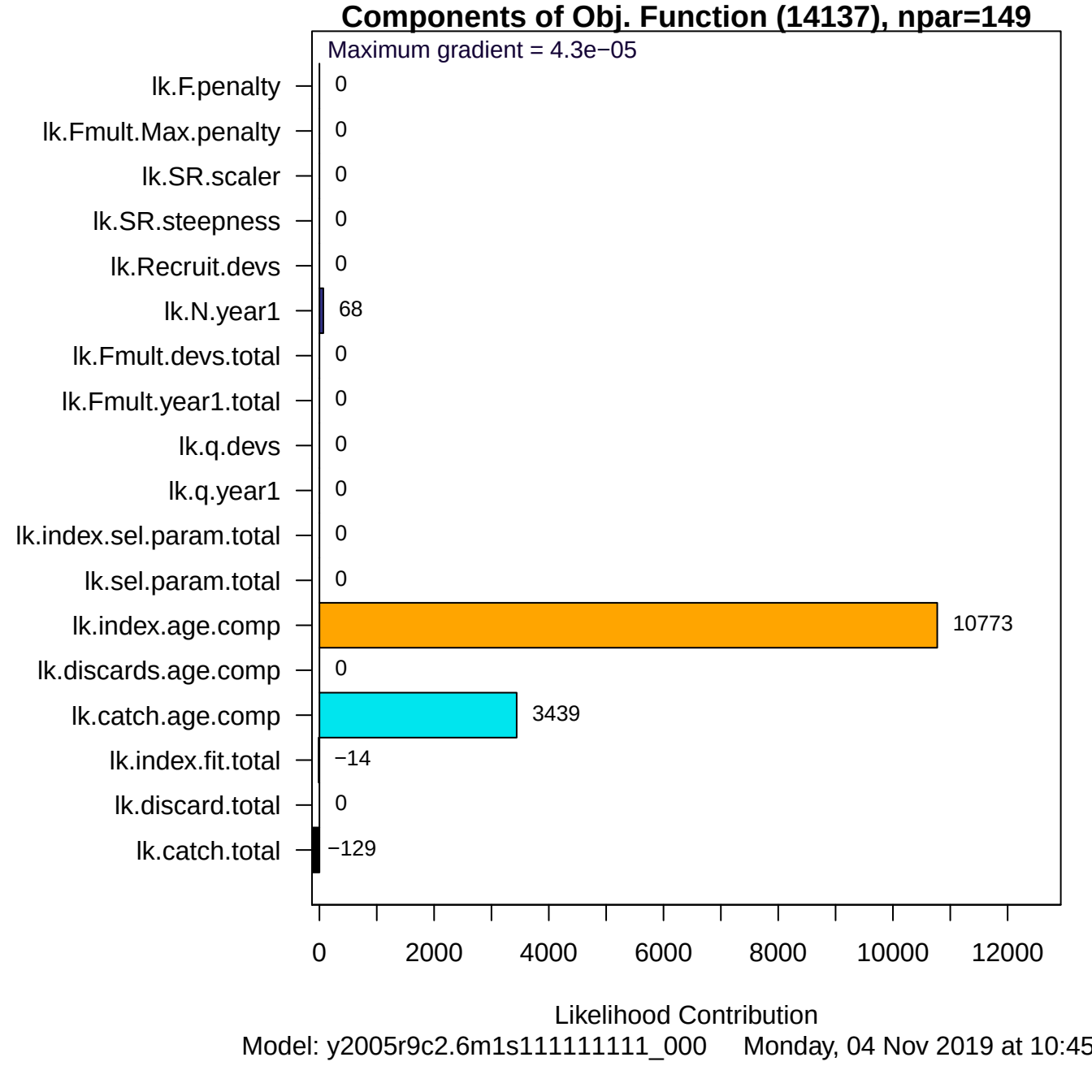
File = y2005r9c2.6m1s111111111_000.dat

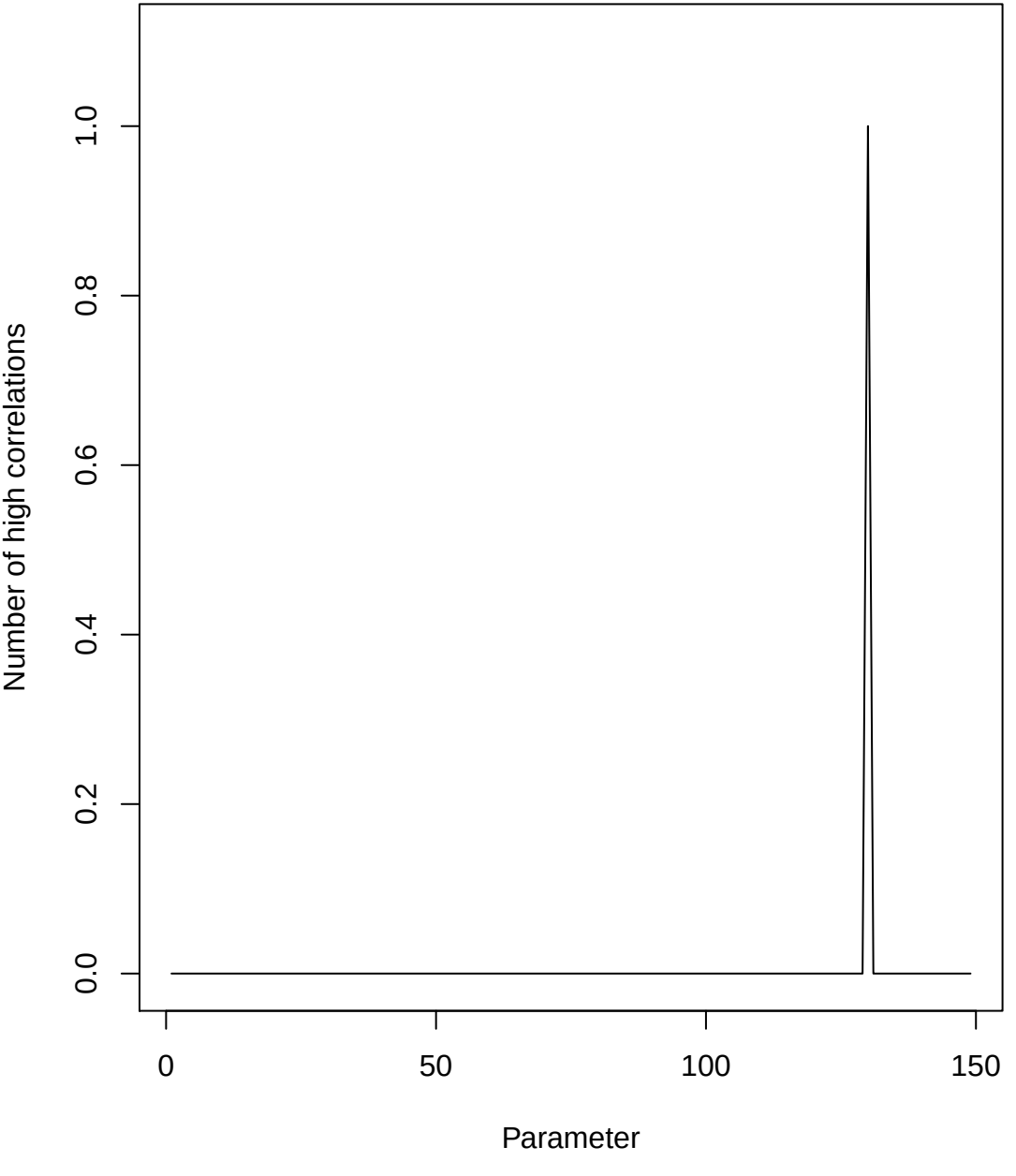
ASAP3 run on Monday, 04 Nov 2019 at 10:45:43

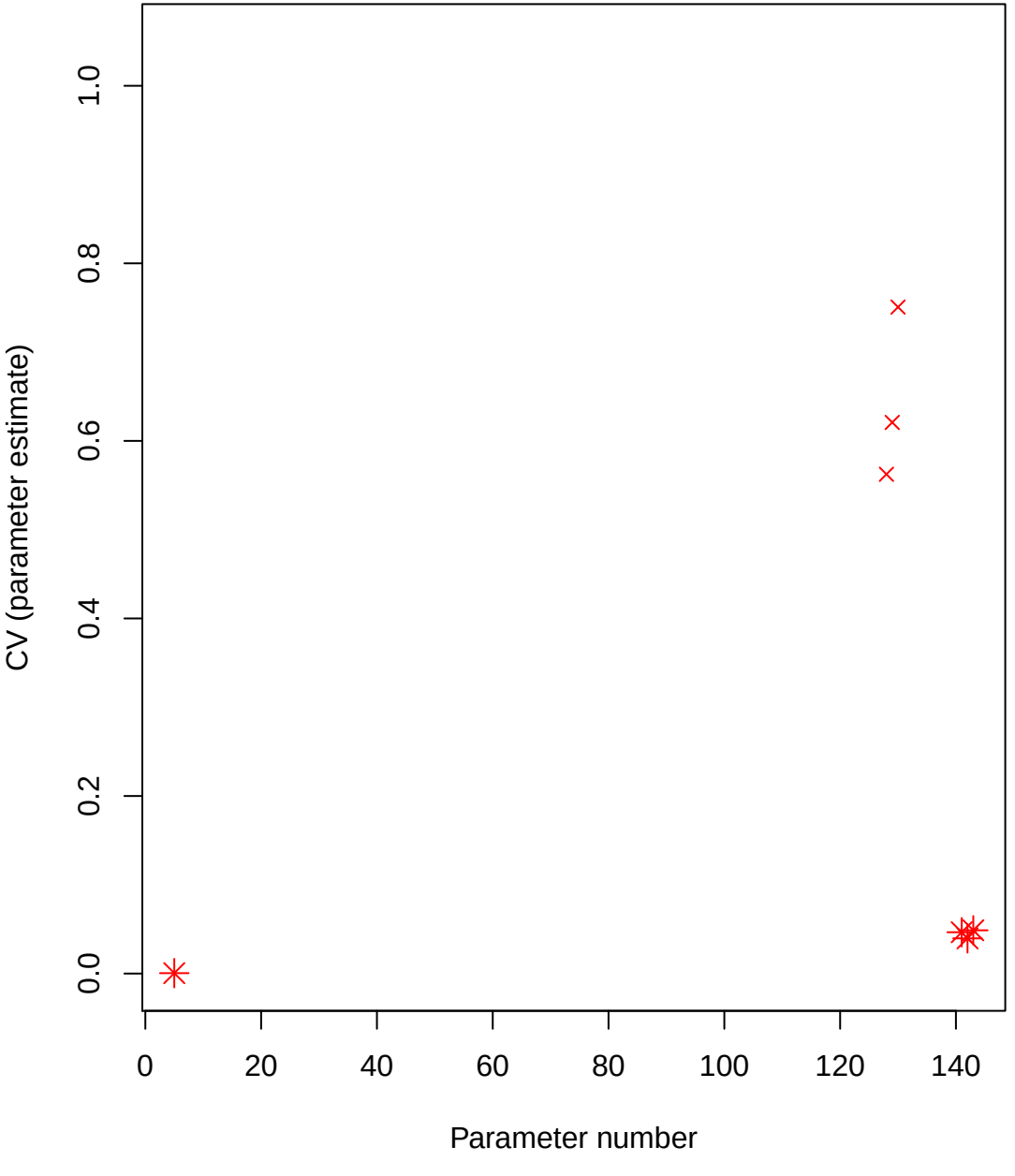
:chris.legault\Documents\Working\ICES−WKFORBIAS 2019\WhiteHake\Rose\w

ASAPplots version = 0.2.14

npar = 149, maximum gradient = 4.26596e−005

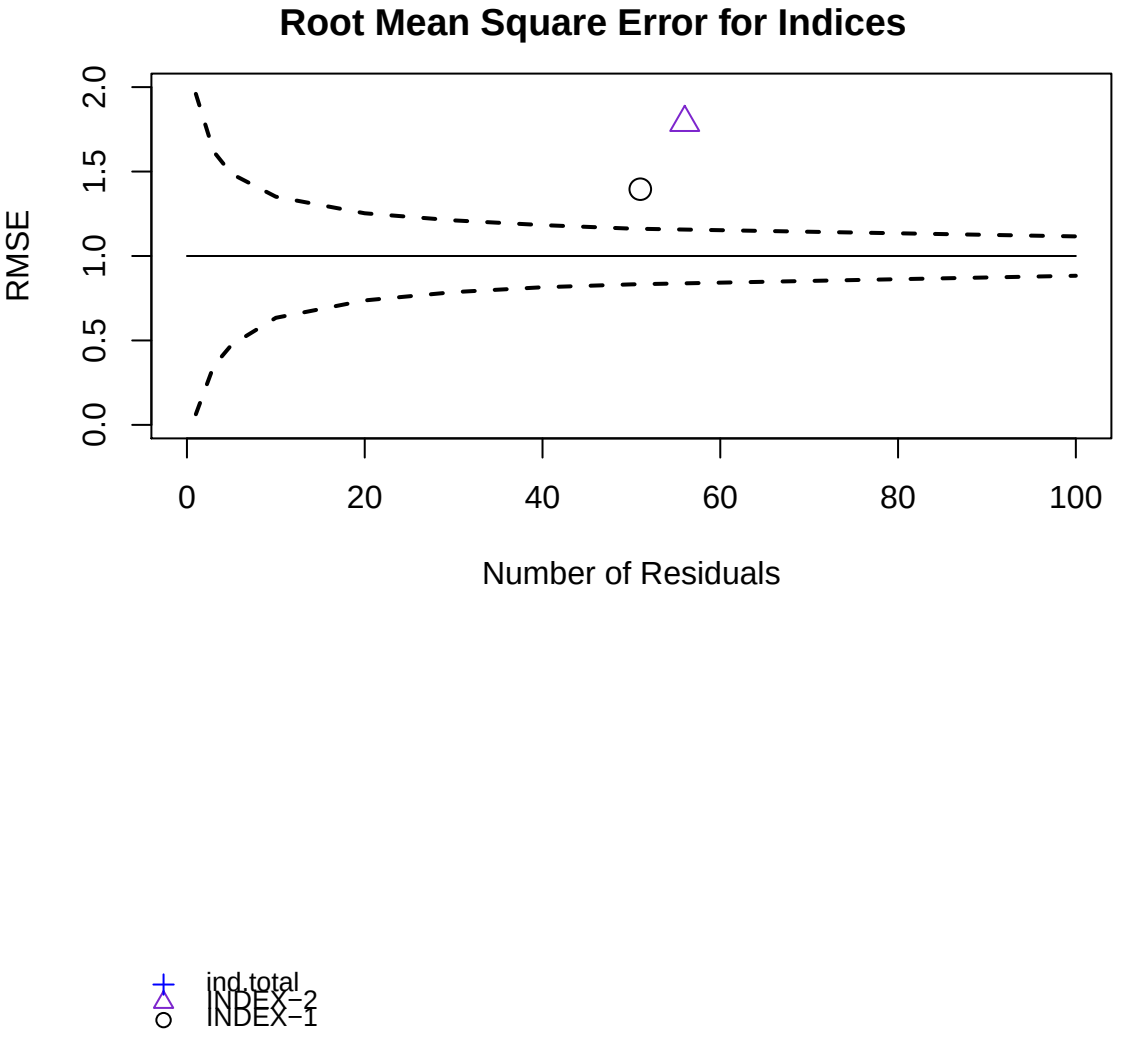

Components of Obj. Function (14137), npar=149
Maximum gradient = 4.3e−05
lk.F.penalty
lk.Fmult.Max.penalty
lk.SR.scaler
lk.SR.steepness
lk.Recruit.devs
lk.N.year1
lk.Fmult.devs.total
lk.Fmult.year1.total
lk.q.devs
lk.q.year1
lk.index.sel.param.total
lk.sel.param.total
lk.index.age.comp
lk.discards.age.comp
lk.catch.age.comp
lk.index.fit.total
lk.discard.total
lk.catch.total
0
0
0
0
0
68
0
0
0
0
0
0
10773
0
3439
−14
0
−129
0
2000
4000
6000
8000
10000
12000
Likelihood Contribution
Model: y2005r9c2.6m1s111111111_000
Monday, 04 Nov 2019 at 10:45

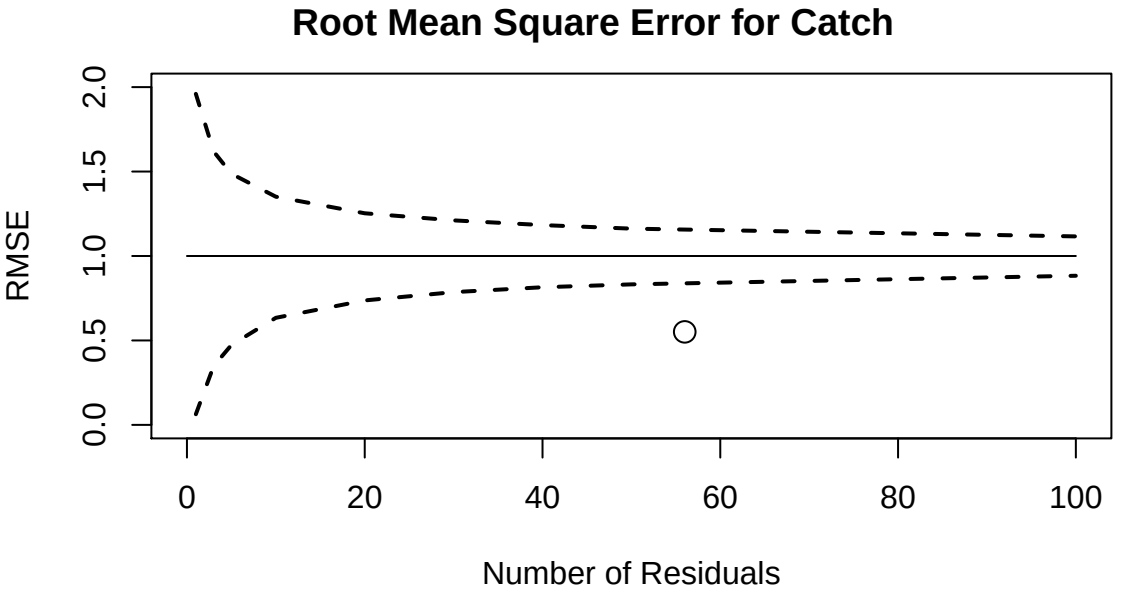

Number of high correlations
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
Parameter


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

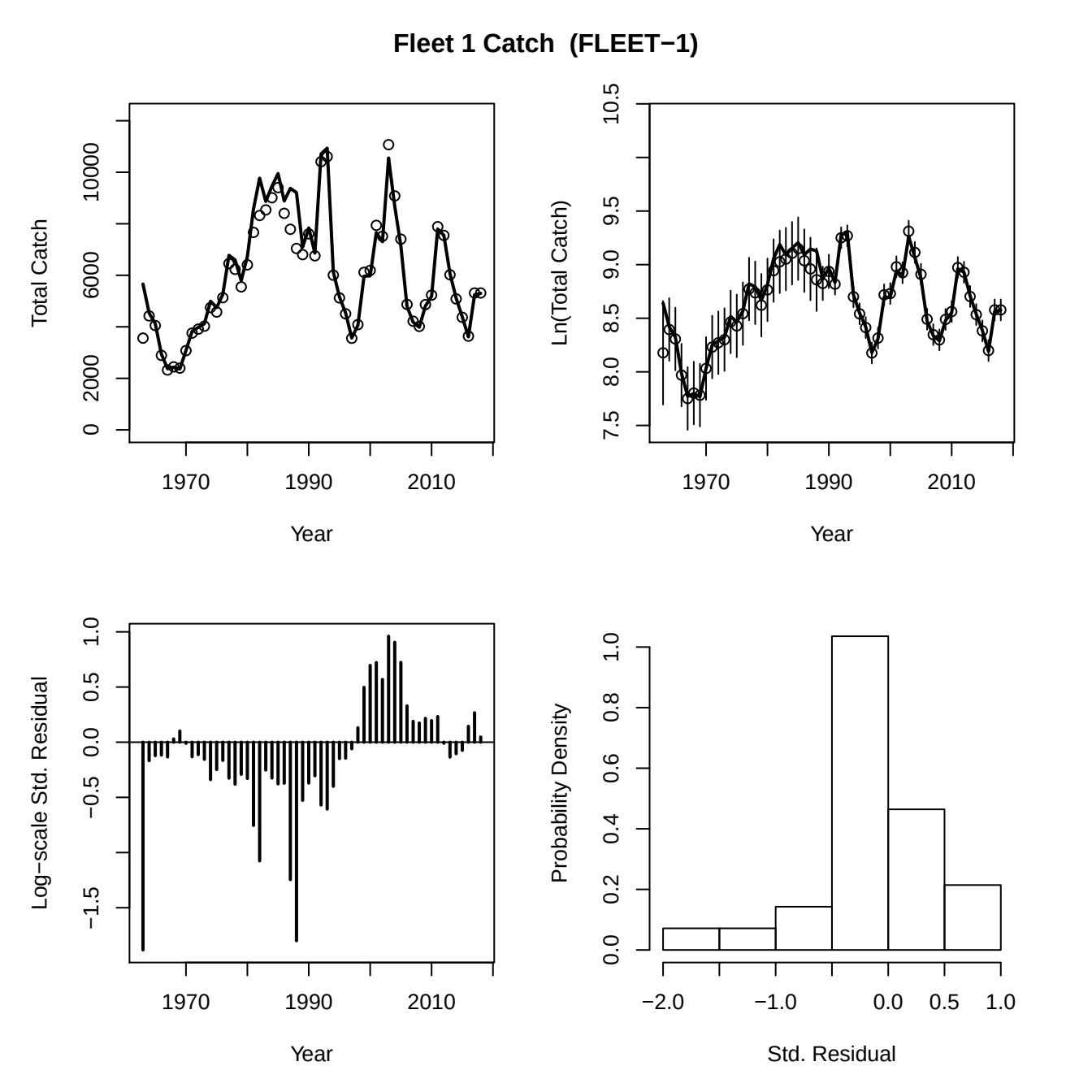
Root Mean Square Error computed from Standardized Residuals

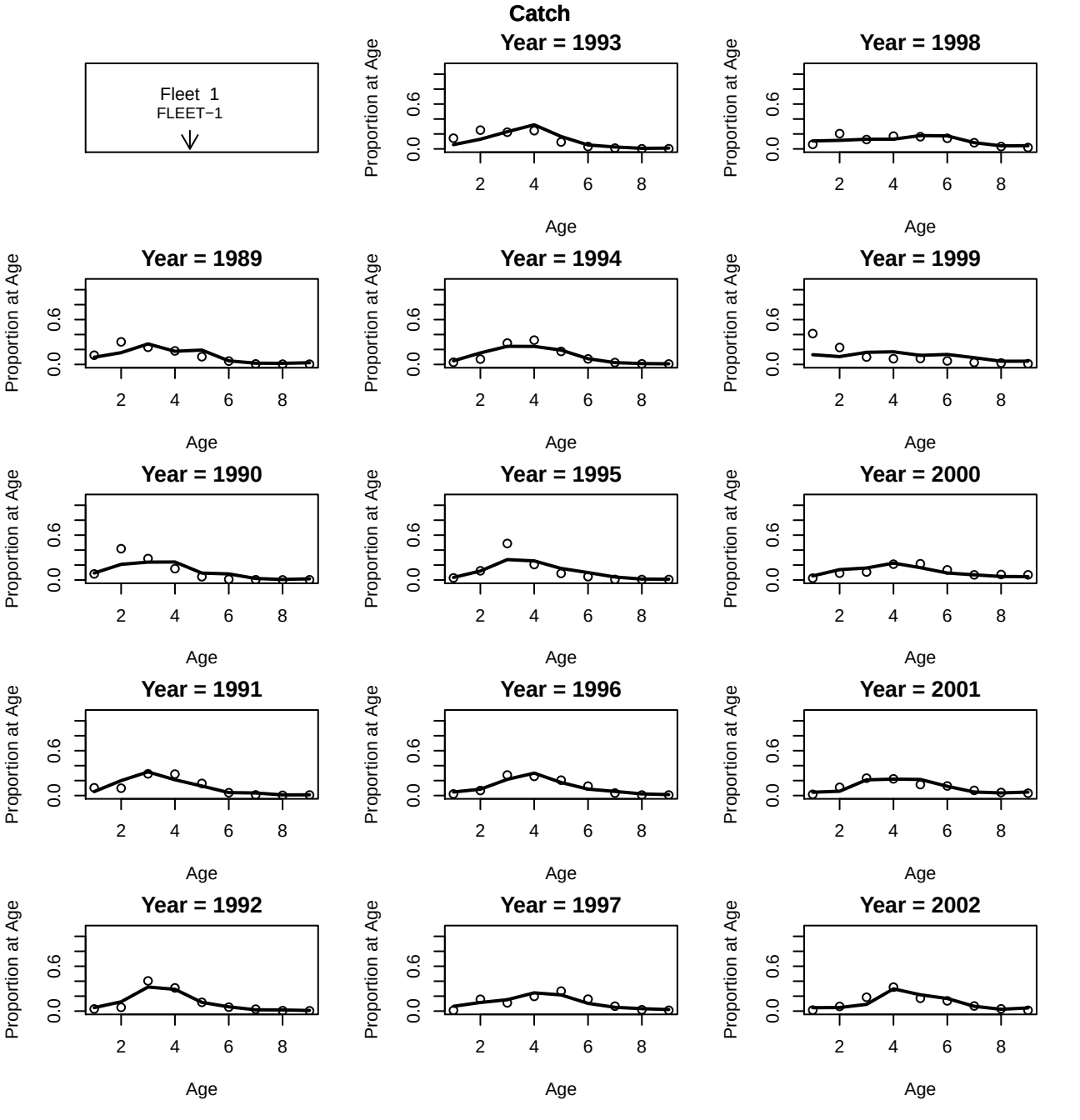
Component	# resids	RMSE
catch.tot	56	0.551
discard.tot	0	0
ind01	51	1.4
ind02	56	1.79
ind.total	107	1.61
N.year1	8	0.655
Fmult.year1	0	0
Fmult.devs.total	0	0
recruit.devs	0	0
fleet.sel.params	0	0
index.sel.params	0	0
q.year1	0	0
q.devs	0	0
SR.steepness	0	0
SR.scaler	0	0

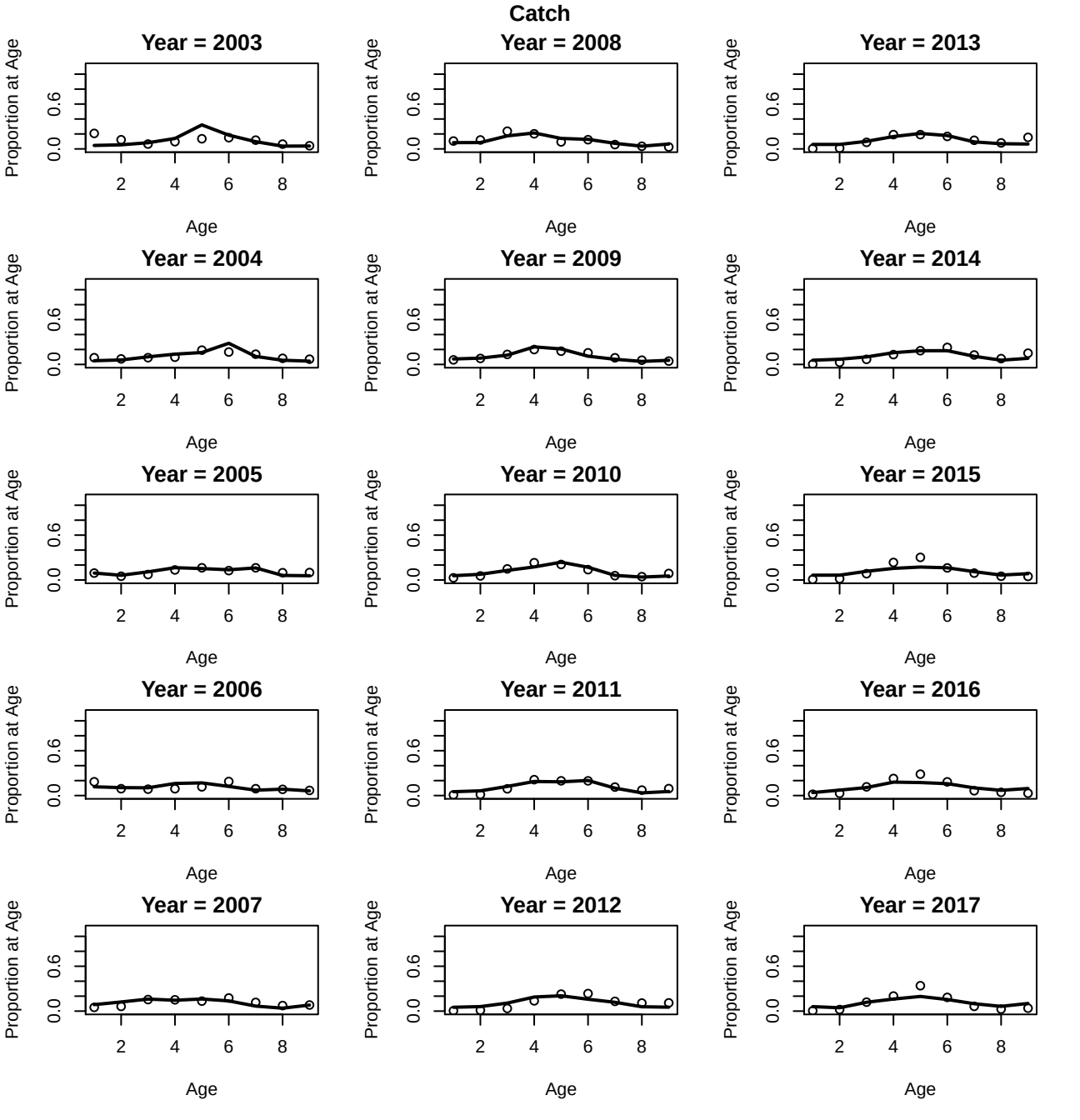

Root Mean Square Error for Indices
RMSE
0.0
0.5
1.0
1.5
2.0
0
20
40
60
80
100
Number of Residuals
ind.total
INDEX−2
INDEX−1

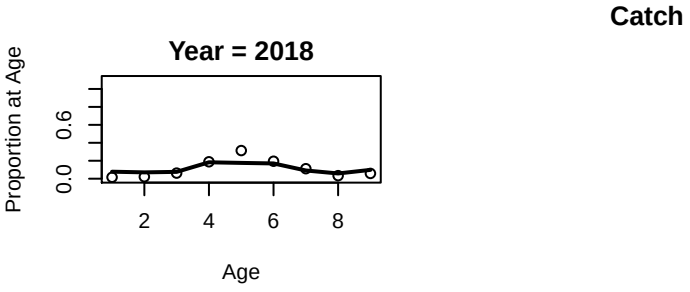

Root Mean Square Error for Catch
RMSE
0.0
0.5
1.0
1.5
2.0
0
20
40
60
80
100
Number of Residuals

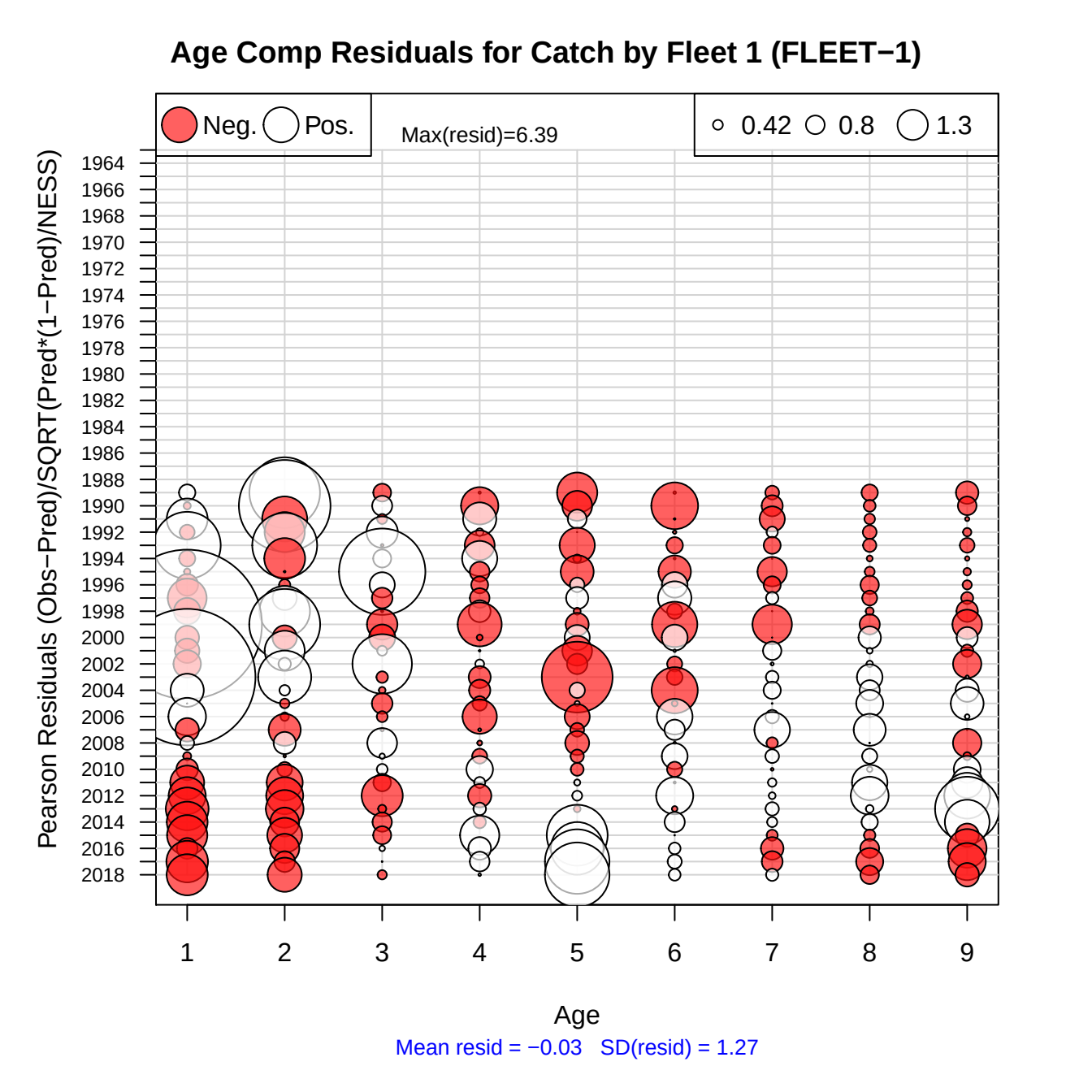
○ catch.tot

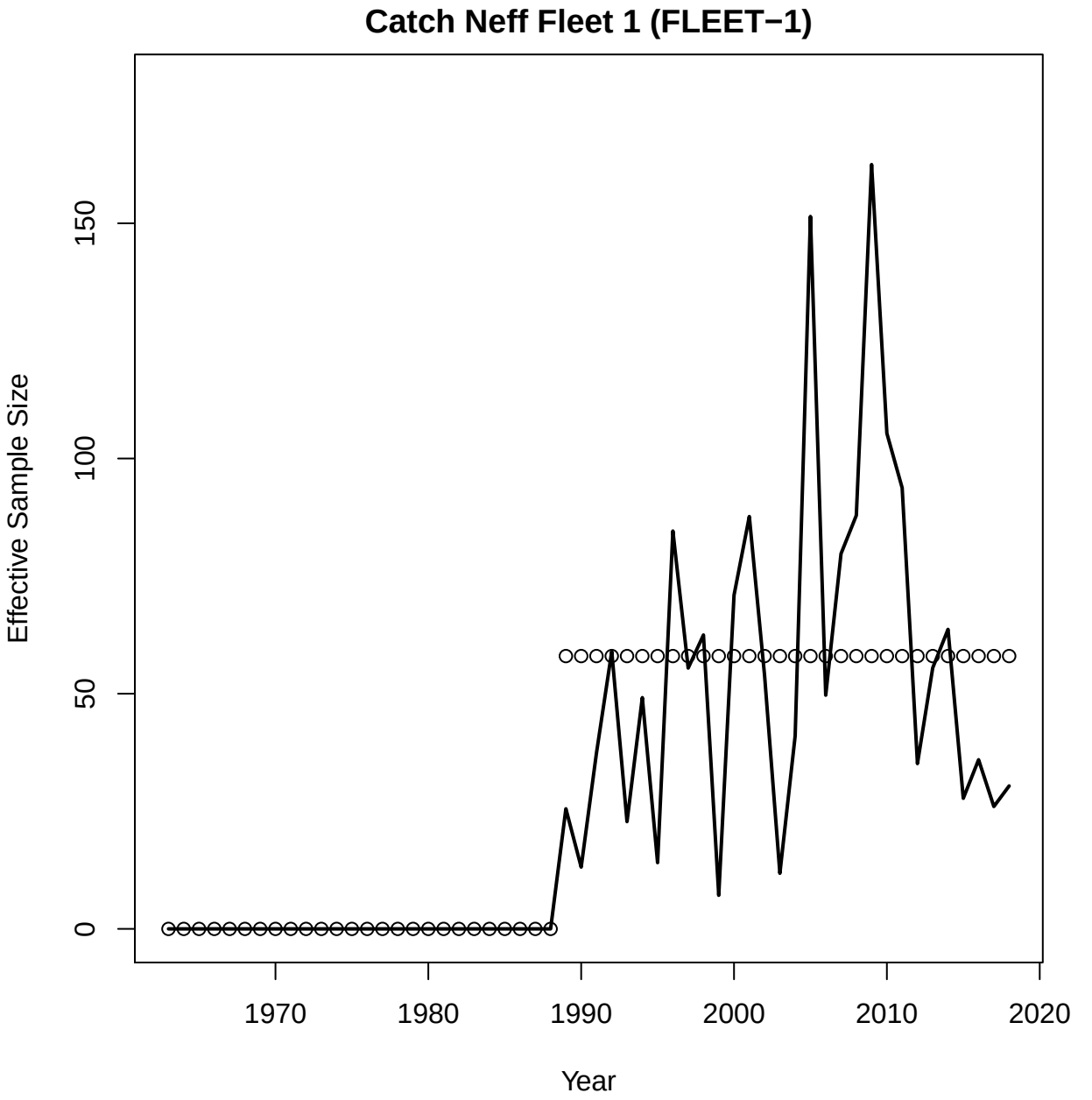

Fleet 1 Catch (FLEET−1)
Total Catch
0
2000
6000
10000
1970
1990
2010
Year
Ln(Total Catch)
7.5
8.0
8.5
9.0
9.5
10.5
1970
1990
2010
Year
Log−scale Std. Residual
−1.5
−0.5
0.0
0.5
1.0
1970
1990
2010
Year
Probability Density
0.0
0.2
0.4
0.6
0.8
1.0
−2.0
−1.0
0.0
0.5
1.0
Std. Residual

