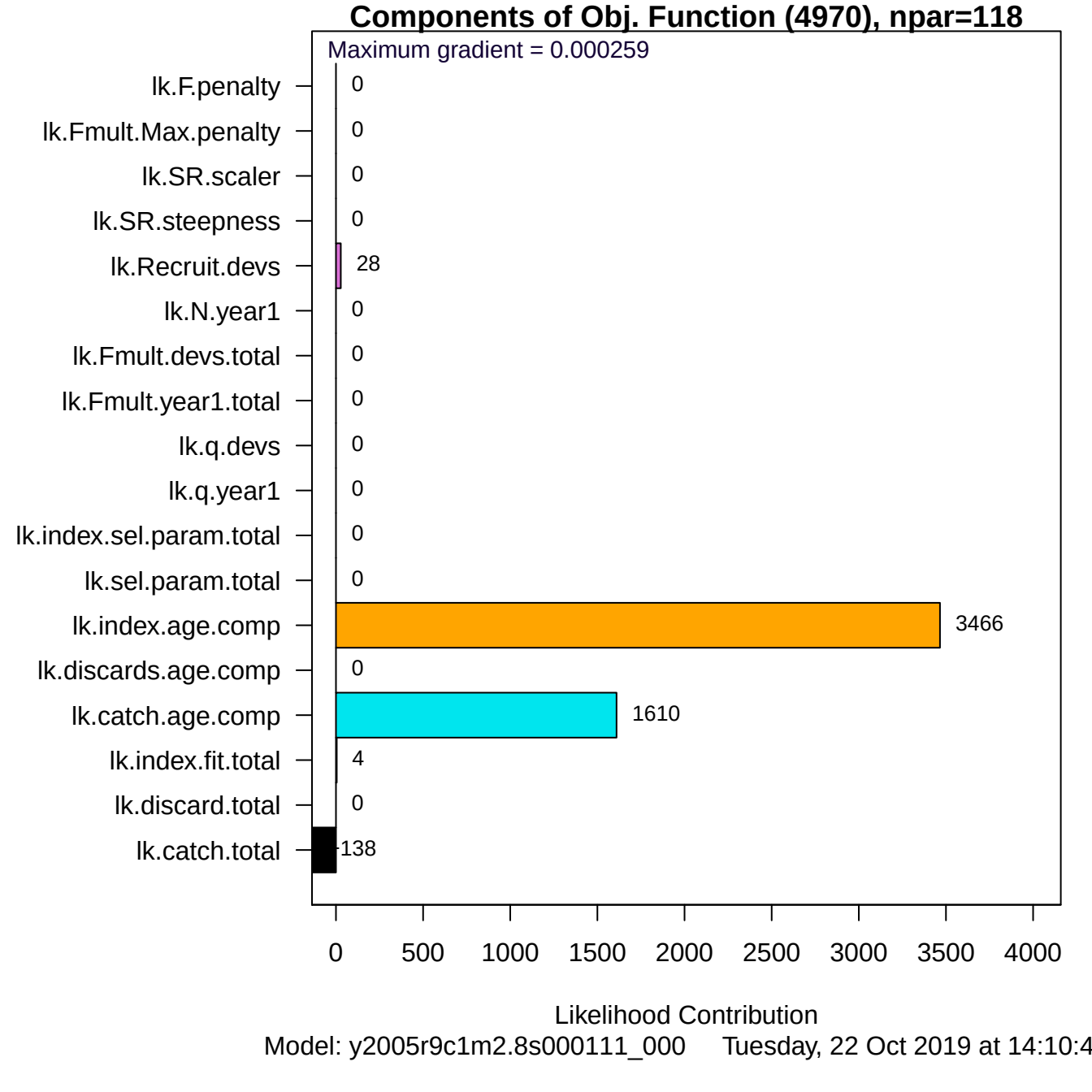
File = y2005r9c1m2.8s000111_000.dat

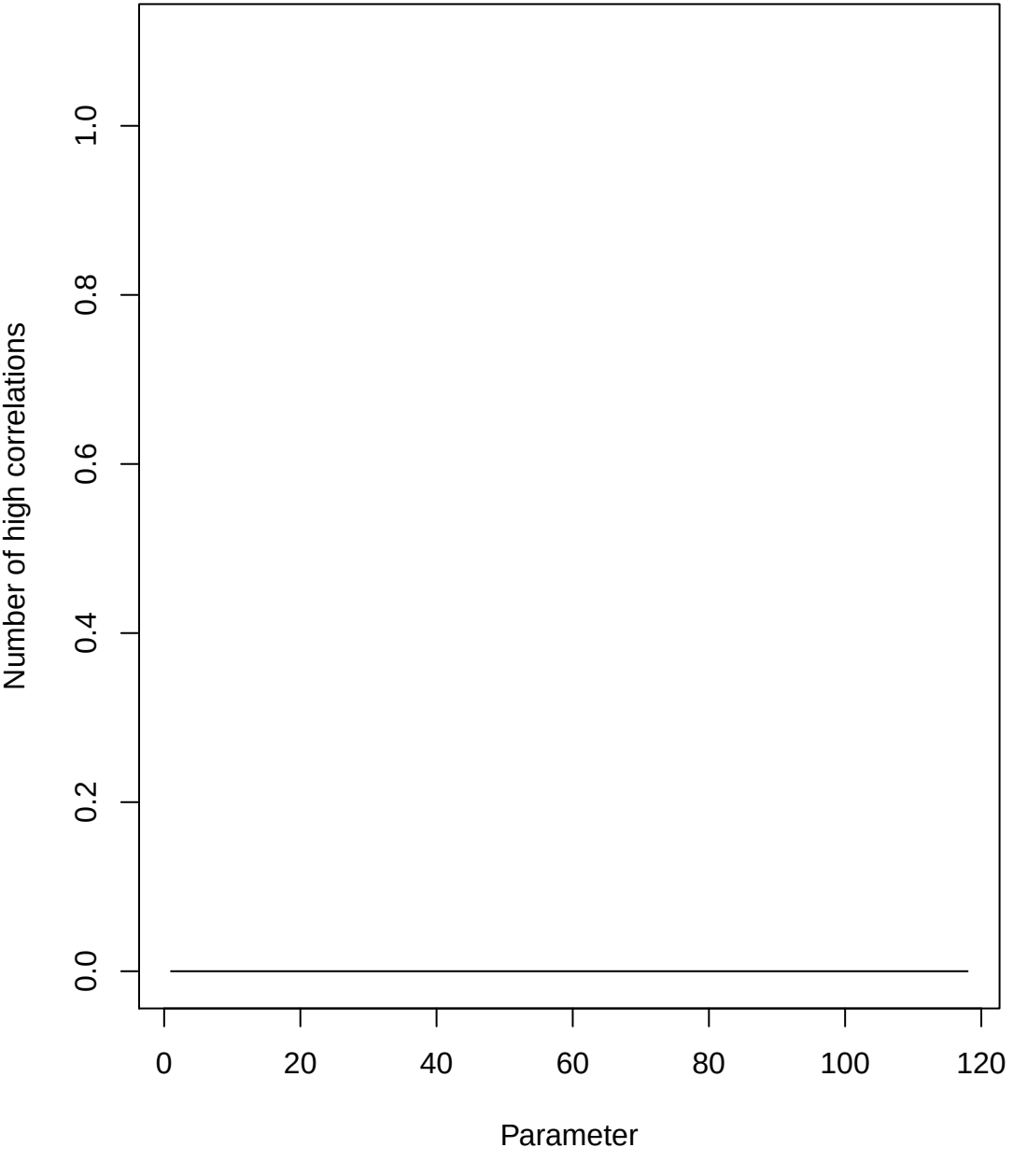
ASAP3 run on Tuesday, 22 Oct 2019 at 14:10:45

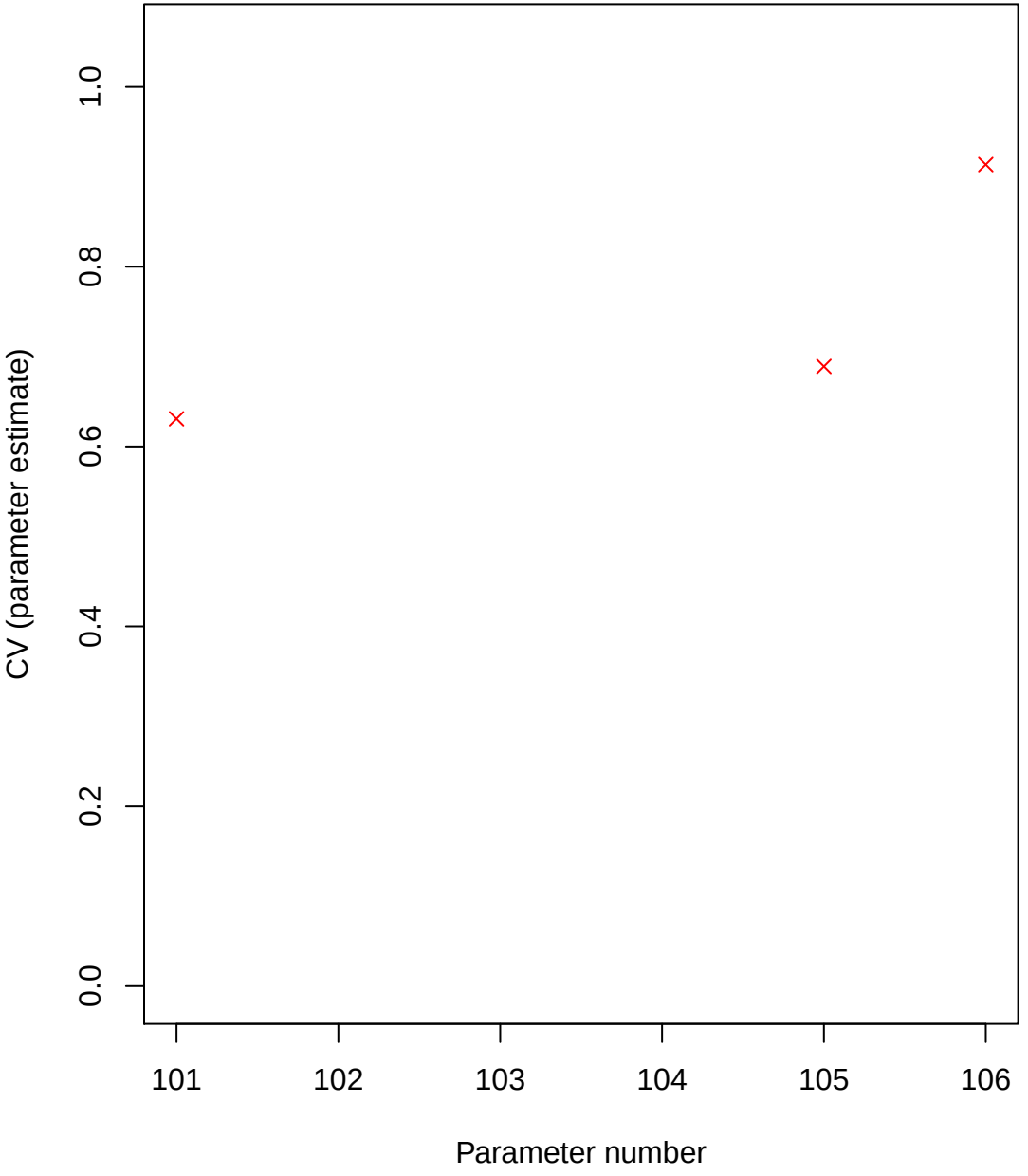
s\chris.legault\Documents\Working\ICES−WKFORBIAS 2019\GBYT\Rose\wor

ASAPplots version = 0.2.14

npar = 118, maximum gradient = 0.000258617

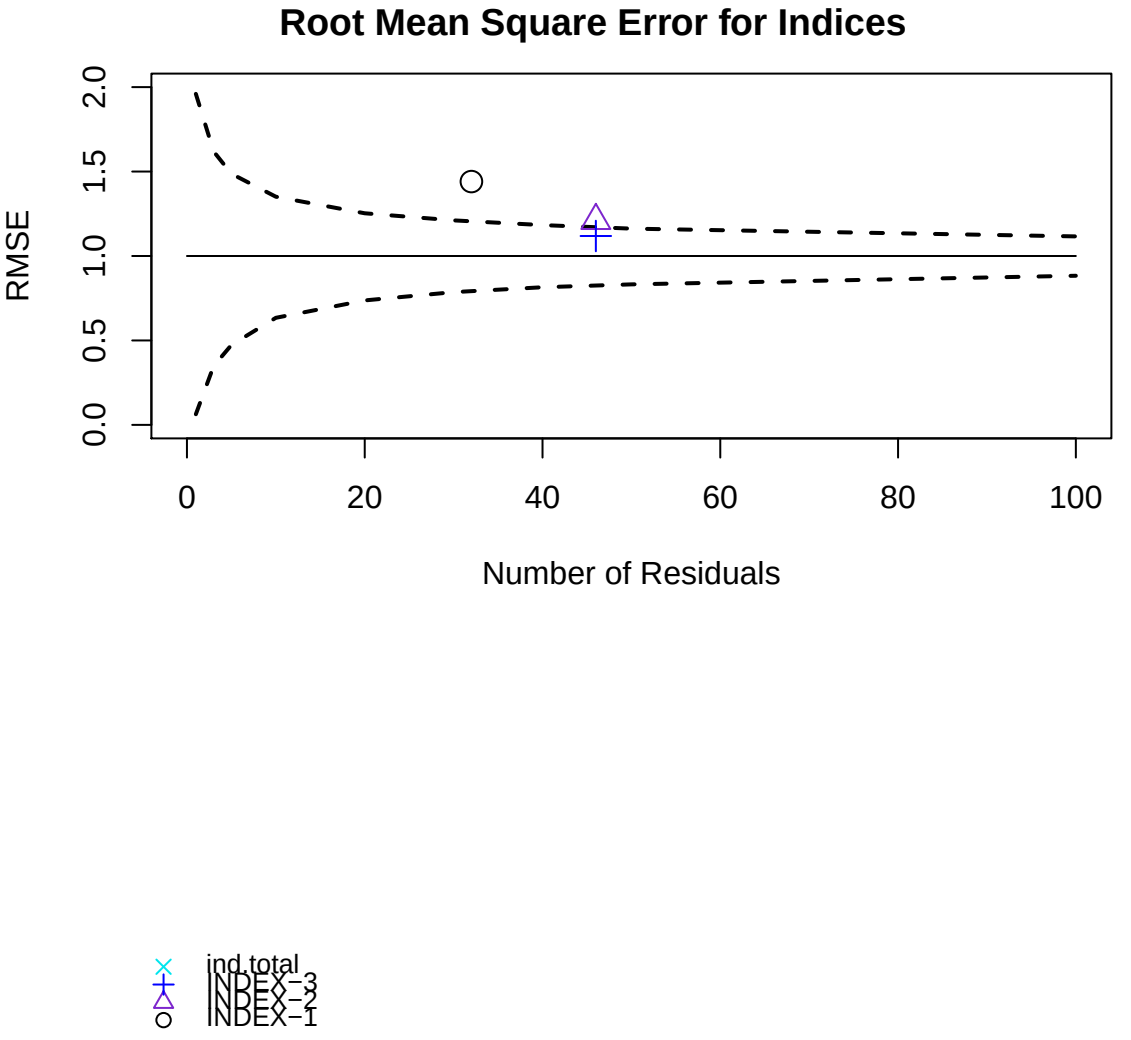

Components of Obj. Function (4970), npar=118
Maximum gradient = 0.000259
lk.F.penalty
lk.Fmult.Max.penalty
lk.SR.scaler
lk.SR.steepness
lk.Recruit.devs
lk.N.year1
lk.Fmult.devs.total
lk.Fmult.year1.total
lk.q.devs
lk.q.year1
lk.index.sel.param.total
lk.sel.param.total
lk.index.age.comp
lk.discards.age.comp
lk.catch.age.comp
lk.index.fit.total
lk.discard.total
lk.catch.total
0
0
0
0
28
0
0
0
0
0
0
0
3466
0
1610
4
0
-138
0
500
1000
1500
2000
2500
3000
3500
4000
Likelihood Contribution
Model: y2005r9c1m2.8s000111_000 Tuesday, 22 Oct 2019 at 14:10:4

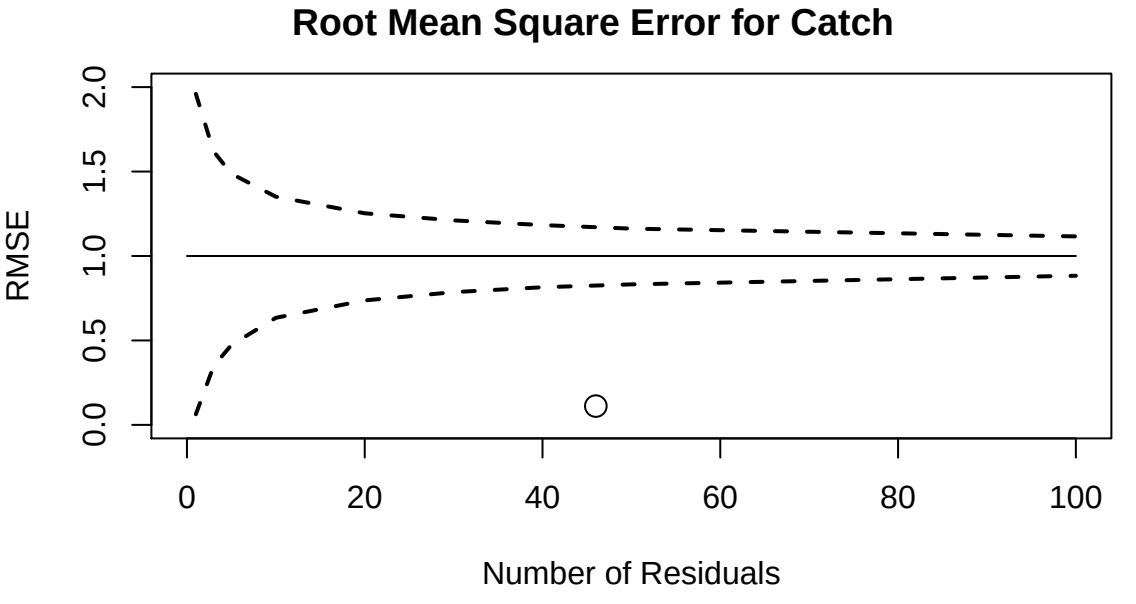

Number of high correlations
0.0
0.2
0.4
0.6
0.8
1.0
0
20
40
60
80
100
120
Parameter


CV (parameter estimate)
0.0
0.2
0.4
0.6
0.8
1.0
101
102
103
104
105
106
Parameter number

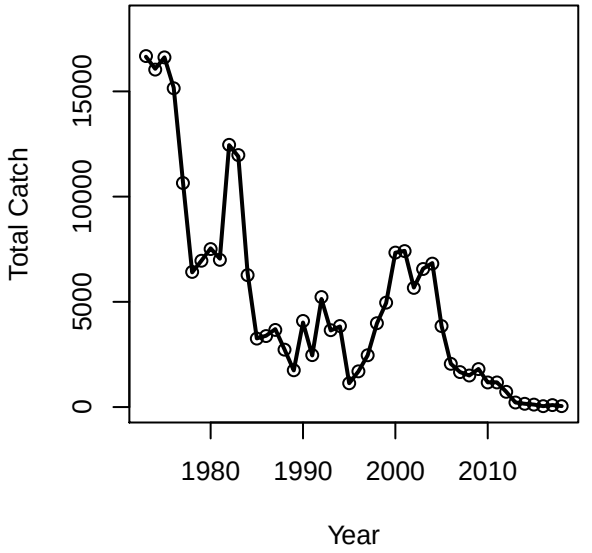
Root Mean Square Error computed from Standardized Residuals

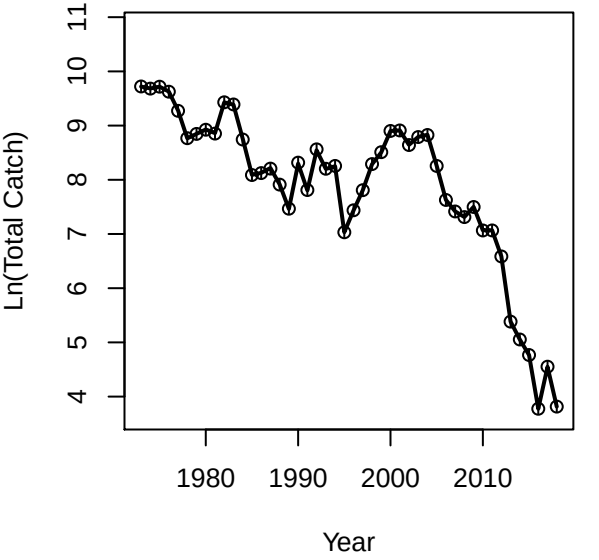
Component	# resids	RMSE
catch.tot	46	0.112
discard.tot	0	0
ind01	32	1.44
ind02	46	1.21
ind03	46	1.12
ind.total	124	1.24
N.year1	0	0
Fmult.year1	0	0
Fmult.devs.total	0	0
recruit.devs	46	1.54
fleet.sel.params	0	0
index.sel.params	0	0
q.year1	0	0
q.devs	0	0
SR.steepness	0	0
SR.scaler	0	0

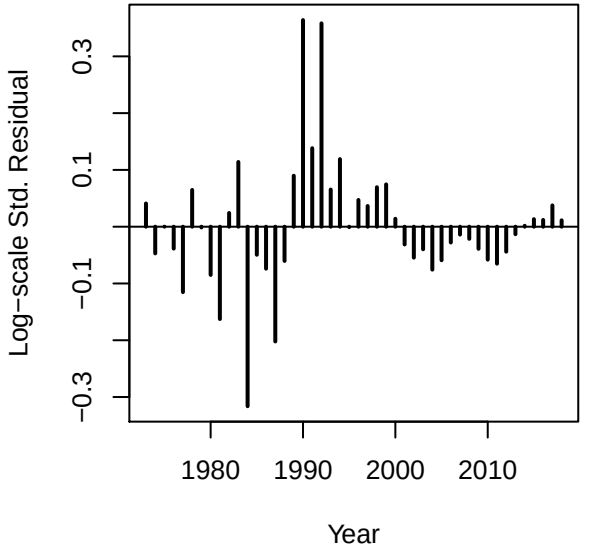

Root Mean Square Error for Indices
RMSE
0.0
0.5
1.0
1.5
2.0
0
20
40
60
80
100
Number of Residuals
ind.total
INDEX−3
INDEX−2
INDEX−1

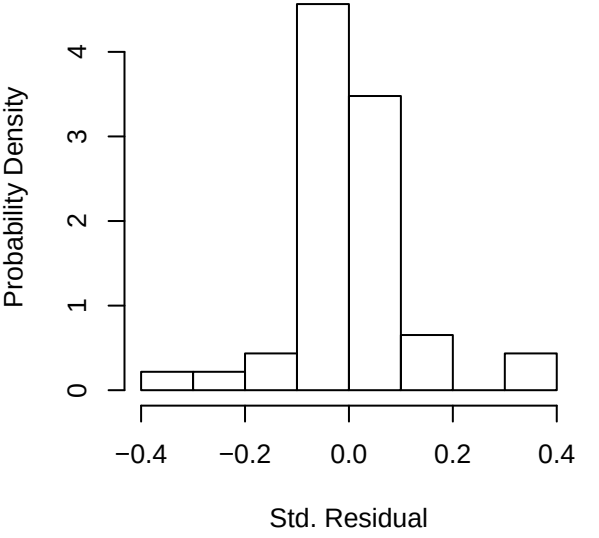

Root Mean Square Error for Catch
RMSE
0.0
0.5
1.0
1.5
2.0
0
20
40
60
80
100
Number of Residuals
catch.tot

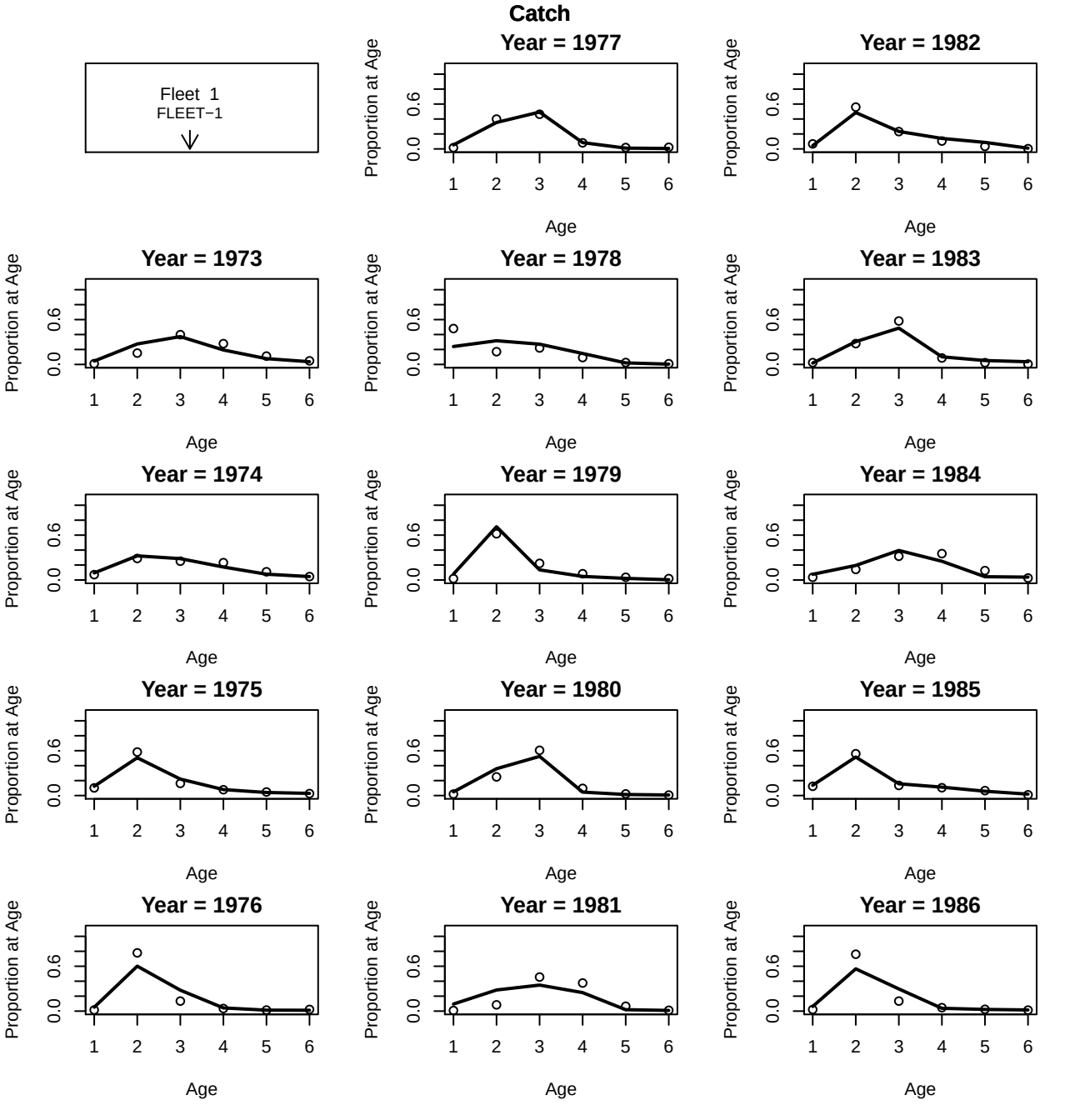
Fleet 1 Catch (FLEET−1)

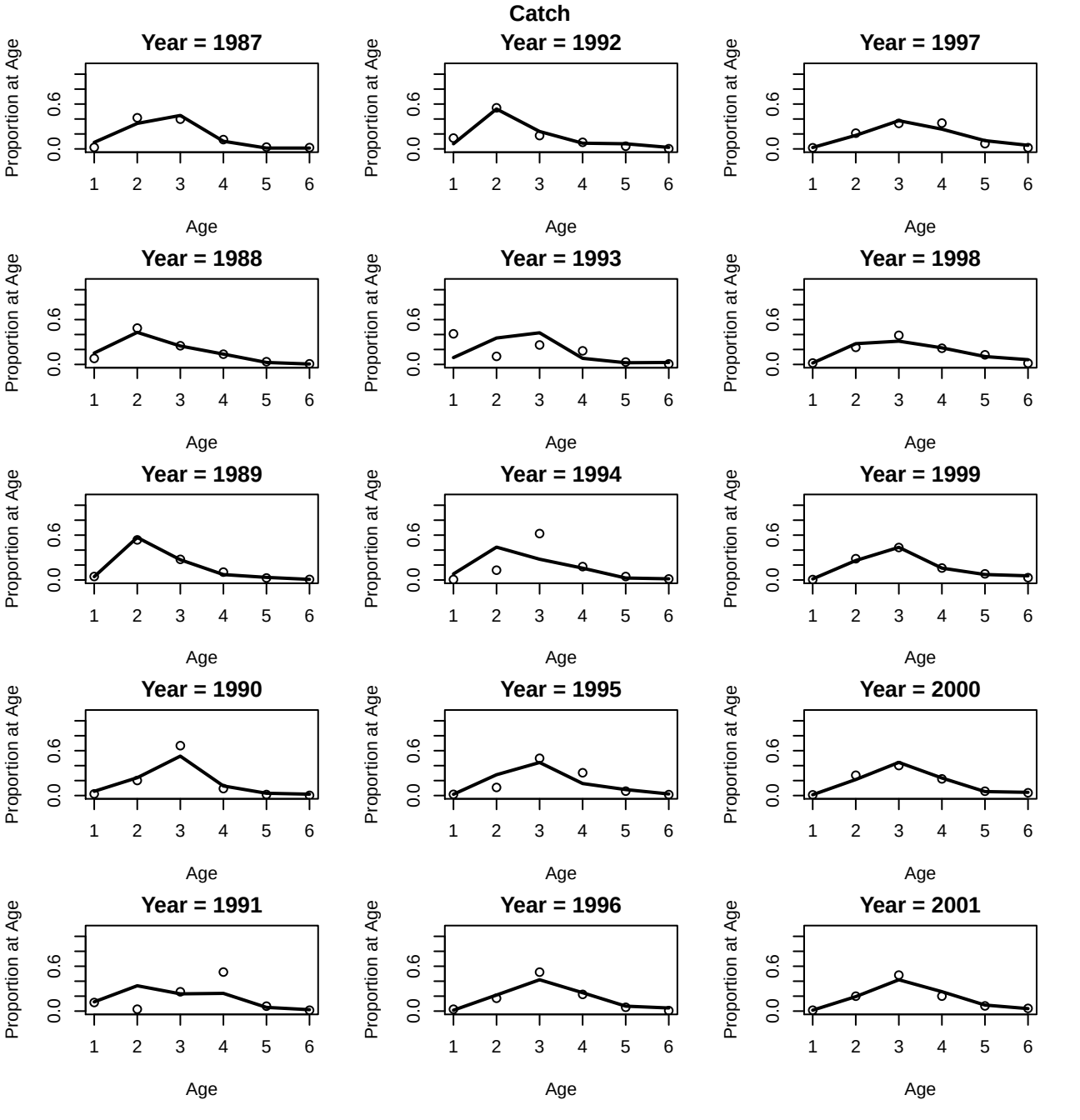


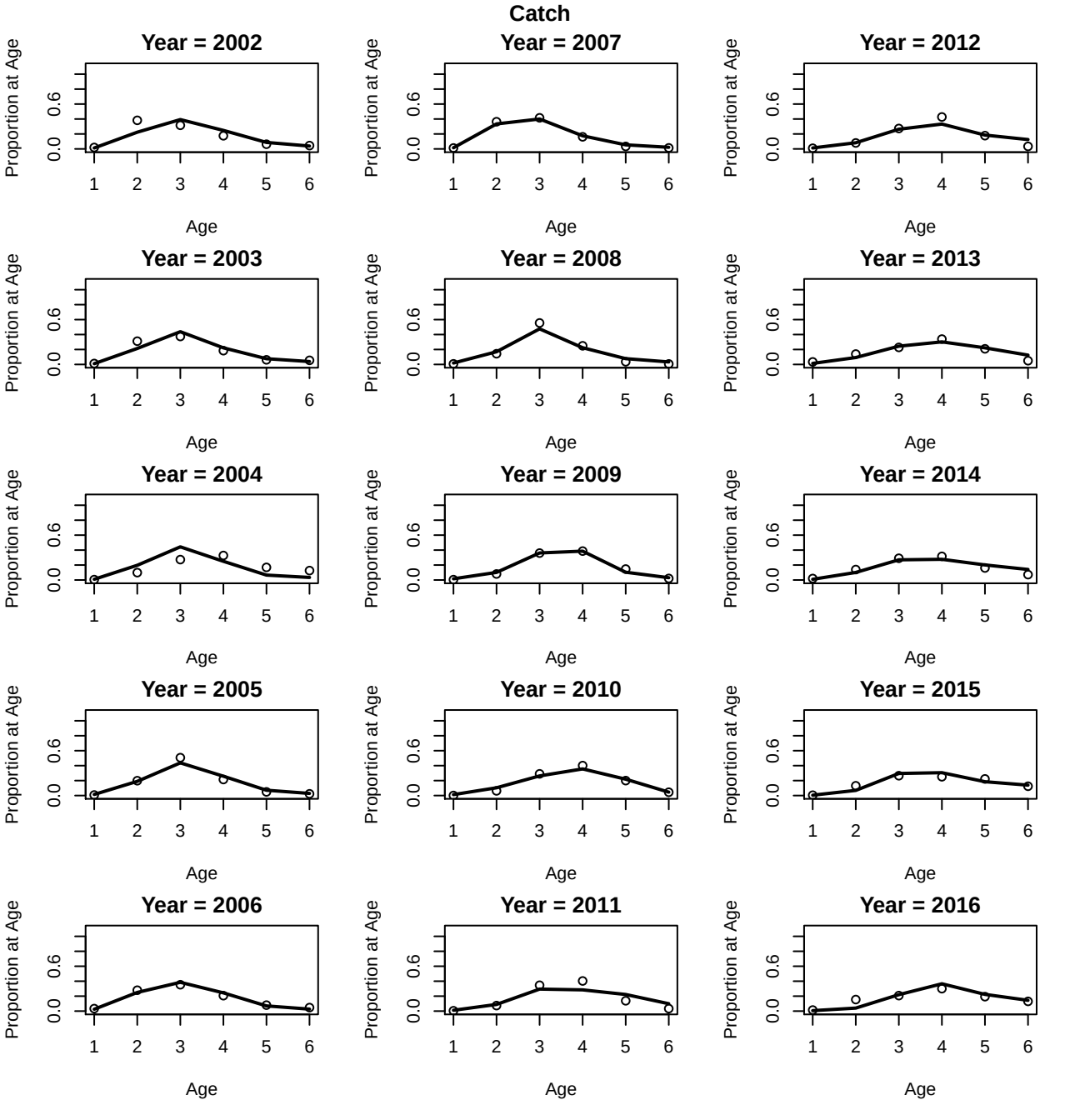




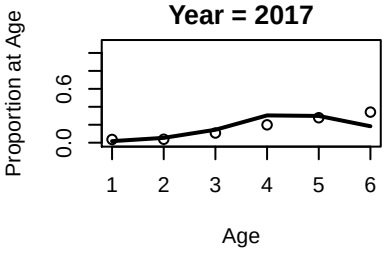


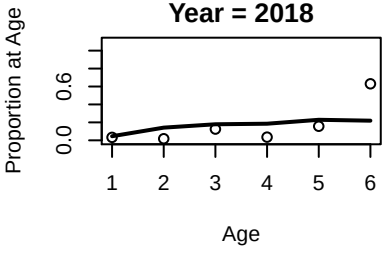

Catch
Fleet 1
FLEET−1
Year = 1977
Year = 1982
Year = 1973
Year = 1978
Year = 1983
Year = 1974
Year = 1979
Year = 1984
Year = 1975
Year = 1980
Year = 1985
Year = 1976
Year = 1981
Year = 1986
Proportion at Age
Age
0.0
0.6
1
2
3
4
5
6

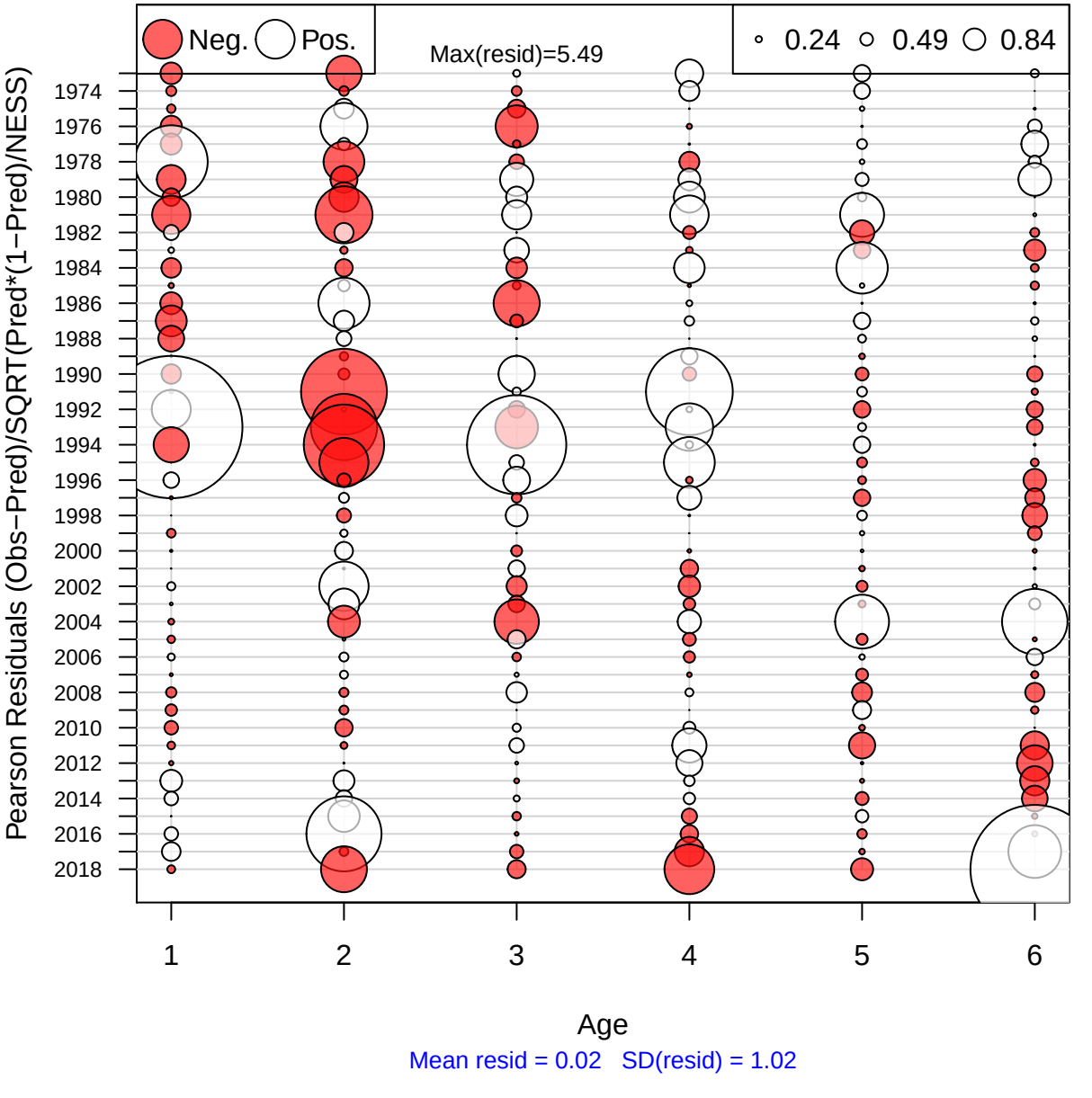

Catch
Year = 1987
Year = 1992
Year = 1997
Year = 1988
Year = 1993
Year = 1998
Year = 1989
Year = 1994
Year = 1999
Year = 1990
Year = 1995
Year = 2000
Year = 1991
Year = 1996
Year = 2001
Proportion at Age
Age
0.0
0.6
1
2
3
4
5
6

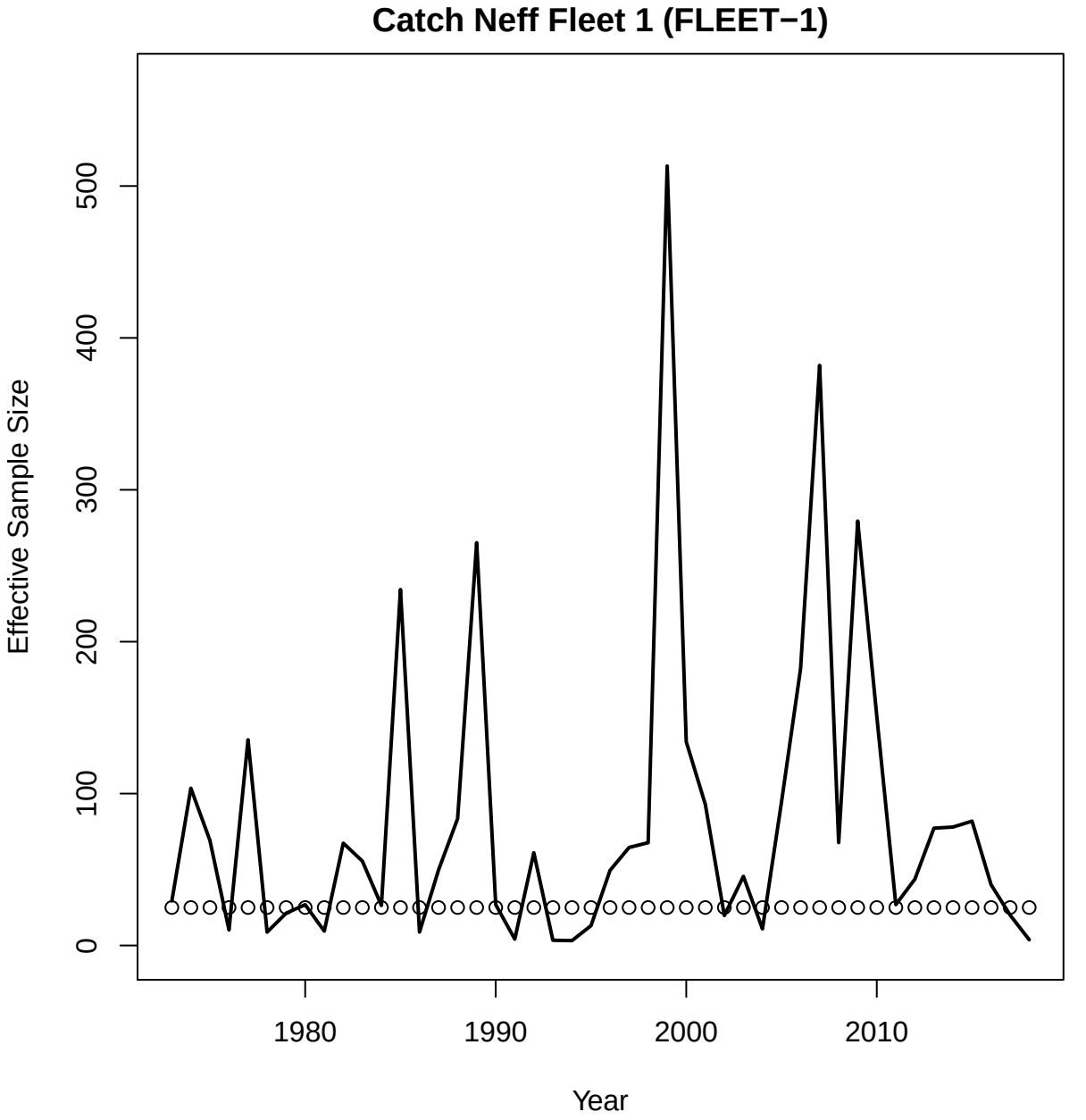

Catch
Year = 2002
Year = 2007
Year = 2012
Year = 2003
Year = 2008
Year = 2013
Year = 2004
Year = 2009
Year = 2014
Year = 2005
Year = 2010
Year = 2015
Year = 2006
Year = 2011
Year = 2016
Proportion at Age
Age
0.0
0.6
1
2
3
4
5
6

