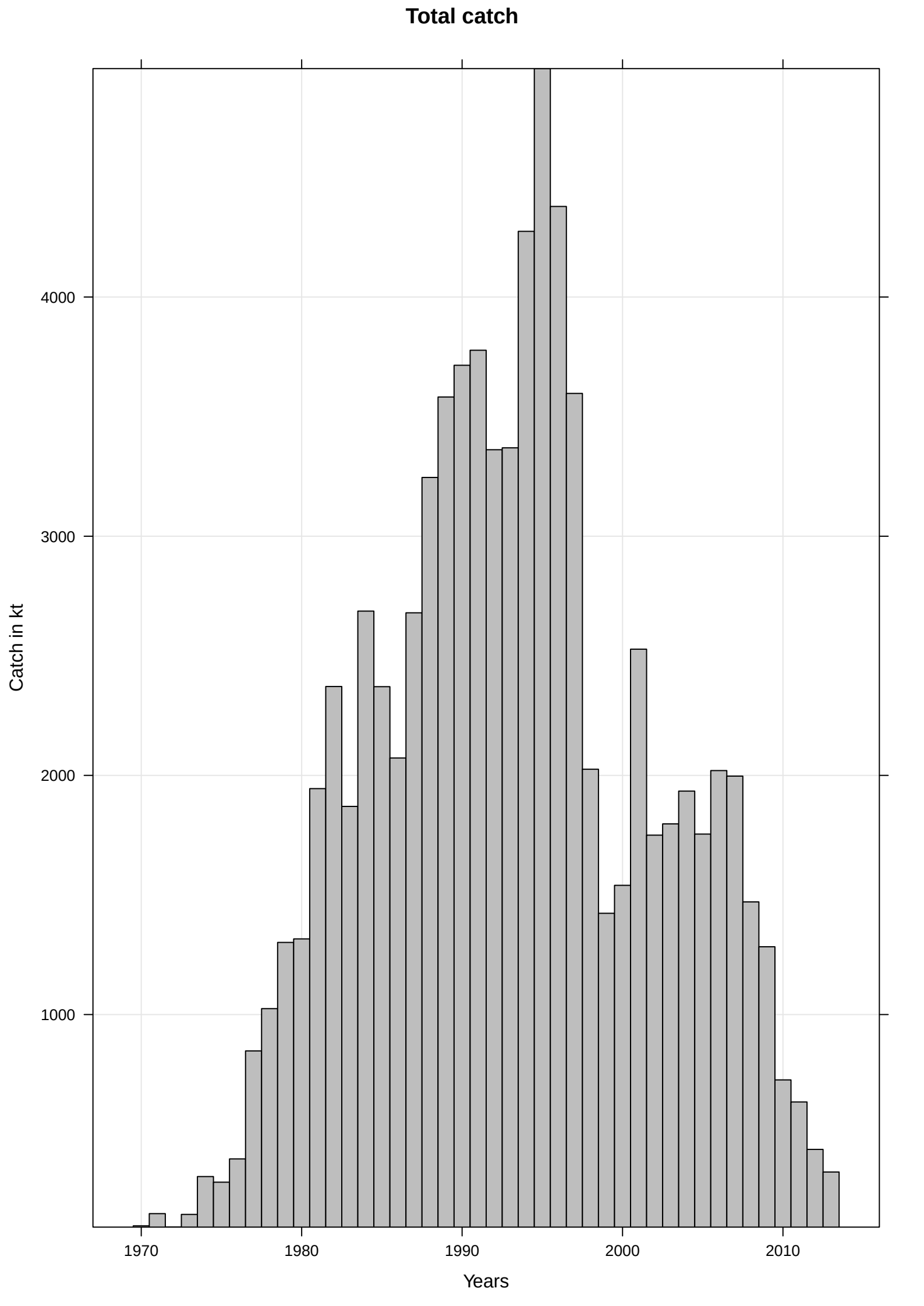
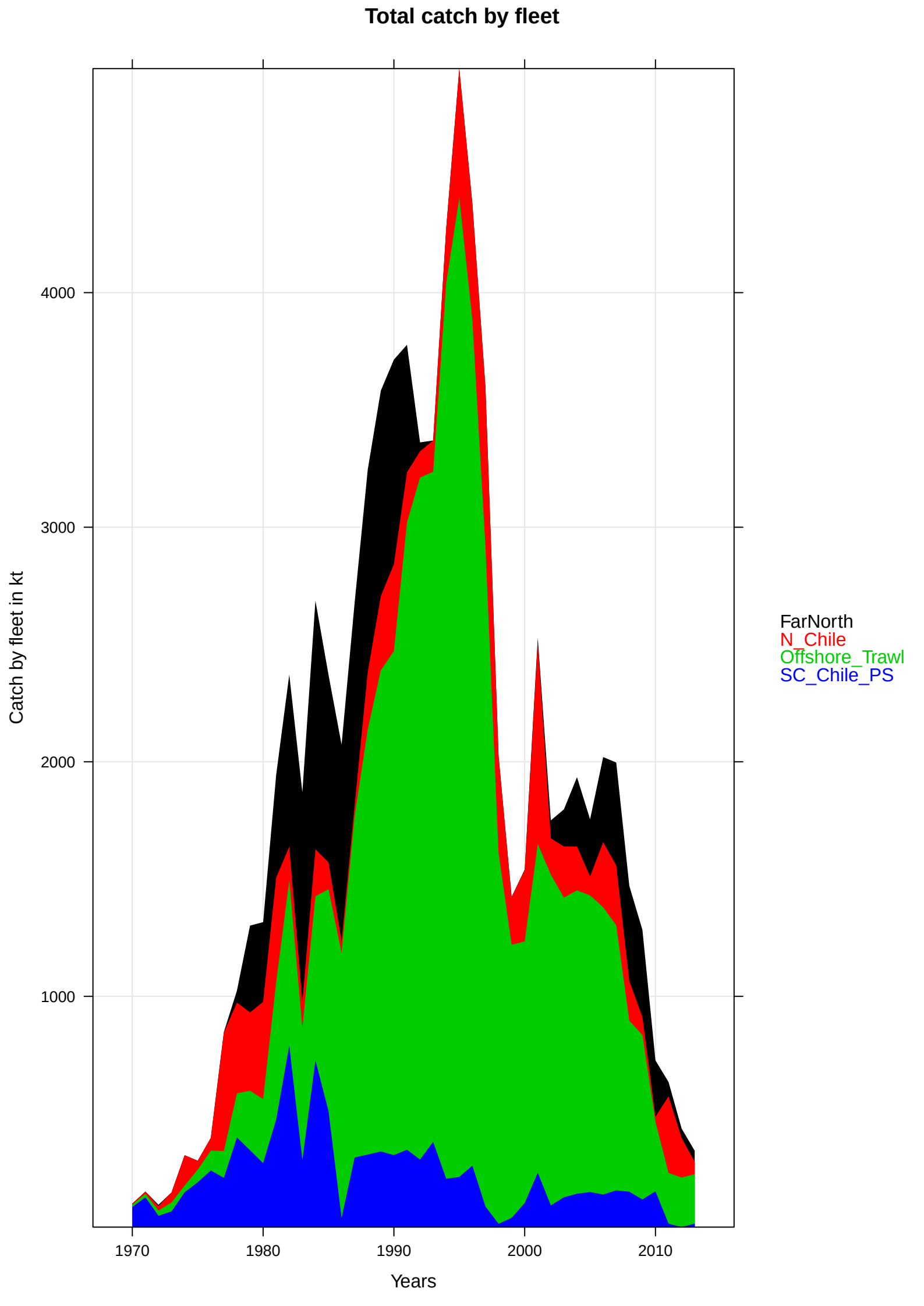
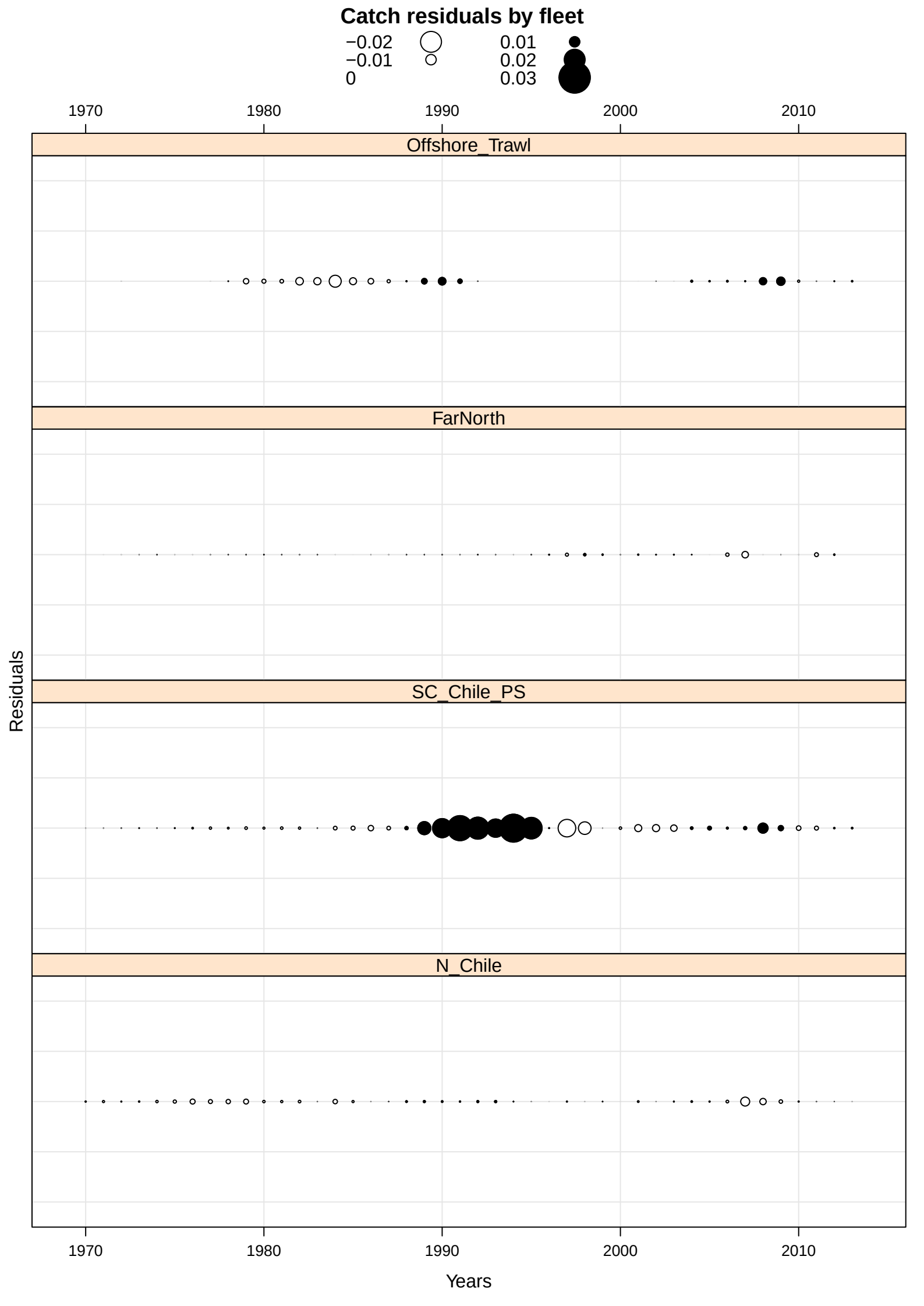
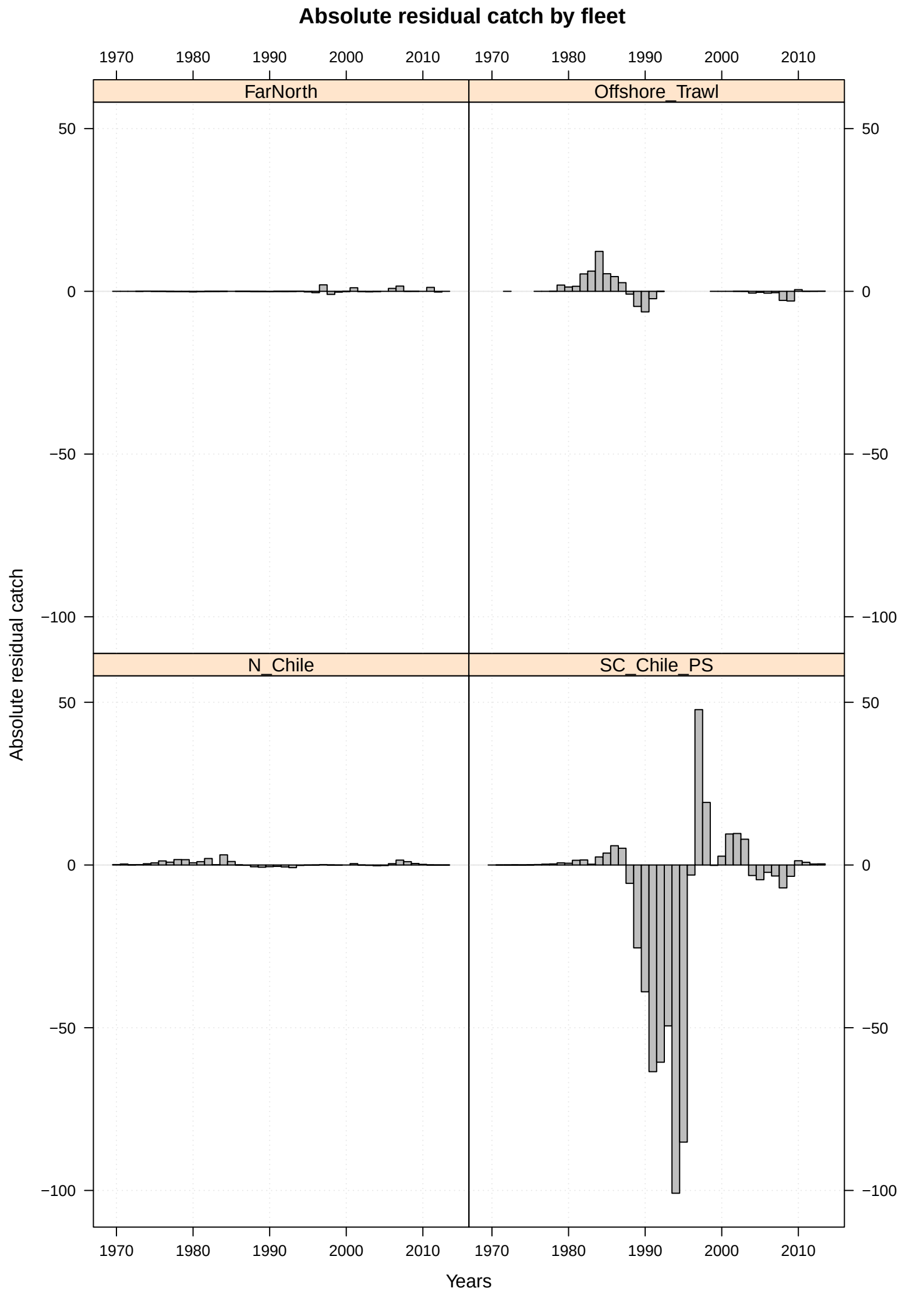
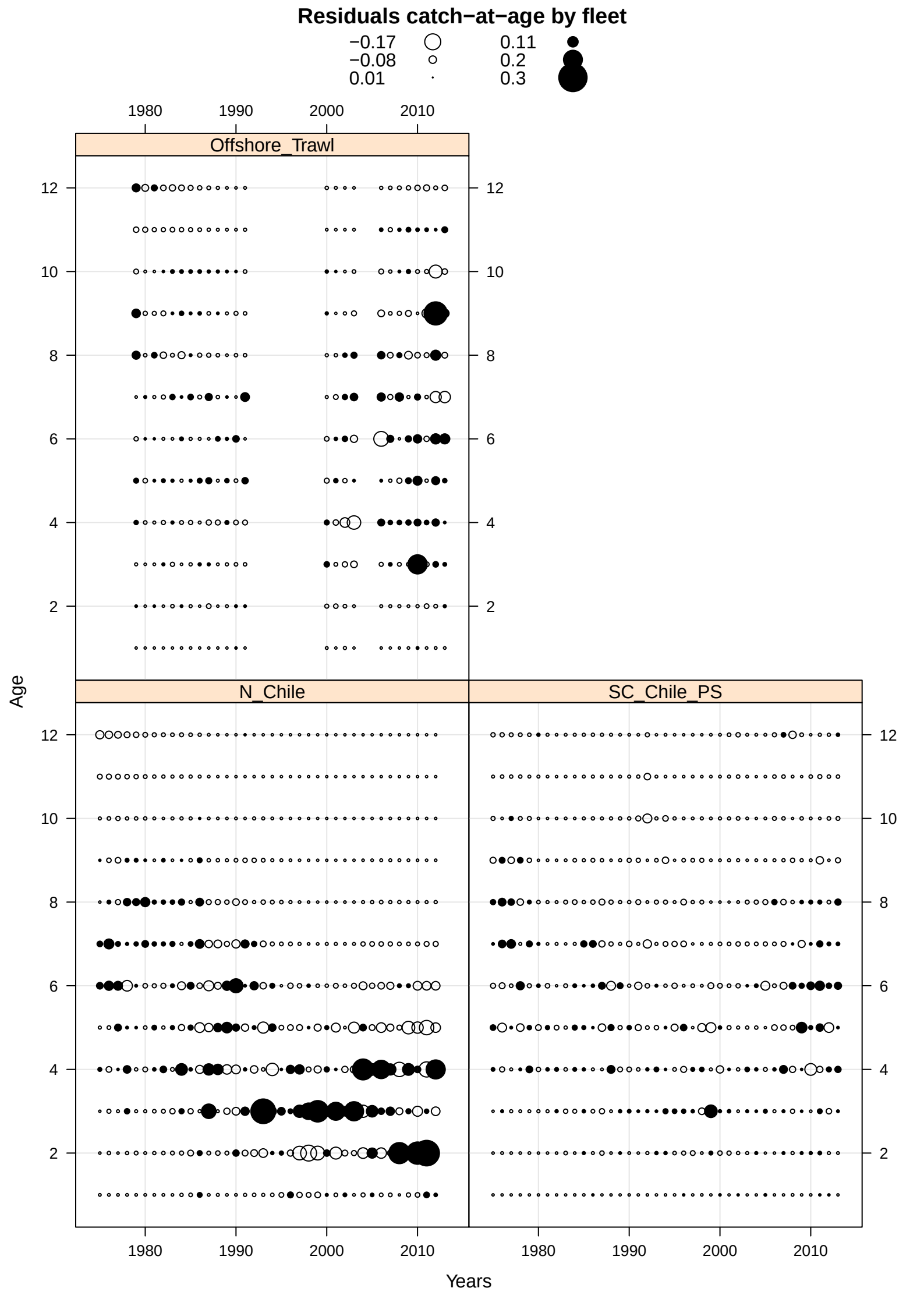
Fit of catch data

