

**NOAA
FISHERIES**

SEDAR 28 Gulf of Mexico Cobia Update Assessment

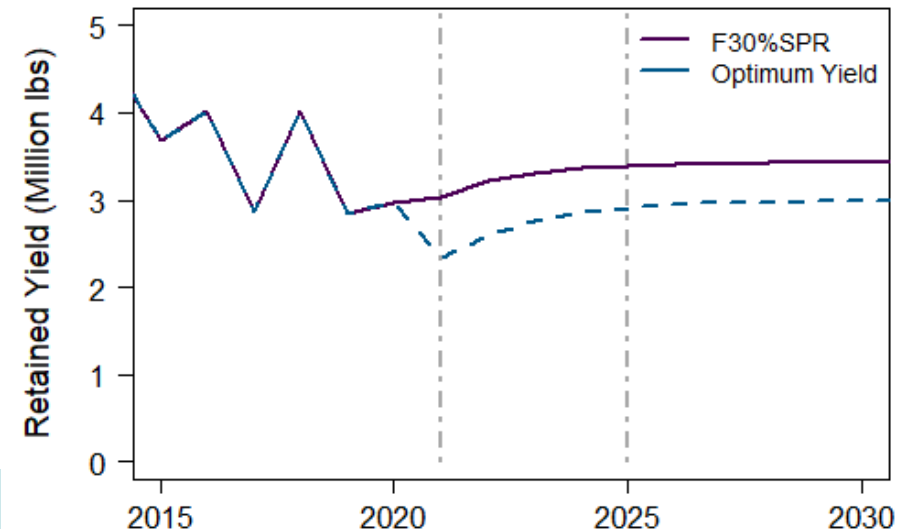
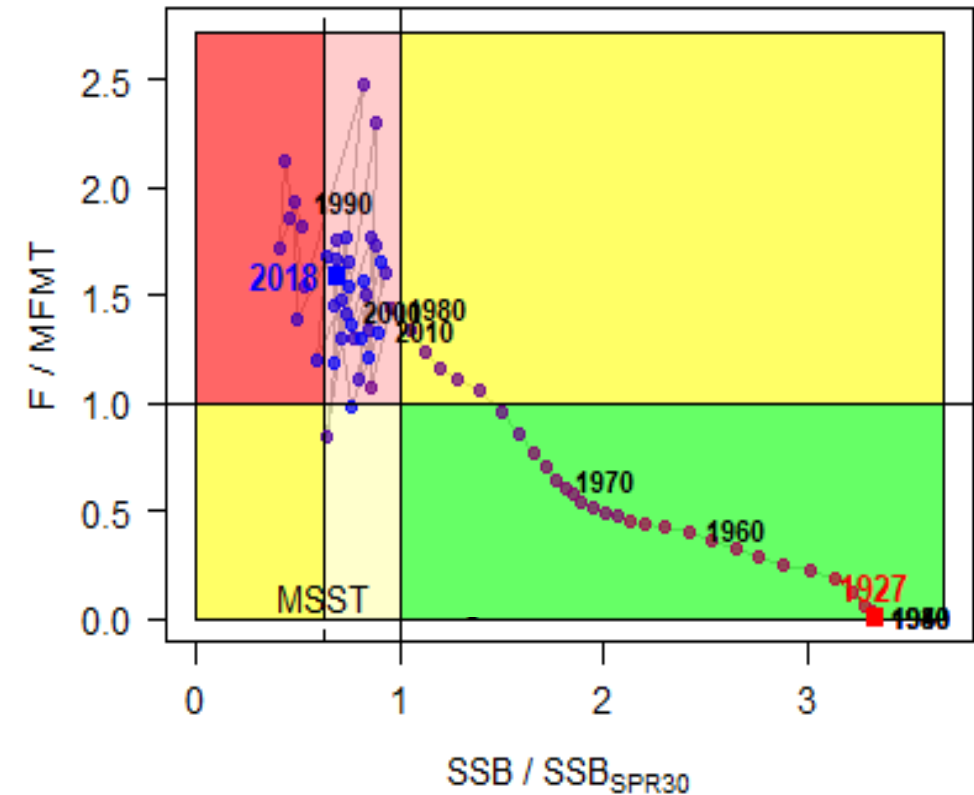
Sustainable Fisheries Division, SEFSC



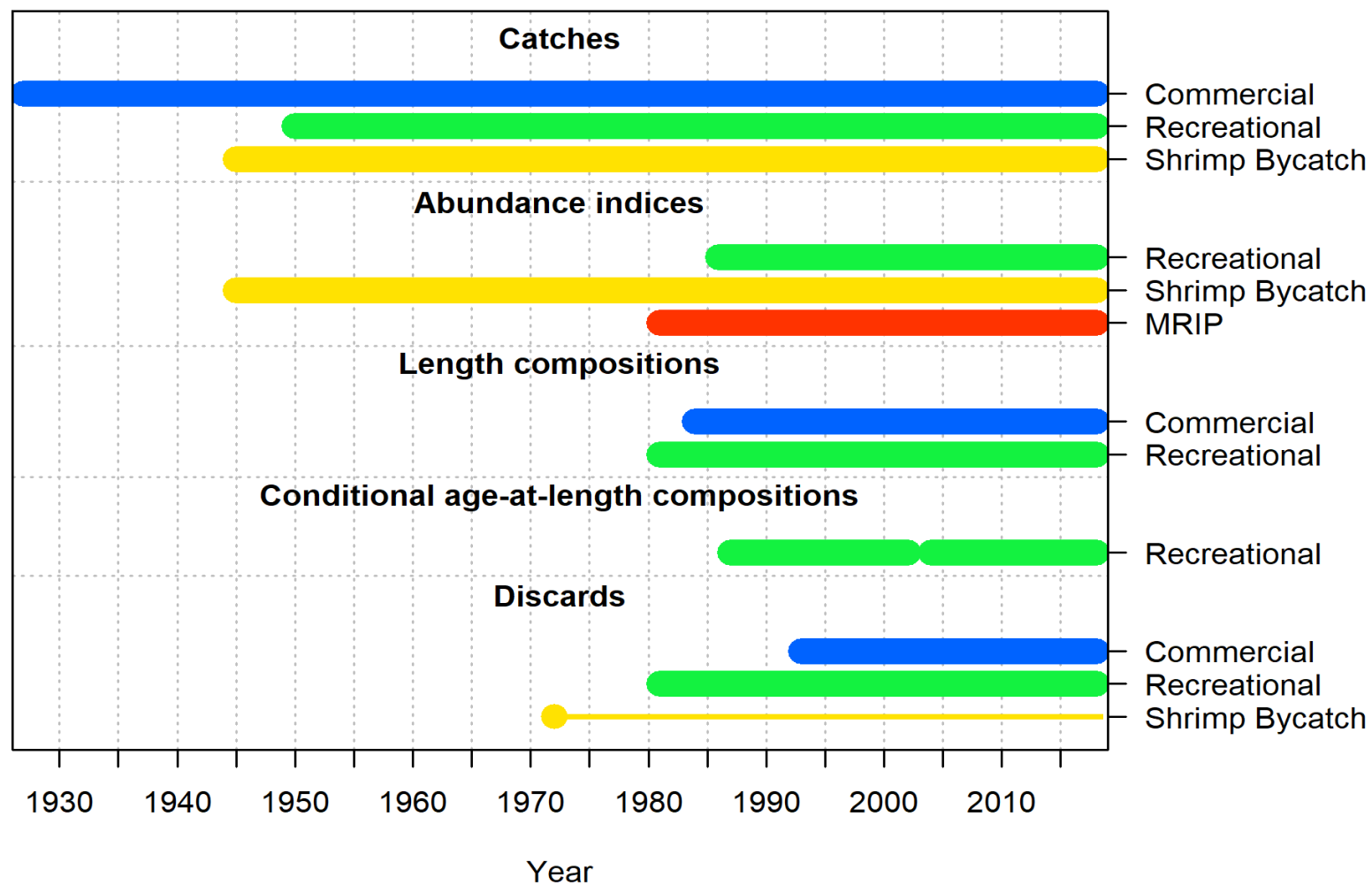
July 21, 2020

Overview

- Used data through 2018
- SEDAR 28U used the same data sets as SEDAR 28
- Used MRIP-FES to adjust recreational catch and effort
- No longer estimating growth or shrimp selectivity
- **Results: Gulf Cobia is undergoing overfishing, but not overfished.**
 - In 2018, the stock was being harvested at 144% of MFMT and SSB was 111% of MSST.
- Fishing mortality must be reduced to rebuild the stock the SPR 30% MSY Proxy

