

File = y2015r0c1m5s111100000\_000.dat

ASAP3 run on Monday, 04 Nov 2019 at 11:44:12

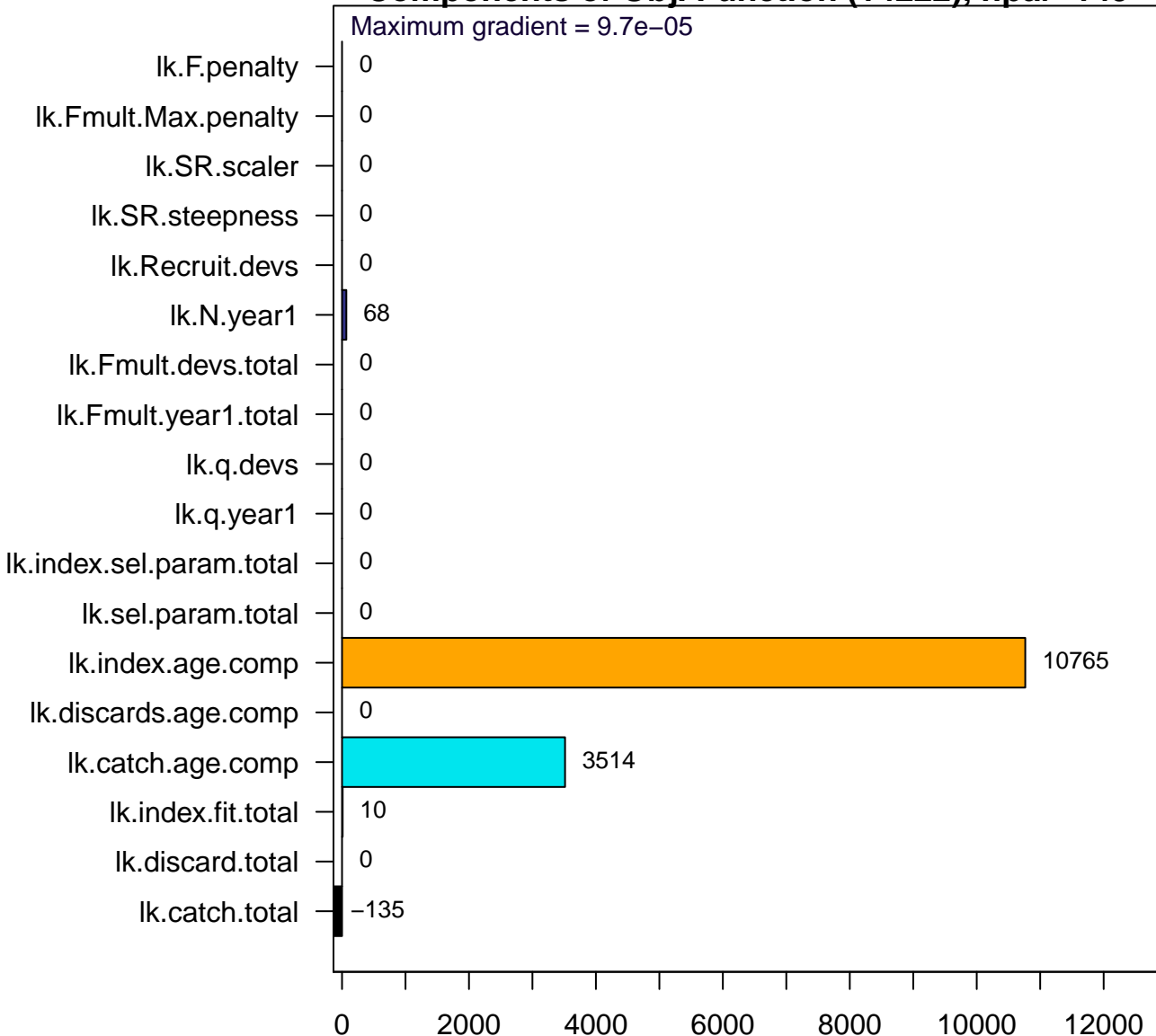
chris.legault\Documents\Working\ICES-WKFORBIAS 2019\WhiteHake\Rose\w

ASAPplots version = 0.2.14

npar = 149, maximum gradient =  $9.66776e-005$

# Components of Obj. Function (14222), npar=149

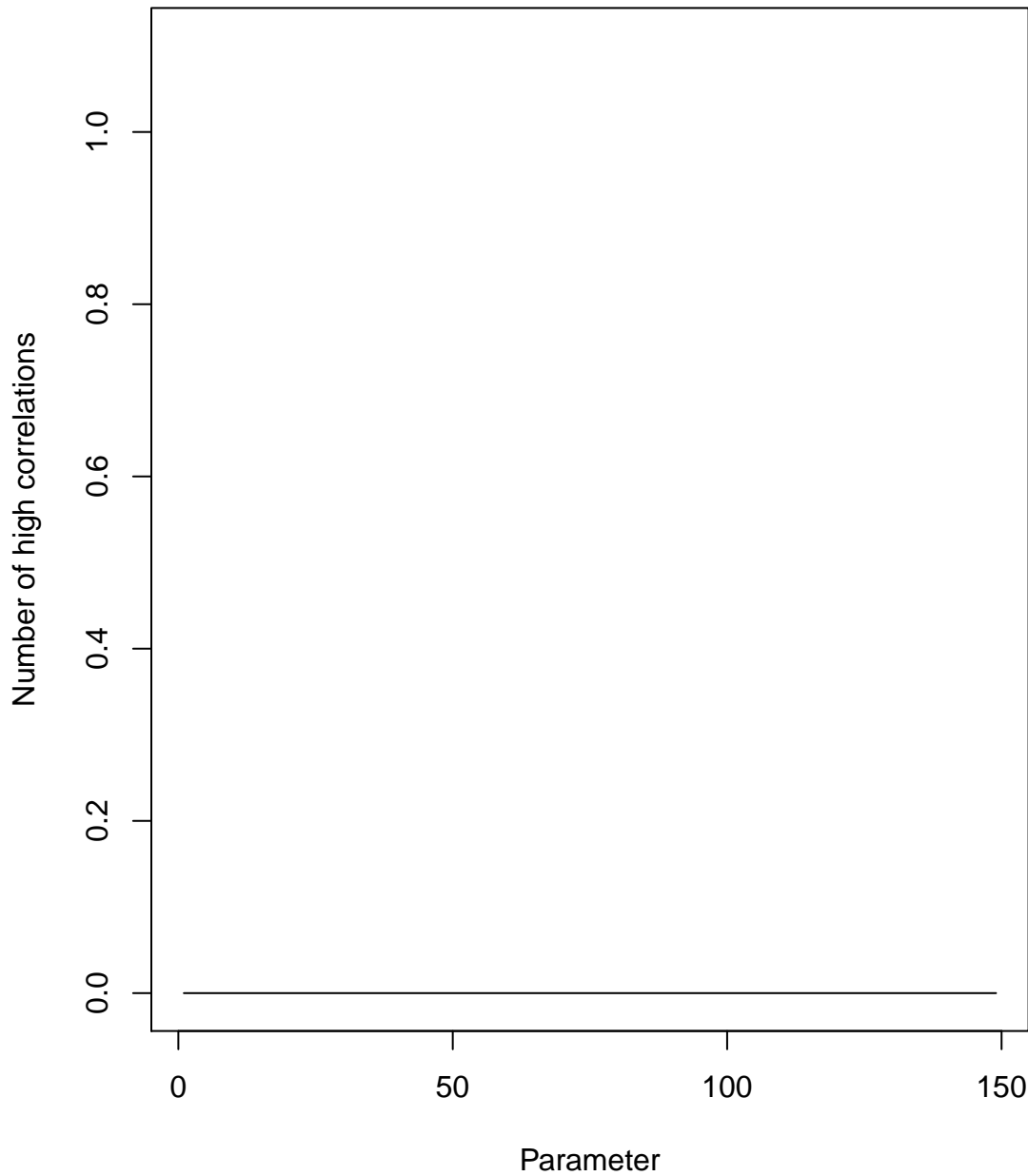
Maximum gradient =  $9.7\text{e-}05$

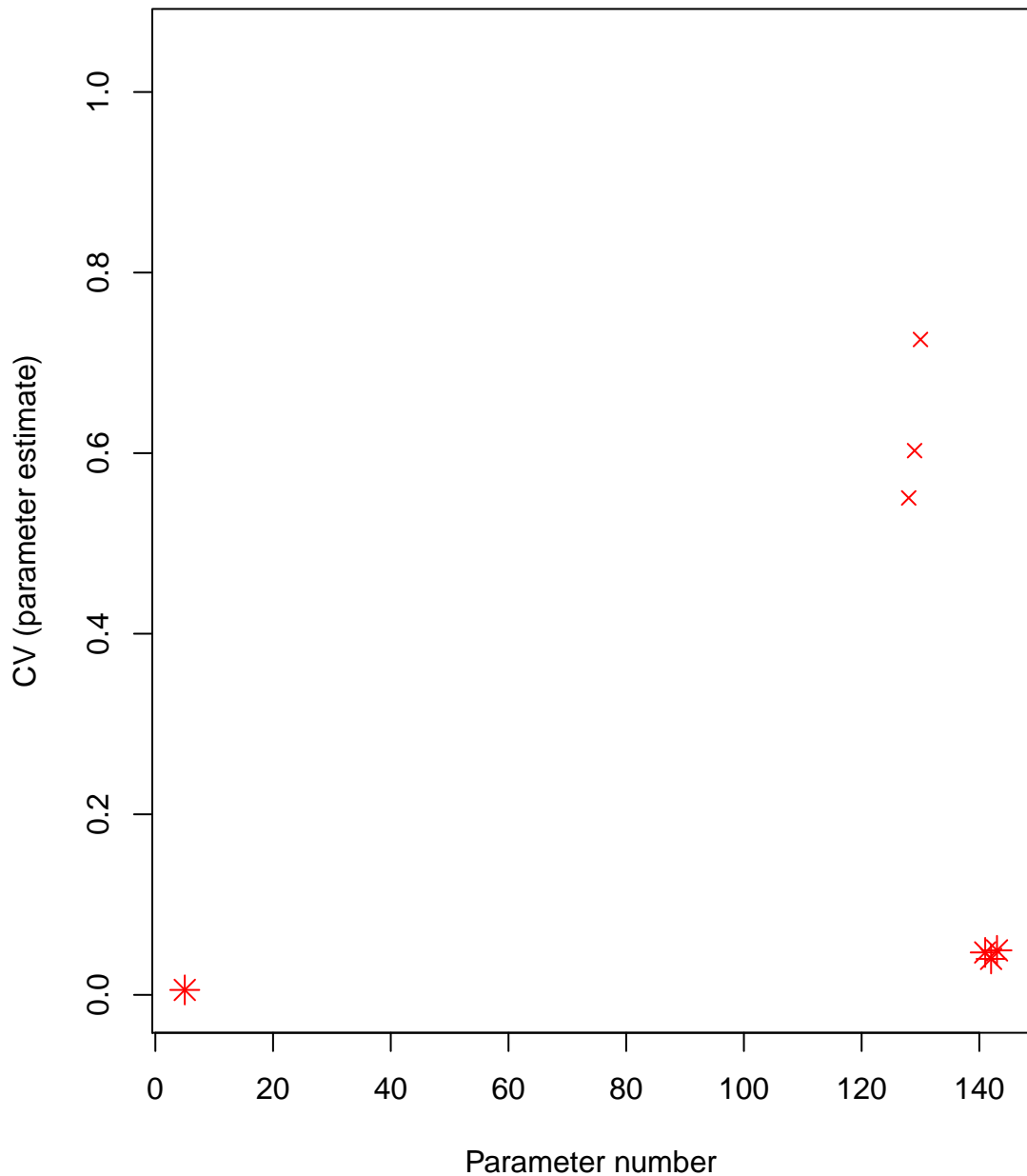


Likelihood Contribution

Model: y2015r0c1m5s111100000\_000

Monday, 04 Nov 2019 at 11:44:

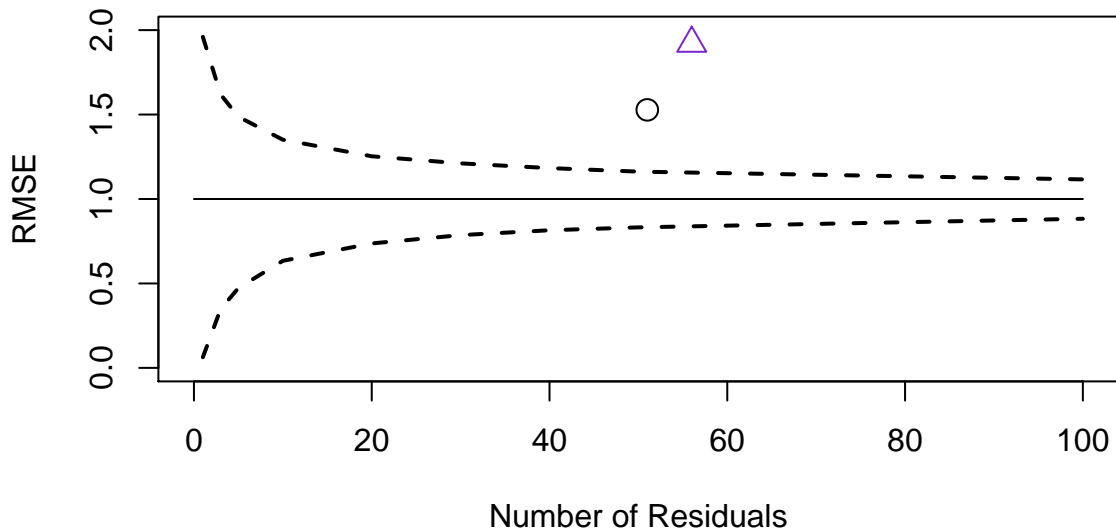




## Root Mean Square Error computed from Standardized Residuals

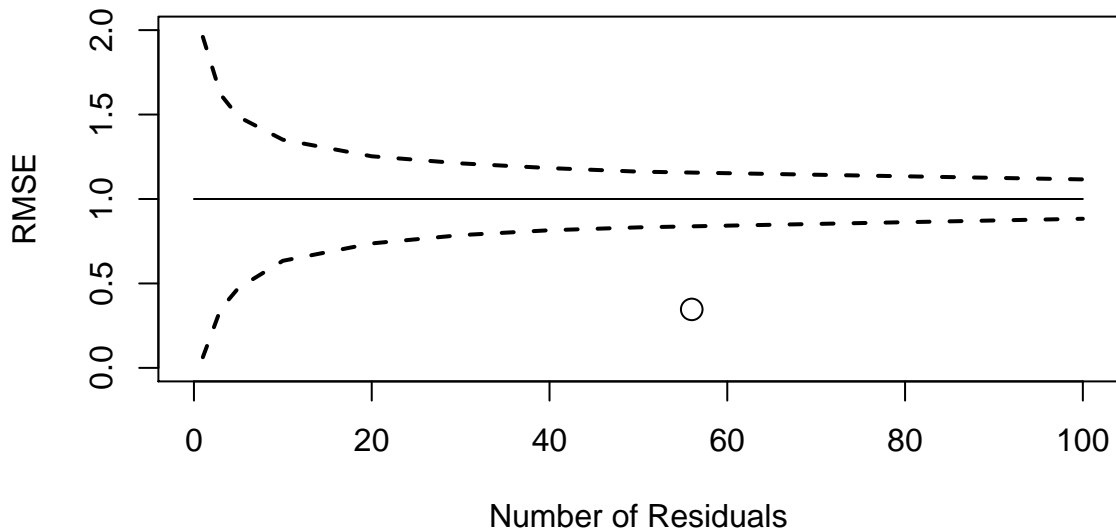
Component	# resids	RMSE
catch.tot	56	0.347
discard.tot	0	0
ind01	51	1.53
ind02	56	1.92
ind.total	107	1.74
N.year1	8	0.741
Fmult.year1	0	0
Fmult.devs.total	0	0
recruit.devs	0	0
fleet.sel.params	0	0
index.sel.params	0	0
q.year1	0	0
q.devs	0	0
SR.steepness	0	0
SR.scaler	0	0

Root Mean Square Error for Indices



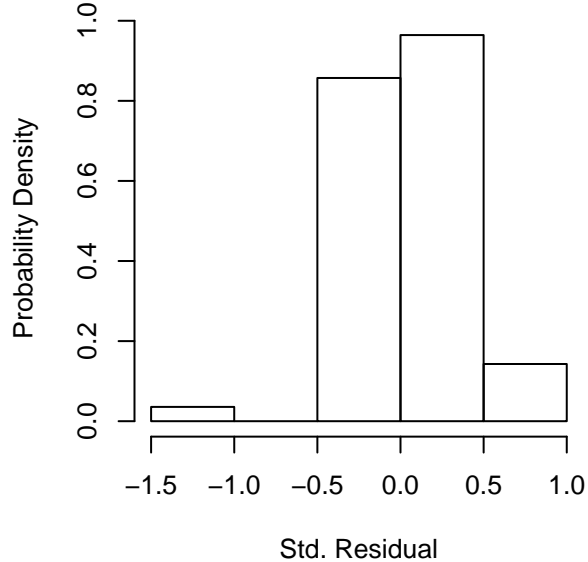
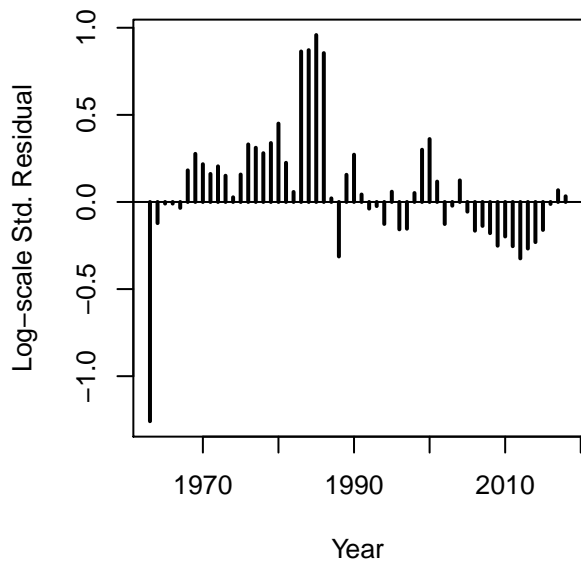
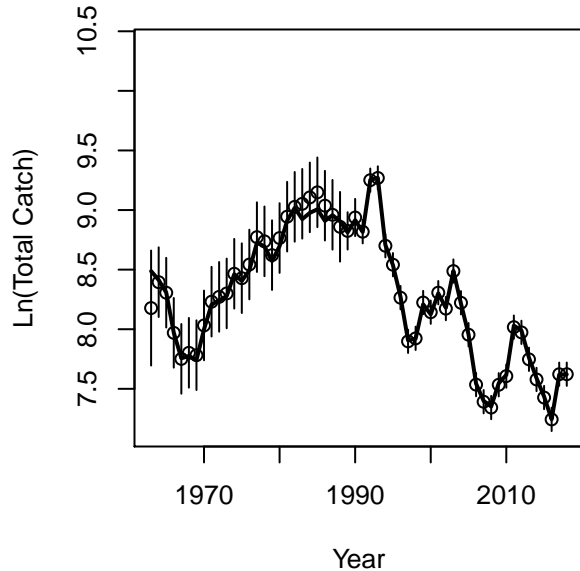
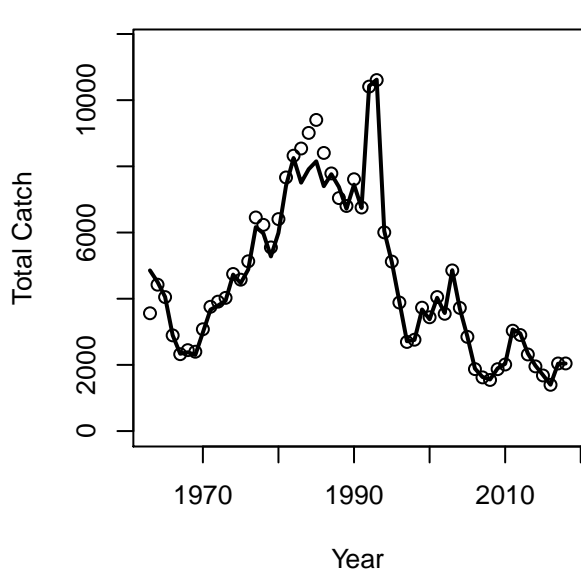
ind total  
INDEX-2  
INDEX-1

## Root Mean Square Error for Catch



○ catch.tot

# Fleet 1 Catch (FLEET-1)

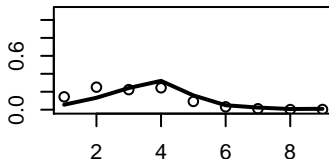




Catch

Year = 1993

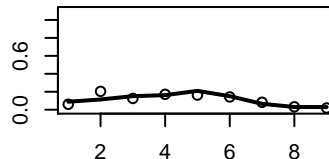
Proportion at Age



Age

Year = 1998

Proportion at Age



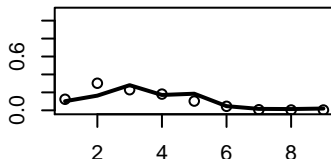
Age

Fleet 1  
FLEET-1



Year = 1989

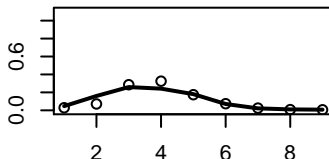
Proportion at Age



Age

Year = 1994

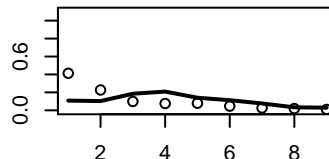
Proportion at Age



Age

Year = 1999

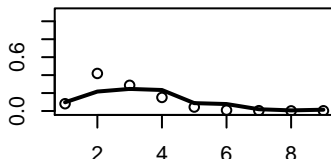
Proportion at Age



Age

Year = 1990

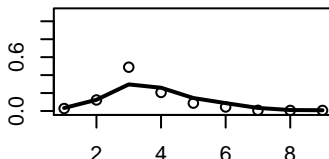
Proportion at Age



Age

Year = 1995

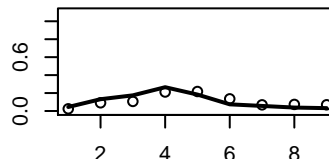
Proportion at Age



Age

Year = 2000

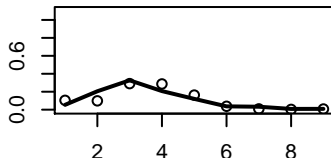
Proportion at Age



Age

Year = 1991

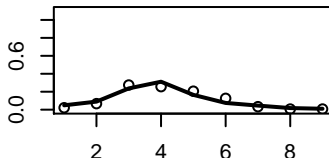
Proportion at Age



Age

Year = 1996

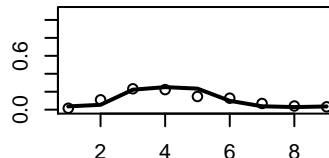
Proportion at Age



Age

Year = 2001

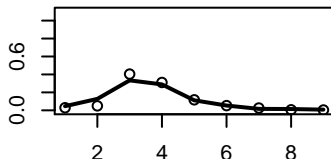
Proportion at Age



Age

Year = 1992

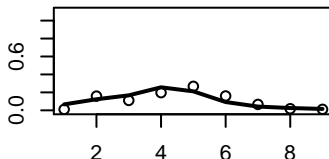
Proportion at Age



Age

Year = 1997

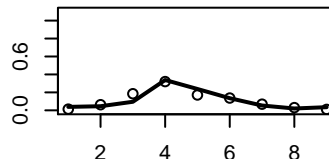
Proportion at Age



Age

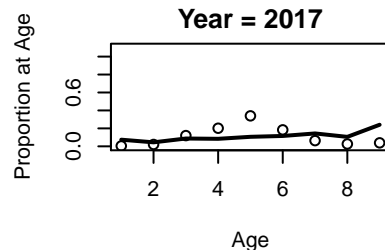
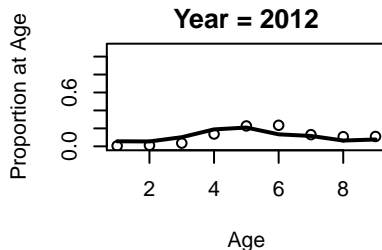
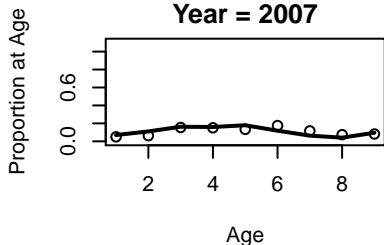
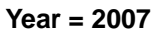
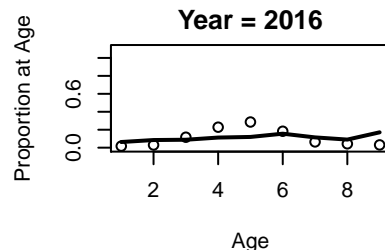
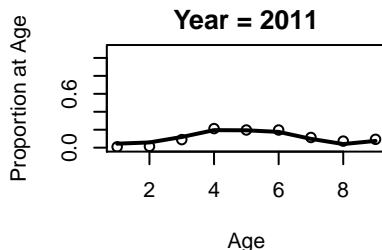
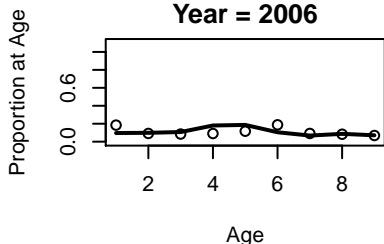
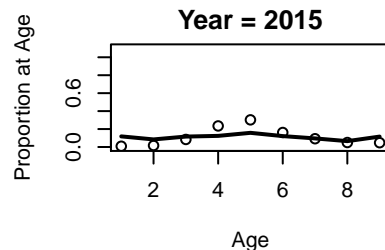
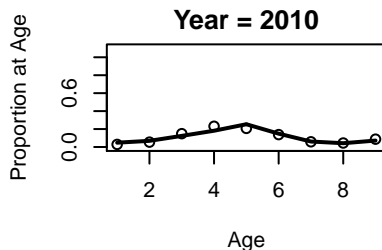
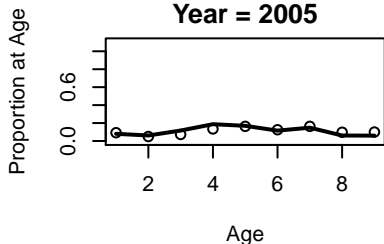
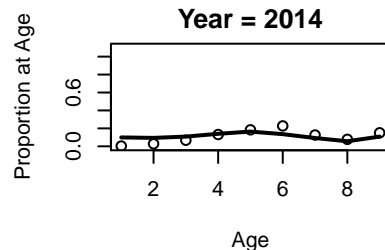
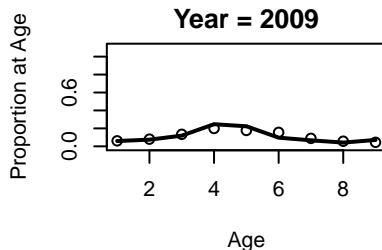
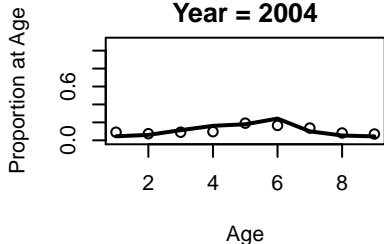
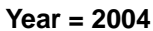
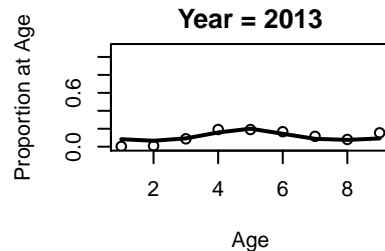
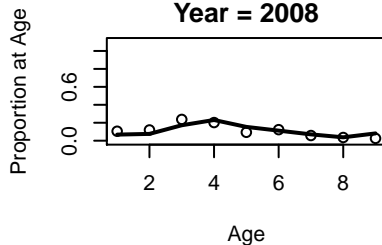
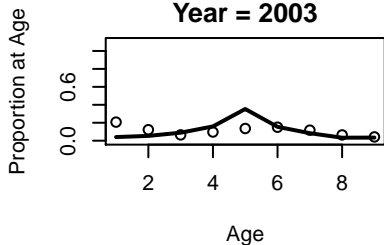
Year = 2002

