SEDAR 64:
Southeastern U.S. Yellowtail Snapper
SAFMC Meeting
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Outline

- Assessment history
  - Past and present assessments and benchmark comparisons
- SEDAR 64 Base Model results
  - Landings, discards, indices, numbers/biomass at age, recruitment, F, SSB
  - Model uncertainty
- Projections
  - Scenarios as defined by the TORs and joint SSC's
  - Joint SSC recommendation

SEDAR 64:
Yellowtail Snapper
Assessment History

Assessment History

SEDAR 3 (2003)
- Integrated and Statistical Catch-at-Age model (ICA) for data 1981 – 2001
- Stock was not overfished nor undergoing overfishing
  - $F_{2001}/F_{MSY} = 0.57$; $SSB_{2001}/SSB_{MSY} = 1.43$

SEDAR 27A (2012)
- Statistical catch-at-age model (ASAP2) for data 1981 – 2010
- $F_{MSY} \rightarrow F_{30\%SPR}$; $MSST = (1-M)*SSB_{F30\%SPR}$
- Stock was not overfished nor undergoing overfishing
 - $F_{2001}/F_{30\%SPR} = 0.15$; $SSB_{2001}/MSST = 3.36$

Assessment History

SEDAR 64 (2020)

- Integrated statistical catch-at-age model (Stock Synthesis v.3.30.14) for data 1992 – 2017
- $F_{30\%SPR}$; MSST = (0.75)*$SSB_{F30\%SPR}$
- Stock is currently not overfished nor undergoing overfishing
  - $F_{2015-2017}/F_{30\%SPR}$ = 0.67; $SSB_{2017}/MSST$ = 2.28
- 3 fleets (Commercial, MRIP (fully calibrated), and Headboat)
- Inclusion of an age 0-1 index; exclusion of Headboat index
- Available length-at-age composition data doubled from last assessment
- Inclusion of length composition data