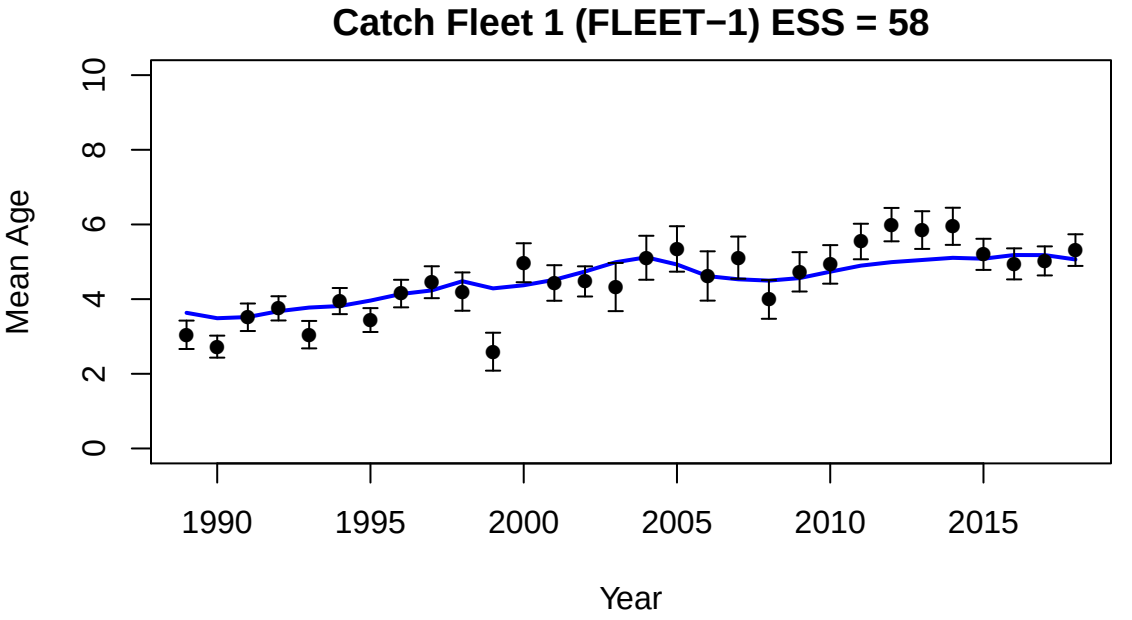

Catch
Fleet 1
FLEET−1
Year = 1993
Year = 1998
Year = 1989
Year = 1994
Year = 1999
Year = 1990
Year = 1995
Year = 2000
Year = 1991
Year = 1996
Year = 2001
Year = 1992
Year = 1997
Year = 2002
Proportion at Age
Age
0.0
0.6
2
4
6
8

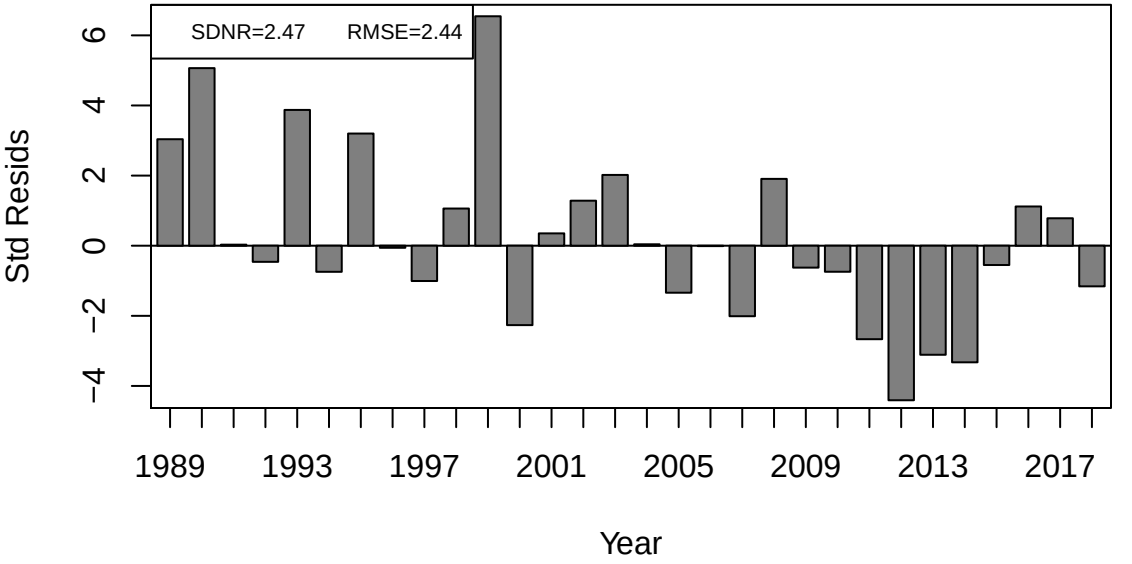

Catch
Year = 2003
Year = 2008
Year = 2013
Year = 2004
Year = 2009
Year = 2014
Year = 2005
Year = 2010
Year = 2015
Year = 2006
Year = 2011
Year = 2016
Year = 2007
Year = 2012
Year = 2017
Proportion at Age
Age
0.0
0.6
2
4
6
8

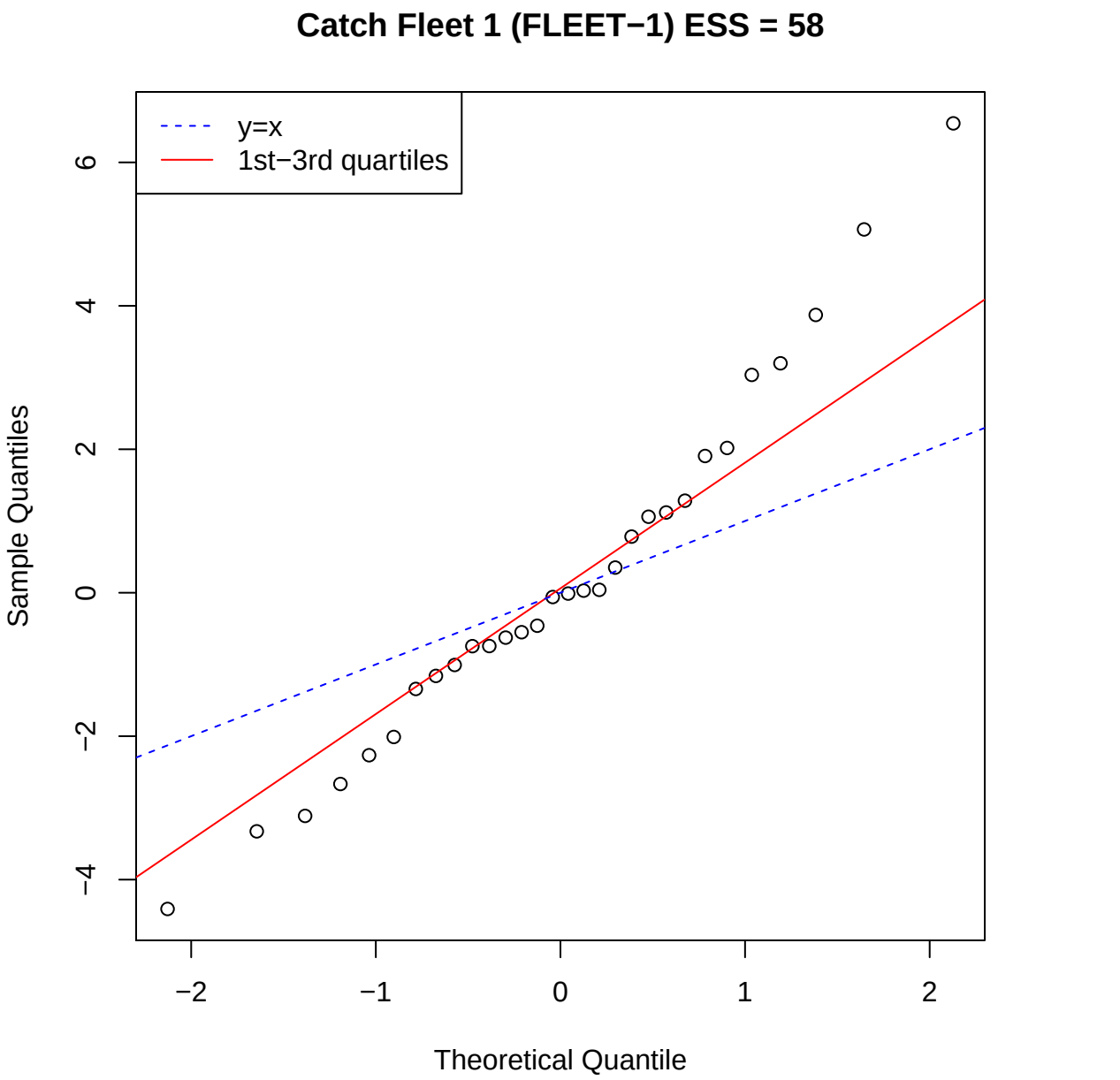

Catch
Year = 2018
Proportion at Age
0.0
0.6
2
4
6
8
Age

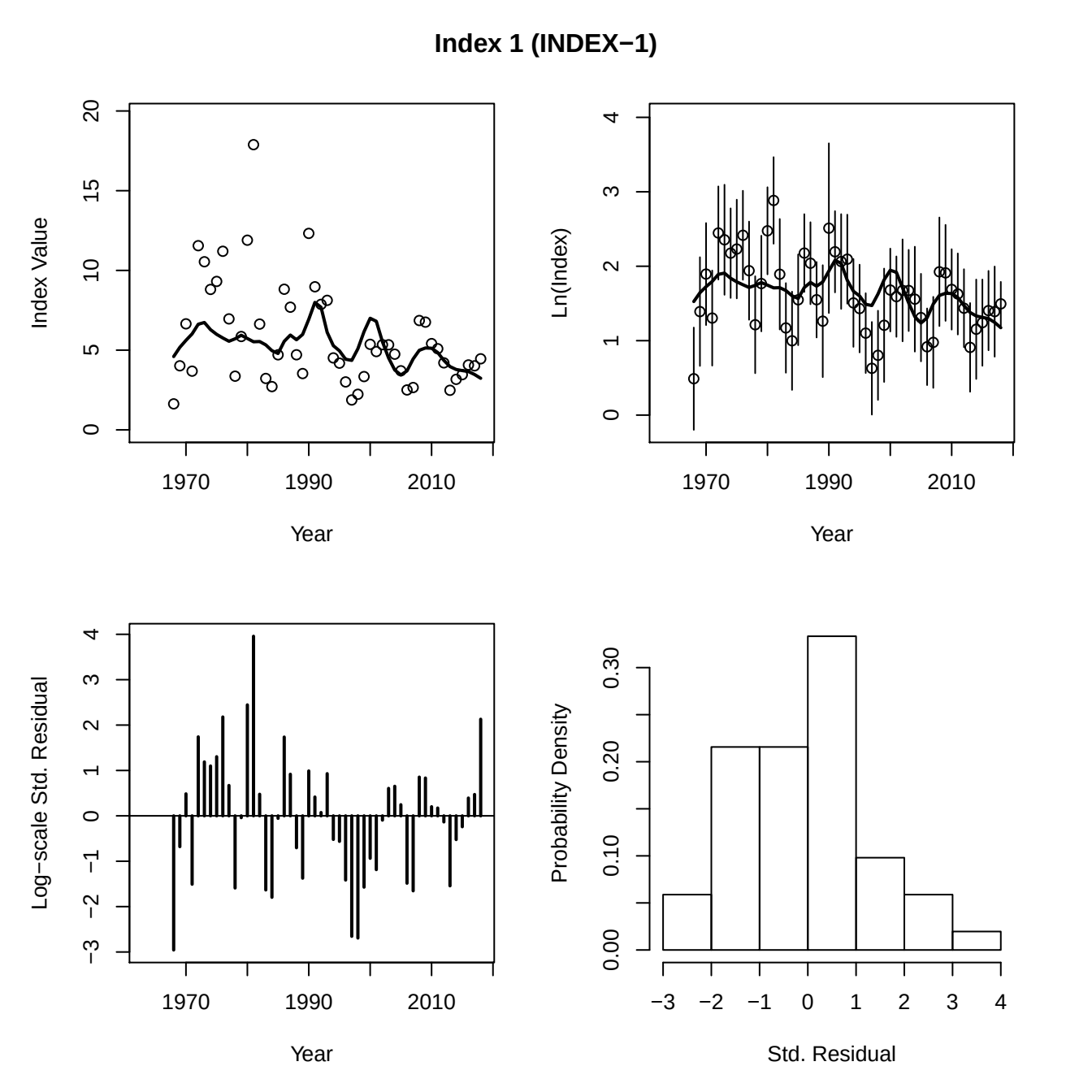

Age Comp Residuals for Catch by Fleet 1 (FLEET−1)
Neg.
Pos.
Max(resid)=6.39
0.42
0.8
1.3
Pearson Residuals (Obs−Pred)/SQRT(Pred*(1−Pred)/NESS)
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
1
2
3
4
5
6
7
8
9
Age
Mean resid = −0.03 SD(resid) = 1.27

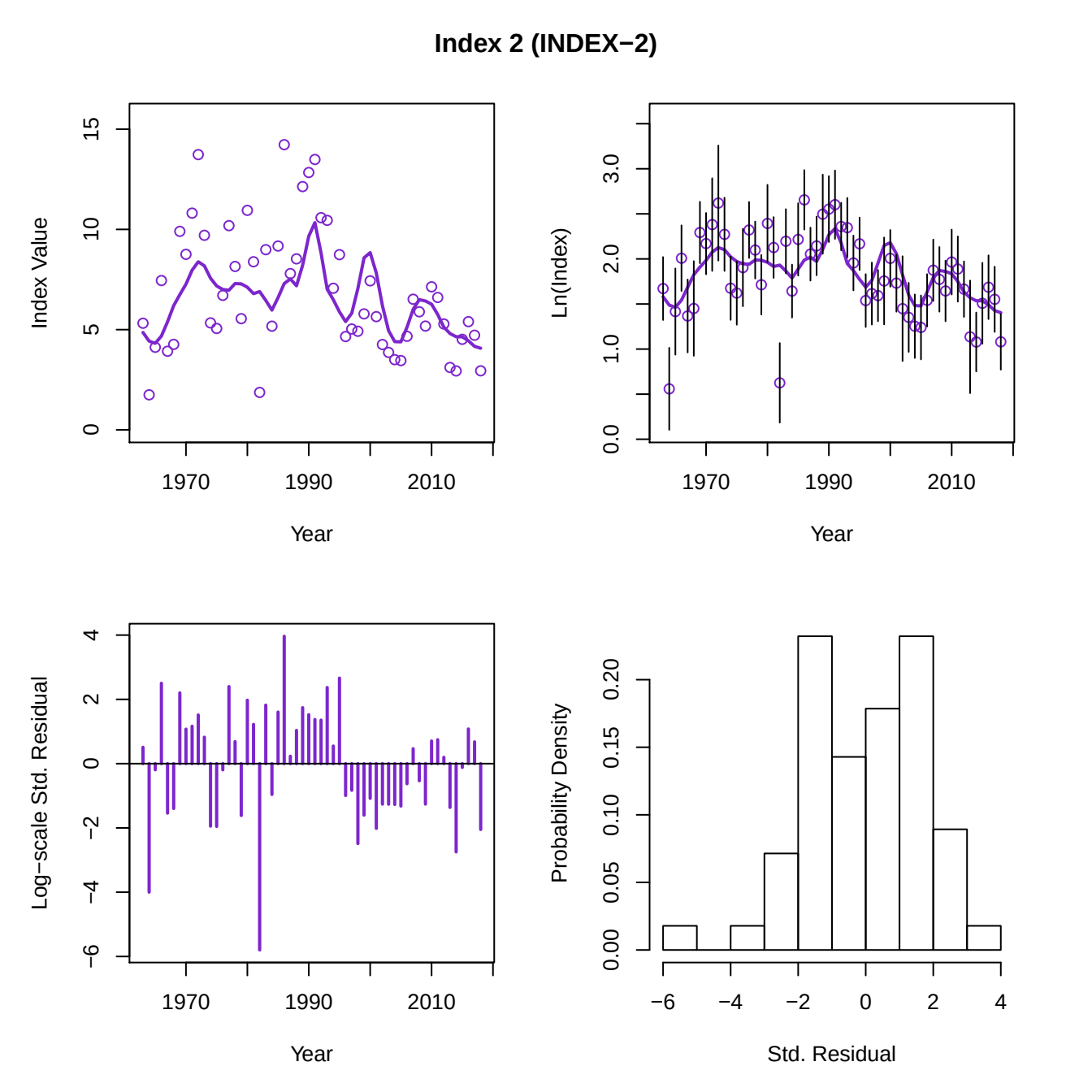

Catch Neff Fleet 1 (FLEET−1)
Effective Sample Size
0
50
100
150
1970
1980
1990
2000
2010
2020
Year

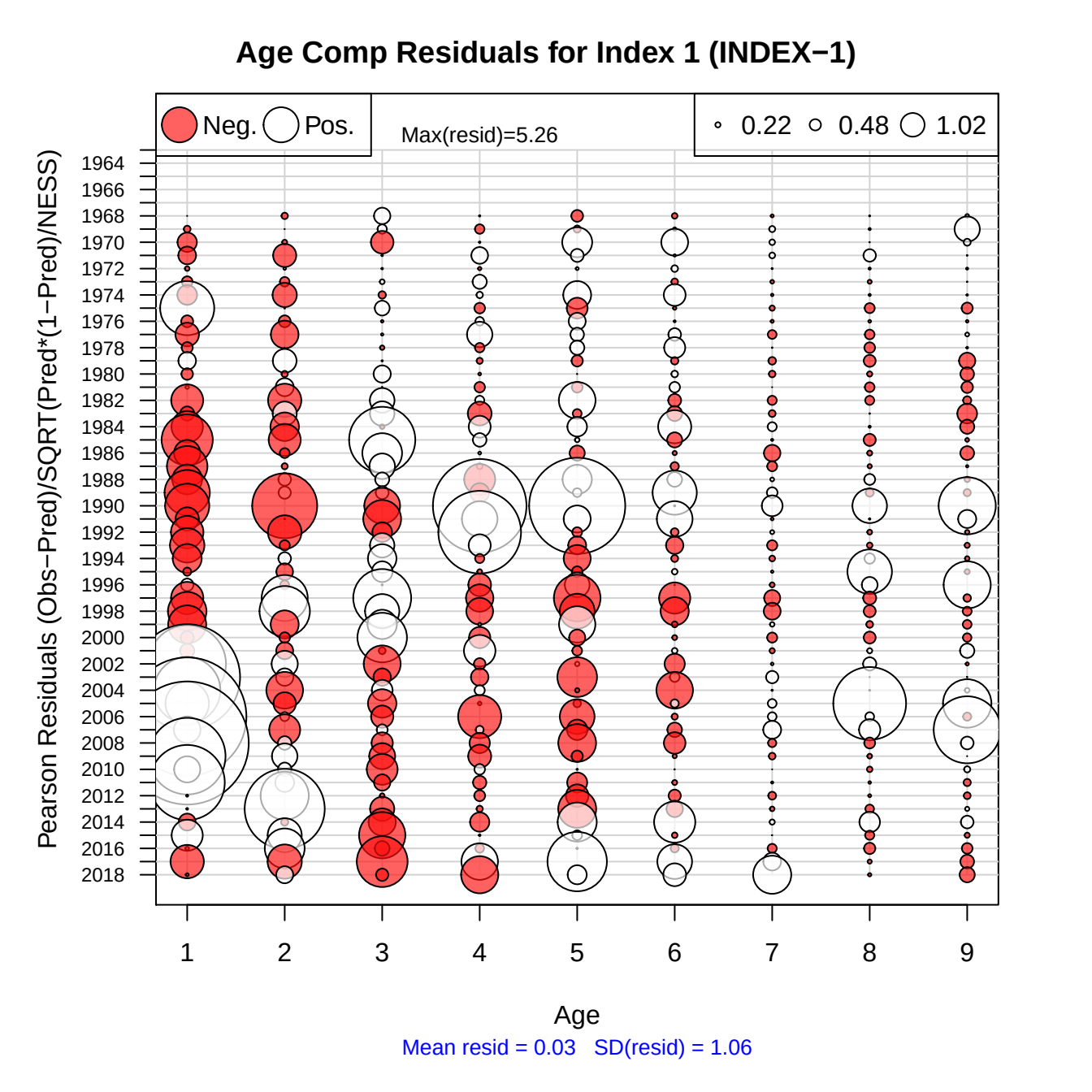

Catch Fleet 1 (FLEET−1) ESS = 58
Mean Age
0
2
4
6
8
10
1990
1995
2000
2005
2010
2015
Year

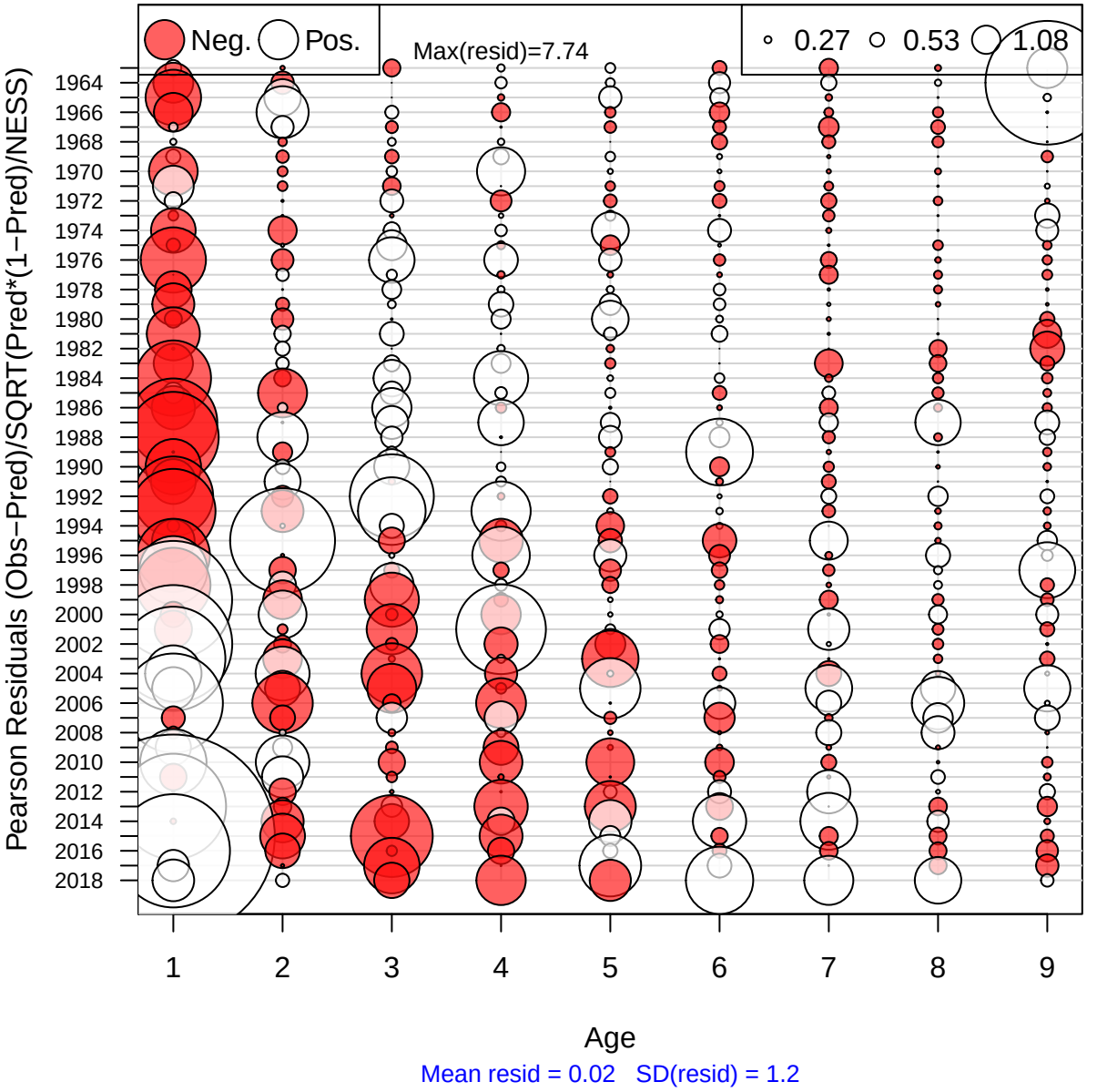

SDNR=2.47
RMSE=2.44
Std Resids
−4
−2
0
2
4
6
1989
1993
1997
2001
2005
2009
2013
2017
Year

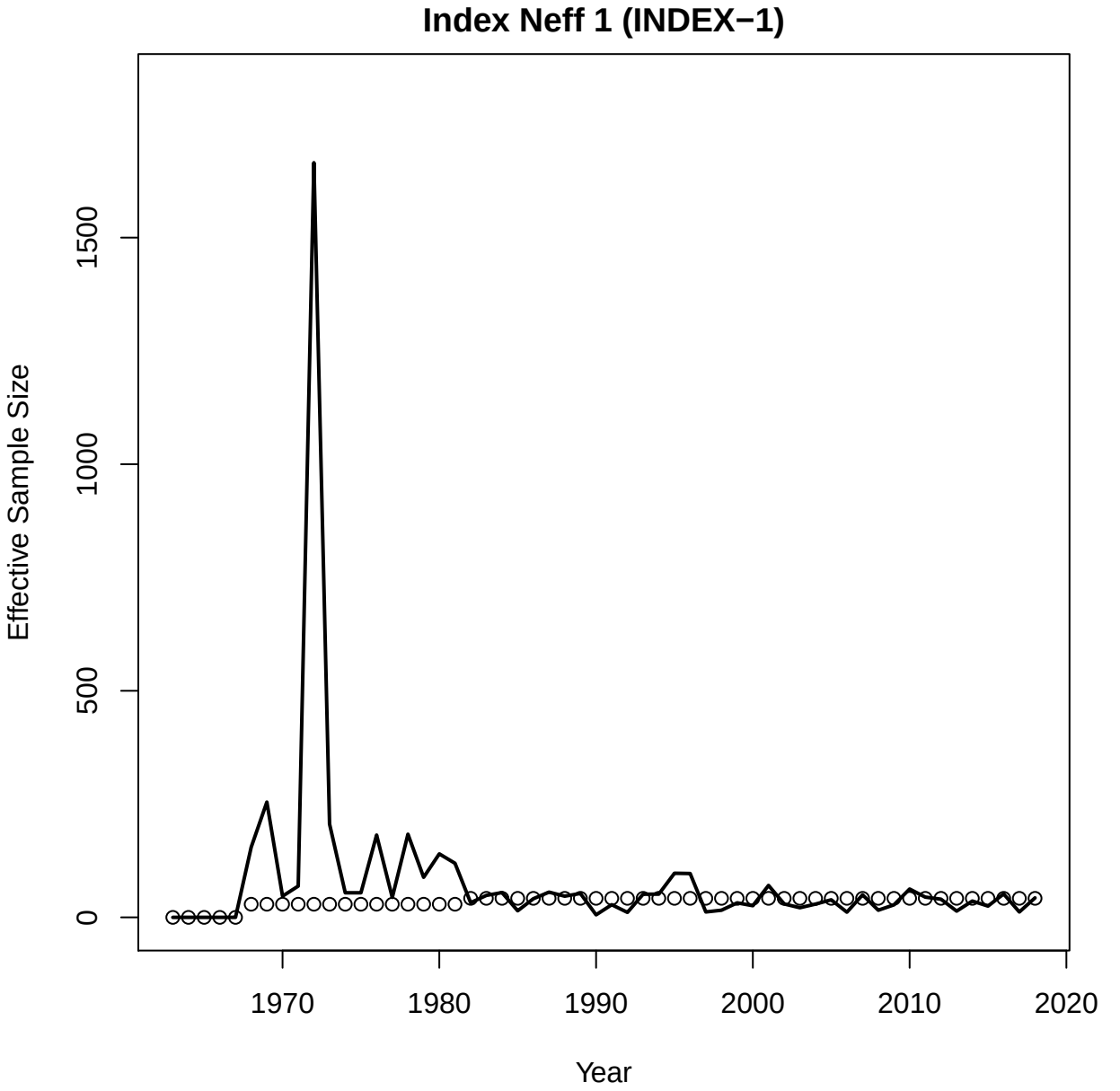

Catch Fleet 1 (FLEET−1) ESS = 58
y=x
1st−3rd quartiles
Sample Quantiles
Theoretical Quantile
6
4
2
0
−2
−4
−2
−1
0
1
2

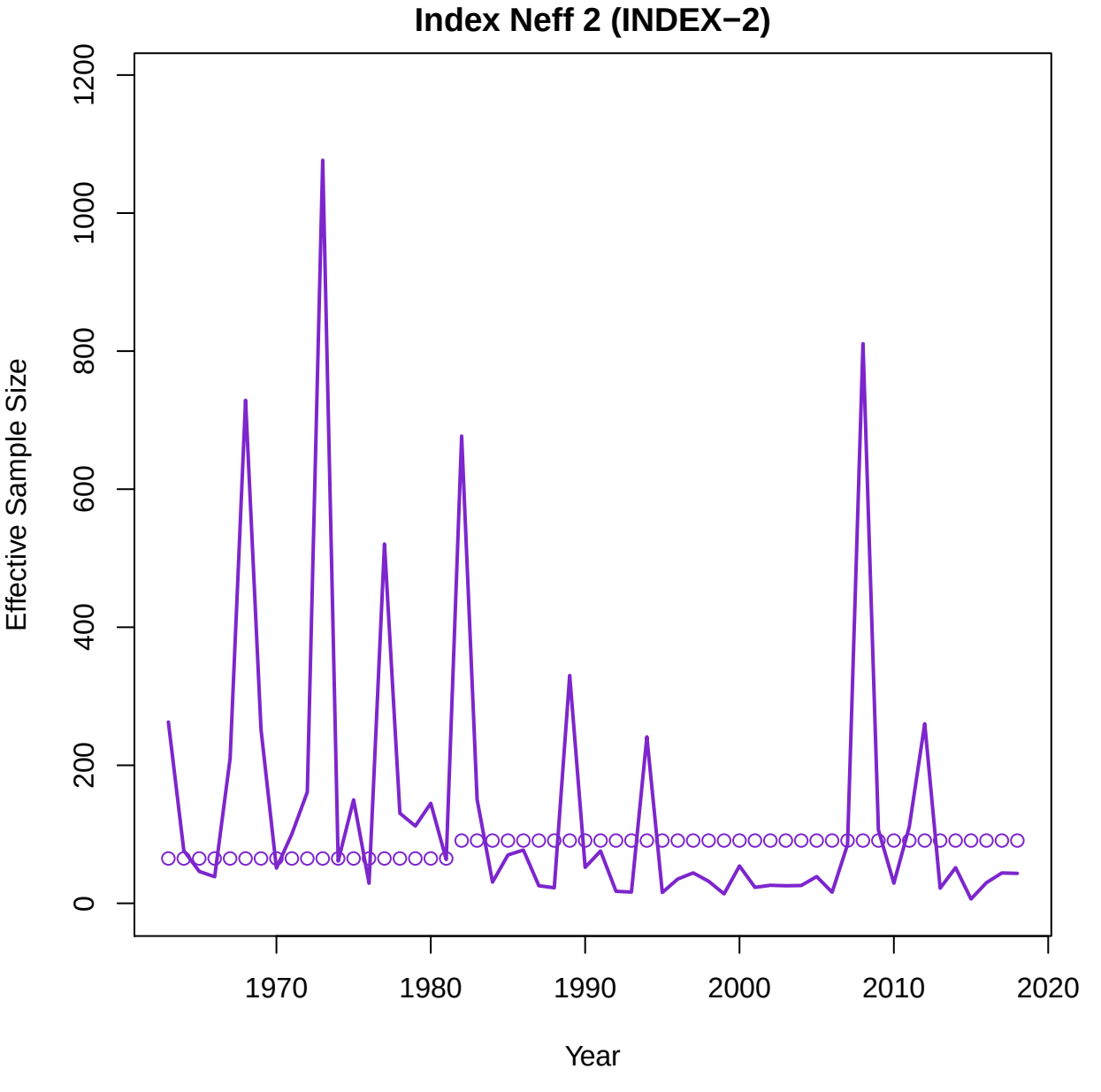

Index 1 (INDEX−1)
Index Value
0
5
10
15
20
1970
1990
2010
Year
Ln(Index)
0
1
2
3
4
1970
1990
2010
Year
Log−scale Std. Residual
−3
−2
−1
0
1
2
3
4
1970
1990
2010
Year
Probability Density
0.00
0.10
0.20
0.30
−3
−2
−1
0
1
2
3
4
Std. Residual

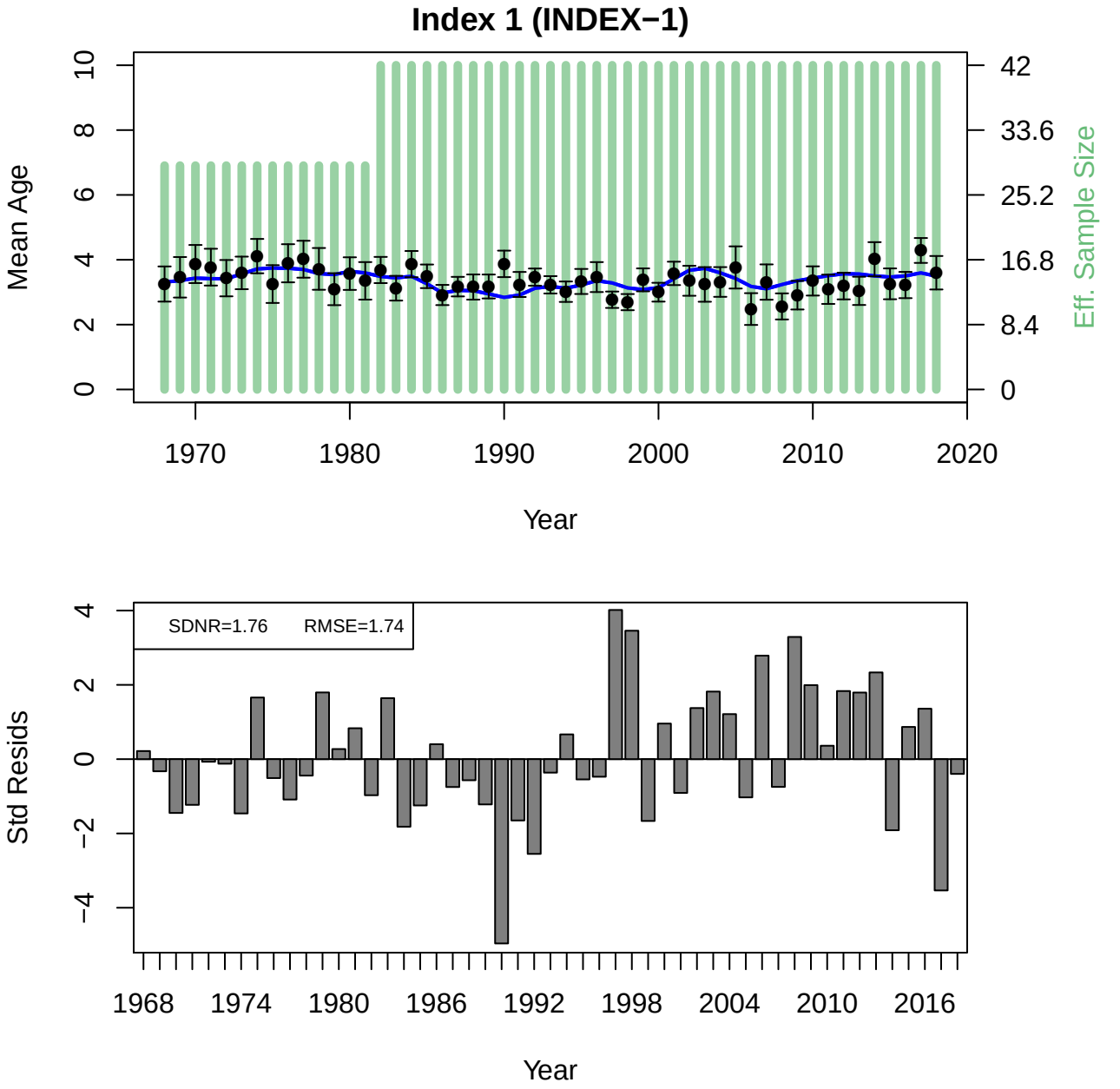

Index 2 (INDEX−2)
Index Value
0
5
10
15
1970
1990
2010
Year
Ln(Index)
0.0
1.0
2.0
3.0
1970
1990
2010
Year
Log−scale Std. Residual
−6
−4
−2
0
2
4
1970
1990
2010
Year
Probability Density
0.00
0.05
0.10
0.15
0.20
−6
−4
−2
0
2
4
Std. Residual