Proportion at Age



Age

**Year = 2008**



Year = 2018

Proportion at Age

0.0 0.6

2

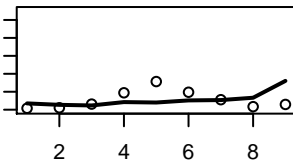
4

6

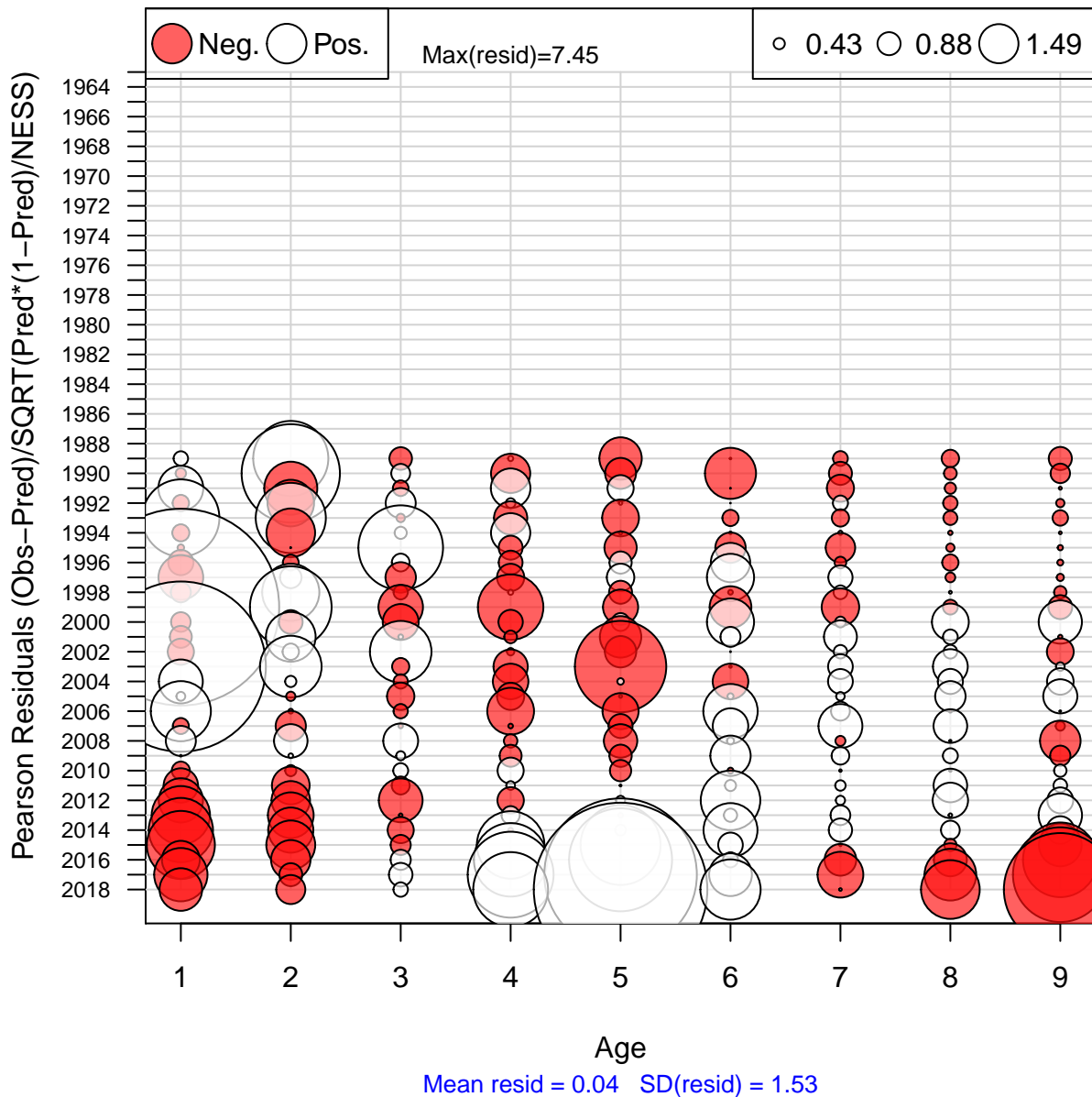
8

Age

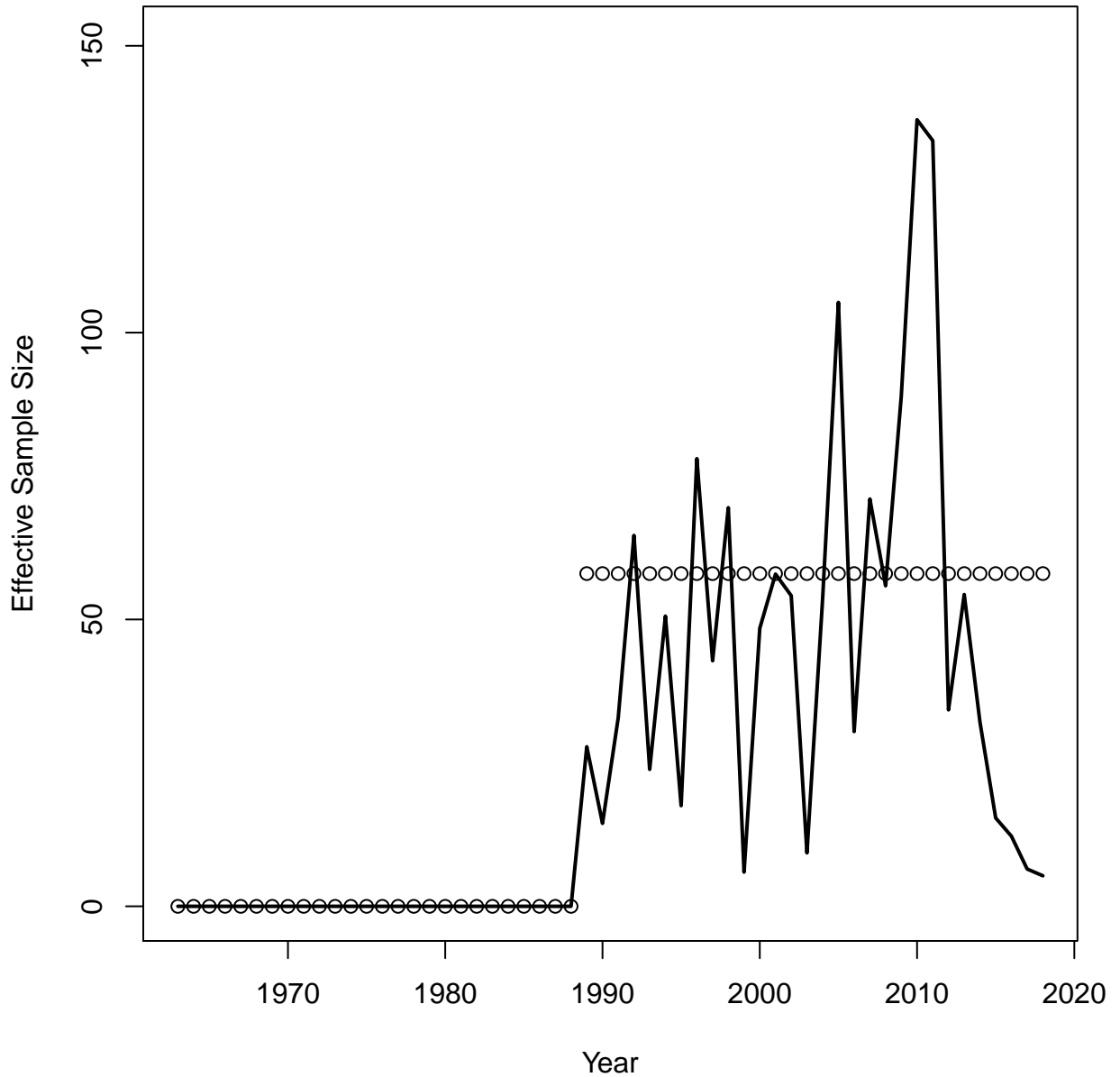
Catch



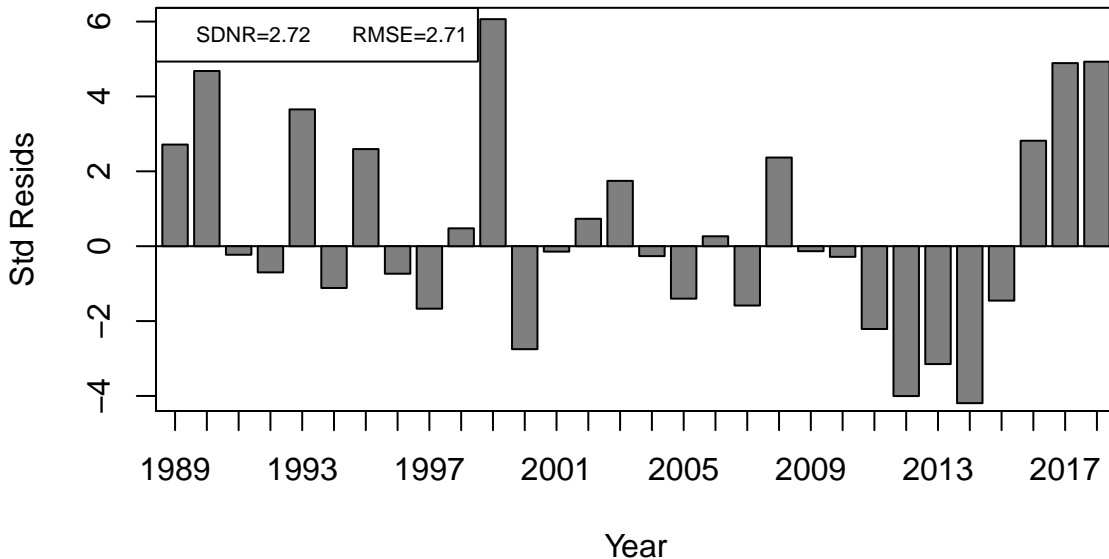
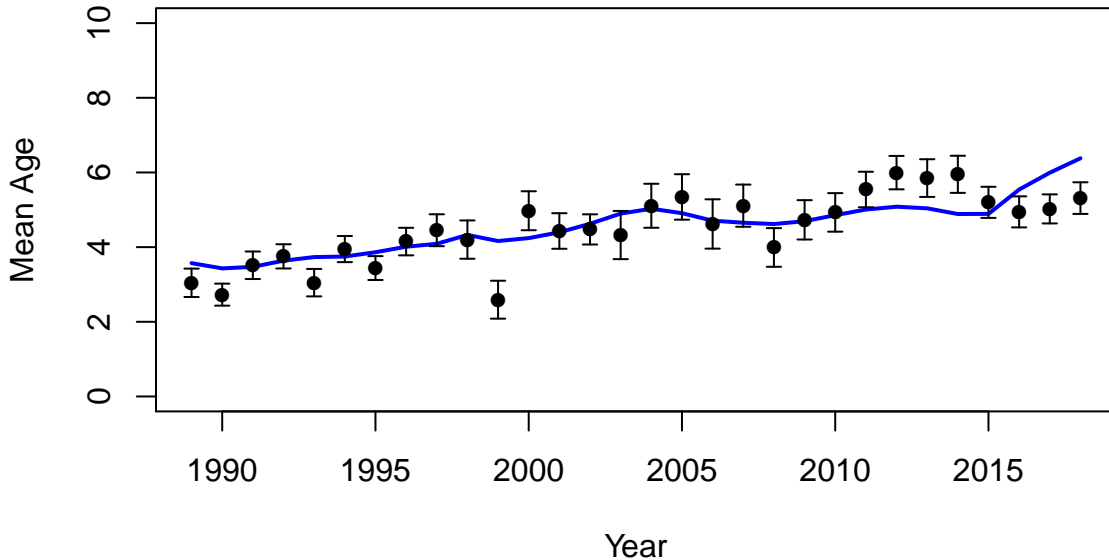
# Age Comp Residuals for Catch by Fleet 1 (FLEET-1)



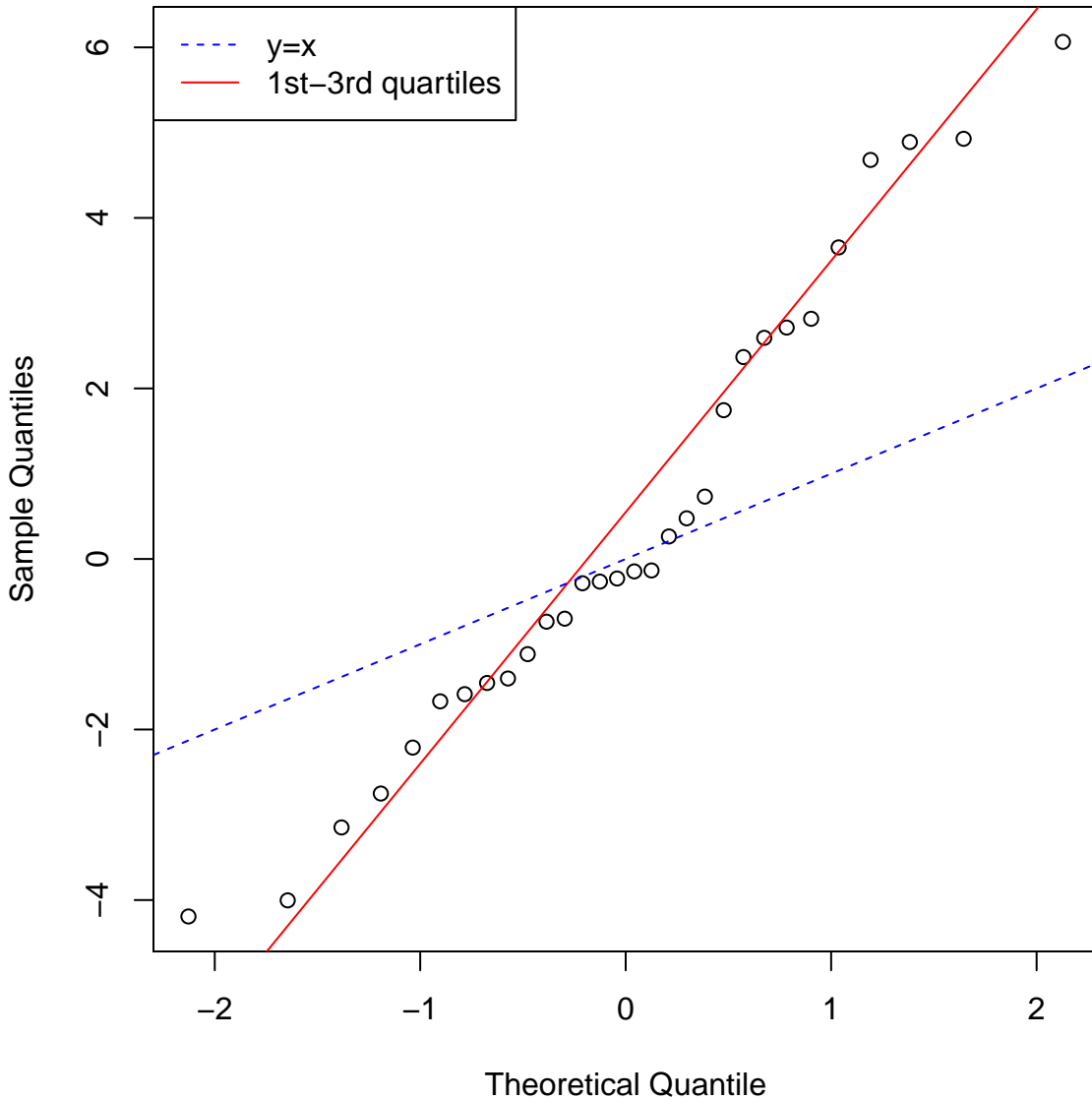
# Catch Neff Fleet 1 (FLEET-1)



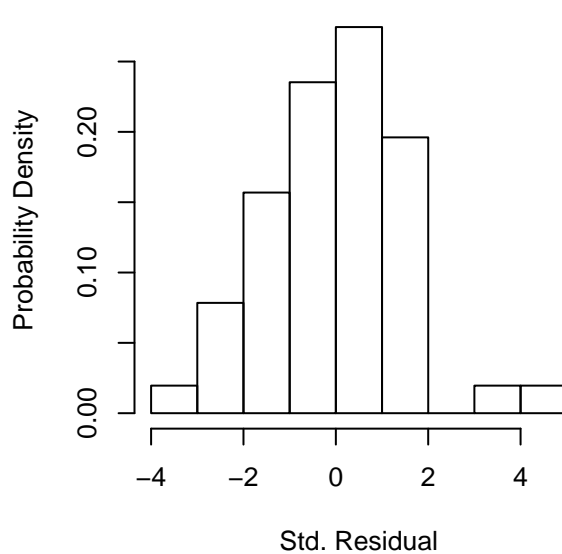
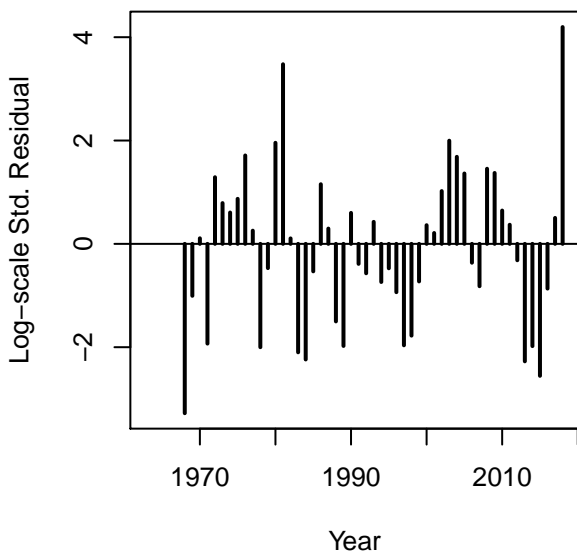
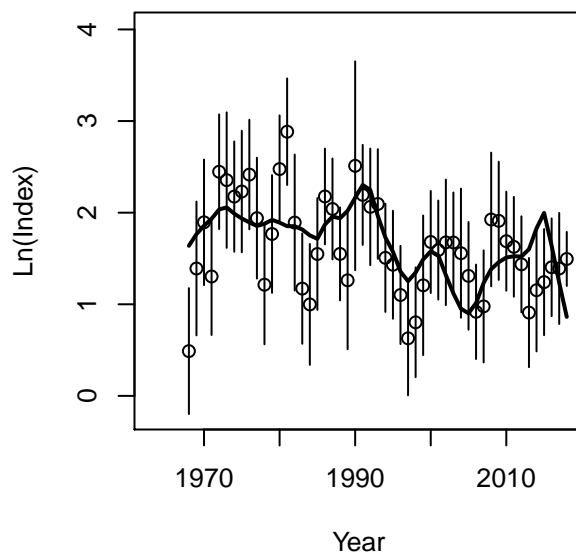
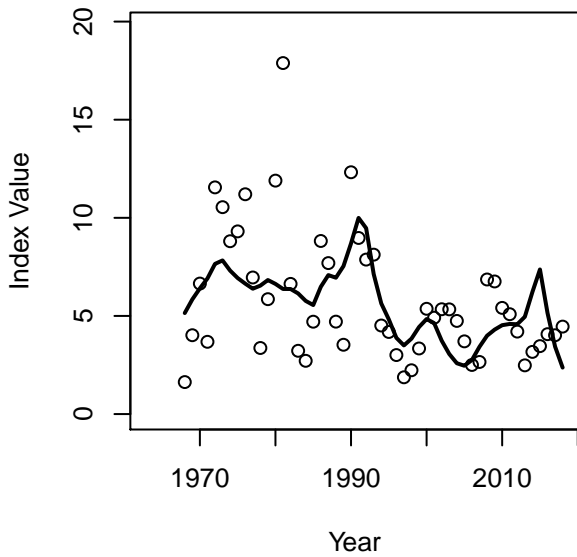
### Catch Fleet 1 (FLEET-1) ESS = 58



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

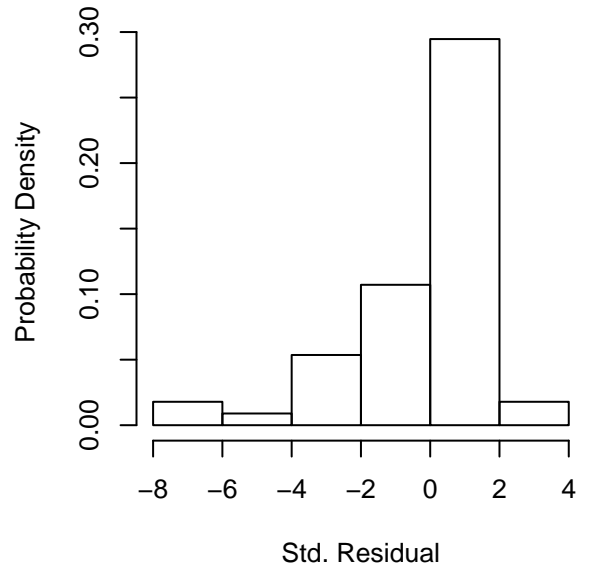
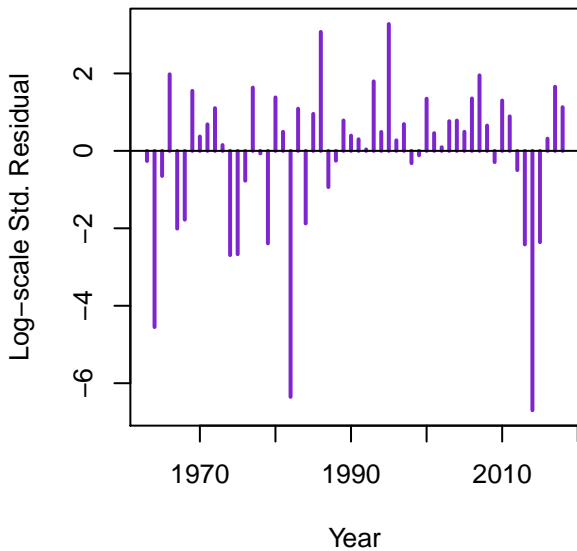
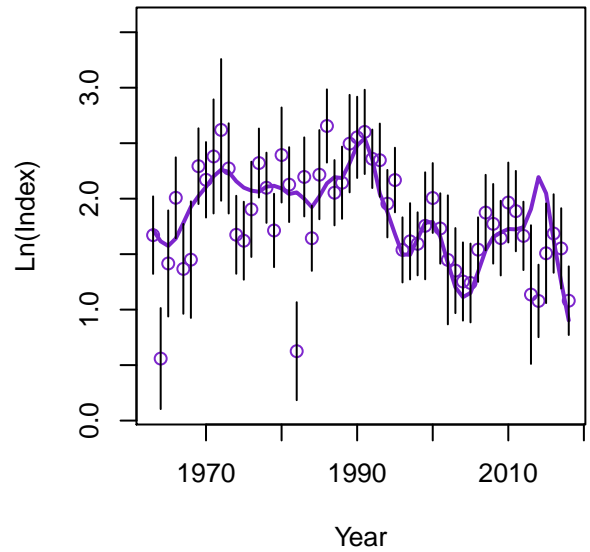
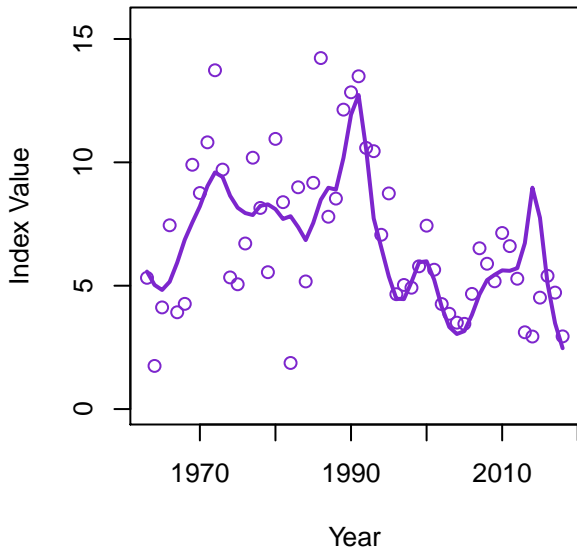


Index 1 (INDEX-1)

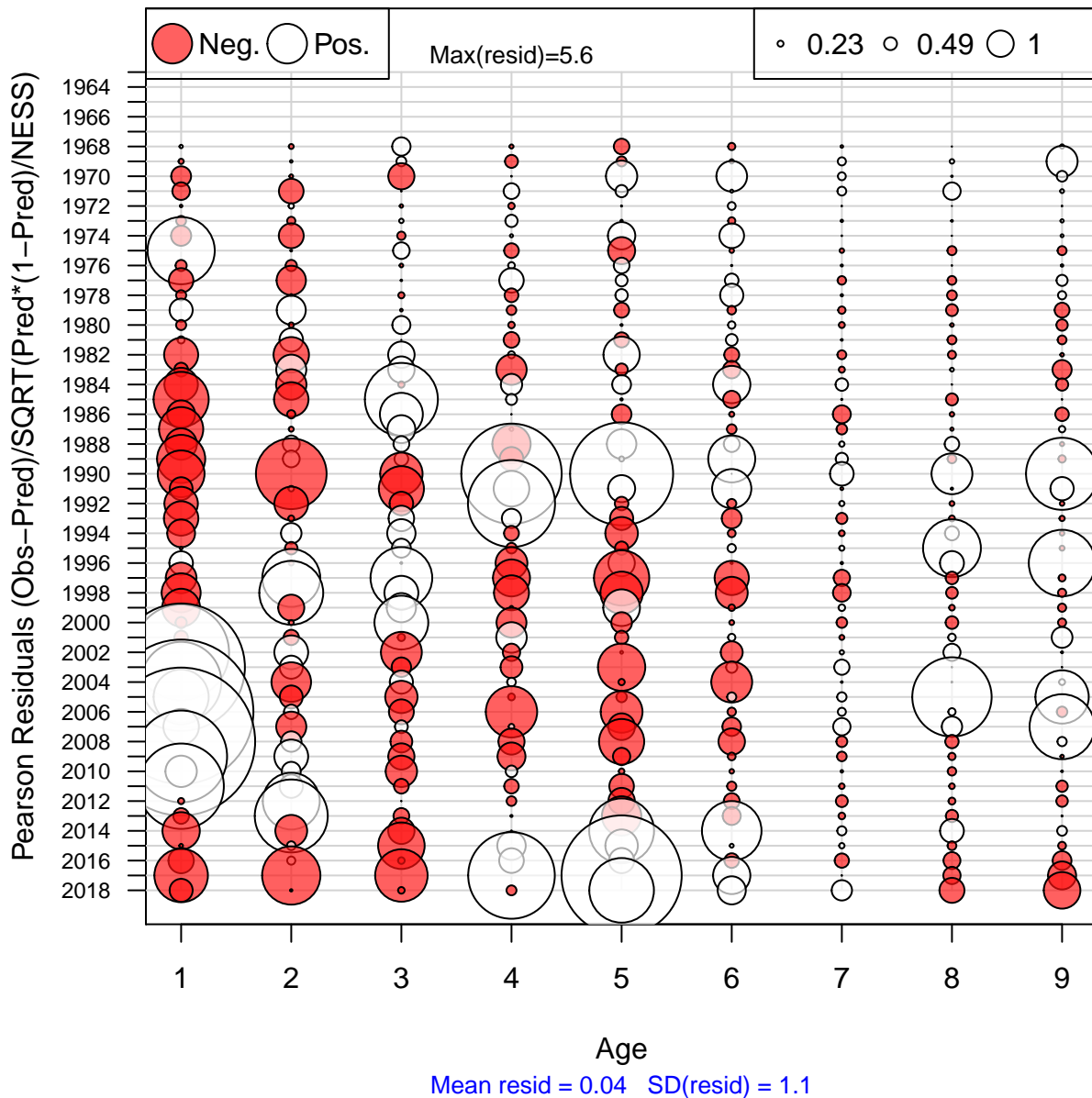




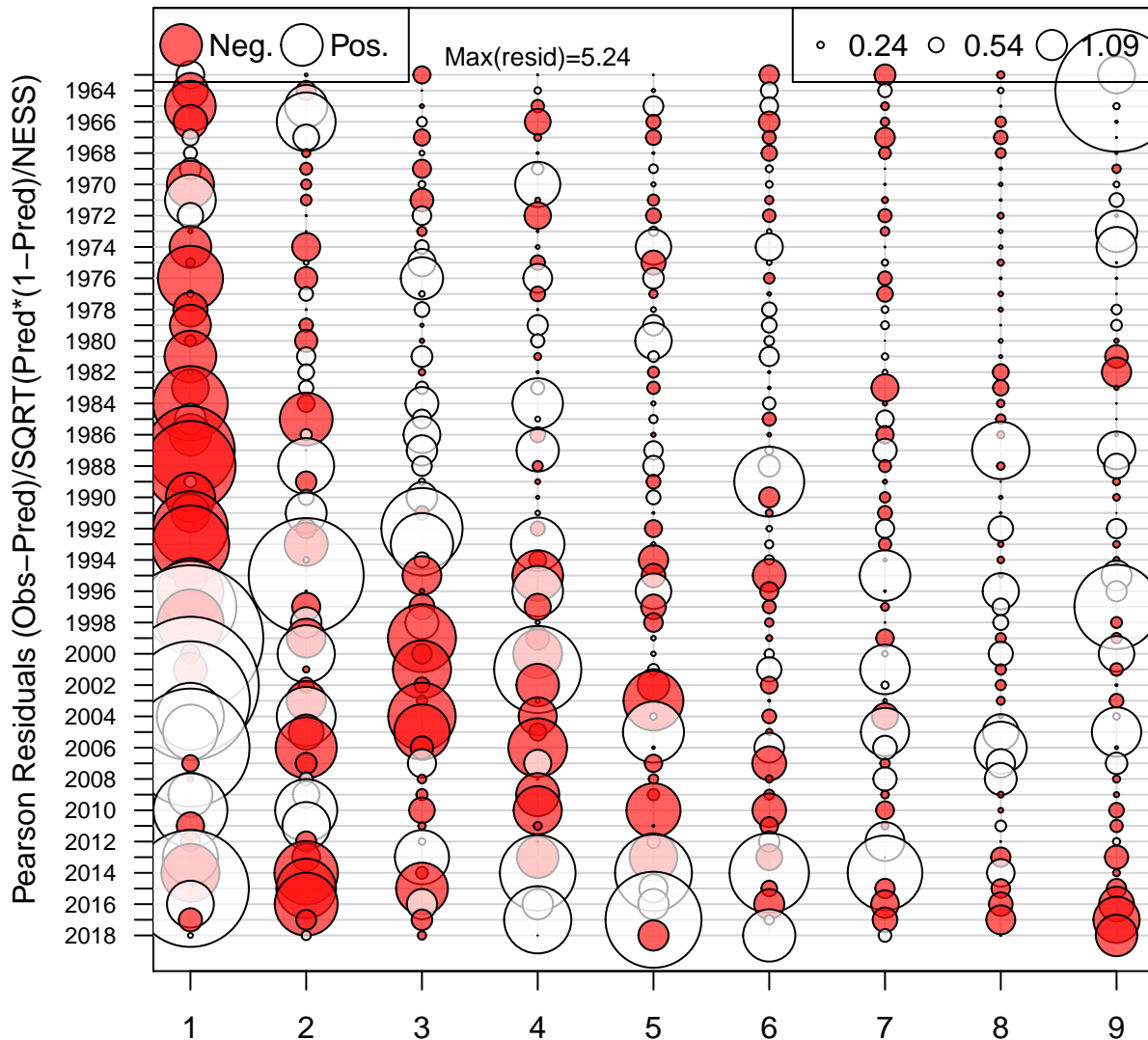
## Index 2 (INDEX-2)



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



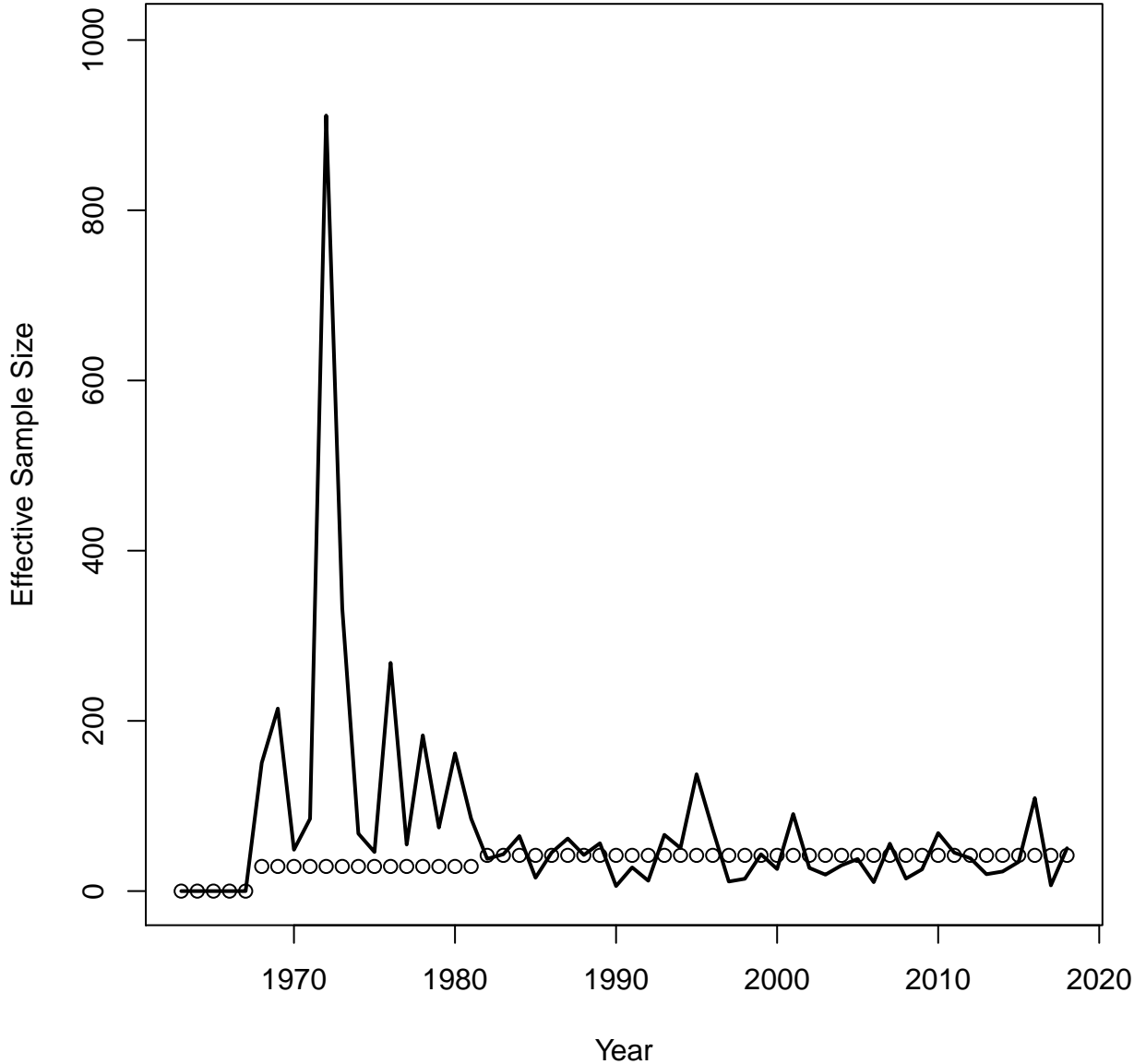
# Age Comp Residuals for Index 2 (INDEX-2)



