SEDAR 79: Mutton Snapper

South Atlantic Fisheries Management Council

USF Center for Quantitative Fisheries Ecology & FWRI Stock Assessment Group

June 12, 2025

Life History Overview

- Tropical reef species associated with coral reef areas in the western Atlantic Ocean.
  - Populations from U.S. waters are believed to belong to a single stock. Most abundant in South FL.
- Juveniles inhabit nearshore bays, seagrass beds, and mangroves before shifting to reefs.
- Observed maximum age = 42 years.
- Forms large spawning/pre-spawning aggregations, peaking April through July
- Primarily hook & line fishery
  - Targeted by commercial and recreational anglers in both state and federal waters
  - 18” minimum size and lower trip limits began in 2018. No fishery closures have occurred.

UF Nick Haddad

Assessment History

SEDAR 15A Benchmark

- ASAP v2 – Statistical Catch-At-Age Model
- **1981-2006**, Single Stock, Ages 1 – 25+
- 5 fleets – All Dome Shaped Selectivity
  - Commercial Hook and Line, Commercial Longline, Commercial Other, Headboat, General Rec (MRFSS)
- 11 Indices of Abundance
  - 5 FD – Selectivity linked to fleets
  - 6 FI – Dome shaped selectivity

Base Model Results: not overfished, overfishing is not occurring

SEDAR 15AU Update

- ASAP v3 – Statistical Catch-At-Age Model
- **1981-2013**, Single Stock, Ages 1 – 25+
- 4 fleets – Com: flat top, Rec: dome shaped
  - Commercial Hook and Line/Other, Commercial Longline, Headboat, General Rec (MRFSS)
- 7 Indices of Abundance
  - 4 FD – Selectivity linked to fleets
  - 3 FI – Dome shaped selectivity

Base Model Results: not overfished, overfishing is not occurring

SEDAR 79 Benchmark Assessment

Data Evaluation Workshop…..Aug 21-25, 2023
Assessment webinars……Feb – July 2024
Review Workshop……Sept 10-12, 2024

SEDAR
Southeast Data, Assessment, and Review

SEDAR 79
Stock Assessment Report

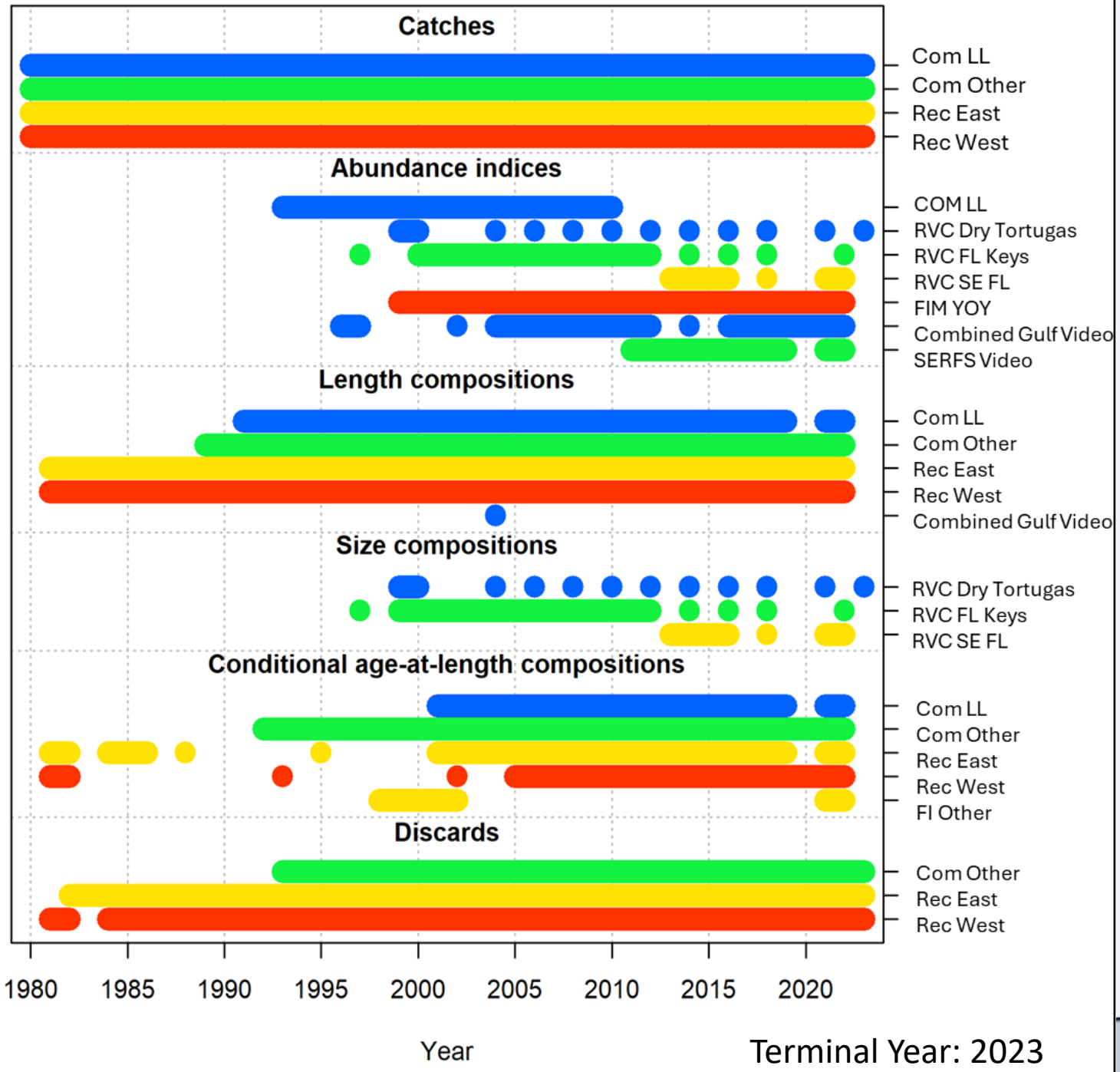
Southeastern US Mutton Snapper

September 2024

SEDAR
4055 Faber Place Drive, Suite 201
North Charleston, SC 29405

https://sedarweb.org/assessments/sedar-79/

Base Model Data Inputs



Terminal Year: 2023

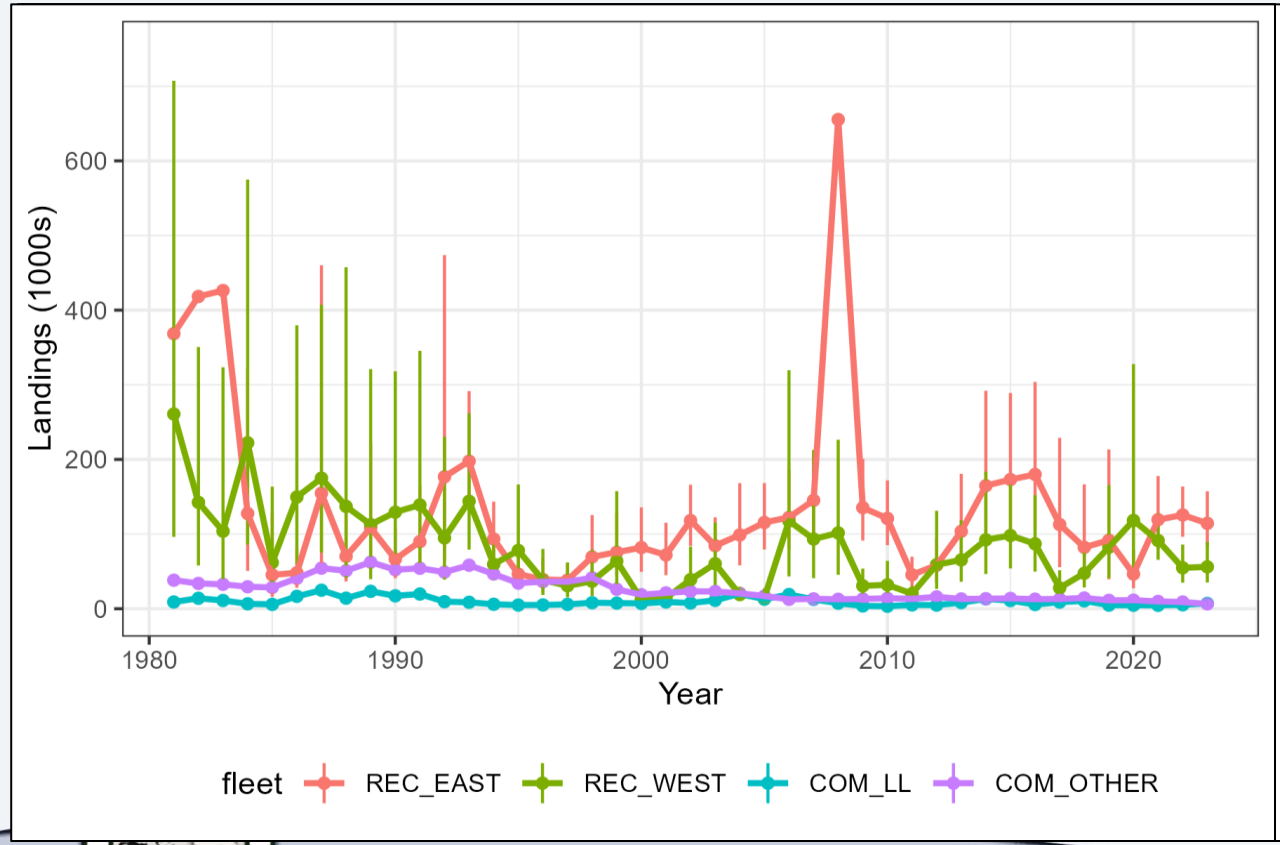
Rec data including FL State Reef Fish Survey

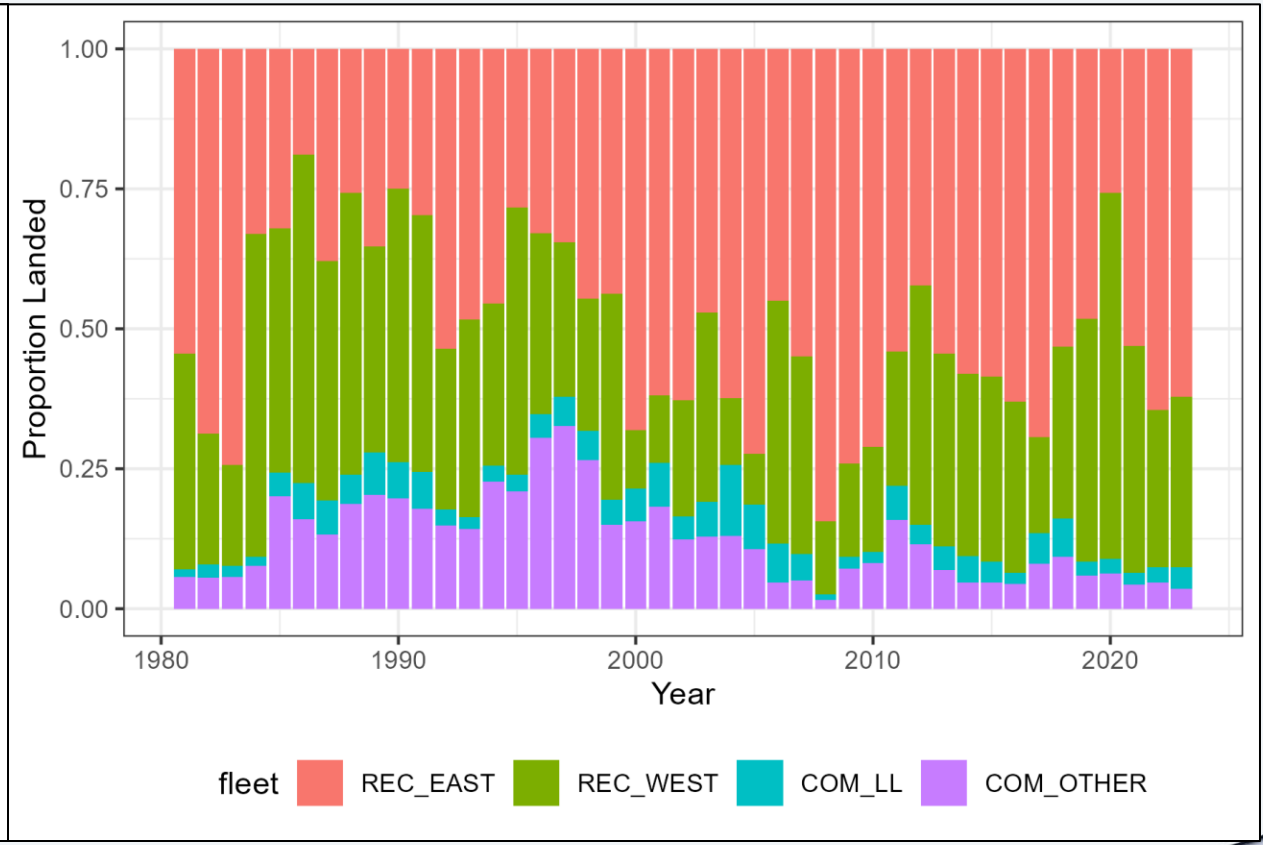
Rec Landings and Releases incorporating SRFS includes:

- Headboat data from SRHS
- Charter data from MRIP-FHS
- Shore mode data from MRIP-FES
- Non-FL Private mode data from MRIP-FES
- FL Private mode data from SRFS (2021-2023)
- MRIP-FES calibrated to SRFS (1981-2020)
  - SEDAR79-AP-02

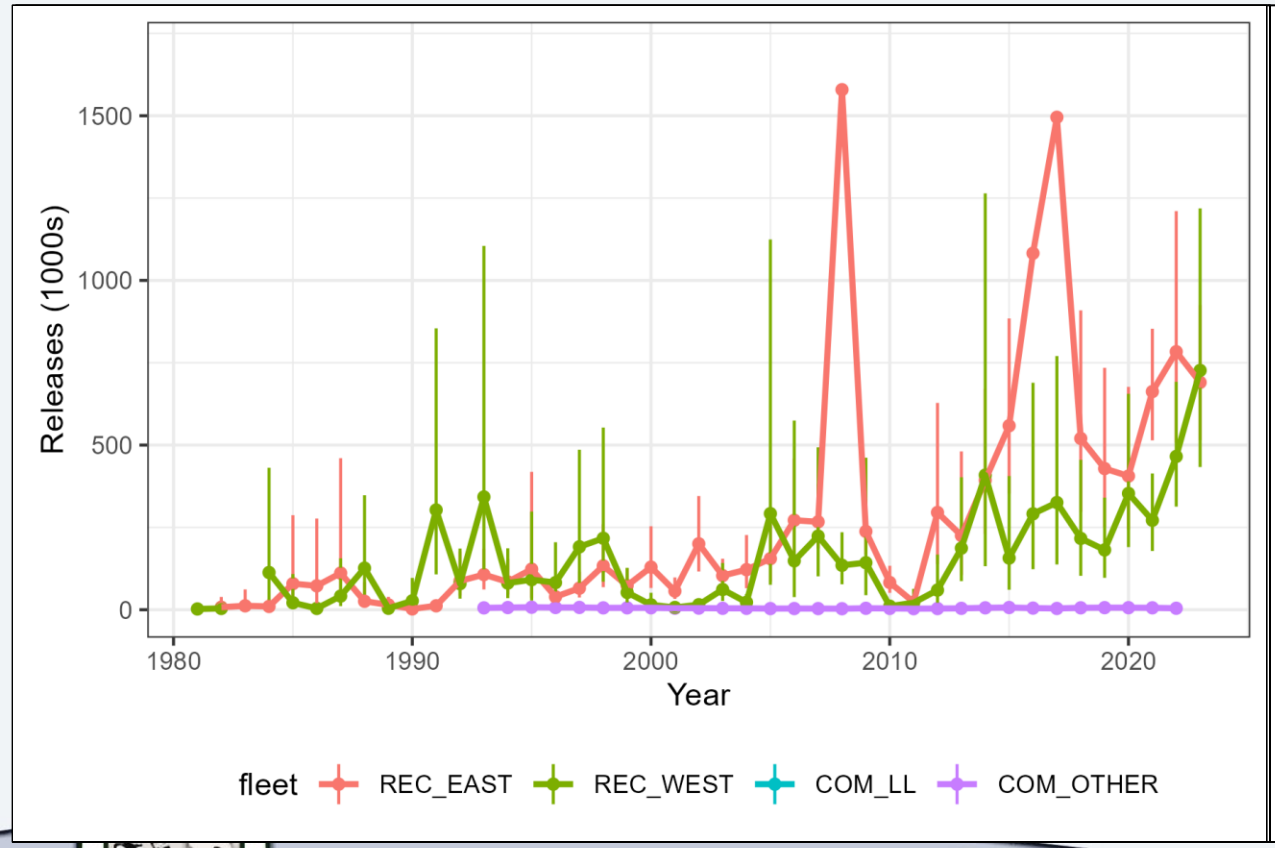
Estimate Type	Region	Ratio
Landings (lbs)	East	0.54
	West	0.28
Landings (num)	East	0.53
	West	0.36
Releases (num)	East	0.55
	West	0.48

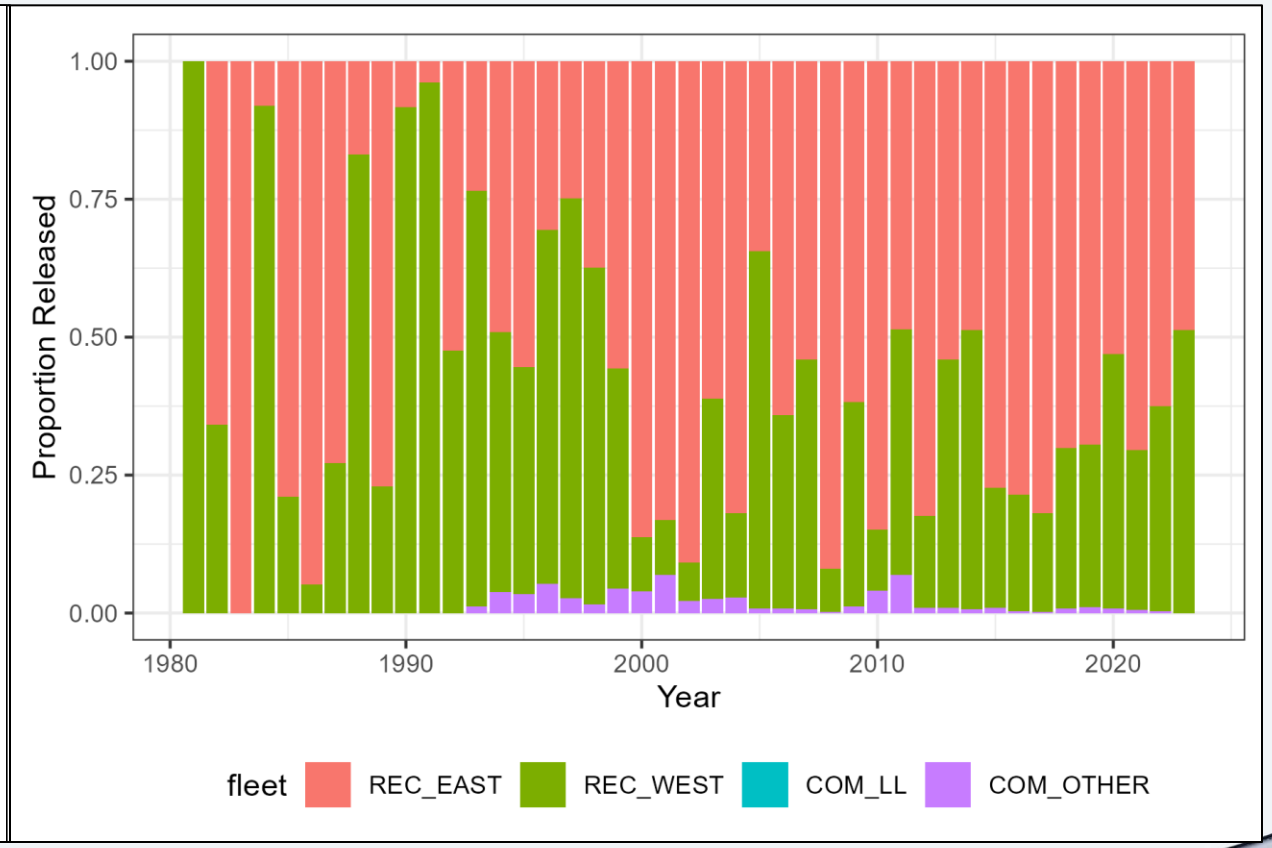
Landings (1000s) by Fleet (inc SRFS)





