



SEDAR 64

Southeastern U.S. Yellowtail Snapper

GMFMC Reef Fish Advisory Panel

February 24th, 2020

Shanae D. Allen and Christopher E. Swanson

FWRI Stock Assessment Group, St. Petersburg, FL



Outline

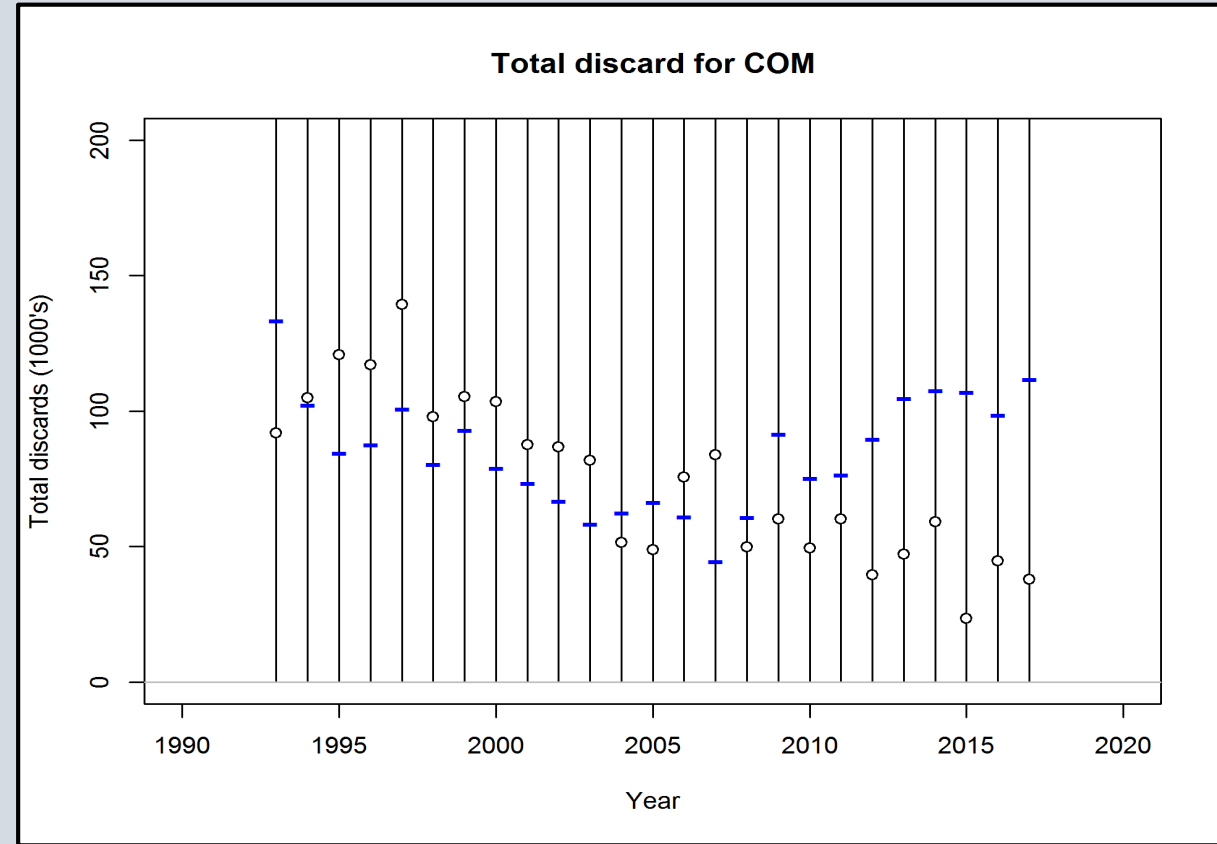
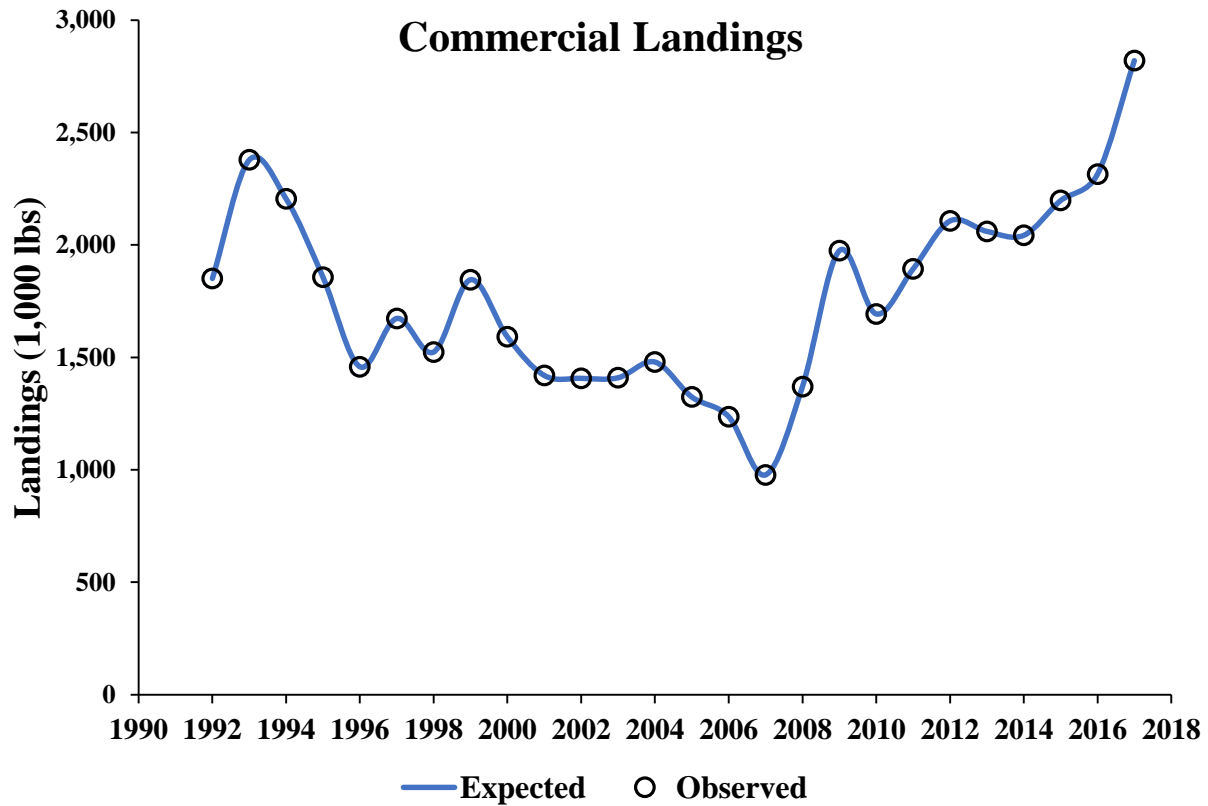
1. SEDAR 64 Base Model data and results
 - Fits to landings and discards
 - Non-calibrated versus calibrated MRIP estimates
 - Stock status over time
2. Projections
 - Scenarios as defined by the TORs and joint SSC's
 - Joint SSC recommendation
3. Comparison to previous assessments



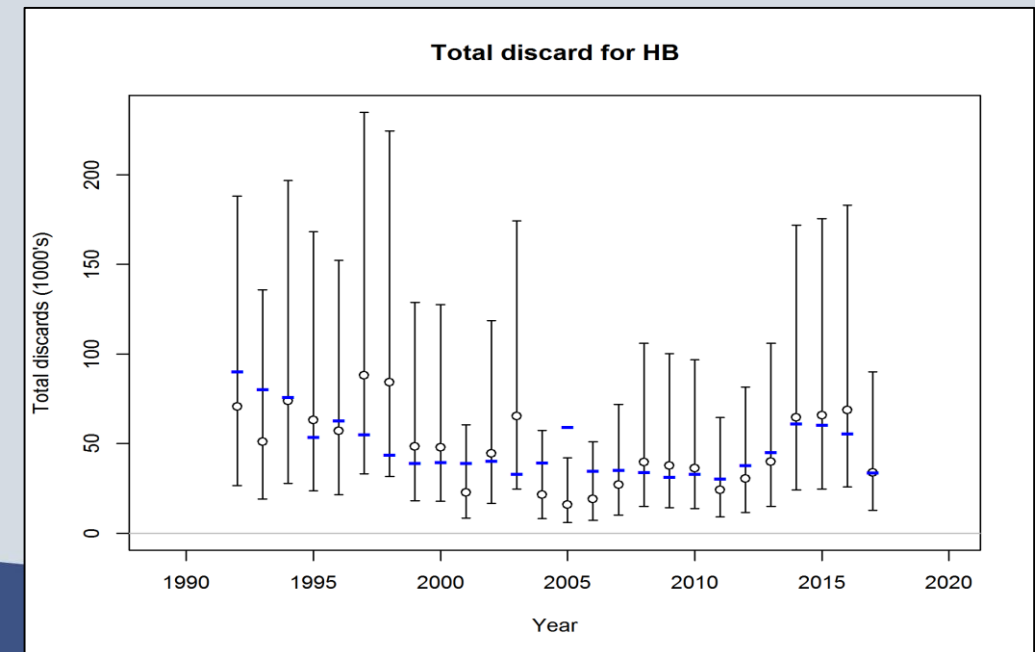
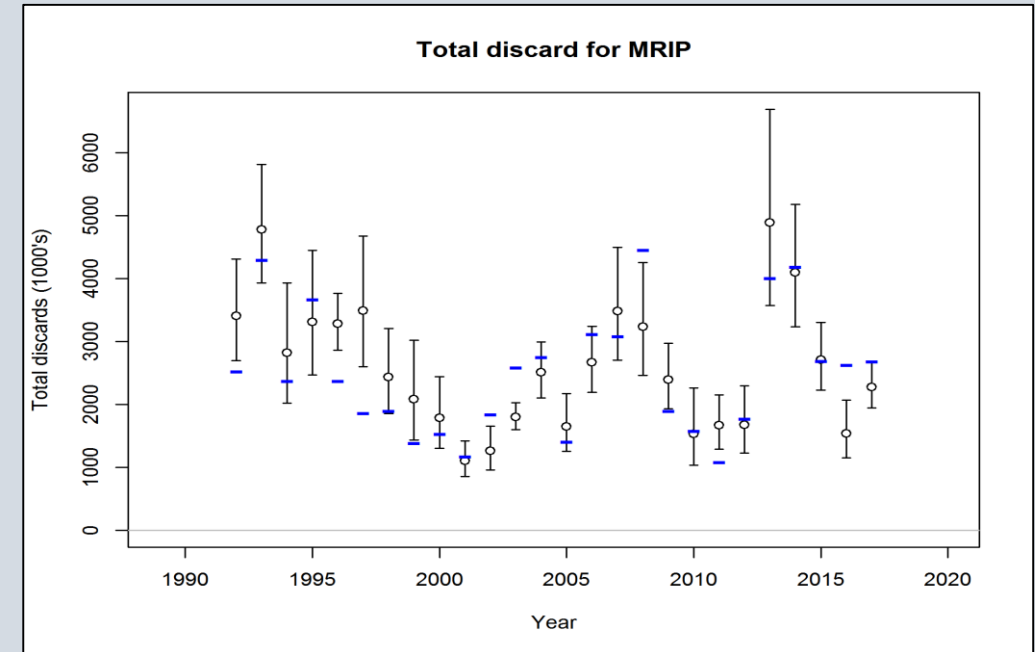
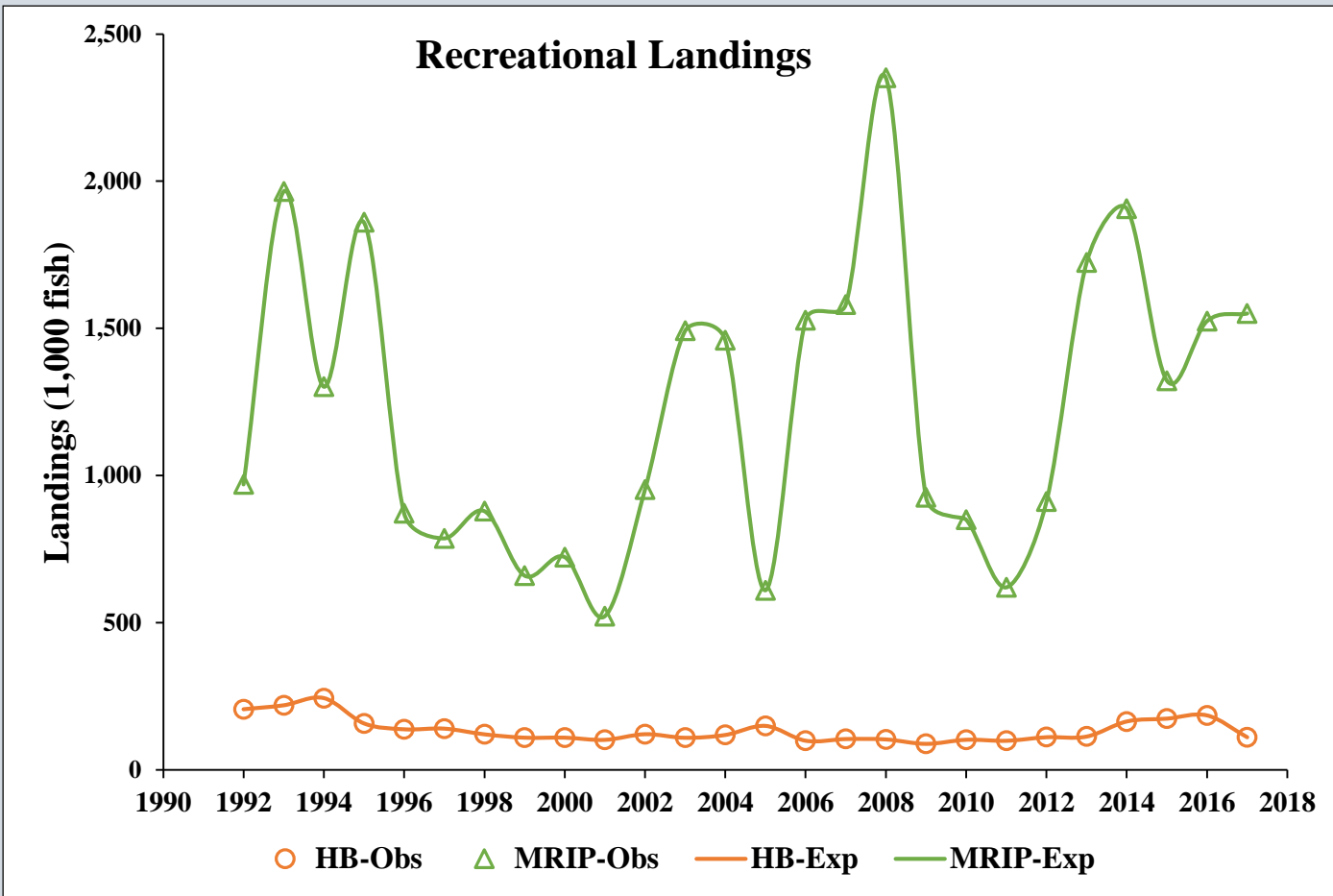
SEDAR 64: Yellowtail Snapper Base Model Results



