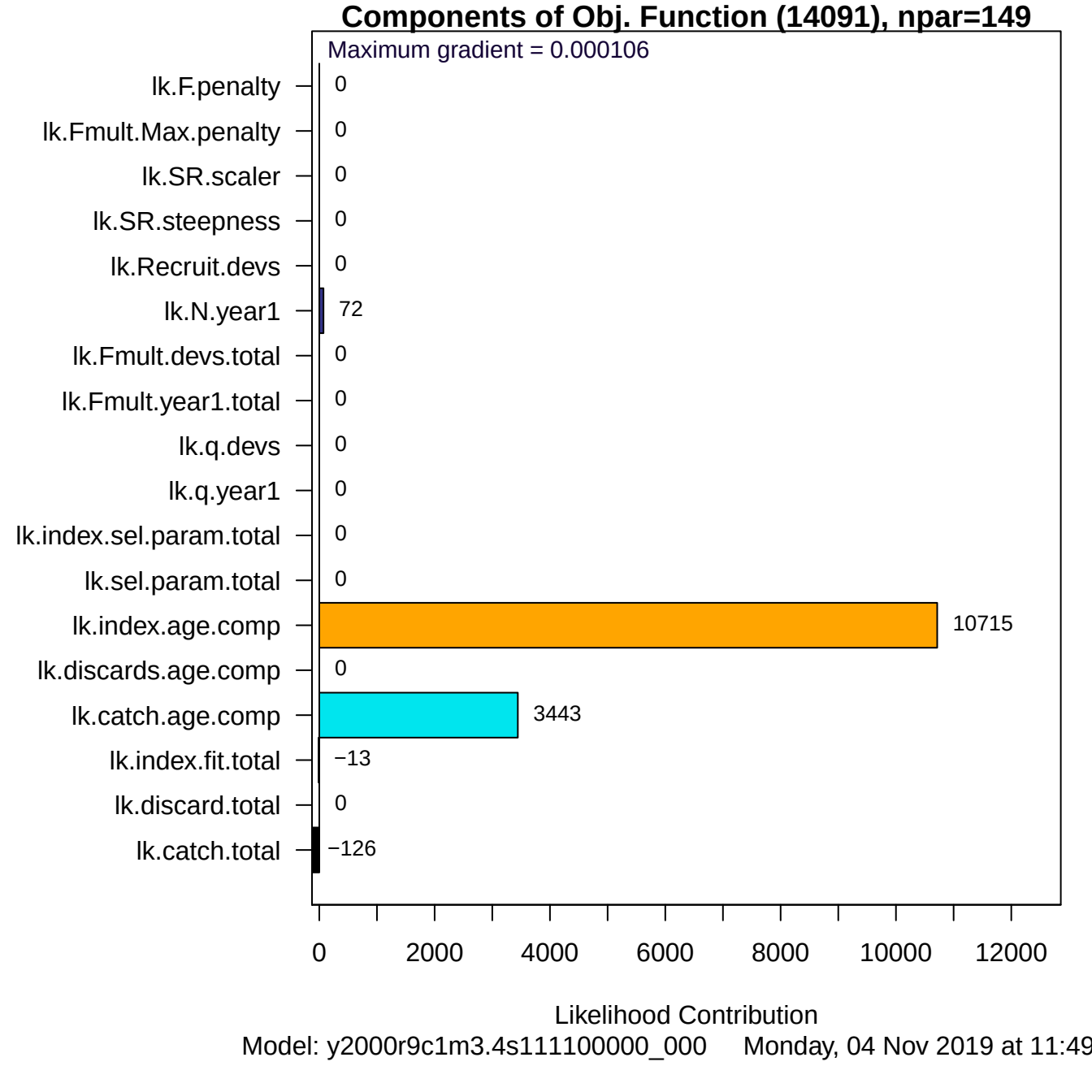
File = y2000r9c1m3.4s111100000_000.dat

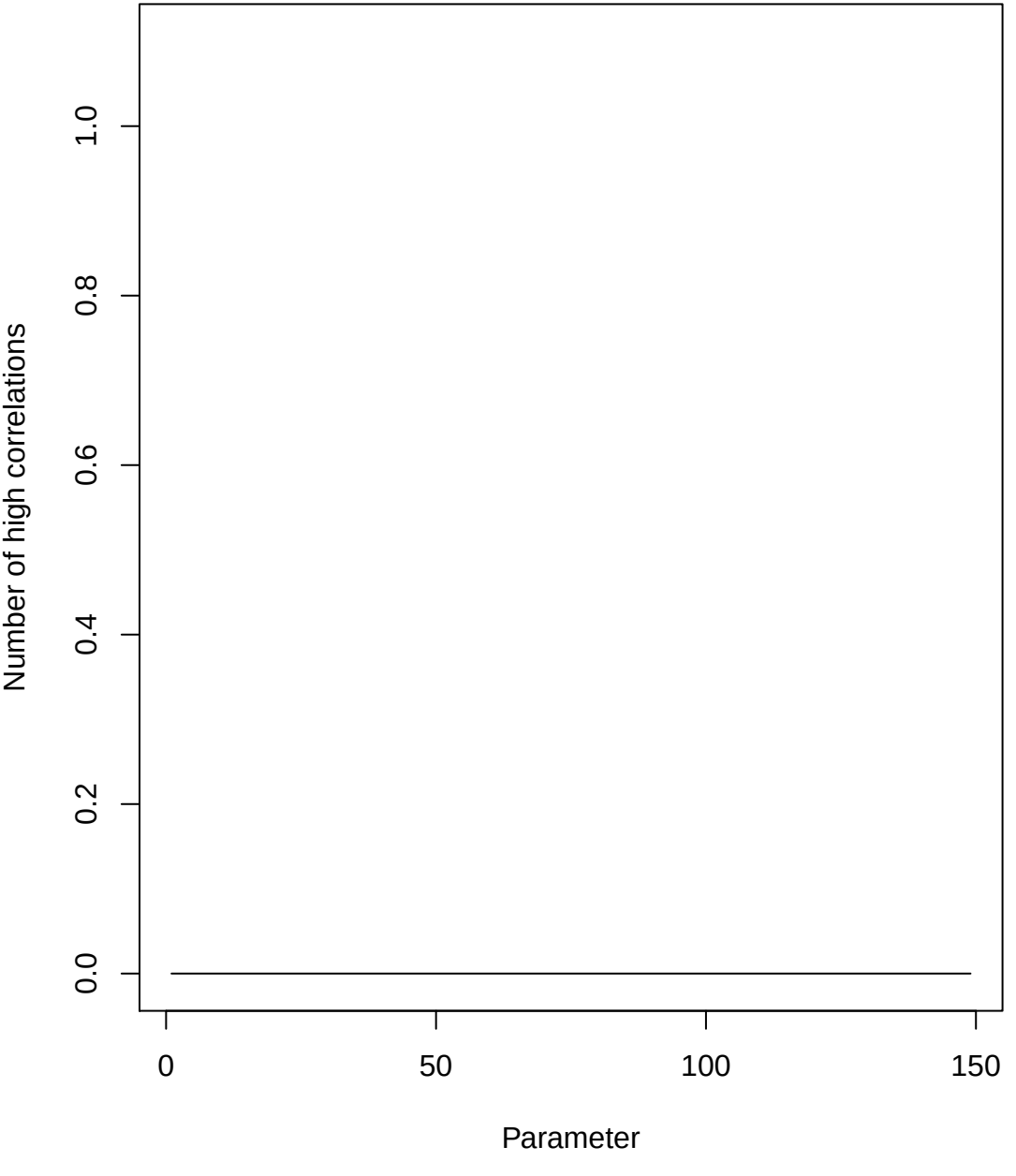
ASAP3 run on Monday, 04 Nov 2019 at 11:49:33

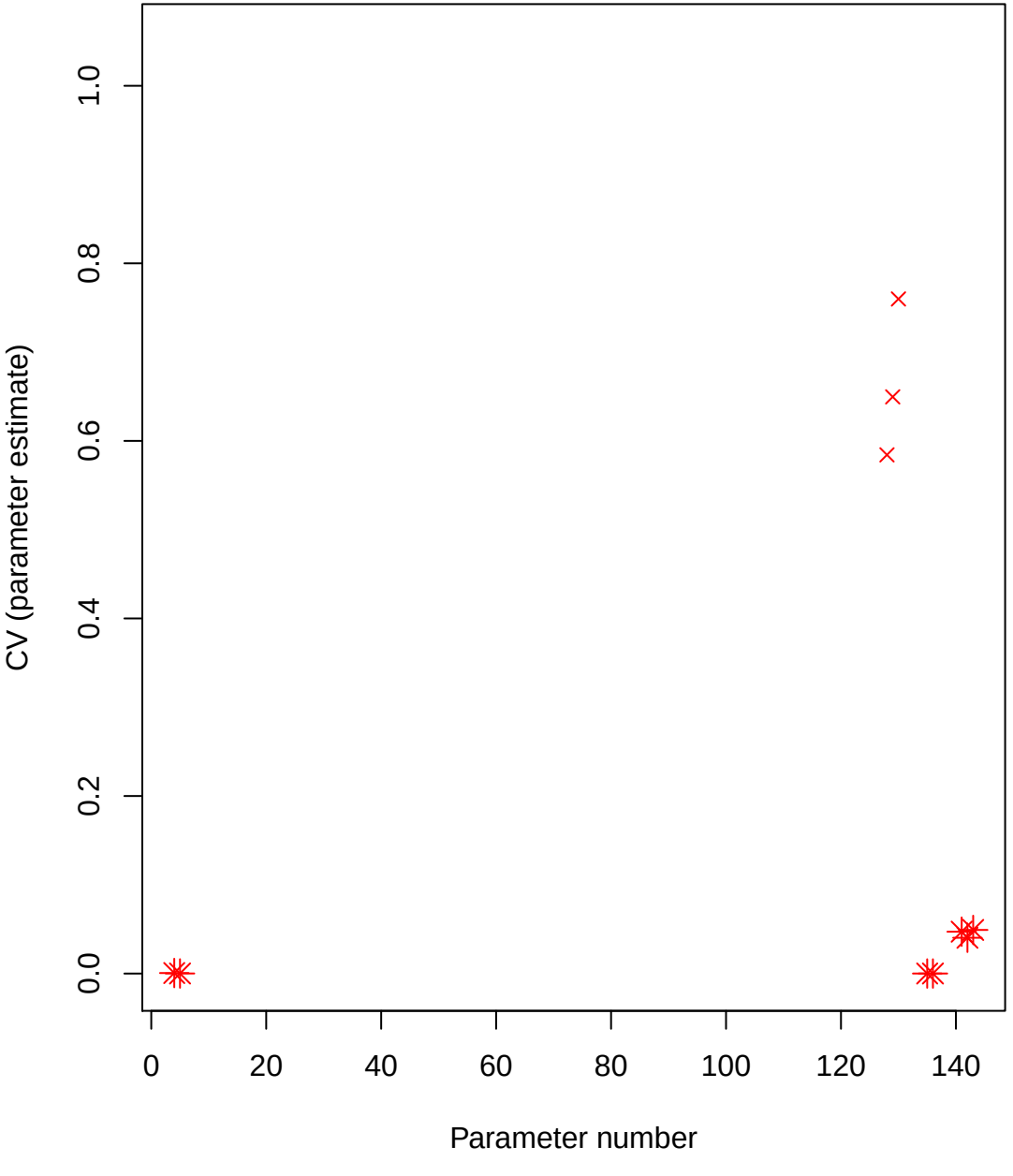
:chris.legault\Documents\Working\ICES−WKFORBIAS 2019\WhiteHake\Rose\w

ASAPplots version = 0.2.14

npar = 149, maximum gradient = 0.000105864

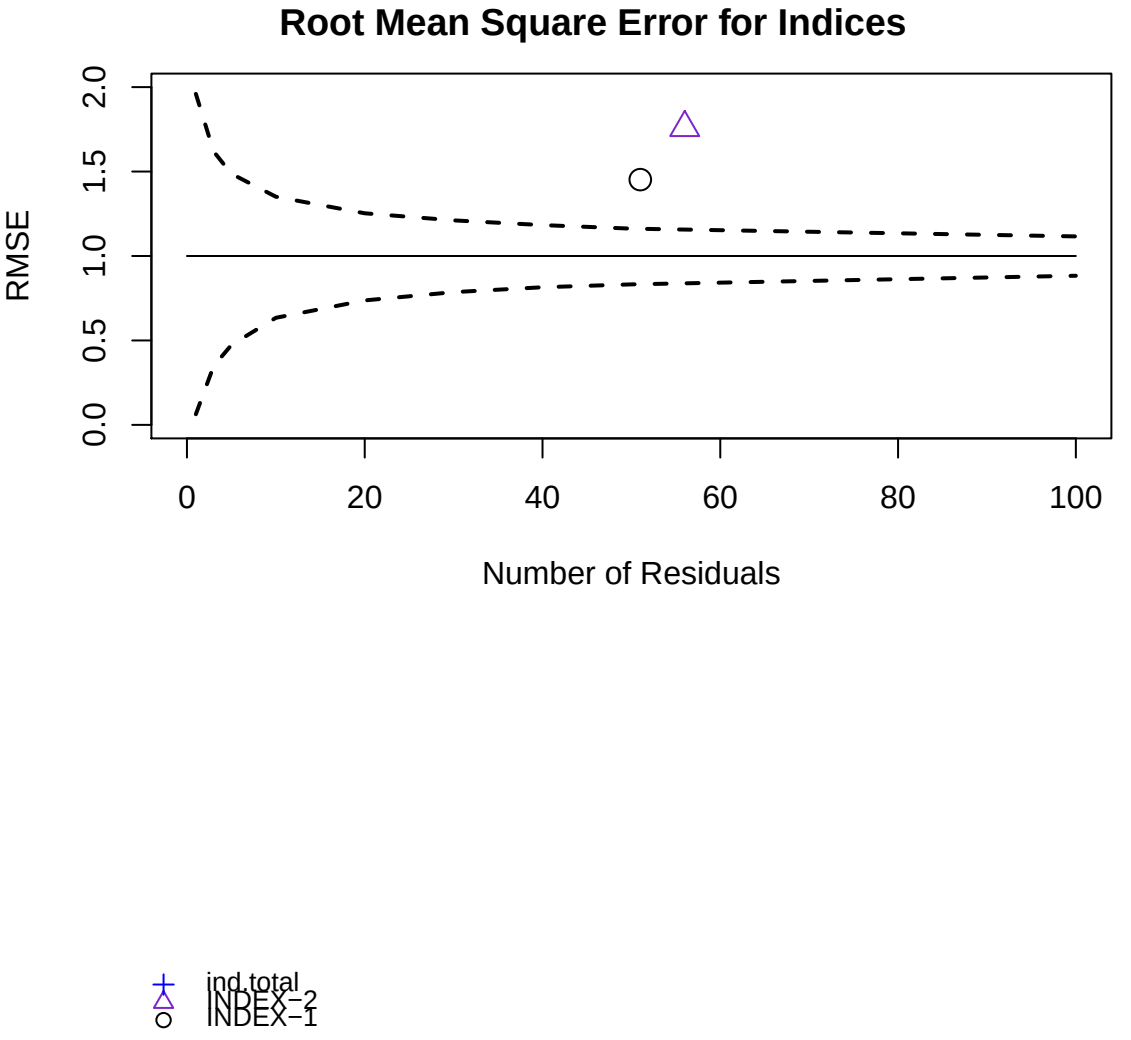

Components of Obj. Function (14091), npar=149
Maximum gradient = 0.000106
lk.F.penalty
lk.Fmult.Max.penalty
lk.SR.scaler
lk.SR.steepness
lk.Recruit.devs
lk.N.year1
lk.Fmult.devs.total
lk.Fmult.year1.total
lk.q.devs
lk.q.year1
lk.index.sel.param.total
lk.sel.param.total
lk.index.age.comp
lk.discards.age.comp
lk.catch.age.comp
lk.index.fit.total
lk.discard.total
lk.catch.total
0
0
0
0
0
72
0
0
0
0
0
0
10715
0
3443
−13
0
−126
0
2000
4000
6000
8000
10000
12000
Likelihood Contribution
Model: y2000r9c1m3.4s111100000_000
Monday, 04 Nov 2019 at 11:49

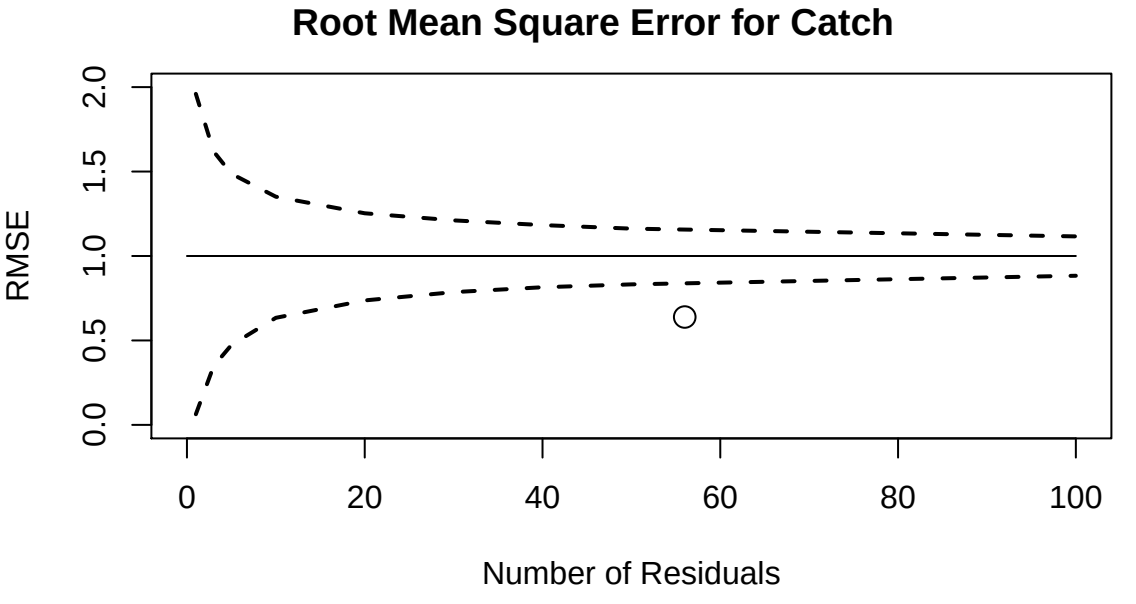

Number of high correlations
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
Parameter

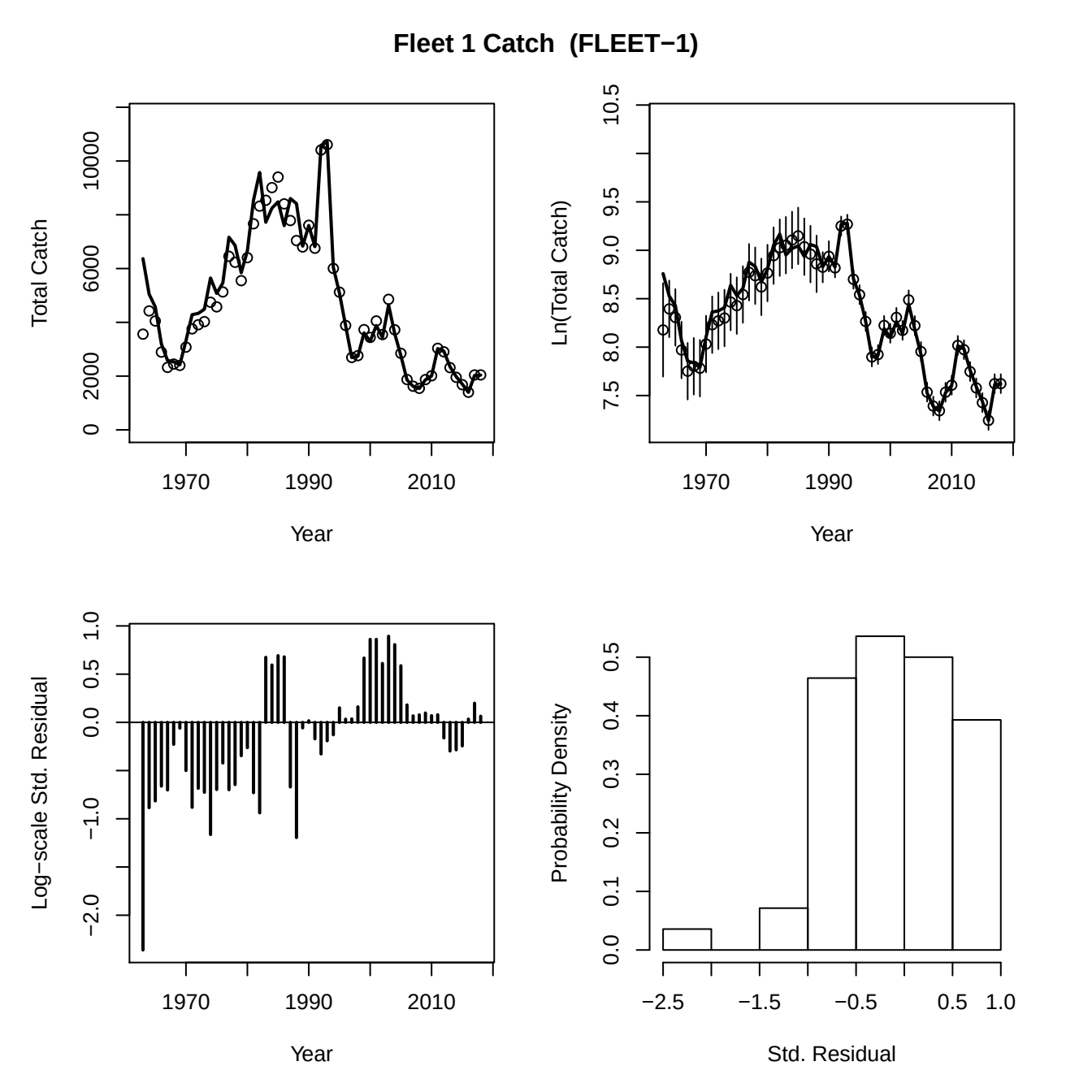

CV (parameter estimate)
0.0
0.2
0.4
0.6
0.8
1.0
0
20
40
60
80
100
120
140
Parameter number

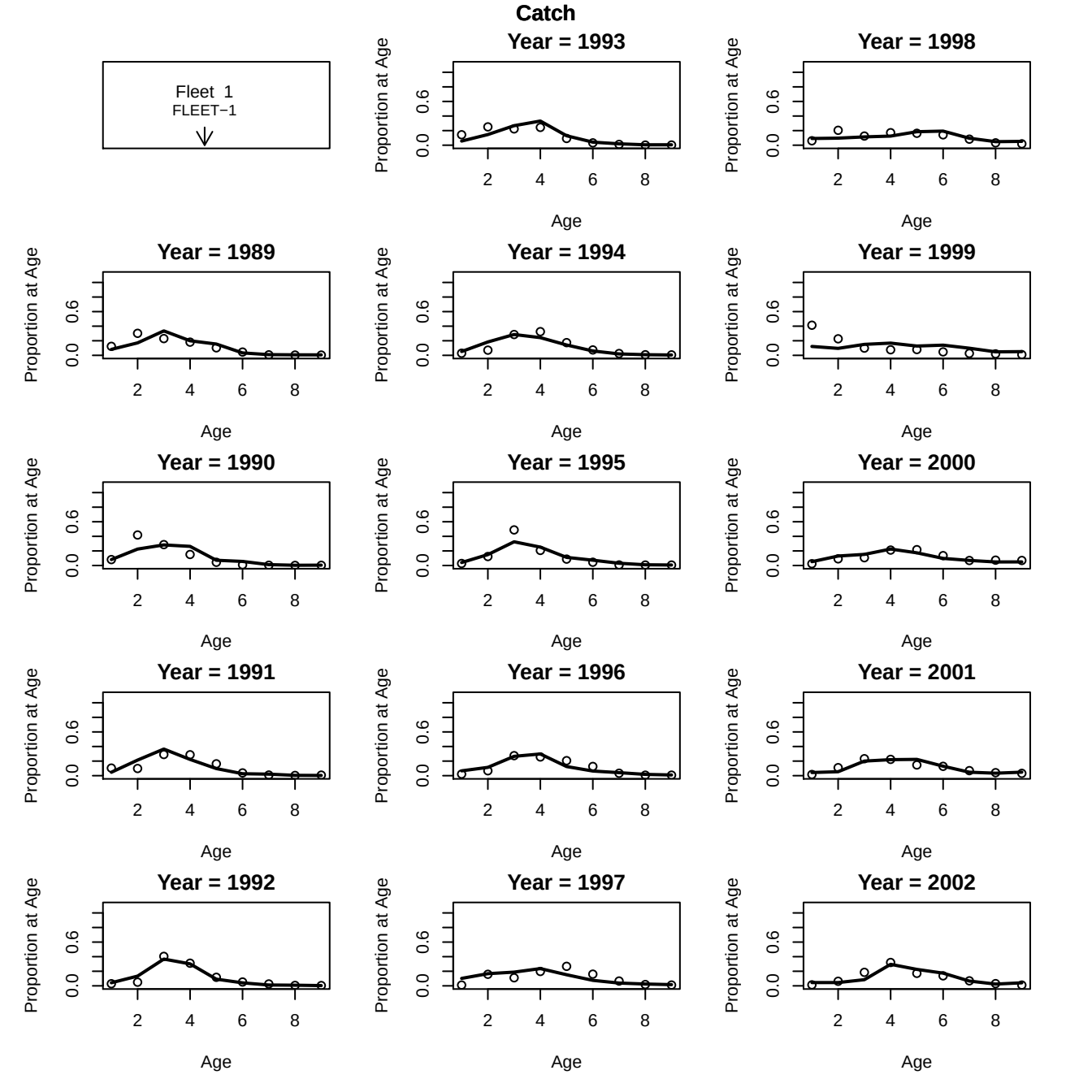
Root Mean Square Error computed from Standardized Residuals

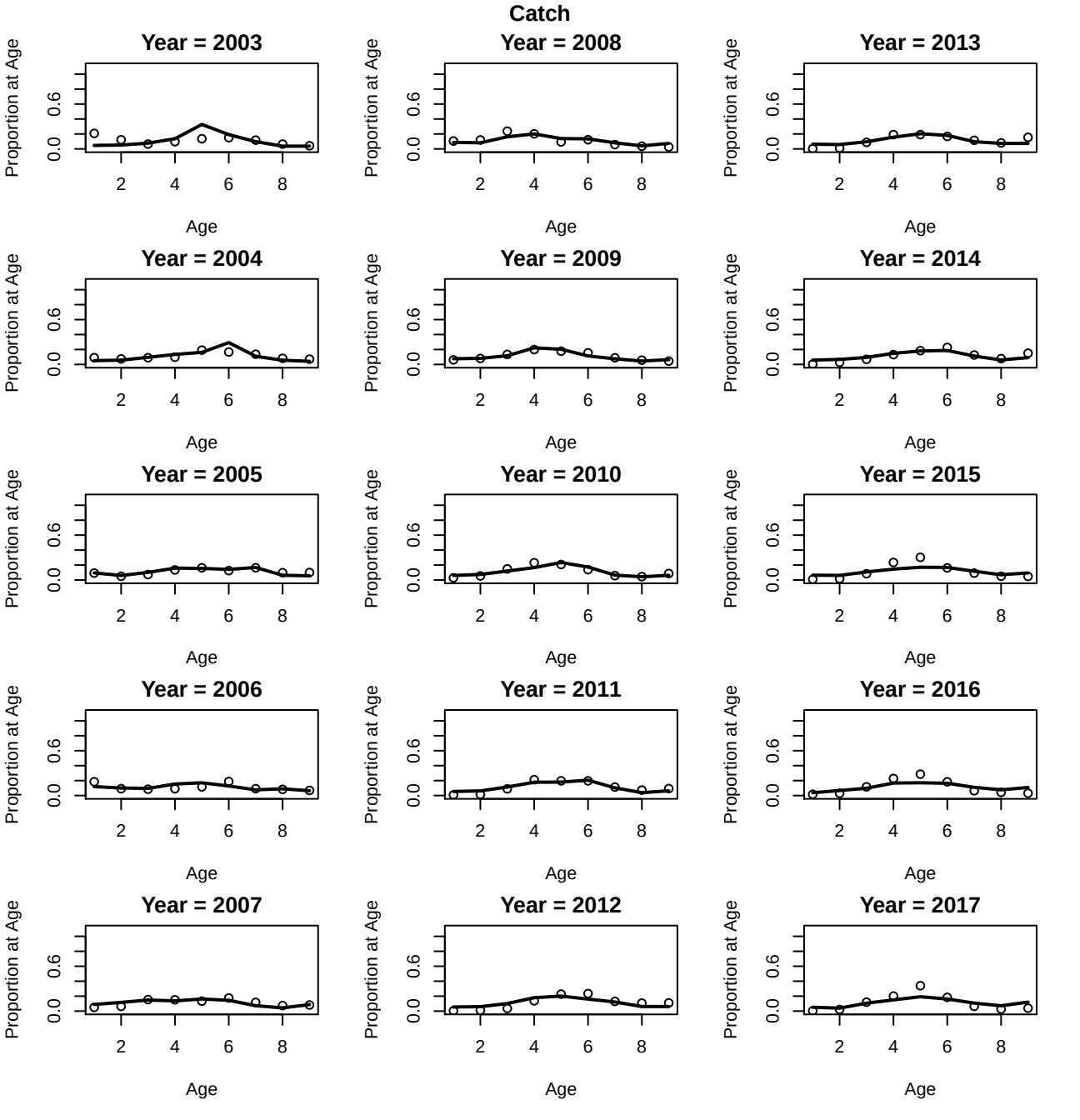
Component	# resids	RMSE
catch.tot	56	0.639
discard.tot	0	0
ind01	51	1.45
ind02	56	1.76
ind.total	107	1.62
N.year1	8	1.31
Fmult.year1	0	0
Fmult.devs.total	0	0
recruit.devs	0	0
fleet.sel.params	0	0
index.sel.params	0	0
q.year1	0	0
q.devs	0	0
SR.steepness	0	0
SR.scaler	0	0


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−2
INDEX−1

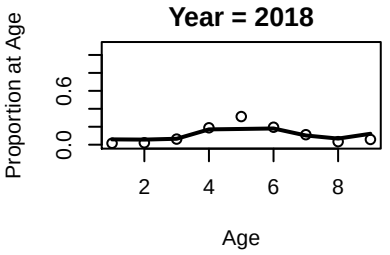

Root Mean Square Error for Catch
RMSE
0.0
0.5
1.0
1.5
2.0
0
20
40
60
80
100
Number of Residuals
catch.tot

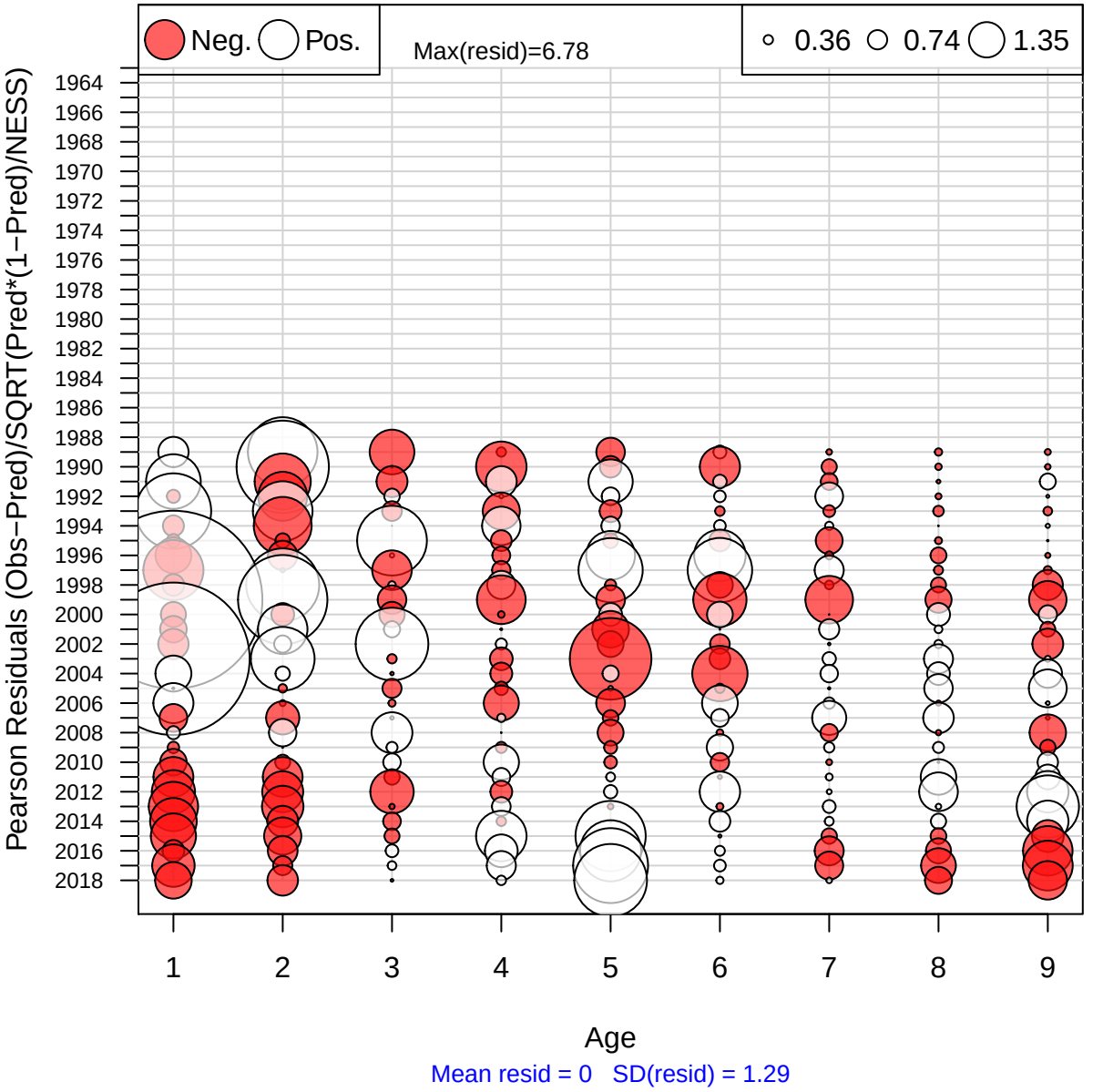

Fleet 1 Catch (FLEET−1)
Total Catch
0
2000
6000
10000
1970
1990
2010
Year
Ln(Total Catch)
7.5
8.0
8.5
9.0
9.5
10.5
1970
1990
2010
Year
Log−scale Std. Residual
−2.0
−1.0
0.0
0.5
1.0
1970
1990
2010
Year
Probability Density
0.0
0.1
0.2
0.3
0.4
0.5
−2.5
−1.5
−0.5
0.5
1.0
Std. Residual

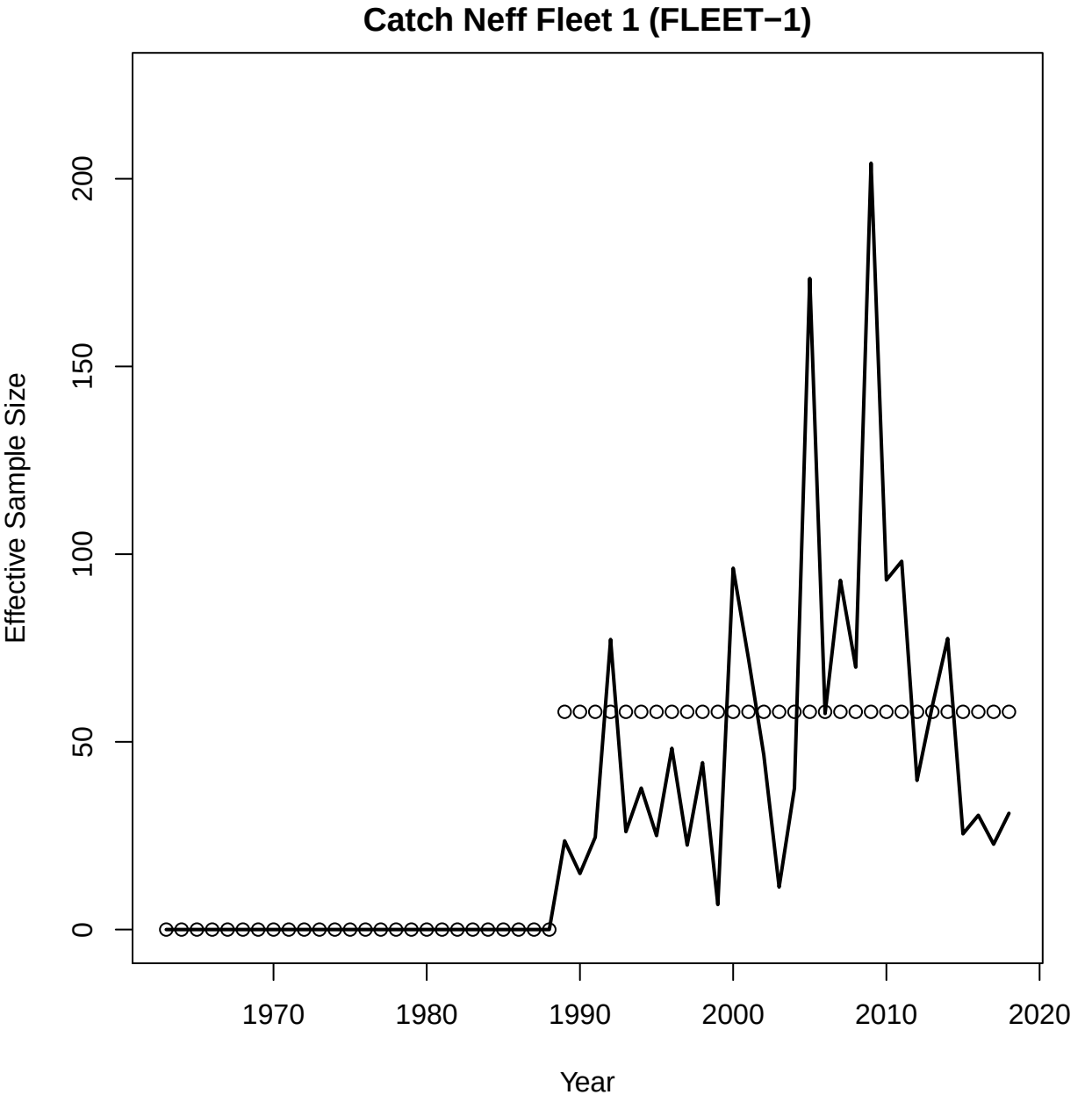

Catch
Fleet 1
FLEET−1
Year = 1993
Year = 1998
Year = 1989
Year = 1994
Year = 1999
Year = 1990
Year = 1995
Year = 2000
Year = 1991
Year = 1996
Year = 2001
Year = 1992
Year = 1997
Year = 2002
Proportion at Age
Age
0.0
0.6
2
4
6
8

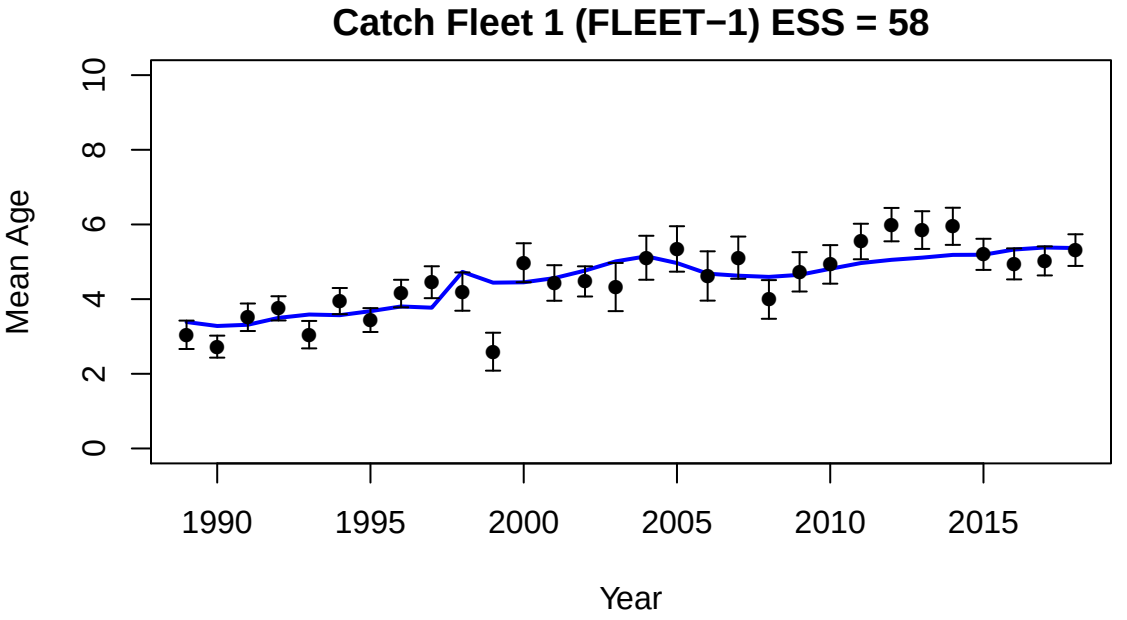

Catch
Year = 2003
Year = 2008
Year = 2013
Year = 2004
Year = 2009
Year = 2014
Year = 2005
Year = 2010
Year = 2015
Year = 2006
Year = 2011
Year = 2016
Year = 2007
Year = 2012
Year = 2017
Proportion at Age
Age
0.0
0.6
2
4
6
8