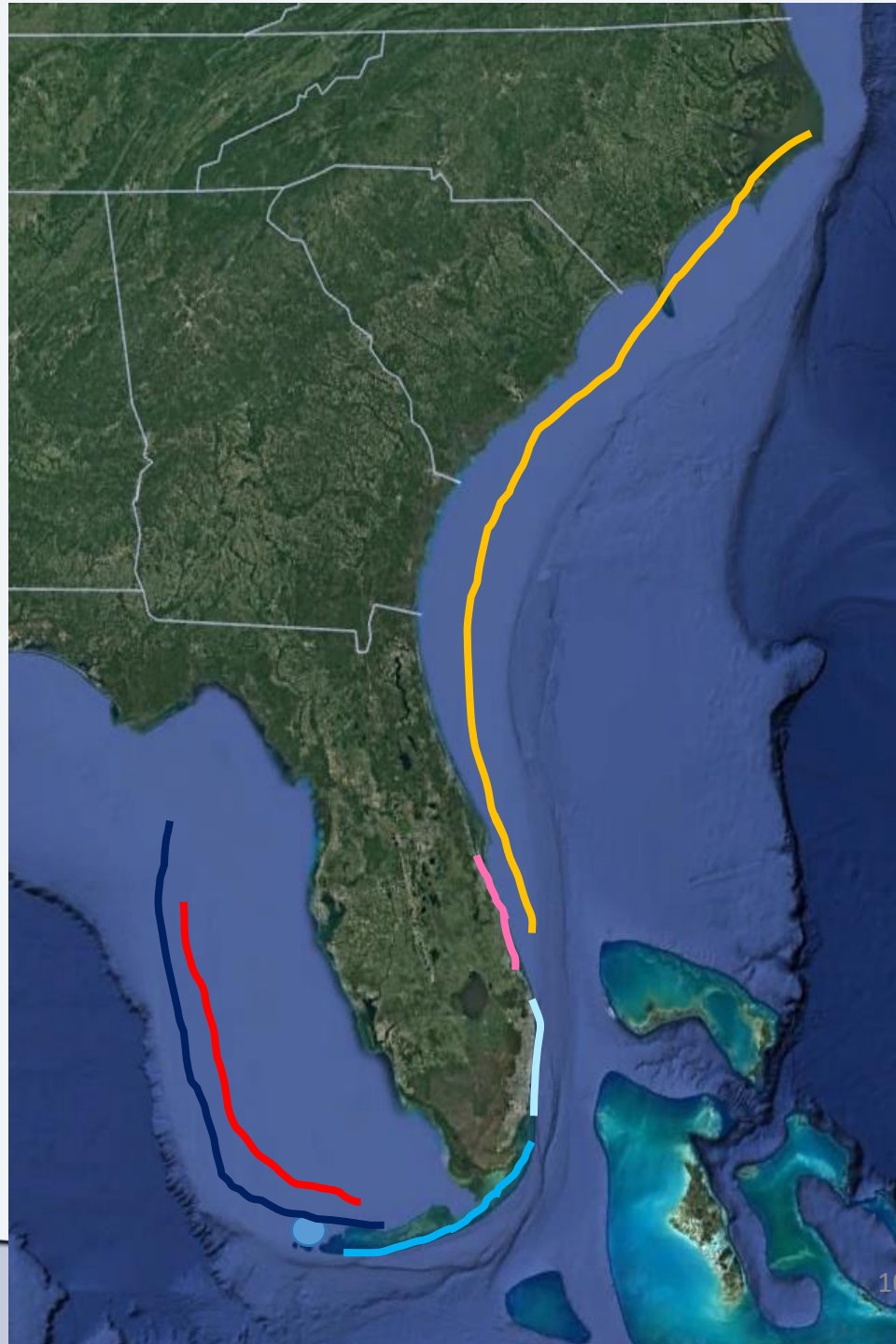
Releases (1000s) by Fleet (inc SRFS)





Main Data Inputs: Indices

Index	FD or FI	Time Series	Num of Years	Targets	Lengths	Ages
SERFS Video	FI	2010-2022	12	Post YOY	No	No
FIM Indian River Lagoon	FI	1999-2022	24	YOY	Yes	Few
RVC SE FL RVC FL Keys RVC Dry Tortugas	FI	2013-2022 1997-2022 1999-2023	7 19 12	Post YOY	Yes	No
Combined Gulf Video	FI	1996-2022	20	Post YOY	Yes	No
Commercial Longline	FD	1993-2010	18	Adults	Yes	Yes



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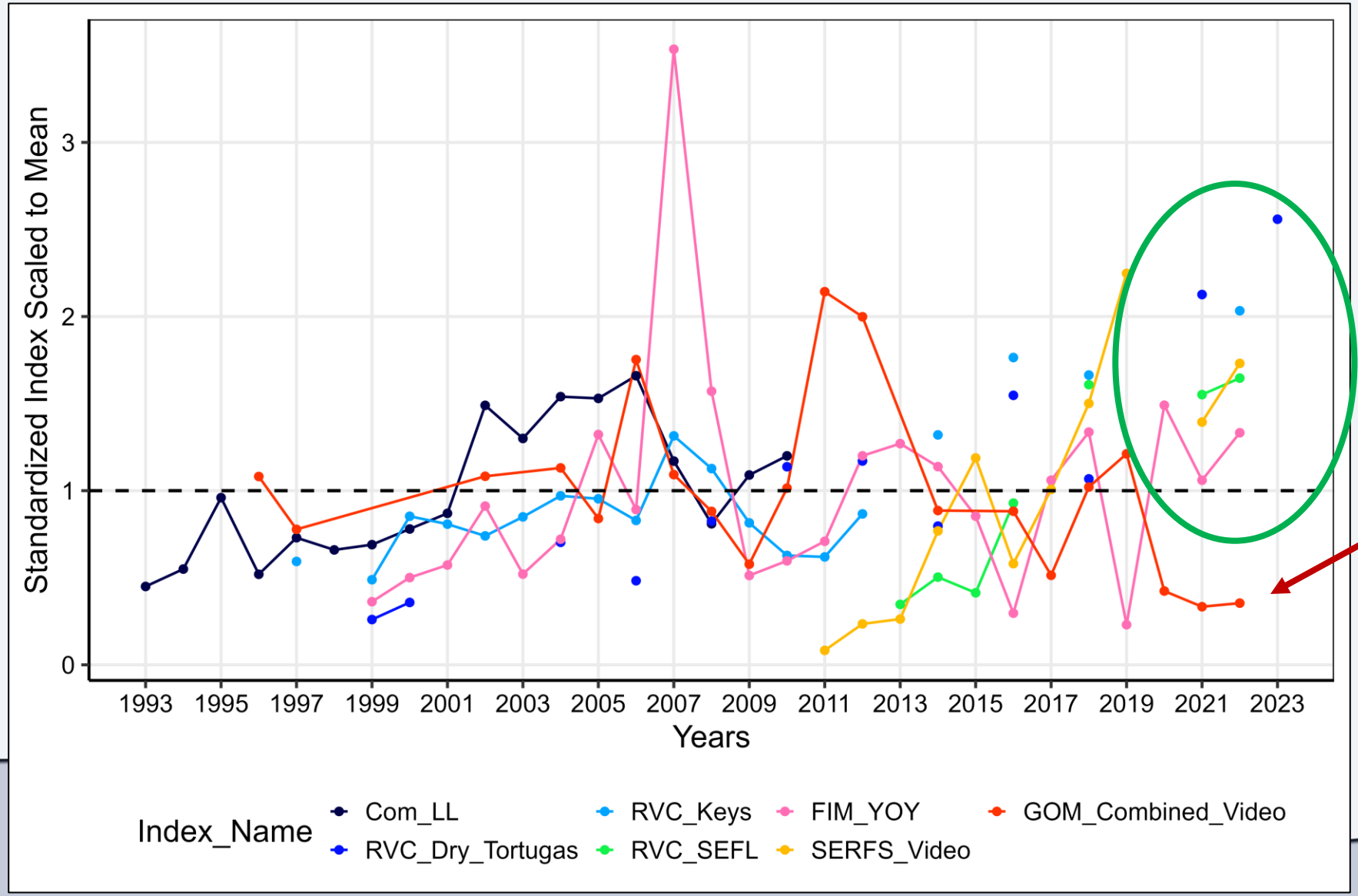

Base Model Configuration & Results

Stock Synthesis Model Configuration

Stock Synthesis v. 3.30.22.1

- Moderate complexity: 1 season, 1 area
- Years: 1981 - 2023
- Spawning: June 1
- Settlement: January at Age 1
- Combined sex model with female SSB
- Discard Mortality = 30%
- Estimated steepness (no prior)
- 202 out of 241 parameters estimated

Life History

- Estimated growth using external growth model inputs as initial guesses
- 40 ages in the model (1-40)
- Natural mortality: Lorenzen with Fixed Average M for ages 3-40
- Maturity: Fixed (A50 = 3.5 years)
- Fecundity = Spawning biomass at length
- Length-Weight: Fixed

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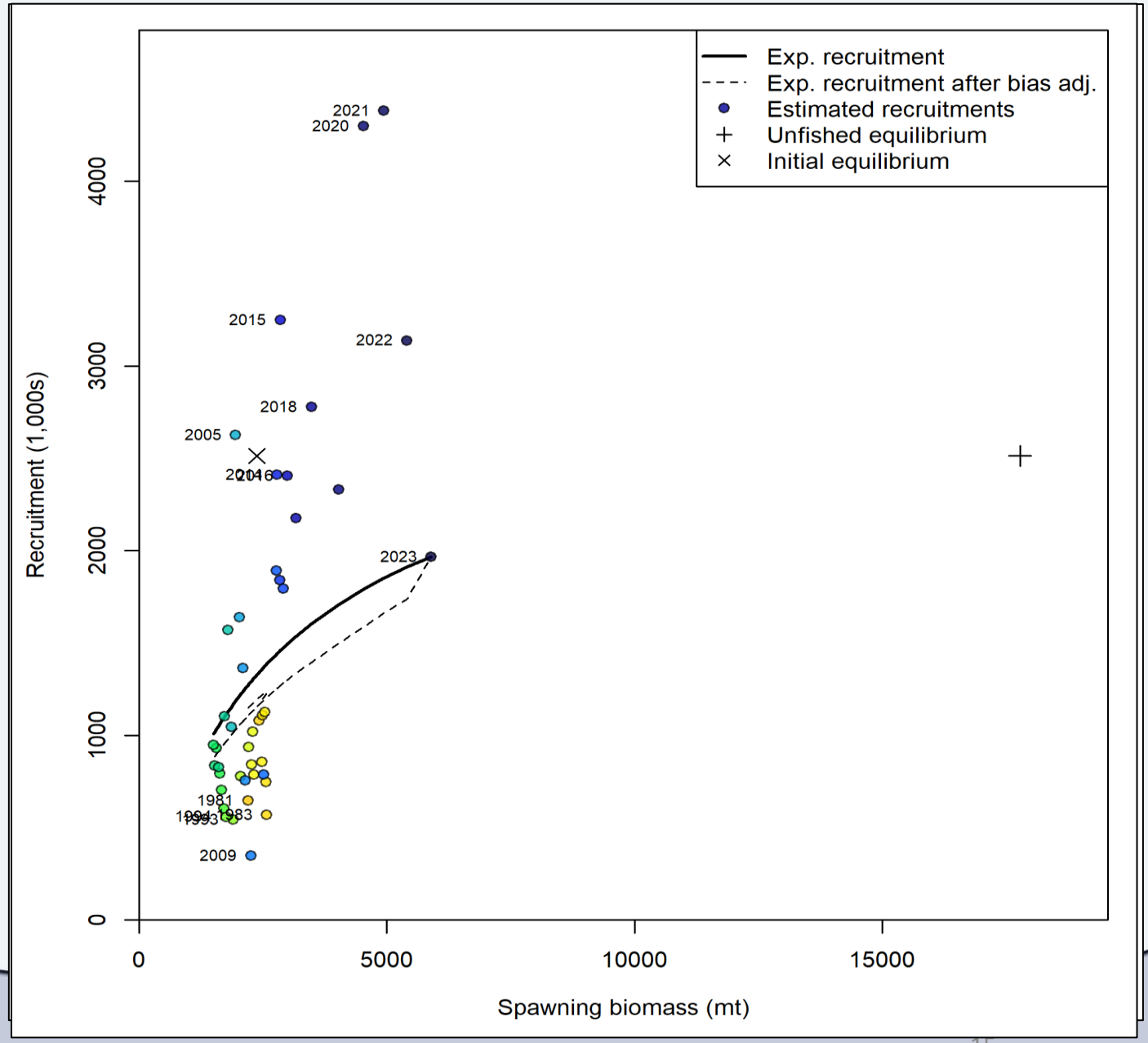
Stock Recruit Curve

SSB_0: 17,778 mt

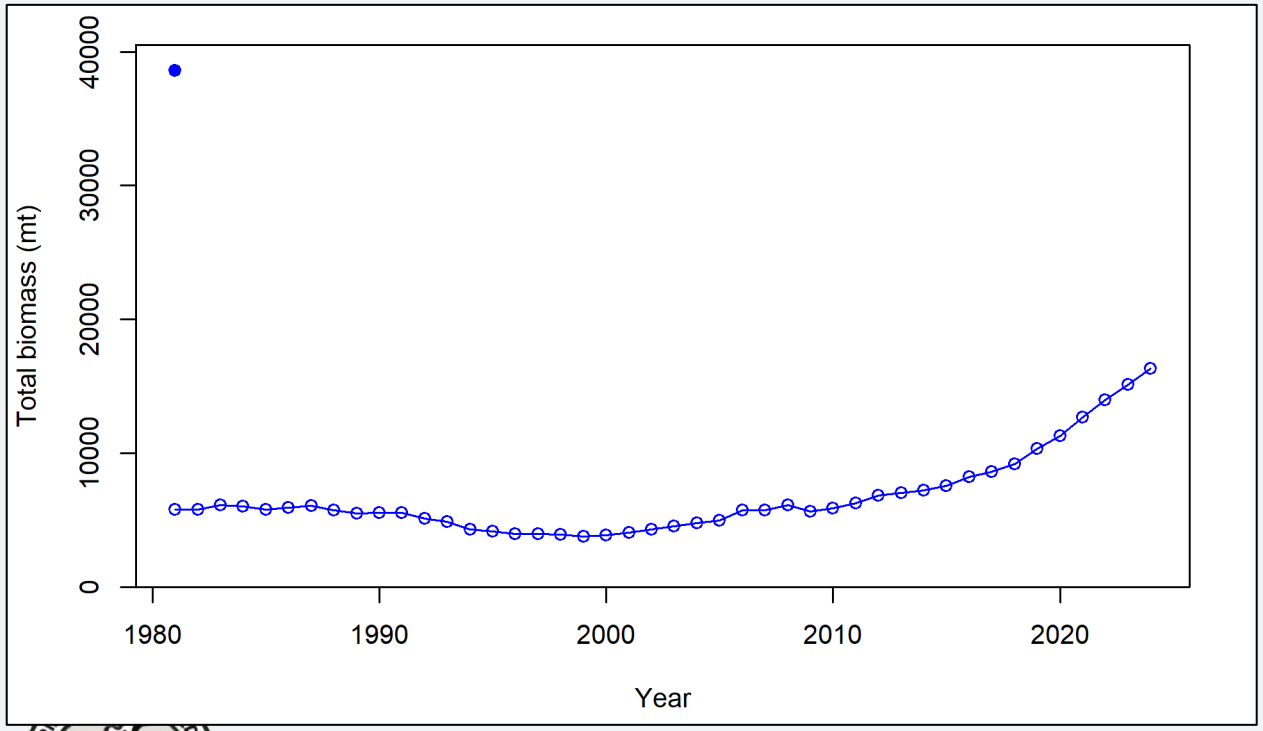
RO: 2.513 million

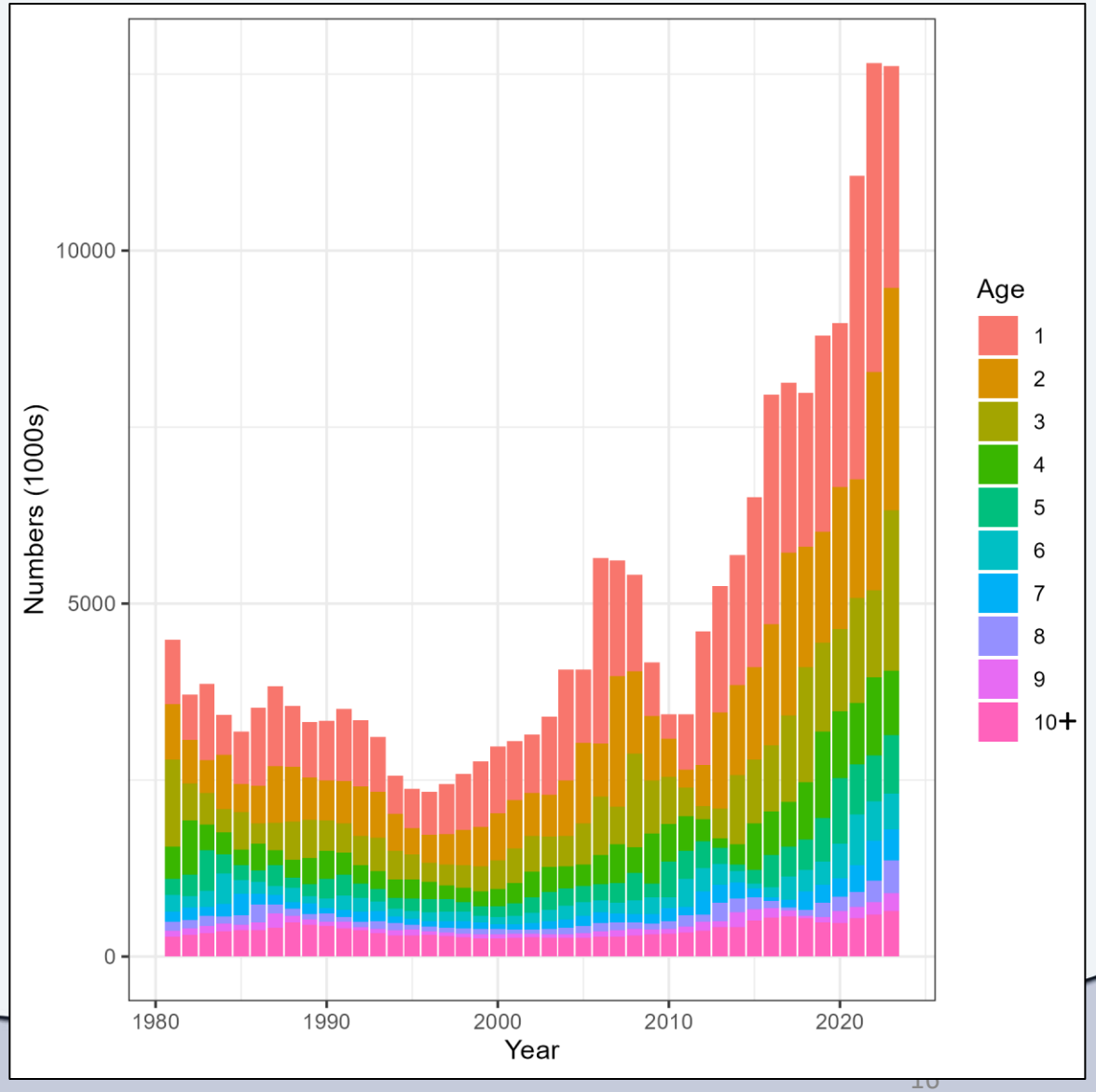
h: 0.64 (CI: 0.52 – 0.77)