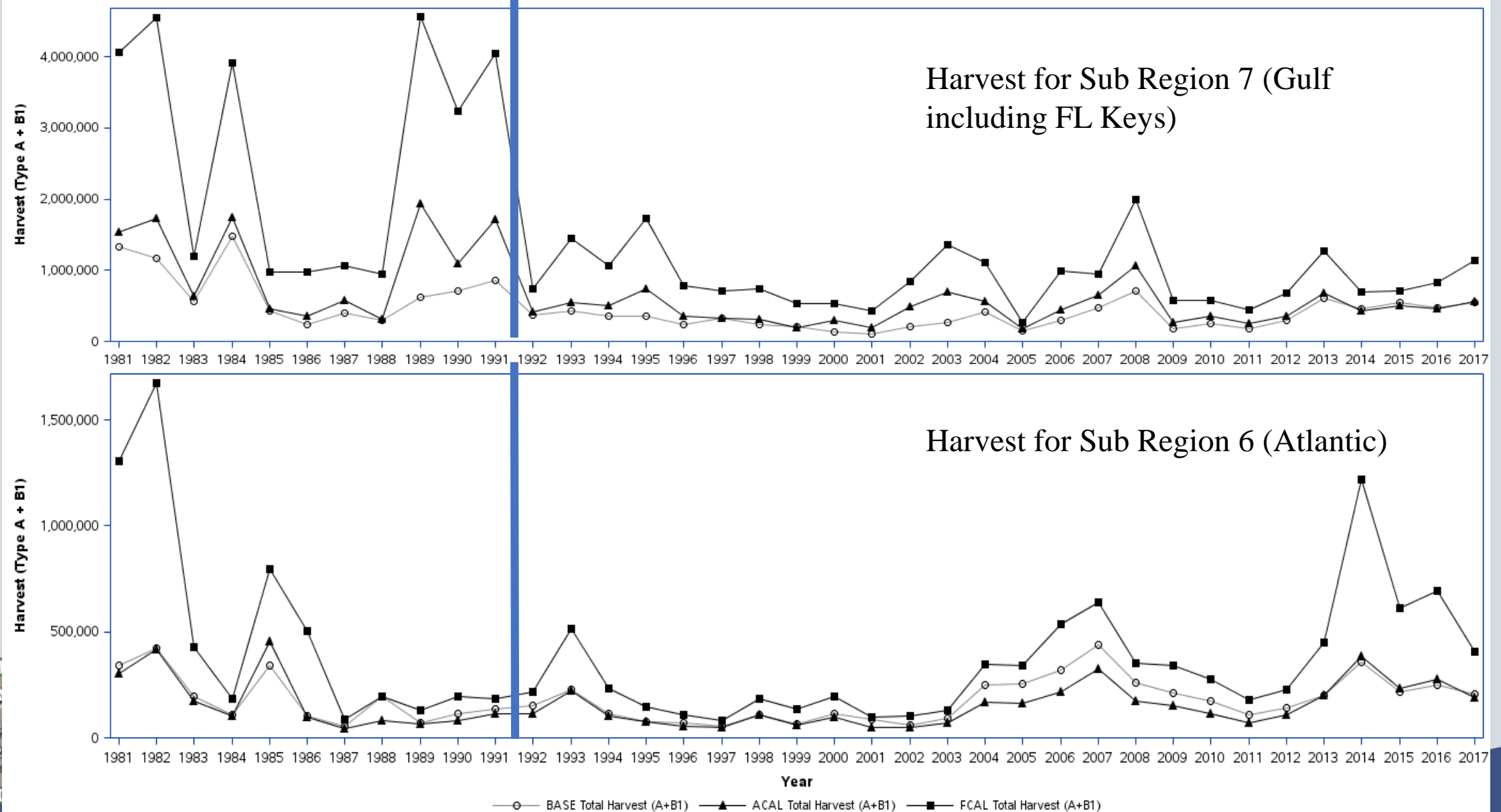
Commercial Landings and Discards



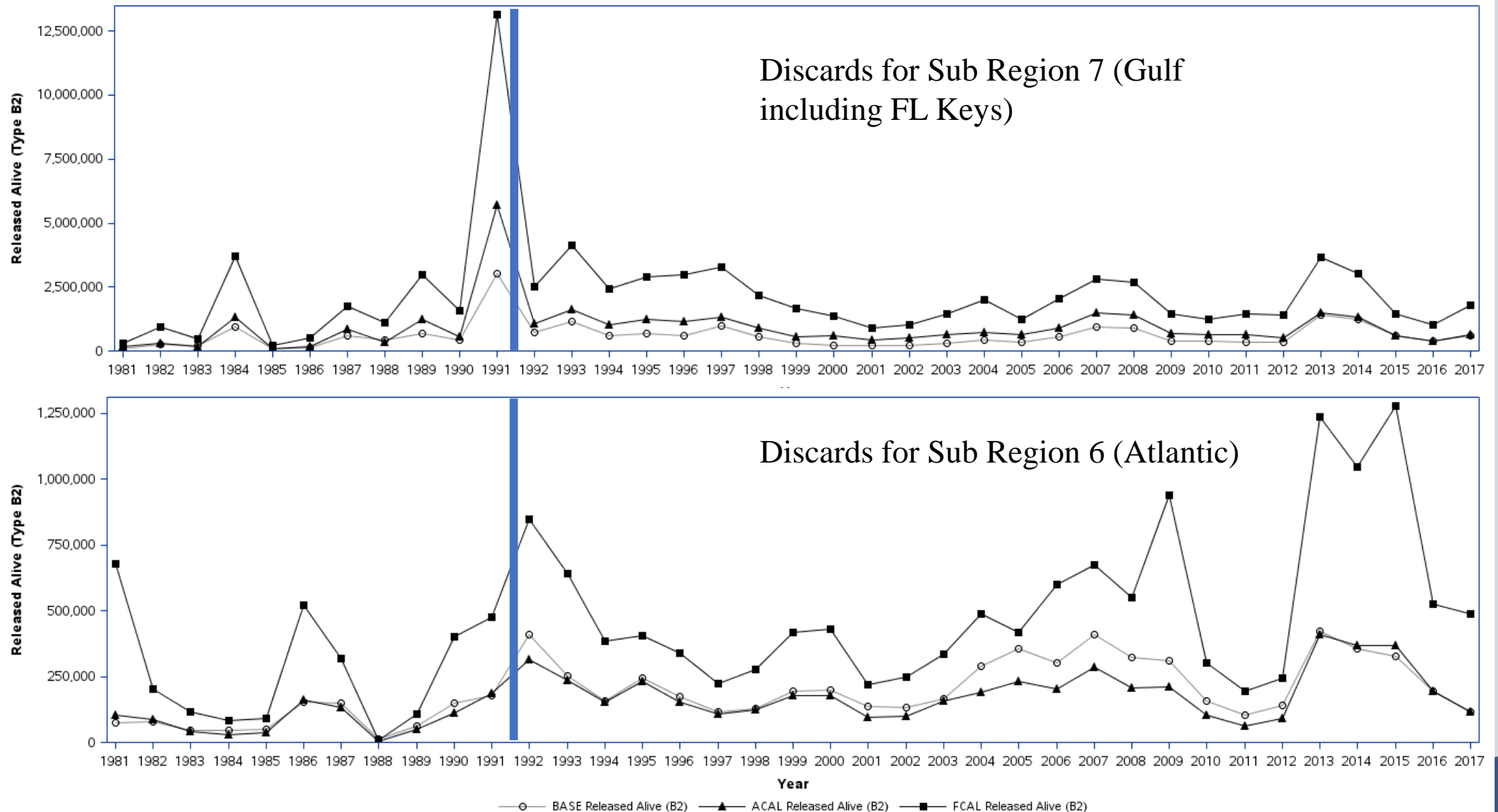
Recreational Landings and Discards



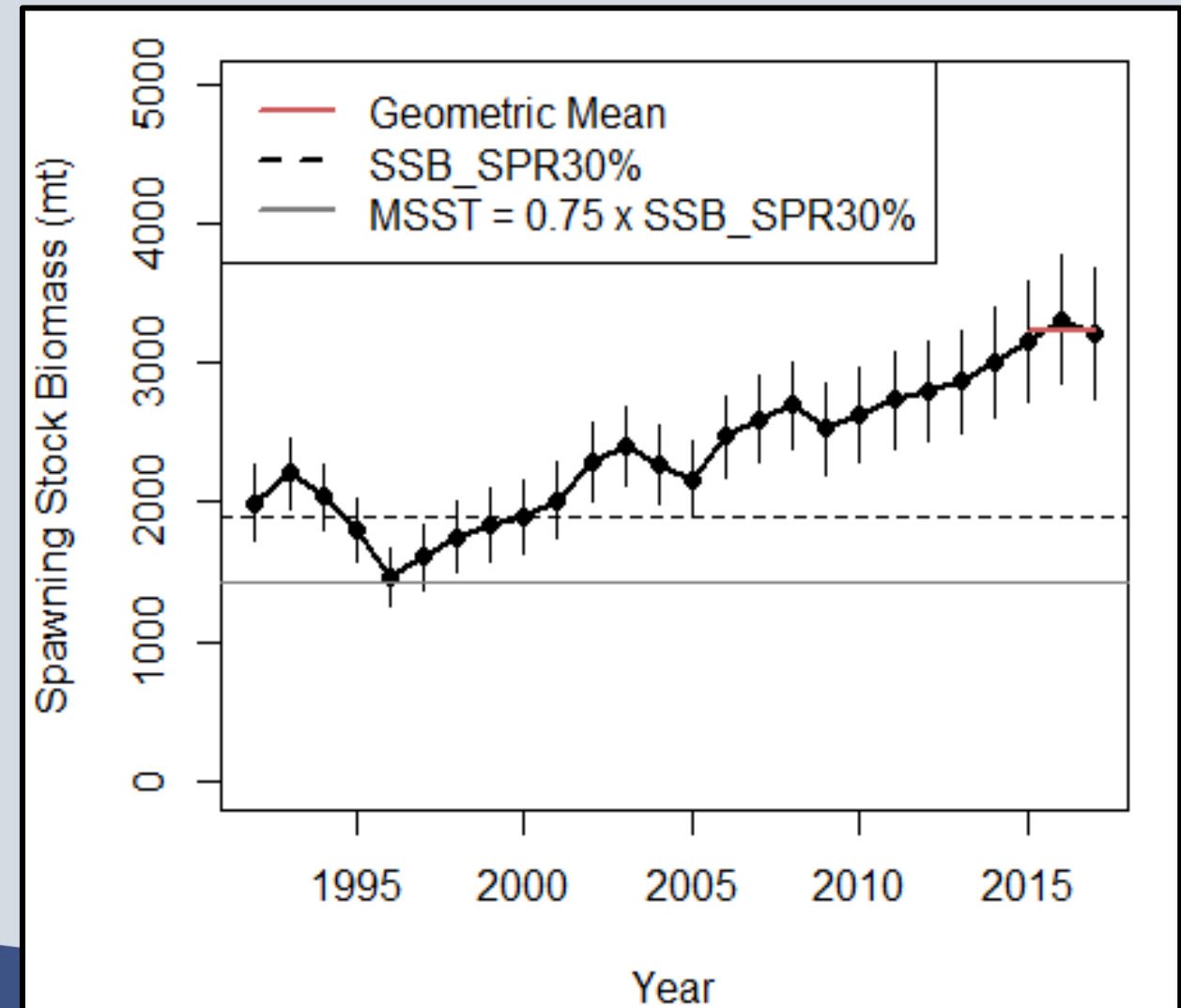
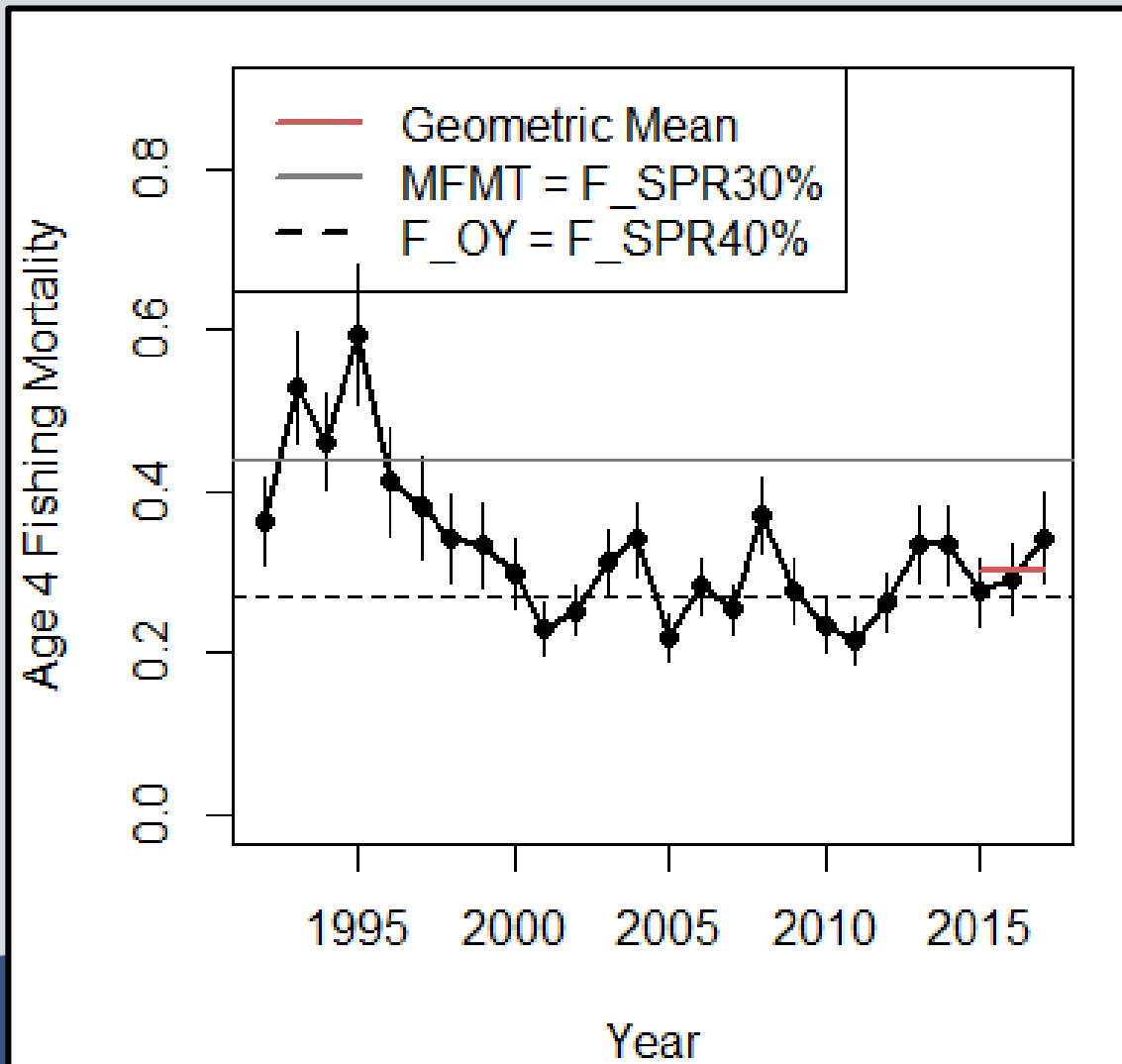
Comparison of non-calibrated vs calibrated MRIP Landings



Comparison of non-calibrated vs calibrated MRIP Discards



Estimated Fishing mortality and SSB



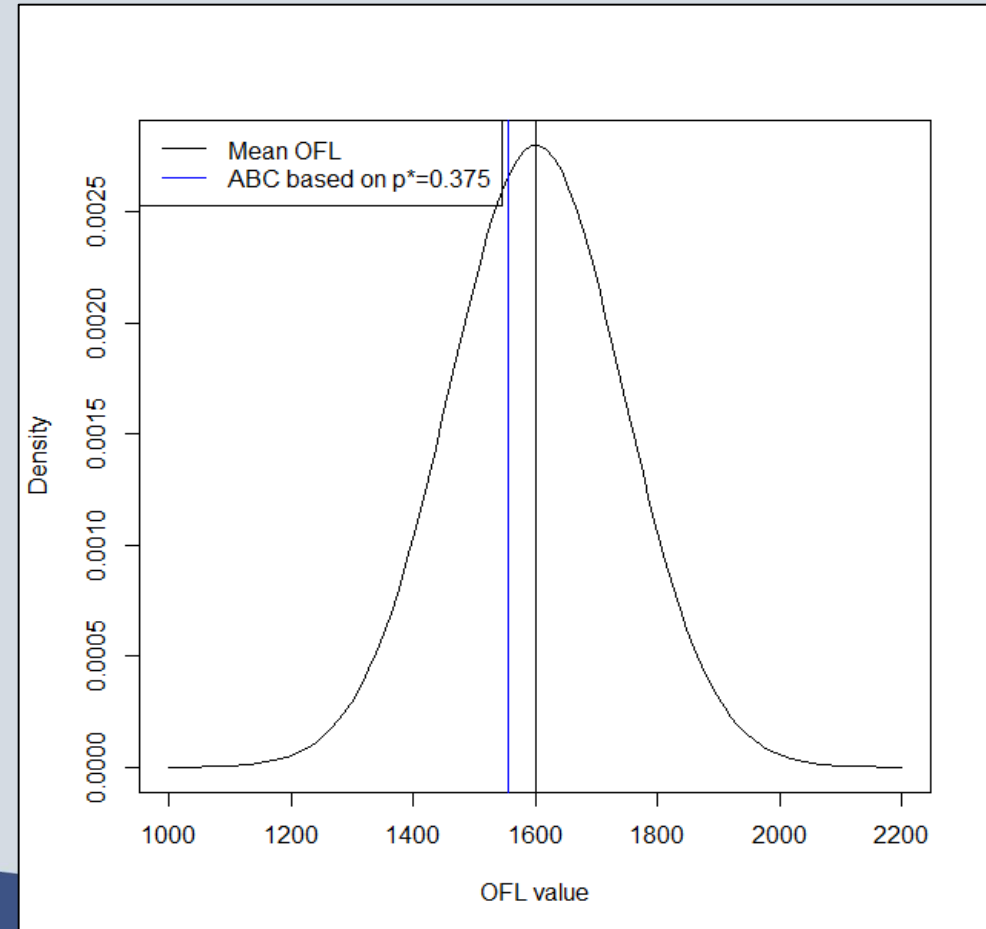
SEDAR 64: Yellowtail Snapper Projections



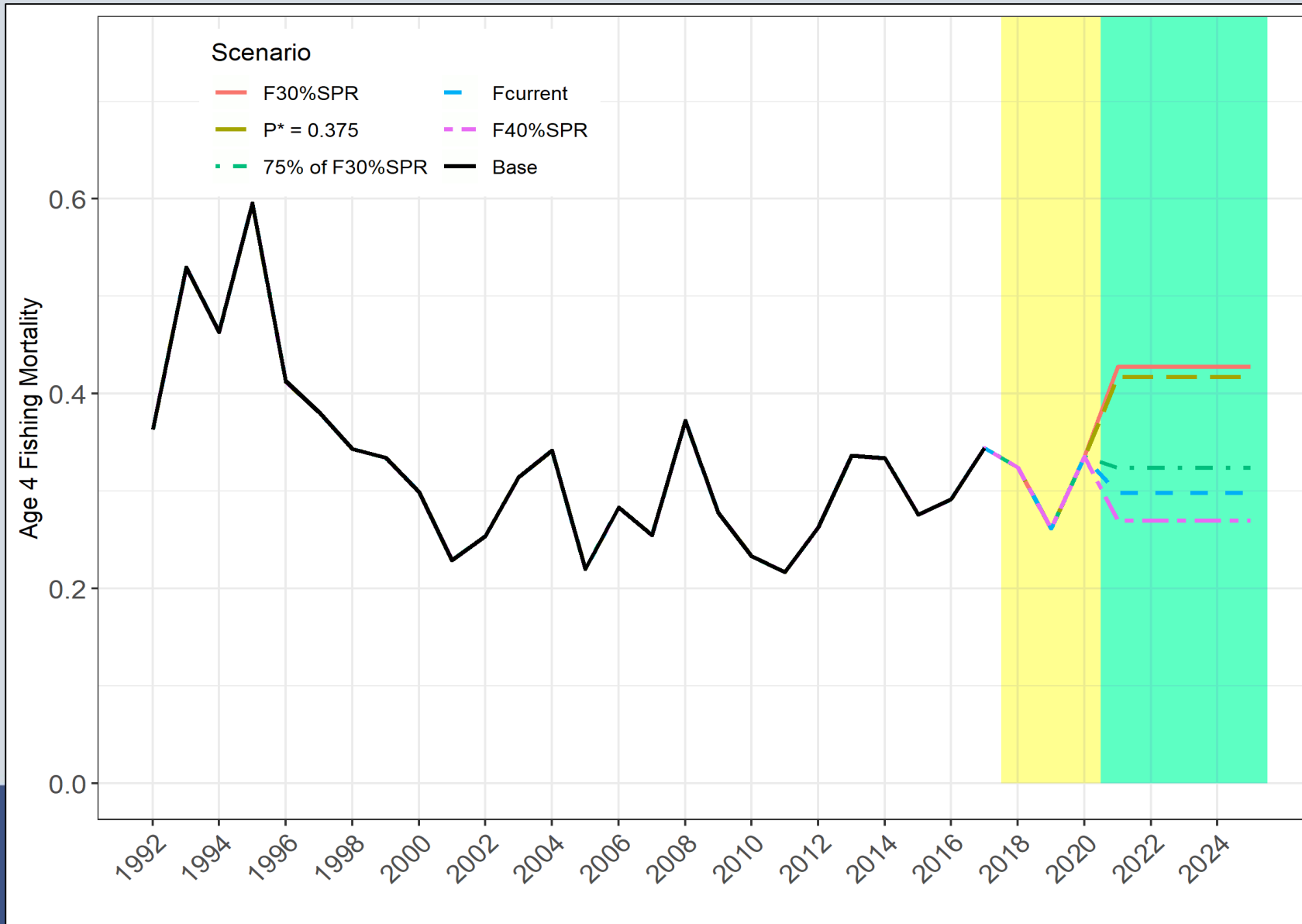
Projection Scenarios:

