



NOAA
FISHERIES

SEDAR 67: Gulf of Mexico Vermilion Snapper

Gulf of Mexico Fishery Management Council
Reef Fish Advisory Panel
Assessment Review



Sustainable Fisheries Division, SEFSC
October 6, 2020



NOAA FISHERIES

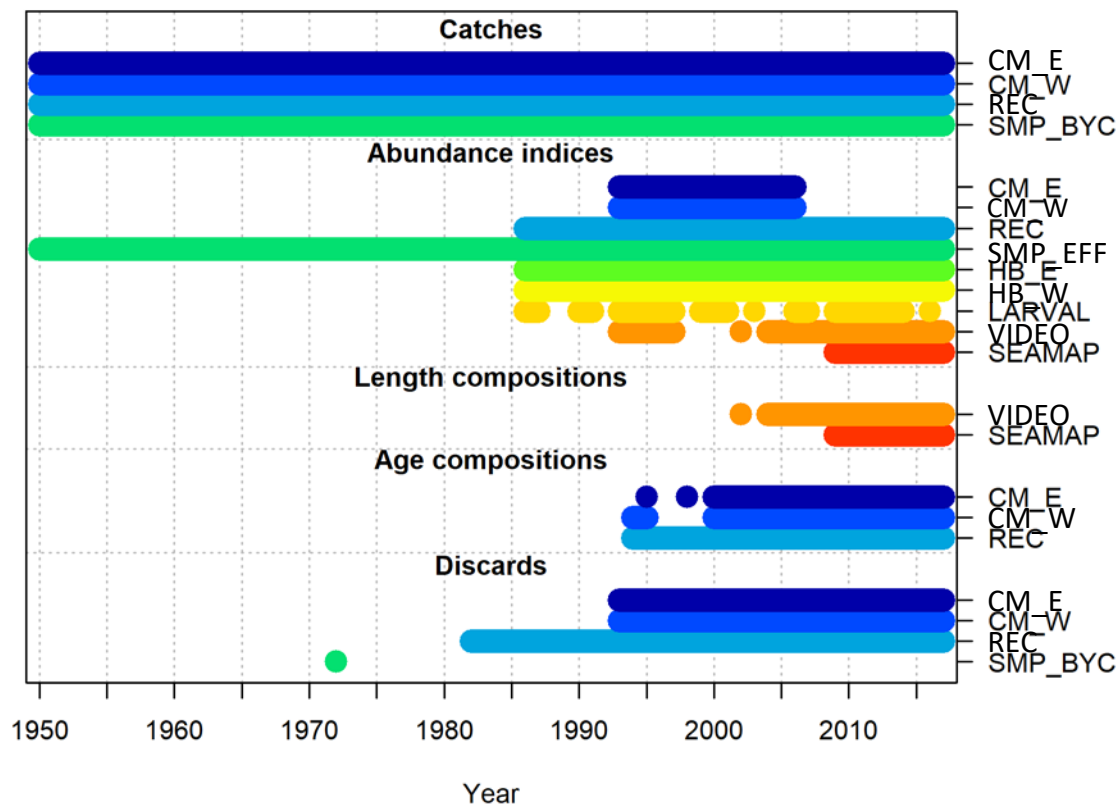
Outline

- Review of data inputs
 - Changes from SEDAR 45
- Model results
- Projections