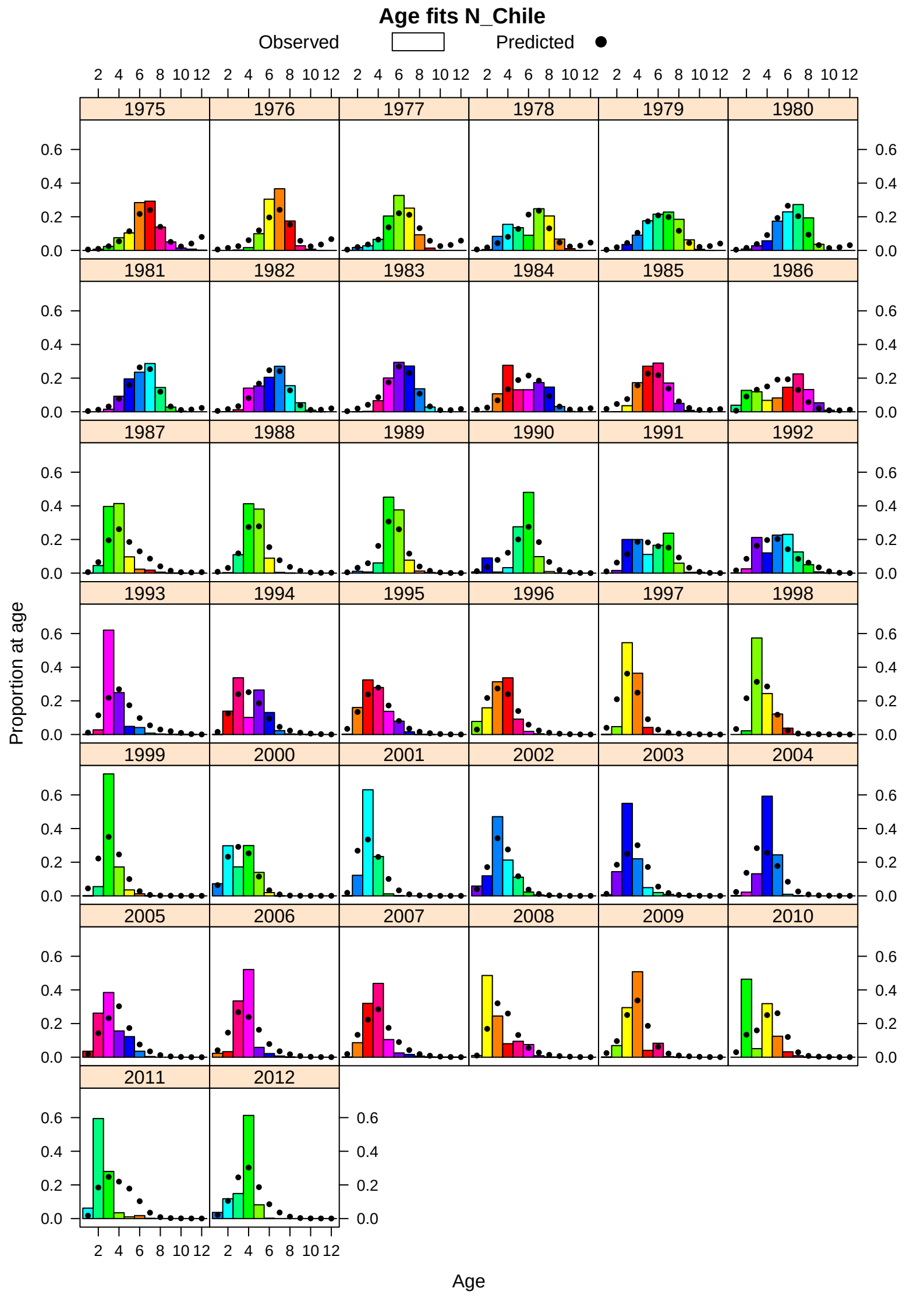

Total catch
Catch in kt
4000
3000
2000
1000
1970
1980
1990
2000
2010
Years

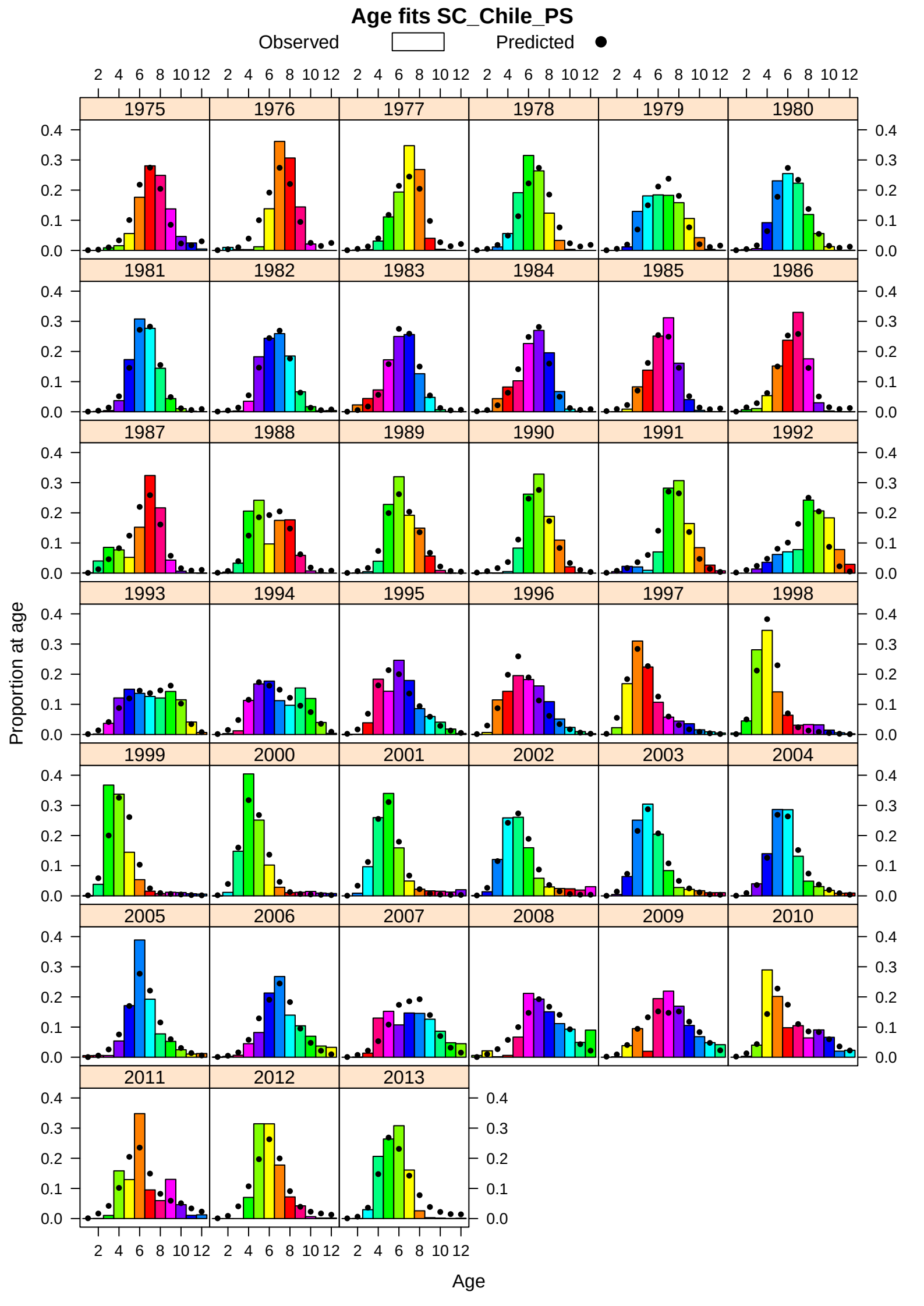

Total catch by fleet
Catch by fleet in kt
4000
3000
2000
1000
1970
1980
1990
2000
2010
Years
FarNorth
N_Chile
Offshore_Trawl
SC_Chile_PS

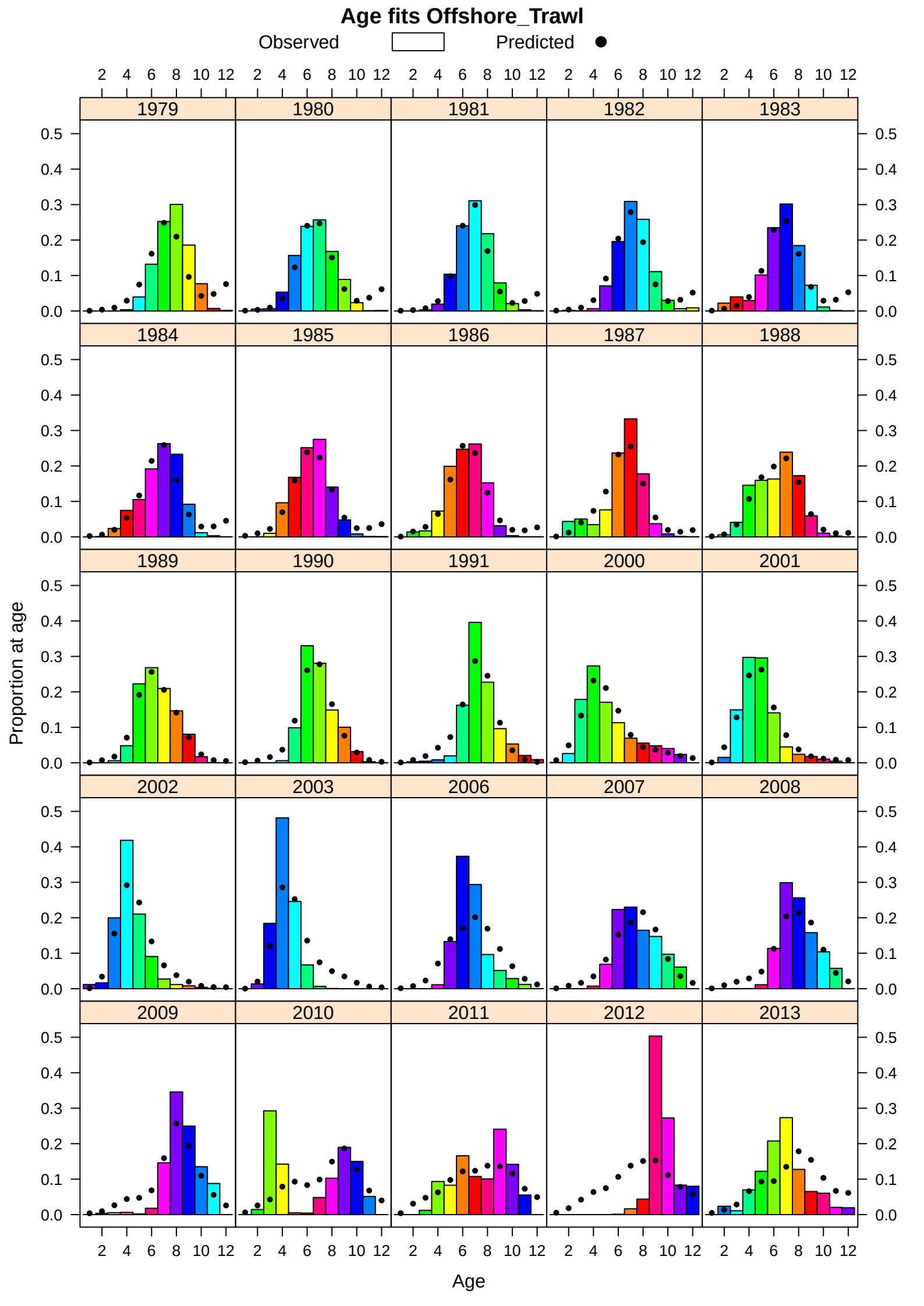

Catch residuals by fleet
−0.02
−0.01
0
0.01
0.02
0.03
1970
1980
1990
2000
2010
Offshore_Trawl
FarNorth
SC_Chile_PS
N_Chile
Residuals
Years