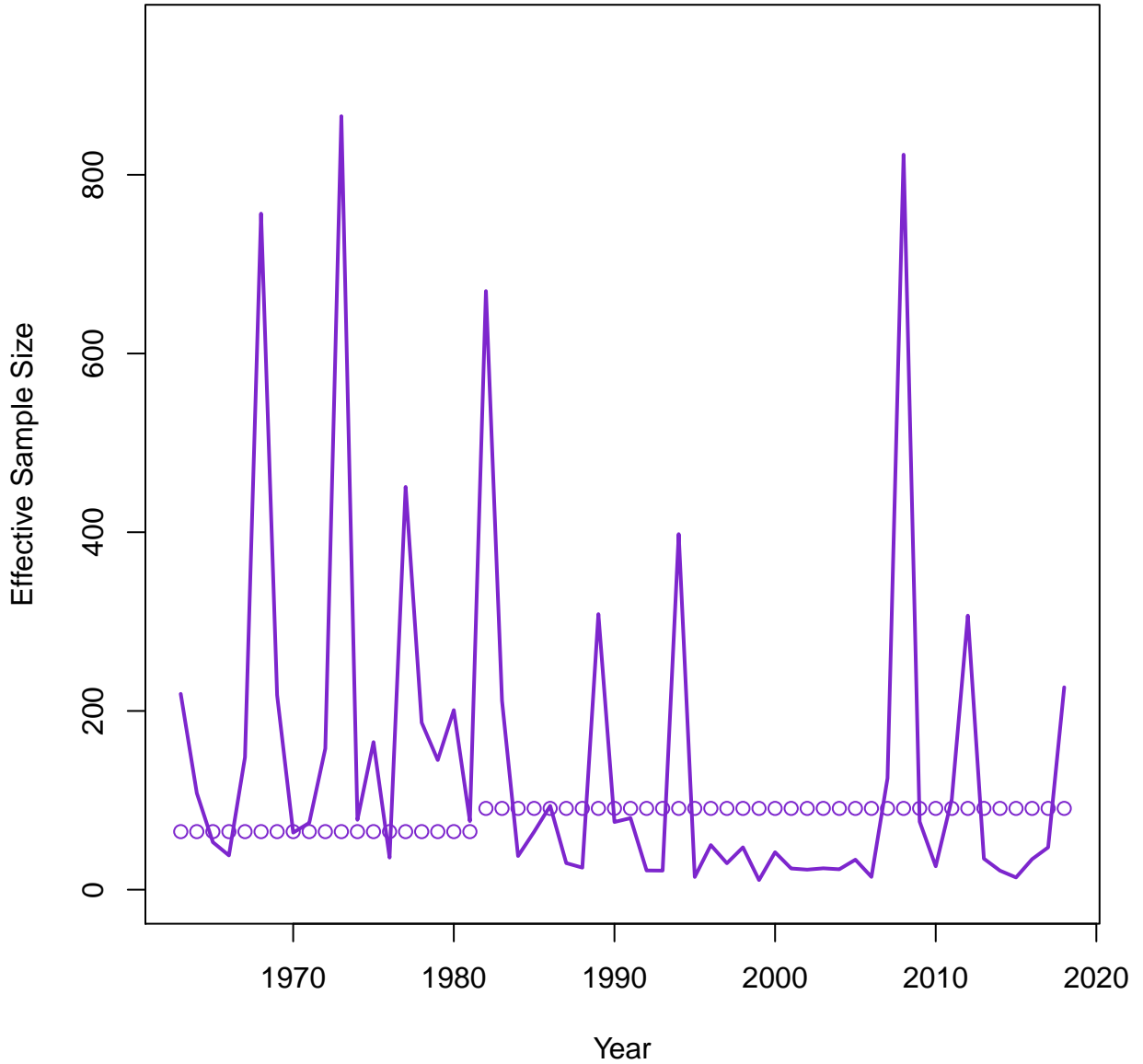
Age

Mean resid = 0.04 SD(resid) = 1.16

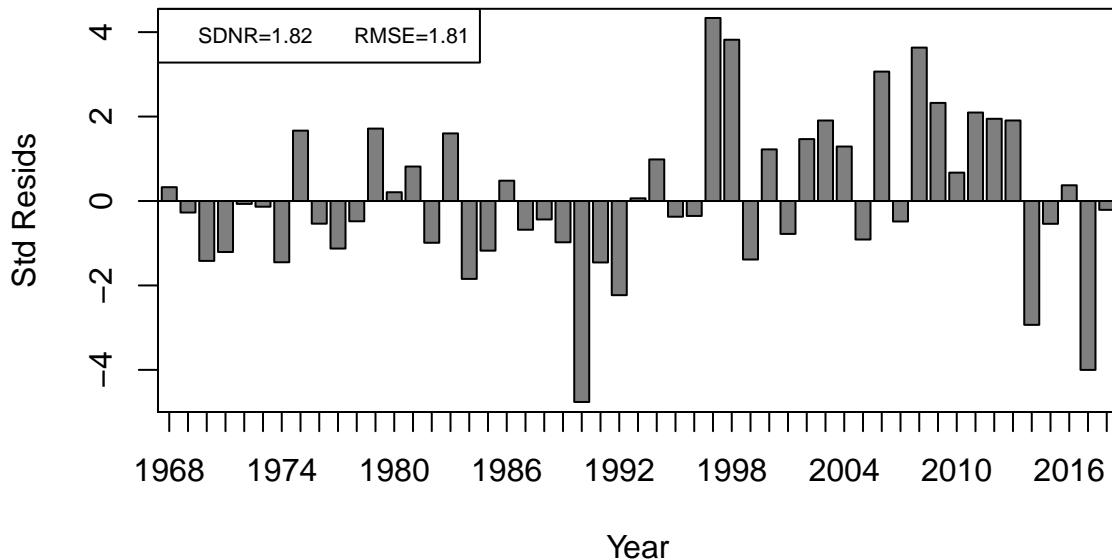
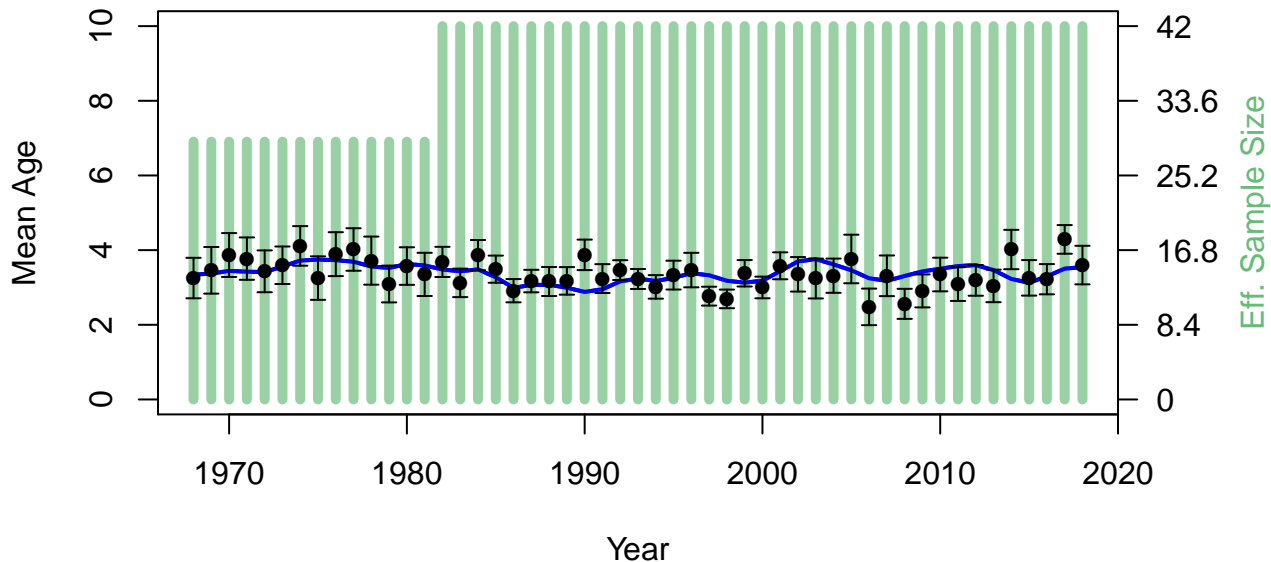
# Index Neff 1 (INDEX-1)



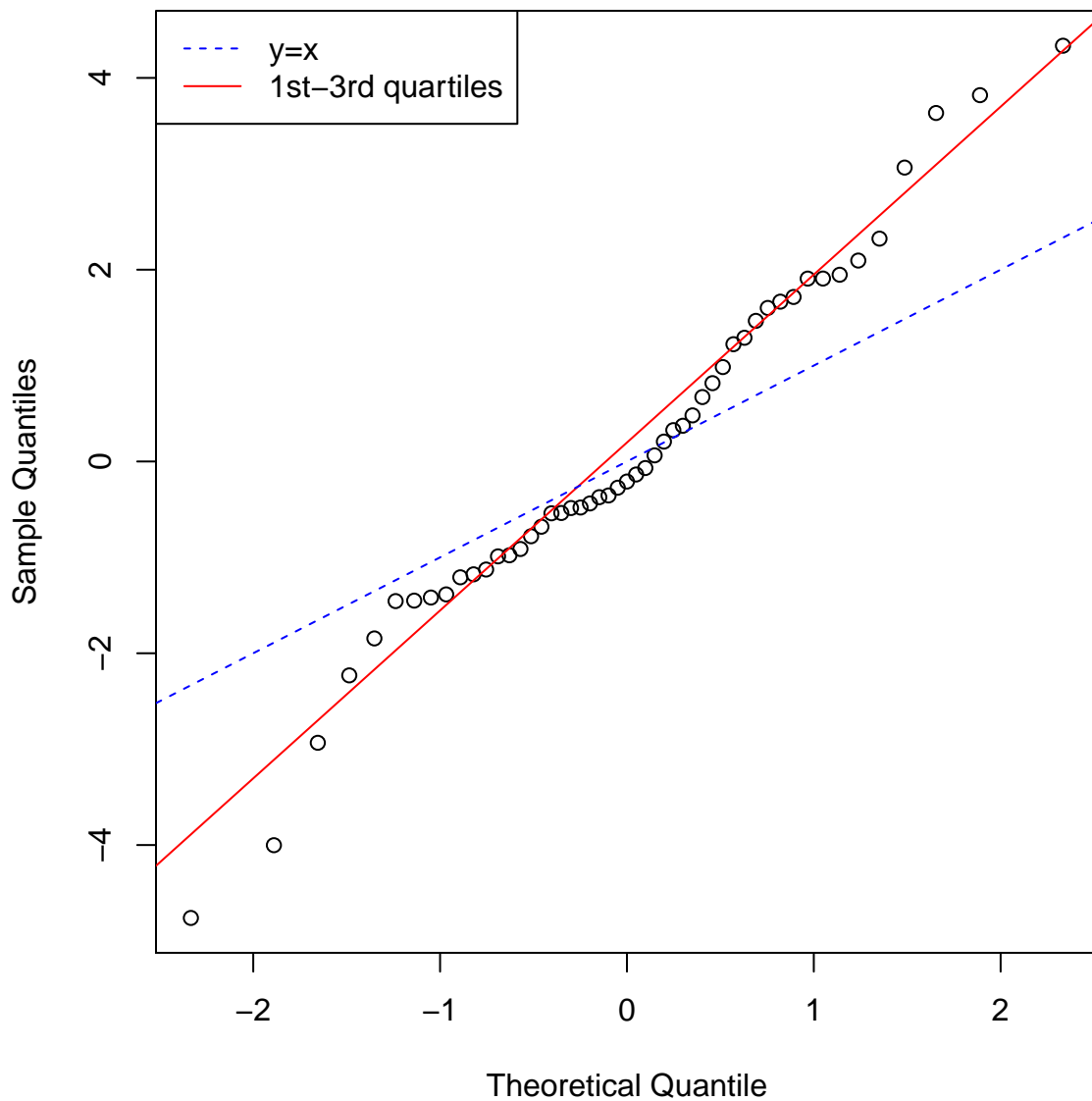
## Index Neff 2 (INDEX-2)



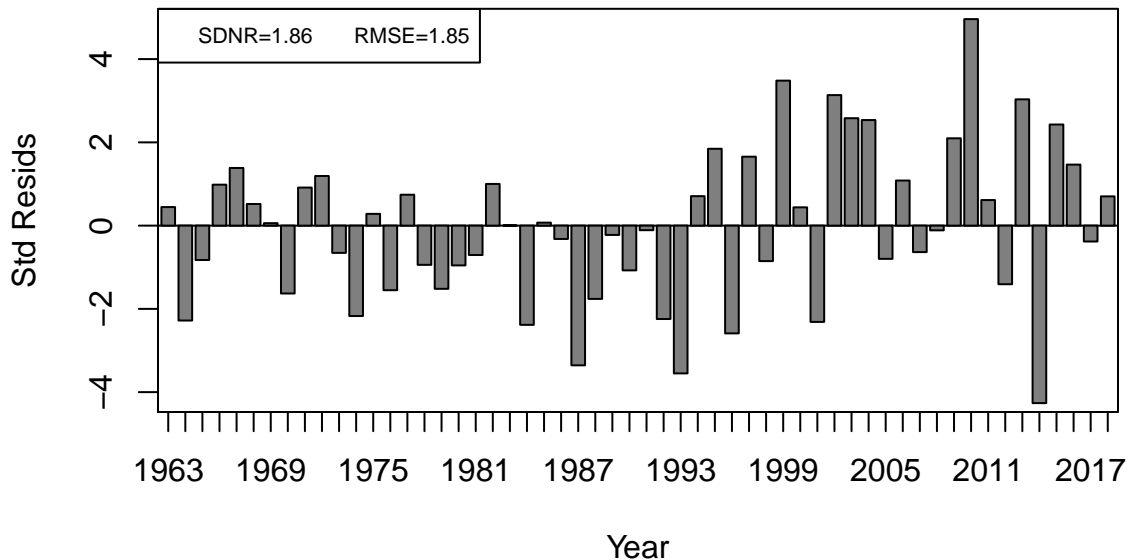
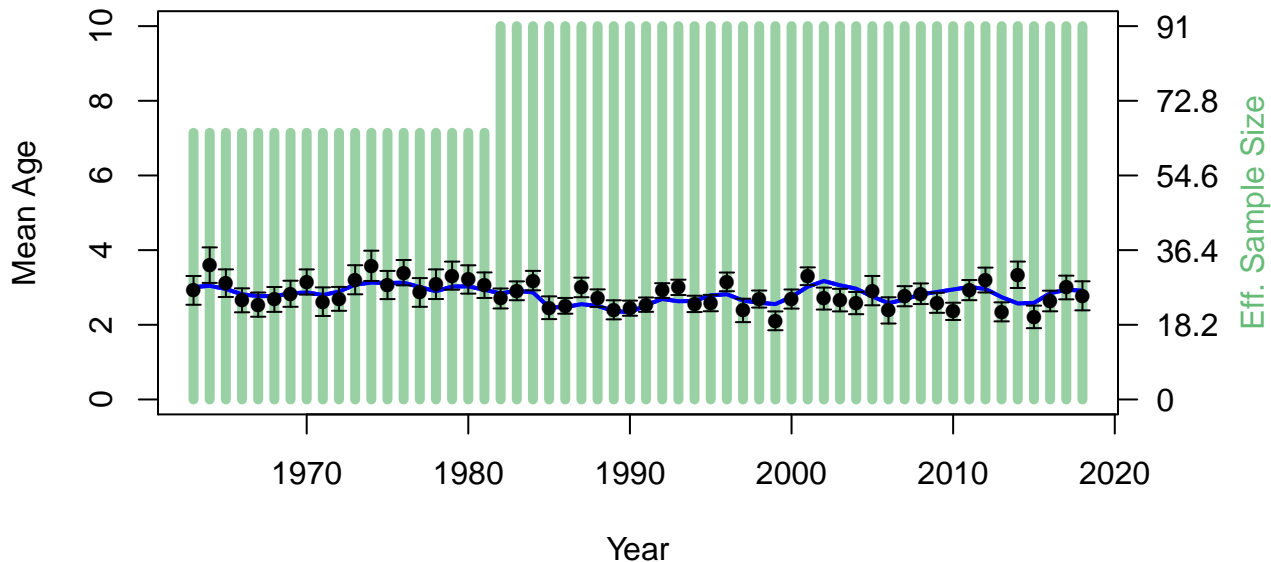
# Index 1 (INDEX-1)



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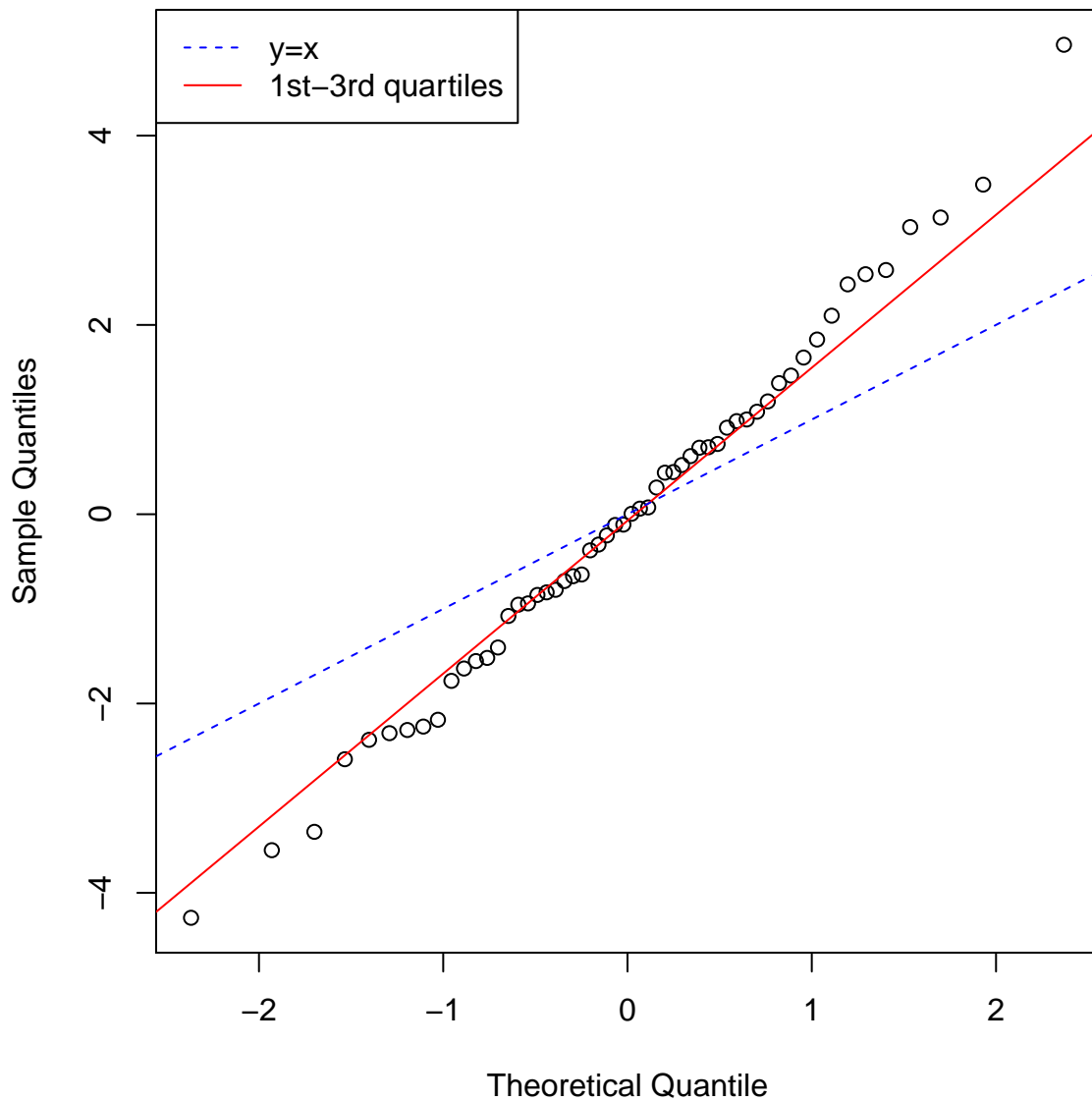


## Index 2 (INDEX-2)

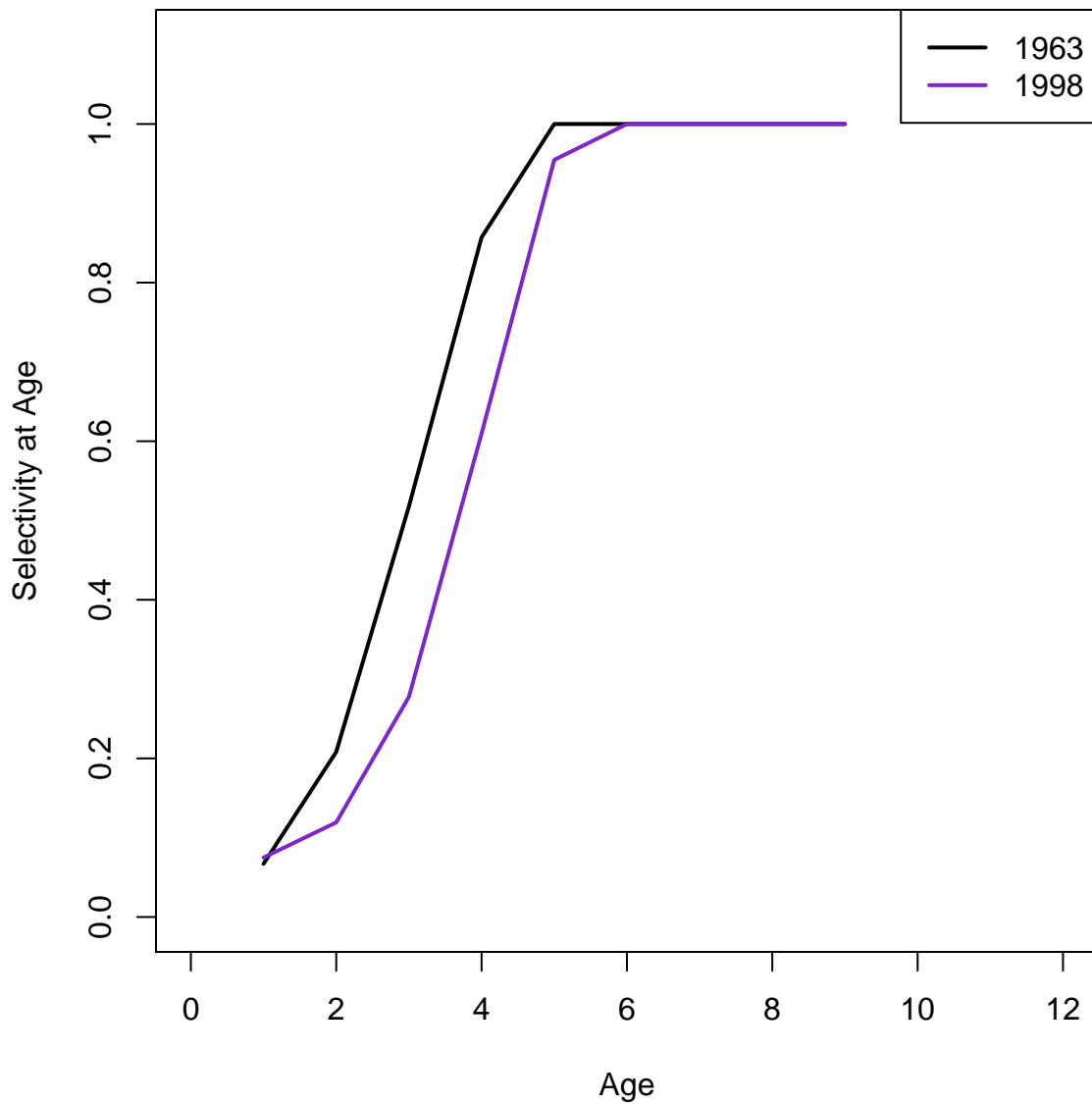


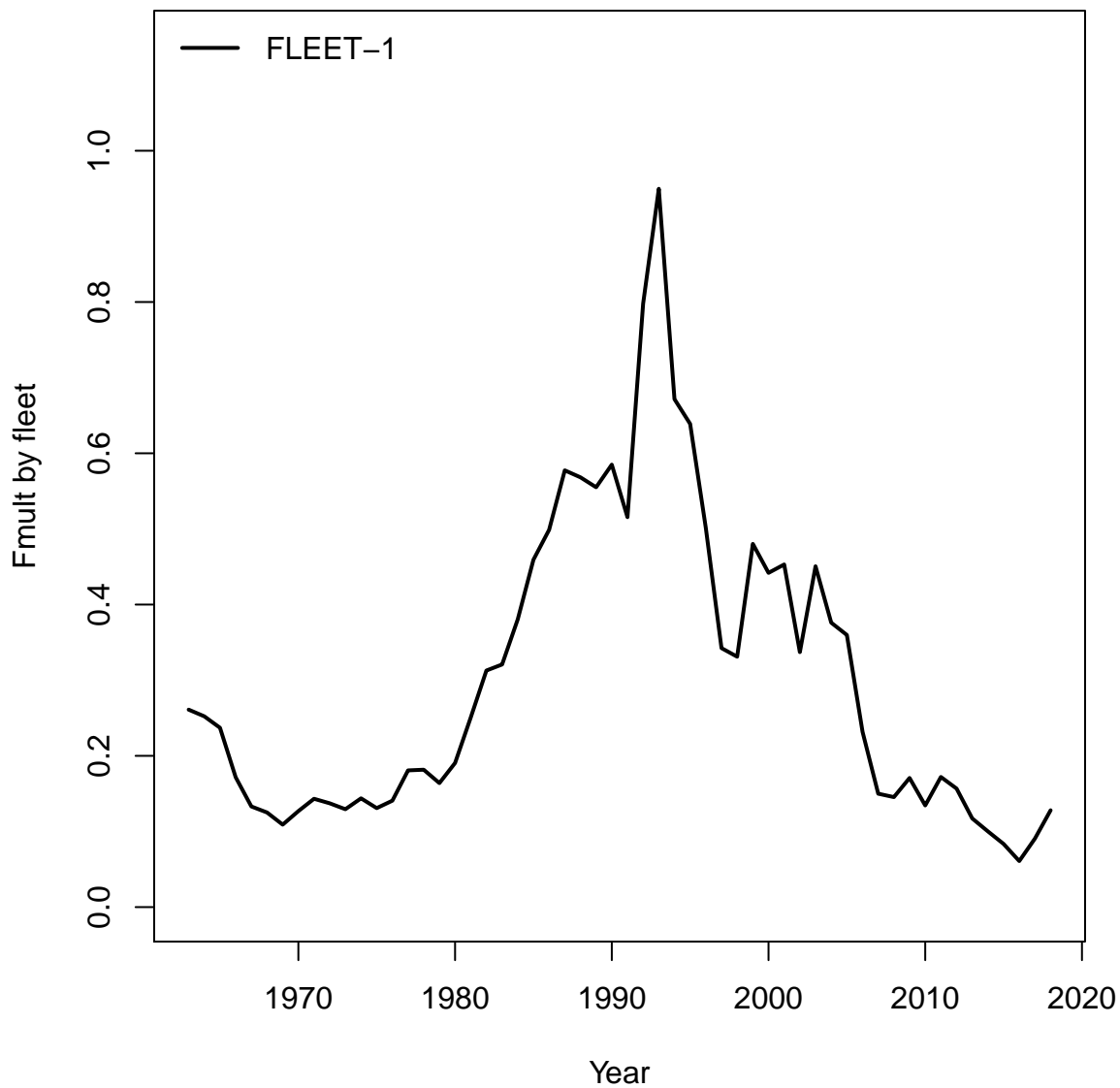


## Index 2 (INDEX-2)

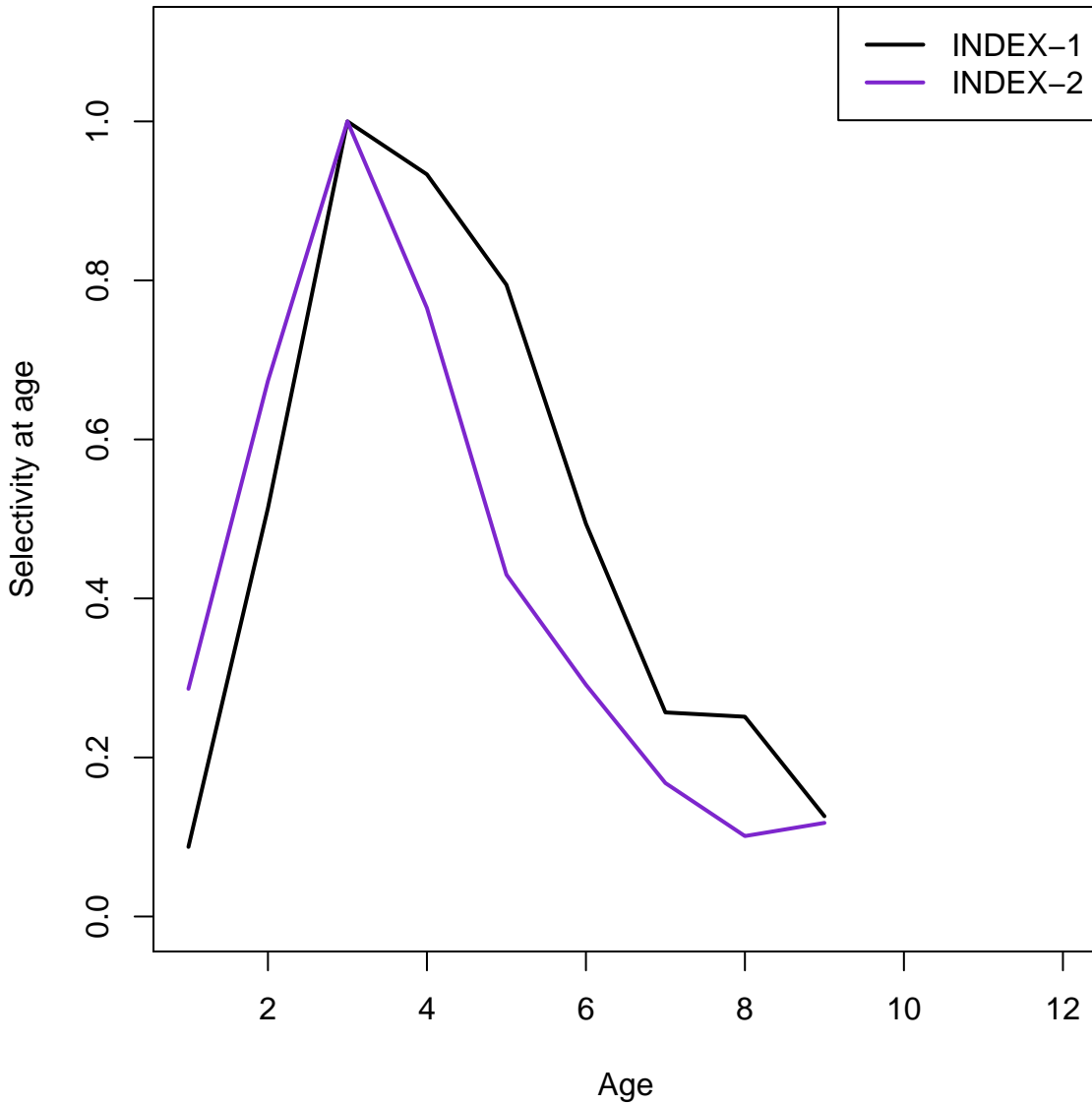


# Fleet 1 (FLEET-1)

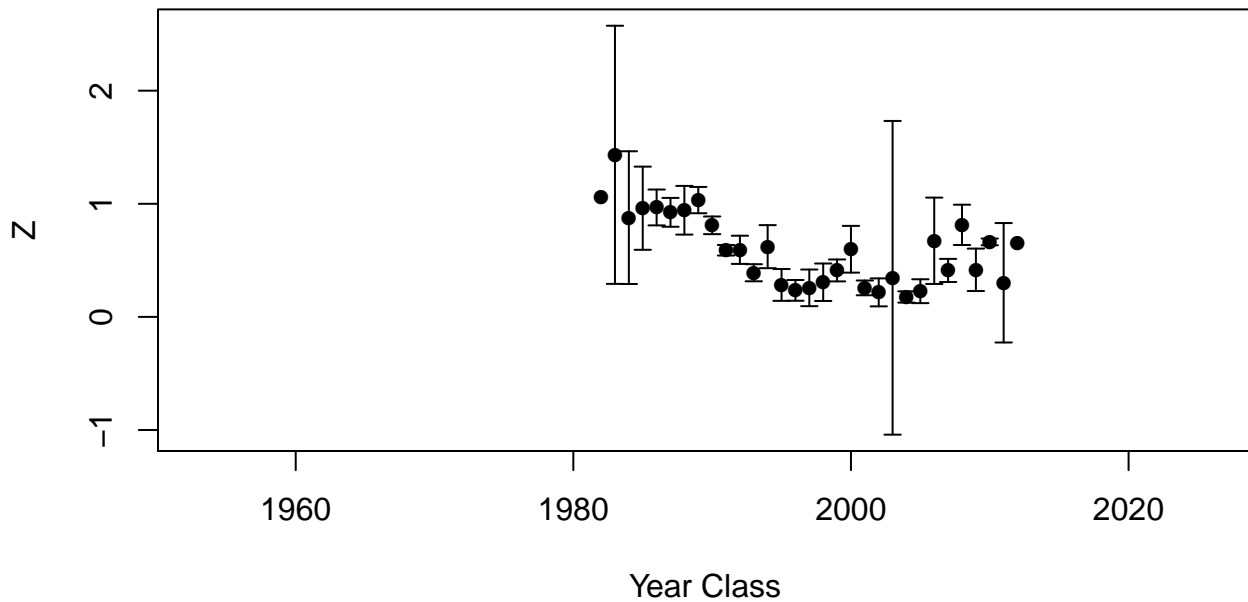
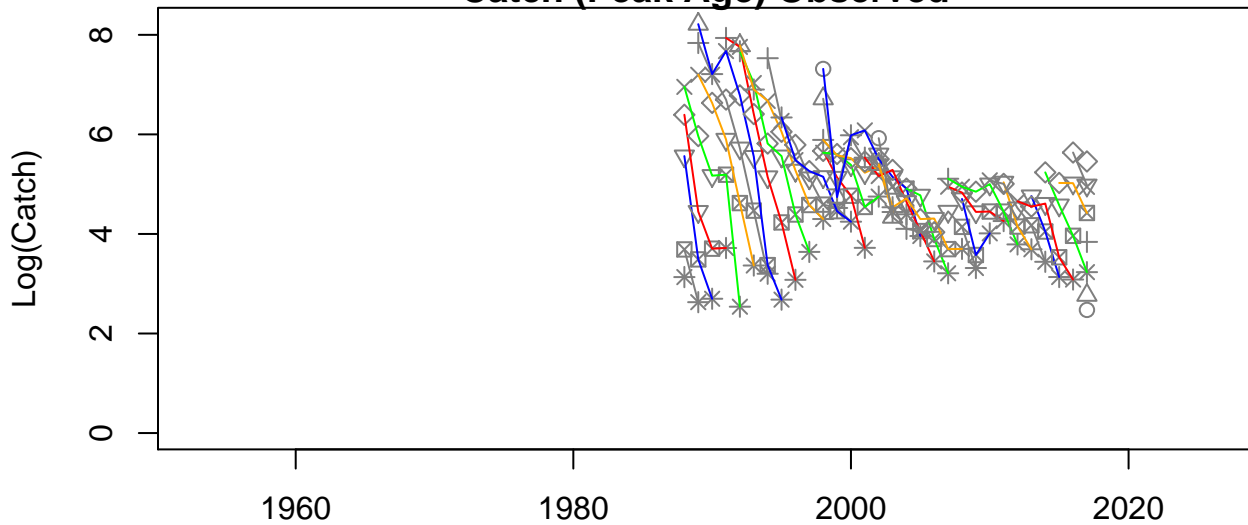