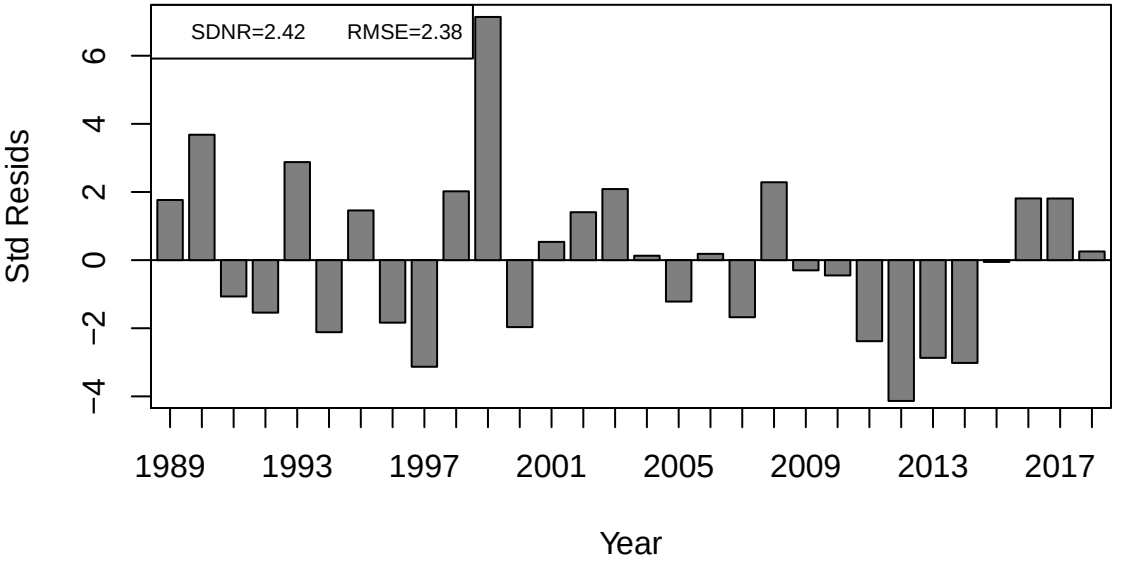
Catch

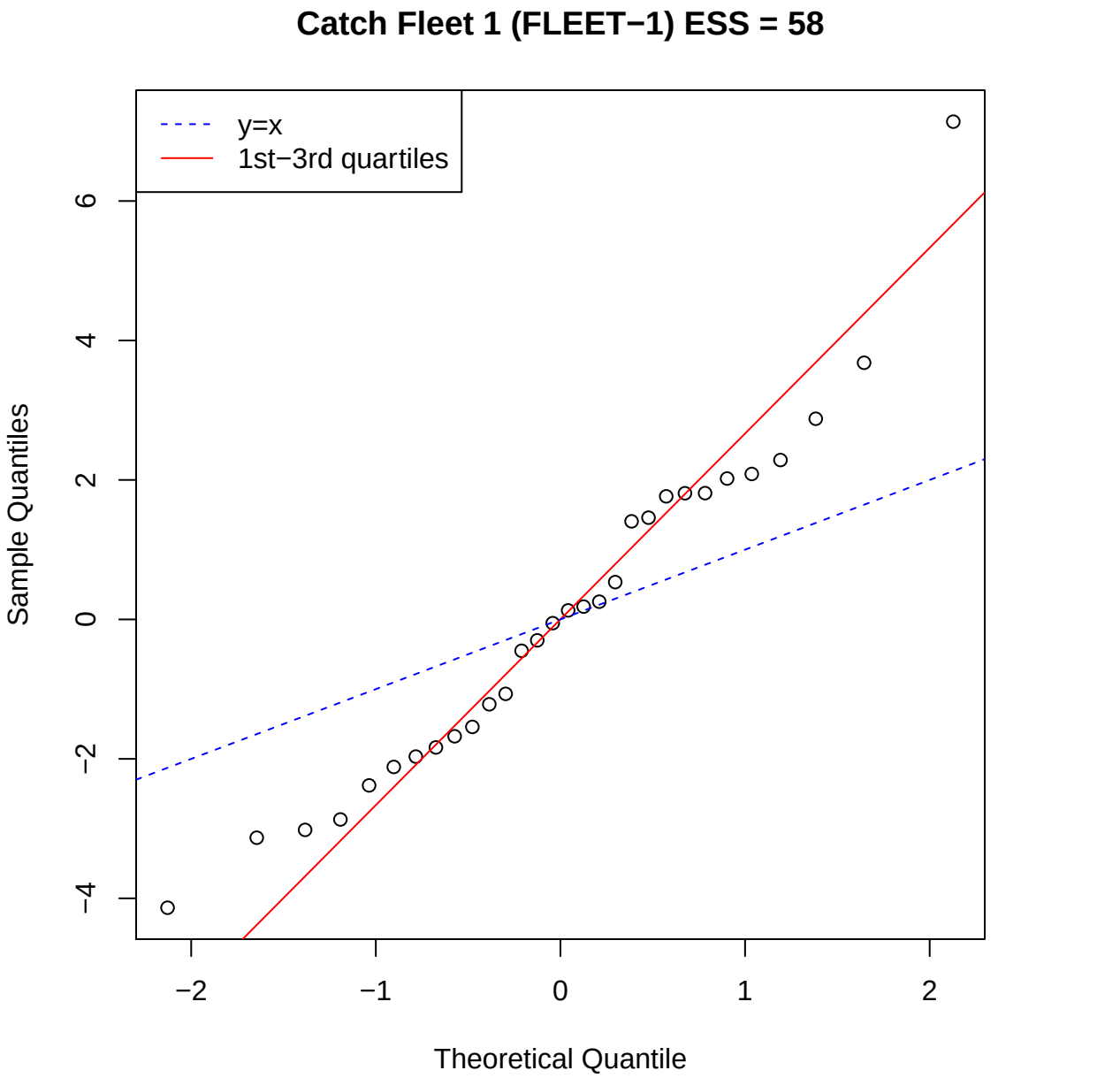


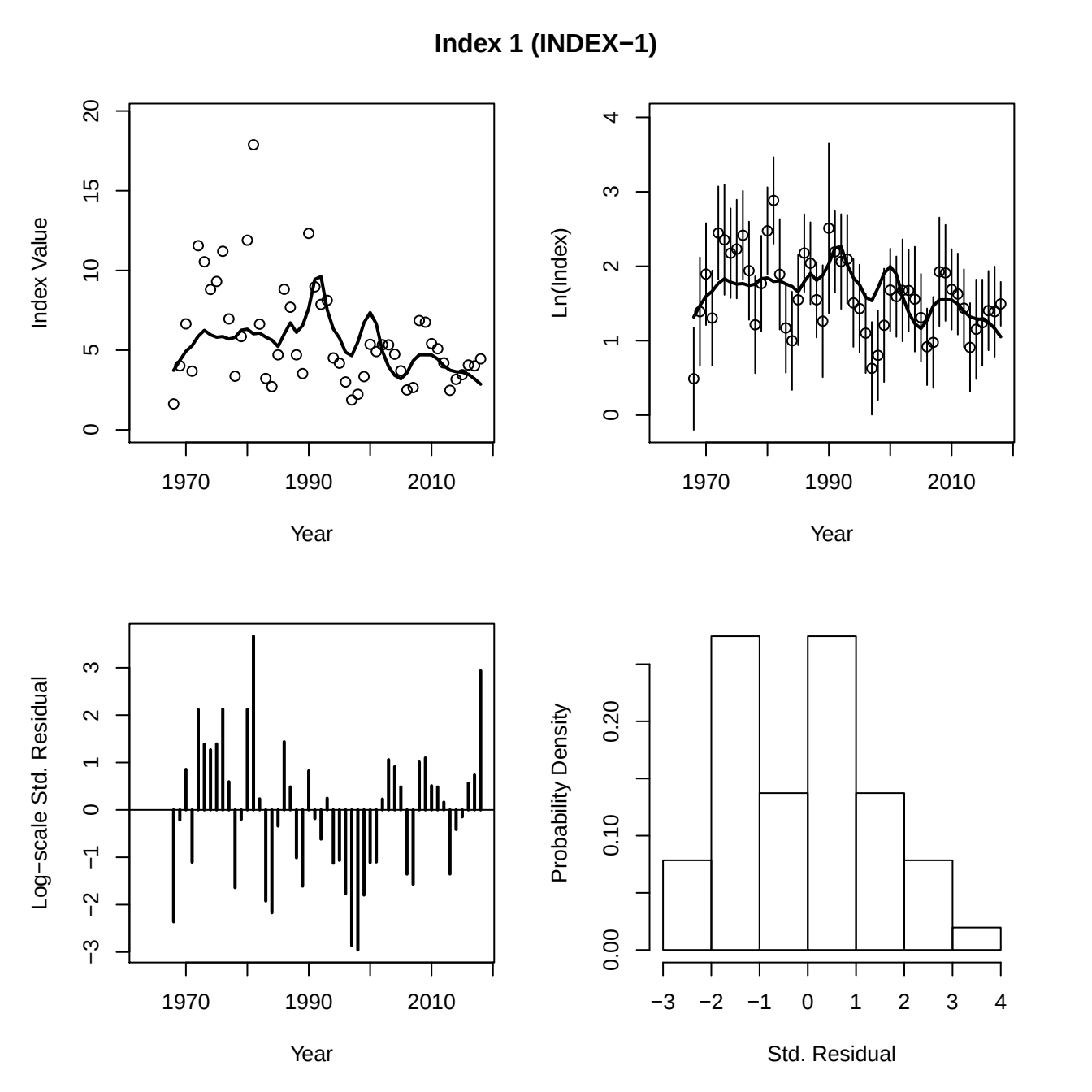

Age Comp Residuals for Catch by Fleet 1 (FLEET−1)
Neg.
Pos.
Max(resid)=6.78
0.36
0.74
1.35
Pearson Residuals (Obs−Pred)/SQRT(Pred*(1−Pred)/NESS)
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
1
2
3
4
5
6
7
8
9
Age
Mean resid = 0 SD(resid) = 1.29

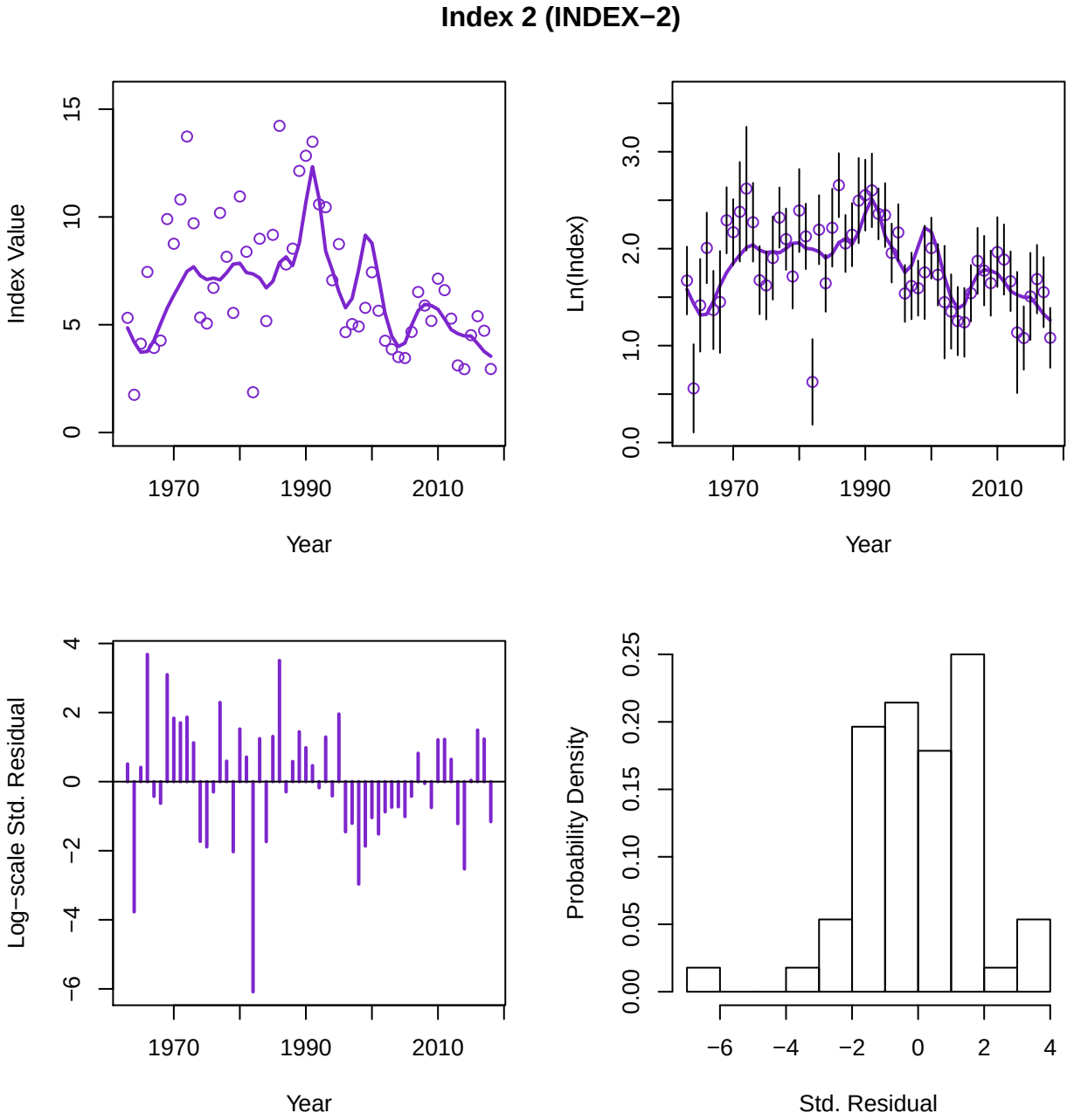

Catch Neff Fleet 1 (FLEET−1)
Effective Sample Size
0
50
100
150
200
1970
1980
1990
2000
2010
2020
Year

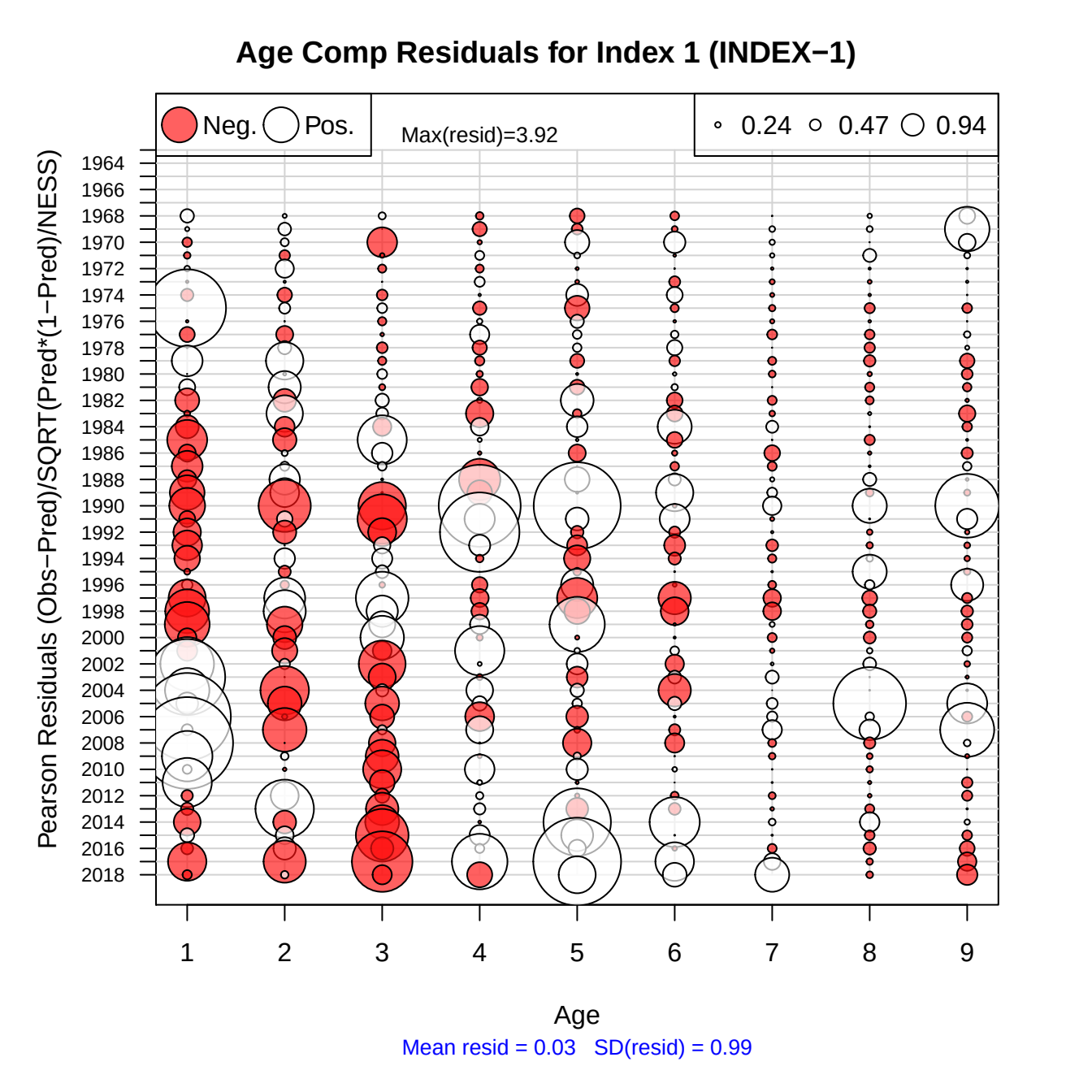

Catch Fleet 1 (FLEET−1) ESS = 58
Mean Age
0
2
4
6
8
10
1990
1995
2000
2005
2010
2015
Year

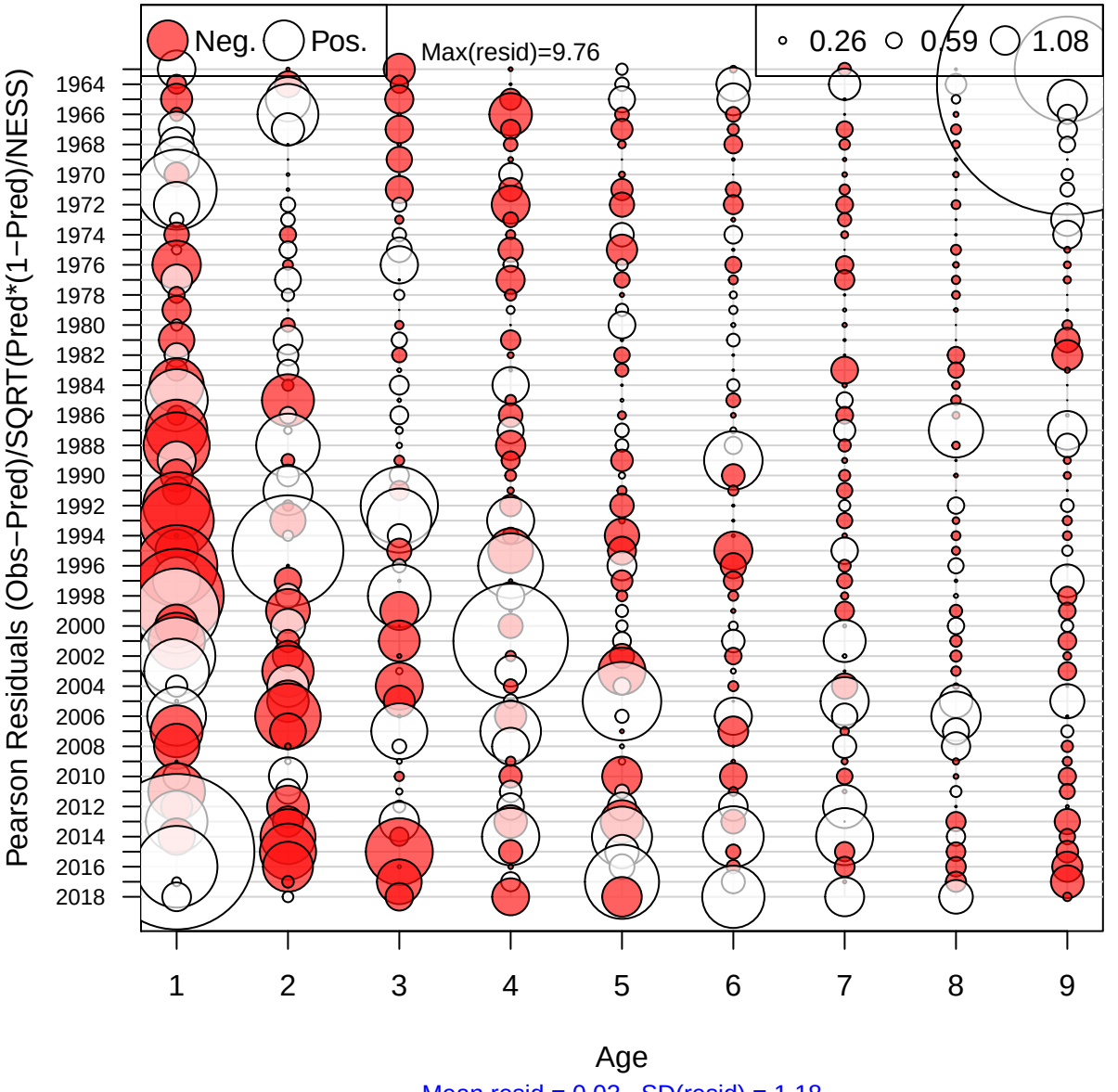

SDNR=2.42
RMSE=2.38
Std Resids
−4
−2
0
2
4
6
1989
1993
1997
2001
2005
2009
2013
2017
Year

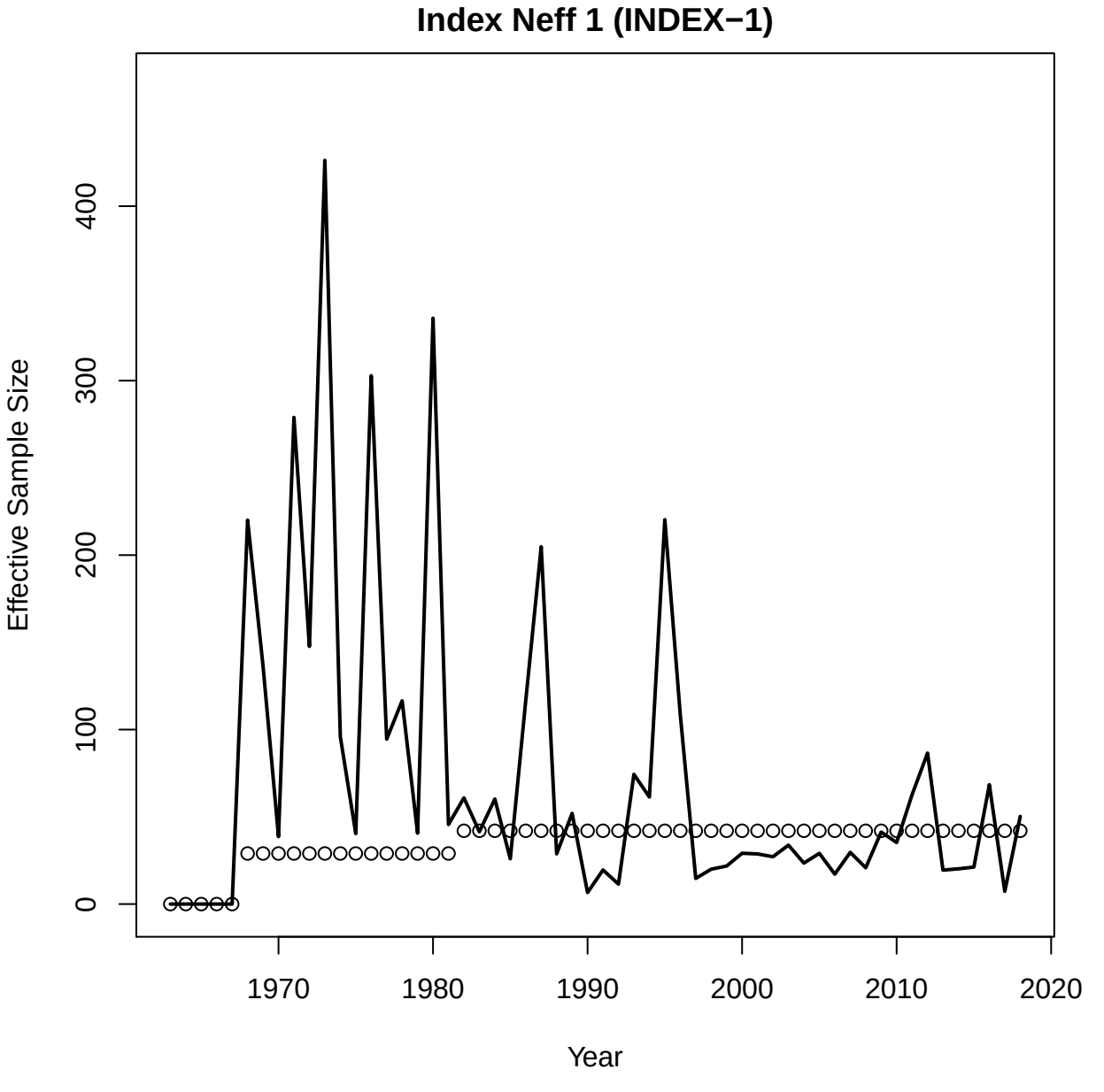

Catch Fleet 1 (FLEET−1) ESS = 58
y=x
1st−3rd quartiles
Sample Quantiles
Theoretical Quantile
−4
−2
0
2
4
6
−2
−1
0
1
2

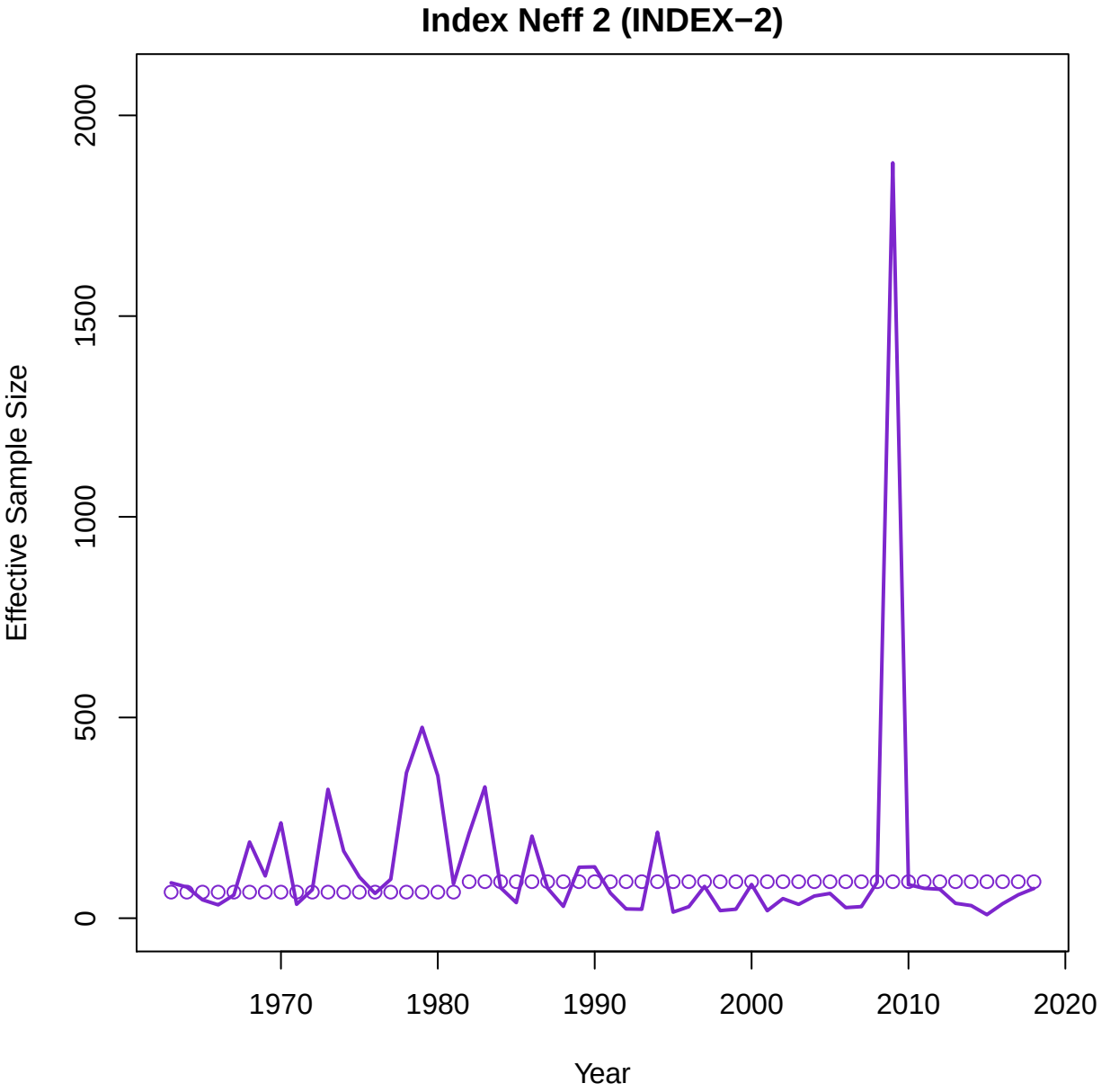

Index 1 (INDEX−1)
Index Value
0
5
10
15
20
1970
1990
2010
Year
Ln(Index)
0
1
2
3
4
1970
1990
2010
Year
Log−scale Std. Residual
−3
−2
−1
0
1
2
3
1970
1990
2010
Year
Probability Density
0.00
0.10
0.20
−3
−2
−1
0
1
2
3
4
Std. Residual

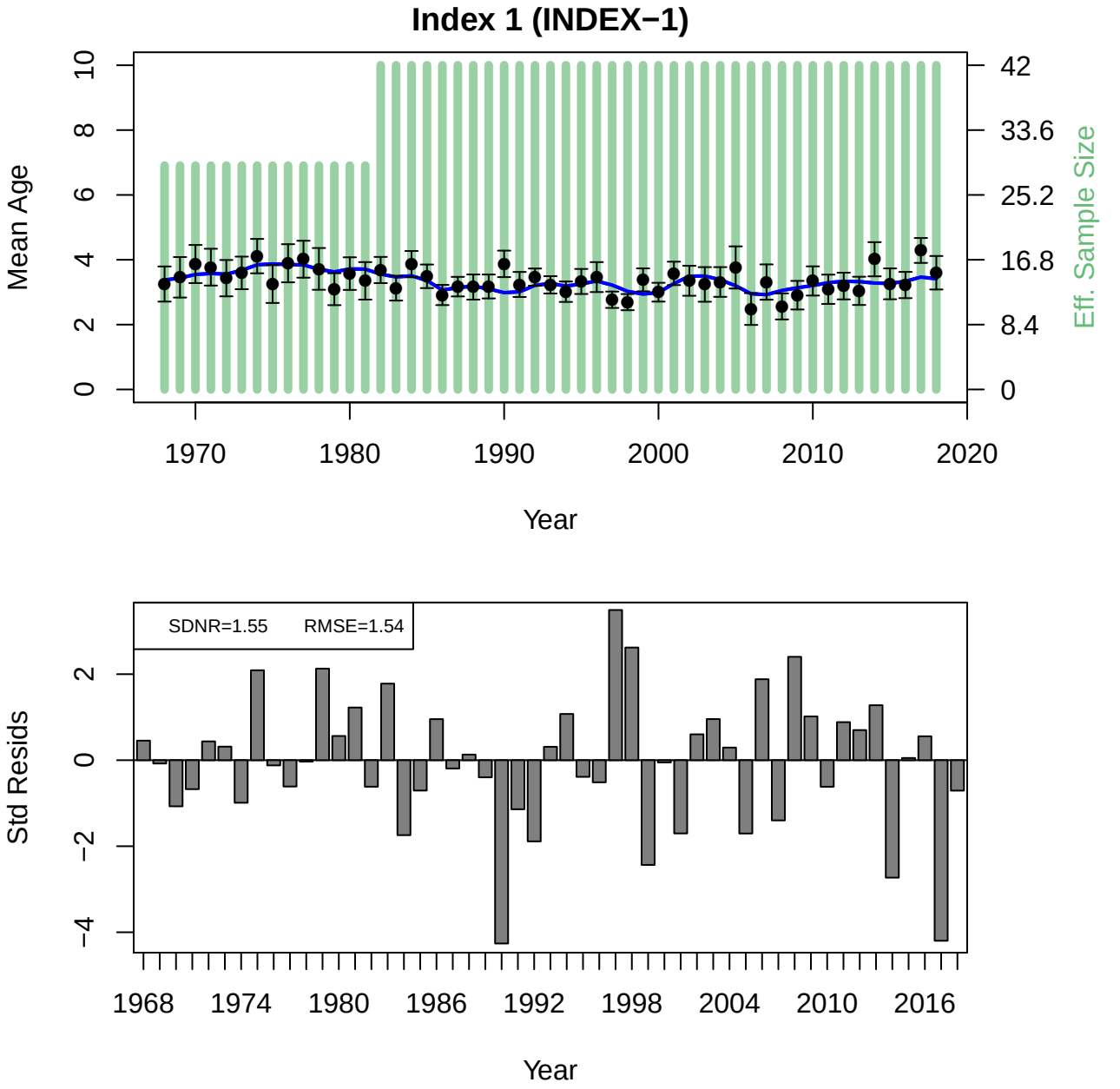

Index 2 (INDEX−2)
Index Value
0
5
10
15
1970
1990
2010
Year
Ln(Index)
0.0
1.0
2.0
3.0
1970
1990
2010
Year
Log−scale Std. Residual
−6
−4
−2
0
2
4
1970
1990
2010
Year
Probability Density
0.00
0.05
0.10
0.15
0.20
0.25
−6
−4
−2
0
2
4
Std. Residual

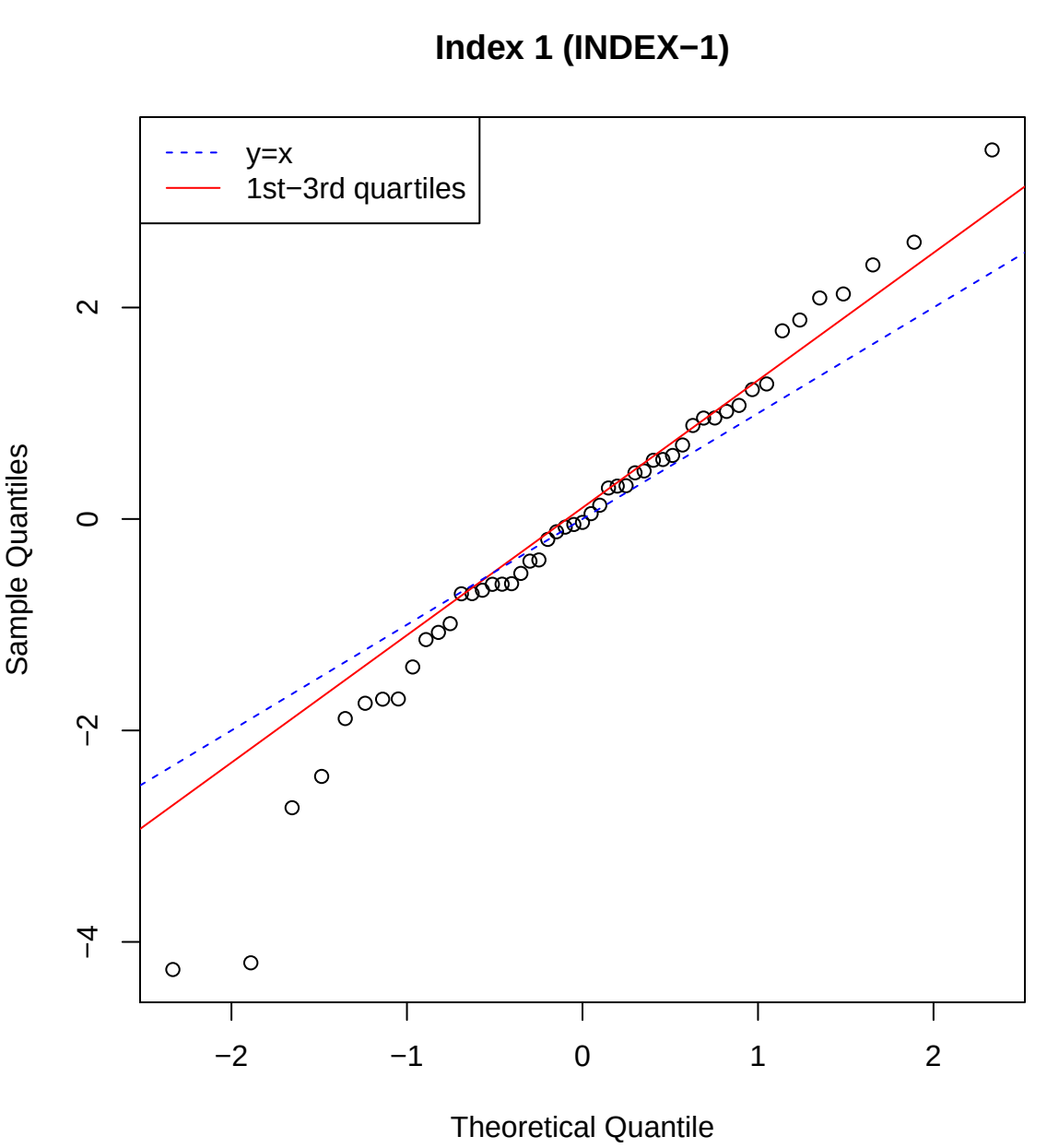

Age Comp Residuals for Index 1 (INDEX−1)
Neg.
Pos.
Max(resid)=3.92
0.24
0.47
0.94
Pearson Residuals (Obs−Pred)/SQRT(Pred*(1−Pred)/NESS)
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
1
2
3
4
5
6
7
8
9
Age
Mean resid = 0.03 SD(resid) = 0.99

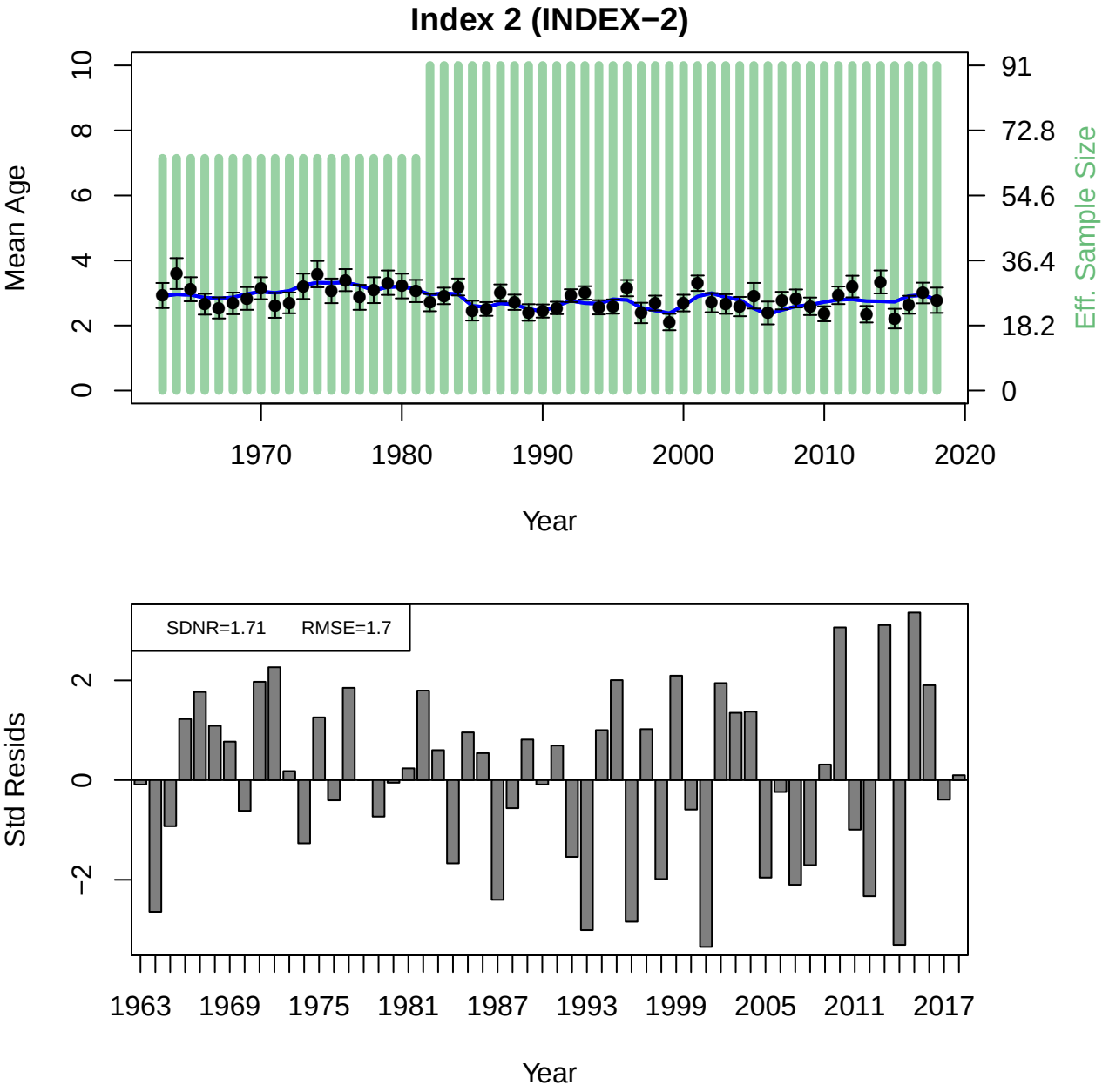

Age Comp Residuals for Index 2 (INDEX−2)
Neg.
Pos.
Max(resid)=9.76
0.26
0.59
1.08
Pearson Residuals (Obs−Pred)/SQRT(Pred*(1−Pred)/NESS)
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
1
2
3
4
5
6
7
8
9
Age
Mean resid = 0.03 SD(resid) = 1.18

