

File = y2010r4c1m3.5s111100000\_000.dat

ASAP3 run on Monday, 04 Nov 2019 at 11:47:25

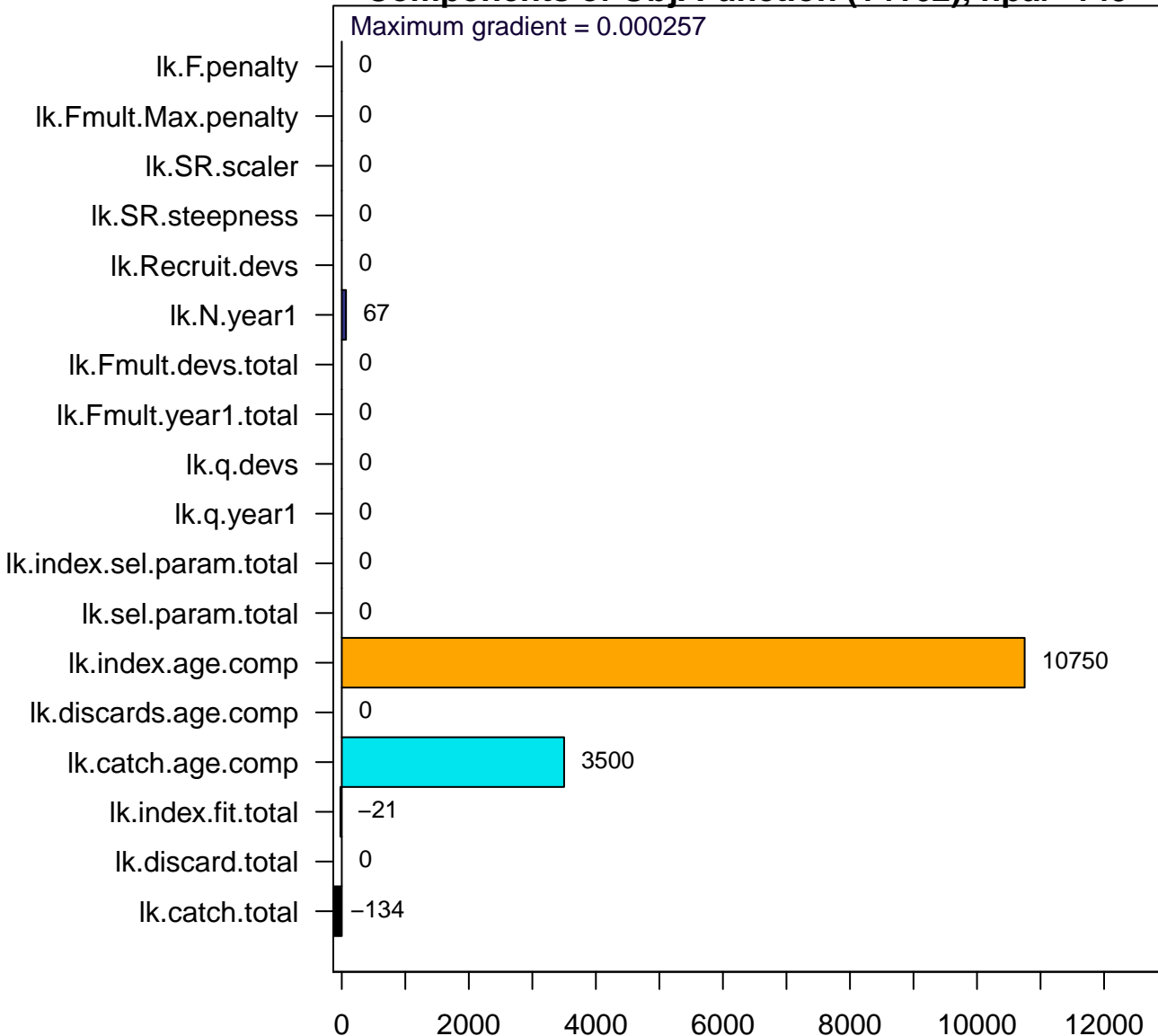
chris.legault\Documents\Working\ICES-WKFORBIAS 2019\WhiteHake\Rose\w

ASAPplots version = 0.2.14

npar = 149, maximum gradient = 0.000257062

# Components of Obj. Function (14162), npar=149

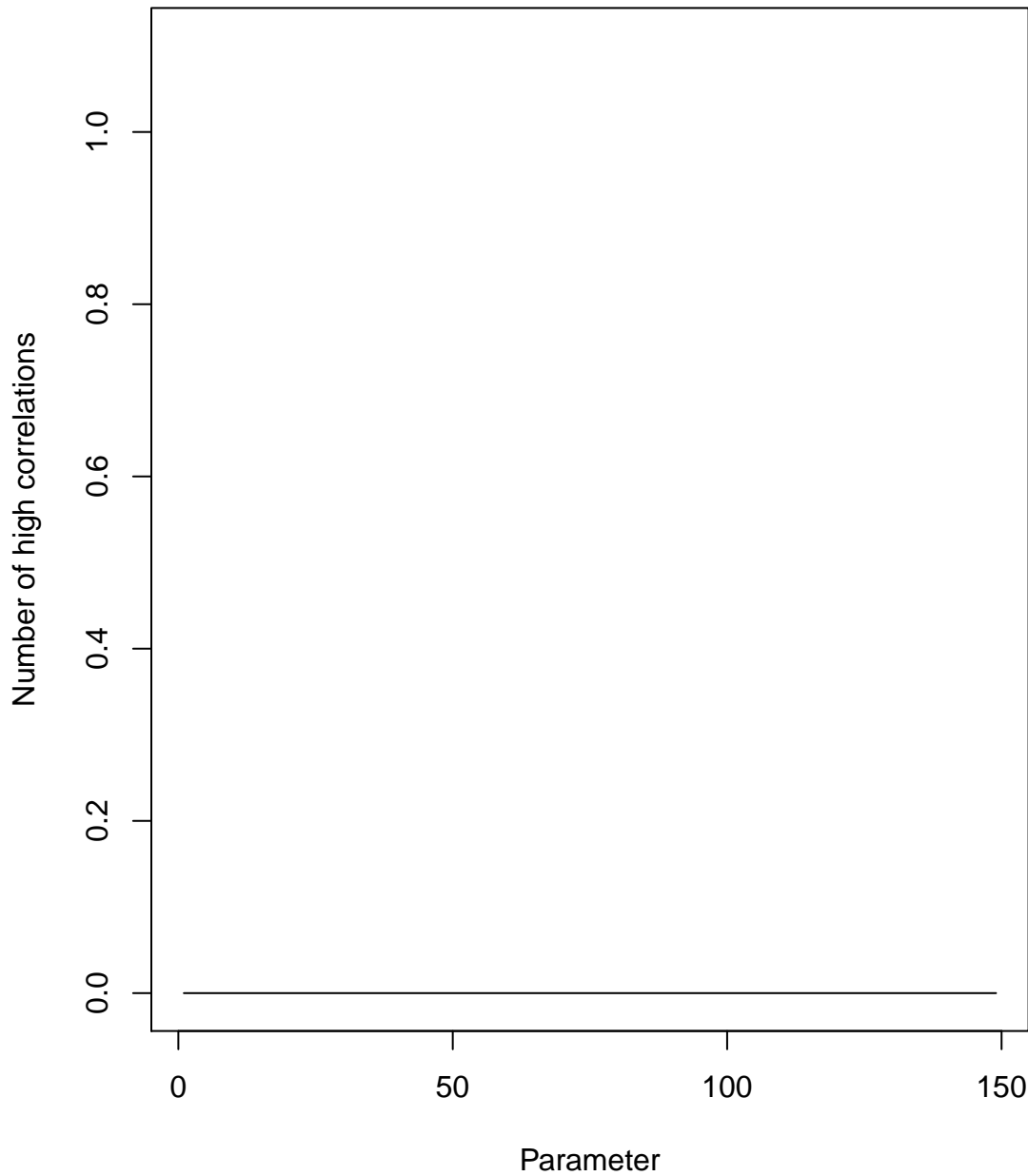
Maximum gradient = 0.000257

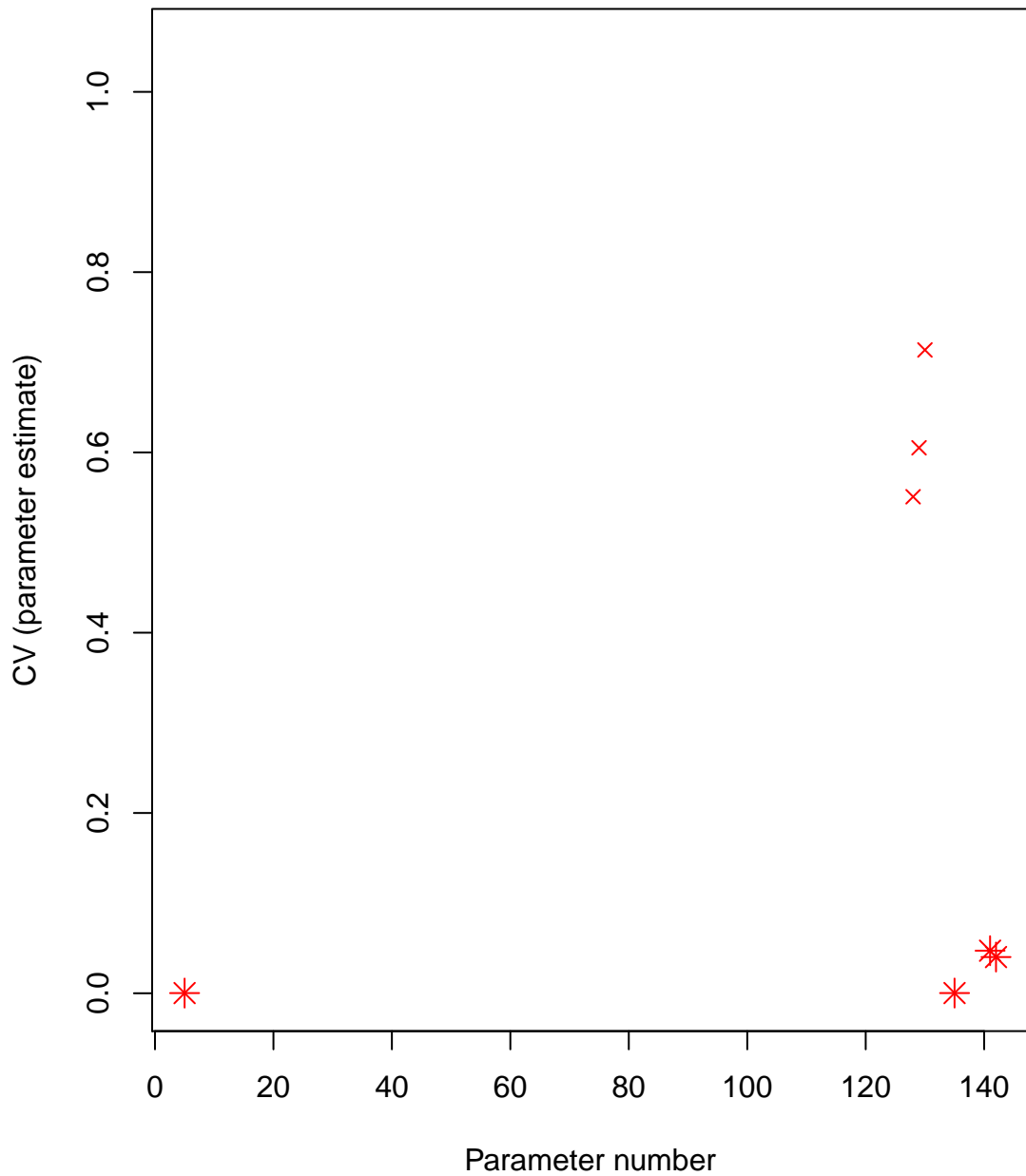


Likelihood Contribution

Model: y2010r4c1m3.5s111100000\_000

Monday, 04 Nov 2019 at 11:47

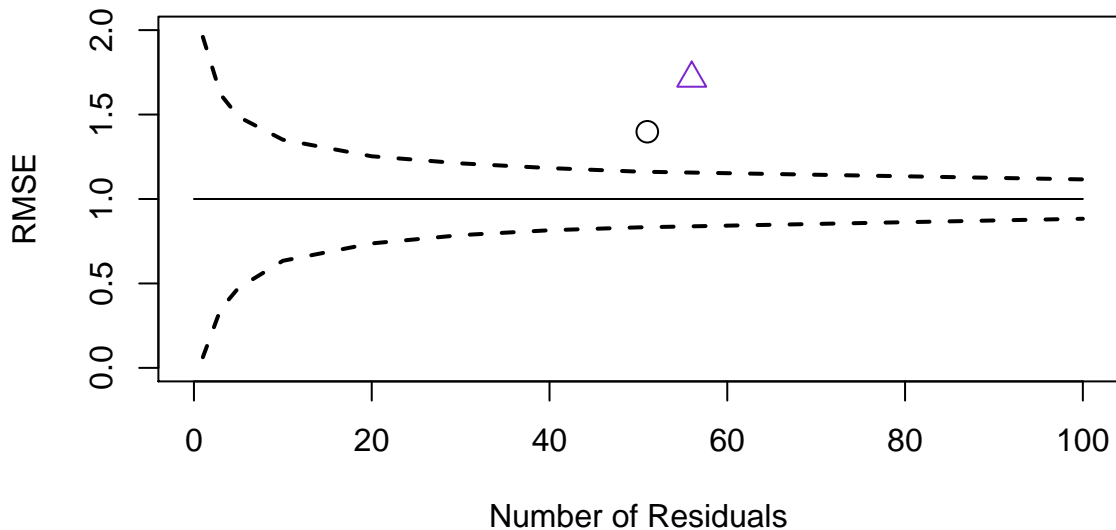




## Root Mean Square Error computed from Standardized Residuals

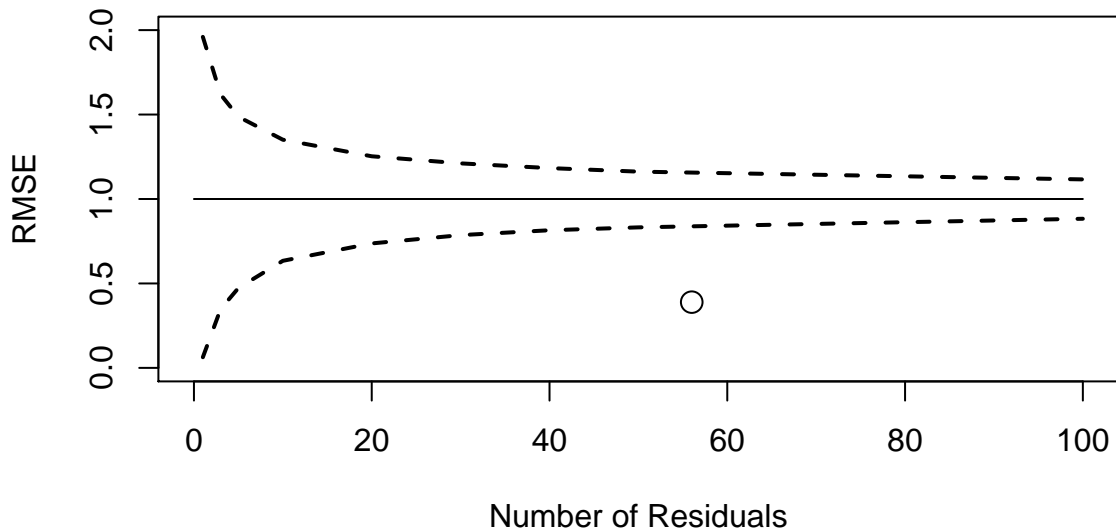
Component	# resids	RMSE
catch.tot	56	0.39
discard.tot	0	0
ind01	51	1.4
ind02	56	1.71
ind.total	107	1.57
N.year1	8	0.853
Fmult.year1	0	0
Fmult.devs.total	0	0
recruit.devs	0	0
fleet.sel.params	0	0
index.sel.params	0	0
q.year1	0	0
q.devs	0	0
SR.steepness	0	0
SR.scaler	0	0

Root Mean Square Error for Indices



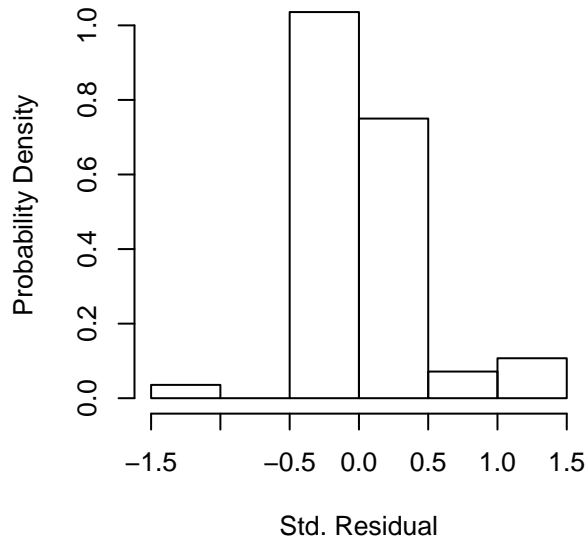
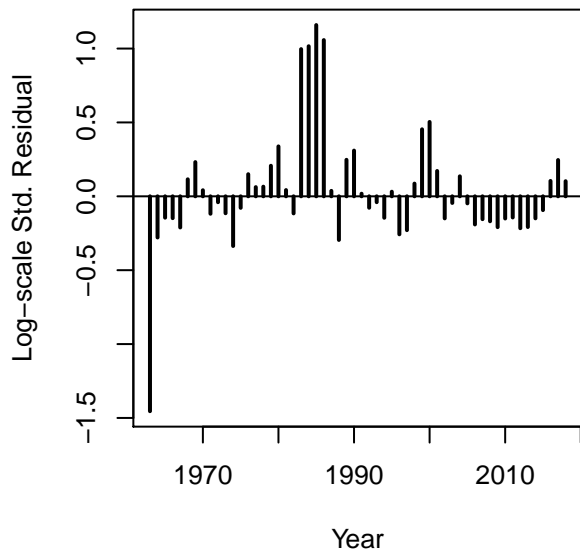
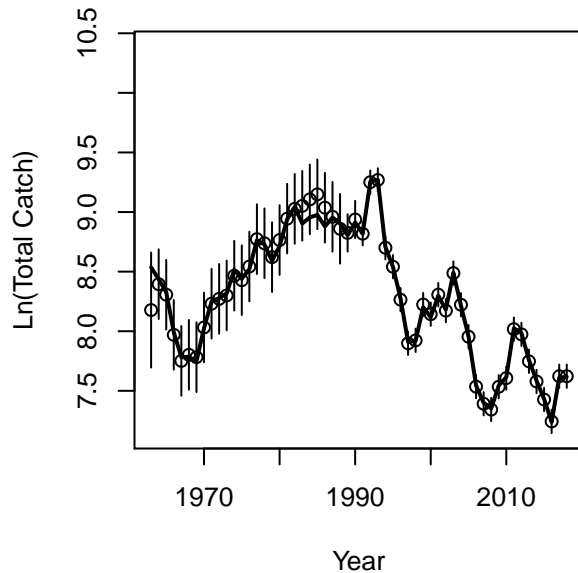
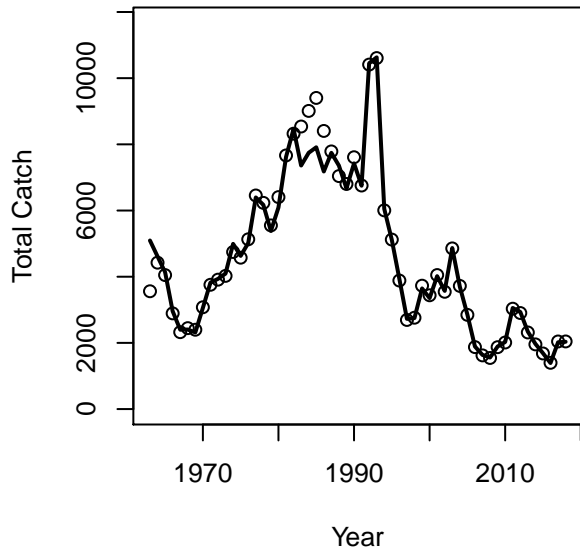
+ ind total  
△ INDEX-2  
○ INDEX-1

## Root Mean Square Error for Catch



○ catch.tot

# Fleet 1 Catch (FLEET-1)

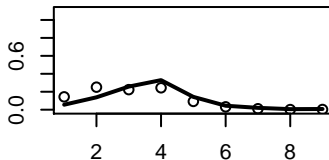




Catch

Year = 1993

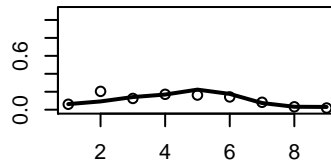
Proportion at Age



Age

Year = 1998

Proportion at Age



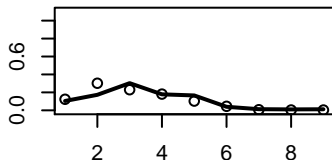
Age

Fleet 1  
FLEET-1



Year = 1989

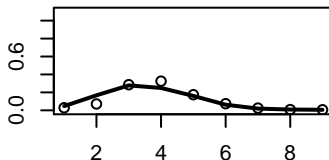
Proportion at Age



Age

Year = 1994

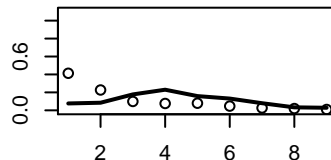
Proportion at Age



Age

Year = 1999

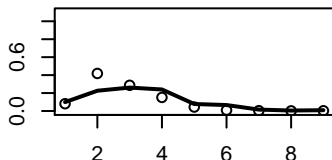
Proportion at Age



Age

Year = 1990

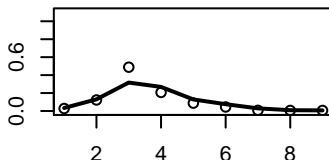
Proportion at Age



Age

Year = 1995

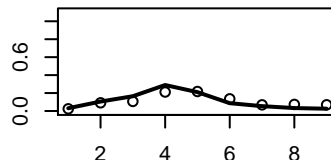
Proportion at Age



Age

Year = 2000

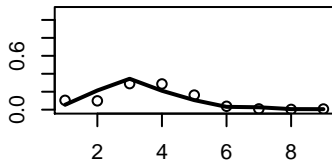
Proportion at Age



Age

Year = 1991

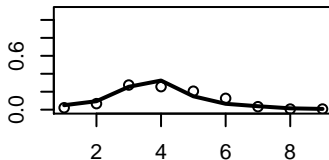
Proportion at Age



Age

Year = 1996

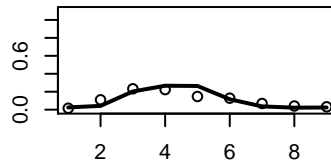
Proportion at Age



Age

Year = 2001

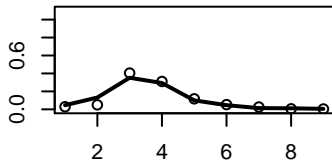
Proportion at Age



Age

Year = 1992

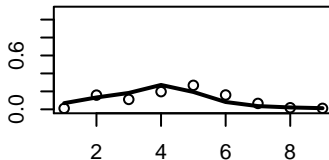
Proportion at Age



Age

Year = 1997

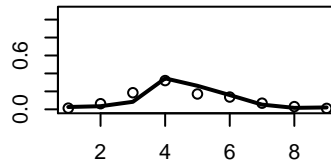
Proportion at Age



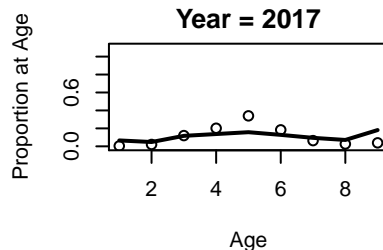
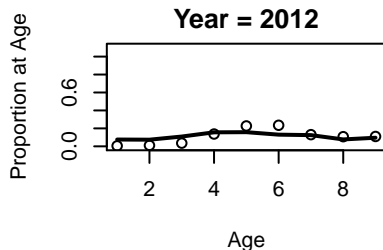
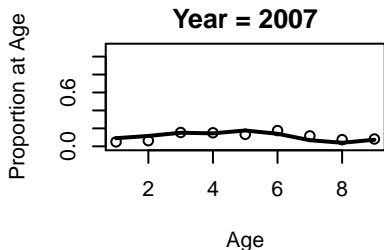
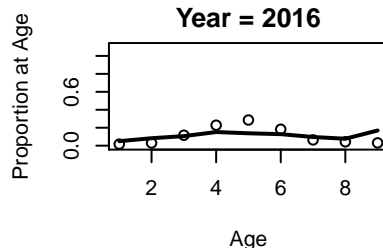
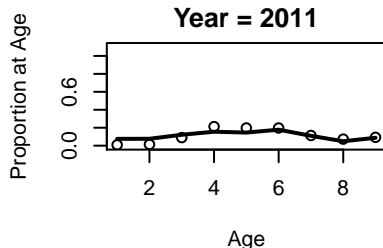
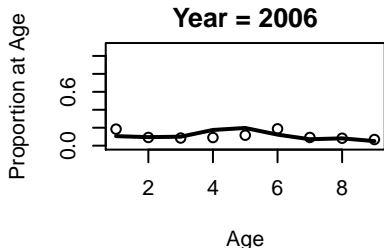
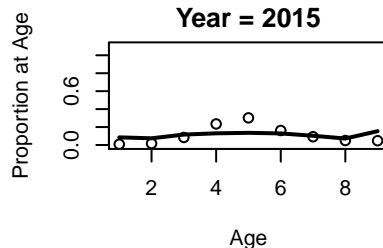
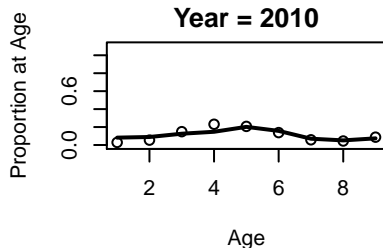
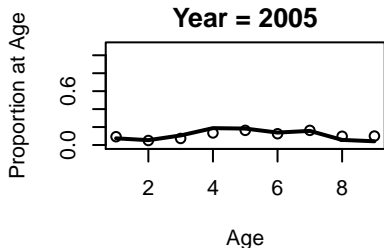
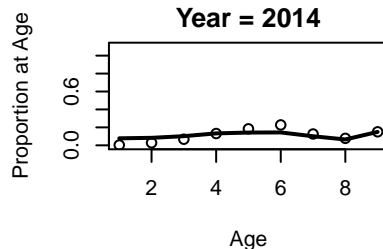
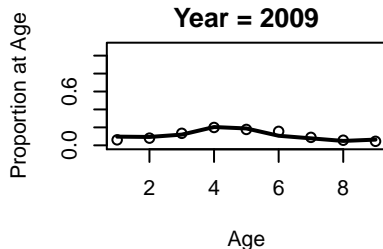
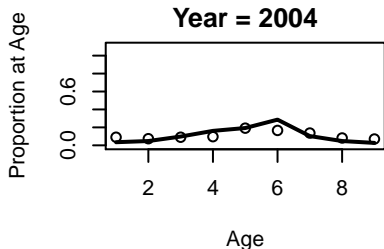
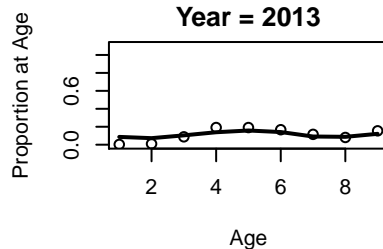
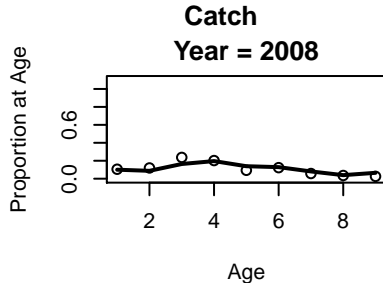
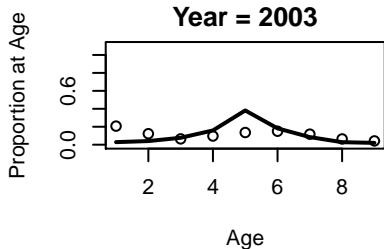
Age

