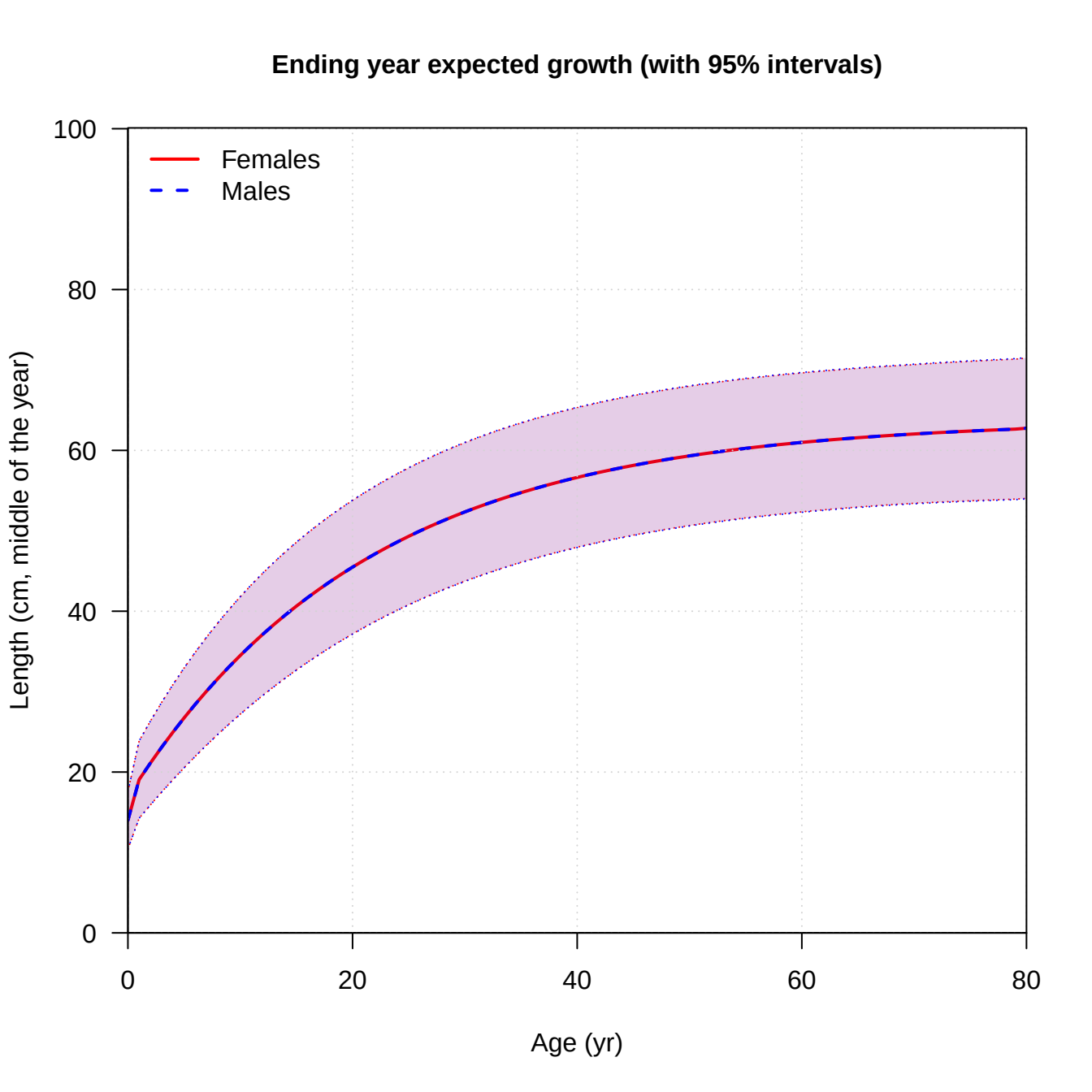
Plots created using the 'r4ss' package in R

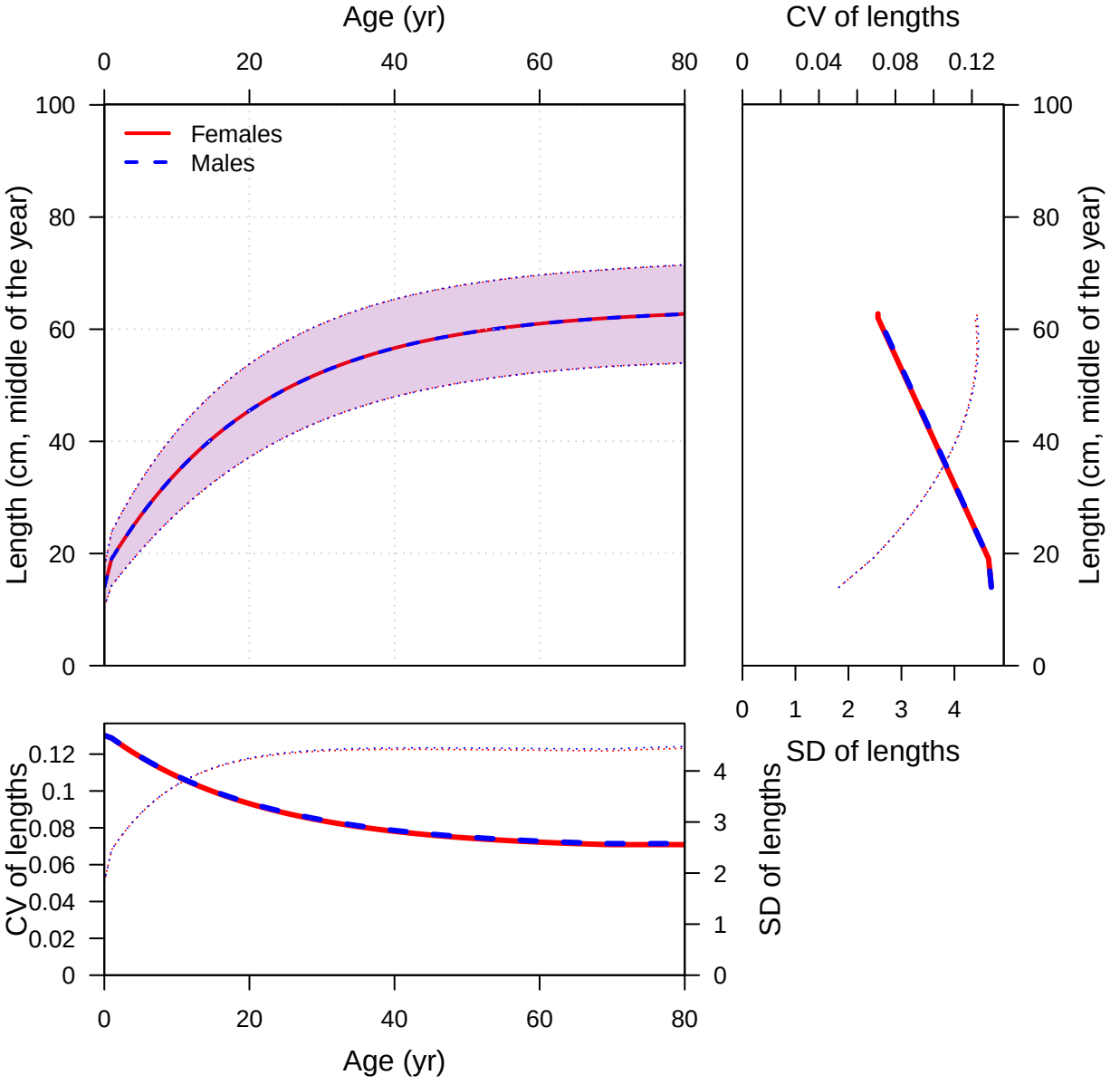
Stock Synthesis version: SS−V3.23b

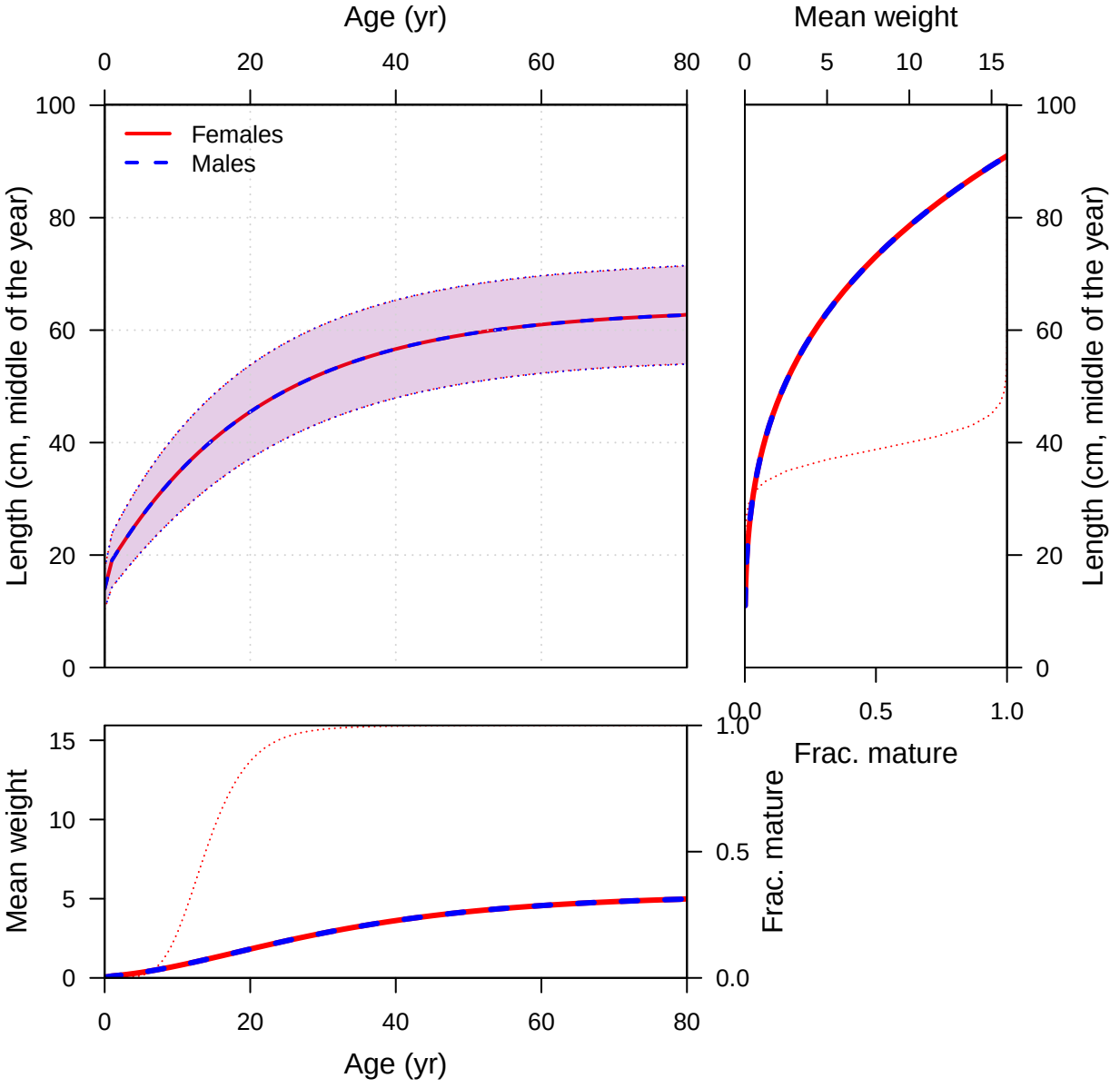
StartTime: Sun Aug 05 21:00:35 2012

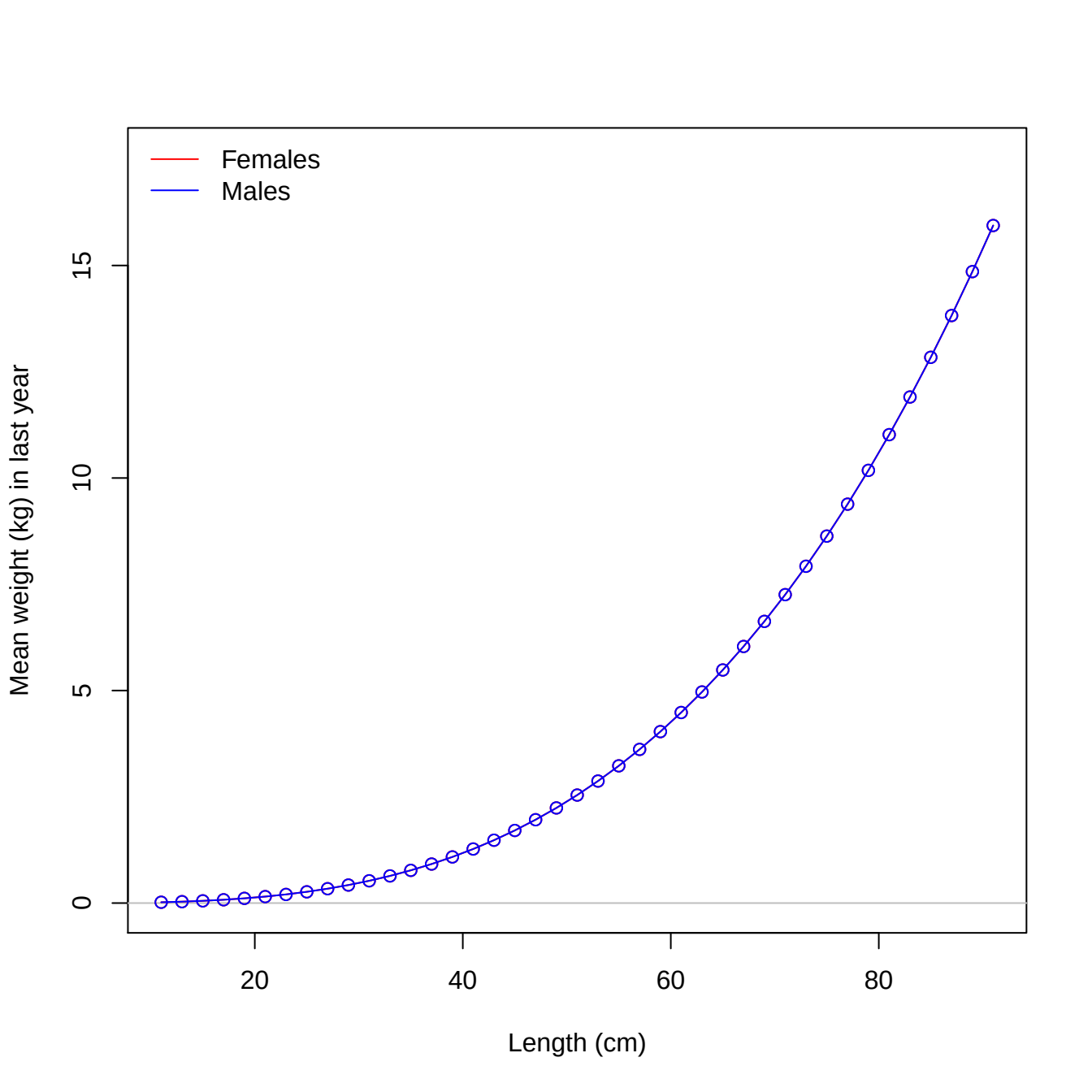
Data_File: dat_ifit.ss

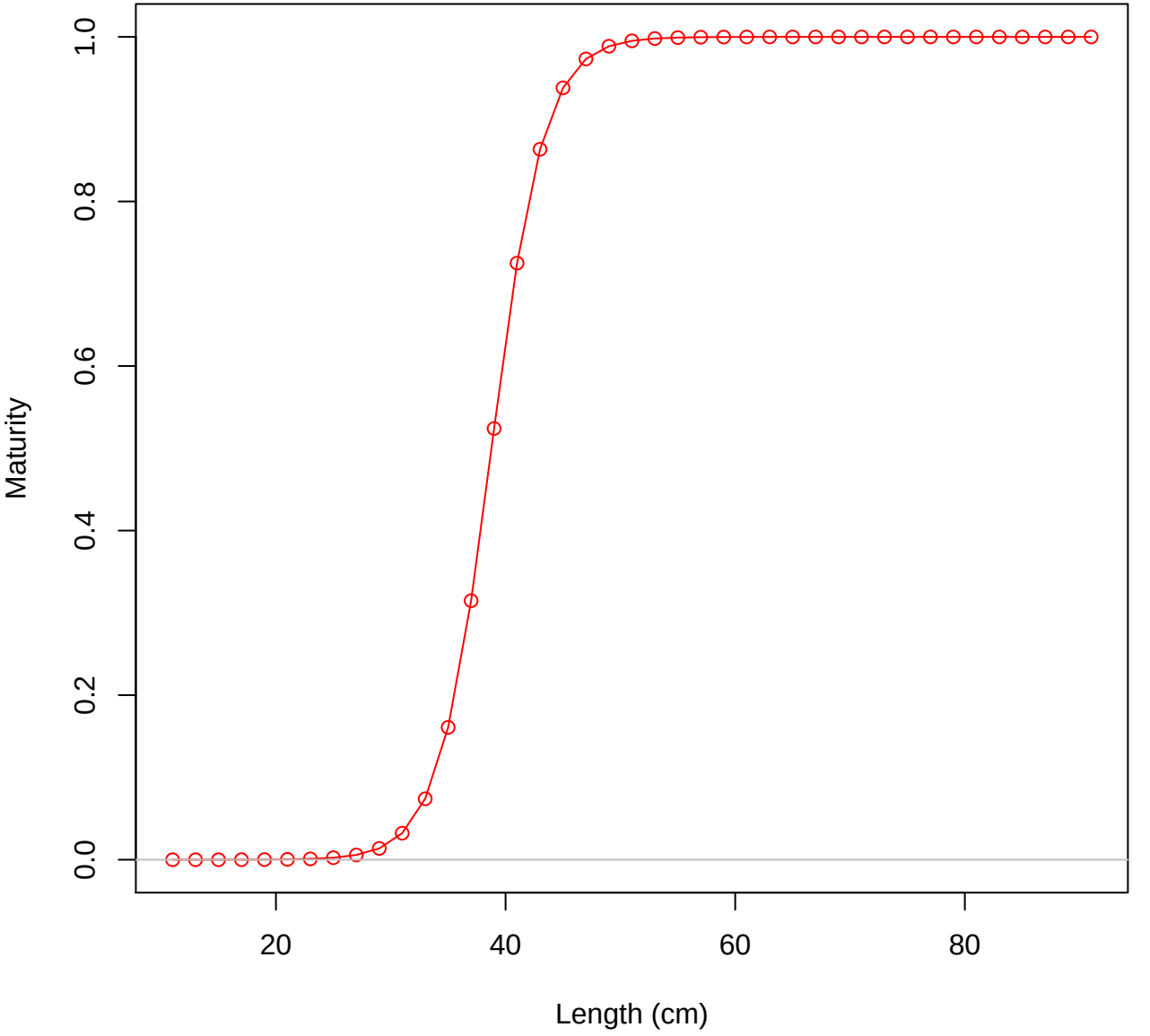
Control_File: ctl_ifit.ss

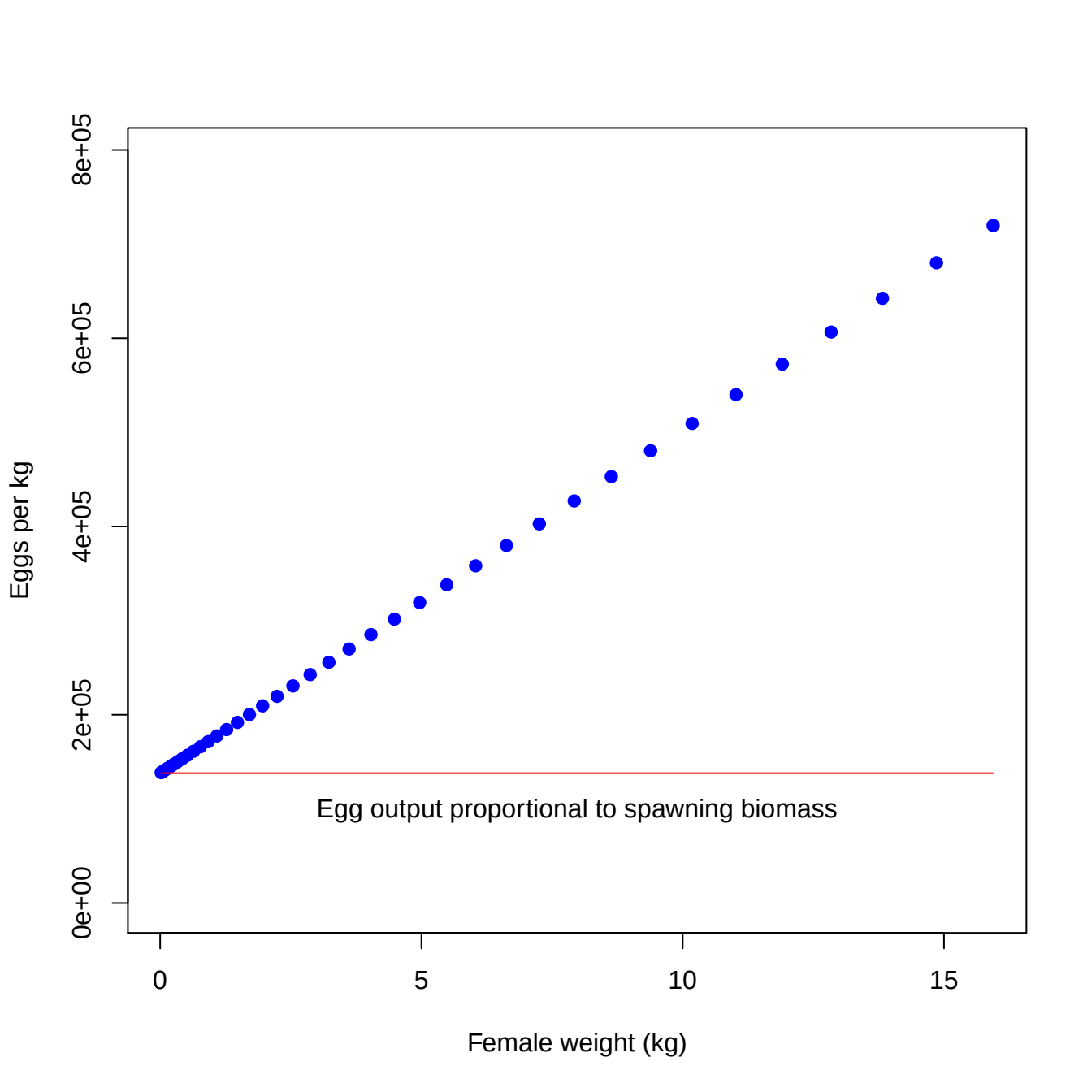

Ending year expected growth (with 95% intervals)
Females
Males
Length (cm, middle of the year)
Age (yr)
0
20
40
60
80
100

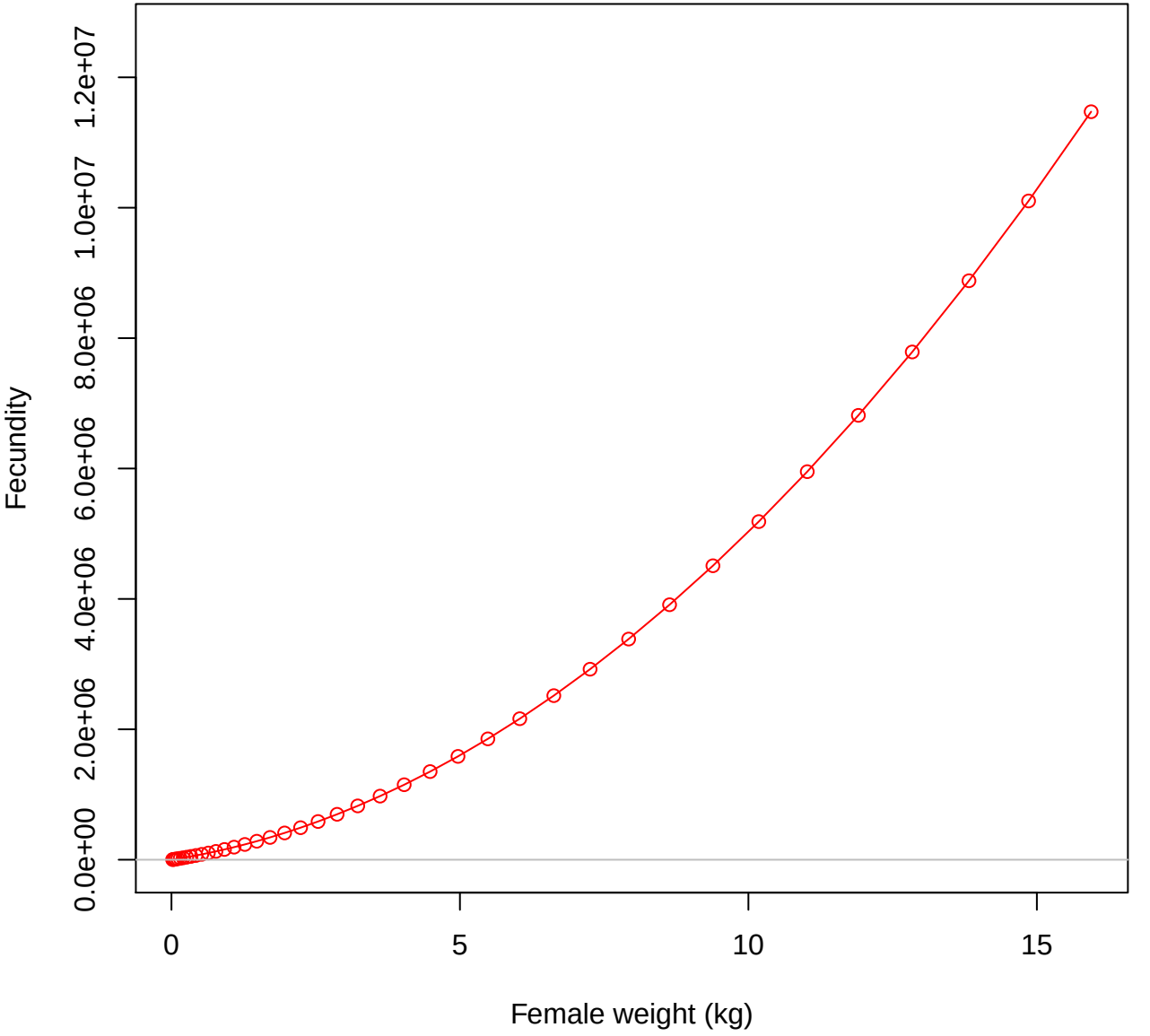

Age (yr)
0
20
40
60
80
CV of lengths
0
0.04
0.08
0.12
Length (cm, middle of the year)
100
80
60
40
20
0
Females
Males
SD of lengths
0
1
2
3
4
CV of lengths
0.12
0.1
0.08
0.06
0.04
0.02
0
SD of lengths
4
3
2
1
0
Age (yr)

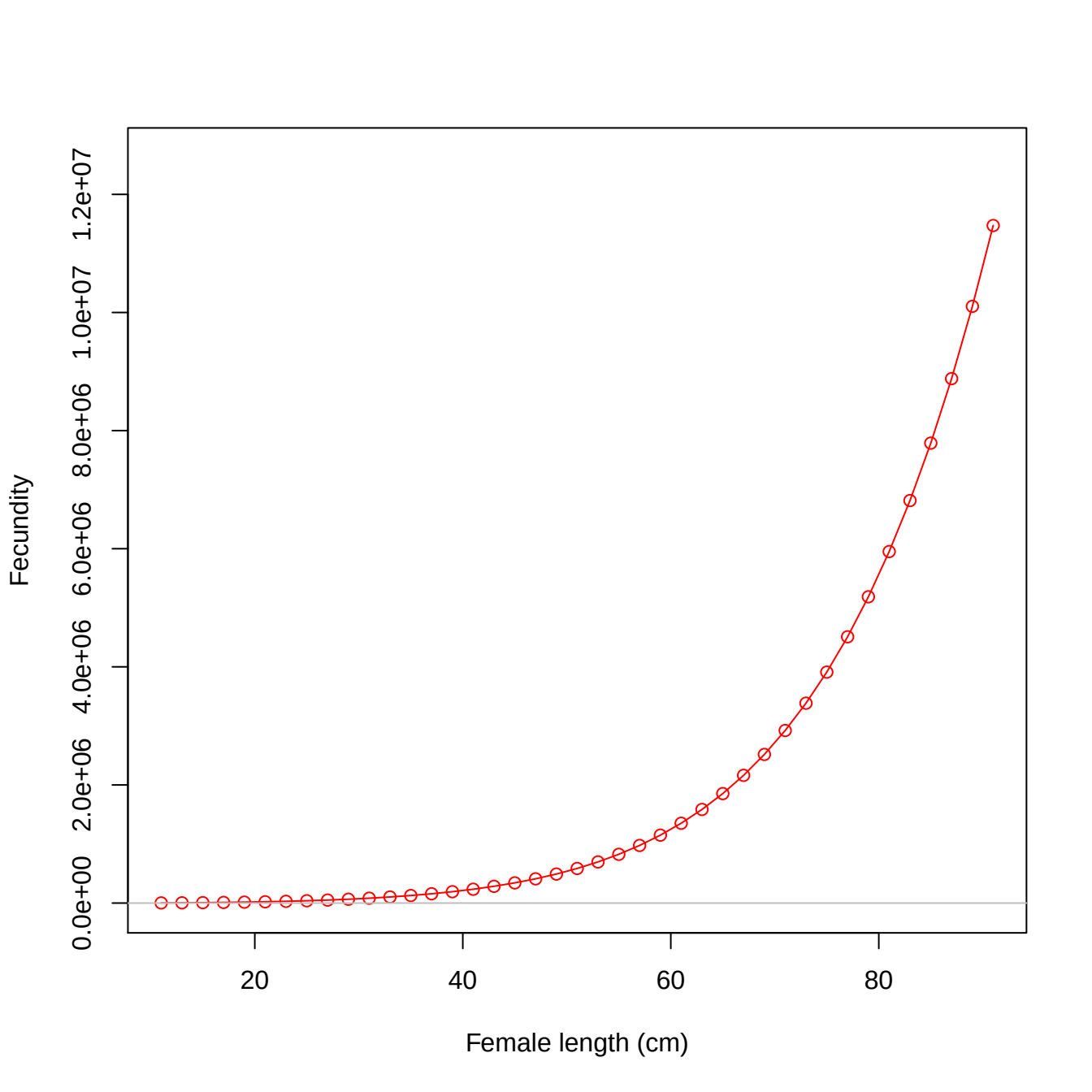

Age (yr)
0
20
40
60
80
Mean weight
0
5
10
15
Length (cm, middle of the year)
100
80
60
40
20
0
Females
Males
Frac. mature
0.0
0.5
1.0
Mean weight
15
10
5
0
Age (yr)

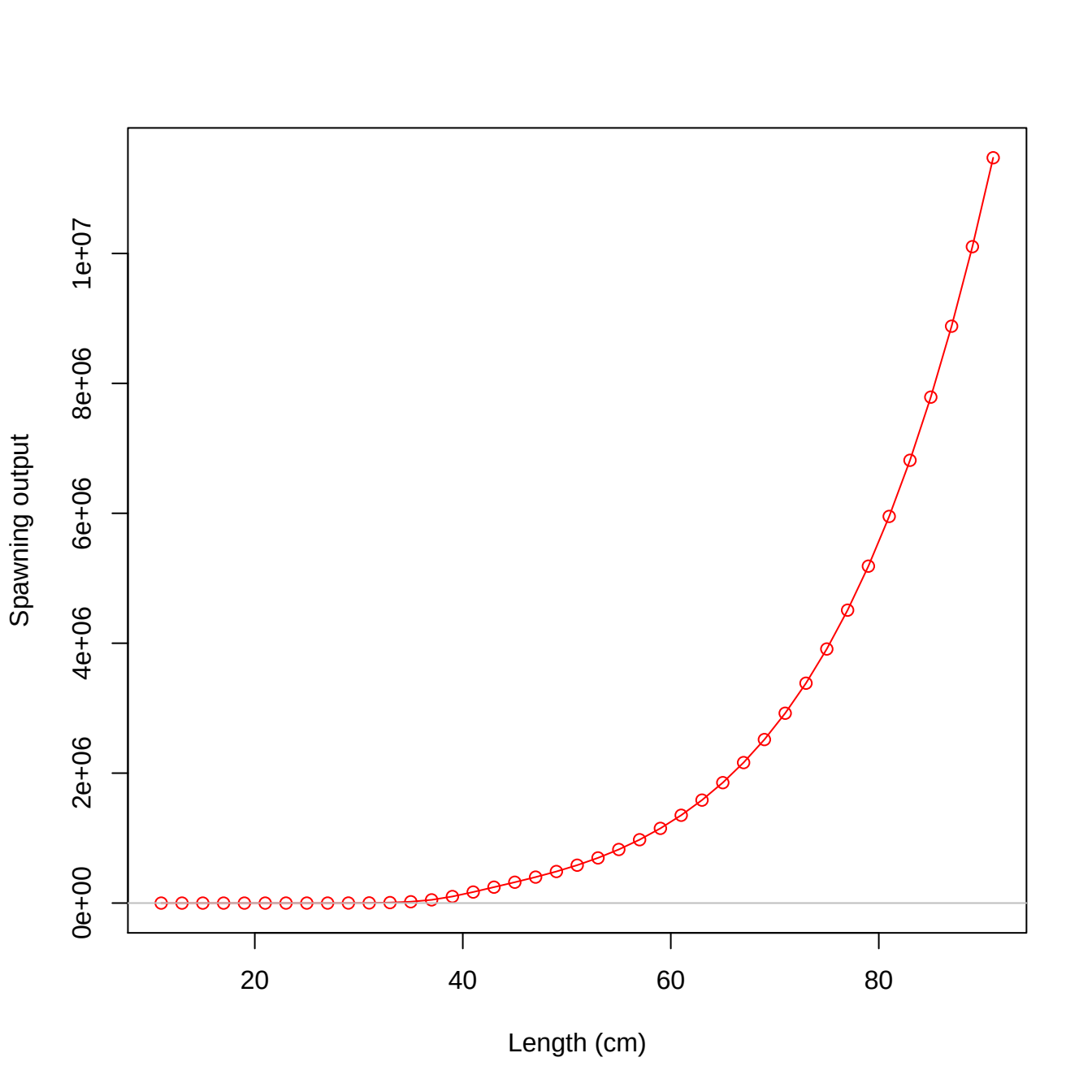

Females
Males
Mean weight (kg) in last year
0
5
10
15
20
40
60
80
Length (cm)

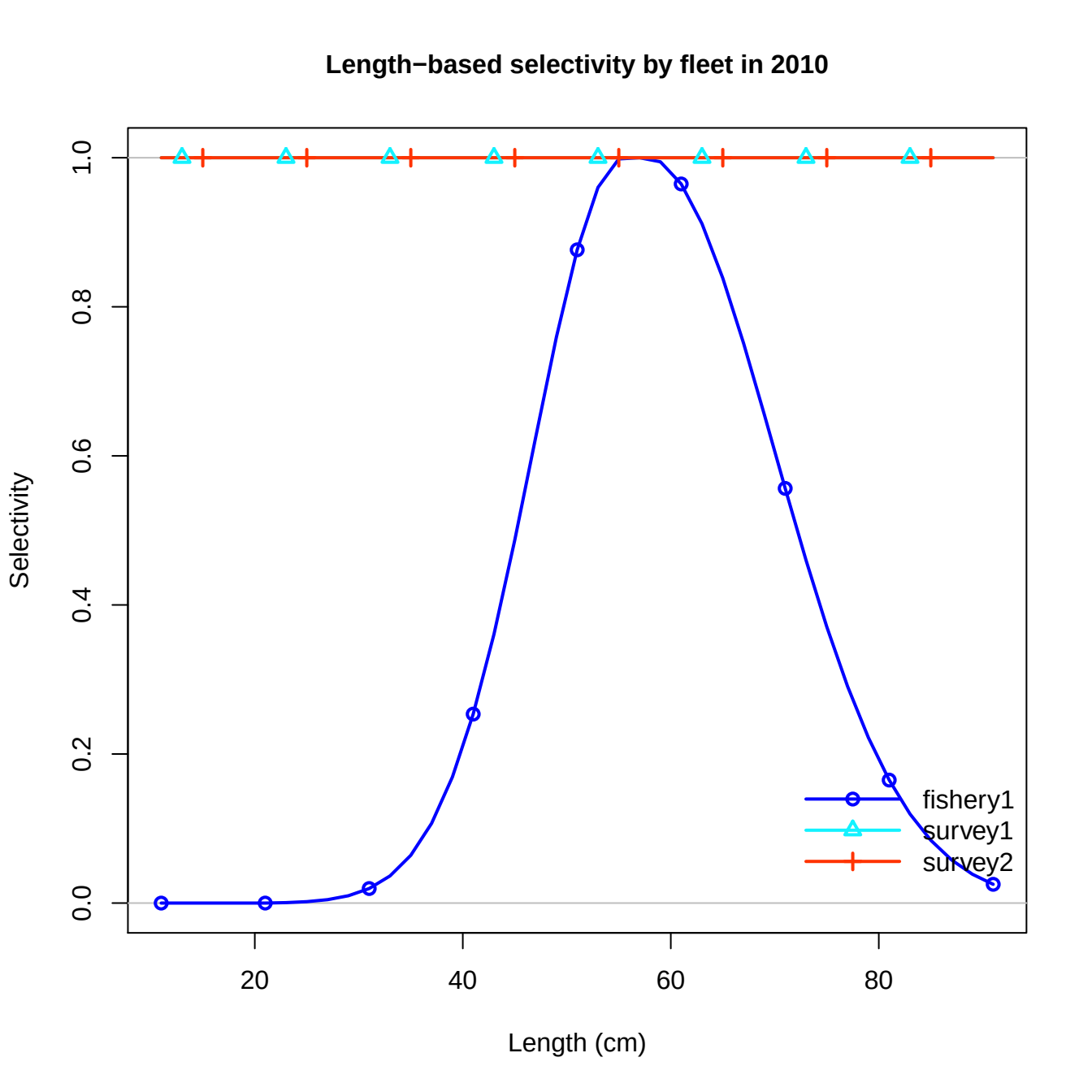

Maturity
0.0
0.2
0.4
0.6
0.8
1.0
20
40
60
80
Length (cm)

