

SEDAR 22 YEG RW

Assessment model results IV: Model
results

February 12, 2011

Tampa, FL



2002 Assessment

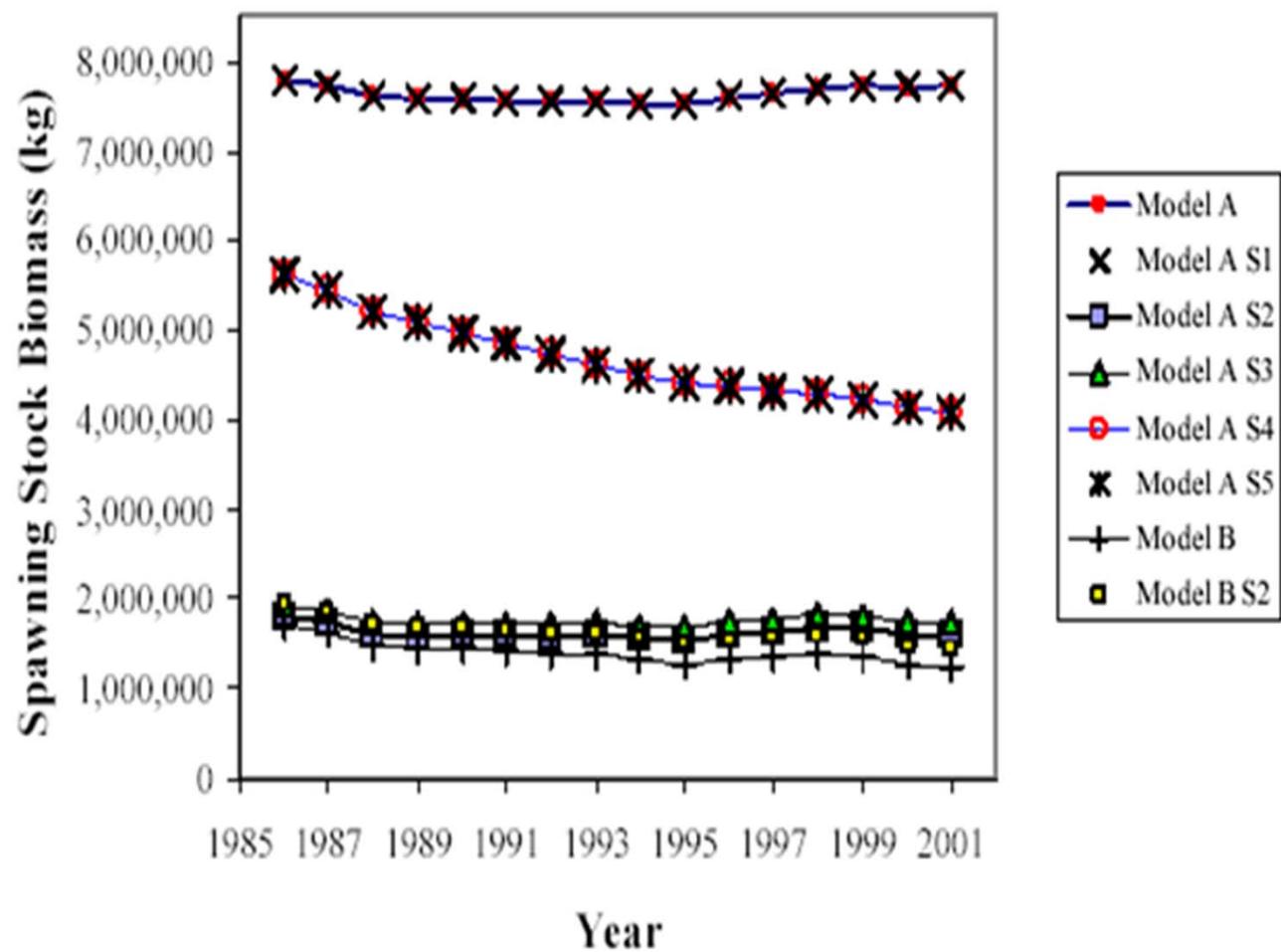


Previous YEG assessment (2002)

Little contrast in landings
or CPUE

Inconclusive results

Strong potential for serial depletion

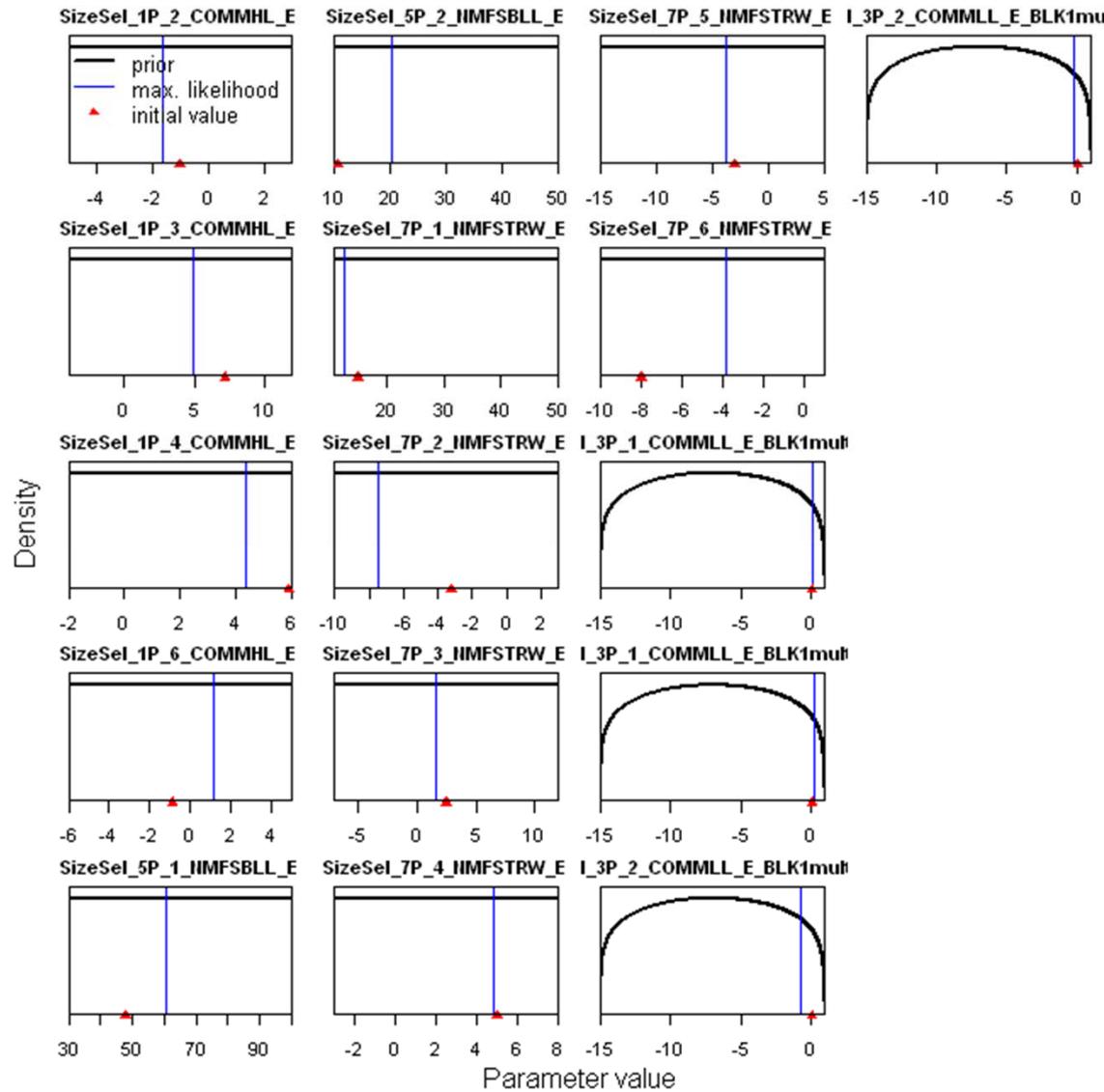


Model runs

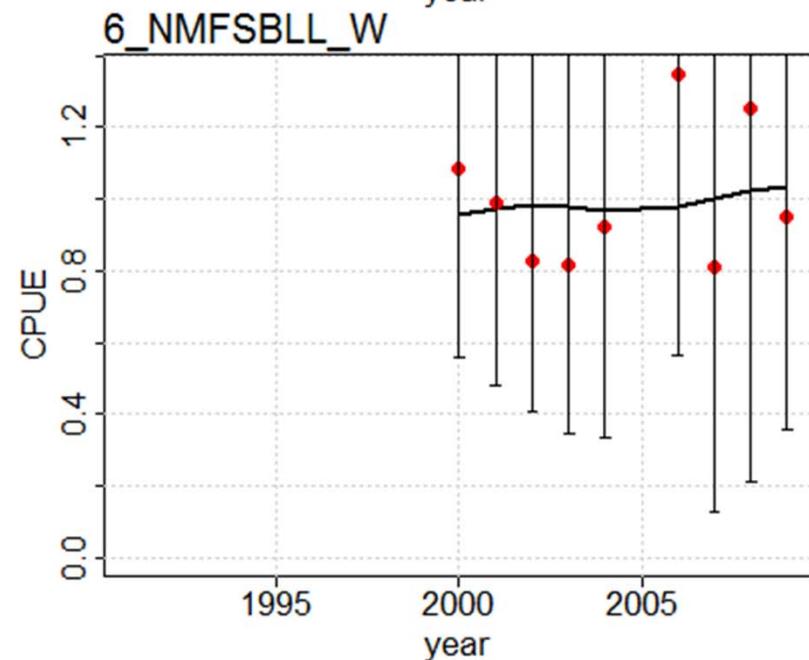
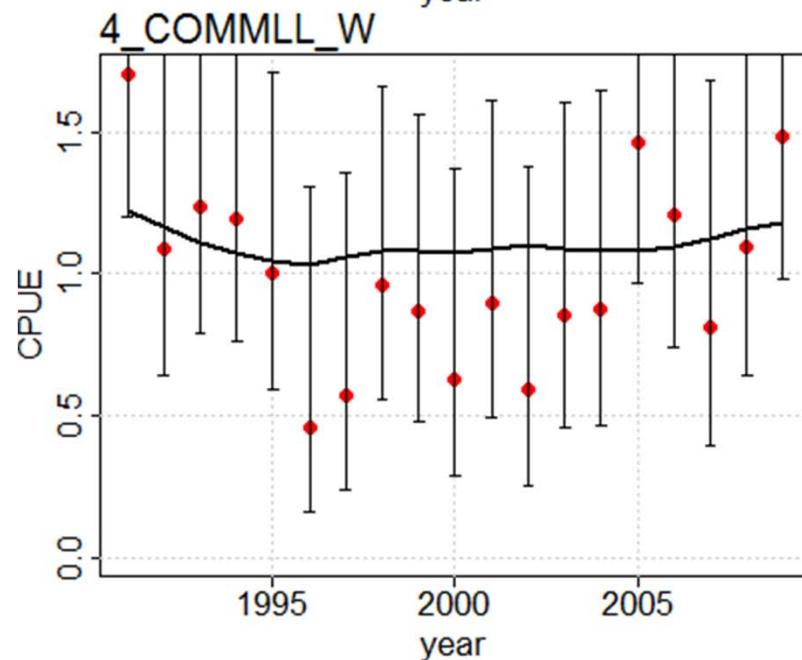
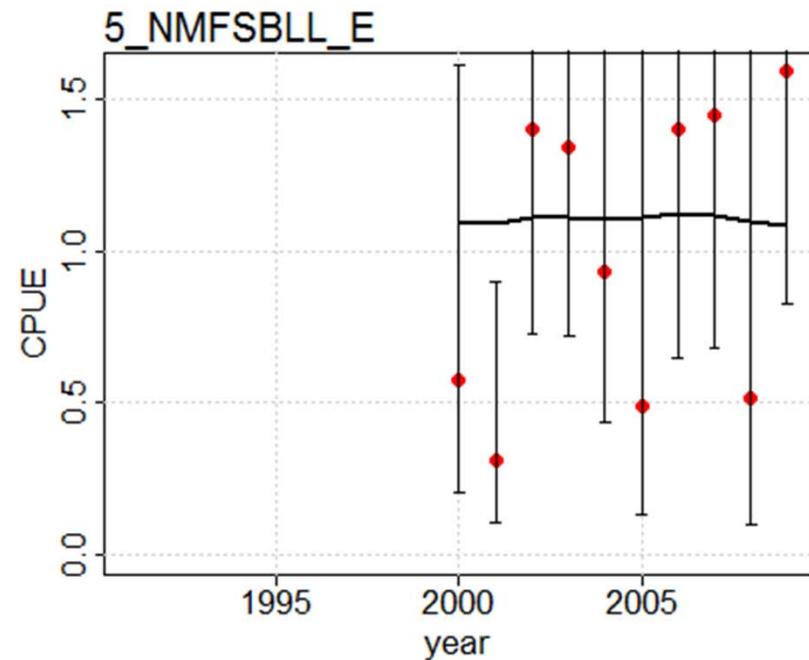
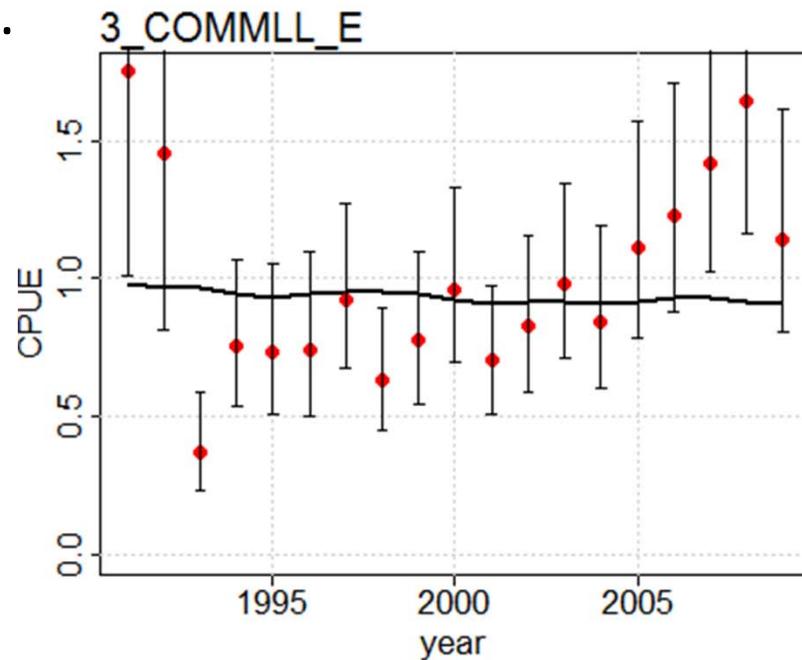
Type	number	RUN	Key characteristics	Key Result
scoping runs	1	Scoping sigma R	8 fixed values of sigma R (0.1-0.9)	sigma R input should be ~0.2
	2	Profile on ref. age	4 values (5,15, 20, 25) Lor M scaling	same as scaling M
	3	Scoping steepness	8 fixed values of steepness (0.3-0.99)	Model estimates stp >0.9
Base and sensitivity runs	4	Base model results	4 growth, 4 flts, 4 srvys, 2 sex, 2 area	presented in detail
	5	Update 2002 model	(1986-2009), assume 0 eq.catch.	Results depend upon init F
	6	Update 2002 model	(1986-2009), assume 5 yr avg eq catch.	Results depend upon init F
	7	no rec devs		Poorer fit due to no rec devs
	8	Three-area model	Original 3 area, 6 growth curve model	Poor fit CPUE, F is high in South
	9	No sel.time-blocks	Single selectivity for comm LL	Poorer fit to model
	10	Estimate M	Estimate M for East and West	Better fit, model E_M= 0.087 W_M= 0.11
	11	Low steepness (0.7)	input fixed steepness of 0.7	More pessimistic status
	12	no est. herm. parms	Fixed input herm parms	Poor model fit
Sensitivity on base	14	Low landings	Alt. landings 1981-1985 stat. area 6 and 7	Lower overall MSY
	15	Low M	M=0.055	Poorer model fit, Lower MSY
	16	High M	M=0.099	Better model fit, Higher MSY
Extra runs	17	Retro5	5 year retrospective runs	
	18	estHerm NoMalesin	no males in SSB	
	19	NoMalesinSSB Noest	no males in SSB, no est herm parms	
	20	Production model	Only est. 3 parms (stp, R0 and rec partition)	

Table 3.14. Likelihood components for base and sensitivity runs.

