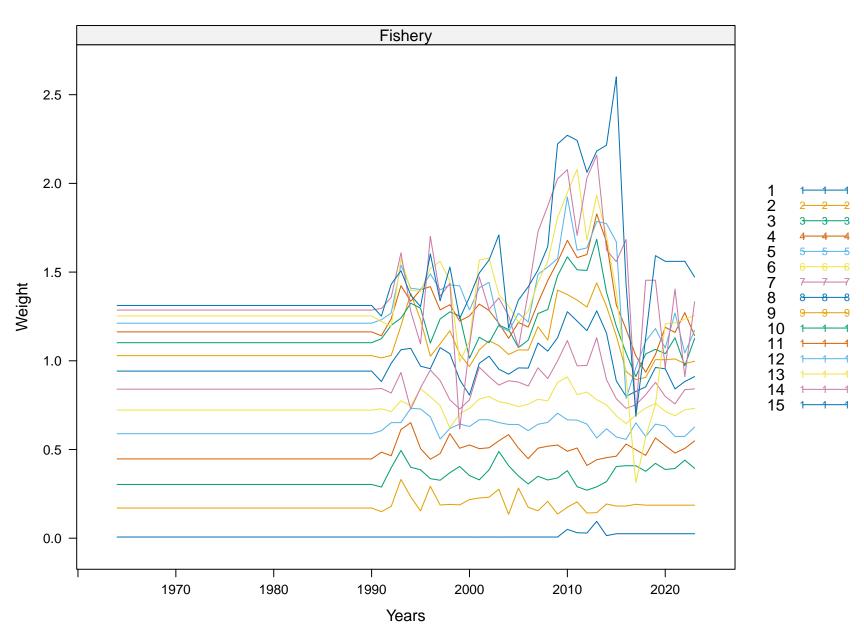
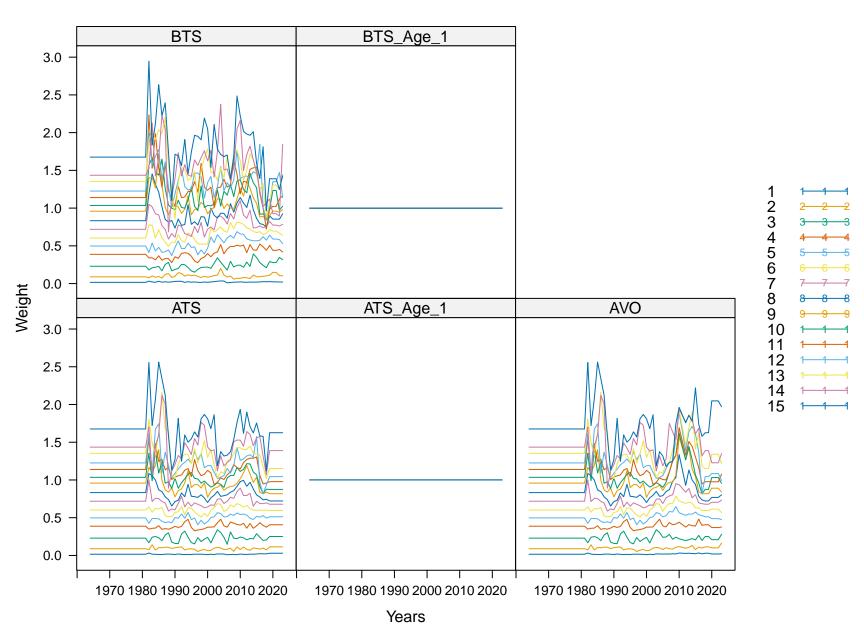
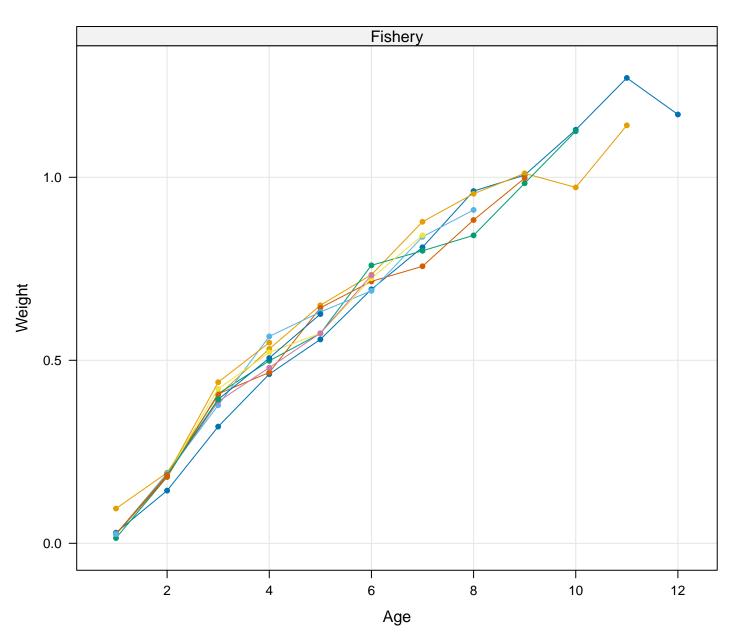
### Weight at age in the fishery