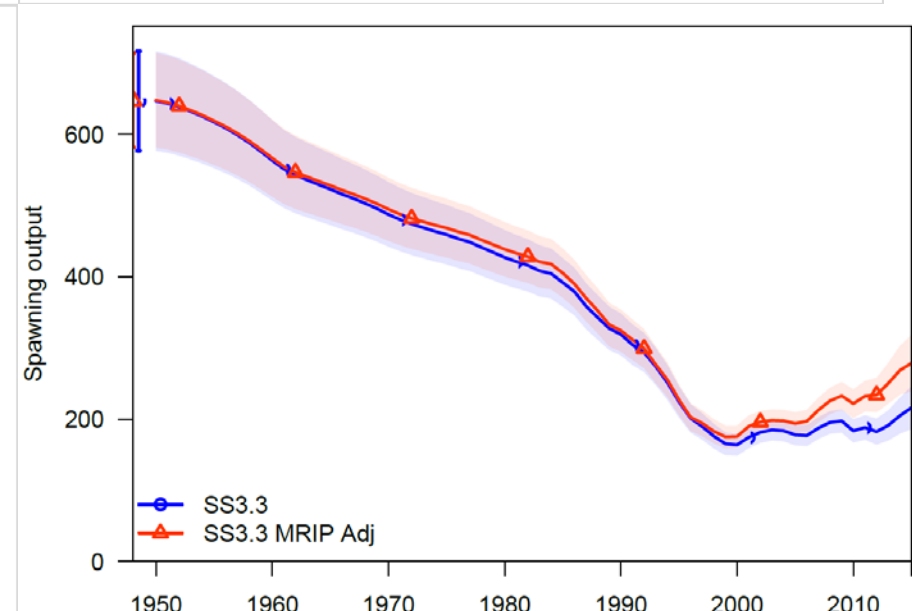
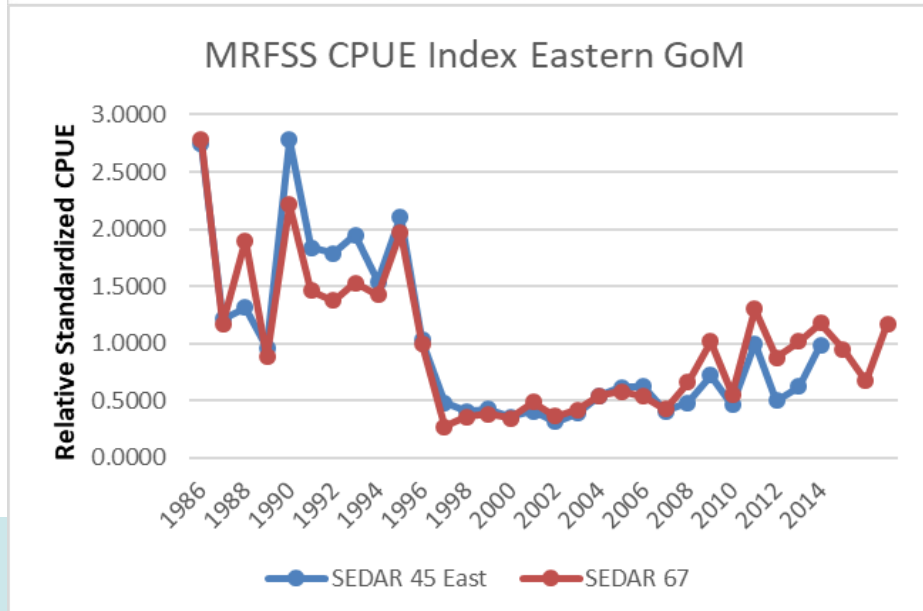
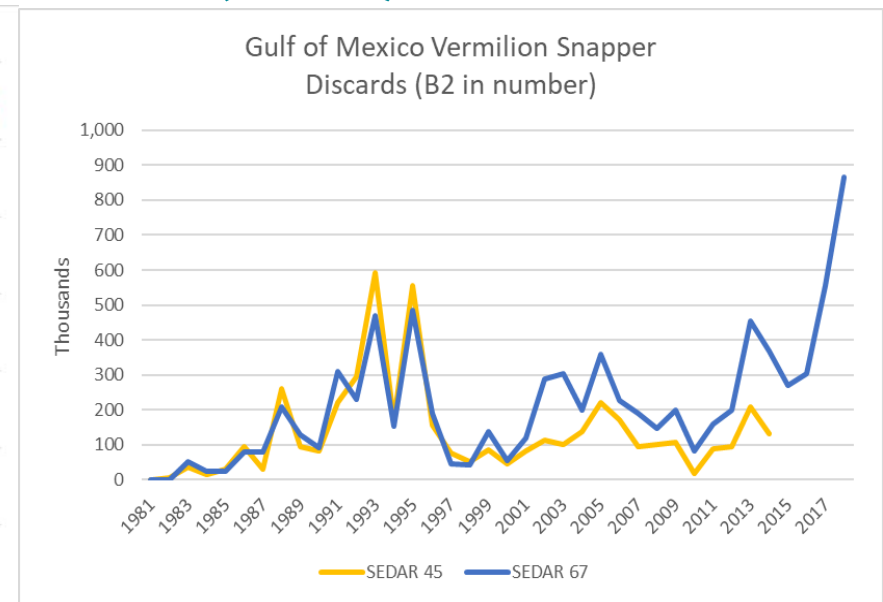
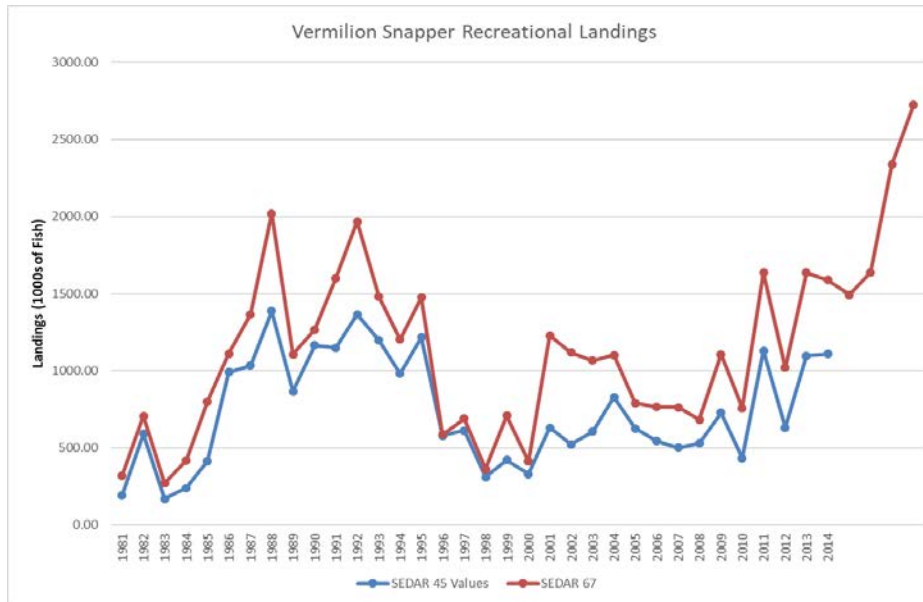


Review of Data & Updates

- All data updated (2017)
- Data changes from SEDAR 45
 - Used FES rec. data
 - Combined video survey used
 - Discards included
 - Commercial indices truncated