3.2.2.2. Base model results, Input parameters, priors, maximum likelihood and starting values.



3.2.2.2. Base model results, Figure 3.11. Base model fits to the CPUE .



3.2.2.2. Base model results

Length composition fits

Age composition fits

See report figures,

For Pearson residuals, the solid circles are positive residuals (i.e., observed greater than predicted) and open circles are negative residuals (i.e., predicted greater than observed).

Figure 3.78. Base model estimated vs otolith fitted growth

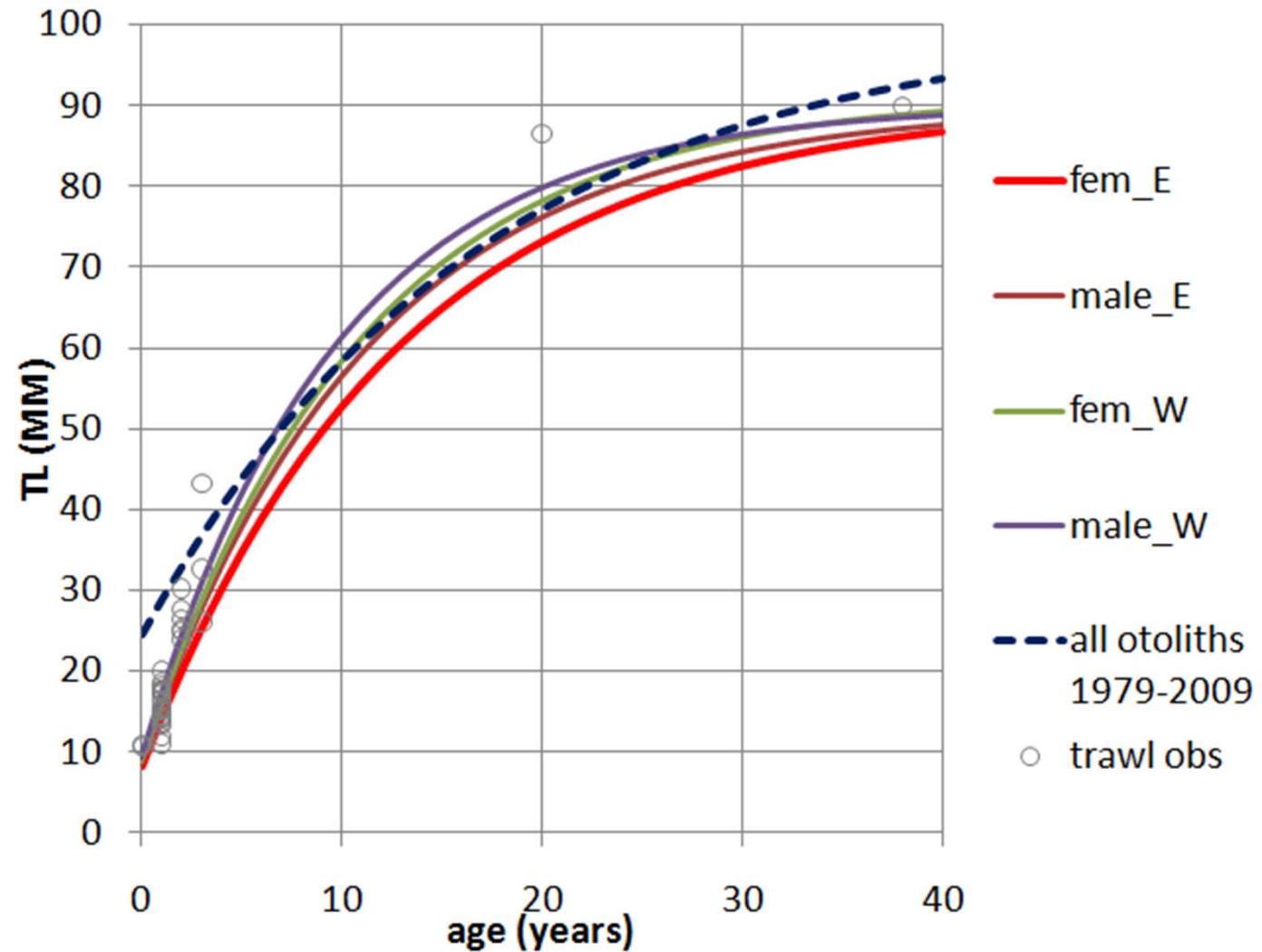


Figure 3.78. Base model estimated vs otolith fitted growth

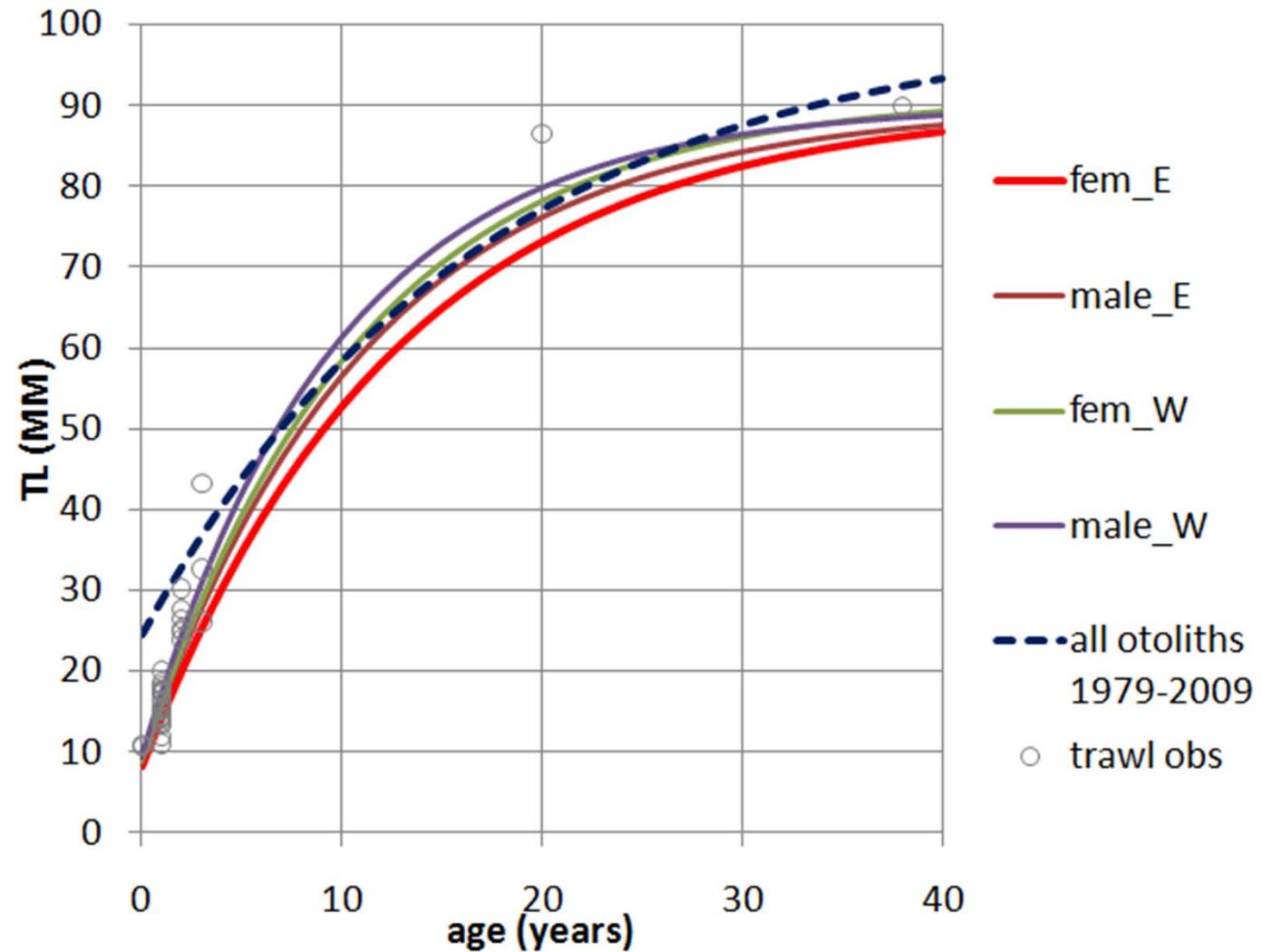
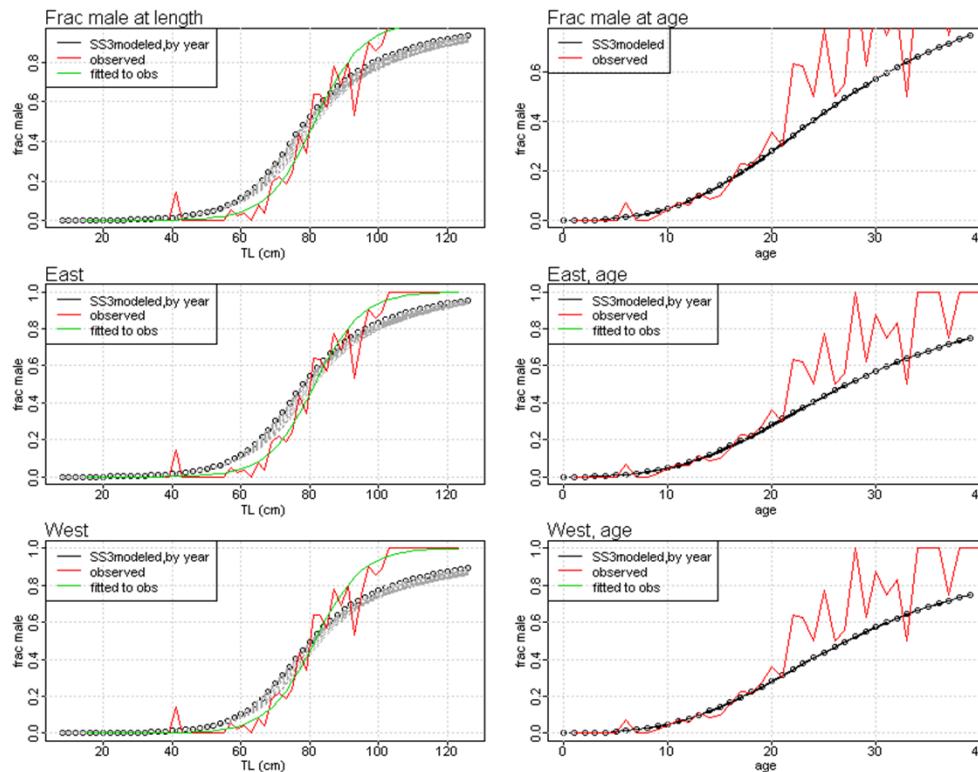


Figure 3.79. Empirically observed fraction male at length and age (Red) and SS3 estimated fraction (gray).



Model estimated versus input prop male at age

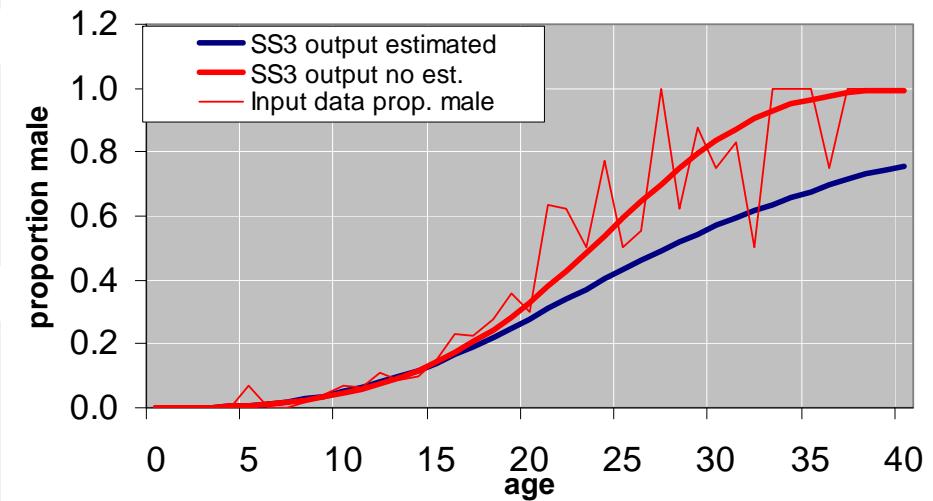


Figure 3.80. Stock Biomass

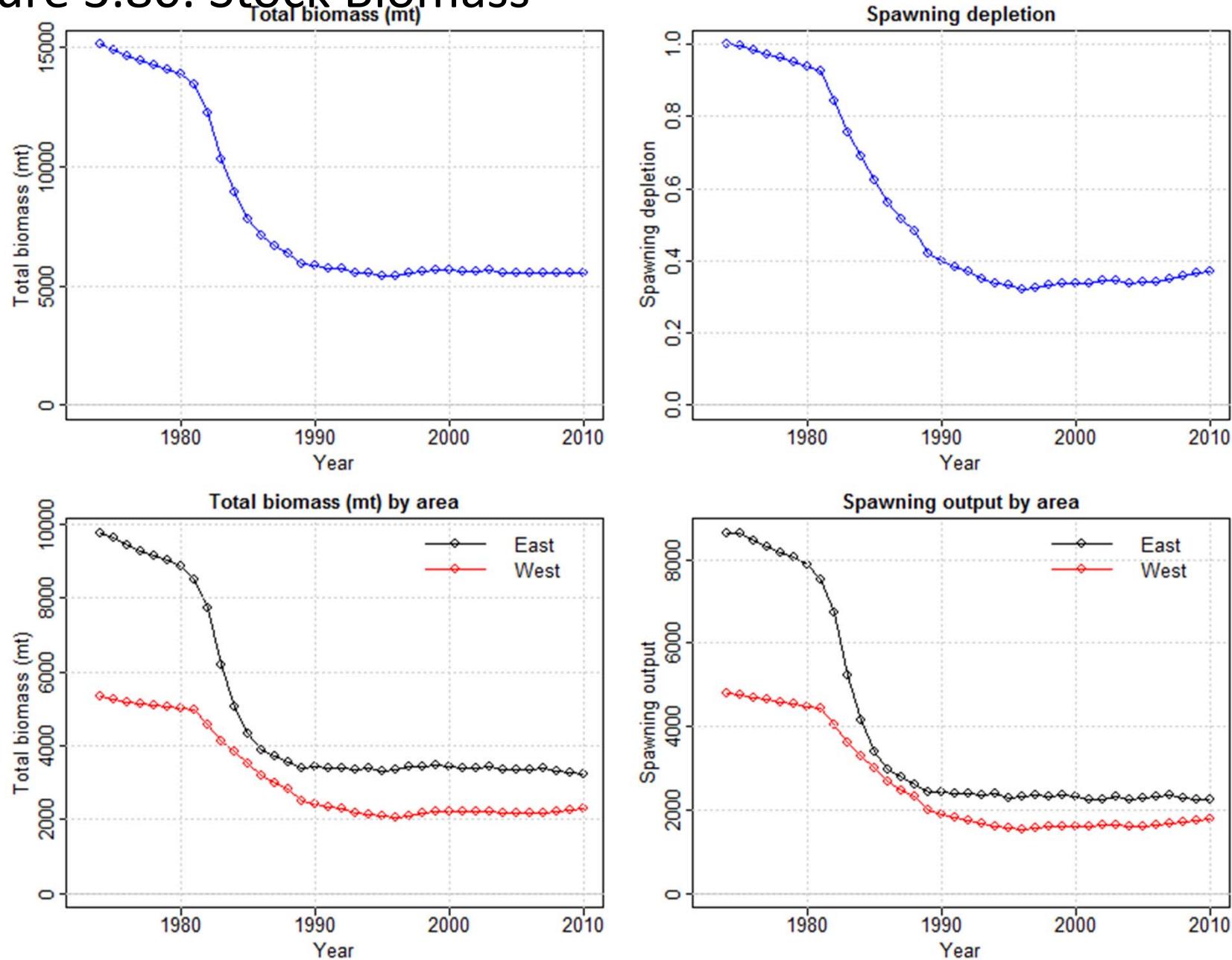


Figure 3.81. Total estimated biomass and fishing mortality, YEG base model.