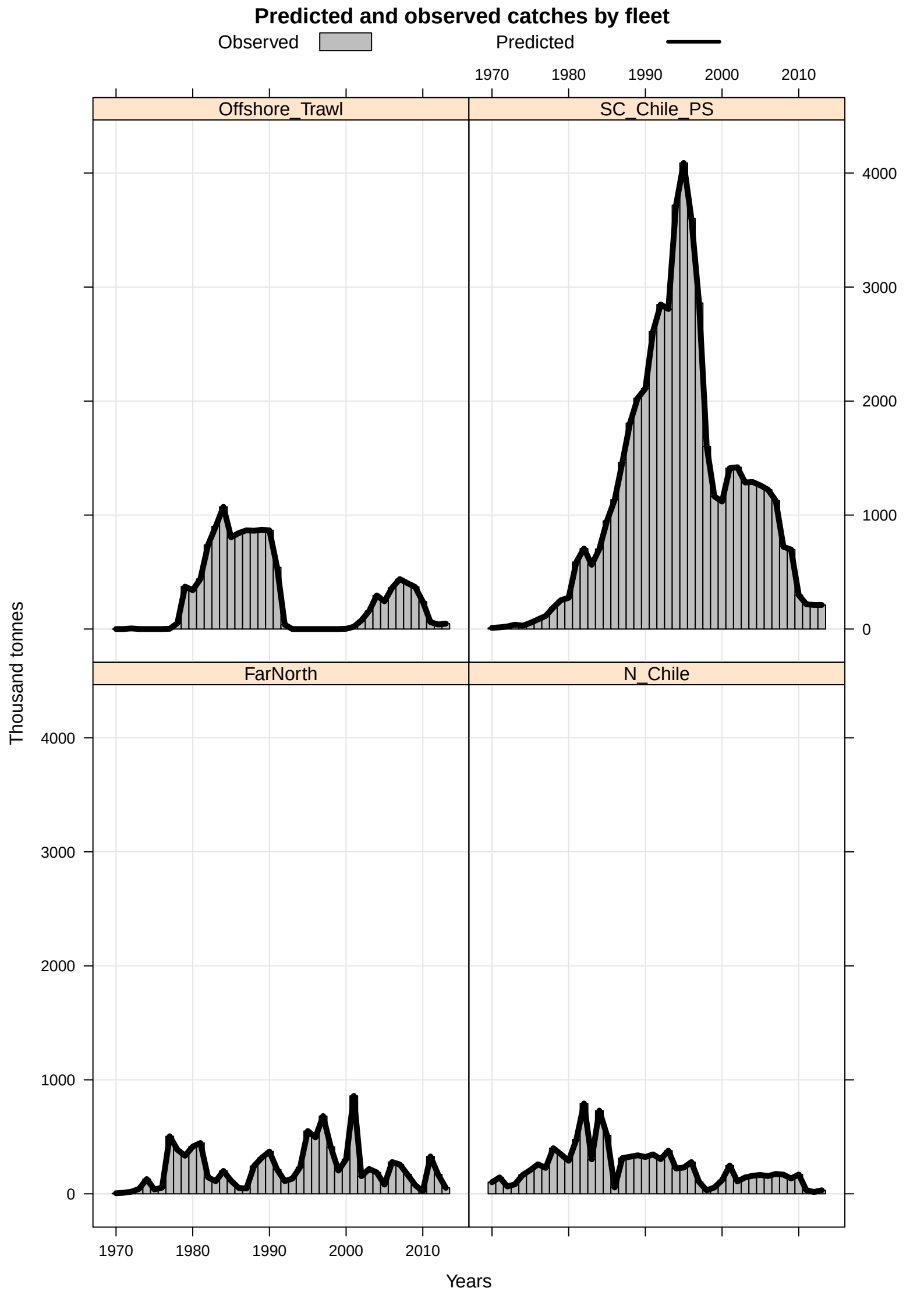

Absolute residual catch by fleet
FarNorth
Offshore_Trawl
N_Chile
SC_Chile_PS
1970
1980
1990
2000
2010
50
0
−50
−100
Absolute residual catch
Years


Residuals catch−at−age by fleet
−0.17
−0.08
0.01
0.11
0.2
0.3
Offshore_Trawl
N_Chile
SC_Chile_PS
Age
Years
1980
1990
2000
2010
2
4
6
8
10
12

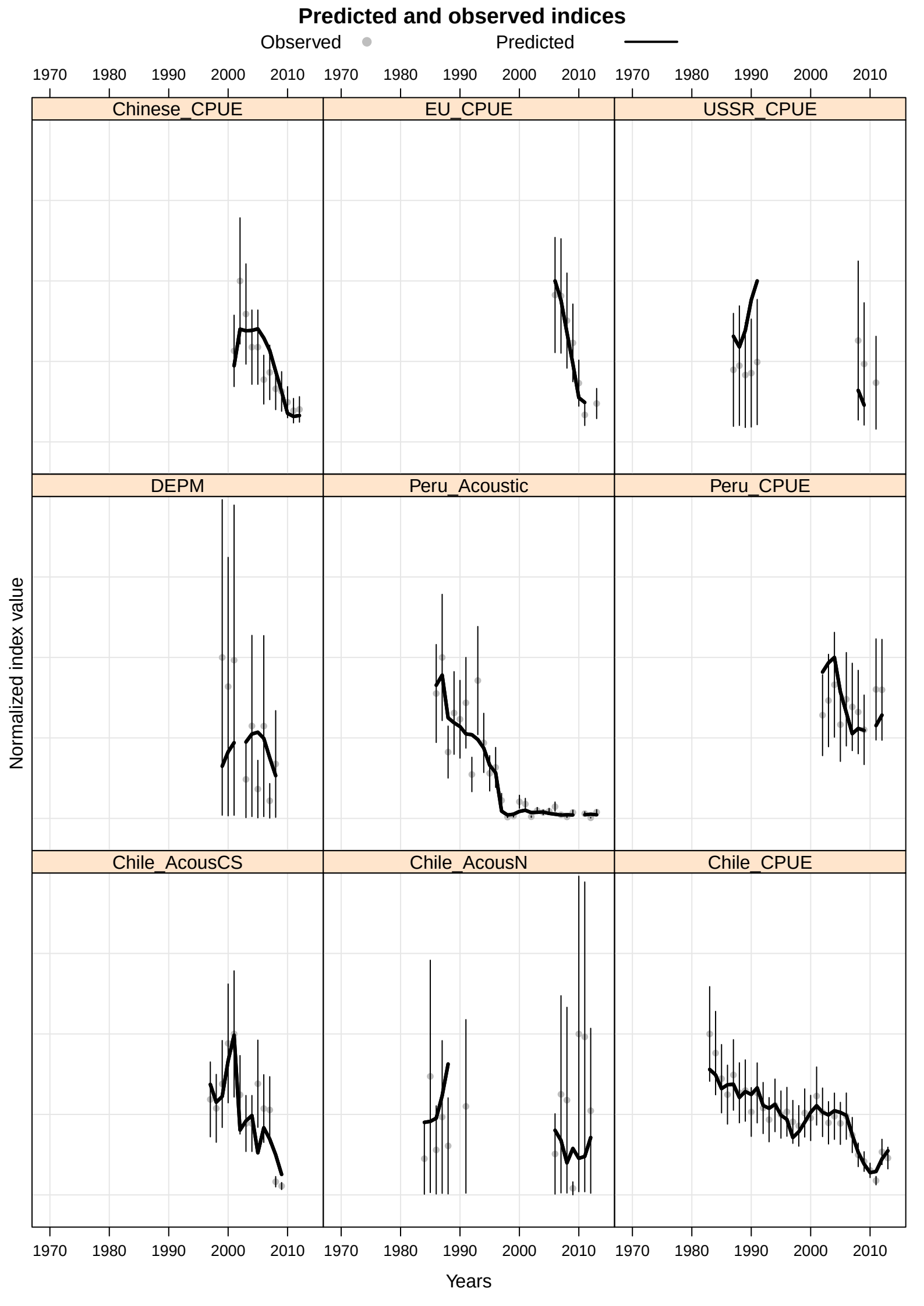

Age fits N_Chile
Observed
Predicted
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Proportion at age
Age

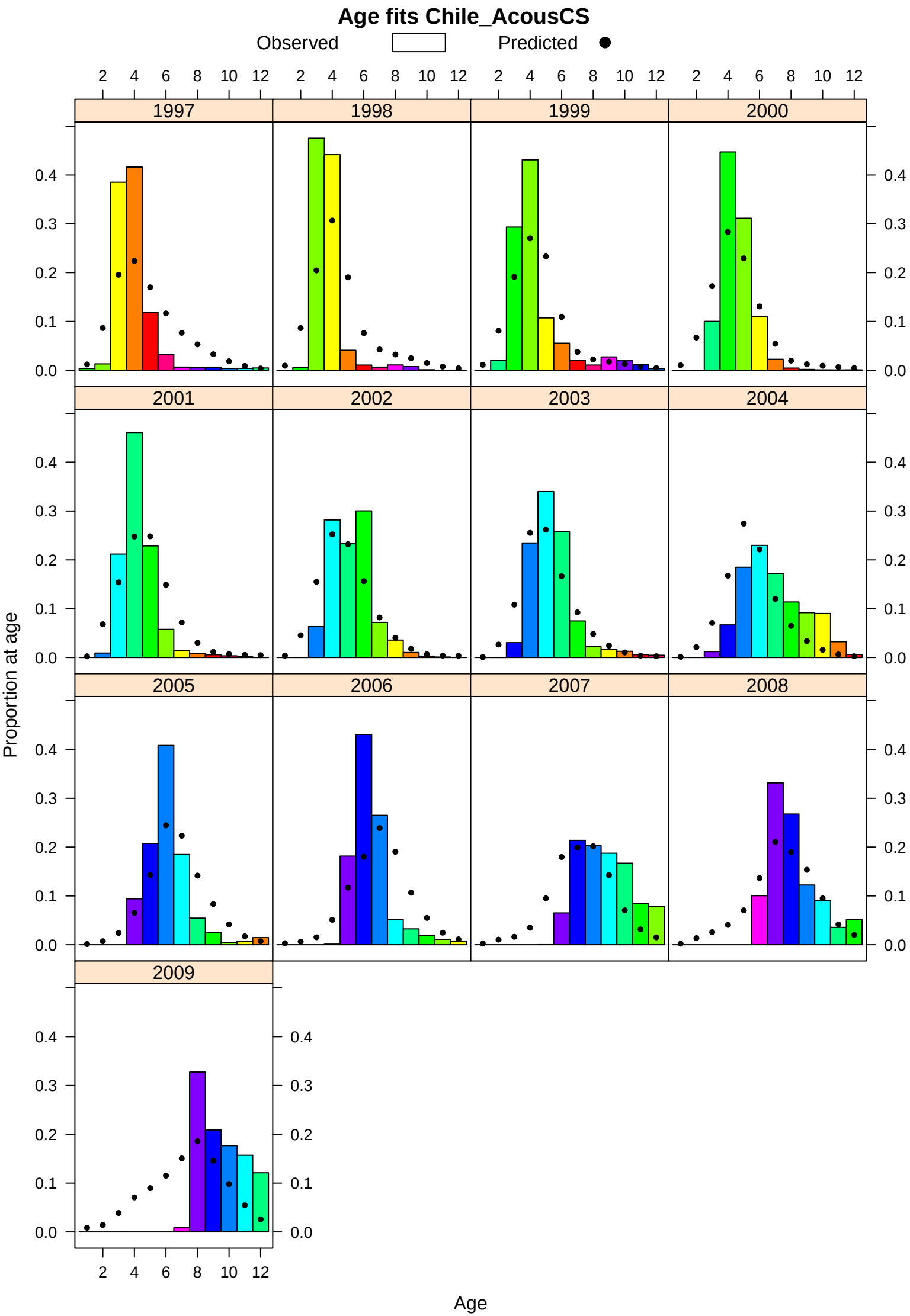

Age fits SC_Chile_PS
Observed
Predicted
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Proportion at age
Age