Scenarios determined by the TORs, S64 analysts, and joint SSC's for a stock not overfished nor undergoing overfishing

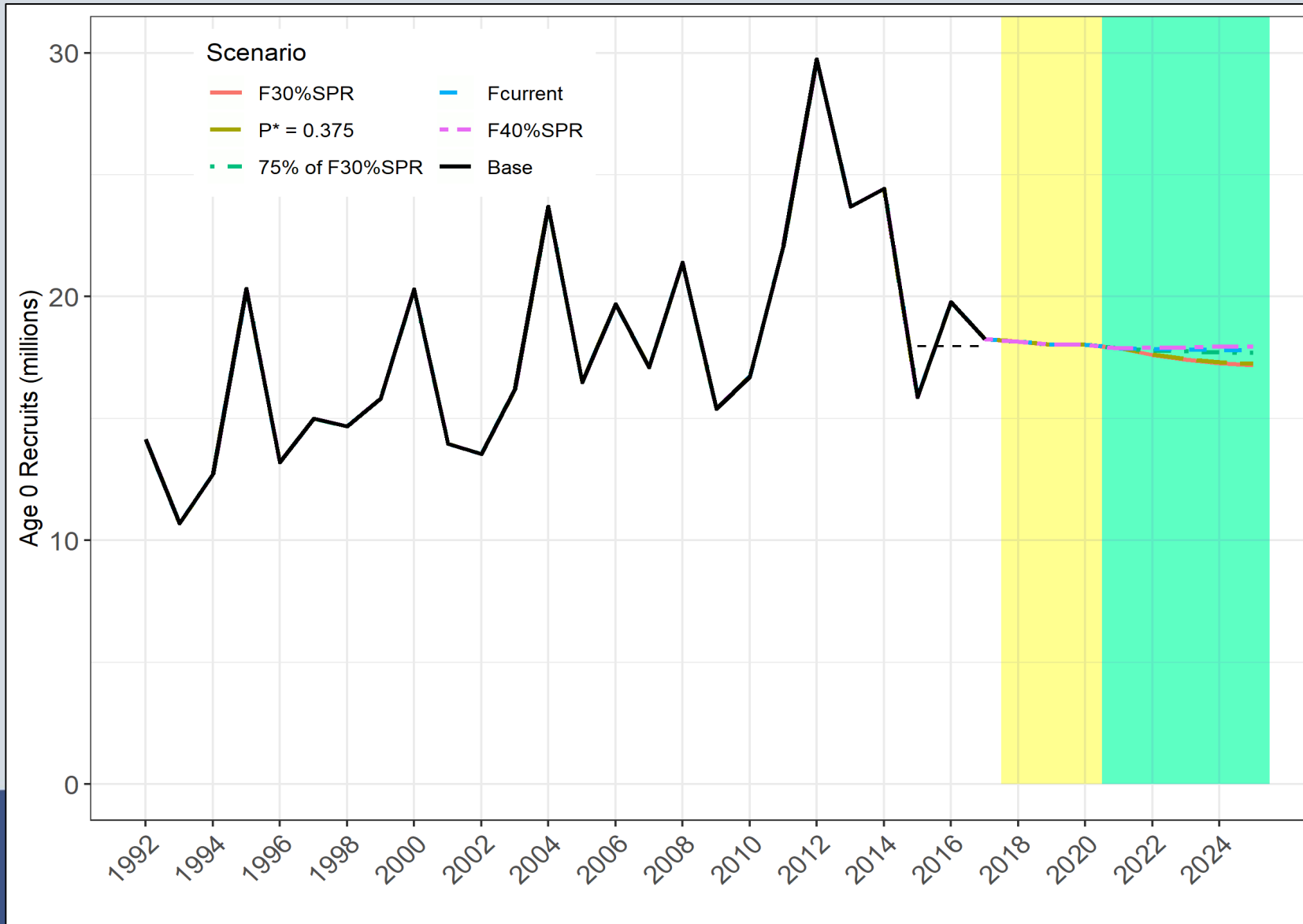
1. $F = F_{MSY} = F_{30\%SPR}$
2. $F = 97.5\%$ of F_{MSY} ($P^* = 0.375$)
3. $F = 75\%$ of $F_{30\%SPR}$
4. $F = F_{current}$
5. $F = F_{40\%SPR}$ (F_{OY} in S27A)



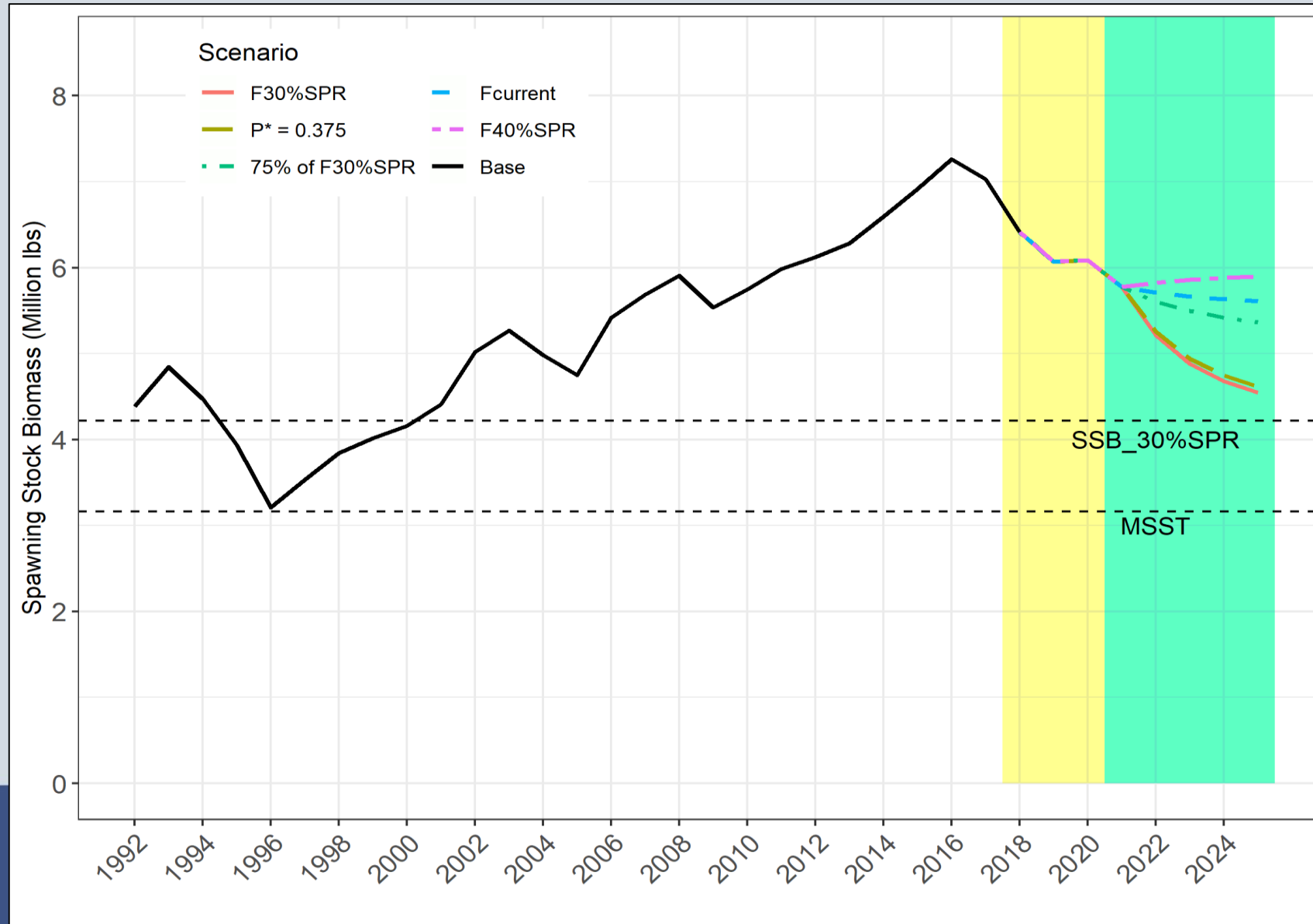
Projection Results: Fishing Mortality Rate



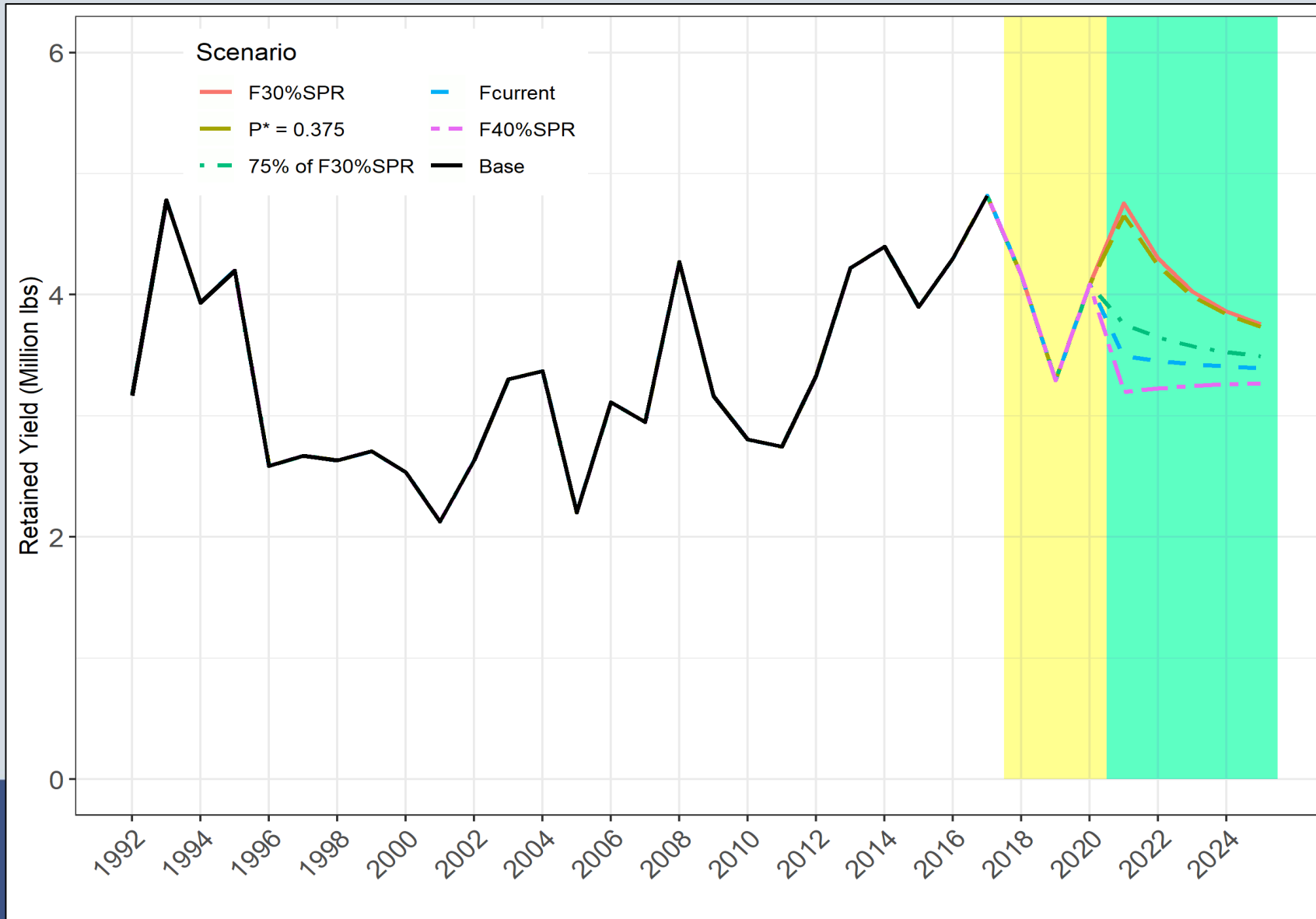
Projection Results: Recruitment



Projection Results: Spawning Stock Biomass



Projection Results: Retained Yield



Projection Results:

- “The SSCs recommended using the calculated P^* value of 37.5% to produce the ABCs for 2021-2025...”

$P^* = 0.375$				
Year	Recruits (millions)	Fishing Mortality Rate	Spawning Stock (million lbs)	Retained Yield (million lbs)
2018	18.159	0.324	6.416	4.161
2019	18.019	0.262	6.071	3.296
2020	18.026	0.336	6.088	4.084
2021	17.887	0.417	5.775	4.655
2022	17.625	0.417	5.256	4.242
2023	17.444	0.417	4.940	3.991
2024	17.322	0.417	4.745	3.836
2025	17.239	0.417	4.619	3.736



Projection Results:

- “...and also recommend that the Council consider adjusting the ACL or ACT for management uncertainty (e.g., 75% F30%SPR).”

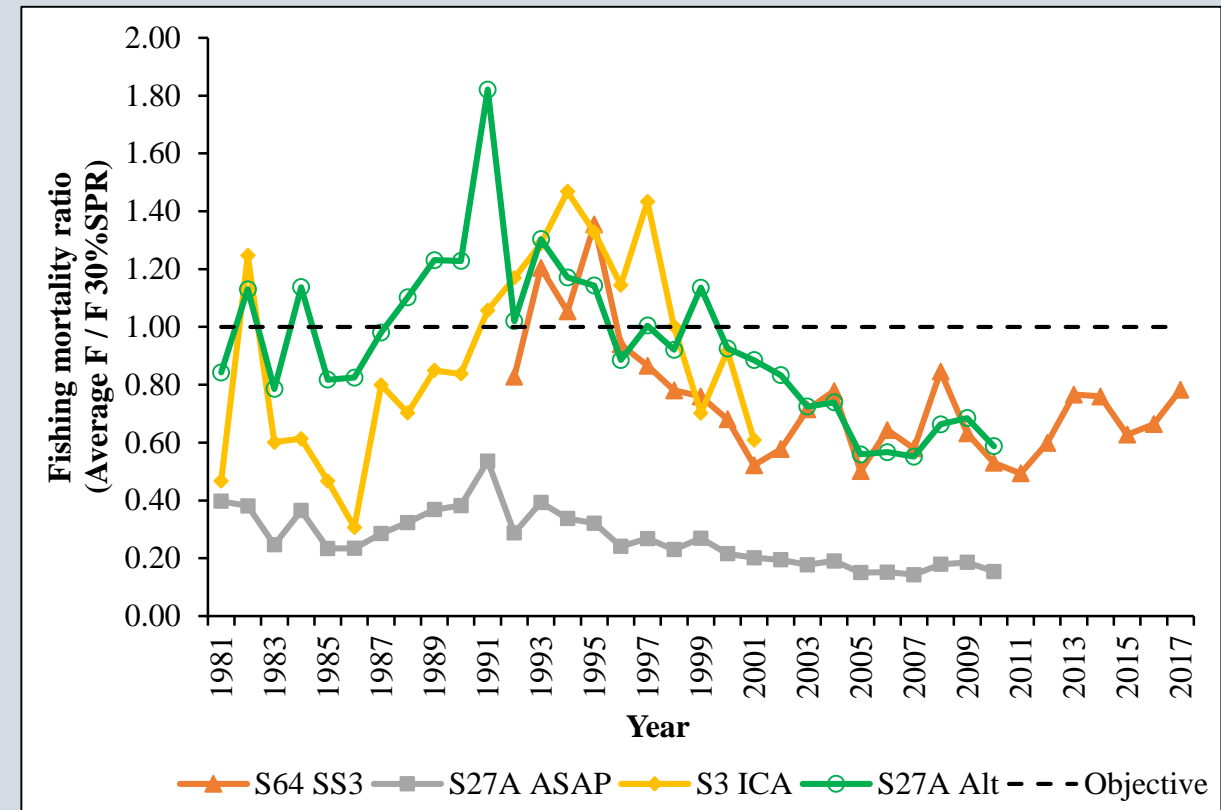
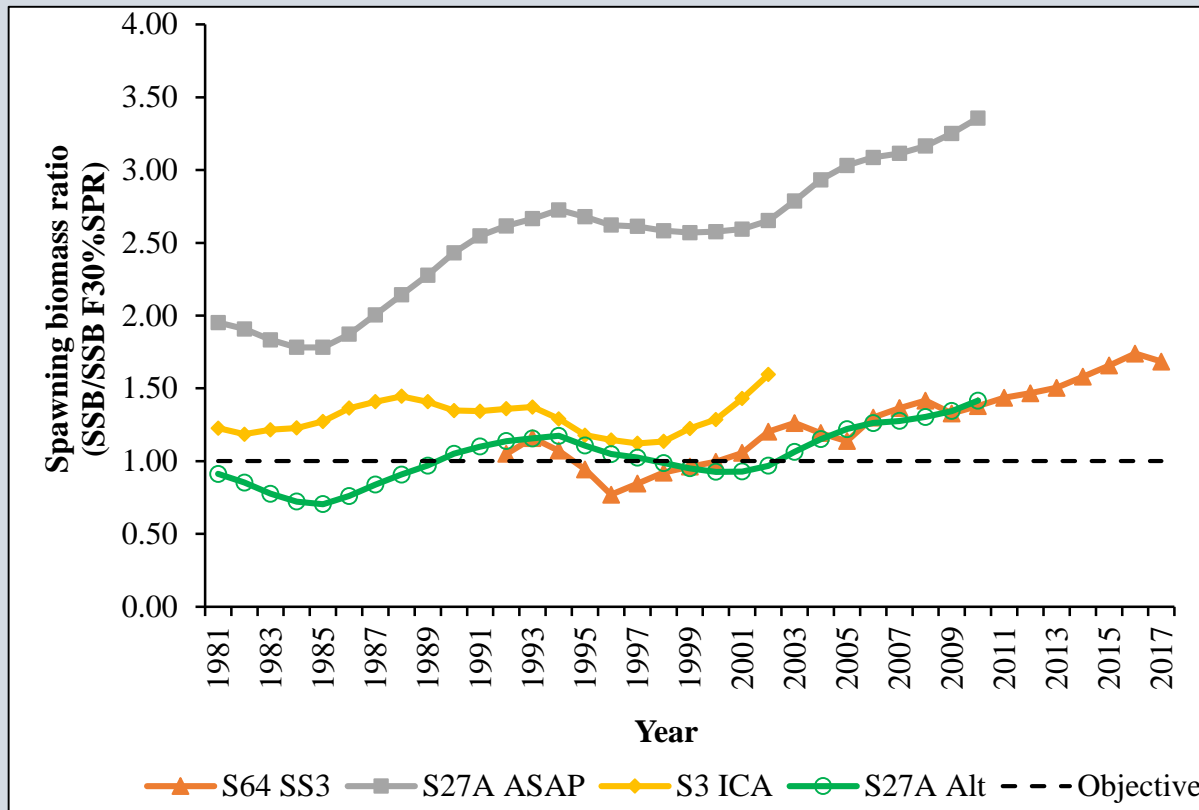
Retained yield (million lbs)					
Projection Scenario					
Year	F30%SPR	P* = 0.375	75% of F30%SPR	Fcurrent	F40%SPR
2018	4.161	4.161	4.161	4.161	4.161
2019	3.296	3.296	3.296	3.296	3.296
2020	4.084	4.084	4.084	4.084	4.084
2021	4.754	4.655	3.758	3.494	3.199
2022	4.301	4.242	3.649	3.454	3.227
2023	4.028	3.991	3.576	3.427	3.247
2024	3.863	3.836	3.526	3.408	3.259
2025	3.756	3.736	3.492	3.393	3.267



