



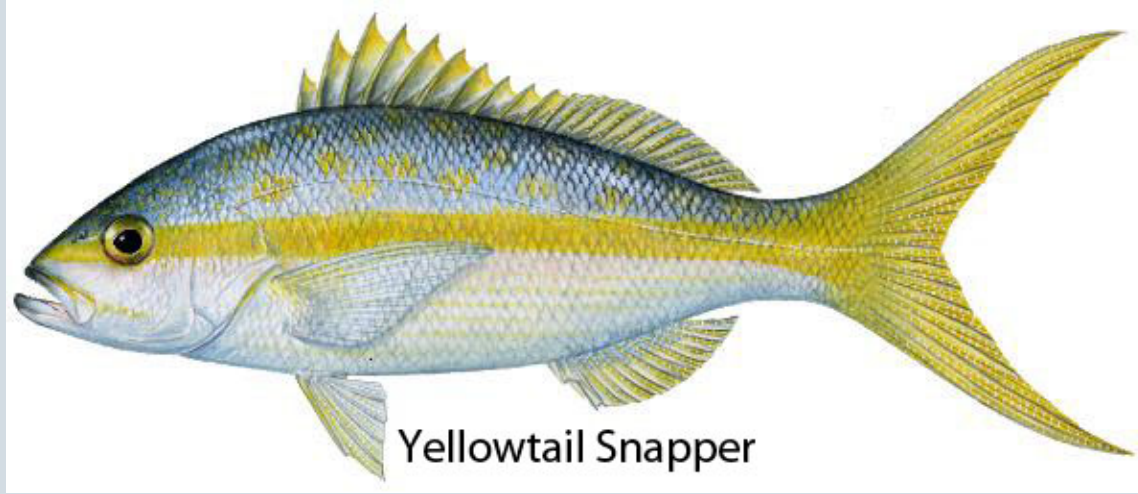
# SEDAR 64: Yellowtail Snapper Assessment Model Results

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FWRI Stock Assessment Group, St. Petersburg, FL

Review Workshop: February 24 – 26, 2020





# SEDAR 64: Yellowtail Snapper Assessment Model Results

## Continuity Model





**SEDAR 27A: ASAP2  
1981 – 2010**

**SEDAR 27A: ASAP3  
1981 – 2010**

**SEDAR 27A: ASAP3  
1981 – 2017  
(Continuity Model)  
S64 Data; S27A Config**



**SEDAR 27A: ASAP3  
1981 – 2010  
S27A Data; S64 Config.**

**SEDAR 64: ASAP3  
1992 – 2017**

**SEDAR 64: SS3  
1992 – 2017**

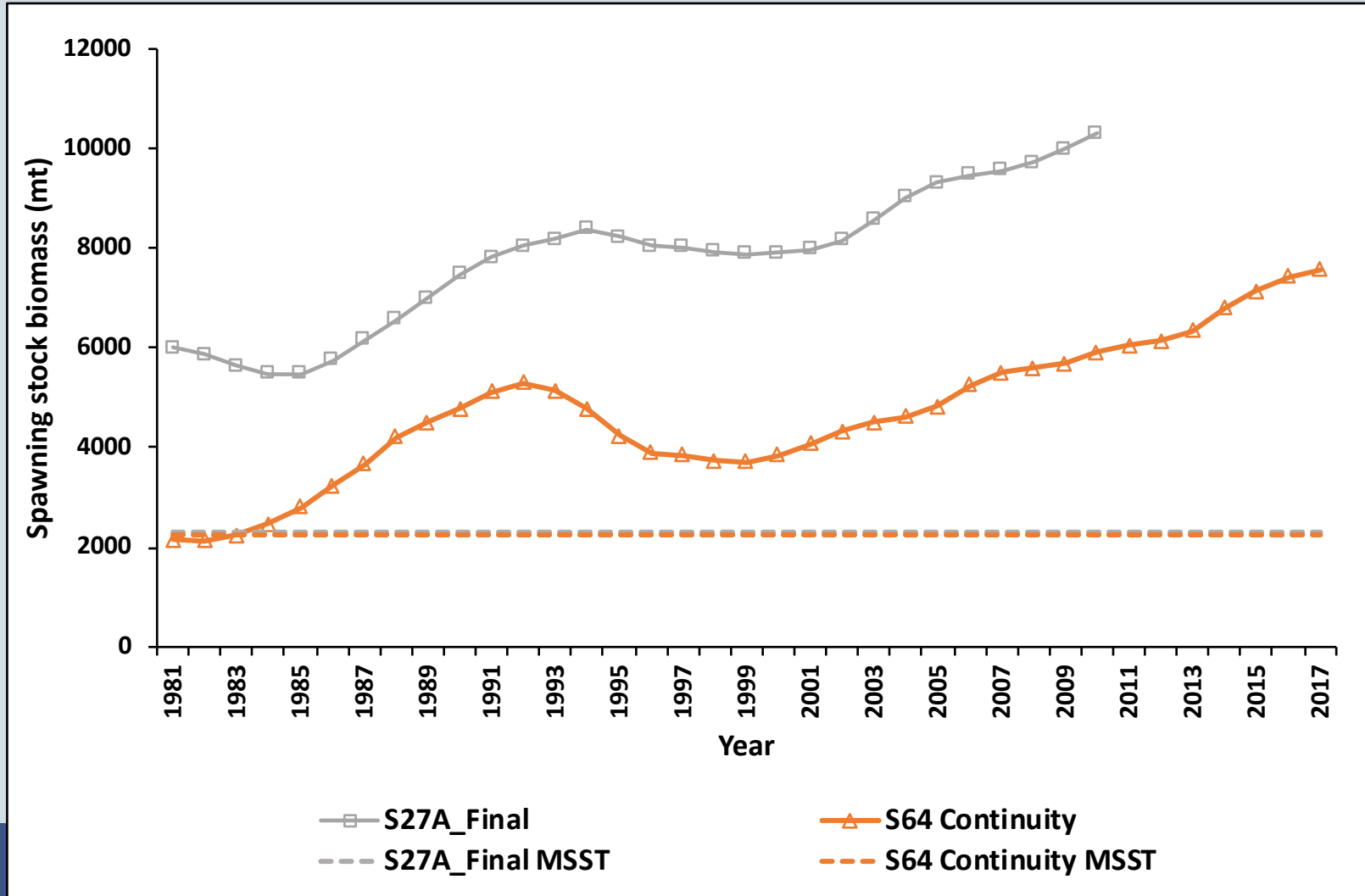


# Continuity Model

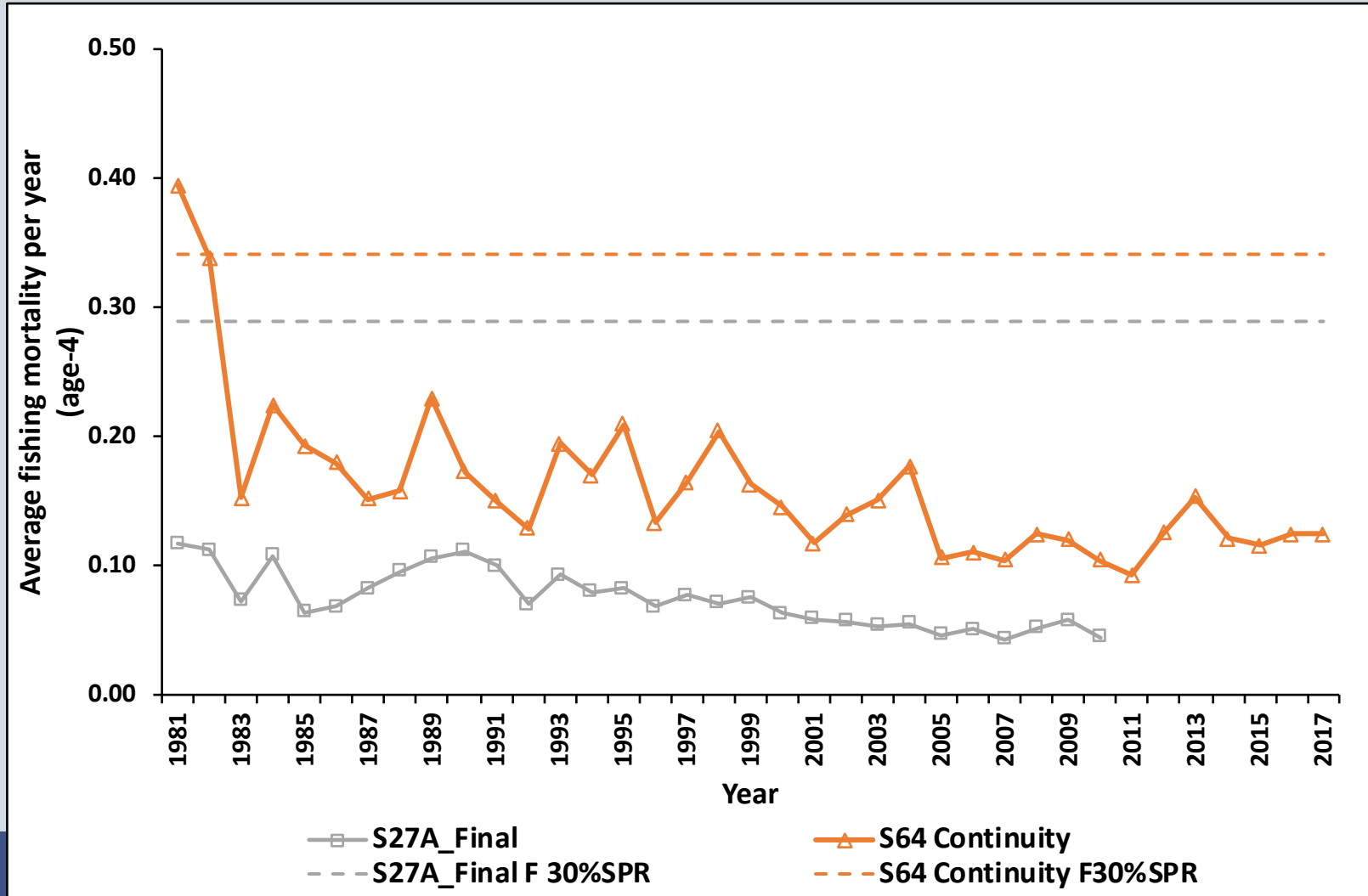
- 
- 1) Run the SEDAR 27A Final Model in the current version of ASAP to ensure the same results were produced
    - Version 2.0 → version 3.0.16
  - 2) Configure the SEDAR 64 data as close to the methods used for SEDAR 27A as possible (see Table 3.8.1 in the AW Report). For Example,
    - 3 weight-at-age matrices
    - 9 selectivity blocks
    - Flat-topped selectivity types for all fleets
    - Only one RVC index (age 1+) and no Headboat index
    - Constant catchability for Commercial CPUE index
    - Weighting factors (lambdas)
    - Age-Length-Key methods
- 



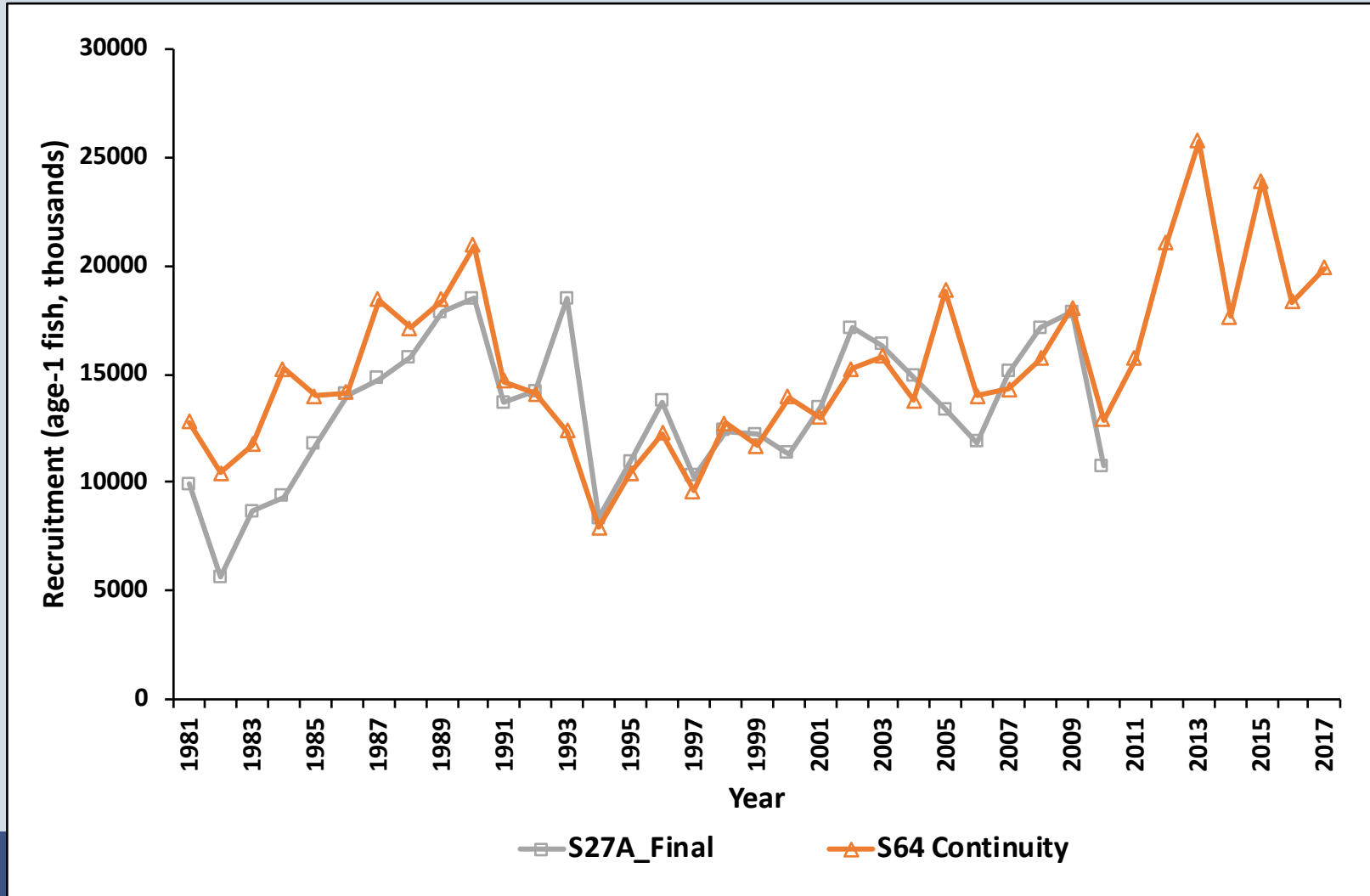
# Continuity Model



# Continuity Model



# Continuity Model





Stock Status Determination Criterion				
Criteria	Definition	S27A_Final	S64_Contintuity	
MSST (Minimum Stock Size Threshold)	$0.75 * SSB_{F30\%SPR}$	2,303.75 mt	2,249.65 mt	
$SSB_{F30\%SPR}$	The estimated spawning stock biomass associated with F at 30% SPR	3,071.67 mt	2,999.53 mt	
$SSB_{current}$ (recent average of SSB)	The geometric mean of SSB for last 3 years	10,003.20 mt	7,379.55 mt	
MFMT (Maximum Fishing Mortality Threshold)	$F_{30\% SPR}$	0.289 yr <sup>-1</sup>	0.341 yr <sup>-1</sup>	
$F_{30\%SPR}$	The fishing mortality rate associated with 30% SPR	0.289 yr <sup>-1</sup>	0.341 yr <sup>-1</sup>	
$F_{current}$	The geometric mean of F on age-4 fish for last 3 years	0.051 yr <sup>-1</sup>	0.121 yr <sup>-1</sup>	



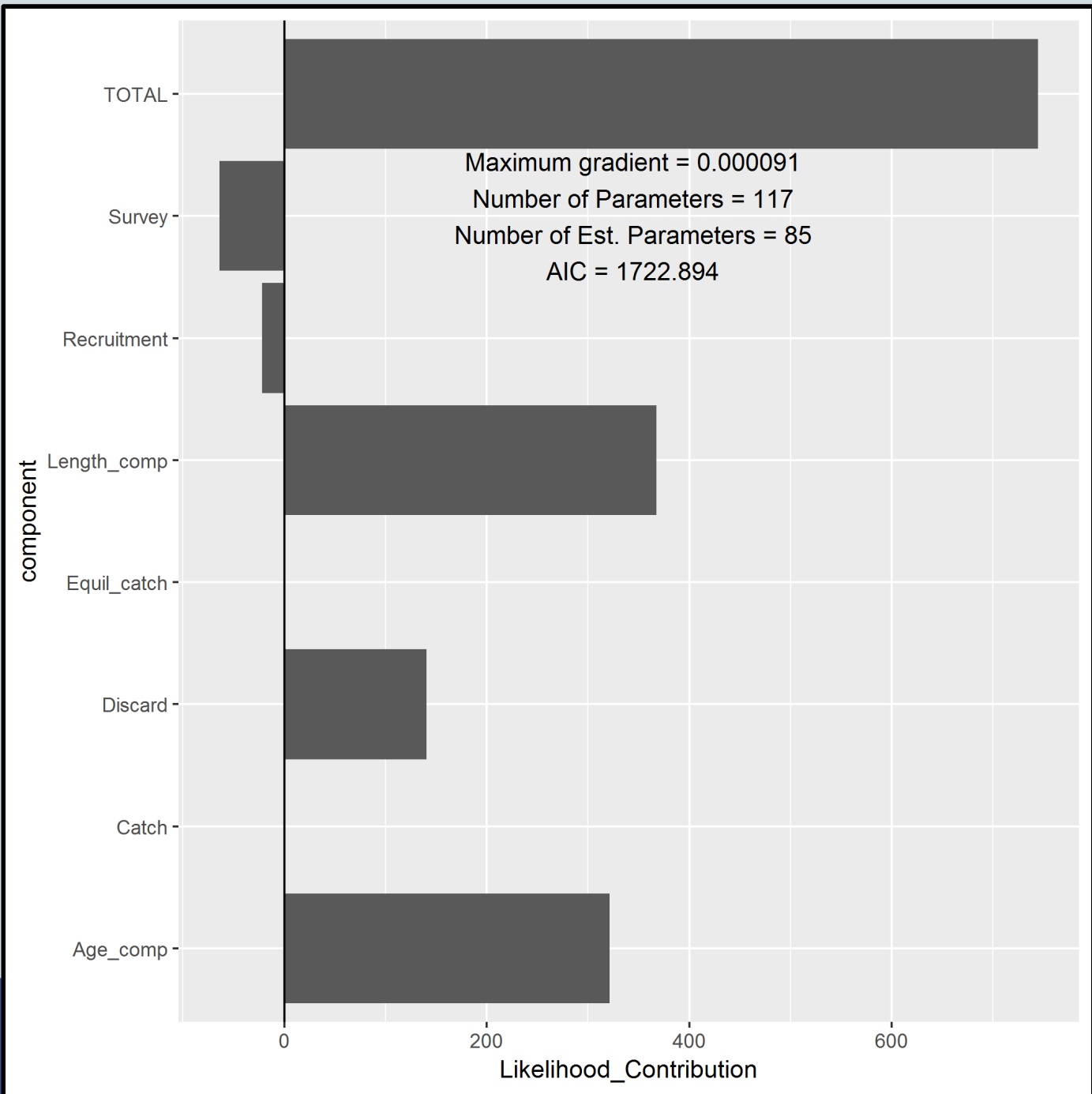


# SEDAR 64: Yellowtail Snapper Assessment Model Results

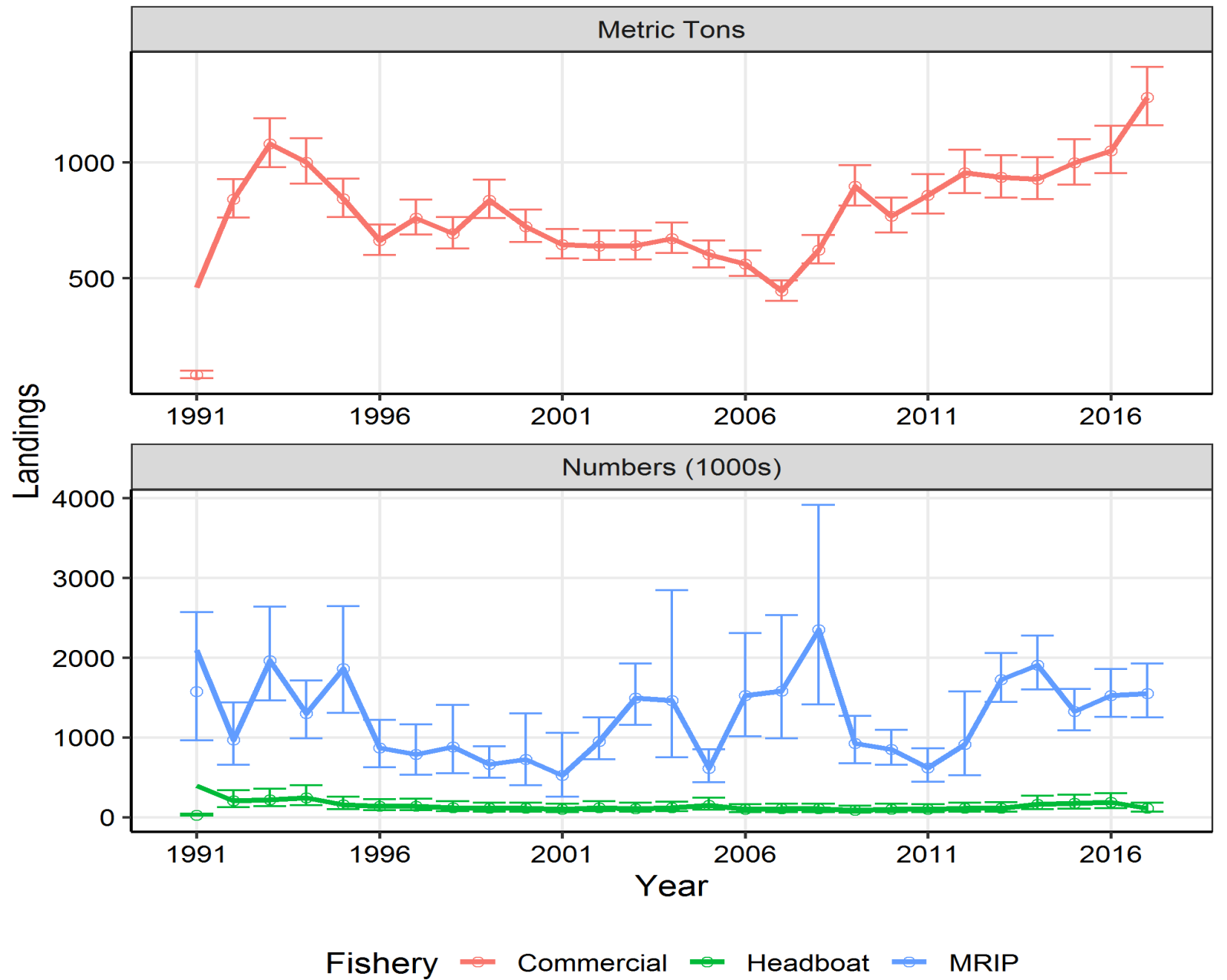
## Base Model Fits



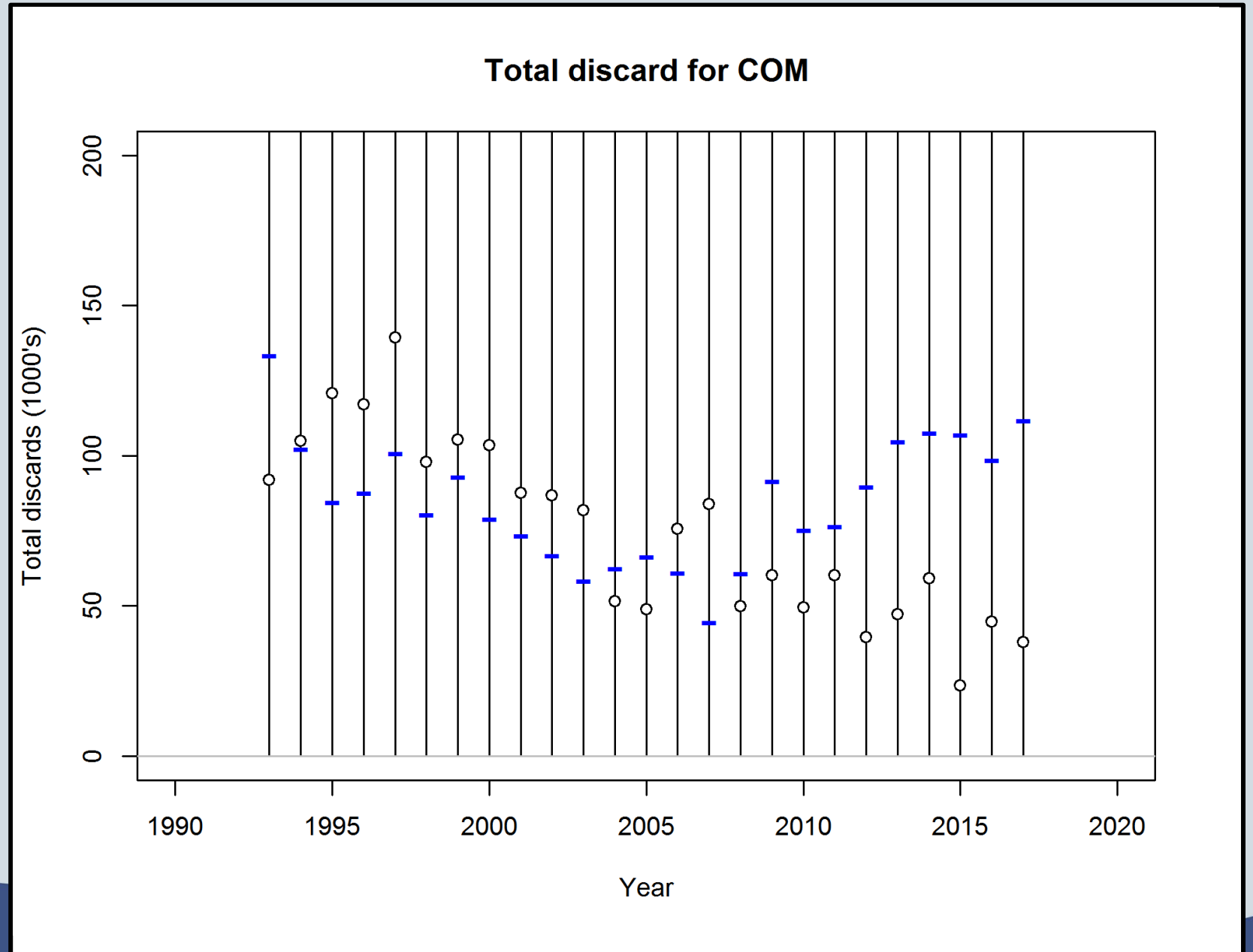
# Likelihood Overview



# Model Fits: Landings

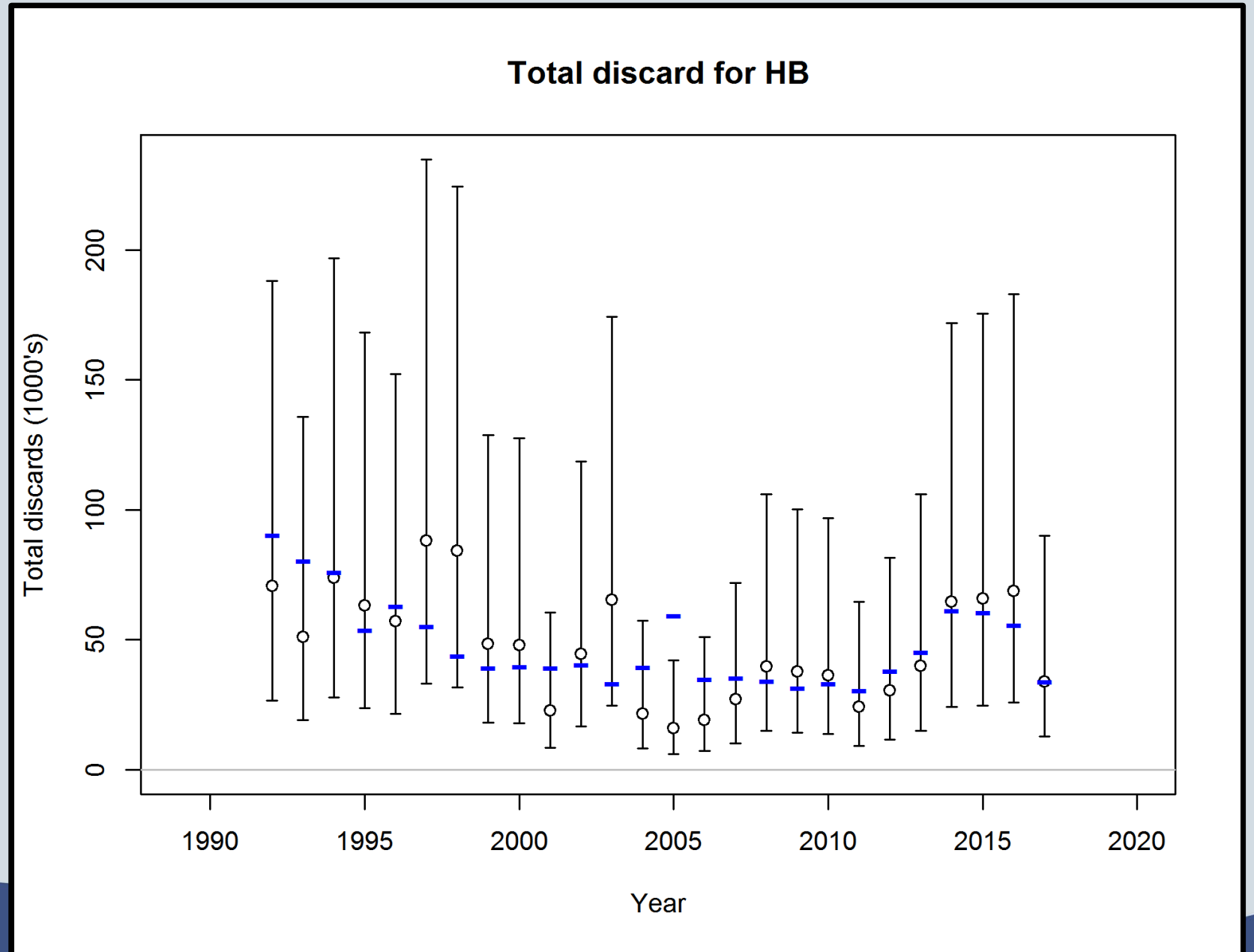


# Model Fits: Commercial Discards

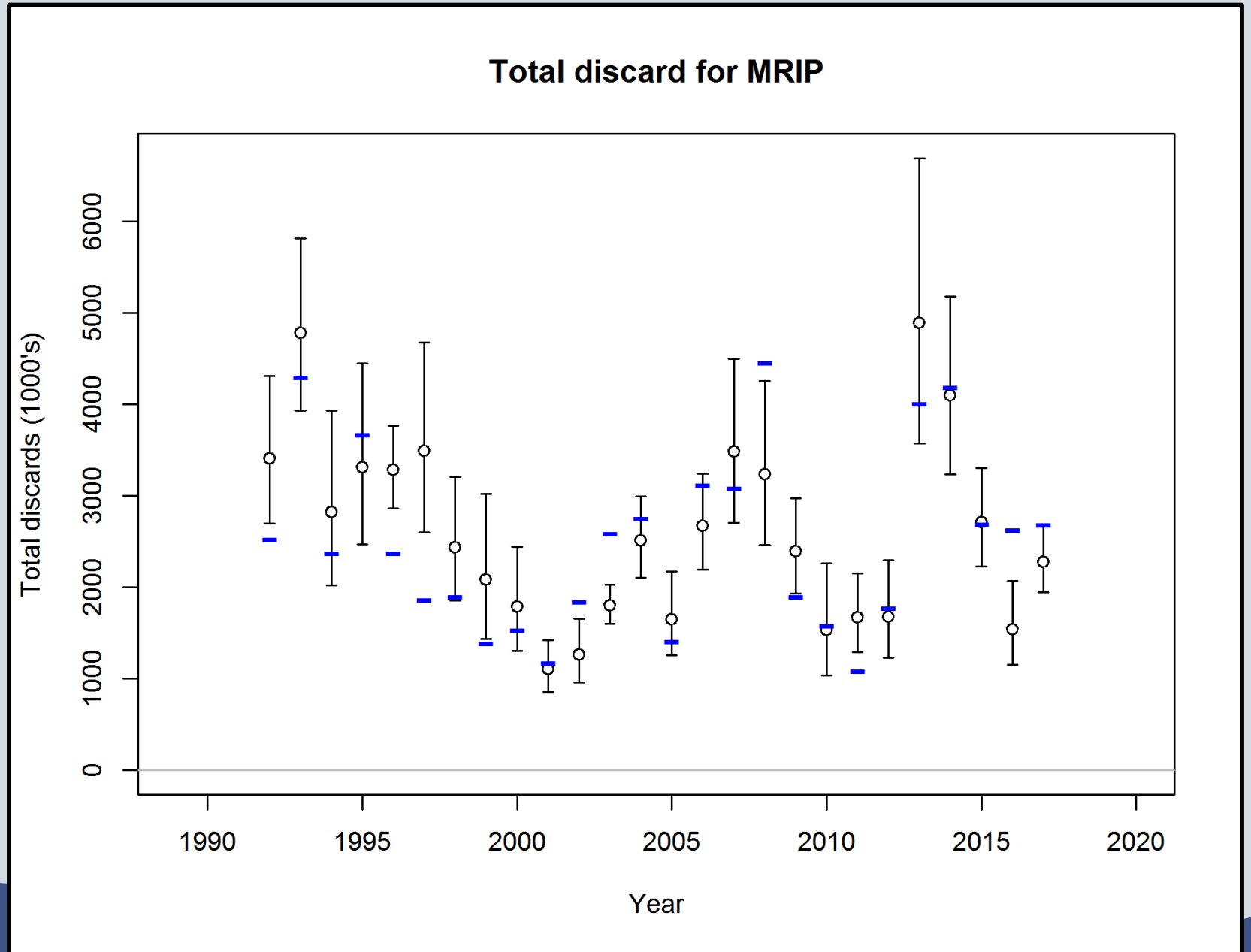




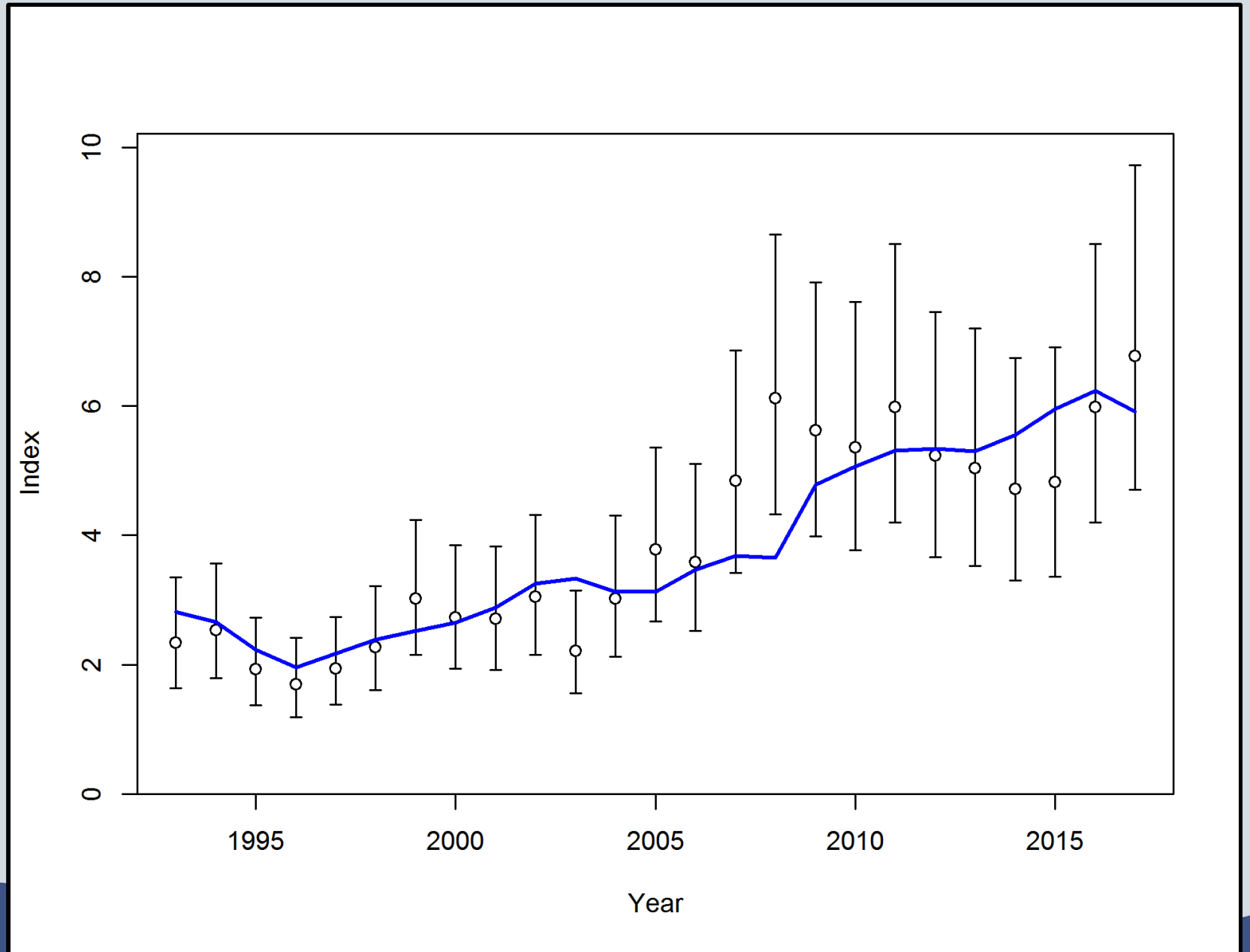
# Model Fits: Headboat Discards



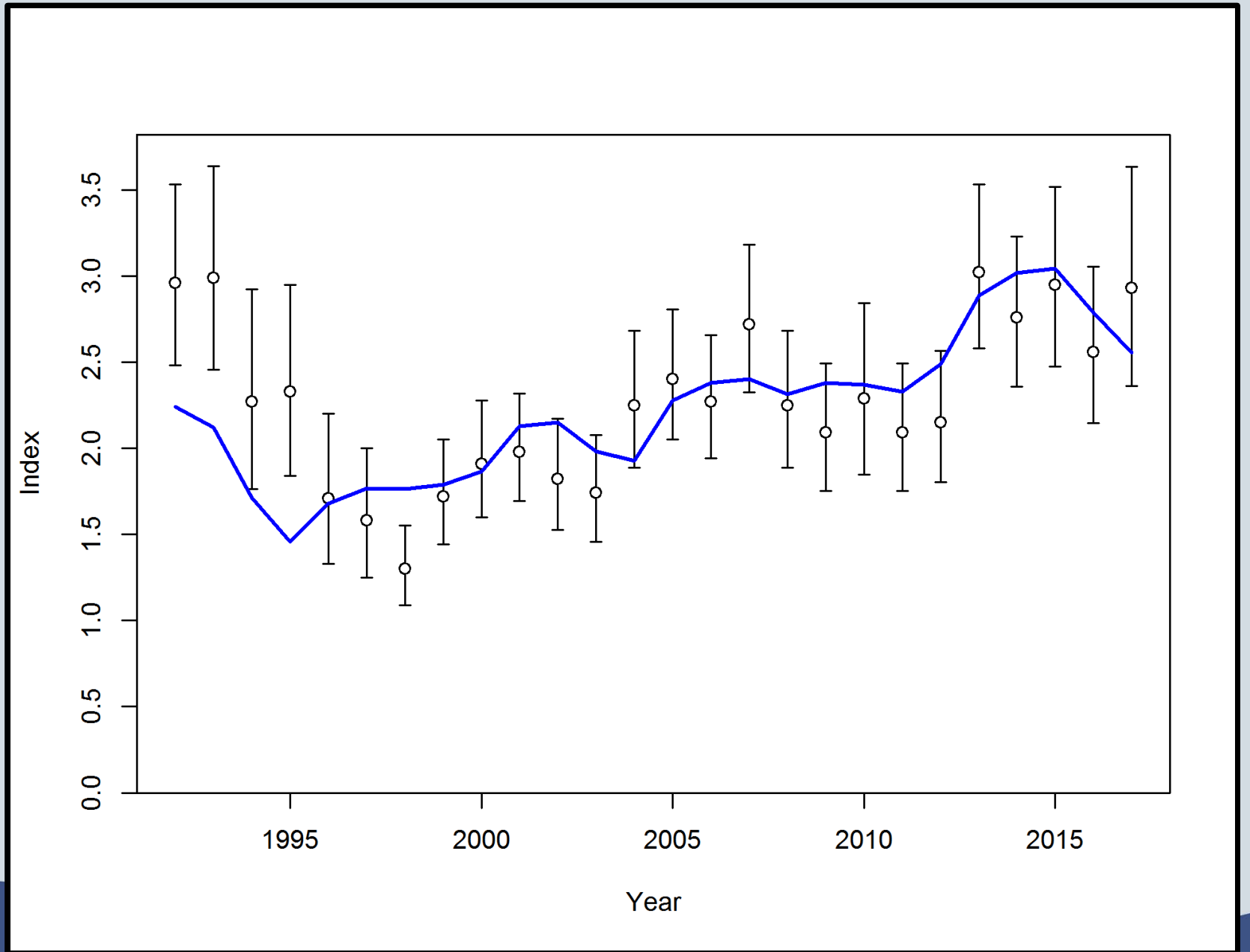
# Model Fits: MRIP Discards



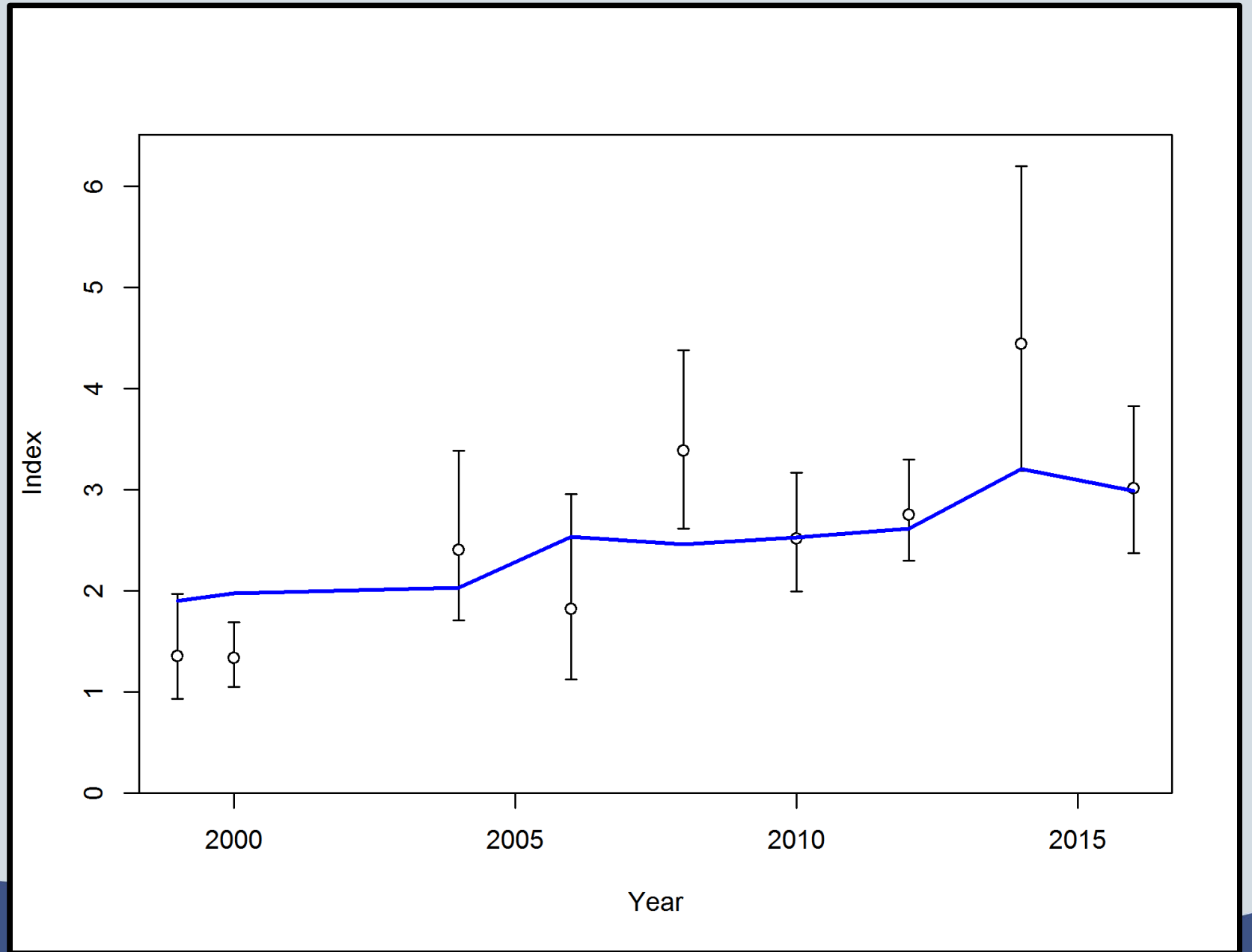
# Model Fits: Commercial CPUE



# Model Fits: MRIP CPUE

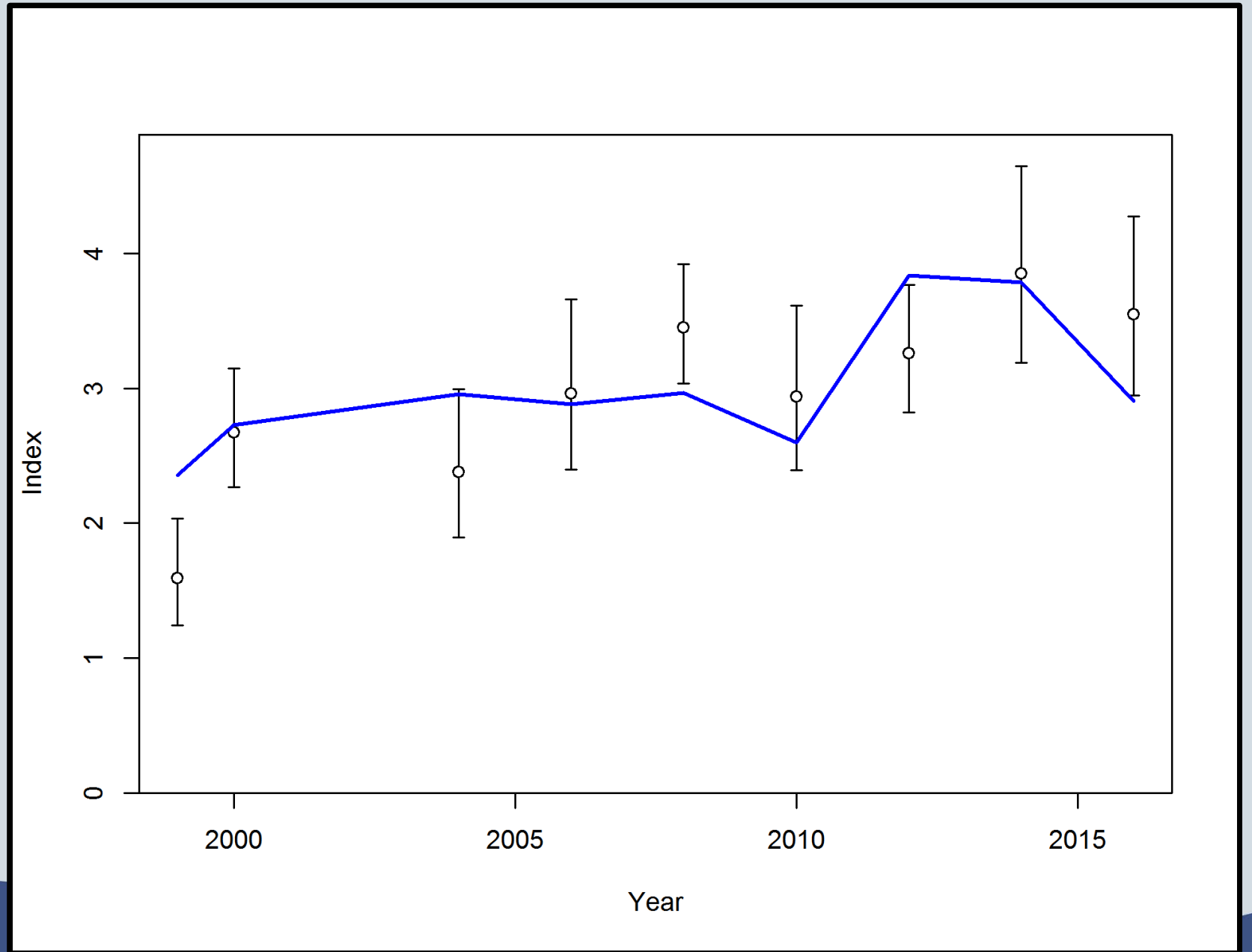


# Model Fits: RVC Adult Index

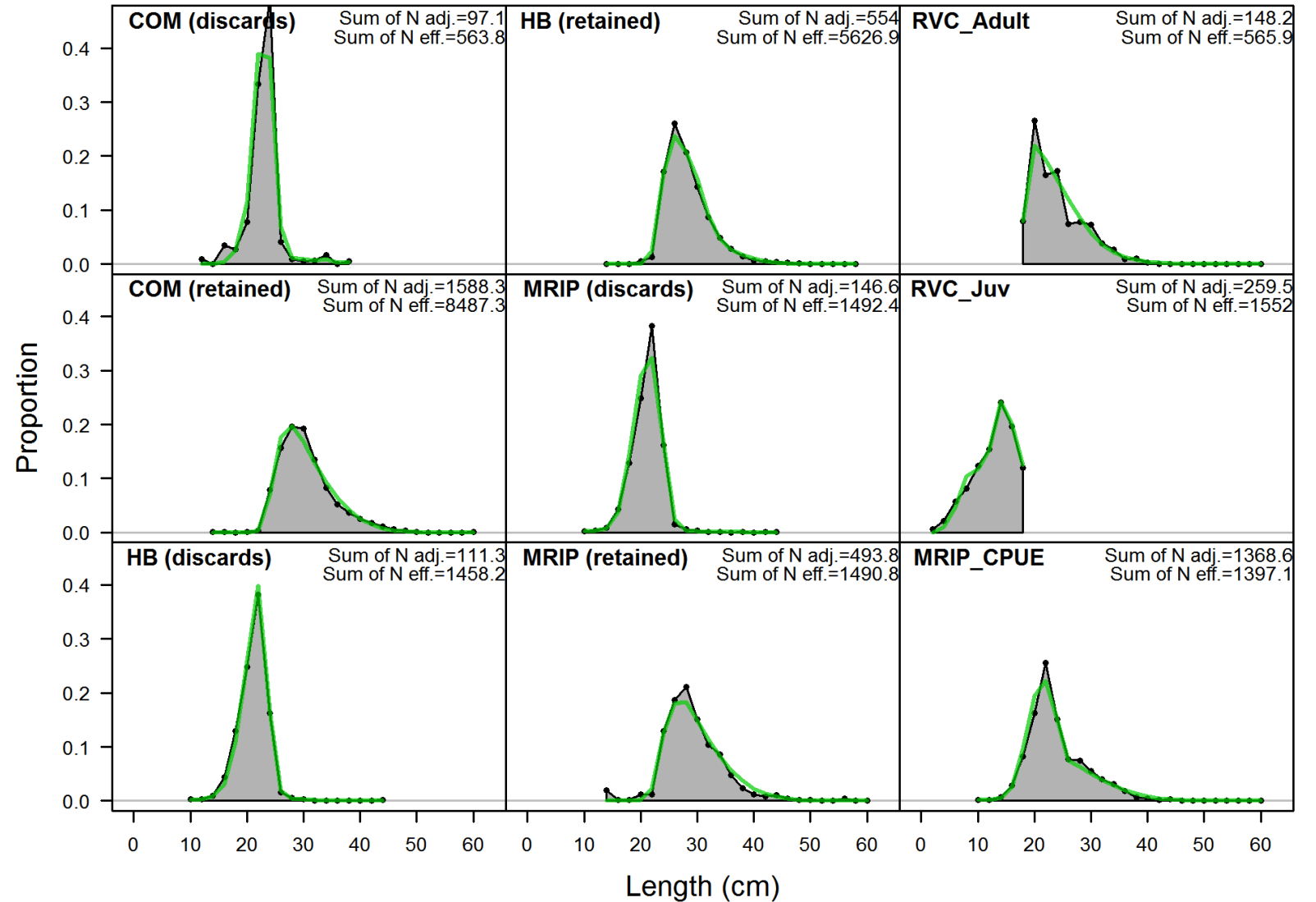




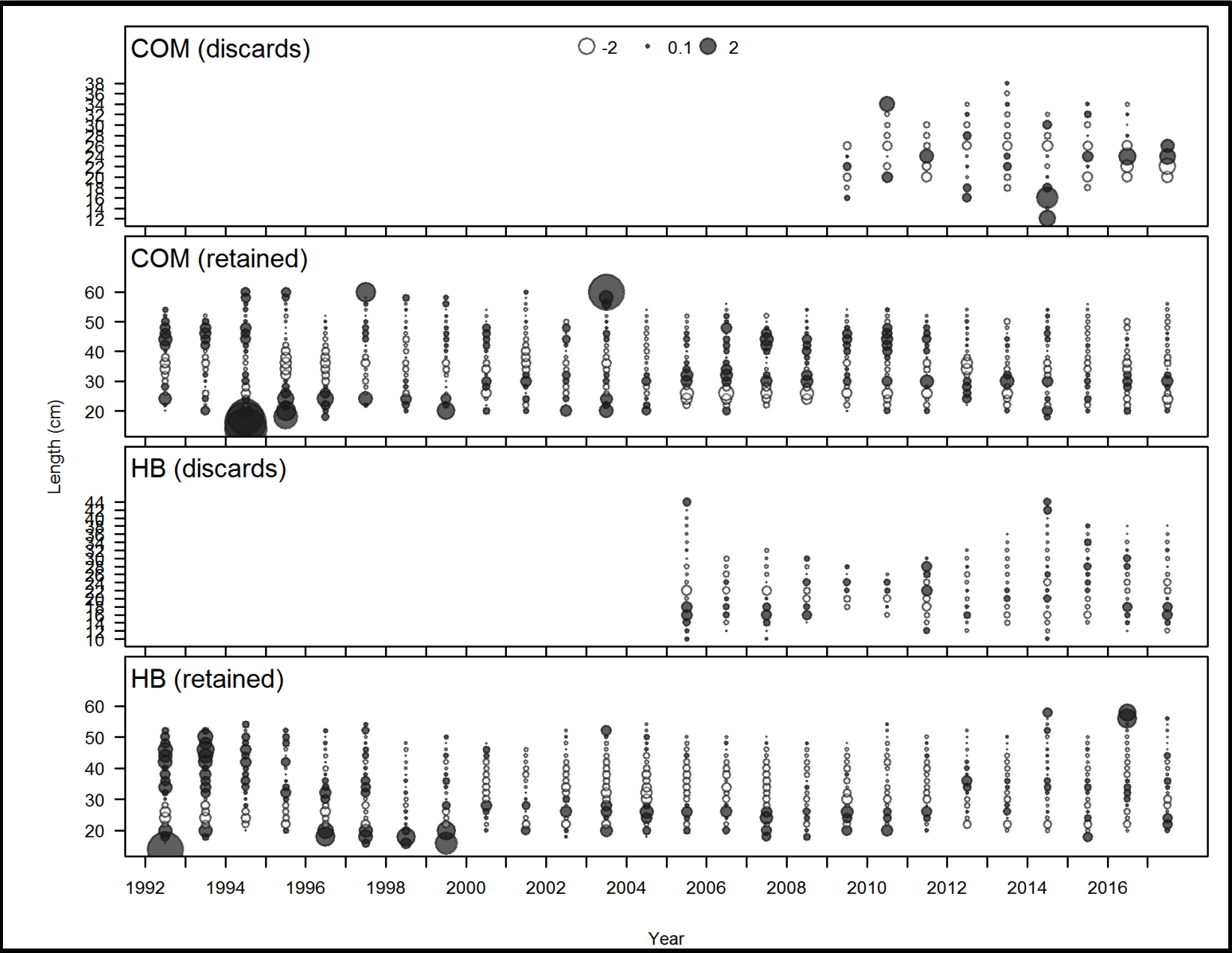
# Model Fits: RVC Juvenile Index



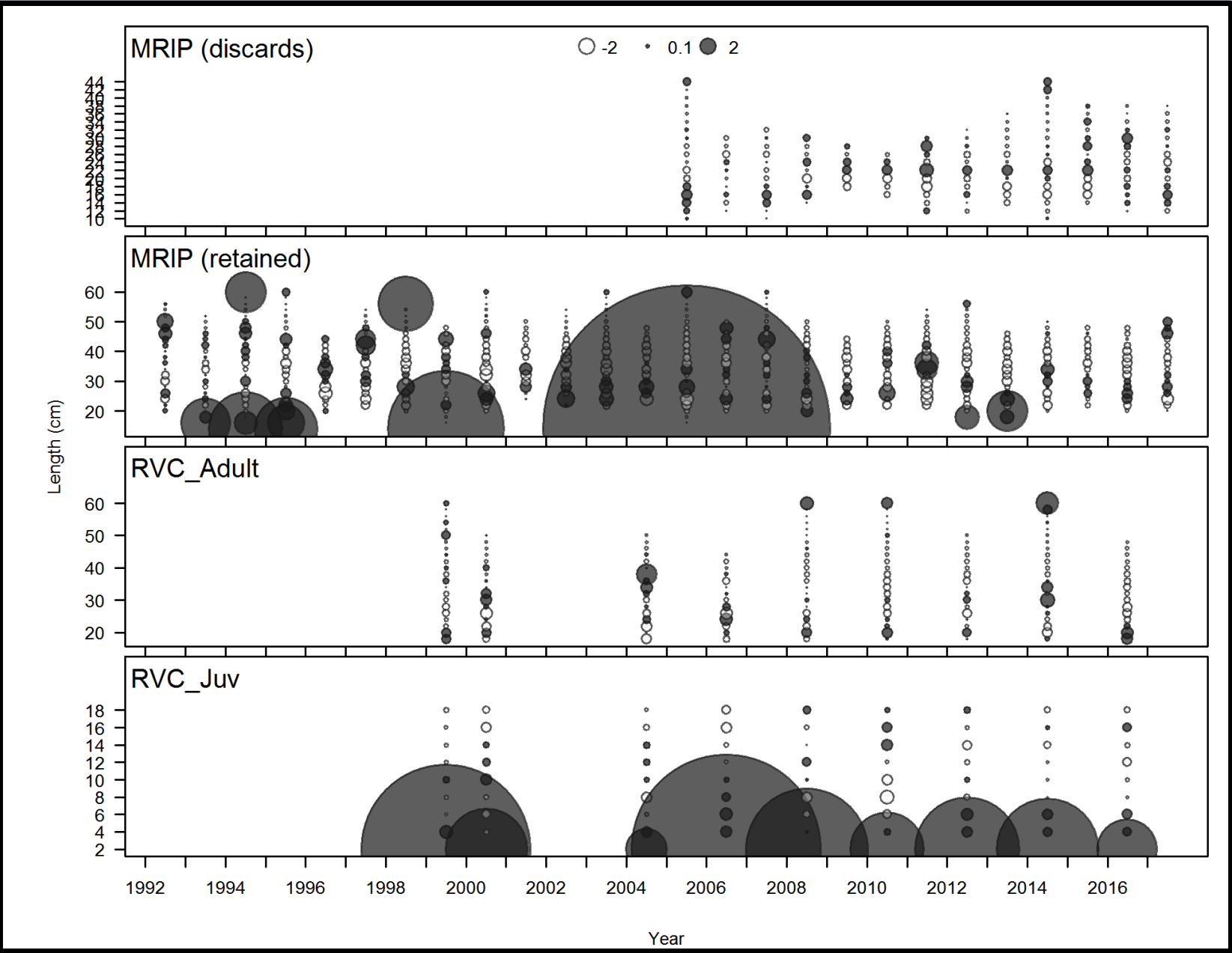
# Model Fits: Overall length compositions per fleet