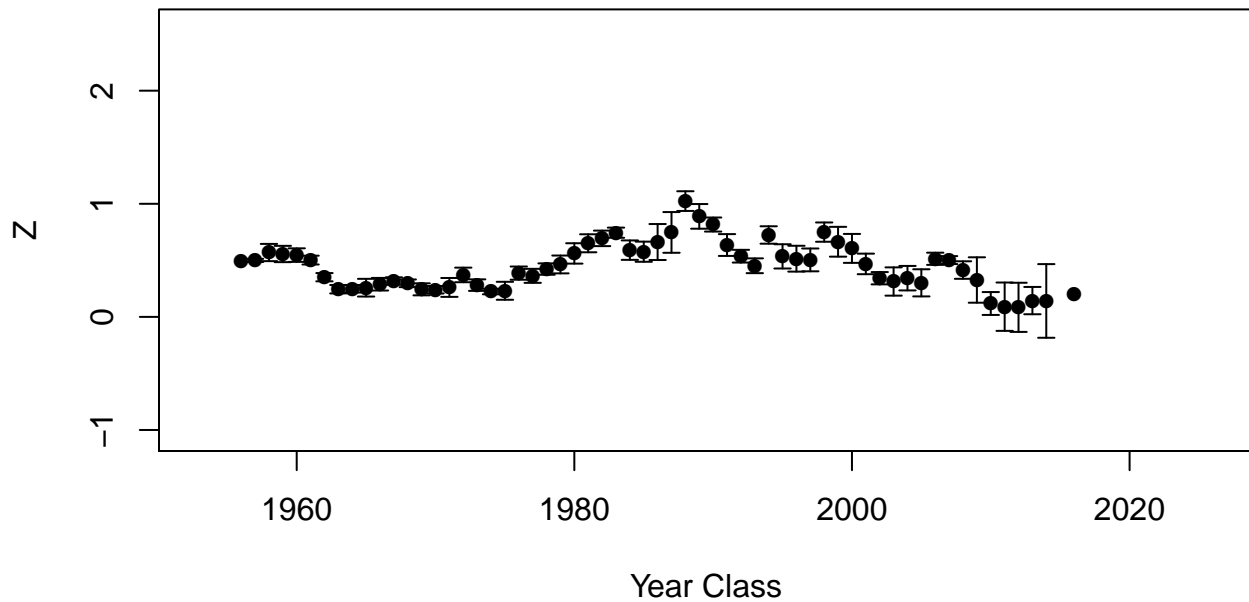
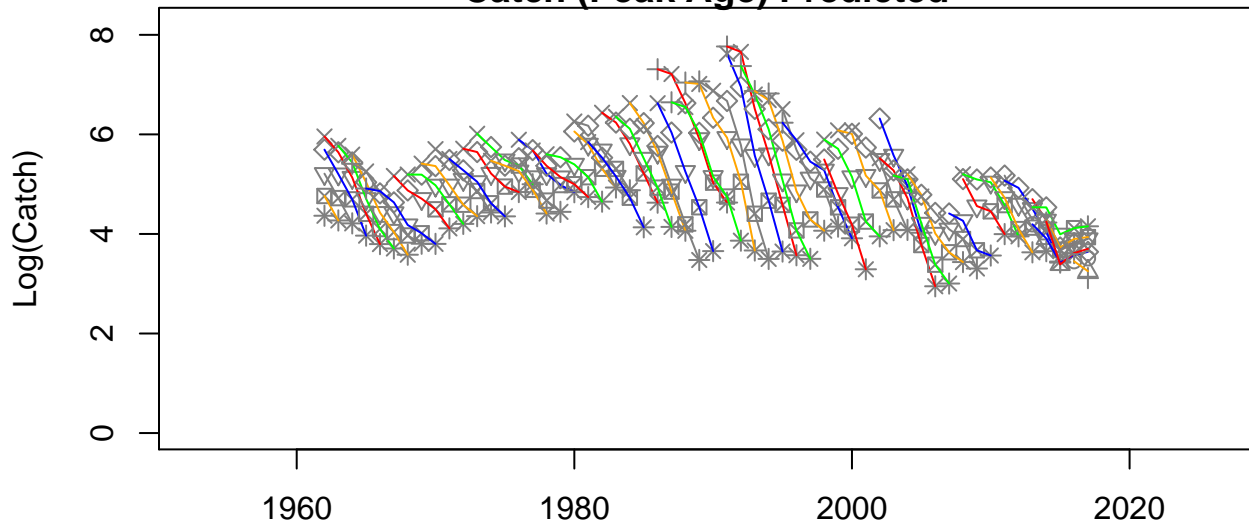
## Indices



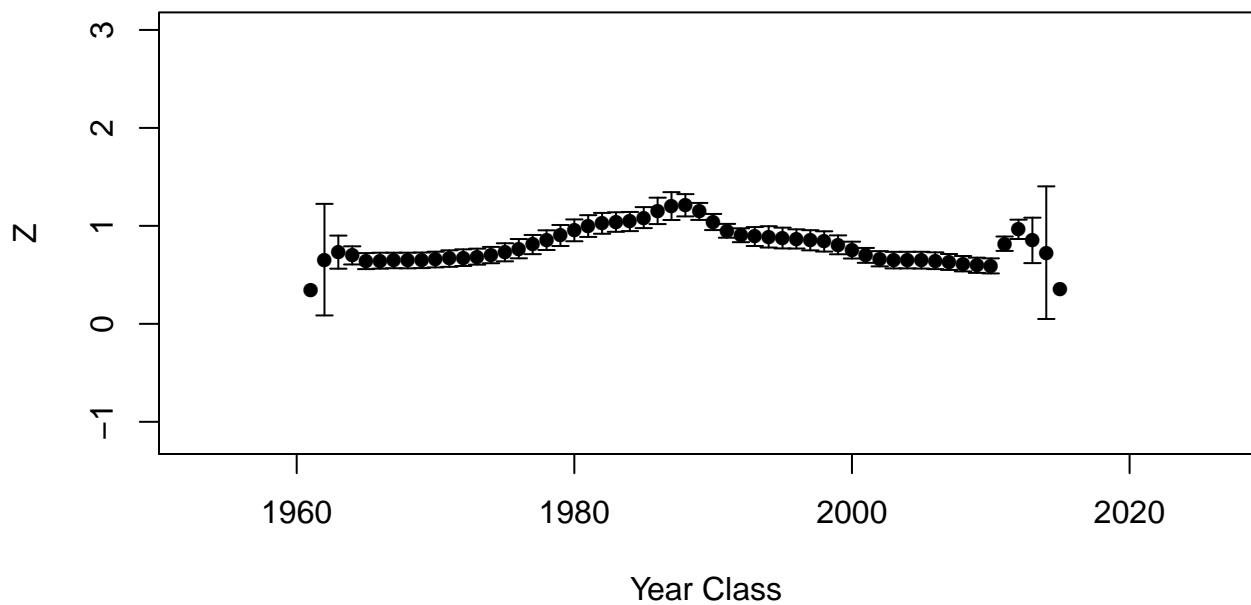
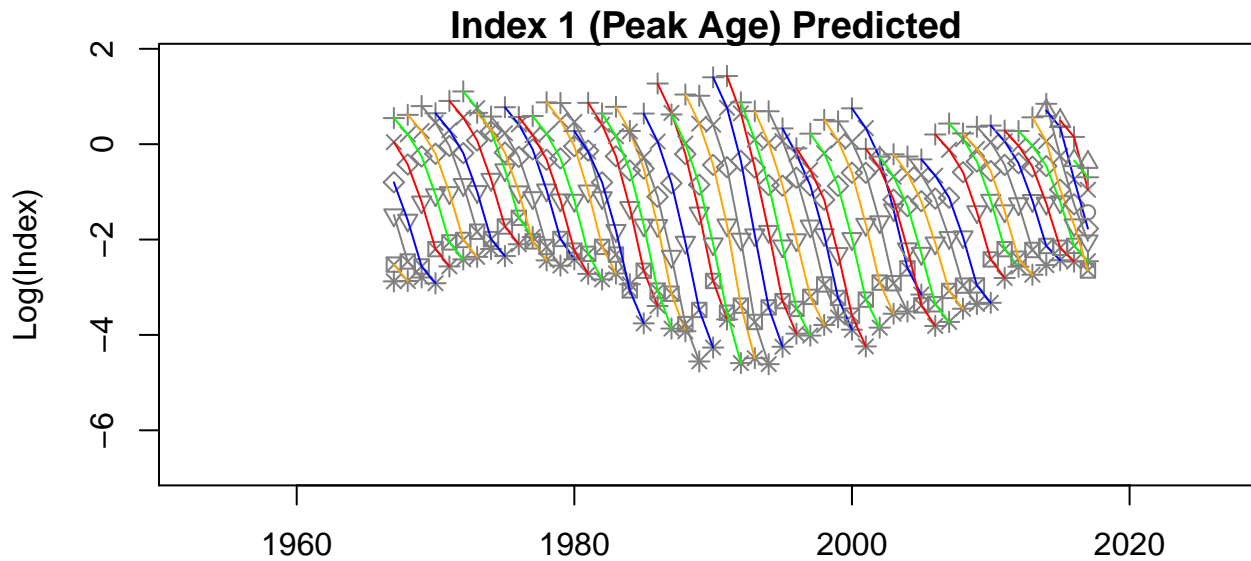
**Catch (Peak Age) Observed**



**Catch (Peak Age) Predicted**

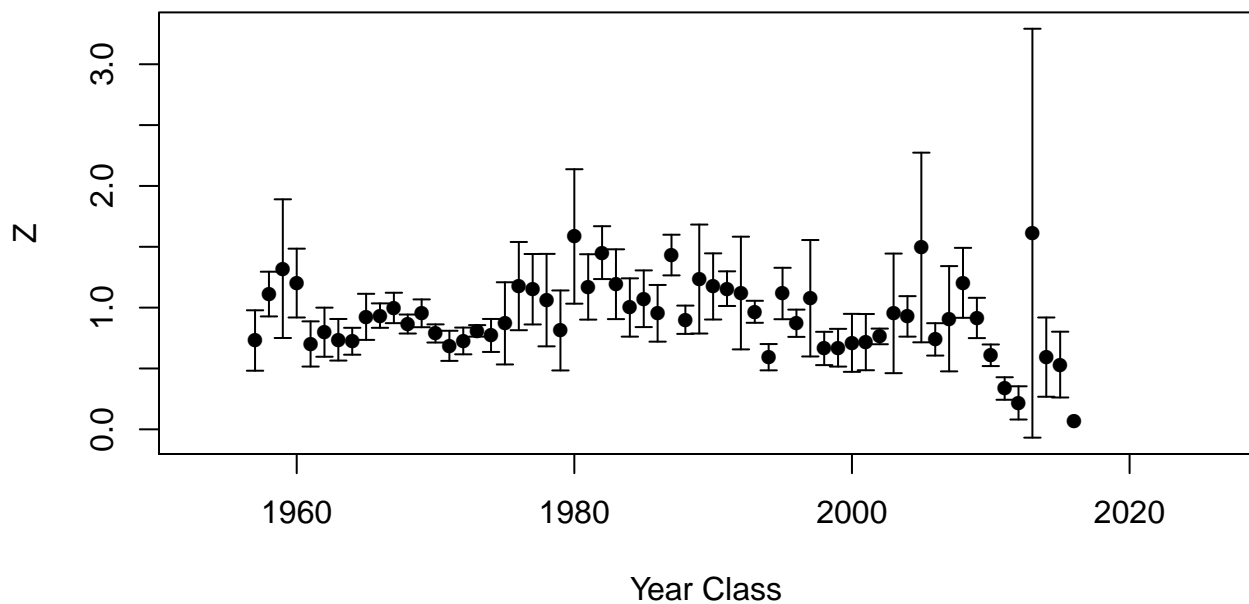




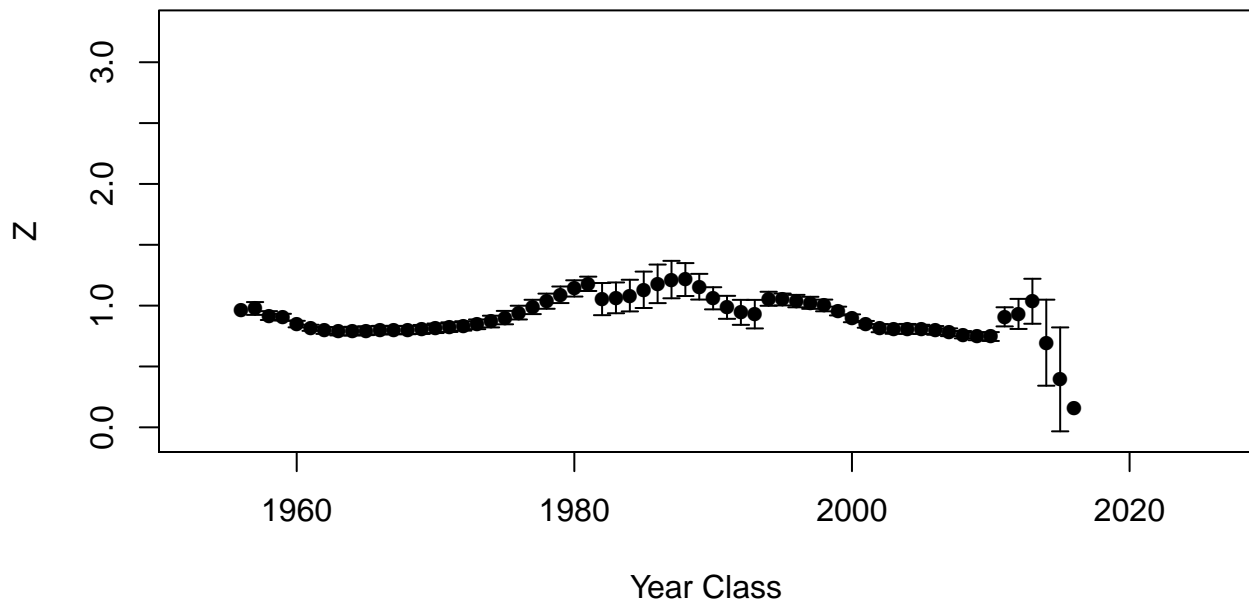
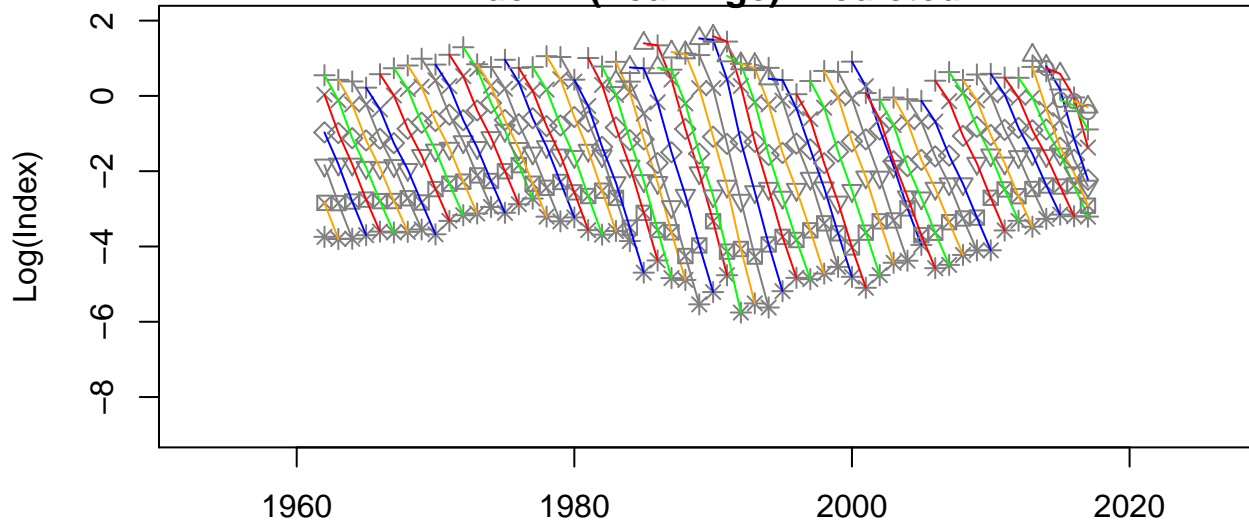