SEDAR 64: Yellowtail Snapper Comparison to Previous Assessments



Comparison to Previous Assessments and Alternative 27A Model



S64_SS3	– SEDAR 64 Final Model
S27A ASAP	– SEDAR 27A Final Model
S3_ICA	– SEDAR 3 Final Model
S27A_Alt	– Alternative SEDAR 27A Model with additional weight at age matrices

Yellowtail Snapper Management Quantities

Quantity	Definitions		S27A_Final (CHTS)	S64_Final (MRIP)
2010 Conditions	SSB ₂₀₁₀	SSB in 2010	22.73 mp	5.79 mp
	F ₂₀₁₀	age-4 F in 2010	0.04 yr ⁻¹	0.23 yr ⁻¹
F _{30%SPR}	The fishing mortality rate associated with 30% SPR		0.29 yr ⁻¹	0.44 yr ⁻¹
SSB _{30%SPR}	Spawning Stock Biomass associated with 30% SPR		6.77 mp	4.20 mp
Total Yield @ F _{30%SPR}	Equilibrium Value		3.69 mp	3.67 mp
MFMT (Max Fishing Mortality)	F _{30%SPR}	Equilibrium Value		0.44 yr ⁻¹
	F _{MSY}	Empirical Distribution	0.24 yr ⁻¹	
OFL (Overfishing Limit)	Retained Yield @ F _{30%SPR}	Average of 2021-2025 Projections		4.14 mp
	98% of the Total Yield @ F _{MSY}	Stochastic Projections (P*=0.5)	4.51 mp	
ABC (Acceptable Biological Catch)	Based on OFL distribution when P* = 0.375	Average of 2021-2025 Projections		4.09 mp
	Based on OFL distribution when P* = 0.40		4.05 mp	
ACL (Annual Catch Limit)	Gulf (25%)	11% below the Gulf apportionment of ABC	901,125 lbs	?
	Atlantic (75%)	Equal to the Atlantic apportionment of ABC	3,037,500 lbs	?



Yellowtail Snapper Management Quantities

Quantity	Definitions		S27A_Final (CHTS)	S64_Final (MRIP)
2010 Conditions	SSB ₂₀₁₀	SSB in 2010	22.73 mp	5.79 mp
	F ₂₀₁₀	age-4 F in 2010	0.04 yr ⁻¹	0.23 yr ⁻¹
F _{30%SPR}	The fishing mortality rate associated with 30% SPR		0.29 yr ⁻¹	0.44 yr ⁻¹
SSB _{30%SPR}	Spawning Stock Biomass associated with 30% SPR		6.77 mp	4.20 mp
Total Yield @ F _{30%SPR}	Equilibrium Value		3.69 mp	3.67 mp
MFMT (Max Fishing Mortality)	F _{30%SPR}	Equilibrium Value		0.44 yr ⁻¹
	F _{MSY}	Empirical Distribution	0.24 yr ⁻¹	
OFL (Overfishing Limit)	Retained Yield @ F _{30%SPR}	Average of 2021-2025 Projections		4.14 mp
	98% of the Total Yield @ F _{MSY}	Stochastic Projections (P*=0.5)	4.51 mp	
ABC (Acceptable Biological Catch)	Based on OFL distribution when P* = 0.375	Average of 2021-2025 Projections		4.09 mp
	Based on OFL distribution when P* = 0.40		4.05 mp	
ACL (Annual Catch Limit)	Gulf (25%)	11% below the Gulf apportionment of ABC	901,125 lbs	?
	Atlantic (75%)	Equal to the Atlantic apportionment of ABC	3,037,500 lbs	?



Yellowtail Snapper Management Quantities

Quantity	Definitions		S27A_Final (CHTS)	S64_Final (MRIP)
2010 Conditions	SSB ₂₀₁₀	SSB in 2010	22.73 mp	5.79 mp
	F ₂₀₁₀	age-4 F in 2010	0.04 yr ⁻¹	0.23 yr ⁻¹
F _{30%SPR}	The fishing mortality rate associated with 30% SPR		0.29 yr ⁻¹	0.44 yr ⁻¹
SSB _{30%SPR}	Spawning Stock Biomass associated with 30% SPR		6.77 mp	4.20 mp
Total Yield @ F _{30%SPR}	Equilibrium Value		3.69 mp	3.67 mp
MFMT (Max Fishing Mortality)	F _{30%SPR}	Equilibrium Value		0.44 yr ⁻¹
	F _{MSY}	Empirical Distribution	0.24 yr ⁻¹	
OFL (Overfishing Limit)	Retained Yield @ F _{30%SPR}	Average of 2021-2025 Projections		4.14 mp
	98% of the Total Yield @ F _{MSY}	Stochastic Projections (P*=0.5)	4.51 mp	
ABC (Acceptable Biological Catch)	Based on OFL distribution when P* = 0.375	Average of 2021-2025 Projections		4.09 mp
	Based on OFL distribution when P* = 0.40		4.05 mp	
ACL (Annual Catch Limit)	Gulf (25%)	11% below the Gulf apportionment of ABC	901,125 lbs	?
	Atlantic (75%)	Equal to the Atlantic apportionment of ABC	3,037,500 lbs	?



Yellowtail Snapper Management Quantities

Quantity	Definitions		S27A_Final (CHTS)	S64_Final (MRIP)
2010 Conditions	SSB ₂₀₁₀	SSB in 2010	22.73 mp	5.79 mp
	F ₂₀₁₀	age-4 F in 2010	0.04 yr ⁻¹	0.23 yr ⁻¹
F _{30%SPR}	The fishing mortality rate associated with 30% SPR		0.29 yr ⁻¹	0.44 yr ⁻¹
SSB _{30%SPR}	Spawning Stock Biomass associated with 30% SPR		6.77 mp	4.20 mp
Total Yield @ F _{30%SPR}	Equilibrium Value		3.69 mp	3.67 mp
MFMT (Max Fishing Mortality)	F _{30%SPR}	Equilibrium Value		0.44 yr ⁻¹
	F _{MSY}	Empirical Distribution	0.24 yr ⁻¹	
OFL (Overfishing Limit)	Retained Yield @ F _{30%SPR}	Average of 2021-2025 Projections		4.14 mp
	98% of the Total Yield @ F _{MSY}	Stochastic Projections (P*=0.5)	4.51 mp	
ABC (Acceptable Biological Catch)	Based on OFL distribution when P* = 0.375	Average of 2021-2025 Projections		4.09 mp
	Based on OFL distribution when P* = 0.40		4.05 mp	
ACL (Annual Catch Limit)	Gulf (25%)	11% below the Gulf apportionment of ABC	901,125 lbs	?
	Atlantic (75%)	Equal to the Atlantic apportionment of ABC	3,037,500 lbs	?



Yellowtail Snapper Management Quantities

Quantity	Definitions		S27A_Final (CHTS)	S64_Final (MRIP)
2010 Conditions	SSB ₂₀₁₀	SSB in 2010	22.73 mp	5.79 mp
	F ₂₀₁₀	age-4 F in 2010	0.04 yr ⁻¹	0.23 yr ⁻¹
F _{30%SPR}	The fishing mortality rate associated with 30% SPR		0.29 yr ⁻¹	0.44 yr ⁻¹
SSB _{30%SPR}	Spawning Stock Biomass associated with 30% SPR		6.77 mp	4.20 mp
Total Yield @ F _{30%SPR}	Equilibrium Value		3.69 mp	3.67 mp
MFMT (Max Fishing Mortality)	F _{30%SPR}	Equilibrium Value		0.44 yr ⁻¹
	F _{MSY}	Empirical Distribution	0.24 yr ⁻¹	
OFL (Overfishing Limit)	Retained Yield @ F _{30%SPR}	Average of 2021-2025 Projections		4.14 mp
	98% of the Total Yield @ F _{MSY}	Stochastic Projections (P*=0.5)	4.51 mp	
ABC (Acceptable Biological Catch)	Based on OFL distribution when P* = 0.375	Average of 2021-2025 Projections		4.09 mp
	Based on OFL distribution when P* = 0.40		4.05 mp	
ACL (Annual Catch Limit)	Gulf (25%)	11% below the Gulf apportionment of ABC	901,125 lbs	?
	Atlantic (75%)	Equal to the Atlantic apportionment of ABC	3,037,500 lbs	?

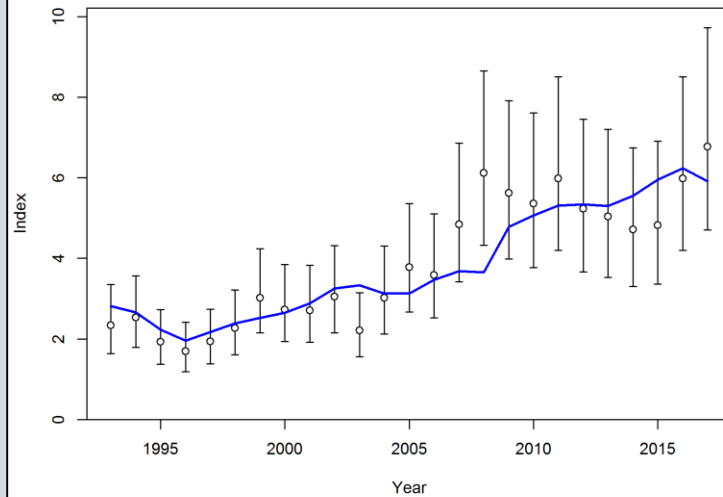


A close-up photograph of a fish, likely a species of wrasse, with a blue body and prominent white horizontal stripes. The fish has a large, round eye with a yellowish-orange iris and a slightly open mouth. A yellow speech bubble is positioned to the right of the fish's head, containing the text "Questions?". The background is a deep blue, suggesting an underwater environment. Other parts of similar fish are visible in the background, slightly out of focus.

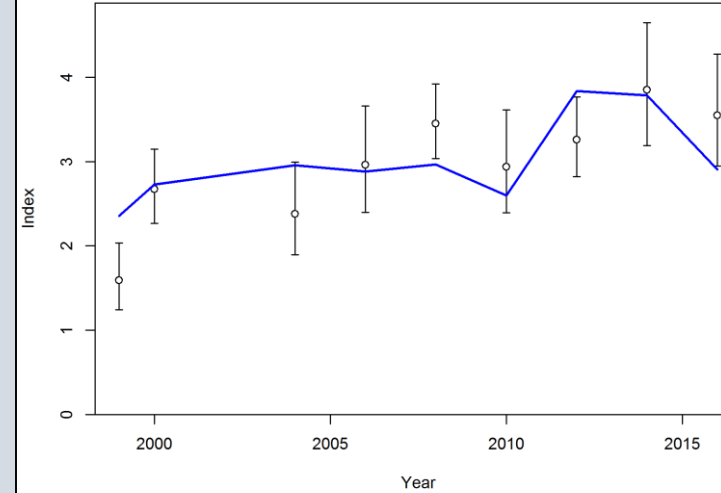
Questions?