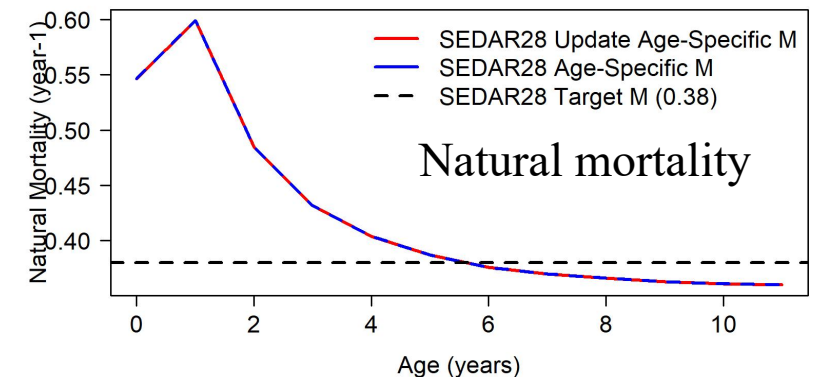
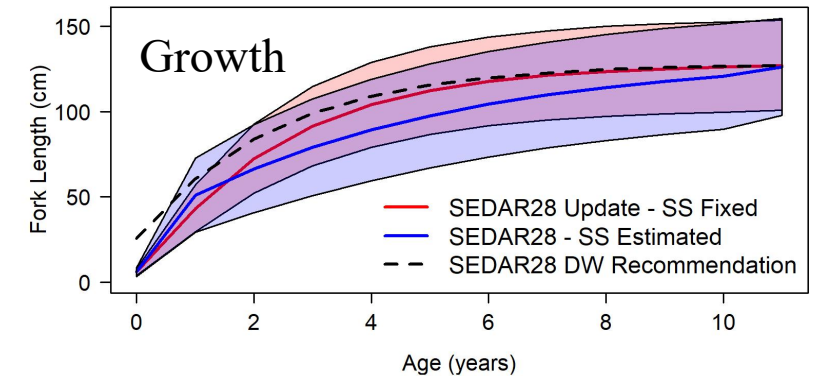
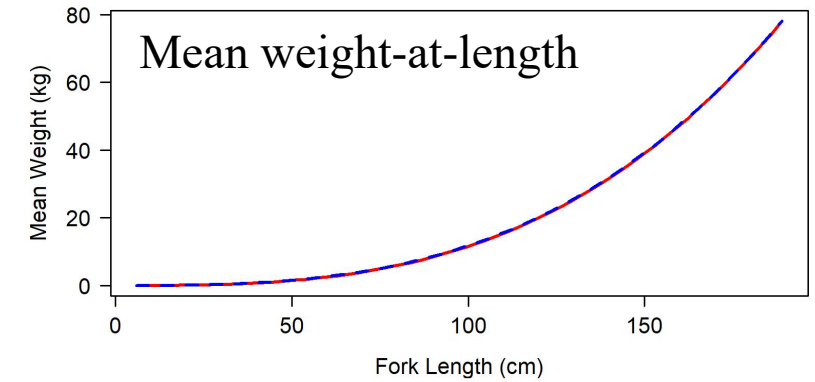


Data – Overview



Data – Life History

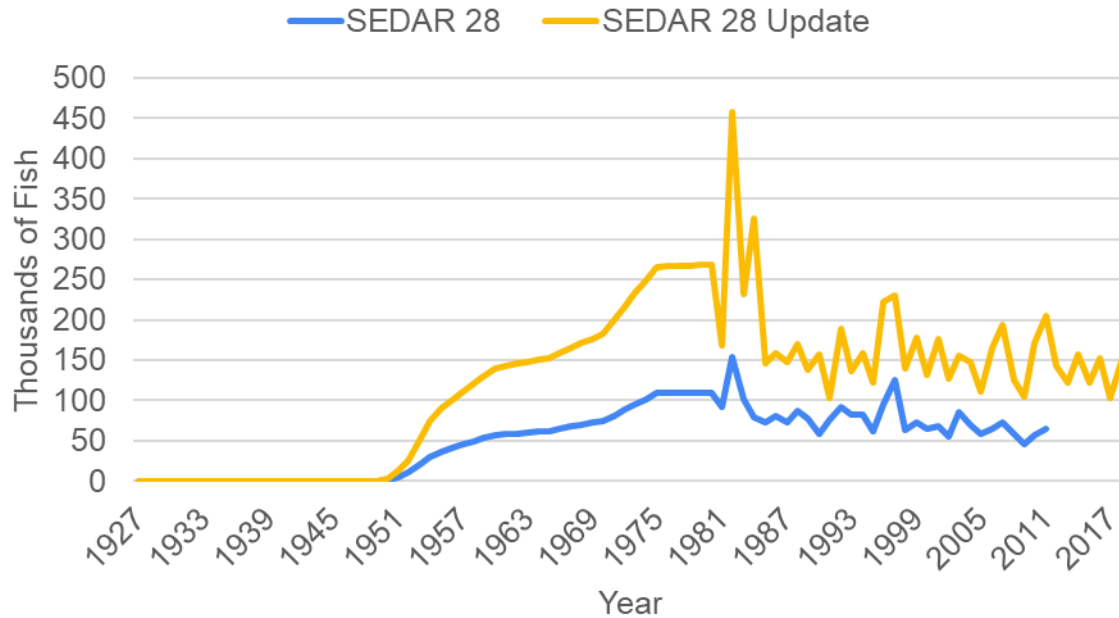
Topic	Decision
Length-Weight Conversion	Unchanged
Maturity	Unchanged
SSB Metric	Unchanged
Fecundity	Unchanged
Natural Mortality	Unchanged
Age and Growth	Fixed L_{\max} and K to SEDAR 28 DW Recommendation



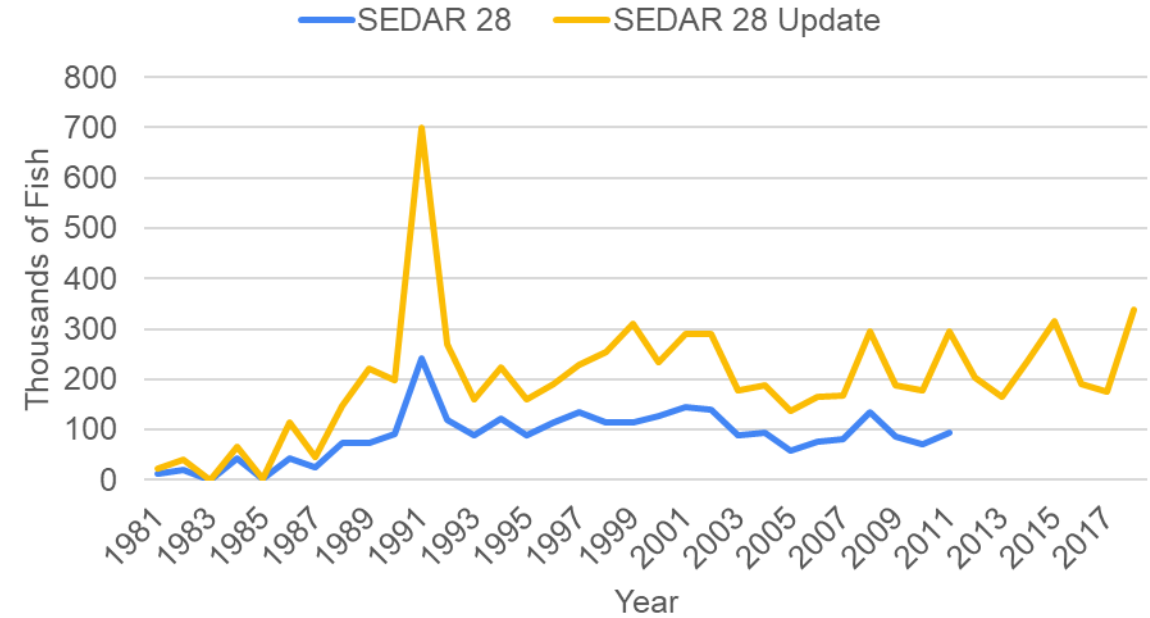
Data – Recreational – Landings and Discards

Topic	Decision
Recreational Landings	Use new MRIP-Fishing Effort Survey [FES]-adjusted WP-02
Recreational Discards	Use new MRIP-Fishing Effort Survey [FES]-adjusted WP-02

Recreational Landings (1927 - 2018)