**Index 2 (Peak Age) Observed**



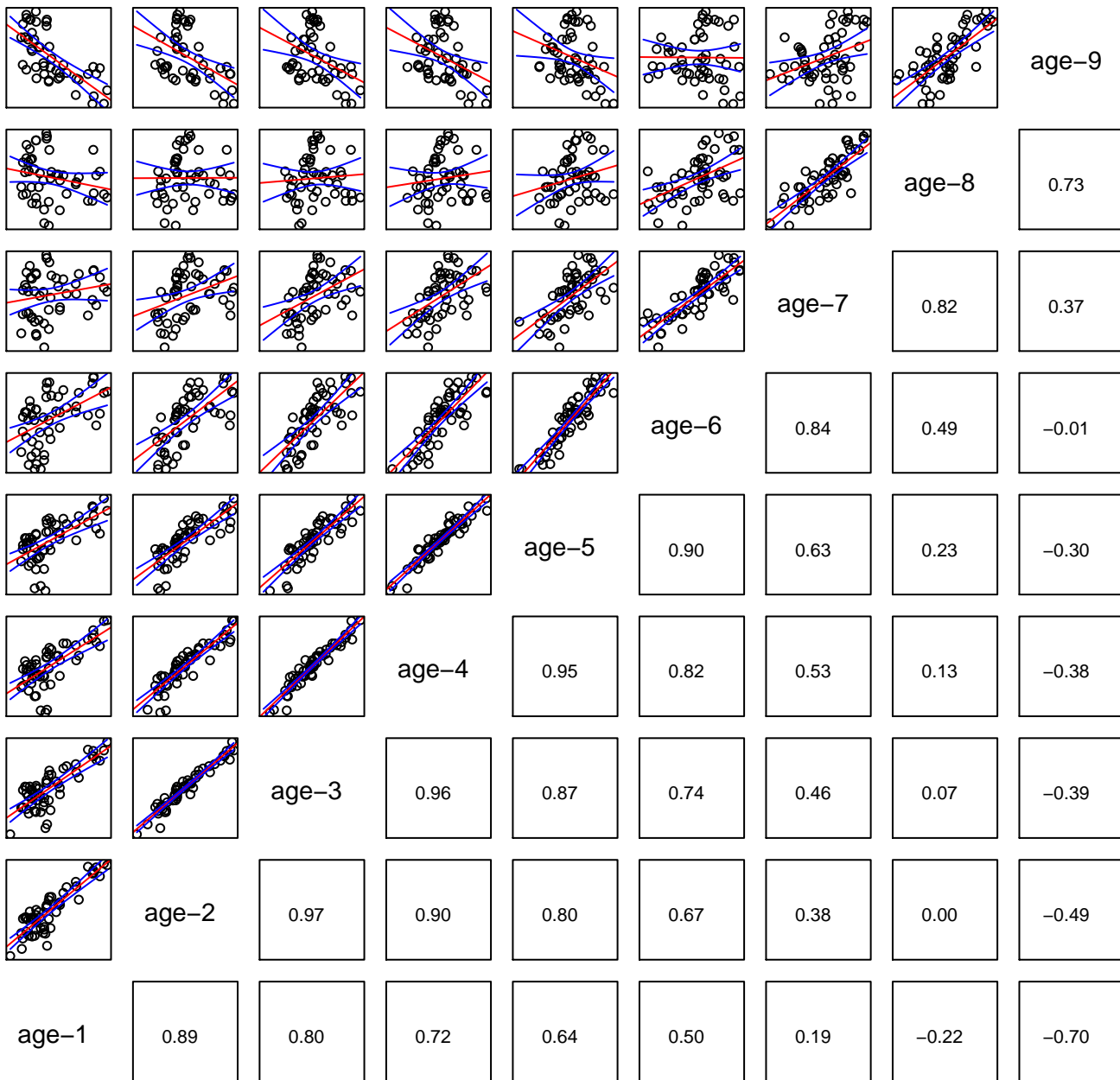
**Index 2 (Peak Age) Predicted**



## Catch Observed



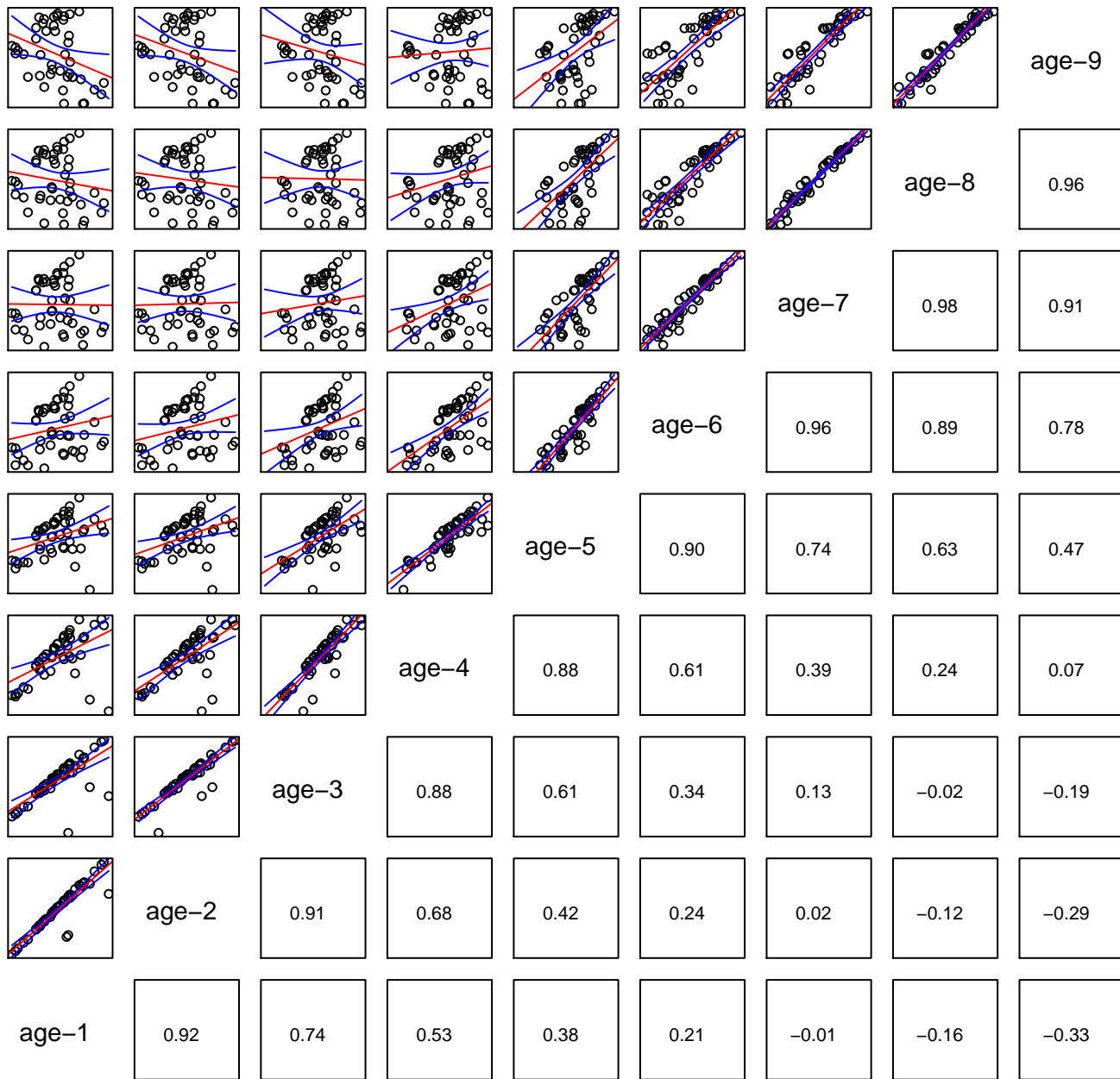
## Catch Predicted



Index 1 (INDEX-1) Observed

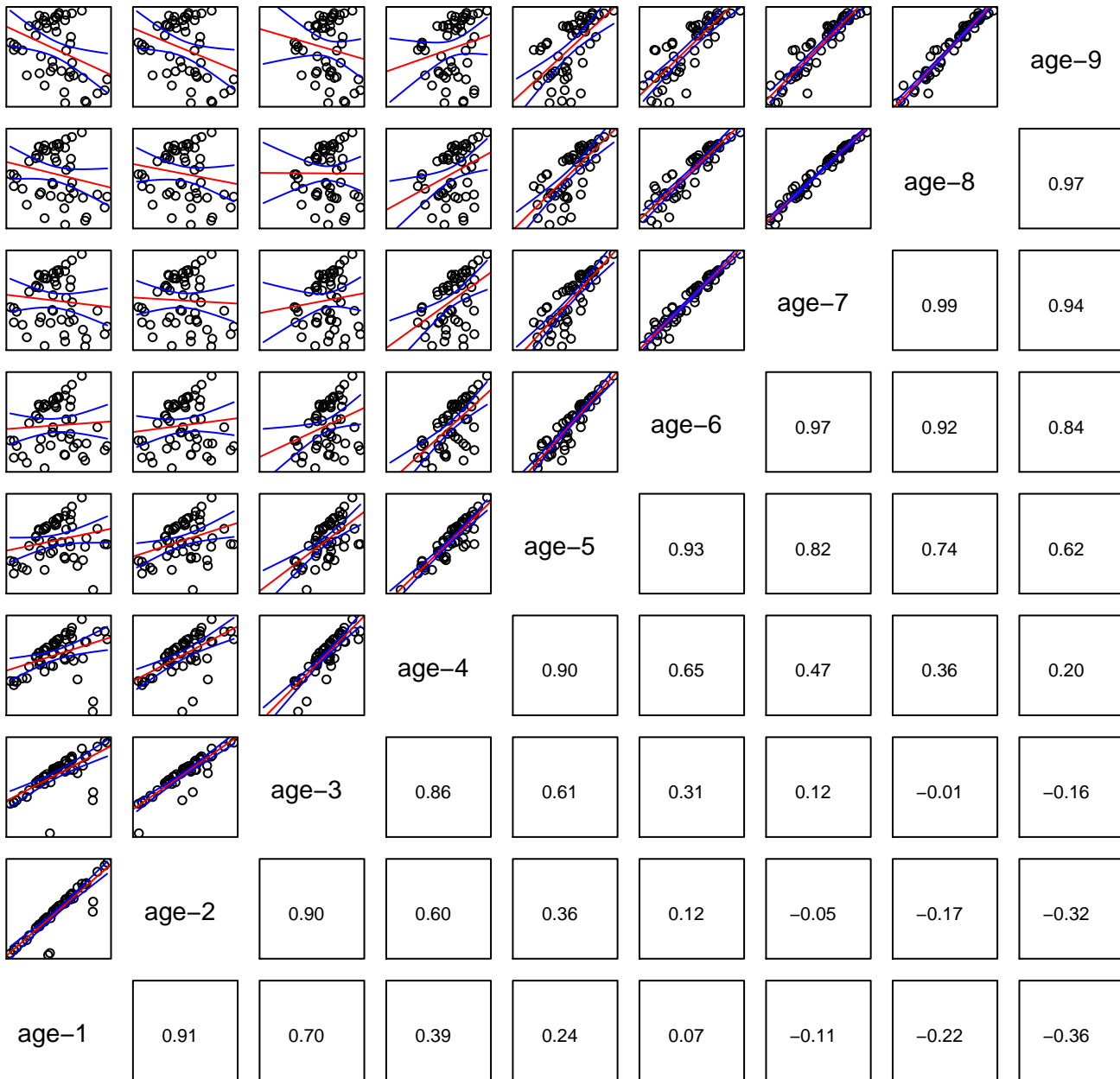


Index 1 (INDEX-1) Predicted

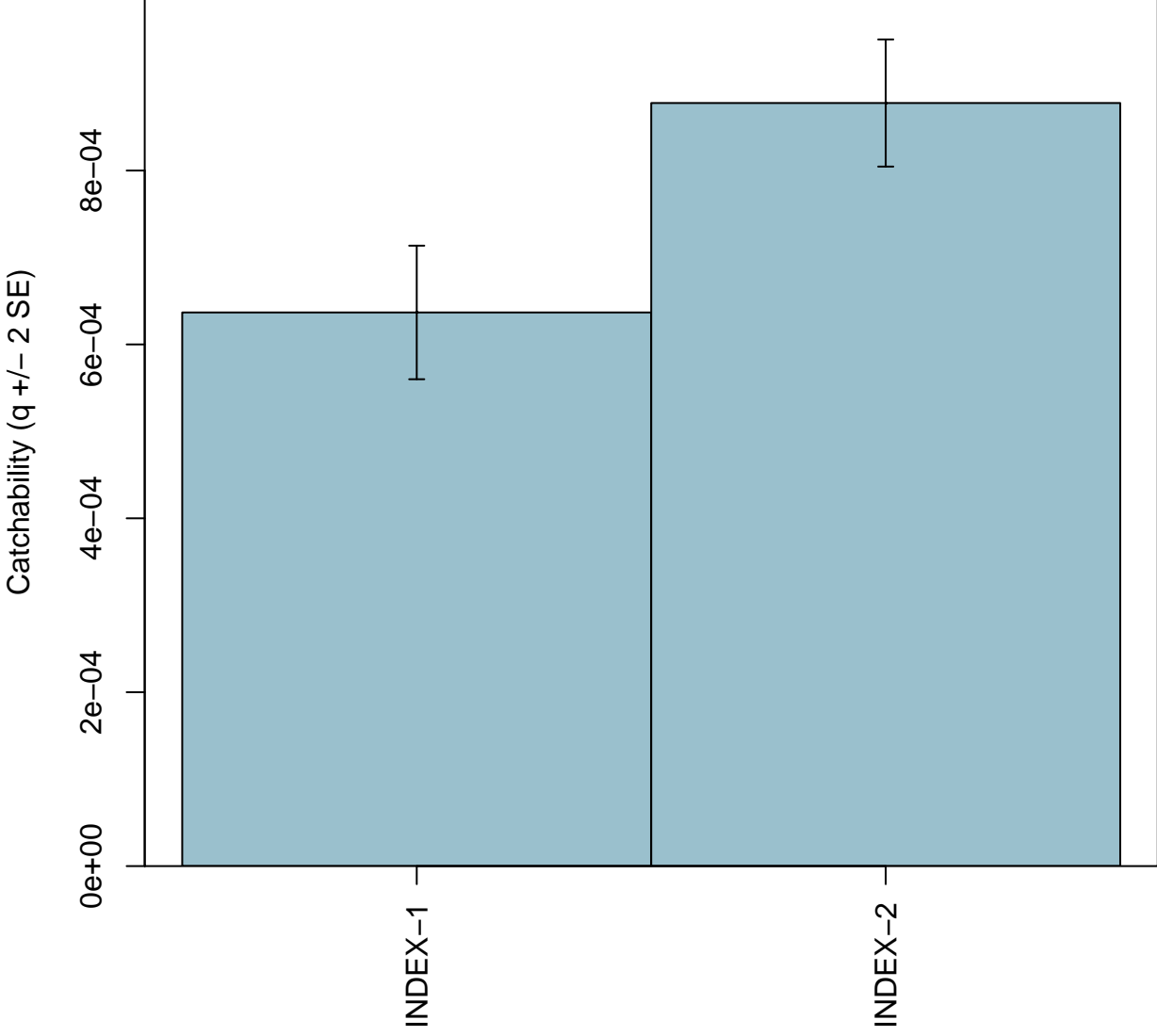


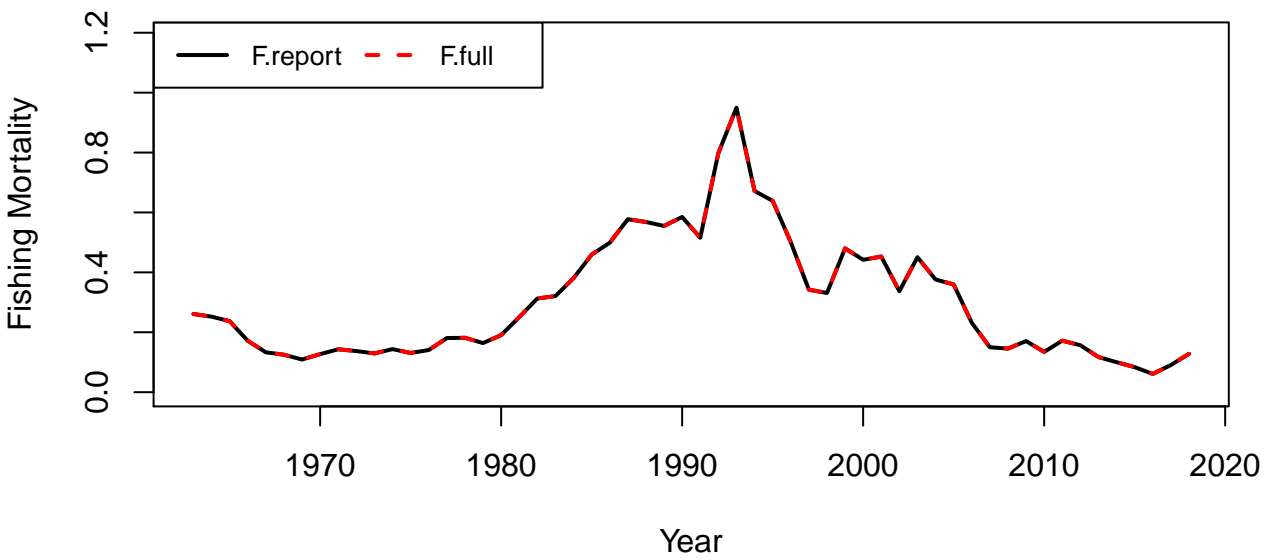
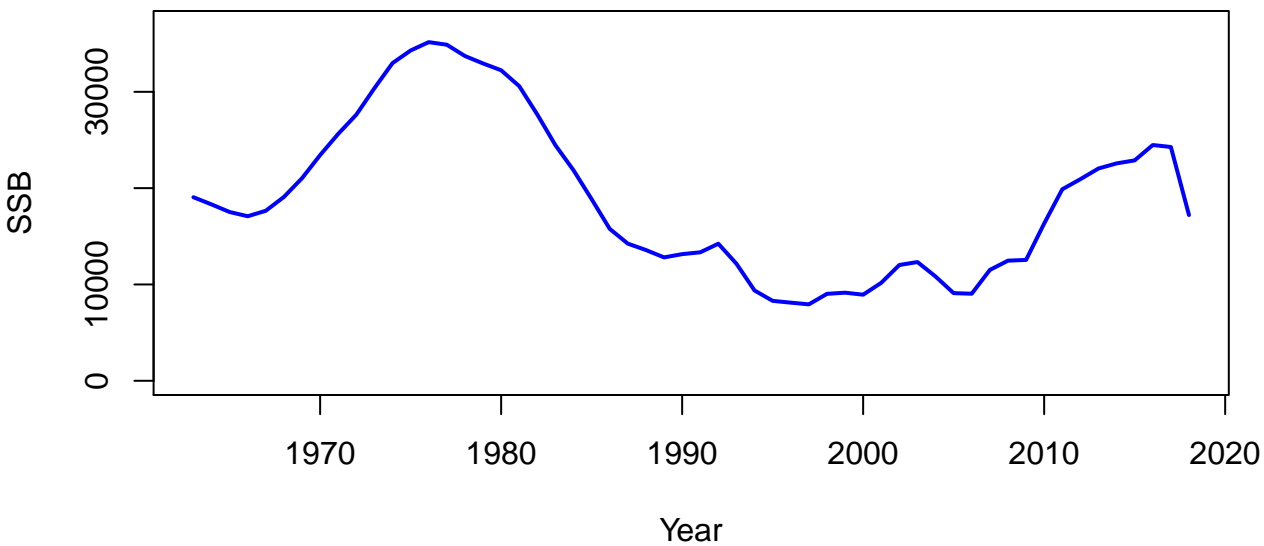


Index 2 (INDEX-2) Predicted

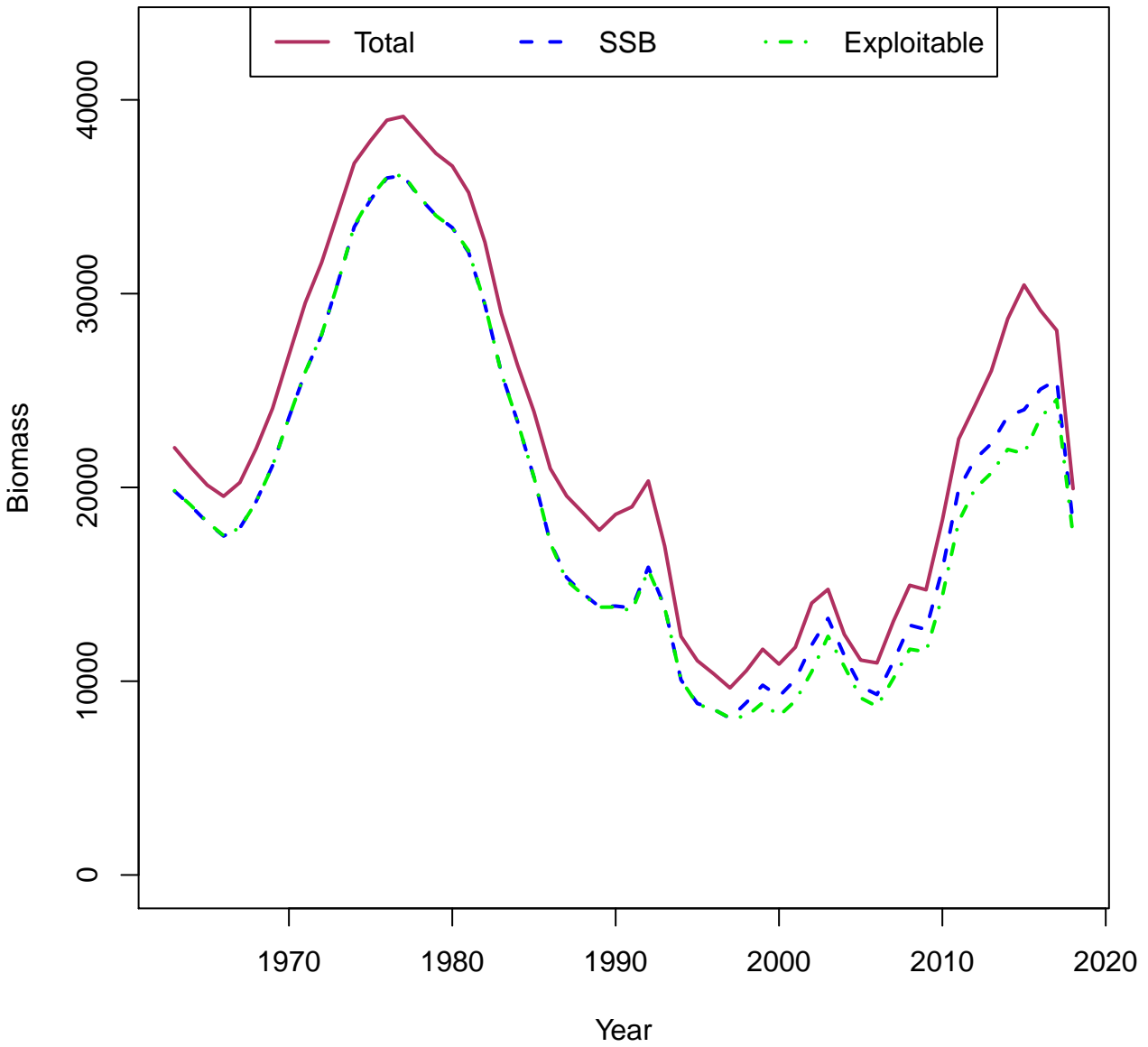


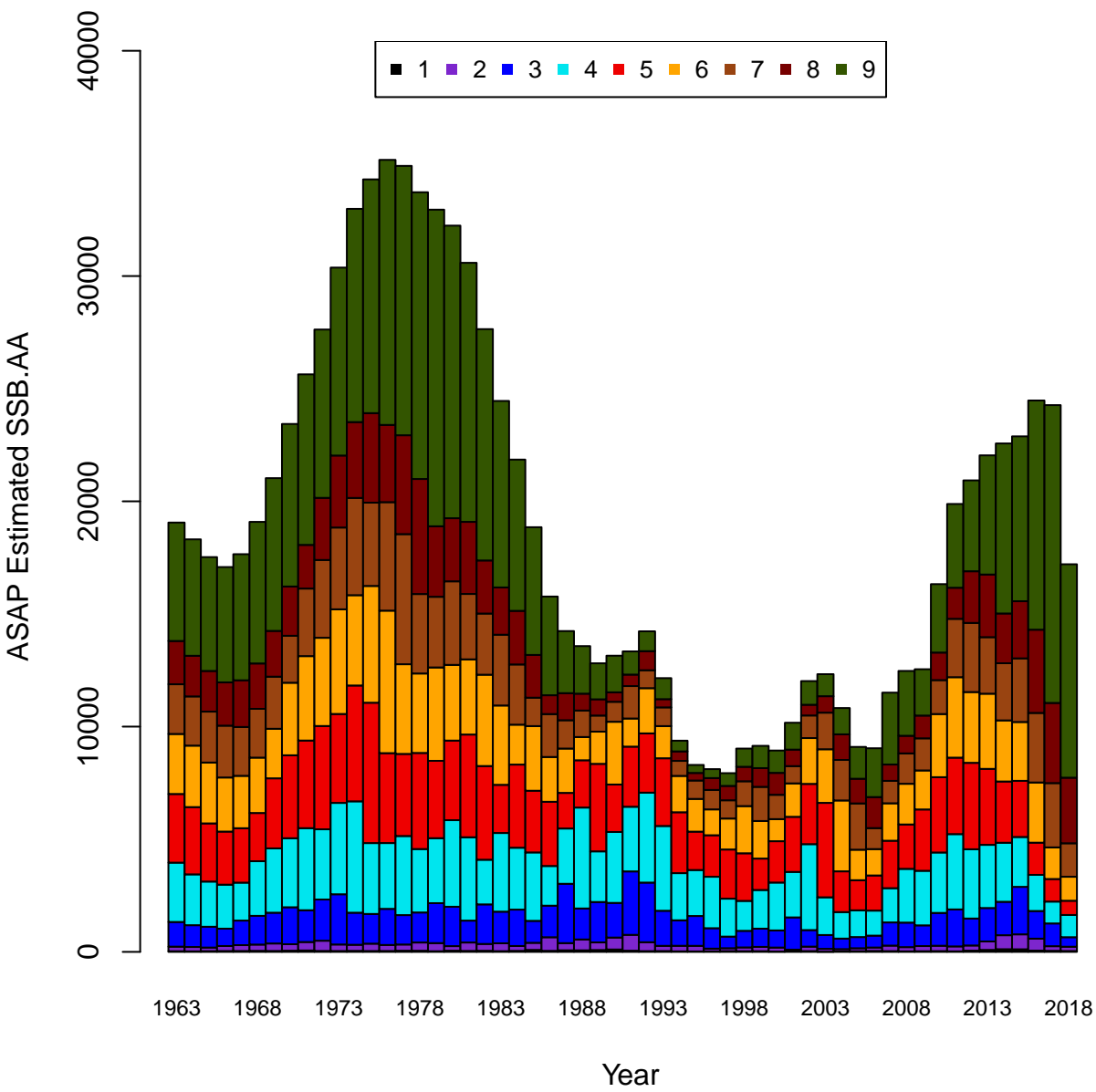


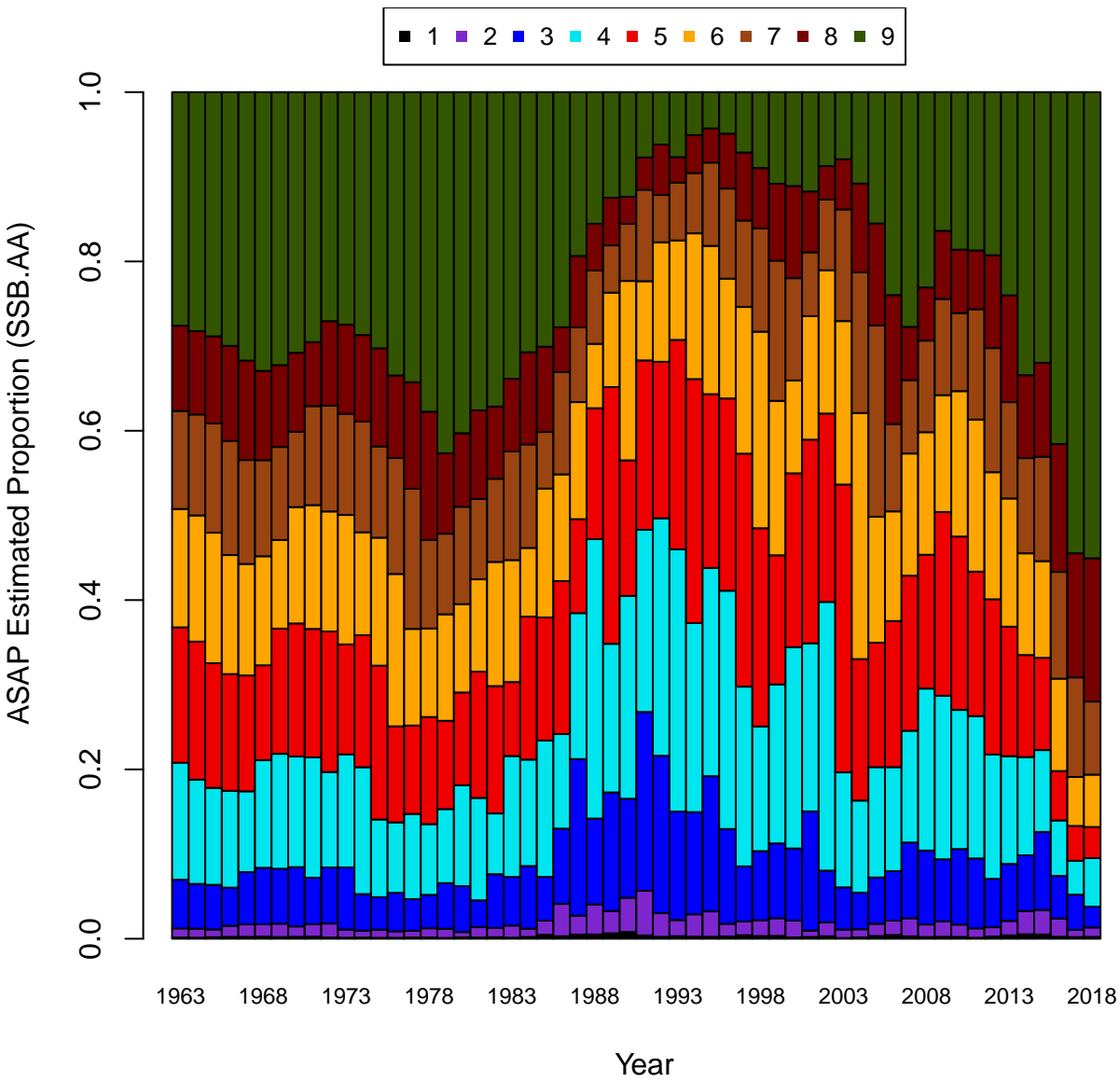


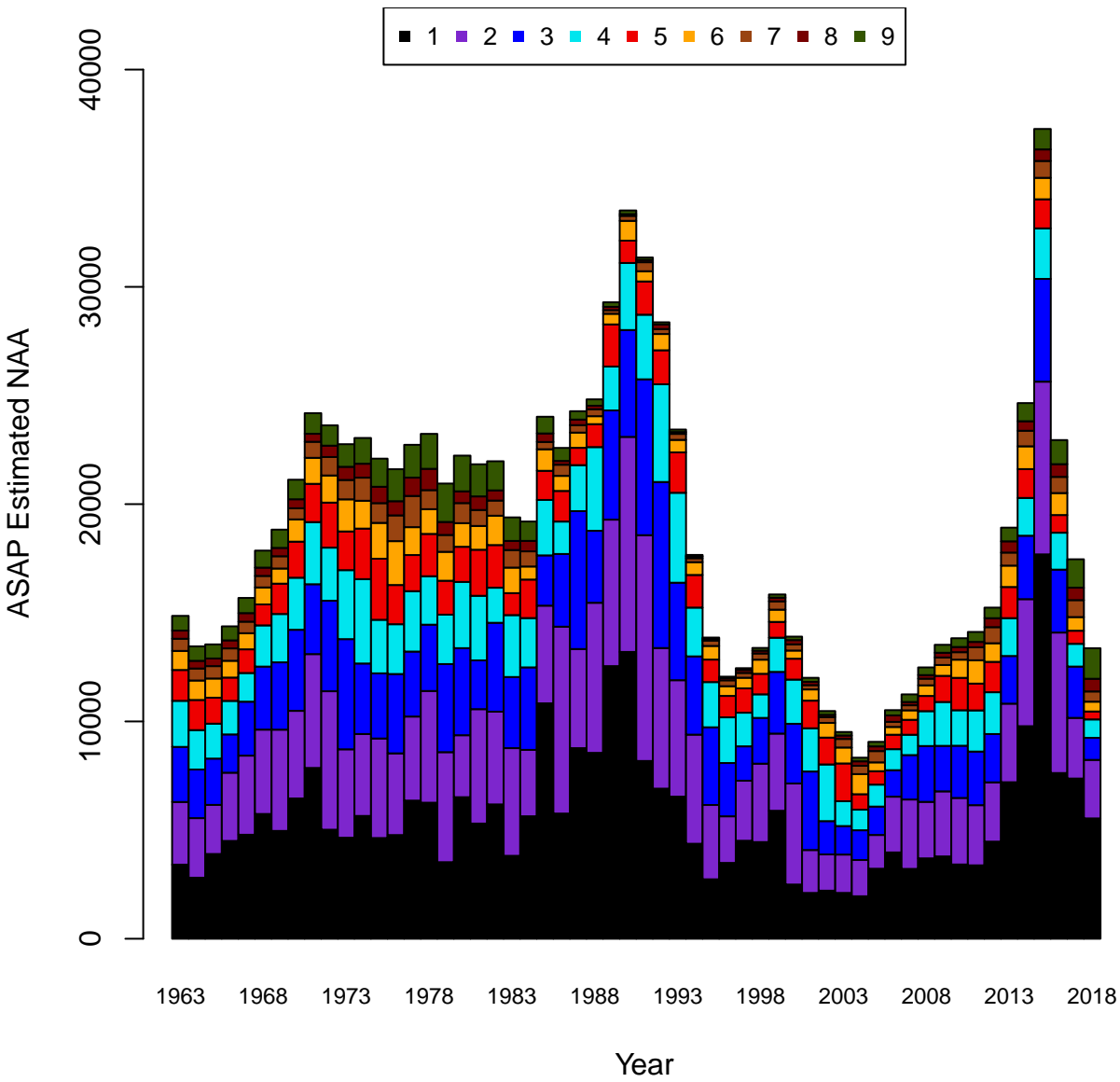


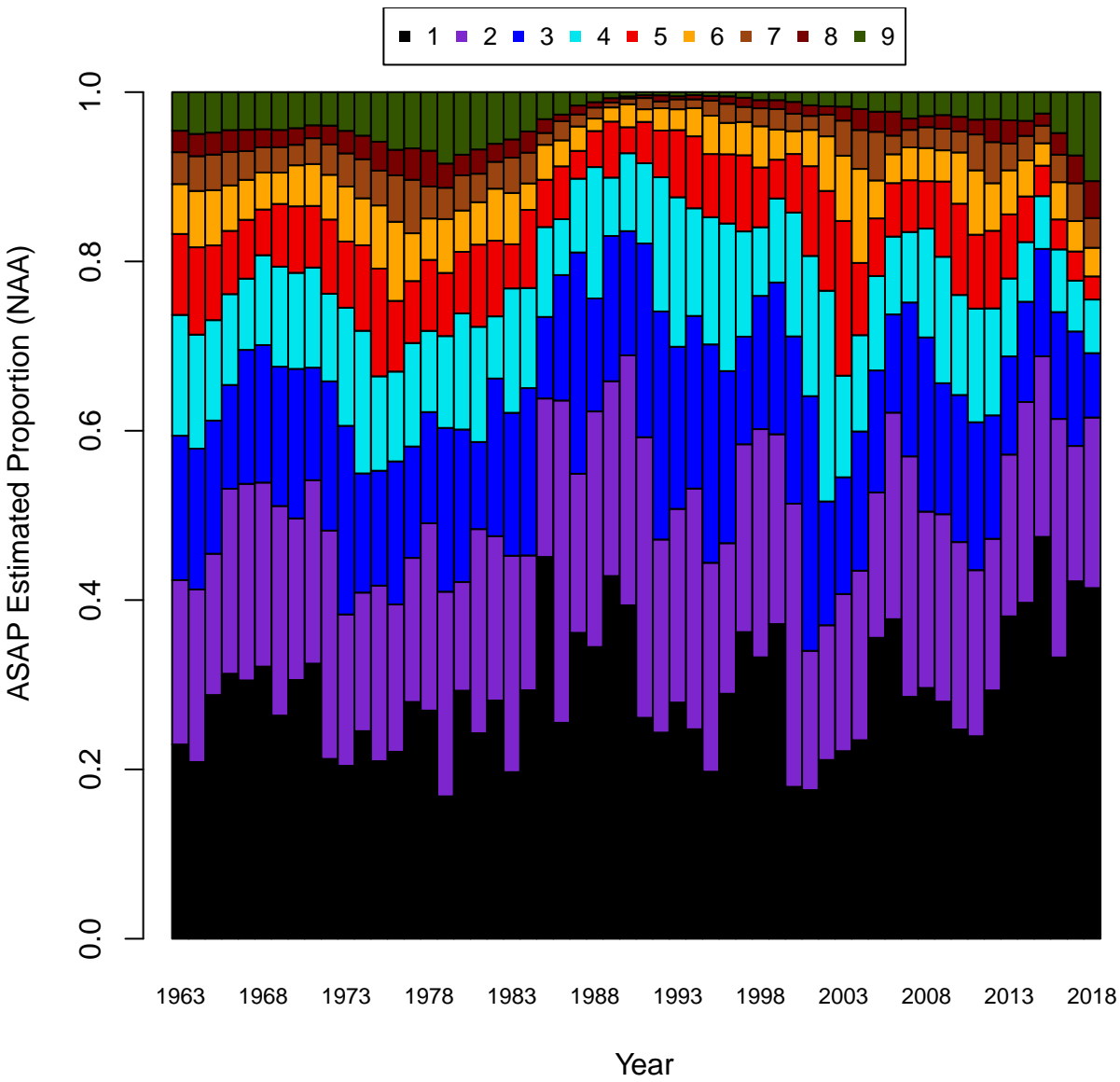
**Comparison of January 1 Biomass**

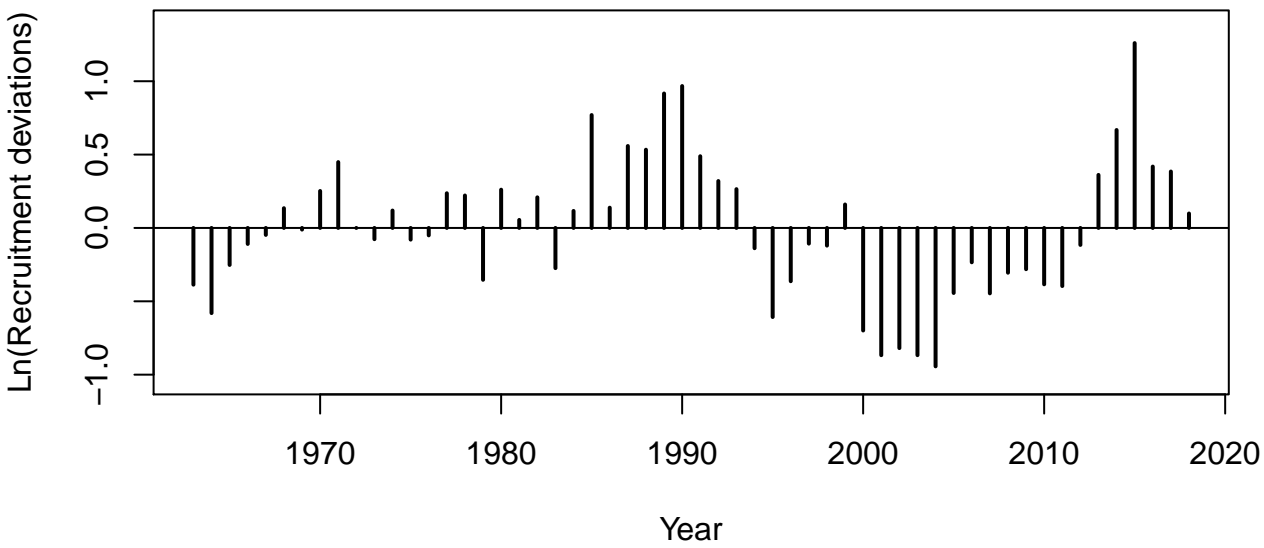
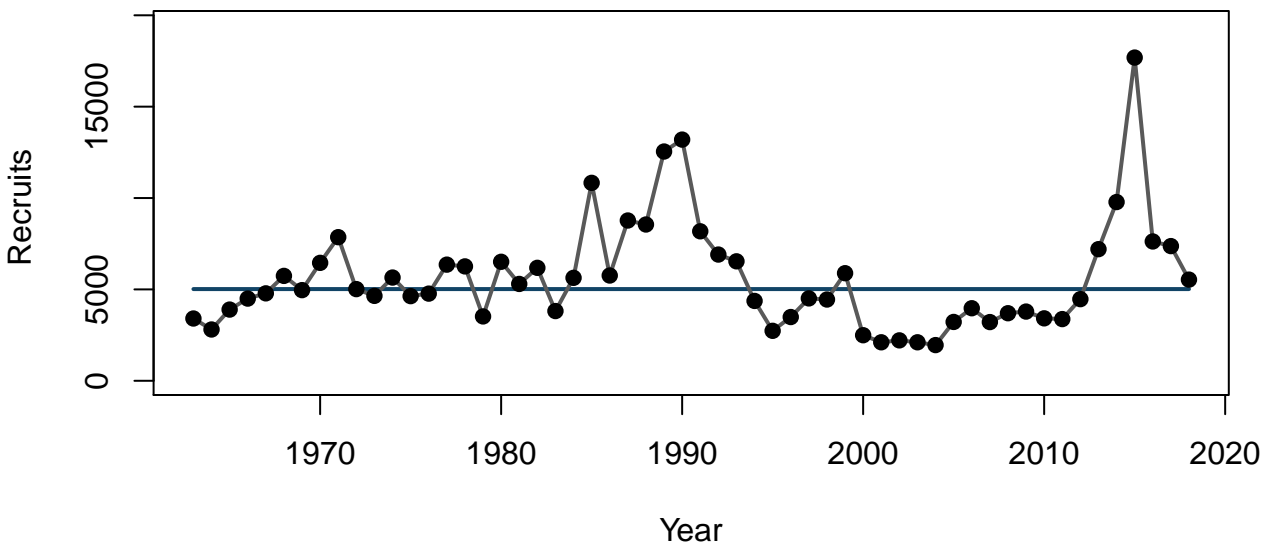