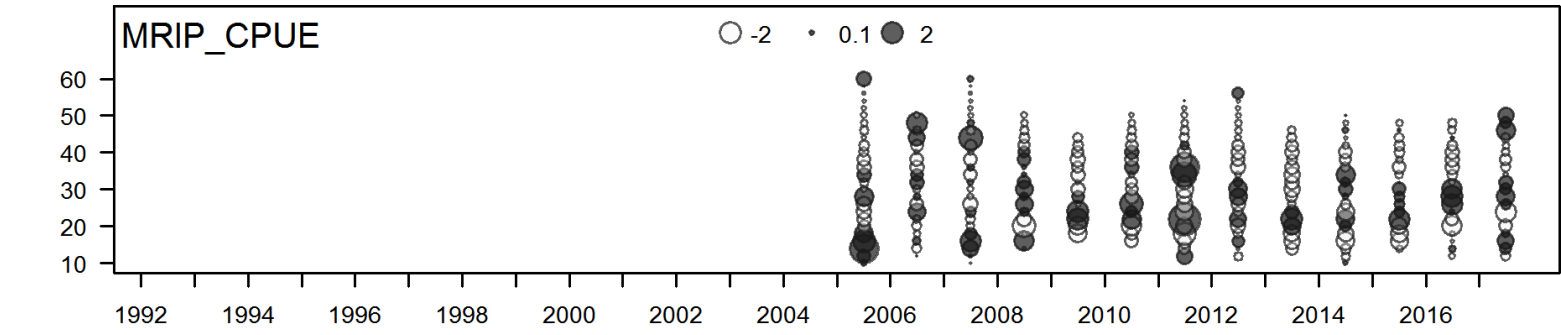
# Model Fits: Pearson residuals from length comps



# Model Fits: Pearson residuals from length comps



# Model Fits: Pearson residuals from length comps



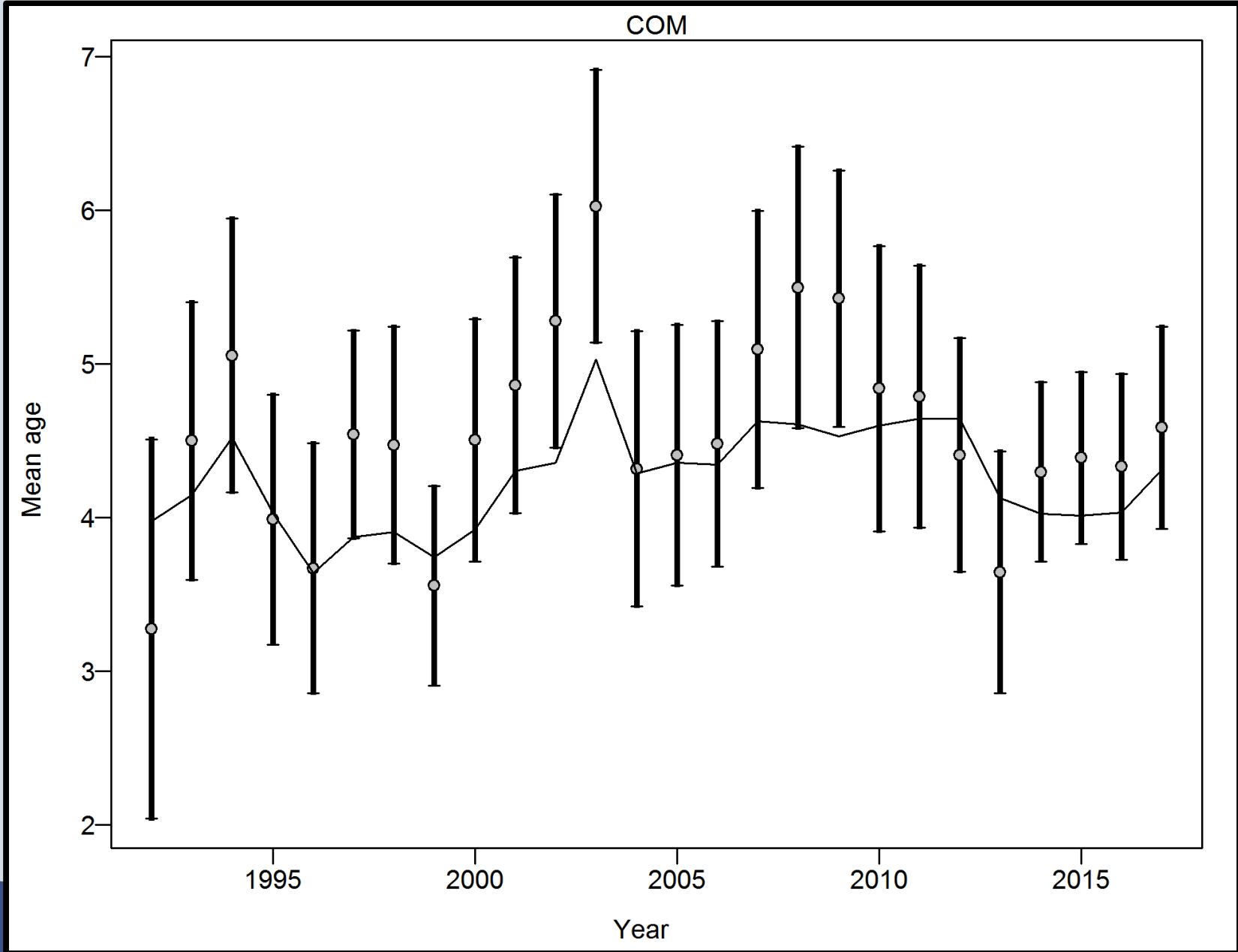
Length (cm)

Year

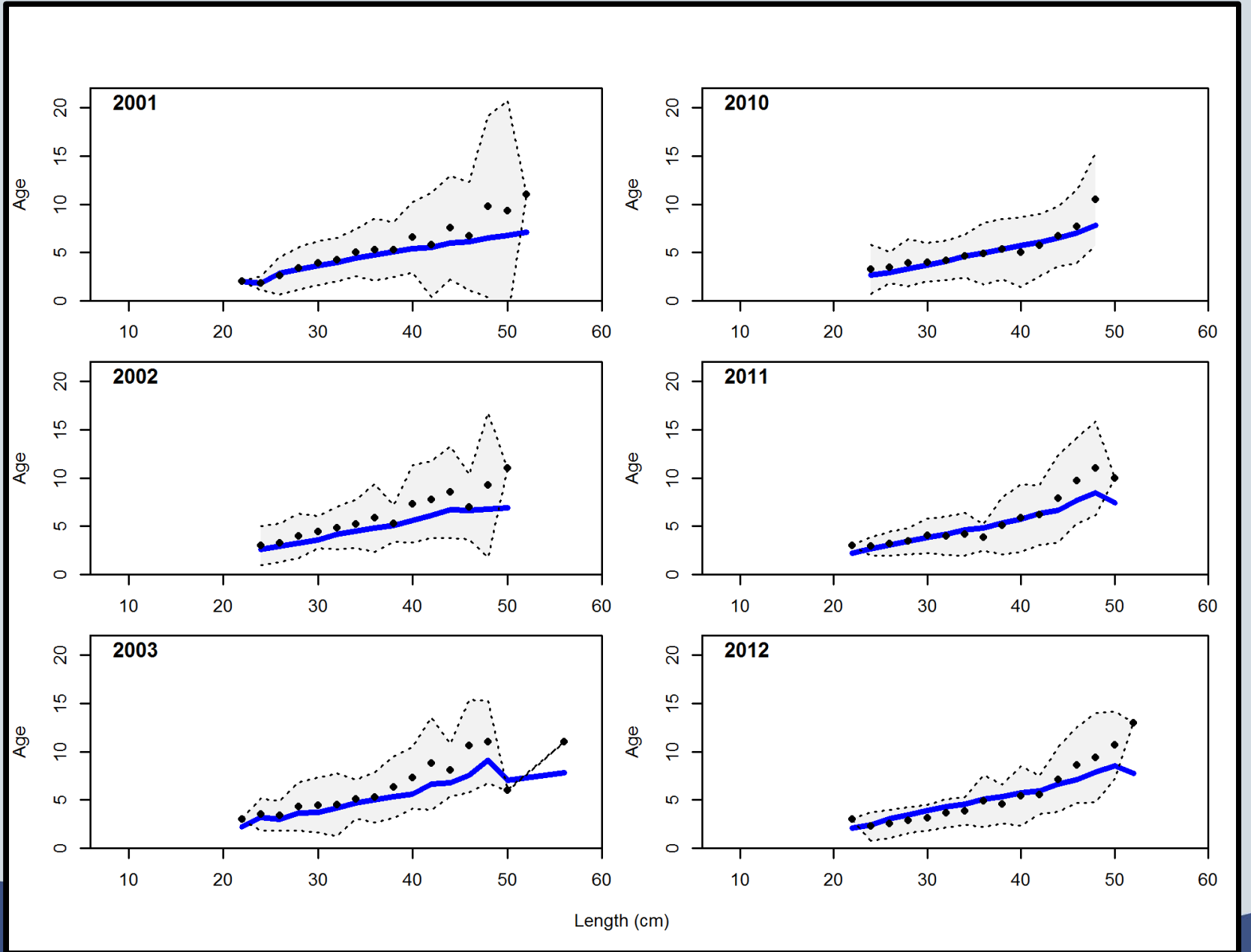




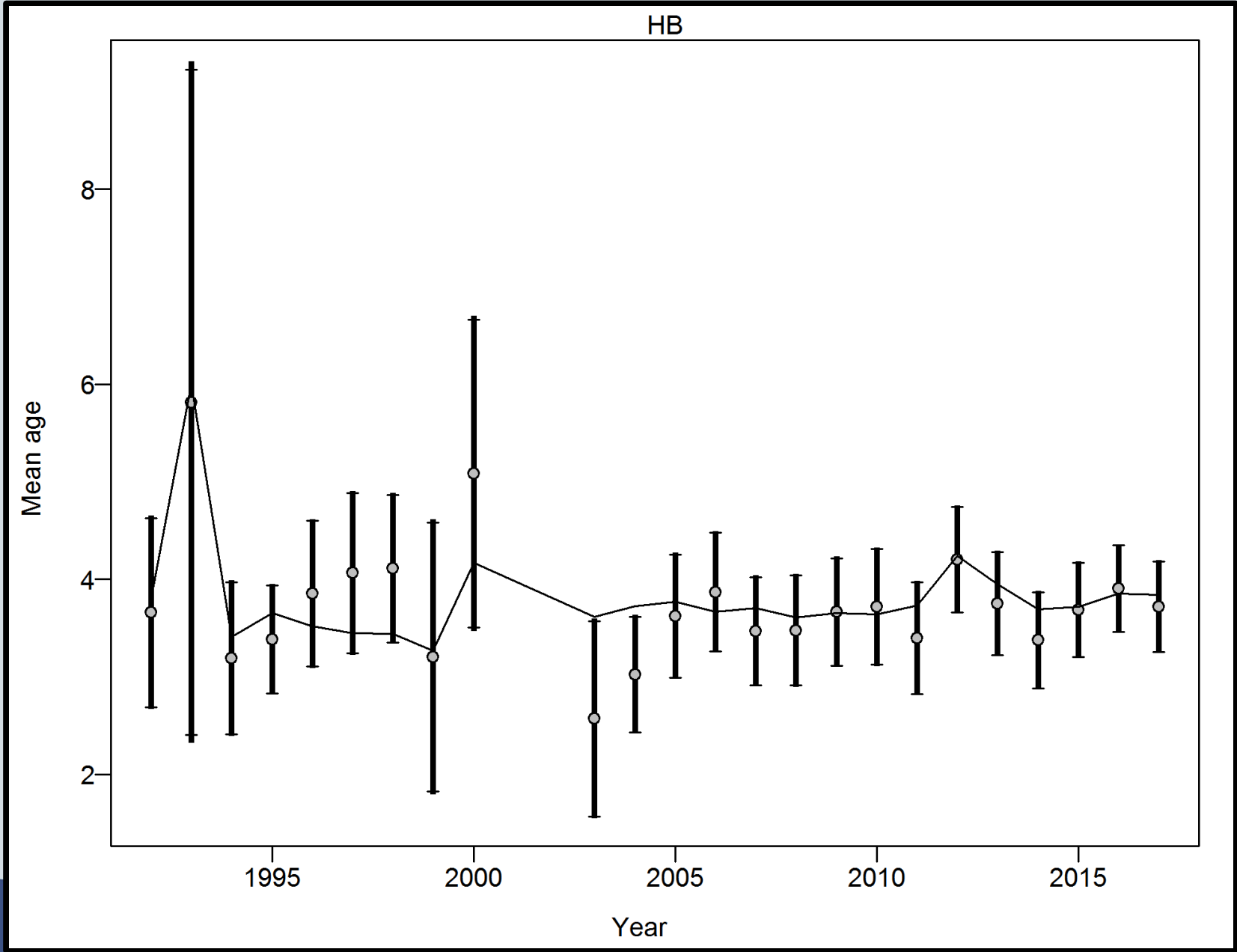
# Model Fits: Commercial Mean Age



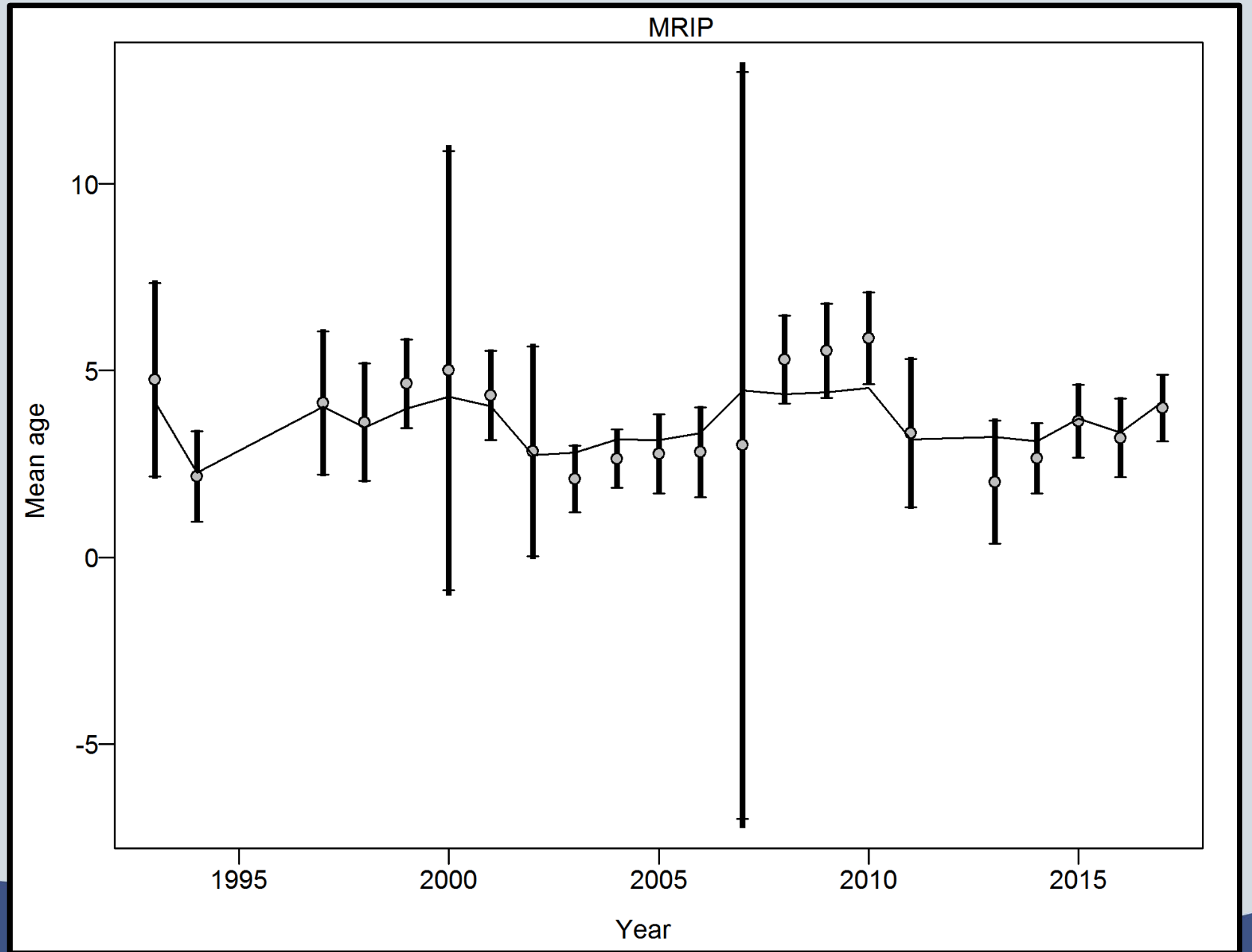
# Model Fits: Commercial Age at Length



# Model Fits: Headboat Mean Age



# Model Fits: MRIP Mean Age





# SEDAR 64: Yellowtail Snapper Assessment Model Results

## Base Model: Estimated Parameters



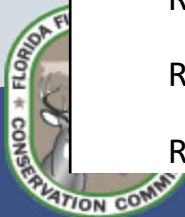
# Estimated Parameters (85 out of 117)

Parameter	Value	Phase	Min	Max	Init	Status	Parm_StDev	Gradient	Pr_type
L_at_Amin_Fem_GP_1	5.352	3	2	20	2	OK	0.701	-1.1844E-06	No_prior
L_at_Amax_Fem_GP_1	36.229	4	25	60	42.3	OK	0.965	-3.6381E-06	No_prior
VonBert_K_Fem_GP_1	0.342	4	0.1	0.5	0.207	OK	0.027	-3.6253E-06	No_prior
CV_young_Fem_GP_1	0.233	6	0.1	0.5	0.179	OK	0.018	1.0799E-07	No_prior
CV_old_Fem_GP_1	0.188	6	0.005	0.4	0.179	OK	0.012	-2.4465E-06	No_prior
SR_LN(R0)	9.897	5	5	20	13	OK	0.120	9.0701E-05	No_prior
SR_BH_steep	0.808	5	0.3	0.99	0.75	OK	0.130	4.1639E-06	No_prior
SR_sigmaR	0.250	7	0.005	0.8	0.2	OK	0.048	-1.3082E-06	No_prior
InitF_seas_1_flt_1COM	0.134	1	0	0.5	0.25	OK	0.161	3.8951E-07	<b>Sym_Beta</b>
InitF_seas_1_flt_2HB	0.062	1	0	0.1	0.05	OK	0.072	7.5186E-08	<b>Sym_Beta</b>
InitF_seas_1_flt_3MRIP	0.667	1	0	1	0.5	OK	0.350	6.5749E-07	<b>Sym_Beta</b>
LnQ_base_COM(1)	-6.954	2	-18	5	-7	OK	0.089	-4.4598E-06	No_prior
LnQ_base_COM(1)_BLK1repl_2009	-6.658	2	-12	5	-6	OK	0.102	1.429E-05	No_prior



# Estimated Parameters (cont.)

Parameter	Value	Phase	Min	Max	Init	Status	Parm_StDev	Gradient	Pr_type
Size_inflection_COM(1)	25.994	2	10	35	27	OK	0.212	-3.0015E-06	No_prior
Size_95%width_COM(1)	3.579	3	1	20	7.4	OK	0.290	2.9881E-06	No_prior
Retain_L_infl_COM(1)	24.212	3	5	35	29	OK	0.217	-6.4343E-06	No_prior
Retain_L_width_COM(1)	0.697	4	0.6	5	2.4	OK	0.081	-3.7009E-07	No_prior
Retain_L_asymptote_logit_COM(1)	6.035	4	1	30	1.5	OK	0.668	4.806E-07	No_prior
Size_DblN_peak_HB(2)	27.984	2	11.1	40	23	OK	0.557	-7.4829E-06	No_prior
Size_DblN_top_logit_HB(2)	-12.632	3	-18	-1	-10	OK	83.801	6.1165E-09	No_prior
Size_DblN_ascend_se_HB(2)	3.532	4	-4	12	3.5	OK	0.149	2.1815E-05	No_prior
Size_DblN_descend_se_HB(2)	2.642	4	-2	6	3.5	OK	0.697	1.0891E-07	No_prior
Size_DblN_start_logit_HB(2)	-8.421	3	-15	5	-10	OK	4.082	7.6385E-07	No_prior
Size_DblN_end_logit_HB(2)	-0.379	3	-10	5	-5	OK	0.353	-8.4438E-07	No_prior
Retain_L_infl_HB(2)	24.235	3	15	35	27	OK	0.136	-2.4732E-07	No_prior
Retain_L_width_HB(2)	0.708	4	0.1	12	2.4	OK	0.081	-1.8097E-06	No_prior
Retain_L_asymptote_logit_HB(2)	5.298	4	1	10	4	OK	1.009	8.4418E-08	No_prior



# Estimated Parameters (cont.)

Parameter	Value	Phase	Min	Max	Init	Status	Parm_StDev	Gradient	Pr_type
Size_DblN_peak_MRIP(3)	23.019	2	11.1	30	23	OK	0.021	9.86E-06	No_prior
Size_DblN_top_logit_MRIP(3)	-14.638	3	-18	1	-7	OK	55.384	-6.9927E-08	No_prior
Size_DblN_ascend_se_MRIP(3)	2.763	4	0	5	2	OK	0.064	-1.3927E-06	No_prior
Size_DblN_descend_se_MRIP(3)	-10.573	4	-25	6	2	OK	88.965	2.6084E-08	No_prior
Size_DblN_start_logit_MRIP(3)	-6.565	3	-20	7	-7	OK	0.713	-6.4151E-07	No_prior
Size_DblN_end_logit_MRIP(3)	-0.188	3	-10	5	-5	OK	0.116	2.0028E-06	No_prior
Retain_L_infl_MRIP(3)	25.825	3	11.1	33	27	OK	0.158	-1.014E-06	No_prior
Retain_L_width_MRIP(3)	0.845	4	0.1	10	2.4	OK	0.093	-2.3323E-06	No_prior
Retain_L_asymptote_logit_MRIP(3)	4.268	4	1	10	6	OK	1.139	-1.6222E-07	No_prior





# Estimated Parameters (cont.)

Parameter	Value	Phase	Min	Max	Init	Status	Parm_StDev	Gradient	Pr_type
Size_DbIN_peak_RVC_Adult(4)	19.032	2	16	25	19	OK	0.026	3.14841E-05	No_prior
Size_DbIN_top_logit_RVC_Adult(4)	-12.550	3	-20	-1	-10	OK	116.918	-2.09862E-09	No_prior
Size_DbIN_ascend_se_RVC_Adult(4)	-14.100	4	-28	-0.2	-7	OK	310.810	6.8434E-08	No_prior
Size_DbIN_descend_se_RVC_Adult(4)	4.770	4	1	6	3.5	OK	1.294	1.01377E-06	No_prior
Size_DbIN_start_logit_RVC_Adult(4)	-11.054	3	-15	0	-10	OK	65.183	-1.46343E-08	No_prior
Size_DbIN_end_logit_RVC_Adult(4)	-1.056	3	-15	10	-5	OK	1.769	2.13733E-07	No_prior
Size_DbIN_peak_RVC_Juv(5)	13.476	3	8	18	18	OK	0.576	-2.08594E-06	No_prior
Size_DbIN_top_logit_RVC_Juv(5)	-8.585	4	-10	-1	-4	OK	29.471	1.30462E-05	No_prior
Size_DbIN_ascend_se_RVC_Juv(5)	-1.815	5	-1.9	5	3	OK	2.415	1.24014E-05	No_prior
Size_DbIN_descend_se_RVC_Juv(5)	2.531	5	-22	4	-9	OK	0.317	-4.55364E-06	No_prior
Size_DbIN_start_logit_RVC_Juv(5)	-1.372	2	-30	10	8	OK	0.330	5.35873E-05	No_prior



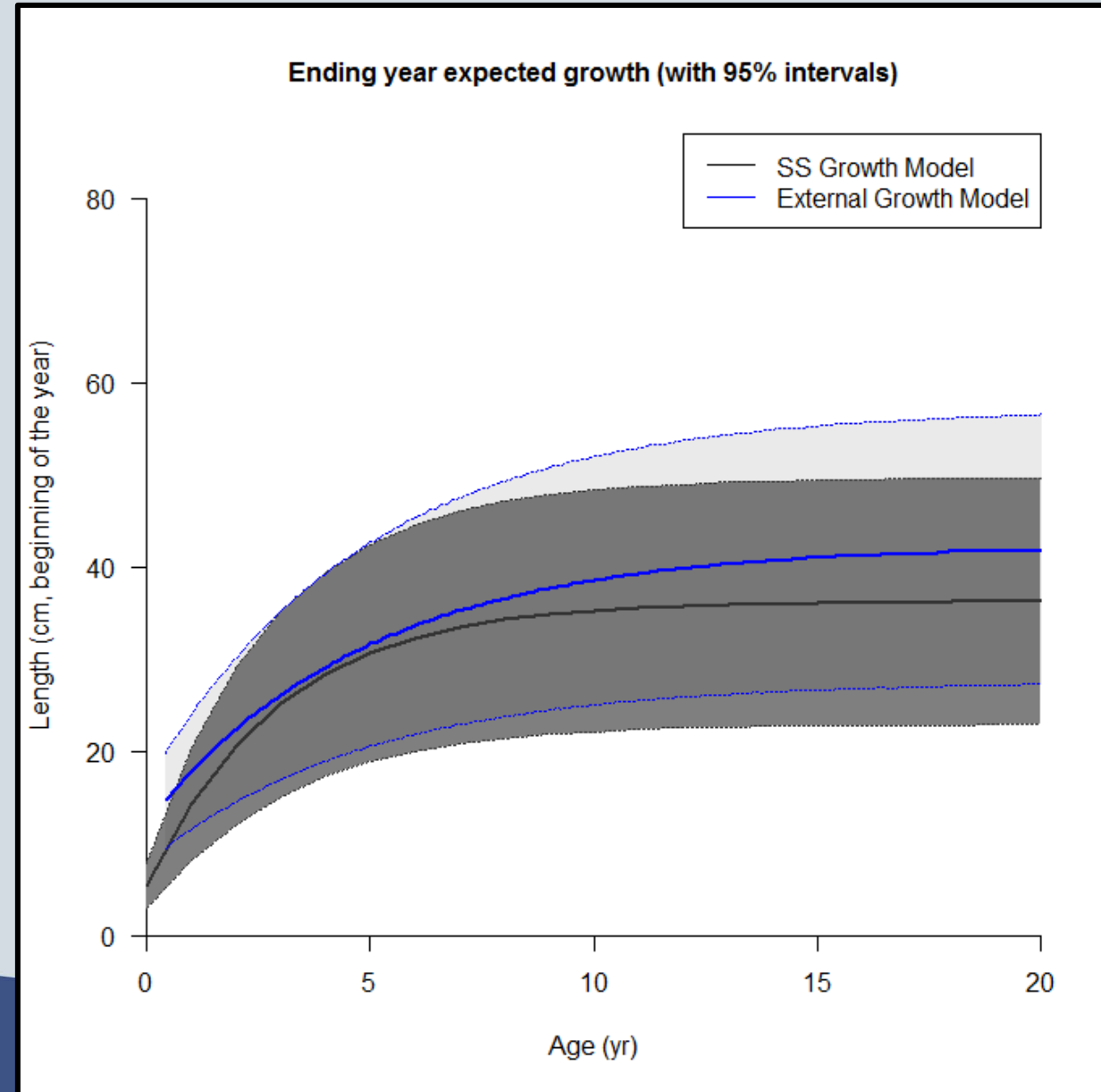
# Model Estimated: Von Bertalanffy Growth

## SS Model (black)

- $L_{inf}$ : 36.2 cm
- $k$ : 0.34 year<sup>-1</sup>
- $CV_{young}$ : 0.23
- $CV_{old}$ : 0.19

## Size-truncated external model (blue)

- $L_{inf}$ : 42.3 cm
- $k$ : 0.21 year<sup>-1</sup>
- $CV_{young}$ : 0.18
- $CV_{old}$ : 0.18

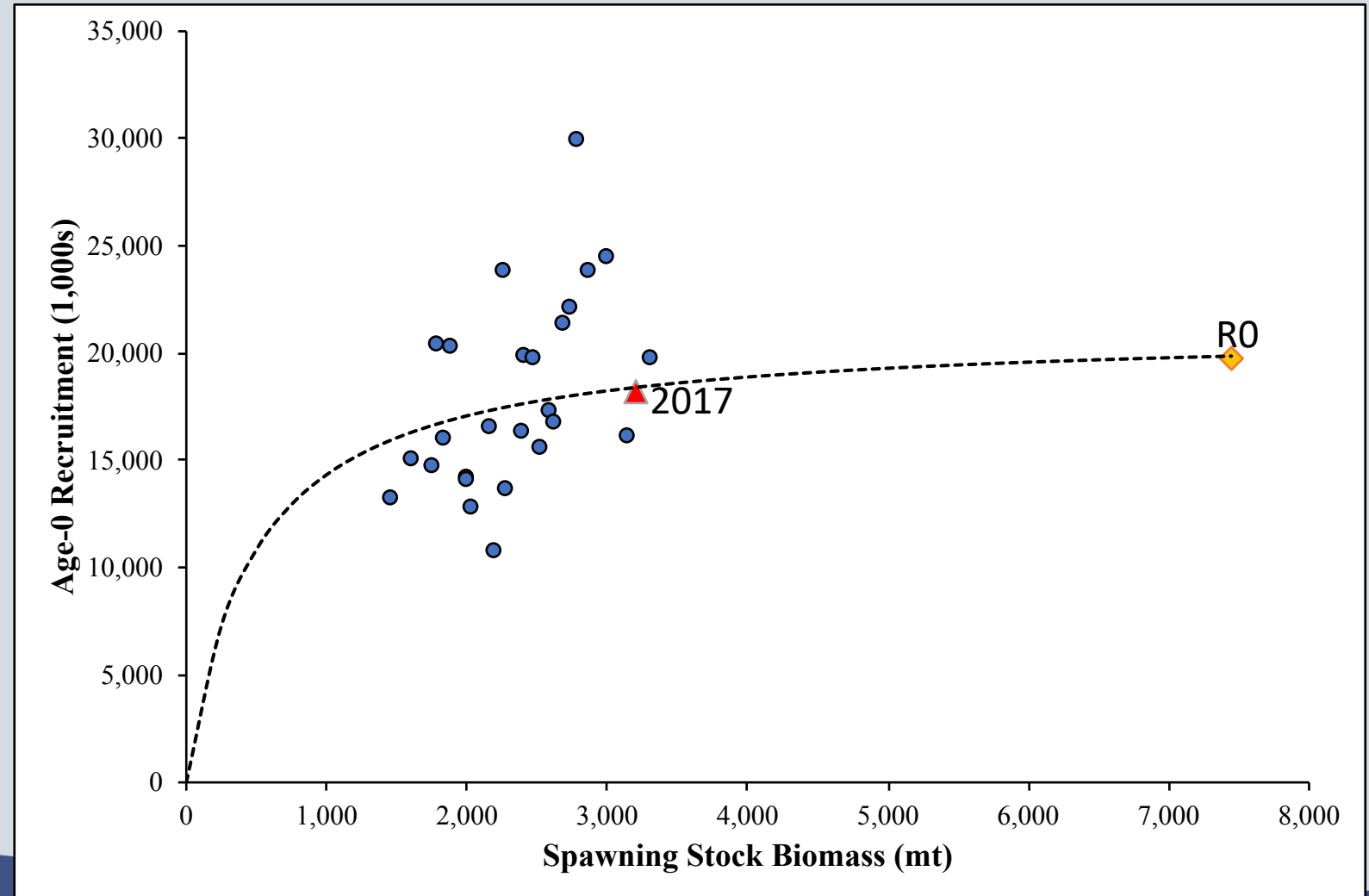


# Model Estimated: Spawner-Recruitment Curve

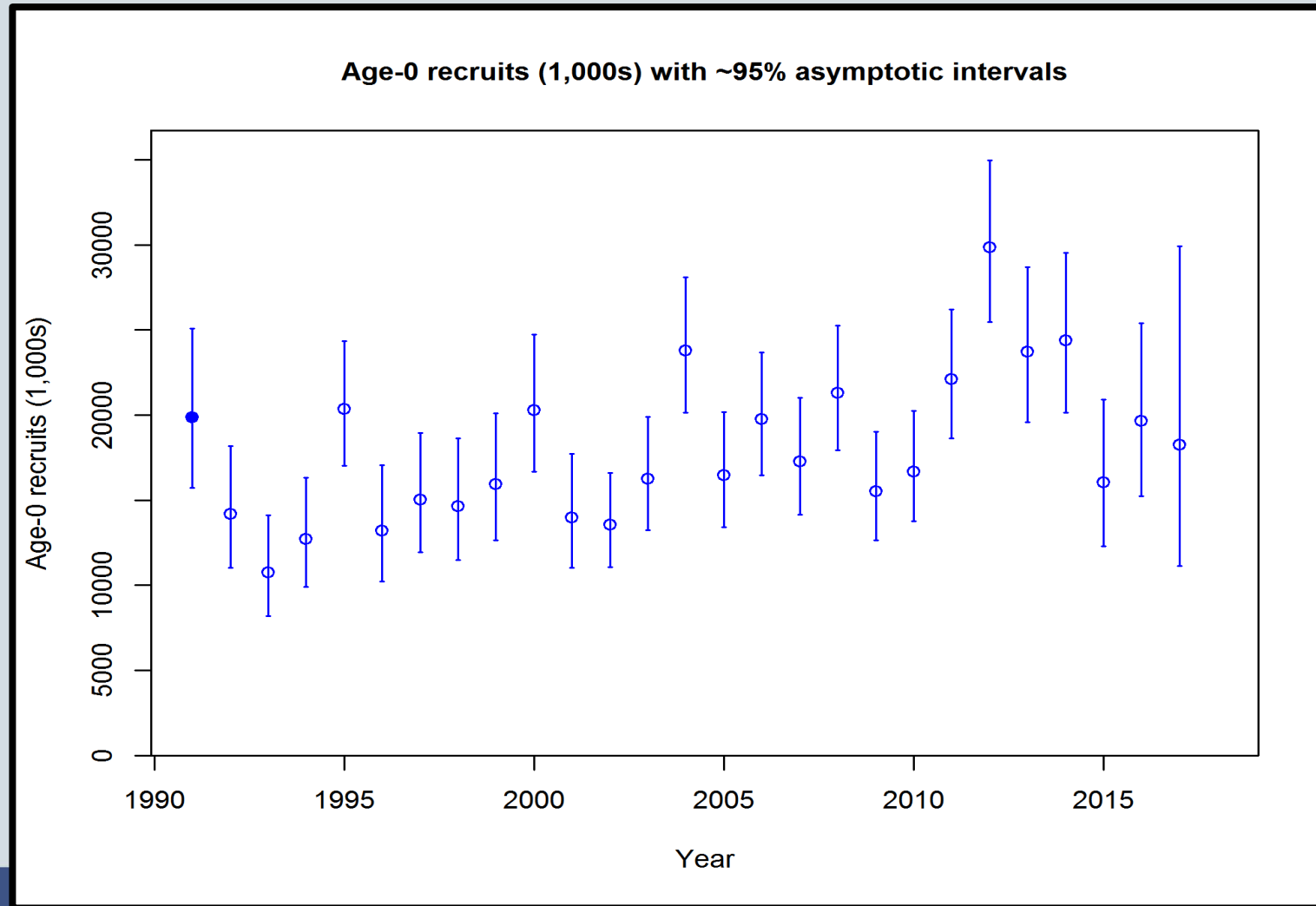
SSB0: 7,446.26 mt  
 $R_0$ : 19.864 million  
*steepness*: 0.808

Beverton-Holt stock-recruitment parameters

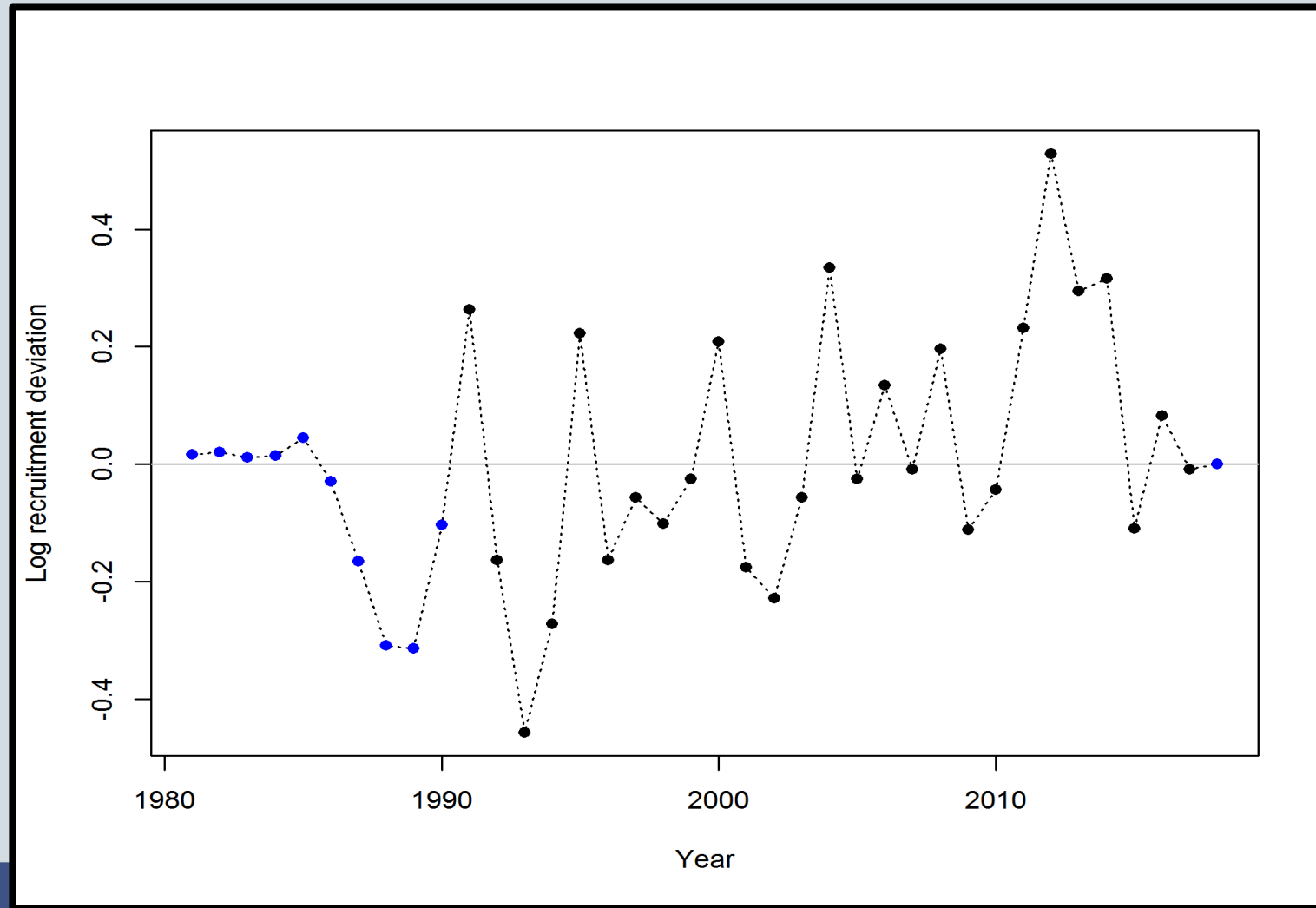
- a: 21,127.61
- b: 473.52



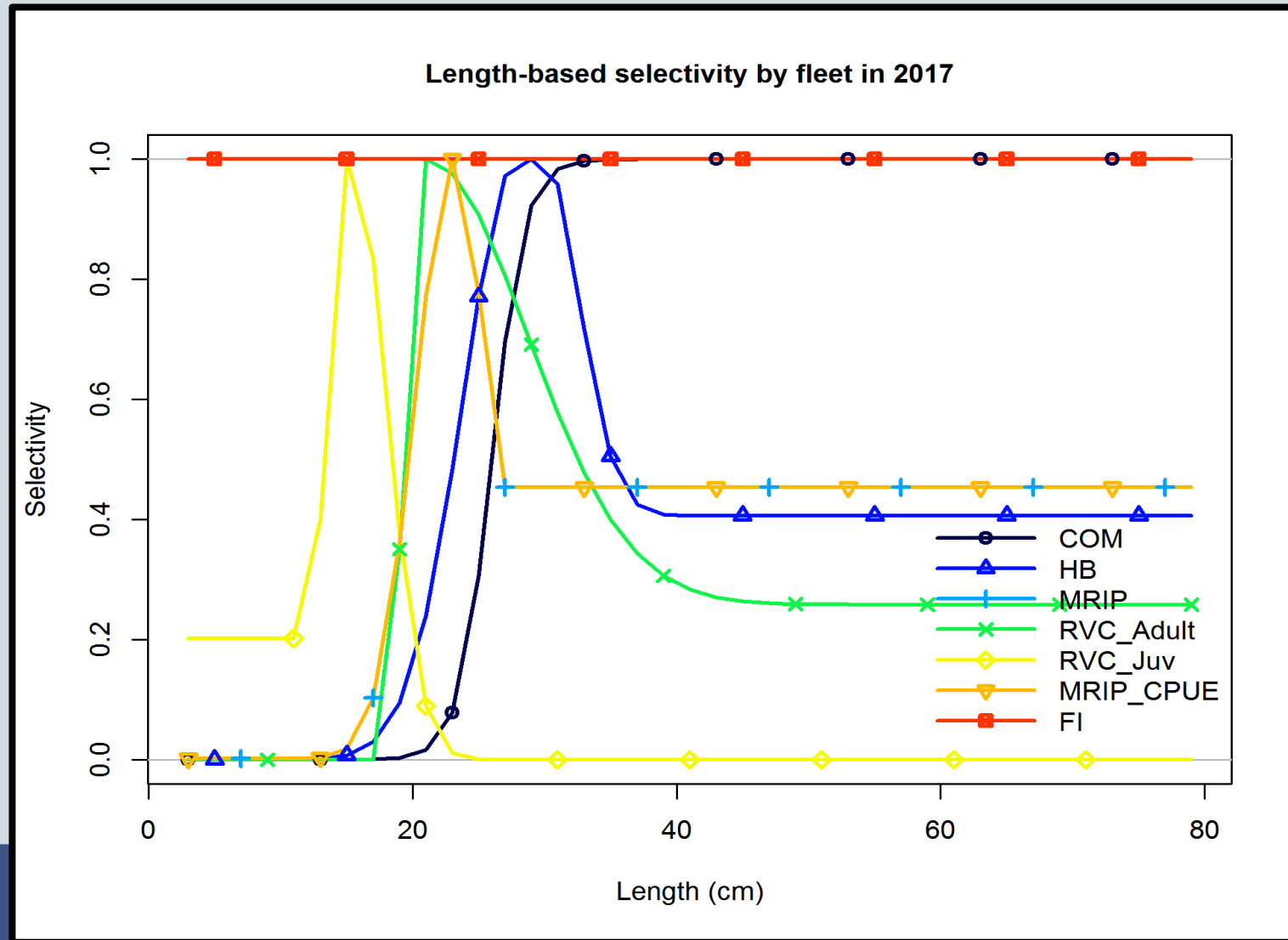
# Model Estimated: Recruitment



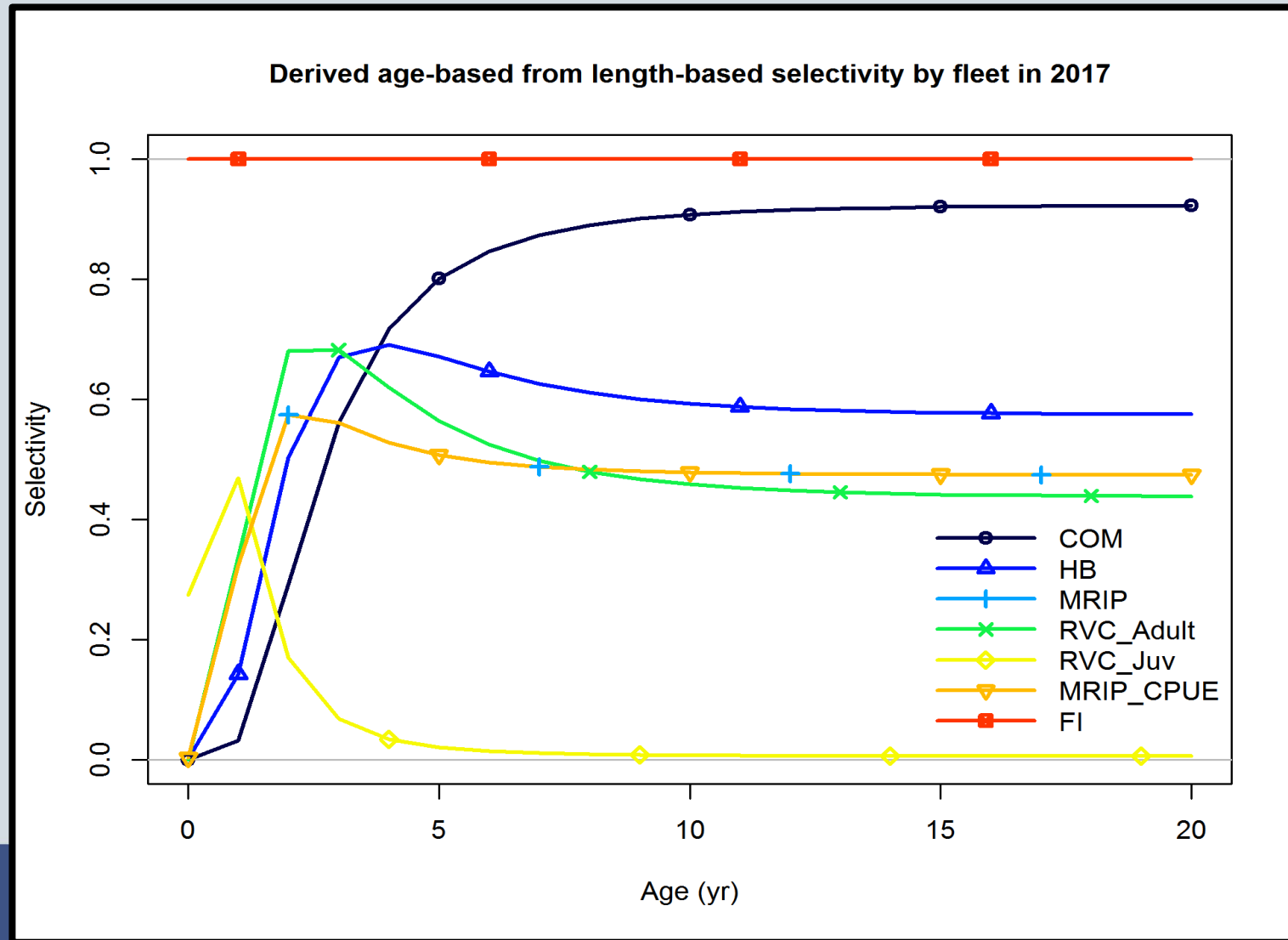
# Model Estimated: Recruitment Deviations