### Weight at age in the survey

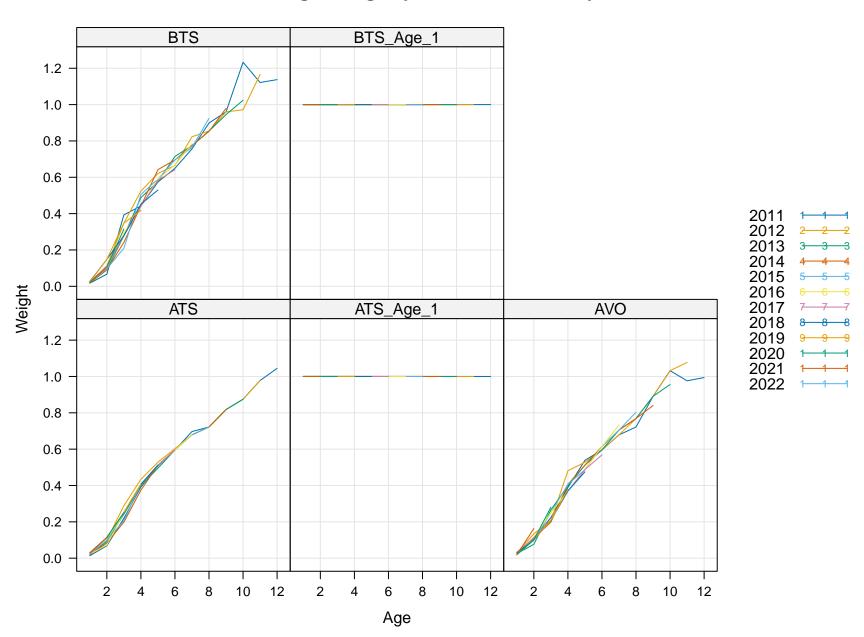


### Weight at age by cohort in the fleet

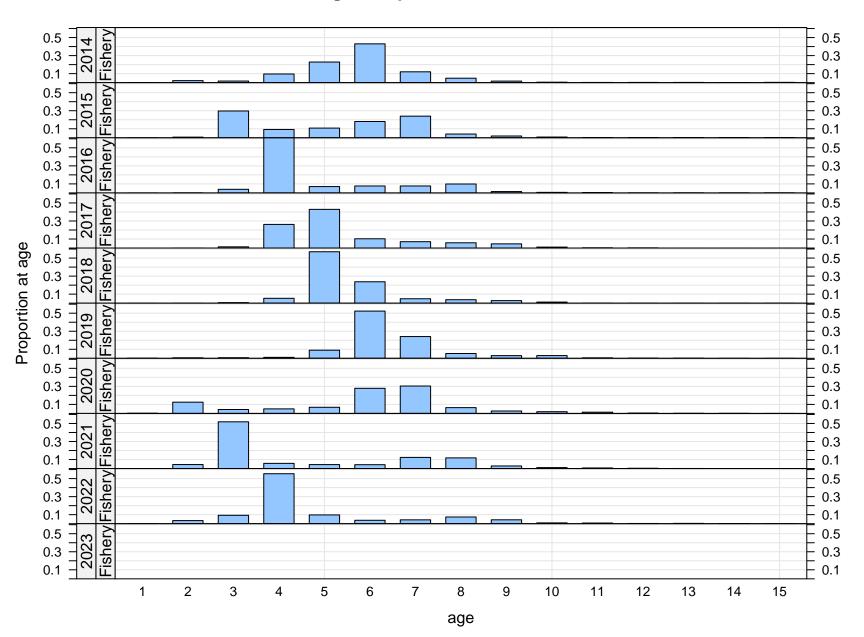




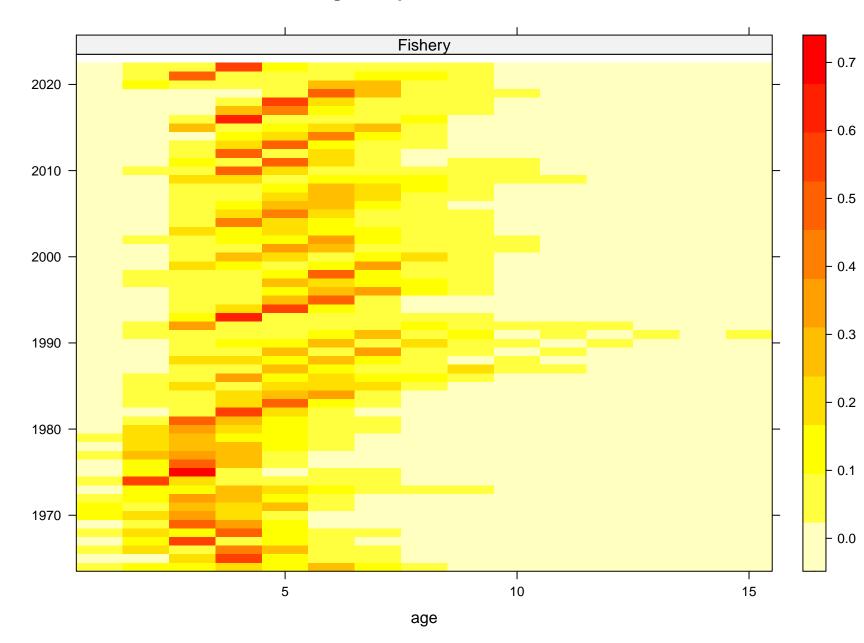
#### Weight at age by cohort in the survey