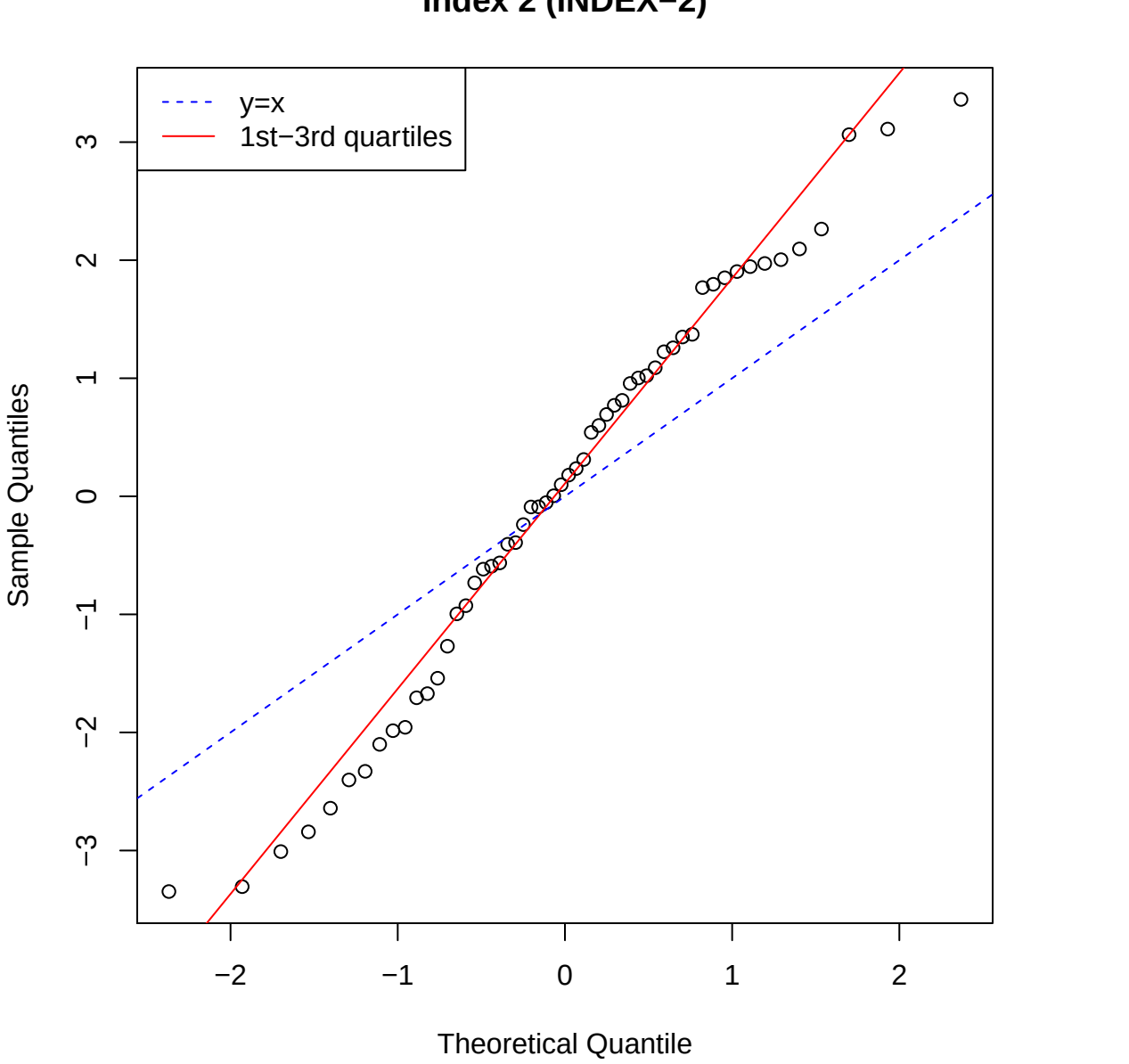

Index Neff 1 (INDEX−1)
Effective Sample Size
0
100
200
300
400
1970
1980
1990
2000
2010
2020
Year

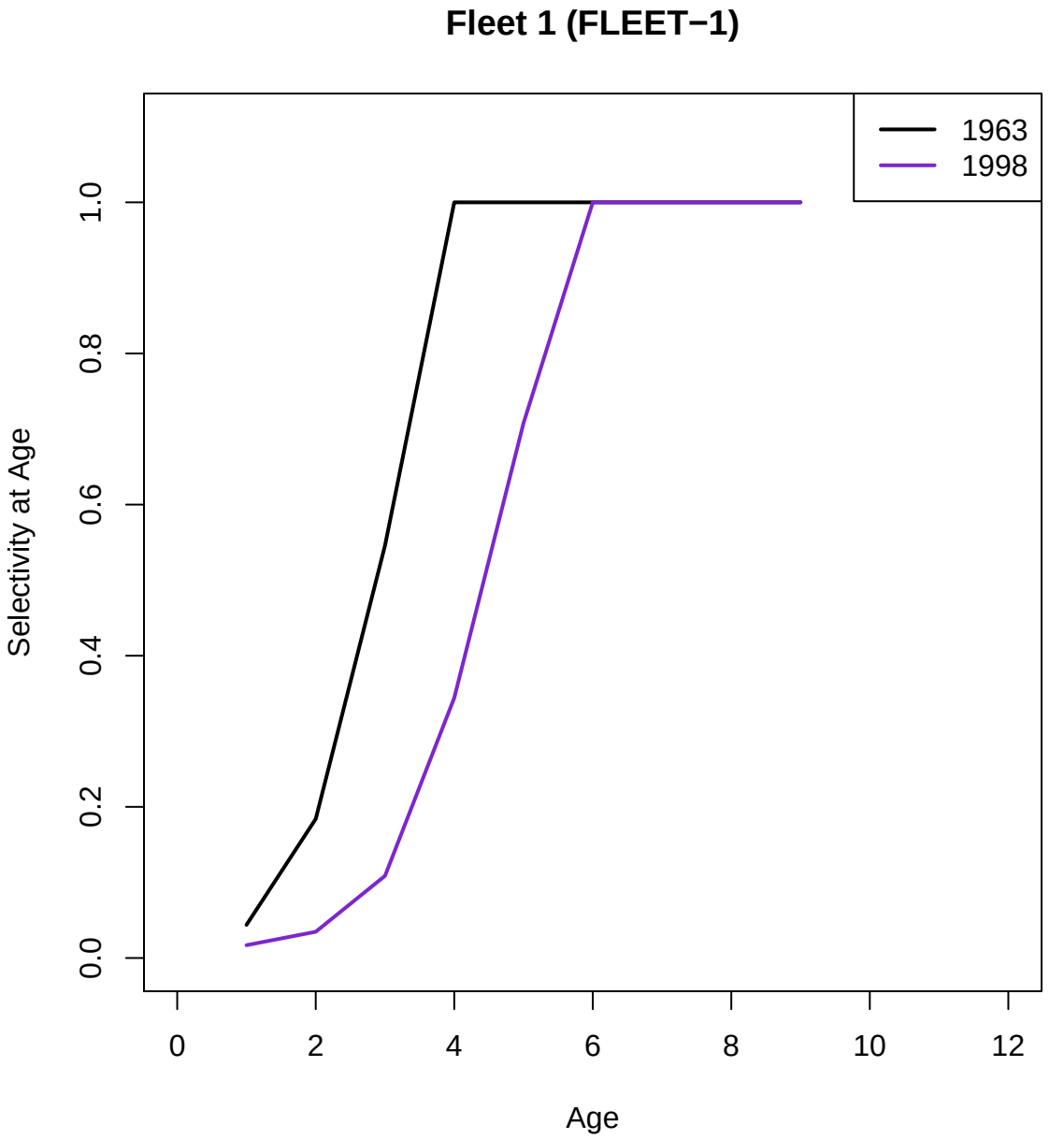

Index Neff 2 (INDEX−2)
Effective Sample Size
0
500
1000
1500
2000
1970
1980
1990
2000
2010
2020
Year

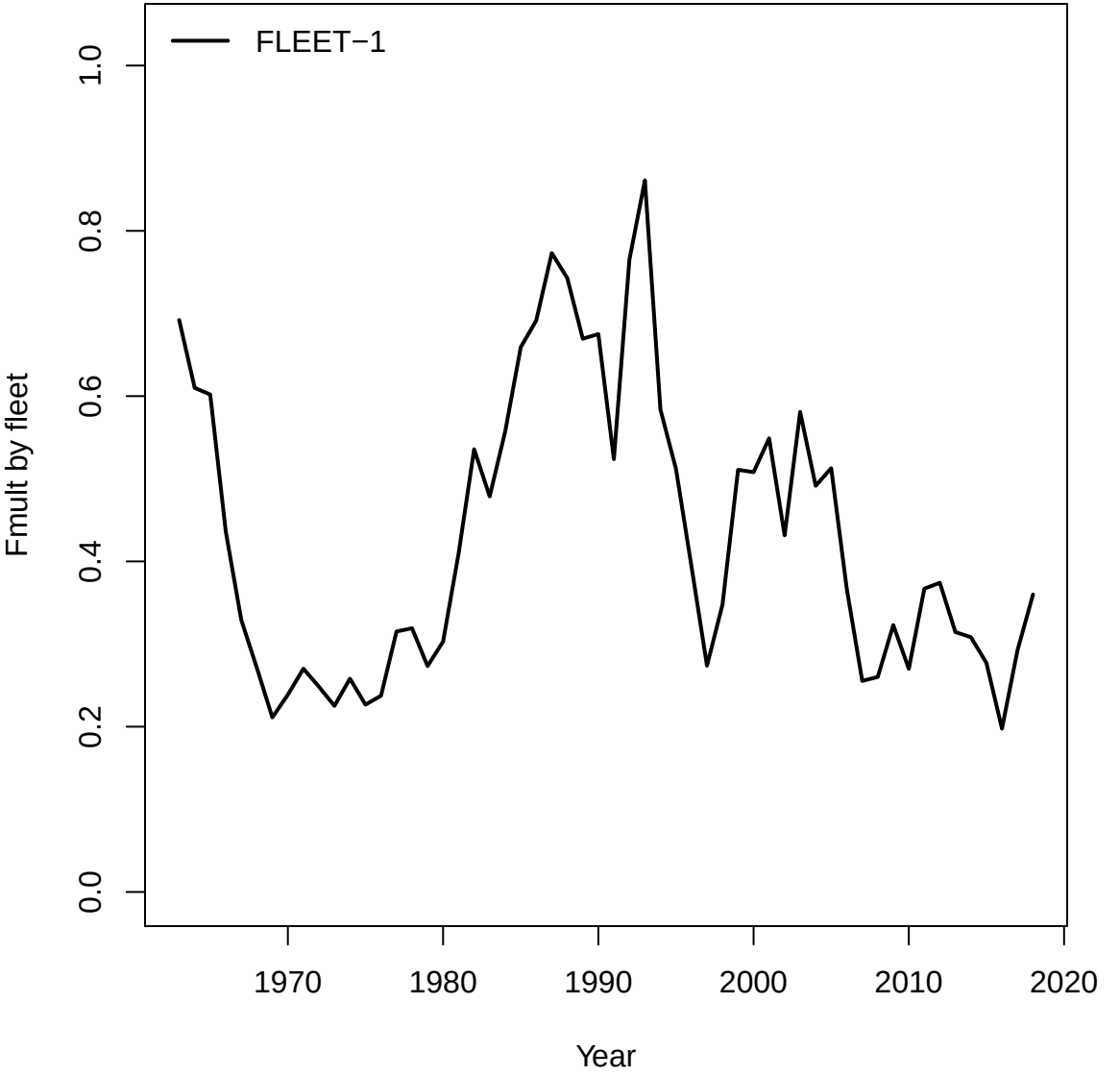

Index 1 (INDEX−1)
Mean Age
Eff. Sample Size
0
2
4
6
8
10
42
33.6
25.2
16.8
8.4
0
1970
1980
1990
2000
2010
2020
Year
SDNR=1.55
RMSE=1.54
Std Resids
−4
−2
0
2
1968
1974
1980
1986
1992
1998
2004
2010
2016
Year

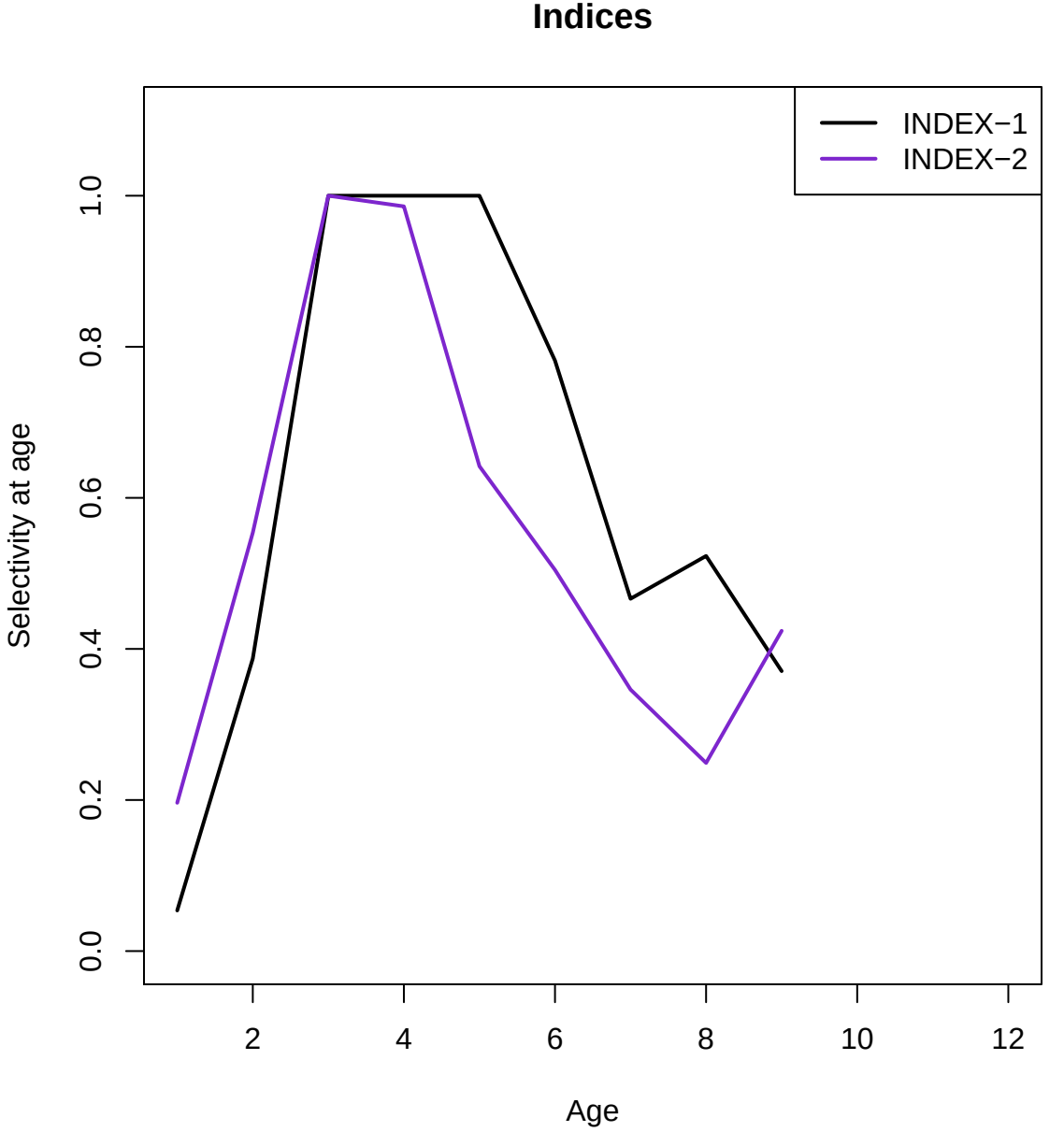

Index 1 (INDEX−1)
y=x
1st−3rd quartiles
Sample Quantiles
Theoretical Quantile
2
0
−2
−4
−2
−1
0
1
2

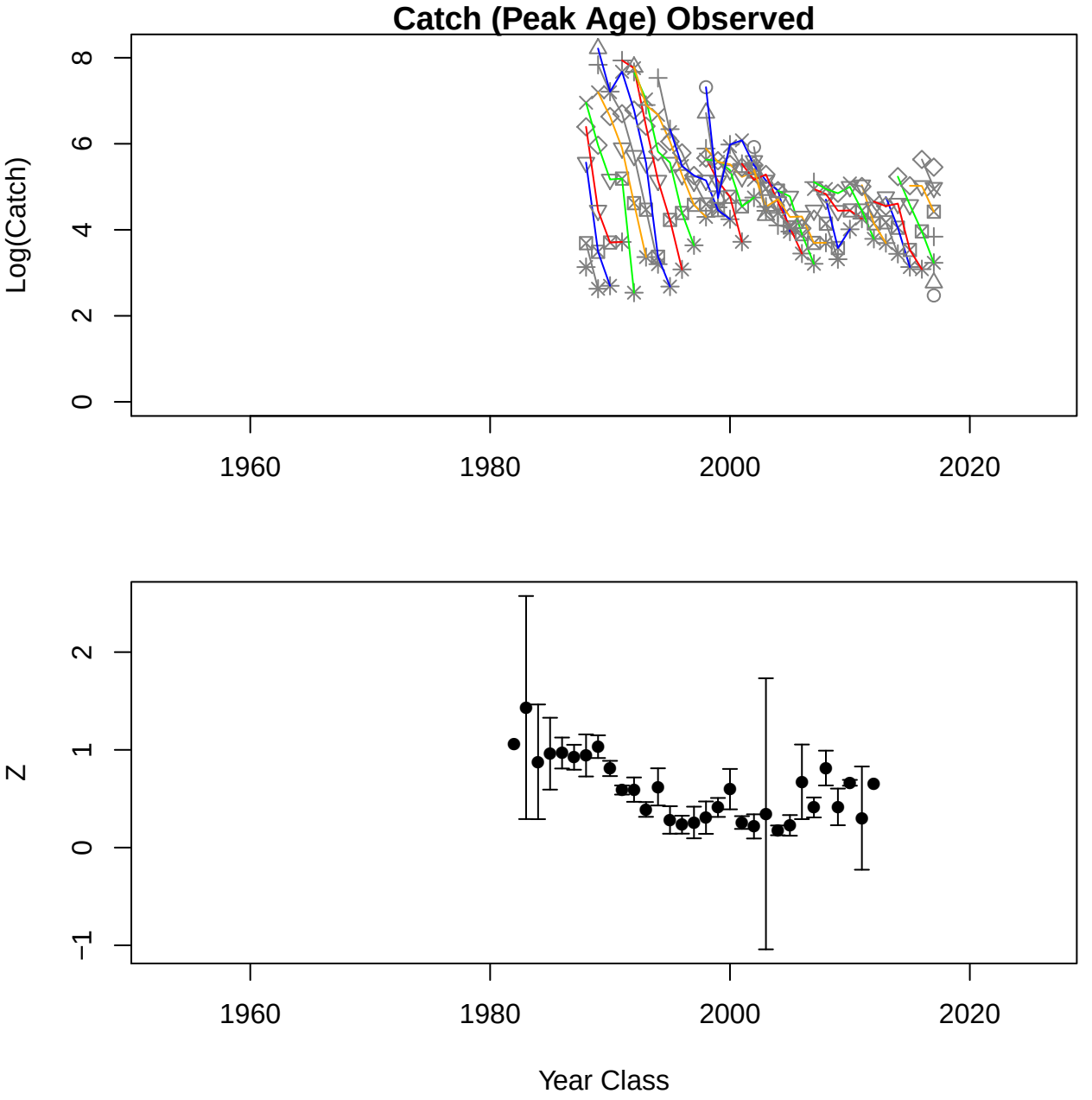

Index 2 (INDEX−2)
Mean Age
Eff. Sample Size
0
2
4
6
8
10
91
72.8
54.6
36.4
18.2
0
1970
1980
1990
2000
2010
2020
Year
SDNR=1.71
RMSE=1.7
Std Resids
−2
0
2
1963
1969
1975
1981
1987
1993
1999
2005
2011
2017
Year

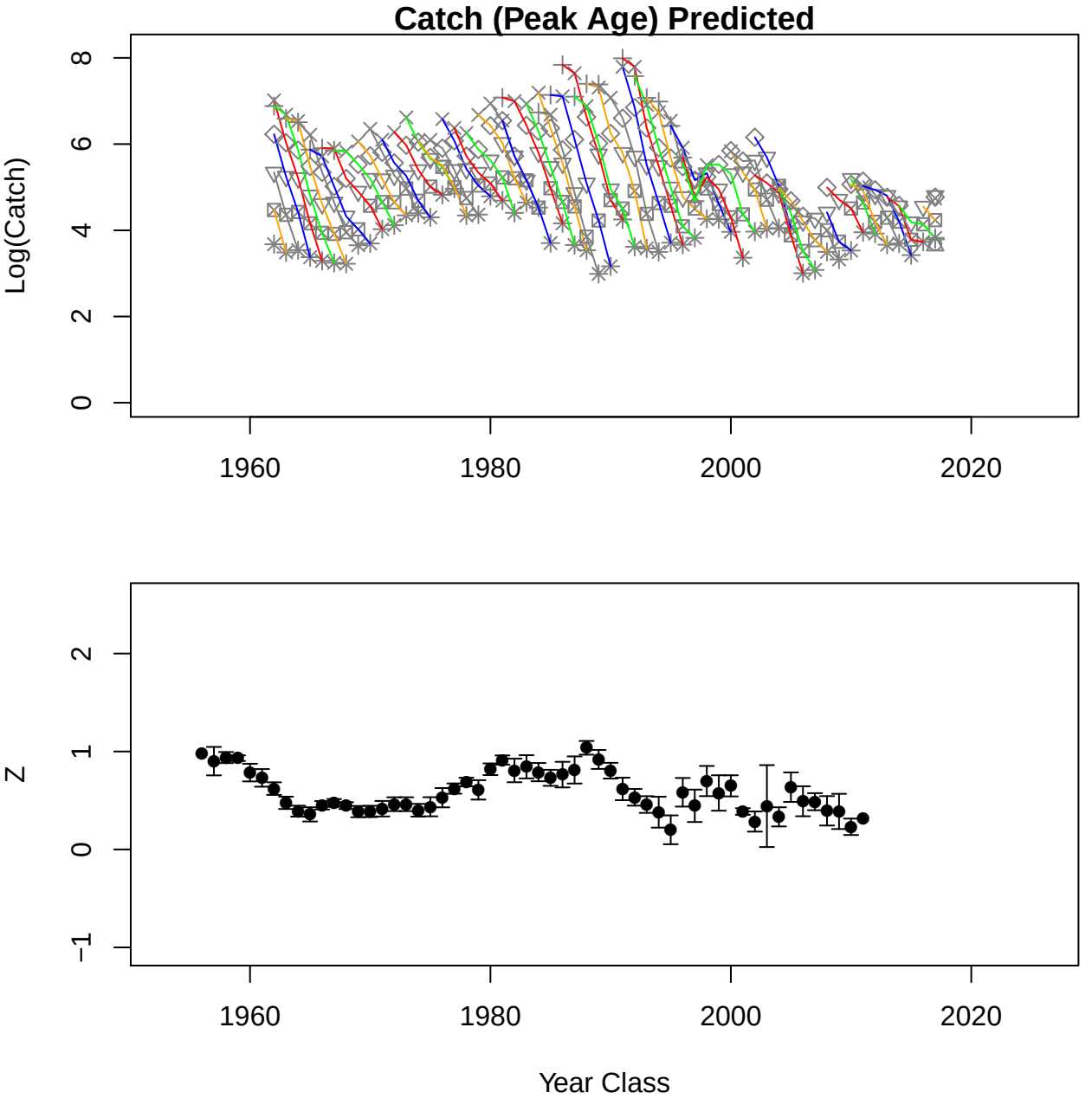

Index 2 (INDEX−2)
y=x
1st−3rd quartiles
Sample Quantiles
Theoretical Quantile
3
2
1
0
−1
−2
−3
−2
−1
0
1
2

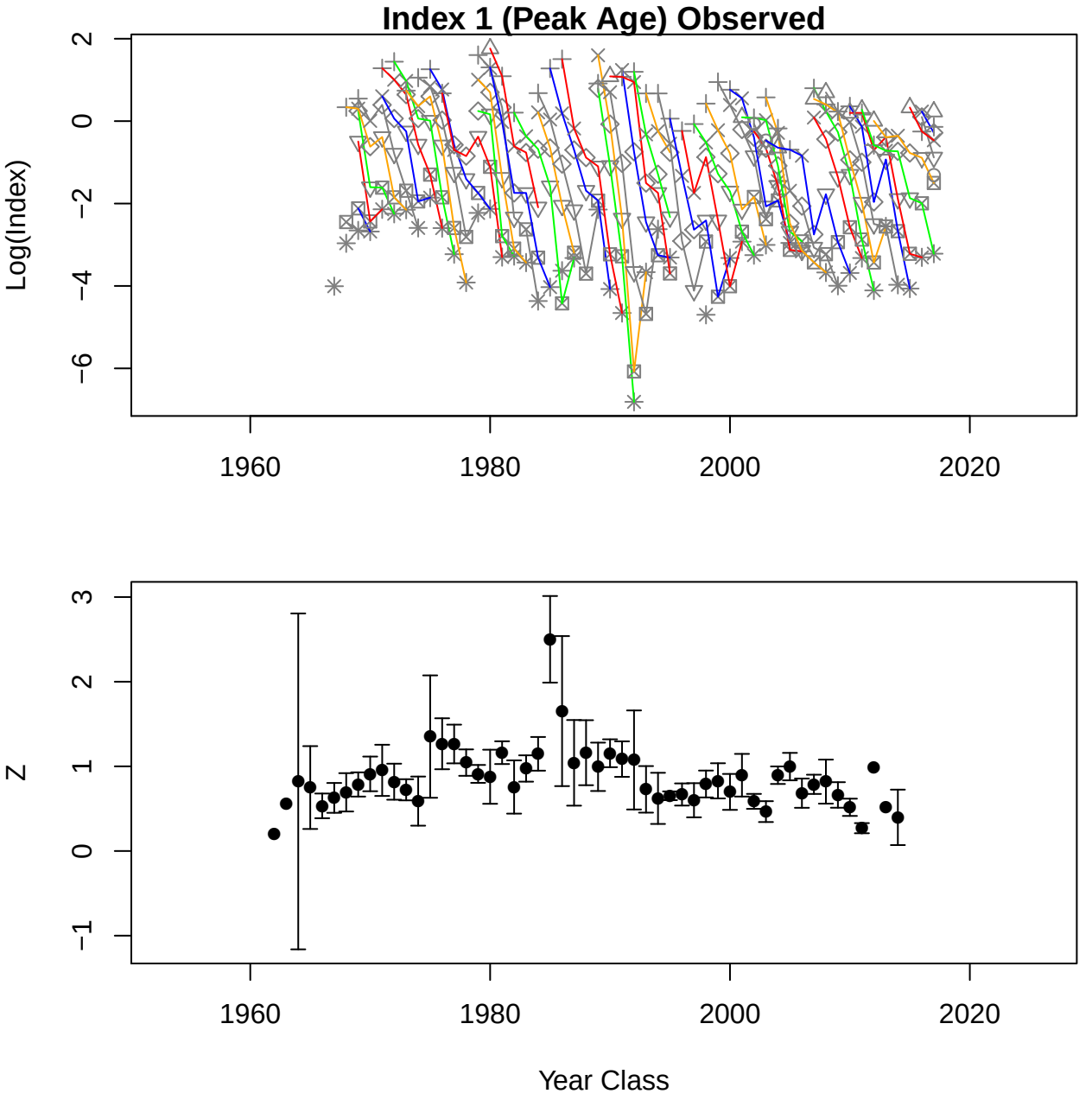

Fleet 1 (FLEET−1)
1963
1998
Selectivity at Age
0.0
0.2
0.4
0.6
0.8
1.0
0
2
4
6
8
10
12
Age

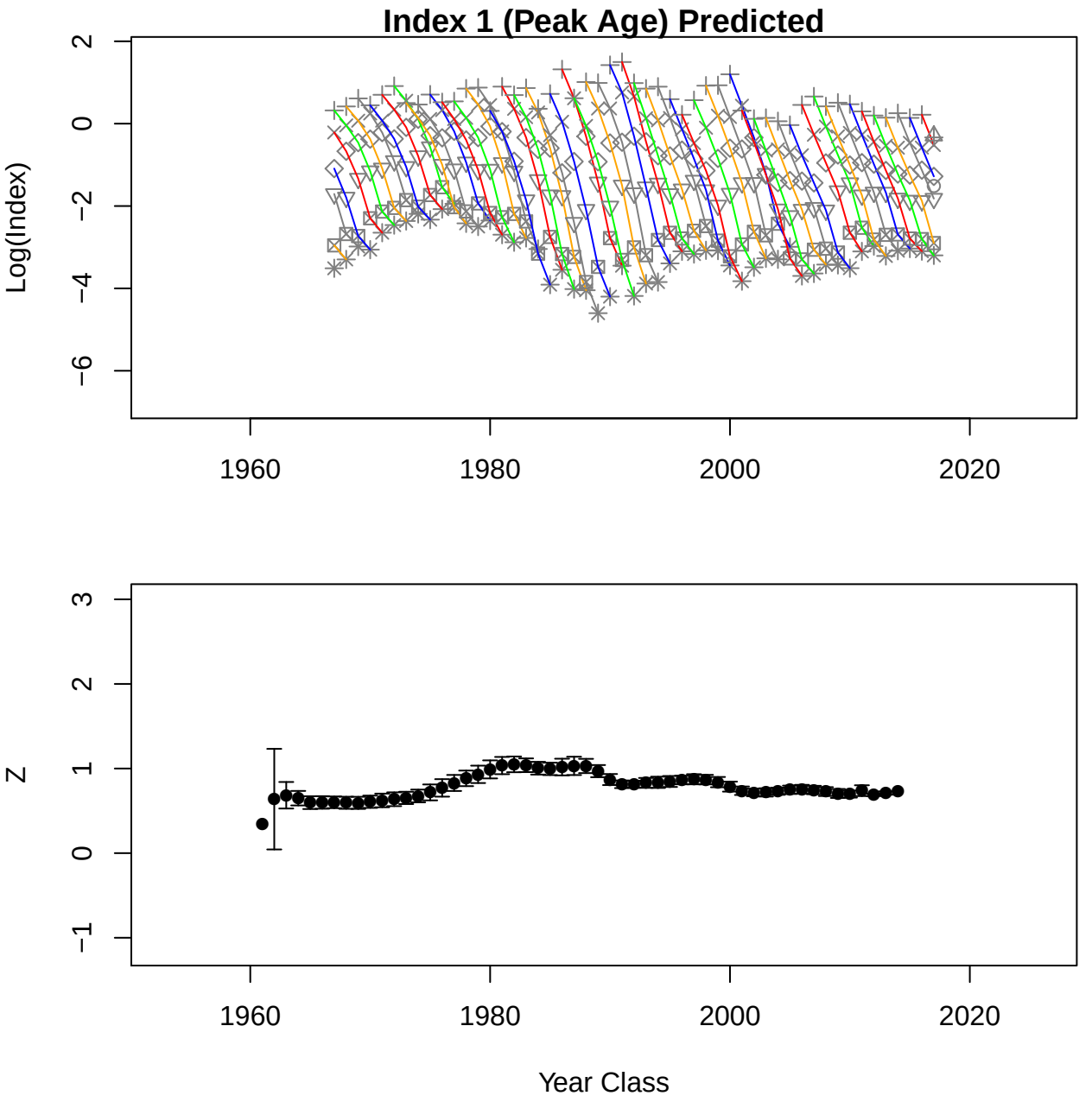

FLEET−1
Fmult by fleet
0.0
0.2
0.4
0.6
0.8
1.0
1970
1980
1990
2000
2010
2020
Year

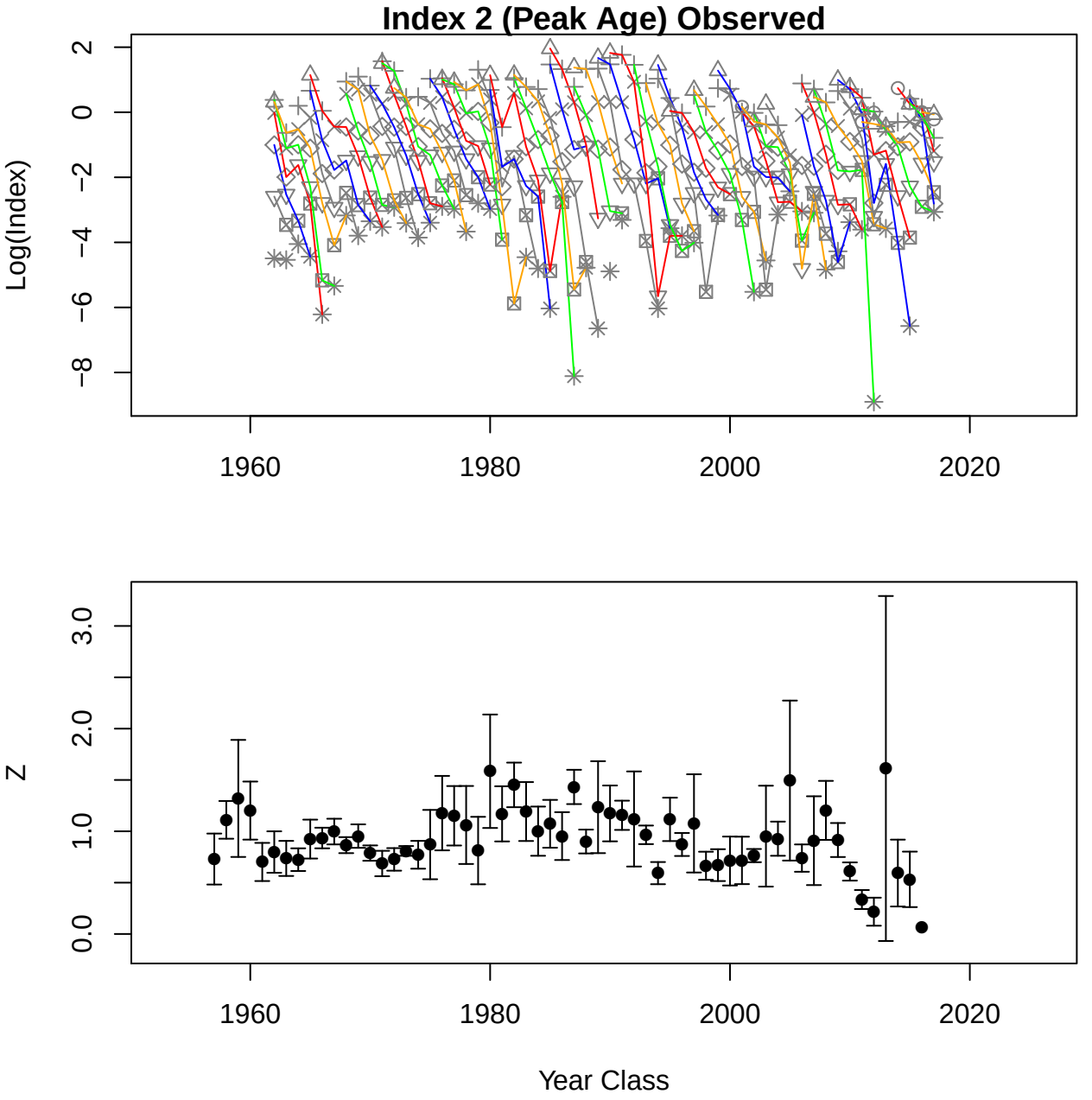

Indices
INDEX−1
INDEX−2
Selectivity at age
0.0
0.2
0.4
0.6
0.8
1.0
2
4
6
8
10
12
Age

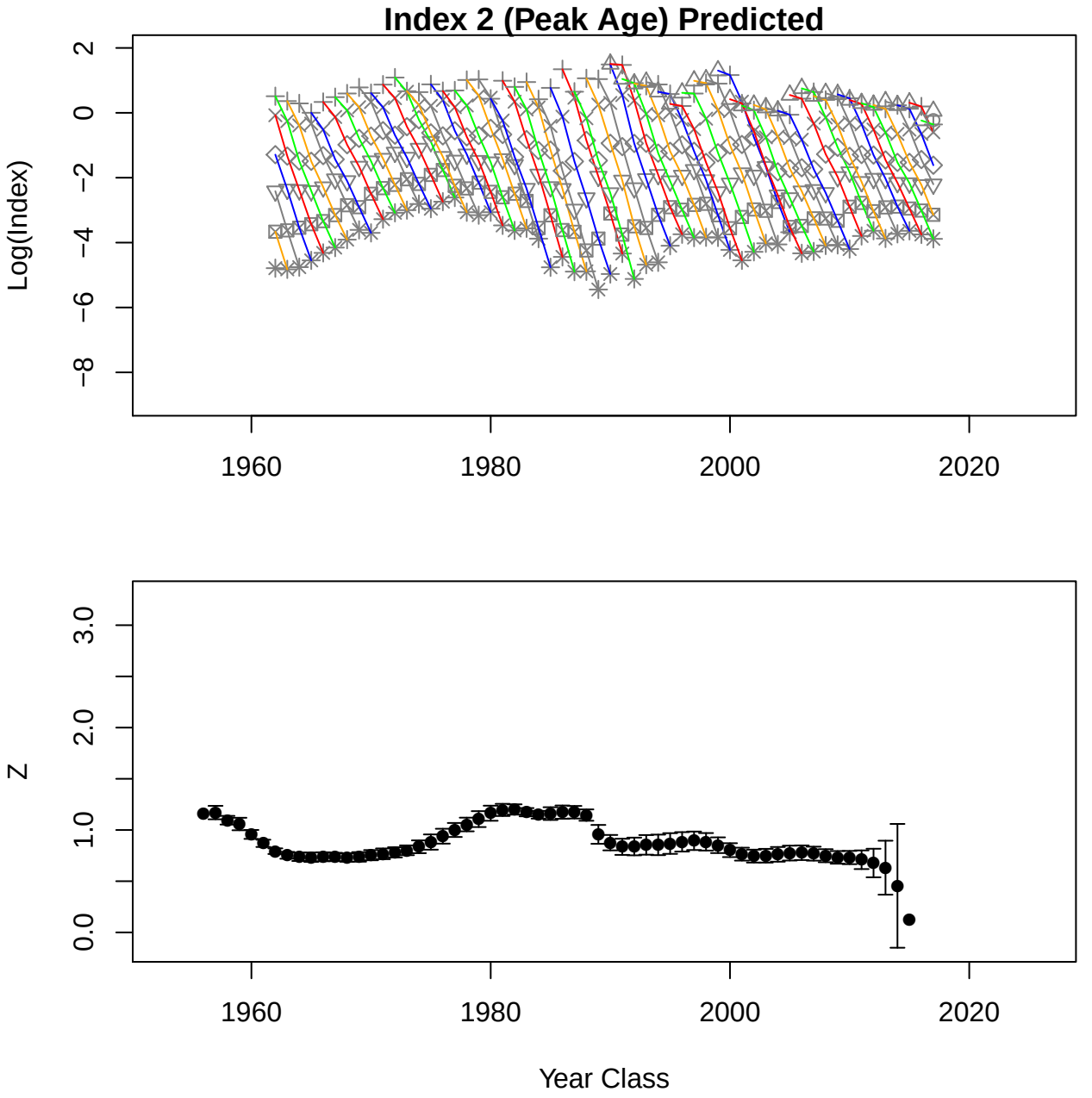

Catch (Peak Age) Observed
Log(Catch)
0
2
4
6
8
1960
1980
2000
2020
Z
−1
0
1
2
1960
1980
2000
2020
Year Class