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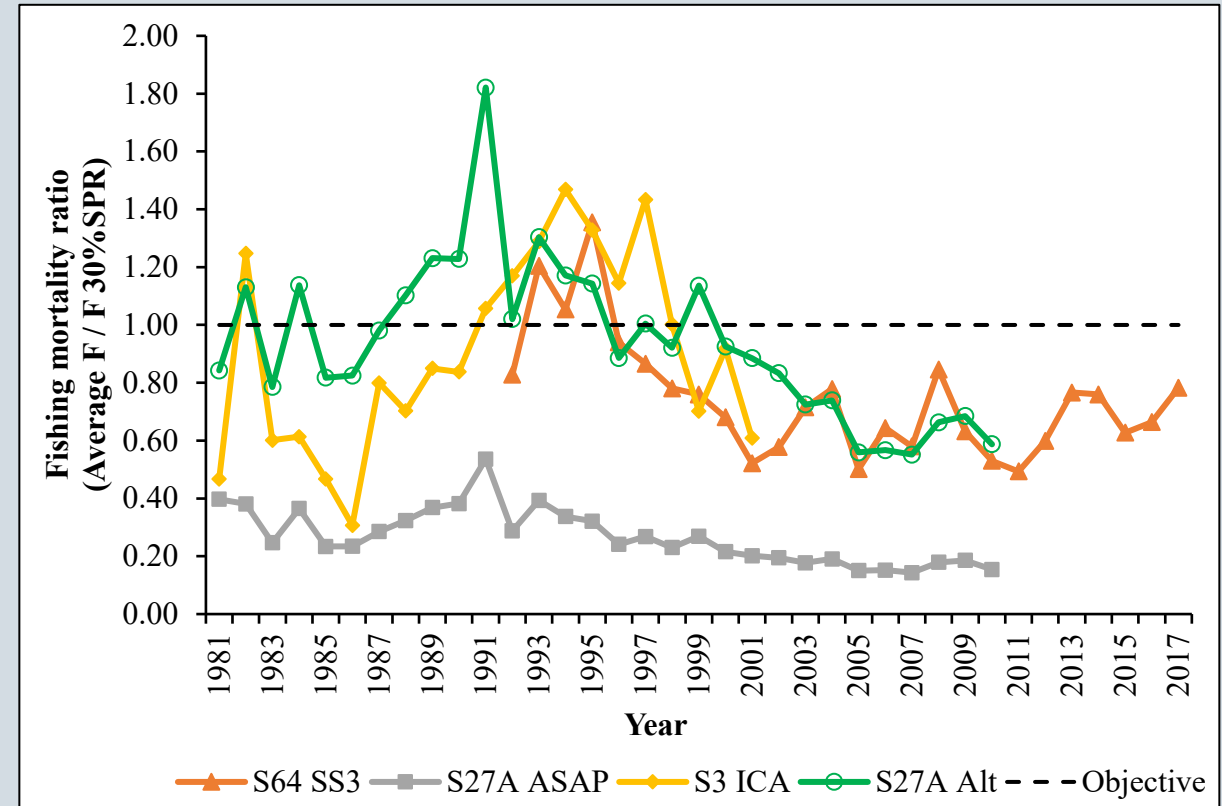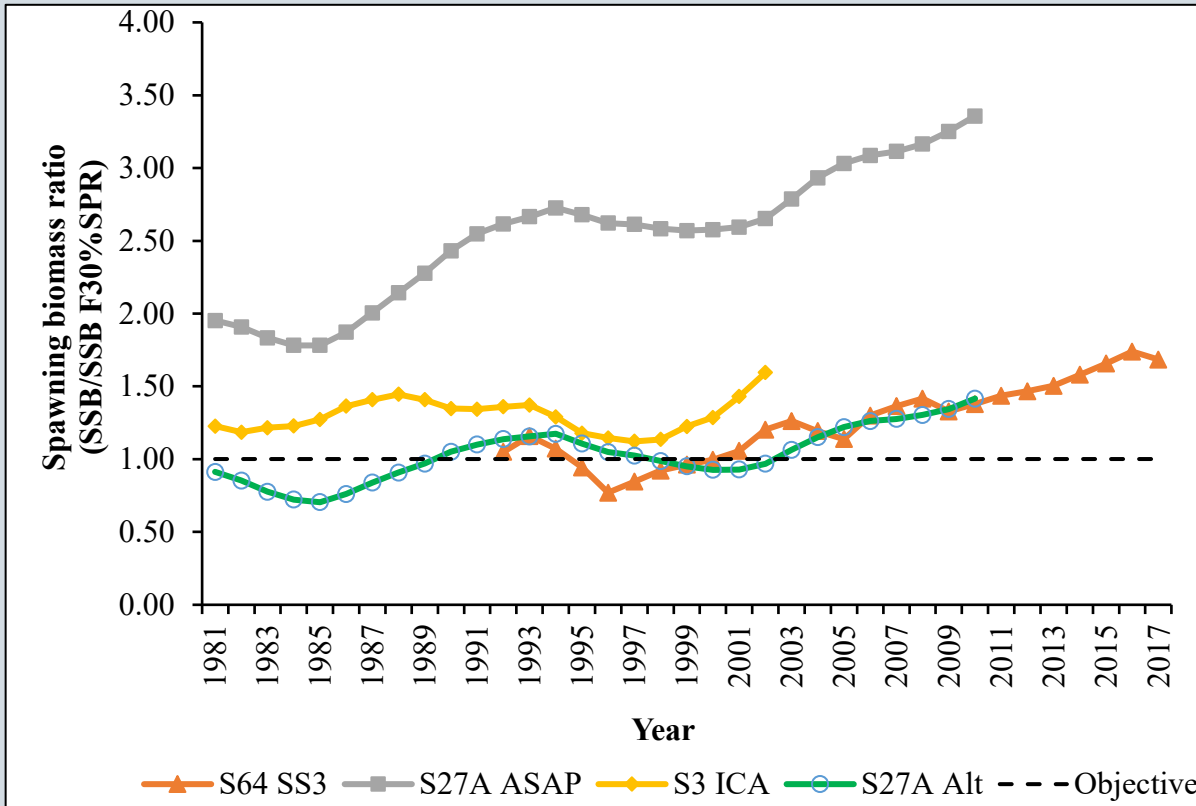
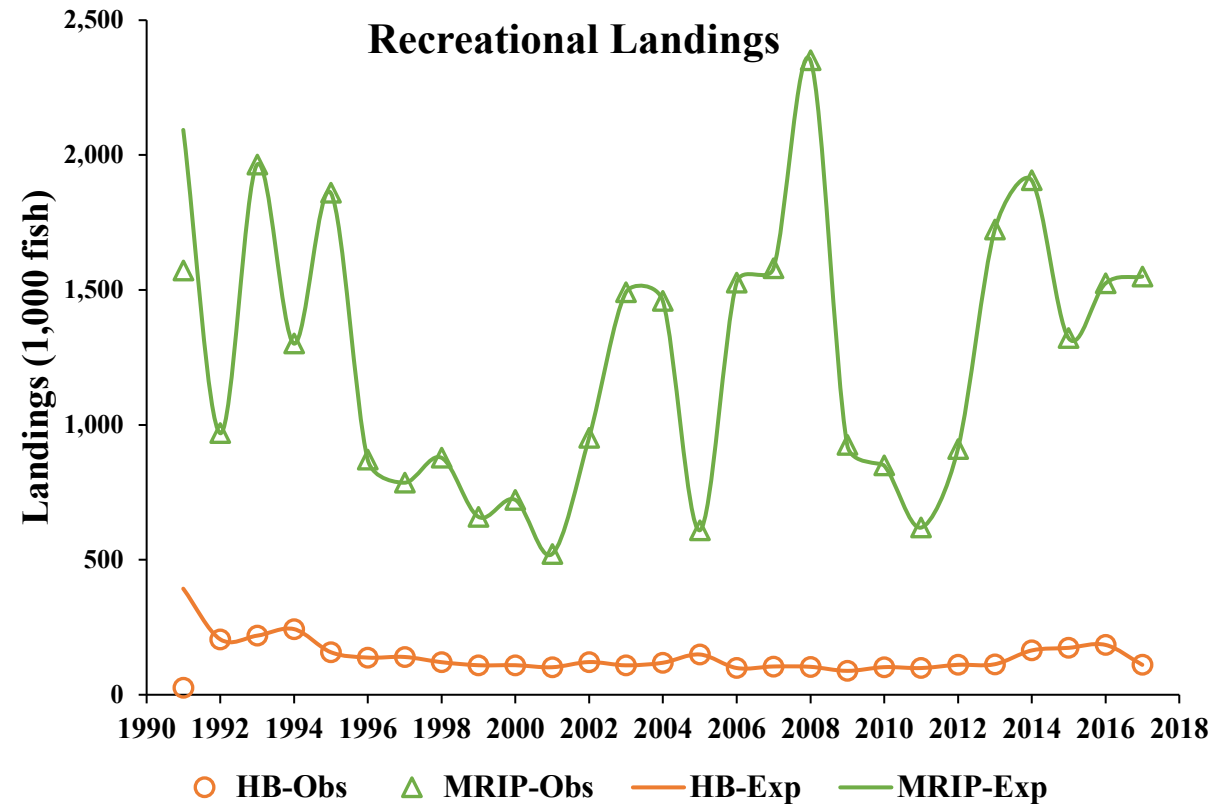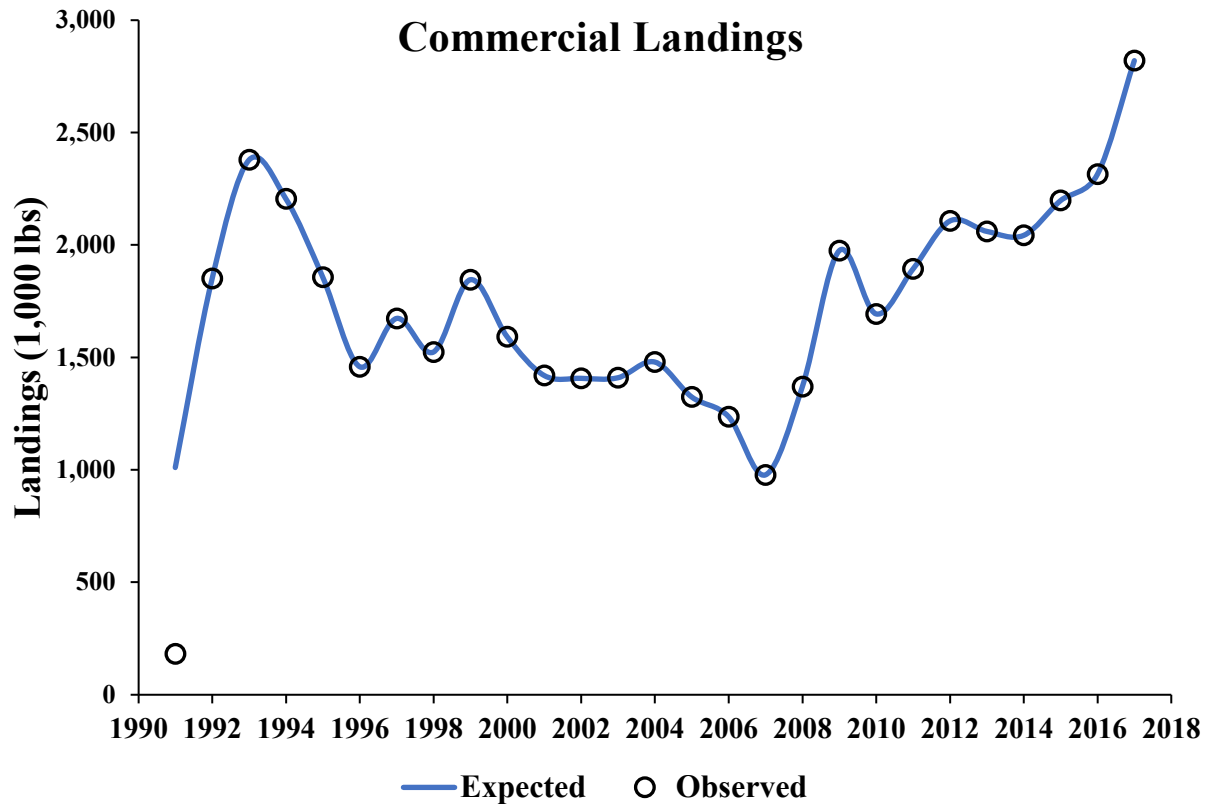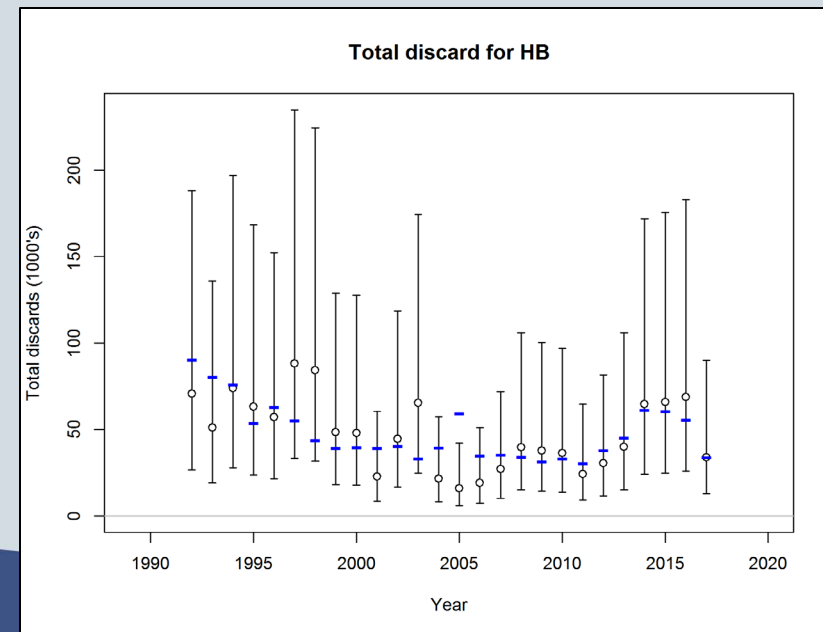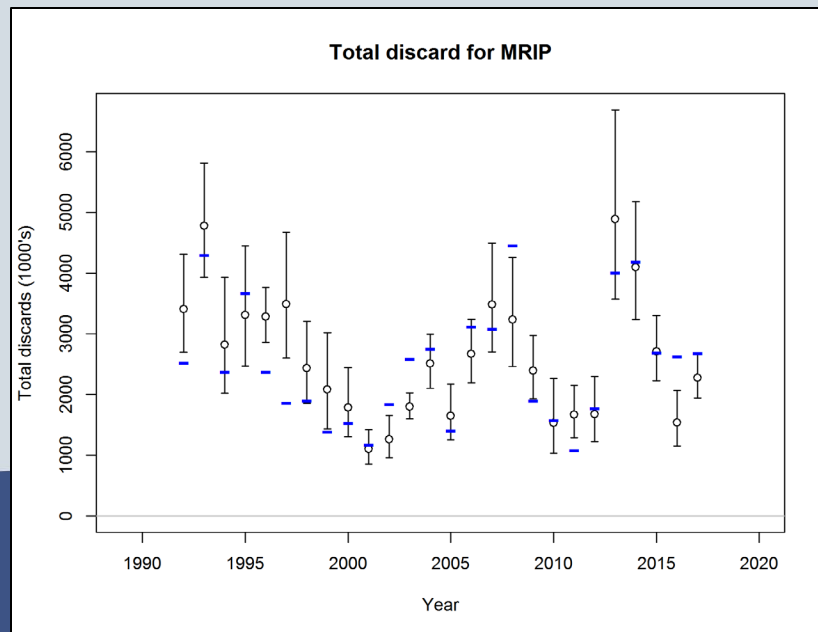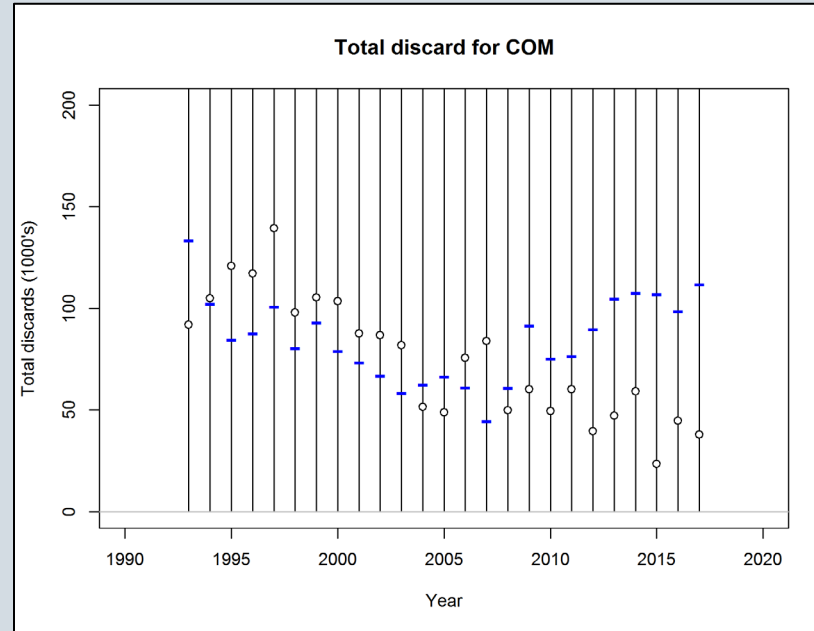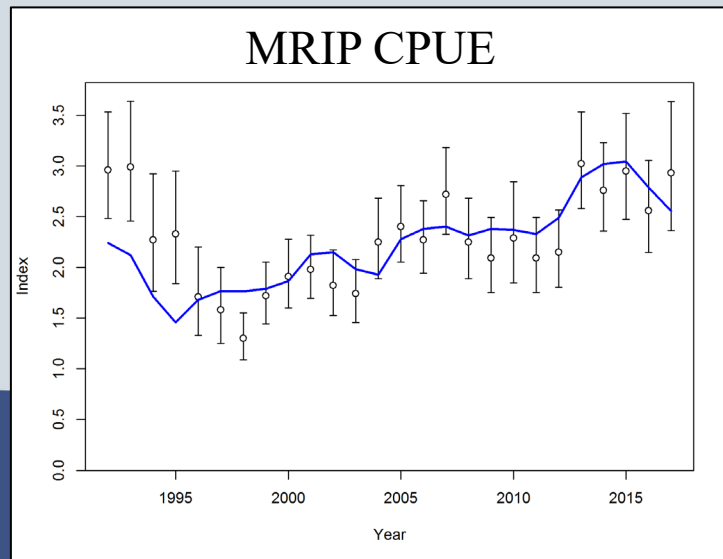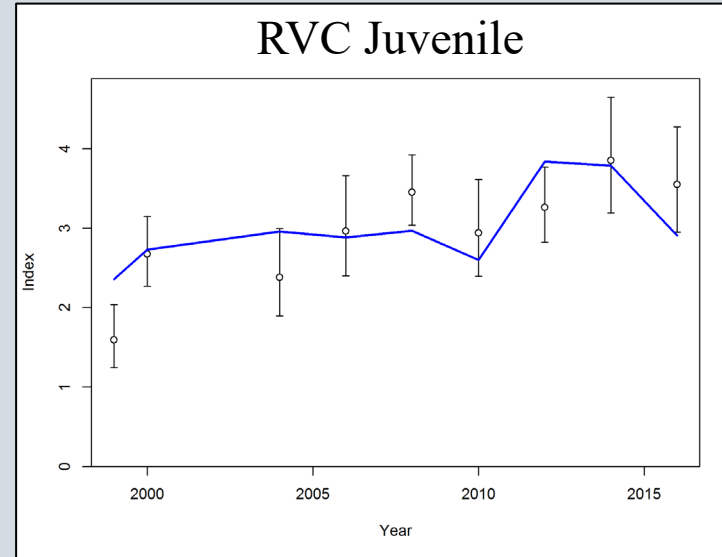|	
S3_ICA	– SEDAR 3 Final Model
S27A ASAP	– SEDAR 27A Final Model
S27A_Alt	– Alternative SEDAR 27A Model with additional weight at age matrices
S64_SS3	– SEDAR 64 Final Model

