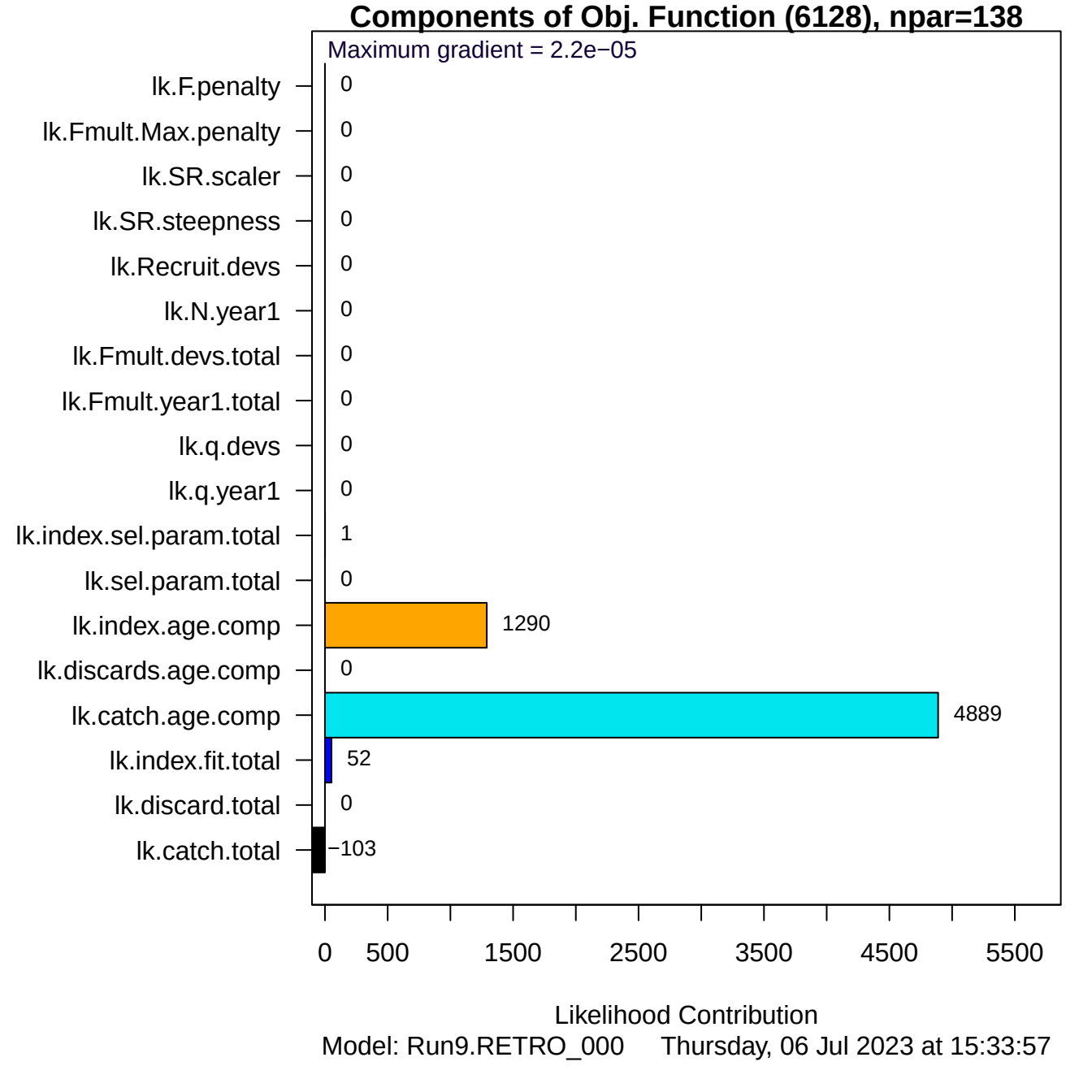
File = Run9.RETRO_000.dat

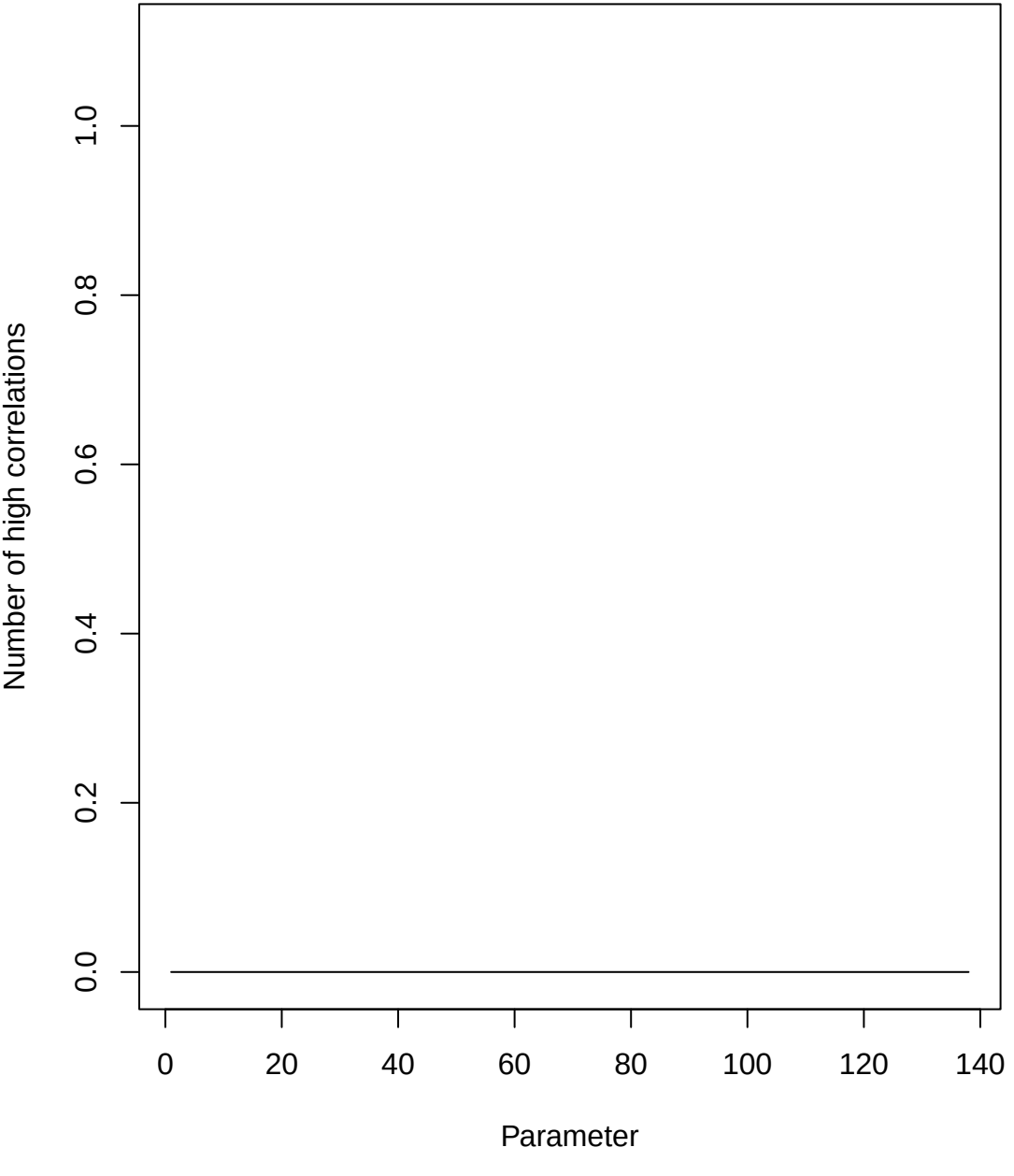
ASAP3 run on Thursday, 06 Jul 2023 at 15:33:57

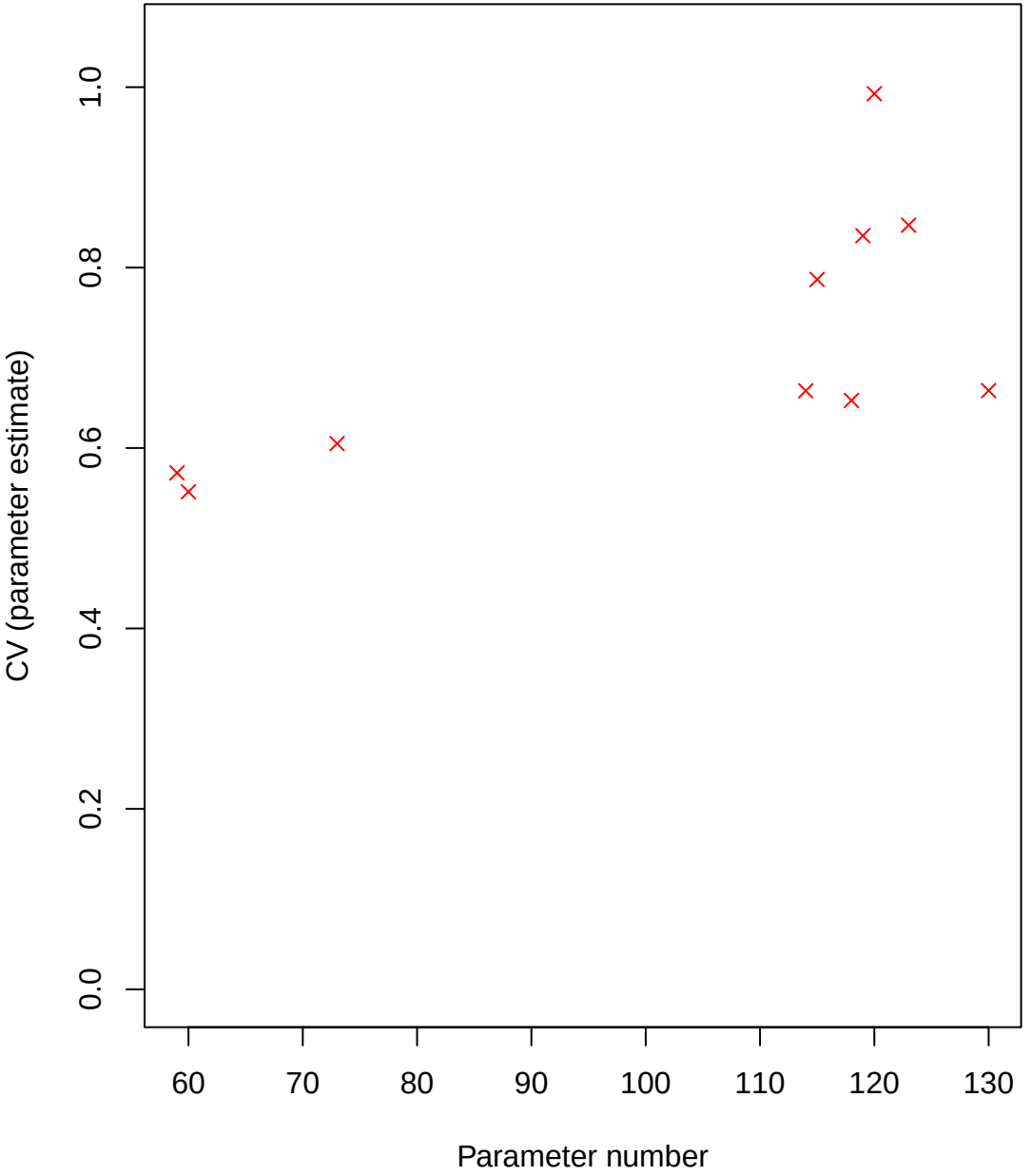
sers\Kiersten.Curti\Desktop\Work\Mackerel\2023.Management.Track\Run9\retı

ASAPplots version = 0.2.18

npar = 138, maximum gradient = 2.20575e−005

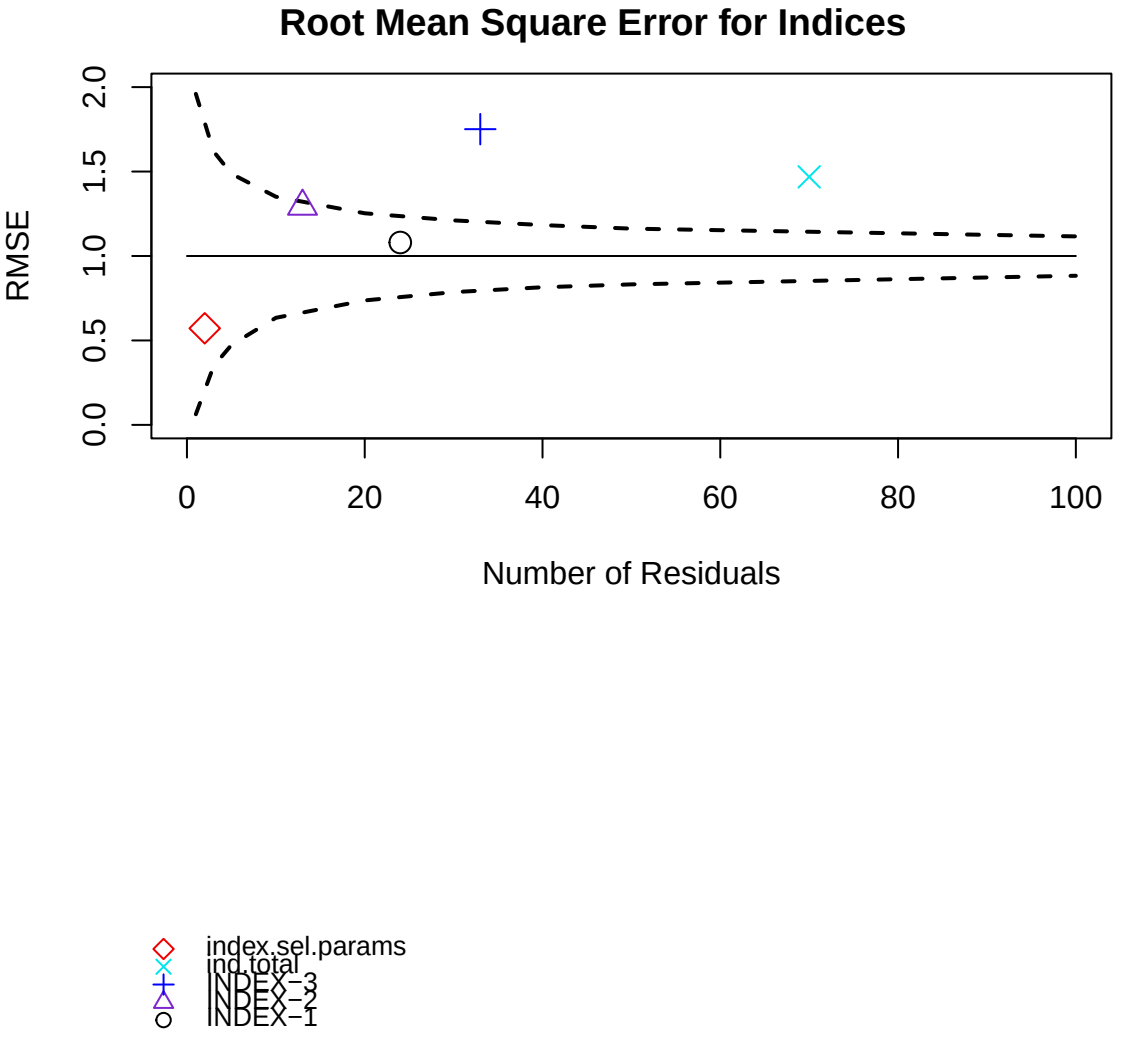

Components of Obj. Function (6128), npar=138
Maximum gradient = 2.2e−05
lk.F.penalty
lk.Fmult.Max.penalty
lk.SR.scaler
lk.SR.steepness
lk.Recruit.devs
lk.N.year1
lk.Fmult.devs.total
lk.Fmult.year1.total
lk.q.devs
lk.q.year1
lk.index.sel.param.total
lk.sel.param.total
lk.index.age.comp
lk.discards.age.comp
lk.catch.age.comp
lk.index.fit.total
lk.discard.total
lk.catch.total
0
0
0
0
0
0
0
0
0
0
0
1
0
1290
0
4889
52
0
−103
0
500
1500
2500
3500
4500
5500
Likelihood Contribution
Model: Run9.RETRO_000 Thursday, 06 Jul 2023 at 15:33:57

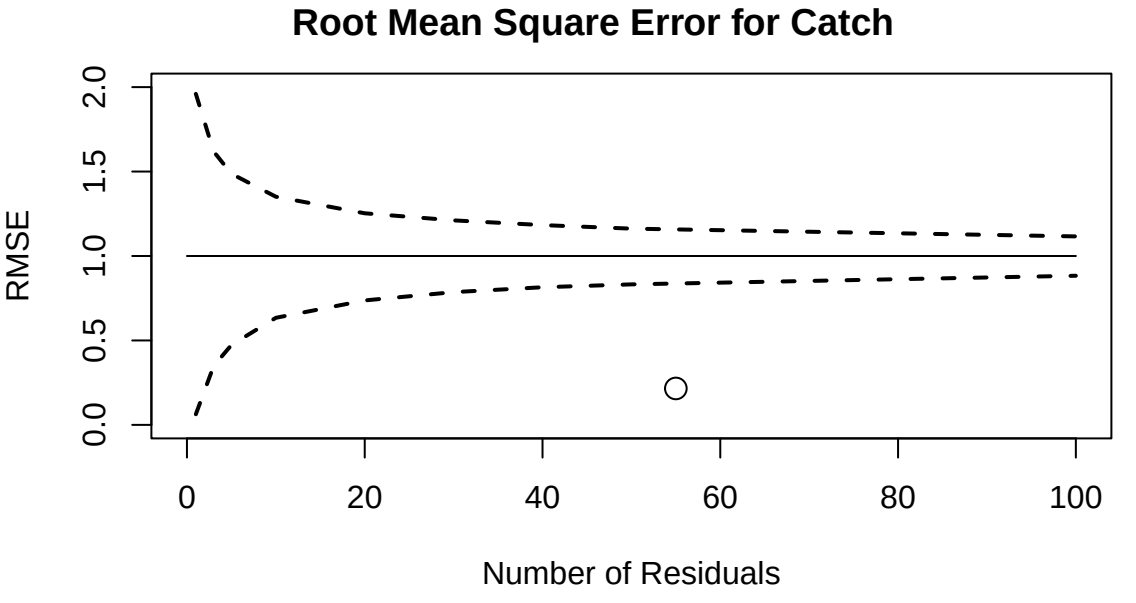

Number of high correlations
0.0
0.2
0.4
0.6
0.8
1.0
0
20
40
60
80
100
120
140
Parameter


CV (parameter estimate)
0.0
0.2
0.4
0.6
0.8
1.0
60
70
80
90
100
110
120
130
Parameter number

Root Mean Square Error computed from Standardized Residuals

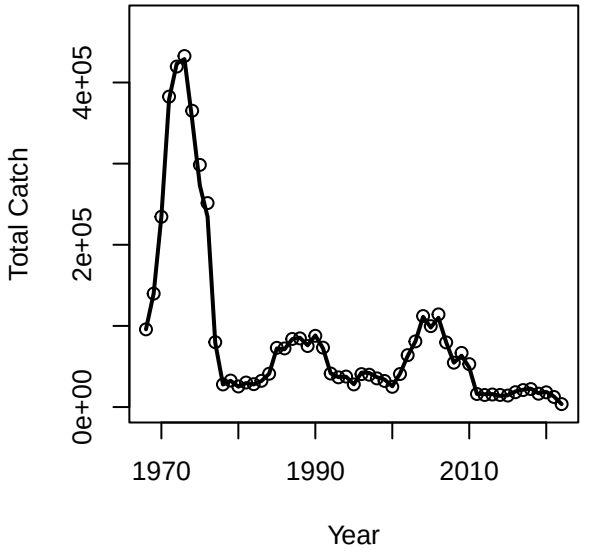
Component	# resids	RMSE
catch.tot	55	0.216
discard.tot	0	0
ind01	24	1.08
ind02	13	1.29
ind03	33	1.75
ind.total	70	1.47
N.year1	0	0
Fmult.year1	0	0
Fmult.devs.total	0	0
recruit.devs	0	0
fleet.sel.params	0	0
index.sel.params	2	0.572
q.year1	0	0
q.devs	0	0
SR.steepness	0	0
SR.scaler	0	0

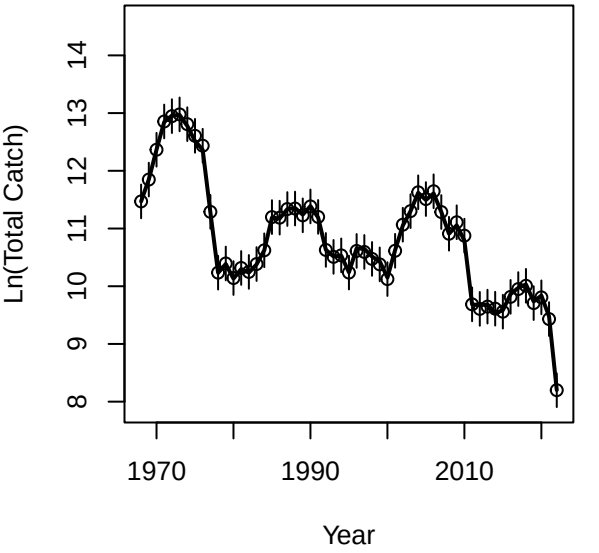

Root Mean Square Error for Indices
RMSE
0.0
0.5
1.0
1.5
2.0
0
20
40
60
80
100
Number of Residuals
index.sel.params
ind.total
INDEX−3
INDEX−2
INDEX−1

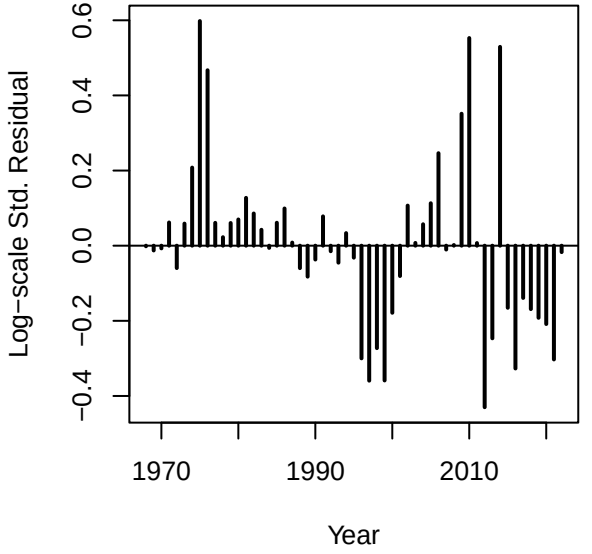

Root Mean Square Error for Catch
RMSE
0.0
0.5
1.0
1.5
2.0
0
20
40
60
80
100
Number of Residuals

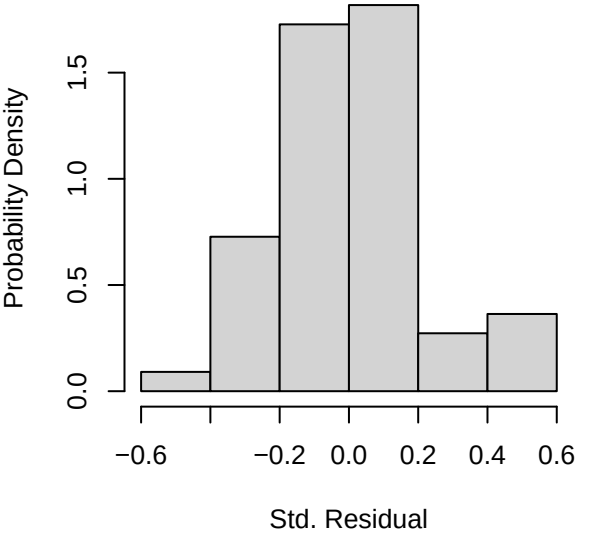
○ catch.tot

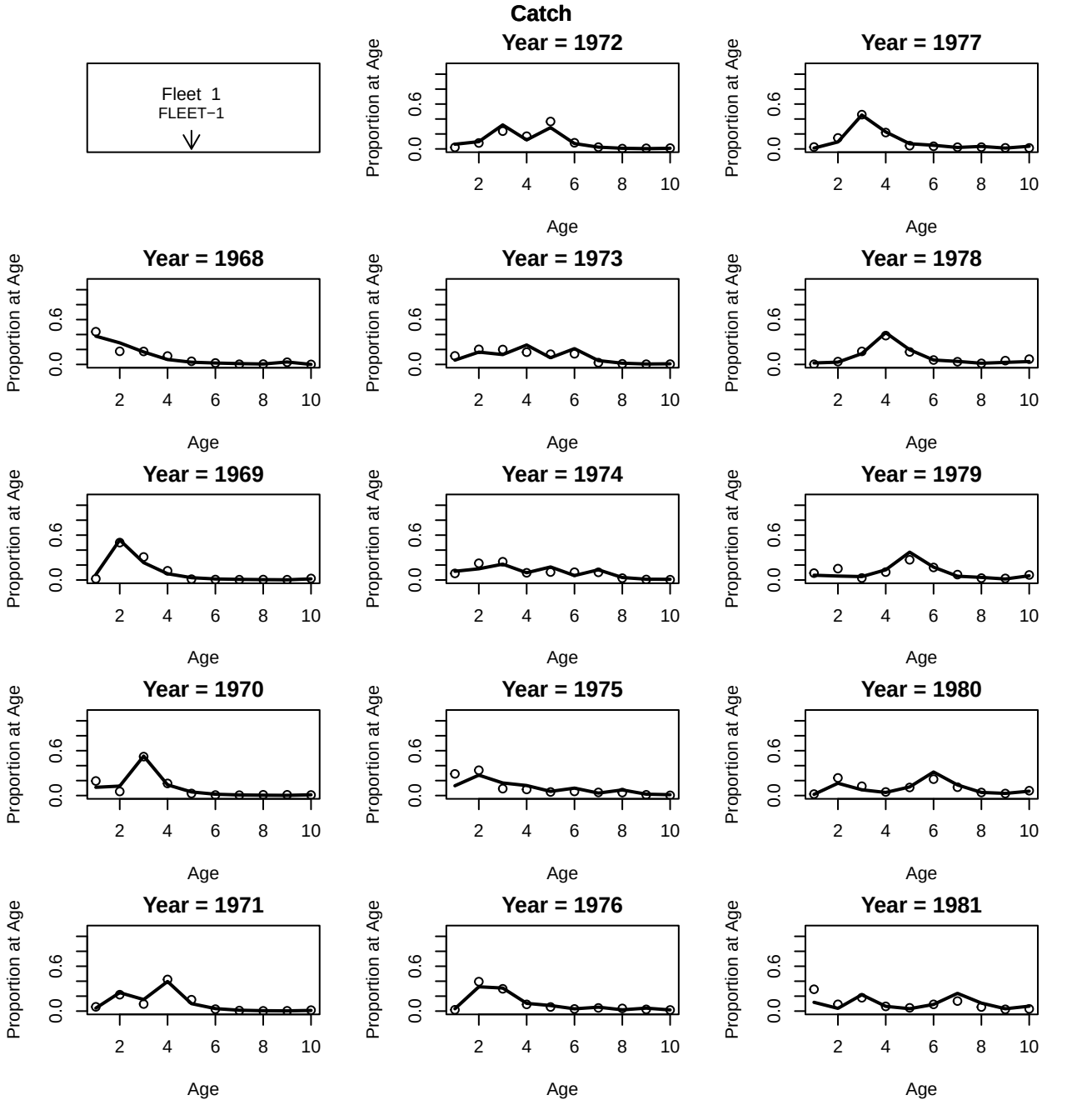
Fleet 1 Catch (FLEET−1)