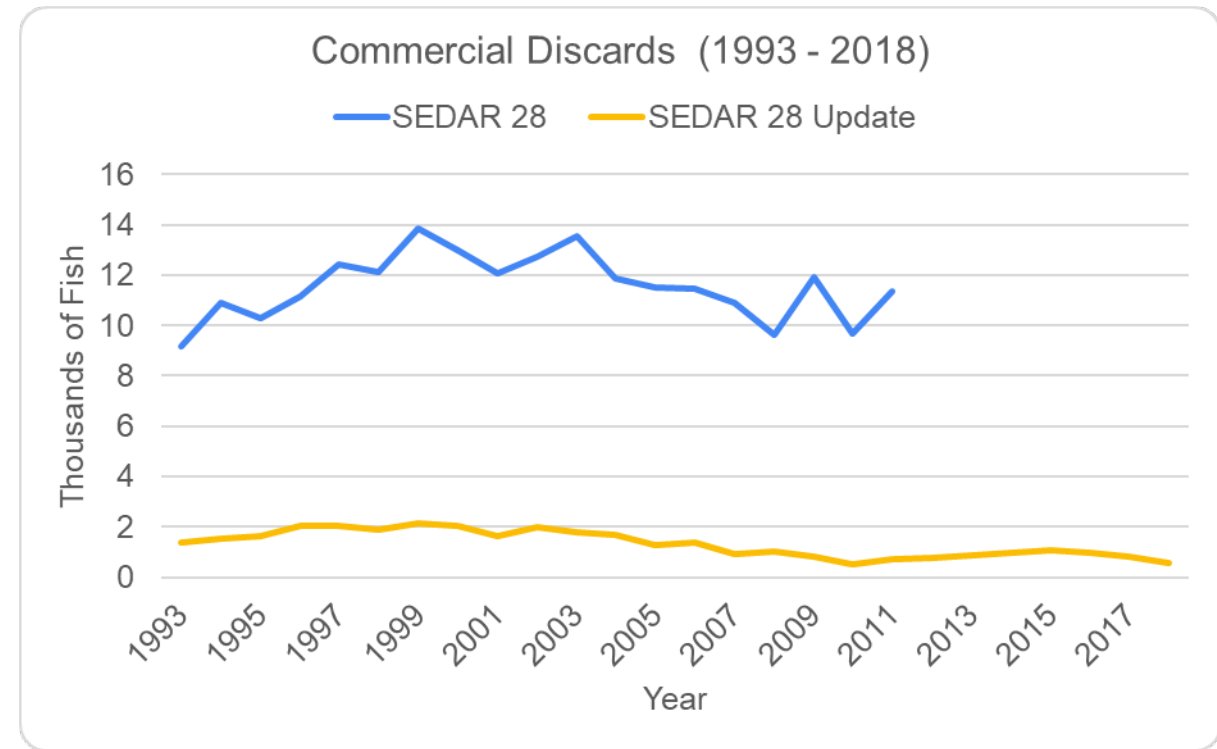
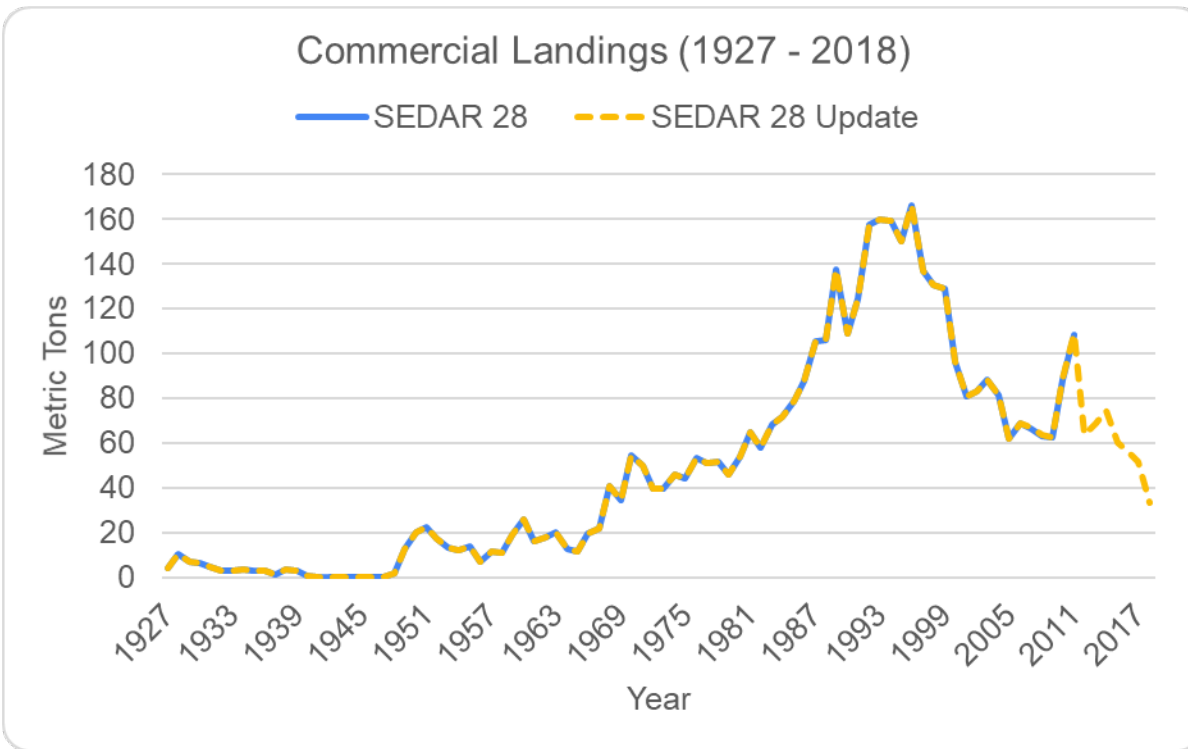


Recreational Discards (1981 - 2018)



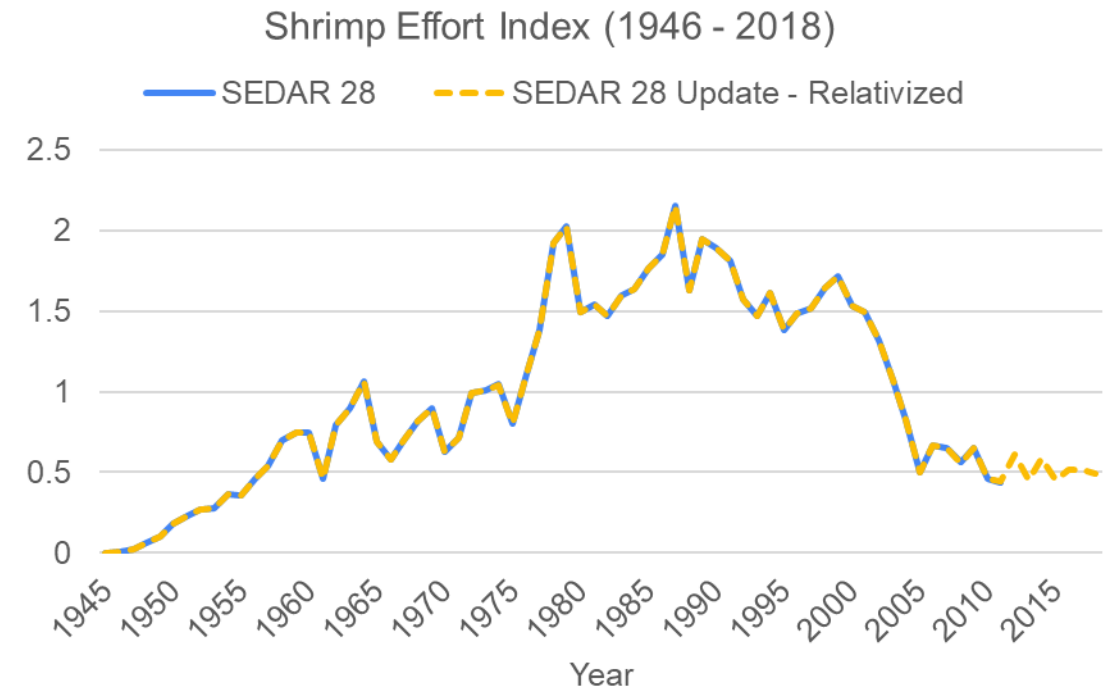
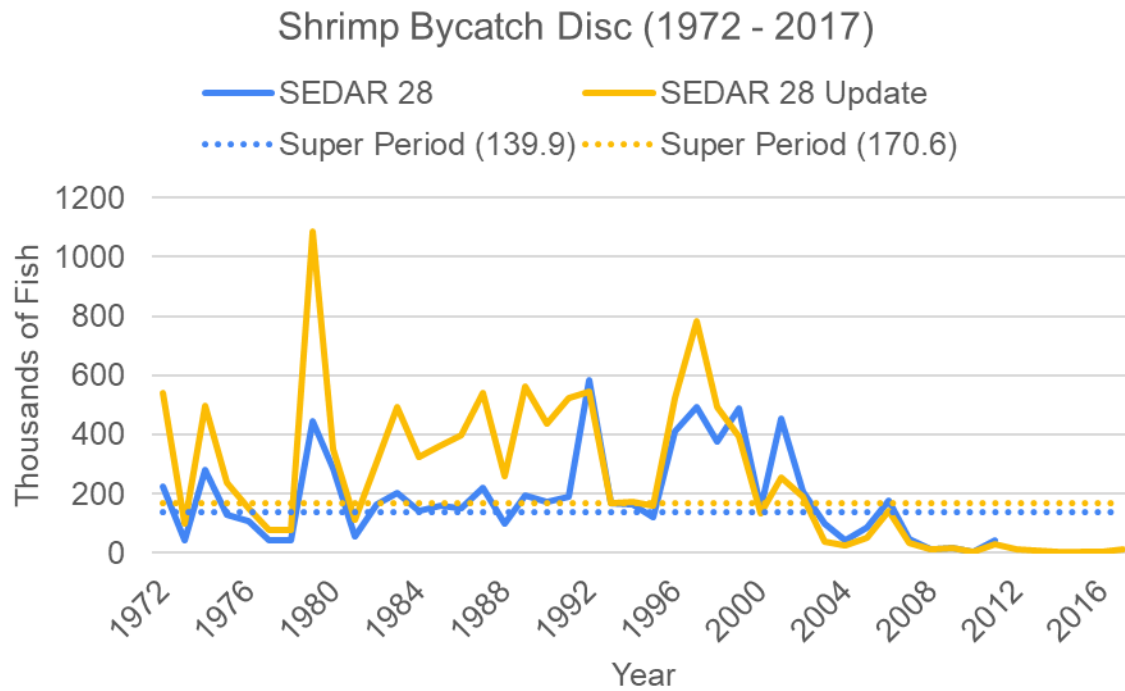
Data – Commercial – Landings and Discards

Topic	Decision
Commercial Landings	Unchanged
Commercial Discards	CPUE expansion using coastal observer program in conjunction with total fishing effort from the commercial reef fish logbook program (used consistently in recent reef fish assessments) WP-06