σ_R: 0.55

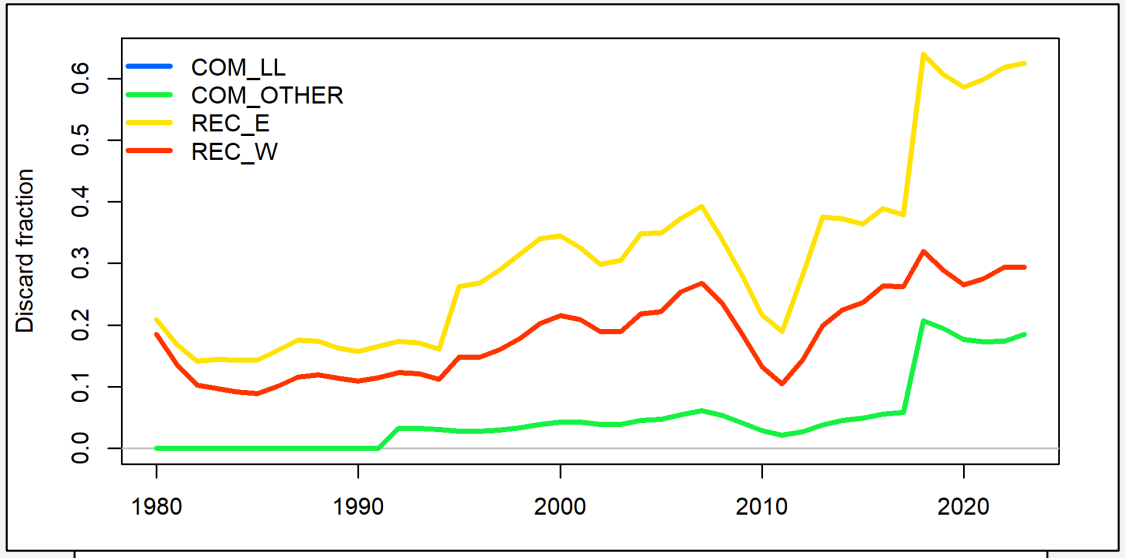


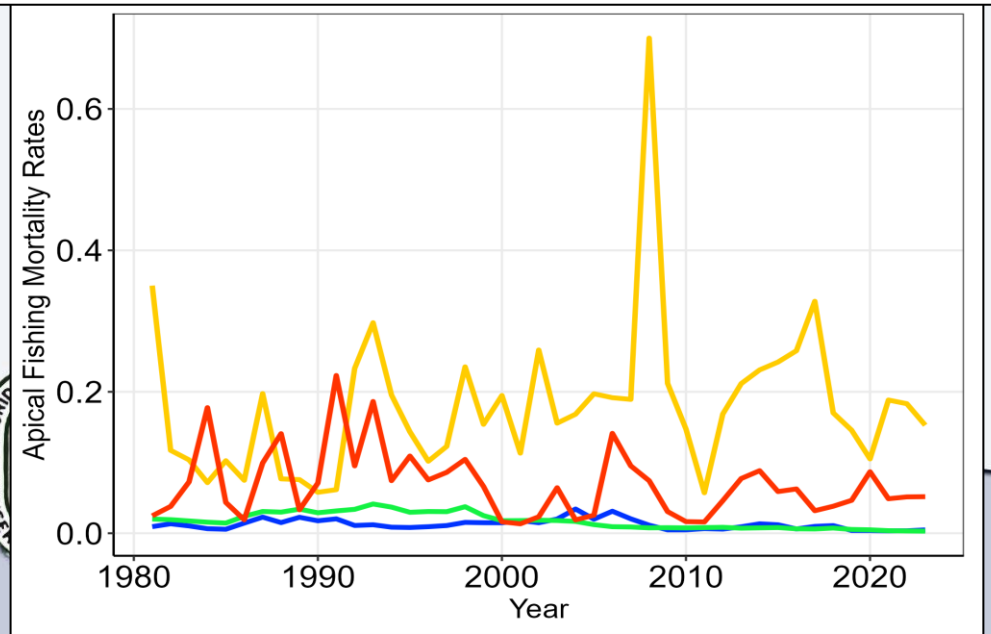
Total Biomass and Numbers at Age

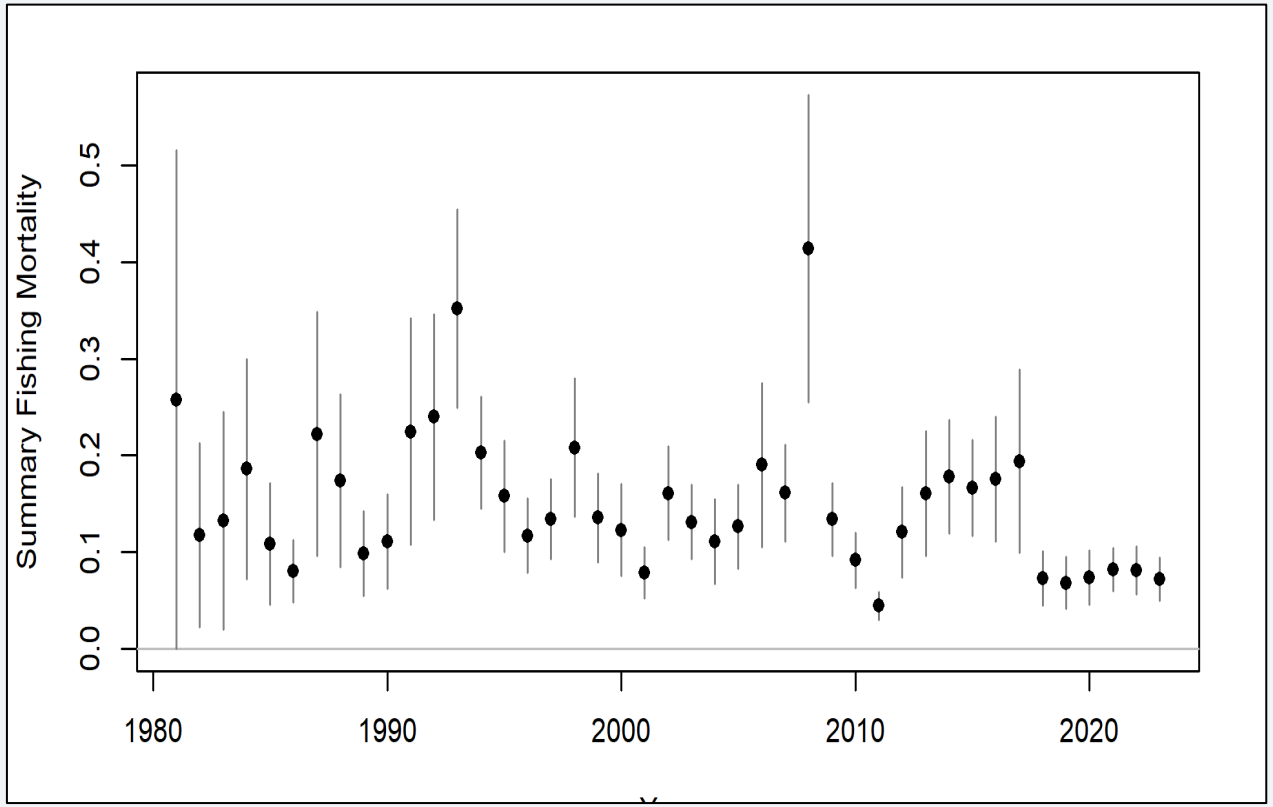




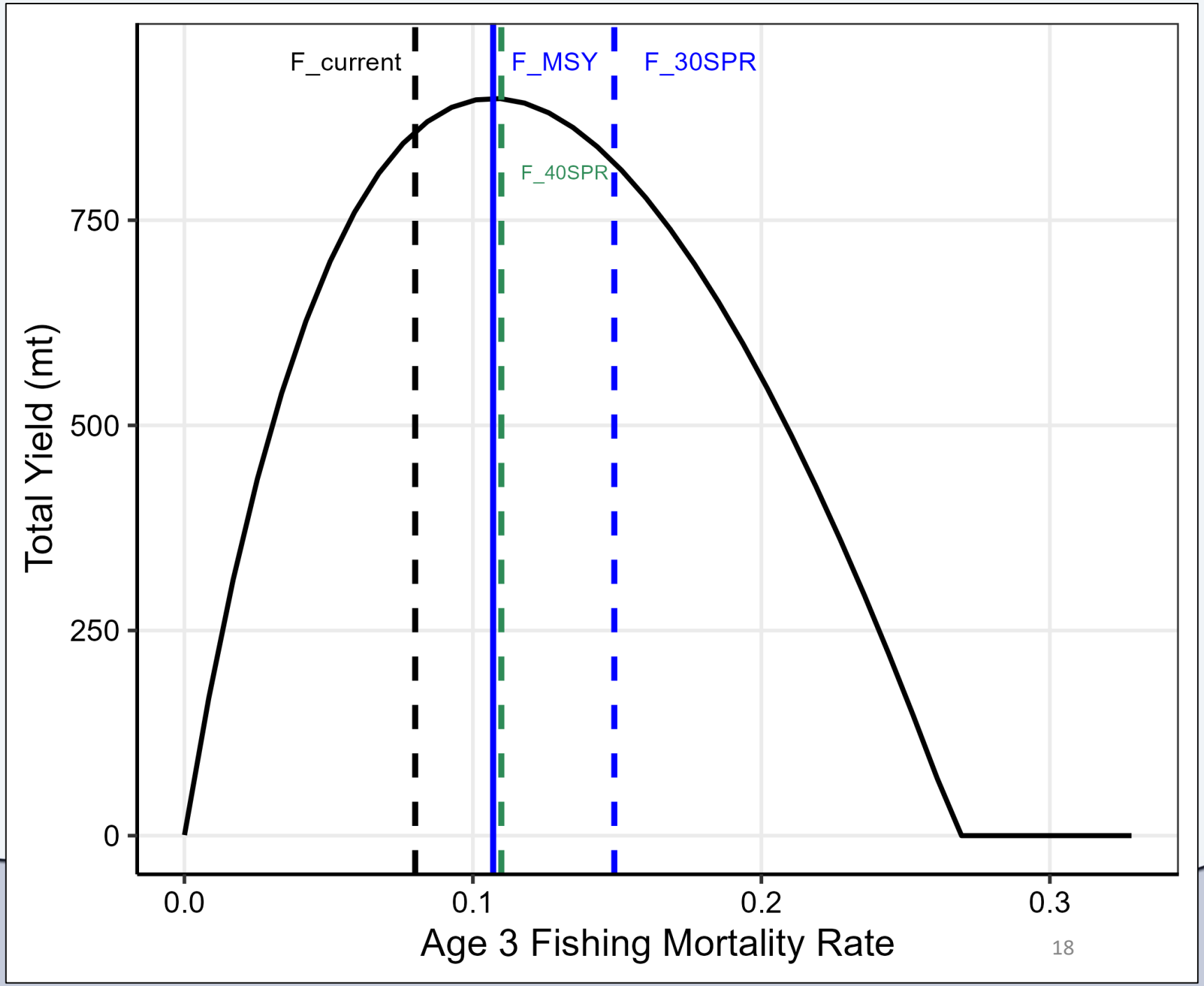
Discard Fractions, Apical Fs, Annual Fs







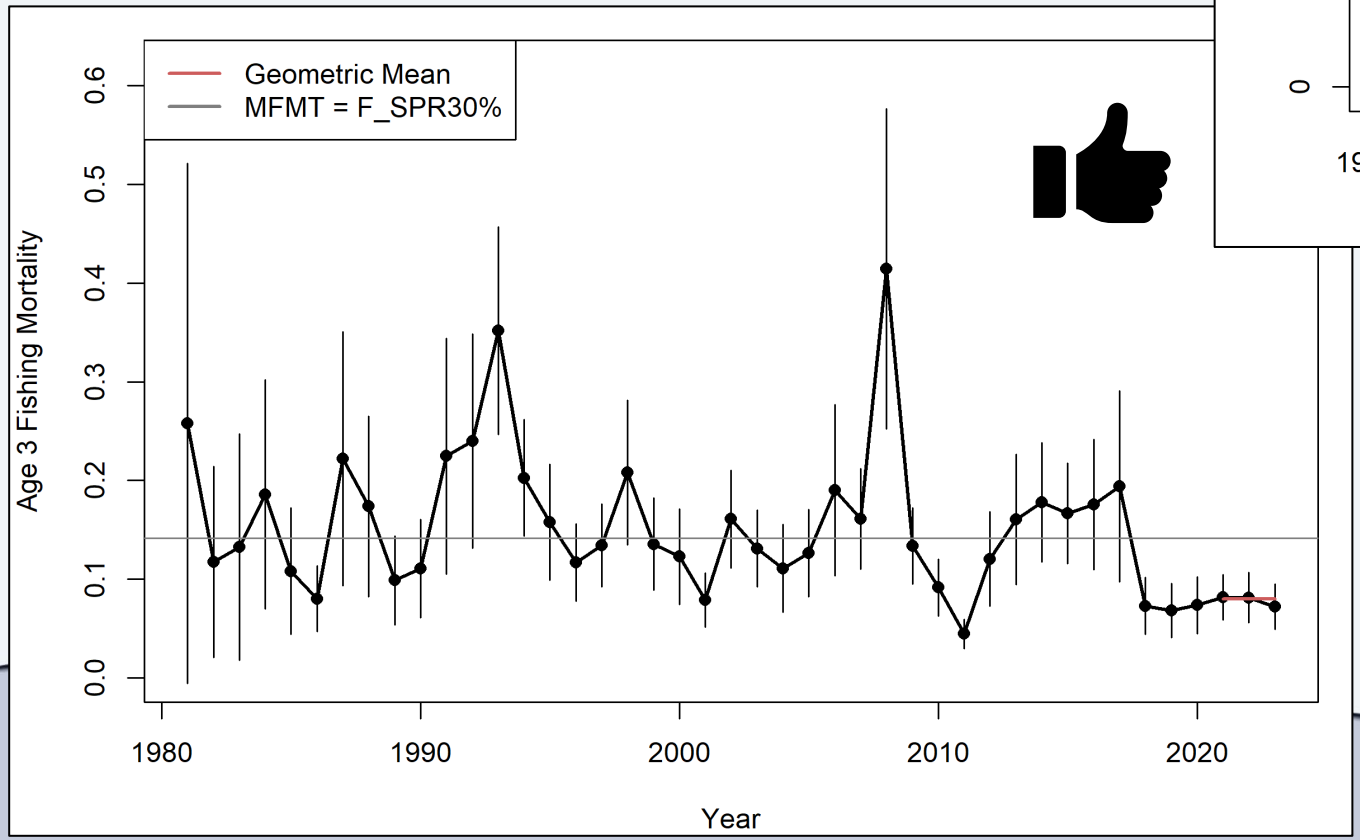
Yield Curve

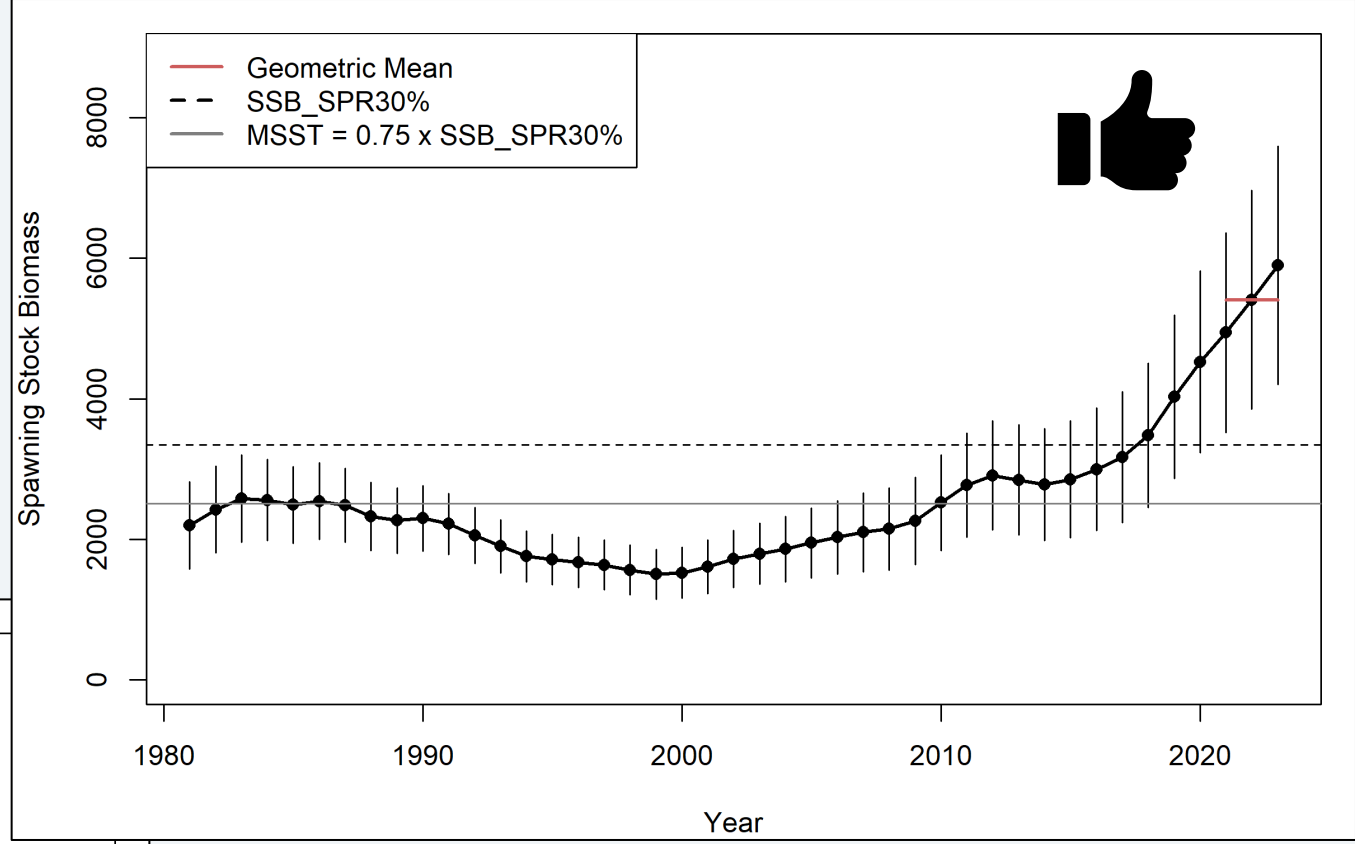

F_current
F_MSY
F_30SPR
F_40SPR
750
500
250
0
Total Yield (mt)
0.0
0.1
0.2
0.3
Age 3 Fishing Mortality Rate