# Model Estimated: Length-based Selectivity



# Model Estimated: Age-based Selectivity





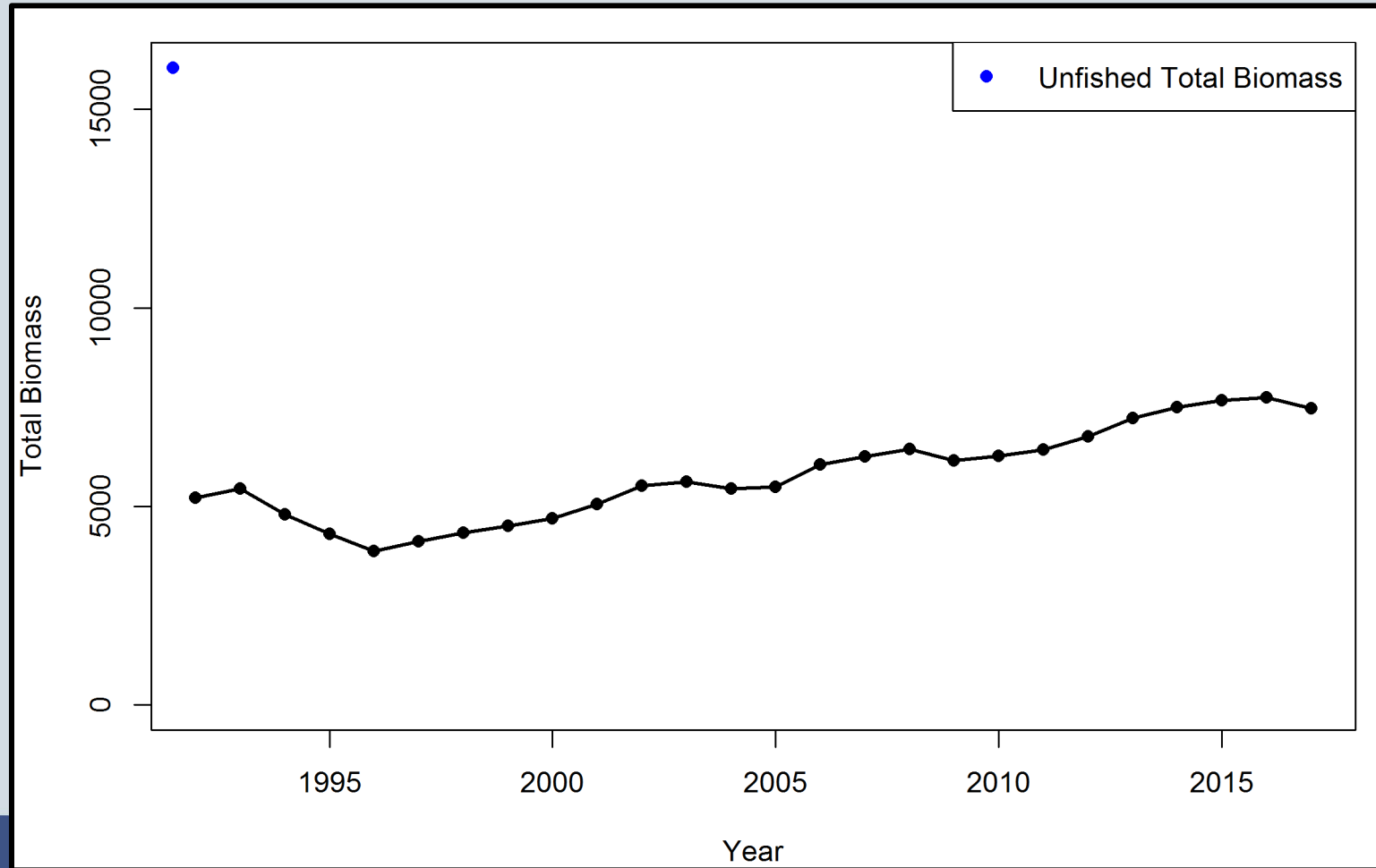
# SEDAR 64: Yellowtail Snapper Assessment Model Results

## Base Model: Results

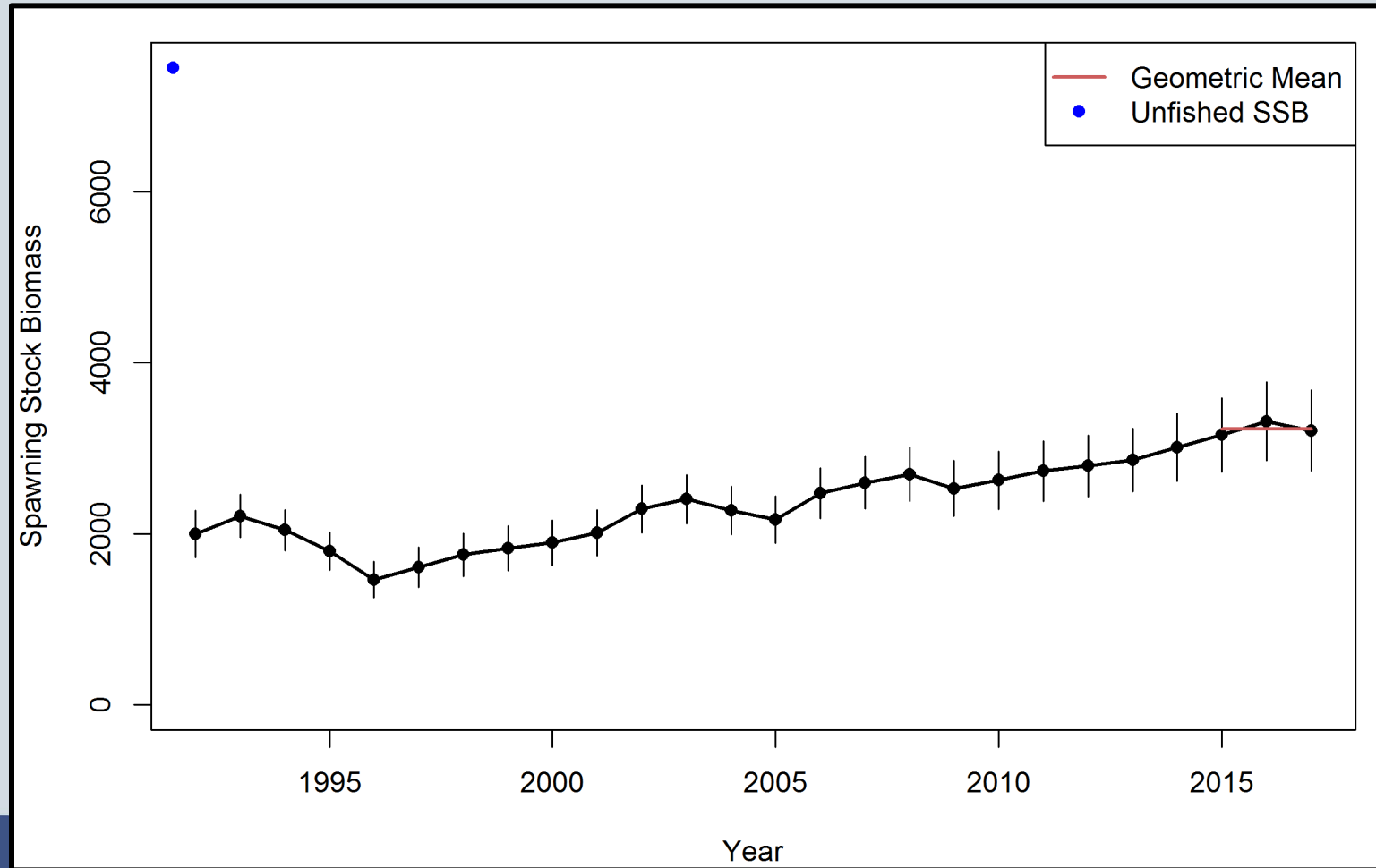




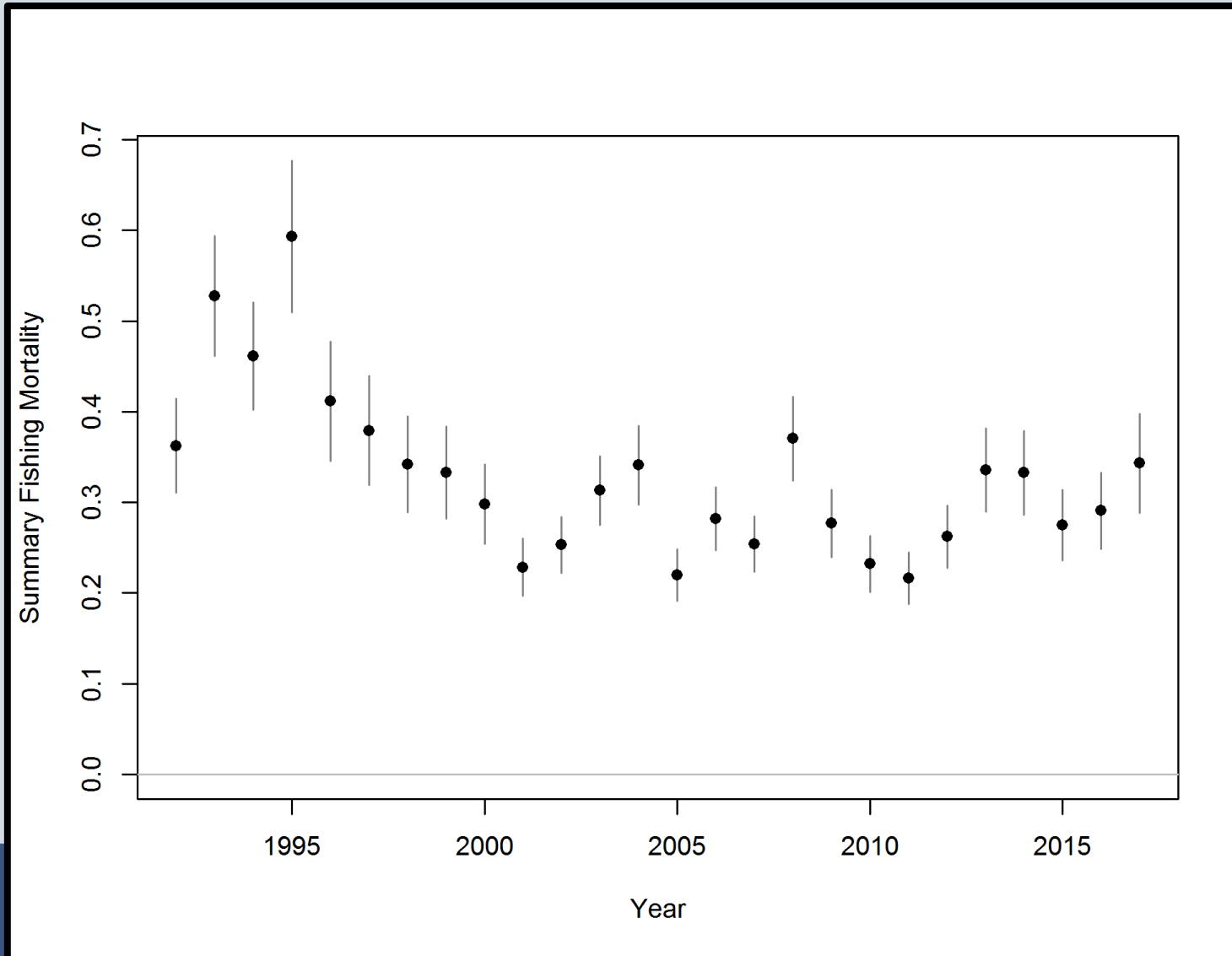
# Total Biomass (mt)



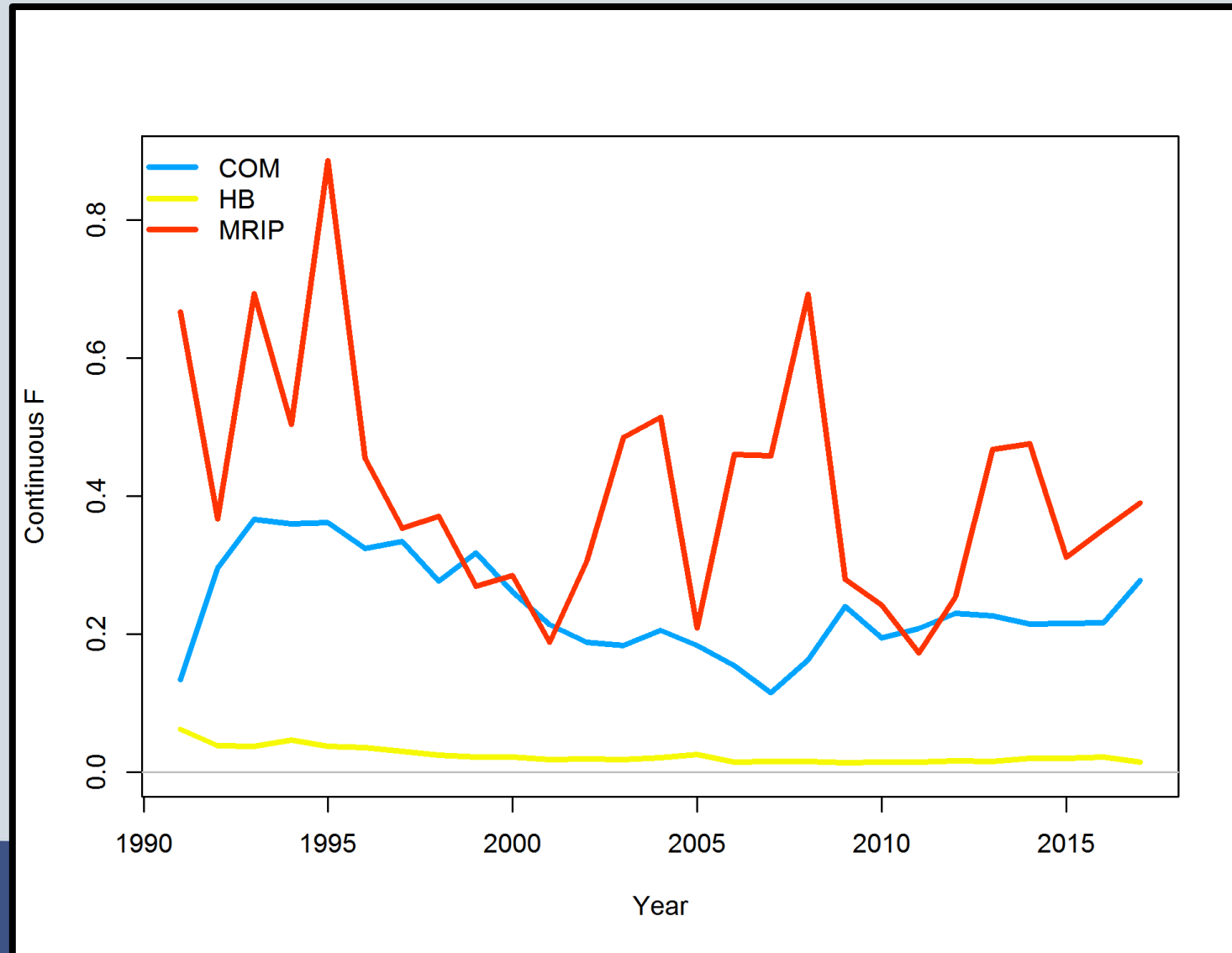
# Spawning Stock Biomass (mt)



# Age-4 Fishing Mortality Rates



# Apical Fishing Mortality Rates by Fleet





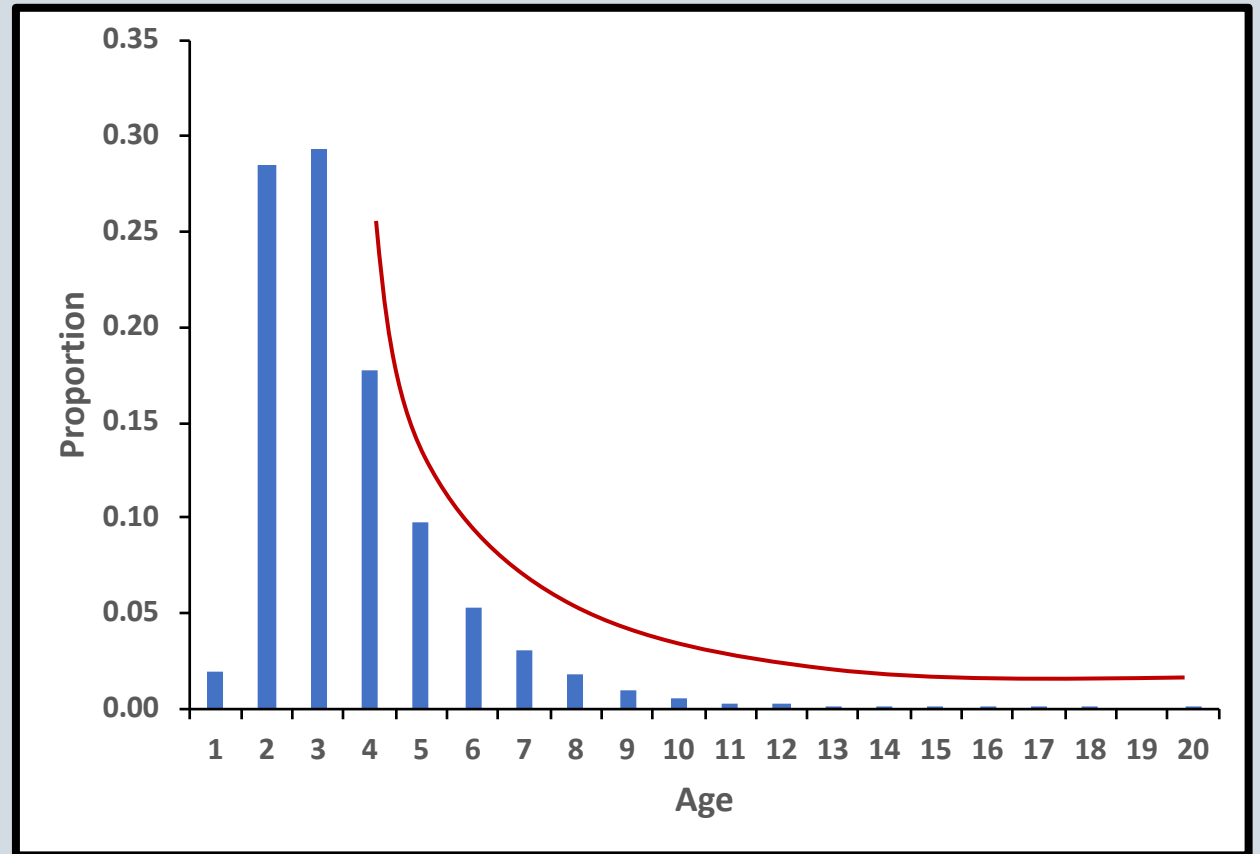
# SEDAR 64: Yellowtail Snapper Assessment Model Results

## **Base Model: Catch Curve Analysis**



# Catch Curve Analysis

<b>Chapman-Robson</b>	
Florida only specimens	
Ages 4-20	
<b>N =</b>	18,316
<b>Total =</b>	24,089
<b>Ann. surv. rate (S) =</b>	0.568
<b>Z =</b>	0.57 yr <sup>-1</sup>
<b>variance =</b>	0.000006
<b>SE =</b>	0.002406
95% confidence intervals for total mortality (Z)	
Ages 4-20	
upper	0.57 yr <sup>-1</sup>
lower	0.56 yr <sup>-1</sup>
<b>M =</b>	0.22 yr <sup>-1</sup>
<b>F =</b>	0.35 yr <sup>-1</sup>



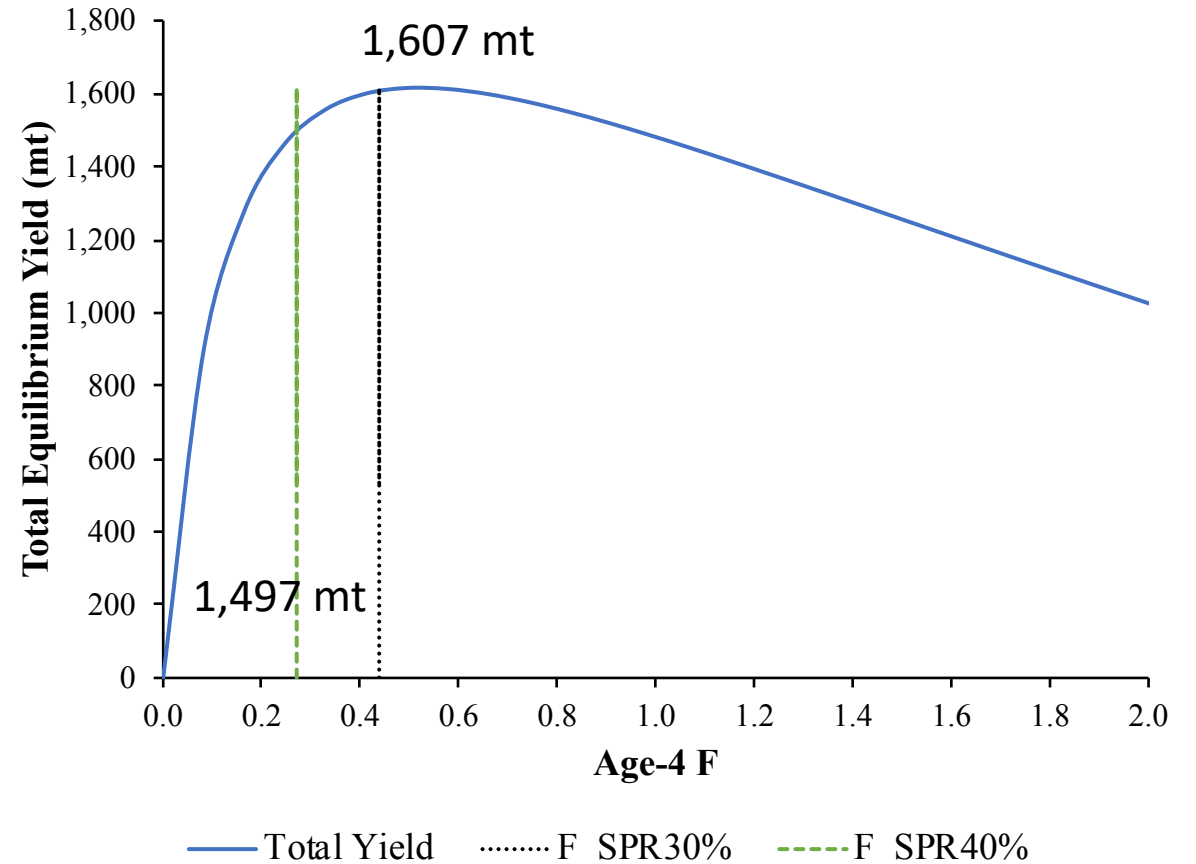
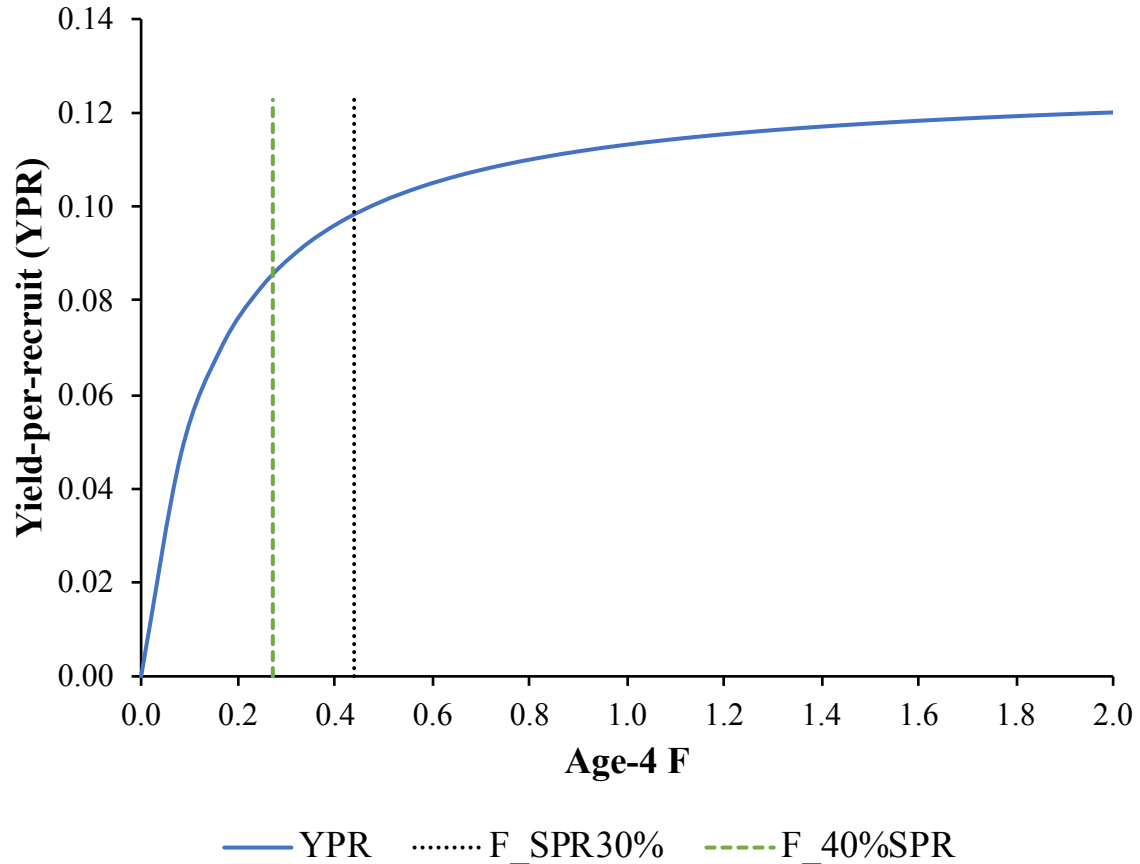


# SEDAR 64: Yellowtail Snapper Assessment Model Results

## **Base Model: Per-recruit Analysis**

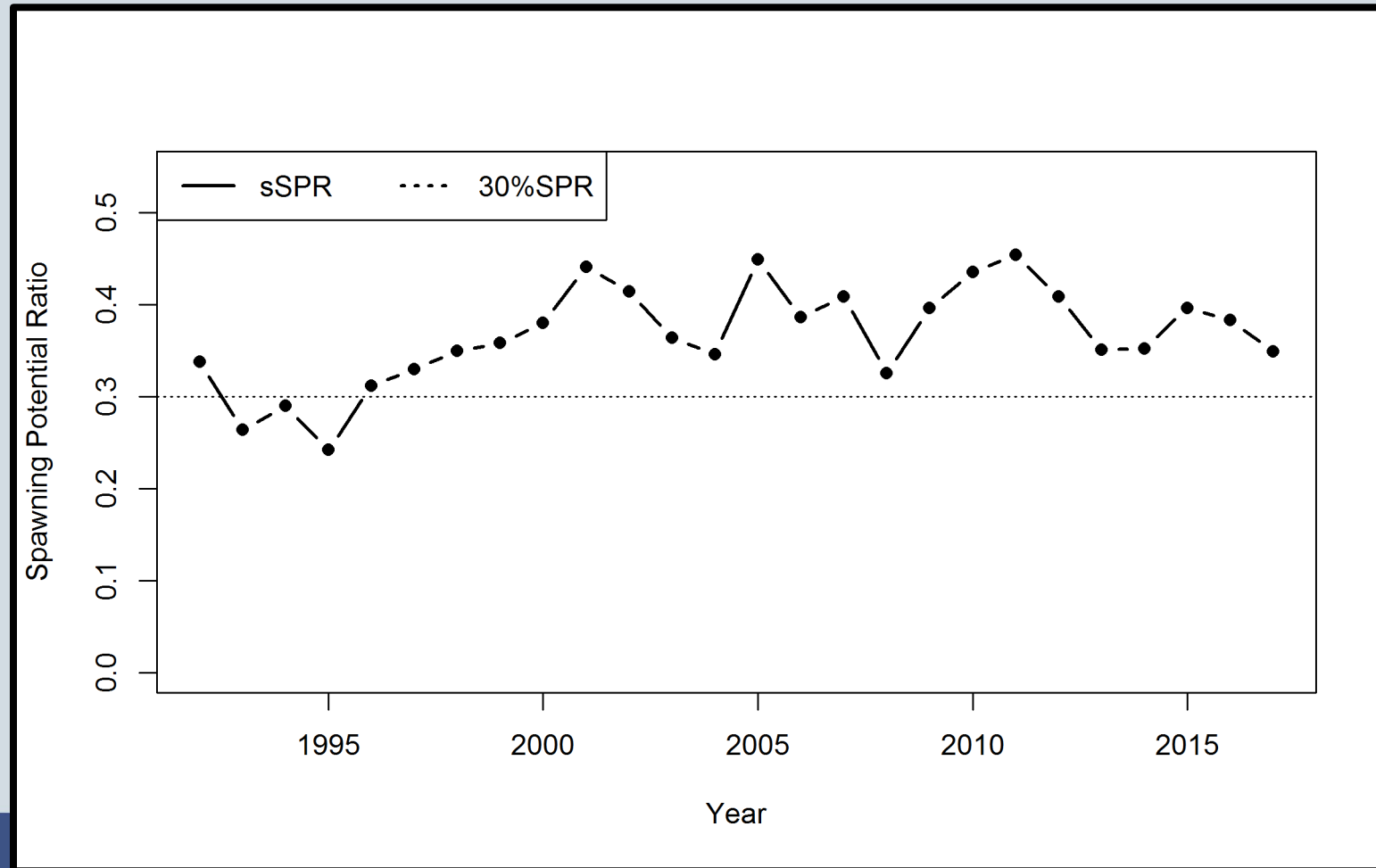


# Yield-per-recruit (YPR)





# Spawning Potential Ratio (SPR)





# SEDAR 64: Yellowtail Snapper Assessment Model Results

## Base Model Diagnostics: Correlation Analysis



# Correlated Parameters (correlation coefficient > 0.7)

Parameter <sub>i</sub>	Parameter <sub>j</sub>	Correlation > 0.7
Size_DbIN_ascend_se_RVC_Juv(5)	Size_DbIN_peak_RVC_Juv(5)	0.992
Size_DbIN_ascend_se_HB(2)	Size_DbIN_peak_HB(2)	0.858
Size_DbIN_start_logit_RVC_Juv(5)	L_at_Amin_Fem_GP_1	0.769
Retain_L_width_MRIP(3)	Retain_L_infl_MRIP(3)	0.735
CV_old_Fem_GP_1	L_at_Amax_Fem_GP_1	-0.710
Main_InitAge_1	SR_LN(R0)	-0.716
VonBert_K_Fem_GP_1	L_at_Amin_Fem_GP_1	-0.761
InitF_seas_1_flt_3MRIP	InitF_seas_1_flt_1COM	-0.776
VonBert_K_Fem_GP_1	L_at_Amax_Fem_GP_1	-0.852
SR_BH_steep	SR_LN(R0)	-0.864
Size_DbIN_end_logit_RVC_Adult(4)	Size_DbIN_descend_se_RVC_Adult(4)	-0.917





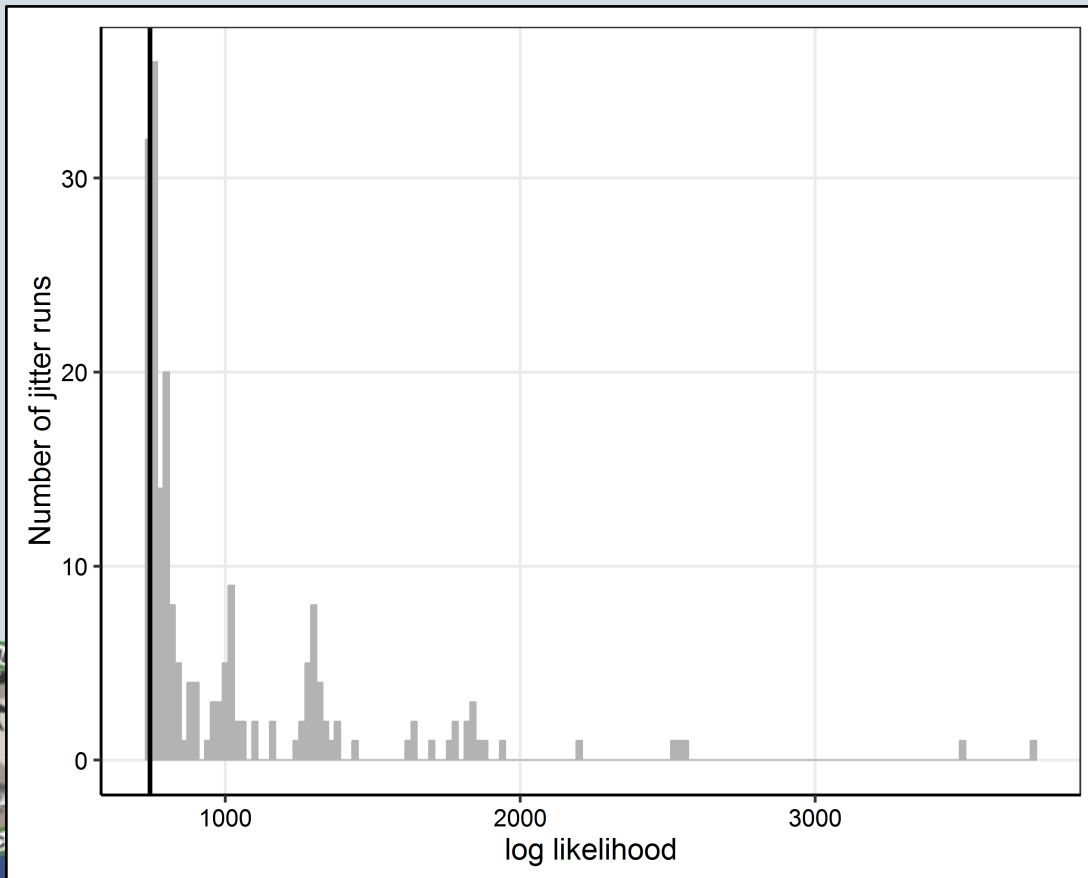
# SEDAR 64: Yellowtail Snapper Assessment Model Results

## Base Model Diagnostics: Jitter Analysis



# Jitter Analysis (vary starting points by 20%)

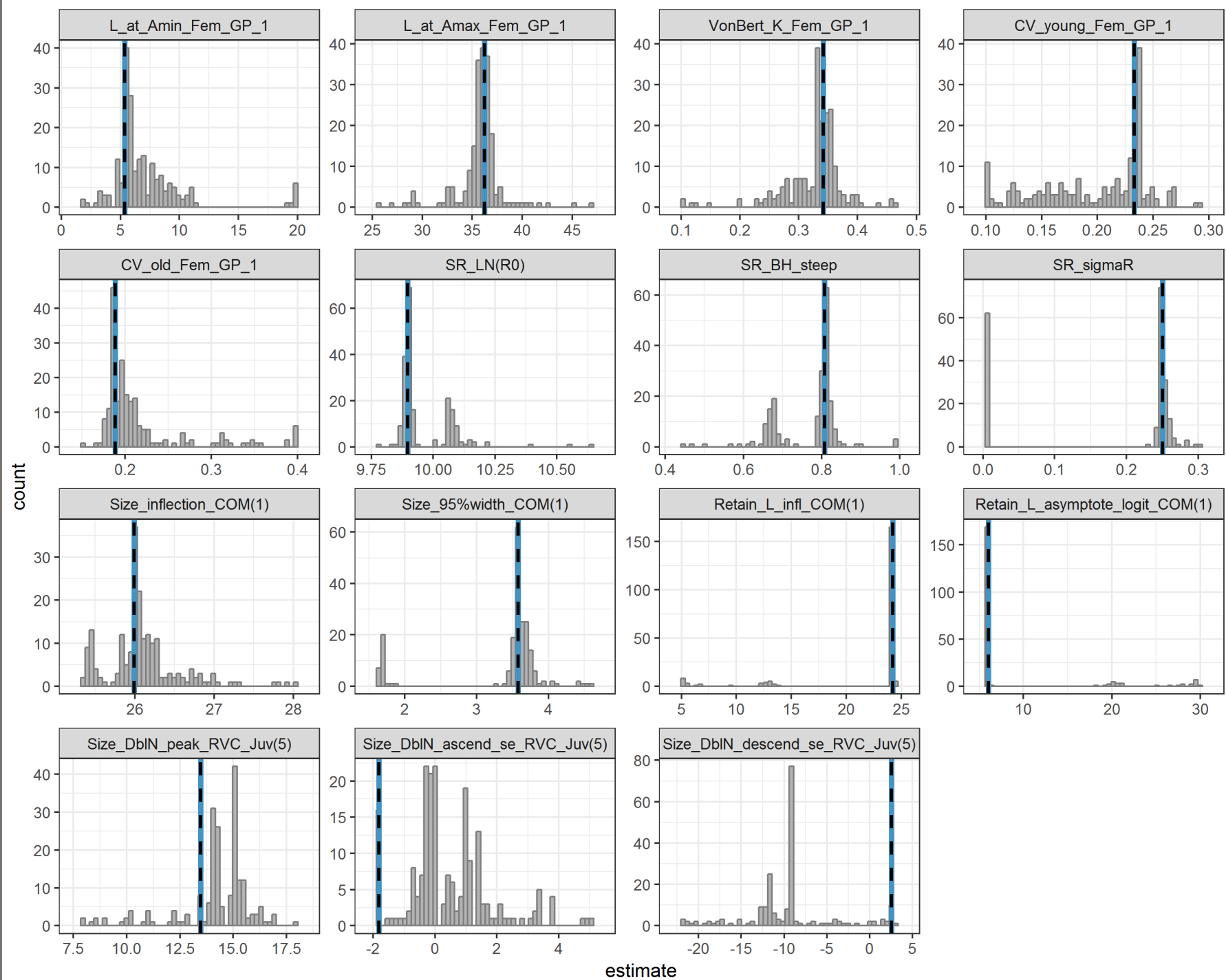
Number of runs	Base LL	Min LL	Max LL	Runs with parameters near bounds	Runs above gradient threshold
200	744.447	744.447	3737.58	140	118



Parameters near bounds (top 14)	Number of runs
SR_sigmaR	62
CV_young_Fem_GP_1	11
Size_DbIN_descend_se_RVC_Adult(4)	10
Size_DbIN_ascend_se_RVC_Juv(5)	9
L_at_Amin_Fem_GP_1	7
CV_old_Fem_GP_1	6
Retain_L_infl_COM(1)	6
Size_DbIN_ascend_se_MRIP(3)	5
Size_DbIN_end_logit_MRIP(3)	4
SR_BH_steep	3
Size_DbIN_peak_RVC_Juv(5)	3
VonBert_K_Fem_GP_1	2
InitF_seas_1_ft_3MRIP	1
Retain_L_asymptote_logit_COM(1)	1



# Jitter Analysis: Parameters



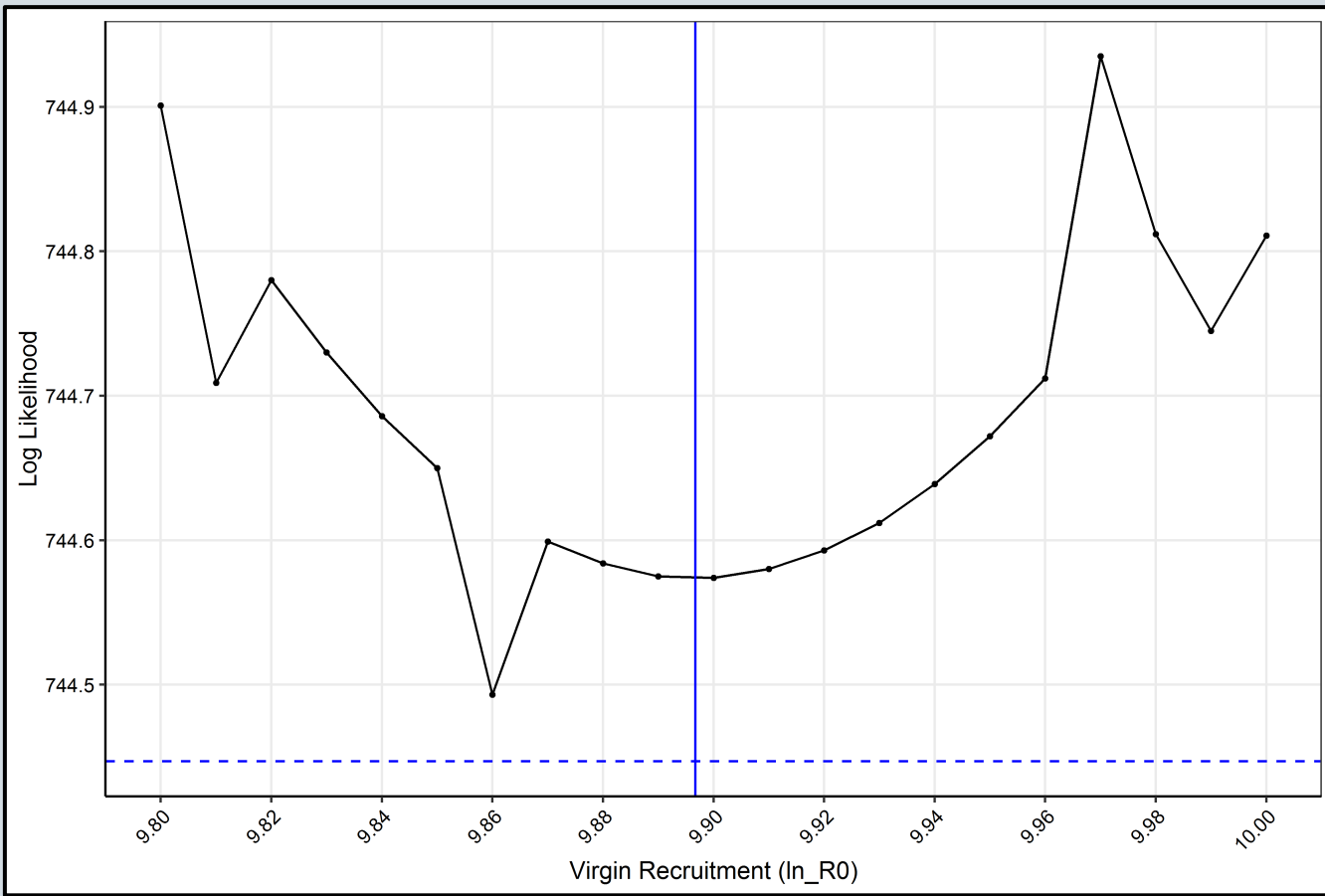


# SEDAR 64: Yellowtail Snapper Assessment Model Results

## Base Model Diagnostics: Likelihood Profiles

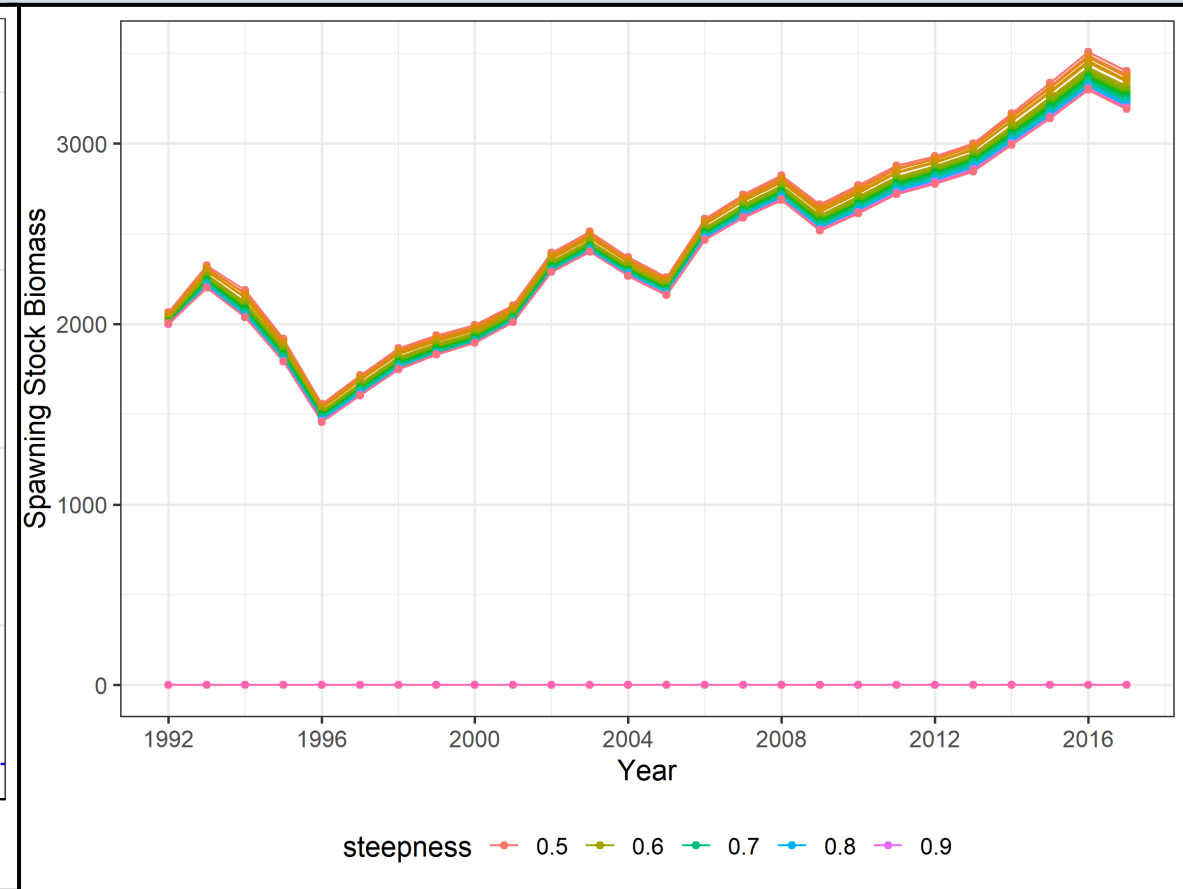
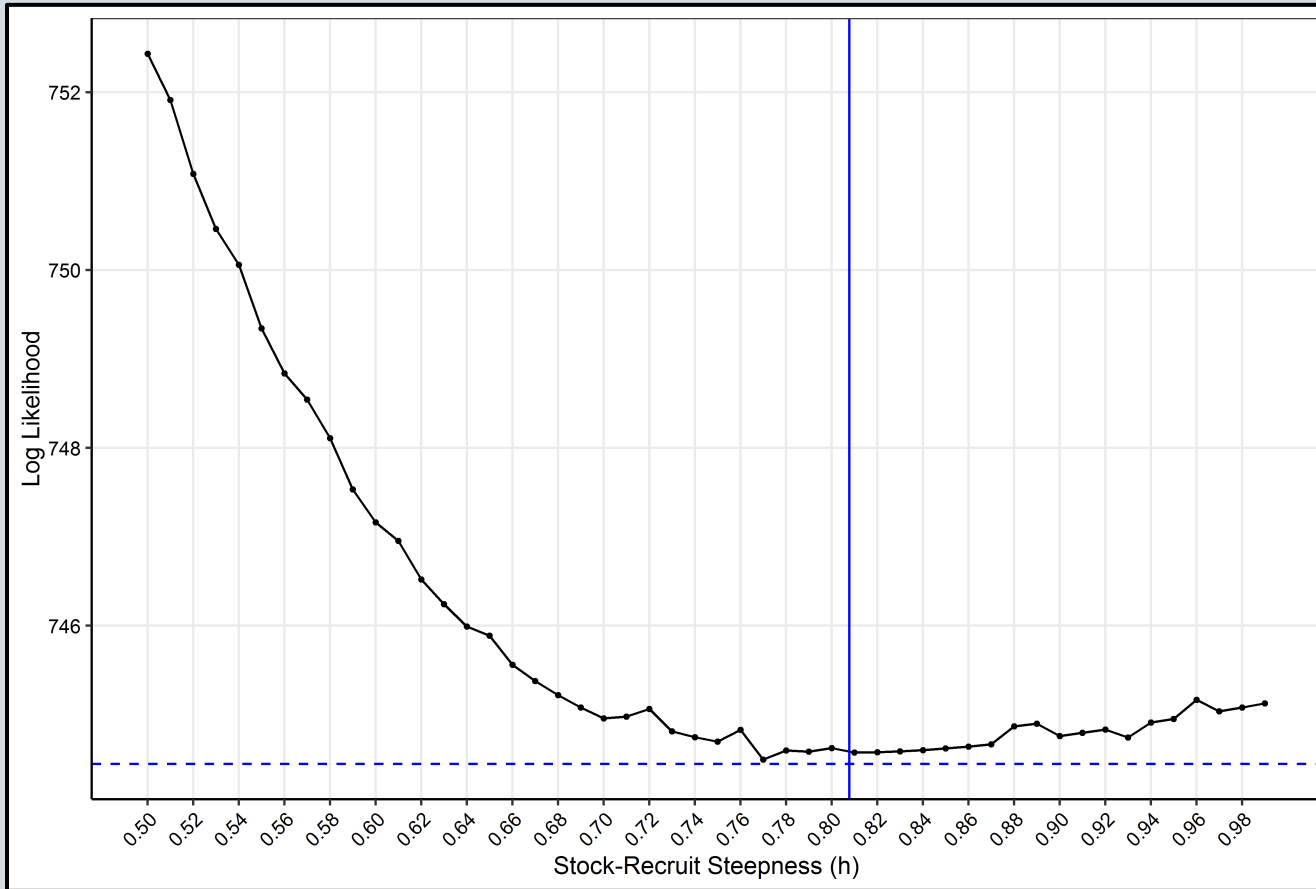


# Likelihood Profile – Unfished Recruitment (R0)

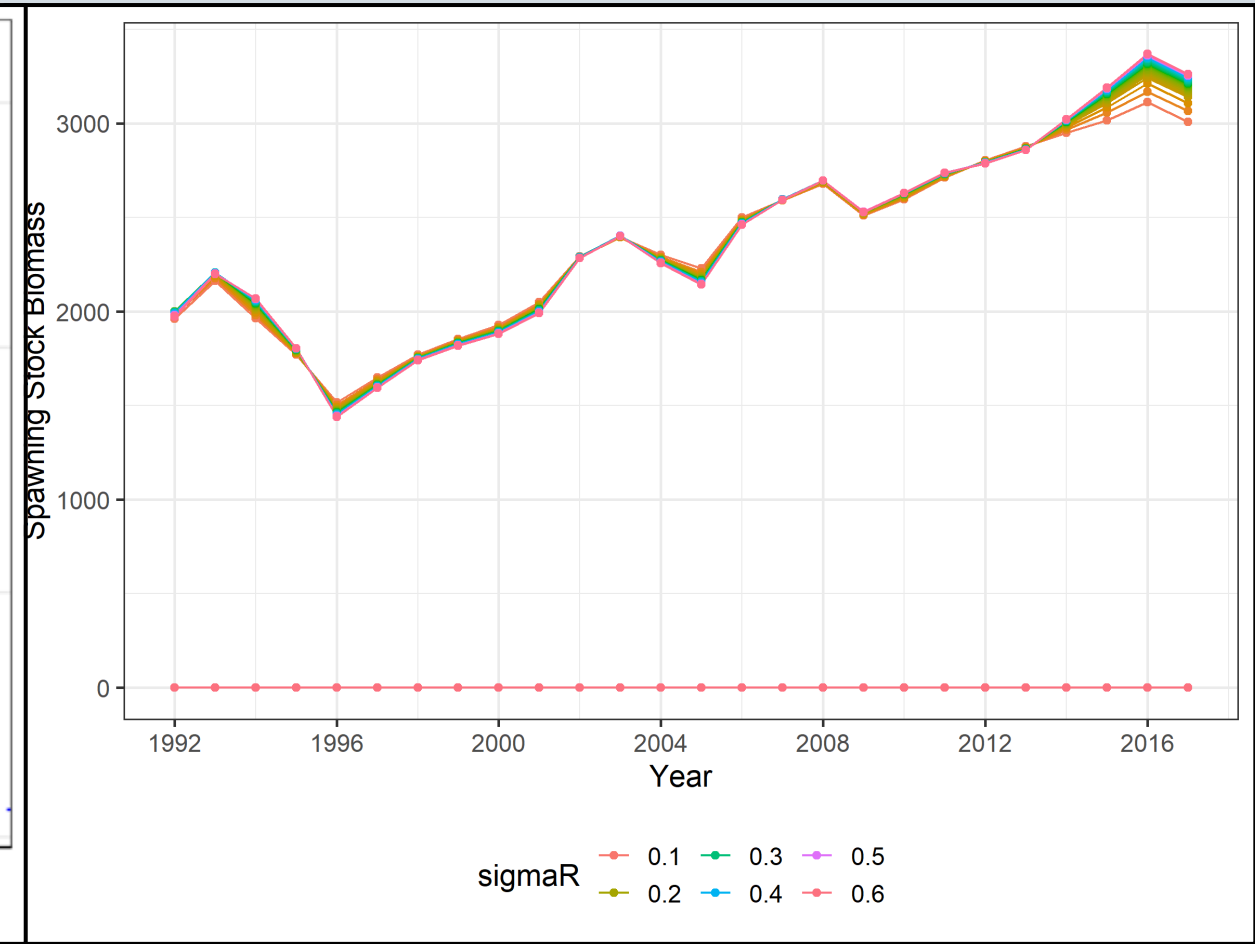
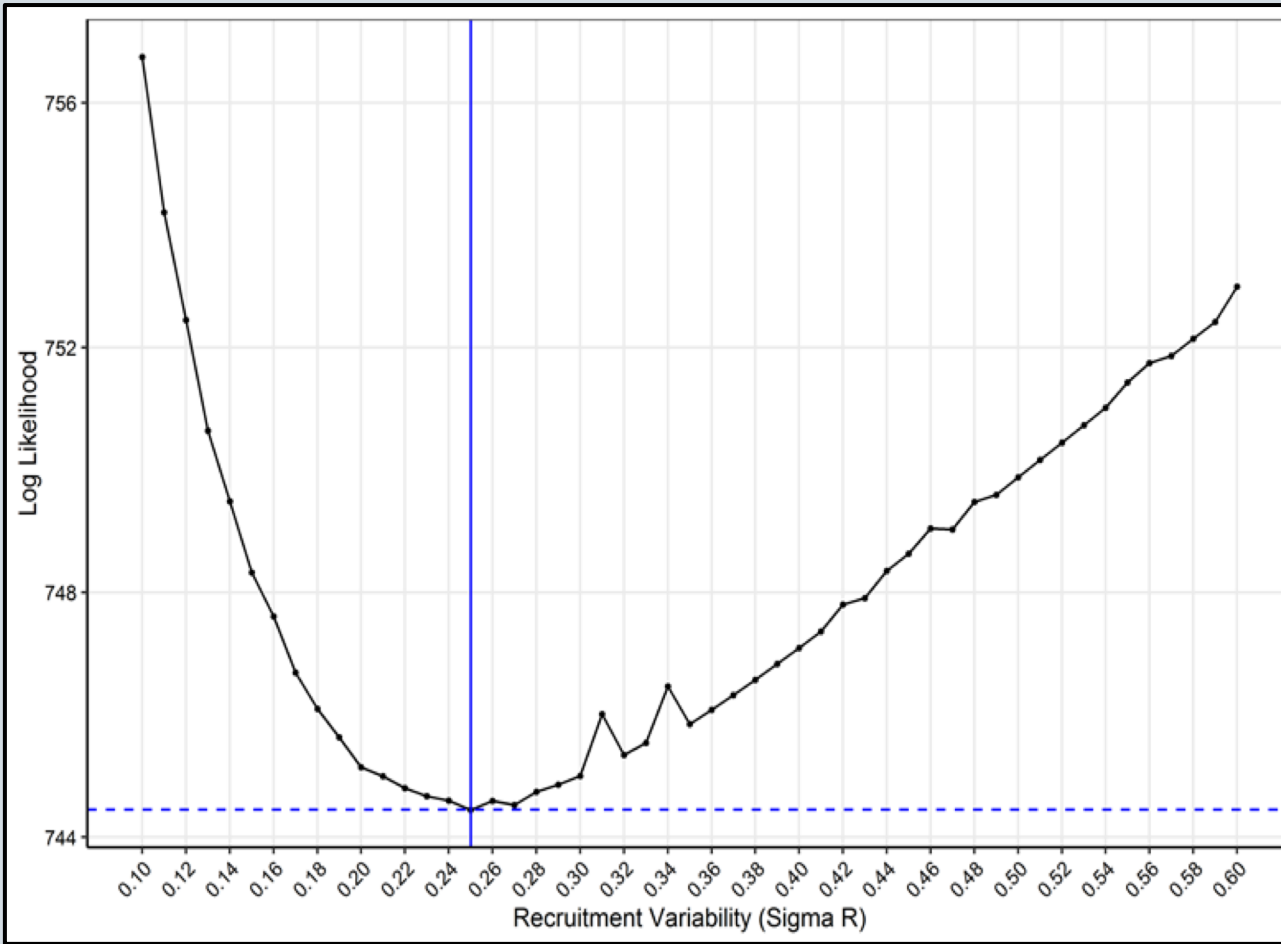