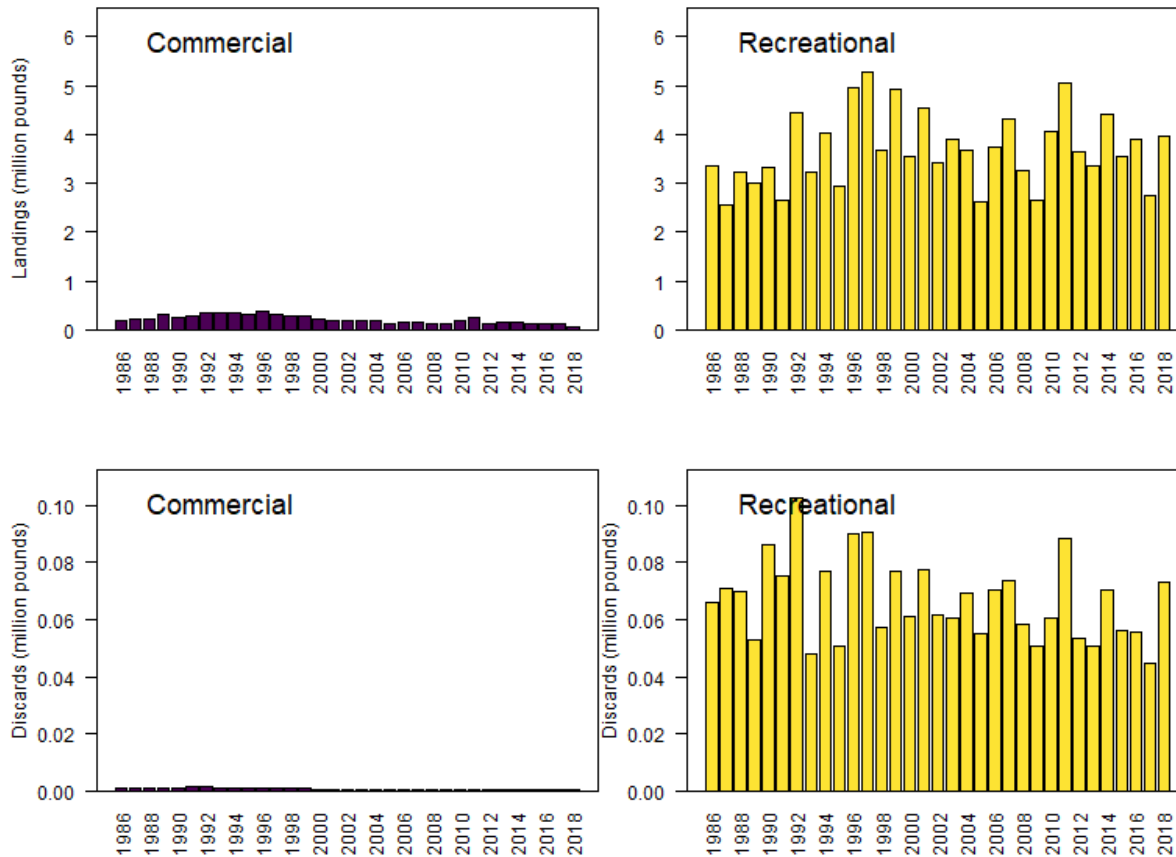
Data Summary – Shrimp Bycatch

Topic	Decision
Shrimp Bycatch	Incorporate use of bycatch reduction devices into the analysis WP-07
Shrimp Effort Index	CV relativized 0.20 for all years

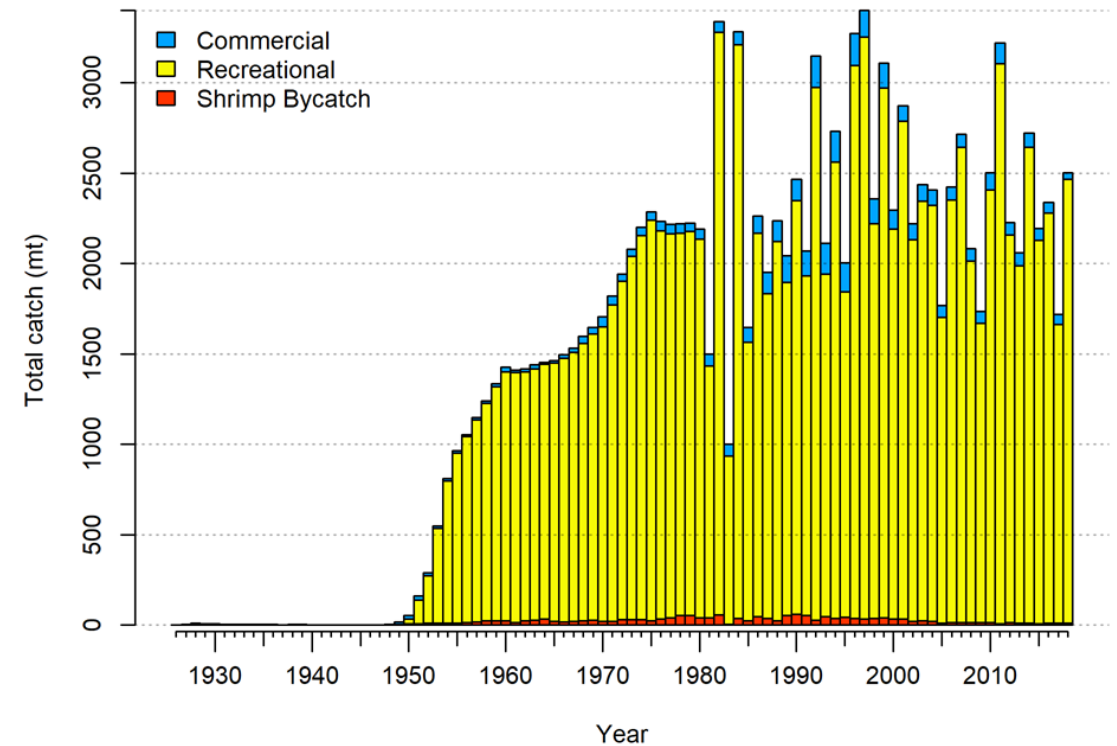


Base Model – Results

Landings and discard estimates for commercial and recreational fisheries in millions of pounds, 1986-2018.



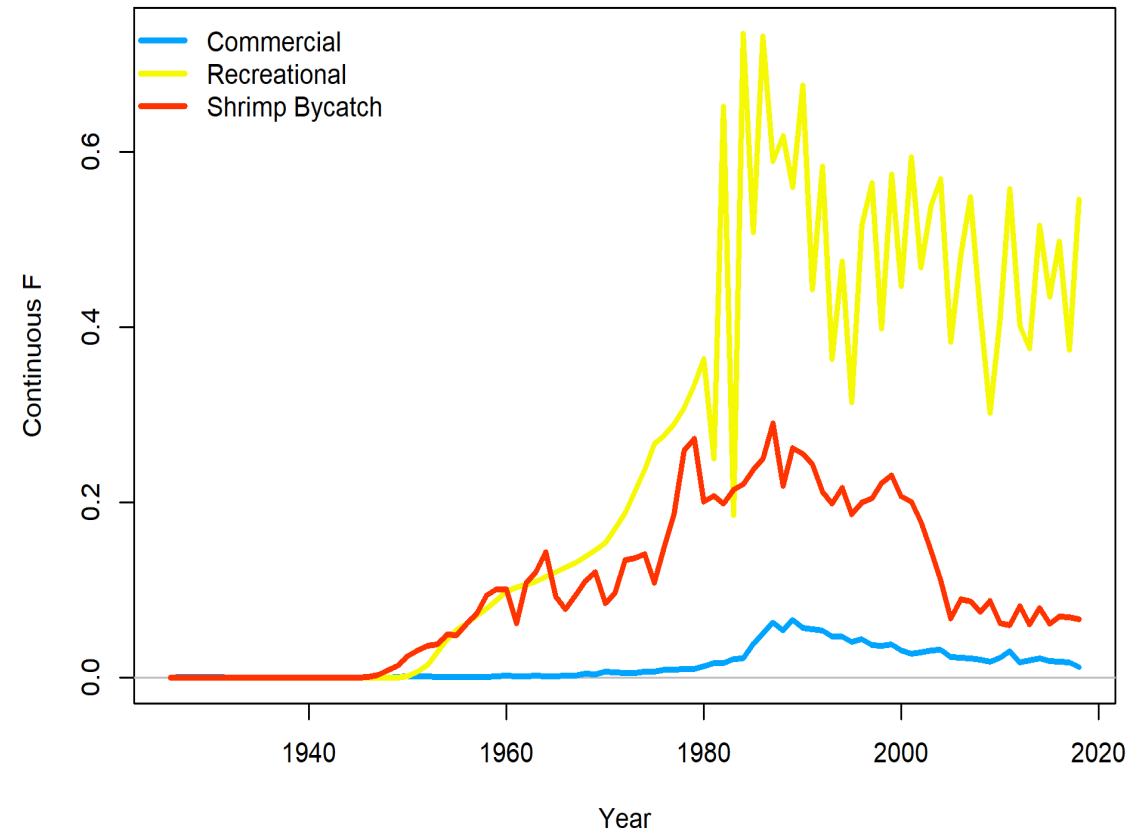
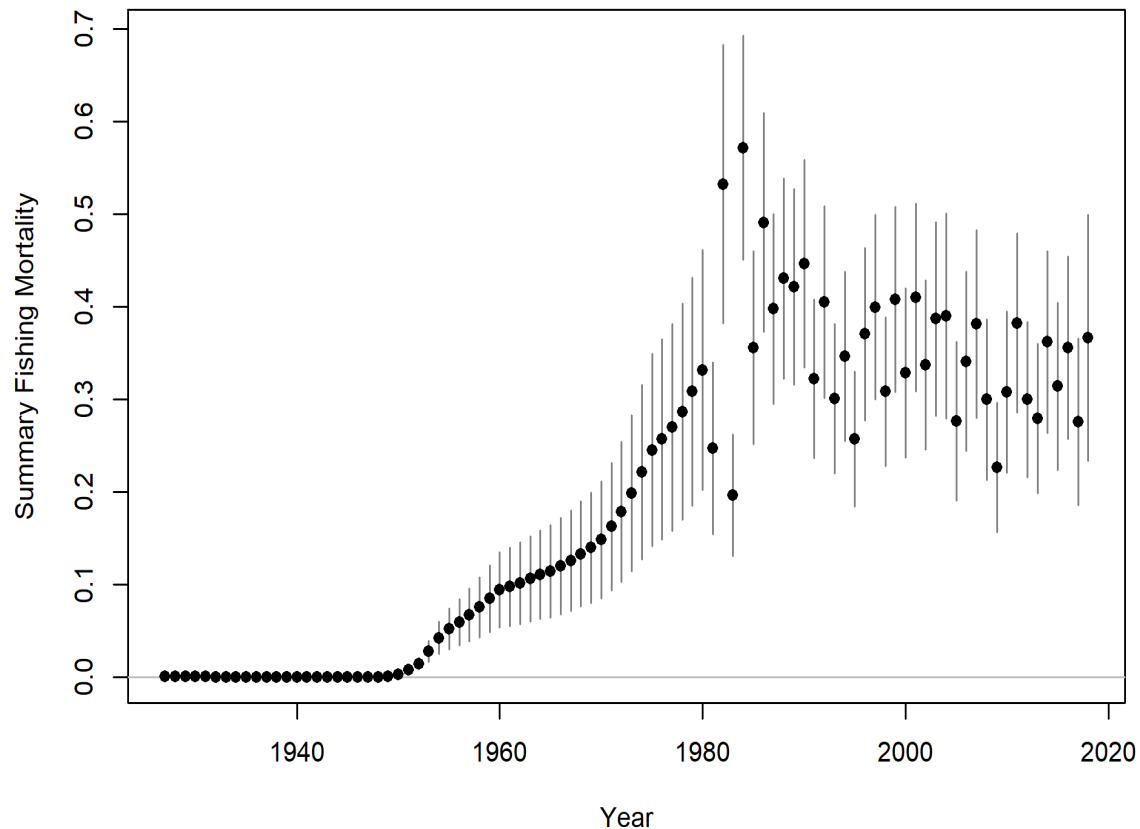
Estimated catch history, includes both landings and discards in metric tons, 1927-2018.