SEDAR 64:
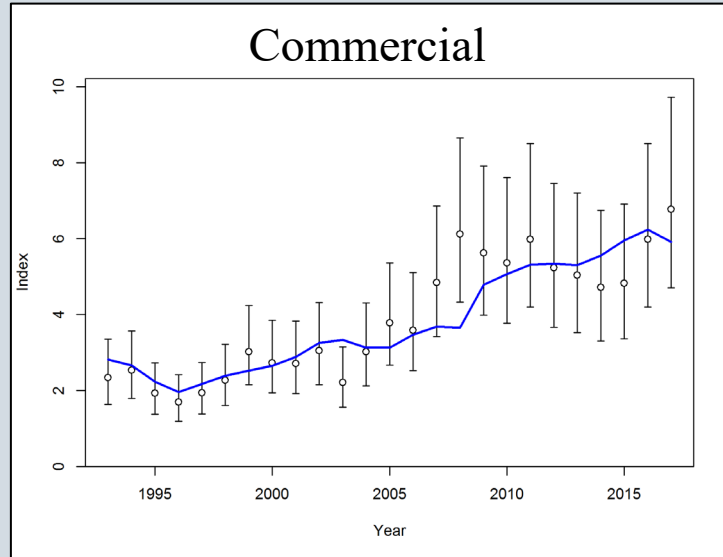## Yellowtail Snapper
Base Model Results