South Atlantic and Gulf of Mexico Fishery Management Councils (Amendment 41)

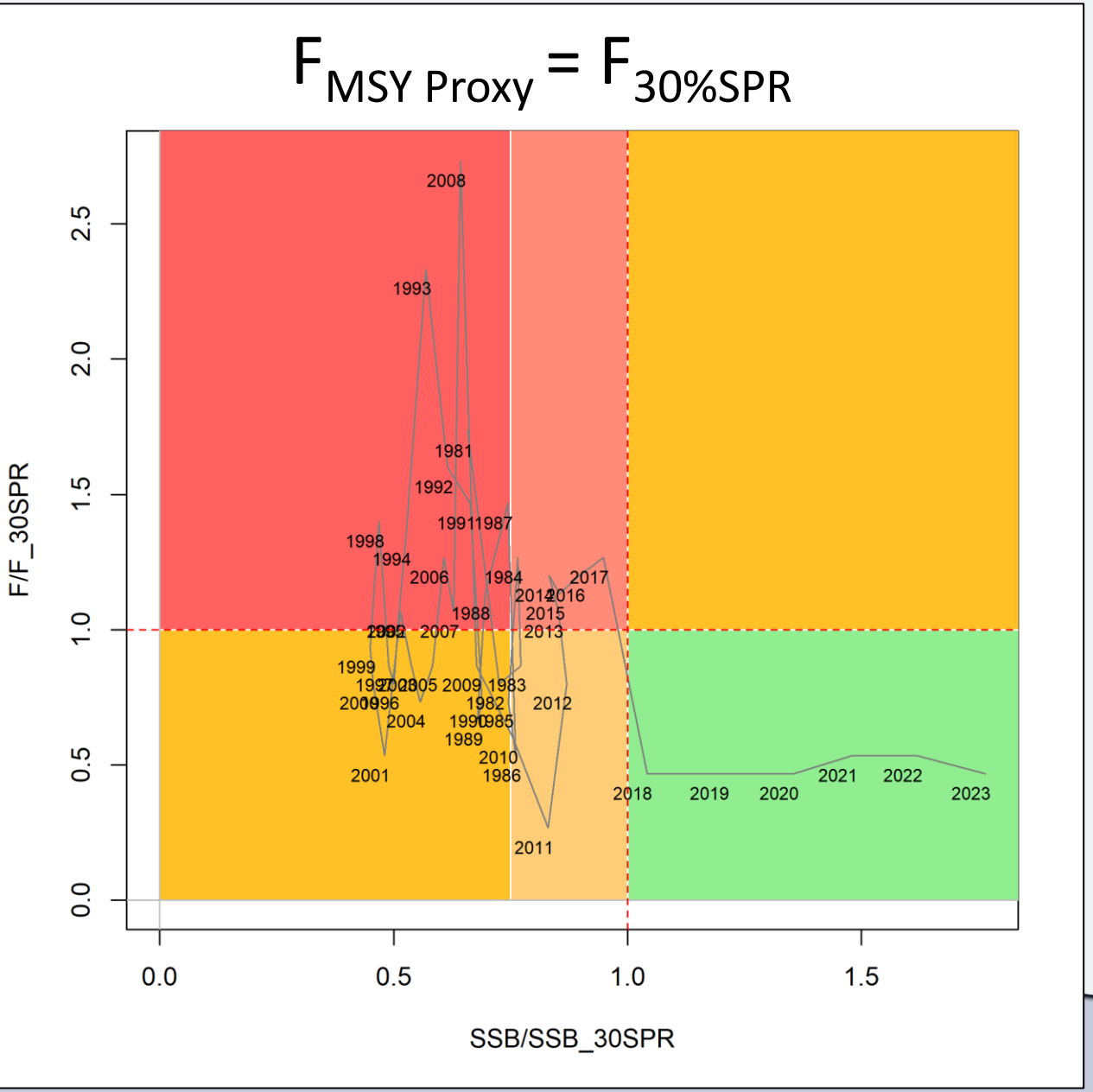
Criteria	Definition	Base Model Value
MFMT (Maximum Fishing Mortality Threshold)	The fishing mortality rate associated with 30% SPR ($F_{30\% SPR}$) and the proxy used for F_{MSY}	0.15 yr^{-1}
F_{OY} (the proxy associated with optimum yield)	The fishing mortality rate associated with 40% SPR ($F_{40\%SPR}$)	0.11 yr^{-1}
$F_{current}$	The geometric mean of F on age-3 fish for 2021 - 2023	0.08 yr^{-1}
$SSB_{F30\%SPR}$	The estimated spawning stock biomass associated with F at 30% SPR	3,352 mt (7,389,895 lbs.)
MSST (Minimum Stock Size Threshold)	$0.75*SSB_{F30\%SPR}$	2,514 mt (5,542,421 lbs.)
$SSB_{current}$ (recent average of SSB)	The geometric mean of SSB for 2021 - 2023	5,403 mt (11,911,576 lbs.)
MSY proxy (Maximum Sustainable Yield Proxy)	Equilibrium yield at $F_{30\%SPR}$	681.87 mt (1,503,266 lbs.)