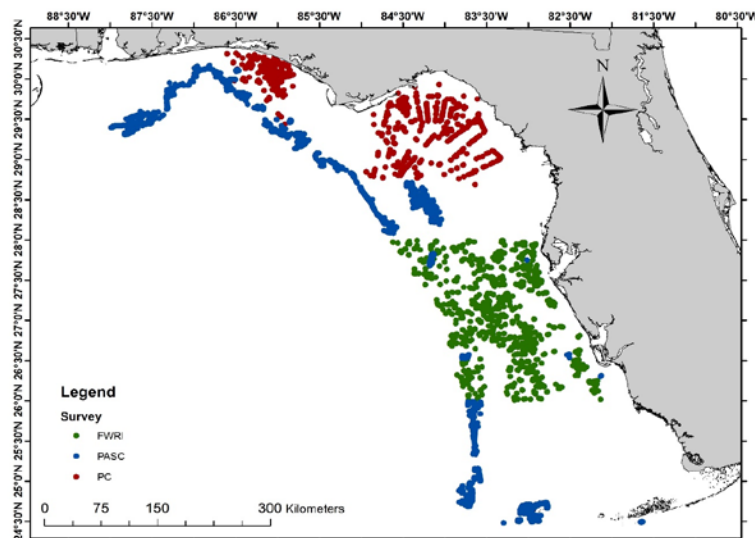
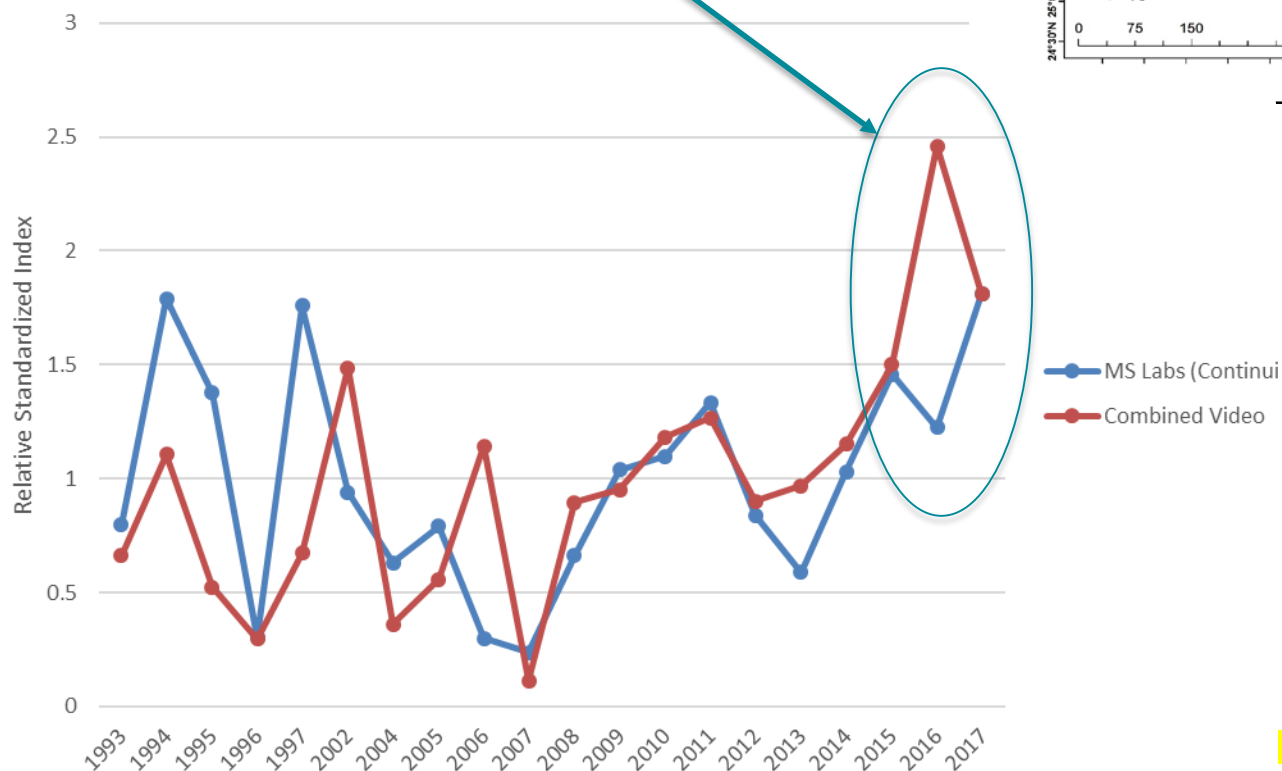
Recreational Data Products (FES)