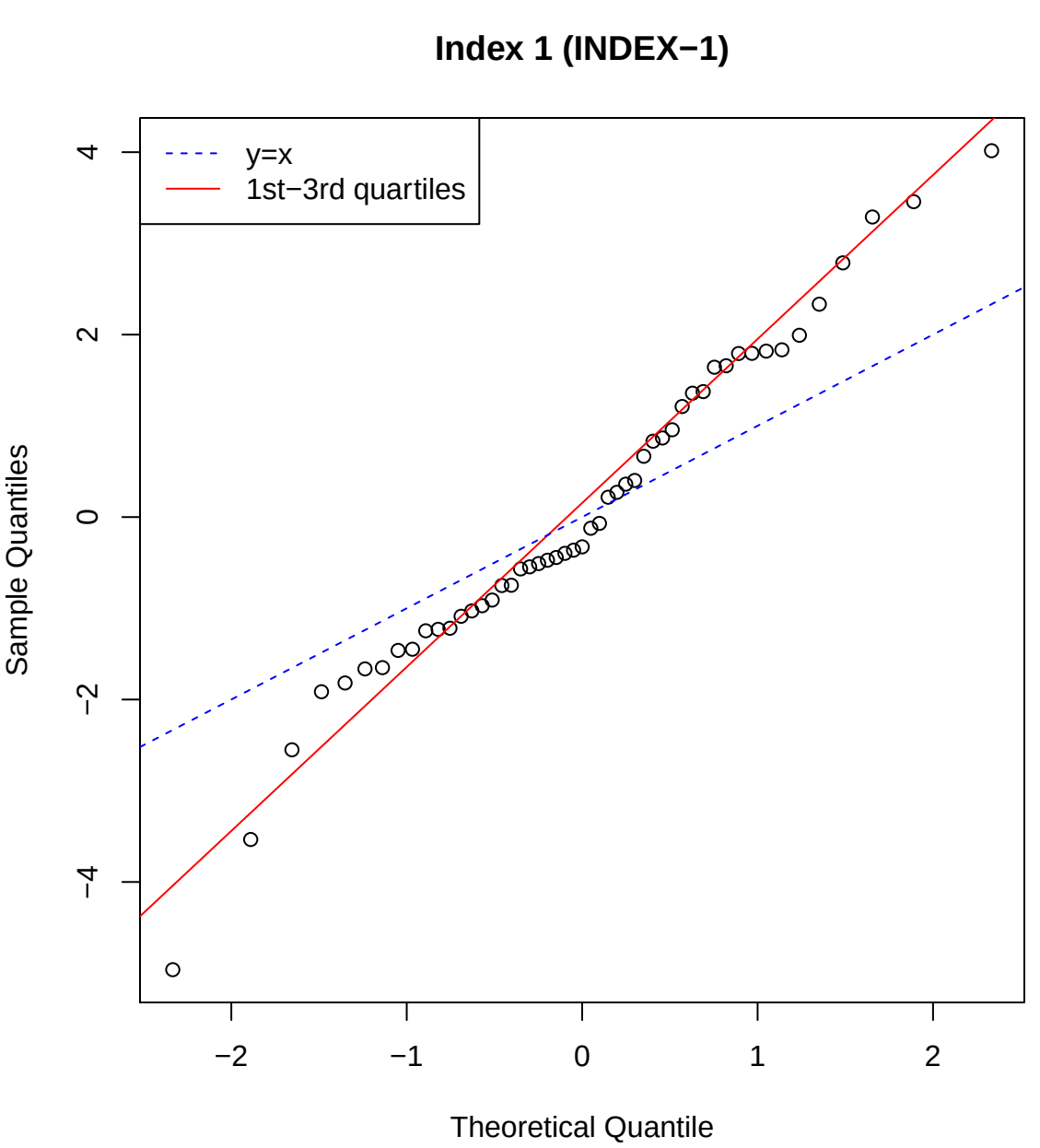

Age Comp Residuals for Index 1 (INDEX−1)
Neg.
Pos.
Max(resid)=5.26
0.22
0.48
1.02
Pearson Residuals (Obs−Pred)/SQRT(Pred*(1−Pred)/NESS)
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
1
2
3
4
5
6
7
8
9
Age
Mean resid = 0.03 SD(resid) = 1.06

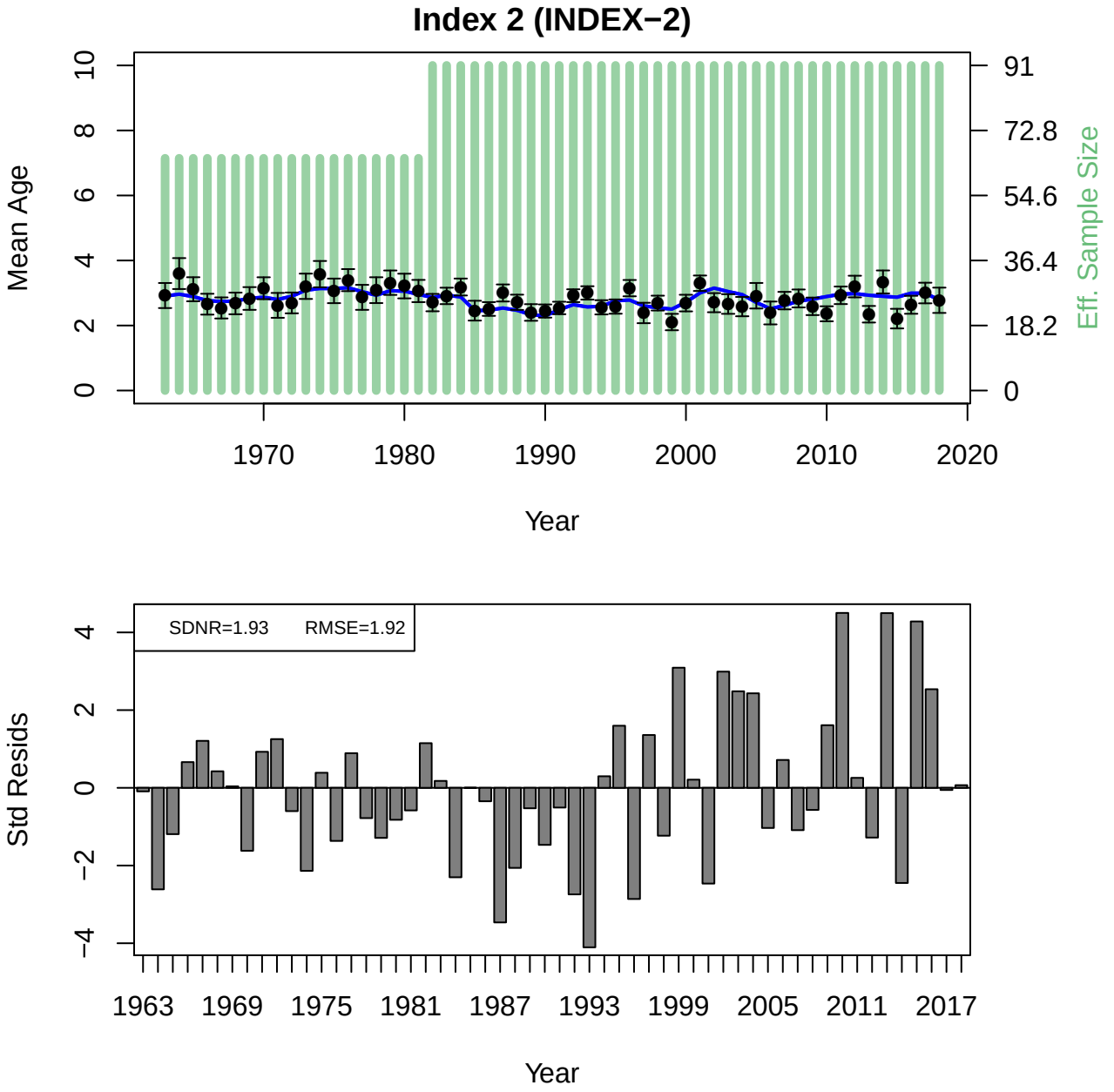

Age Comp Residuals for Index 2 (INDEX−2)
Neg.
Pos.
Max(resid)=7.74
0.27
0.53
1.08
Pearson Residuals (Obs−Pred)/SQRT(Pred*(1−Pred)/NESS)
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
1
2
3
4
5
6
7
8
9
Age
Mean resid = 0.02 SD(resid) = 1.2

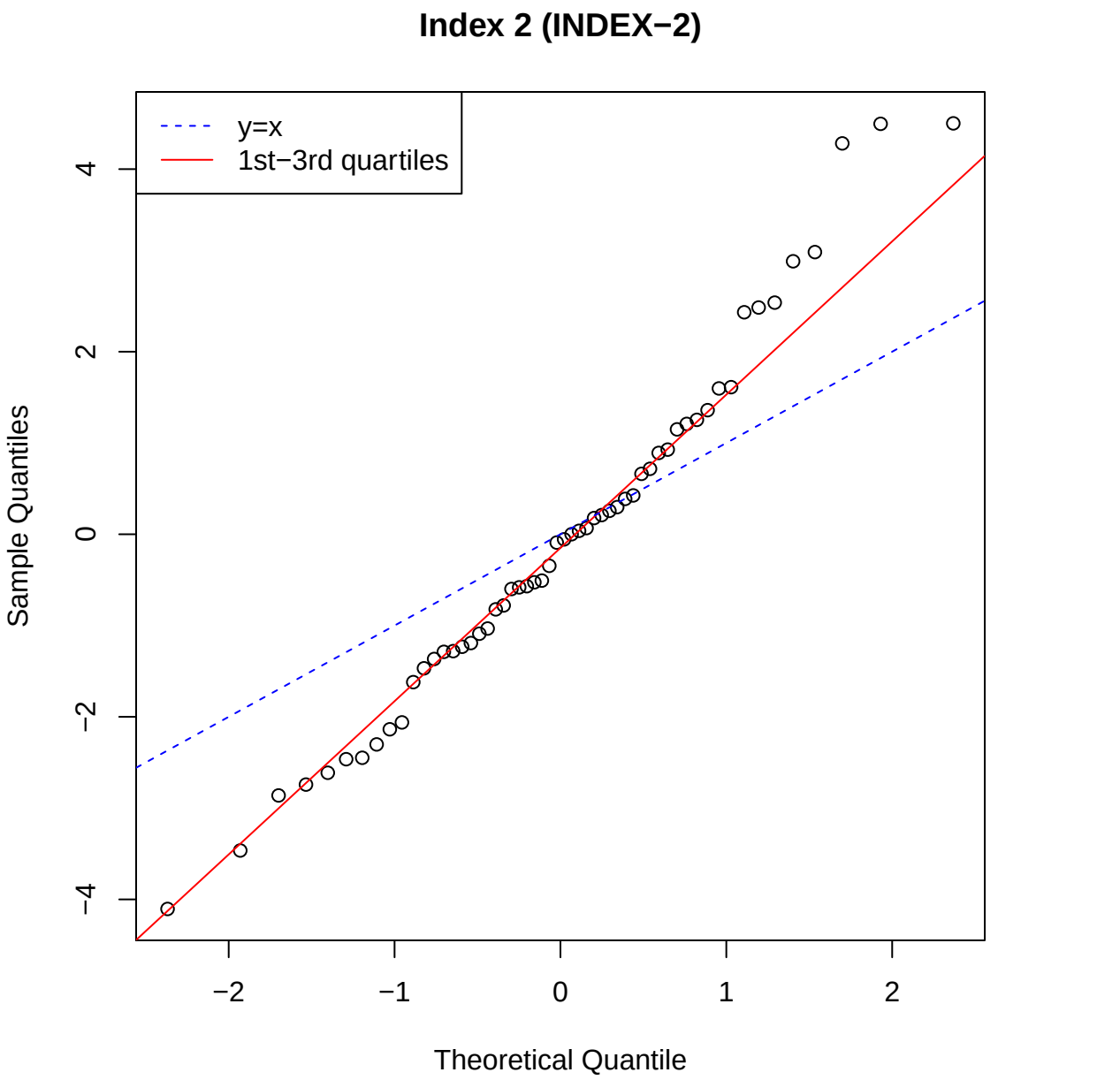

Index Neff 1 (INDEX−1)
Effective Sample Size
0
500
1000
1500
1970
1980
1990
2000
2010
2020
Year

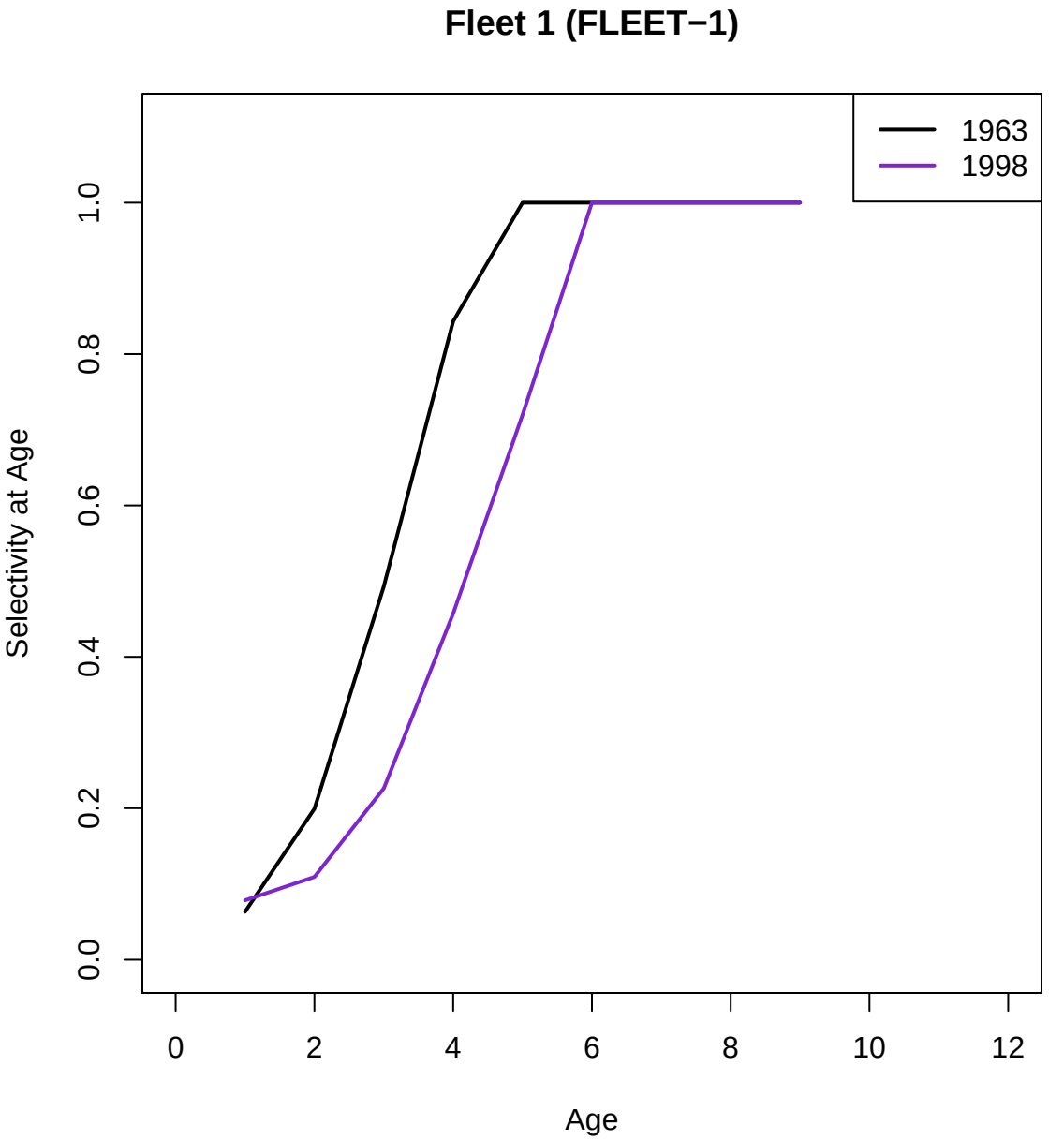

Index Neff 2 (INDEX−2)
Effective Sample Size
0
200
400
600
800
1000
1200
1970
1980
1990
2000
2010
2020
Year

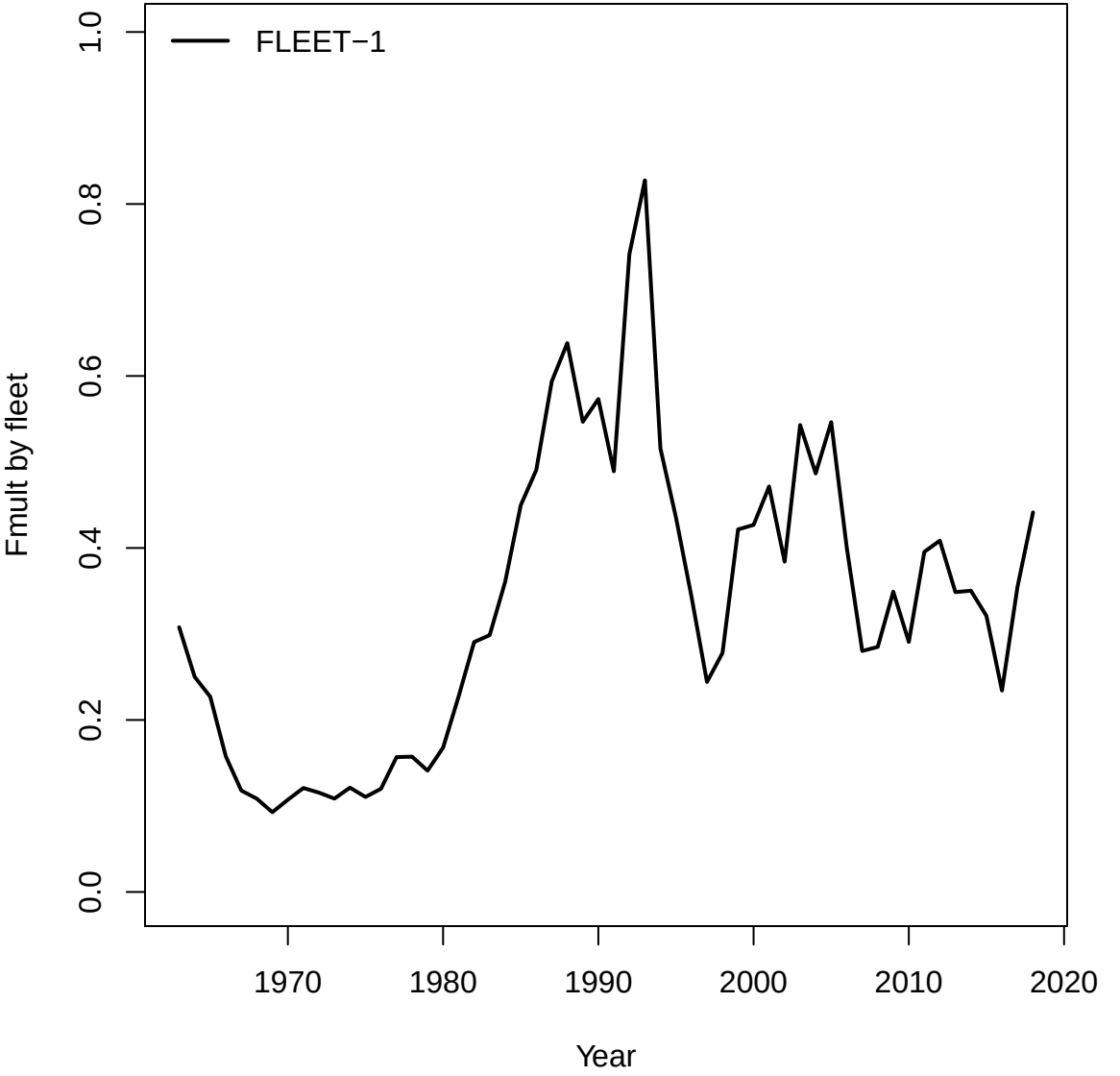

Index 1 (INDEX−1)
Mean Age
Eff. Sample Size
0
2
4
6
8
10
42
33.6
25.2
16.8
8.4
0
1970
1980
1990
2000
2010
2020
Year
SDNR=1.76
RMSE=1.74
Std Resids
−4
−2
0
2
4
1968
1974
1980
1986
1992
1998
2004
2010
2016
Year

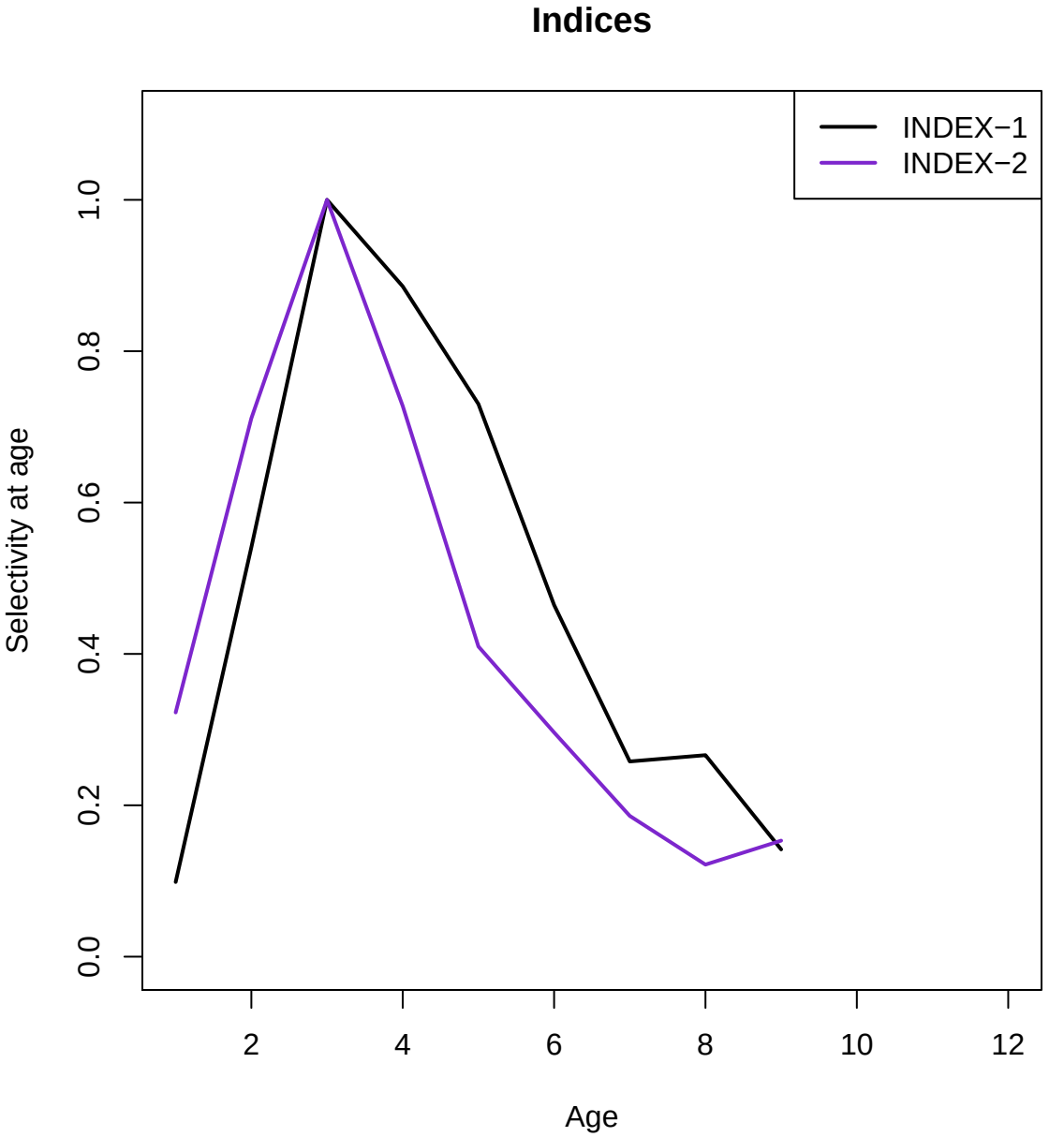

Index 1 (INDEX−1)
y=x
1st−3rd quartiles
Sample Quantiles
Theoretical Quantile
4
2
0
−2
−4
−2
−1
0
1
2

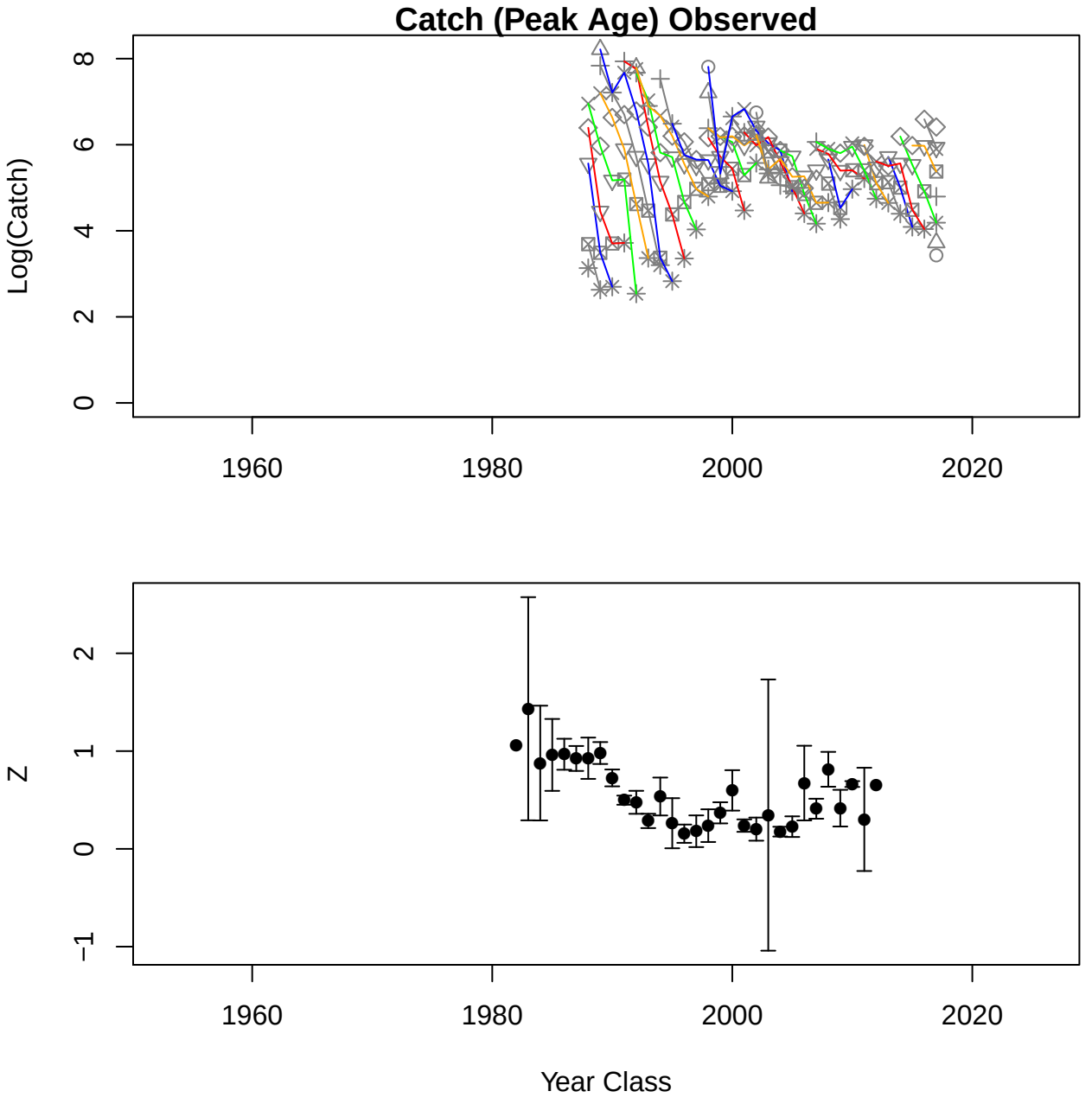

Index 2 (INDEX−2)
Mean Age
Eff. Sample Size
0
2
4
6
8
10
91
72.8
54.6
36.4
18.2
0
1970
1980
1990
2000
2010
2020
Year
SDNR=1.93
RMSE=1.92
Std Resids
−4
−2
0
2
4
1963
1969
1975
1981
1987
1993
1999
2005
2011
2017
Year

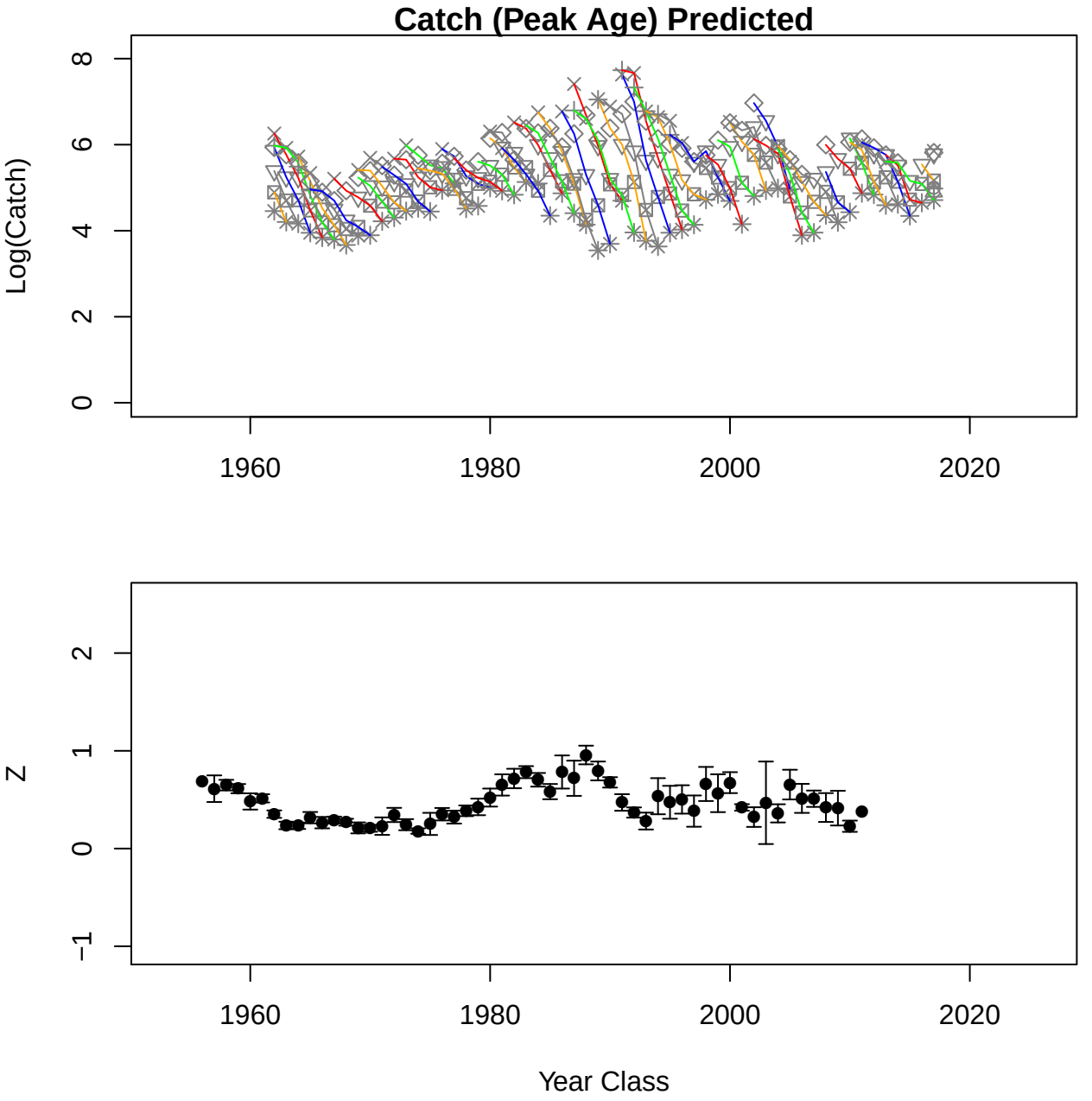

Index 2 (INDEX−2)
y=x
1st−3rd quartiles
Sample Quantiles
Theoretical Quantile
4
2
0
−2
−4
−2
−1
0
1
2

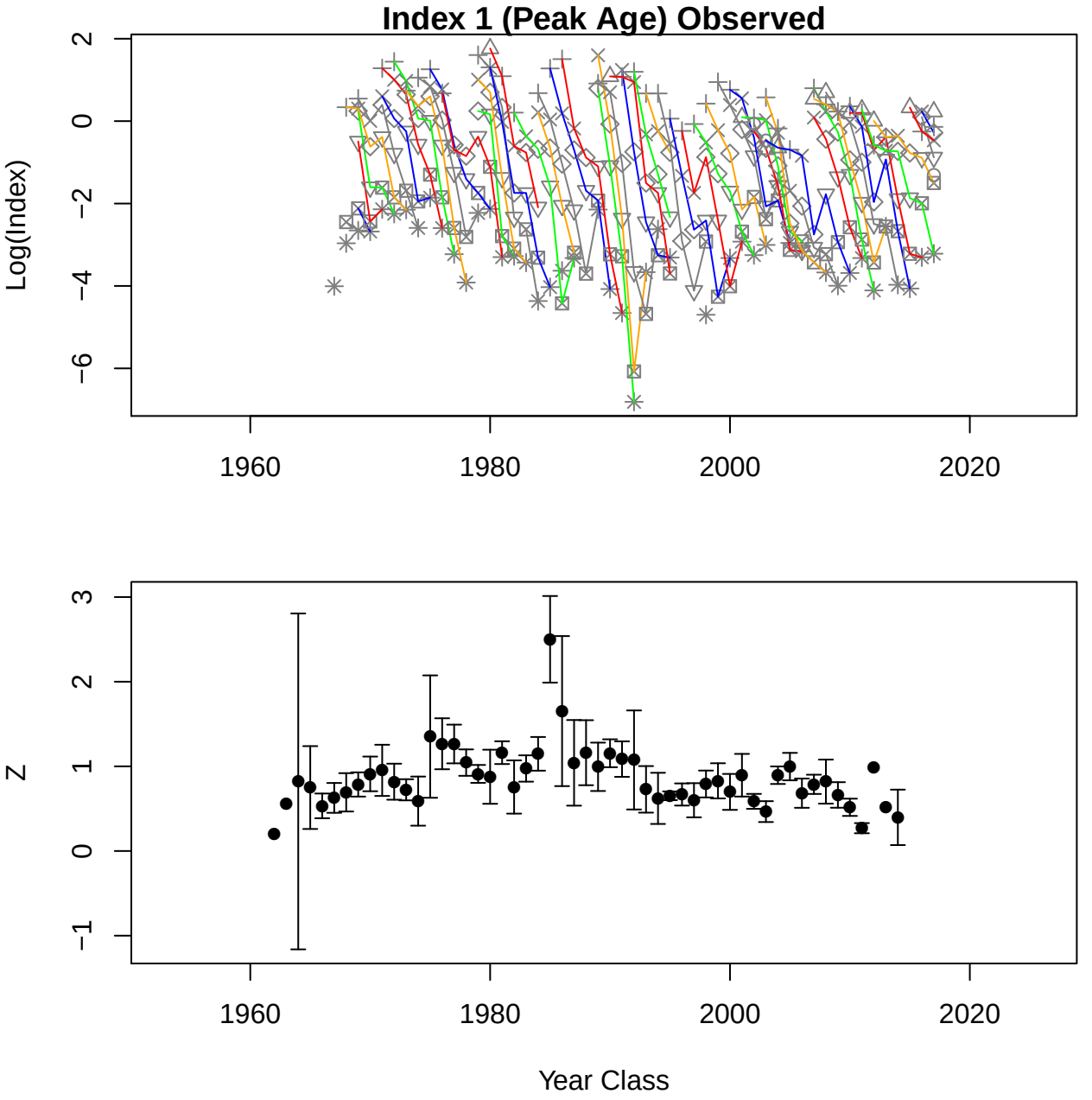

Fleet 1 (FLEET−1)
1963
1998
Selectivity at Age
0.0
0.2
0.4
0.6
0.8
1.0
0
2
4
6
8
10
12
Age