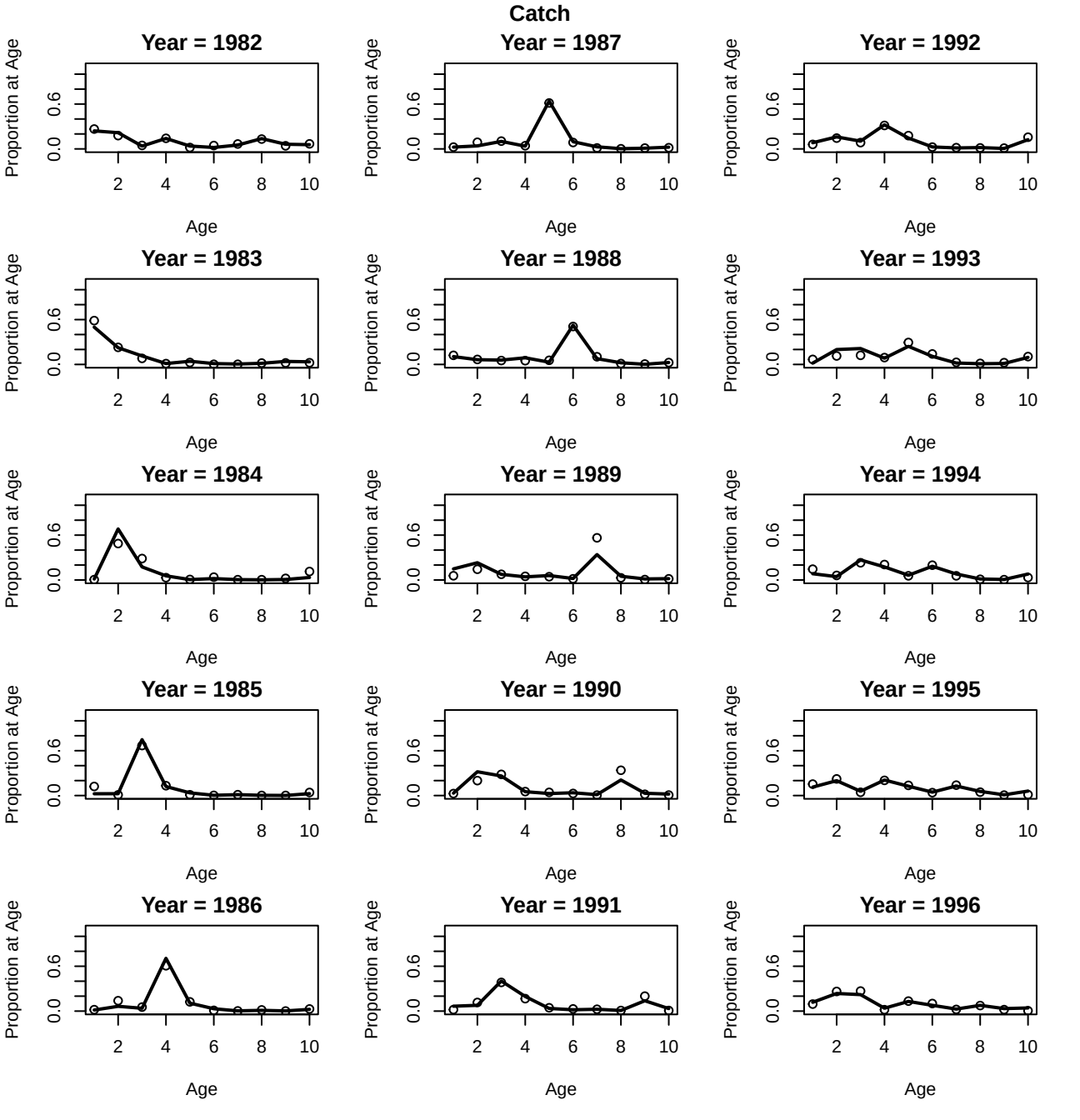


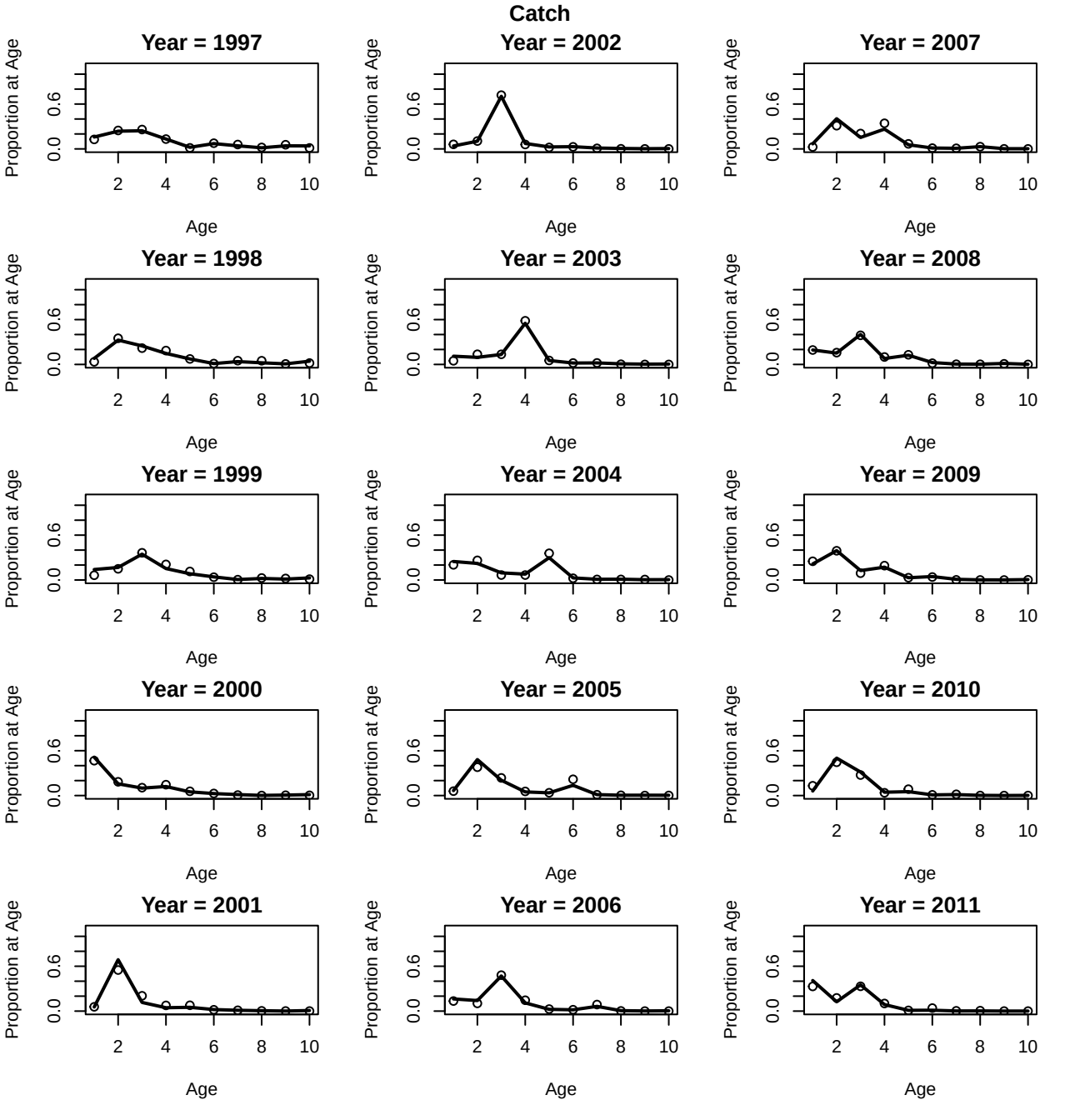


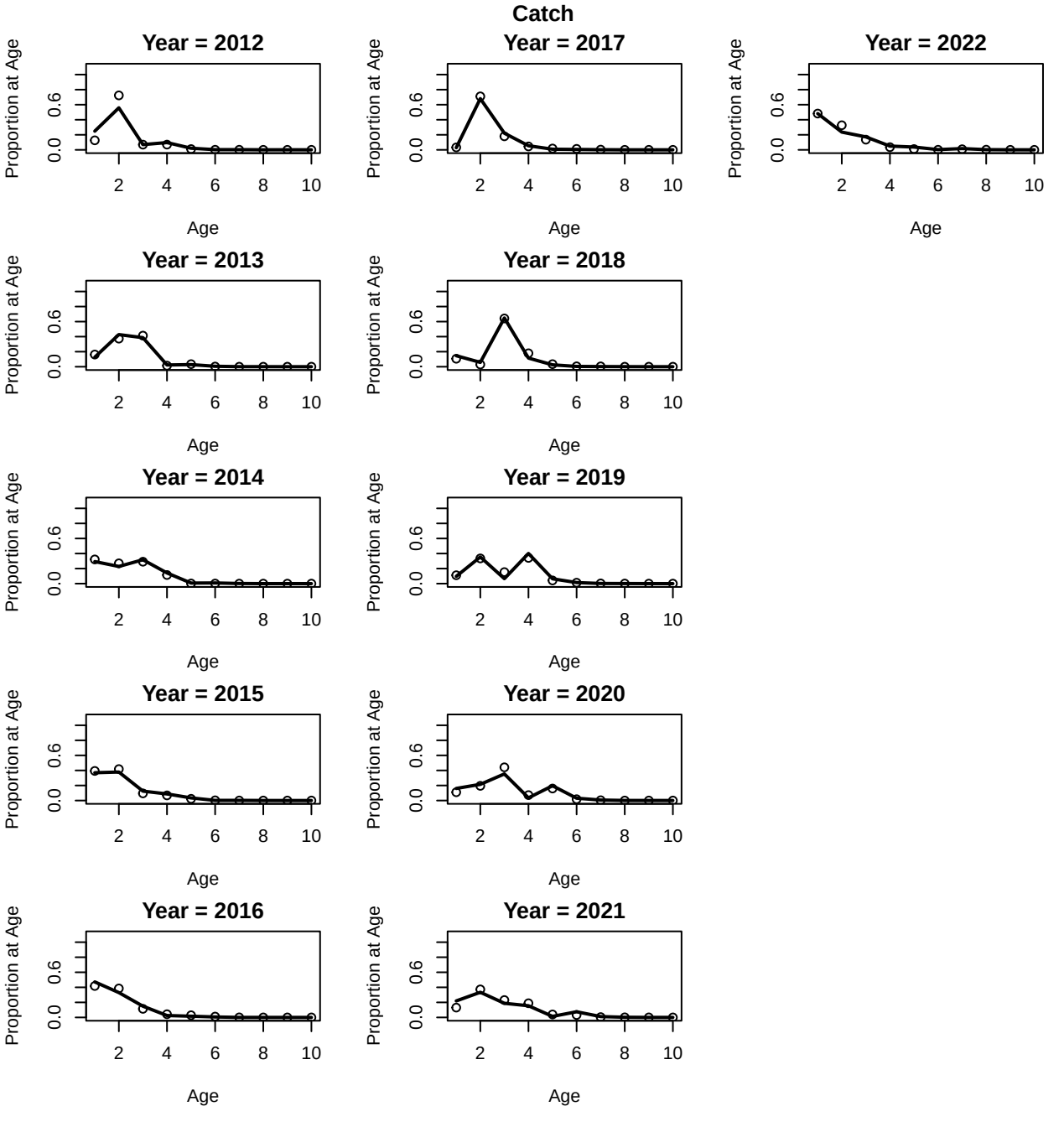


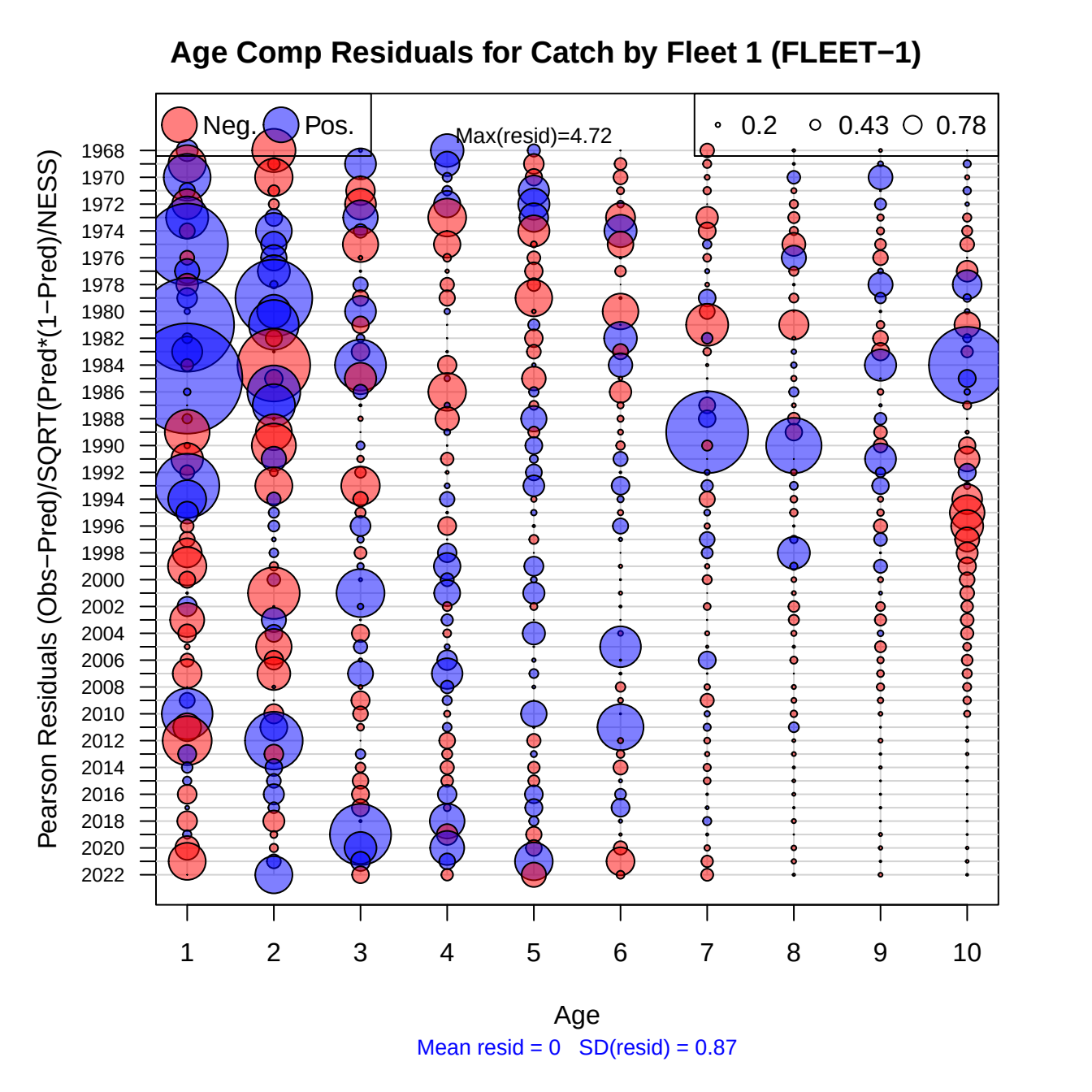


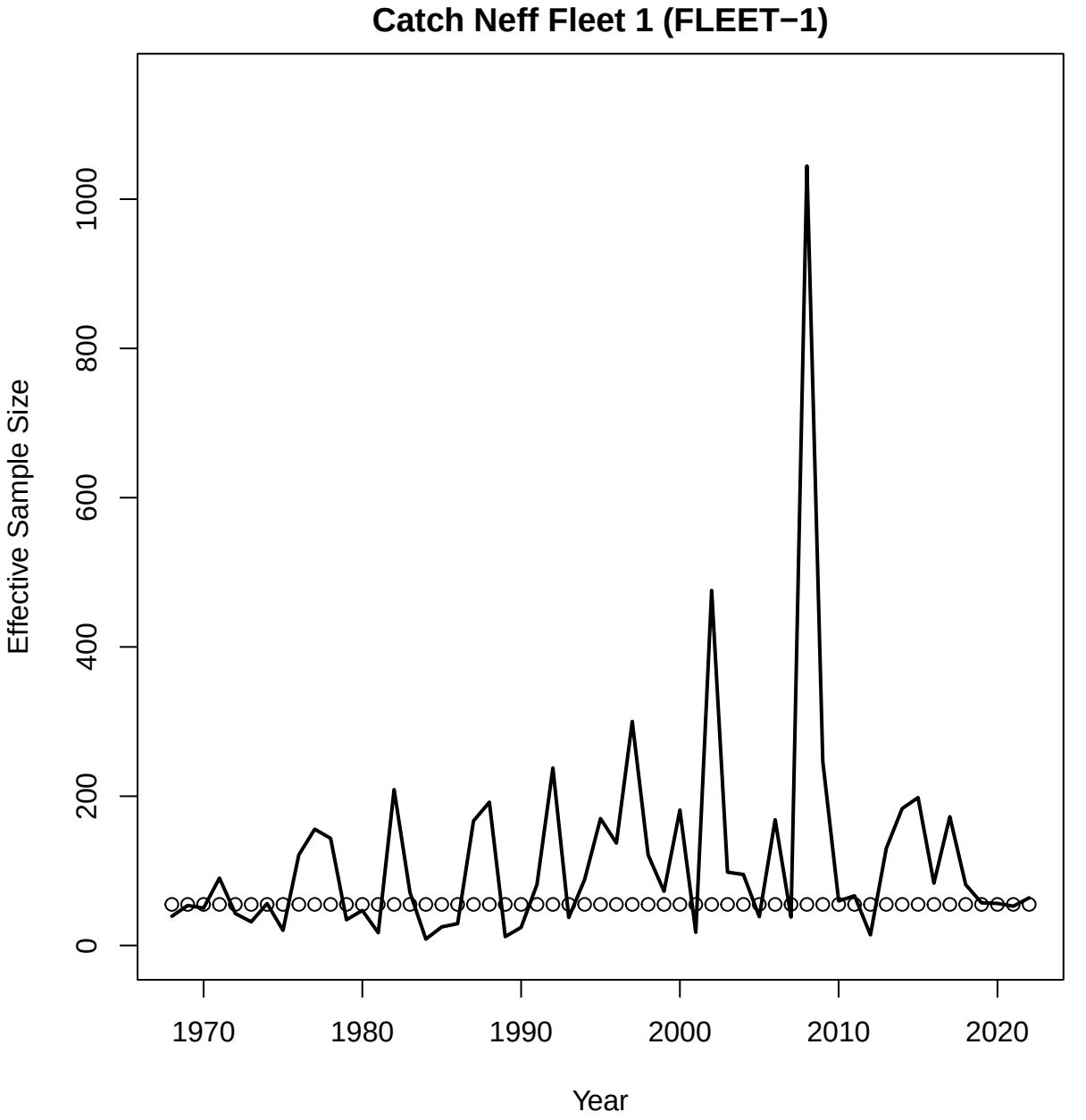

Catch
Fleet 1
FLEET−1
Year = 1972
Year = 1977
Year = 1968
Year = 1973
Year = 1978
Year = 1969
Year = 1974
Year = 1979
Year = 1970
Year = 1975
Year = 1980
Year = 1971
Year = 1976
Year = 1981
Proportion at Age
Age
0.0
0.6
2
4
6
8
10

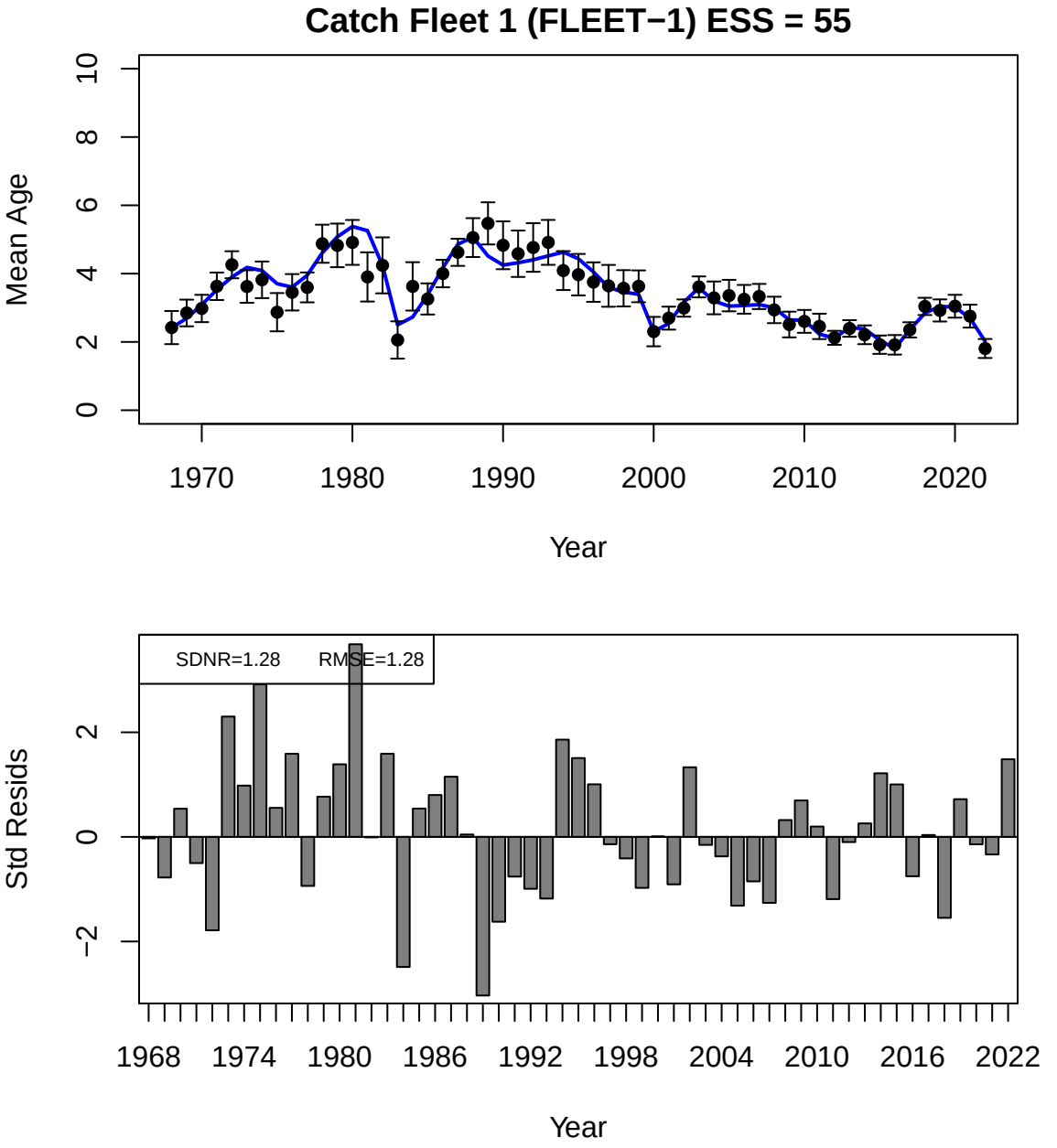

Catch
Year = 1982
Year = 1987
Year = 1992
Year = 1983
Year = 1988
Year = 1993
Year = 1984
Year = 1989
Year = 1994
Year = 1985
Year = 1990
Year = 1995
Year = 1986
Year = 1991
Year = 1996
Proportion at Age
Age
0.0
0.6
2
4
6
8
10

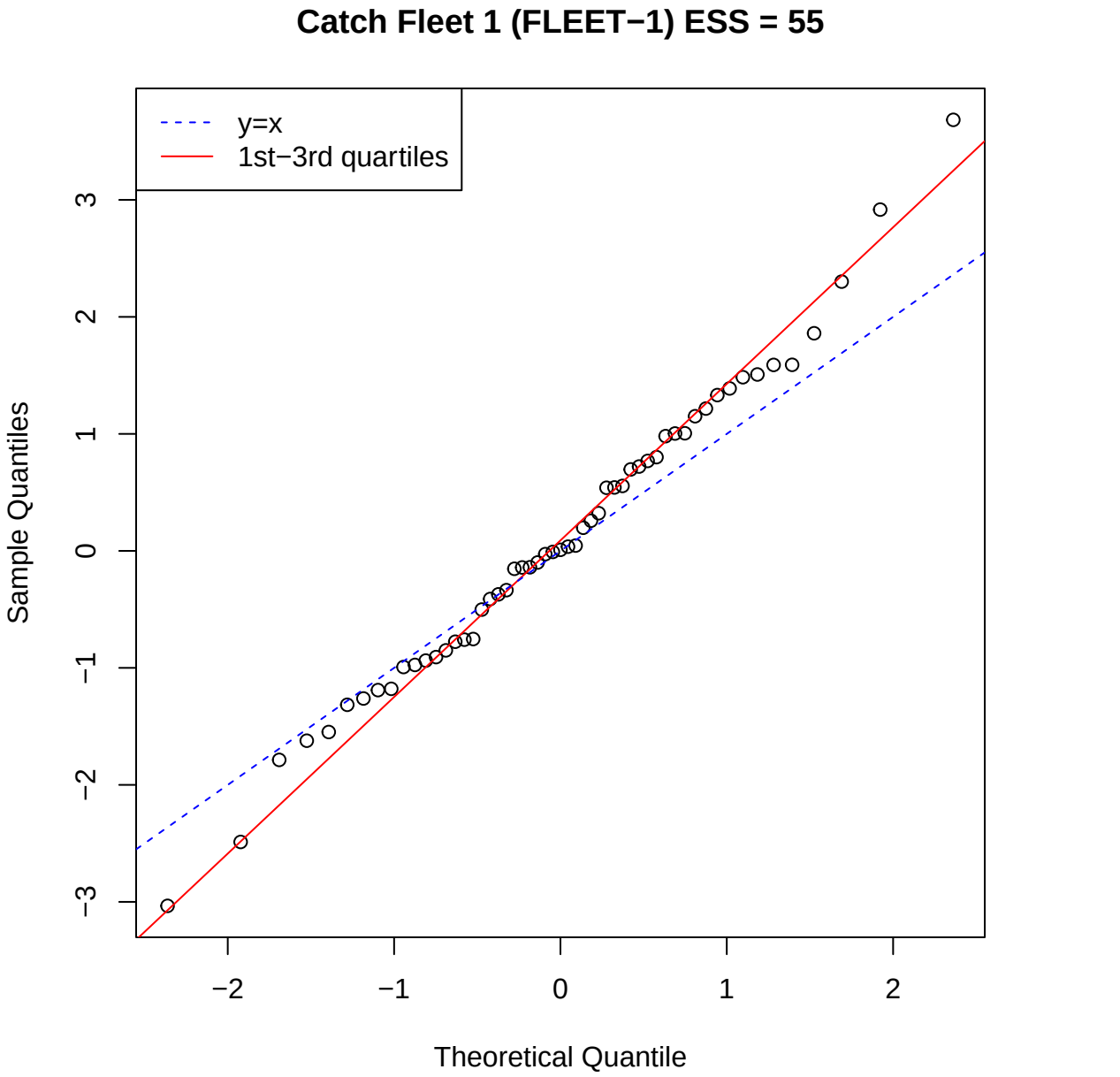

Catch
Year = 1997
Year = 2002
Year = 2007
Year = 1998
Year = 2003
Year = 2008
Year = 1999
Year = 2004
Year = 2009
Year = 2000
Year = 2005
Year = 2010
Year = 2001
Year = 2006
Year = 2011
Proportion at Age
Age
0.0
0.6
2
4
6
8
10

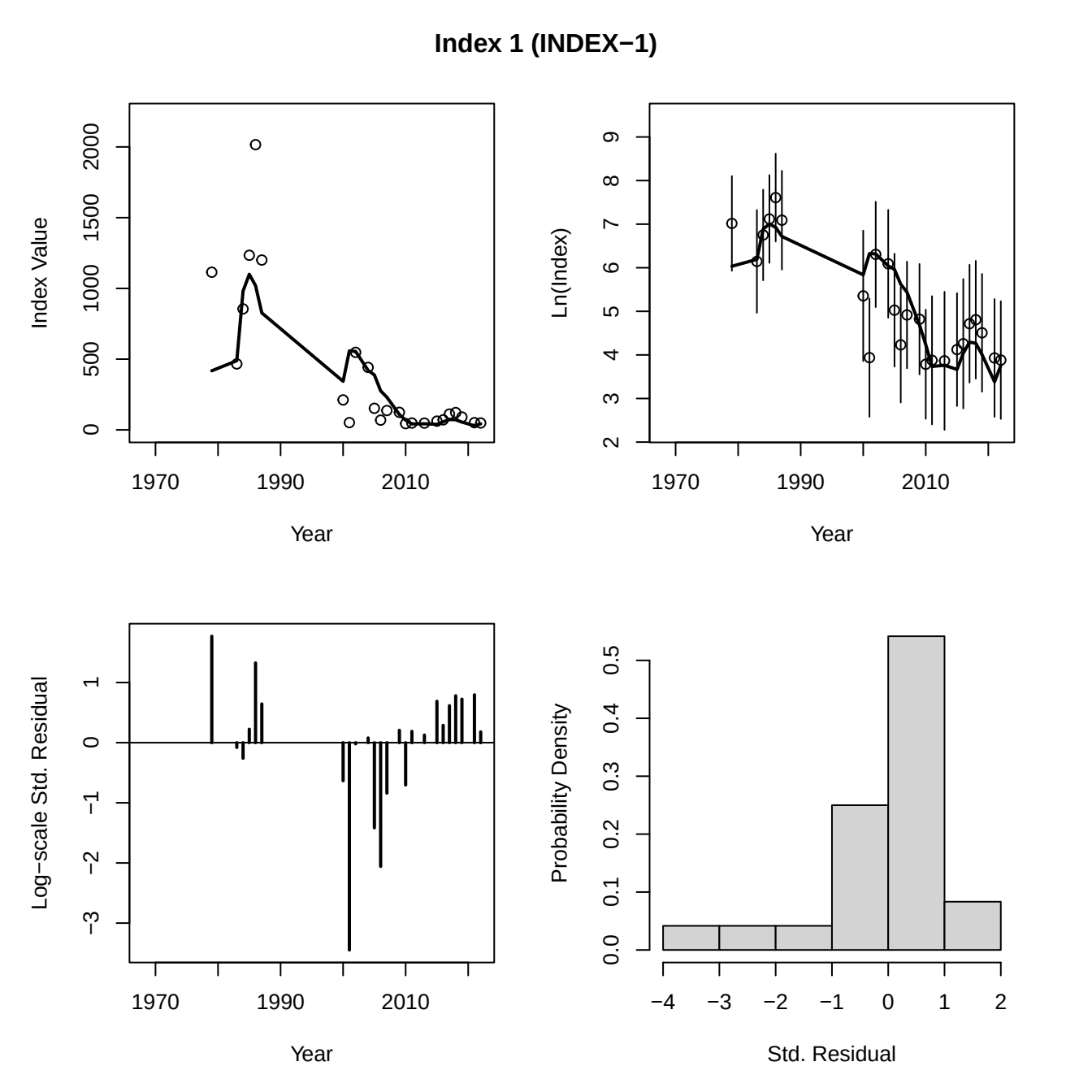

Catch
Year = 2012
Year = 2017
Year = 2022
Year = 2013
Year = 2018
Year = 2014
Year = 2019
Year = 2015
Year = 2020
Year = 2016
Year = 2021
Proportion at Age
Age
0.0
0.6
2
4
6
8
10

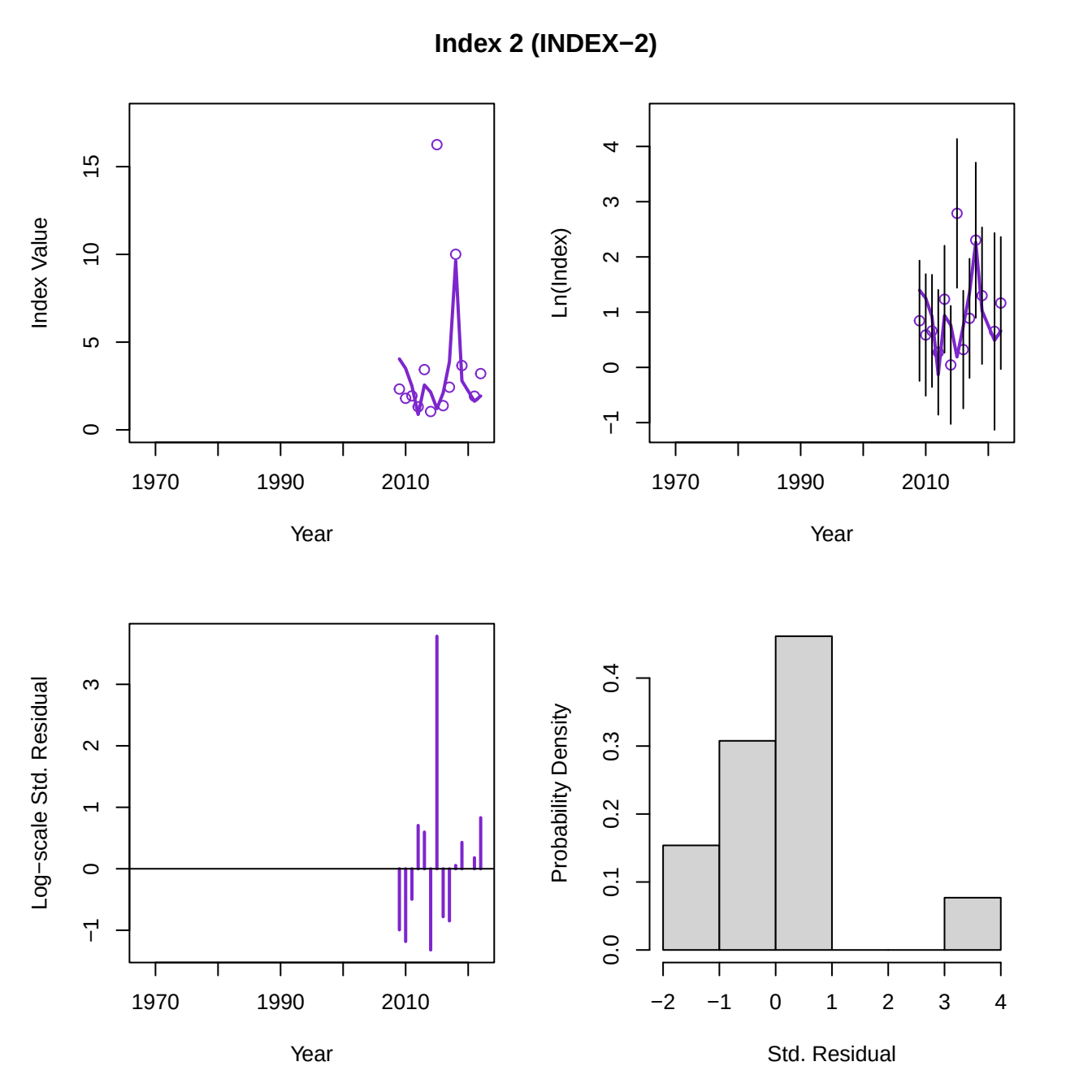

Age Comp Residuals for Catch by Fleet 1 (FLEET−1)
Neg.
Pos.
Max(resid)=4.72
0.2
0.43
0.78
Pearson Residuals (Obs−Pred)/SQRT(Pred*(1−Pred)/NESS)
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
1
2
3
4
5
6
7
8
9
10
Age
Mean resid = 0 SD(resid) = 0.87


Catch Neff Fleet 1 (FLEET−1)
Effective Sample Size
0
200
400
600
800
1000
1970
1980
1990
2000
2010
2020
Year

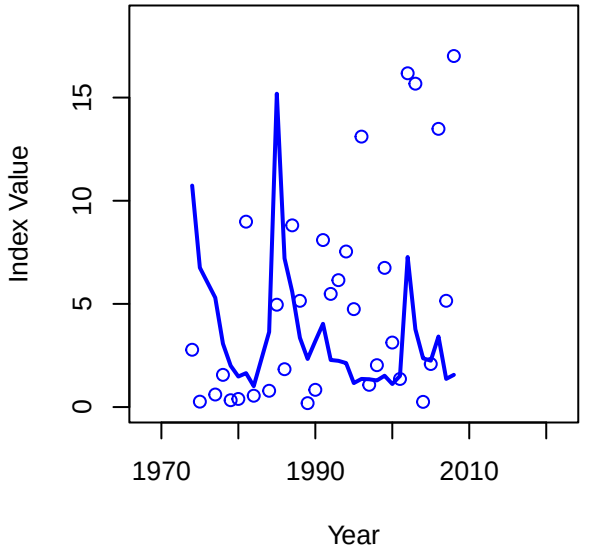

Catch Fleet 1 (FLEET−1) ESS = 55
Mean Age
0
2
4
6
8
10
1970
1980
1990
2000
2010
2020
Year
SDNR=1.28
RMSE=1.28
Std Resids
−2
0
2
1968
1974
1980
1986
1992
1998
2004
2010
2016
2022
Year

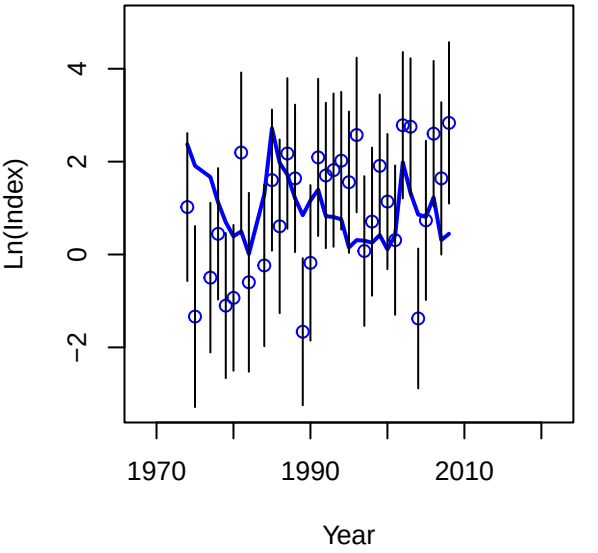

Catch Fleet 1 (FLEET−1) ESS = 55
y=x
1st−3rd quartiles
Sample Quantiles
Theoretical Quantile
−3
−2
−1
0
1
2
3
−2
−1
0
1
2

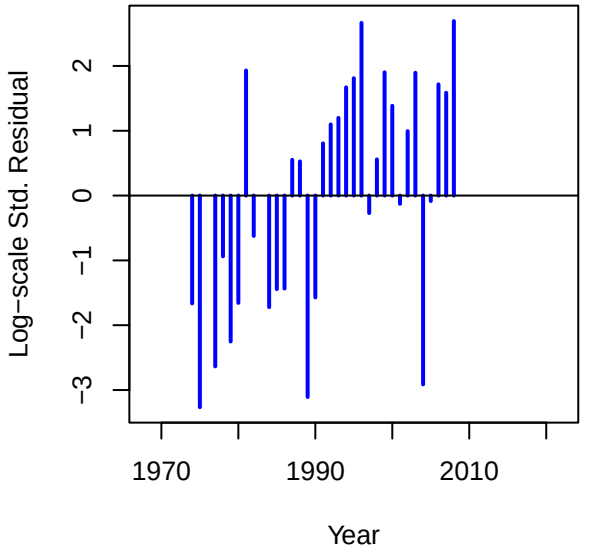

Index 1 (INDEX−1)
Index Value
0
500
1000
1500
2000
1970
1990
2010
Year
Ln(Index)
2
3
4
5
6
7
8
9
1970
1990
2010
Year
Log−scale Std. Residual
−3
−2
−1
0
1
1970
1990
2010
Year
Probability Density
0.0
0.1
0.2
0.3
0.4
0.5
−4
−3
−2
−1
0
1
2
Std. Residual

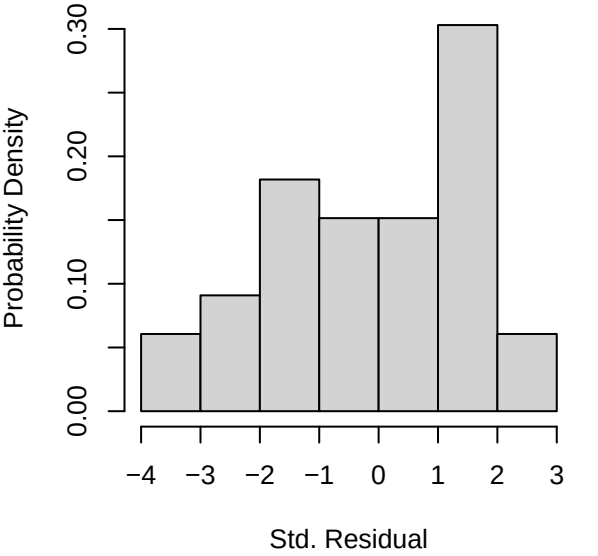

Index 2 (INDEX−2)
Index Value
0
5
10
15
1970
1990
2010
Year
Ln(Index)
−1
0
1
2
3
4
1970
1990
2010
Year
Log−scale Std. Residual
−1
0
1
2
3
1970
1990
2010
Year
Probability Density
0.0
0.1
0.2
0.3
0.4
−2
−1
0
1
2
3
4
Std. Residual

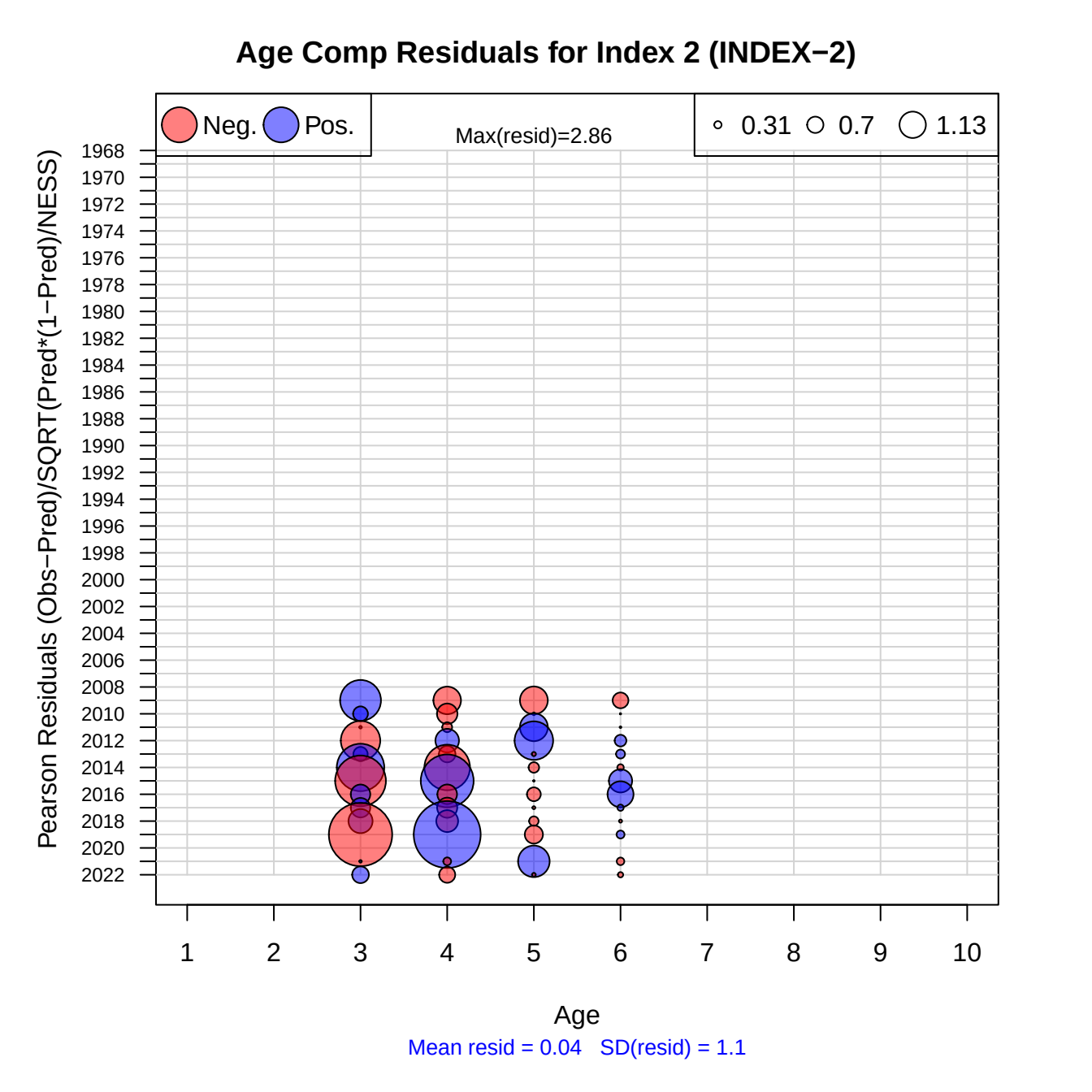
Index 3 (INDEX−3)