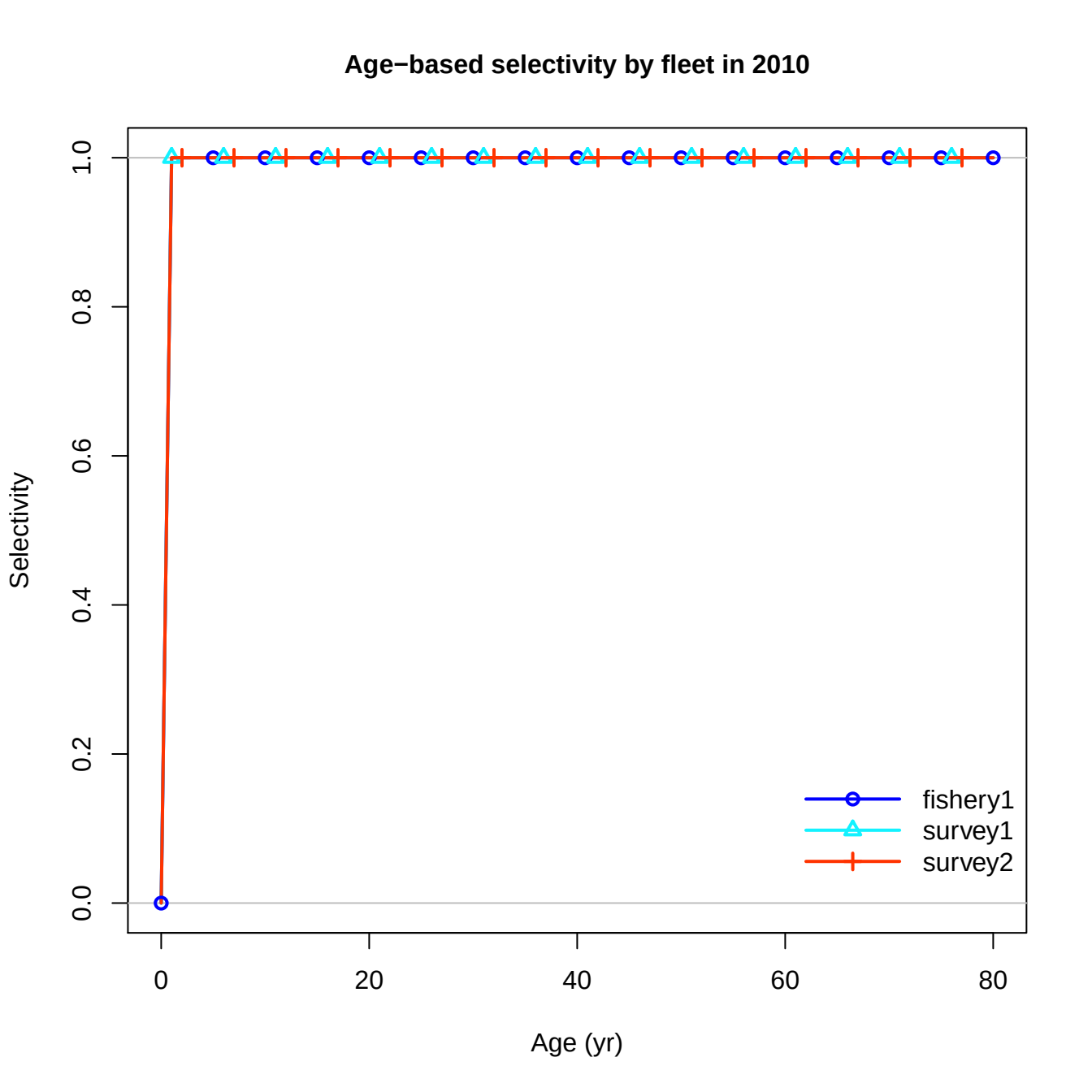

Eggs per kg
0e+00
2e+05
4e+05
6e+05
8e+05
0
5
10
15
Female weight (kg)
Egg output proportional to spawning biomass

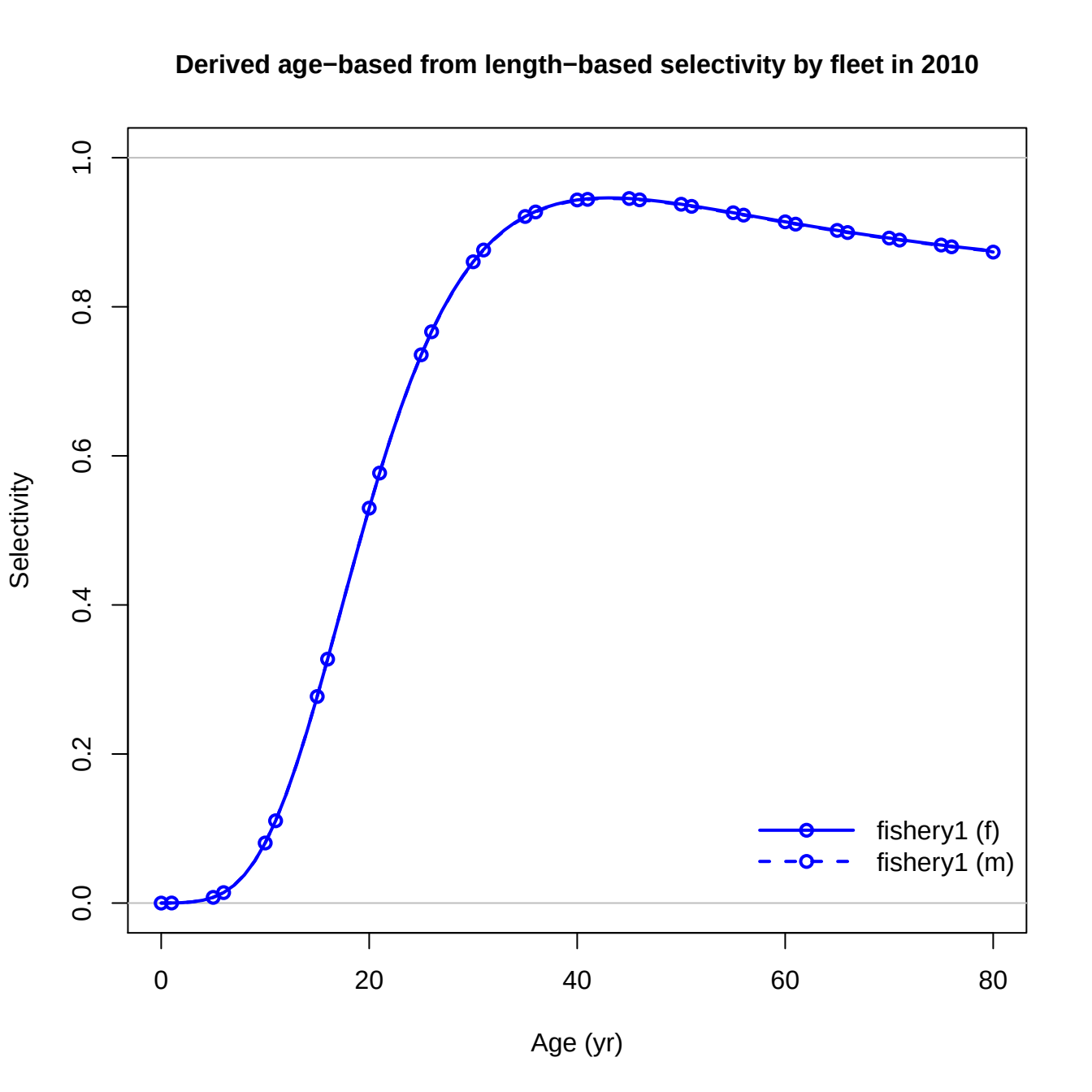

Fecundity
0.0e+00
2.0e+06
4.0e+06
6.0e+06
8.0e+06
1.0e+07
1.2e+07
0
5
10
15
Female weight (kg)

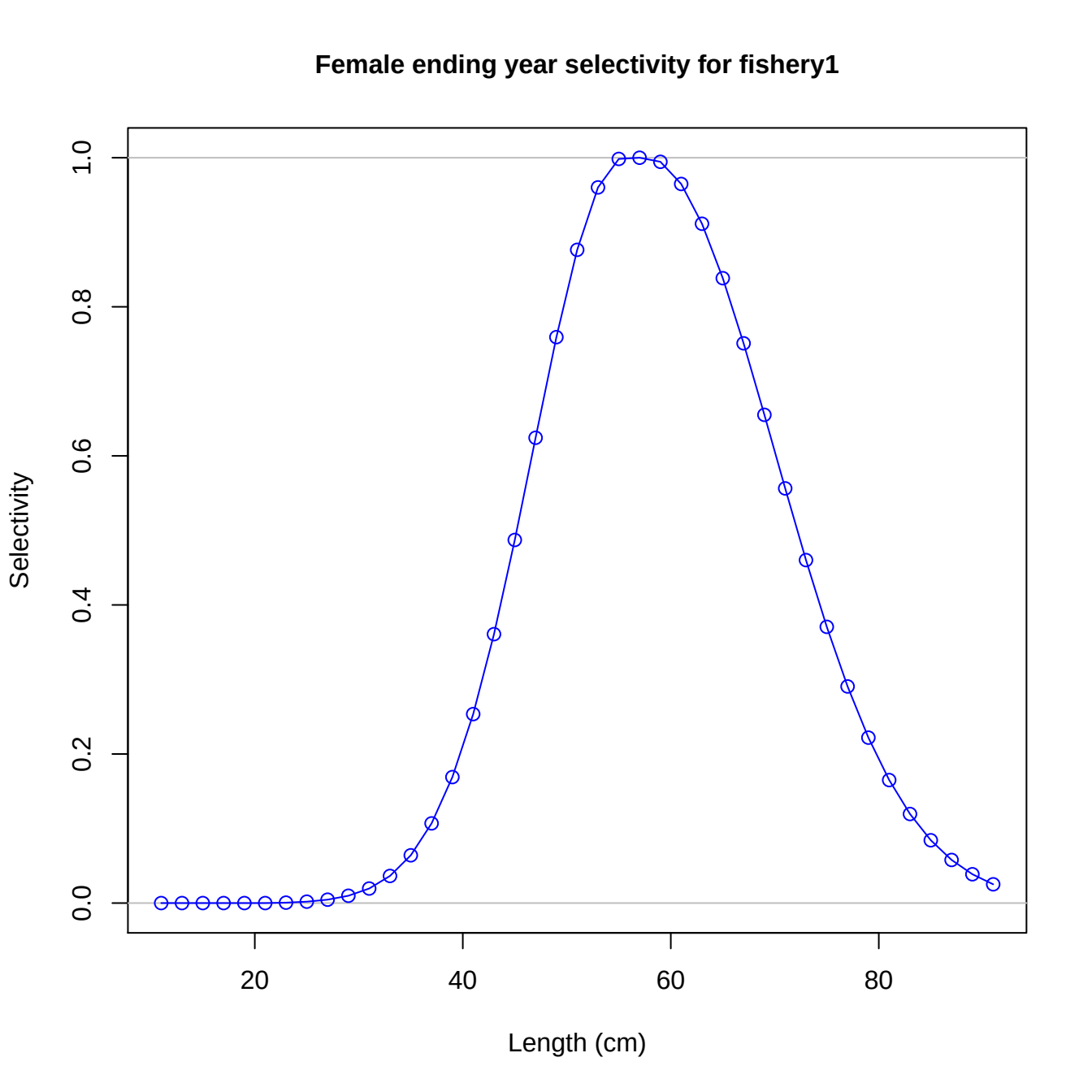

Fecundity
0.0e+00
2.0e+06
4.0e+06
6.0e+06
8.0e+06
1.0e+07
1.2e+07
20
40
60
80
Female length (cm)

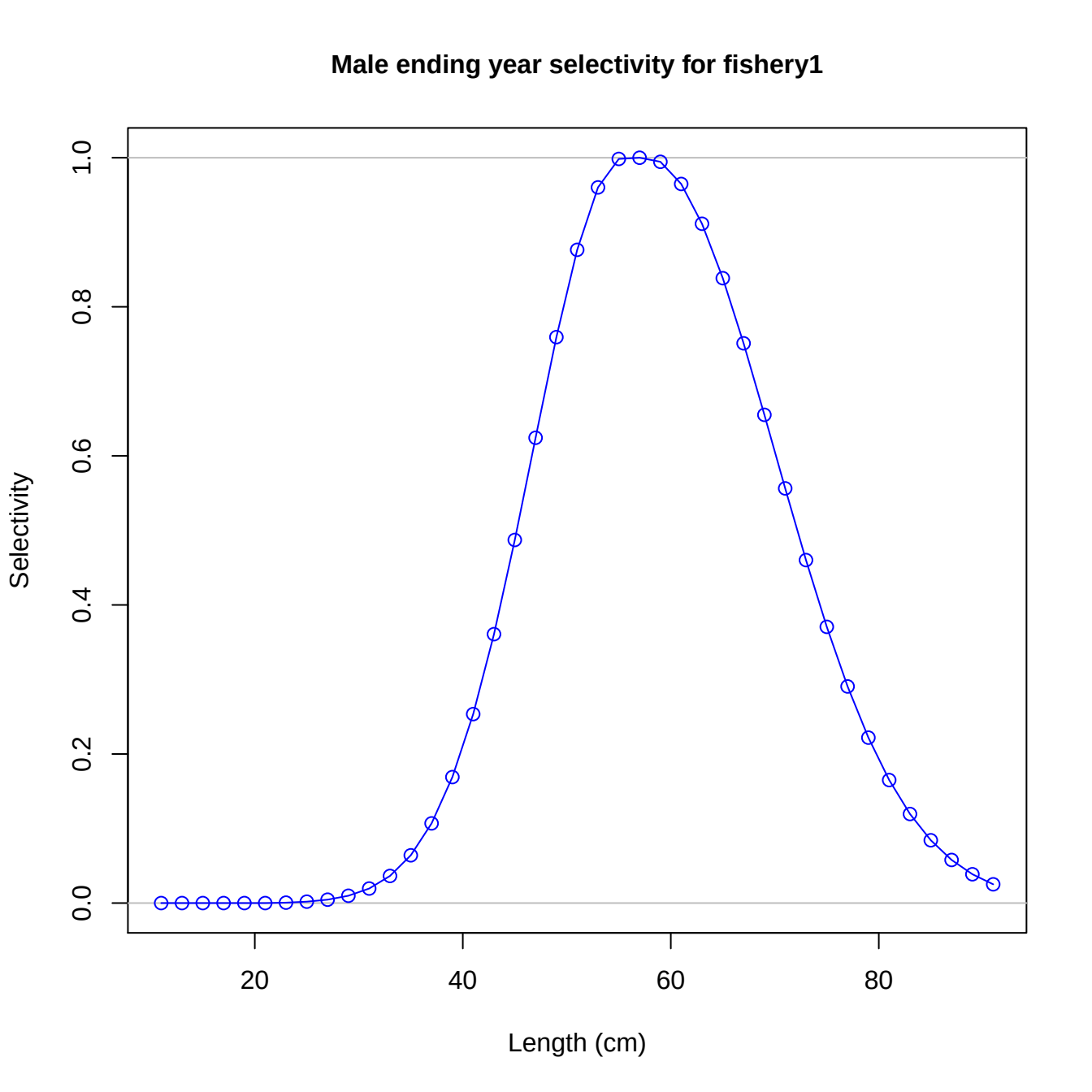

Spawning output
0e+00
2e+06
4e+06
6e+06
8e+06
1e+07
20
40
60
80
Length (cm)

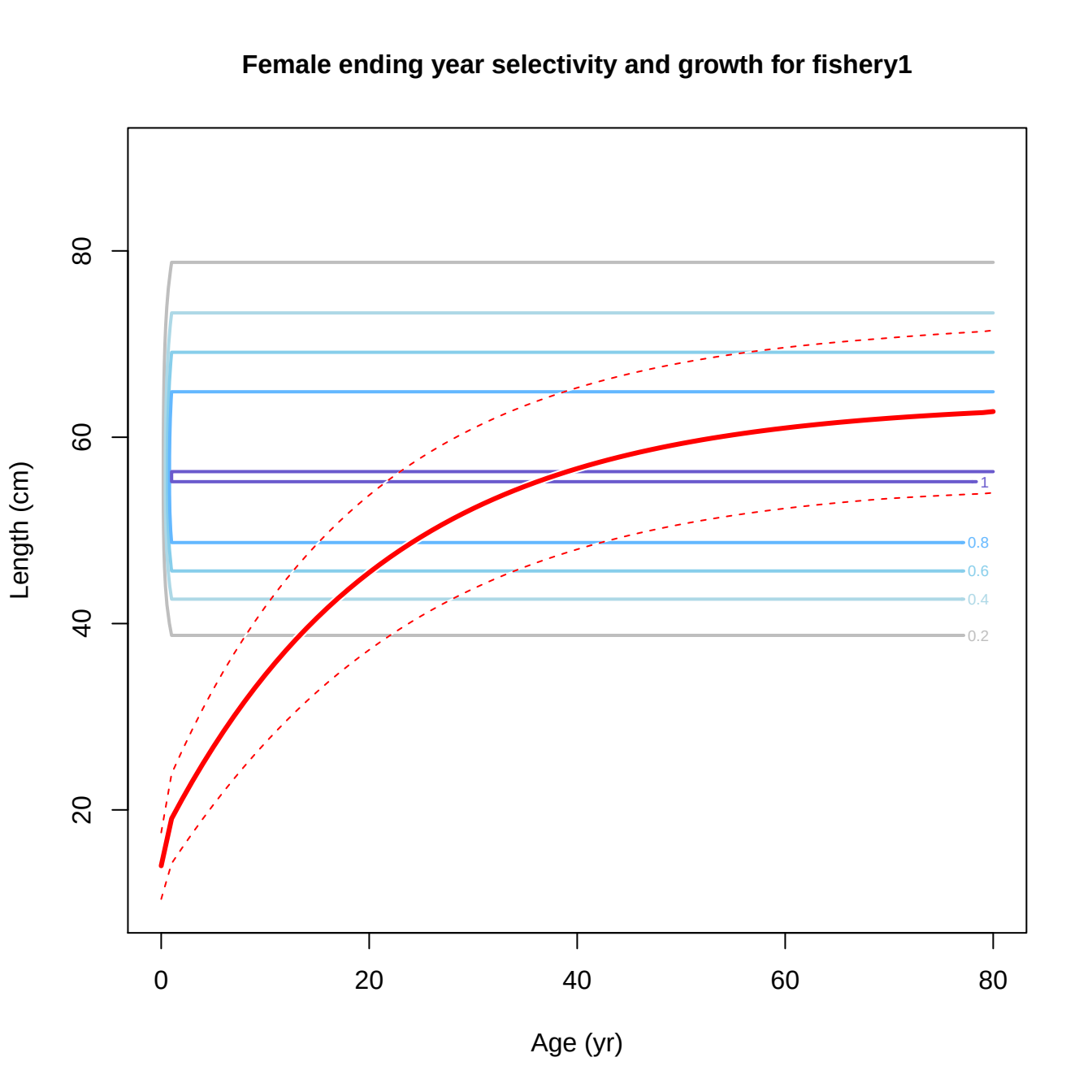

Length−based selectivity by fleet in 2010
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
20
40
60
80
Length (cm)
fishery1
survey1
survey2

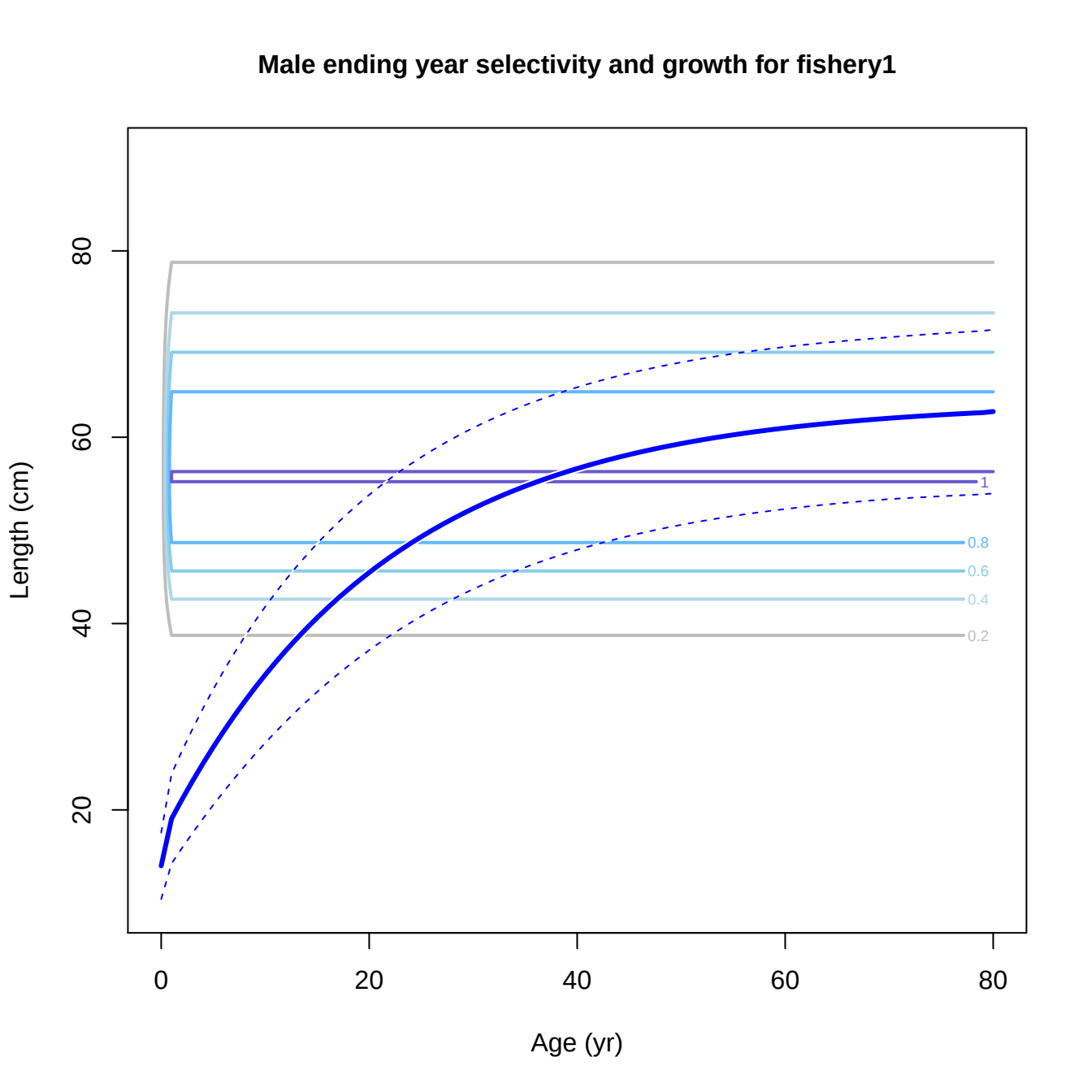

Age−based selectivity by fleet in 2010
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
20
40
60
80
Age (yr)
fishery1
survey1
survey2

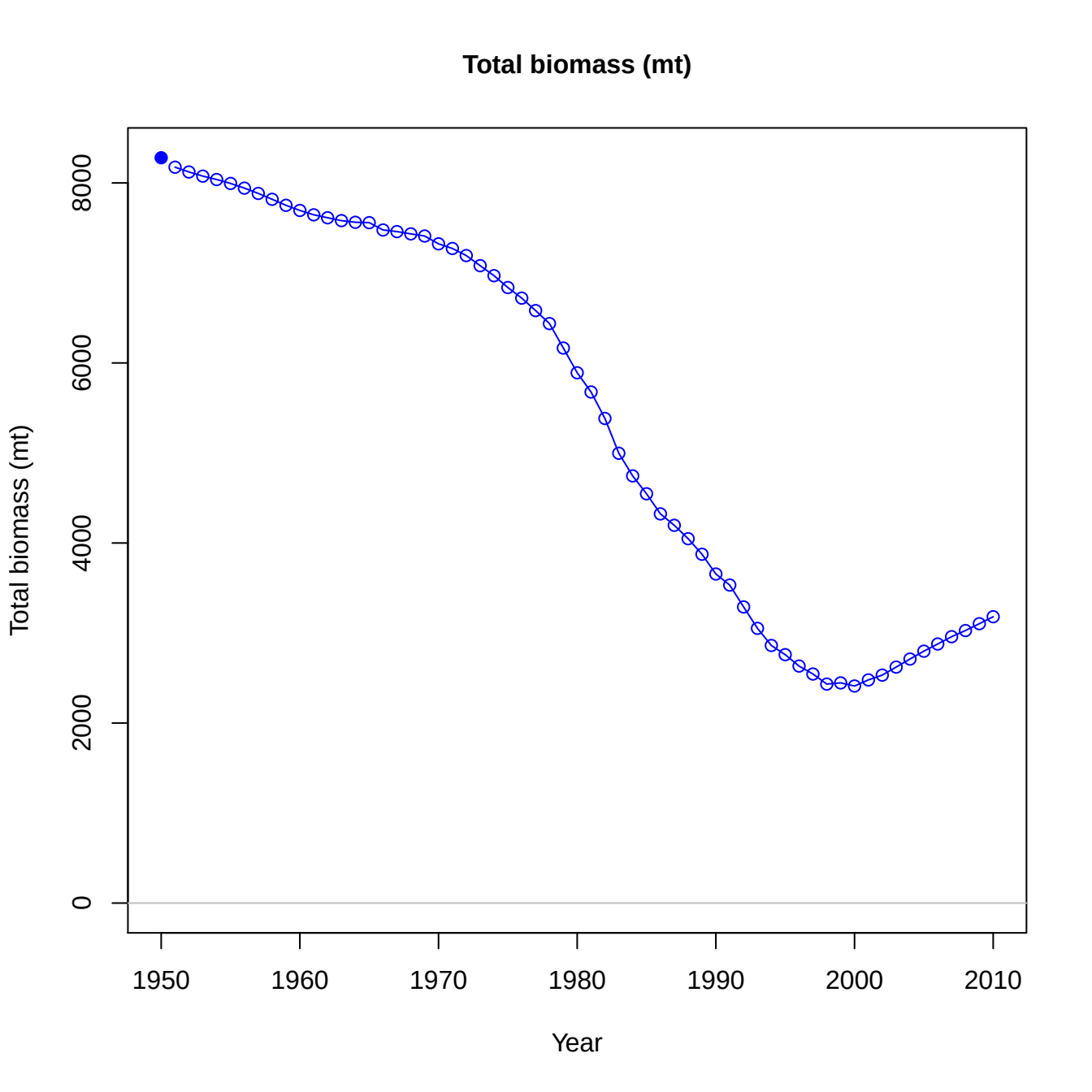

Derived age−based from length−based selectivity by fleet in 2010
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
20
40
60
80
Age (yr)
fishery1 (f)
fishery1 (m)

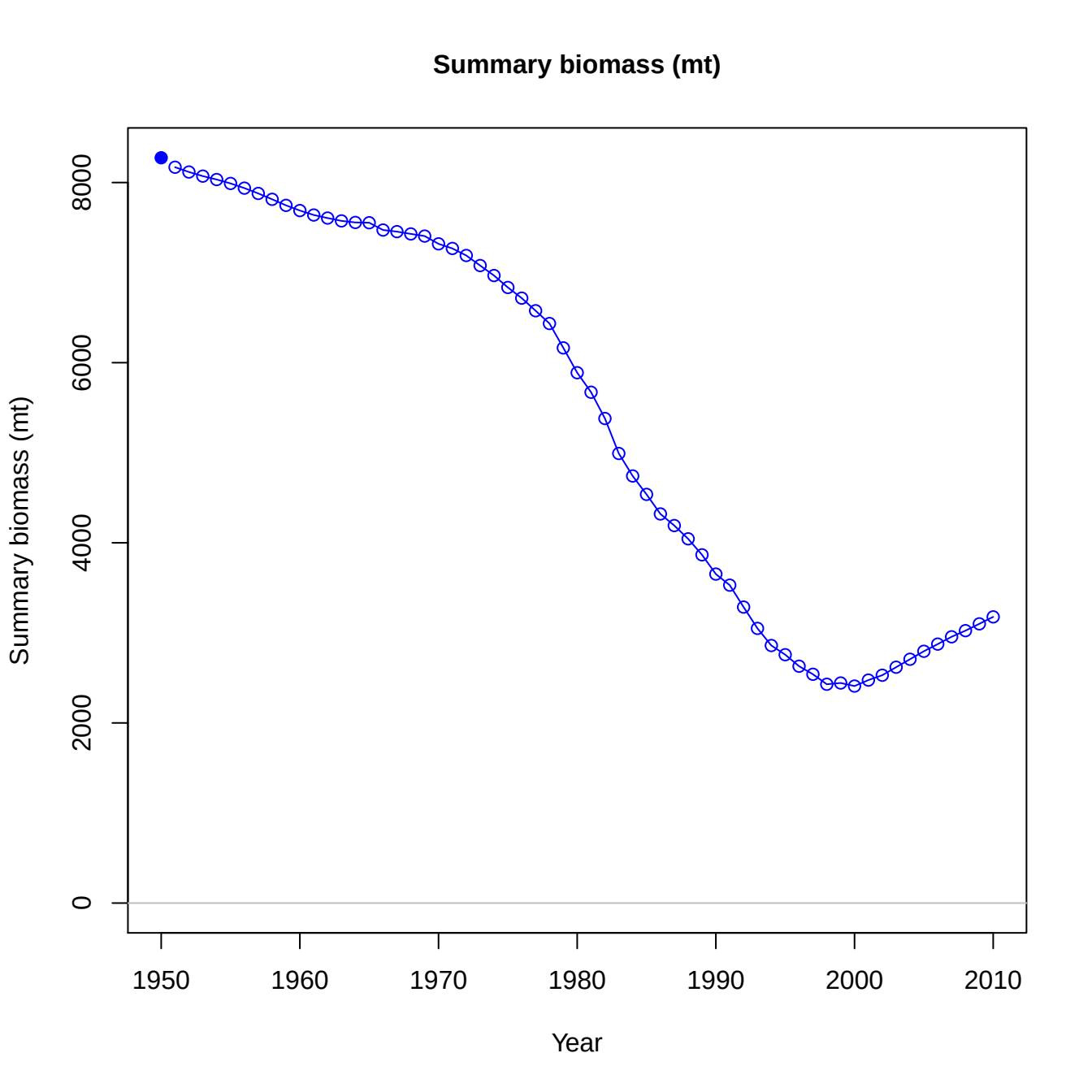

Female ending year selectivity for fishery1
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
20
40
60
80
Length (cm)

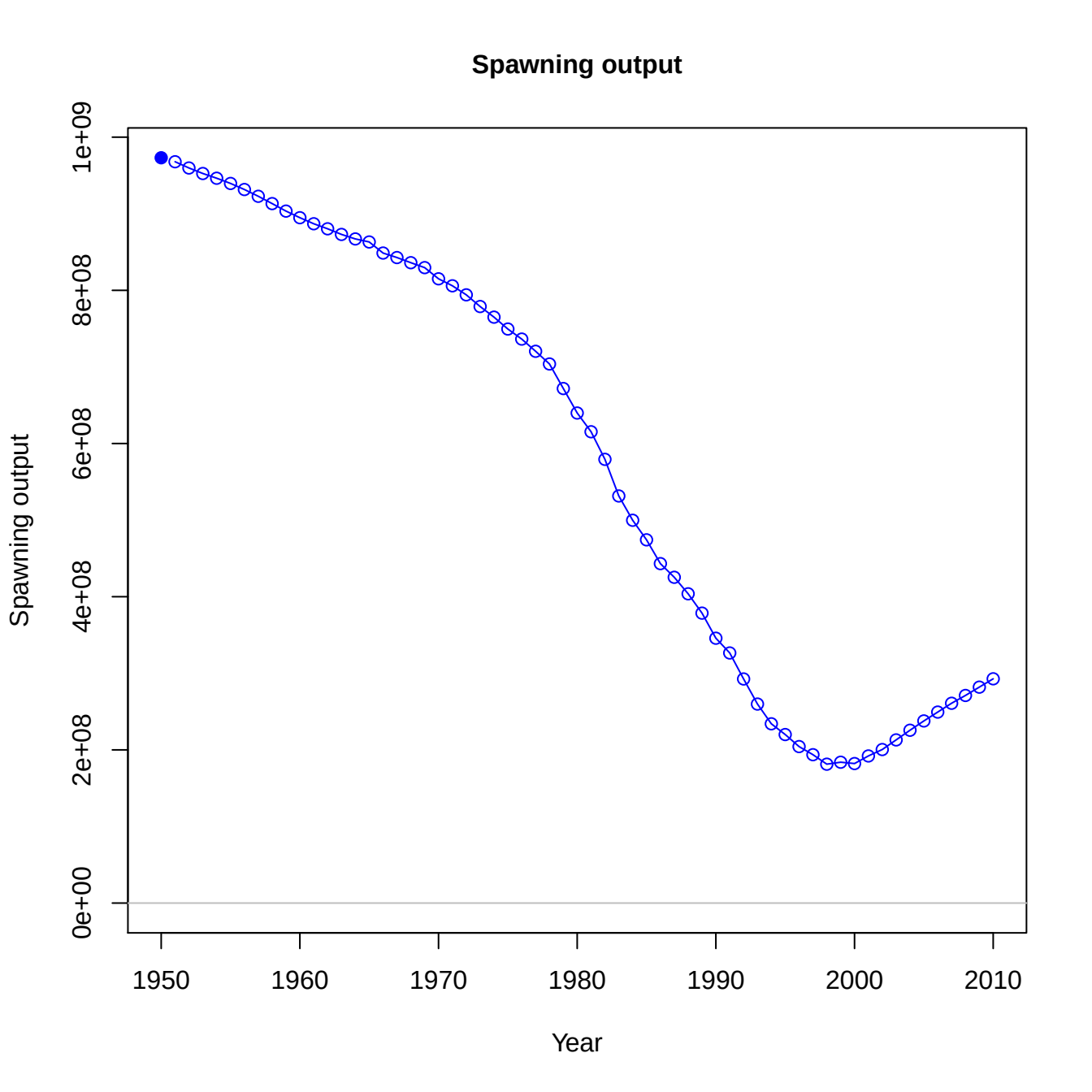

Male ending year selectivity for fishery1
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
20
40
60
80
Length (cm)

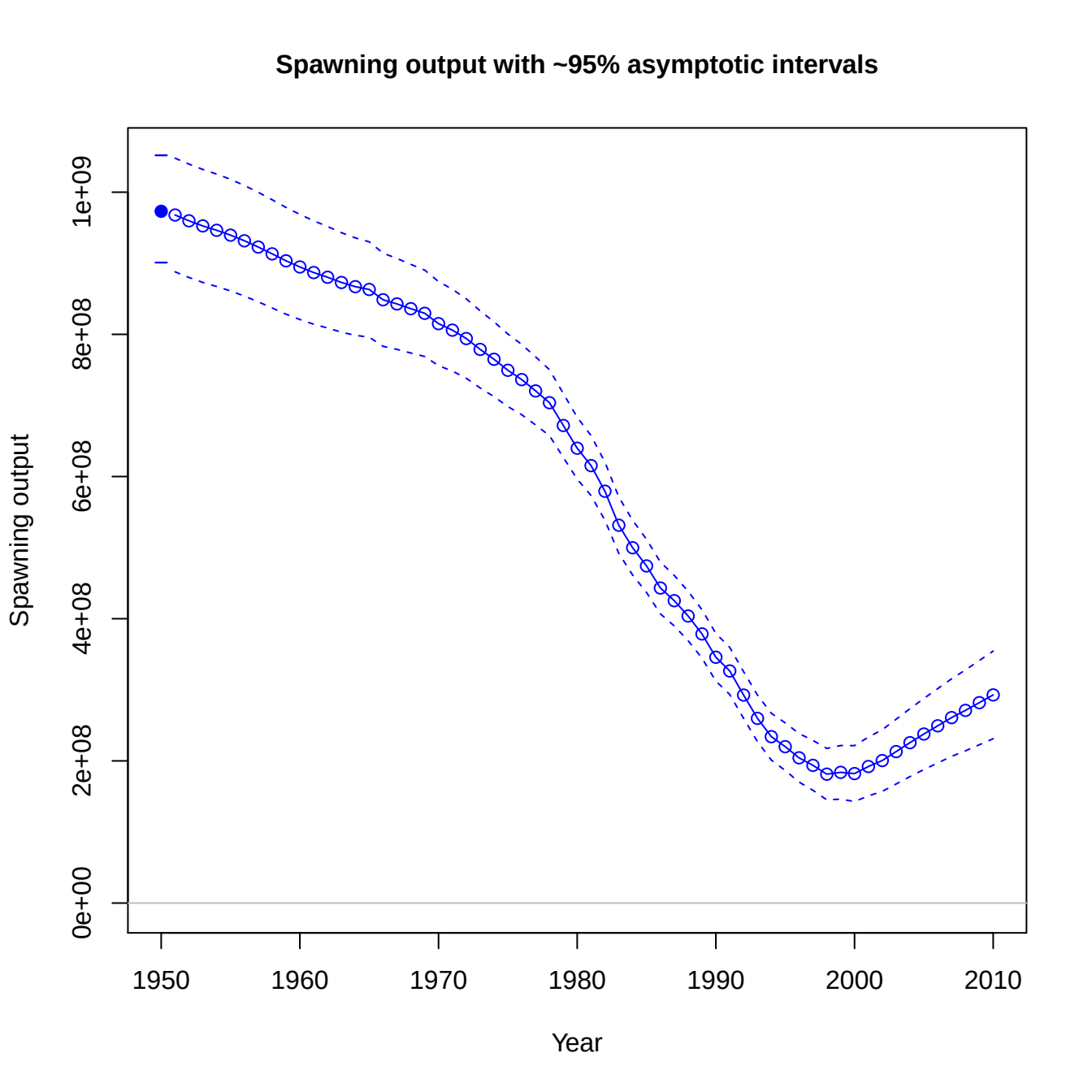

Female ending year selectivity and growth for fishery1
Length (cm)
20
40
60
80
0
20
40
60
80
Age (yr)
1
0.8
0.6
0.4
0.2