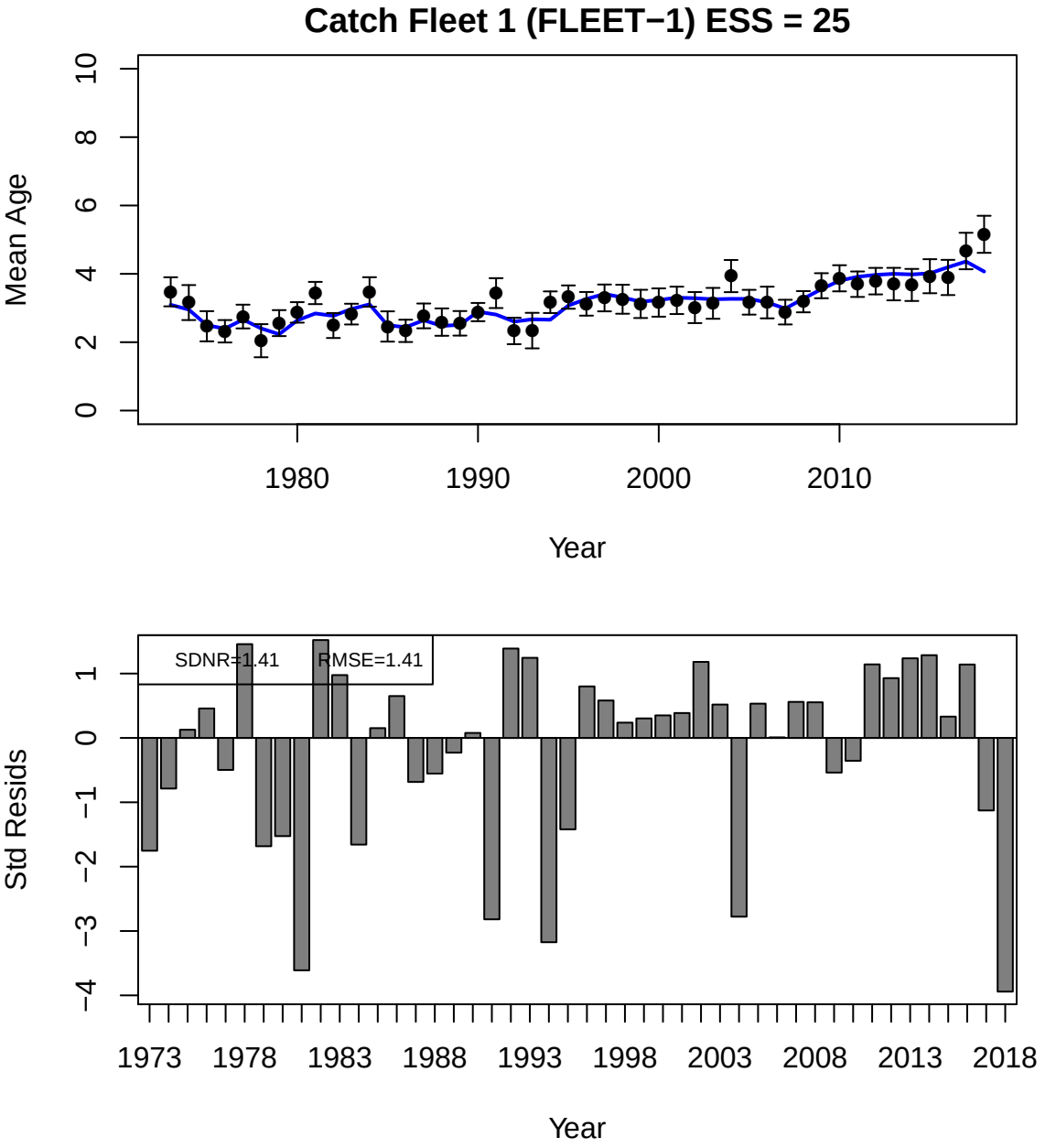
Catch

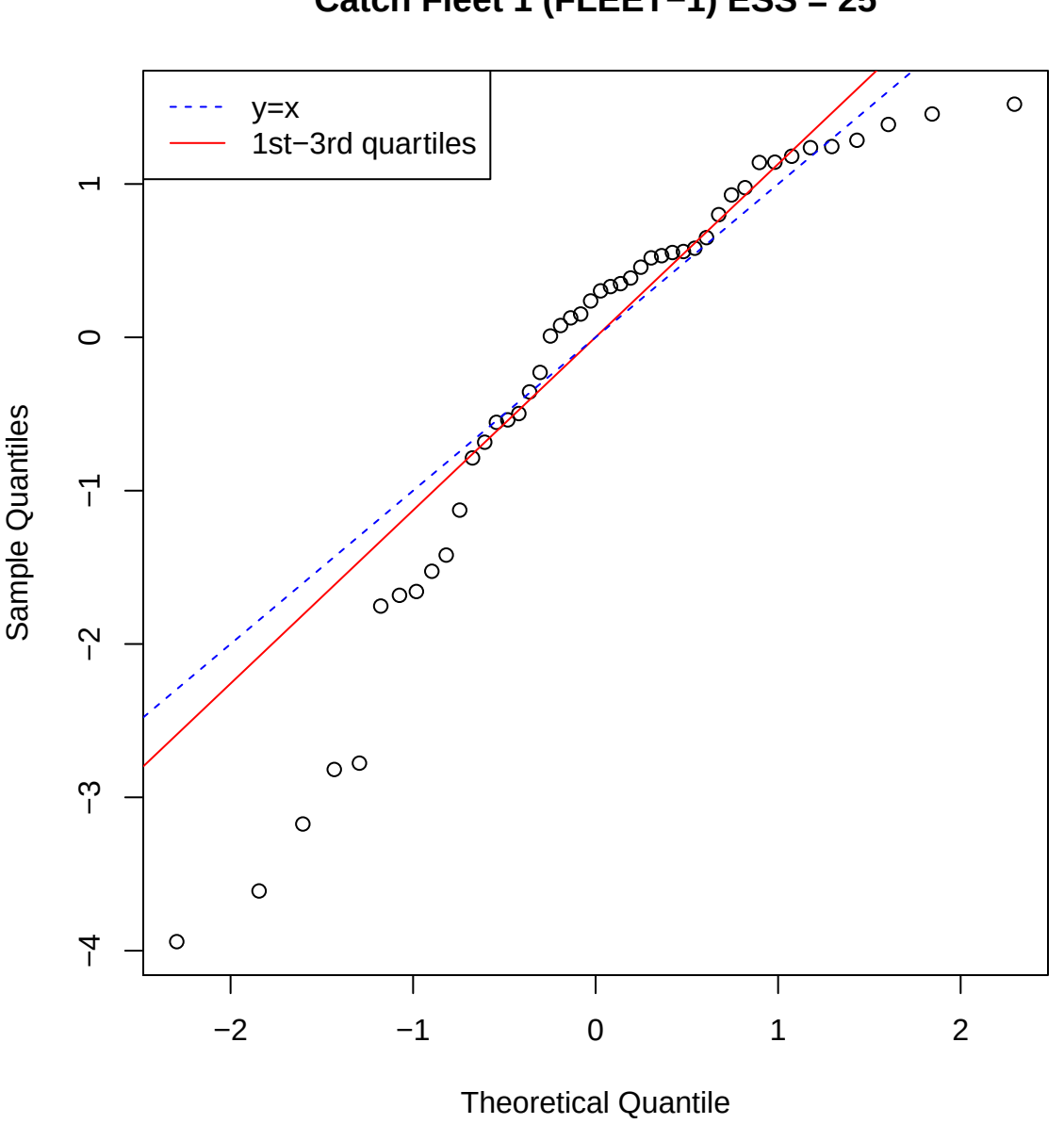

Year = 2017
Proportion at Age
0.0
0.6
1
2
3
4
5
6
Age

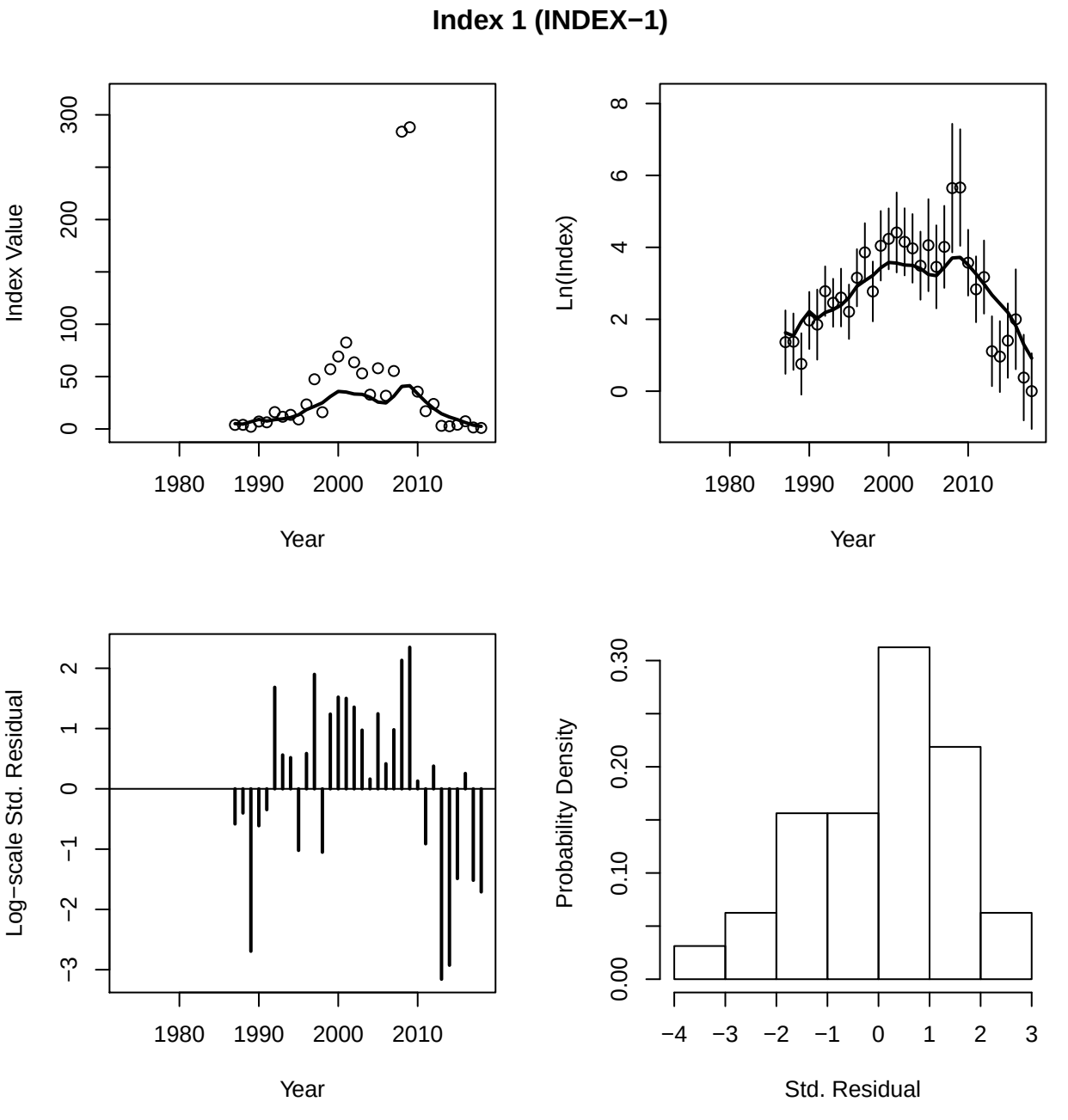

Year = 2018
Proportion at Age
0.0
0.6
1
2
3
4
5
6
Age


Age Comp Residuals for Catch by Fleet 1 (FLEET−1)
Neg.
Pos.
Max(resid)=5.49
0.24
0.49
0.84
Pearson Residuals (Obs−Pred)/SQRT(Pred*(1−Pred)/NESS)
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
1
2
3
4
5
6
Age
Mean resid = 0.02 SD(resid) = 1.02

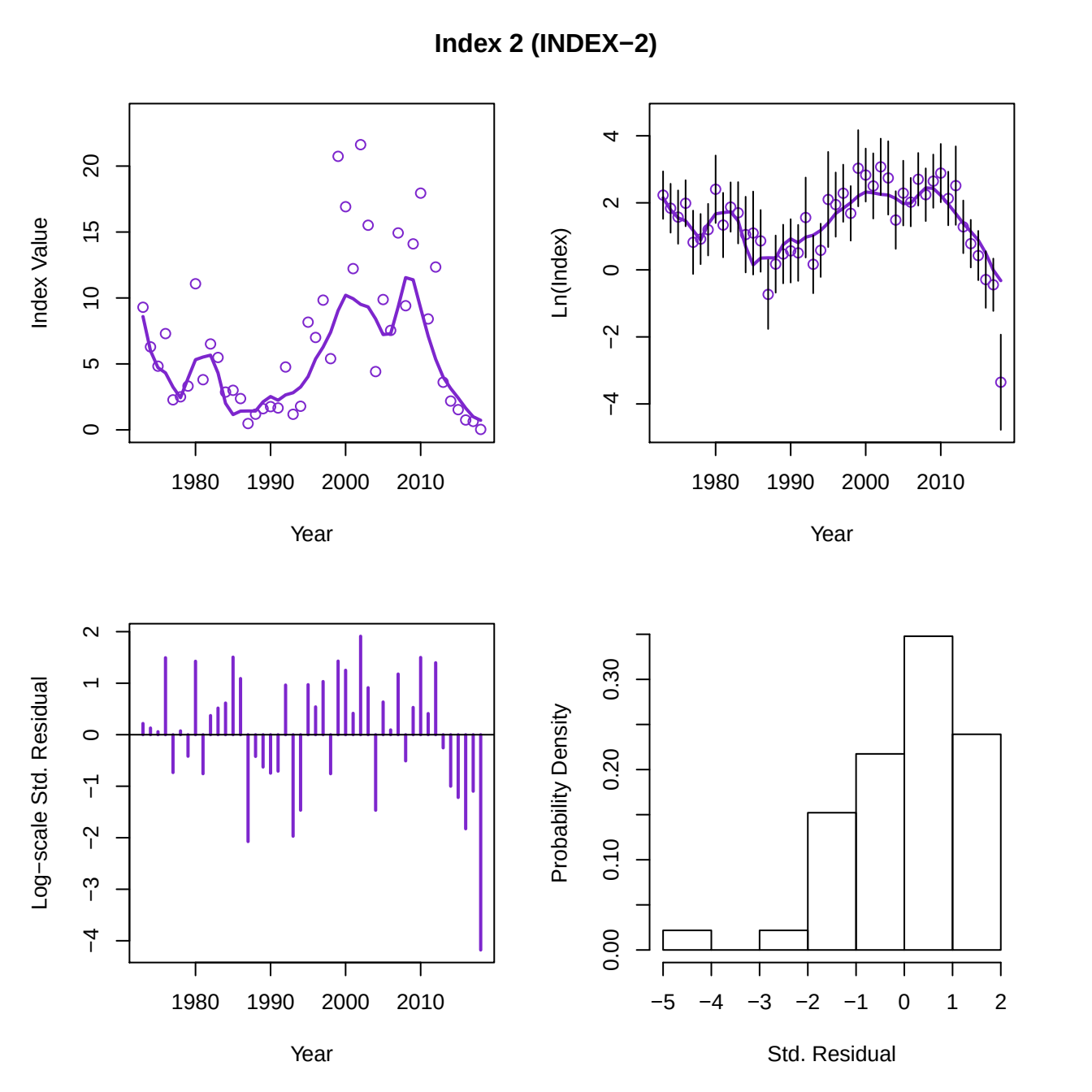

Catch Neff Fleet 1 (FLEET−1)
Effective Sample Size
0
100
200
300
400
500
1980
1990
2000
2010
Year

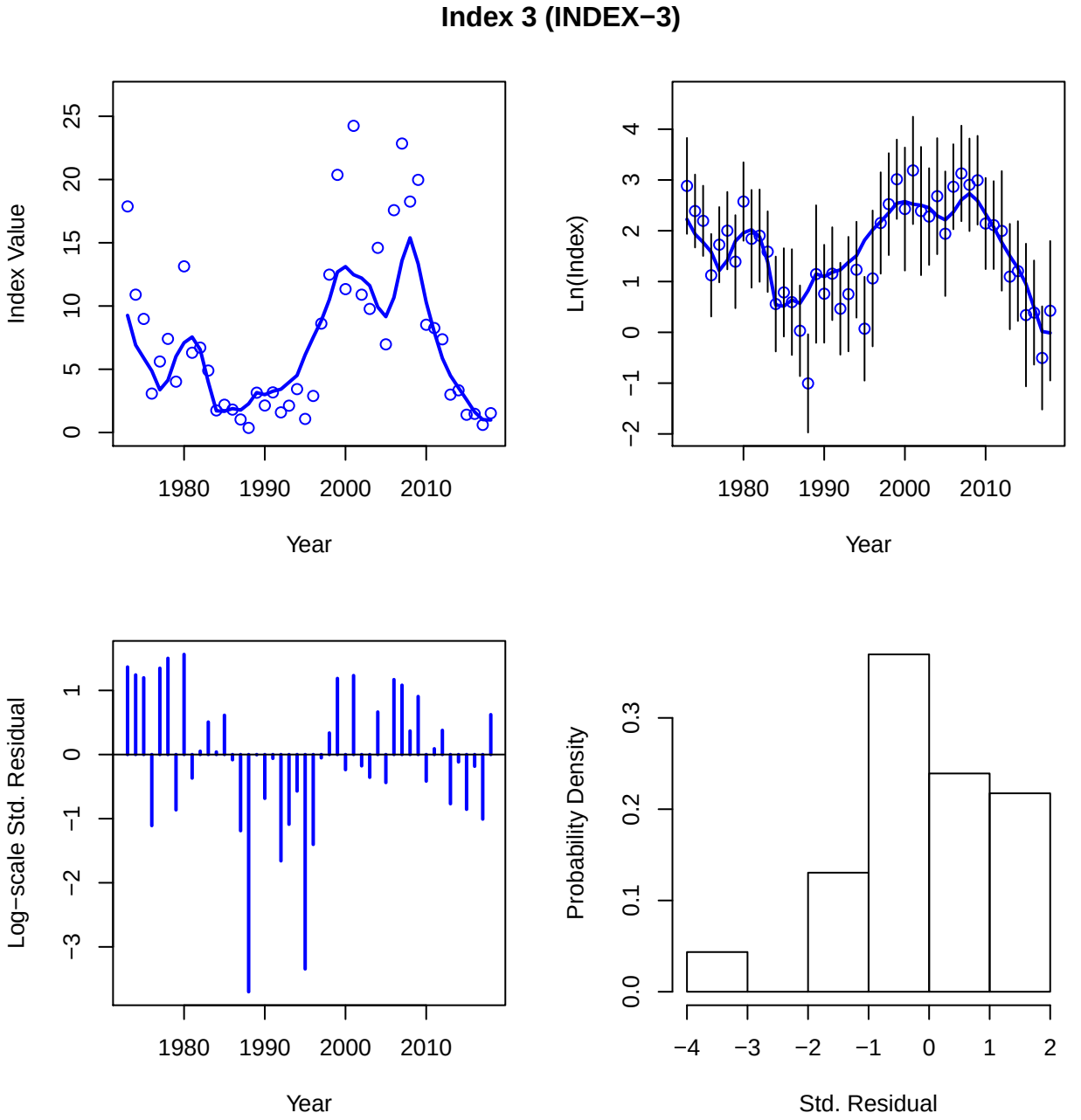

Catch Fleet 1 (FLEET−1) ESS = 25
Mean Age
0
2
4
6
8
10
1980
1990
2000
2010
Year
SDNR=1.41
RMSE=1.41
Std Resids
−4
−3
−2
−1
0
1
1973
1978
1983
1988
1993
1998
2003
2008
2013
2018
Year

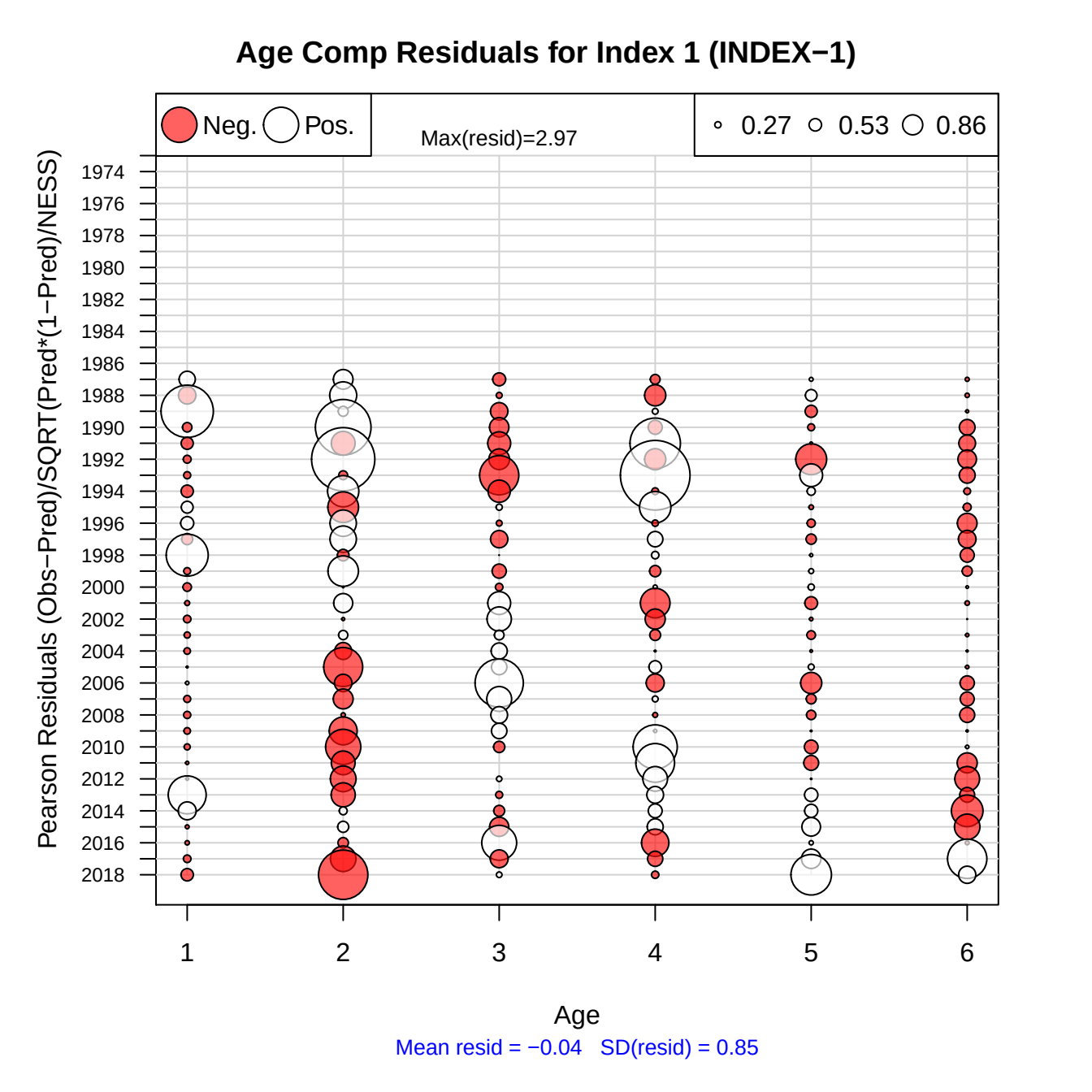

Catch Fleet 1 (FLEET−1) ESS = 25
y=x
1st−3rd quartiles
Sample Quantiles
Theoretical Quantile
−4
−3
−2
−1
0
1
2
−2
−1
0
1
2

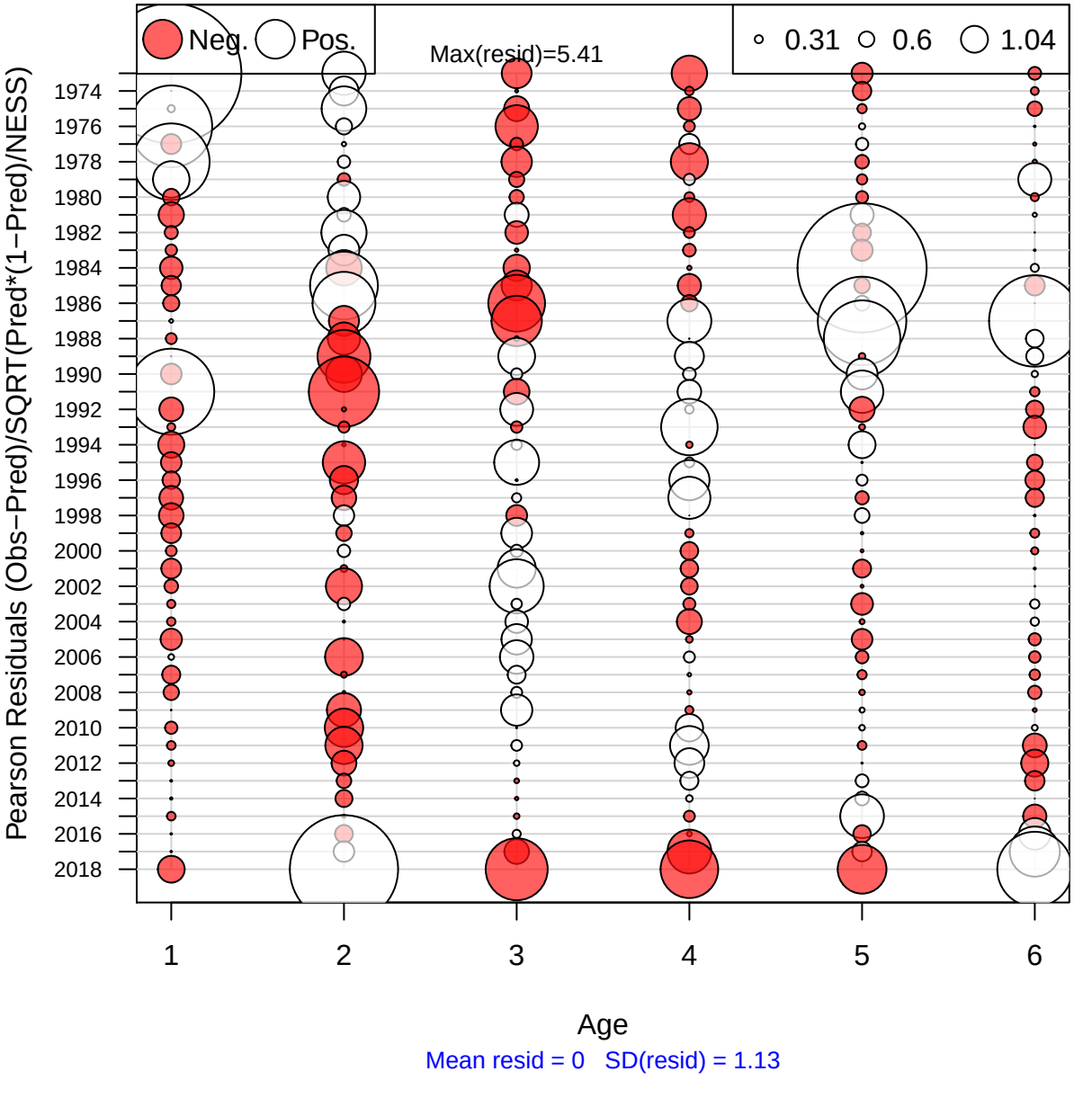


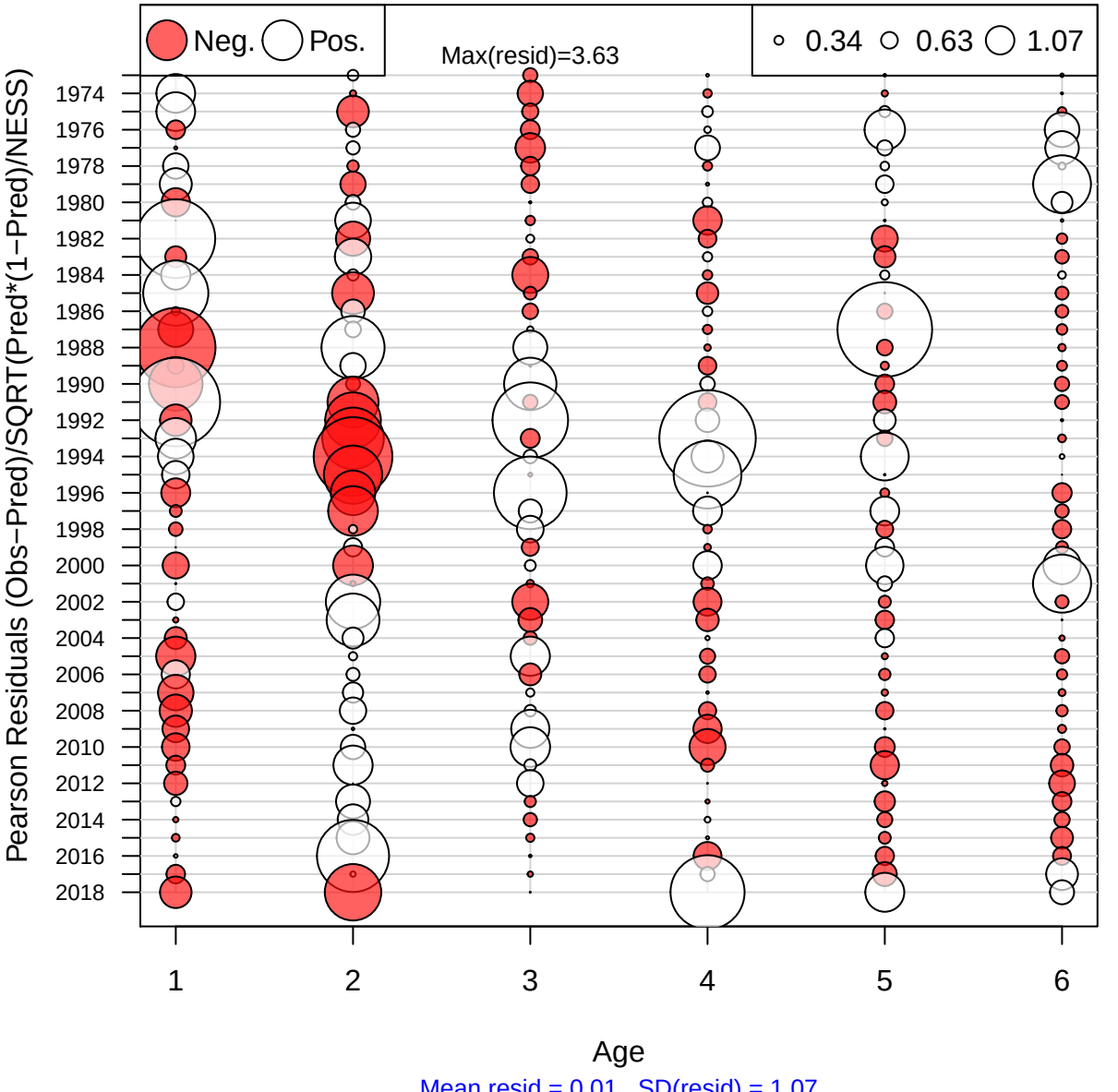
Index 1 (INDEX−1)
Index Value
0
50
100
200
300
1980
1990
2000
2010
Year
Ln(Index)
0
2
4
6
8
1980
1990
2000
2010
Year
Log−scale Std. Residual
−3
−2
−1
0
1
2
1980
1990
2000
2010
Year
Probability Density
0.00
0.10
0.20
0.30
−4
−3
−2
−1
0
1
2
3
Std. Residual

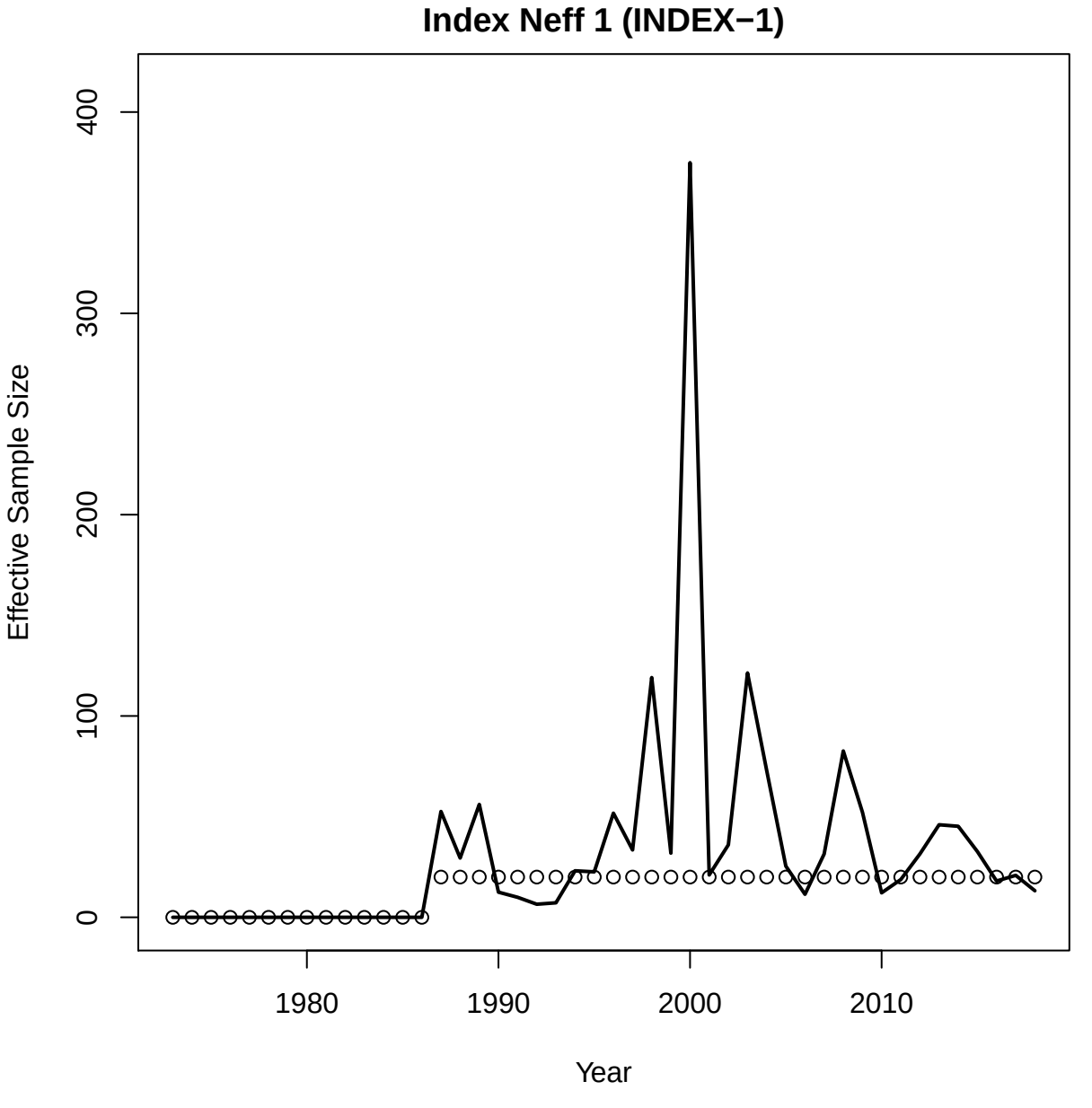

Index 2 (INDEX−2)
Index Value
0
5
10
15
20
1980
1990
2000
2010
Year
Ln(Index)
−4
−2
0
2
4
1980
1990
2000
2010
Year
Log−scale Std. Residual
−4
−3
−2
−1
0
1
2
1980
1990
2000
2010
Year
Probability Density
0.00
0.10
0.20
0.30
−5
−4
−3
−2
−1
0
1
2
Std. Residual

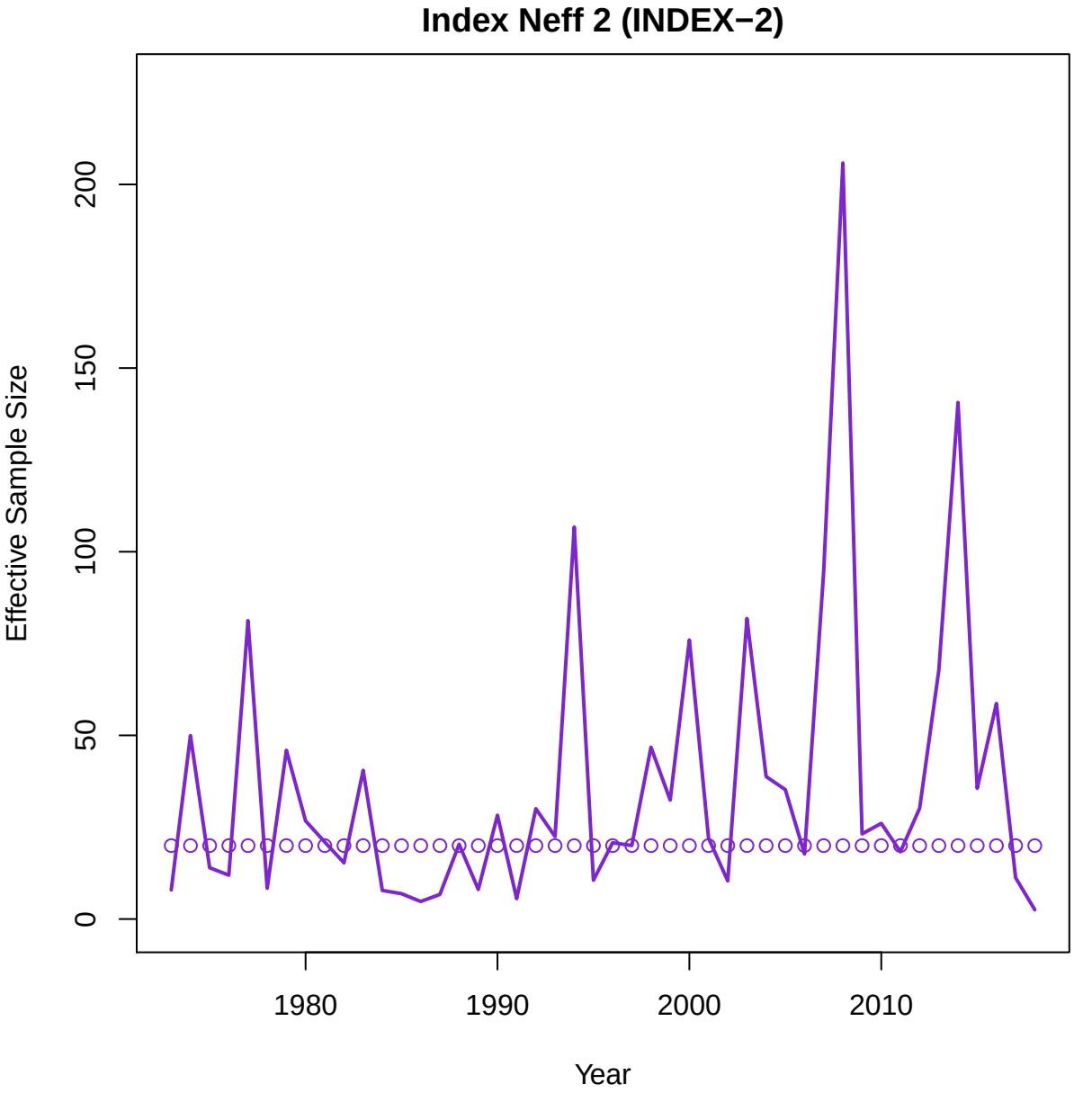

Index 3 (INDEX−3)
Index Value
0
5
10
15
20
25
1980
1990
2000
2010
Year
Ln(Index)
−2
−1
0
1
2
3
4
1980
1990
2000
2010
Year
Log−scale Std. Residual
−3
−2
−1
0
1
1980
1990
2000
2010
Year
Probability Density
0.0
0.1
0.2
0.3
−4
−3
−2
−1
0
1
2
Std. Residual

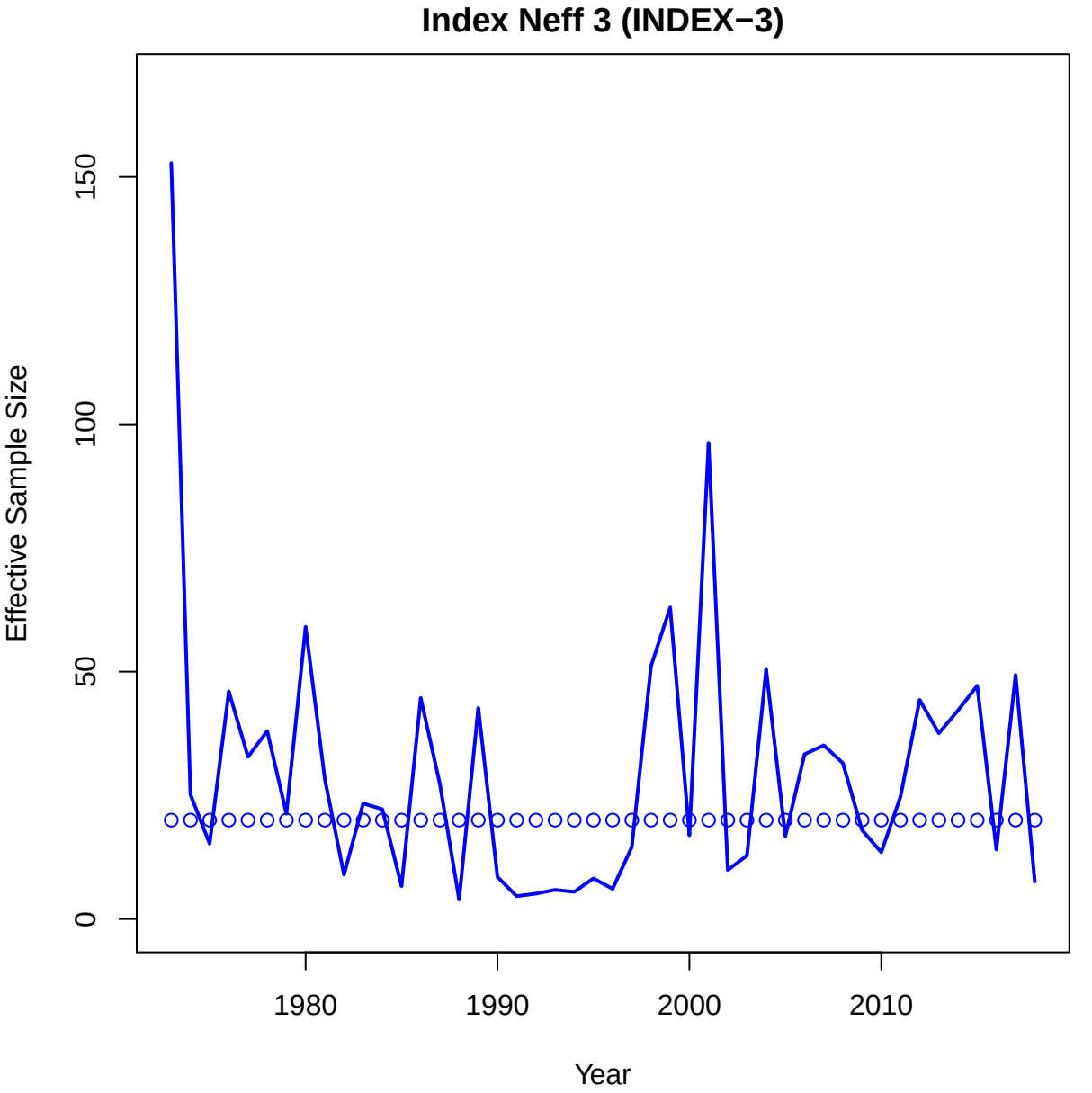

Age Comp Residuals for Index 1 (INDEX−1)
Neg.
Pos.
Max(resid)=2.97
0.27
0.53
0.86
Pearson Residuals (Obs−Pred)/SQRT(Pred*(1−Pred)/NESS)
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
1
2
3
4
5
6
Age
Mean resid = −0.04 SD(resid) = 0.85

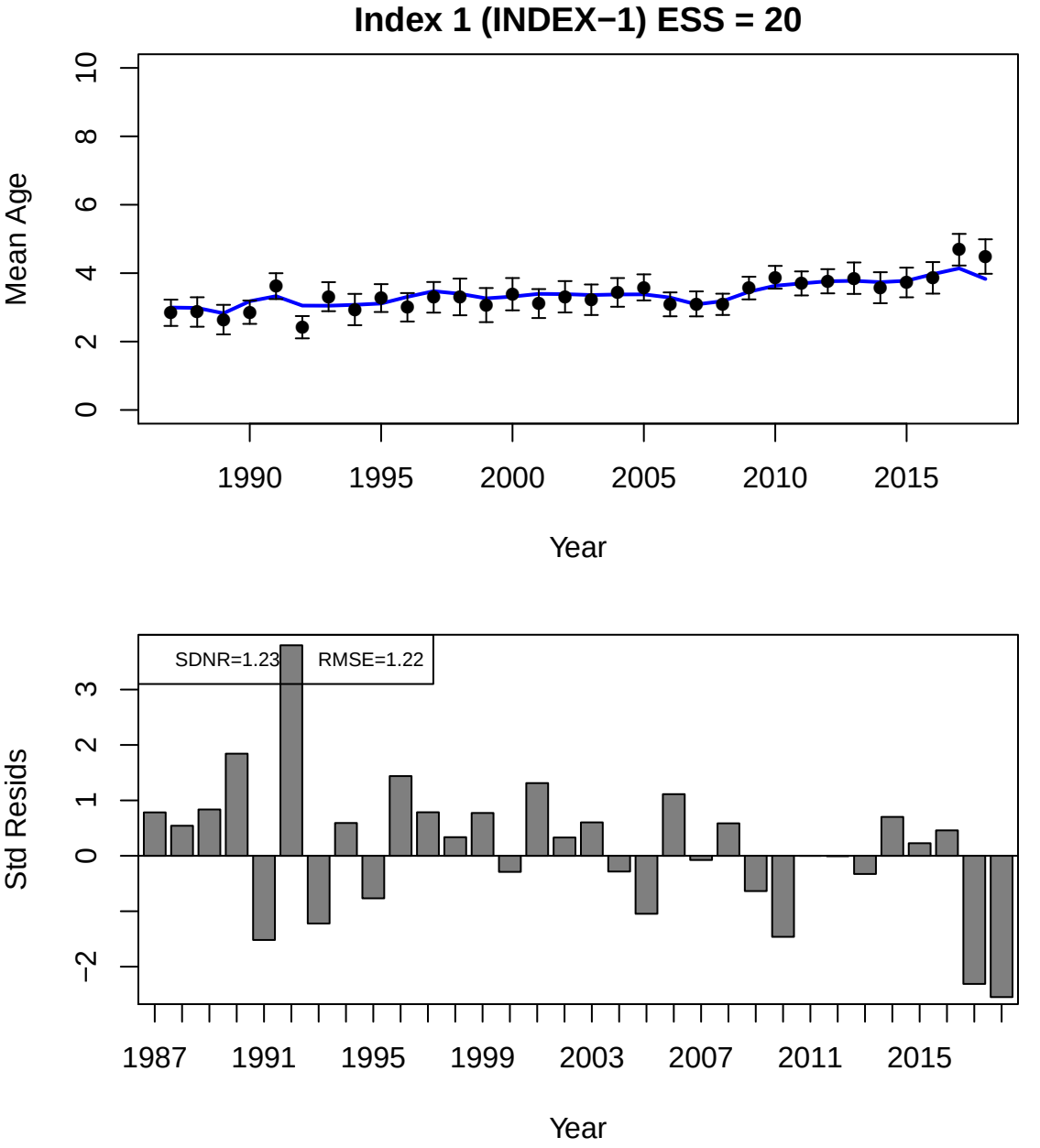

Age Comp Residuals for Index 2 (INDEX−2)
Neg.
Pos.
Max(resid)=5.41
0.31
0.6
1.04
Pearson Residuals (Obs−Pred)/SQRT(Pred*(1−Pred)/NESS)
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
1
2
3
4
5
6
Age
Mean resid = 0 SD(resid) = 1.13

