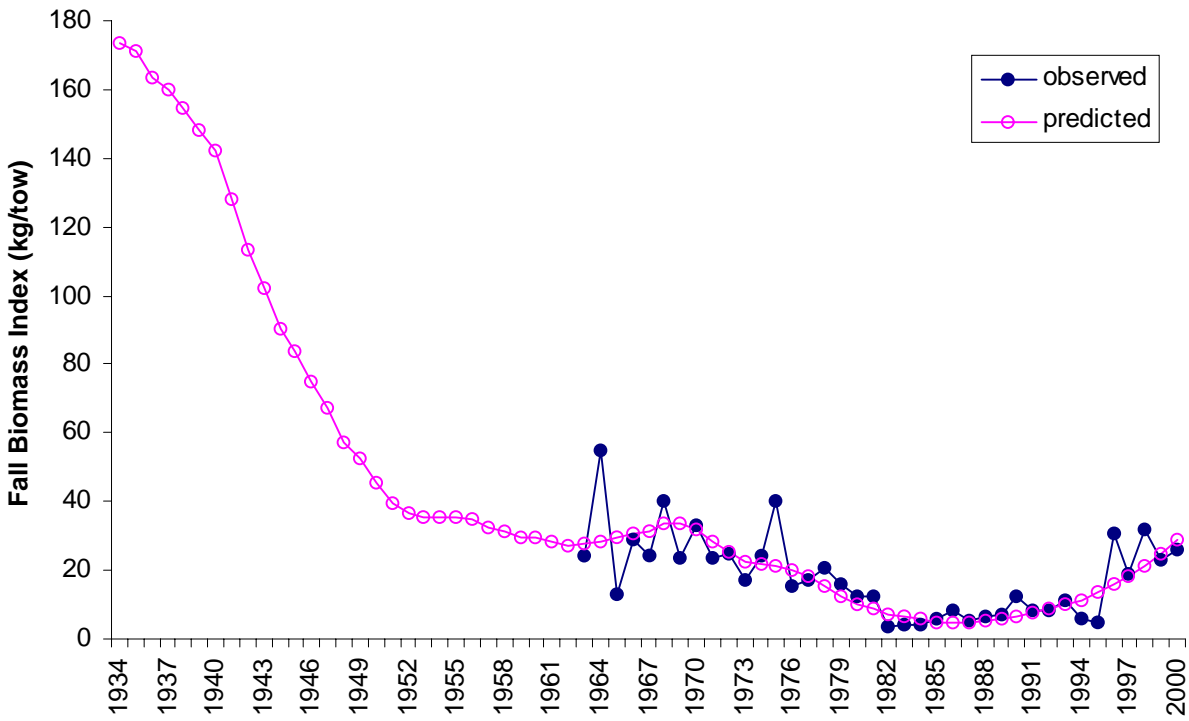


Figure C38. Observed and predicted autumn survey biomass index from ASPIC.