Indices of Abundance and Biomass

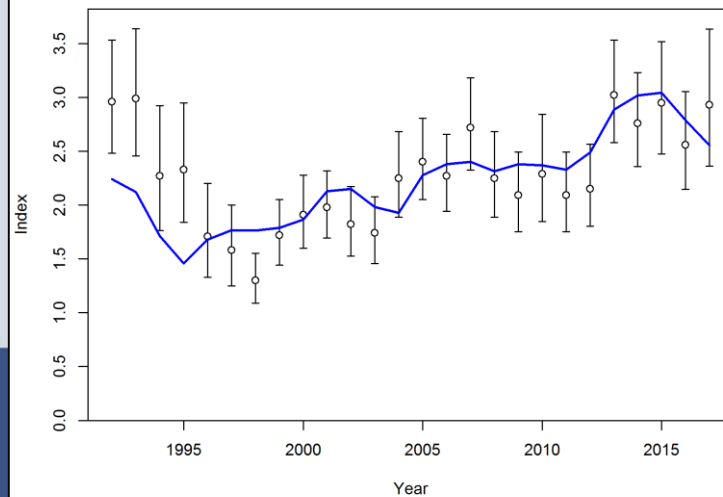
Commercial



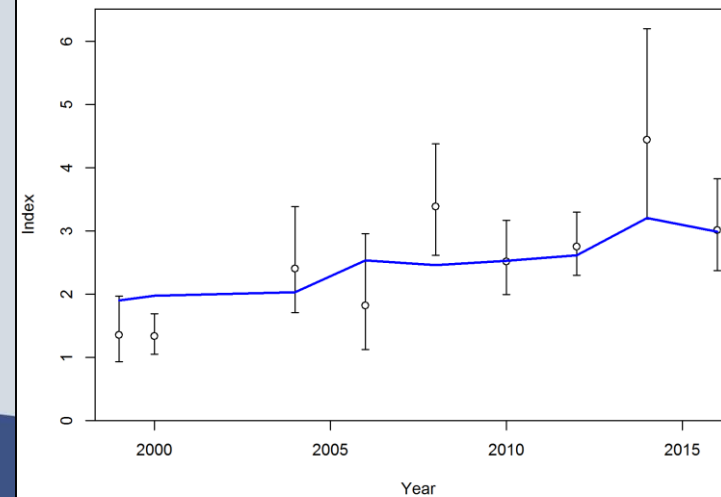
RVC Juvenile



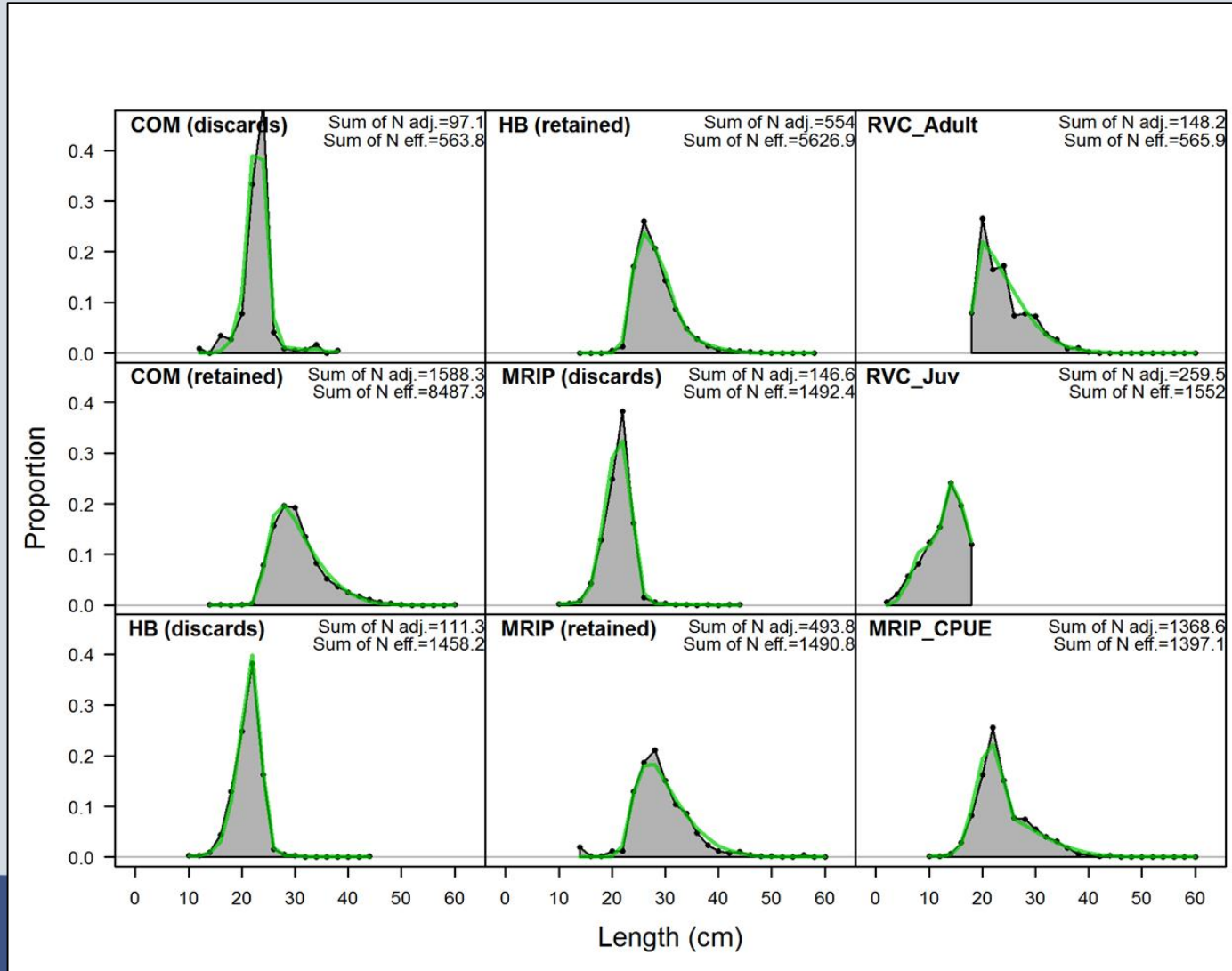
MRIP CPUE



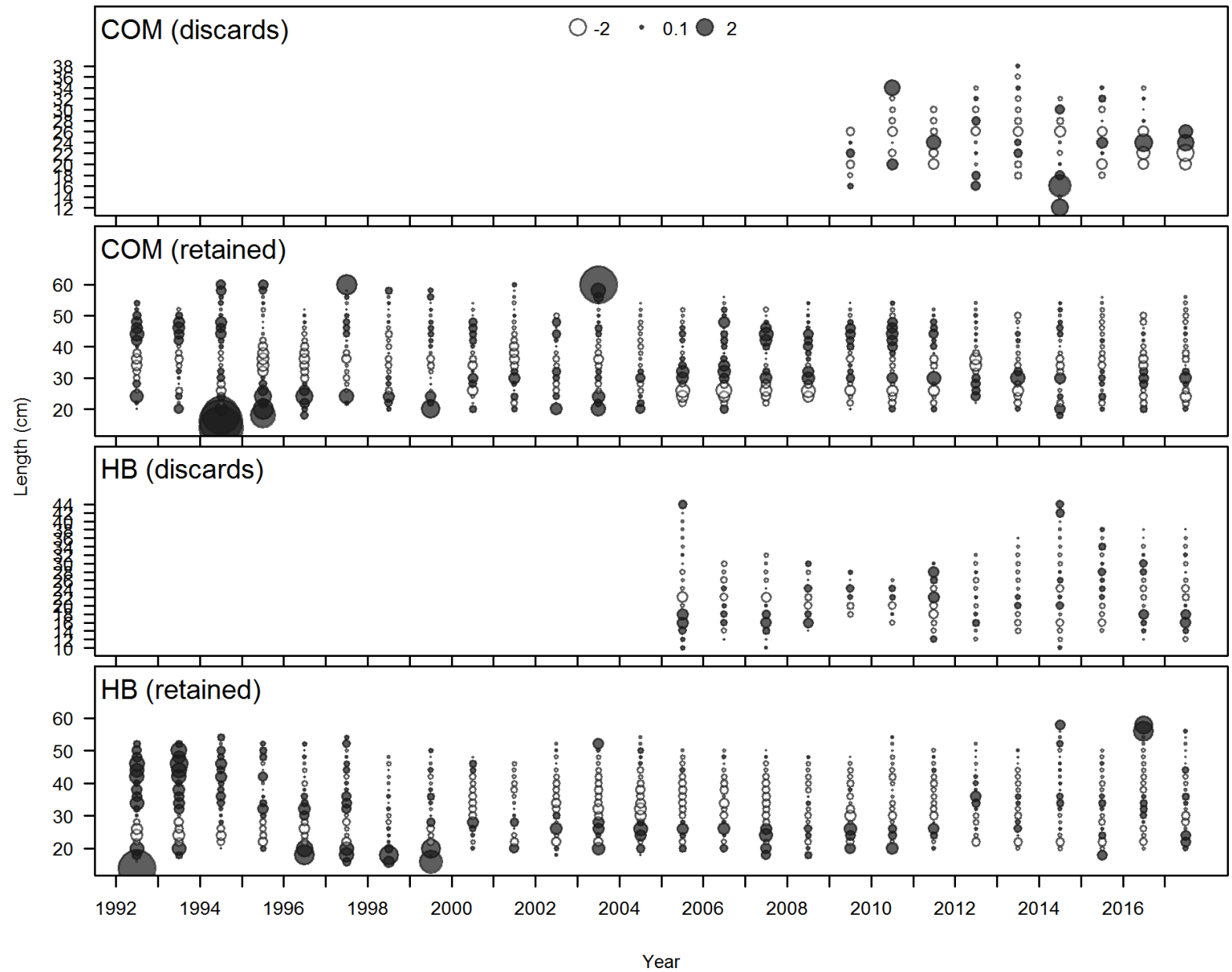
RVC Adult



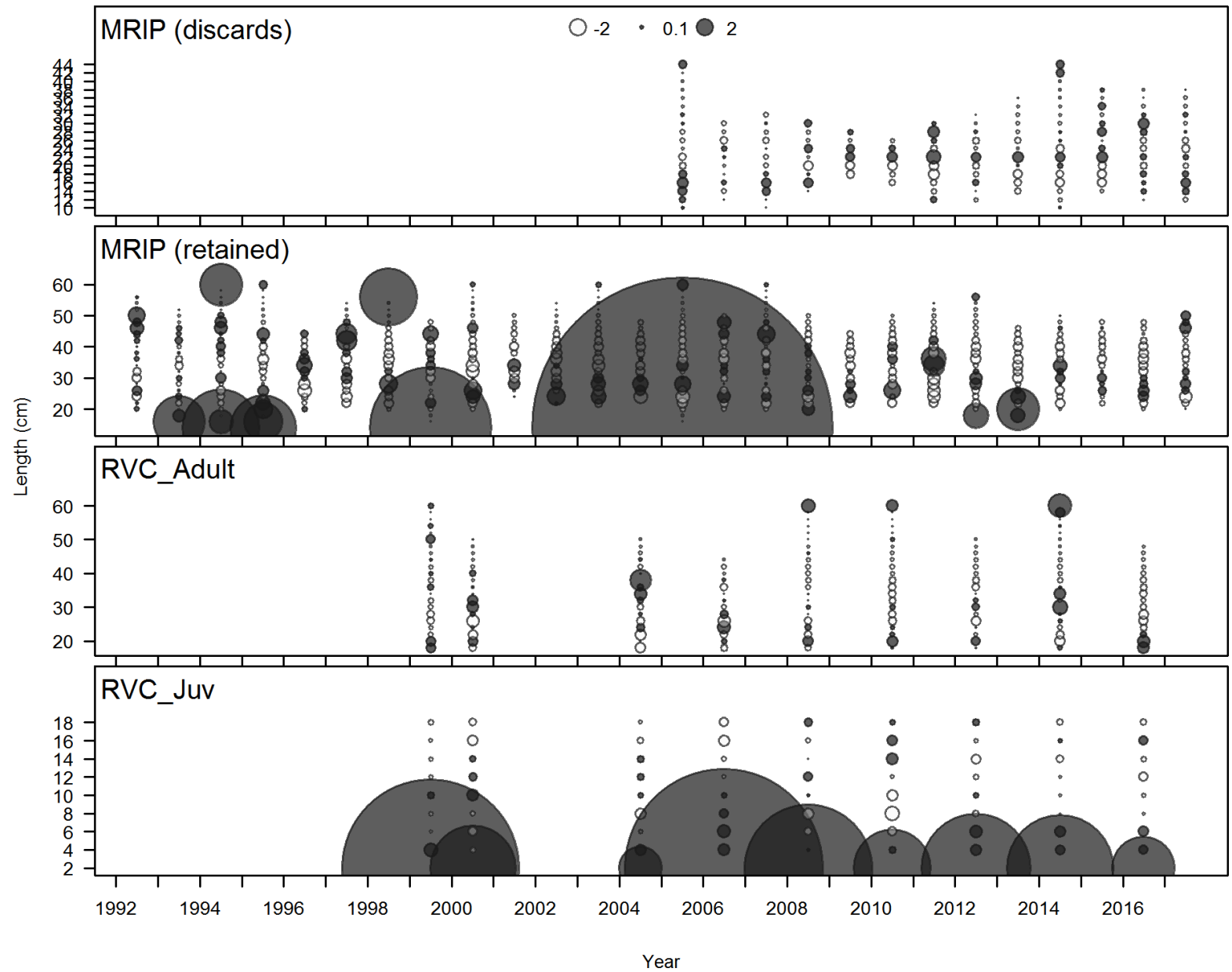
Length Composition Data



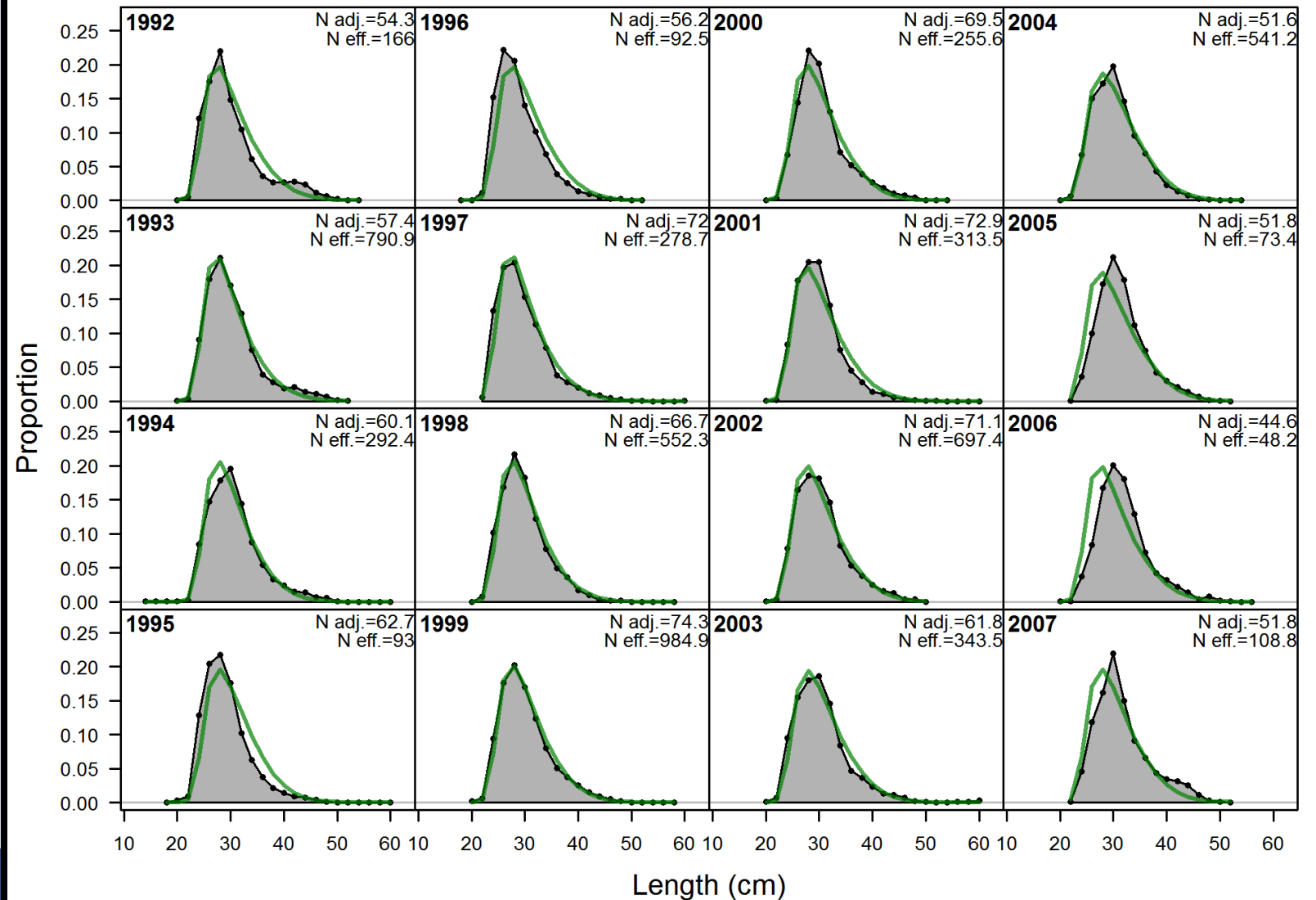
Model Fits: Pearson residuals from length comps



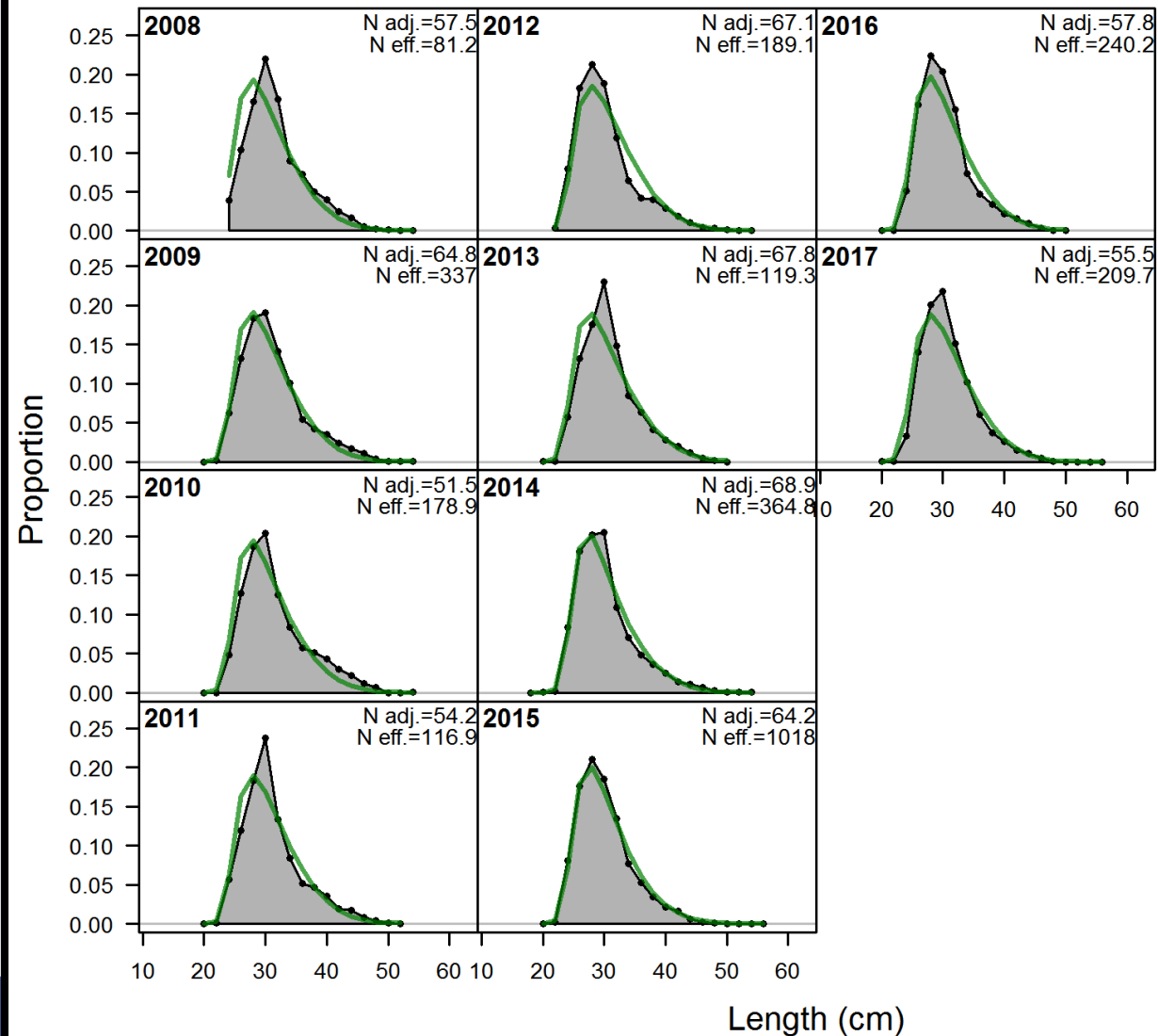
Model Fits: Pearson residuals from length comps



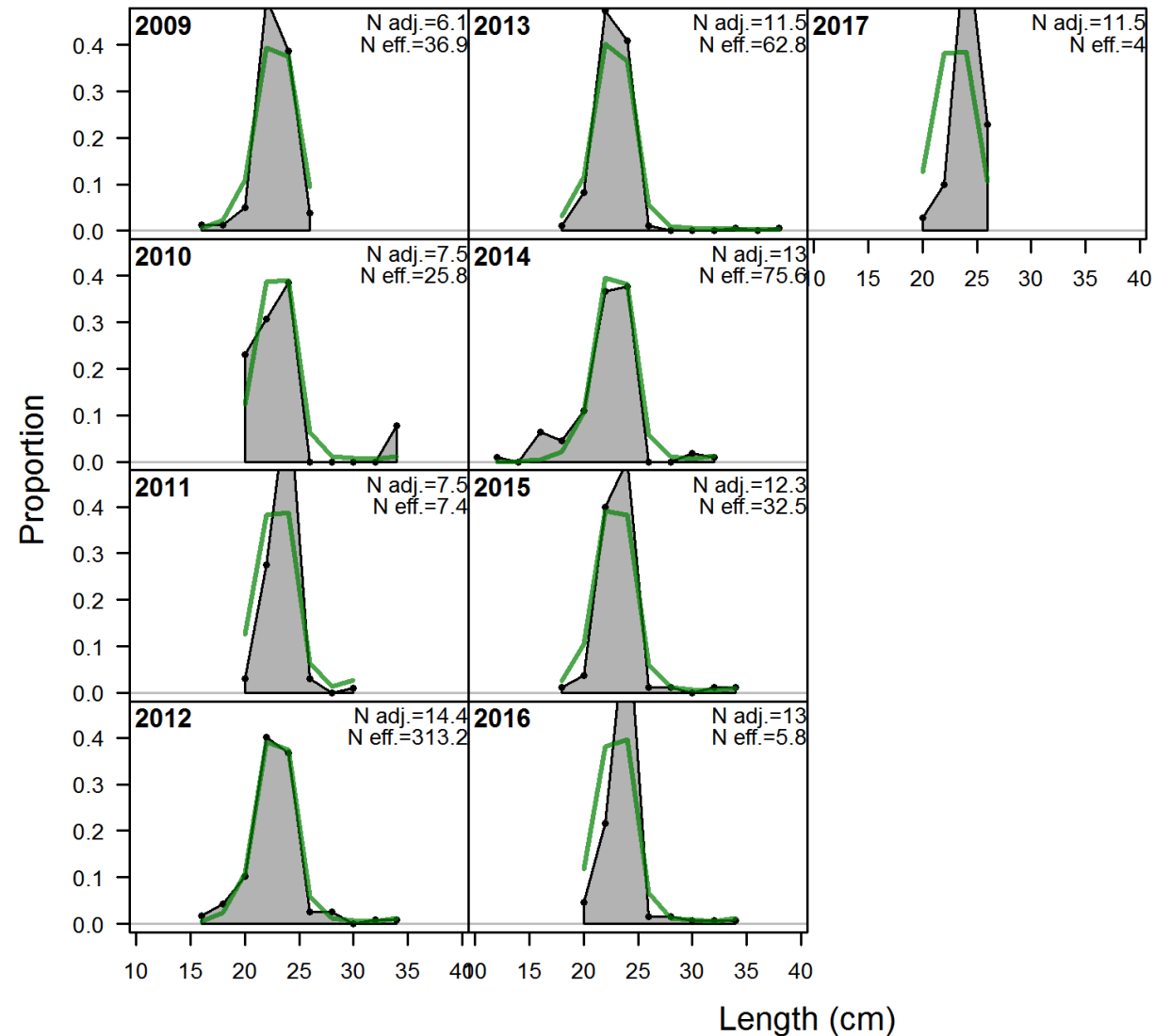
Model Fits: Lengths of Commercial Landings