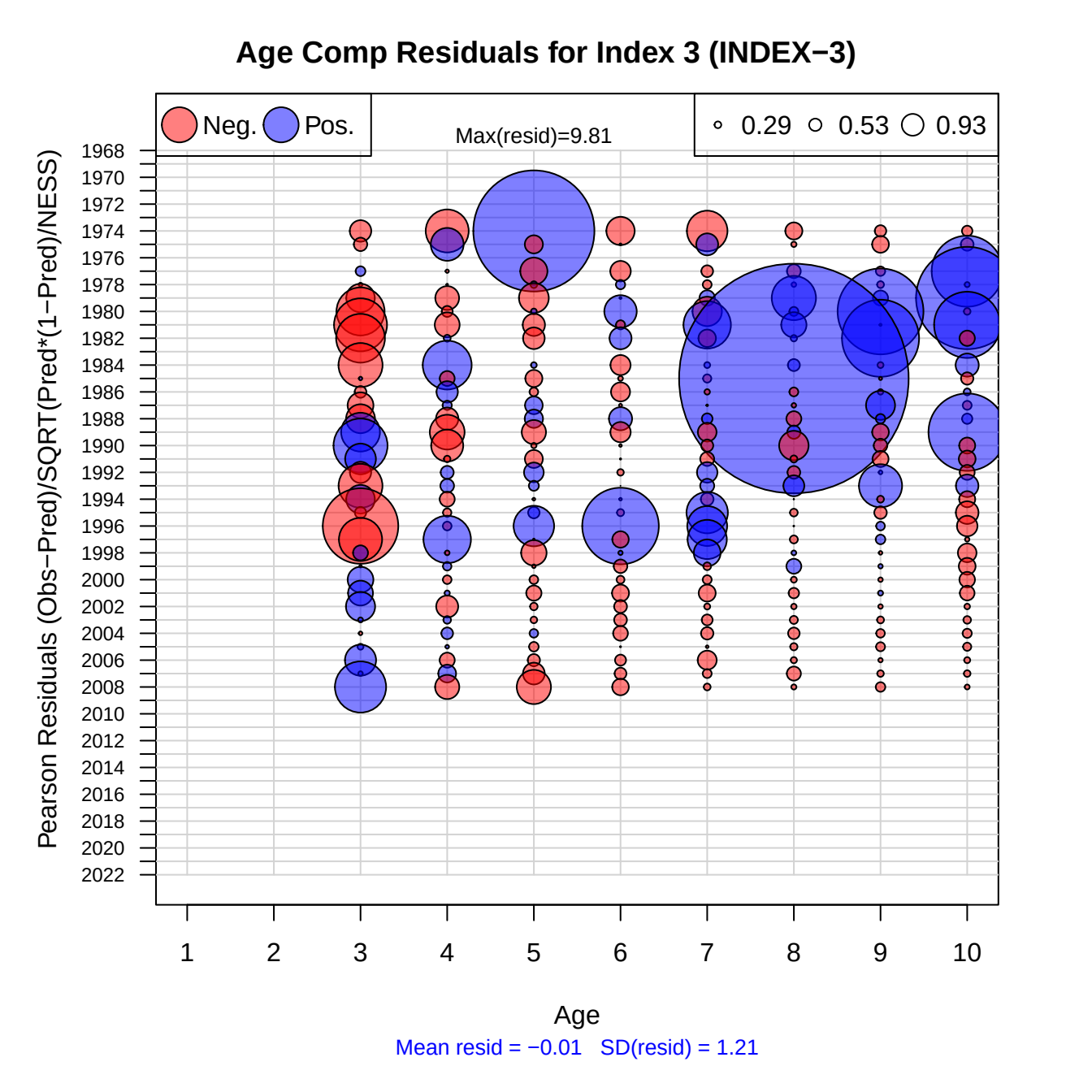


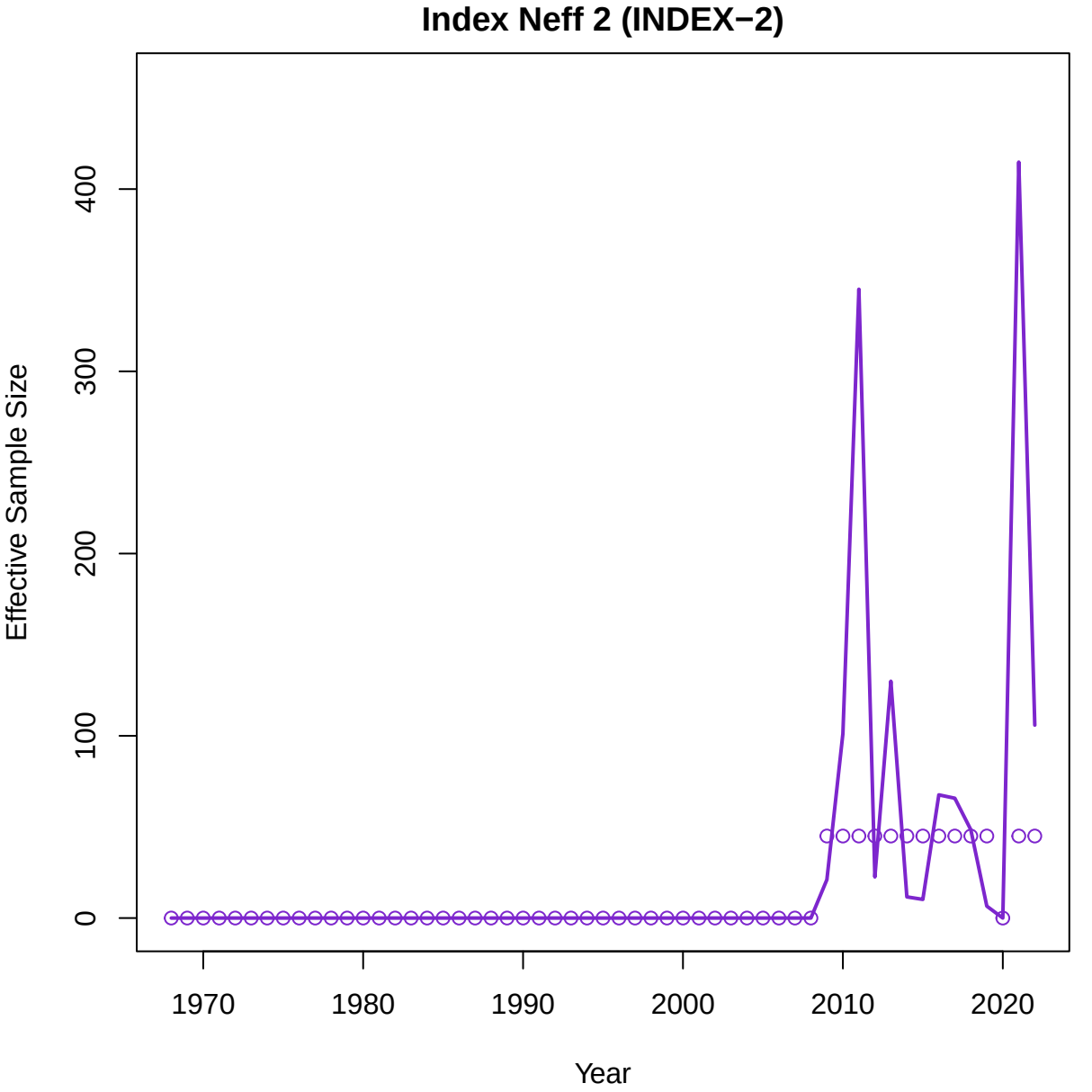


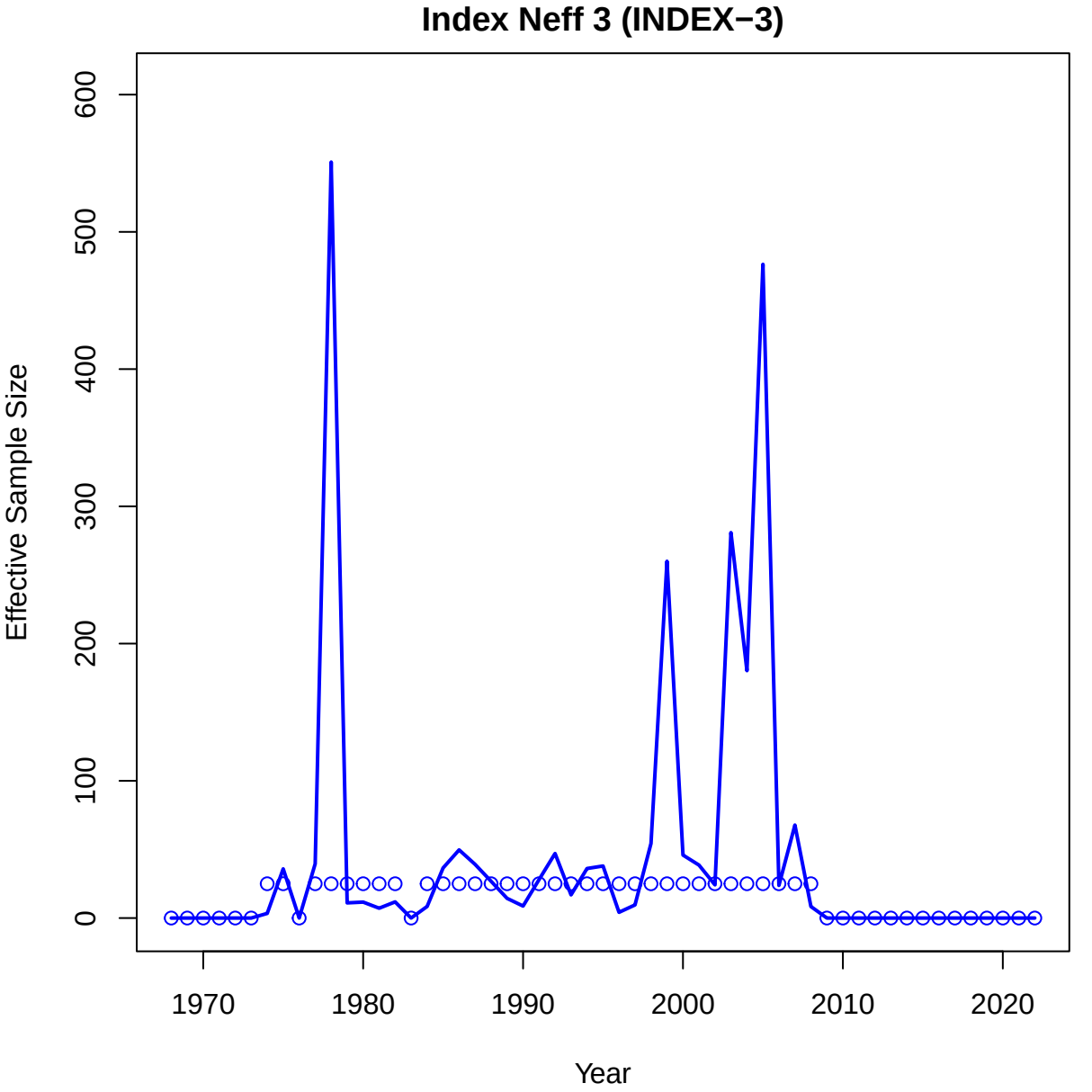


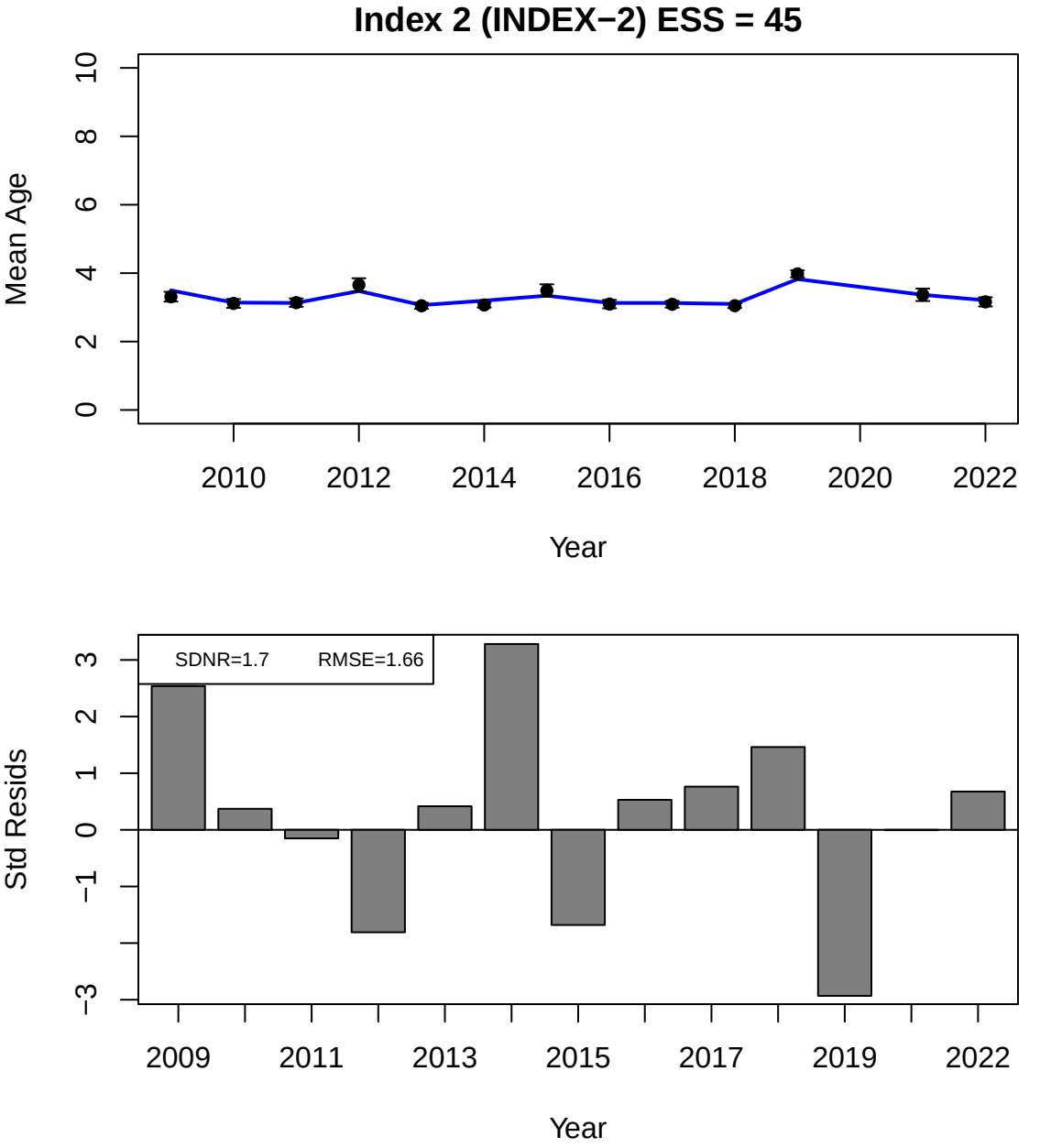


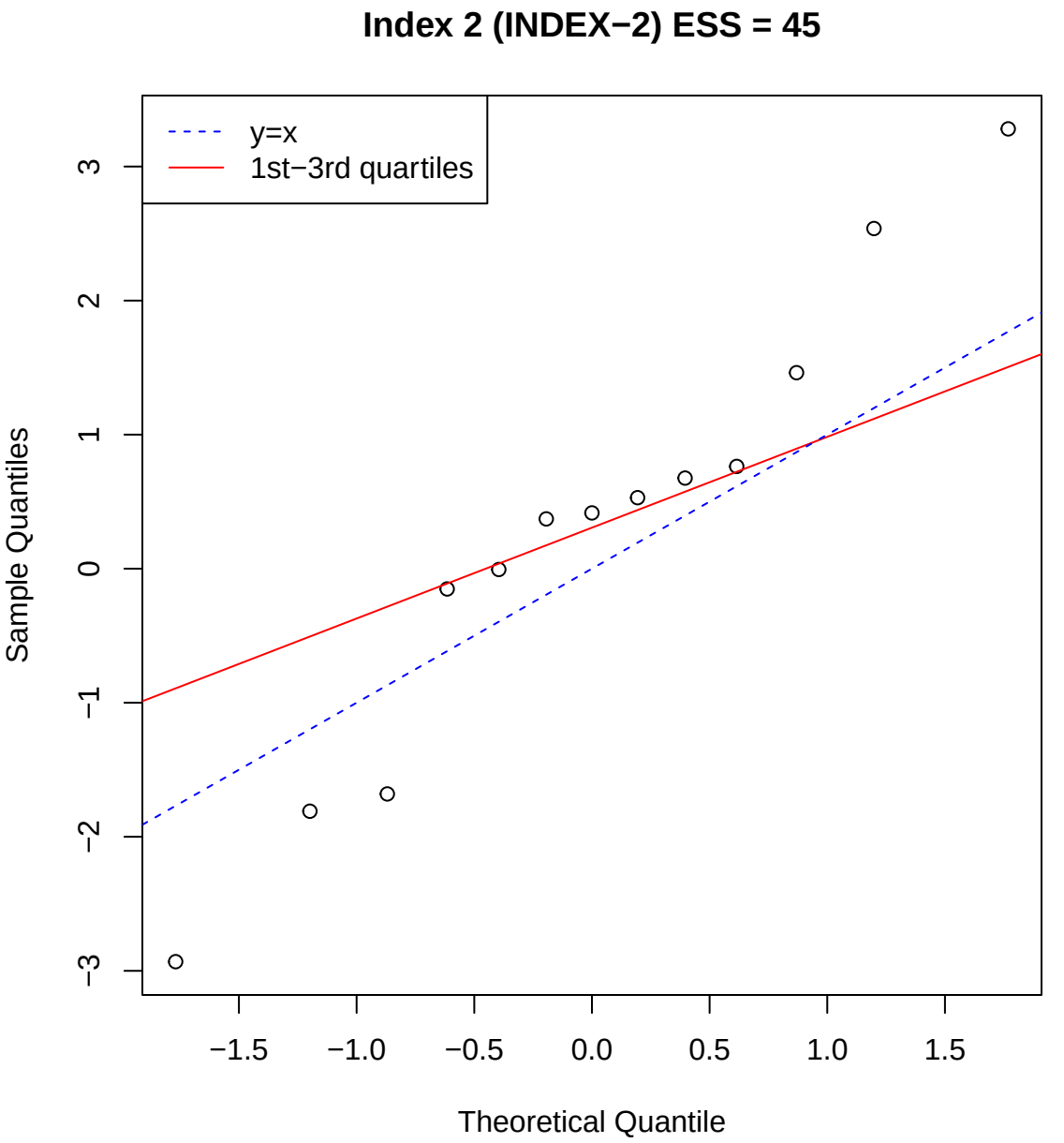

Age Comp Residuals for Index 2 (INDEX−2)
Neg.
Pos.
Max(resid)=2.86
0.31
0.7
1.13
Pearson Residuals (Obs−Pred)/SQRT(Pred*(1−Pred)/NESS)
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
1
2
3
4
5
6
7
8
9
10
Age
Mean resid = 0.04 SD(resid) = 1.1

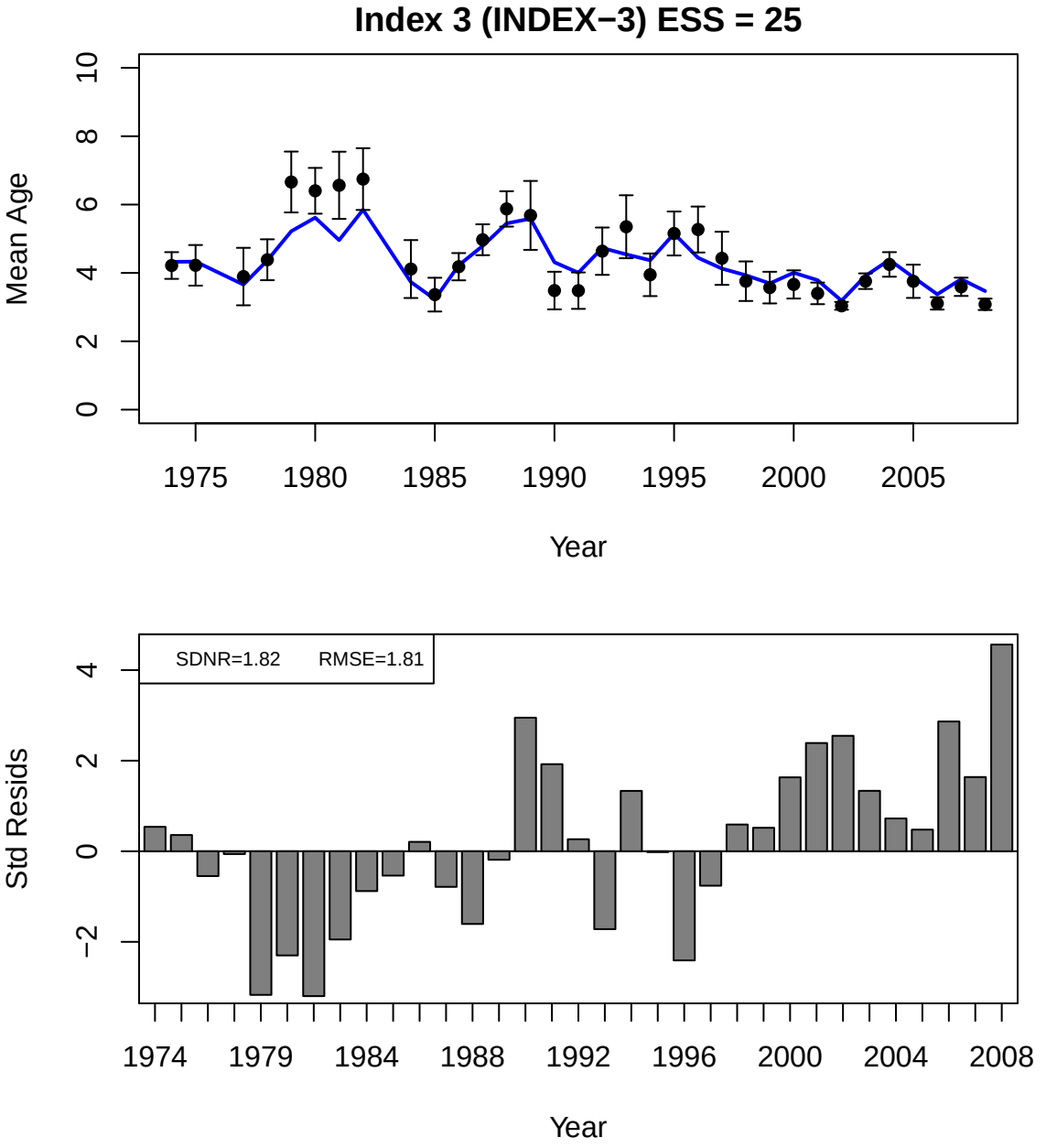

Age Comp Residuals for Index 3 (INDEX−3)
Neg.
Pos.
Max(resid)=9.81
0.29
0.53
0.93
Pearson Residuals (Obs−Pred)/SQRT(Pred*(1−Pred)/NESS)
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
1
2
3
4
5
6
7
8
9
10
Age
Mean resid = −0.01 SD(resid) = 1.21

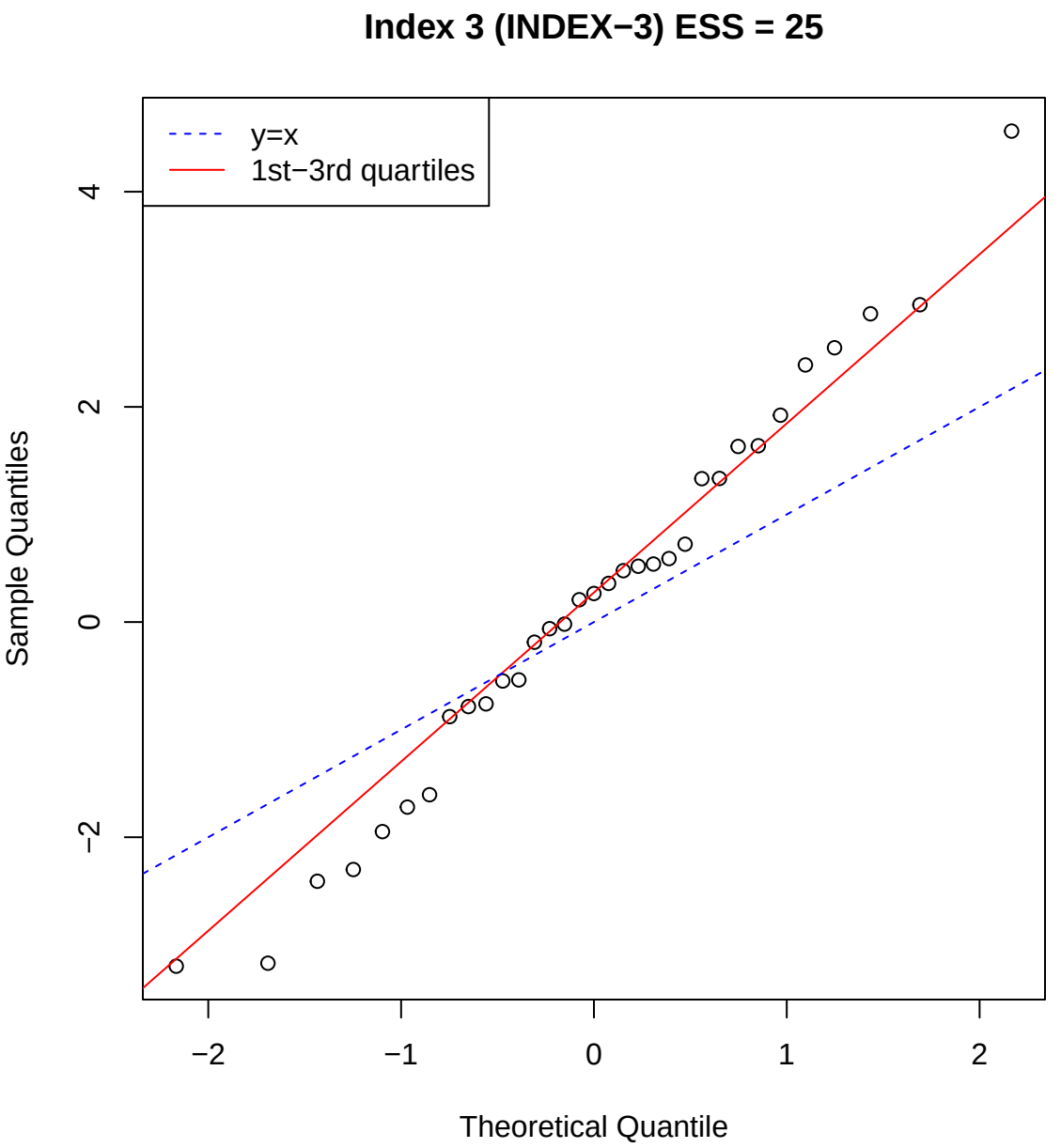

Index Neff 2 (INDEX−2)
Effective Sample Size
0
100
200
300
400
1970
1980
1990
2000
2010
2020
Year

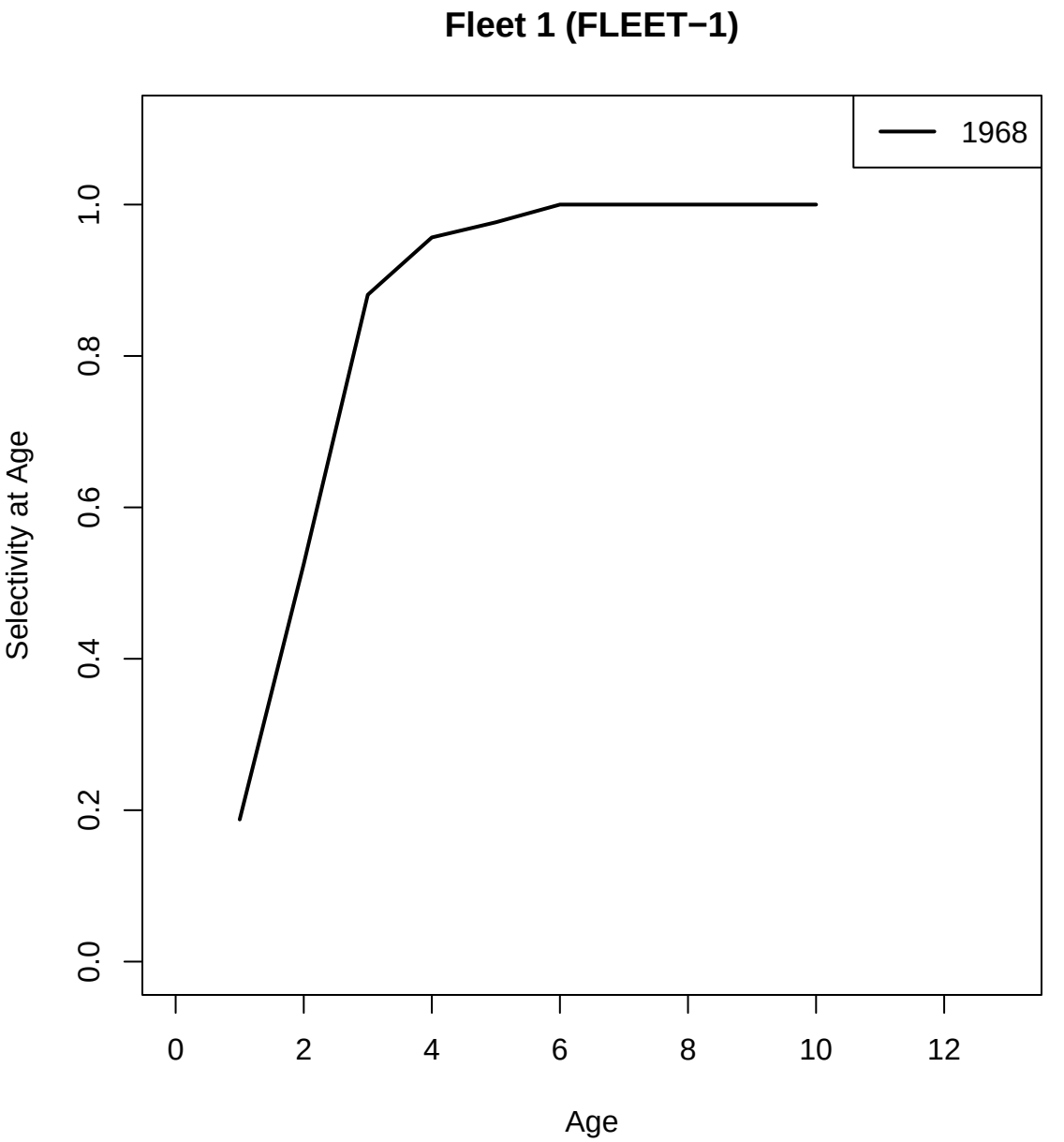

Index Neff 3 (INDEX−3)
Effective Sample Size
0
100
200
300
400
500
600
1970
1980
1990
2000
2010
2020
Year

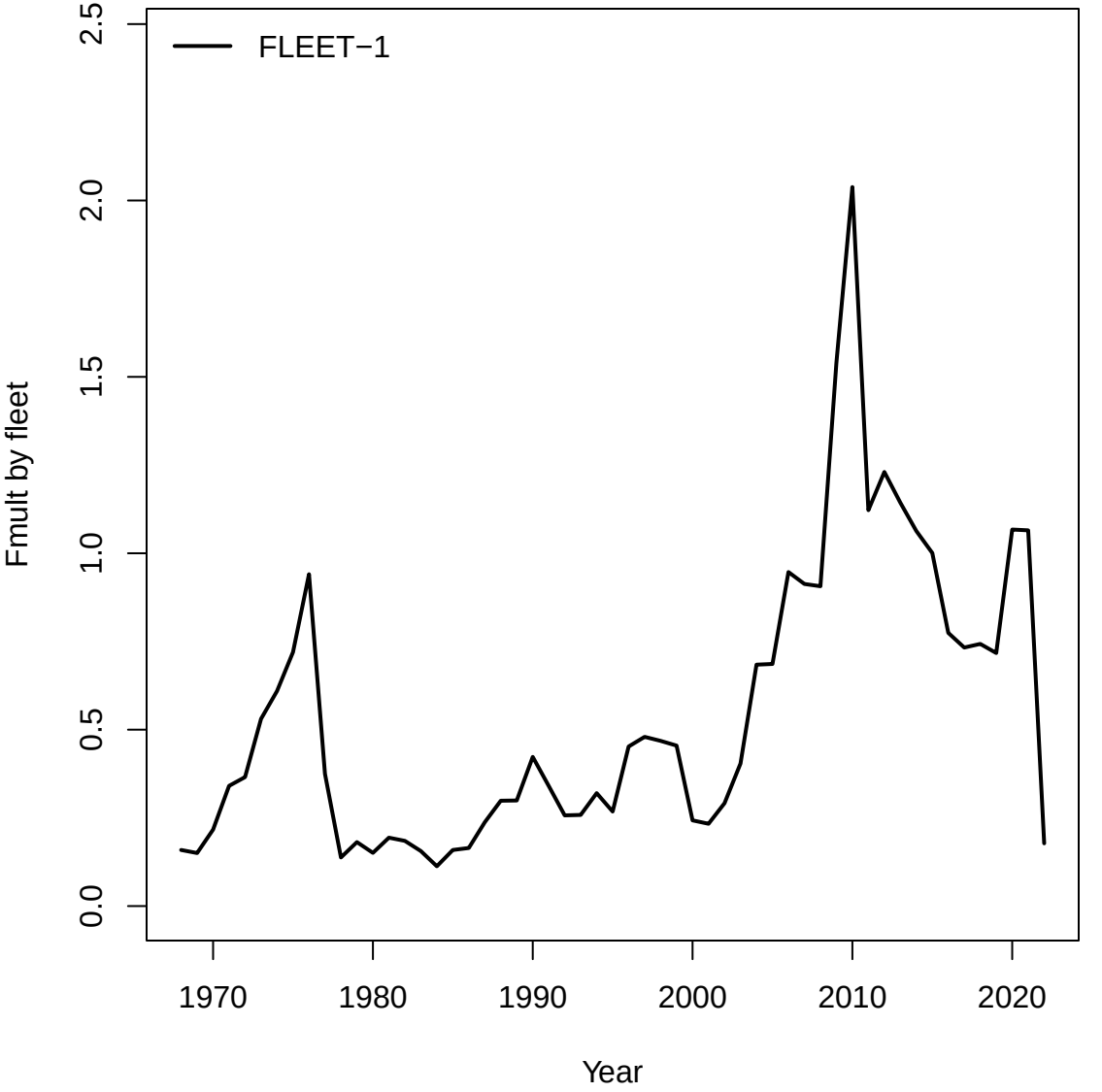

Index 2 (INDEX−2) ESS = 45
Mean Age
0
2
4
6
8
10
2010
2012
2014
2016
2018
2020
2022
Year
SDNR=1.7
RMSE=1.66
Std Resids
−3
−1
0
1
2
3
2009
2011
2013
2015
2017
2019
2022
Year

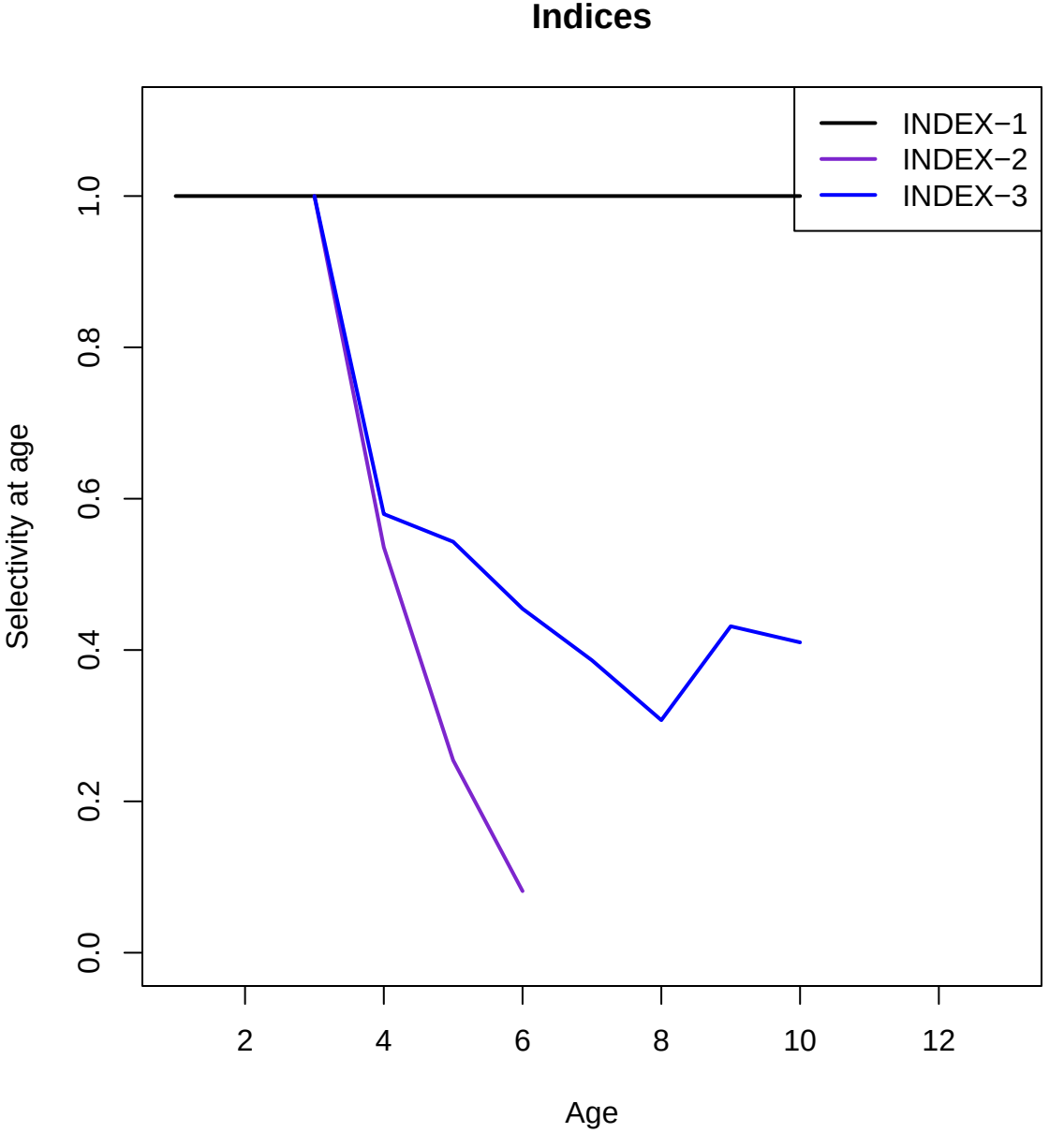

Index 2 (INDEX−2) ESS = 45
y=x
1st−3rd quartiles
Sample Quantiles
Theoretical Quantile
−3
−2
−1
0
1
2
3
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5

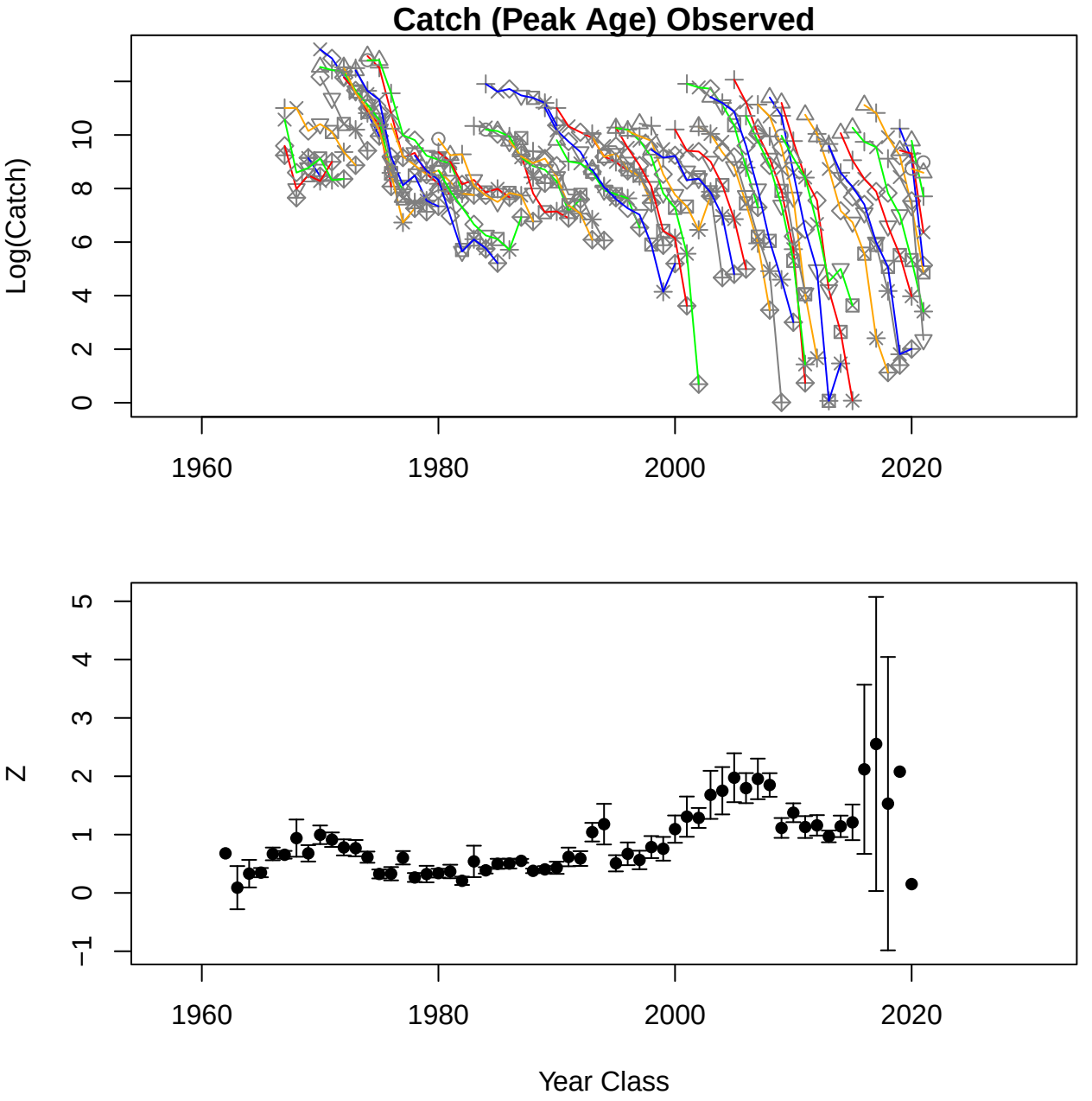

Index 3 (INDEX−3) ESS = 25
Mean Age
0
2
4
6
8
10
1975
1980
1985
1990
1995
2000
2005
Year
SDNR=1.82
RMSE=1.81
Std Resids
−2
0
2
4
1974
1979
1984
1988
1992
1996
2000
2004
2008
Year