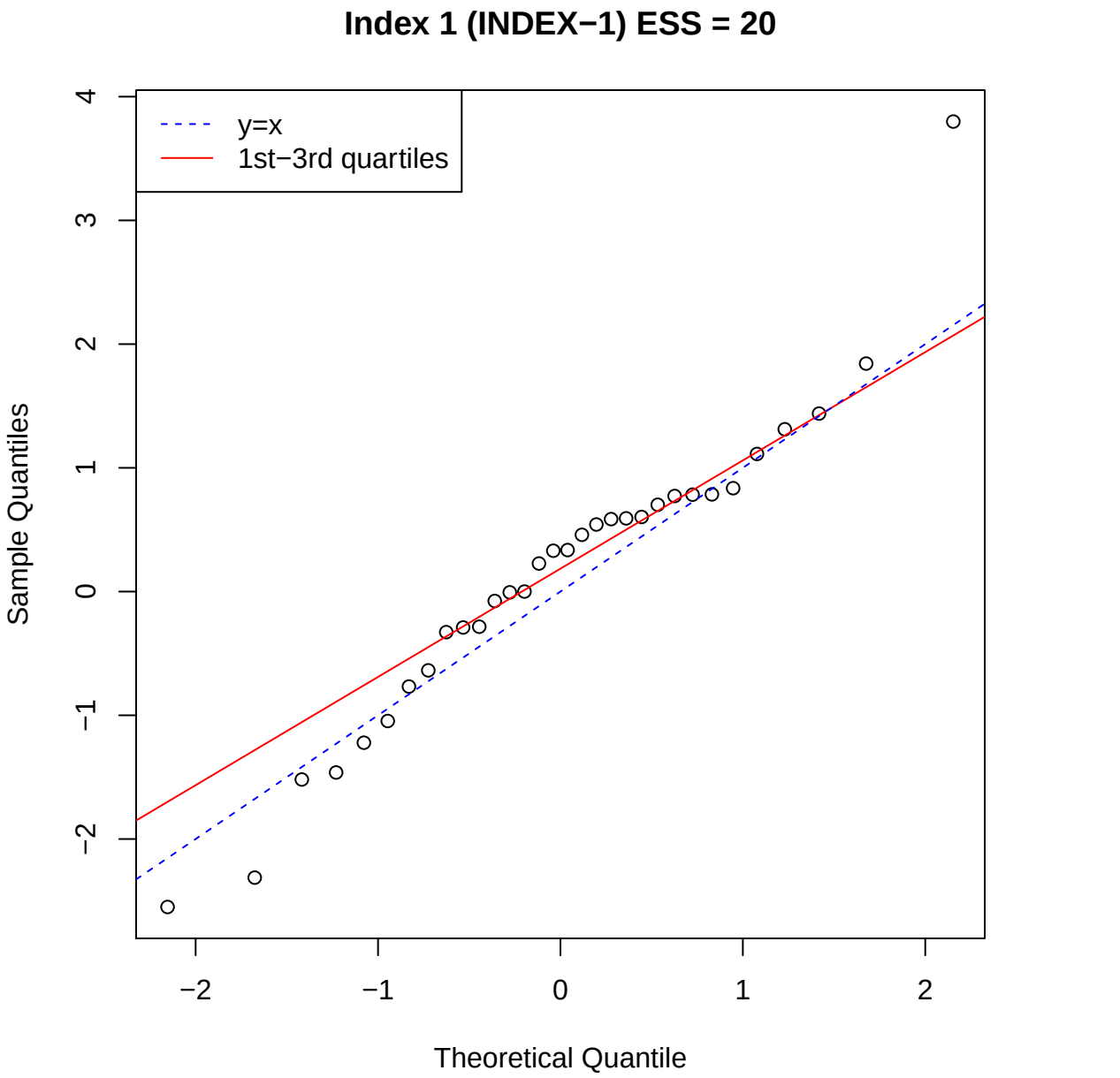

Age Comp Residuals for Index 3 (INDEX−3)
Neg.
Pos.
Max(resid)=3.63
0.34
0.63
1.07
Pearson Residuals (Obs−Pred)/SQRT(Pred*(1−Pred)/NESS)
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
1
2
3
4
5
6
Age
Mean resid = 0.01 SD(resid) = 1.07

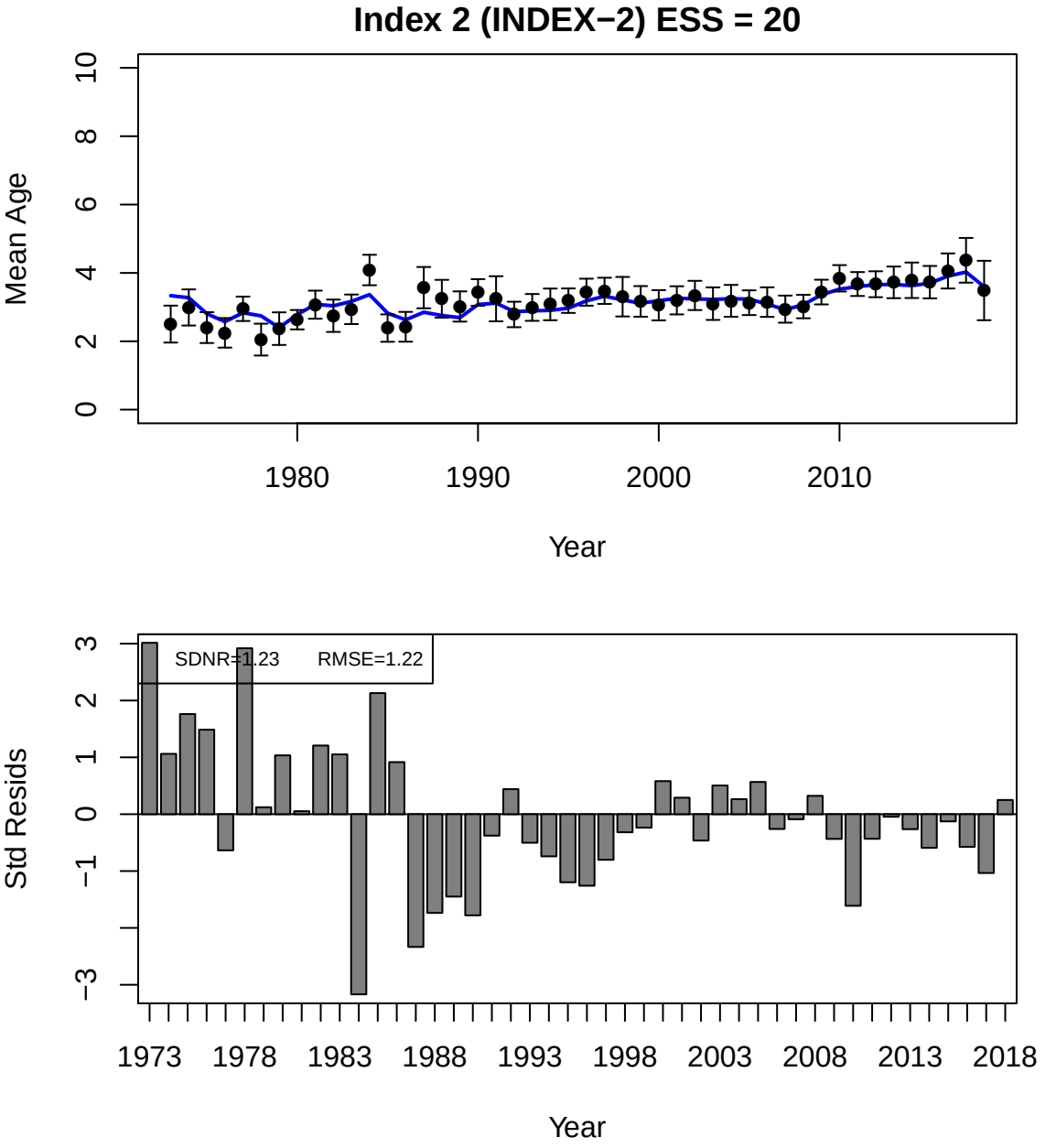

Index Neff 1 (INDEX−1)
Effective Sample Size
0
100
200
300
400
1980
1990
2000
2010
Year

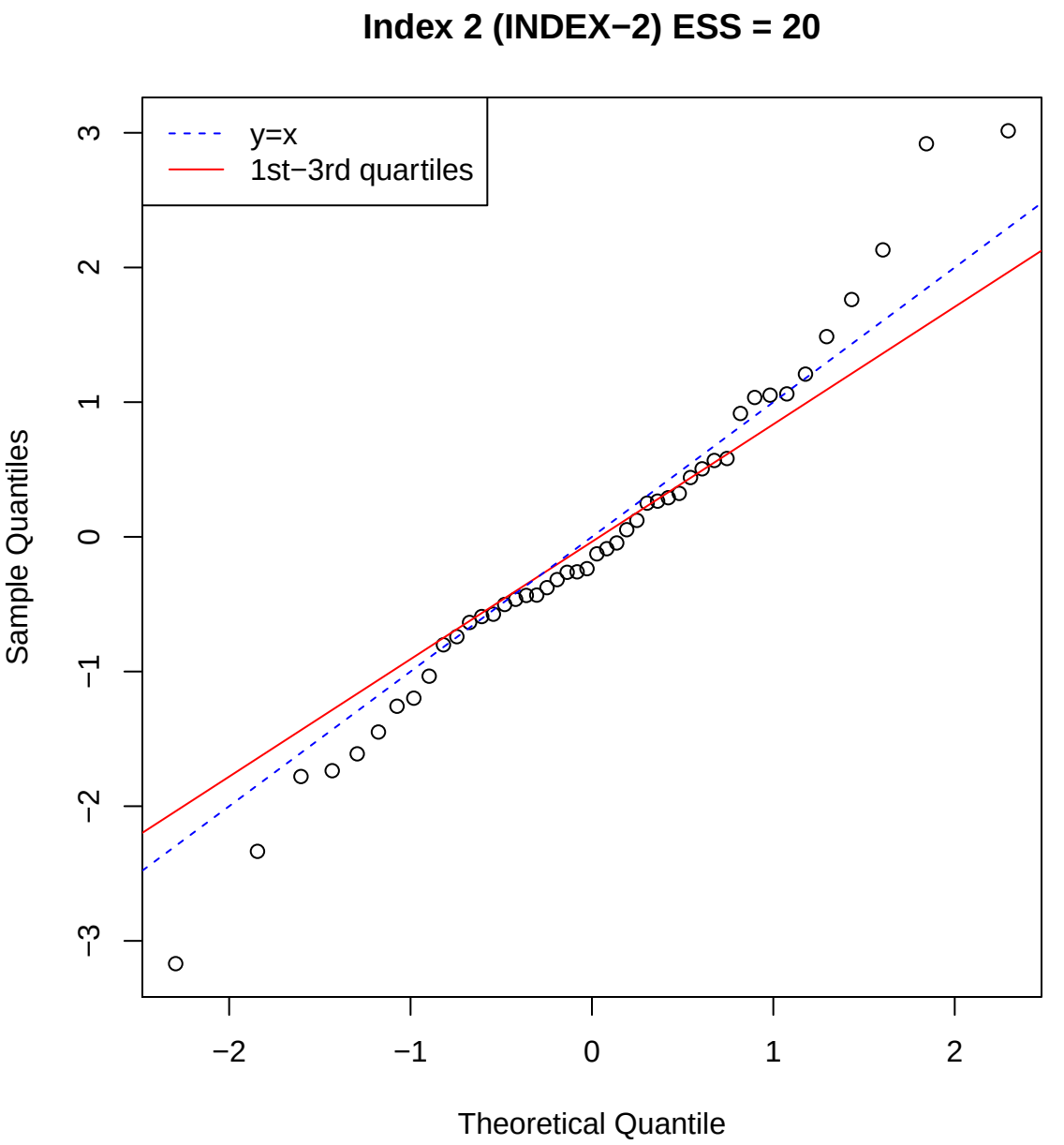

Index Neff 2 (INDEX−2)
Effective Sample Size
0
50
100
150
200
1980
1990
2000
2010
Year

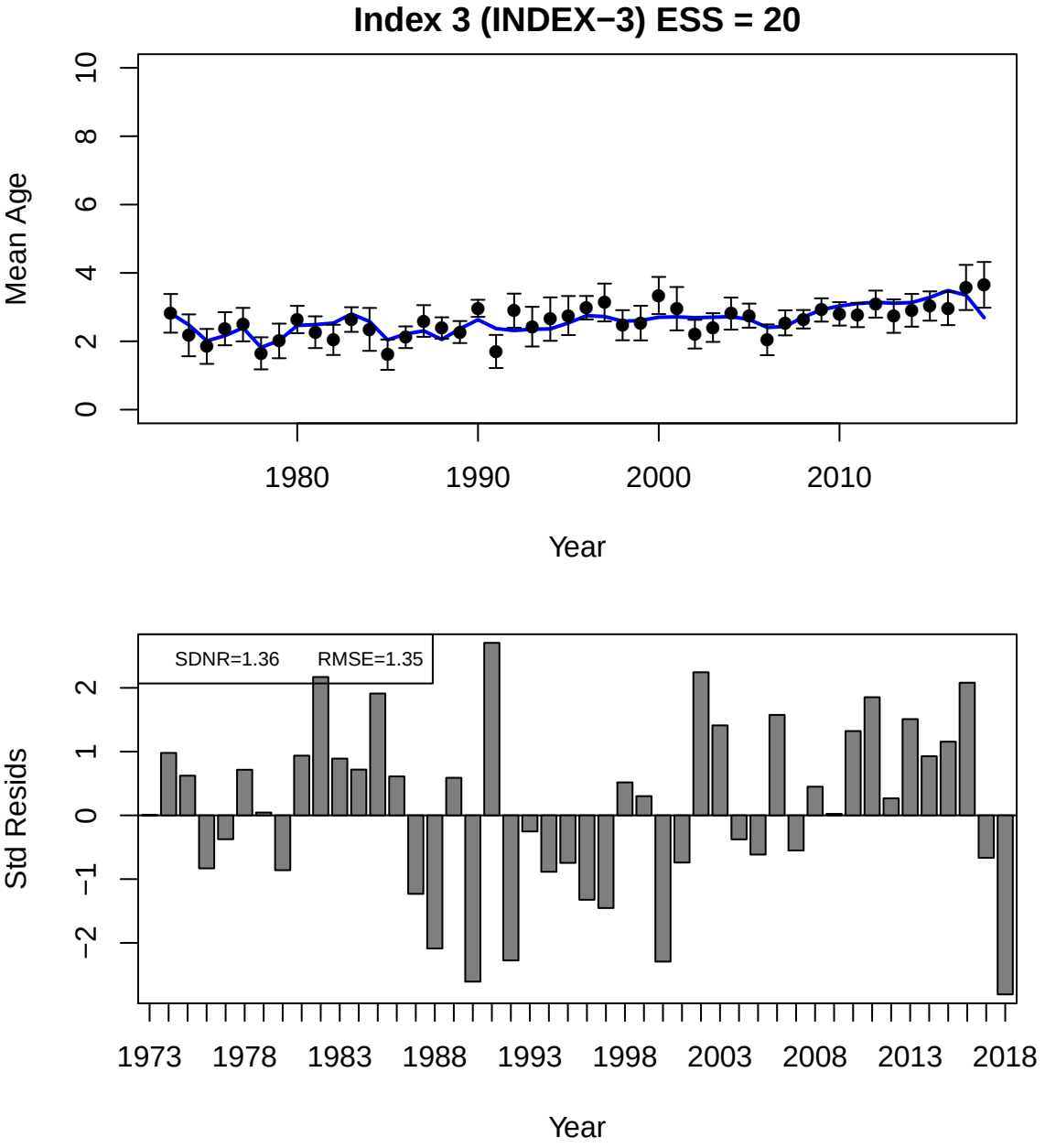

Index Neff 3 (INDEX−3)
Effective Sample Size
0
50
100
150
1980
1990
2000
2010
Year

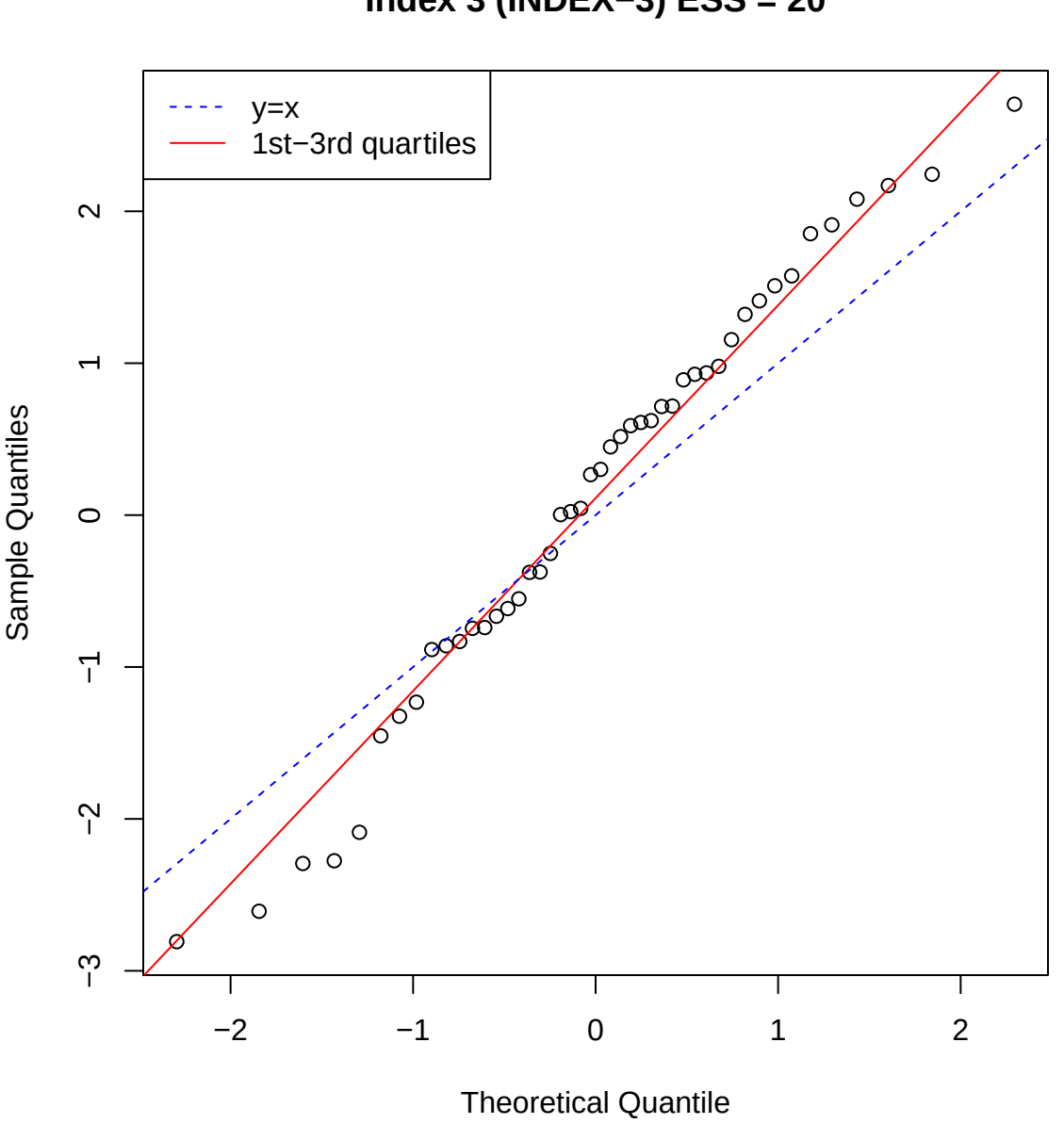

Index 1 (INDEX−1) ESS = 20
Mean Age
0
2
4
6
8
10
1990
1995
2000
2005
2010
2015
Year
SDNR=1.23
RMSE=1.22
Std Resids
−2
0
1
2
3
1987
1991
1995
1999
2003
2007
2011
2015
Year

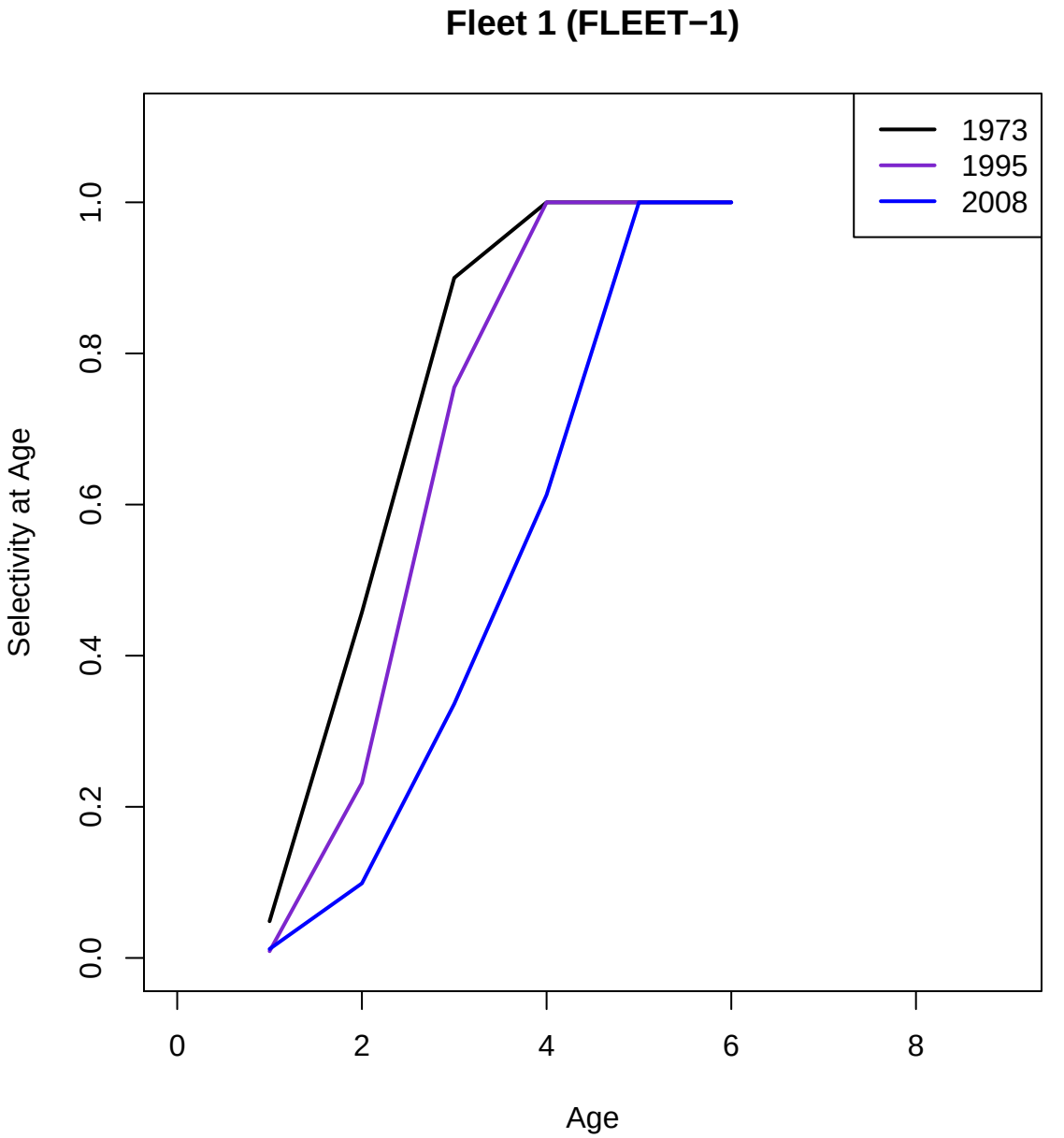

Index 1 (INDEX−1) ESS = 20
y=x
1st−3rd quartiles
Sample Quantiles
Theoretical Quantile
4
3
2
1
0
−1
−2
−2
−1
0
1
2

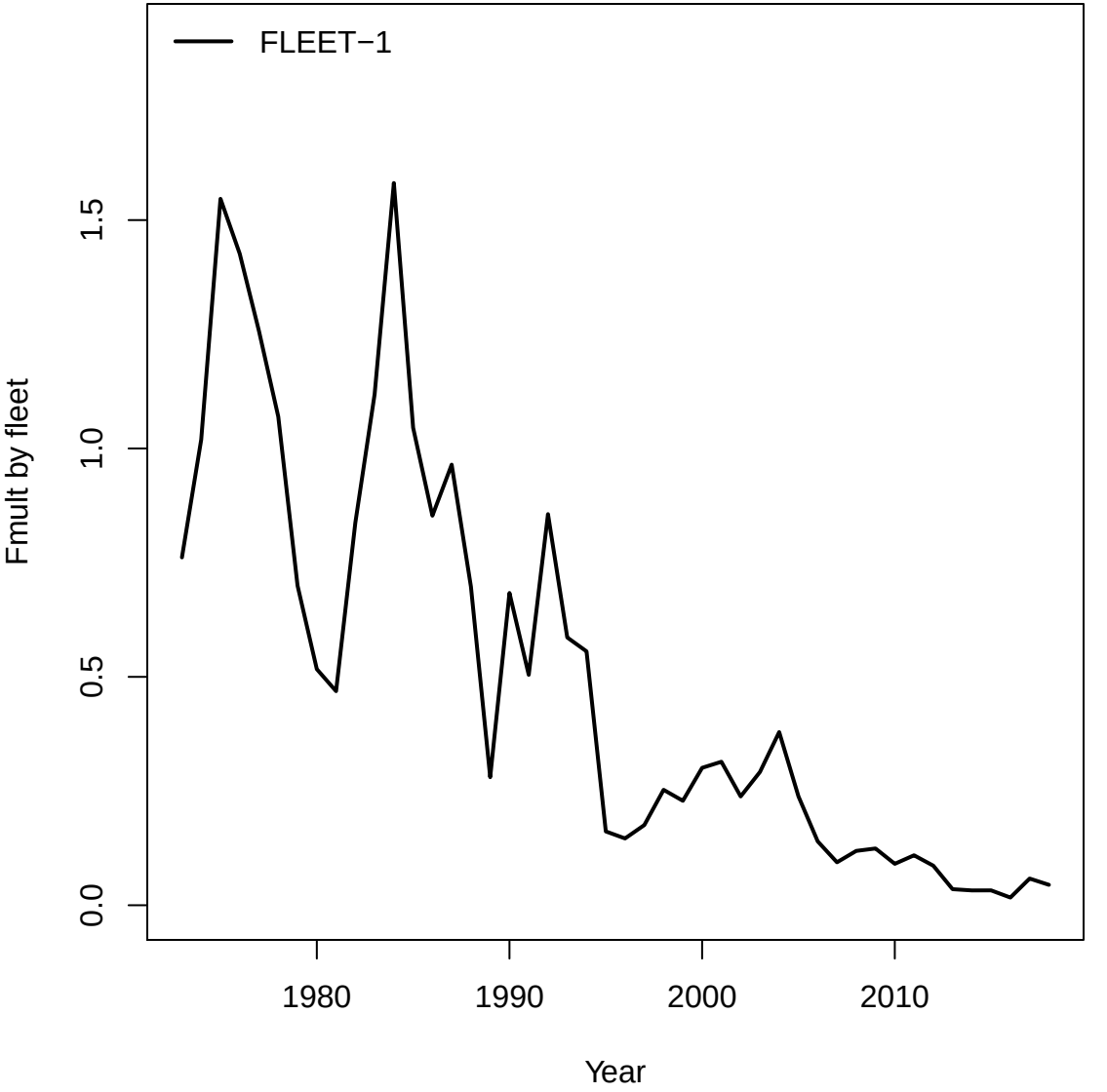

Index 2 (INDEX−2) ESS = 20
Mean Age
0
2
4
6
8
10
1980
1990
2000
2010
Year
SDNR=1.23
RMSE=1.22
Std Resids
−3
−1
0
1
2
3
1973
1978
1983
1988
1993
1998
2003
2008
2013
2018
Year

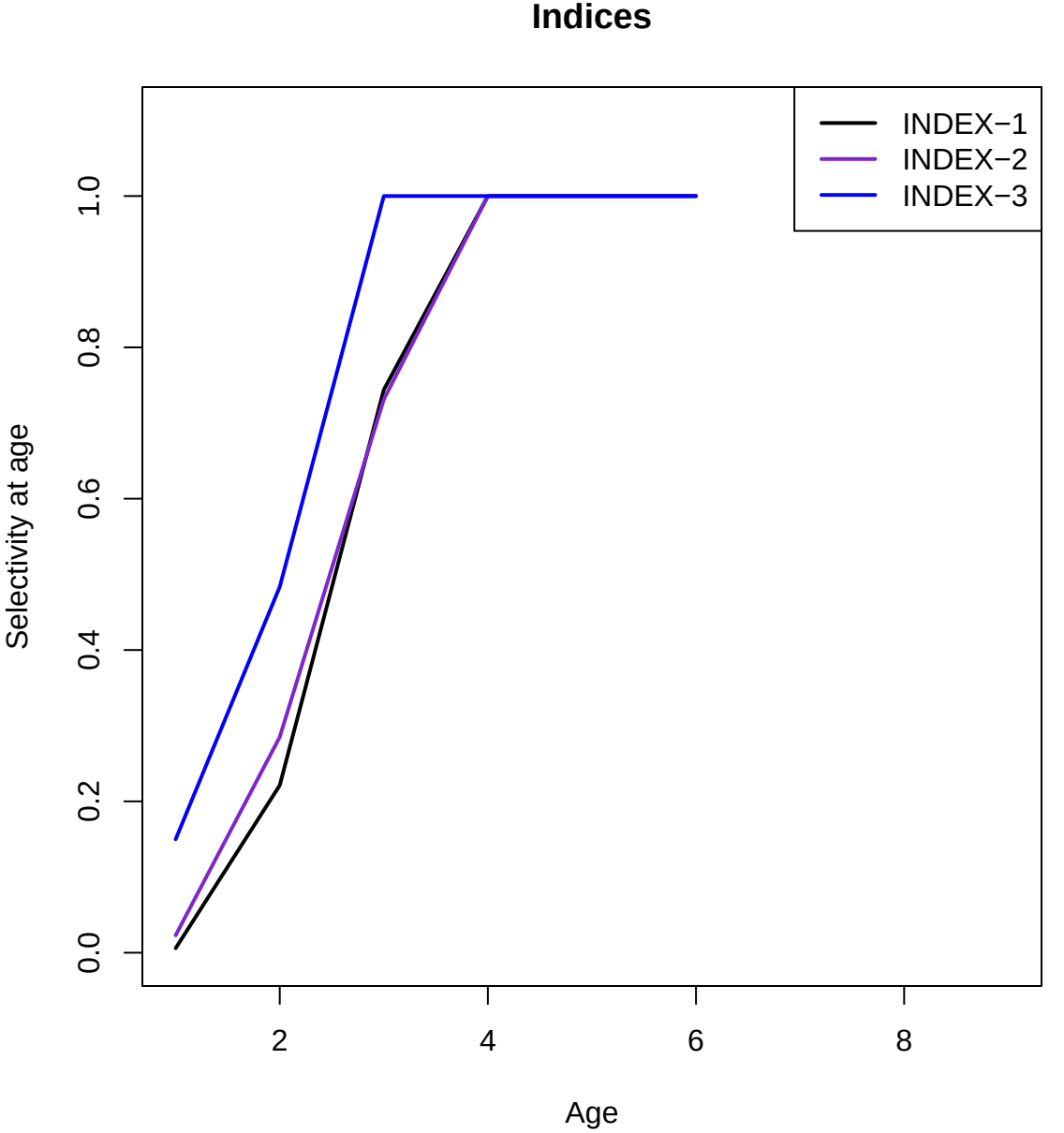

Index 2 (INDEX−2) ESS = 20
y=x
1st−3rd quartiles
Sample Quantiles
Theoretical Quantile
3
2
1
0
−1
−2
−3
−2
−1
0
1
2

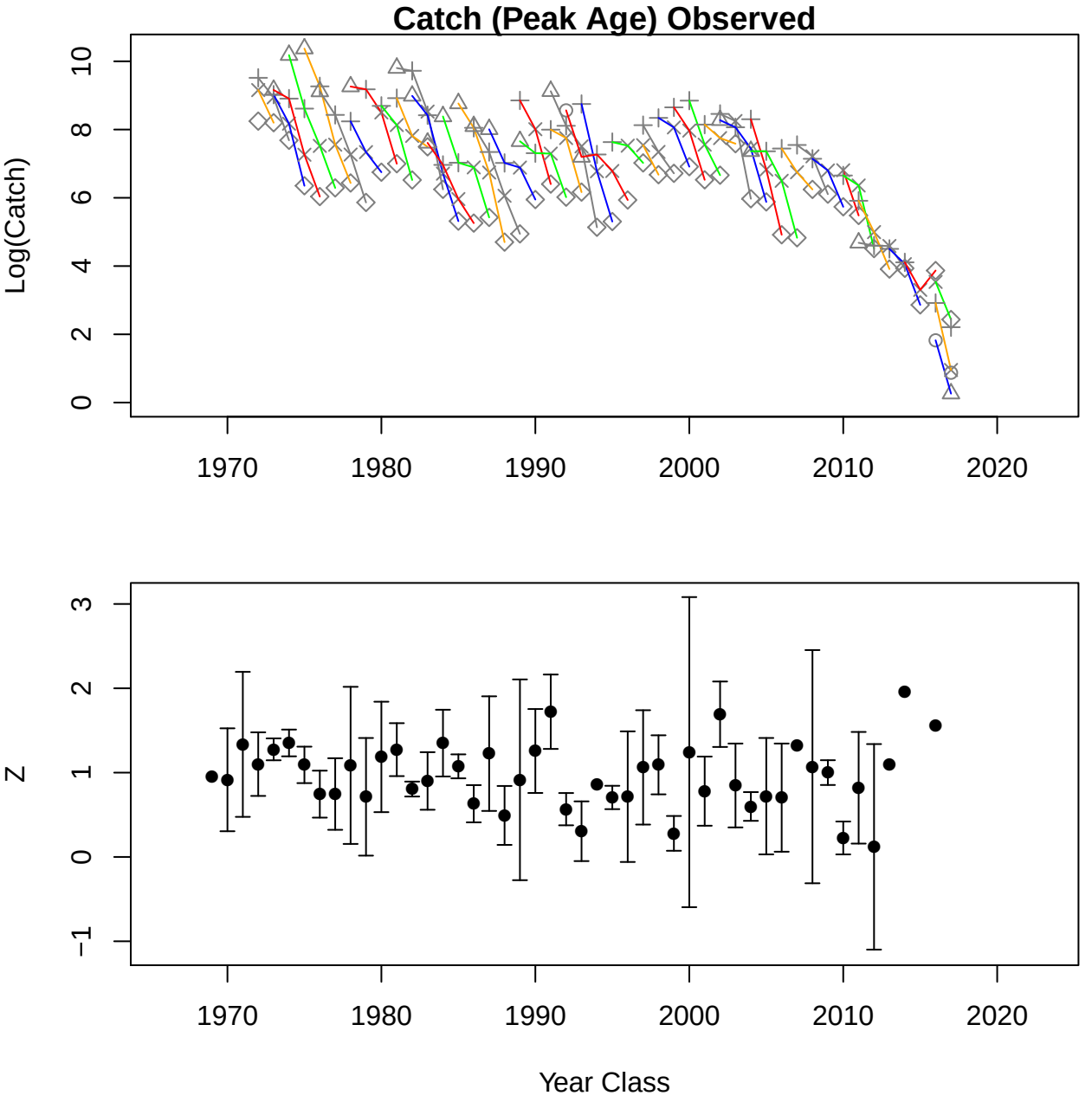

Index 3 (INDEX−3) ESS = 20
Mean Age
0
2
4
6
8
10
1980
1990
2000
2010
Year
SDNR=1.36
RMSE=1.35
Std Resids
−2
−1
0
1
2
1973
1978
1983
1988
1993
1998
2003
2008
2013
2018
Year

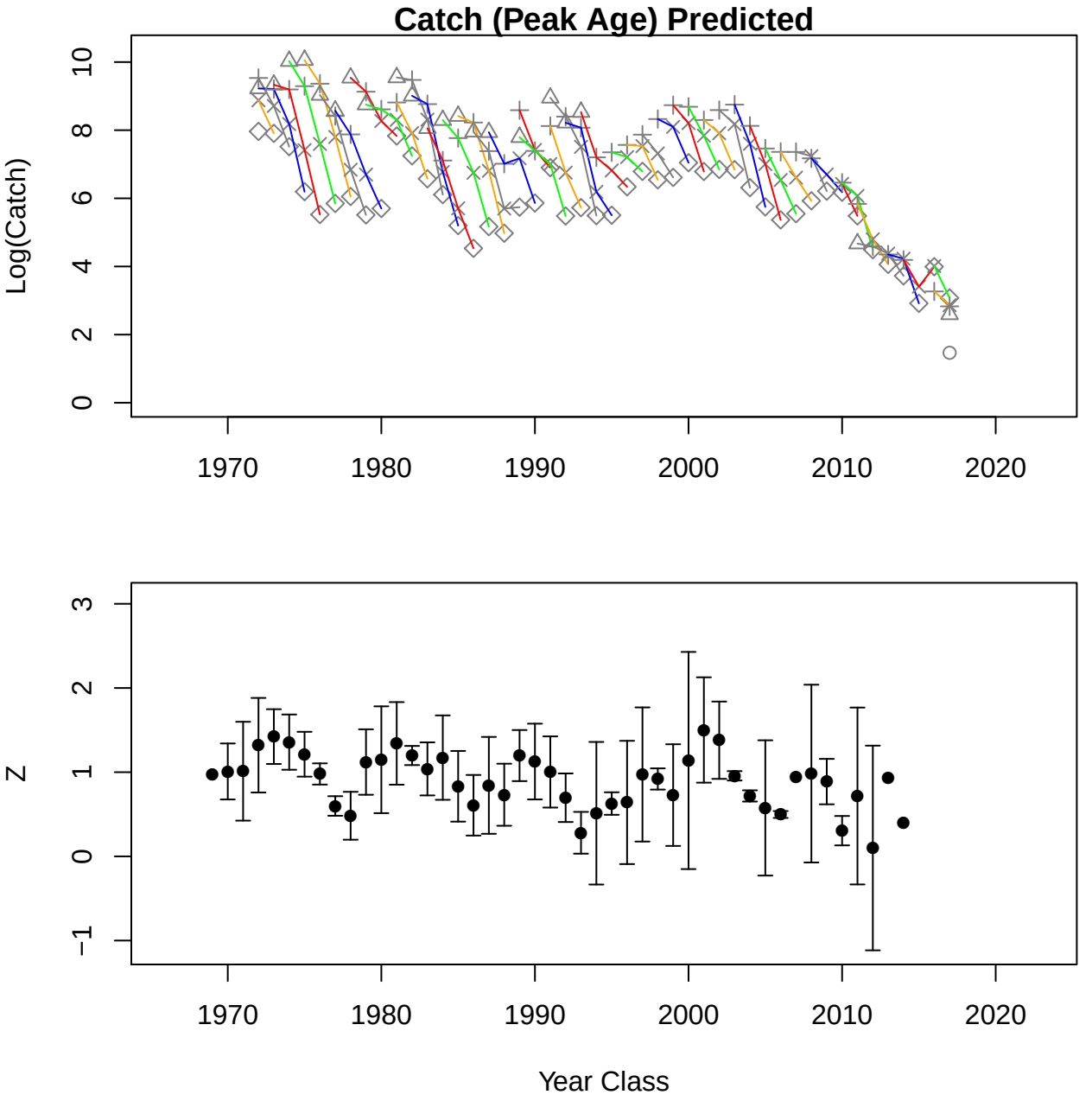

Index 3 (INDEX−3) ESS = 20
y=x
1st−3rd quartiles
Sample Quantiles
Theoretical Quantile
−3
−2
−1
0
1
2
−2
−1
0
1
2

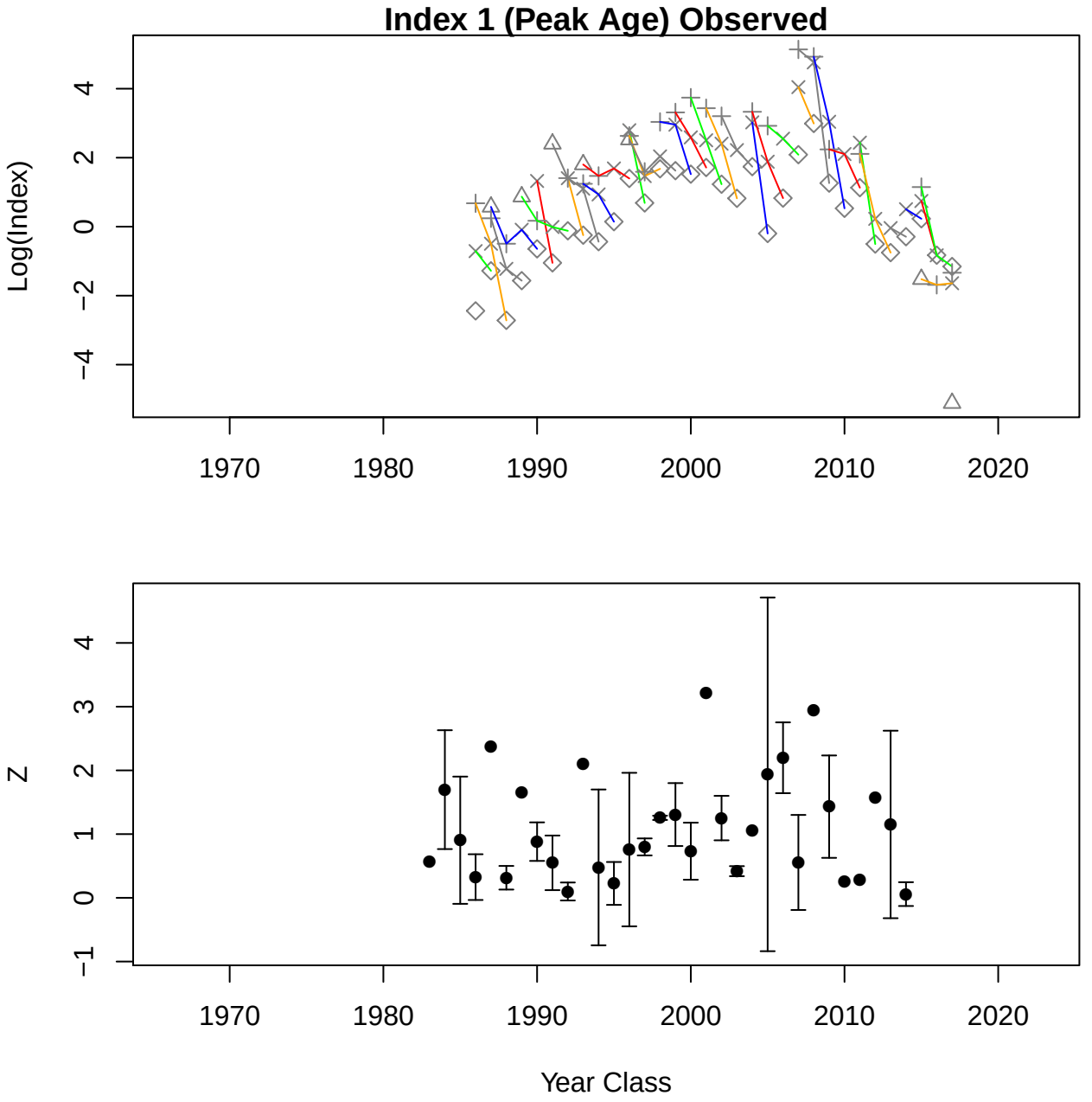

Fleet 1 (FLEET−1)
1973
1995
2008
Selectivity at Age
0.0
0.2
0.4
0.6
0.8
1.0
0
2
4
6
8
Age