S64 Base Model:
Landings

S64 Base Model:
Discards

S64 Base Model:
Indices of Abundance and Biomass
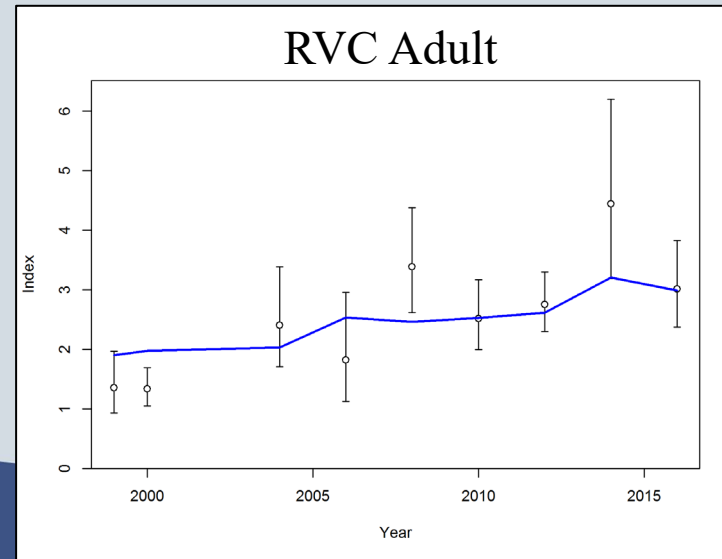
S64 Base Model:
Length Composition Data
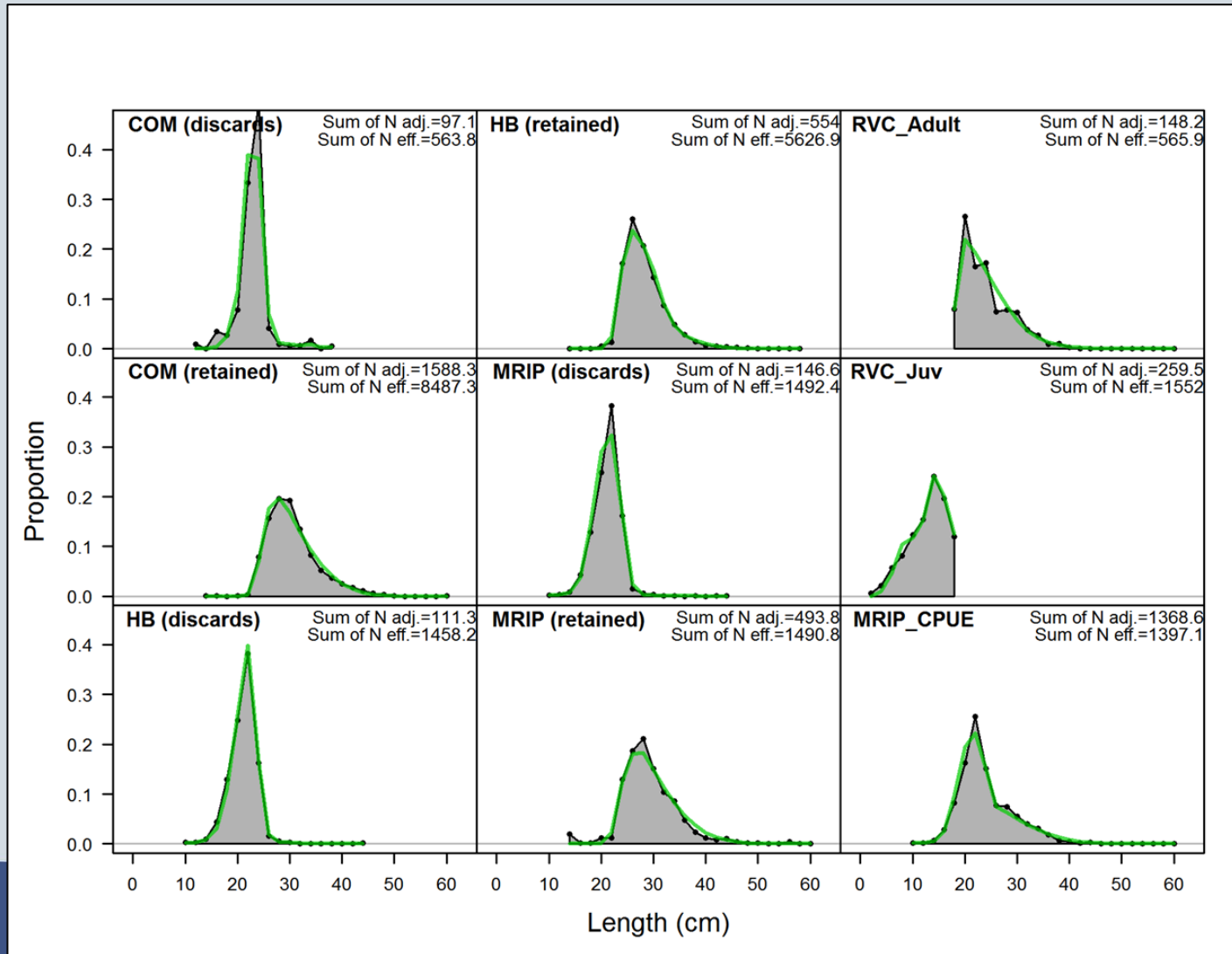
S64 Base Model:
Age Composition Data
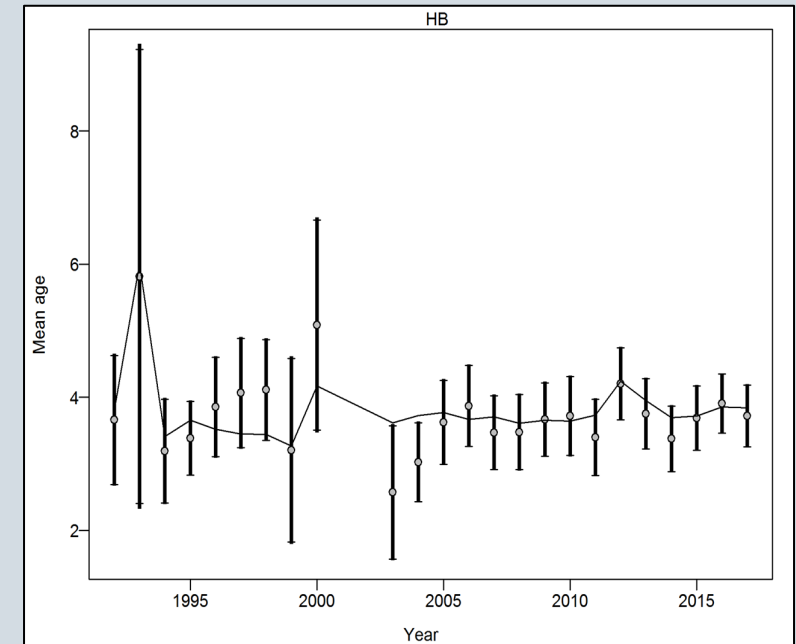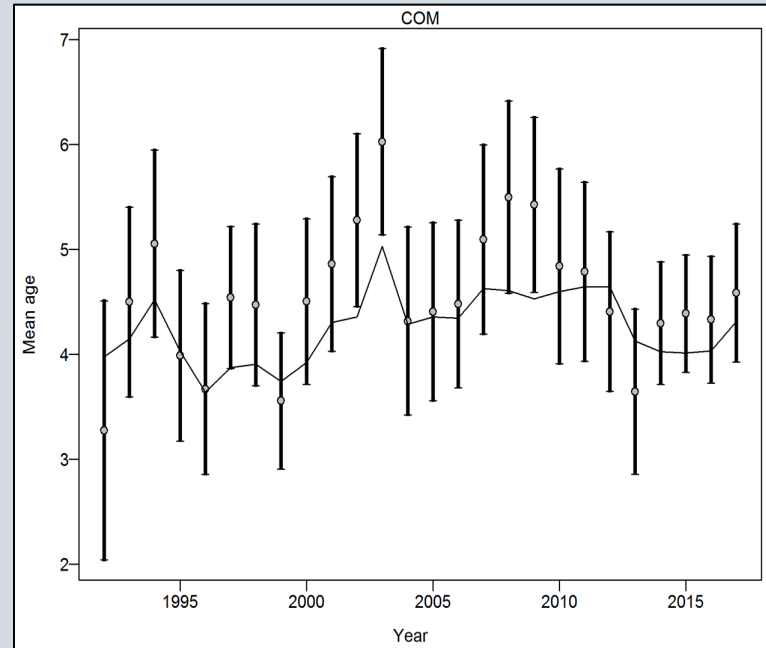
S64 Base Model:
Numbers and Biomass at age
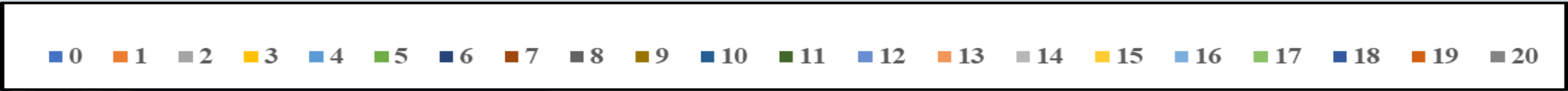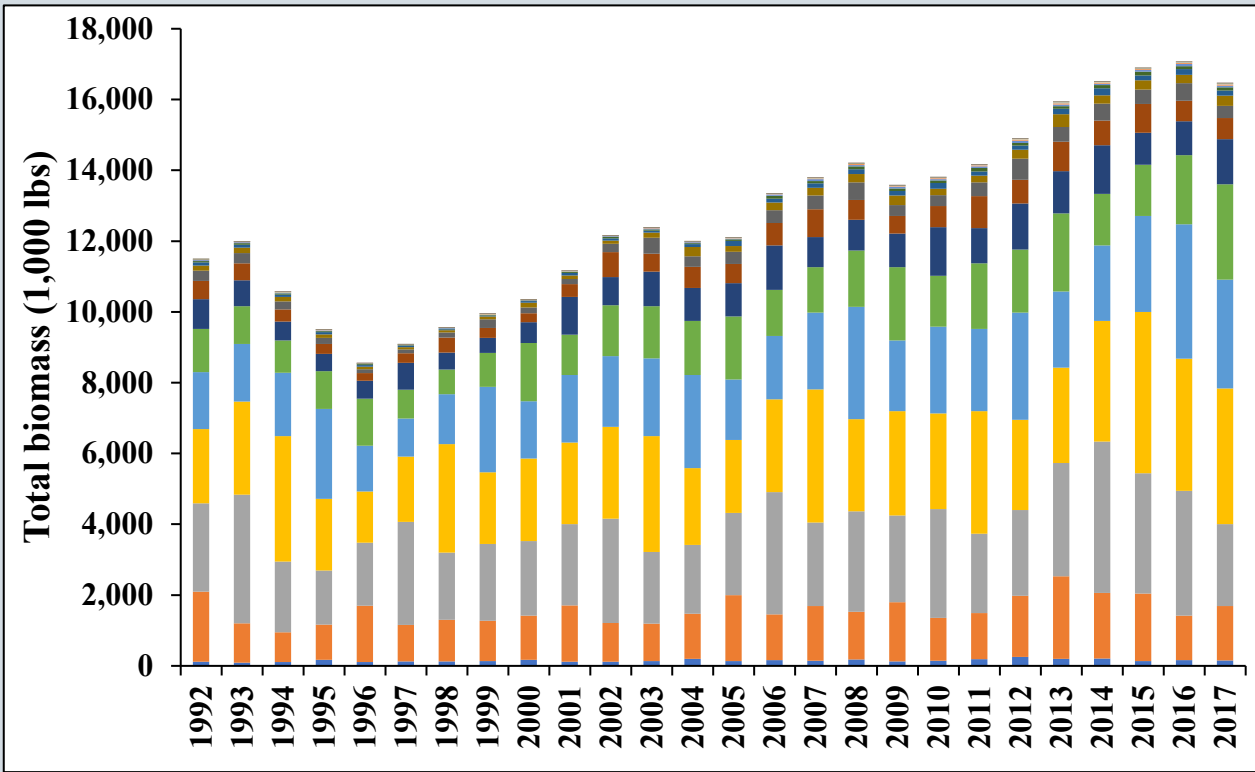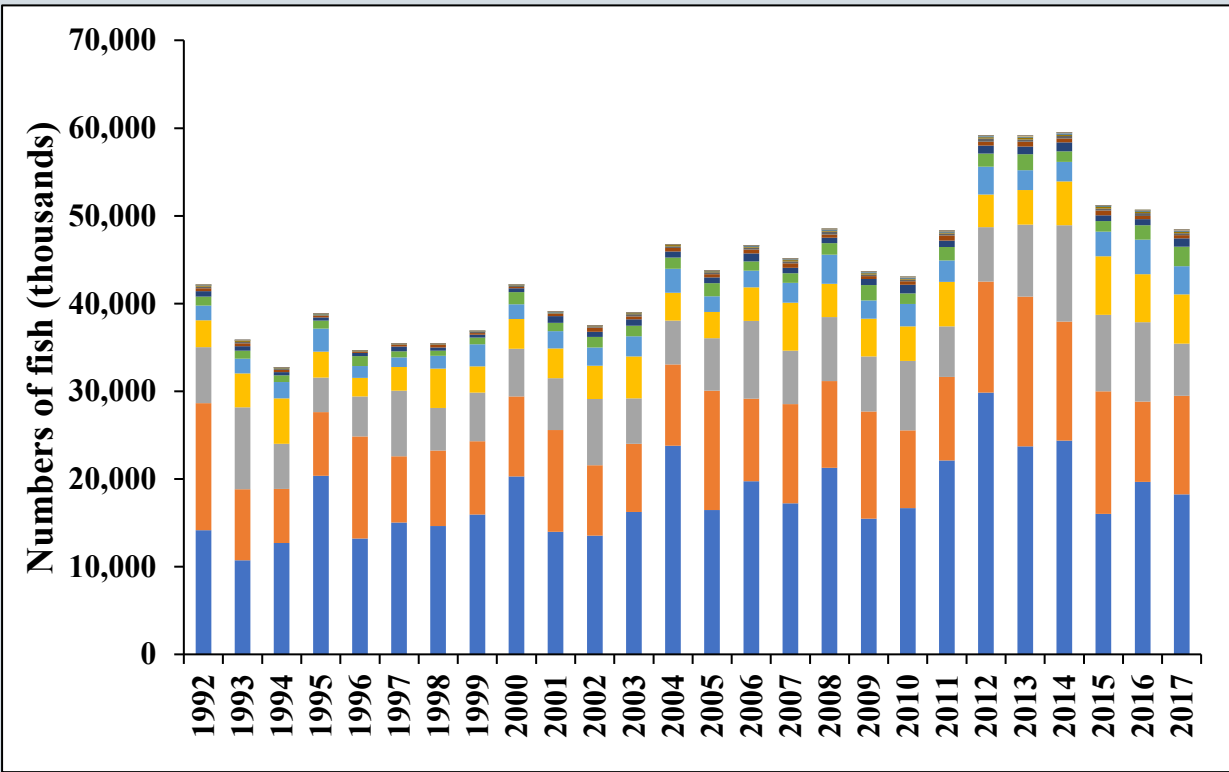
S64 Base Model:
Estimated Recruitment
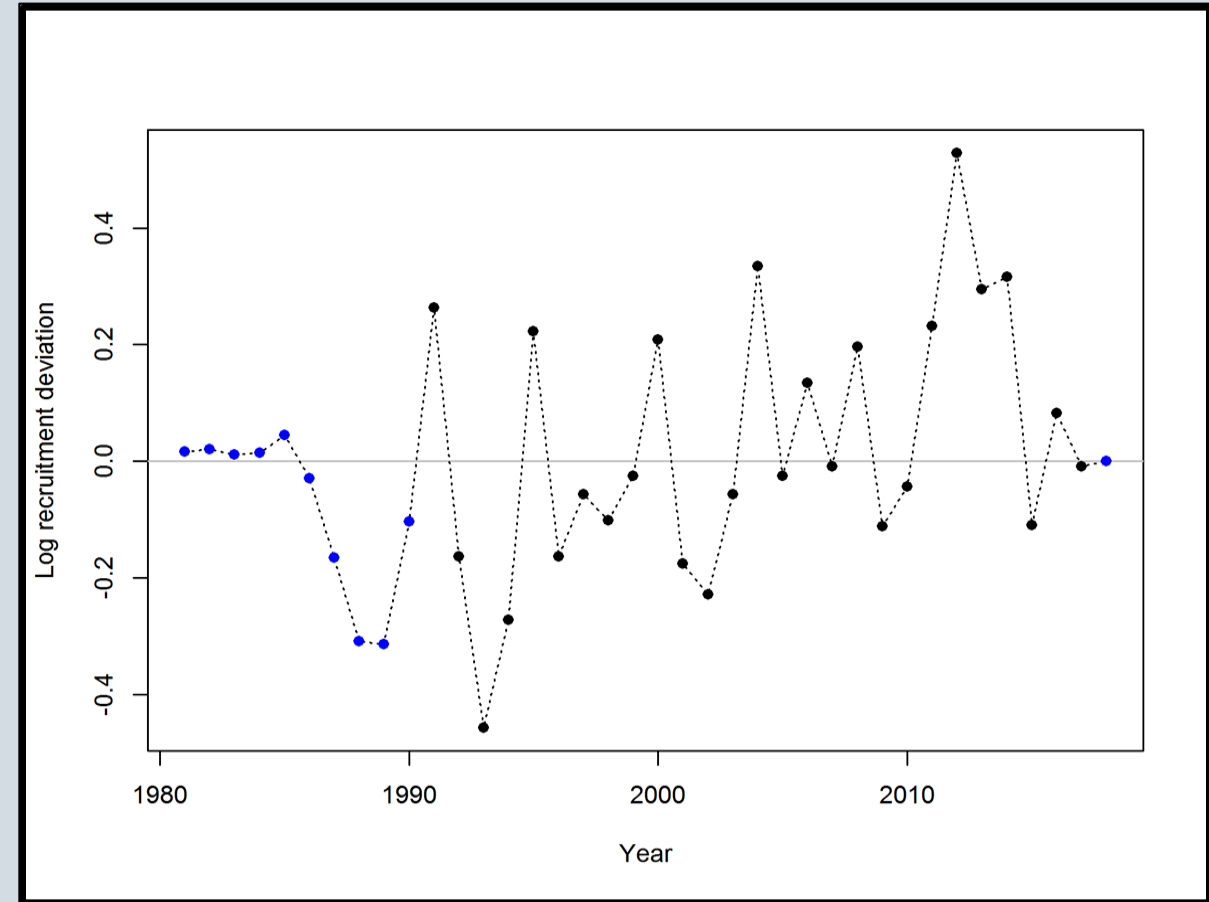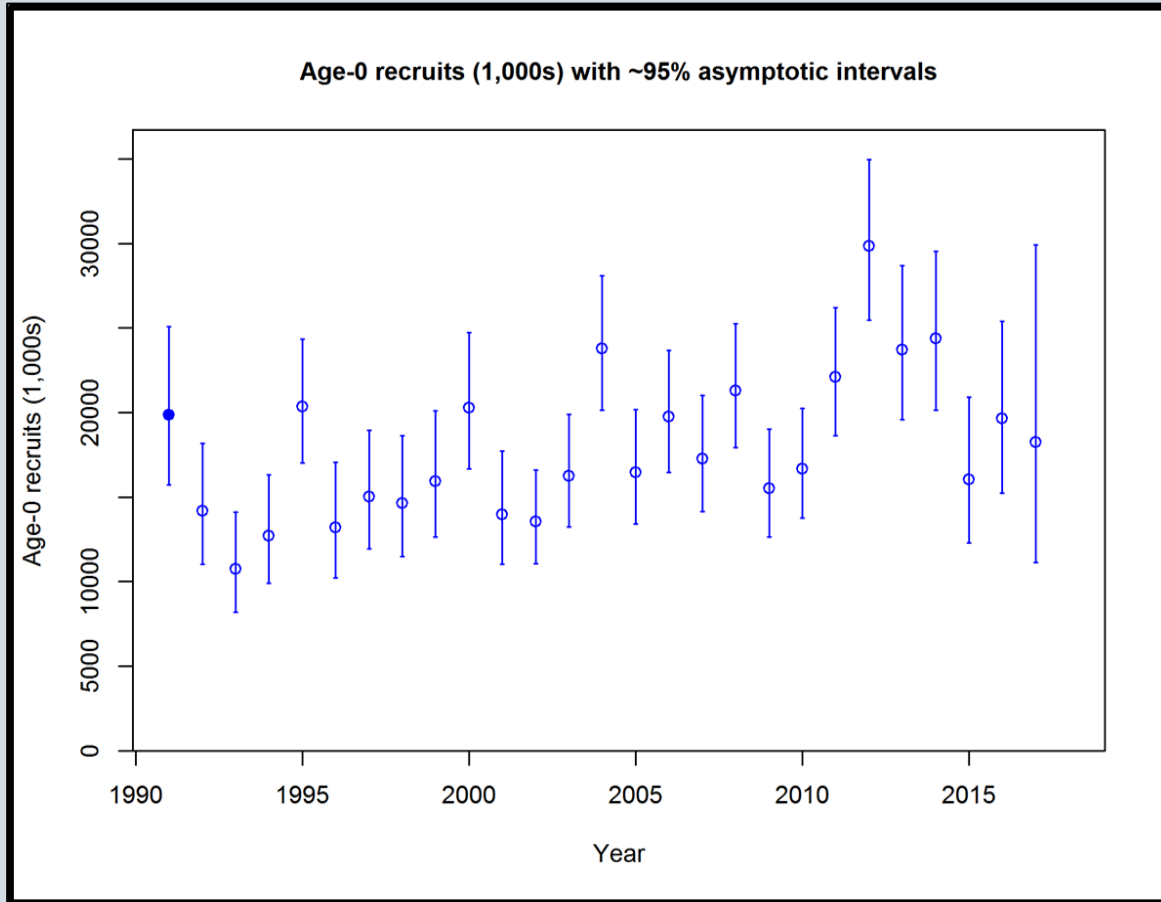
S64 Base Model:
Estimated Fishing mortality and SSB
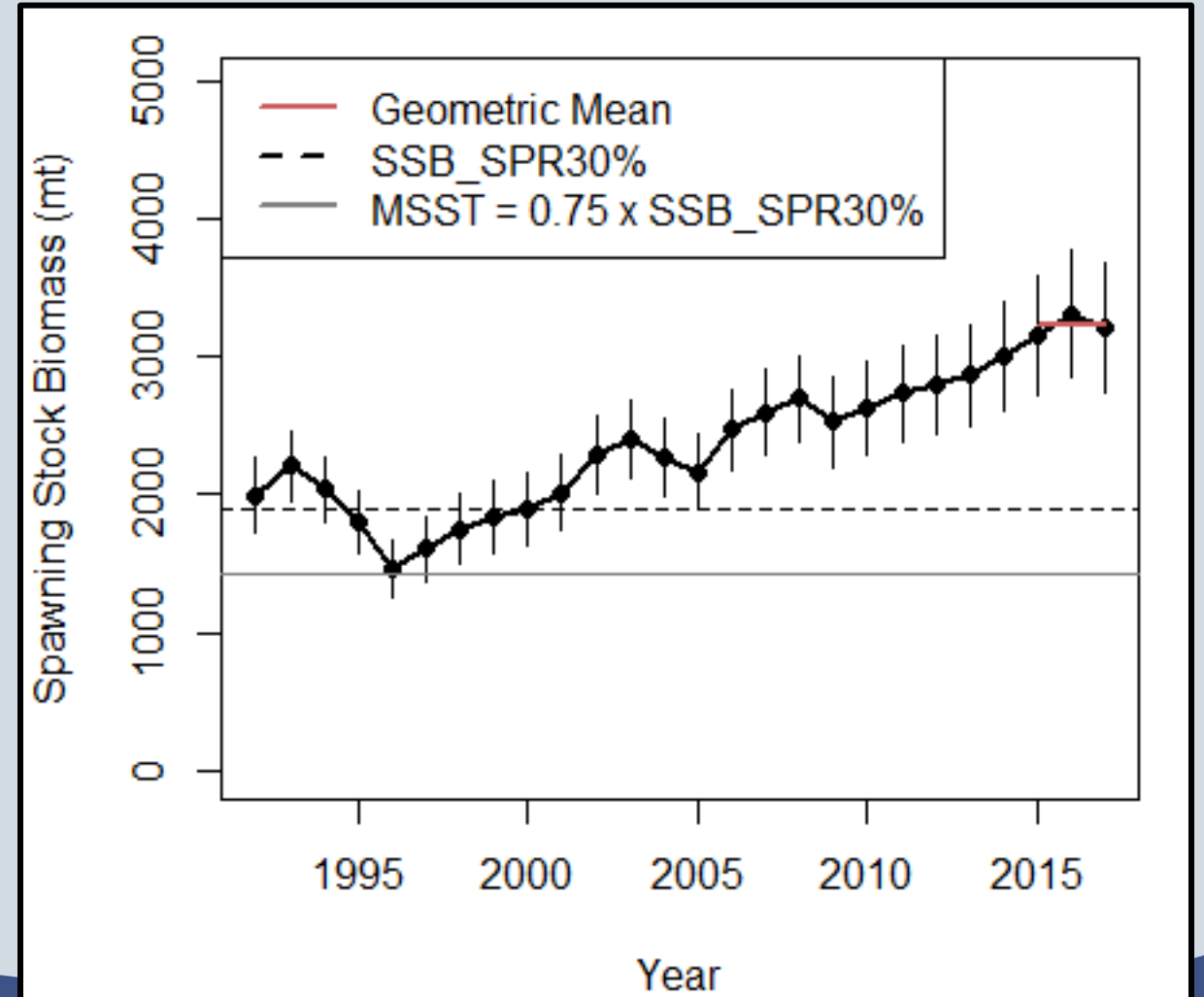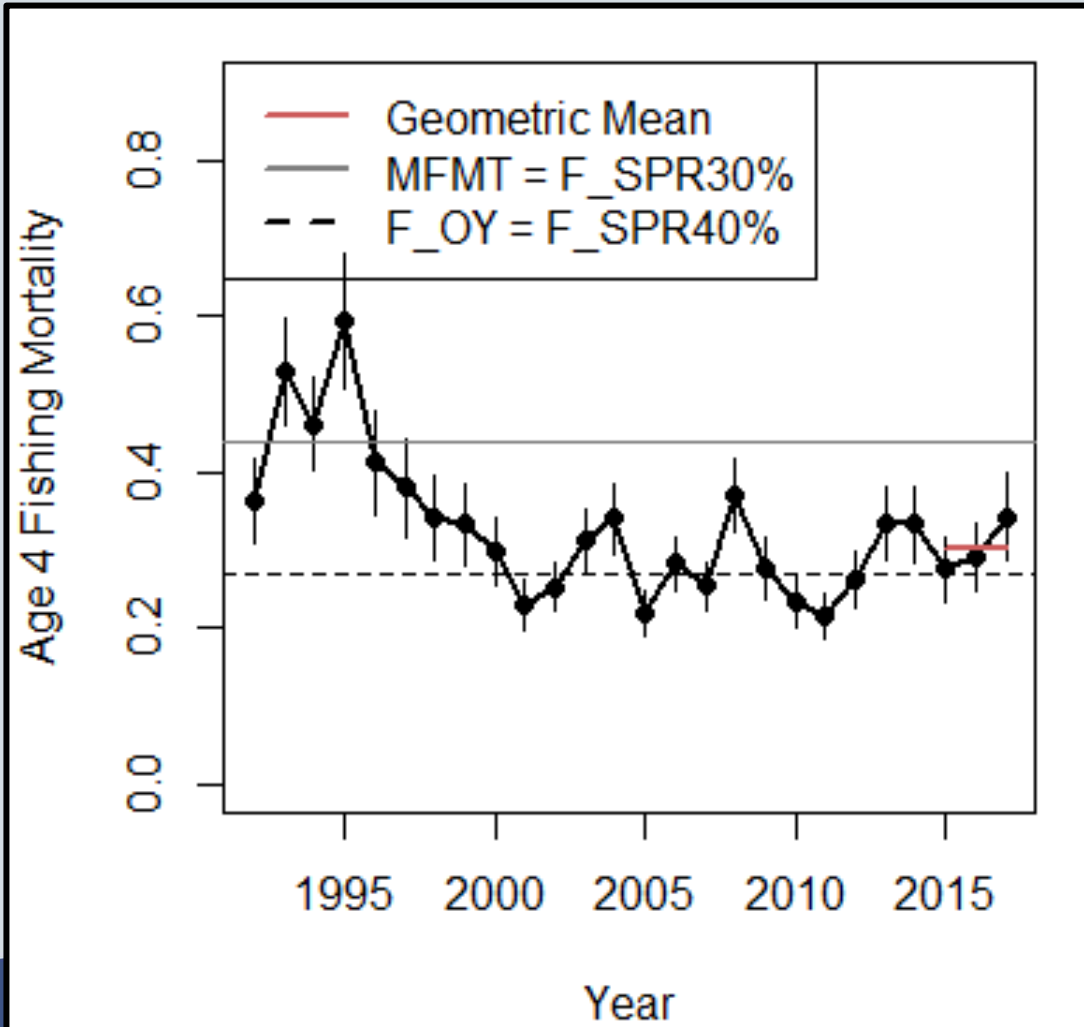
Uncertainty:
Markov Chain Monte-Carlo