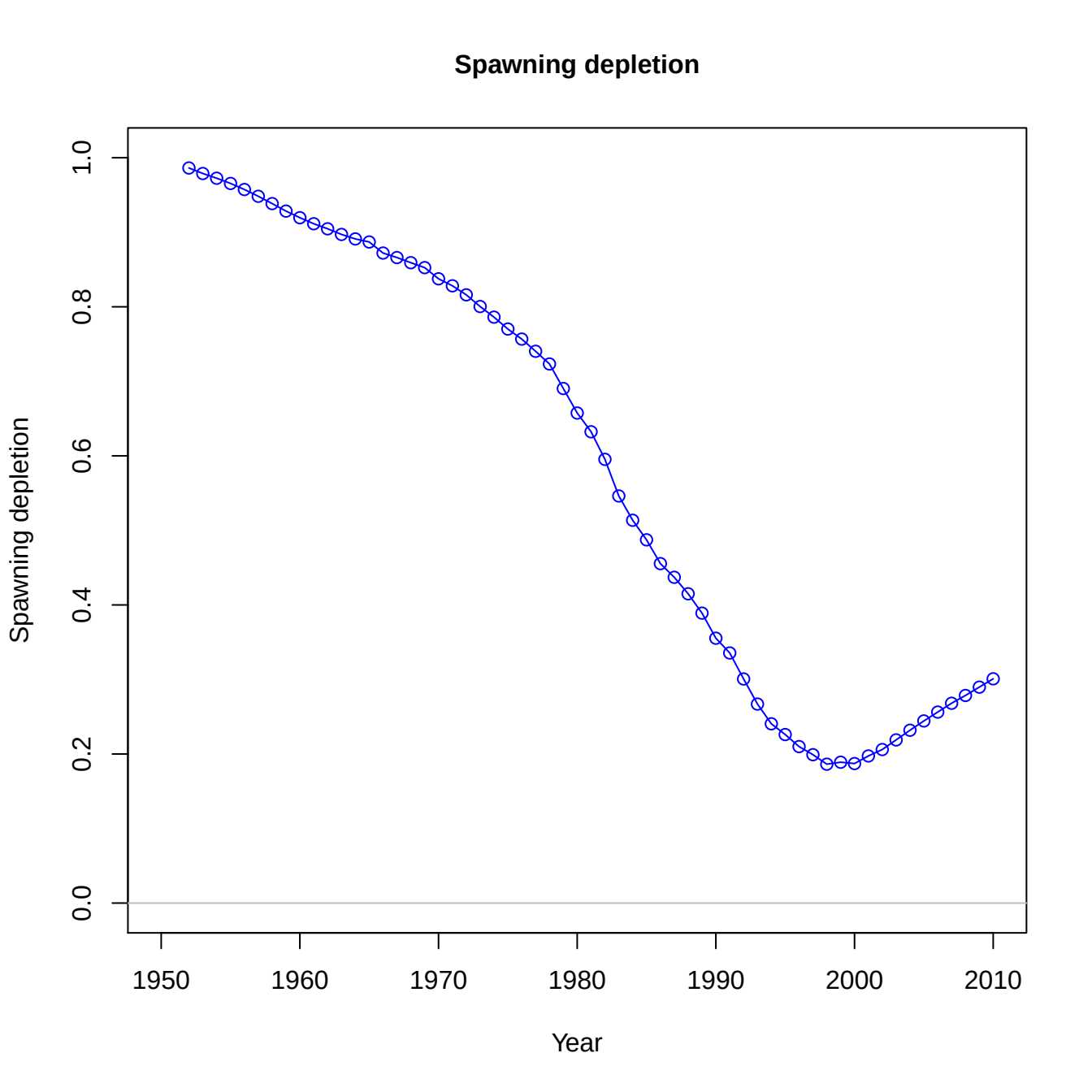

Male ending year selectivity and growth for fishery1
Length (cm)
20
40
60
80
0
20
40
60
80
Age (yr)
1
0.8
0.6
0.4
0.2

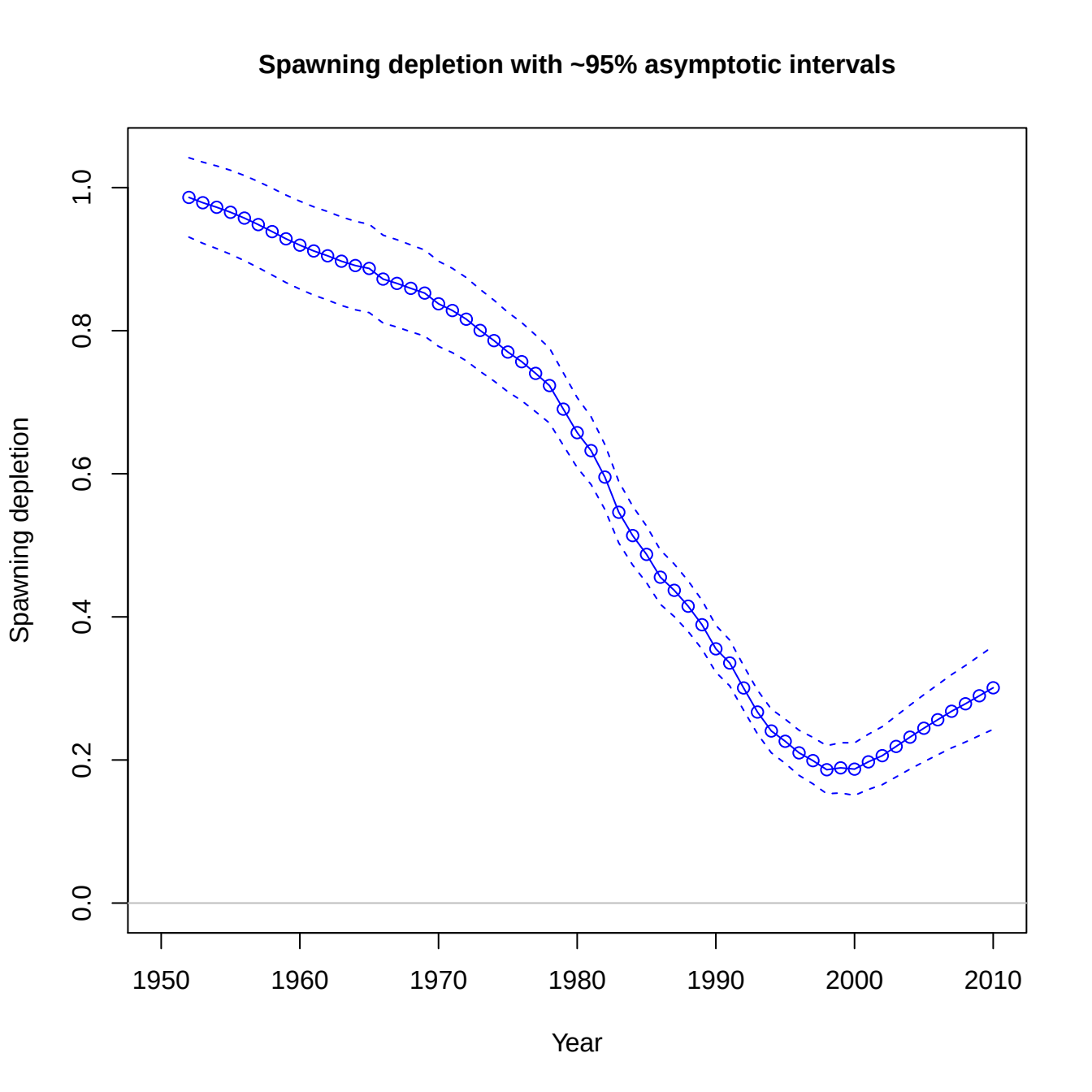

Total biomass (mt)
Total biomass (mt)
0
2000
4000
6000
8000
1950
1960
1970
1980
1990
2000
2010
Year

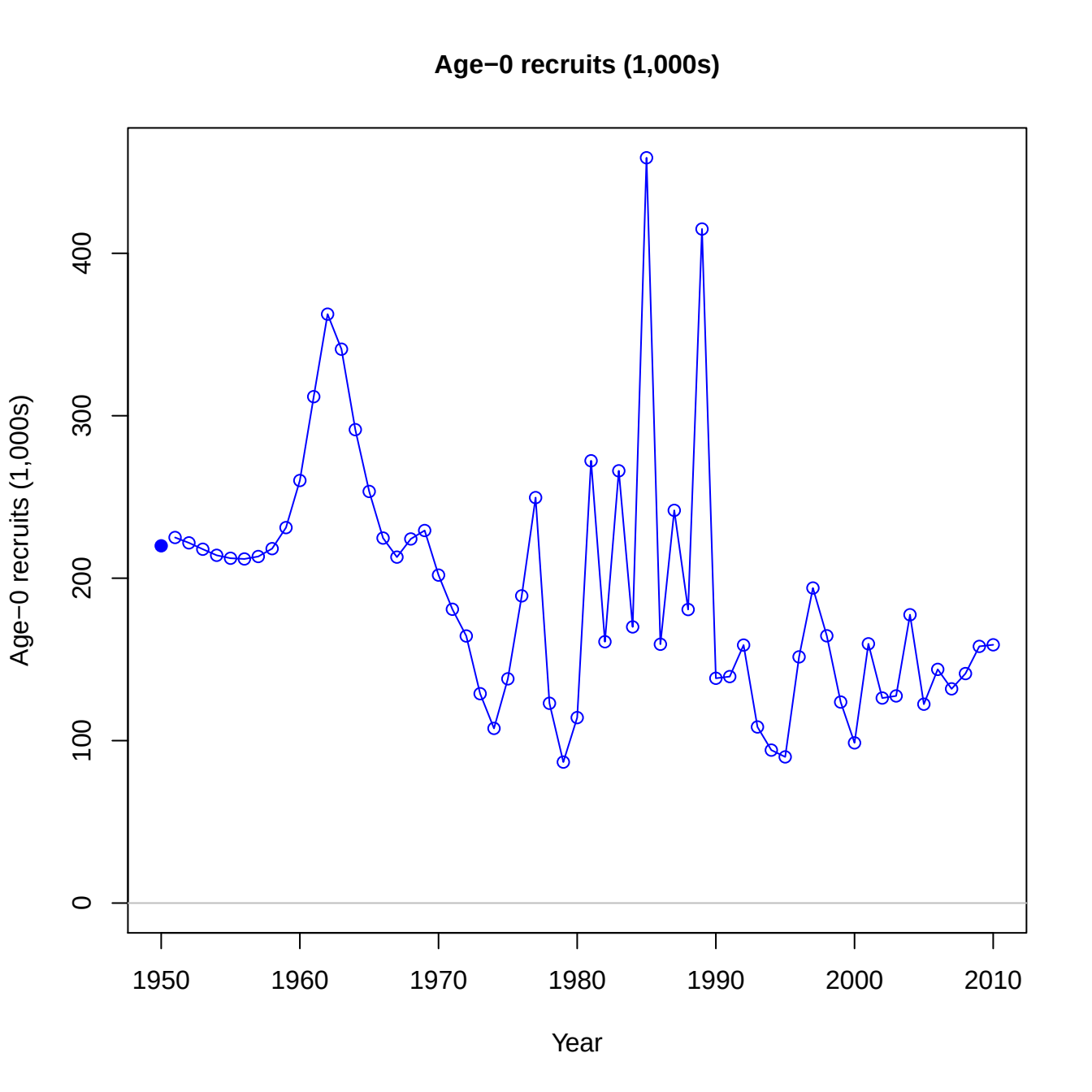

Summary biomass (mt)
Summary biomass (mt)
0
2000
4000
6000
8000
1950
1960
1970
1980
1990
2000
2010
Year

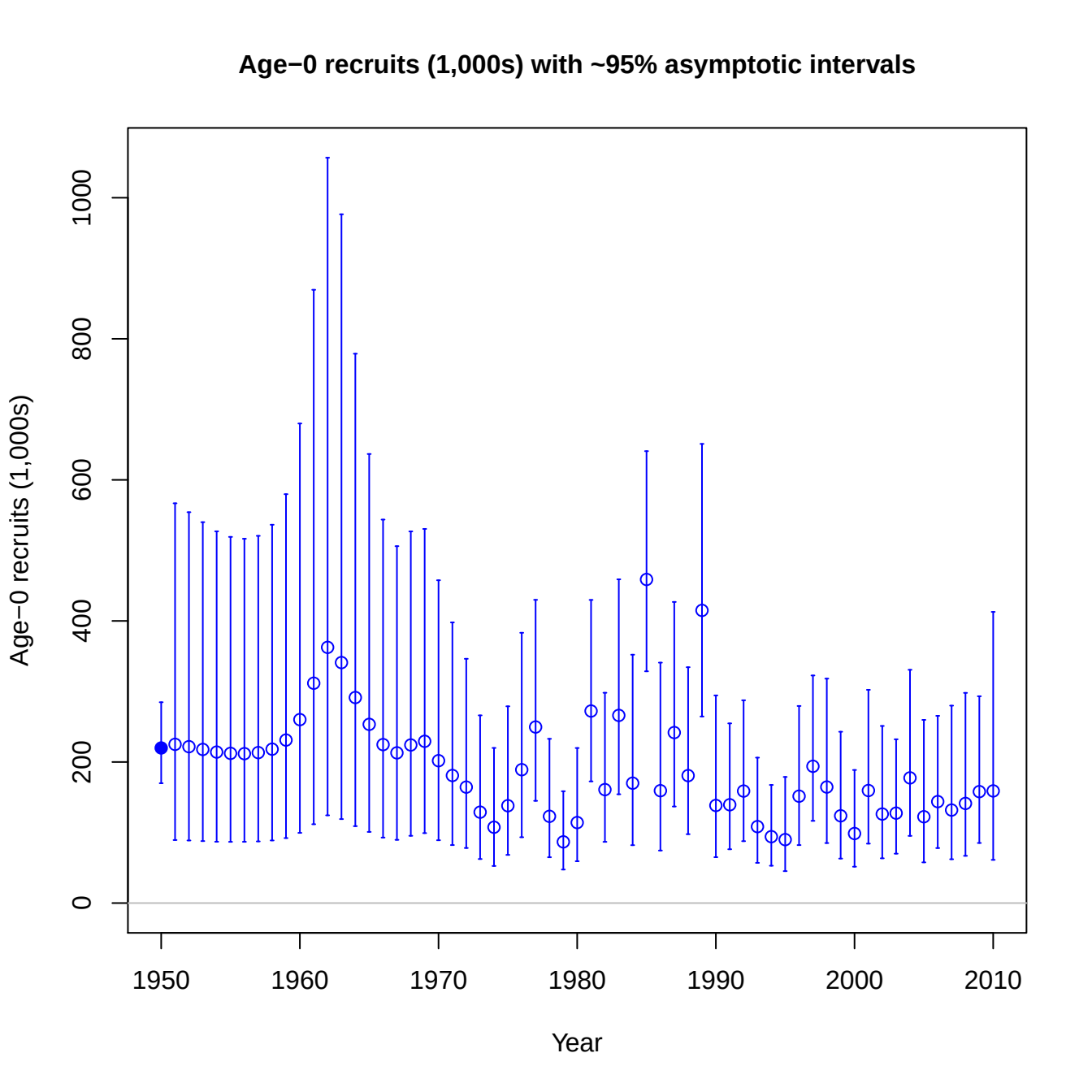

Spawning output
Spawning output
0e+00
2e+08
4e+08
6e+08
8e+08
1e+09
1950
1960
1970
1980
1990
2000
2010
Year

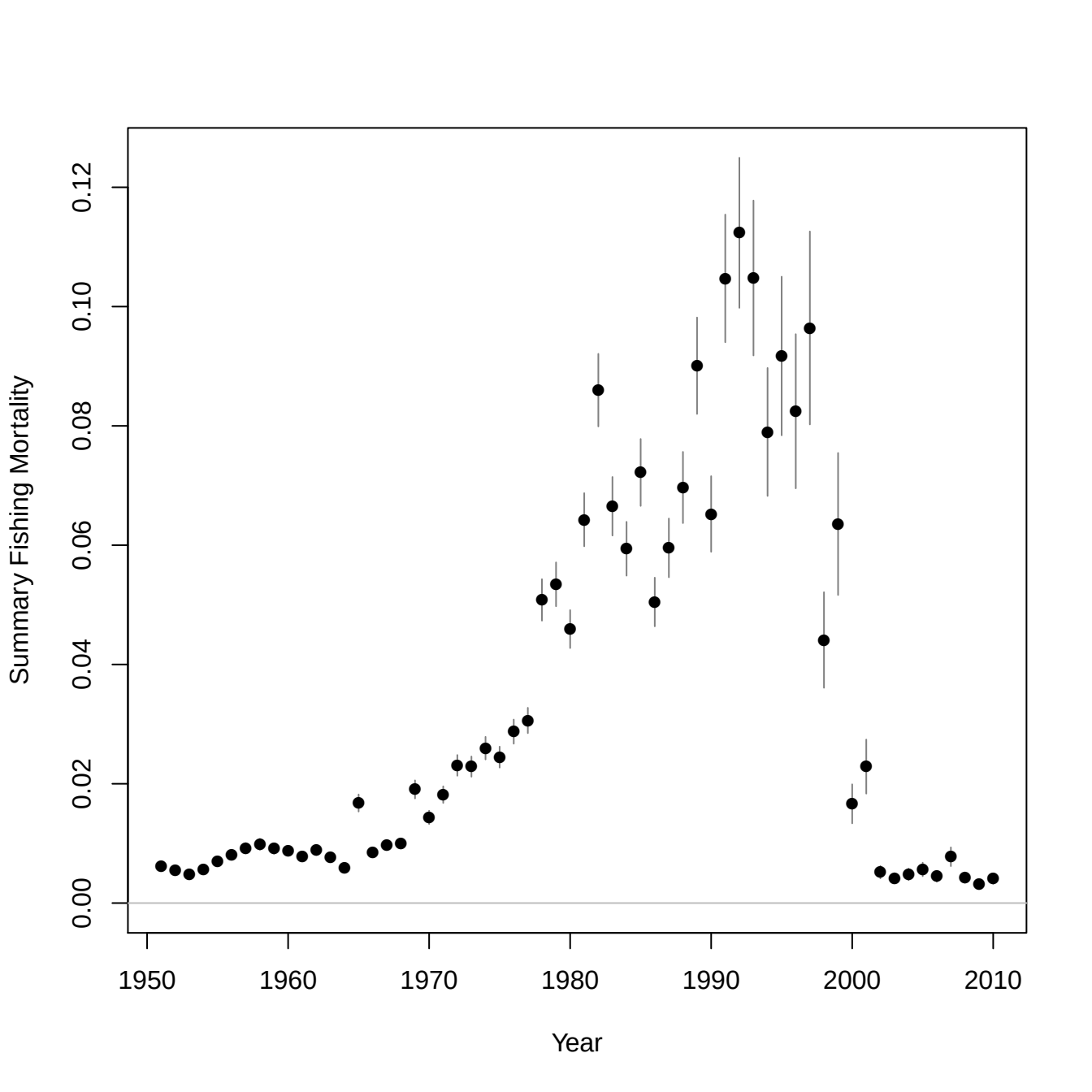

Spawning output with ~95% asymptotic intervals
Spawning output
0e+00
2e+08
4e+08
6e+08
8e+08
1e+09
1950
1960
1970
1980
1990
2000
2010
Year

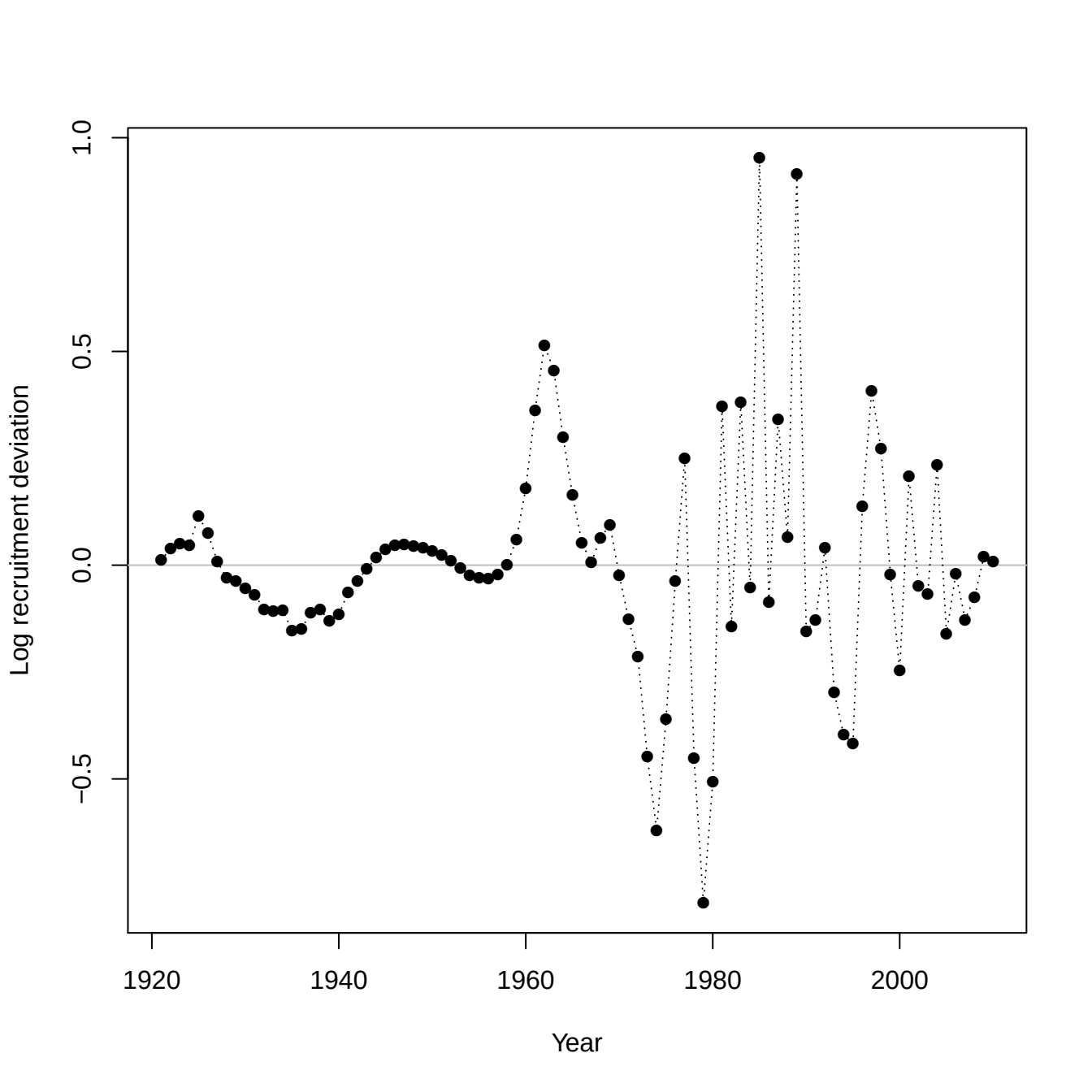

Spawning depletion
Spawning depletion
1.0
0.8
0.6
0.4
0.2
0.0
1950
1960
1970
1980
1990
2000
2010
Year

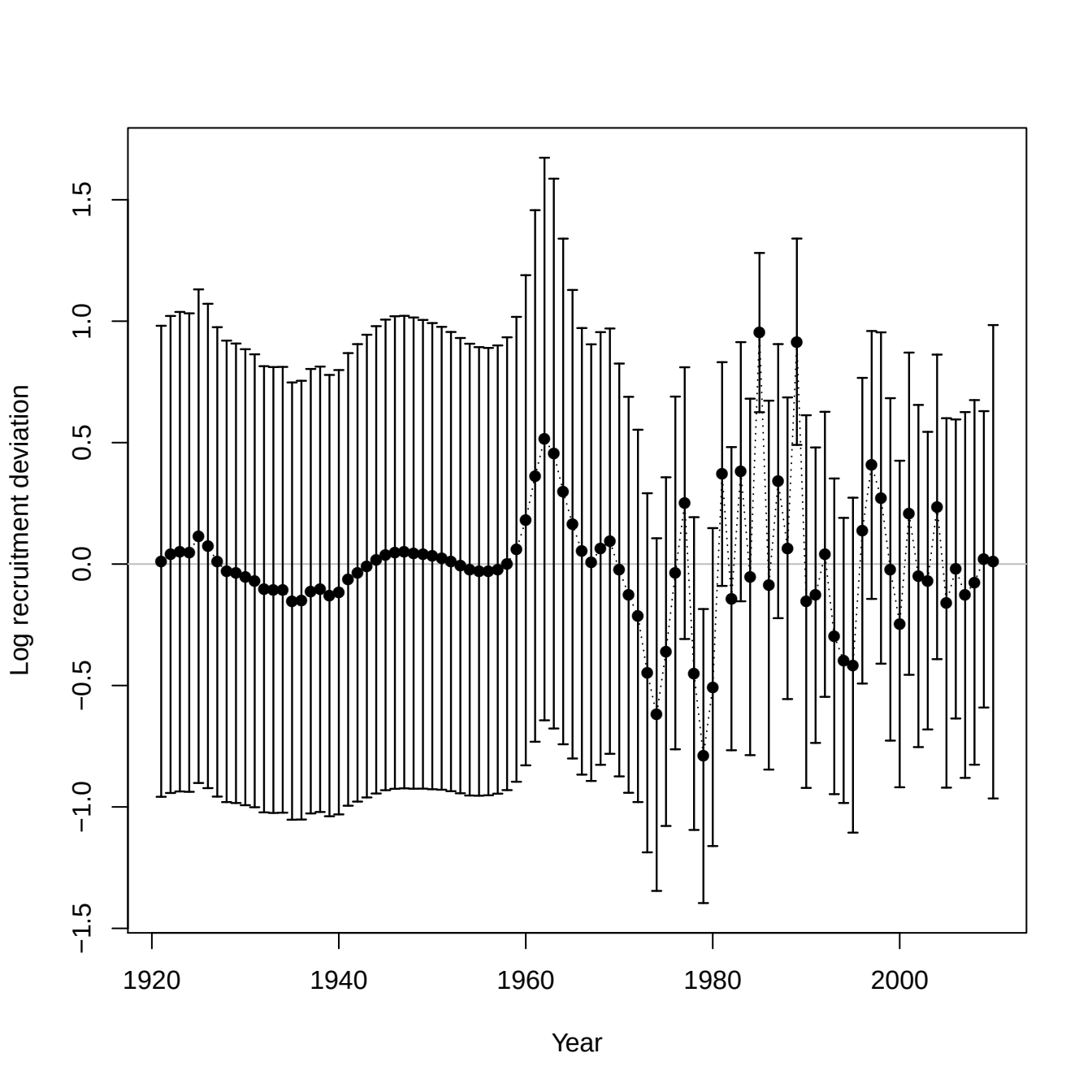

Spawning depletion with ~95% asymptotic intervals
Spawning depletion
0.0
0.2
0.4
0.6
0.8
1.0
1950
1960
1970
1980
1990
2000
2010
Year

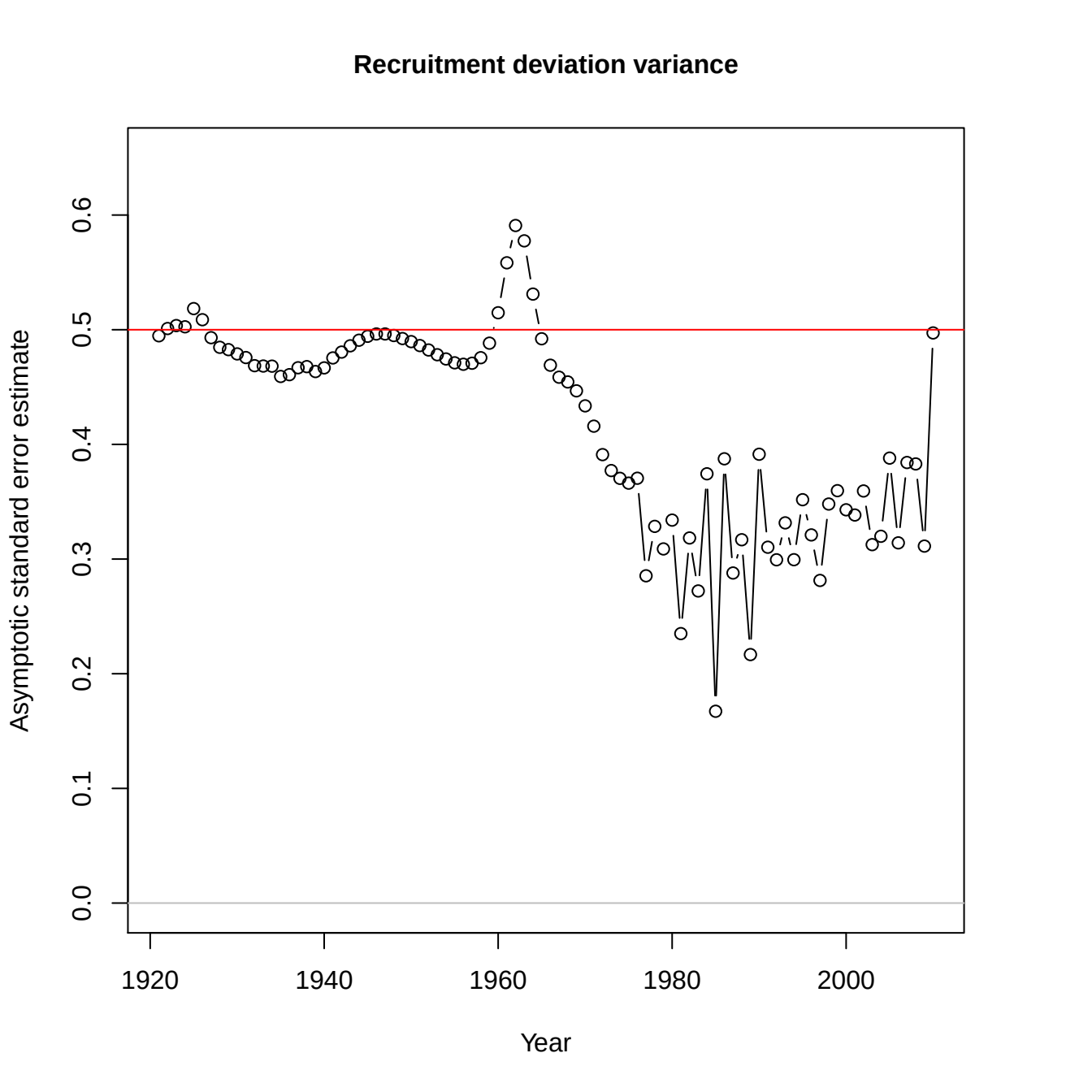

Age−0 recruits (1,000s)
Age−0 recruits (1,000s)
0
100
200
300
400
1950
1960
1970
1980
1990
2000
2010
Year

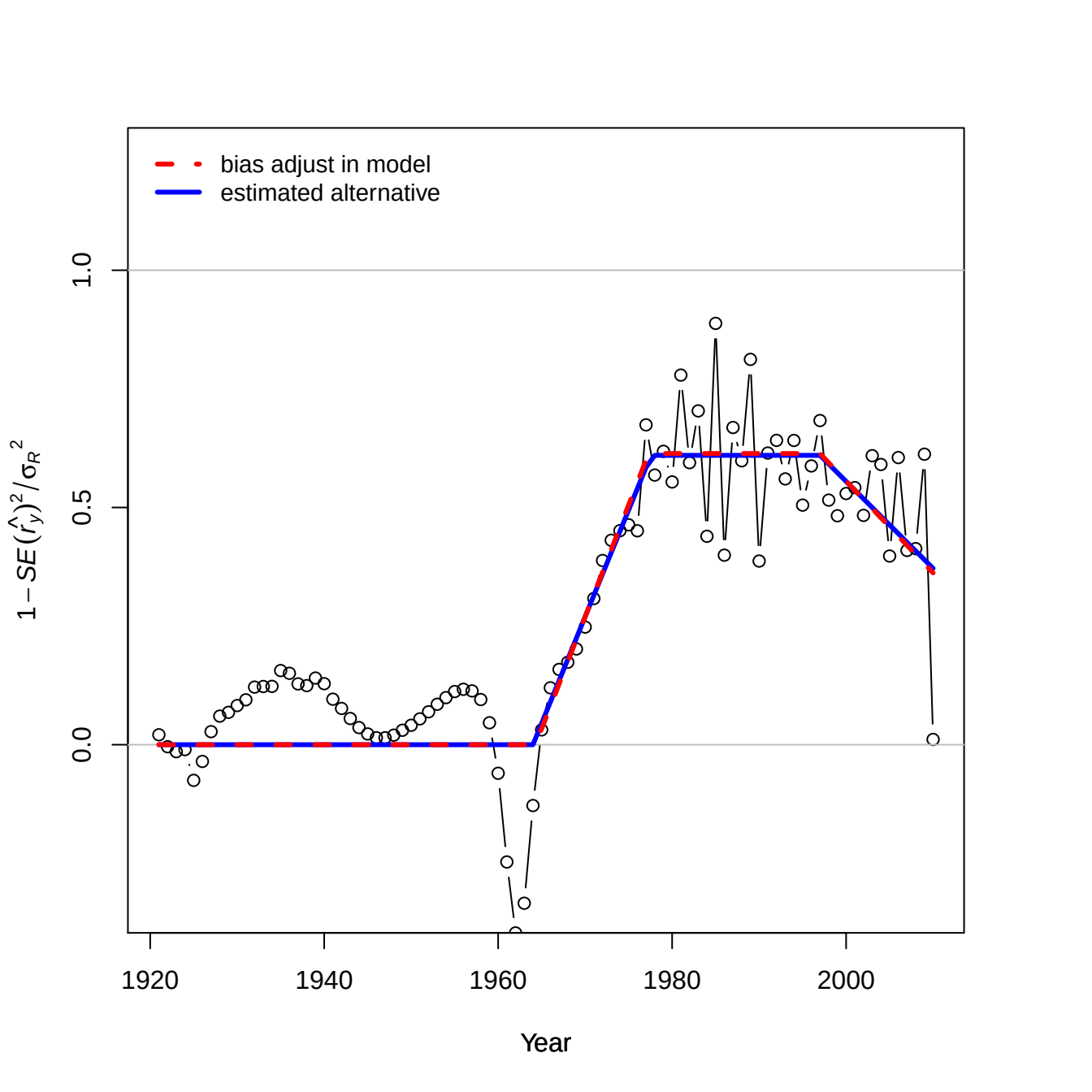

Age−0 recruits (1,000s) with ~95% asymptotic intervals
Age−0 recruits (1,000s)
0
200
400
600
800
1000
1950
1960
1970
1980
1990
2000
2010
Year

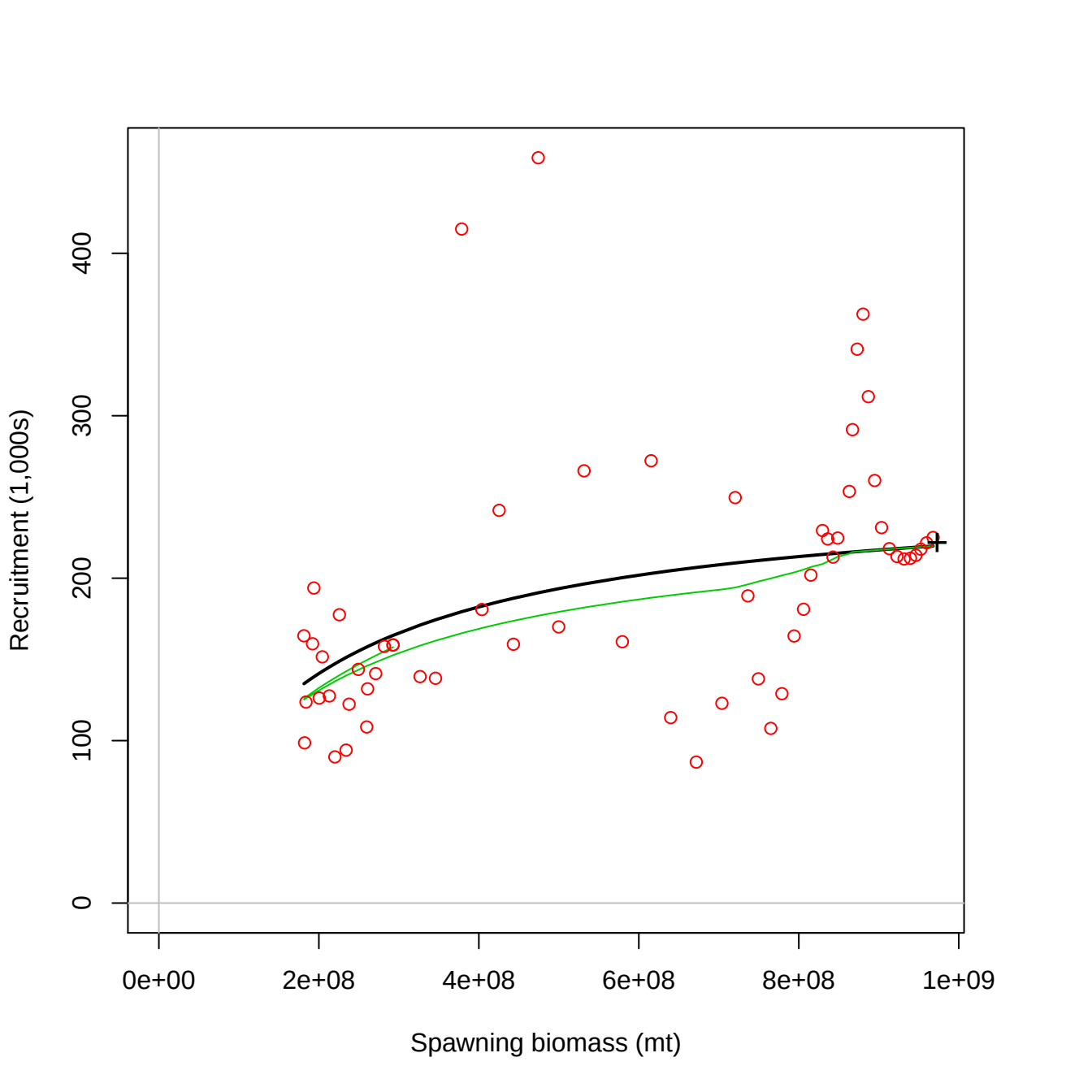

Summary Fishing Mortality
0.00
0.02
0.04
0.06
0.08
0.10
0.12
1950
1960
1970
1980
1990
2000
2010
Year