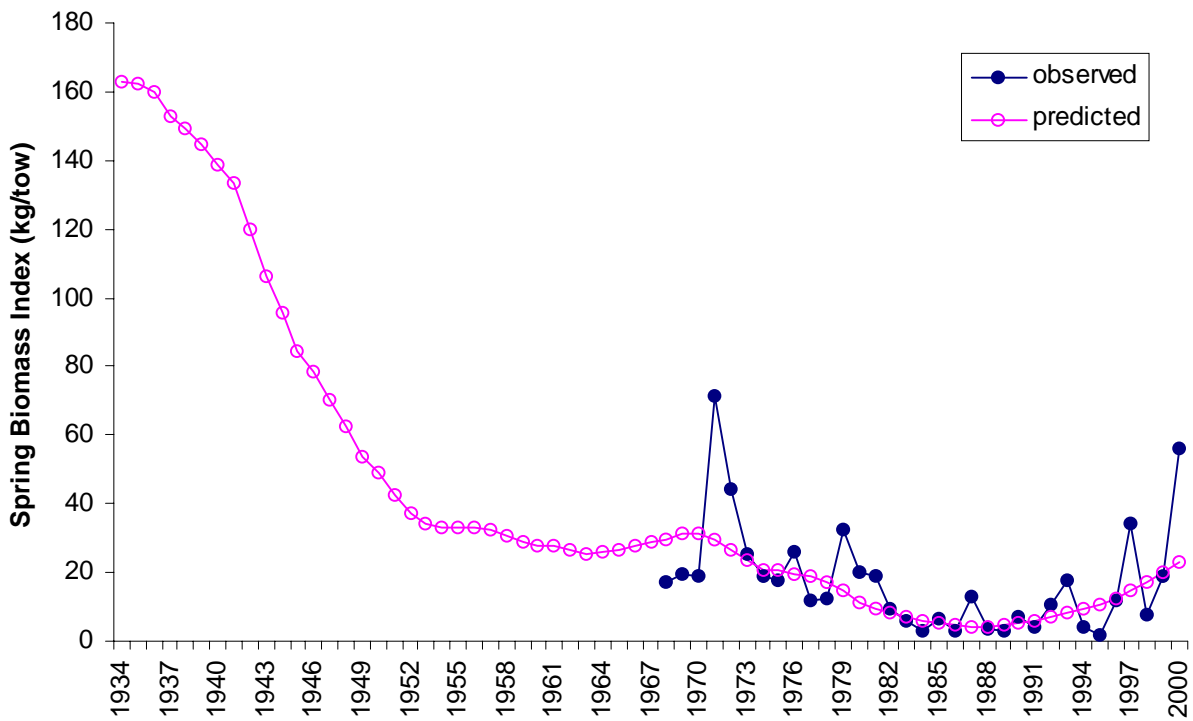


Figure C39. Observed and predicted spring survey biomass index from ASPIC.