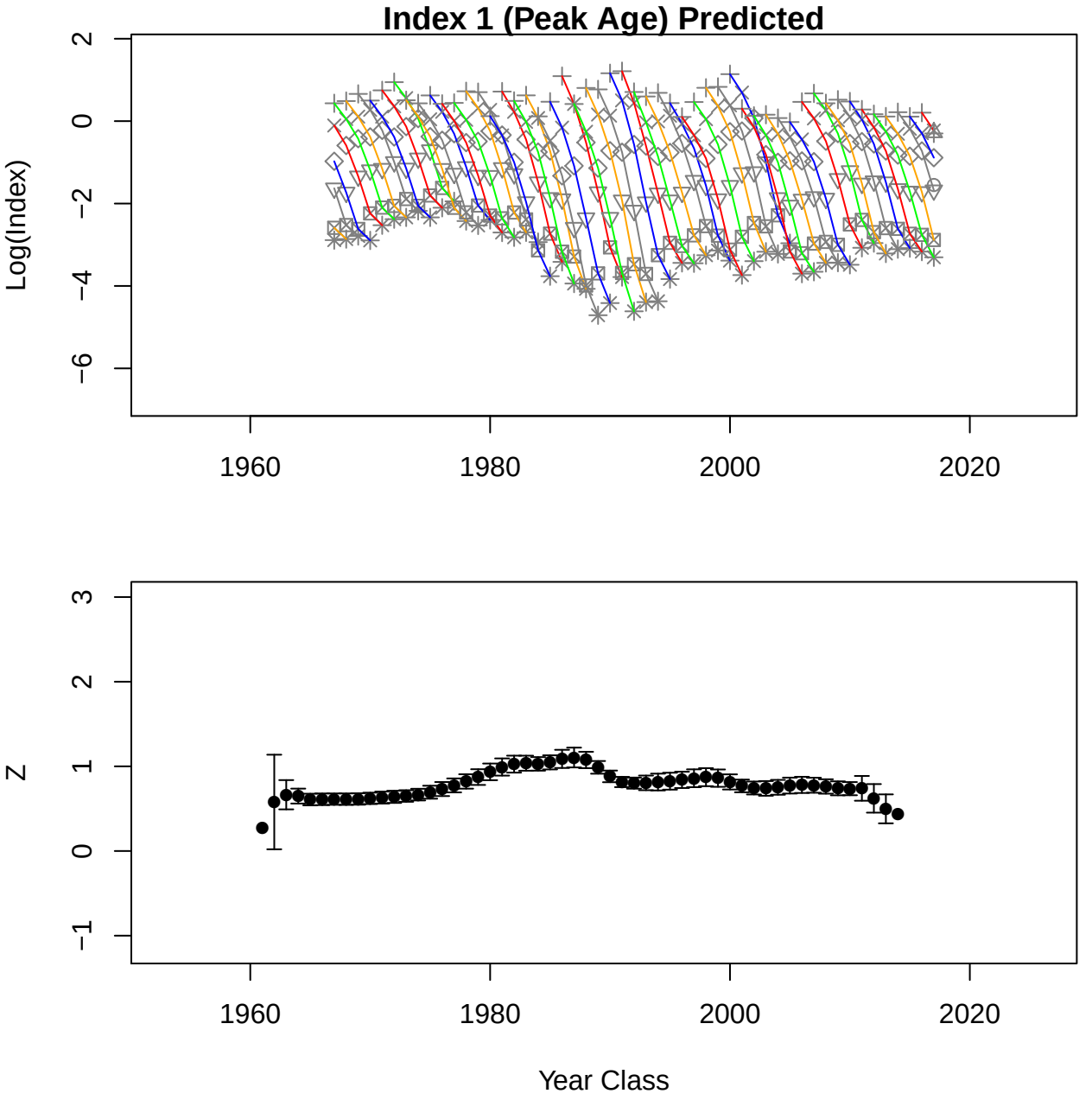

FLEET−1
Fmult by fleet
0.0
0.2
0.4
0.6
0.8
1.0
1970
1980
1990
2000
2010
2020
Year

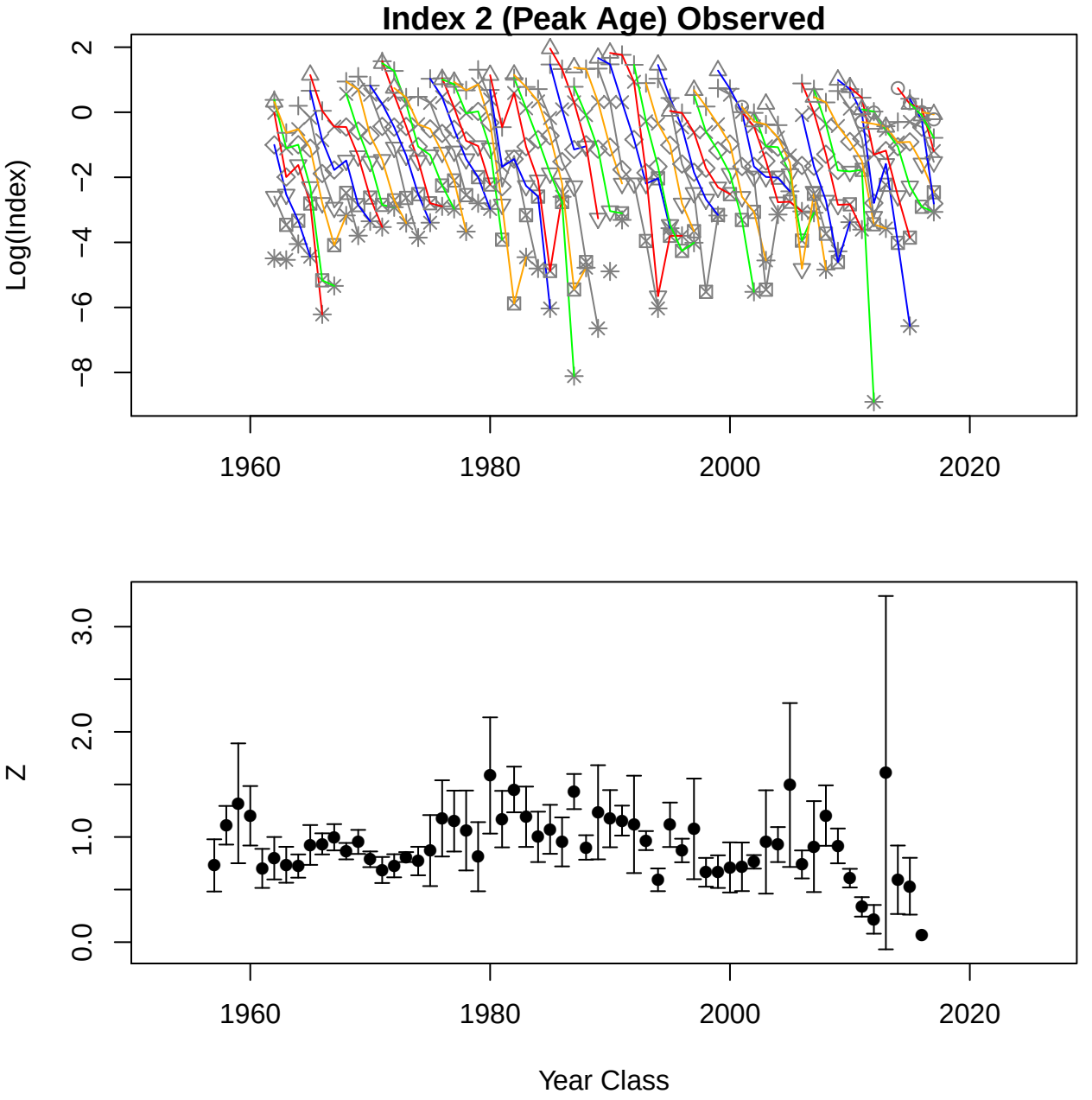

Indices
INDEX−1
INDEX−2
Selectivity at age
0.0
0.2
0.4
0.6
0.8
1.0
2
4
6
8
10
12
Age

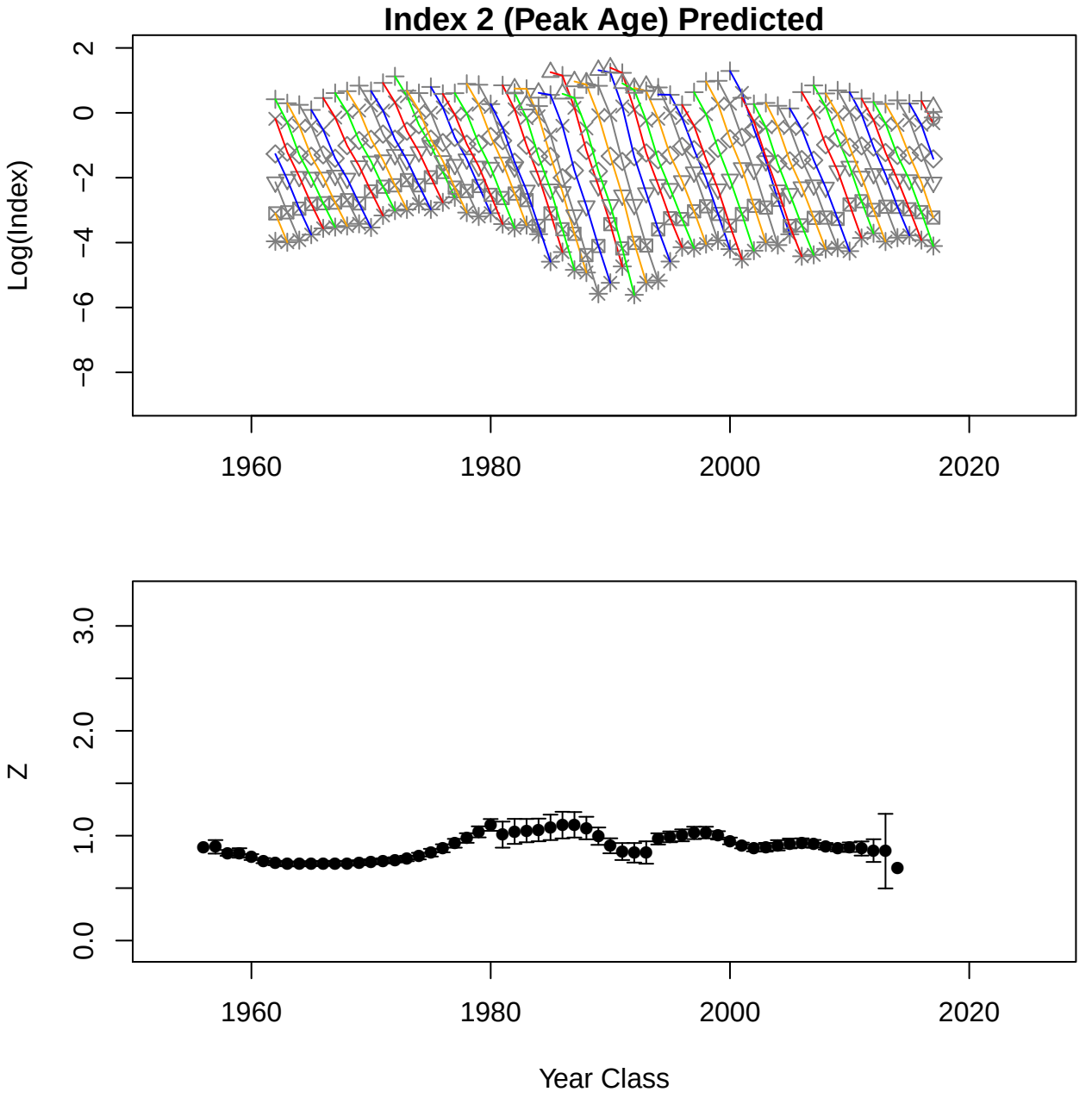

Catch (Peak Age) Observed
Log(Catch)
0
2
4
6
8
1960
1980
2000
2020
Z
−1
0
1
2
1960
1980
2000
2020
Year Class

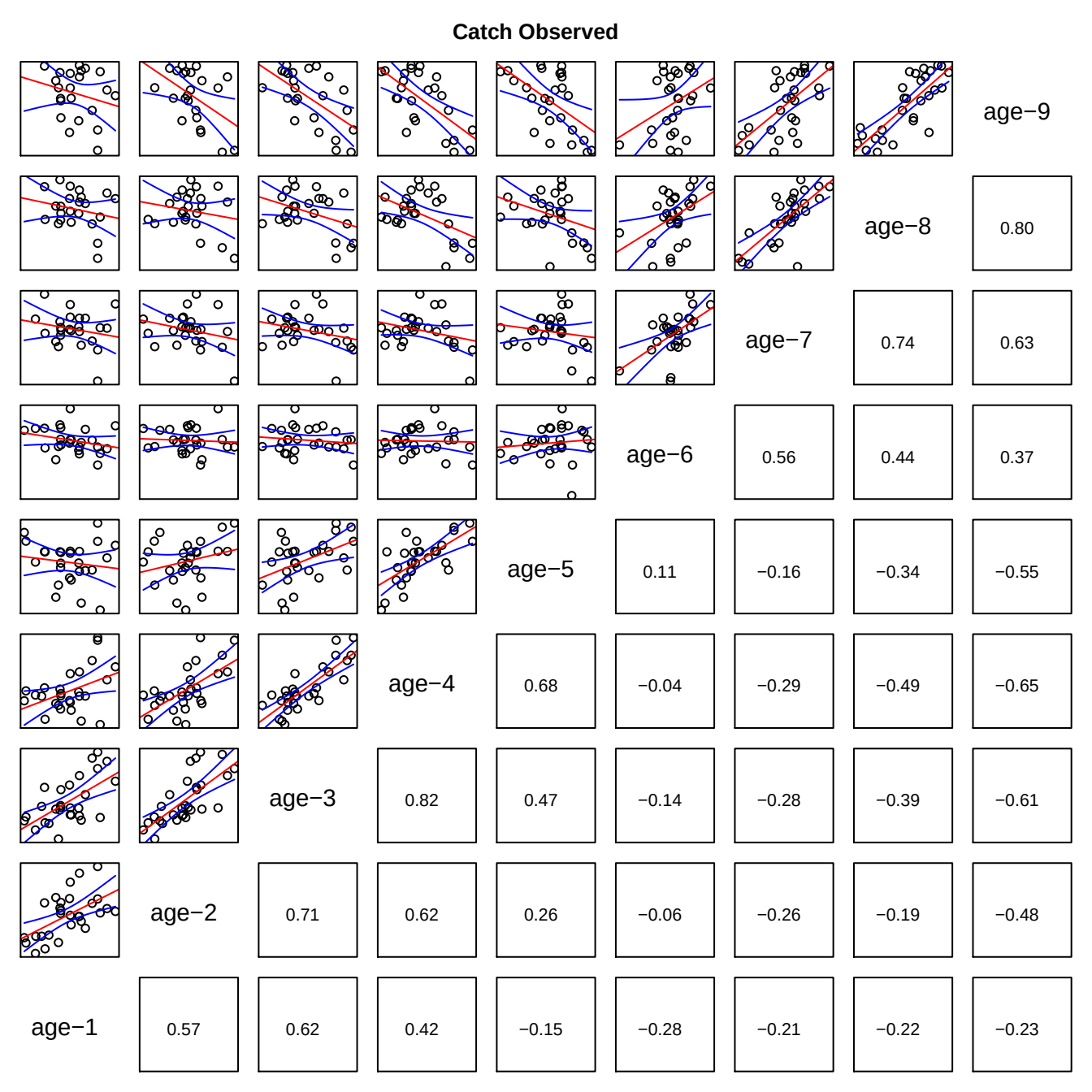

Catch (Peak Age) Predicted
Log(Catch)
0
2
4
6
8
1960
1980
2000
2020
Z
−1
0
1
2
1960
1980
2000
2020
Year Class

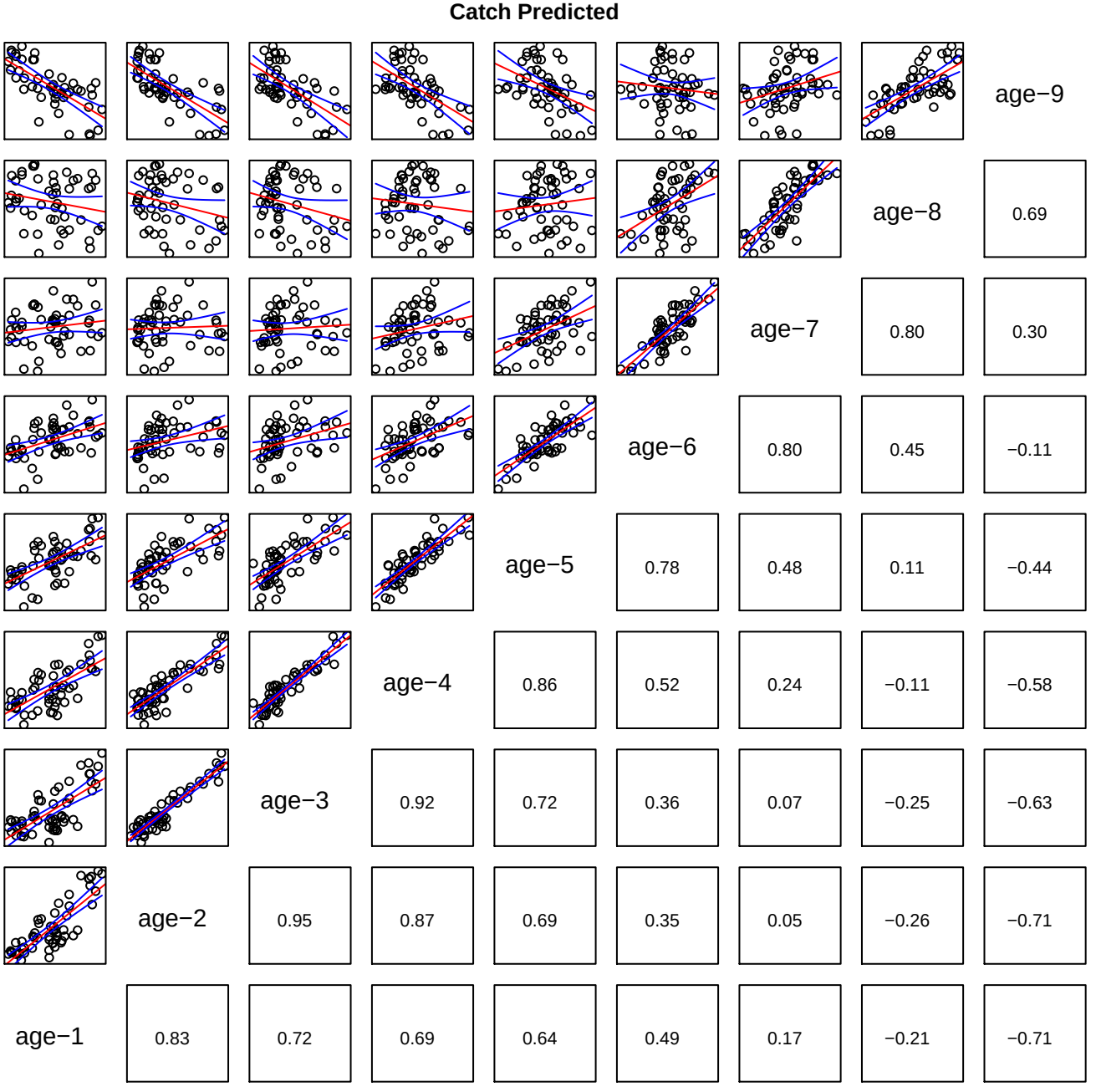

Index 1 (Peak Age) Observed
Log(Index)
2
0
−2
−4
−6
1960
1980
2000
2020
Z
3
2
1
0
−1
1960
1980
2000
2020
Year Class


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

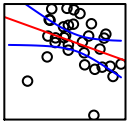
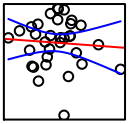
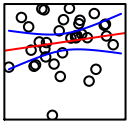
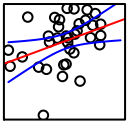
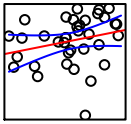
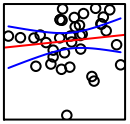
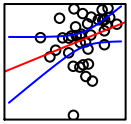
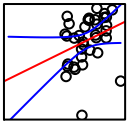

Index 2 (Peak Age) Observed
Log(Index)
2
0
−2
−4
−6
−8
1960
1980
2000
2020
Z
3.0
2.0
1.0
0.0
1960
1980
2000
2020
Year Class


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

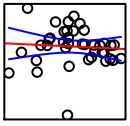
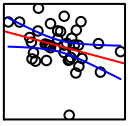
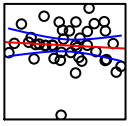
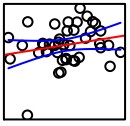
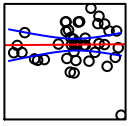
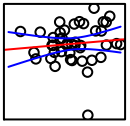
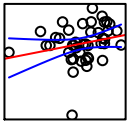

Catch Observed
age−9
age−8
0.80
age−7
0.74
0.63
age−6
0.56
0.44
0.37
age−5
0.11
−0.16
−0.34
−0.55
age−4
0.68
−0.04
−0.29
−0.49
−0.65
age−3
0.82
0.47
−0.14
−0.28
−0.39
−0.61
age−2
0.71
0.62
0.26
−0.06
−0.26
−0.19
−0.48
age−1
0.57
0.62
0.42
−0.15
−0.28
−0.21
−0.22
−0.23


Catch Predicted
age−9
age−8
0.69
age−7
0.80
0.30
age−6
0.80
0.45
−0.11
age−5
0.78
0.48
0.11
−0.44
age−4
0.86
0.52
0.24
−0.11
−0.58
age−3
0.92
0.72
0.36
0.07
−0.25
−0.63
age−2
0.95
0.87
0.69
0.35
0.05
−0.26
−0.71
age−1
0.83
0.72
0.69
0.64
0.49
0.17
−0.21
−0.71

Index 1 (INDEX−1) Observed

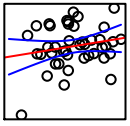
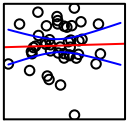
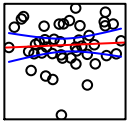
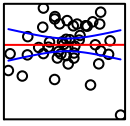
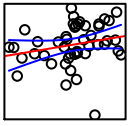
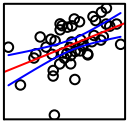









age−9

age−8

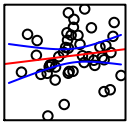
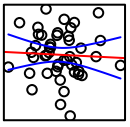
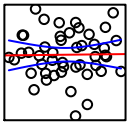
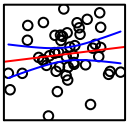
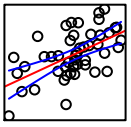
0.31

age−7

0.24

0.31

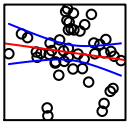
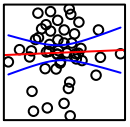
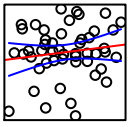
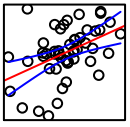






age−6

0.48

0.11

0.12

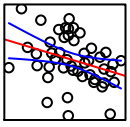
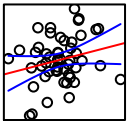
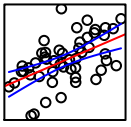
age−5

0.57

0.23

0.01

0.25

age−4

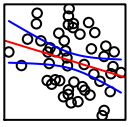
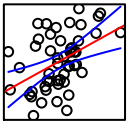
0.45

0.14

0.00

0.22

0.37

age−3

0.54

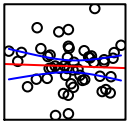
0.14

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

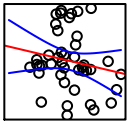
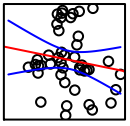
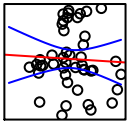
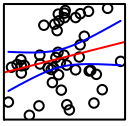
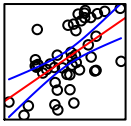
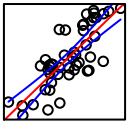
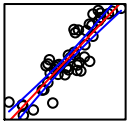
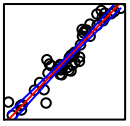
0.13

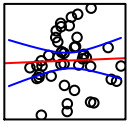
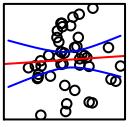
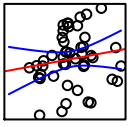
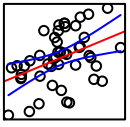
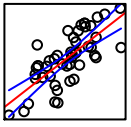
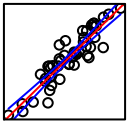
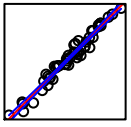
0.20

−0.07

−0.34

Index 1 (INDEX−1) Predicted









age−9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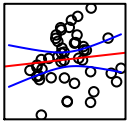
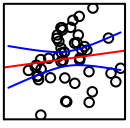
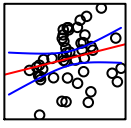
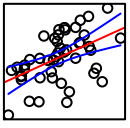
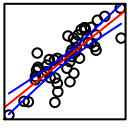
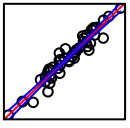
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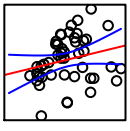
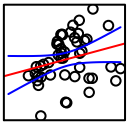
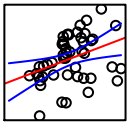
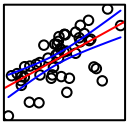
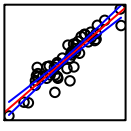
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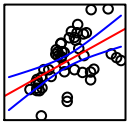
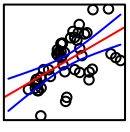
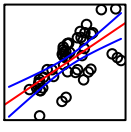
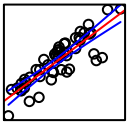
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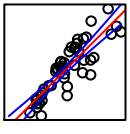
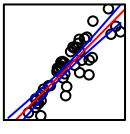
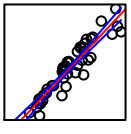
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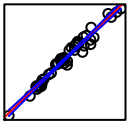
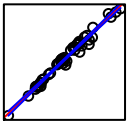
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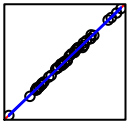
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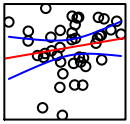
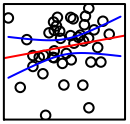
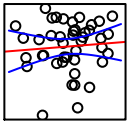
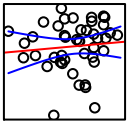
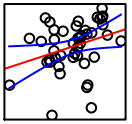
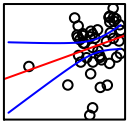
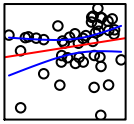
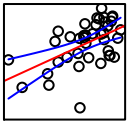
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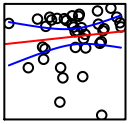
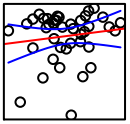
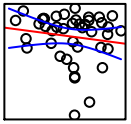
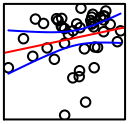
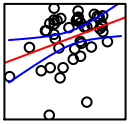
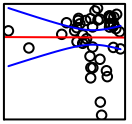
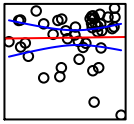
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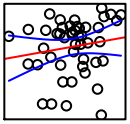
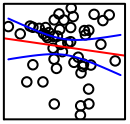
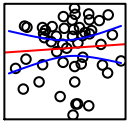
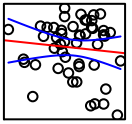
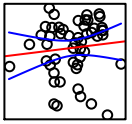
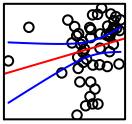
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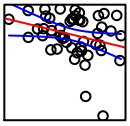
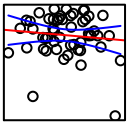
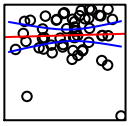
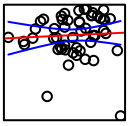
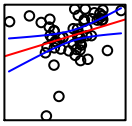
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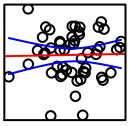
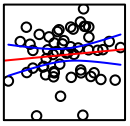
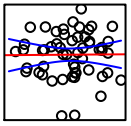
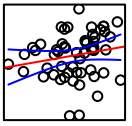
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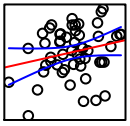
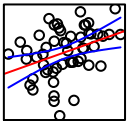
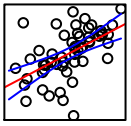
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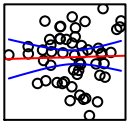
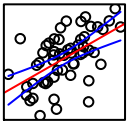
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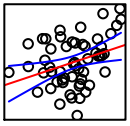
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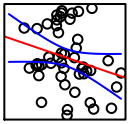
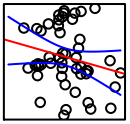
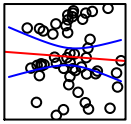
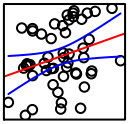
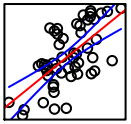
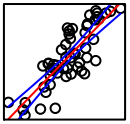
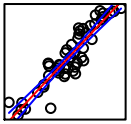
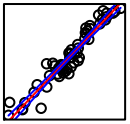
Index 2 (INDEX−2) Predicted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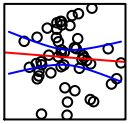
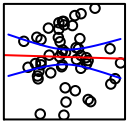
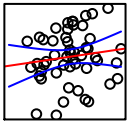
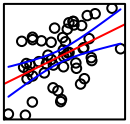
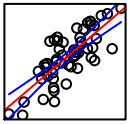
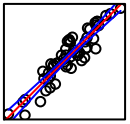
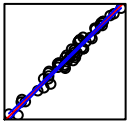
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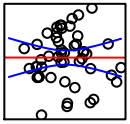
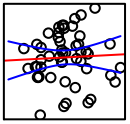
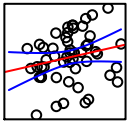
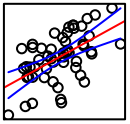
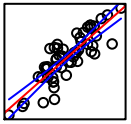
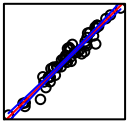
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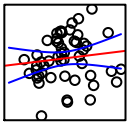
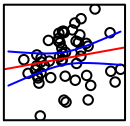
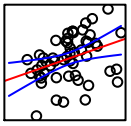
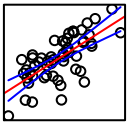
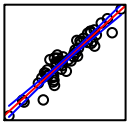
0.92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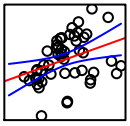
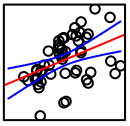
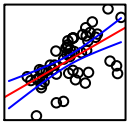
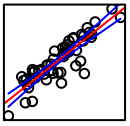
0.93

0.84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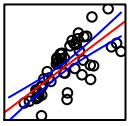
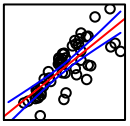
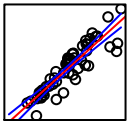
0.65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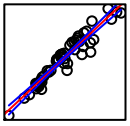
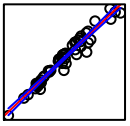
0.47

0.30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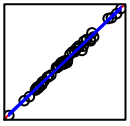
0.22

0.13

−0.06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0.43

0.18

0.05

−0.03

−0.21

age−1

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0.74

0.36

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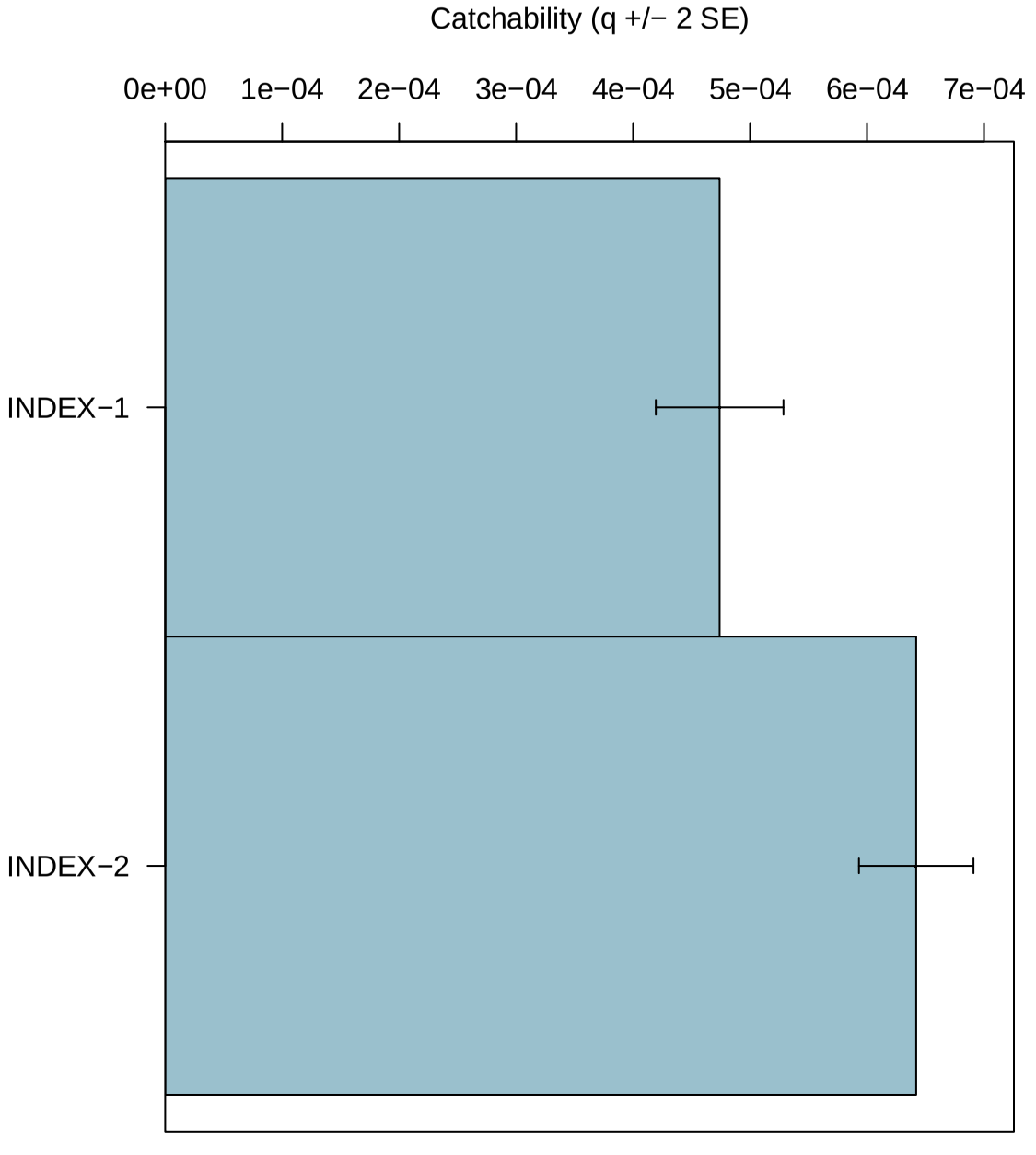
0.00