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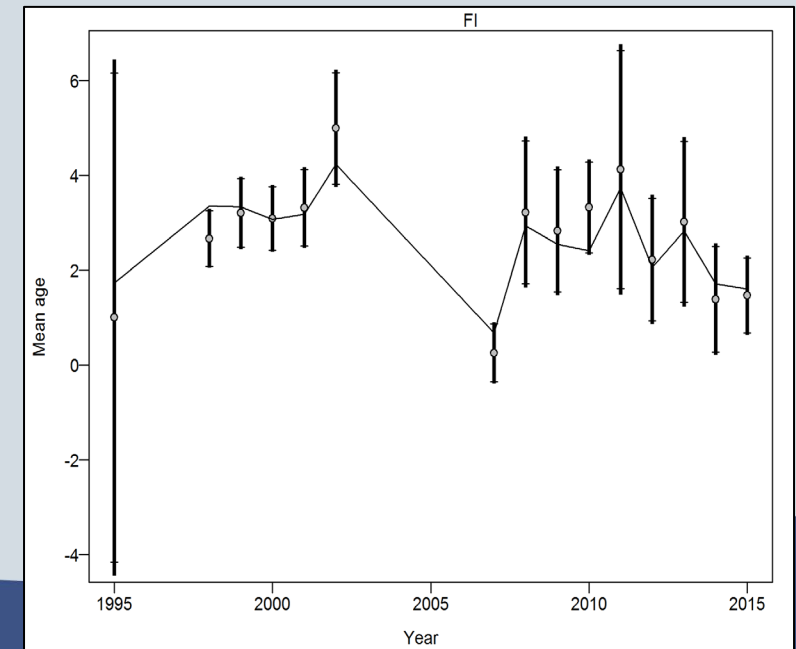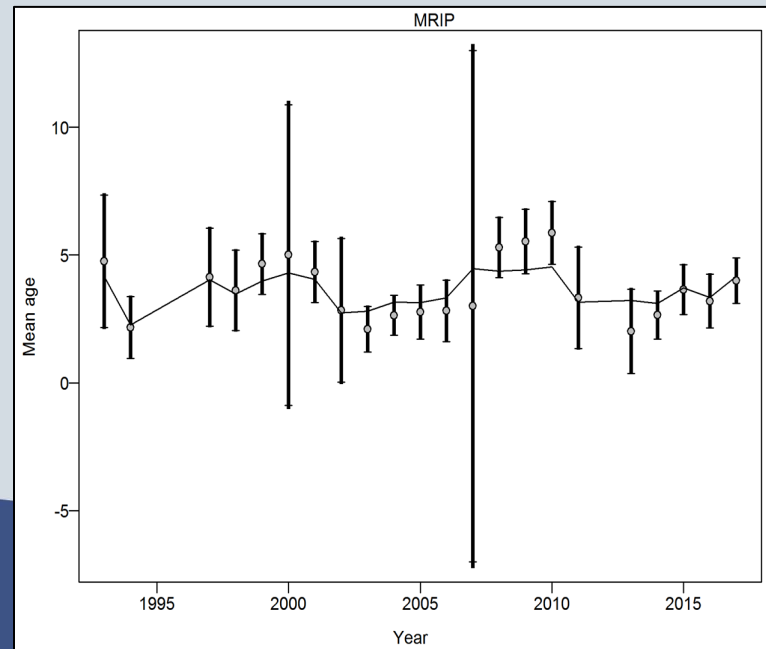- Two chains
  - 1) 2,500 iterations saved from 5,000,000 (2,000 burn in)
  - 2) 2,500 iterations saved from 10,000,000 (5,002,000 burn in)
- Two-chain convergence assessed using Gelman and Rubin's (1992) potential reduction scale factor