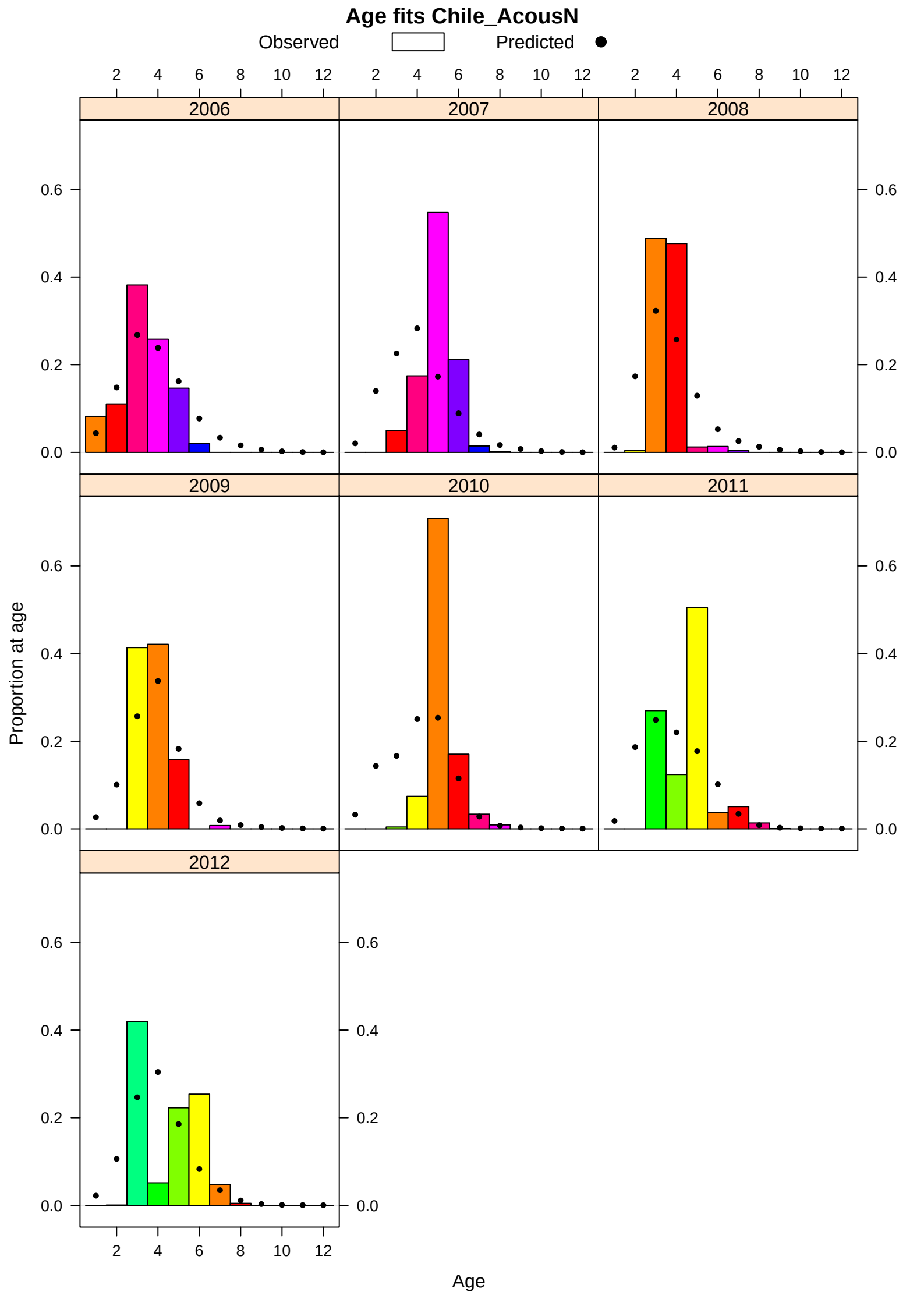

Age fits Offshore_Trawl
Observed
Predicted
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
2000
2001
2002
2003
2006
2007
2008
2009
2010
2011
2012
2013
Proportion at age
Age

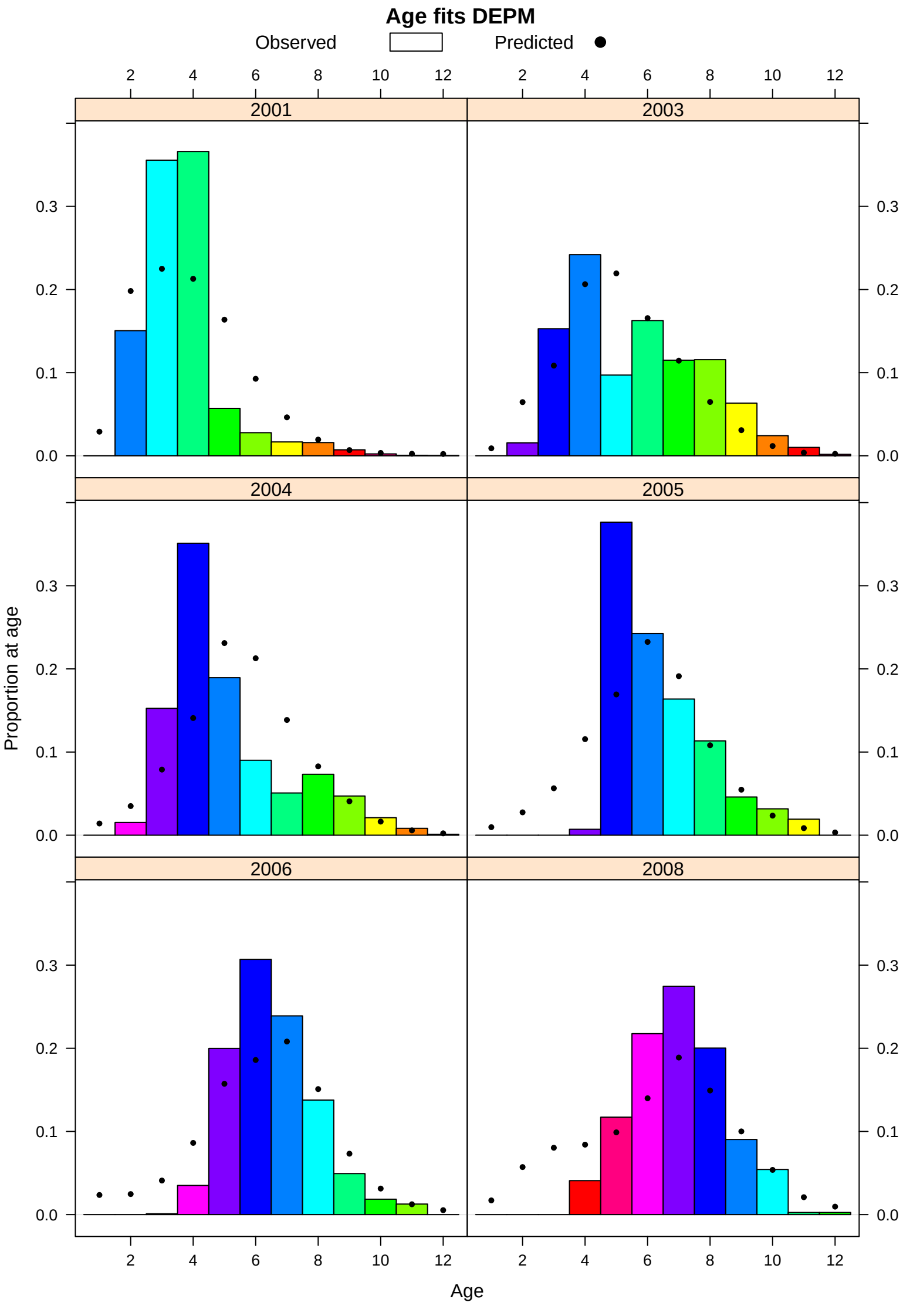

Predicted and observed catches by fleet
Observed
Predicted
Offshore_Trawl
SC_Chile_PS
FarNorth
N_Chile
Thousand tonnes
Years
0
1000
2000
3000
4000
1970
1980
1990
2000
2010

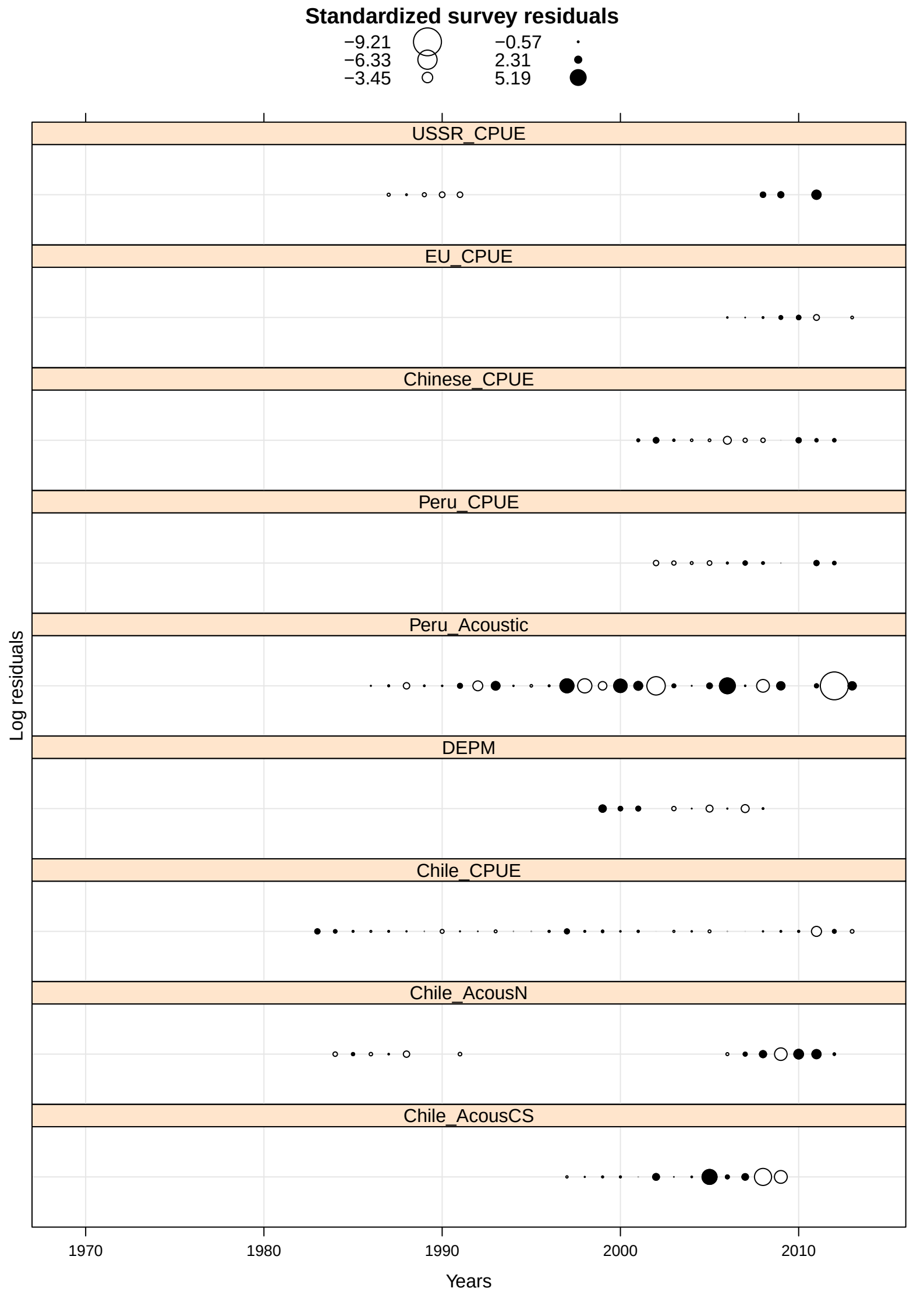
Fit of survey data

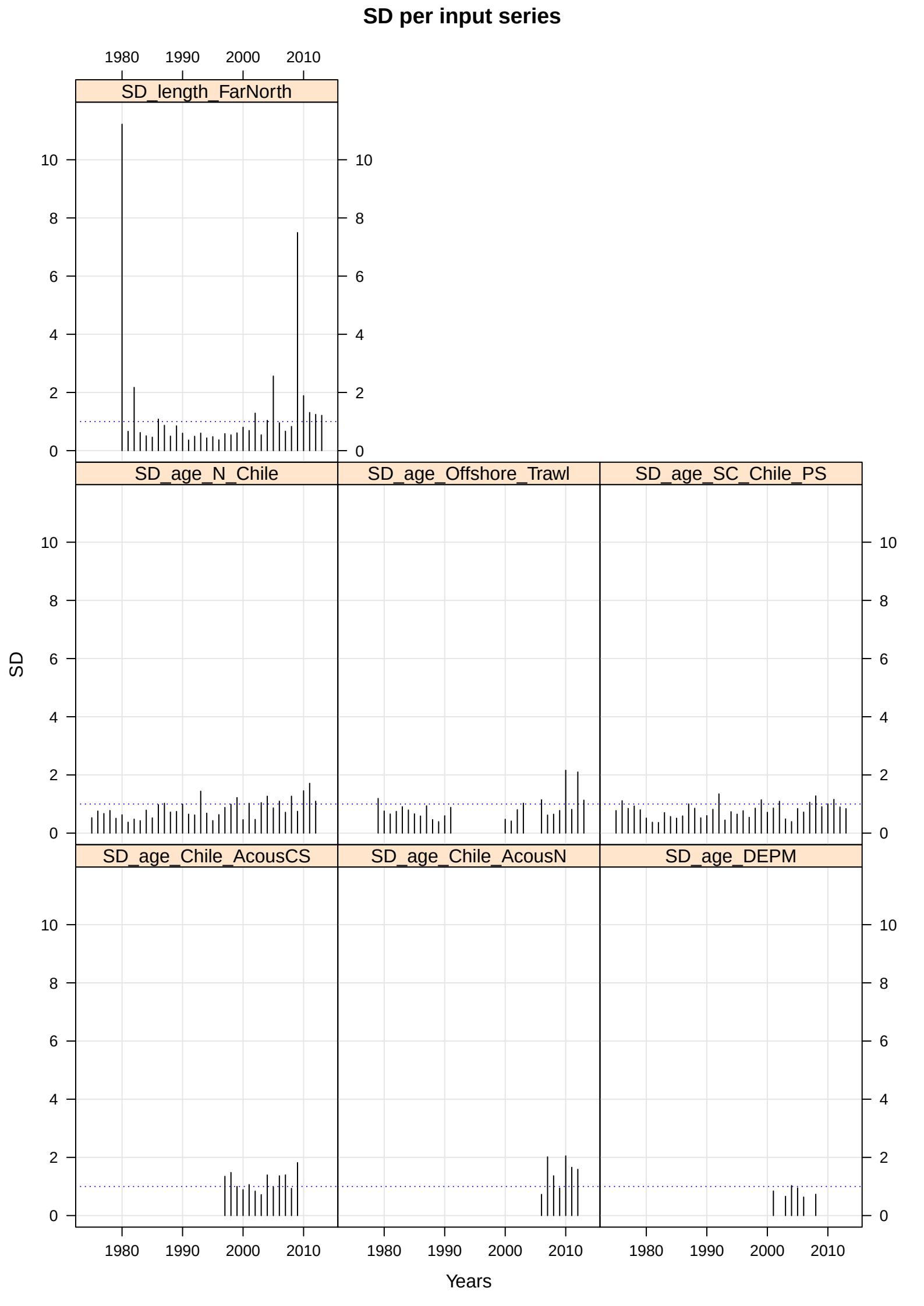

Predicted and observed indices
Observed
Predicted
Chinese_CPUE
EU_CPUE
USSR_CPUE
DEPM
Peru_Acoustic
Peru_CPUE
Chile_AcousCS
Chile_AcousN
Chile_CPUE
Normalized index value
Years
1970
1980
1990
2000
2010


Age fits Chile_AcousCS
Observed
Predicted
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
Proportion at age
Age