Combined Video Survey

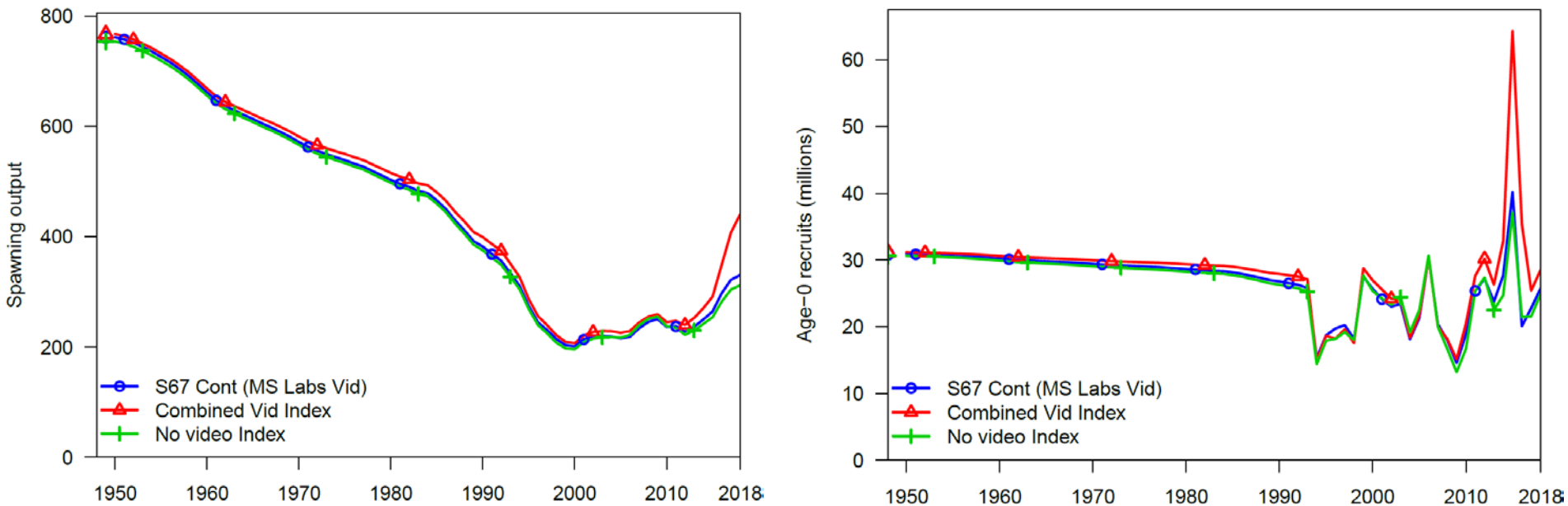
Hypothesized that differences in recent trends may be due to strong inshore recruitment that becomes available to MS labs survey on 1-2 year delay

Video Survey Comparison



Year	FWRI	Pasc	PC	Grand Total
1993		2.03252		2.03252
1994		3.40404		3.40404
1995		1.608696		1.608696
1996		0.907143		0.907143
1997		2.074074		2.074074
2002		4.572368		4.572368
2004		1.107383		1.107383
2005		1.718978		1.718978
2006		0.614583	2.031579	0.966057
2007		0.469697	0.126984	0.414758
2008		1.975962	4.2	2.647651
2009		2.849057	3.084112	2.916667
2010	2.531034	4.040359	3.668966	3.508772
2011	2.429864	4.094556	4.56962	3.692308
2012	2.341772	2.070671	4.366667	2.680597
2013	4.548913	1.053892	5.443299	3.439732
2014	6.325175	1.646809	5.060976	4.417518
2015	5.665179	4.513158	4.059524	4.847426
2016	13.76289	2.131068	13.24561	9.411559
2017	7.207317	2.883408	9.393333	6.022346

Video survey effect on base model

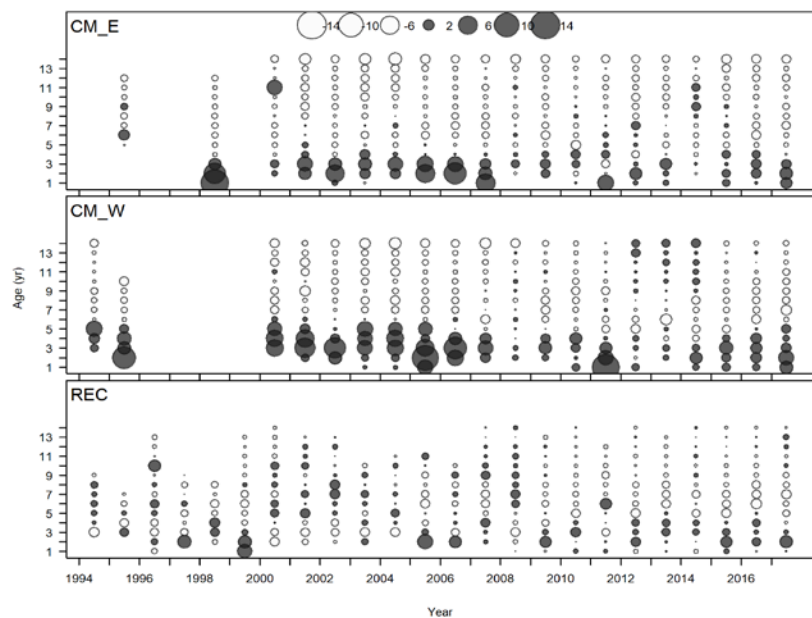


Recent uptick in biomass supported by multiple sources of data

Using combined video survey results in model estimating large recruitment event in 2015 and 2016, which occurs in all model runs (i.e., time series high recruitment event estimated in 2015 regardless of whether video surveys are incorporated).