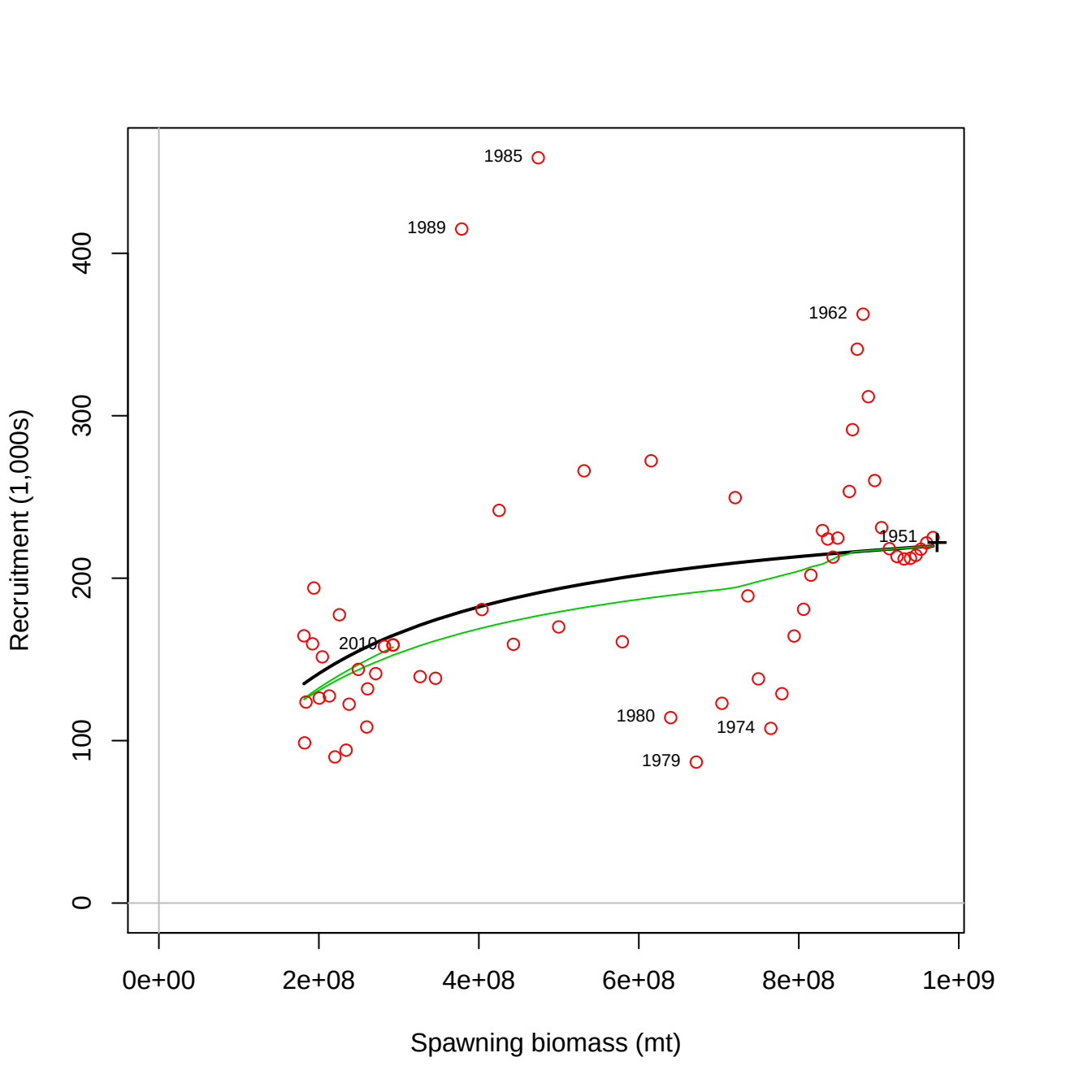

Log recruitment deviation
1.0
0.5
0.0
−0.5
1920
1940
1960
1980
2000
Year

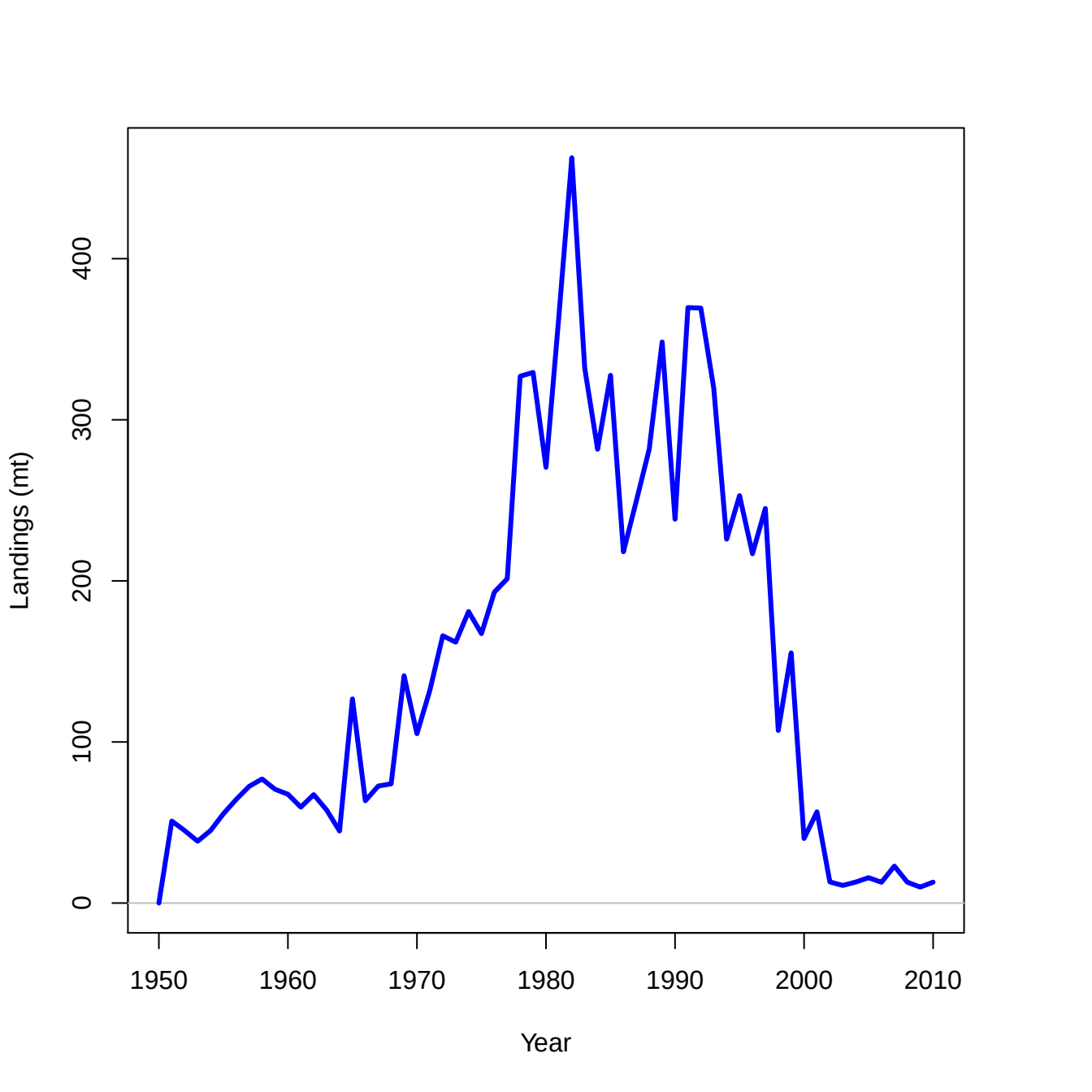

Log recruitment deviation
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
1920
1940
1960
1980
2000
Year

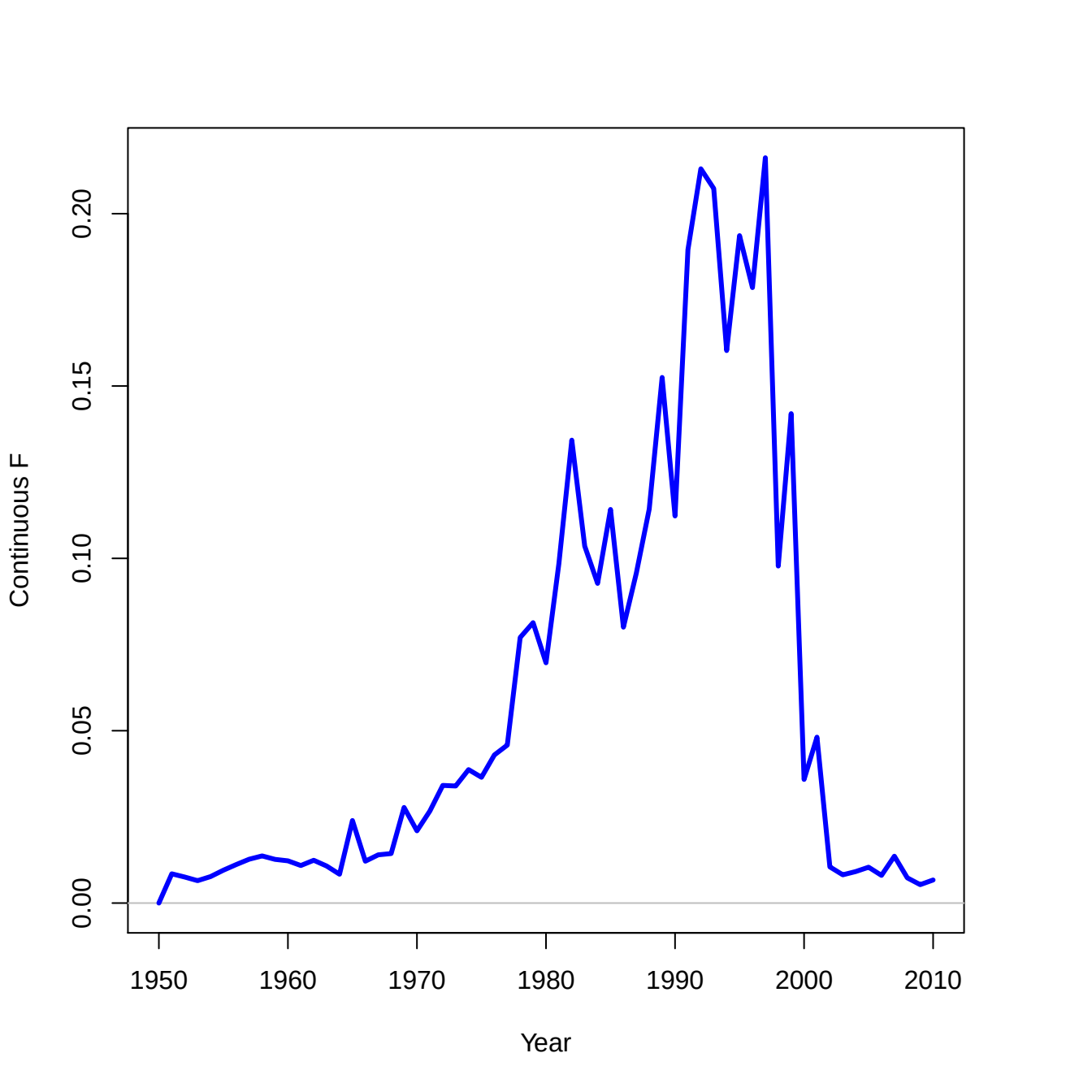

Recruitment deviation variance
Asymptotic standard error estimate
0.0
0.1
0.2
0.3
0.4
0.5
0.6
1920
1940
1960
1980
2000
Year

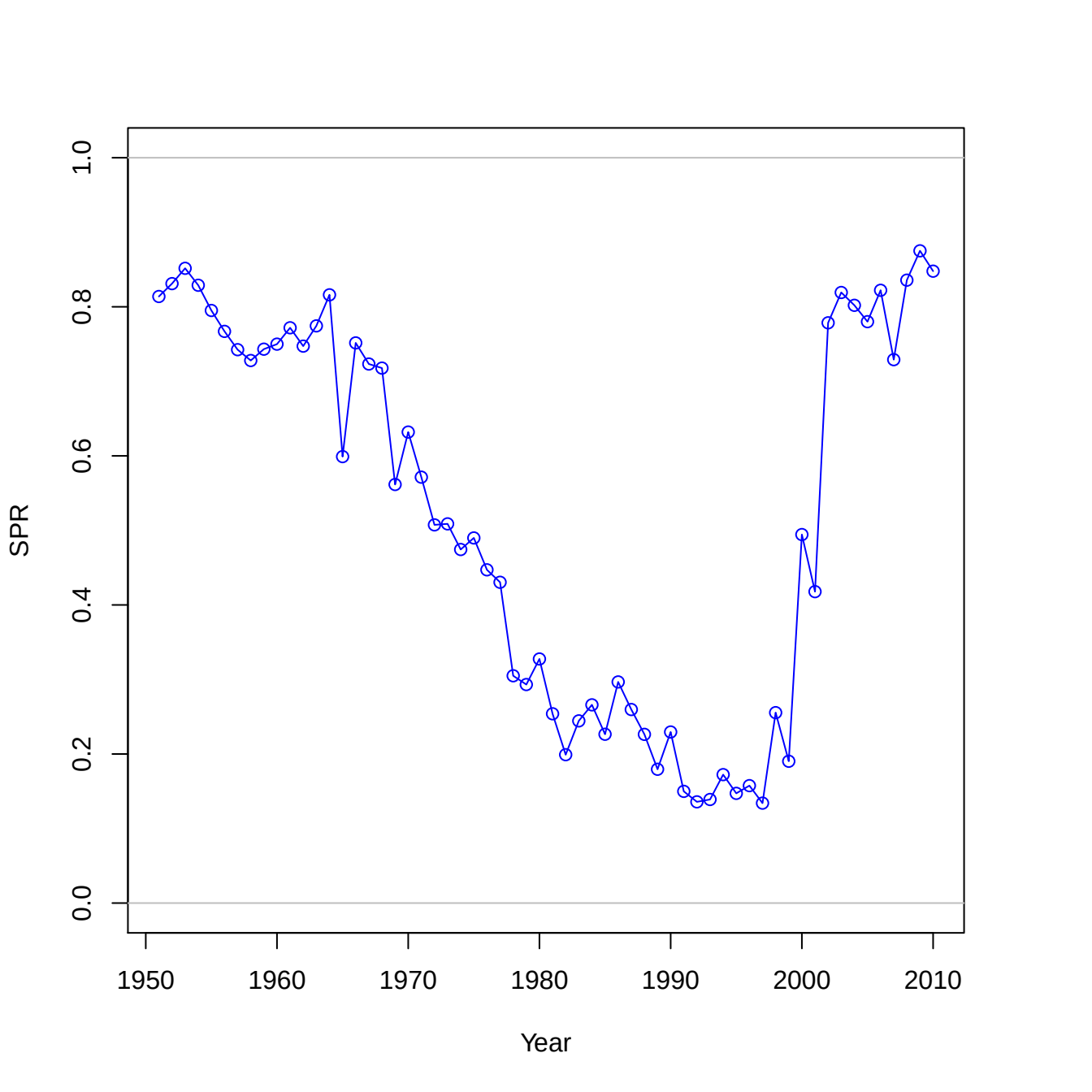

bias adjust in model
estimated alternative
1.0
0.5
0.0
$1 - SE(\hat{r}_y)^2 / \sigma_R^2$
1920
1940
1960
1980
2000
Year

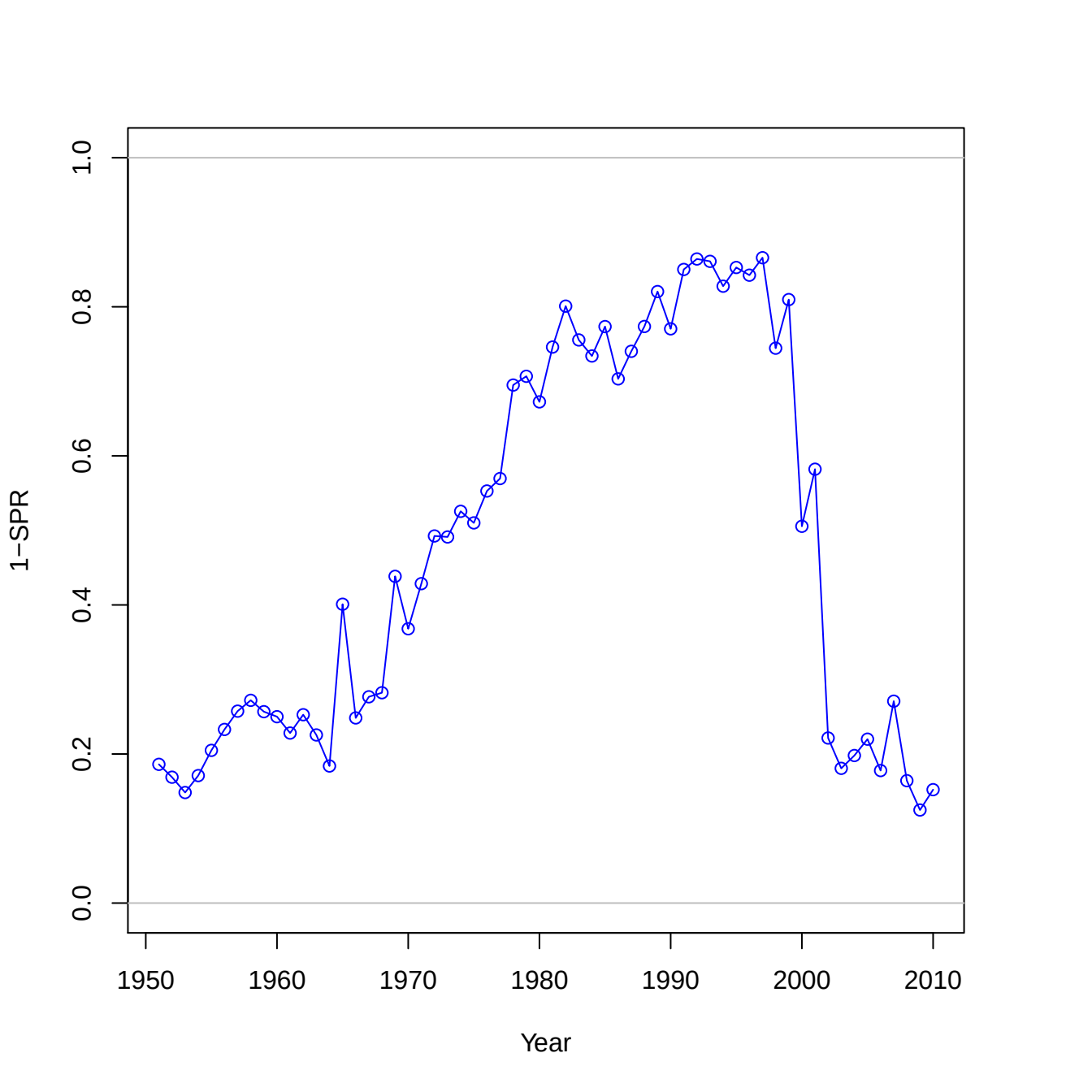

Recruitment (1,000s)
0
100
200
300
400
0e+00
2e+08
4e+08
6e+08
8e+08
1e+09
Spawning biomass (mt)

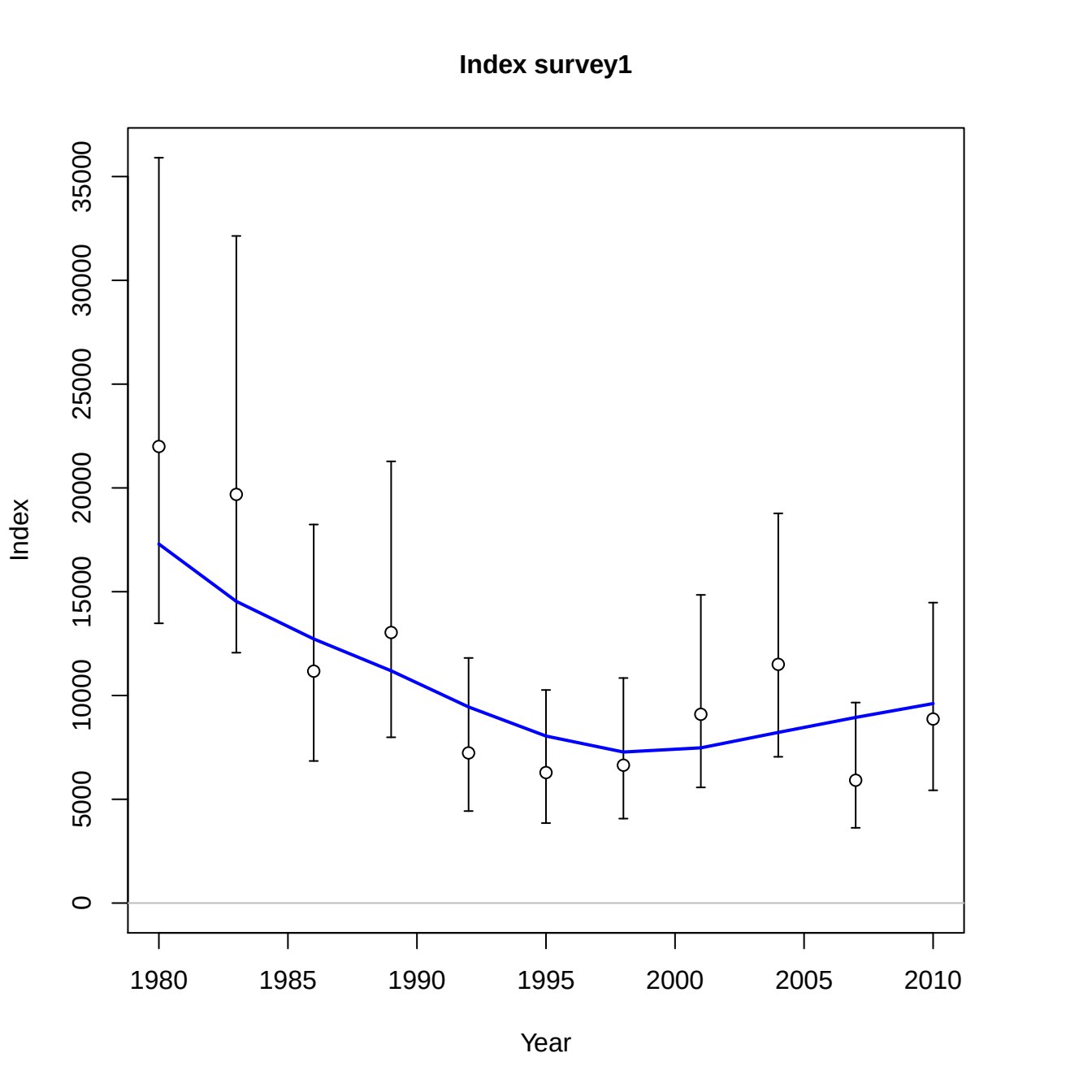

1985
1989
1962
1951
2010
1980
1974
1979
Recruitment (1,000s)
0
100
200
300
400
0e+00
2e+08
4e+08
6e+08
8e+08
1e+09
Spawning biomass (mt)

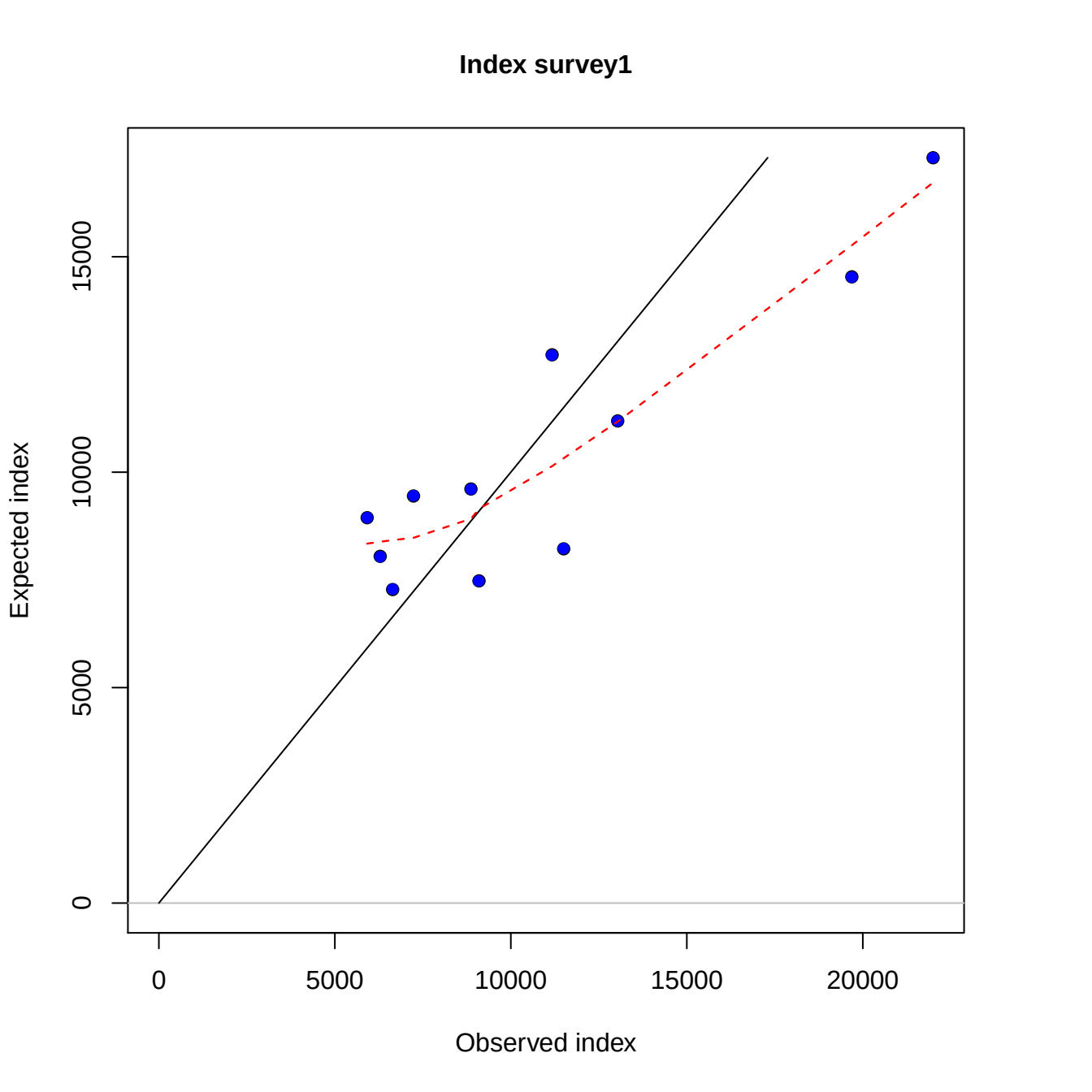

Landings (mt)
0
100
200
300
400
1950
1960
1970
1980
1990
2000
2010
Year

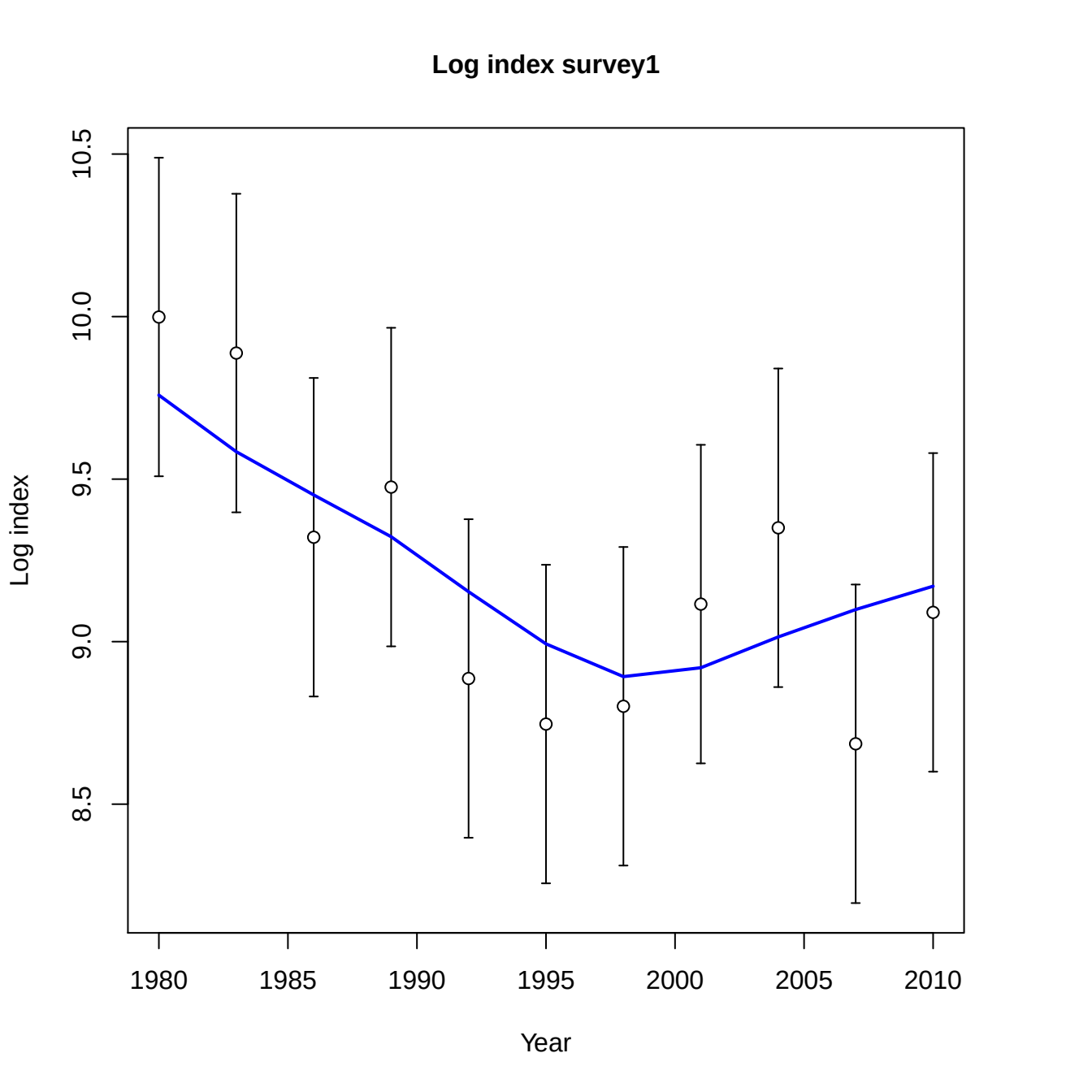

Continuous F
0.00
0.05
0.10
0.15
0.20
1950
1960
1970
1980
1990
2000
2010
Year

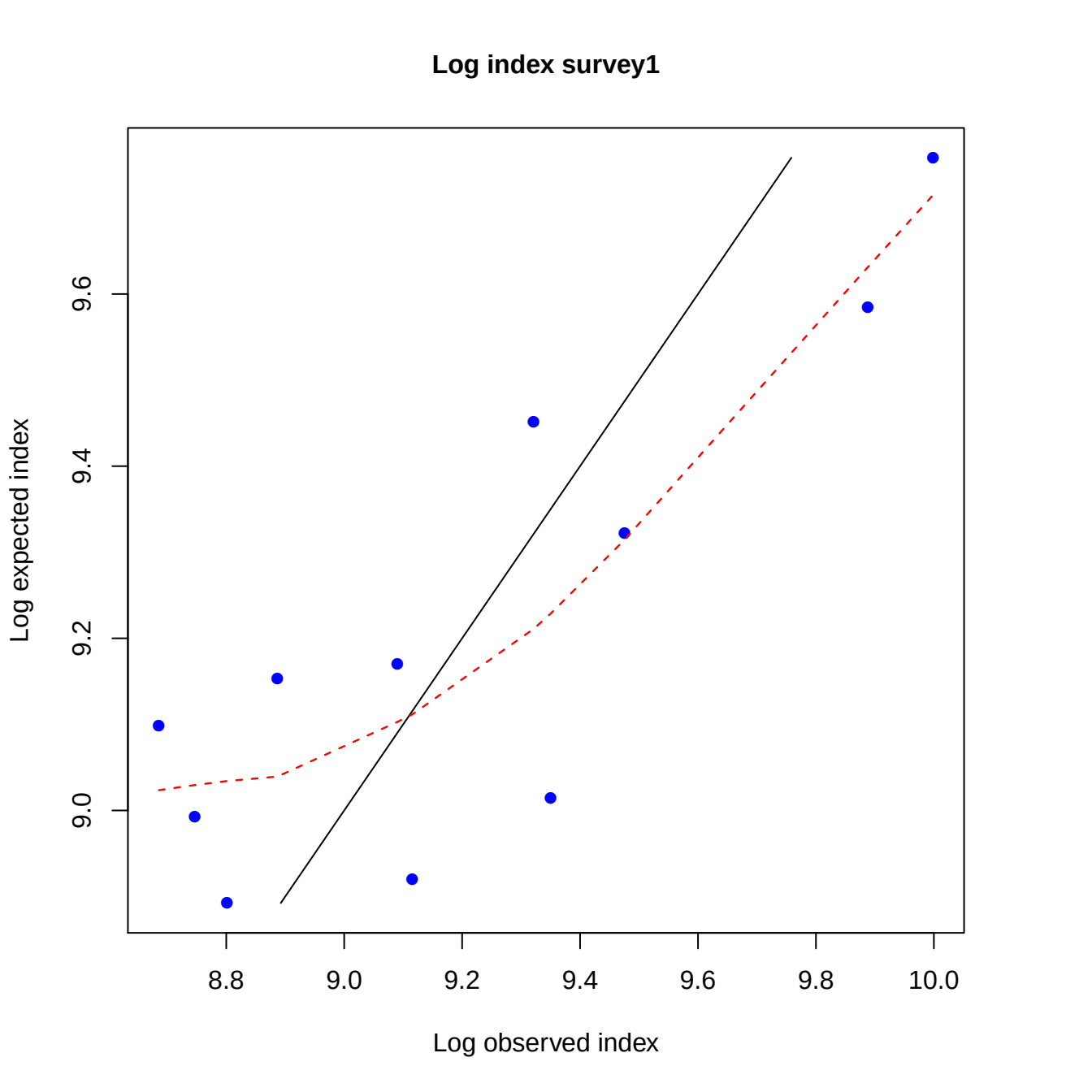

SPR
1.0
0.8
0.6
0.4
0.2
0.0
1950
1960
1970
1980
1990
2000
2010
Year

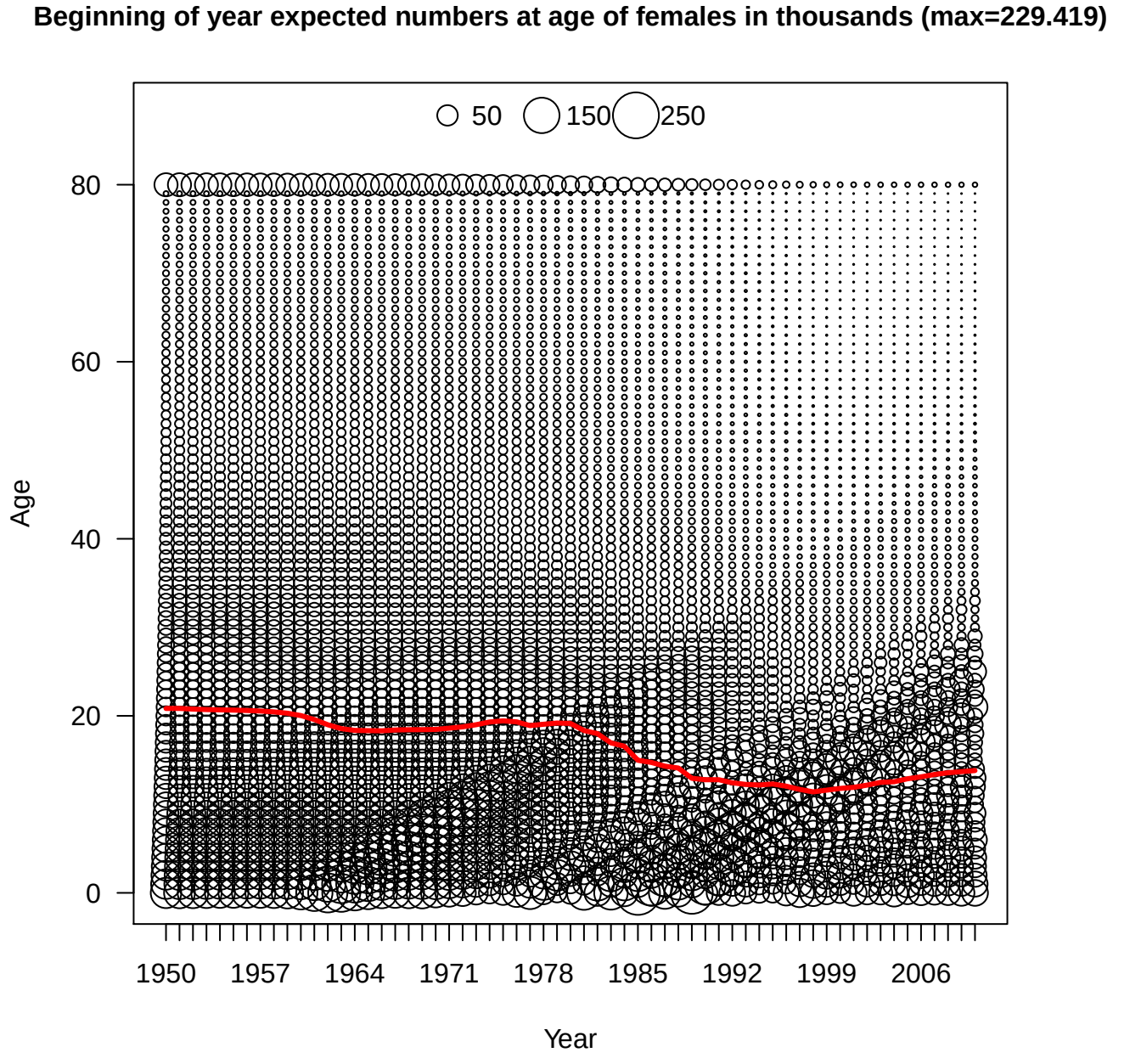

1−SPR
0.0
0.2
0.4
0.6
0.8
1.0
1950
1960
1970
1980
1990
2000
2010
Year

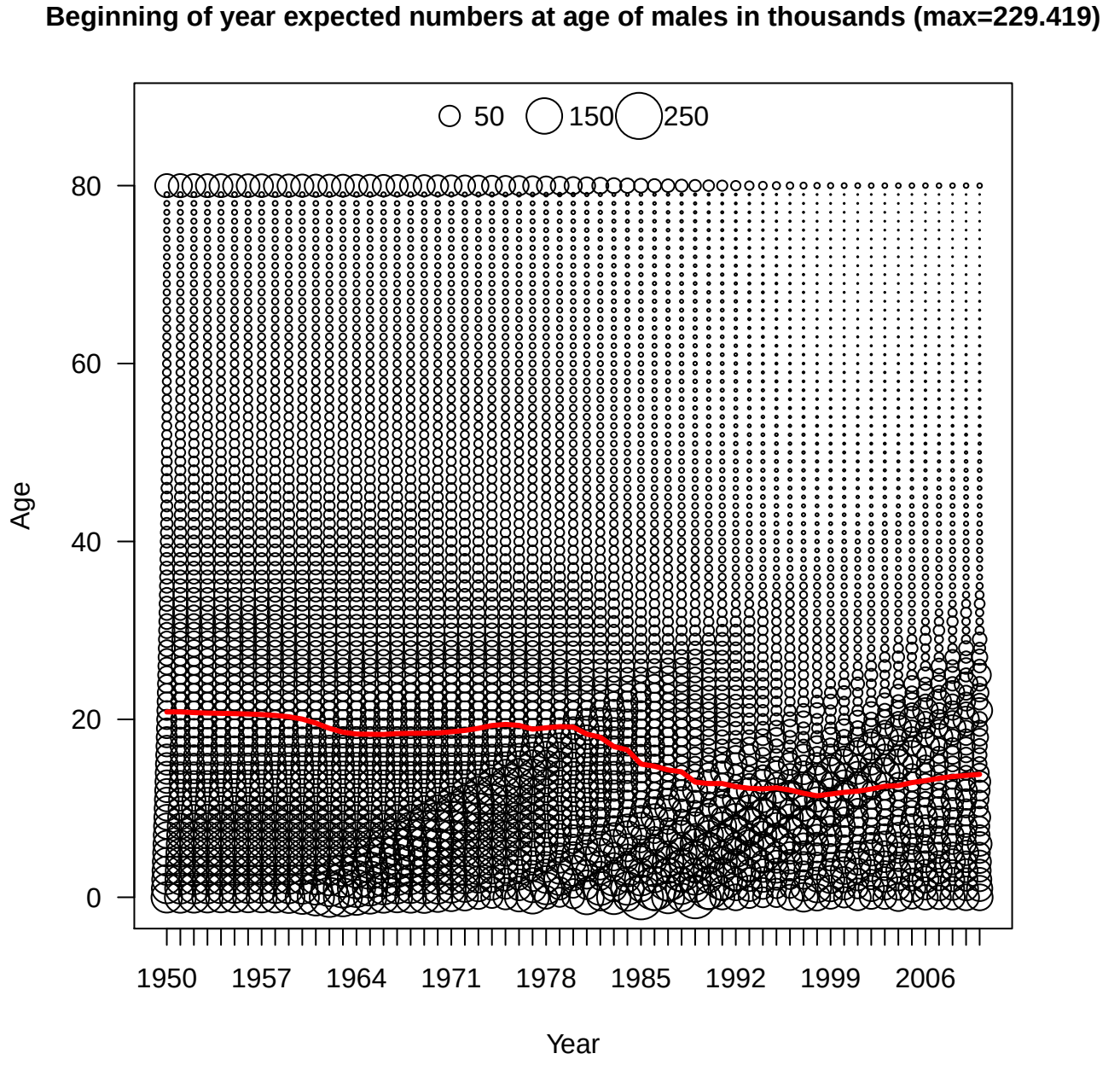

Index survey1
Index
0
5000
10000
15000
20000
25000
30000
35000
1980
1985
1990
1995
2000
2005
2010
Year

