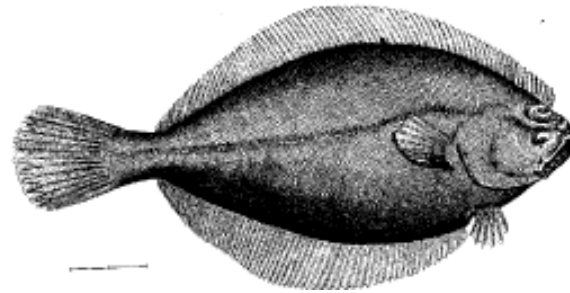




NOAA
FISHERIES

Gulf of Maine - Georges Bank American Plaice



Hippoglossoides platessoides

Groundfish Operational Assessment Review Meeting
NEFSC
Woods Hole, Ma
September 14-18, 2015

Last assessed:

2012 Update

Age –structured model :

VPA; Terminal year = 2010

Reference Points:

$F_{40\%} = .179$

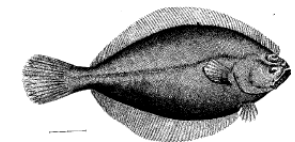
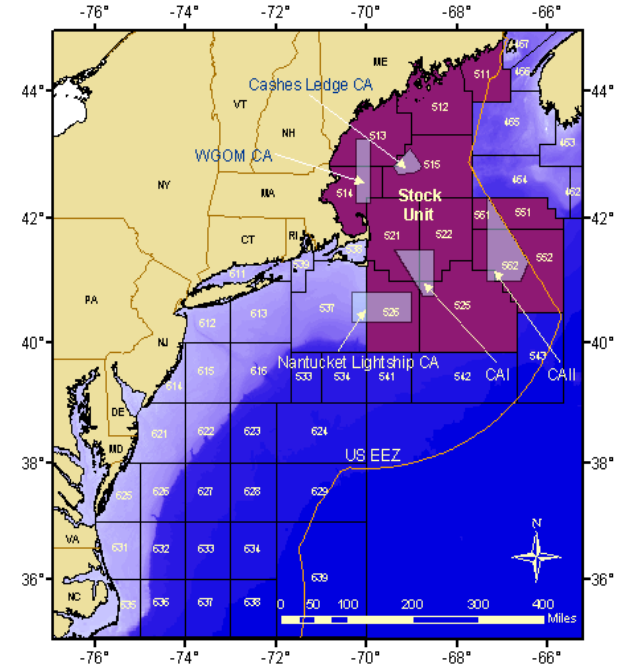
$MSY = 3,385$ mt

$SSB_{MSY} = 18,398$ mt

Status in 2012:

Not overfished : 2010 SSB = 10,805 mt (retro adjusted)

Overfishing *not* occurring: 2011 F = 0.13 (retro adjusted)



2015 Operational assessment:

Age –structured model :

VPA; Terminal year = 2014

Reference Points:

$$F_{40\%} = 0.196$$

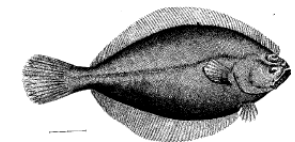
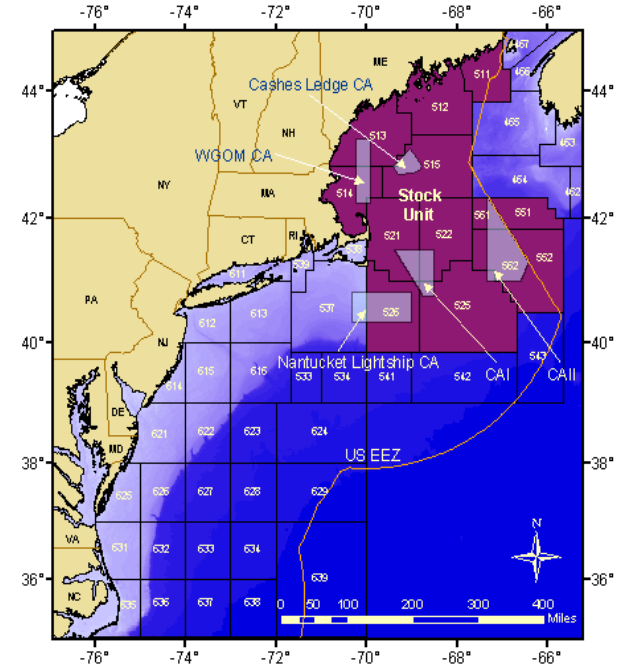
$$MSY = 2,658 \text{ mt}$$

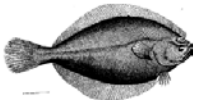
$$SSB_{MSY} = 13,288 \text{ mt}$$

Status in 2015:

Not overfished : 2014 SSB = 10,977 mt (retro adjusted)

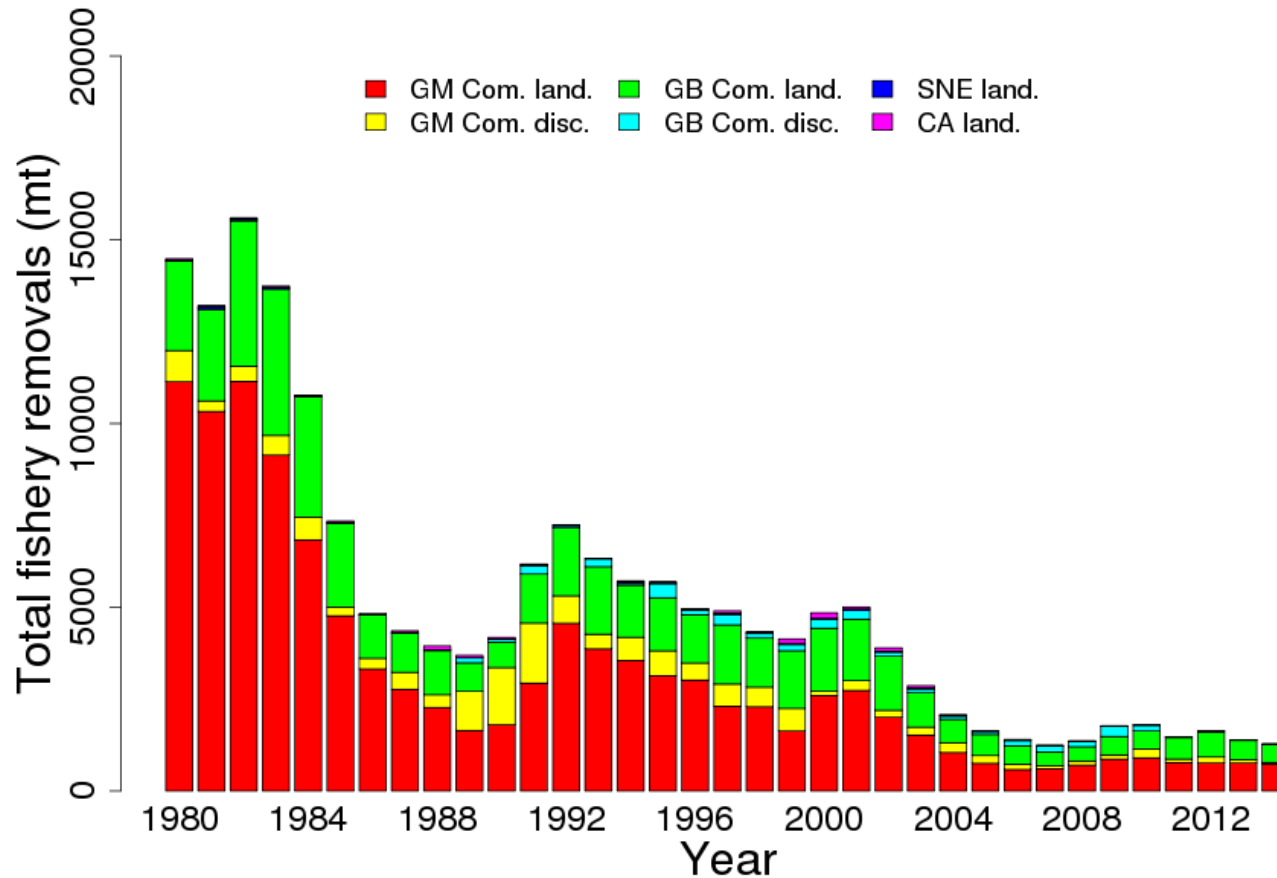
Overfishing *not* occurring: 2011 F = 0.12 (retro adjusted)

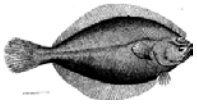




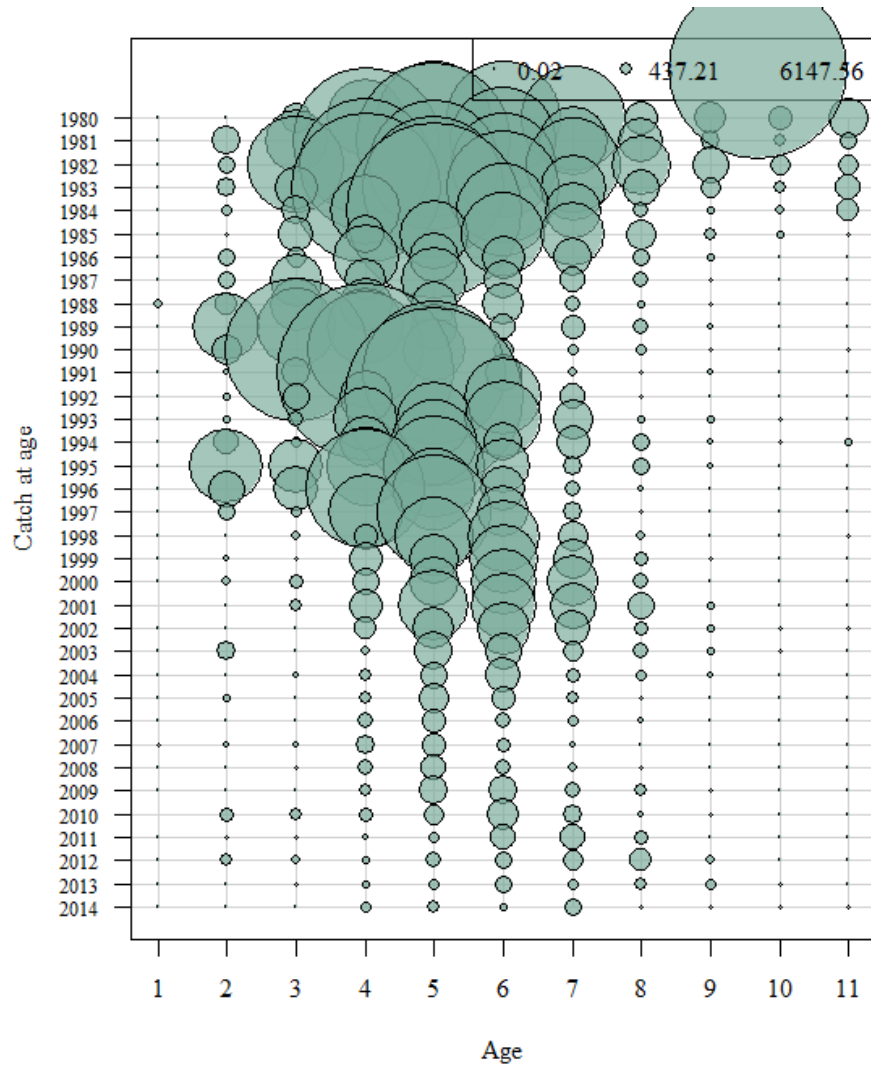
Catch

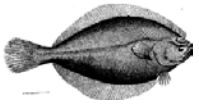
Catch 2014 = 1,328 mt (1,239 mt landings, 89 mt discards)