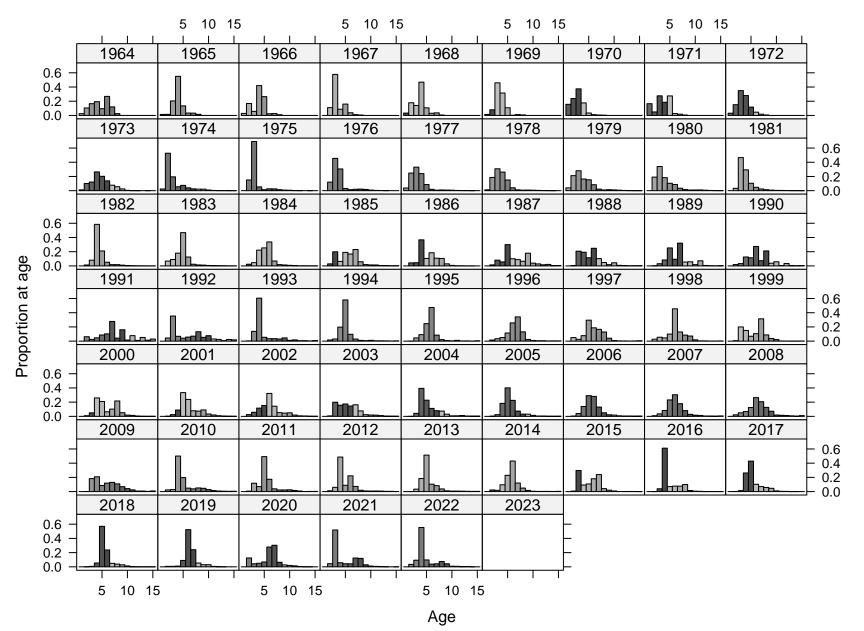
#### Age composition in fleets



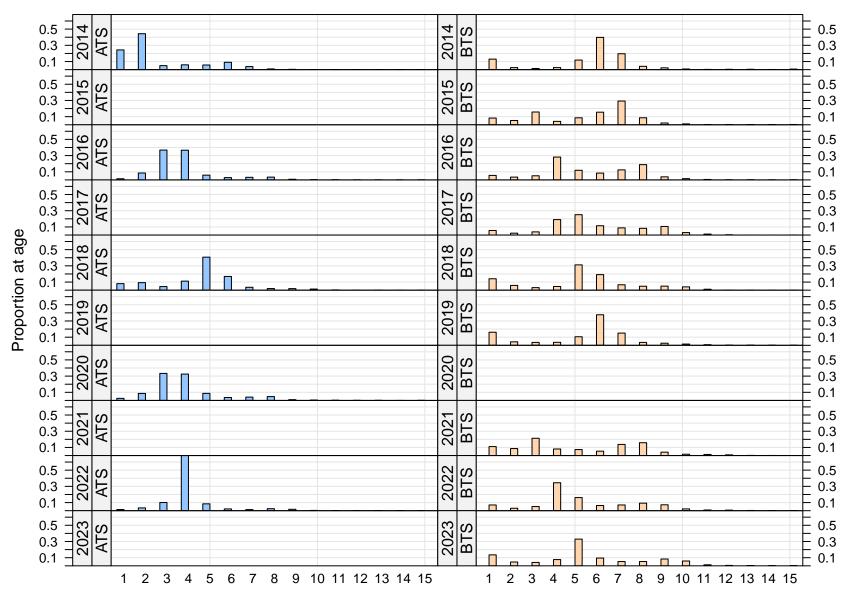
## Age composition in fleets



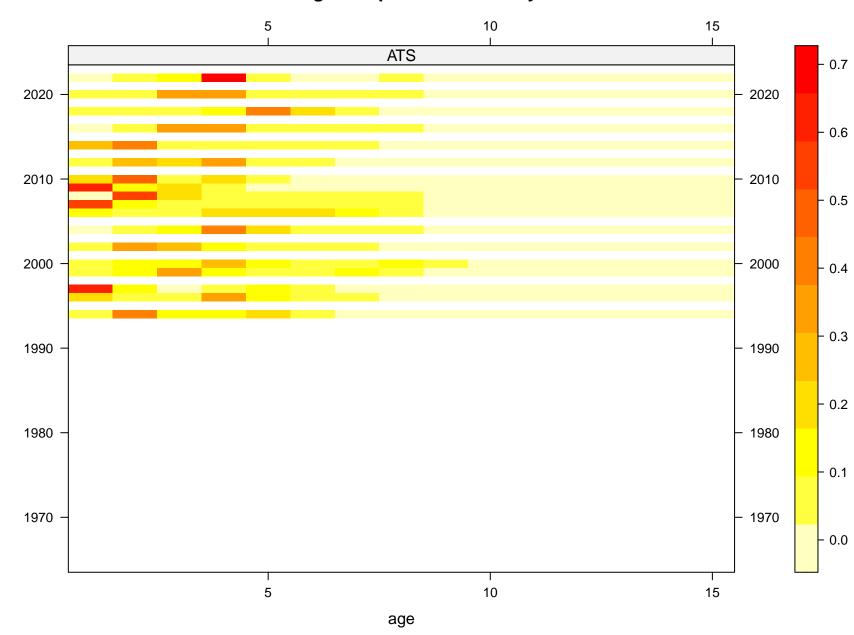
#### Age composition in fleets Fishery



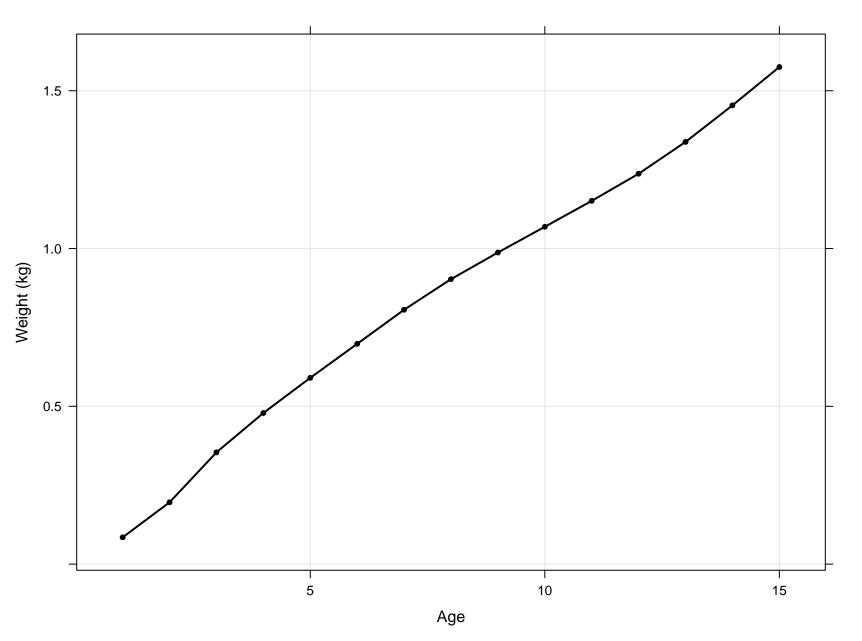
#### Age composition in surveys



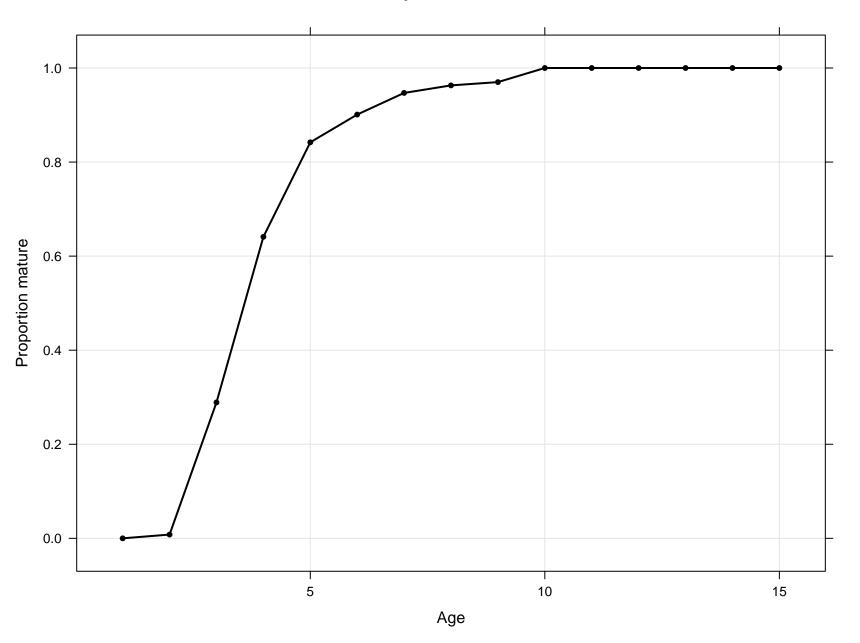
Age composition in surveys



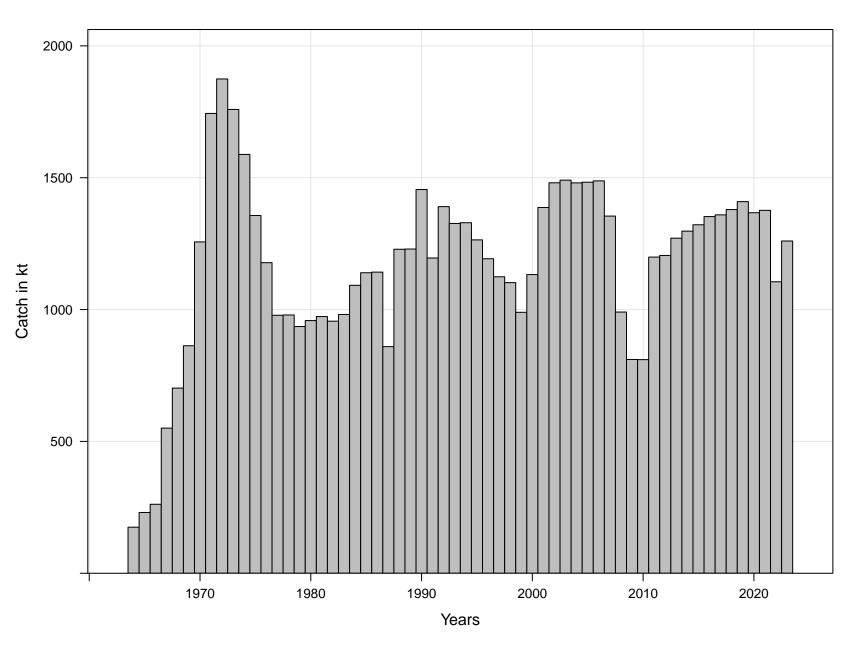
Weight in the stock

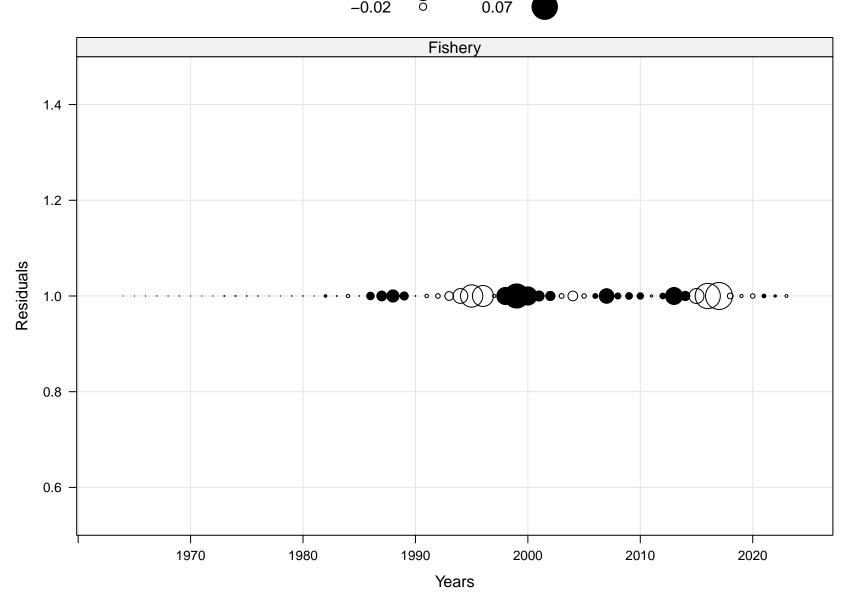


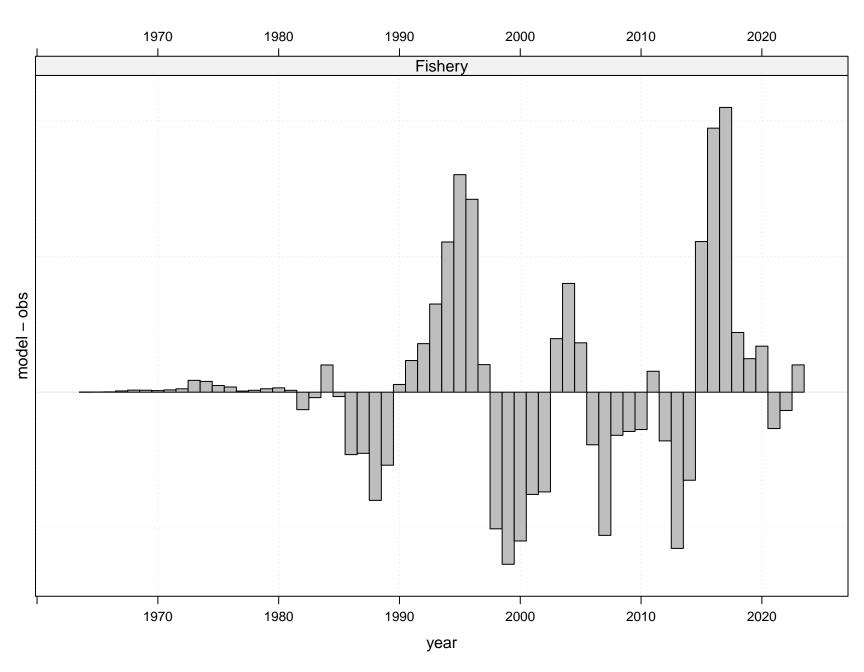
Maturity in the stock



Total catch







Absolute residual catch by fleet

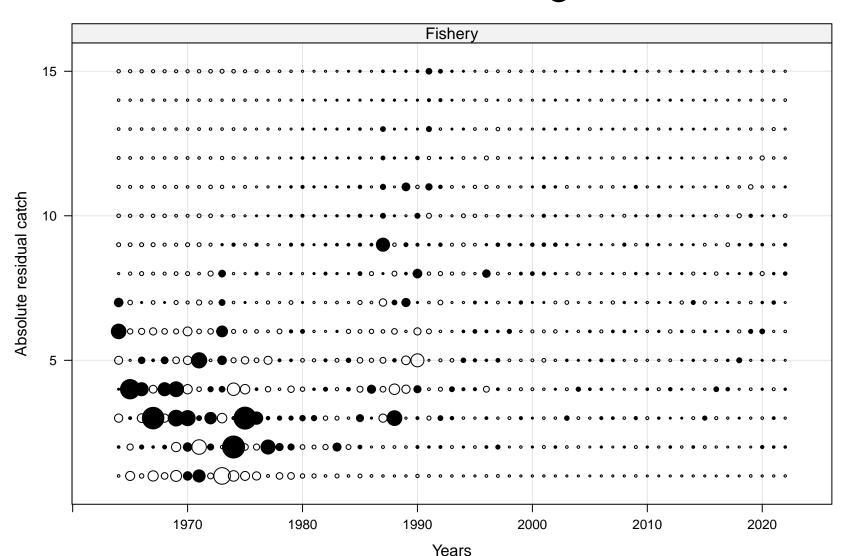
-0.1-0.06

0.04

0.09

-0.01

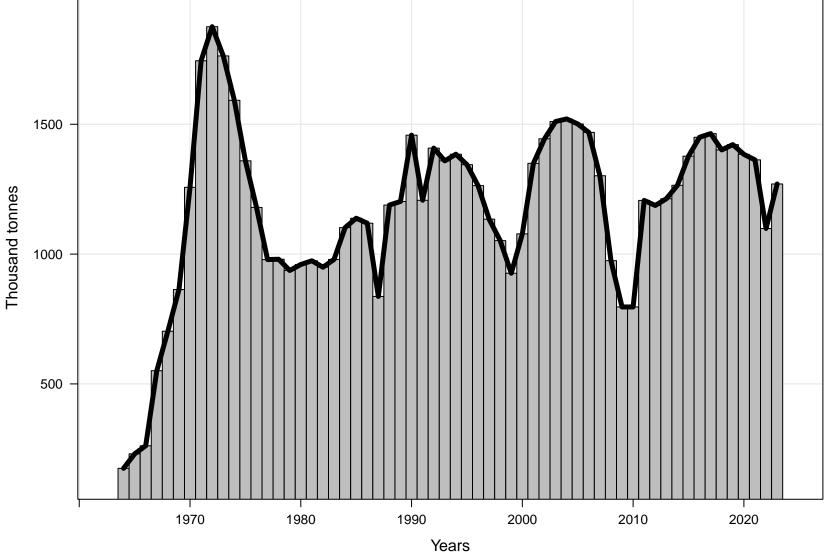