−0.07

−0.26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2e−04
3e−04
4e−04
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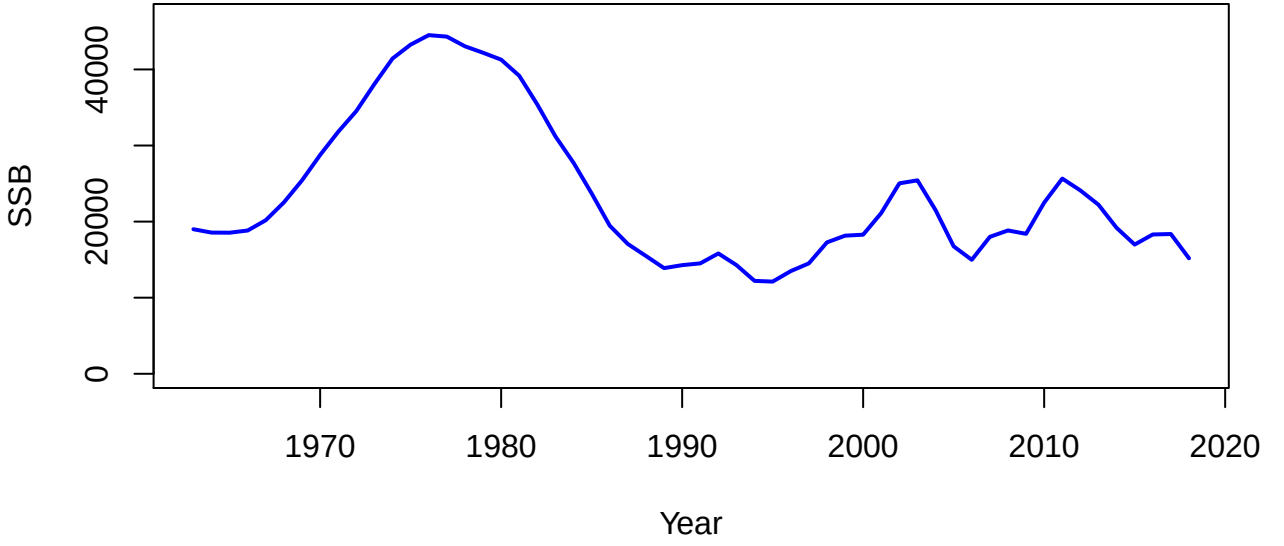
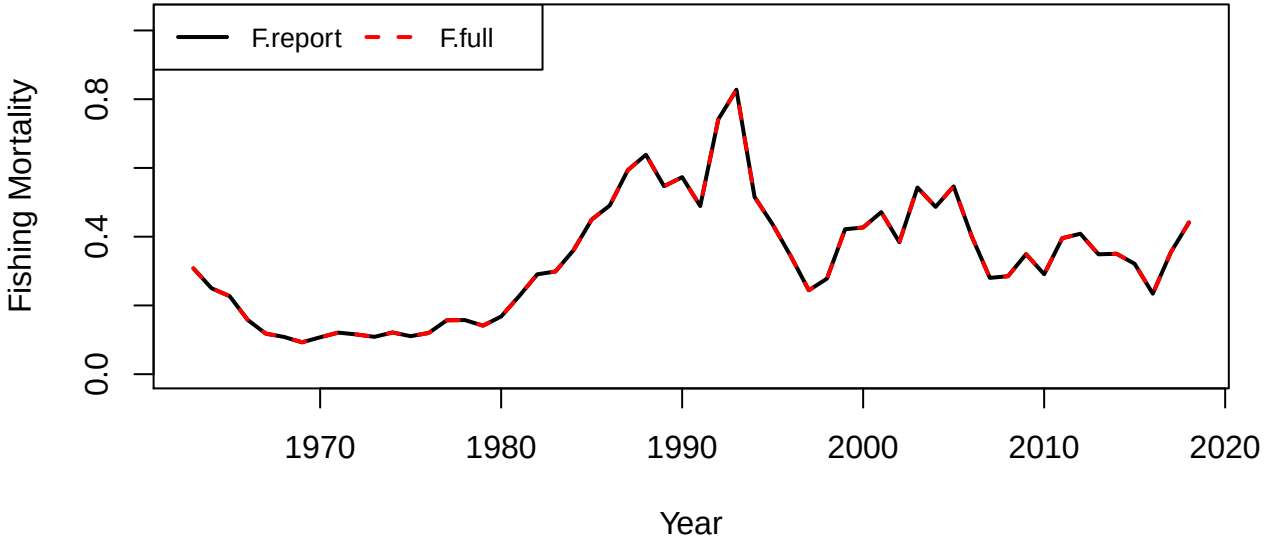
6e−04
7e−04
INDEX−1
INDEX−2


SSB
0
20000
40000
1970
1980
1990
2000
2010
2020
Year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F.full
Fishing Mortality
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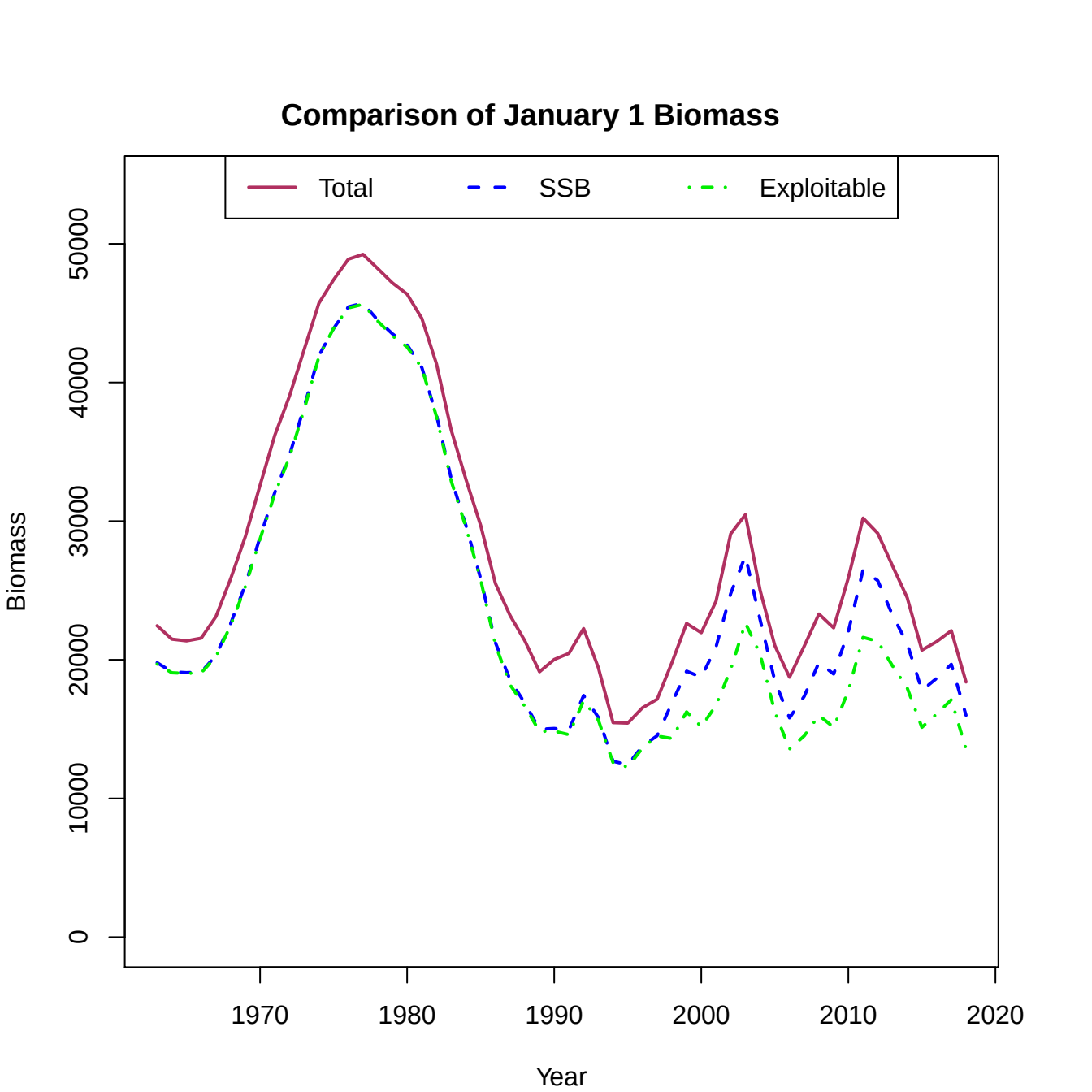
0.4
0.8
1970
1980
1990
2000
2010
2020
Year


Comparison of January 1 Biomass
Total
SSB
Exploitable
Biomass
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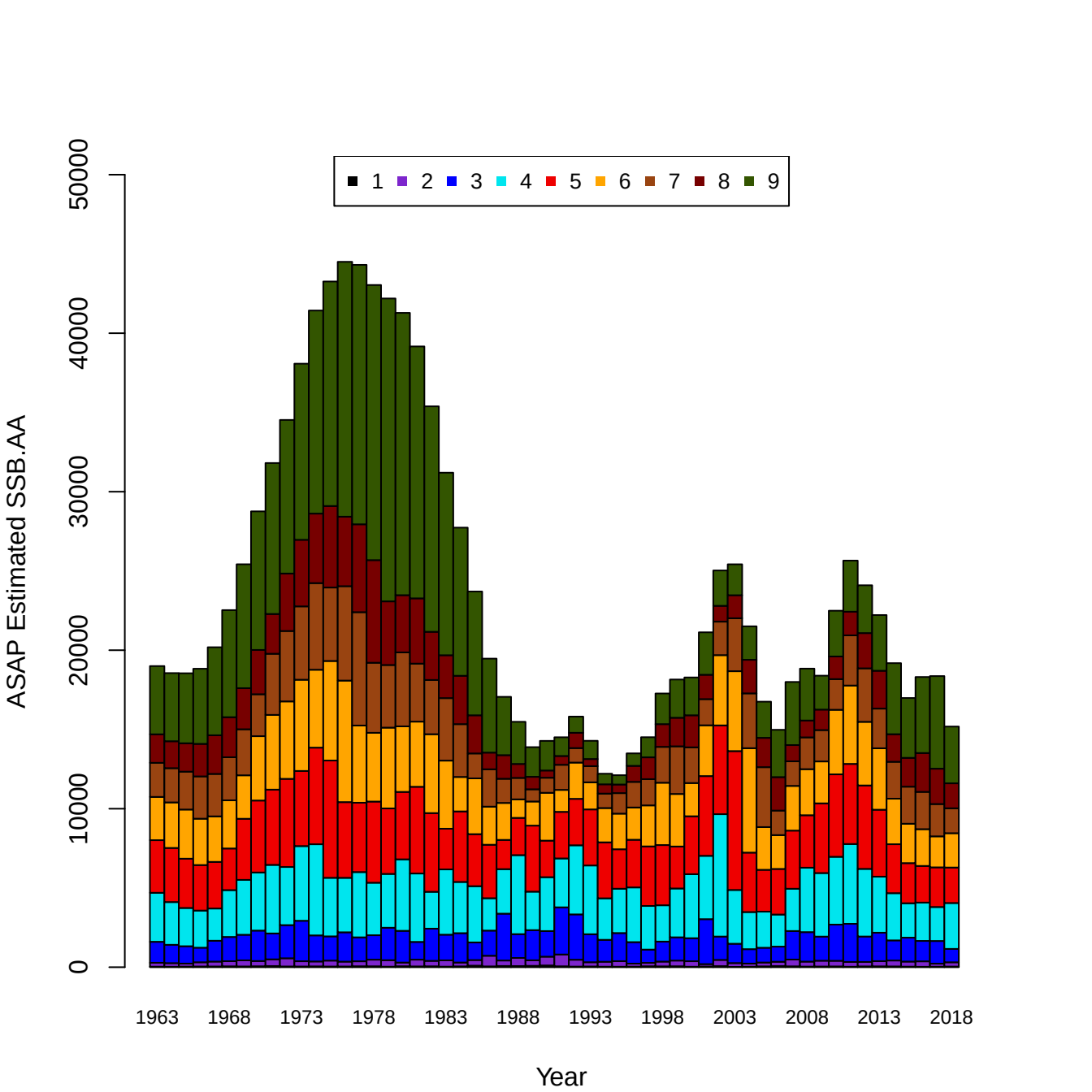
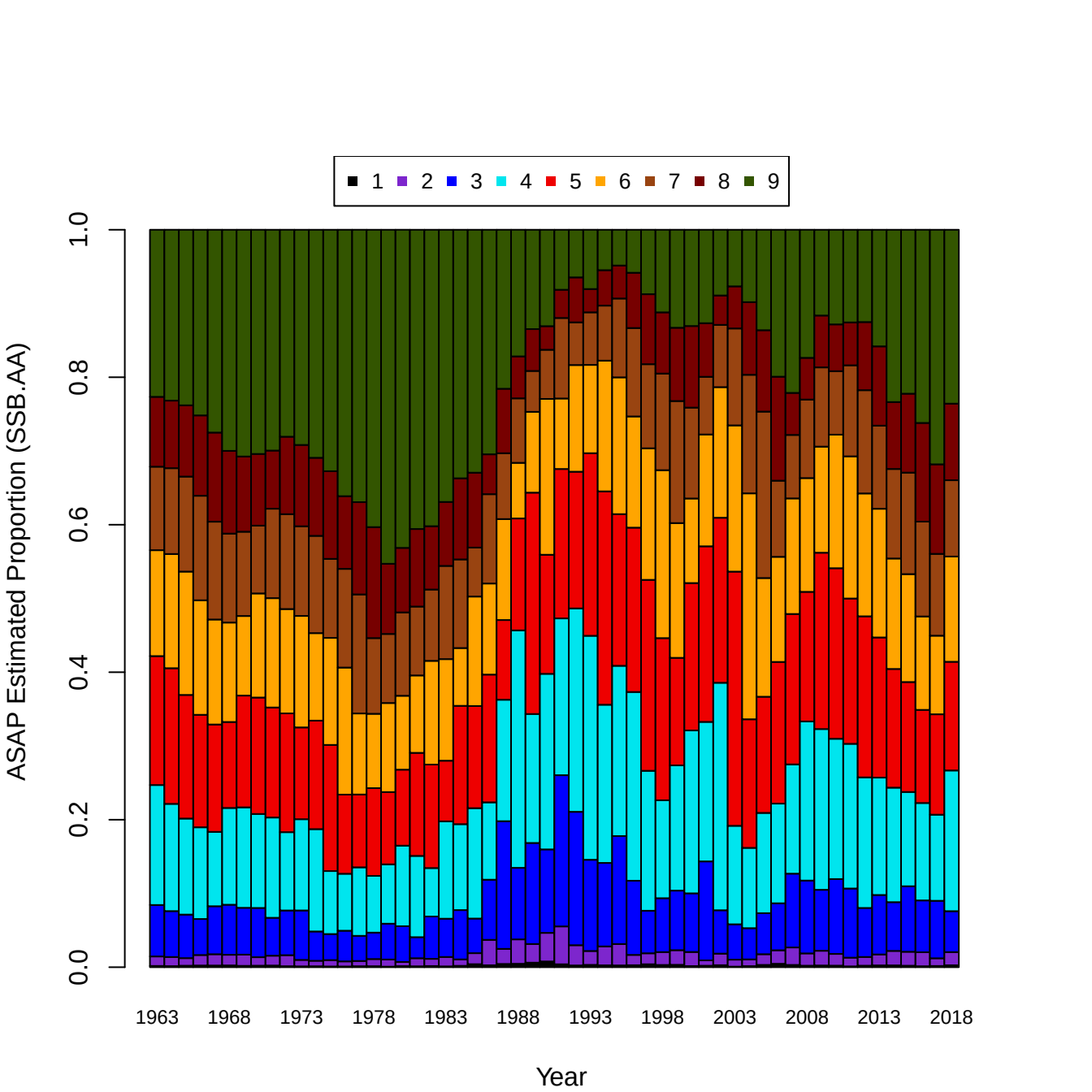
10000
20000
30000
40000
50000
1970
1980
1990
2000
2010
2020
Year


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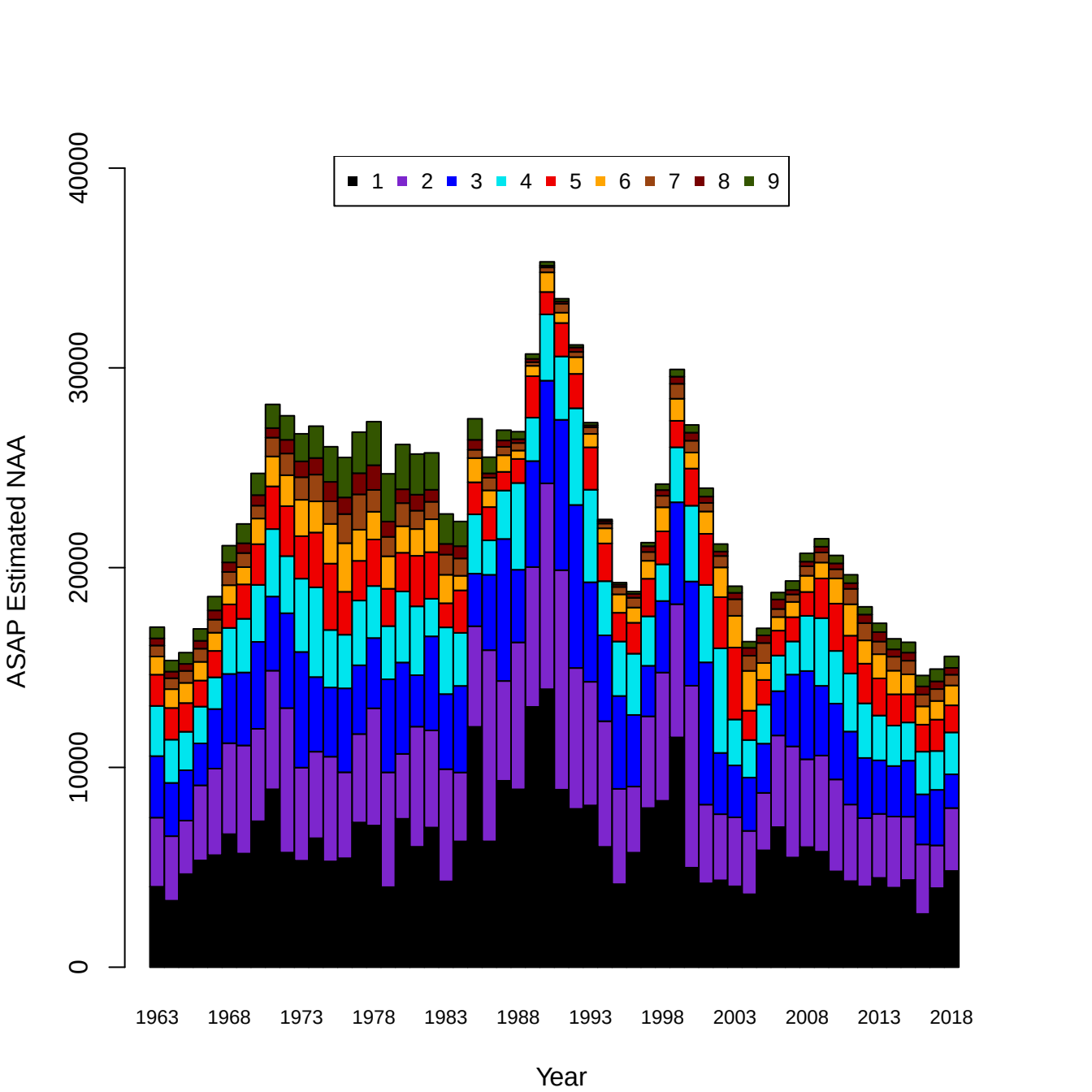
1968
1973
1978
1983
1988
1993
1998
2003
2008
2013
2018
Year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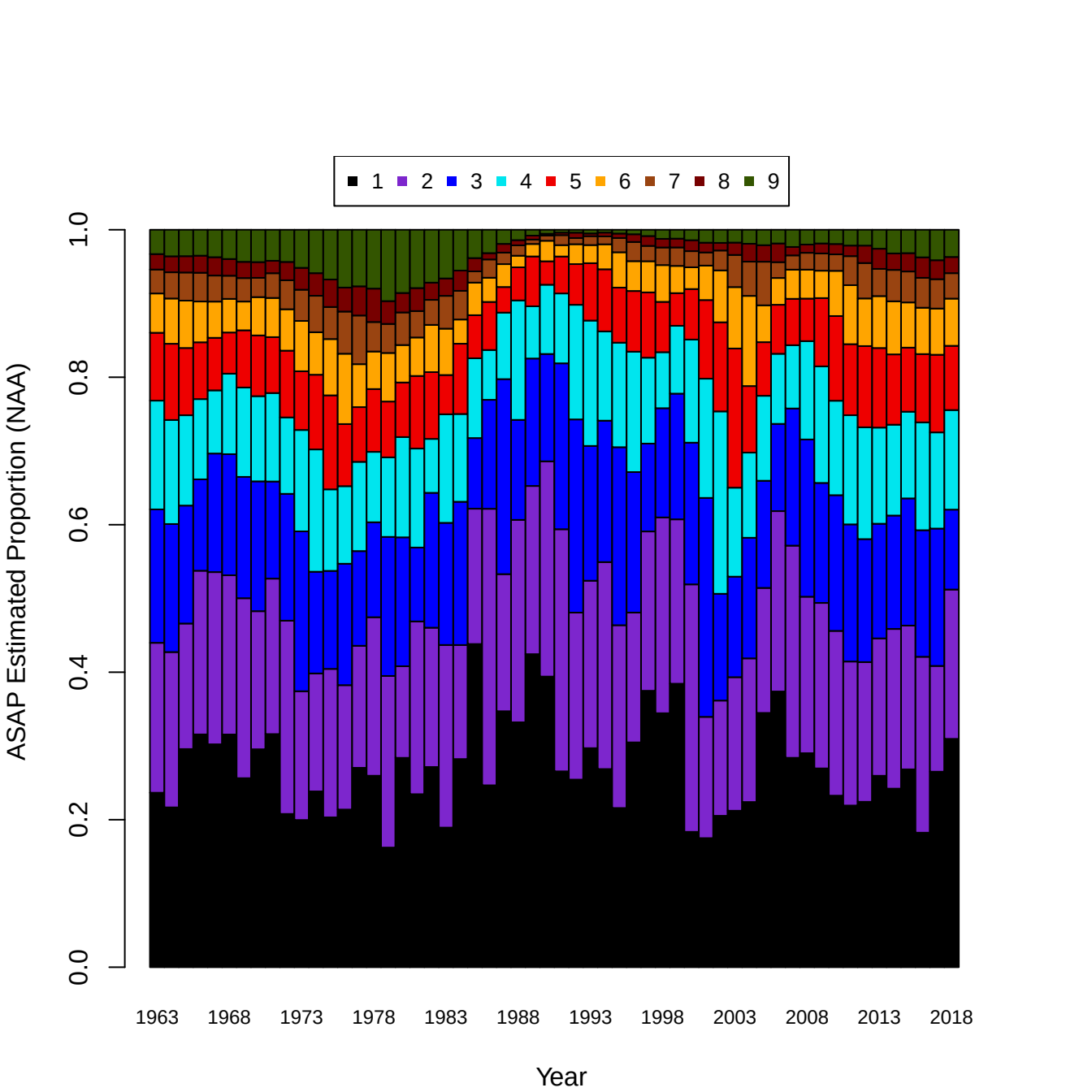
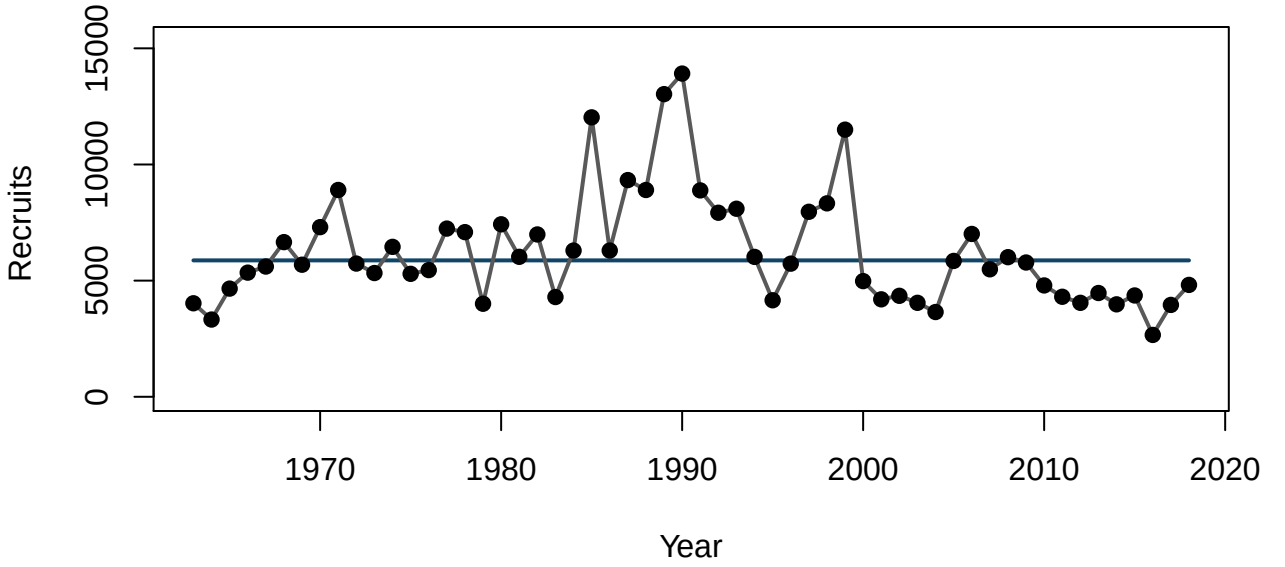
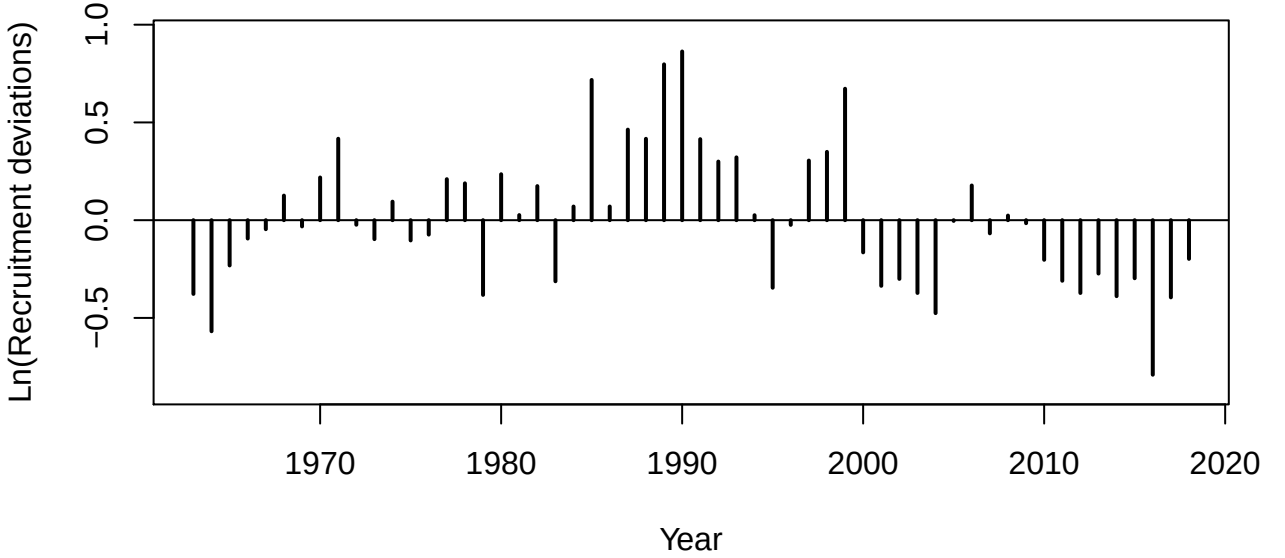
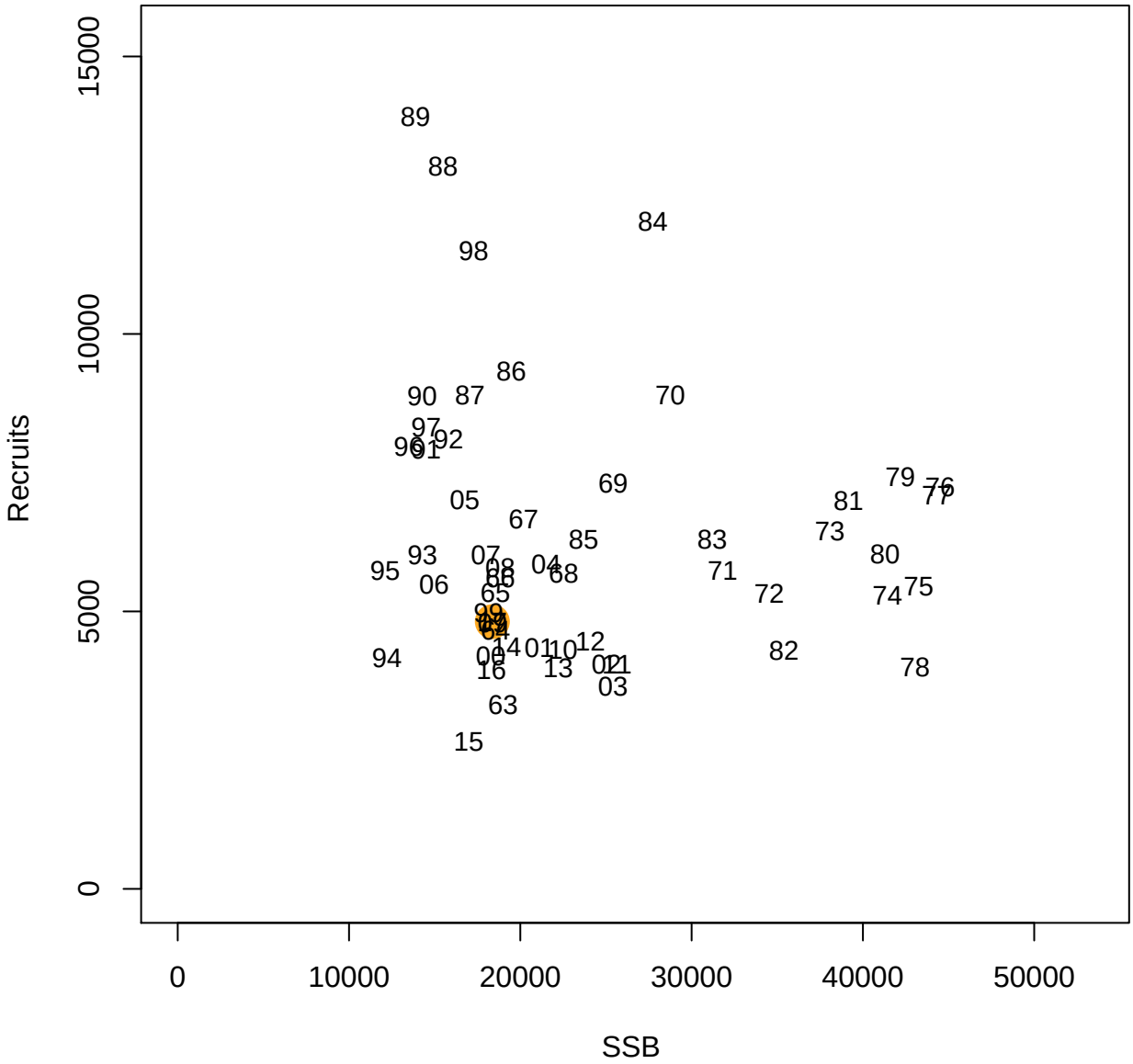
Year

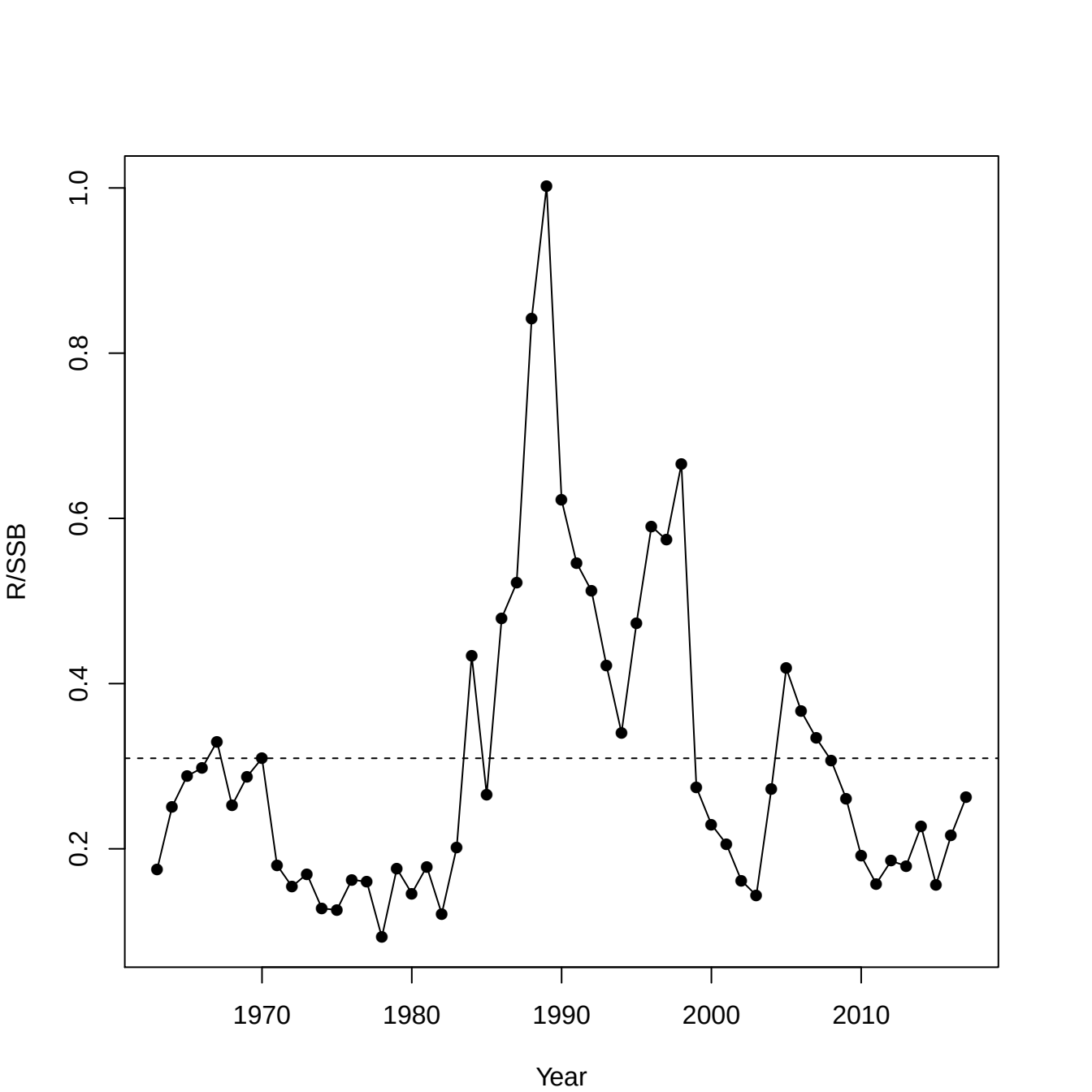

1 2 3 4 5 6 7 8 9
ASAP Estimated Proportion (NAA)
0.0
0.2
0.4
0.6
0.8
1.0
1963
1968
1973
1978
1983
1988
1993
1998
2003
2008
2013
2018
Year