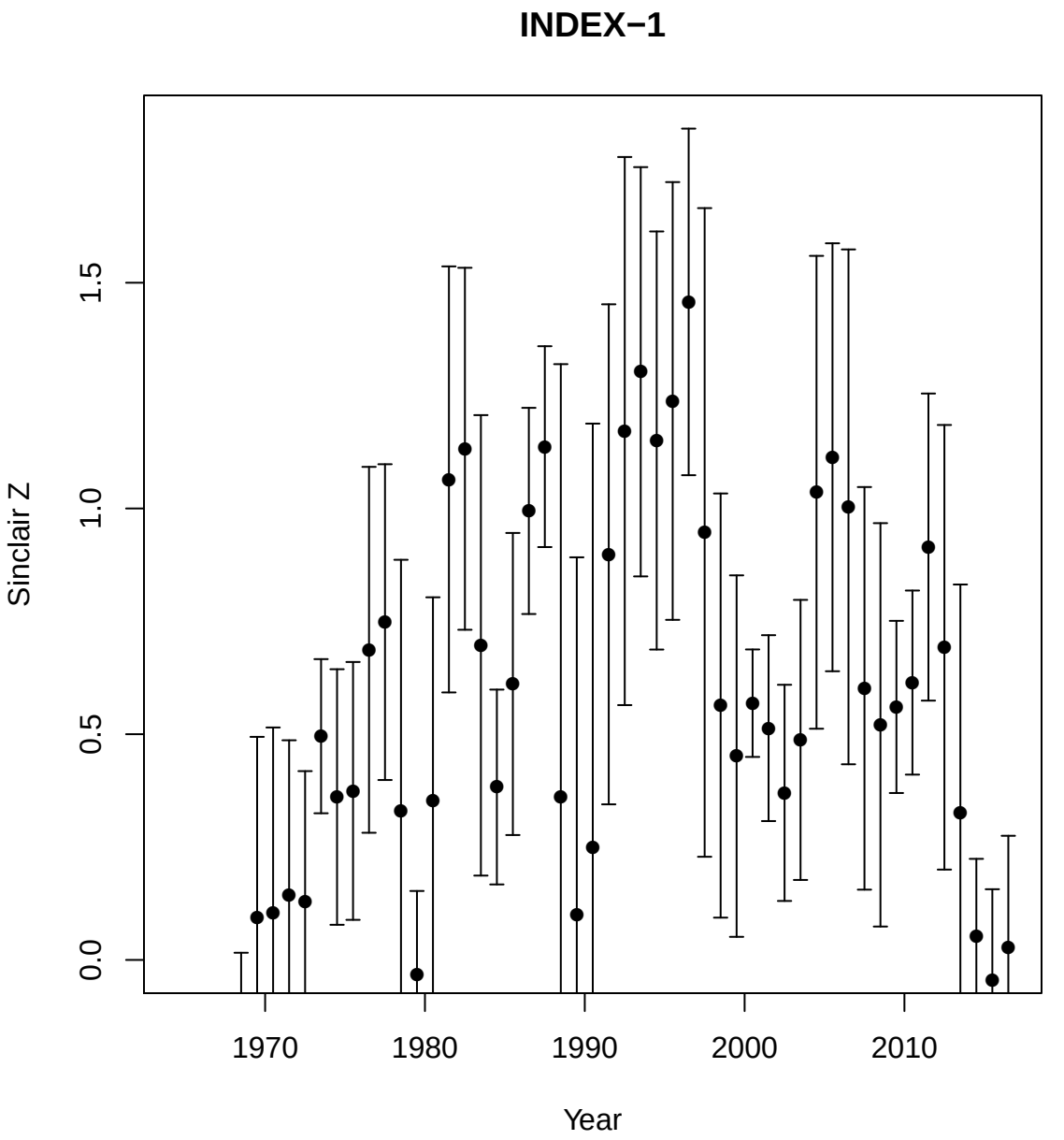

Catch (Peak Age) Predicted
Log(Catch)
0
2
4
6
8
1960
1980
2000
2020
Z
−1
0
1
2
1960
1980
2000
2020
Year Class

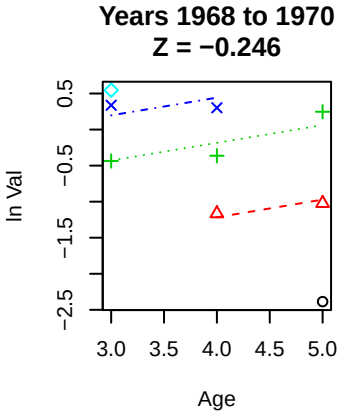

Index 1 (Peak Age) Observed
Log(Index)
2
0
−2
−4
−6
1960
1980
2000
2020
Z
3
2
1
0
−1
1960
1980
2000
2020
Year Class

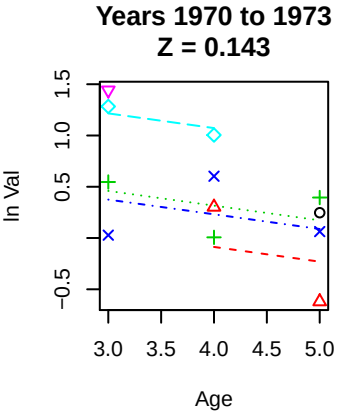

Index 1 (Peak Age) Predicted
Log(Index)
2
0
−2
−4
−6
1960
1980
2000
2020
Z
3
2
1
0
−1
1960
1980
2000
2020
Year Class

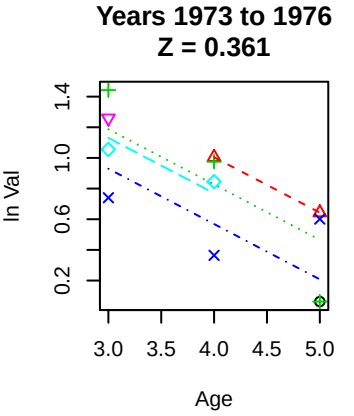

Index 2 (Peak Age) Observed
Log(Index)
2
0
−2
−4
−6
−8
1960
1980
2000
2020
Z
3.0
2.0
1.0
0.0
1960
1980
2000
2020
Year Class

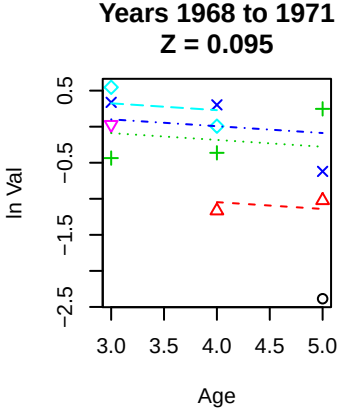

Index 2 (Peak Age) Predicted
Log(Index)
2
0
−2
−4
−6
−8
1960
1980
2000
2020
Z
3.0
2.0
1.0
0.0
1960
1980
2000
2020
Year Class

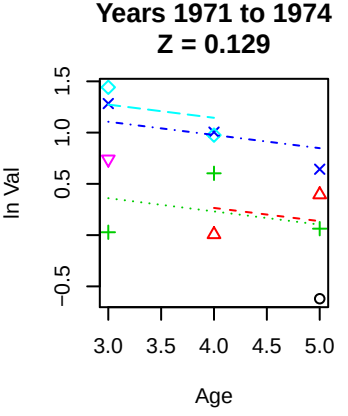

INDEX−1
Sinclair Z
0.0
0.5
1.0
1.5
1970
1980
1990
2000
2010
Year

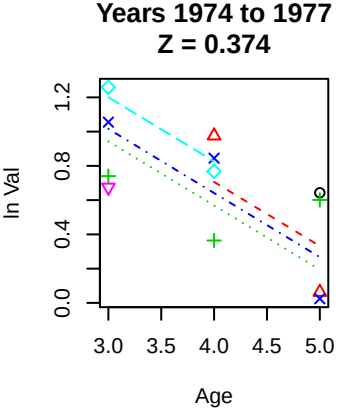

Years 1968 to 1970
Z = −0.246
ln Val
Age

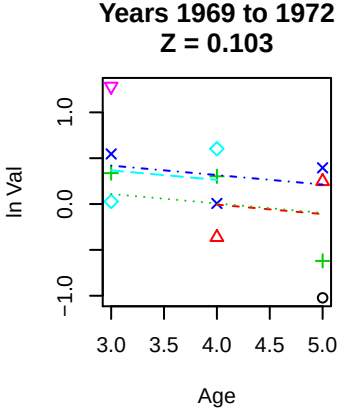

Years 1970 to 1973
Z = 0.143
ln Val
Age

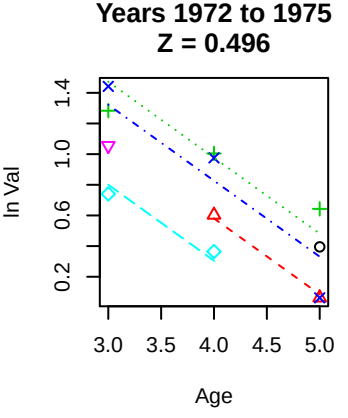

Years 1973 to 1976
Z = 0.361
ln Val
Age

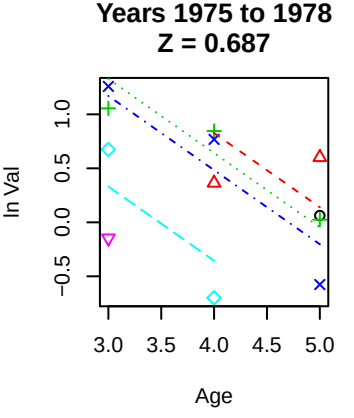

Years 1968 to 1971
Z = 0.095
ln Val
Age

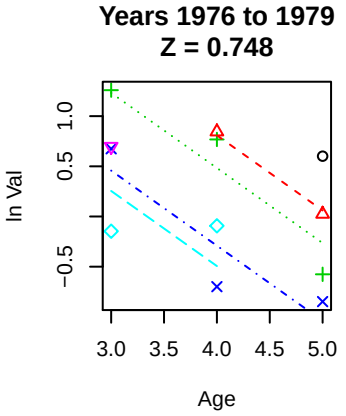

Years 1971 to 1974
Z = 0.129
ln Val
Age

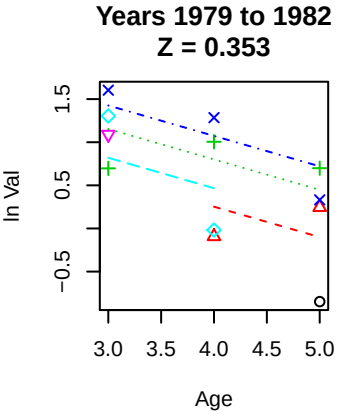

Years 1974 to 1977
Z = 0.374
ln Val
Age

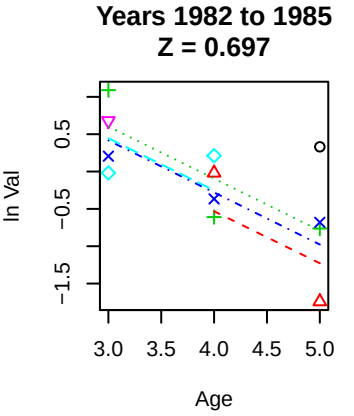

Years 1969 to 1972
Z = 0.103
ln Val
Age

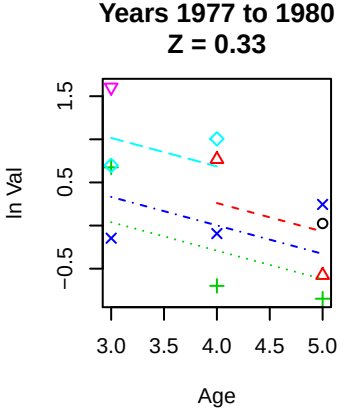

Years 1972 to 1975
Z = 0.496
ln Val
Age

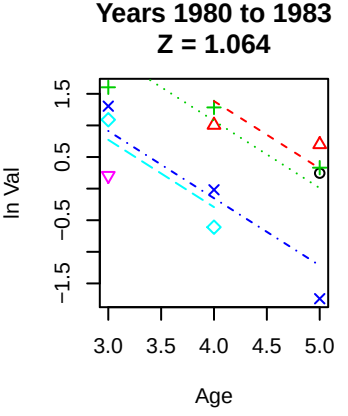

Years 1975 to 1978
Z = 0.687
ln Val
Age

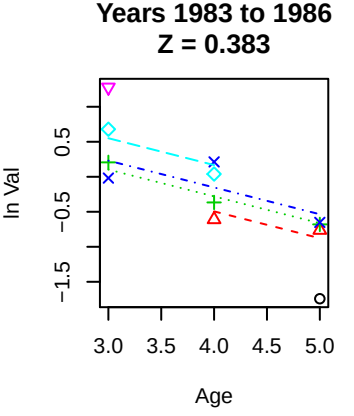

Years 1976 to 1979
Z = 0.748
ln Val
Age

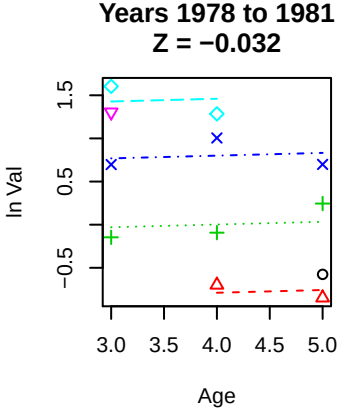

Years 1979 to 1982
Z = 0.353
ln Val
Age

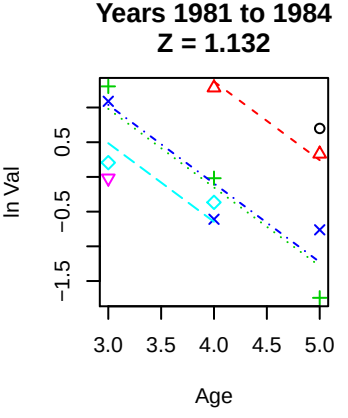

Years 1982 to 1985
Z = 0.697
ln Val
Age

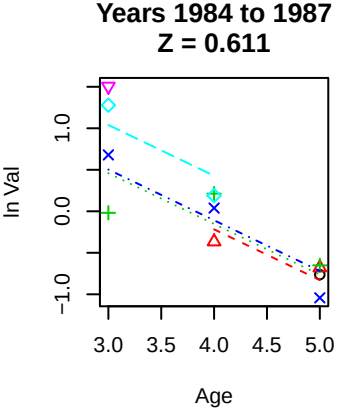

Years 1977 to 1980
Z = 0.33
ln Val
Age

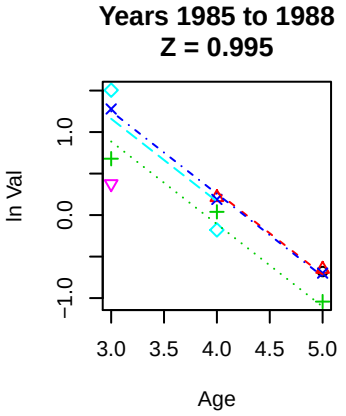

Years 1980 to 1983
Z = 1.064
ln Val
Age

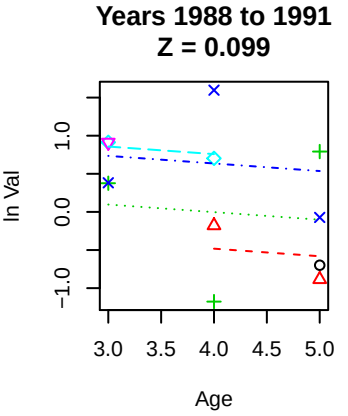

Years 1983 to 1986
Z = 0.383
ln Val
Age

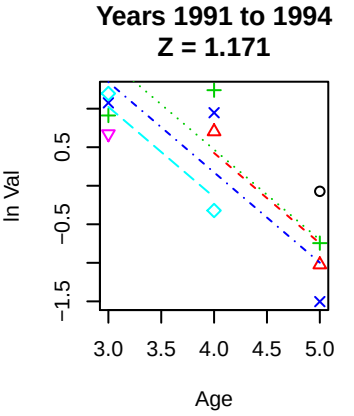

Years 1978 to 1981
Z = −0.032
ln Val
Age

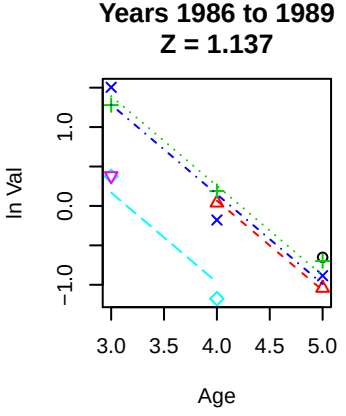

Years 1981 to 1984
Z = 1.132
ln Val
Age

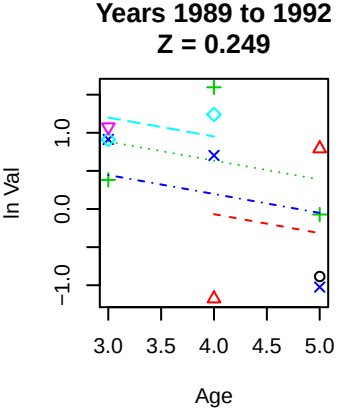

Years 1984 to 1987
Z = 0.611
ln Val
Age

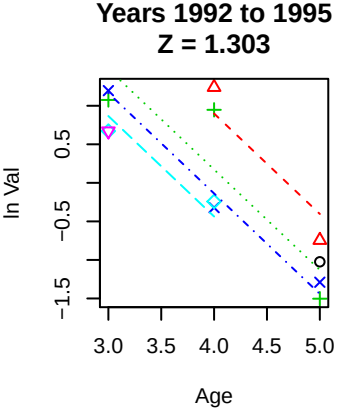

Years 1985 to 1988
Z = 0.995
ln Val
Age

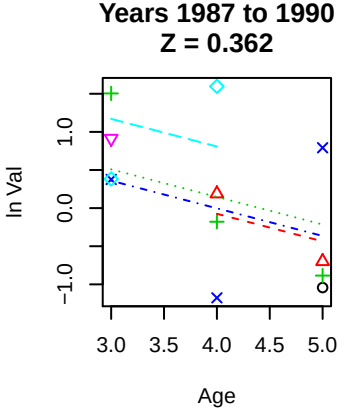

Years 1988 to 1991
Z = 0.099
ln Val
Age

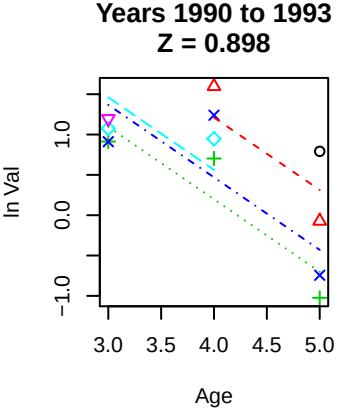

Years 1991 to 1994
Z = 1.171
ln Val
Age

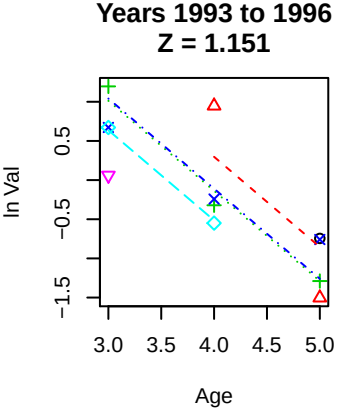

Years 1986 to 1989
Z = 1.137
ln Val
Age

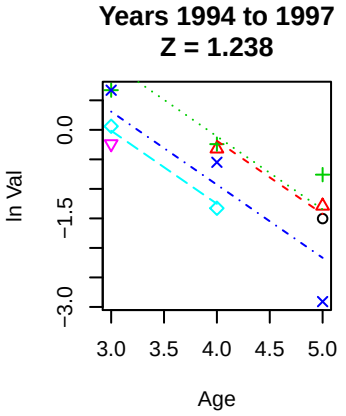

Years 1989 to 1992
Z = 0.249
ln Val
Age

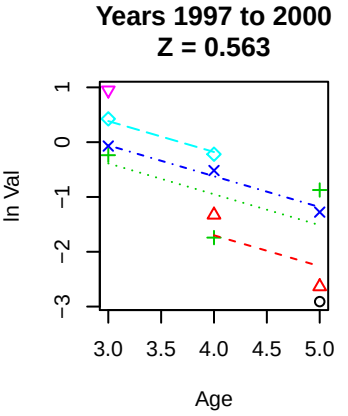

Years 1992 to 1995
Z = 1.303
ln Val
Age

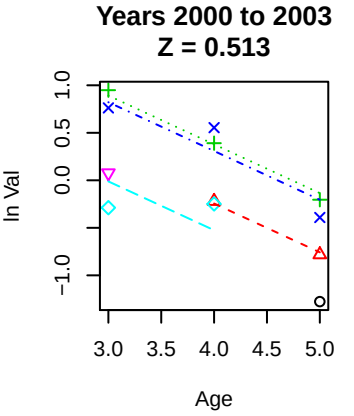

Years 1987 to 1990
Z = 0.362
ln Val
Age


Years 1990 to 1993
Z = 0.898
ln Val
Age


Years 1993 to 1996
Z = 1.151
ln Val
Age


Years 1994 to 1997
Z = 1.238
ln Val
0.0
−1.5
−3.0
3.0
3.5
4.0
4.5
5.0
Age


Years 1997 to 2000
Z = 0.563
ln Val
1
0
−1
−2
−3
3.0
3.5
4.0
4.5
5.0
Age


Years 2000 to 2003
Z = 0.513
ln Val
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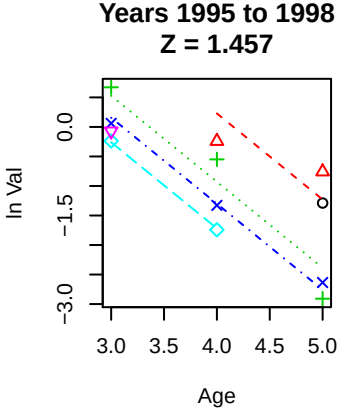
0.5
0.0
−1.0
3.0
3.5
4.0
4.5
5.0
Age


Years 1995 to 1998
Z = 1.457
ln Val
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−1.5
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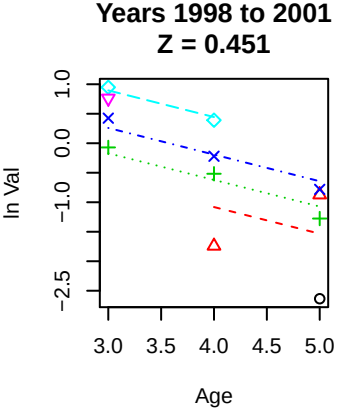
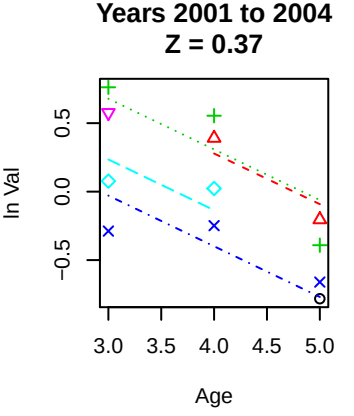
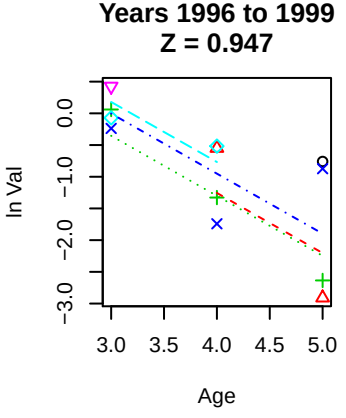
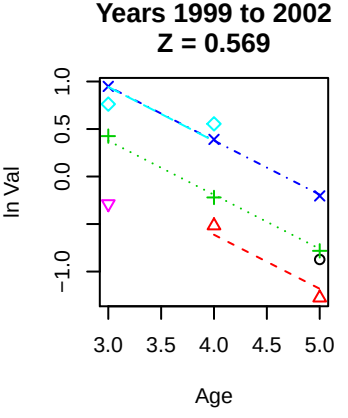
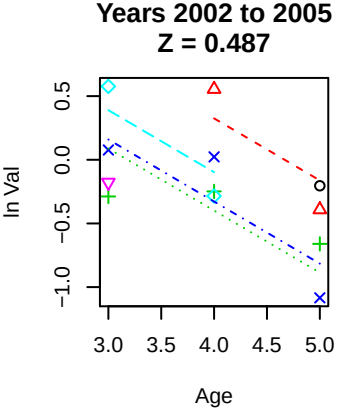
3.0
3.5
4.0
4.5
5.0
Age

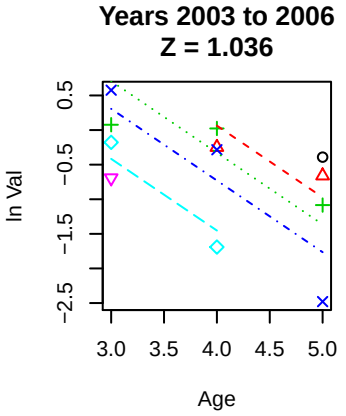

Years 1998 to 2001
Z = 0.451
ln Val
1.0
0.0
−1.0
−2.5
3.0
3.5
4.0
4.5
5.0
Age

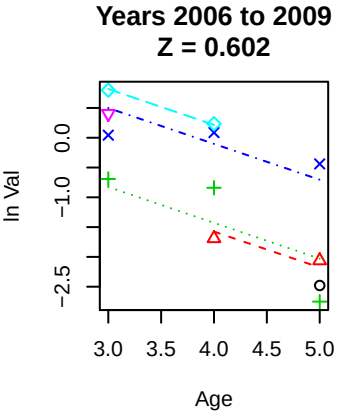

Years 2001 to 2004
Z = 0.37
ln Val
0.5
0.0
−0.5
3.0
3.5
4.0
4.5
5.0
Age

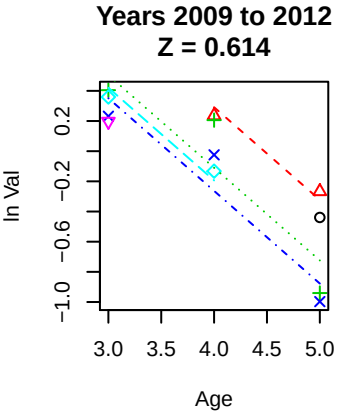

Years 1996 to 1999
Z = 0.947
ln Val
0.0
−1.0
−2.0
−3.0
3.0
3.5
4.0
4.5
5.0
Age

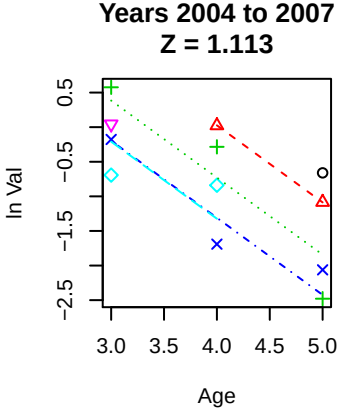

Years 1999 to 2002
Z = 0.569
ln Val
1.0
0.5
0.0
−1.0
3.0
3.5
4.0
4.5
5.0
Age

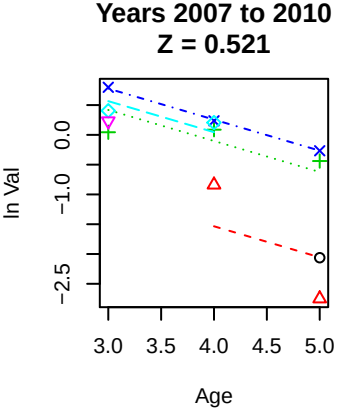

Years 2002 to 2005
Z = 0.487
ln Val
0.5
0.0
−0.5
−1.0
3.0
3.5
4.0
4.5
5.0
Age

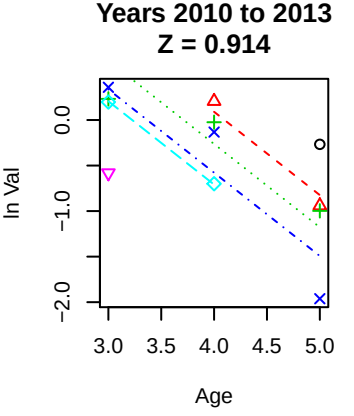

Years 2003 to 2006
Z = 1.036
ln Val
Age

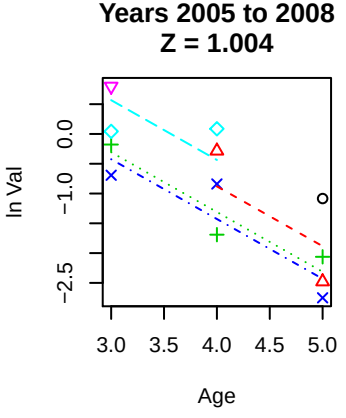

Years 2006 to 2009
Z = 0.602
ln Val
Age

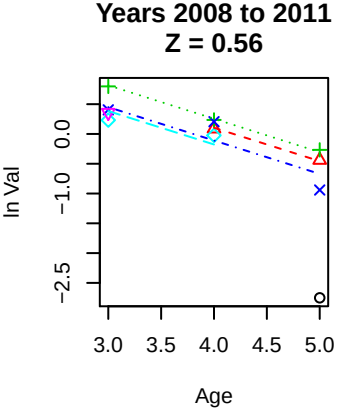

Years 2009 to 2012
Z = 0.614
ln Val
Age

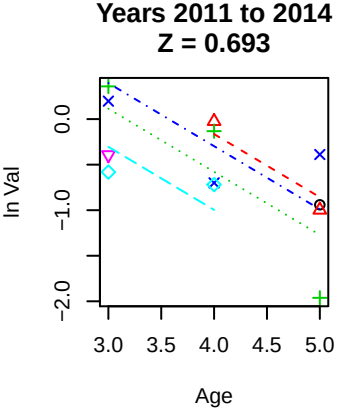

Years 2004 to 2007
Z = 1.113
ln Val
Age

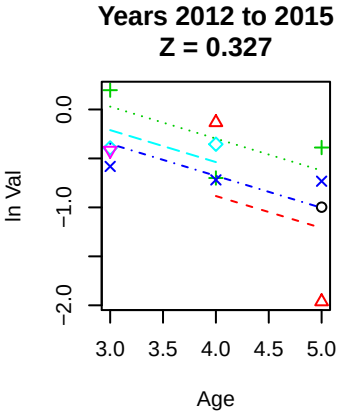

Years 2007 to 2010
Z = 0.521
ln Val
Age

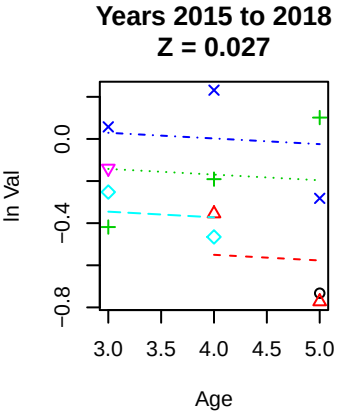

Years 2010 to 2013
Z = 0.914
ln Val
Age

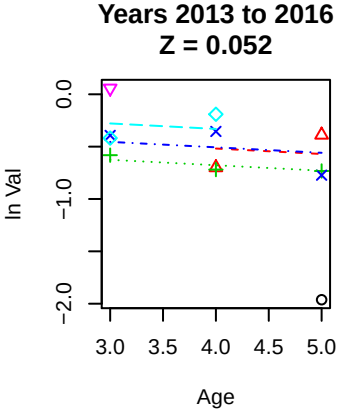

Years 2005 to 2008
Z = 1.004
ln Val
Age

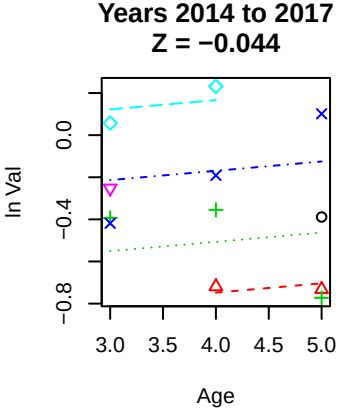

Years 2008 to 2011
Z = 0.56
ln Val
Age

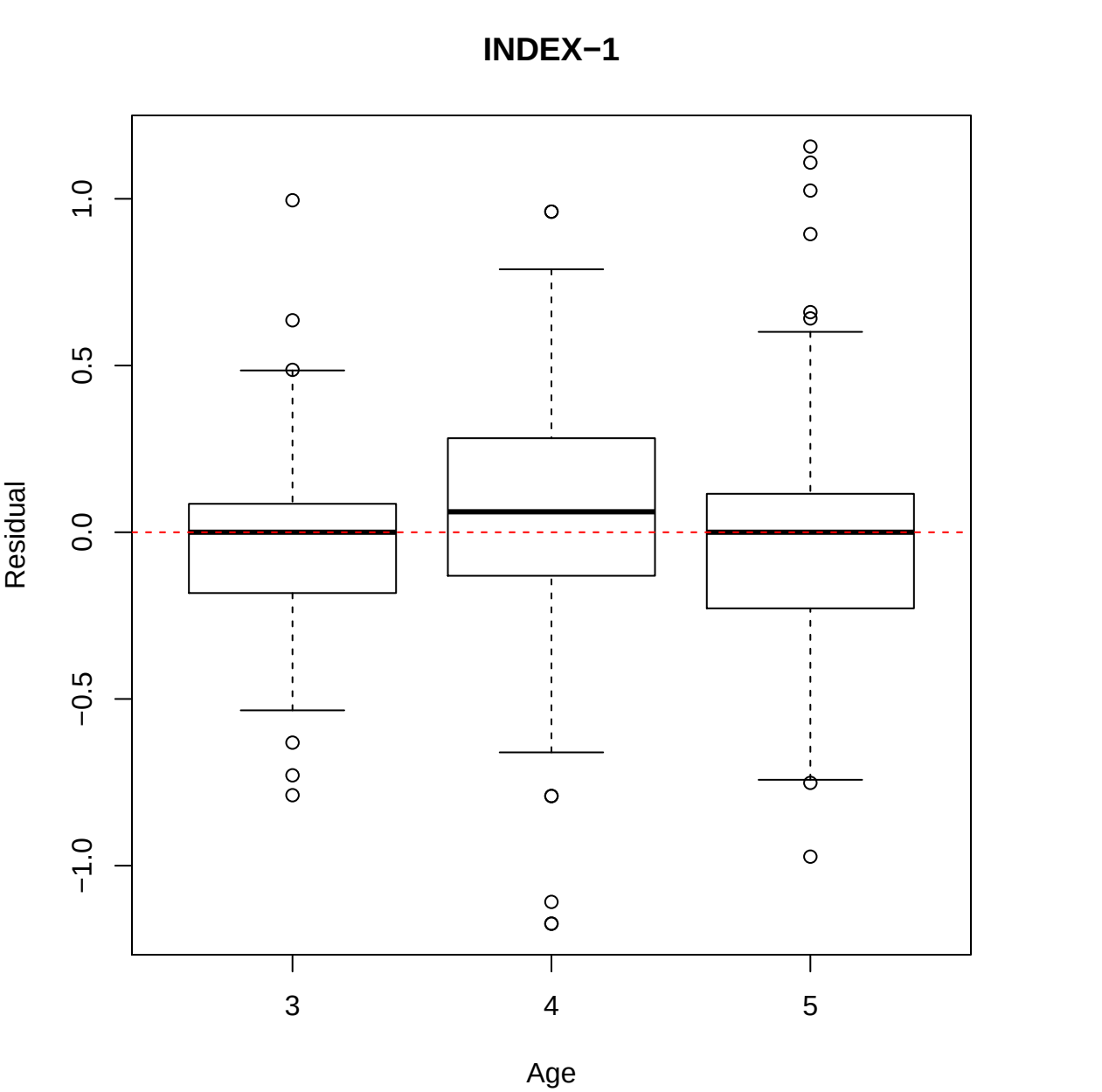

Years 2011 to 2014
Z = 0.693
ln Val
Age

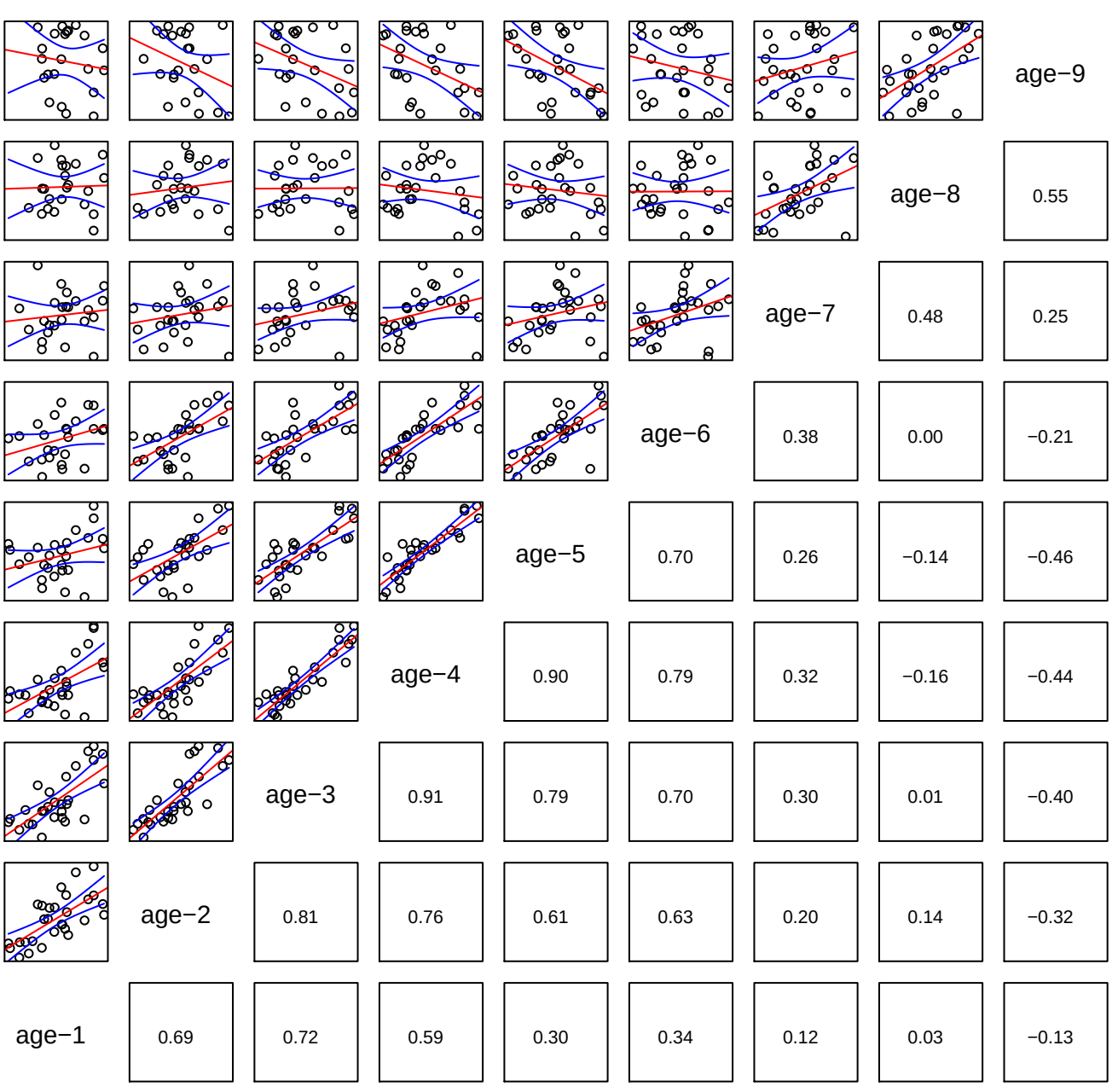

Years 2012 to 2015
Z = 0.327
ln Val
0.0
−1.0
−2.0
3.0
3.5
4.0
4.5
5.0
Age

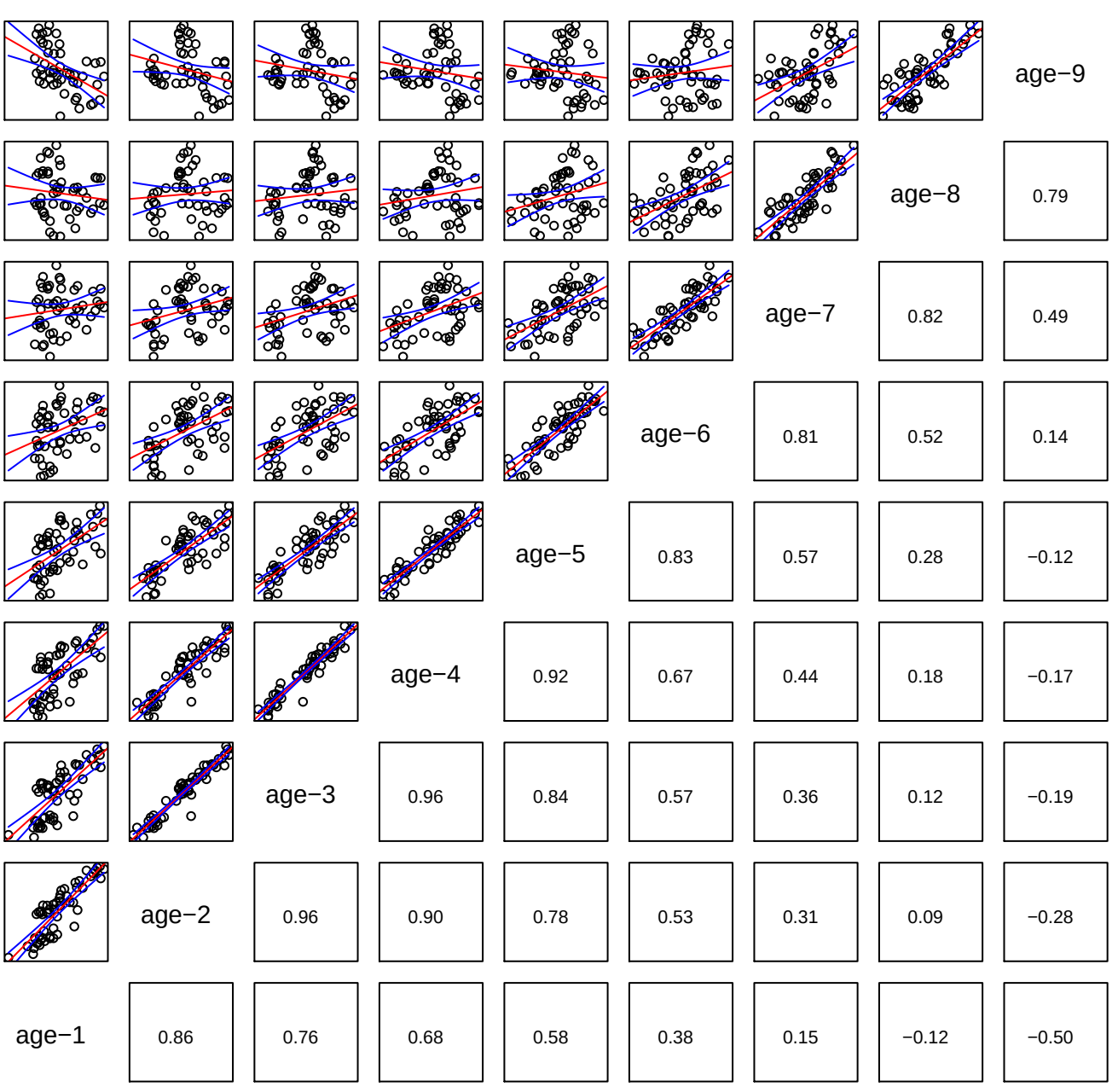

Years 2015 to 2018
Z = 0.027
ln Val
0.0
−0.4
−0.8
3.0
3.5
4.0
4.5
5.0
Age


Years 2013 to 2016
Z = 0.052
ln Val
0.0
−1.0
−2.0
3.0
3.5
4.0
4.5
5.0
Age

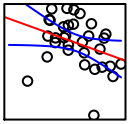
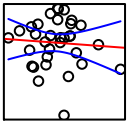
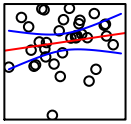
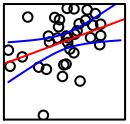
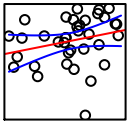
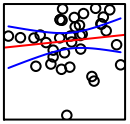
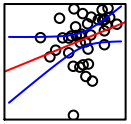
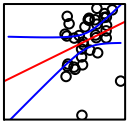