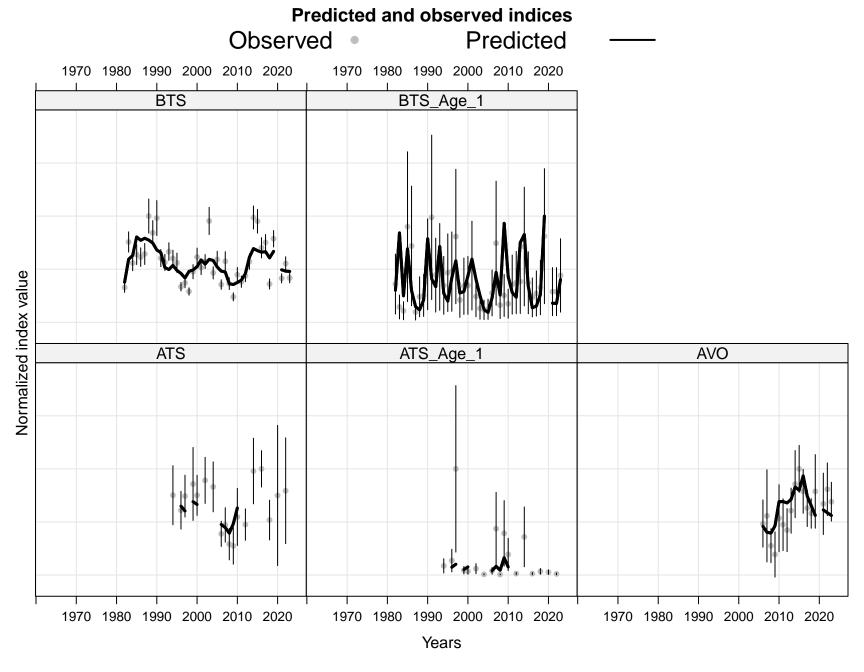


**Age fits Fishery** Predicted Observed 10 15 10 15 10 15 10 15 10 15 10 15 5 10 15 5 15 5 5 5 10 15 5 5 1964 1966 1967 1969 1970 1972 1965 1968 1971 0.6 0.6 0.4 0.4 <u>w</u> 0.2 0.2 0.0 0.0 1973 1974 1975 1976 1977 1978 1979 1980 1981 0.6 0.6 0.4 0.4 Æ 0.2 0.0 0.2 0.0 1982 1983 1984 1985 1986 1987 1988 1989 1990 0.6 0.6 0.4 0.4 0.2 0.2 MM age 0.0 0.0 1991 1992 1993 1994 1995 1996 1997 1998 1999 Proportion at 0.6 0.6 0.4 0.4 0.2 0.2 0.0 0.0 2002 2003 2004 2005 2006 2007 2008 2000 2001 0.6 0.6 0.4 0.4 0.2 0.2 0.0 0.0 2009 2010 2011 2012 2013 2014 2015 2016 2017 0.6 0.6 0.4 0.4 0.2 0.2 0.0 0.0 2018 2019 2020 2021 2022 0.6 0.6 0.4 -0.2 -0.0 -0.4 0.2 0.0 10 15 5 10 15 10 15 5 10 15 5 15 5 5