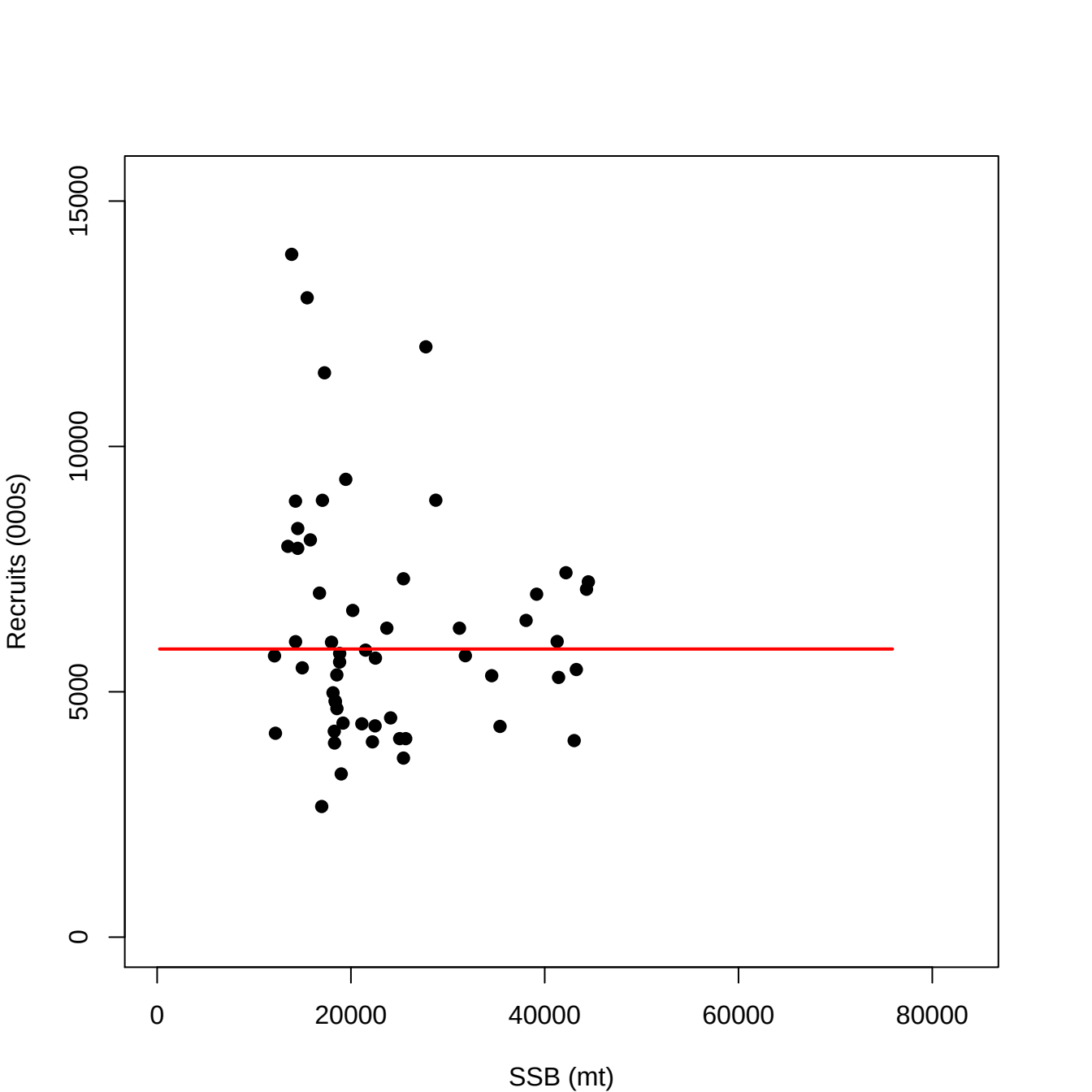

Recruits
0
5000
10000
15000
1970
1980
1990
2000
2010
2020
Year

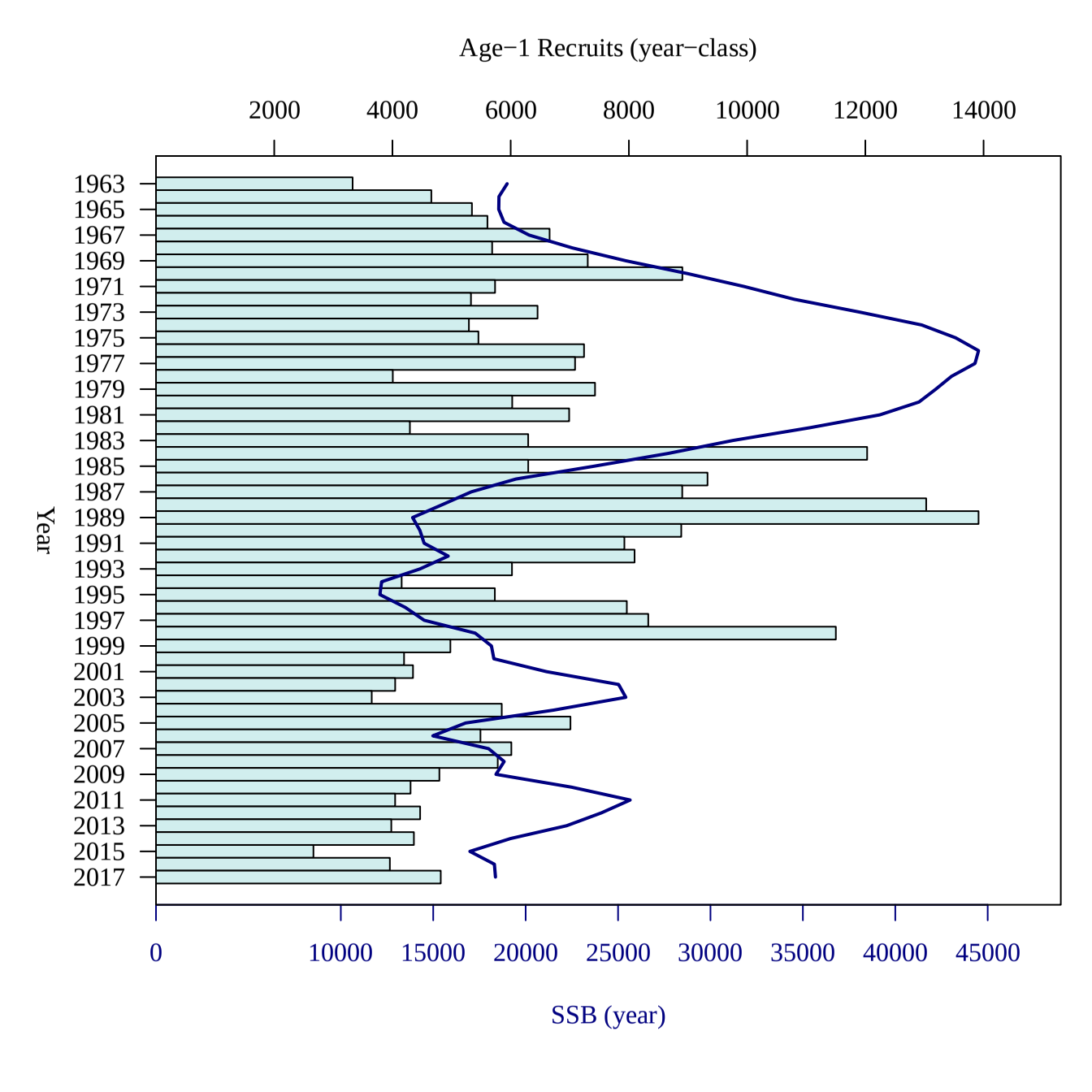

Ln(Recruitment deviations)
−0.5
0.0
0.5
1.0
1970
1980
1990
2000
2010
2020
Year

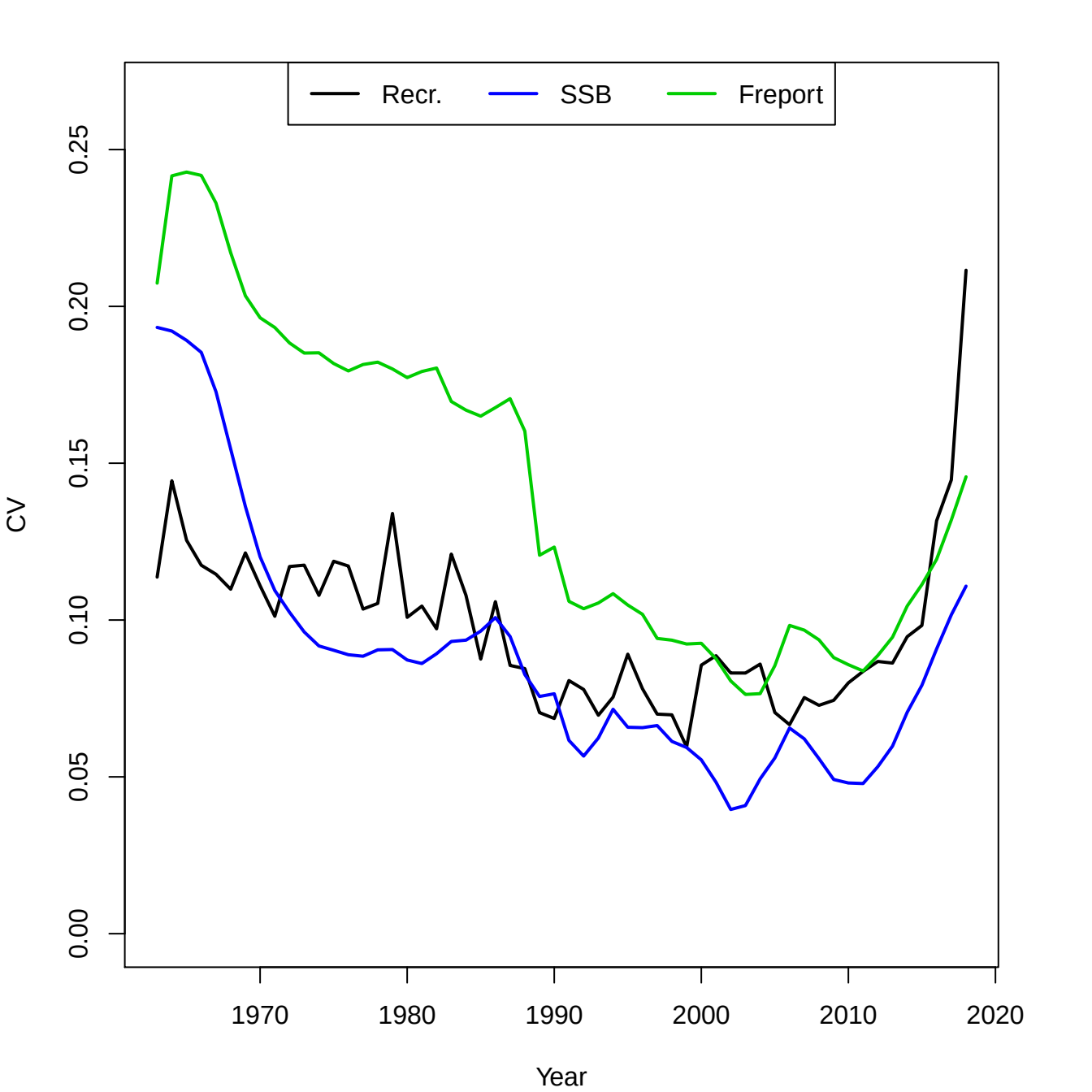


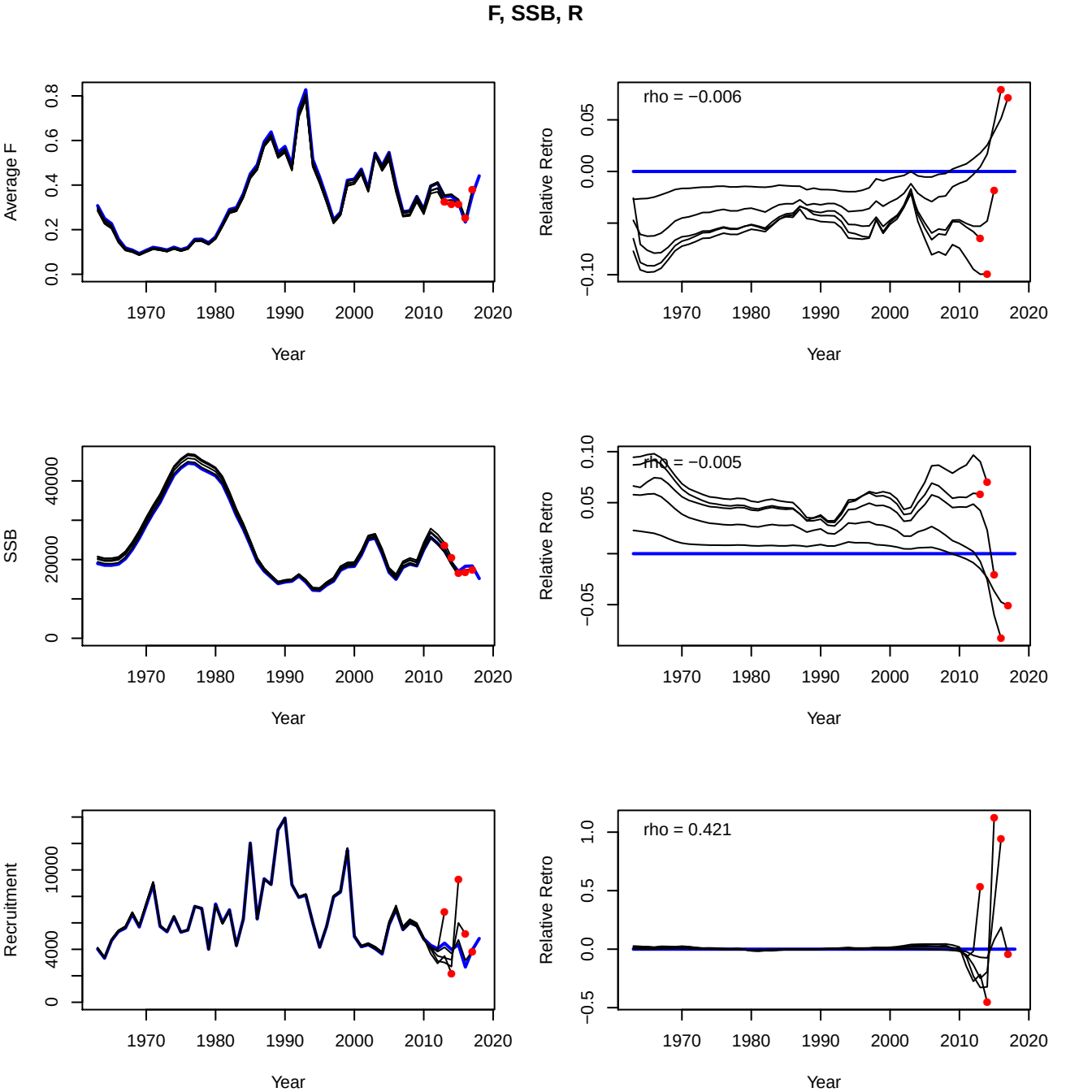
Recruits
SSB
0
5000
10000
15000
0
10000
20000
30000
40000
50000
89
88
84
98
86
90
87
70
97
92
96
91
69
79
76
77
05
81
67
73
85
83
80
93
07
04
95
08
68
71
06
66
65
72
74
75
99
64
12
14
01
10
82
94
09
16
13
02
11
78
03
63
15

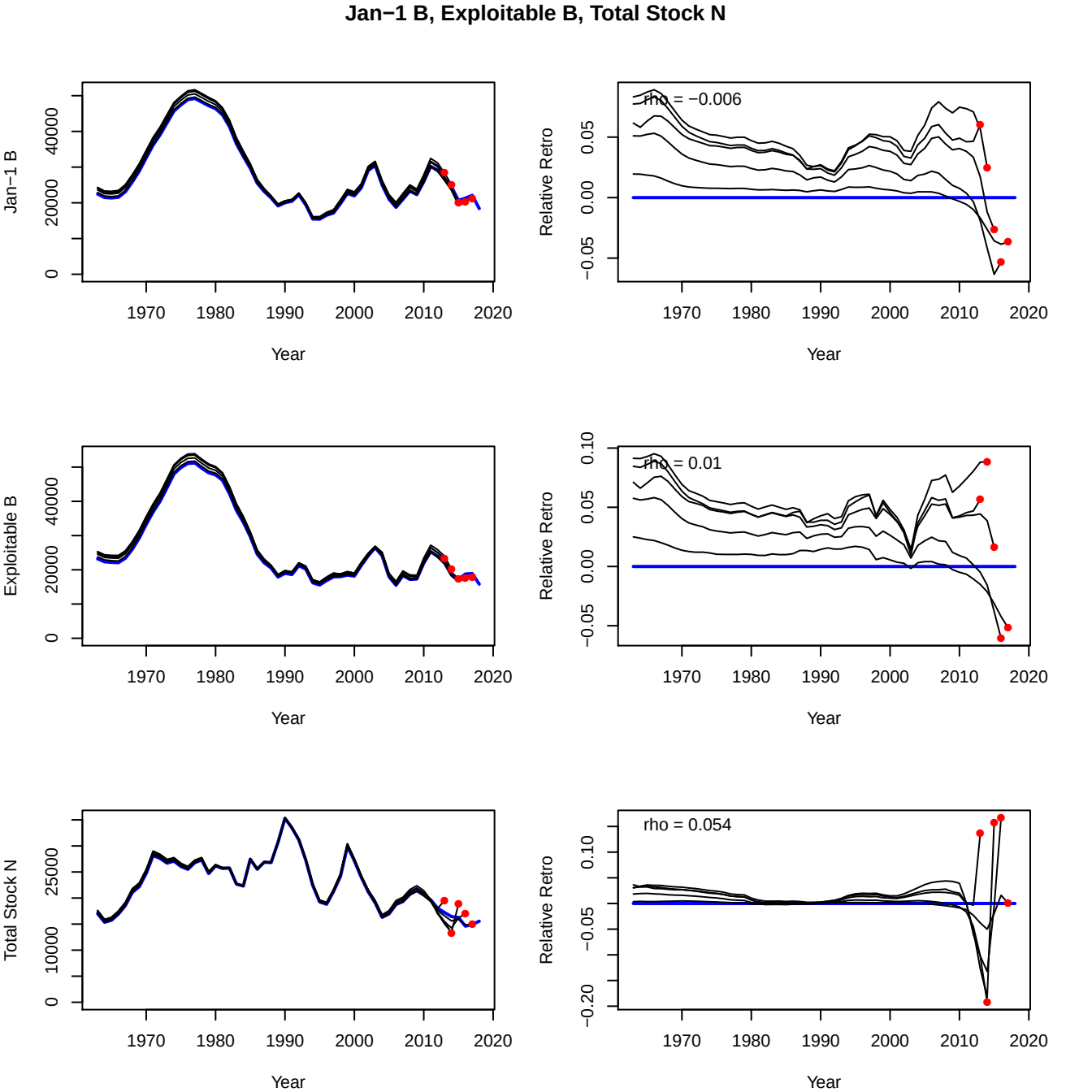

R/SSB
0.2
0.4
0.6
0.8
1.0
1970
1980
1990
2000
2010
Year


Recruits (000s)
0
5000
10000
15000
0
20000
40000
60000
80000
SSB (mt)

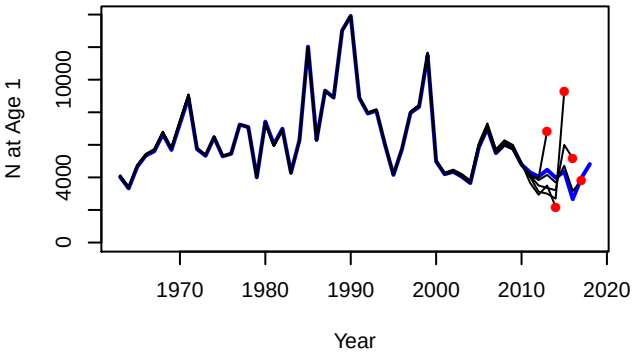

Age−1 Recruits (year−class)
2000
4000
6000
8000
10000
12000
14000
Year
1963
1965
1967
1969
1971
1973
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
2015
2017
0
10000
15000
20000
25000
30000
35000
40000
45000
SSB (year)

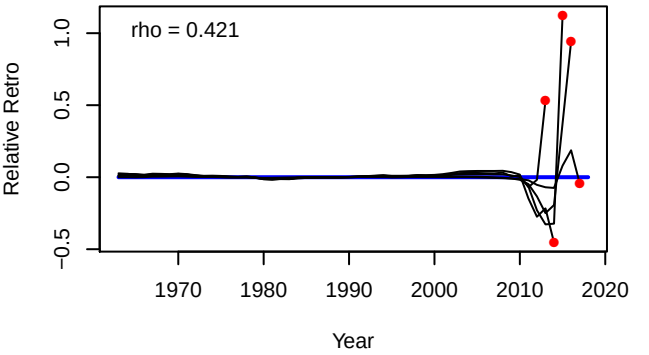

Recr.
SSB
Freport
CV
0.00
0.05
0.10
0.15
0.20
0.25
1970
1980
1990
2000
2010
2020
Year

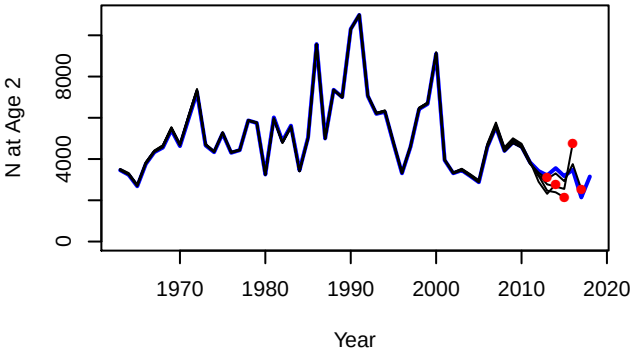

F, SSB, R
Average F
Year
Relative Retro
rho = −0.006
SSB
rho = −0.005
Recruitment
rho = 0.421

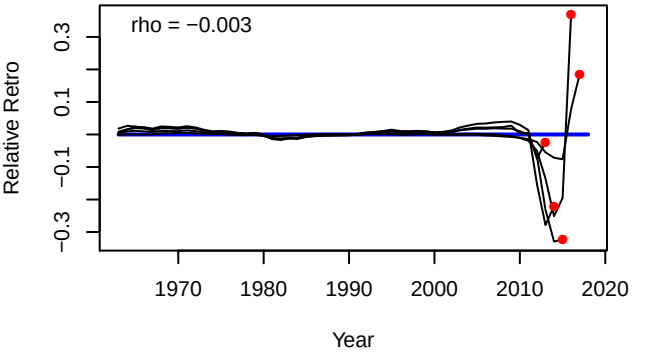

Jan−1 B, Exploitable B, Total Stock N
Jan−1 B
Exploitable B
Total Stock N
Relative Retro
Year
rho = −0.006
rho = 0.01
rho = 0.054
0
20000
40000
10000
25000
−0.05
0.00
0.05
0.10
−0.20
1970
1980
1990
2000
2010
2020

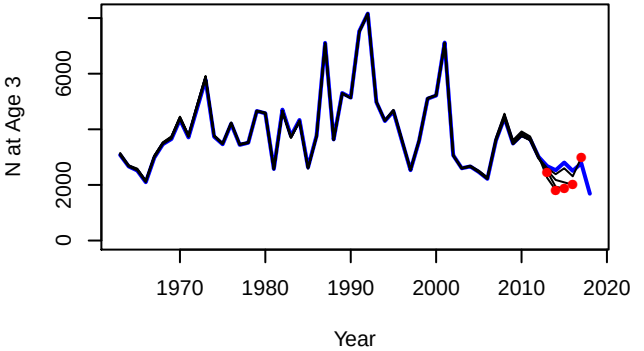
Stock Numbers at Age

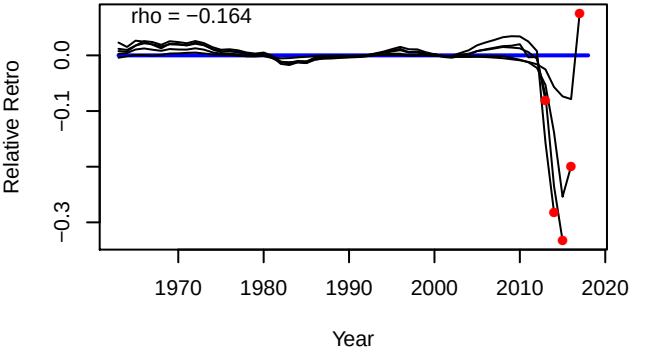




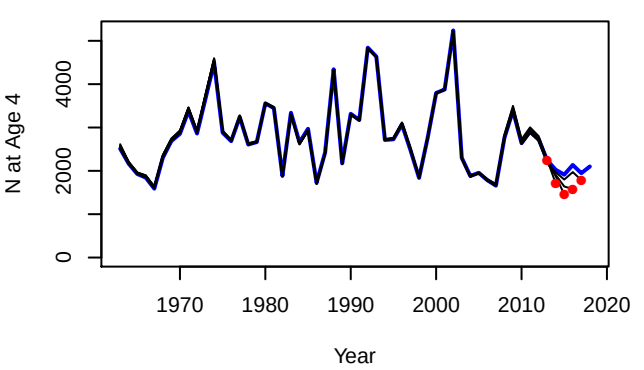


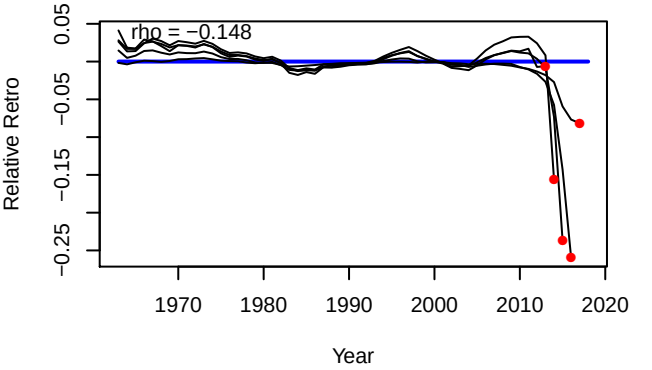


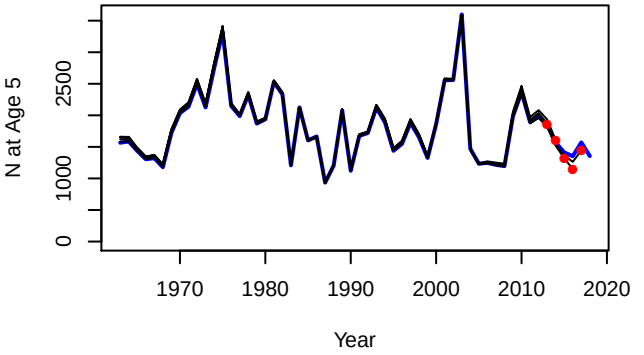


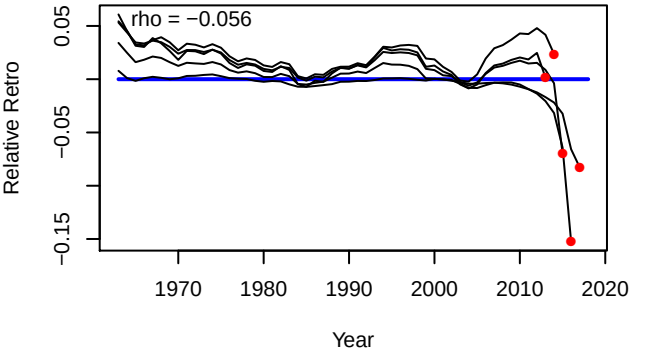


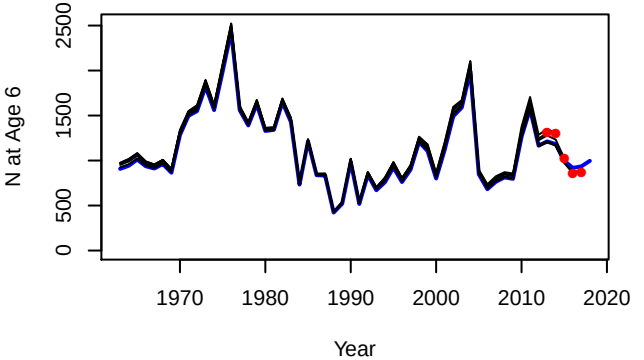
Stock Numbers at Age

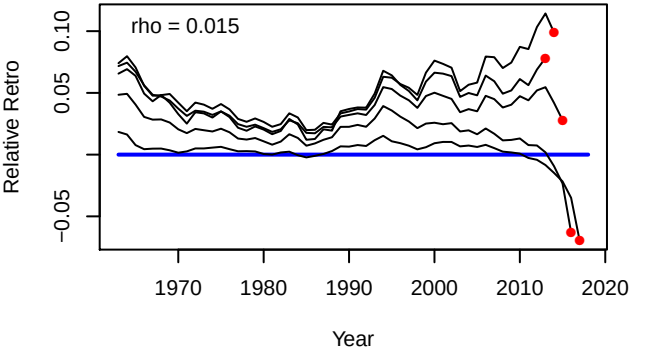




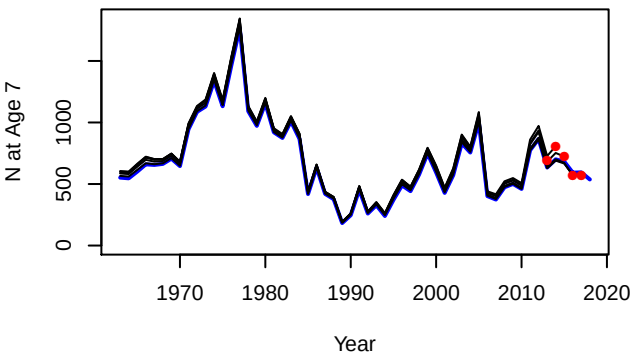


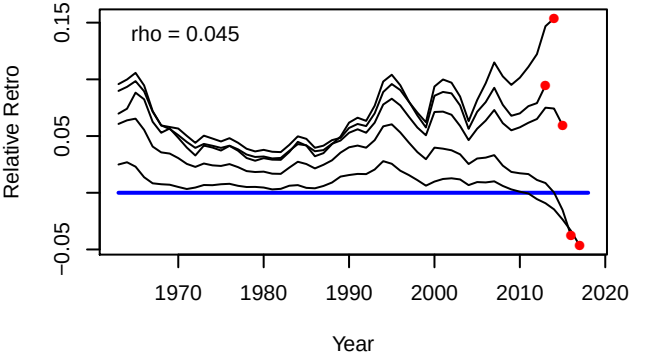


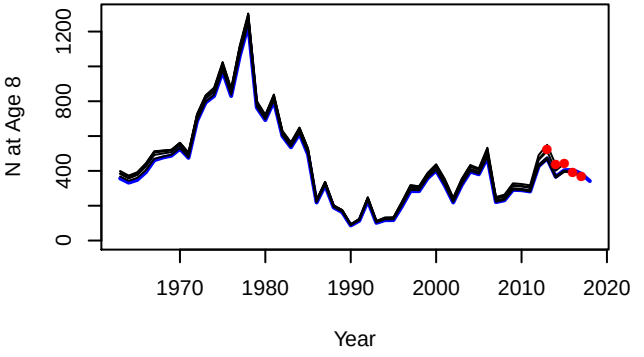


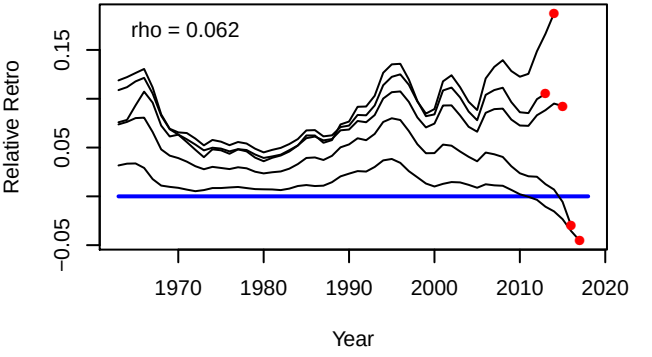


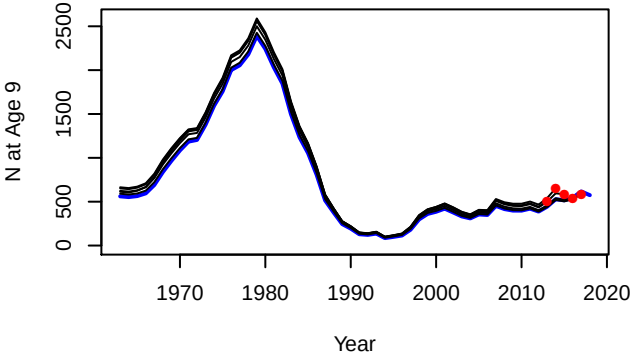
Stock Numbers at Age

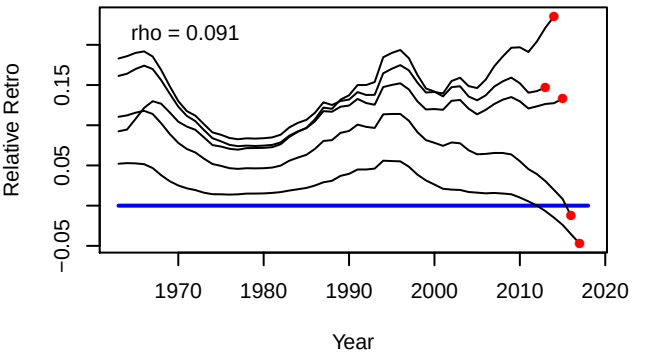


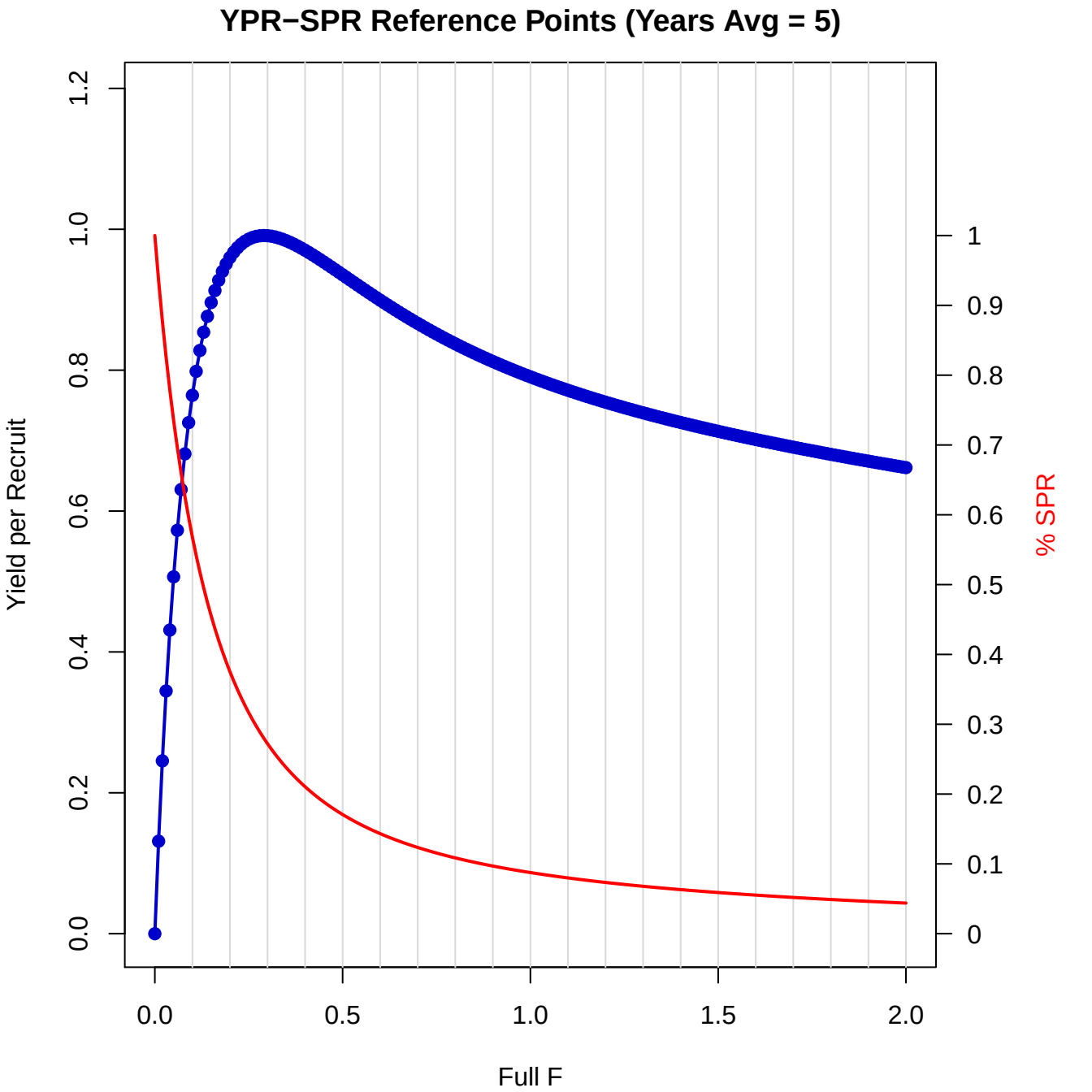






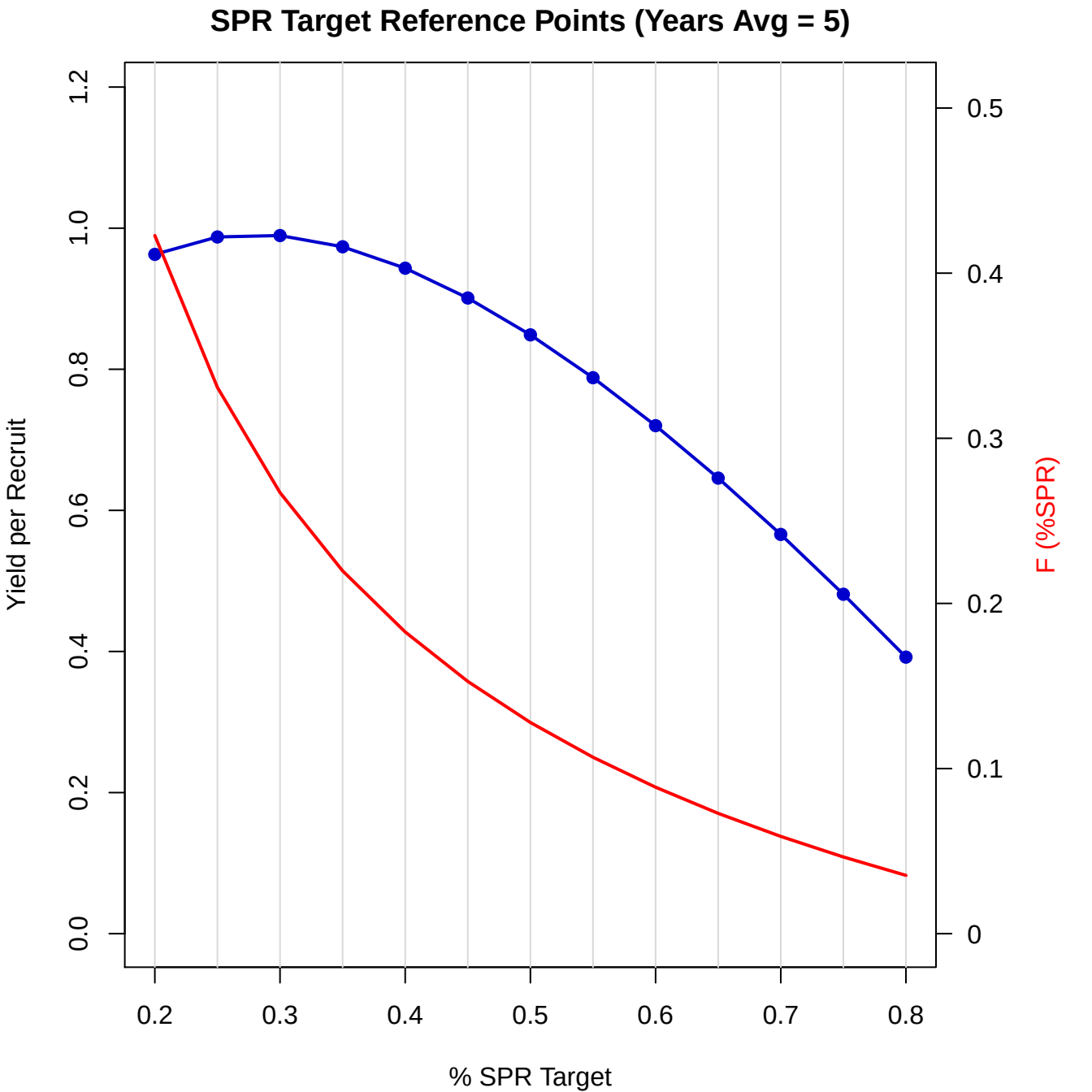





YPR−SPR Reference Points (Years Avg = 5)
Yield per Recruit
% SPR
Full F
0.0
0.2
0.4
0.6
0.8
1.0
1.2
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.0
0.5
1.0
1.5
2.0