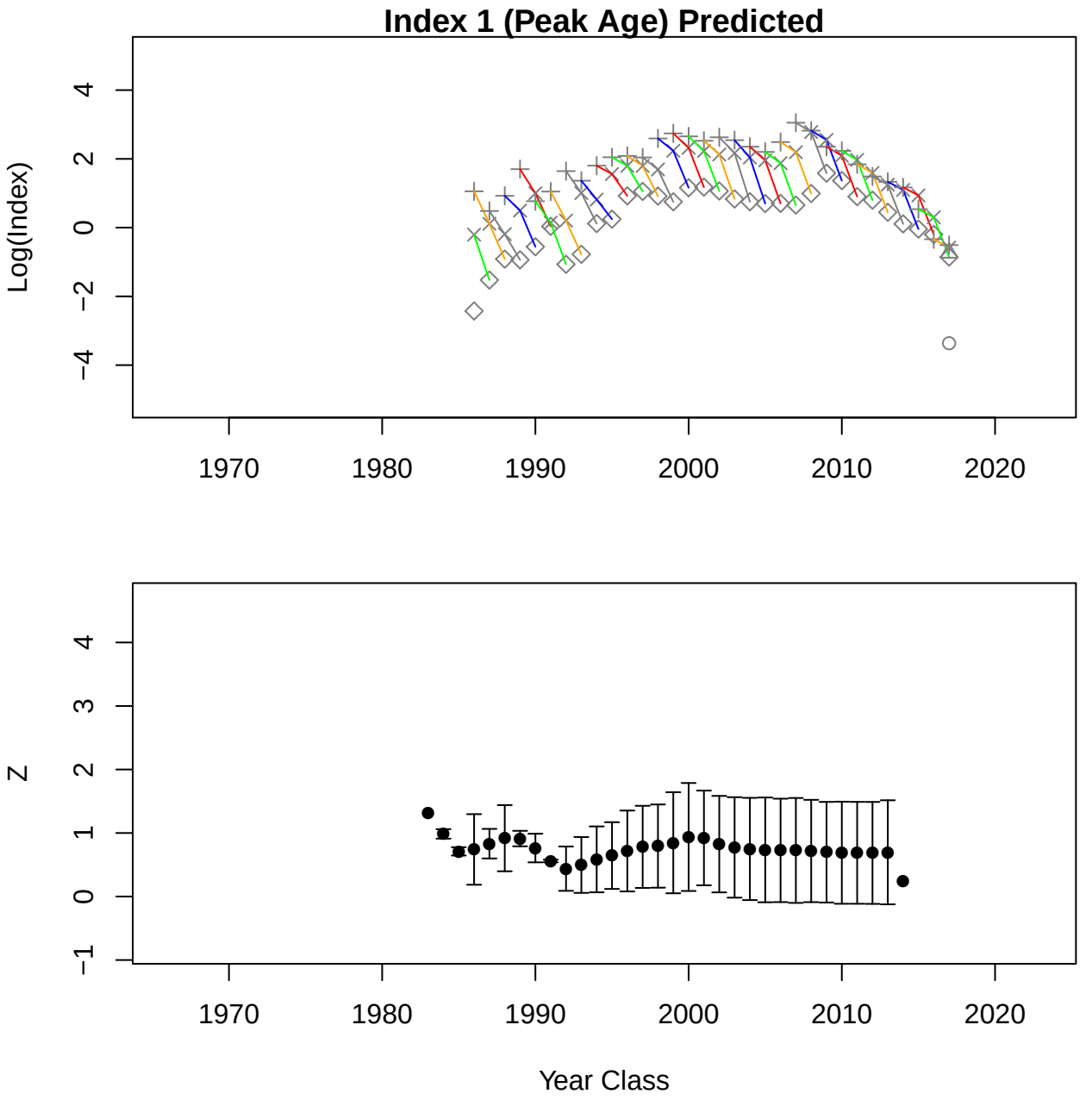

FLEET−1
Fmult by fleet
0.0
0.5
1.0
1.5
1980
1990
2000
2010
Year

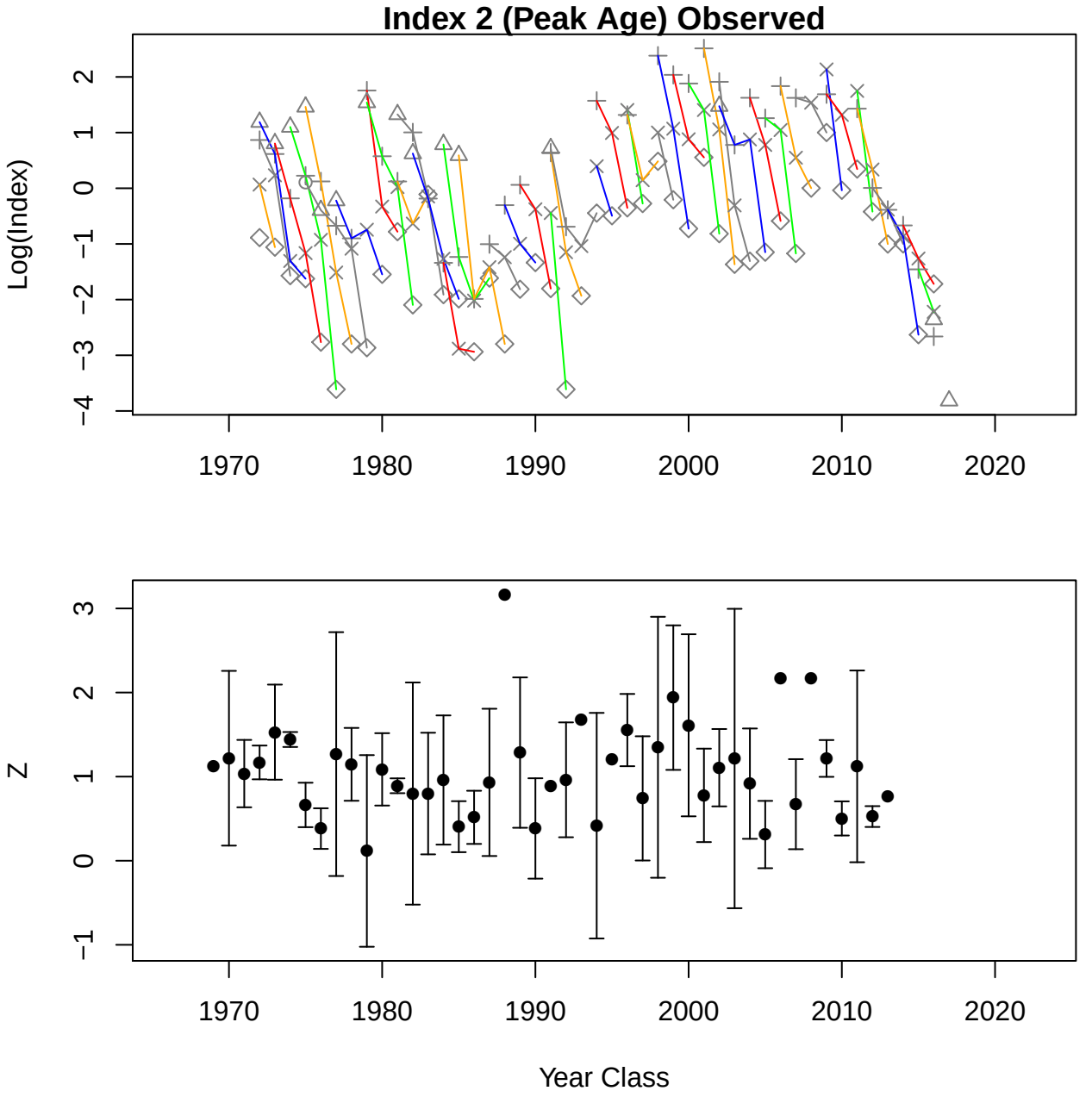

Indices
INDEX−1
INDEX−2
INDEX−3
Selectivity at age
0.0
0.2
0.4
0.6
0.8
1.0
2
4
6
8
Age

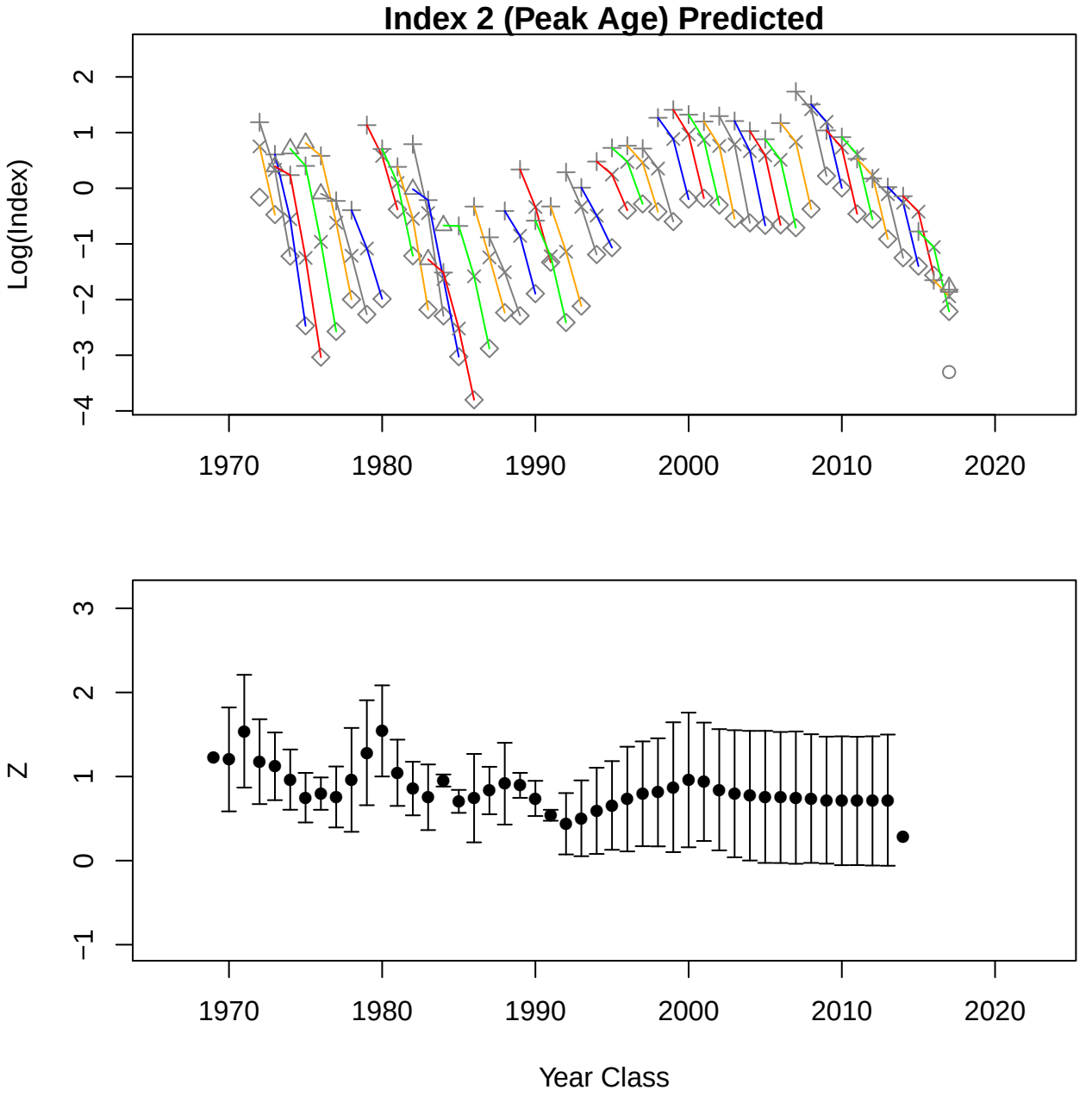

Catch (Peak Age) Observed
Log(Catch)
0
2
4
6
8
10
1970
1980
1990
2000
2010
2020
Z
−1
0
1
2
3
1970
1980
1990
2000
2010
2020
Year Class

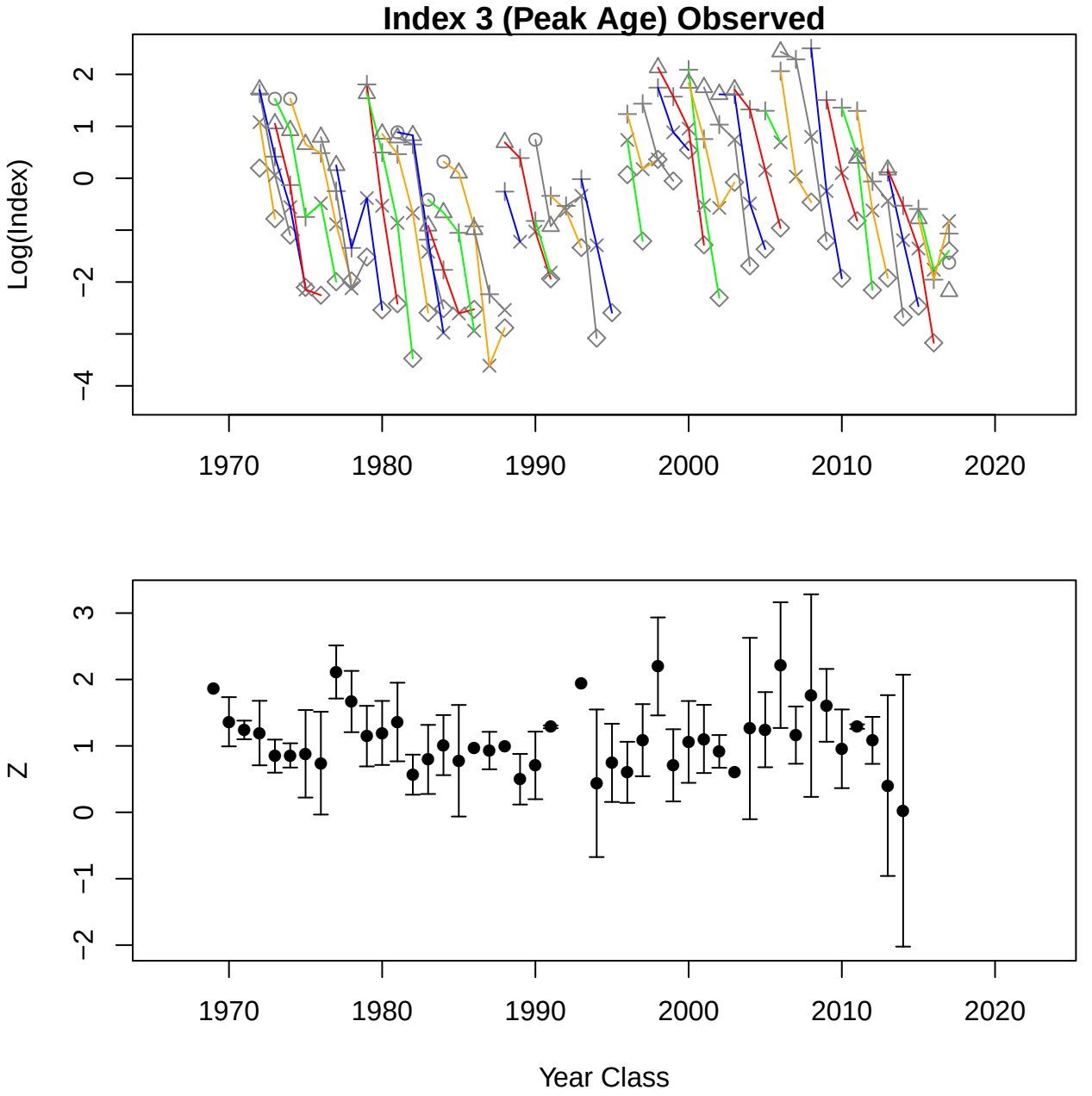

Catch (Peak Age) Predicted
Log(Catch)
0
2
4
6
8
10
1970
1980
1990
2000
2010
2020
Z
−1
0
1
2
3
1970
1980
1990
2000
2010
2020
Year Class

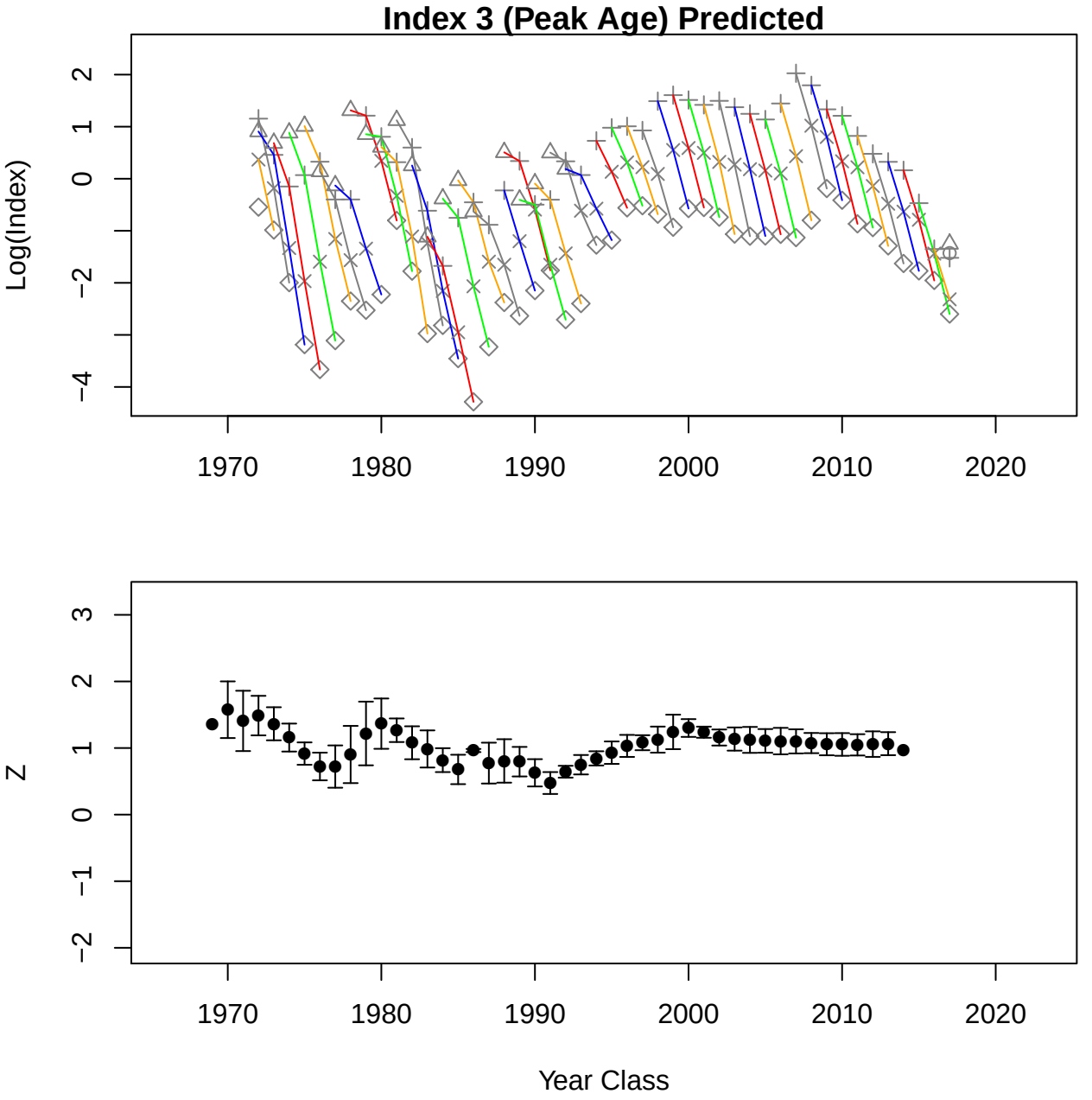

Index 1 (Peak Age) Observed
Log(Index)
4
2
0
−2
−4
1970
1980
1990
2000
2010
2020
Z
4
3
2
1
0
−1
1970
1980
1990
2000
2010
2020
Year Class

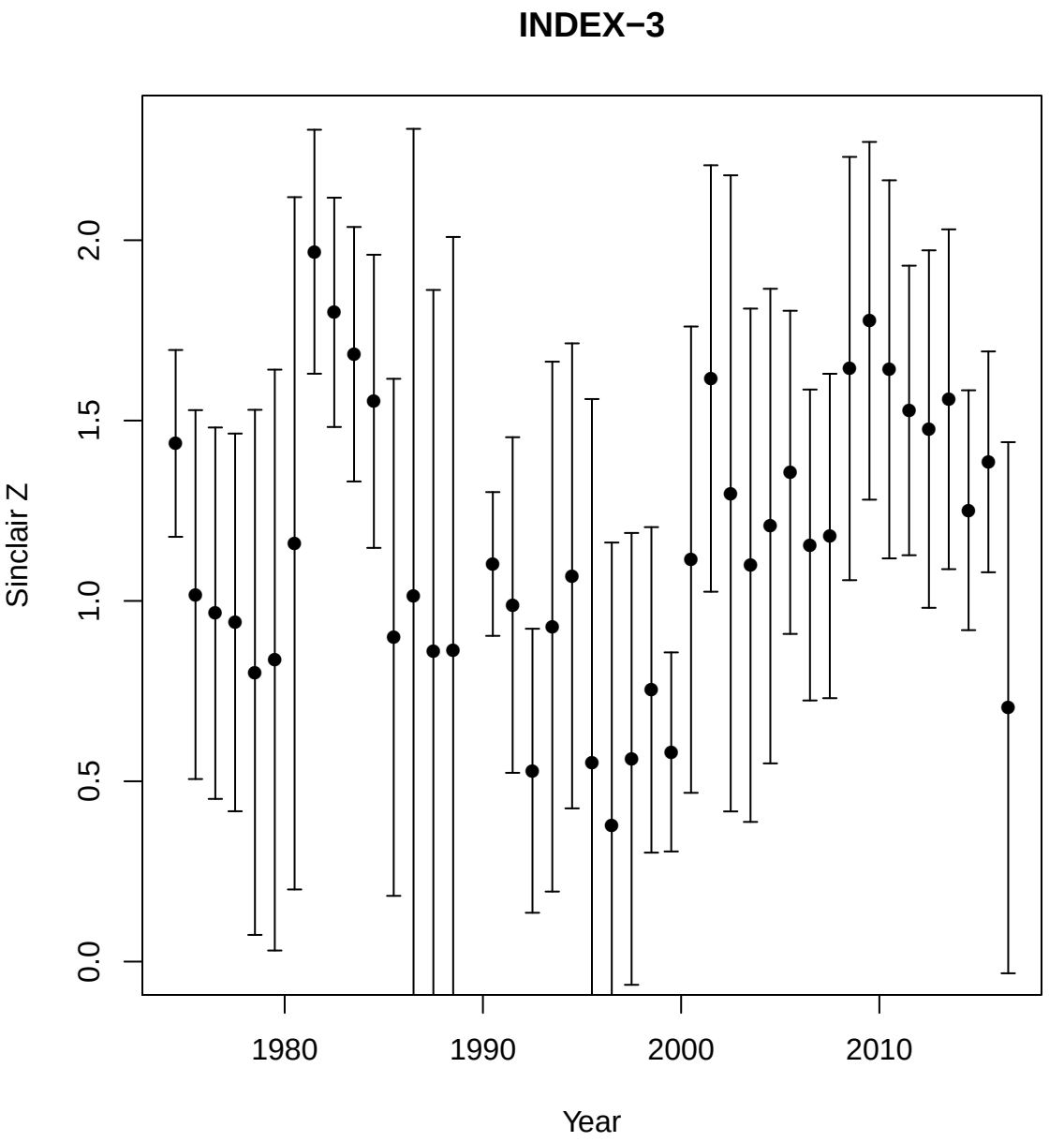

Index 1 (Peak Age) Predicted
Log(Index)
4
2
0
−2
−4
1970
1980
1990
2000
2010
2020
Z
4
3
2
1
0
−1
1970
1980
1990
2000
2010
2020
Year Class

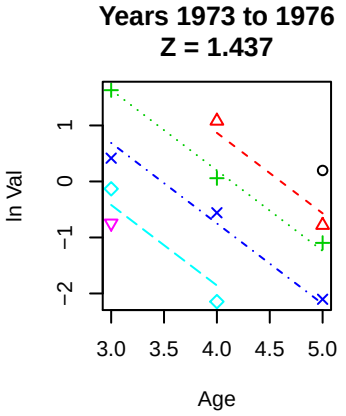

Index 2 (Peak Age) Observed
Log(Index)
2
1
0
−1
−2
−3
−4
1970
1980
1990
2000
2010
2020
Z
3
2
1
0
−1
1970
1980
1990
2000
2010
2020
Year Class

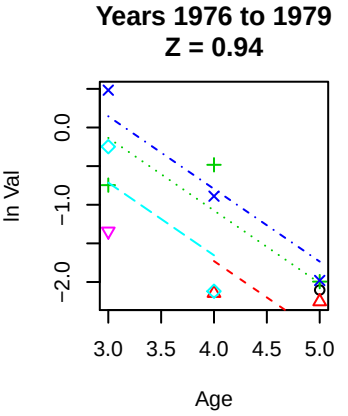

Index 2 (Peak Age) Predicted
Log(Index)
2
1
0
−1
−2
−3
−4
1970
1980
1990
2000
2010
2020
Z
3
2
1
0
−1
1970
1980
1990
2000
2010
2020
Year Class

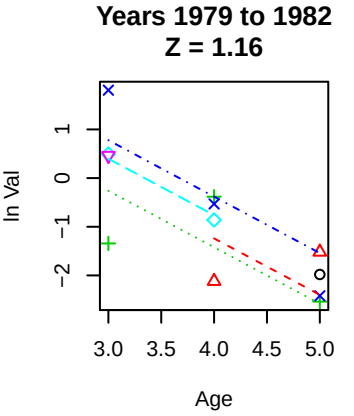

Index 3 (Peak Age) Observed
Log(Index)
2
1
0
−2
−4
1970
1980
1990
2000
2010
2020
Z
3
2
1
0
−1
−2
1970
1980
1990
2000
2010
2020
Year Class

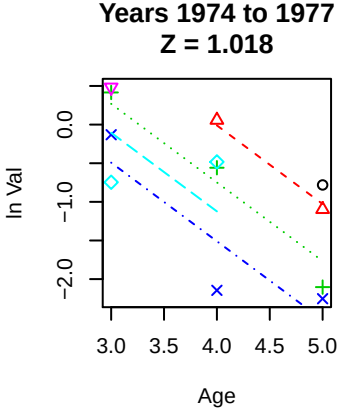

Index 3 (Peak Age) Predicted
Log(Index)
2
1
0
−2
−4
1970
1980
1990
2000
2010
2020
Z
3
2
1
0
−1
−2
1970
1980
1990
2000
2010
2020
Year Class