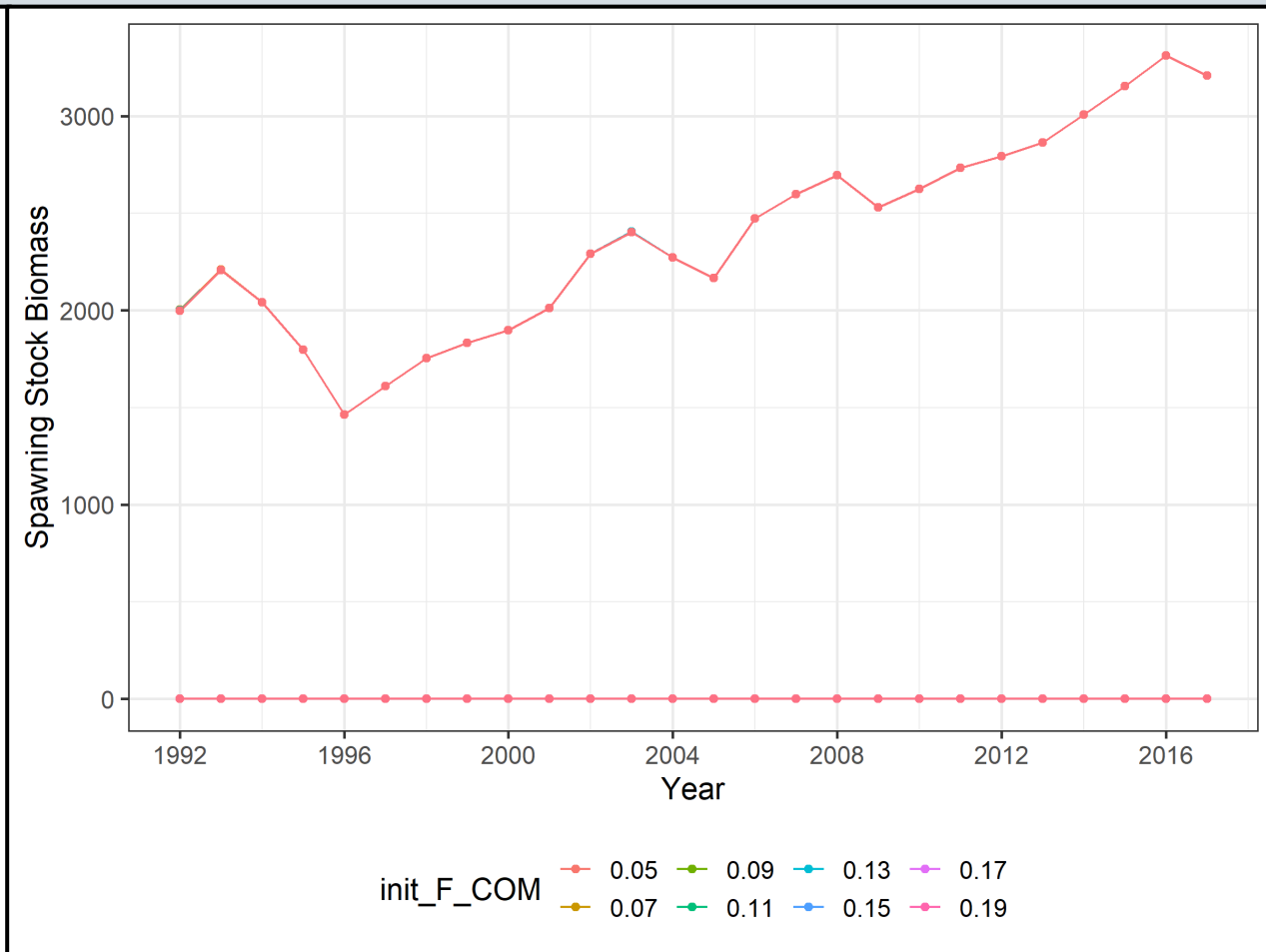
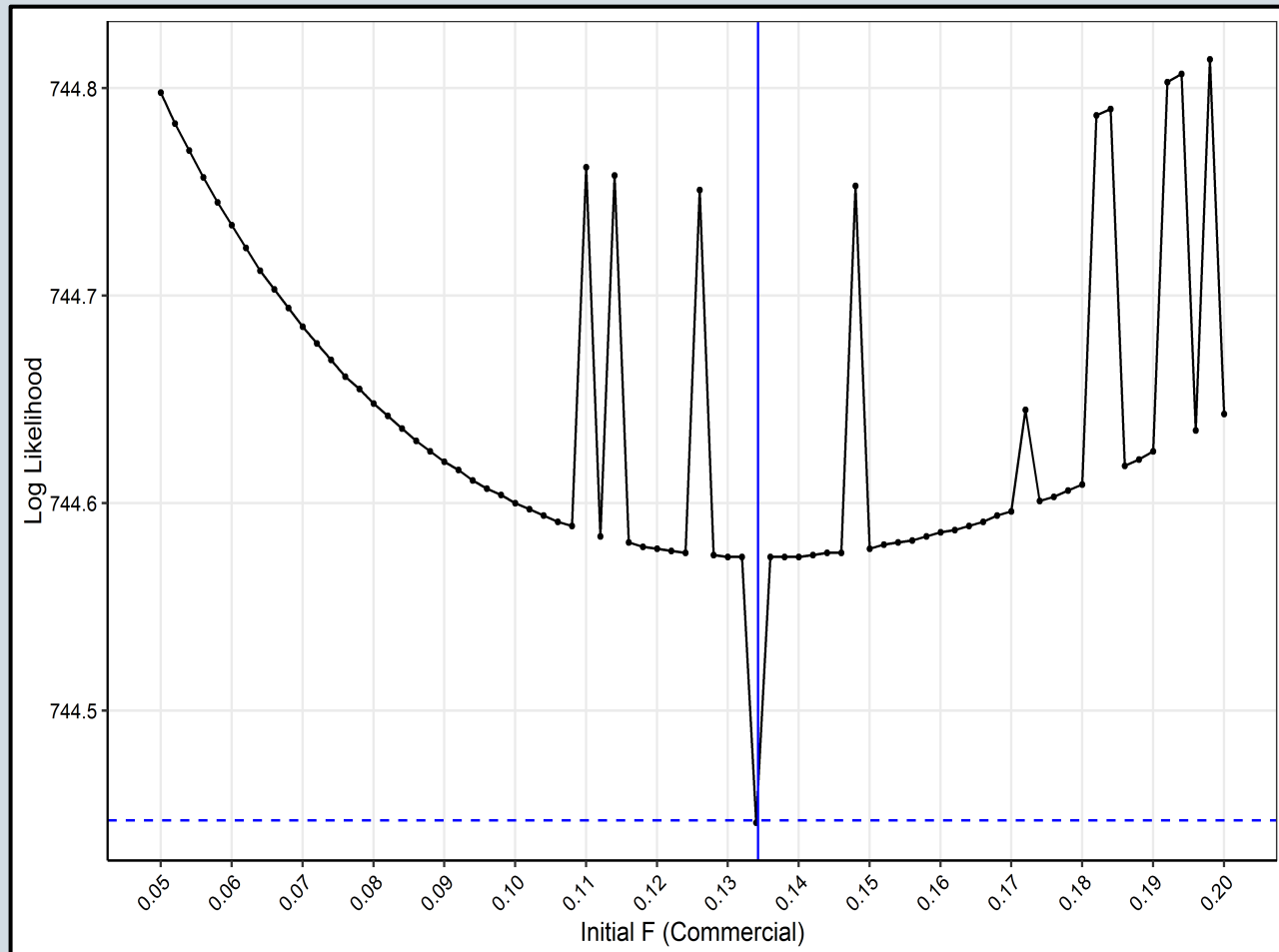
# Likelihood Profile - Steepness



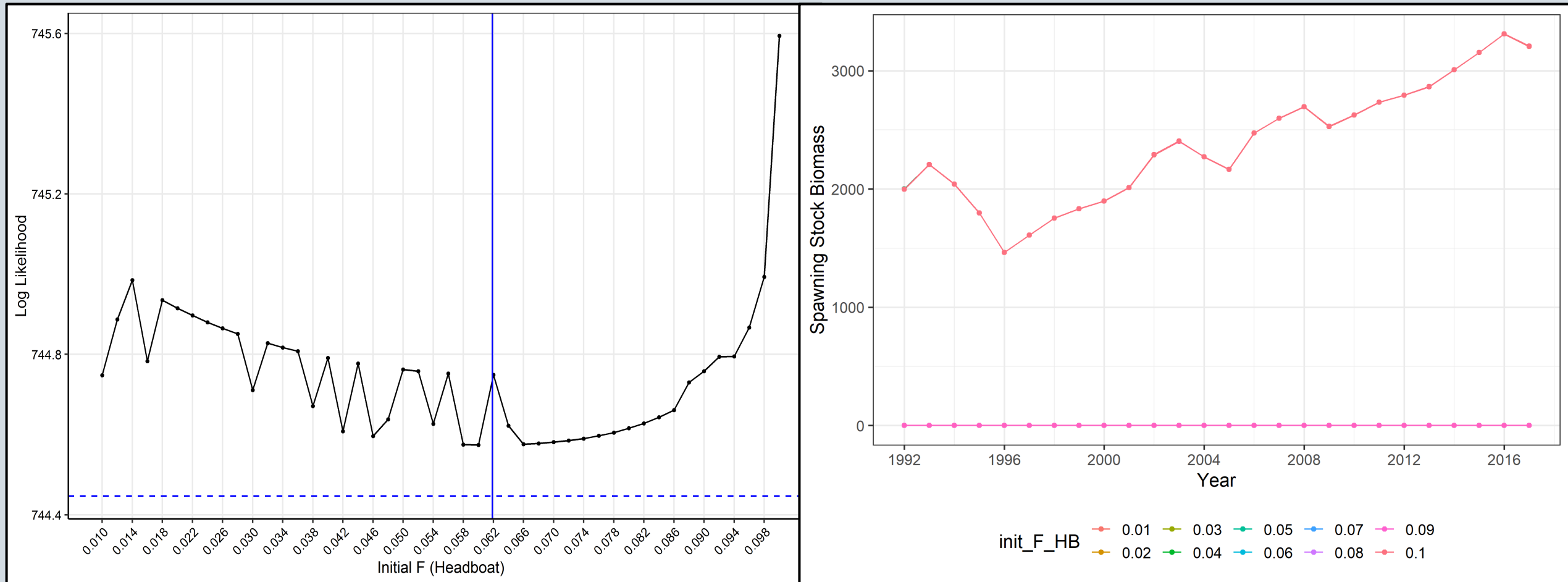
# Likelihood Profile – Recruitment Variability



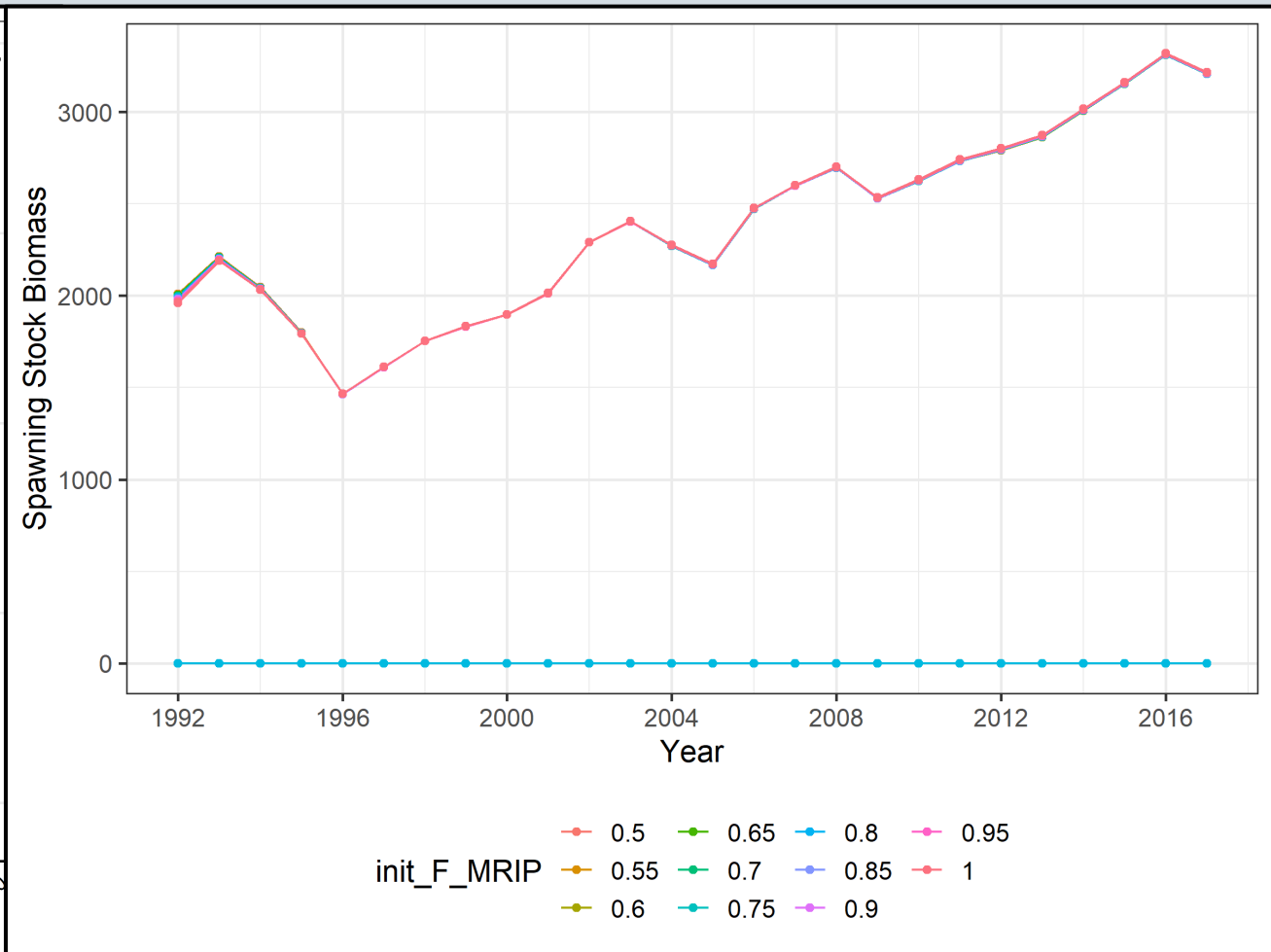
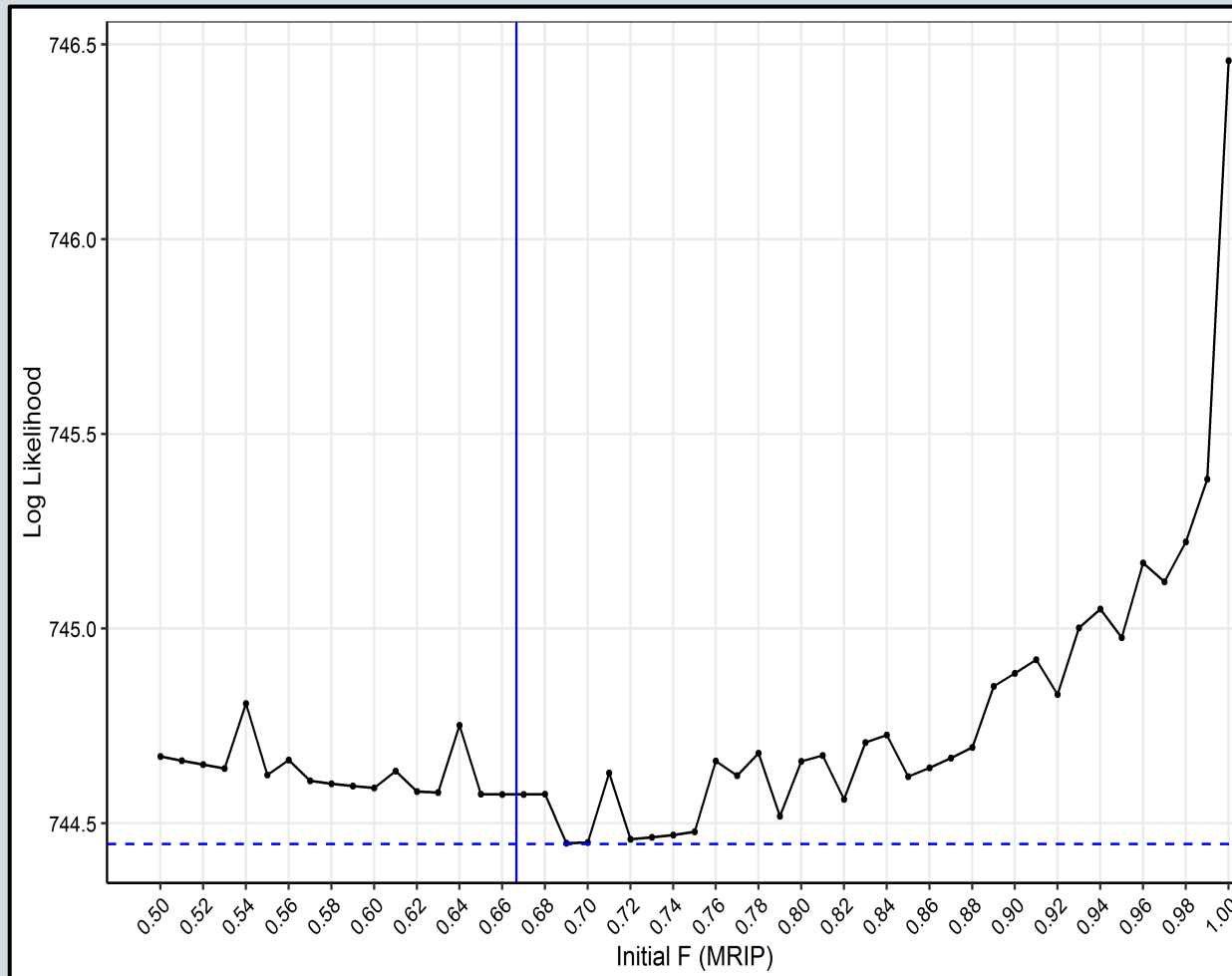
# Likelihood Profile – Initial Commercial F

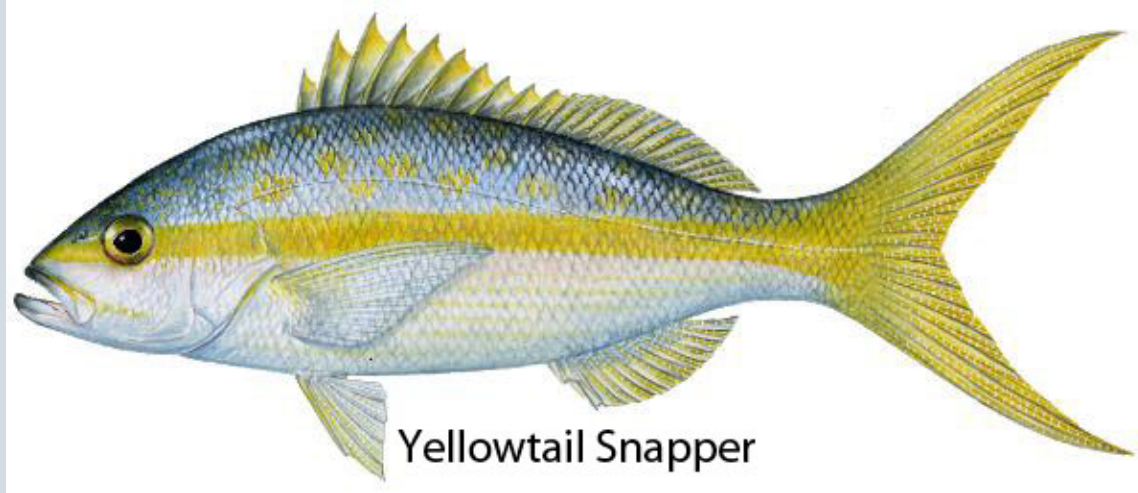


# Likelihood Profile – Initial Headboat F



# Likelihood Profile – Initial MRIP F





# SEDAR 64: Yellowtail Snapper Assessment Model Results

## Base Model Diagnostics: Parametric Bootstrap



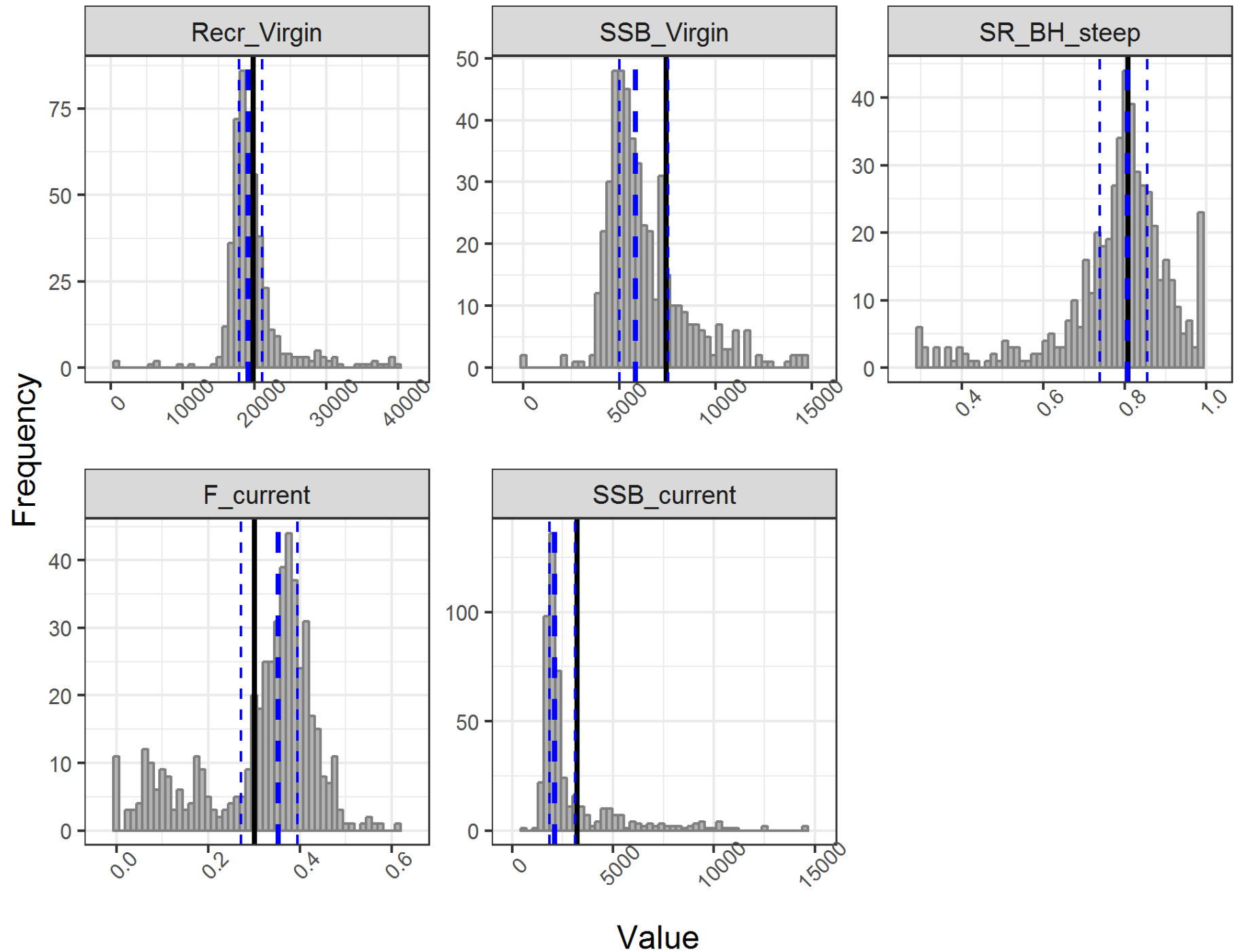
# Bootstrap Analysis

Number of runs	Base LL	Min LL	Max LL	Runs with parameters near bounds	Runs above gradient threshold	Number of failed runs
500	744.4	1773.8	14881.8	445	500	0

Parameter near bounds (top 10)	Number of runs
Size_DbIN_descend_se_RVC_Adult(4)	204
CV_old_Fem_GP_1	199
CV_young_Fem_GP_1	115
VonBert_K_Fem_GP_1	81
L_at_Amin_Fem_GP_1	74
Size_DbIN_descend_se_HB(2)	64
Retain_L_infl_COM(1)	60
Size_DbIN_end_logit_HB(2)	49
Size_DbIN_ascend_se_HB(2)	43
Size_DbIN_top_logit_HB(2)	30



# Bootstrap Analysis: Parameters







# SEDAR 64: Yellowtail Snapper Assessment Model Results

**Base Model Diagnostics: Retrospective (7-yr)**



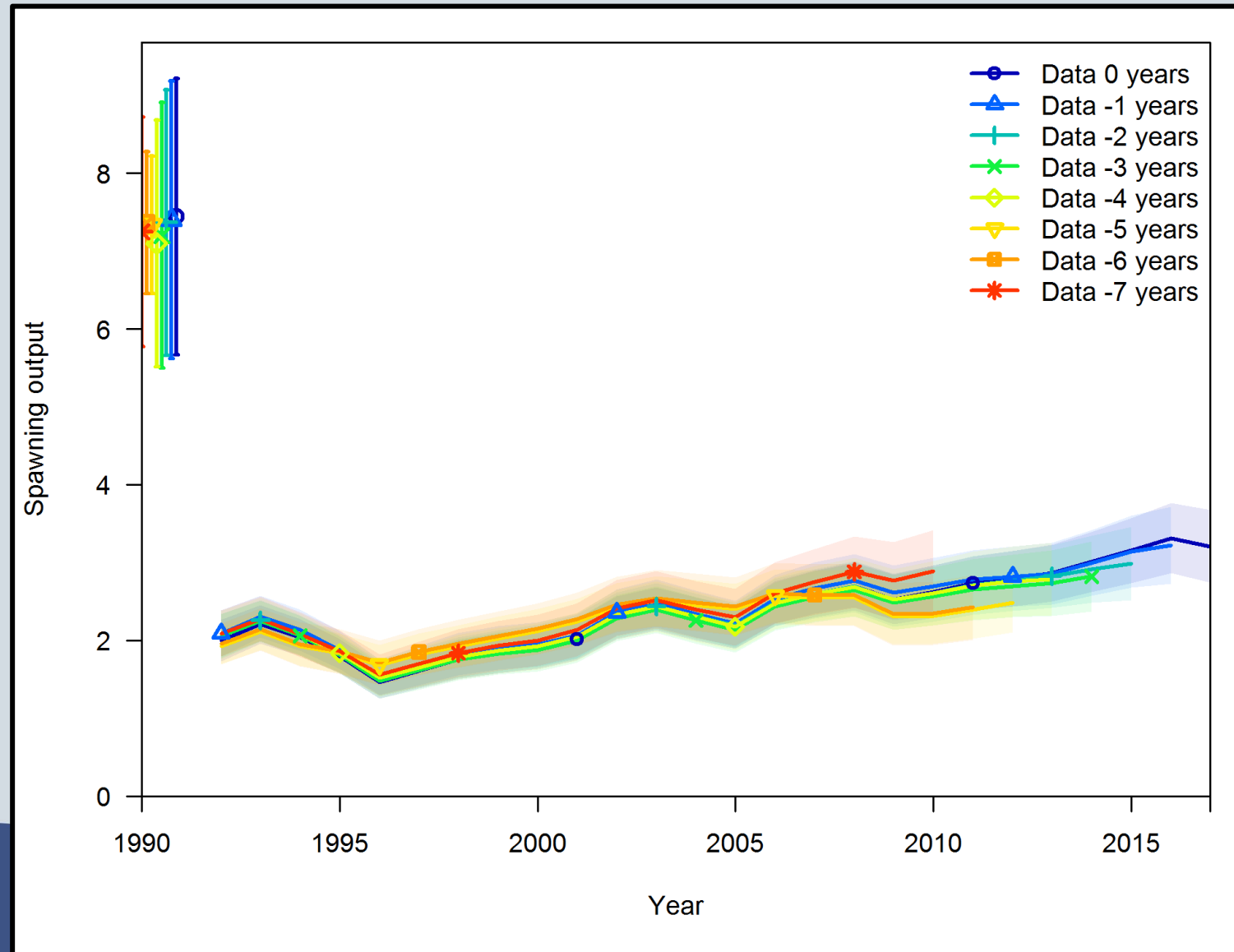
# Retrospective Analysis

Parameter	AFSC Mohn's Rho (Hurtado et al. 2015)
SSB	-0.04
Recruitment	-0.10
Age-4 F	0.06

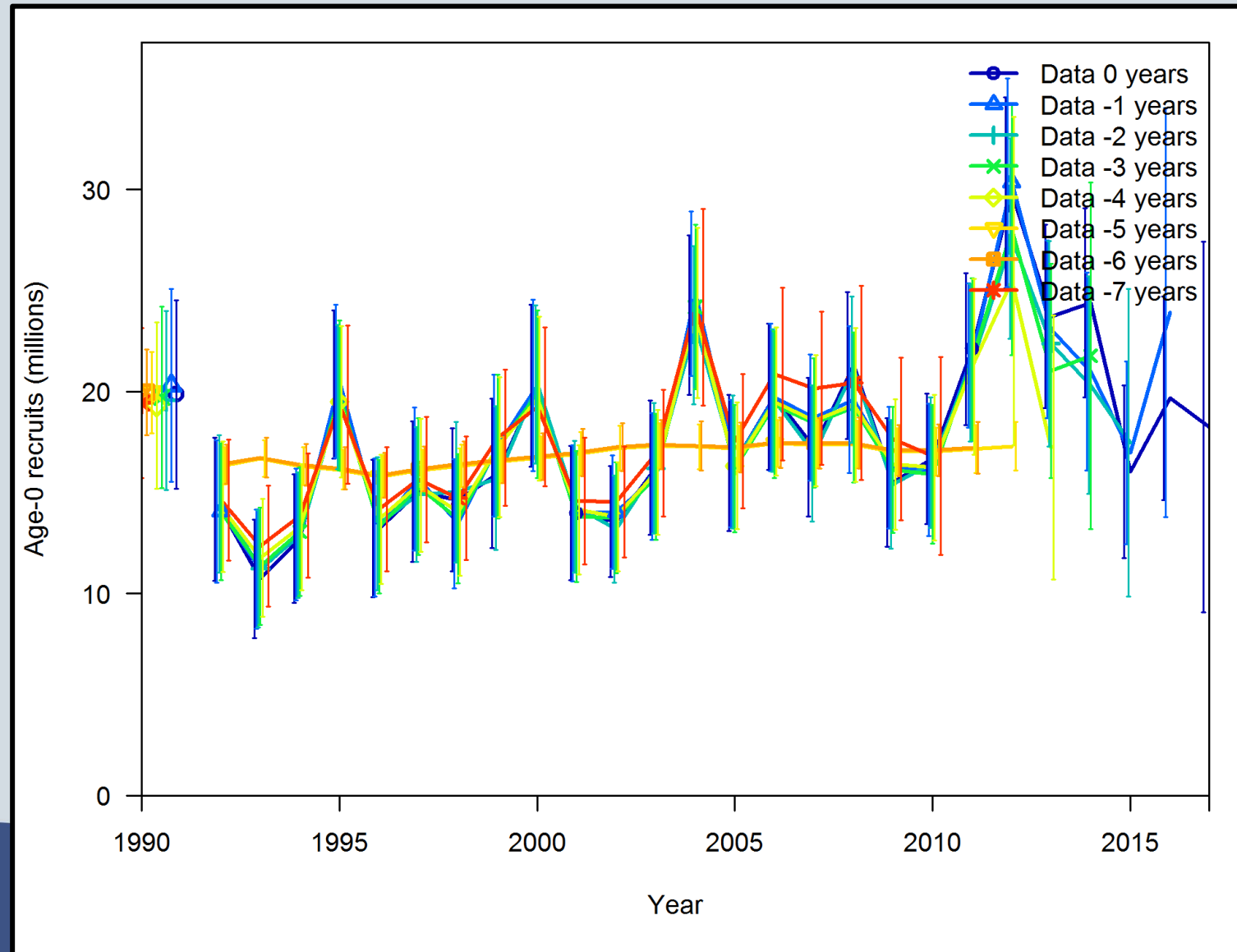
Peel	Gradient	Number of parameters near bounds
Base	<0.0001	0
- 1 yr	<0.0001	0
- 2 yrs	<0.0001	0
- 3 yrs	<b>0.0003</b>	0
- 4 yrs	<b>0.0002</b>	0
- 5 yrs	<0.0001	0
- 6 yrs	<0.0001	<b>1</b>
- 7 yrs	<0.0001	<b>1</b>



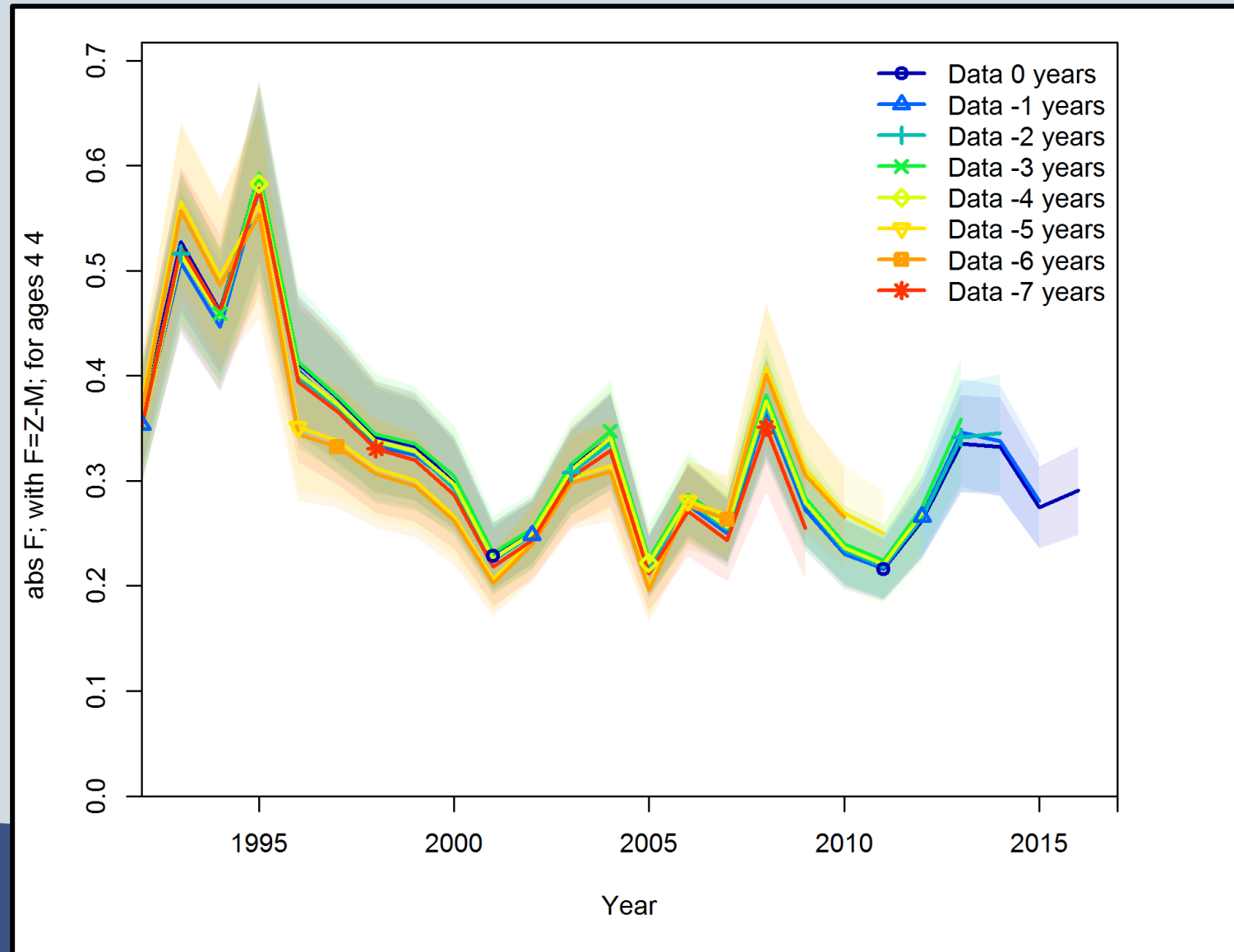
# Retrospective Analysis



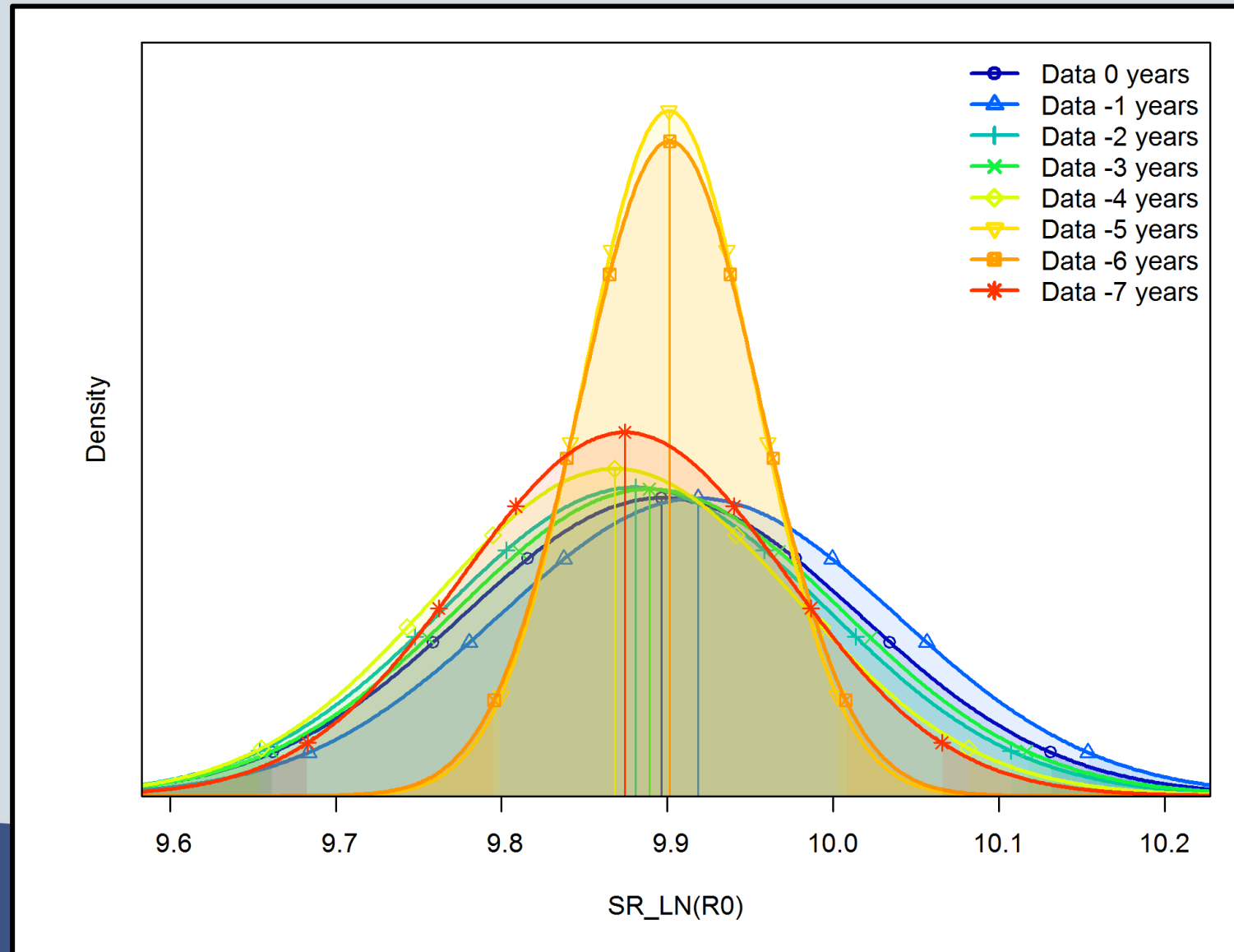
# Retrospective Analysis



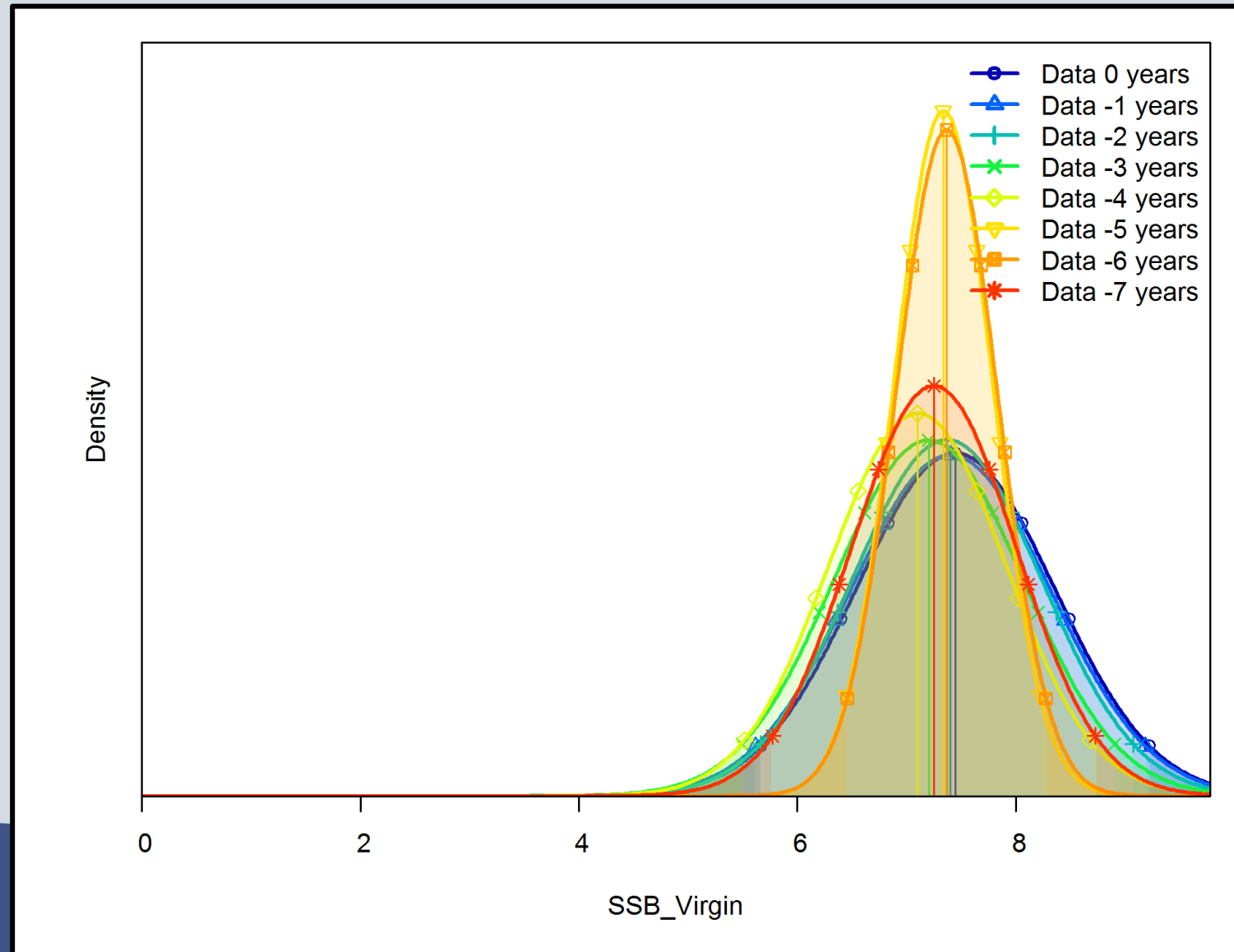
# Retrospective Analysis



# Retrospective Analysis



# Retrospective Analysis





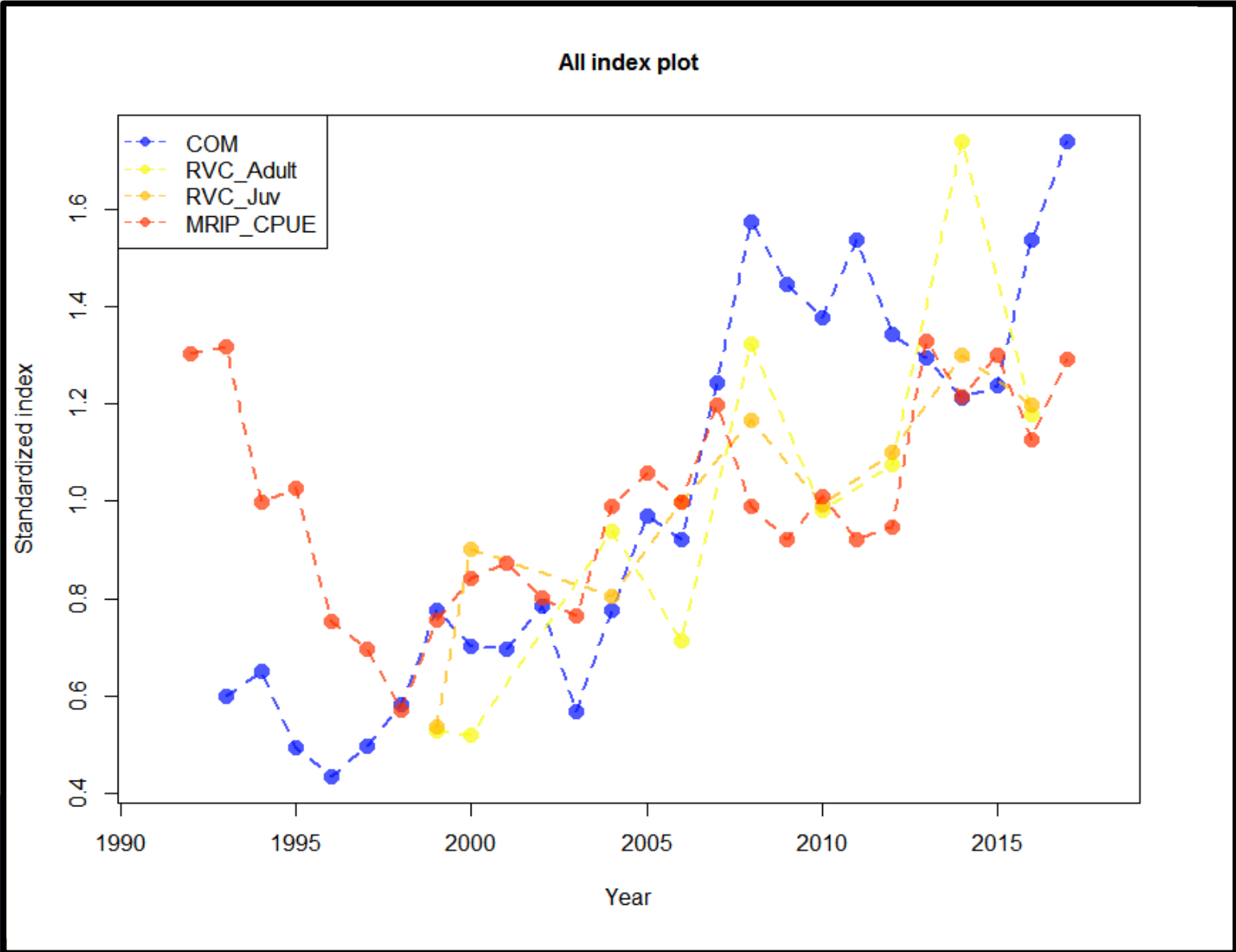
# SEDAR 64: Yellowtail Snapper Assessment Model Results