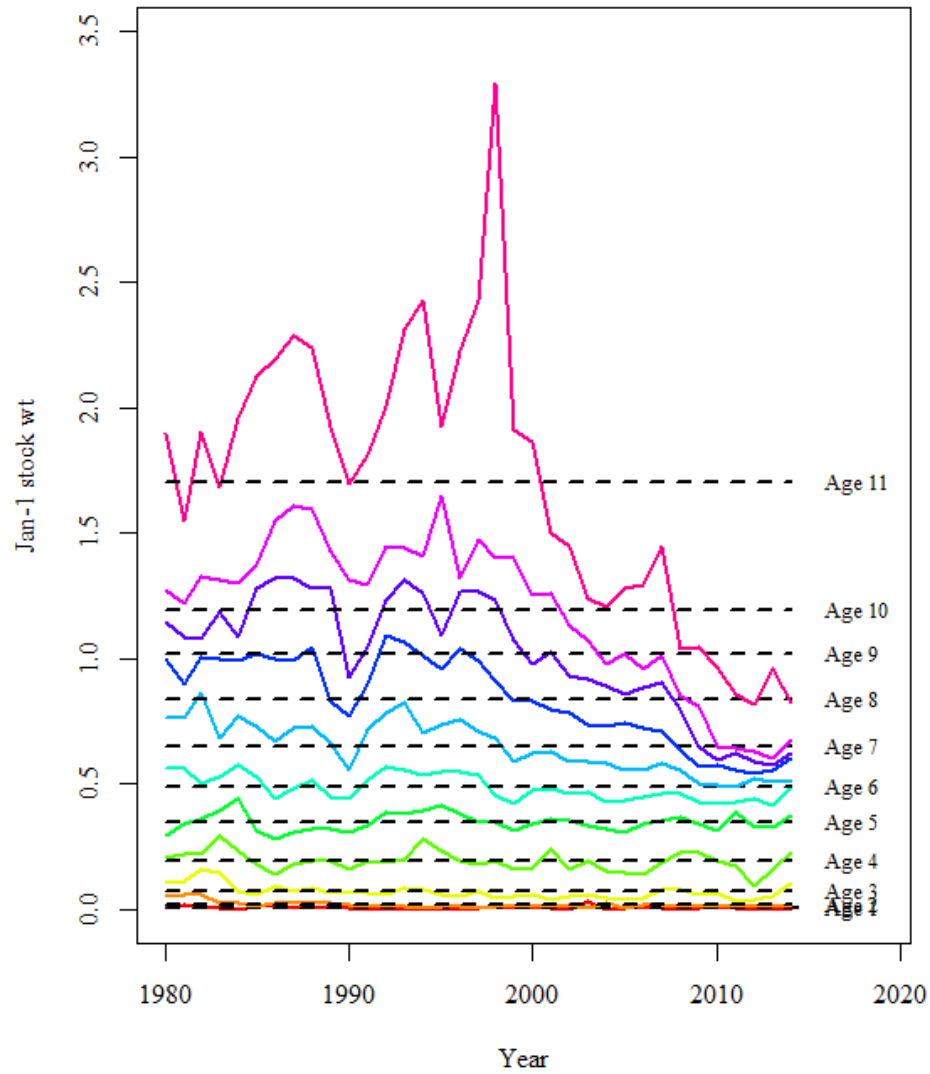


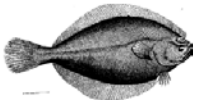
Catch at age



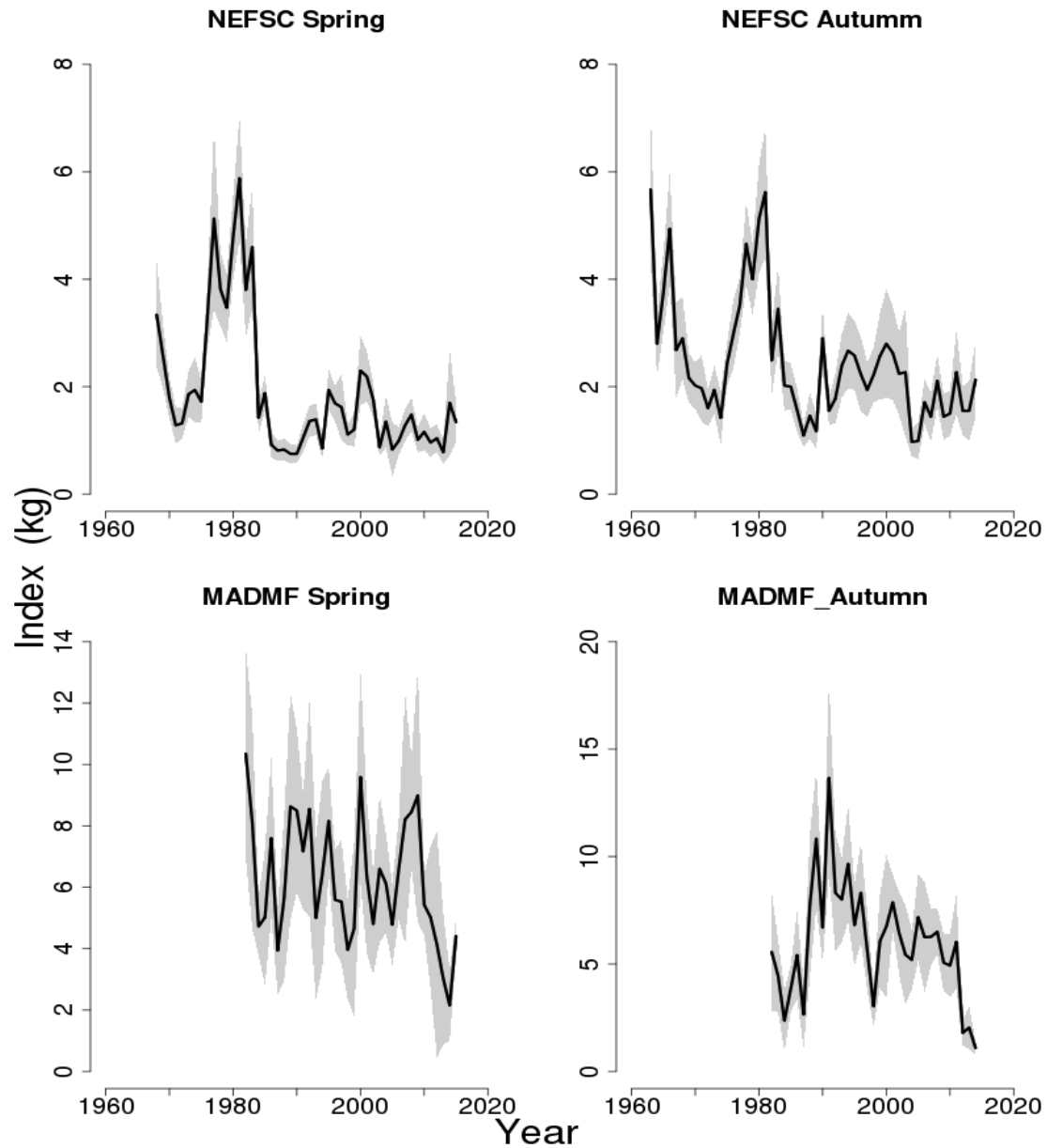


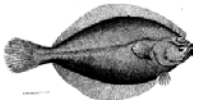
Jan. 1 stock weight at age



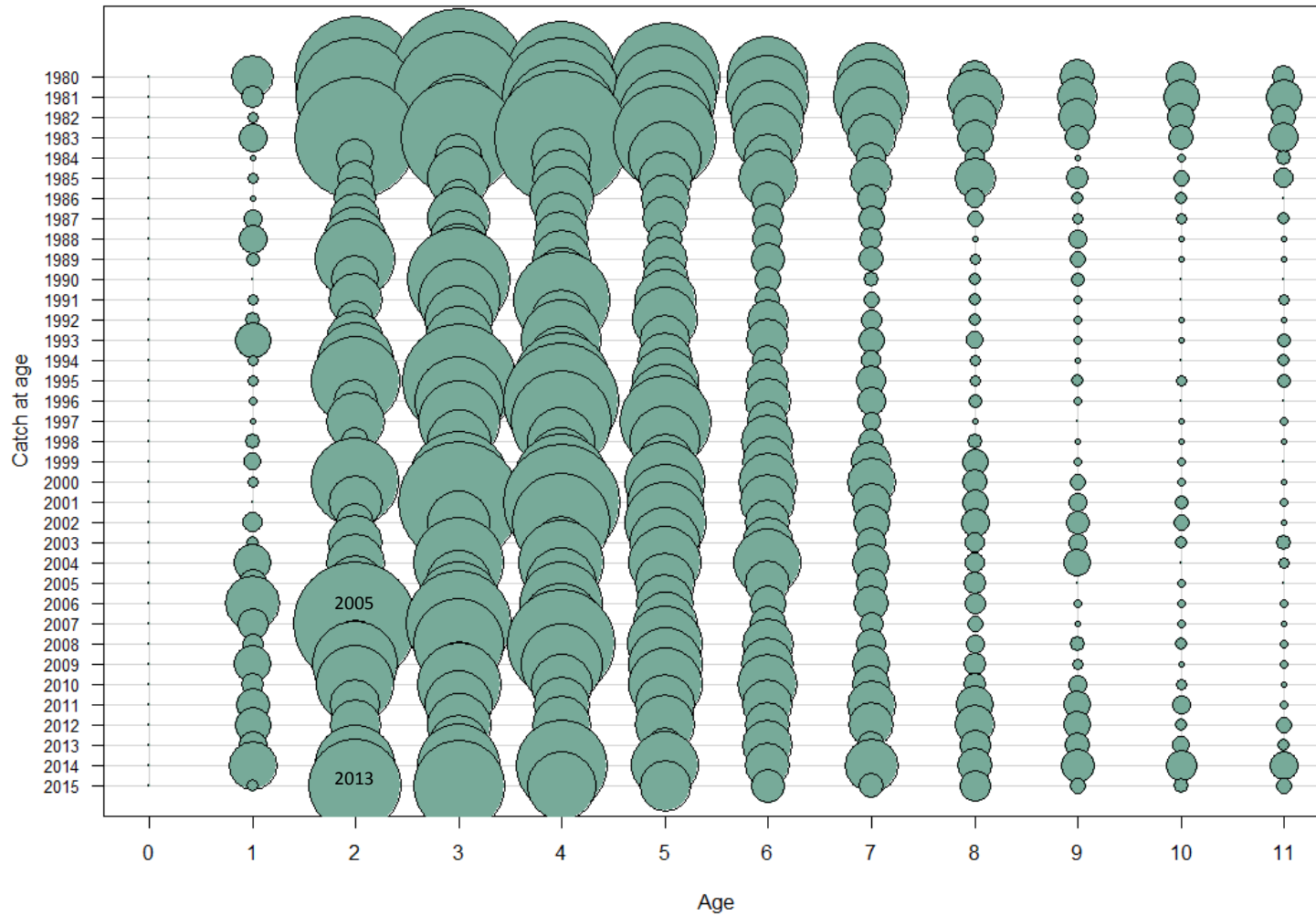


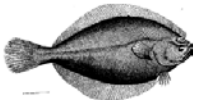
Survey indices





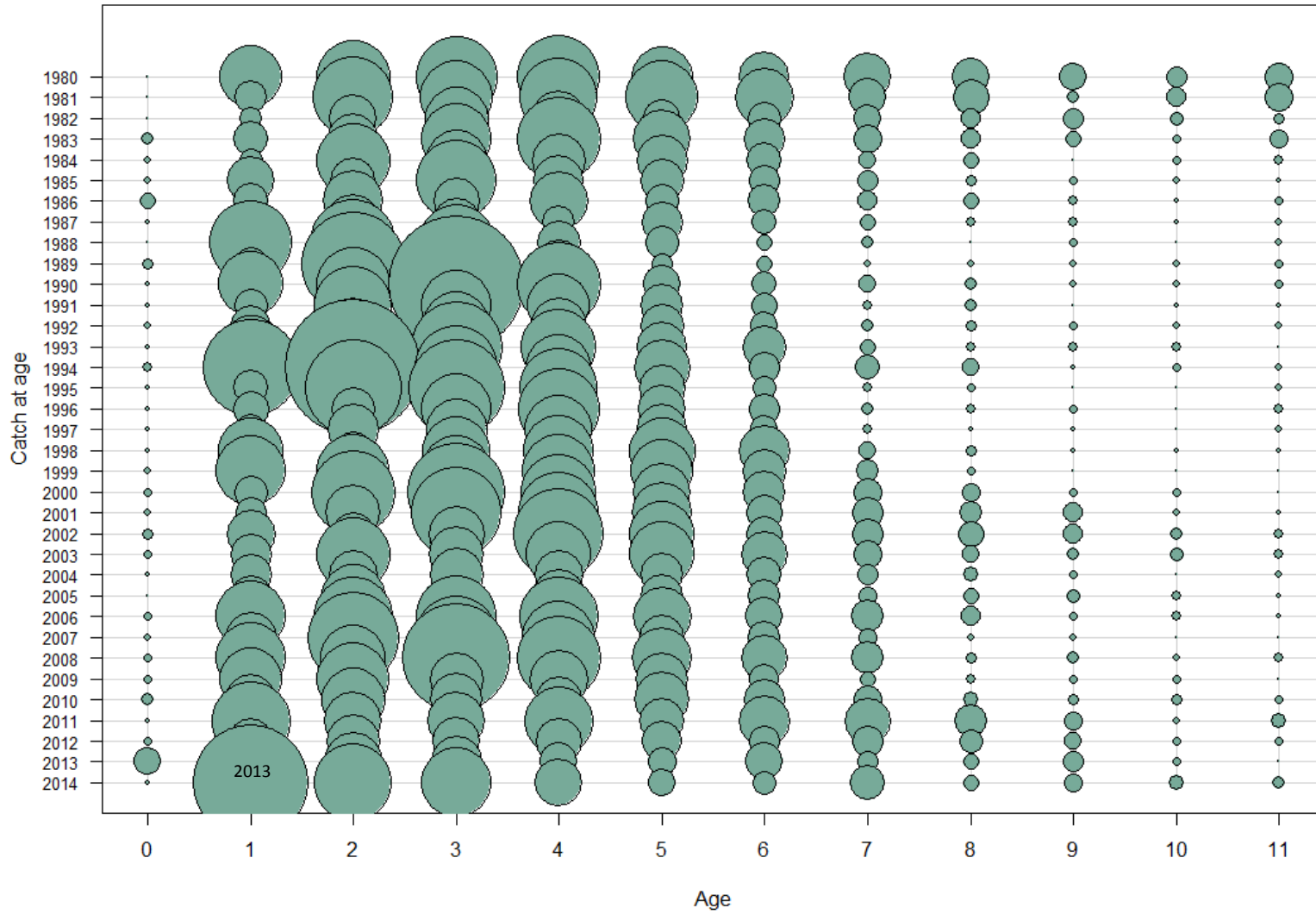
Spring Survey Numbers at Age

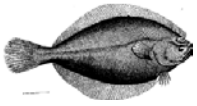




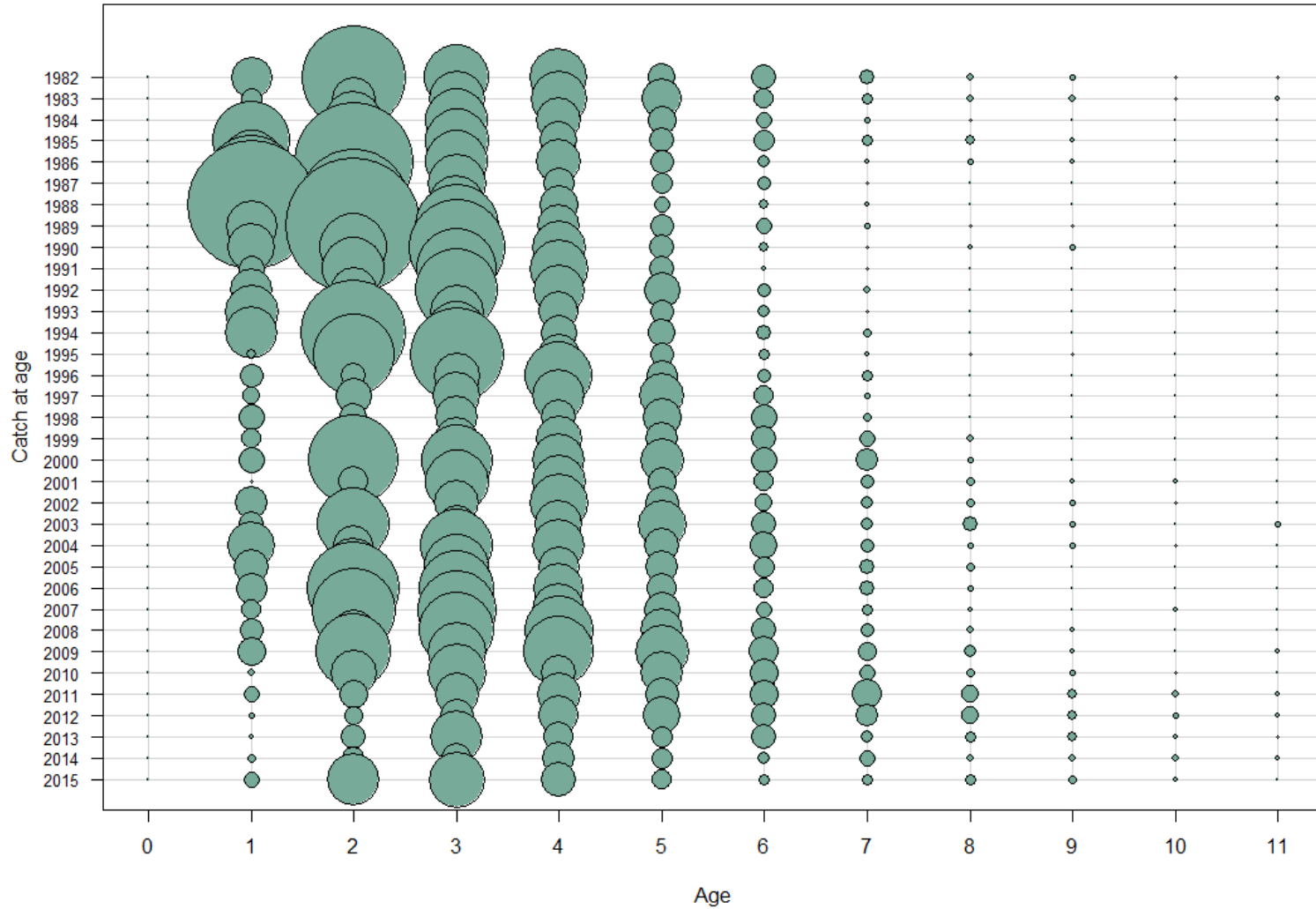
Data

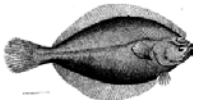
Autumn Survey Numbers at Age





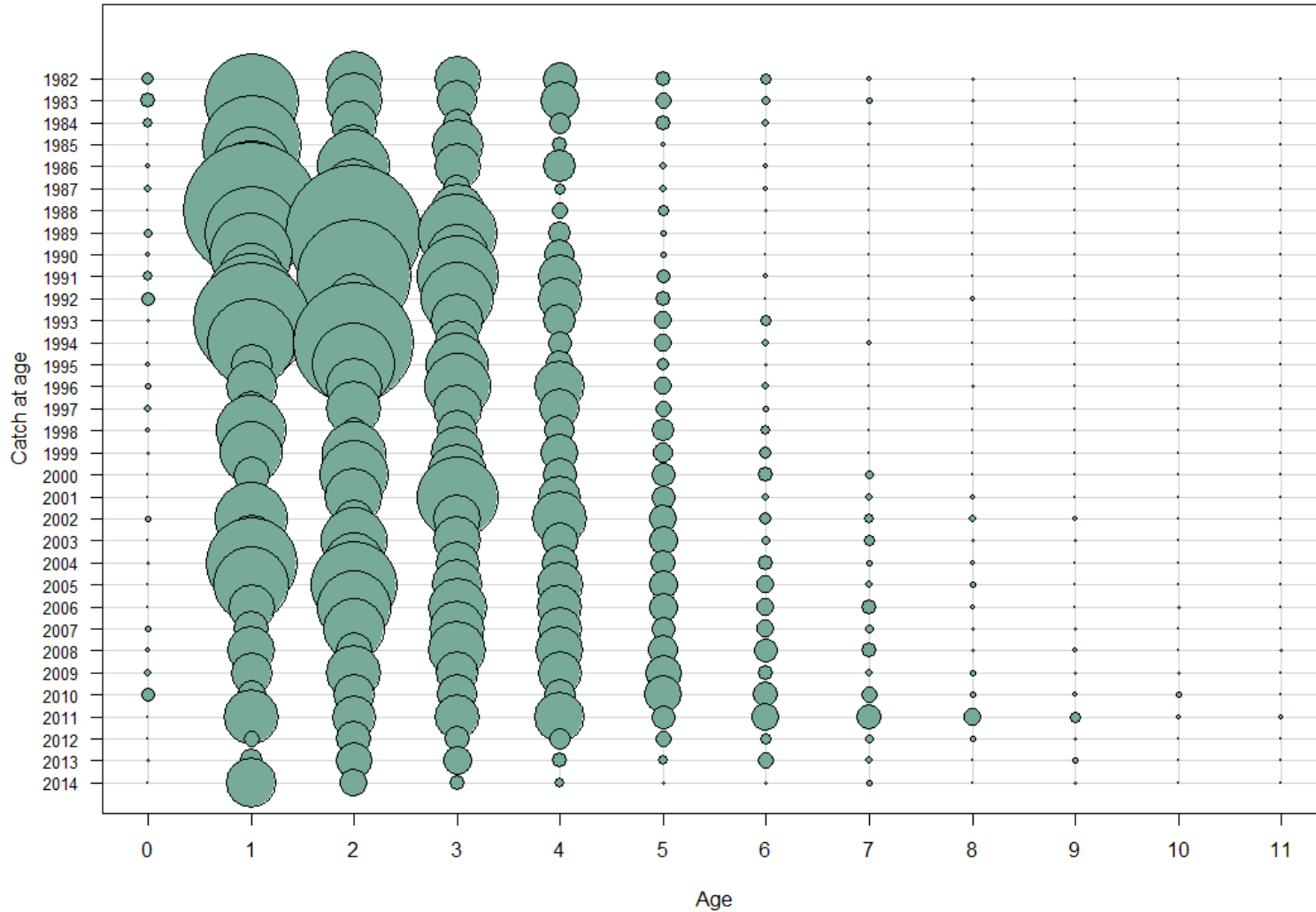
Spring MA Survey Numbers at Age

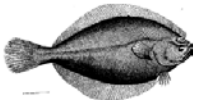




Data

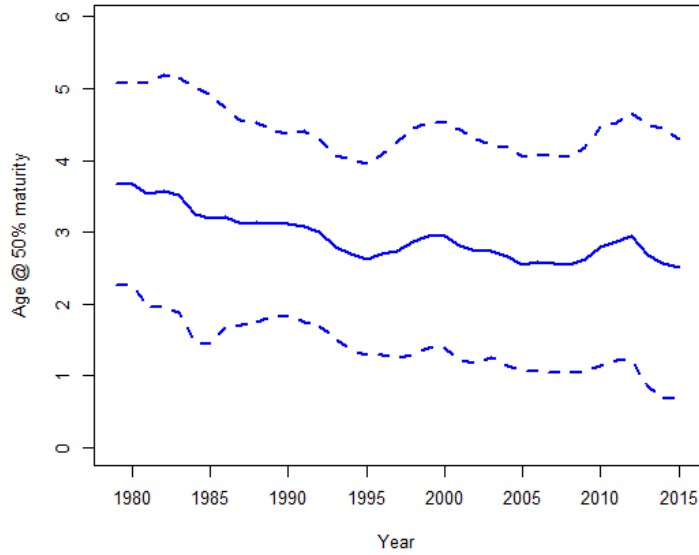
Autumn MA Survey Numbers at Age



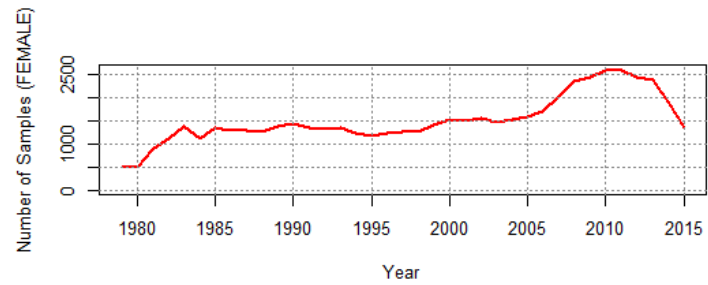
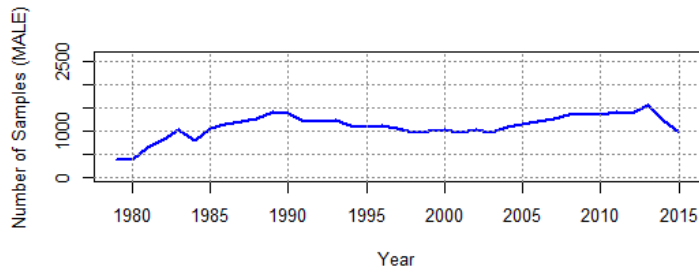
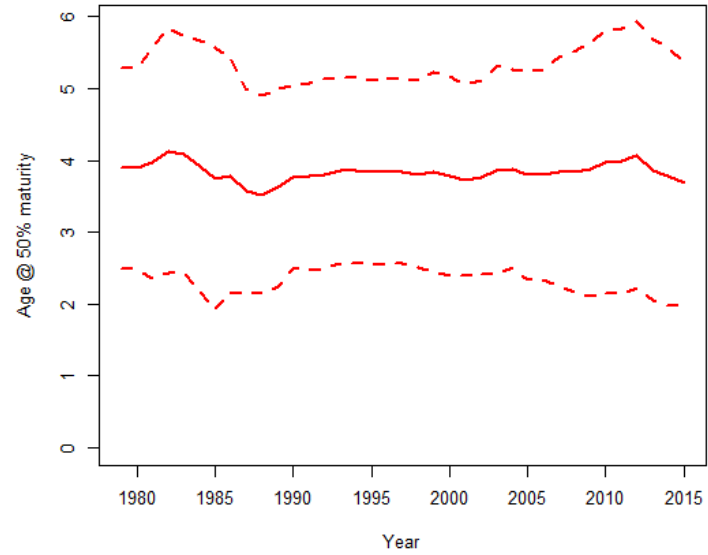


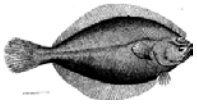
Data - Maturity at age

MALE GM-GB American Plaice at 50% maturity (5 yr window)



FEMALE GM-GB American Plaice at 50% maturity (5 yr window)

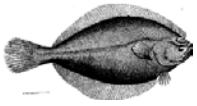




Sensitivity Bridge runs

A					B					C					D				
2012 TY 2010 VPA 3.1.0					2015 TY 2010 Rerun VPA 3.3.0					2015 TY2010 rerun MA SV					2015 TY2014				
Res.SumSq 368.625					Res.SumSq 370.19					Res.SumSq					Res.SumSq 445.855				
Population # Std					Population # Std					Population # Std					Population # Std				
age	2011	Error	CV	F2010	age	2011	Error	CV	F2010	age	2011	Error	CV	F2010	age	2015	Error	CV	F2014
1	20748	10020	0.48	0.00	1	20708	10022	0.48	0.00	1	23539	11056	0.47	0.00	1	9134	4551	0.50	0.00
2	6241	1742	0.28	0.07	2	6235	1744	0.28	0.07	2	8180	2221	0.27	0.03	2	24832	7151	0.29	0.00
3	11428	2583	0.23	0.06	3	11420	2587	0.23	0.06	3	15358	3289	0.21	0.03	3	7570	1691	0.22	0.01
4	11089	2120	0.19	0.07	4	11082	2123	0.19	0.07	4	12572	2290	0.18	0.07	4	4964	946	0.19	0.07
5	6771	1169	0.17	0.05	5	6766	1171	0.17	0.05	5	6780	1129	0.17	0.05	5	4898	882	0.18	0.16