Year = 2002

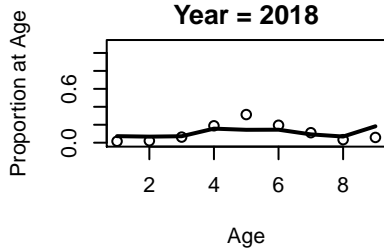
Proportion at Age



Age

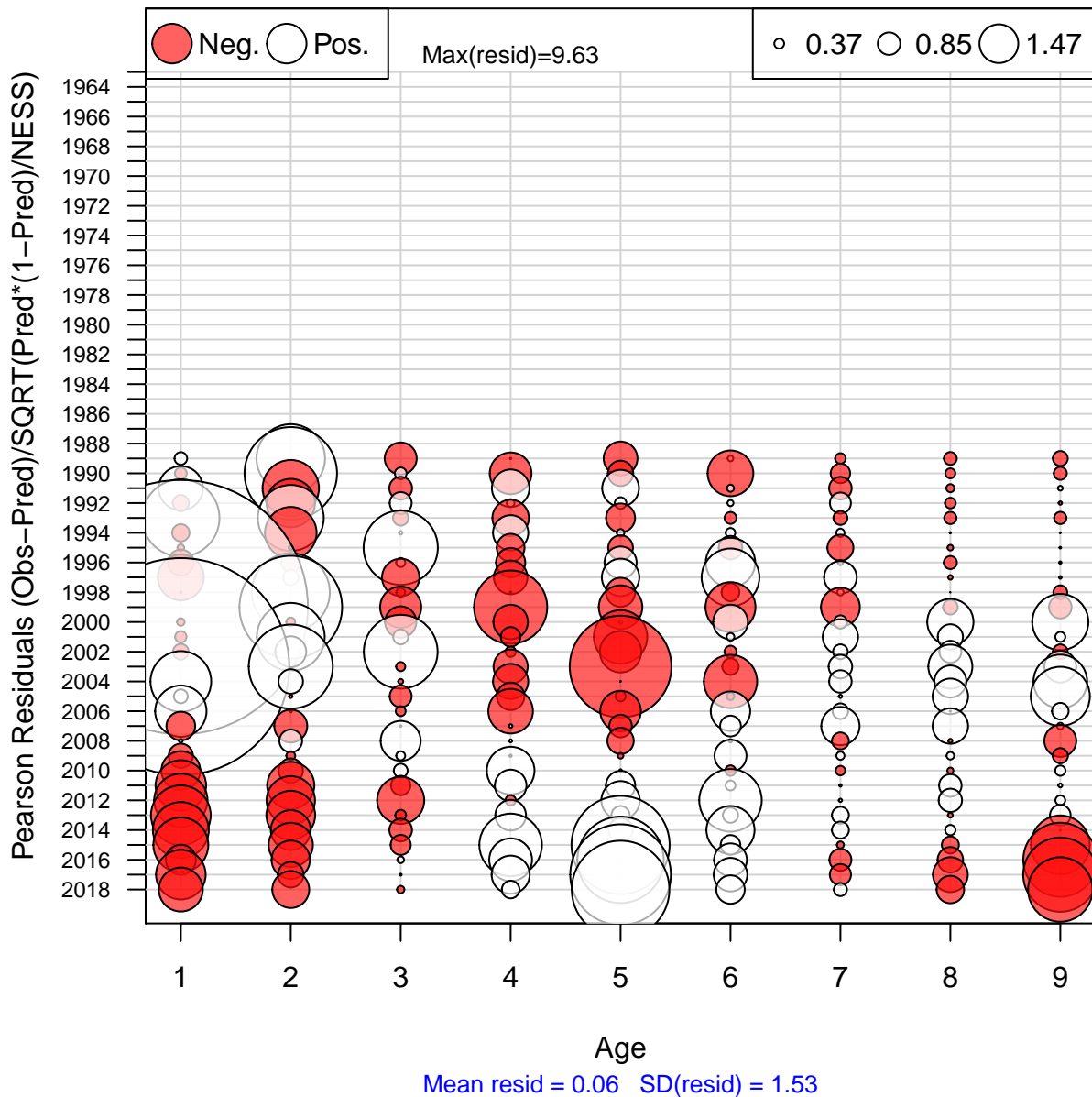


Year = 2018

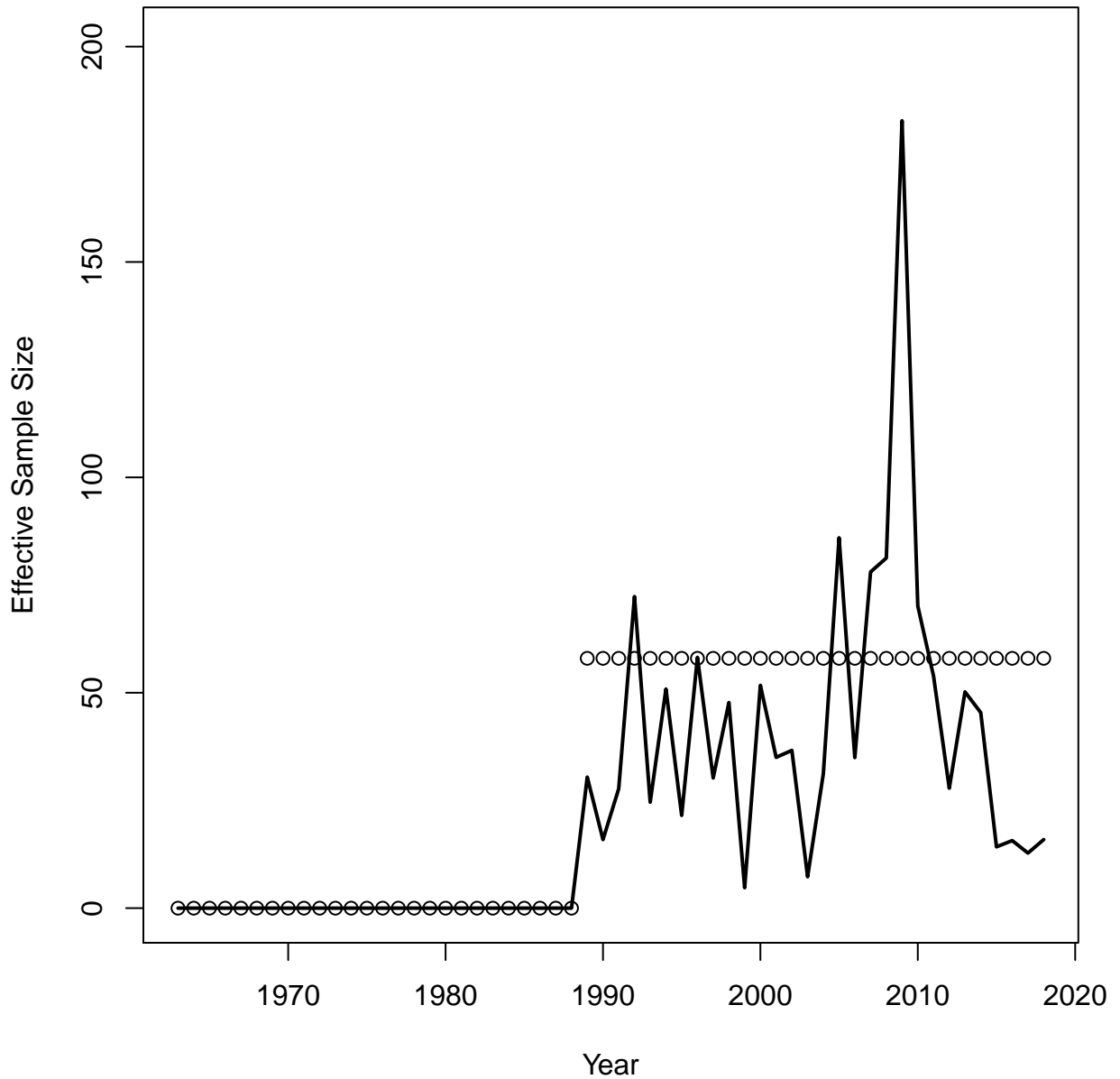


Catch

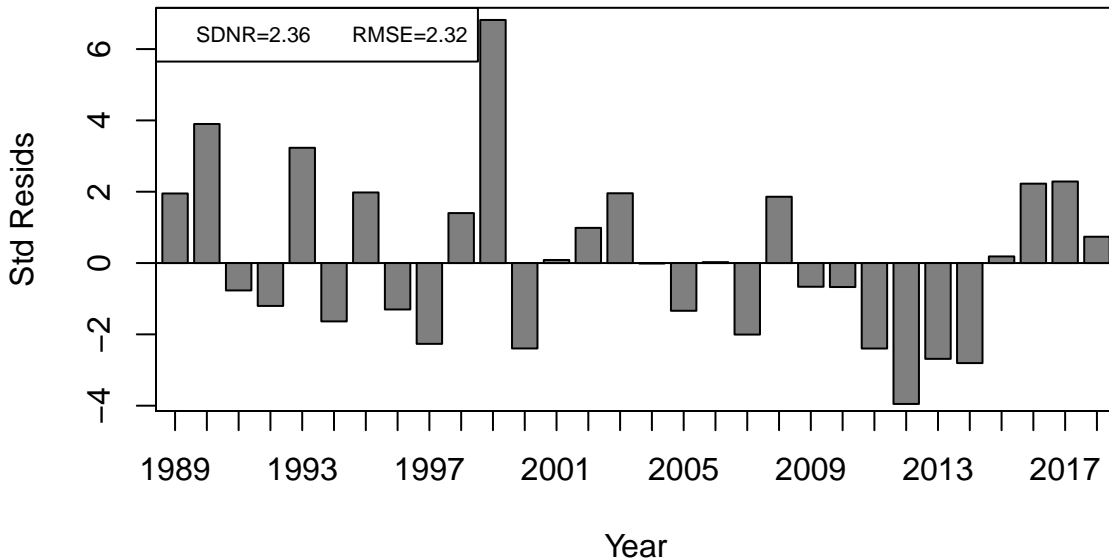
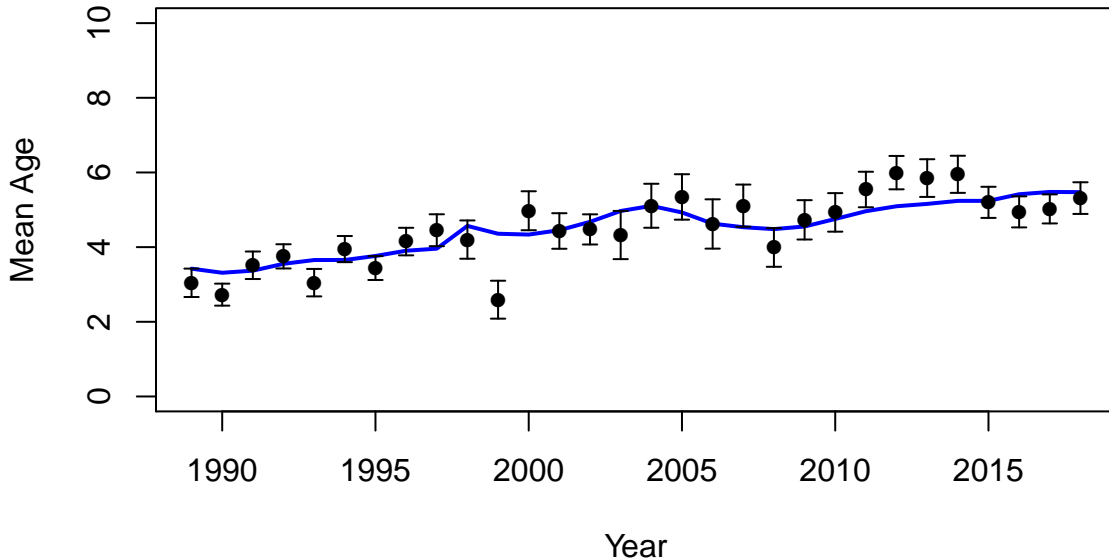
# Age Comp Residuals for Catch by Fleet 1 (FLEET-1)



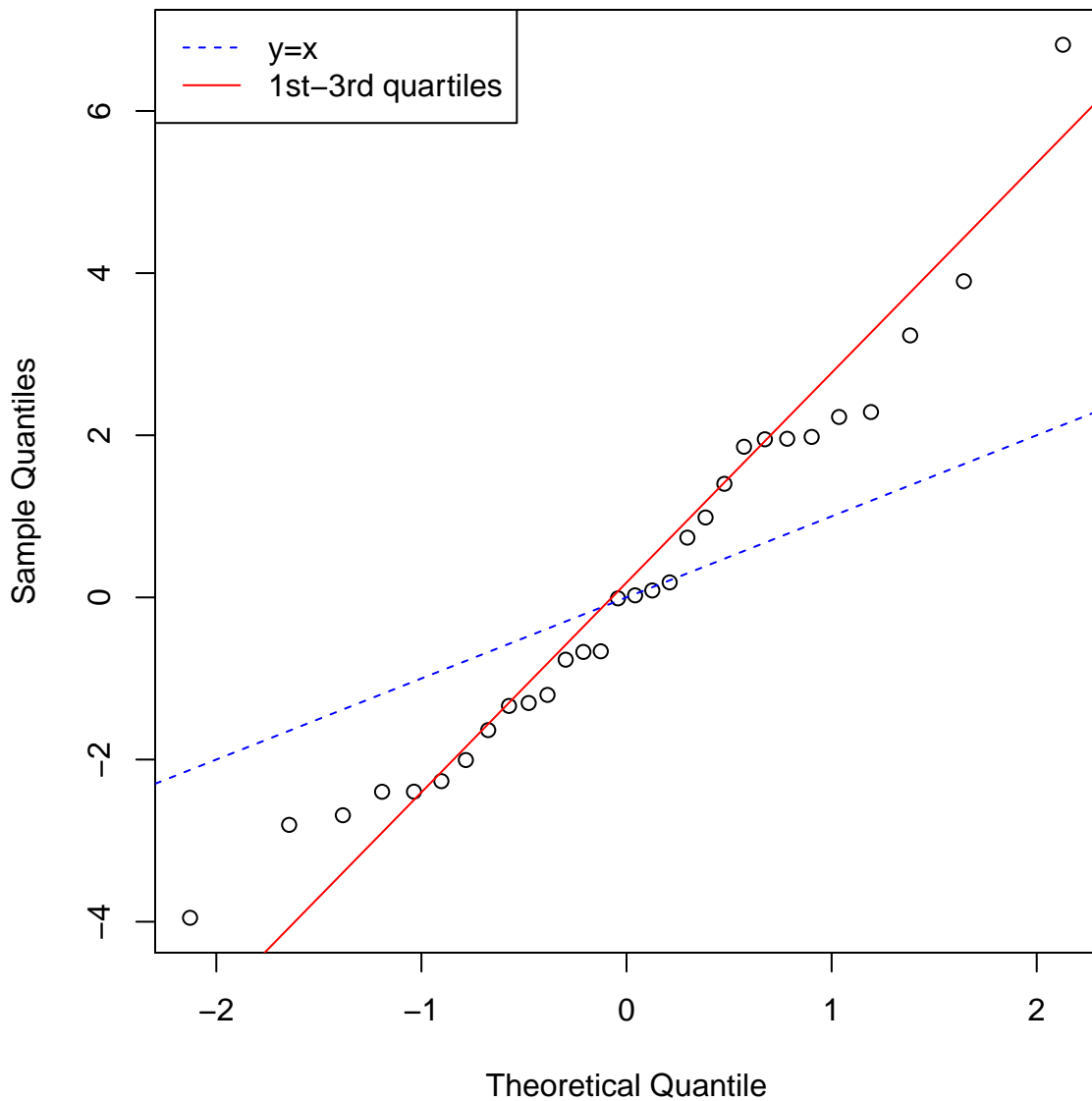
# Catch Neff Fleet 1 (FLEET-1)



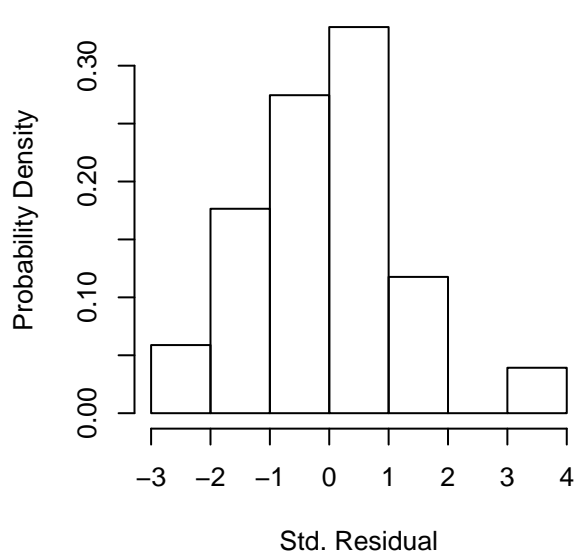
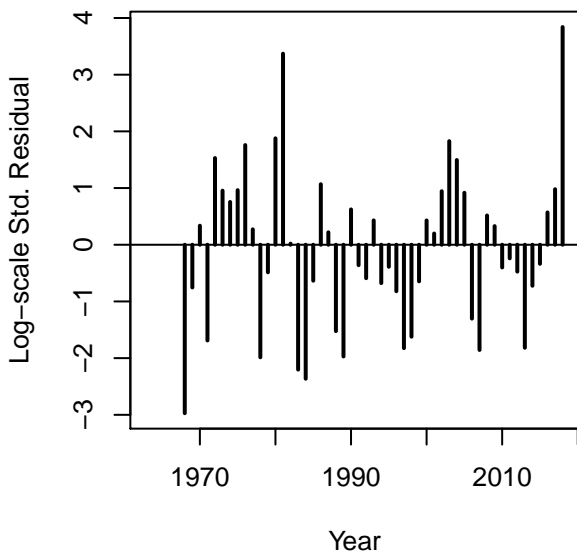
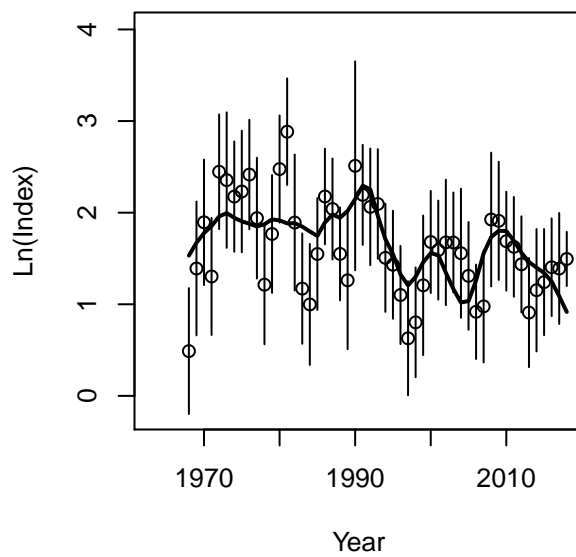
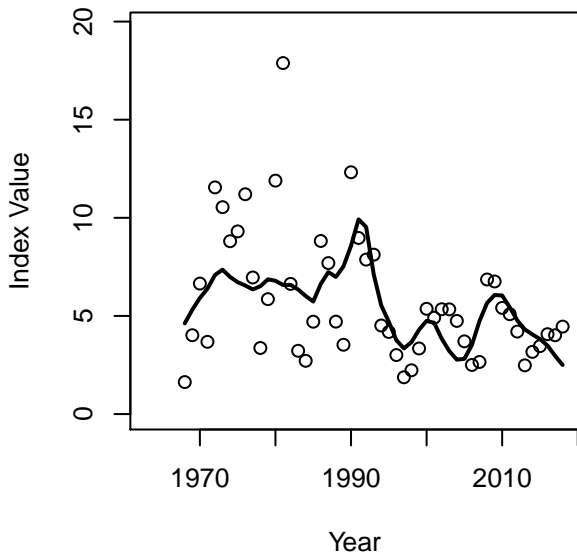
### Catch Fleet 1 (FLEET-1) ESS = 58



# Catch Fleet 1 (FLEET-1) ESS = 58

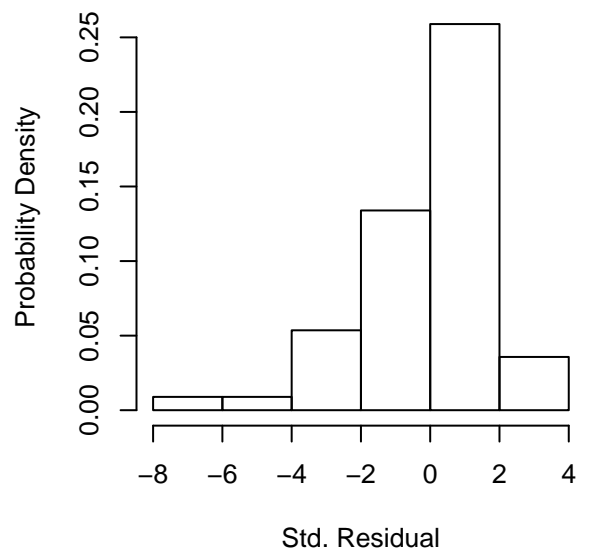
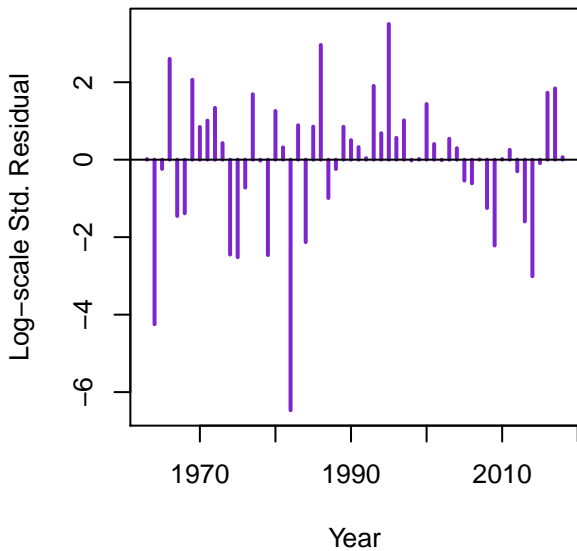
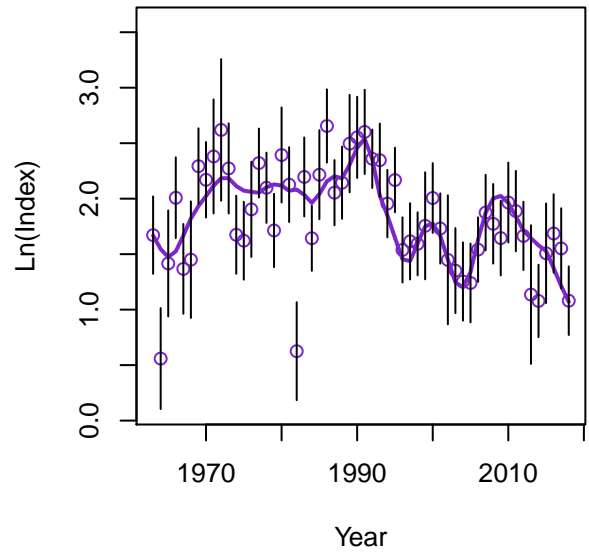
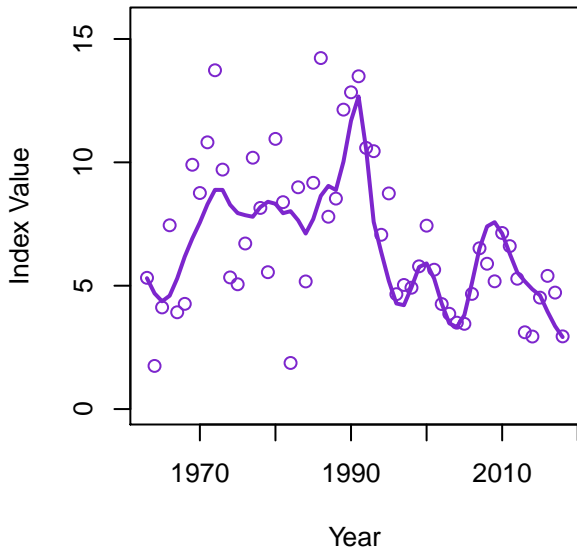


Index 1 (INDEX-1)

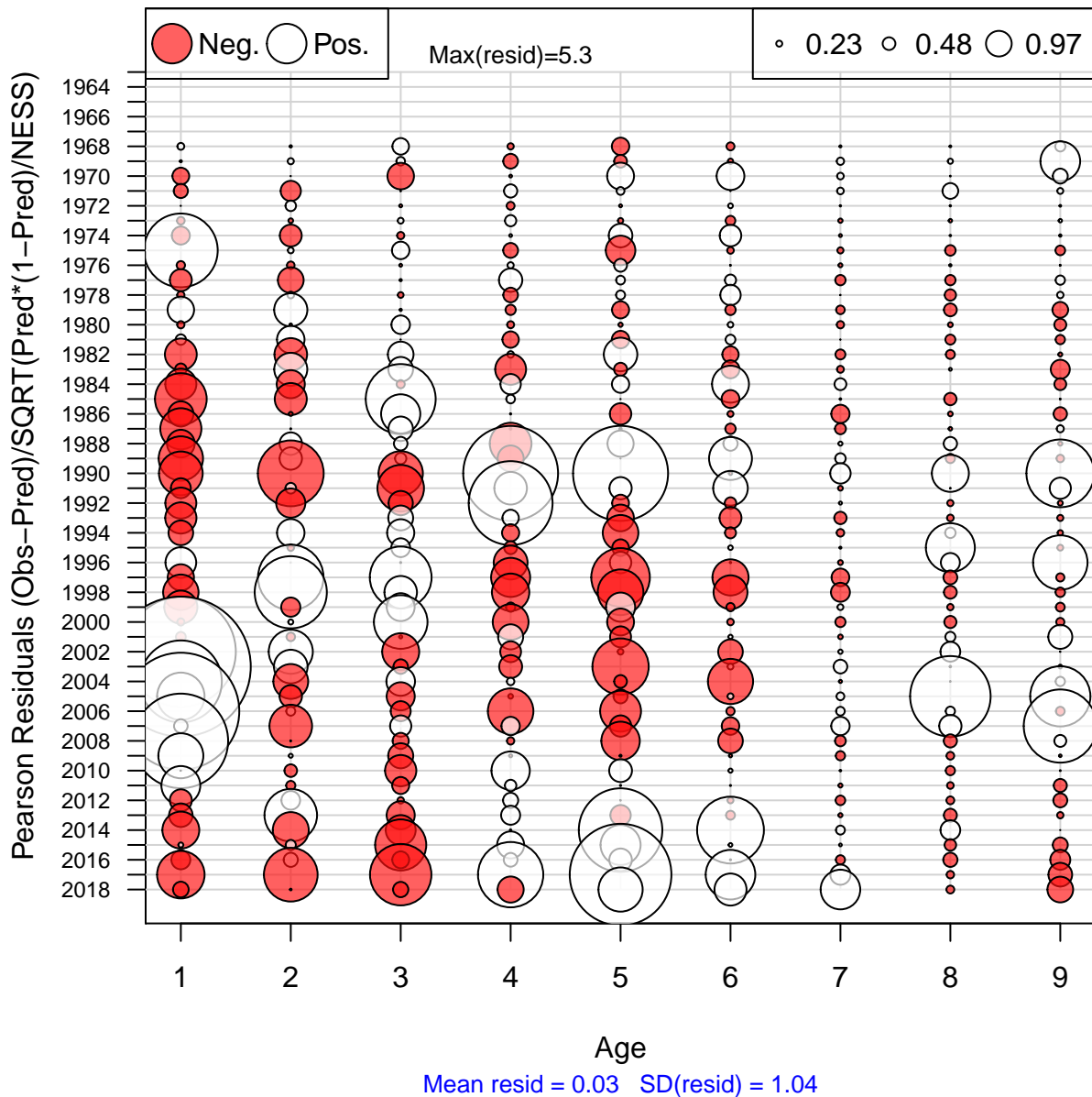




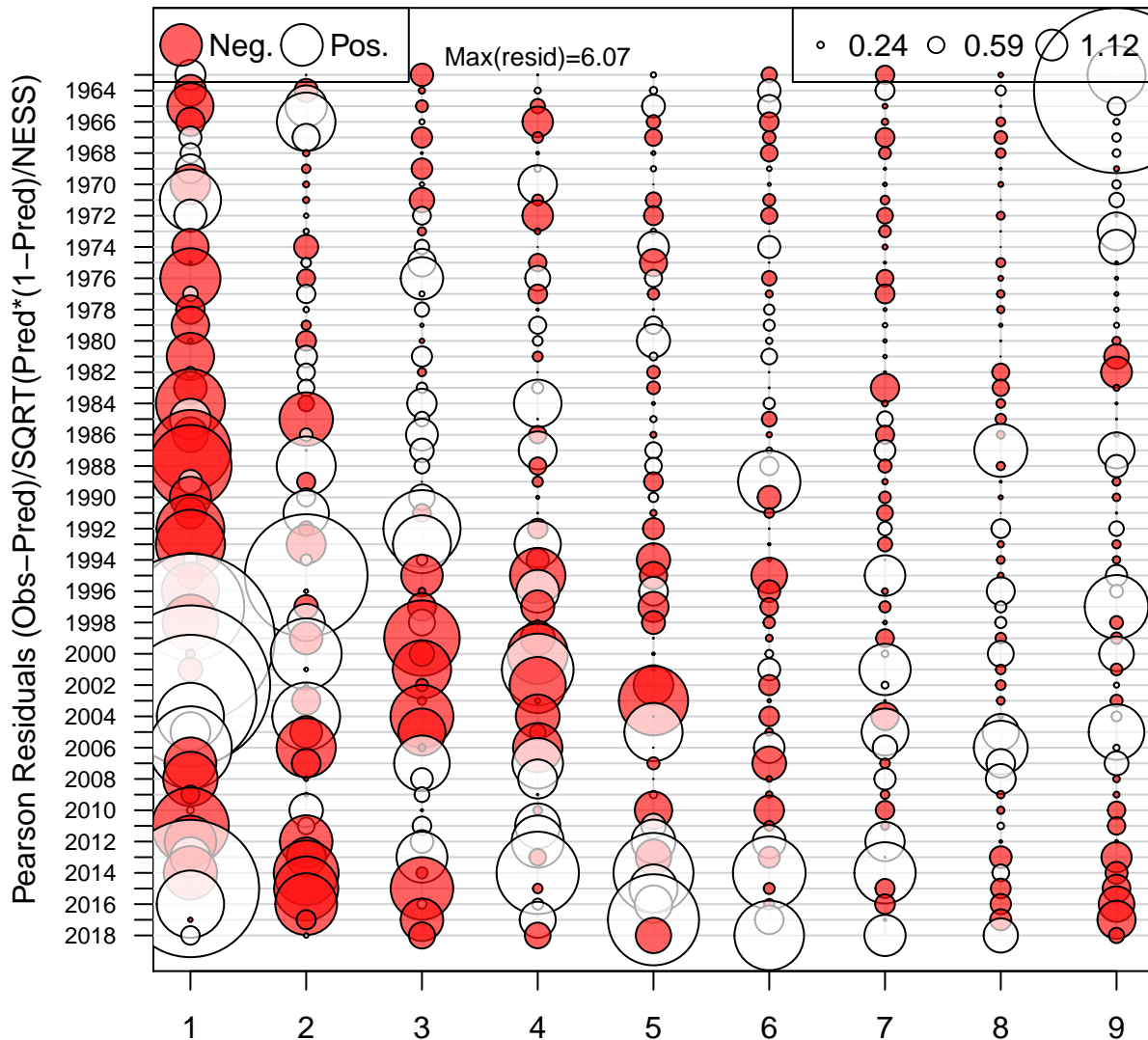
## Index 2 (INDEX-2)



# Age Comp Residuals for Index 1 (INDEX-1)



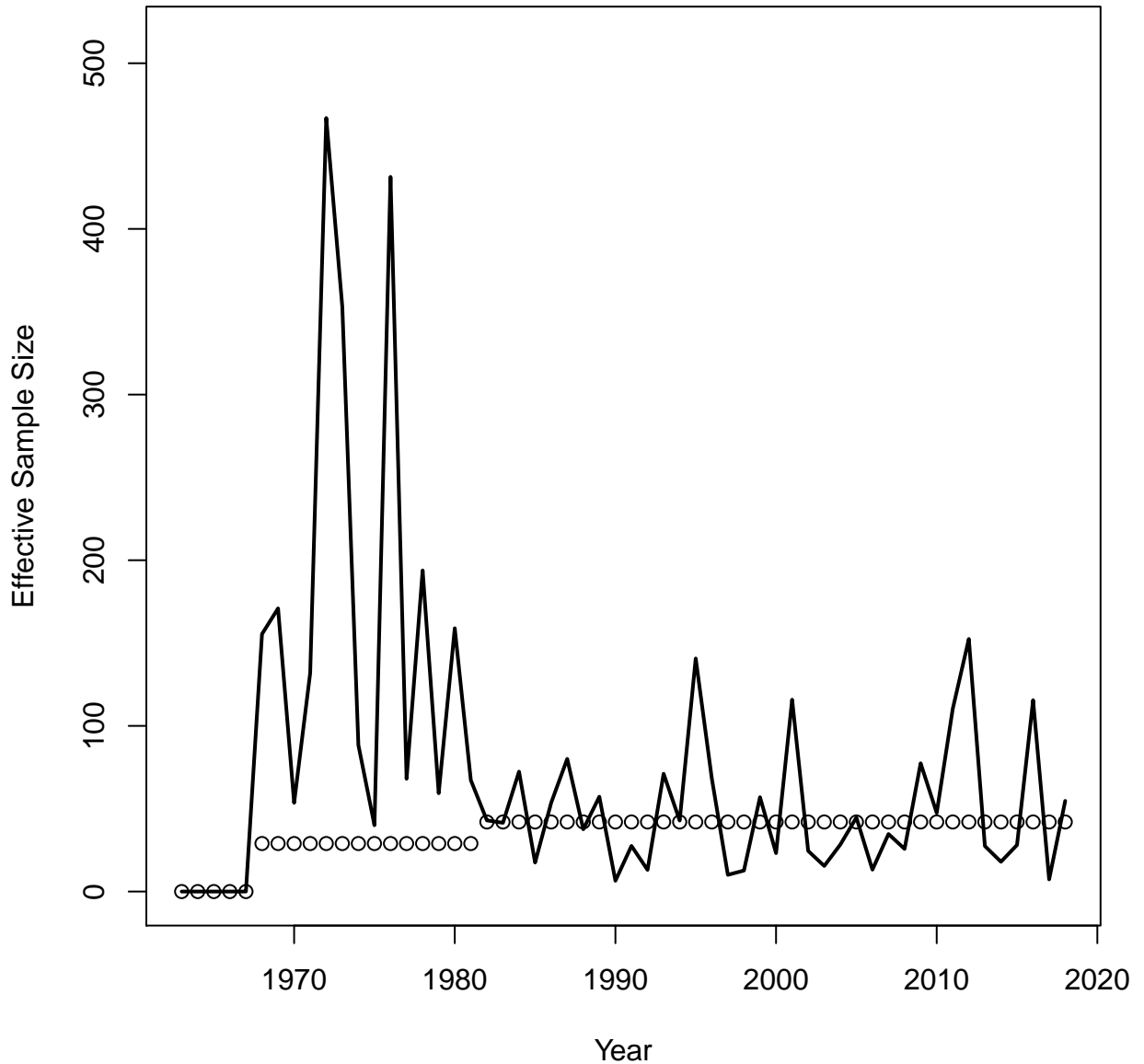
# Age Comp Residuals for Index 2 (INDEX-2)



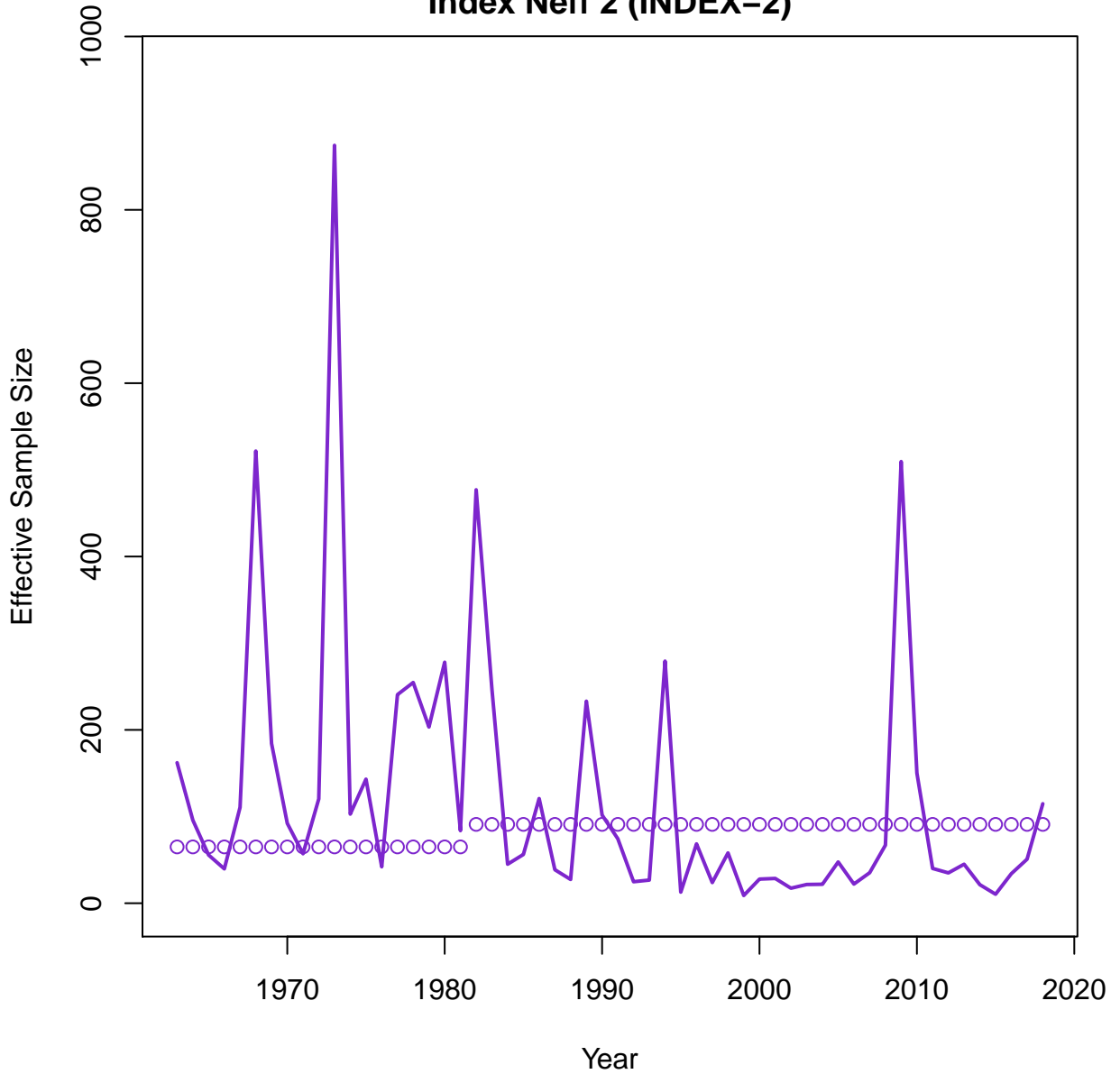
Age

Mean resid = 0.03 SD(resid) = 1.19

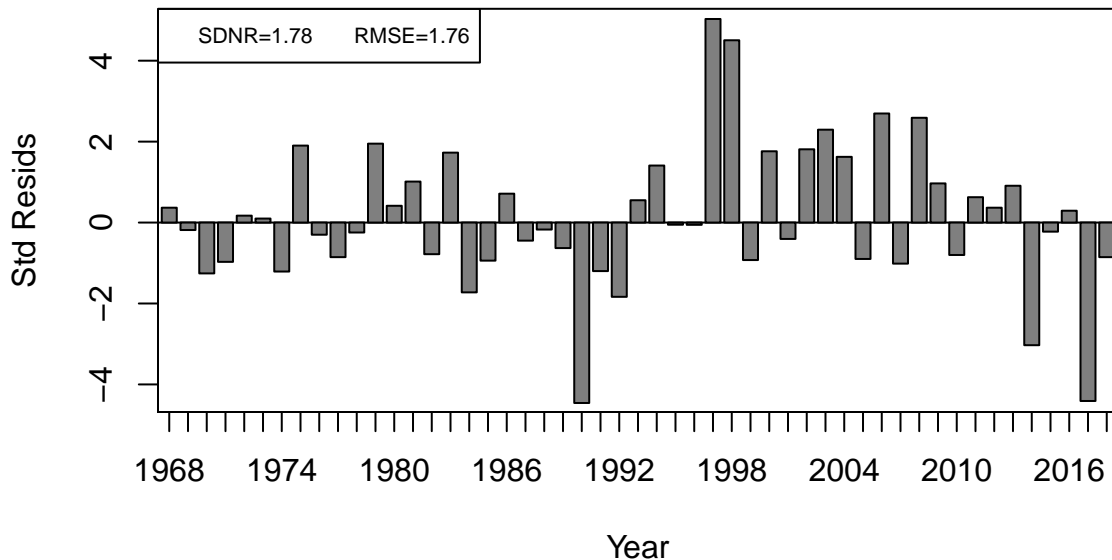
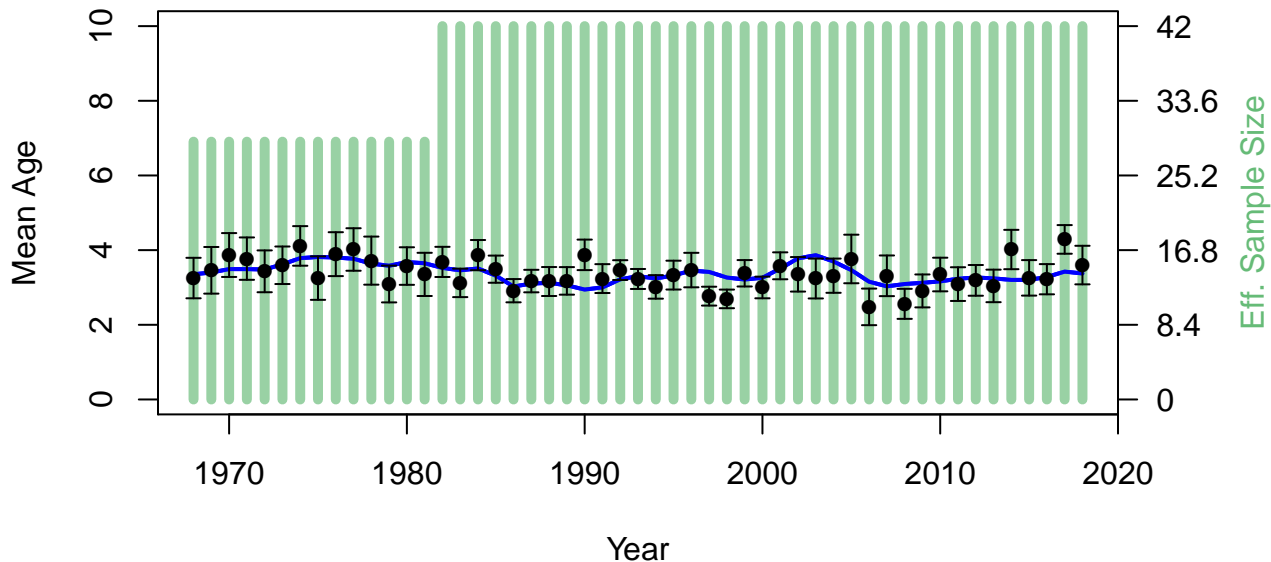
# Index Neff 1 (INDEX-1)



