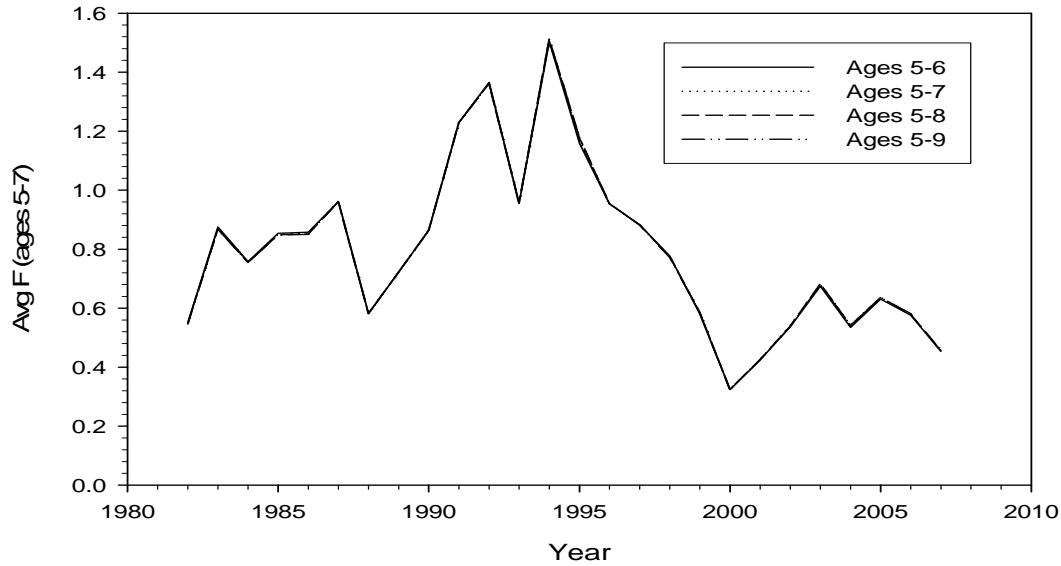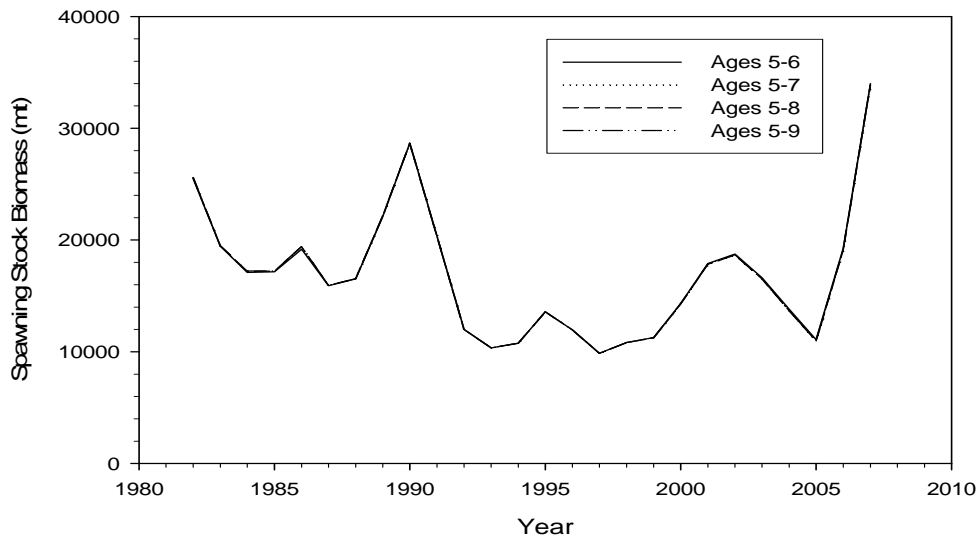**Appendix D**: F on oldest true age explorations for the Gulf of Maine stock of Atlantic cod.   .