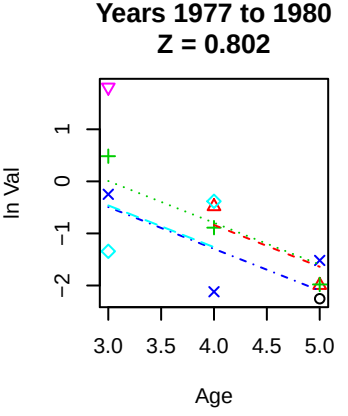

INDEX−3
Sinclair Z
0.0
0.5
1.0
1.5
2.0
1980
1990
2000
2010
Year

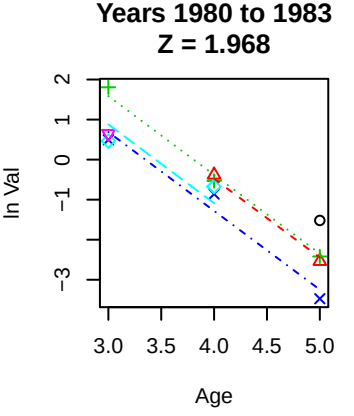

Years 1973 to 1976
Z = 1.437
ln Val
Age

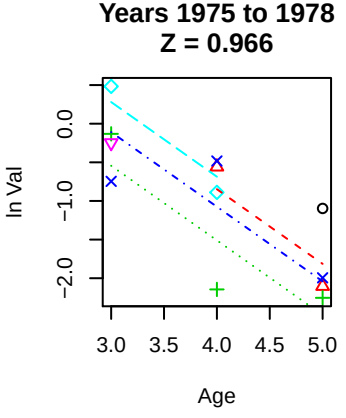

Years 1976 to 1979
Z = 0.94
ln Val
Age

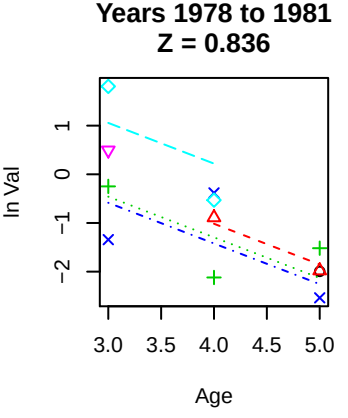

Years 1979 to 1982
Z = 1.16
ln Val
Age

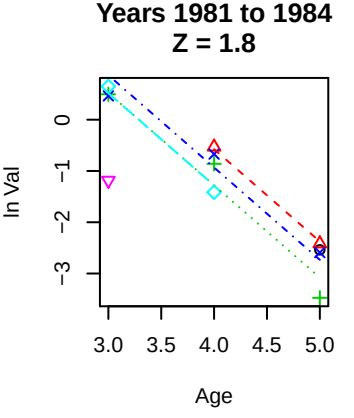

Years 1974 to 1977
Z = 1.018
ln Val
Age

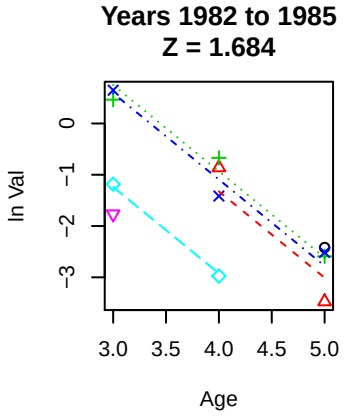

Years 1977 to 1980
Z = 0.802
ln Val
Age

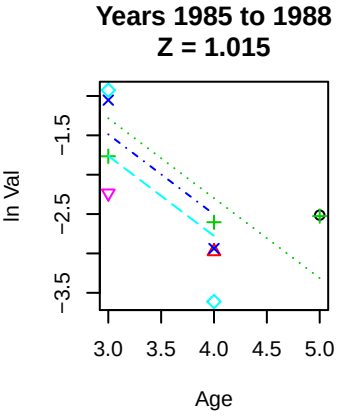

Years 1980 to 1983
Z = 1.968
ln Val
Age

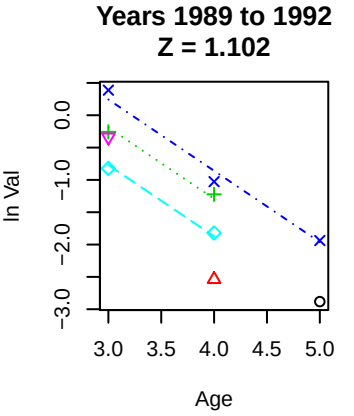

Years 1975 to 1978
Z = 0.966
ln Val
Age

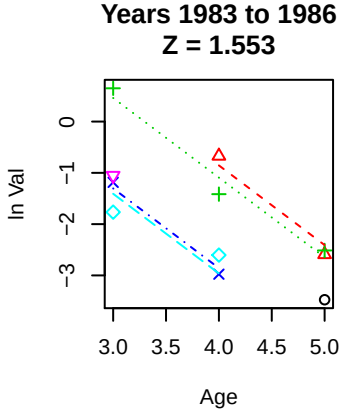

Years 1978 to 1981
Z = 0.836
ln Val
Age

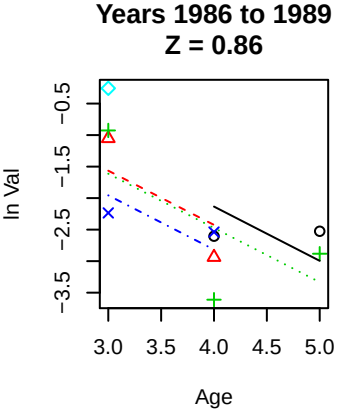

Years 1981 to 1984
Z = 1.8
ln Val
Age

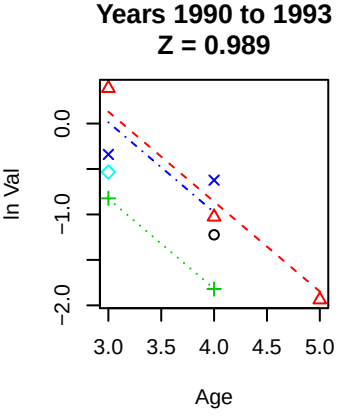

Years 1982 to 1985
Z = 1.684
ln Val
Age

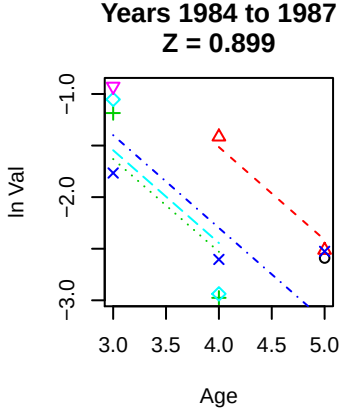

Years 1985 to 1988
Z = 1.015
ln Val
Age

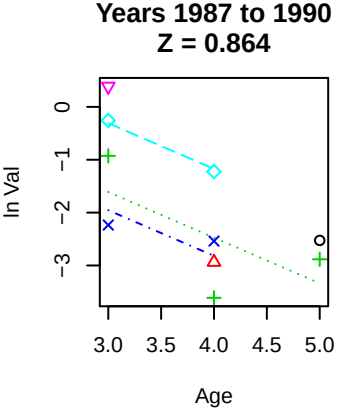

Years 1989 to 1992
Z = 1.102
ln Val
Age

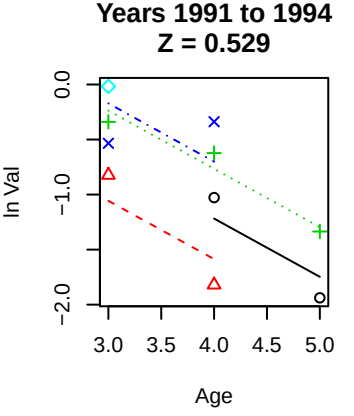

Years 1983 to 1986
Z = 1.553
ln Val
Age

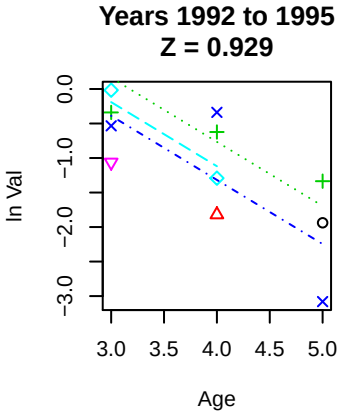

Years 1986 to 1989
Z = 0.86
ln Val
Age

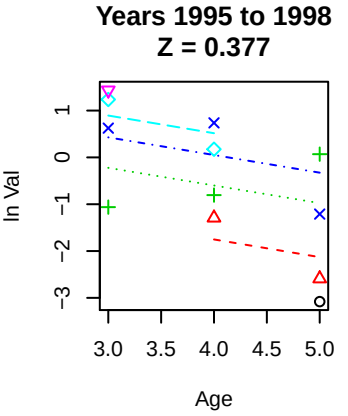

Years 1990 to 1993
Z = 0.989
ln Val
Age

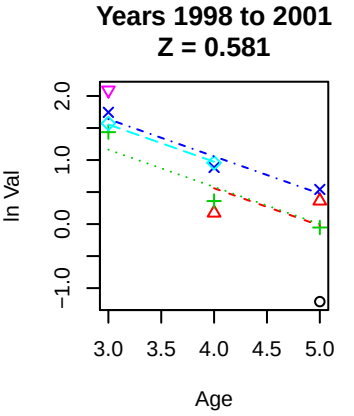

Years 1984 to 1987
Z = 0.899
ln Val
Age

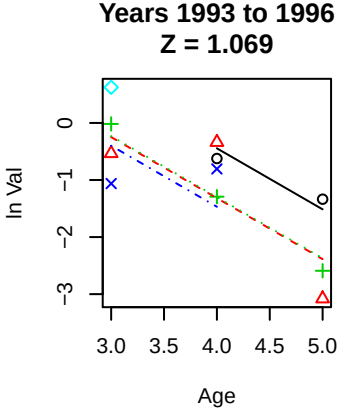

Years 1987 to 1990
Z = 0.864
ln Val
Age

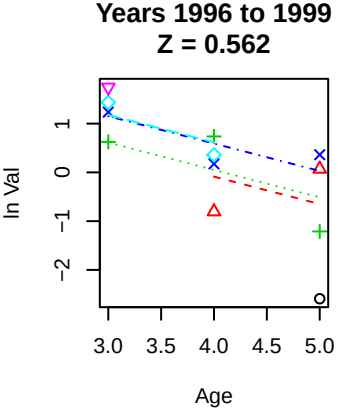

Years 1991 to 1994
Z = 0.529
ln Val
Age

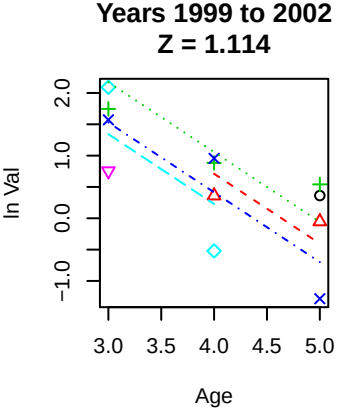

Years 1992 to 1995
Z = 0.929
ln Val
Age

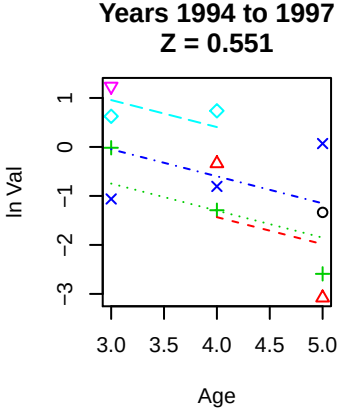

Years 1995 to 1998
Z = 0.377
ln Val
Age

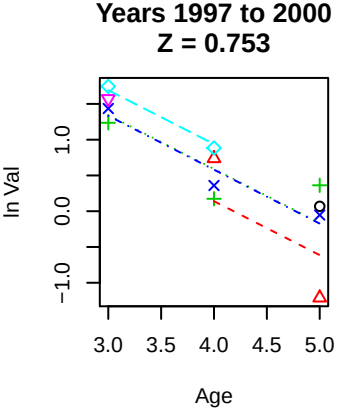

Years 1998 to 2001
Z = 0.581
ln Val
Age

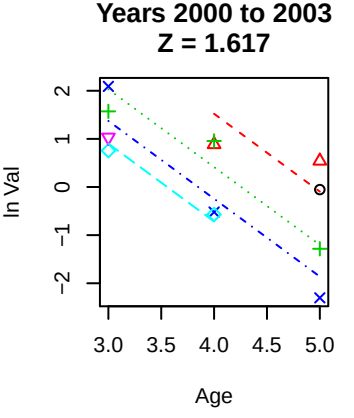

Years 1993 to 1996
Z = 1.069
ln Val
Age

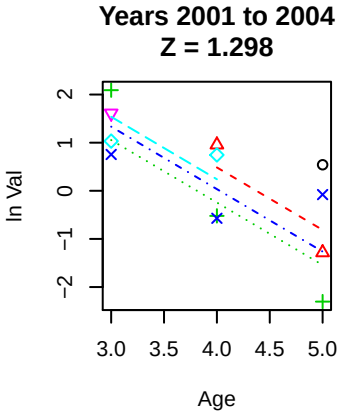

Years 1996 to 1999
Z = 0.562
ln Val
Age

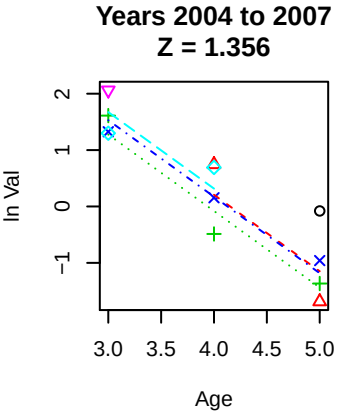

Years 1999 to 2002
Z = 1.114
ln Val
Age

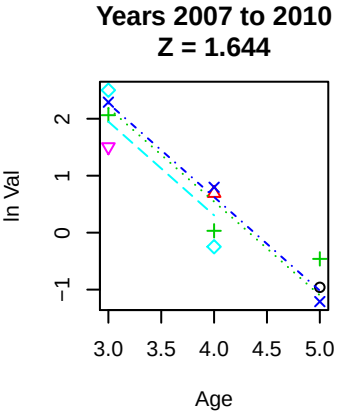

Years 1994 to 1997
Z = 0.551
ln Val
Age

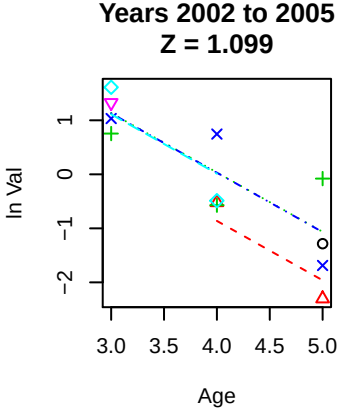

Years 1997 to 2000
Z = 0.753
ln Val
Age

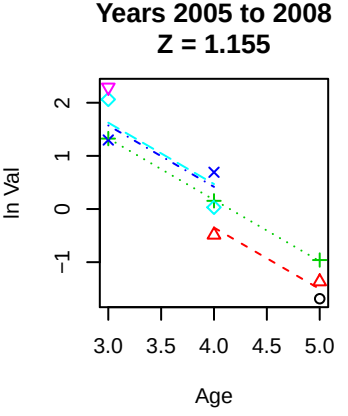

Years 2000 to 2003
Z = 1.617
ln Val
Age

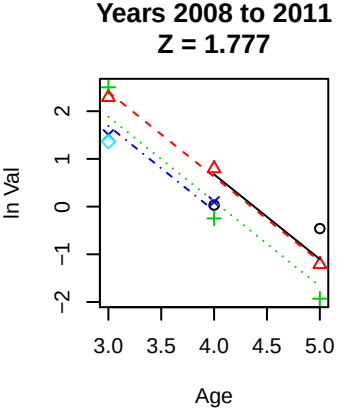

Years 2001 to 2004
Z = 1.298
ln Val
Age

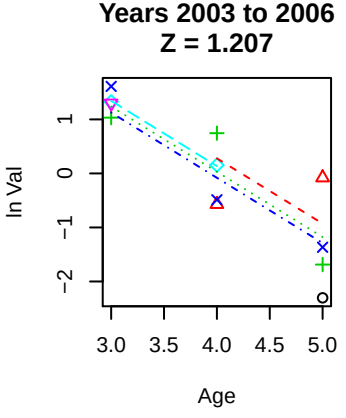

Years 2004 to 2007
Z = 1.356
ln Val
Age

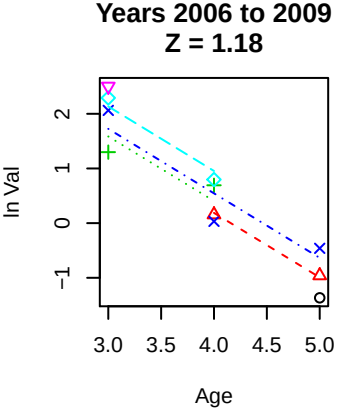

Years 2007 to 2010
Z = 1.644
ln Val
Age

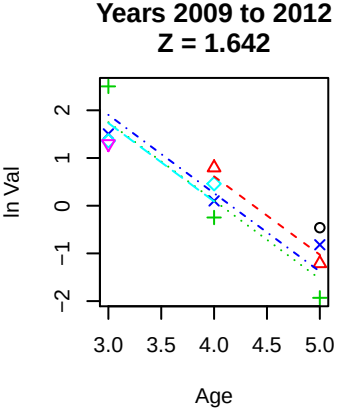

Years 2002 to 2005
Z = 1.099
ln Val
Age

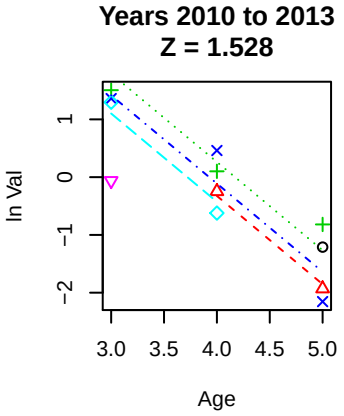

Years 2005 to 2008
Z = 1.155
ln Val
Age

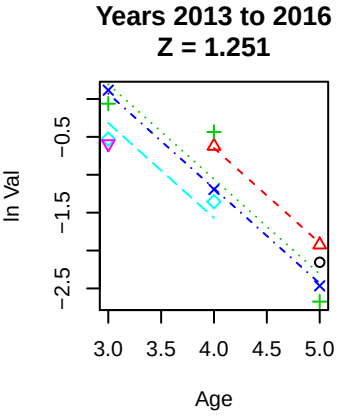

Years 2008 to 2011
Z = 1.777
ln Val
Age

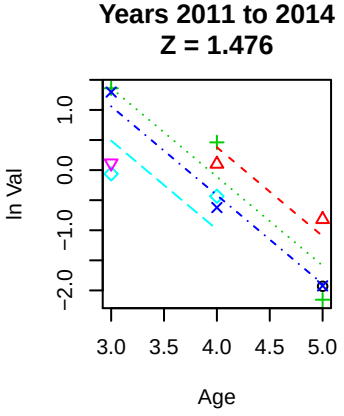

Years 2003 to 2006
Z = 1.207
ln Val
Age

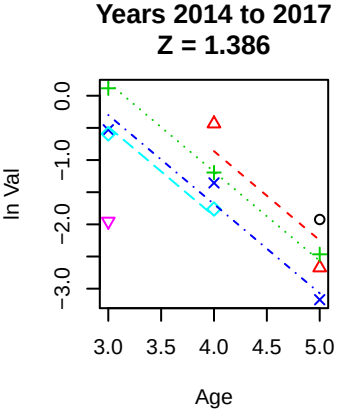

Years 2006 to 2009
Z = 1.18
ln Val
Age

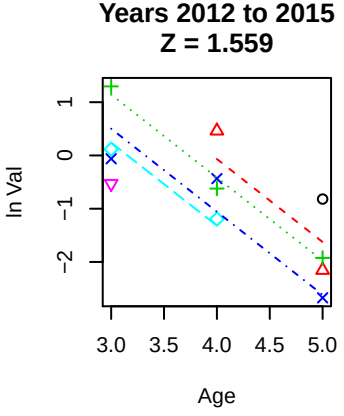

Years 2009 to 2012
Z = 1.642
ln Val
Age

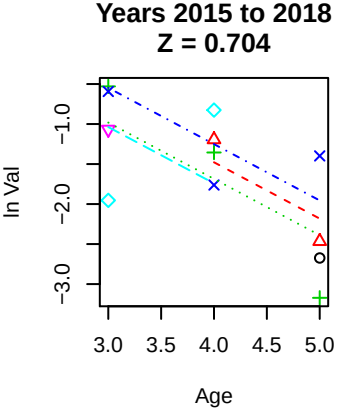

Years 2010 to 2013
Z = 1.528
ln Val
Age

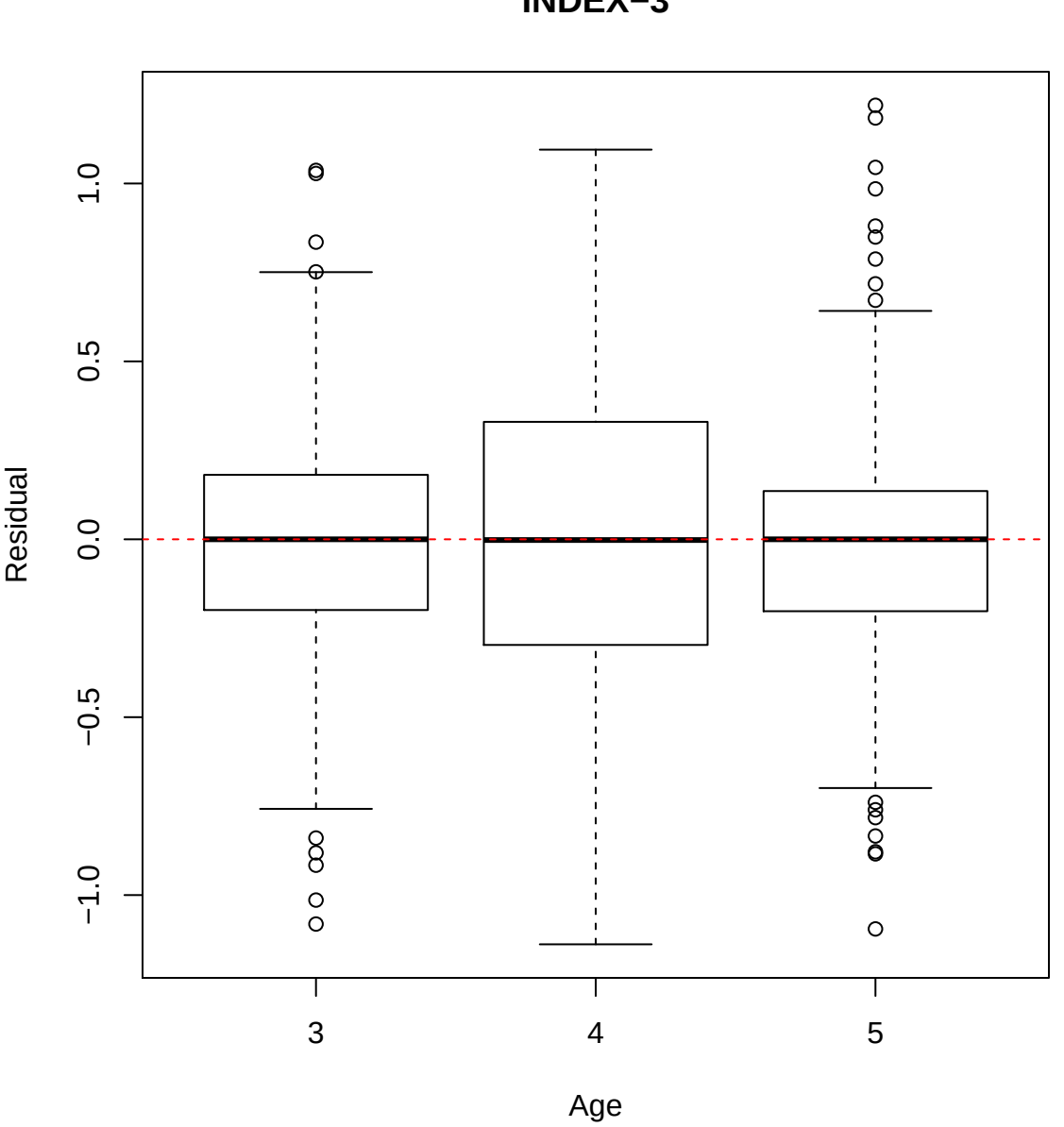

Years 2013 to 2016
Z = 1.251
ln Val
Age

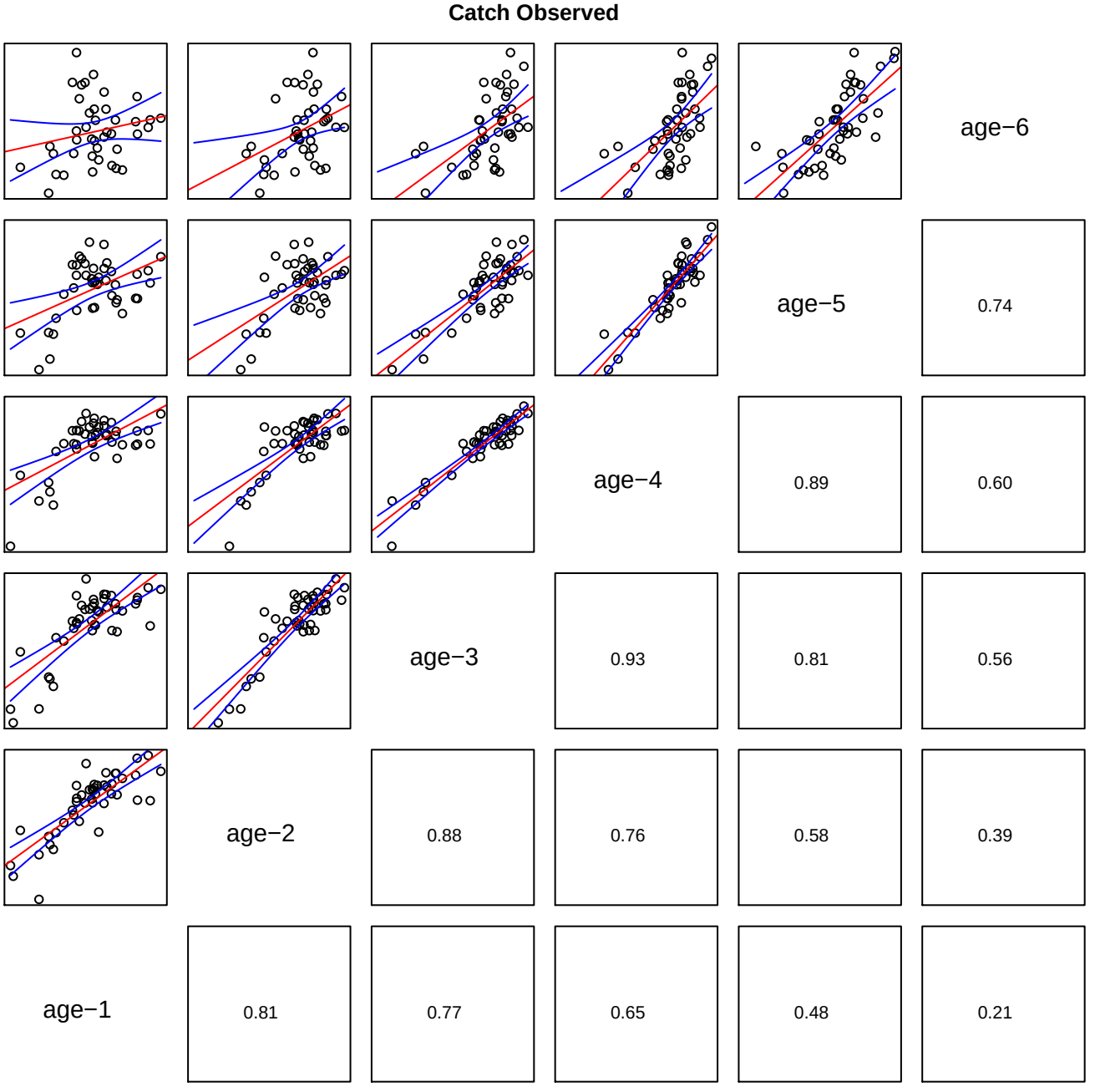

Years 2011 to 2014
Z = 1.476
ln Val
Age

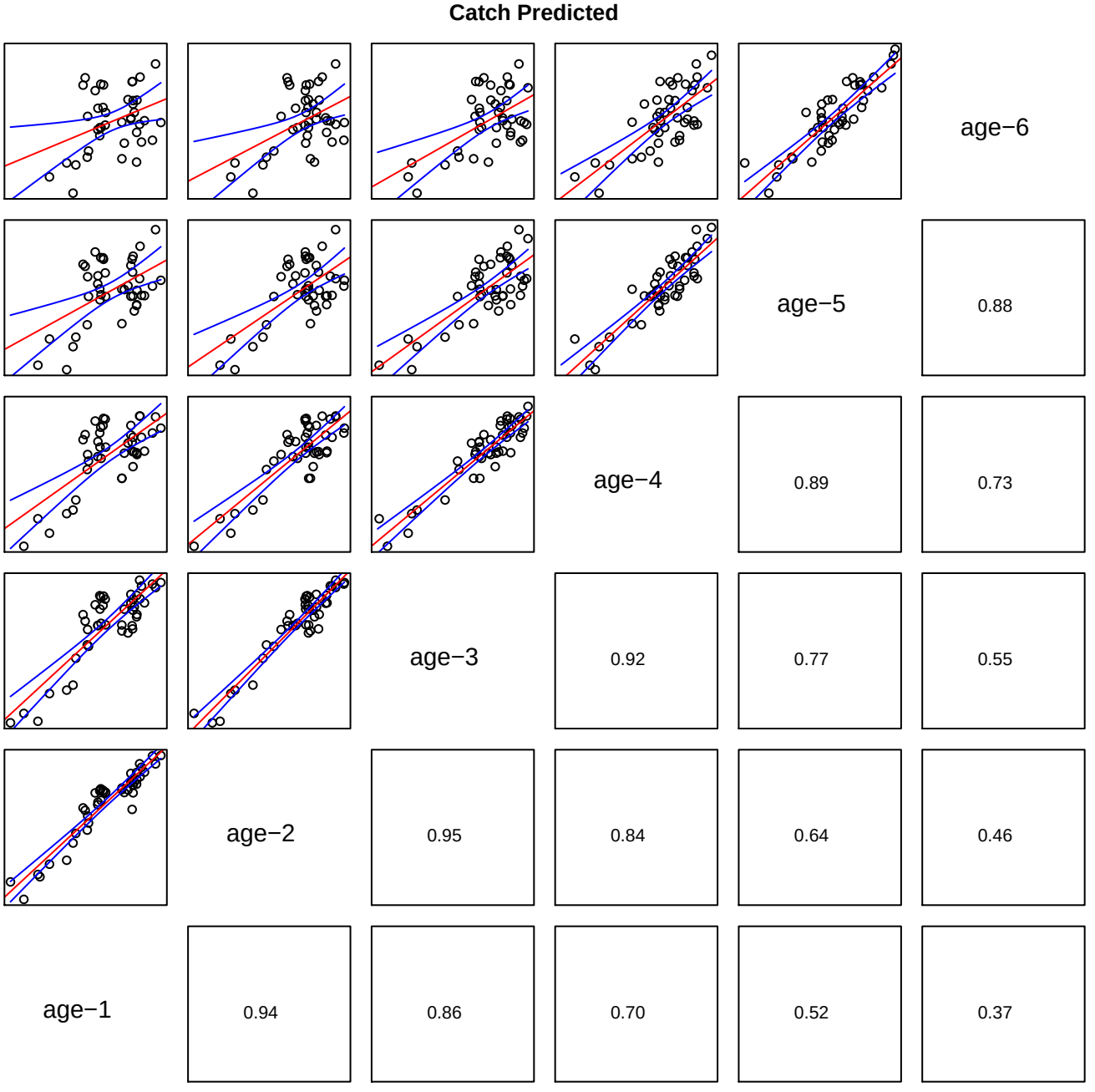

Years 2014 to 2017
Z = 1.386
ln Val
Age

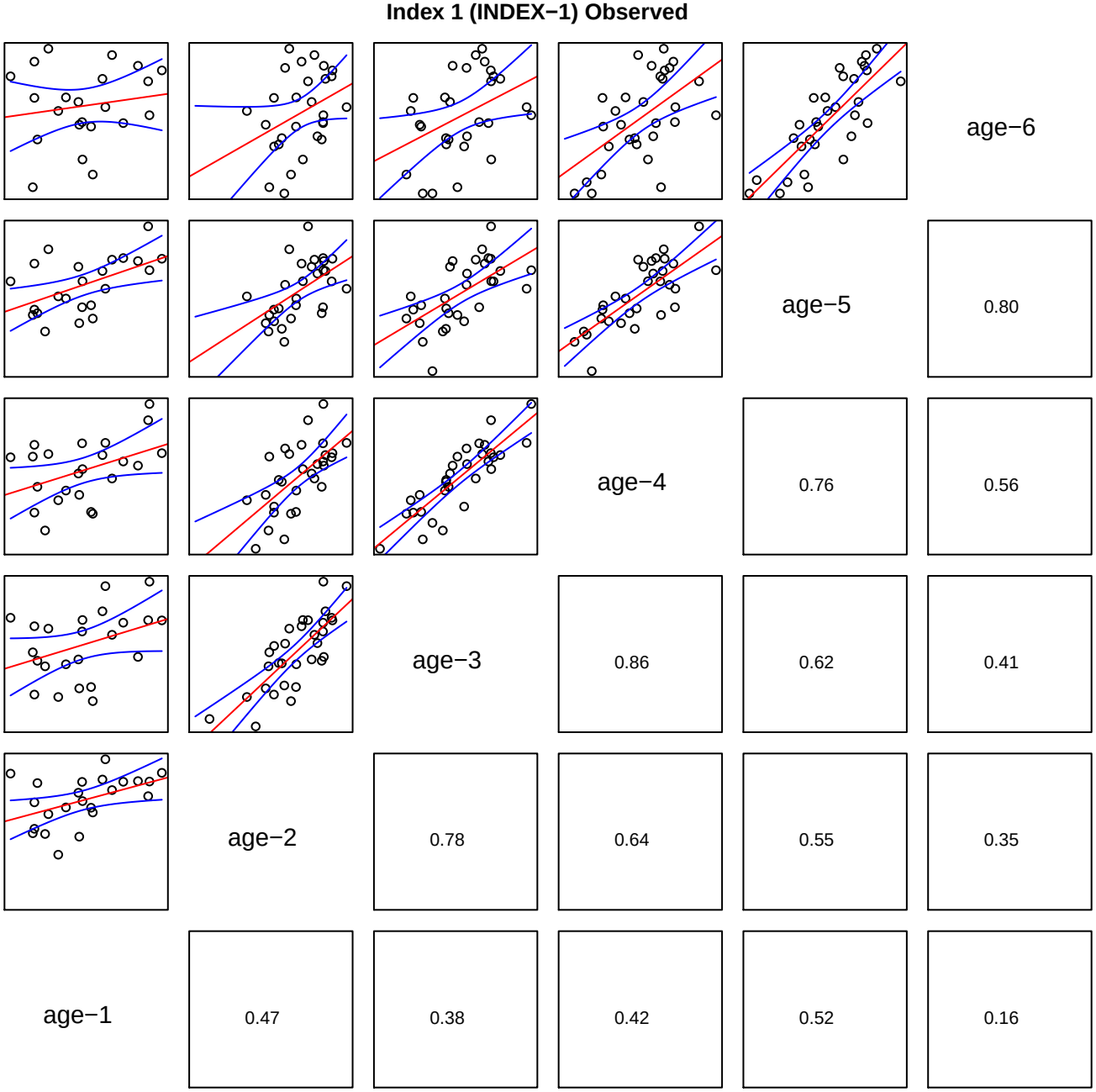

Years 2012 to 2015
Z = 1.559
ln Val
Age


Years 2015 to 2018
Z = 0.704
ln Val
Age

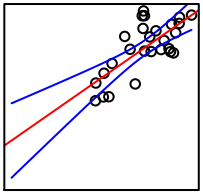

INDEX−3
Residual
1.0
0.5
0.0
−0.5
−1.0
3
4
5
Age

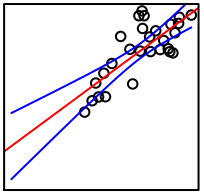

Catch Observed
age−6
age−5
0.74
age−4
0.89
0.60
age−3
0.93
0.81
0.56
age−2
0.88
0.76
0.58
0.39
age−1
0.81
0.77
0.65
0.48
0.21

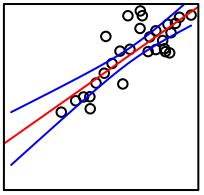

Catch Predicted
age−6
age−5
0.88
age−4
0.89
0.73
age−3
0.92
0.77
0.55
age−2
0.95
0.84
0.64
0.46
age−1
0.94
0.86
0.70
0.52
0.37

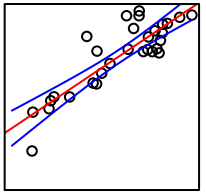

Index 1 (INDEX−1) Observed
age−6
age−5
0.80
age−4
0.76
0.56
age−3
0.86
0.62
0.41
age−2
0.78
0.64
0.55
0.35
age−1
0.47
0.38
0.42
0.52
0.16

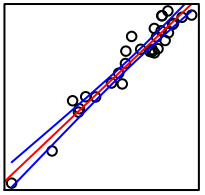
Index 1 (INDEX−1) Predicted



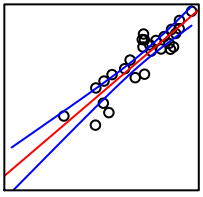


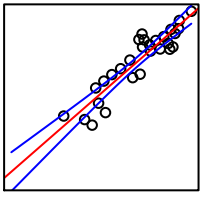


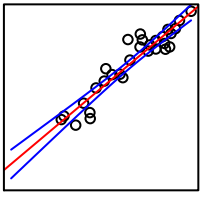


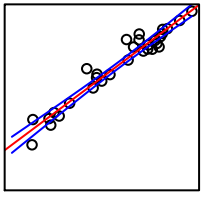


age−6



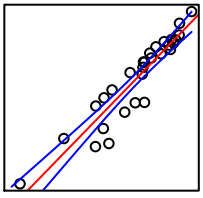


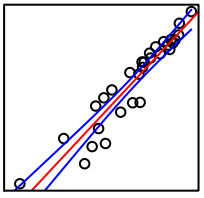


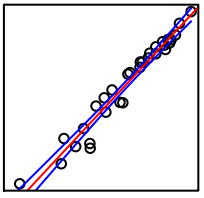


age−5

0.97



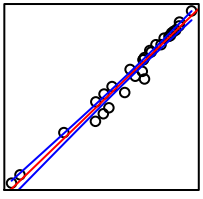


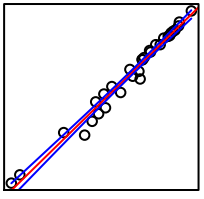


age−4

0.97

0.87



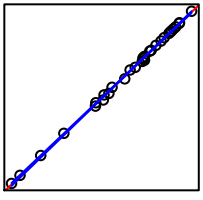


age−3

0.98

0.94

0.80



age−2

0.99

0.94

0.92

0.77

age−1

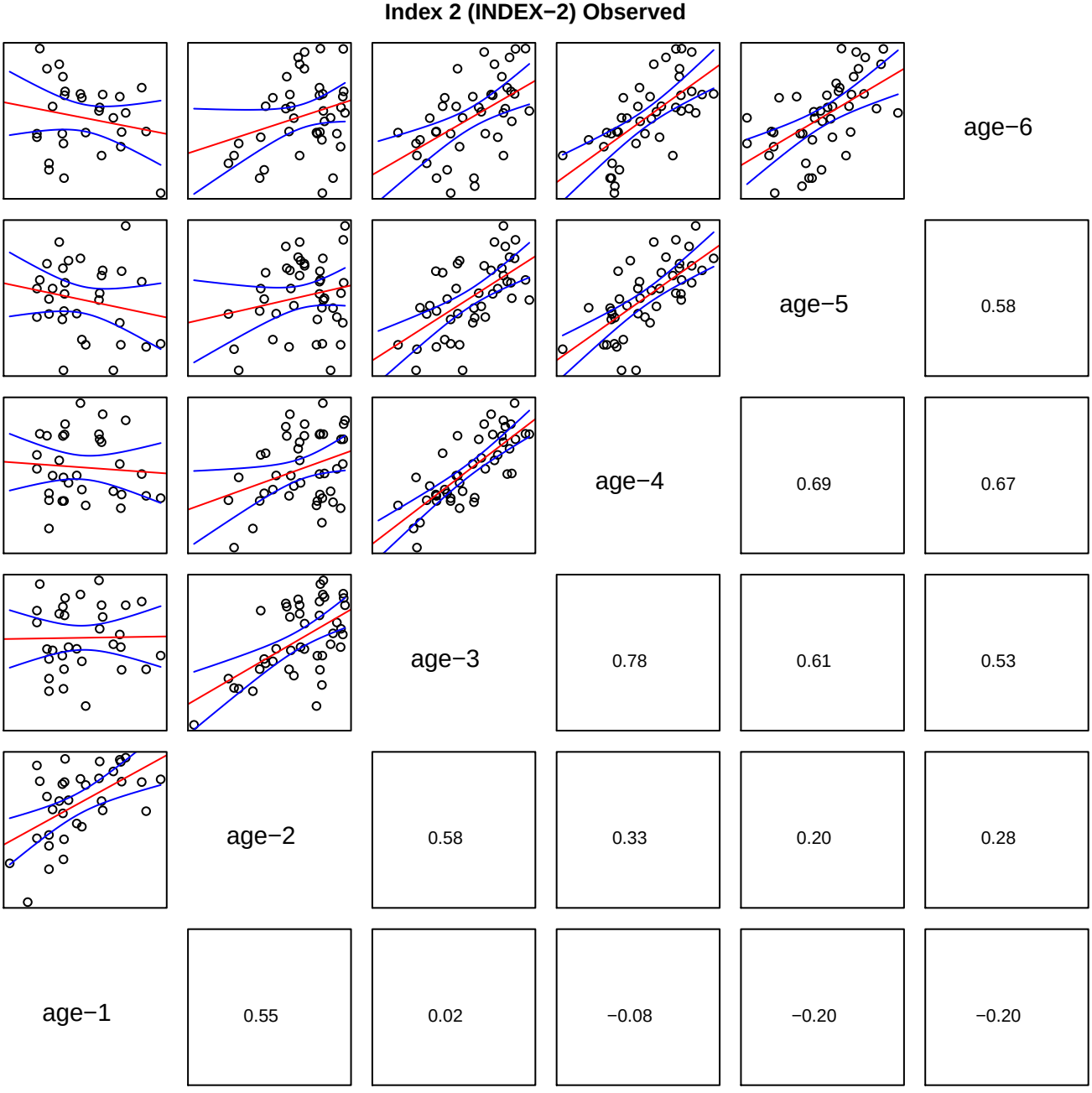
1.00

0.99

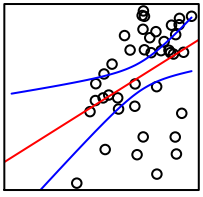
0.94

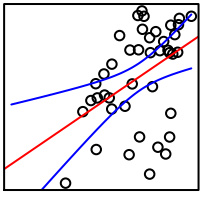
0.90

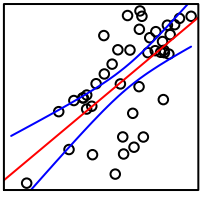
0.72

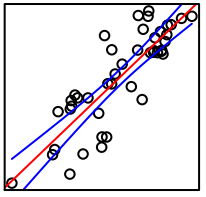

Index 2 (INDEX−2) Observed
age−6
age−5
0.58
age−4
0.69
0.67
age−3
0.78
0.61
0.53
age−2
0.58
0.33
0.20
0.28
age−1
0.55
0.02
−0.08
−0.20
−0.20

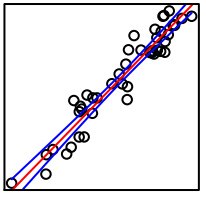
Index 2 (INDEX−2) Predicted



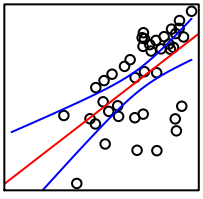


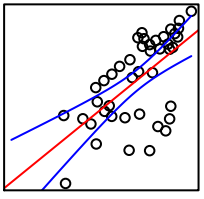


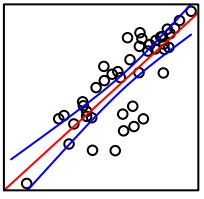


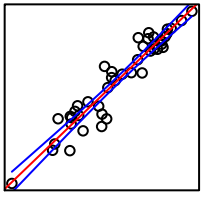


age−6



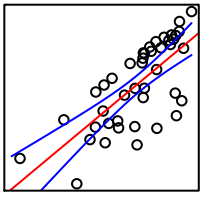


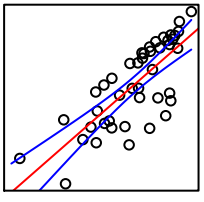


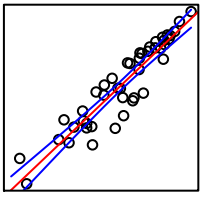


age−5

0.96



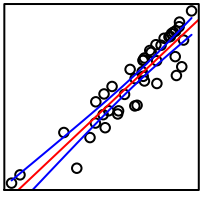


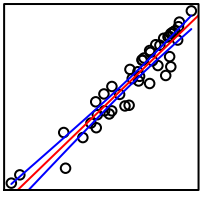


age−4

0.96

0.85



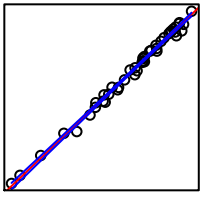


age−3

0.93

0.81

0.64



age−2

0.95

0.78

0.62

0.44

age−1

1.00

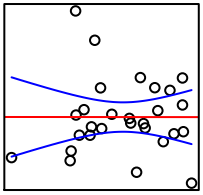
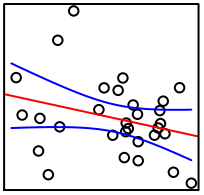
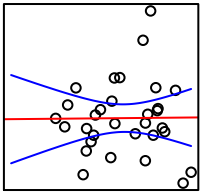
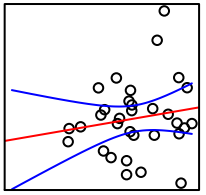
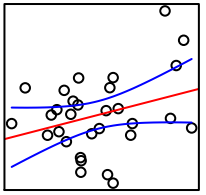
0.92

0.73

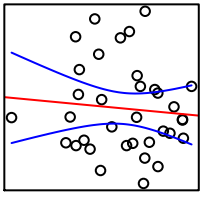
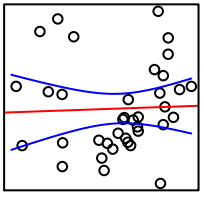
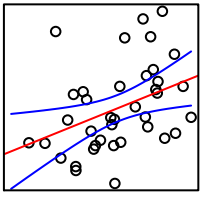
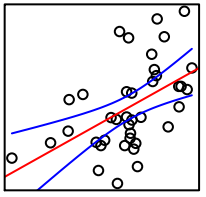
0.58

0.40

Index 3 (INDEX−3) Observed

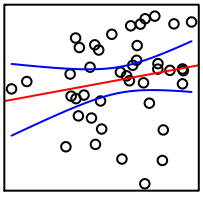
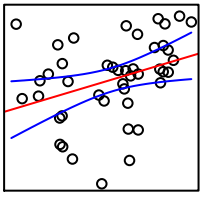
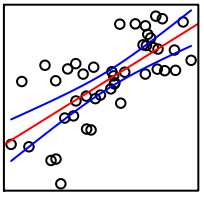






age−6

age−5

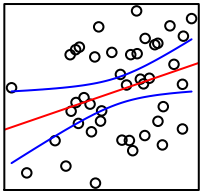
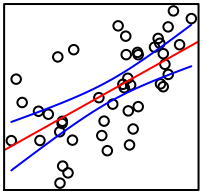
0.31

age−4

0.51

0.16

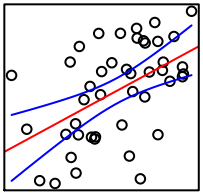



age−3

0.71

0.39

0.01



age−2

0.62

0.34

0.04

−0.29

age−1

0.51

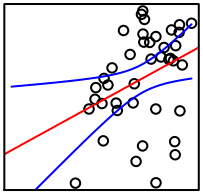
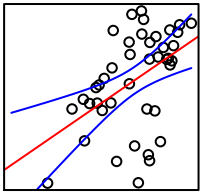
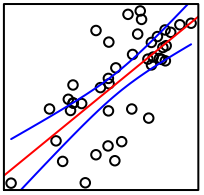
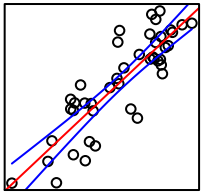
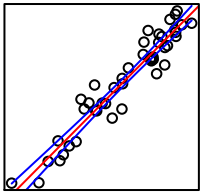
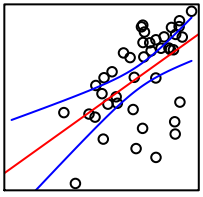
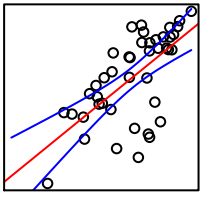
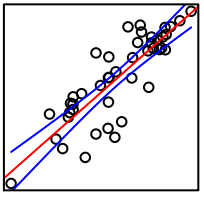
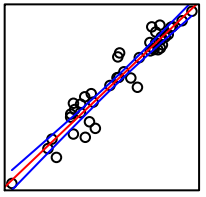
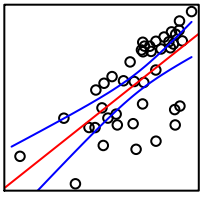
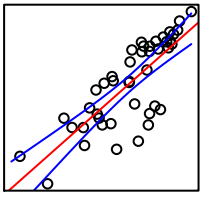
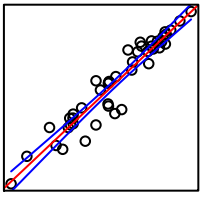
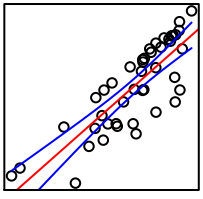
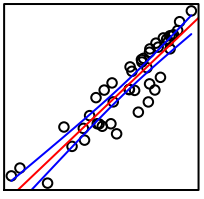
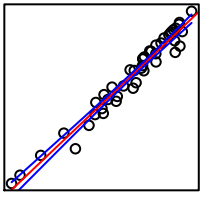
0.33