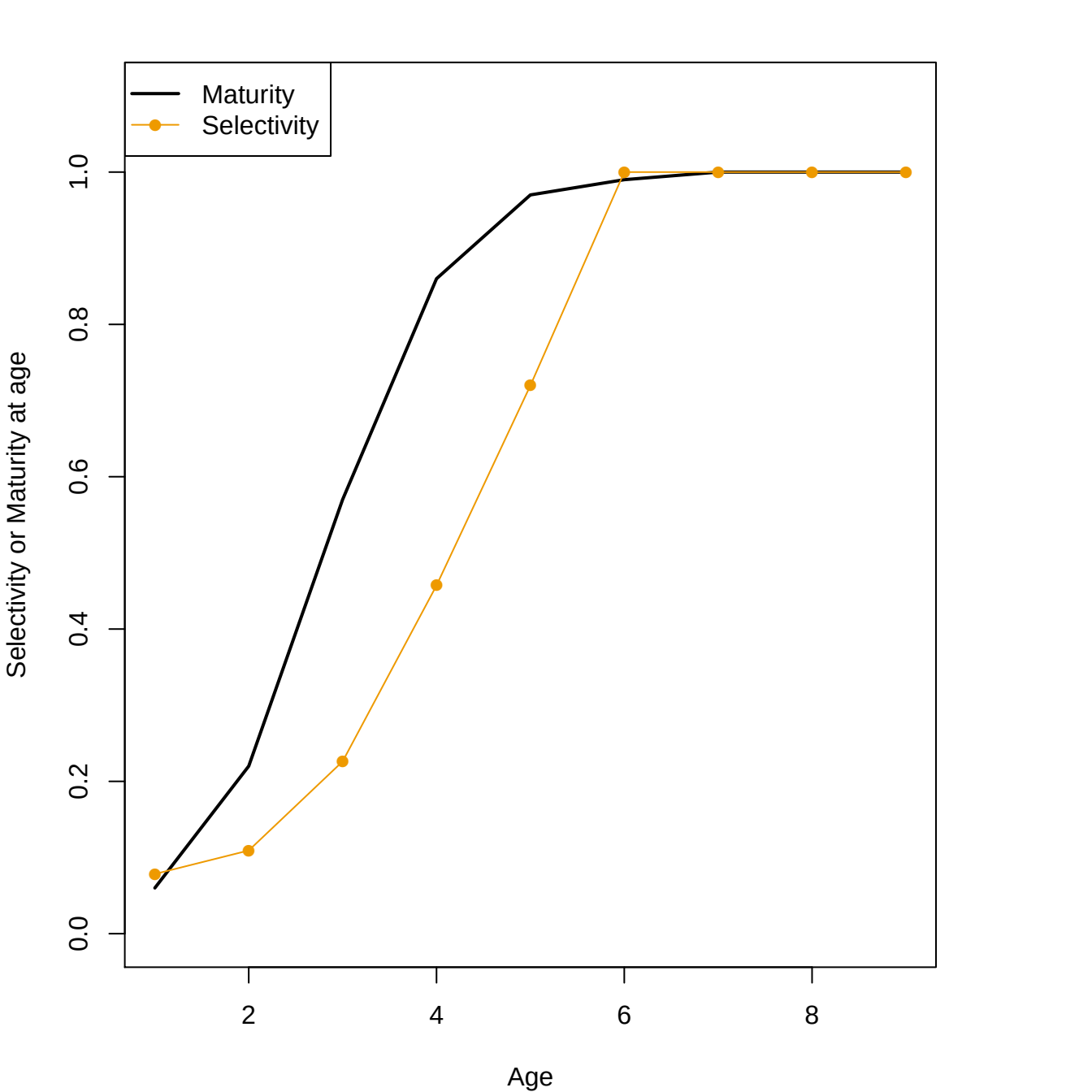
YPR−SPR Reference Points (Years Avg = 5)

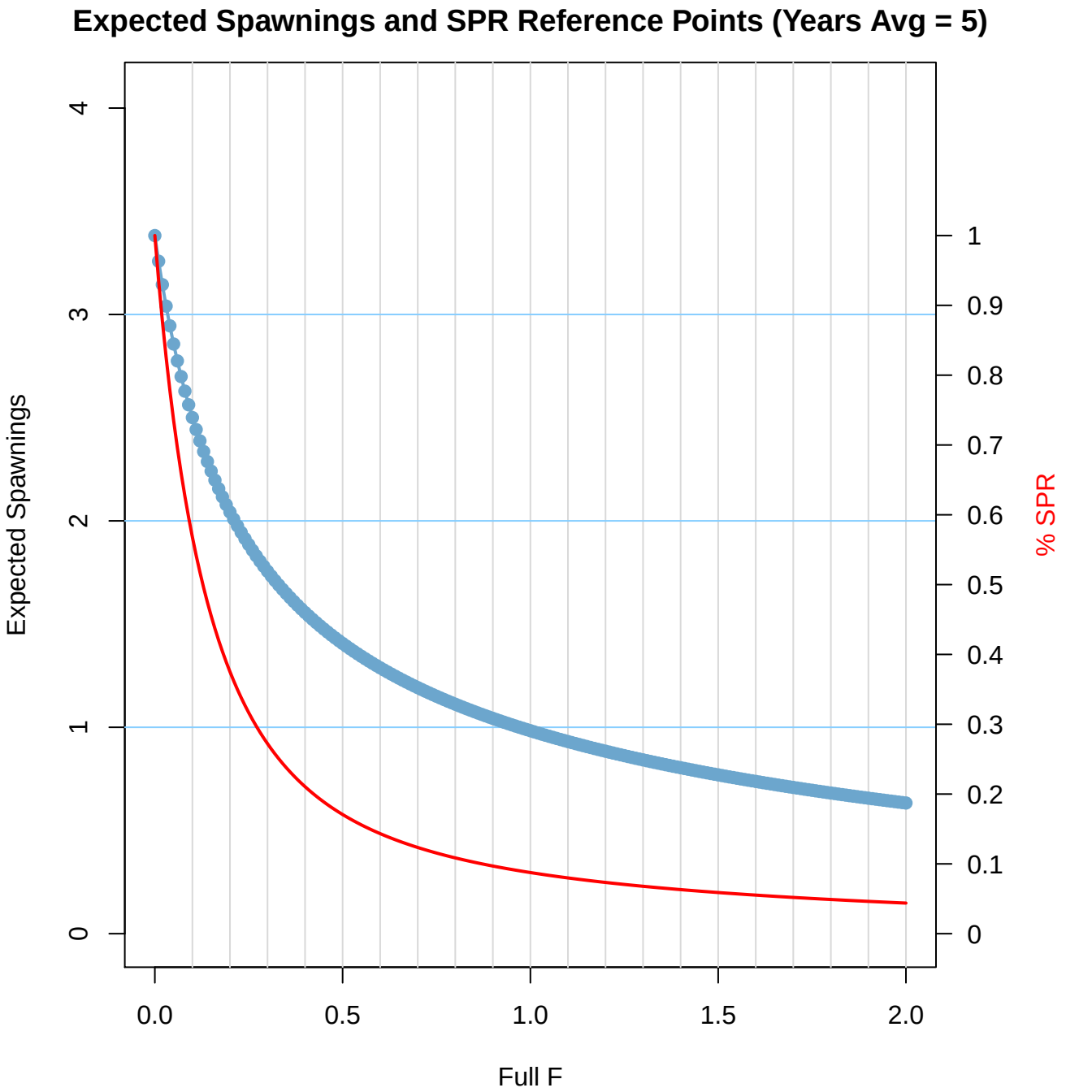
F	YPR	SPR	F	YPR	SPR	F	YPR	SPR
0	0	1	0.35	0.9838	0.2378	0.7	0.8664	0.1235
0.01	0.1313	0.9358	0.36	0.9815	0.2318	0.71	0.8633	0.1218
0.02	0.2454	0.878	0.37	0.9789	0.2261	0.72	0.8603	0.1202
0.03	0.3446	0.8257	0.38	0.9762	0.2207	0.73	0.8573	0.1186
0.04	0.4311	0.7784	0.39	0.9733	0.2155	0.74	0.8543	0.117
0.05	0.5067	0.7352	0.4	0.9703	0.2105	0.75	0.8514	0.1155
0.06	0.5727	0.6959	0.41	0.9671	0.2058	0.76	0.8485	0.1141
0.07	0.6306	0.6598	0.42	0.9638	0.2012	0.77	0.8457	0.1126
0.08	0.6812	0.6267	0.43	0.9604	0.1969	0.78	0.8429	0.1112
0.09	0.7255	0.5962	0.44	0.957	0.1927	0.79	0.8402	0.1099
0.1	0.7644	0.568	0.45	0.9535	0.1886	0.8	0.8374	0.1086
0.11	0.7983	0.542	0.46	0.9499	0.1848	0.81	0.8348	0.1073
0.12	0.828	0.5179	0.47	0.9463	0.181	0.82	0.8321	0.106
0.13	0.8539	0.4954	0.48	0.9427	0.1775	0.83	0.8295	0.1048
0.14	0.8765	0.4746	0.49	0.9391	0.174	0.84	0.827	0.1036
0.15	0.8961	0.4552	0.5	0.9354	0.1707	0.85	0.8244	0.1024
0.16	0.913	0.437	0.51	0.9318	0.1675	0.86	0.822	0.1012
0.17	0.9276	0.42	0.52	0.9281	0.1644	0.87	0.8195	0.1001
0.18	0.9402	0.4041	0.53	0.9245	0.1615	0.88	0.8171	0.099
0.19	0.9509	0.3892	0.54	0.9208	0.1586	0.89	0.8147	0.098
0.2	0.9599	0.3752	0.55	0.9172	0.1558	0.9	0.8123	0.0969
0.21	0.9675	0.3621	0.56	0.9136	0.1531	0.91	0.81	0.0959
0.22	0.9738	0.3497	0.57	0.91	0.1506	0.92	0.8077	0.0949
0.23	0.9789	0.338	0.58	0.9064	0.1481	0.93	0.8055	0.0939
0.24	0.9829	0.327	0.59	0.9029	0.1456	0.94	0.8033	0.0929
0.25	0.9861	0.3165	0.6	0.8994	0.1433	0.95	0.8011	0.092
0.26	0.9884	0.3067	0.61	0.8959	0.141	0.96	0.7989	0.0911
0.27	0.9899	0.2974	0.62	0.8925	0.1388	0.97	0.7968	0.0902
0.28	0.9908	0.2885	0.63	0.8891	0.1367	0.98	0.7947	0.0893
0.29	0.9911	0.2801	0.64	0.8857	0.1346	0.99	0.7926	0.0884
0.3	0.9909	0.2721	0.65	0.8824	0.1326	1	0.7905	0.0876
0.31	0.9902	0.2646	0.66	0.8791	0.1307	1.01	0.7885	0.0867
0.32	0.9891	0.2574	0.67	0.8759	0.1288	1.02	0.7865	0.0859
0.33	0.9877	0.2505	0.68	0.8727	0.127	1.03	0.7846	0.0851
0.34	0.9859	0.244	0.69	0.8695	0.1252	1.04	0.7826	0.0843


SPR Target Reference Points (Years Avg = 5)
Yield per Recruit
F (%SPR)
% SPR Target
0.0
0.2
0.4
0.6
0.8
1.0
1.2
0
0.1
0.2
0.3
0.4
0.5
0.2
0.3
0.4
0.5
0.6
0.7
0.8

SPR Target Reference Points (Years Avg = 5)

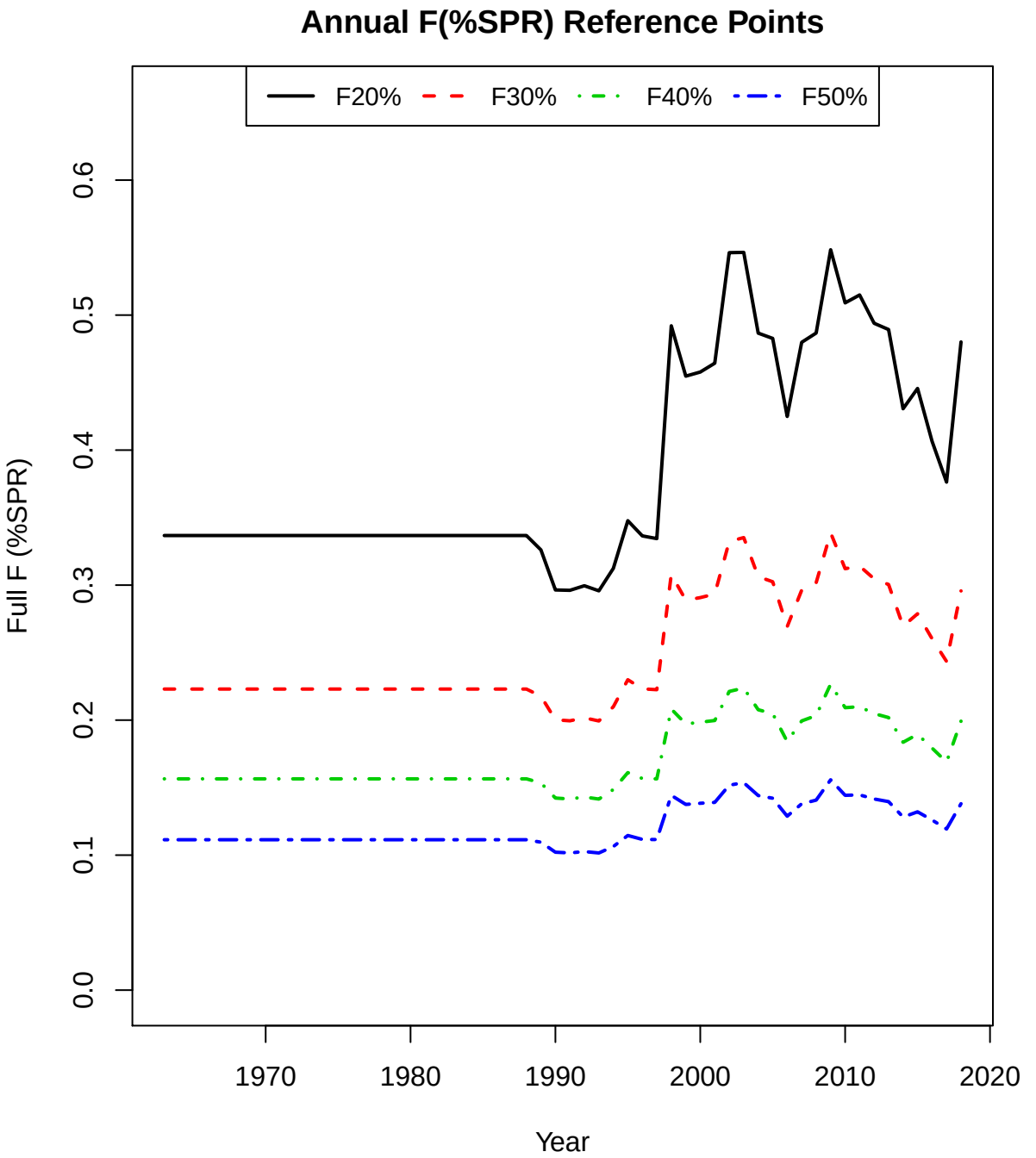
% SPR	F(%SPR)	YPR
0.2	0.4228	0.9629
0.25	0.3308	0.9875
0.3	0.2671	0.9895
0.35	0.2197	0.9736
0.4	0.1827	0.9433
0.45	0.1528	0.901
0.5	0.1279	0.8488
0.55	0.1068	0.7881
0.6	0.0887	0.7201
0.65	0.0729	0.6458
0.7	0.0589	0.5659
0.75	0.0465	0.4811
0.8	0.0353	0.392

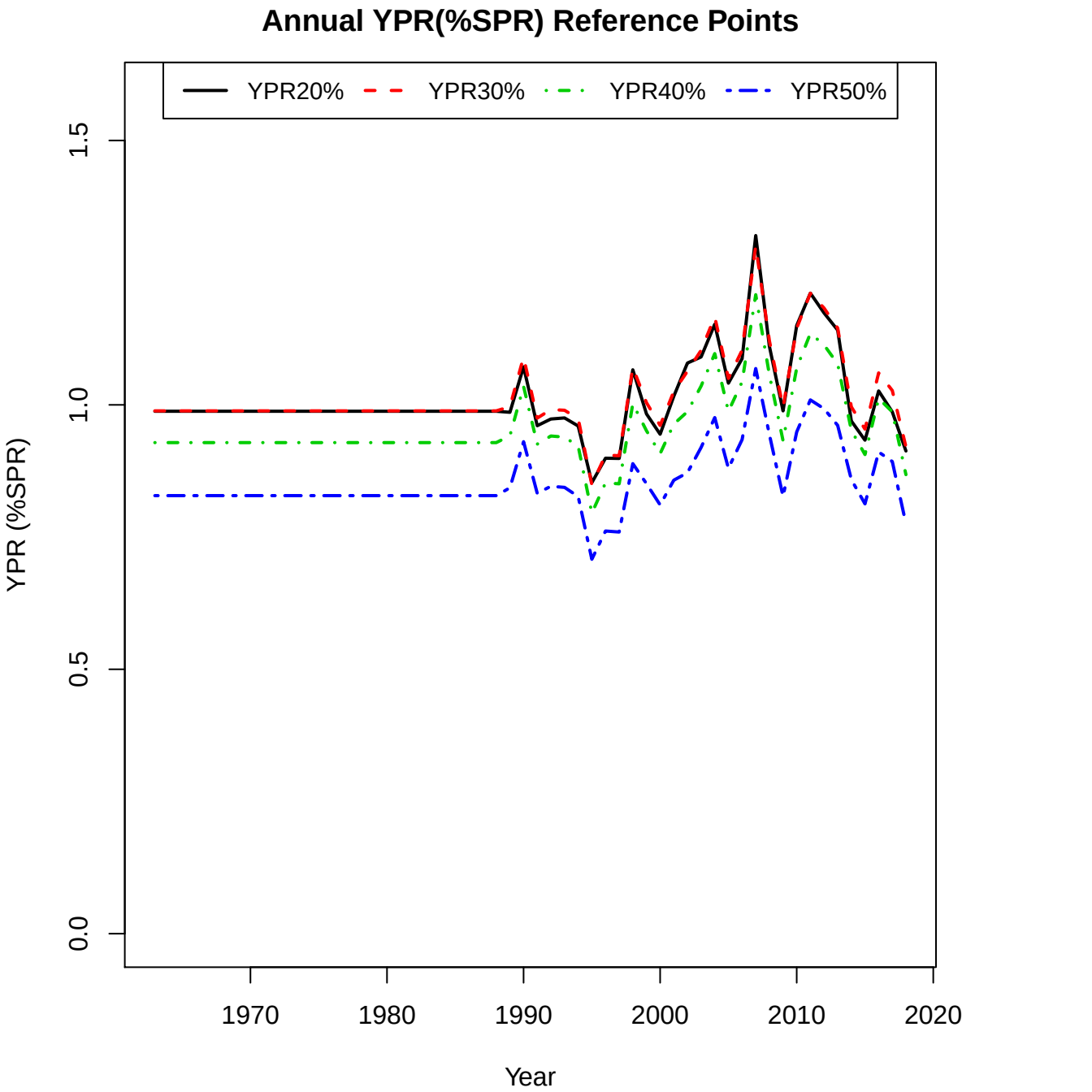

Maturity
Selectivity
Selectivity or Maturity at age
0.0
0.2
0.4
0.6
0.8
1.0
2
4
6
8
Age


Expected Spawnings and SPR Reference Points (Years Avg = 5)
Expected Spawnings
% SPR
Full F
0
1
2
3
4
0.0
0.5
1.0
1.5
2.0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

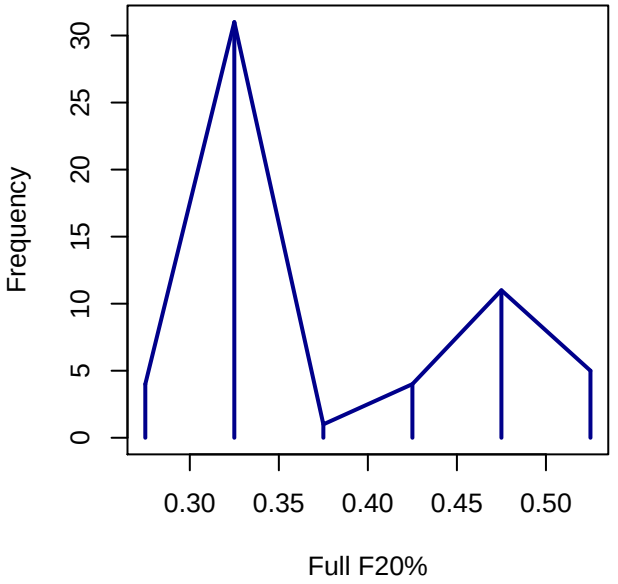
Expected Spawnings & SPR Reference Points (Years Avg = 5)

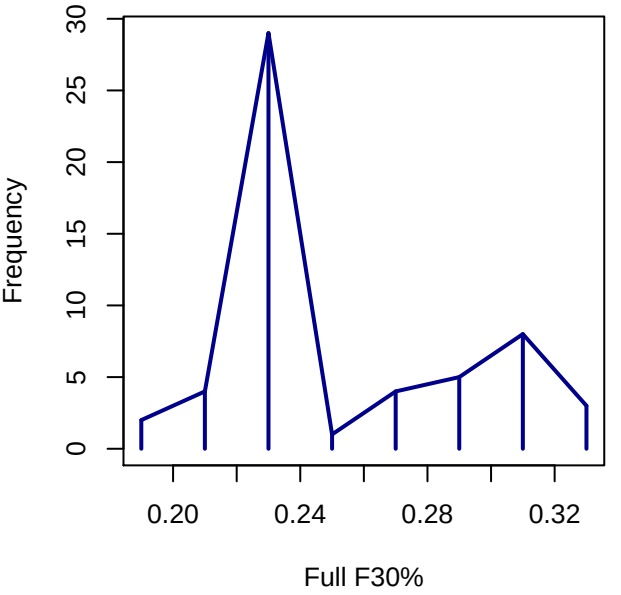
F	E[Sp]	SPR	F	E[Sp]	SPR	F	E[Sp]	SPR
0	3.3824	1	0.35	1.6481	0.2378	0.7	1.1922	0.1235
0.01	3.258	0.9358	0.36	1.6286	0.2318	0.71	1.1836	0.1218
0.02	3.1445	0.878	0.37	1.6096	0.2261	0.72	1.1751	0.1202
0.03	3.0406	0.8257	0.38	1.5912	0.2207	0.73	1.1667	0.1186
0.04	2.945	0.7784	0.39	1.5734	0.2155	0.74	1.1585	0.117
0.05	2.8568	0.7352	0.4	1.556	0.2105	0.75	1.1504	0.1155
0.06	2.7751	0.6959	0.41	1.5392	0.2058	0.76	1.1424	0.1141
0.07	2.6992	0.6598	0.42	1.5228	0.2012	0.77	1.1346	0.1126
0.08	2.6285	0.6267	0.43	1.5068	0.1969	0.78	1.1269	0.1112
0.09	2.5624	0.5962	0.44	1.4913	0.1927	0.79	1.1193	0.1099
0.1	2.5005	0.568	0.45	1.4762	0.1886	0.8	1.1118	0.1086
0.11	2.4424	0.542	0.46	1.4615	0.1848	0.81	1.1045	0.1073
0.12	2.3877	0.5179	0.47	1.4471	0.181	0.82	1.0973	0.106
0.13	2.3361	0.4954	0.48	1.4331	0.1775	0.83	1.0902	0.1048
0.14	2.2874	0.4746	0.49	1.4195	0.174	0.84	1.0831	0.1036
0.15	2.2412	0.4552	0.5	1.4061	0.1707	0.85	1.0762	0.1024
0.16	2.1975	0.437	0.51	1.3931	0.1675	0.86	1.0694	0.1012
0.17	2.1559	0.42	0.52	1.3804	0.1644	0.87	1.0627	0.1001
0.18	2.1164	0.4041	0.53	1.368	0.1615	0.88	1.0561	0.099
0.19	2.0787	0.3892	0.54	1.3559	0.1586	0.89	1.0496	0.098
0.2	2.0428	0.3752	0.55	1.344	0.1558	0.9	1.0431	0.0969
0.21	2.0085	0.3621	0.56	1.3324	0.1531	0.91	1.0368	0.0959
0.22	1.9756	0.3497	0.57	1.321	0.1506	0.92	1.0306	0.0949
0.23	1.9442	0.338	0.58	1.3099	0.1481	0.93	1.0244	0.0939
0.24	1.9141	0.327	0.59	1.299	0.1456	0.94	1.0183	0.0929
0.25	1.8851	0.3165	0.6	1.2883	0.1433	0.95	1.0123	0.092
0.26	1.8573	0.3067	0.61	1.2778	0.141	0.96	1.0064	0.0911
0.27	1.8306	0.2974	0.62	1.2676	0.1388	0.97	1.0005	0.0902
0.28	1.8048	0.2885	0.63	1.2575	0.1367	0.98	0.9948	0.0893
0.29	1.78	0.2801	0.64	1.2477	0.1346	0.99	0.9891	0.0884
0.3	1.7561	0.2721	0.65	1.238	0.1326	1	0.9835	0.0876
0.31	1.733	0.2646	0.66	1.2285	0.1307	1.01	0.9779	0.0867
0.32	1.7107	0.2574	0.67	1.2192	0.1288	1.02	0.9724	0.0859
0.33	1.6892	0.2505	0.68	1.21	0.127	1.03	0.967	0.0851
0.34	1.6683	0.244	0.69	1.2011	0.1252	1.04	0.9617	0.0843

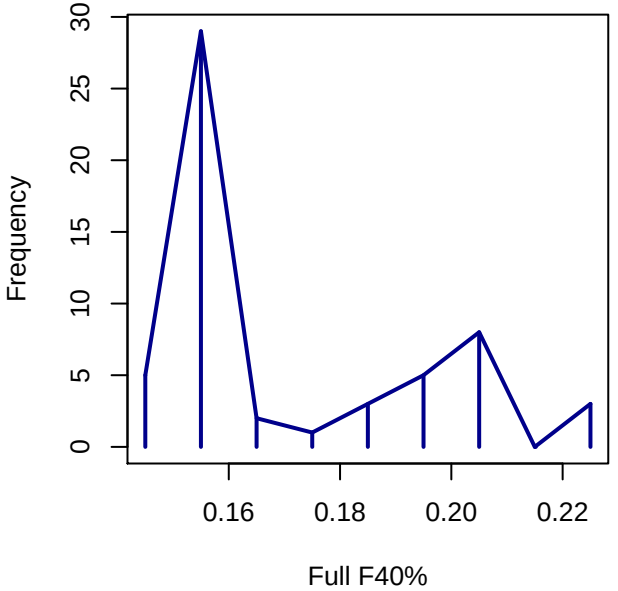

Annual F(%SPR) Reference Points
F20%
F30%
F40%
F50%
Full F (%SPR)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
1970
1980
1990
2000
2010
2020
Year

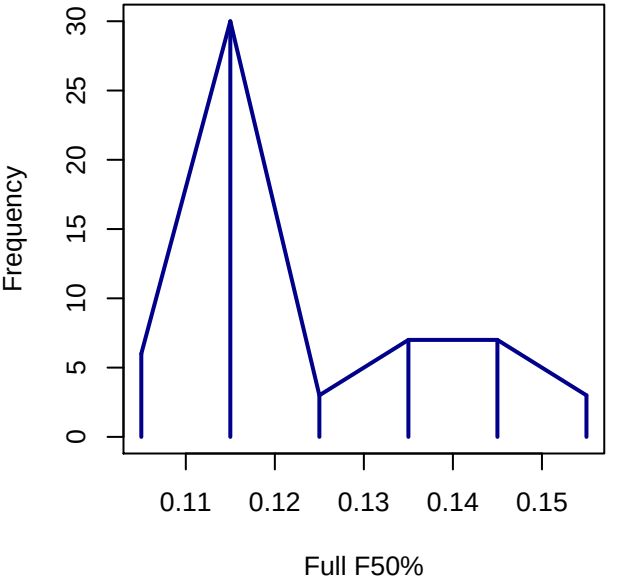

Annual YPR(%SPR) Reference Points
YPR20%
YPR30%
YPR40%
YPR50%
YPR (%SPR)
0.0
0.5
1.0
1.5
1970
1980
1990
2000
2010
2020
Year