## Base Model Diagnostics: Jack-knife Analysis





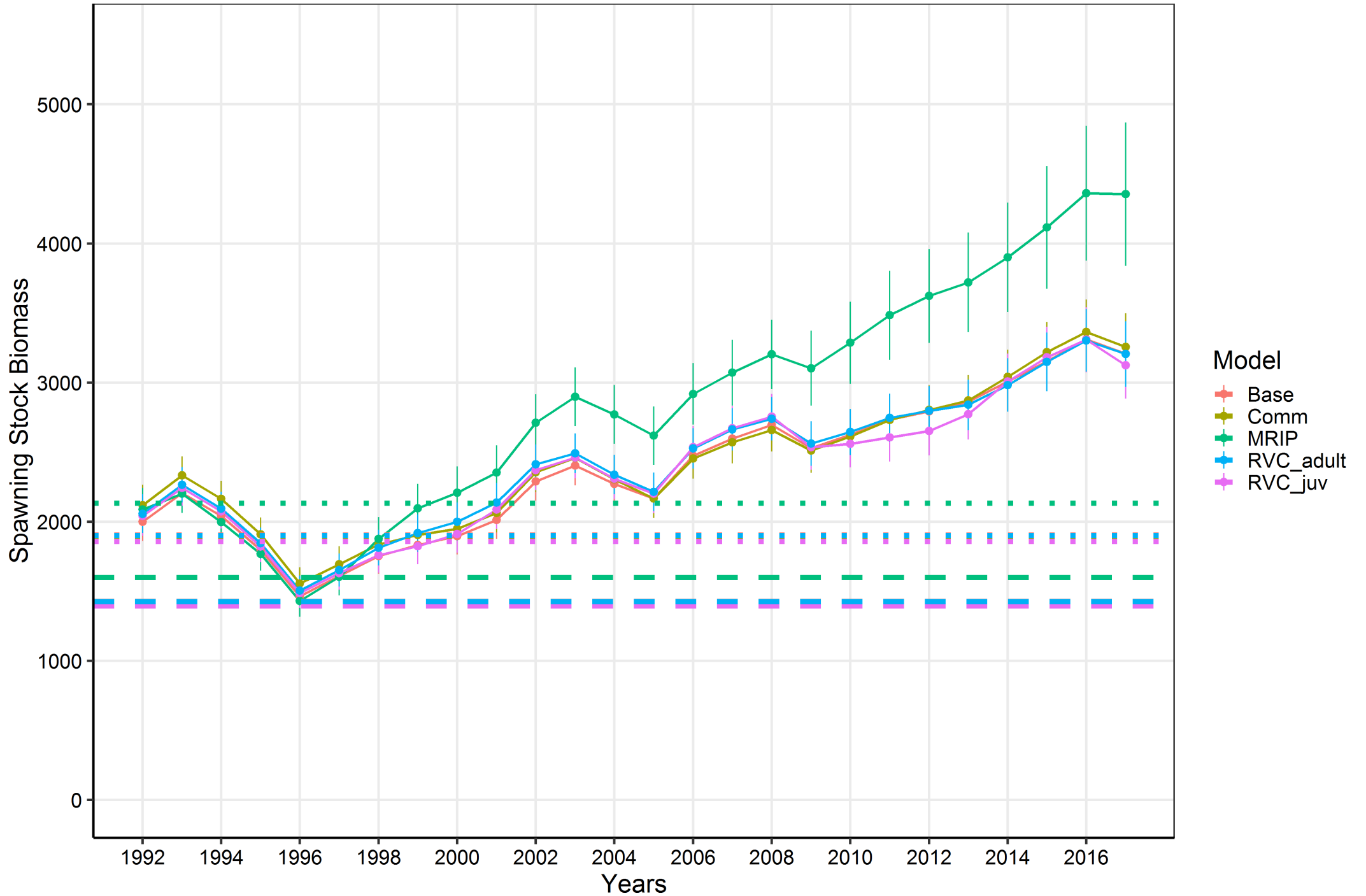
# Jack-knife Analysis

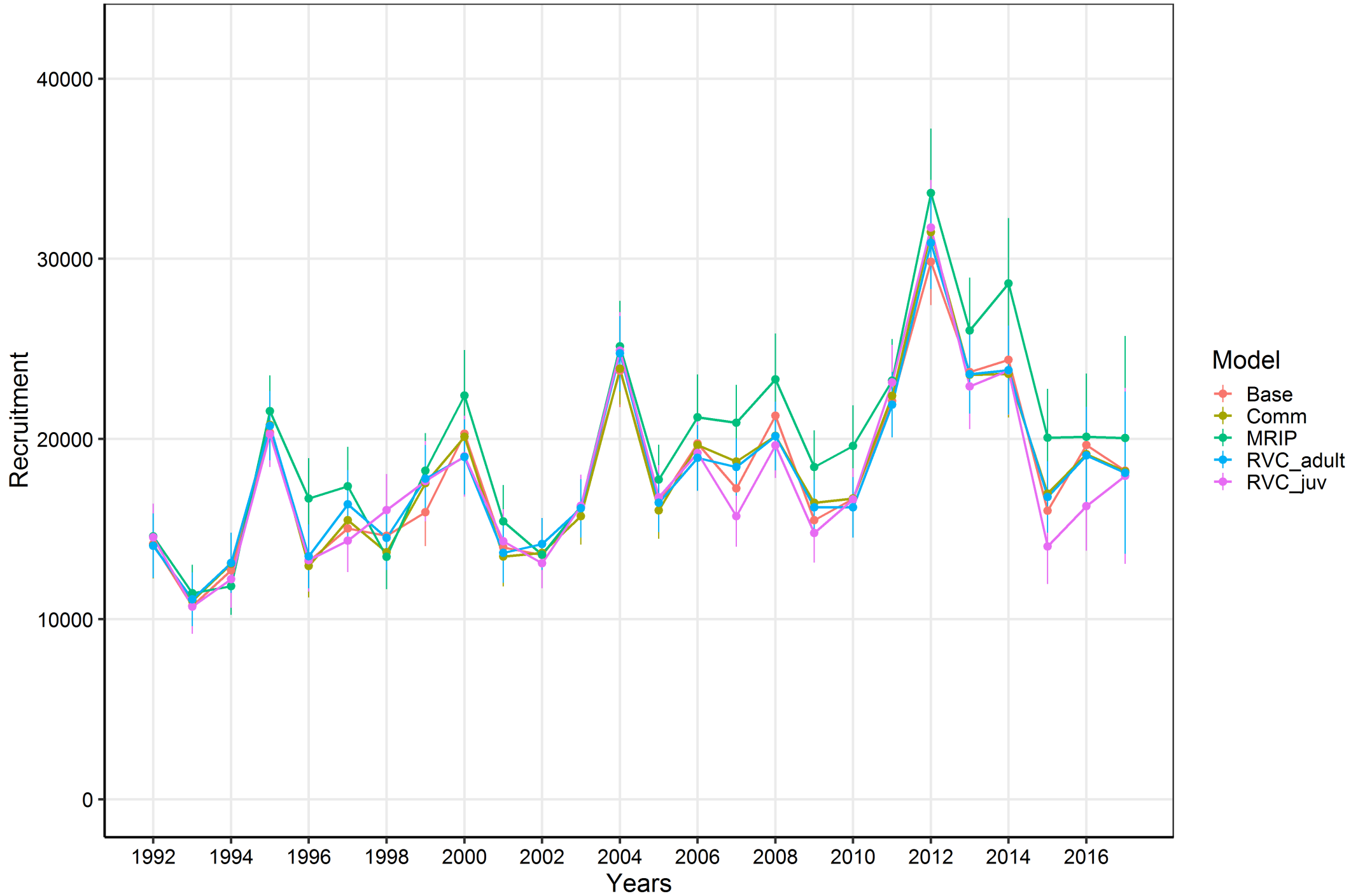


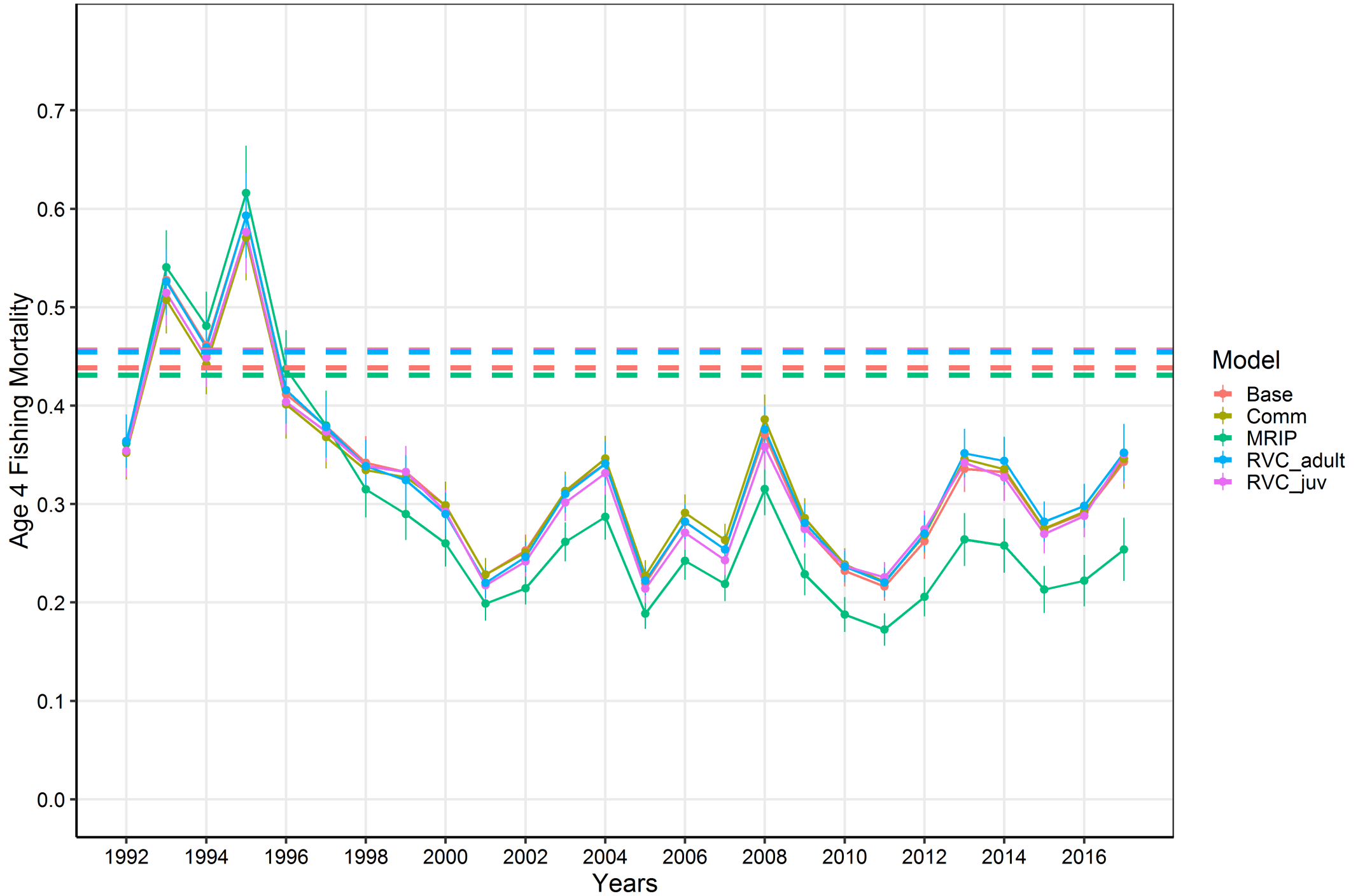
# Jack-knife Analysis

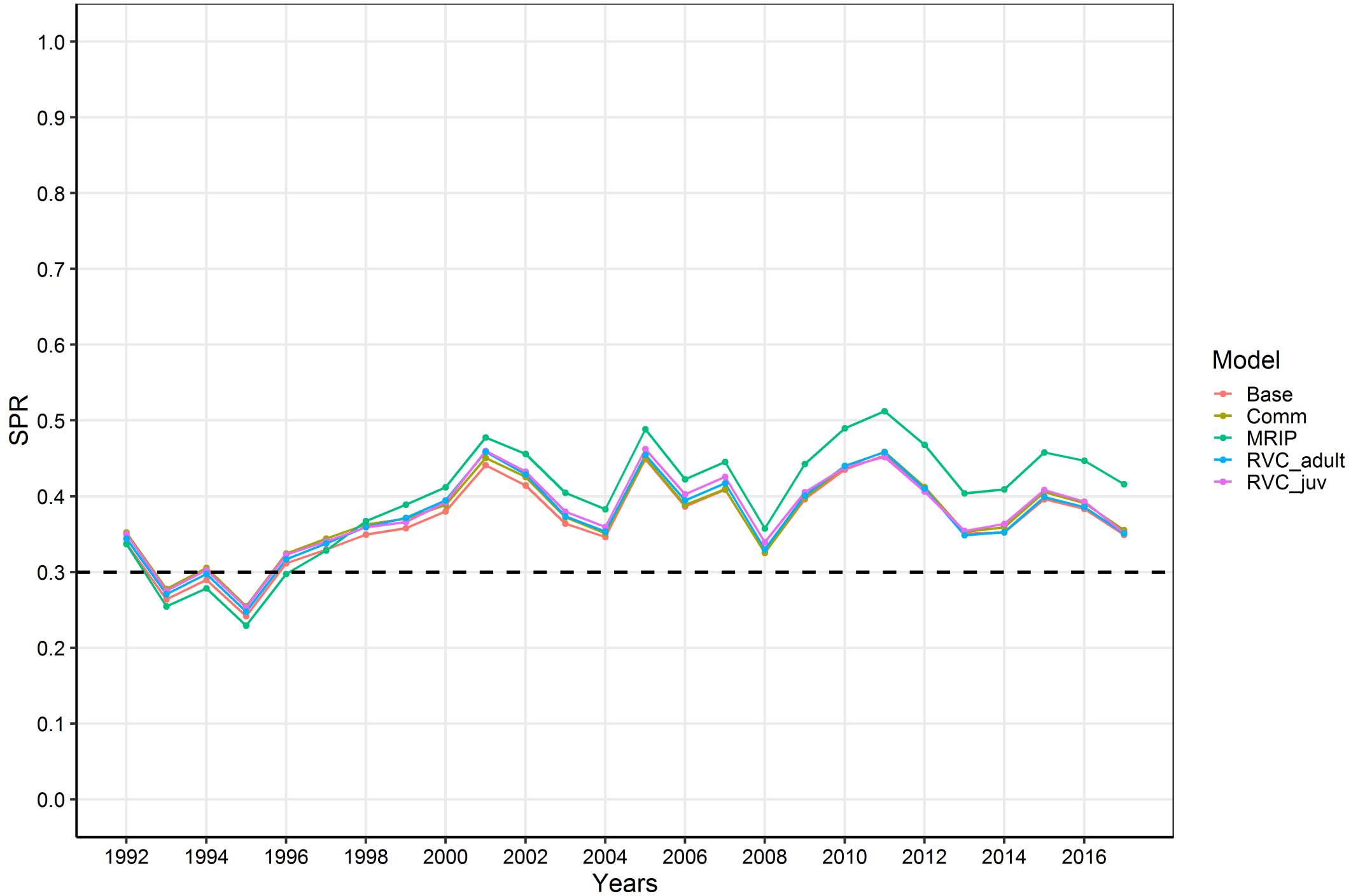
Parameter	Base	No Comm	No MRIP	No RVC Juv	No RVC Adult
TOTAL LL	744.447	920.738	790.918	720.722	881.745
Survey LL	-63.816	-36.583	-50.084	-55.812	-58.486
Length comp LL	367.901	373.124	271.647	338.048	360.329
Age comp LL	321.183	464.127	465.539	323.954	463.739
Recr_Virgin_millions	19.864	20.130	21.155	18.712	19.815
SSB_Virgin_thousand_mt	7.446	7.433	8.218	6.836	7.339
SR_LN(R0)	9.897	9.910	9.960	9.837	9.894
SR_BH_steep	0.808	0.796	0.821	0.867	0.819
L_at_Amax_Fem_GP_1	36.229	35.383	36.201	35.181	35.503
VonBert_K_Fem_GP_1	0.342	0.394	0.388	0.343	0.390













# SEDAR 64: Yellowtail Snapper Assessment Model Results

## Sensitivity Runs



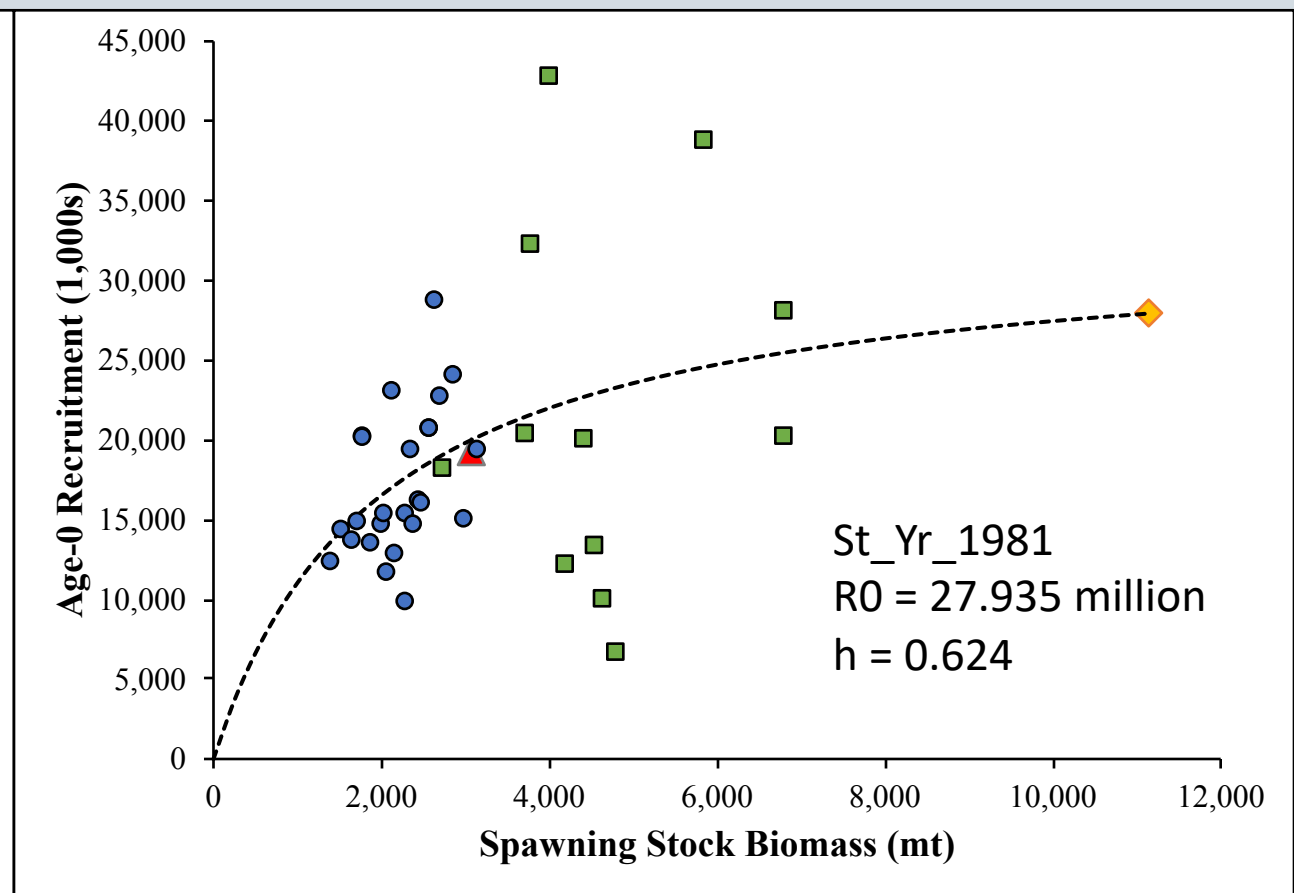
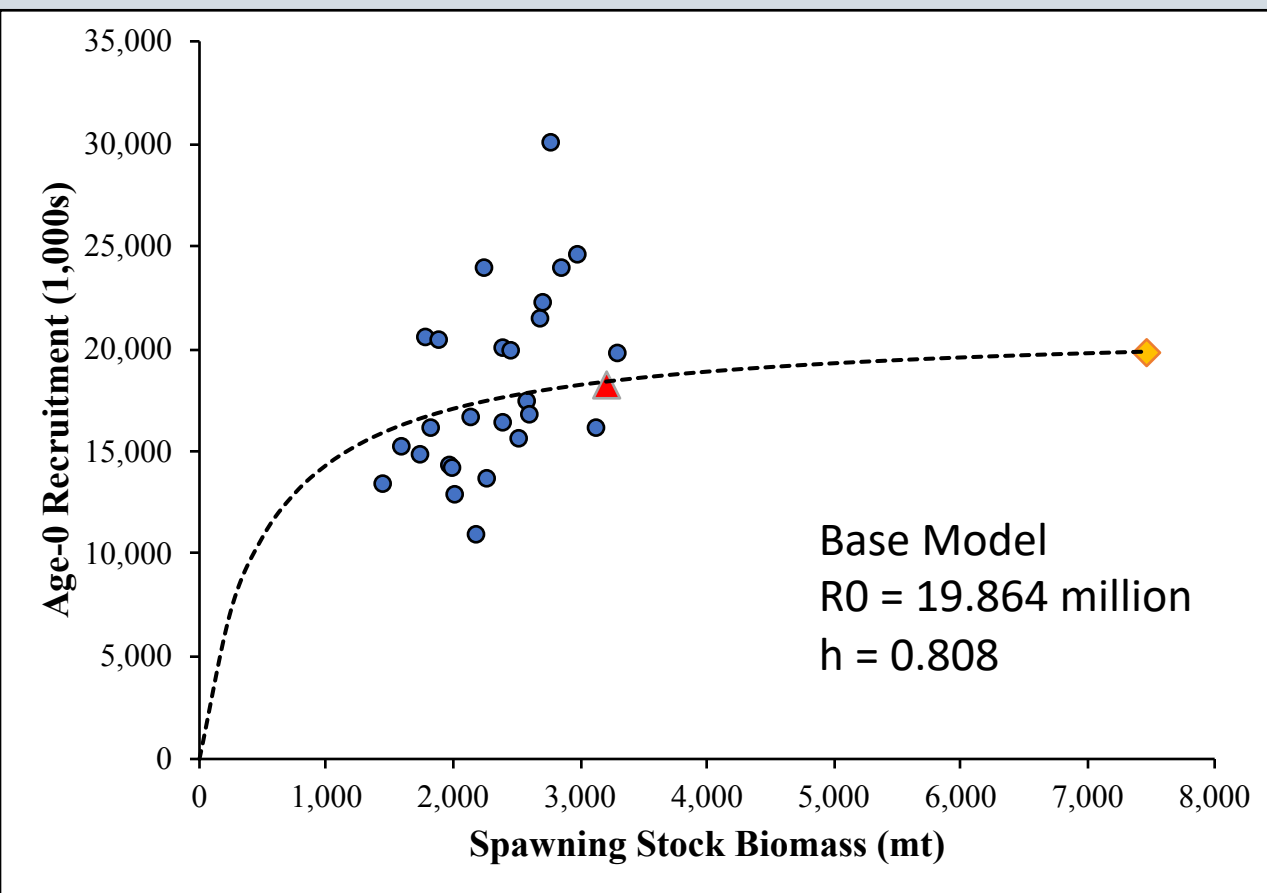
# Sensitivity Run 1: 1981 Start Year

<b>Estimated Parameters</b>	<b>Base</b>	<b>StYr 1981</b>
Likelihood	744.45	1025.91
Linf (cm)	36.23	37.23
k	0.34	0.34
Steepness (BH)	0.81	0.62
LN(R0)	9.90	10.24
sigmaR	0.25	0.39
<b>Derived Quantities</b>		
SSB unfished (thousand mt)	7.45	11.16
Recr_unfished (millions)	19.86	27.94
F_SPR30%	0.44	0.43
F_geom	0.30	0.33
MSST (0.75 * SSB_SPR30%)	1,428	1,473
SSB_geom	3,223	3,088
SPR <sub>2017</sub>	0.35	0.33

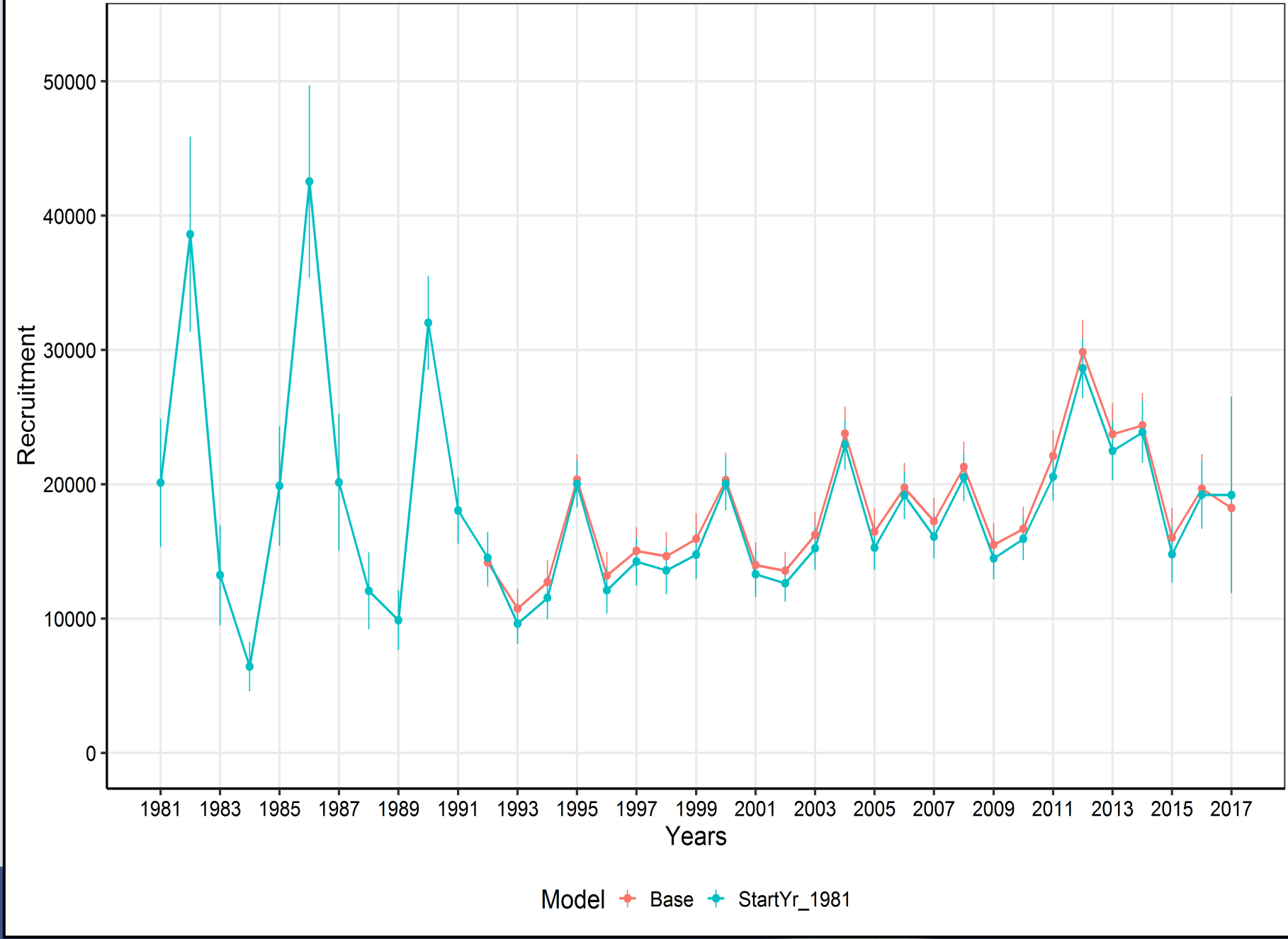




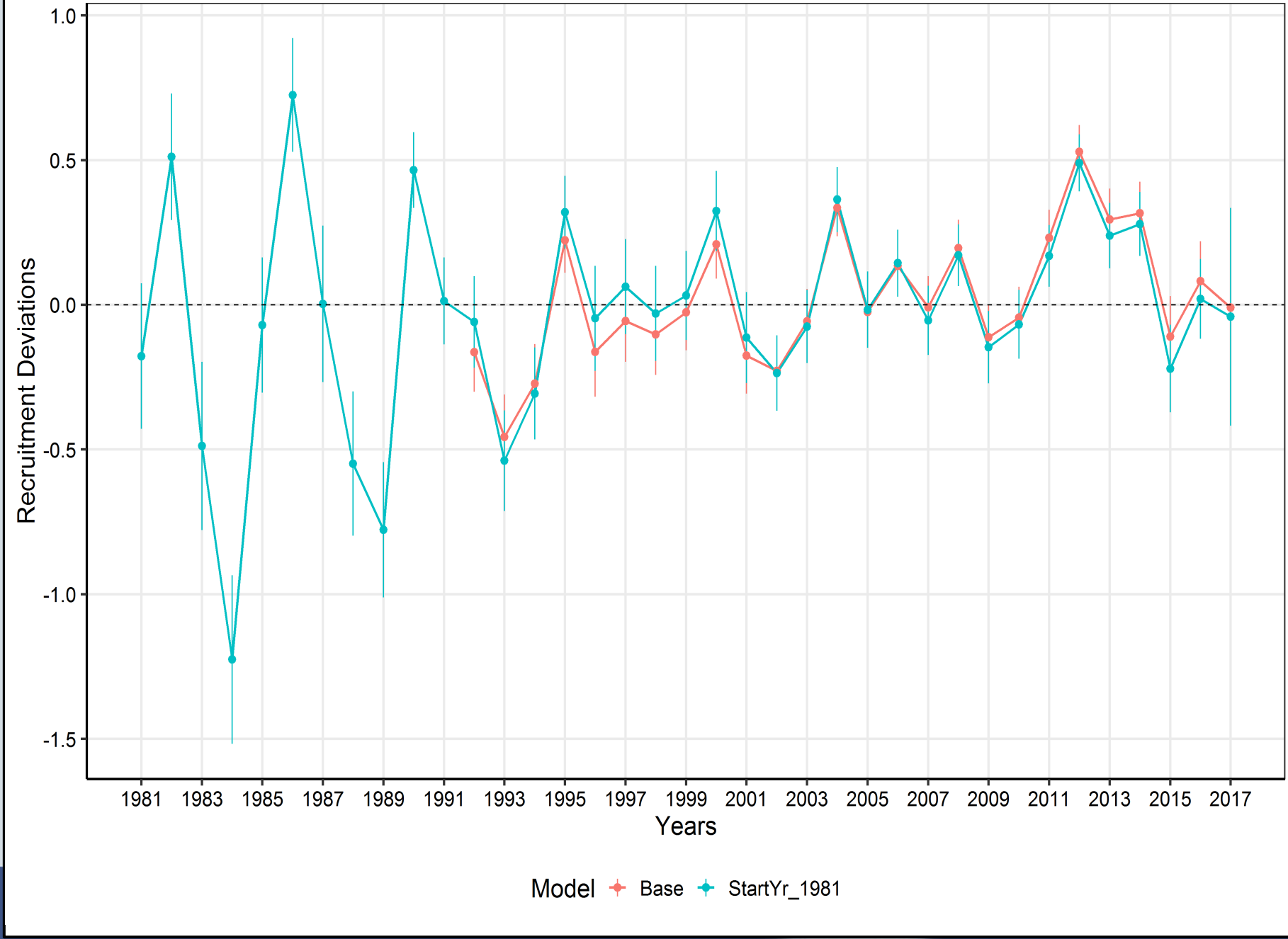
# Sensitivity Run 1: 1981 Start Year



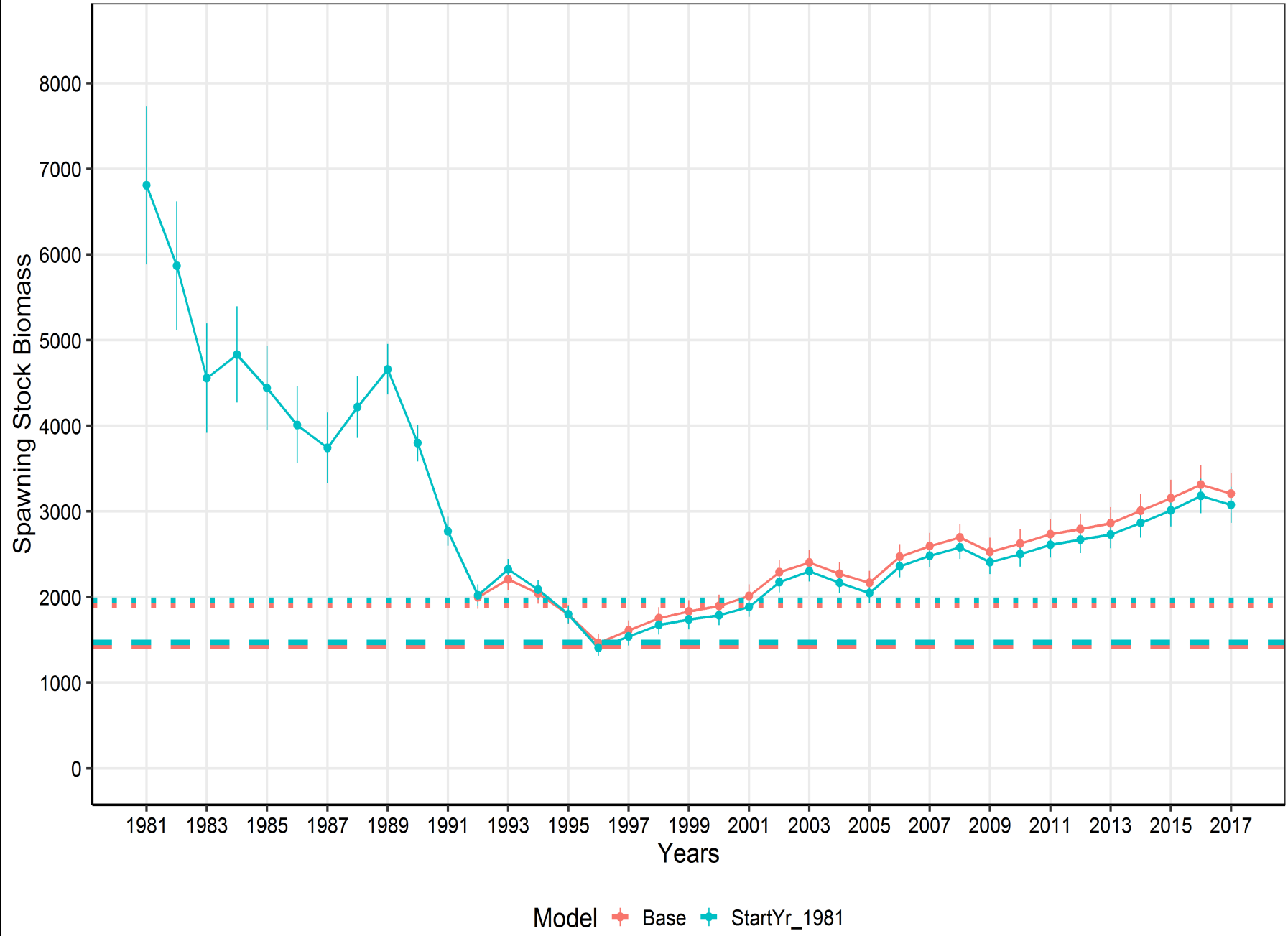
# Sensitivity Run 1: 1981 Start Year



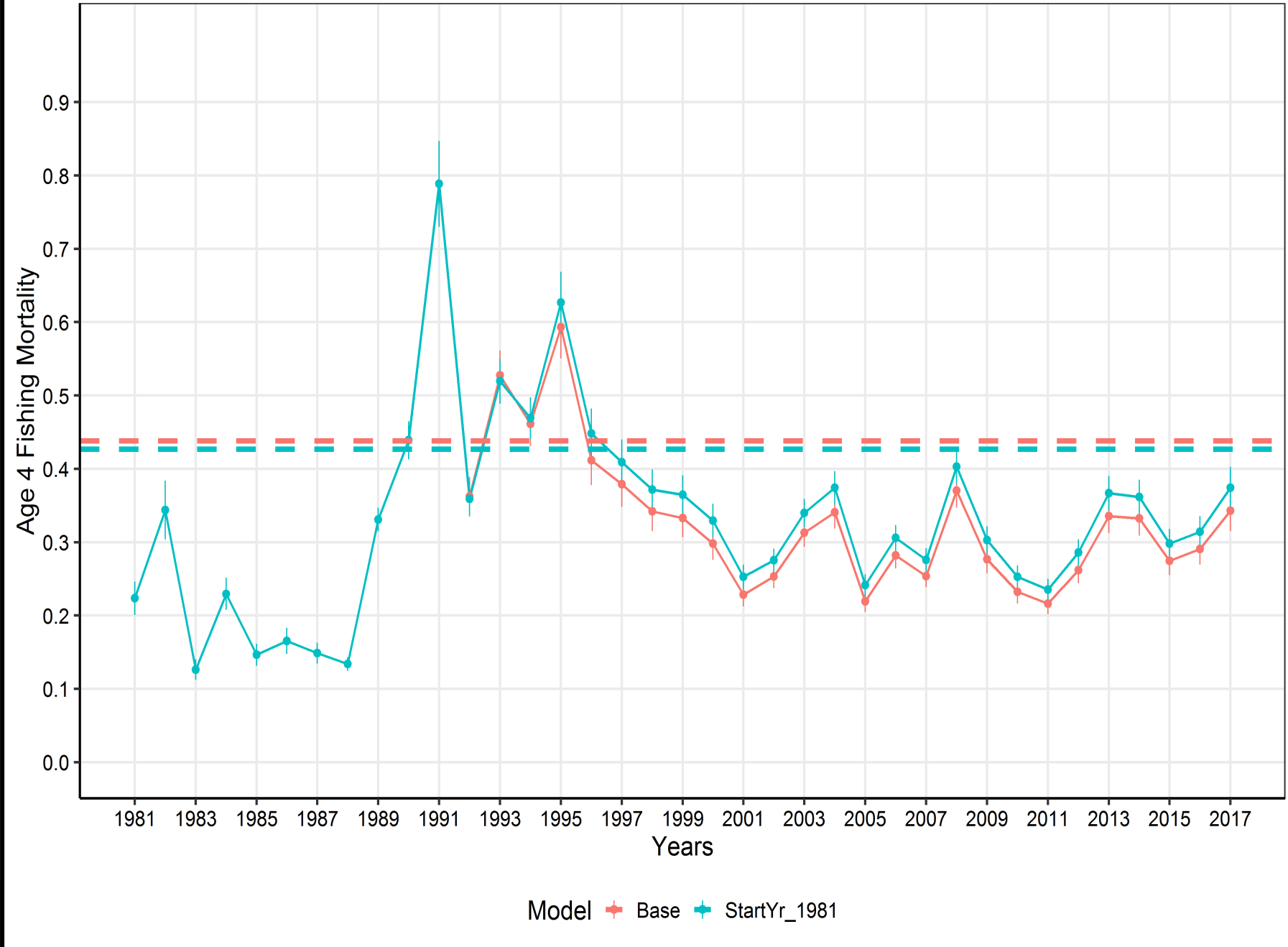
# Sensitivity Run 1: 1981 Start Year



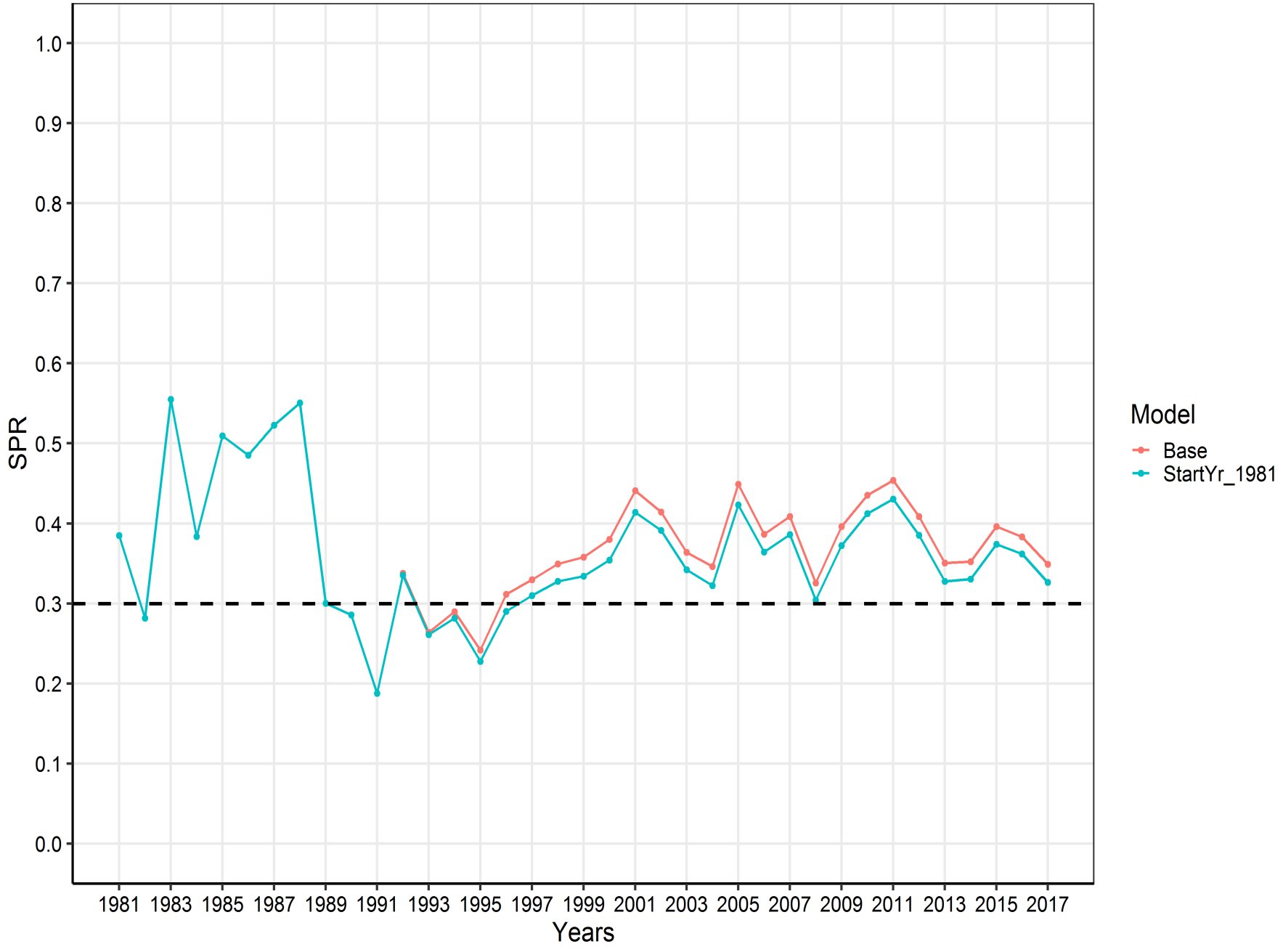
# Sensitivity Run 1: 1981 Start Year



# Sensitivity Run 1: 1981 Start Year

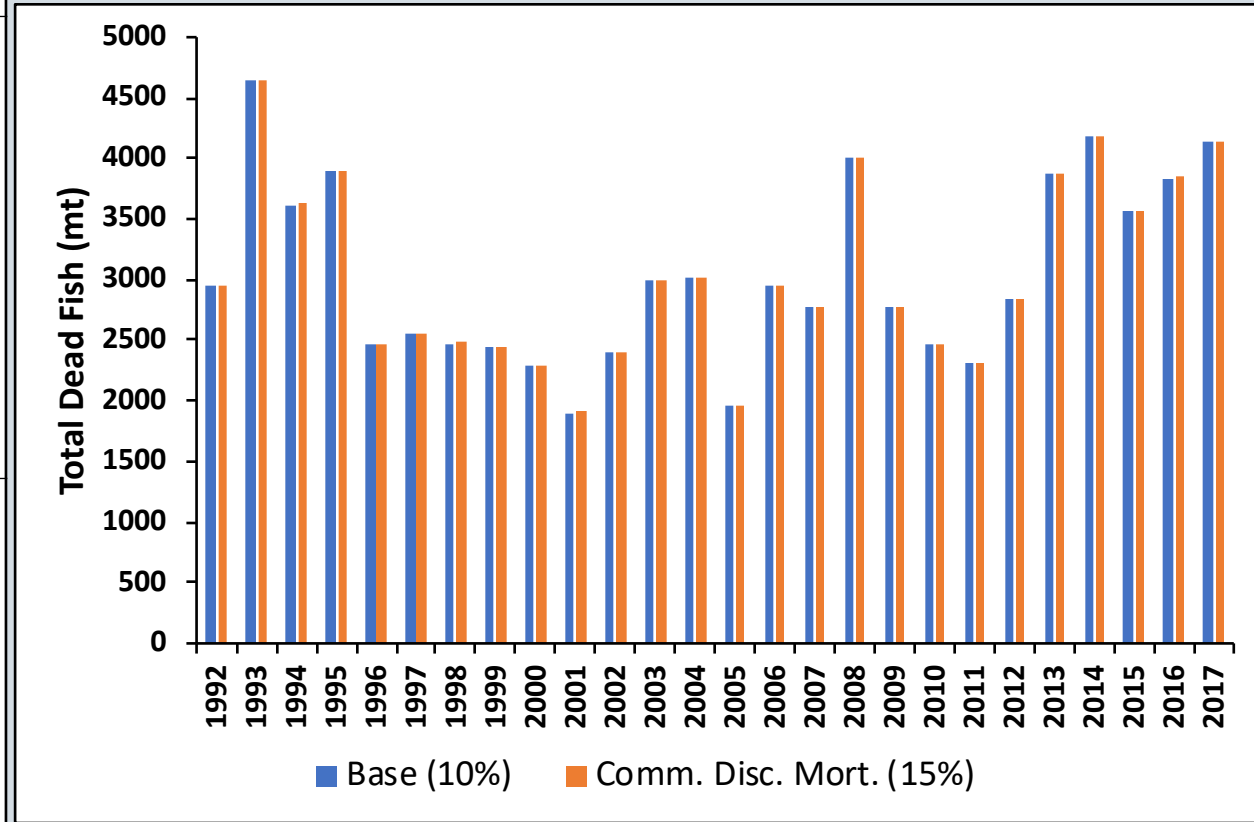


# Sensitivity Run 1: 1981 Start Year



# Sensitivity Run 5a: 15% Commercial Discard Mortality

Estimated Parameters	Base (10%)	Comm. Disc. Mort. (15%)
Likelihood	744.45	744.8
Linf (cm)	36.23	36.5
k	0.34	0.33
Steepness (BH)	0.81	0.81
LN(R0)	9.90	9.90
sigmaR	0.25	0.25
<b>Derived Quantities</b>		
SSB unfished (thousand mt)	7.45	7.45
Recr_unfished (millions)	19.86	19.83
F_SPR30%	0.44	0.43
F_geom	0.30	0.30
MSST (0.75 * SSB_SPR30%)	1,428	1,436
SSB_geom	3,223	3,206
SPR <sub>2017</sub>	0.35	0.35



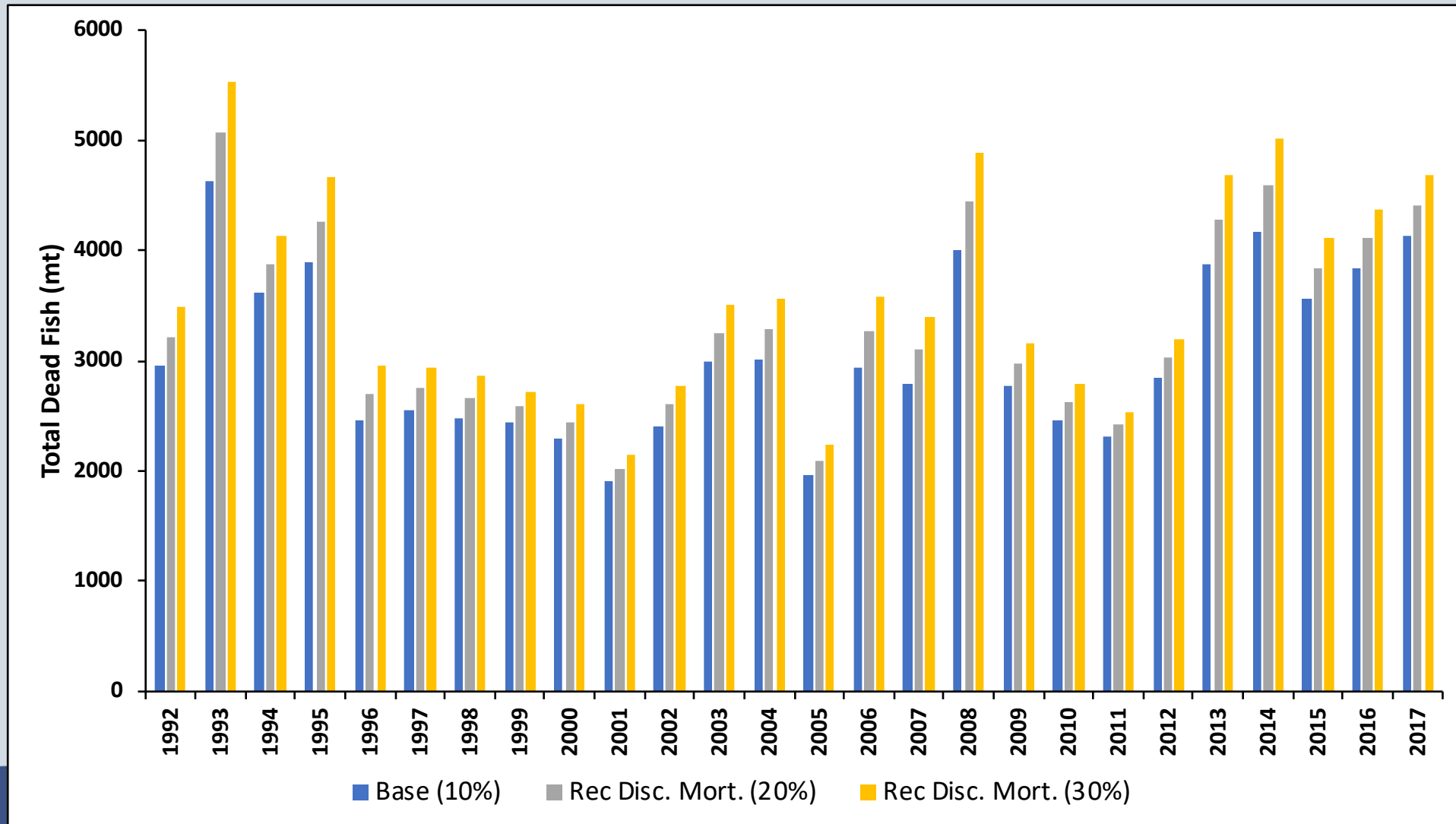
# Sensitivity Run 5b: 20% and 30% MRIP Discard Mortality

<b>Estimated Parameters</b>	<b>Base (10%)</b>	<b>Rec. Disc. Mort. (20%)</b>	<b>Rec. Disc. Mort. (30%)</b>
Likelihood	744.5	990.8	741.0
Linf (cm)	36.23	35.48	36.67
k	0.34	0.35	0.33
Steepness (BH)	0.81	0.79	0.79
LN(R0)	9.90	9.96	10.02
sigmaR	0.25	0.24	0.23
<b>Derived Quantities</b>			
SSB unfished (thousand mt)	7.45	7.83	8.51
Recr_unfished (millions)	19.86	21.24	22.56
F_SPR30%	0.44	0.43	0.40
F_geom	0.30	0.30	0.31
MSST (0.75 * SSB_SPR30%)	1,428	1,467	1,590
SSB_geom	3,223	3,297	3,316
SPR <sub>2017</sub>	0.35	0.35	0.33

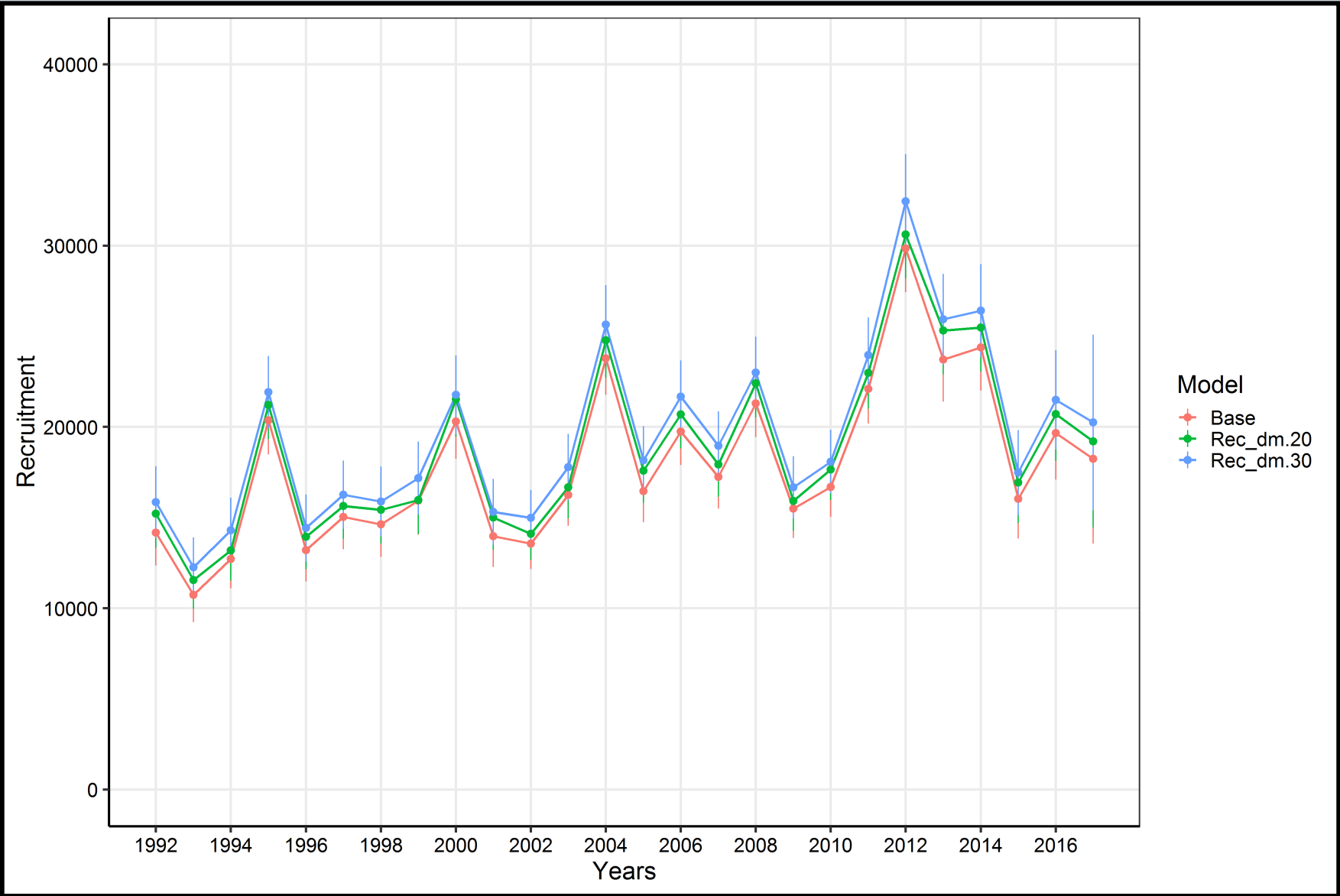




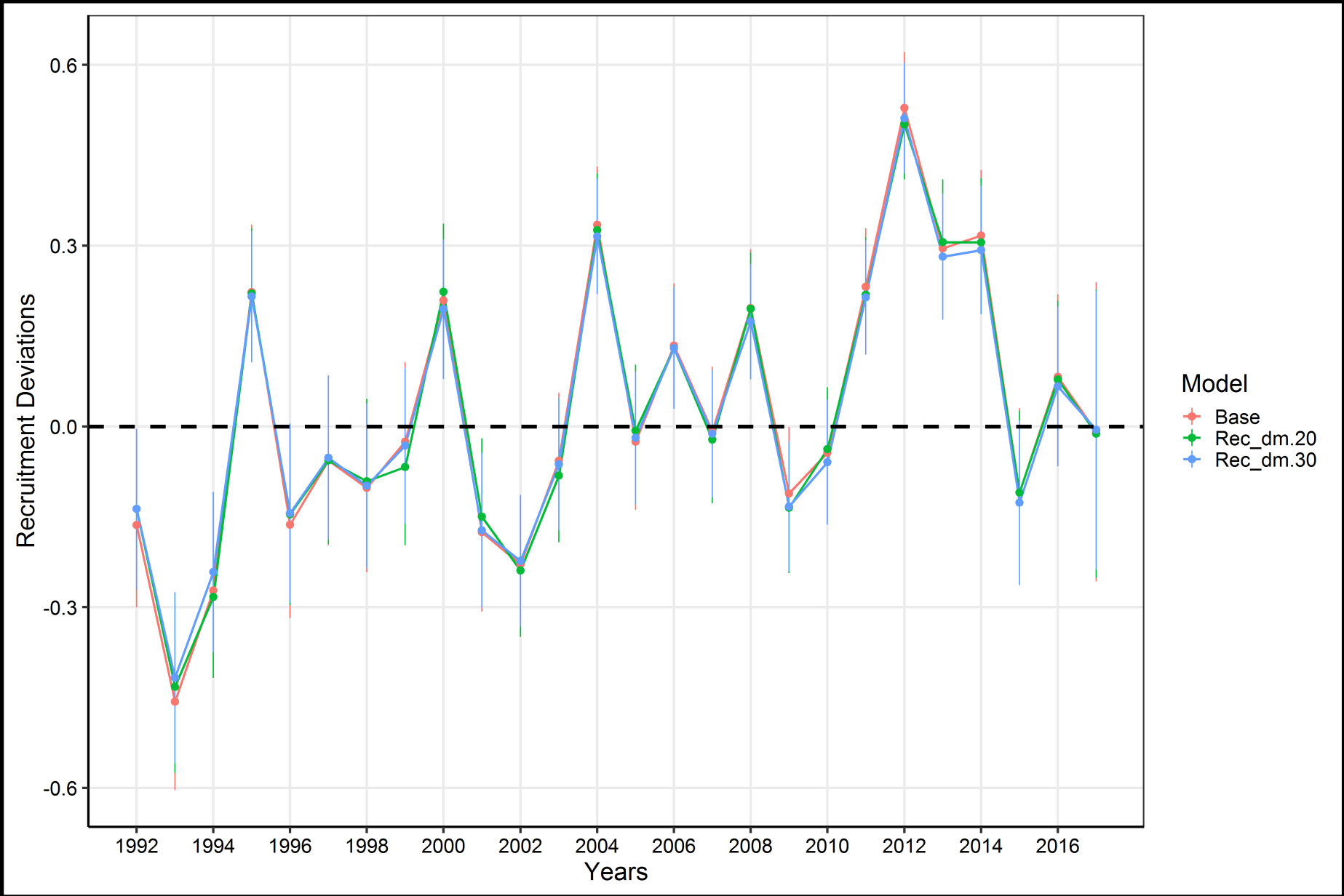
# Sensitivity Run 5b: 20% and 30% MRIP Discard Mortality