6	12858	2067	0.16	0.11	6	12850	2071	0.16	0.11	6	12881	2001	0.16	0.12	6	2260	434	0.19	0.07
7	8705	1426	0.16	0.10	7	8732	1472	0.17	0.11	7	8109	1338	0.17	0.11	7	3301	571	0.17	0.13
8	5738	985	0.17	0.08	8	5599	970	0.17	0.09	8	5210	887	0.17	0.09	8	4191	722	0.17	0.08
9	2598	505	0.19	0.04	9	2431	478	0.20	0.05	9	2288	443	0.19	0.05	9	2063	412	0.20	0.04
10	2770	503	0.18	0.09	10	2615	482	0.18	0.09	10	2474	448	0.18	0.09	10	4740	786	0.17	0.08
total	88946				total	88439				total	97393				total	67953			
2010	F6-9	SSB			2010	F6-9	SSB	Rct.		2010	F6-9	SSB	Rct.		2014	F6-9	SSB	Rct.	
unadj	0.09	17642			unadj	0.09	17463			unadj	0.09	17359			unadj	0.08	14543	9.134	
M. Rho	-0.35	0.63	1.24		M. Rho	-0.37	0.62	0.40							retro adj	0.12	10977	7.087	
adj. fct	1.54	0.61	0.45		adj. fct	1.59	0.62	0.71							M. Rho	-0.32	0.32	0.29	
															adj. fct	1.48	0.75	0.78	
Index	Catchability	Std. Err	CV		Index	Catchability	Std. Err	CV		Index	Catchability	Std. Err	CV		Index	Catchability	Std. Err	CV	
spr_us_1	0.009	0.002	0.21		spr_us_1	0.01	0.002	0.21		spr_us_1	0.010	0.002	0.20		spr_us_1	0.012	0.003	0.21	
spr_us_2	0.129	0.016	0.12		spr_us_2	0.13	0.016	0.12		spr_us_2	0.132	0.015	0.11		spr_us_2	0.150	0.017	0.11	
spr_us_3	0.239	0.023	0.10		spr_us_3	0.24	0.024	0.10		spr_us_3	0.244	0.024	0.10		spr_us_3	0.284	0.030	0.10	
spr_us_4	0.338	0.026	0.08		spr_us_4	0.34	0.026	0.08		spr_us_4	0.344	0.026	0.08		spr_us_4	0.377	0.030	0.08	
spr_us_5	0.333	0.024	0.07		spr_us_5	0.33	0.024	0.07		spr_us_5	0.338	0.024	0.07		spr_us_5	0.357	0.027	0.08	
spr_us_6	0.269	0.021	0.08		spr_us_6	0.27	0.021	0.08		spr_us_6	0.272	0.021	0.08		spr_us_6	0.291	0.021	0.07	
spr_us_7	0.244	0.022	0.09		spr_us_7	0.24	0.022	0.09		spr_us_7	0.247	0.022	0.09		spr_us_7	0.256	0.022	0.09	
spr_us_8	0.182	0.023	0.13		spr_us_8	0.18	0.023	0.13		spr_us_8	0.184	0.023	0.13		spr_us_8	0.201	0.023	0.11	
spr_us_9+	0.184	0.025	0.14		spr_us_9+	0.18	0.025	0.14		spr_us_9+	0.185	0.025	0.14		spr_us_9+	0.196	0.023	0.12	