Years 2014 to 2017
Z = −0.044
ln Val
0.0
−0.4
−0.8
3.0
3.5
4.0
4.5
5.0
Age


INDEX−1
Residual
1.0
0.5
0.0
−0.5
−1.0
3
4
5
Age

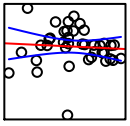
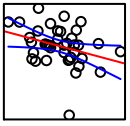
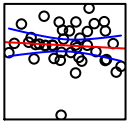
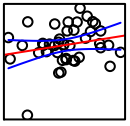
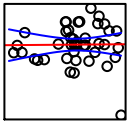
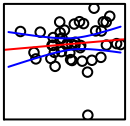
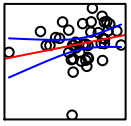

Catch Observed
age−9
age−8
0.55
age−7
0.48
0.25
age−6
0.38
0.00
−0.21
age−5
0.70
0.26
−0.14
−0.46
age−4
0.90
0.79
0.32
−0.16
−0.44
age−3
0.91
0.79
0.70
0.30
0.01
−0.40
age−2
0.81
0.76
0.61
0.63
0.20
0.14
−0.32
age−1
0.69
0.72
0.59
0.30
0.34
0.12
0.03
−0.13


Catch Predicted
age−9
age−8
0.79
age−7
0.82
0.49
age−6
0.81
0.52
0.14
age−5
0.83
0.57
0.28
−0.12
age−4
0.92
0.67
0.44
0.18
−0.17
age−3
0.96
0.84
0.57
0.36
0.12
−0.19
age−2
0.96
0.90
0.78
0.53
0.31
0.09
−0.28
age−1
0.86
0.76
0.68
0.58
0.38
0.15
−0.12
−0.50

Index 1 (INDEX−1) Observed

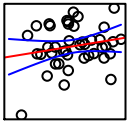
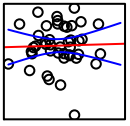
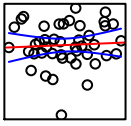
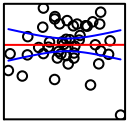
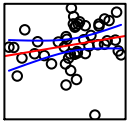
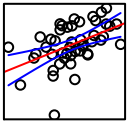









age−9

age−8

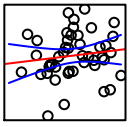
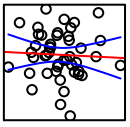
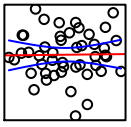
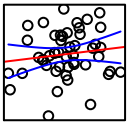
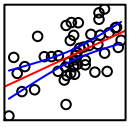
0.31

age−7

0.24

0.31

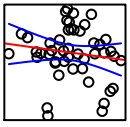
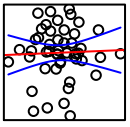
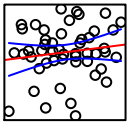
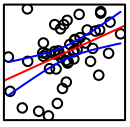






age−6

0.48

0.11

0.12

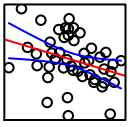
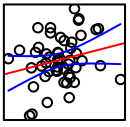
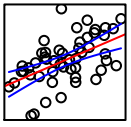
age−5

0.57

0.23

0.01

0.25

age−4

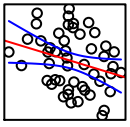
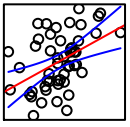
0.45

0.14

0.00

0.22

0.37

age−3

0.54

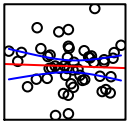
0.14

0.01

0.06

−0.08

0.16



age−2

0.45

0.24

0.04

−0.05

0.03

−0.32

−0.07

age−1

−0.04

−0.28

−0.33

−0.14

0.13

0.20

−0.07

−0.34

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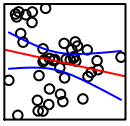
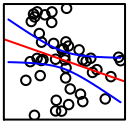
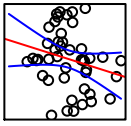
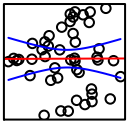
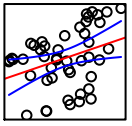
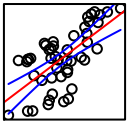
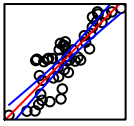
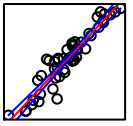
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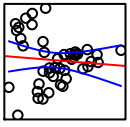
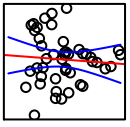
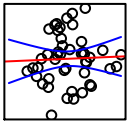
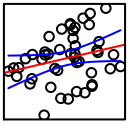
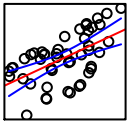
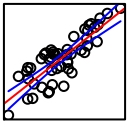
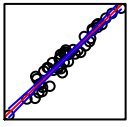
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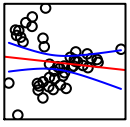
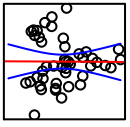
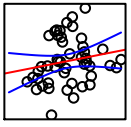
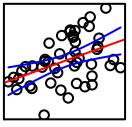
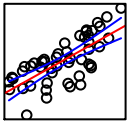
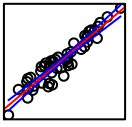
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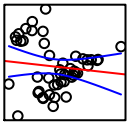
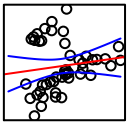
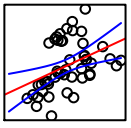
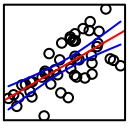
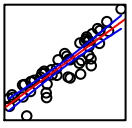
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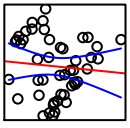
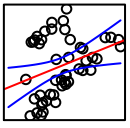
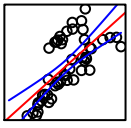
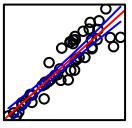
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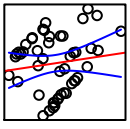
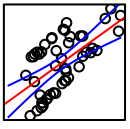
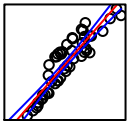
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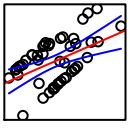
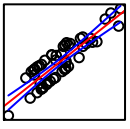
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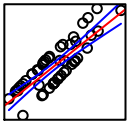
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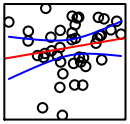
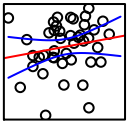
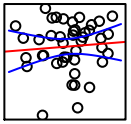
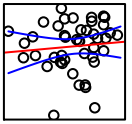
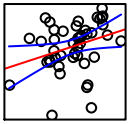
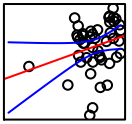
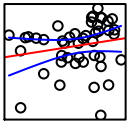
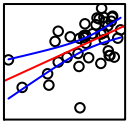
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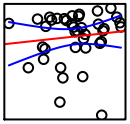
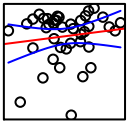
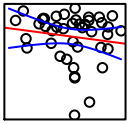
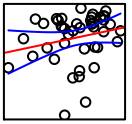
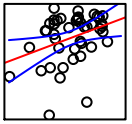
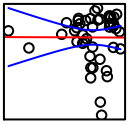
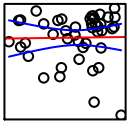
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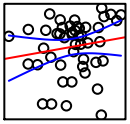
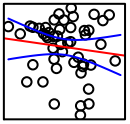
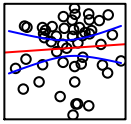
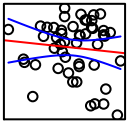
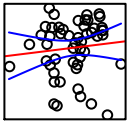
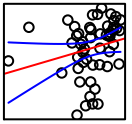
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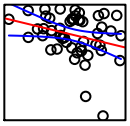
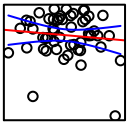
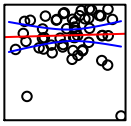
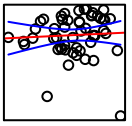
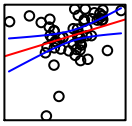
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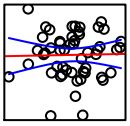
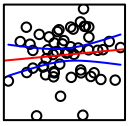
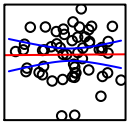
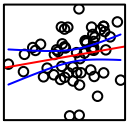
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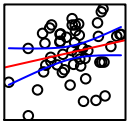
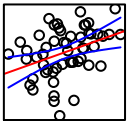
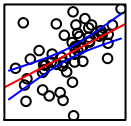
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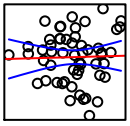
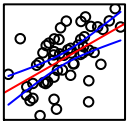
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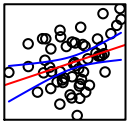
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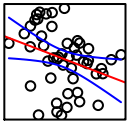

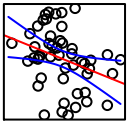

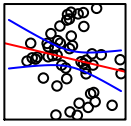

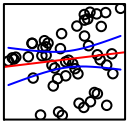

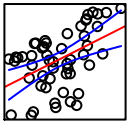

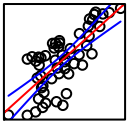

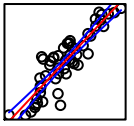

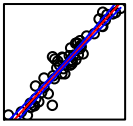

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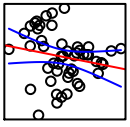

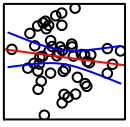

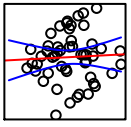

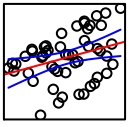

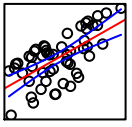

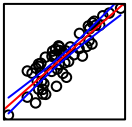

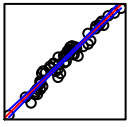

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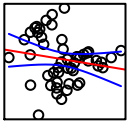

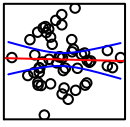

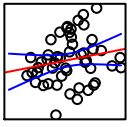

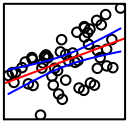

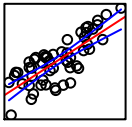

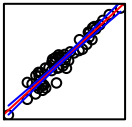

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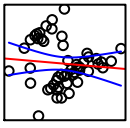

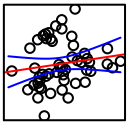

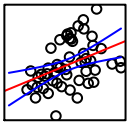

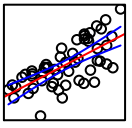

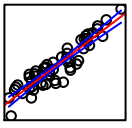

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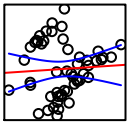

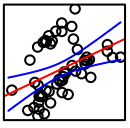

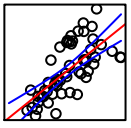

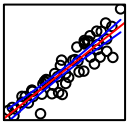

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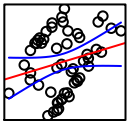

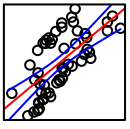

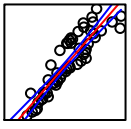

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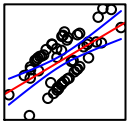
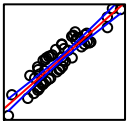
0.12





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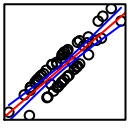

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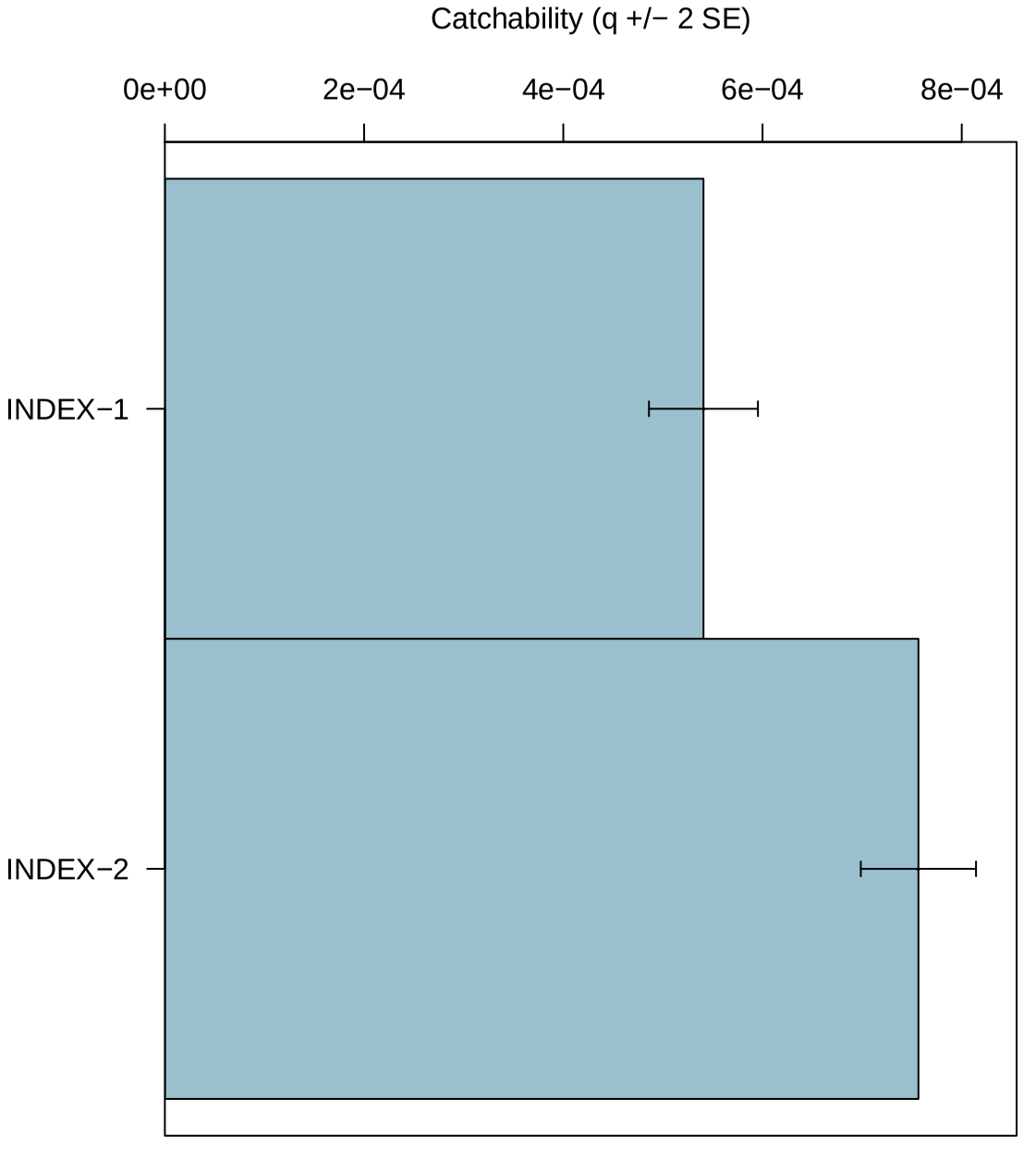
−0.09

−0.17

−0.20

−0.32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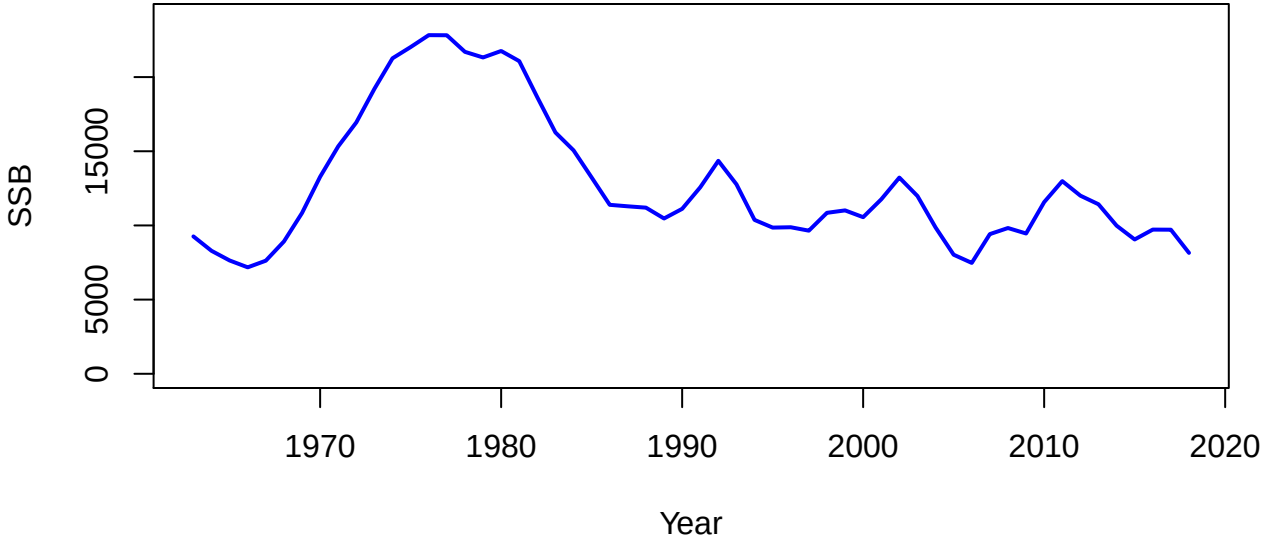
4e−04
6e−04
8e−04
INDEX−1
INDEX−2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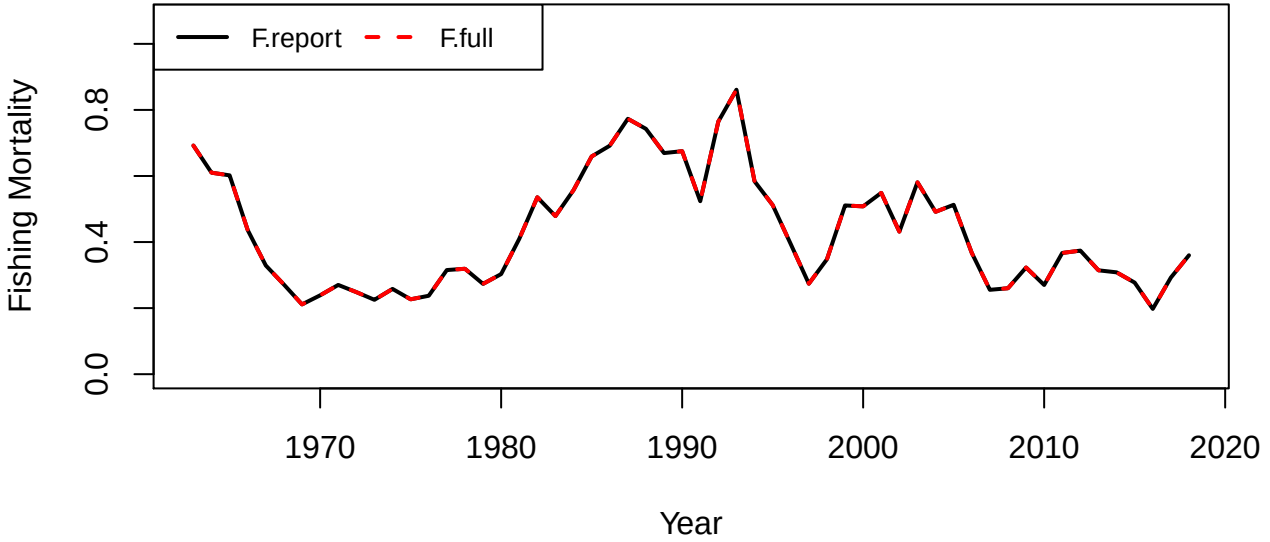
1990
2000
2010
2020
Year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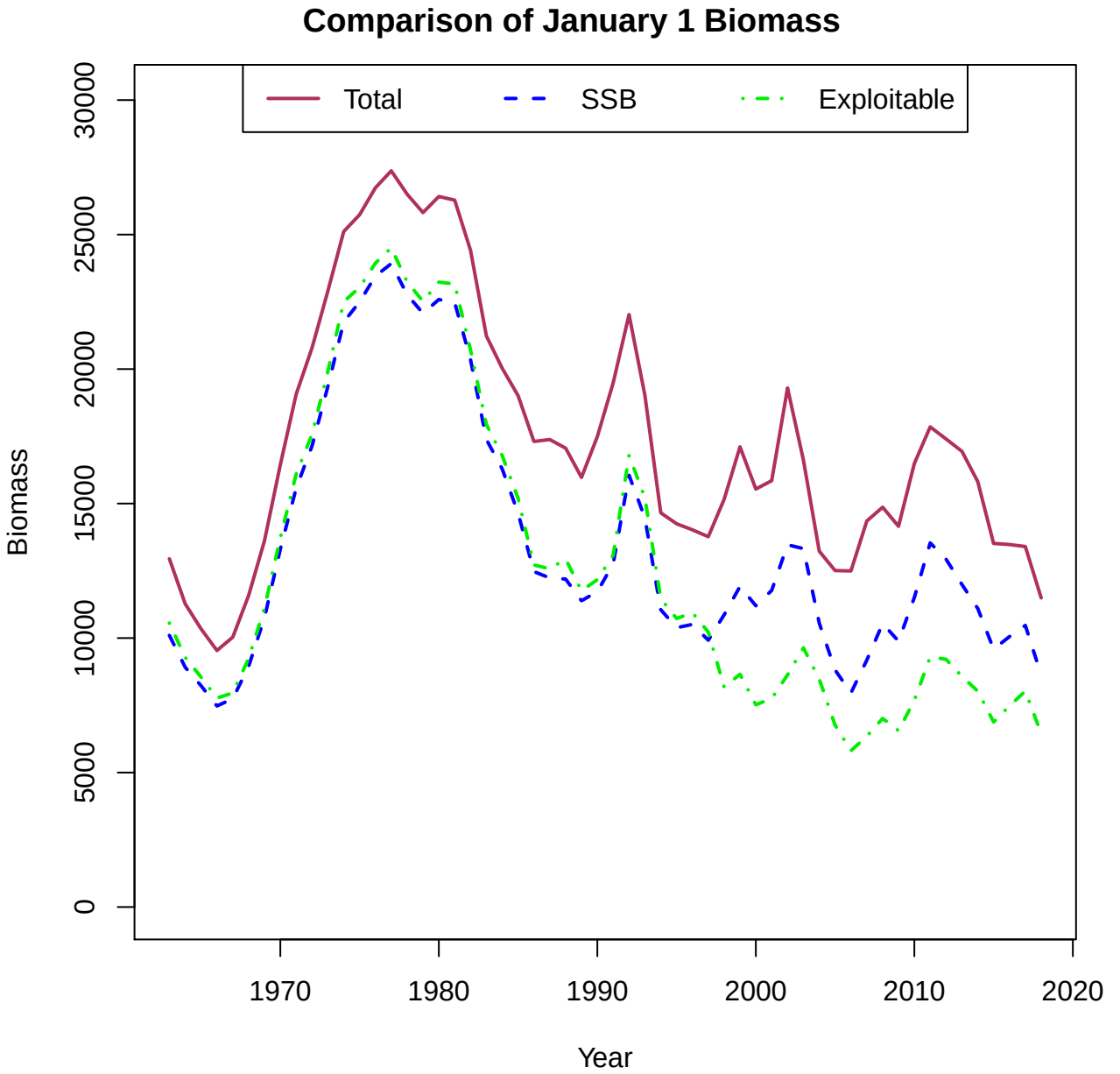
2020
Year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1970
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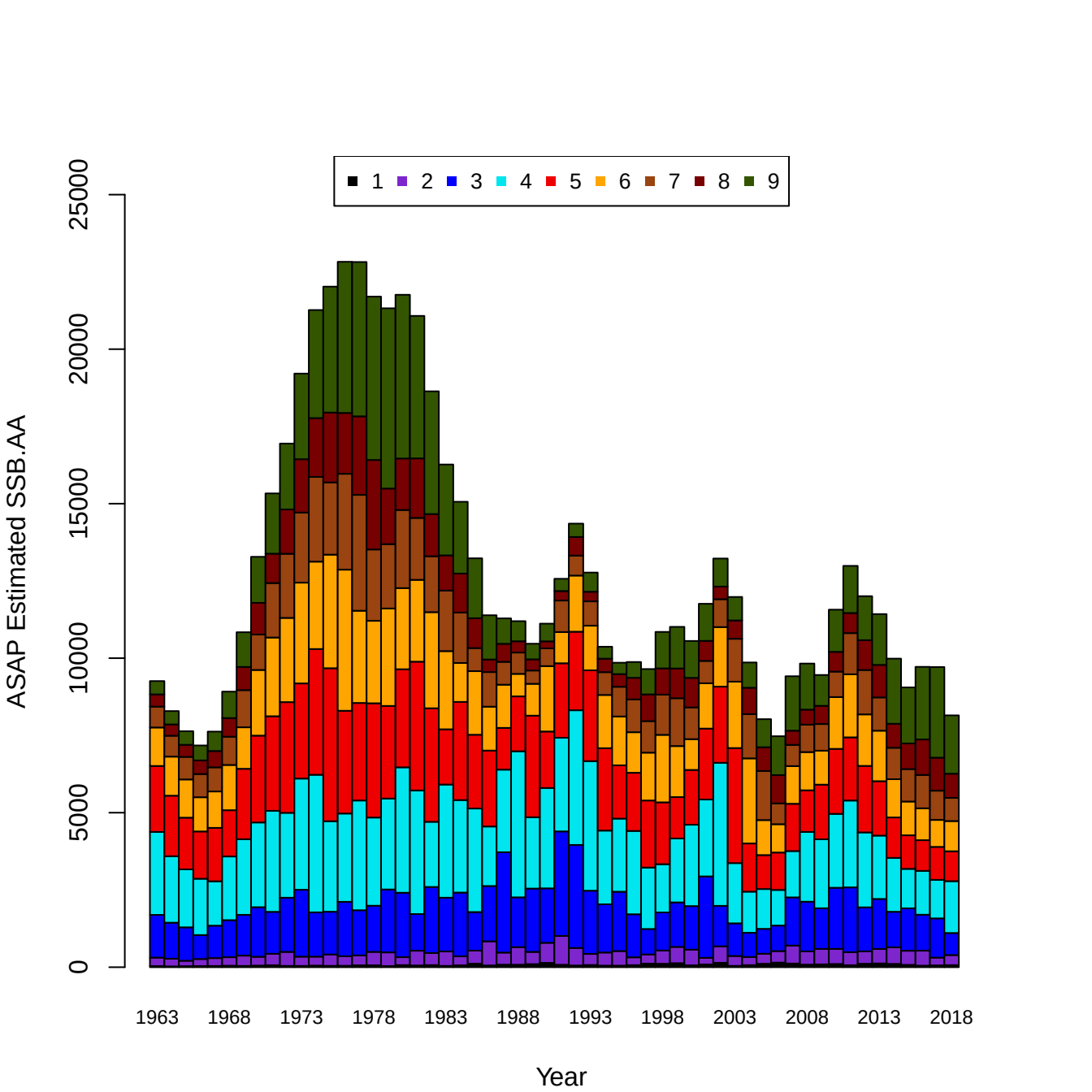
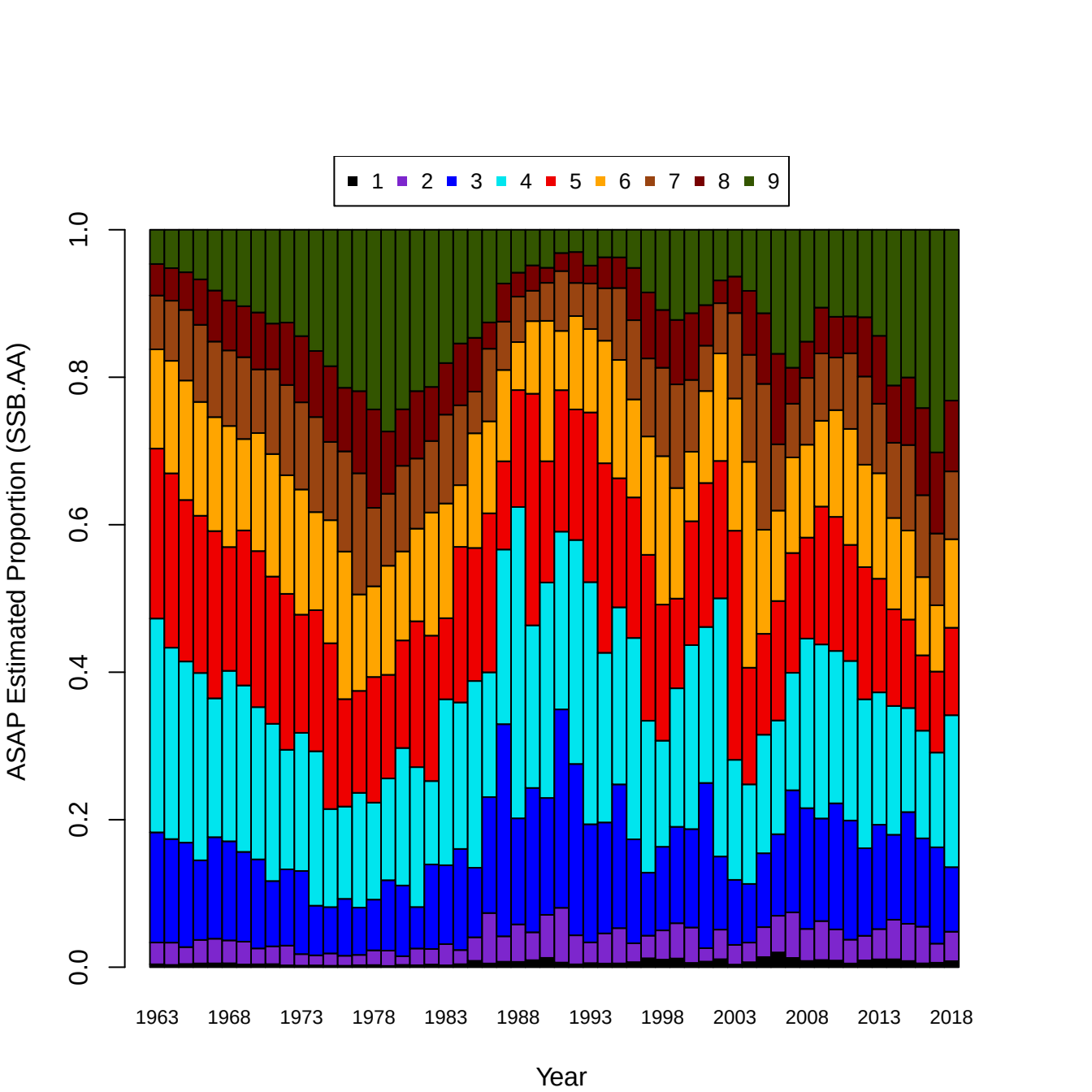
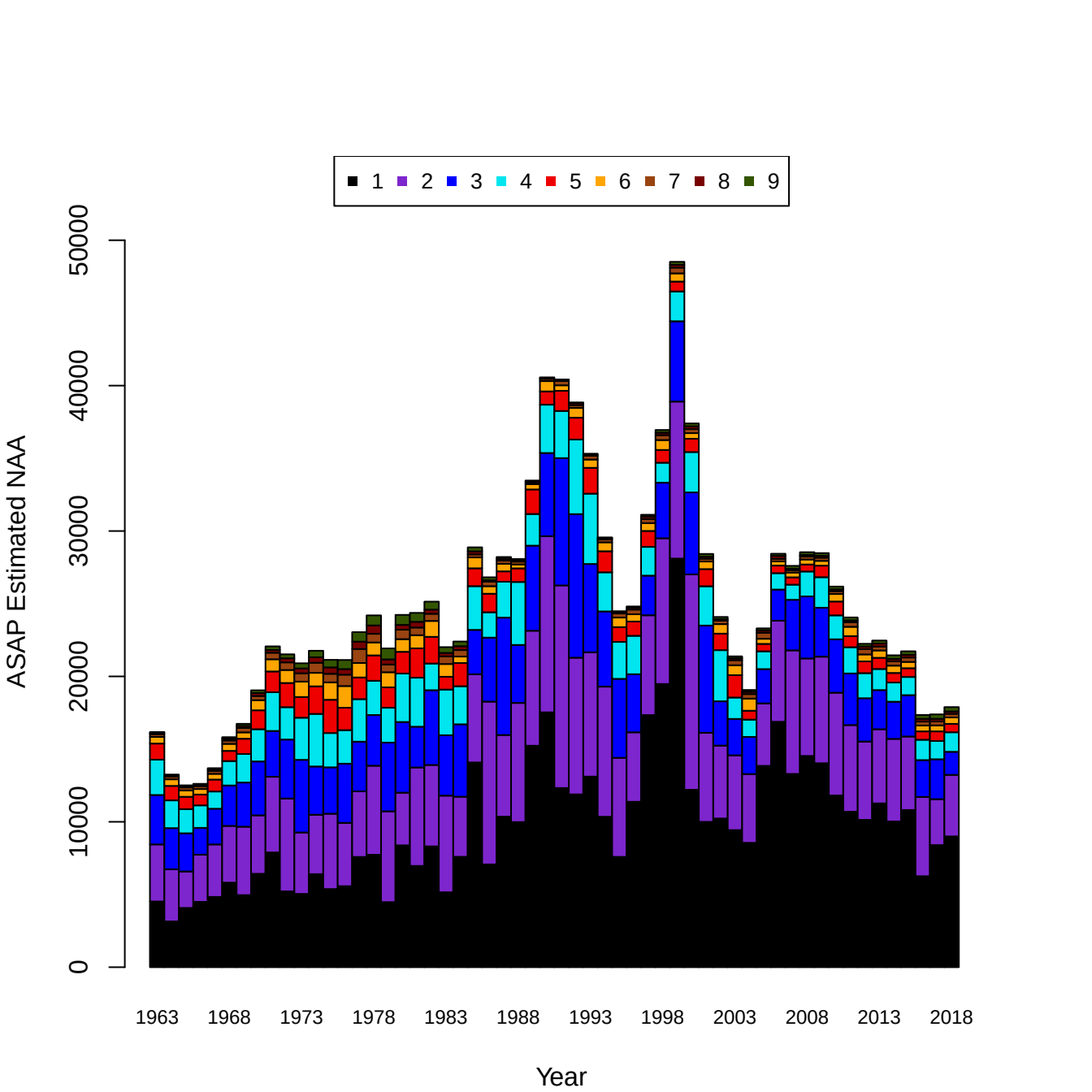
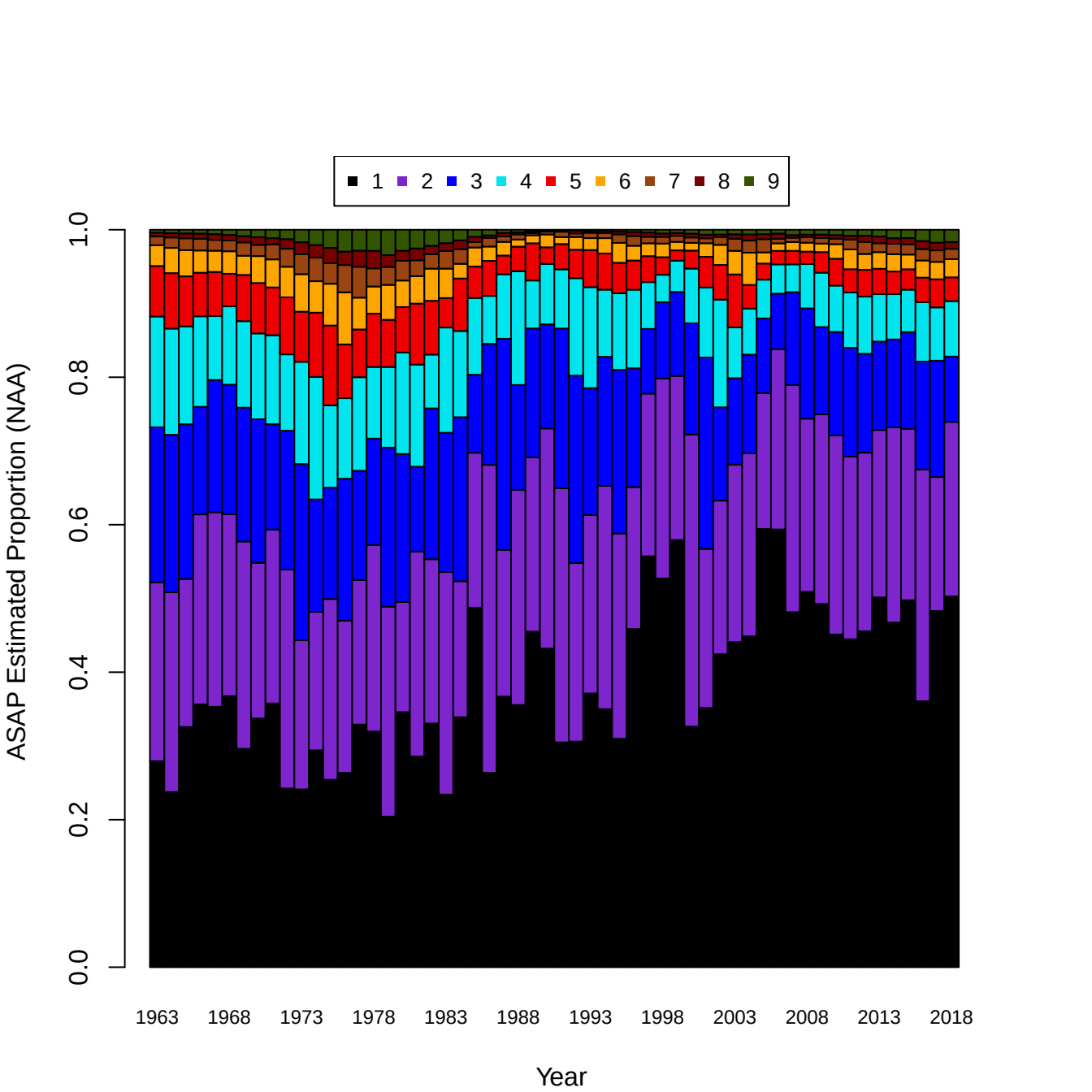
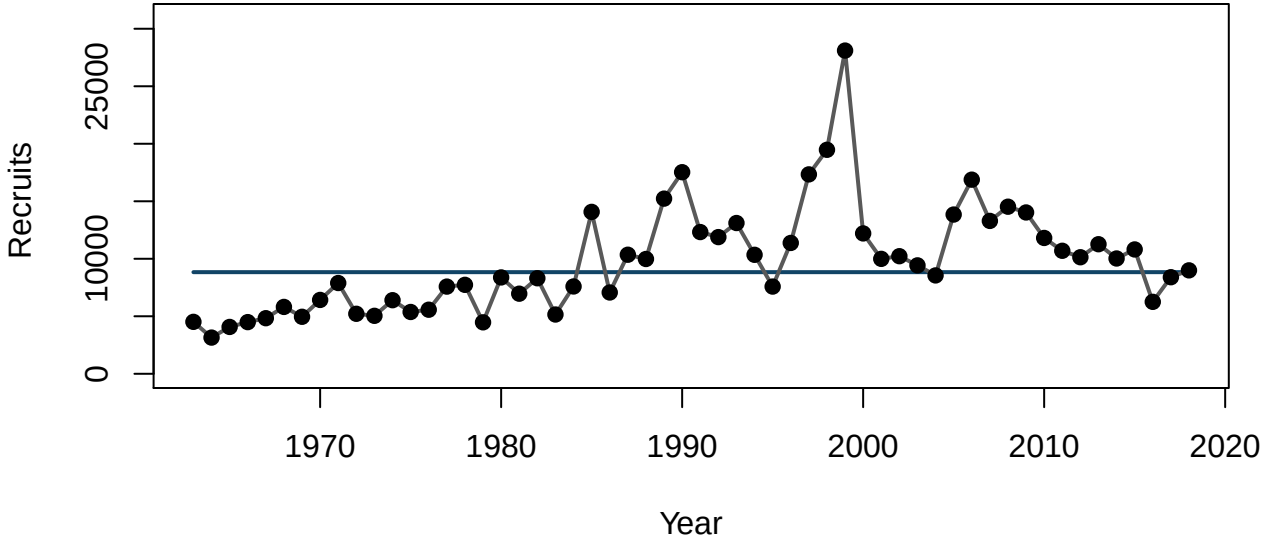
2000
2010
2020
Year