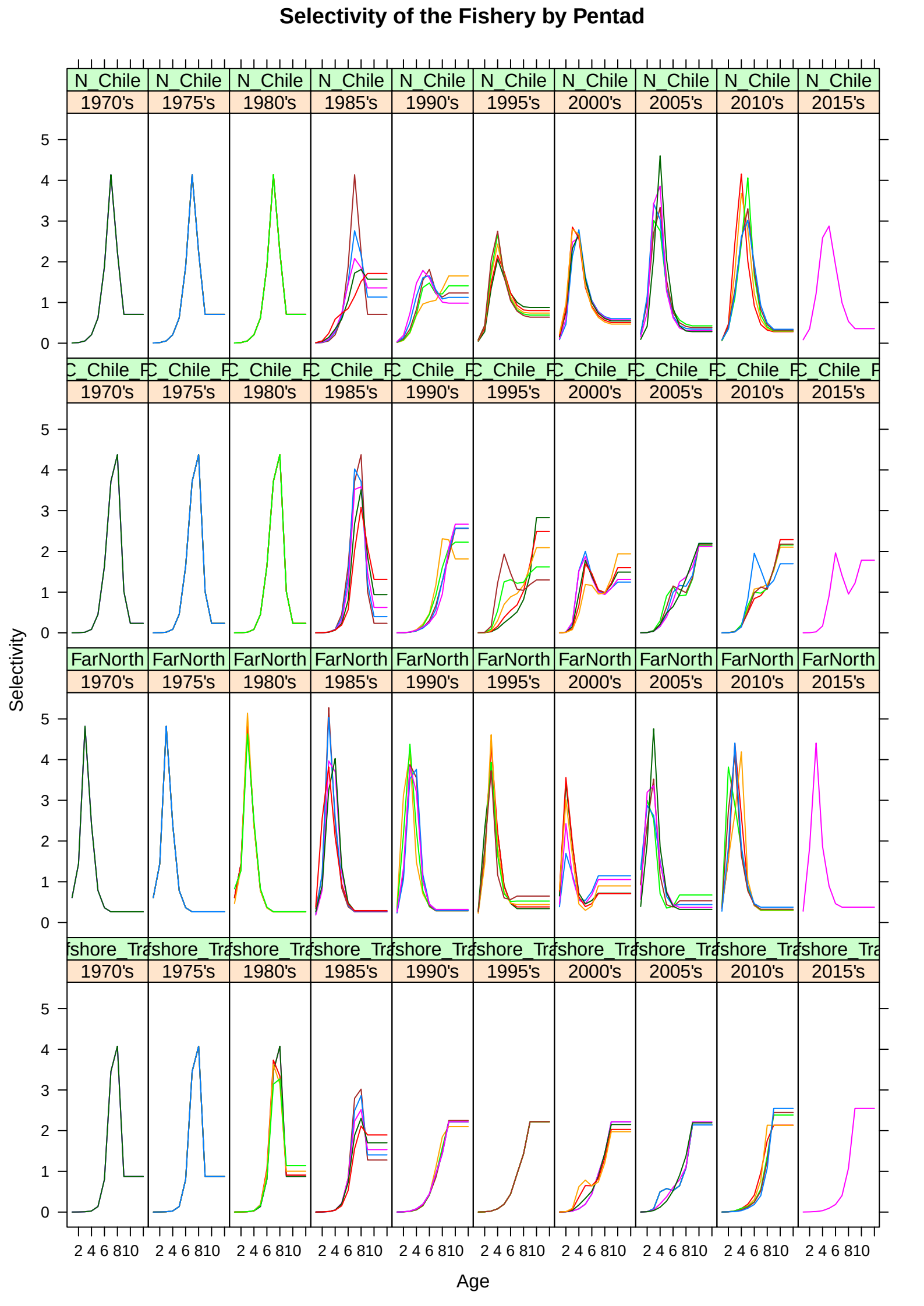

Age fits Chile_AcousN
Observed
Predicted
2006
2007
2008
2009
2010
2011
2012
Proportion at age
Age
0.0
0.2
0.4
0.6
2
4
6
8
10
12

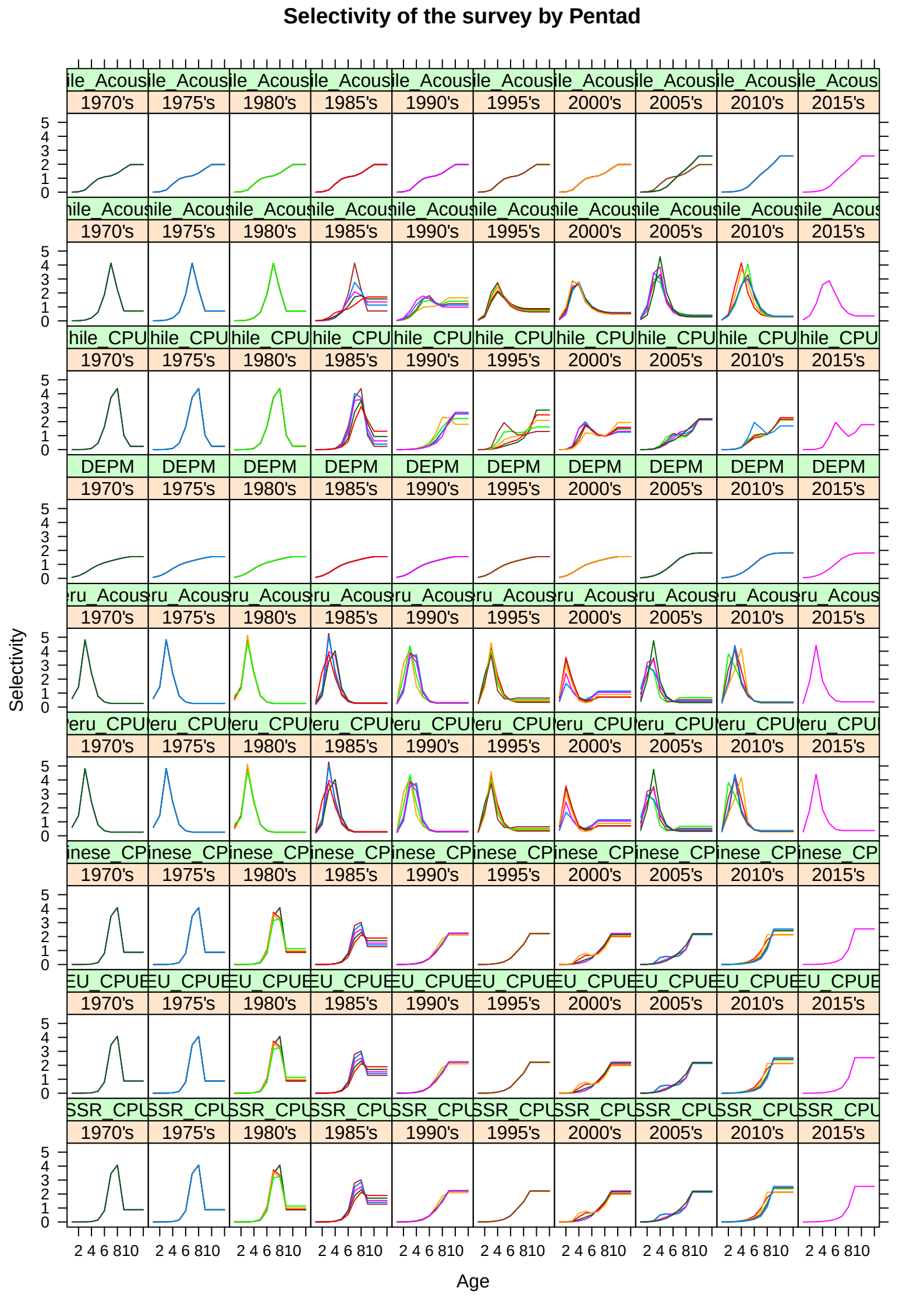

Age fits DEPM
Observed
Predicted
2001
2003
2004
2005
2006
2008
Proportion at age
Age
0.0
0.1
0.2
0.3
2
4
6
8
10
12

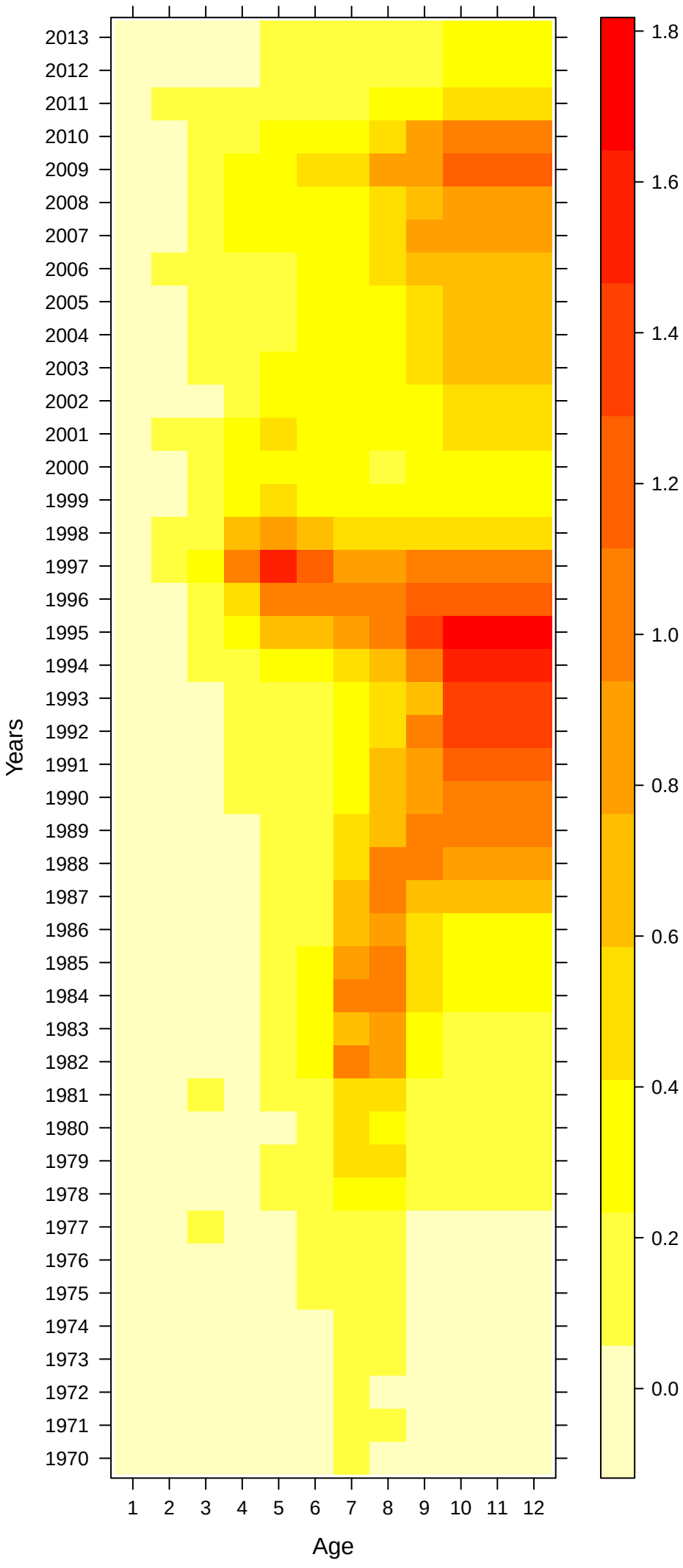

Standardized survey residuals
−9.21
−6.33
−3.45
−0.57
2.31
5.19
USSR_CPUE
EU_CPUE
Chinese_CPUE
Peru_CPUE
Peru_Acoustic
DEPM
Chile_CPUE
Chile_AcousN
Chile_AcousCS
Log residuals
1970
1980
1990
2000
2010
Years

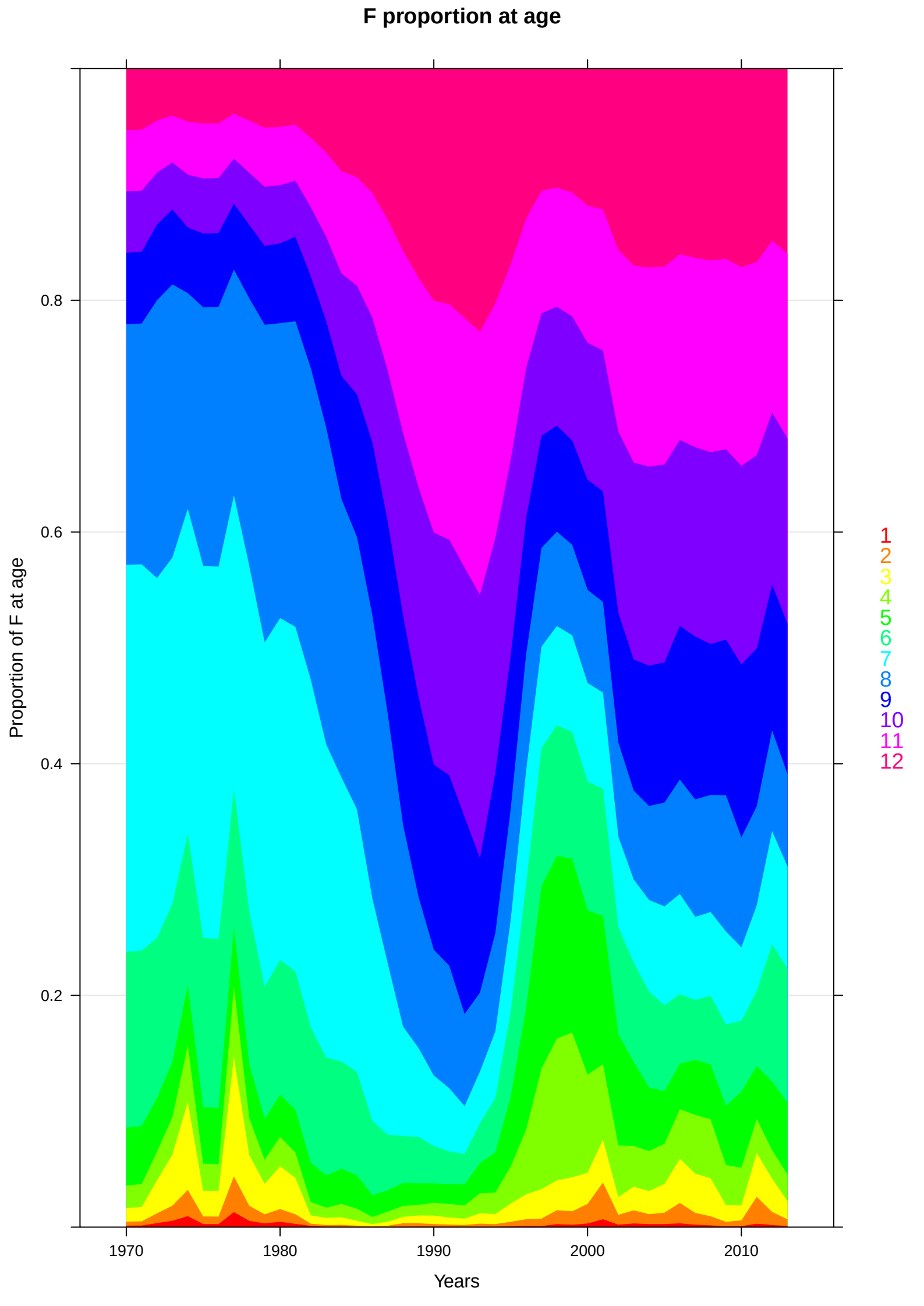

SD per input series
SD_length_FarNorth
SD_age_N_Chile
SD_age_Offshore_Trawl
SD_age_SC_Chile_PS
SD_age_Chile_AcousCS
SD_age_Chile_AcousN
SD_age_DEPM
SD
Years
0
2
4
6
8
10
1980
1990
2000
2010