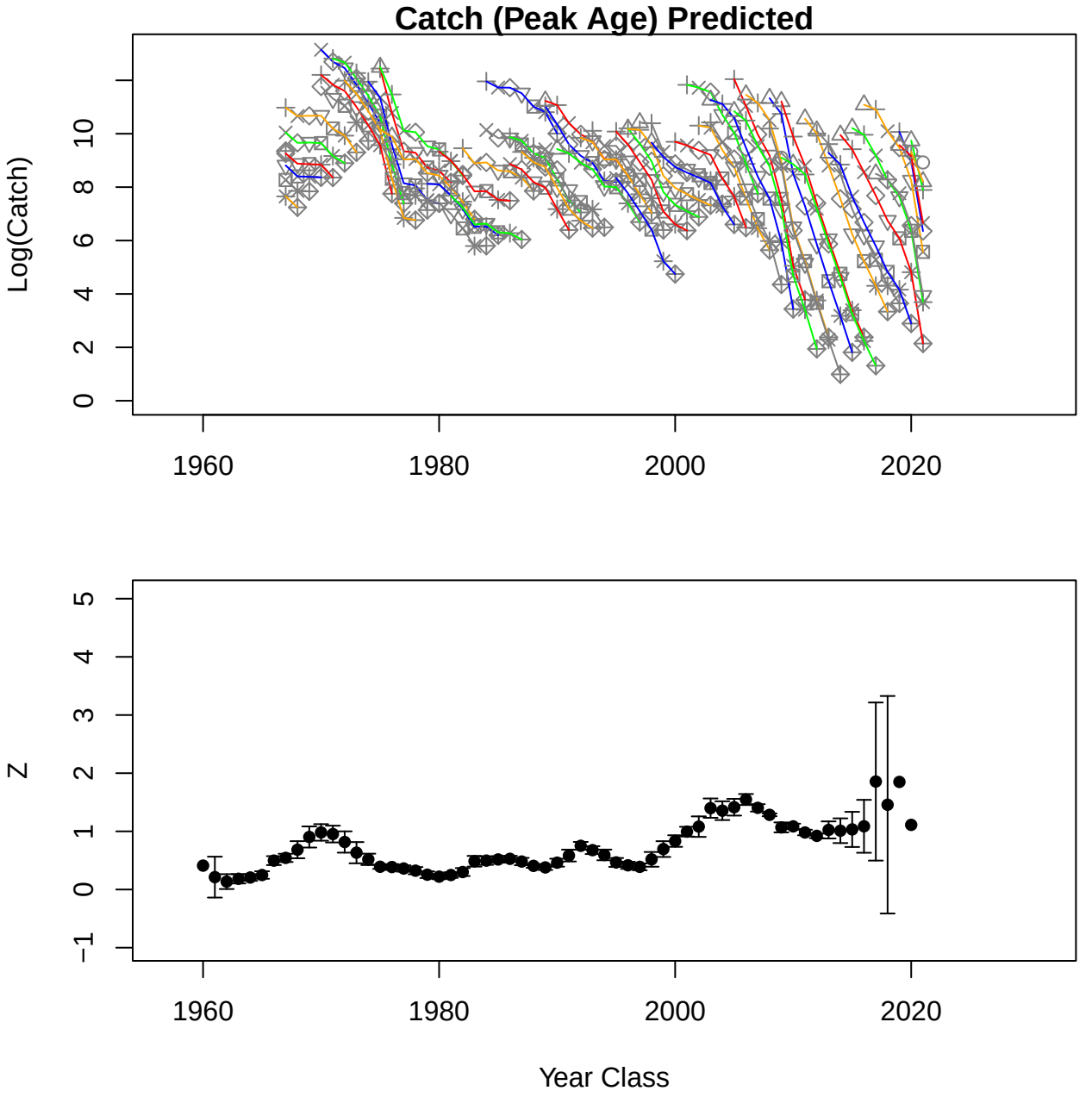

Index 3 (INDEX−3) ESS = 25
y=x
1st−3rd quartiles
Sample Quantiles
Theoretical Quantile
4
2
0
−2
−2
−1
0
1
2

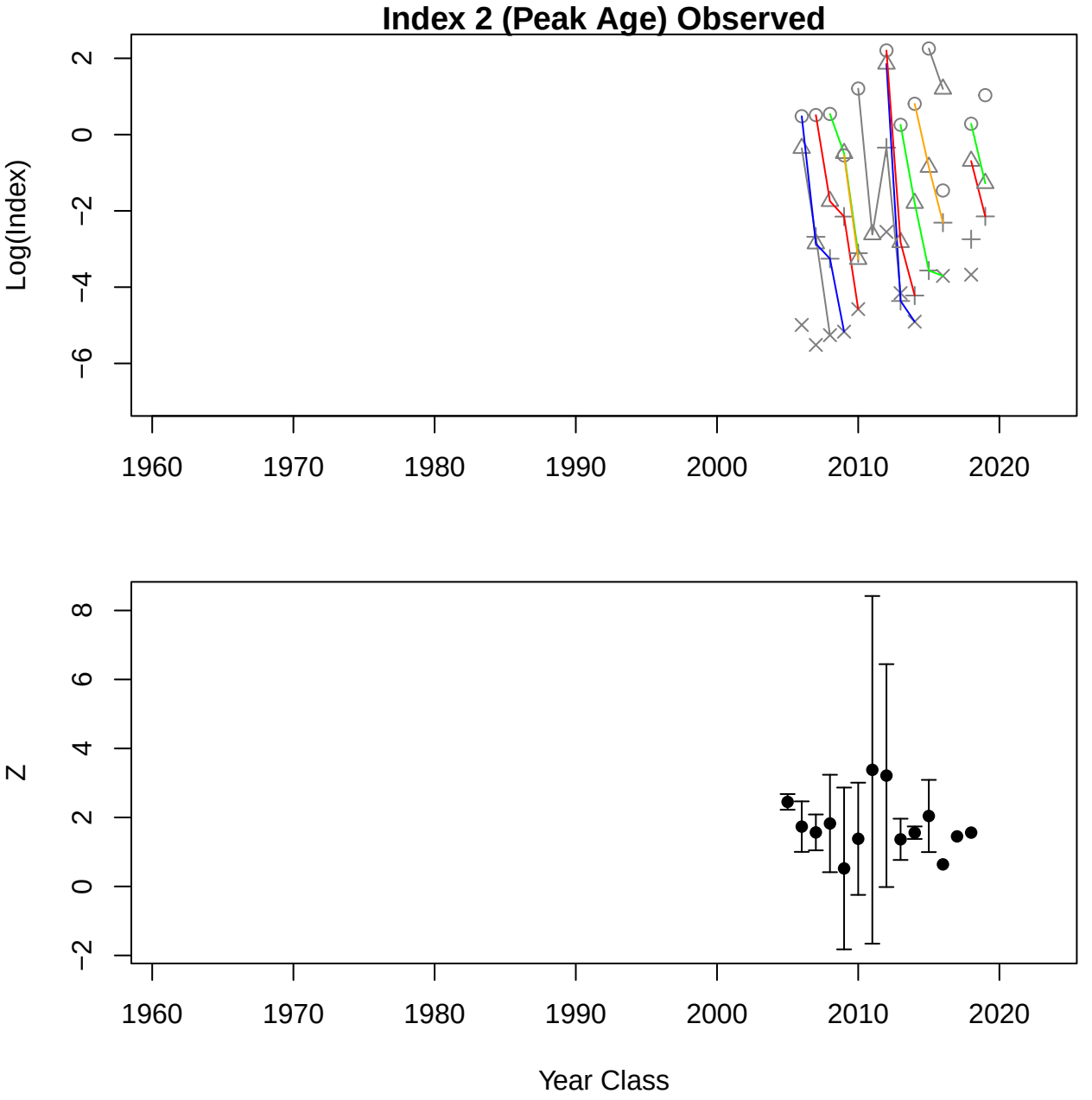

Fleet 1 (FLEET−1)
1968
Selectivity at Age
0.0
0.2
0.4
0.6
0.8
1.0
0
2
4
6
8
10
12
Age

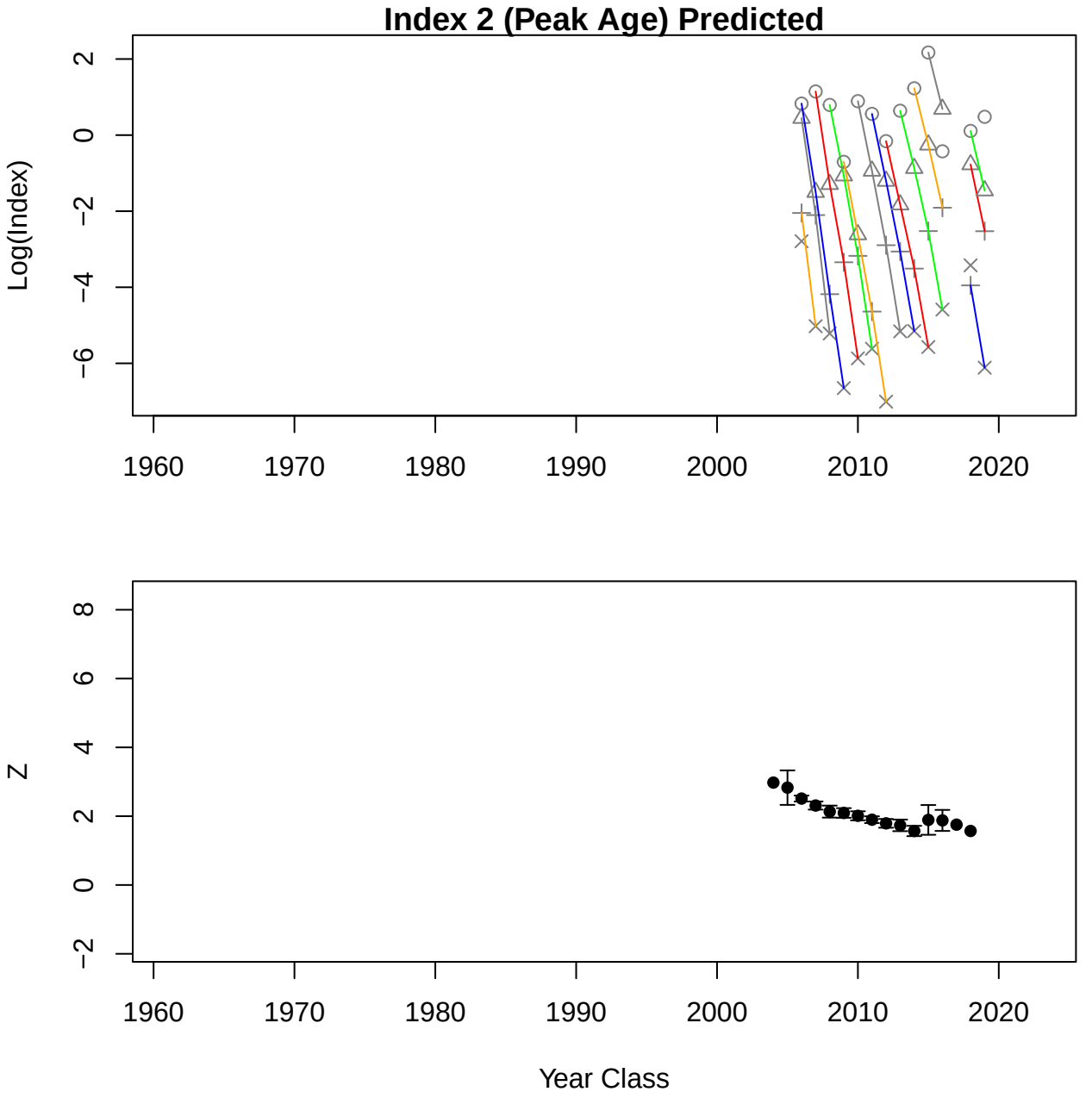

FLEET−1
Fmult by fleet
0.0
0.5
1.0
1.5
2.0
2.5
1970
1980
1990
2000
2010
2020
Year

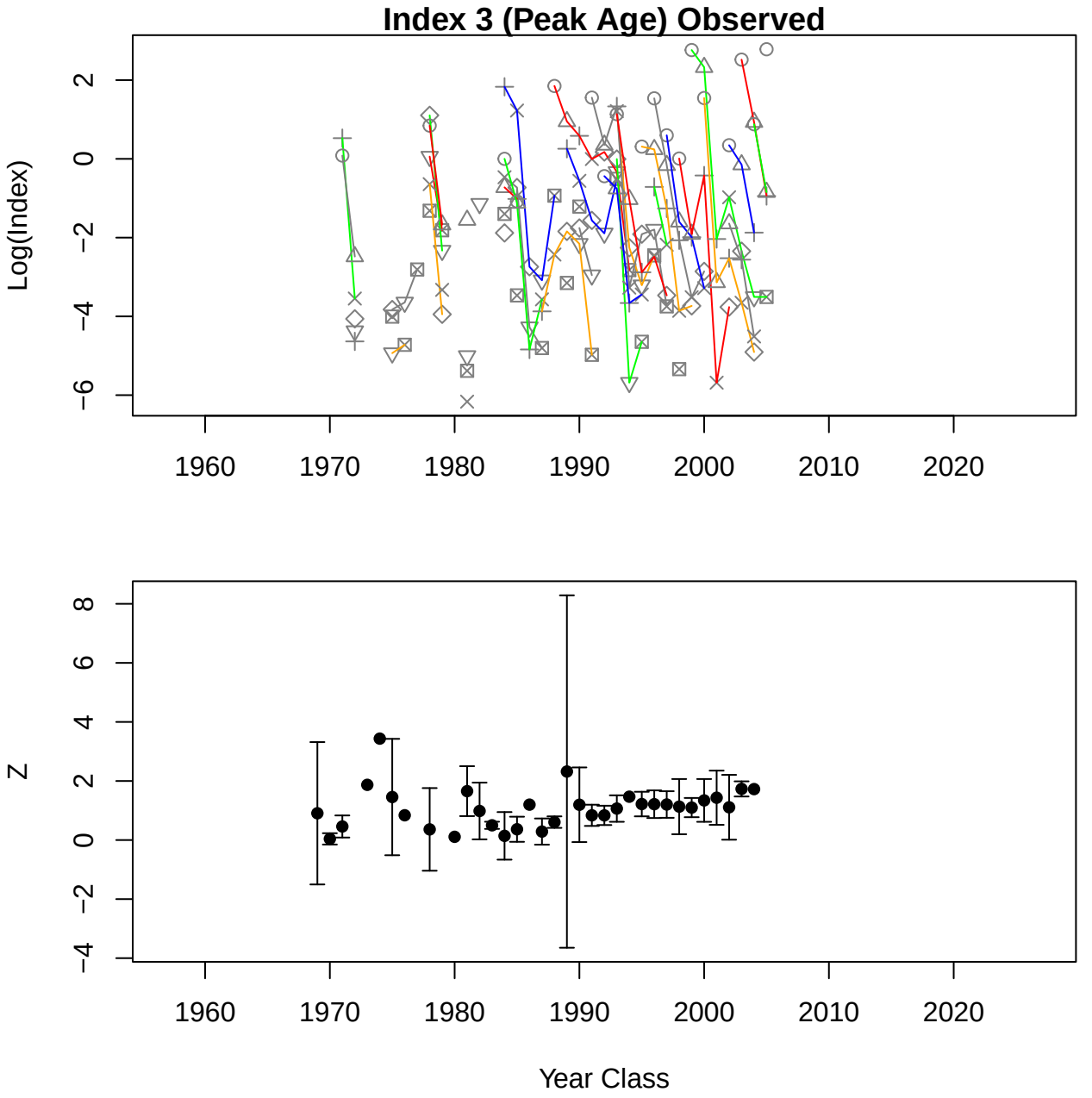

Indices
INDEX−1
INDEX−2
INDEX−3
Selectivity at age
0.0
0.2
0.4
0.6
0.8
1.0
2
4
6
8
10
12
Age

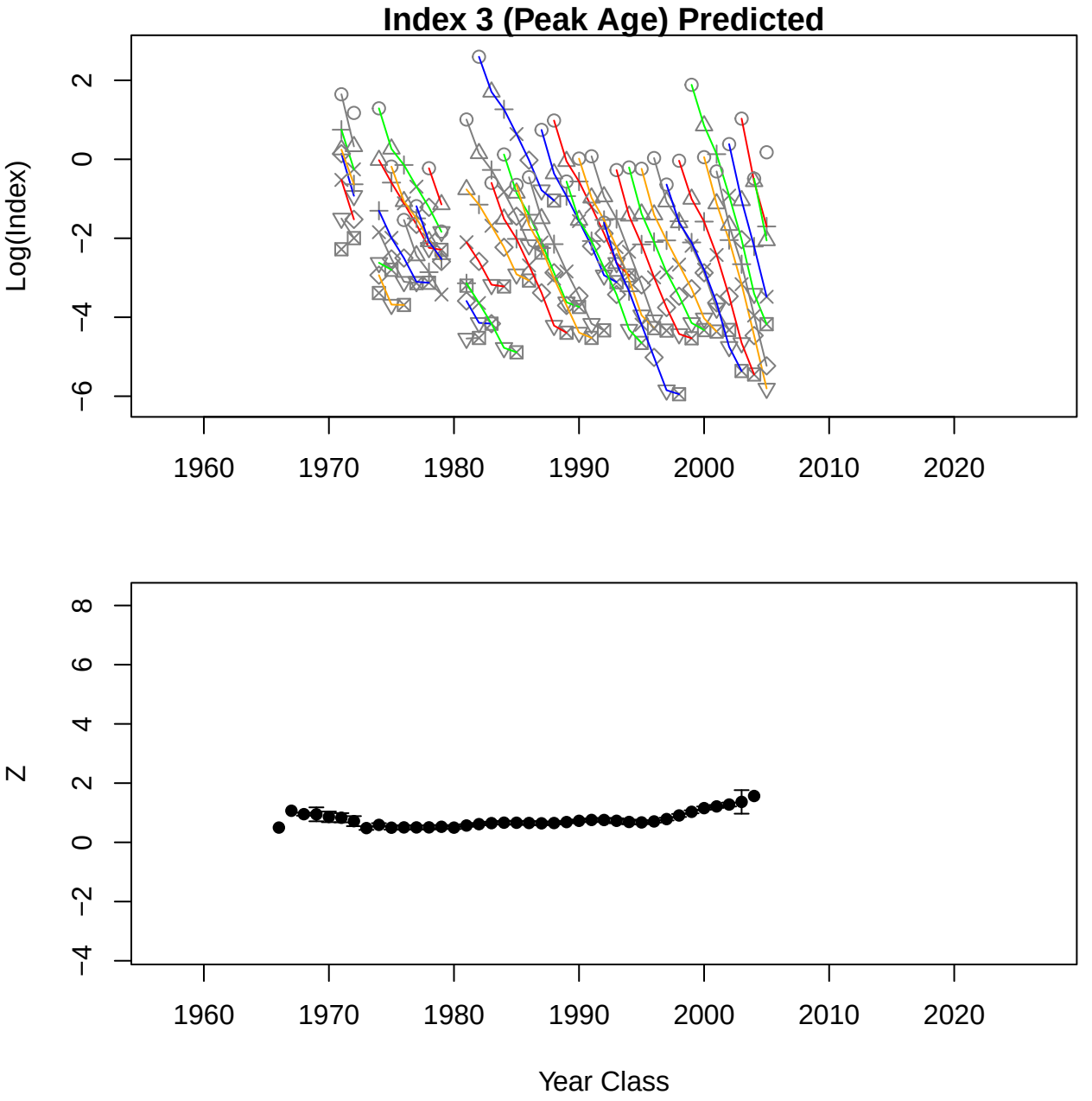

Catch (Peak Age) Observed
Log(Catch)
0
2
4
6
8
10
1960
1980
2000
2020
Z
−1
0
1
2
3
4
5
1960
1980
2000
2020
Year Class

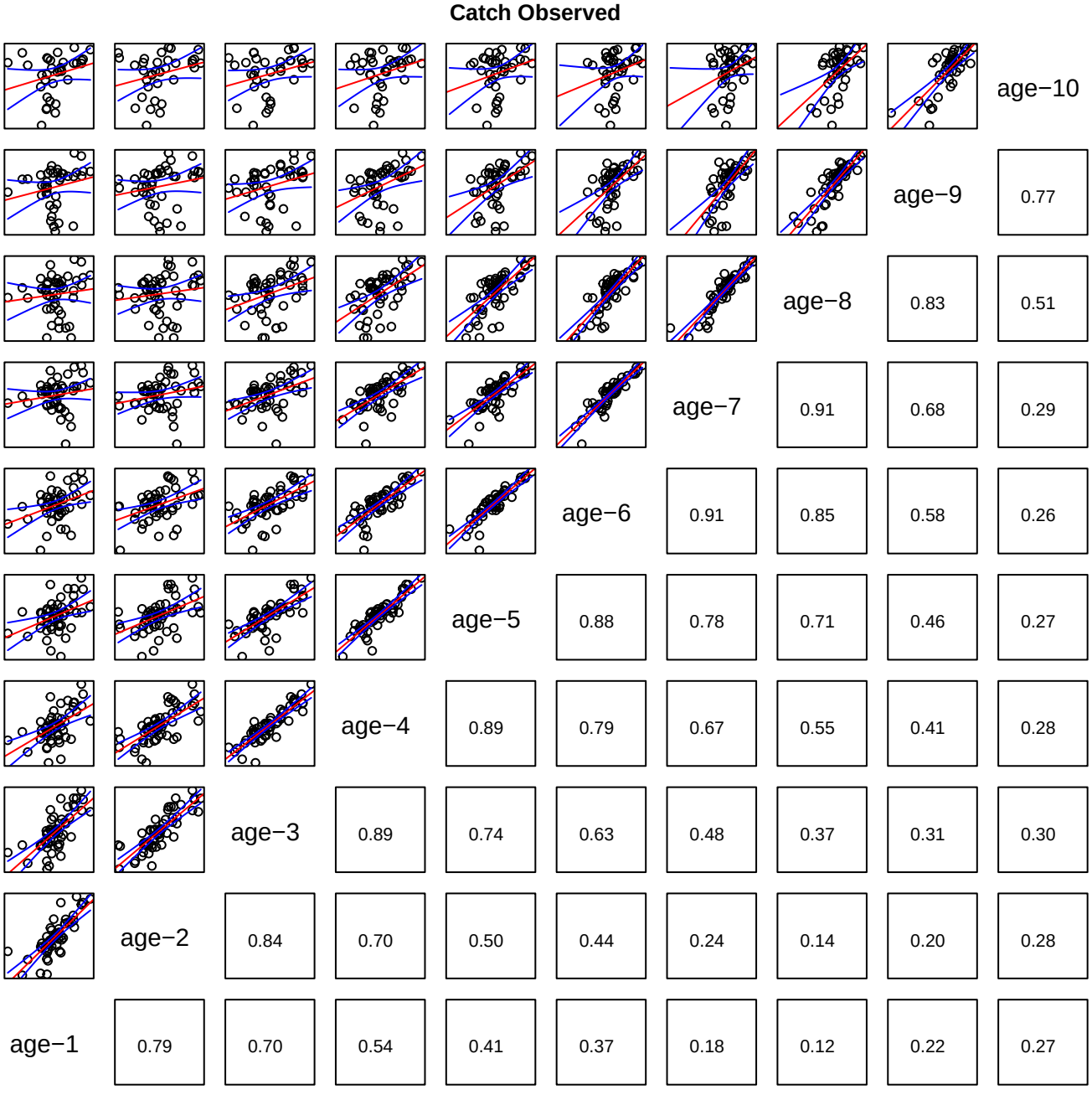

Catch (Peak Age) Predicted
Log(Catch)
0
2
4
6
8
10
1960
1980
2000
2020
Z
−1
0
1
2
3
4
5
1960
1980
2000
2020
Year Class

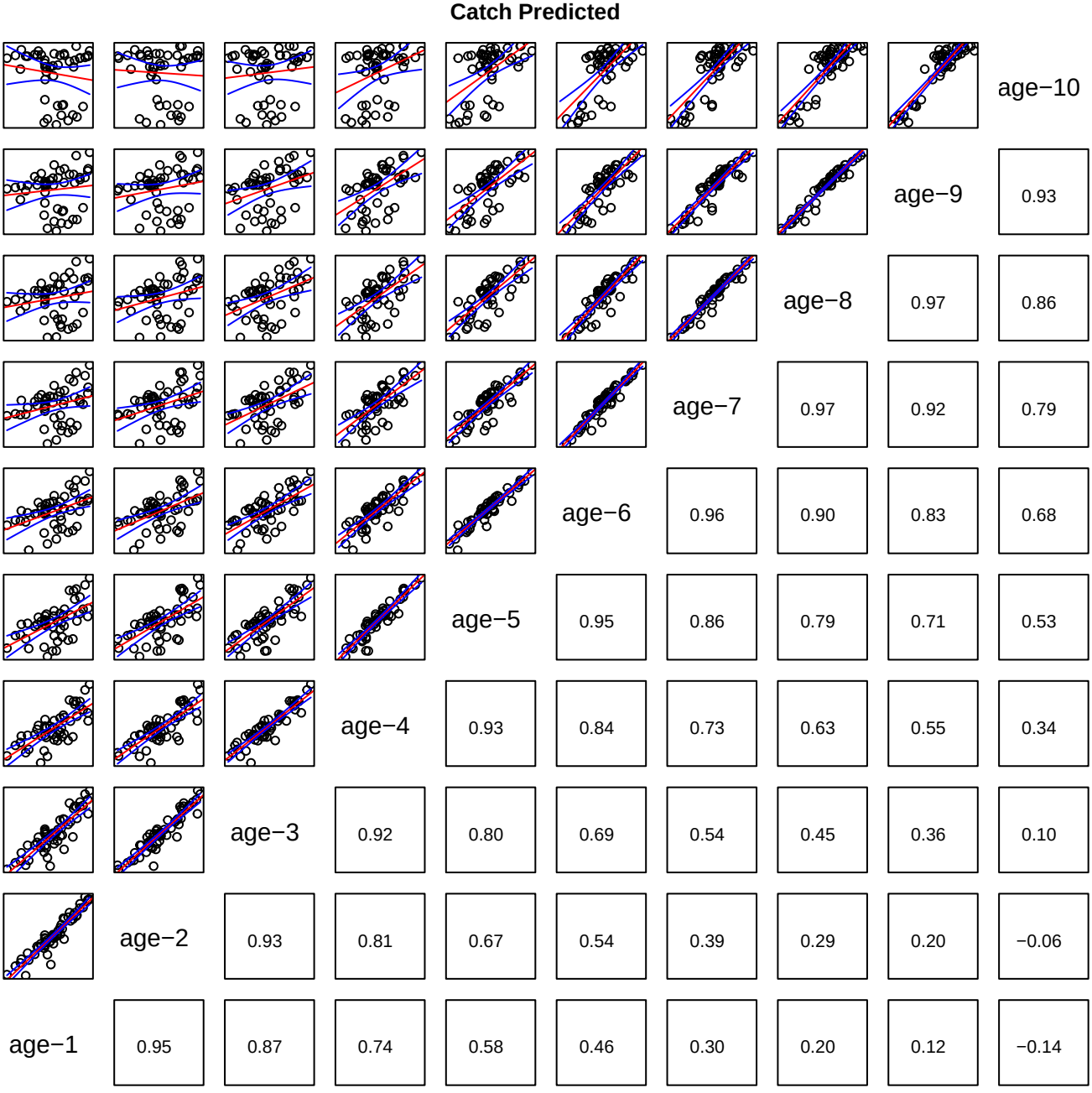

Index 2 (Peak Age) Observed
Log(Index)
2
0
−2
−4
−6
1960
1970
1980
1990
2000
2010
2020
Z
8
6
4
2
0
−2
1960
1970
1980
1990
2000
2010
2020
Year Class

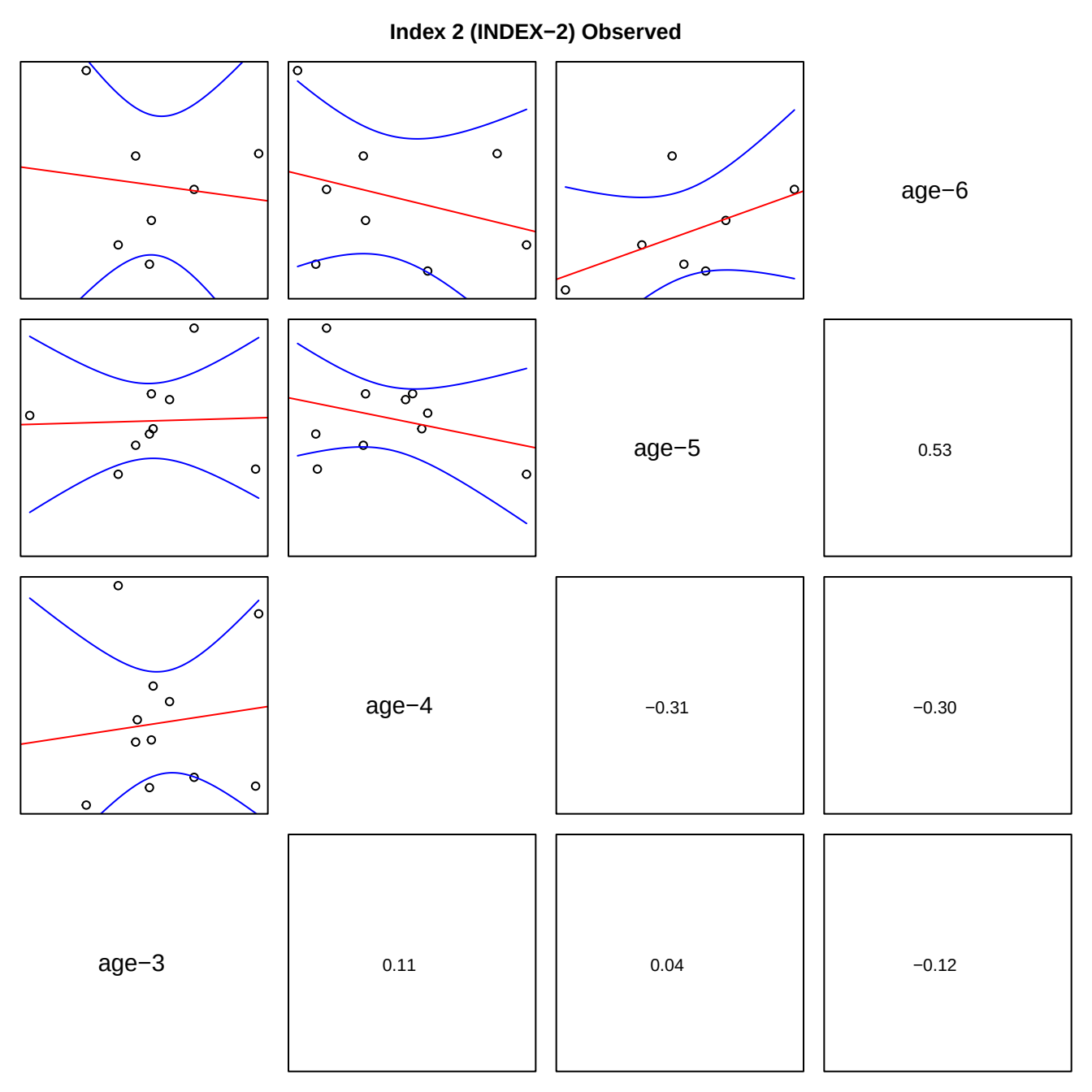

Index 2 (Peak Age) Predicted
Log(Index)
2
0
−2
−4
−6
1960
1970
1980
1990
2000
2010
2020
Z
8
6
4
2
0
−2
1960
1970
1980
1990
2000
2010
2020
Year Class


Index 3 (Peak Age) Observed
Log(Index)
2
0
−2
−4
−6
1960
1970
1980
1990
2000
2010
2020
Z
8
6
4
2
0
−2
−4
1960
1970
1980
1990
2000
2010
2020
Year Class

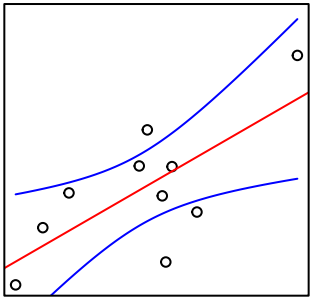

Index 3 (Peak Age) Predicted
Log(Index)
2
0
−2
−4
−6
1960
1970
1980
1990
2000
2010
2020
Z
8
6
4
2
0
−2
−4
1960
1970
1980
1990
2000
2010
2020
Year Class

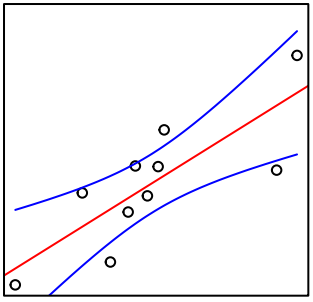

Catch Observed
age−10
age−9
0.77
age−8
0.83
0.51
age−7
0.91
0.68
0.29
age−6
0.91
0.85
0.58
0.26
age−5
0.88
0.78
0.71
0.46
0.27
age−4
0.89
0.79
0.67
0.55
0.41
0.28
age−3
0.89
0.74
0.63
0.48
0.37
0.31
0.30
age−2
0.84
0.70
0.50
0.44
0.24
0.14
0.20
0.28
age−1
0.79
0.70
0.54
0.41
0.37
0.18
0.12
0.22
0.27

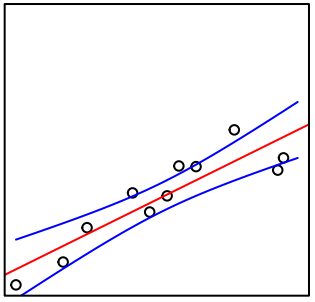

Catch Predicted
age−10
age−9
0.93
age−8
0.97
0.86
age−7
0.97
0.92
0.79
age−6
0.96
0.90
0.83
0.68
age−5
0.95
0.86
0.79
0.71
0.53
age−4
0.93
0.84
0.73
0.63
0.55
0.34
age−3
0.92
0.80
0.69
0.54
0.45
0.36
0.10
age−2
0.93
0.81
0.67
0.54
0.39
0.29
0.20
−0.06
age−1
0.95
0.87
0.74
0.58
0.46
0.30
0.20
0.12
−0.14


Index 2 (INDEX−2) Observed
age−6
age−5
0.53
age−4
−0.31
−0.30
age−3
0.11
0.04
−0.12

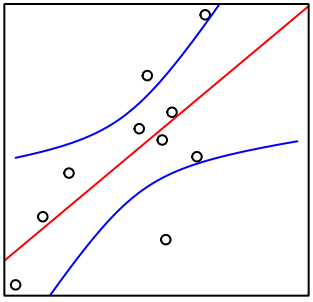
Index 2 (INDEX−2) Predicted

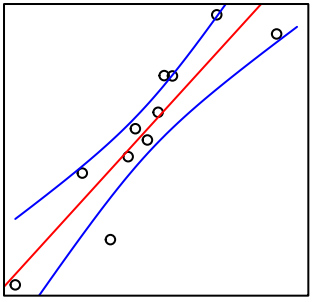






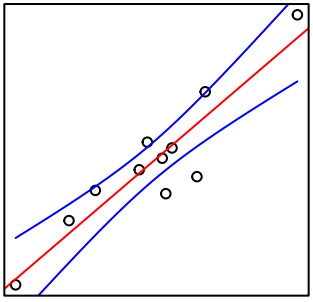
age−6





age−5

0.90



age−4

0.91

0.81

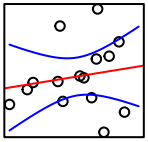
age−3

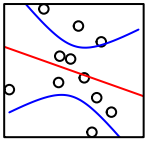
0.92

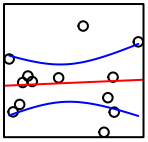
0.69

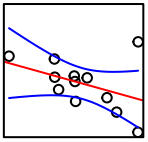
0.72

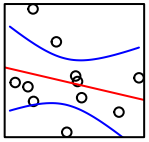
Index 3 (INDEX−3) Observed

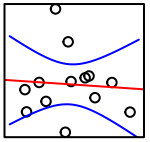


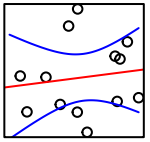




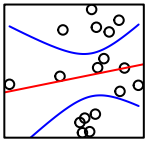


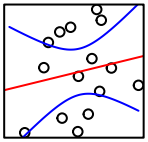


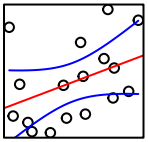


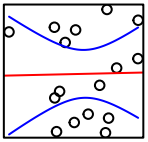


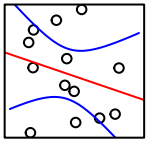
age−10

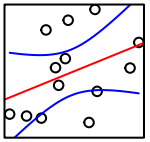






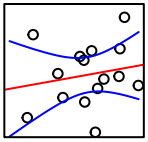


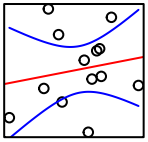


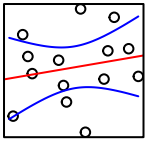


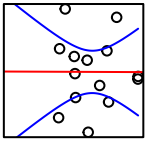
age−9

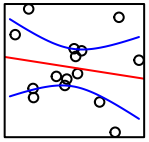
0.13







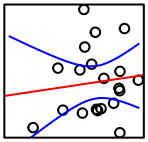


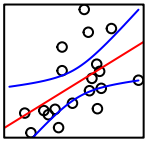


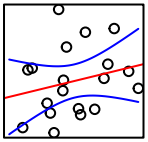
age−8

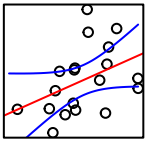
0.40

−0.07







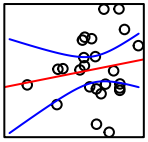


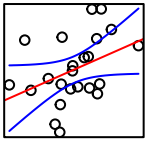
age−7

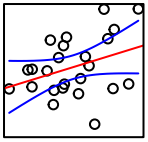
−0.17

−0.26

−0.27







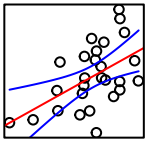
age−6

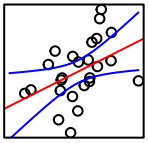
0.42

0.00

0.02

−0.42





age−5

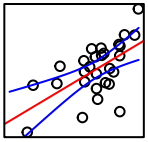
0.35

0.24

0.20

0.40

0.07



age−4

0.44

0.40

0.52

0.18

0.18

−0.28

age−3

0.60

0.52

0.16

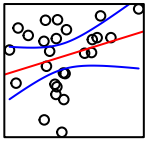
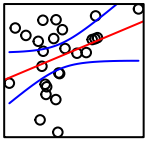
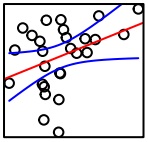
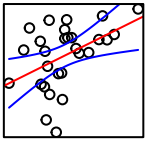
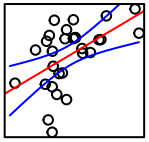
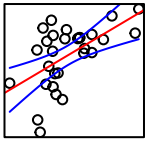
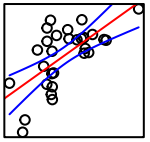
0.11

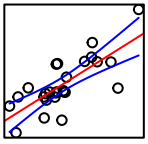
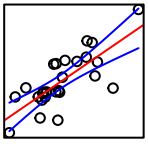
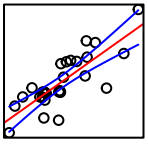
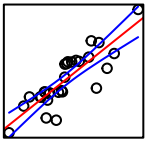
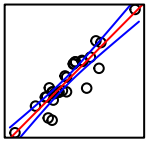
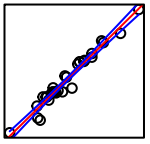
0.19

0.15

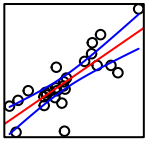
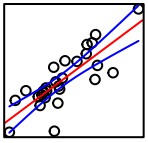
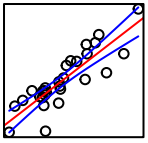
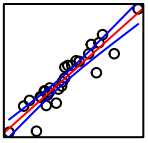
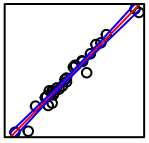
0.17