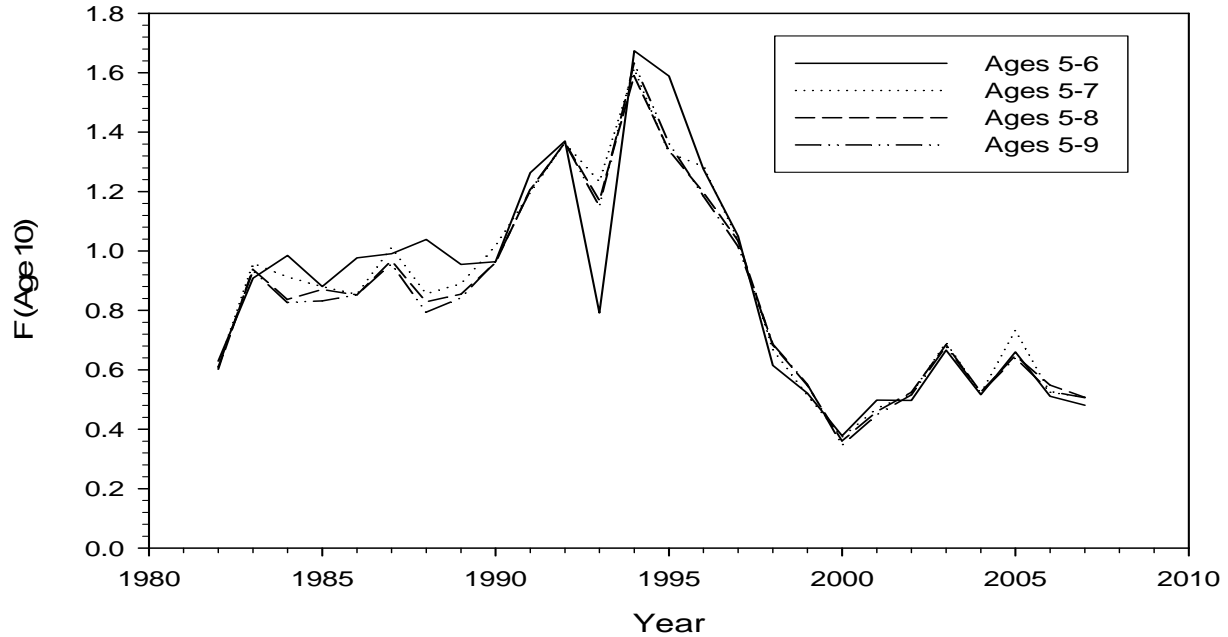## Comparative Trends in Average Fully Recruited F

In the 11 plus VPA formulation, F on the oldest true age (age 10) was estimated in a series of trial VPAs using ages 5-6, 5-7, 5-8, and 5-9 as a basis for computing F on age 10. An additional exploration was conducted using ages 8-9. The following graphics show the impact on the average F (ages 5-7), spawning stock biomass, and F on age 10.

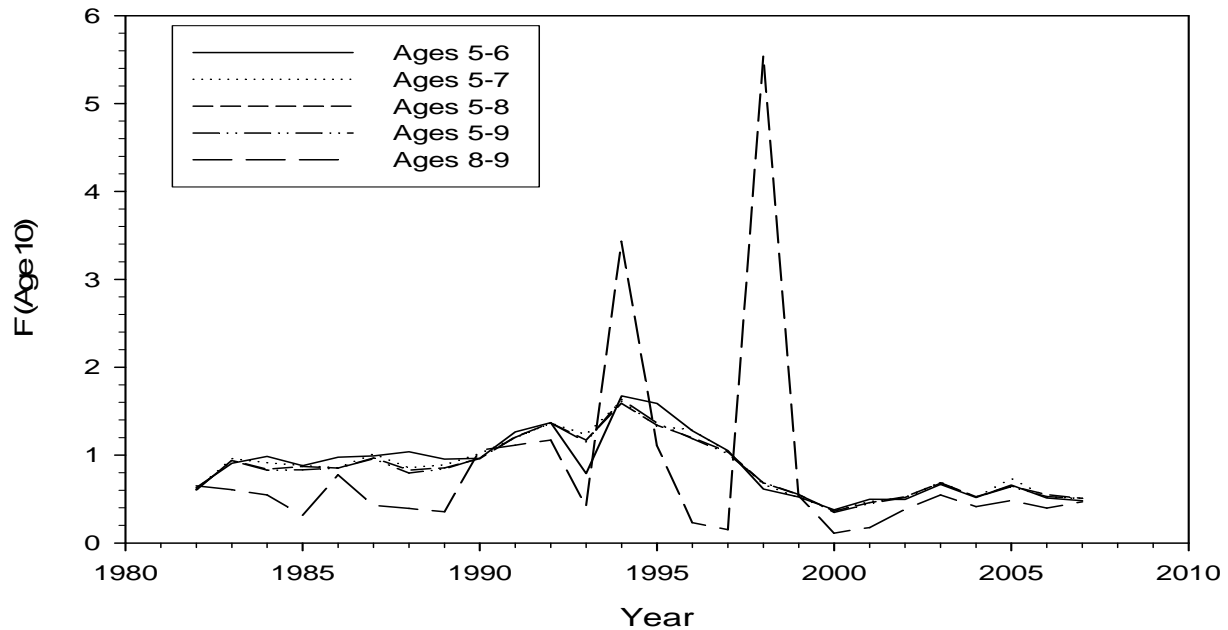## Comparative Trends in Spawning Stock Biomass

In each trial, the average F on the fully recruited ages (5-7) and the spawning stock biomass were not appreciably affected by the choice of age range.

Comparative Trends in F on the Oldest Age (Age 10)

The F on the oldest (age 10), however, was directly affected by the choice of age range. The age 5-6 range caused F to deviate from the other ranges, especially in 1993. Overall, the age range did not substantially affect the estimate of F on the oldest true age.

Comparative Trends in F on the Oldest Age (Age 10)

When ages 8-9 were included in the analysis, the estimate of F on age 10 was generally lower than the estimates obtained from the other age ranges, sometimes as much as 80-90% lower (1996 and 1997). In other cases (1994 and 1998), the estimates are as much as 2-6 times higher. The estimates of F on ages 8 and 9 are highly variable, especially during the 1990s.