us1aut	0.121	0.016	0.13		us1aut	0.12	0.016	0.13		us1aut	0.124	0.015	0.12		us1aut	0.154	0.021	0.14	
us2aut	0.314	0.026	0.08		us2aut	0.31	0.026	0.08		us2aut	0.319	0.026	0.08		us2aut	0.369	0.032	0.09	
us3aut	0.456	0.037	0.08		us3aut	0.46	0.037	0.08		us3aut	0.465	0.038	0.08		us3aut	0.507	0.038	0.08	
us4aut	0.535	0.043	0.08		us4aut	0.54	0.043	0.08		us4aut	0.544	0.044	0.08		us4aut	0.569	0.044	0.08	
us5aut	0.512	0.045	0.09		us5aut	0.51	0.045	0.09		us5aut	0.519	0.045	0.09		us5aut	0.520	0.046	0.09	
us6aut	0.458	0.046	0.10		us6aut	0.46	0.045	0.10		us6aut	0.464	0.045	0.10		us6aut	0.469	0.044	0.09	
us7aut	0.328	0.044	0.13		us7aut	0.33	0.044	0.13		us7aut	0.331	0.044	0.13		us7aut	0.352	0.044	0.12	
us8paut	0.301	0.043	0.14		us8paut	0.30	0.042	0.14		us8paut	0.303	0.042	0.14		us8paut	0.314	0.038	0.12	
spr_ma_1	0.037	0.008	0.22		spr_ma_1	0.04	0.008	0.22		spr_ma_1	0.036	0.008	0.23		spr_ma_1	0.031	0.007	0.23	
spr_ma_2	0.225	0.032	0.14		spr_ma_2	0.23	0.032	0.14		spr_ma_2	0.160	0.022	0.14		spr_ma_2	0.152	0.021	0.14	
spr_ma_3	0.305	0.022	0.07		spr_ma_3	0.31	0.022	0.07		spr_ma_3	0.224	0.018	0.08		spr_ma_3	0.241	0.019	0.08	
spr_ma_4	0.223	0.018	0.08		spr_ma_4	0.22	0.017	0.08		spr_ma_4	0.170	0.012	0.07		spr_ma_4	0.181	0.012	0.07	
spr_ma_5	0.134	0.013	0.10		spr_ma_5	0.13	0.013	0.10		spr_ma_5	0.103	0.010	0.09		spr_ma_5	0.108	0.010	0.09	
ma1aut	0.219	0.037	0.17		ma1aut	0.22	0.037	0.17		ma1aut	0.197	0.026	0.13		ma1aut	0.190	0.025	0.13	
ma2aut	0.322	0.035	0.11		ma2aut	0.32	0.035	0.11		ma2aut	0.247	0.027	0.11		ma2aut	0.254	0.026	0.10	
ma3aut	0.266	0.028	0.10		ma3aut	0.27	0.028	0.10		ma3aut	0.219	0.022	0.10		ma3aut	0.215	0.022	0.10	
ma4aut	0.149	0.020	0.13		ma4aut	0.15	0.020	0.13		ma4aut	0.126	0.016	0.12		ma4aut	0.124	0.017	0.14	
ma5aut	0.062	0.012	0.19		ma5aut	0.06	0.011	0.19		ma5aut	0.055	0.010	0.18		ma5aut	0.055	0.010	0.18	

Run C: revised MA state indices , re-estimation of discards.