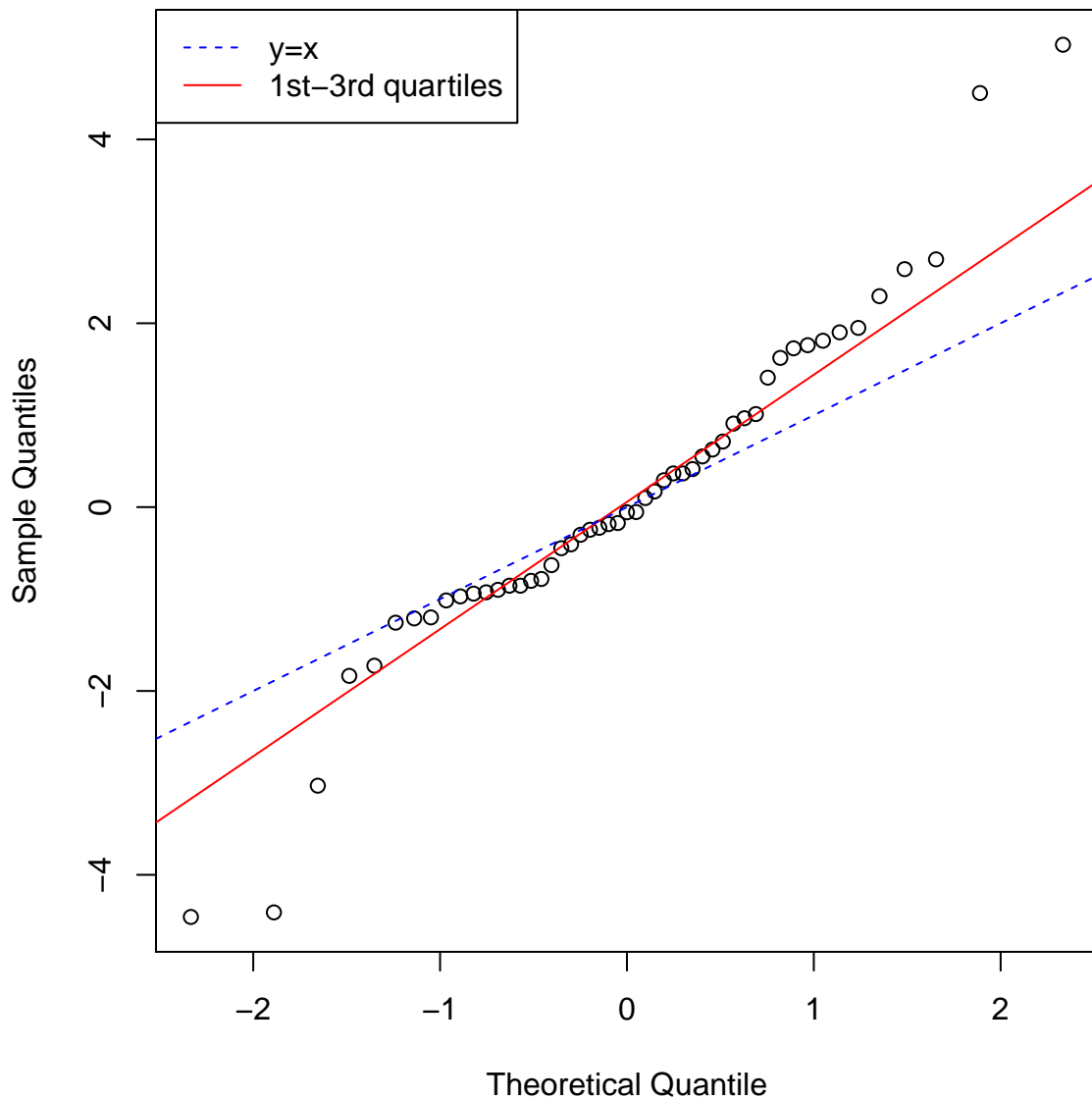
Index Neff 2 (INDEX-2)



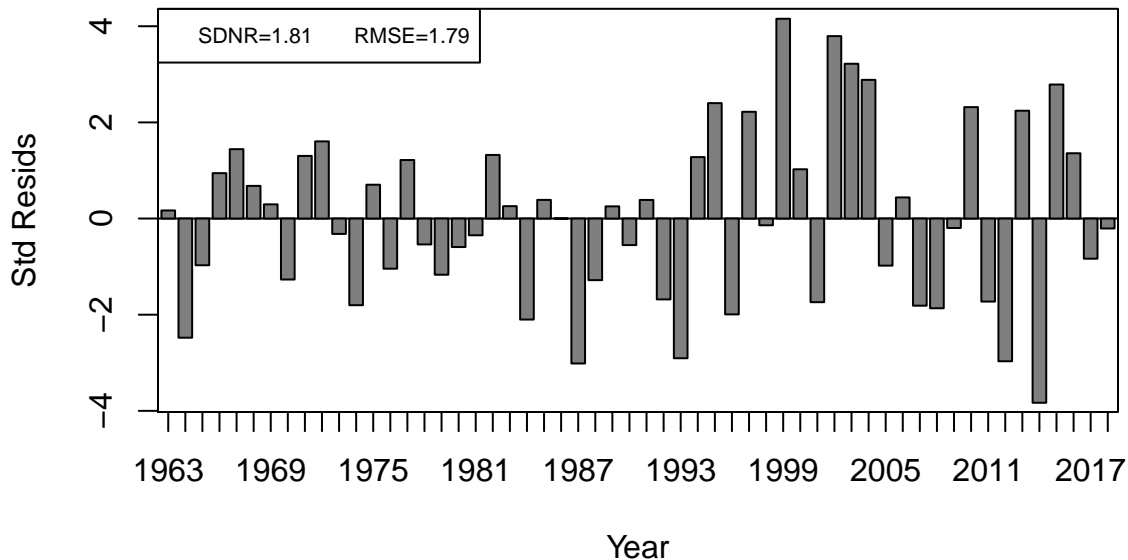
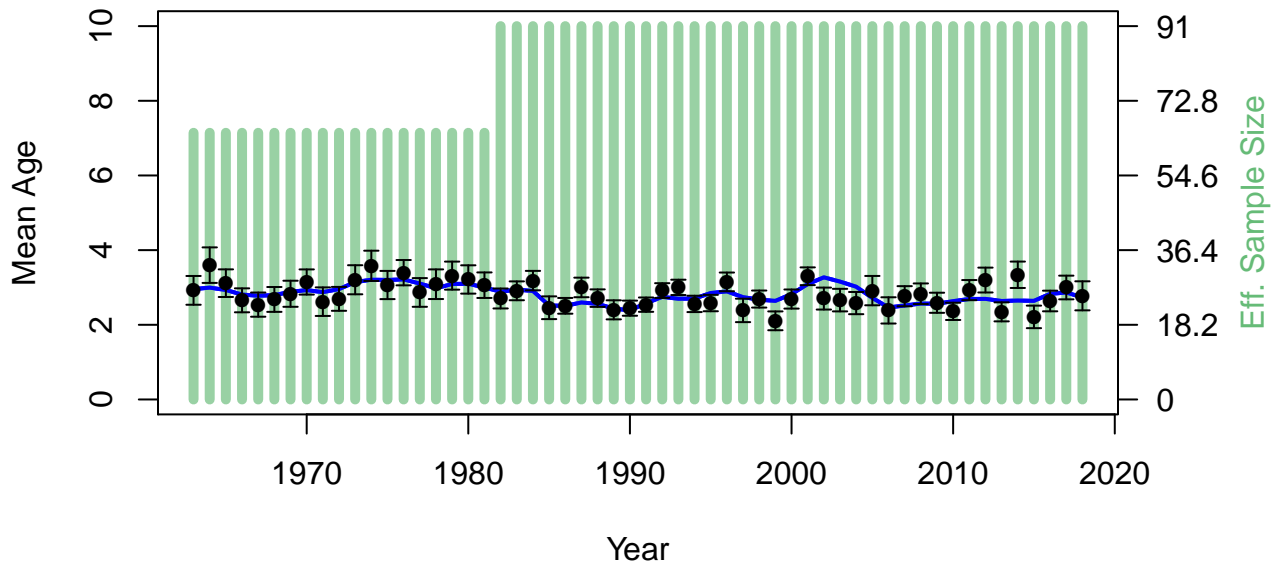
Index 1 (INDEX-1)



# Index 1 (INDEX-1)

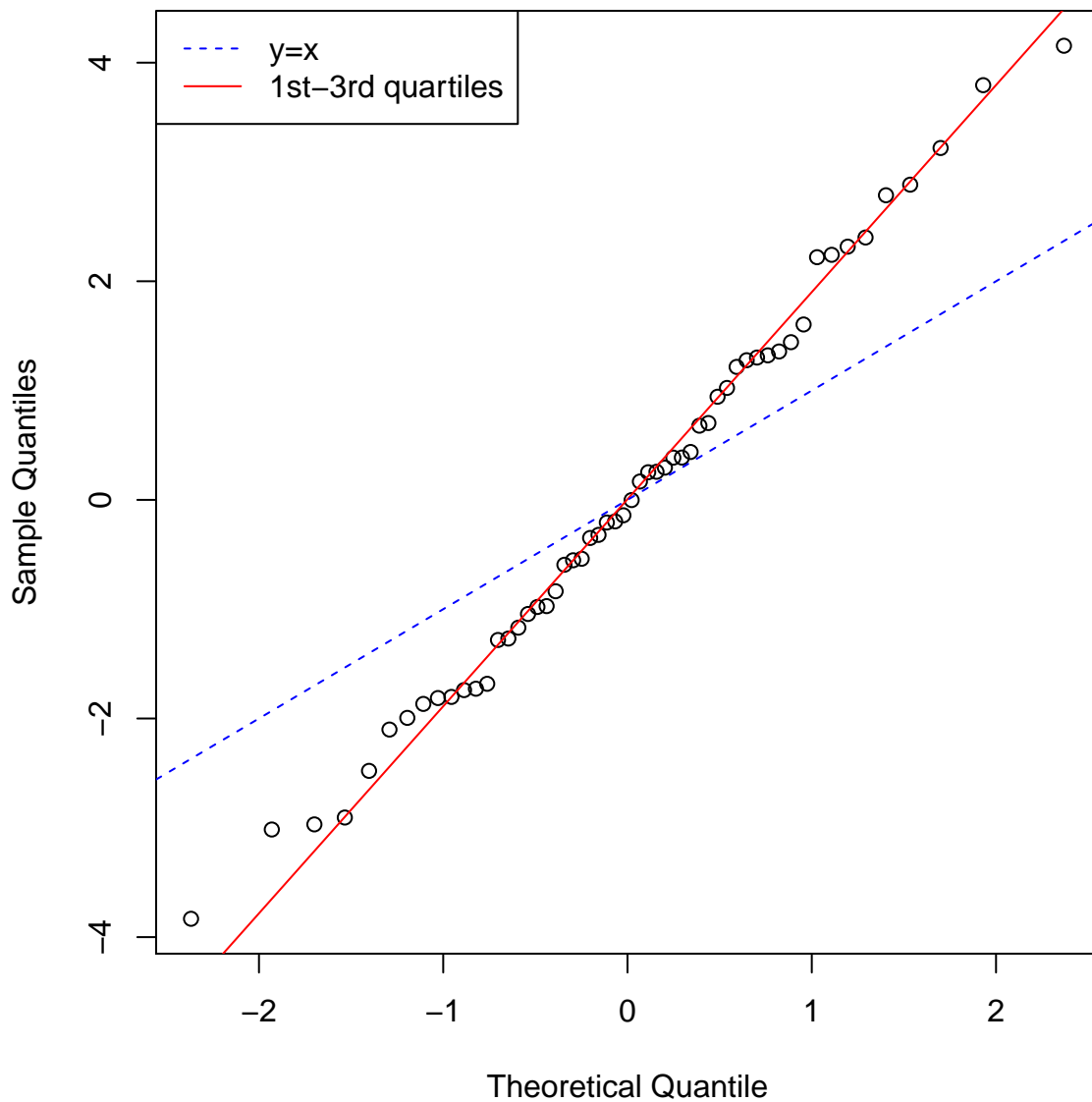


Index 2 (INDEX-2)

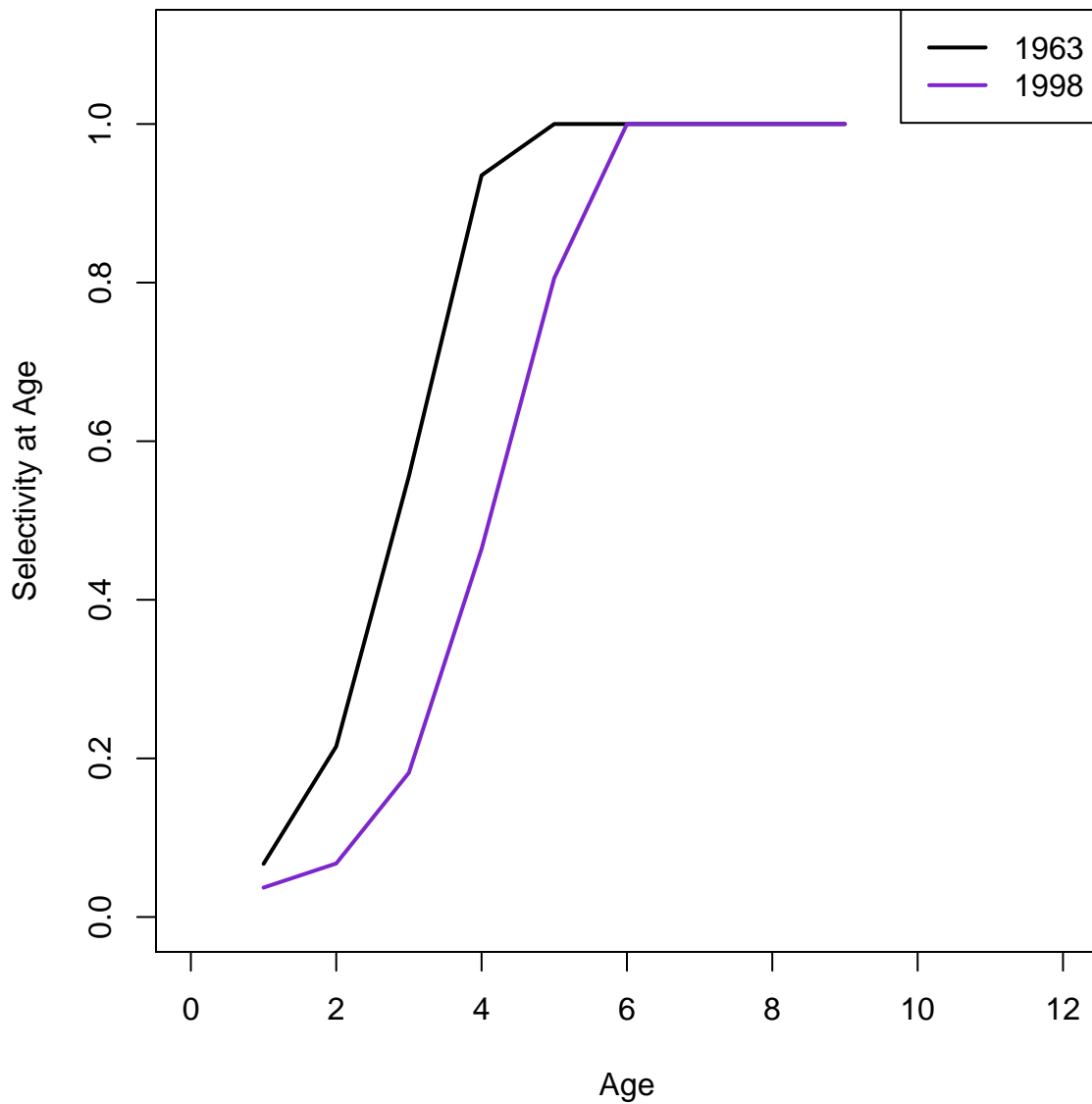


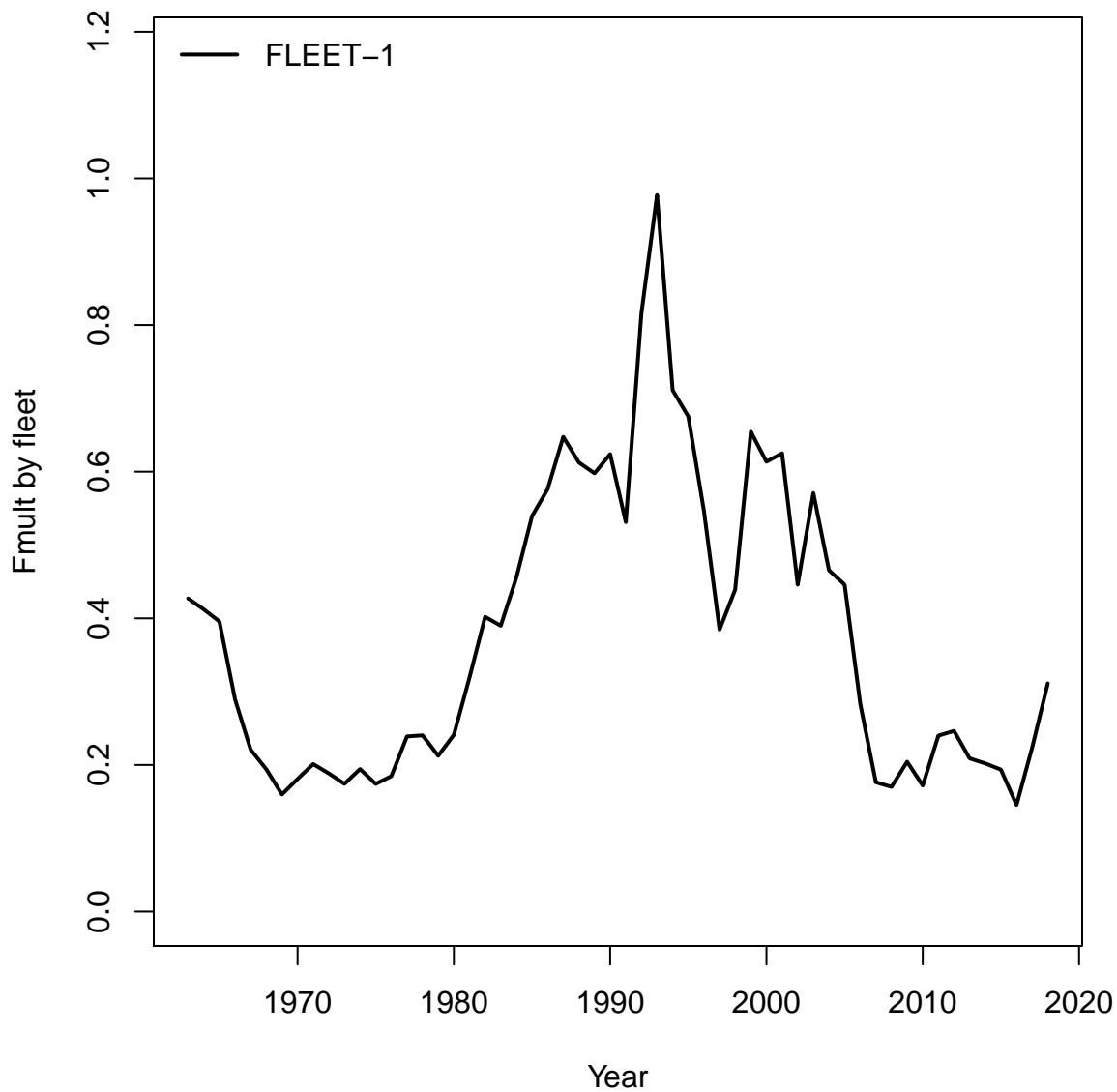


## Index 2 (INDEX-2)

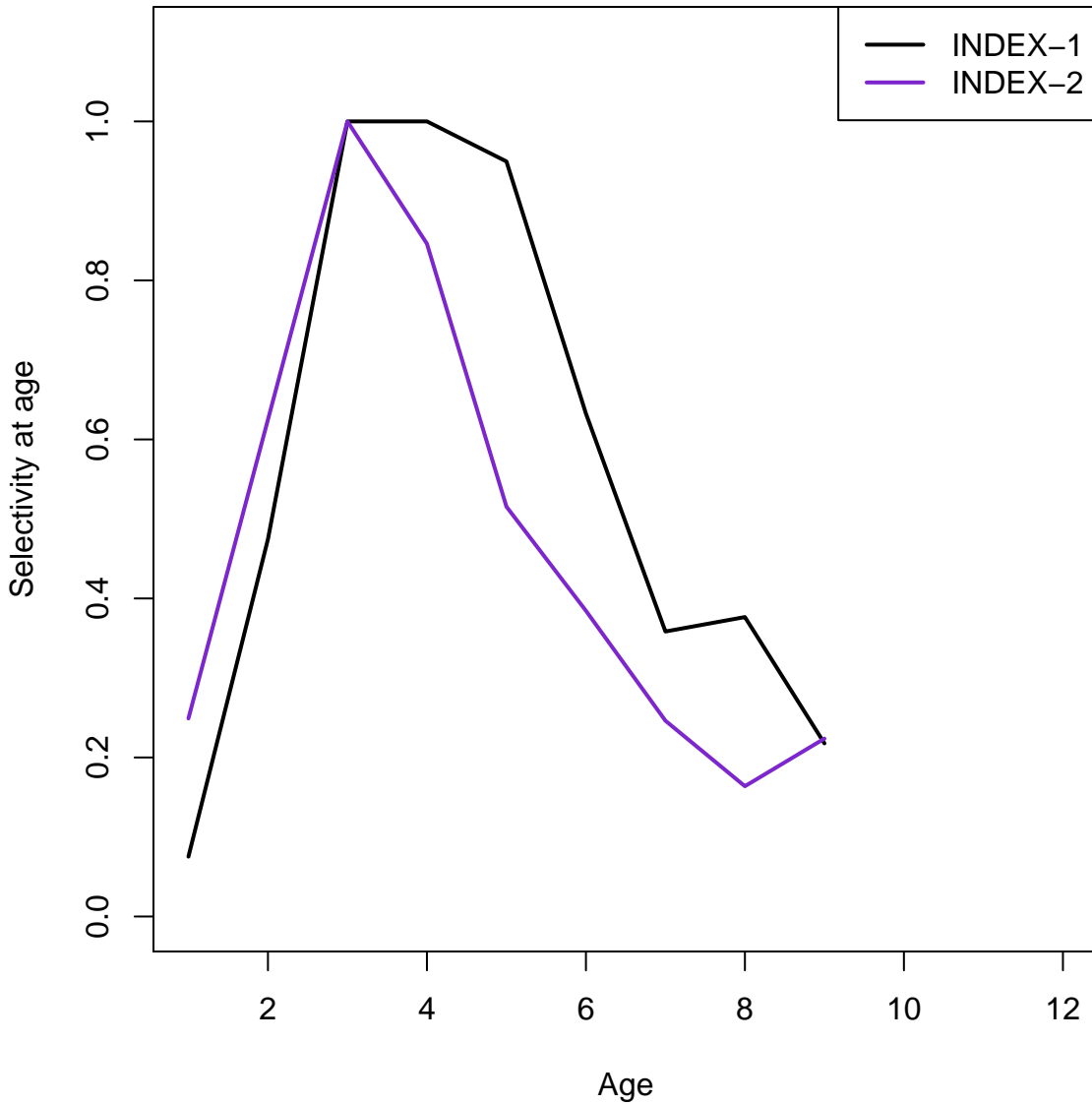


# Fleet 1 (FLEET-1)



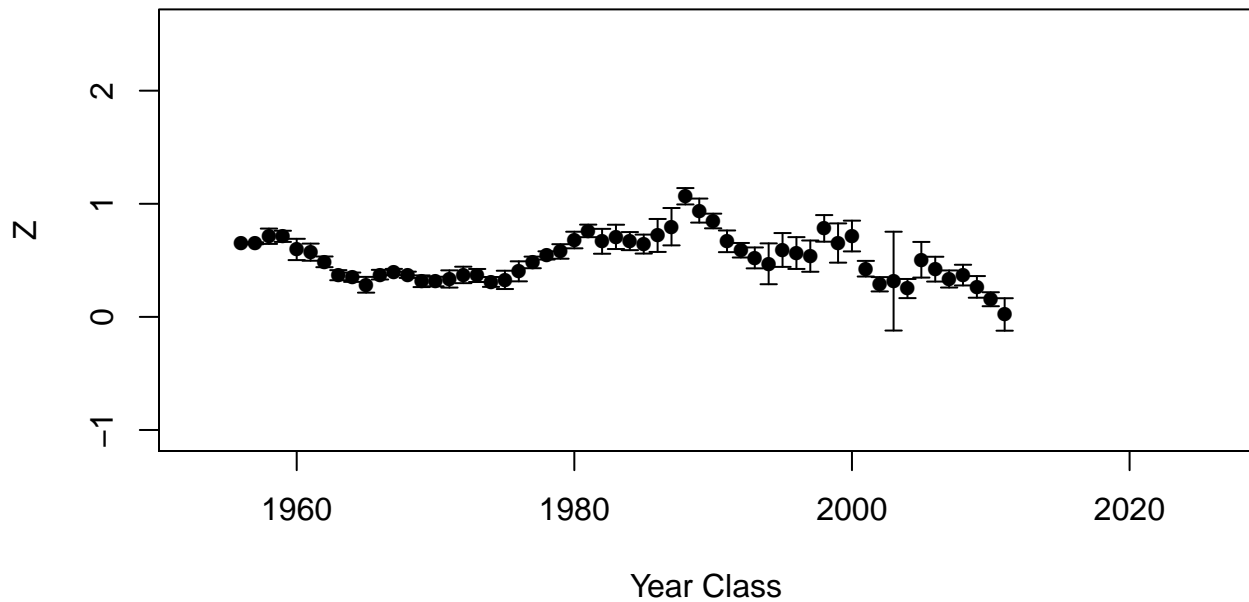
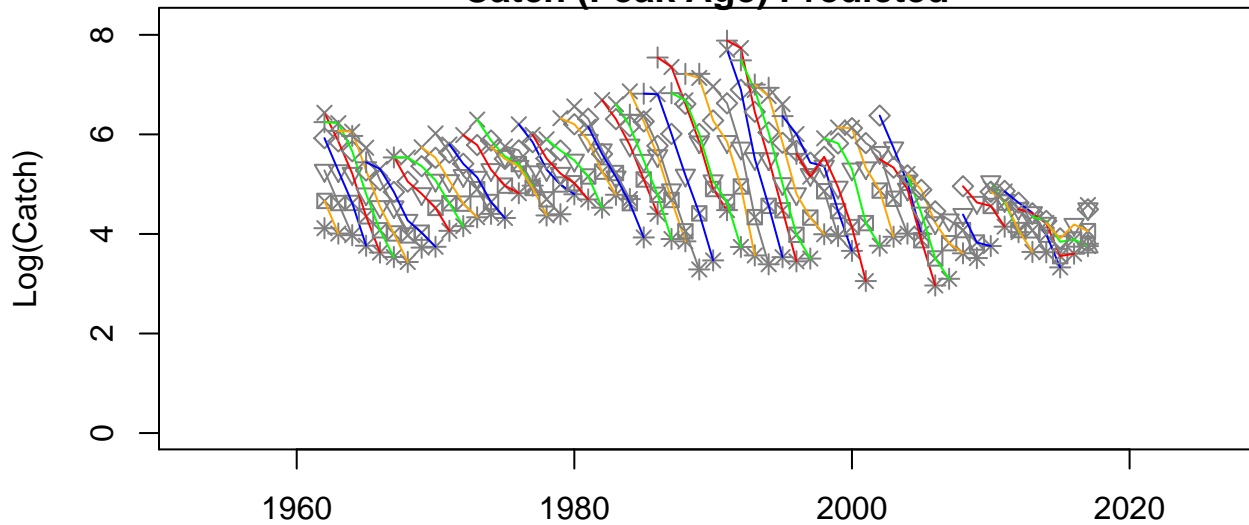


# Indices

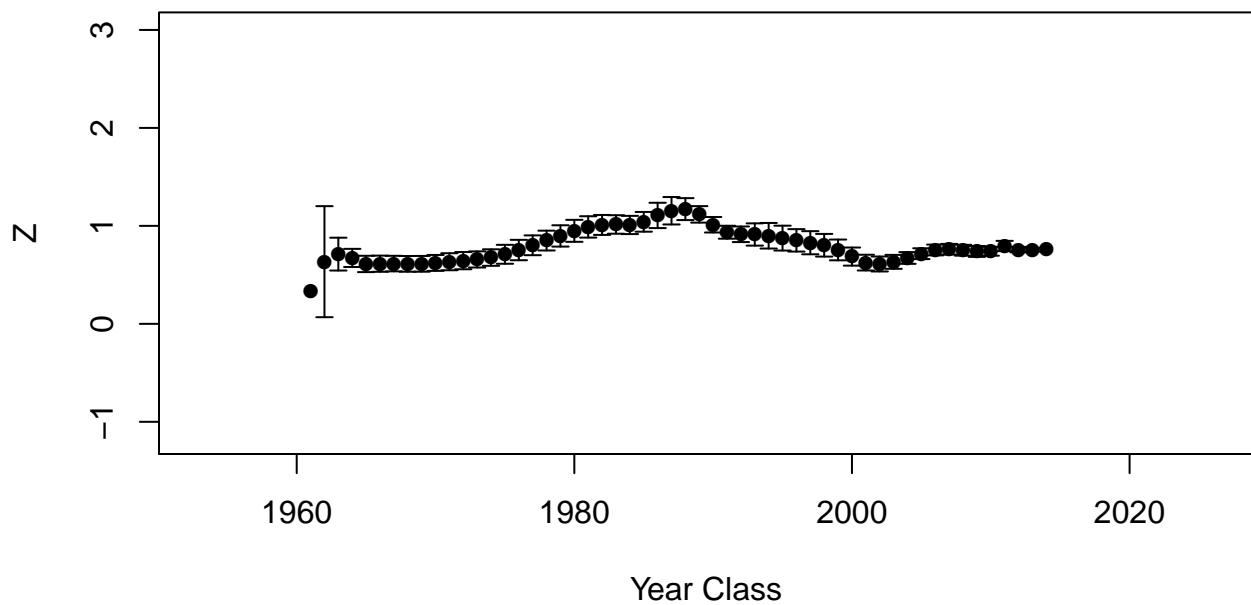
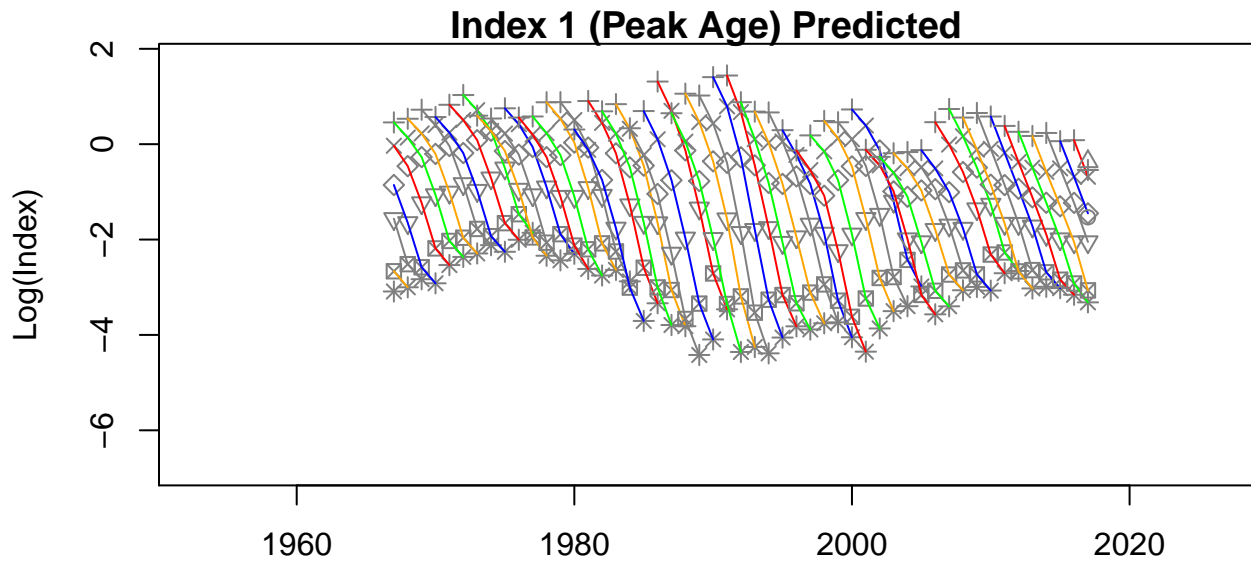