Base Model – Results

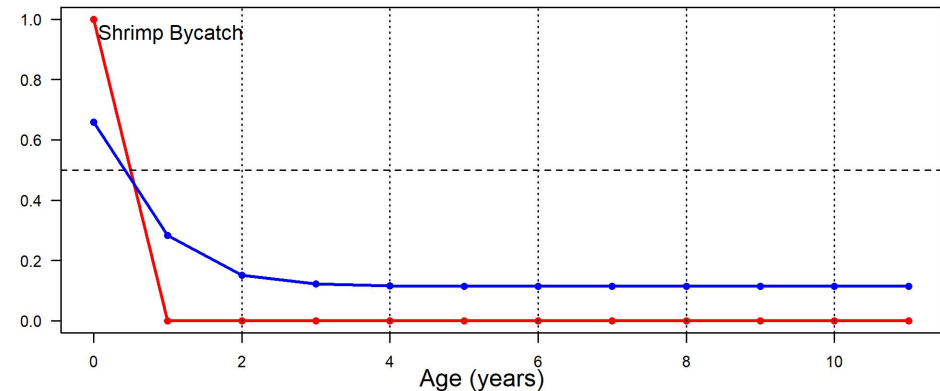
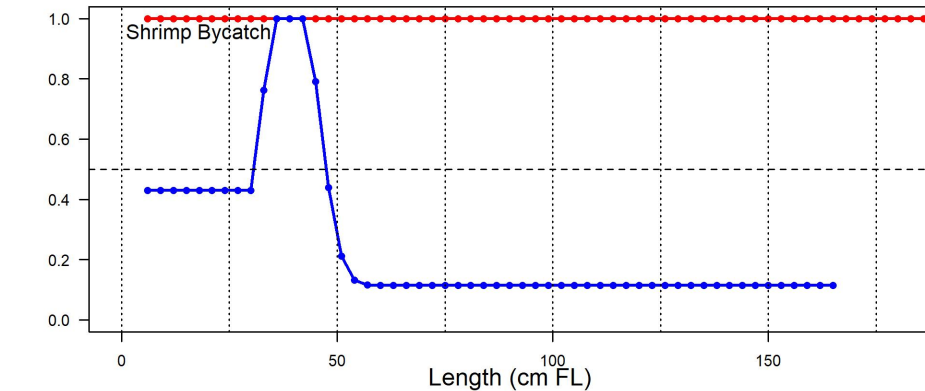
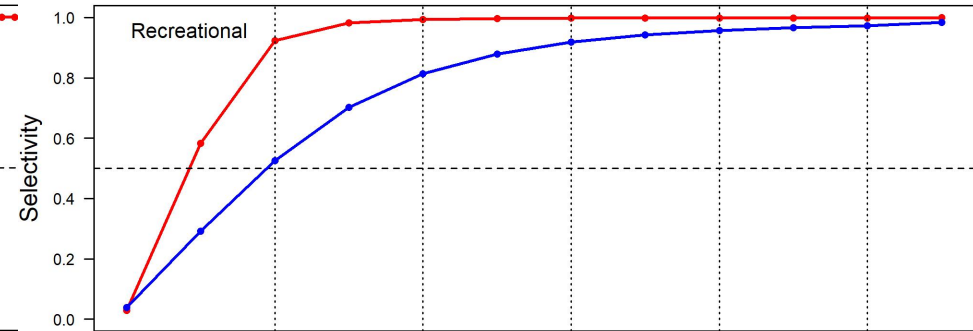
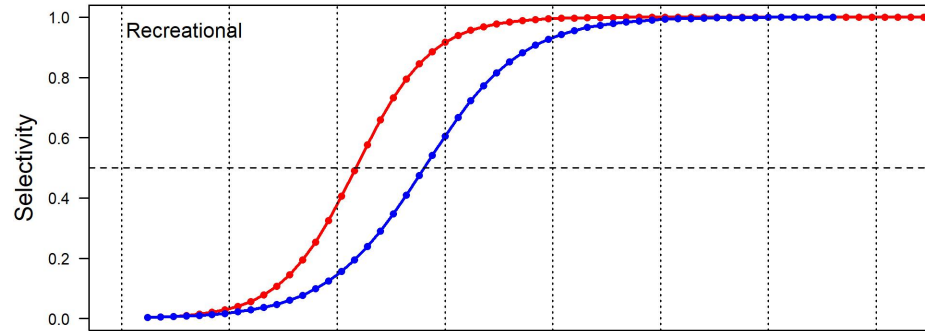
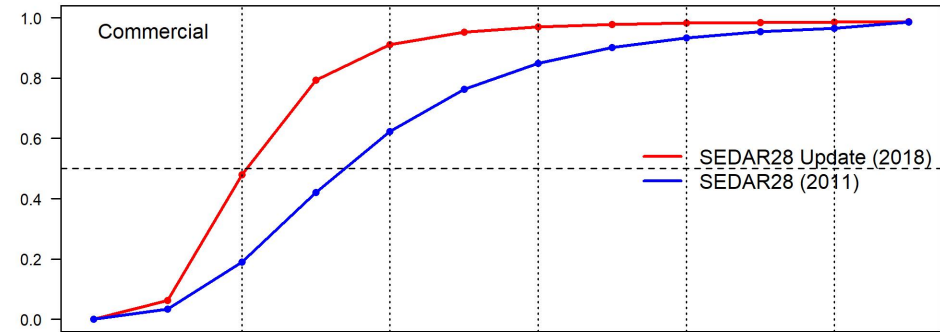
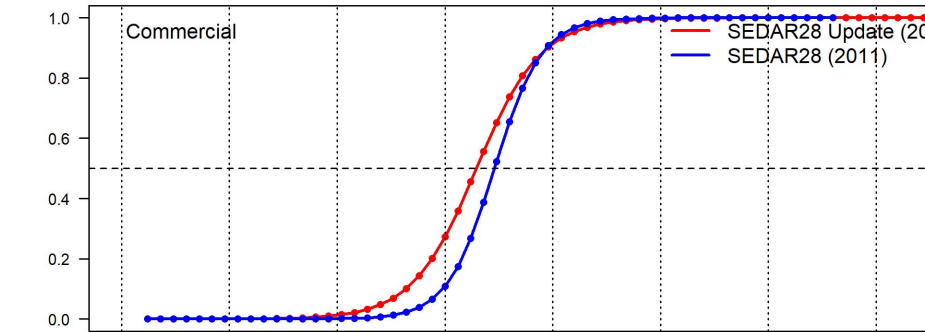
Annual exploitation rate (total kill/total biomass) [left]

Fleet-specific estimates of instantaneous fishing mortality rate [right]