**CAA , 1980-2014 , Ages 1-11+
Commercial Landings and Discards**

Swept-area estimates from 4 surveys used for calibration:

NEFSC Spring ages 1-8, 9+, 1980-2015

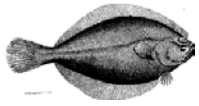
NEFSC Autumn 1-7, 8+ , 1980- 2014 → 1981-2015

MADMF Spring ages 1-5, 1982-2015

MADMF Autumn ages 1-5, 1982-2014 → 1983-2015

Maturity: 5 year moving average

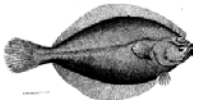
F on oldest age (10), average of ages 6-9



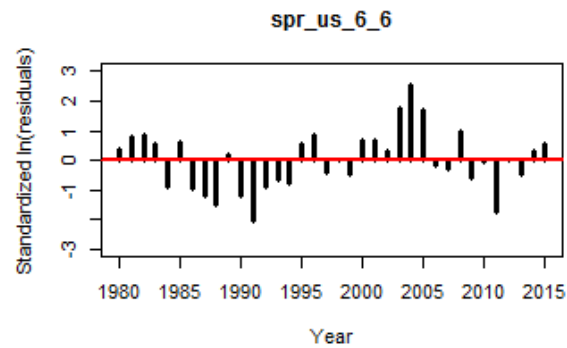
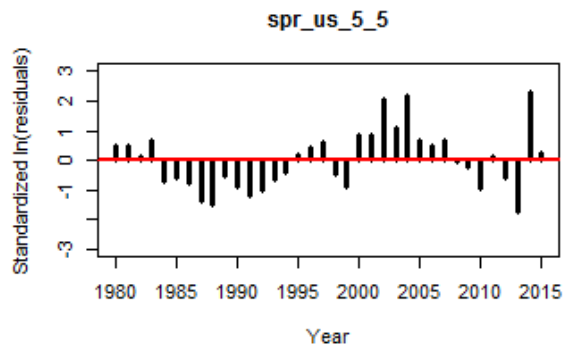
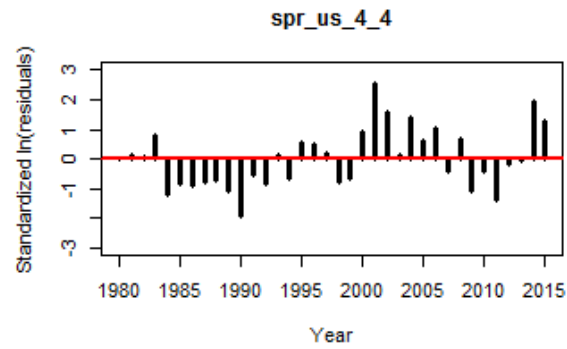
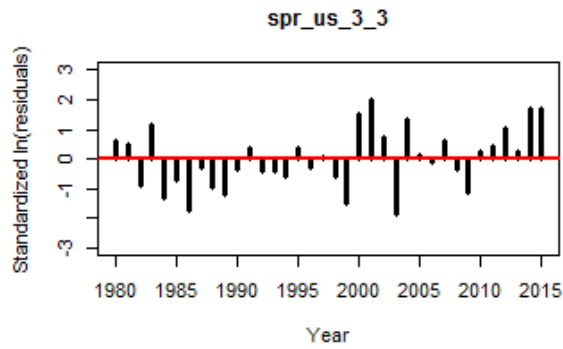
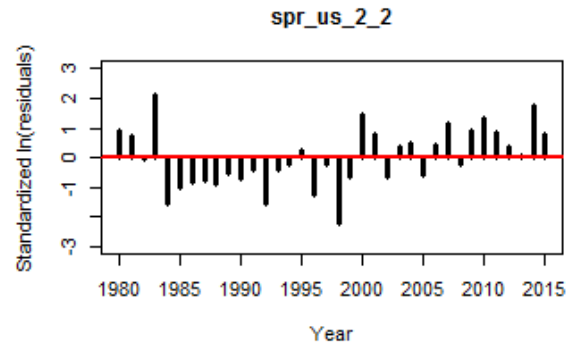
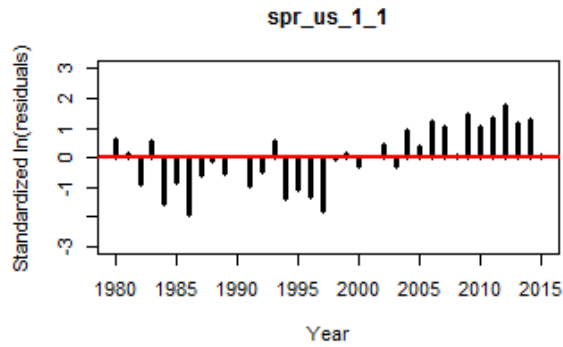
Assessment results - Stock size in 2011

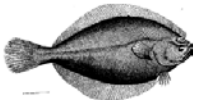
2015 TY2014				
	Res.SumSq	445.855		
	Population #	Std		
age	2015	Error	CV	F2014
1	9134	4551	0.50	0.00
2	24832	7151	0.29	0.00
3	7570	1691	0.22	0.01
4	4964	946	0.19	0.07
5	4898	882	0.18	0.16
6	2260	434	0.19	0.07
7	3301	571	0.17	0.13
8	4191	722	0.17	0.08
9	2063	412	0.20	0.04
10	4740	786	0.17	0.08
total	67953			
2014	F6-9	SSB	Rct.	
unadj	0.08	14543	9.134	
retro adj	0.12	10977	7.087	
M. Rho	-0.32	0.32	0.29	
adj. fct	1.48	0.75	0.78	

Rho dec.from 2012

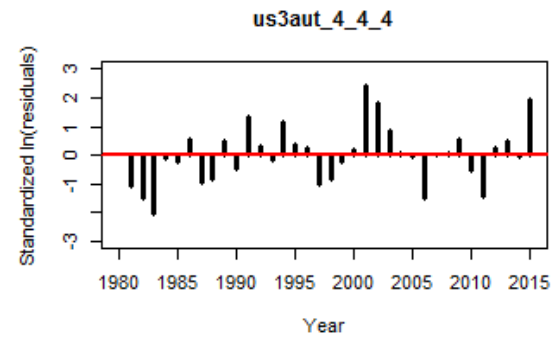
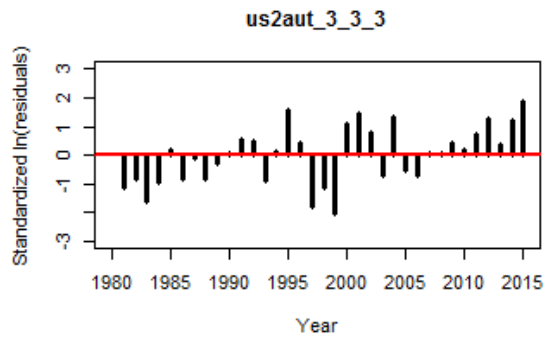
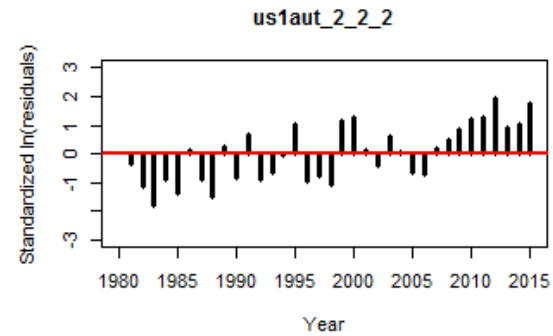
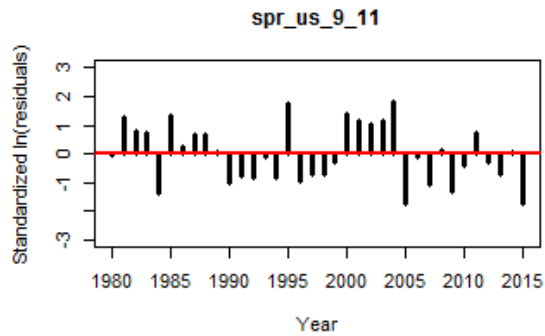
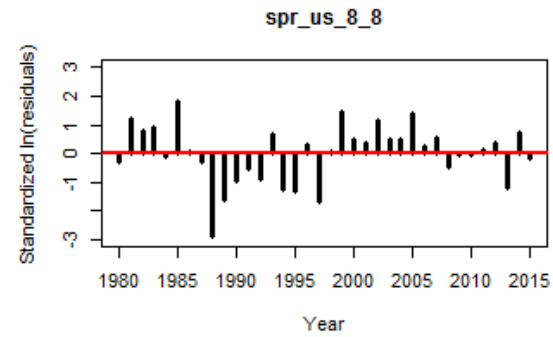
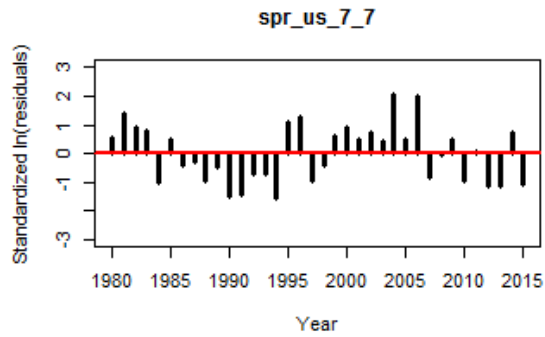