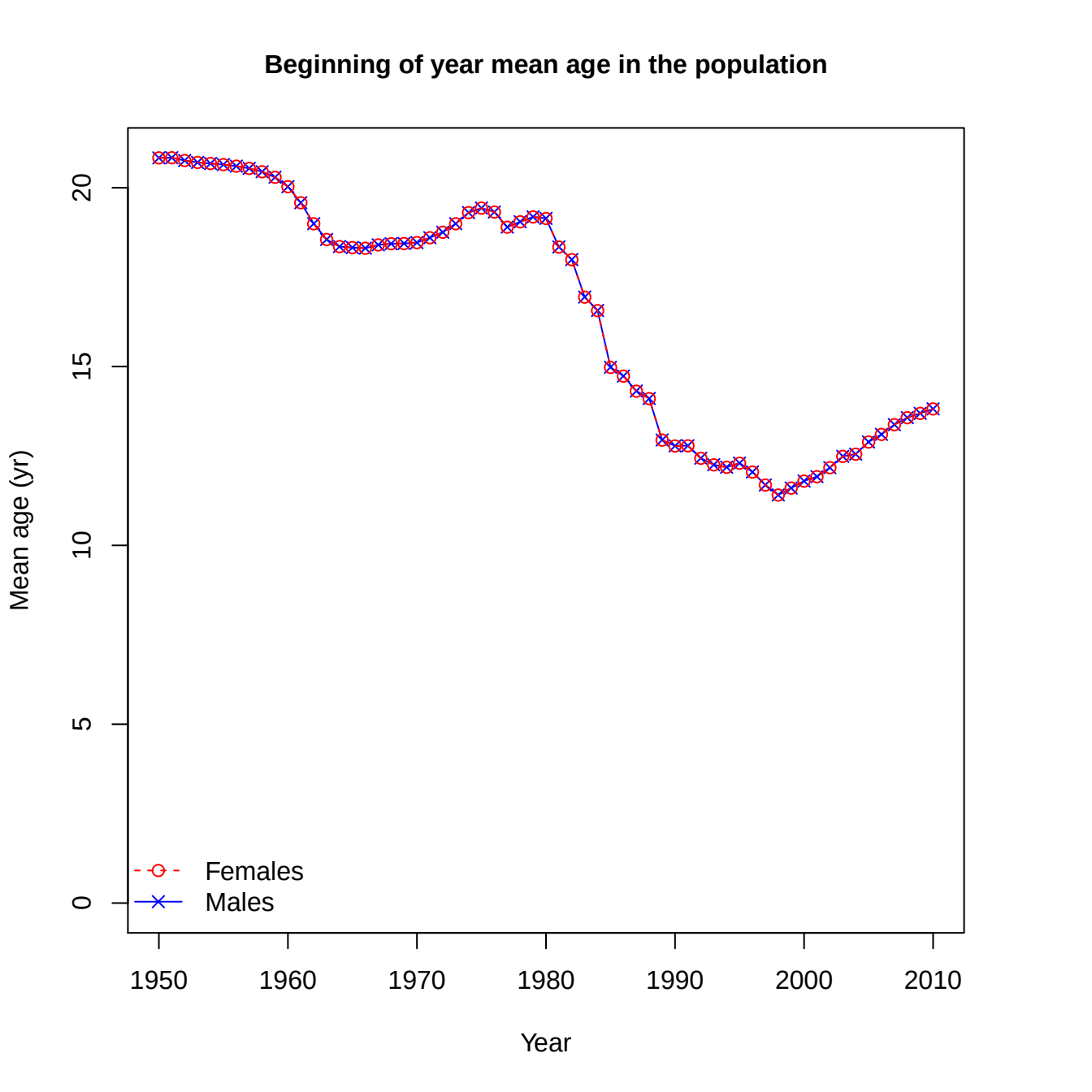

Index survey1
Expected index
Observed index
0
5000
10000
15000
0
5000
10000
15000
20000

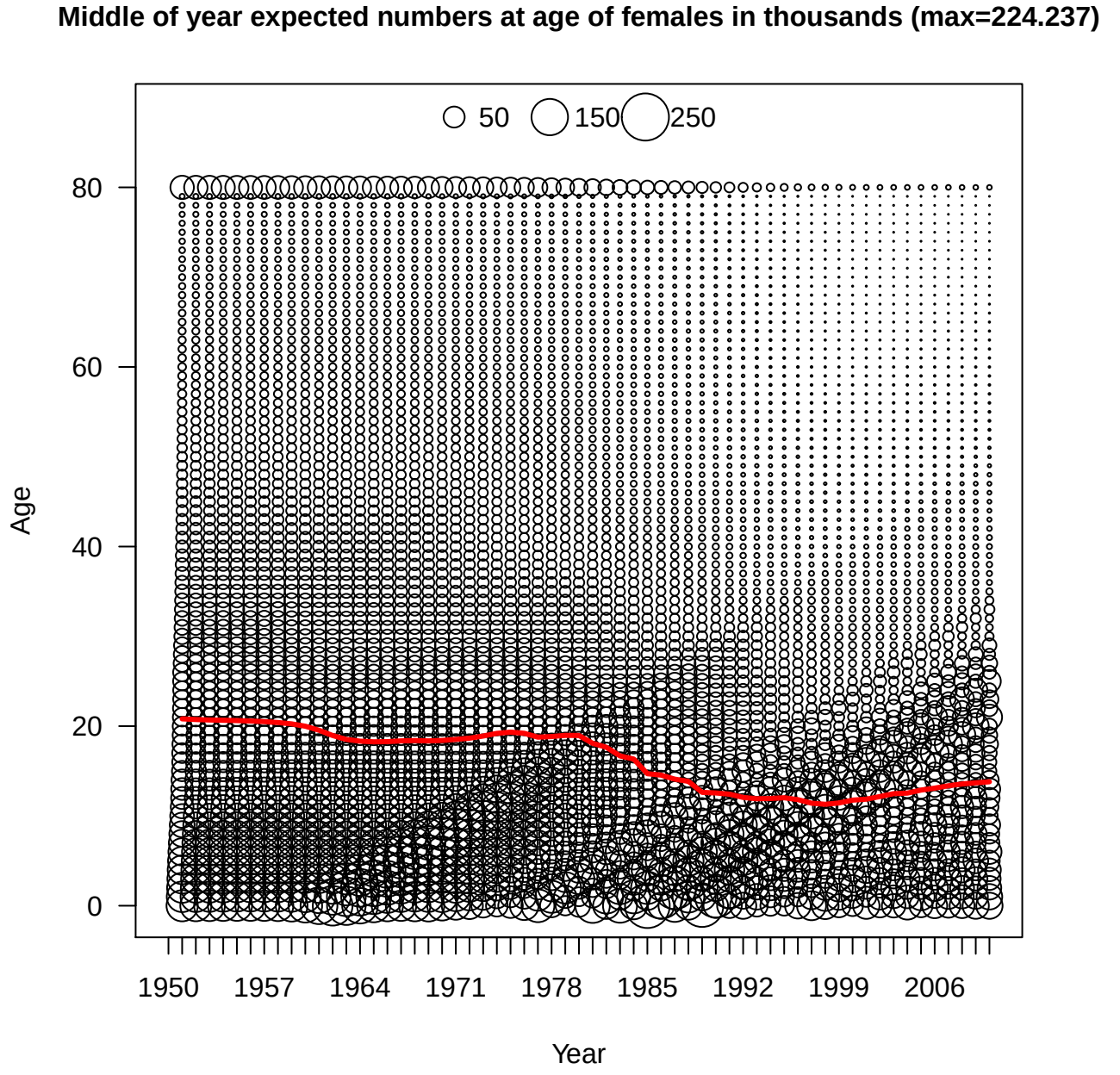

Log index survey1
Log index
10.5
10.0
9.5
9.0
8.5
1980
1985
1990
1995
2000
2005
2010
Year

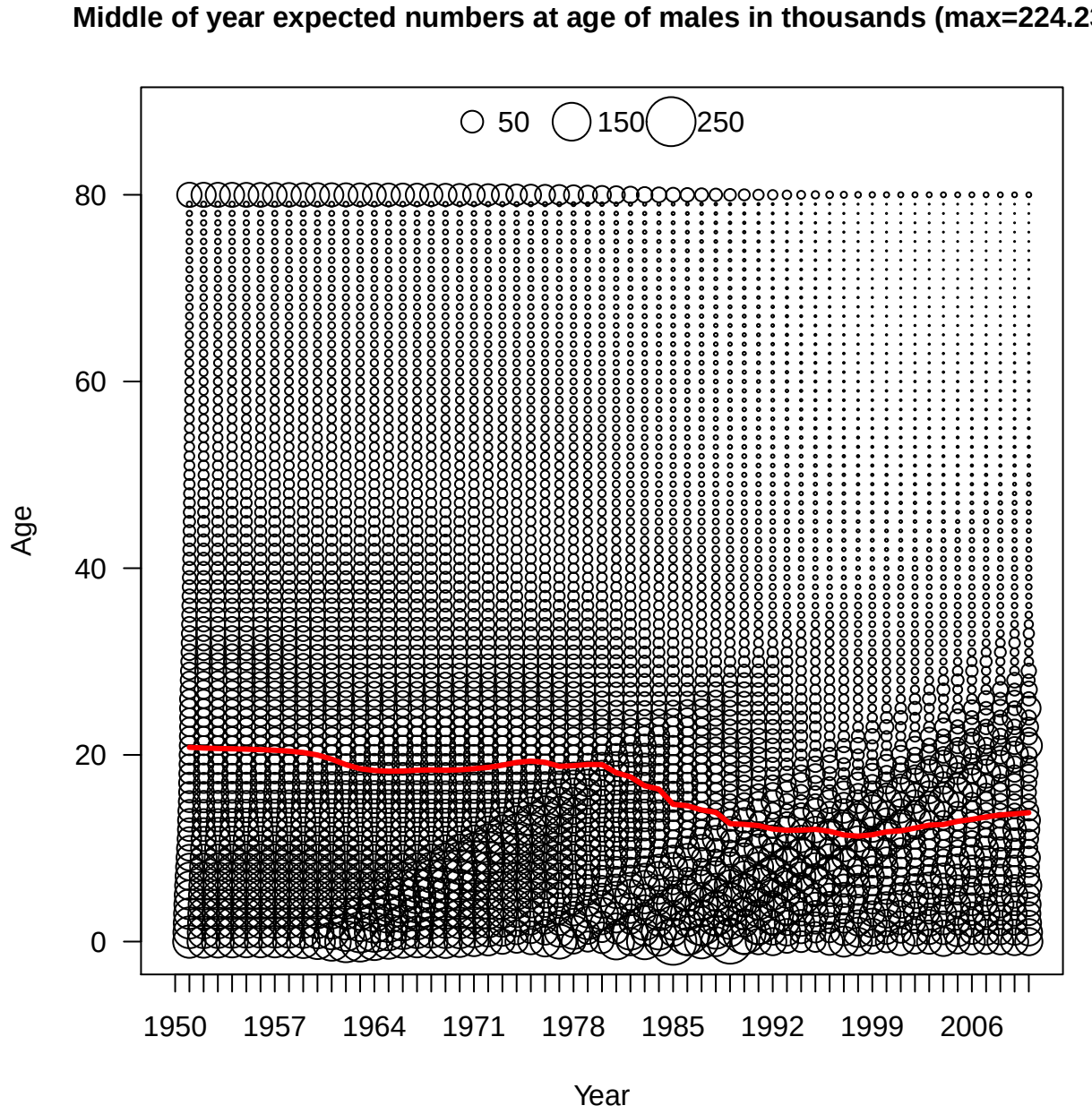

Log index survey1
Log expected index
9.0
9.2
9.4
9.6
Log observed index
8.8
9.0
9.2
9.4
9.6
9.8
10.0

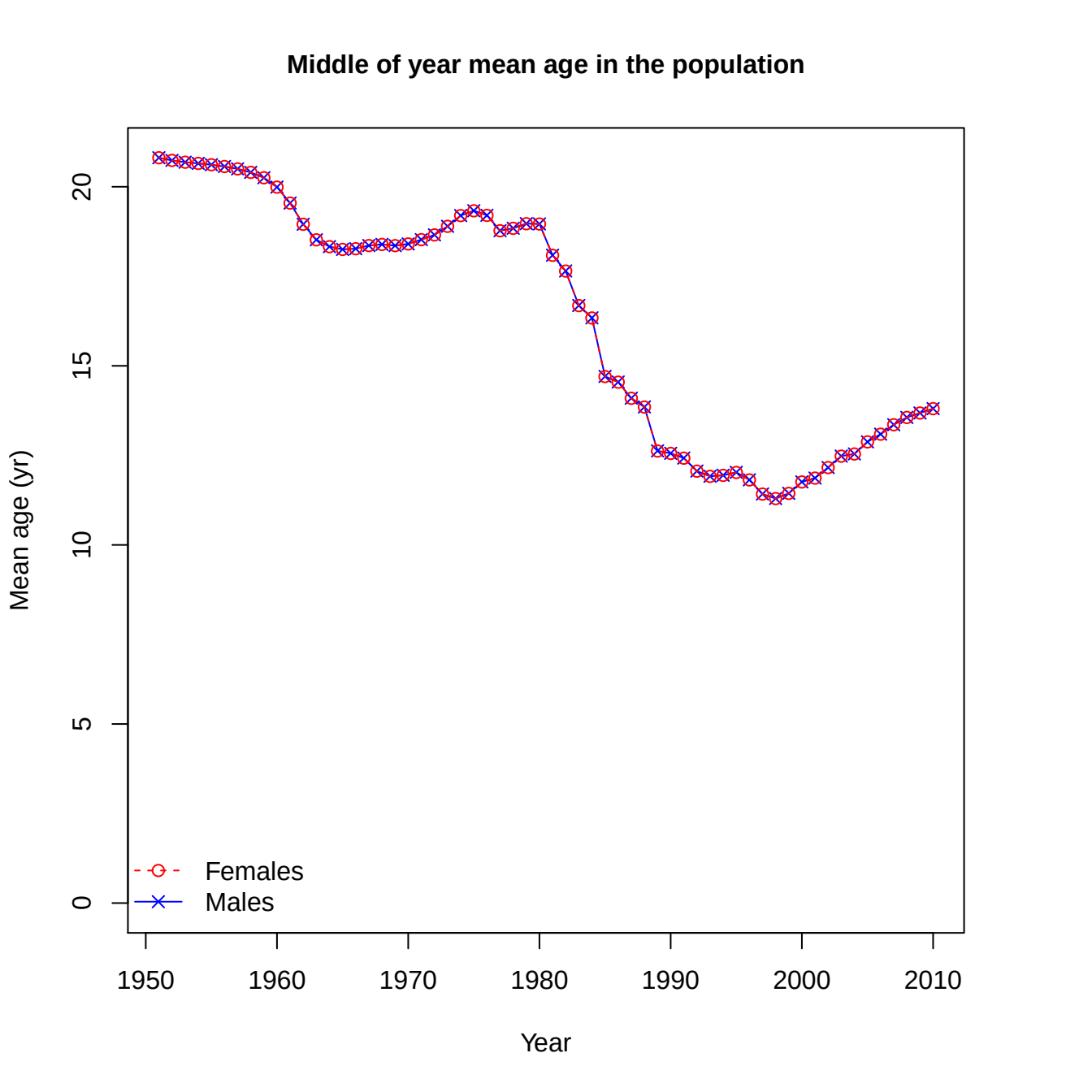

Beginning of year expected numbers at age of females in thousands (max=229.419)
50
150
250
80
60
40
20
0
Age
1950
1957
1964
1971
1978
1985
1992
1999
2006
Year

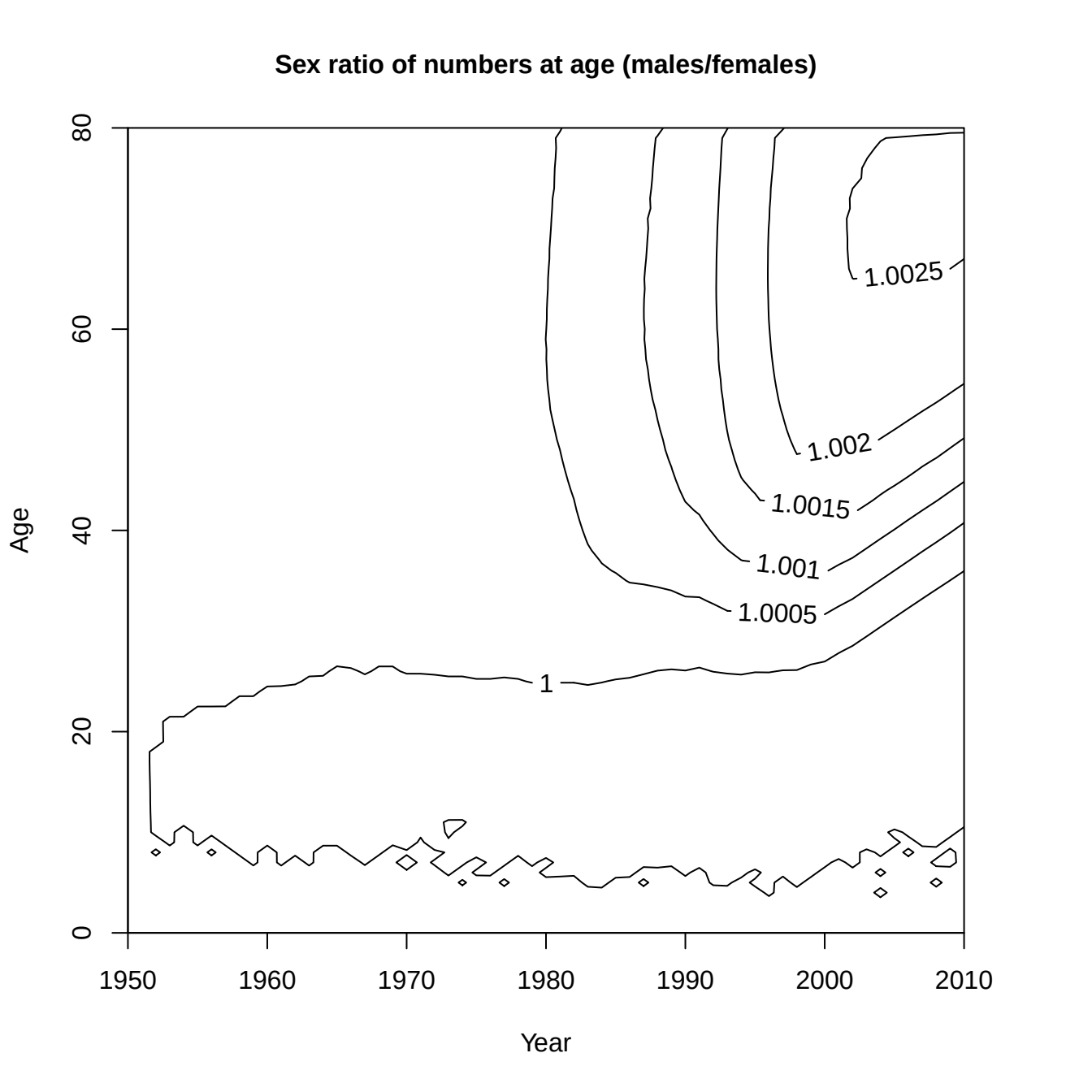

Beginning of year expected numbers at age of males in thousands (max=229.419)
50
150
250
80
60
40
20
0
Age
1950
1957
1964
1971
1978
1985
1992
1999
2006
Year

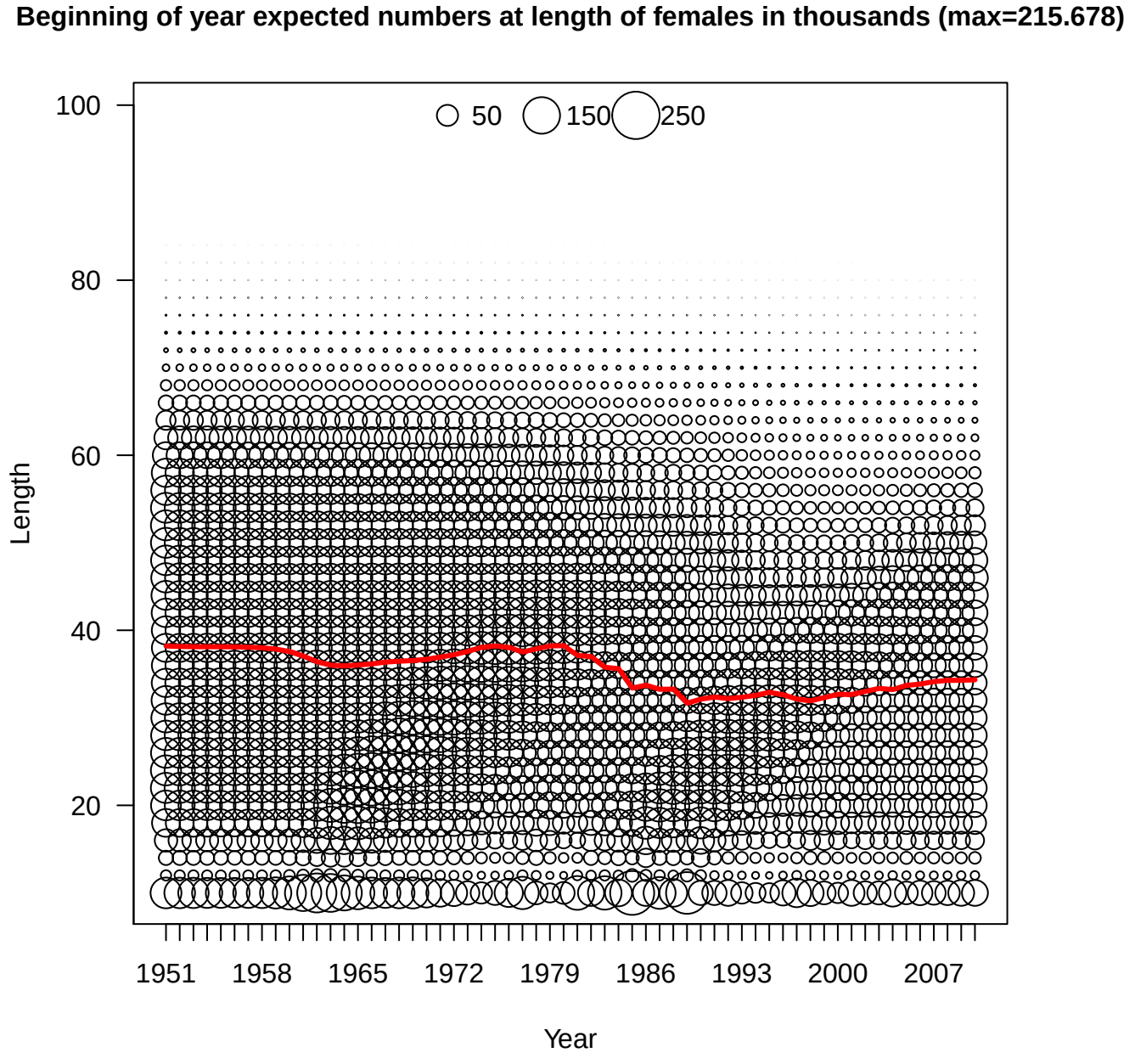

Beginning of year mean age in the population
Mean age (yr)
0
5
10
15
20
1950
1960
1970
1980
1990
2000
2010
Year
Females
Males

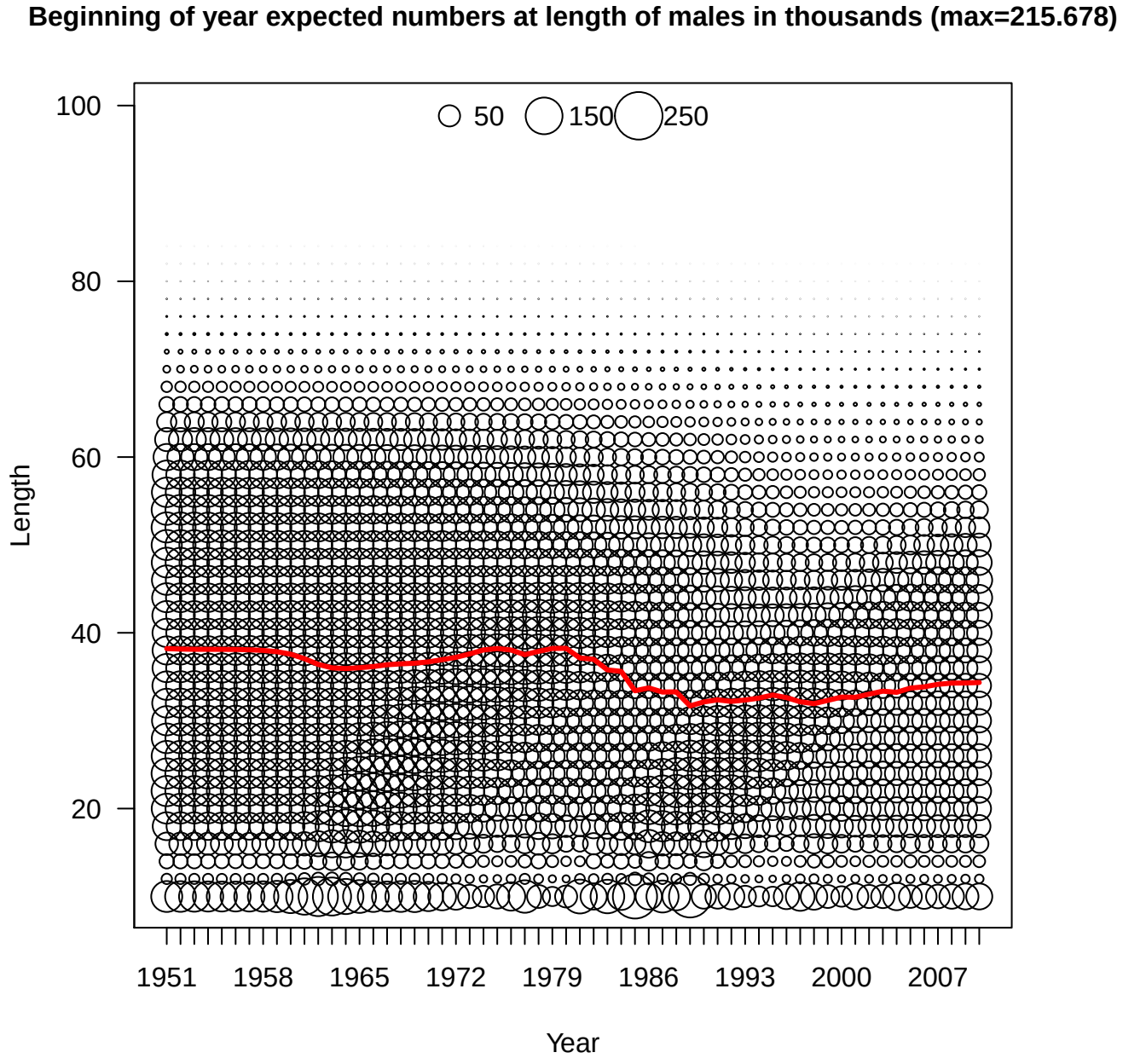

Middle of year expected numbers at age of females in thousands (max=224.237)
50
150
250
80
60
40
20
0
Age
1950
1957
1964
1971
1978
1985
1992
1999
2006
Year

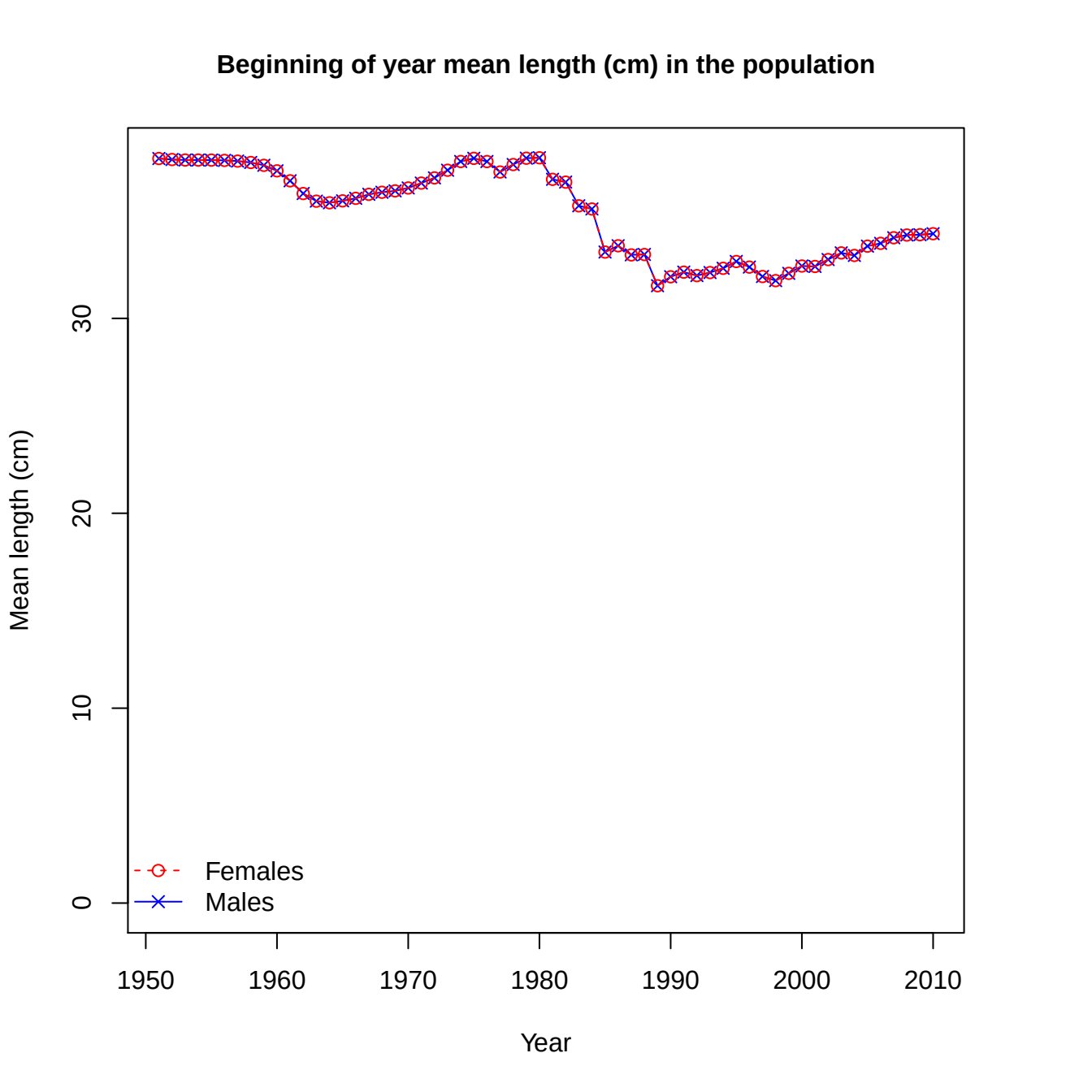

Middle of year expected numbers at age of males in thousands (max=224.237)
50
150
250
80
60
40
20
0
Age
1950
1957
1964
1971
1978
1985
1992
1999
2006
Year

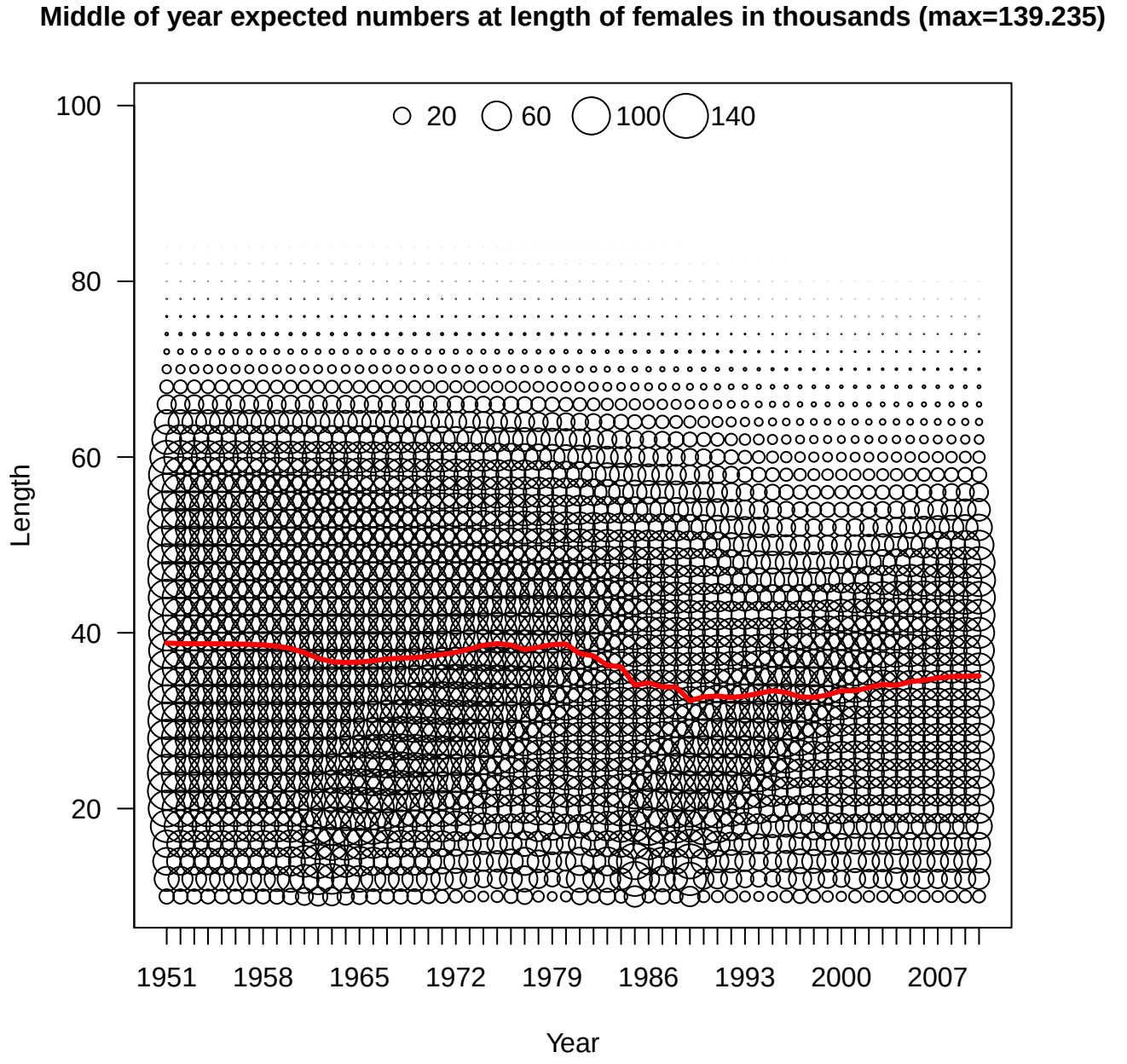

Middle of year mean age in the population
Mean age (yr)
0
5
10
15
20
1950
1960
1970
1980
1990
2000
2010
Year
Females
Males

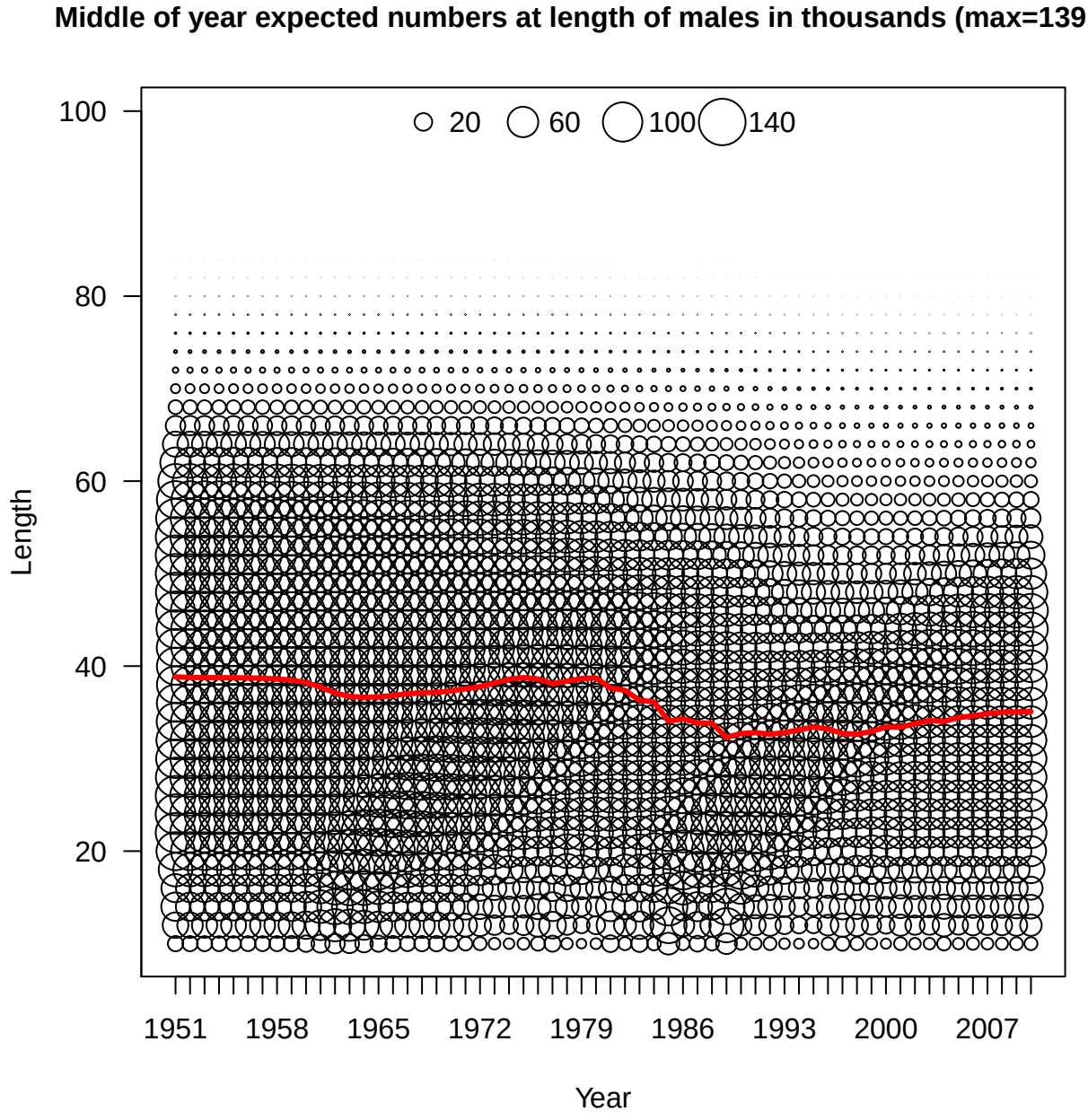

Sex ratio of numbers at age (males/females)
Age
Year
0
20
40
60
80
1950
1960
1970
1980
1990
2000
2010
1.0025
1.002
1.0015
1.001
1.0005
1