Index 3 (INDEX−3) Predicted








age−10

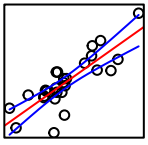
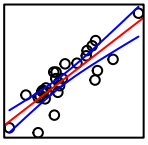
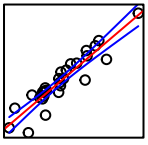
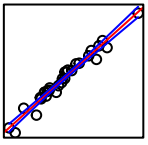






age−9

0.66






age−8

0.98

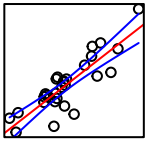
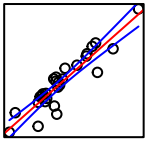
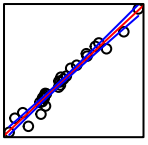
0.57





age−7

0.98

0.91

0.53

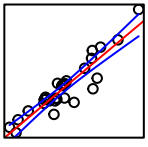
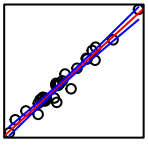



age−6

0.98

0.93

0.85

0.46



age−5

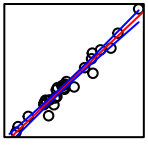
0.98

0.93

0.86

0.81

0.38


age−4

0.98

0.92

0.85

0.81

0.76

0.37

age−3

0.98

0.92

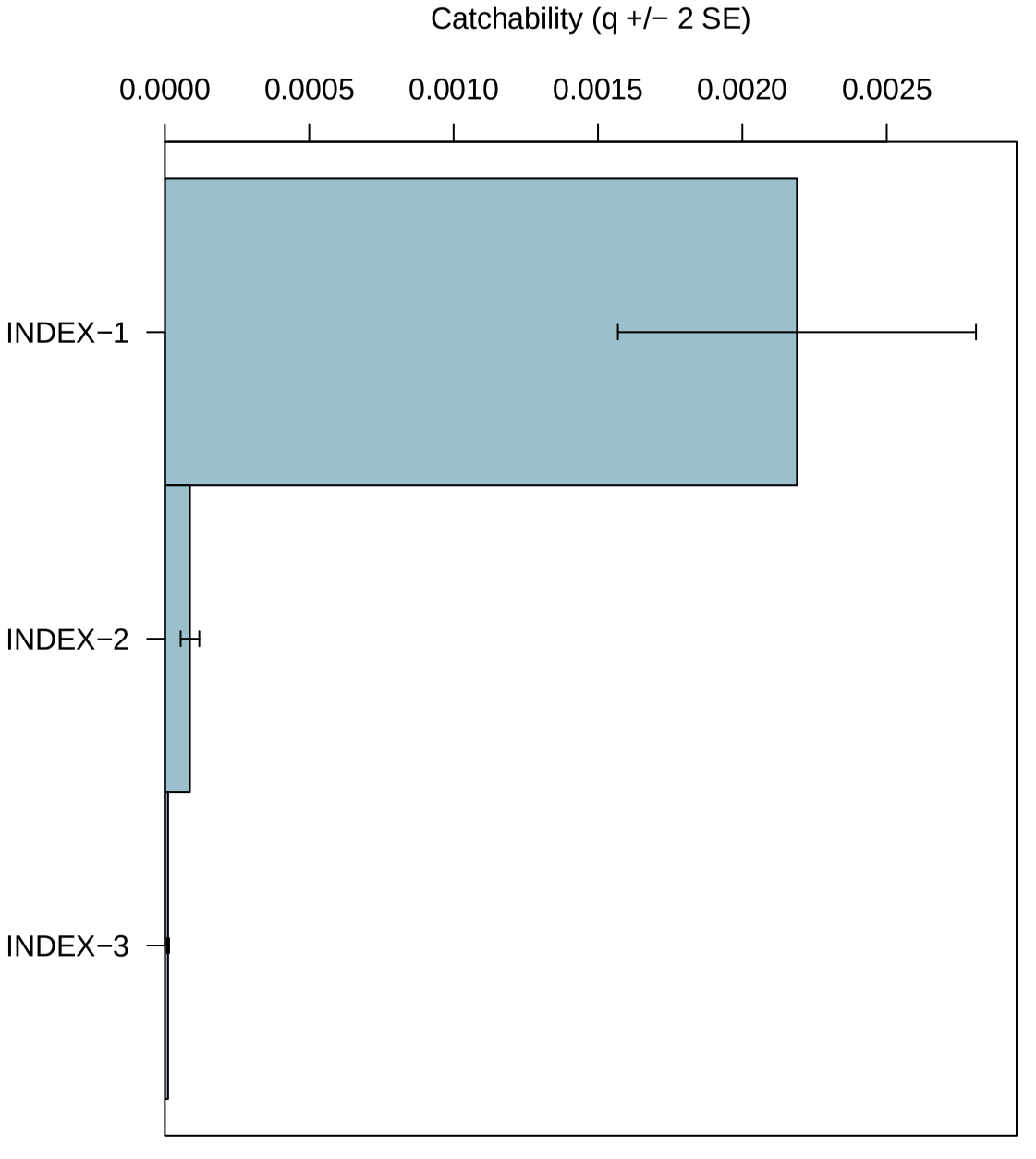
0.86

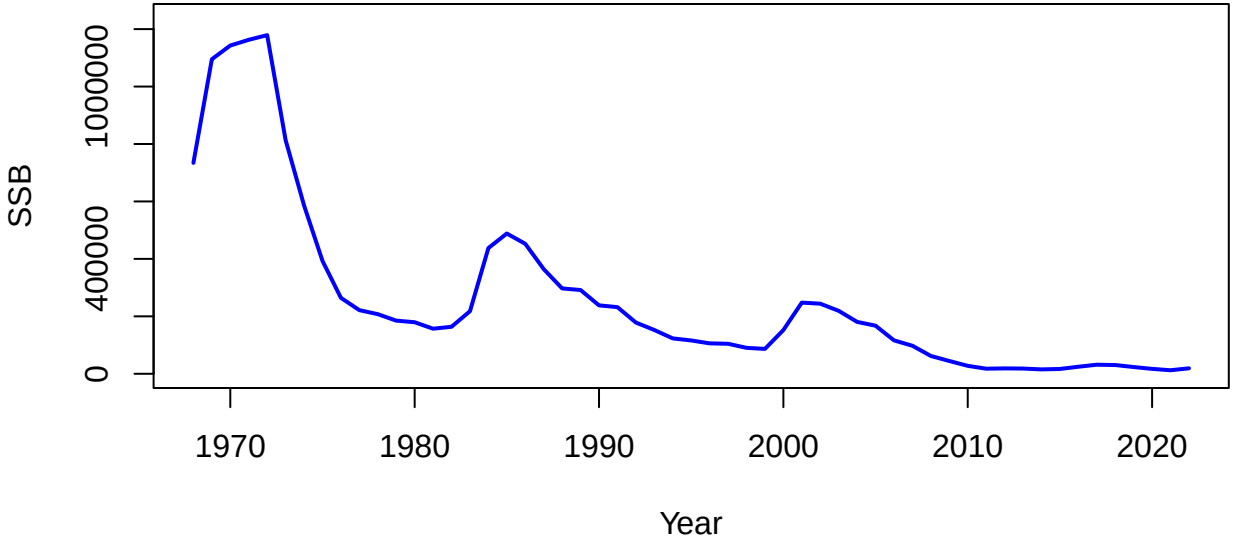
0.82

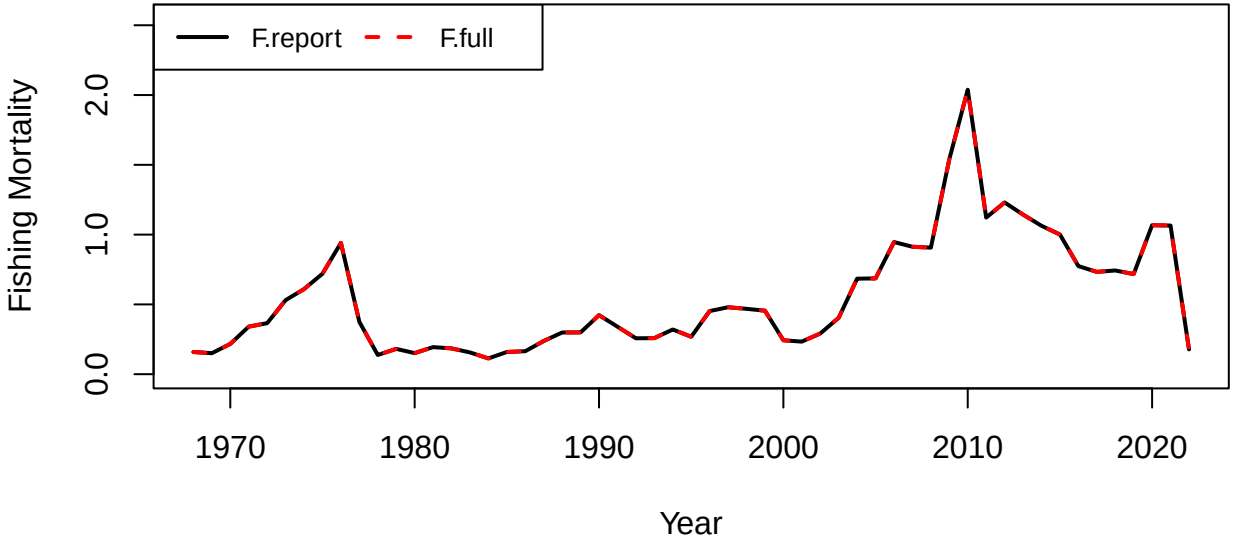
0.80

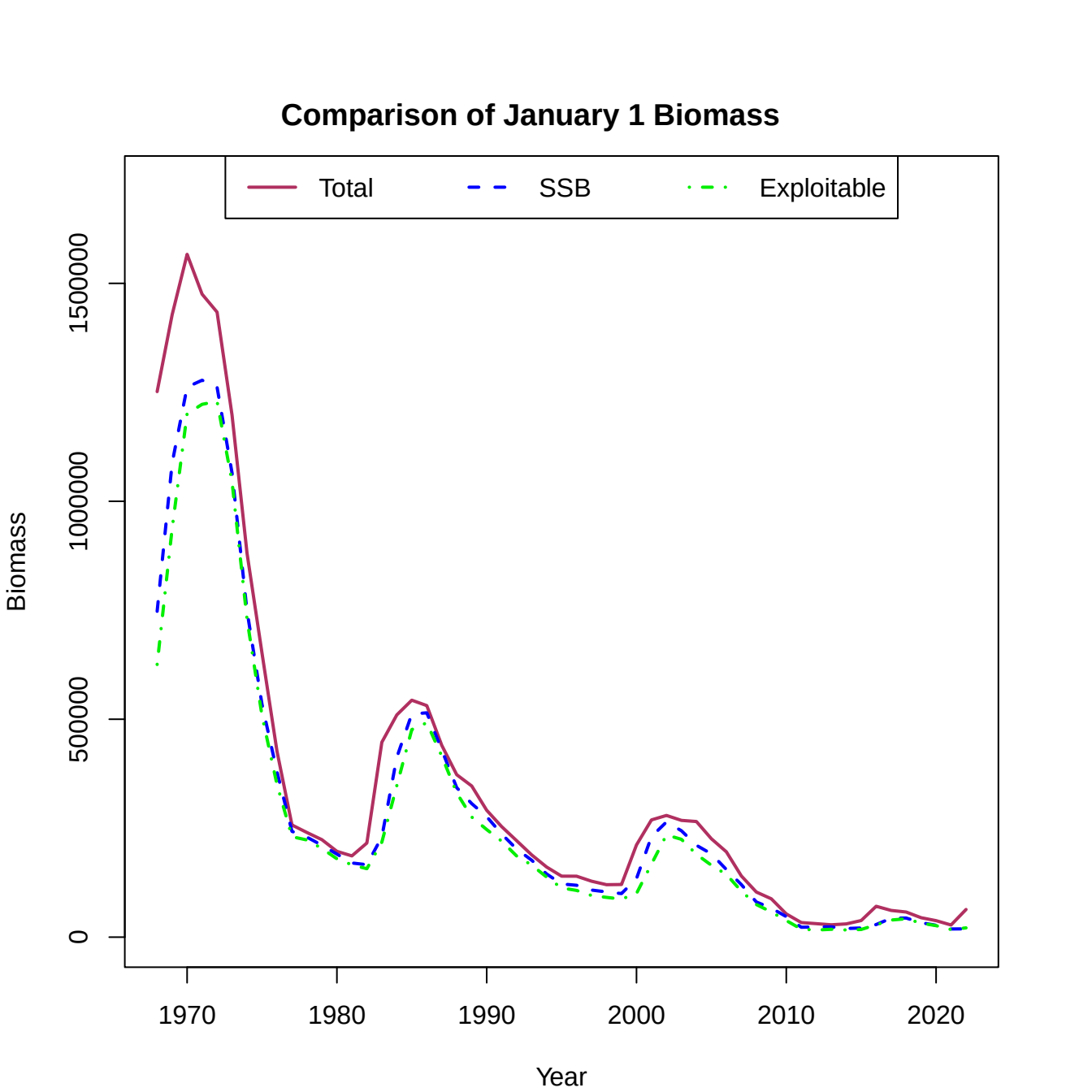
0.75

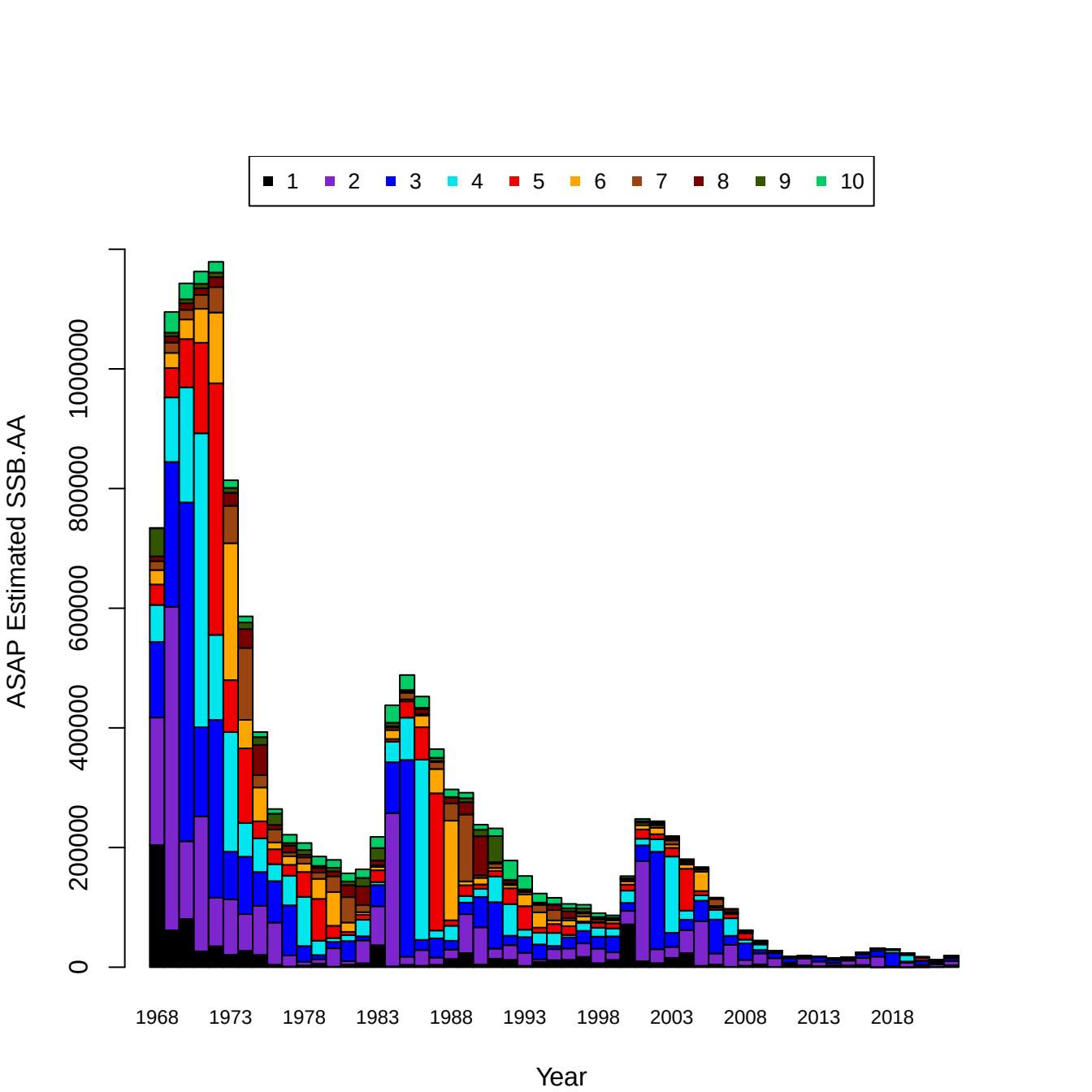
0.29

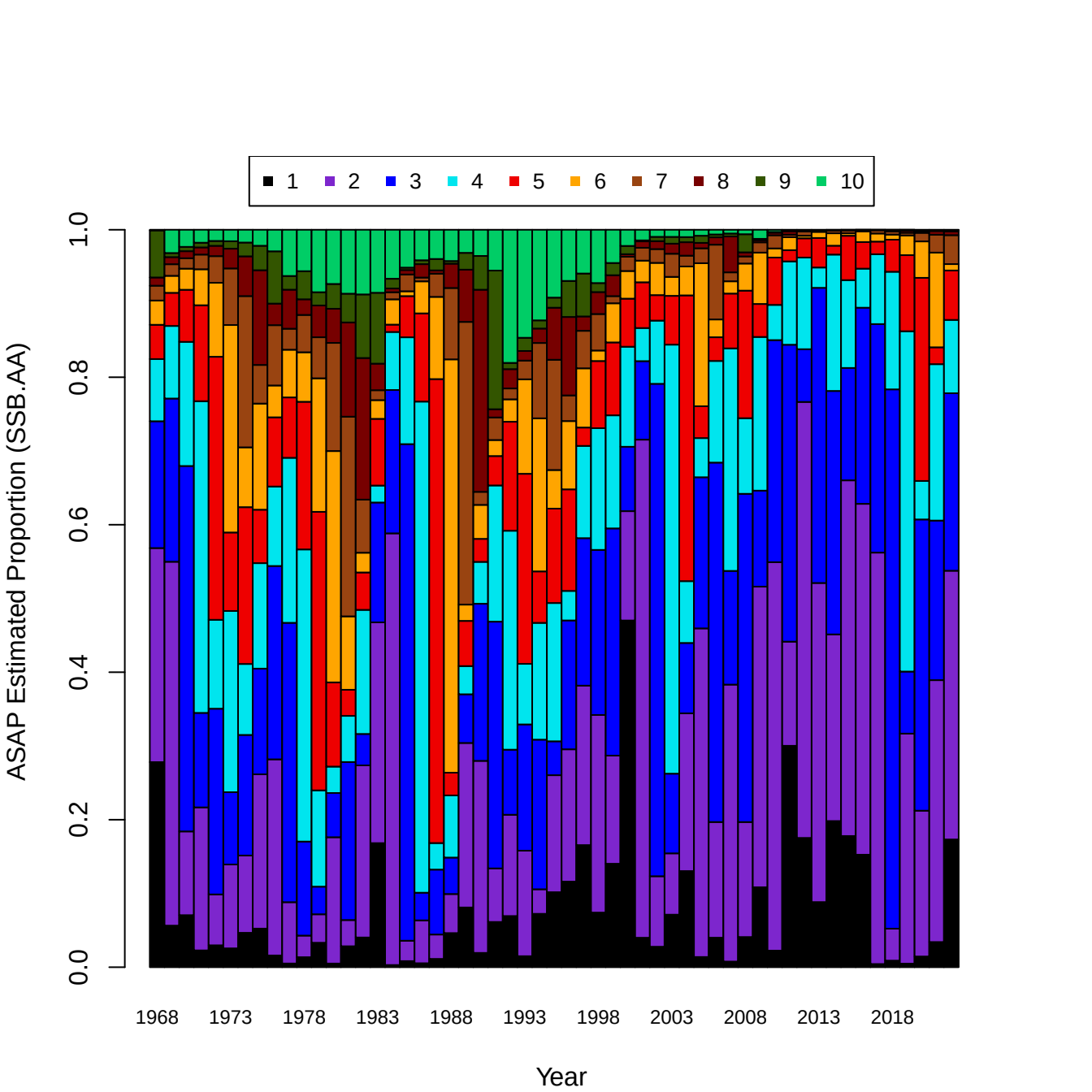

Catchability (q +/− 2 SE)
0.0000
0.0005
0.0010
0.0015
0.0020
0.0025
INDEX−1
INDEX−2
INDEX−3

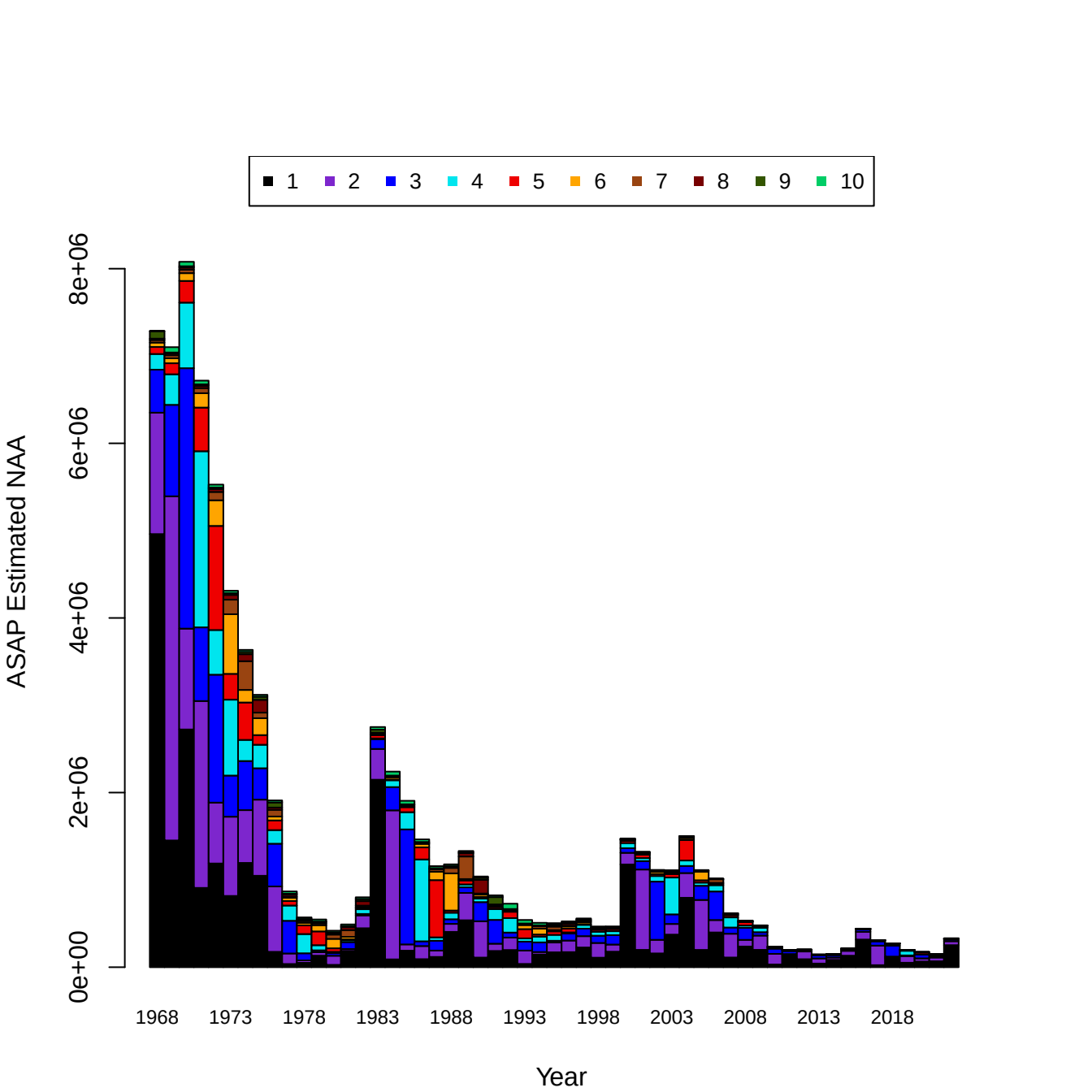

SSB
0
400000
1000000
1970
1980
1990
2000
2010
2020
Year

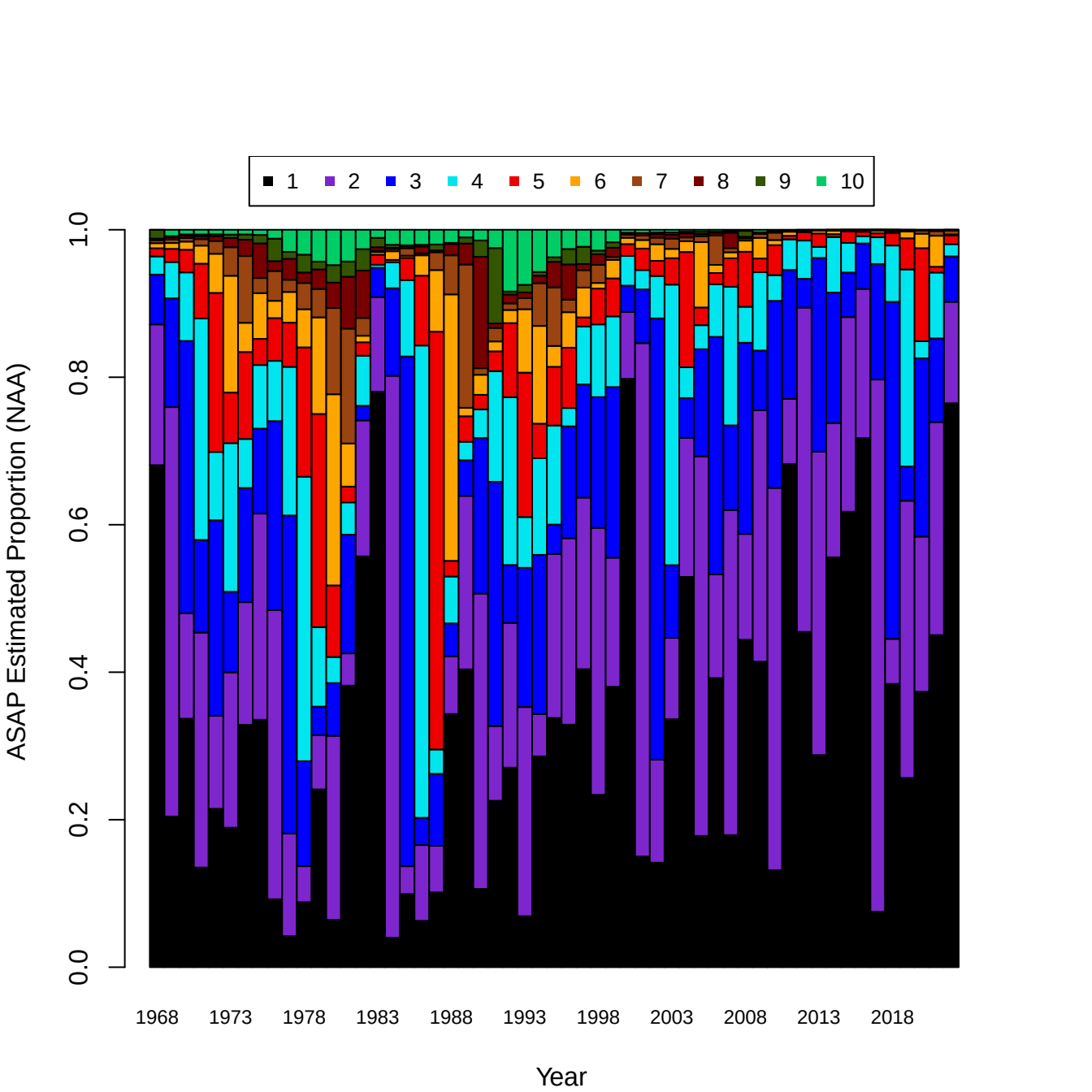

F.report
F.full
Fishing Mortality
0.0
1.0
2.0
1970
1980
1990
2000
2010
2020
Year

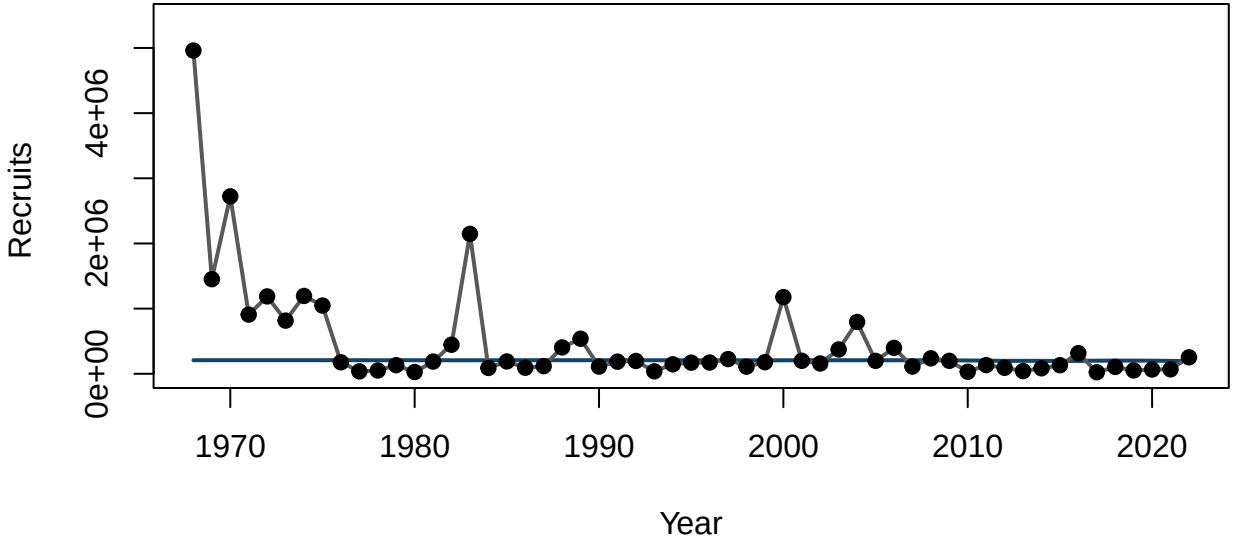

Comparison of January 1 Biomass
Total
SSB
Exploitable
Biomass
0
500000
1000000
1500000
1970
1980
1990
2000
2010
2020
Year

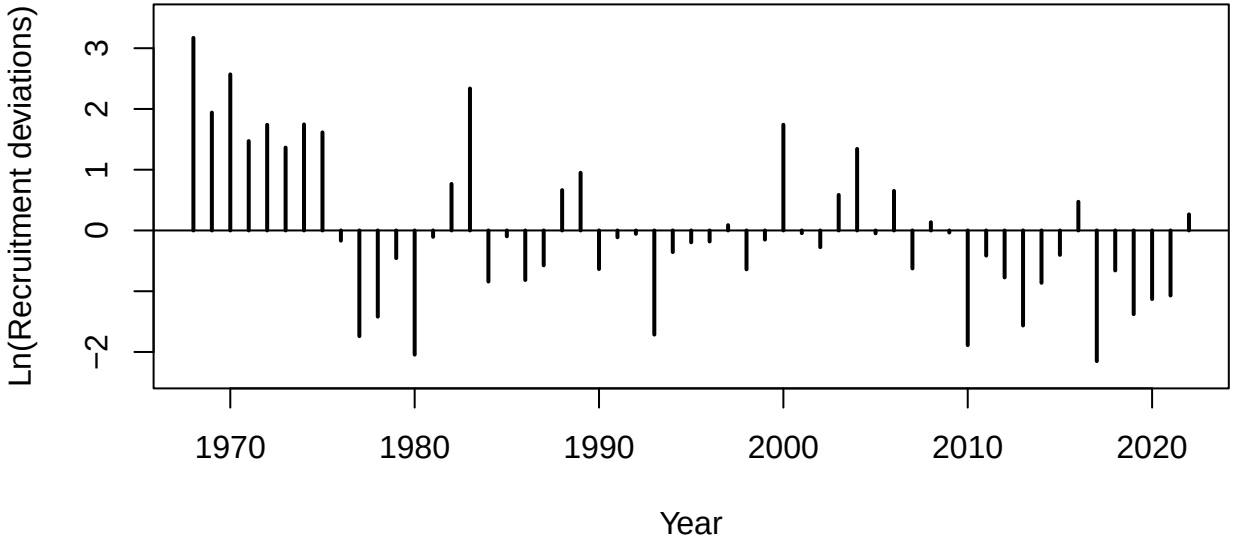

1
2
3
4
5
6
7
8
9
10
ASAP Estimated SSB.AA
0
200000
400000
600000
800000
1000000
1968
1973
1978
1983
1988
1993
1998
2003
2008
2013
2018
Year

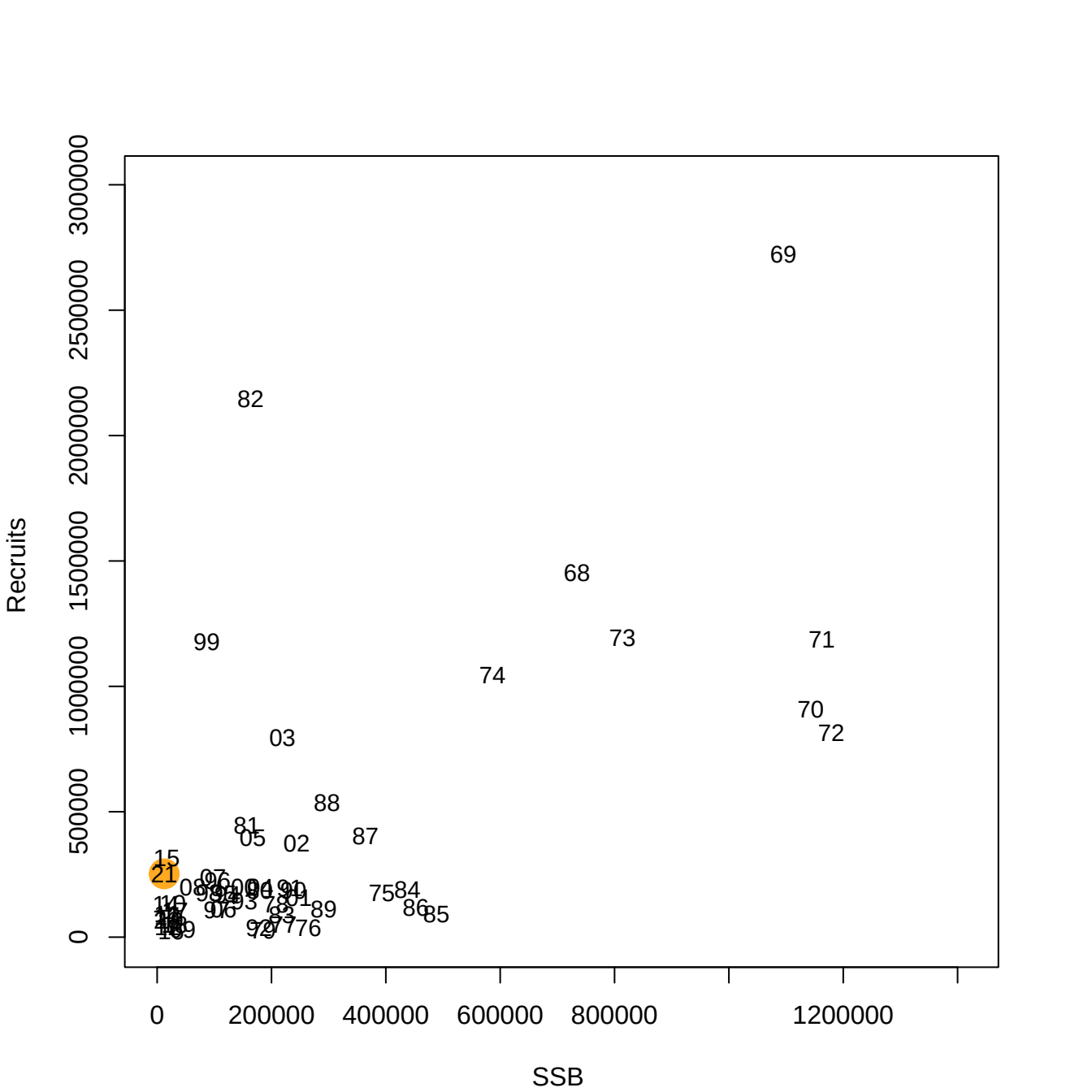

1
2
3
4
5
6
7
8
9
10
ASAP Estimated Proportion (SSB.AA)
0.0
0.2
0.4
0.6
0.8
1.0
1968
1973
1978
1983
1988
1993
1998
2003
2008
2013
2018
Year

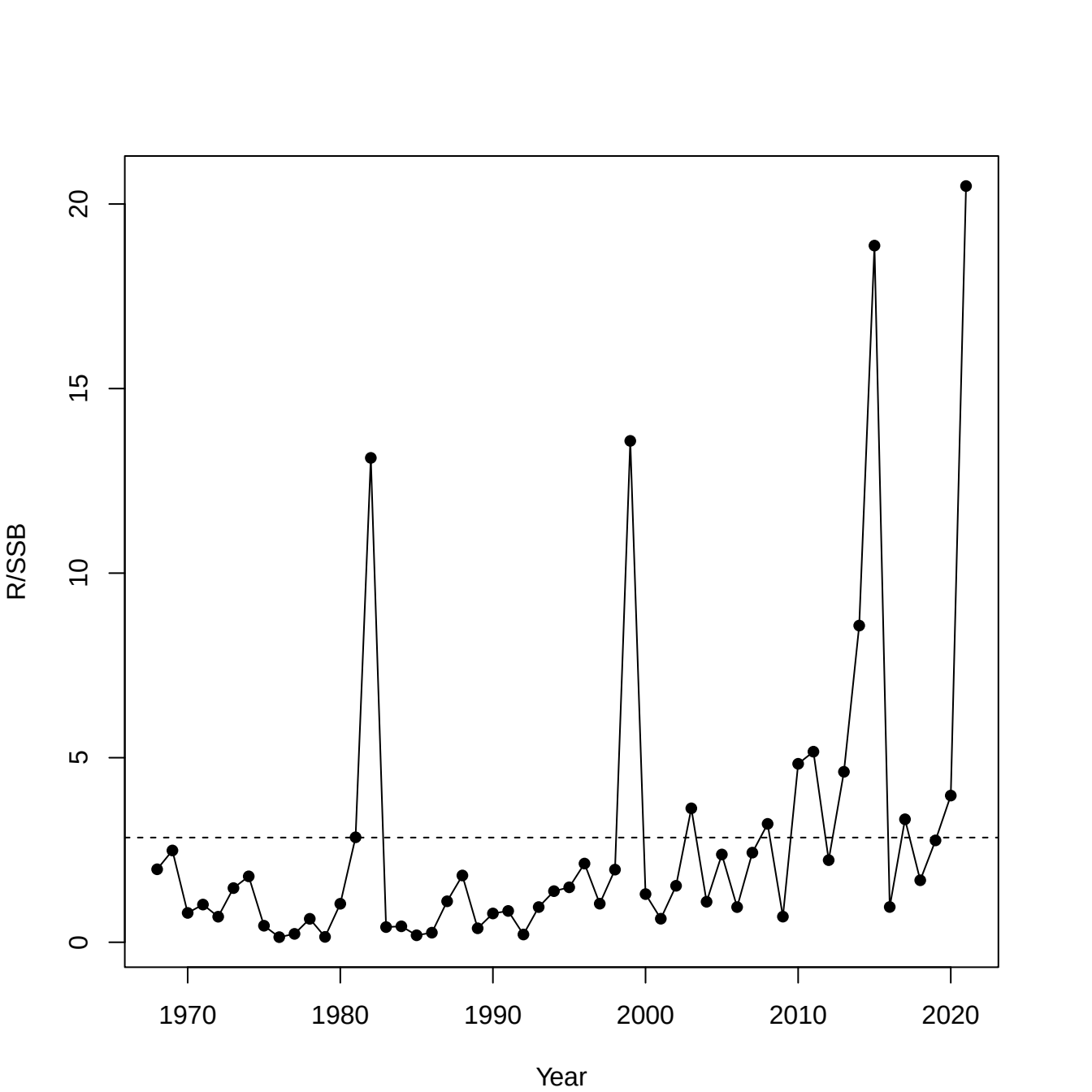

1
2
3
4
5
6
7
8
9
10
ASAP Estimated NAA
0e+00
2e+06
4e+06
6e+06
8e+06
1968
1973
1978
1983
1988
1993
1998
2003
2008
2013
2018
Year