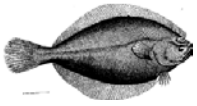
Assessment results - survey residuals



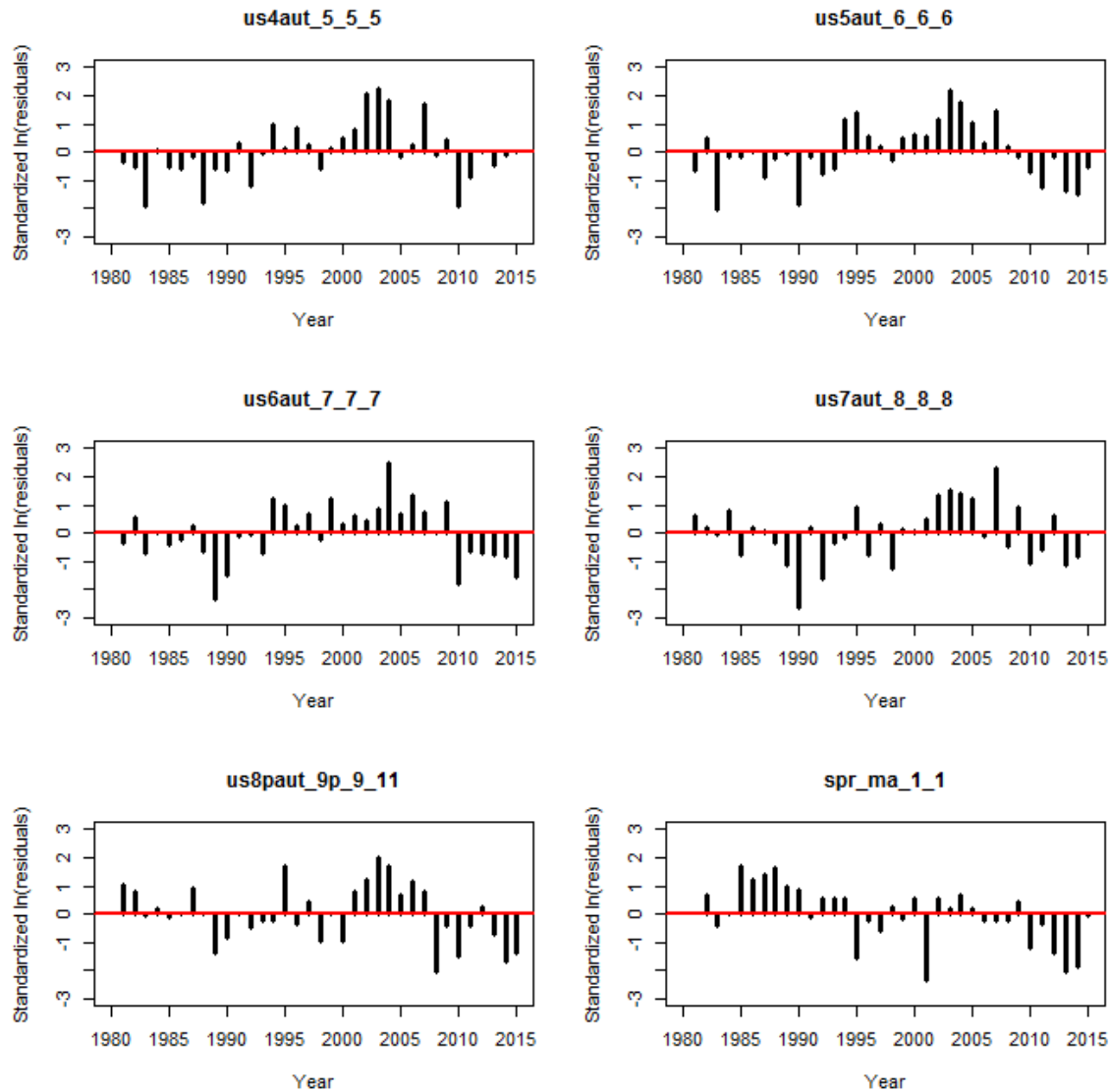


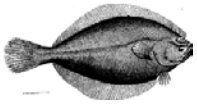
Assessment results - survey residuals



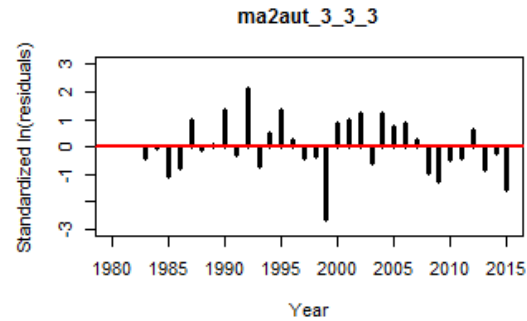
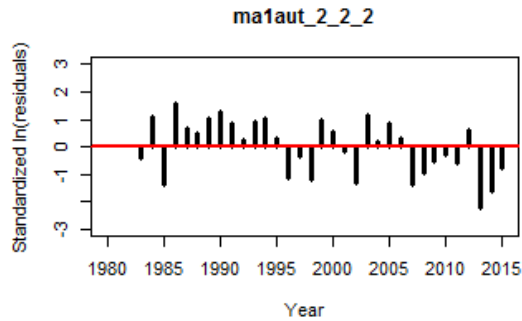
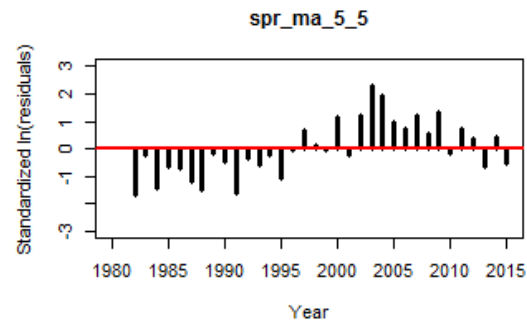
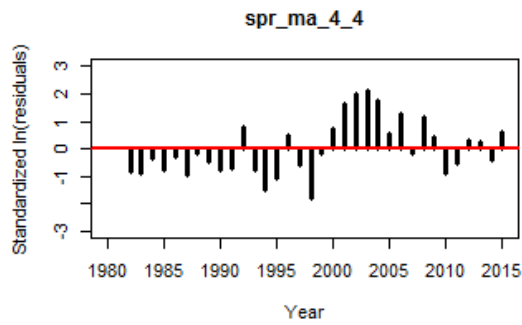
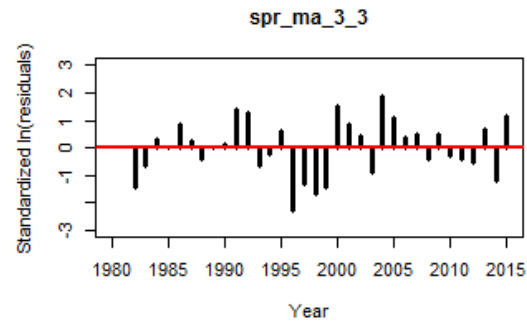
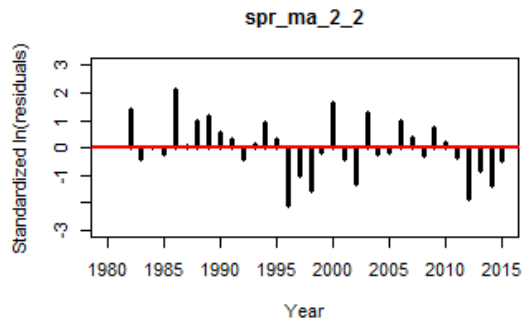


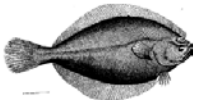
Assessment results - survey residuals



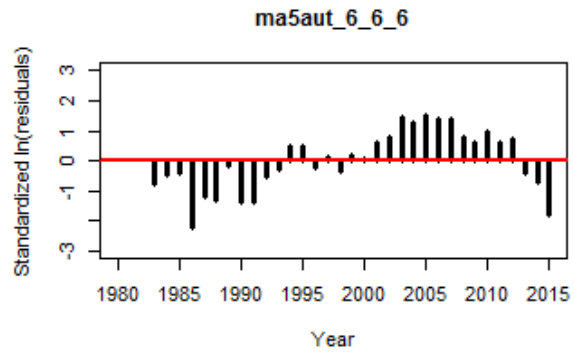
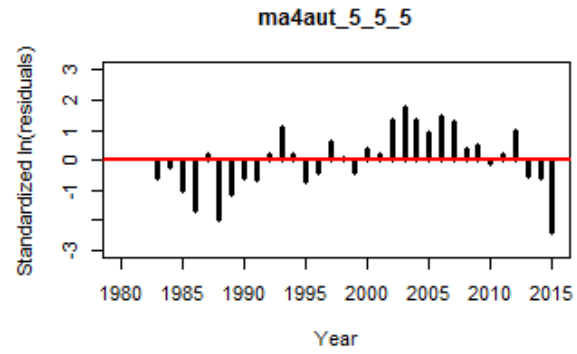
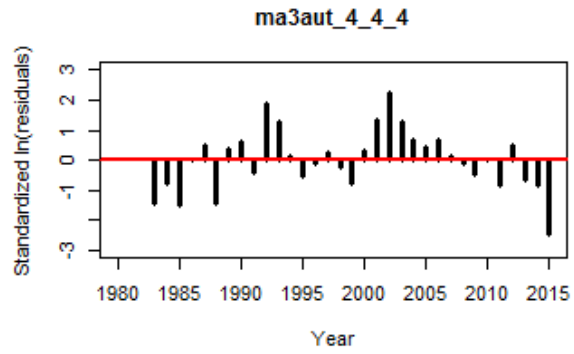