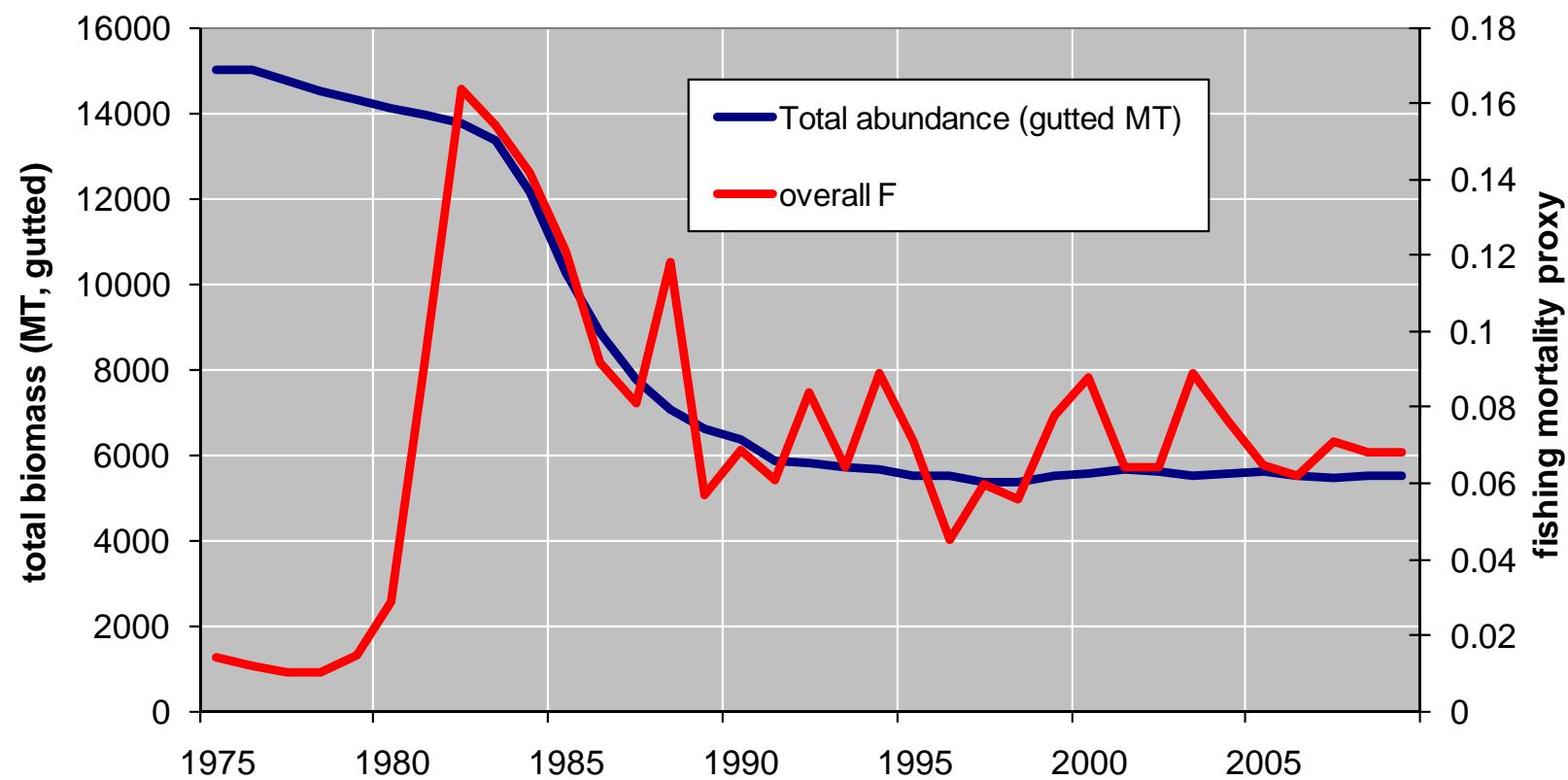


Figure 3.82. Numbers by year and age for females (left) and males (right) and for East (top) and West (bottom). Red line is the mean age.

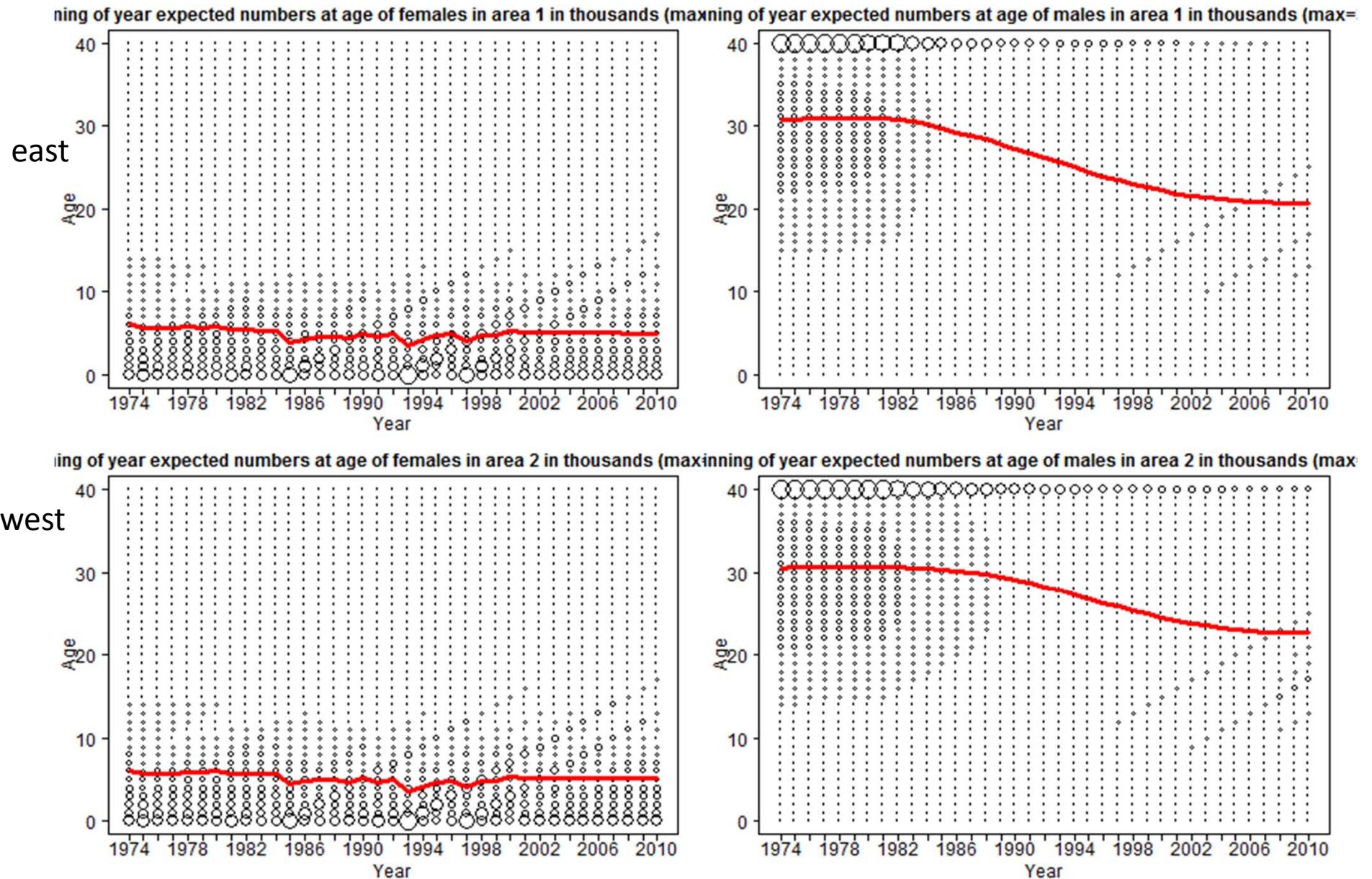


Figure 3.83. Base model stock recruit relationship, recruits, recruitment deviations and recruits.

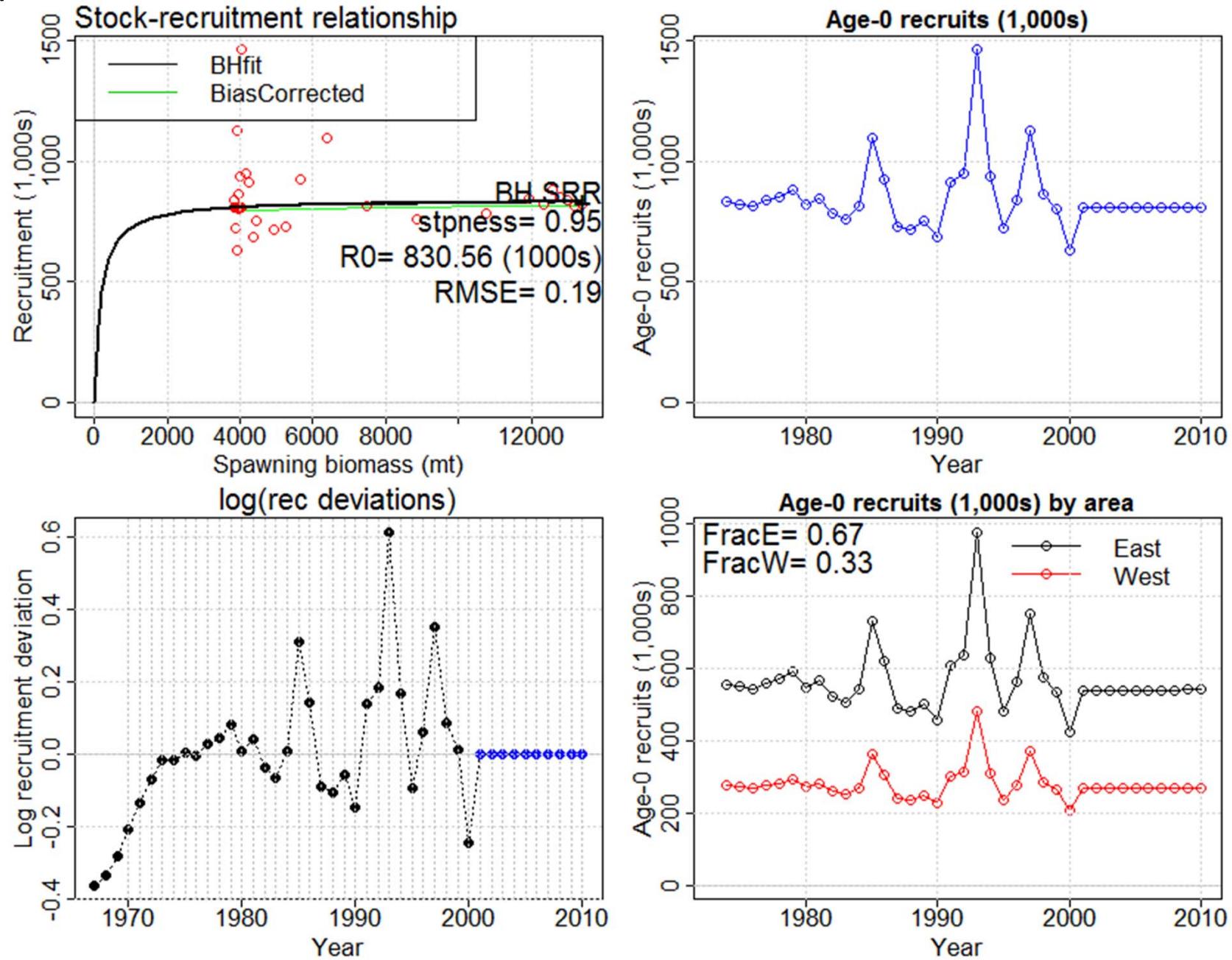


Figure 3.84. Fishery and survey selectivity patterns

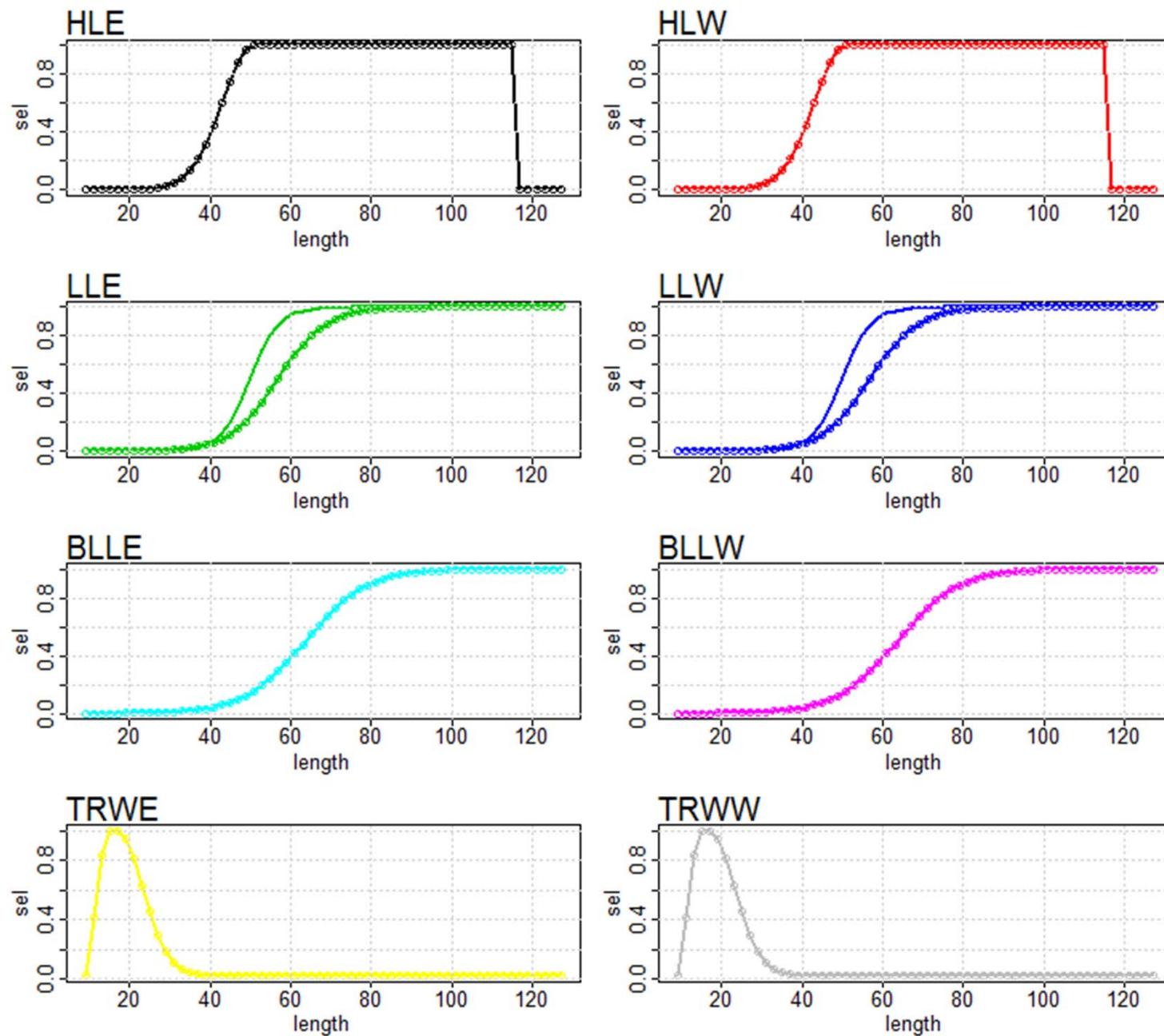


Figure 3.85. Base model landings and estimated fleet specific fishing mortality rates.