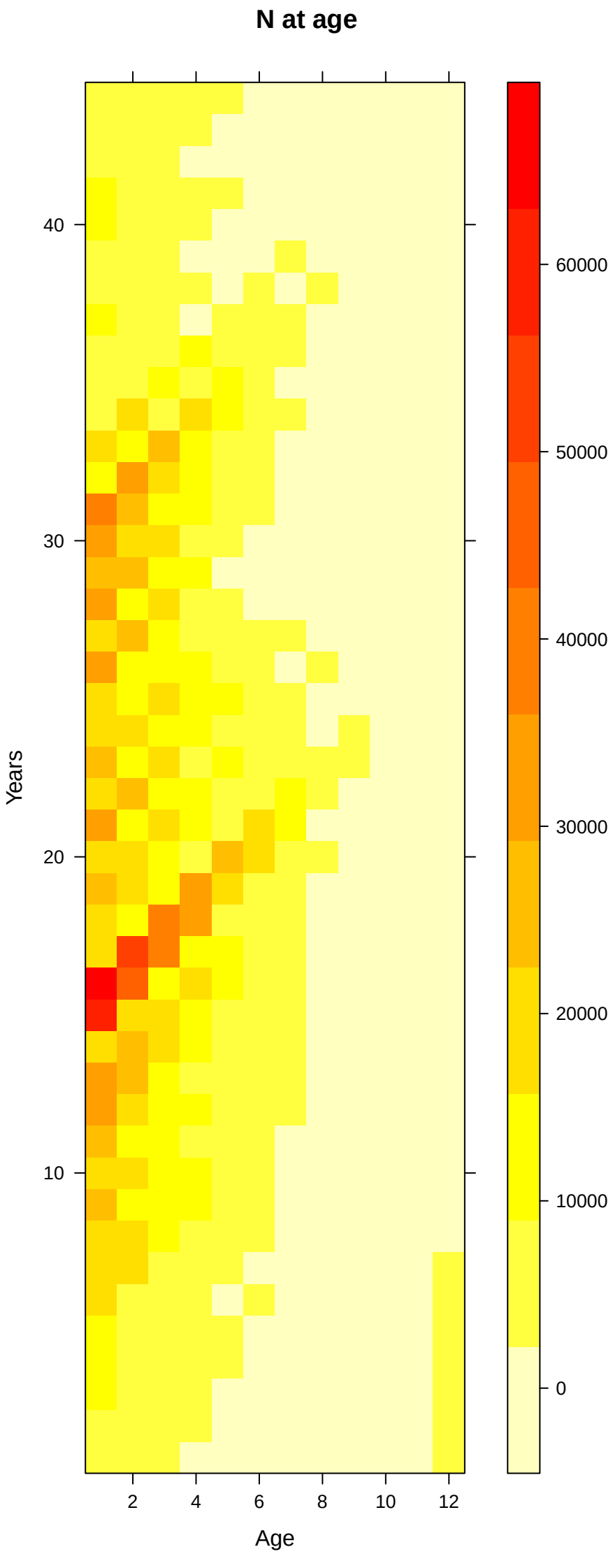
Fleet & Survey sel & F

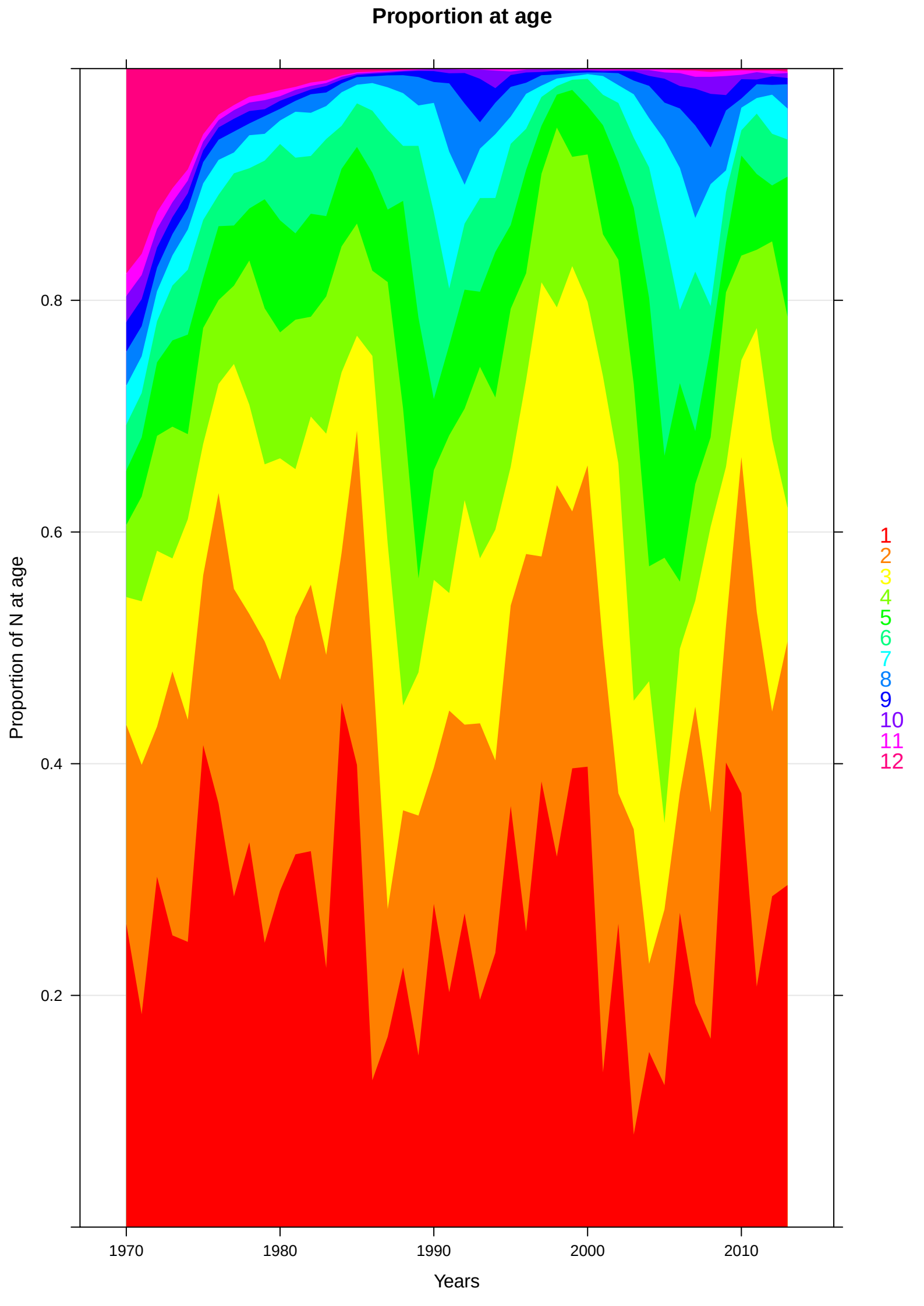

Selectivity of the Fishery by Pentad
N_Chile
1970's
1975's
1980's
1985's
1990's
1995's
2000's
2005's
2010's
2015's
FarNorth
Selectivity
Age
0
1
2
3
4
5
2 4 6 8 10

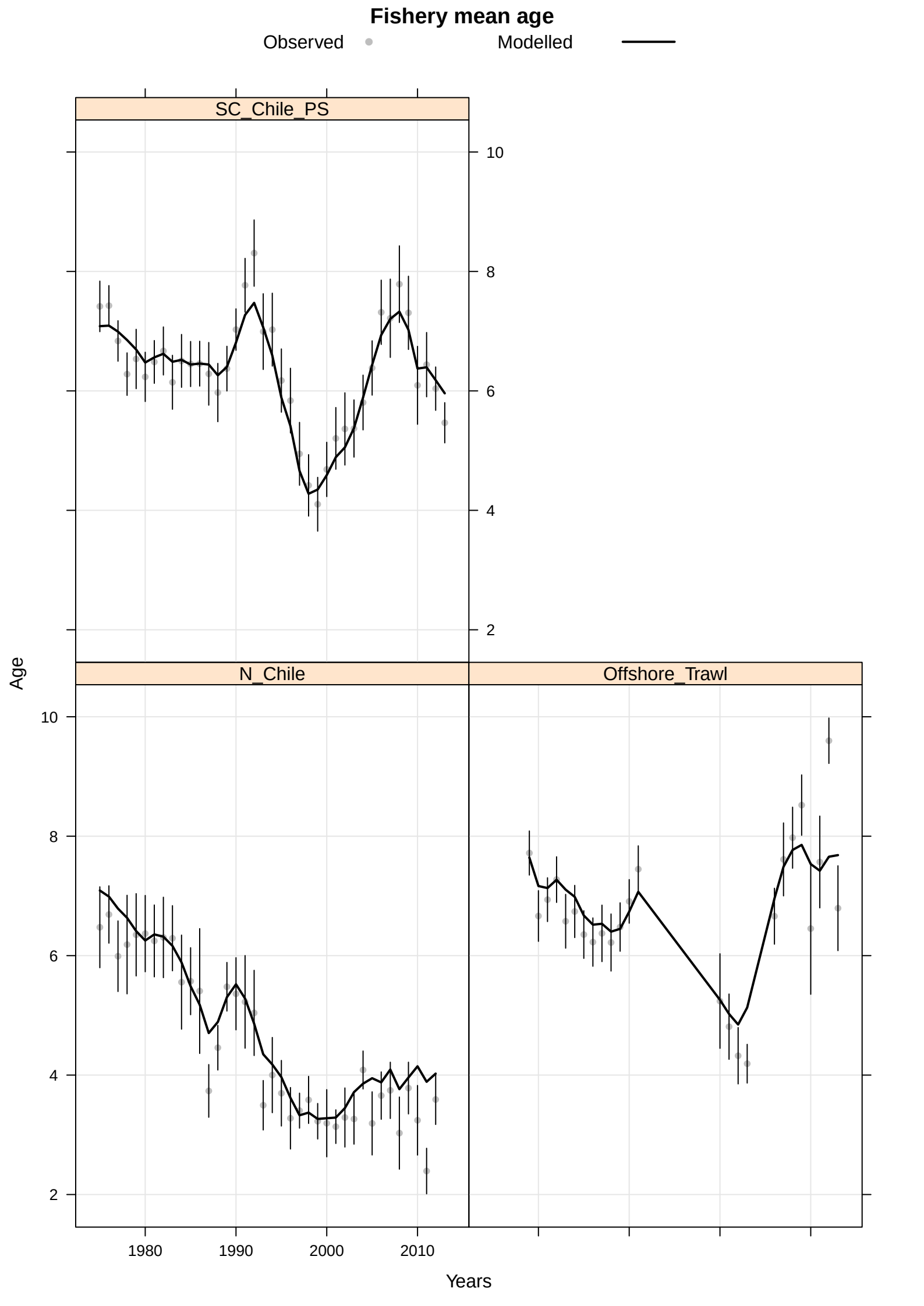

Selectivity of the survey by Pentad
1970's
1975's
1980's
1985's
1990's
1995's
2000's
2005's
2010's
2015's
DEPM
Selectivity
Age

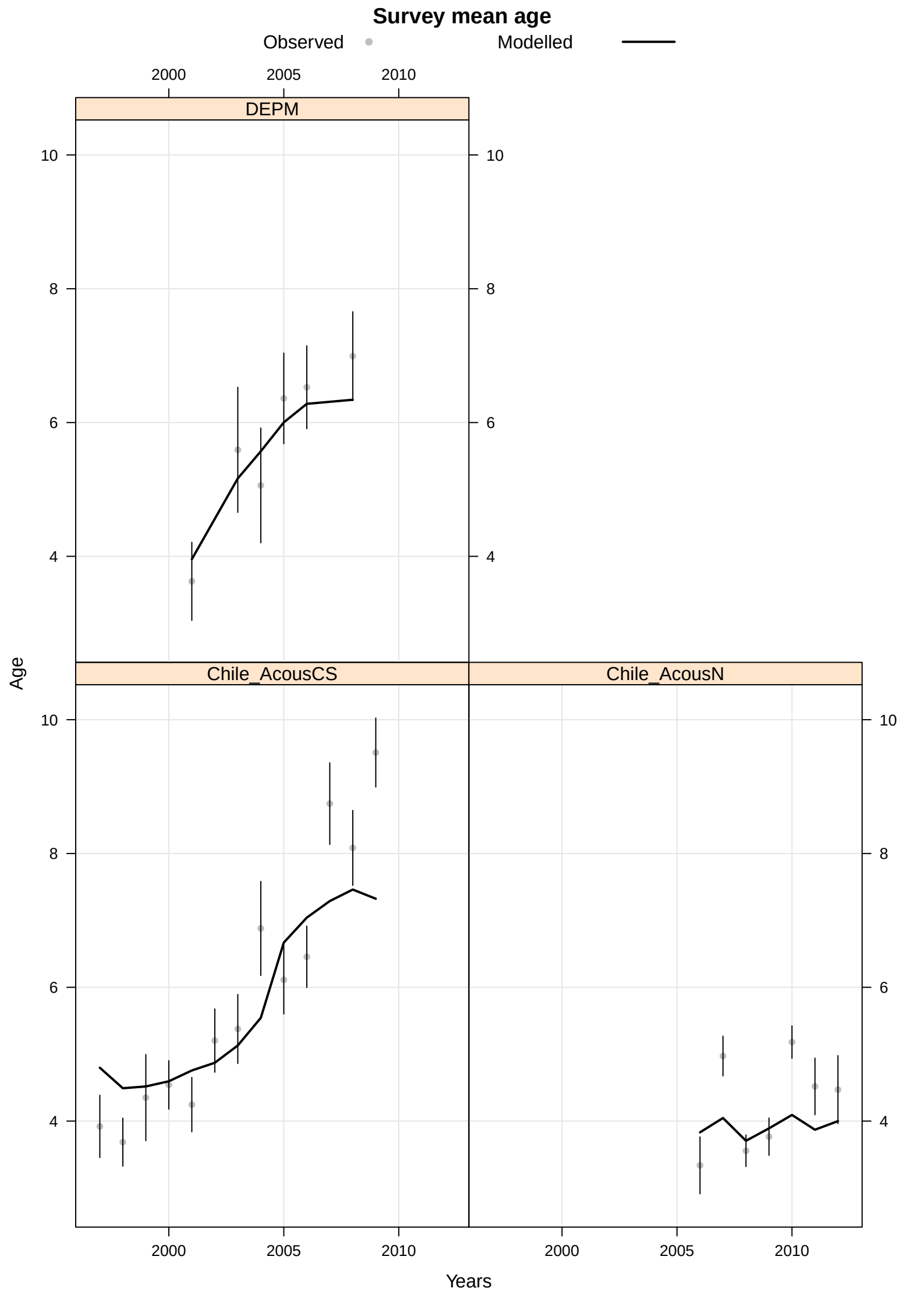

F at age
Years
2013
2012
2011
2010
2009
2008
2007
2006
2005
2004
2003
2002
2001
2000
1999
1998
1997
1996
1995
1994
1993
1992
1991
1990
1989
1988
1987
1986
1985
1984
1983
1982
1981
1980
1979
1978
1977
1976
1975
1974
1973
1972
1971
1970
1 2 3 4 5 6 7 8 9 10 11 12
Age
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0