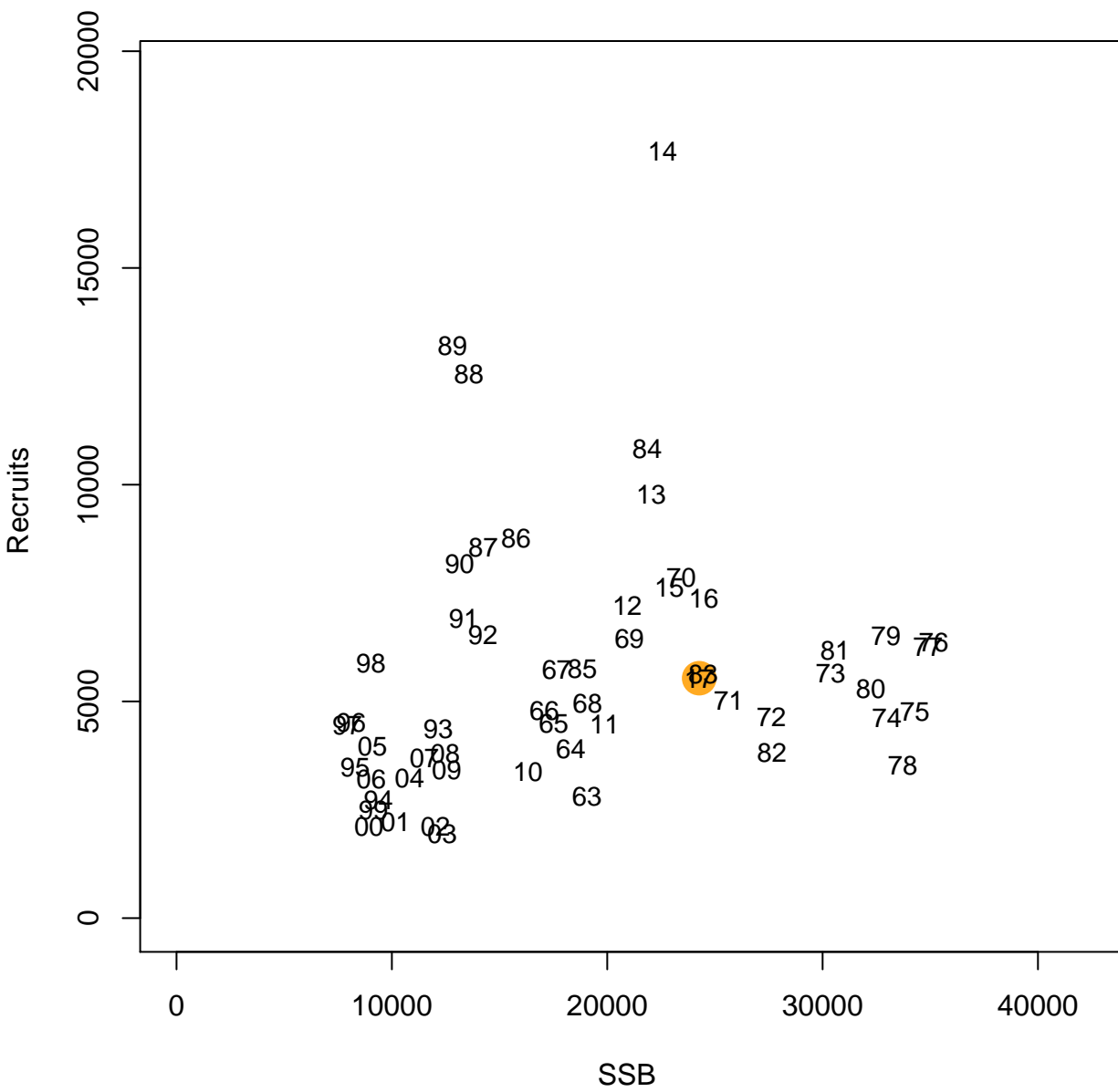


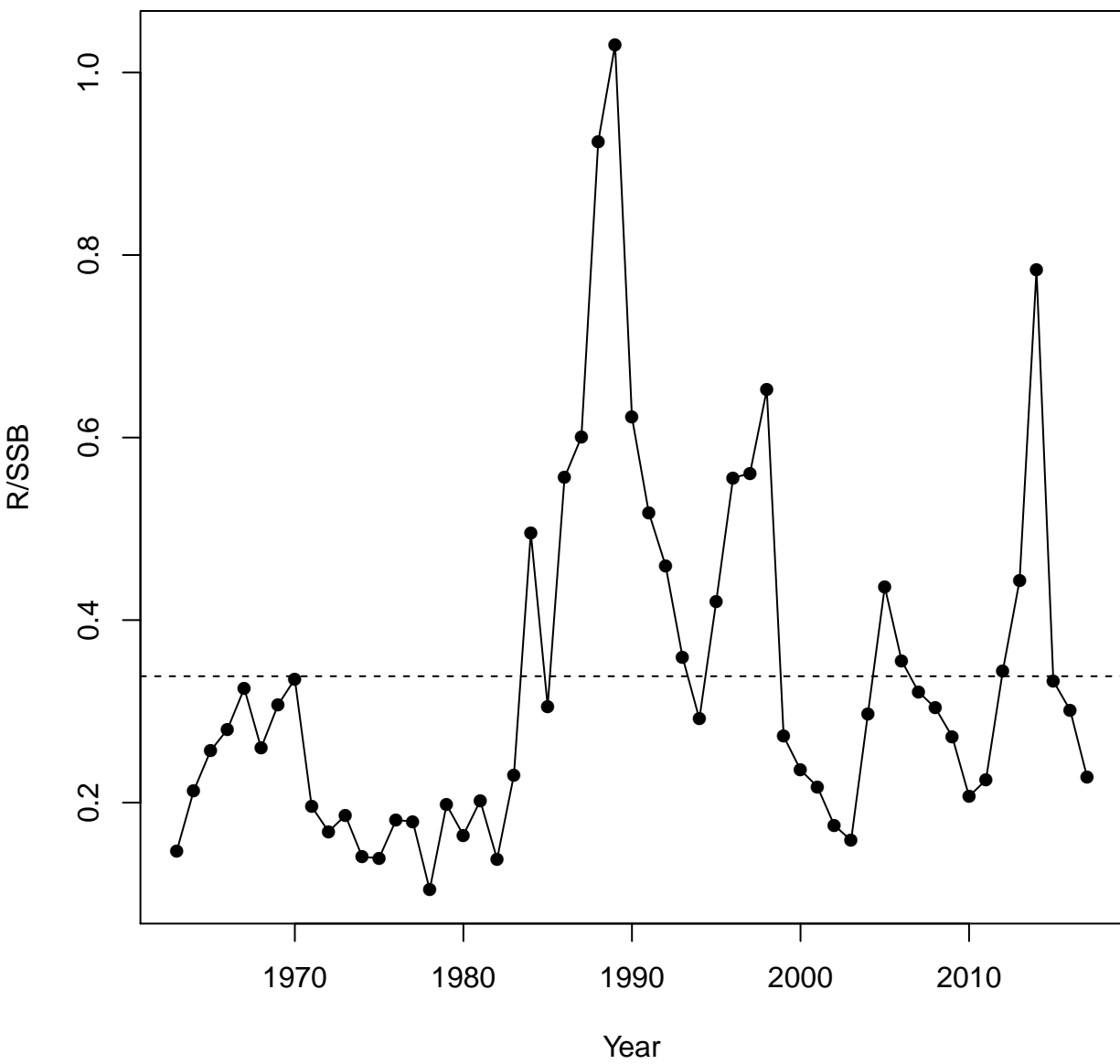


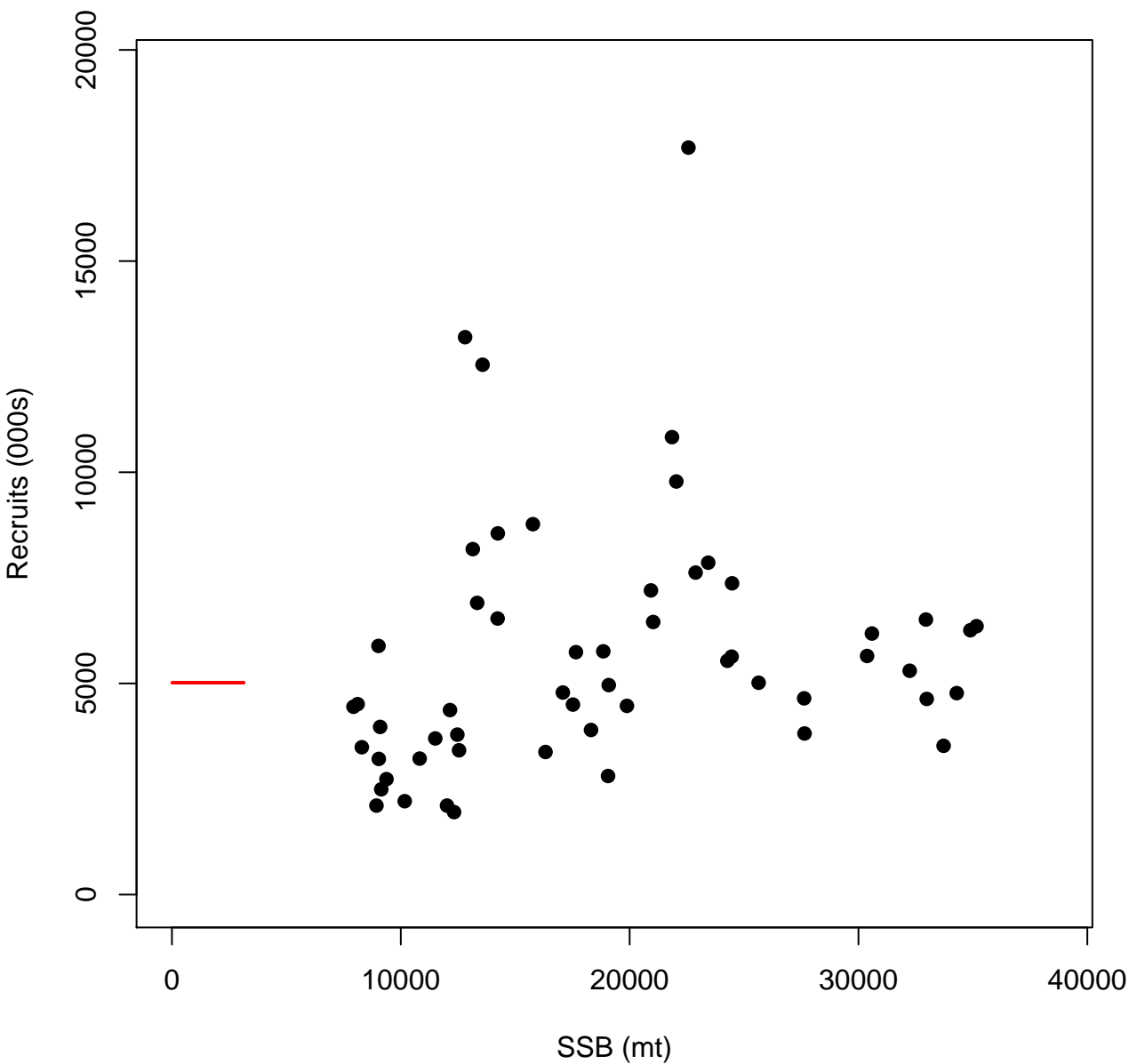


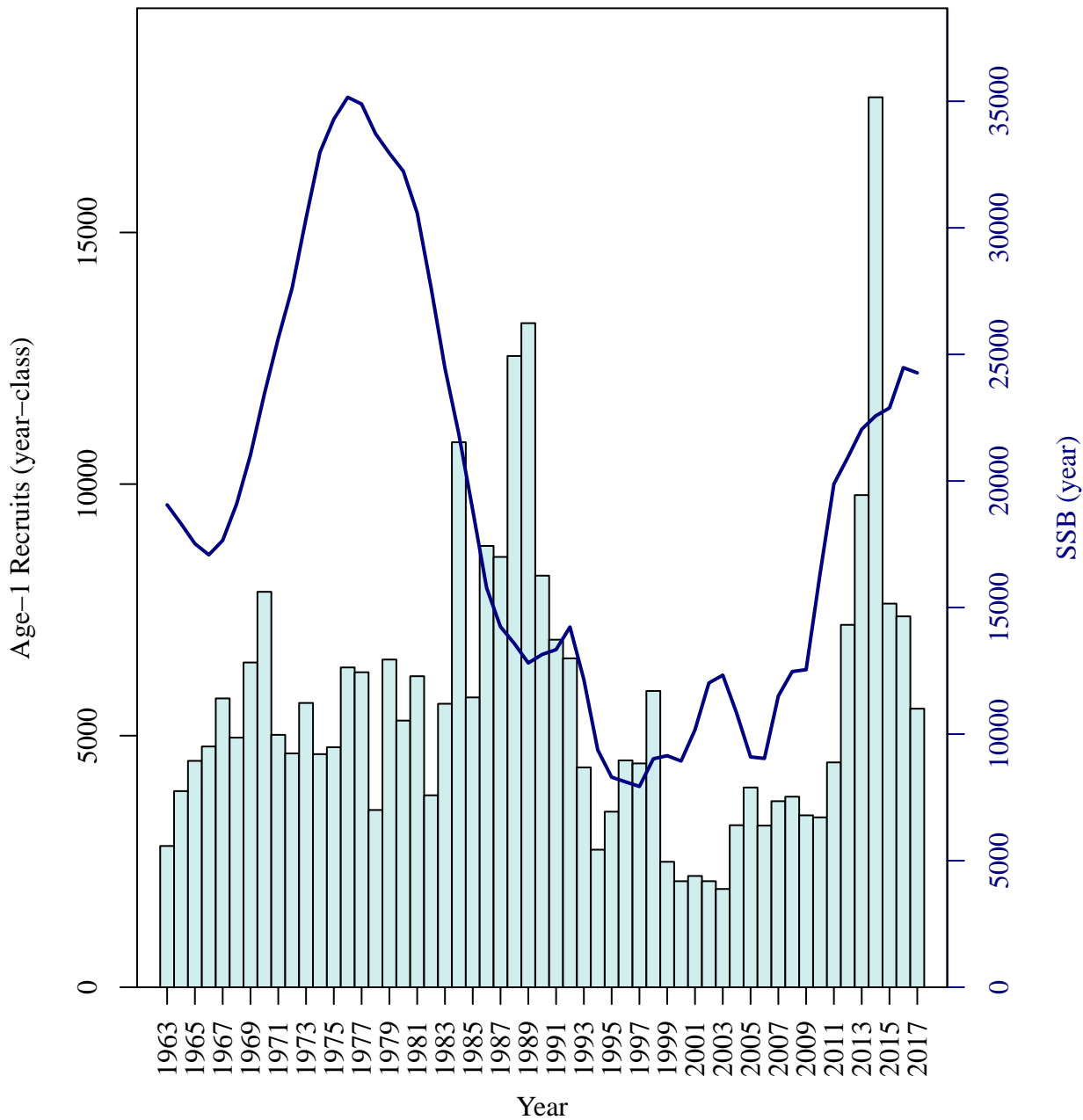




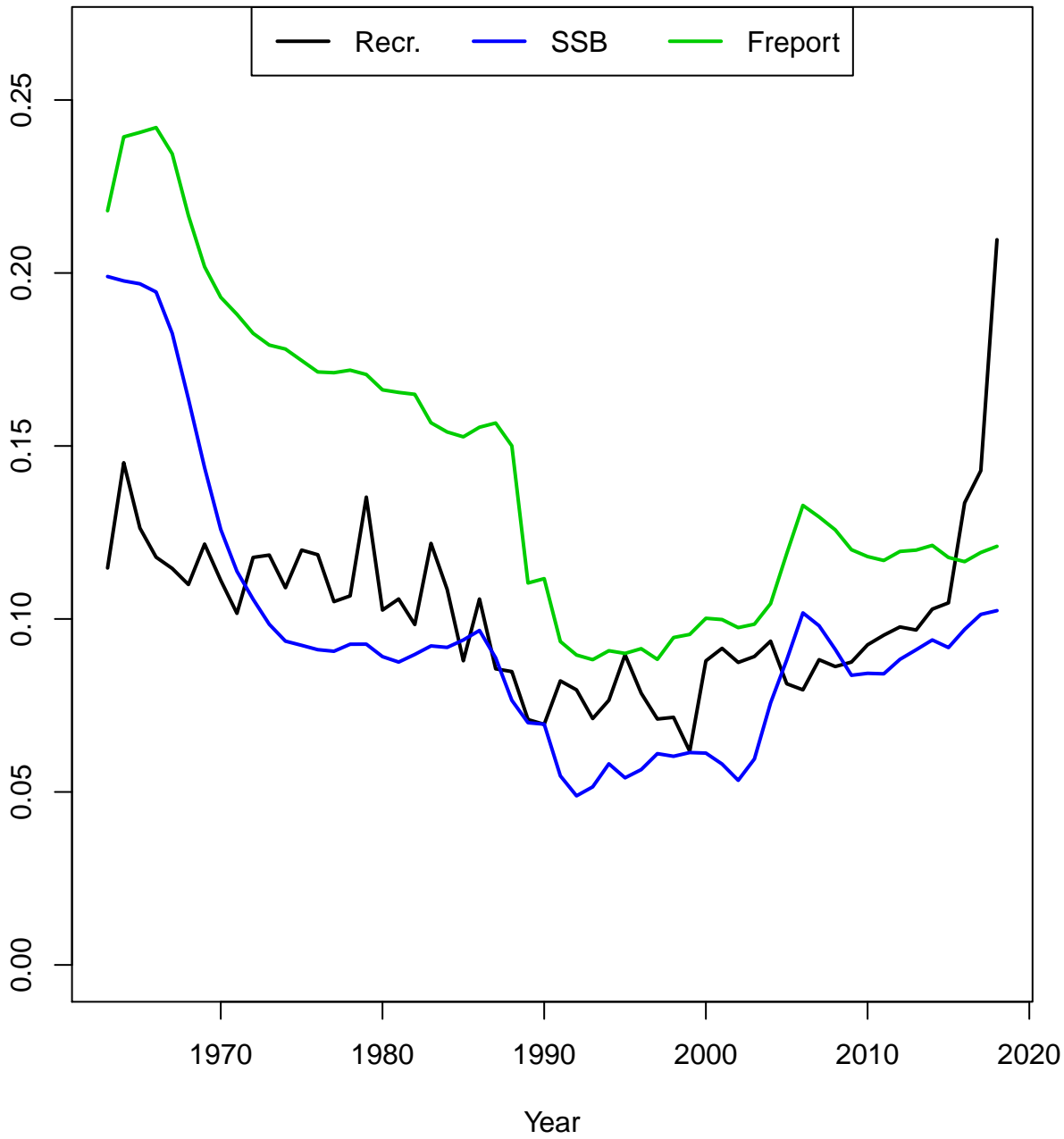




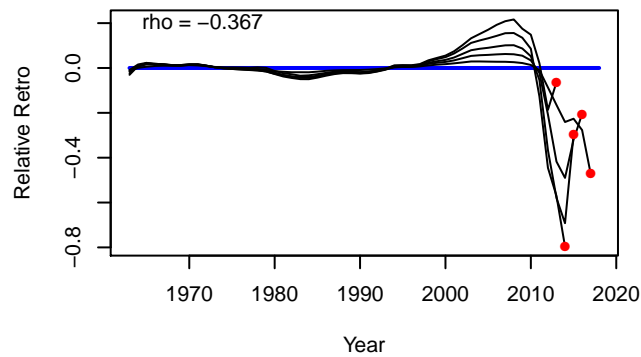
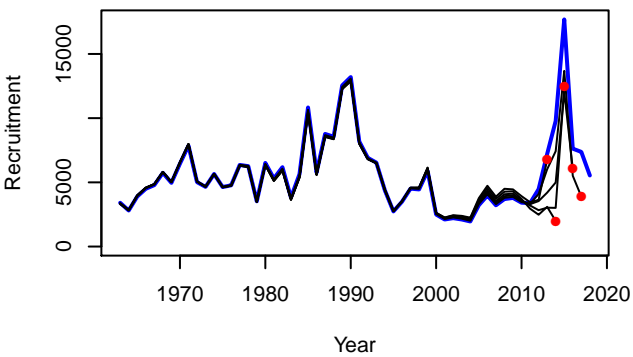
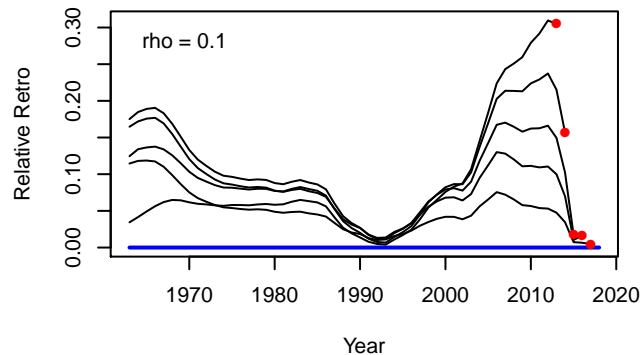
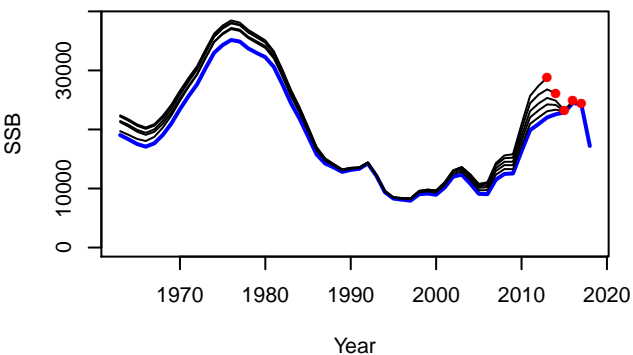
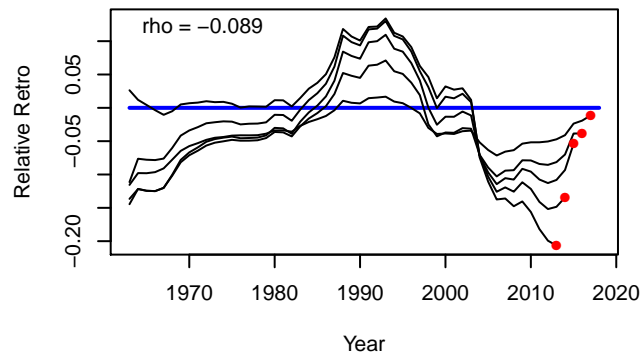
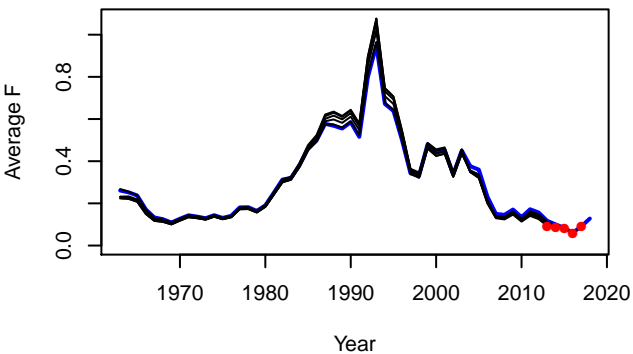