Results
MSY proxy= 30%SPR

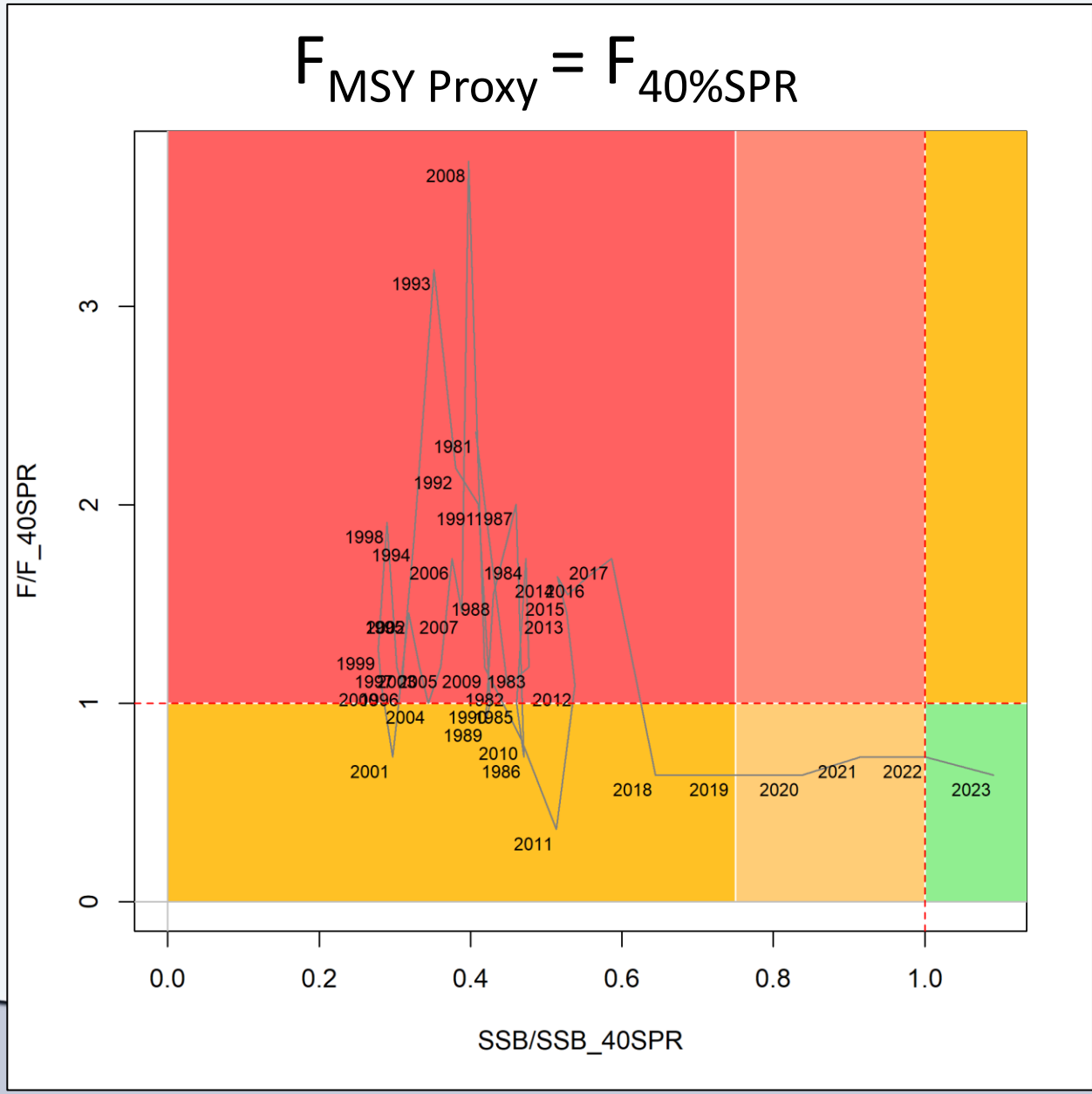




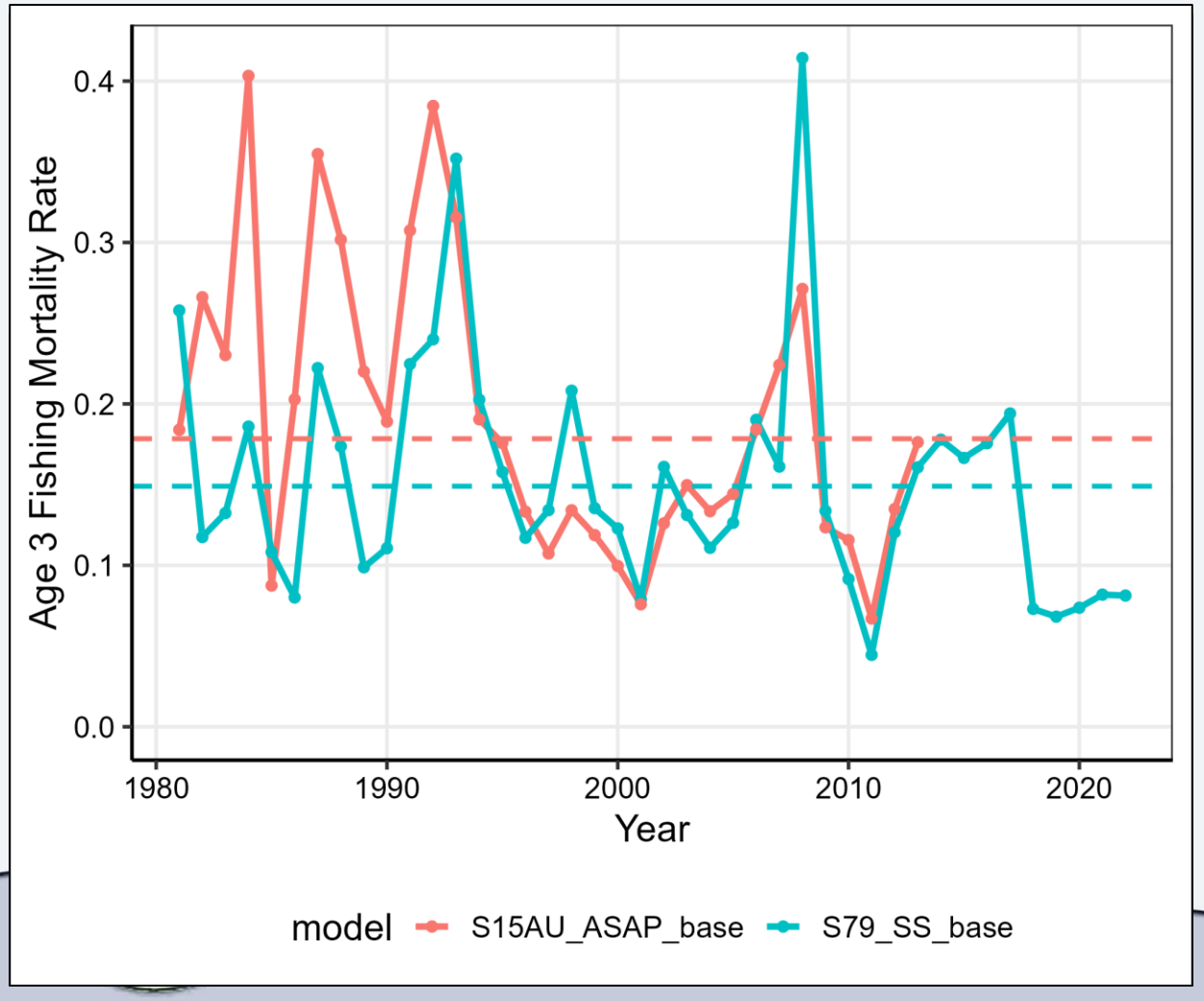
$F_{MSY\ Proxy} = F_{30\%SPR}$

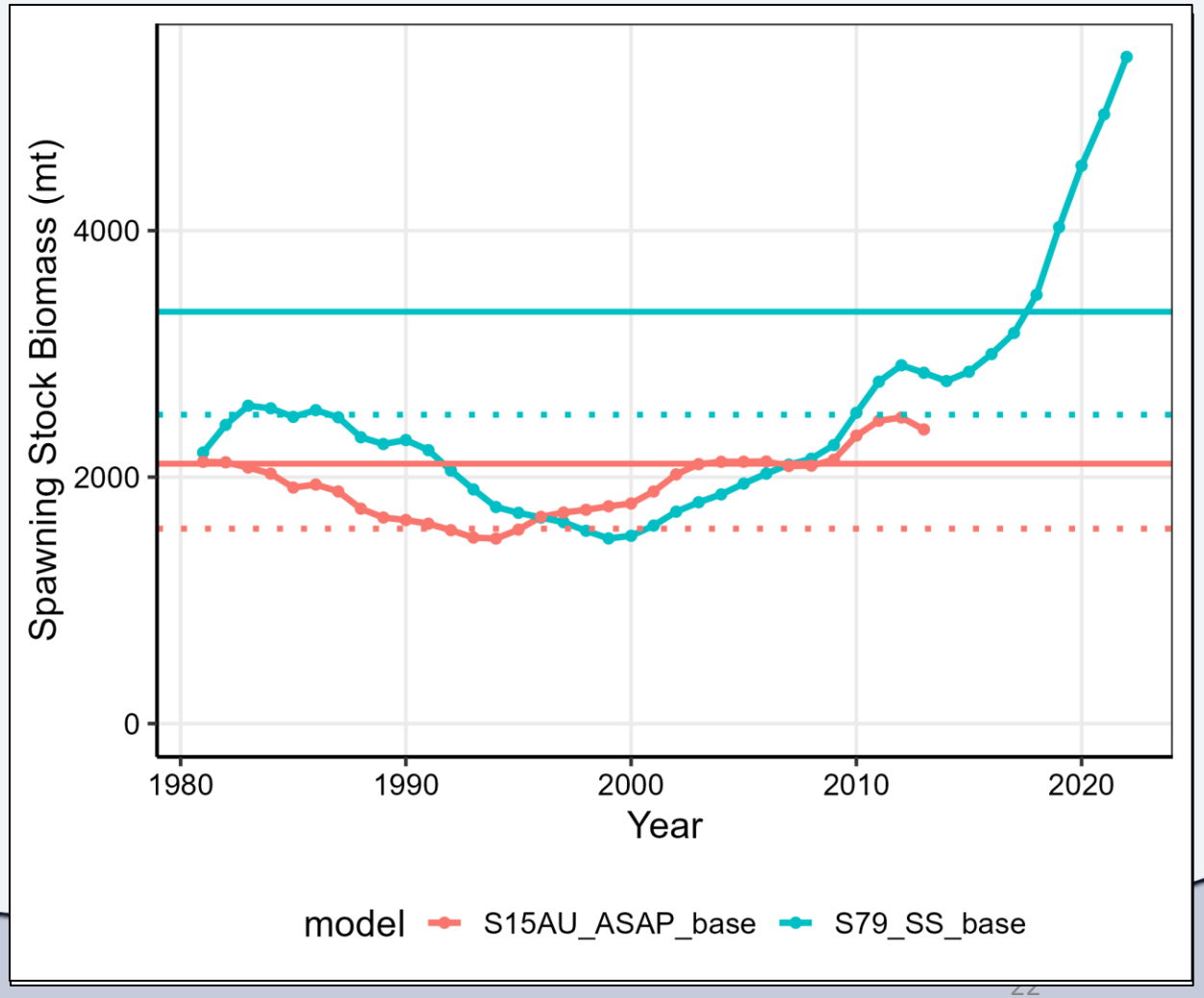


$F_{MSY\ Proxy} = F_{40\%SPR}$



Comparison to SEDAR 15AU

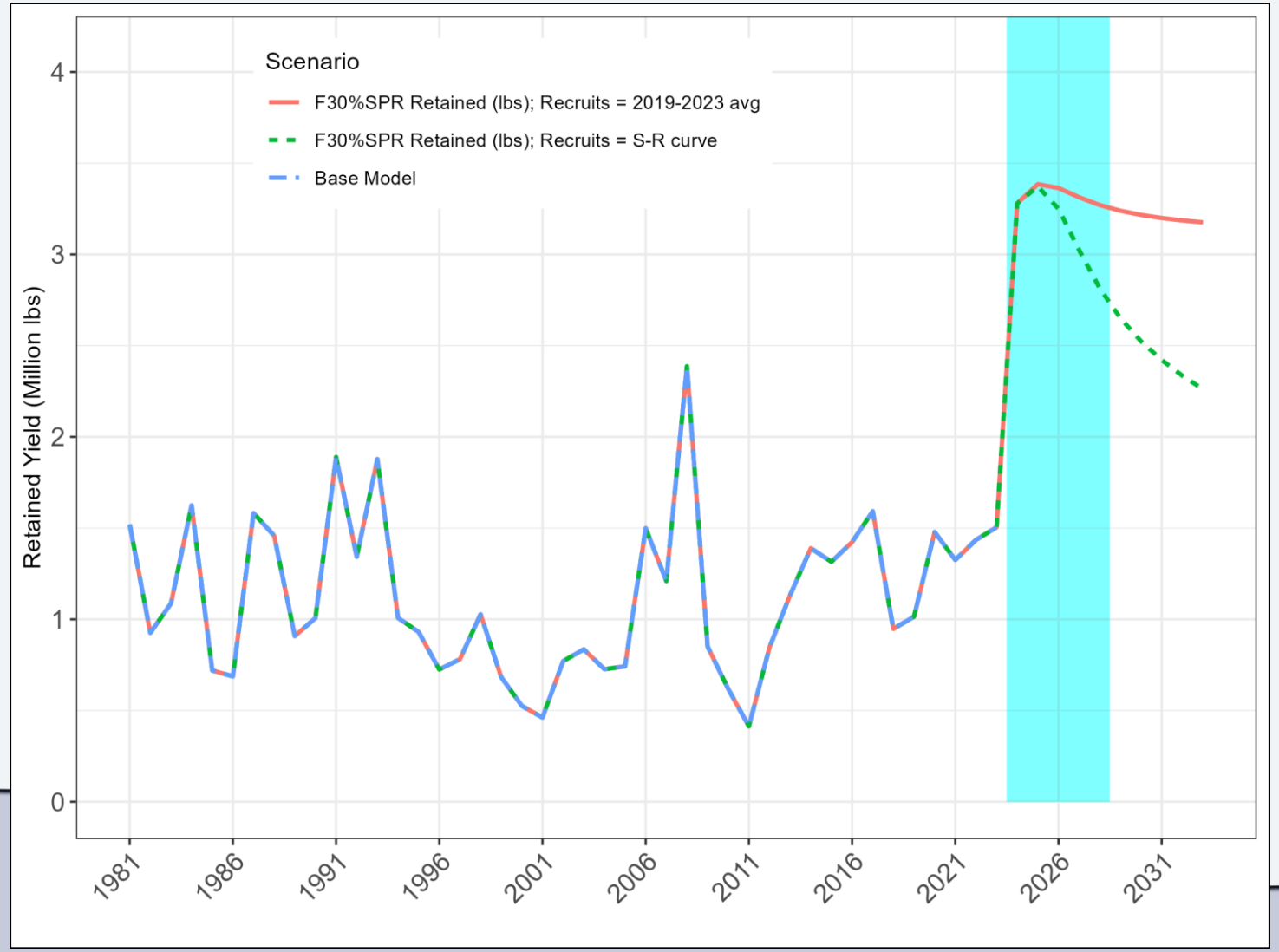




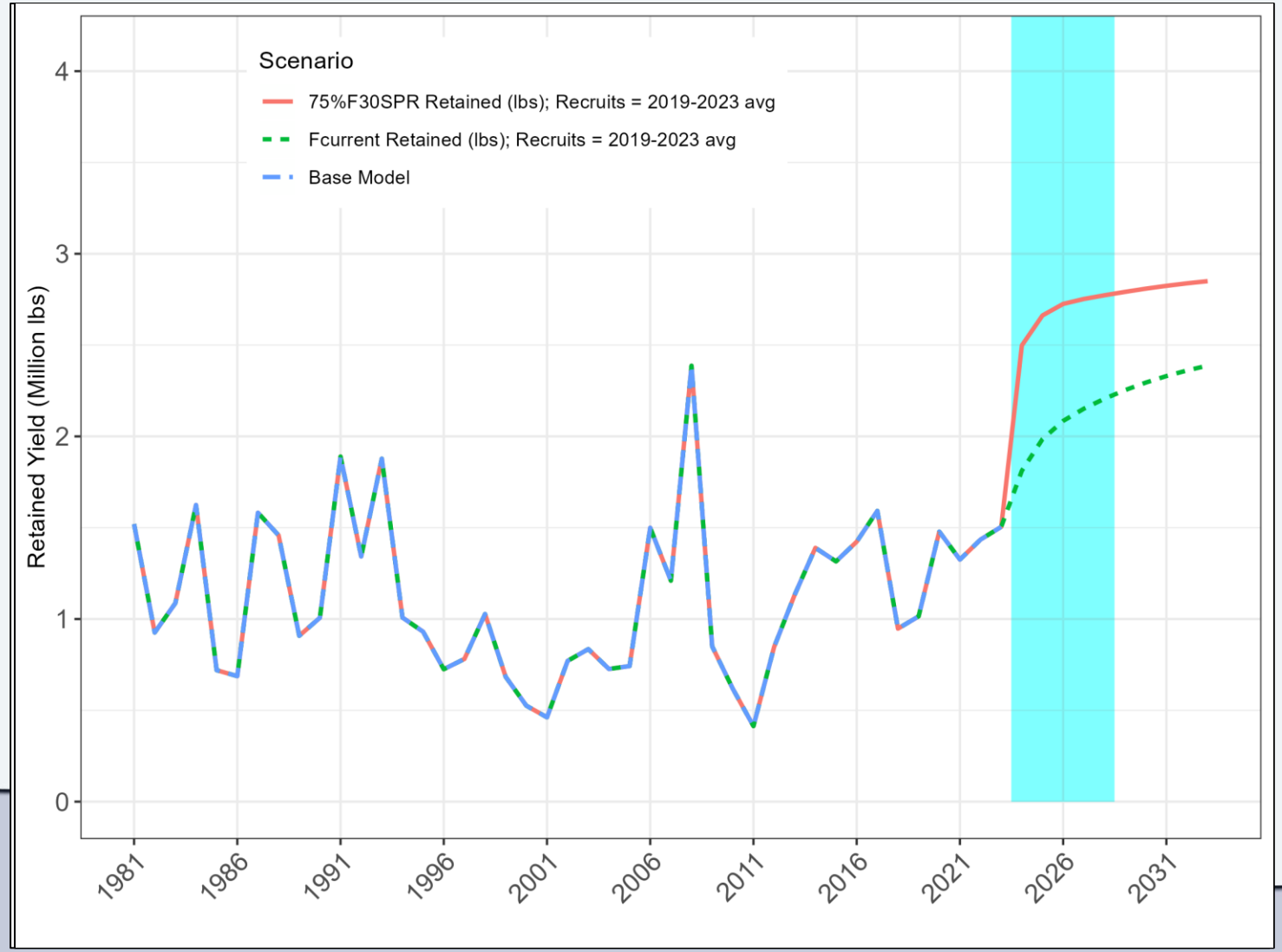
Projection Scenarios

- Constant F scenarios In TORs (TOR 10):
  - $F_{30\%SPR}$
  - 75% of $F_{30\%SPR}$ (also equal to $F_{40\%SPR}$)
  - $F_{current}$ (average of 2021-2023 estimates)

$F_{30\%SPR}$ Projection Scenario – Retained Yield (lbs)



Other Projection Scenarios – Retained Yield (lbs)



Feeley et al. 2018

Size Limit History

South Atlantic Federal (3 - 200 Miles)

- 12” (30.5 cm) TL (1/1992 – 1/1995)
- 16” (40.6 cm) TL (1/1995 – 2/2018)
- 18” (45.7 cm) TL (2/2018 – present)

Gulf Federal (10 -200 Miles)

- 12” (30.5 cm) TL (2/1990 – 11/1999)
- 16” (40.6 cm) TL (11/1999 – 7/2018)
- 18” (45.7 cm) TL (7/2018- present)

FL State Waters South Atlantic (0 - 3 Miles) **& Gulf** (0 -10 Miles)

- 12” (30.5 cm) TL (7/1985 – 2/1994)
- 16” (40.6 cm) TL (3/1994 – 12/2016)
- 18” (45.7 cm) TL (1/2017 – present)

Quota History (CHTS units)

South Atlantic

Commercial ACL

- 157,707 lbs (4/2012 – 2/2018)
- 104,231 lbs (2/2018 – 12/2018)
- 107,981 lbs (1/2019 – 12/2019)
- 111,354 lbs (1/2020 – present)

Recreational ACL (CHTS)

- 768,893 **lbs** (4/2012 – 2/2018)
- 121,318 fish (2/2018 – 12/2018)
- 124,766 fish (1/2019 – 12/2019)
- 127,115 fish (1/2020 – present)

Gulf

Combined ACL

- 203,000 lbs (1/2012 – 12/2017)
- 134,424 lbs (1/2018 – 12/2018)
- 139,392 lbs (1/2019 – 12/2019)
- 143,694 lbs (1/2020 – present)

*No closures have occurred due to reaching the ACL

Spatial Closures

- Dry Tortugas:
  - Riley's Hump: 1994 – 2002: May 1 – June 30
  - Tortugas Reserve: 2002 – Present: year-round
  - Pulley Ridge: 2006 – Present: bottom gears prohibited year-round
  - Research Natural Area within Dry Tortugas National Park: 2007 – Present: fishing and anchoring prohibited inside 46-square-mile marine sanctuary
- FL Keys
  - Western Dry Rocks (10 mi SW of Key West): 2021 – Present: April 1 – July 31

Tortugas Reef Survey
(Photo: FKNMS)

Trip Limit History – Federal Waters

South Atlantic (3 - 200 Miles)

Commercial

- 5 fish per person/day limit from April – June and 500-pound commercial vessel limit for July – March (2/2018 – present)

Recreational

- Included in the aggregate daily bag limit of 10 snappers (1/1992 – present)
- 5 fish per person per day included in the aggregate daily bag limit of 10 snappers (2/2018 – present)

Gulf (10 -200 Miles)

Commercial

- None

Recreational

- 10 snapper aggregate in the 20-reef fish aggregate (1/1984 – 7/2018)
- 5 fish per person per day included in the aggregate daily bag limit of 10 snappers (7/2018 – present)

Trip Limit History – FL State Waters

Commercial - Trip Limit Per Boat/Day

- Restricts all harvest in May and June to the bag limit (12/1992 – 1/2017)
- **South Atlantic** (0 - 3 Miles): 5 fish per person/day limit from April – June and 500-pound commercial vessel limit for July – March (1/2017 – present)

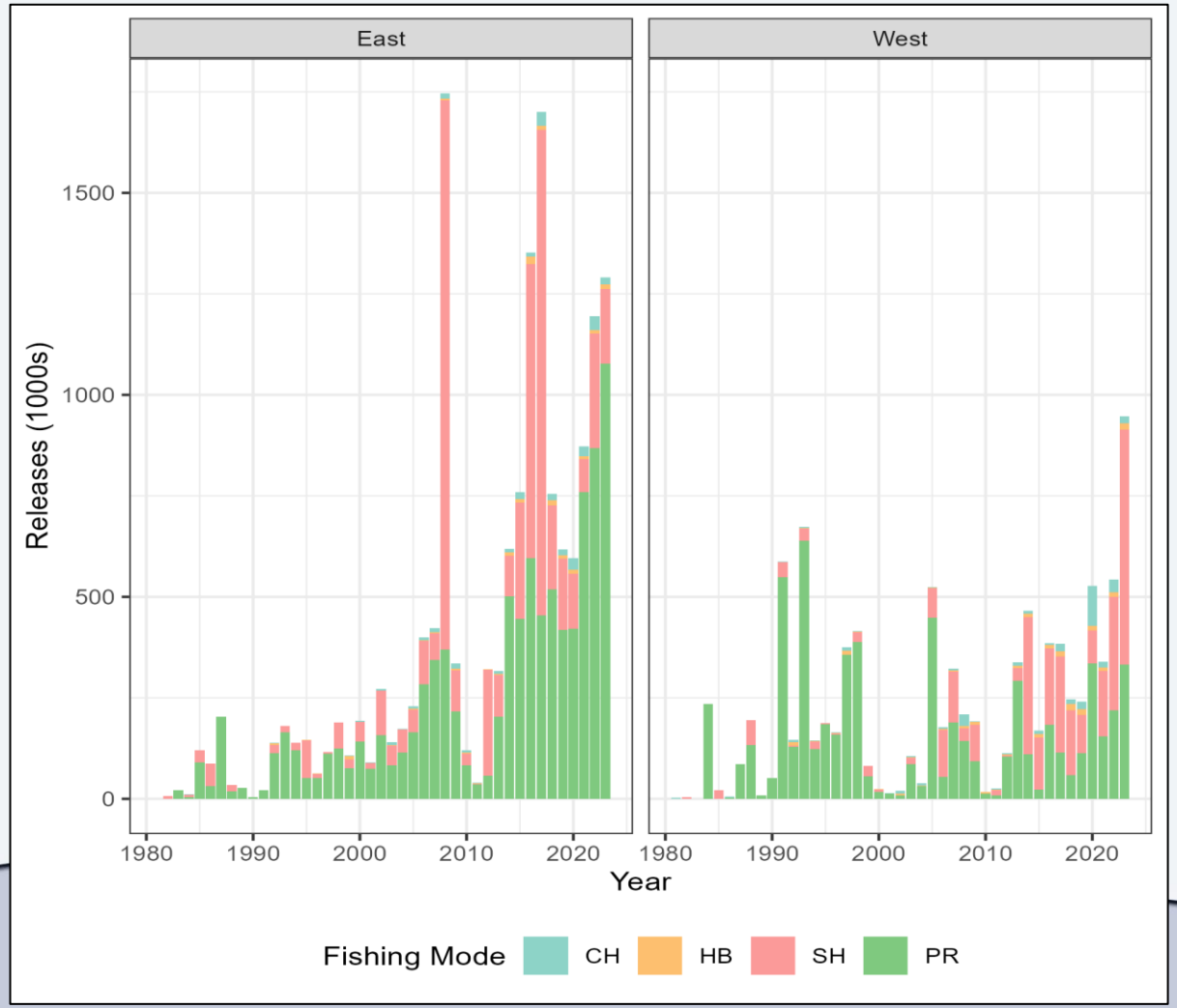
Recreational - Bag Limit Per Person/Day

- Included in the aggregate daily bag limit of 10 snappers (1/1992 – present)
- Restricts all harvest in May and June to the bag limit (12/1992 – 1/2017)
- 5 fish per person per day included in the aggregate daily bag limit of 10 snappers (2/2017 – present)