**Catch (Peak Age) Predicted**

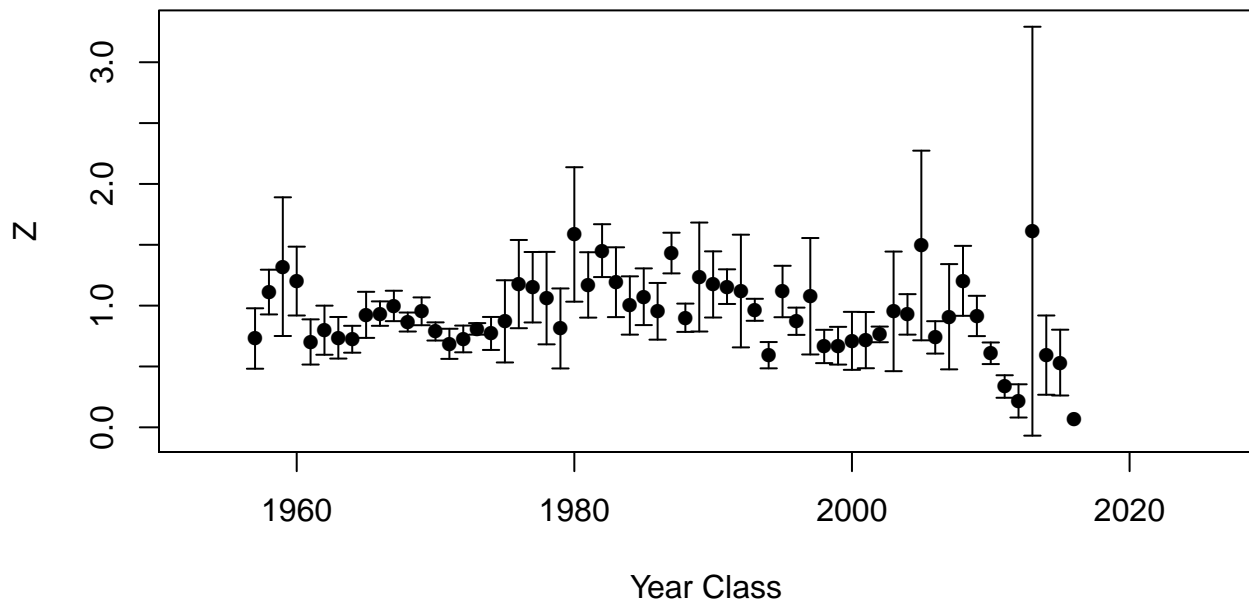




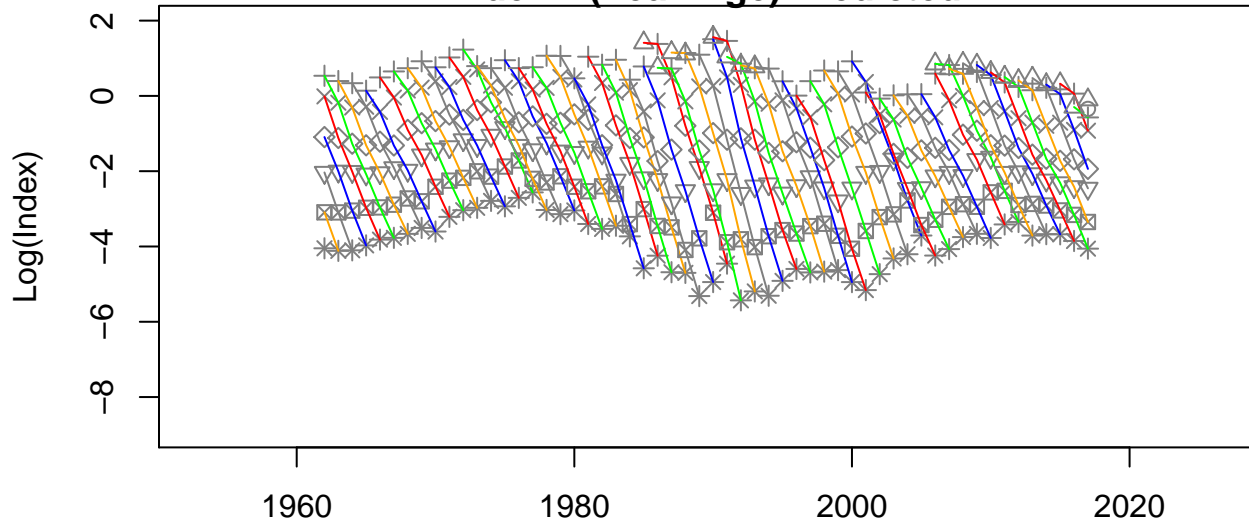




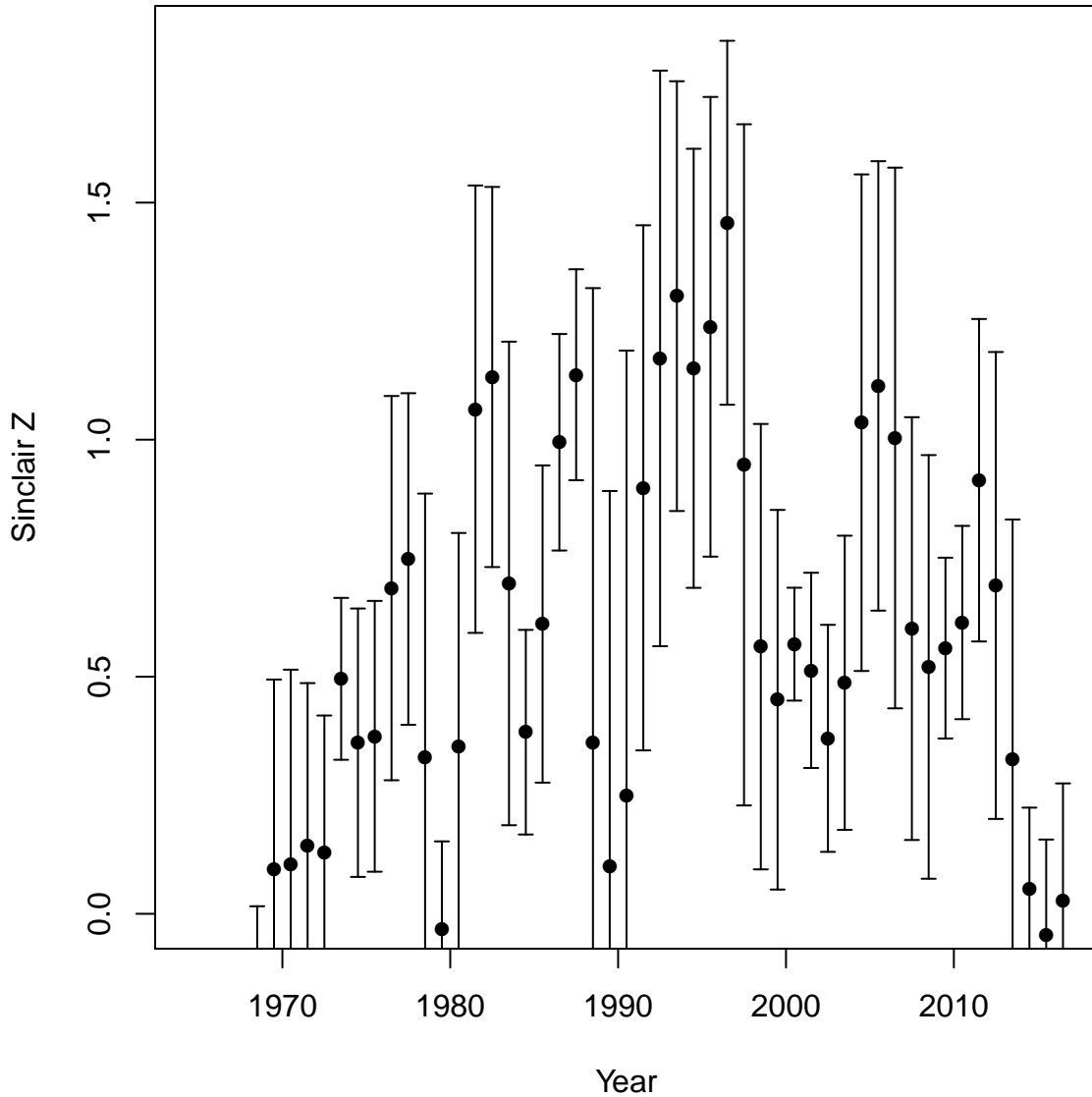
**Index 2 (Peak Age) Observed**



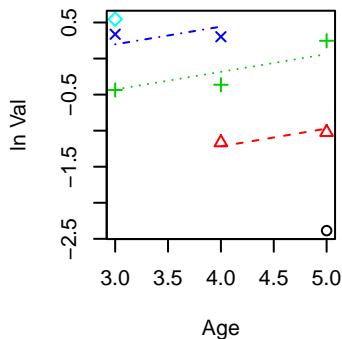
**Index 2 (Peak Age) Predicted**



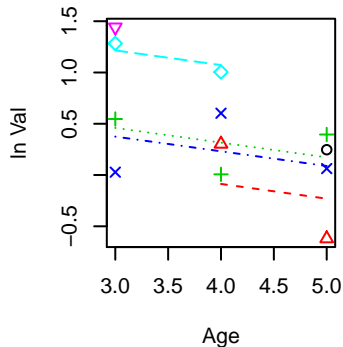
# INDEX-1



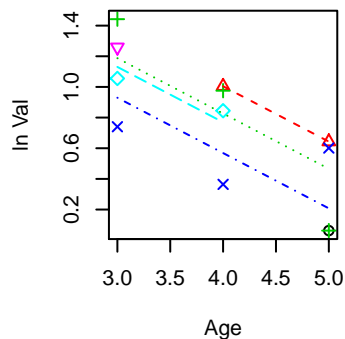
**Years 1968 to 1970**  
**Z = -0.246**



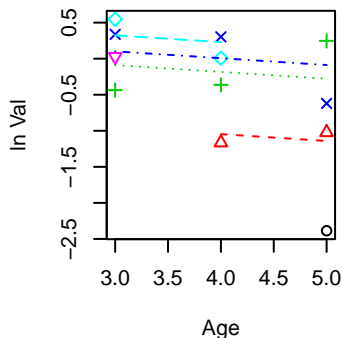
**Years 1970 to 1973**  
**Z = 0.143**



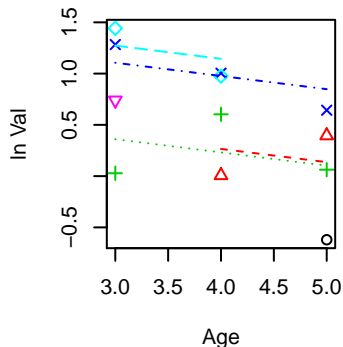
**Years 1973 to 1976**  
**Z = 0.361**



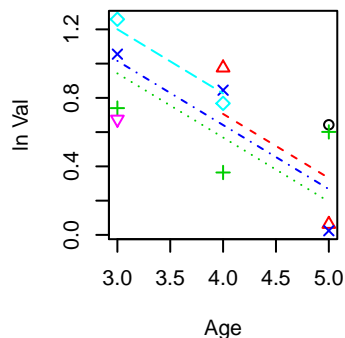
**Years 1968 to 1971**  
**Z = 0.095**



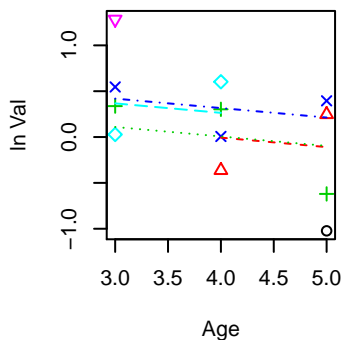
**Years 1971 to 1974**  
**Z = 0.129**



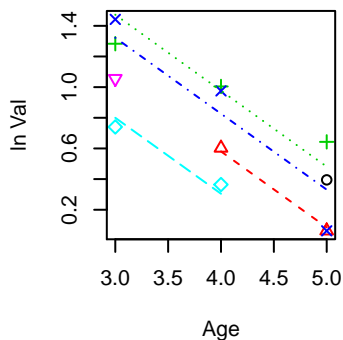
**Years 1974 to 1977**  
**Z = 0.374**



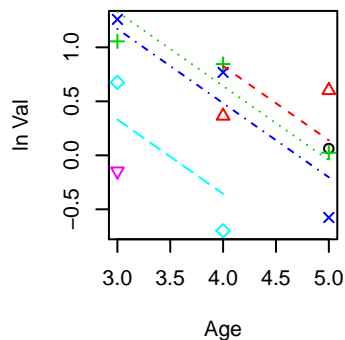
**Years 1969 to 1972**  
**Z = 0.103**



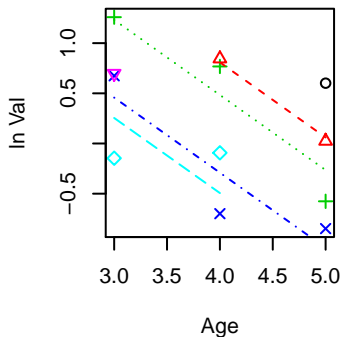
**Years 1972 to 1975**  
**Z = 0.496**



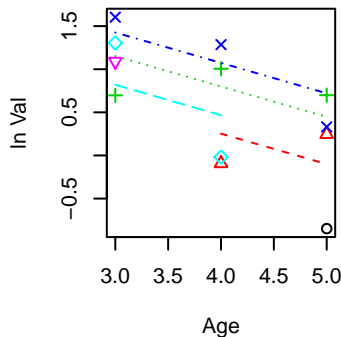
**Years 1975 to 1978**  
**Z = 0.687**



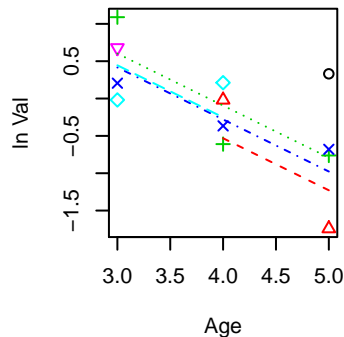
**Years 1976 to 1979**  
**Z = 0.748**



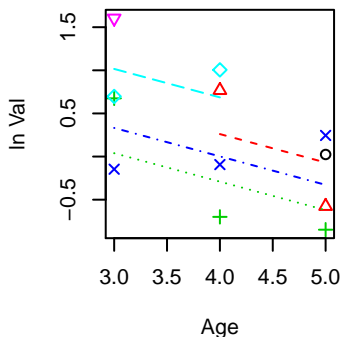
**Years 1979 to 1982**  
**Z = 0.353**



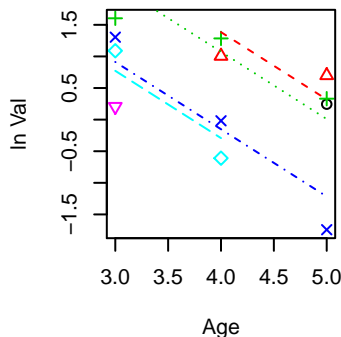
**Years 1982 to 1985**  
**Z = 0.697**



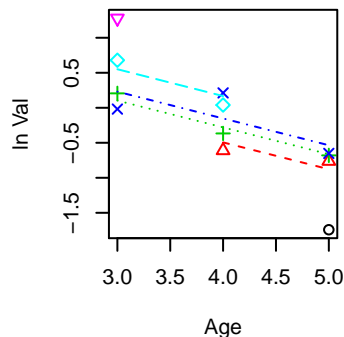
**Years 1977 to 1980**  
**Z = 0.33**



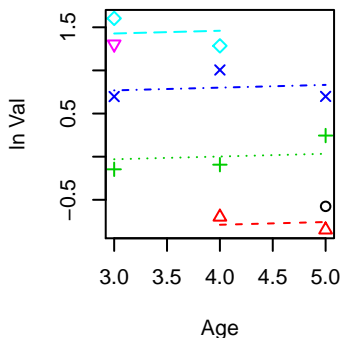
**Years 1980 to 1983**  
**Z = 1.064**



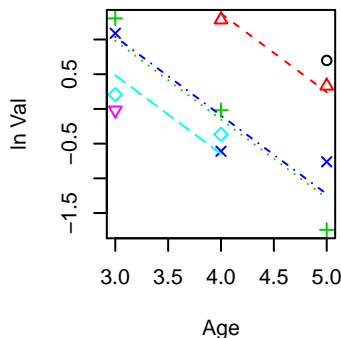
**Years 1983 to 1986**  
**Z = 0.383**



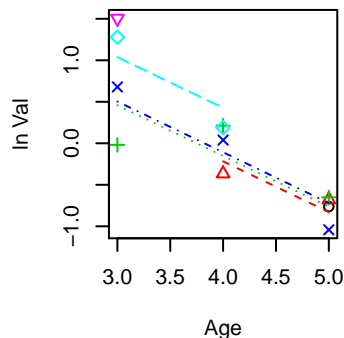
**Years 1978 to 1981**  
**Z = -0.032**



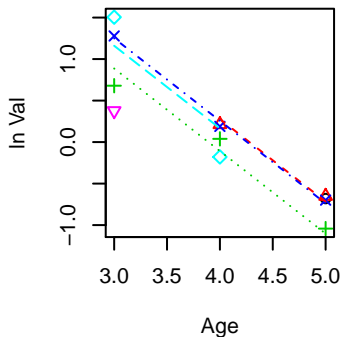
**Years 1981 to 1984**  
**Z = 1.132**



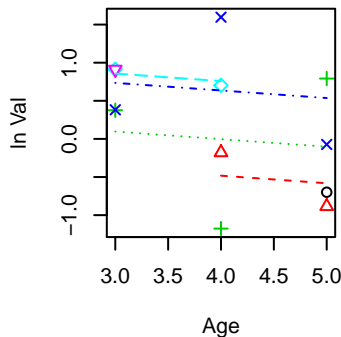
**Years 1984 to 1987**  
**Z = 0.611**



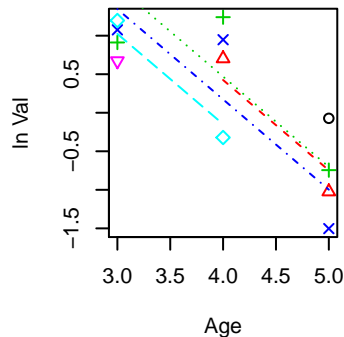
**Years 1985 to 1988**  
**Z = 0.995**



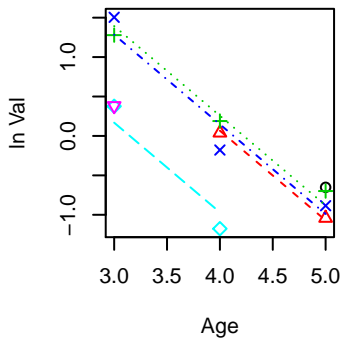
**Years 1988 to 1991**  
**Z = 0.099**



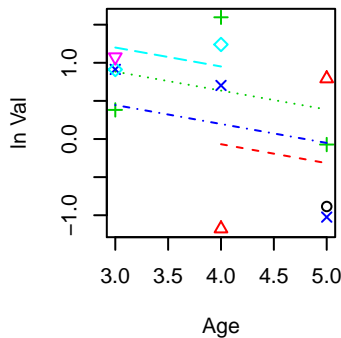
**Years 1991 to 1994**  
**Z = 1.171**



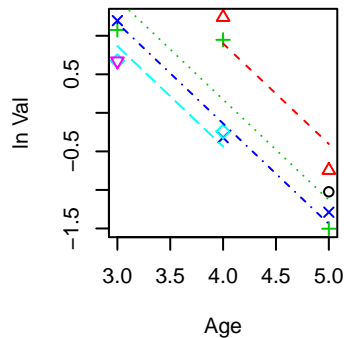
**Years 1986 to 1989**  
**Z = 1.137**



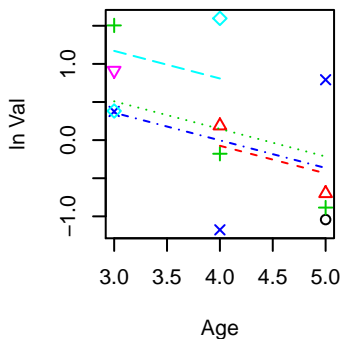
**Years 1989 to 1992**  
**Z = 0.249**



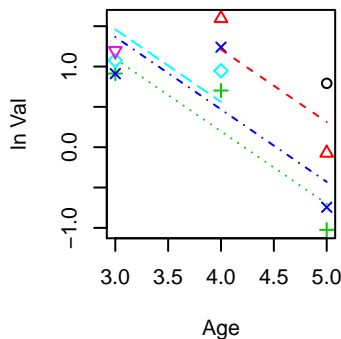
**Years 1992 to 1995**  
**Z = 1.303**



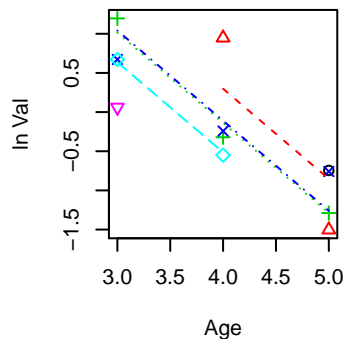