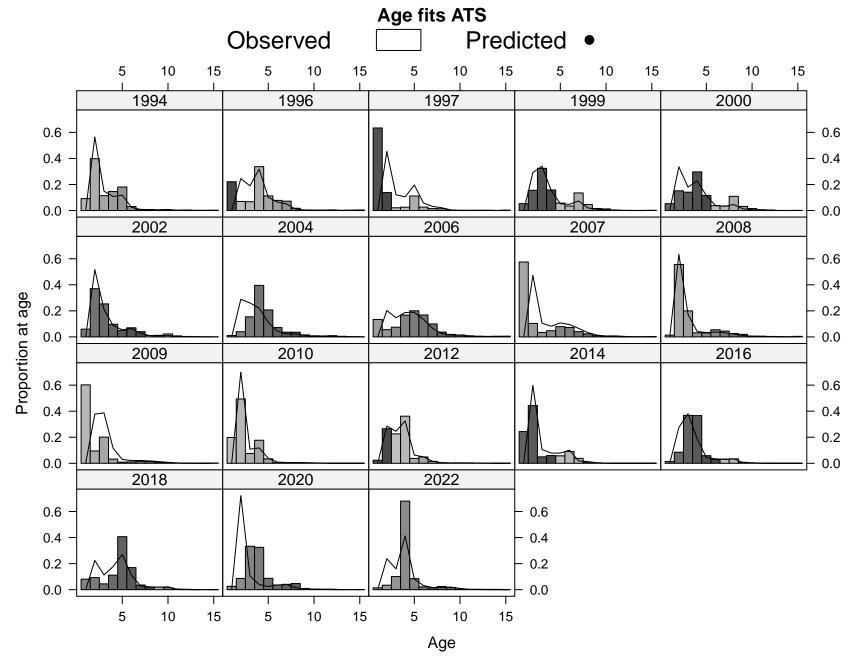
Age

Predicted and observed catches by fleet **Predicted** Observed Fishery

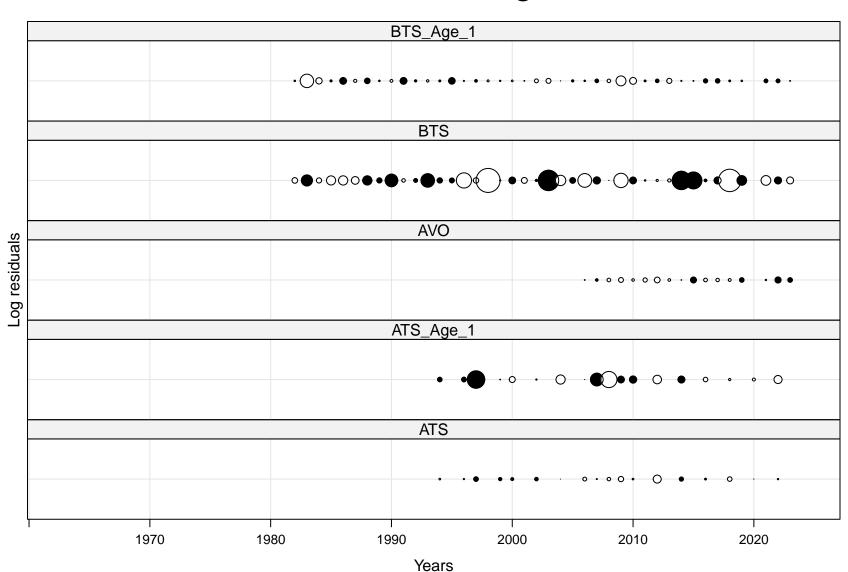




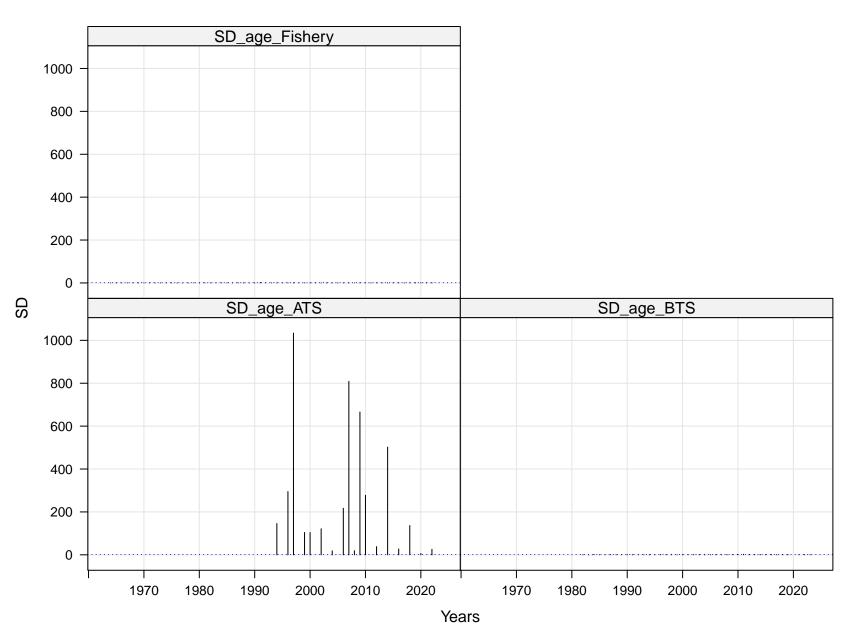
Age fits BTS **Predicted** Observed 0.5 0.4 0.3 0.2 0.1 0.0 0.5 0.4 0.3 0.2 0.1 0.0 0.5 0.4 0.3 0.2 0.1 0.0 0.5 0.4 0.3 0.2 0.1 0.0 0.5 0.4 0.3 0.2 0.1 0.0 0.5 0.4 0.3 0.2 0.1 0.0 Proportion at age 0.5 0.4 0.3 0.2 0.1 0.0 0.5 0.4 0.3 0.2 0.1 0.0 0.5 0.4 0.3 0.2 0.1 0.0 0.5 0.4 0.3 0.2 0.1 0.0 0.5 0.4 0.3 0.2 0.1 0.0 0.5 0.4 0.3 0.2 0.1 0.0 Age



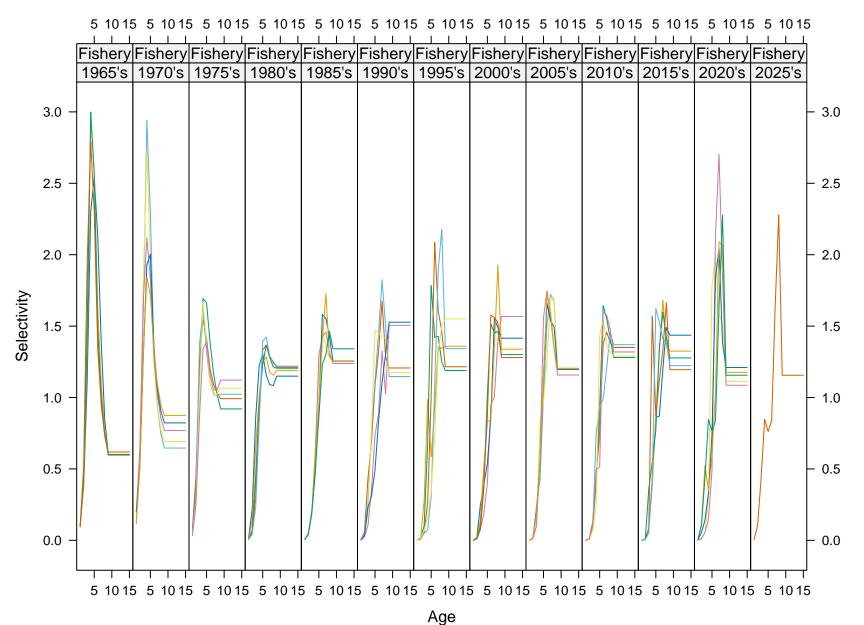




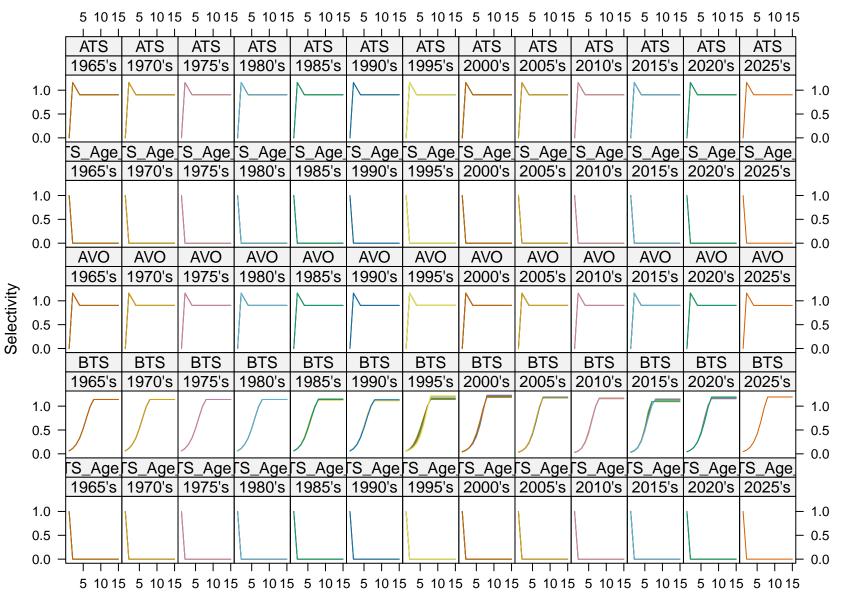
### **SD** per input series



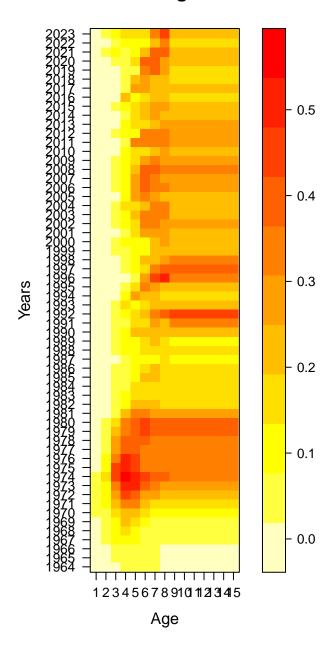
#### Selectivity of the Fishery by Pentad