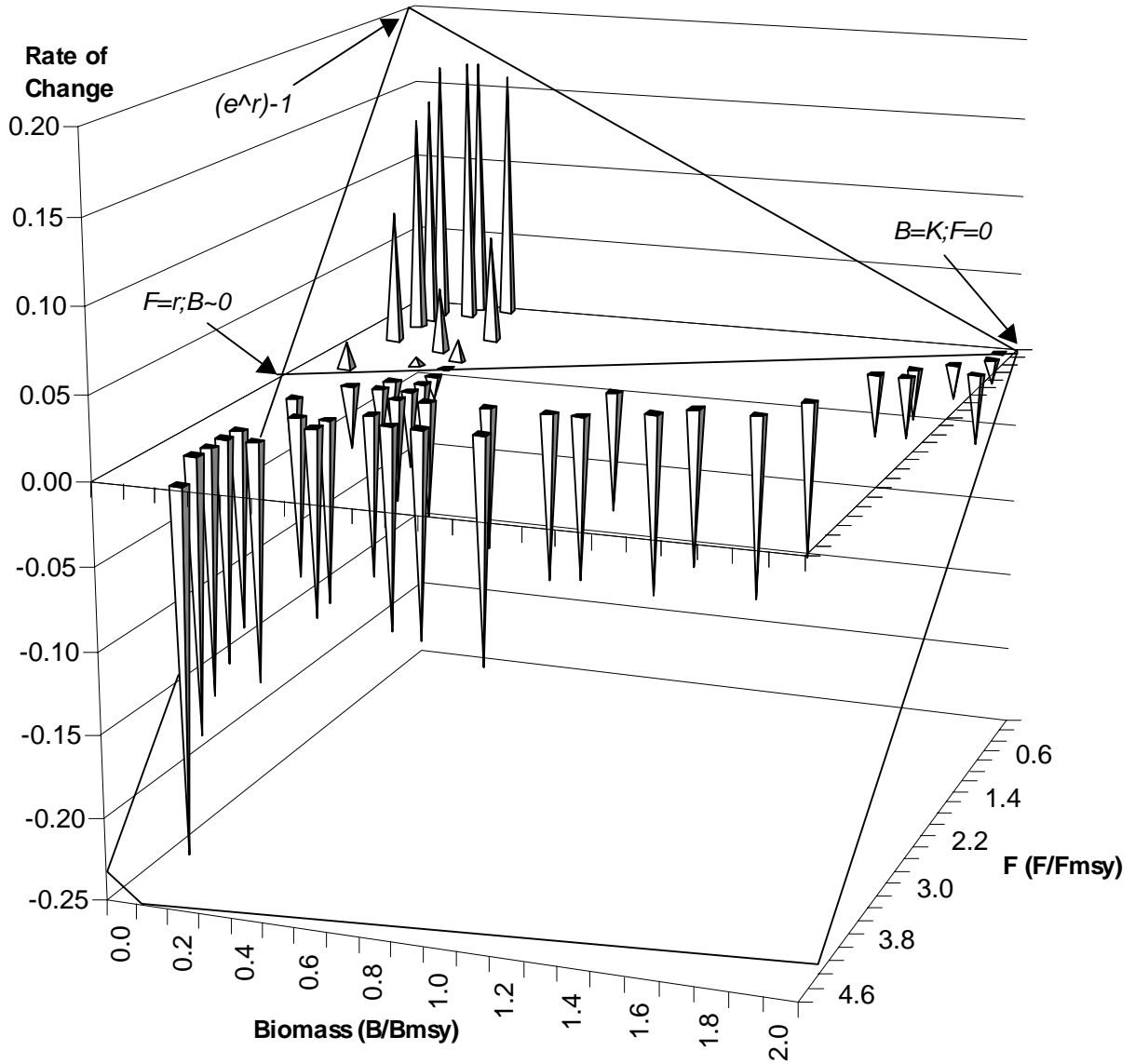


Figure C40. Observed rate of change, expressed as a planar function of biomass and fishing mortality, for estimation of biomass dynamics parameters (dashed line indicates equilibrium conditions).