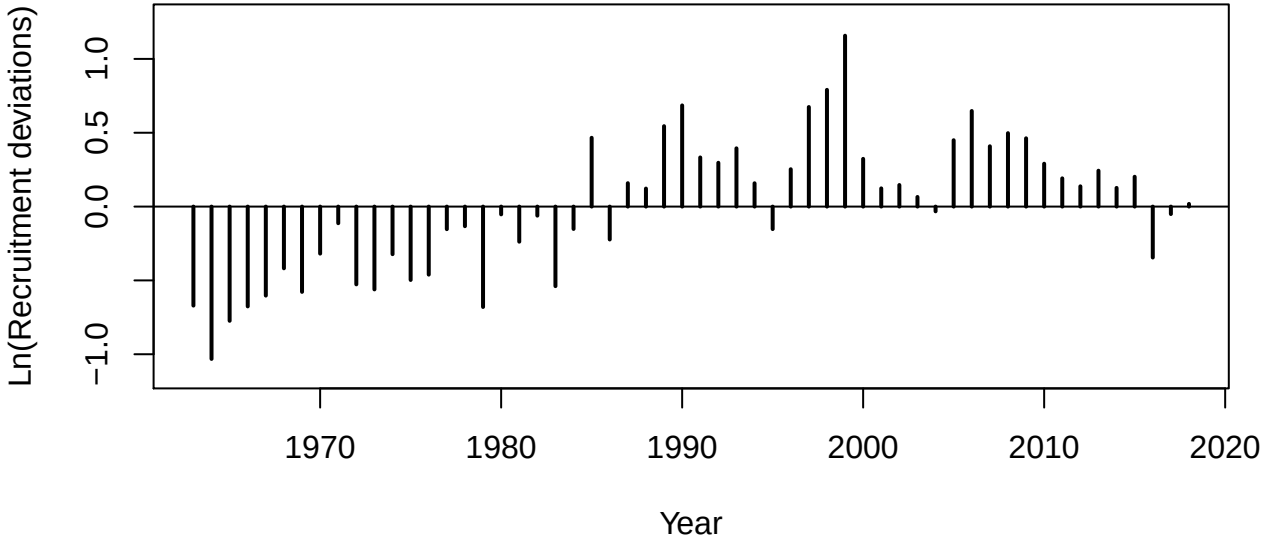

1 2 3 4 5 6 7 8 9
ASAP Estimated SSB.AA
0
5000
10000
15000
20000
25000
1963
1968
1973
1978
1983
1988
1993
1998
2003
2008
2013
2018
Year

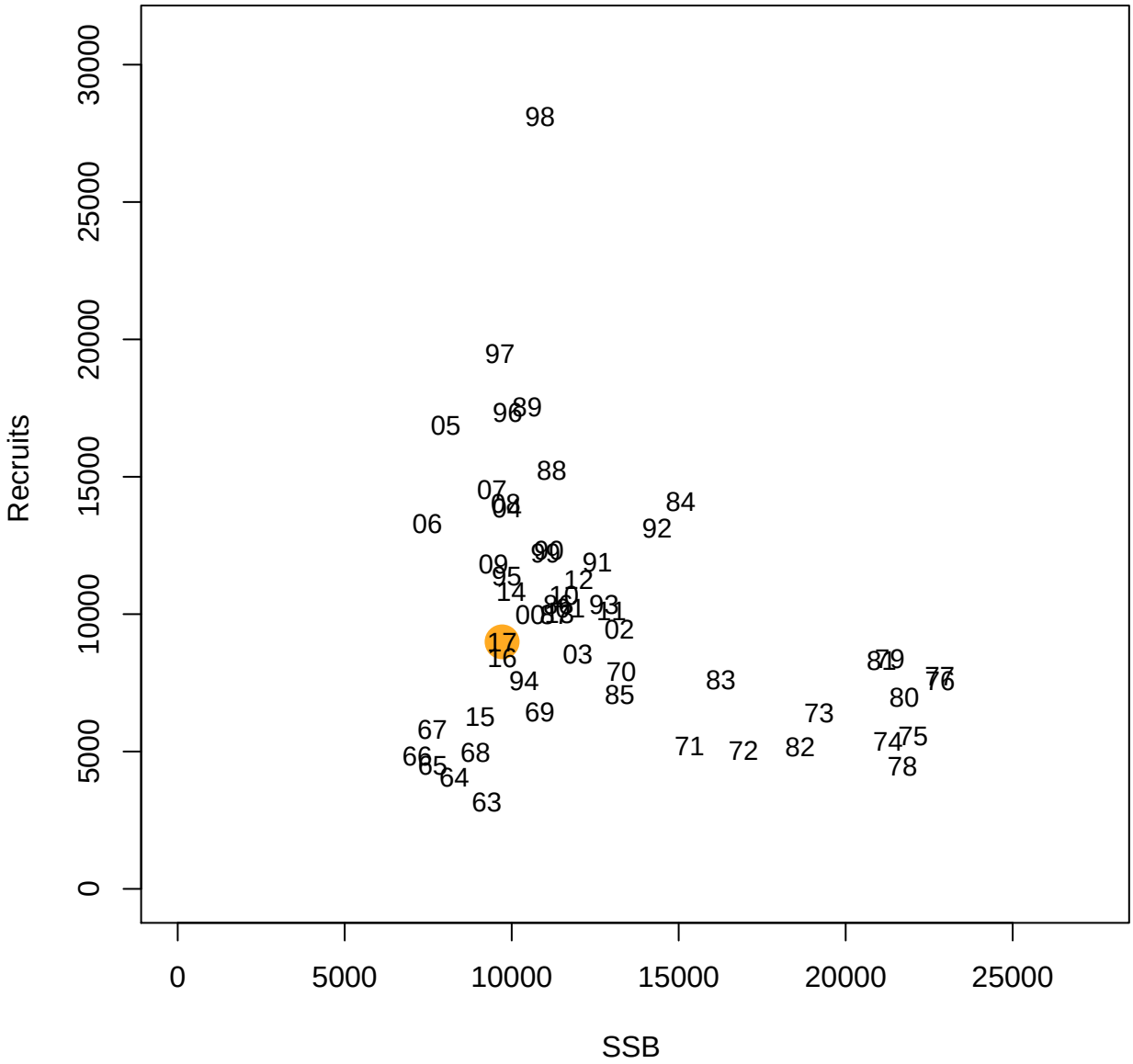

1 2 3 4 5 6 7 8 9
ASAP Estimated Proportion (SSB.AA)
0.0
0.2
0.4
0.6
0.8
1.0
1963
1968
1973
1978
1983
1988
1993
1998
2003
2008
2013
2018
Year


1 2 3 4 5 6 7 8 9
ASAP Estimated NAA
0
10000
20000
30000
40000
50000
1963
1968
1973
1978
1983
1988
1993
1998
2003
2008
2013
2018
Year

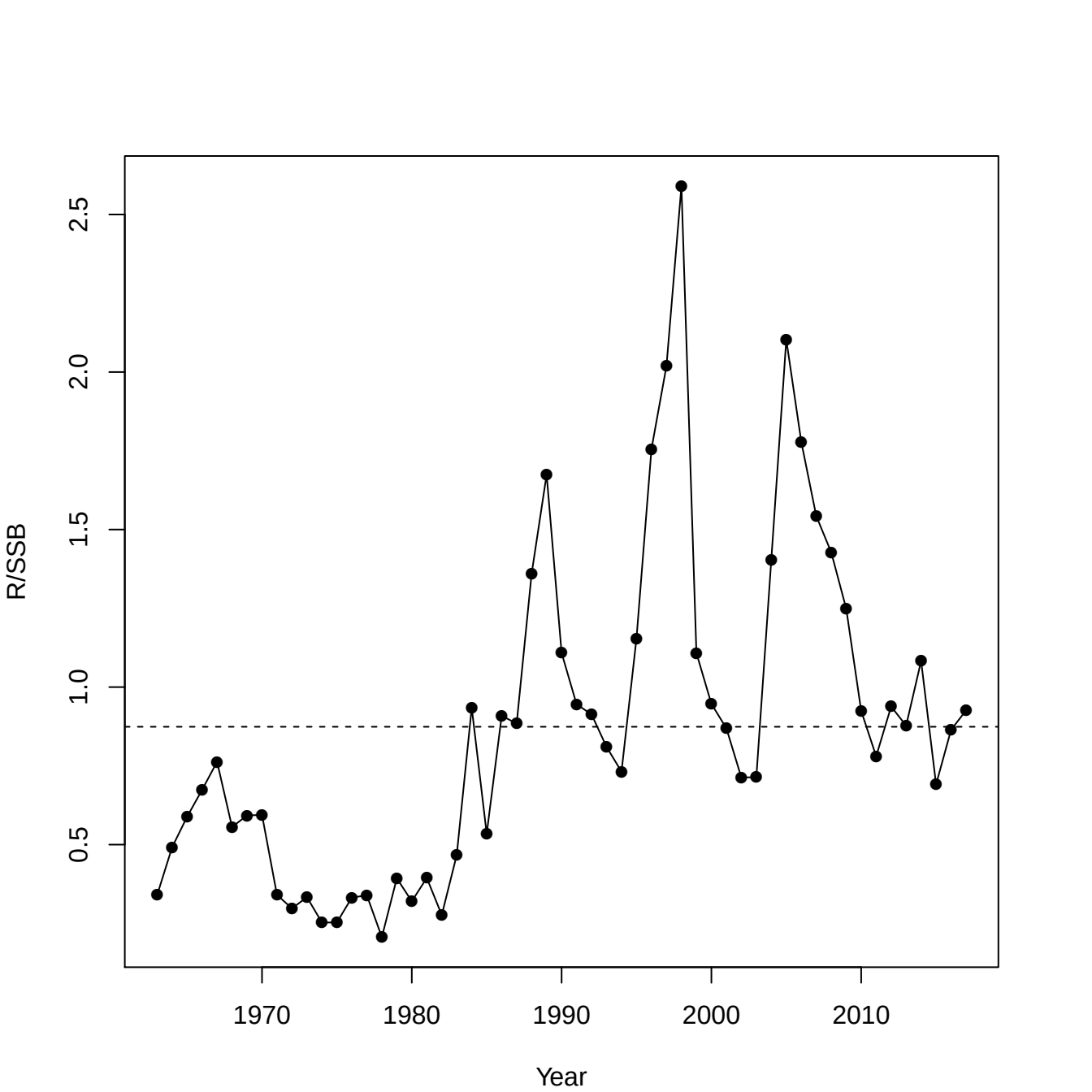

1 2 3 4 5 6 7 8 9
ASAP Estimated Proportion (NAA)
0.0
0.2
0.4
0.6
0.8
1.0
1963
1968
1973
1978
1983
1988
1993
1998
2003
2008
2013
2018
Year

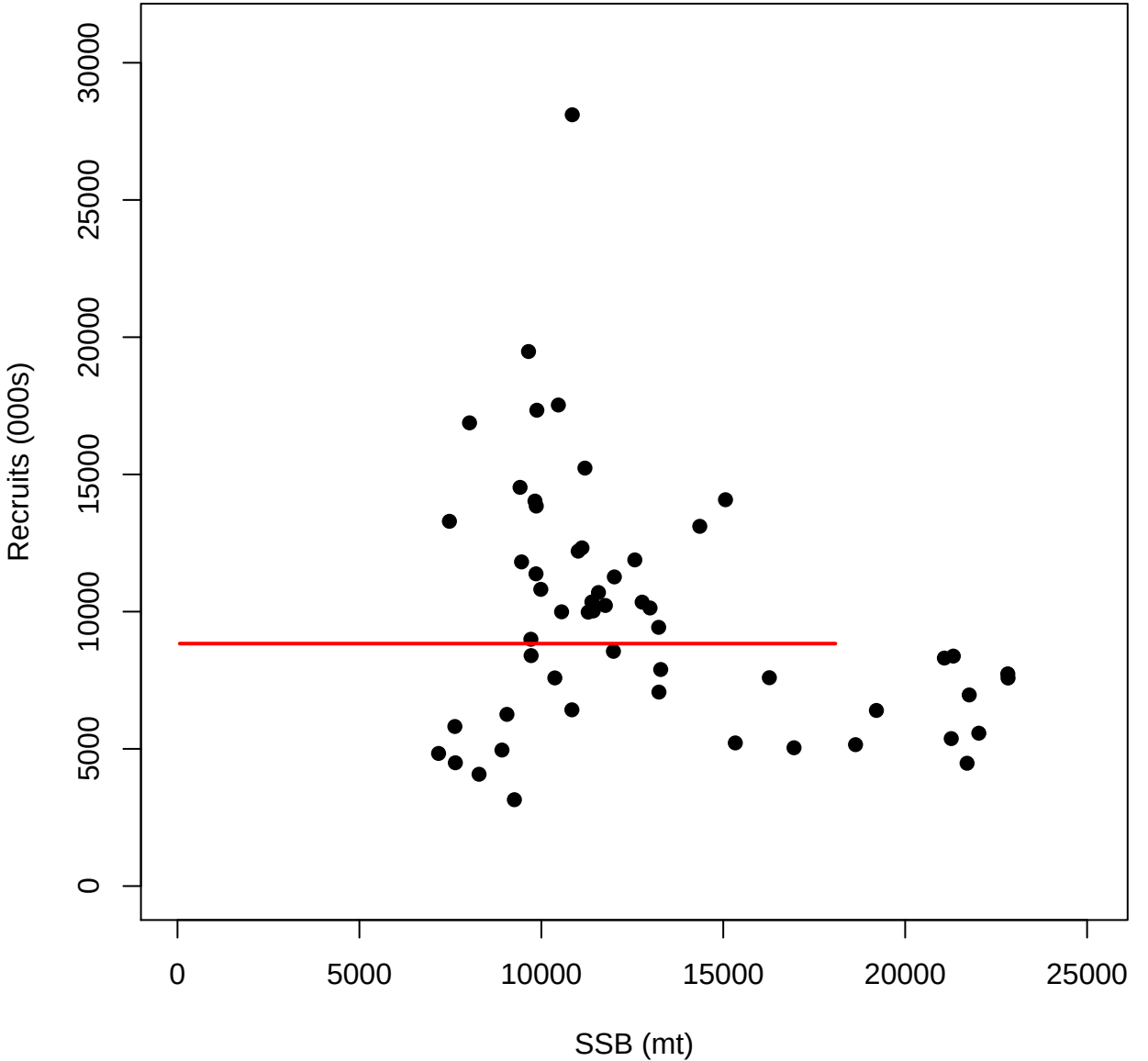

Recruits
0
10000
25000
1970
1980
1990
2000
2010
2020
Year

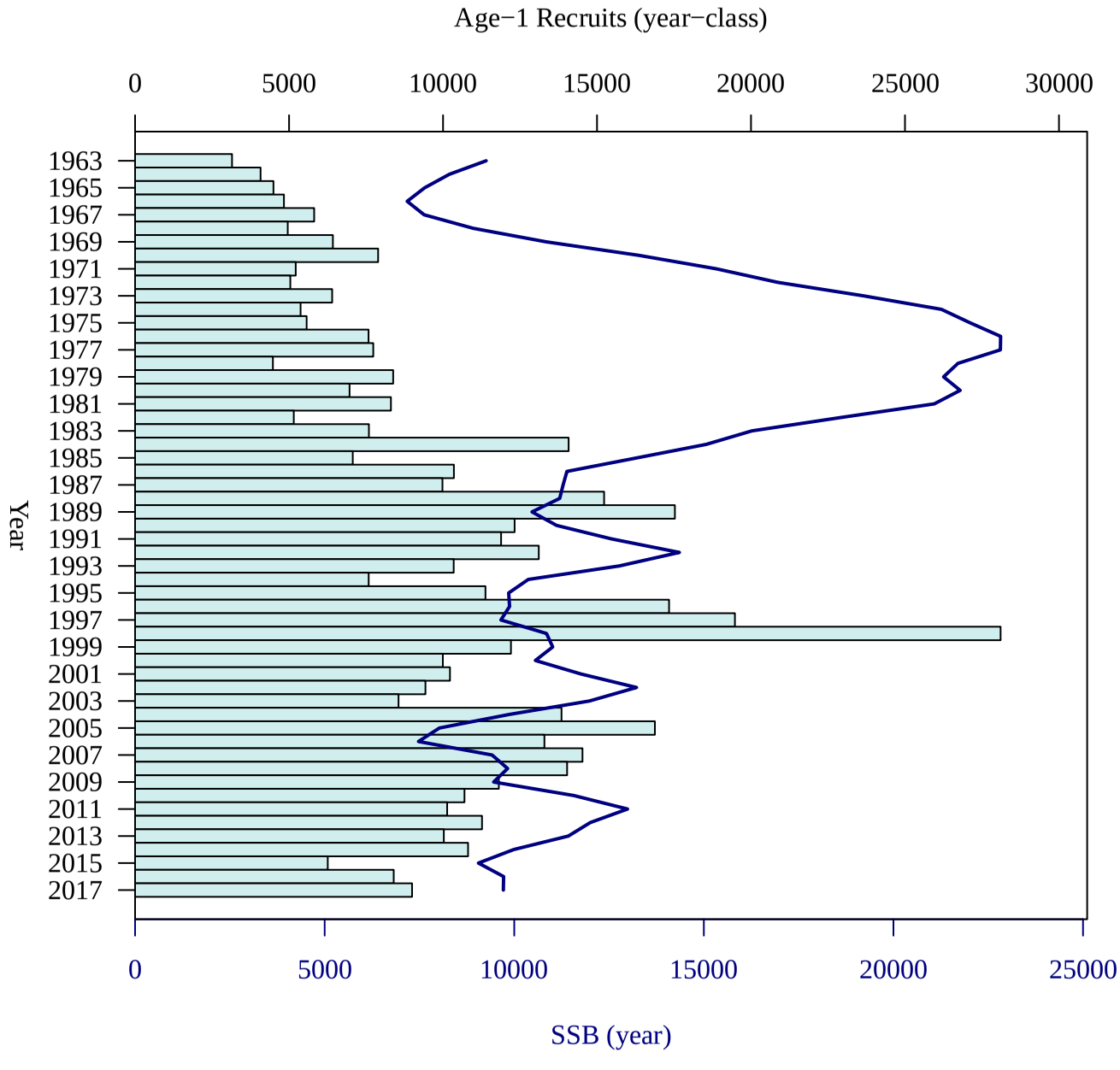

Ln(Recruitment deviations)
−1.0
0.0
0.5
1.0
1970
1980
1990
2000
2010
2020
Year

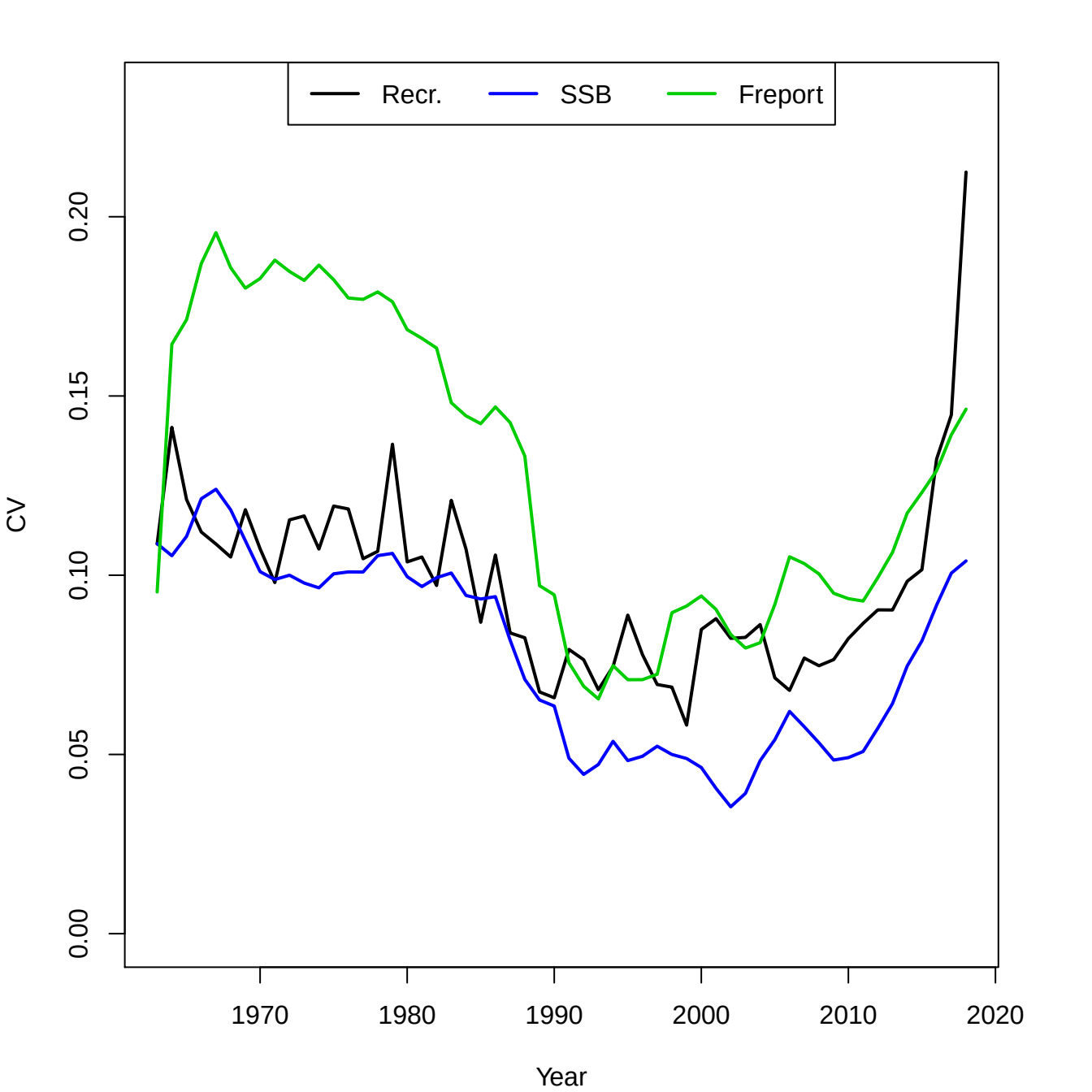


Recruits
SSB
0
5000
10000
15000
20000
25000
30000
98
97
89
96
05
88
07
08
04
84
06
92
90
99
91
09
95
12
14
10
93
11
00
02
17
16
03
70
94
83
85
79
81
77
76
80
73
15
69
67
68
66
65
64
63
71
72
82
74
75
78

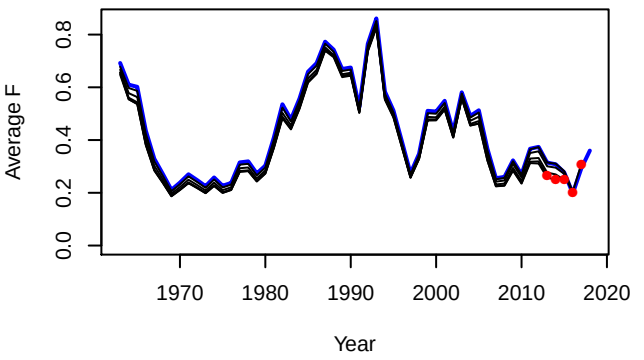

R/SSB
0.5
1.0
1.5
2.0
2.5
1970
1980
1990
2000
2010
Year

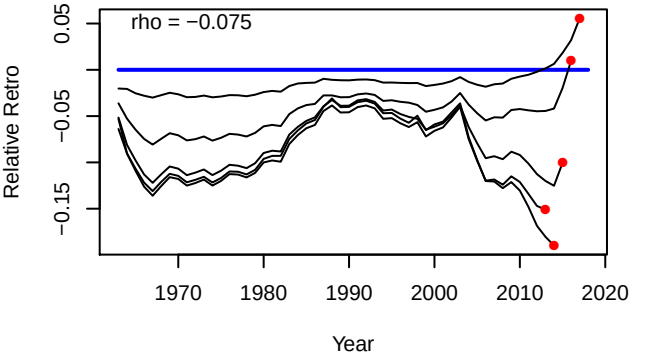

Recruits (000s)
0
5000
10000
15000
20000
25000
30000
0
5000
10000
15000
20000
25000
SSB (mt)

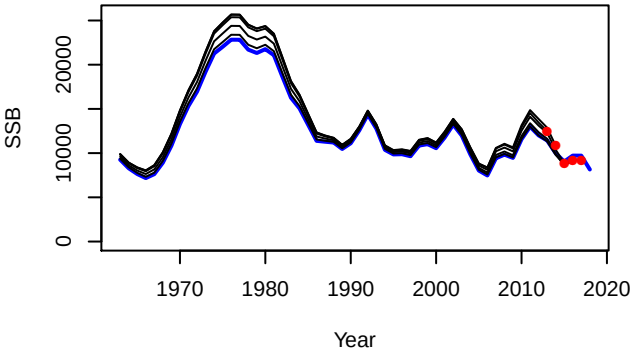

Age−1 Recruits (year−class)
0
5000
10000
15000
20000
25000
30000
Year
1963
1965
1967
1969
1971
1973
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
2015
2017
0
5000
10000
15000
20000
25000
SSB (year)

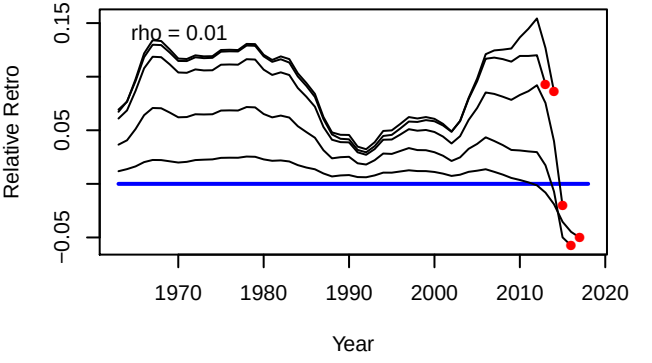

Recr.
SSB
Freport
CV
0.00
0.05
0.10
0.15
0.20
1970
1980
1990
2000
2010
2020
Year

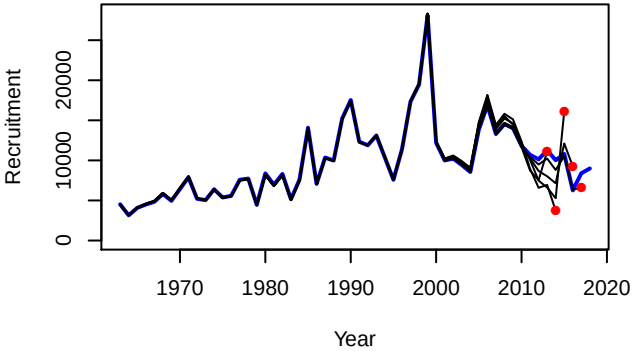
F, SSB, R

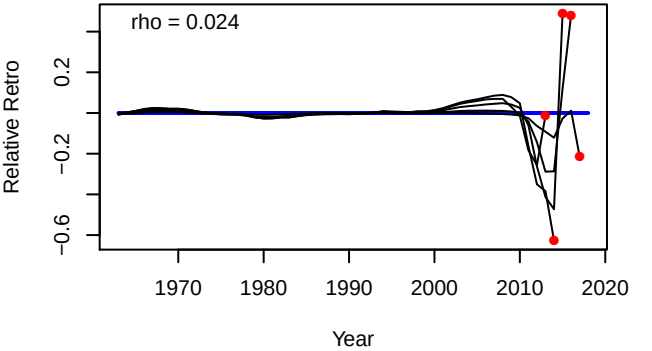

Average F
0.0
0.2
0.4
0.6
0.8
1970
1980
1990
2000
2010
2020
Year

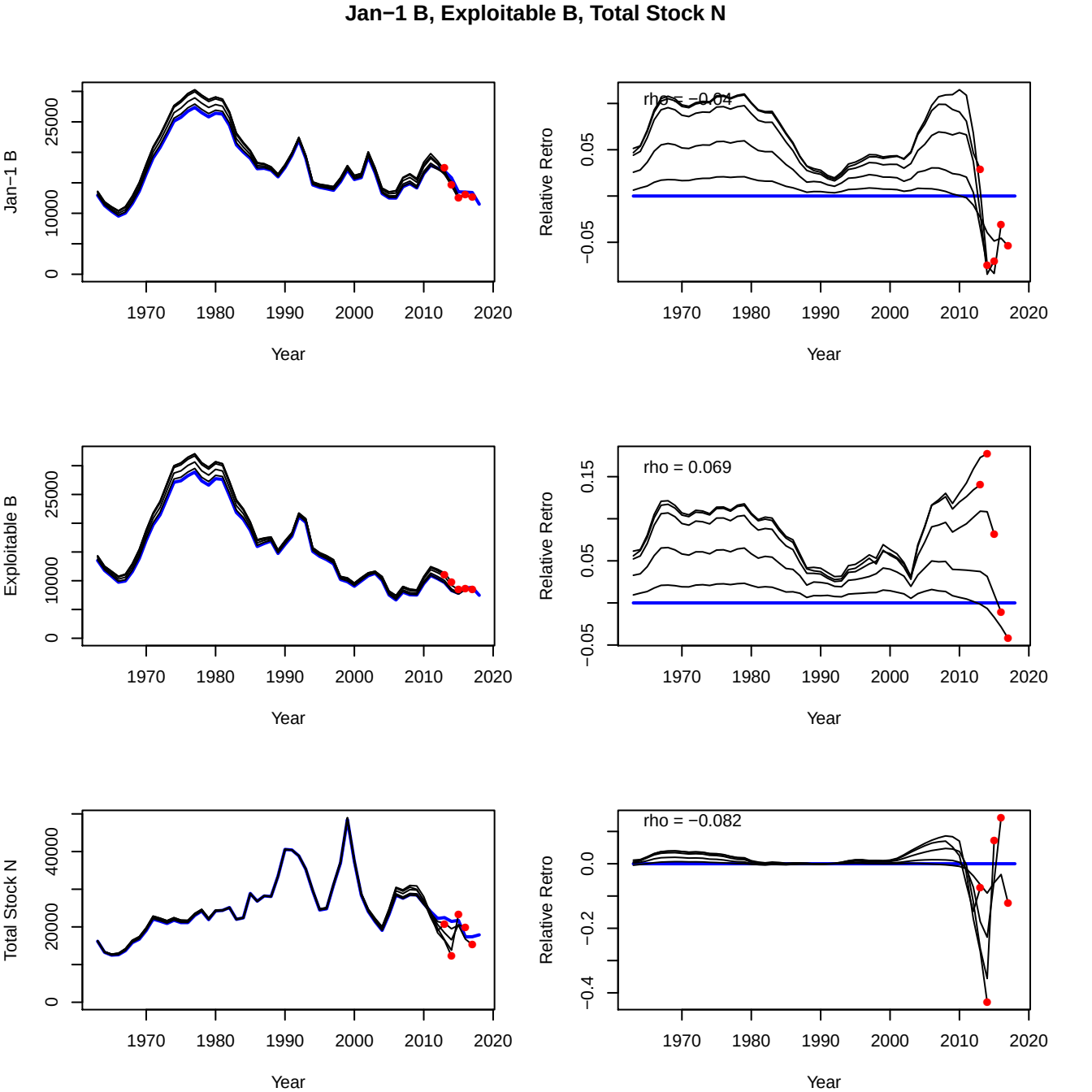

rho = −0.075
Relative Retro
0.05
−0.05
−0.15
1970
1980
1990
2000
2010
2020
Year


SSB
0
10000
20000
1970
1980
1990
2000
2010
2020
Year

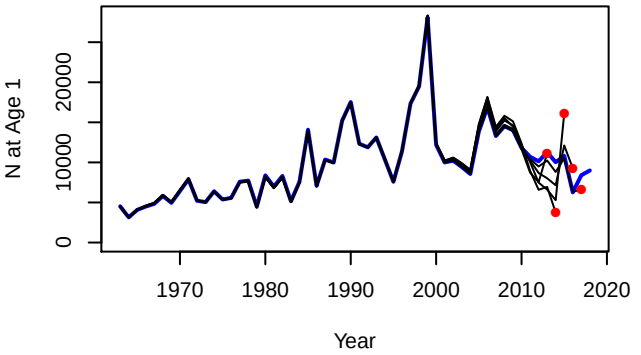

rho = 0.01
Relative Retro
0.15
0.05
−0.05
1970
1980
1990
2000
2010
2020
Year

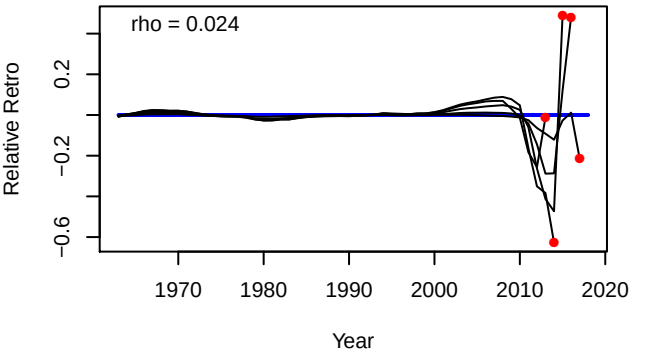

Recruitment
0
10000
20000
1970
1980
1990
2000
2010
2020
Year

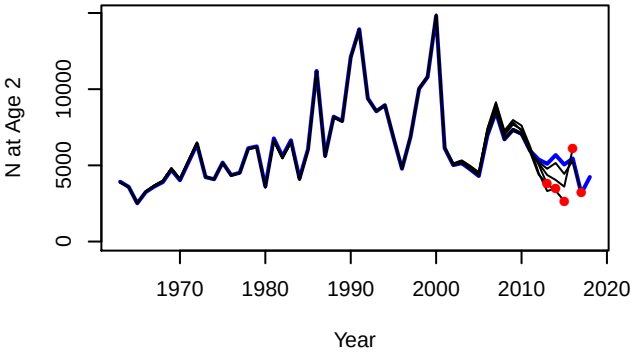

rho = 0.024
Relative Retro
0.2
−0.2
−0.6
1970
1980
1990
2000
2010
2020
Year

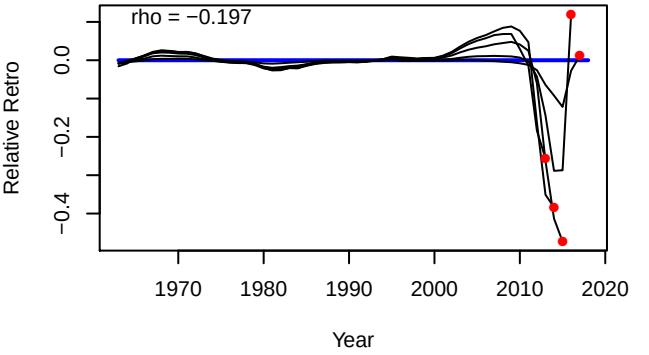

Jan−1 B, Exploitable B, Total Stock N
Jan−1 B
Exploitable B
Total Stock N
Relative Retro
Year
rho = −0.04
rho = 0.069
rho = −0.082
0
10000
20000
25000
40000
0.05
0.15
0.0
−0.2
−0.4
1970
1980
1990
2000
2010
2020