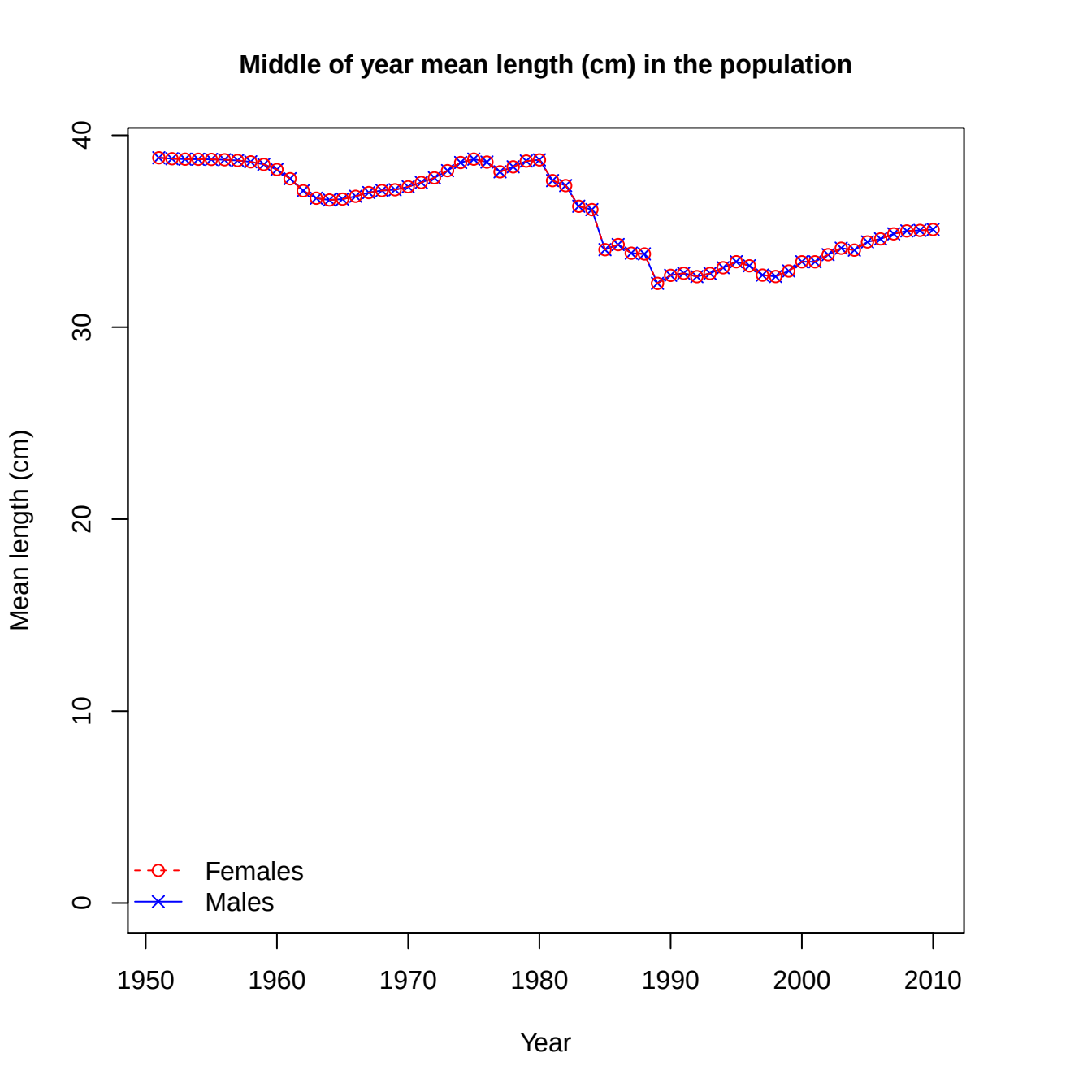

Beginning of year expected numbers at length of females in thousands (max=215.678)
50
150
250
100
80
60
40
20
Length
1951
1958
1965
1972
1979
1986
1993
2000
2007
Year

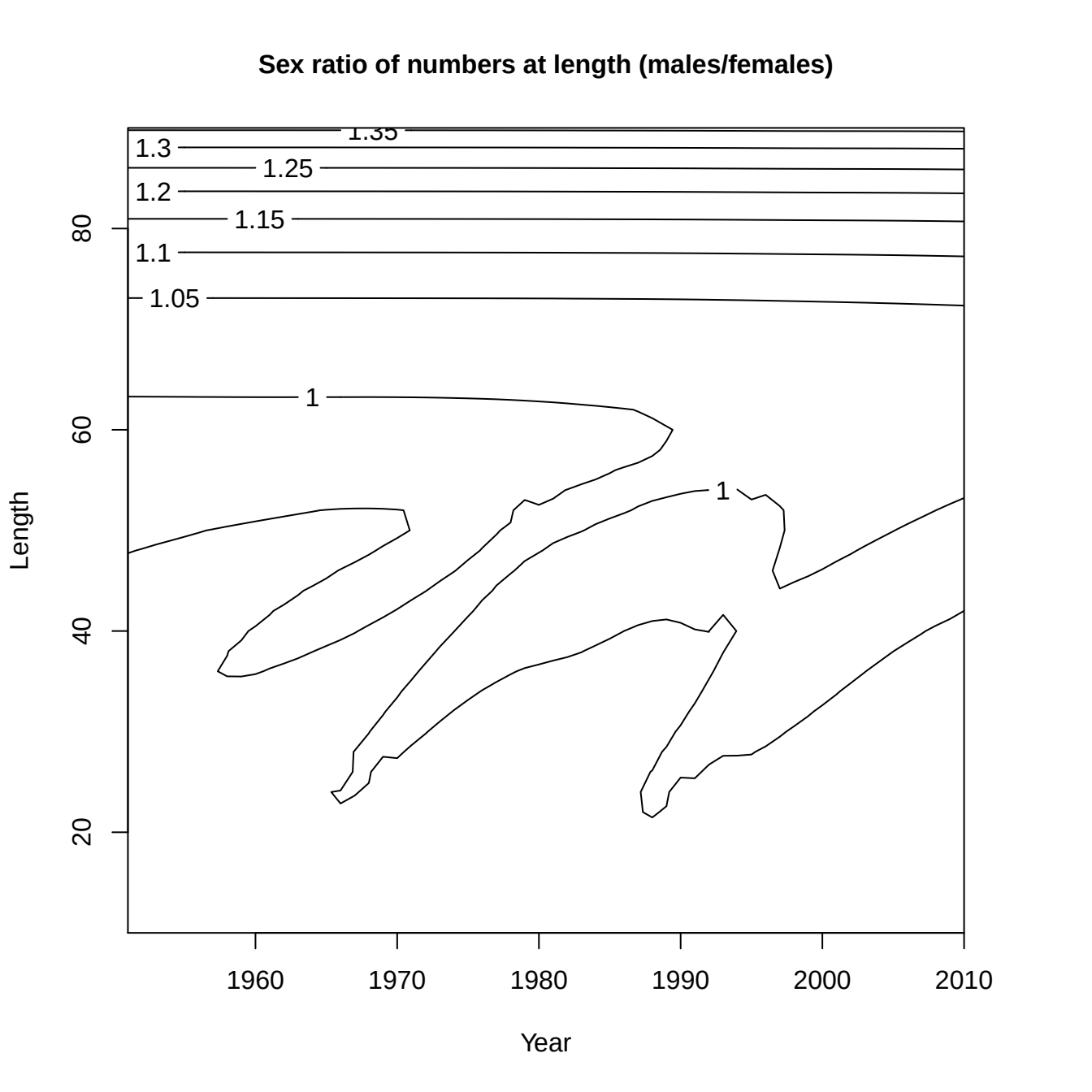

Beginning of year expected numbers at length of males in thousands (max=215.678)
50
150
250
100
80
60
40
20
Length
1951
1958
1965
1972
1979
1986
1993
2000
2007
Year

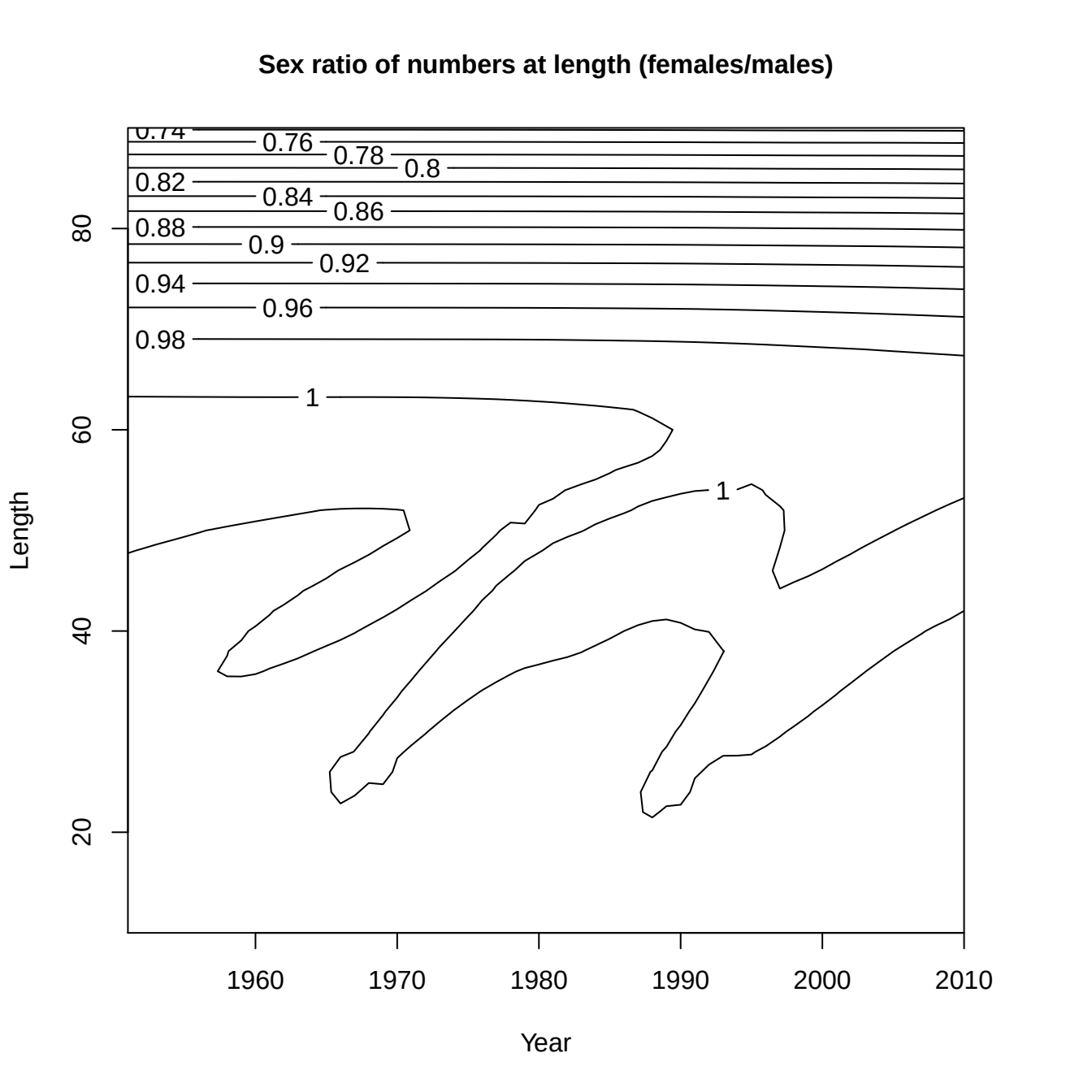

Beginning of year mean length (cm) in the population
Mean length (cm)
0
10
20
30
1950
1960
1970
1980
1990
2000
2010
Year
Females
Males

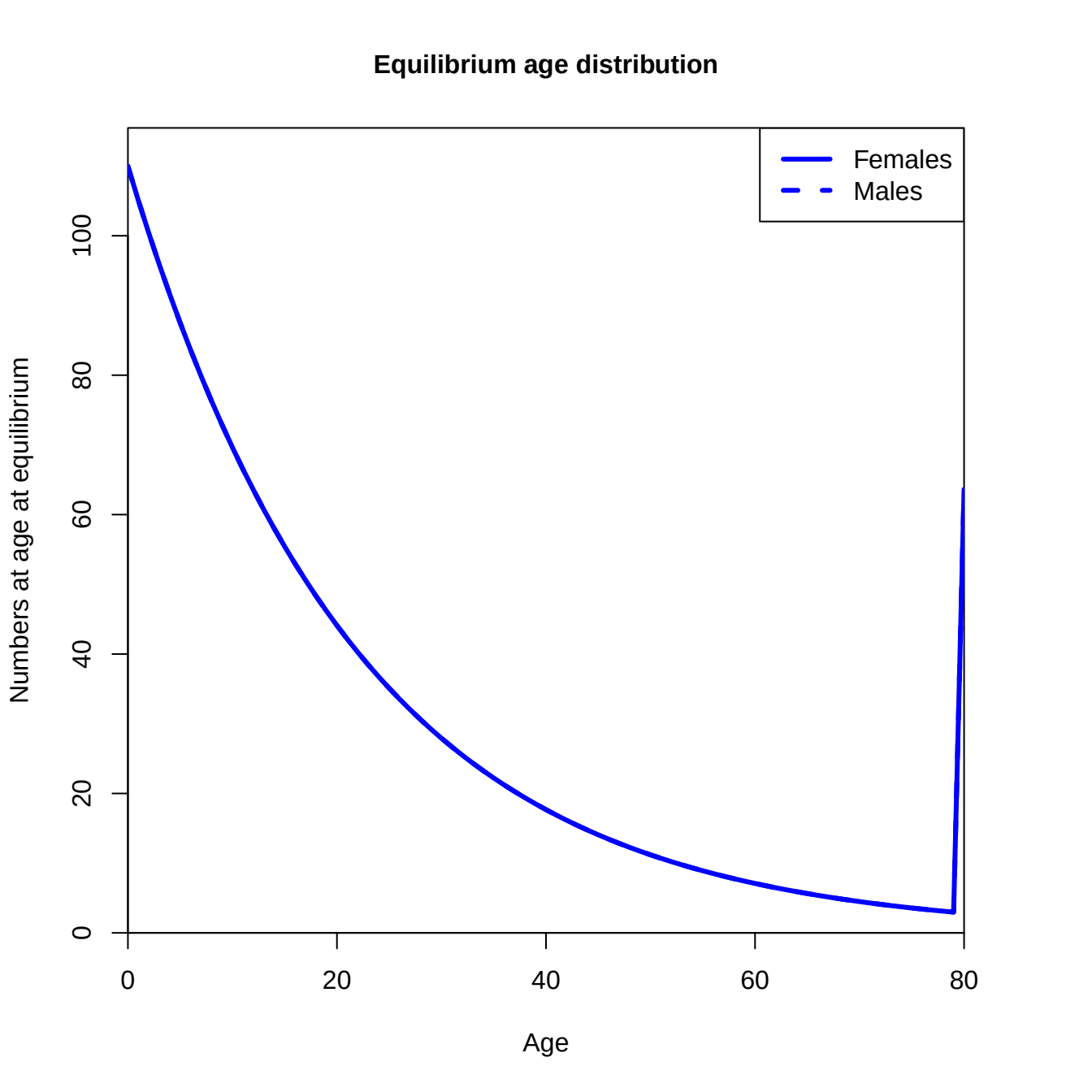

Middle of year expected numbers at length of females in thousands (max=139.235)
20
60
100
140
100
80
60
40
20
Length
1951
1958
1965
1972
1979
1986
1993
2000
2007
Year

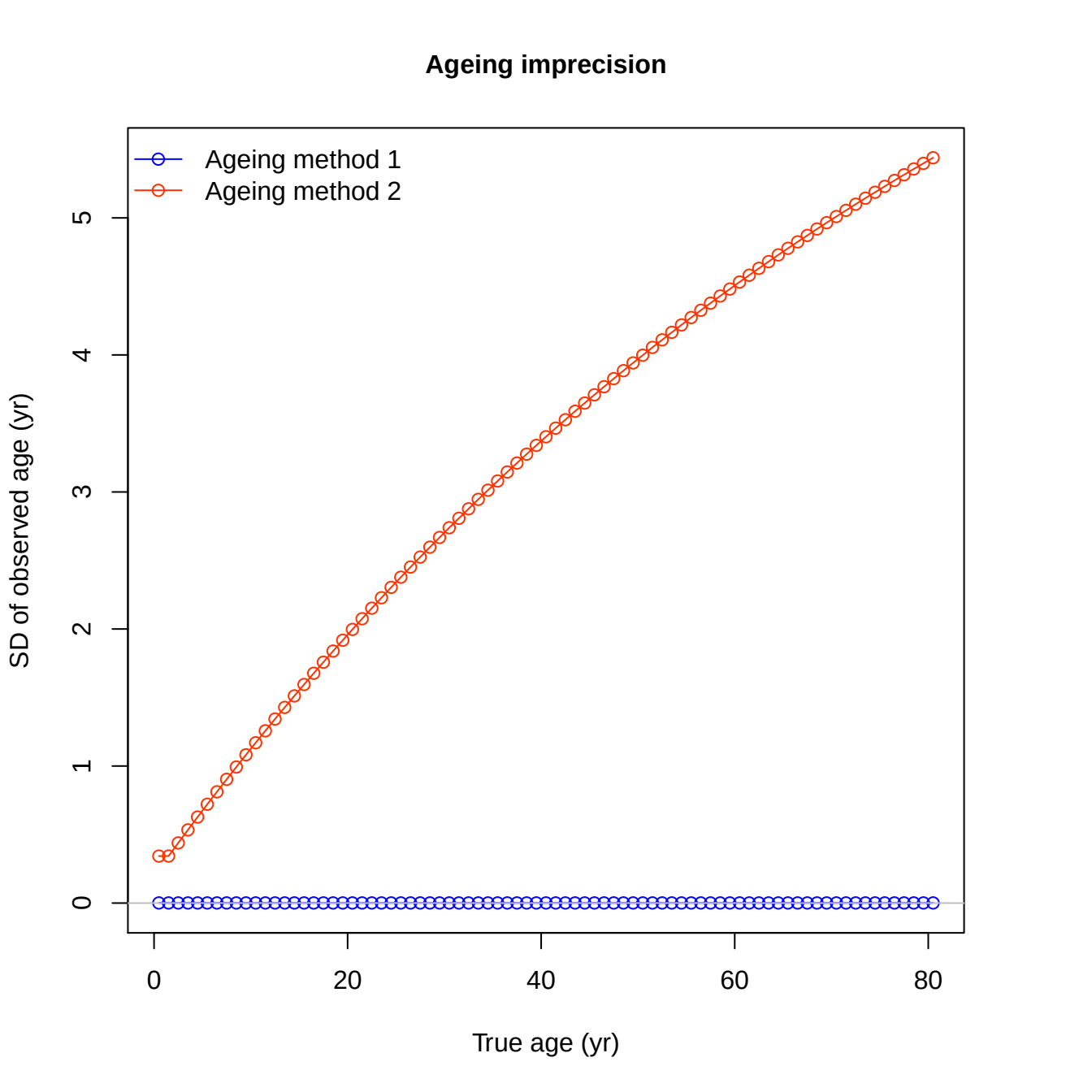

Middle of year expected numbers at length of males in thousands (max=139.236)
20
60
100
140
100
80
60
40
20
Length
1951
1958
1965
1972
1979
1986
1993
2000
2007
Year


Middle of year mean length (cm) in the population
Mean length (cm)
0
10
20
30
40
1950
1960
1970
1980
1990
2000
2010
Year
Females
Males

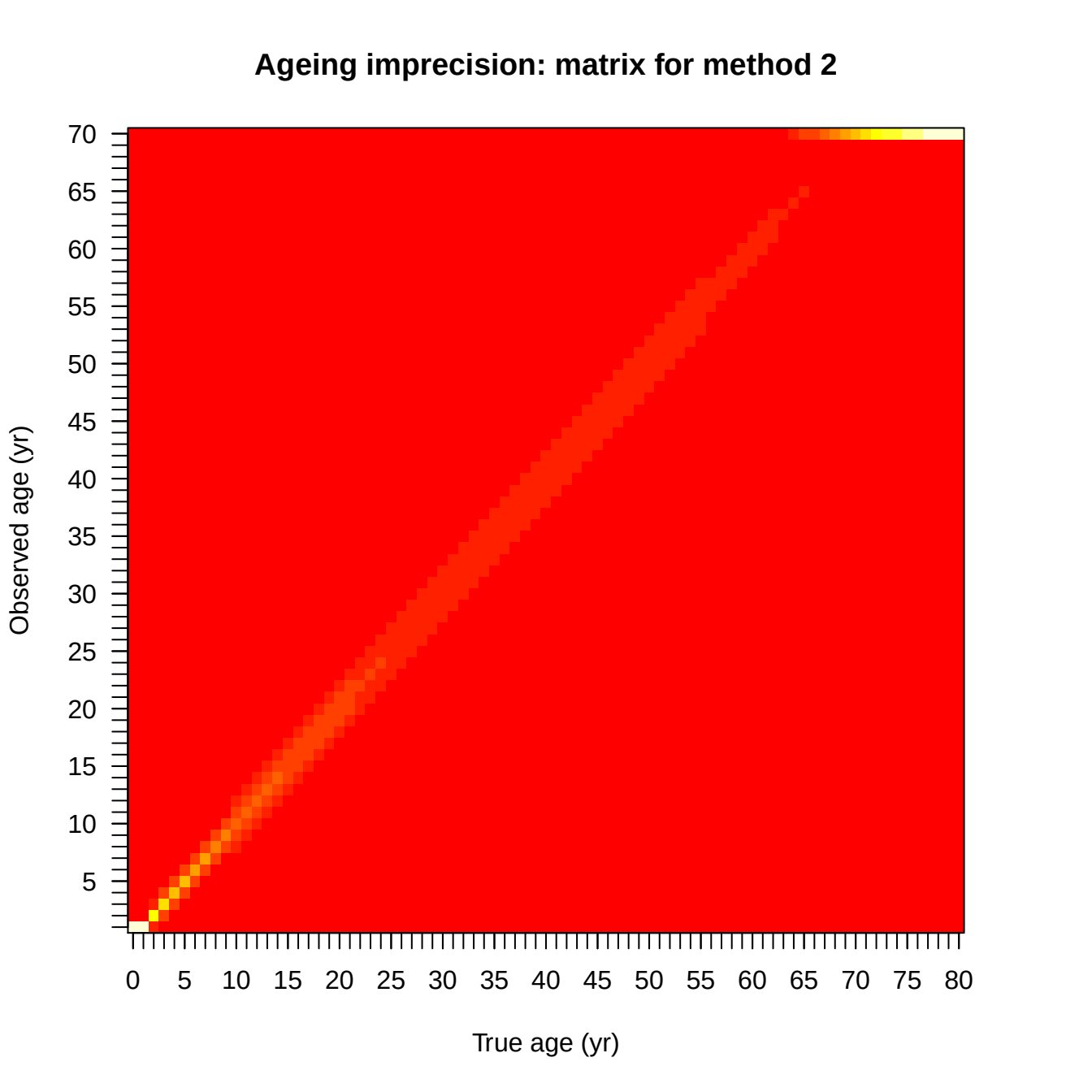

Sex ratio of numbers at length (males/females)
1.35
1.3
1.25
1.2
1.15
1.1
1.05
1
1
Length
20
40
60
80
1960
1970
1980
1990
2000
2010
Year

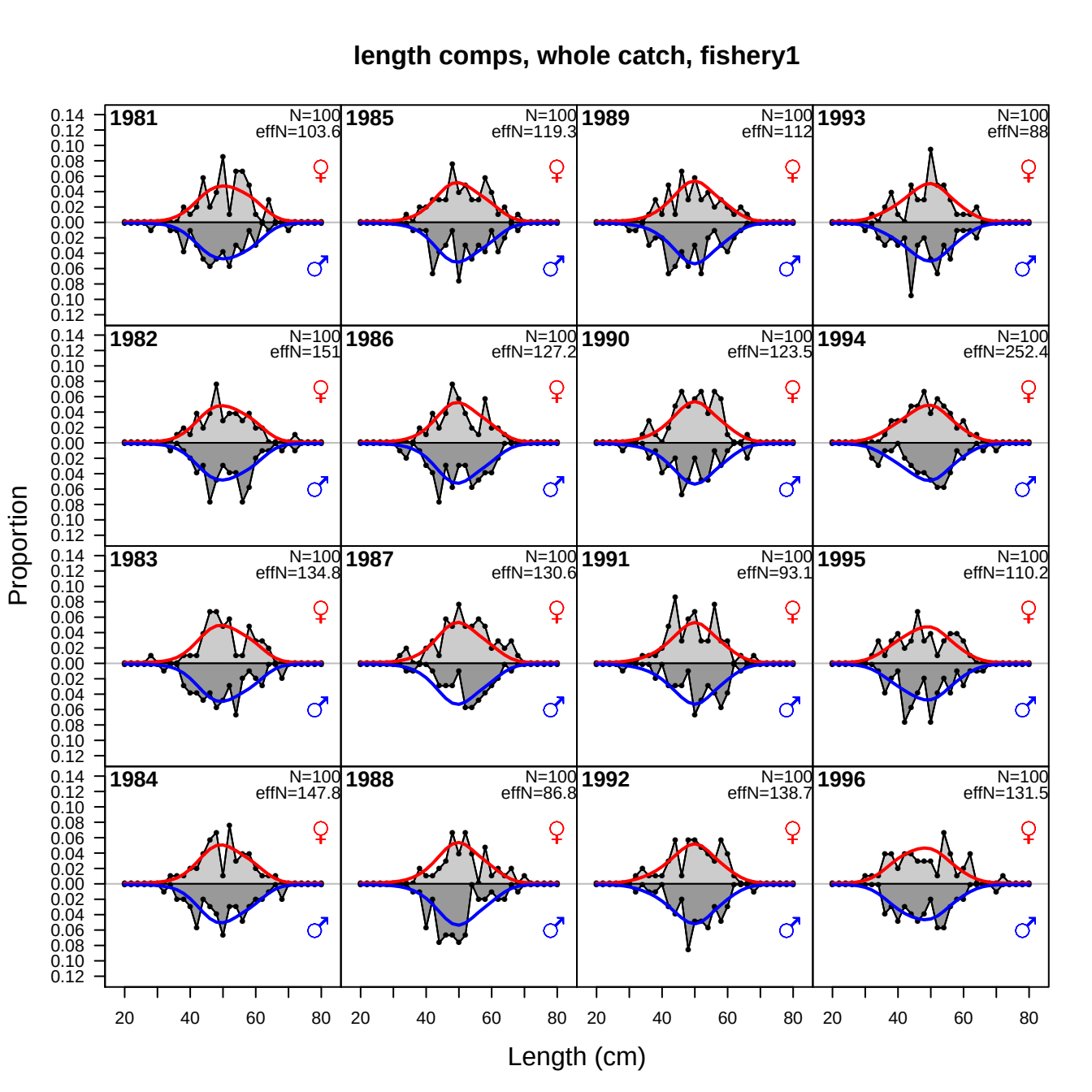

Sex ratio of numbers at length (females/males)
0.74
0.76
0.78
0.8
0.82
0.84
0.86
0.88
0.9
0.92
0.94
0.96
0.98
1
1
Length
20
40
60
80
1960
1970
1980
1990
2000
2010
Year

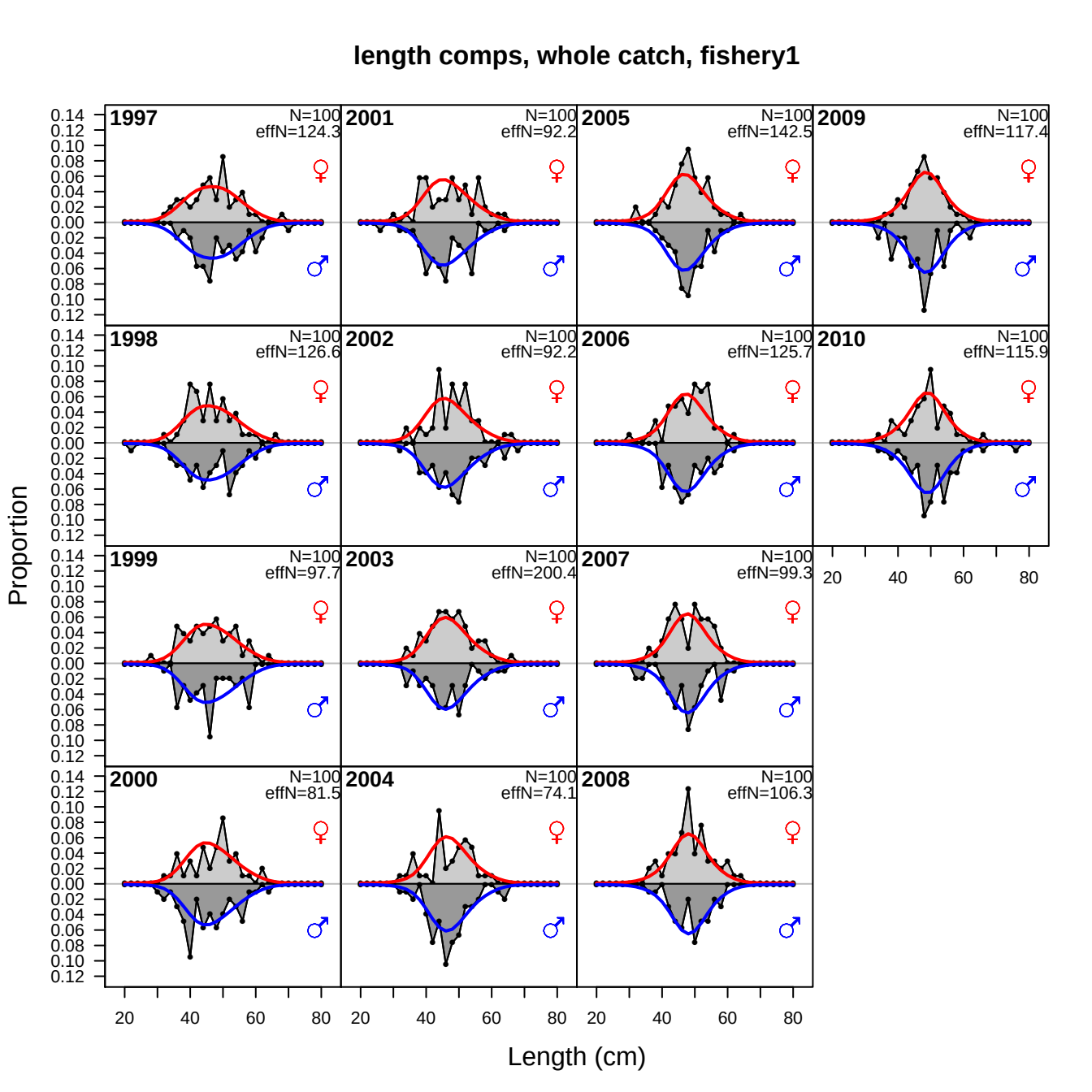

Equilibrium age distribution
Females
Males
Numbers at age at equilibrium
0
20
40
60
80
100
0
20
40
60
80
Age

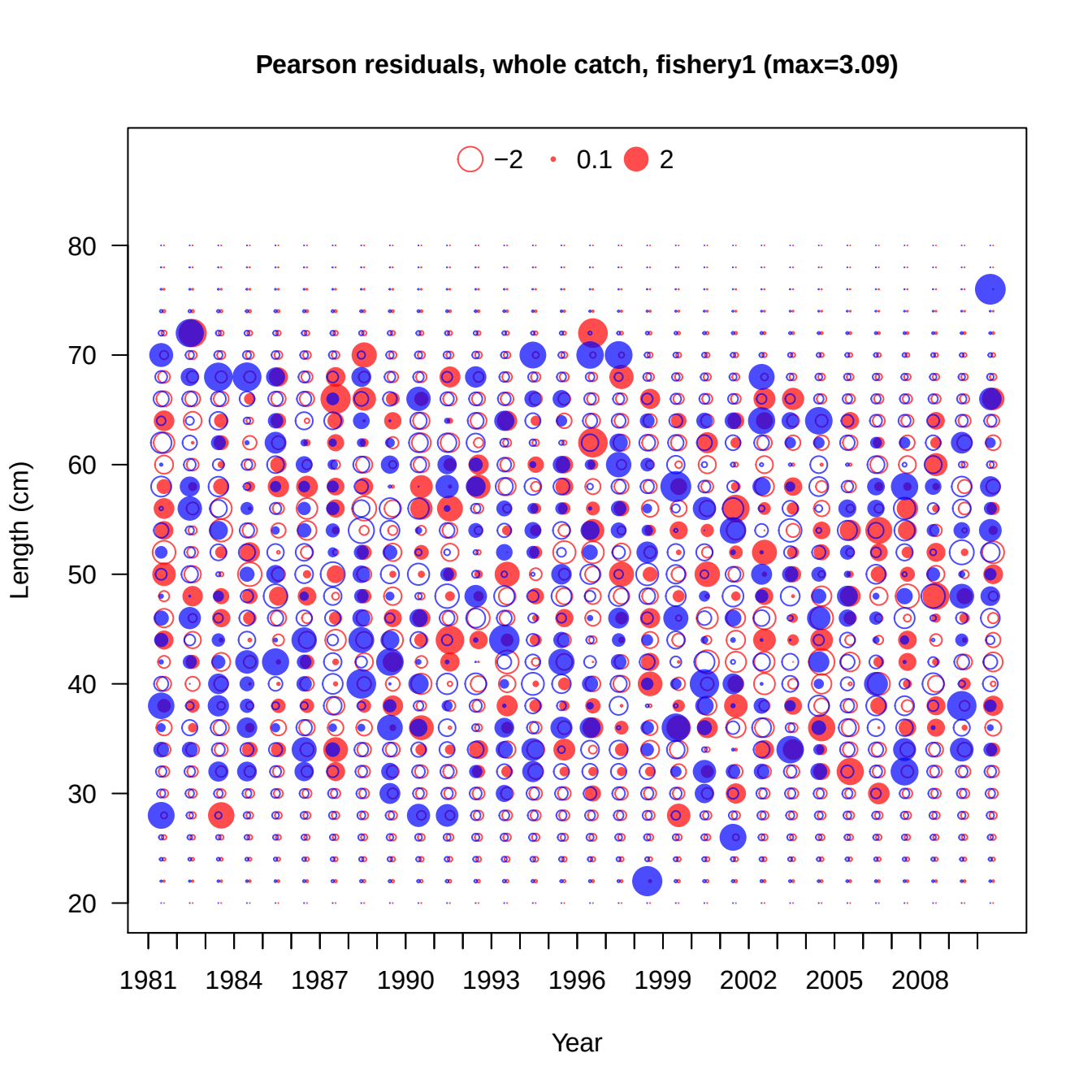

Ageing imprecision
Ageing method 1
Ageing method 2
SD of observed age (yr)
0
1
2
3
4
5
0
20
40
60
80
True age (yr)

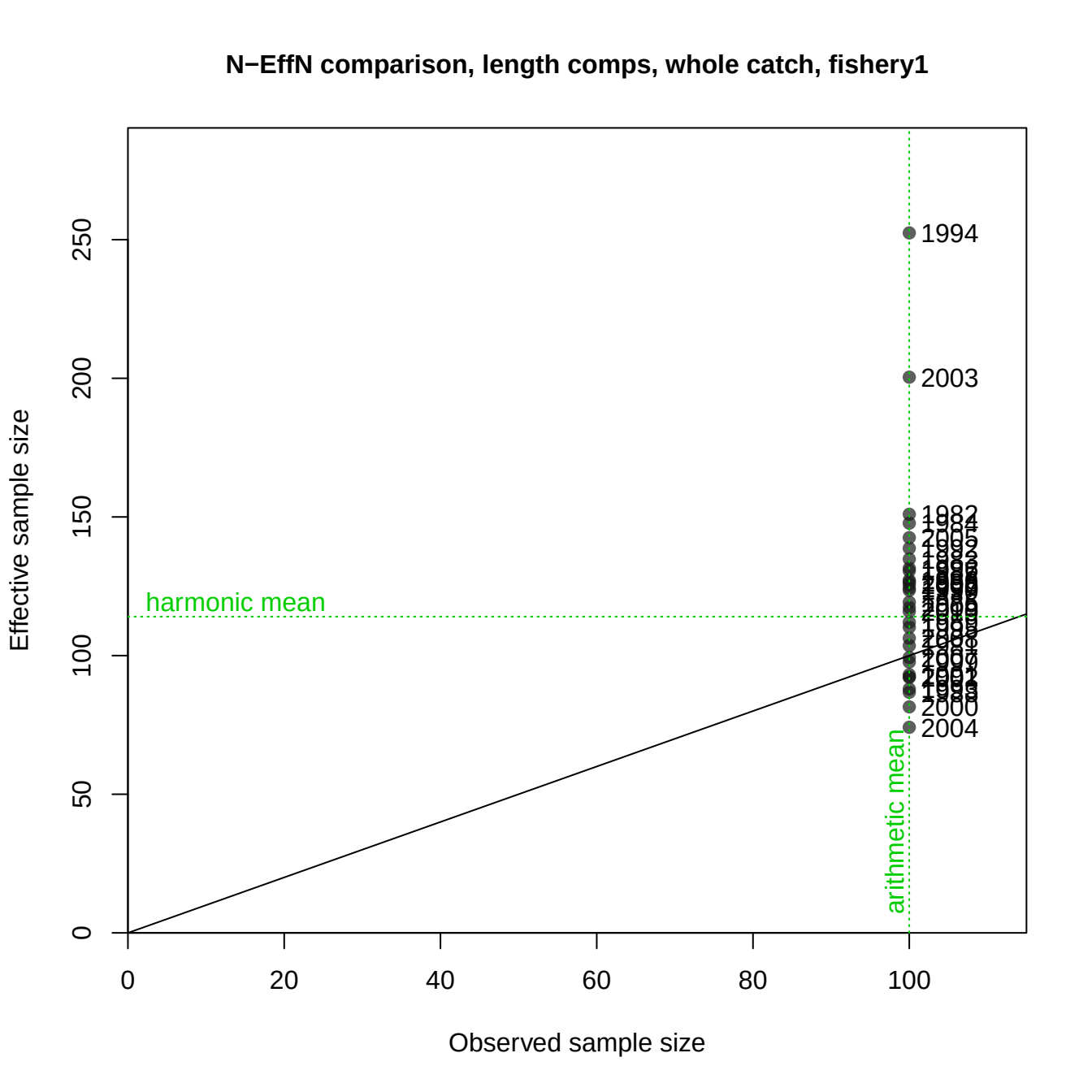
Ageing imprecision: matrix for method 1
Observed age (yr)
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
True age (yr)