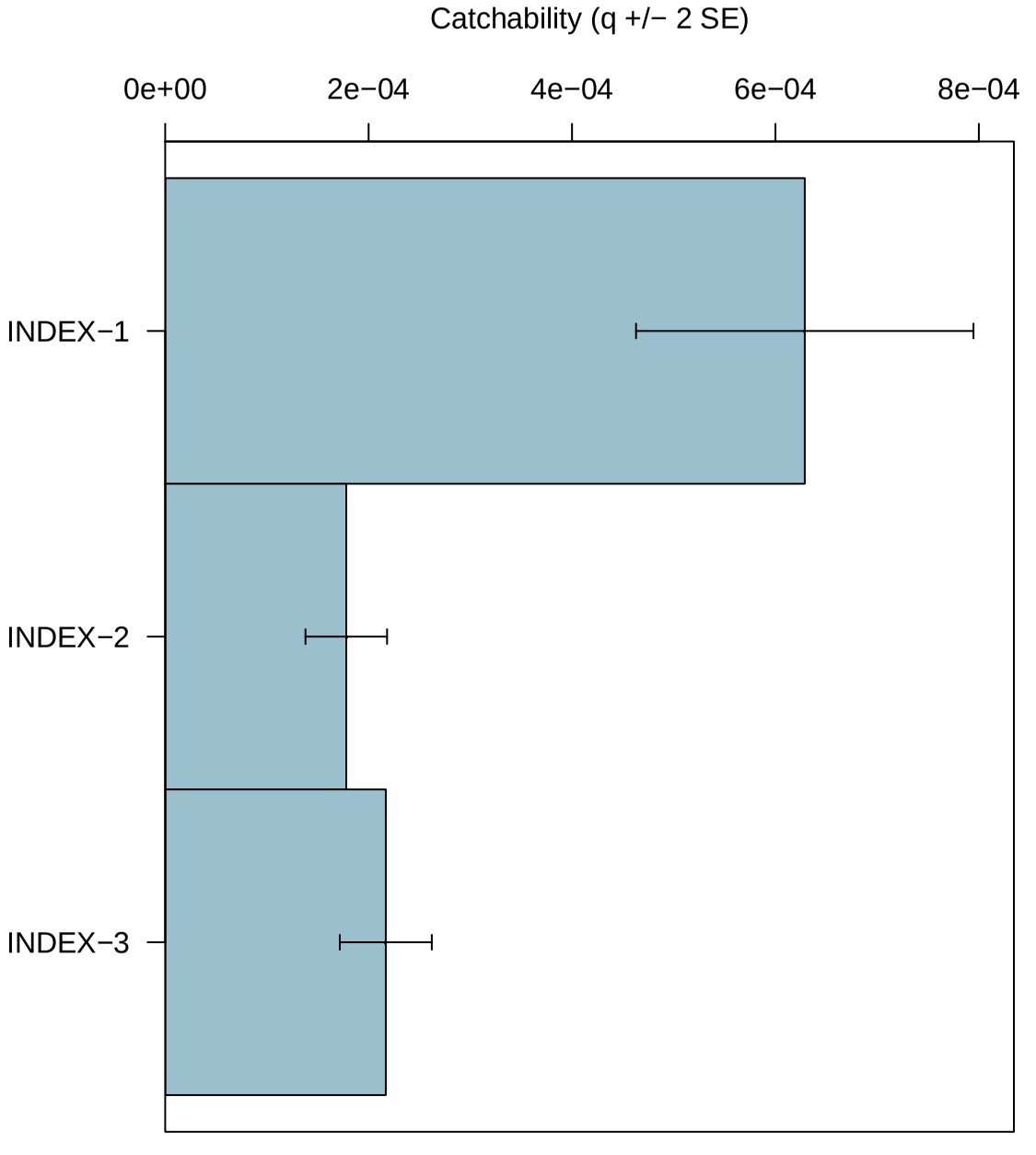
0.19

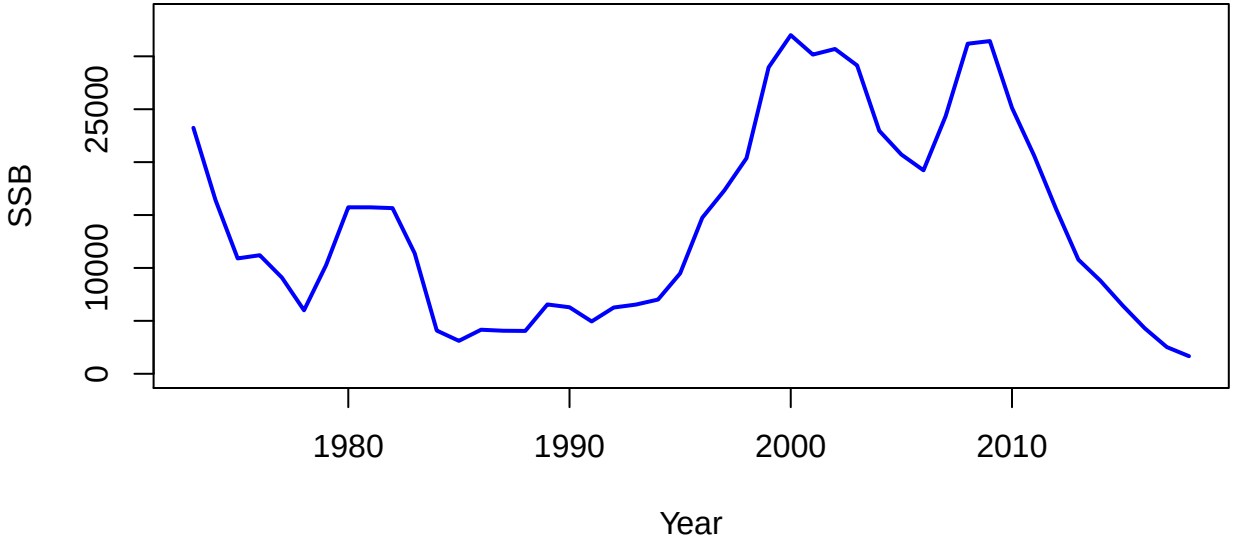
−0.09

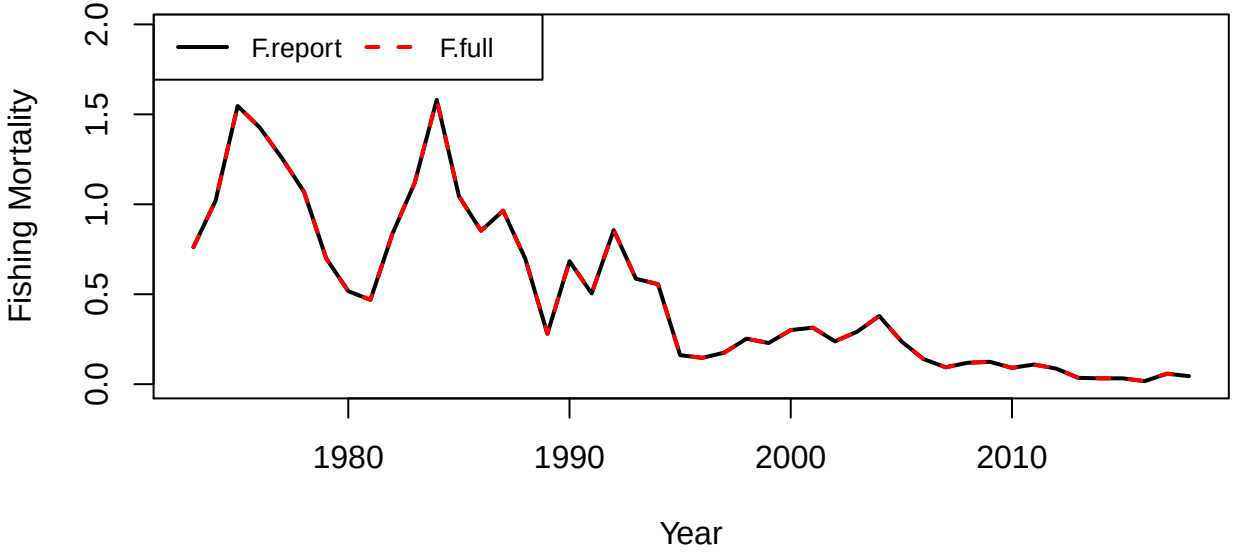
0.00

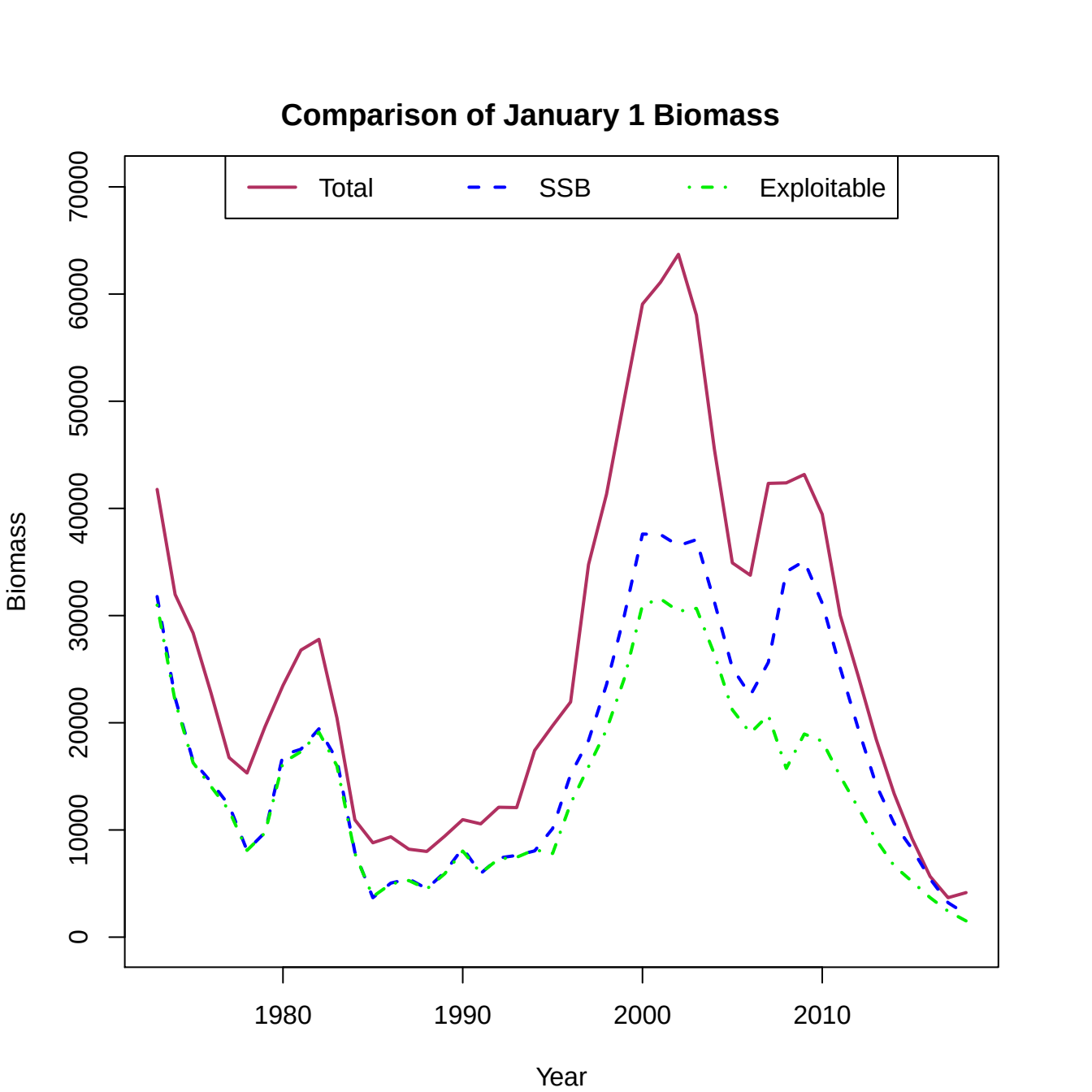
Index 3 (INDEX−3) Predicted

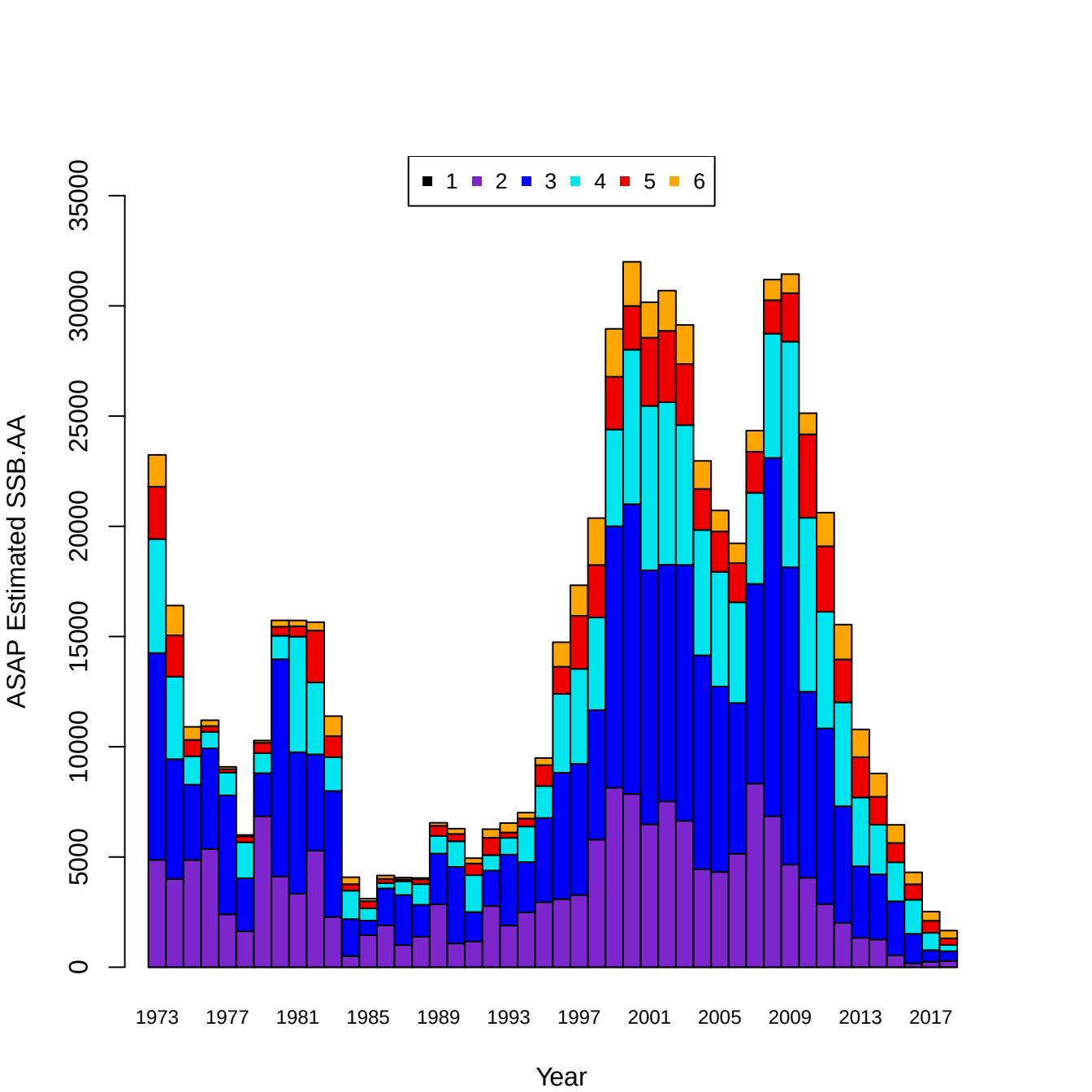





age−6




age−5
0.96



age−4
0.96
0.86


age−3
0.96
0.85
0.70

age−2
0.92
0.79
0.65
0.47
age−1
0.98
0.83
0.68
0.54
0.35

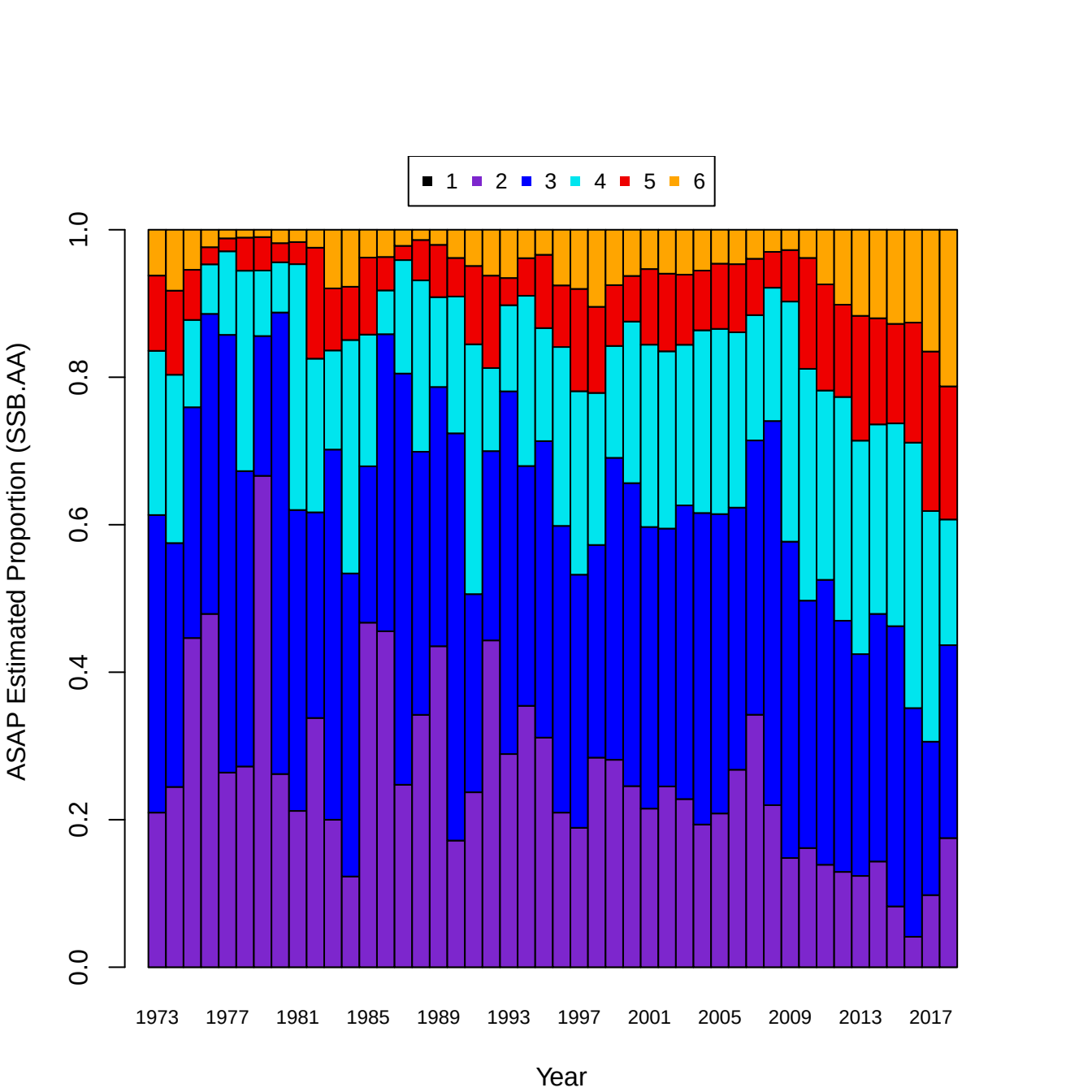

Catchability (q +/− 2 SE)
0e+00
2e−04
4e−04
6e−04
8e−04
INDEX−1
INDEX−2
INDEX−3

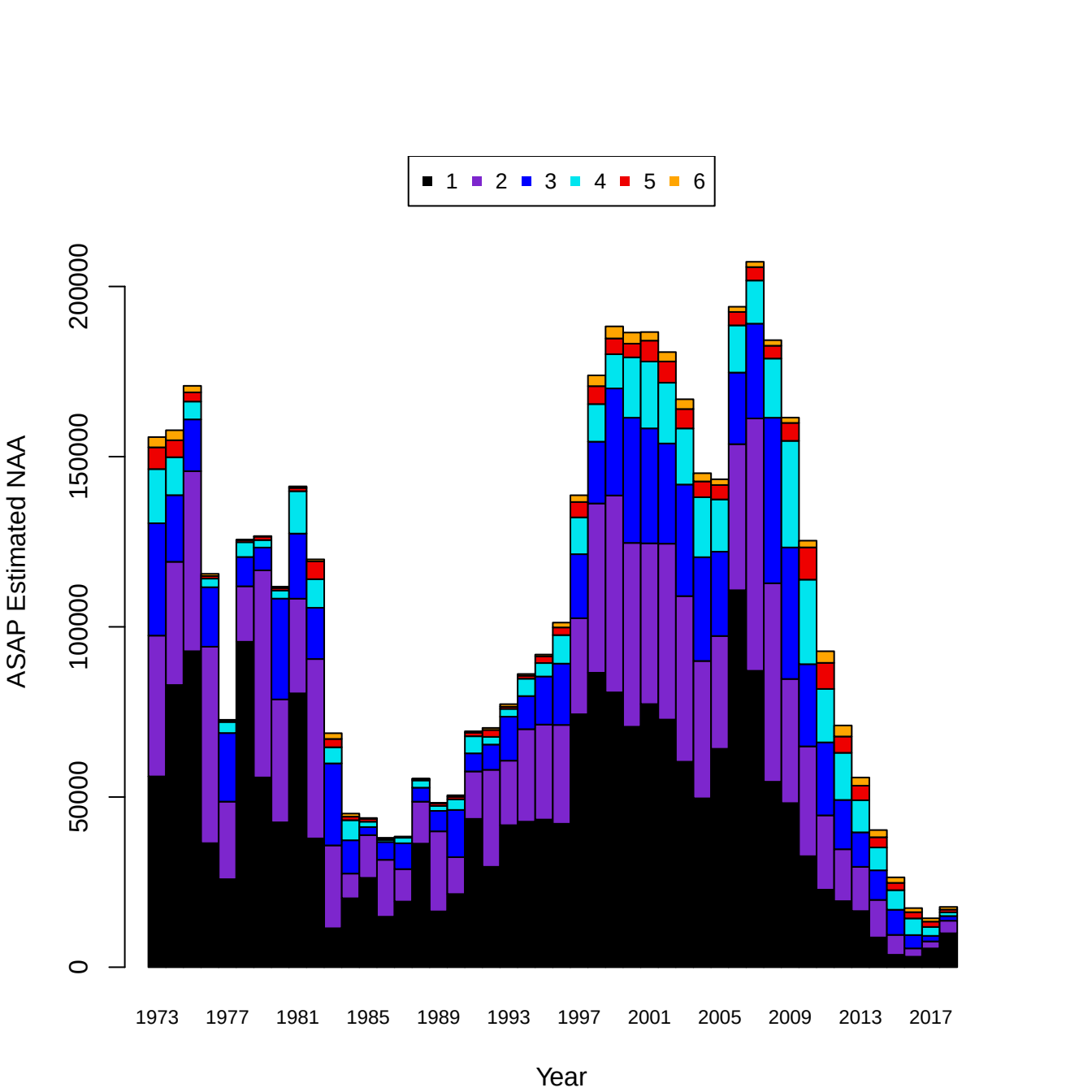

SSB
0
10000
25000
1980
1990
2000
2010
Year

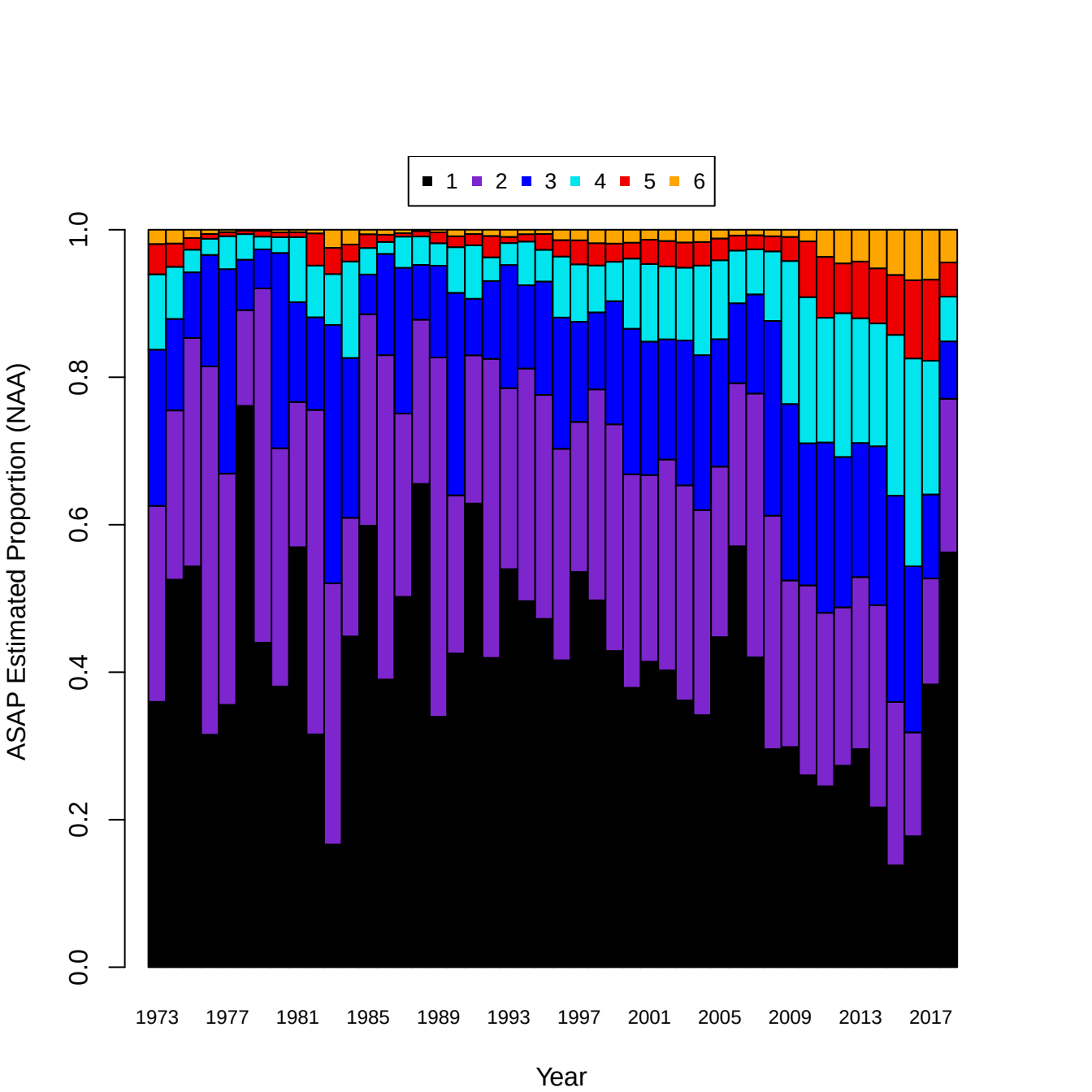

Fishing Mortality
0.0
0.5
1.0
1.5
2.0
F.report
F.full
1980
1990
2000
2010
Year

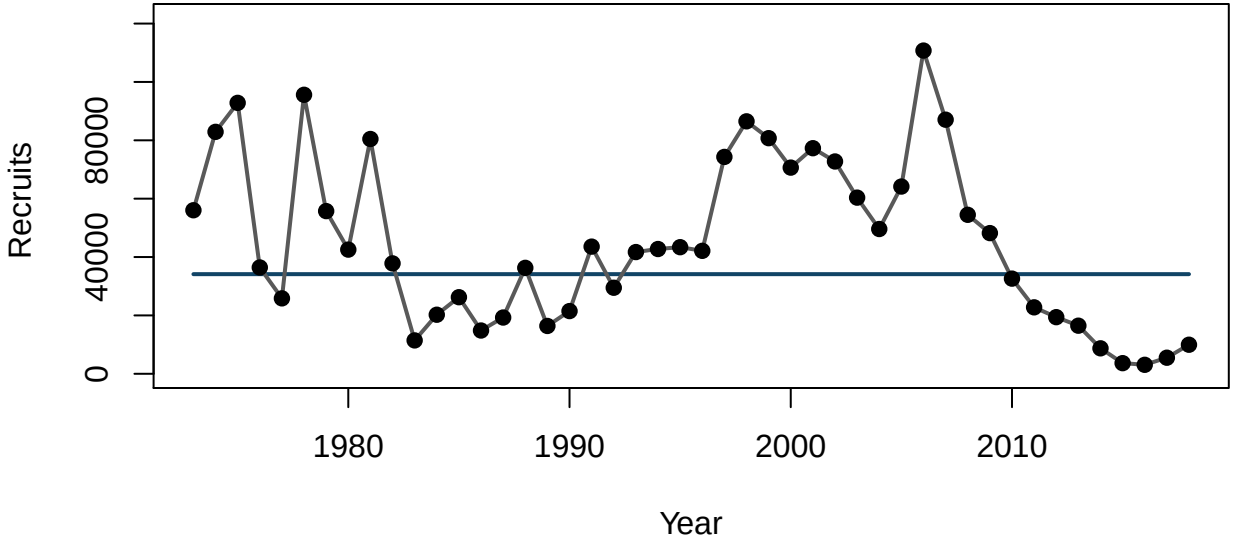

Comparison of January 1 Biomass
Total
SSB
Exploitable
Biomass
0
10000
20000
30000
40000
50000
60000
70000
1980
1990
2000
2010
Year

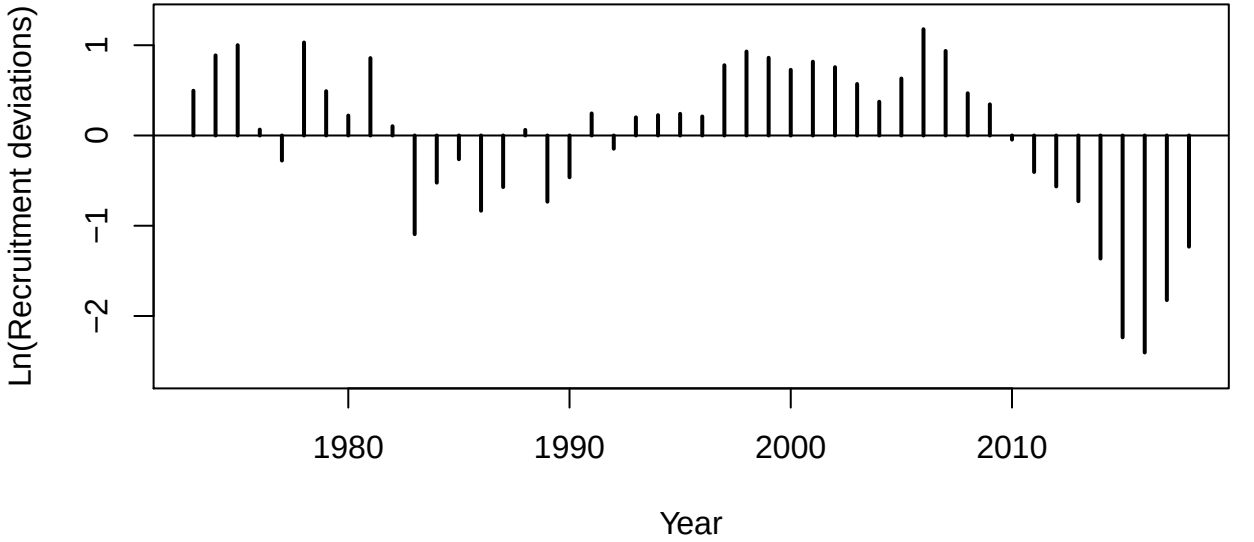

1
2
3
4
5
6
ASAP Estimated SSB.AA
0
5000
10000
15000
20000
25000
30000
35000
1973
1977
1981
1985
1989
1993
1997
2001
2005
2009
2013
2017
Year

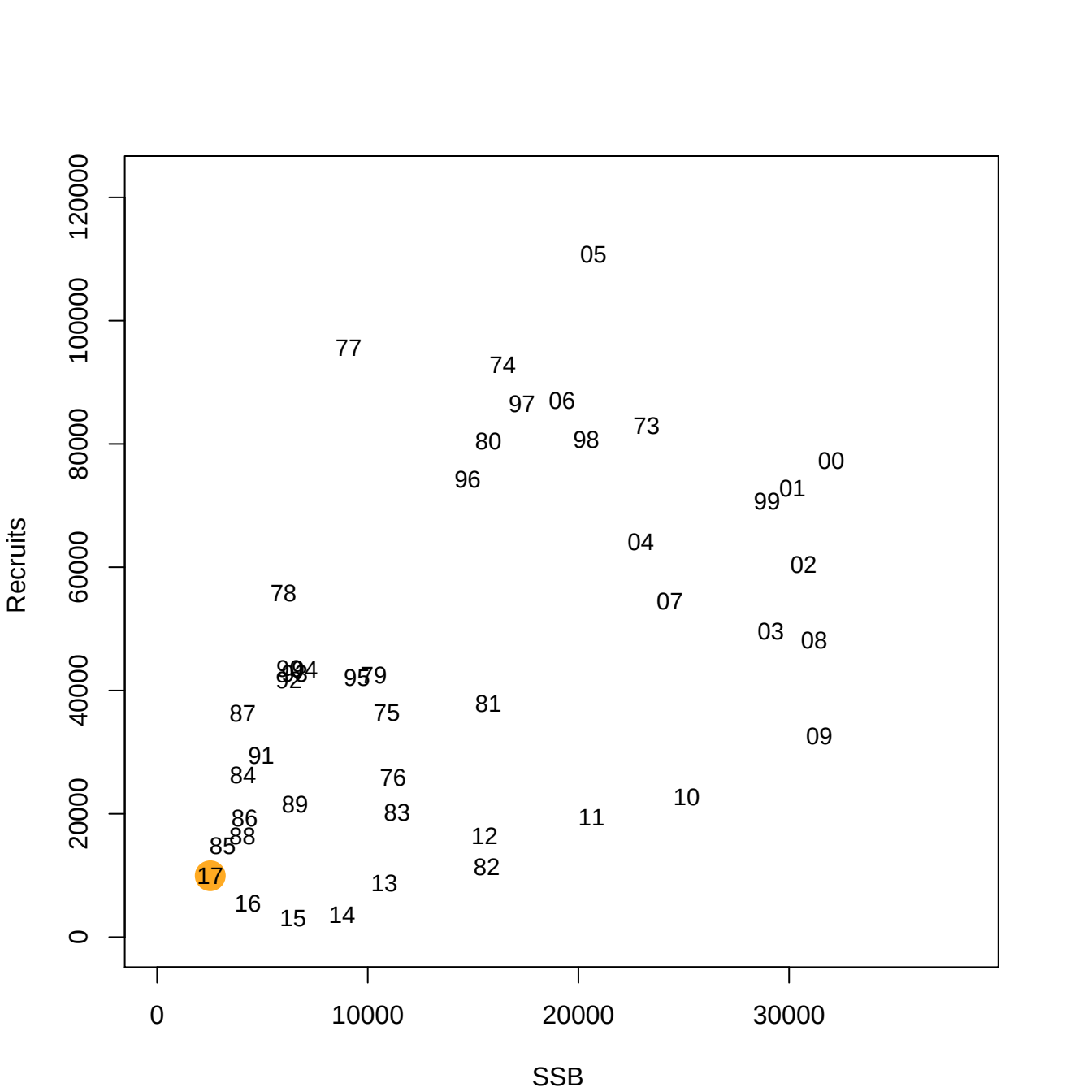

1
2
3
4
5
6
ASAP Estimated Proportion (SSB.AA)
0.0
0.2
0.4
0.6
0.8
1.0
1973
1977
1981
1985
1989
1993
1997
2001
2005
2009
2013
2017
Year

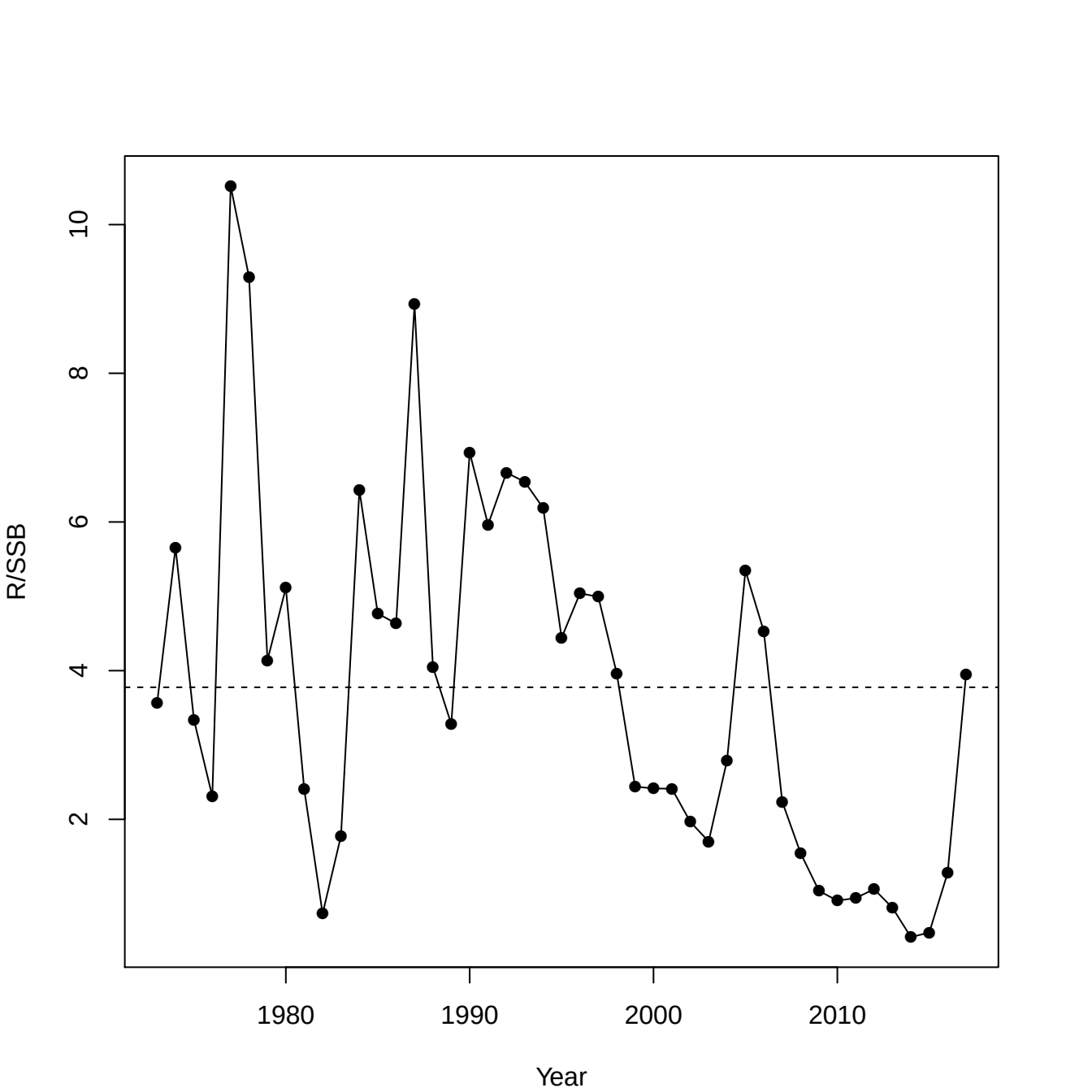

1
2
3
4
5
6
ASAP Estimated NAA
0
50000
100000
150000
200000
1973
1977
1981
1985
1989
1993
1997
2001
2005
2009
2013
2017
Year

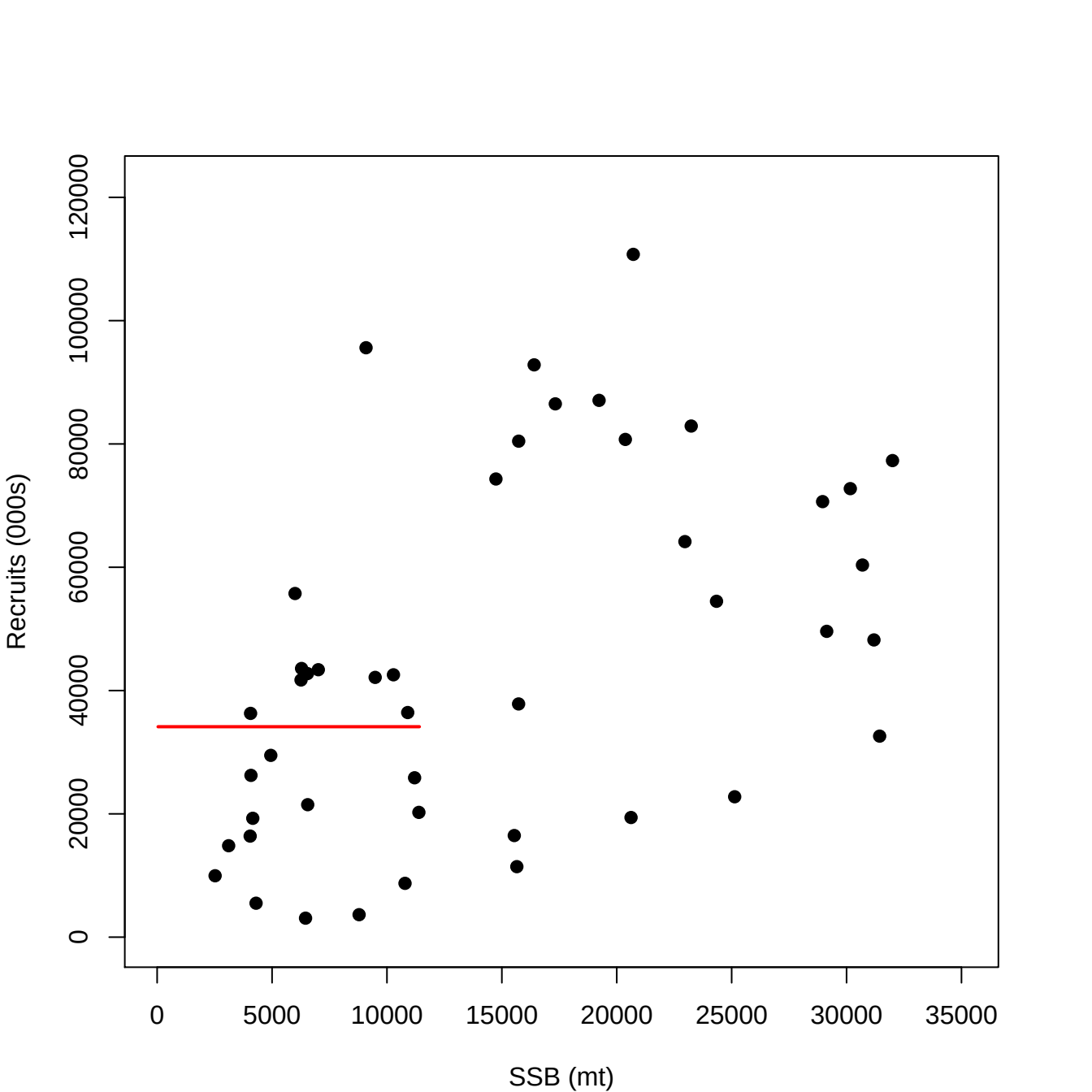

1
2
3
4
5
6
ASAP Estimated Proportion (NAA)
0.0
0.2
0.4
0.6
0.8
1.0
1973
1977
1981
1985
1989
1993
1997
2001
2005
2009
2013
2017
Year

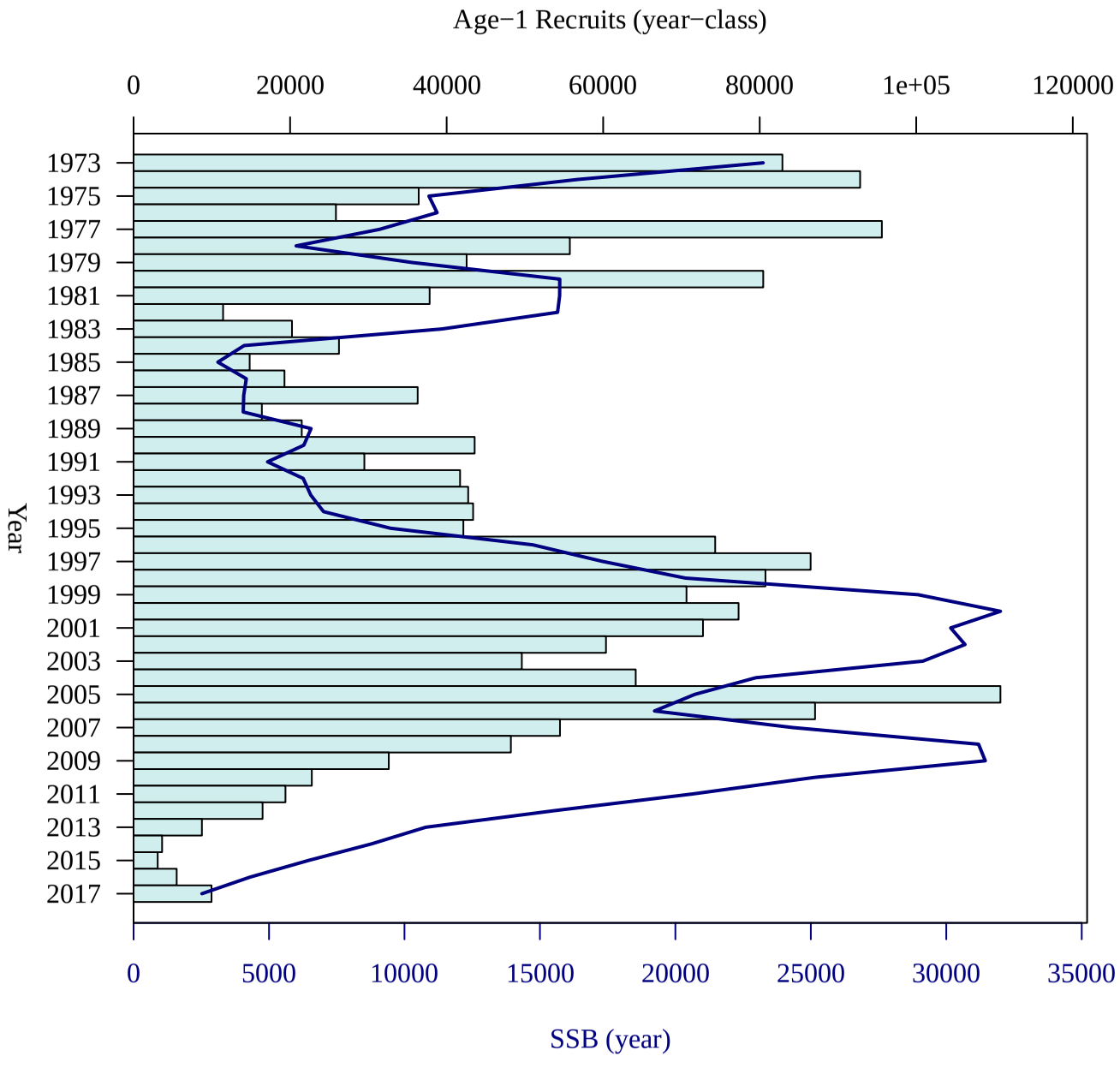

Recruits
0
40000
80000
1980
1990
2000
2010
Year

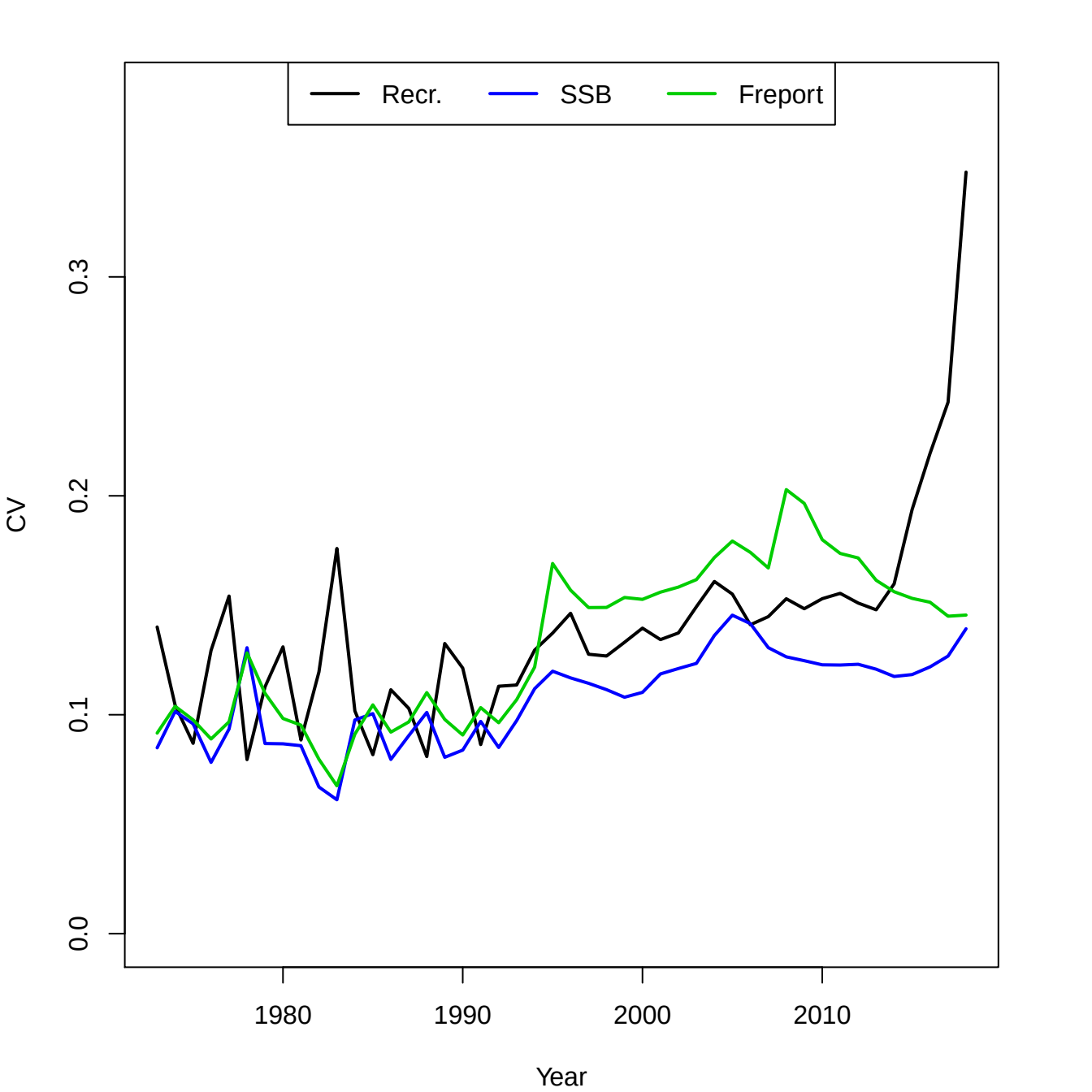

Ln(Recruitment deviations)
−2
−1
0
1
1980
1990
2000
2010
Year

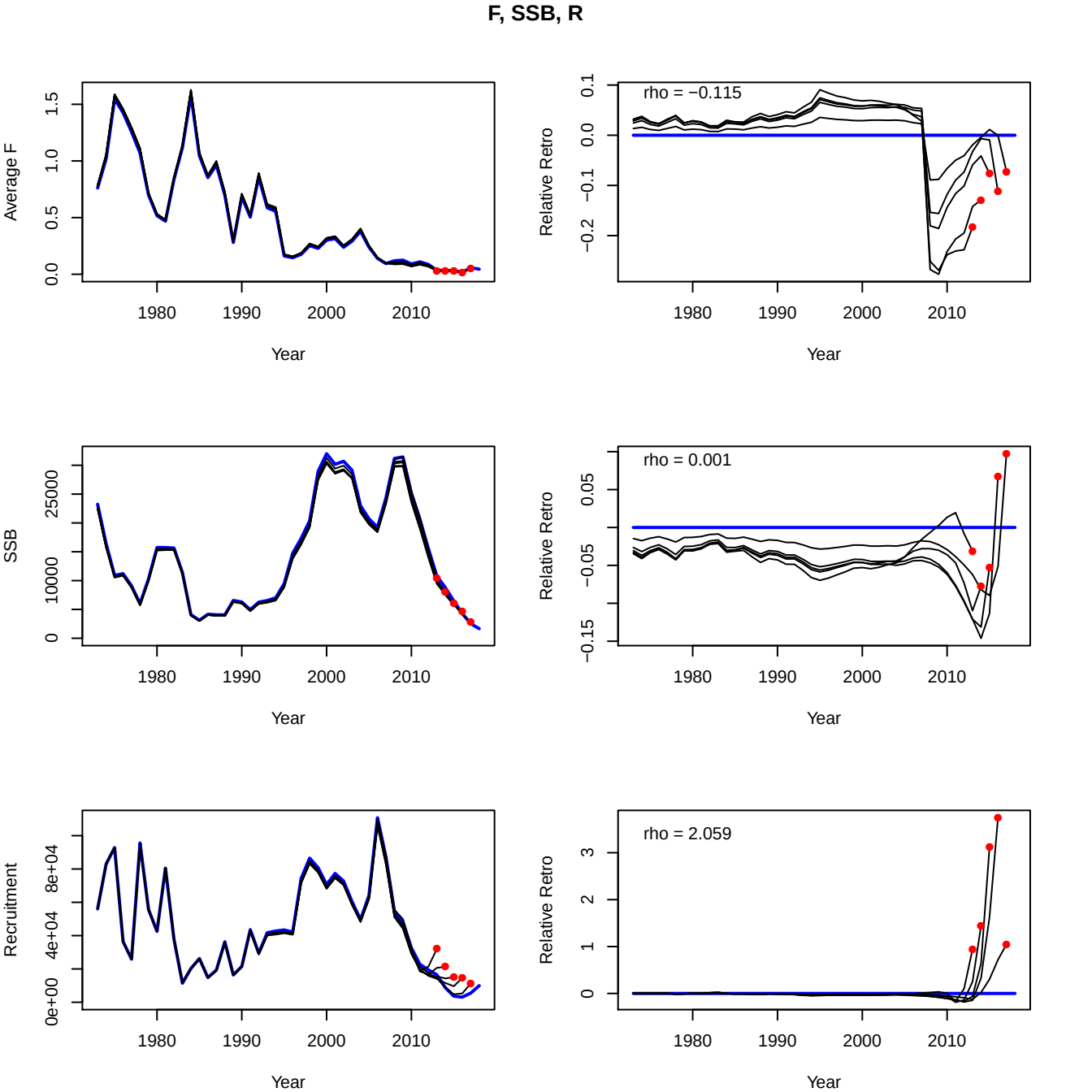

Recruits
SSB
0
20000
40000
60000
80000
100000
120000
0
10000
20000
30000
05
77
74
97
06
73
80
98
00
96
99
01
04
02
78
07
03
08
81
87
75
09
91
84
76
10
89
83
86
11
88
12
85
82
17
13
16
15
14

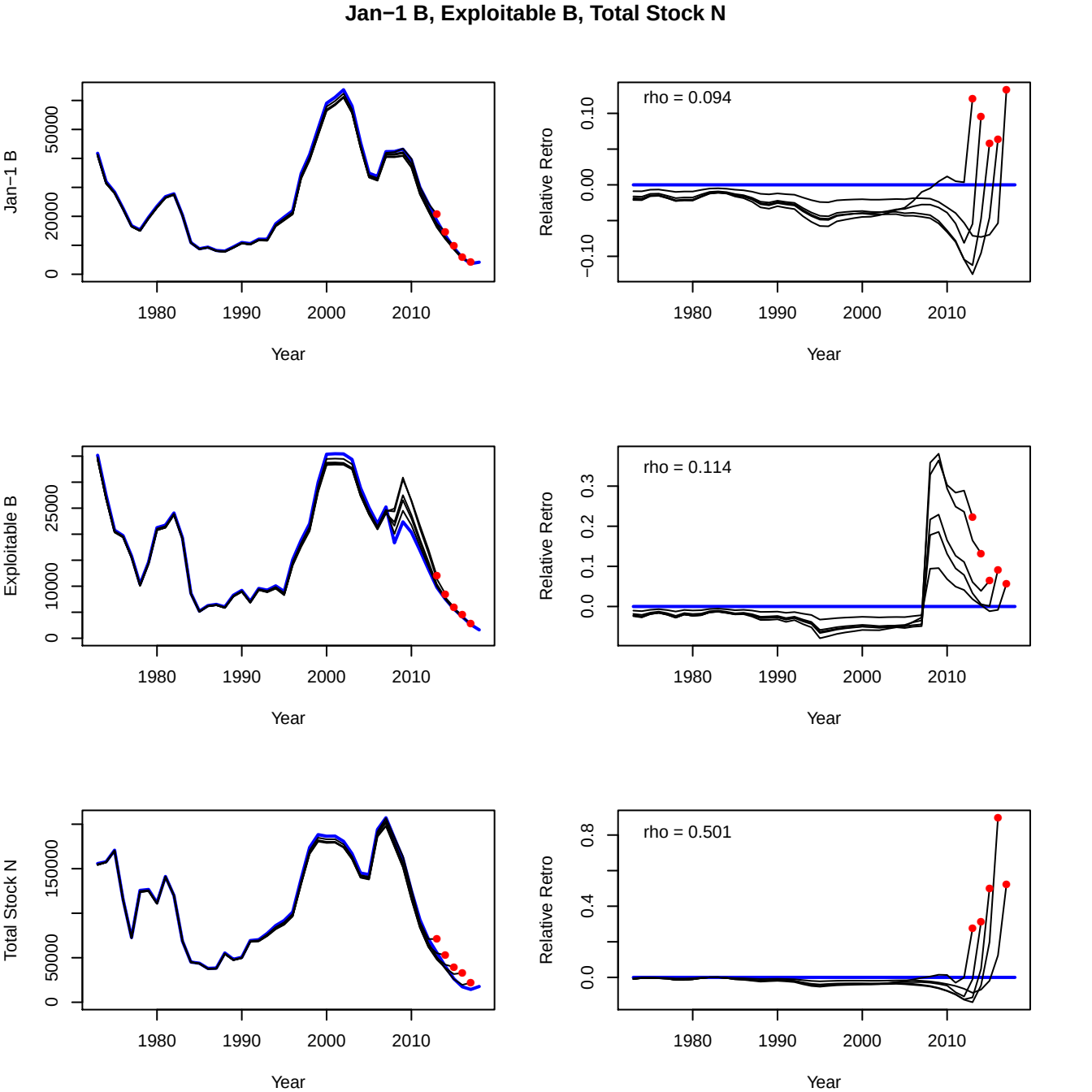

R/SSB
2
4
6
8
10
1980
1990
2000
2010
Year


Recruits (000s)
0
20000
40000
60000
80000
100000
120000
0
5000
10000
15000
20000
25000
30000
35000
SSB (mt)