Uncertainty:
Markov Chain Monte-Carlo
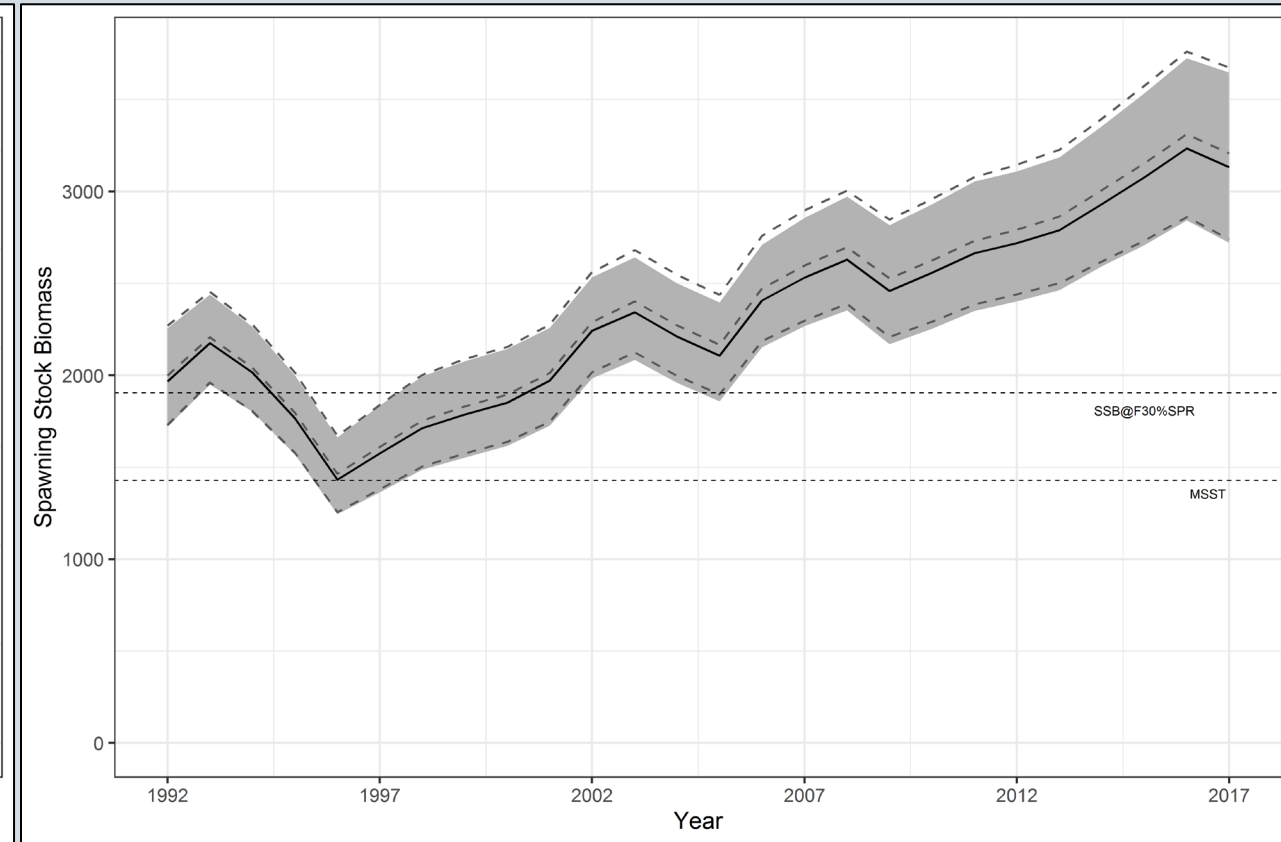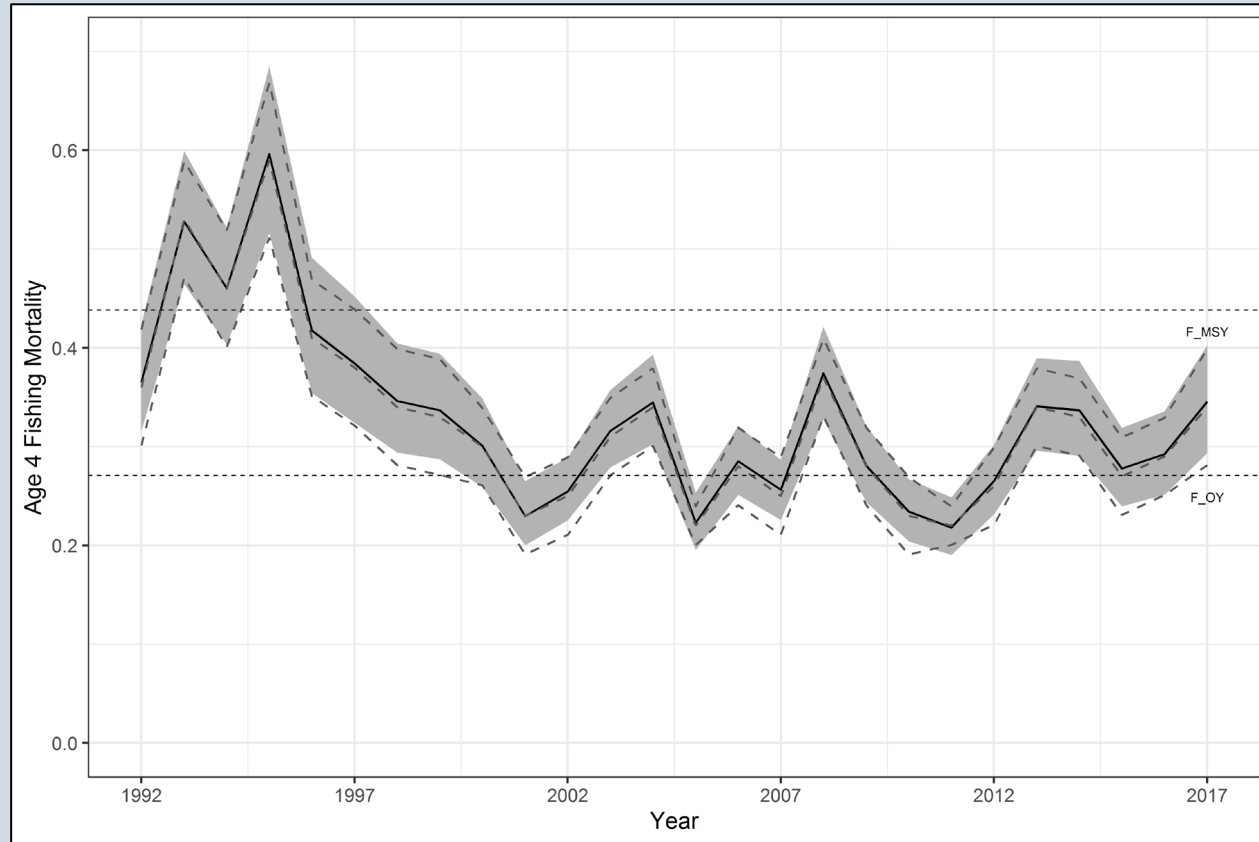
Uncertainty:
Markov Chain Monte-Carlo
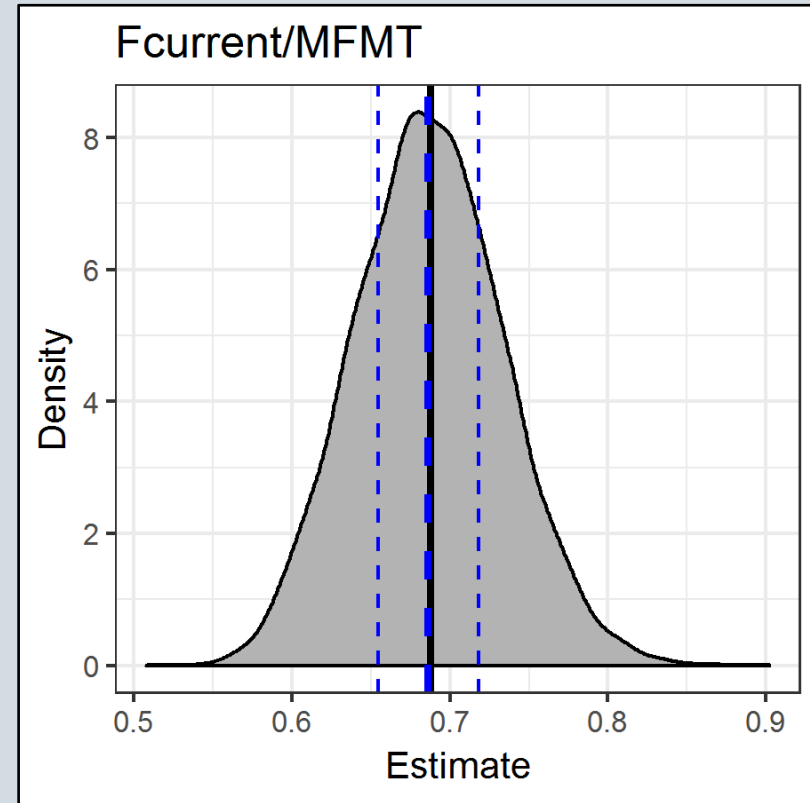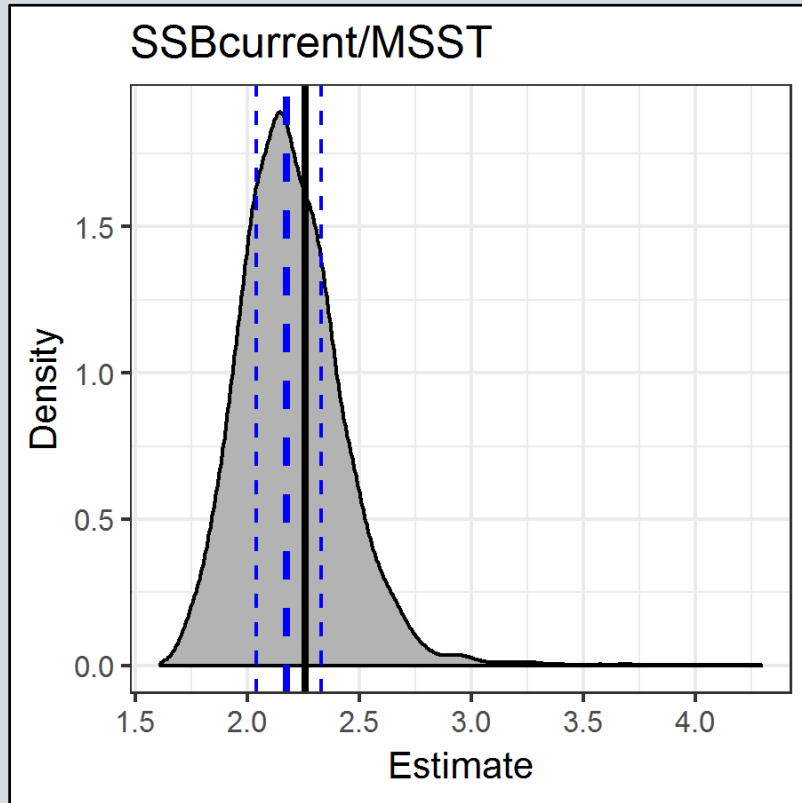
SEDAR 64: Yellowtail Snapper Projections