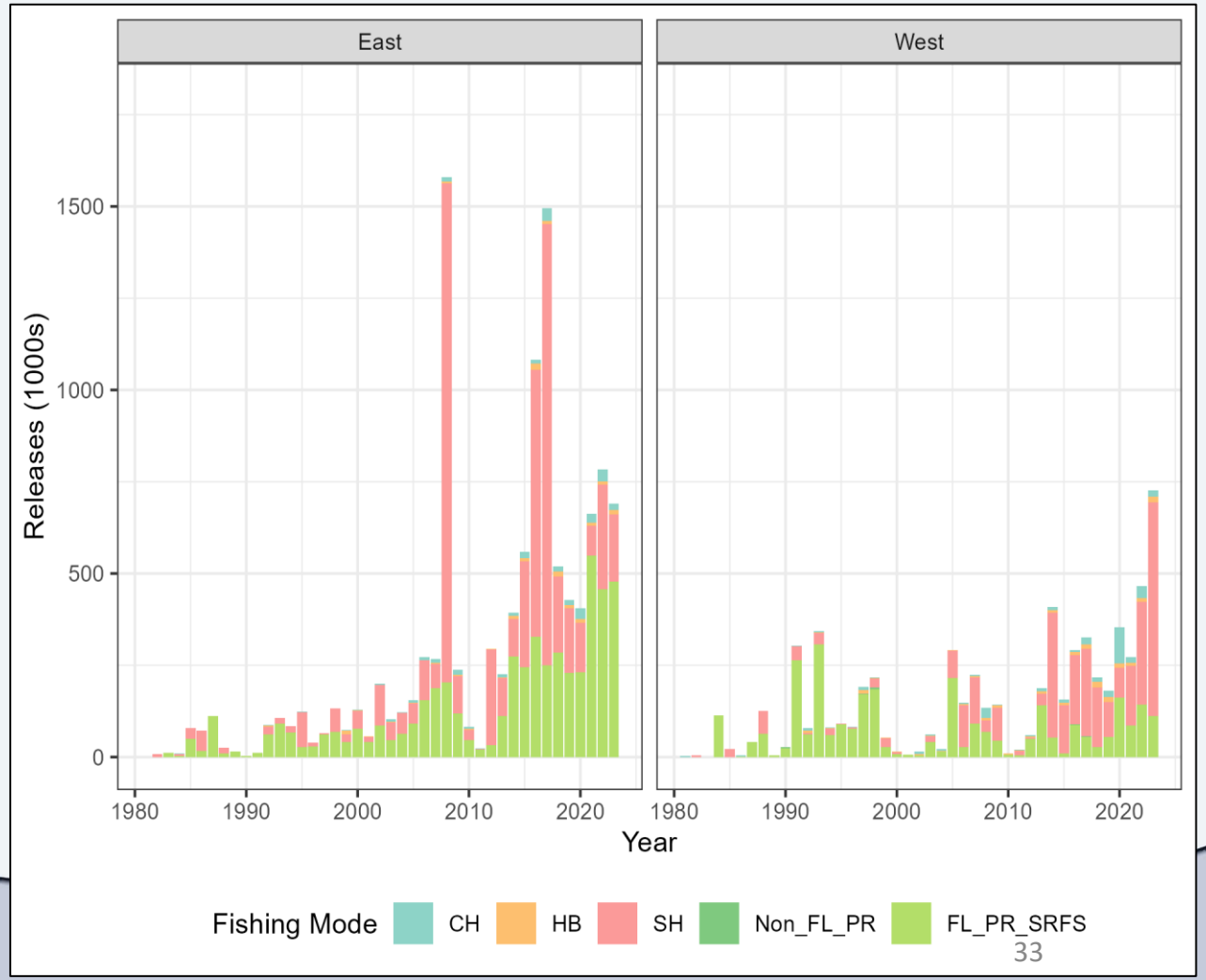
MRIP-FES Landings

SRFS-calibrated Landings

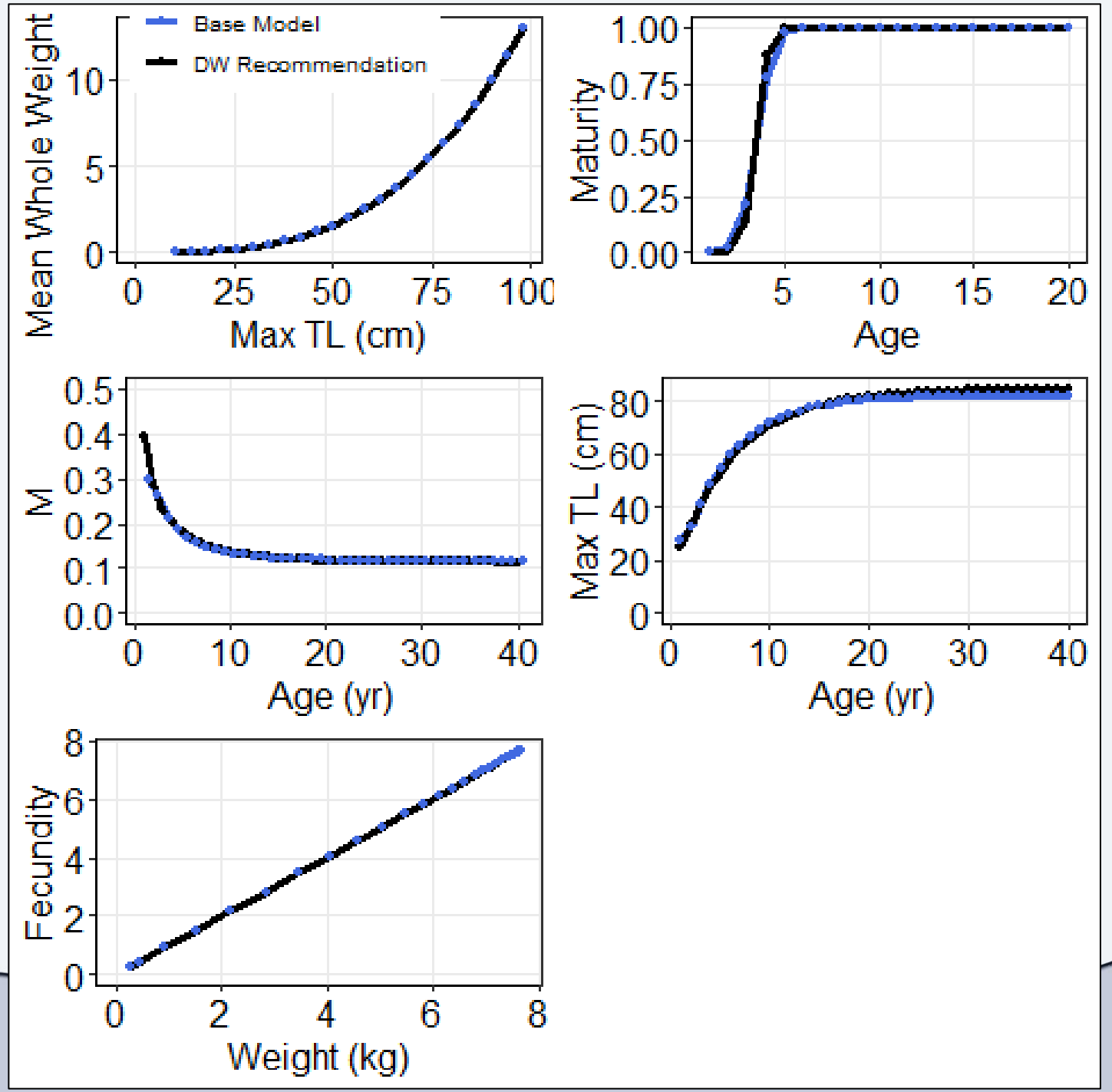
MRIP-FES Releases



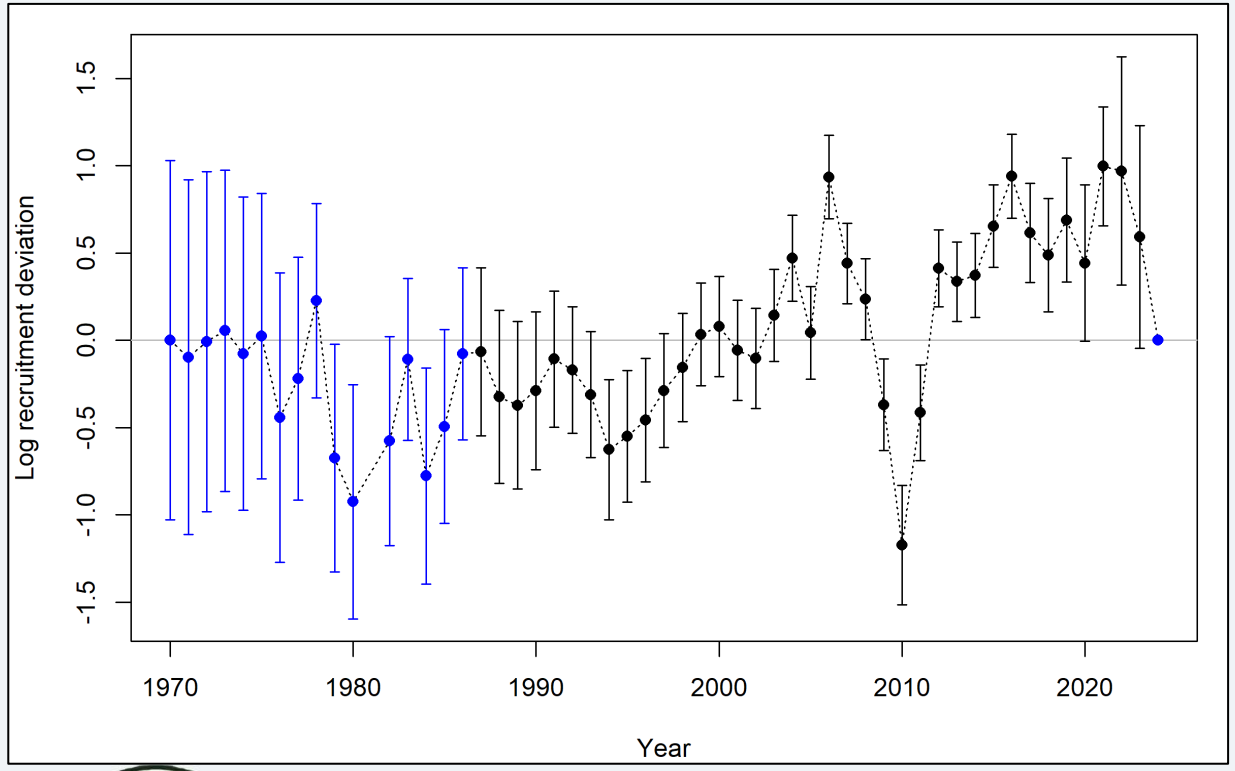
SRFS-calibrated Releases

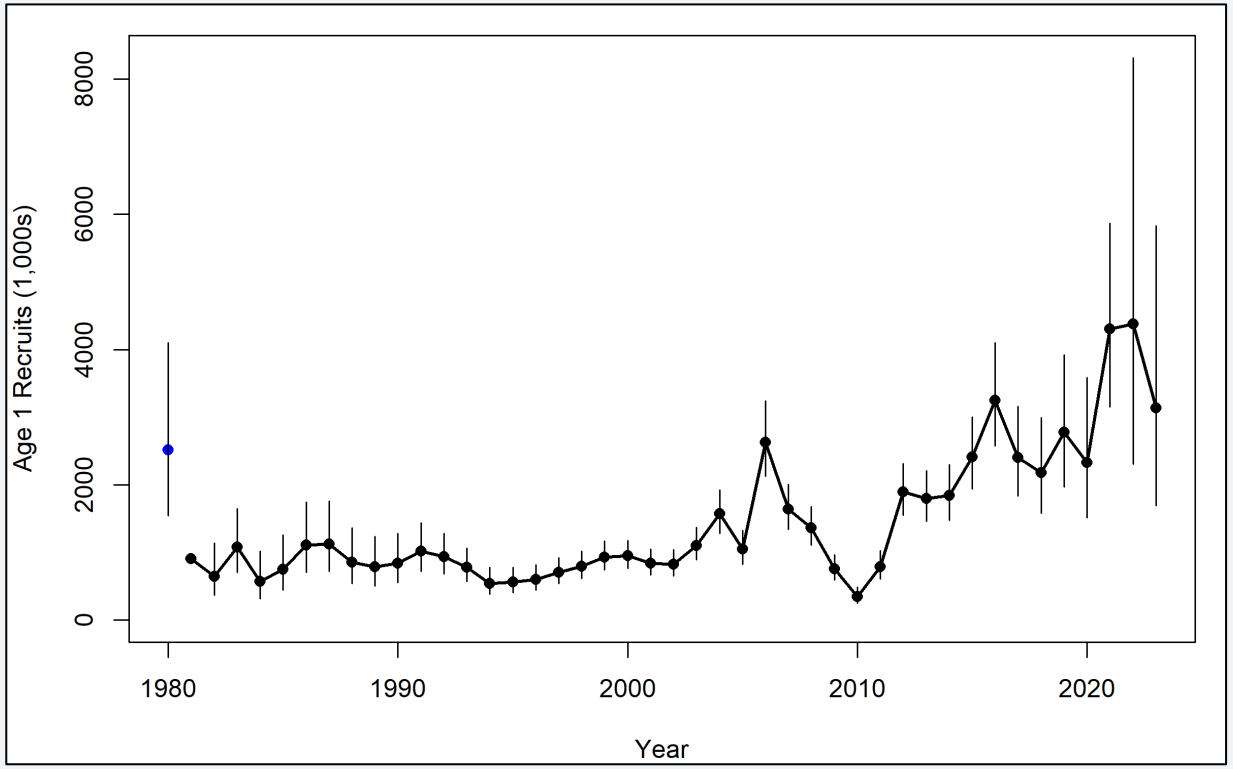


Life History



Age 1 Recruits & Numbers at Age





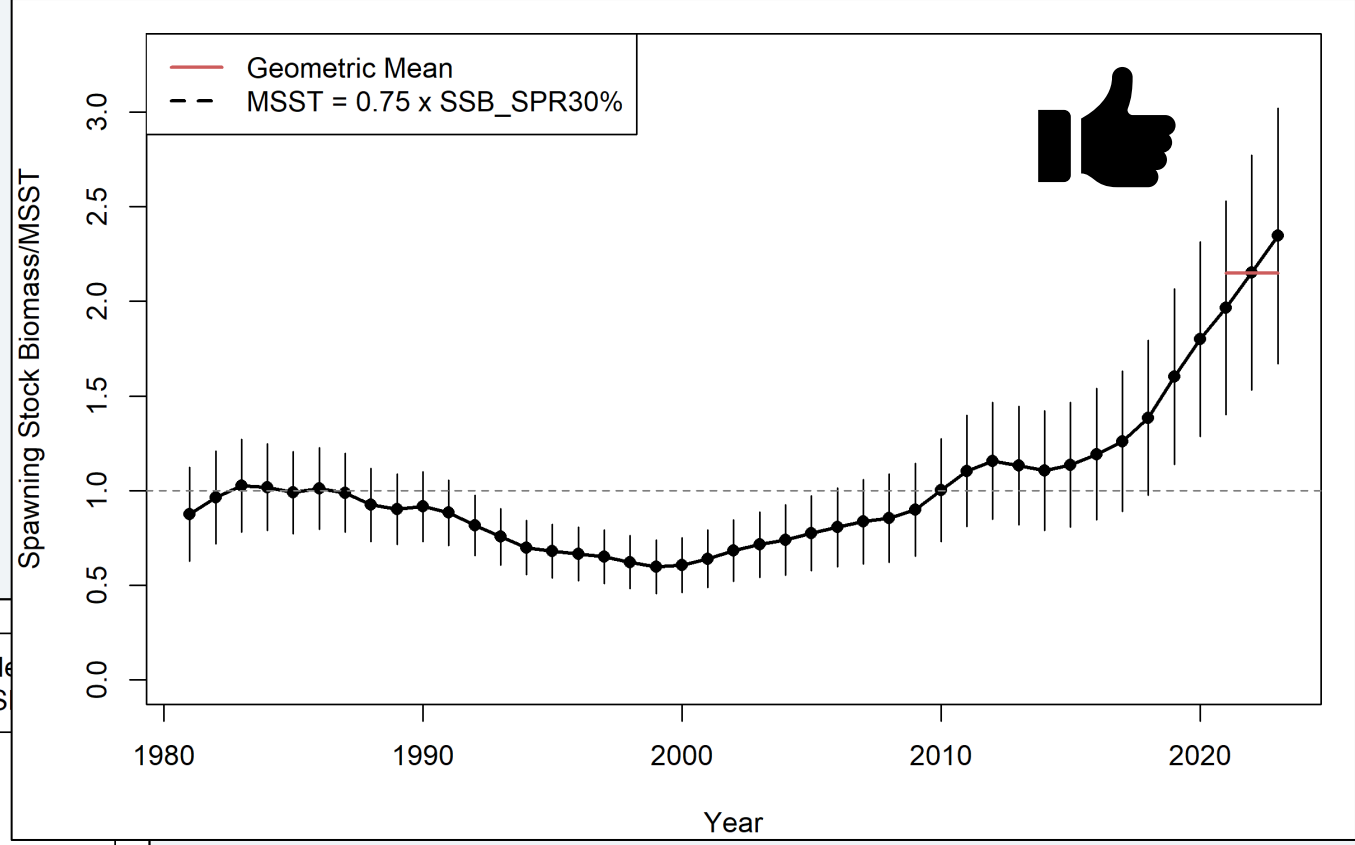
Projection Scenario – $F_{30\%SPR}$ (long and short-term)

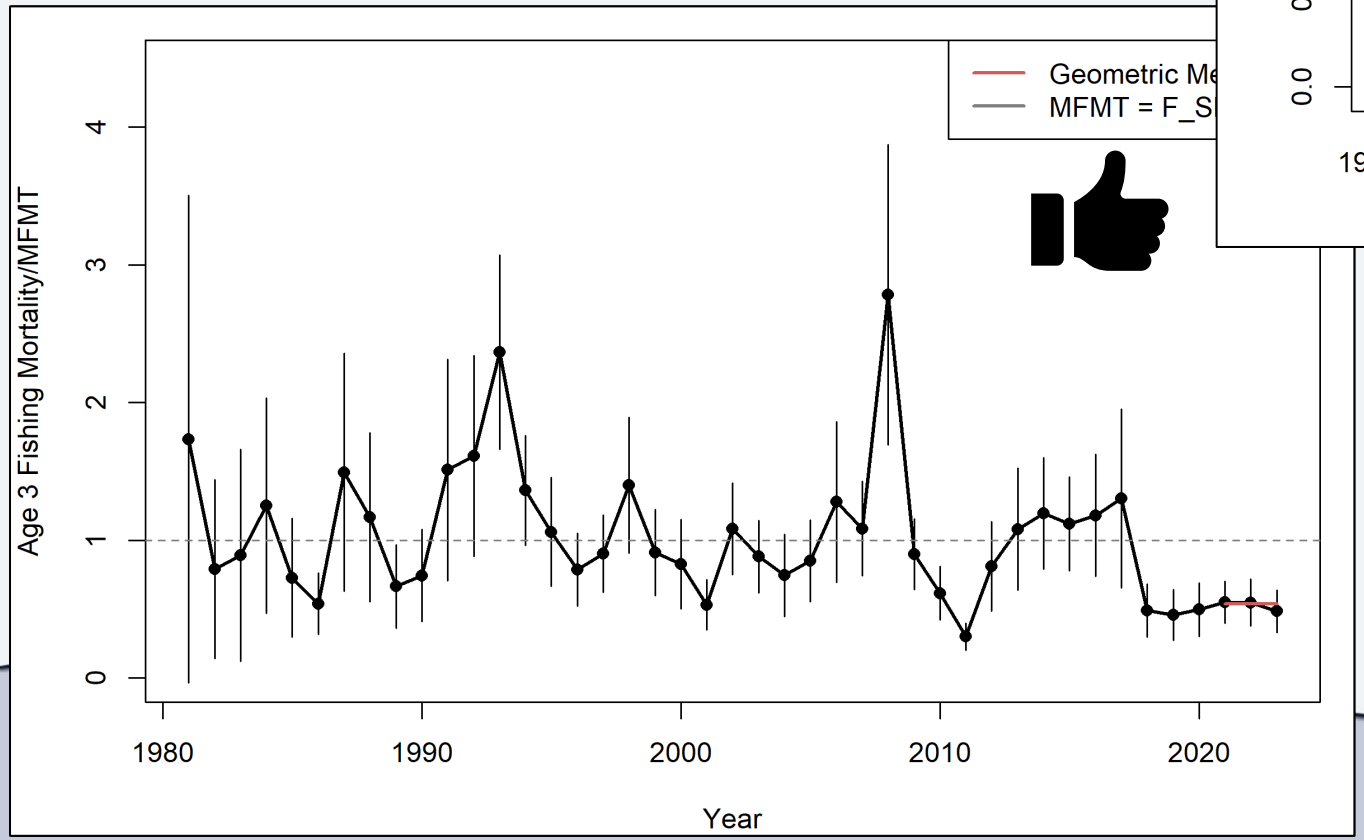
Equilibrium Projections (Recruits = S-R Curve)							Short-Term Projections (Recruits = 2019-2023 avg)					
Year	Age 1 Recruits (millions)	Age 3 F	SSB (mt)	Retained Yield (lbs)	Retained Num	Released Num	Age 1 Recruits (millions)	Age 3 F	SSB (mt)	Retained Yield (lbs)	Retained Num	Released Num
2024	1.966	0.149	6,488	3,278,980	627,789	1,644,393	3.284	0.149	6,488	3,280,143	628,742	1,844,997
2025	2.026	0.149	6,864	3,372,143	623,832	1,302,368	3.284	0.149	6,867	3,384,760	630,618	1,694,199
2026	2.061	0.149	6,974	3,249,912	564,280	1,101,926	3.284	0.149	7,029	3,363,706	605,530	1,635,621
2027	2.070	0.149	6,821	3,023,751	495,817	1,036,220	3.284	0.149	7,089	3,313,030	583,152	1,618,291
2028	2.057	0.149	6,584	2,814,305	446,663	1,018,590	3.284	0.149	7,118	3,270,355	568,844	1,613,371
2029	2.035	0.149	6,342	2,650,664	415,719	1,009,913	3.284	0.149	7,130	3,239,178	560,244	1,611,911
2030	2.012	0.149	6,109	2,523,697	395,653	1,000,587	3.284	0.149	7,130	3,216,409	554,984	1,611,442
2031	1.989	0.149	5,889	2,421,114	381,362	989,955	3.284	0.149	7,123	3,199,290	551,639	1,611,282
2032	1.965	0.149	5,682	2,335,047	370,254	978,716	3.284	0.149	7,112	3,186,071	549,426	1,611,220
2033	1.942	0.149	5,490	2,261,068	361,084	967,345	3.284	0.149	7,098	3,175,662	547,907	1,611,193