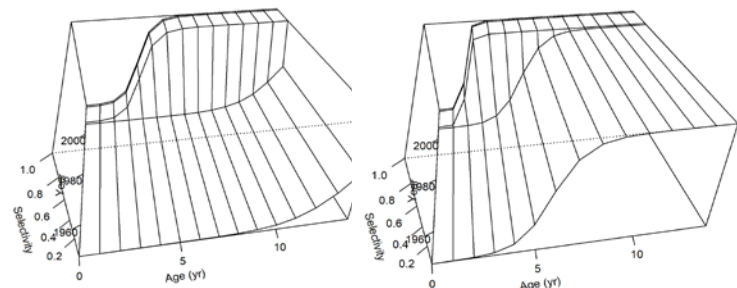
Fitting discard observations creates model instability

- Degrades fit to catch data
- Creates issues estimating selectivity
 - Fewer fish selected, fewer fish discarded (below min. size)
- Severely underestimates young fish
 - Fewer recruits/selected fish, fewer discards (below min. size)



Time-varying selectivity for CM_W

Time-varying selectivity for CM_E



likelihood
Components

Cont

2. Comb
Vid

4. Cont w
Disc

7. Comb
Vid w
Disc

7b. Comb
Vid w
Disc CV
0.5

8b. Comb
Vid, Trunc
CPUE,
Include
Disc CV
0.0

8j. Cont
Vid, Trunc
CPUE,
Include
Disc CV
0.0

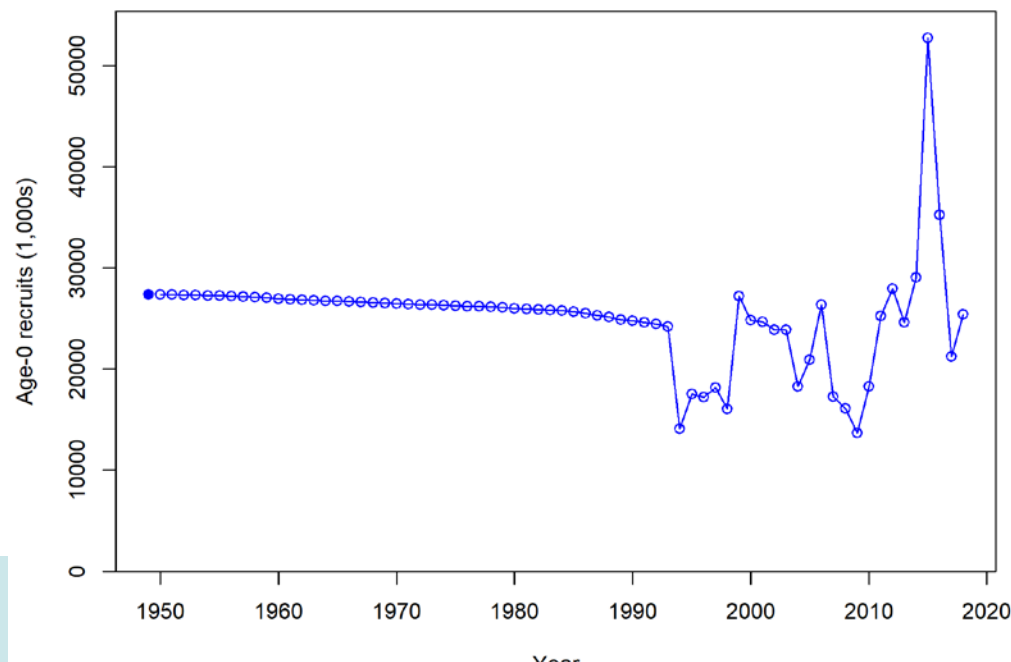
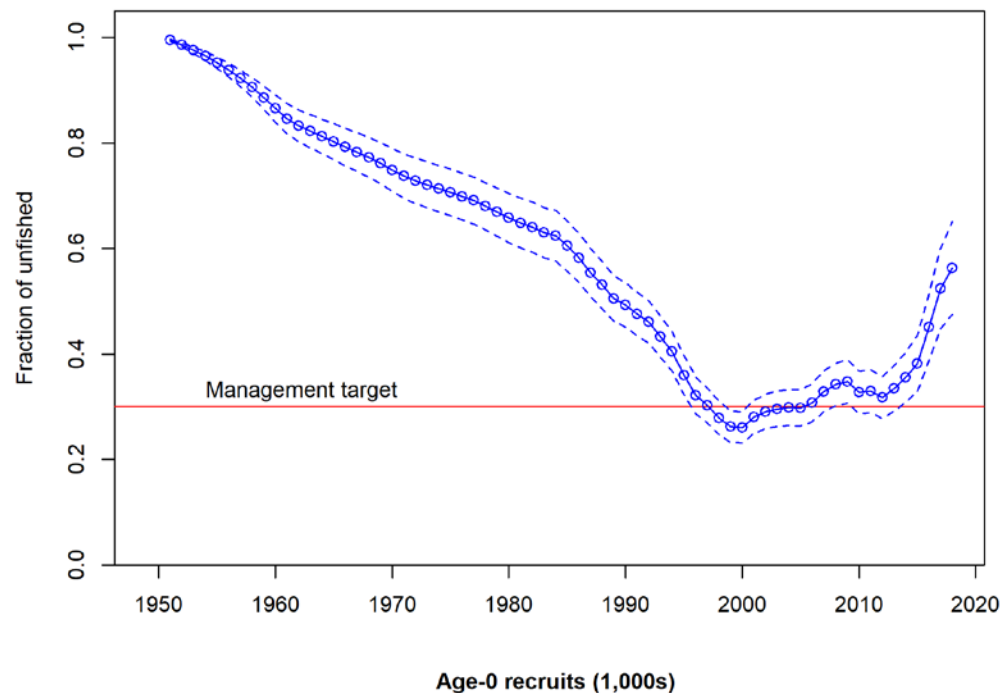
	Cont	2. Comb Vid	4. Cont w Disc	7. Comb Vid w Disc	7b. Comb Vid w Disc CV 0.5	8b. Comb Vid, Trunc CPUE, Include Disc CV 0.0	8j. Cont Vid, Trunc CPUE, Include Disc CV 0.0
TOTAL	314.128	351.096	2210.52	1896.62	963.443	349.501	305.805
Catch	3.6796	4.06656	130.177	121.157	22.8276	3.31552	3.2269
Survey	-23.1652	26.5231	-46.2778	-6.42855	-4.0839	18.5092	-30.4535
Discard	-1.05535	-0.86514	1587.75	1309.49	590.874	-1.82489	-1.76759
Length_comp	92.2831	84.3862	101.567	81.8654	86.5769	88.5899	98.3925
Age_comp	254.688	250.274	446.981	395.904	272.952	254.791	257.678
Recruitment	-12.4162	-13.7733	-10.0411	-5.74802	-6.22868	-14.9065	-21.4321
Parm_softbounds	0.017116	0.01399	0.011802	0.016211	0.011269	0.013238	0.01722