Projection Scenarios:

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

- $F = F_{MSY} = F_{30\%SPR}$
- $F = 97.5\%$ of F_{MSY} $(P^* = 0.375)$
  - mean = 1,608 mt (OFL)
  - sd = 125 mt
  - cv = 0.09
- $F = 75\%$ of F_{MSY}
- $F = F_{current}$
- $F = F_{40\%SPR}$ $(F_{OY}$ in S27A)
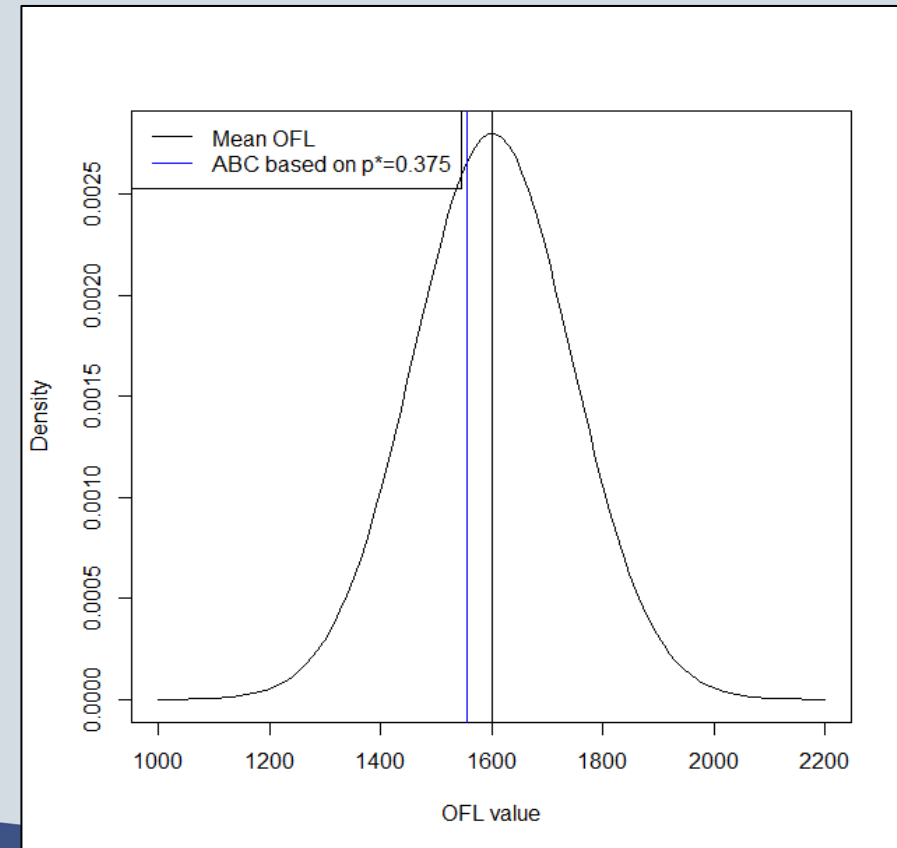
Projection Methodology:

- 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.