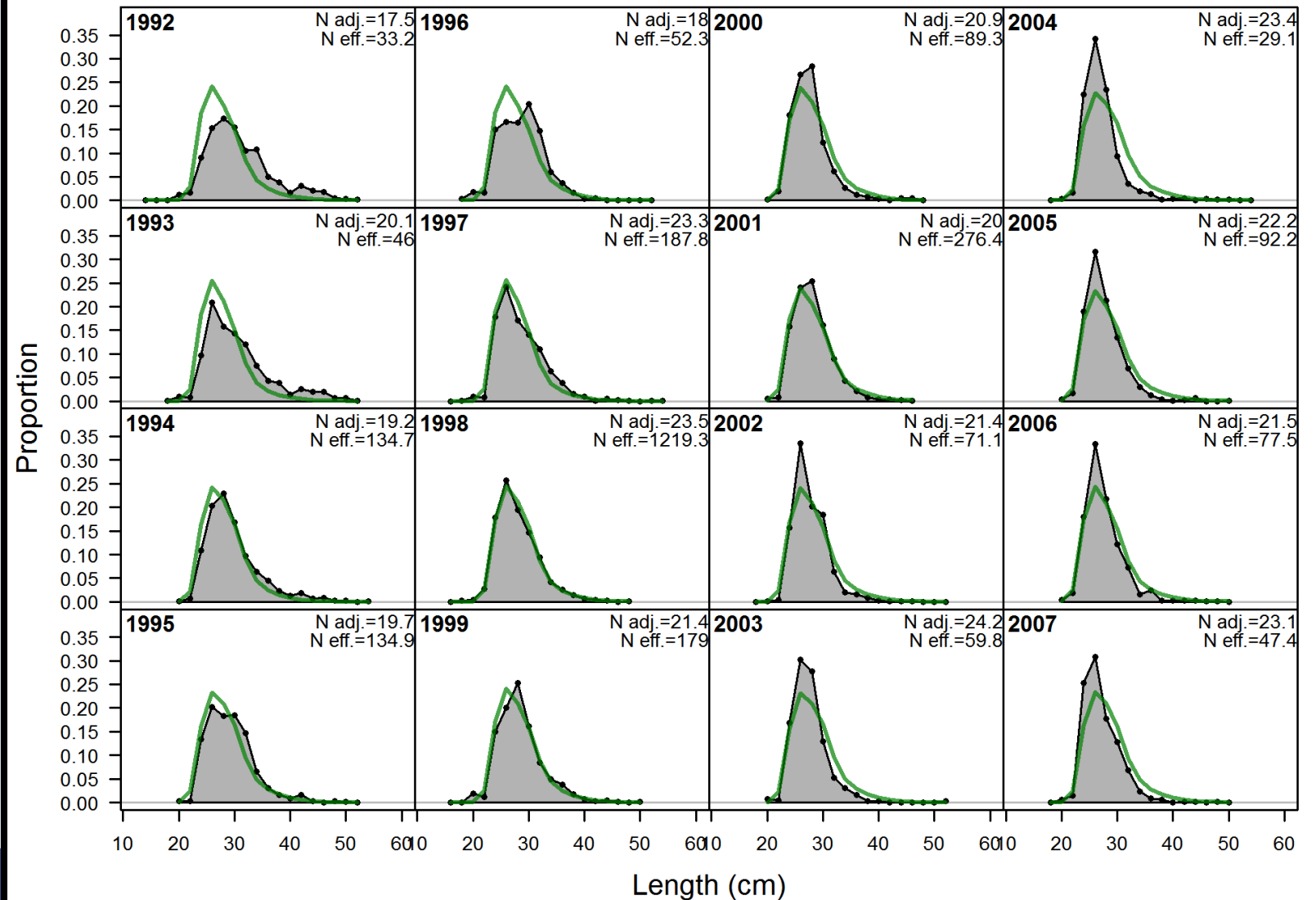
Model Fits: Lengths of Commercial Landings



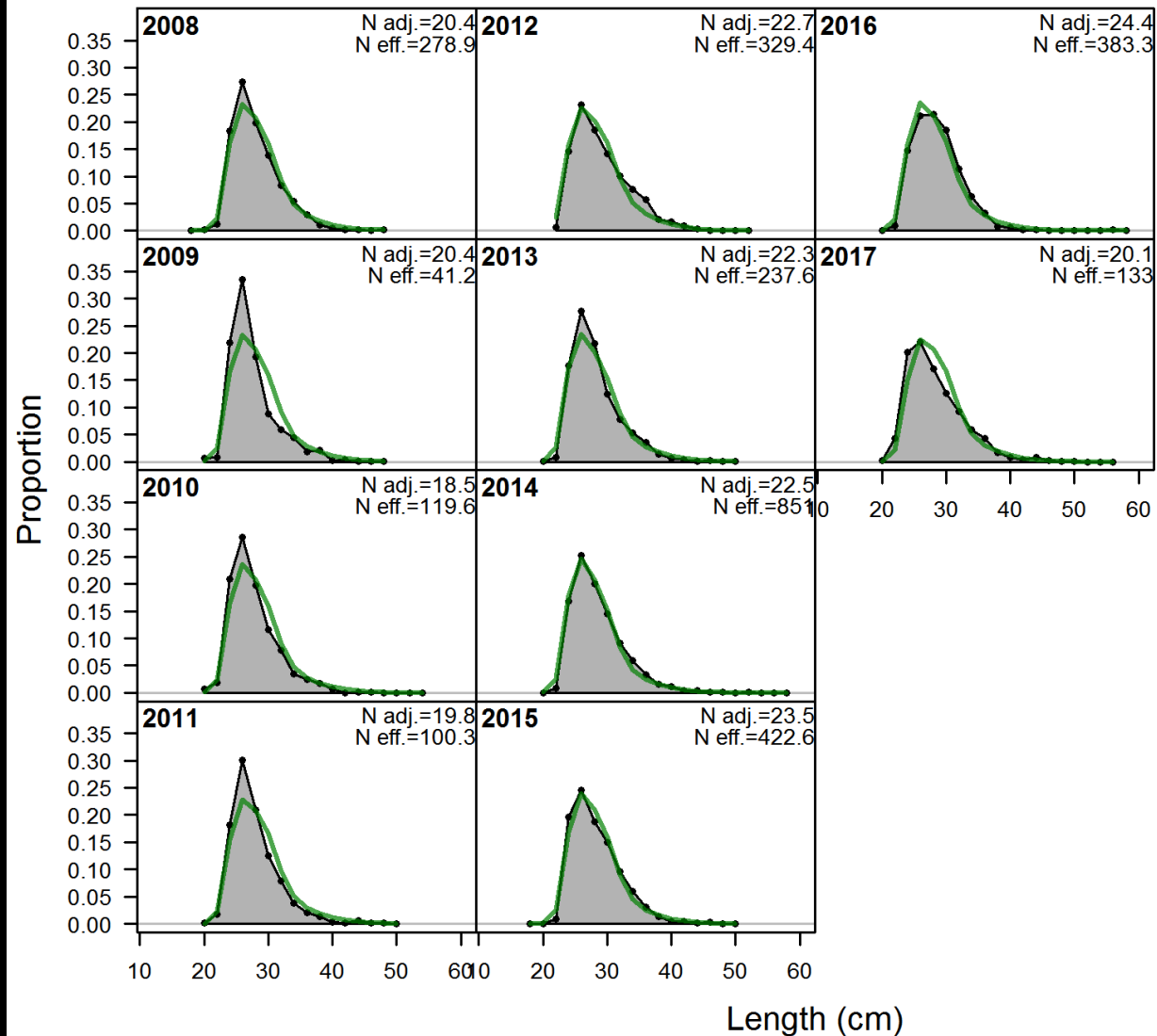
Model Fits: Lengths of Commercial Discards



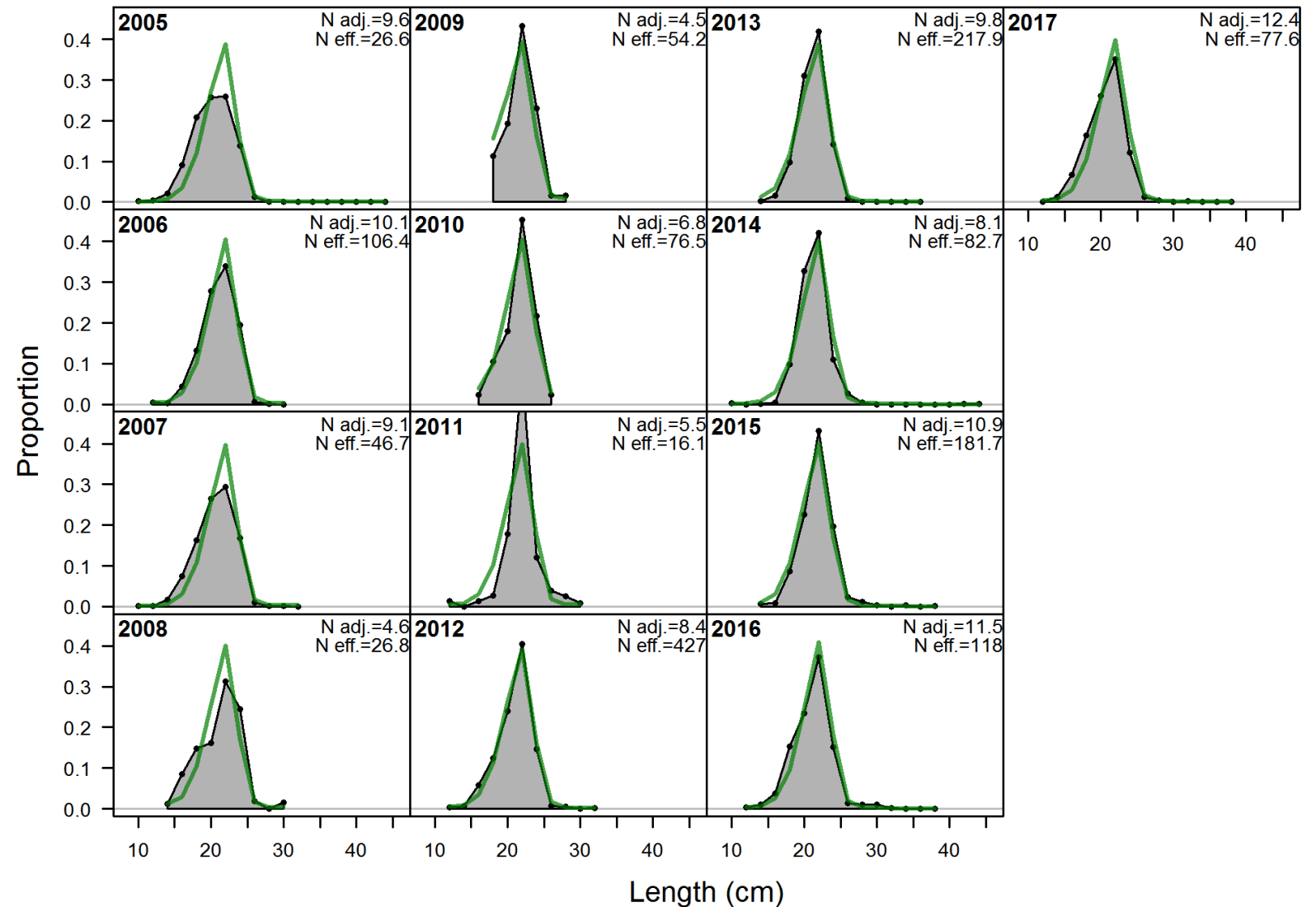
Model Fits: Lengths of Headboat Landings



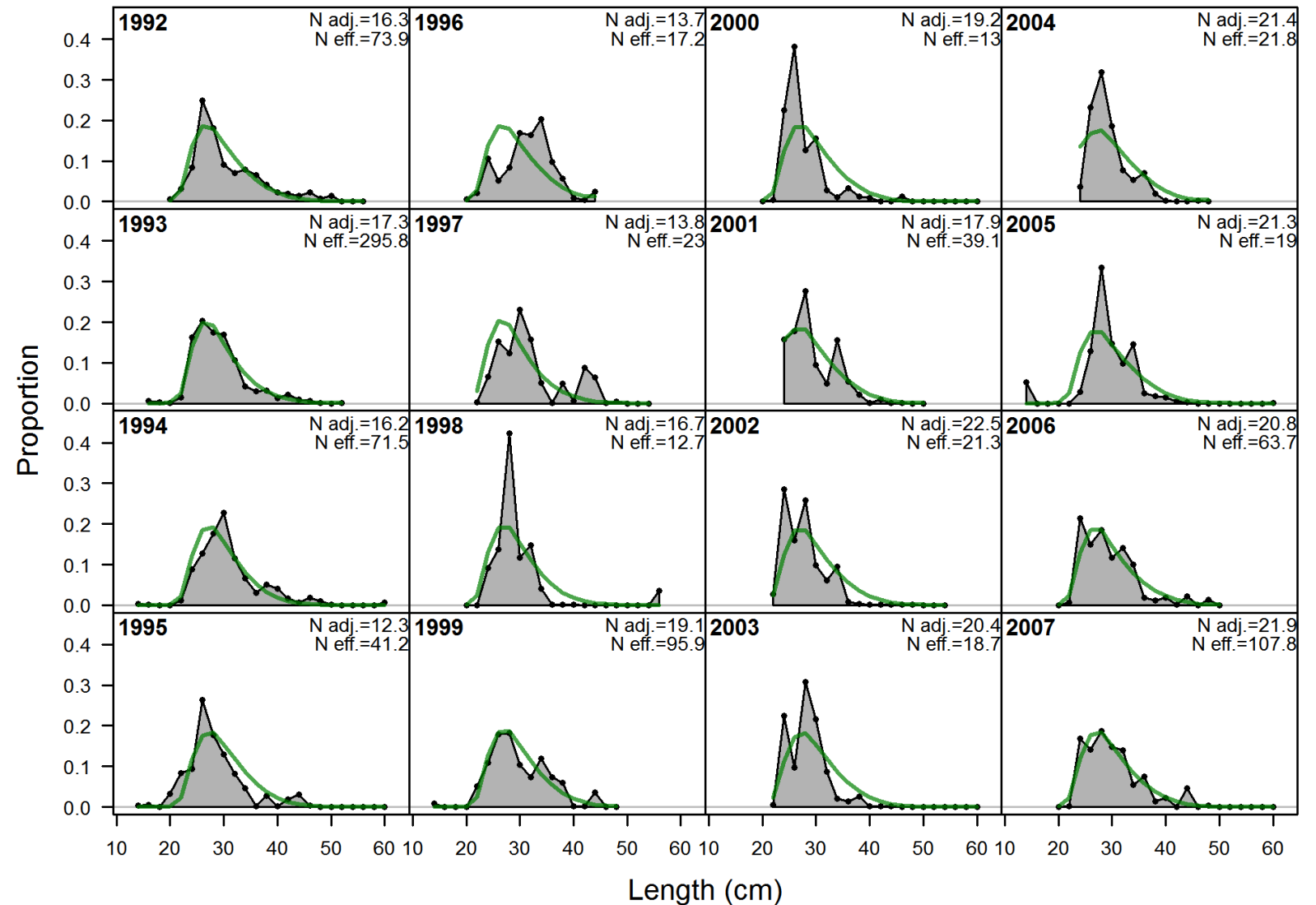
Model Fits: Lengths of Headboat Landings



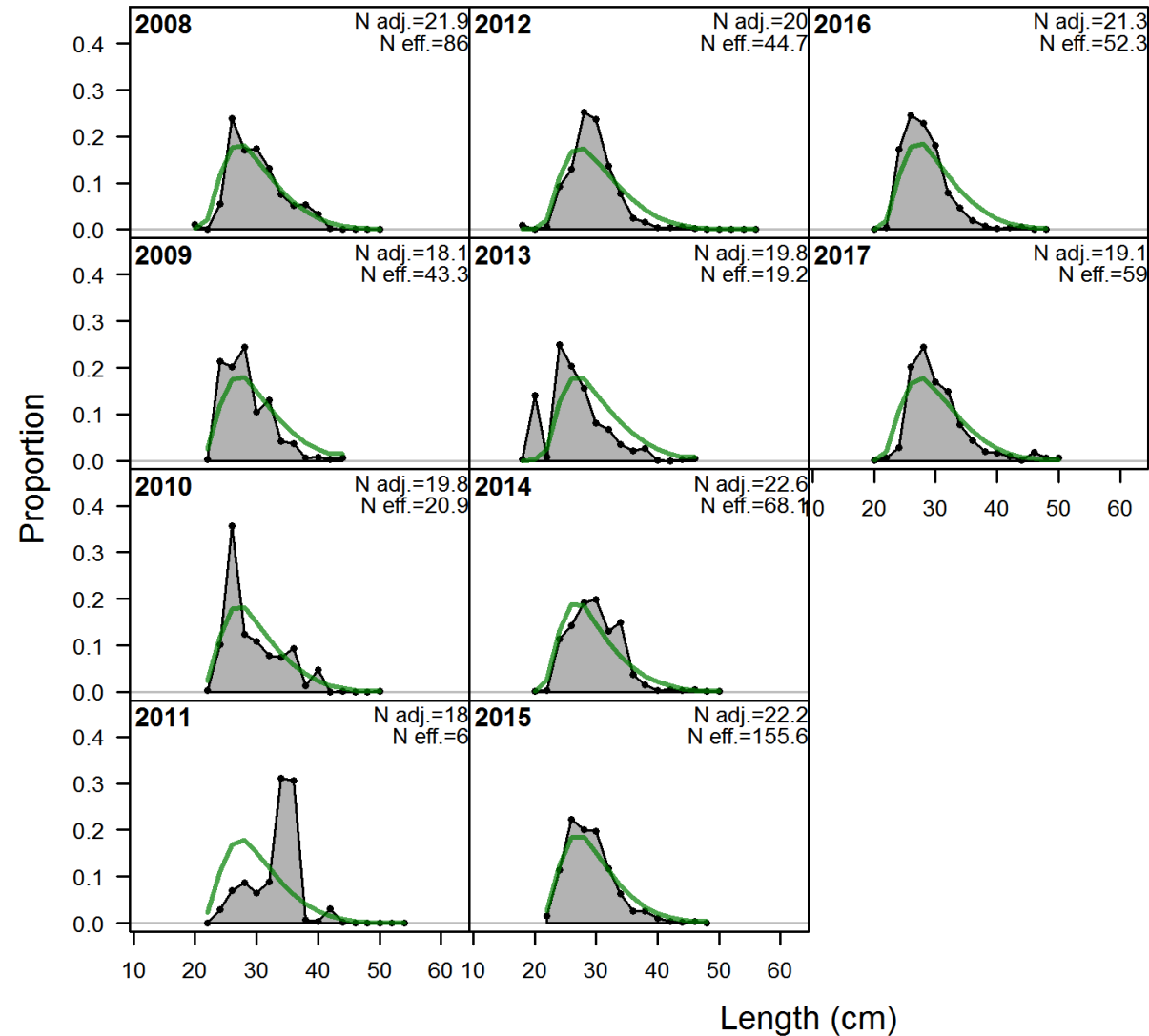
Model Fits: Lengths of Headboat Discards