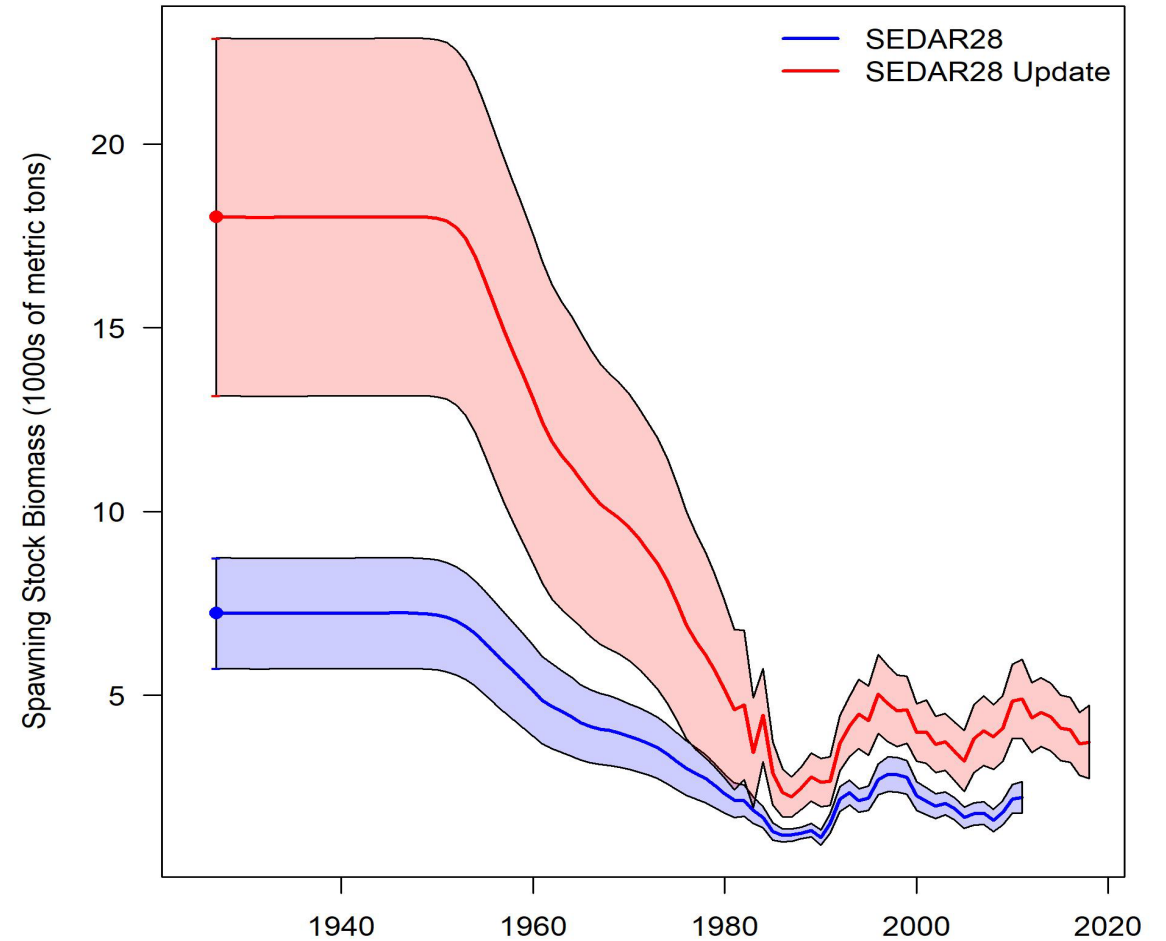
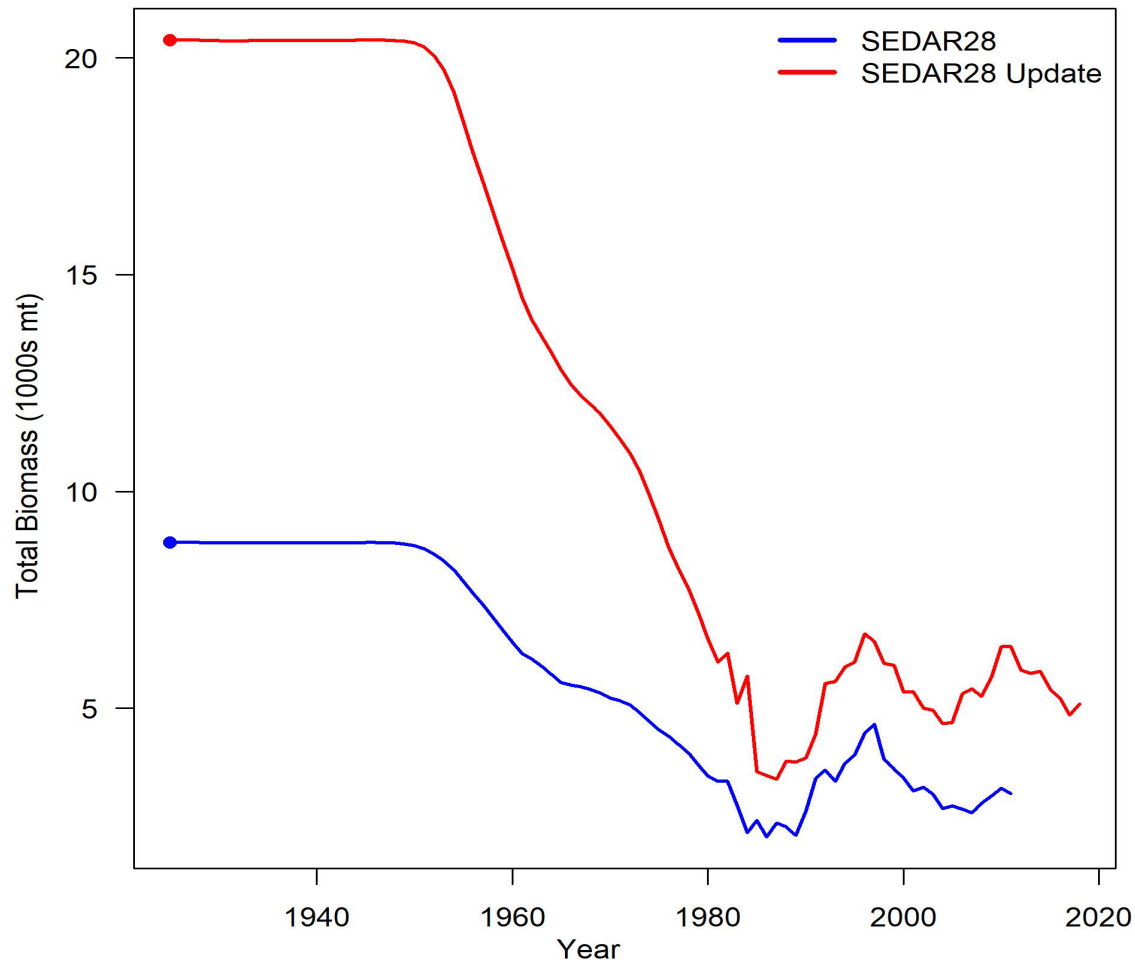
Base Model – Results

Length selectivity [left]
Age selectivity [right]



Base Model – Results

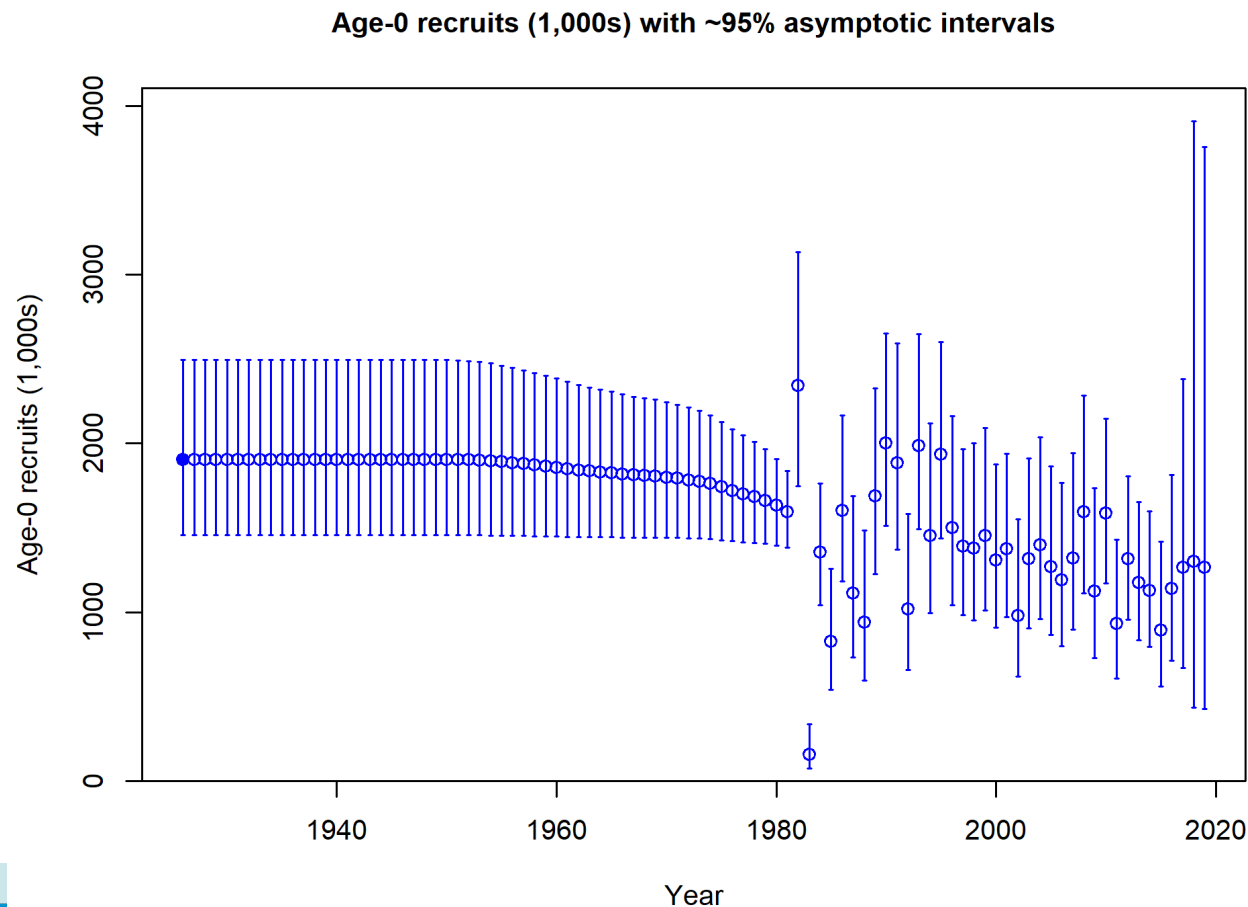
Estimate of total biomass [left] and spawning stock biomass [right]