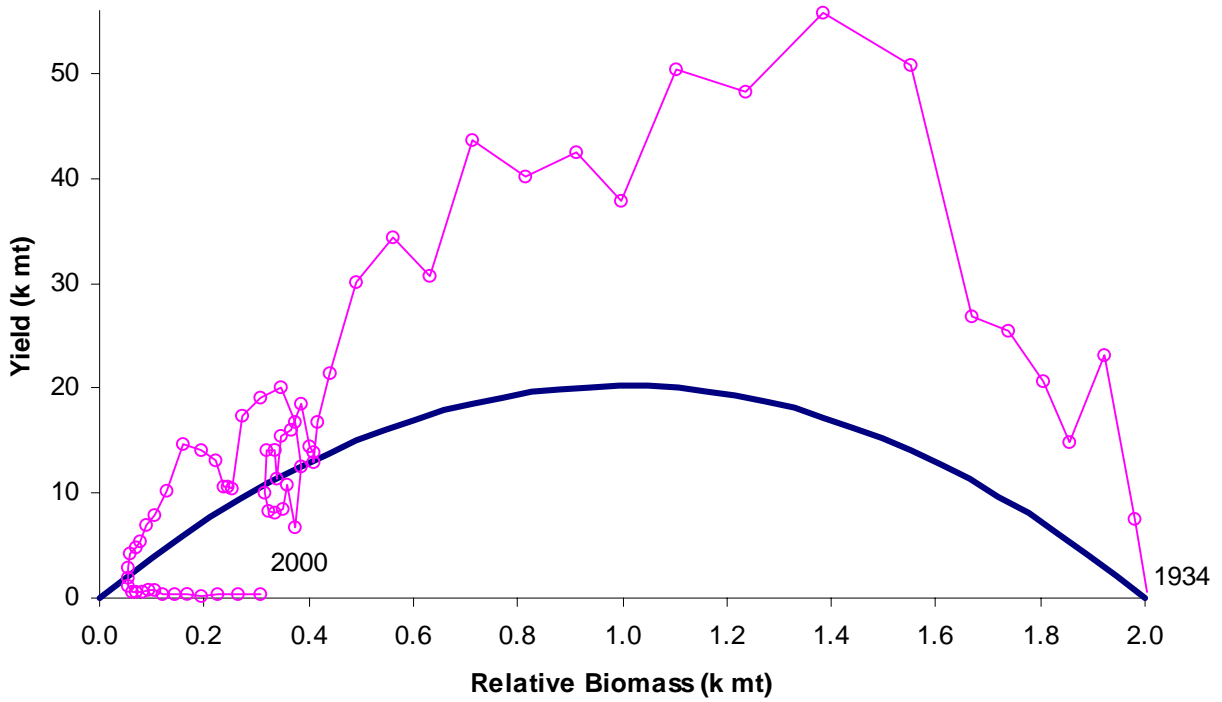


Figure C41. Biomass dynamics of Subarea 5 Redfish from ASPIC.

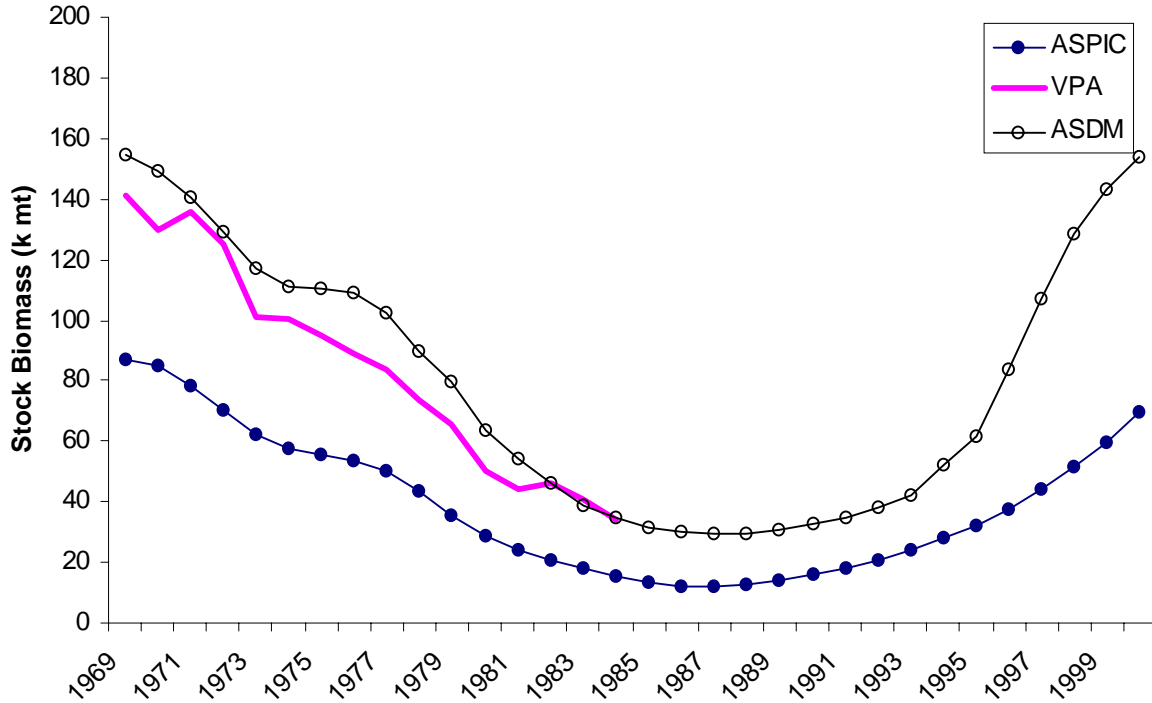


Figure C42. Comparison of biomass estimates from ASPIC, VPA (NEFSC 1986), and the age-structured dynamic model.