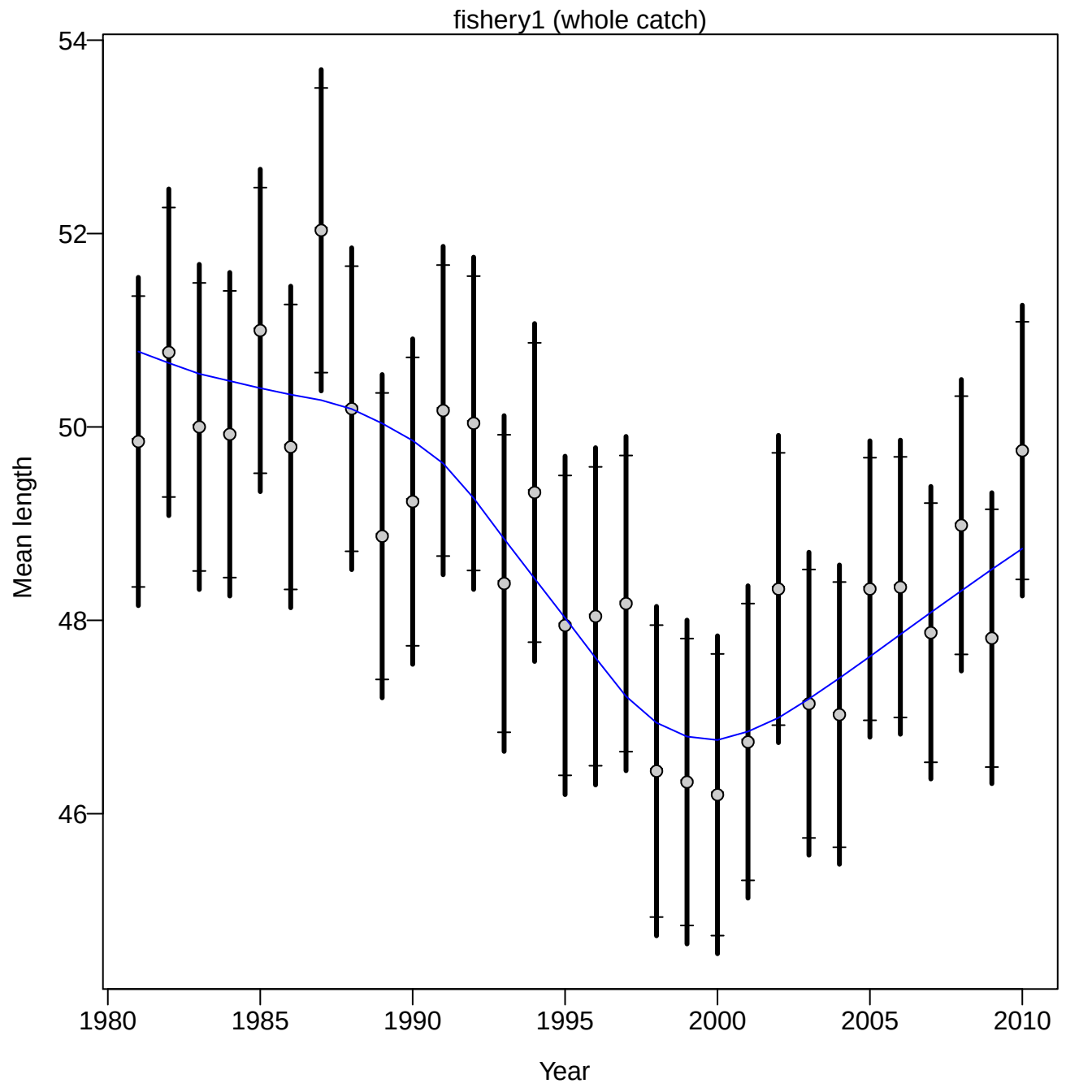

Ageing imprecision: matrix for method 2
Observed age (yr)
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
True age (yr)

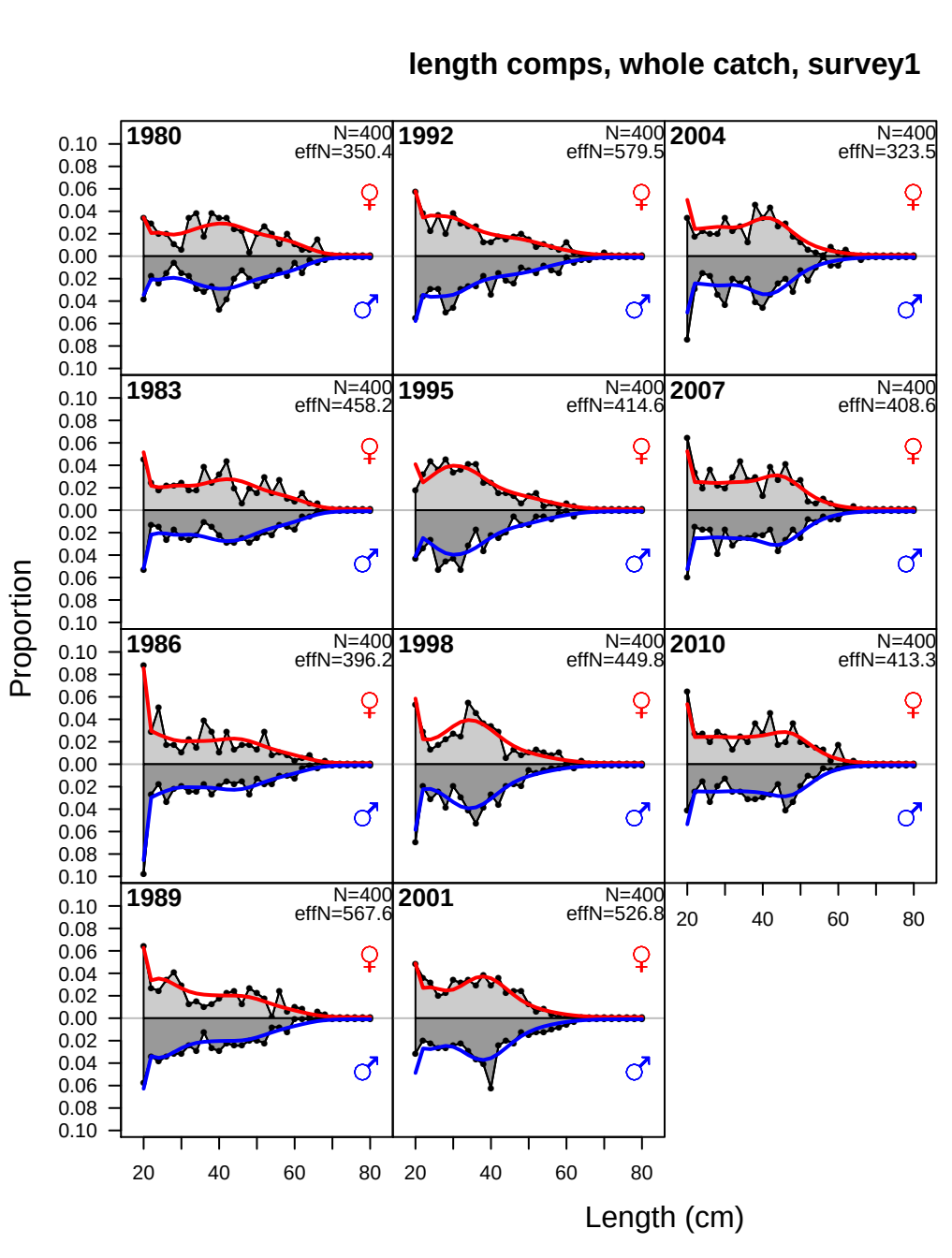

length comps, whole catch, fishery1
1981 N=100 effN=103.6
1985 N=100 effN=119.3
1989 N=100 effN=112
1993 N=100 effN=88
1982 N=100 effN=151
1986 N=100 effN=127.2
1990 N=100 effN=123.5
1994 N=100 effN=252.4
1983 N=100 effN=134.8
1987 N=100 effN=130.6
1991 N=100 effN=93.1
1995 N=100 effN=110.2
1984 N=100 effN=147.8
1988 N=100 effN=86.8
1992 N=100 effN=138.7
1996 N=100 effN=131.5
Proportion
Length (cm)

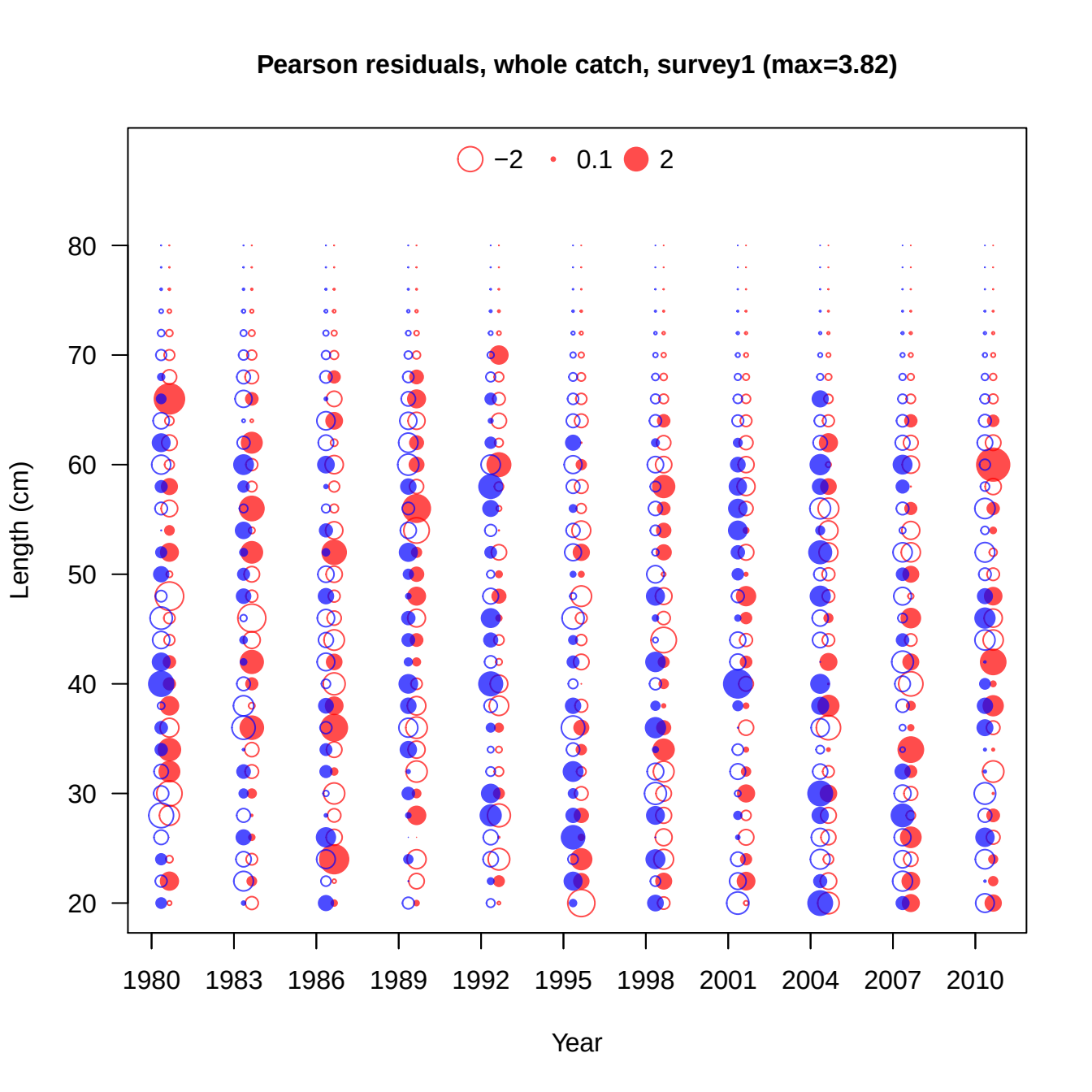

length comps, whole catch, fishery1
1997 N=100 effN=124.3
2001 N=100 effN=92.2
2005 N=100 effN=142.5
2009 N=100 effN=117.4
1998 N=100 effN=126.6
2002 N=100 effN=92.2
2006 N=100 effN=125.7
2010 N=100 effN=115.9
1999 N=100 effN=97.7
2003 N=100 effN=200.4
2007 N=100 effN=99.3
2000 N=100 effN=81.5
2004 N=100 effN=74.1
2008 N=100 effN=106.3
Proportion
Length (cm)

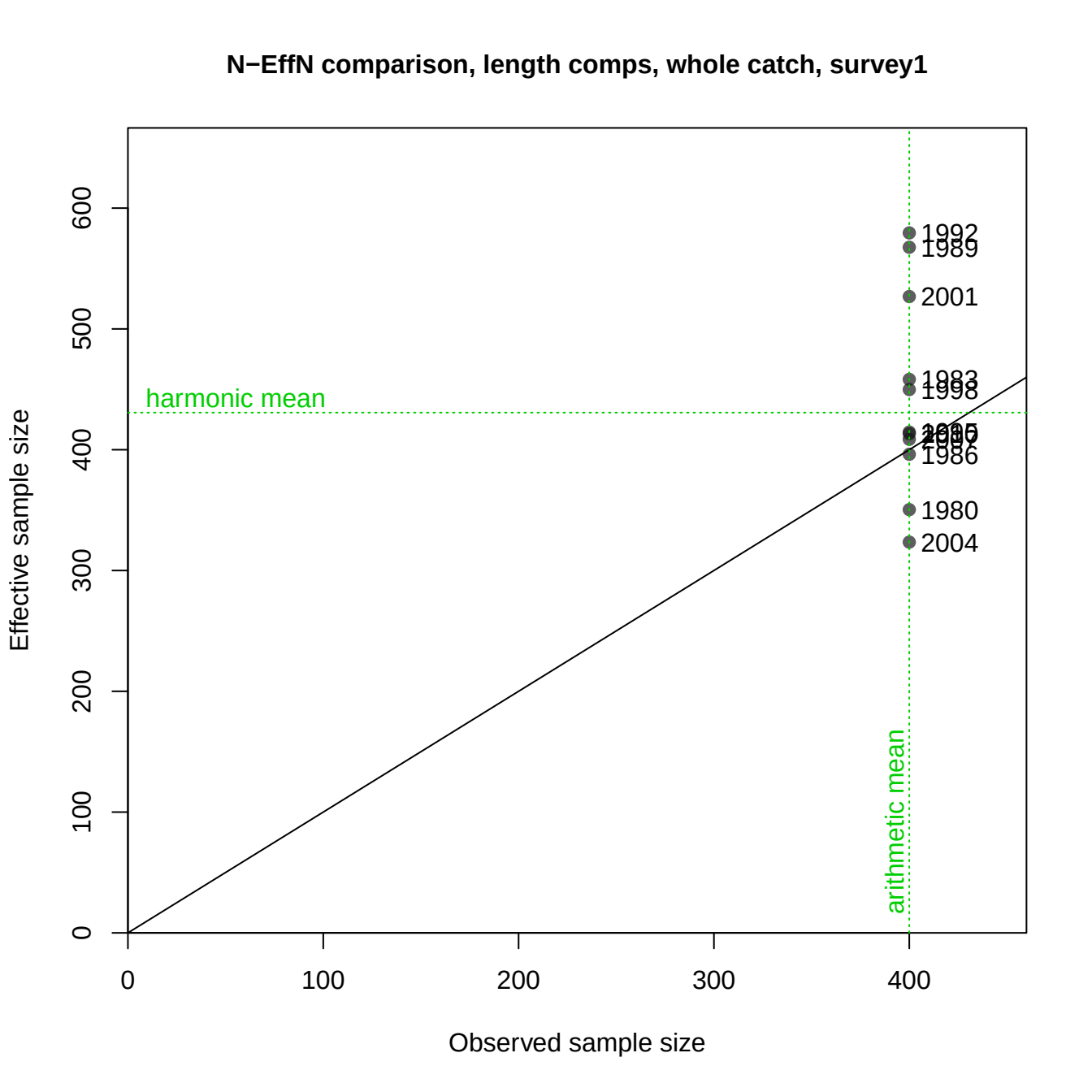

Pearson residuals, whole catch, fishery1 (max=3.09)
−2
0.1
2
Length (cm)
80
70
60
50
40
30
20
1981
1984
1987
1990
1993
1996
1999
2002
2005
2008
Year

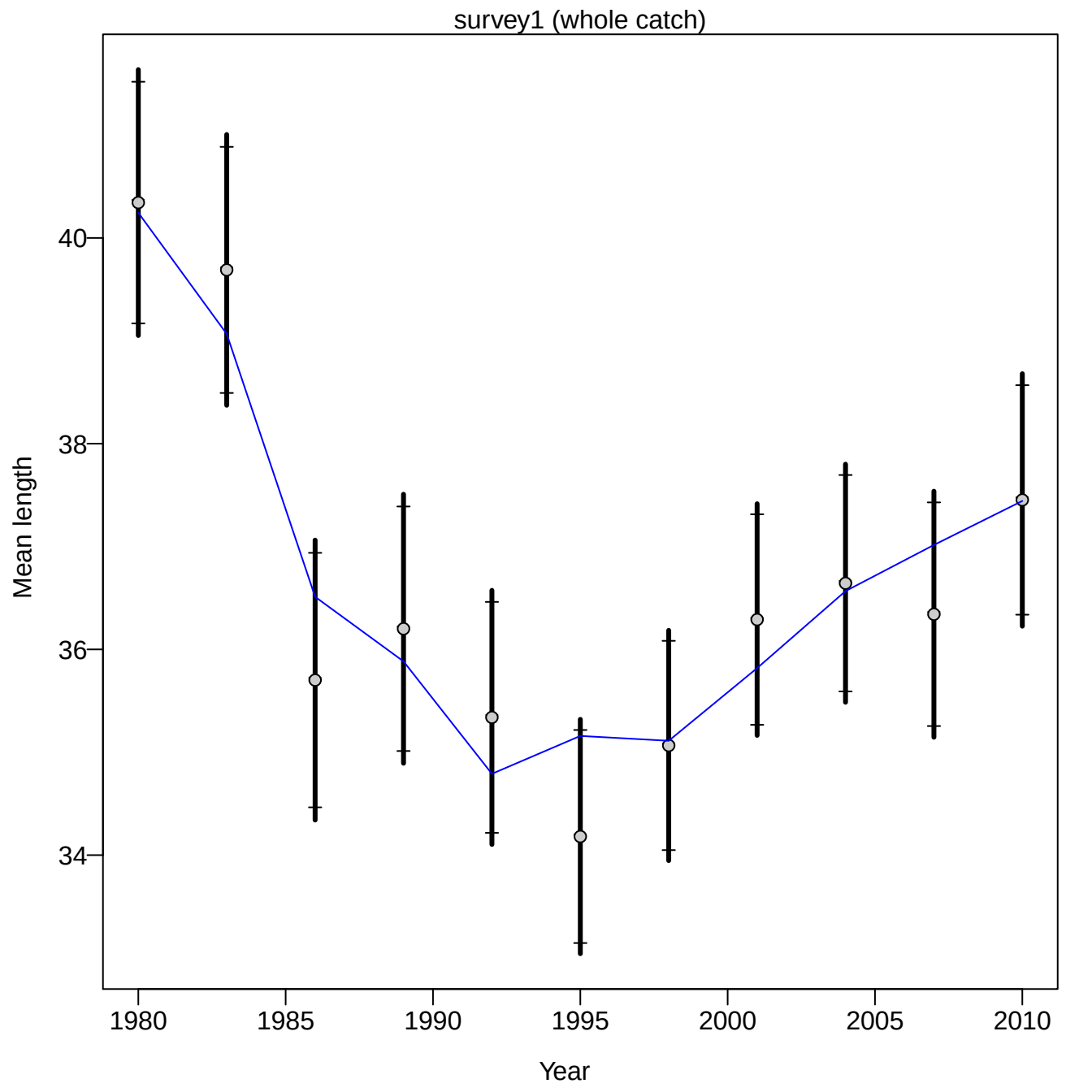

N−EffN comparison, length comps, whole catch, fishery1
Effective sample size
Observed sample size
0
50
100
150
200
250
0
20
40
60
80
100
harmonic mean
arithmetic mean
1994
2003
2000
2004

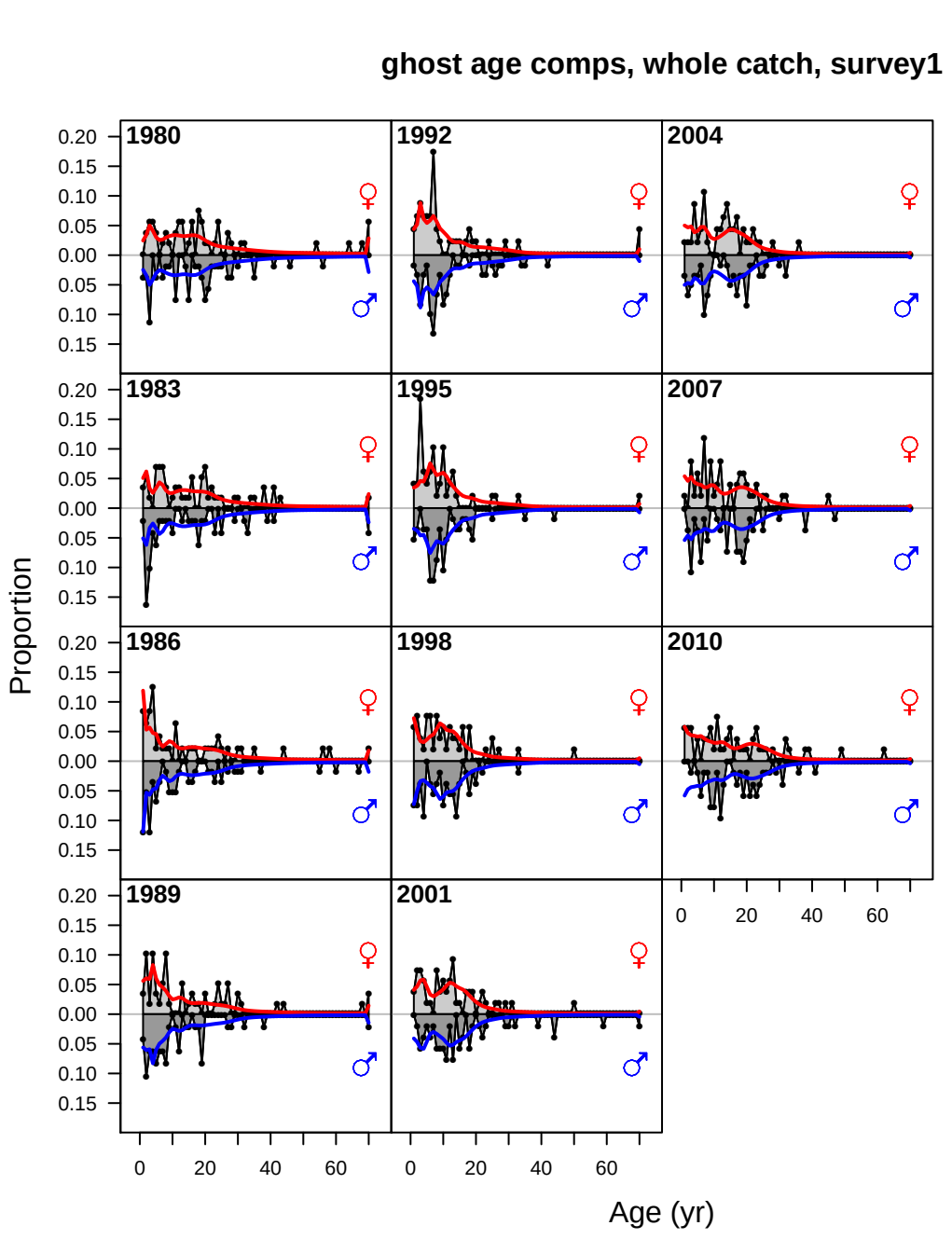

fishery1 (whole catch)
54
52
50
48
46
Mean length
1980
1985
1990
1995
2000
2005
2010
Year

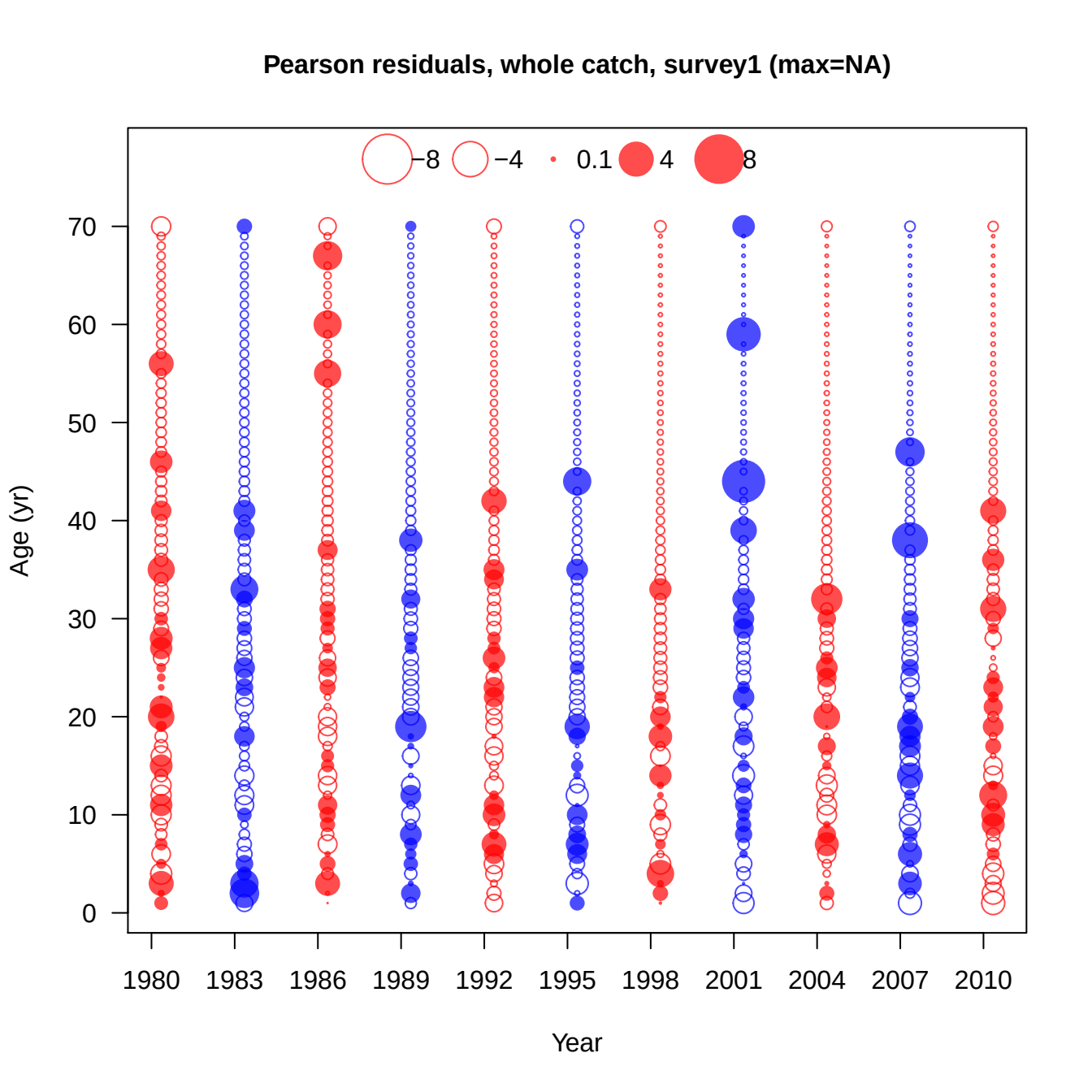

length comps, whole catch, survey1
1980
N=400
effN=350.4
1992
N=400
effN=579.5
2004
N=400
effN=323.5
1983
N=400
effN=458.2
1995
N=400
effN=414.6
2007
N=400
effN=408.6
1986
N=400
effN=396.2
1998
N=400
effN=449.8
2010
N=400
effN=413.3
1989
N=400
effN=567.6
2001
N=400
effN=526.8
Proportion
Length (cm)

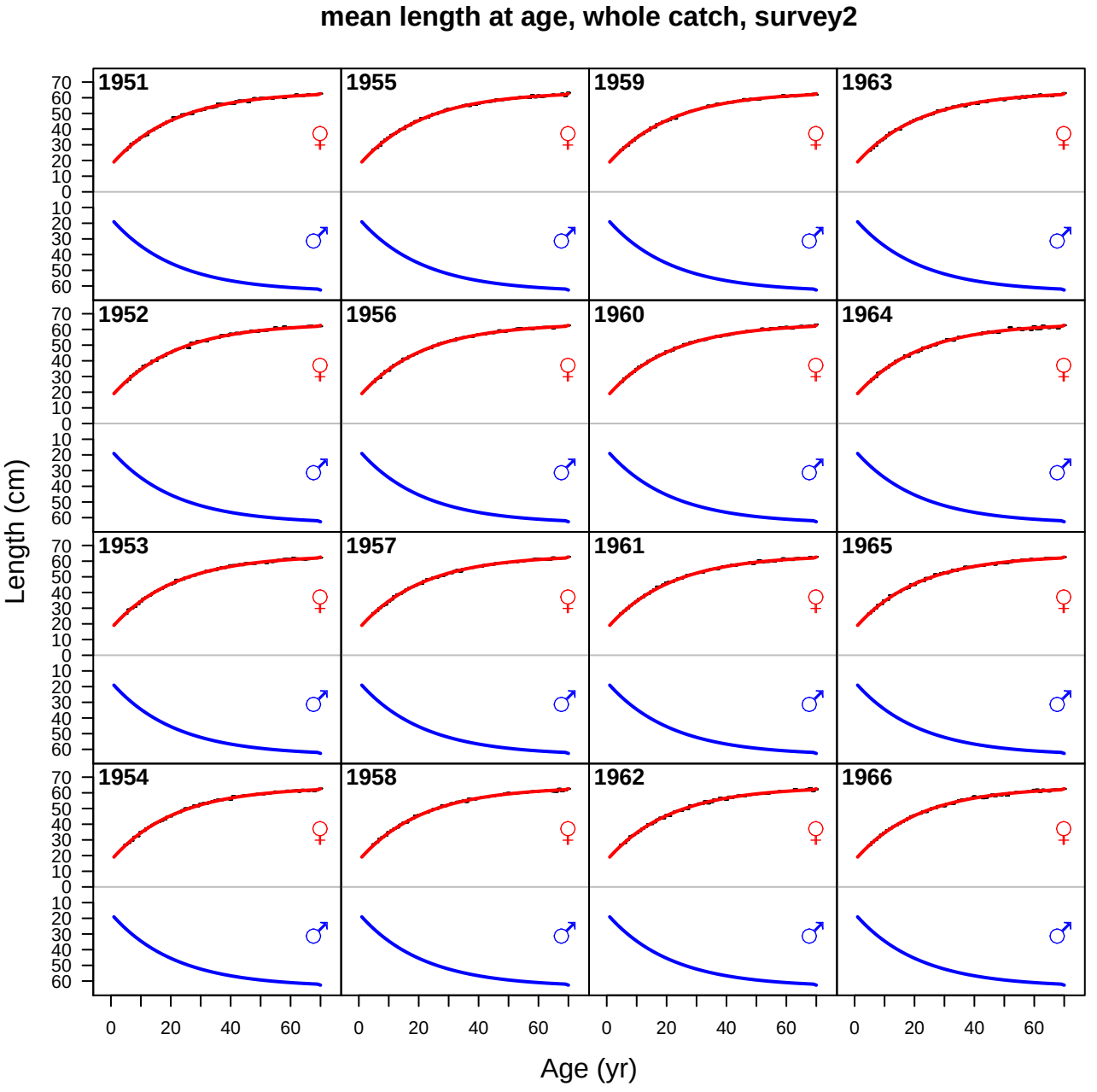

Pearson residuals, whole catch, survey1 (max=3.82)
−2
0.1
2
Length (cm)
80
70
60
50
40
30
20
1980
1983
1986
1989
1992
1995
1998
2001
2004
2007
2010
Year

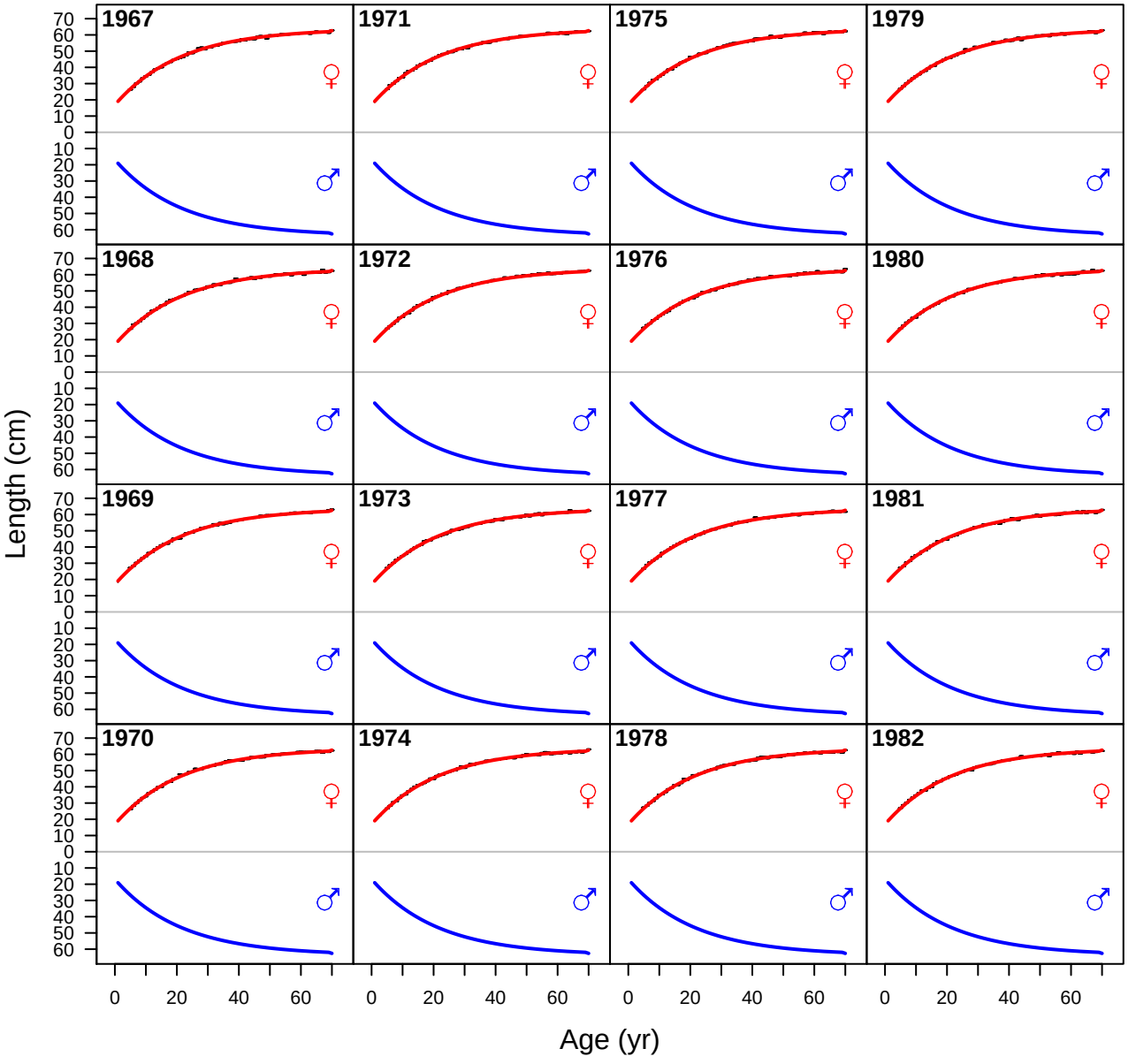

N−EffN comparison, length comps, whole catch, survey1
Effective sample size
Observed sample size
harmonic mean
arithmetic mean
0
100
200
300
400
500
600
1992
1989
2001
1983
1998
1986
1980
2004