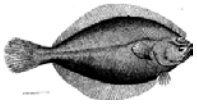
Assessment results - survey residuals



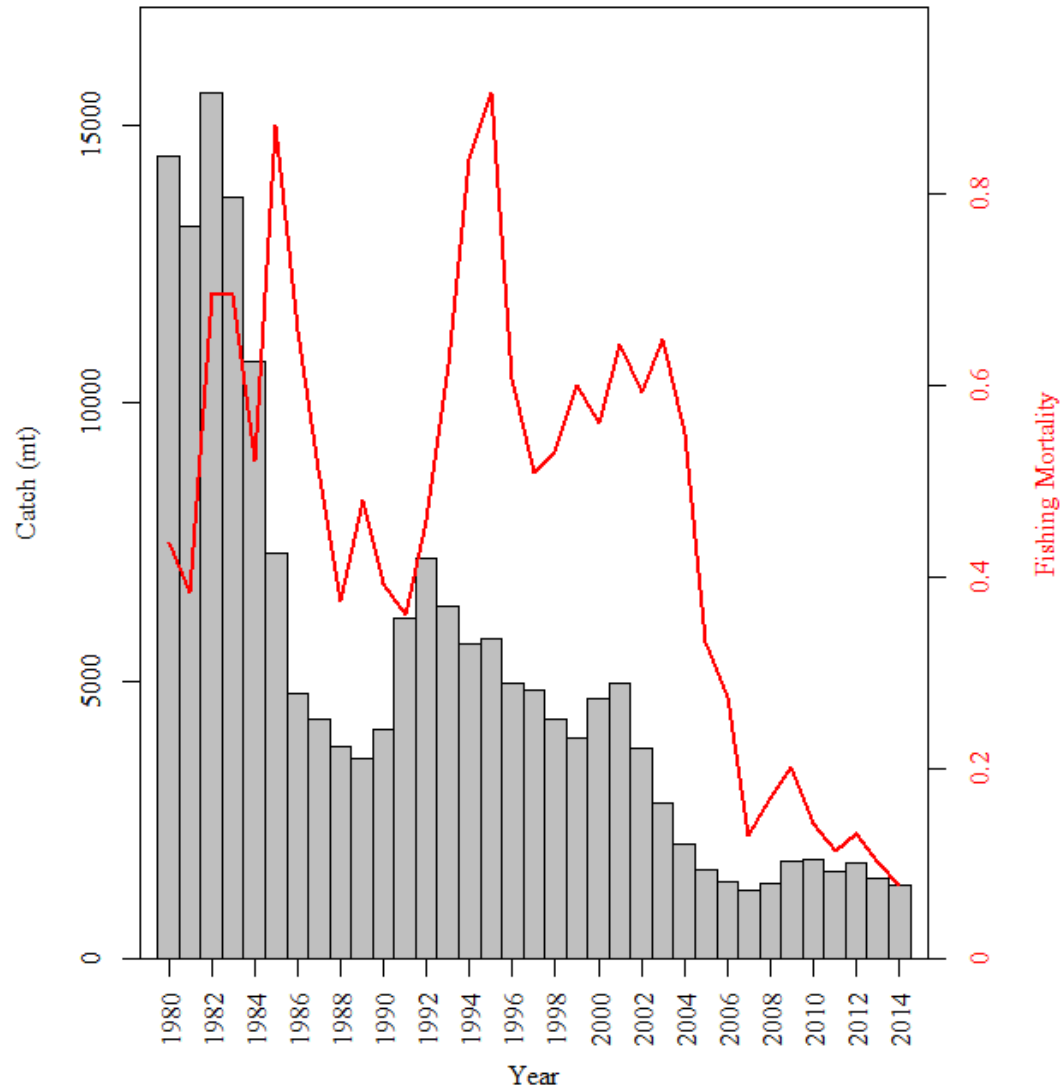


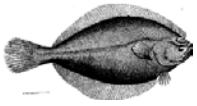
Assessment results - survey residuals



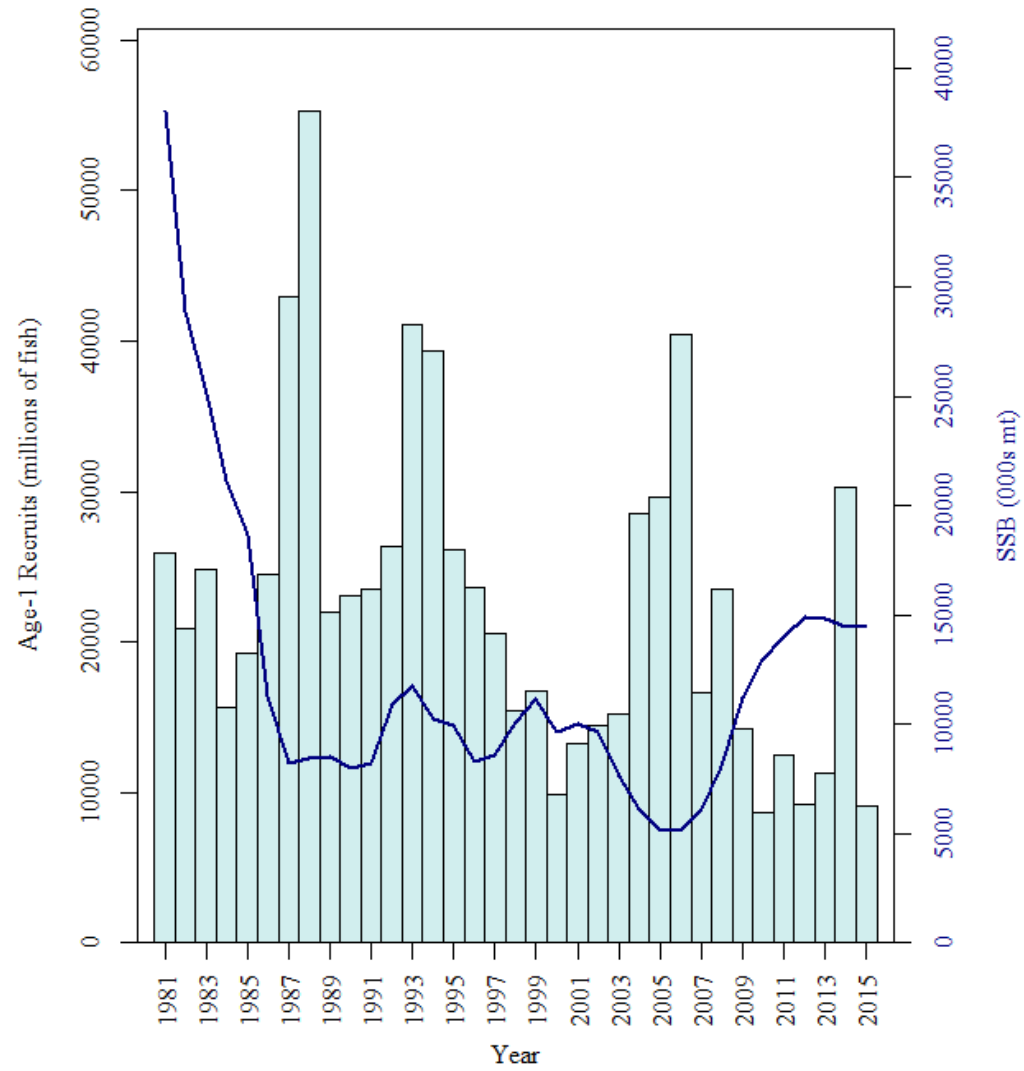


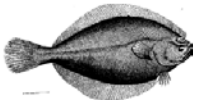
Assessment results





Assessment results

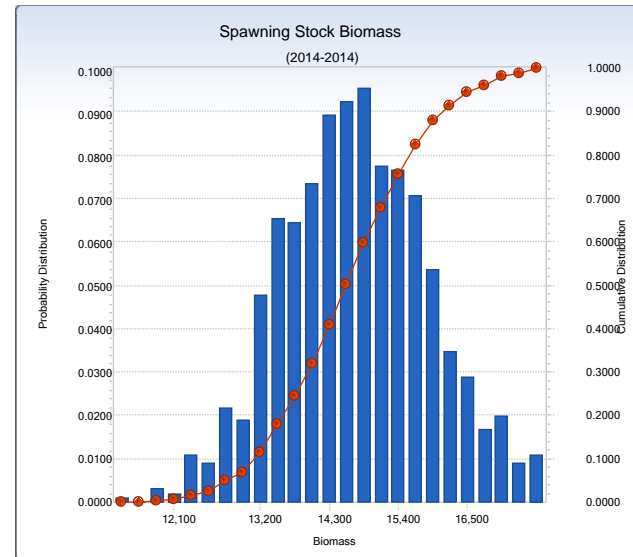
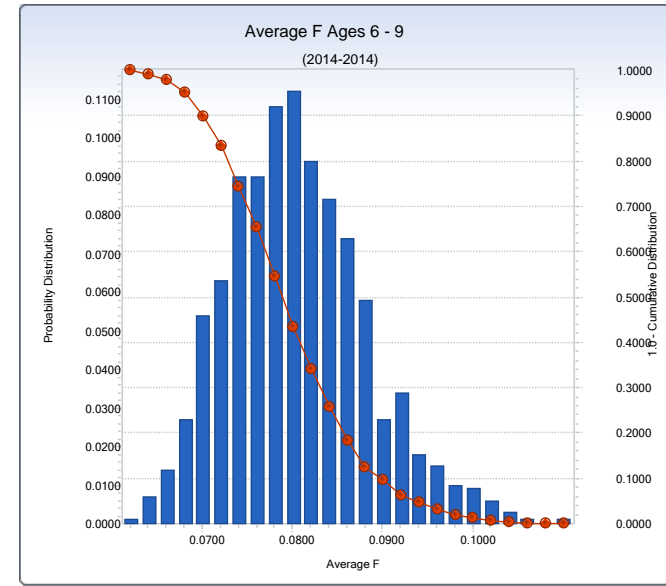


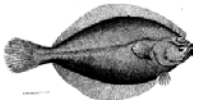


Assessment results

F₂₀₁₄=0.08,
90% Prob. F between
0.069 and 0.093

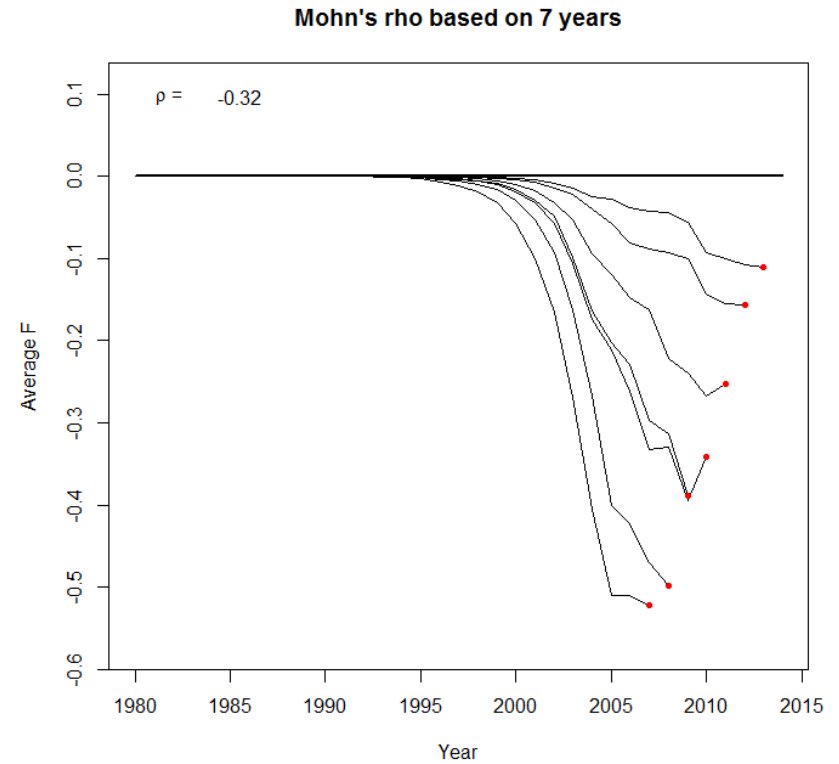
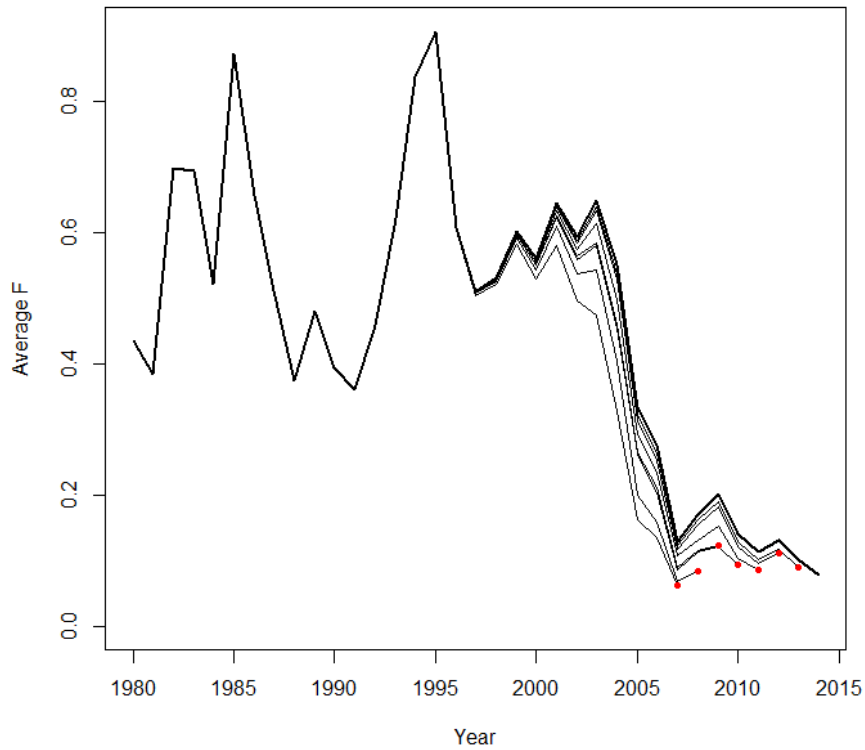
SSB₂₀₁₄ = 14,453 mt
90% Prob. SSB between
12,831 mt and 16,555 mt