Projection Results: Fishing Mortality Rate

Projection Results: Recruitment
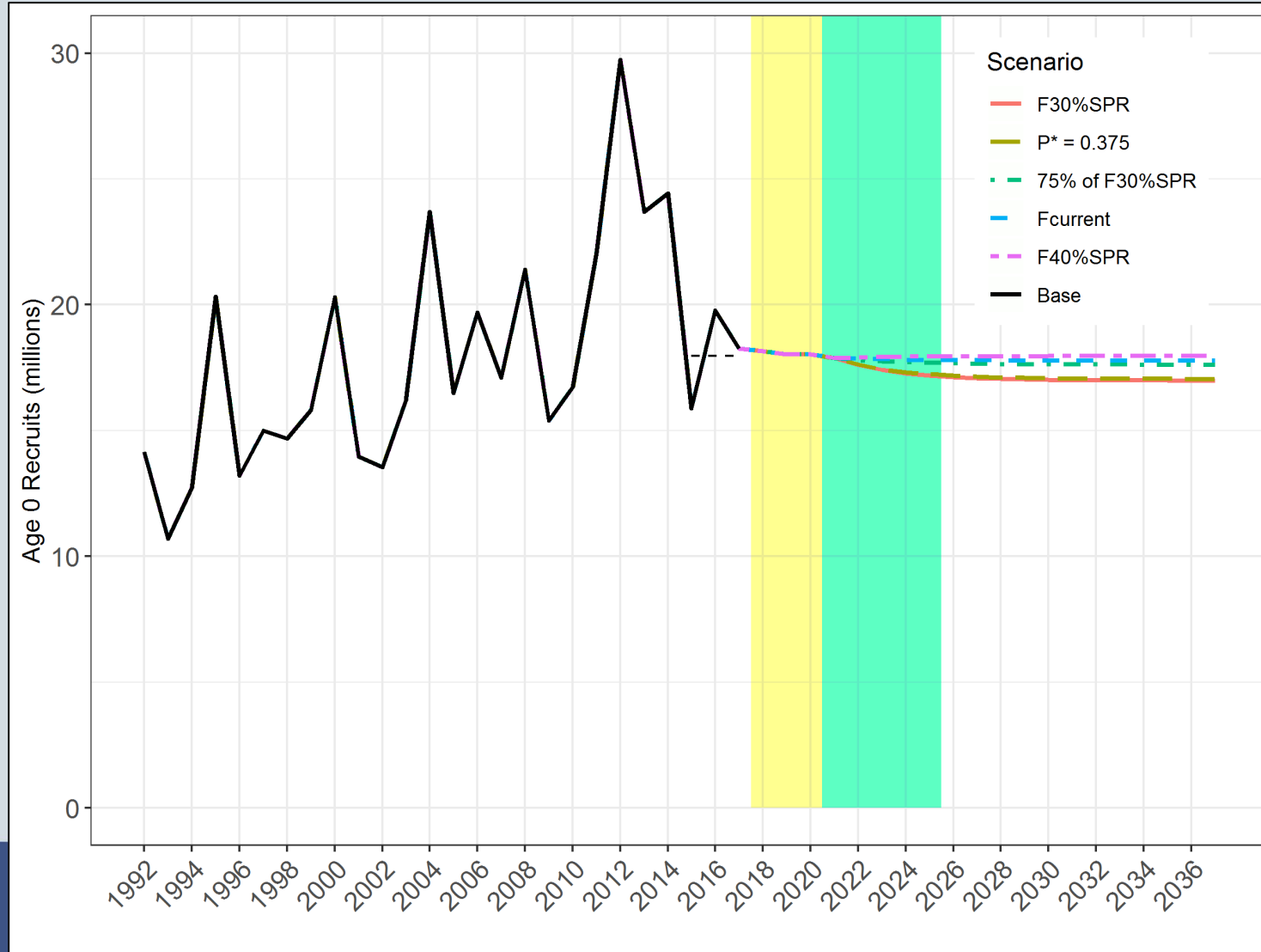
Projection Results: Spawning Stock Biomass
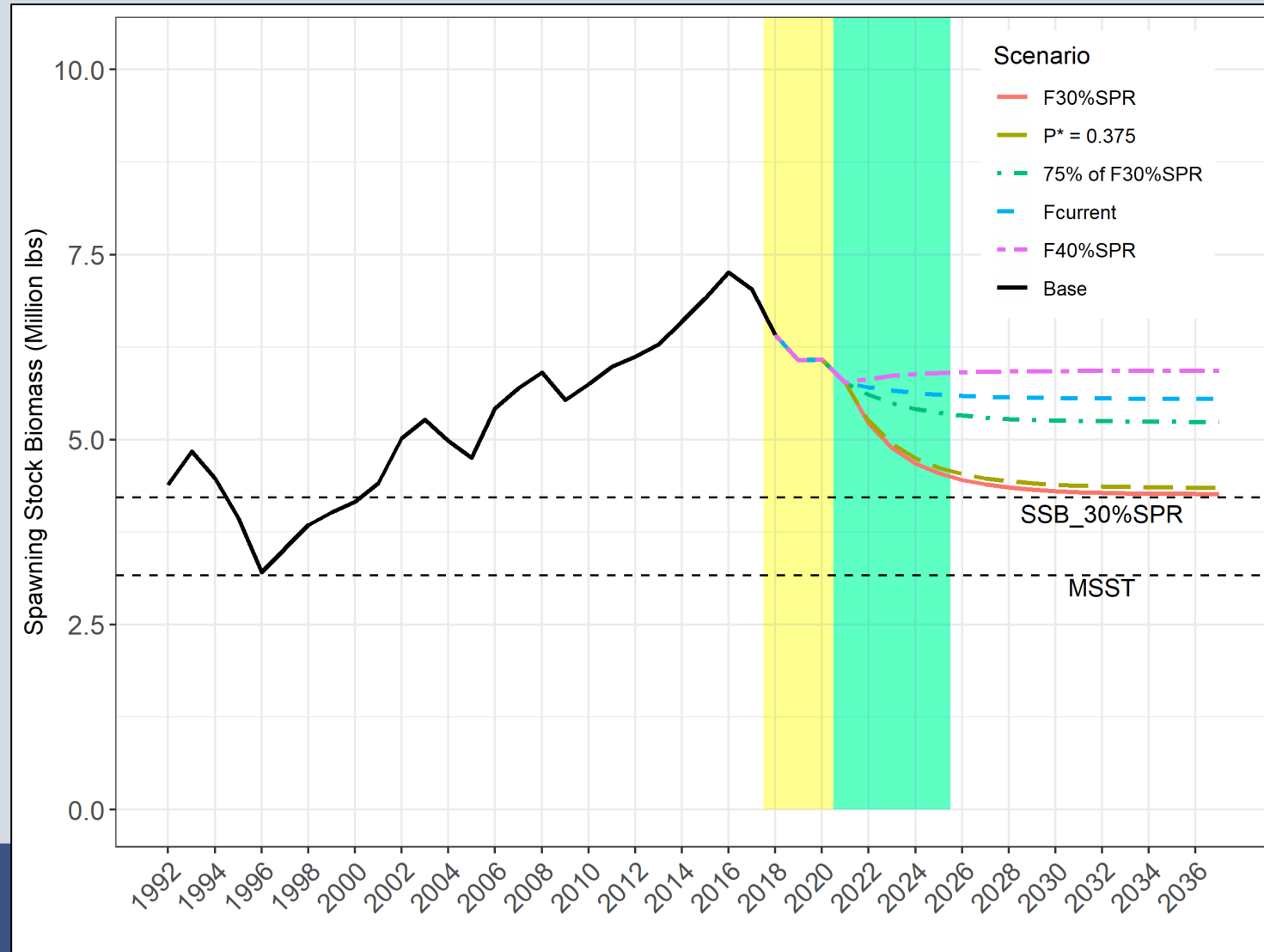
Projection Results: Retained Yield
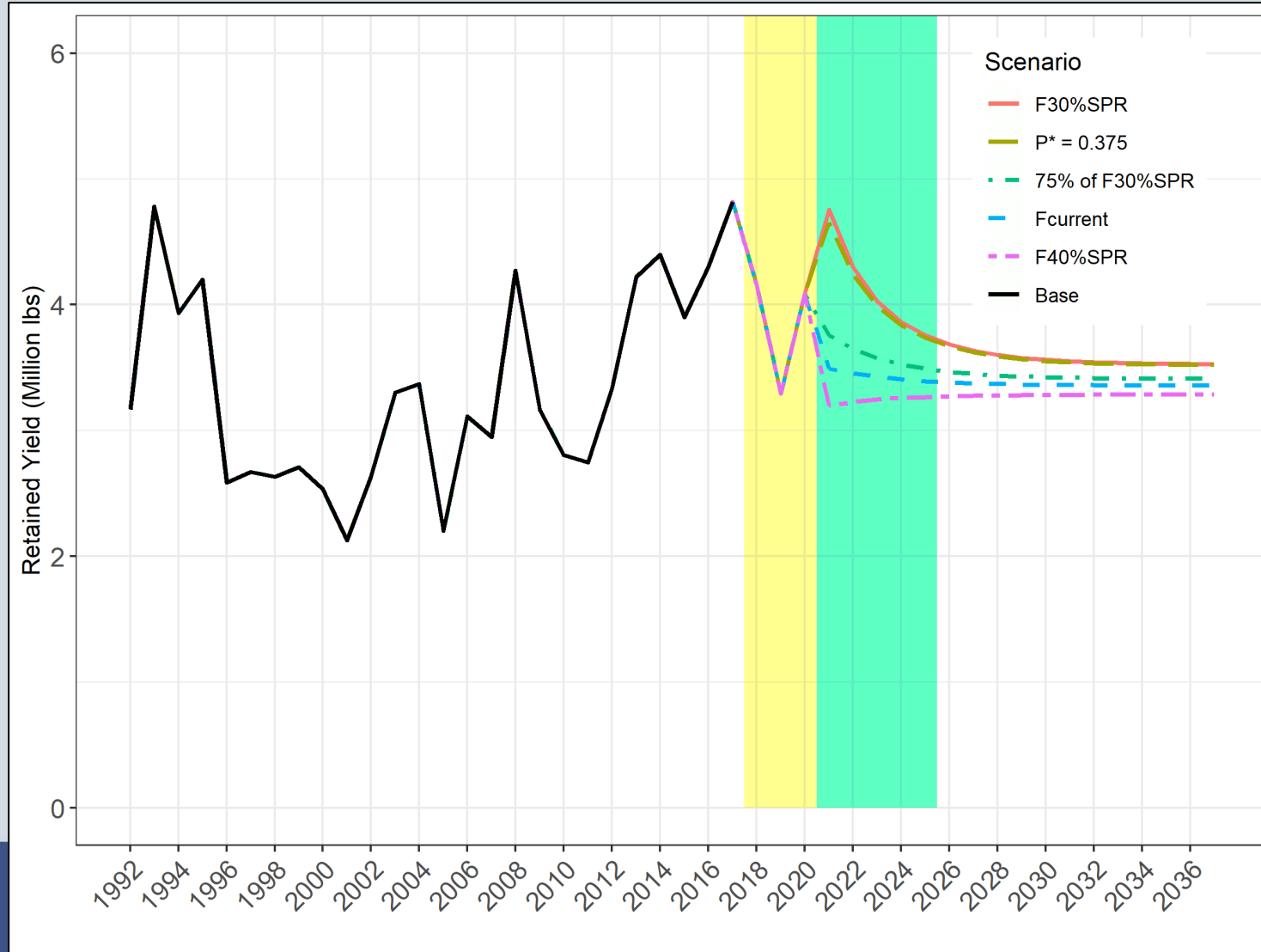
Projection Results:

- "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
2026	17.181	0.417	4.534	3.669
2027	17.140	0.417	4.476	3.623
2028	17.112	0.417	4.436	3.590
2029	17.092	0.417	4.409	3.568
2030	17.077	0.417	4.389	3.553
2031	17.068	0.417	4.376	3.542
2032	17.061	0.417	4.367	3.535
2033	17.056	0.417	4.360	3.530
2034	17.052	0.417	4.355	3.526
2035	17.050	0.417	4.352	3.524
2036	17.048	0.417	4.350	3.522
2037	17.047	0.417	4.348	3.520

Projection Results:

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

| Year | Retained yield (million lbs) Projection Scenario | | | | |
	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
2026	3.684	3.669	3.467	3.382	3.272
2027	3.635	3.623	3.450	3.375	3.276
2028	3.601	3.590	3.438	3.370	3.279
2029	3.578	3.568	3.429	3.366	3.280
2030	3.562	3.553	3.423	3.363	3.282
2031	3.550	3.542	3.419	3.361	3.283
2032	3.542	3.535	3.416	3.360	3.284
2033	3.537	3.530	3.414	3.359	3.284
2034	3.533	3.526	3.412	3.358	3.285
2035	3.530	3.524	3.411	3.358	3.285
2036	3.528	3.522	3.411	3.357	3.285
2037	3.527	3.520	3.410	3.357	3.285

Questions?

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}	