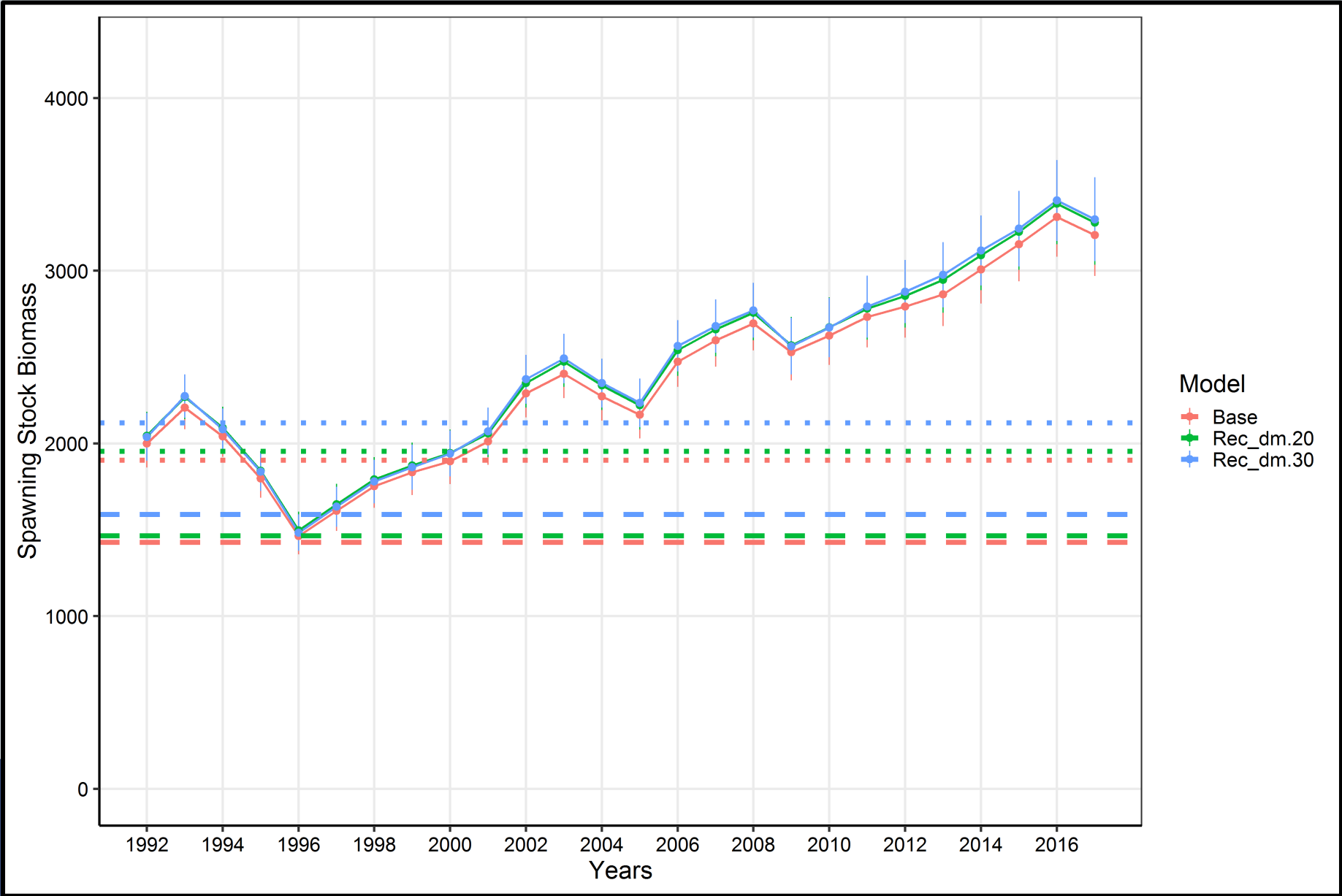
# Sensitivity Run 5b: 20% and 30% MRIP Discard Mortality



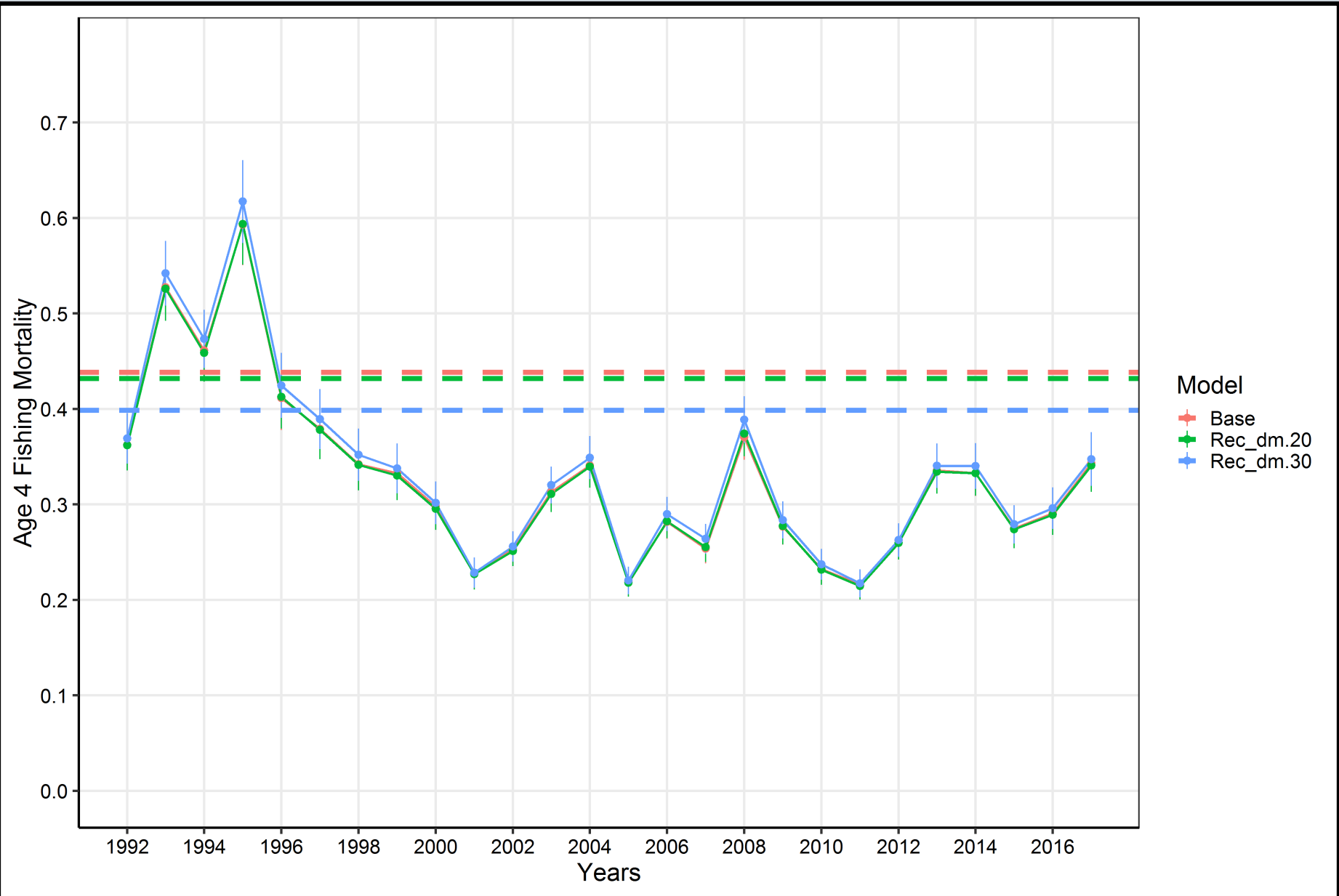
# Sensitivity Run 5b: 20% and 30% MRIP Discard Mortality



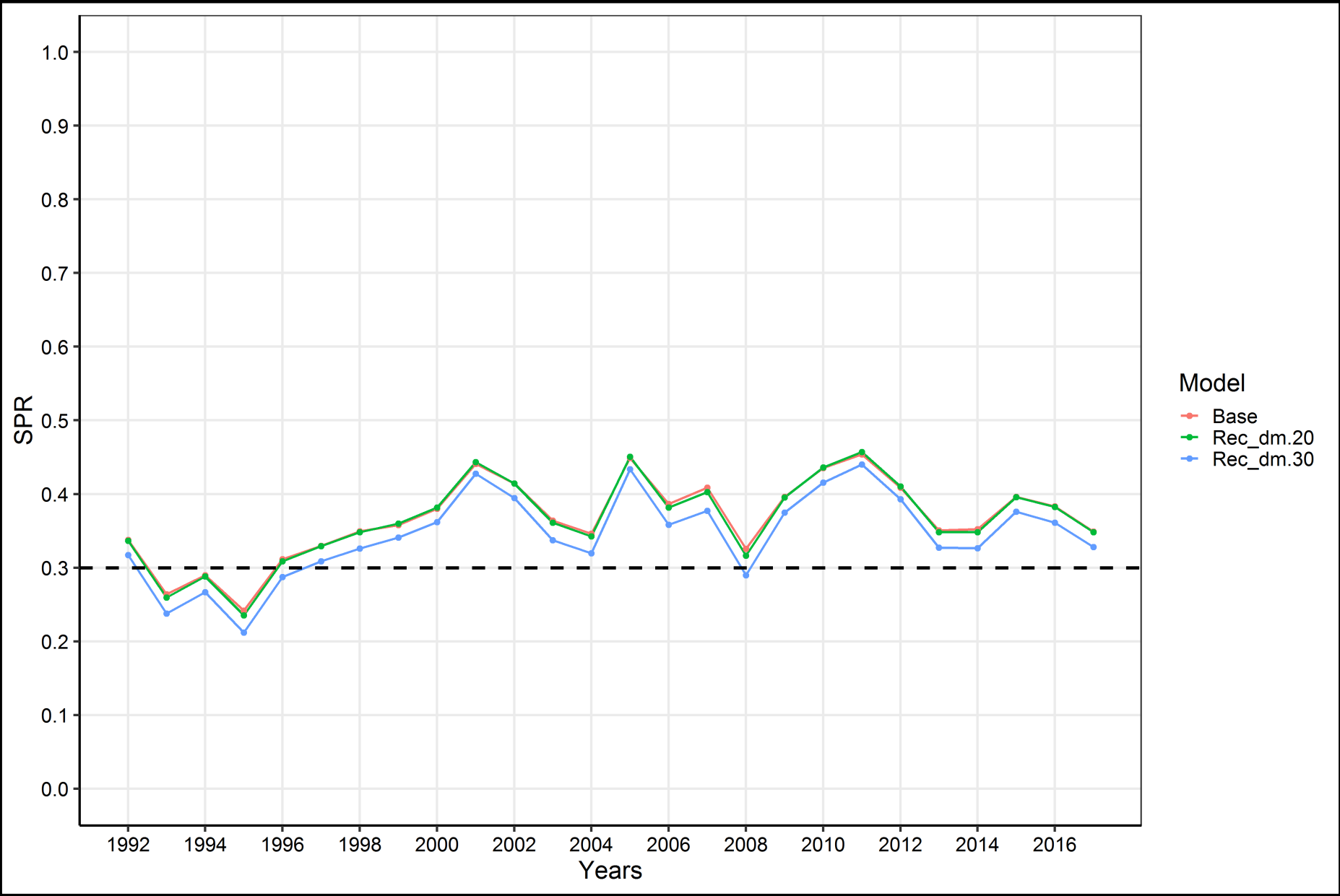
# Sensitivity Run 5b: 20% and 30% MRIP Discard Mortality



# Sensitivity Run 5b: 20% and 30% MRIP Discard Mortality



# Sensitivity Run 5b: 20% and 30% MRIP Discard Mortality



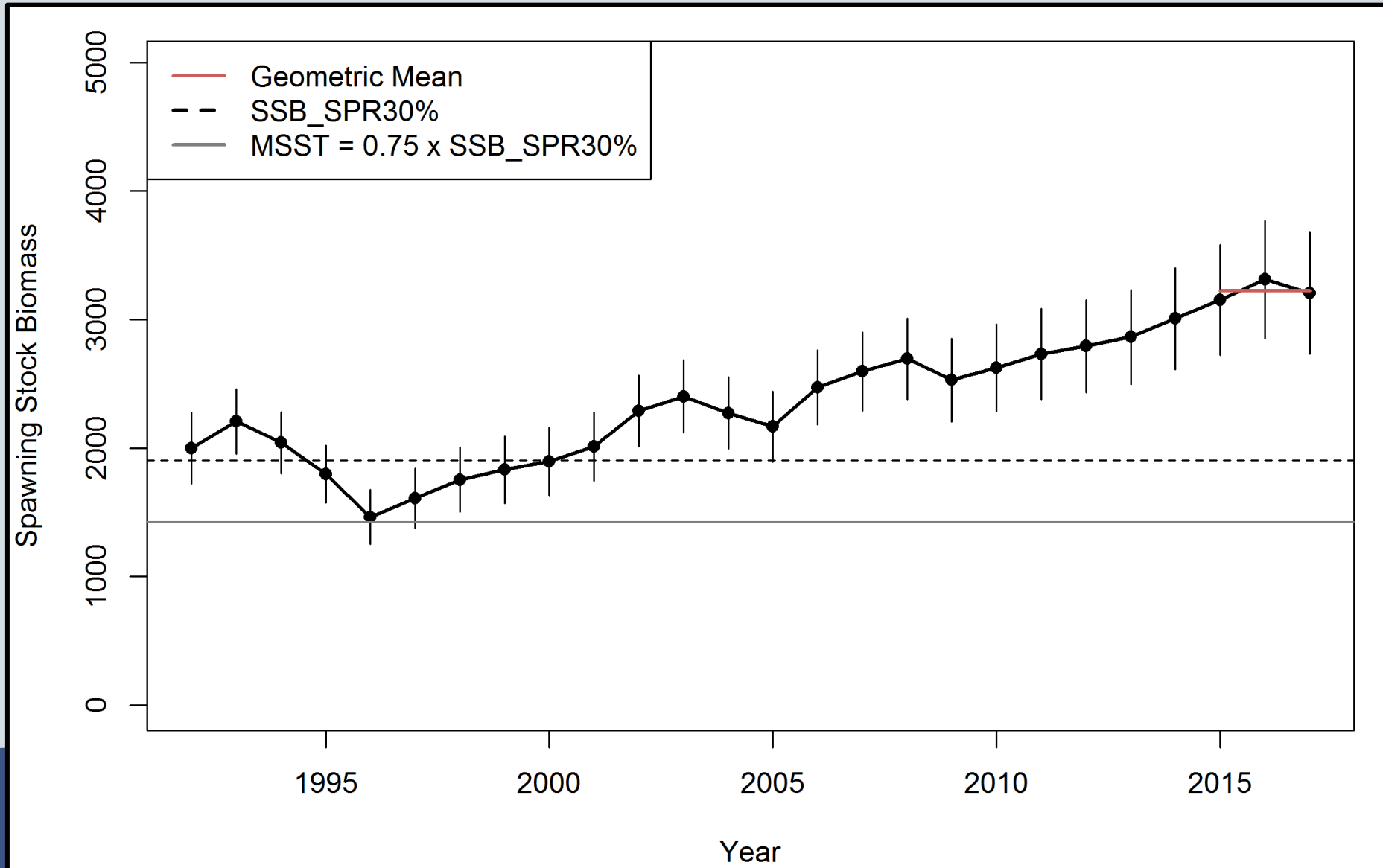


# SEDAR 64: Yellowtail Snapper Assessment Model Results

**Base Model: Benchmark/Reference Points**

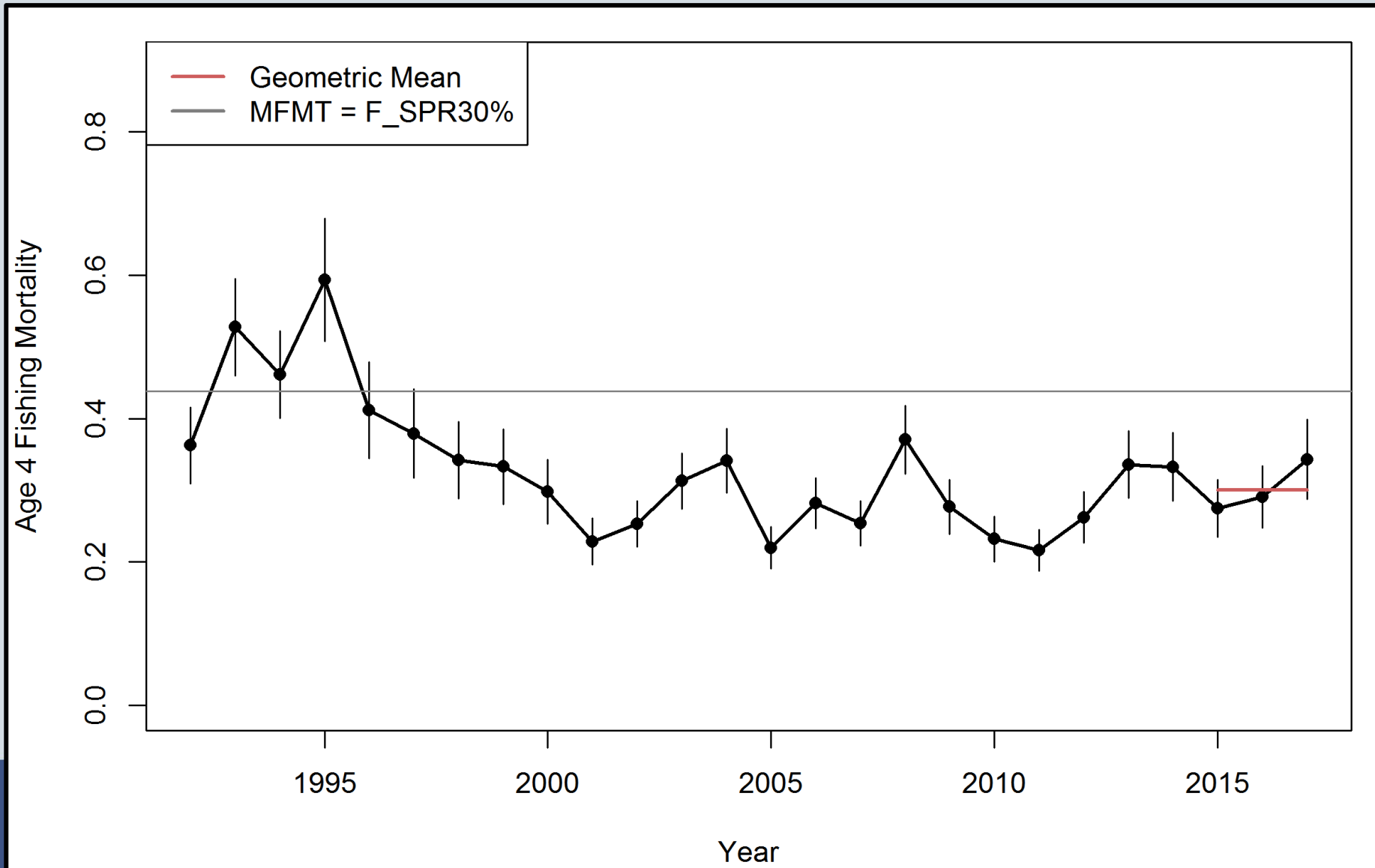


# Spawning Stock Biomass (mt)

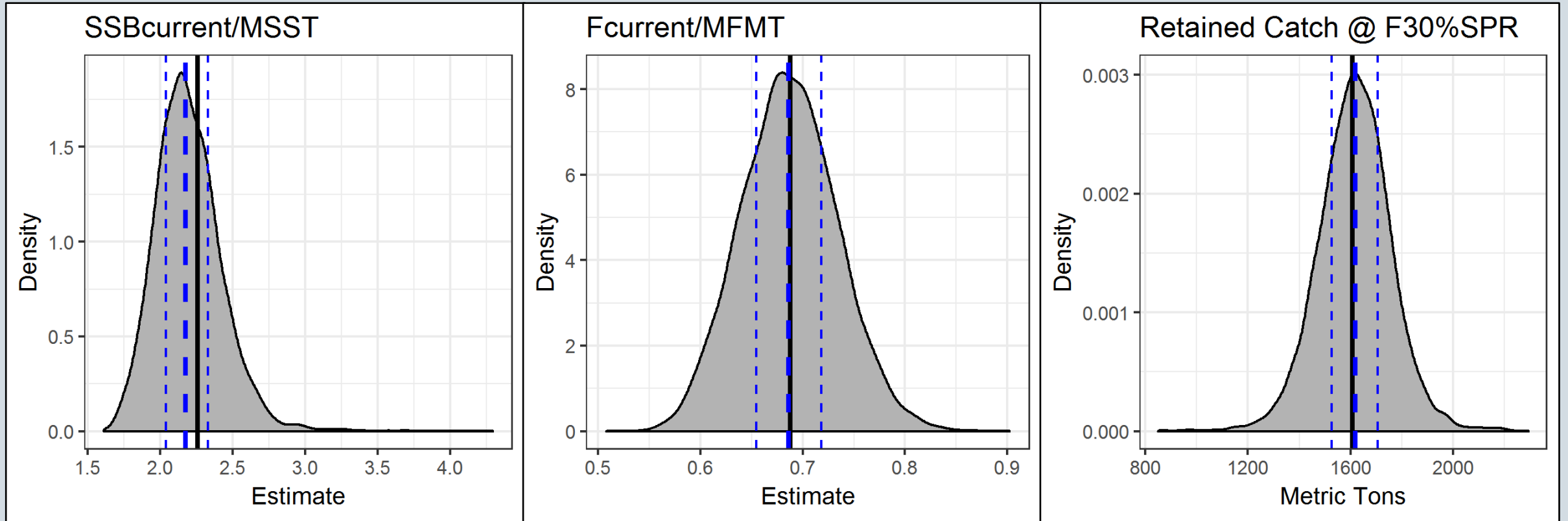




# Age 4 Fishing Mortality

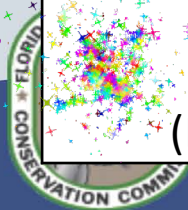


# MCMC Results



## South Atlantic and Gulf of Mexico Fishery Management Councils

Criteria	Definition	Value
MSST (Minimum Stock Size Threshold)	$0.75 * SSB_{F30\%SPR}$	1,428 mt
$SSB_{F30\%SPR}$	The estimated spawning stock biomass associated with F at 30% SPR	1,904 mt
$SSB_{current}$	The geometric mean of SSB for 2015 - 2017	3,223 mt
MFMT (Maximum Fishing Mortality Threshold)	$F_{30\% SPR}$	$0.438 \text{ yr}^{-1}$
$F_{30\%SPR}$	The fishing mortality rate associated with 30% SPR	$0.438 \text{ yr}^{-1}$
$F_{current}$	The geometric mean of F on age-4 fish for 2015 - 2017	$0.295 \text{ yr}^{-1}$
OY (Optimum Yield)	Yield at $F_{OY}$	1,497 mt
$F_{OY}$ (Fishing Mortality Rate at OY)	$F_{40\% SPR}$	$0.271 \text{ yr}^{-1}$



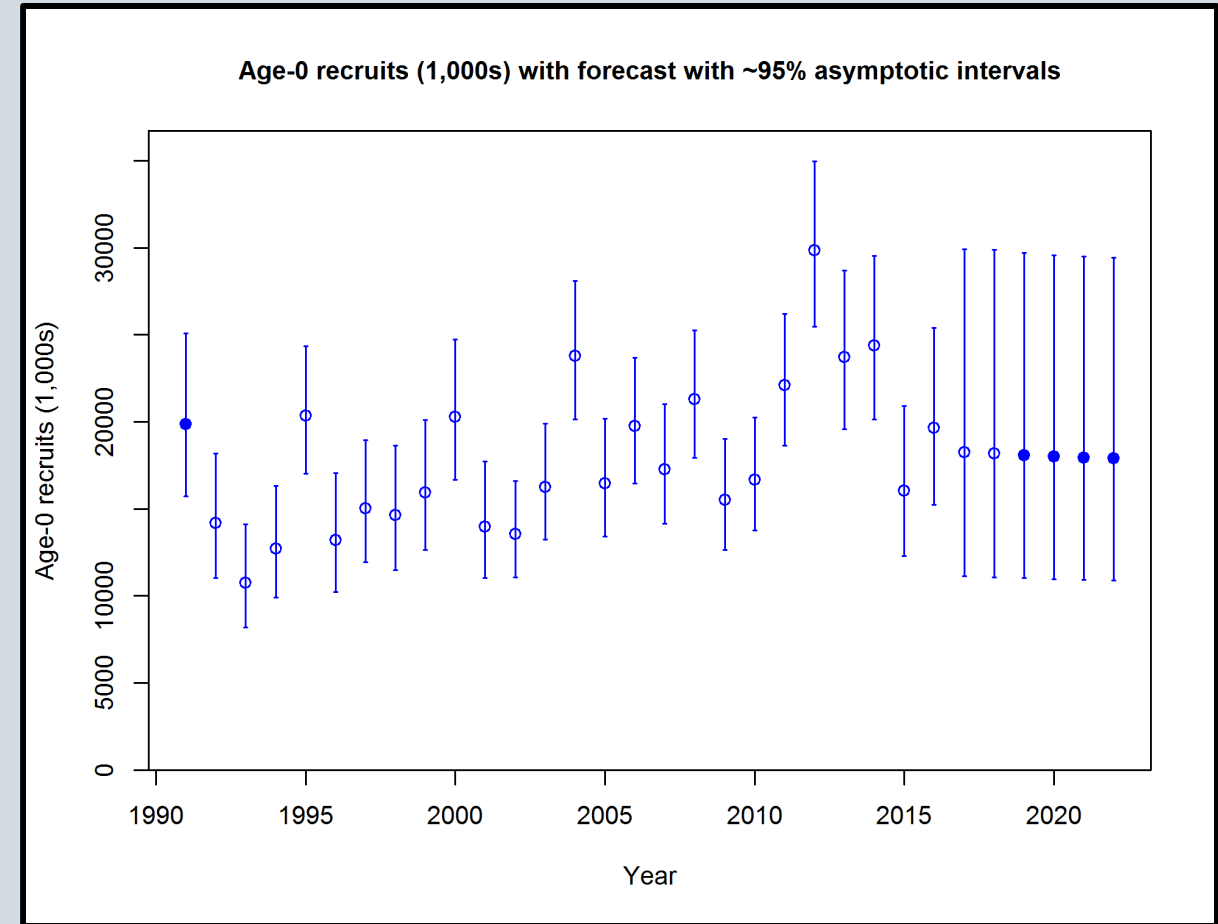
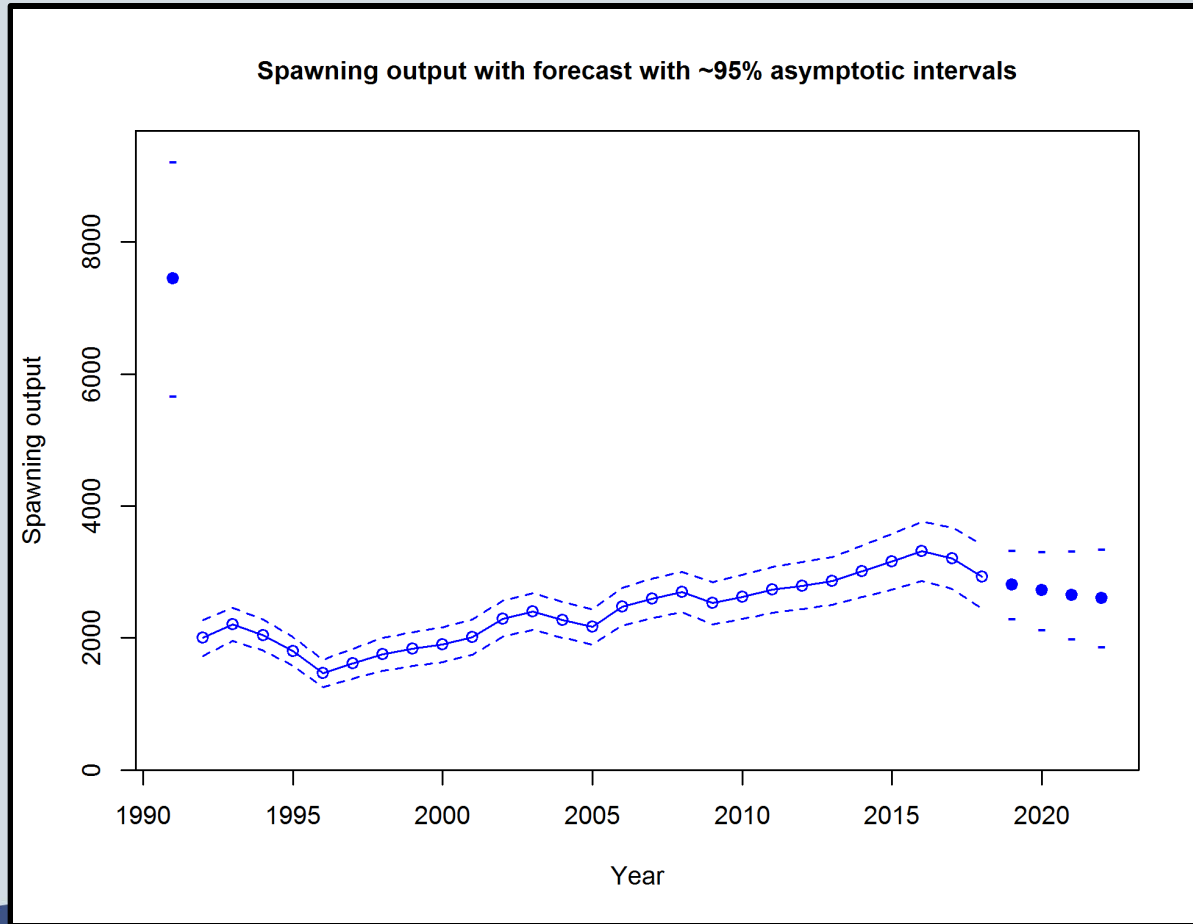


# SEDAR 64: Yellowtail Snapper Assessment Model Results

## Base Model: Projections

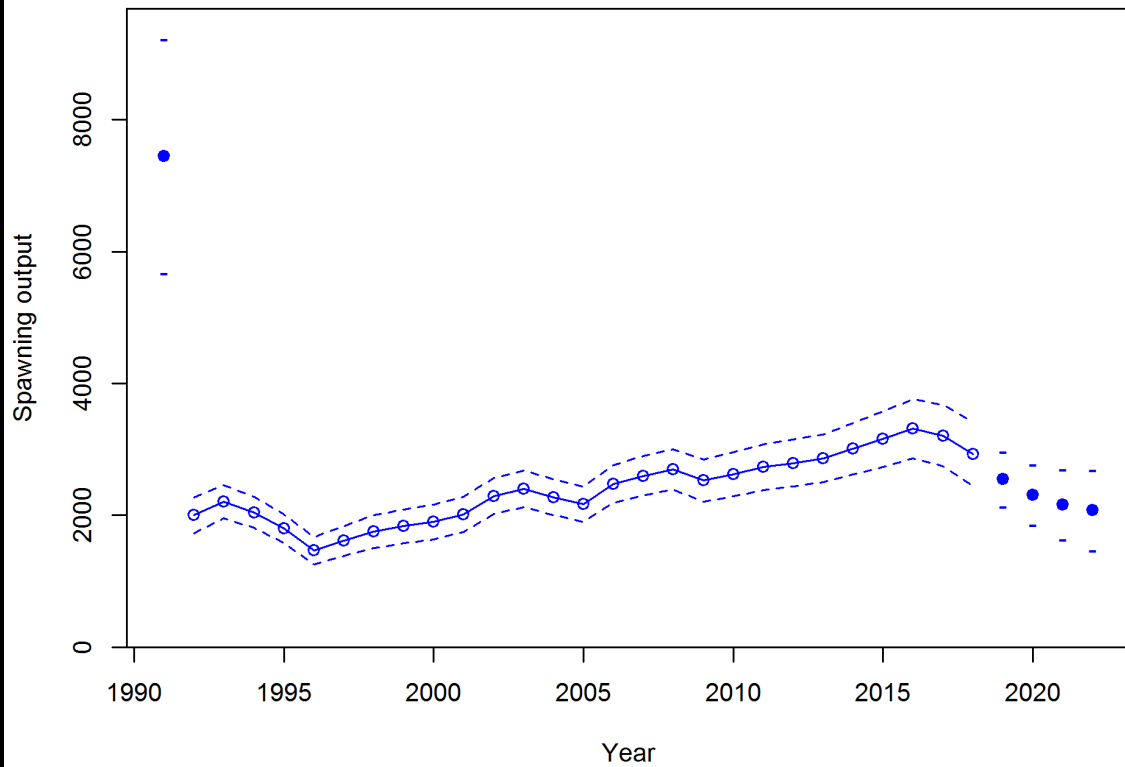


# 5 Year Projections – 2015-2017 Average F

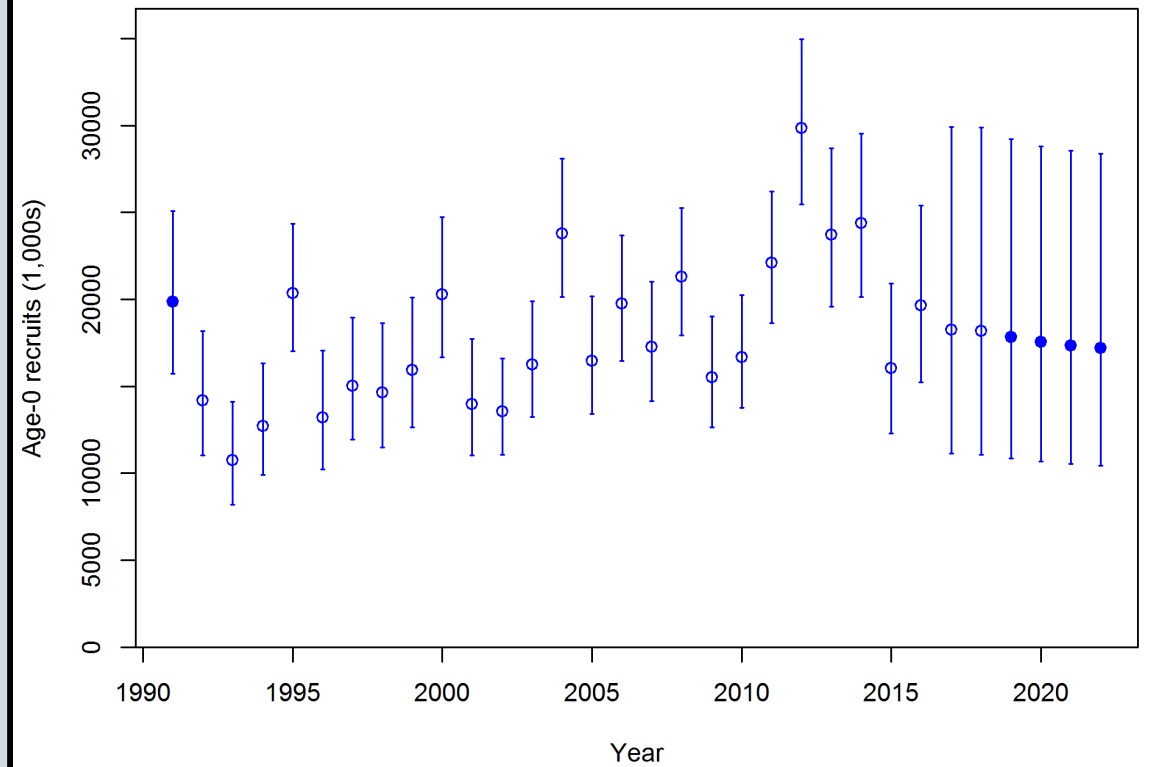


# 5 Year Projections – F 30%SPR

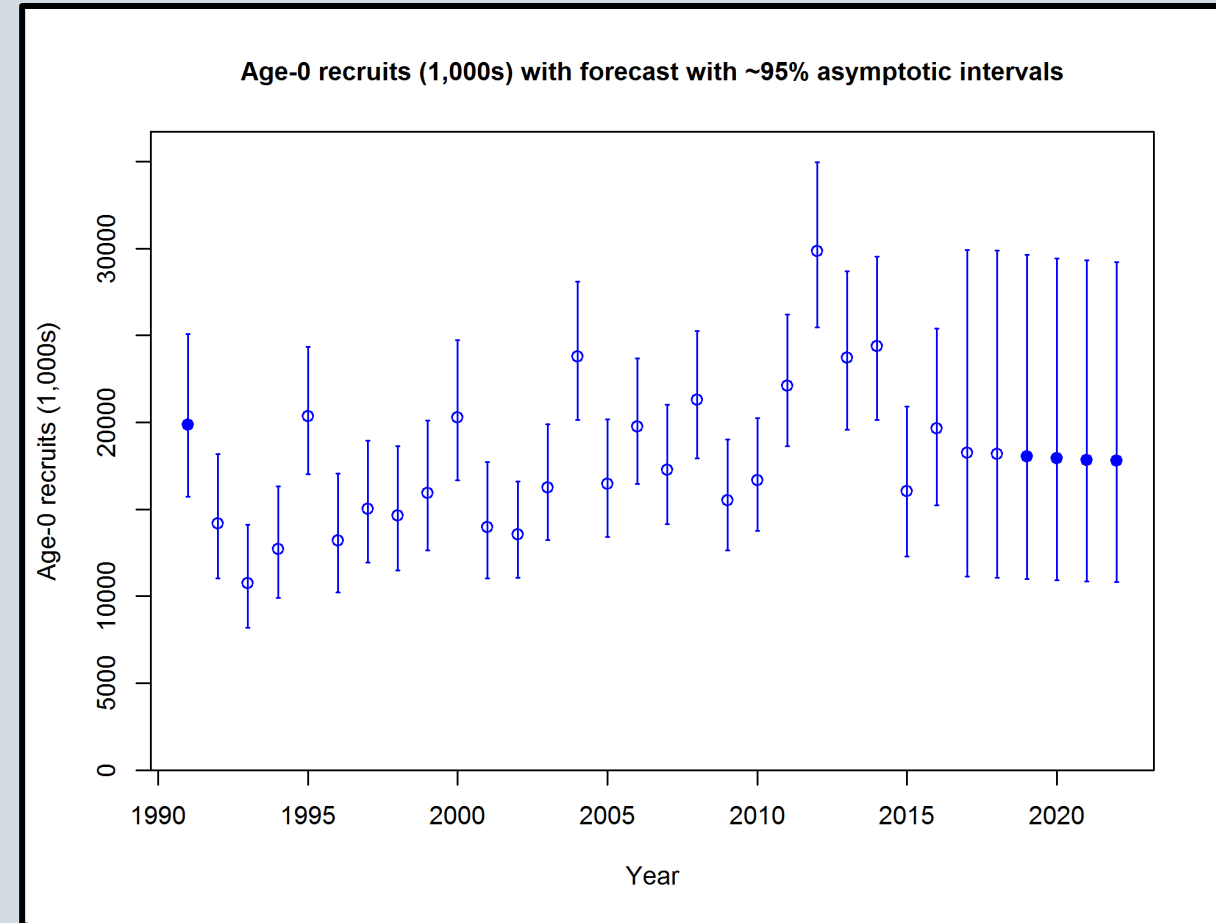
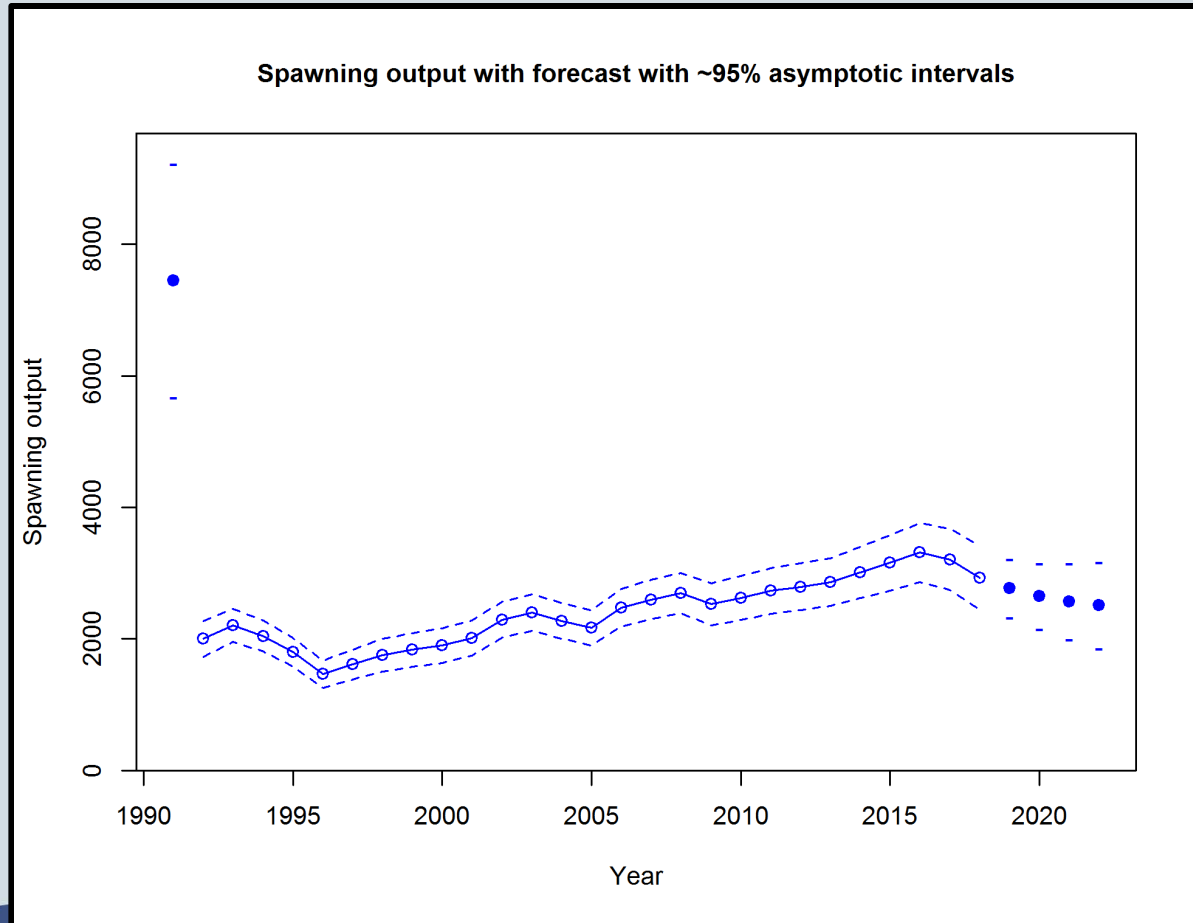
Spawning output with forecast with ~95% asymptotic intervals



Age-0 recruits (1,000s) with forecast with ~95% asymptotic intervals



# 5 Year Projections – F @ 75% of F 30%SPR





# SEDAR 64: Yellowtail Snapper Assessment Model Results

## Model Bridging Exercise





✓  
SEDAR 27A: ASAP2  
1981 – 2010

✓  
SEDAR 27A: ASAP3  
1981 – 2010

✓  
SEDAR 27A: ASAP3  
1981 – 2017  
(Continuity Model)  
S64 Data; S27A Config

↓  
SEDAR 27A: ASAP3  
1981 – 2010  
S27A Data; S64 Config.