Projection Scenarios –75% $F_{30\%SPR}$ & $F_{current}$

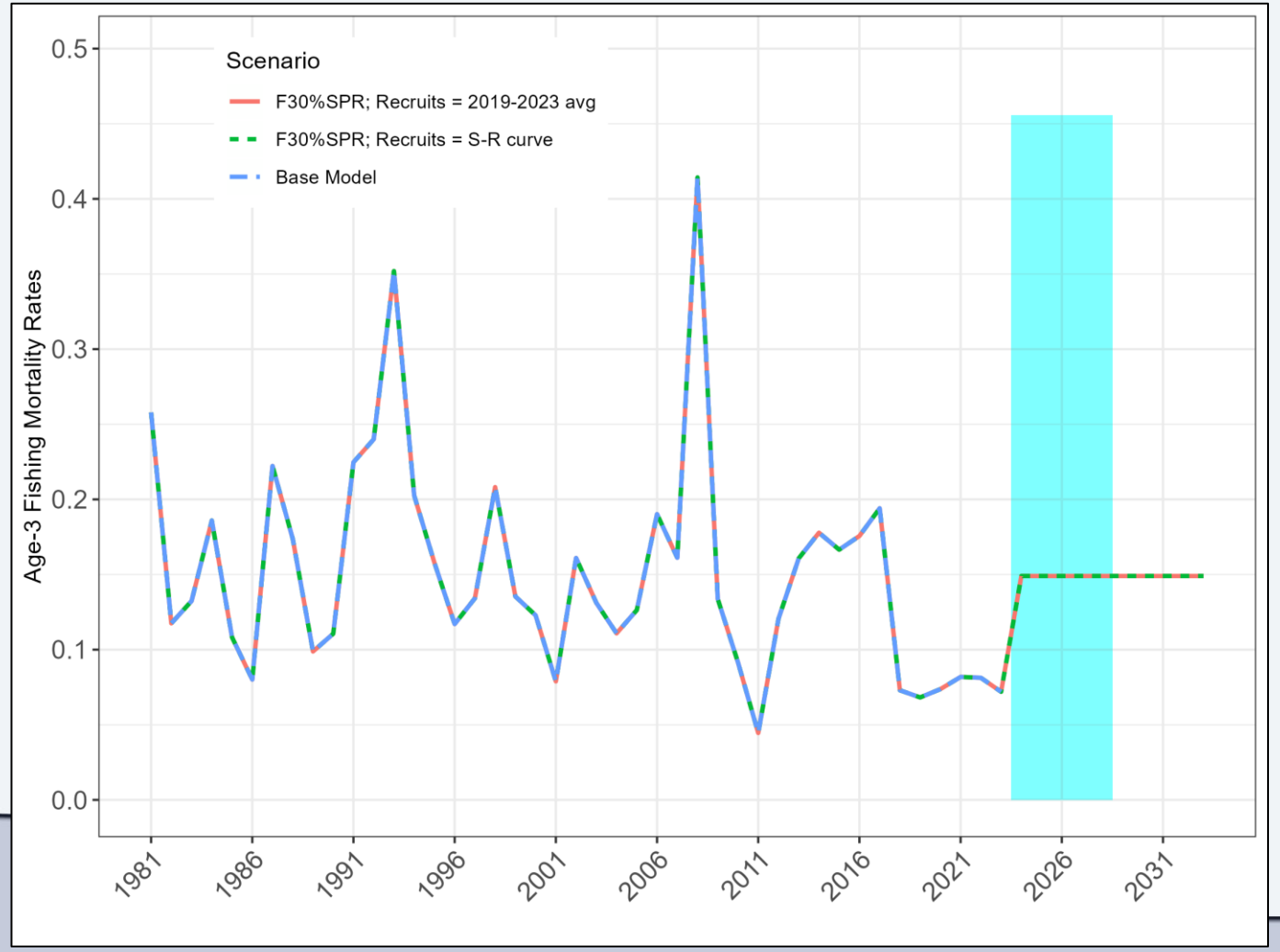
	Recruits = 2019-2023 avg F = 75% $F_{30\%SPR}$						**Recruits = 2019-2023 avg F = Fcurrent**					
Year	Age 1 Recruits (millions)	Age 3 F	SSB (mt)	Retained Yield (lbs)	Retained Num	Released Num	Age 1 Recruits (millions)	Age 3 F	SSB (mt)	Retained Yield (lbs)	Retained Num	Released Num
2024	3.284	0.112	6,565	2,498,073	479,551	1,401,786	3.284	0.080	6,631	1,811,994	348,293	1,014,735
2025	3.284	0.112	7,160	2,662,320	497,423	1,307,562	3.284	0.080	7,419	1,985,255	371,812	959,507
2026	3.284	0.112	7,547	2,725,359	491,431	1,270,669	3.284	0.080	8,022	2,084,741	376,453	937,997
2027	3.284	0.112	7,822	2,752,377	483,445	1,259,725	3.284	0.080	8,512	2,151,561	377,279	931,733
2028	3.284	0.112	8,047	2,772,615	478,662	1,256,565	3.284	0.080	8,942	2,206,166	378,545	929,928
2029	3.284	0.112	8,233	2,791,436	476,385	1,255,608	3.284	0.080	9,319	2,253,469	380,361	929,379
2030	3.284	0.112	8,386	2,808,849	475,505	1,255,296	3.284	0.080	9,646	2,294,626	382,360	929,197
2031	3.284	0.112	8,513	2,824,461	475,332	1,255,184	3.284	0.080	9,930	2,330,278	384,303	929,135
2032	3.284	0.112	8,618	2,838,173	475,501	1,255,144	3.284	0.080	10,177	2,361,052	386,090	929,112
2033	3.284	0.112	8,705	2,850,076	475,824	1,255,129	3.284	0.080	10,389	2,387,571	387,685	929,104

Results
MSY proxy= 30%SPR

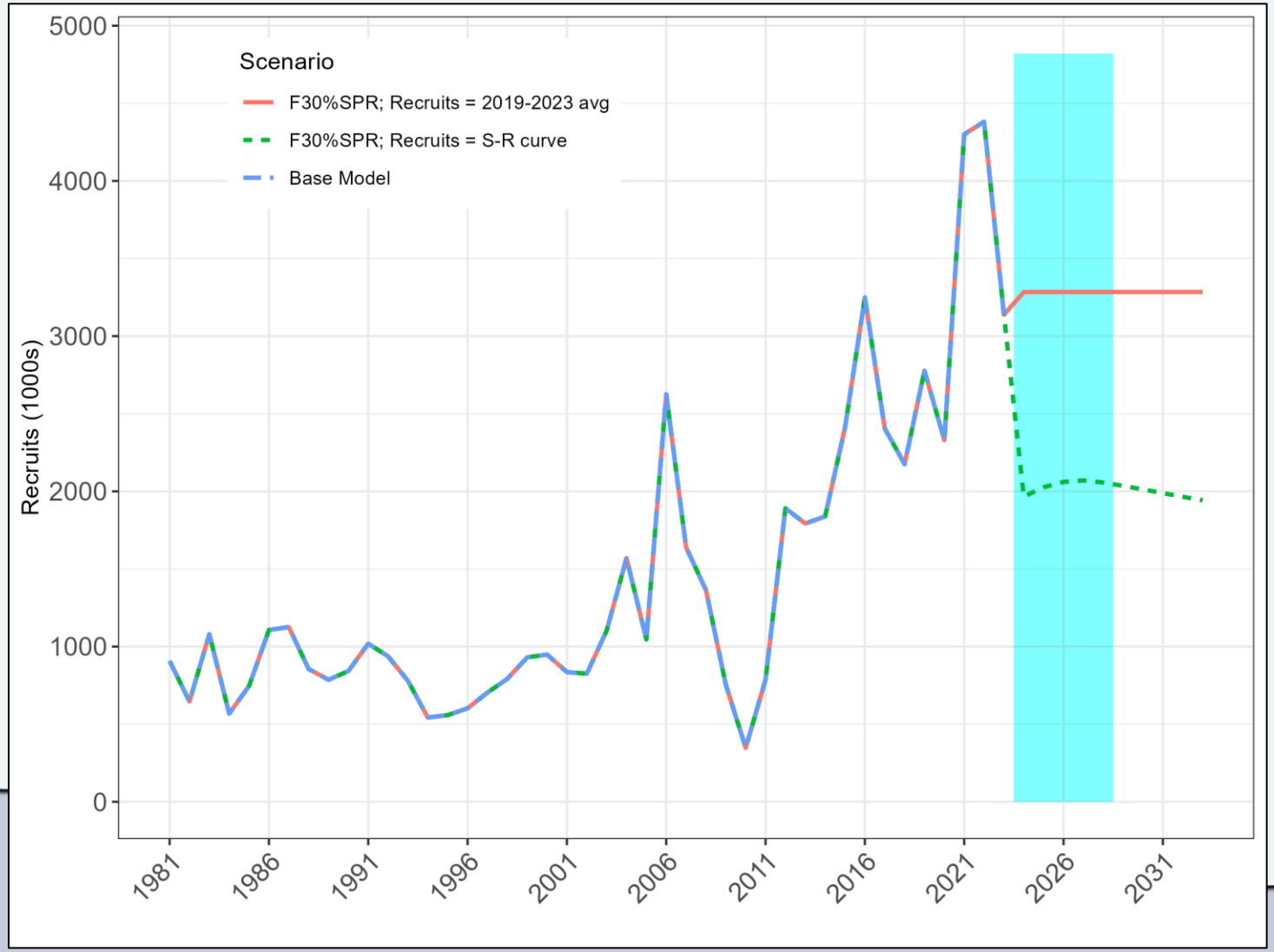




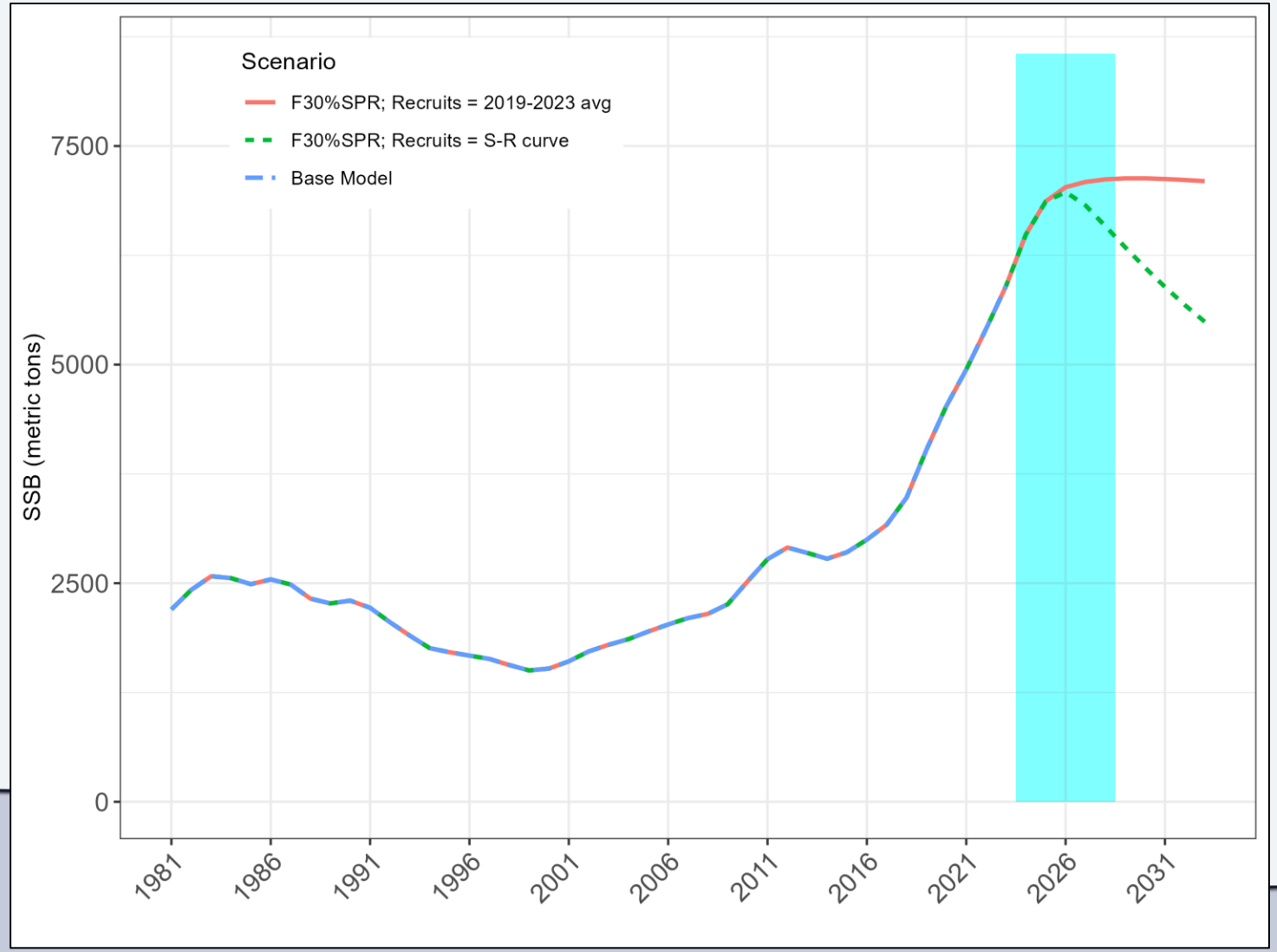
$F_{30\%SPR}$ Projection Scenario – Fishing Mortality



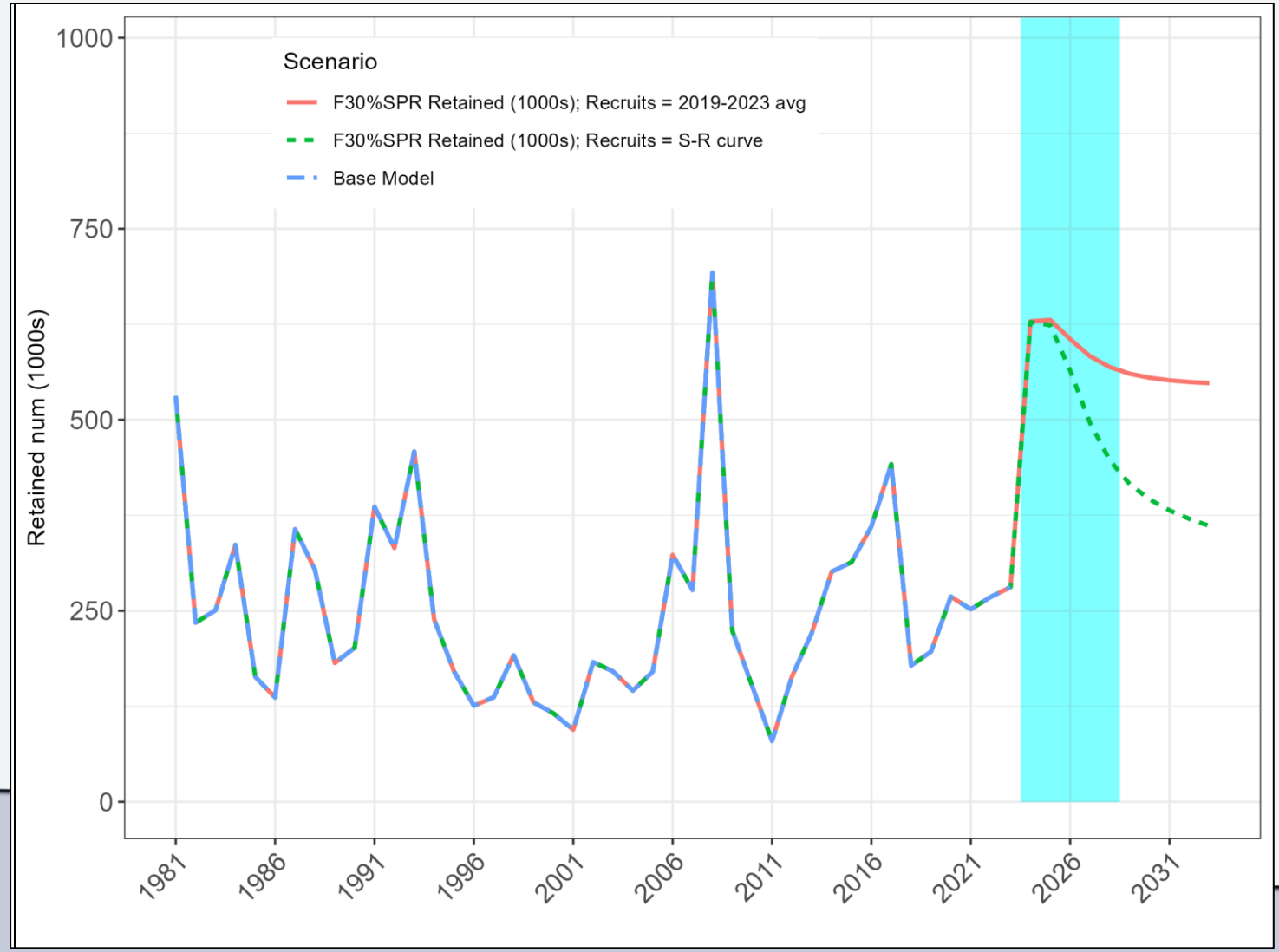
$F_{30\%SPR}$ Projection Scenario - Recruits