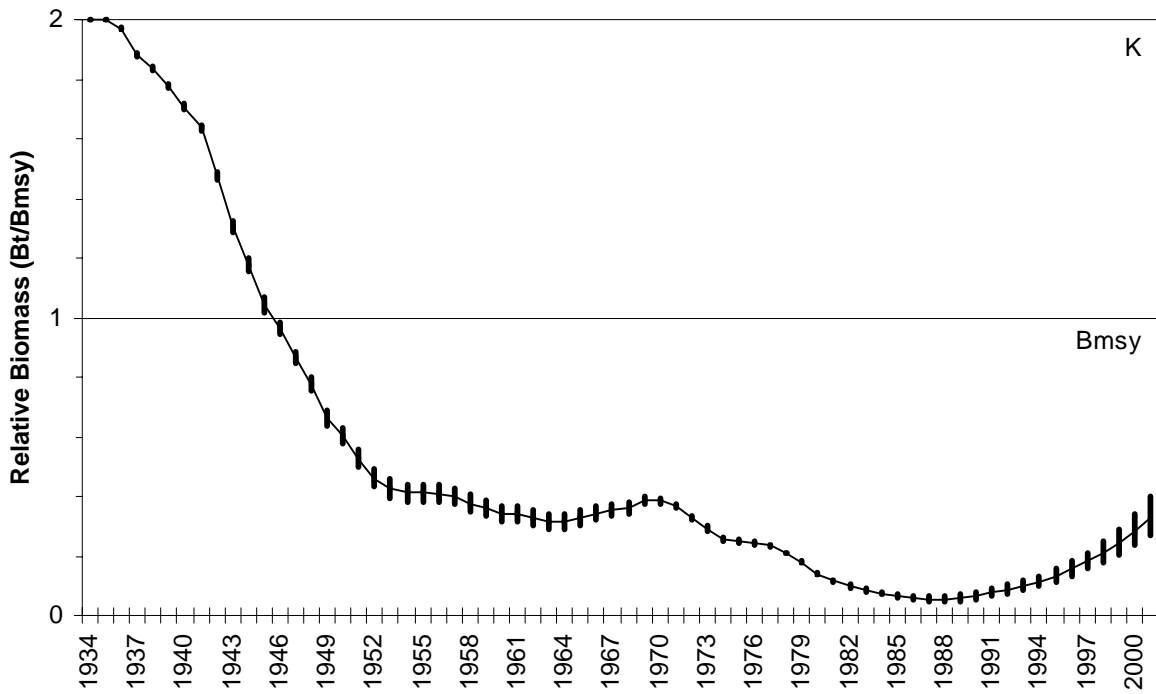


Figure C43. Estimates of relative biomass and 80% confidence limits from ASPIC.