F proportion at age
Proportion of F at age
0.2
0.4
0.6
0.8
1970
1980
1990
2000
2010
Years
1
2
3
4
5
6
7
8
9
10
11
12

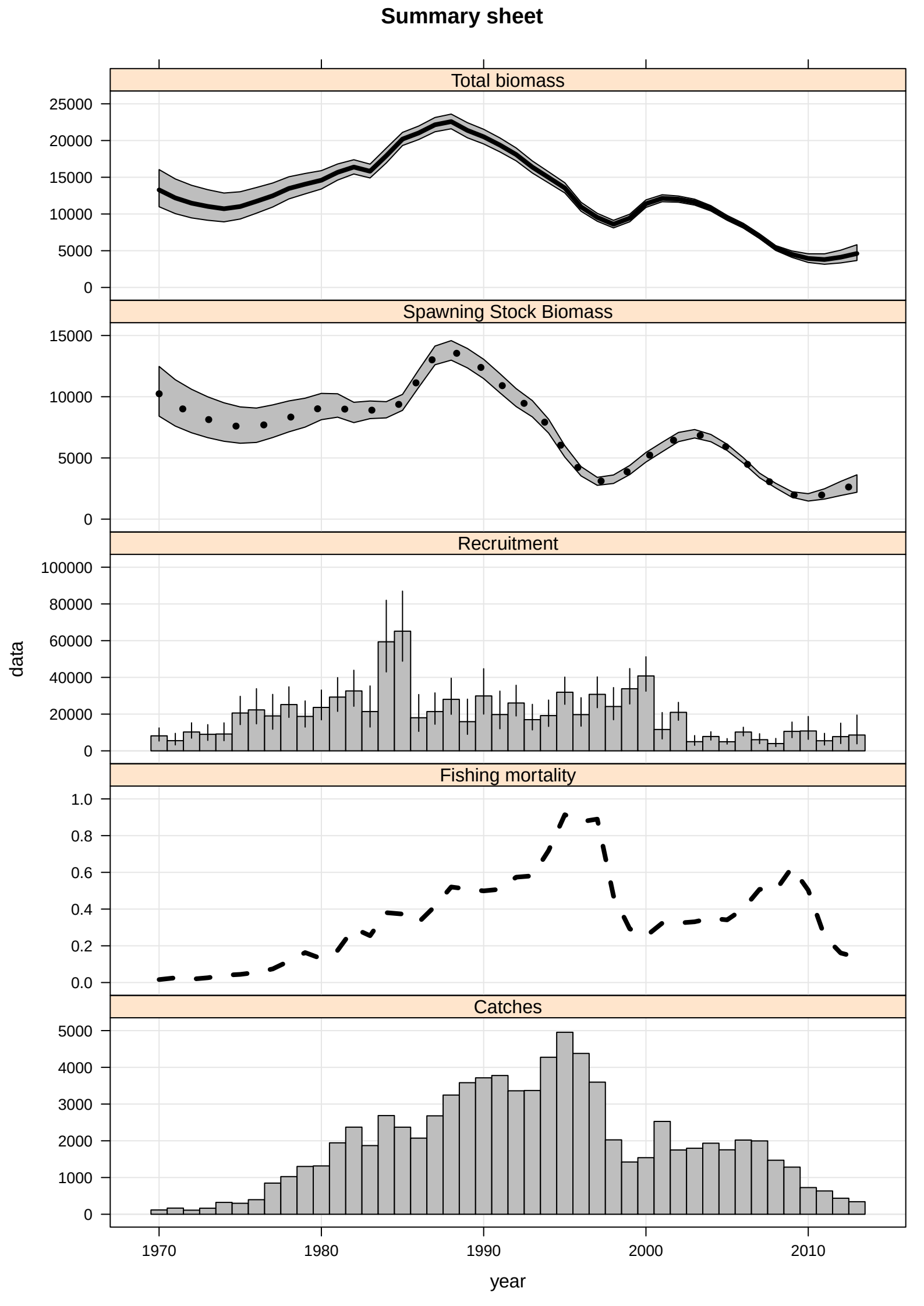

N at age
Years
40
30
20
10
2
4
6
8
10
12
Age
60000
50000
40000
30000
20000
10000
0

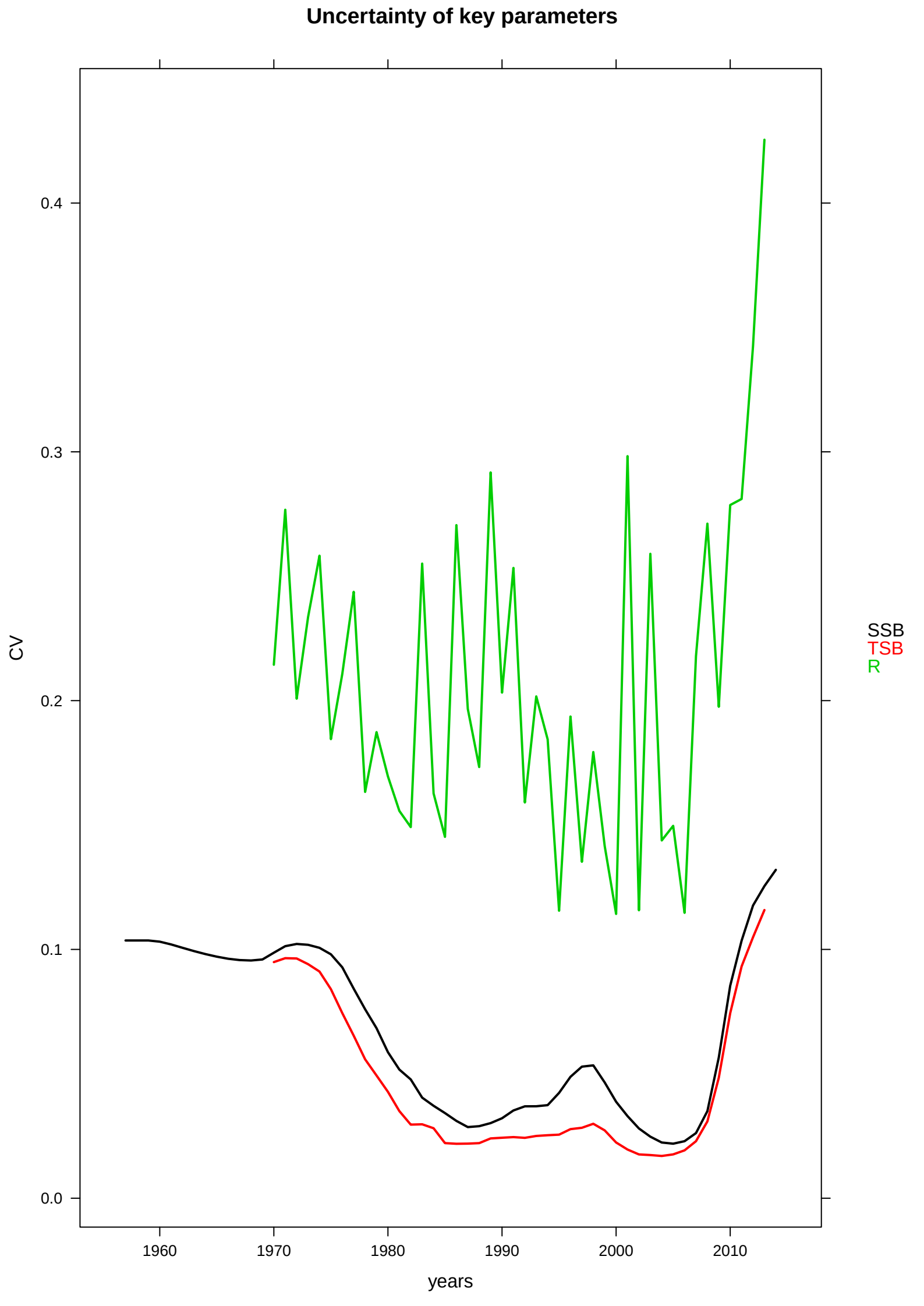

Proportion at age
Proportion of N at age
0.2
0.4
0.6
0.8
1970
1980
1990
2000
2010
Years
1
2
3
4
5
6
7
8
9
10
11
12

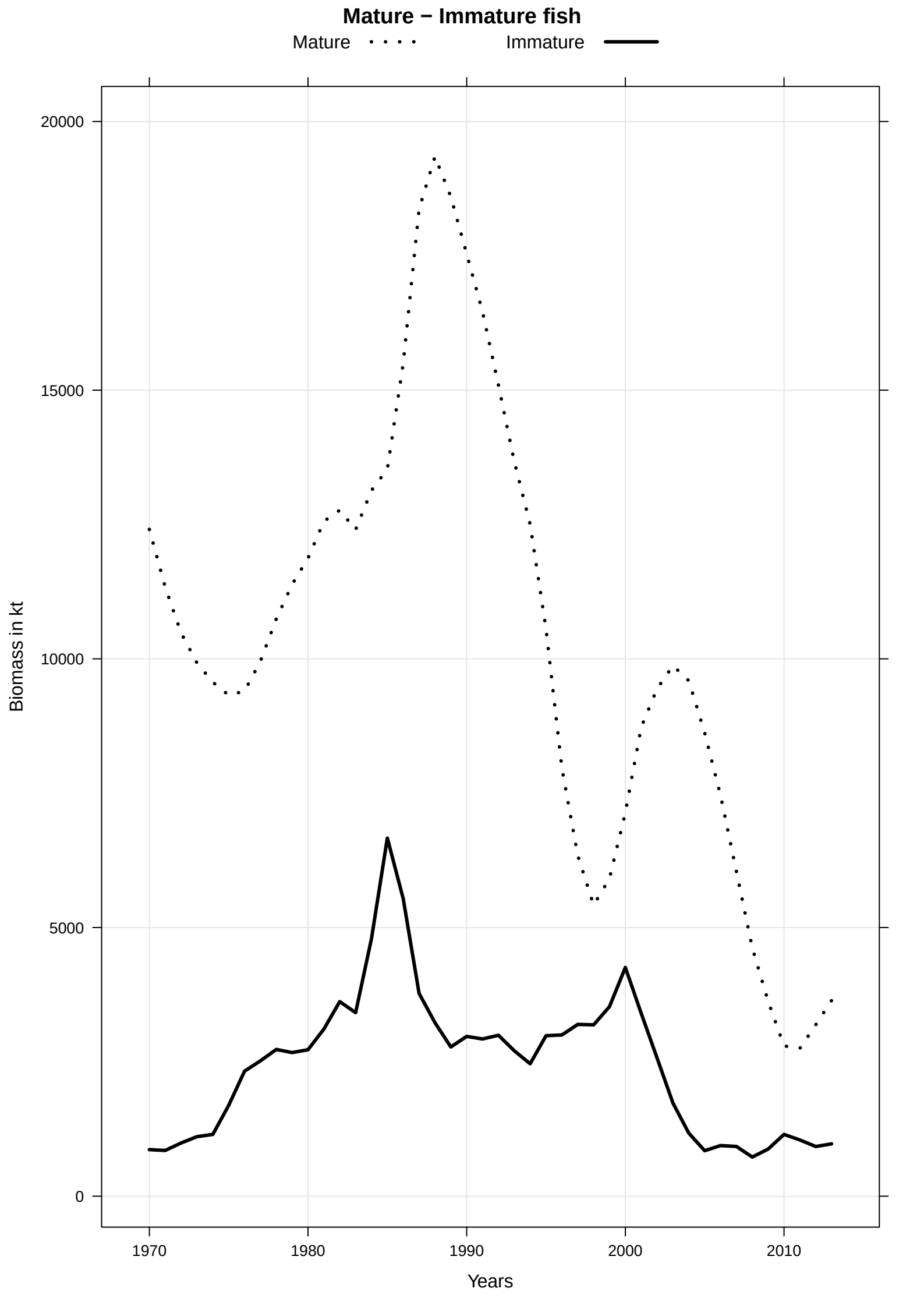

Fishery mean age
Observed
Modelled
SC_Chile_PS
N_Chile
Offshore_Trawl
Age
Years
2
4
6
8
10
1980
1990
2000
2010