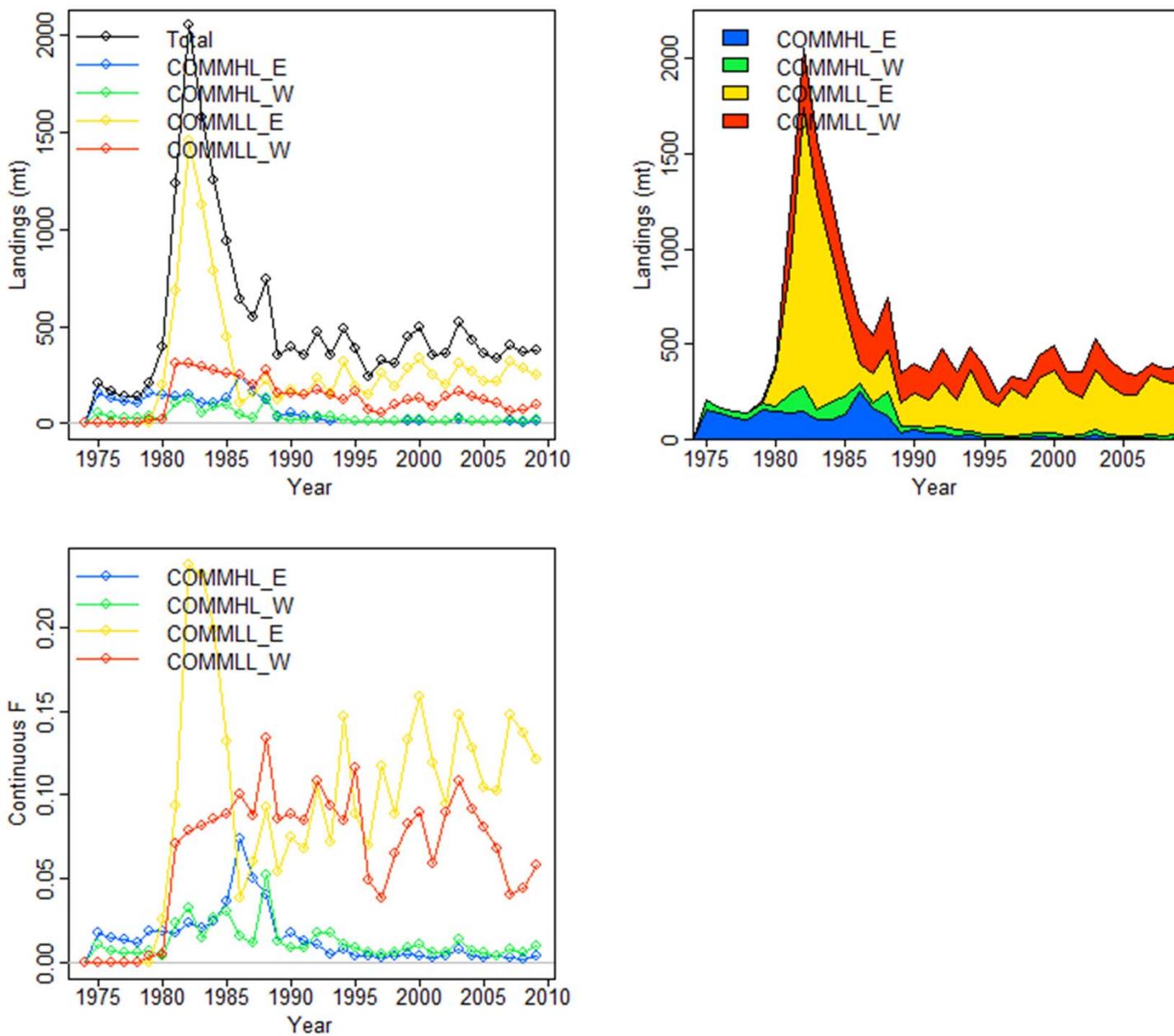


Figure 3.87. Comparison of SSB trajectories for 9 sensitivity runs (plus production model and no males in SSB run)

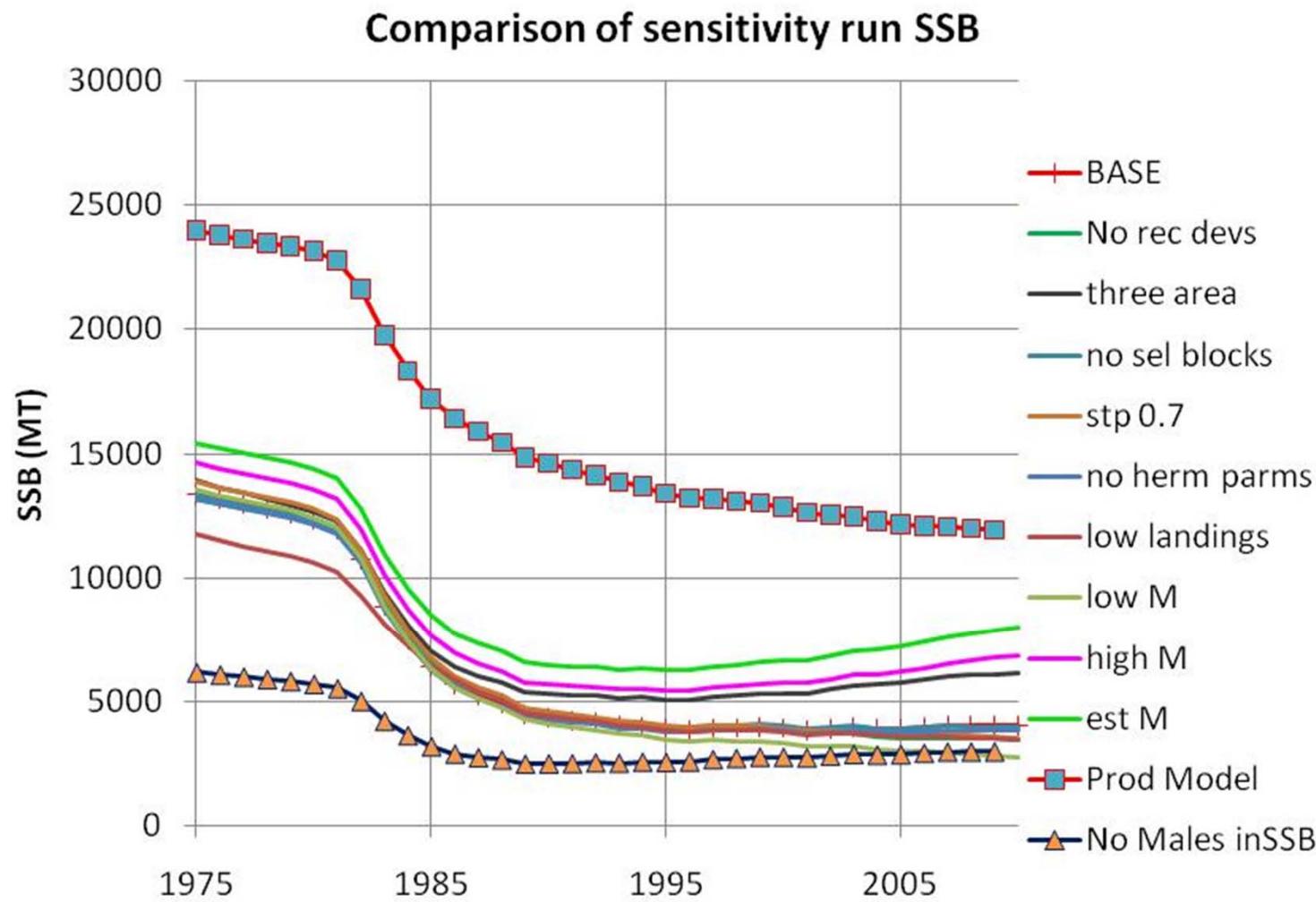


Figure 3.87. Comparison of SSB trajectories for 9 sensitivity runs (plus production model and no males in SSB run)

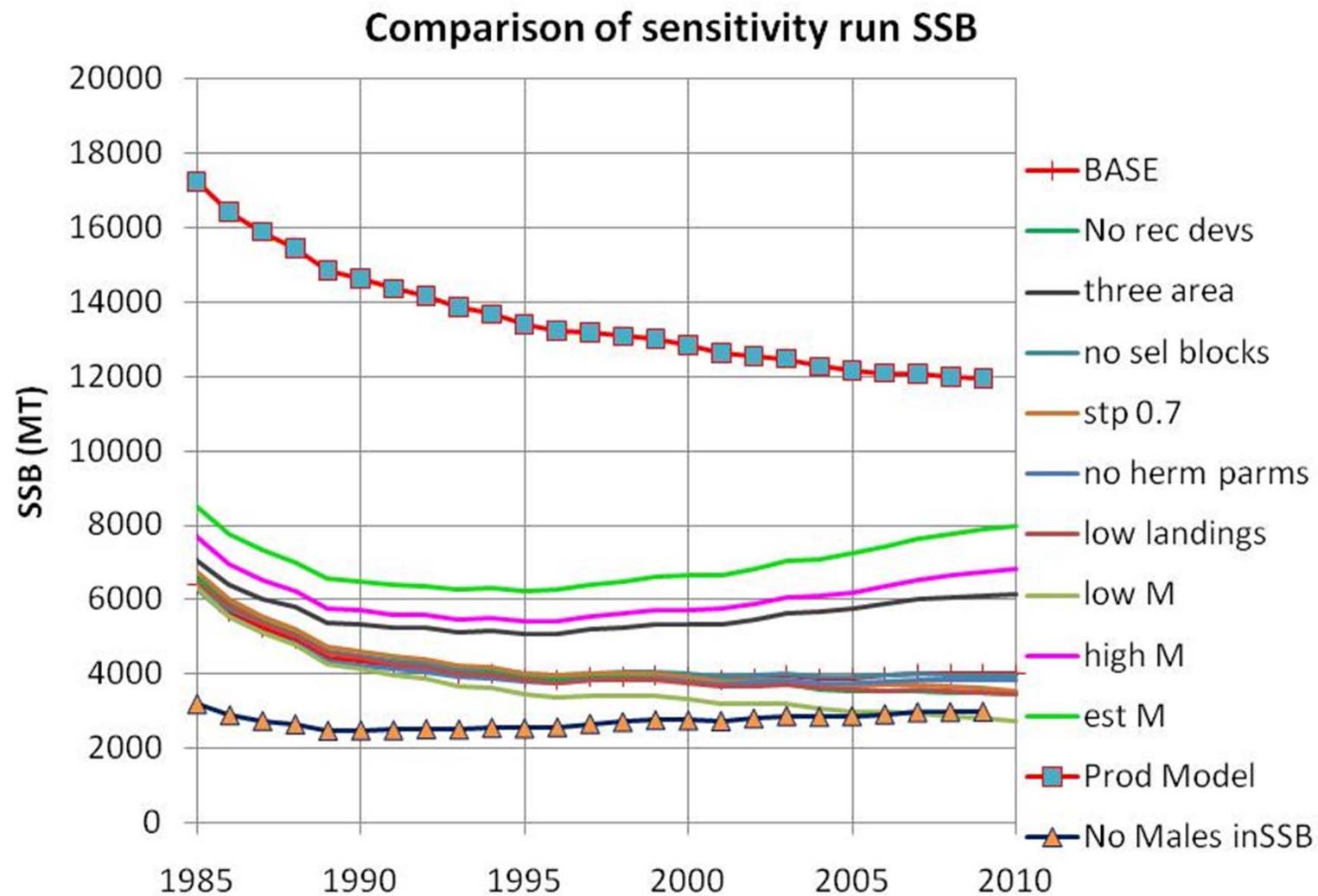


Figure 3.87. Comparison of recruits and F for 9 sensitivity runs
(plus production model and no males in SSB run)

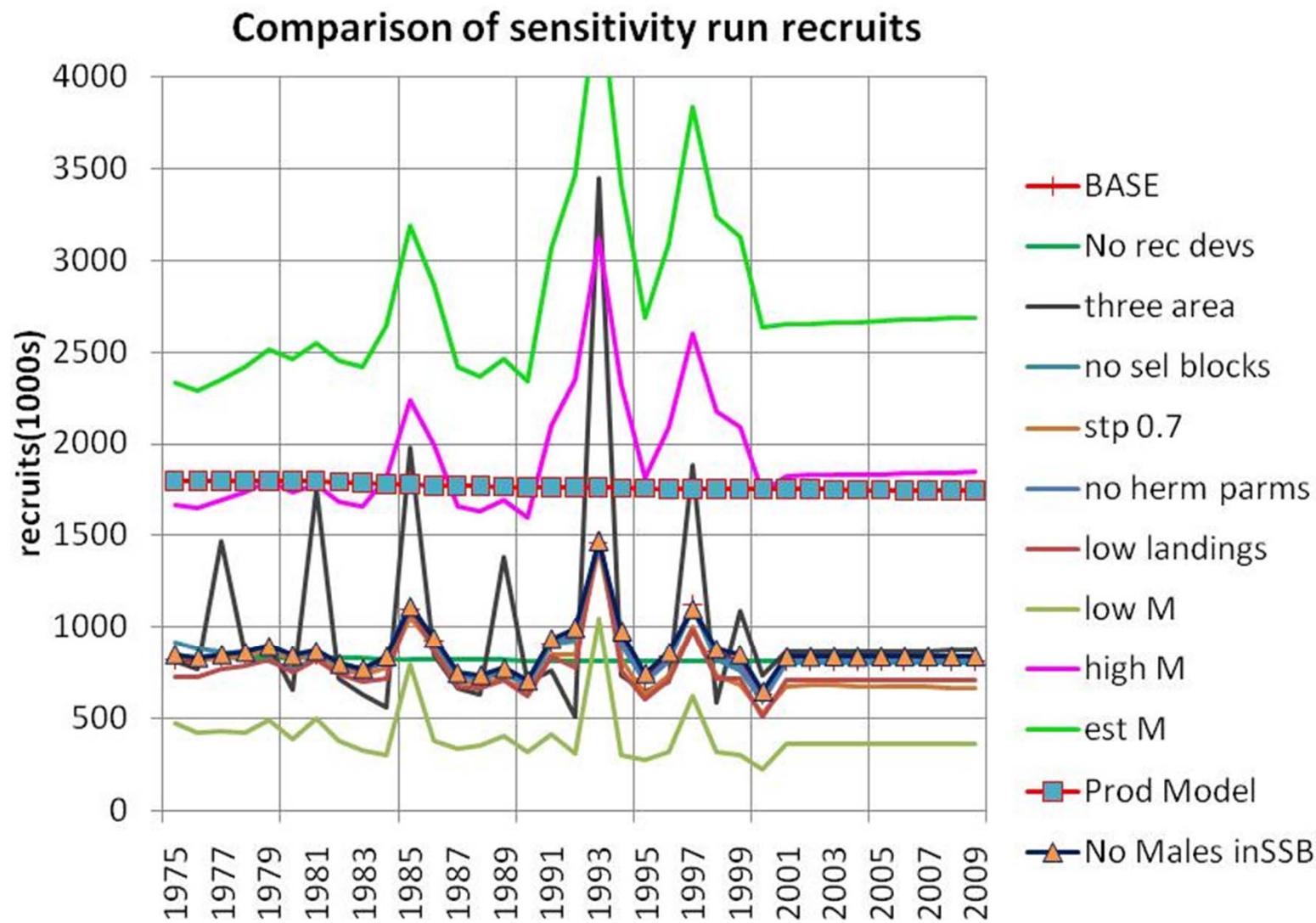


Figure 3.87. Comparison of recruits and F for 9 sensitivity runs
(plus production model and no males in SSB run)