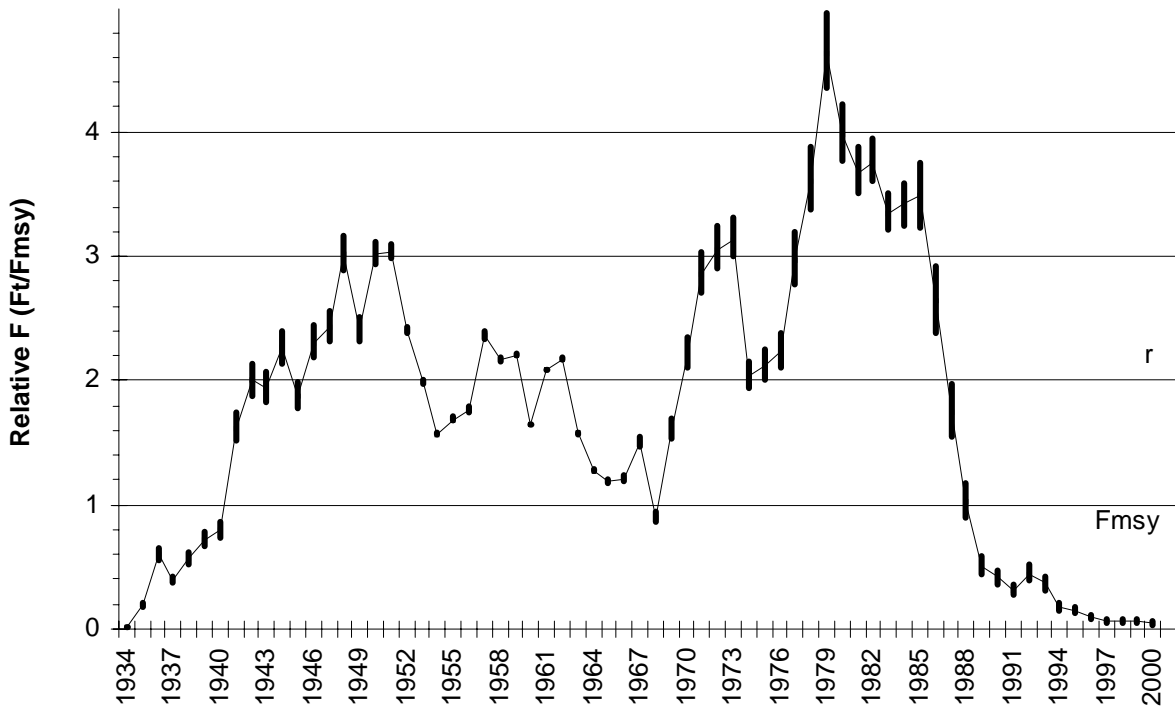


Figure C44. Estimates of relative fishing mortality and 80% confidence limits from ASPIC.

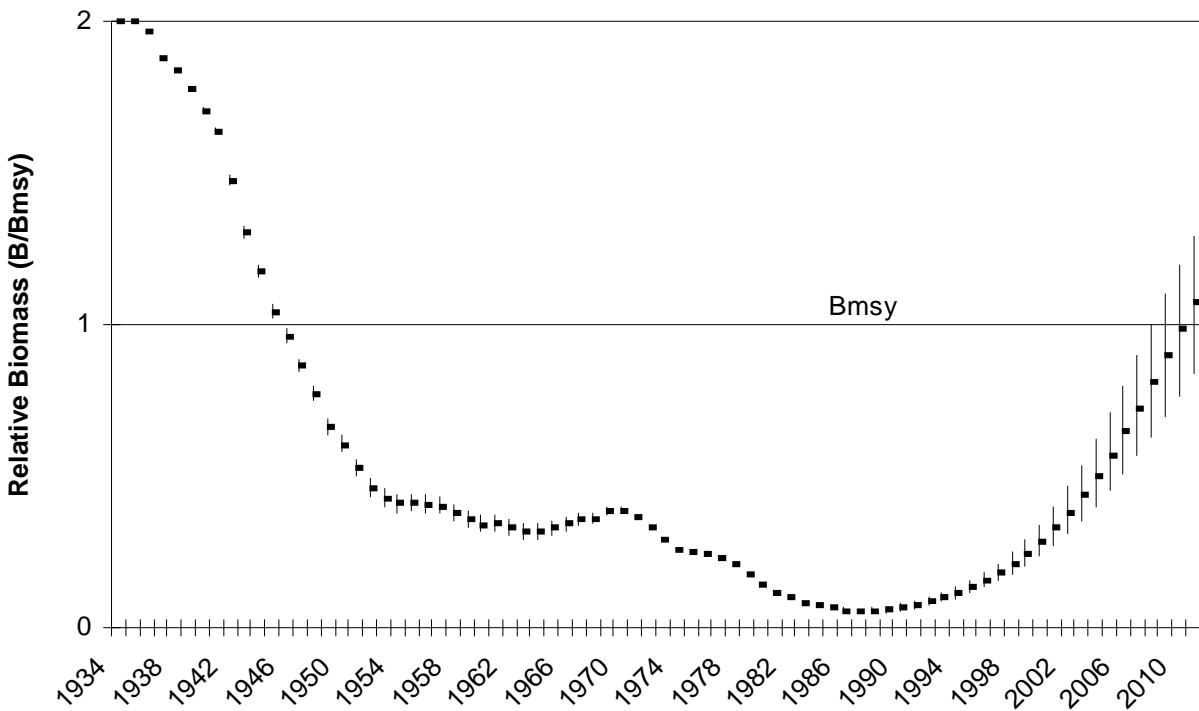


Figure C45. Ten-year projections of redfish biomass assuming no fishing mortality from 2001-2010.