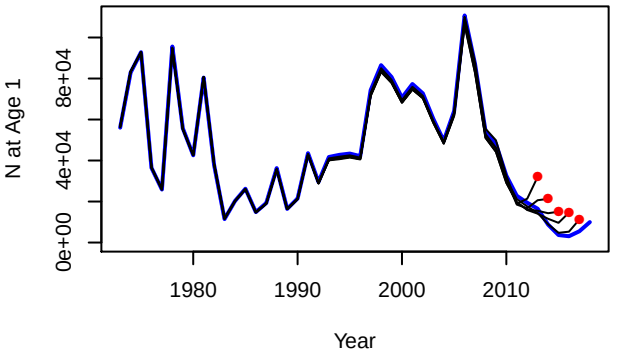

Age−1 Recruits (year−class)
0
20000
40000
60000
80000
1e+05
120000
Year
1973
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
2015
2017
0
5000
10000
15000
20000
25000
30000
35000
SSB (year)

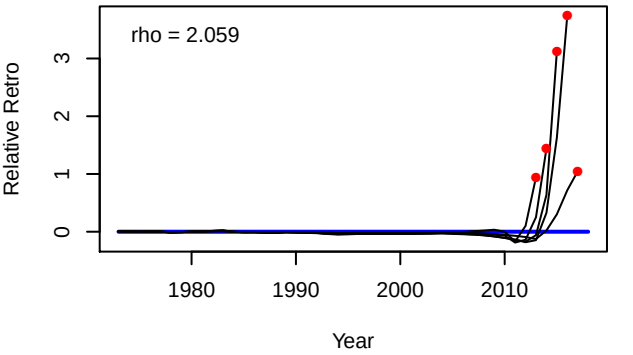

Recr.
SSB
Freport
CV
0.0
0.1
0.2
0.3
1980
1990
2000
2010
Year

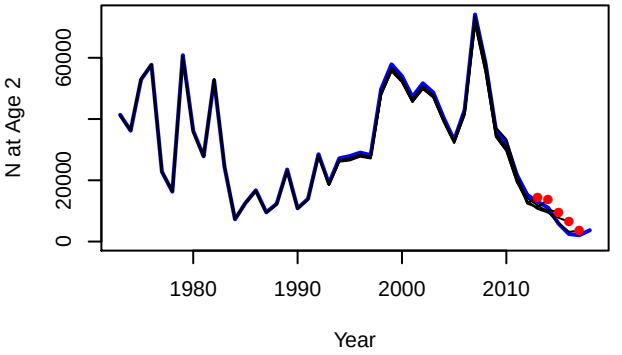

F, SSB, R
Average F
0.0
0.5
1.0
1.5
1980
1990
2000
2010
Year
Relative Retro
rho = −0.115
0.1
0.0
−0.1
−0.2
1980
1990
2000
2010
Year
SSB
0
10000
25000
1980
1990
2000
2010
Year
Relative Retro
rho = 0.001
0.05
−0.05
−0.15
1980
1990
2000
2010
Year
Recruitment
0e+00
4e+04
8e+04
1980
1990
2000
2010
Year
Relative Retro
rho = 2.059
0
1
2
3
1980
1990
2000
2010
Year

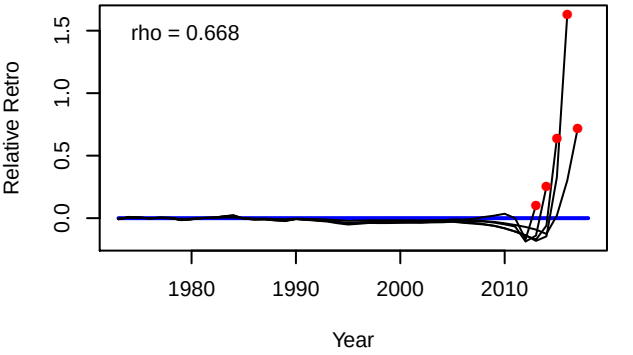

Jan−1 B, Exploitable B, Total Stock N
Jan−1 B
Exploitable B
Total Stock N
Relative Retro
rho = 0.094
rho = 0.114
rho = 0.501
Year
1980
1990
2000
2010

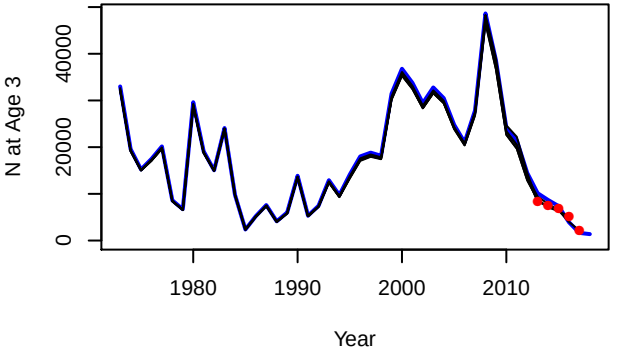
Stock Numbers at Age

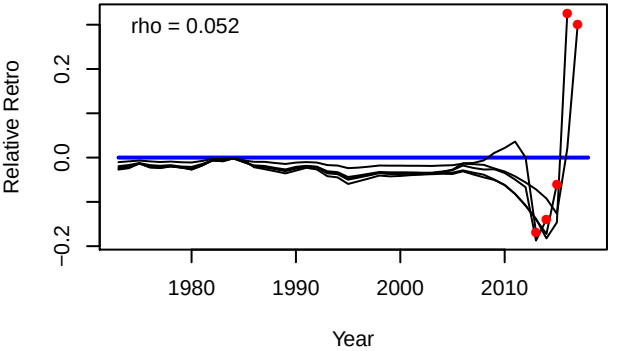




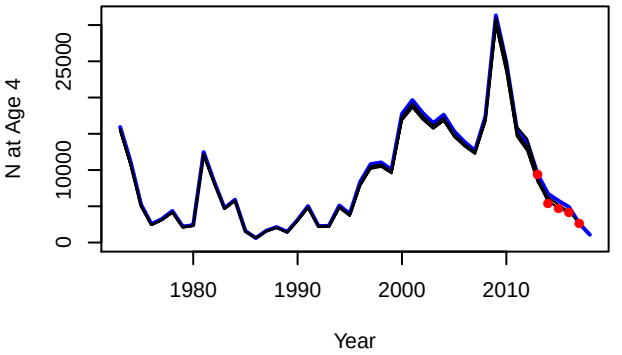


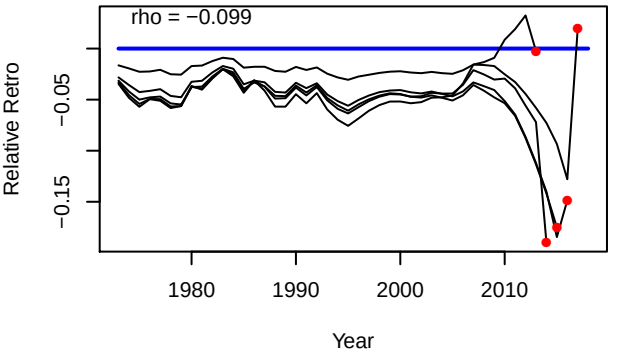


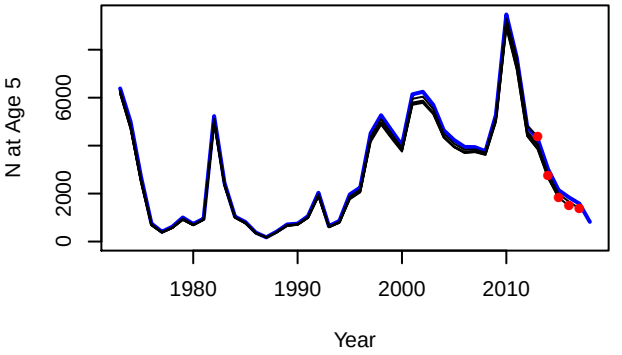


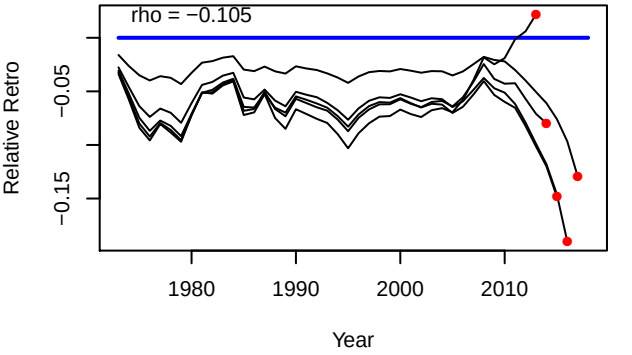


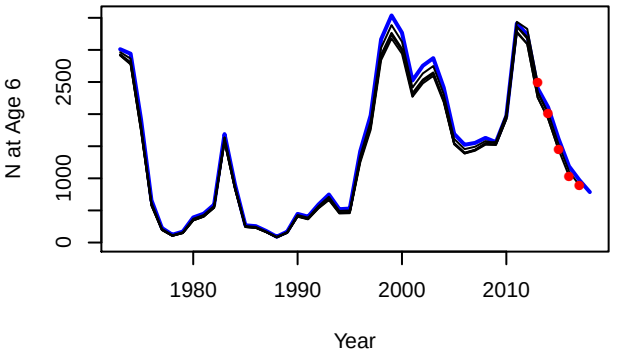
Stock Numbers at Age

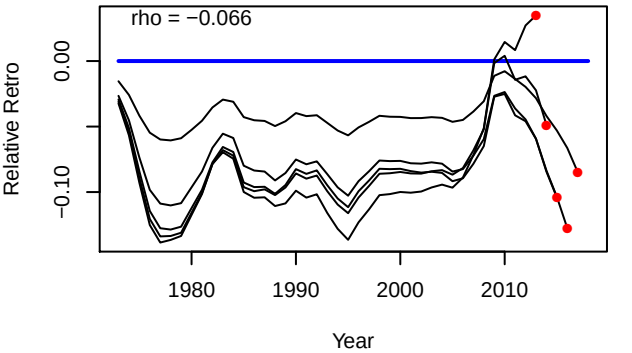


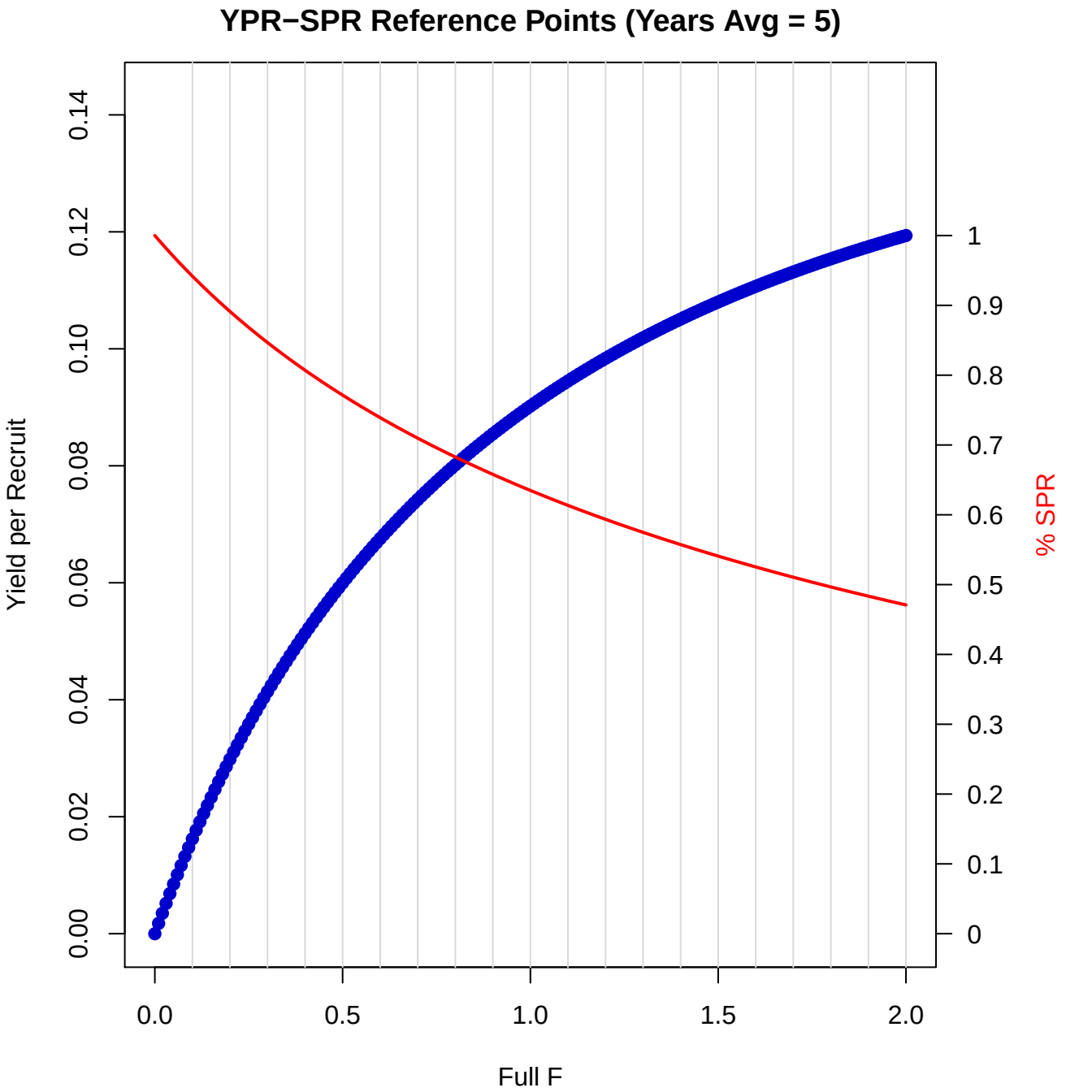






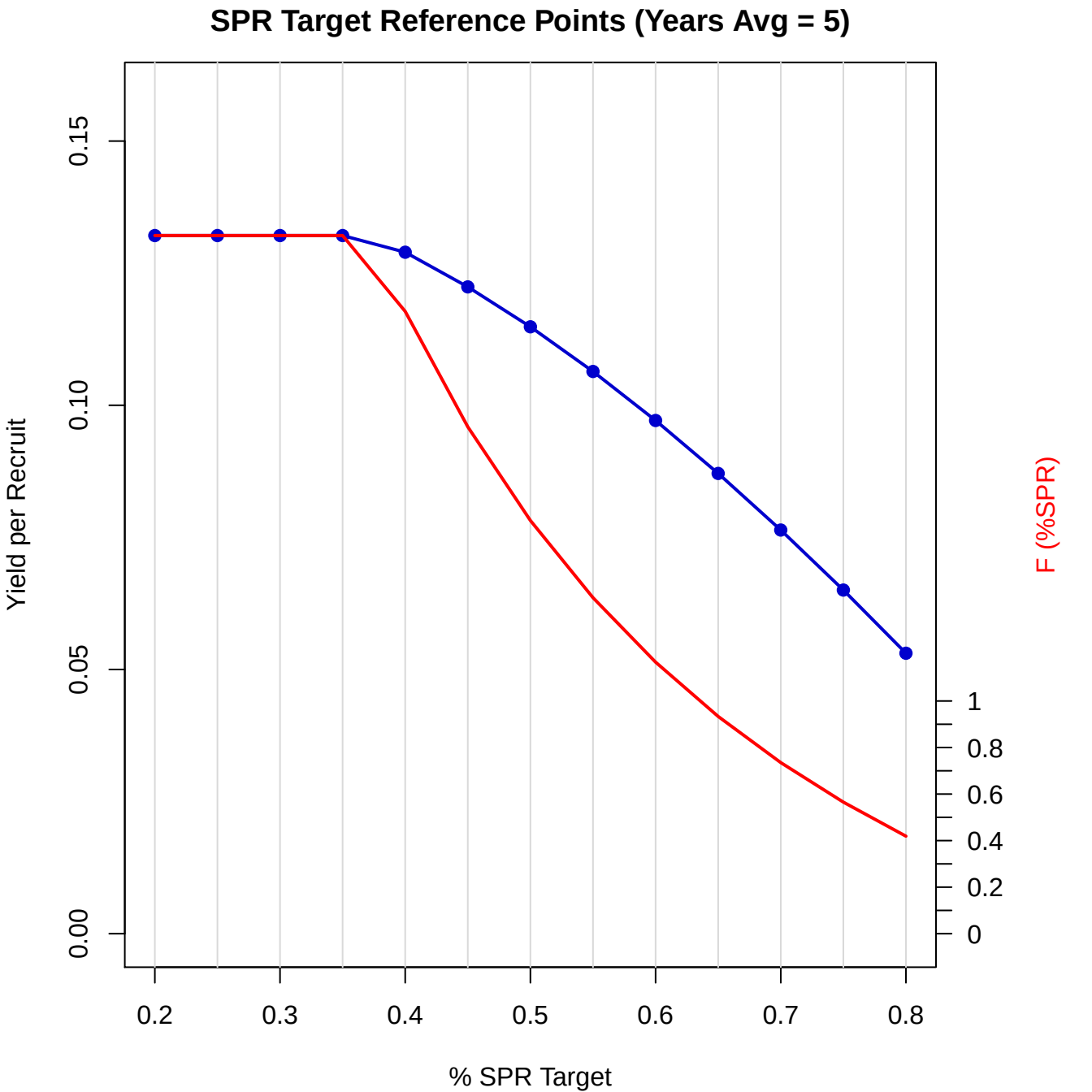





YPR−SPR Reference Points (Years Avg = 5)
Yield per Recruit
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
% SPR
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.0
0.5
1.0
1.5
2.0
Full F

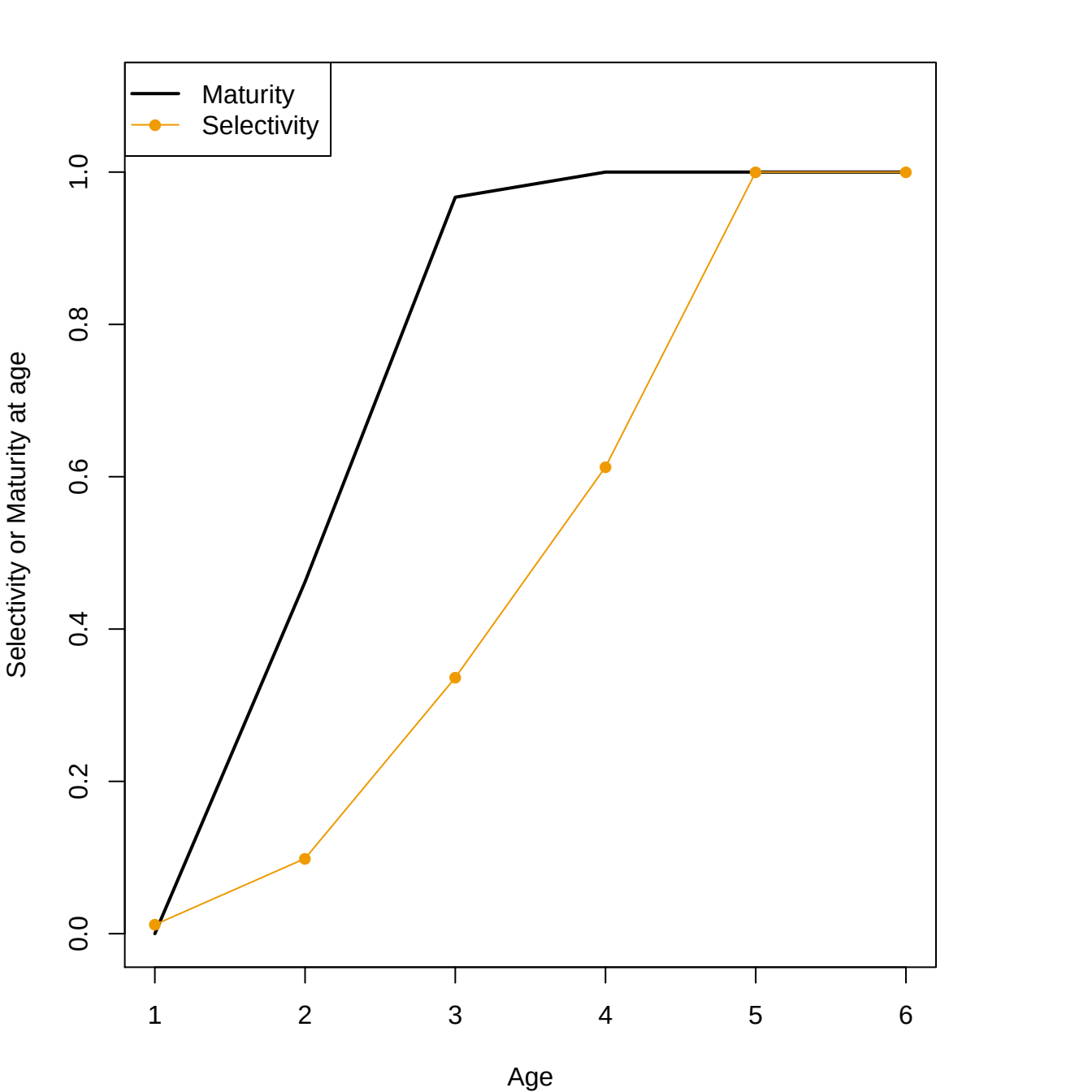
YPR−SPR Reference Points (Years Avg = 5)

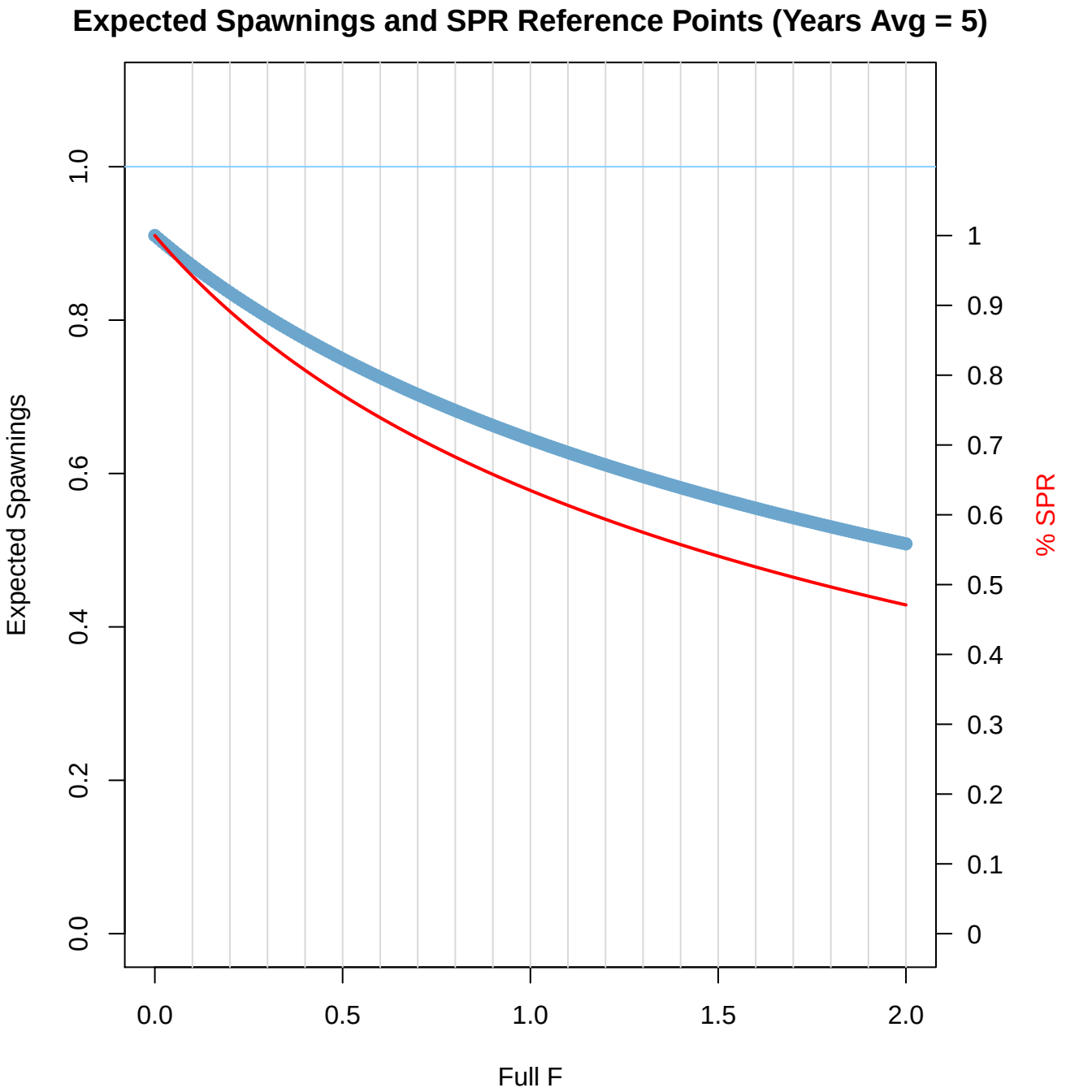
F	YPR	SPR	F	YPR	SPR	F	YPR	SPR
0	0	1	0.35	0.0466	0.8263	0.7	0.0742	0.7097
0.01	0.0018	0.9938	0.36	0.0475	0.8224	0.71	0.0749	0.7069
0.02	0.0035	0.9877	0.37	0.0485	0.8185	0.72	0.0755	0.7042
0.03	0.0052	0.9817	0.38	0.0495	0.8147	0.73	0.0761	0.7014
0.04	0.0069	0.9757	0.39	0.0504	0.8108	0.74	0.0767	0.6987
0.05	0.0085	0.9699	0.4	0.0513	0.8071	0.75	0.0773	0.696
0.06	0.0101	0.9641	0.41	0.0523	0.8033	0.76	0.0779	0.6933
0.07	0.0117	0.9584	0.42	0.0532	0.7996	0.77	0.0785	0.6906
0.08	0.0132	0.9528	0.43	0.0541	0.796	0.78	0.079	0.688
0.09	0.0147	0.9473	0.44	0.0549	0.7924	0.79	0.0796	0.6854
0.1	0.0162	0.9419	0.45	0.0558	0.7888	0.8	0.0802	0.6828
0.11	0.0177	0.9365	0.46	0.0567	0.7852	0.81	0.0807	0.6802
0.12	0.0191	0.9312	0.47	0.0575	0.7817	0.82	0.0813	0.6776
0.13	0.0206	0.926	0.48	0.0583	0.7783	0.83	0.0818	0.6751
0.14	0.0219	0.9208	0.49	0.0592	0.7748	0.84	0.0823	0.6726
0.15	0.0233	0.9157	0.5	0.06	0.7714	0.85	0.0829	0.6701
0.16	0.0247	0.9107	0.51	0.0608	0.7681	0.86	0.0834	0.6676
0.17	0.026	0.9058	0.52	0.0616	0.7647	0.87	0.0839	0.6652
0.18	0.0273	0.9009	0.53	0.0624	0.7614	0.88	0.0844	0.6627
0.19	0.0286	0.8961	0.54	0.0631	0.7581	0.89	0.085	0.6603
0.2	0.0298	0.8913	0.55	0.0639	0.7549	0.9	0.0855	0.6579
0.21	0.0311	0.8866	0.56	0.0646	0.7517	0.91	0.086	0.6555
0.22	0.0323	0.8819	0.57	0.0654	0.7485	0.92	0.0864	0.6532
0.23	0.0335	0.8773	0.58	0.0661	0.7454	0.93	0.0869	0.6508
0.24	0.0347	0.8728	0.59	0.0668	0.7423	0.94	0.0874	0.6485
0.25	0.0358	0.8683	0.6	0.0676	0.7392	0.95	0.0879	0.6462
0.26	0.037	0.8639	0.61	0.0683	0.7361	0.96	0.0884	0.6439
0.27	0.0381	0.8595	0.62	0.069	0.7331	0.97	0.0888	0.6416
0.28	0.0392	0.8552	0.63	0.0696	0.7301	0.98	0.0893	0.6394
0.29	0.0403	0.851	0.64	0.0703	0.7271	0.99	0.0898	0.6371
0.3	0.0414	0.8467	0.65	0.071	0.7241	1	0.0902	0.6349
0.31	0.0425	0.8426	0.66	0.0717	0.7212	1.01	0.0907	0.6327
0.32	0.0435	0.8384	0.67	0.0723	0.7183	1.02	0.0911	0.6305
0.33	0.0445	0.8344	0.68	0.073	0.7154	1.03	0.0915	0.6283
0.34	0.0456	0.8303	0.69	0.0736	0.7126	1.04	0.092	0.6262


SPR Target Reference Points (Years Avg = 5)
Yield per Recruit
0.00
0.05
0.10
0.15
F (%SPR)
0
0.2
0.4
0.6
0.8
1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
% SPR Target

SPR Target Reference Points (Years Avg = 5)

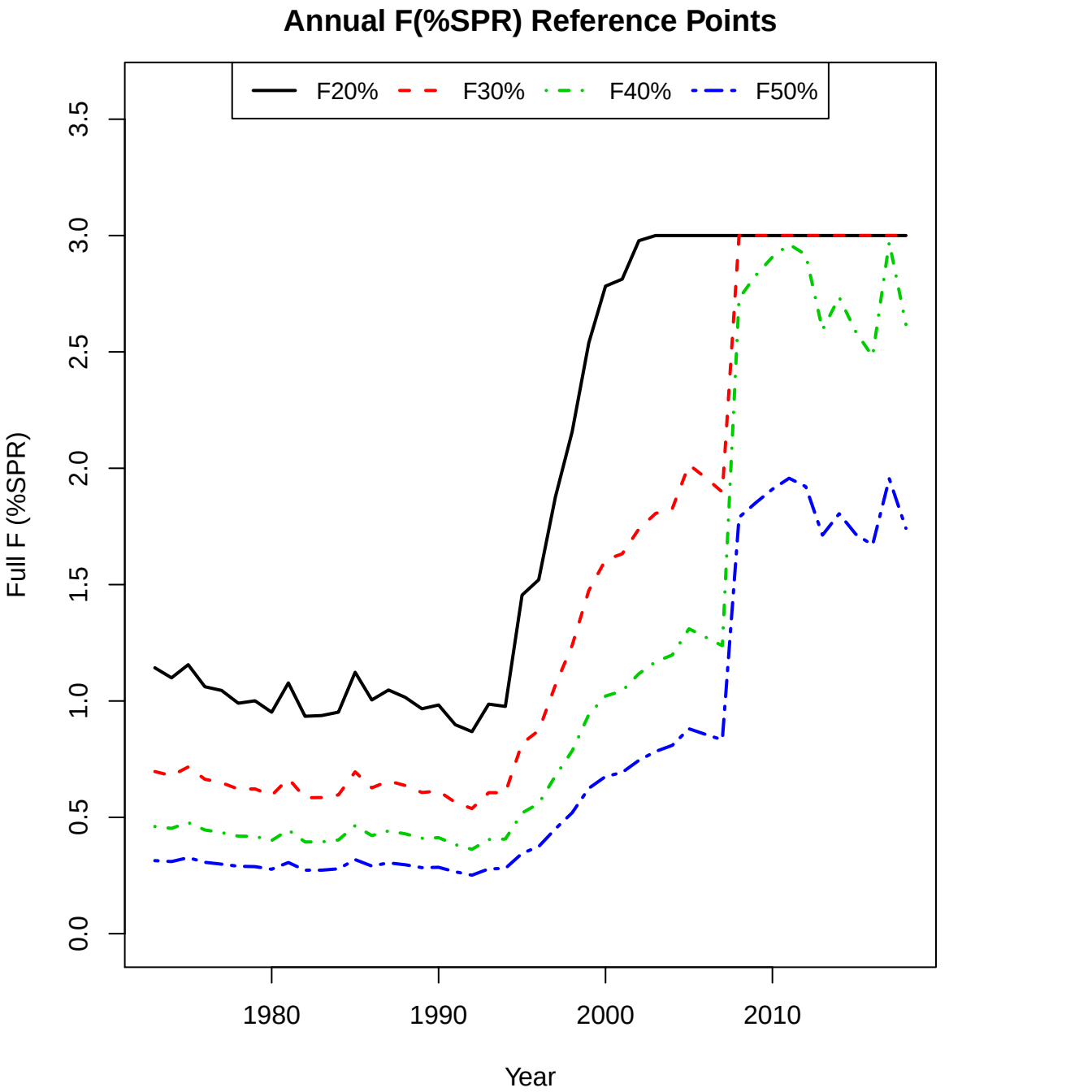
% SPR	F(%SPR)	YPR
0.2	3	0.1321
0.25	3	0.1321
0.3	3	0.1321
0.35	3	0.1321
0.4	2.674	0.129
0.45	2.178	0.1224
0.5	1.7755	0.1149
0.55	1.4438	0.1064
0.6	1.1669	0.0971
0.65	0.9335	0.0871
0.7	0.7352	0.0764
0.75	0.5653	0.065
0.8	0.419	0.0531

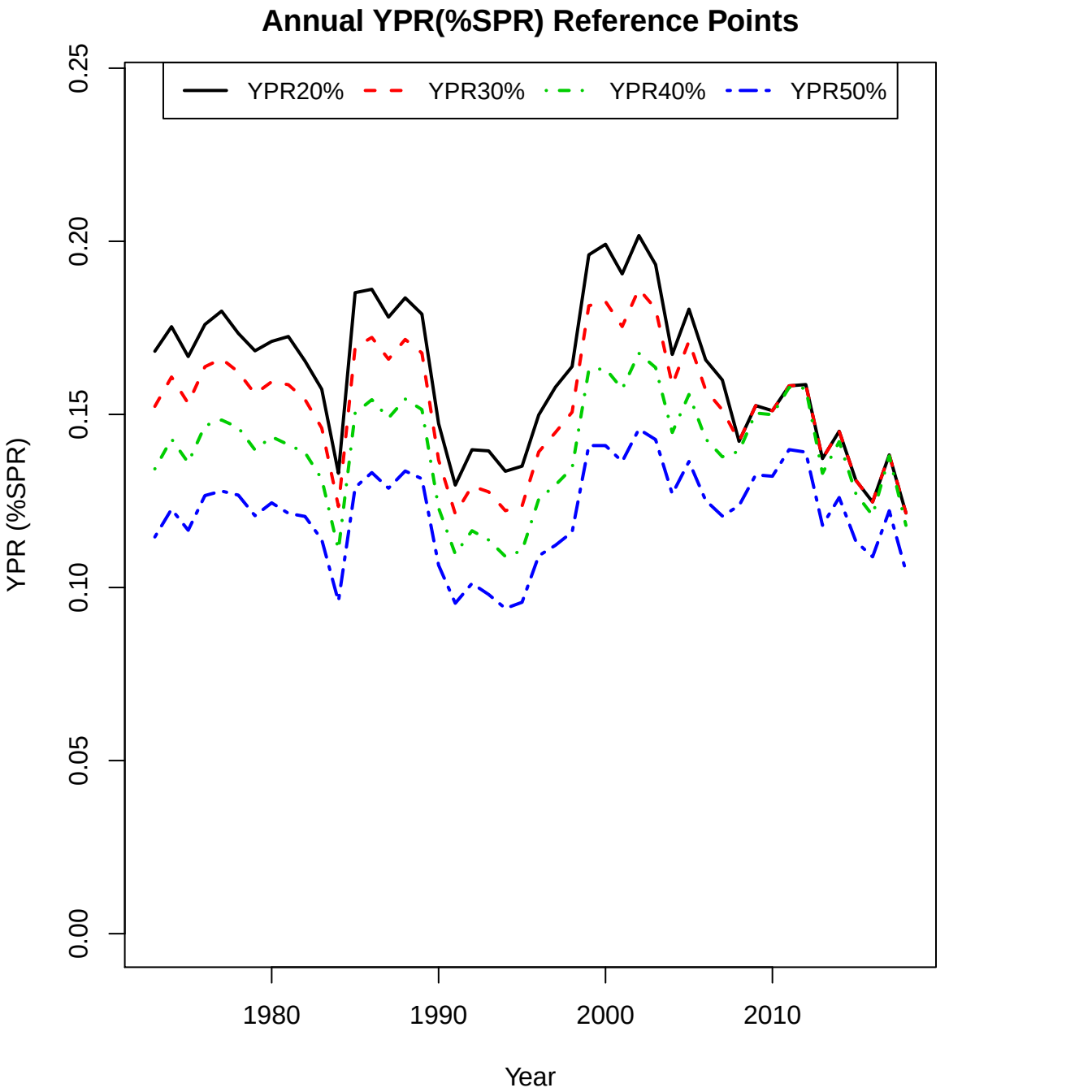

Maturity
Selectivity
Selectivity or Maturity at age
0.0
0.2
0.4
0.6
0.8
1.0
1
2
3
4
5
6
Age


Expected Spawnings and SPR Reference Points (Years Avg = 5)
Expected Spawnings
% SPR
Full F
0.0
0.2
0.4
0.6
0.8
1.0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.0
0.5
1.0
1.5
2.0

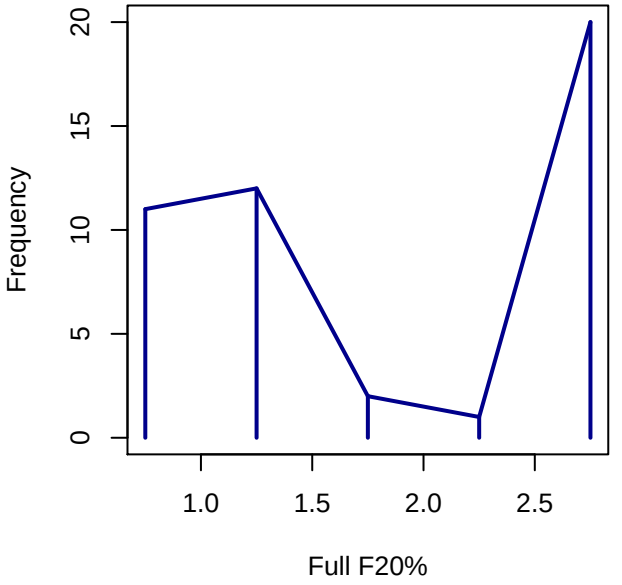
Expected Spawnings & SPR Reference Points (Years Avg = 5)

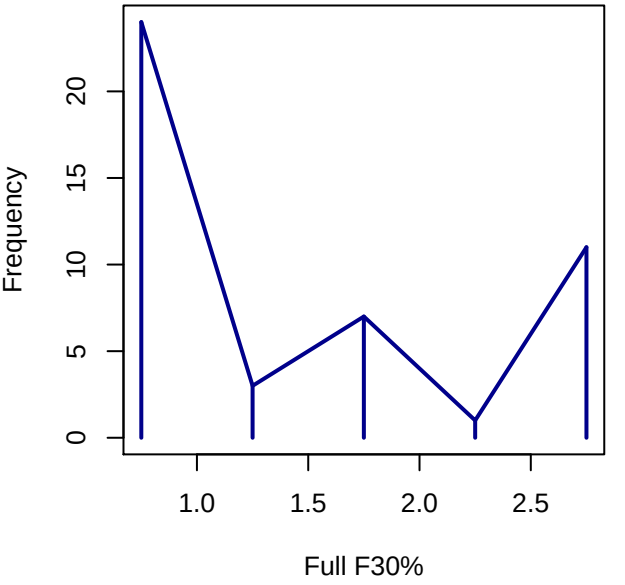
F	E[Sp]	SPR	F	E[Sp]	SPR	F	E[Sp]	SPR
0	0.9103	1	0.35	0.7897	0.8263	0.7	0.7029	0.7097
0.01	0.9061	0.9938	0.36	0.7868	0.8224	0.71	0.7008	0.7069
0.02	0.902	0.9877	0.37	0.784	0.8185	0.72	0.6986	0.7042
0.03	0.898	0.9817	0.38	0.7812	0.8147	0.73	0.6965	0.7014
0.04	0.894	0.9757	0.39	0.7784	0.8108	0.74	0.6944	0.6987
0.05	0.89	0.9699	0.4	0.7757	0.8071	0.75	0.6923	0.696
0.06	0.8861	0.9641	0.41	0.773	0.8033	0.76	0.6903	0.6933
0.07	0.8823	0.9584	0.42	0.7703	0.7996	0.77	0.6882	0.6906
0.08	0.8784	0.9528	0.43	0.7676	0.796	0.78	0.6862	0.688
0.09	0.8747	0.9473	0.44	0.7649	0.7924	0.79	0.6841	0.6854
0.1	0.8709	0.9419	0.45	0.7623	0.7888	0.8	0.6821	0.6828
0.11	0.8673	0.9365	0.46	0.7597	0.7852	0.81	0.6801	0.6802
0.12	0.8636	0.9312	0.47	0.7571	0.7817	0.82	0.6781	0.6776
0.13	0.86	0.926	0.48	0.7545	0.7783	0.83	0.6762	0.6751
0.14	0.8565	0.9208	0.49	0.752	0.7748	0.84	0.6742	0.6726
0.15	0.8529	0.9157	0.5	0.7494	0.7714	0.85	0.6722	0.6701
0.16	0.8495	0.9107	0.51	0.7469	0.7681	0.86	0.6703	0.6676
0.17	0.846	0.9058	0.52	0.7445	0.7647	0.87	0.6684	0.6652
0.18	0.8426	0.9009	0.53	0.742	0.7614	0.88	0.6665	0.6627
0.19	0.8392	0.8961	0.54	0.7396	0.7581	0.89	0.6646	0.6603
0.2	0.8359	0.8913	0.55	0.7371	0.7549	0.9	0.6627	0.6579
0.21	0.8326	0.8866	0.56	0.7347	0.7517	0.91	0.6608	0.6555
0.22	0.8293	0.8819	0.57	0.7323	0.7485	0.92	0.659	0.6532
0.23	0.8261	0.8773	0.58	0.73	0.7454	0.93	0.6571	0.6508
0.24	0.8229	0.8728	0.59	0.7276	0.7423	0.94	0.6553	0.6485
0.25	0.8197	0.8683	0.6	0.7253	0.7392	0.95	0.6534	0.6462
0.26	0.8166	0.8639	0.61	0.723	0.7361	0.96	0.6516	0.6439
0.27	0.8135	0.8595	0.62	0.7207	0.7331	0.97	0.6498	0.6416
0.28	0.8104	0.8552	0.63	0.7184	0.7301	0.98	0.648	0.6394
0.29	0.8074	0.851	0.64	0.7161	0.7271	0.99	0.6463	0.6371
0.3	0.8044	0.8467	0.65	0.7139	0.7241	1	0.6445	0.6349
0.31	0.8014	0.8426	0.66	0.7117	0.7212	1.01	0.6427	0.6327
0.32	0.7984	0.8384	0.67	0.7095	0.7183	1.02	0.641	0.6305
0.33	0.7955	0.8344	0.68	0.7073	0.7154	1.03	0.6392	0.6283
0.34	0.7926	0.8303	0.69	0.7051	0.7126	1.04	0.6375	0.6262

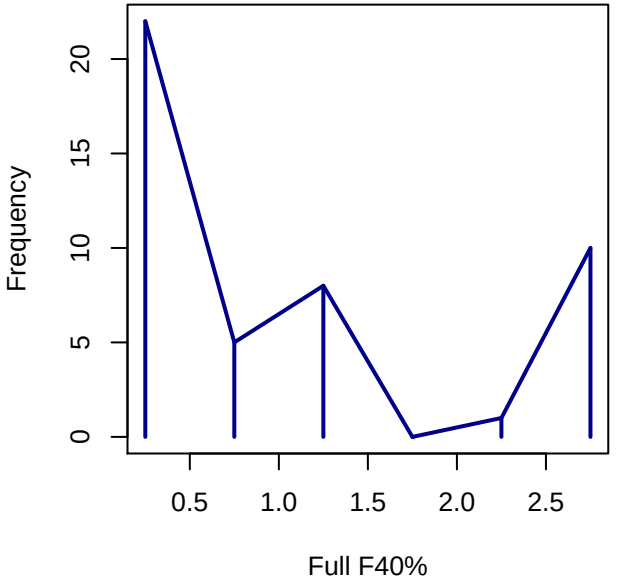

Annual F(%SPR) Reference Points
F20%
F30%
F40%
F50%
Full F (%SPR)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
1980
1990
2000
2010
Year