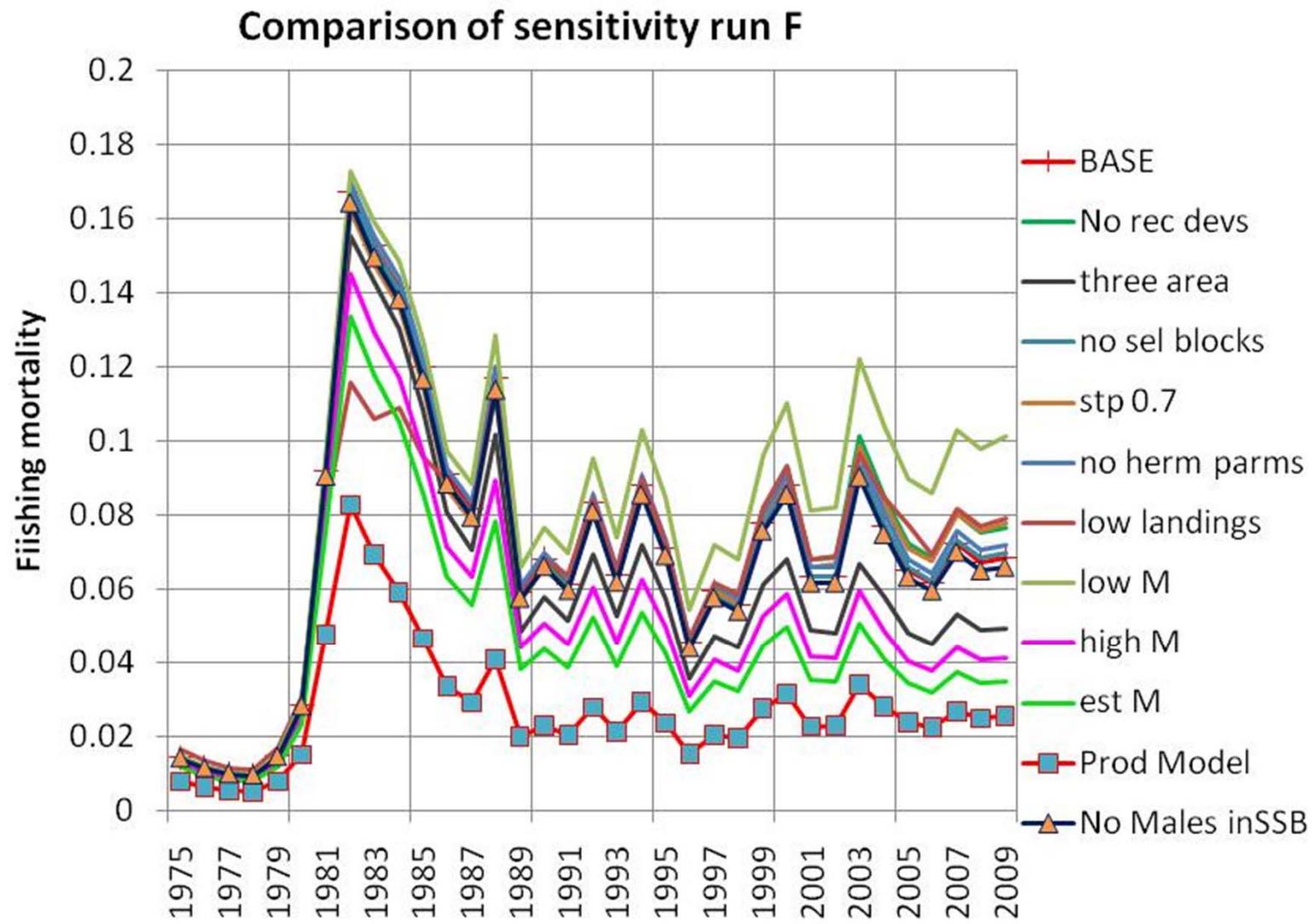
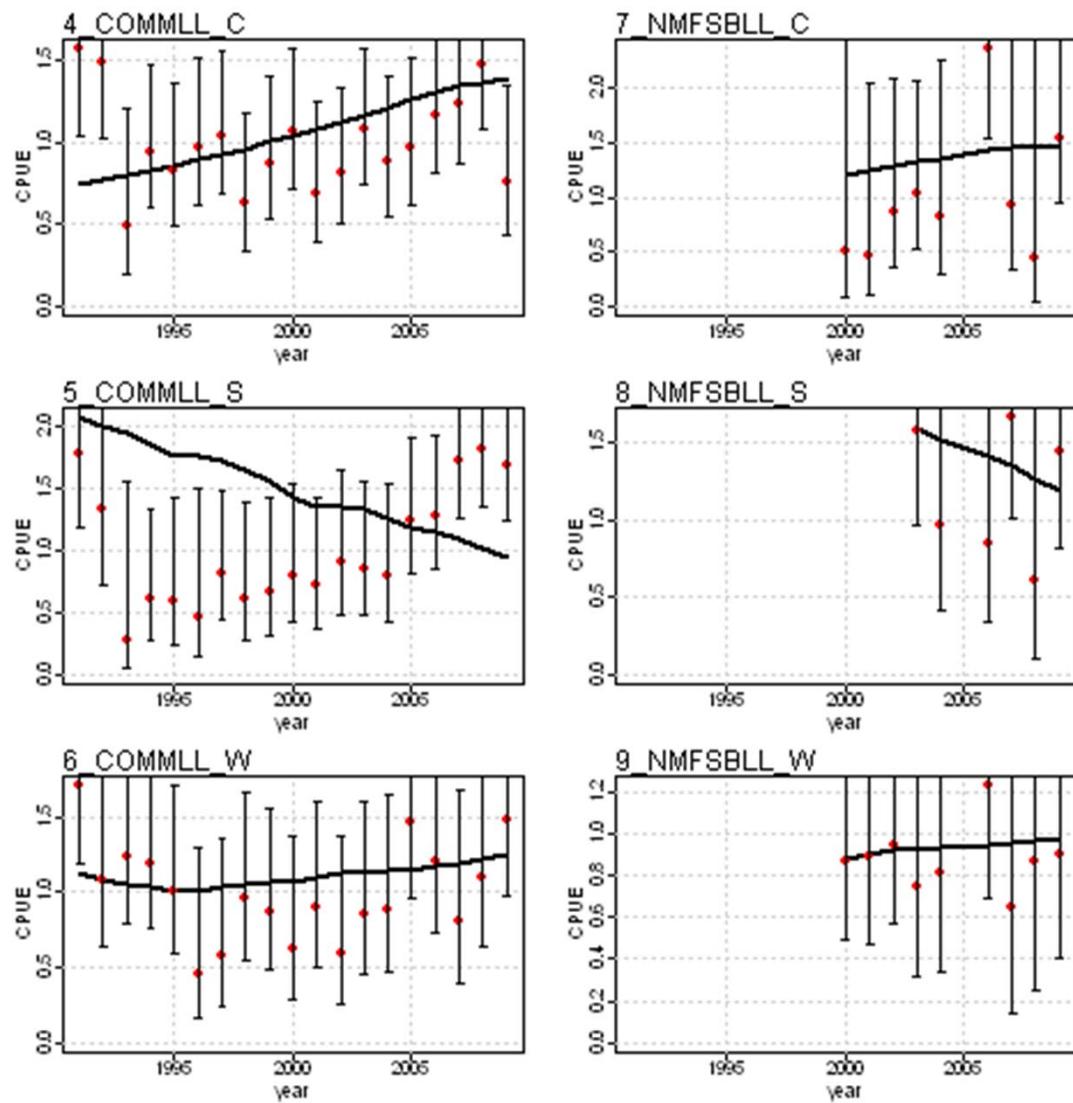


Figure 3.89. Fits to CPUE indices for the three area sensitivity run



The problem

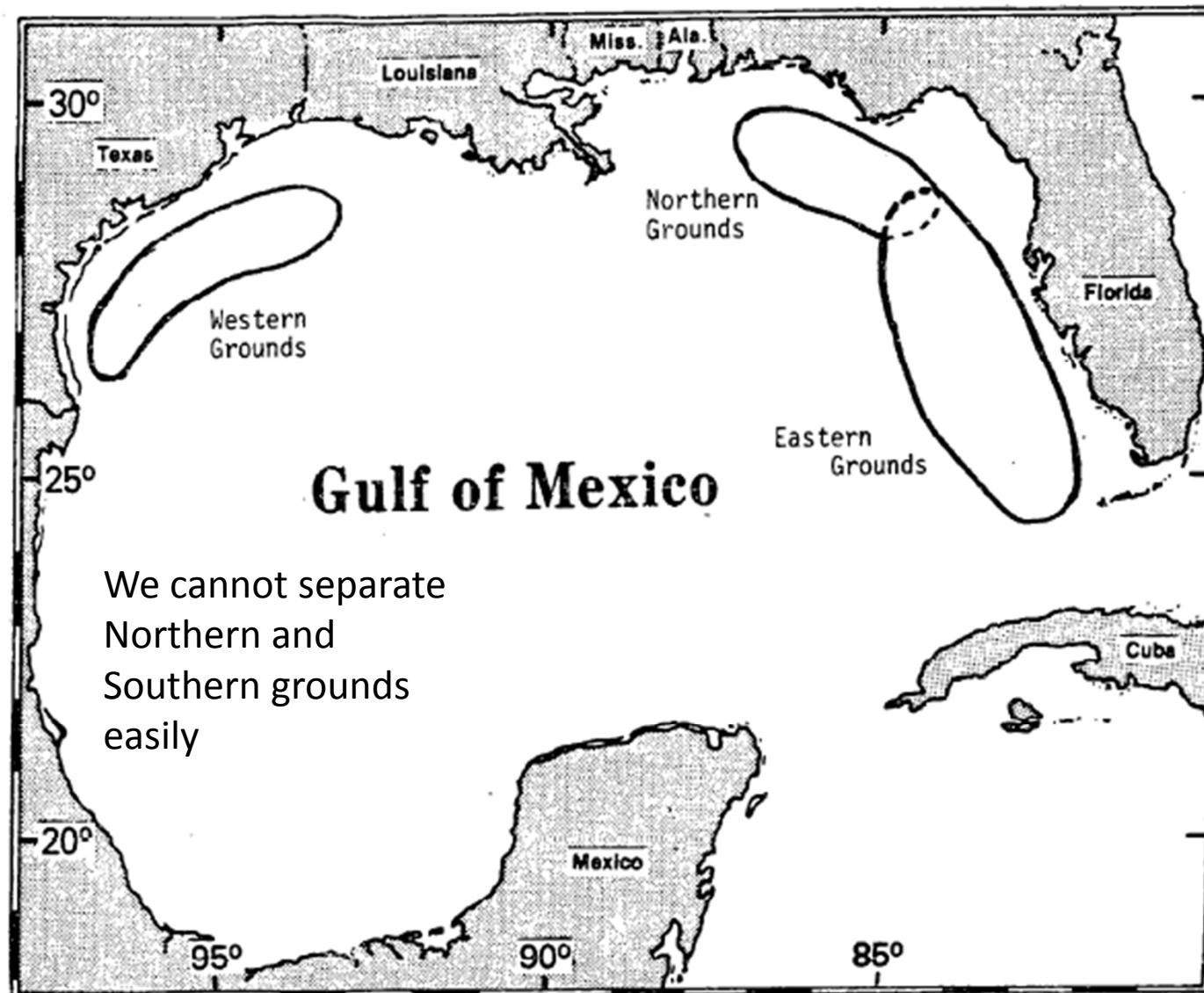
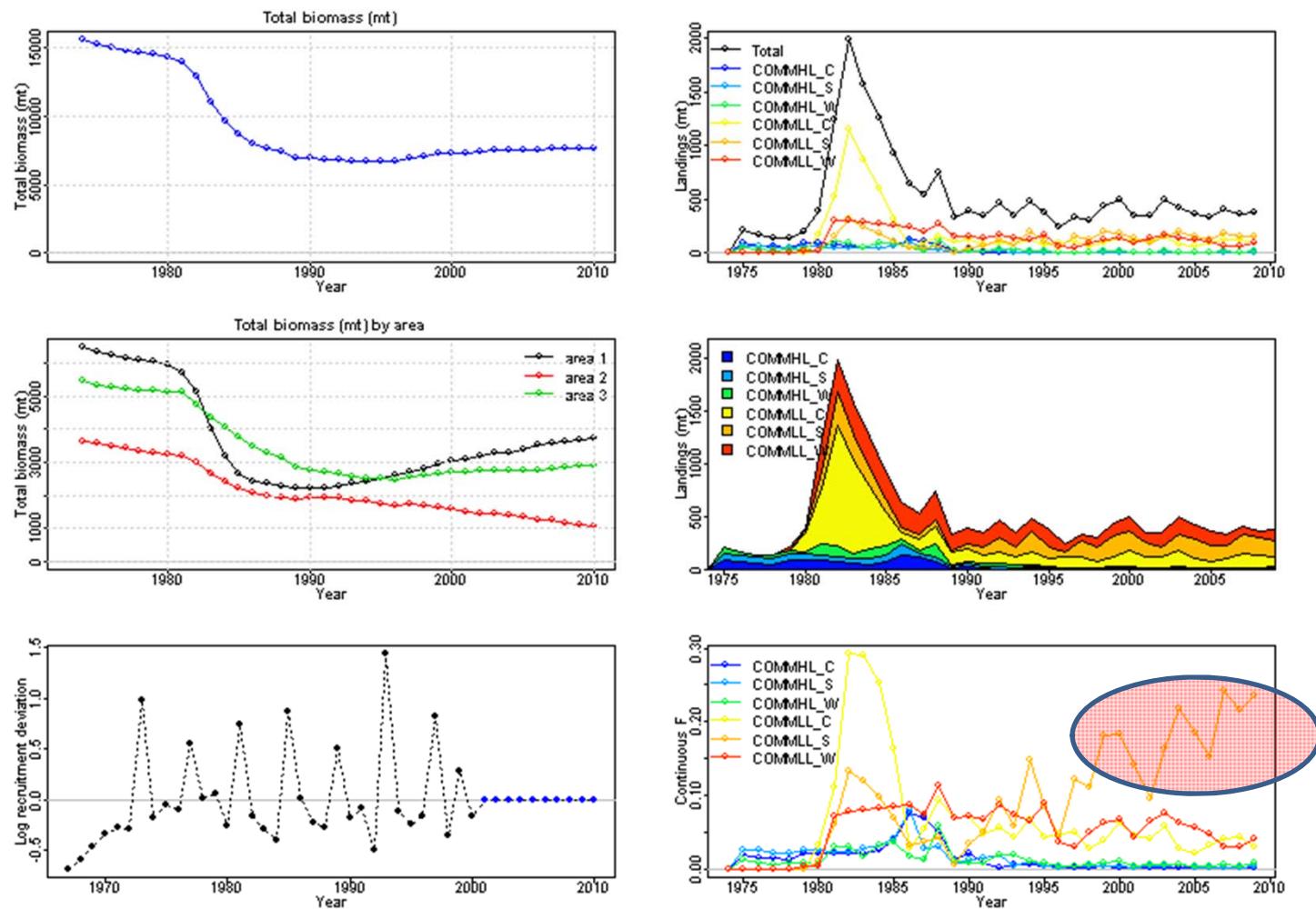


FIGURE 1

MAJOR BOTTOM LONGLINE FISHING GROUNDS

From Prytherch, 1983

Figure 3.90. Total biomass, biomass by area, recruitment deviations, landings and instantaneous F for the three-area model.