Annual F (%SPR) Reference Points

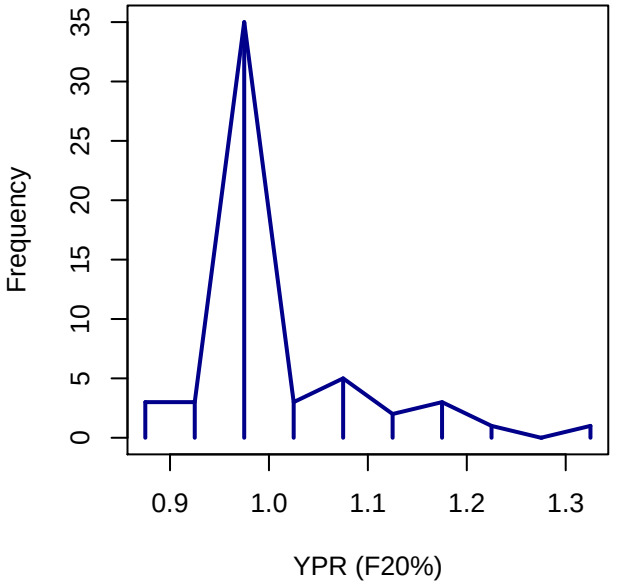


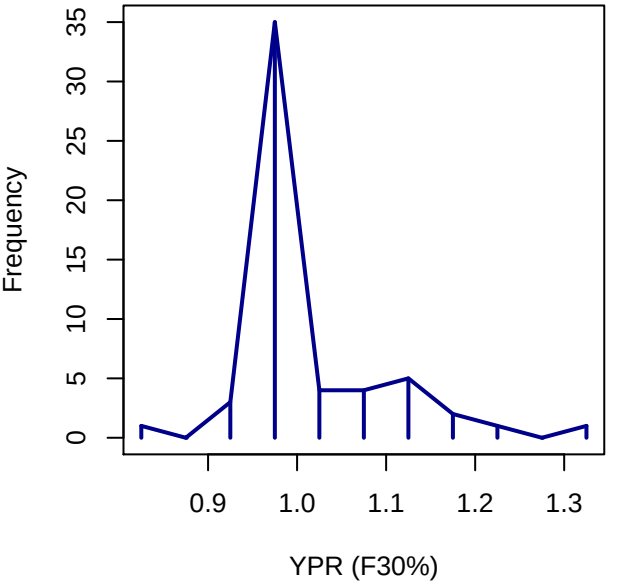


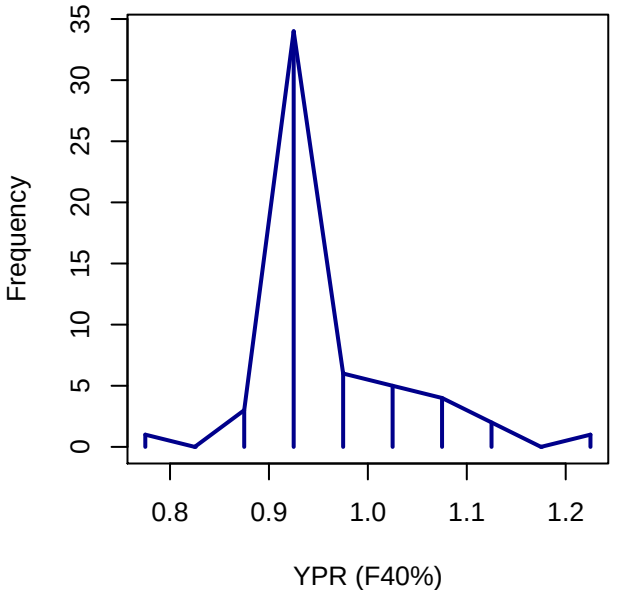


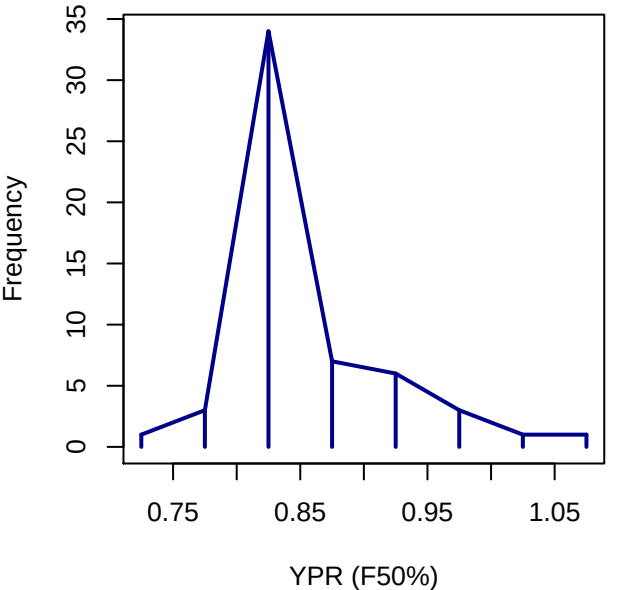


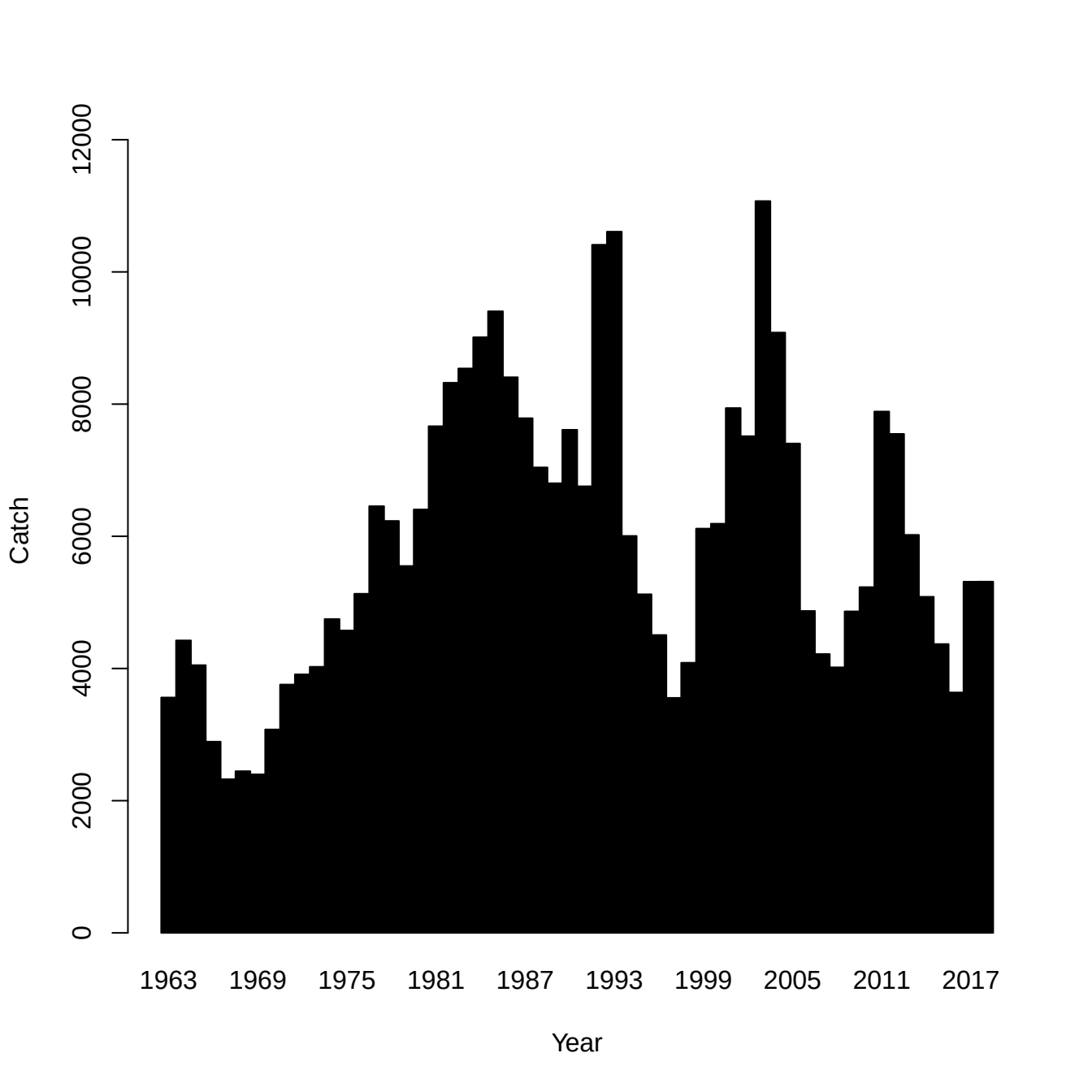
Annual YPR (%SPR) Reference Points

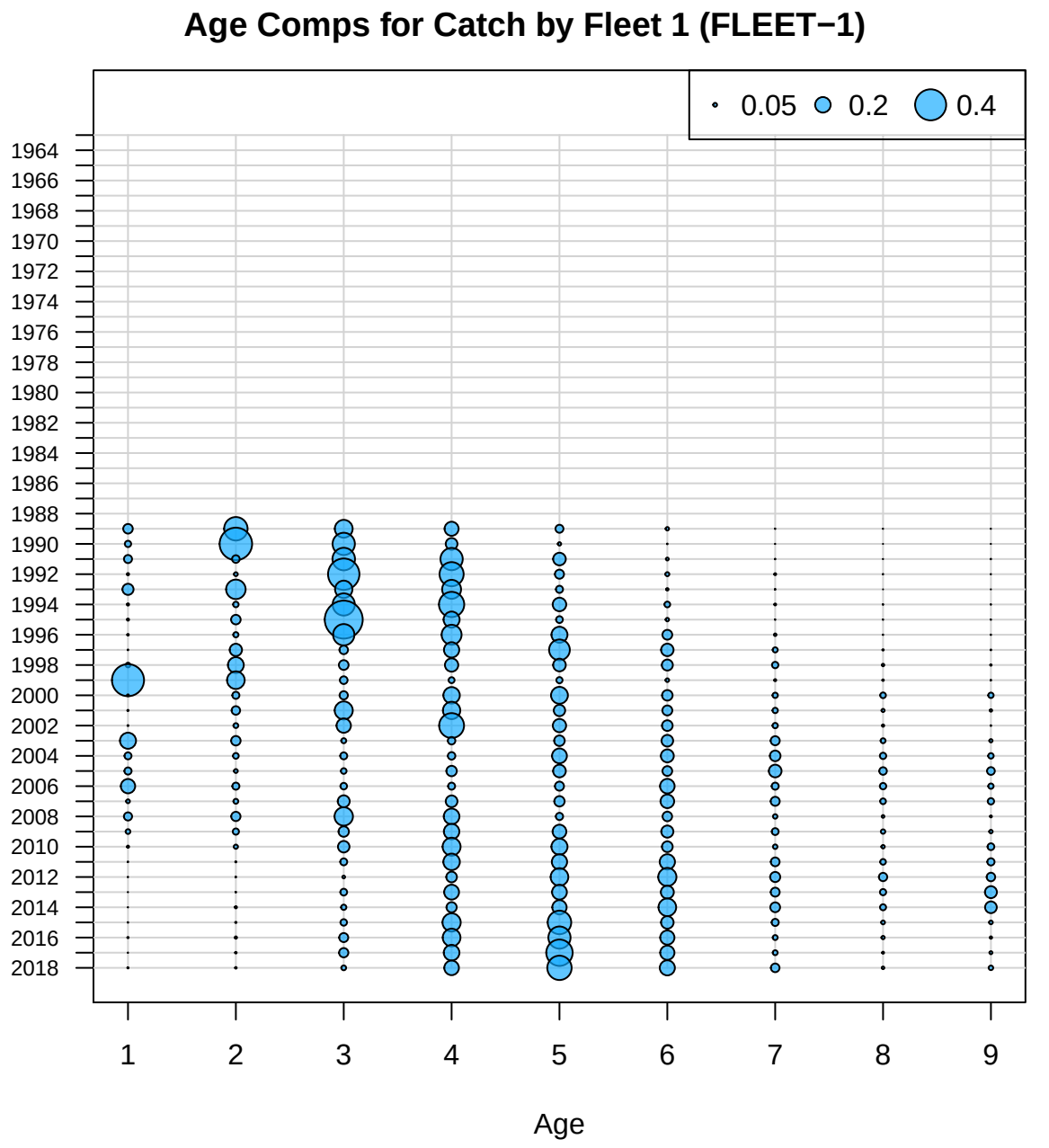


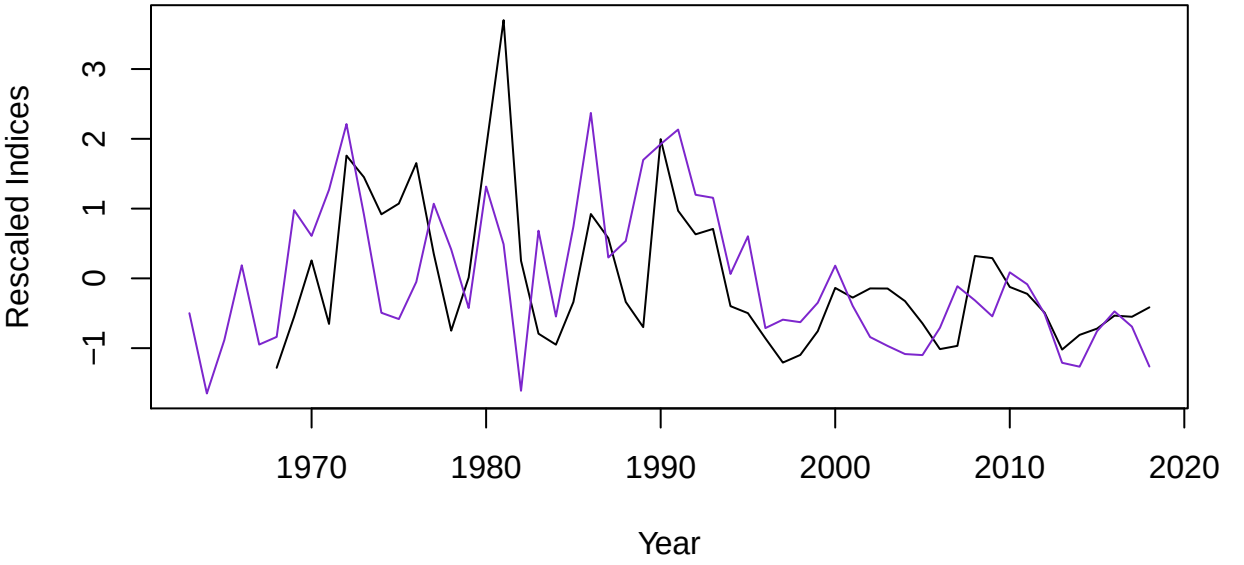


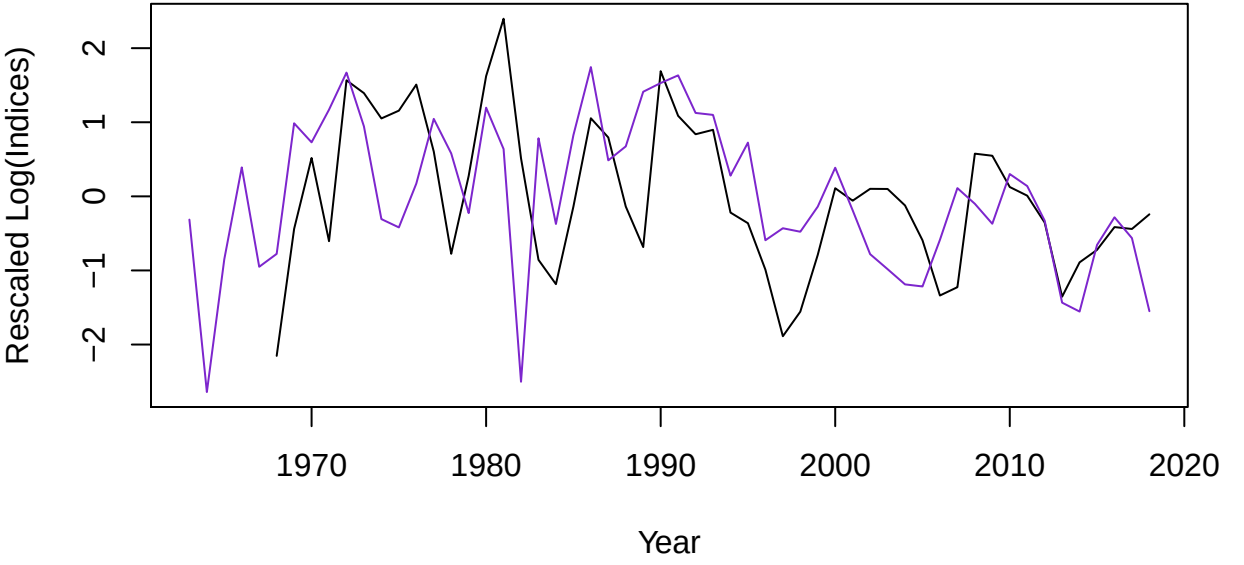


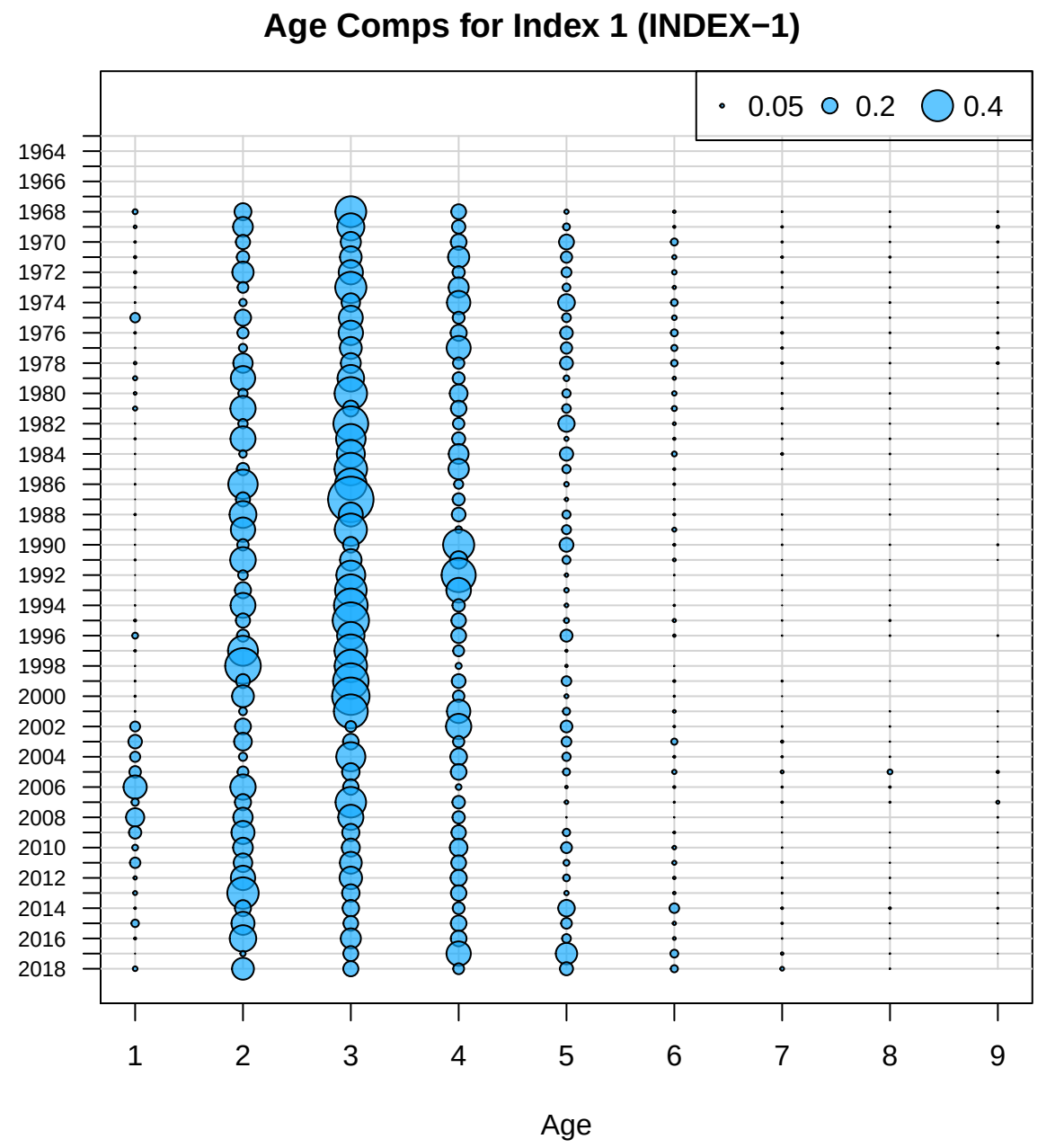


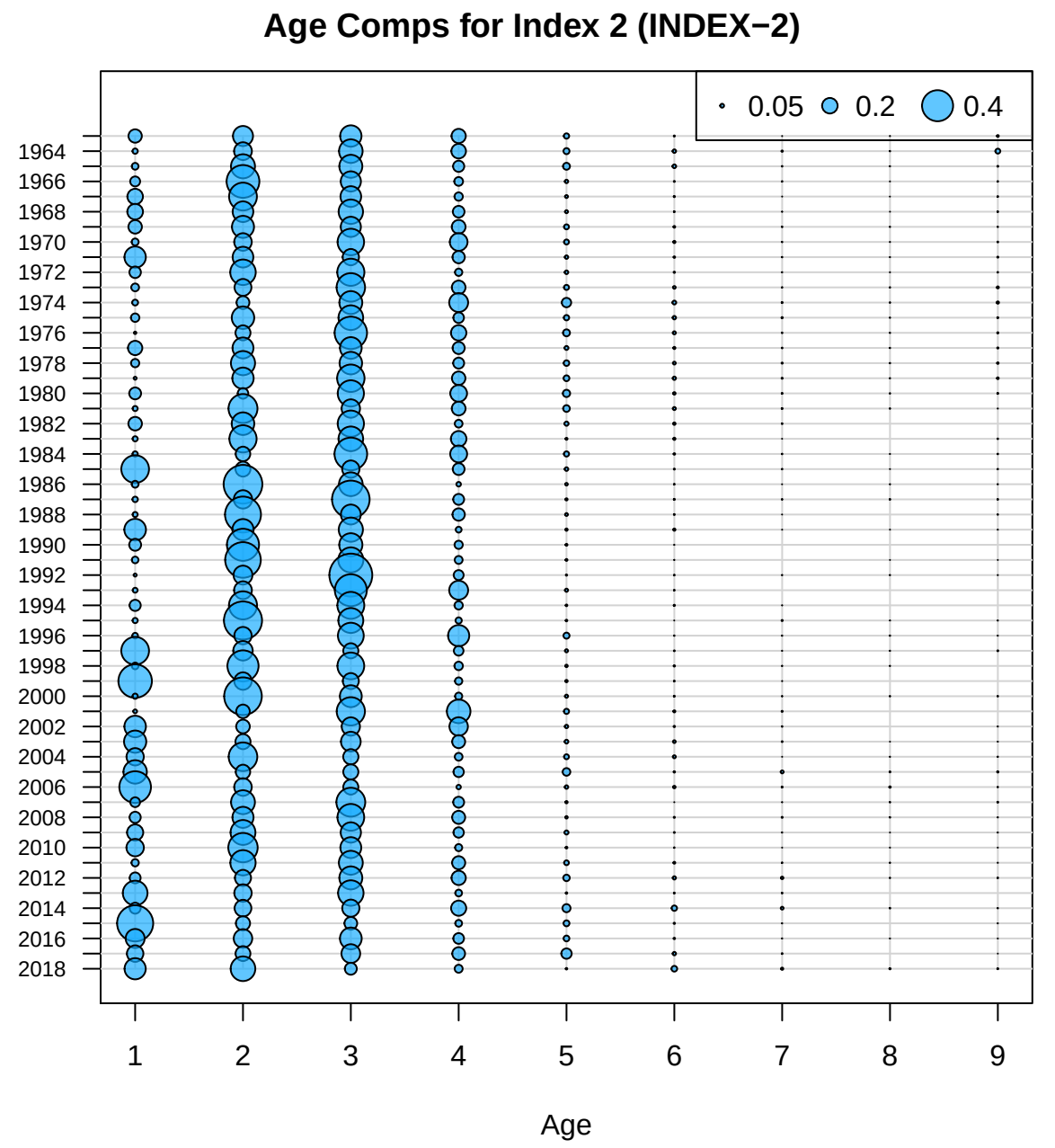

Catch
0
2000
4000
6000
8000
10000
12000
1963
1969
1975
1981
1987
1993
1999
2005
2011
2017
Year

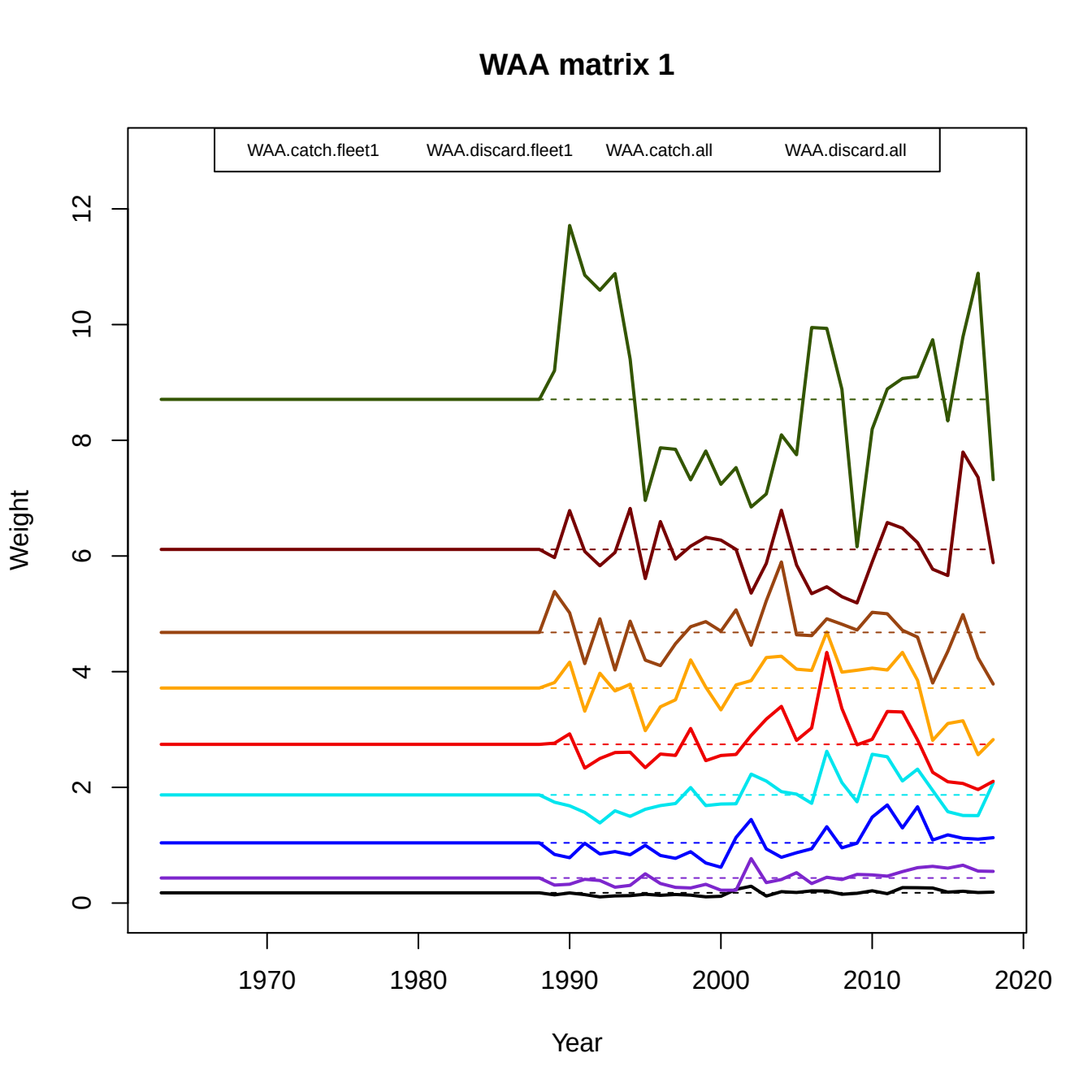

Age Comps for Catch by Fleet 1 (FLEET−1)
0.05
0.2
0.4
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
1
2
3
4
5
6
7
8
9
Age

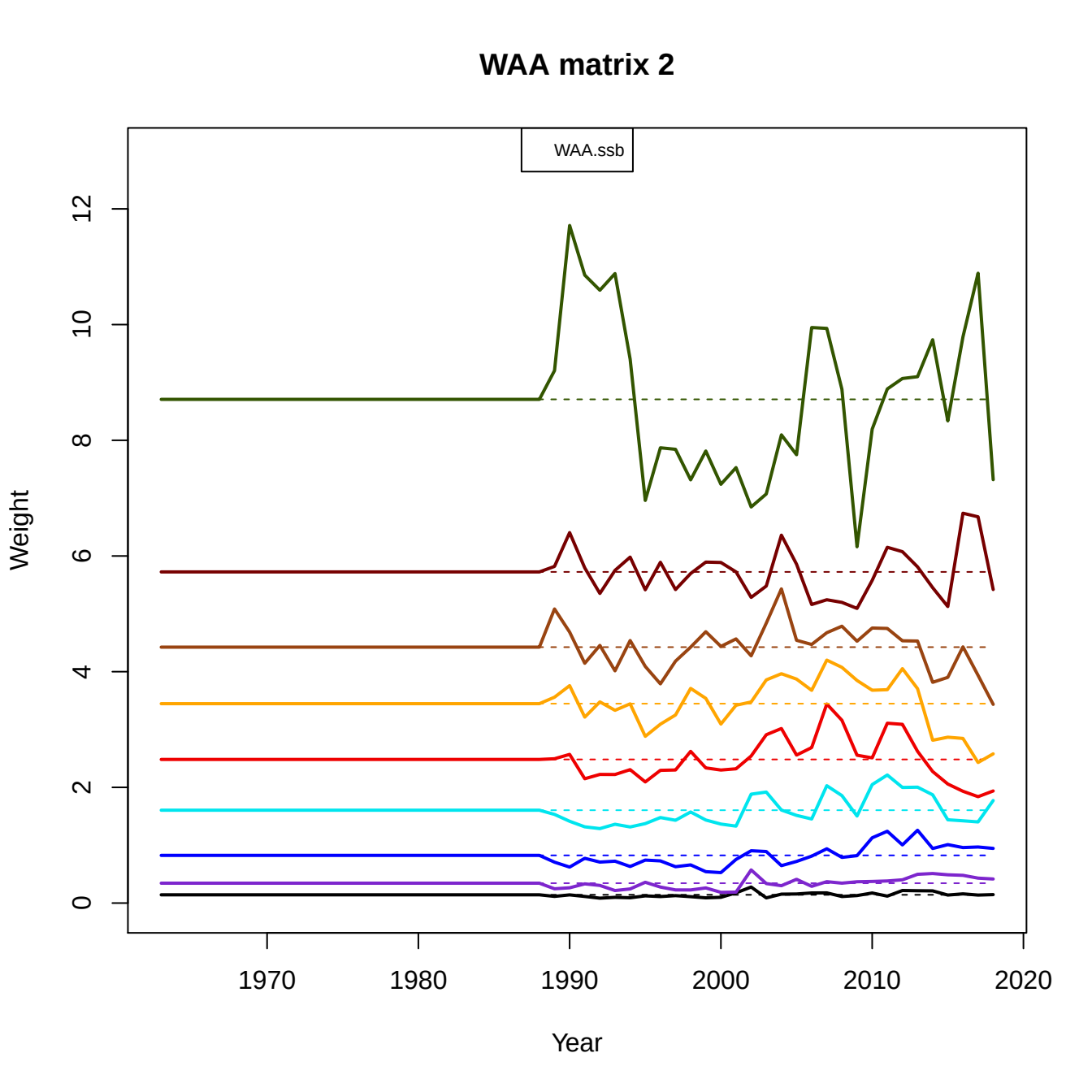

Rescaled Indices
−1
0
1
2
3
1970
1980
1990
2000
2010
2020
Year

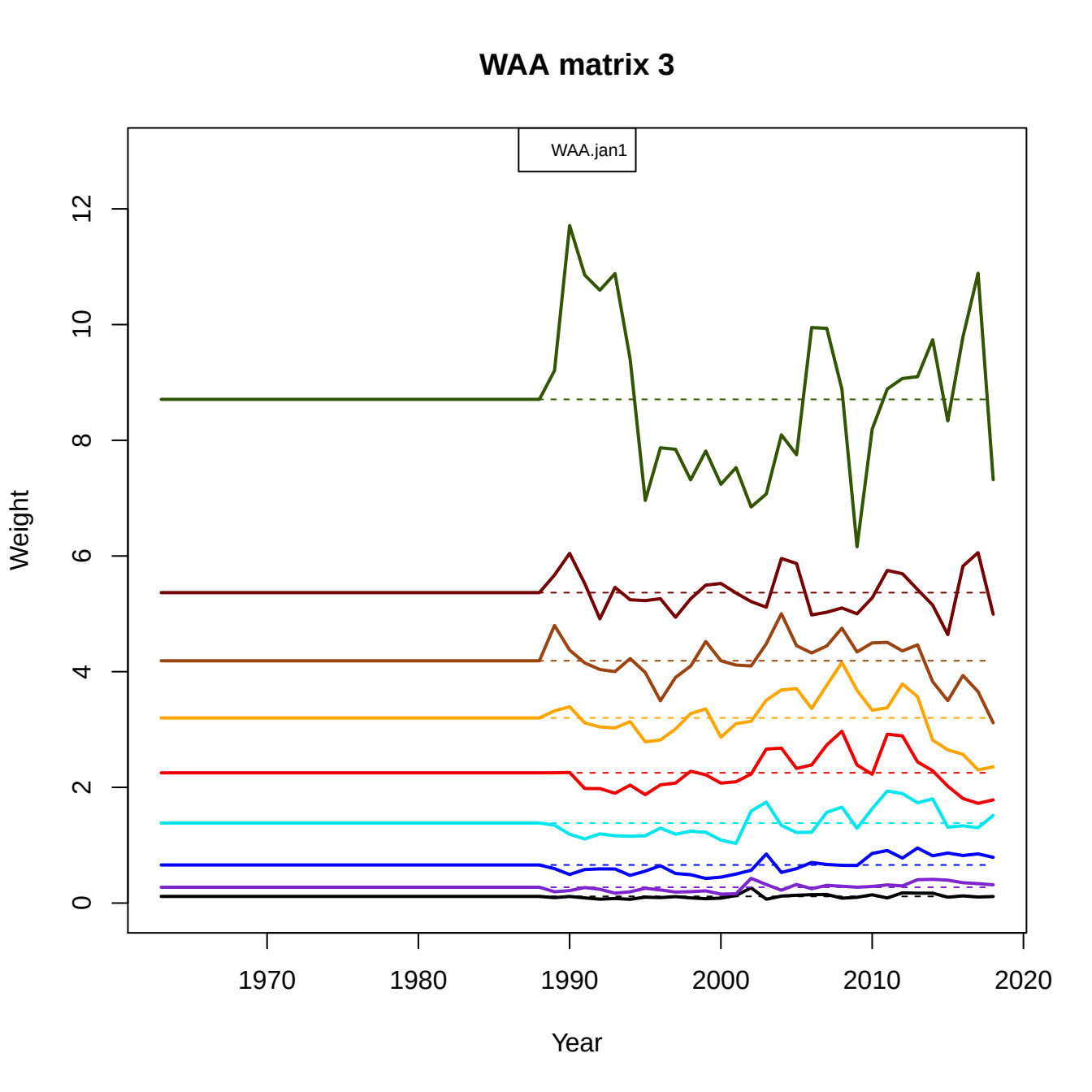

Rescaled Log(Indices)
−2
−1
0
1
2
1970
1980
1990
2000
2010
2020
Year

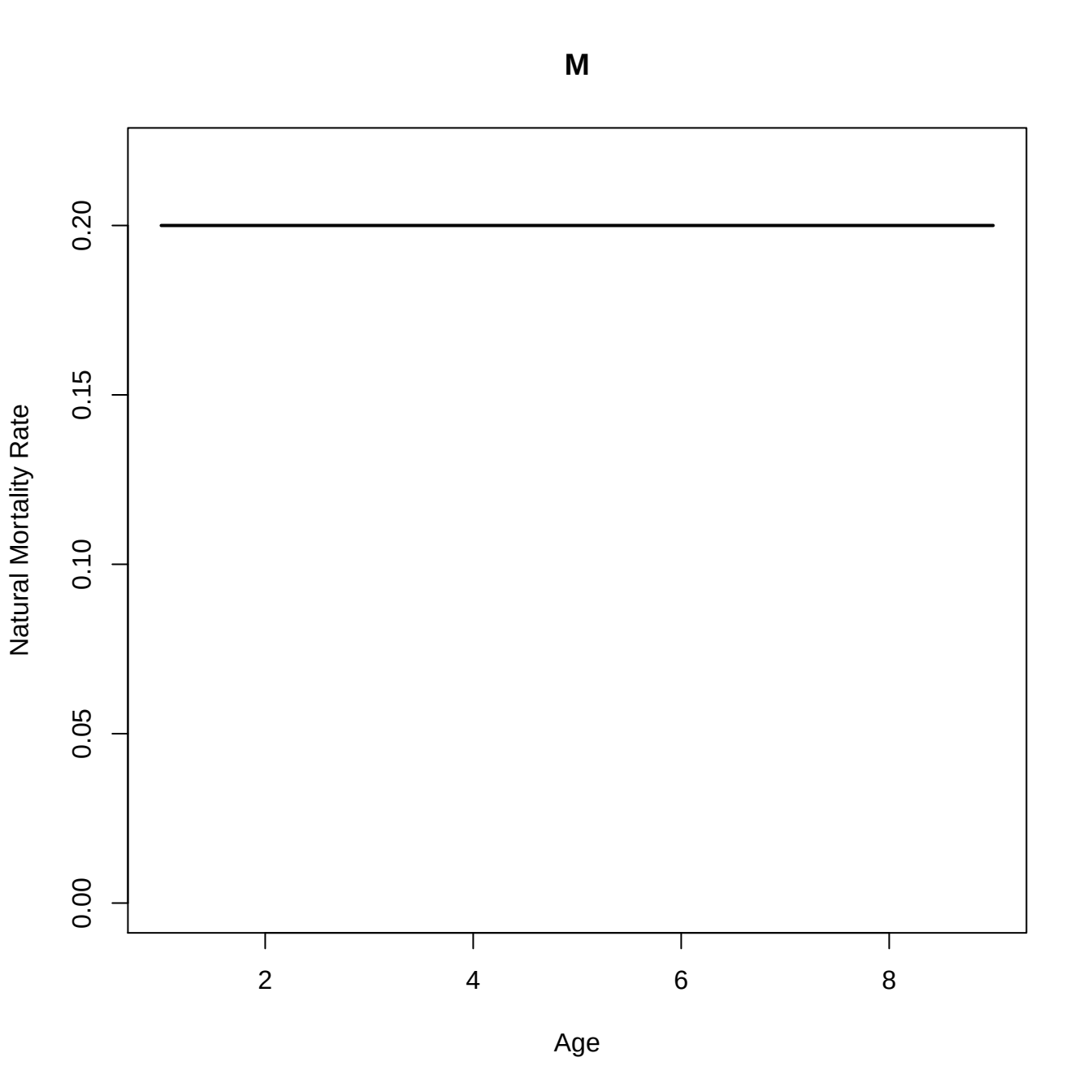

Age Comps for Index 1 (INDEX−1)
0.05
0.2
0.4
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
1
2
3
4
5
6
7
8
9
Age

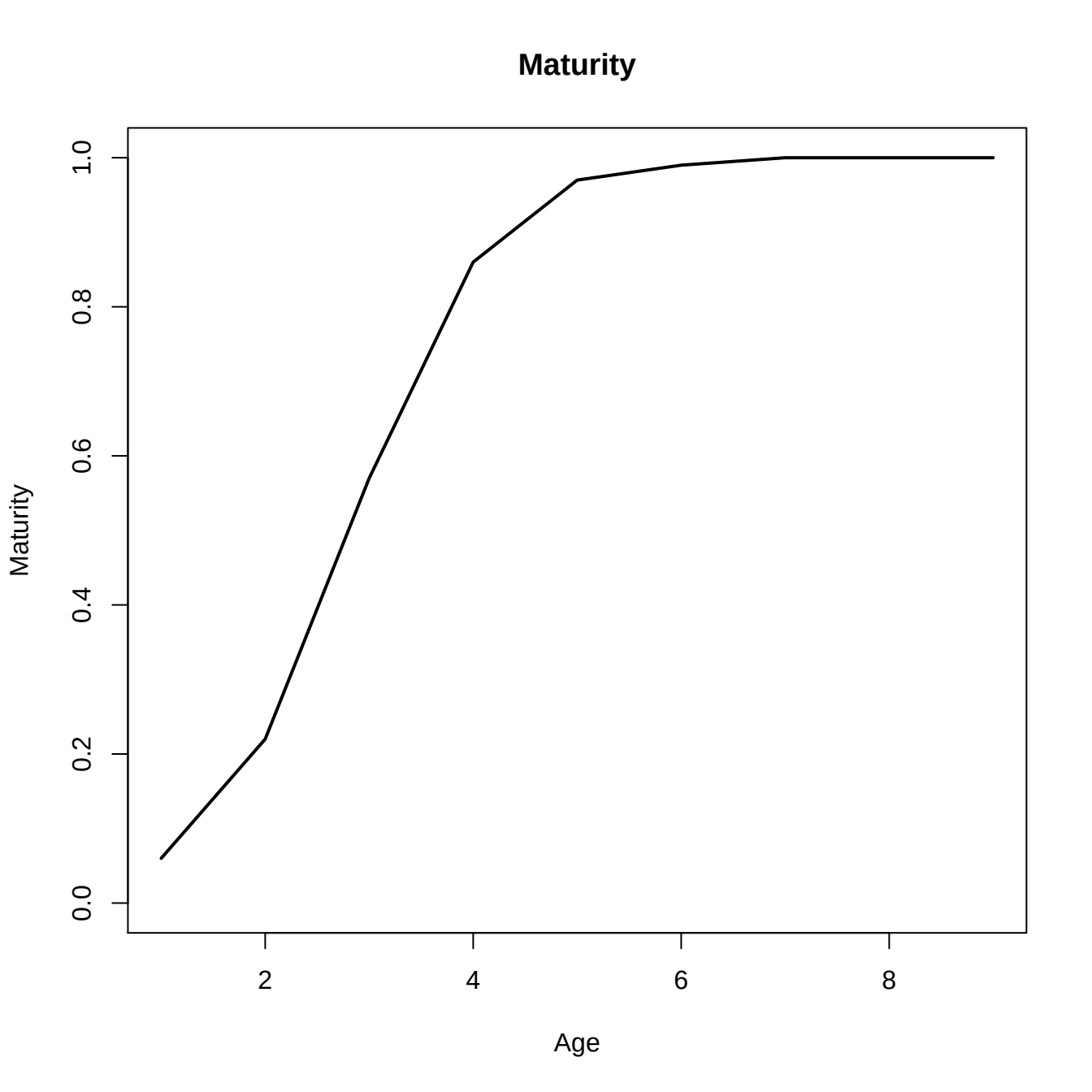

Age Comps for Index 2 (INDEX−2)
0.05
0.2
0.4
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
1
2
3
4
5
6
7
8
9
Age


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
Natural Mortality Rate
0.00
0.05
0.10
0.15
0.20
2
4
6
8
Age


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