↓  
SEDAR 64: ASAP3  
1992 – 2017

✓  
SEDAR 64: SS3  
1992 – 2017



# SEDAR 64: Yellowtail Snapper Assessment Model Results

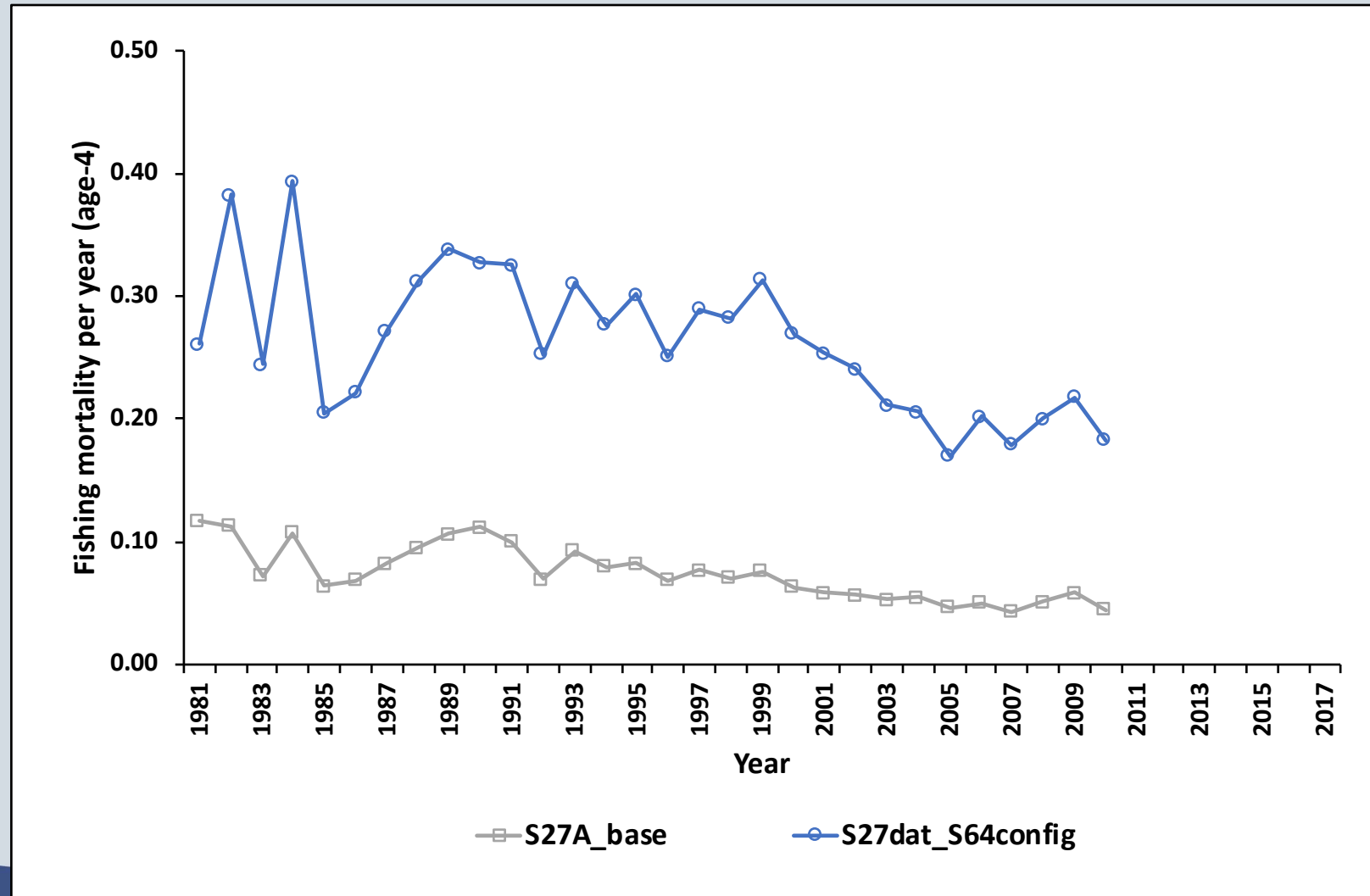
**S27A data with S64 configuration**



# Model Bridging with ASAP v.3

## Configuration

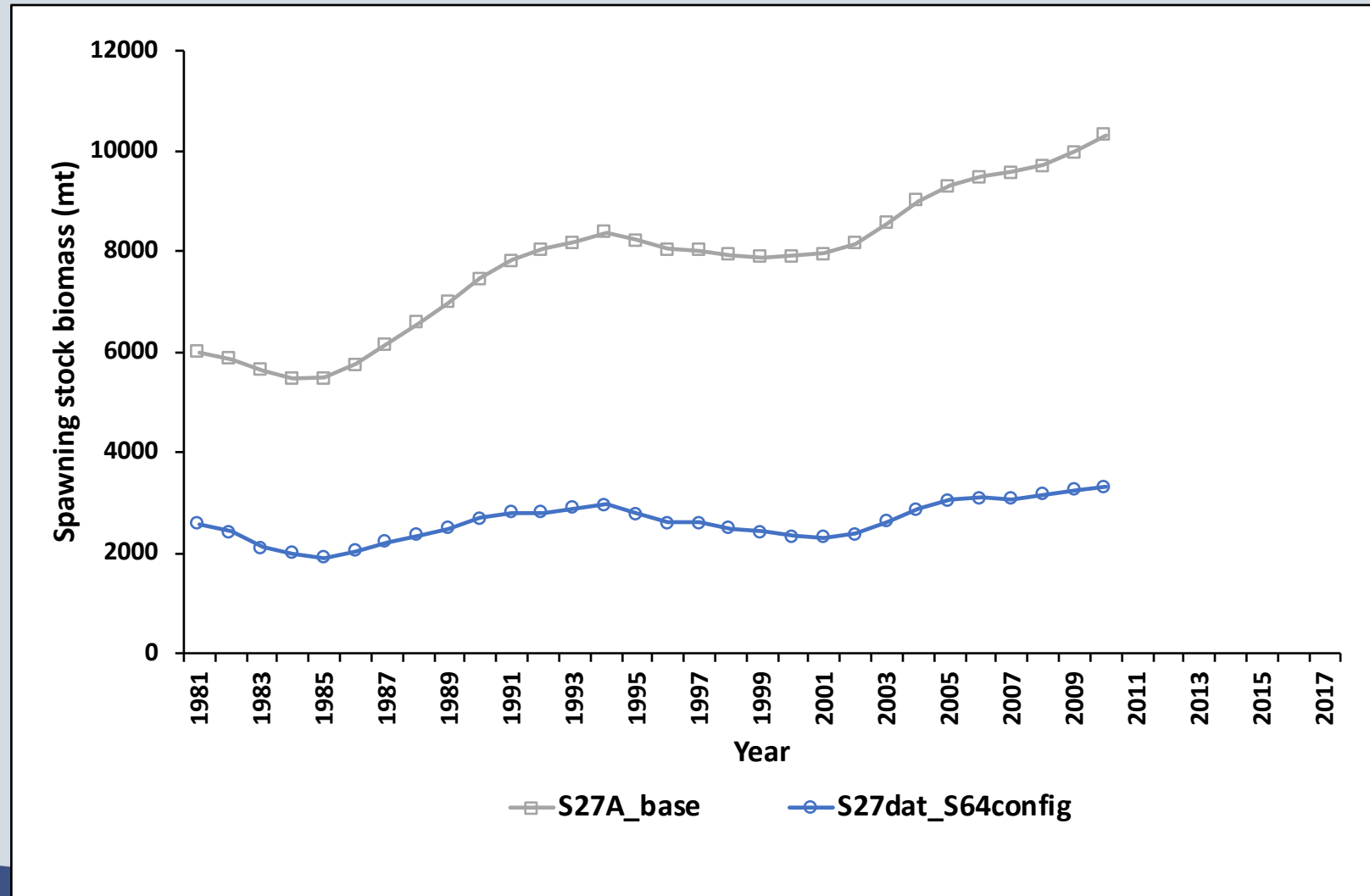
- 'Continuity model' showed differences arose from changes in data
- Testing differences caused by configuration
- Use the data from S27A but configure the ASAP model according to S64



# Model Bridging with ASAP v.3

## Configuration

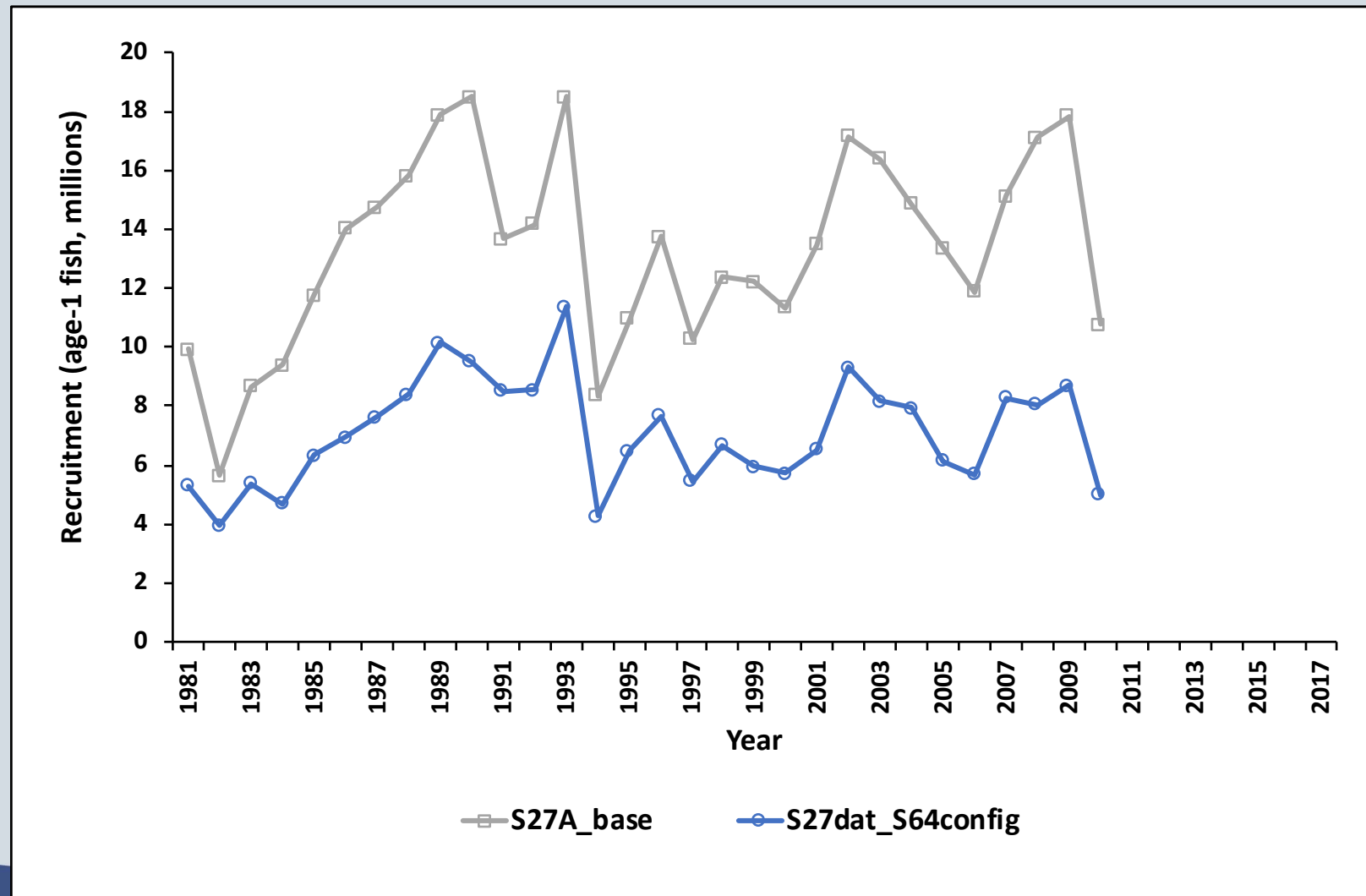
- 'Continuity model' showed differences arose from changes in data
- Testing differences caused by configuration
- Use the data from S27A but configure the ASAP model according to S64



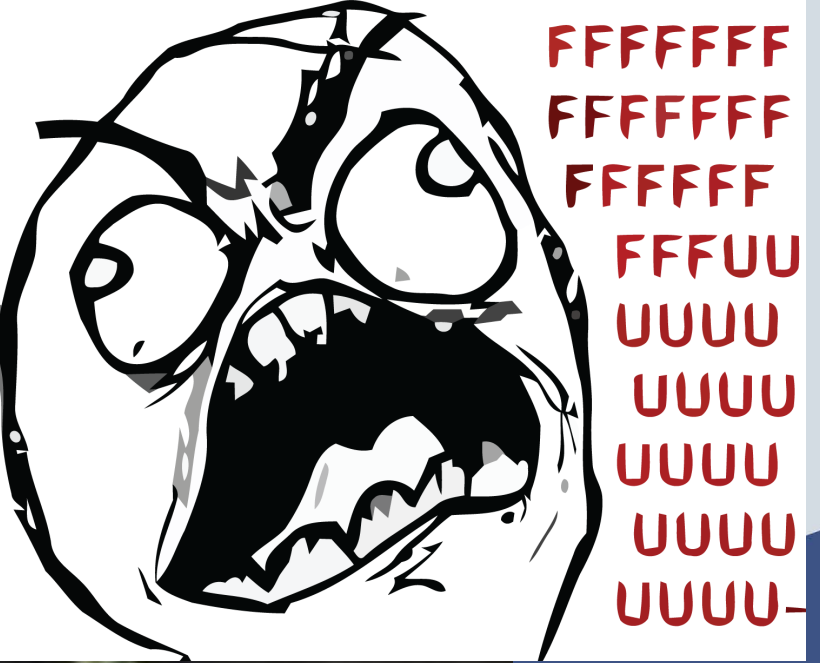
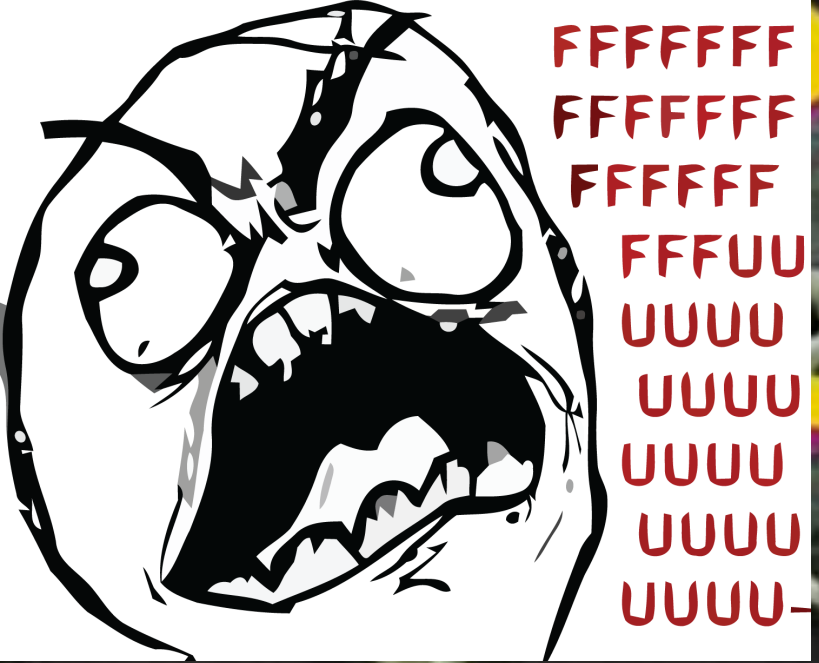
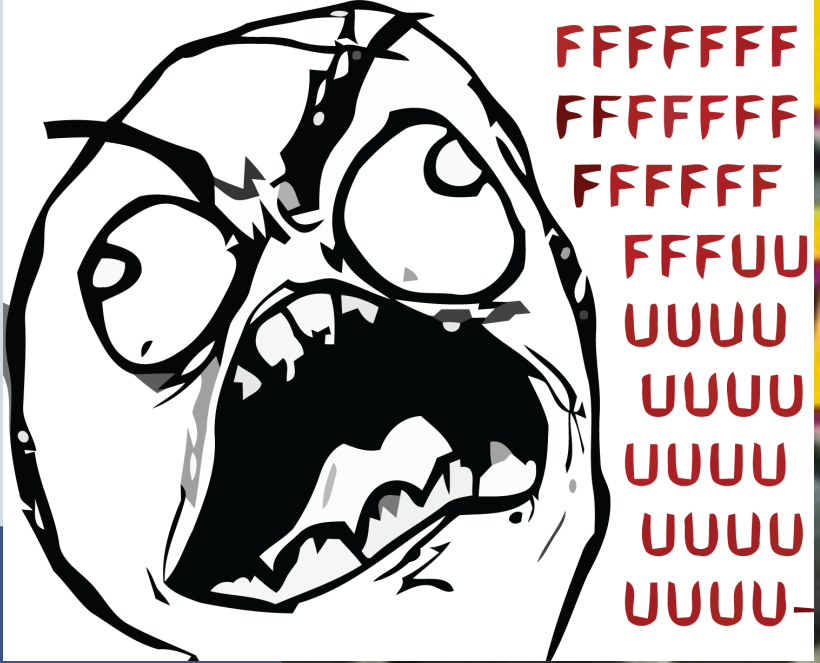
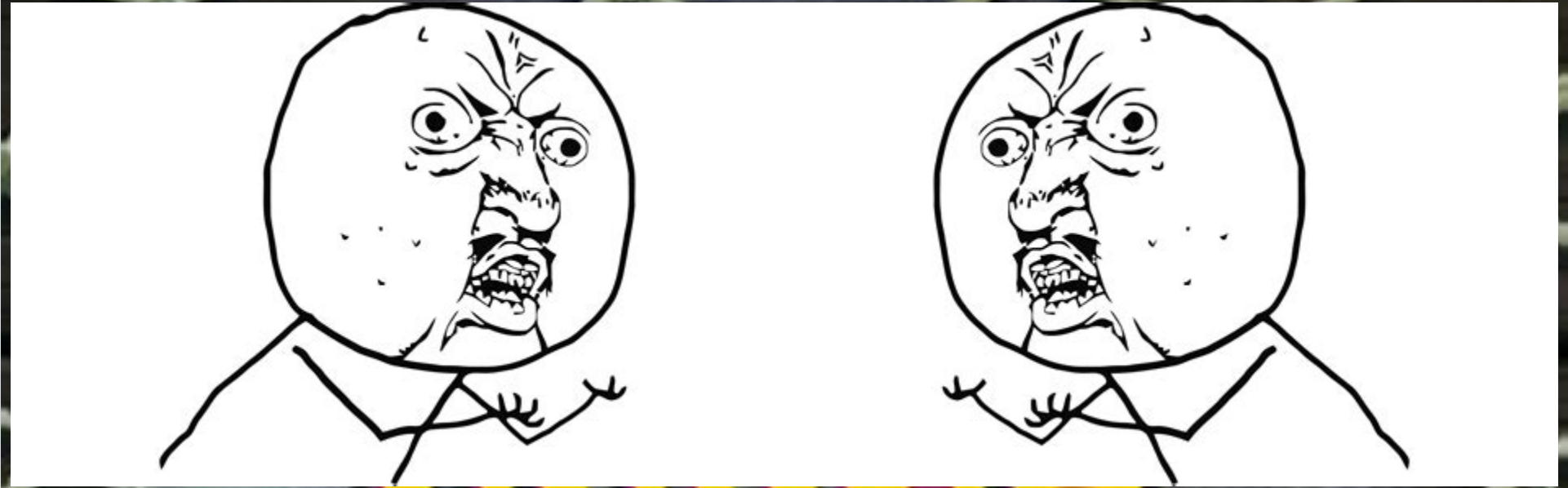
# Model Bridging with ASAP v.3

## Configuration

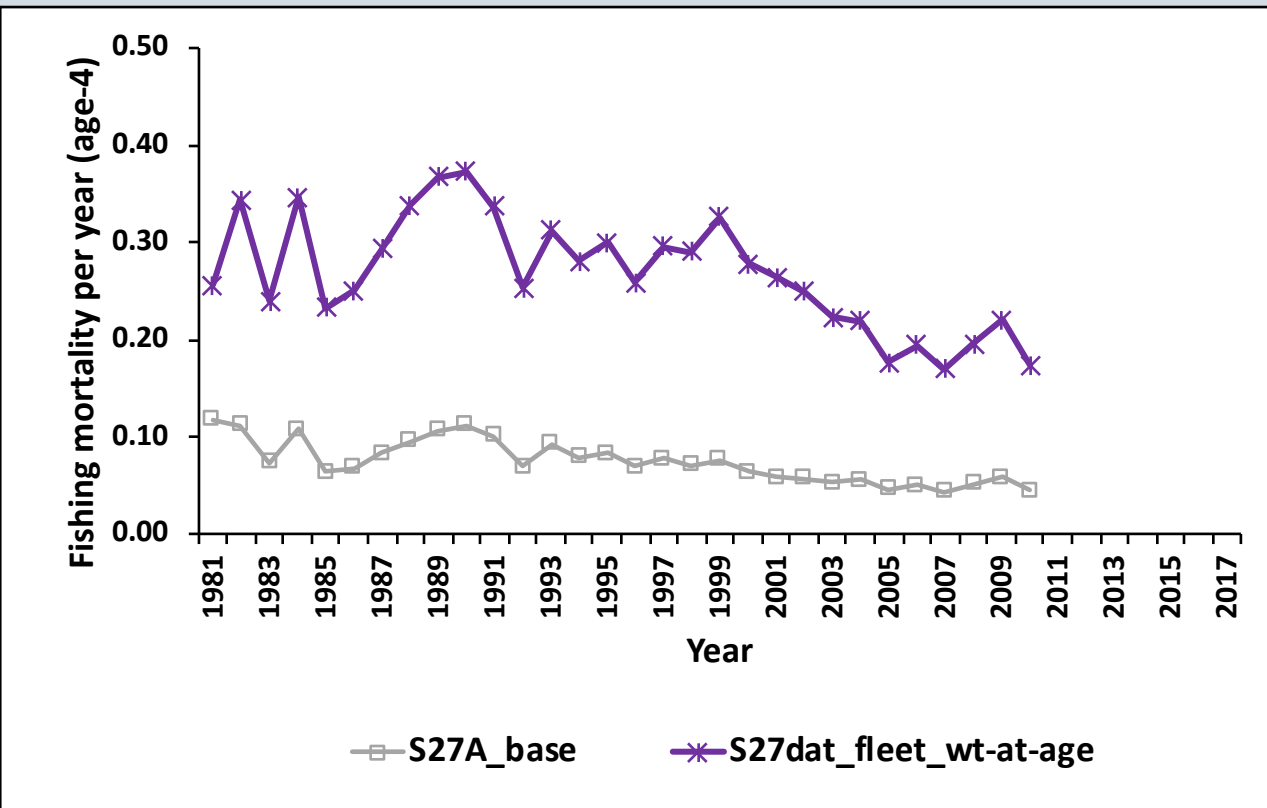
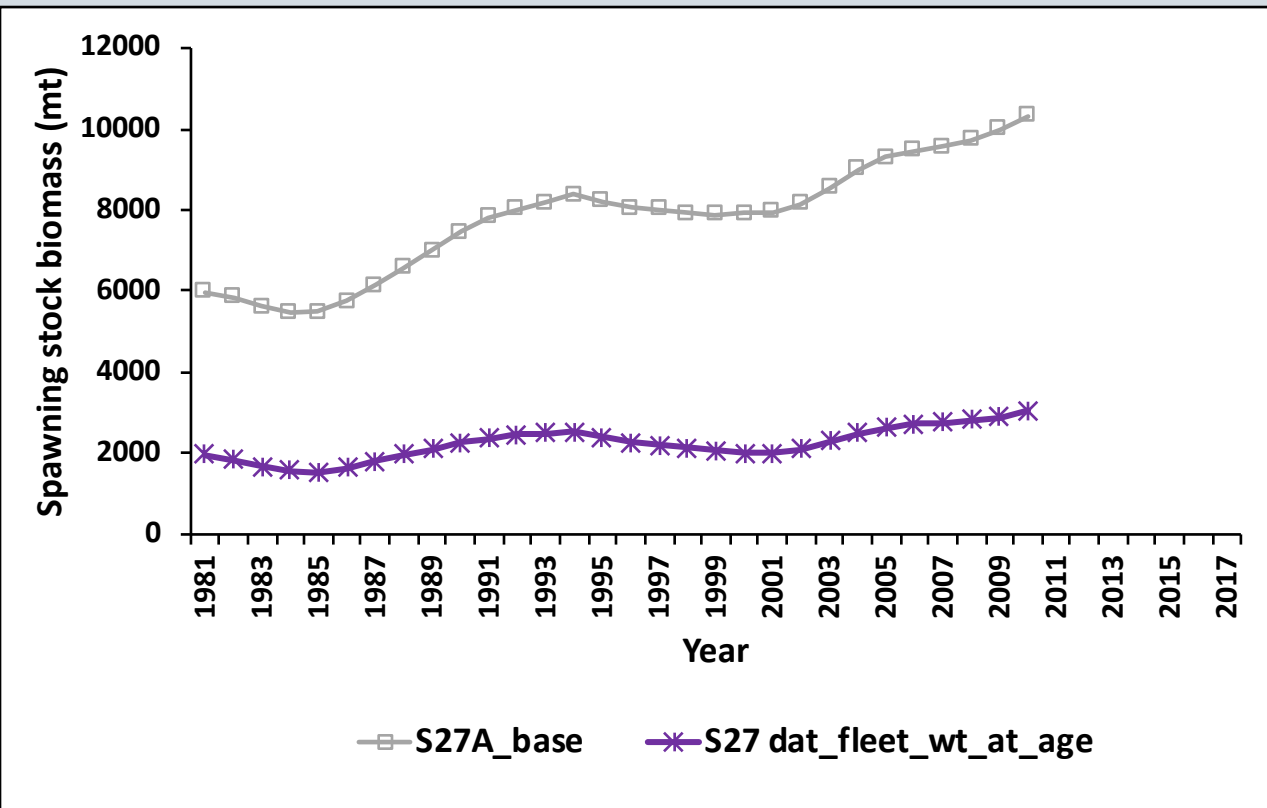
- 'Continuity model' showed differences arose from changes in data
- Testing differences caused by configuration
- Use the data from S27A but configure the ASAP model according to S64







# Model Bridging with ASAP v.3

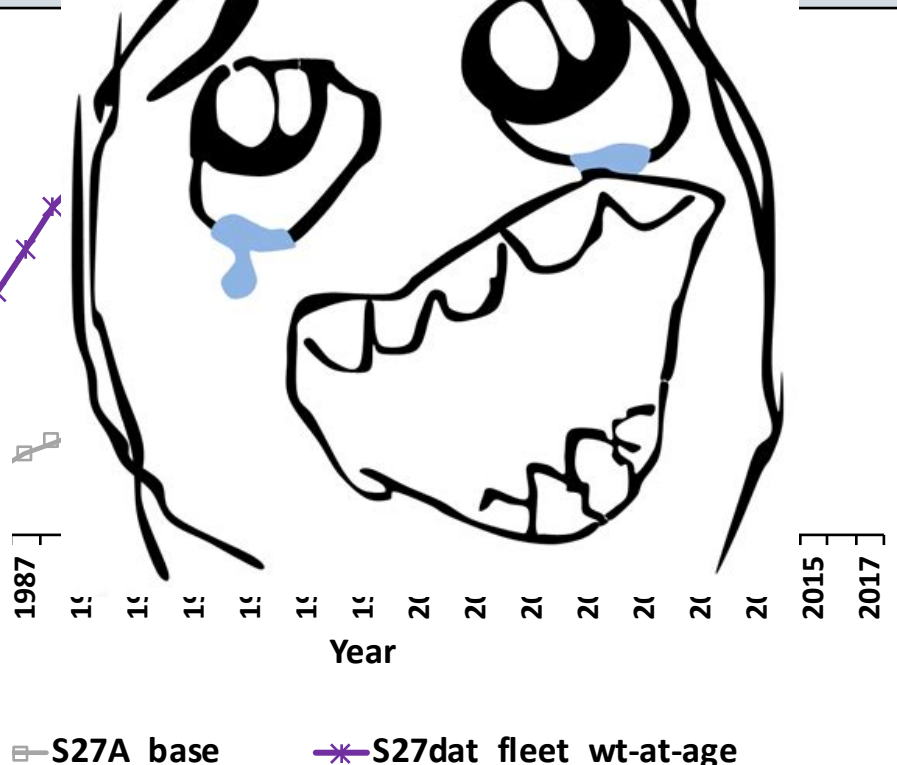
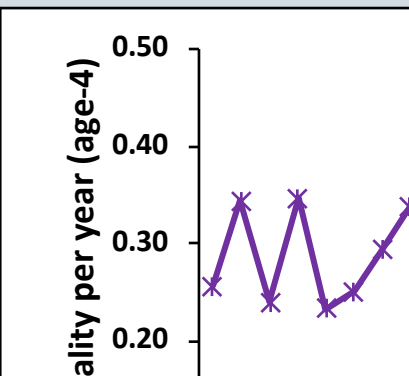
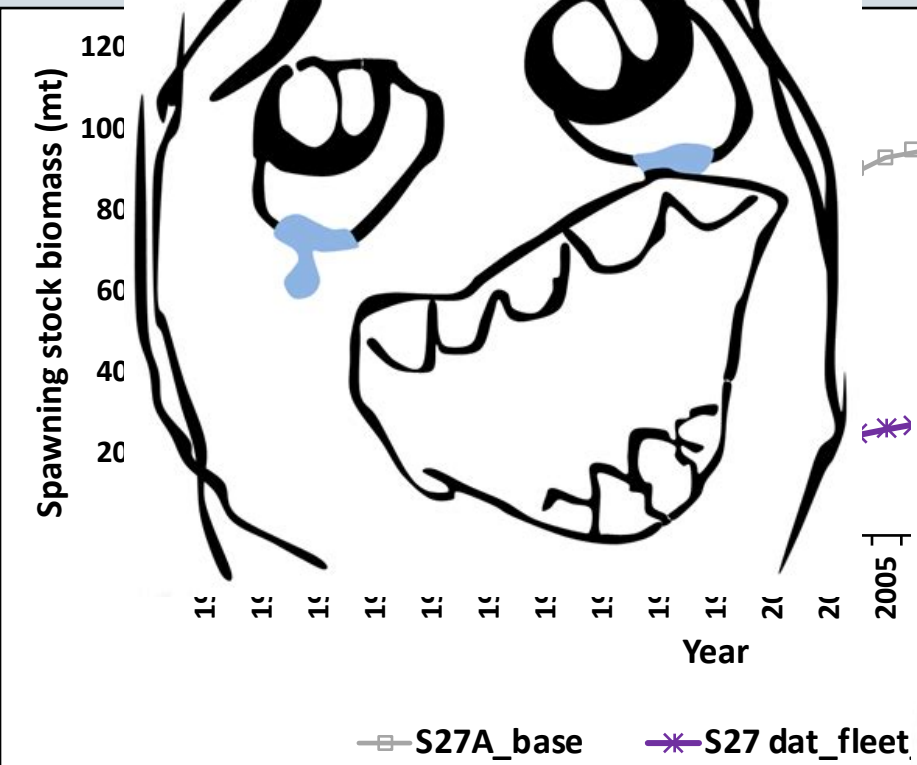


Expanding the number of weight-at-age matrices from 3 to 10

- A limitation imposed by the ASAP version 2 platform



# Model Bridging with ASA



Expanding the number of

- A limitation imposed

prices from 3 to 10

platform





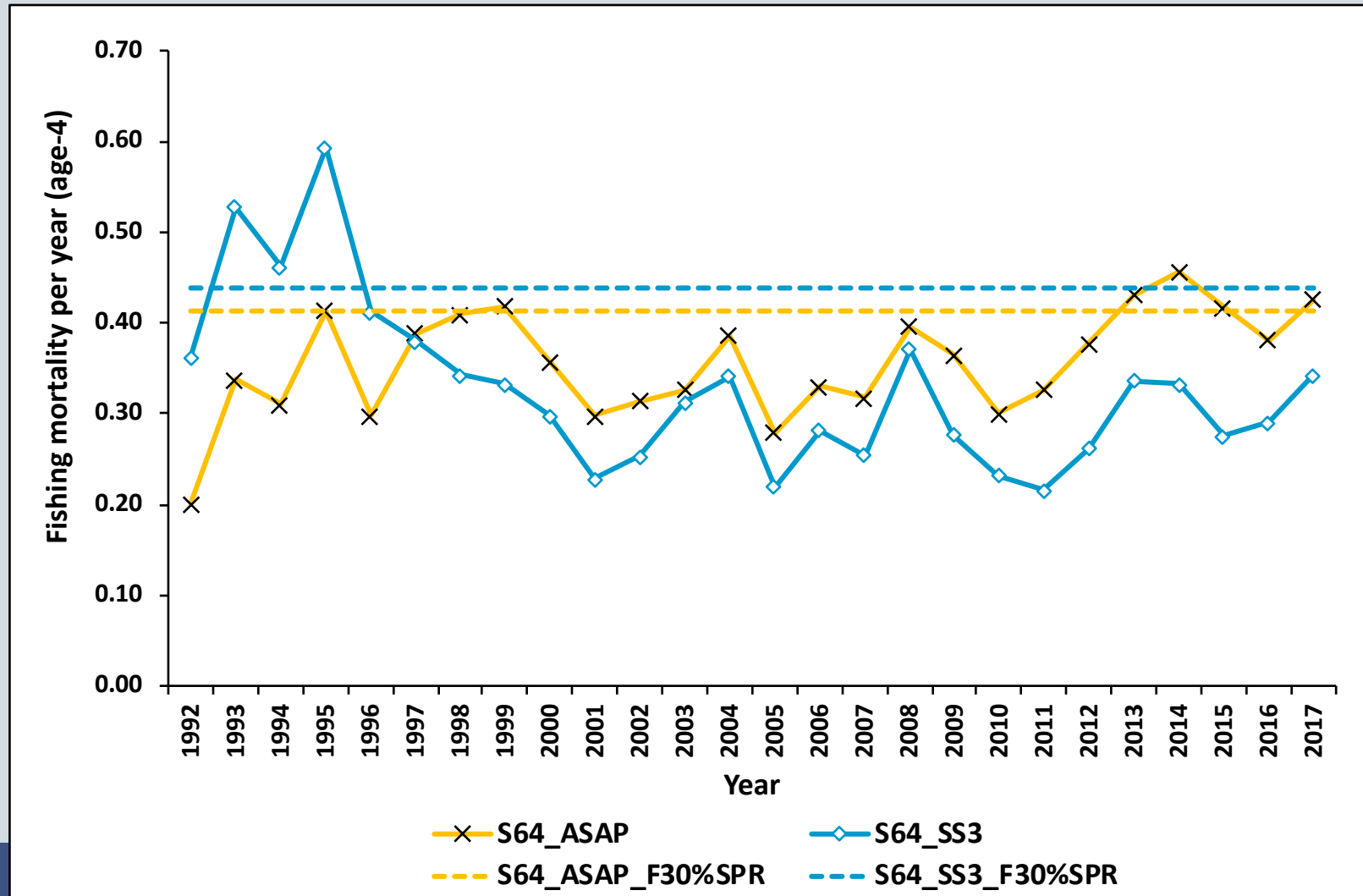


# SEDAR 64: Yellowtail Snapper Assessment Model Results

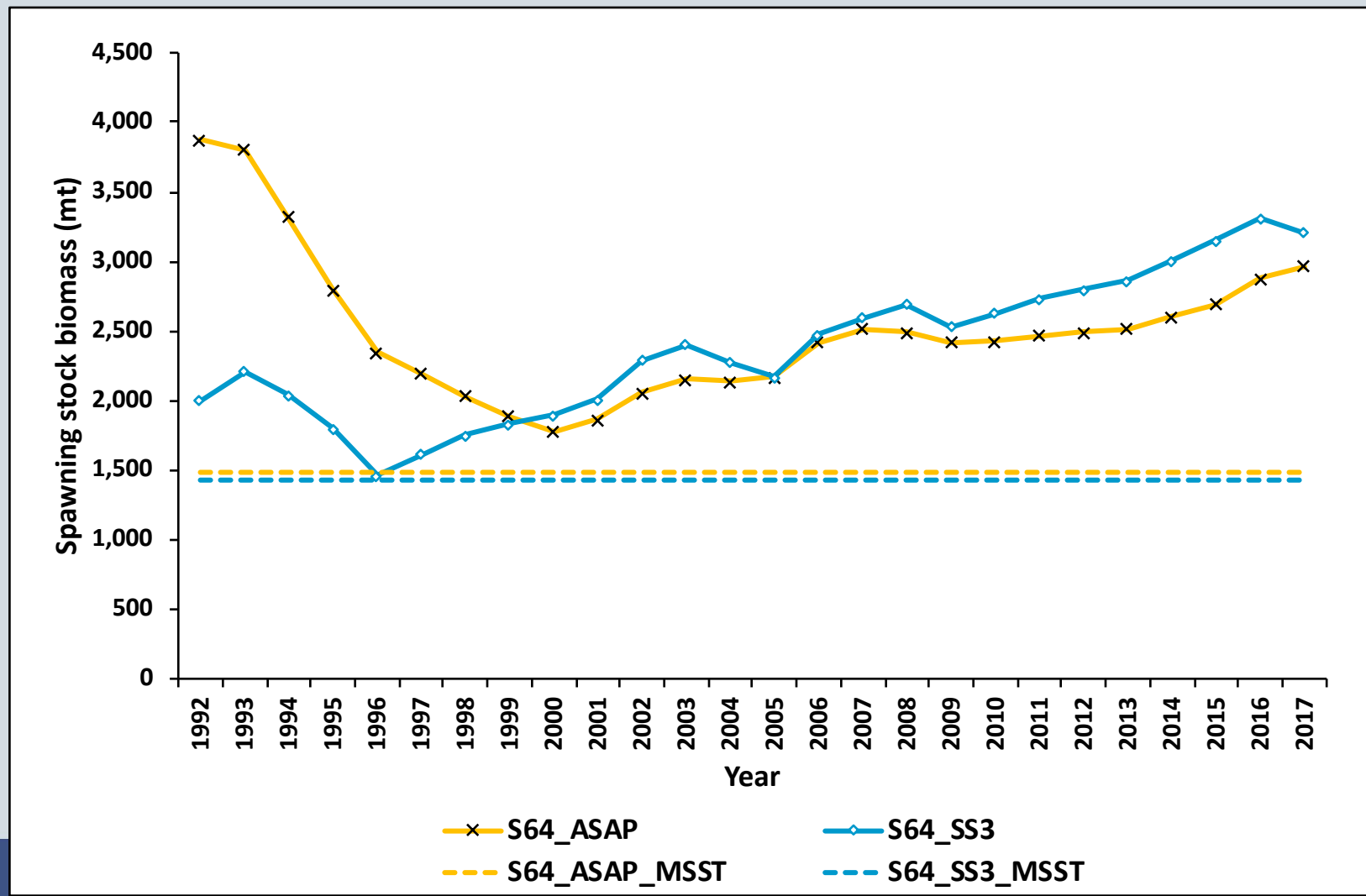
**S64 ASAP and SS3**



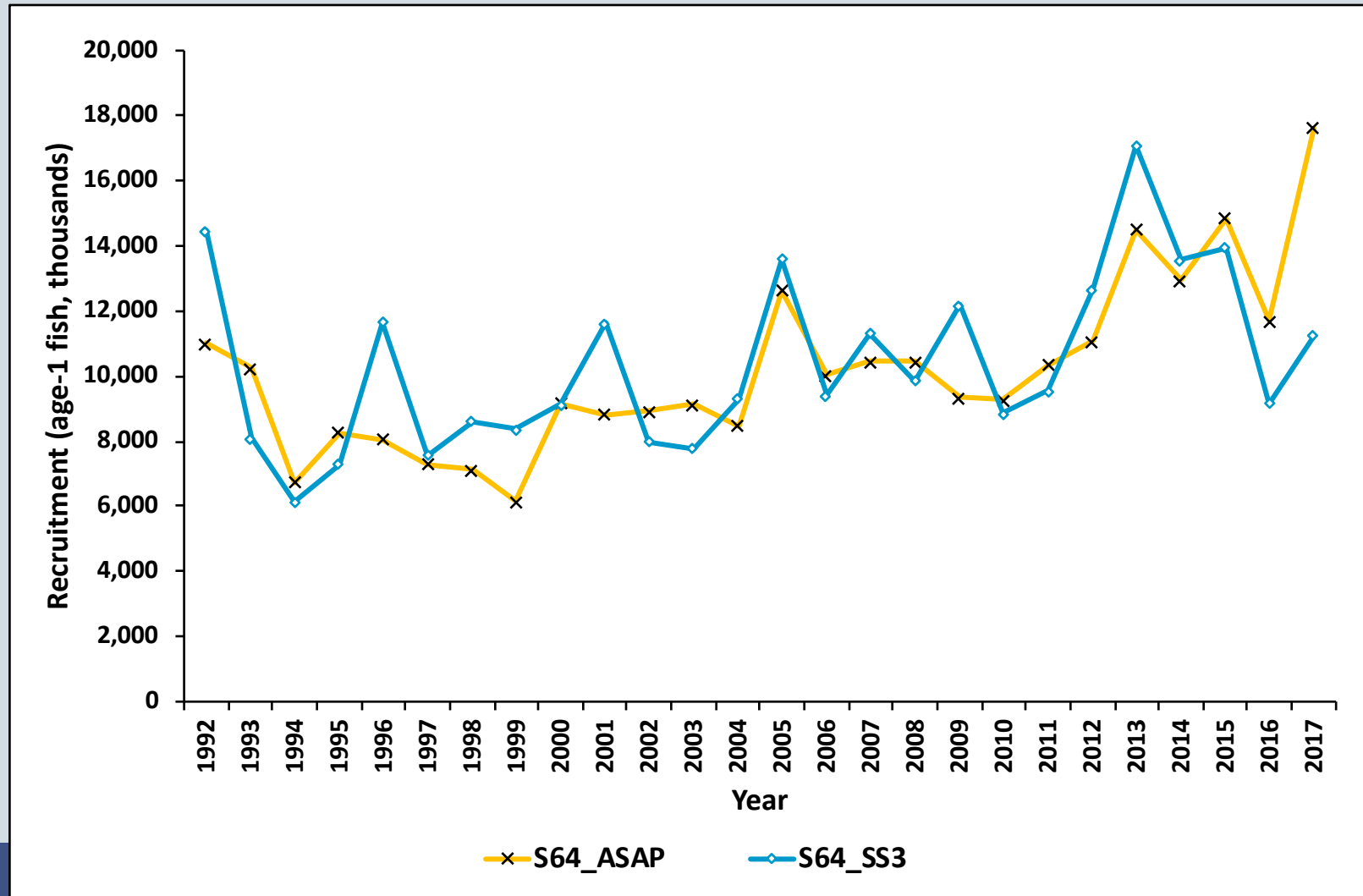
# Model Bridging: S64 ASAP and S64 SS3



# Model Bridging: S64 ASAP and S64 SS3



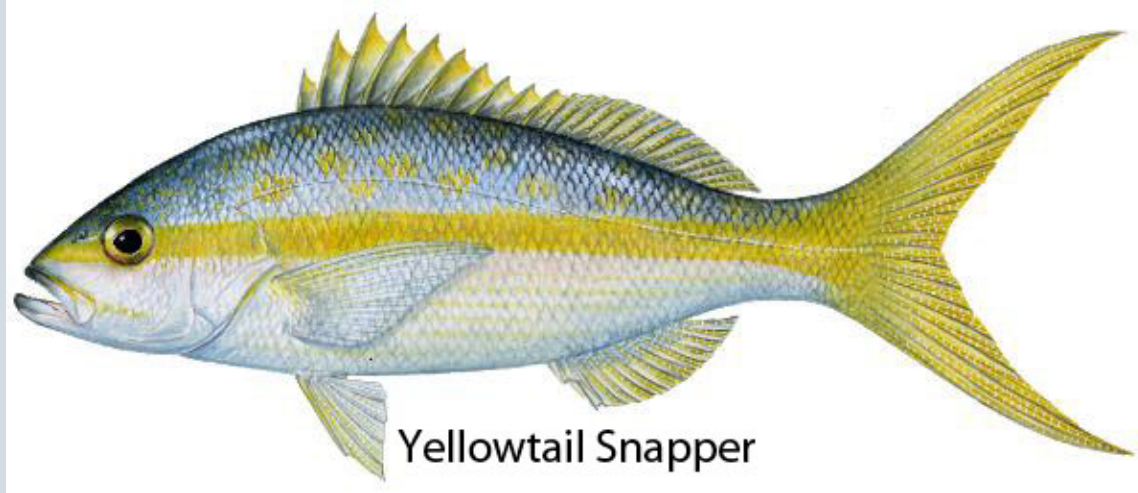
# Model Bridging: S64 ASAP and S64 SS3



## Stock Status Determination Criterion

Criteria	Definition	S64_SS3	S64_ASAP
MSST (Minimum Stock Size Threshold)	$0.75 * SSB_{F30\%SPR}$	1,428 mt	1,484 mt
$SSB_{F30\%SPR}$	The estimated spawning stock biomass associated with F at 30% SPR	1,904 mt	1,978 mt
$SSB_{current}$	The geometric mean of SSB for last 3 years	3,223 mt	2,841 mt
MFMT (Maximum Fishing Mortality Threshold)	$F_{30\% SPR}$	$0.438 \text{ yr}^{-1}$	$0.413 \text{ yr}^{-1}$
$F_{30\%SPR}$	The fishing mortality rate associated with 30% SPR	$0.438 \text{ yr}^{-1}$	$0.413 \text{ yr}^{-1}$
$F_{current}$	The geometric mean of F on age-4 fish for last 3 years	$0.301 \text{ yr}^{-1}$	$0.407 \text{ yr}^{-1}$



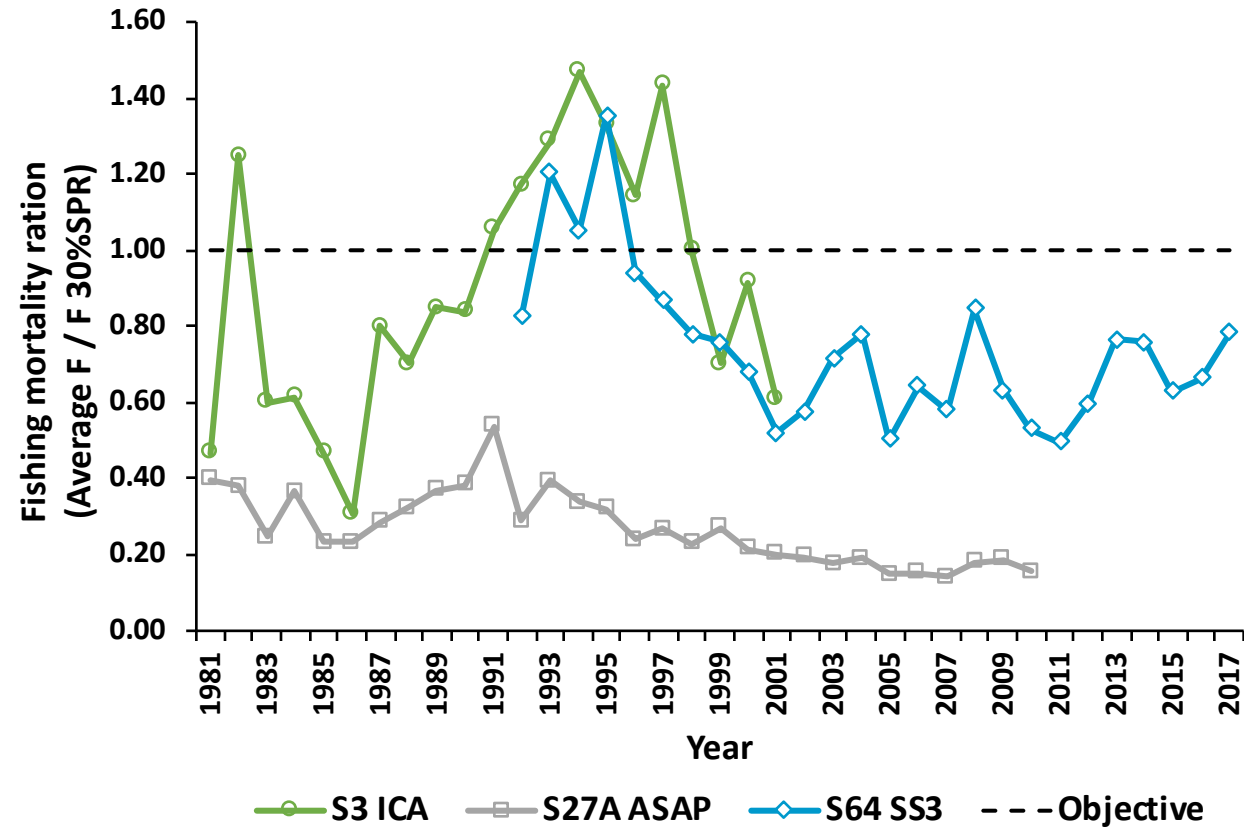
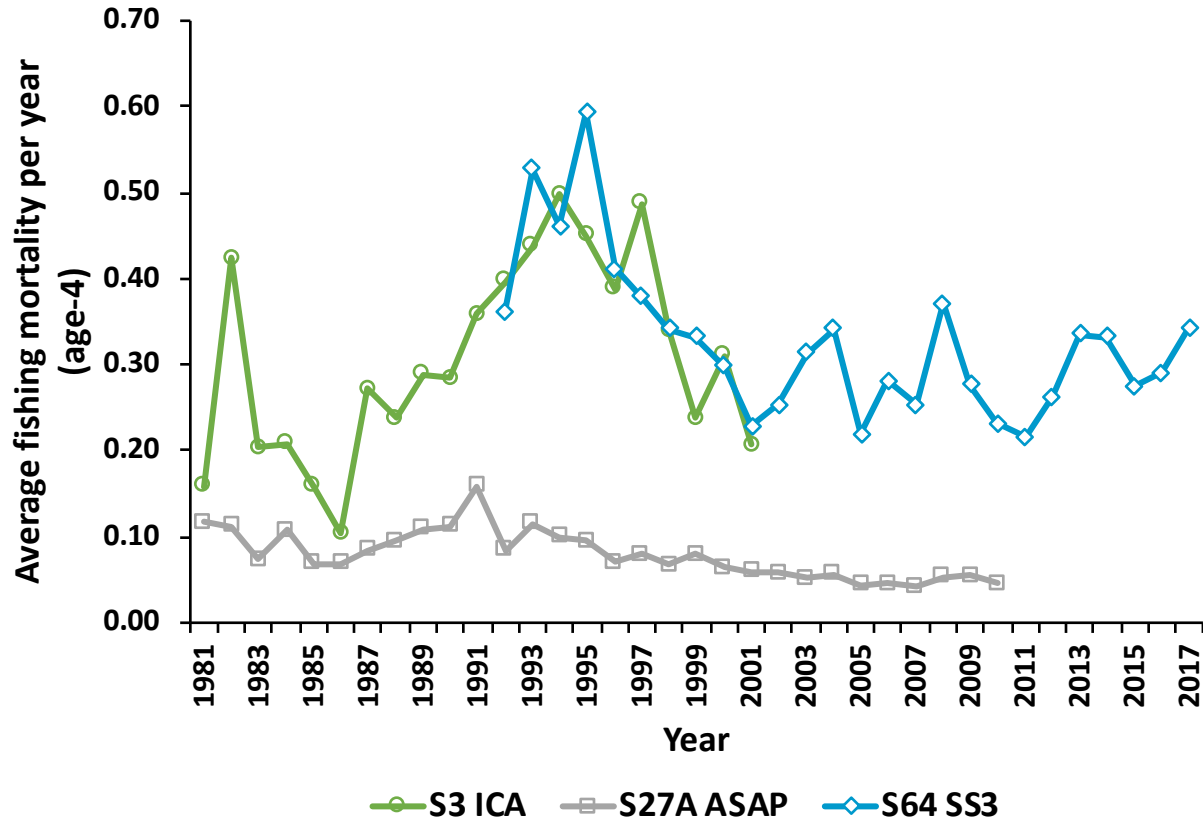


# SEDAR 64: Yellowtail Snapper Assessment Model Results

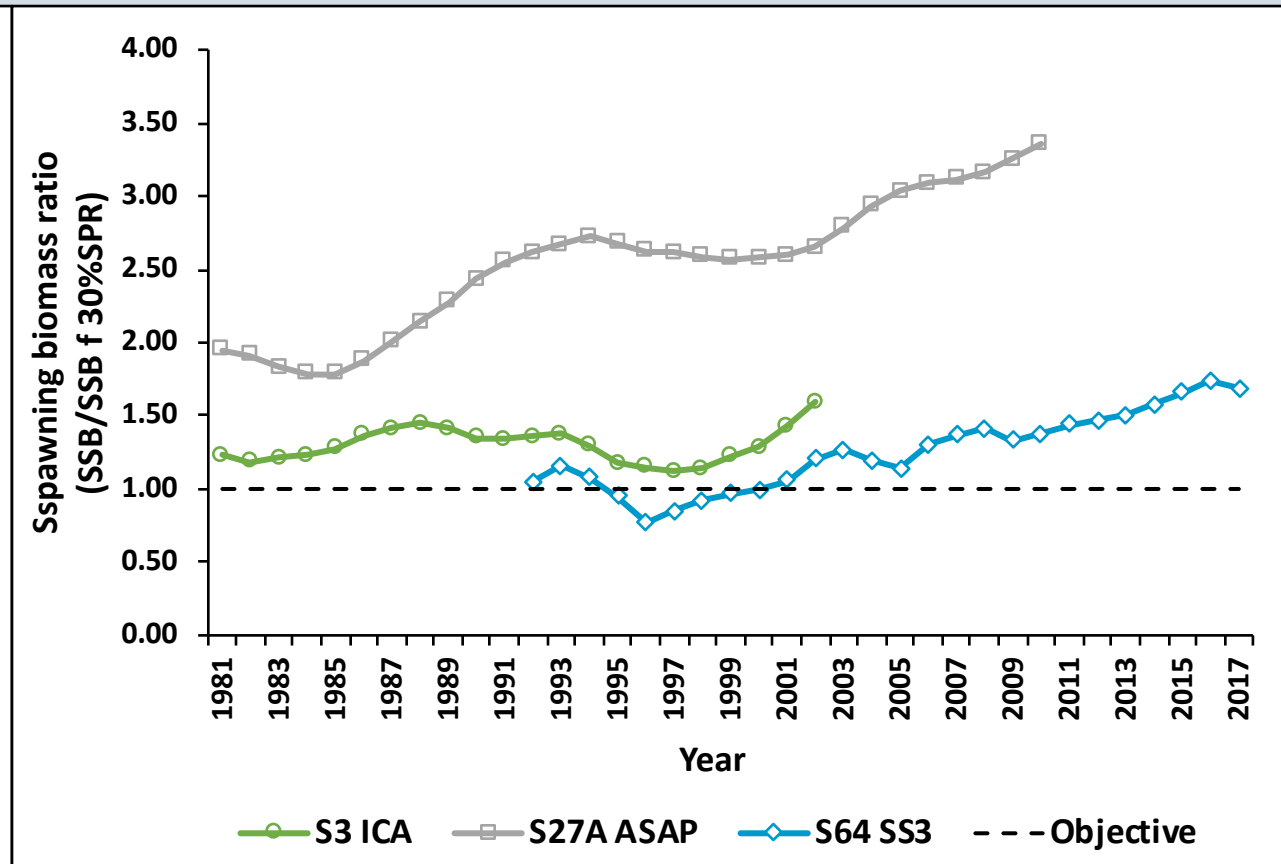
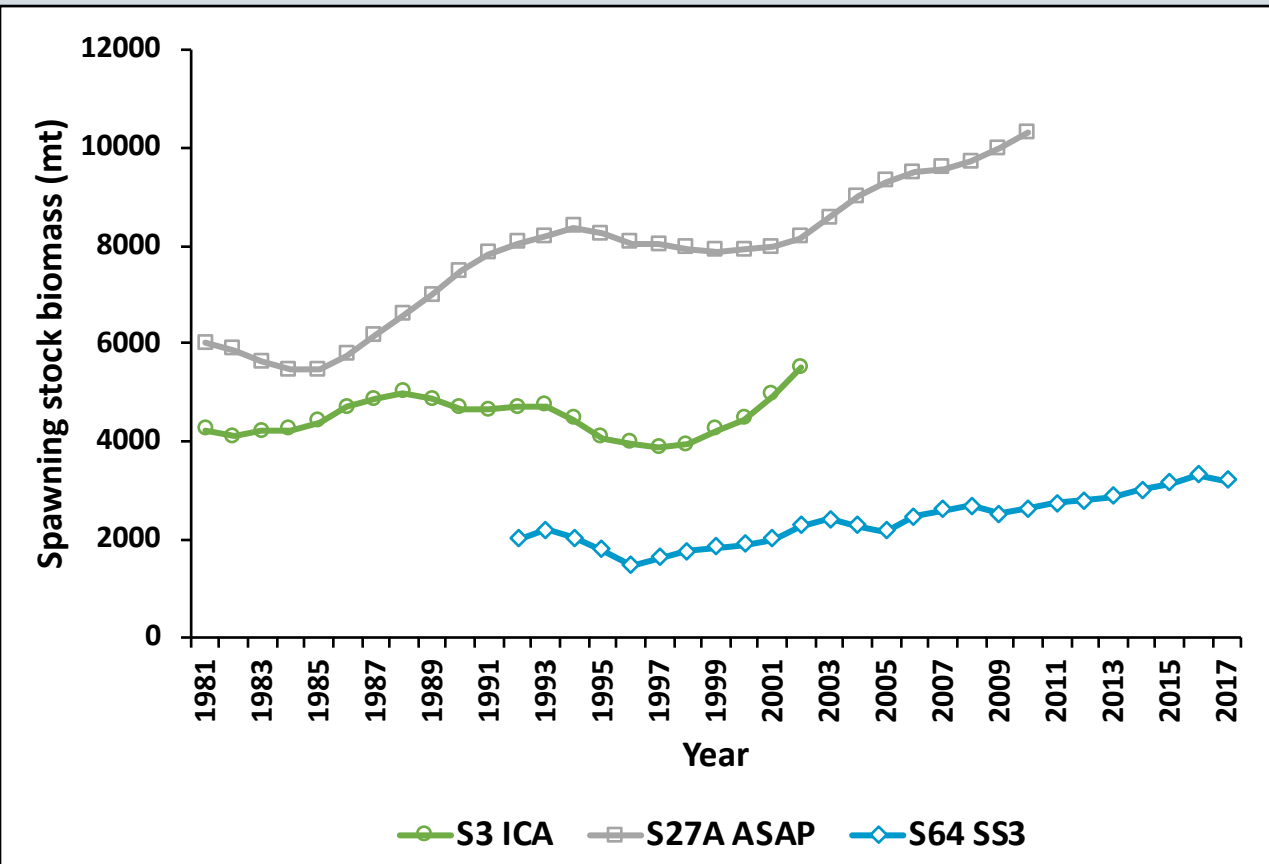
**S3 ICA, S27A ASAP, and S64 SS3**



# S3 ICA, S27A ASAP, and S64 SS3

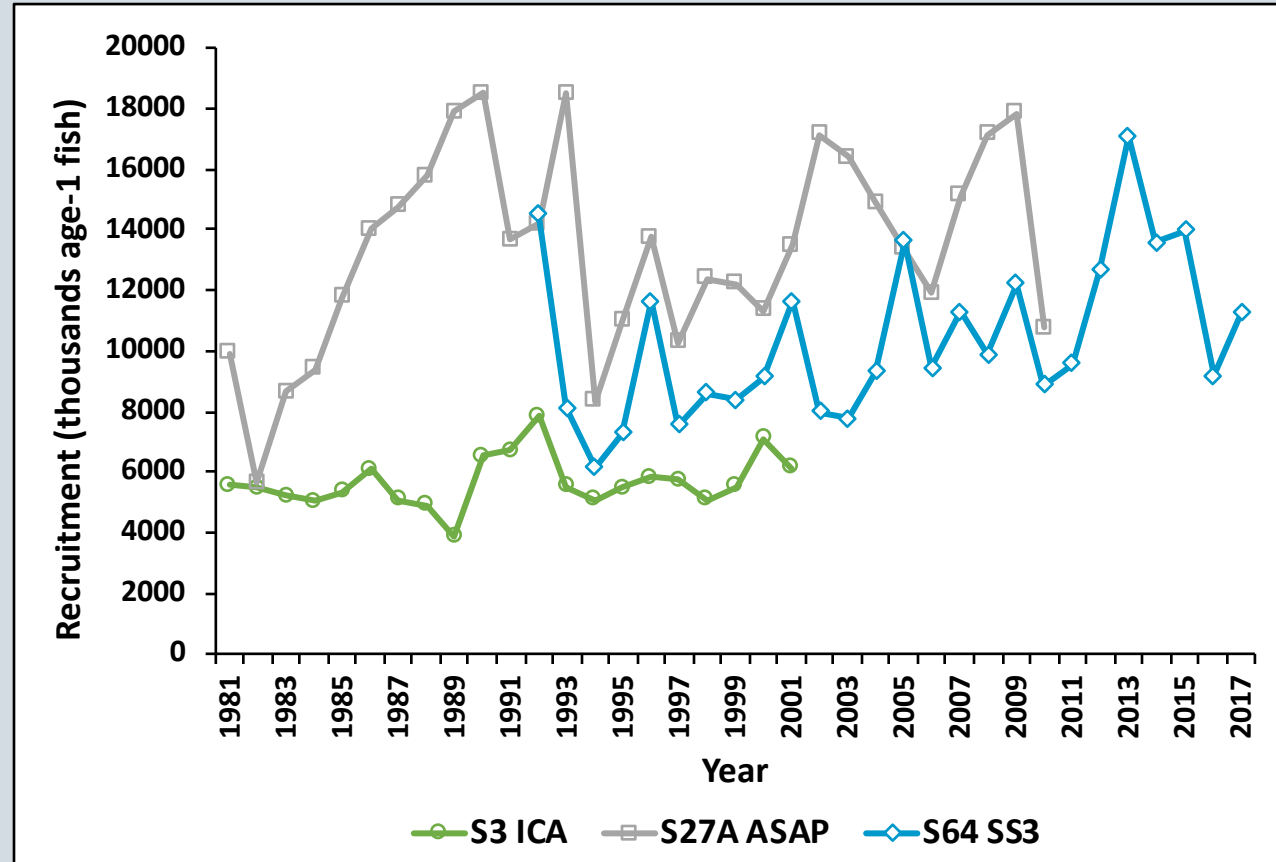


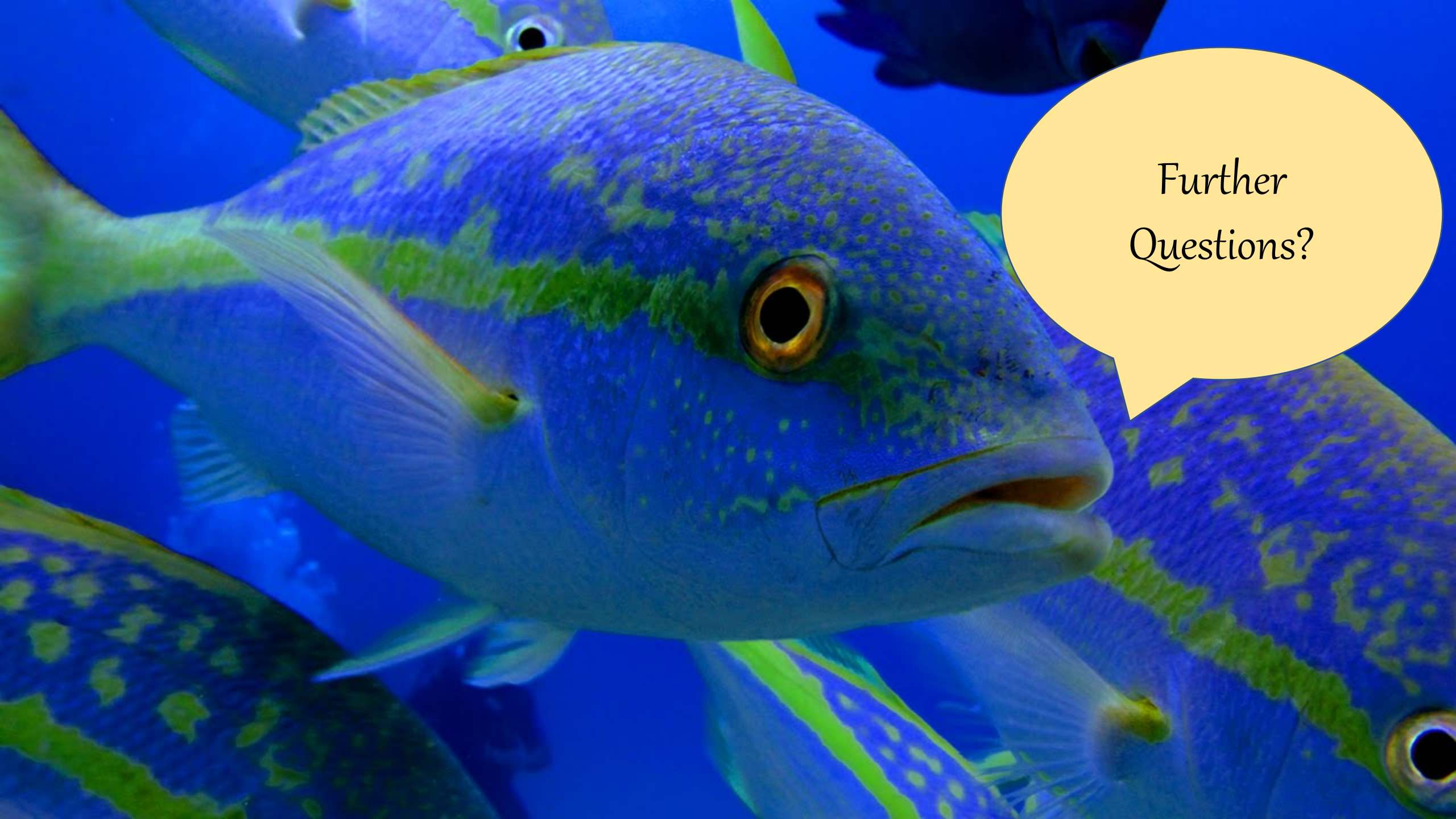
# S3 ICA, S27A ASAP, and S64 SS3





# S3 ICA, S27A ASAP, and S64 SS3





Further  
Questions?