**Years 1987 to 1990**  
**Z = 0.362**



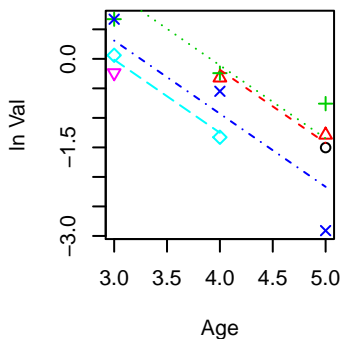
**Years 1990 to 1993**  
**Z = 0.898**



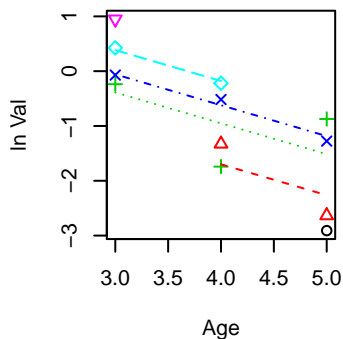
**Years 1993 to 1996**  
**Z = 1.151**



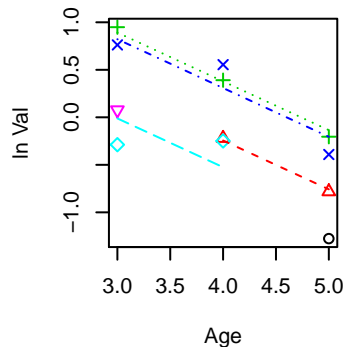
**Years 1994 to 1997**  
**Z = 1.238**



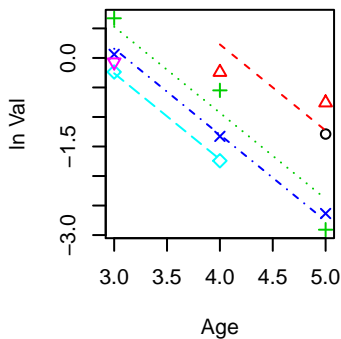
**Years 1997 to 2000**  
**Z = 0.563**



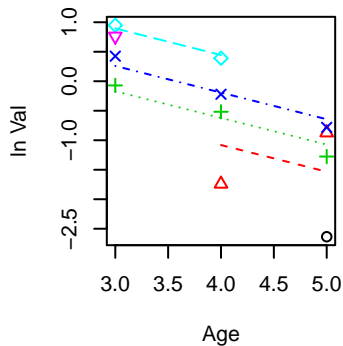
**Years 2000 to 2003**  
**Z = 0.513**



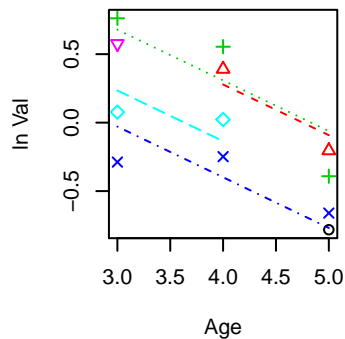
**Years 1995 to 1998**  
**Z = 1.457**



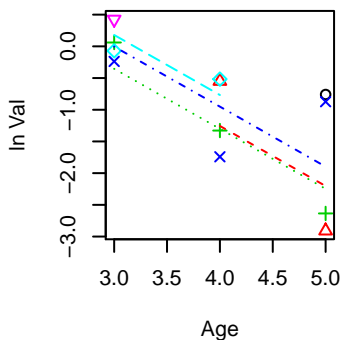
**Years 1998 to 2001**  
**Z = 0.451**



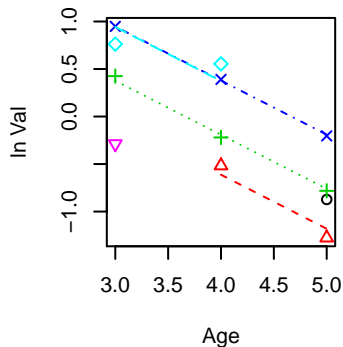
**Years 2001 to 2004**  
**Z = 0.37**



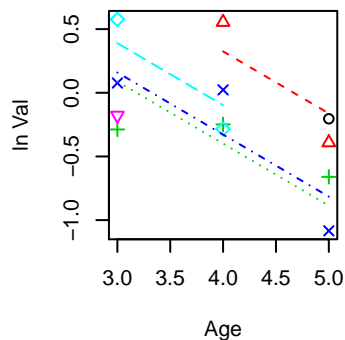
**Years 1996 to 1999**  
**Z = 0.947**



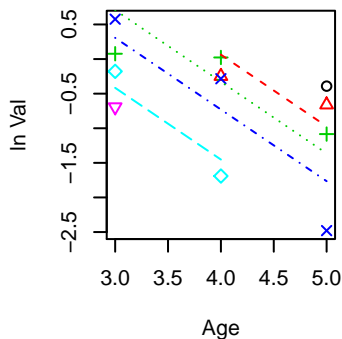
**Years 1999 to 2002**  
**Z = 0.569**



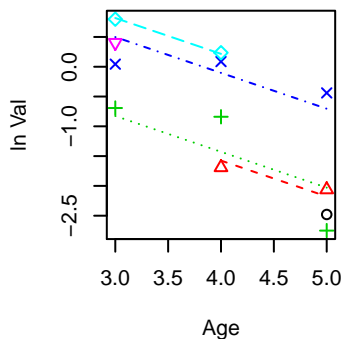
**Years 2002 to 2005**  
**Z = 0.487**



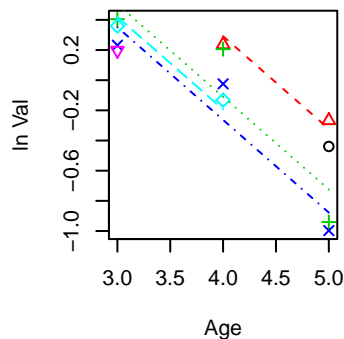
**Years 2003 to 2006**  
**Z = 1.036**



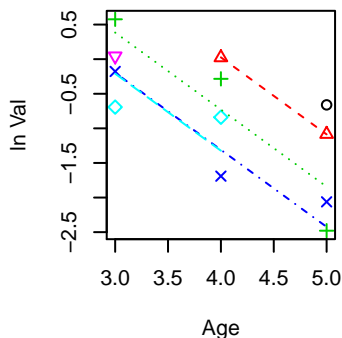
**Years 2006 to 2009**  
**Z = 0.602**



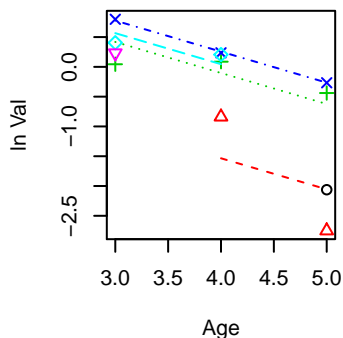
**Years 2009 to 2012**  
**Z = 0.614**



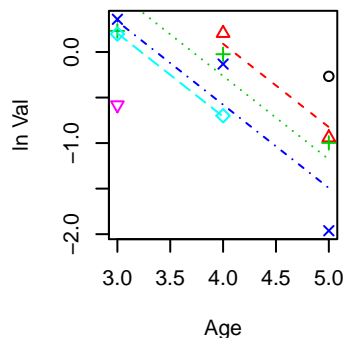
**Years 2004 to 2007**  
**Z = 1.113**



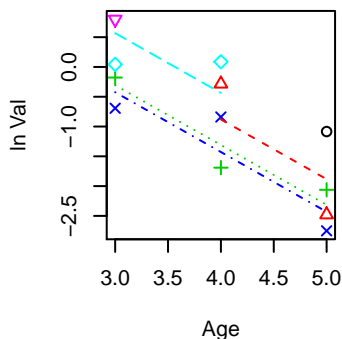
**Years 2007 to 2010**  
**Z = 0.521**



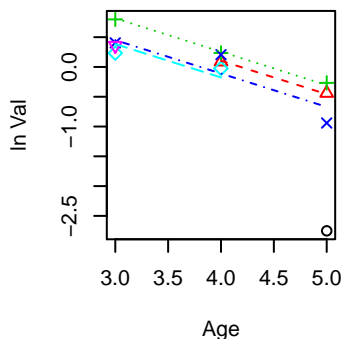
**Years 2010 to 2013**  
**Z = 0.914**



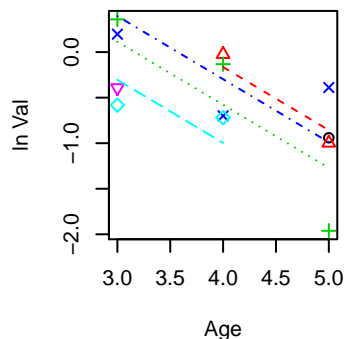
**Years 2005 to 2008**  
**Z = 1.004**



**Years 2008 to 2011**  
**Z = 0.56**

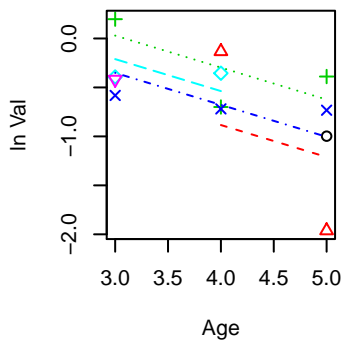


**Years 2011 to 2014**  
**Z = 0.693**

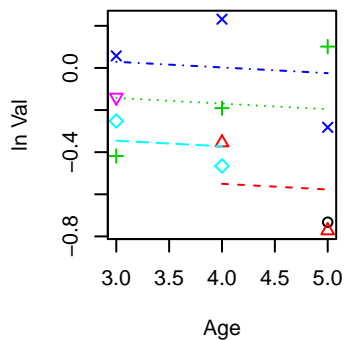




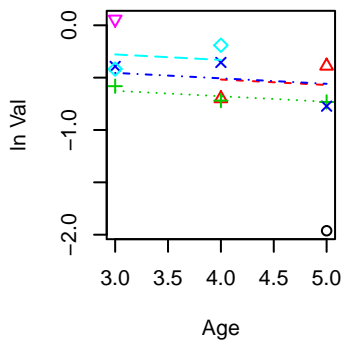
**Years 2012 to 2015**  
**Z = 0.327**



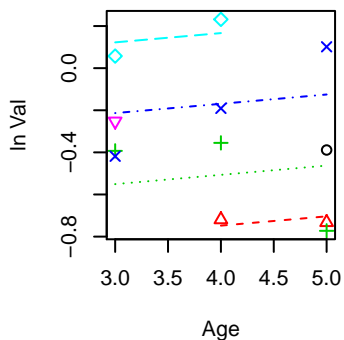
**Years 2015 to 2018**  
**Z = 0.027**



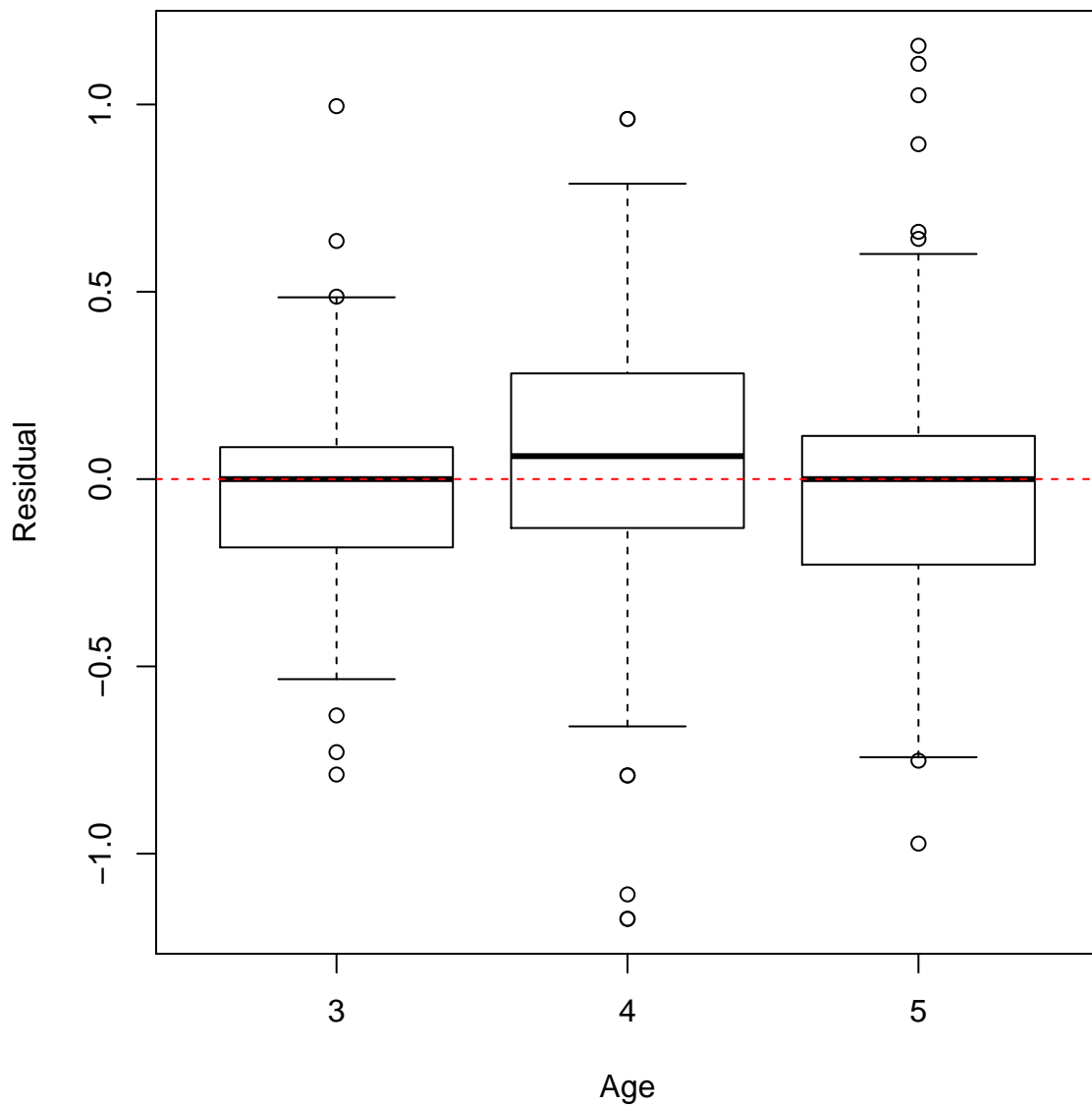
**Years 2013 to 2016**  
**Z = 0.052**



**Years 2014 to 2017**  
**Z = -0.044**



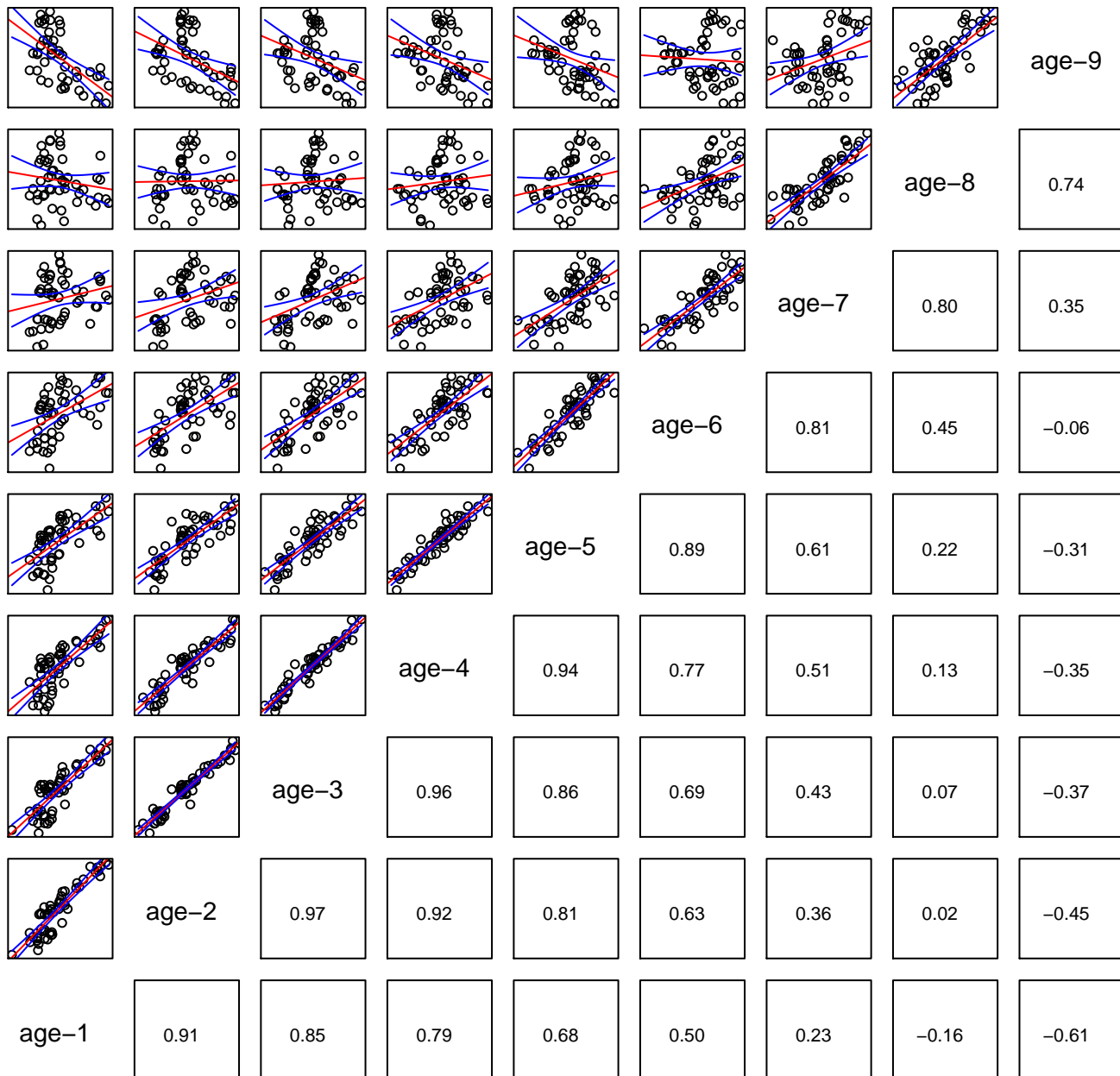
# INDEX-1



## Catch Observed



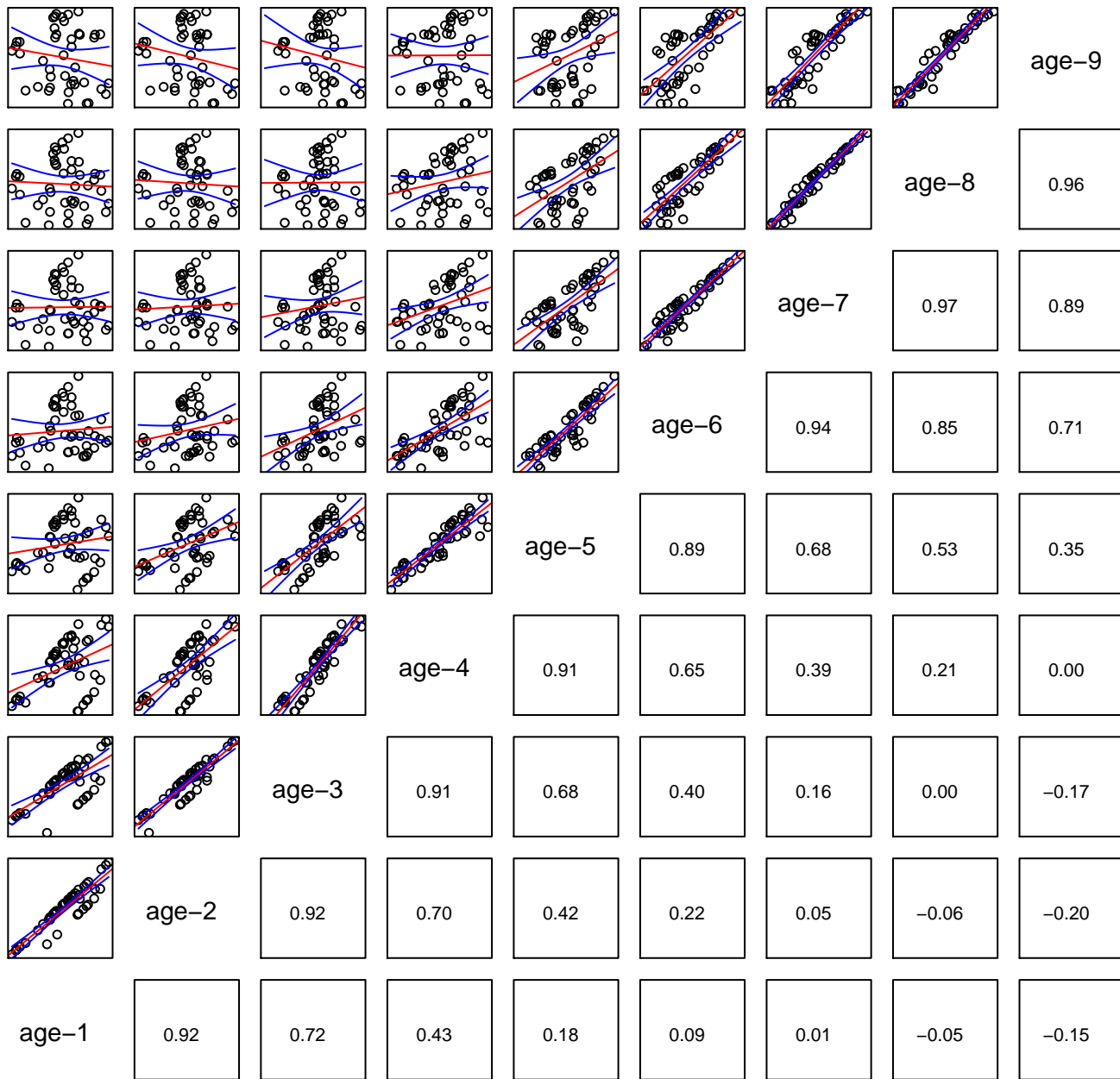
Catch Predicted



# Index 1 (INDEX-1) Observed



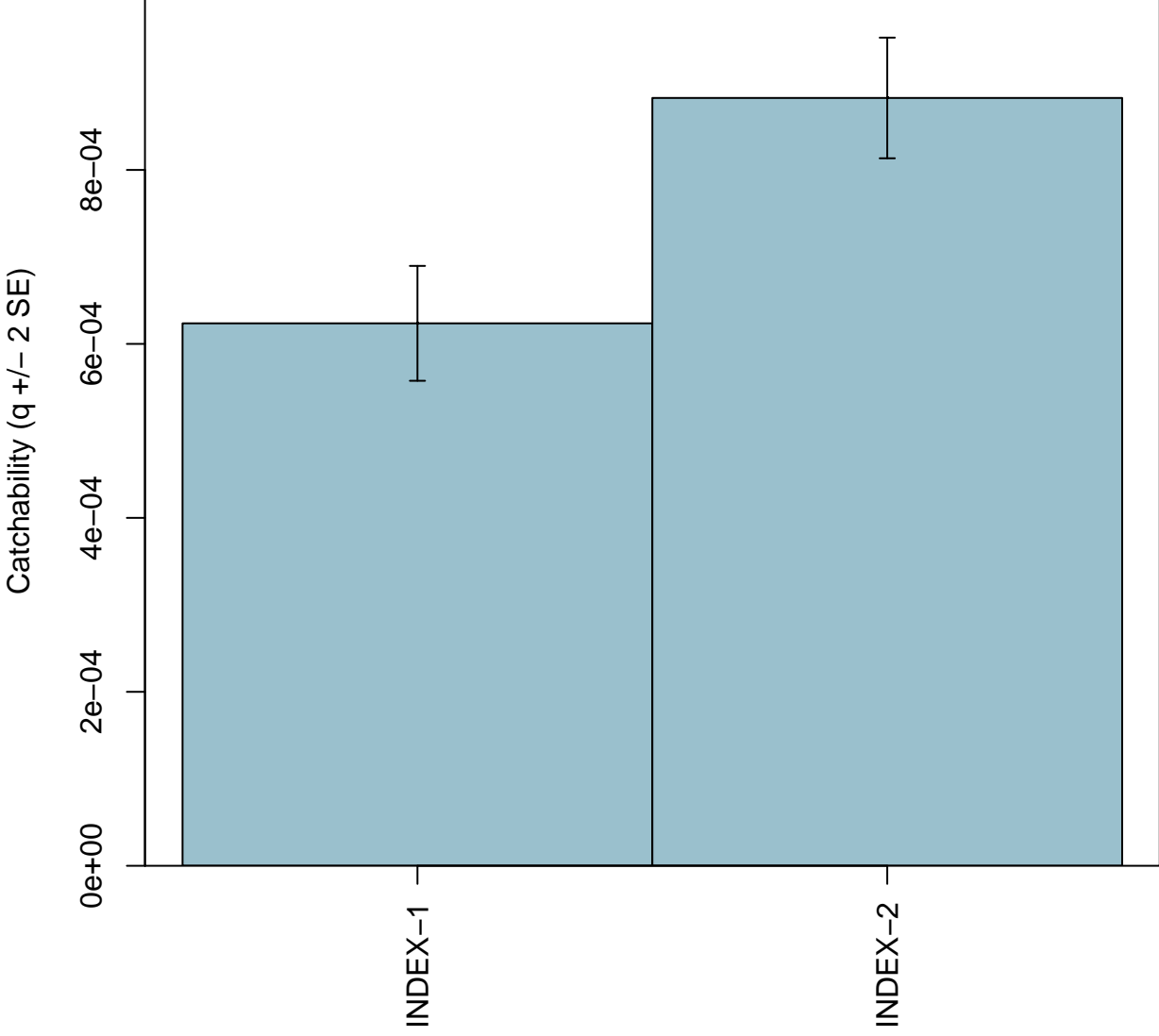
Index 1 (INDEX-1) Predicted

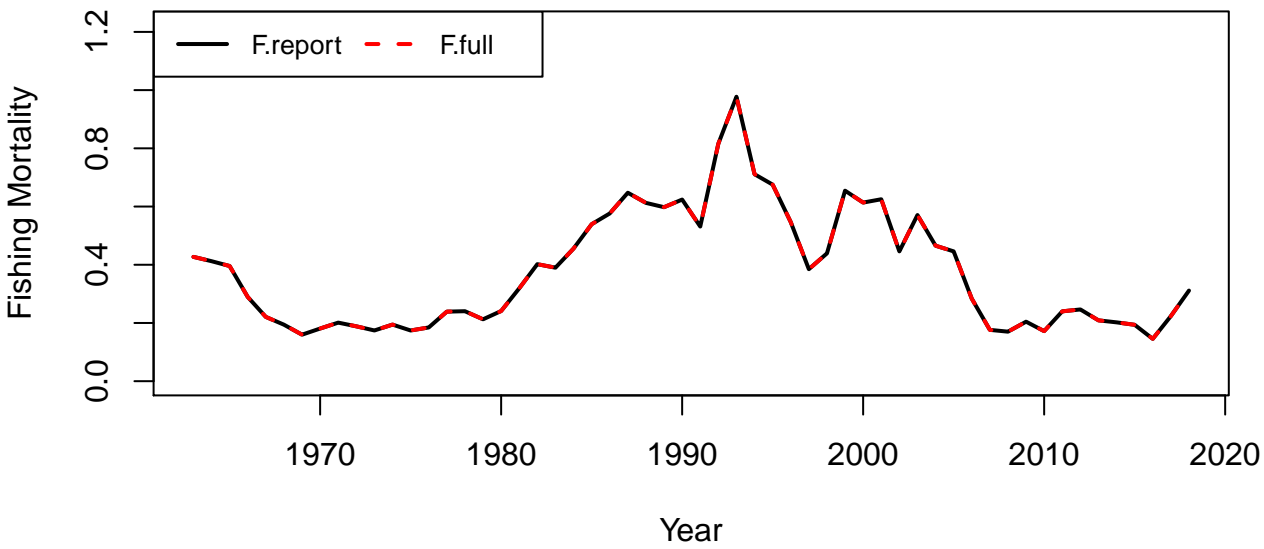
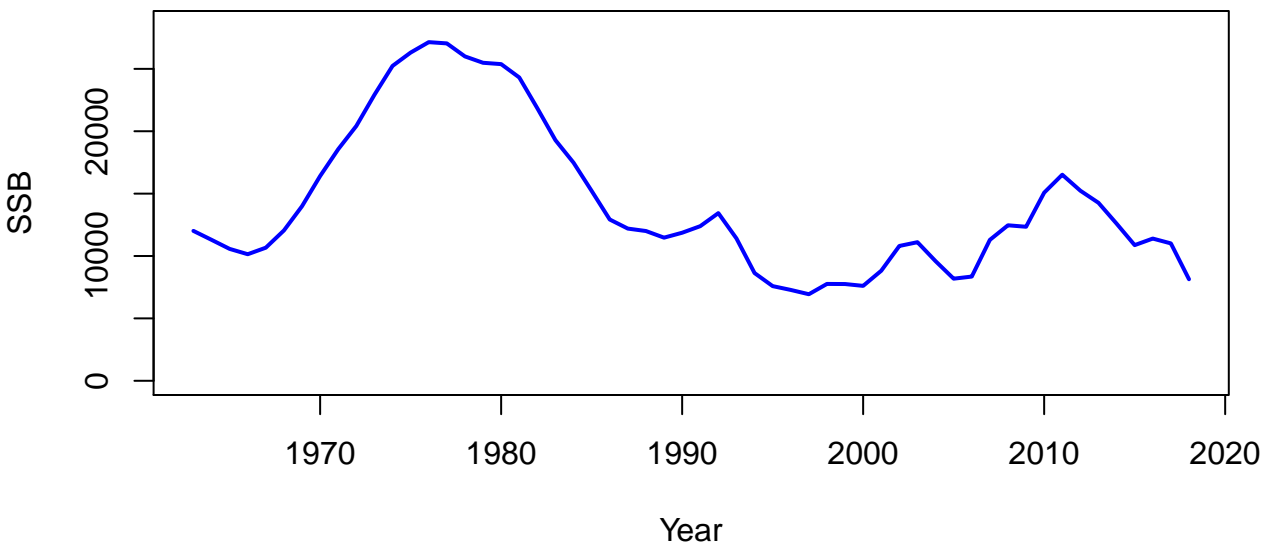