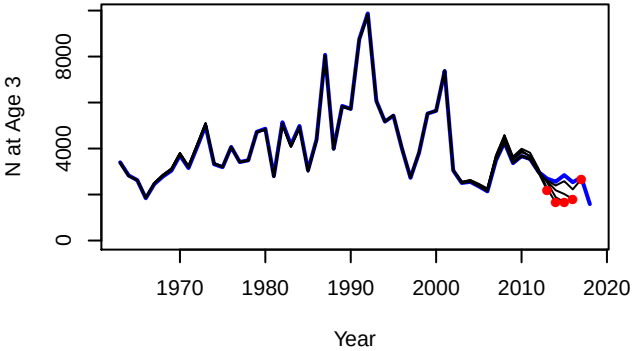
Stock Numbers at Age

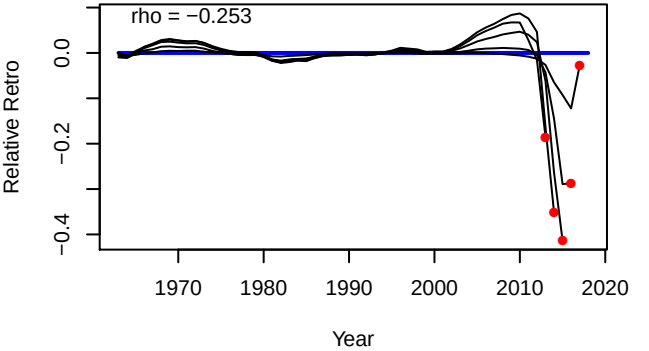




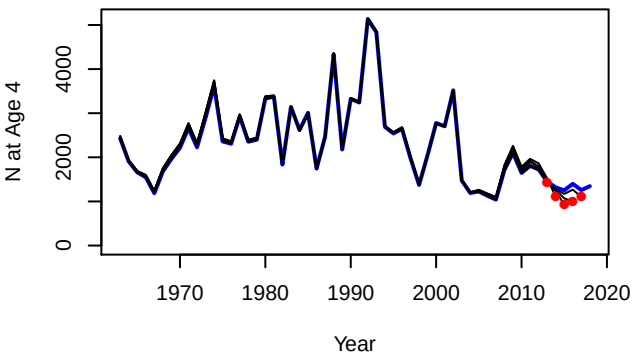


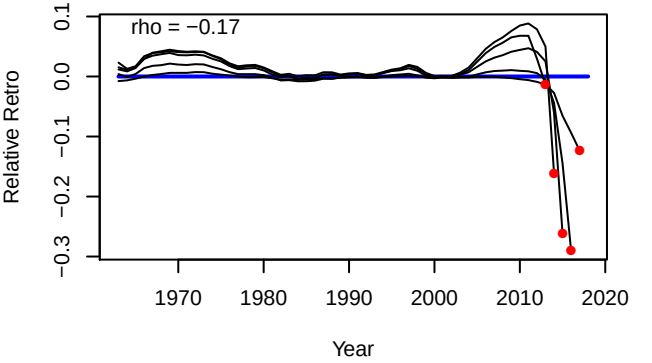


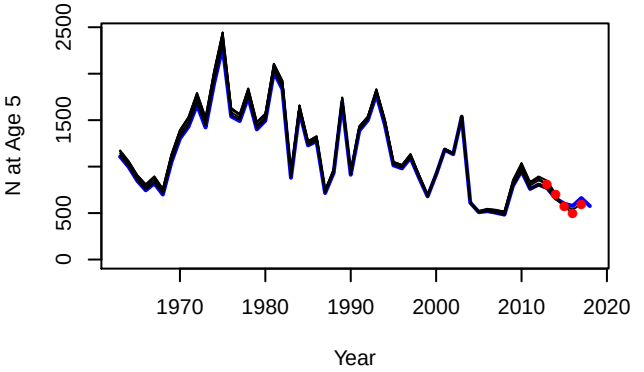


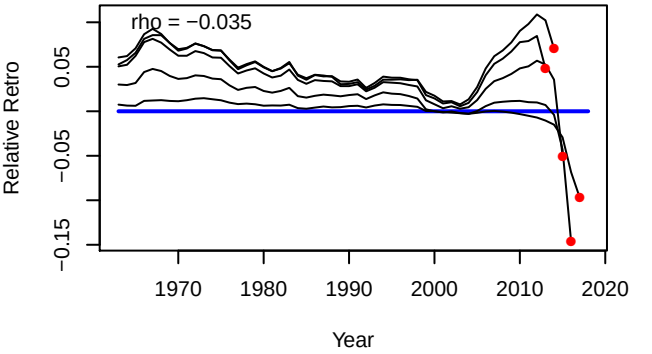


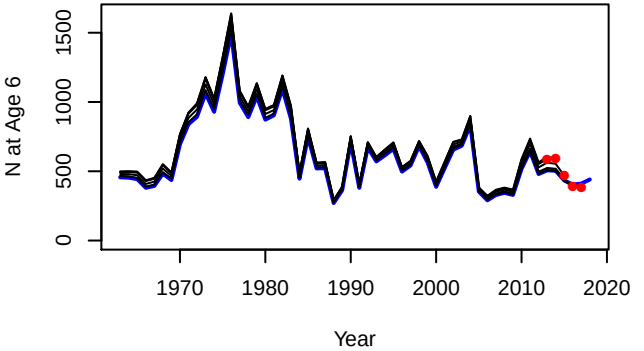
Stock Numbers at Age

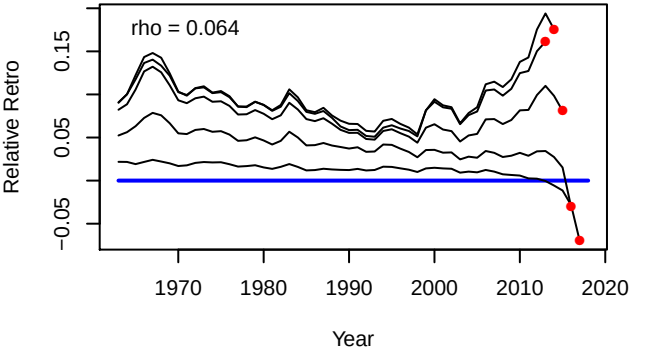




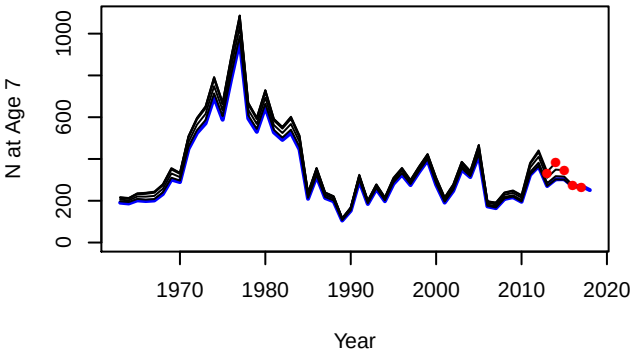


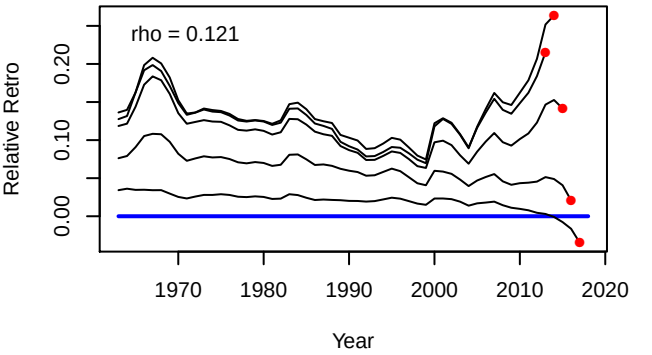


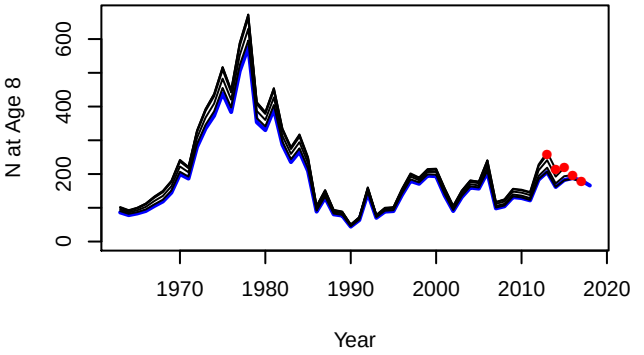


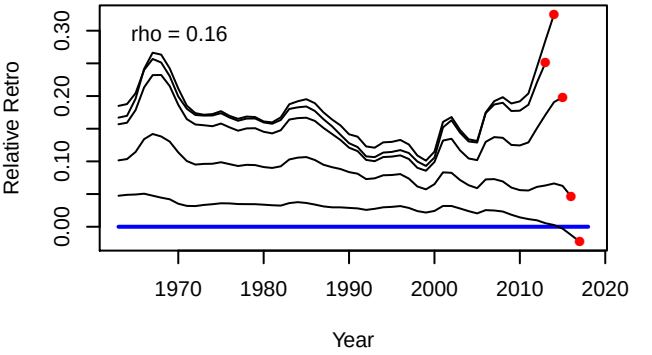


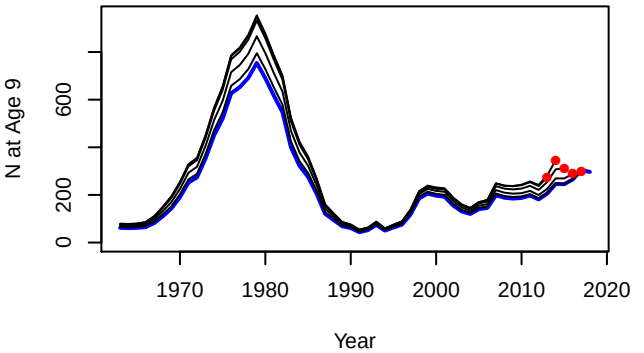
Stock Numbers at Age

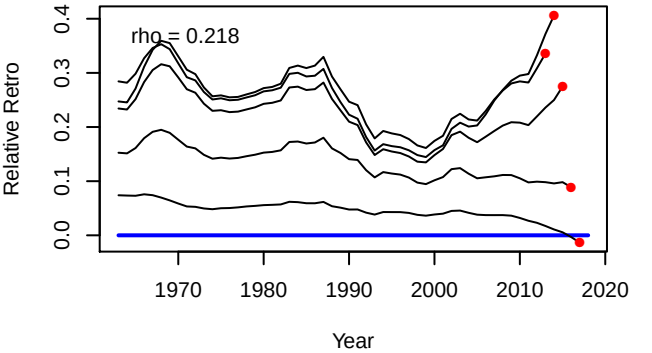


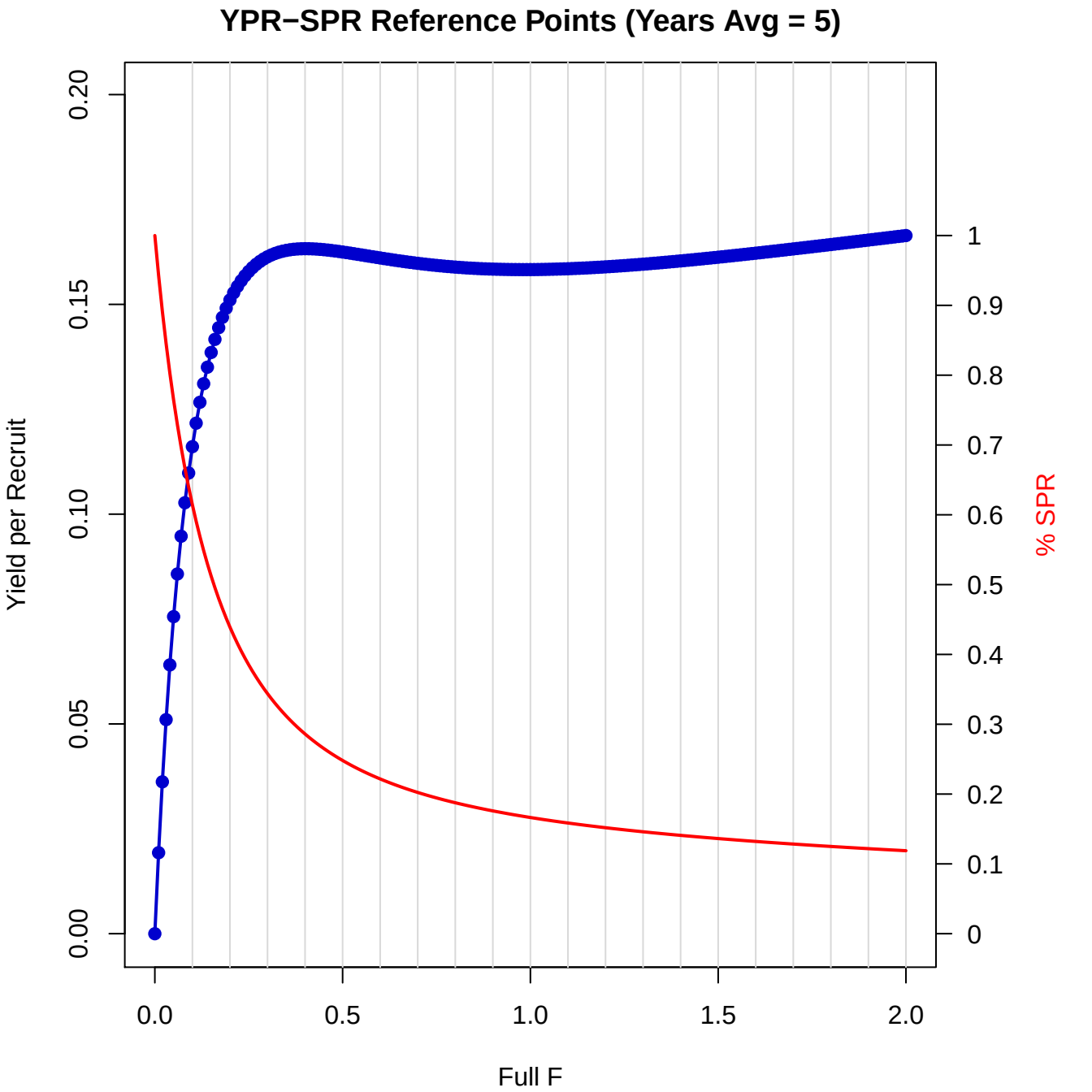






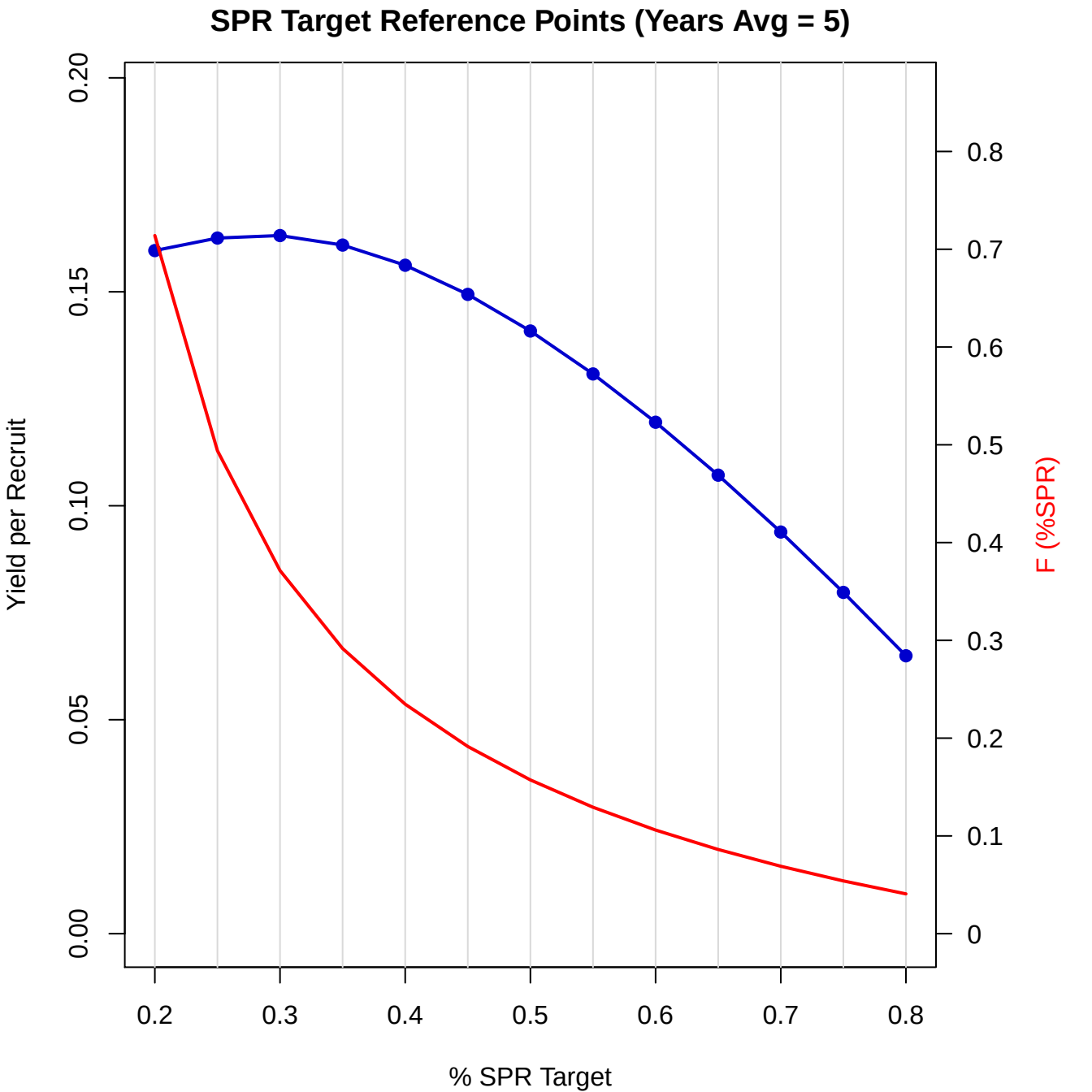





YPR−SPR Reference Points (Years Avg = 5)
Yield per Recruit
% SPR
Full F
0.00
0.05
0.10
0.15
0.20
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.0
0.5
1.0
1.5
2.0

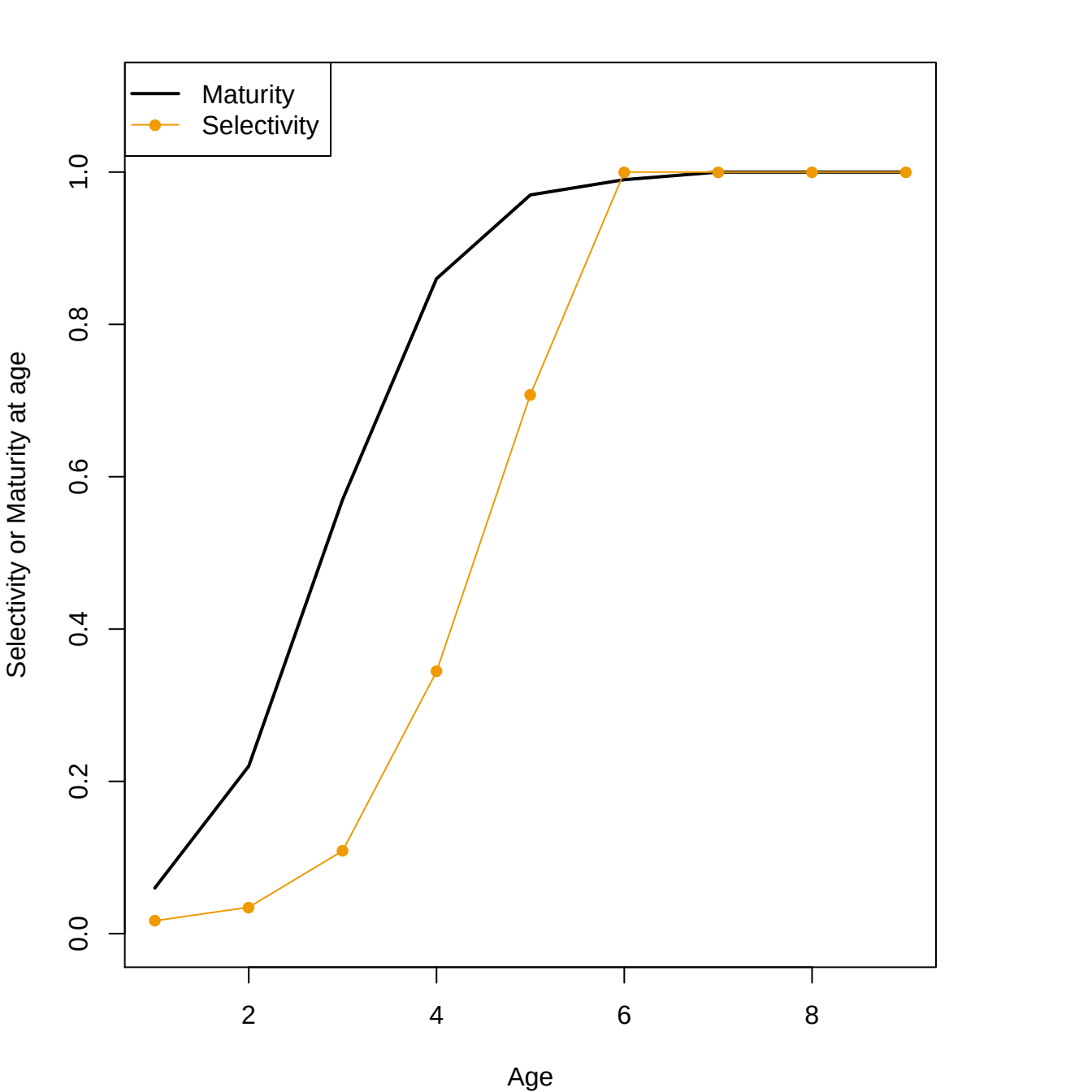
YPR−SPR Reference Points (Years Avg = 5)

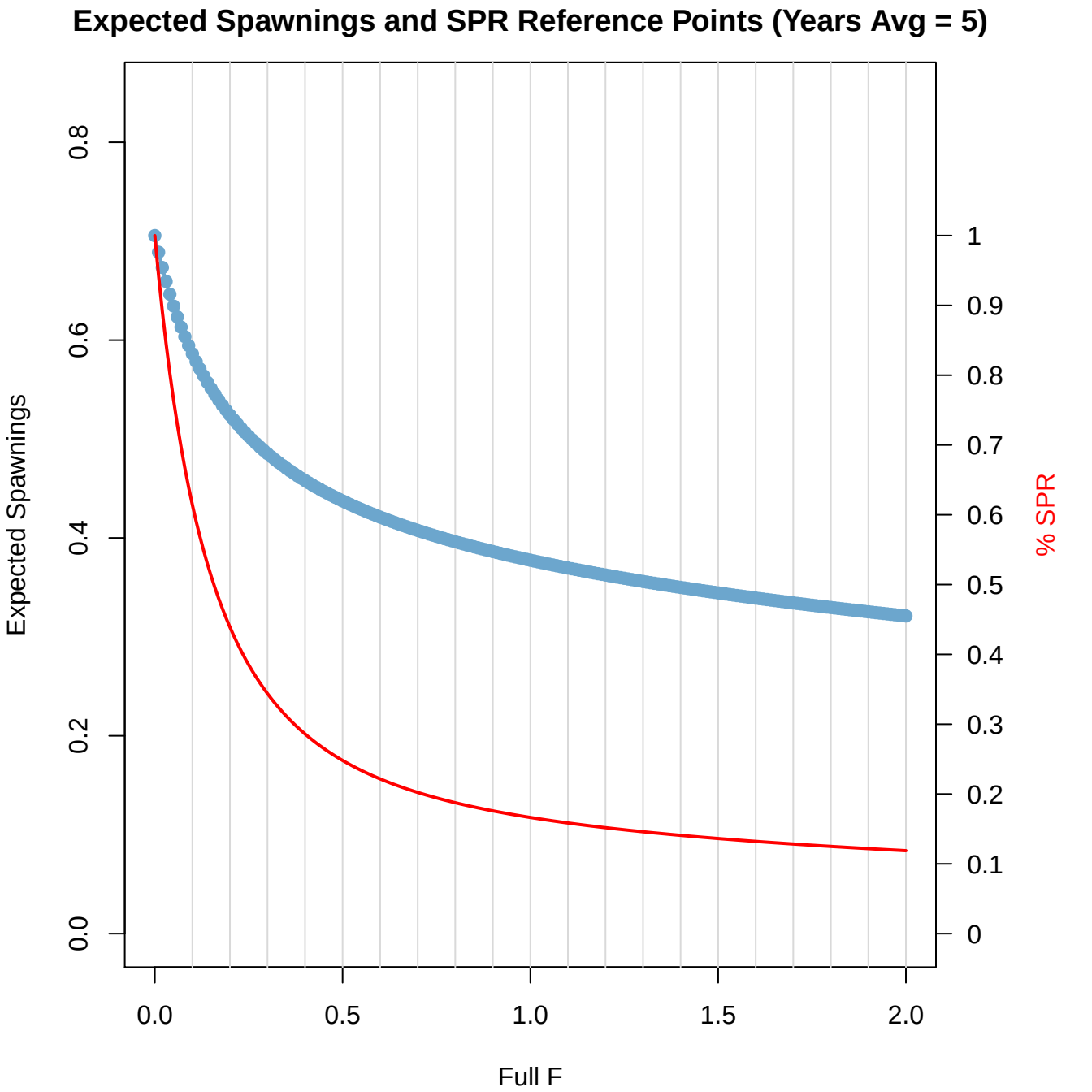
F	YPR	SPR	F	YPR	SPR	F	YPR	SPR
0	0	1	0.35	0.1629	0.3117	0.7	0.1598	0.2023
0.01	0.0193	0.943	0.36	0.163	0.3061	0.71	0.1597	0.2007
0.02	0.0362	0.8916	0.37	0.1631	0.3007	0.72	0.1596	0.199
0.03	0.051	0.8451	0.38	0.1632	0.2956	0.73	0.1595	0.1975
0.04	0.0641	0.8029	0.39	0.1633	0.2907	0.74	0.1594	0.1959
0.05	0.0756	0.7644	0.4	0.1633	0.286	0.75	0.1593	0.1945
0.06	0.0857	0.7291	0.41	0.1633	0.2815	0.76	0.1592	0.193
0.07	0.0947	0.6968	0.42	0.1632	0.2772	0.77	0.1591	0.1916
0.08	0.1027	0.6671	0.43	0.1632	0.2731	0.78	0.159	0.1902
0.09	0.1098	0.6396	0.44	0.1631	0.2691	0.79	0.159	0.1889
0.1	0.1161	0.6143	0.45	0.163	0.2652	0.8	0.1589	0.1875
0.11	0.1217	0.5908	0.46	0.163	0.2615	0.81	0.1588	0.1863
0.12	0.1267	0.569	0.47	0.1628	0.258	0.82	0.1588	0.185
0.13	0.1311	0.5487	0.48	0.1627	0.2546	0.83	0.1587	0.1838
0.14	0.135	0.5298	0.49	0.1626	0.2513	0.84	0.1586	0.1826
0.15	0.1385	0.5121	0.5	0.1625	0.2481	0.85	0.1586	0.1814
0.16	0.1417	0.4956	0.51	0.1624	0.245	0.86	0.1586	0.1803
0.17	0.1444	0.4801	0.52	0.1622	0.2421	0.87	0.1585	0.1791
0.18	0.1469	0.4656	0.53	0.1621	0.2392	0.88	0.1585	0.178
0.19	0.1491	0.4519	0.54	0.1619	0.2364	0.89	0.1584	0.177
0.2	0.151	0.4391	0.55	0.1618	0.2338	0.9	0.1584	0.1759
0.21	0.1528	0.427	0.56	0.1616	0.2312	0.91	0.1584	0.1749
0.22	0.1543	0.4156	0.57	0.1615	0.2287	0.92	0.1584	0.1739
0.23	0.1556	0.4049	0.58	0.1614	0.2263	0.93	0.1583	0.1729
0.24	0.1568	0.3947	0.59	0.1612	0.2239	0.94	0.1583	0.1719
0.25	0.1579	0.3851	0.6	0.1611	0.2217	0.95	0.1583	0.1709
0.26	0.1588	0.3759	0.61	0.1609	0.2195	0.96	0.1583	0.17
0.27	0.1596	0.3673	0.62	0.1608	0.2173	0.97	0.1583	0.1691
0.28	0.1602	0.3591	0.63	0.1607	0.2152	0.98	0.1583	0.1682
0.29	0.1608	0.3513	0.64	0.1605	0.2132	0.99	0.1583	0.1673
0.3	0.1613	0.3438	0.65	0.1604	0.2113	1	0.1583	0.1664
0.31	0.1618	0.3368	0.66	0.1603	0.2094	1.01	0.1583	0.1656
0.32	0.1621	0.3301	0.67	0.1601	0.2075	1.02	0.1583	0.1647
0.33	0.1624	0.3236	0.68	0.16	0.2057	1.03	0.1583	0.1639
0.34	0.1627	0.3175	0.69	0.1599	0.204	1.04	0.1583	0.1631


SPR Target Reference Points (Years Avg = 5)
Yield per Recruit
F (%SPR)
% SPR Target
0.00
0.05
0.10
0.15
0.20
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.2
0.3
0.4
0.5
0.6
0.7
0.8

SPR Target Reference Points (Years Avg = 5)

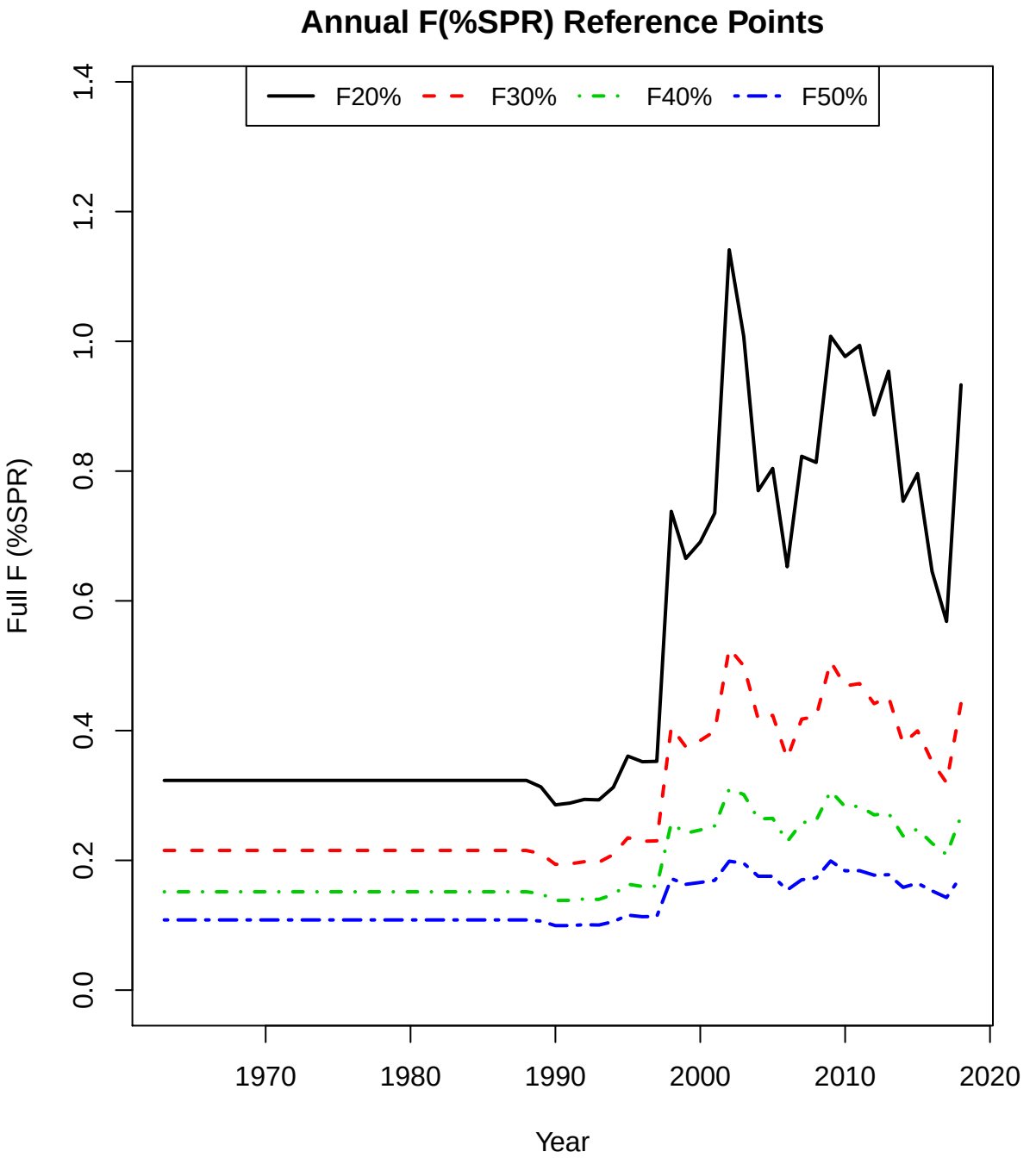
% SPR	F(%SPR)	YPR
0.2	0.714	0.1596
0.25	0.4939	0.1626
0.3	0.3714	0.1631
0.35	0.2917	0.1609
0.4	0.2347	0.1562
0.45	0.1915	0.1494
0.5	0.1573	0.1408
0.55	0.1293	0.1308
0.6	0.106	0.1195
0.65	0.0861	0.1072
0.7	0.069	0.0939
0.75	0.054	0.0798
0.8	0.0407	0.0649

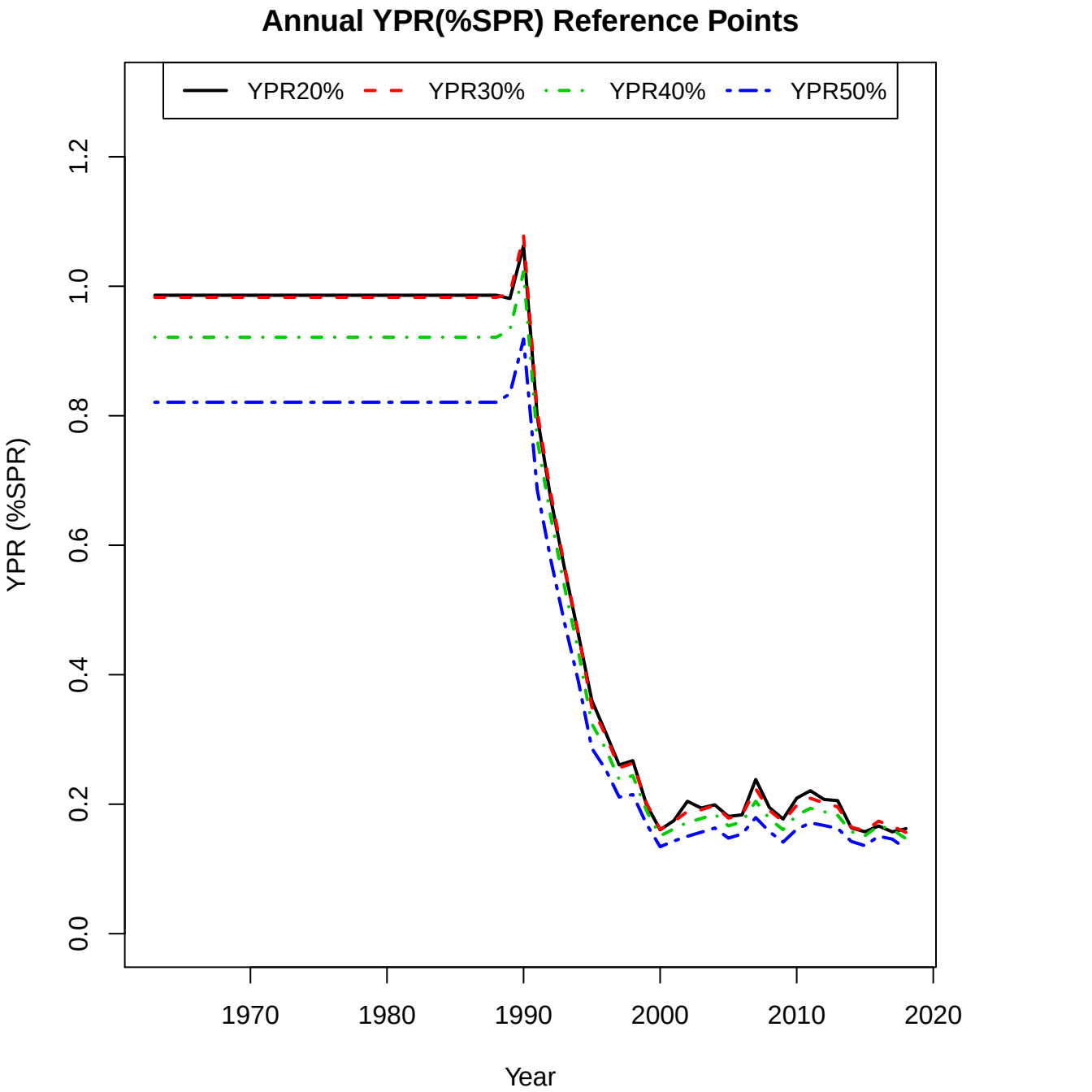

Maturity
Selectivity
Selectivity or Maturity at age
0.0
0.2
0.4
0.6
0.8
1.0
2
4
6
8
Age


Expected Spawnings and SPR Reference Points (Years Avg = 5)
Expected Spawnings
0.0
0.2
0.4
0.6
0.8
% 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

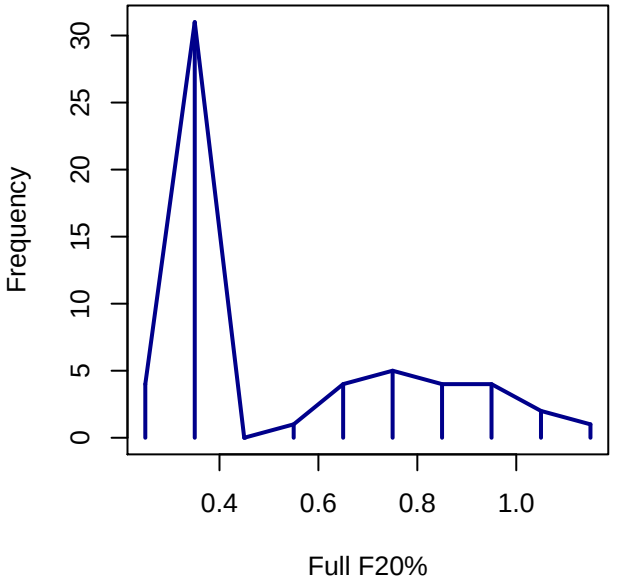
Expected Spawnings & SPR Reference Points (Years Avg = 5)

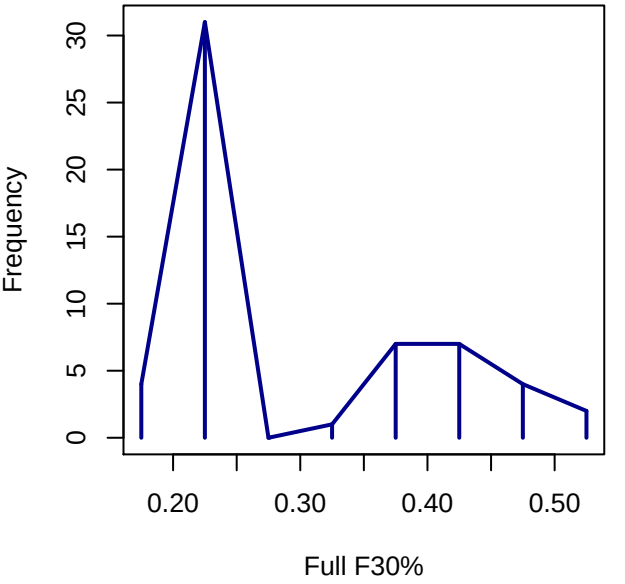
F	E[Sp]	SPR	F	E[Sp]	SPR	F	E[Sp]	SPR
0	0.7057	1	0.35	0.4706	0.3117	0.7	0.4076	0.2023
0.01	0.6888	0.943	0.36	0.4679	0.3061	0.71	0.4064	0.2007
0.02	0.6735	0.8916	0.37	0.4654	0.3007	0.72	0.4052	0.199
0.03	0.6594	0.8451	0.38	0.4628	0.2956	0.73	0.404	0.1975
0.04	0.6464	0.8029	0.39	0.4604	0.2907	0.74	0.4028	0.1959
0.05	0.6345	0.7644	0.4	0.458	0.286	0.75	0.4017	0.1945
0.06	0.6234	0.7291	0.41	0.4557	0.2815	0.76	0.4006	0.193
0.07	0.6132	0.6968	0.42	0.4535	0.2772	0.77	0.3994	0.1916
0.08	0.6036	0.6671	0.43	0.4513	0.2731	0.78	0.3983	0.1902
0.09	0.5946	0.6396	0.44	0.4492	0.2691	0.79	0.3973	0.1889
0.1	0.5862	0.6143	0.45	0.4471	0.2652	0.8	0.3962	0.1875
0.11	0.5784	0.5908	0.46	0.4451	0.2615	0.81	0.3951	0.1863
0.12	0.571	0.569	0.47	0.4431	0.258	0.82	0.3941	0.185
0.13	0.564	0.5487	0.48	0.4412	0.2546	0.83	0.3931	0.1838
0.14	0.5574	0.5298	0.49	0.4393	0.2513	0.84	0.3921	0.1826
0.15	0.5511	0.5121	0.5	0.4374	0.2481	0.85	0.3911	0.1814
0.16	0.5452	0.4956	0.51	0.4357	0.245	0.86	0.3901	0.1803
0.17	0.5396	0.4801	0.52	0.4339	0.2421	0.87	0.3891	0.1791
0.18	0.5342	0.4656	0.53	0.4322	0.2392	0.88	0.3881	0.178
0.19	0.5291	0.4519	0.54	0.4305	0.2364	0.89	0.3872	0.177
0.2	0.5242	0.4391	0.55	0.4288	0.2338	0.9	0.3863	0.1759
0.21	0.5196	0.427	0.56	0.4272	0.2312	0.91	0.3853	0.1749
0.22	0.5151	0.4156	0.57	0.4257	0.2287	0.92	0.3844	0.1739
0.23	0.5109	0.4049	0.58	0.4241	0.2263	0.93	0.3835	0.1729
0.24	0.5068	0.3947	0.59	0.4226	0.2239	0.94	0.3826	0.1719
0.25	0.5029	0.3851	0.6	0.4211	0.2217	0.95	0.3818	0.1709
0.26	0.4991	0.3759	0.61	0.4196	0.2195	0.96	0.3809	0.17
0.27	0.4954	0.3673	0.62	0.4182	0.2173	0.97	0.38	0.1691
0.28	0.4919	0.3591	0.63	0.4168	0.2152	0.98	0.3792	0.1682
0.29	0.4886	0.3513	0.64	0.4154	0.2132	0.99	0.3783	0.1673
0.3	0.4853	0.3438	0.65	0.4141	0.2113	1	0.3775	0.1664
0.31	0.4822	0.3368	0.66	0.4127	0.2094	1.01	0.3767	0.1656
0.32	0.4791	0.3301	0.67	0.4114	0.2075	1.02	0.3759	0.1647
0.33	0.4762	0.3236	0.68	0.4101	0.2057	1.03	0.3751	0.1639
0.34	0.4734	0.3175	0.69	0.4089	0.204	1.04	0.3743	0.1631

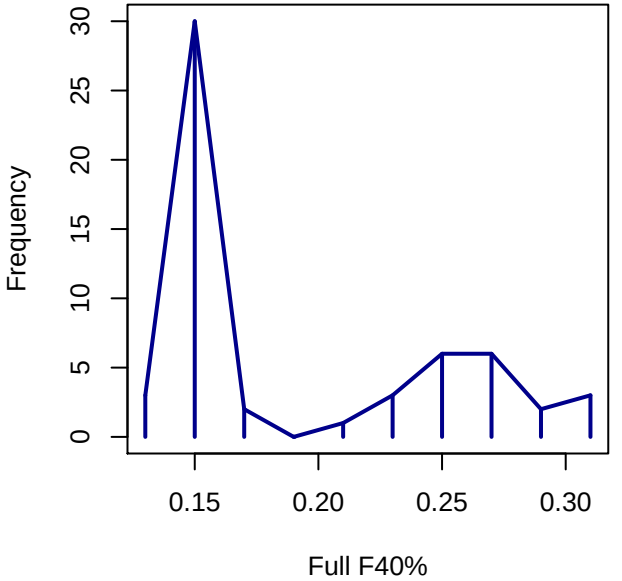

Annual F(%SPR) Reference Points
F20%
F30%
F40%
F50%
Full F (%SPR)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1970
1980
1990
2000
2010
2020
Year

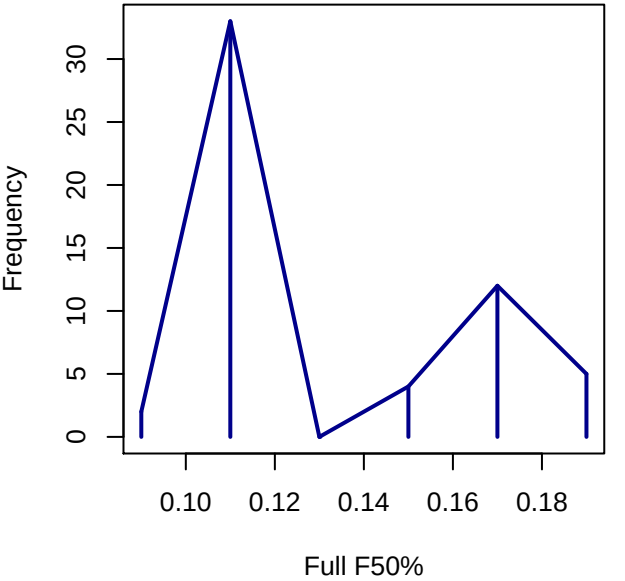

Annual YPR(%SPR) Reference Points
YPR20%
YPR30%
YPR40%
YPR50%
YPR (%SPR)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1970
1980
1990
2000
2010
2020
Year