Moving to the 2-area model substantially improves the RMSE, and the wildly divergent recruitment deviations

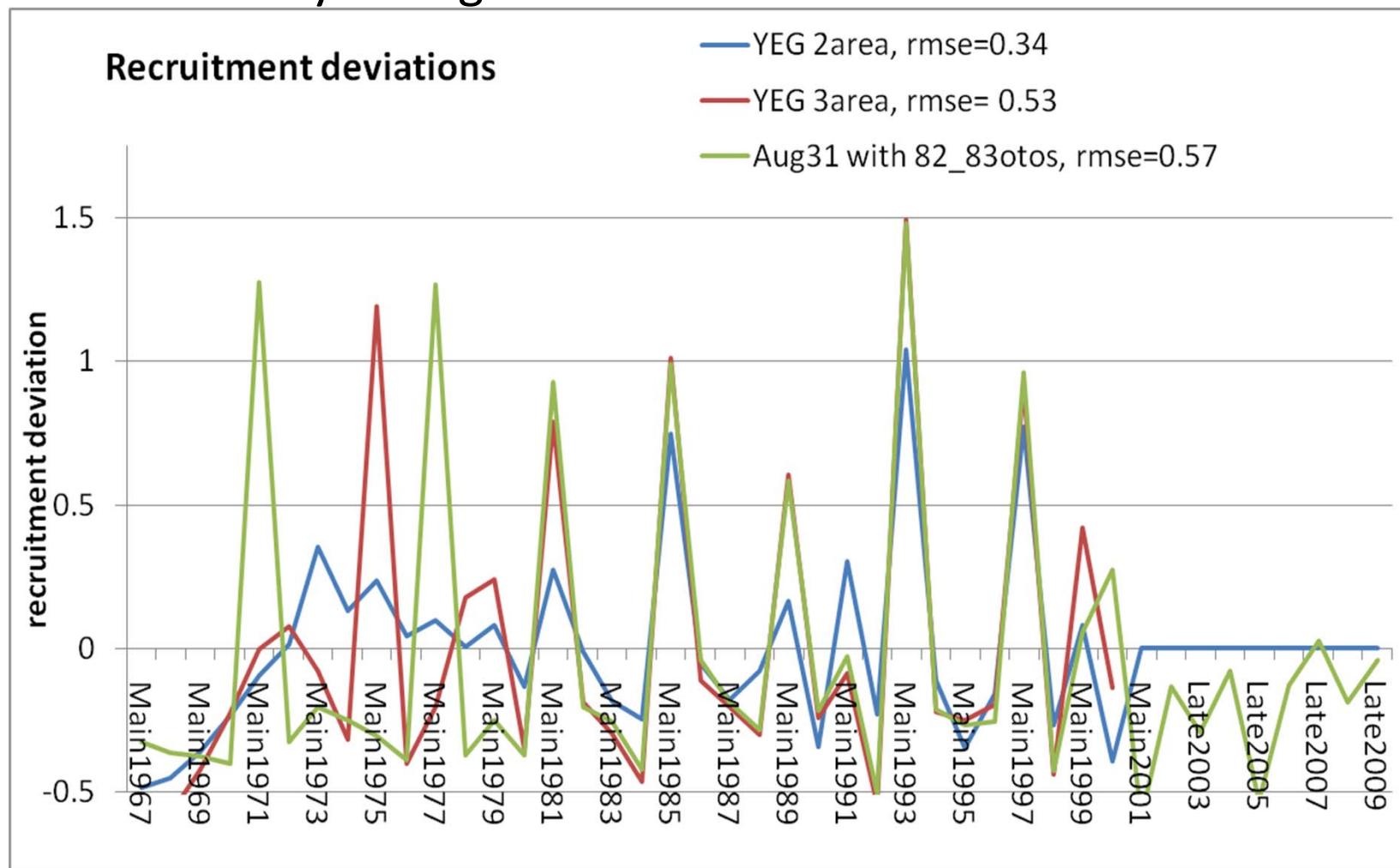


Figure 3.93. CPUE fits for sensitivity run incorporating low landings history.

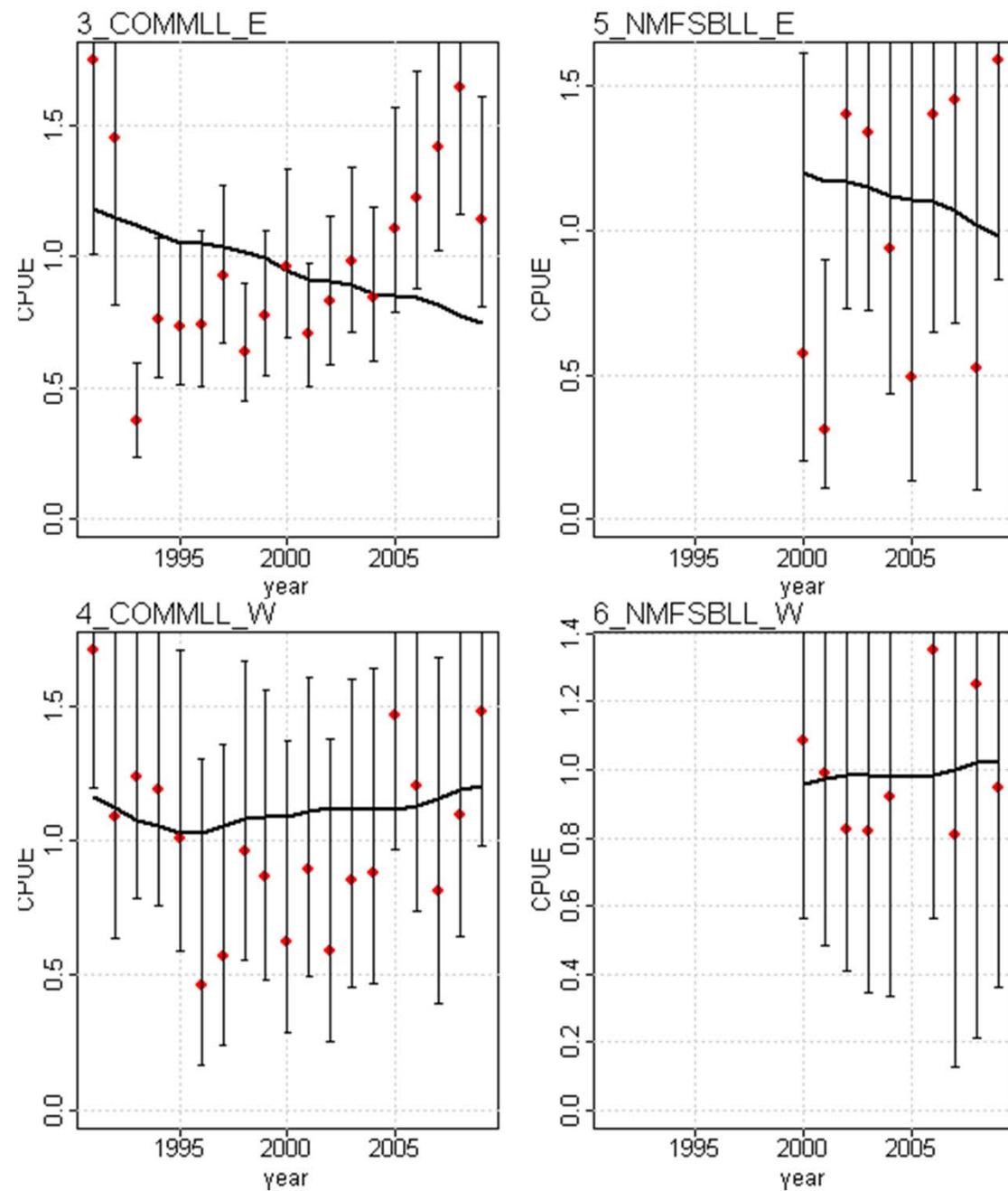
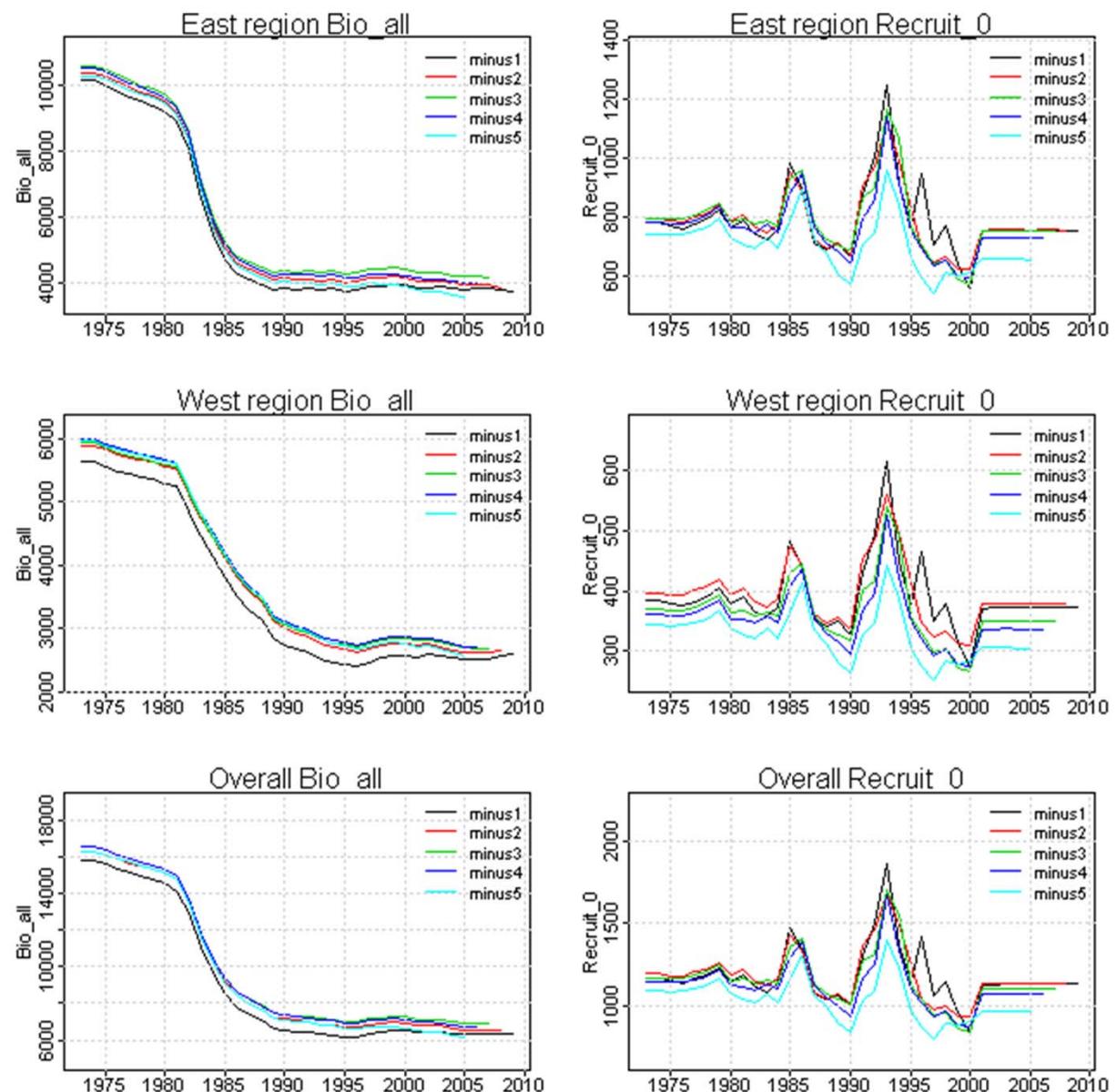


Figure 3.94. Retrospective patterns for total biomass and estimated recruits



- Estimated quantities/benchmarks

estimate/ benchmark	YEG BASE	Update 86_09	Update 86_09		No Rec Devs	Three Area	No Sel Blocks	Est. M	Low Stp0.7	NoEst Herm Parms	low Land- ing		prod	no males in SSB	nomales in SSB
			zeroeq								LowM	HighM			
TotBioUnfished	15120	23851	9935	14821	15599	15082	18583	15673	14749	13165	14288	17103	27399	15349	15334
SPB_Virgin	13423	21636	8839	13176	13978	13417	15470	13923	13122	11686	13172	14541	23991	6201	4826
Recr_Virgin	831	1226	559	829	881	824	2791	869	834	716	354	1889	1797	852	877
SSB_B40%virg	5369	8654	3536	5270	5591	5367	6188	5569	5249	4674	5269	5817	9596	2481	1930
SSB_SPR40%	5270	8579	3371	5202	5494	5268	5801	4567	5157	4600	5216	5573	9168	2425	1886
SSB_SPR30%	3911	6403	2460	3873	4080	3910	4190	3007	3863	3449	4013	4113	6698		
MSST_SPR40%	4885	7953	3125	4822	5093	4884	5378	4233	4780	4264	4835	5166	8499	2248	1749
SSB_MSY	2401	3552	1926	2247	2513	2396	3127	4072	2371	2012	2377	2853	6041	1755	1683
SPB_2009	4026	8090	3496	3489	6105	3982	7883	3606	3812	3486	2562	6710	11941	2980	2778
Fstd_40%virgin	0.047	0.043	0.045	0.047	0.047	0.046	0.049	0.039	0.047	0.046	0.040	0.051	0.030	0.076	0.095
Fstd_SPR40%	0.048	0.043	0.047	0.048	0.048	0.047	0.053	0.048	0.048	0.047	0.040	0.053	0.032	0.078	0.097
Fstd_SPR30%	0.066	0.060	0.065	0.066	0.067	0.065	0.073	0.066	0.067	0.066	0.057	0.073	0.043		
Fstd_MSY	0.099	0.099	0.080	0.103	0.101	0.098	0.091	0.053	0.099	0.102	0.087	0.097	0.047	0.105	0.108
F_2009	0.068	0.037	0.086	0.077	0.049	0.070	0.035	0.078	0.072	0.079	0.108	0.041	0.025	0.066	0.066
Yield B40%virgin	322.9	456.7	200.1	318.1	328.2	316.6	435.7	271.1	319.2	279.1	249.1	412.7	377.6	377.0	391.5
Yield_SPR40%	325.7	458.5	203.7	320.0	330.9	319.3	448.0	281.7	321.8	281.2	250.3	420.5	383.1	378.5	392.0
Yield_SPR30%	358.1	503.6	218.7	352.6	364.6	351.0	448.0	274.6	356.1	311.9	285.0	462.5	403.1		
Yield_MSY	374.6	532.0	221.7	371.3	381.9	367.1	497.6	283.2	369.2	325.2	288.0	471.9	404.2	387.6	393.1