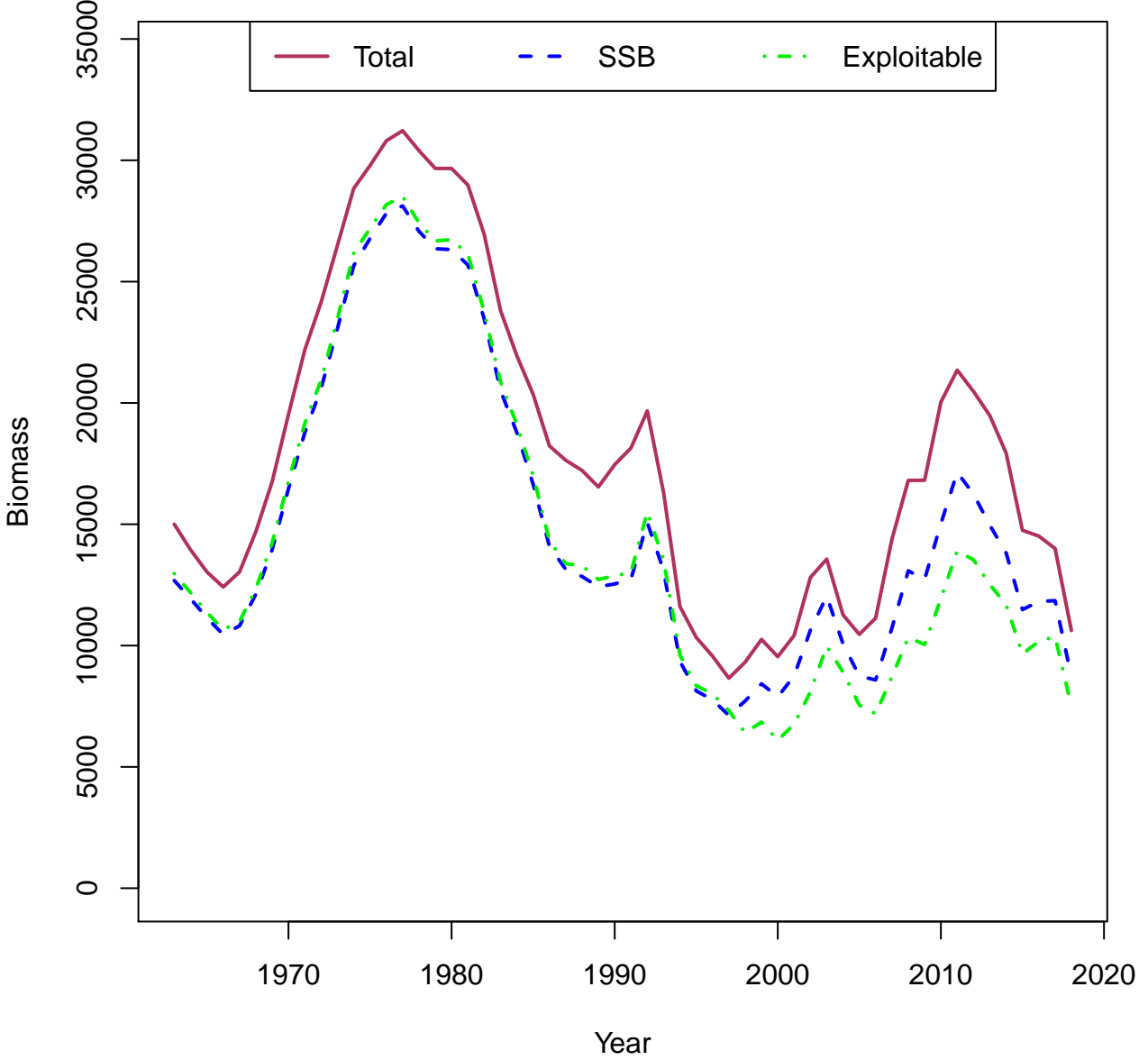


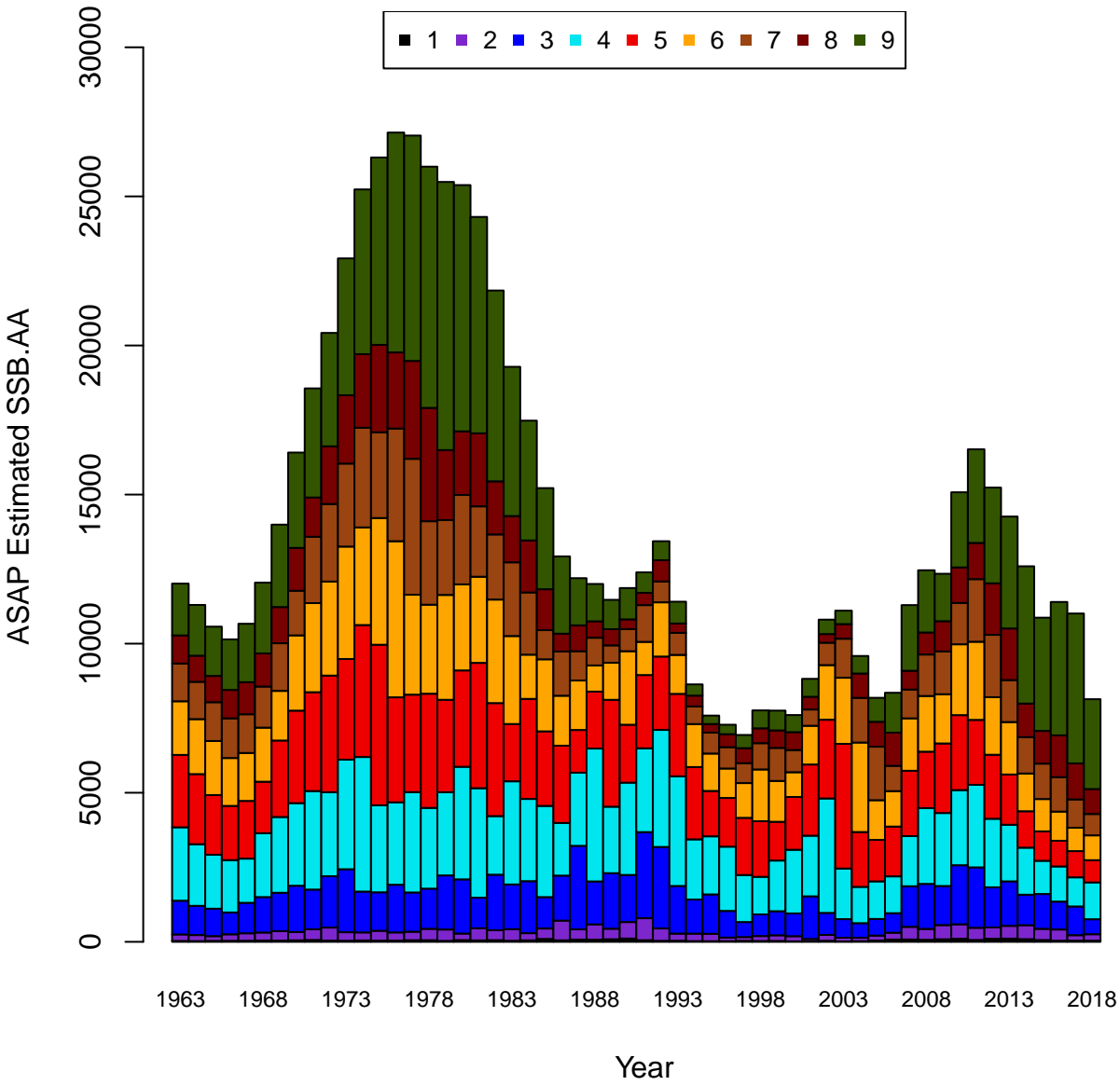


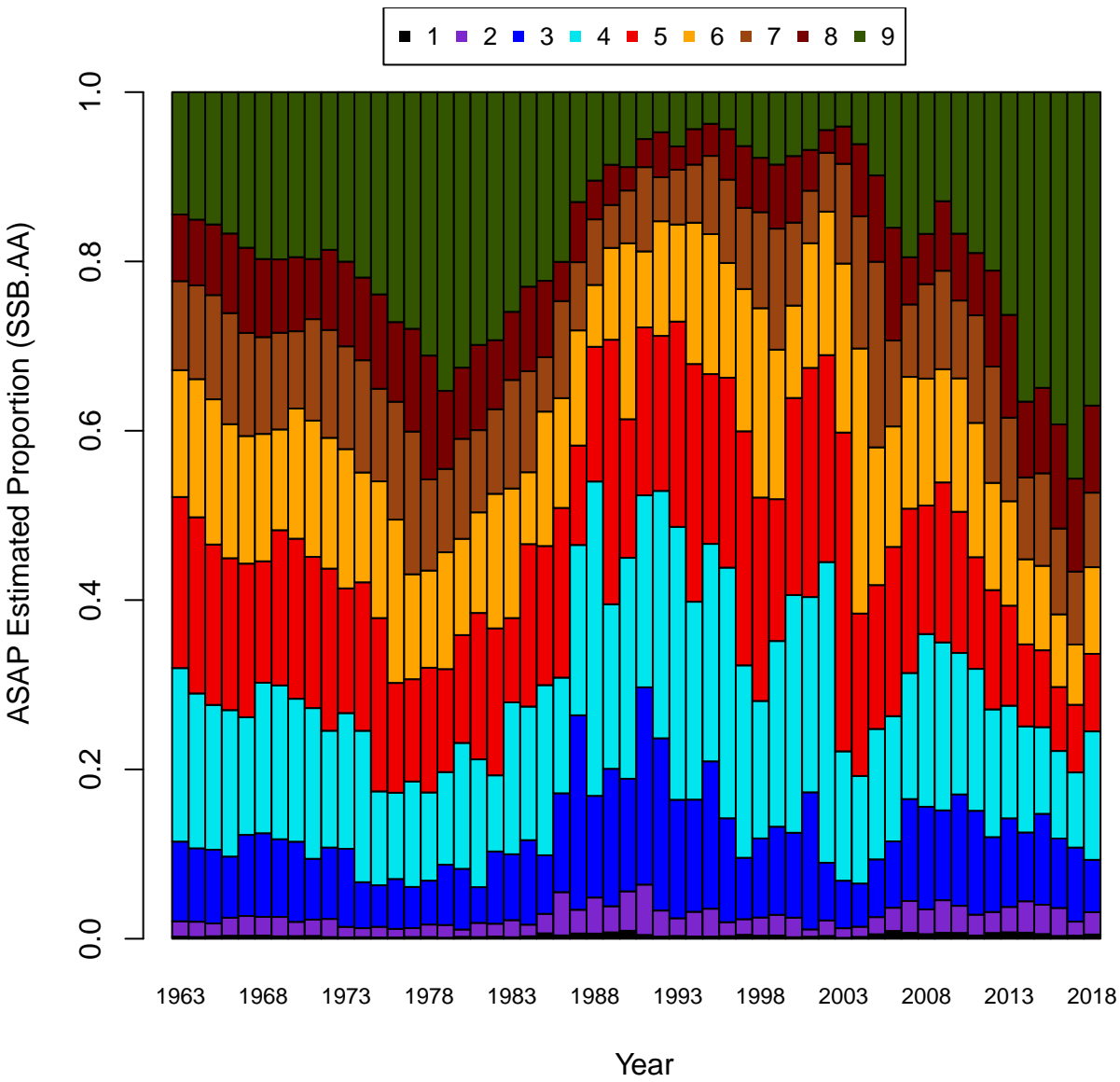




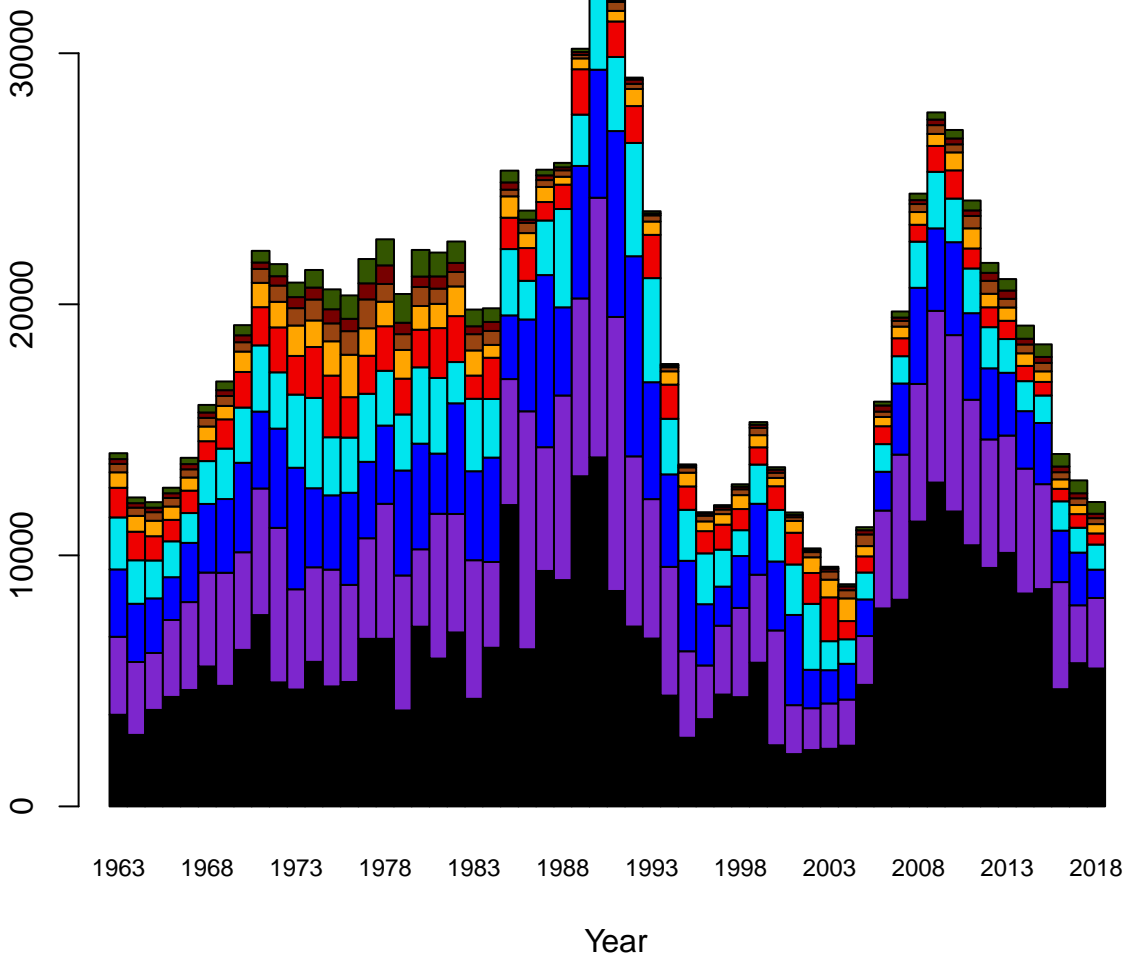
**Comparison of January 1 Biomass**

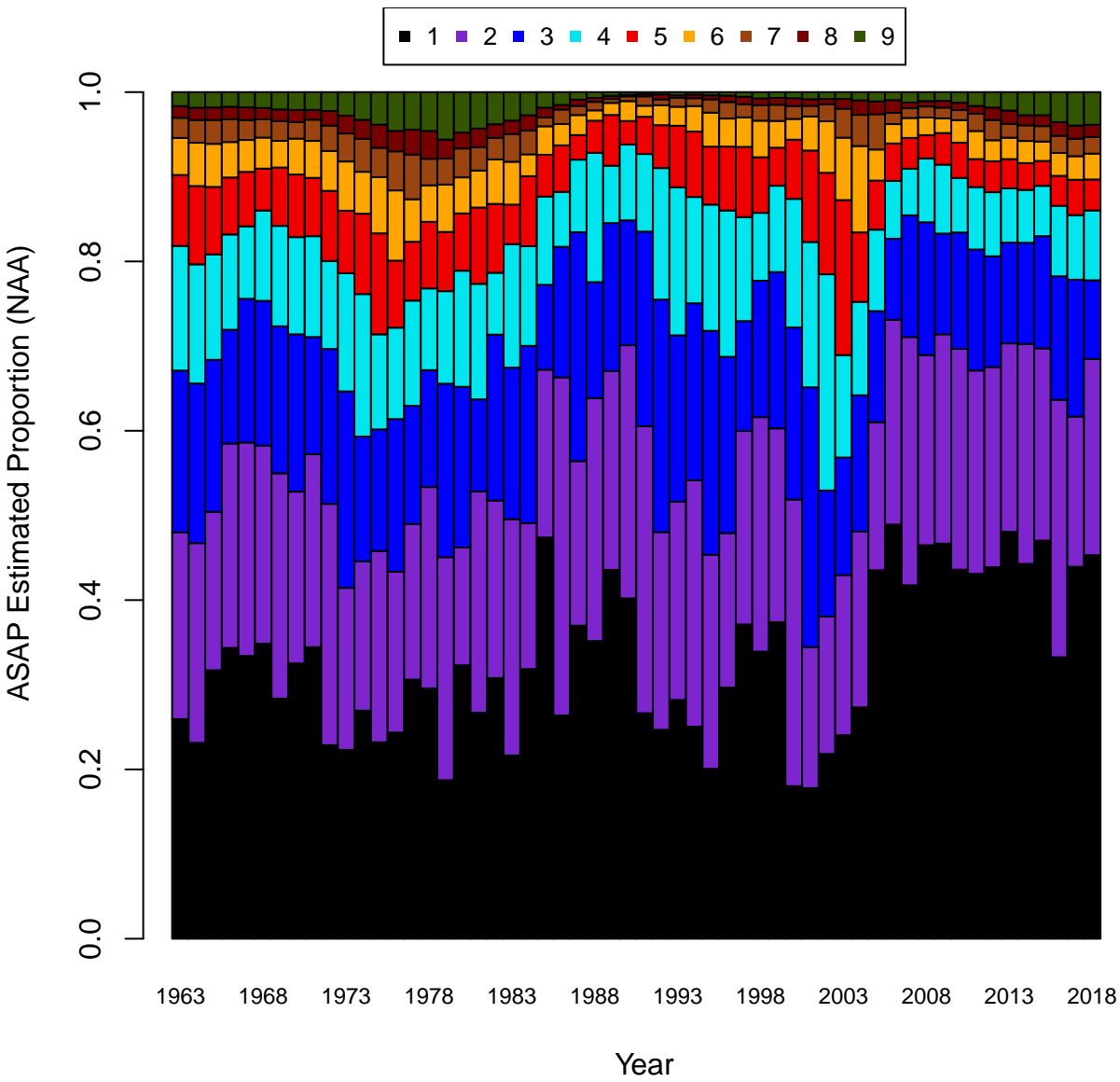


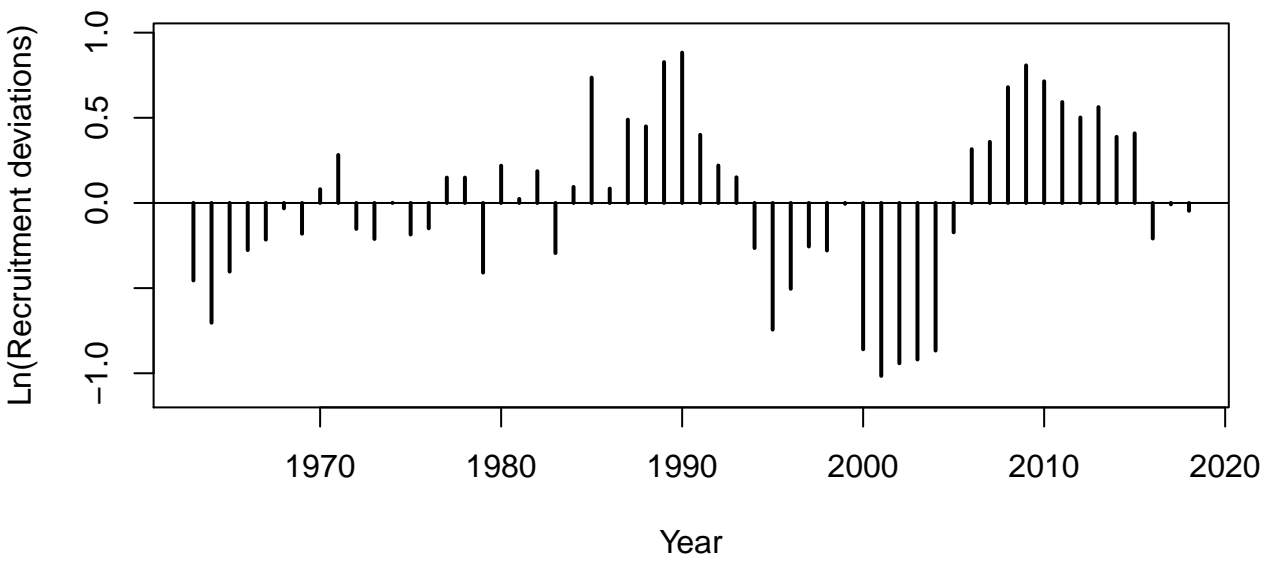
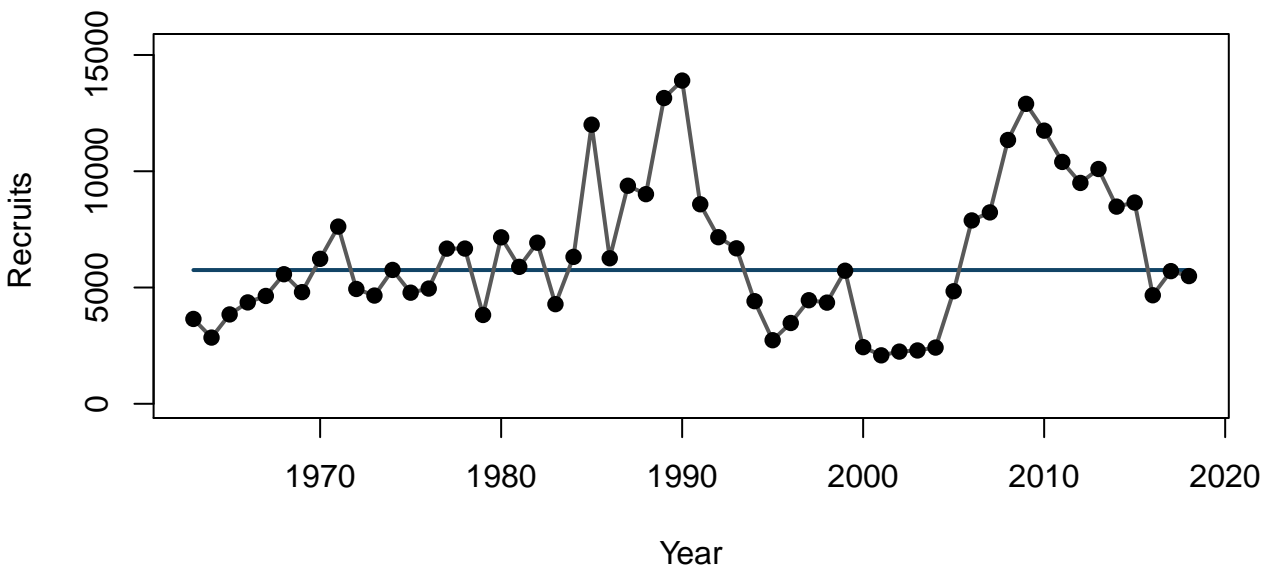




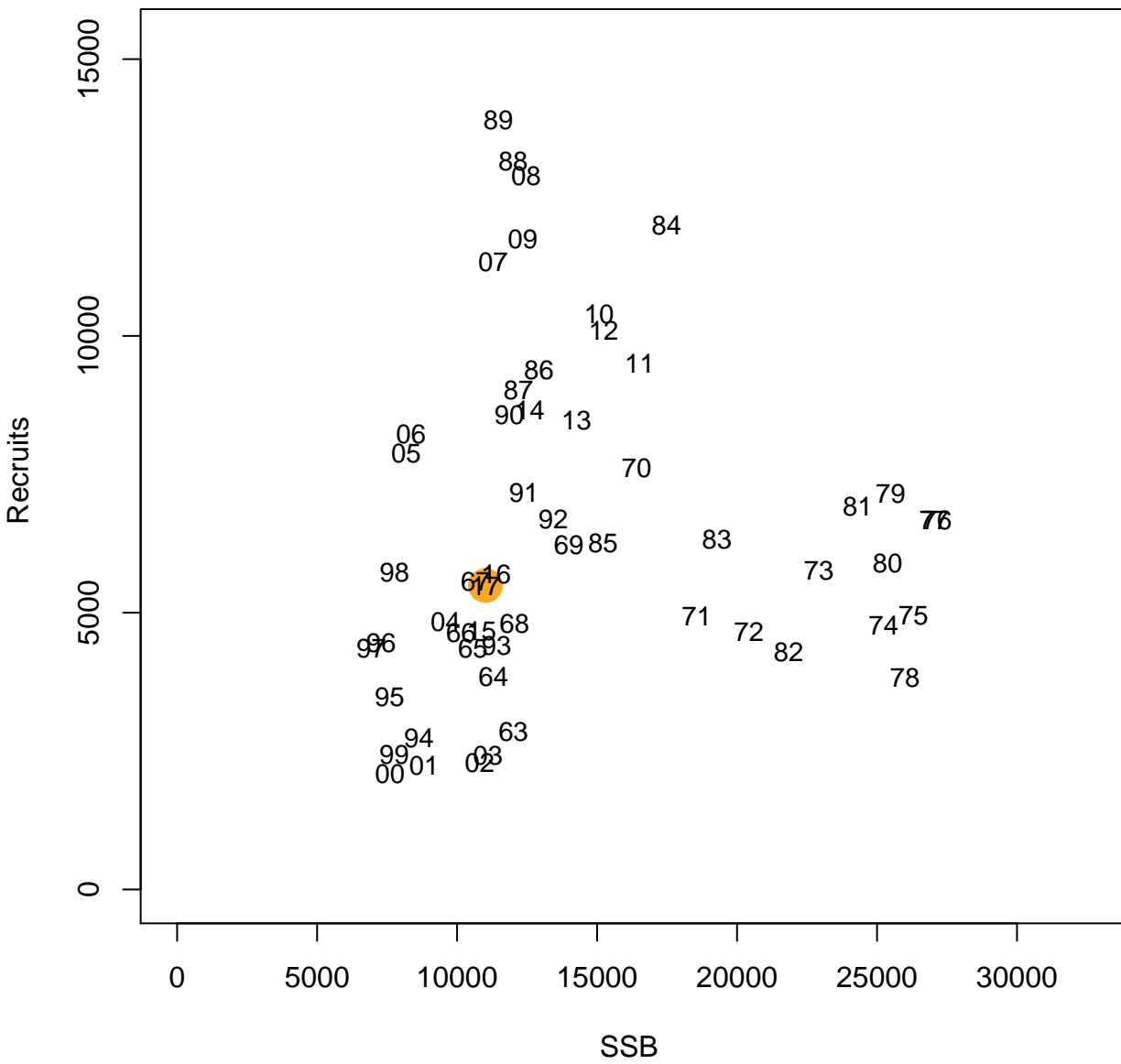
ASAP Estimated NAA

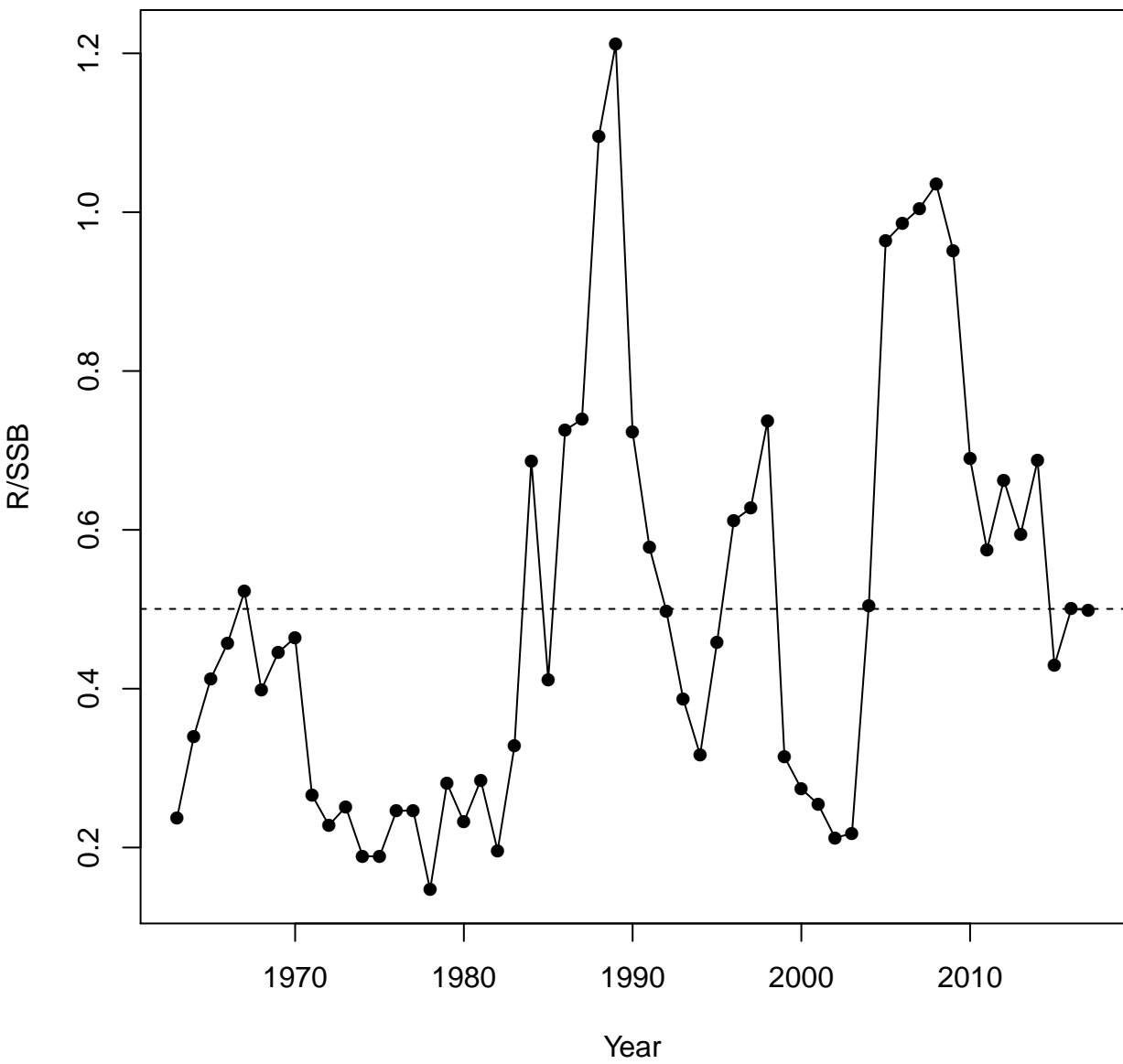


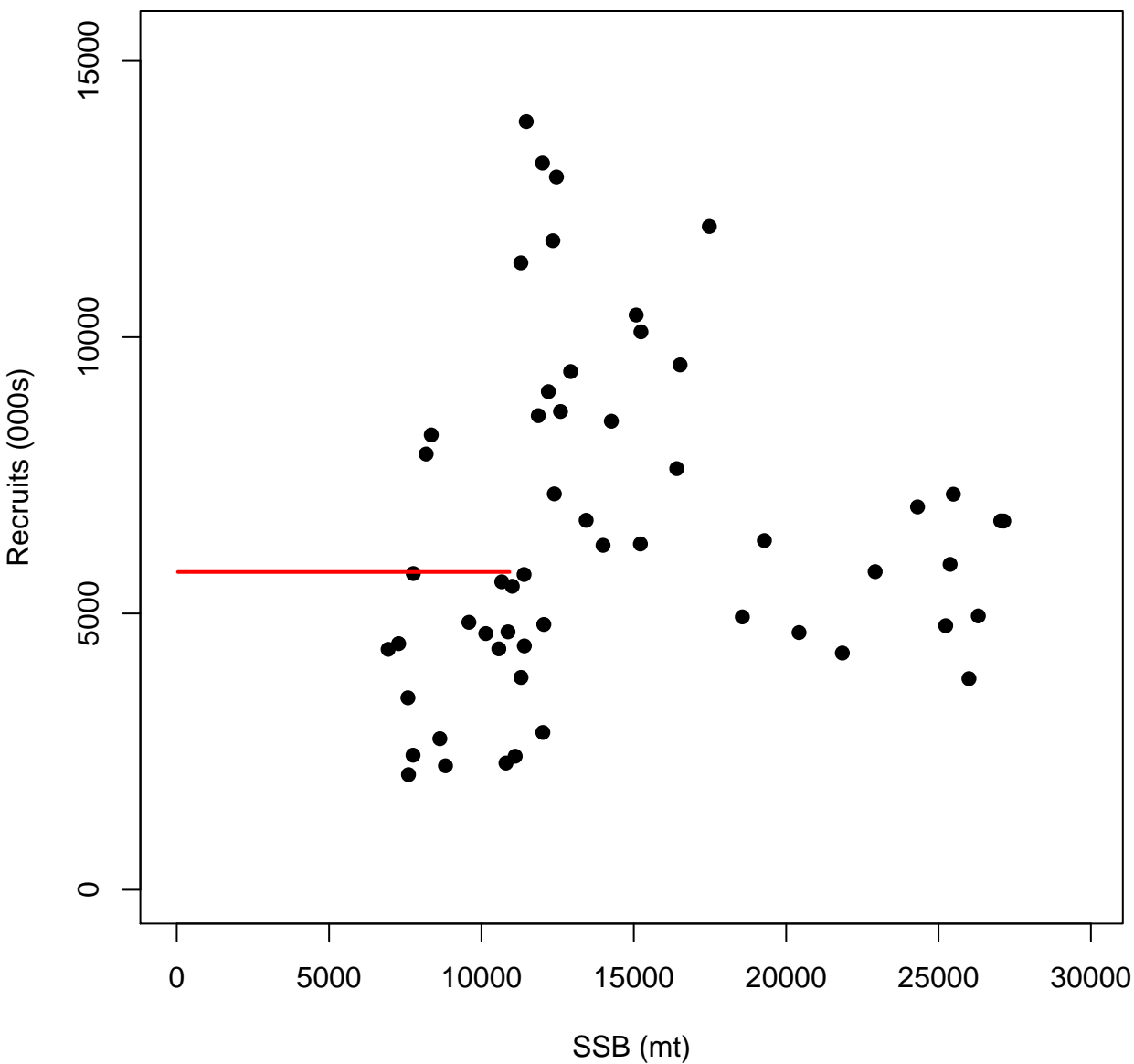


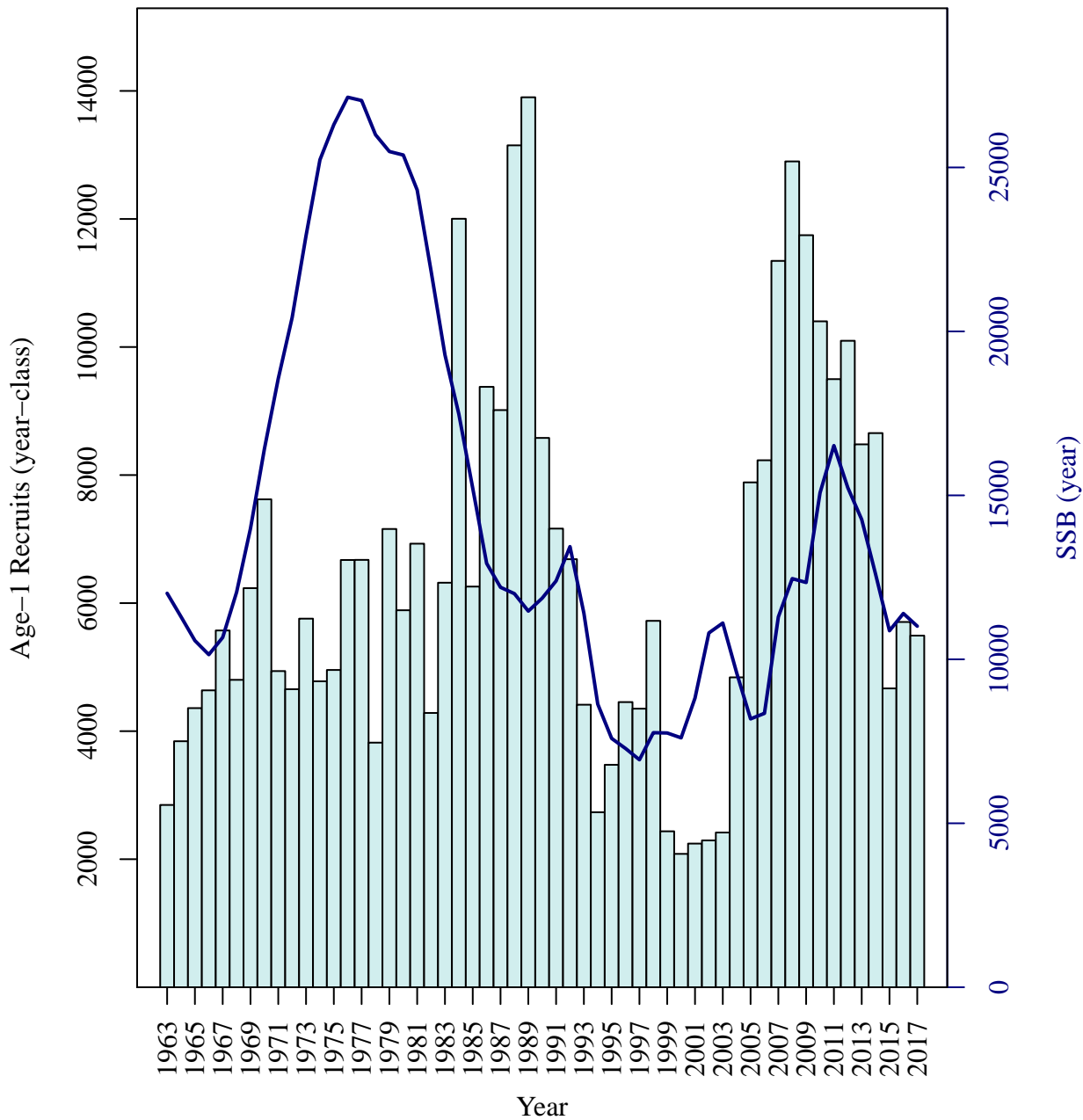


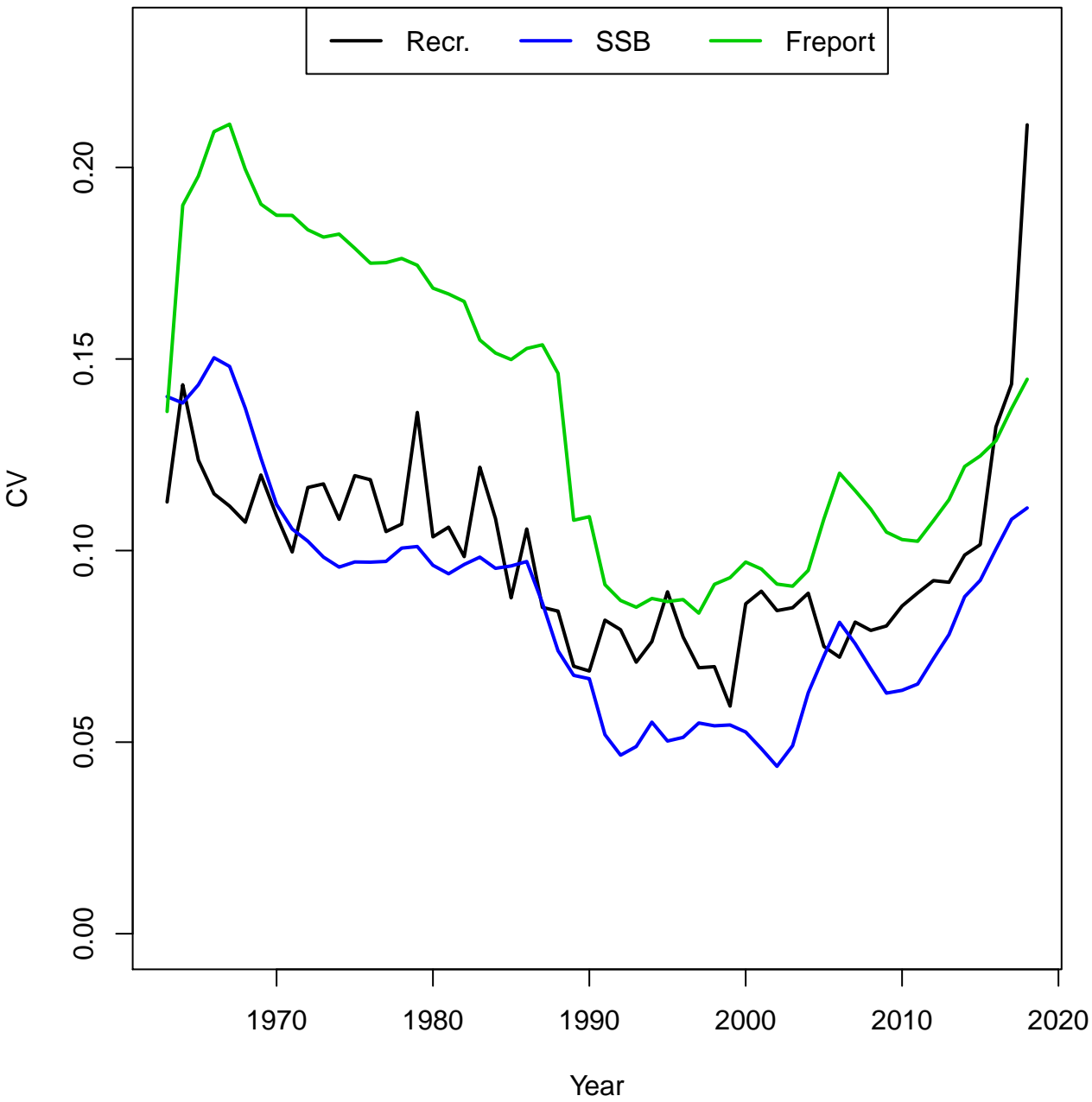




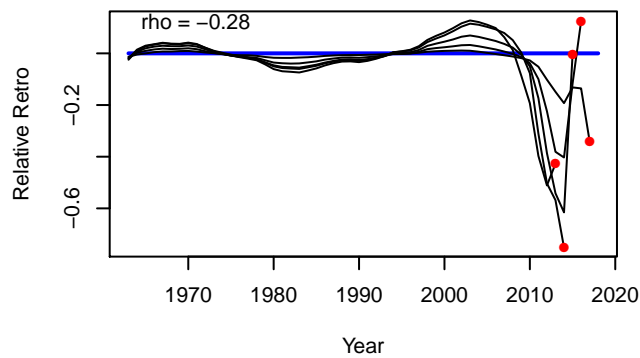
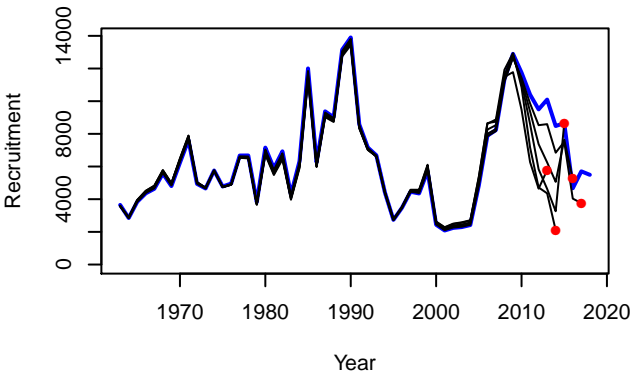
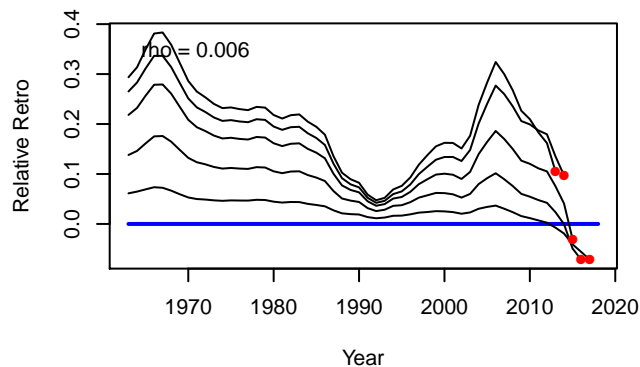
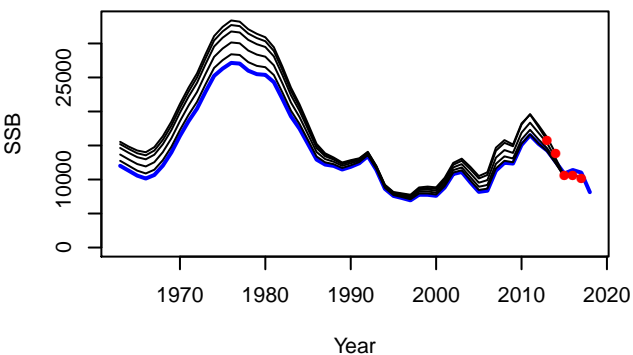
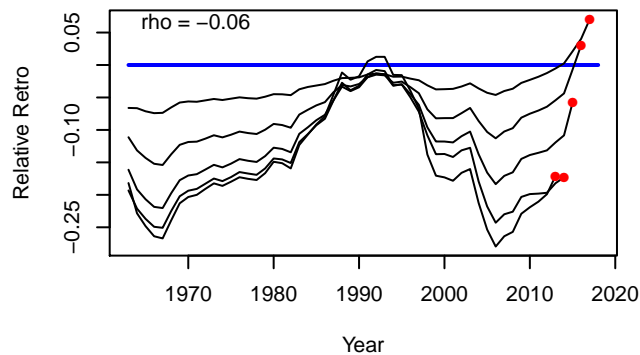
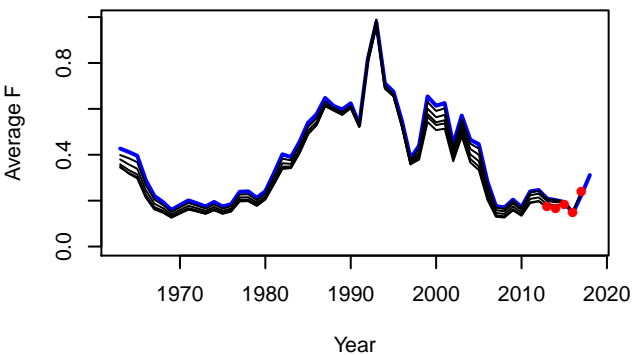




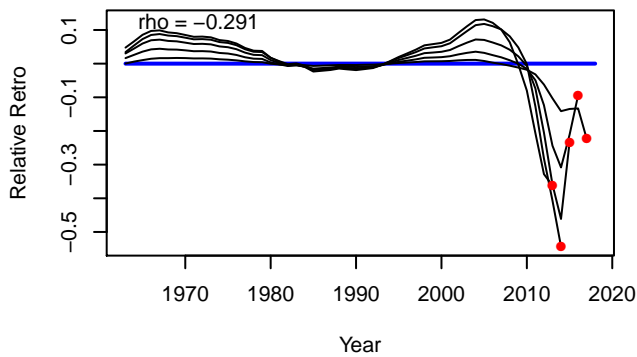
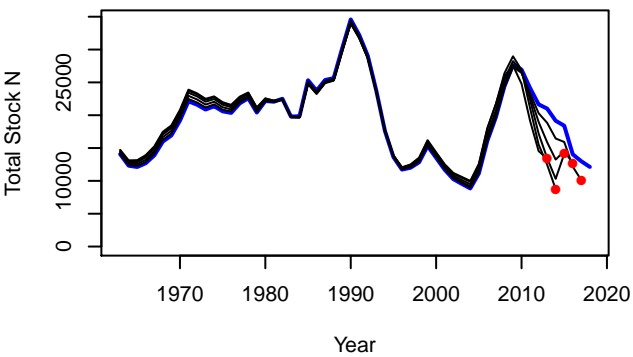
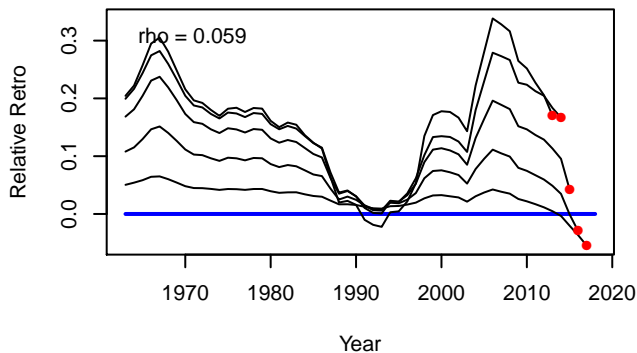
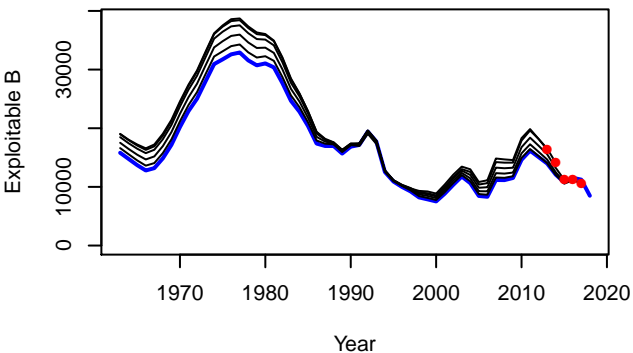
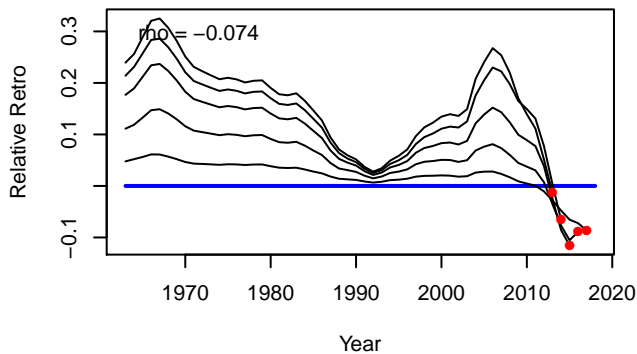
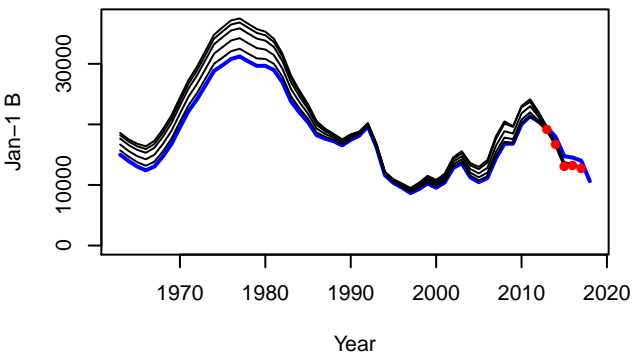