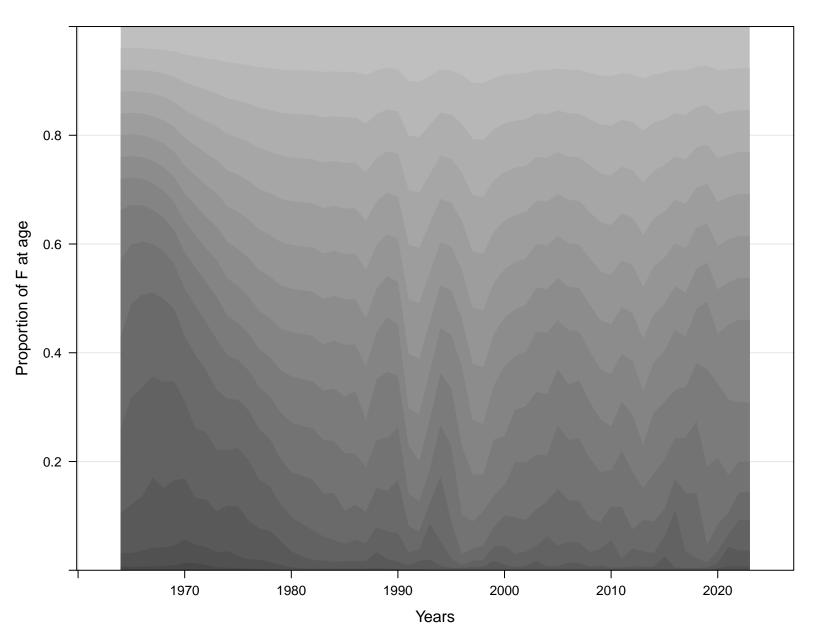
#### Selectivity of the survey by Pentad