Annual F (%SPR) Reference Points

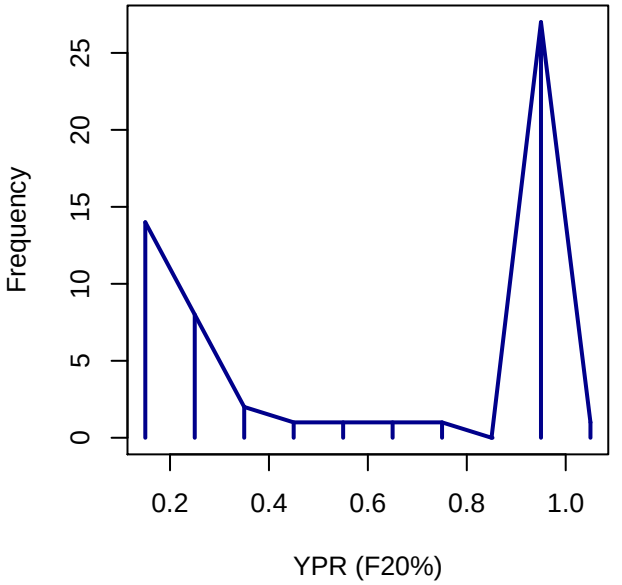


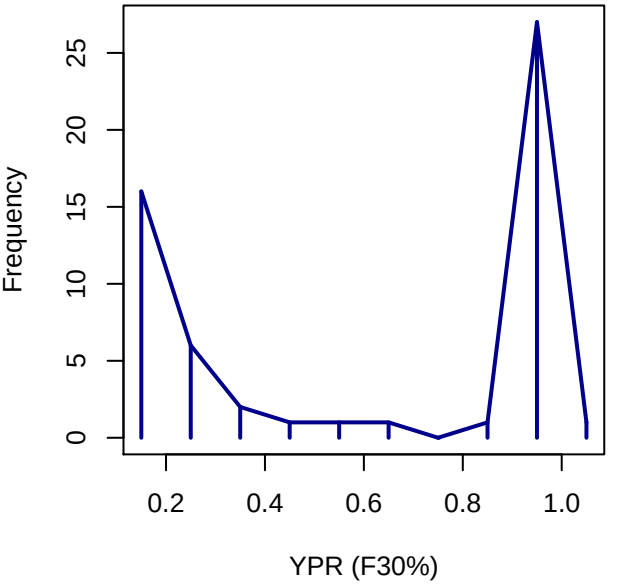


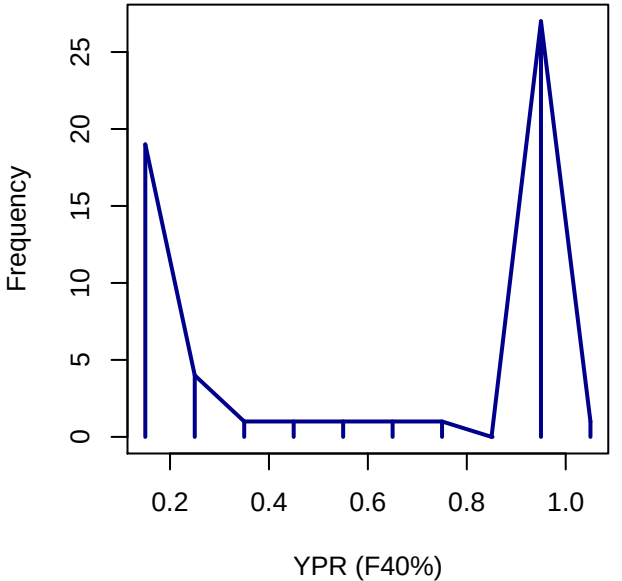


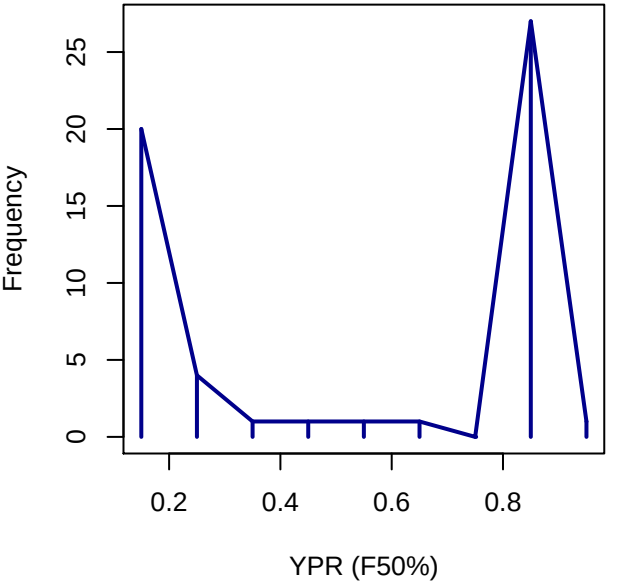


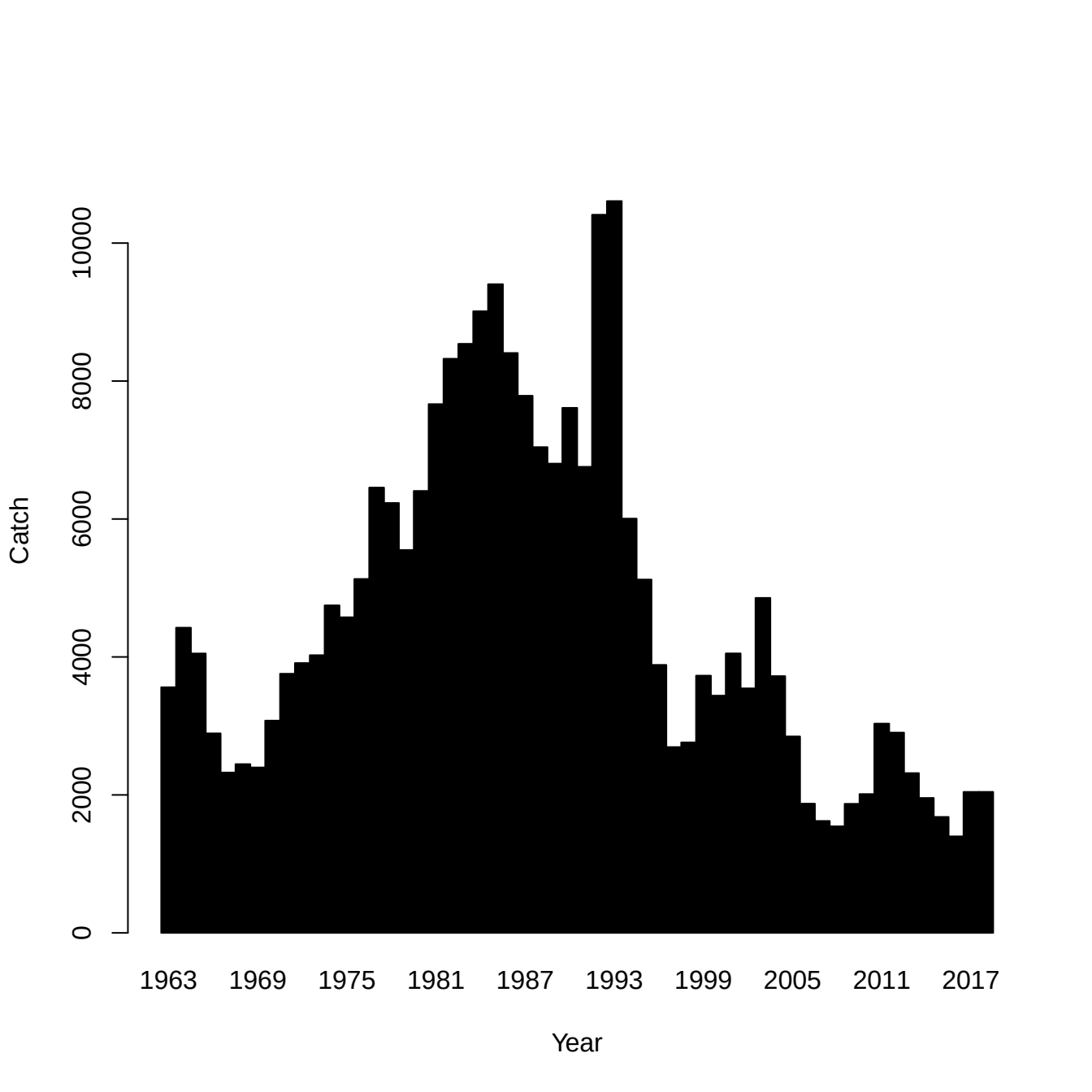
Annual YPR (%SPR) Reference Points

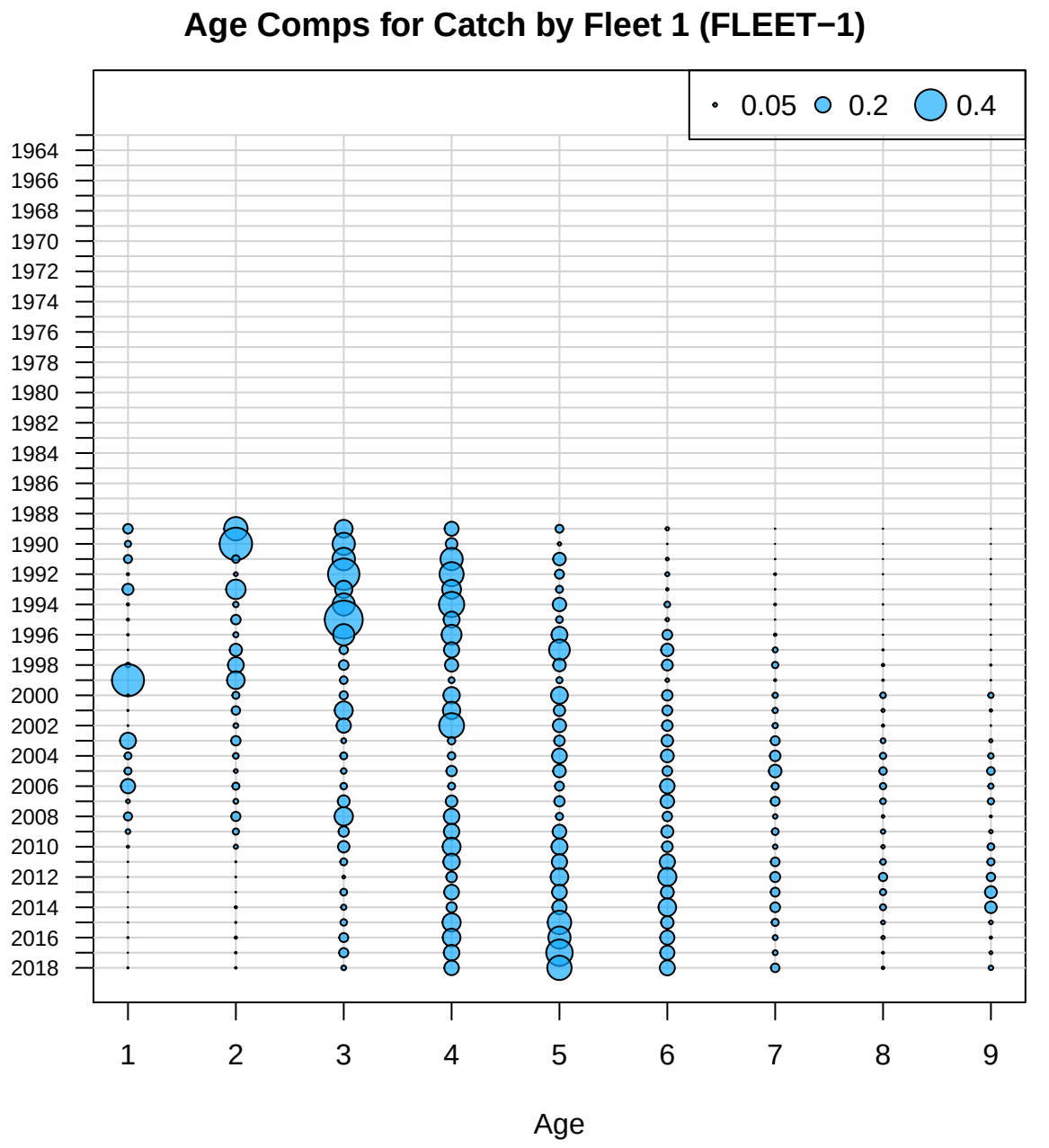


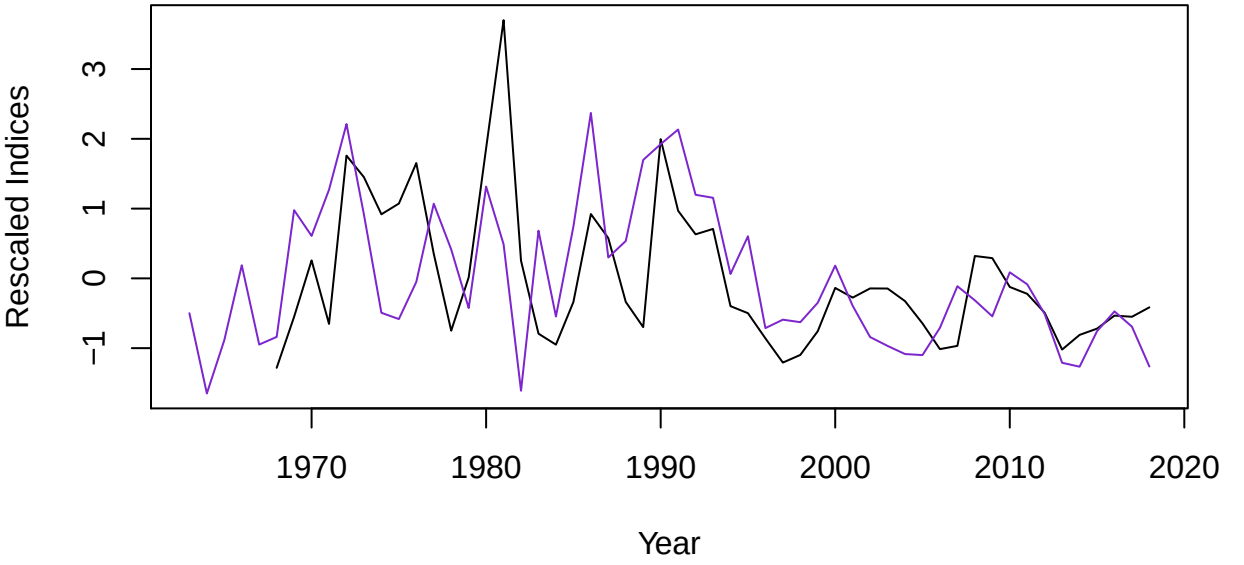


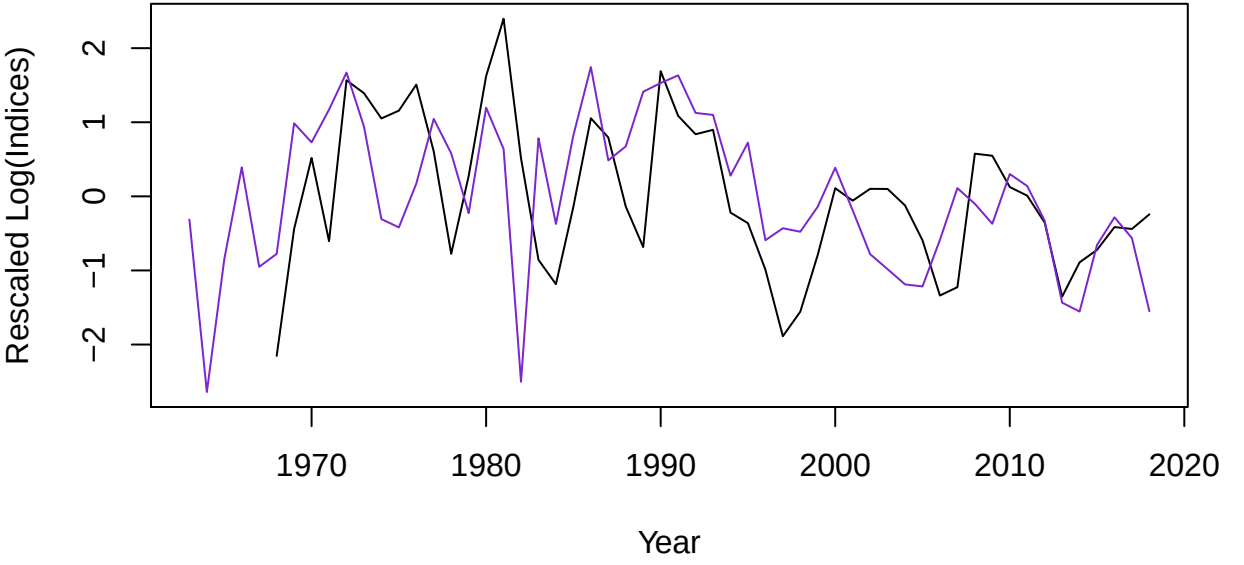


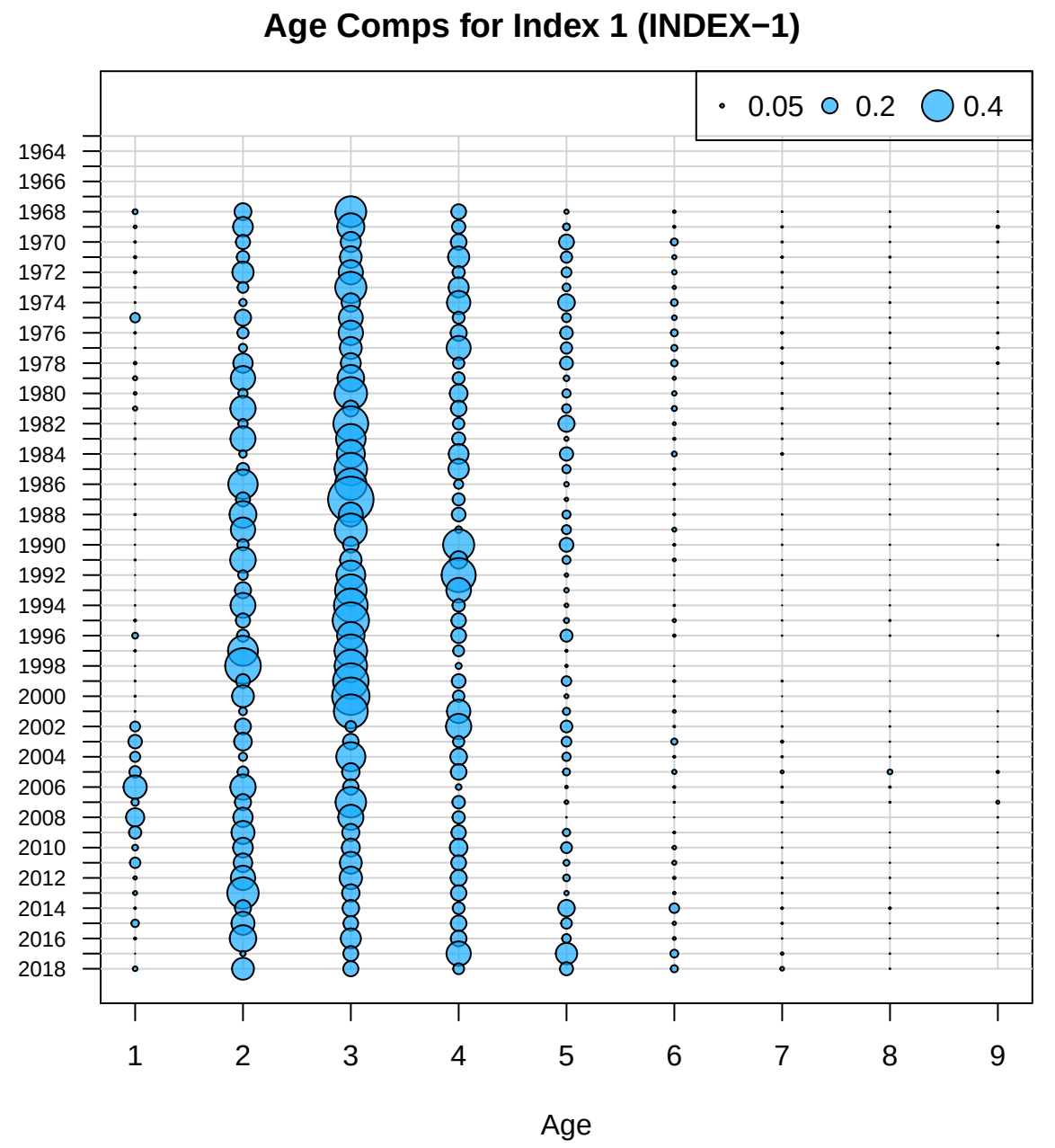


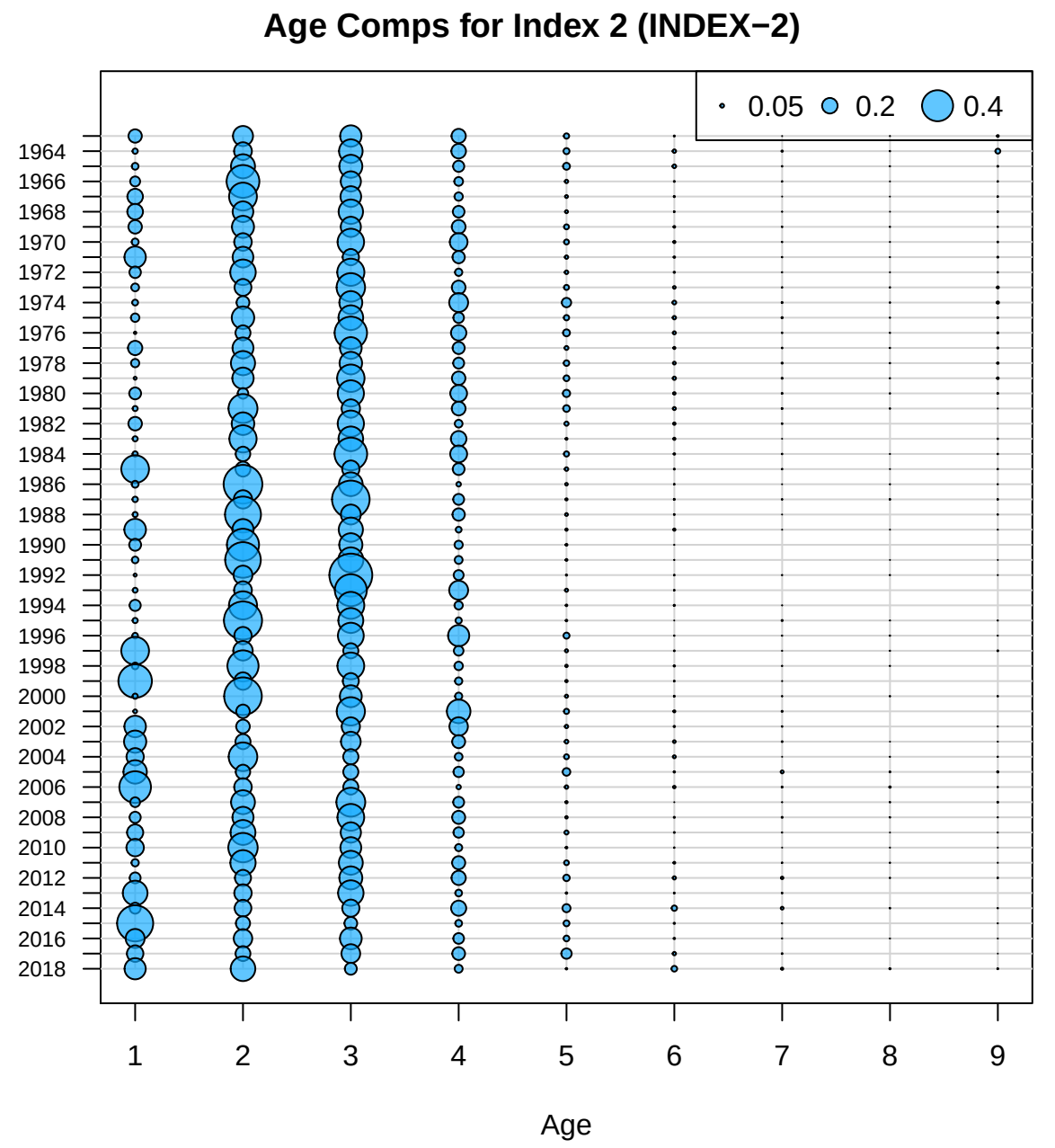

Catch
0
2000
4000
6000
8000
10000
1963
1969
1975
1981
1987
1993
1999
2005
2011
2017
Year

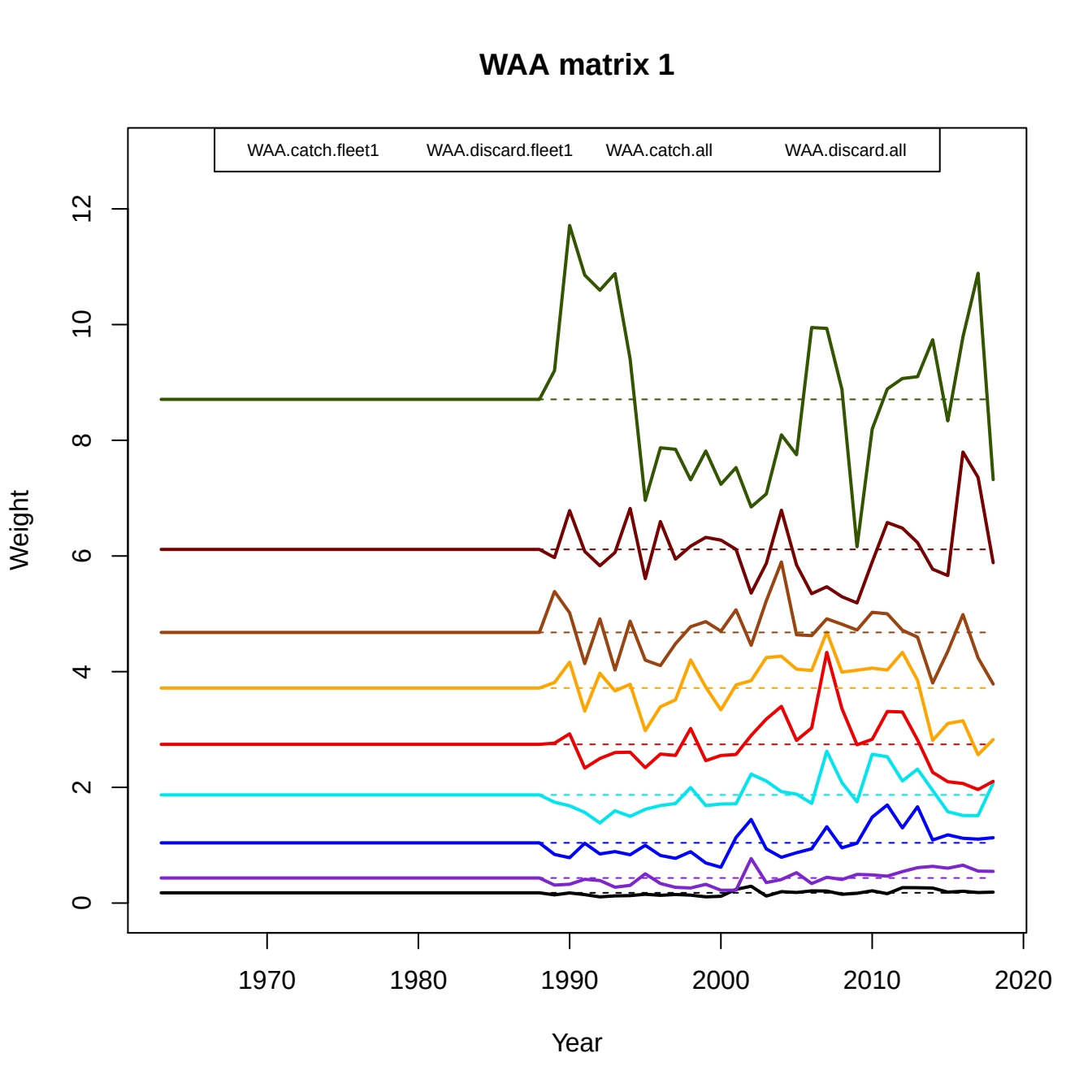

Age Comps for Catch by Fleet 1 (FLEET−1)
0.05
0.2
0.4
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
1
2
3
4
5
6
7
8
9
Age

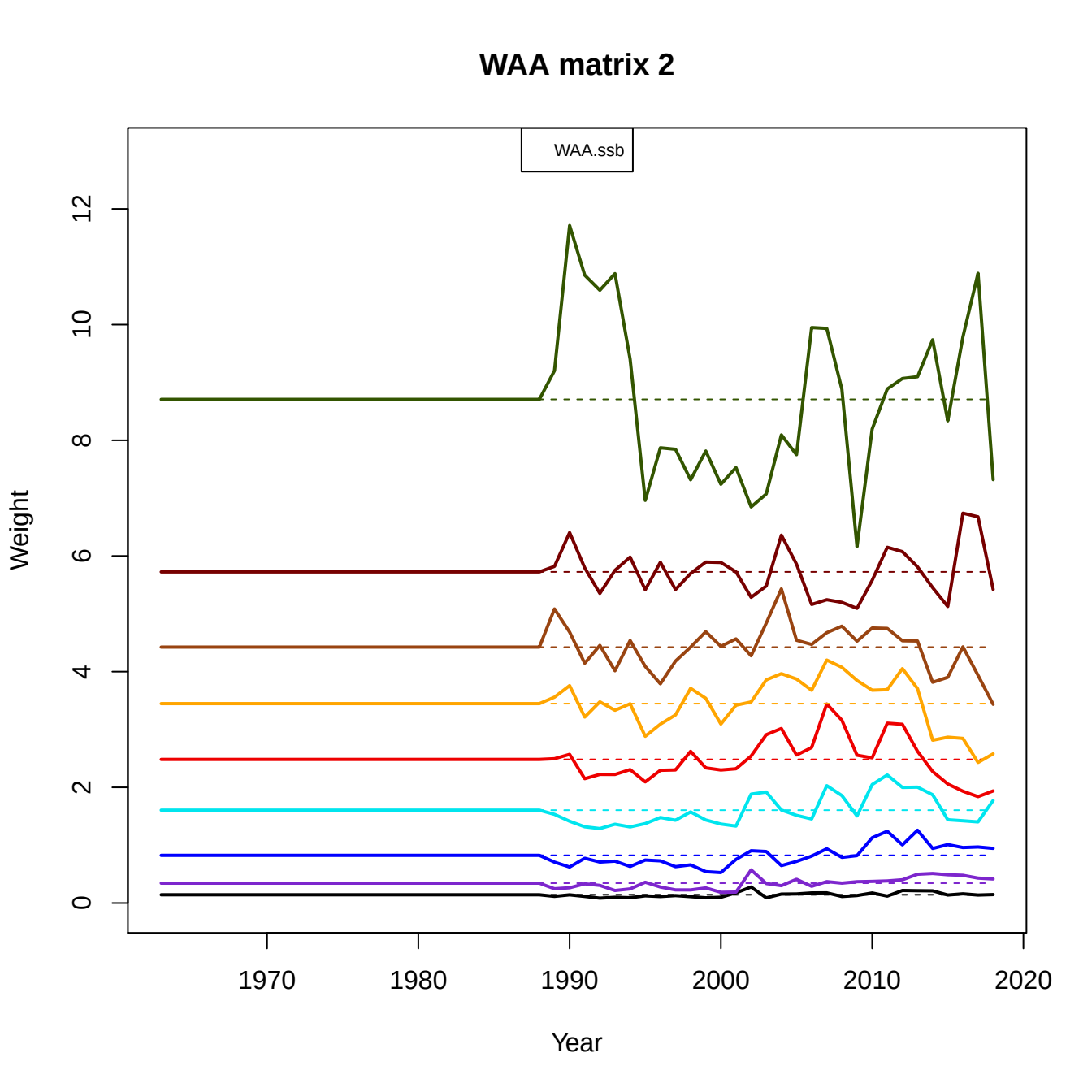

Rescaled Indices
−1
0
1
2
3
1970
1980
1990
2000
2010
2020
Year

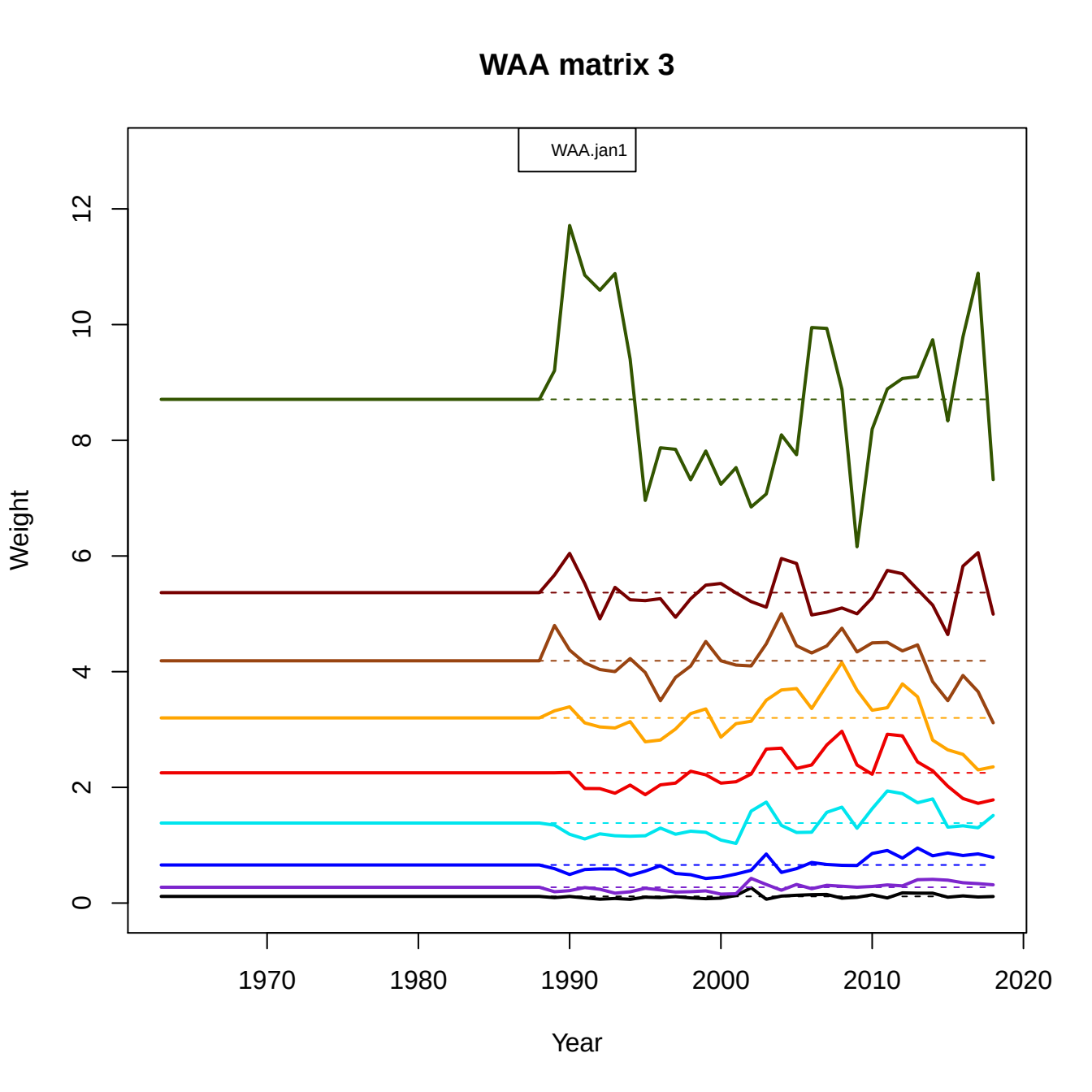

Rescaled Log(Indices)
−2
−1
0
1
2
1970
1980
1990
2000
2010
2020
Year

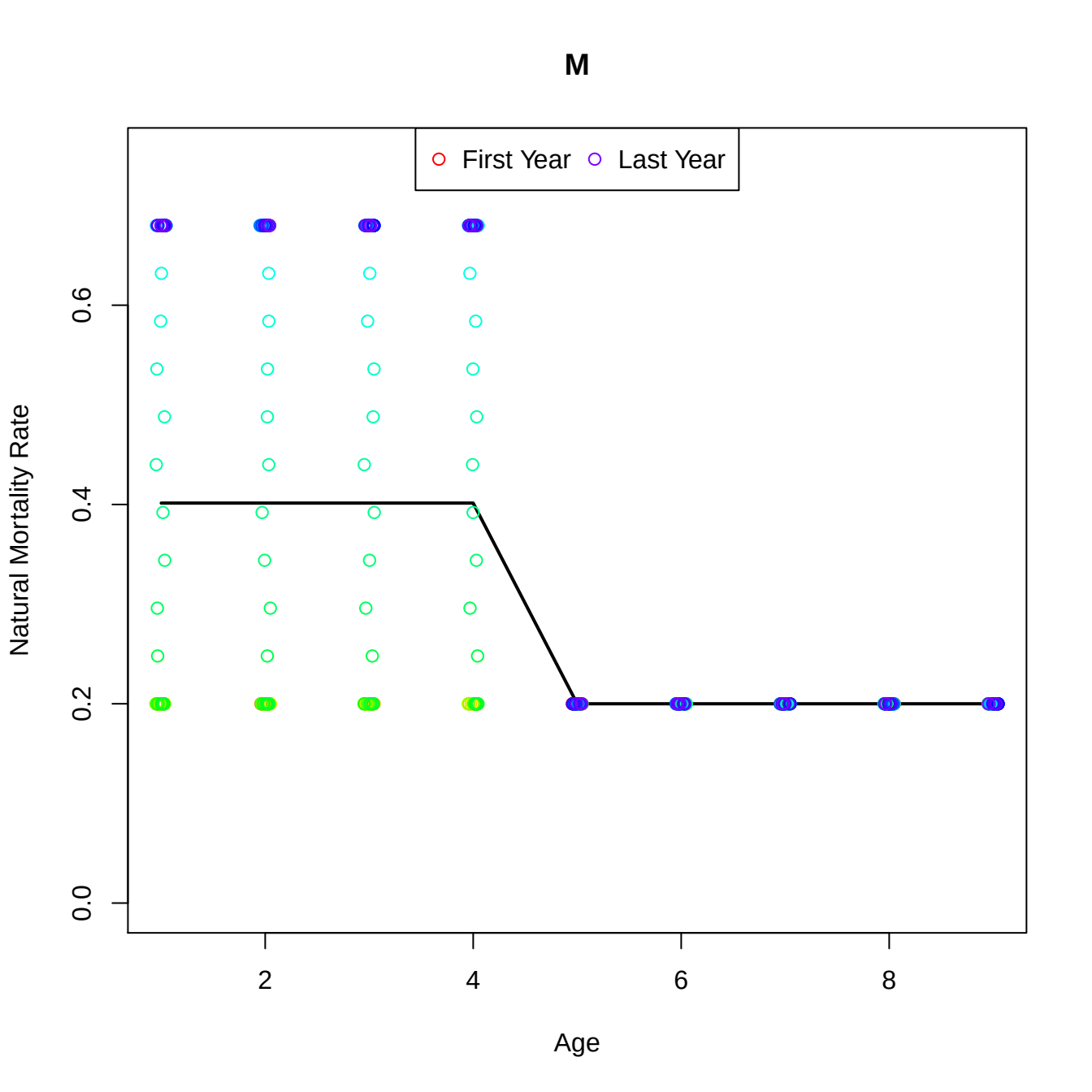

Age Comps for Index 1 (INDEX−1)
0.05
0.2
0.4
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
1
2
3
4
5
6
7
8
9
Age

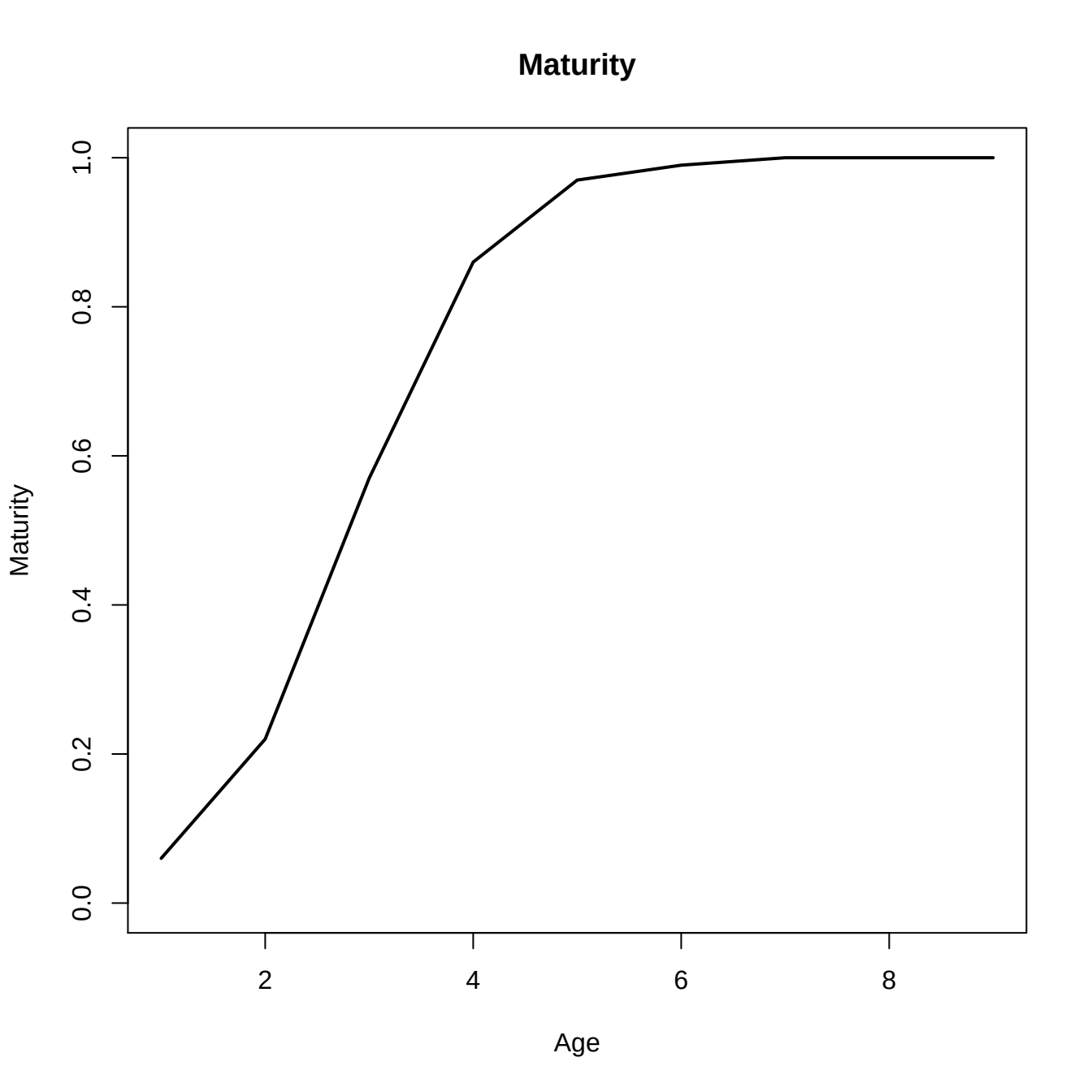

Age Comps for Index 2 (INDEX−2)
0.05
0.2
0.4
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
1
2
3
4
5
6
7
8
9
Age


WAA matrix 1
WAA.catch.fleet1
WAA.discard.fleet1
WAA.catch.all
WAA.discard.all
Weight
0
2
4
6
8
10
12
1970
1980
1990
2000
2010
2020
Year


WAA matrix 2
WAA.ssb
Weight
0
2
4
6
8
10
12
1970
1980
1990
2000
2010
2020
Year


WAA matrix 3
WAA.jan1
Weight
0
2
4
6
8
10
12
1970
1980
1990
2000
2010
2020
Year


M
First Year
Last Year
Natural Mortality Rate
0.0
0.2
0.4
0.6
2
4
6
8
Age


Maturity
Maturity
0.0
0.2
0.4
0.6
0.8
1.0
2
4
6
8
Age