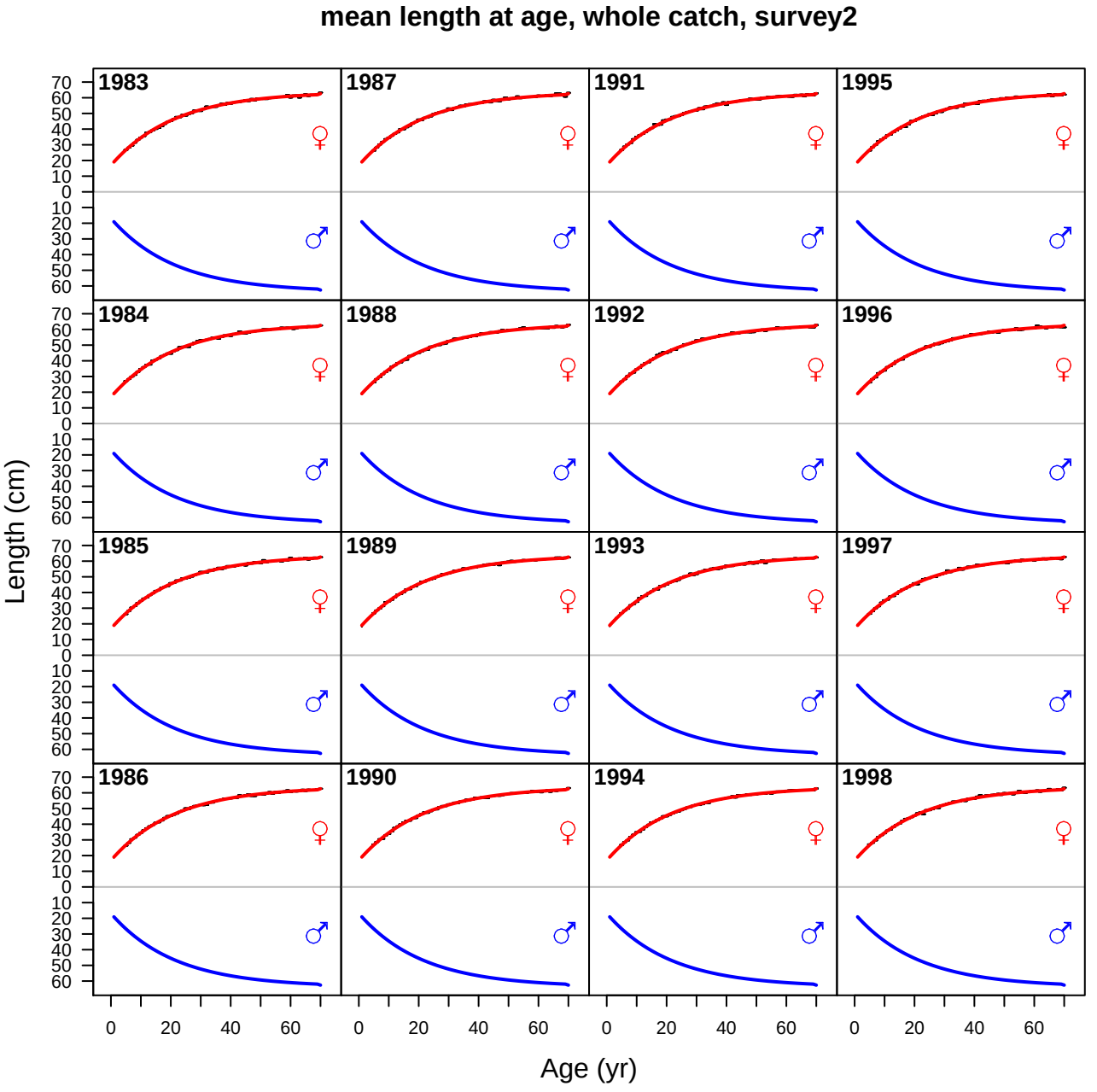

survey1 (whole catch)
Mean length
40
38
36
34
1980
1985
1990
1995
2000
2005
2010
Year

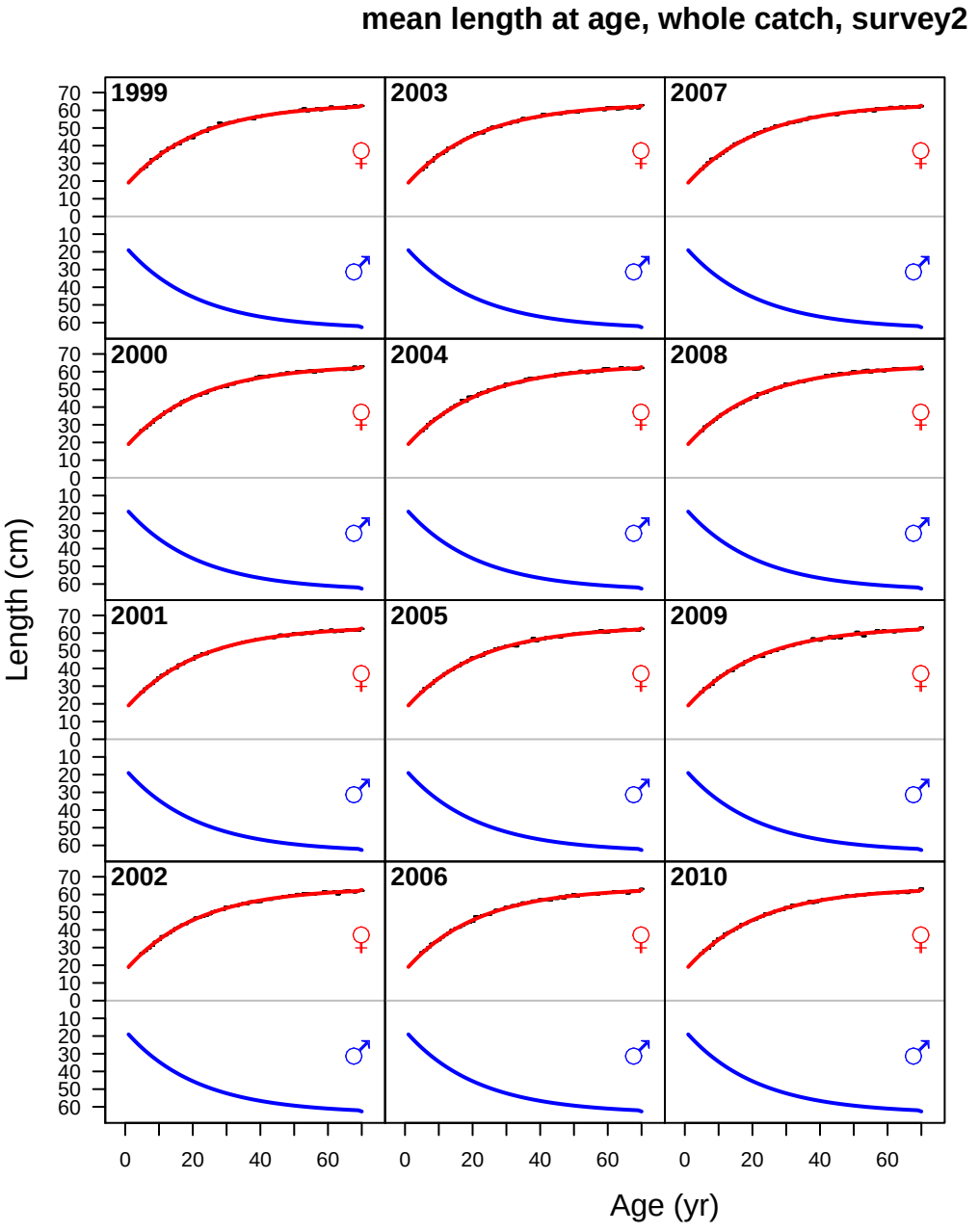

ghost age comps, whole catch, survey1
1980
1992
2004
1983
1995
2007
1986
1998
2010
1989
2001
Proportion
Age (yr)
0.20
0.15
0.10
0.05
0.00
0.05
0.10
0.15
0
20
40
60

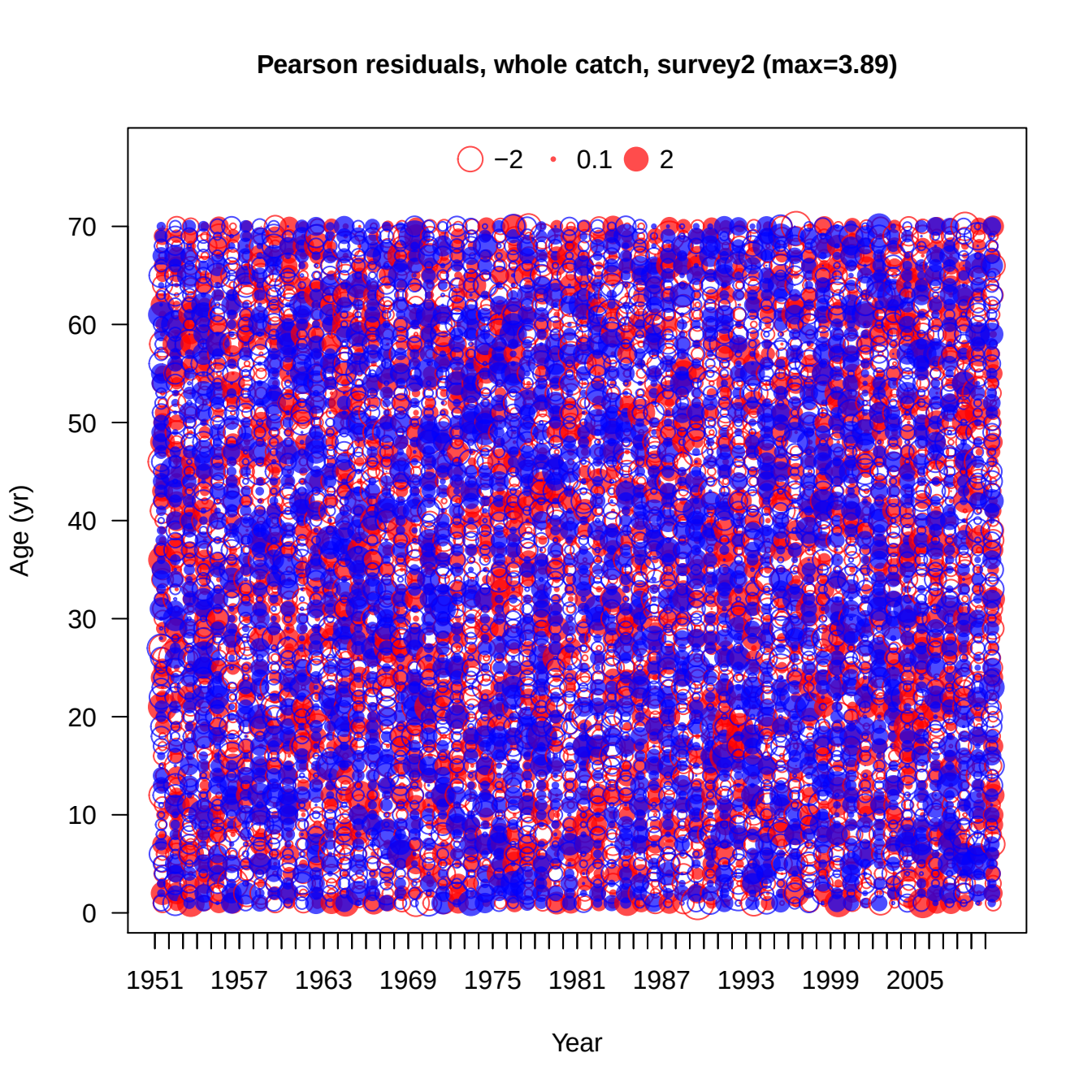

Pearson residuals, whole catch, survey1 (max=NA)
−8
−4
0.1
4
8
Age (yr)
0
10
20
30
40
50
60
70
1980
1983
1986
1989
1992
1995
1998
2001
2004
2007
2010
Year

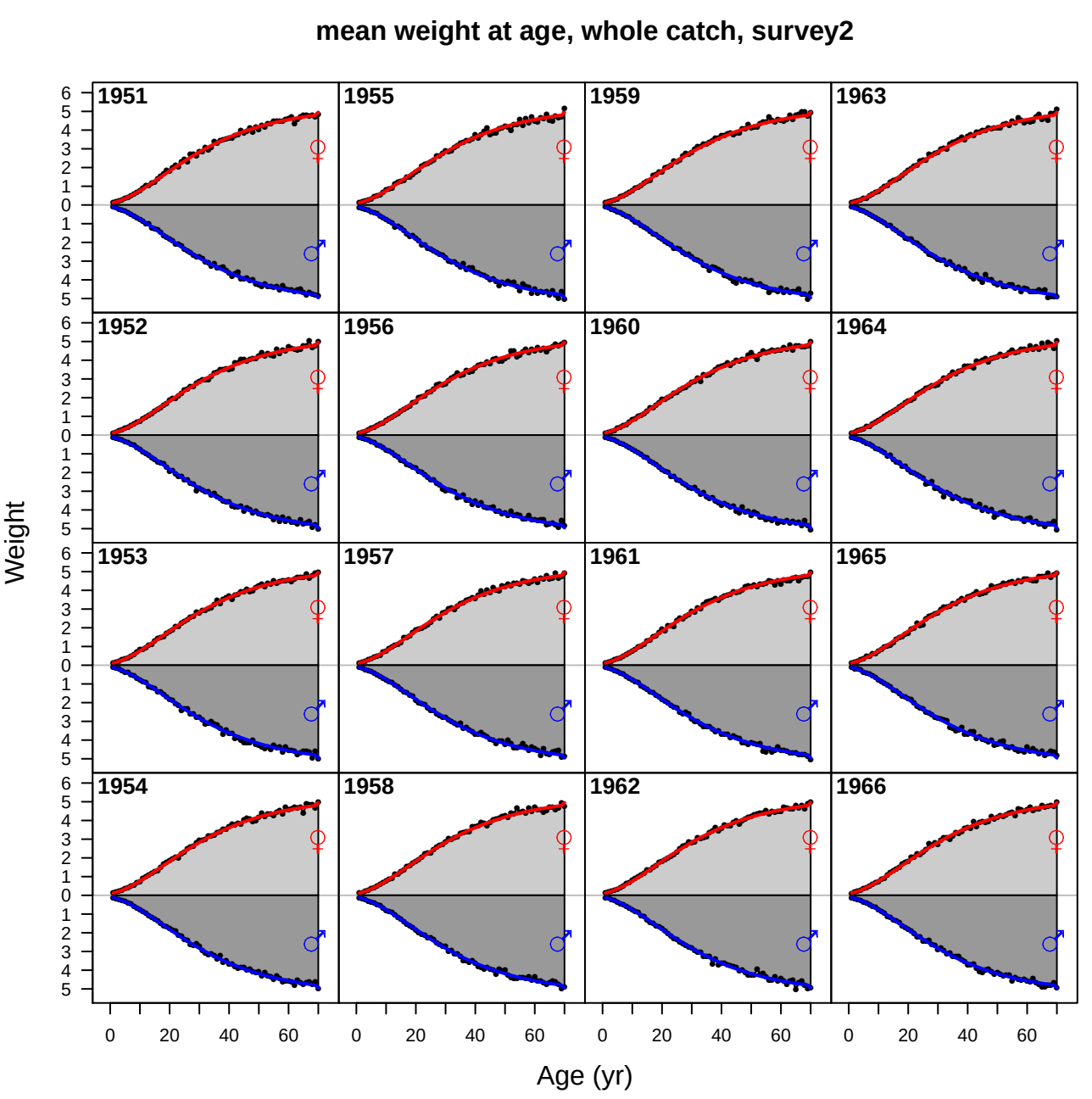

mean length at age, whole catch, survey2
1951
1955
1959
1963
1952
1956
1960
1964
1953
1957
1961
1965
1954
1958
1962
1966
Length (cm)
Age (yr)

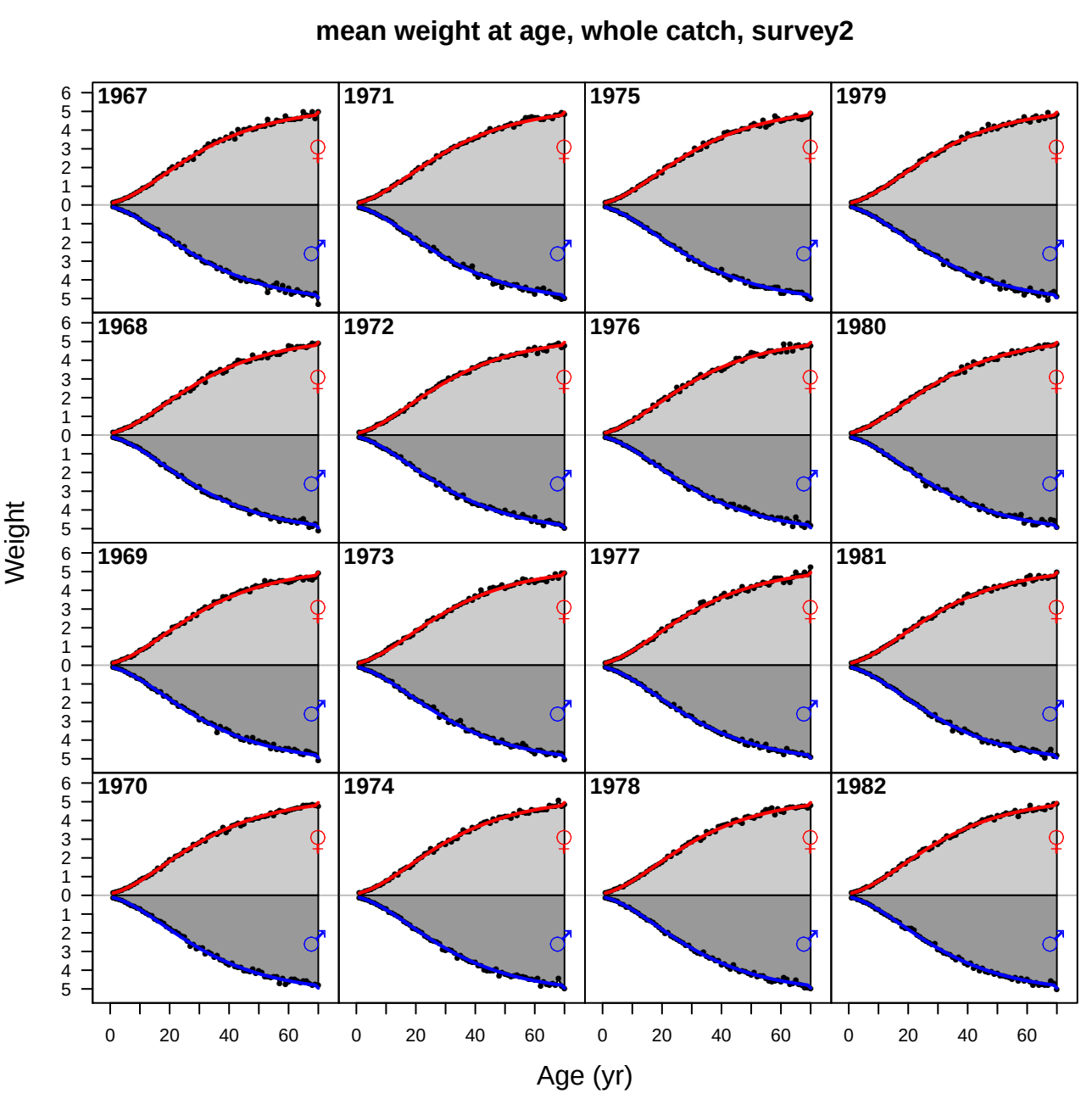

mean length at age, whole catch, survey2
1967
1971
1975
1979
1968
1972
1976
1980
1969
1973
1977
1981
1970
1974
1978
1982
Length (cm)
Age (yr)

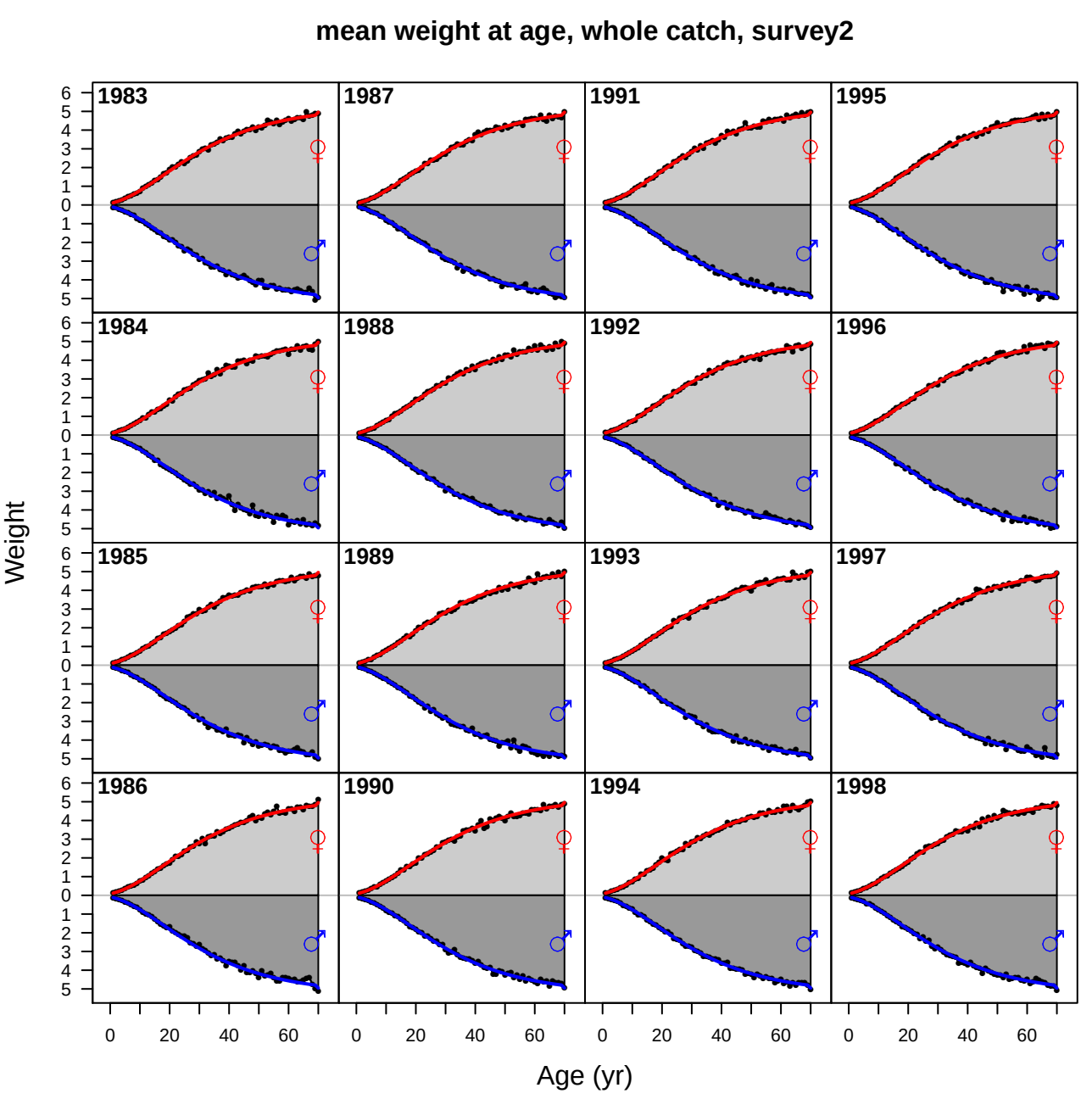

mean length at age, whole catch, survey2
1983
1987
1991
1995
1984
1988
1992
1996
1985
1989
1993
1997
1986
1990
1994
1998
Length (cm)
Age (yr)

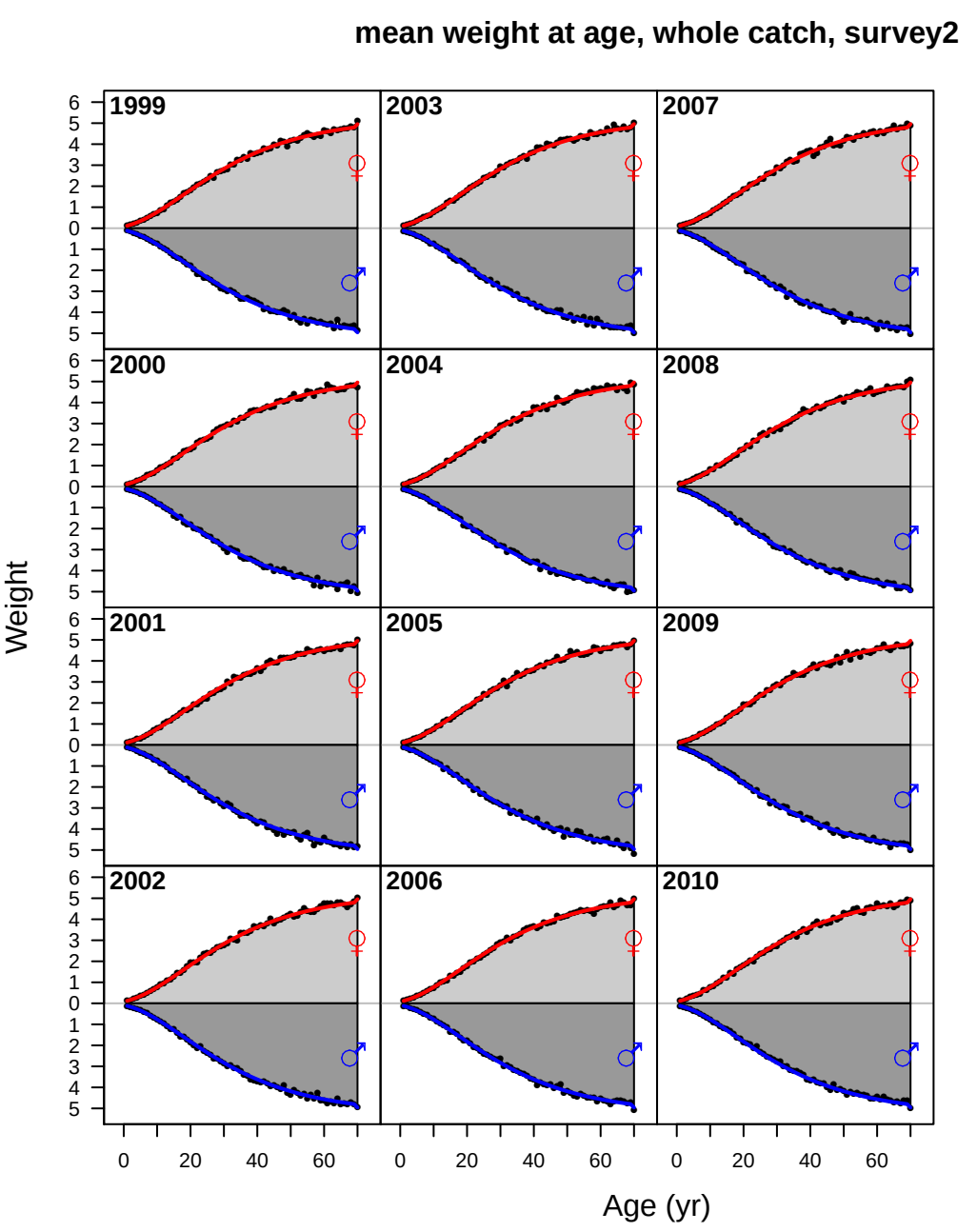

mean length at age, whole catch, survey2
1999
2003
2007
2000
2004
2008
2001
2005
2009
2002
2006
2010
Length (cm)
Age (yr)

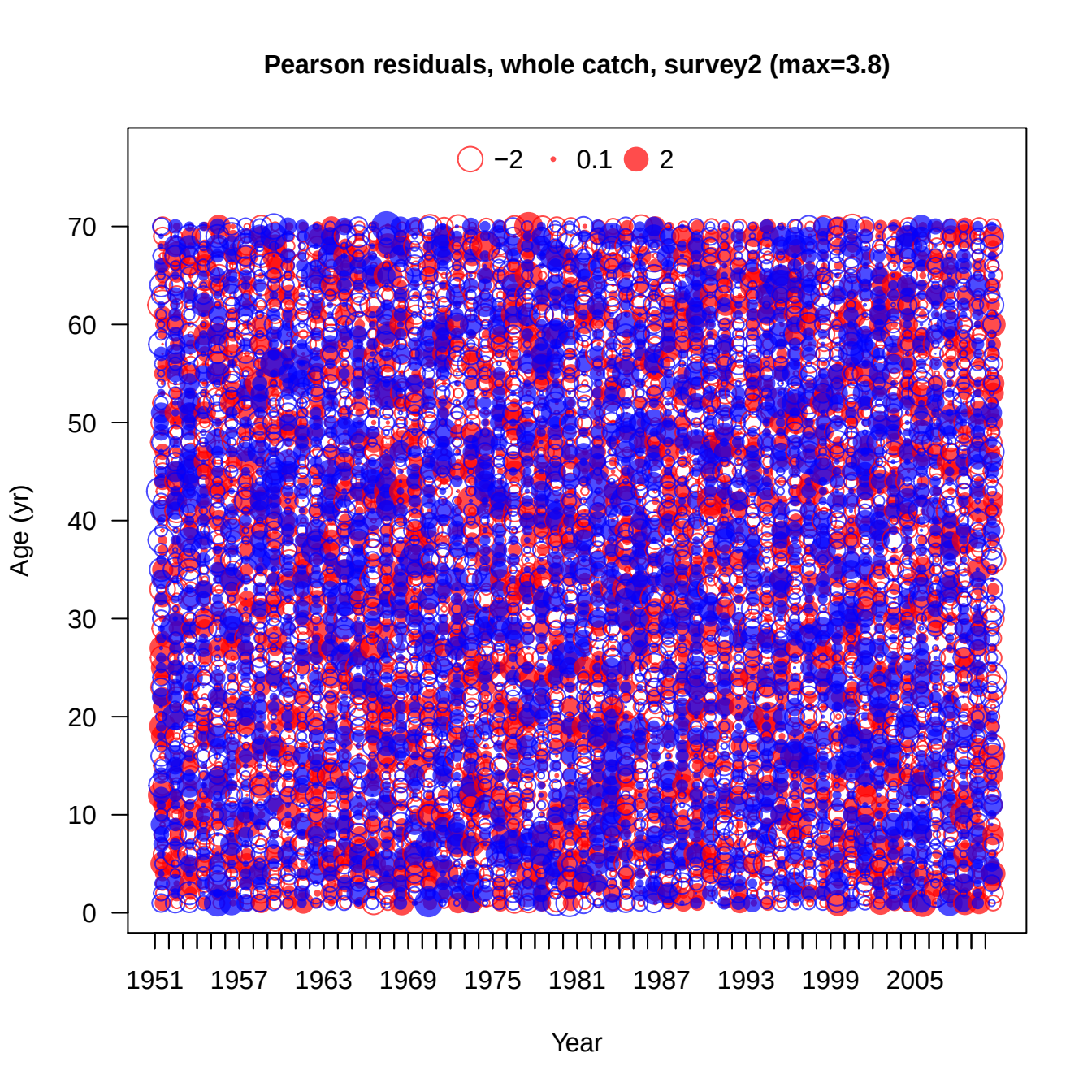

Pearson residuals, whole catch, survey2 (max=3.89)
−2
0.1
2
70
60
50
40
30
20
10
0
Age (yr)
1951
1957
1963
1969
1975
1981
1987
1993
1999
2005
Year

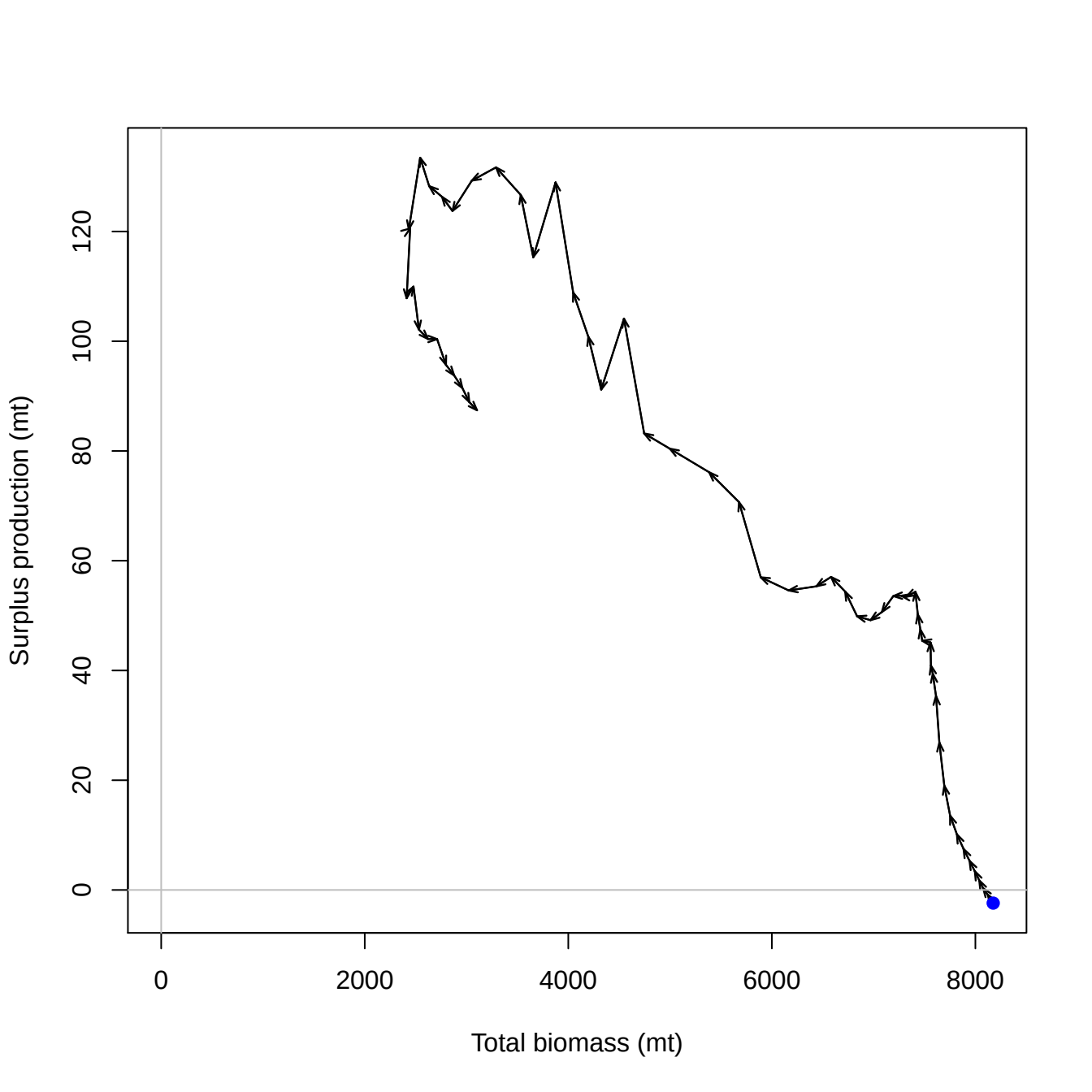

mean weight at age, whole catch, survey2
1951
1955
1959
1963
1952
1956
1960
1964
1953
1957
1961
1965
1954
1958
1962
1966
Weight
Age (yr)
0
20
40
60

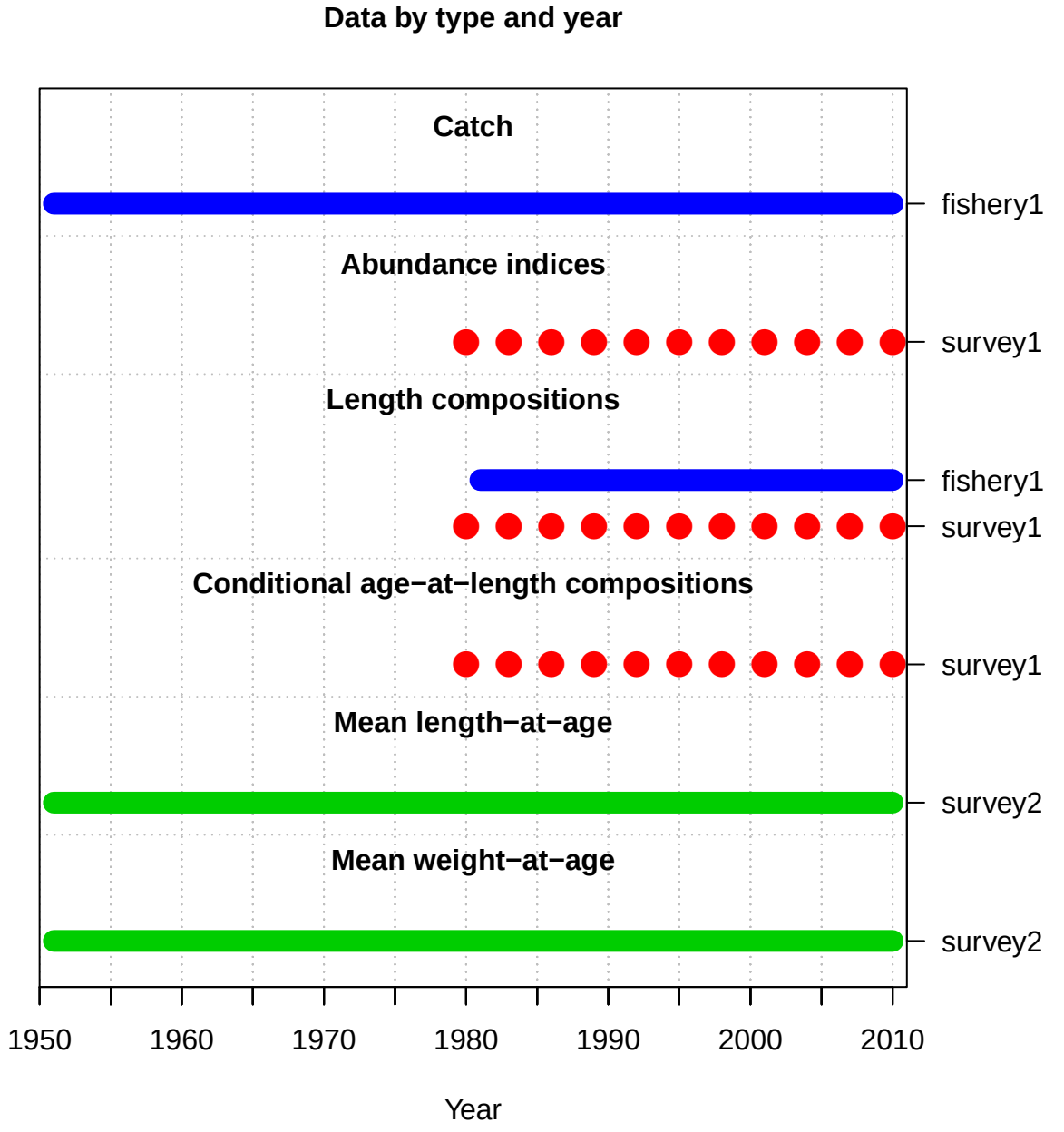

mean weight at age, whole catch, survey2
1967
1971
1975
1979
1968
1972
1976
1980
1969
1973
1977
1981
1970
1974
1978
1982
Weight
Age (yr)
0
20
40
60


mean weight at age, whole catch, survey2
1983
1987
1991
1995
1984
1988
1992
1996
1985
1989
1993
1997
1986
1990
1994
1998
Weight
Age (yr)
0
20
40
60
6
5
4
3
2
1
0


mean weight at age, whole catch, survey2
1999
2003
2007
2000
2004
2008
2001
2005
2009
2002
2006
2010
Weight
Age (yr)
0
20
40
60


Pearson residuals, whole catch, survey2 (max=3.8)
−2
0.1
2
Age (yr)
0
10
20
30
40
50
60
70
1951
1957
1963
1969
1975
1981
1987
1993
1999
2005
Year


Surplus production (mt)
0
20
40
60
80
100
120
0
2000
4000
6000
8000
Total biomass (mt)


Data by type and year
Catch
fishery1
Abundance indices
survey1
Length compositions
fishery1
survey1
Conditional age−at−length compositions
survey1
Mean length−at−age
survey2
Mean weight−at−age
survey2
1950
1960
1970
1980
1990
2000
2010
Year