Discard Summary

- Discards not fit, but included which allows removals, due to discarding, to be incorporated in the model
- Including discards rescaled model but didn't change stock status
- Discards will be re-evaluated as part of next vermilion snapper assessment

Biomass & Recruitment

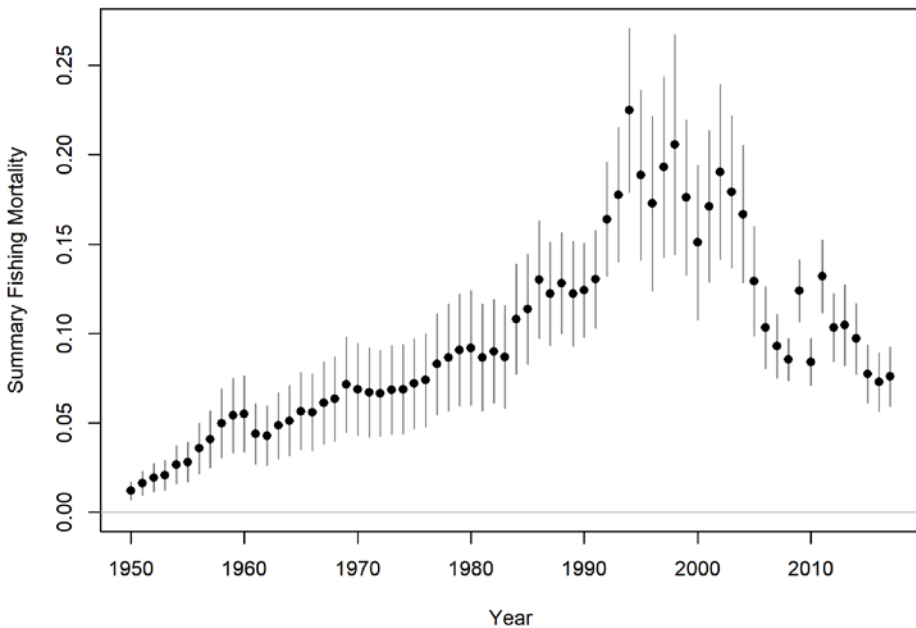
- Biomass estimated to have increased dramatically since last assessment
- Recruitment may be cyclical; possible linkages not explored in S67.



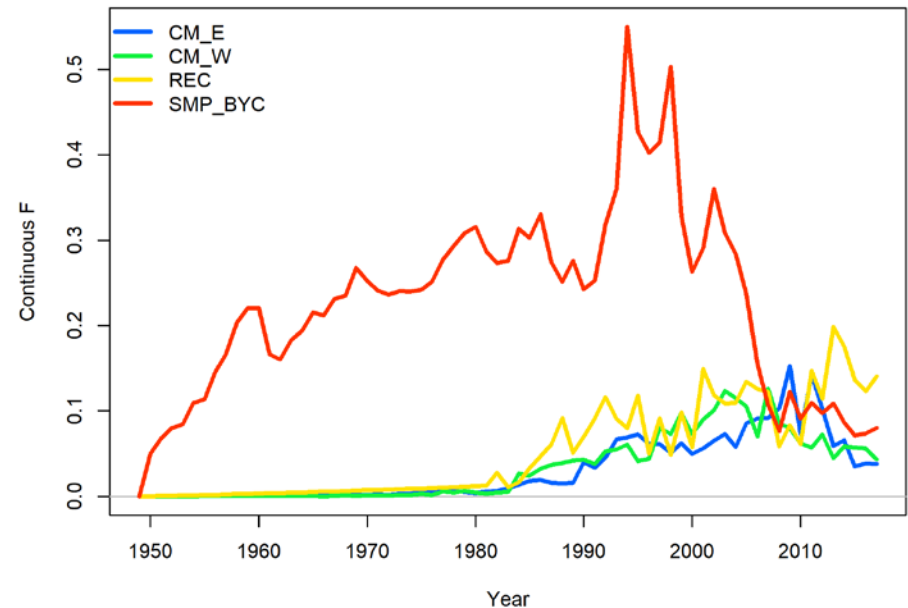
Fishing Mortality

Harvest Rate

(total number killed/exploitable numbers, Age-1+)