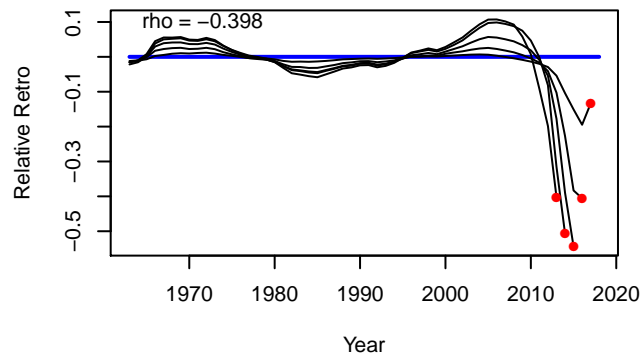
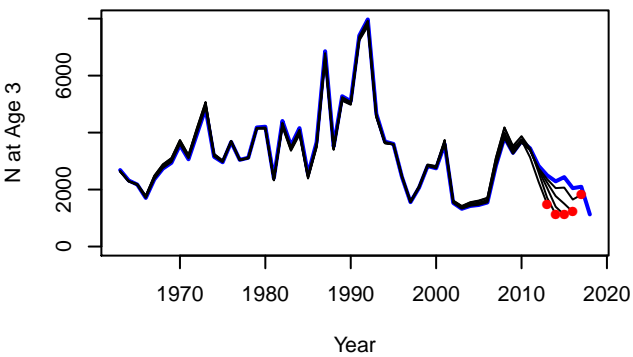
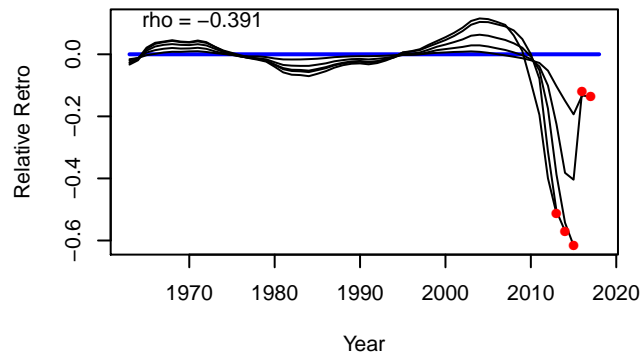
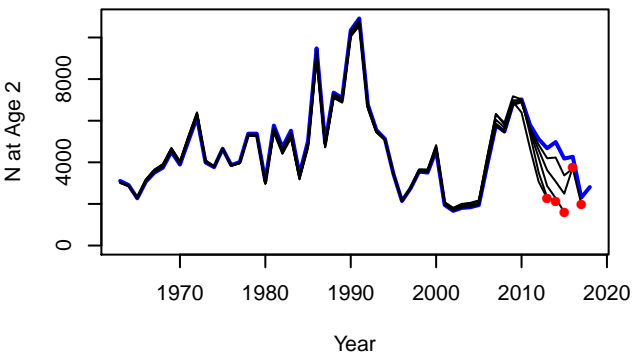
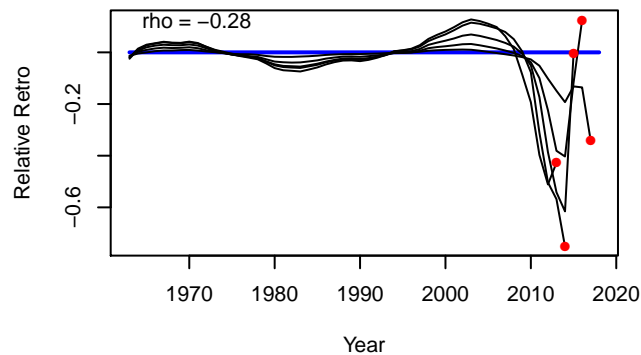
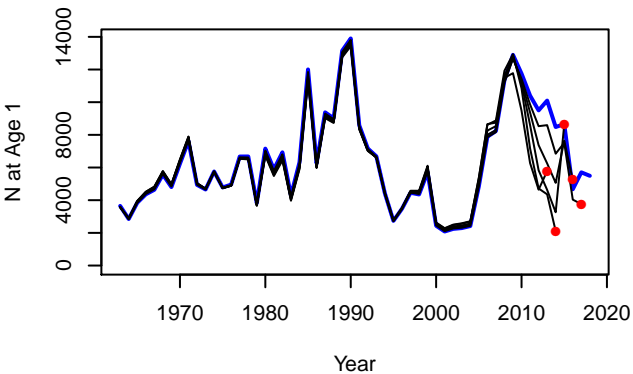
# F, SSB, R



# Jan-1 B, Exploitable B, Total Stock N



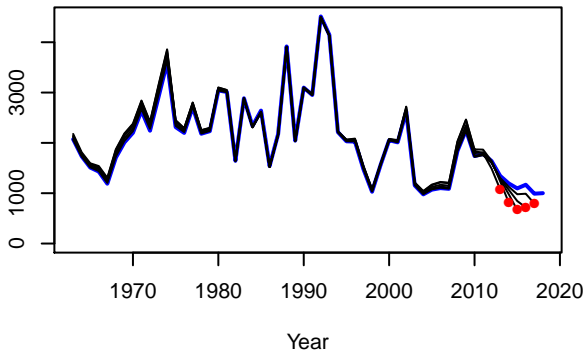
# Stock Numbers at Age



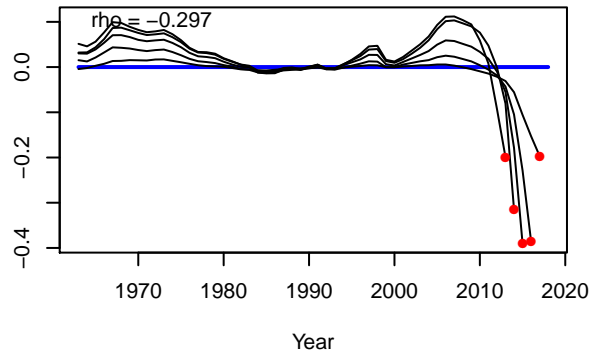


# Stock Numbers at Age

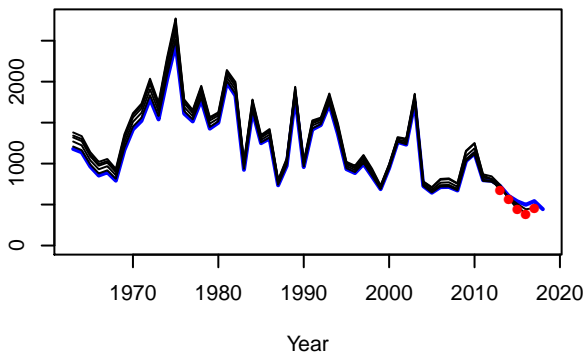
N at Age 4



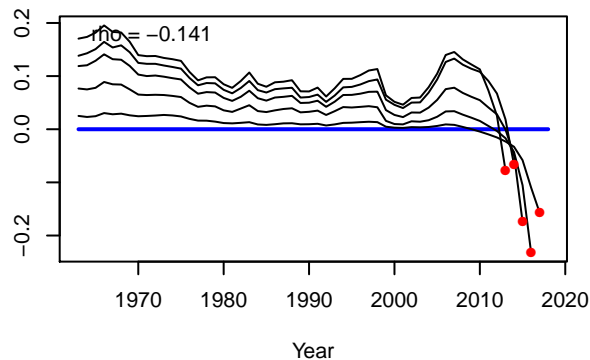
Relative Retro



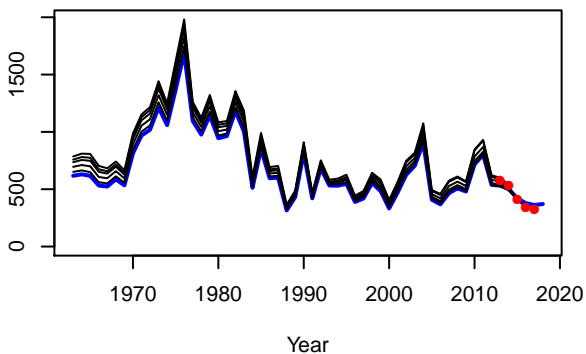
N at Age 5



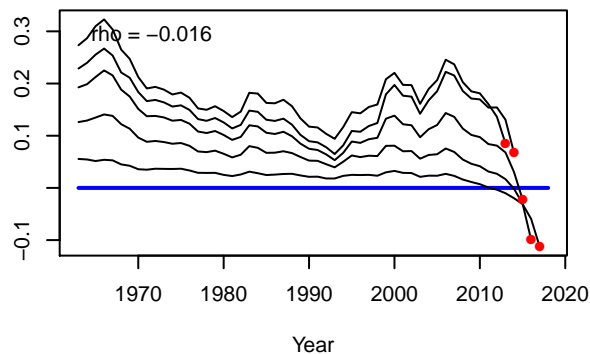
Relative Retro



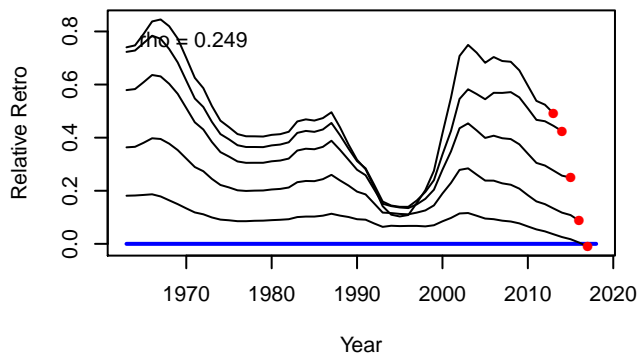
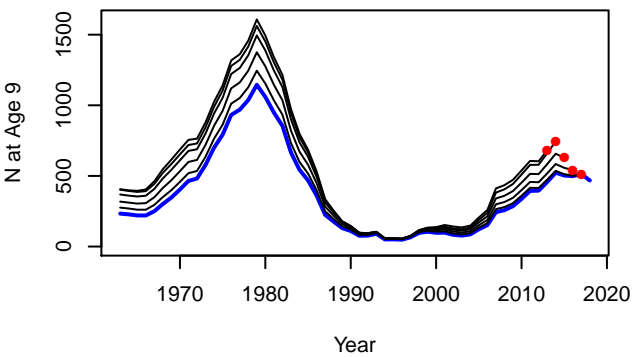
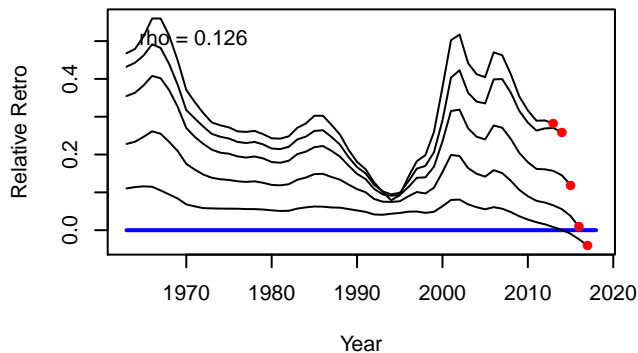
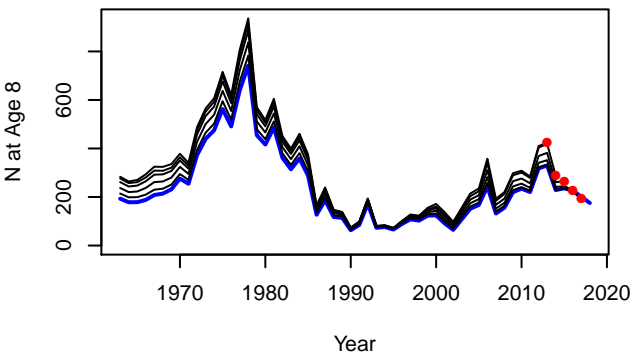
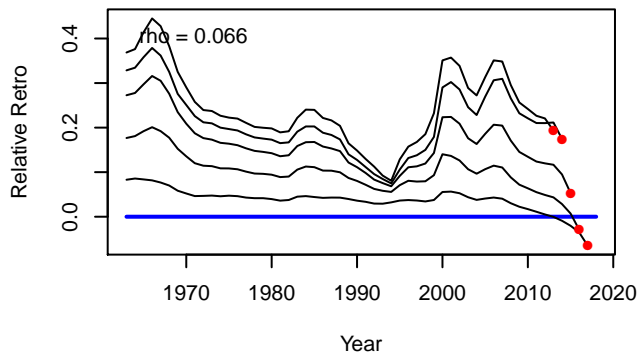
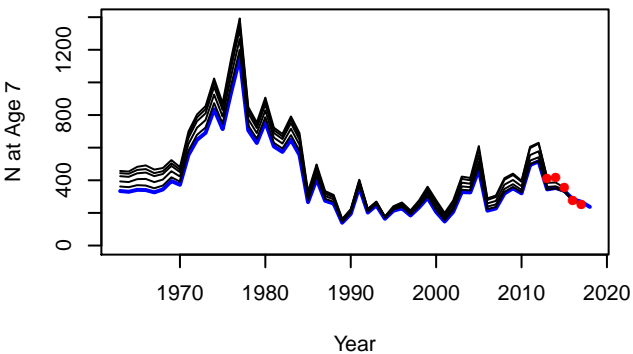
N at Age 6



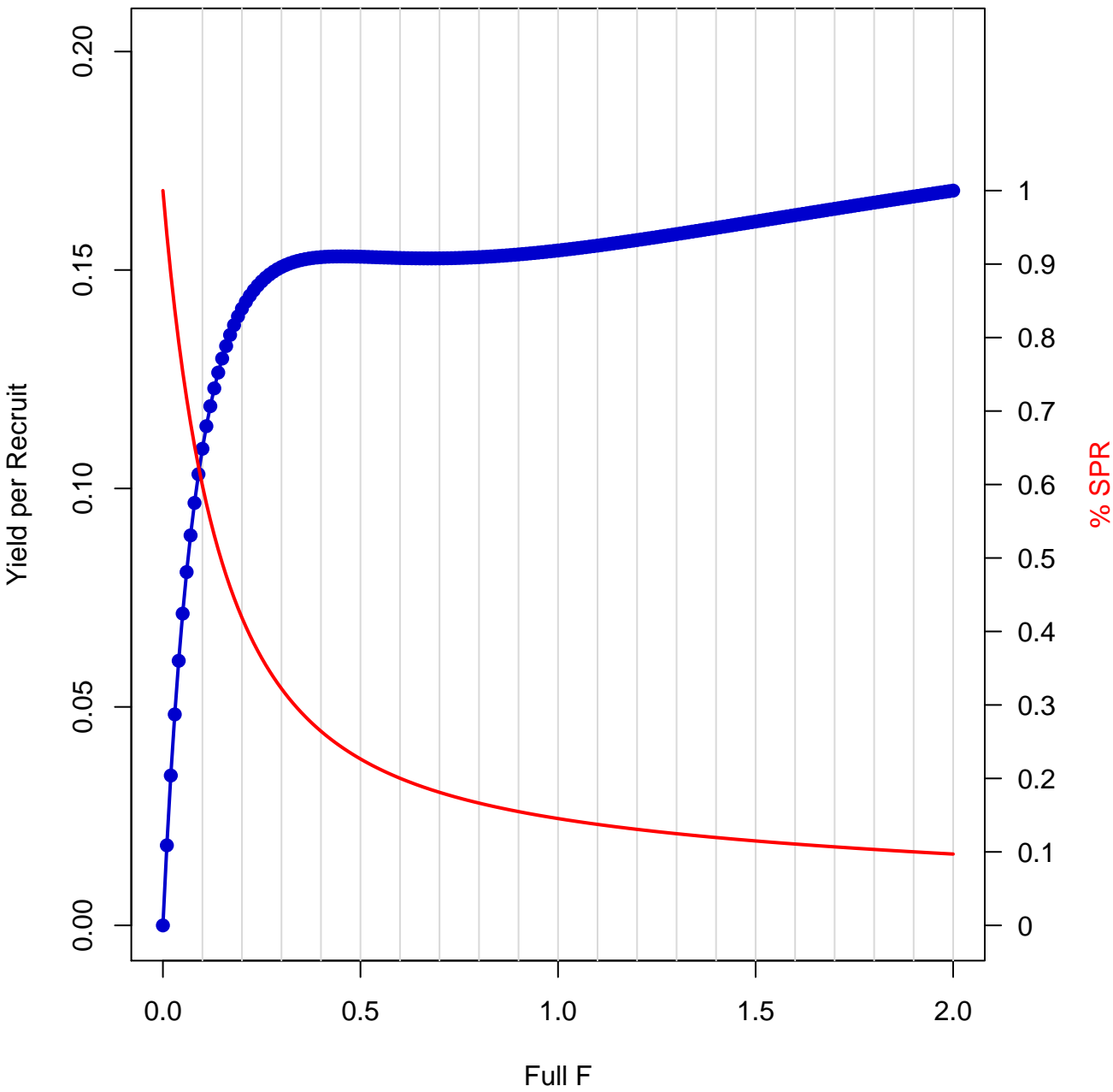
Relative Retro



# Stock Numbers at Age



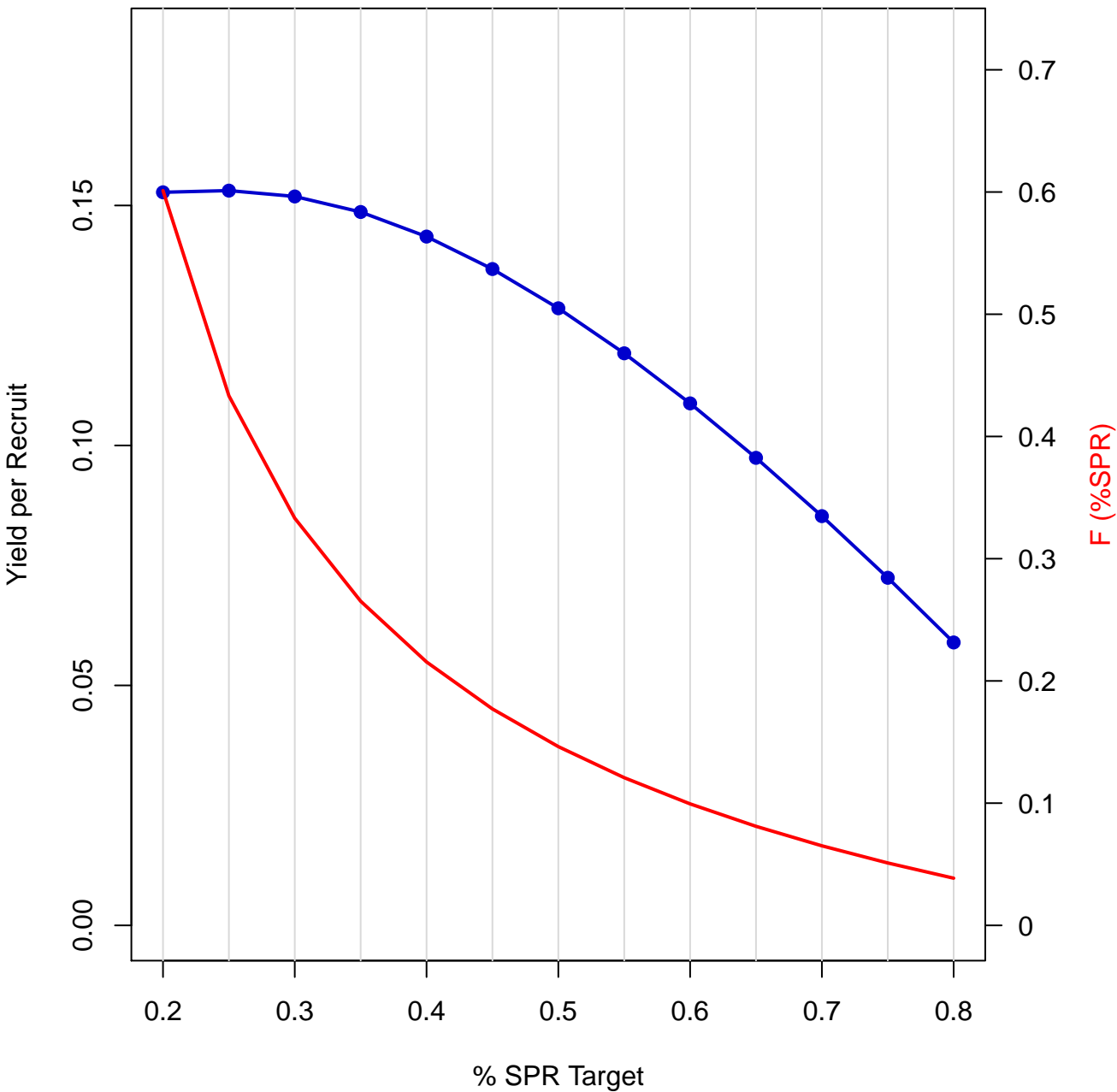
YPR-SPR Reference Points (Years Avg = 5)



# YPR–SPR Reference Points (Years Avg = 5)

F	YPR	SPR	F	YPR	SPR	F	YPR	SPR
0	0	1	0.35	0.1523	0.2899	0.7	0.1527	0.1811
0.01	0.0183	0.9404	0.36	0.1525	0.2843	0.71	0.1527	0.1794
0.02	0.0343	0.8867	0.37	0.1526	0.279	0.72	0.1527	0.1778
0.03	0.0483	0.8382	0.38	0.1528	0.2739	0.73	0.1527	0.1763
0.04	0.0606	0.7941	0.39	0.1529	0.269	0.74	0.1527	0.1748
0.05	0.0714	0.754	0.4	0.153	0.2643	0.75	0.1528	0.1733
0.06	0.0809	0.7174	0.41	0.153	0.2598	0.76	0.1528	0.1719
0.07	0.0893	0.6839	0.42	0.1531	0.2555	0.77	0.1528	0.1705
0.08	0.0967	0.6531	0.43	0.1531	0.2513	0.78	0.1529	0.1691
0.09	0.1033	0.6247	0.44	0.1531	0.2474	0.79	0.1529	0.1677
0.1	0.1091	0.5985	0.45	0.1531	0.2435	0.8	0.1529	0.1664
0.11	0.1143	0.5743	0.46	0.1531	0.2399	0.81	0.153	0.1652
0.12	0.1188	0.5518	0.47	0.1531	0.2363	0.82	0.153	0.1639
0.13	0.1229	0.5309	0.48	0.1531	0.2329	0.83	0.1531	0.1627
0.14	0.1265	0.5115	0.49	0.1531	0.2296	0.84	0.1532	0.1615
0.15	0.1297	0.4934	0.5	0.153	0.2265	0.85	0.1532	0.1603
0.16	0.1326	0.4764	0.51	0.153	0.2234	0.86	0.1533	0.1592
0.17	0.1351	0.4606	0.52	0.153	0.2205	0.87	0.1533	0.1581
0.18	0.1374	0.4458	0.53	0.153	0.2177	0.88	0.1534	0.157
0.19	0.1394	0.4319	0.54	0.1529	0.2149	0.89	0.1535	0.1559
0.2	0.1412	0.4188	0.55	0.1529	0.2123	0.9	0.1536	0.1548
0.21	0.1427	0.4065	0.56	0.1529	0.2097	0.91	0.1536	0.1538
0.22	0.1441	0.3949	0.57	0.1528	0.2072	0.92	0.1537	0.1528
0.23	0.1454	0.384	0.58	0.1528	0.2048	0.93	0.1538	0.1518
0.24	0.1464	0.3736	0.59	0.1528	0.2025	0.94	0.1539	0.1508
0.25	0.1474	0.3639	0.6	0.1528	0.2003	0.95	0.154	0.1499
0.26	0.1482	0.3547	0.61	0.1527	0.1981	0.96	0.1541	0.149
0.27	0.149	0.3459	0.62	0.1527	0.196	0.97	0.1542	0.148
0.28	0.1496	0.3376	0.63	0.1527	0.1939	0.98	0.1543	0.1471
0.29	0.1502	0.3297	0.64	0.1527	0.1919	0.99	0.1544	0.1462
0.3	0.1507	0.3223	0.65	0.1527	0.19	1	0.1545	0.1454
0.31	0.1511	0.3152	0.66	0.1527	0.1881	1.01	0.1546	0.1445
0.32	0.1515	0.3084	0.67	0.1527	0.1863	1.02	0.1547	0.1437
0.33	0.1518	0.3019	0.68	0.1527	0.1845	1.03	0.1548	0.1429
0.34	0.1521	0.2958	0.69	0.1527	0.1828	1.04	0.1549	0.142

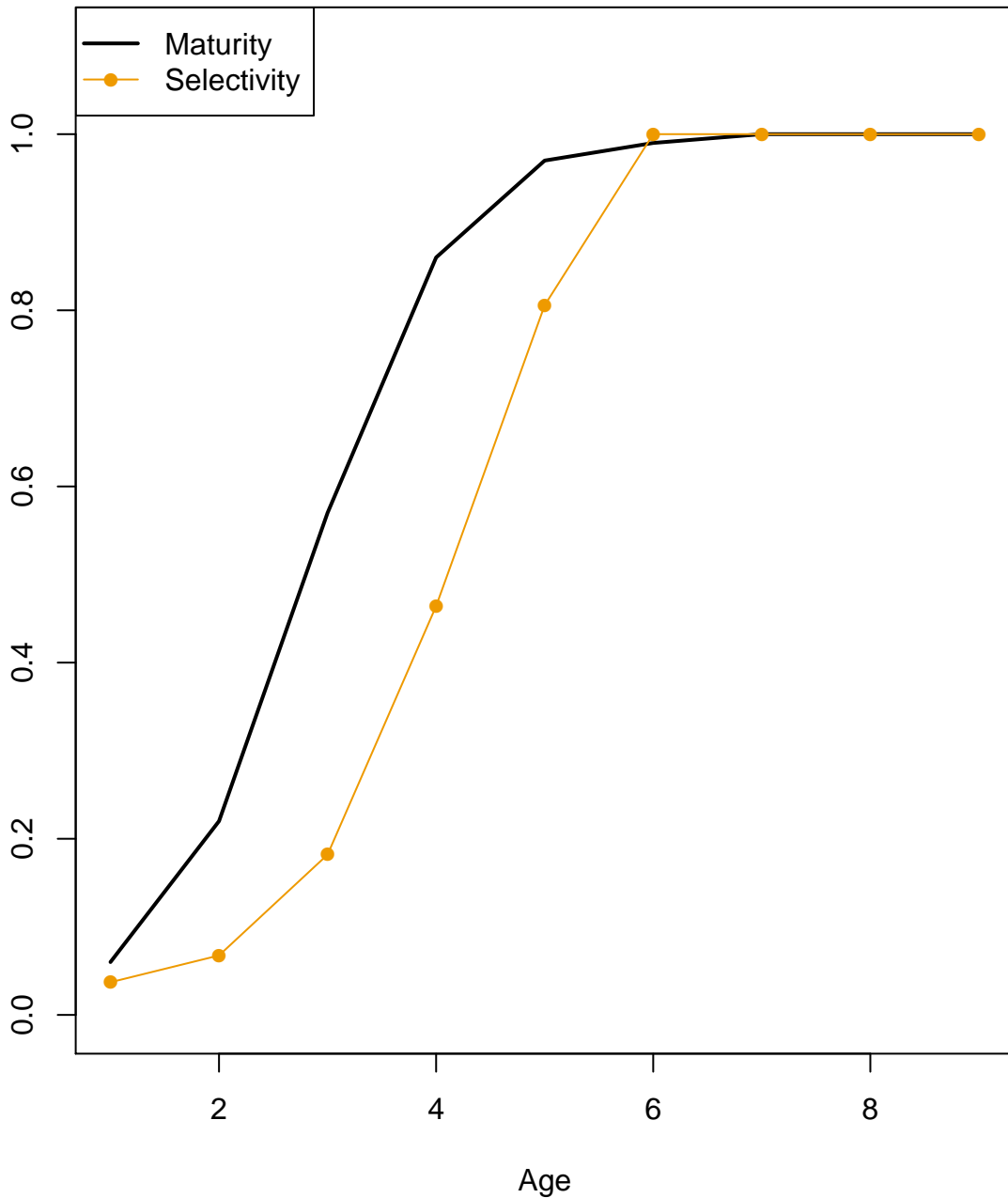
**SPR Target Reference Points (Years Avg = 5)**



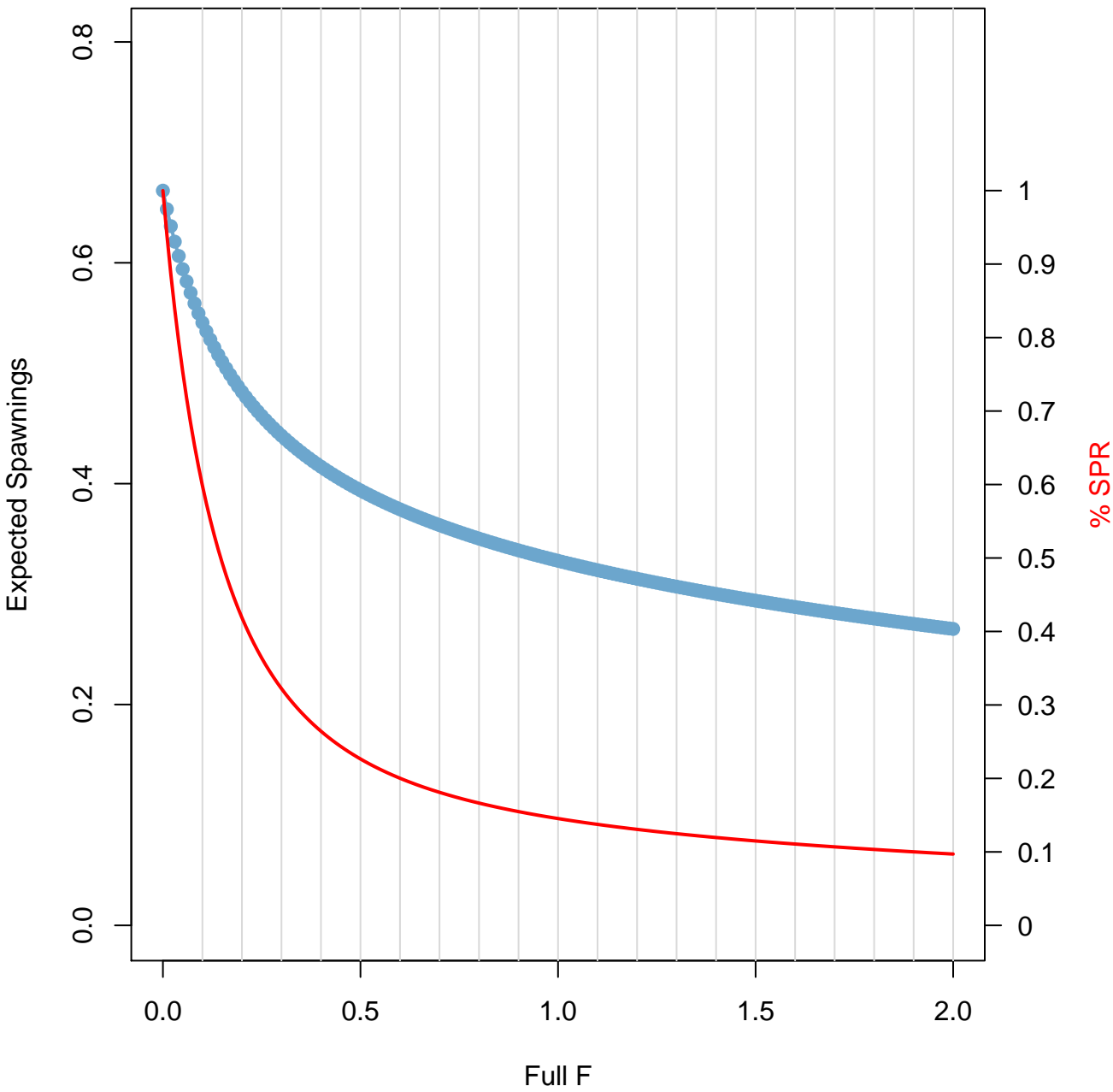
## SPR Target Reference Points (Years Avg = 5)

% SPR	F(%SPR)	YPR
0.2	0.6012	0.1528
0.25	0.4333	0.1531
0.3	0.3331	0.1519
0.35	0.2653	0.1486
0.4	0.2155	0.1435
0.45	0.1771	0.1368
0.5	0.1463	0.1286
0.55	0.1208	0.1192
0.6	0.0994	0.1088
0.65	0.0811	0.0974
0.7	0.0651	0.0853
0.75	0.0511	0.0724
0.8	0.0386	0.059