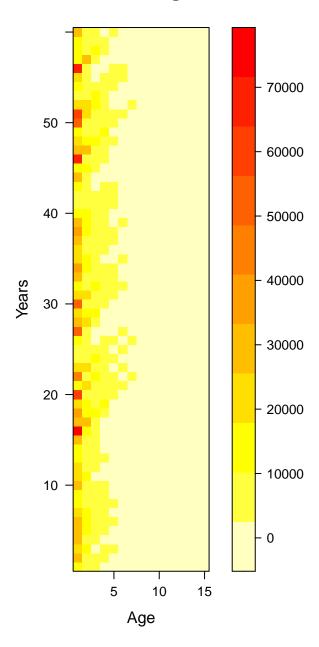
F at age



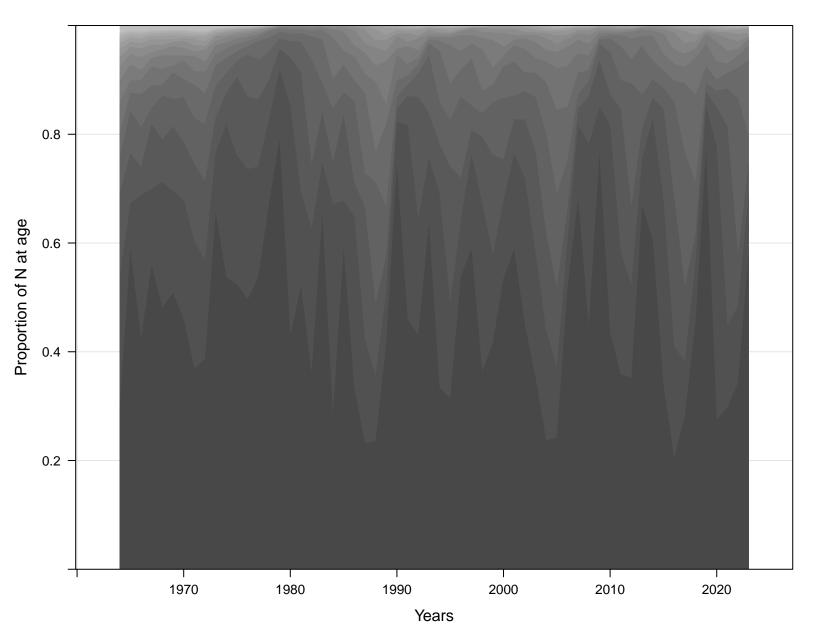
# F proportion at age





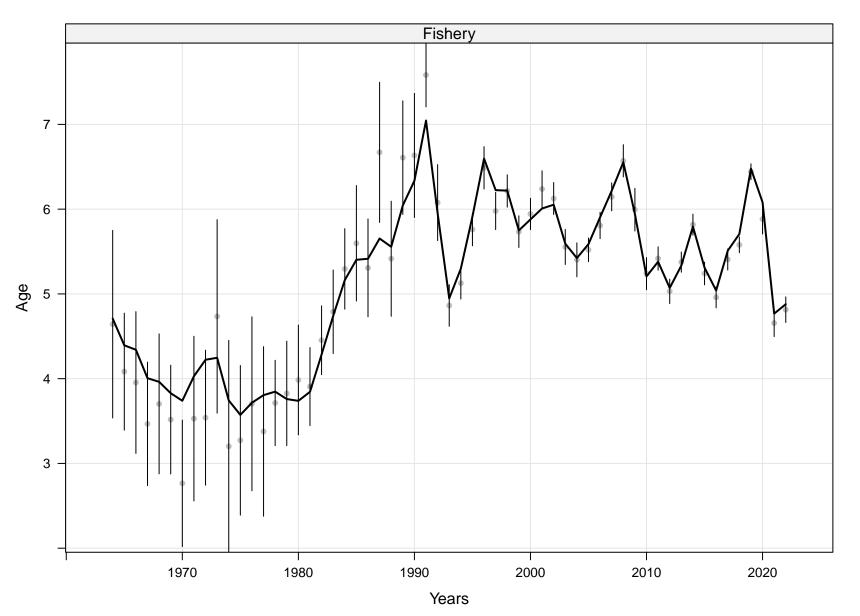


# **Proportion at age**



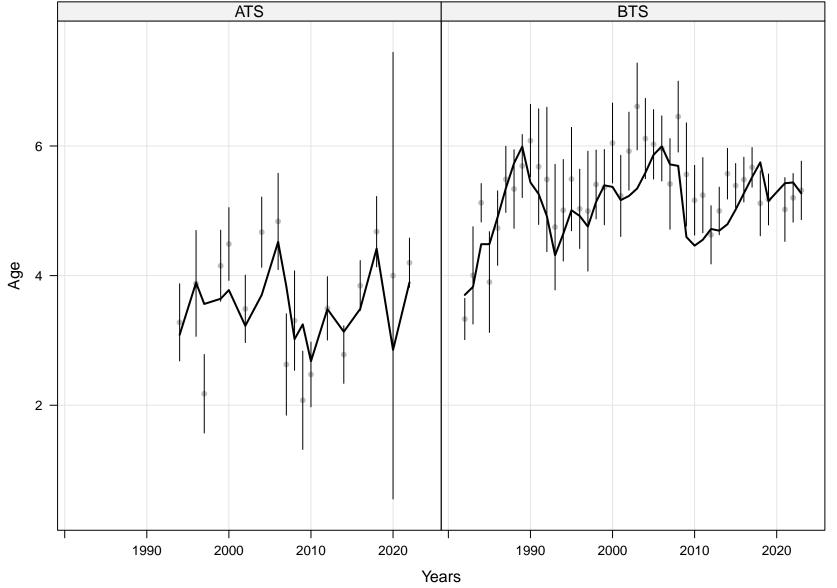
Fishery mean age

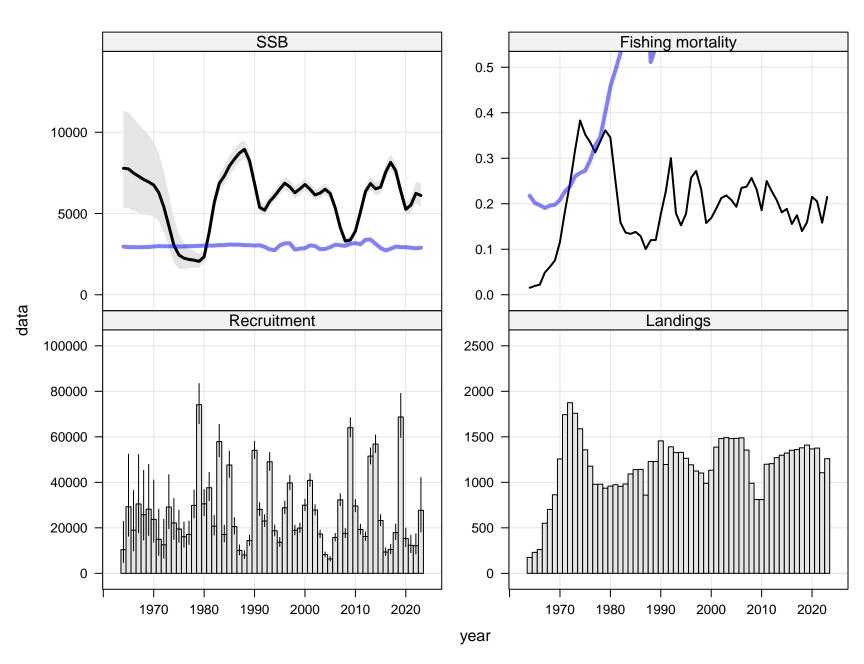
Observed • Modelled —

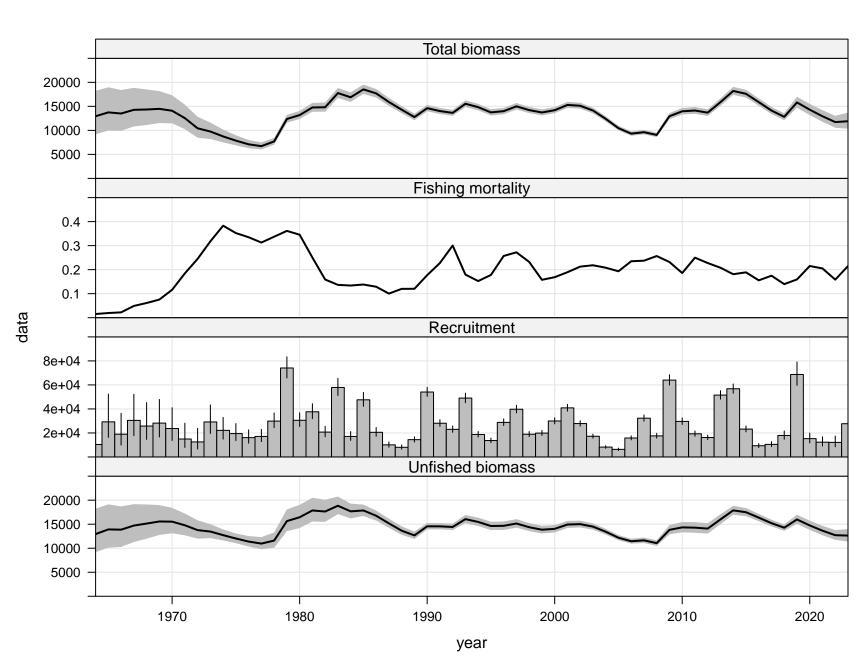


Survey mean age

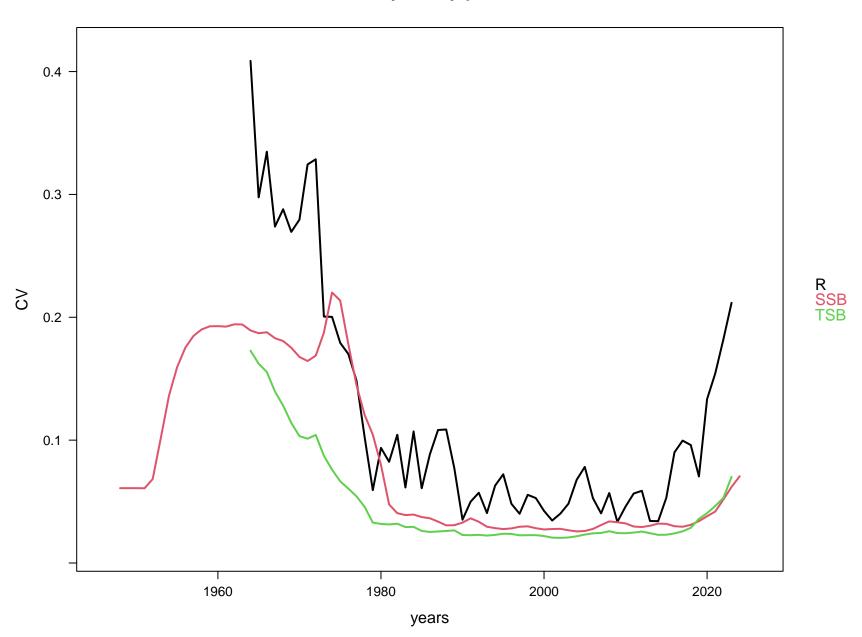








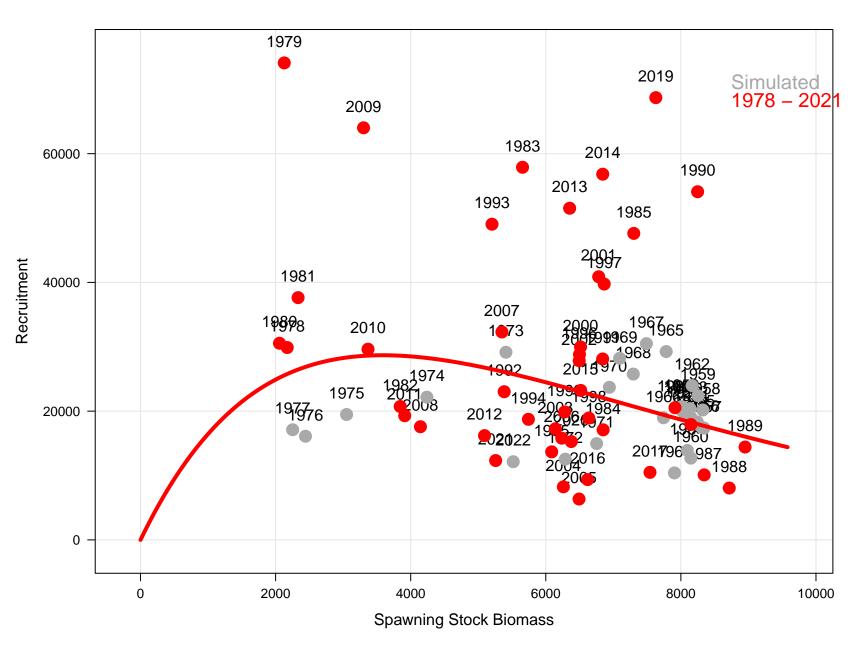
### **Uncertainty of key parameters**



Mature - Immature fish Mature · · · · **Immature** 10000 8000 Biomass in kt 6000 -4000 -2000 1970 1980 2000 2010 2020 1990