Base Model – Results

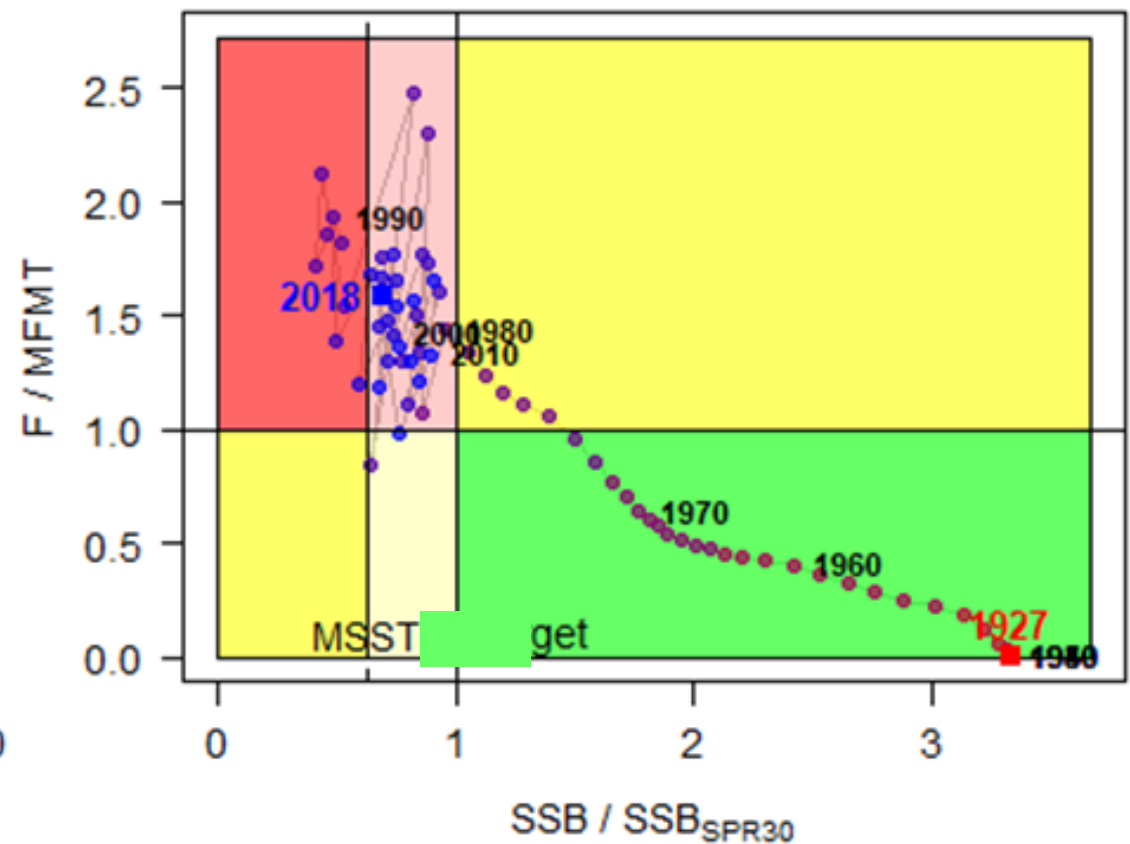
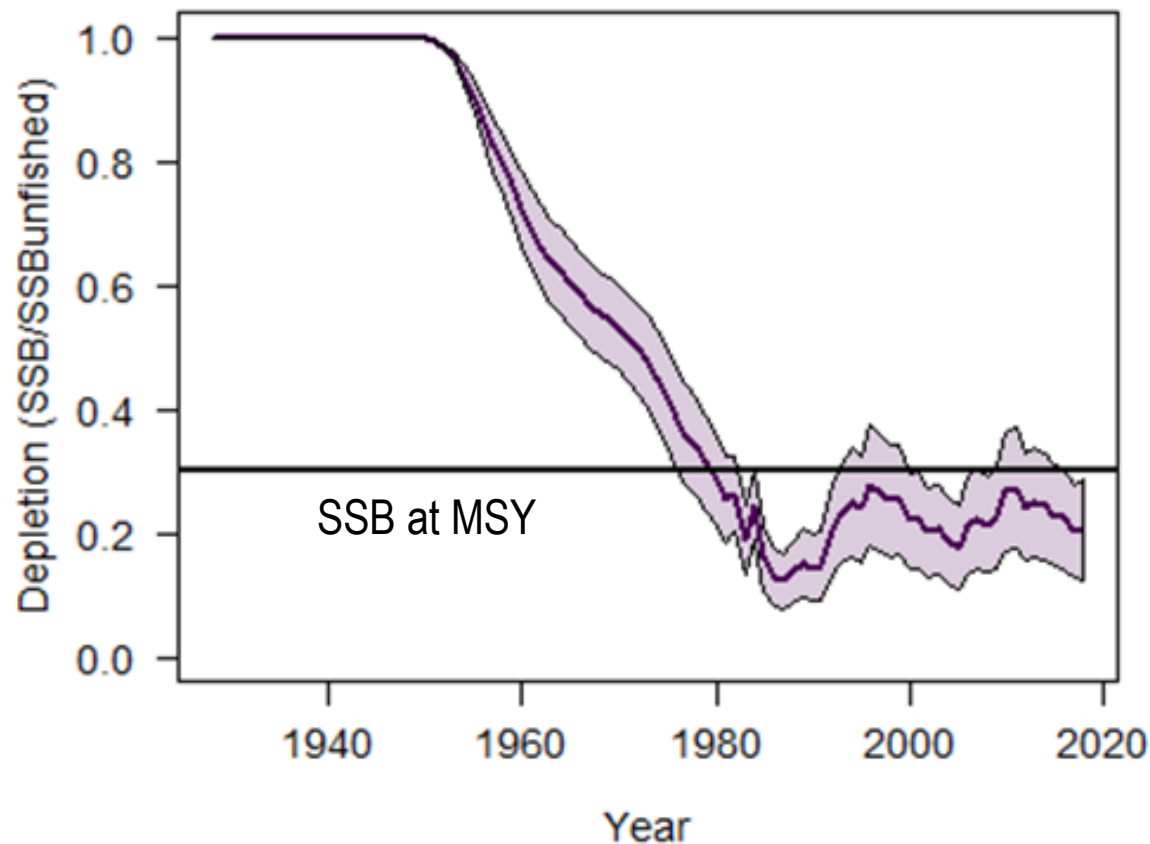
Spawner recruitment relationship poorly defined

Highest recruitment in 1982 (2.34 Million) and lowest in 1983 (0.16 million)



Base Model – Results

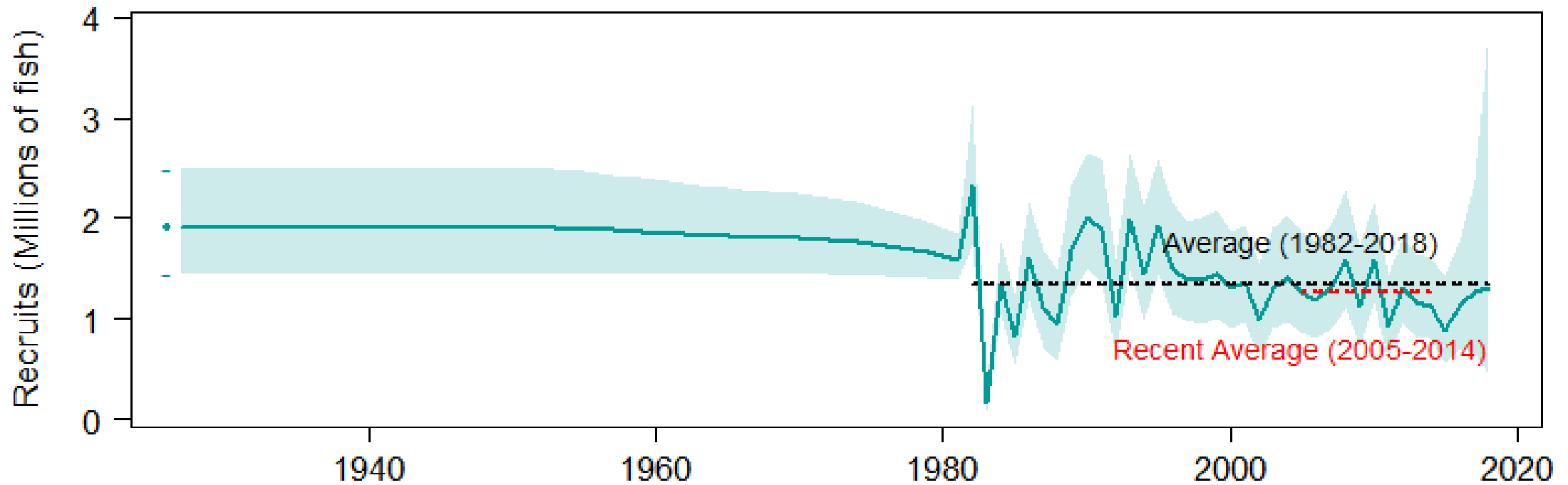
- Gulf Cobia is undergoing overfishing but not overfished
- As of 2018, SSB is below SSB at MSY. At ~ 21% SPR, need to be at 30%
- Gulf Cobia has experienced overfishing every year from 1975 – 2018, except 1983 and 2009