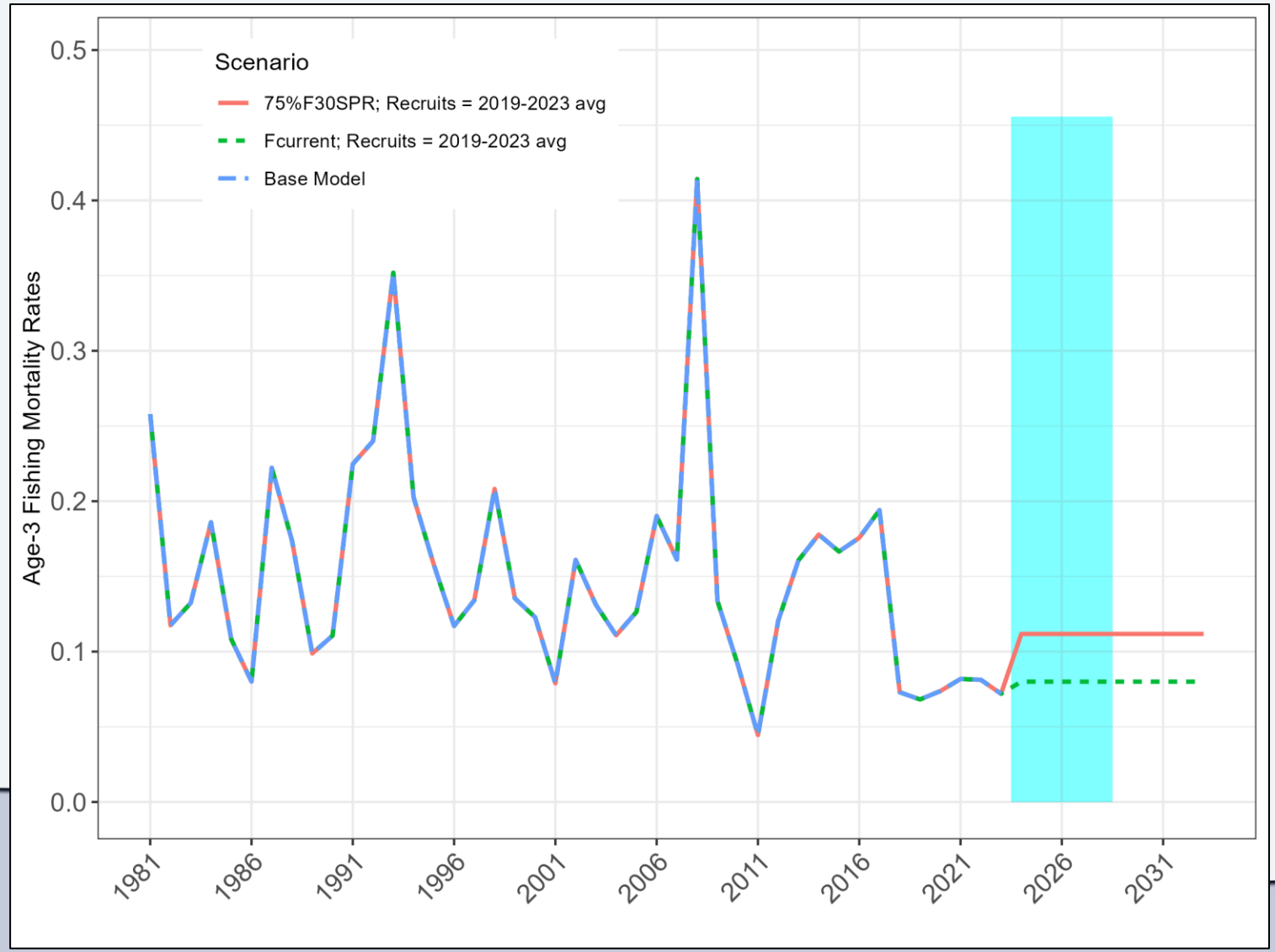
$F_{30\%SPR}$ Projection Scenario - SSB



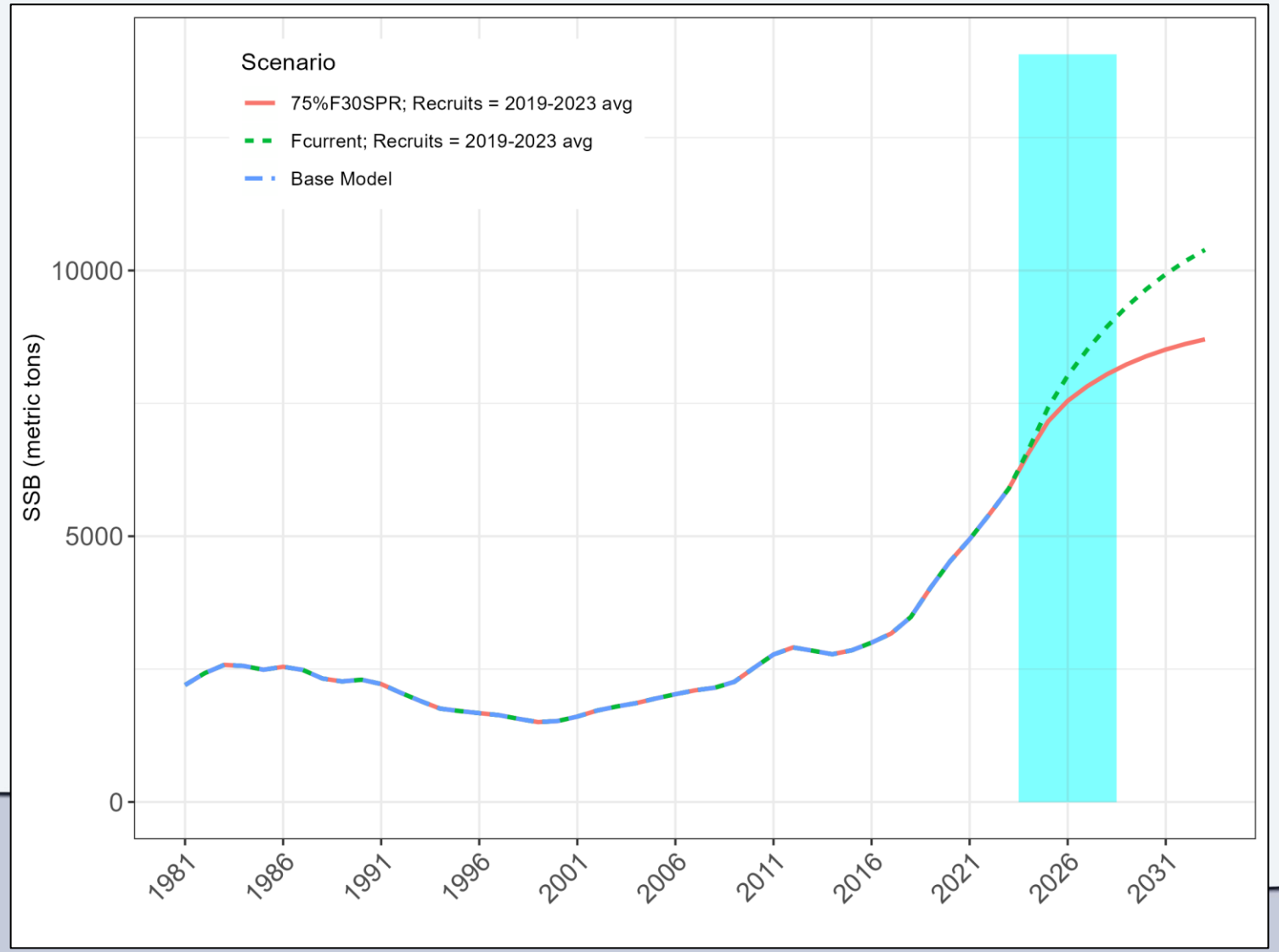
$F_{30\%SPR}$ Projection Scenario – Retained Num



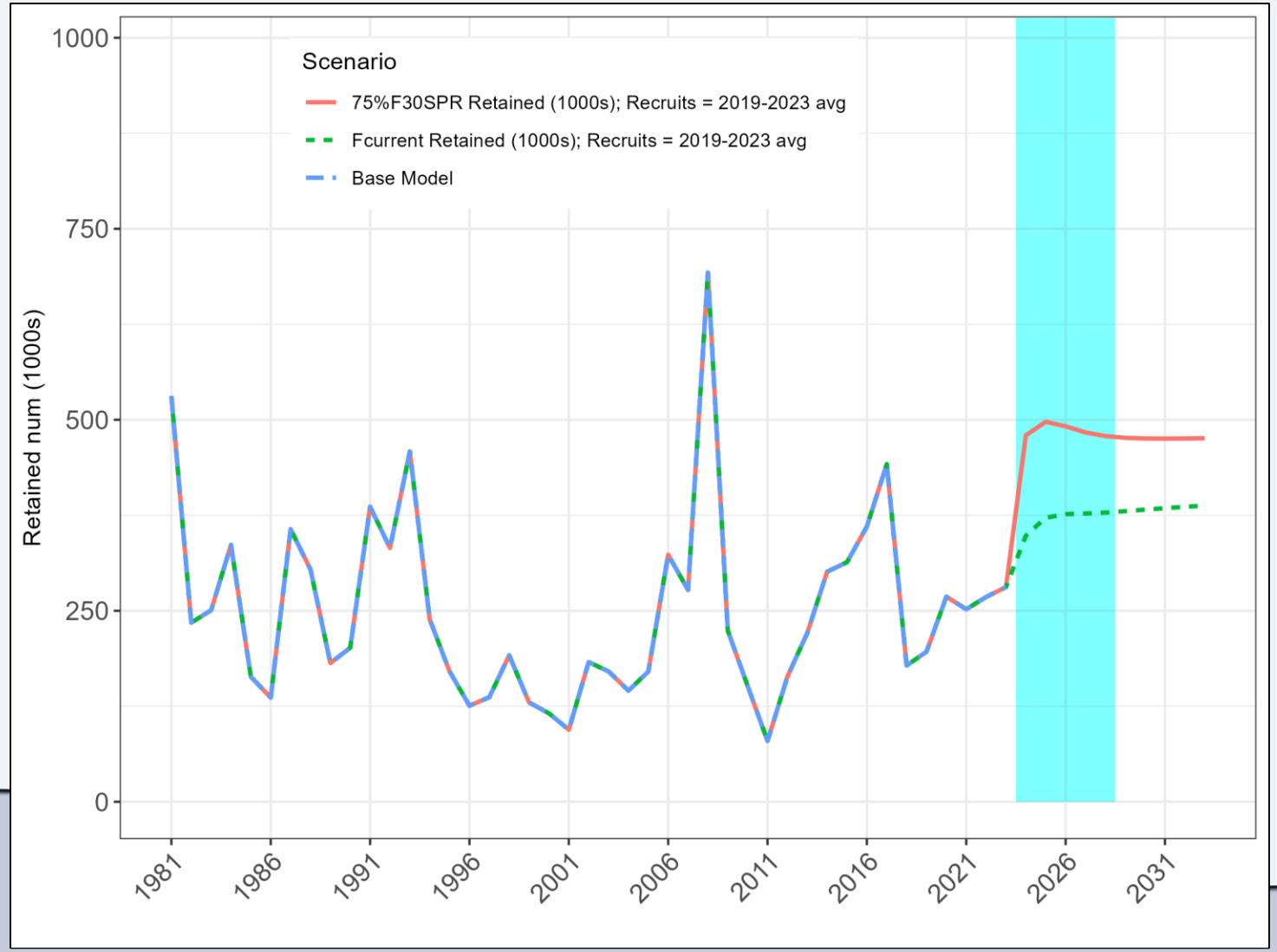
Other Projection Scenarios – Fishing Mortality



Other Projection Scenarios – SSB

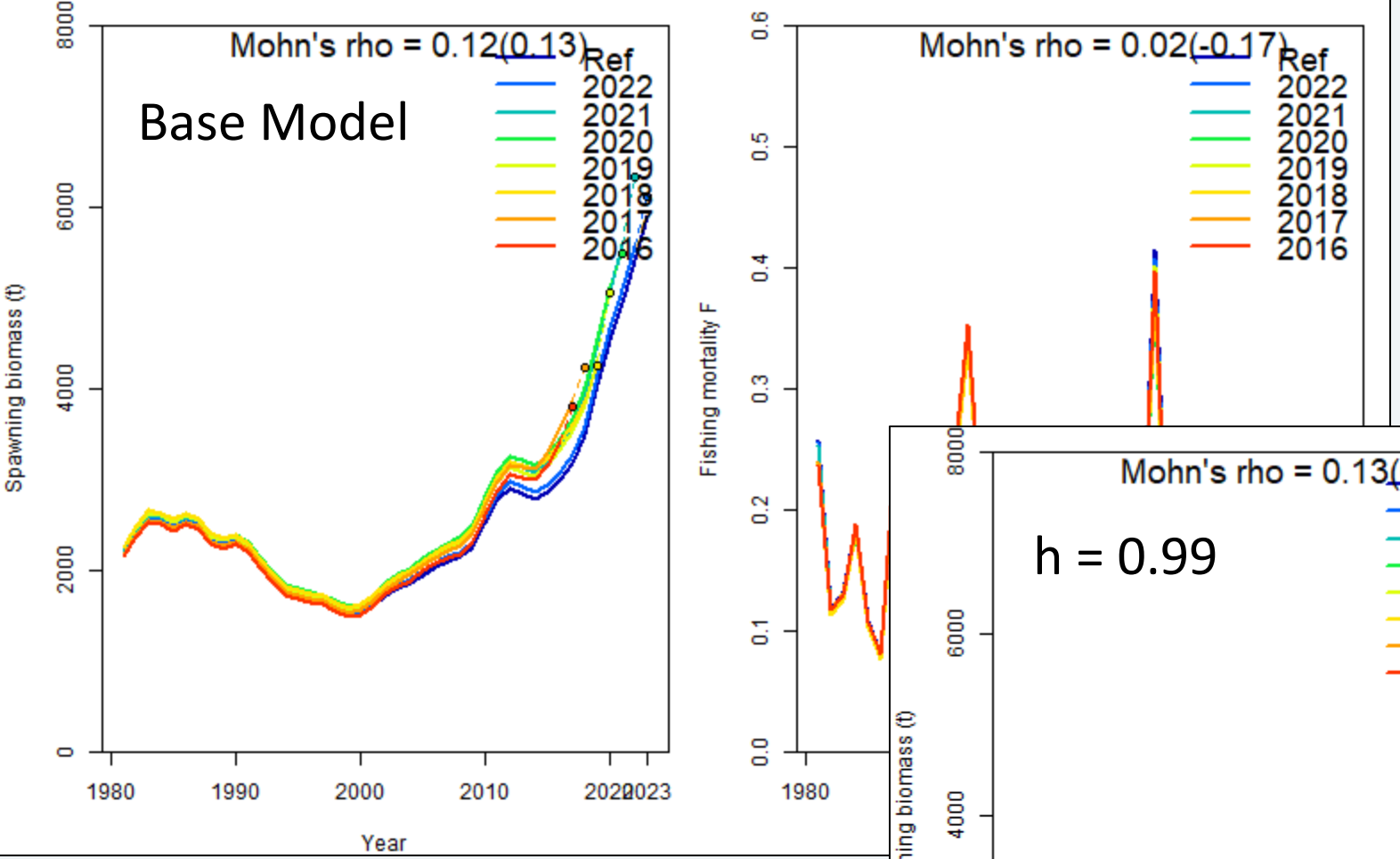


Other Projection Scenarios – Retained Num

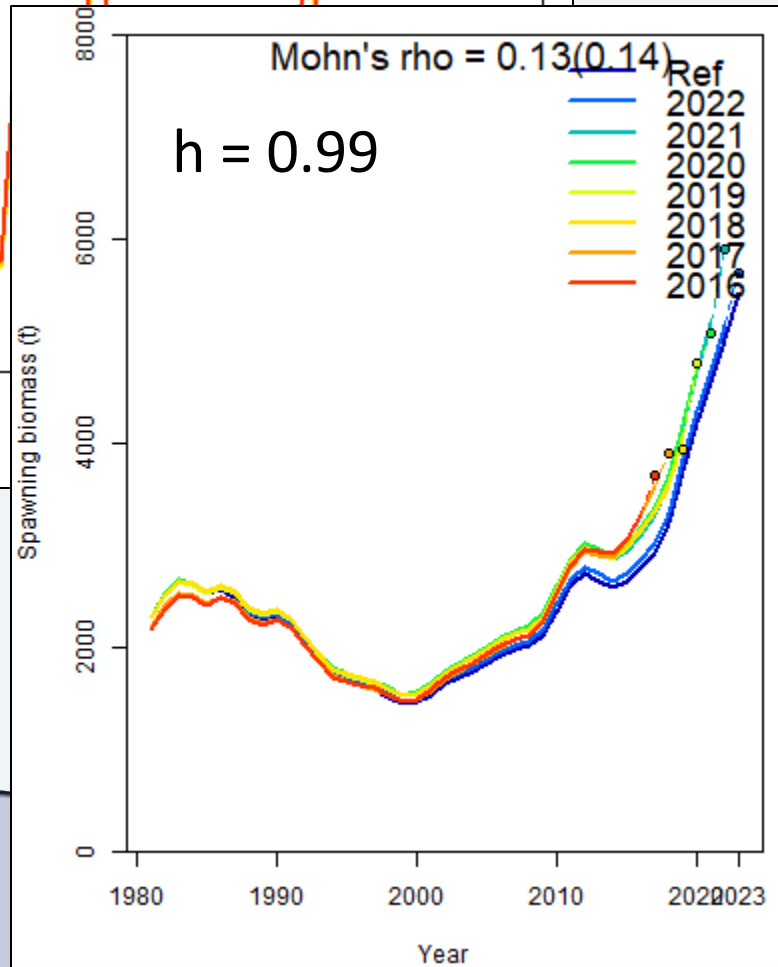


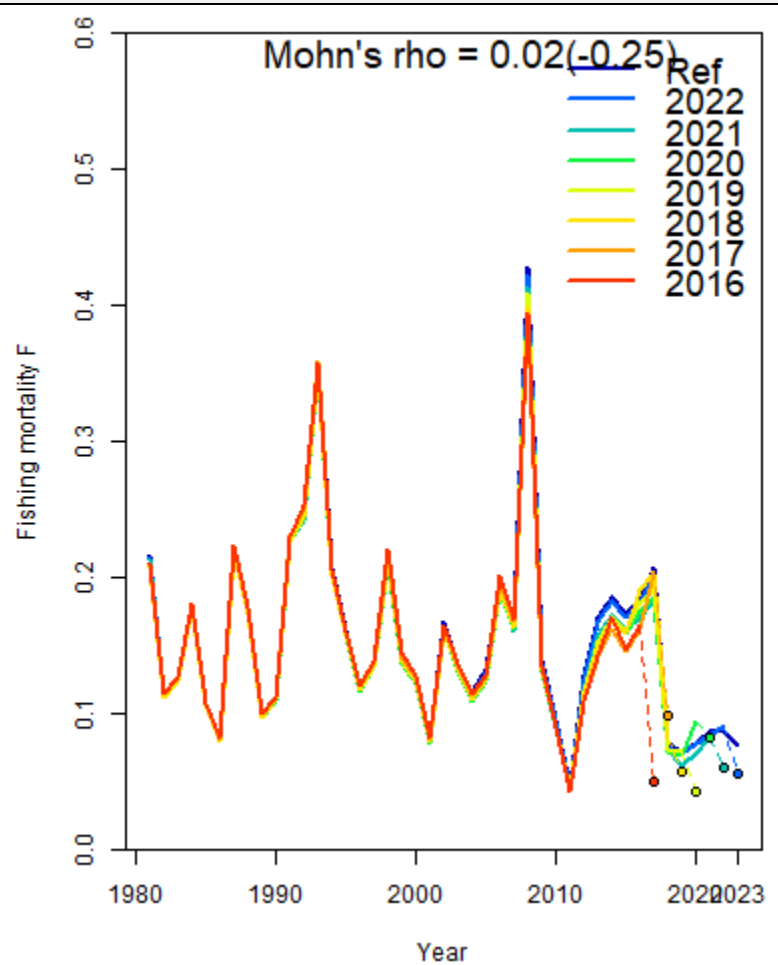
Review Panel Recommendations

- Investigate the stock structure through tagging experiments and genetics.
- Use spatial models to estimate abundance from indices and reconsider the use of the COM Longline CPUE.
- Improve the sampling design of the recreational fishery that may under-sample large/old fish, and that could lead to overestimation of the stock size.
- Obtain release mortality rates for Mutton Snapper.
- Resolve MCMC analysis issues and enable stochastic projections in the future.
- Use a fishing mortality rate of F = 0.11 as the benchmark for stock status (~$F_{MSY,}$ $F_{40\%SPR}$, and 75% of $F_{30\%SPR}$).


Mohn's rho = 0.12(0.13)
Base Model
Ref
2022
2021
2020
2019
2018
2017
2016
Spawning biomass (t)
Year

Mohn's rho = 0.02(-0.17)
Ref
2022
2021
2020
2019
2018
2017
2016
Fishing mortality F


Mohn's rho = 0.13(0.14)
h = 0.99
Ref
2022
2021
2020
2019
2018
2017
2016
Spawning biomass (t)
Year


Mohn's rho = 0.02(-0.25)
Ref
2022
2021
2020
2019
2018
2017
2016
Fishing mortality F
Year

Model Validation Comparison

Model Component	Data Source	Prediction Error (MASE)	
		Base Model	h=0.99
Index of Abundance	RVC_DT	0.47	0.48
	RVC_KEYS	1.16	1.25
	RVC_SEFL	1.88	1.94
	FIM_YOY	0.54	0.69
	GOM_VID	1.17	1.46
	SERFS_VID	0.74	0.72
	Joint	0.81	0.93