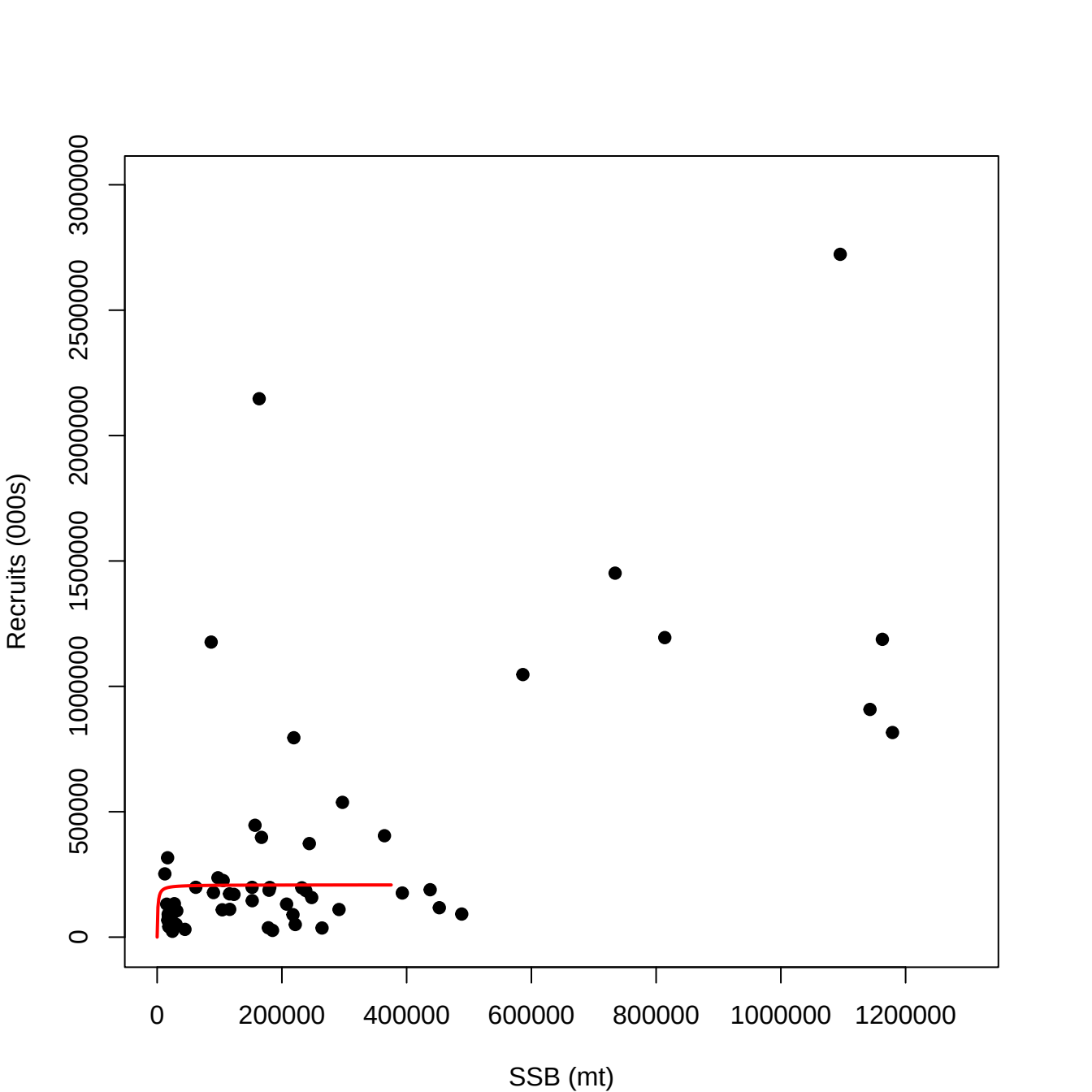

1
2
3
4
5
6
7
8
9
10
ASAP Estimated Proportion (NAA)
0.0
0.2
0.4
0.6
0.8
1.0
1968
1973
1978
1983
1988
1993
1998
2003
2008
2013
2018
Year

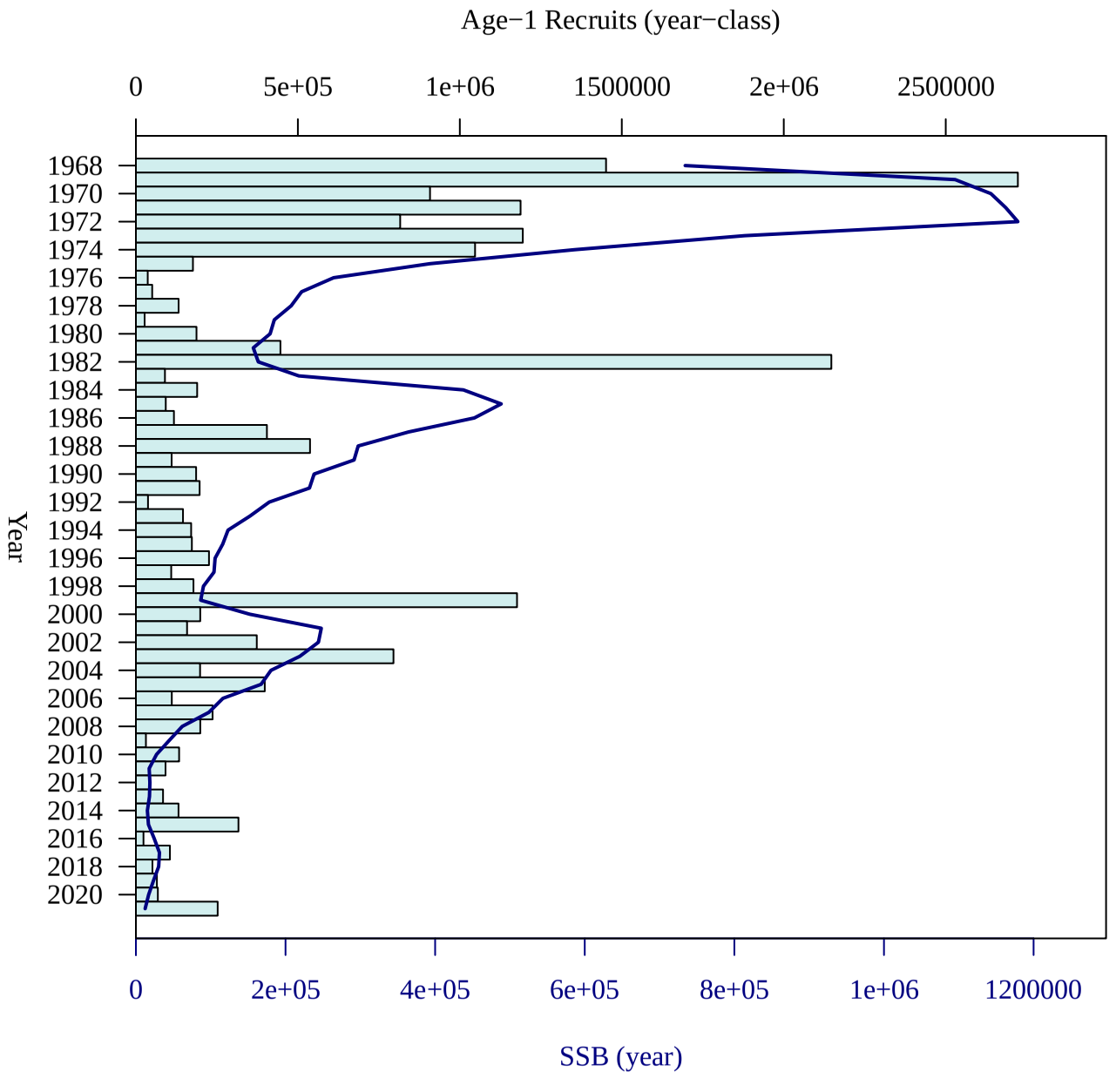

Recruits
0e+00
2e+06
4e+06
1970
1980
1990
2000
2010
2020
Year

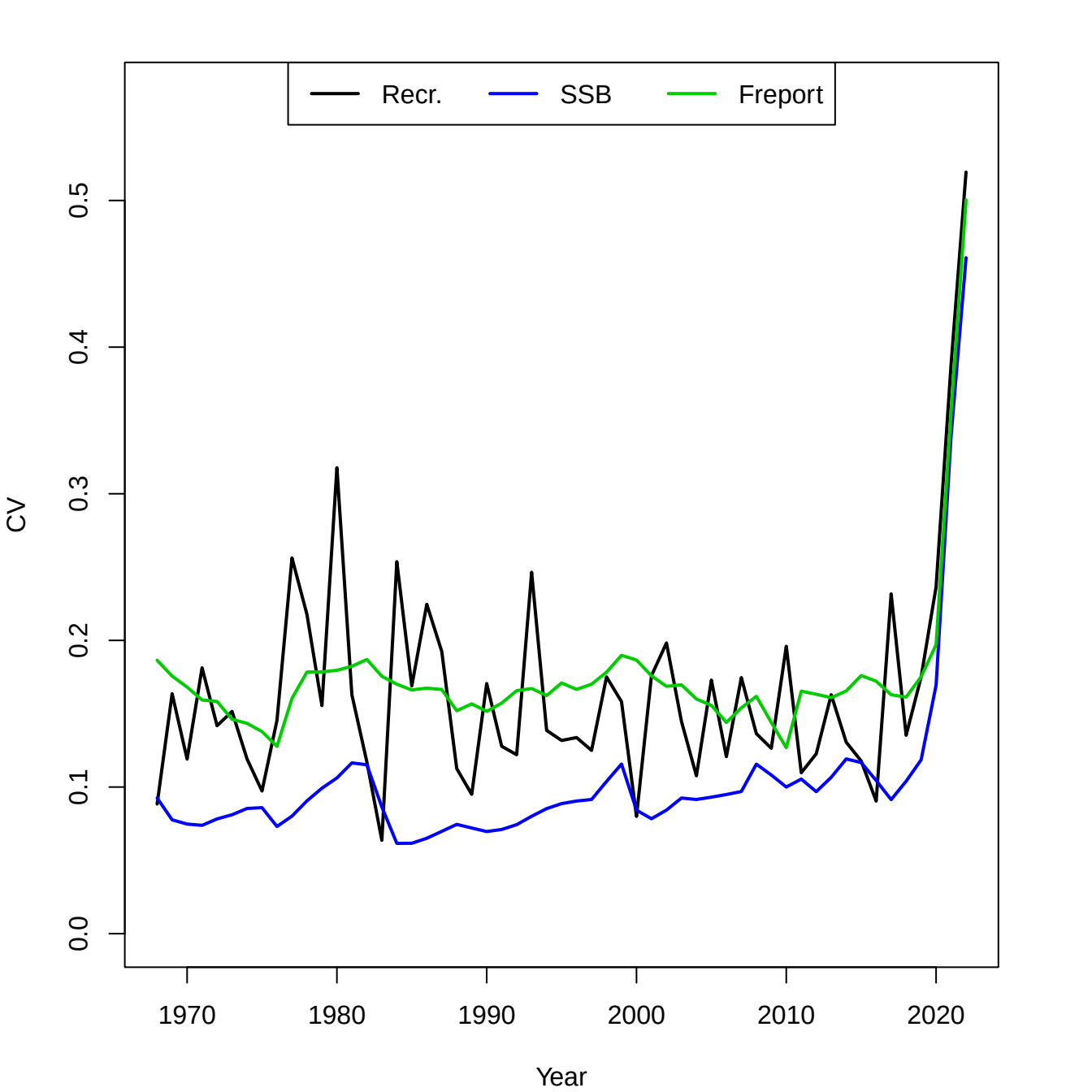

Ln(Recruitment deviations)
−2
0
1
2
3
1970
1980
1990
2000
2010
2020
Year


Recruits
SSB
0
500000
1000000
1500000
2000000
2500000
3000000
0
200000
400000
600000
800000
1200000
69
82
68
73
71
99
74
70
72
03
88
81
05
02
87
15
21
75
84
86
85
89
76

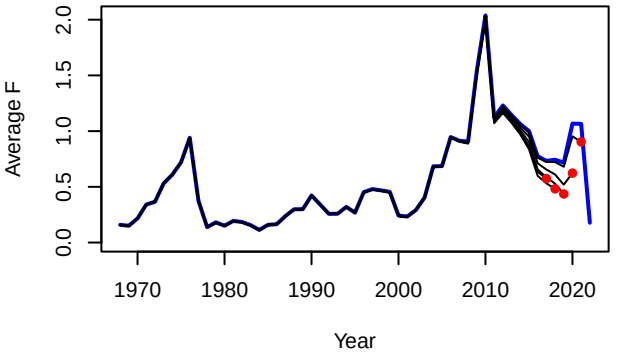

R/SSB
0
5
10
15
20
1970
1980
1990
2000
2010
2020
Year

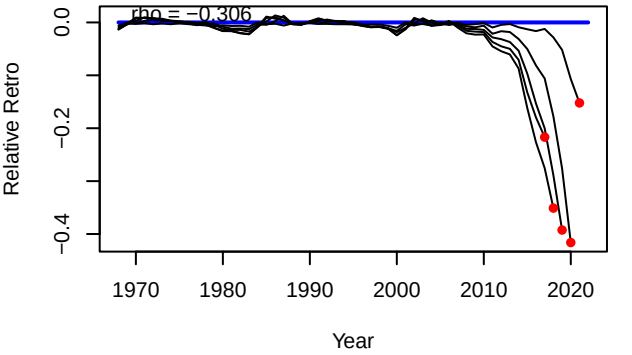

Recruits (000s)
0
500000
1000000
1500000
2000000
2500000
3000000
0
200000
400000
600000
800000
1000000
1200000
SSB (mt)

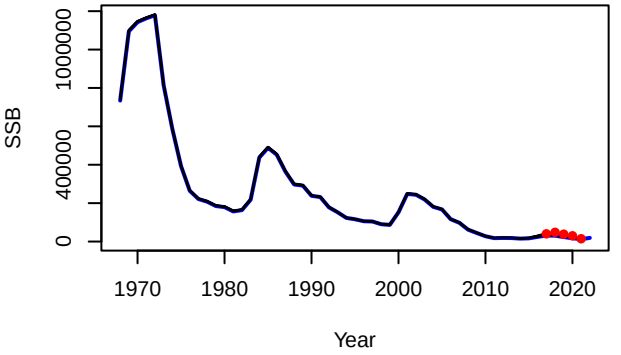

Age−1 Recruits (year−class)
0
5e+05
1e+06
1500000
2e+06
2500000
Year
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
0
2e+05
4e+05
6e+05
8e+05
1e+06
1200000
SSB (year)

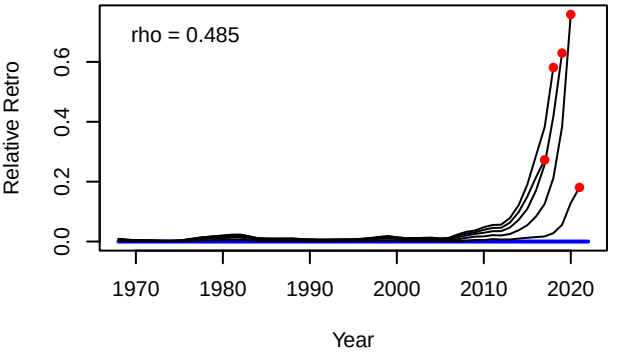

Recr.
SSB
Freport
CV
0.0
0.1
0.2
0.3
0.4
0.5
1970
1980
1990
2000
2010
2020
Year

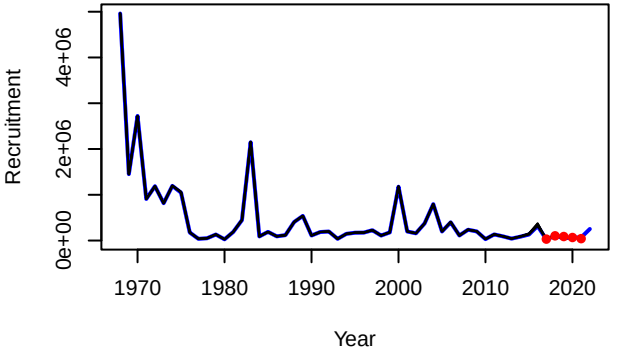
F, SSB, R

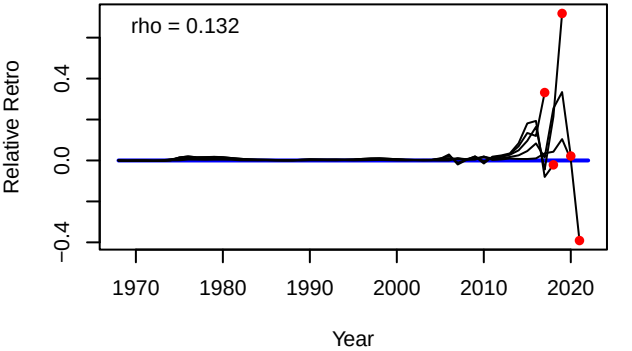

Average F
0.0
0.5
1.0
1.5
2.0
1970
1980
1990
2000
2010
2020
Year

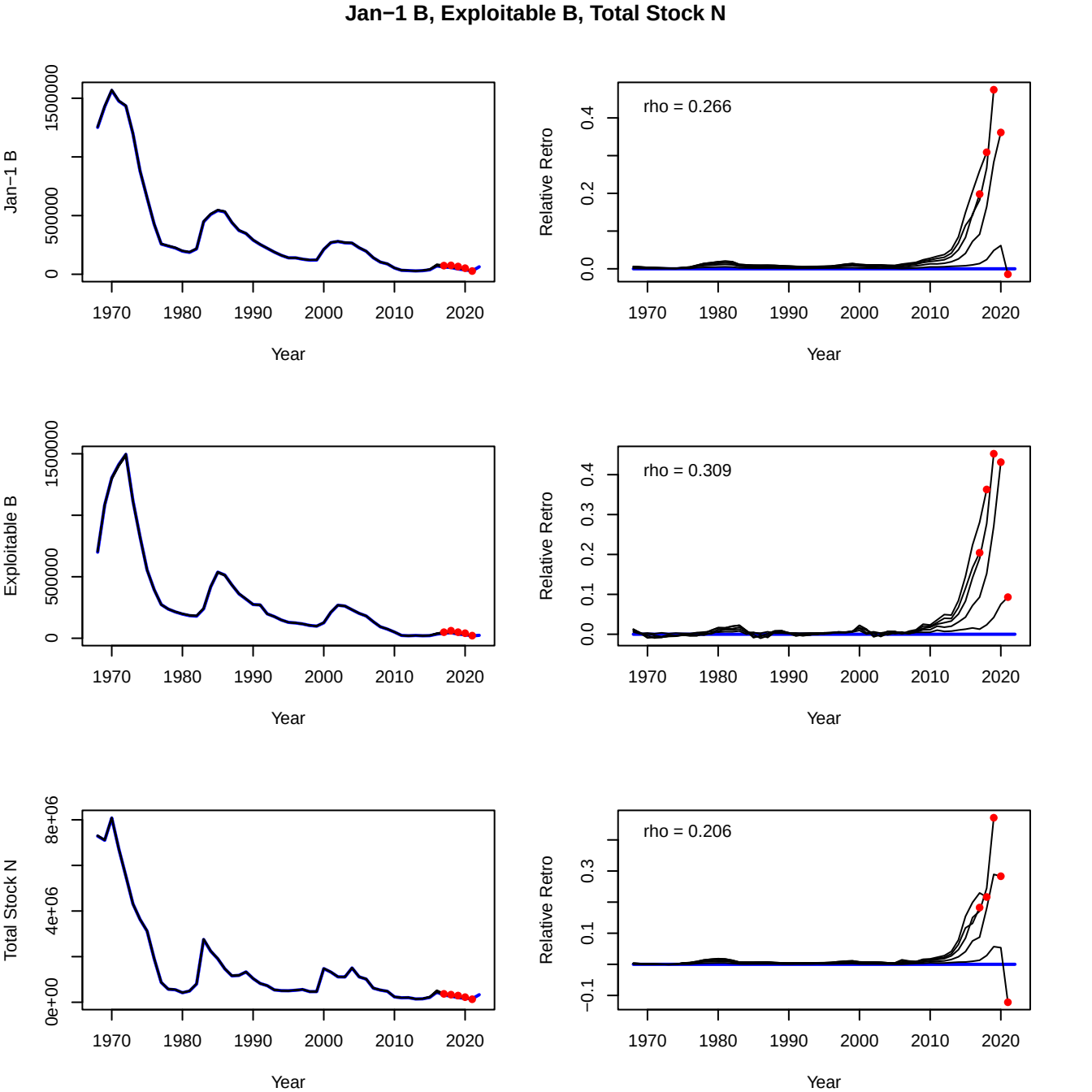

rho = −0.306
Relative Retro
0.0
−0.2
−0.4
1970
1980
1990
2000
2010
2020
Year


SSB
0
400000
1000000
1970
1980
1990
2000
2010
2020
Year

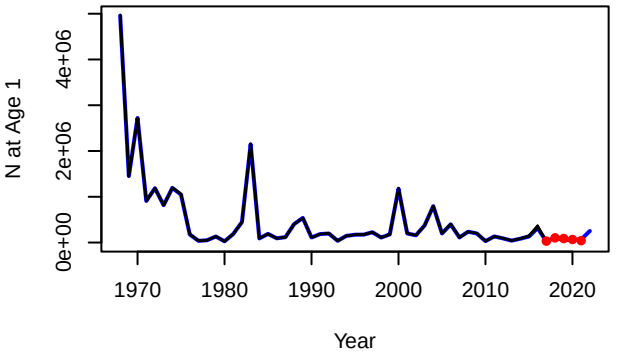

rho = 0.485
Relative Retro
0.0
0.2
0.4
0.6
1970
1980
1990
2000
2010
2020
Year

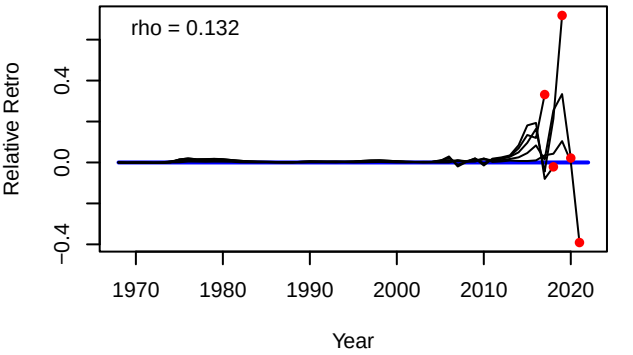

Recruitment
0e+00
2e+06
4e+06
1970
1980
1990
2000
2010
2020
Year

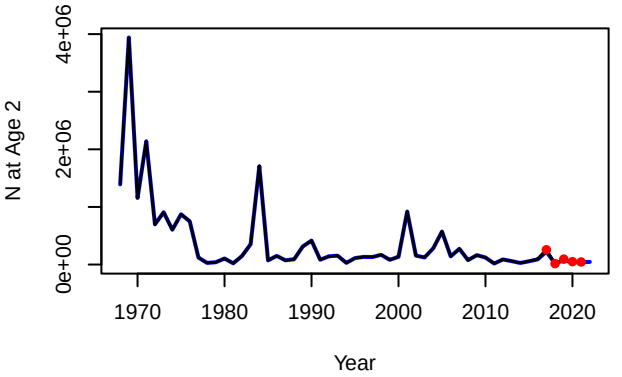

rho = 0.132
Relative Retro
−0.4
0.0
0.4
1970
1980
1990
2000
2010
2020
Year

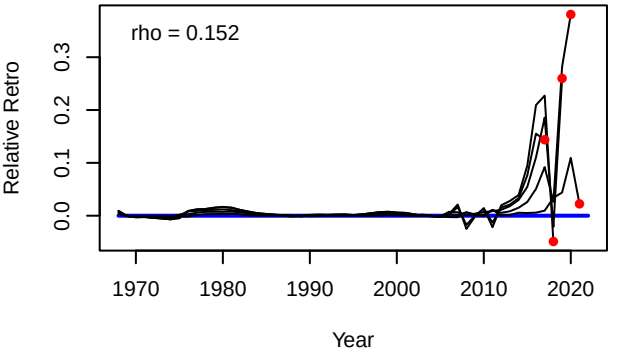

Jan−1 B, Exploitable B, Total Stock N
Jan−1 B
Exploitable B
Total Stock N
Relative Retro
rho = 0.266
rho = 0.309
rho = 0.206
Year
0
500000
1500000
0e+00
4e+06
8e+06
0.0
0.2
0.4
0.1
0.3
−0.1
1970
1980
1990
2000
2010
2020