Estimated quantities/benchmarks

(condensed table)

estimate/ benchmark	YEG BASE	No Rec Devs	Est. M	Low Stp0.7	NoEst Herm Parms	BASE low Land- ing	prod	no males in SSB	nomales in SSB no est herms
TotBioUnfished	15120	14821	18583	15673	14749	13165	27399	15349	15334
SPB_Virgin	13423	13176	15470	13923	13122	11686	23991	6201	4826
Recr_Virgin	831	829	2791	869	834	716	1797	852	877
SSB_B40%virg	5369	5270	6188	5569	5249	4674	9596	2481	1930
SSB_SPR40%	5270	5202	5801	4567	5157	4600	9168	2425	1886
SSB_SPR30%	3911	3873	4190	3007	3863	3449	6698		
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SSB_MSY	2401	2247	3127	4072	2371	2012	6041	1755	1683
SPB_2009	4026	3489	7883	3606	3812	3486	11941	2980	2778
Fstd_40%virgin	0.047	0.047	0.049	0.039	0.047	0.046	0.030	0.076	0.095
Fstd_SPR40%	0.048	0.048	0.053	0.048	0.048	0.047	0.032	0.078	0.097
Fstd_SPR30%	0.066	0.066	0.073	0.066	0.067	0.066	0.043		
Fstd_MSY	0.099	0.103	0.091	0.053	0.099	0.102	0.047	0.105	0.108
F_2009	0.068	0.077	0.035	0.078	0.072	0.079	0.025	0.066	0.066
Yield B40%virgin	322.9	318.1	435.7	271.1	319.2	279.1	377.6	377.0	391.5
Yield_SPR40%	325.7	320.0	448.0	281.7	321.8	281.2	383.1	378.5	392.0
Yield_SPR30%	358.1	352.6	448.0	274.6	356.1	311.9	403.1		
Yield_MSY	374.6	371.3	497.6	283.2	369.2	325.2	404.2	387.6	393.1

Relative benchmarks

Relative benchmarks	YEG BASE	Update 86_09	Update 86_09 zeroeq	No Rec Devs	Three Area	No Sel Blocks	Est. M	Low Stp0.7	NoEst HermParms	BASE low Land-ing	LowM	HighM	prod	no males in SSB	no males in SSB no est herms
SSB/B40%virgin	0.75	0.93	0.99	0.66	1.09	0.74	1.27	0.65	0.73	0.75	0.49	1.15	1.24	1.20	1.44
SSB/SPR40%	0.76	0.94	1.04	0.67	1.11	0.76	1.36	0.79	0.74	0.76	0.49	1.20	1.30	1.23	1.47
SSB/SPR30%	1.03	1.26	1.42	0.90	1.50	1.02	1.88	1.20	0.99	1.01	0.64	1.63	1.78		
SSB/MSST_SPR4 0%	0.82	1.02	1.12	0.72	1.20	0.82	1.47	0.85	0.80	0.82	0.53	1.30	1.40	1.33	1.59
SSB/MSY	1.68	2.28	1.81	1.55	2.43	1.66	2.52	0.89	1.61	1.73	1.08	2.35	1.98	1.70	1.65
F_2009/Fstd_40% virgin	1.47	0.87	1.93	1.63	1.06	1.51	0.71	2.01	1.52	1.70	2.74	0.81	0.84	0.87	0.69
F_2009/Fstd_SPR 40%	1.43	0.86	1.82	1.61	1.03	1.48	0.66	1.63	1.48	1.67	2.70	0.77	0.79	0.85	0.68
F_2009/Fstd_SPR 30%	1.03	0.62	1.32	1.16	0.74	1.07	0.48	1.18	1.07	1.20	1.91	0.56	0.59		
F_2009/Fstd_MSY	0.69	0.38	1.07	0.74	0.49	0.71	0.38	1.47	0.72	0.77	1.24	0.42	0.54	0.63	0.61

Relative benchmarks (condensed table)

	YEG BASE	Update 86_09	Update 86_09 zeroeq	No Rec Devs	Est. M	Low Stp0.7	NoEst Herm Parms	BASE low Land- ing	prod	no males in SSB	no males in SSB no est herms
Relative benchmarks											
SSB/B40%virgin	0.75	0.93	0.99	0.66	1.27	0.65	0.73	0.75	1.24	1.20	1.44
SSB/SPR40%	0.76	0.94	1.04	0.67	1.36	0.79	0.74	0.76	1.30	1.23	1.47
SSB/SPR30%	1.03	1.26	1.42	0.90	1.88	1.20	0.99	1.01	1.78		
SSB/ MSST_SPR40%	0.82	1.02	1.12	0.72	1.47	0.85	0.80	0.82	1.40	1.33	1.59
SSB/MSY	1.68	2.28	1.81	1.55	2.52	0.89	1.61	1.73	1.98	1.70	1.65
F_2009/ Fstd_40%virgin	1.47	0.87	1.93	1.63	0.71	2.01	1.52	1.70	0.84	0.87	0.69
F_2009/ Fstd_SPR40%	1.43	0.86	1.82	1.61	0.66	1.63	1.48	1.67	0.79	0.85	0.68
F_2009/ Fstd_SPR30%	1.03	0.62	1.32	1.16	0.48	1.18	1.07	1.20	0.59		
F_2009/ Fstd_MSY	0.69	0.38	1.07	0.74	0.38	1.47	0.72	0.77	0.54	0.63	0.61

Figure 3.103. SRA and SS3 Comparison of biomass trajectories.

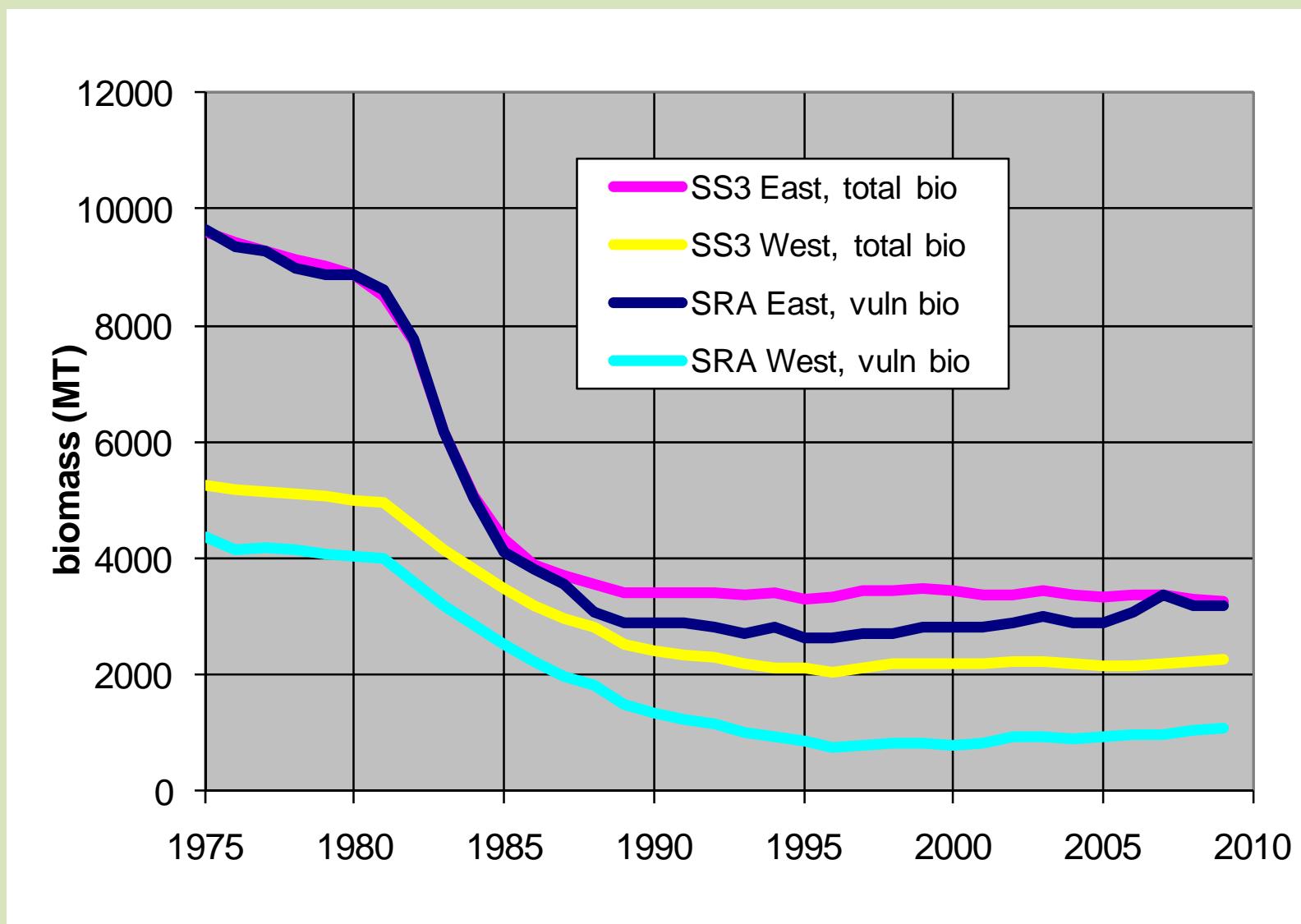


Figure 3.103. SRA and SS3 Comparison of biomass trajectories.

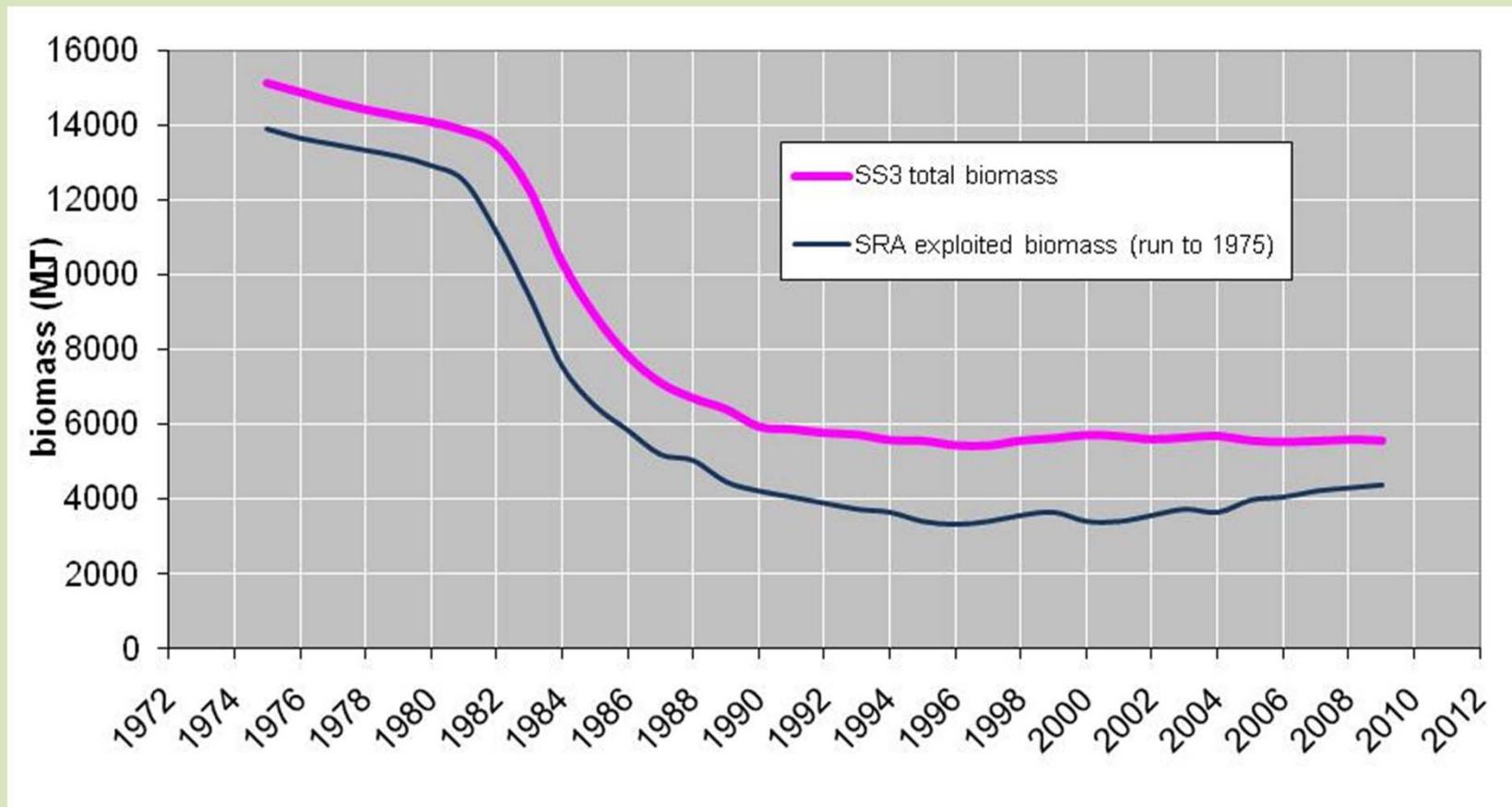
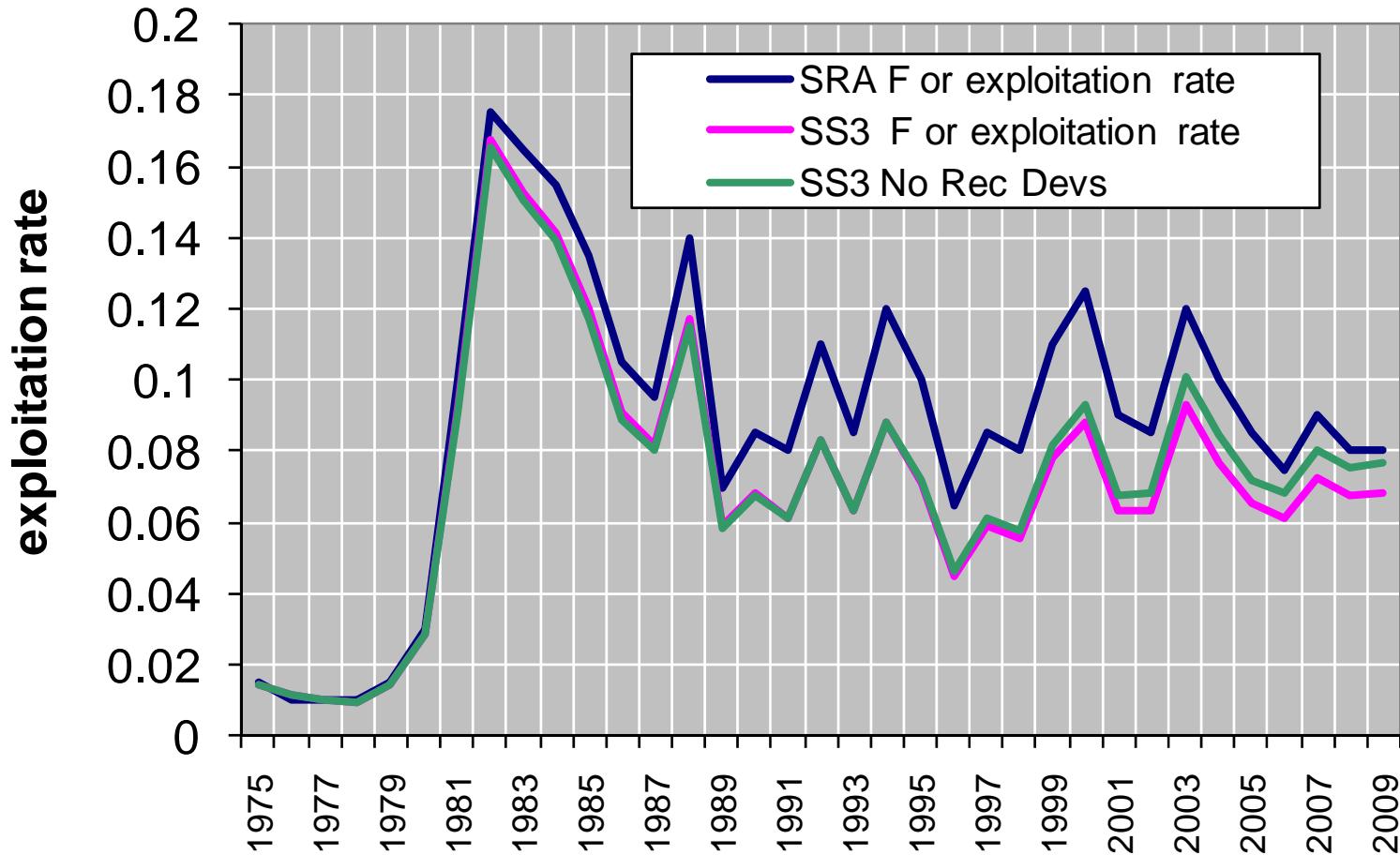