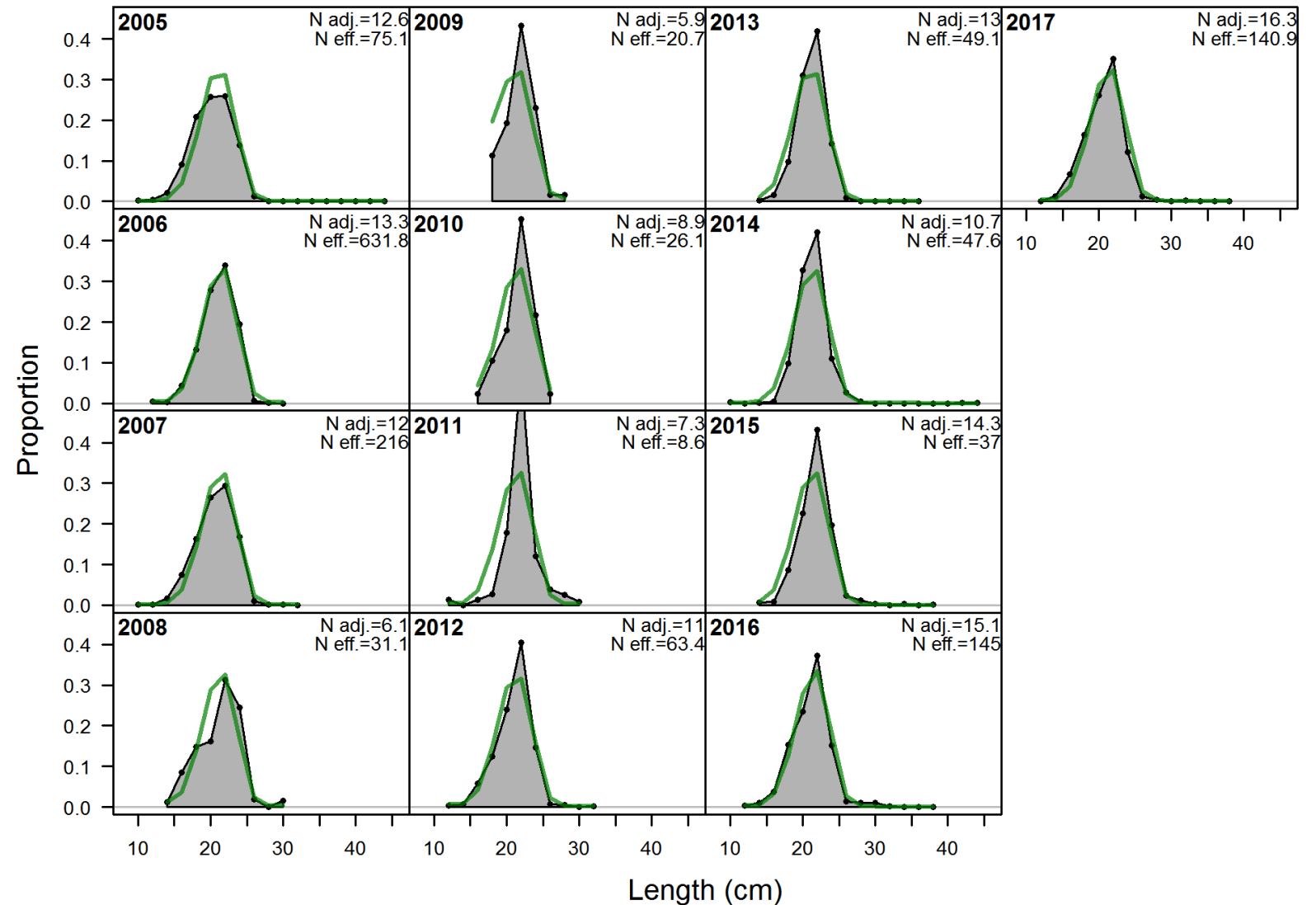
Model Fits: Lengths of MRIP Landings



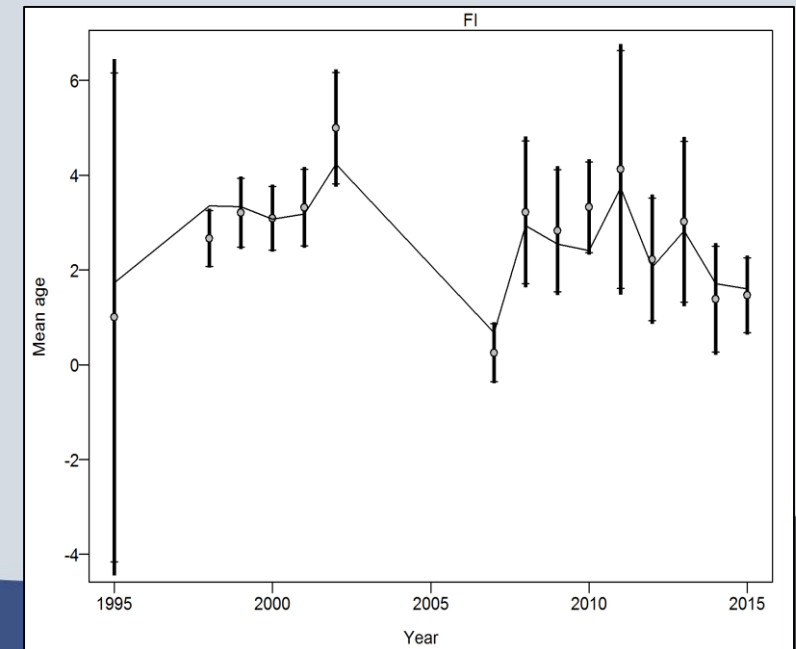
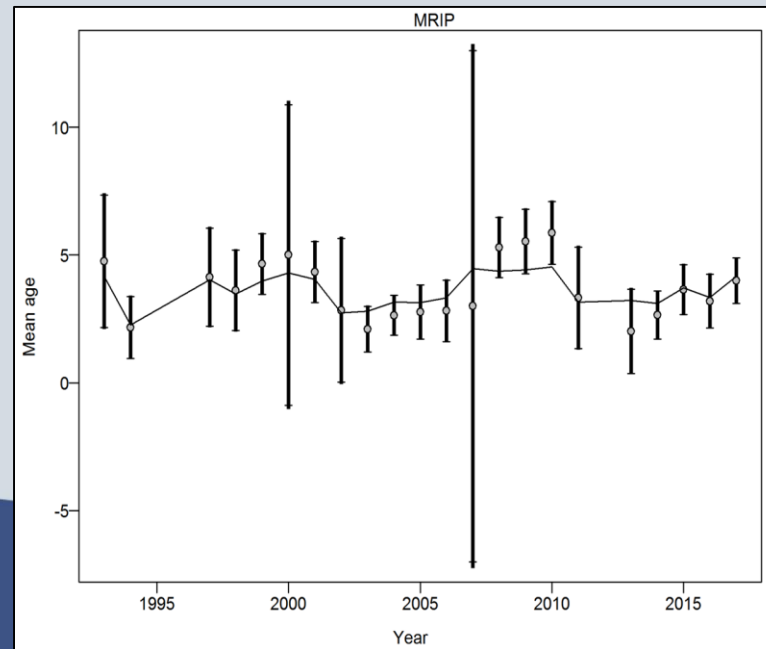
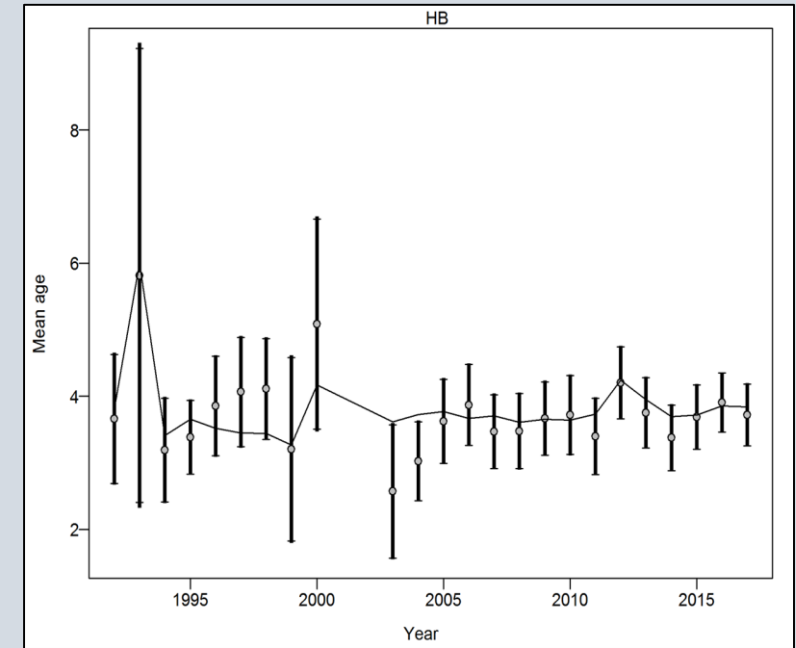
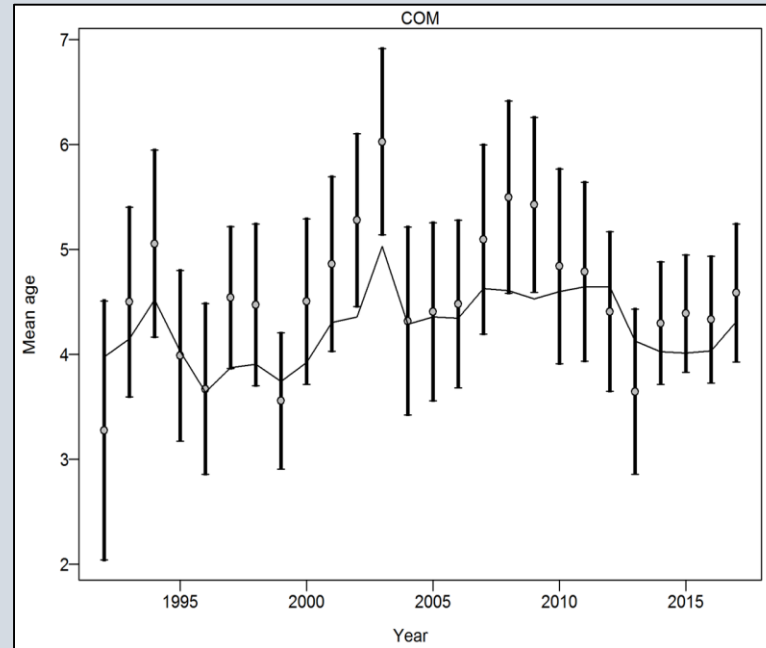
Model Fits: Lengths of MRIP Landings



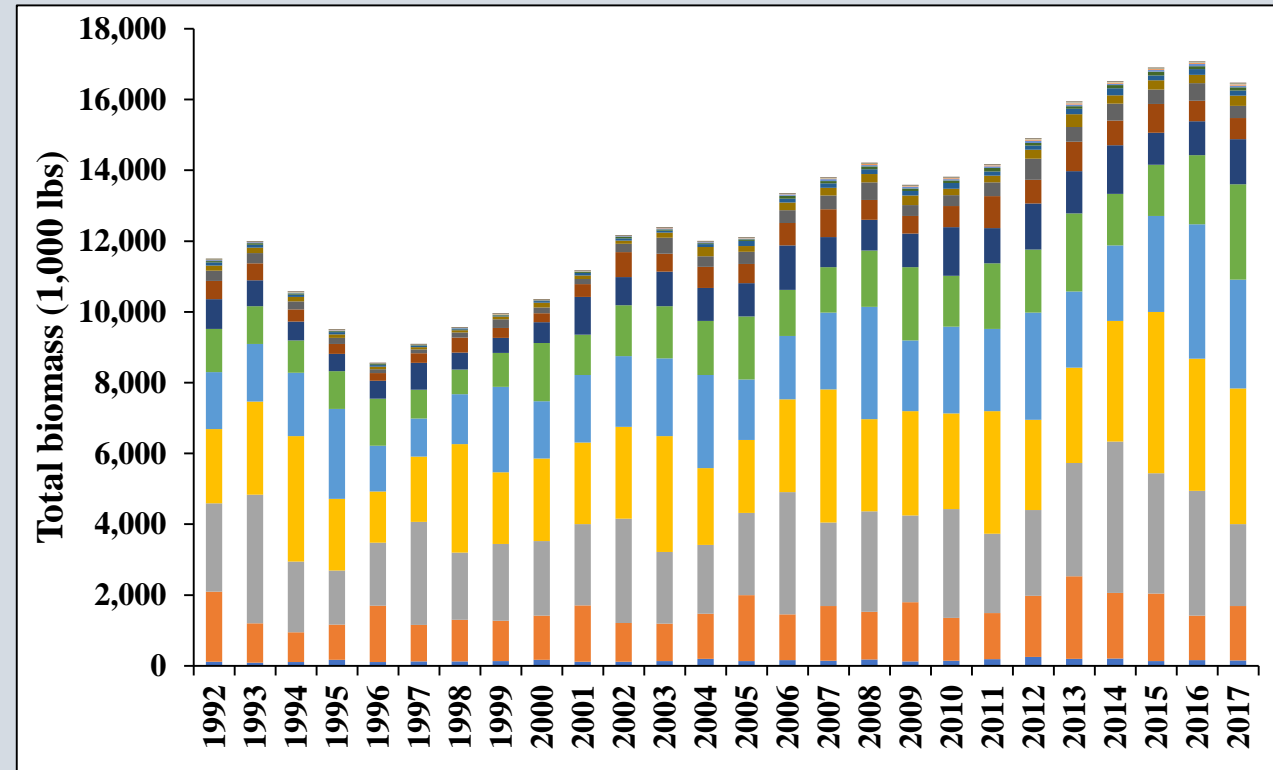
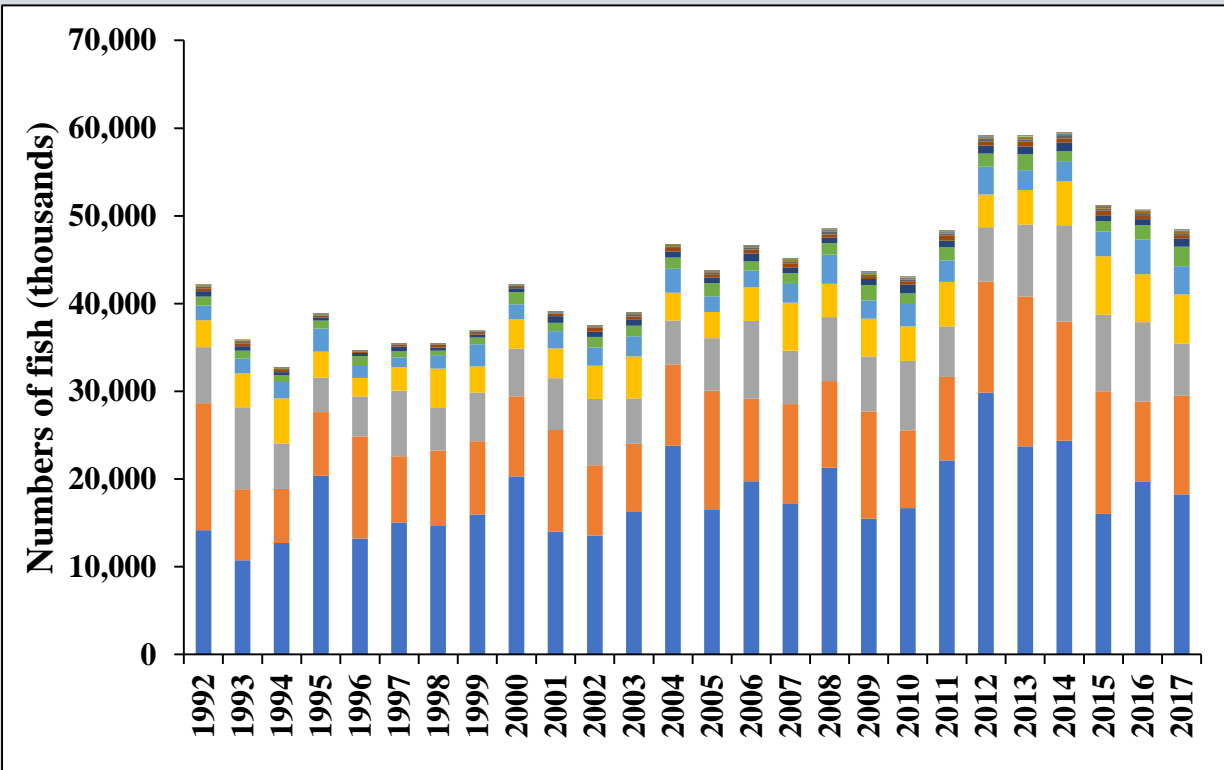
Model Fits: Lengths of MRIP Discards