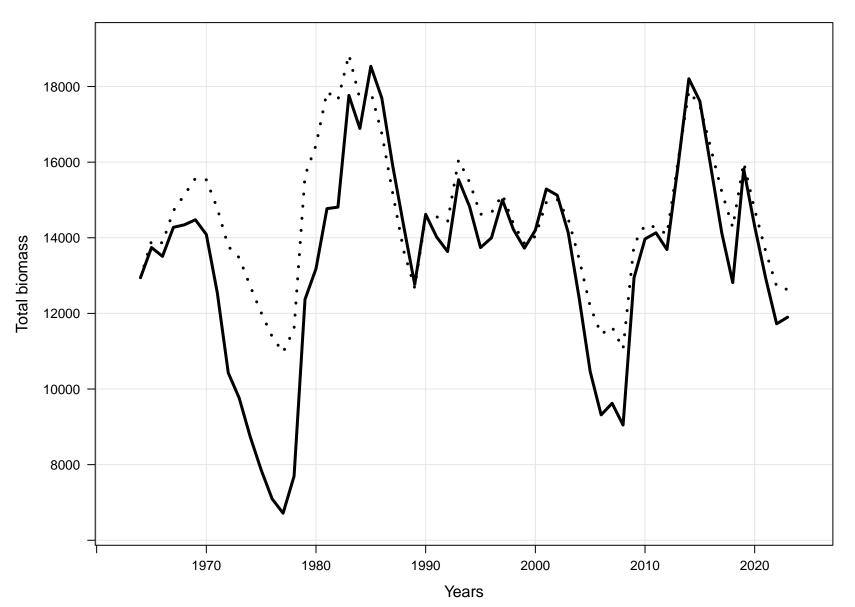
Years

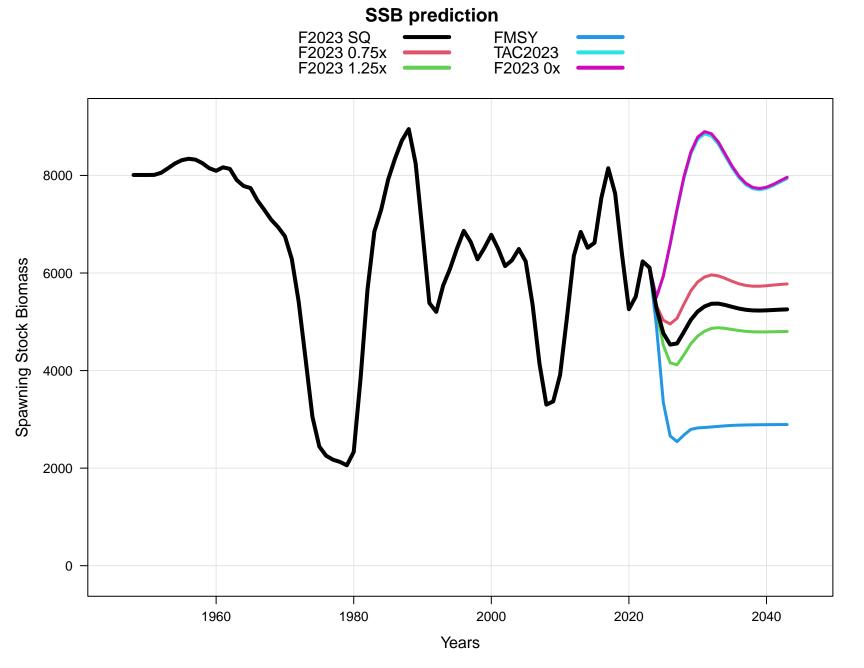
#### **Stock Recruitment**



Comparing fished with unfished biomass

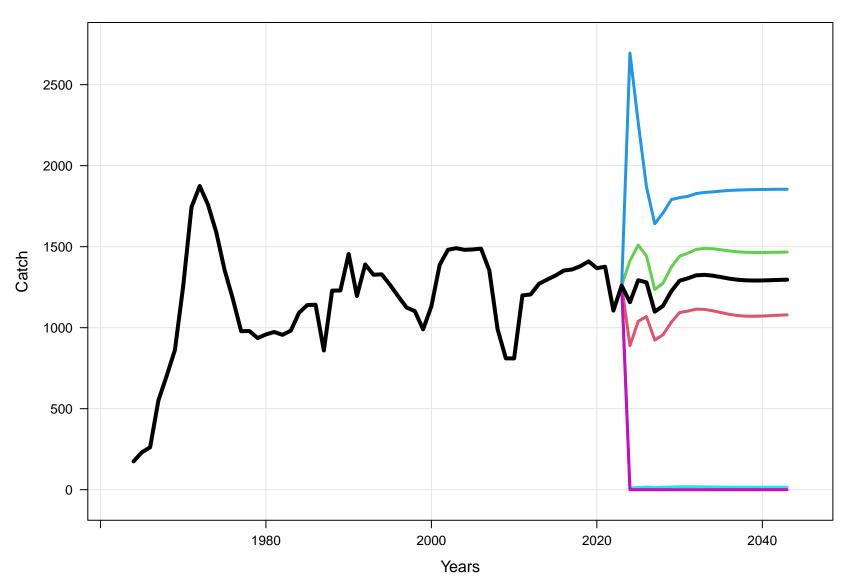
Fished — Unfished ·····



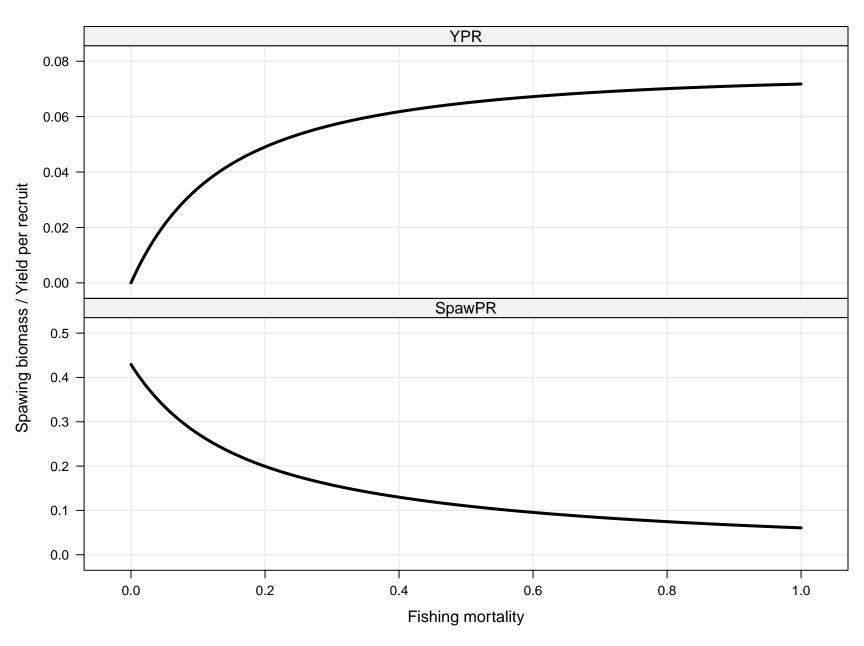


# **Catch prediction**

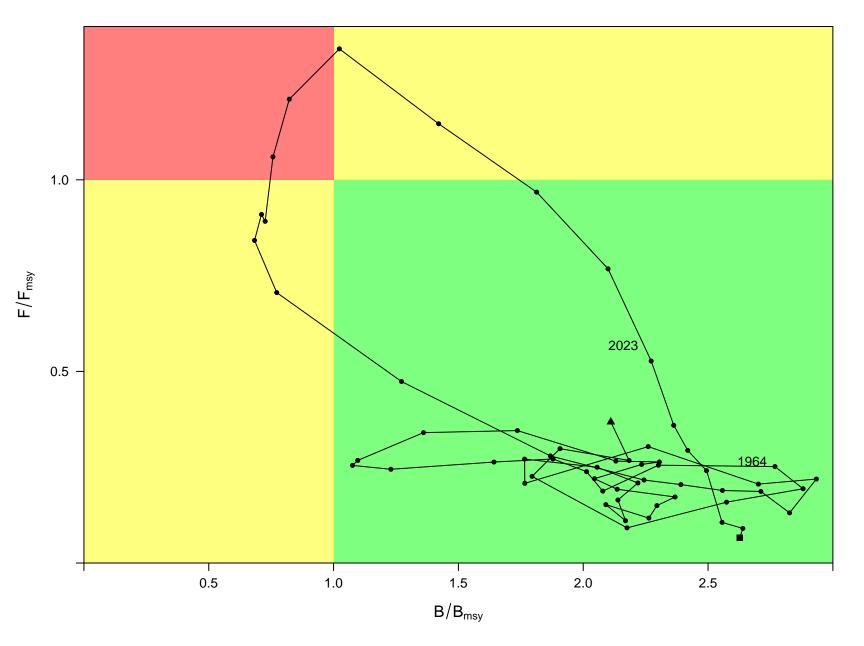


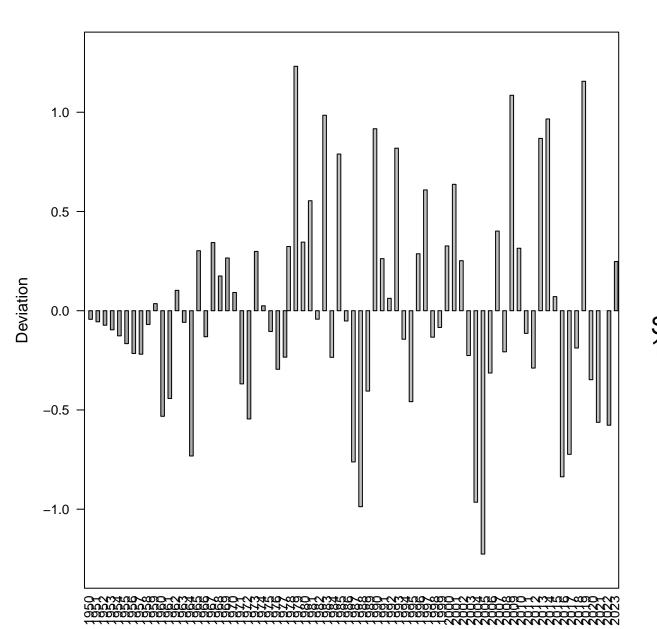


### Yield and spawing stock biomass per recruit



Kobe plot





Simulated 1978 – 2021