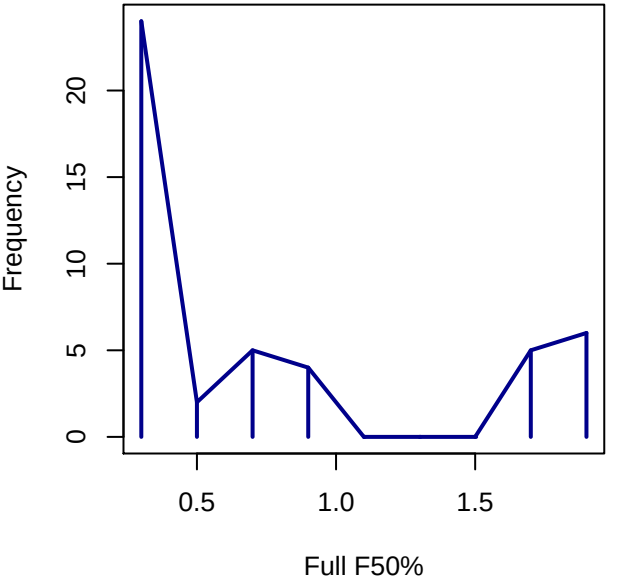

Annual YPR(%SPR) Reference Points
YPR20%
YPR30%
YPR40%
YPR50%
YPR (%SPR)
0.00
0.05
0.10
0.15
0.20
0.25
1980
1990
2000
2010
Year

Annual F (%SPR) Reference Points

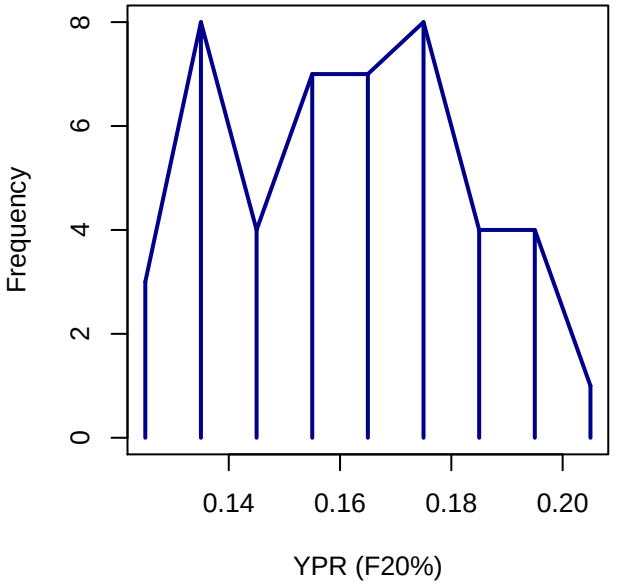


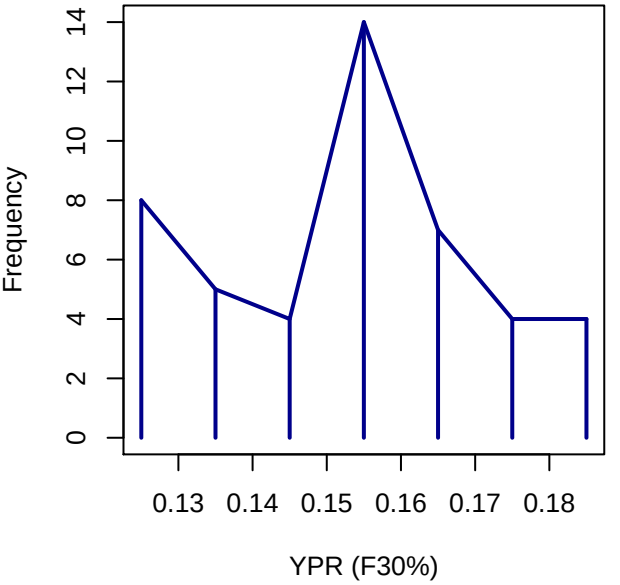


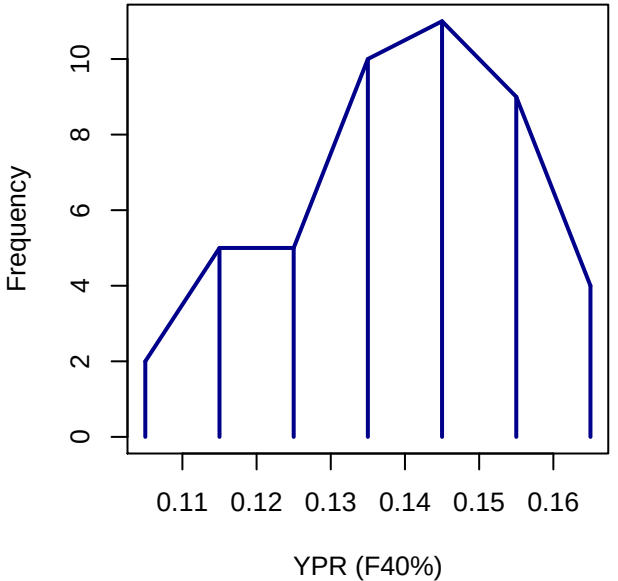


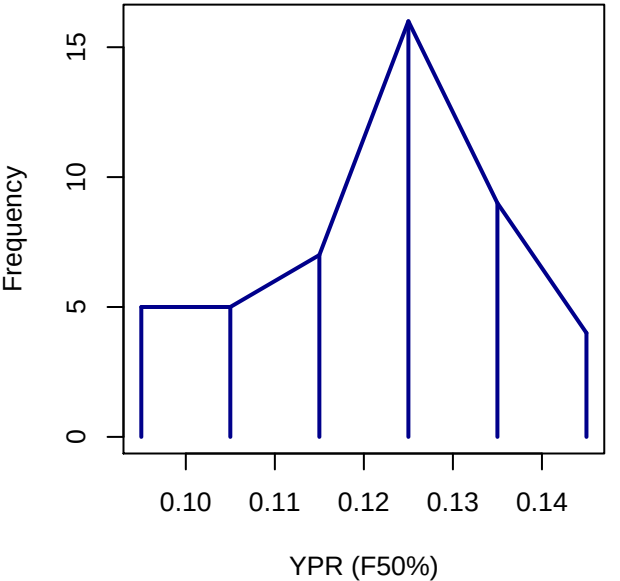


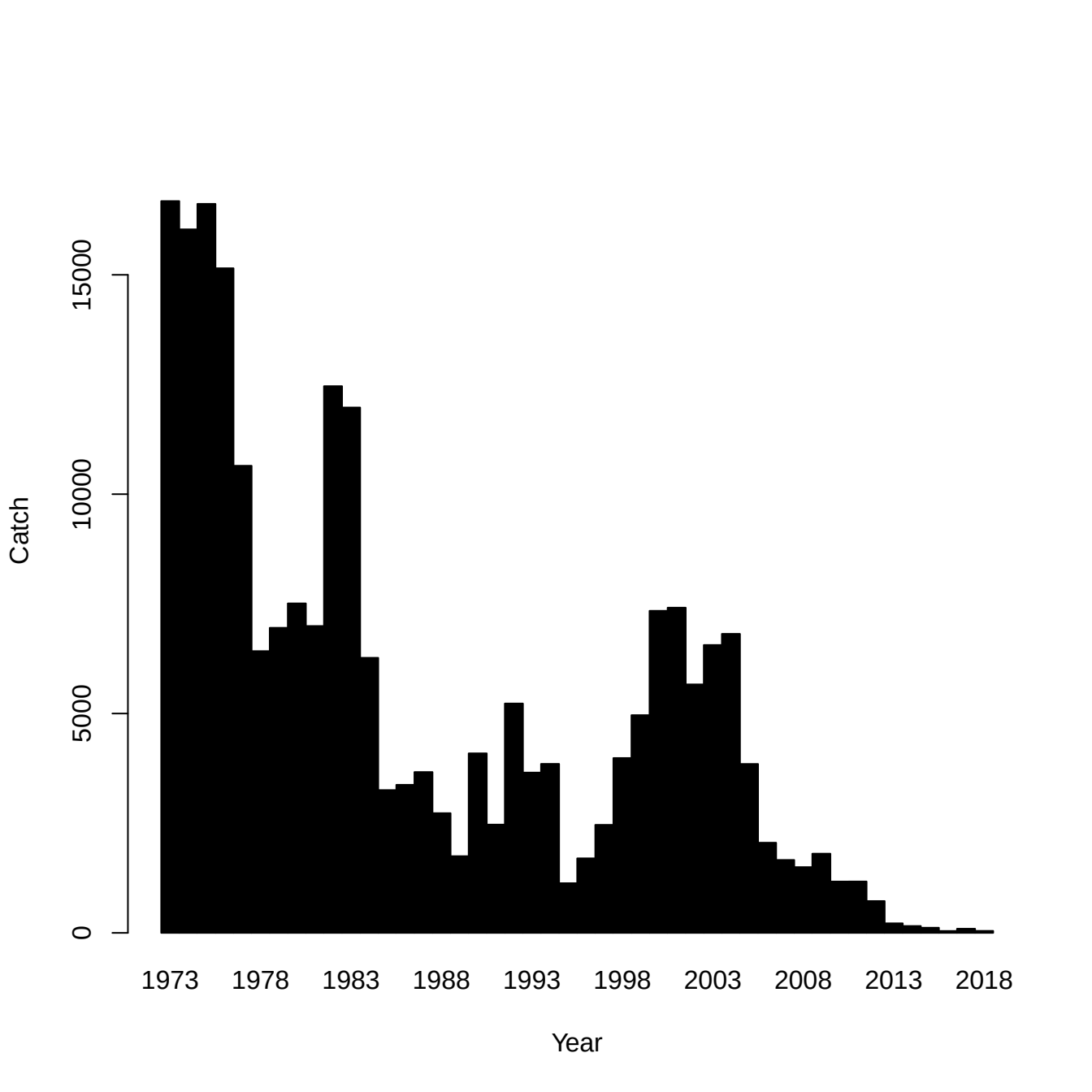
Annual YPR (%SPR) Reference Points

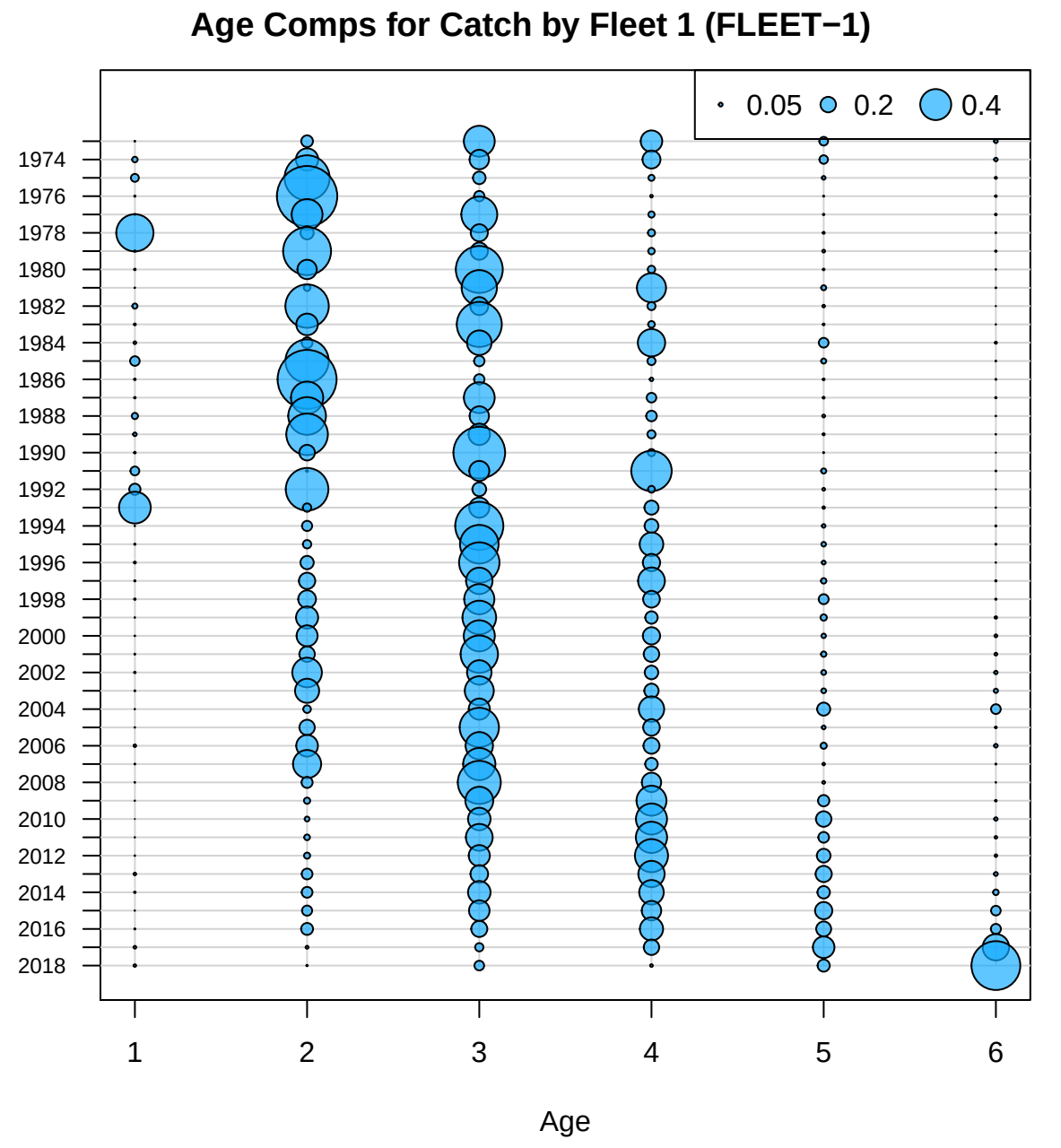


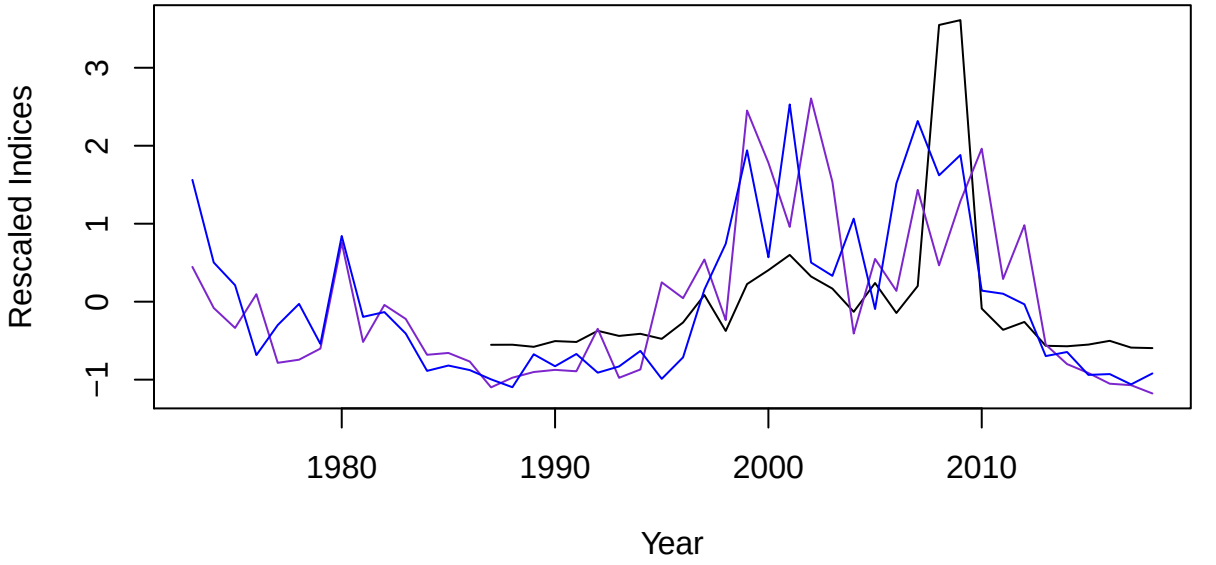


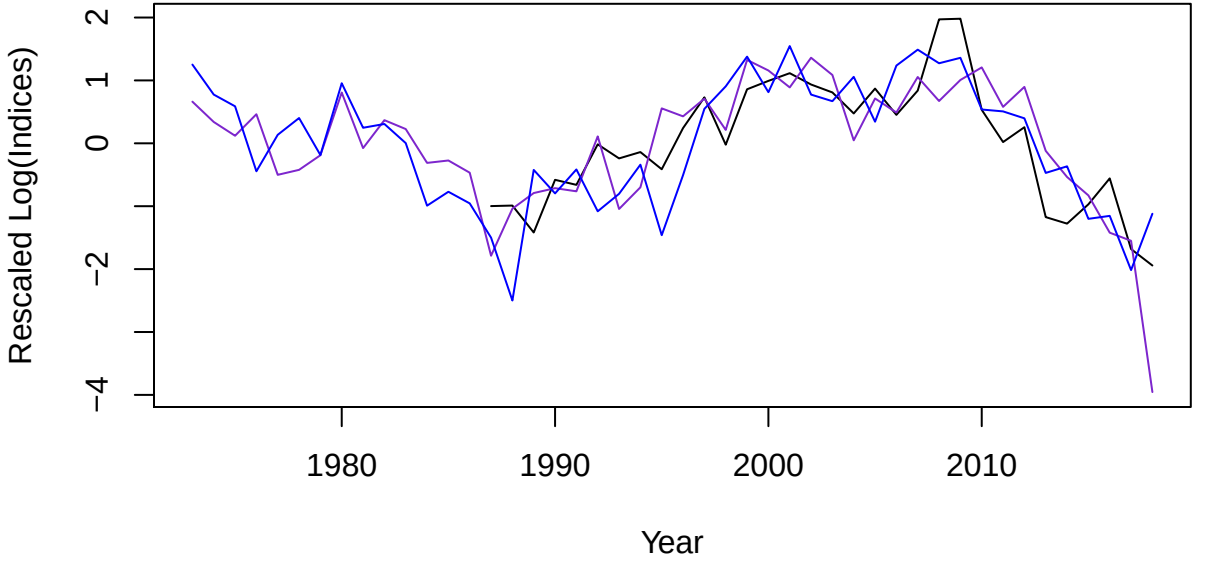


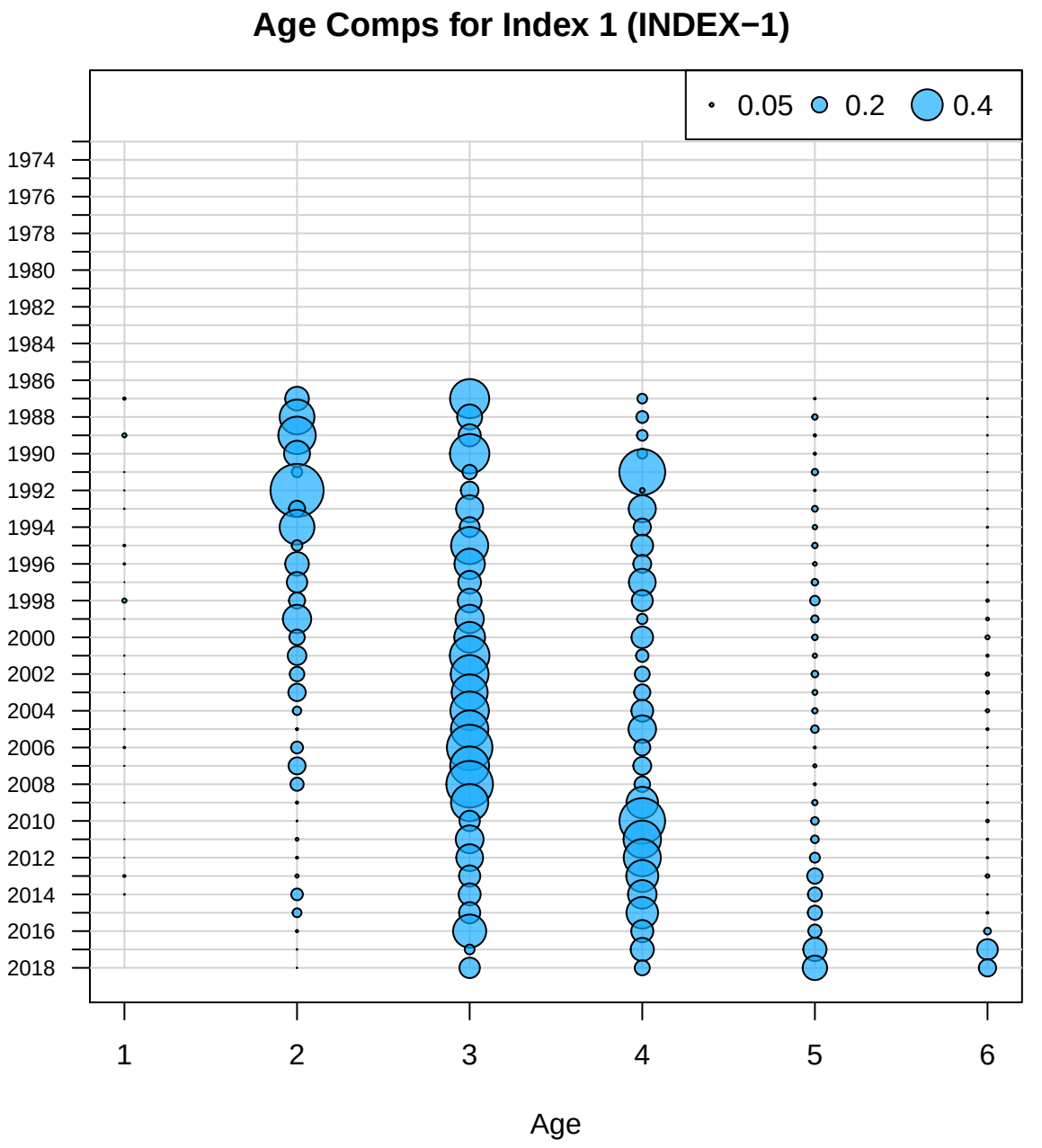


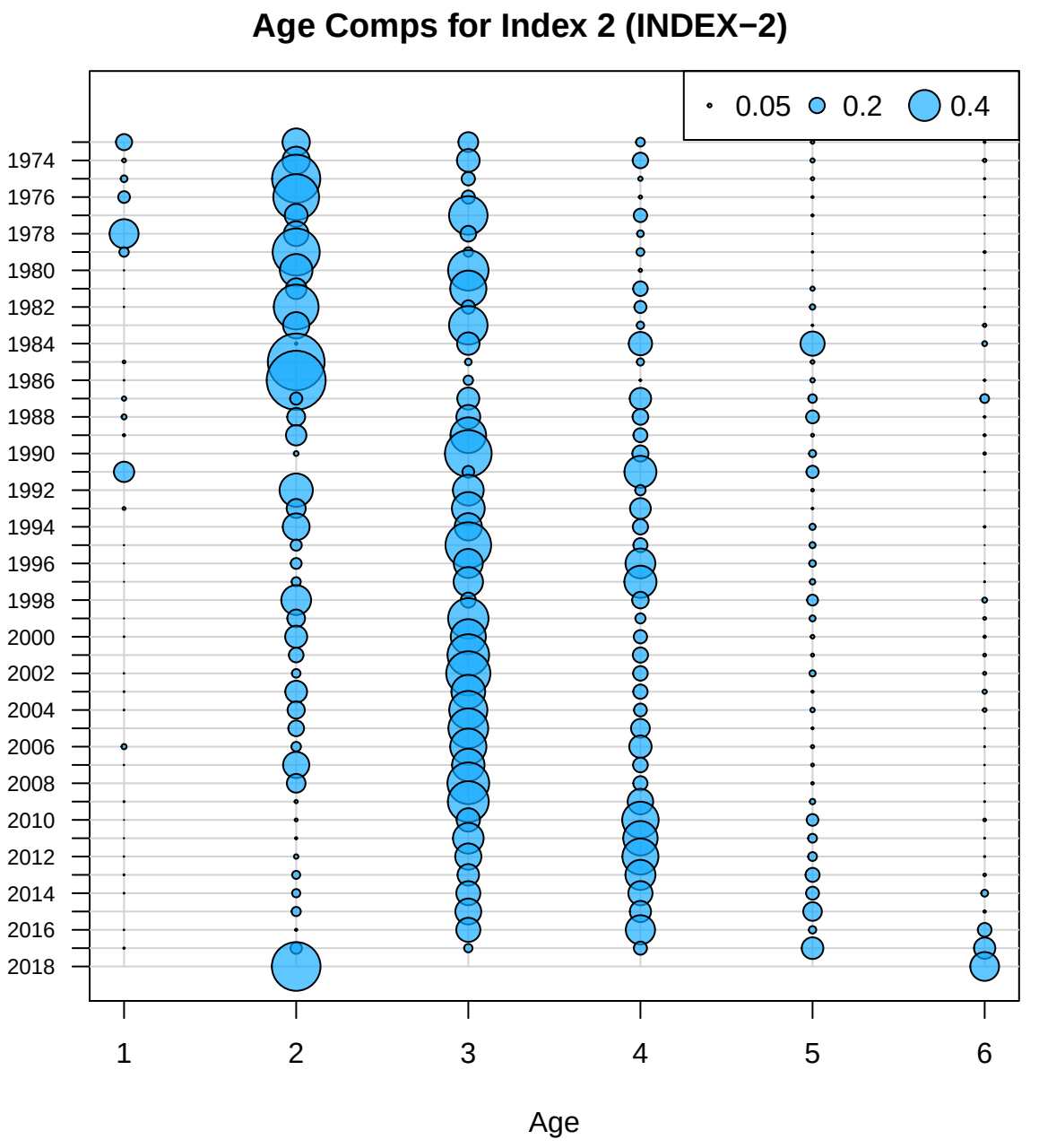

Catch
0
5000
10000
15000
1973
1978
1983
1988
1993
1998
2003
2008
2013
2018
Year

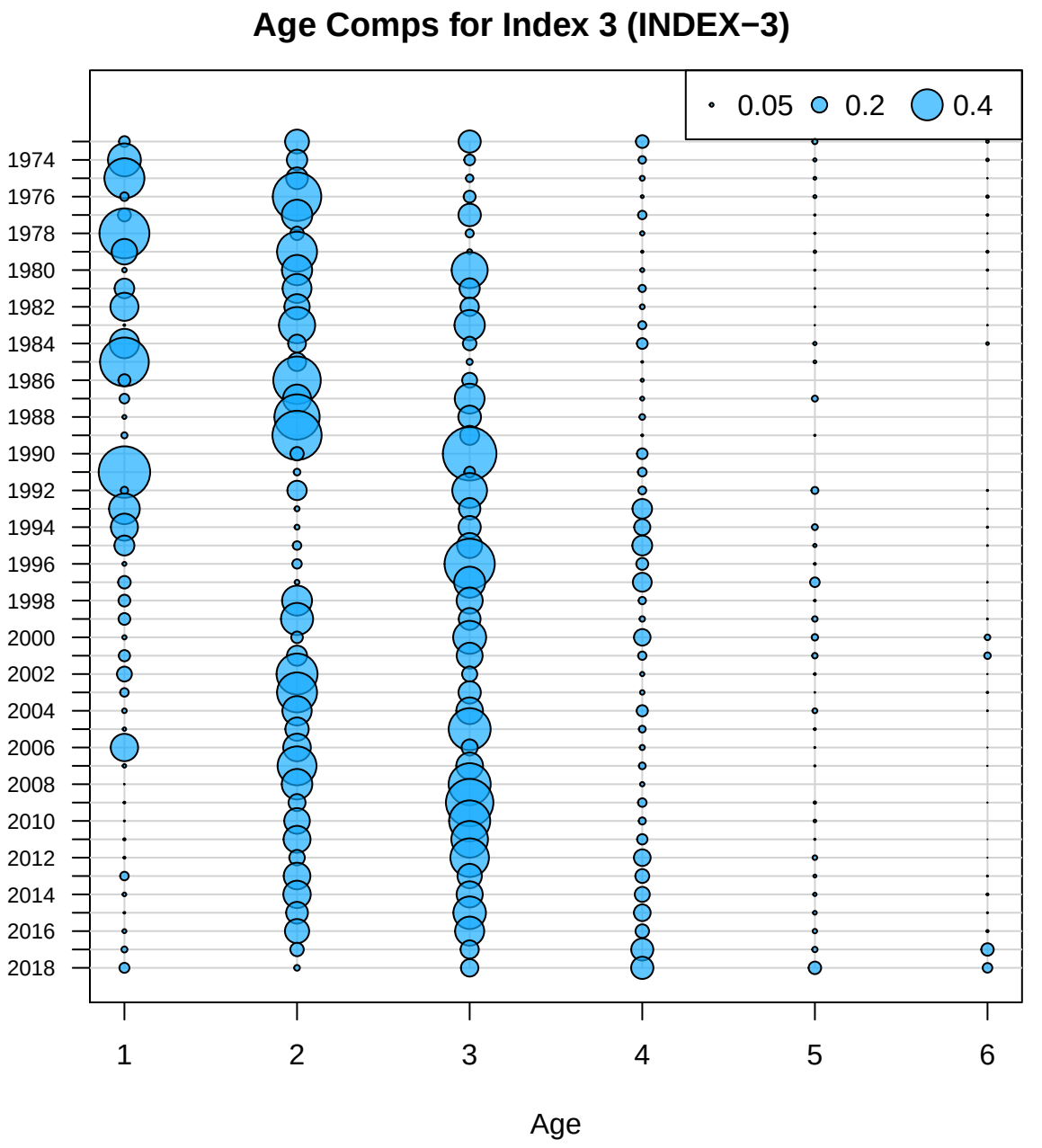

Age Comps for Catch by Fleet 1 (FLEET−1)
0.05
0.2
0.4
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
1
2
3
4
5
6
Age

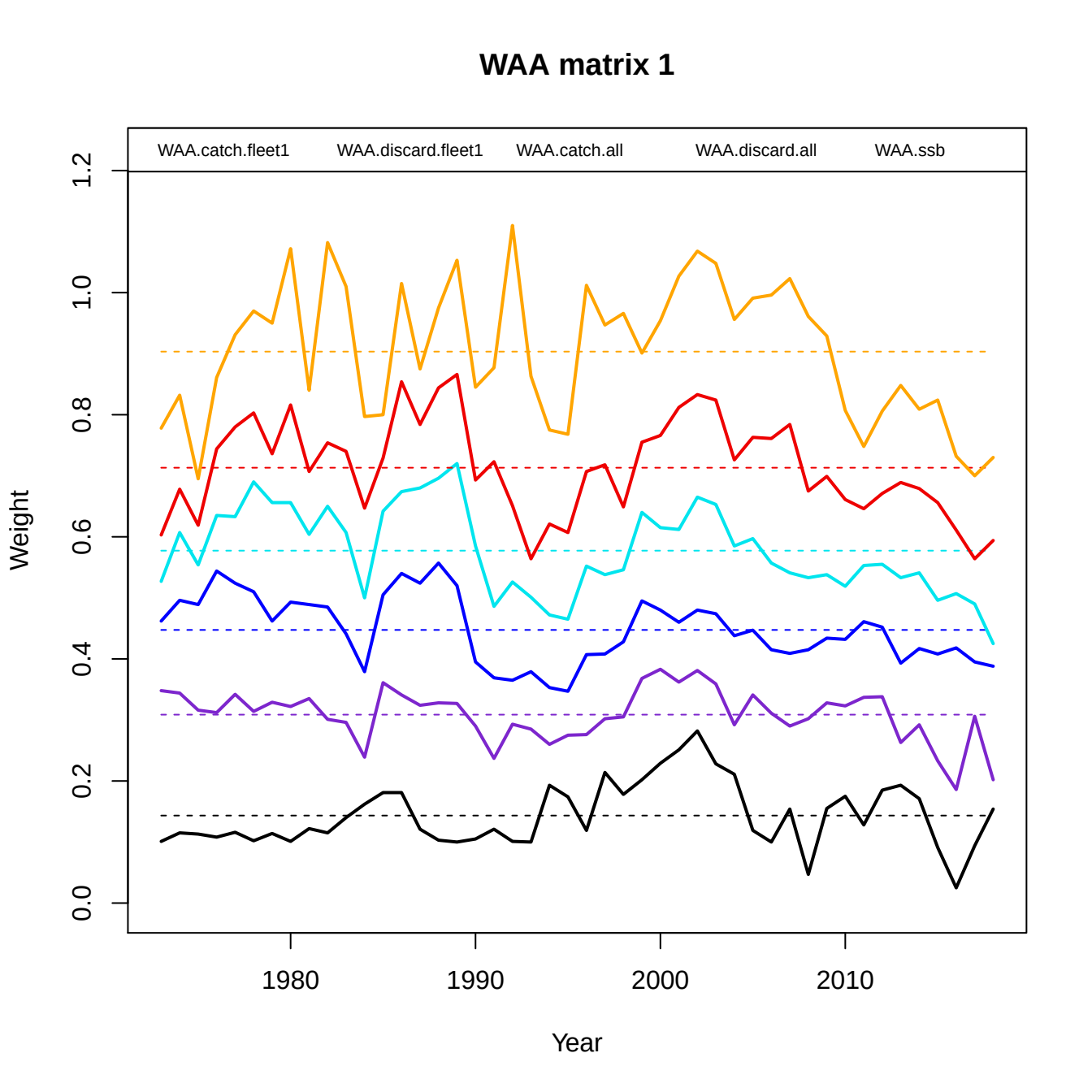

Rescaled Indices
3
2
1
0
−1
1980
1990
2000
2010
Year

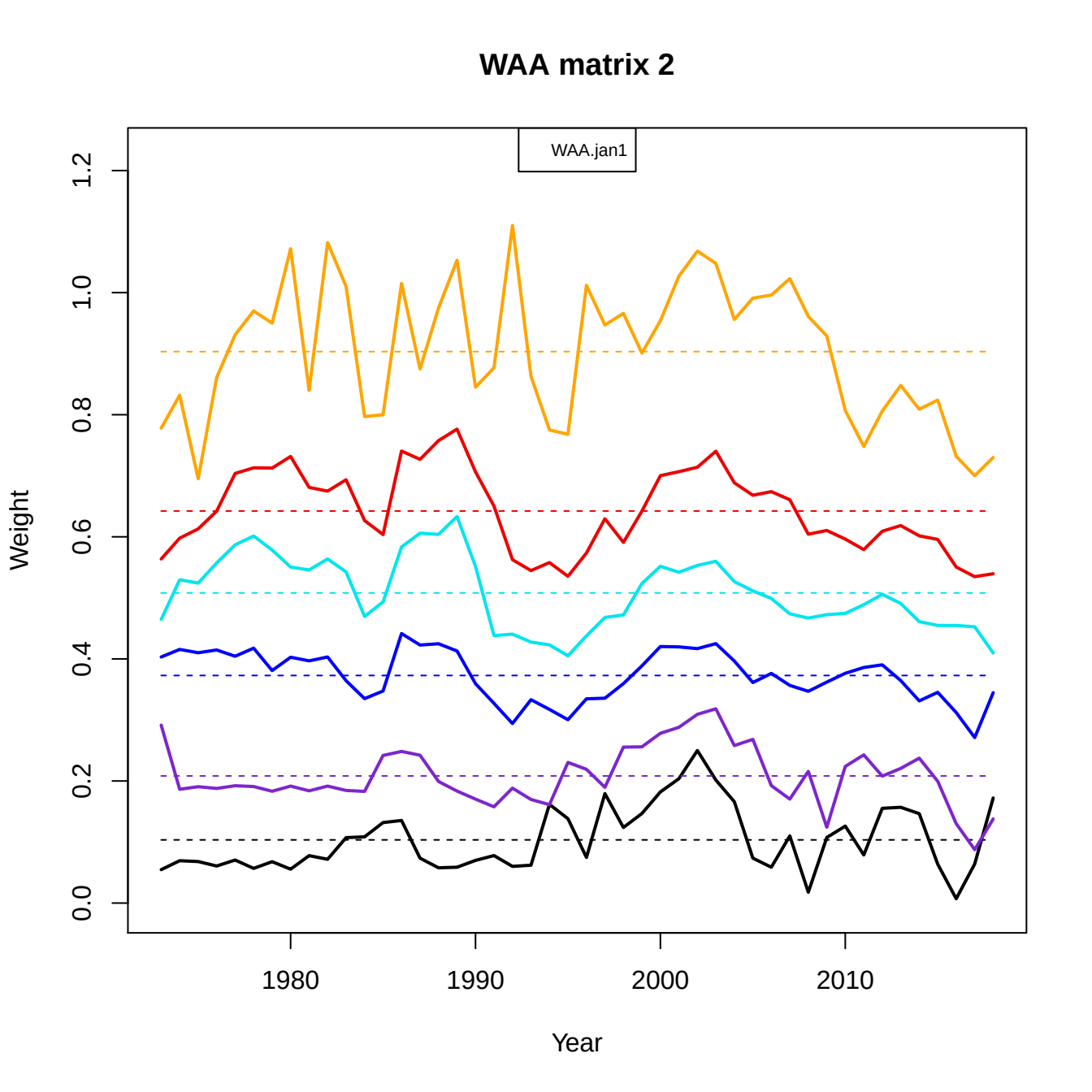

Rescaled Log(Indices)
2
1
0
−2
−4
1980
1990
2000
2010
Year

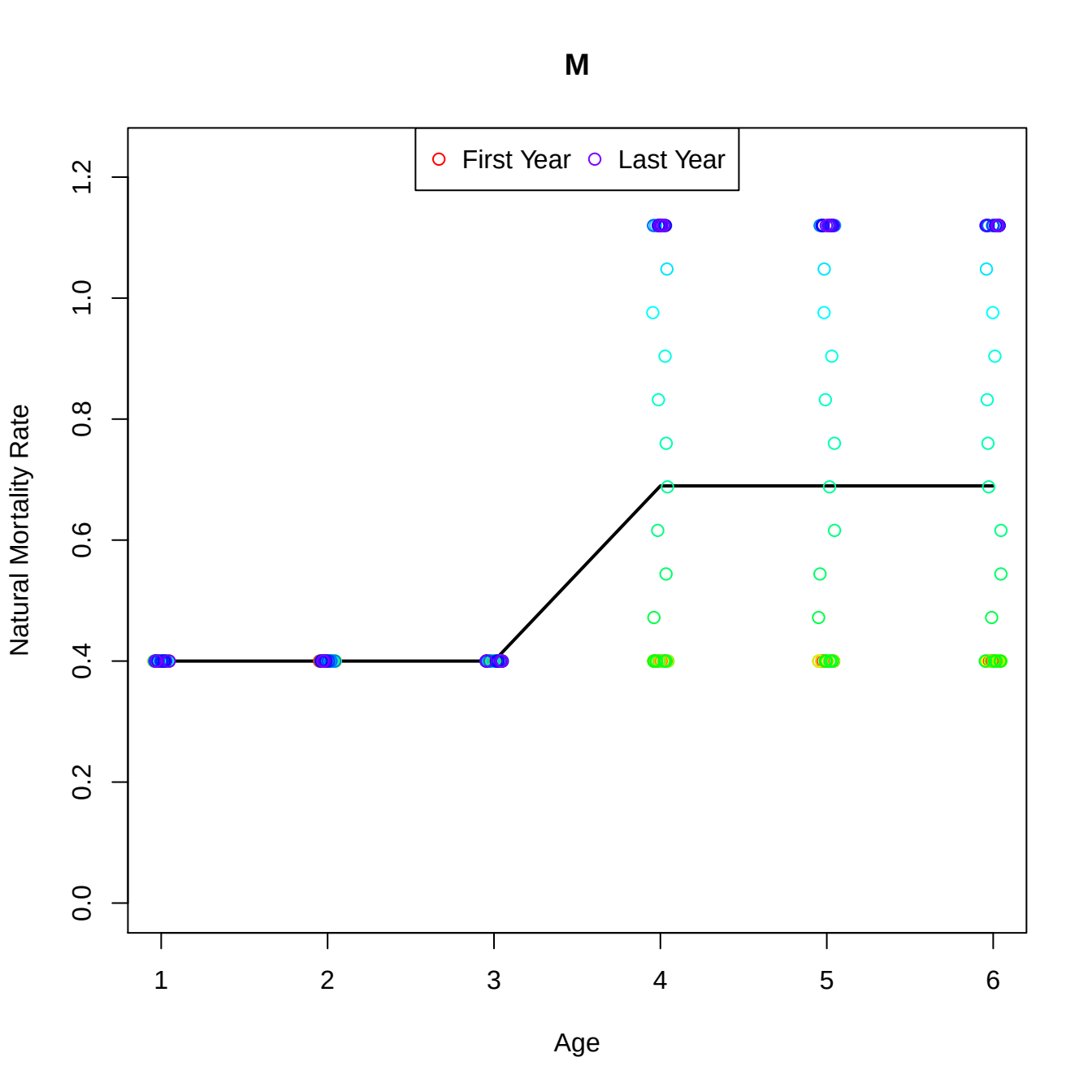

Age Comps for Index 1 (INDEX−1)
0.05
0.2
0.4
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
1
2
3
4
5
6
Age

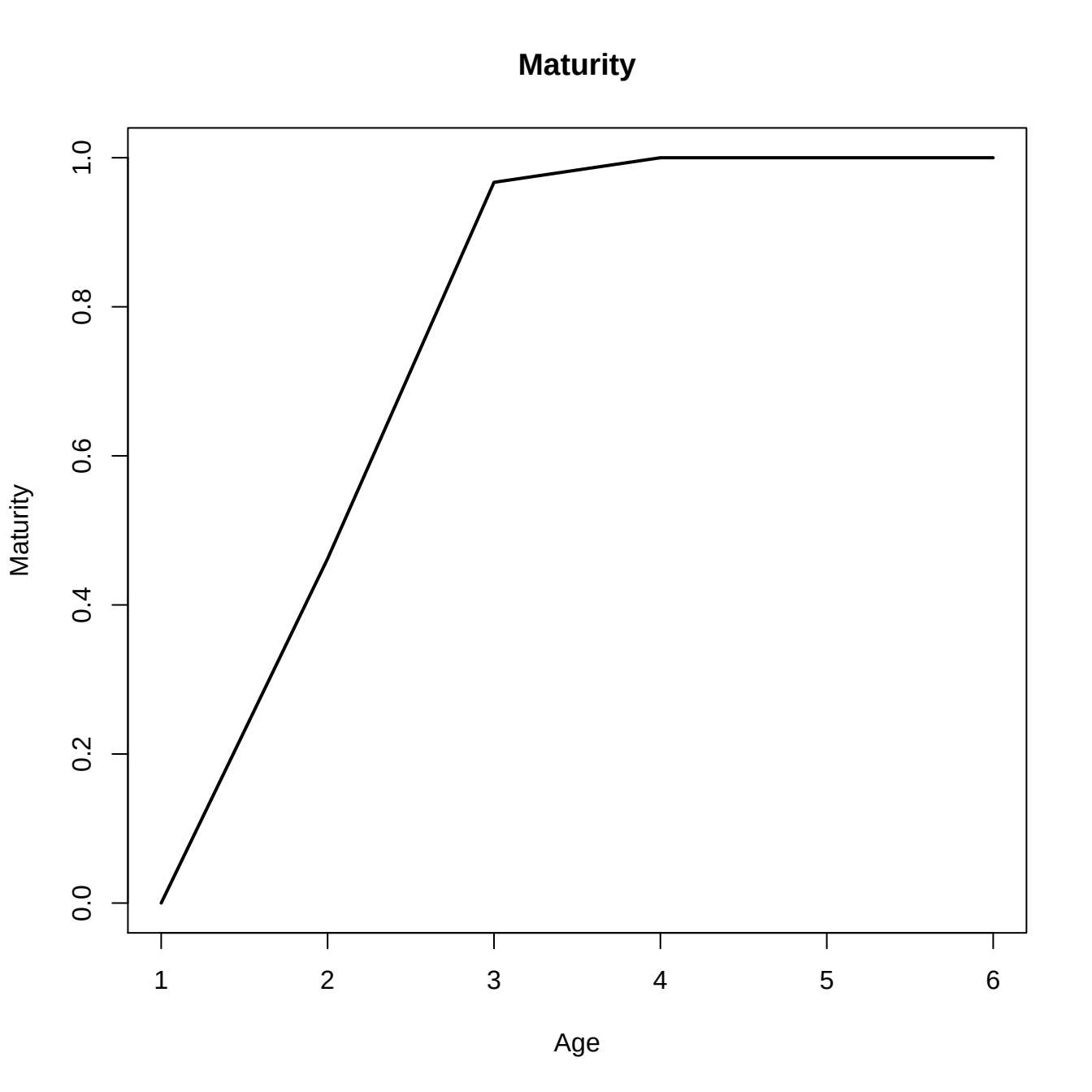

Age Comps for Index 2 (INDEX−2)
0.05
0.2
0.4
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
1
2
3
4
5
6
Age


Age Comps for Index 3 (INDEX−3)
0.05
0.2
0.4
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
1
2
3
4
5
6
Age


WAA matrix 1
WAA.catch.fleet1
WAA.discard.fleet1
WAA.catch.all
WAA.discard.all
WAA.ssb
Weight
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1980
1990
2000
2010
Year


WAA matrix 2
WAA.jan1
Weight
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1980
1990
2000
2010
Year


M
First Year
Last Year
Natural Mortality Rate
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1
2
3
4
5
6
Age


Maturity
Maturity
0.0
0.2
0.4
0.6
0.8
1.0
1
2
3
4
5
6
Age