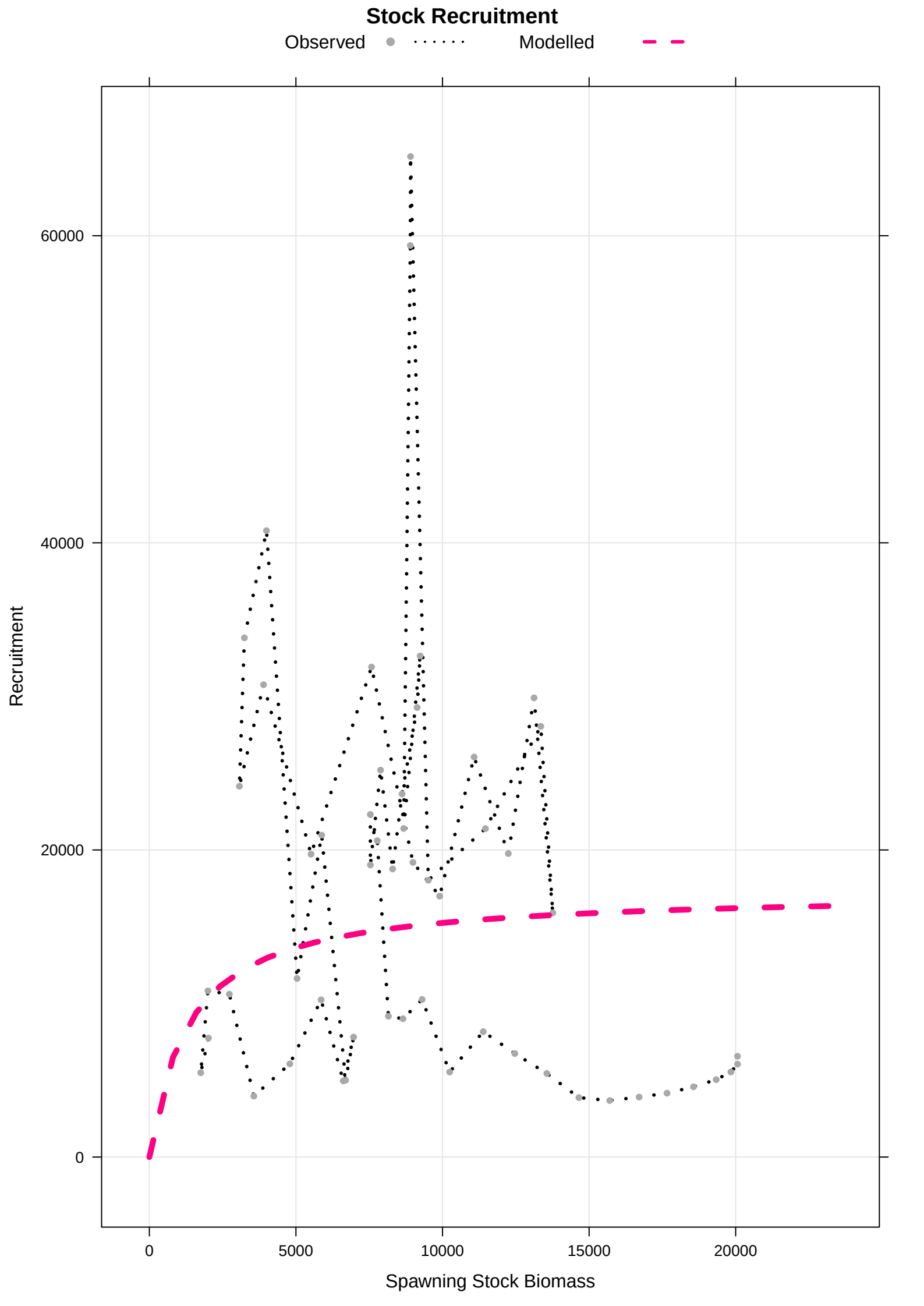

Survey mean age
Observed
Modelled
DEPM
Chile_AcousCS
Chile_AcousN
Age
Years
2000
2005
2010
4
6
8
10

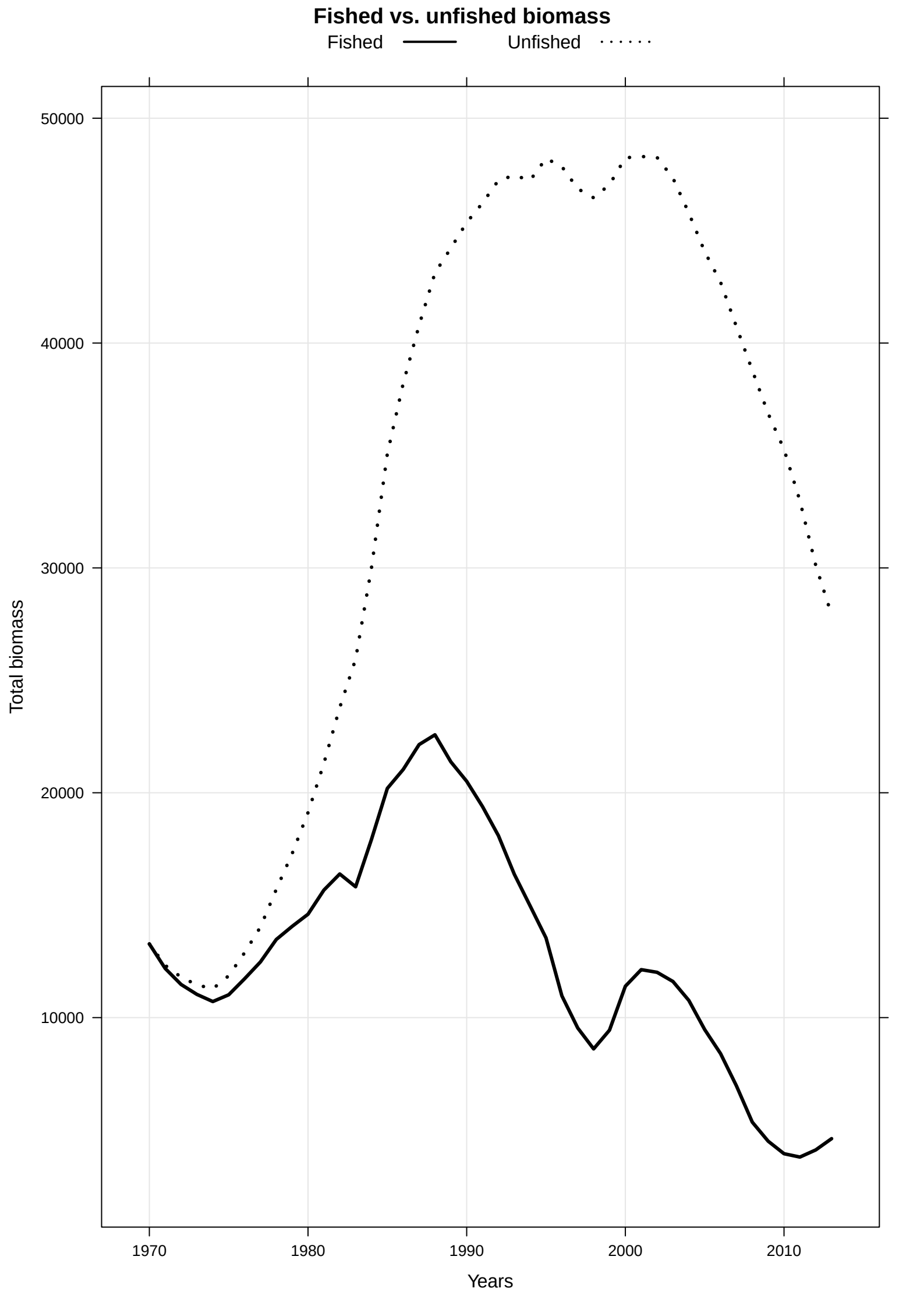
Stock summary


Summary sheet
Total biomass
25000
20000
15000
10000
5000
0
Spawning Stock Biomass
15000
10000
5000
0
Recruitment
100000
80000
60000
40000
20000
0
Fishing mortality
1.0
0.8
0.6
0.4
0.2
0.0
Catches
5000
4000
3000
2000
1000
0
1970
1980
1990
2000
2010
year
data

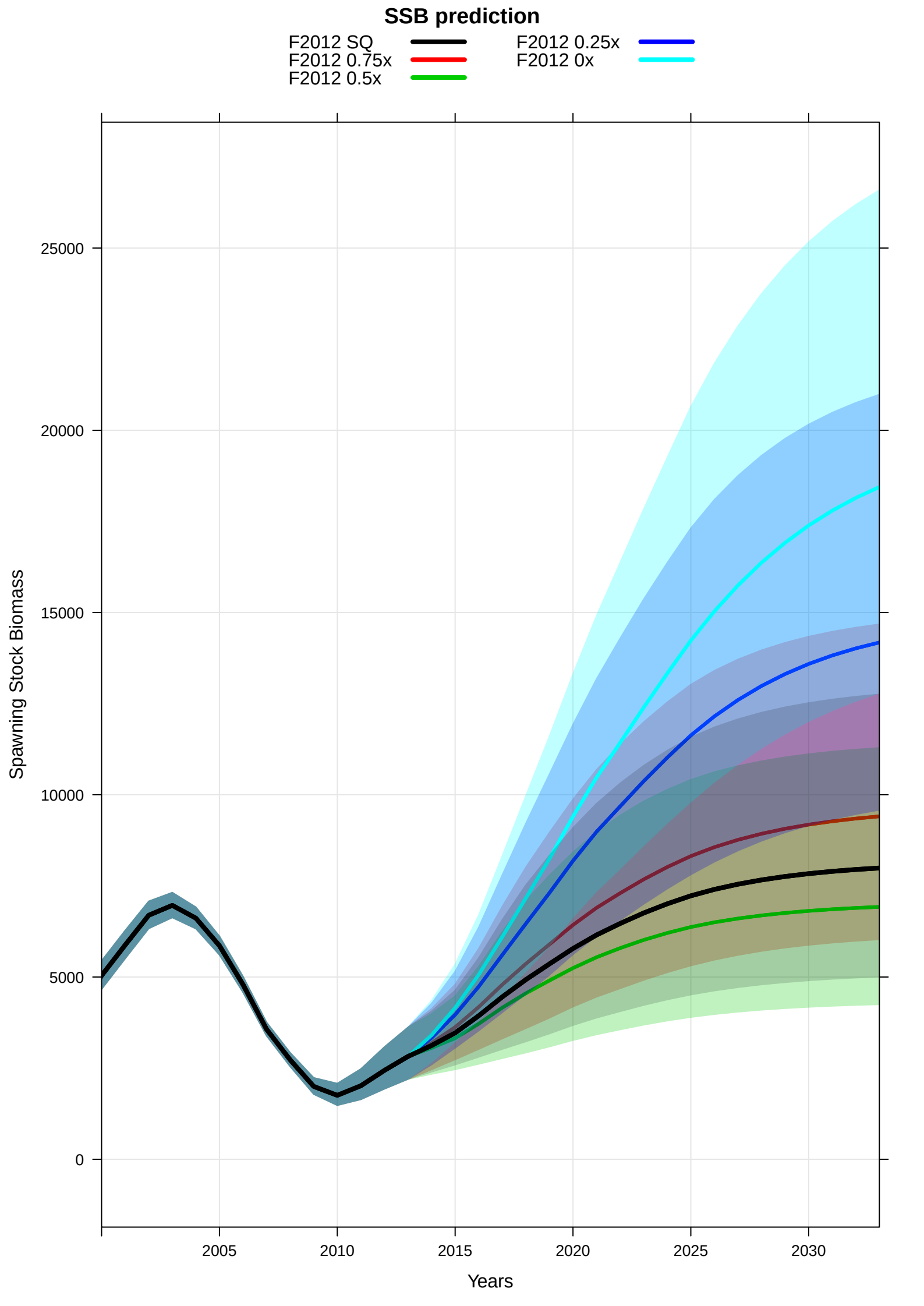

Uncertainty of key parameters
CV
0.0
0.1
0.2
0.3
0.4
1960
1970
1980
1990
2000
2010
years
SSB
TSB
R

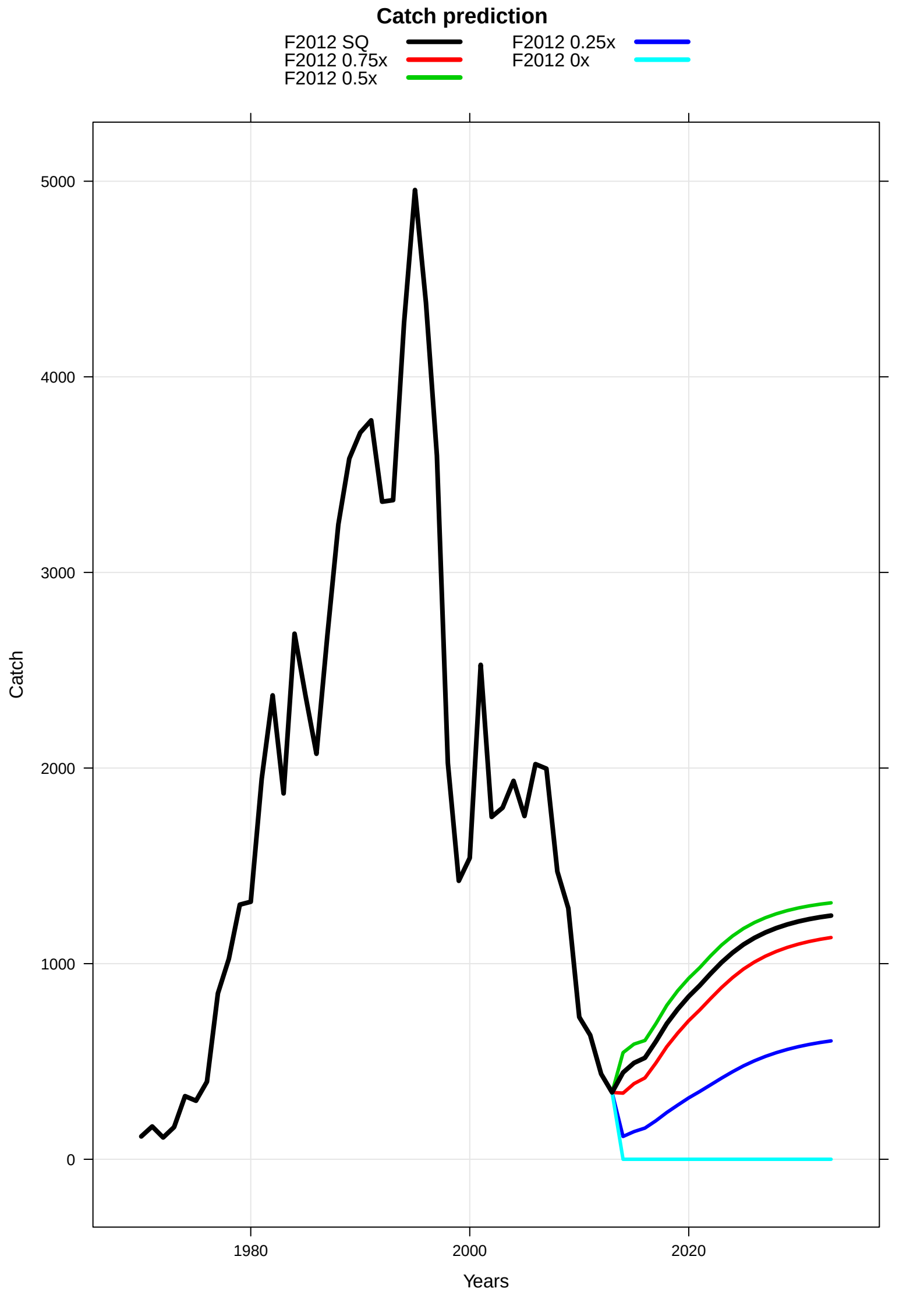

Mature − Immature fish
Mature
Immature
20000
15000
10000
5000
0
Biomass in kt
1970
1980
1990
2000
2010
Years


Stock Recruitment
Observed
Modelled
60000
40000
20000
0
Recruitment
0
5000
10000
15000
20000
Spawning Stock Biomass


Fished vs. unfished biomass
Fished
Unfished
50000
40000
30000
20000
10000
Total biomass
1970
1980
1990
2000
2010
Years

Projections


SSB prediction
F2012 SQ
F2012 0.75x
F2012 0.5x
F2012 0.25x
F2012 0x
Spawning Stock Biomass
25000
20000
15000
10000
5000
0
2005
2010
2015
2020
2025
2030
Years


Catch prediction
F2012 SQ
F2012 0.75x
F2012 0.5x
F2012 0.25x
F2012 0x
5000
4000
3000
2000
1000
0
Catch
1980
2000
2020
Years