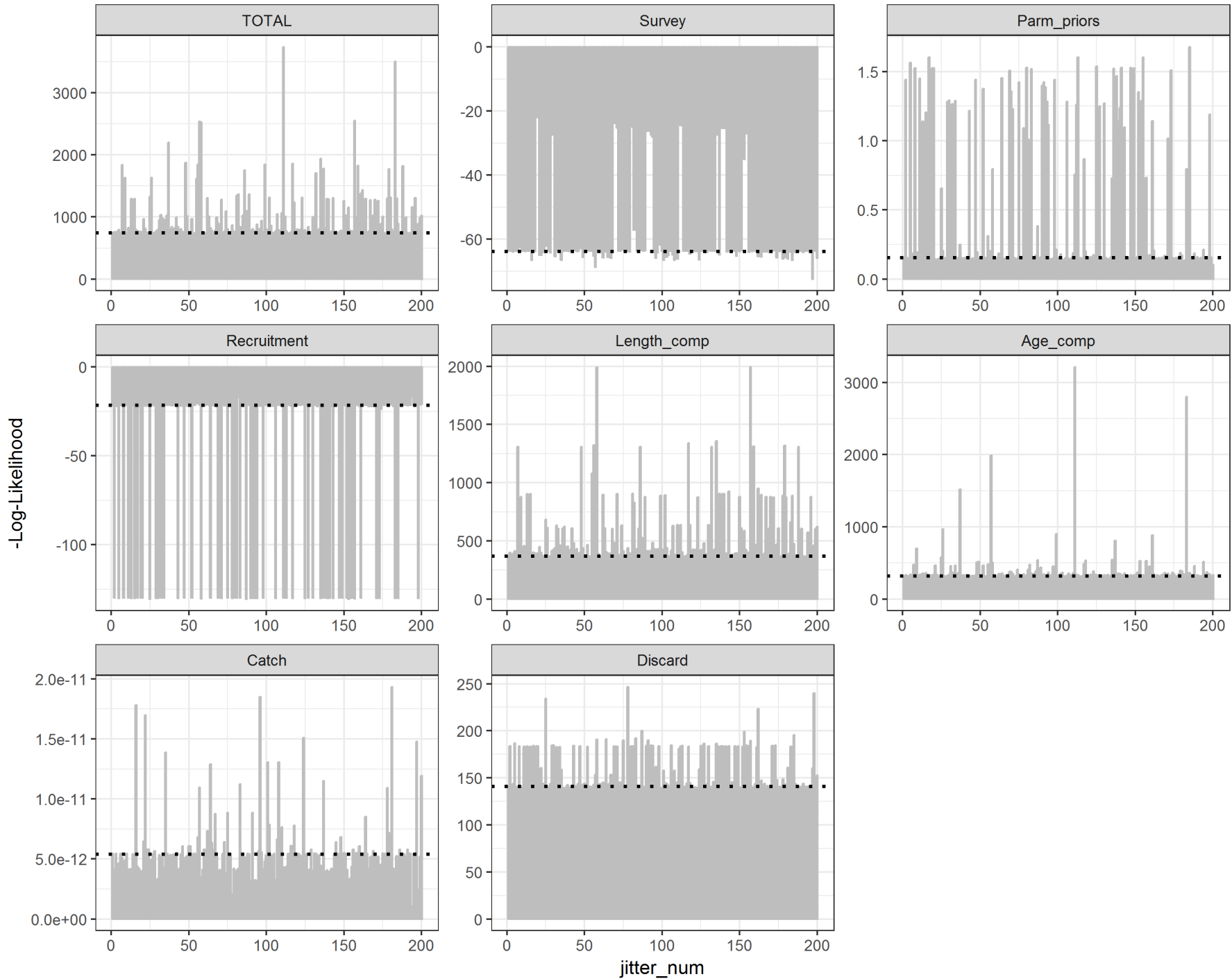
Assessment		S27A	S64	
Framework		ASAP 2	ASAP 3	SS3
Natural mortality		Fixed at age	Fixed at age	Fixed at age
Maturity		Fixed at age	Fixed at age	Fixed at age
Growth		-	-	Estimated
Steepness		Estimated	Estimated	Estimated
Sexes		Combined	Combined	Combined
SSB		Female	Female	Female
Fraction of year before spawning		0.5	0.25	0
Number of weight-at-age matrices		3	10	-
# of Selectivity blocks		9	3	3
Fleet Selectivity	Commercial	Flat-topped	Flat-topped	Flat-topped
	Recreational	Flat-topped	Dome-shaped	Dome-shaped
	MRIP	Flat-topped	Dome-shaped	Dome-shaped
	Headboat	Flat-topped	Dome-shaped	Dome-shaped
Indices		RVC age 1+	RVC Juv	RVC Juv
		Com CPUE	RVC Adult	RVC Adult
		HB CPUE	Com CPUE	Com CPUE
		MRIP CPUE	MRIP CPUE	MRIP CPUE
Index selectivity	RVC age 1+	Age-specific	-	-
	RVC Juv	-	RVC age-1	Dome-shaped
	RVC Adult	-	Dome-shaped	Dome-shaped
	Com CPUE	linked	Flat-topped	linked
	HB CPUE	linked	-	-
	MRIP CPUE	linked	Linked	mirrored to MRIP selectivity



Assessment		S27A	S64	
Catchability	RVC age 1+	constant	-	-
	RVC Juv	-	constant	constant
	RVC Adult	-	constant	constant
	Com CPUE	constant	annual devs	block: 2009-2017
	HB CPUE	constant	-	-
	MRIP CPUE	constant	constant	constant
Lambdas	Indices	< 1	1	1
	Deviation from initial steepness	1	1	-
	Deviation from initial N	1	0	-
	Deviation from initial SSB0	1	-	-
	Deviation from initial R1	-	0	-
	Deviation from initial F-Mult	1	0	-
	Deviation from Equilibrium Catch	-	-	0
Calculate Likelihood Constants		yes	no	no
Years		1981-2010	1992-2017	1992-2017
Natural Mortality: tmax		23 yr	20 yr	20 yr
Release mortality	Commercial	0.115	0.10	0.10
	Recreational MRIP	0.10	0.10	0.10
	Headboat	0.10	0.10	0.10
Average F age		5	4	4

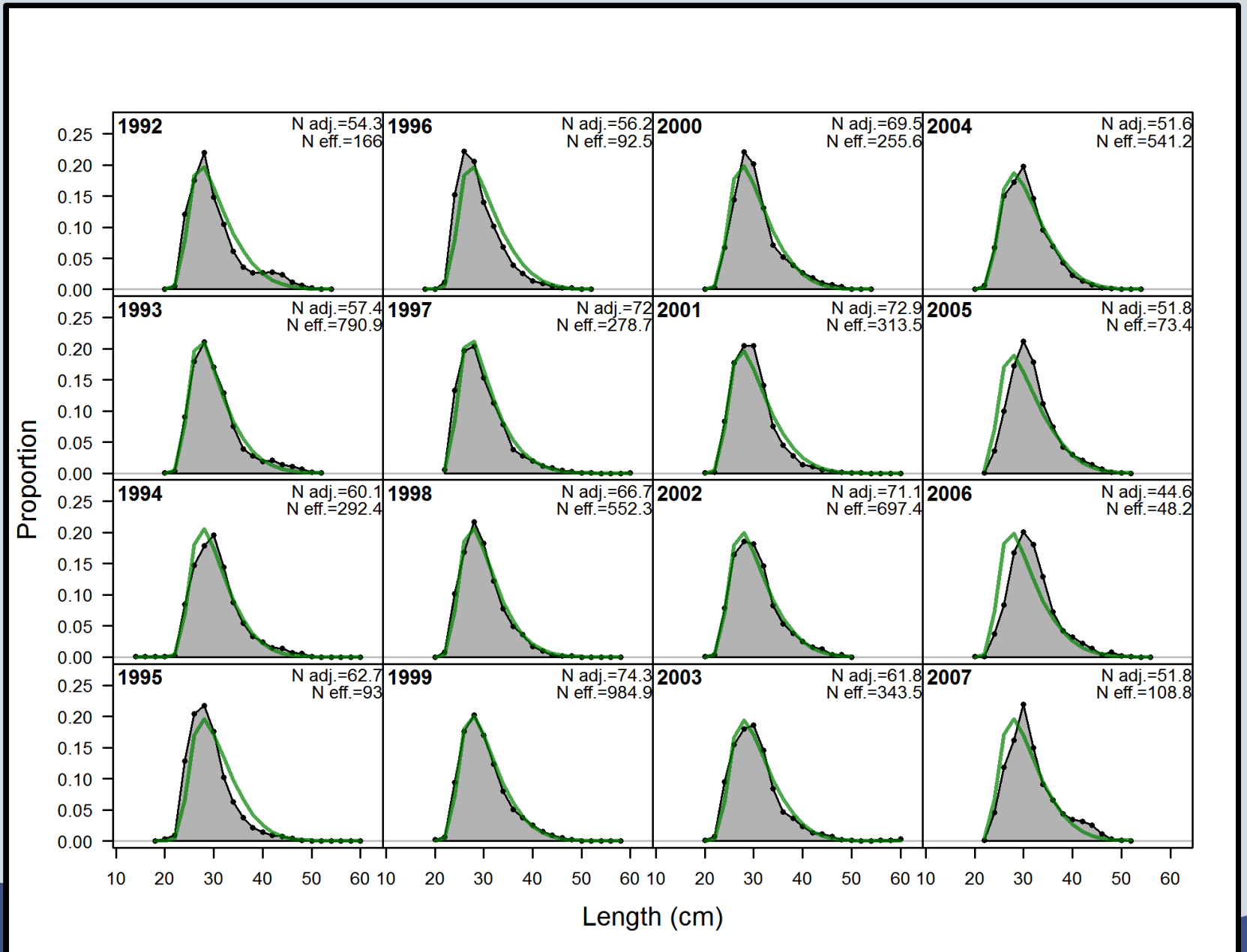


# Jitter Analysis: Likelihood components

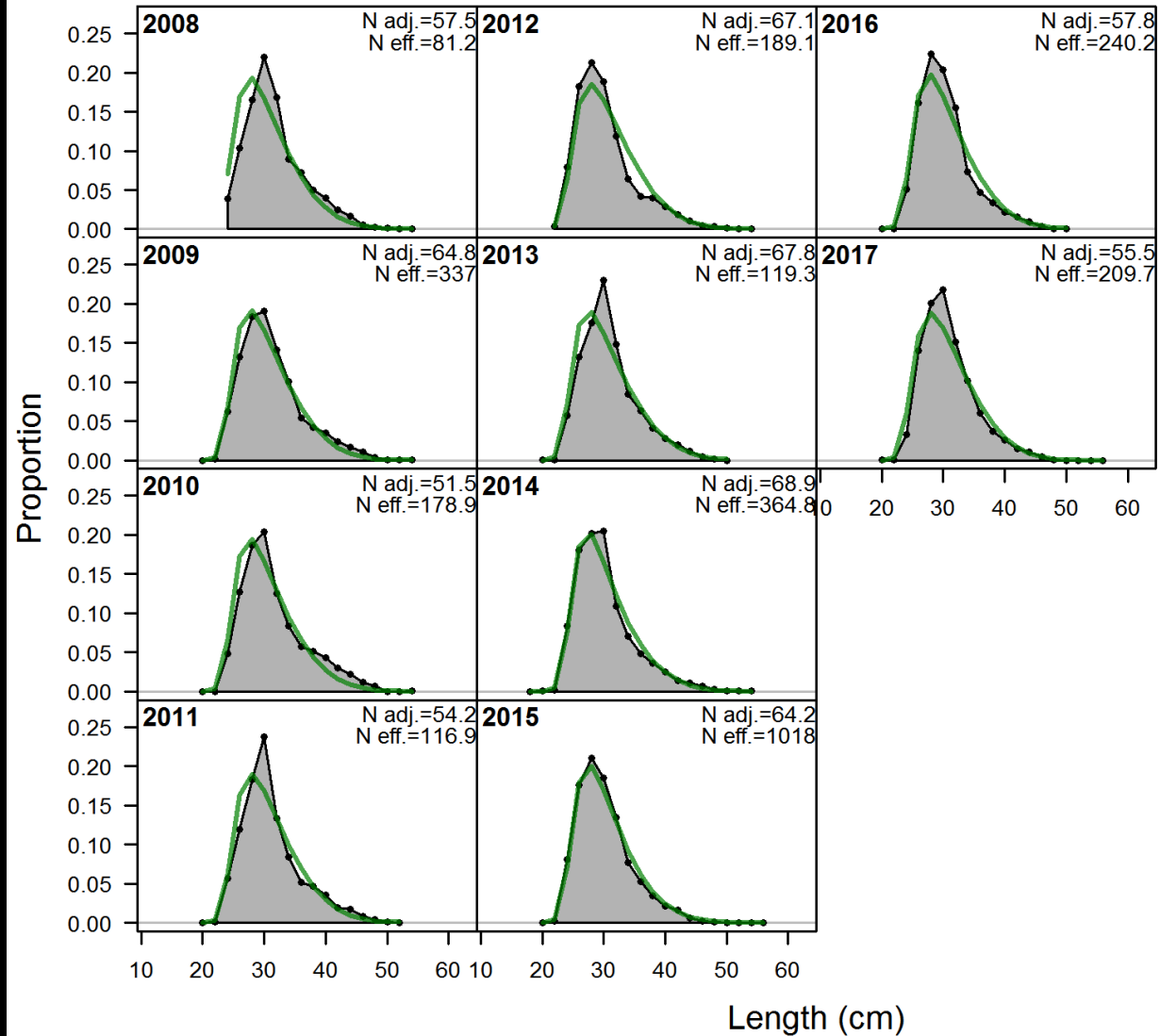




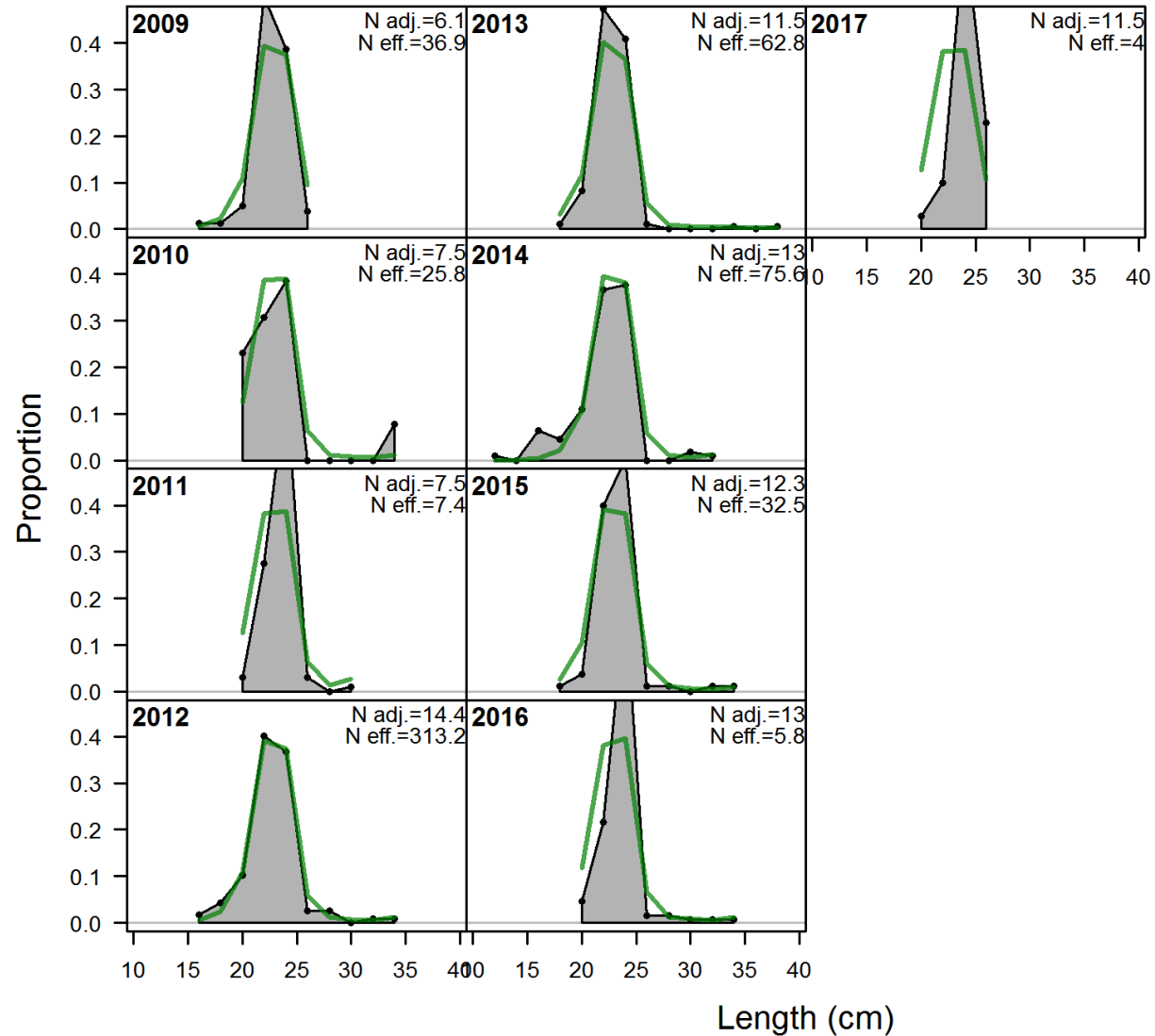
# Model Fits: Lengths of Commercial Landings



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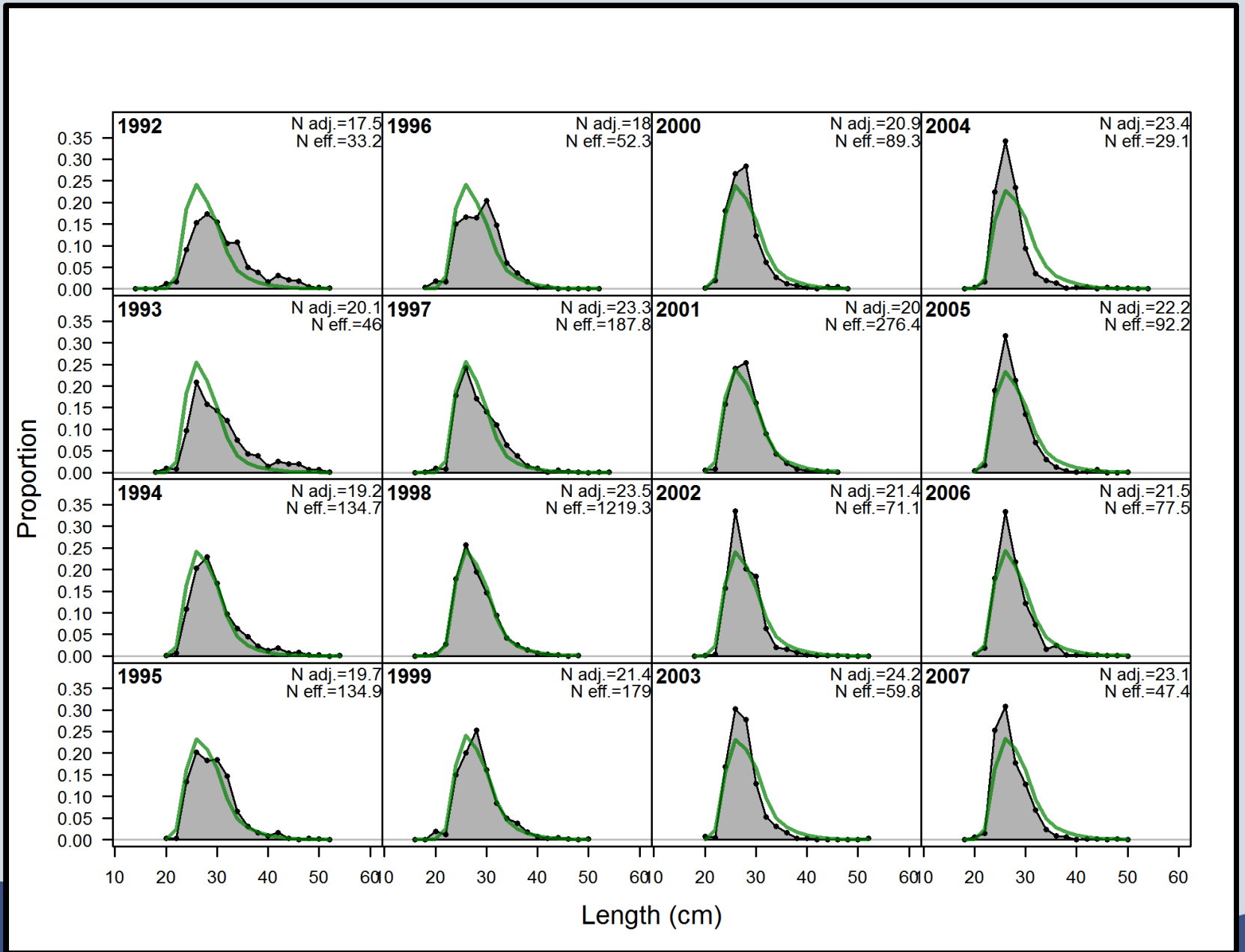


# Model Fits: Lengths of Commercial Discards

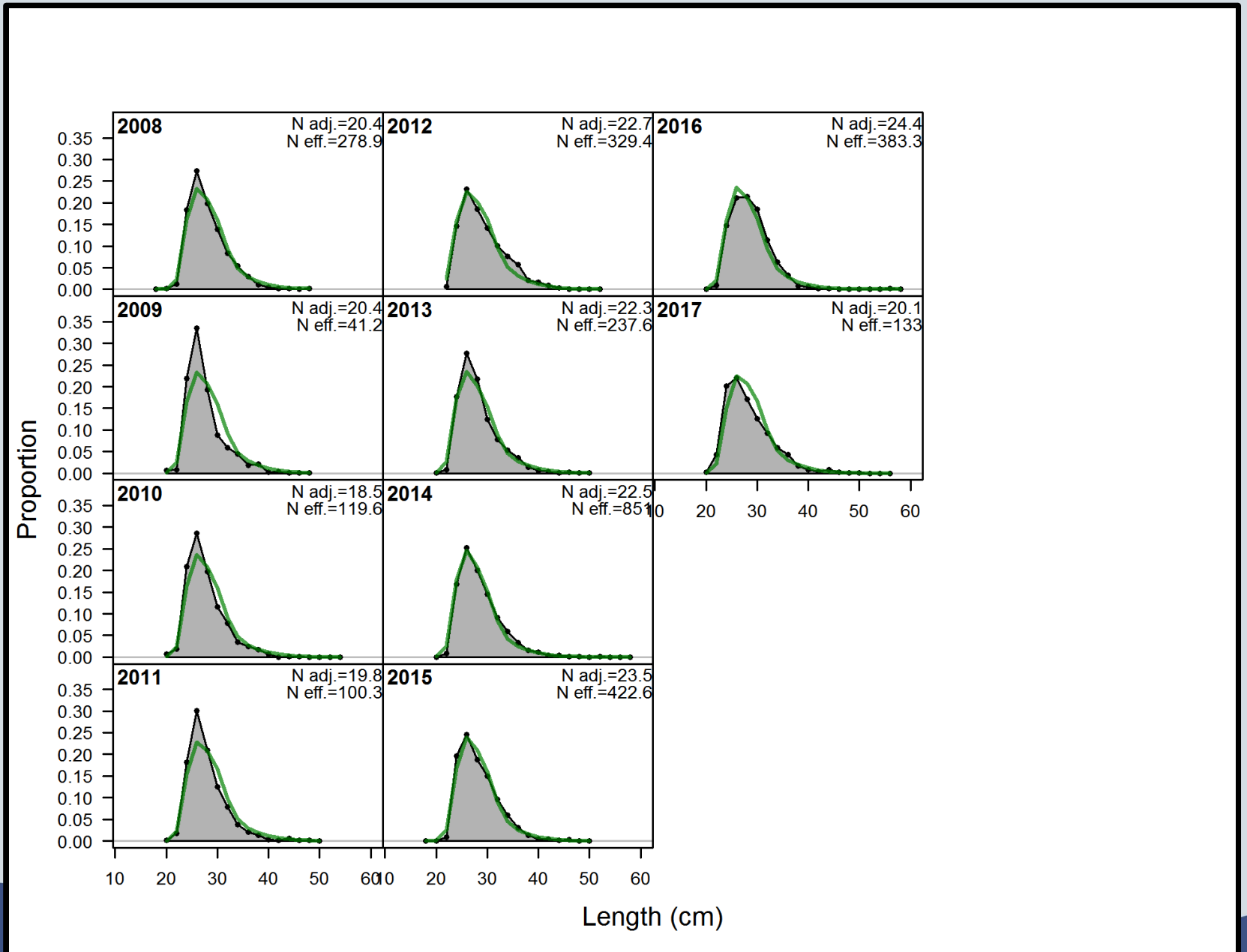




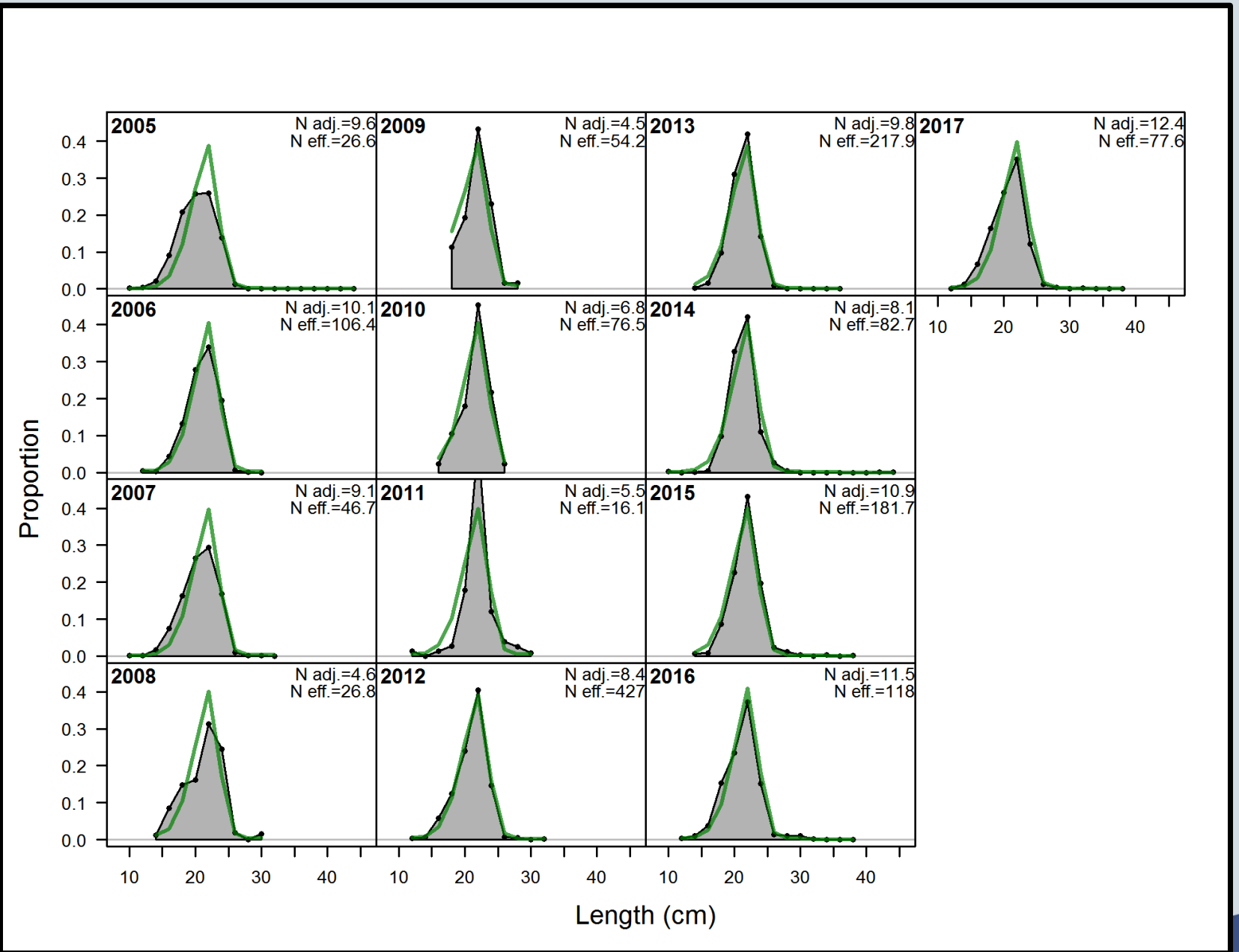
# Model Fits: Lengths of Headboat Landings



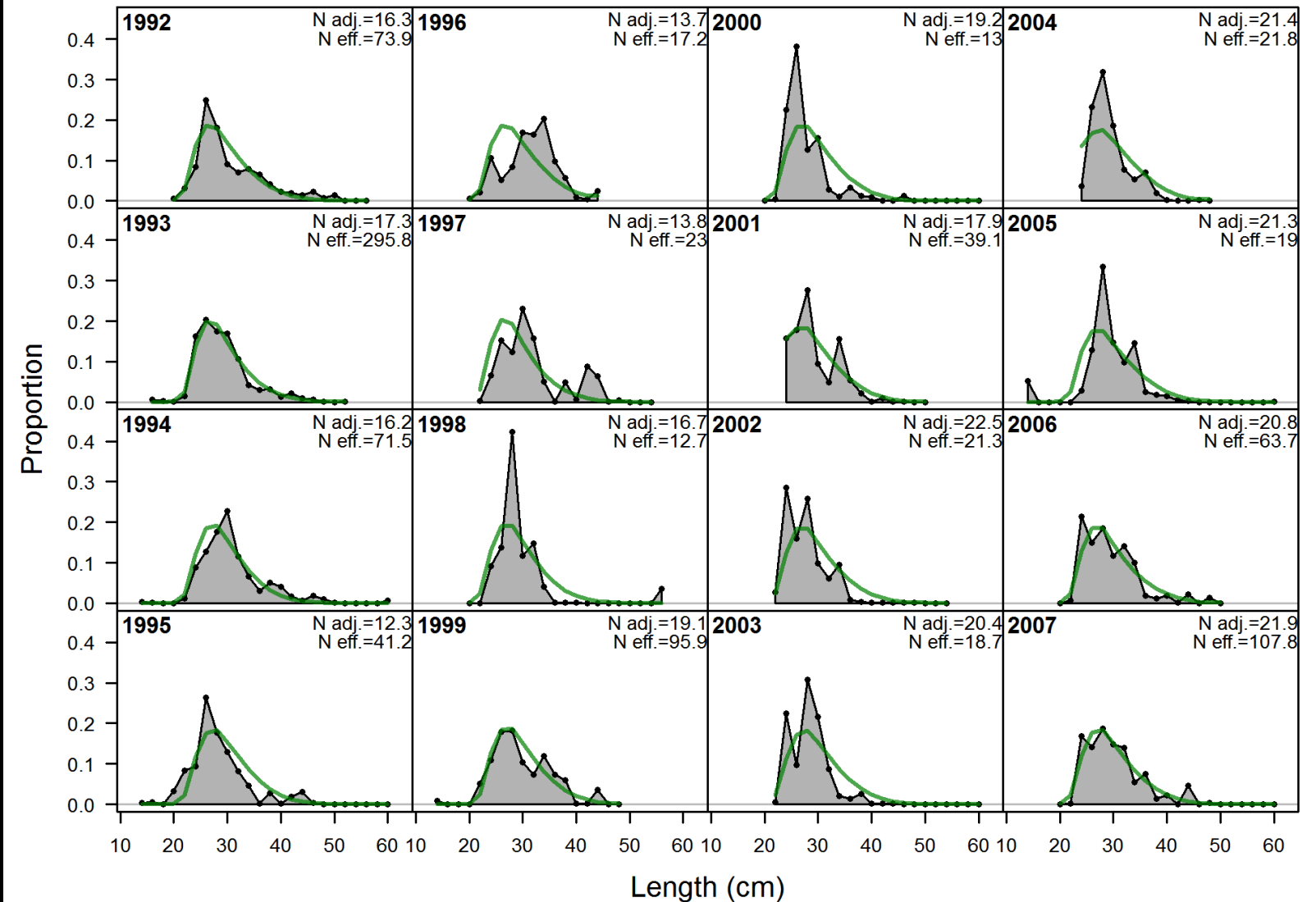
# Model Fits: Lengths of Headboat Landings



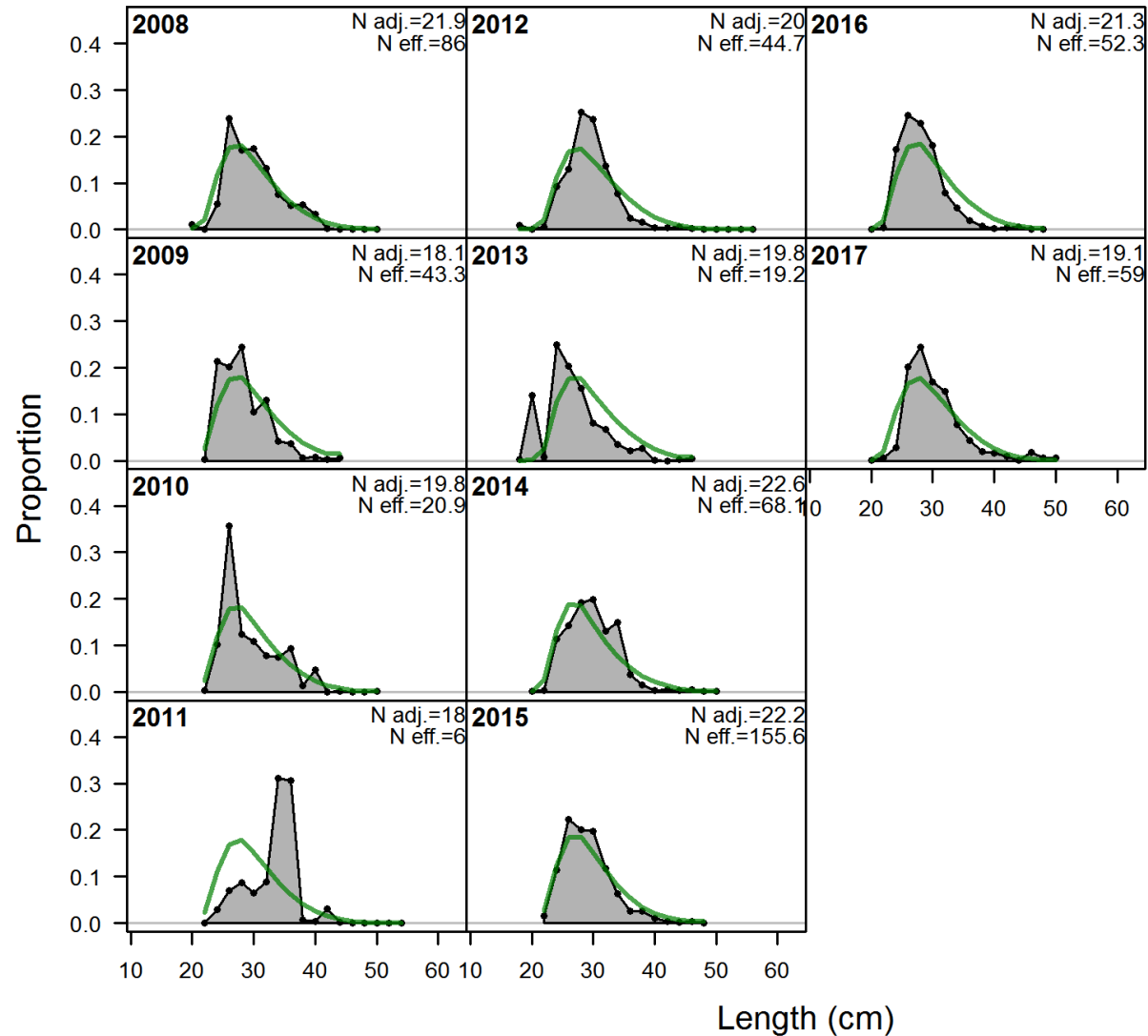
# Model Fits: Lengths of Headboat Discards



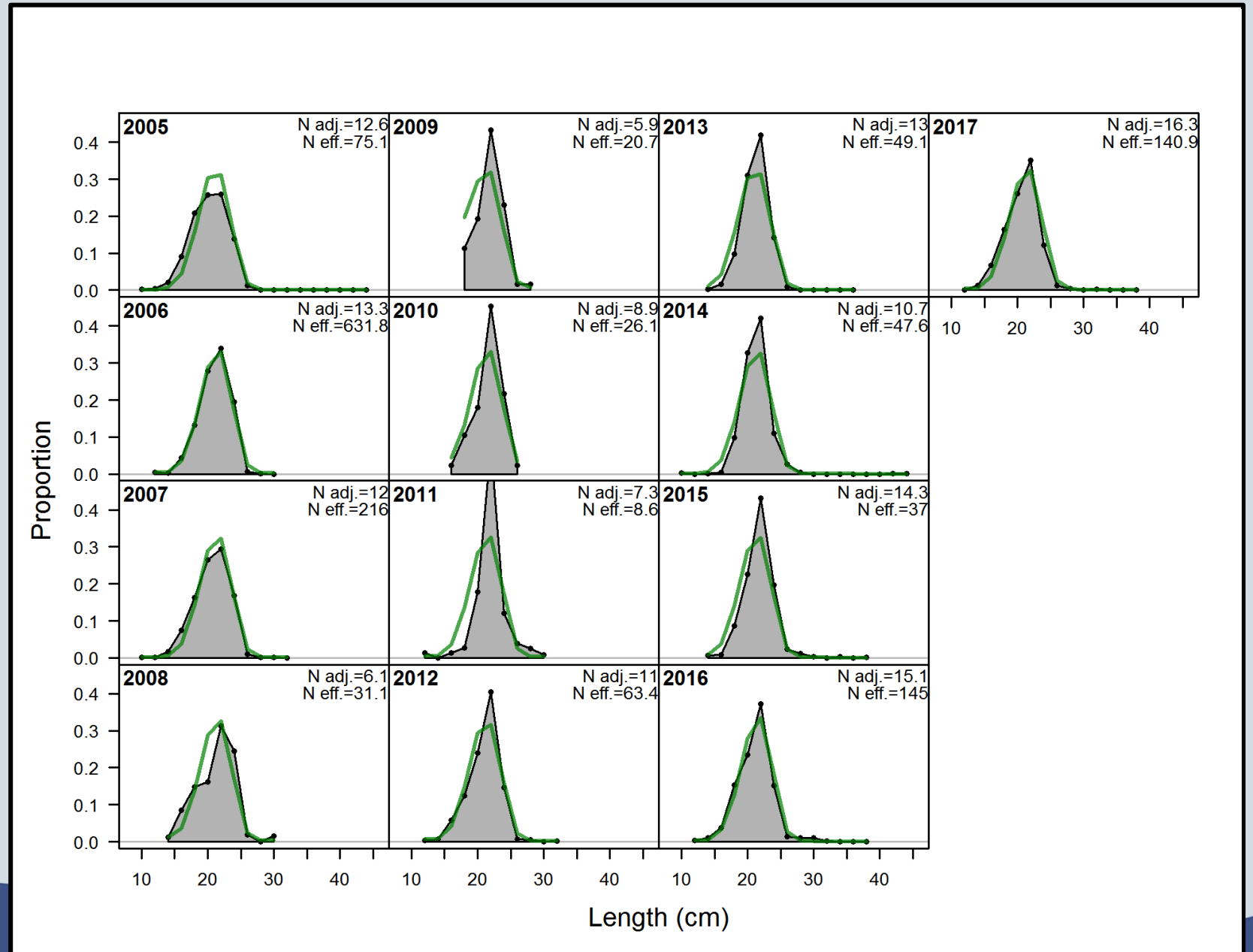
# Model Fits: Lengths of MRIP Landings



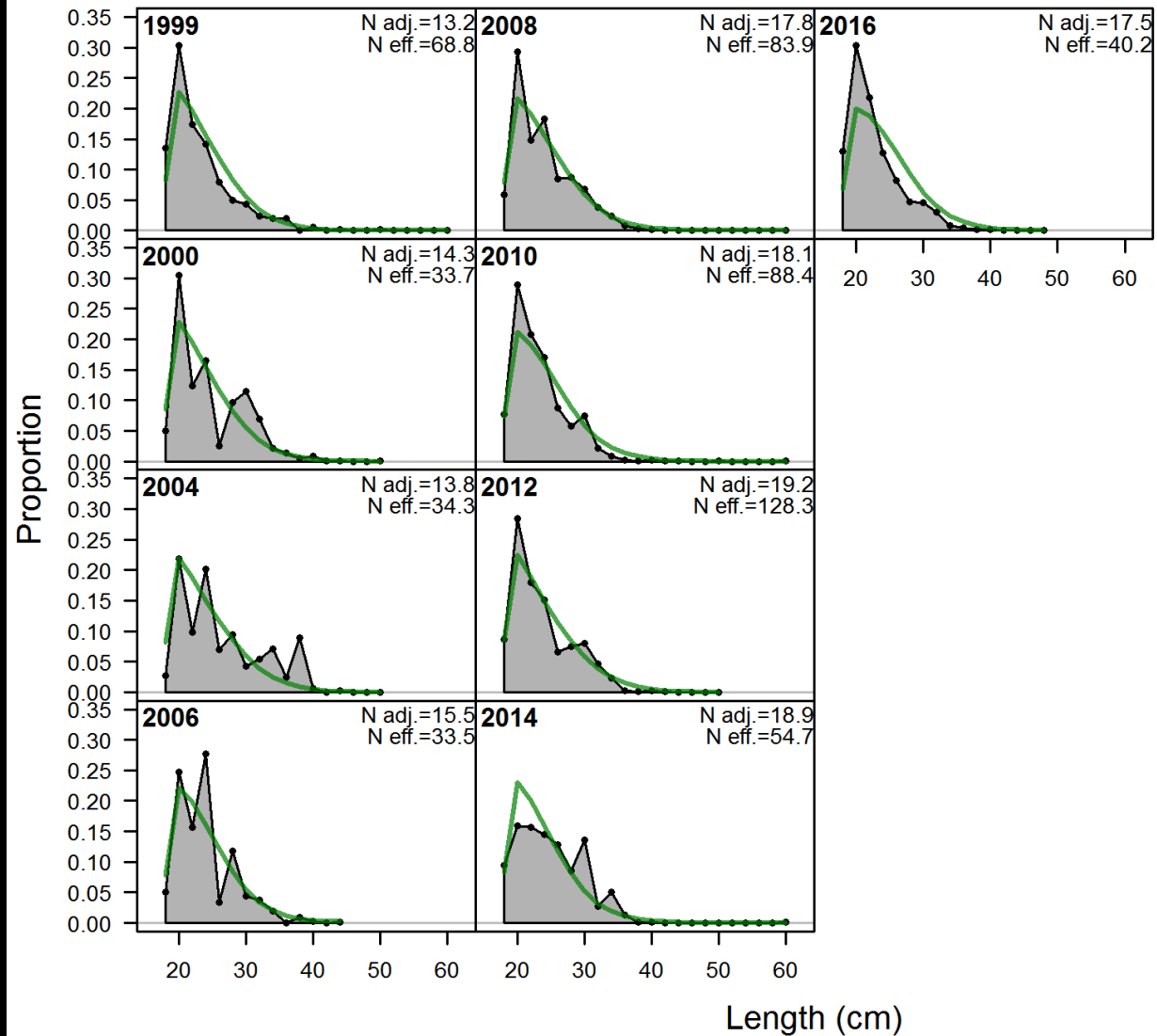
# Model Fits: Lengths of MRIP Landings



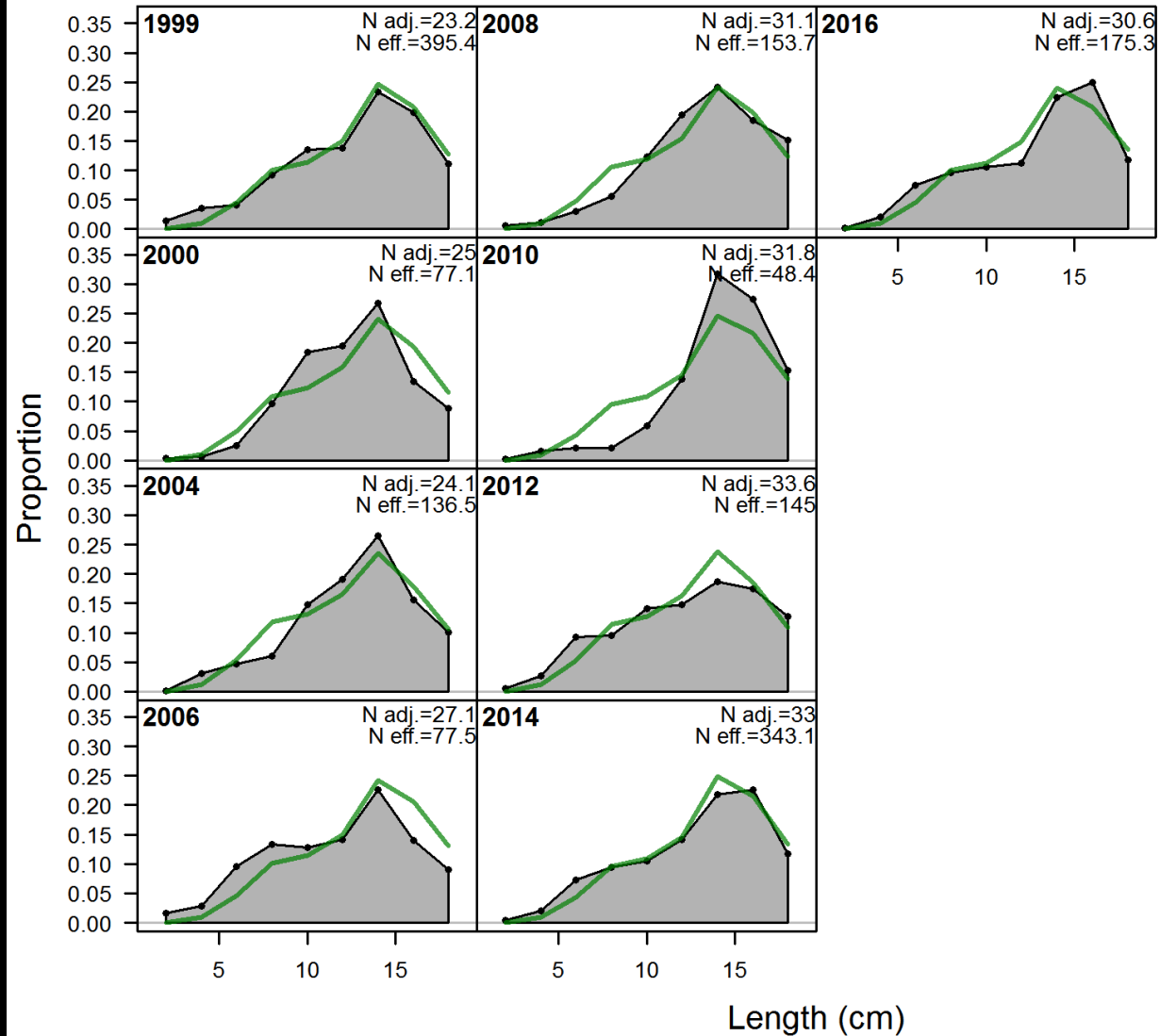
# Model Fits: Lengths of MRIP Discards



# Model Fits: Lengths of RVC Adults



# Model Fits: Lengths of RVC Juveniles





# Model Fits: Lengths of MRIP CPUE (total catch)