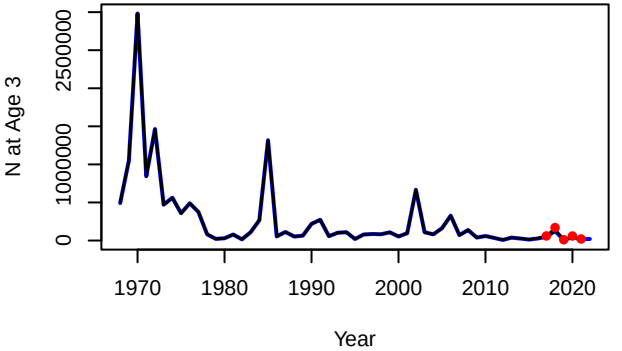
Stock Numbers at Age

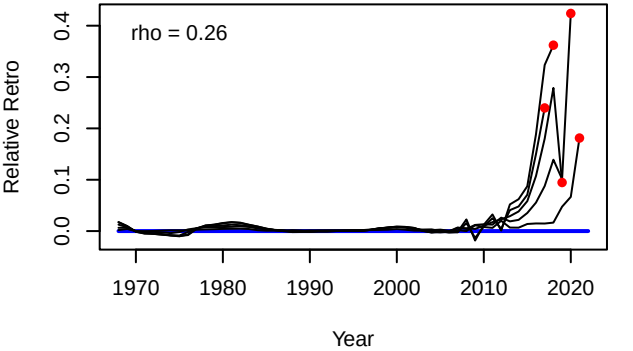




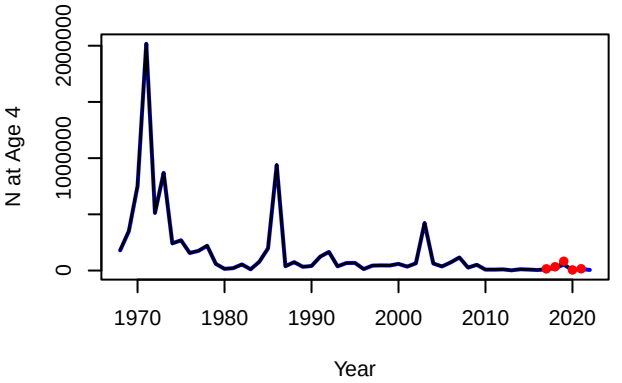


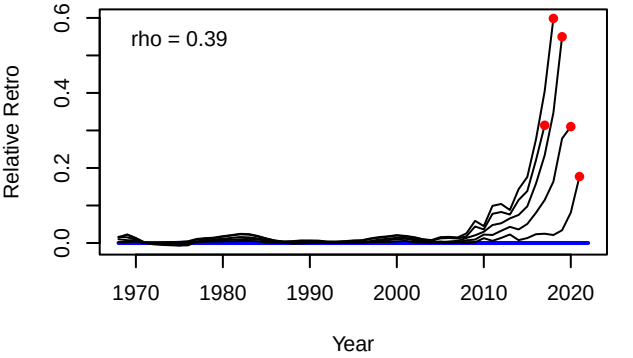


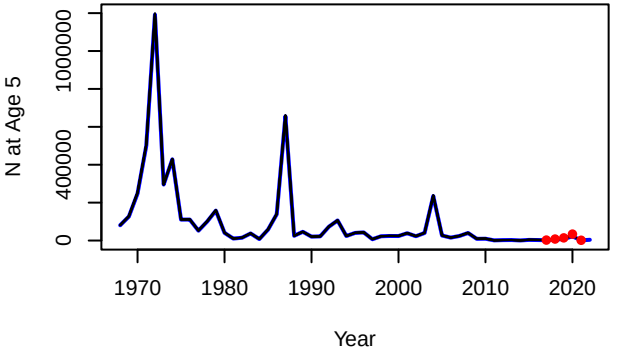


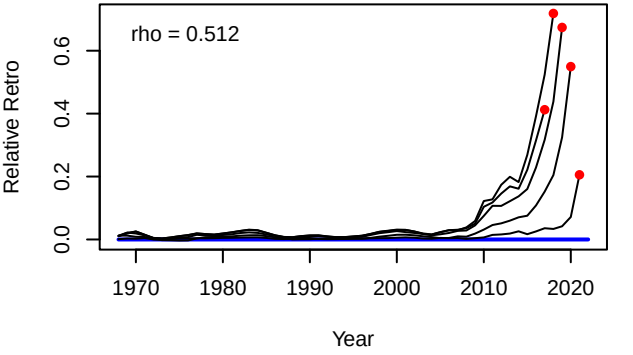


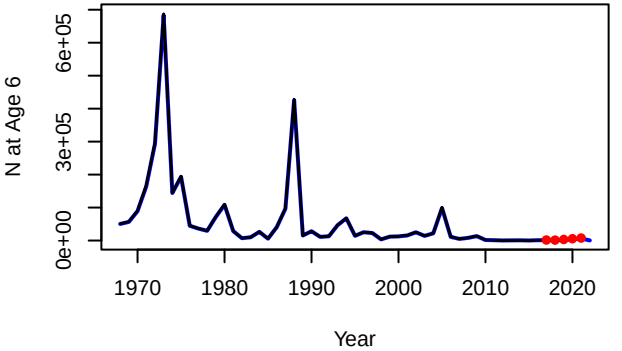
Stock Numbers at Age

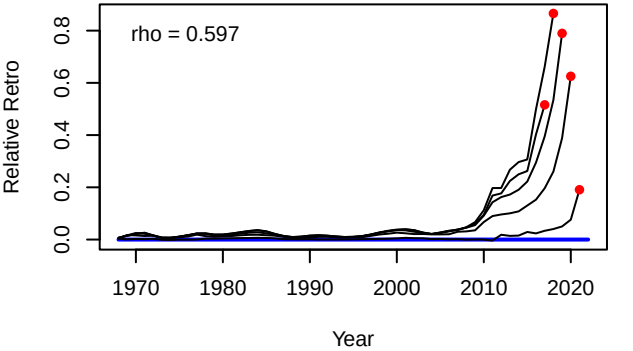




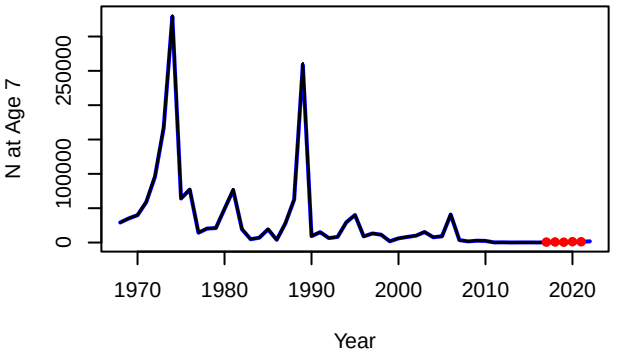


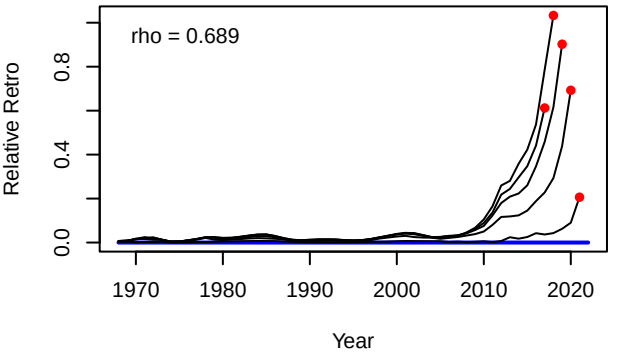


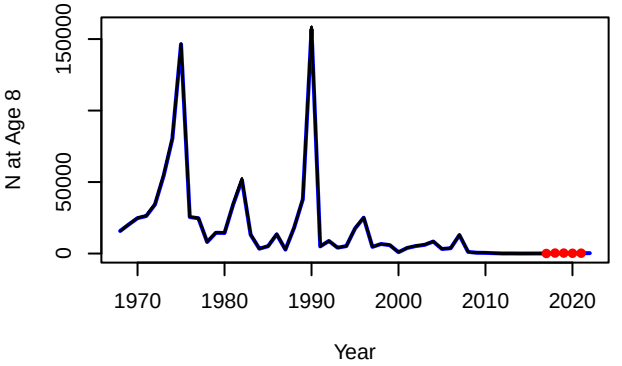


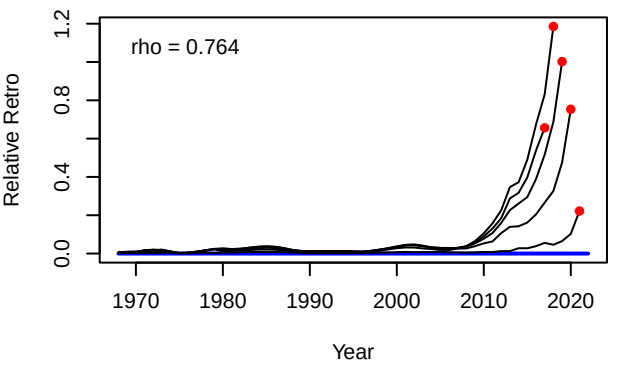


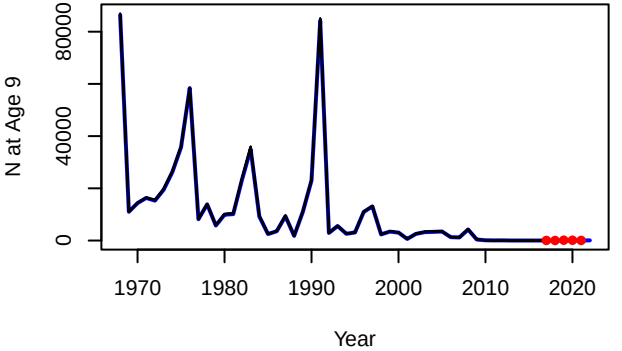
Stock Numbers at Age

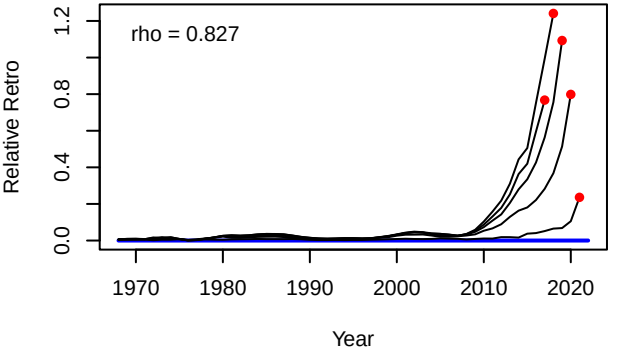




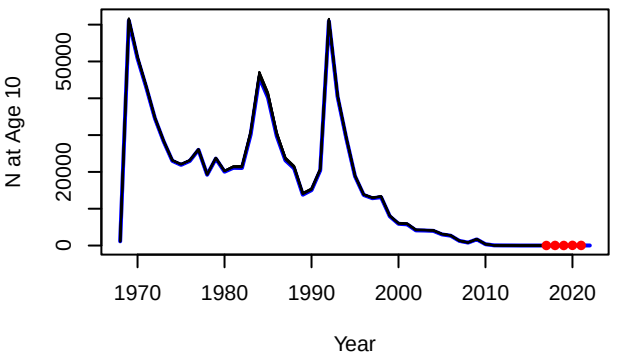


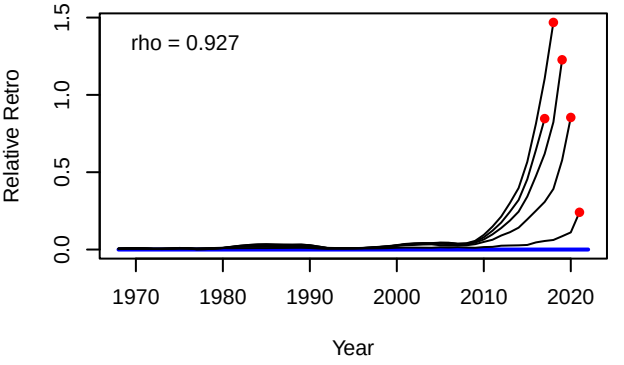


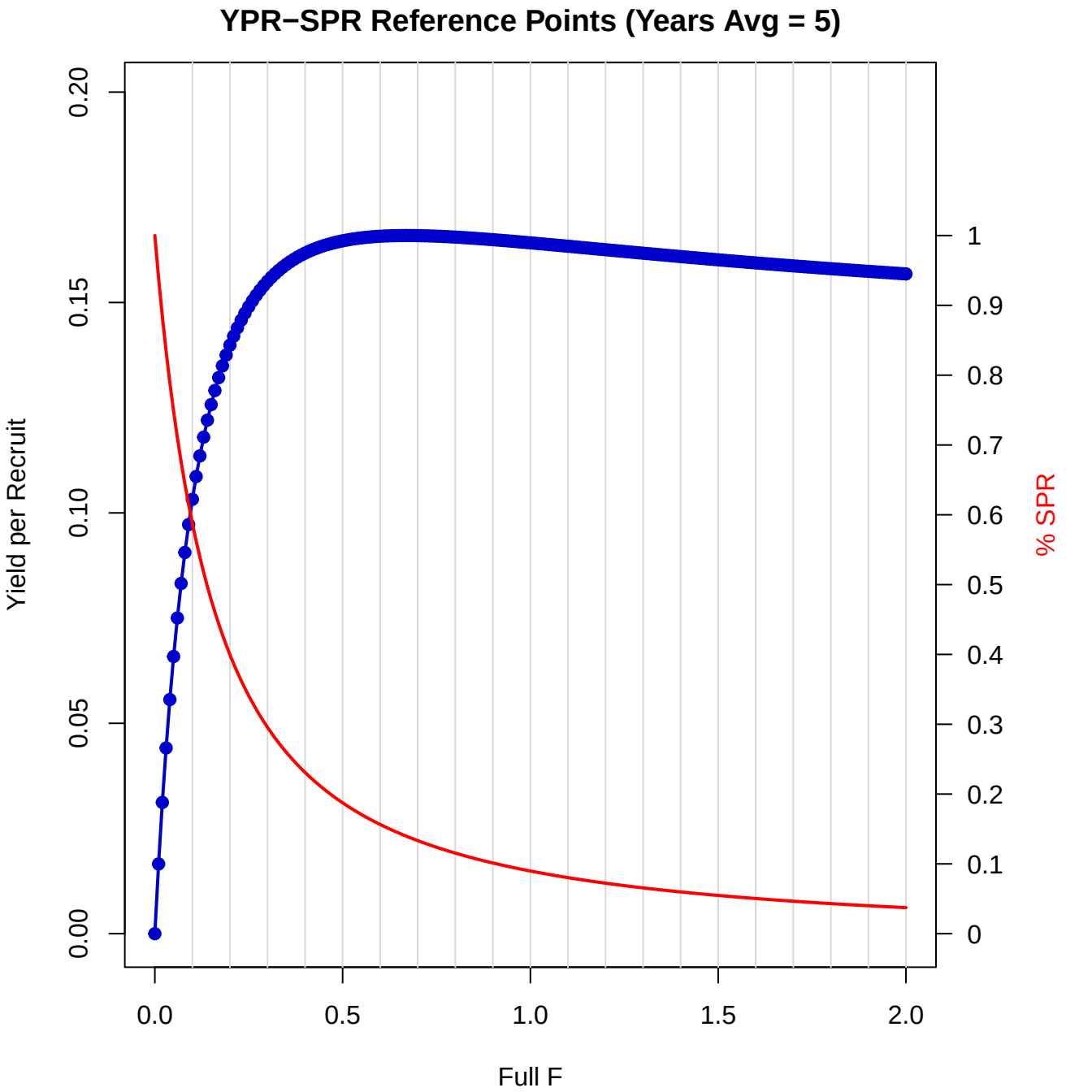




Stock Numbers at Age

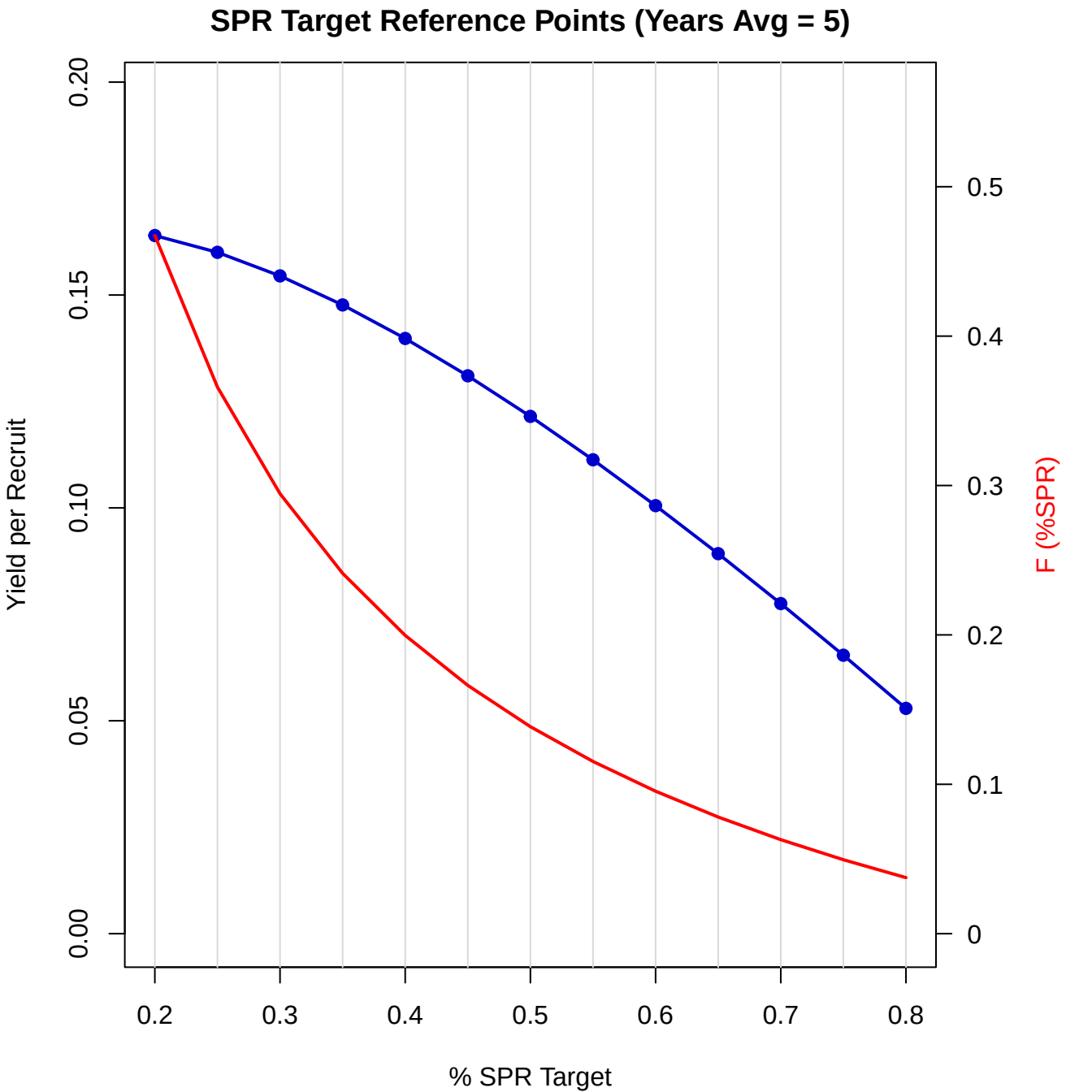





YPR−SPR Reference Points (Years Avg = 5)
Yield per Recruit
0.00
0.05
0.10
0.15
0.20
% SPR
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.0
0.5
1.0
1.5
2.0
Full F

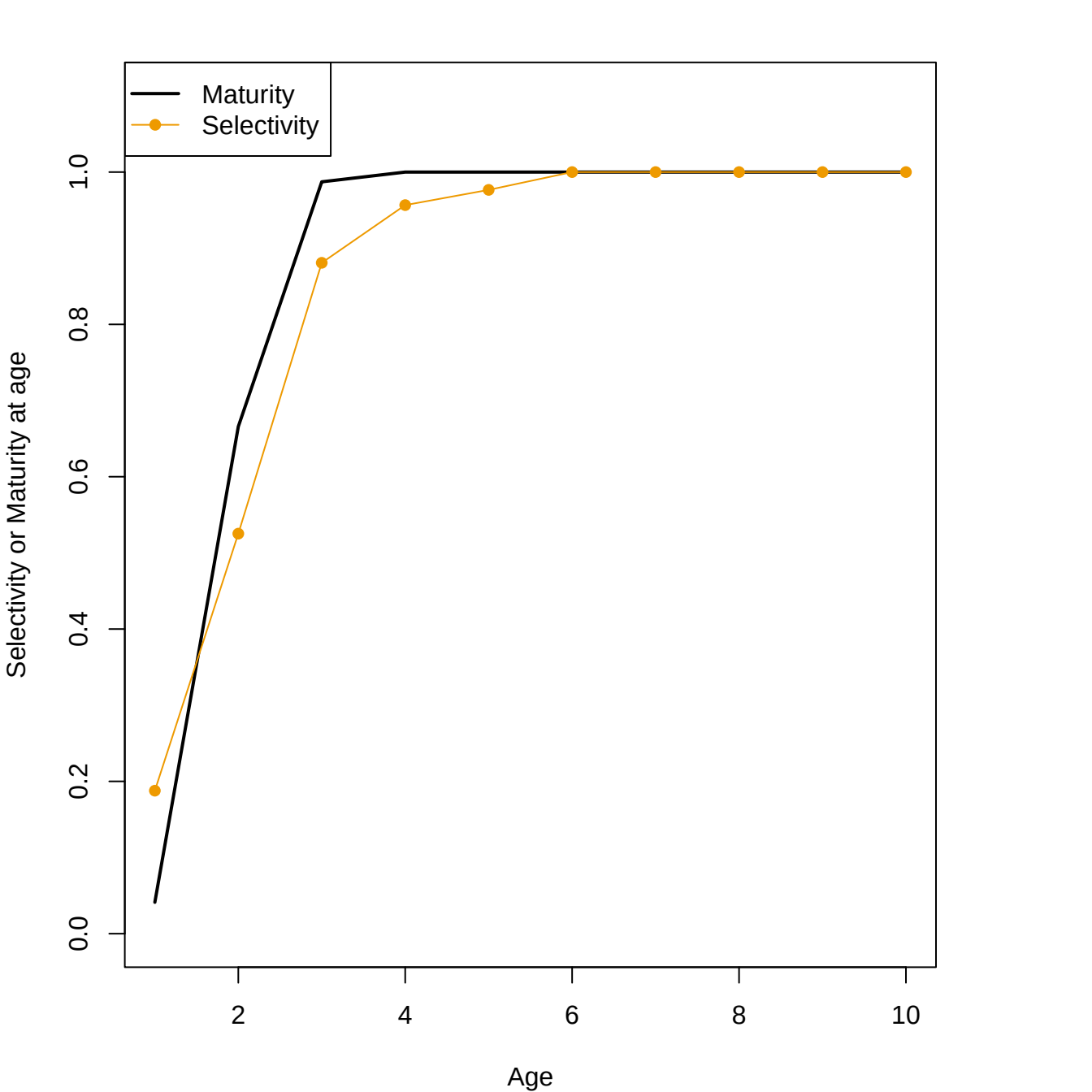
YPR−SPR Reference Points (Years Avg = 5)

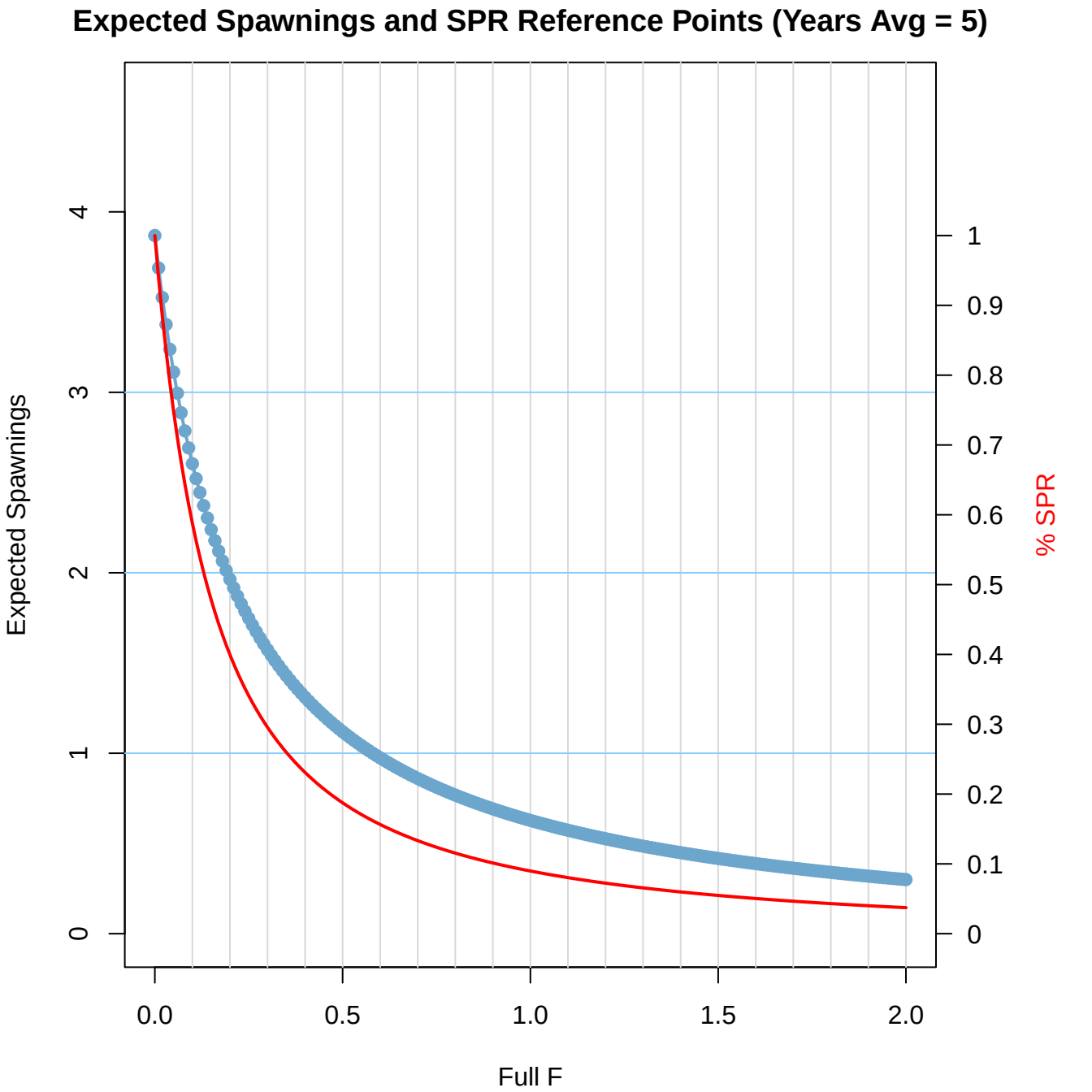
F	YPR	SPR	F	YPR	SPR	F	YPR	SPR
0	0	1	0.35	0.159	0.2598	0.7	0.1659	0.1333
0.01	0.0166	0.939	0.36	0.1597	0.2536	0.71	0.1659	0.1313
0.02	0.0312	0.8841	0.37	0.1603	0.2476	0.72	0.1659	0.1294
0.03	0.0441	0.8344	0.38	0.1608	0.2418	0.73	0.1658	0.1275
0.04	0.0556	0.7892	0.39	0.1613	0.2363	0.74	0.1658	0.1256
0.05	0.0659	0.7481	0.4	0.1617	0.231	0.75	0.1658	0.1238
0.06	0.075	0.7104	0.41	0.1621	0.2258	0.76	0.1657	0.1221
0.07	0.0832	0.6759	0.42	0.1625	0.2209	0.77	0.1657	0.1203
0.08	0.0906	0.6441	0.43	0.1629	0.2162	0.78	0.1656	0.1187
0.09	0.0972	0.6148	0.44	0.1632	0.2116	0.79	0.1656	0.117
0.1	0.1032	0.5877	0.45	0.1635	0.2072	0.8	0.1655	0.1154
0.11	0.1086	0.5626	0.46	0.1638	0.203	0.81	0.1655	0.1139
0.12	0.1135	0.5392	0.47	0.164	0.1989	0.82	0.1654	0.1123
0.13	0.118	0.5175	0.48	0.1643	0.195	0.83	0.1654	0.1108
0.14	0.122	0.4972	0.49	0.1645	0.1912	0.84	0.1653	0.1094
0.15	0.1257	0.4782	0.5	0.1647	0.1875	0.85	0.1653	0.108
0.16	0.1291	0.4605	0.51	0.1648	0.1839	0.86	0.1652	0.1066
0.17	0.1322	0.4438	0.52	0.165	0.1804	0.87	0.1651	0.1052
0.18	0.135	0.4282	0.53	0.1651	0.1771	0.88	0.1651	0.1039
0.19	0.1375	0.4134	0.54	0.1652	0.1739	0.89	0.165	0.1025
0.2	0.1399	0.3996	0.55	0.1654	0.1707	0.9	0.1649	0.1013
0.21	0.142	0.3865	0.56	0.1655	0.1677	0.91	0.1649	0.1
0.22	0.144	0.3741	0.57	0.1655	0.1648	0.92	0.1648	0.0988
0.23	0.1458	0.3624	0.58	0.1656	0.1619	0.93	0.1647	0.0976
0.24	0.1475	0.3513	0.59	0.1657	0.1591	0.94	0.1646	0.0964
0.25	0.149	0.3408	0.6	0.1657	0.1564	0.95	0.1646	0.0952
0.26	0.1504	0.3308	0.61	0.1658	0.1538	0.96	0.1645	0.0941
0.27	0.1517	0.3214	0.62	0.1658	0.1513	0.97	0.1644	0.093
0.28	0.1529	0.3123	0.63	0.1659	0.1488	0.98	0.1643	0.0919
0.29	0.154	0.3038	0.64	0.1659	0.1464	0.99	0.1643	0.0908
0.3	0.155	0.2956	0.65	0.1659	0.1441	1	0.1642	0.0898
0.31	0.156	0.2878	0.66	0.1659	0.1418	1.01	0.1641	0.0888
0.32	0.1568	0.2803	0.67	0.1659	0.1396	1.02	0.164	0.0877
0.33	0.1576	0.2732	0.68	0.1659	0.1374	1.03	0.1639	0.0868
0.34	0.1584	0.2663	0.69	0.1659	0.1353	1.04	0.1639	0.0858


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
0.2
0.3
0.4
0.5
0.6
0.7
0.8

SPR Target Reference Points (Years Avg = 5)

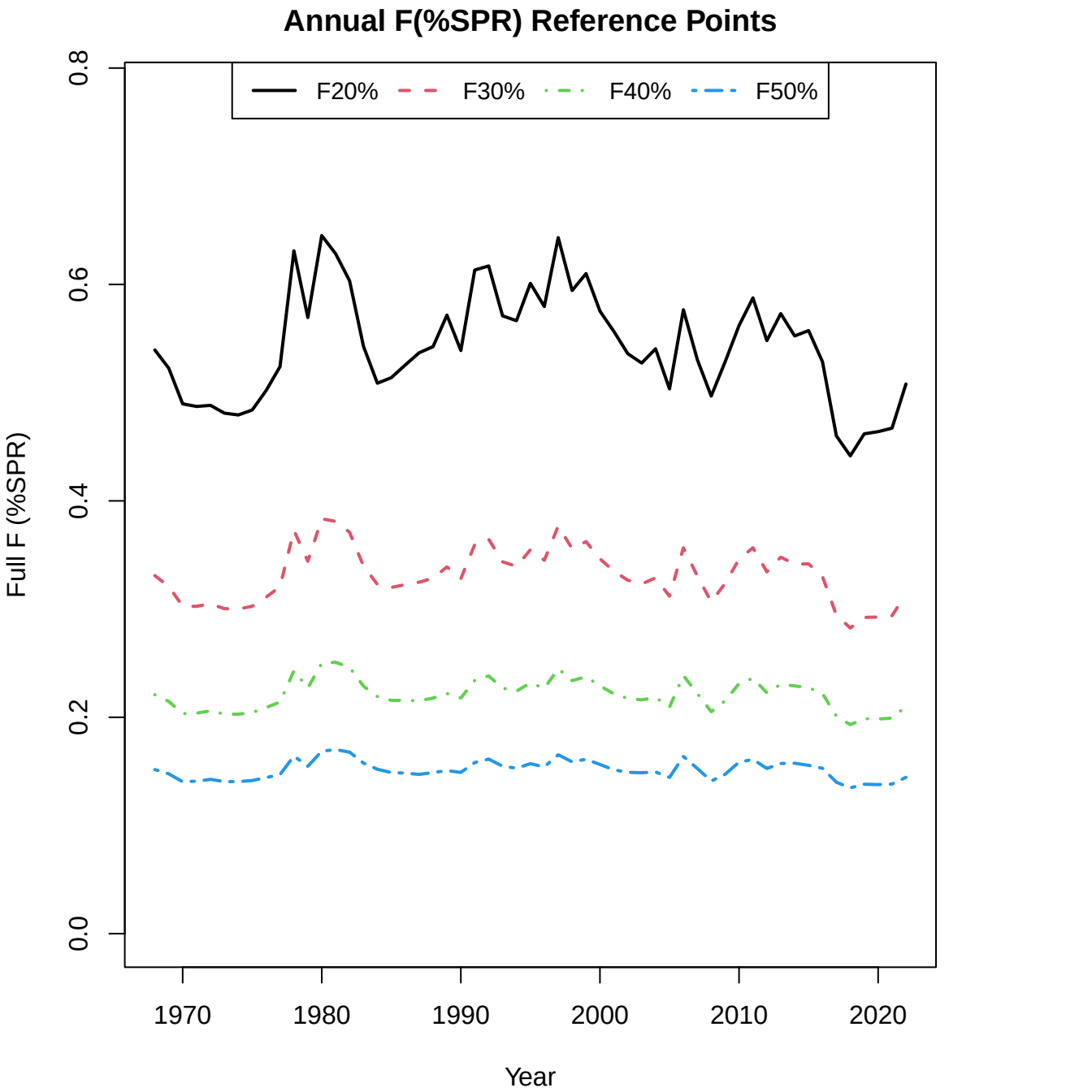
% SPR	F(%SPR)	YPR
0.2	0.4673	0.164
0.25	0.3659	0.16
0.3	0.2945	0.1545
0.35	0.2412	0.1477
0.4	0.1997	0.1398
0.45	0.1662	0.131
0.5	0.1386	0.1215
0.55	0.1153	0.1113
0.6	0.0954	0.1005
0.65	0.0781	0.0893
0.7	0.0629	0.0775
0.75	0.0495	0.0654
0.8	0.0375	0.0529

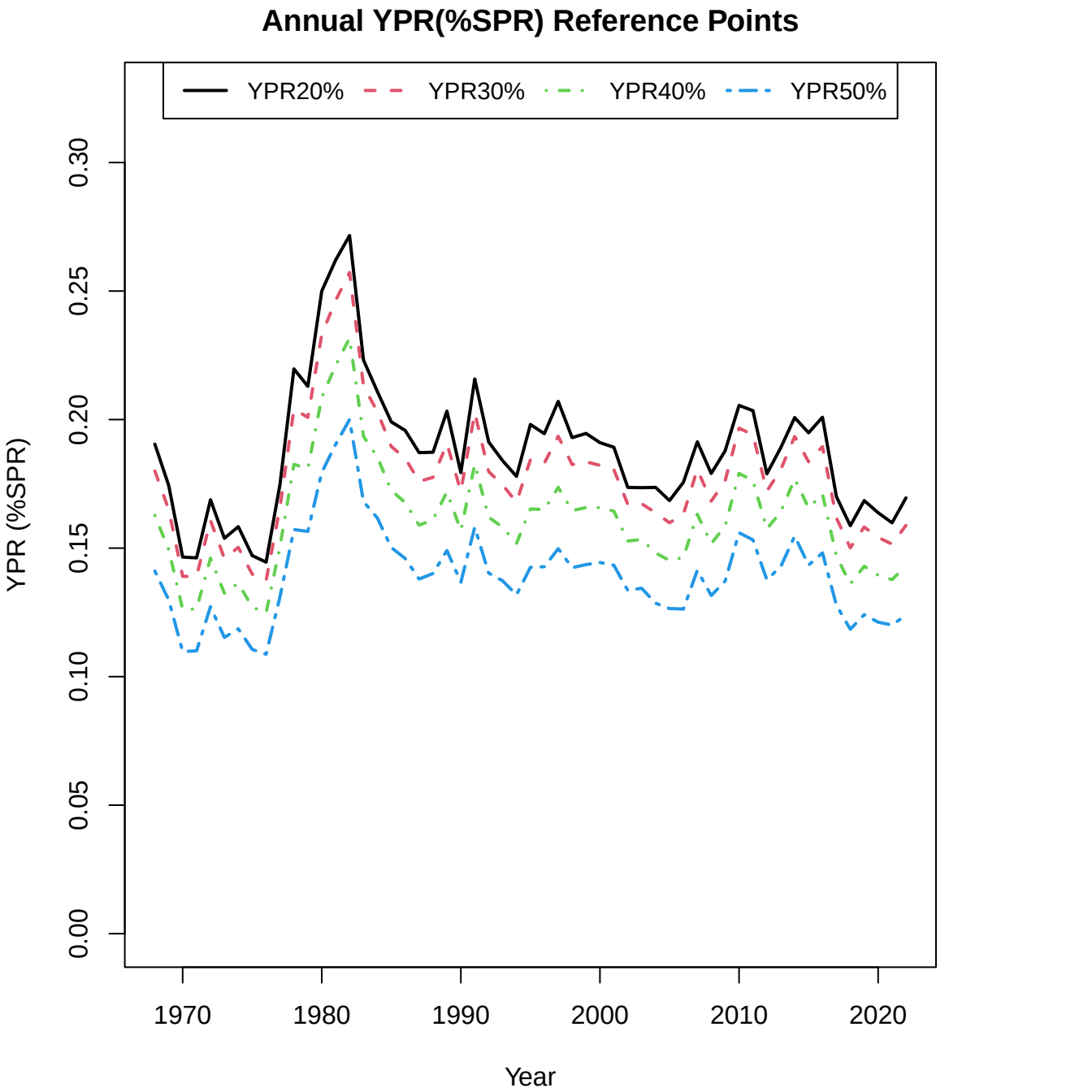

Maturity
Selectivity
Selectivity or Maturity at age
0.0
0.2
0.4
0.6
0.8
1.0
2
4
6
8
10
Age

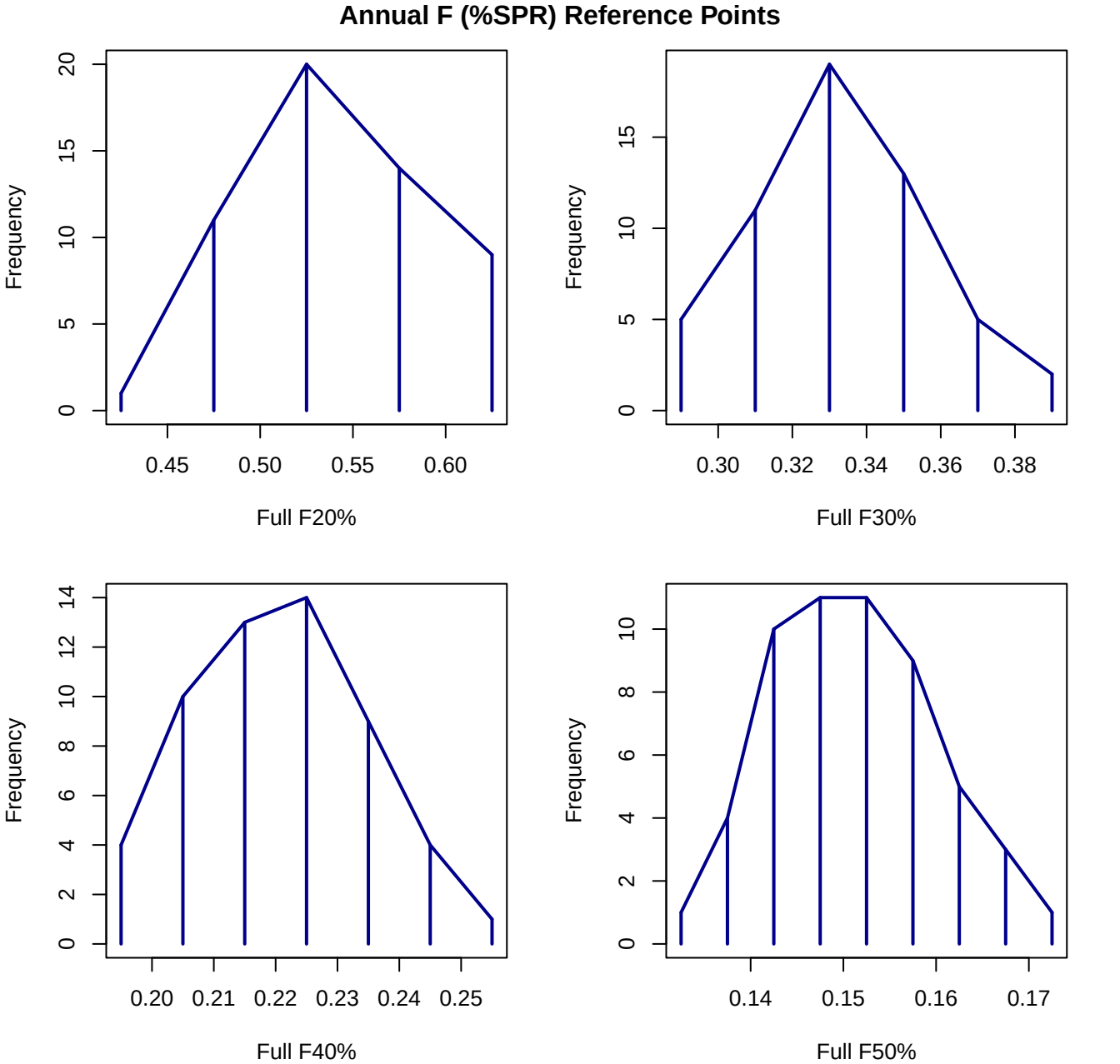

Expected Spawnings and SPR Reference Points (Years Avg = 5)
Expected Spawnings
0
1
2
3
4
% SPR
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.0
0.5
1.0
1.5
2.0
Full F

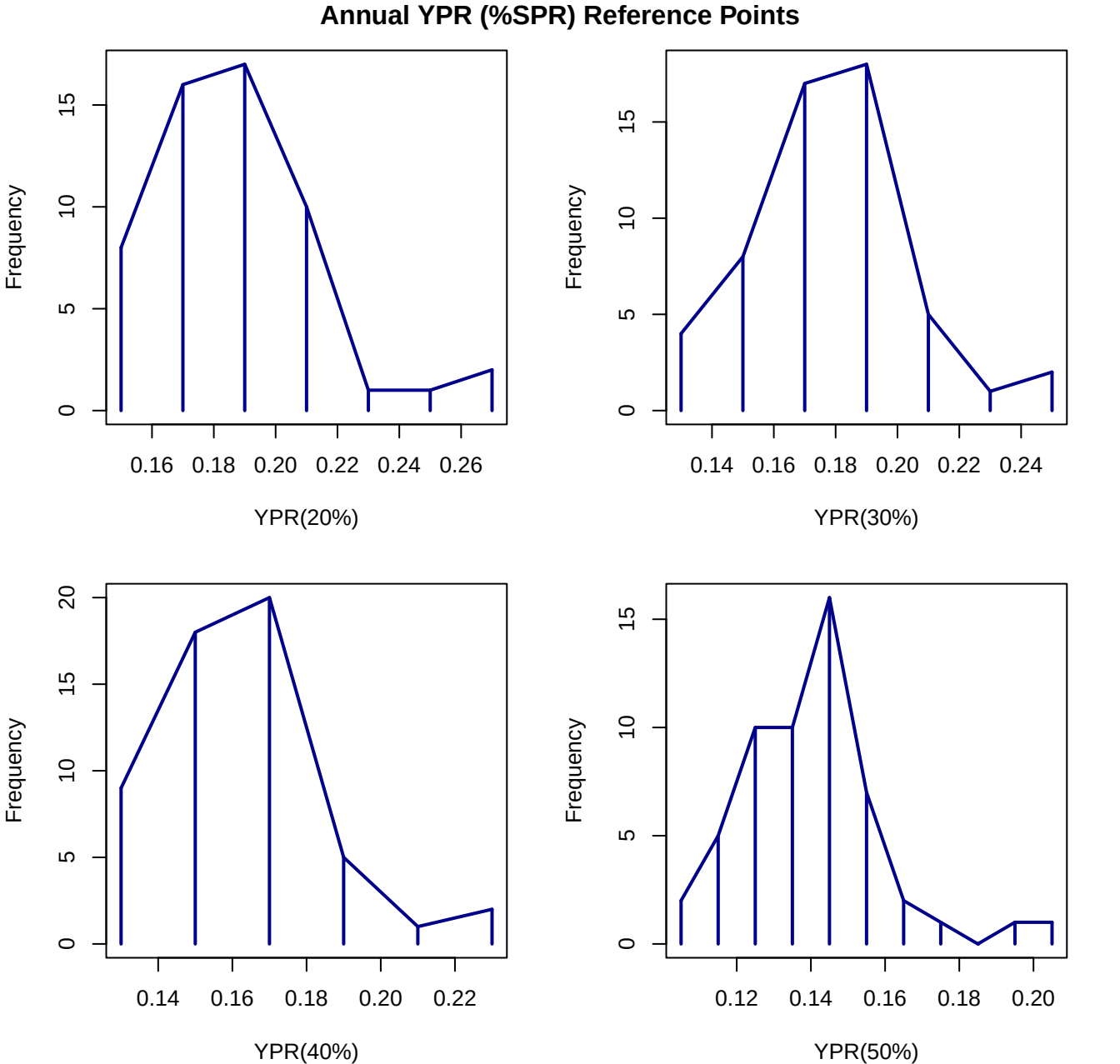
Expected Spawnings & SPR Reference Points (Years Avg = 5)

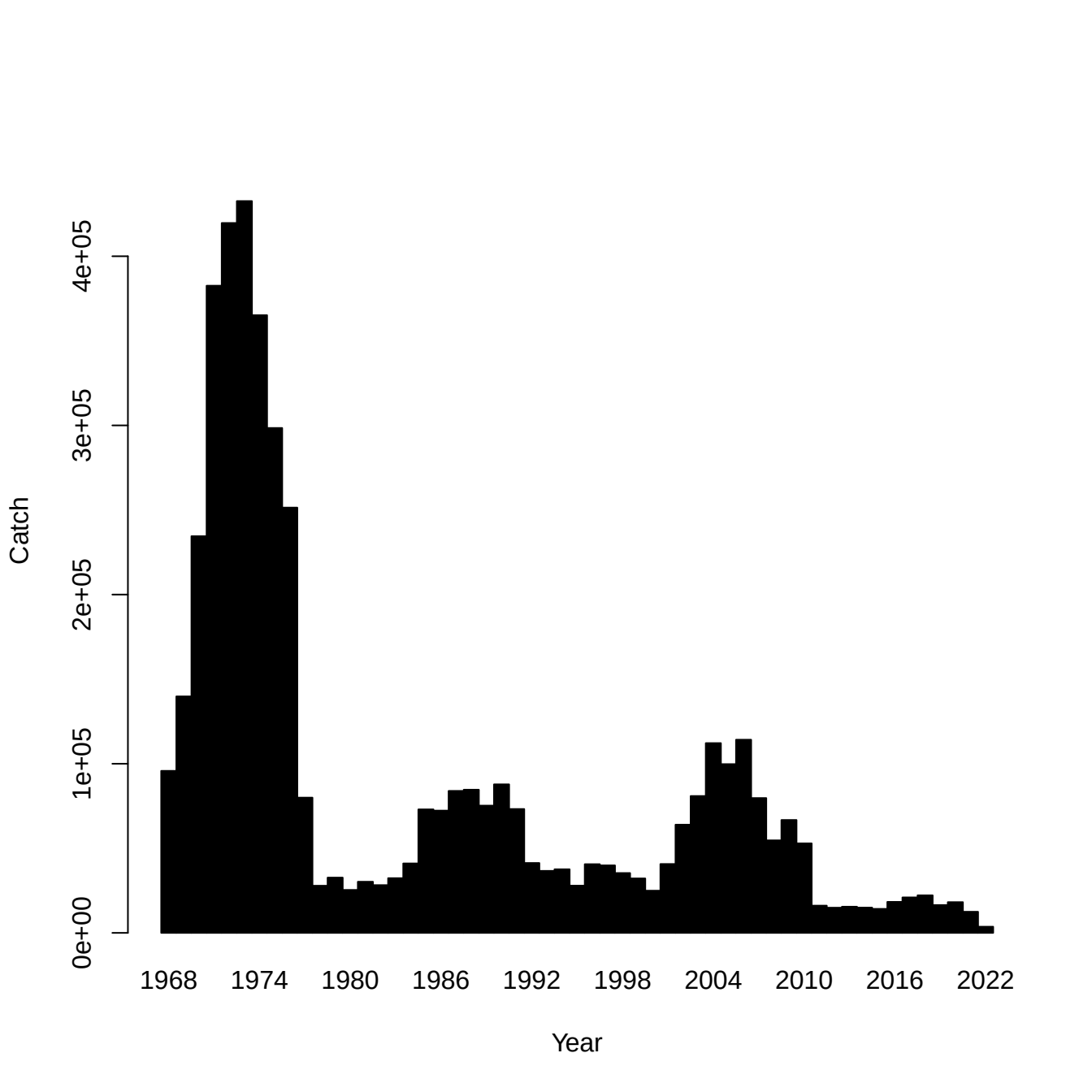
F	E[Sp]	SPR	F	E[Sp]	SPR	F	E[Sp]	SPR
0	3.8688	1	0.35	1.4303	0.2598	0.7	0.8602	0.1333
0.01	3.689	0.939	0.36	1.4046	0.2536	0.71	0.8501	0.1313
0.02	3.5253	0.8841	0.37	1.3797	0.2476	0.72	0.8402	0.1294
0.03	3.3757	0.8344	0.38	1.3557	0.2418	0.73	0.8305	0.1275
0.04	3.2384	0.7892	0.39	1.3325	0.2363	0.74	0.8211	0.1256
0.05	3.1119	0.7481	0.4	1.31	0.231	0.75	0.8118	0.1238
0.06	2.9951	0.7104	0.41	1.2882	0.2258	0.76	0.8027	0.1221
0.07	2.8867	0.6759	0.42	1.2671	0.2209	0.77	0.7937	0.1203
0.08	2.7859	0.6441	0.43	1.2467	0.2162	0.78	0.785	0.1187
0.09	2.692	0.6148	0.44	1.2268	0.2116	0.79	0.7764	0.117
0.1	2.6042	0.5877	0.45	1.2076	0.2072	0.8	0.768	0.1154
0.11	2.522	0.5626	0.46	1.1889	0.203	0.81	0.7597	0.1139
0.12	2.4448	0.5392	0.47	1.1707	0.1989	0.82	0.7516	0.1123
0.13	2.3722	0.5175	0.48	1.153	0.195	0.83	0.7436	0.1108
0.14	2.3038	0.4972	0.49	1.1359	0.1912	0.84	0.7358	0.1094
0.15	2.2392	0.4782	0.5	1.1192	0.1875	0.85	0.7281	0.108
0.16	2.1781	0.4605	0.51	1.1029	0.1839	0.86	0.7206	0.1066
0.17	2.1202	0.4438	0.52	1.0871	0.1804	0.87	0.7132	0.1052
0.18	2.0653	0.4282	0.53	1.0717	0.1771	0.88	0.7059	0.1039
0.19	2.0131	0.4134	0.54	1.0567	0.1739	0.89	0.6988	0.1025
0.2	1.9635	0.3996	0.55	1.0421	0.1707	0.9	0.6918	0.1013
0.21	1.9162	0.3865	0.56	1.0278	0.1677	0.91	0.6849	0.1
0.22	1.8711	0.3741	0.57	1.0139	0.1648	0.92	0.6781	0.0988
0.23	1.8281	0.3624	0.58	1.0004	0.1619	0.93	0.6714	0.0976
0.24	1.7869	0.3513	0.59	0.9871	0.1591	0.94	0.6649	0.0964
0.25	1.7476	0.3408	0.6	0.9742	0.1564	0.95	0.6584	0.0952
0.26	1.7098	0.3308	0.61	0.9616	0.1538	0.96	0.6521	0.0941
0.27	1.6737	0.3214	0.62	0.9493	0.1513	0.97	0.6459	0.093
0.28	1.639	0.3123	0.63	0.9373	0.1488	0.98	0.6397	0.0919
0.29	1.6056	0.3038	0.64	0.9255	0.1464	0.99	0.6337	0.0908
0.3	1.5736	0.2956	0.65	0.914	0.1441	1	0.6278	0.0898
0.31	1.5428	0.2878	0.66	0.9028	0.1418	1.01	0.6219	0.0888
0.32	1.5131	0.2803	0.67	0.8918	0.1396	1.02	0.6162	0.0877
0.33	1.4845	0.2732	0.68	0.881	0.1374	1.03	0.6105	0.0868
0.34	1.4569	0.2663	0.69	0.8705	0.1353	1.04	0.6049	0.0858