Selectivity or Maturity at age



**Expected Spawnings and SPR Reference Points (Years Avg = 5)**

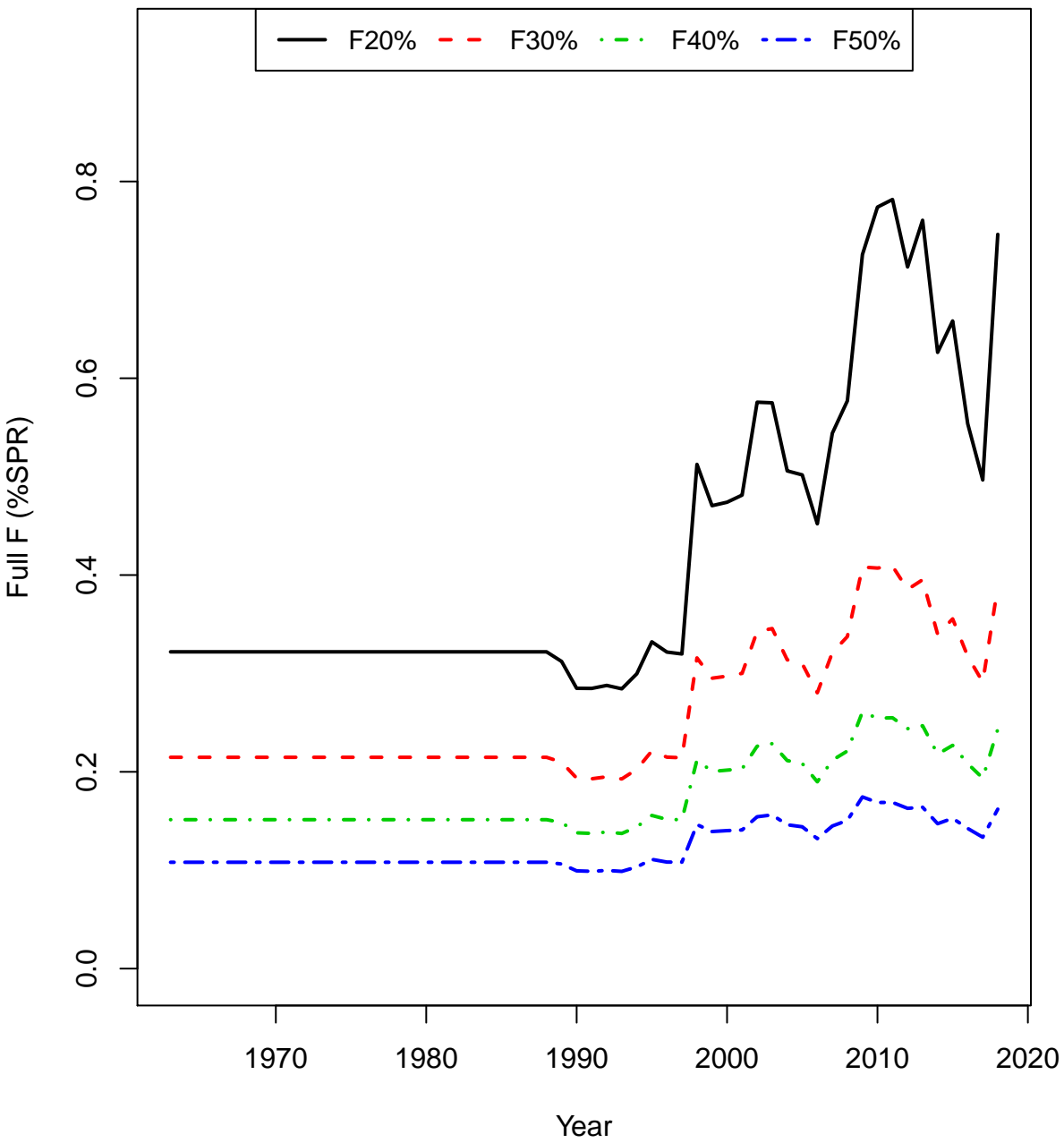




**Expected Spawnings & SPR Reference Points (Years Avg = 5)**

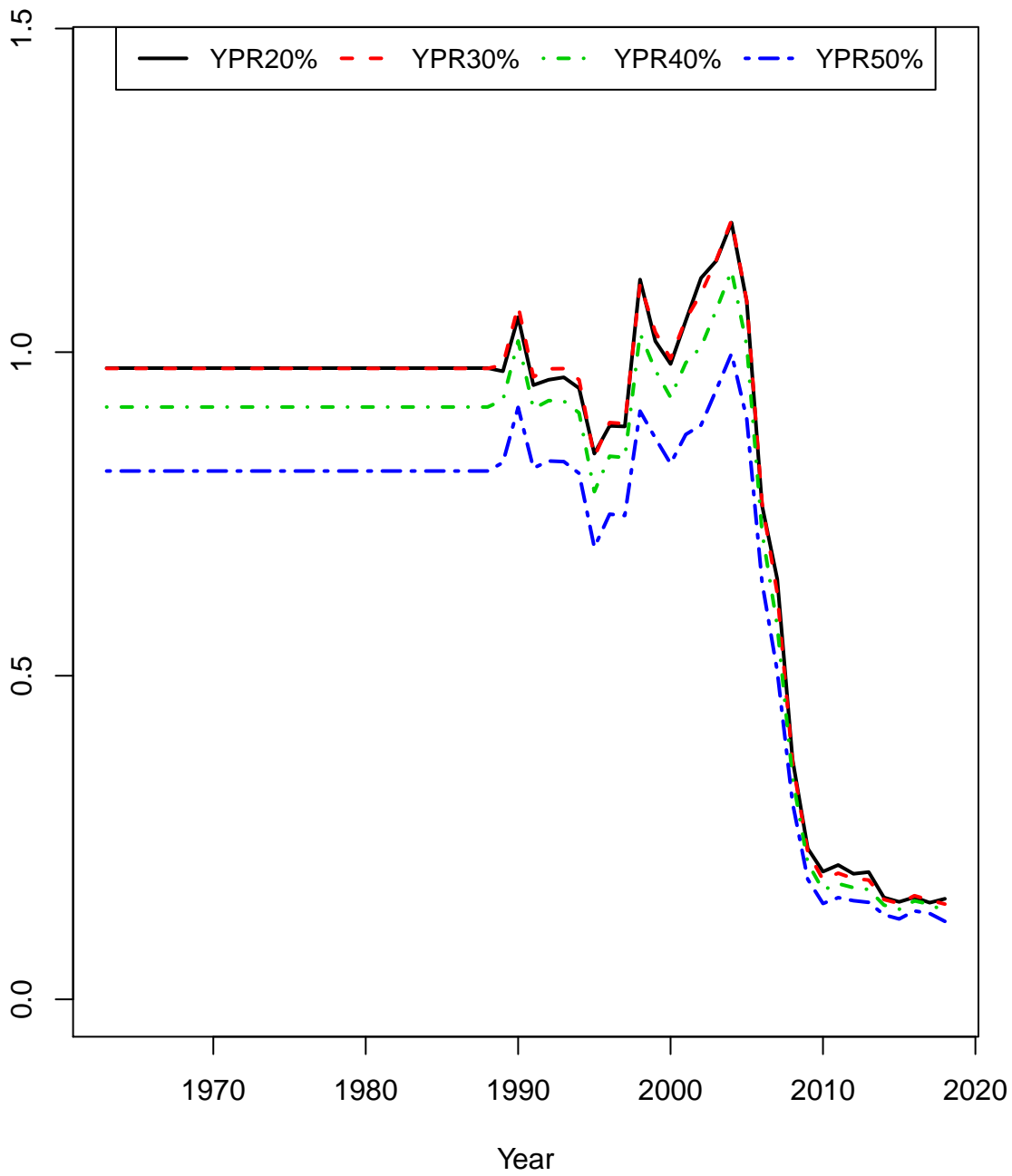
F	E[Sp]	SPR	F	E[Sp]	SPR	F	E[Sp]	SPR
0	0.6654	1	0.35	0.4284	0.2899	0.7	0.3625	0.1811
0.01	0.6486	0.9404	0.36	0.4256	0.2843	0.71	0.3612	0.1794
0.02	0.6332	0.8867	0.37	0.423	0.279	0.72	0.3599	0.1778
0.03	0.6191	0.8382	0.38	0.4204	0.2739	0.73	0.3586	0.1763
0.04	0.6062	0.7941	0.39	0.4178	0.269	0.74	0.3574	0.1748
0.05	0.5942	0.754	0.4	0.4154	0.2643	0.75	0.3562	0.1733
0.06	0.5832	0.7174	0.41	0.413	0.2598	0.76	0.355	0.1719
0.07	0.5729	0.6839	0.42	0.4107	0.2555	0.77	0.3538	0.1705
0.08	0.5632	0.6531	0.43	0.4084	0.2513	0.78	0.3526	0.1691
0.09	0.5543	0.6247	0.44	0.4062	0.2474	0.79	0.3514	0.1677
0.1	0.5458	0.5985	0.45	0.404	0.2435	0.8	0.3503	0.1664
0.11	0.5379	0.5743	0.46	0.4019	0.2399	0.81	0.3491	0.1652
0.12	0.5305	0.5518	0.47	0.3998	0.2363	0.82	0.348	0.1639
0.13	0.5234	0.5309	0.48	0.3978	0.2329	0.83	0.3469	0.1627
0.14	0.5168	0.5115	0.49	0.3959	0.2296	0.84	0.3459	0.1615
0.15	0.5104	0.4934	0.5	0.3939	0.2265	0.85	0.3448	0.1603
0.16	0.5045	0.4764	0.51	0.3921	0.2234	0.86	0.3437	0.1592
0.17	0.4988	0.4606	0.52	0.3902	0.2205	0.87	0.3427	0.1581
0.18	0.4933	0.4458	0.53	0.3884	0.2177	0.88	0.3416	0.157
0.19	0.4882	0.4319	0.54	0.3867	0.2149	0.89	0.3406	0.1559
0.2	0.4832	0.4188	0.55	0.3849	0.2123	0.9	0.3396	0.1548
0.21	0.4785	0.4065	0.56	0.3832	0.2097	0.91	0.3386	0.1538
0.22	0.474	0.3949	0.57	0.3816	0.2072	0.92	0.3376	0.1528
0.23	0.4696	0.384	0.58	0.3799	0.2048	0.93	0.3367	0.1518
0.24	0.4654	0.3736	0.59	0.3783	0.2025	0.94	0.3357	0.1508
0.25	0.4614	0.3639	0.6	0.3768	0.2003	0.95	0.3348	0.1499
0.26	0.4576	0.3547	0.61	0.3752	0.1981	0.96	0.3338	0.149
0.27	0.4539	0.3459	0.62	0.3737	0.196	0.97	0.3329	0.148
0.28	0.4503	0.3376	0.63	0.3722	0.1939	0.98	0.332	0.1471
0.29	0.4468	0.3297	0.64	0.3708	0.1919	0.99	0.3311	0.1462
0.3	0.4435	0.3223	0.65	0.3693	0.19	1	0.3302	0.1454
0.31	0.4403	0.3152	0.66	0.3679	0.1881	1.01	0.3293	0.1445
0.32	0.4372	0.3084	0.67	0.3665	0.1863	1.02	0.3284	0.1437
0.33	0.4341	0.3019	0.68	0.3652	0.1845	1.03	0.3275	0.1429
0.34	0.4312	0.2958	0.69	0.3638	0.1828	1.04	0.3266	0.142

Annual F(%SPR) Reference Points

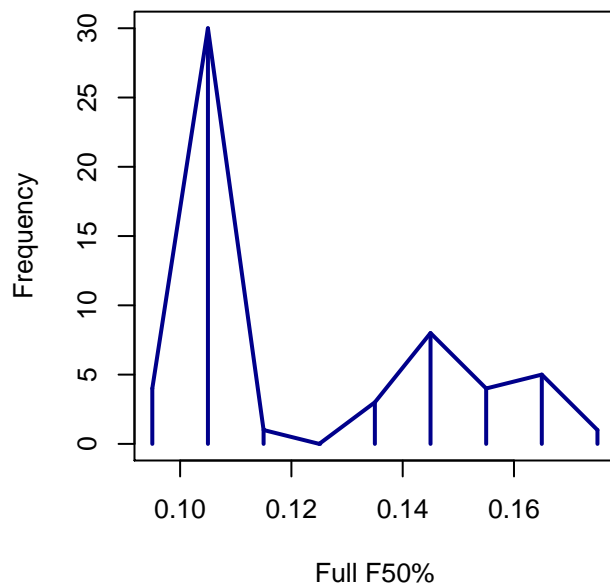
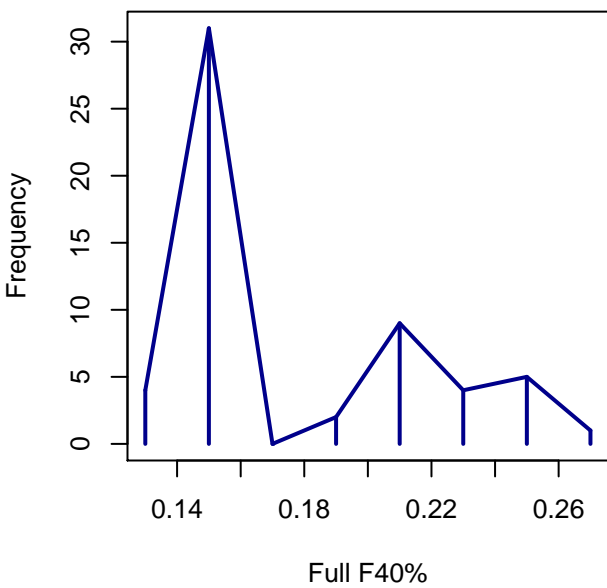
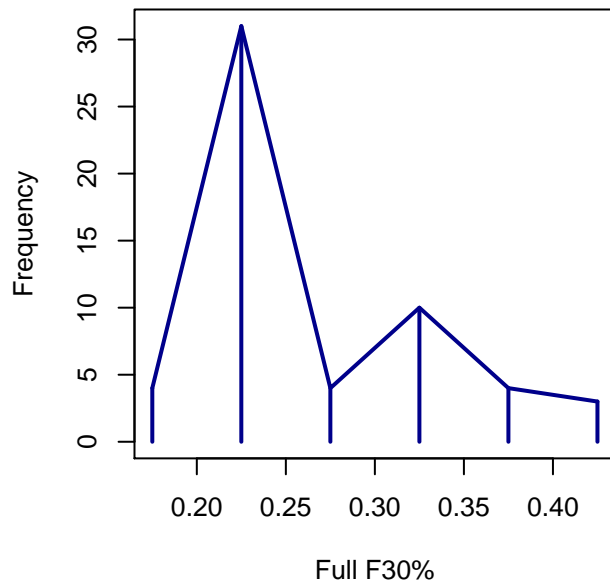
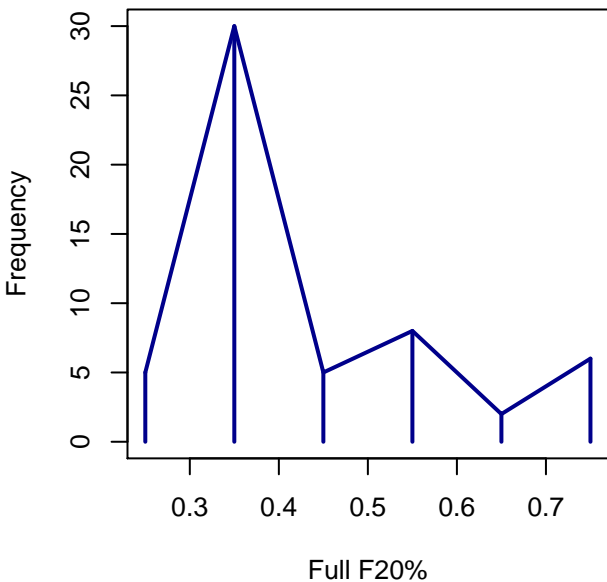


Annual YPR(%SPR) Reference Points

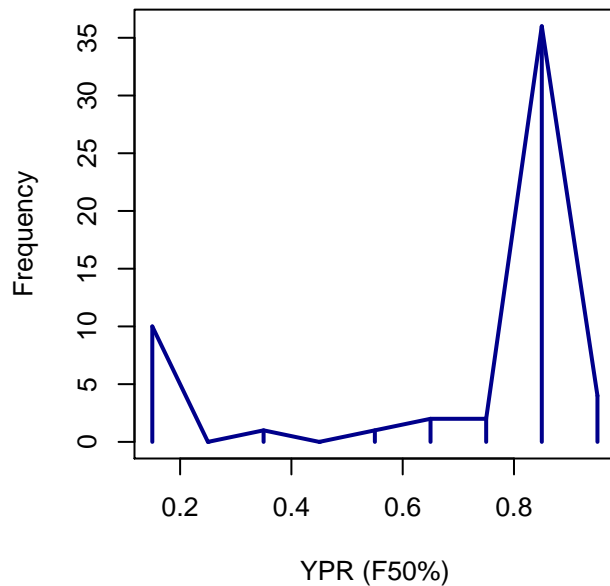
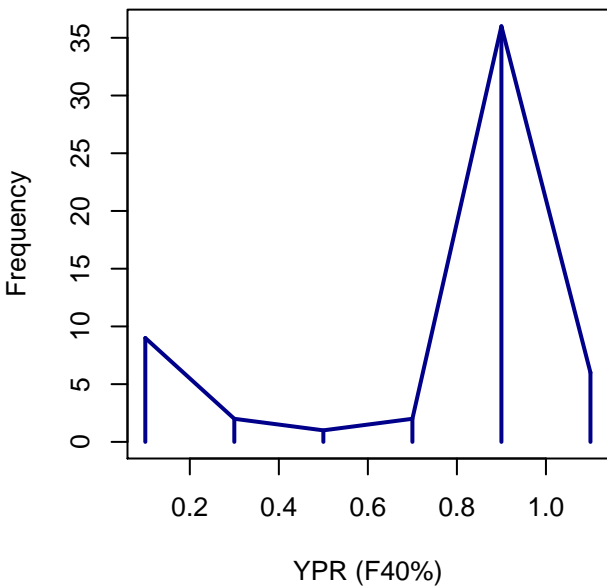
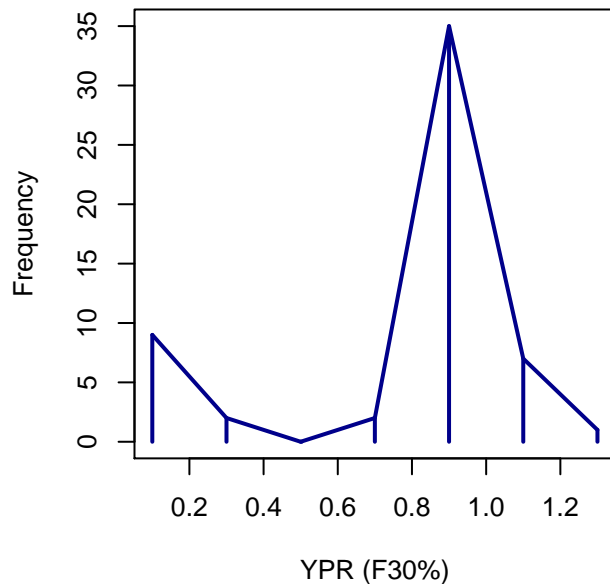
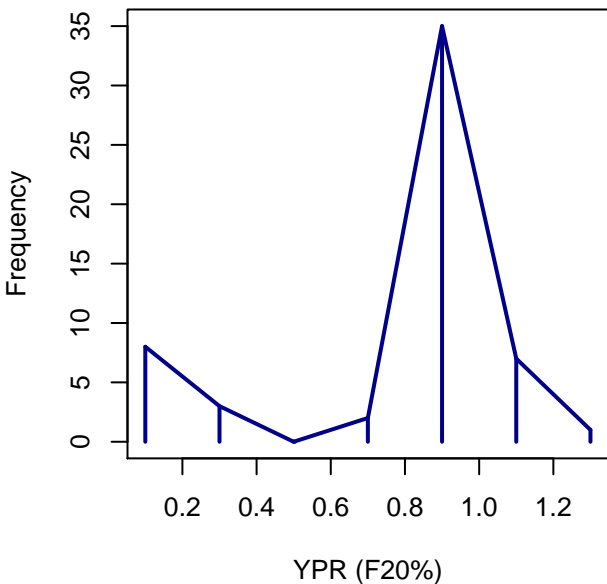
YPR (%SPR)

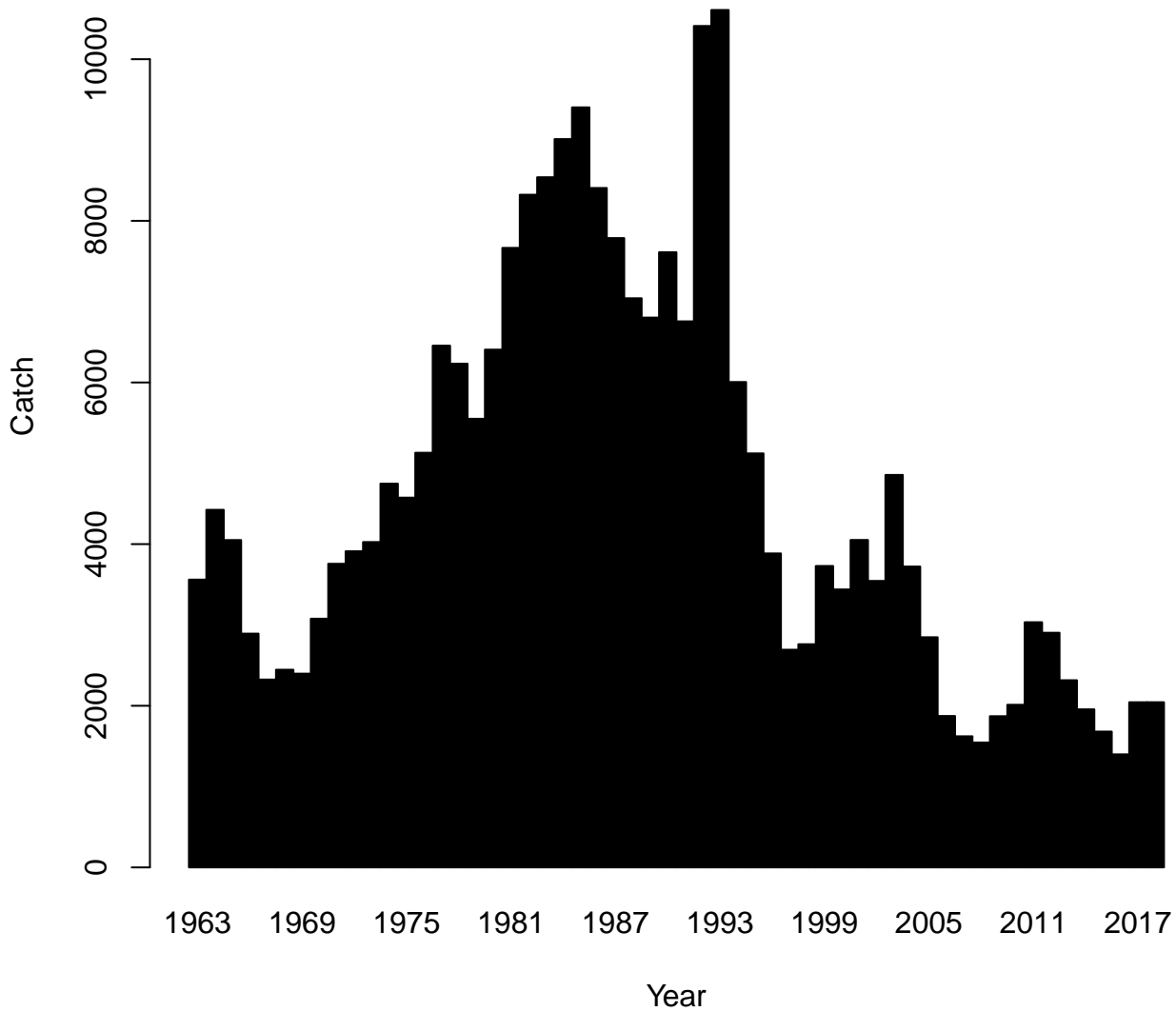


## Annual F (%SPR) Reference Points



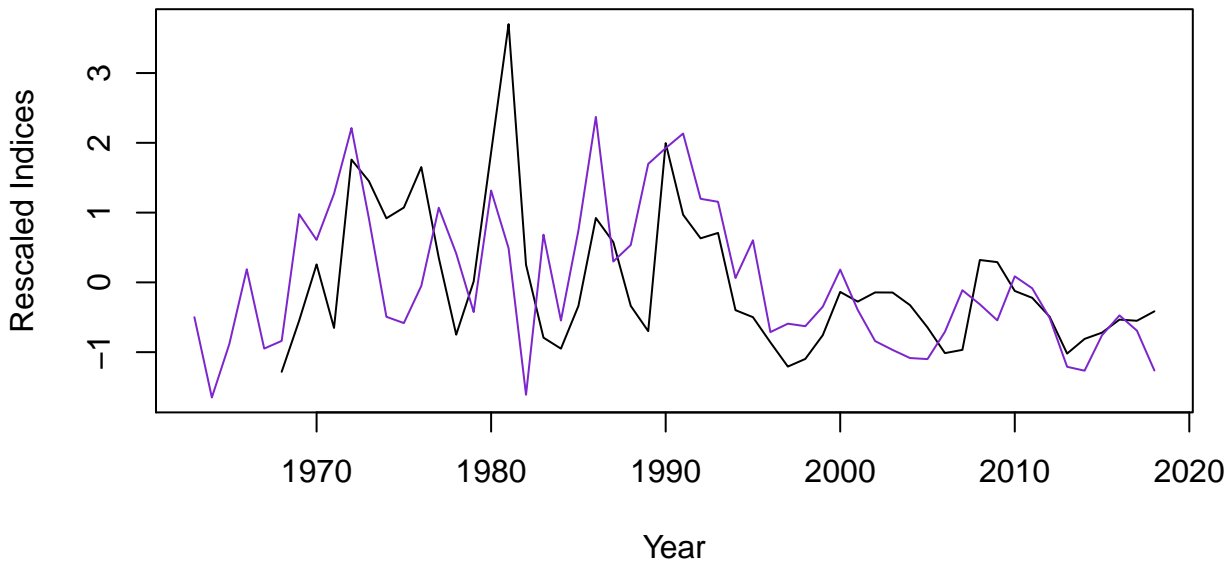
## Annual YPR (%SPR) Reference Points





# Age Comps for Catch by Fleet 1 (FLEET-1)







# Age Comps for Index 1 (INDEX-1)

• 0.05 • 0.2 • 0.4



Age

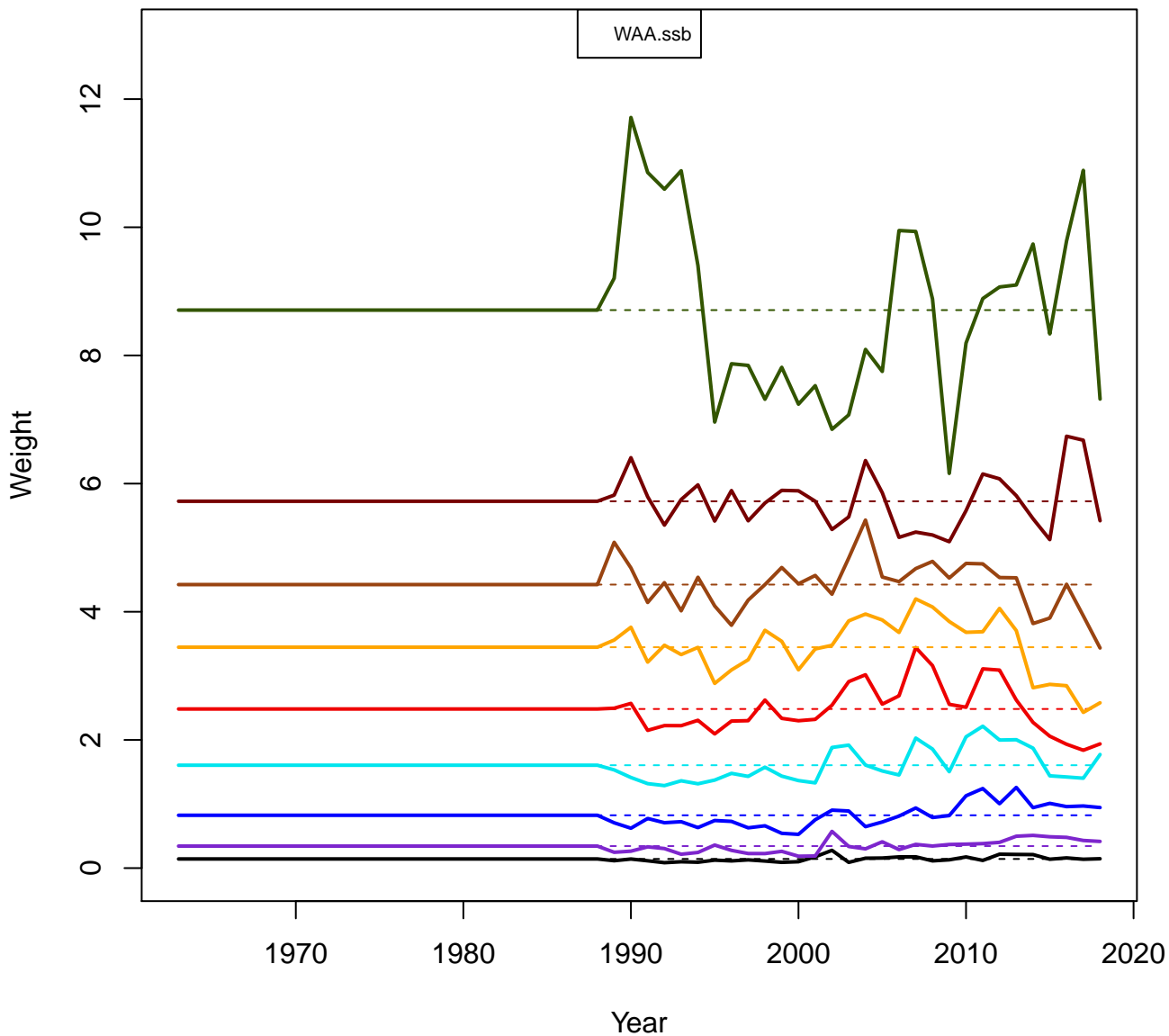
# Age Comps for Index 2 (INDEX-2)



# WAA matrix 1



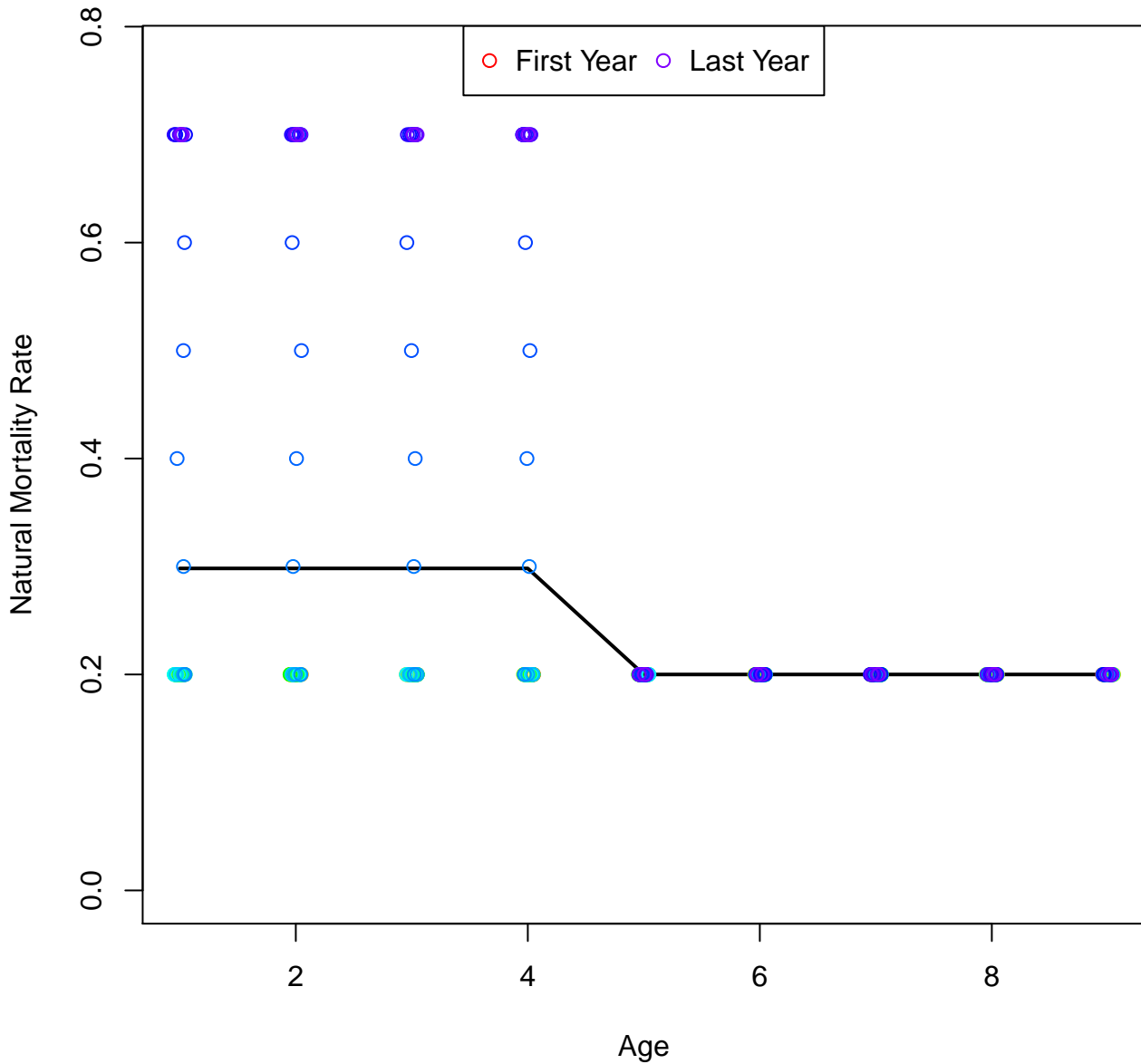
## WAA matrix 2



# WAA matrix 3



M



# Maturity