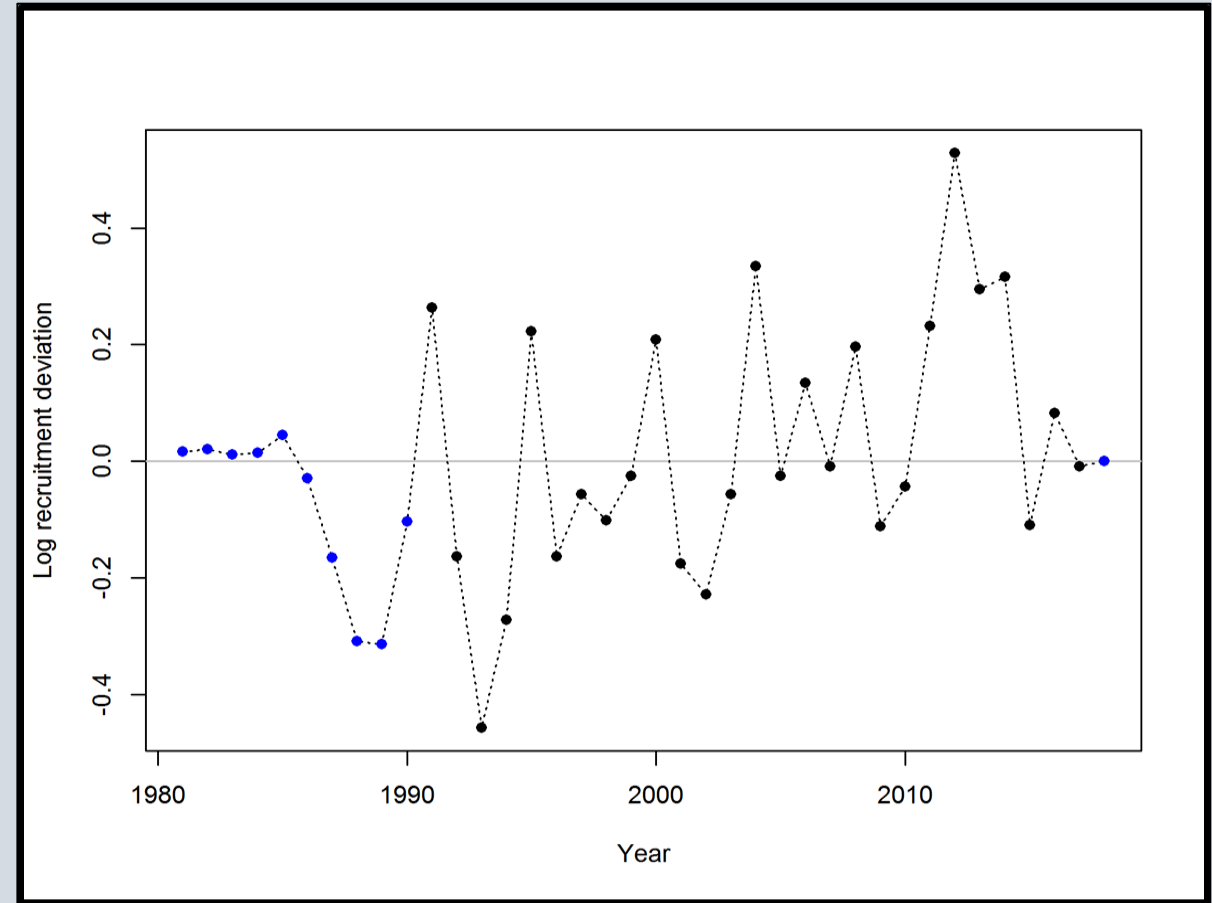
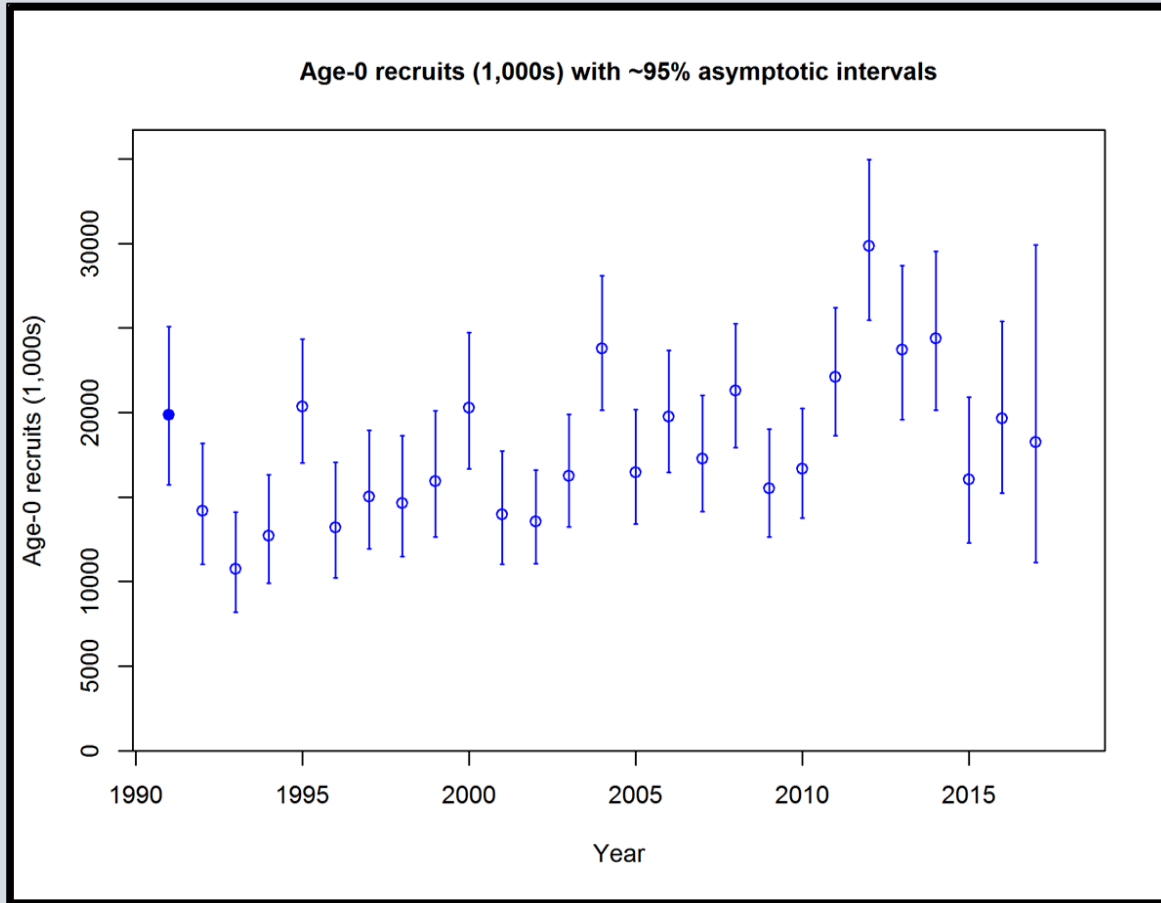
Age Composition



Numbers and Biomass at age



Estimated Recruitment



Projection Methodology:

- Deterministic projections were conducted to estimate landings for years 2021-2037.
- Structure and parameters of the projection model same as assessment model.
- Recruitment for first year of projection equal to 2015 – 2017 average (~18 million).
- Retained landings in numbers (rec fleets) and metric tons (com fleet) were incorporated for interim years 2018 and 2019. Landings for 2020 were assumed equal to the 2017 – 2019 average.
- An iterative method (provided by the SEFSC) specifies fishing mortality rates for each fleet per year (2021 – 2037) so that fleet allocations are kept constant each year.
- Transferring the model from SS version 3.30.14 to 3.30.13 was necessary because of SS 3.30.14 bug. Differences in Base Model output were negligible.



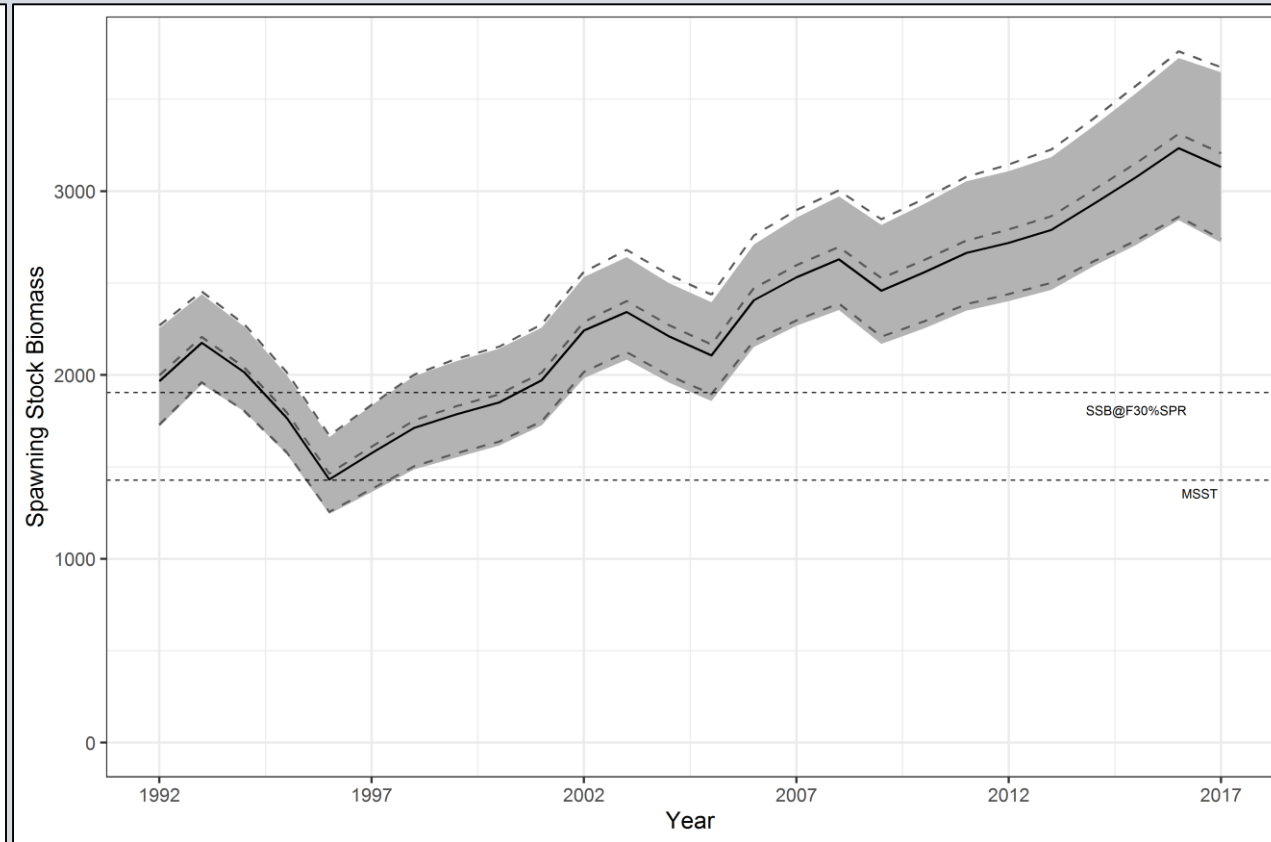
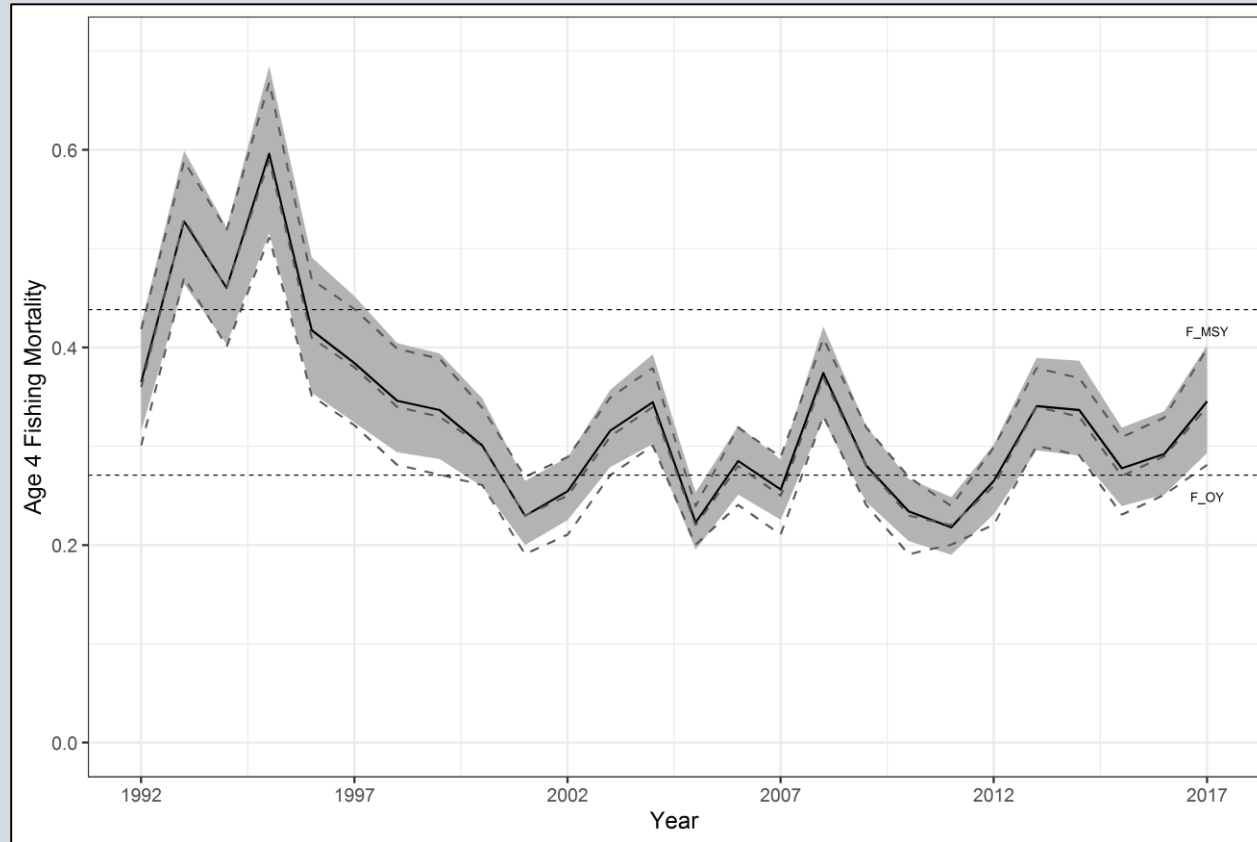
Uncertainty: Markov Chain Monte-Carlo

MCMC Analysis

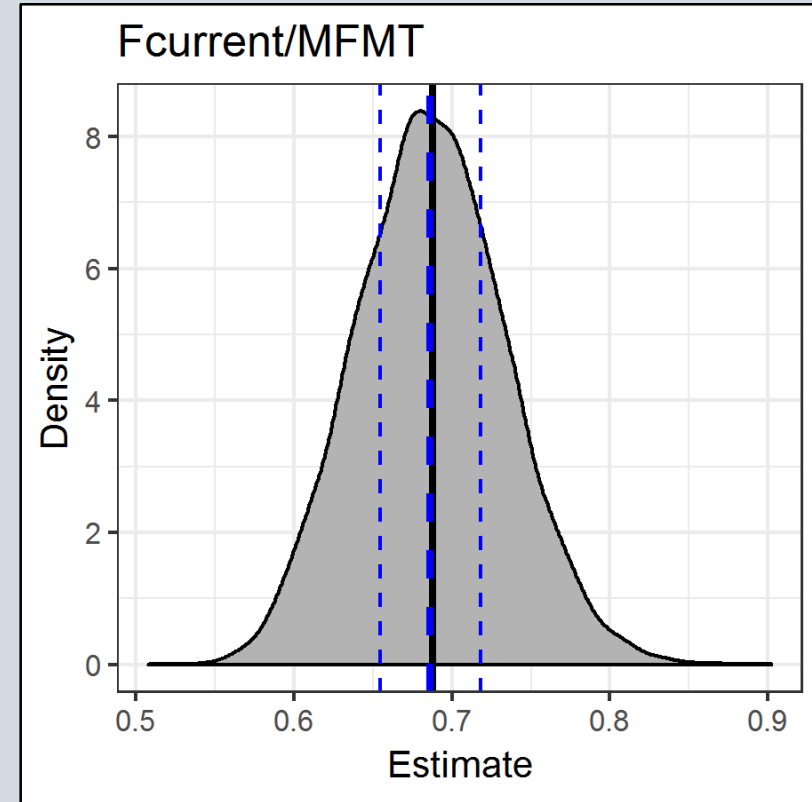
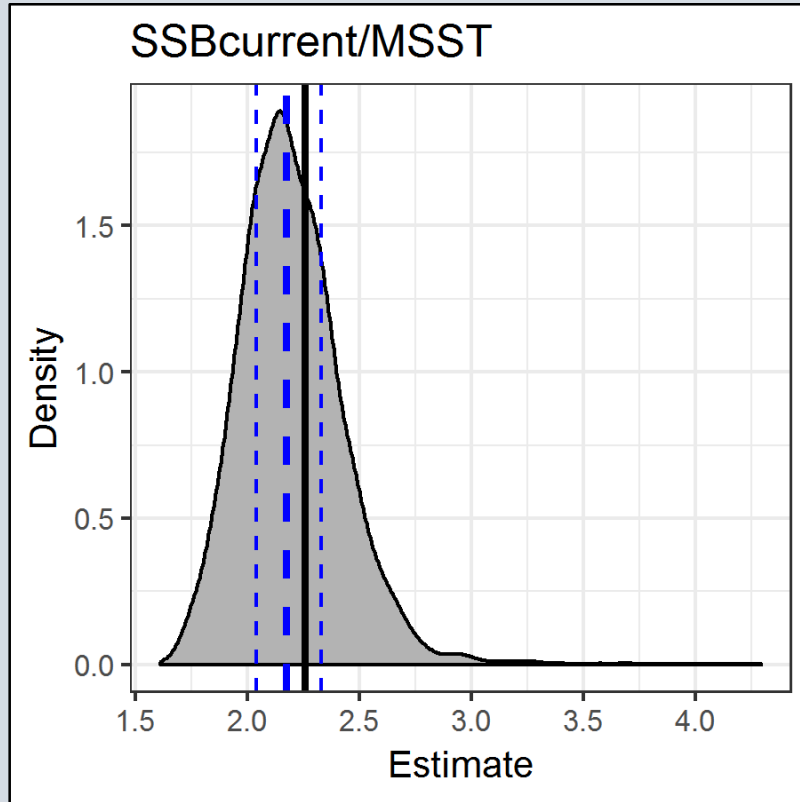
- Generate posterior distributions of model parameters and derived quantities
- Two chains
 - 1) 2,500 iterations saved from 5,000,000 (2,000 burn in)
 - 2) 2,500 iterations saved from 10,000,000 (5,002,000 burn in)
- Two-chain convergence assessed using Gelman and Rubin's (1992) potential reduction scale factor



Uncertainty: Markov Chain Monte-Carlo



Uncertainty: Markov Chain Monte-Carlo



Stock Assessment Model:

Management Quantities

South Atlantic and Gulf of Mexico Fishery Management Councils				
Criteria	Definition	Value	Pounds (lbs)	
MSST (Minimum Stock Size Threshold)	$0.75 * SSB_{F30\%SPR}$	1,428 mt	3,148,201 lbs	
$SSB_{F30\%SPR}$	The estimated spawning stock biomass associated with F at 30% SPR	1,904 mt	4,197,601 lbs	
$SSB_{current}$	The geometric mean of SSB for 2015 - 2017	3,223 mt	7,105,499 lbs	
MFMT (Maximum Fishing Mortality Threshold)	$F_{30\% SPR}$	0.438 yr^{-1}		
OFL (Overfishing Limit)	Retained Yield at MFMT	1,608 mt	3,545,033 lbs	
$F_{current}$	The geometric mean of F on age-4 fish for 2015 - 2017	0.295 yr^{-1}		
OY (Optimum Yield)	Retained Yield at F_{OY}	1,497 mt	3,300,320 lbs	
F_{OY} (Fishing Mortality Rate at OY)	$F_{40\% SPR}$	0.271 yr^{-1}		