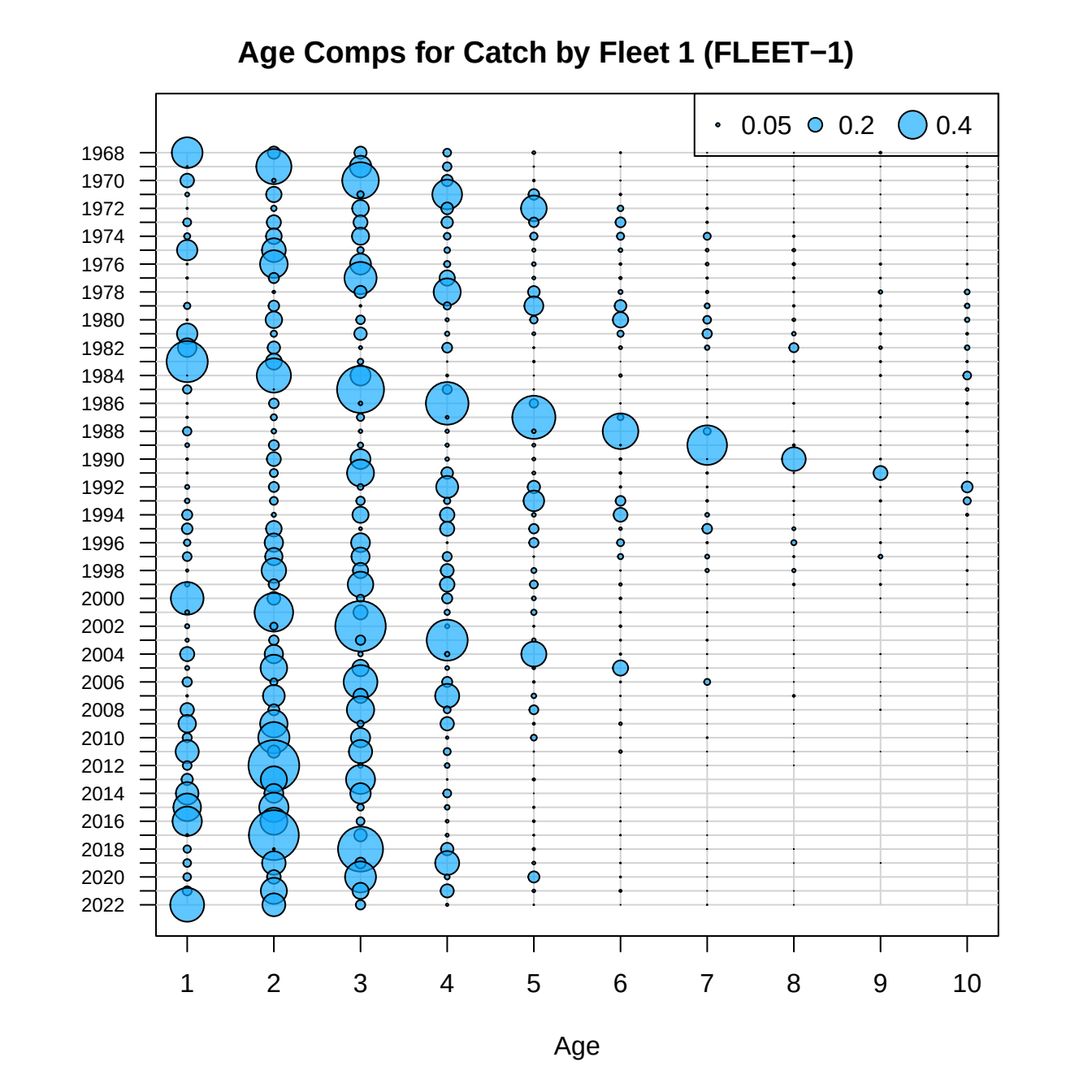

Annual F(%SPR) Reference Points
F20%
F30%
F40%
F50%
Full F (%SPR)
0.0
0.2
0.4
0.6
0.8
1970
1980
1990
2000
2010
2020
Year

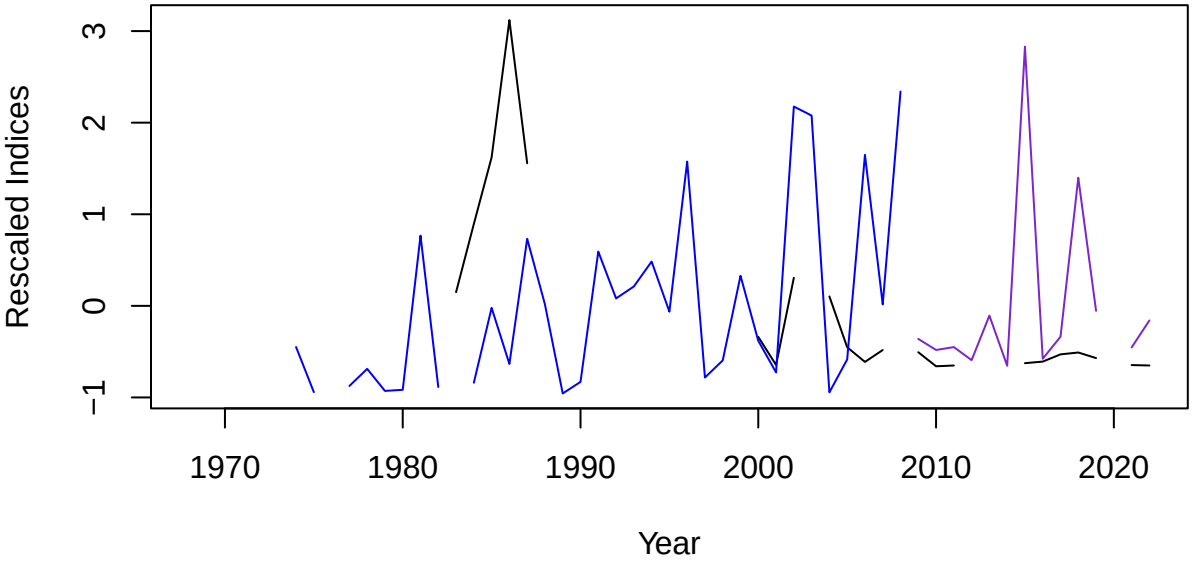

Annual YPR(%SPR) Reference Points
YPR20%
YPR30%
YPR40%
YPR50%
YPR (%SPR)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
1970
1980
1990
2000
2010
2020
Year

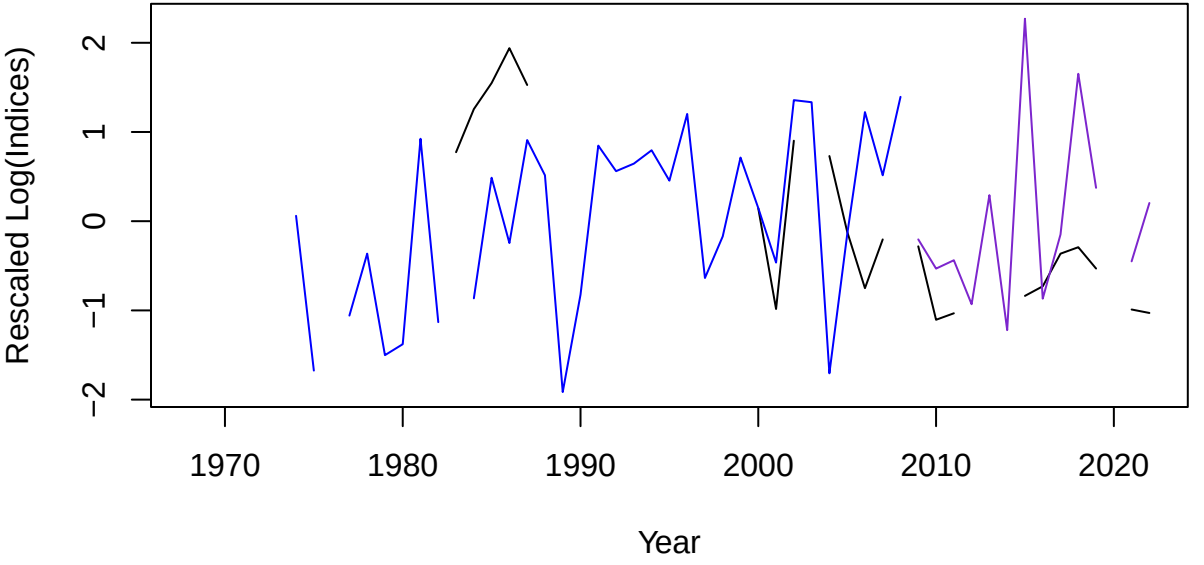

Annual F (%SPR) Reference Points
Frequency
0
5
10
15
20
0.45
0.50
0.55
0.60
Full F20%
Frequency
0
5
10
15
0.30
0.32
0.34
0.36
0.38
Full F30%
Frequency
0
2
4
6
8
10
12
14
0.20
0.21
0.22
0.23
0.24
0.25
Full F40%
Frequency
0
2
4
6
8
10
0.14
0.15
0.16
0.17
Full F50%

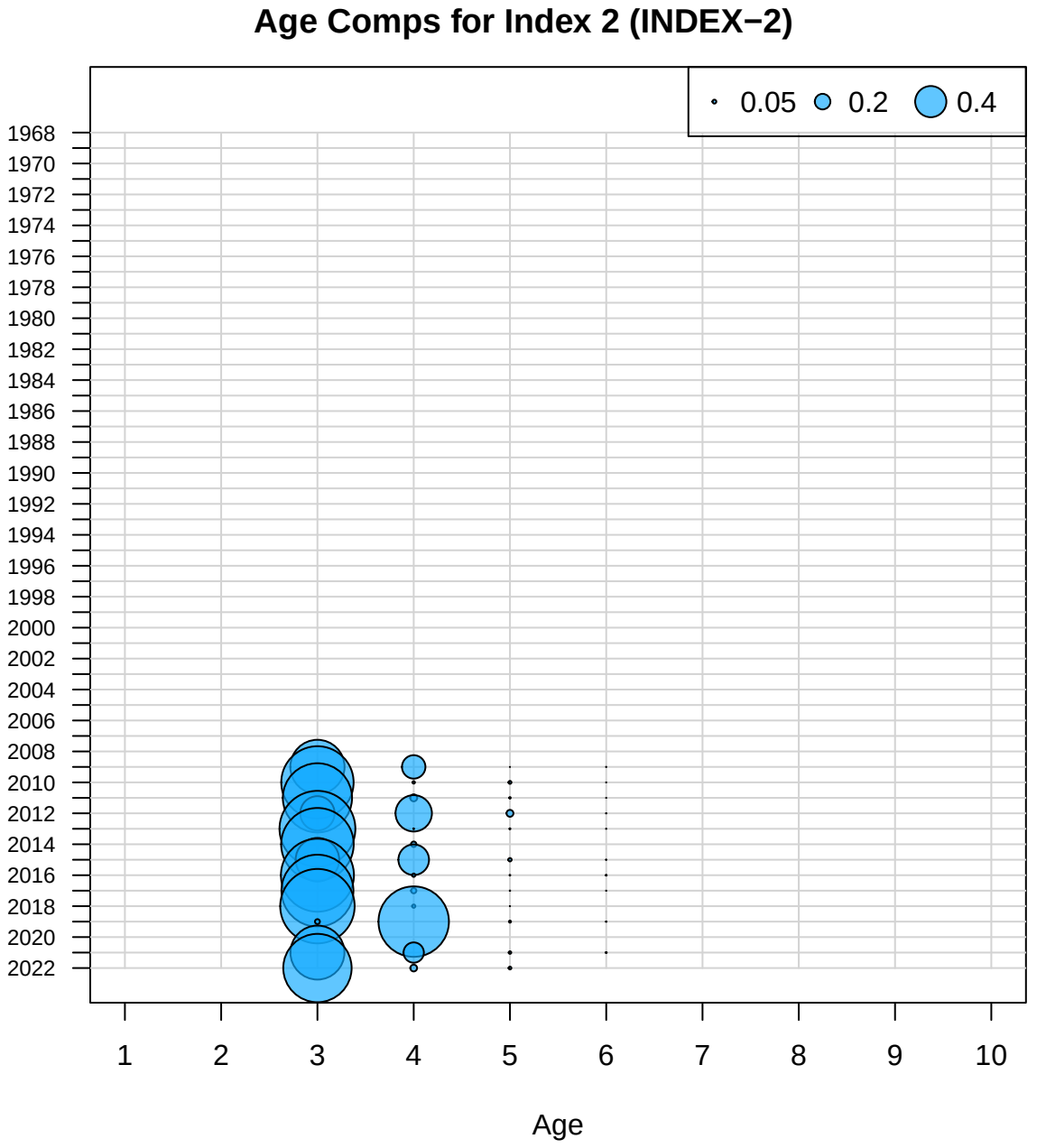

Annual YPR (%SPR) Reference Points
Frequency
0
5
10
15
0.16
0.18
0.20
0.22
0.24
0.26
YPR(20%)
Frequency
0
5
10
15
0.14
0.16
0.18
0.20
0.22
0.24
YPR(30%)
Frequency
0
5
10
15
20
0.14
0.16
0.18
0.20
0.22
YPR(40%)
Frequency
0
5
10
15
0.12
0.14
0.16
0.18
0.20
YPR(50%)

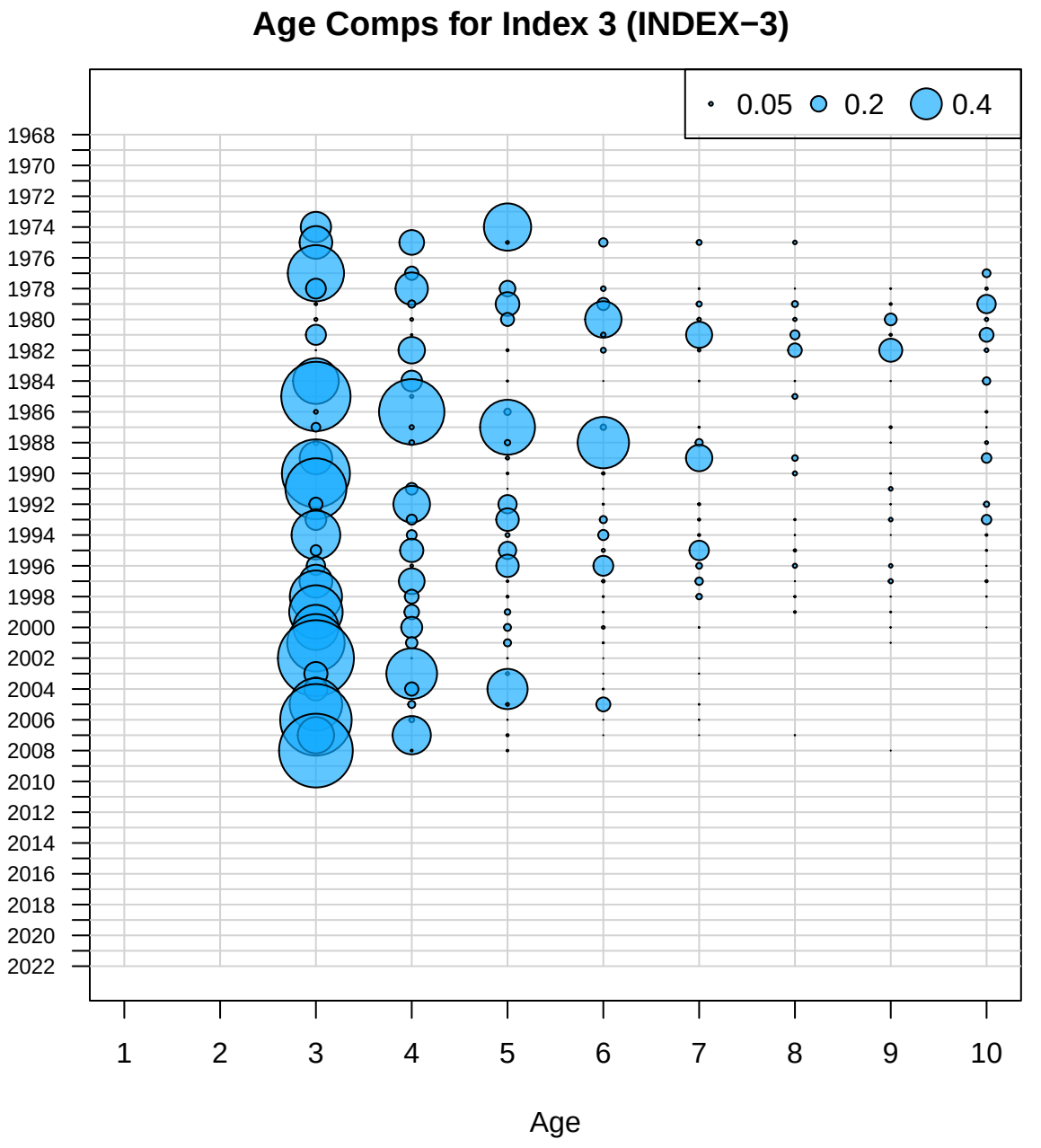

Catch
0e+00
1e+05
2e+05
3e+05
4e+05
1968
1974
1980
1986
1992
1998
2004
2010
2016
2022
Year

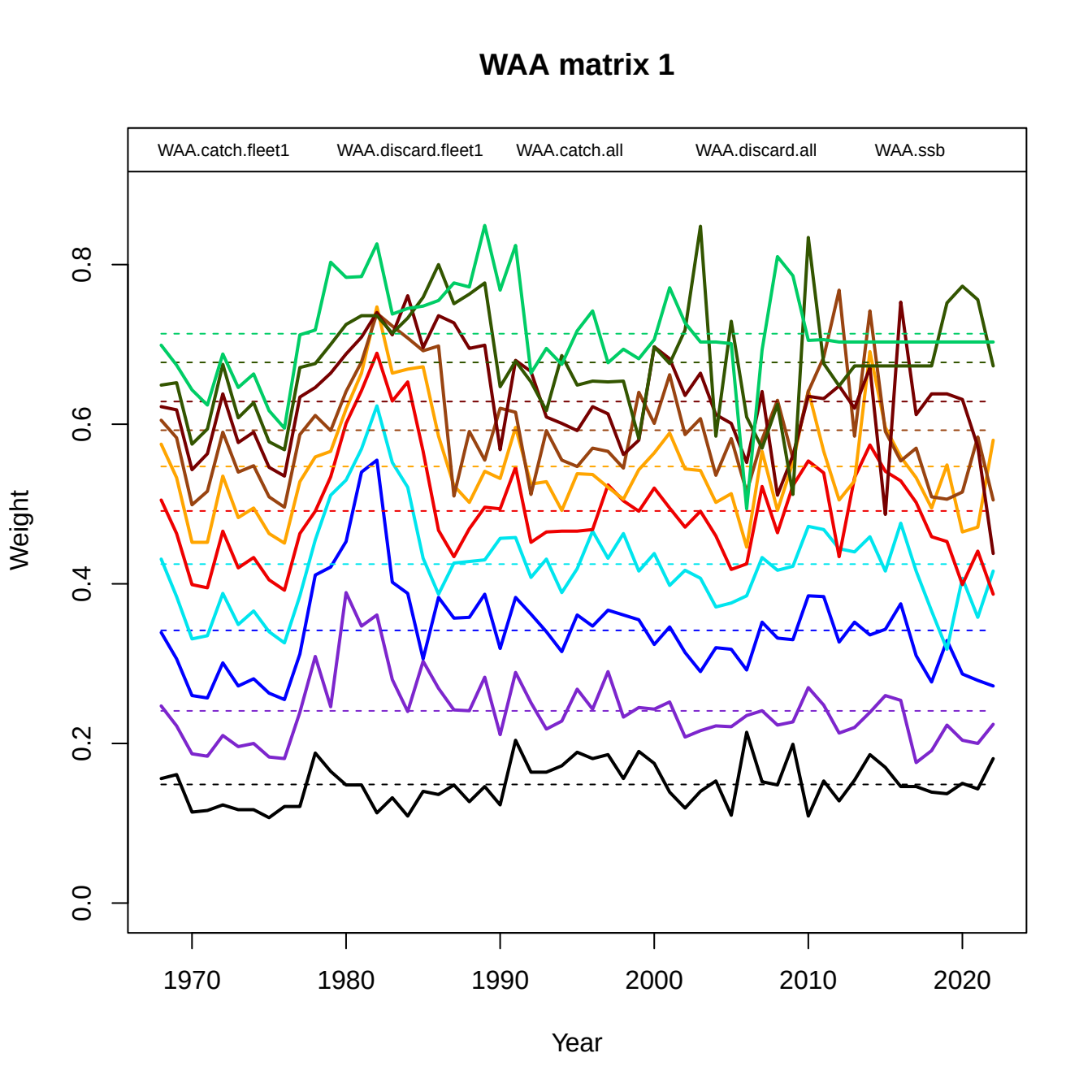

Age Comps for Catch by Fleet 1 (FLEET−1)
0.05
0.2
0.4
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
1
2
3
4
5
6
7
8
9
10
Age

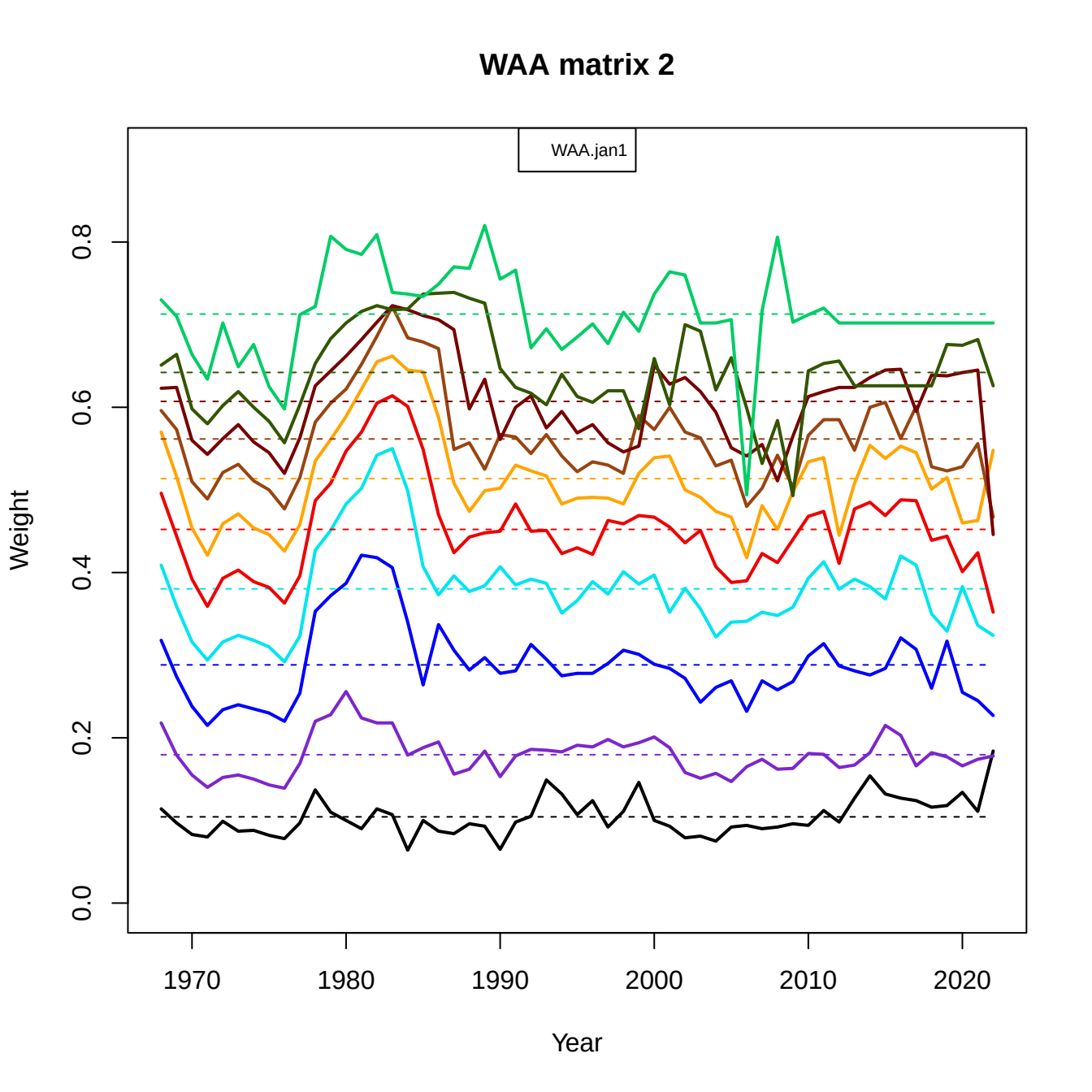

Rescaled Indices
3
2
1
0
−1
1970
1980
1990
2000
2010
2020
Year

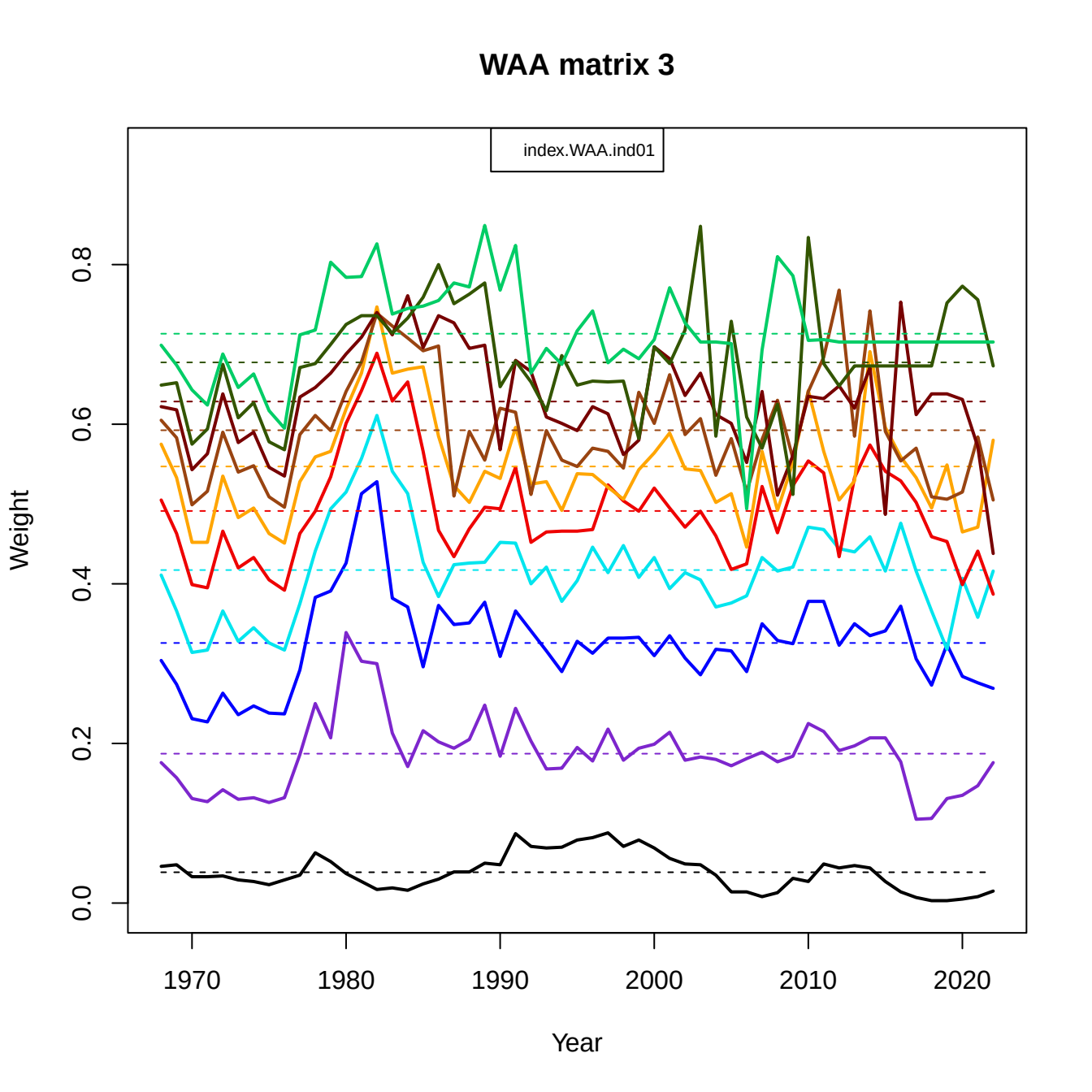

Rescaled Log(Indices)
2
1
0
−1
−2
1970
1980
1990
2000
2010
2020
Year

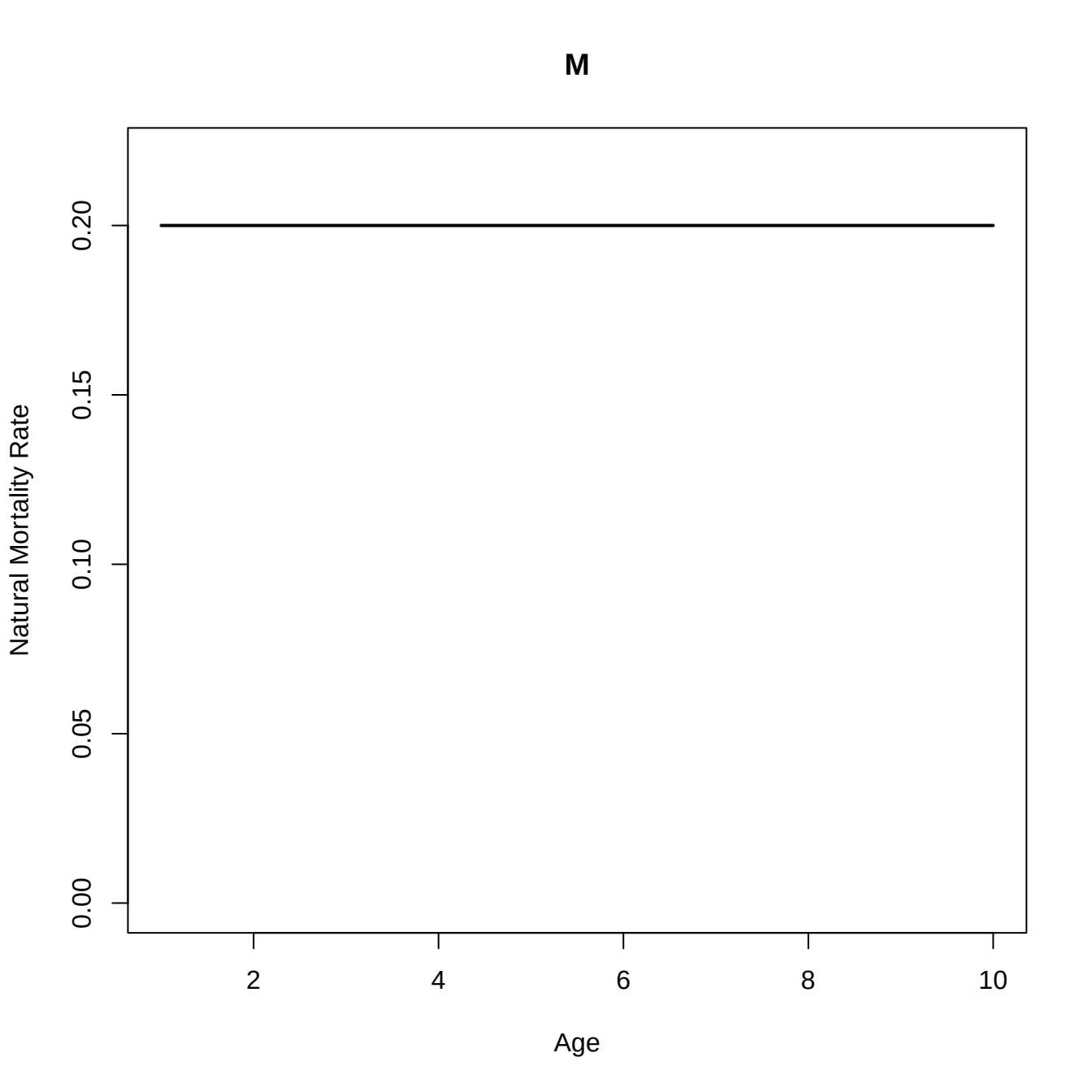

Age Comps for Index 2 (INDEX−2)
0.05
0.2
0.4
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
1
2
3
4
5
6
7
8
9
10
Age

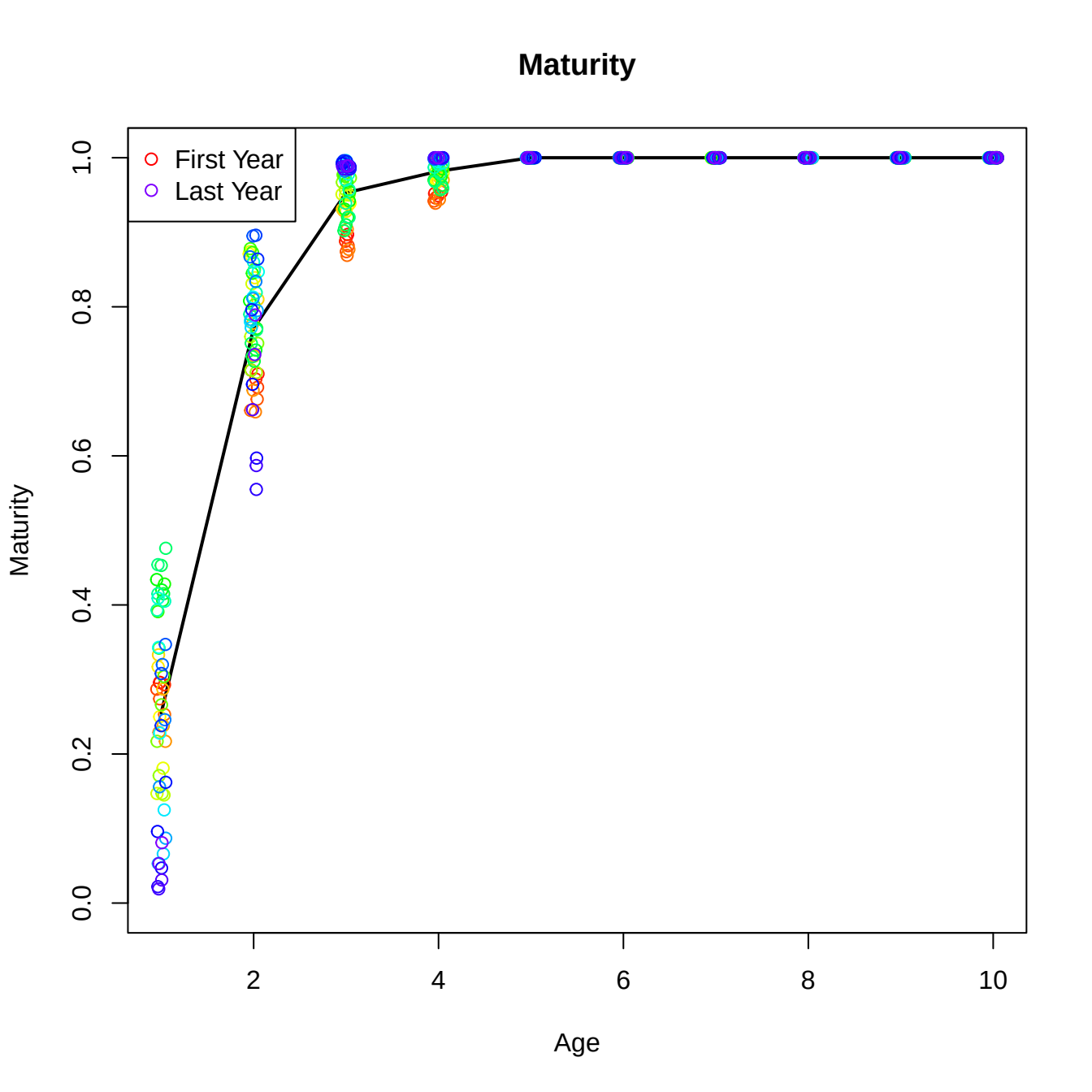

Age Comps for Index 3 (INDEX−3)
0.05
0.2
0.4
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
1
2
3
4
5
6
7
8
9
10
Age


WAA matrix 1
WAA.catch.fleet1
WAA.discard.fleet1
WAA.catch.all
WAA.discard.all
WAA.ssb
Weight
0.0
0.2
0.4
0.6
0.8
1970
1980
1990
2000
2010
2020
Year


WAA matrix 2
WAA.jan1
Weight
0.0
0.2
0.4
0.6
0.8
1970
1980
1990
2000
2010
2020
Year


WAA matrix 3
index.WAA.ind01
Weight
0.0
0.2
0.4
0.6
0.8
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
10
Age


Maturity
First Year
Last Year
Maturity
0.0
0.2
0.4
0.6
0.8
1.0
2
4
6
8
10
Age