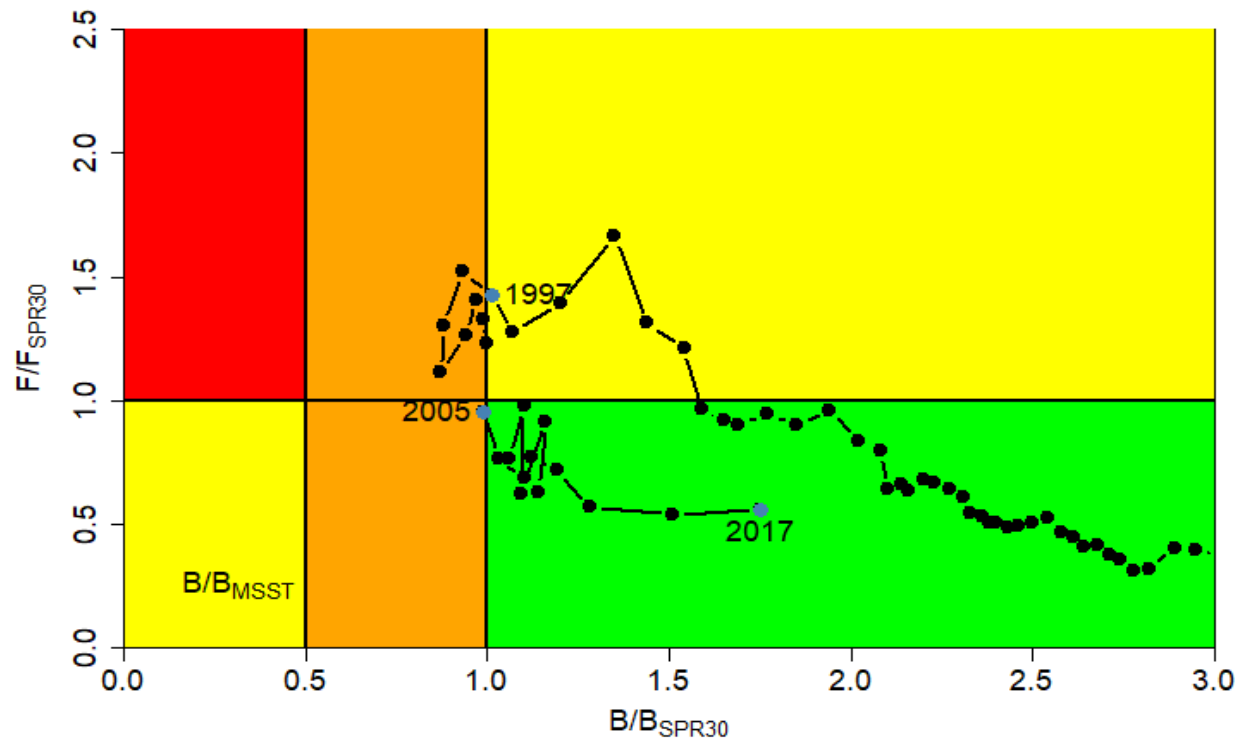


Fleet Specific F



- Harvest rate has steadily declined since peak in 1990's.
- Presently, mortality dominated by the recreational sector

Stock Status



- $MSST = 0.5 * SSB_{FSPR30\%}$
- Overfishing is not occurring and the stock is not overfished
- Model estimates overfishing occurred from 1992 – 2004 and stock has never been overfished

Projection Settings

Parameter	Value	Comment
Relative F	Average from 2015 – 2017	Avg. relative fishing mortality (2015-2017)
Selectivity	Estimates from 2017	Fleet specific selectivity estimated in terminal year
Recruitment	21,965,800	Bias adjusted geometric mean recruitment (2005 – 2014)
Shrimp Bycatch	$F = 0.075$	Avg. shrimp bycatch fishing mortality (2015-2017)
2018 Landings	4,840,039 lbs. WW	Finalized landings (SEFSC)
2019 Landings	4,366,021 lbs. WW	Three year (2016-2018) avg.
2020 Landings	4,366,021 lbs. WW	Three year (2016-2018) avg.