CV

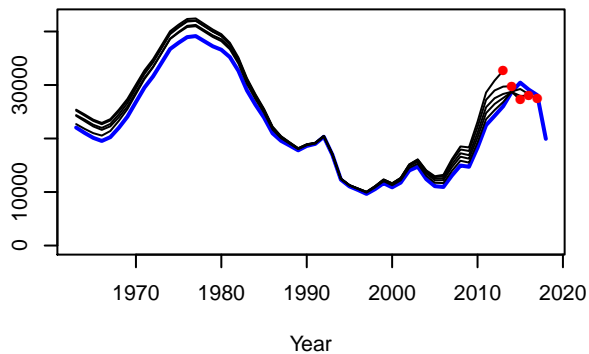


# F, SSB, R

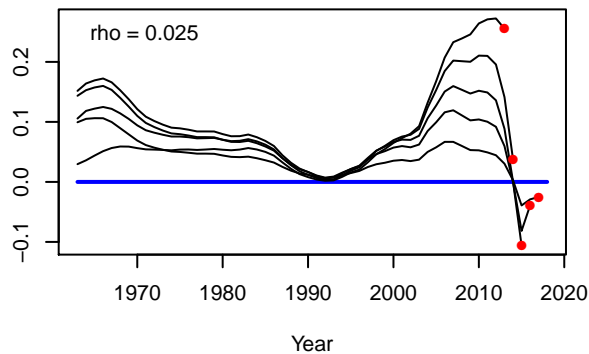


# Jan-1 B, Exploitable B, Total Stock N

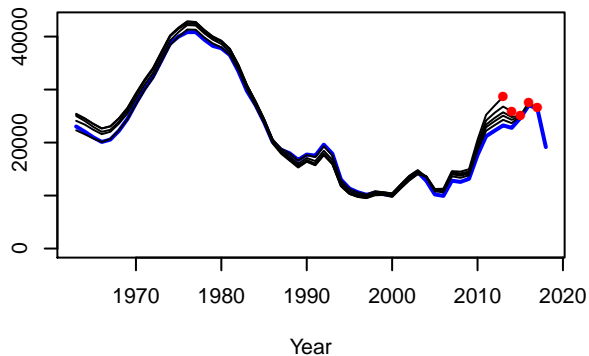
Jan-1 B



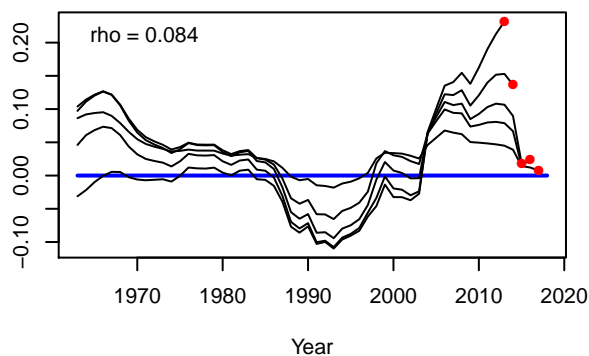
Relative Retro



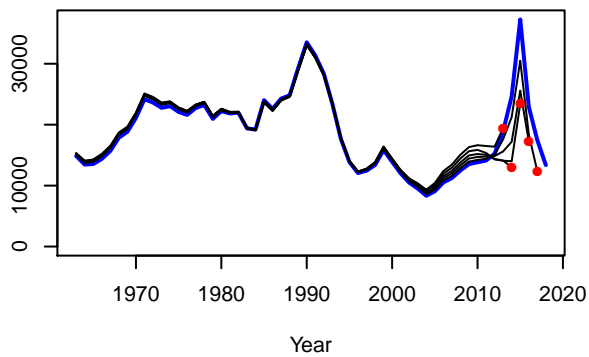
Exploitable B



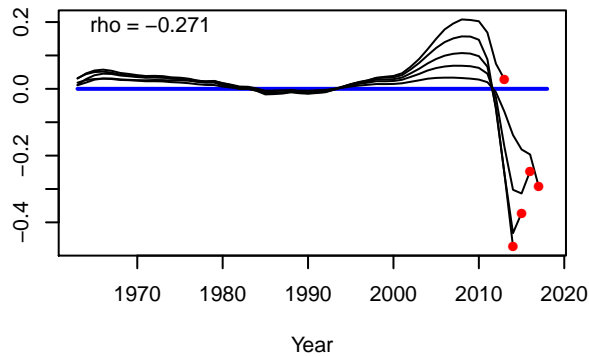
Relative Retro



Total Stock N

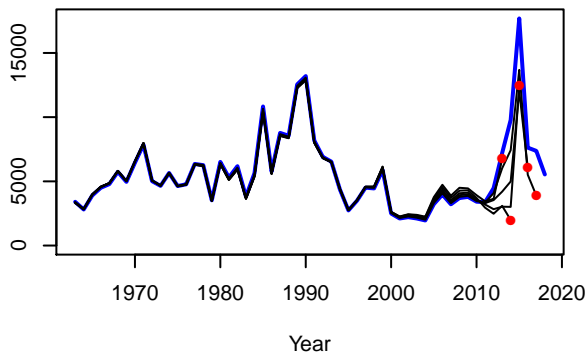


Relative Retro

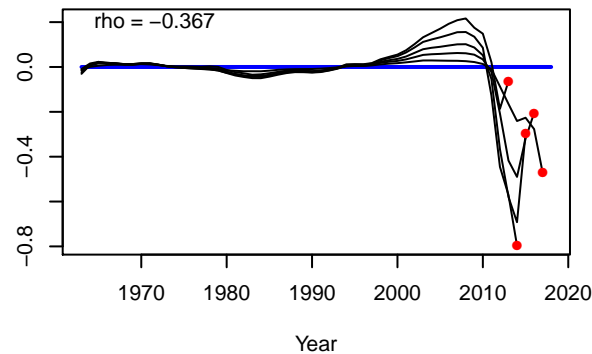


# Stock Numbers at Age

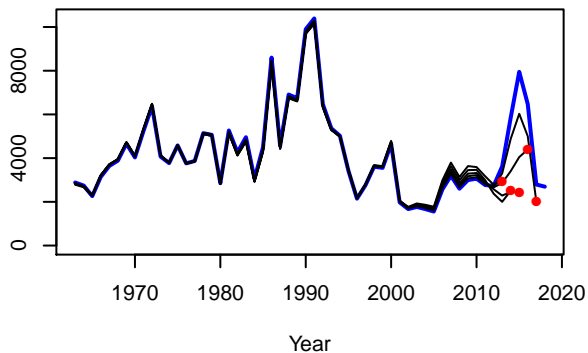
N at Age 1



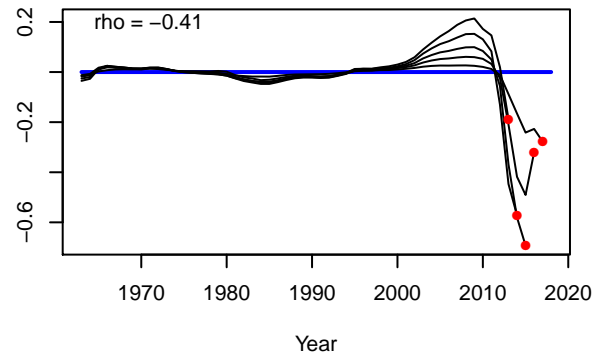
Relative Retro



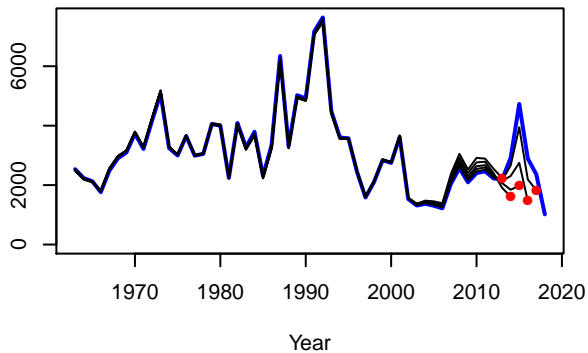
N at Age 2



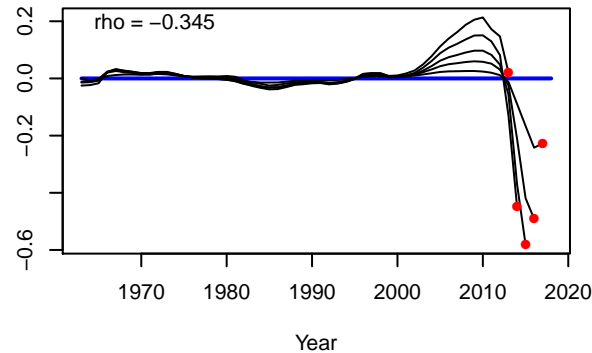
Relative Retro



N at Age 3



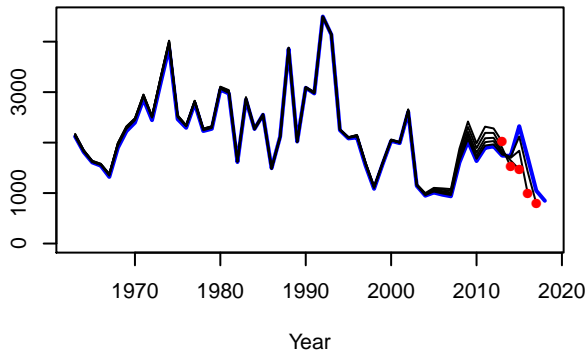
Relative Retro



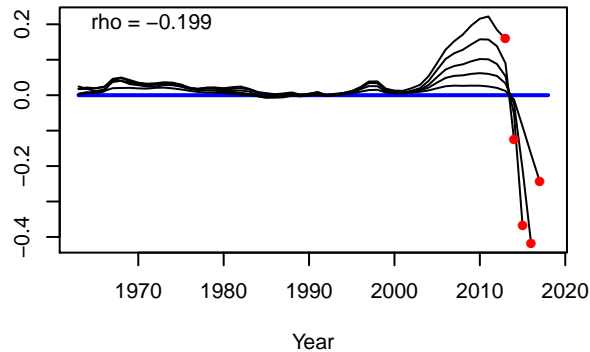


# Stock Numbers at Age

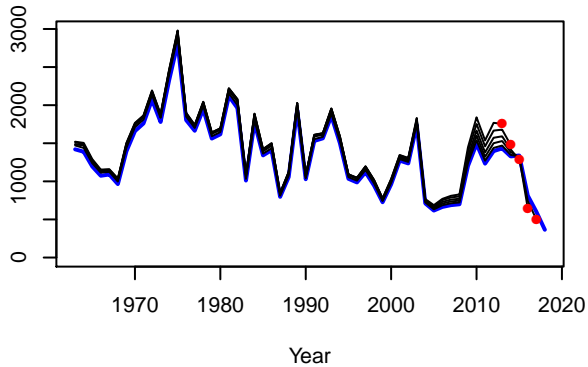
N at Age 4



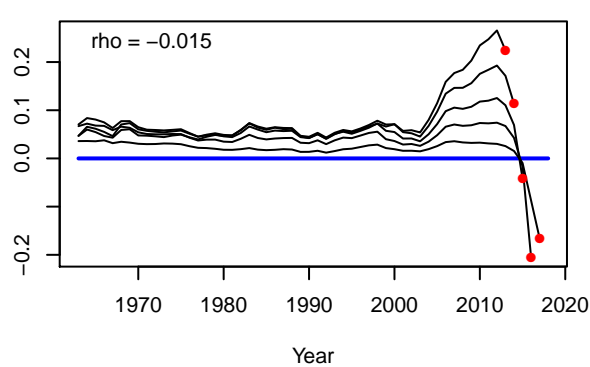
Relative Retro



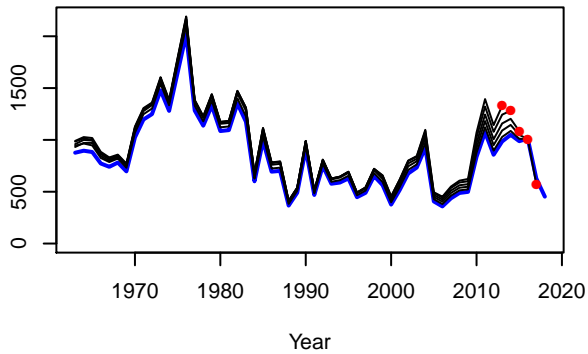
N at Age 5



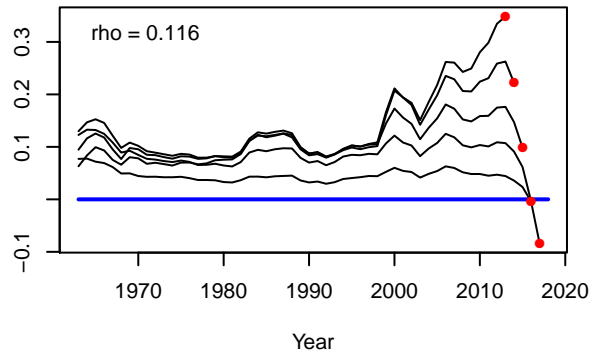
Relative Retro



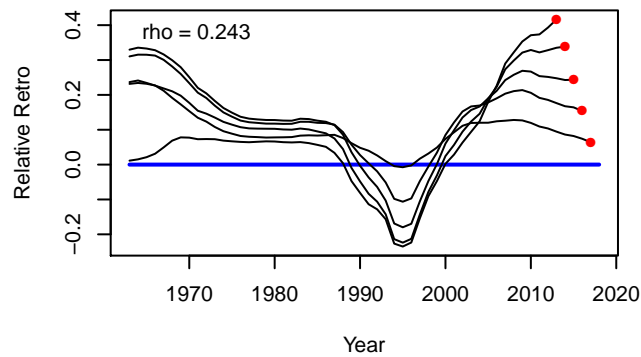
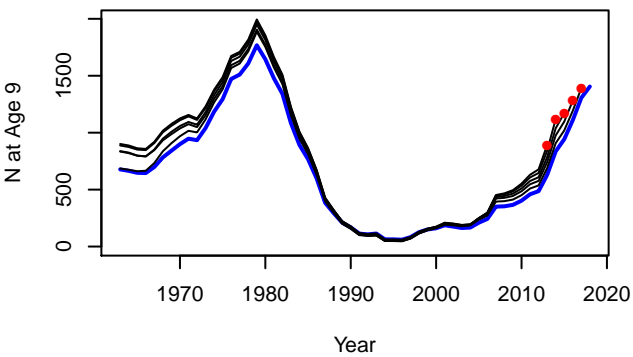
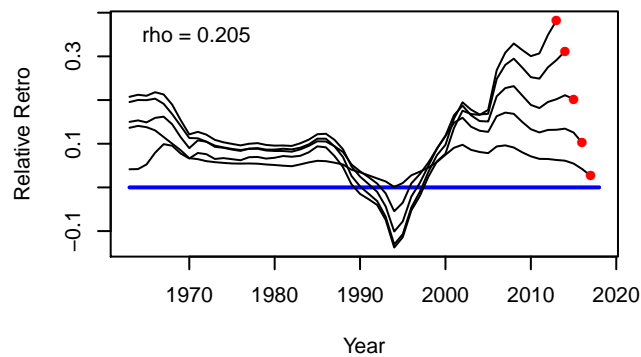
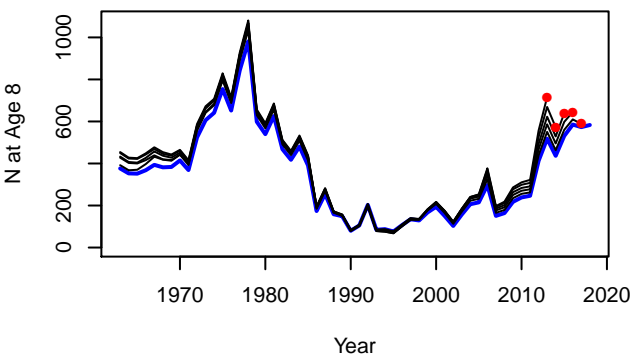
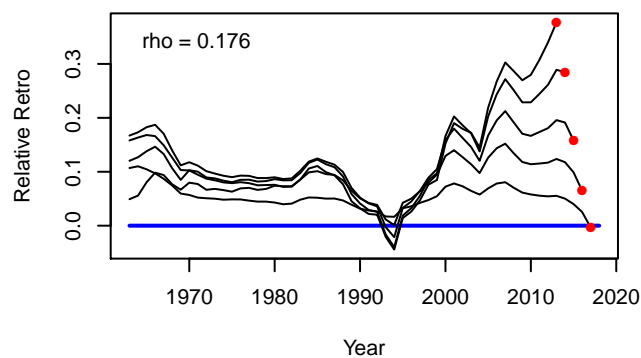
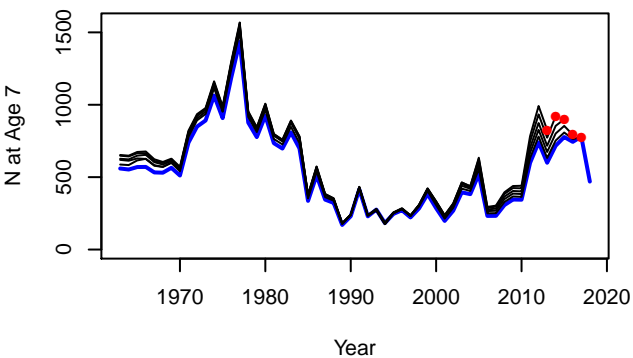
N at Age 6



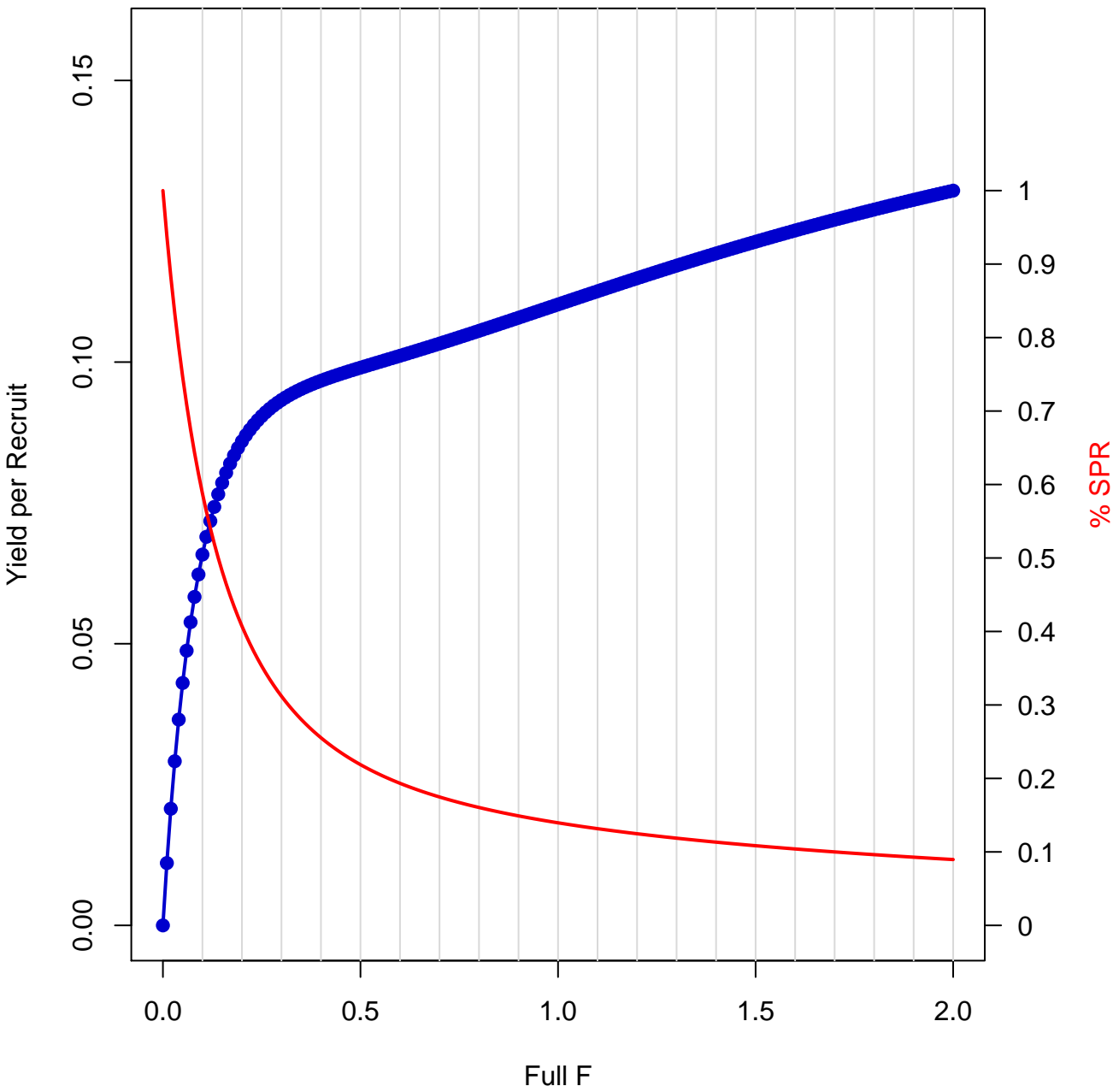
Relative Retro



# Stock Numbers at Age



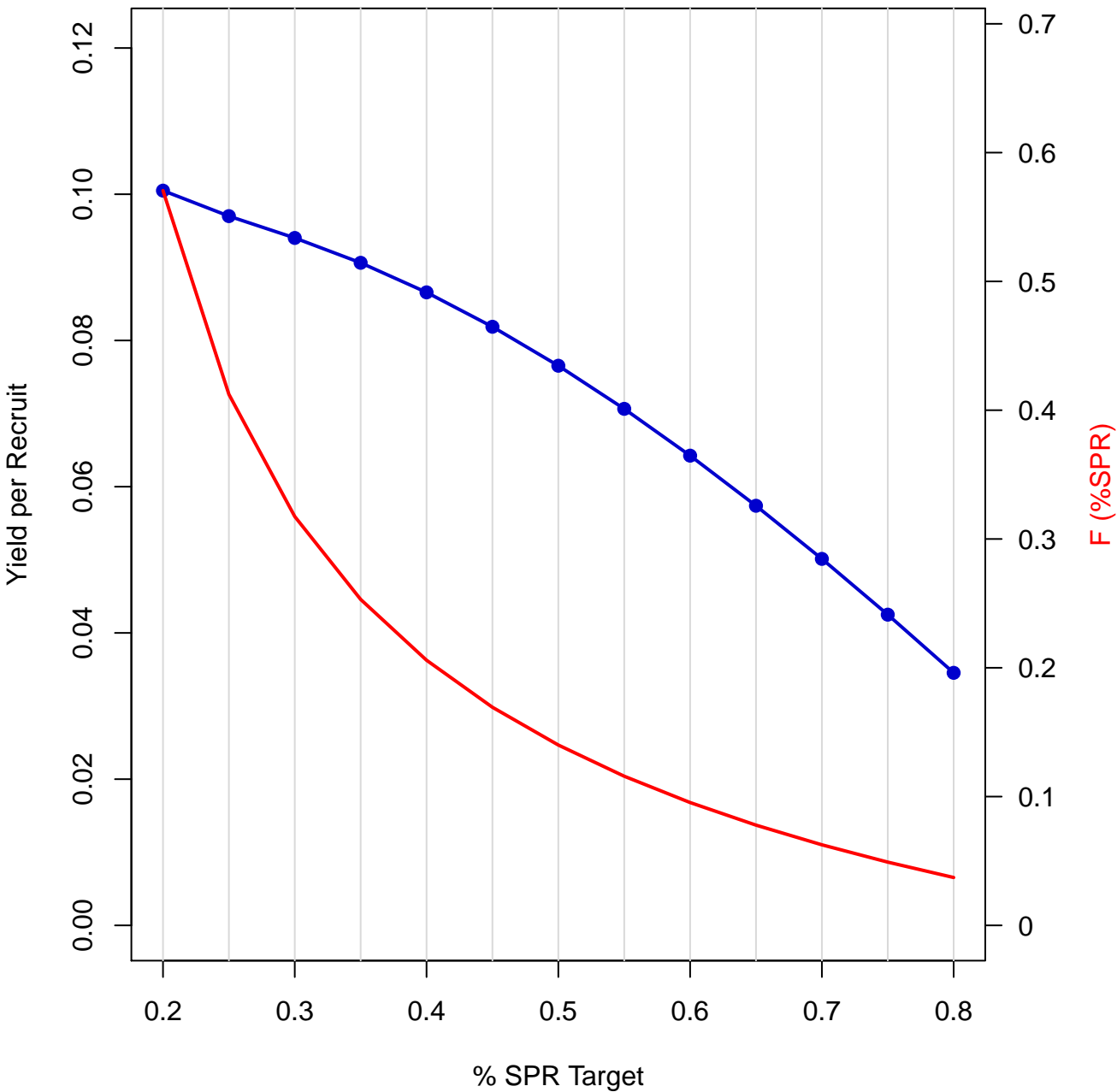
YPR-SPR Reference Points (Years Avg = 5)



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

F	YPR	SPR	F	YPR	SPR	F	YPR	SPR
0	0	1	0.35	0.0952	0.2803	0.7	0.1033	0.1748
0.01	0.0111	0.9383	0.36	0.0955	0.2749	0.71	0.1035	0.1732
0.02	0.0207	0.8829	0.37	0.0959	0.2697	0.72	0.1037	0.1716
0.03	0.0291	0.8329	0.38	0.0961	0.2647	0.73	0.104	0.1701
0.04	0.0365	0.7877	0.39	0.0964	0.2599	0.74	0.1042	0.1686
0.05	0.043	0.7466	0.4	0.0967	0.2554	0.75	0.1044	0.1672
0.06	0.0488	0.7091	0.41	0.0969	0.251	0.76	0.1046	0.1658
0.07	0.0538	0.6748	0.42	0.0972	0.2468	0.77	0.1049	0.1644
0.08	0.0583	0.6434	0.43	0.0974	0.2428	0.78	0.1051	0.163
0.09	0.0623	0.6146	0.44	0.0977	0.2389	0.79	0.1053	0.1617
0.1	0.0658	0.588	0.45	0.0979	0.2352	0.8	0.1055	0.1604
0.11	0.069	0.5634	0.46	0.0981	0.2317	0.81	0.1058	0.1592
0.12	0.0718	0.5407	0.47	0.0984	0.2283	0.82	0.106	0.158
0.13	0.0743	0.5196	0.48	0.0986	0.225	0.83	0.1062	0.1568
0.14	0.0765	0.5001	0.49	0.0988	0.2218	0.84	0.1065	0.1556
0.15	0.0785	0.4819	0.5	0.099	0.2187	0.85	0.1067	0.1544
0.16	0.0804	0.4649	0.51	0.0992	0.2158	0.86	0.1069	0.1533
0.17	0.082	0.449	0.52	0.0994	0.213	0.87	0.1072	0.1522
0.18	0.0834	0.4342	0.53	0.0996	0.2102	0.88	0.1074	0.1511
0.19	0.0847	0.4203	0.54	0.0999	0.2076	0.89	0.1076	0.1501
0.2	0.0859	0.4073	0.55	0.1001	0.205	0.9	0.1079	0.149
0.21	0.087	0.3951	0.56	0.1003	0.2025	0.91	0.1081	0.148
0.22	0.088	0.3836	0.57	0.1005	0.2001	0.92	0.1083	0.147
0.23	0.0889	0.3727	0.58	0.1007	0.1978	0.93	0.1086	0.146
0.24	0.0897	0.3625	0.59	0.1009	0.1955	0.94	0.1088	0.145
0.25	0.0904	0.3529	0.6	0.1011	0.1934	0.95	0.1091	0.1441
0.26	0.0911	0.3438	0.61	0.1013	0.1913	0.96	0.1093	0.1432
0.27	0.0917	0.3352	0.62	0.1015	0.1892	0.97	0.1095	0.1422
0.28	0.0923	0.327	0.63	0.1018	0.1872	0.98	0.1098	0.1413
0.29	0.0928	0.3193	0.64	0.102	0.1853	0.99	0.11	0.1405
0.3	0.0933	0.3119	0.65	0.1022	0.1834	1	0.1102	0.1396
0.31	0.0937	0.305	0.66	0.1024	0.1816	1.01	0.1105	0.1387
0.32	0.0941	0.2984	0.67	0.1026	0.1798	1.02	0.1107	0.1379
0.33	0.0945	0.292	0.68	0.1028	0.1781	1.03	0.1109	0.1371
0.34	0.0949	0.286	0.69	0.1031	0.1764	1.04	0.1112	0.1362

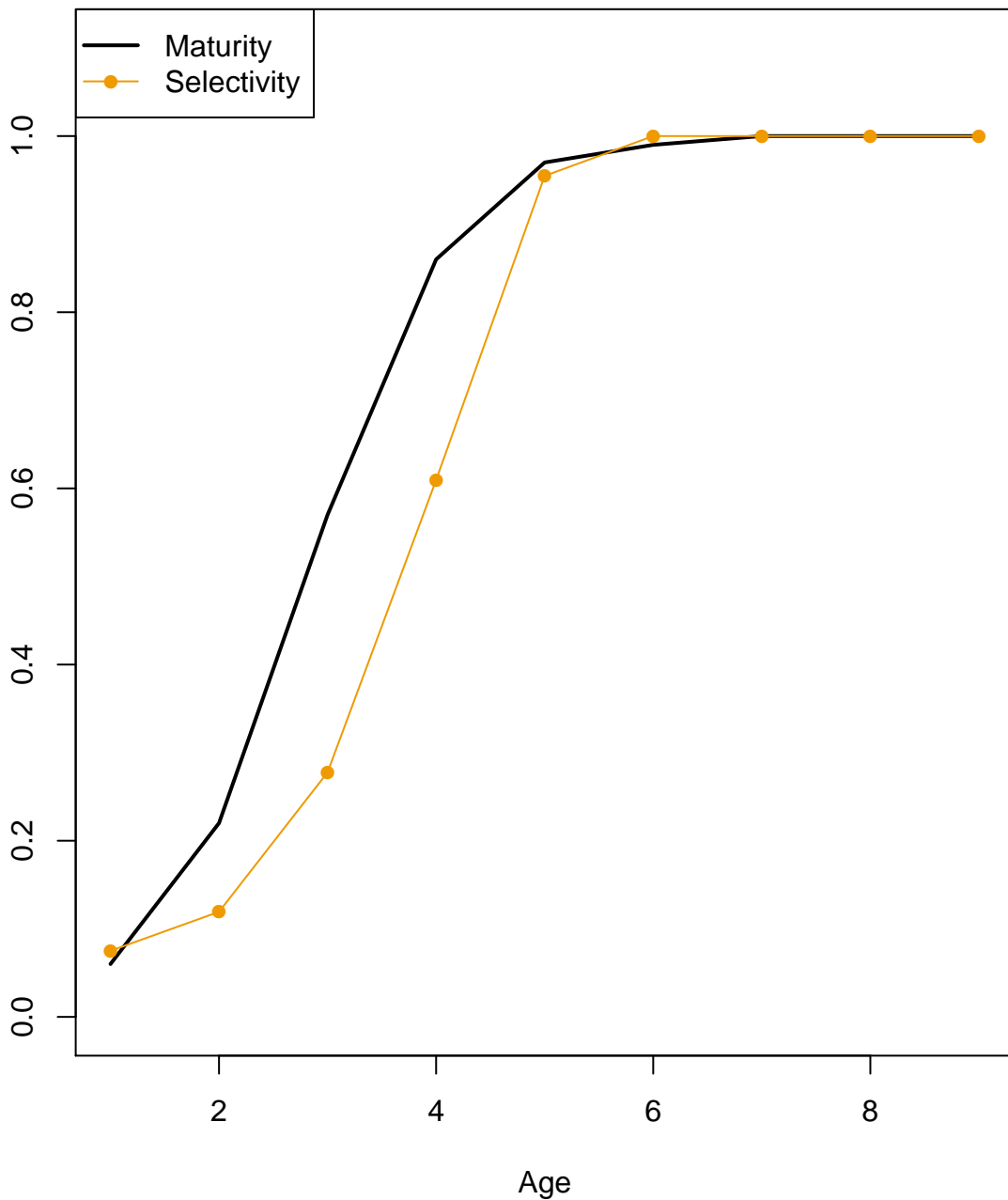
**SPR Target Reference Points (Years Avg = 5)**



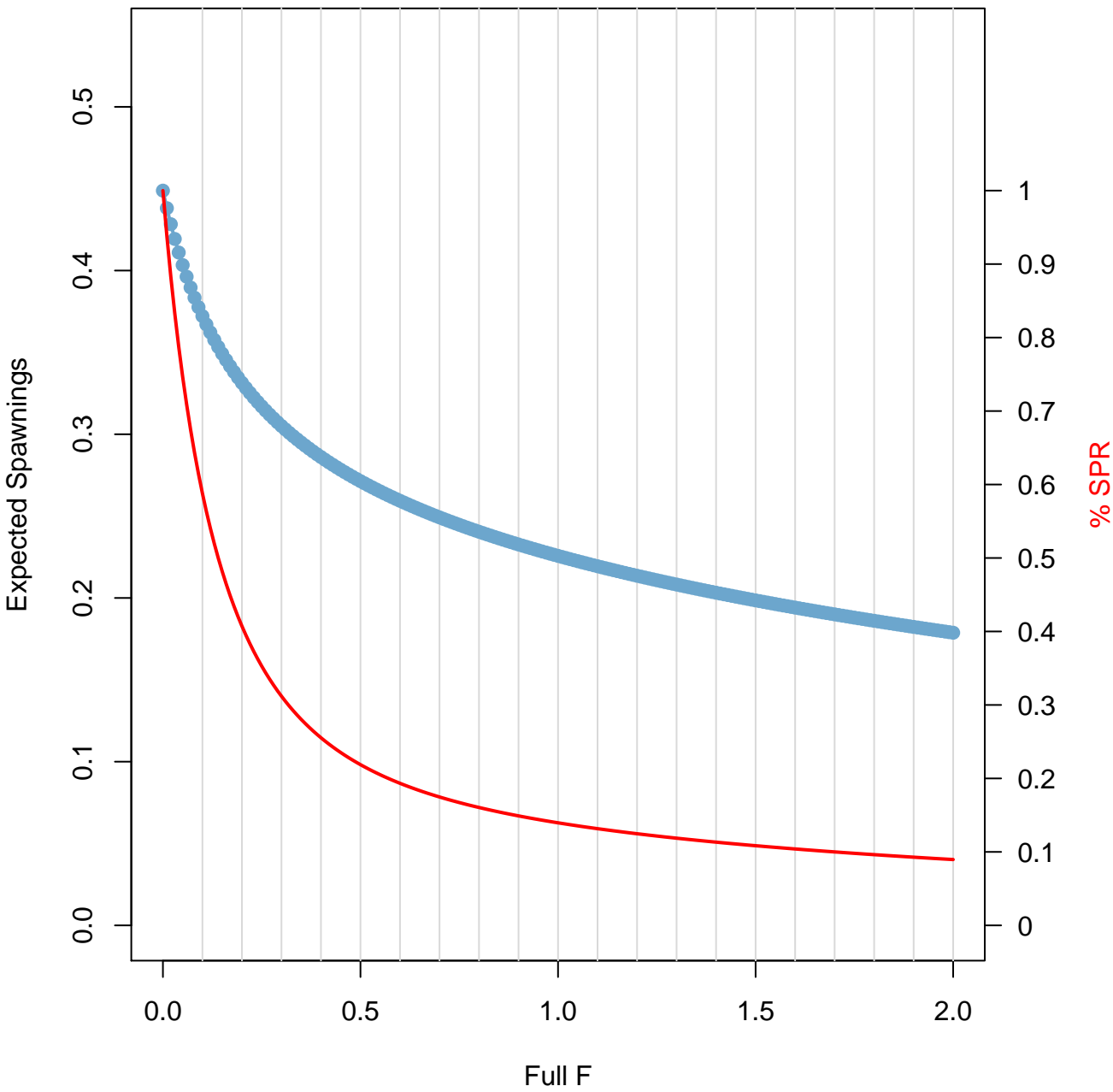
# SPR Target Reference Points (Years Avg = 5)

% SPR	F(%SPR)	YPR
0.2	0.5705	0.1005
0.25	0.4123	0.097
0.3	0.3175	0.094
0.35	0.2531	0.0906
0.4	0.2059	0.0866
0.45	0.1694	0.0819
0.5	0.14	0.0765
0.55	0.1158	0.0707
0.6	0.0954	0.0642
0.65	0.0778	0.0574
0.7	0.0626	0.0501
0.75	0.0491	0.0425
0.8	0.0372	0.0345

Selectivity or Maturity at age



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

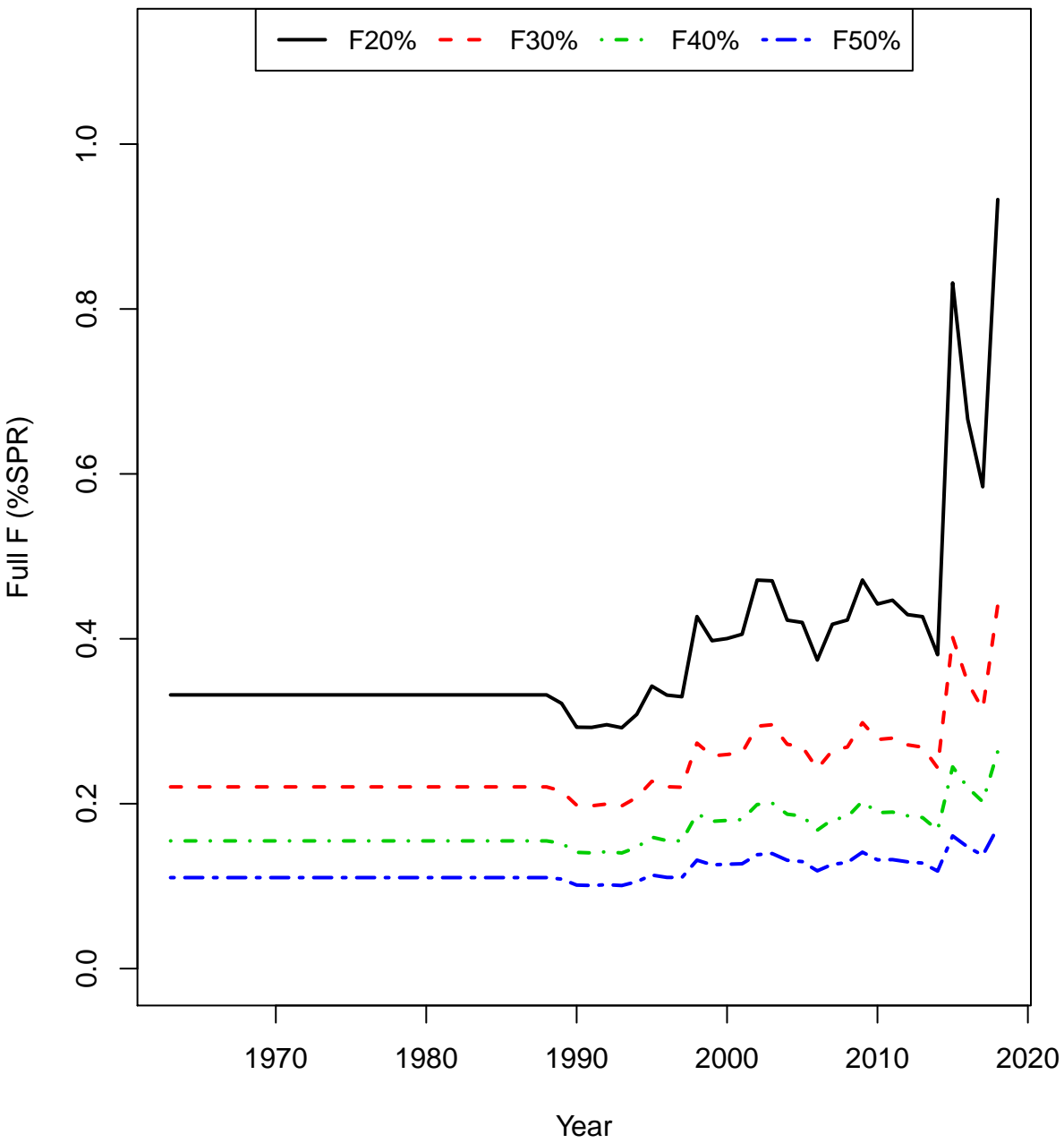




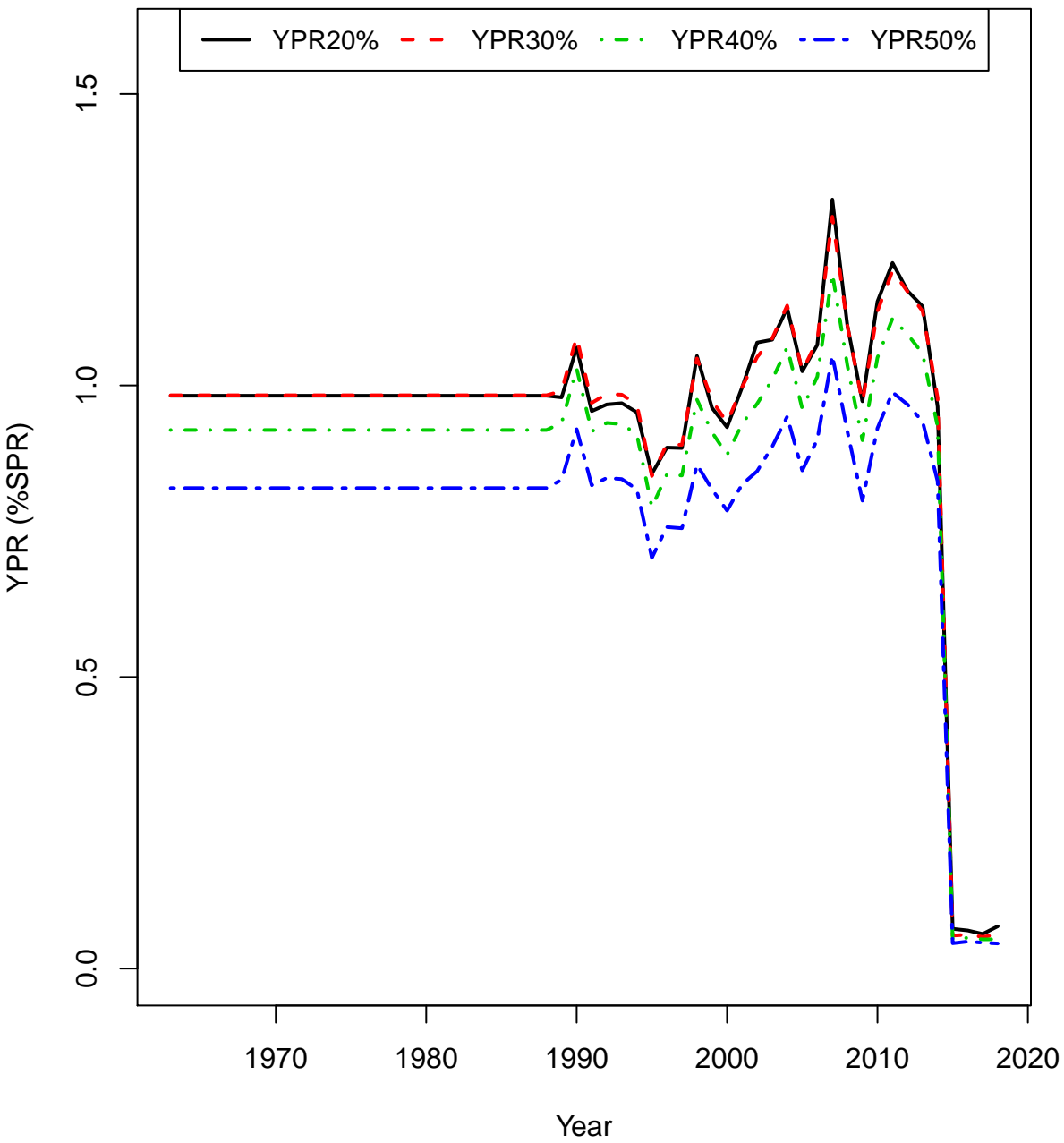
**Expected Spawns & SPR Reference Points (Years Avg = 5)**