Projection – Settings

Assumptions

- $MSST = SSB_{SPR30\%} * (1-M)$, where $M = 0.38 \text{ y}^{-1}$ for the base model
 - So, $MSST = 62\%$ of $SSB_{SPR30\%}$
- Recruitment was fixed as recent mean (2005-2014)



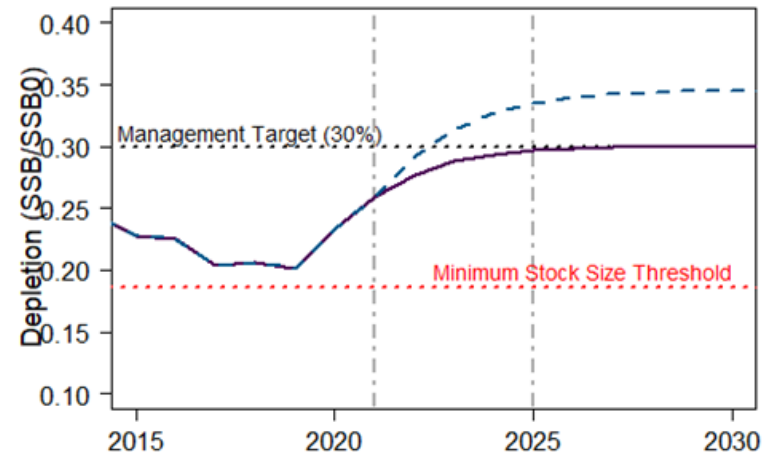
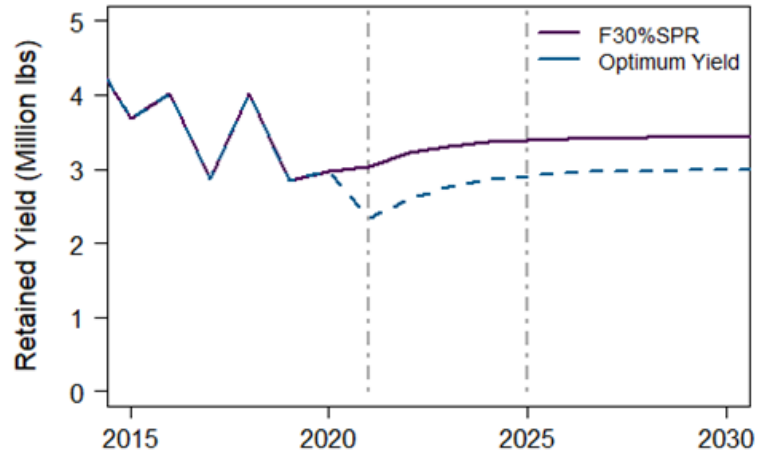
Projections – Settings

Parameter	Value	Comment
Relative F	Average from 2016-2018	Average relative fishing mortality over terminal three years (2016-2018) of model
Selectivity	Estimates from 2018	Fleet specific selectivity estimated in terminal year
Recruitment	1,263,050	Bias adjusted geometric mean recruitment averaged over recent time period (2005-2014) Time-invariant in projections
Shrimp Bycatch	F = 0.0684	Average shrimp bycatch fishing mortality over terminal three years (2016-2018) of model Time-invariant in projections
2019 Landings	Comm. = 15.98 (mt ww), Rec. = 125,043 fish	Provisional 2019 Landings adjusted to FES (SERO)
2020 Landings	Comm. = 33.61 (mt ww), Rec. = 125,731 fish	Three year (2017-2019) average

Projections – Results

Mortality Rate Criteria		
$F_{SPR30\%}$	Equilibrium F that achieves $SPR_{30\%}$	0.231
MFMT $F_{SPR30\%}$	$F_{SPR30\%}$	0.231 ← 1
F at Optimum Yield	$0.75 * \text{Directed F at } F_{SPR30\%}$	0.179
$F_{Current}$	Average ($F_{2016} - F_{2018}$)	0.33 ← 2
$F_{Current}/MFMT_{FSPR30\%}$	Current stock status based on $F_{SPR30\%}$	1.44 ← 3 2 > 1
Biomass Criteria		
$SSB_{FSPR30\%}$	Equilibrium SSB at $F_{SPR30\%}$	5406
$MSST_{FSPR30\%}$	$(1-M)*SSB_{FSPR30\%}$	3352 ← 4
SSB at Optimum Yield	Equilibrium SSB when Directed F = $0.75 * \text{Directed F at } F_{SPR30\%}$	6227
SSB_0	Virgin SSB	18016
$SSB_{Current}$	SSB_{2018}	3725 ← 5
$SSB_{Current}/SSB_{FSPR30\%}$	Current stock status based on $SSB_{FSPR30\%}$	0.69
$SSB_{Current}/MSST_{FSPR30\%}$	Current stock status based on $MSST_{FSPR30\%}$	1.11 ← 6 5 > 4
$SSB_{Current}/SSB_0$	2018 SPR	0.21

Projections – Results



Projections at SPR

ABC based on P^* of 0.398

YEAR	SSB/SSB _{FSPR30%}	SSB/MSST	SSB/SSB ₀	OFL	ABC
2021	0.86	1.39	0.26	3.03	2.81
2022	0.92	1.49	0.28	3.21	3.06
2023	0.96	1.55	0.29	3.31	3.21
2024	0.98	1.58	0.29	3.37	3.30
2025	0.99	1.59	0.30	3.40	3.34
2026	0.99	1.60	0.30	3.41	3.36
2027	1.00	1.61	0.30	3.42	3.37
2028	1.00	1.61	0.30	3.42	3.38
2029	1.00	1.61	0.30	3.42	3.38
2030	1.00	1.61	0.30	3.43	3.38

Projections at OY

Directed $F = 0.75 \times \text{Directed } F \text{ at } F_{\text{SPR30\%}}$

YEAR	SSB/SSB _{FSPR30%}	SSB/MSST	SSB/SSB ₀	OY
2021	0.86	1.39	0.26	2.34
2022	0.97	1.57	0.29	2.60
2023	1.05	1.69	0.31	2.76
2024	1.09	1.76	0.33	2.86
2025	1.12	1.80	0.34	2.91
2026	1.13	1.83	0.34	2.95
2027	1.14	1.84	0.34	2.96
2028	1.15	1.85	0.34	2.97
2029	1.15	1.85	0.34	2.98
2030	1.15	1.85	0.35	2.98

**Better accounting
of uncertainty in
the projections**

Projections – Results for SEDAR 28 with FES Landings

- Updating SEDAR 28U with MRIP-FES recreational landings increased estimates of virgin spawning stock biomass, recruitment, and projected yields
- If SEDAR 28 had used MRIP-FES in 2013, the equilibrium yield estimate would have been about 4.87 mp rather than 2.66 mp
- The current equilibrium yield estimate of 3.43 mp is about a 33% decrease from the status quo, and not the large increase that it appears to be.

Model	Terminal Year	SSB	R	F_{SPR30}	SSB_0	SSB_{FSPR30}	Equil. Yield
SEDAR 28	2011	1896	751.5	0.378	7235	2065	2.66
SEDAR 28 FES	2011	3643	1429.5	0.094	17642	5280	4.87
SEDAR 28 Update	2018	3956	1270.9	0.231	18016	5406	3.43

Management Overview

Trip Limits

7/19/1990	2/Person Gulf and S.A.	55 FR 29370
2/11/2018	1/Person, 2/Vessel FL gulf state waters	68B-19.004
3/11/2018	1/Person, 6/Vessel FL atlantic state waters Recreational	68B-19.004
3/11/2018	2/Person, 6/Vessel FL atlantic state waters Commercial	68B-19.004
3/22/2019	No longer managed in S.A	84 FR 4733

Size Limits

2/04/1983	33 in (88.9 cm) Fork Length Gulf and S.A.	48 FR 5270
3/21/2019	No longer managed in S.A.	84 FR 4733
3/25/2020	36 in (91.4 cm) Fork Length Gulf zone	85 FR 10328
3/25/2020	33 in (83.8 cm) Fork Lenth FL east coast zone	85 FR 10328

ACL

1/30/2012	1.46 Million LBS (2012 - 2013)	76 FR 82057
3/01/2015	1.57 Million LBS (2014) Gulf zone ACL	80 FR 4216
3/01/2015	1.61 Million LBS (2015) Gulf zone ACL	80 FR 4216
3/01/2015	1.66 Million LBS (2016 +) Gulf zone ACL	80 FR 4216
3/01/2015	0.88 Million LBS (2014) FL east coast zone ACL	80 FR 4216
3/01/2015	0.90 Million LBS (2015) FL east coast zone ACL	80 FR 4216
3/01/2015	0.93 Million LBS (2016 +) FL east coast zone ACL	80 FR 4216