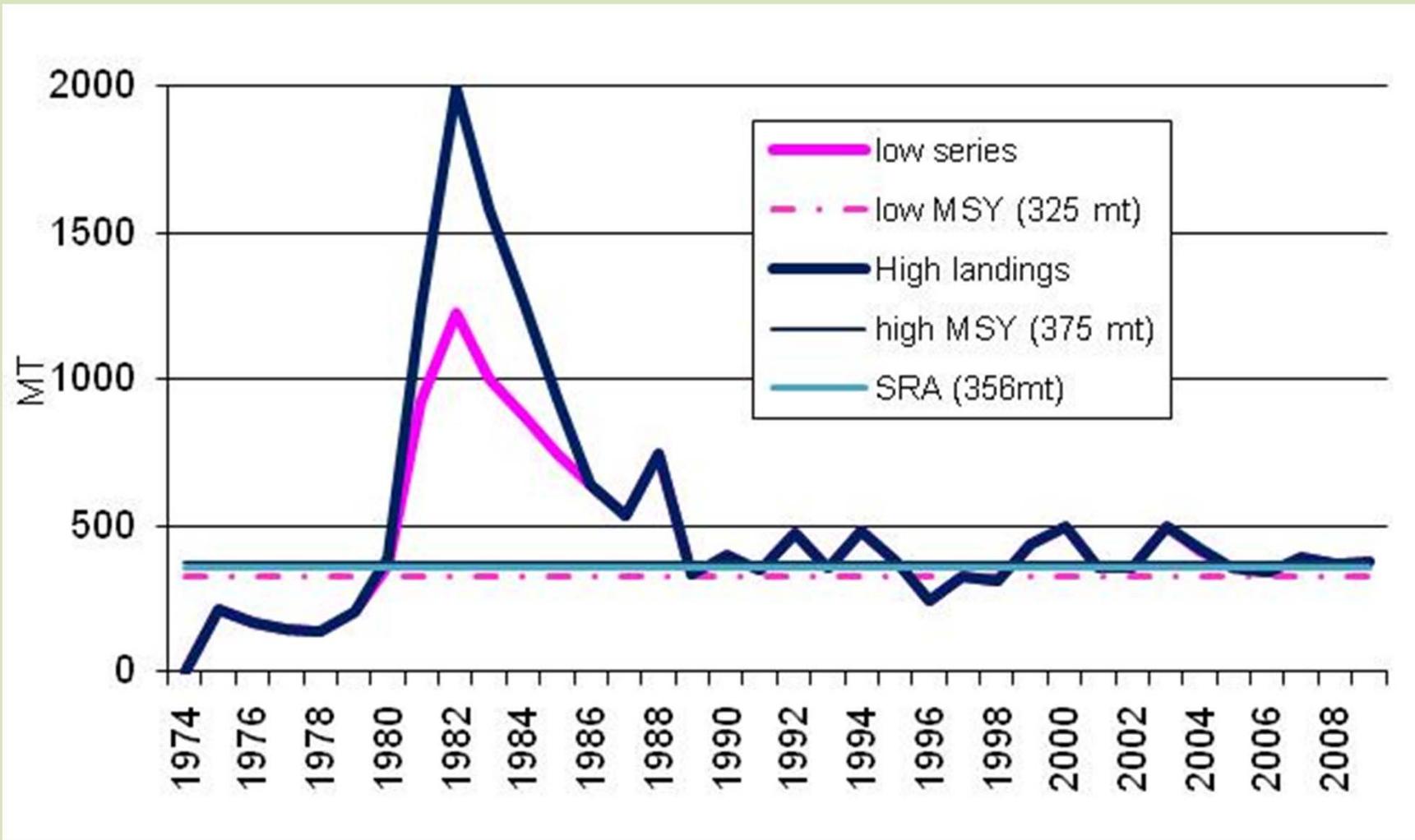
Figure 3.105. Estimated overall exploitation rates for SRA (all area model) and SS3 (combined across both areas).



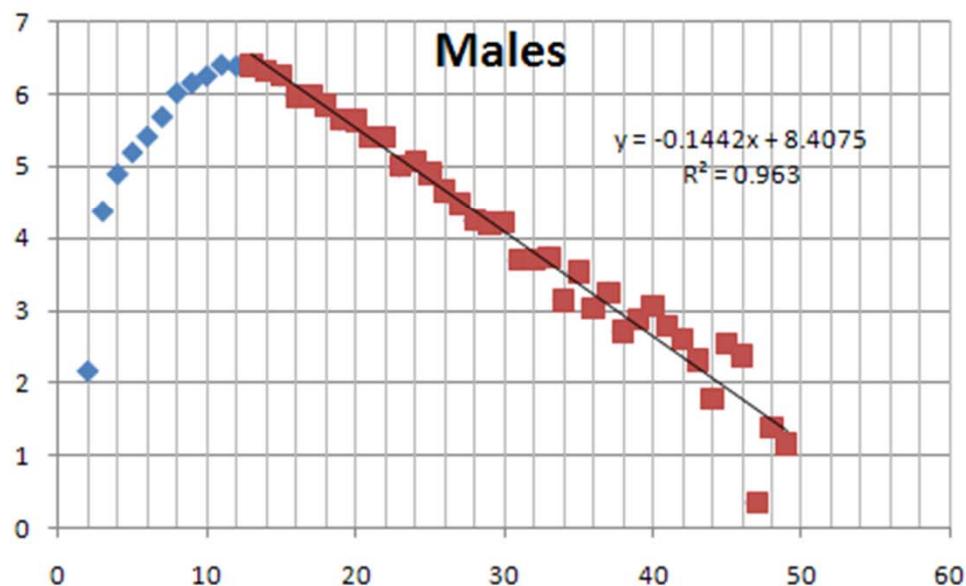
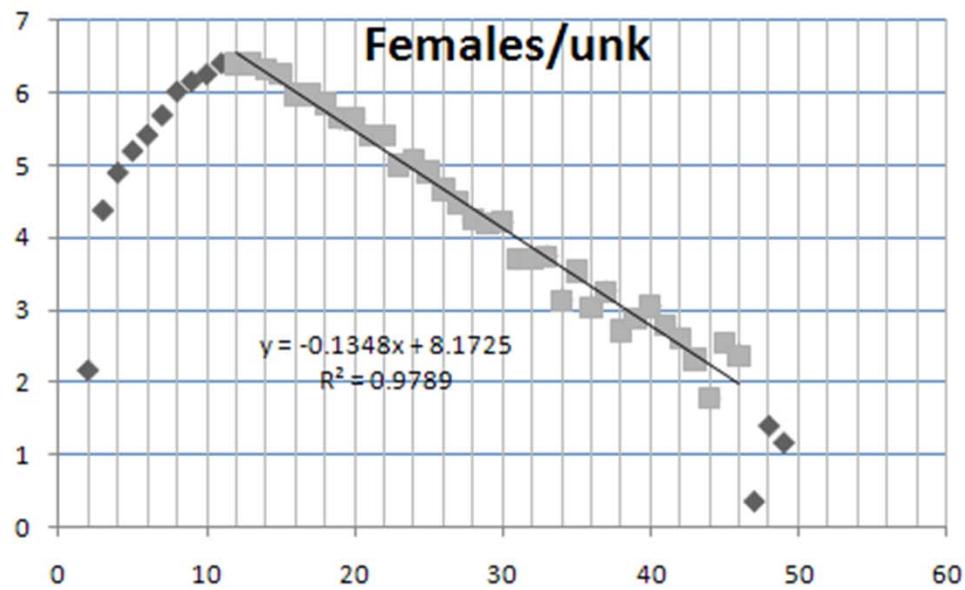
Benchmark and proxy comparison between SRA and SS3 models

estimate/ benchmark	YEG BASE	No Rec Devs	Low Stp0.7	prod	SRA (median)
TotBio_Unfished	15120	14821	15673	27399	
SPB_Virgin	13423	13176	13923	23991	
Recr_Virgin	831	829	869	1797	
SSB_B40%virgin	5369	5270	5569	9596	
SSB_SPR40%	5270	5202	4567	9168	
SSB_SPR30%	3911	3873	3007	6698	
MSST_SPR40%	4885	4822	4233	8499	
SSB_MSY	2401	2247	4072	6041	9,524
SPB_2009	4026	3489	3606	11941	4,599
SSB/B40%virgin	0.75	0.66	0.65	1.24	
SSB/SPR40%	0.76	0.67	0.79	1.30	
SSB/SPR30%	1.03	0.90	1.20	1.78	
SSB/MSST_SPR40%	0.82	0.72	0.85	1.40	
SSB/MSY	1.68	1.55	0.89	1.98	0.49
Fstd_40%virgin	0.047	0.047	0.039	0.030	
Fstd_SPR40%	0.048	0.048	0.048	0.032	
Fstd_SPR30%	0.066	0.066	0.066	0.043	
Fstd_MSY	0.099	0.103	0.053	0.047	0.08
F_2009	0.068	0.077	0.078	0.025	0.08
F_2009/Fstd_40%virgin	1.47	1.63	2.01	0.84	
F_2009/Fstd_SPR40%	1.43	1.61	1.63	0.79	
F_2009/Fstd_SPR30%	1.03	1.16	1.18	0.59	
F_2009/Fstd_MSY	0.69	0.74	1.47	0.54	0.98
Yield B40%virgin	323	318	271	378	
Yield_SPR40%	326	320	282	383	
Yield_SPR30%	358	353	275	403	
Yield_MSY	375	371	283	404	356

Landings vs estimated MSY for SS3 and SRA



Catch curves



All Female $y = -0.1348x + 8.1725$
 $R^2 = 0.9789$

All Male $y = -0.1442x + 8.4075$
 $R^2 = 0.963$

Female Central $y = -0.1656x + 6.9062$
 $R^2 = 0.9442$

Male Central $y = -0.1394x + 6.2896$
 $R^2 = 0.9152$

South Female $y = -0.1378x + 7.6755$
 $R^2 = 0.967$

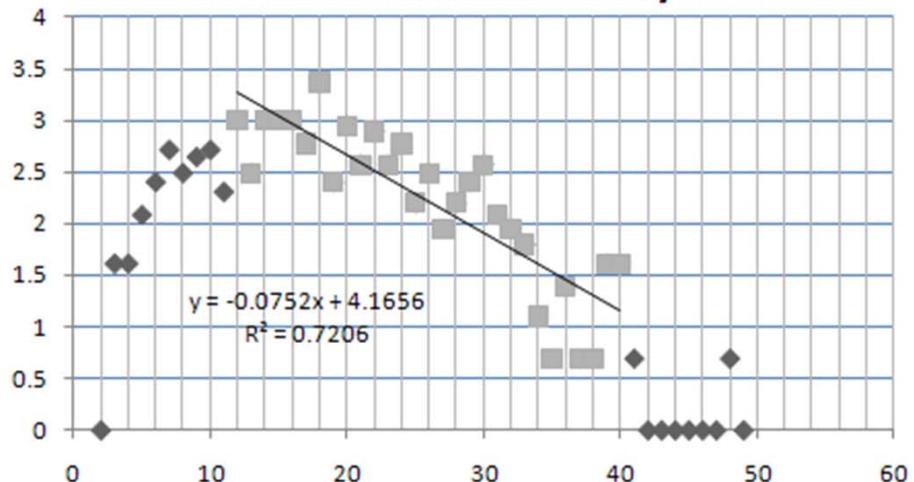
South Male $y = -0.1495x + 7.9753$
 $R^2 = 0.9397$

West Female $y = -0.136x + 6.9515$
 $R^2 = 0.9695$

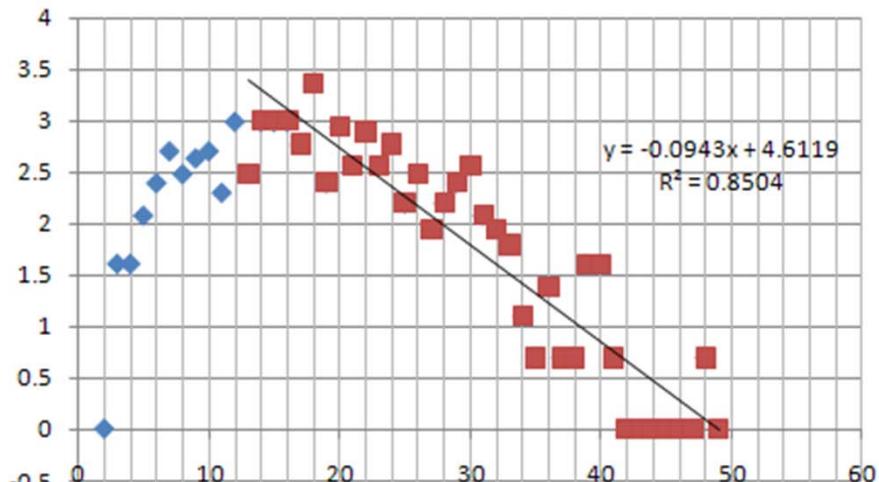
West Male $y = -0.1414x + 7.097$
 $R^2 = 0.9328$

Catch curves

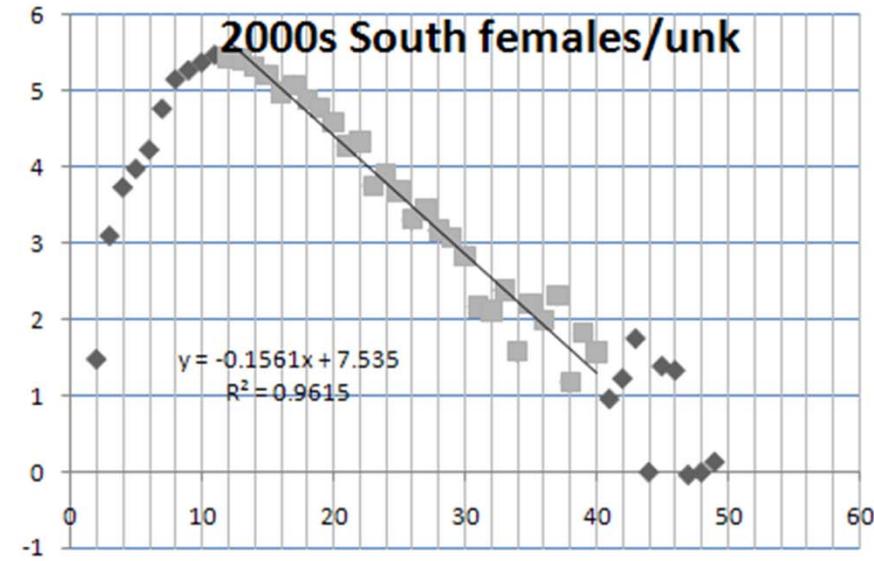
1977-80 South Females/unk



1977-80 Males South



2000s South females/unk



2000s South males