<b>F</b>	<b>E[Sp]</b>	<b>SPR</b>	<b>F</b>	<b>E[Sp]</b>	<b>SPR</b>	<b>F</b>	<b>E[Sp]</b>	<b>SPR</b>
0	0.4488	1	0.35	0.2949	0.2803	0.7	0.2492	0.1748
0.01	0.4381	0.9383	0.36	0.2931	0.2749	0.71	0.2483	0.1732
0.02	0.4283	0.8829	0.37	0.2913	0.2697	0.72	0.2474	0.1716
0.03	0.4193	0.8329	0.38	0.2895	0.2647	0.73	0.2465	0.1701
0.04	0.411	0.7877	0.39	0.2878	0.2599	0.74	0.2456	0.1686
0.05	0.4034	0.7466	0.4	0.2861	0.2554	0.75	0.2447	0.1672
0.06	0.3963	0.7091	0.41	0.2845	0.251	0.76	0.2438	0.1658
0.07	0.3896	0.6748	0.42	0.2829	0.2468	0.77	0.243	0.1644
0.08	0.3834	0.6434	0.43	0.2813	0.2428	0.78	0.2421	0.163
0.09	0.3776	0.6146	0.44	0.2798	0.2389	0.79	0.2413	0.1617
0.1	0.3722	0.588	0.45	0.2783	0.2352	0.8	0.2405	0.1604
0.11	0.3671	0.5634	0.46	0.2769	0.2317	0.81	0.2396	0.1592
0.12	0.3623	0.5407	0.47	0.2755	0.2283	0.82	0.2388	0.158
0.13	0.3577	0.5196	0.48	0.2741	0.225	0.83	0.238	0.1568
0.14	0.3534	0.5001	0.49	0.2727	0.2218	0.84	0.2372	0.1556
0.15	0.3492	0.4819	0.5	0.2714	0.2187	0.85	0.2365	0.1544
0.16	0.3453	0.4649	0.51	0.2701	0.2158	0.86	0.2357	0.1533
0.17	0.3416	0.449	0.52	0.2688	0.213	0.87	0.2349	0.1522
0.18	0.3381	0.4342	0.53	0.2675	0.2102	0.88	0.2342	0.1511
0.19	0.3347	0.4203	0.54	0.2663	0.2076	0.89	0.2334	0.1501
0.2	0.3314	0.4073	0.55	0.2651	0.205	0.9	0.2327	0.149
0.21	0.3283	0.3951	0.56	0.2639	0.2025	0.91	0.232	0.148
0.22	0.3253	0.3836	0.57	0.2627	0.2001	0.92	0.2312	0.147
0.23	0.3225	0.3727	0.58	0.2616	0.1978	0.93	0.2305	0.146
0.24	0.3197	0.3625	0.59	0.2605	0.1955	0.94	0.2298	0.145
0.25	0.317	0.3529	0.6	0.2594	0.1934	0.95	0.2291	0.1441
0.26	0.3145	0.3438	0.61	0.2583	0.1913	0.96	0.2284	0.1432
0.27	0.312	0.3352	0.62	0.2572	0.1892	0.97	0.2277	0.1422
0.28	0.3096	0.327	0.63	0.2562	0.1872	0.98	0.2271	0.1413
0.29	0.3073	0.3193	0.64	0.2551	0.1853	0.99	0.2264	0.1405
0.3	0.3051	0.3119	0.65	0.2541	0.1834	1	0.2257	0.1396
0.31	0.3029	0.305	0.66	0.2531	0.1816	1.01	0.2251	0.1387
0.32	0.3008	0.2984	0.67	0.2521	0.1798	1.02	0.2244	0.1379
0.33	0.2988	0.292	0.68	0.2511	0.1781	1.03	0.2238	0.1371
0.34	0.2968	0.286	0.69	0.2502	0.1764	1.04	0.2231	0.1362

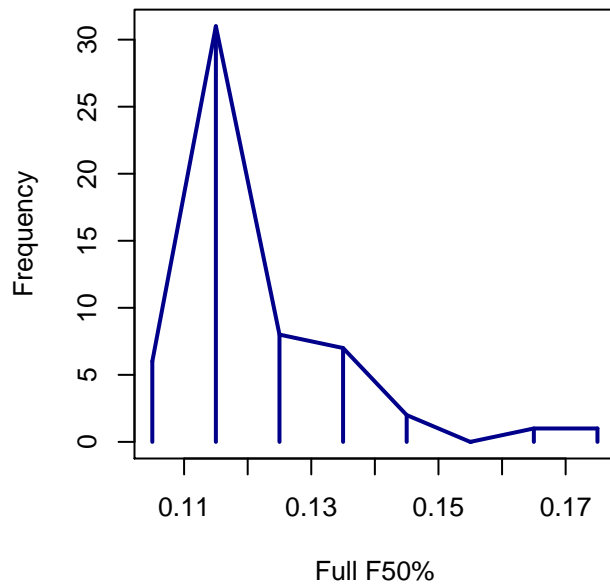
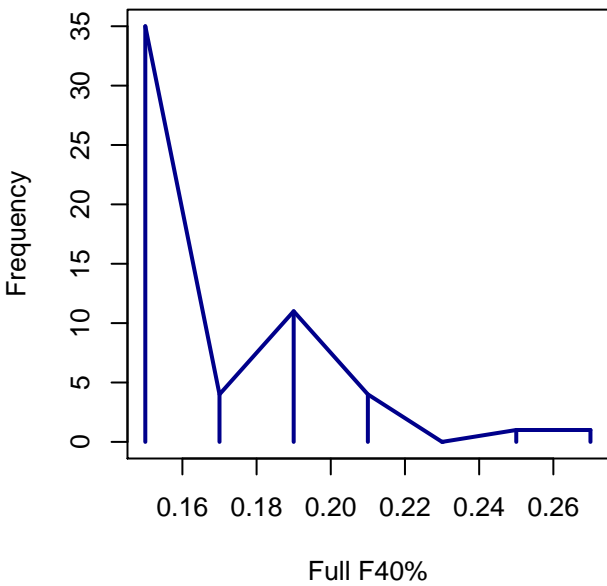
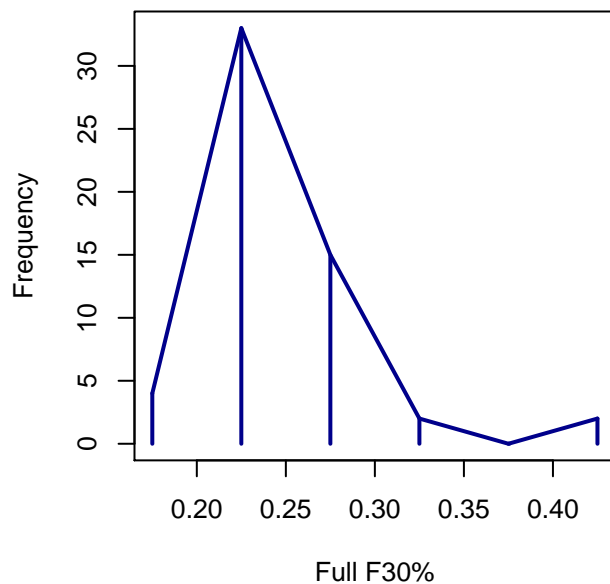
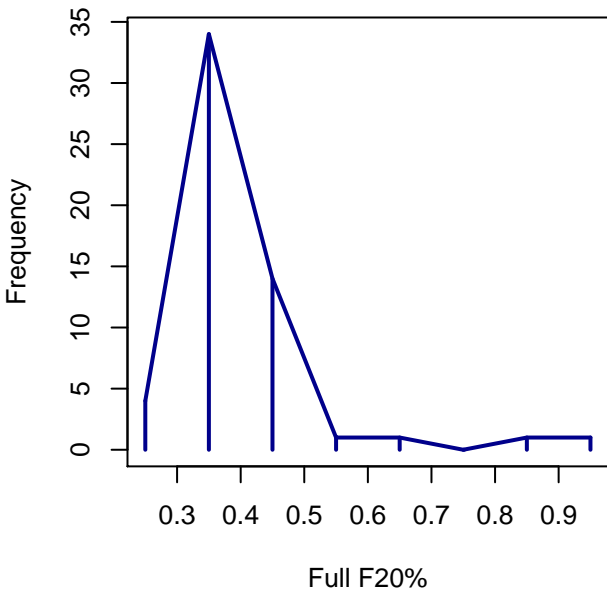
Annual F(%SPR) Reference Points



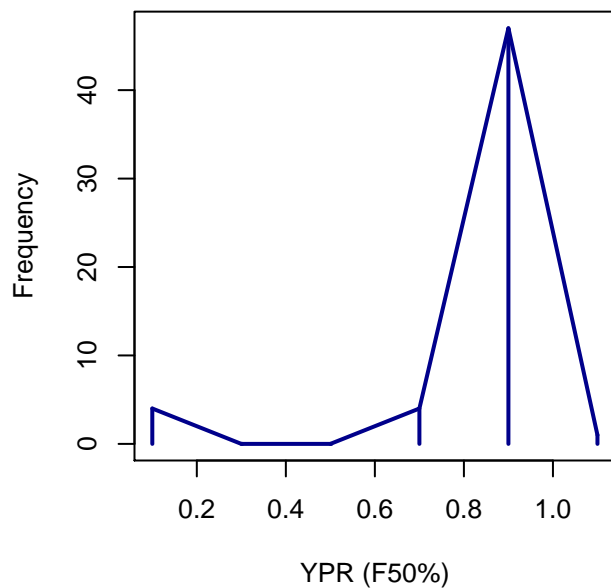
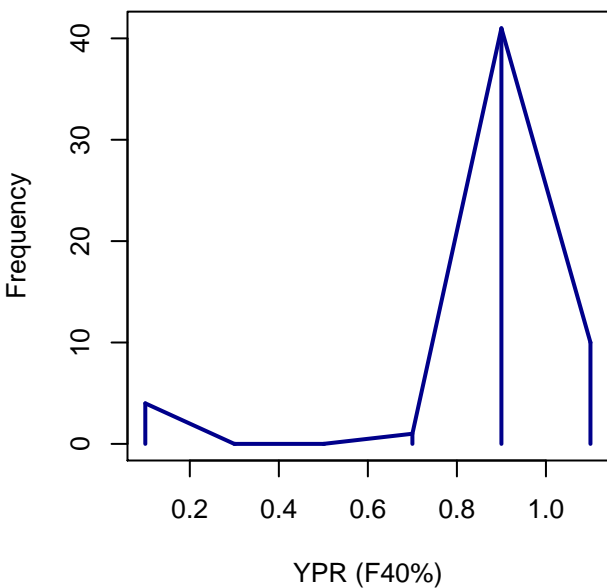
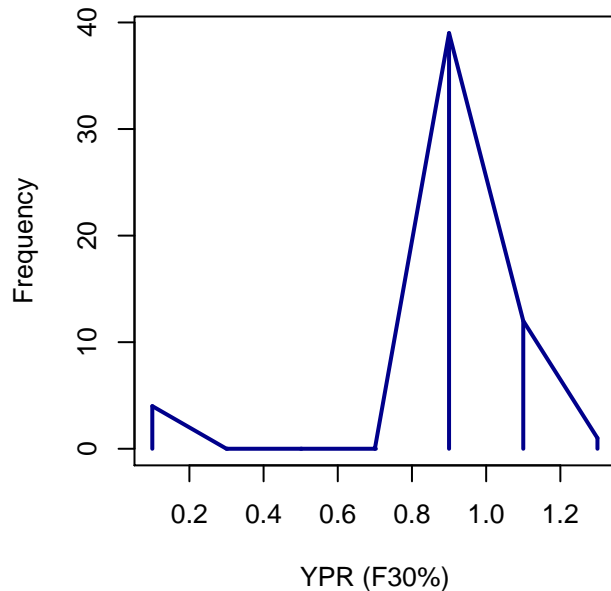
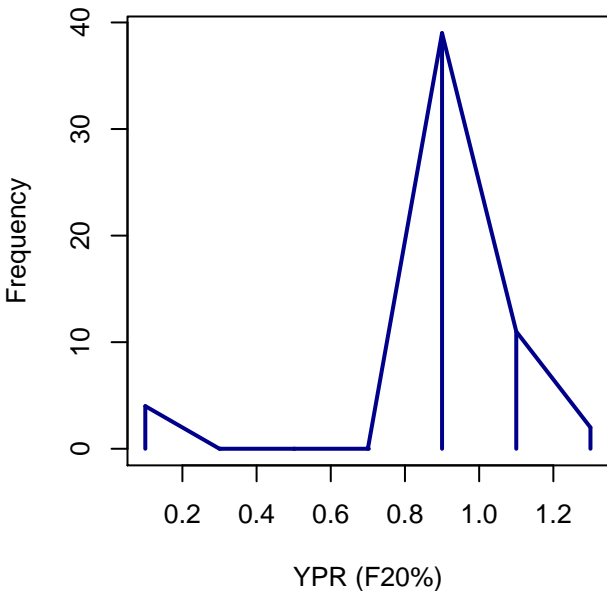
Annual YPR(%SPR) Reference Points



## Annual F (%SPR) Reference Points

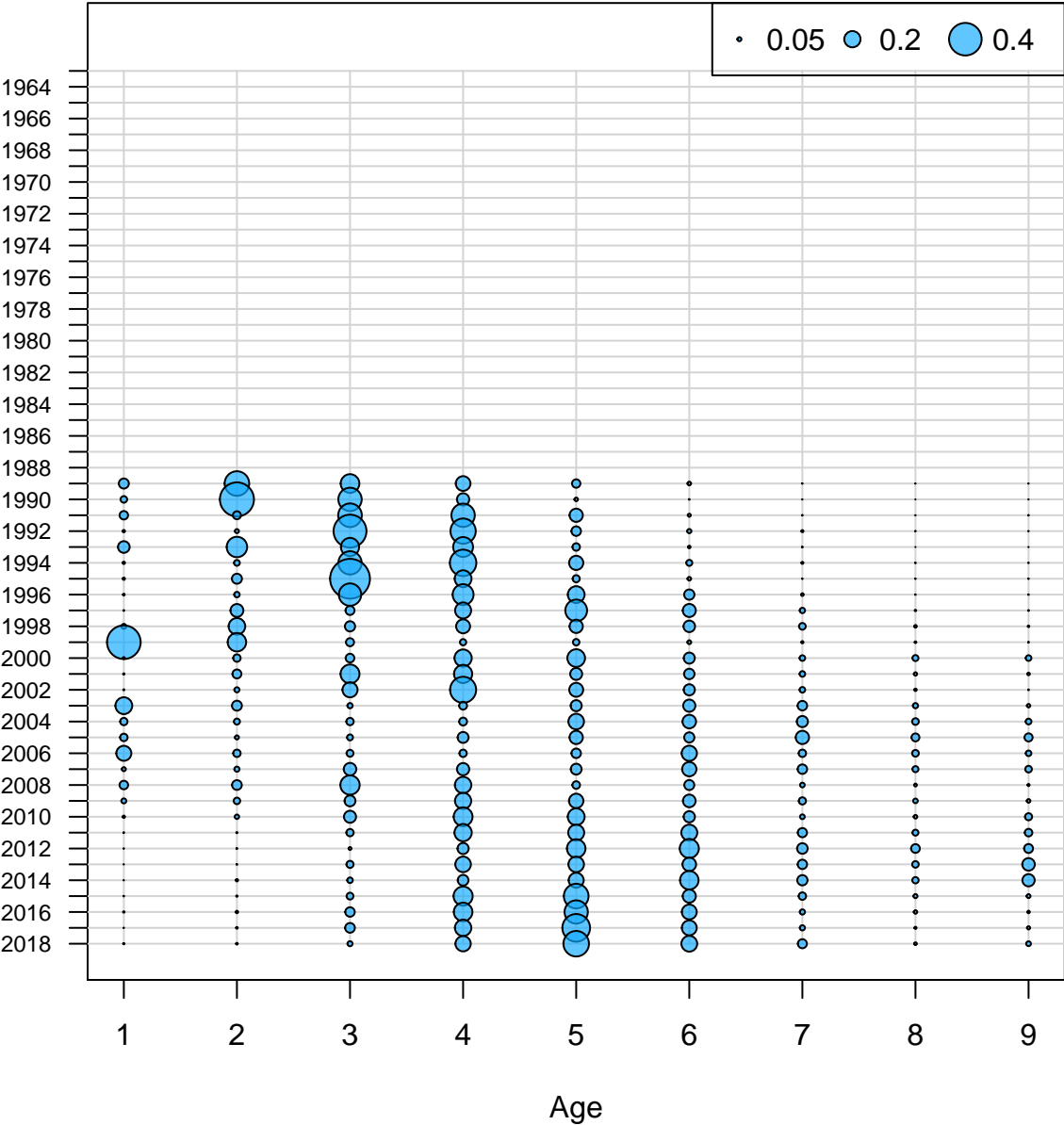


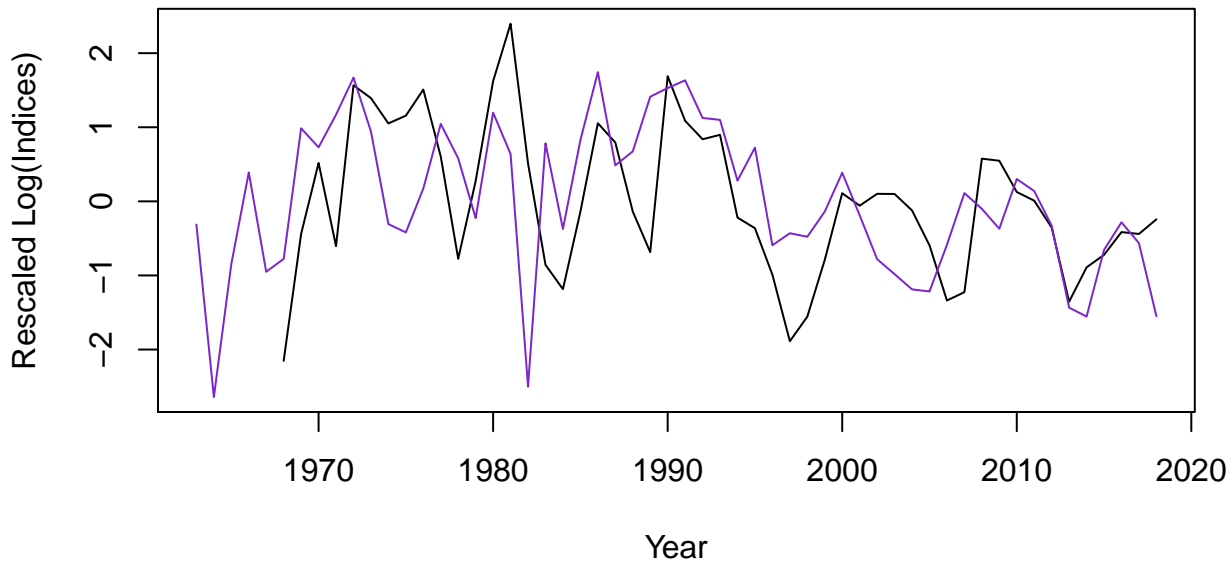
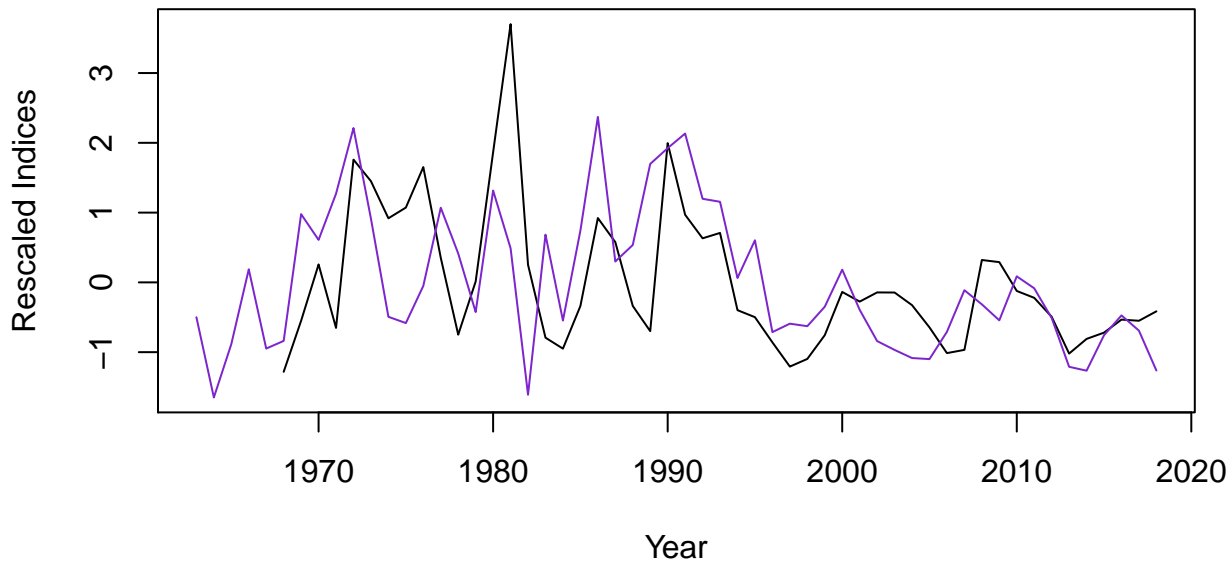
**Annual YPR (%SPR) Reference Points**





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







# Age Comps for Index 1 (INDEX-1)

• 0.05 • 0.2 • 0.4

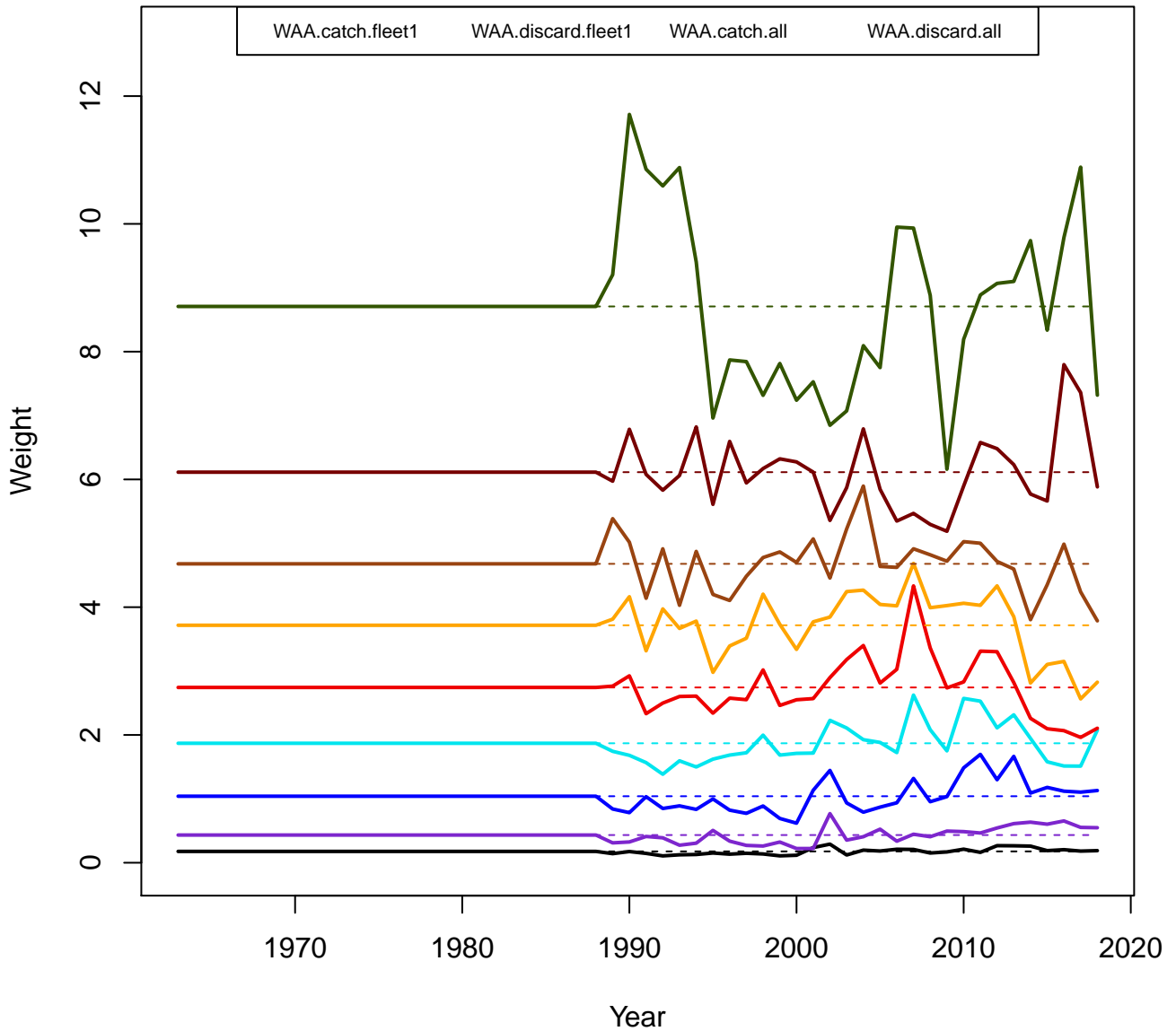


Age

# Age Comps for Index 2 (INDEX-2)



# WAA matrix 1



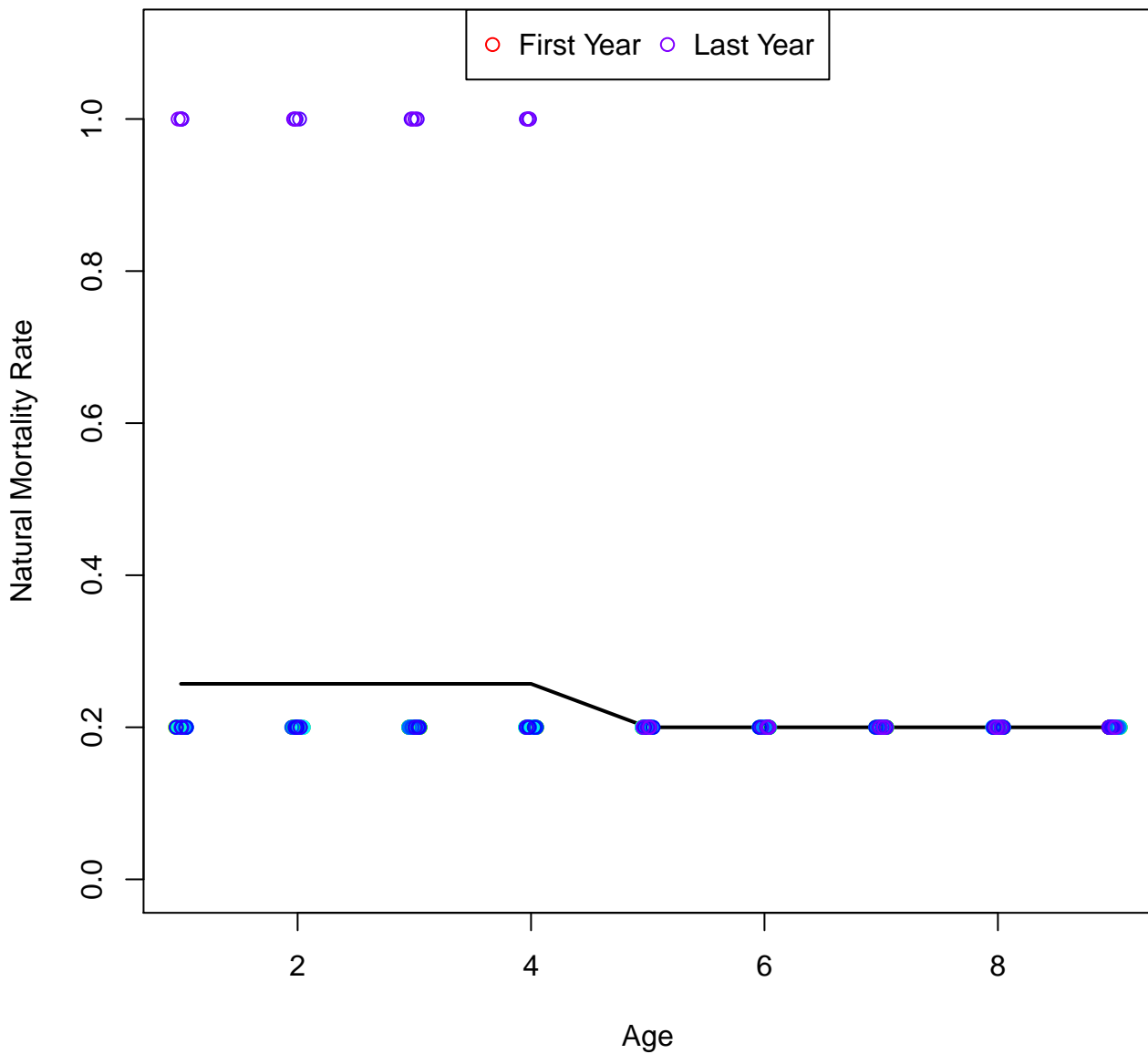
# WAA matrix 2



# WAA matrix 3



M



# Maturity