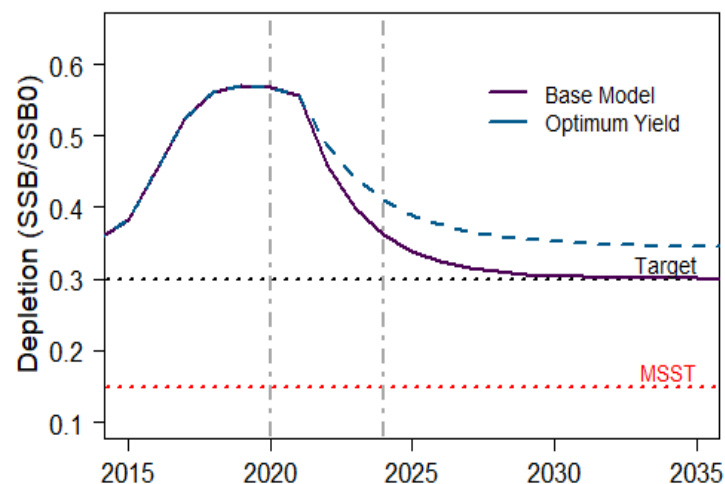
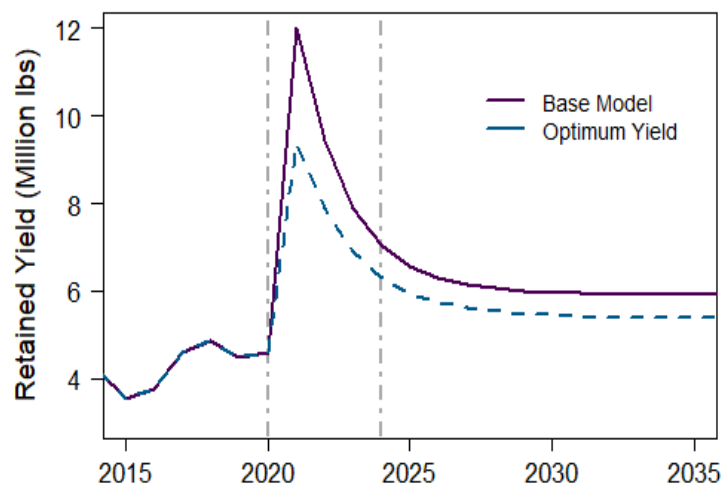
Uncertainty

- Fixing recruitment and other parameters (e.g., M) led to underestimated uncertainty in SS3 projections
 - Low SR variance also influenced uncertainty
- Uncertainty around forecast yield appears too small to support use of P^* approach to setting ABC
- Alternate approach for accounting for uncertainty (e.g., $75\%F_{SPR30}$) is recommended

Proposed yield streams

Year	OFL	ABC (P*)	ABC (75%F _{SPR30})
2021	12.03	11.73	9.37
2022	9.45	9.25	7.87
2023	7.9	7.77	6.89
2024	7.04	6.94	6.29
2025	6.57	6.48	5.95
3yr Avg.	9.79	9.58	8.04
5yr Avg.	8.60	8.43	7.27
10yr Avg.	7.35	7.23	6.42

P* = 0.398



Project SEDAR 45 with FES Landings

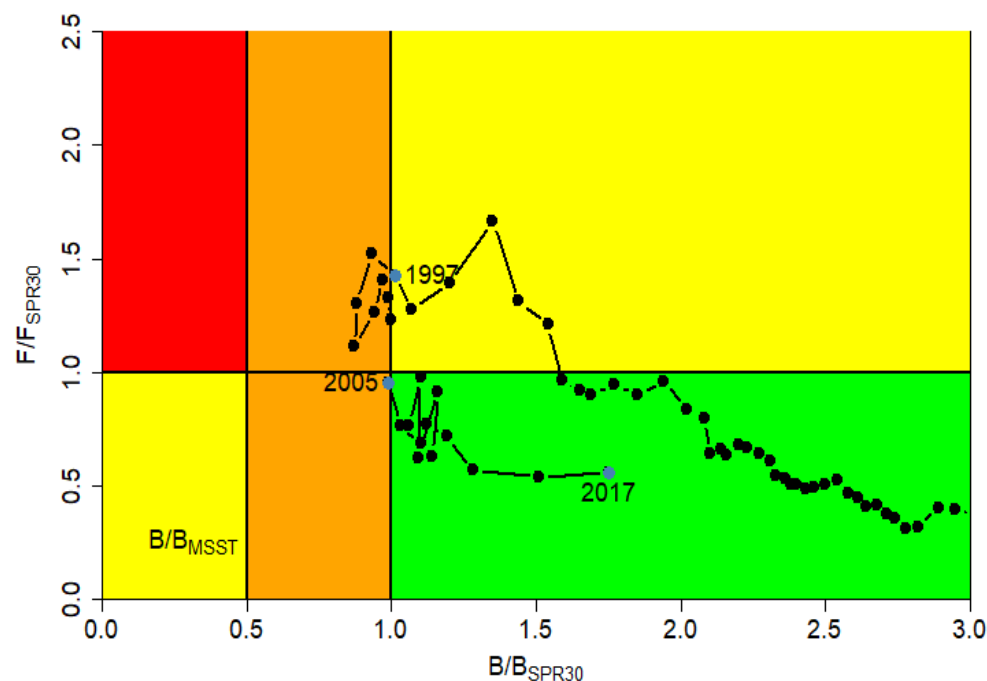
- Update S45 base model with FES landings
 - For gap fill years in projections:
 - Use finalized 2015 and 2016 FES landings, for rec
 - Use original (provisional/assumed) landings for all other fleets

Model	Terminal Year	SSB	R	F_{SPR30}	SSB_0	SSB_{FSPR30}	Equil. Yield
SEDAR 45	2014	1.91E+14	17343.3	0.103	6.56E+14	1.97E+14	3.35
SEDAR 45 FES	2014	2.28E+14	22561.0	0.14	6.51E+14	1.96E+14	5.19
SEDAR 67 Base	2017	2.22E+14	21965.8	0.135	6.73E+14	2.02E+14	5.91

- FES accounts for majority of increase in forecast yield

Summary

- SSC approved the assessment for use in management and recommended that the OFL and ABC be set at 8.6 mp ww and 7.27 mp ww, respectively.
- Stock capable of supporting increased removals in the near term.



Questions



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