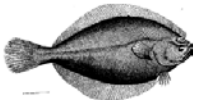




Assessment results

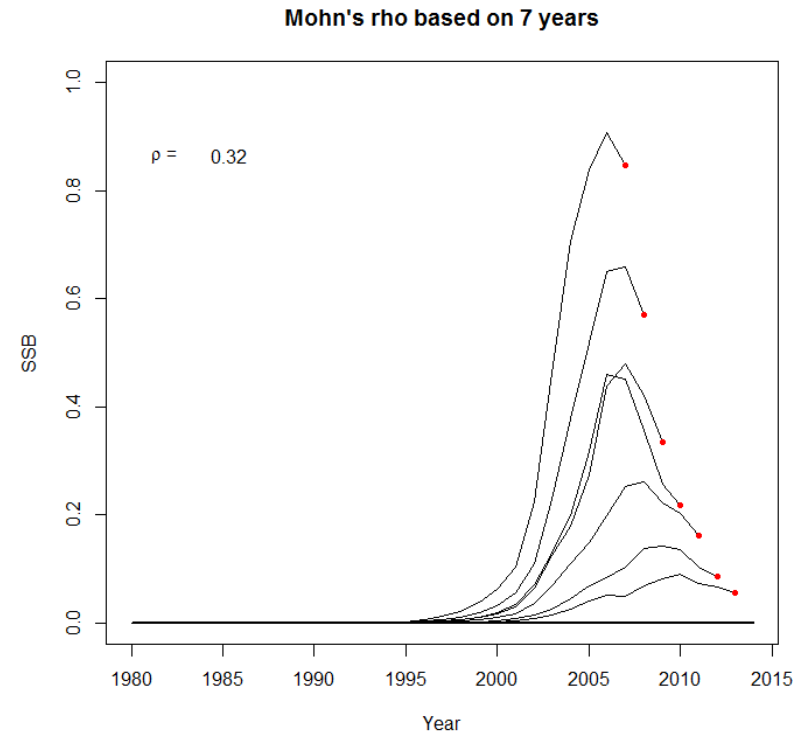
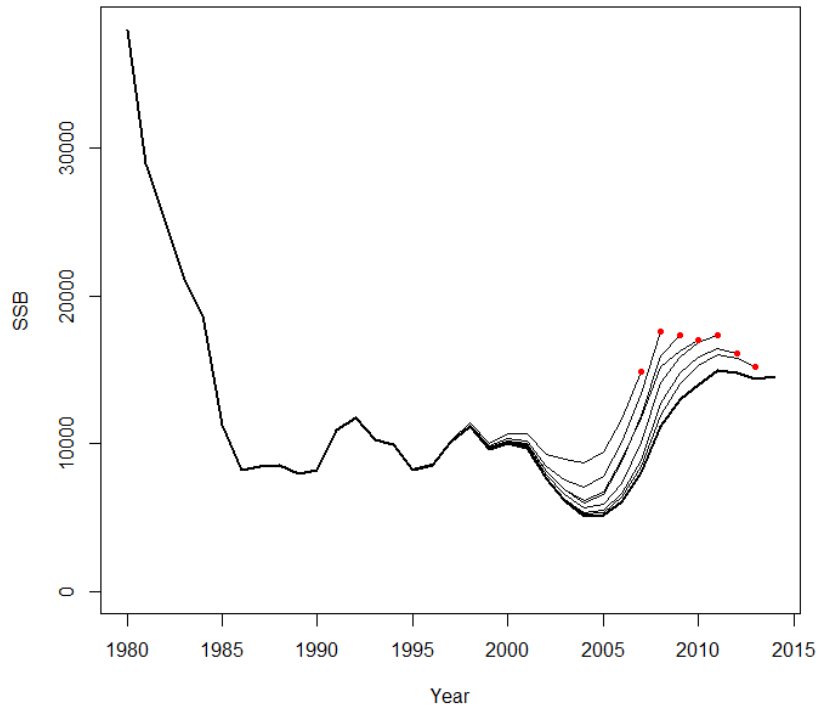
Retrospective – Relative Difference to terminal year F

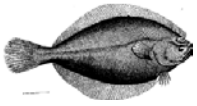




Assessment results

Retrospective – Relative Difference to terminal year SSB

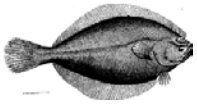




Yield Per Recruit Analysis

Age	VPA selectivity	Natural Mortality	Stock weight	Catch weight	Spawning stock weight	Proportion mature
1	0.00	0.20	0.004	0.006	0.004	0.03
2	0.11	0.20	0.016	0.033	0.016	0.10
3	0.23	0.20	0.060	0.119	0.060	0.27
4	0.46	0.20	0.170	0.312	0.170	0.54
5	0.72	0.20	0.345	0.407	0.345	0.79
6	0.90	0.20	0.440	0.489	0.440	0.92
7	1.00	0.20	0.508	0.547	0.508	0.98
8	1.00	0.20	0.566	0.597	0.566	0.99
9	1.00	0.20	0.601	0.627	0.601	1.00
10	1.00	0.20	0.641	0.656	0.641	1.00
11	1.00	0.20	0.885	0.885	0.885	1.00

YPR 2014	F40%	Y/R	SSB/R	Mean R (000s)	SSBmsy (mt)	MSY (mt)
2014 TY	0.196	0.100	0.575	23456	13480	2348



Biological Reference Points

Stochastic Projections : 100 years

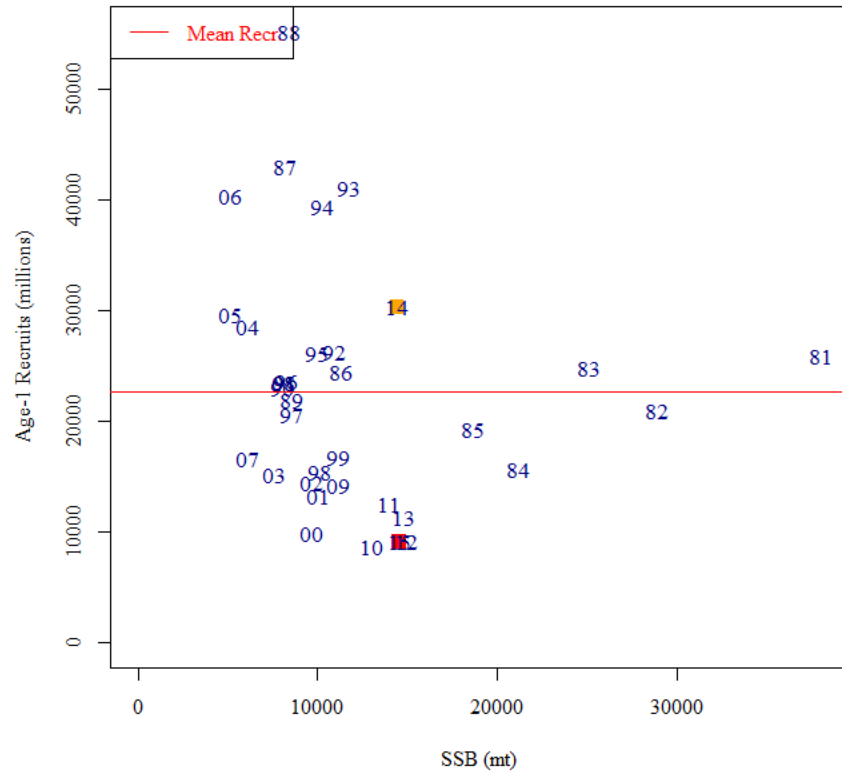
Input same as YPR

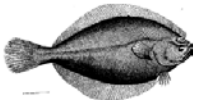
CDF of 34 recruitments:

F40% = 0.196

MSY = 3,385 mt

SSB_{msy} = 13,288 mt





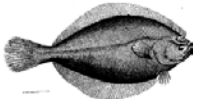
Projections

Estimated Catch 2015

Retro adjusted by numbers at age

1 F Scenario: F 40%

Year	5%	SSB	95%
2015	7,852	8,947	10,160
2016	7,505	8,645	9,863
2017	7,156	8,324	9,697
2018	7,132	8,710	11,185
	5%	Catch	95%
2015	1,395	1,395	1,395
2016	1,465	1,695	1,926
2017	1,433	1,686	2,022
2018	1,398	1,722	2,247
	5%	F	95%
2015	0.137	0.156	0.178
2016	0.196	0.196	0.196
2017	0.196	0.196	0.196
2018	0.196	0.196	0.196



Sources of Uncertainty

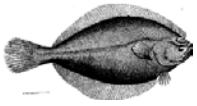
Age composition of 1980-1984 catch; estimated applying NEFSC age keys

Historical discards prior to 1989

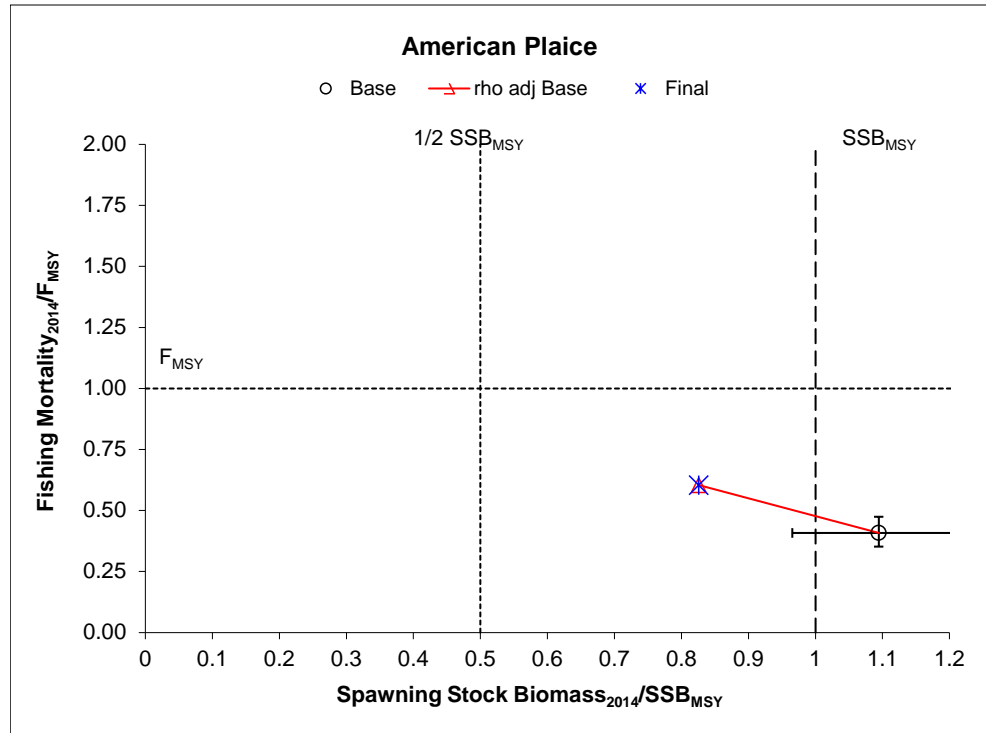
Age composition of small mesh otter trawl discards; prorated using large mesh

Retrospective bias of F , SSB , and recruitment

Growth differences between GM and GB fish, influence on CAA



GM-GB American plaice



Status :
not overfished , overfishing not occurring

Questions ?

